LIEBHERR

Mobile crane with lattice mast

LG 1750

LG 1750-006

Operating instructions

BAL No.: 15409-07-02

Serial No.	
Date	

ORIGINAL OPERATING INSTRUCTIONS

The operating instructions are part of the crane!

They must always be available within reach!

The regulations for on-road driving and crane operation must be observed!

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Preface

Manufacturer

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General

This crane was built according to the state of technology and recognized safety technical regulations. Despite that, dangers to body and life for the user and / or third persons or damage to the crane and / or other material assets can occur.

This crane may only be used:
- In impeccable technical condition.
- For destined use.
- By trained personnel, which acts in a safety and danger conscious way.
- When no safety relevant problems are present.
- When no modifications were made on the crane.

Any problems, which could affect safety must be fixed immediately.

Modifications on the crane may only be made with written approval by Liebherr-Werk Ehingen GmbH.

Data logger

This crane is equipped with a data recording device. Among others, the following data is recorded:
- Date and time of day.
- Entered set up configuration of the crane.
- Actual load.
- Percentage of utilization of the crane.
- Boom radius (working radius).
- Main boom angle, luffing jib angle.
- Total telescopic boom length, length of each telescopic section.
- Every actuation of bypass devices.

The recorded data can be read with a respective software.

Safety and warning display

The safety and warning display is directed to all persons who work with the crane.

The terms **DANGER**, **WARNING**, **CAUTION** and **NOTICE** used in the crane documentation are intended to point out certain rules of conduct to all persons working with the crane.

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Warning signs	Signal word	Explanation
	**DANGER**	Designates a dangerous situation which will lead to death or serious injury if it is not prevented. [1)]
	**WARNING**	Designates a dangerous situation, which can lead to death or serious injury if it is not prevented. [1)]
	**CAUTION**	Designates a dangerous situation, which can lead to slight or medium-grade injuries if it is not prevented. [1)]
	NOTICE	Designates a dangerous situation, which can lead to property damage if it is not prevented.

[1)] This could also result in property damage.

Additional notes

The term **Note** is used in the crane documentation to make all persons working with the crane aware of useful information and tips.

Sign	Signal word	Explanation
	**Note**	Designates useful information and tips.

Crane documentation

The crane documentation is comprised of:
- All supplied documents on paper and in digital form.
- All supplied programs and applications.
- All subsequently supplied information, updates and addenda for the crane documentation.

The crane documentation:
- Makes it possible for you to operate the crane safely.
- Supports you to utilize the permissible application possibilities of the crane.
- Provides you with information about the functionality of important components and systems.

Note
Terminology in the crane documentation.
Certain expressions are used in the crane documentation.
▶ In order to avoid misunderstandings, the same expressions should always be used.

Translations from the German version of the crane documentation: The crane documentation has been translated to be best of one's knowledge. Liebherr-Werk Ehingen GmbH assumes no liability for translation errors. The German version of the crane documentation is solely applicable for factual accuracy. If you find any errors or if any misunderstandings arise when reading the crane documentation, please contact Liebherr-Werk Ehingen GmbH immediately.

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WARNING
Danger of accident due to incorrect operation of the crane!
Incorrect operation of the crane can lead to accidents!
Personnel can be killed or seriously injured!
This could result in property damage!
- ▶ Only authorized and trained expert personnel are permitted to work on the crane.
- ▶ The crane documentation is part of the crane and must be accessible on the crane.
- ▶ The crane documentation and on-site regulations and specifications (such as accident prevention regulations) must be observed.

Using the crane documentation:
- **Makes it easier** to become familiar with the crane.
- **Avoids** problems due to improper operation.

Observing the crane documentation:
- **Increases** reliability in use.
- **Extends** the service life of the crane.
- **Minimizes** repair costs and downtime.

Place the crane documentation accessible in the driver's cab or in the crane cab.

WARNING
Outdated version of crane documentation!
If subsequently supplied information, updates and addenda to the crane documentation are not observed and added, there is a danger of accidents!
Personnel can be killed or seriously injured!
This could result in property damage!
- ▶ Observe and add all subsequently supplied information, updates and addenda for the crane documentation.
- ▶ Make sure that all affected persons always know and understand the latest version of the crane documentation.

WARNING
Crane documentation is not understood!
If parts of the crane documentation are not understood and the tasks are carried out on or with the crane, then there is a danger of accidents!
Personnel can be killed or seriously injured!
This could result in property damage!
- ▶ Clear up open questions regarding the crane documentation with Liebherr Service before carrying out the respective task.

All accident prevention guidelines, operating instructions, load charts etc. are based on destined use of the crane.

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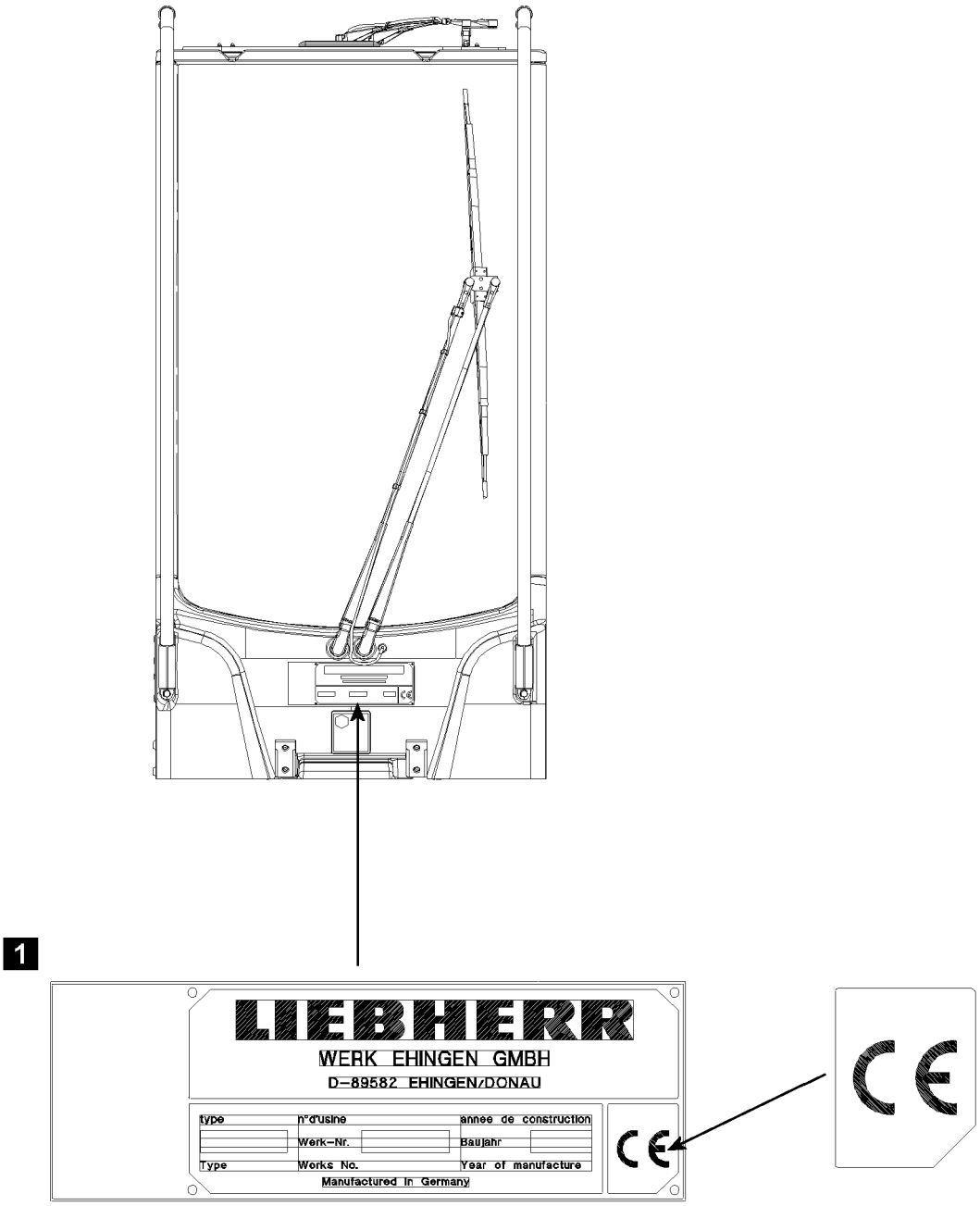

Fig.110001

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CE marking

The CE marking is a mark according to EU laws:
- Cranes with CE-marking according to the European machinery directive 2006/42/EC and the EN 13000! Data tag Crane with CE-marking, see illustration **1**.
- Cranes that are operated outside the respective area of application of the European machinery directive do not require a CE marking. Data tag Crane without CE marking, see illustration **2**.
- It is prohibited to market and operate cranes without CE marking, which do not meet the product-specific regulations valid in Europe, when a CE marking is specified for the country.
- It is prohibited to operate cranes with a tipping load utilization of 85 % within the European Union or in countries that only permit a lower tipping load utilization! The national regulations apply. These cranes may not have a CE marking!

Destined use

The destined use of the crane consists solely in vertical lifting and lowering of free and non-adhered loads, whose weight and center of gravity are known.

To do so, a hook or hook block approved by Liebherr must be reeved on the hoist rope and it may only be operated within the permissible crane configurations.

Driving with the crane, with or without an attached load is only permissible if a corresponding driving or load chart is available. The set up configurations intended for it and the safety conditions must be observed according to the corresponding crane documentation.

Any other use or any other exceeding utilization is **not** destined use.

Destined use also includes the adherence of the required safety guidelines, conditions, prerequisites, set up conditions and working steps in the crane documentation (for example: Operating instructions, load charts, erection and take down charts, job planner).

The manufacturer is **not** liable for damages, which are caused by non-destined use or improper use of the crane. Any associated risk it is carried solely by the owner, the operator and the user of the crane.

Non-destined use

Non-destined use is:
- Working outside the permissible set up configurations according to the load chart.
- Working outside the permissible boom radii and slewing ranges according to the load chart.
- Selecting load charts, which do not correspond to the actual set up configuration.
- Selection of a set up configuration via code or via manual entry, which does not correspond to the actual set up configuration.
- Working with bypassed / deactivated safety equipment, for example bypassed load torque limiter or with bypassed hoist limit switch.
- Increasing the boom radius of the lifted load after a LMB shut off, for example by diagonally pulling the load.
- Using the support pressure display as information in order to utilize the crane up to the tipping limit!
- Use of equipment parts which are not approved for the crane.
- Operation of the crane in an area exposed to explosion hazards.
- Using the crane at sports and recreational events, especially for "Bungee" jumps and / or "Dinner in the sky".
- On-road driving in non-permissible travel condition (axle load, dimension).
- Driving with the equipment in place in a non-permissible travel condition.
- Pushing, pulling or lifting loads with the level control, the sliding beams or the support cylinders.
- Pushing, pulling or lifting loads by actuating the slewing gear, the luffing gear or the telescoping gear.
- Ripping stuck objects loose with the crane.
- Utilizing the crane for a longer period of time for material handling tasks.
- Releasing the crane suddenly (grapple or dumping operation).
- Utilizing the crane when the weight of the load, which is suspended on the crane is changed, for example by filling a container suspended on the load hook, except:

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- The load torque limiter was checked before for function with a known load.
- The crane cab is occupied.
- The crane is operational.
- The container size is selected in such a way that an overload of the crane with full load is eliminated within the valid used load chart.

The crane may **not** be used for:
- Attaching a stuck load for which the weight and center of gravity are not known and which is released only by flame cutting, for example.
- Letting persons drive along outside the driver's cab.
- Transporting personnel in the crane cab while driving.
- Transporting personnel with the load handling equipment and on the load.
- Transporting of persons with work baskets (cherry pickers), if the national regulations of the responsible work safety organization are not observed.
- Transporting loads and objects on the crane chassis.
- Transporting loads and objects on the crane superstructure.
- Transporting loads and objects on the boom lattice sections and / or the crane boom.
- Two hook operation without auxiliary equipment.
- Extended material handling operation.
- Crane operation on a barge if the conditions are not determined and the written release by **Liebherr Werk Ehingen GmbH** is not present.

The crane documentation must be read and used by all persons who are involved in use, operation, assembly and maintenance of the crane.

Ambient temperature

The crane is designed for an ambient temperature of -20 °C to +50 °C.

If the ambient temperature is lower than -20 °C the crane must be modified with „auxiliary equipment for working at low temperatures".

WARNING
Working at low temperatures without the corresponding auxiliary equipment!
The crane components can be damaged and fail. The load can rip off.
Death or severe bodily injuries.

If the crane is operated at an ambient temperature lower than -20 °C:
▶ Make sure that the crane is equipped with the corresponding „auxiliary equipment for working at low temperatures". Observe and adhere to the Crane operating instructions, chapter 2.08.
▶ Use the operating fluids for the corresponding ambient temperature in time. Observe and adhere to the Crane operating instructions, chapter 7.07.

Safety equipment

Special attention must be paid to the safety equipment built into the crane. The safety equipment must constantly be checked for functionality. The crane may not be operated if the safety equipment are not working or not working correctly.

Note
Your motto must always be:
▶ **Safety first!**

The crane has been built in accordance with the applicable travel operation and driving regulations and has been approved by the relevant authorities.

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Equipment and spare parts

WARNING
Danger to life if original equipment parts are **not** used!
If the crane is operated with equipment parts, which are **not** original, then the crane can fail and cause fatal accidents!
Crane components can be damaged!
- ▶ Operate the crane only with original equipment parts!
- ▶ Crane operation with equipment parts, which do **not** belong to the crane is prohibited!
- ▶ If there is any doubt about the origin of equipment parts, contact Liebherr Service!

WARNING
The crane permit and the manufacturer's warranty will become void!
If any original installed parts are modified, manipulated or replaced (e.g. removal of parts, installation of non-original Liebherr parts), both the crane permit and the manufacturer's warranty will become void.
- ▶ Leave installed original parts unchanged!
- ▶ Do not remove installed original parts!
- ▶ Use only Original Liebherr spare parts!
- ▶ If there is any doubt about the origin of spare parts, contact Liebherr Service!

For ordering equipment and spare parts, always keep the crane number handy and provide it.

Definition of directional data for mobile cranes

Driving forwards: Driving with the driver's cab on the front.

Driving in reverse: Driving with the taillights of the crane chassis on the front.

Front, **rear**, **right**, **left** in the **driver's cab** refer to the crane chassis. The driver's cab is always in the front.

Front, **rear**, **right**, **left** in the **crane cab** refer to the crane superstructure. Front is always in direction of the placed down boom.

0° turning angle of the crane superstructure: The boom points in the longitudinal direction to the rear past the rear of the vehicle.

180° turning angle of the crane superstructure: The boom points in the longitudinal direction to the front past the driver's cab.

Definition of directional data for crawler cranes

Driving forward driving forward from the view of the crane operator seated in the crane cab. Turntable in 0° or 180° position.

Driving reverse driving backward from the view of the crane operator seated in the crane cab. Turntable in 0° or 180° position.

Front, **rear**, **right**, **left** always orient themselves on the **crawler track** from the position of the chain tension devices. The chain tension devices on the crawler track are always on the front.

Front, **rear**, **right**, **left** refer to the direction of view of the crane operator seated in the **crane cab**. Front is always in direction of the placed down boom.

Optional equipment and functions

The equipment marked with * and the functions are optionally available and are **not** part of the standard crane (optional equipment).

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Conversion chart

	Initial unit	Multiplication factor	Target unit
Length	mm	0.03937	in
	in	25.4000	mm
	mm	0.00328	ft
	ft	304.8	mm
	cm	0.39370	in
	in	2.5400	cm
	cm	0.0328	ft
	ft	30.48	cm
	m	39.37	in
	in	0.0254	m
	m	**3.281**	**ft**
	ft	**0.3048**	**m**
	km	0.62137	mile
	mile	1.6093	km
Surface	cm^2	0.155	in^2
	in^2	6.4516	cm^2
	m^2	**10.764**	**ft^2**
	ft^2	**0.0929**	**m^2**
Volume	cm^3	0.06102	in^3
	in^3	16.387	cm^3
	m^3	35.3147	ft^3
	ft^3	0.0283	m^3
	l	0.001	m^3
	m^3	1000	l
	l	61.024	in^3
	in^3	0.016387	l
	l	0.0353	ft^3
	ft^3	28.32	l
	l	0.264178	US. liq. gal
	US. liq. gal	3.7853265	l

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	Initial unit	Multiplication factor	Target unit
Mass (weight)	kg	2.20462	lb
	lb	0.45359	kg
	t	**2204.62**	**lb**
	lb	**0.0004536**	**t**
	t	1.1023	short ton US (tn. sh.)
	short ton US (tn. sh.)	0.90718	t
	t	**0.45359**	**kip**
	kip	**2.20462**	**t**
Mass / length	kg/m	0.055998	lb/in
	lb/in	17.857781	kg/m
	kg/m	0.67197	lb/ft
	lb/ft	1.48816	kg/m
Force	N	0.2248	lbf
	lbf	4.4483986	N
	kN	**224.809**	**lbf**
	lbf	**0.0044483986**	**kN**
Turning moment	Nm	8.85075	lbf·in
	lbf·in	0.112984	Nm
	Nm	0.73756	lbf·ft
	lbf·ft	1.3559	Nm
Performance	HP (DIN HP)	0.7355	kW
	kW	1.3596	HP (DIN HP)
Speed	m/s	39.37	in/s
	in/s	0.0254	m/s
	m/s	**3.28084**	**ft/s**
	ft/s	**0.3048**	**m/s**
	km/h	0.62137	mph (mi/h)
	mph (mi/h)	1.60935	km/h
	m/s	2.2369	mph (mi/h)
	mph (mi/h)	0.44704	m/s

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	Initial unit	Multiplication factor	Target unit
Pressure	kPa (kN/m²)	0.01	bar
	bar	100	kPa (kN/m²)
	bar	14.5038	psi
	psi	0.06895	bar
	kPa (kN/m²)	**0.145038**	**psi**
	psi	**6.894759**	**kPa (kN/m²)**
	N/cm²	1.450377	psi
	psi	0.6894759	N/cm²
	N/m²	0.000145038	psi
	psi	6894.759	N/m²
	t/m²	204.81	lbs/ft²
	lbs/ft²	0.0048828	t/m²
Load-related surface	m²/t	0.004882	ft²/lbs
	ft²/lb	204.81	m²/t
Temperature	**°C**	**([°C] · 1.8) + 32**	**°F**
	°F	**([°F] - 32) / 1.8**	**°C**

Conversion chart

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Contents

1 Description of crane

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1 Description of crane

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1.01 Terminology

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Fig.195219

1 Component overview crane chassis

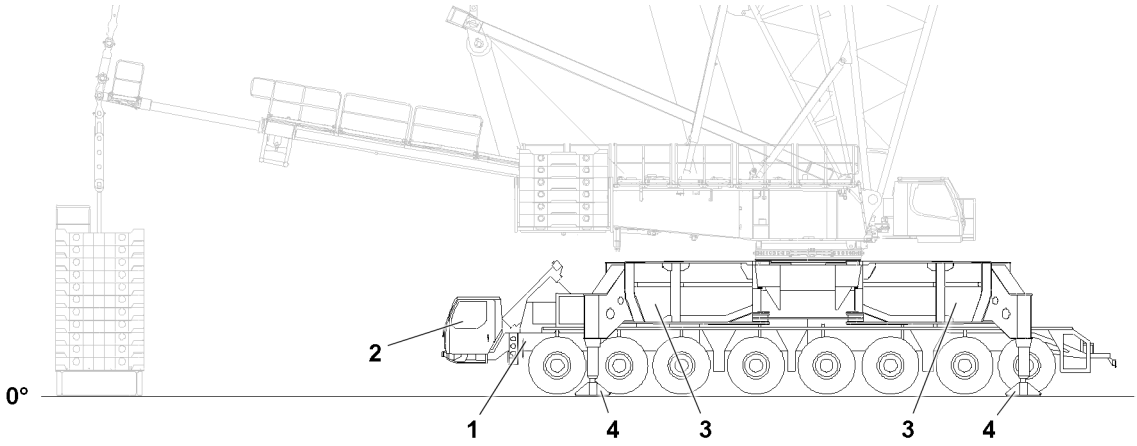

Fig.146522: Component overview crane chassis

1 8-axle chassis
2 Driver's cab
3 Folding beams
4 Support cylinder with support plates

2 Component overview turntable

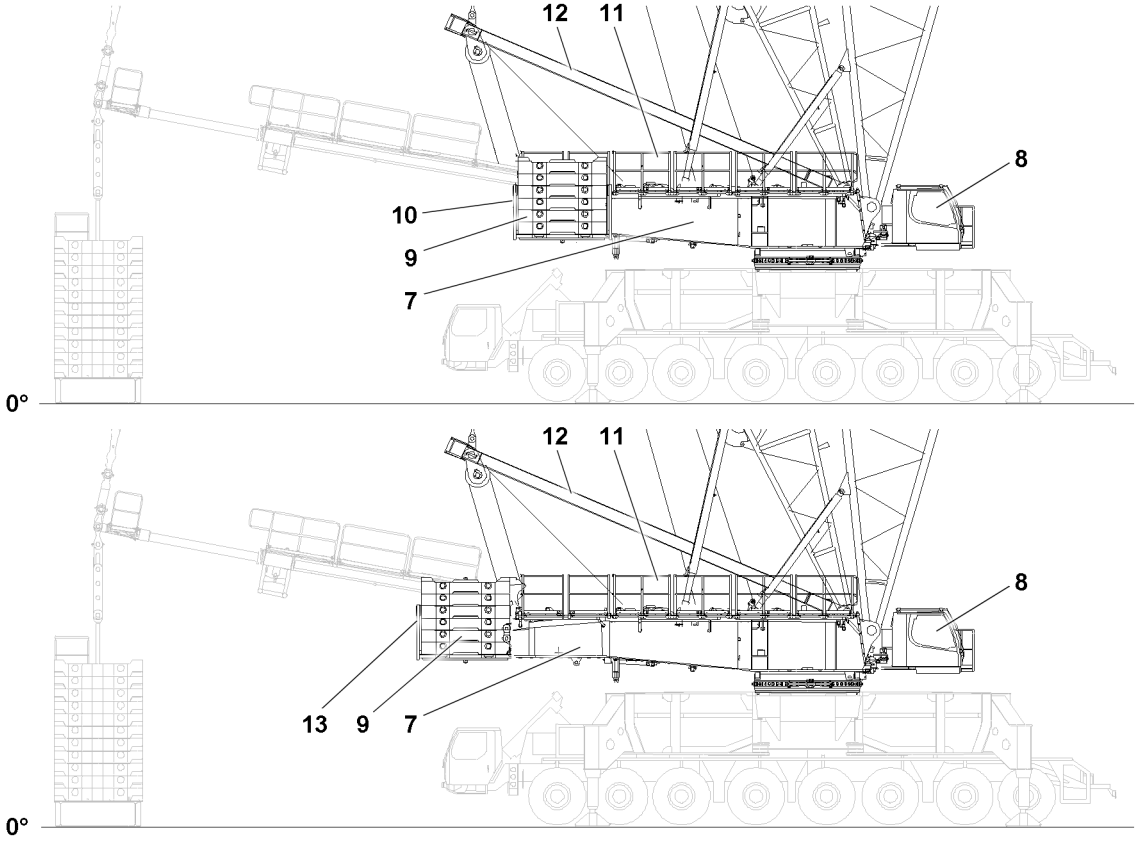

Fig.146523: Component overview turntable

7 Turntable
8 Crane operator's cab
9 Counterweight
10 Bracket counterweight
11 Turntable catwalks and railing
12 SA-frame
13 Turntable extension

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3 Component overview boom

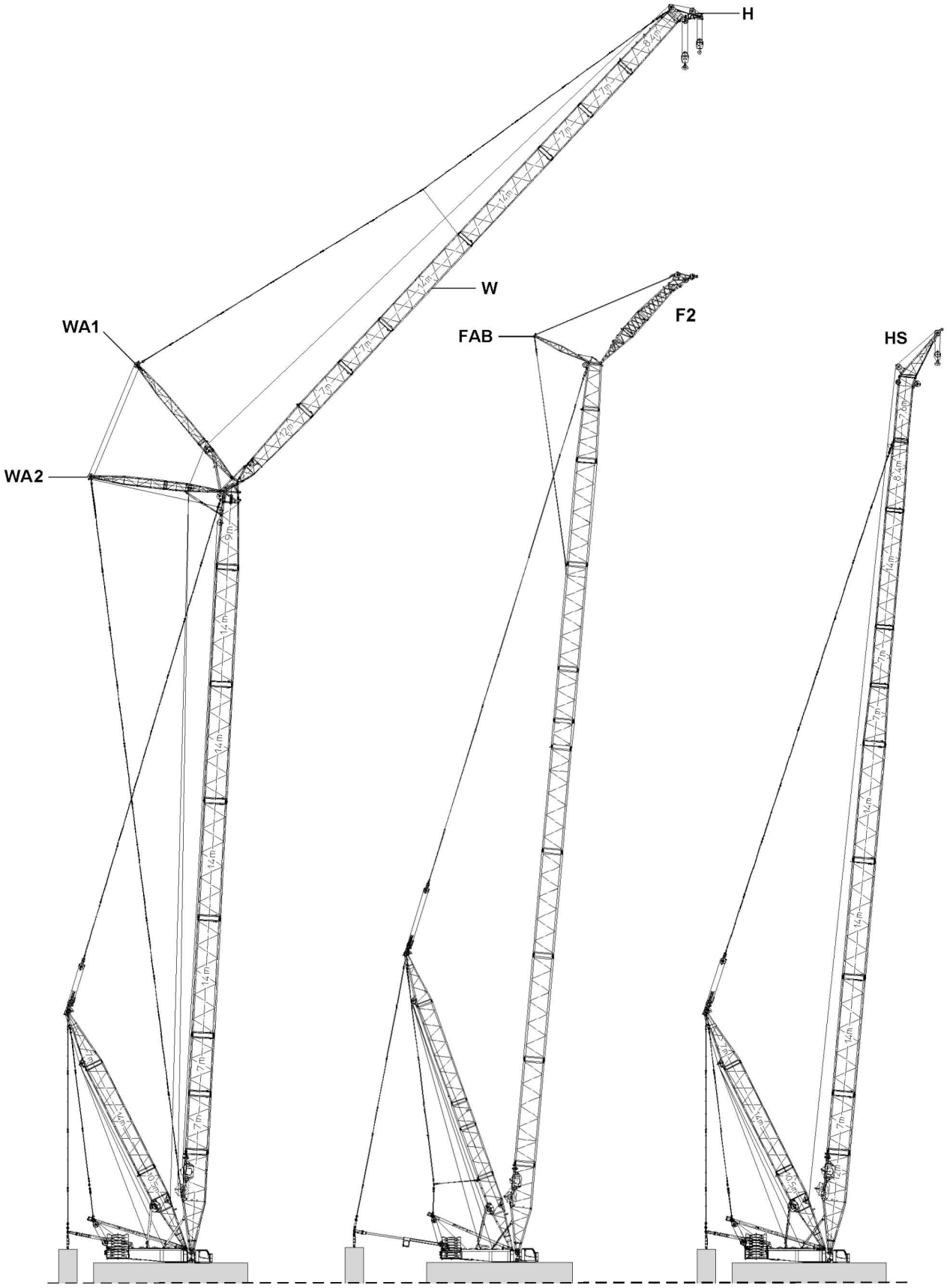

Fig.147245: Component overview boom

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WA1 WA-frame 1
WA2 WA-frame 2
W Luffing lattice jib
H Boom nose
HS Auxiliary jib
FAB F-guying frame
F2 Fixed lattice jib

4 Component overview derrick ballast

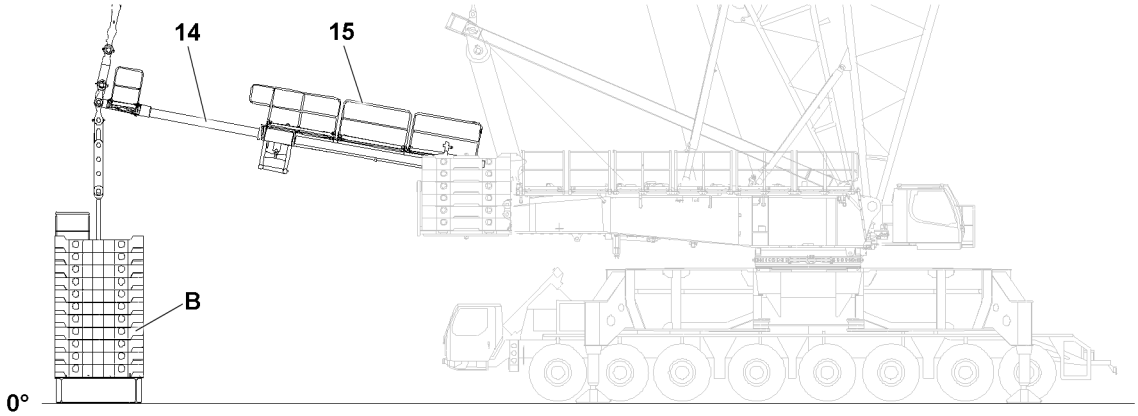

Fig.146525: Component overview derrick ballast

14 Guide-suspended ballast
15 Guide-suspended ballast railings and catwalks
B Derrick ballast - suspended ballast

Note
▶ The ballast trailer **BW** and the suspended ballast **B** are generally referred to as the **derrick ballast**.

5 Ground connection

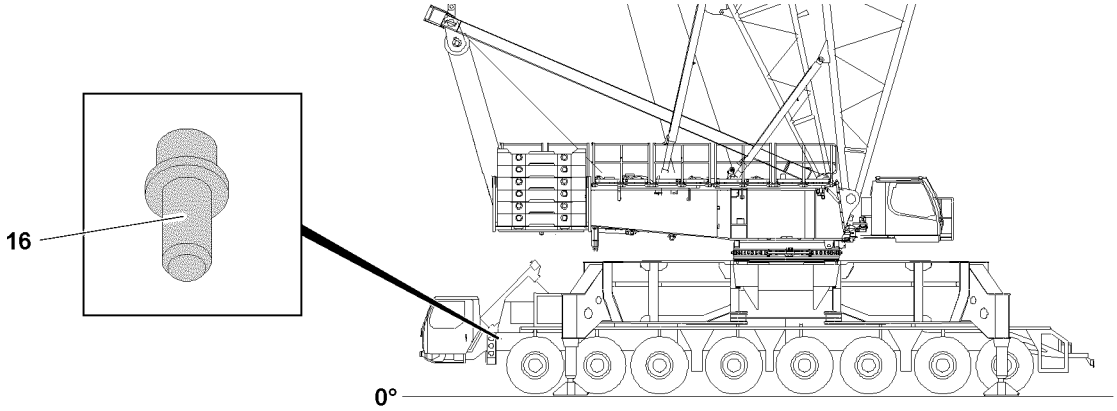

Fig.147686: Ground connection

16 Ground connection

Note
Ground the crane:
▶ Observe and adhere to the instructions in chapter 2.04.

6 S, SL, SL4HS, SL8HS boom

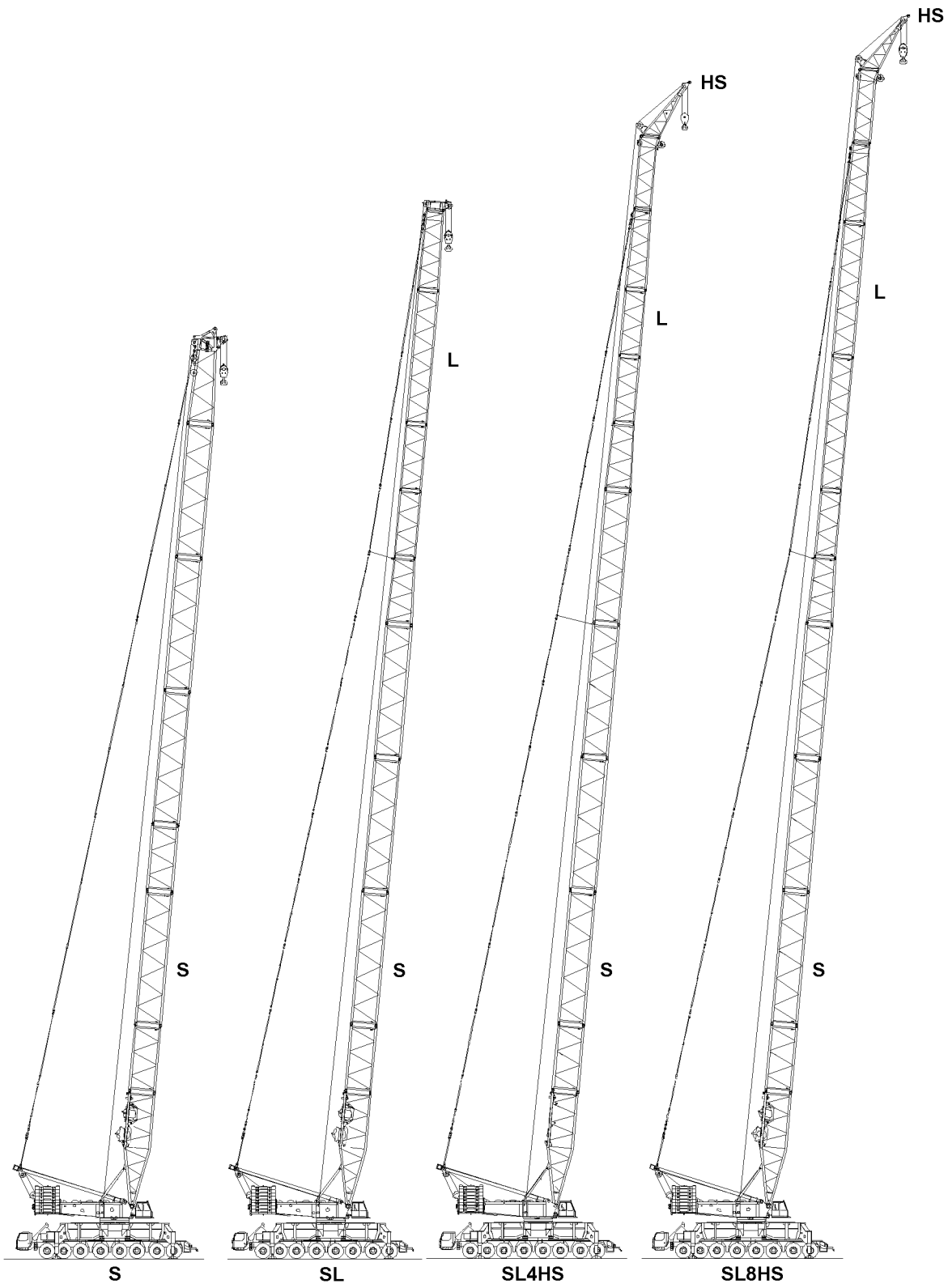

Fig.148056: S, SL, SL4HS, SL8HS boom combinations

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WARNING
The crane can topple over!
- ▶ Make sure that all boom systems are installed only according to the respective assembly chapters and the associated rod plans.
- ▶ Make sure that danger notes for assembly and for crane operation are observed and adhered to.
- ▶ The use of the following boom illustrations for assembly purposes is prohibited.

S Main boom
- Heavy version

SL Main boom
- Heavy-duty version, supplemented on top with light lattice sections **L**
- With roller set / roller sets on L-end section

SL4 Main boom
- Heavy-duty version, supplemented on top with light lattice sections **L**
- With roller set / roller sets on adapter for boom nose
- Boom variant **SL4**

SL8 Main boom
- Heavy-duty version, supplemented on top with light lattice sections **L**
- With roller set / roller sets on adapter for boom nose
- Boom variant **SL8**

HS Auxiliary jib

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7 SW-boom

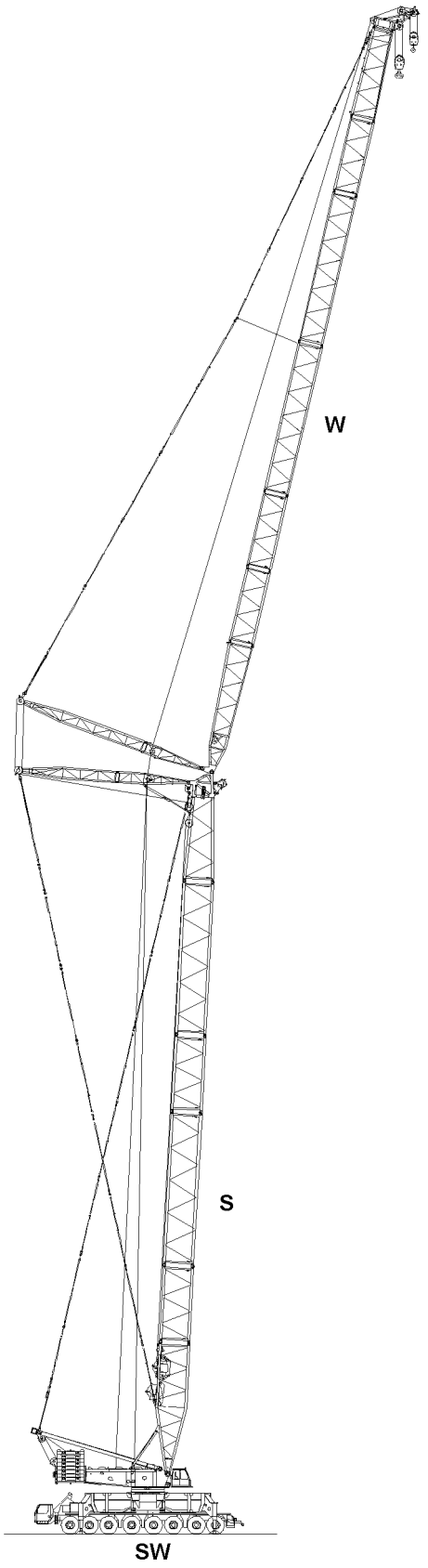

Fig.144973: SW-boom combination

WARNING
The crane can topple over!
- ▶ Make sure that all boom systems are installed only according to the respective assembly chapters and the associated rod plans.
- ▶ Make sure that danger notes for assembly and for crane operation are observed and adhered to.
- ▶ The use of the following boom illustrations for assembly purposes is prohibited.

S Main boom
- Heavy version

W Luffing lattice jib
- Light lattice sections **L**

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8 SD/SDB, SLD/SLDB, S2DB boom

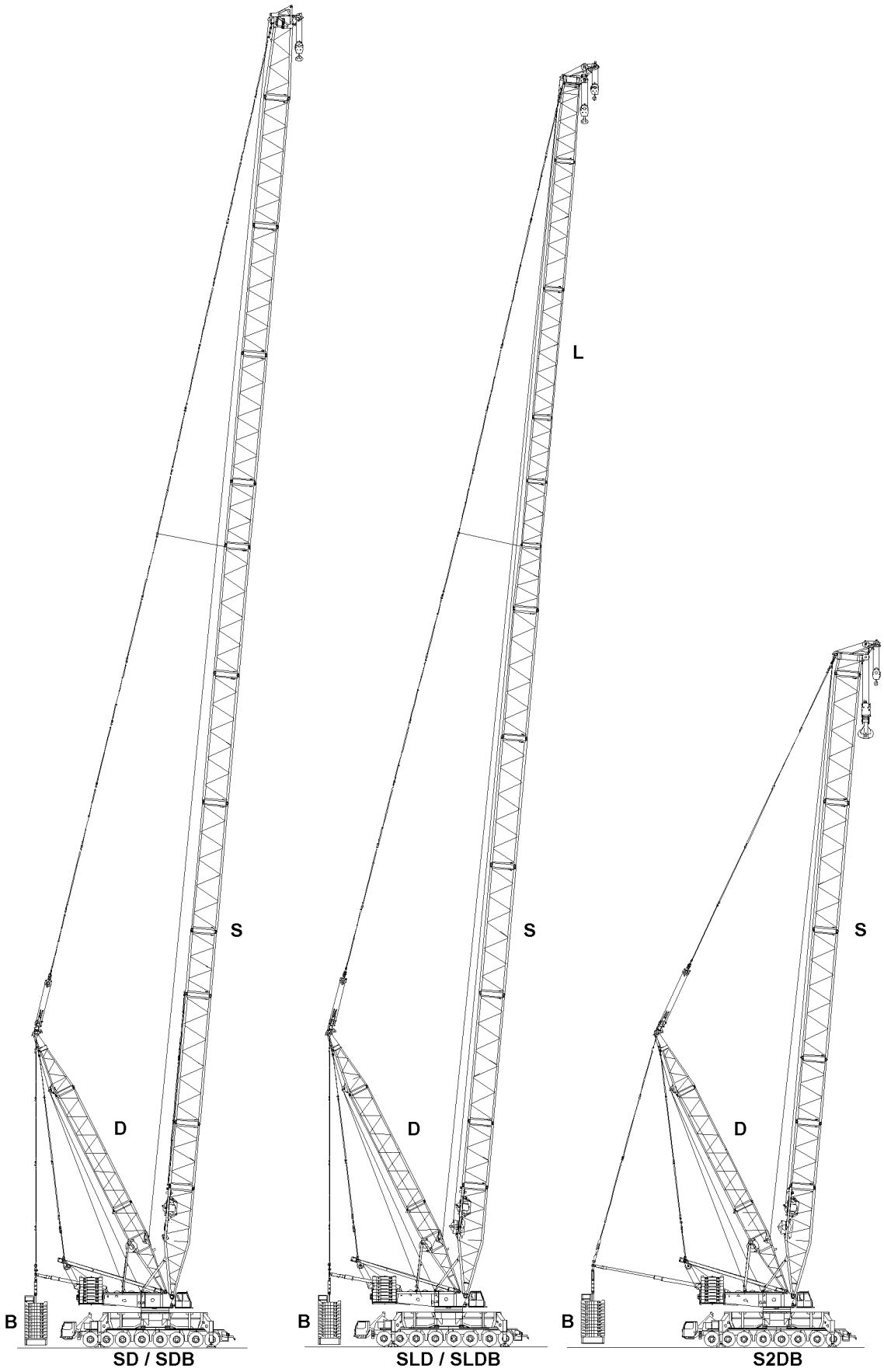

Fig.144976: SD/SDB, SLD/SLDB, S2DB boom combinations

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WARNING
The crane can topple over!
- ▶ Make sure that all boom systems are installed only according to the respective assembly chapters and the associated rod plans.
- ▶ Make sure that danger notes for assembly and for crane operation are observed and adhered to.
- ▶ The use of the following boom illustrations for assembly purposes is prohibited.

S Main boom
- Heavy version

SL Main boom
- Heavy-duty version, supplemented on top with light lattice sections **L**
- With roller set / roller sets on L-end section

S2 Main boom
- Heavy version with 750 t S-end section
- Boom variant **S2**

D Derrick boom
- Derrick-boom length 31.5 m
- Alone as assembly device or in connection with **SD, SLD, S2D**

B Derrick ballast
- Suspended ballast

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9 SDWB, SDWV/SDWVB boom

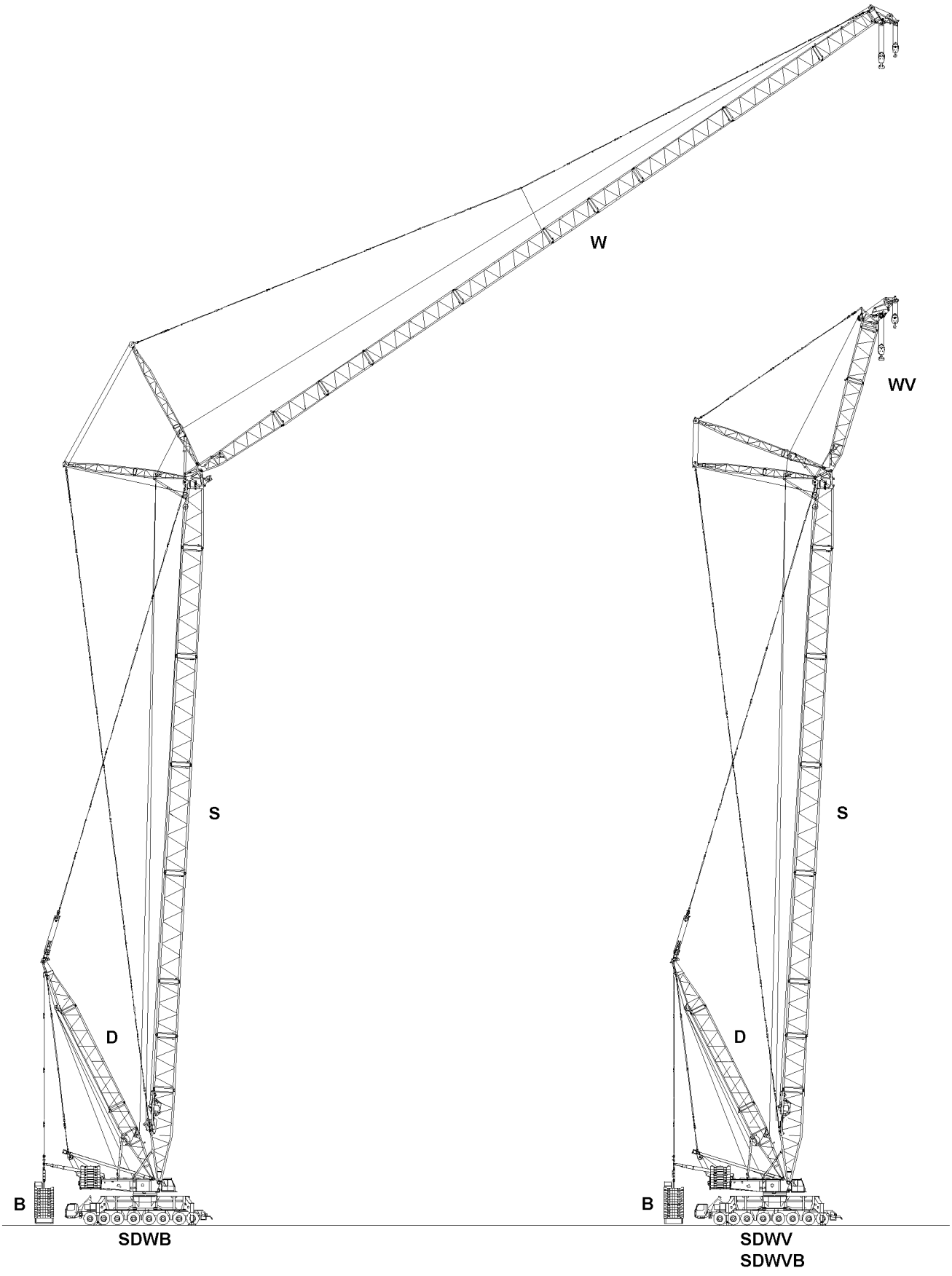

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Fig.144974: SDWB, SDWV/SDWVB boom combinations

WARNING
The crane can topple over!
- ▶ Make sure that all boom systems are installed only according to the respective assembly chapters and the associated rod plans.
- ▶ Make sure that danger notes for assembly and for crane operation are observed and adhered to.
- ▶ The use of the following boom illustrations for assembly purposes is prohibited.

S Main boom
- Heavy version

D Derrick boom
- Derrick-boom length 31.5 m
- Alone as assembly device or in connection with **SD**

W Luffing lattice jib
- Light lattice sections

WV Heavy duty jib
- Light lattice sections
- Short version

B Derrick ballast
- Suspended ballast

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10 SD2B, S6D2B, SL11D2B boom

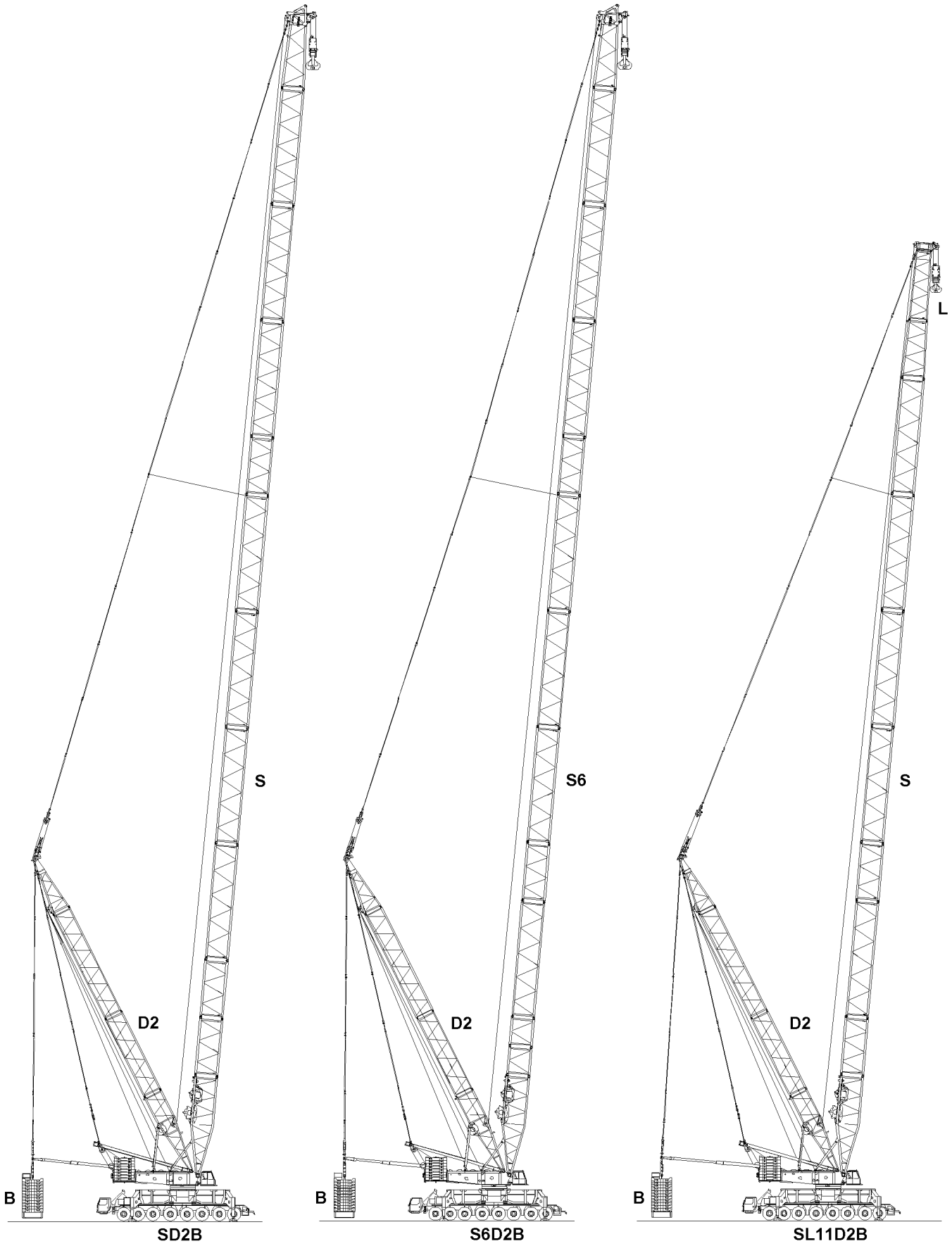

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Fig.147100: SD2B, S6D2B, SL11D2B boom combinations

WARNING
The crane can topple over!
- ▶ Make sure that all boom systems are installed only according to the respective assembly chapters and the associated rod plans.
- ▶ Make sure that danger notes for assembly and for crane operation are observed and adhered to.
- ▶ The use of the following boom illustrations for assembly purposes is prohibited.

S Main boom
- Heavy version

S6 Main boom
- Heavy version, supplemented on the bottom with reinforced lattice sections
- Boom variant **S6**

SL11 Main boom
- Heavy version, bottom with reinforced lattice sections
- Boom variant **SL11**

D2 Derrick boom
- Derrick-boom length 42 m
- Alone as assembly device or in connection with **SD2, S6D2, SL11D2**

B Derrick ballast
- Suspended ballast

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11 S6D2WB, S6D2WV, S6D2WVB boom

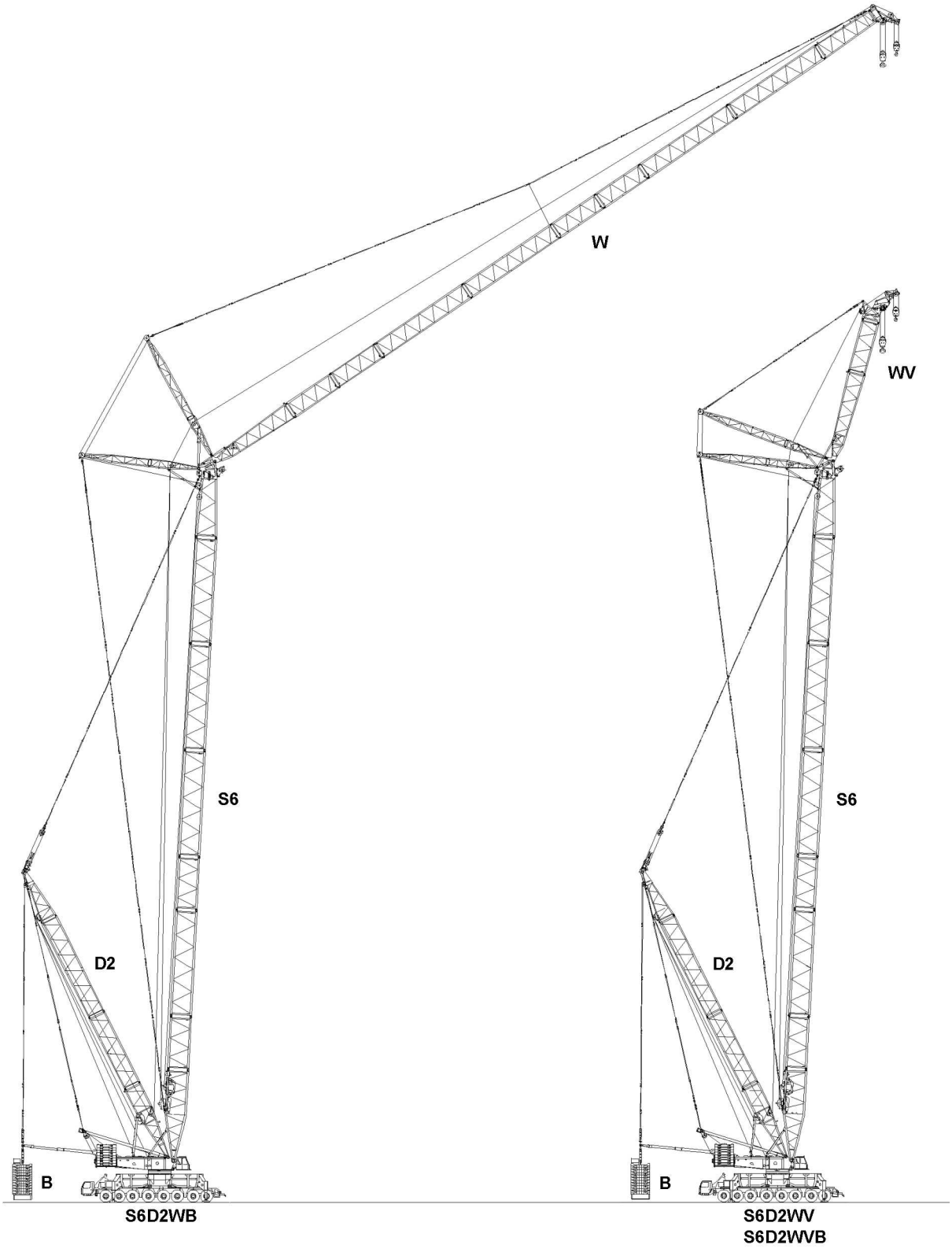

Fig.146972: S6D2WB, S6D2WV/S6D2WVB boom combinations

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WARNING
The crane can topple over!
- ▶ Make sure that all boom systems are installed only according to the respective assembly chapters and the associated rod plans.
- ▶ Make sure that danger notes for assembly and for crane operation are observed and adhered to.
- ▶ The use of the following boom illustrations for assembly purposes is prohibited.

S6 Main boom
- Heavy version, bottom with reinforced lattice sections
- Boom variant **S6**

D2 Derrick boom
- Derrick-boom length 42 m
- Alone as assembly device or in connection with **S6D2**

W Luffing lattice jib
- Light lattice sections **L**

WV Heavy duty jib
- Light lattice sections **L**
- Short version

B Derrick ballast
- Suspended ballast

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12 SL7DHS, SL7D2HS, SL8DHS boom

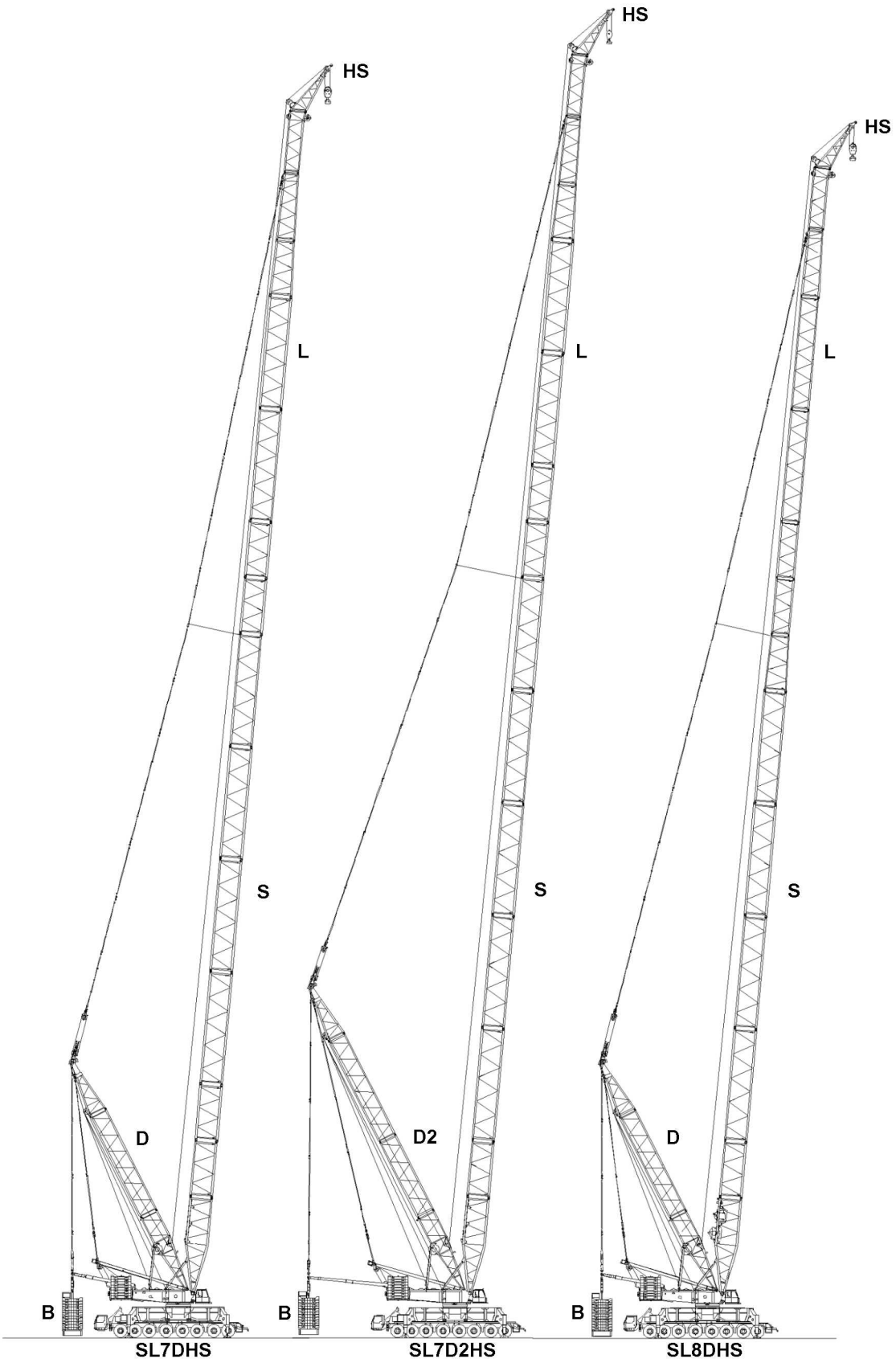

Fig.148057: SL7DHS, SL7D2HS, SL8DHS boom combinations

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WARNING
The crane can topple over!
- ▶ Make sure that all boom systems are installed only according to the respective assembly chapters and the associated rod plans.
- ▶ Make sure that danger notes for assembly and for crane operation are observed and adhered to.
- ▶ The use of the following boom illustrations for assembly purposes is prohibited.

SL7 Main boom
- Heavy-duty version, supplemented on top with light lattice sections **L**
- With roller set / roller sets on adapter for boom nose
- Boom variant **SL7**

SL8 Main boom
- Heavy-duty version, supplemented on top with light lattice sections **L**
- With roller set / roller sets on adapter for boom nose
- Boom variant **SL8**

D Derrick boom
- Alone as assembly device or in connection with **SL7D, SL8D**

Note
- ▶ Use the derrick ballast exclusively for the erection and take-down procedure.

D2 Derrick boom
- Derrick-boom length 42 m
- Alone as assembly device or in connection with **SL7D2**

HS Auxiliary jib

B Derrick ballast
- Suspended ballast

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13 SL13D2B, SL14D2B boom

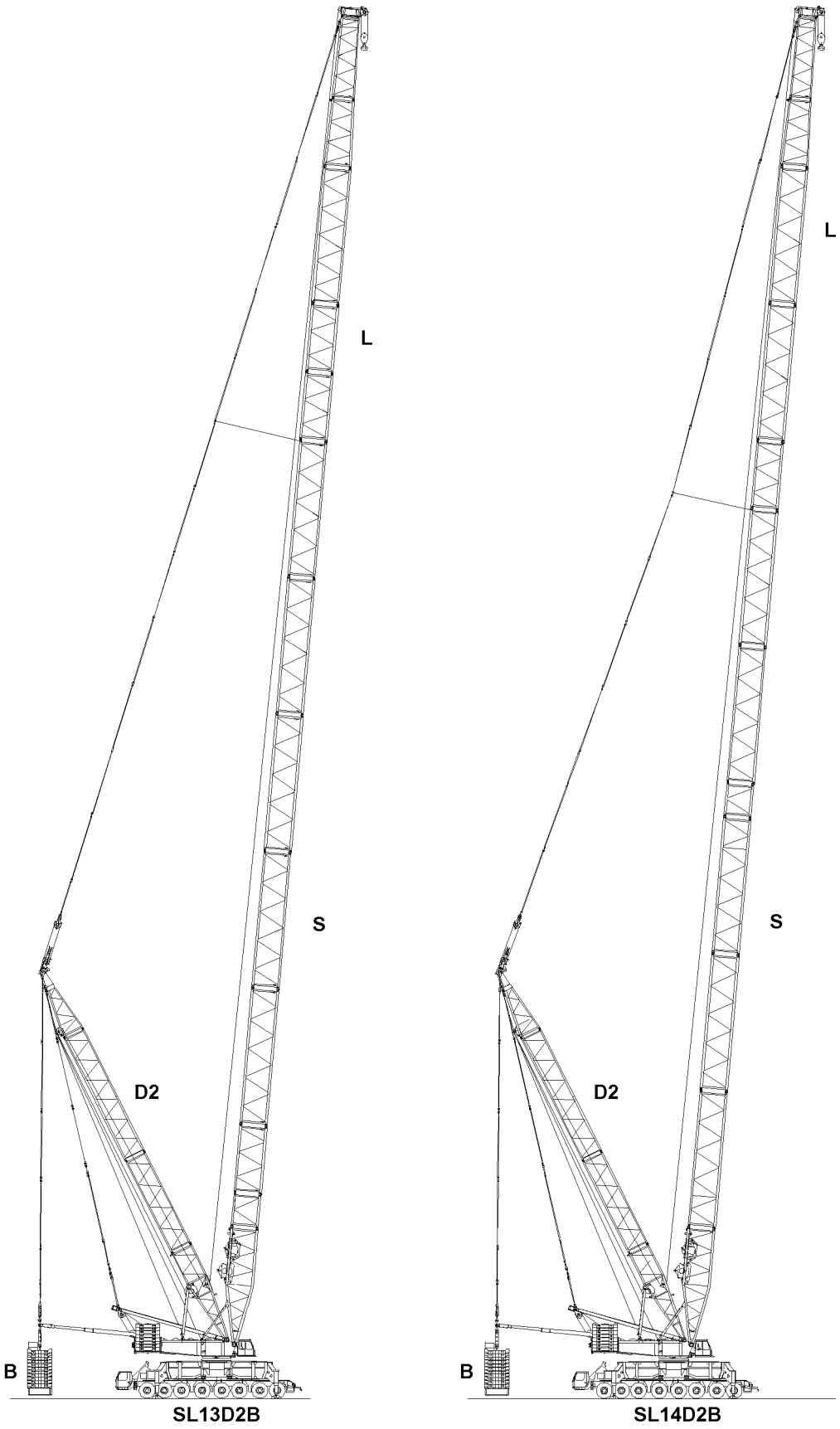

Fig.146973: SL13D2B, SL14D2B boom combinations

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WARNING
The crane can topple over!
- ▶ Make sure that all boom systems are installed only according to the respective assembly chapters and the associated rod plans.
- ▶ Make sure that danger notes for assembly and for crane operation are observed and adhered to.
- ▶ The use of the following boom illustrations for assembly purposes is prohibited.

SL13 Main boom
- Heavy version, bottom with reinforced lattice sections
- Supported on top with light lattice sections **L**
- Boom variant **SL13**

SL14 Main boom
- Heavy-duty version, supplemented on the bottom with reinforced, wide lattice sections (system dimension: S 3326.XX)
- Supported on top with light lattice sections **L**
- Boom variant **SL14**

D2 Derrick boom
- Derrick-boom length 42 m
- Alone as assembly device or in connection with **SL13D2, SL14D2**

B Derrick ballast
- Suspended ballast

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14 SL9D2FB, SL12D2FB boom

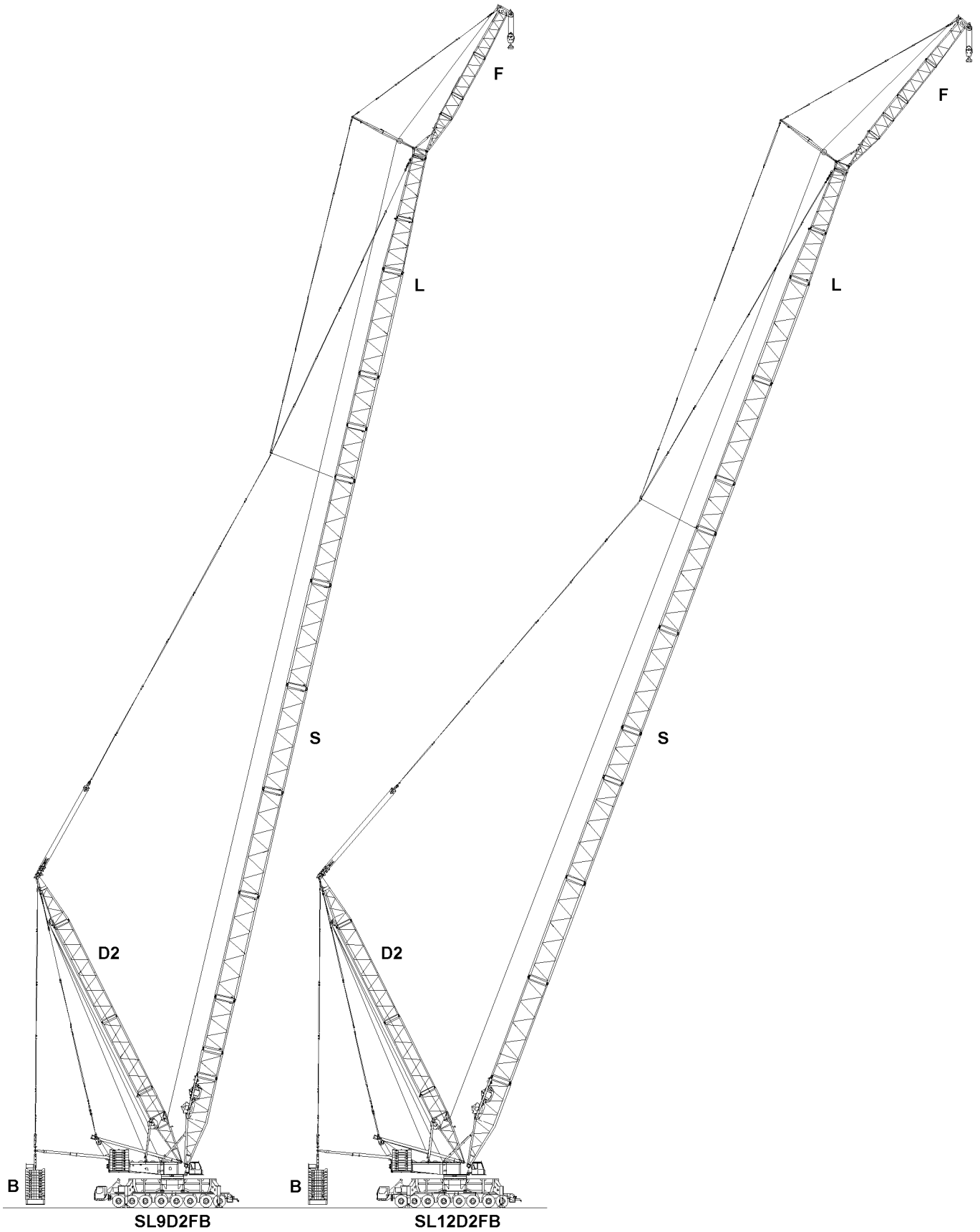

Fig.146974: SL9D2FB, SL12D2FB boom combinations

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WARNING
The crane can topple over!
- ▶ Make sure that all boom systems are installed only according to the respective assembly chapters and the associated rod plans.
- ▶ Make sure that danger notes for assembly and for crane operation are observed and adhered to.
- ▶ The use of the following boom illustrations for assembly purposes is prohibited.

SL9 Main boom
- Heavy version, bottom with reinforced lattice sections
- Supported on top with light lattice sections **L**
- Boom variant **SL9**

SL12 Main boom
- Heavy-duty version, supplemented on the bottom with reinforced, wide lattice sections (system dimension: S 3326.XX)
- Supported on top with light lattice sections **L**
- Boom variant **SL12**

D2 Derrick boom
- Derrick-boom length 42 m
- Alone as assembly device or in connection with **SL9D2, SL12D2**

F Fixed lattice jib

B Derrick ballast
- Suspended ballast

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15 SXLD4B, SXZLD4B boom

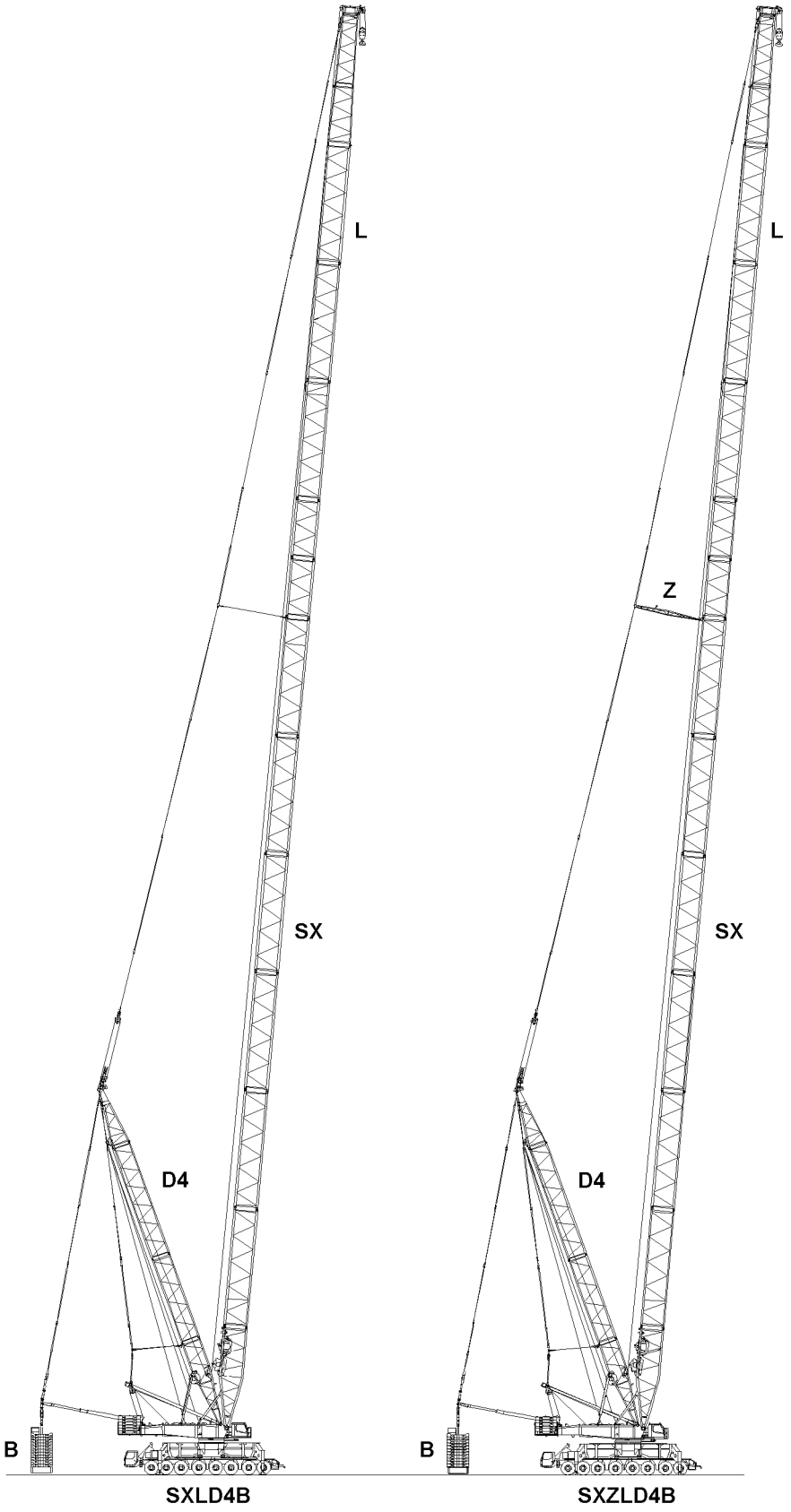

Fig.146975: SXLD4B, SXZLD4B boom combinations

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WARNING
The crane can topple over!
- ▶ Make sure that all boom systems are installed only according to the respective assembly chapters and the associated rod plans.
- ▶ Make sure that danger notes for assembly and for crane operation are observed and adhered to.
- ▶ The use of the following boom illustrations for assembly purposes is prohibited.

SX Main boom
- Heavy-duty version, supplemented on the bottom with reinforced, wide lattice sections (system dimension: S 3326.XX)
- Supported on top with light lattice sections **L**

Z Auxiliary guying frame
- Auxiliary guying frame in the lattice version

D4 Derrick boom
- Derrick-boom length 42 m
- With auxiliary guying
- Alone as assembly device or in connection with **SXLD4, SXZLD4**

B Derrick ballast
- Suspended ballast

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16 SXL7D4HS boom

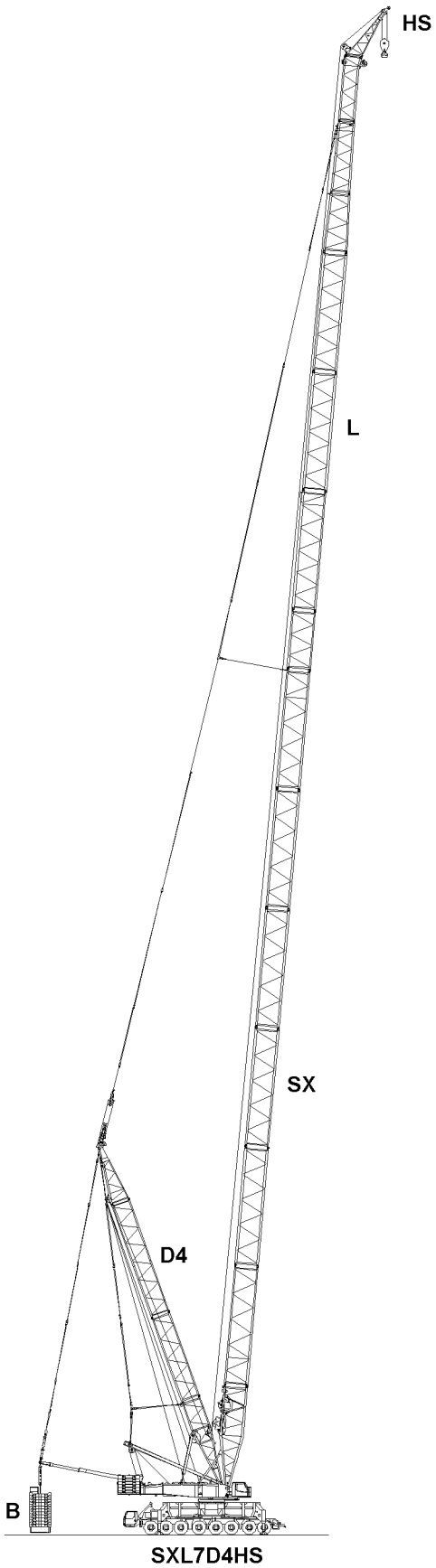

Fig.148058: SXL7D4HS boom combinations

WARNING
The crane can topple over!
- ▶ Make sure that all boom systems are installed only according to the respective assembly chapters and the associated rod plans.
- ▶ Make sure that danger notes for assembly and for crane operation are observed and adhered to.
- ▶ The use of the following boom illustrations for assembly purposes is prohibited.

SX Main boom
- Heavy-duty version, supplemented on the bottom with reinforced, wide lattice sections (system dimension: S 3326.XX)
- Supported on top with light lattice sections **L**
- Boom variant **SXL7**

D4 Derrick boom
- Derrick-boom length 42 m
- With auxiliary guying
- Alone as assembly device or in connection with **SXL7D4**

HS Auxiliary jib

B Derrick ballast
- Suspended ballast

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17 SXD4F2B, SXZD4F2B boom

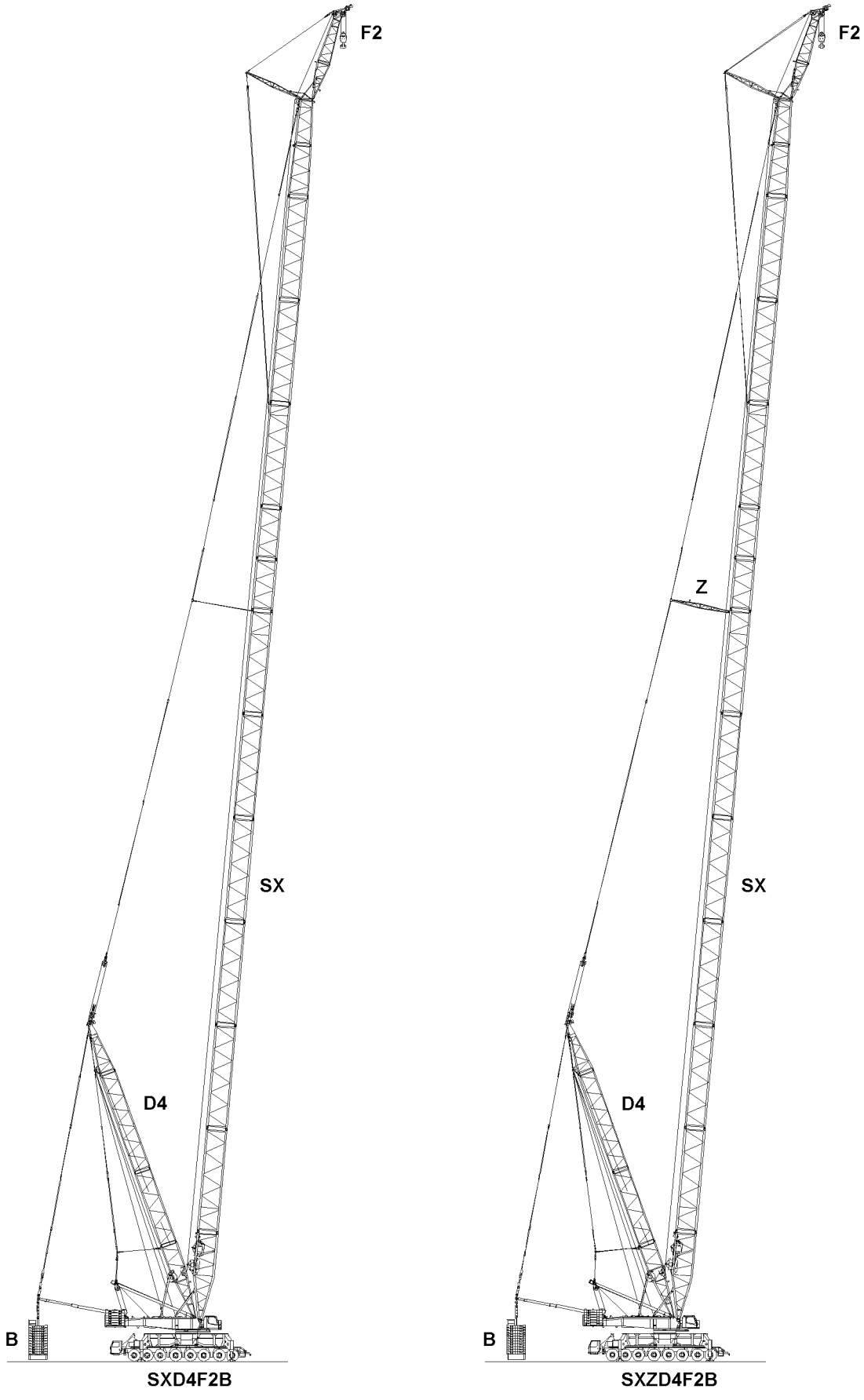

Fig.146976: SXD4F2B, SXZD4F2B boom combinations

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WARNING
The crane can topple over!
- ▶ Make sure that all boom systems are installed only according to the respective assembly chapters and the associated rod plans.
- ▶ Make sure that danger notes for assembly and for crane operation are observed and adhered to.
- ▶ The use of the following boom illustrations for assembly purposes is prohibited.

SX Main boom
- Heavy-duty version, supplemented on the bottom with reinforced, wide lattice sections (system dimension: S 3326.XX)
- Supported on top with light lattice sections **L**

Z Auxiliary guying frame
- Auxiliary guying frame in the lattice version

D4 Derrick boom
- Derrick-boom length 42 m
- With auxiliary guying
- Alone as assembly device or in connection with **SXD4, SXZD4**

F2 Fixed lattice jib
- With integrated boom nose
- With fiber guy ropes

B Derrick ballast
- Suspended ballast

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18 SX2D4F2B, SX3D4F2B boom

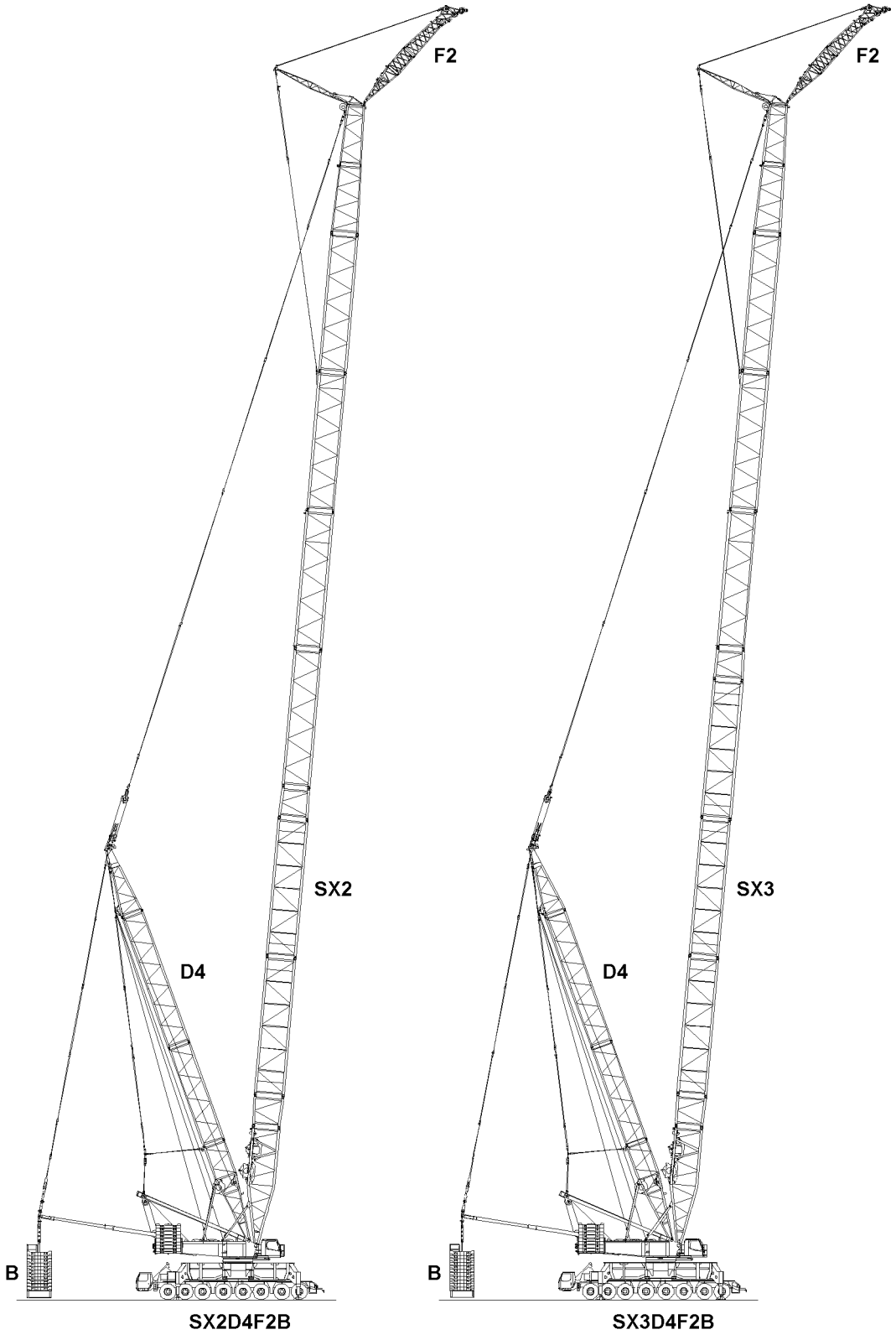

Fig.146978: SX2D4F2B, SX3D4F2B boom combination

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WARNING
The crane can topple over!
- ▶ Make sure that all boom systems are installed only according to the respective assembly chapters and the associated rod plans.
- ▶ Make sure that danger notes for assembly and for crane operation are observed and adhered to.
- ▶ The use of the following boom illustrations for assembly purposes is prohibited.

SX2 Main boom
- Heavy-duty version, supplemented on the bottom with two 2-part lattice sections (system dimension: SX 6028.XX)
- supplemented on the bottom with reinforced, wide lattice sections (system dimension: S 3326.XX)
- Supported on top with light lattice sections **L**

SX3 Main boom
- Heavy-duty version, supplemented on the bottom with three 2-part lattice sections (system dimension: SX 6028.XX)
- supplemented on the bottom with reinforced, wide lattice sections (system dimension: S 3326.XX)
- Supported on top with light lattice sections **L**

D4 Derrick boom
- Derrick-boom length 42 m
- With auxiliary guying
- Alone as assembly device or in connection with **SX2D4, SX3D4**

F2 Fixed lattice jib
- With integrated boom nose
- With fiber guy ropes

B Derrick ballast
- Suspended ballast

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19 SX2ZD4F2B, SX3ZD4F2B boom

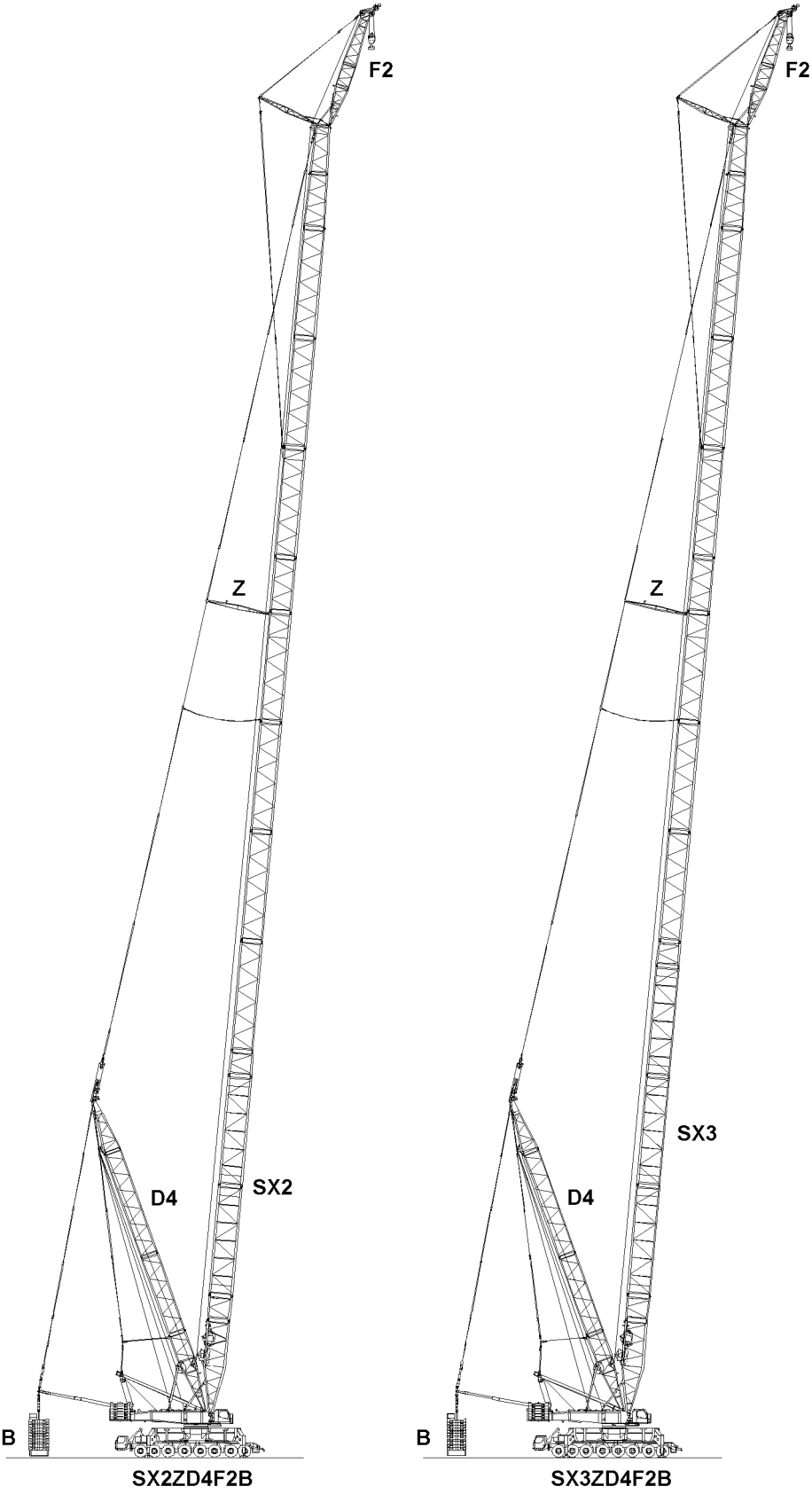

Fig.148059: SX2ZD4F2B, SX3ZD4F2B boom combination

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WARNING
The crane can topple over!
- ▶ Make sure that all boom systems are installed only according to the respective assembly chapters and the associated rod plans.
- ▶ Make sure that danger notes for assembly and for crane operation are observed and adhered to.
- ▶ The use of the following boom illustrations for assembly purposes is prohibited.

SX2 Main boom
- Heavy-duty version, supplemented on the bottom with three 2-part lattice sections (system dimension: SX 6028.XX)
- supplemented on the bottom with reinforced, wide lattice sections (system dimension: S 3326.XX)
- Supported on top with light lattice sections **L**

SX3 Main boom
- Heavy-duty version, supplemented on the bottom with three 2-part lattice sections (system dimension: SX 6028.XX)
- supplemented on the bottom with reinforced, wide lattice sections (system dimension: S 3326.XX)
- Supported on top with light lattice sections **L**

Z Auxiliary guying frame
- Auxiliary guying frame in the lattice version

D4 Derrick boom
- Derrick-boom length 42 m
- With auxiliary guying
- Alone as assembly device or in connection with **SX2ZD4, SX3ZD4**

F2 Fixed lattice jib
- With integrated boom nose
- With fiber guy ropes

B Derrick ballast
- Suspended ballast

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20 SX2LD4B, SX3LD4B boom

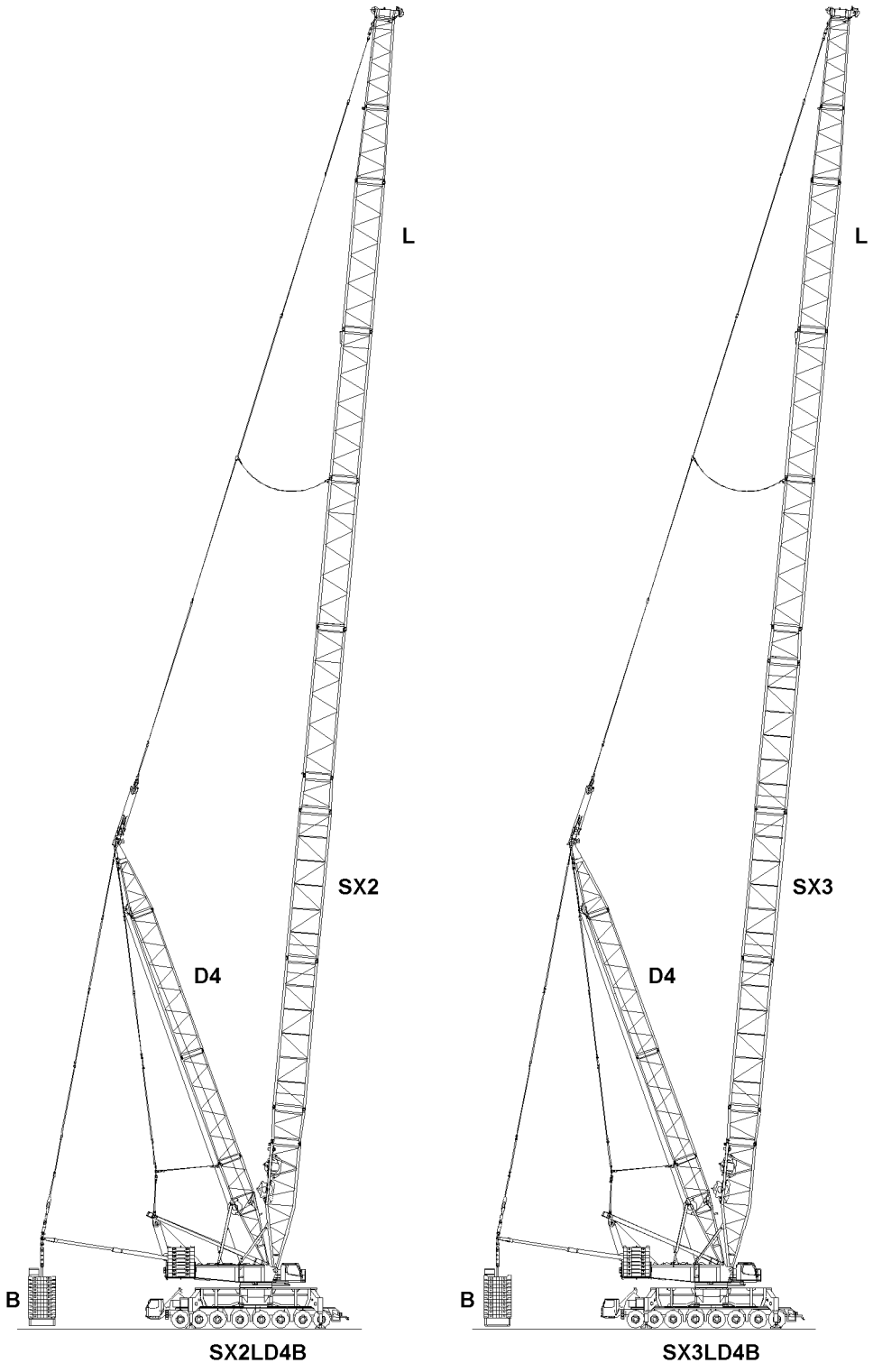

Fig.146979: SX2LD4B, SX3LD4B boom combination

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WARNING
The crane can topple over!
- ▶ Make sure that all boom systems are installed only according to the respective assembly chapters and the associated rod plans.
- ▶ Make sure that danger notes for assembly and for crane operation are observed and adhered to.
- ▶ The use of the following boom illustrations for assembly purposes is prohibited.

SX2L Main boom
- Heavy-duty version, supplemented on the bottom with two 2-part lattice sections (system dimension: SX 6028.XX)
- supplemented on the bottom with reinforced, wide lattice sections (system dimension: S 3326.XX)
- Supported on top with light lattice sections **L**

SX3L Main boom
- Heavy-duty version, supplemented on the bottom with three 2-part lattice sections (system dimension: SX 6028.XX)
- supplemented on the bottom with reinforced, wide lattice sections (system dimension: S 3326.XX)
- Supported on top with light lattice sections **L**

D4 Derrick boom
- Derrick-boom length 42 m
- With auxiliary guying
- Alone as assembly device or in connection with **SX2LD4, SX3LD4**

B Derrick ballast
- Suspended ballast

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21 SX2ZLD4B, SX3ZLD4B boom

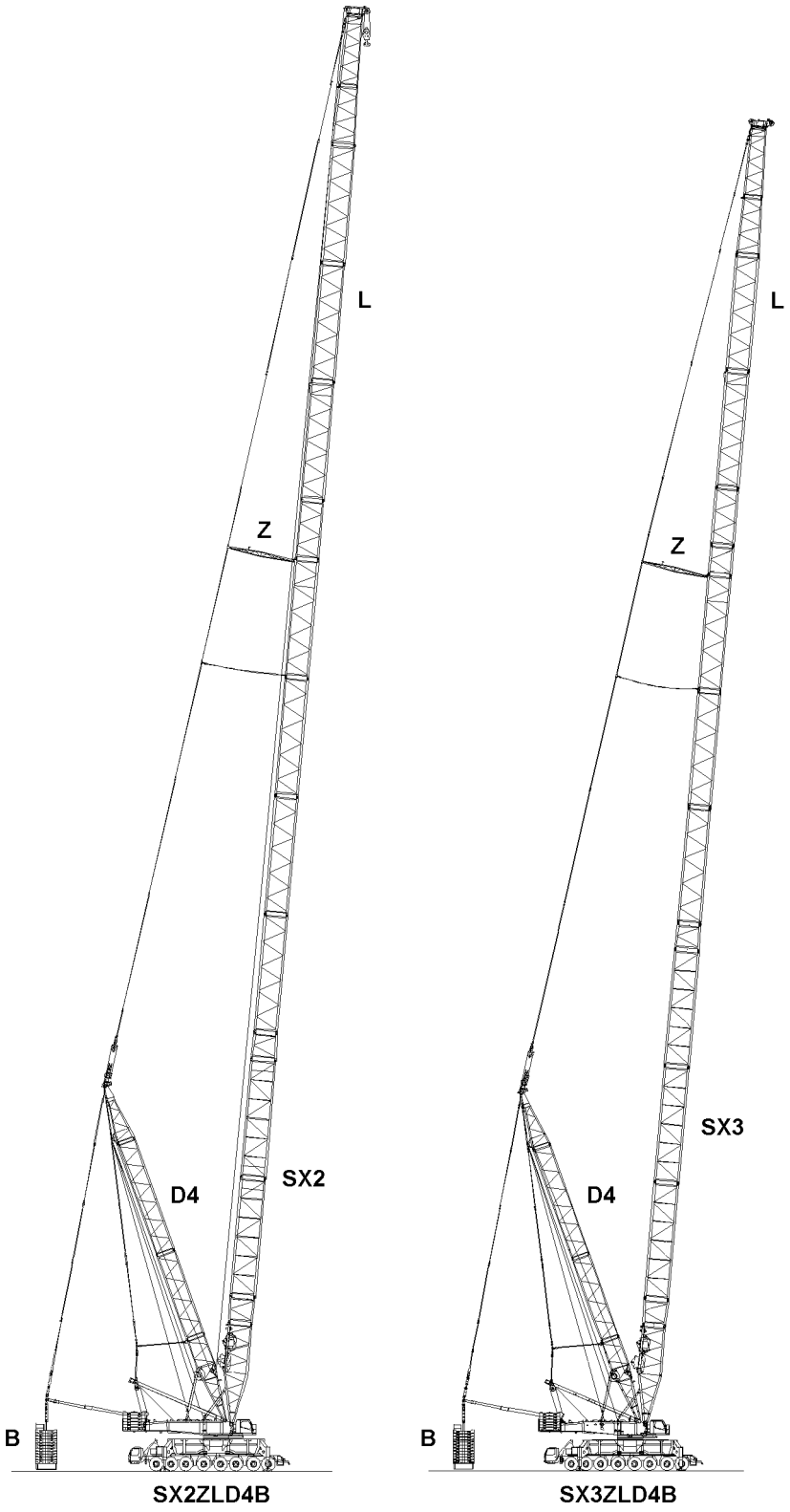

Fig.148060: SX2ZLD4B, SX3ZLD4B boom combination

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WARNING
The crane can topple over!
- ▶ Make sure that all boom systems are installed only according to the respective assembly chapters and the associated rod plans.
- ▶ Make sure that danger notes for assembly and for crane operation are observed and adhered to.
- ▶ The use of the following boom illustrations for assembly purposes is prohibited.

SX2 Main boom
- Heavy-duty version, supplemented on the bottom with two 2-part lattice sections (system dimension: SX 6028.XX)
- supplemented on the bottom with reinforced, wide lattice sections (system dimension: S 3326.XX)
- Supported on top with light lattice sections **L**

SX3 Main boom
- Heavy-duty version, supplemented on the bottom with reinforced, wide lattice sections (system dimension: SX 6028.XX)
- supplemented on the bottom with reinforced, wide lattice sections (system dimension: S 3326.XX)
- Supported on top with light lattice sections **L**

Z Auxiliary guying frame
- Auxiliary guying frame in the lattice version

D4 Derrick boom
- Derrick-boom length 42 m
- With auxiliary guying
- Alone as assembly device or in connection with **SX2ZLD4**, **SX3ZLD4**

B Derrick ballast
- Suspended ballast

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1.02 Product description

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Fig.195219

1 Crane chassis

1.1 Frame

In-house manufactured, weight-optimized and distortion-resistant box structure made from high-strength, close-grained structural steel.

1.2 Supports

Four folded-out hydraulic swing beams, with hydraulic support cylinders.

1.3 Diesel engine

Number of cylinders: 8

Make: LIEBHERR

Water cooled

Note

▶ Depending on one of the respective crane configurations, one of the following engine types is installed on the crane, see also the separate Diesel engine operating instructions!

1.3.1 Engine type D 9508 A7

Performance: 500 KW at 1900 rpm

Maximum torque: 3000 Nm at 1500 rpm

1.3.2 Engine type D 9508 A7 SCR

Performance: 505 KW at 1900 rpm

Maximum torque: 3000 Nm at 1500 rpm

1.4 Transmission

Automatic transmission system with torque converter coupling, manufactured by ZF, Type TC-TRONIC HD with 12 forward gears and 2 reverse gears, distributor gear with lockable longitudinal differential.

1.5 Axles

All 8 axles suspended and steerable.

Axles 1, 2, 4 and 6 are planetary axles, axle 4 with longitudinal differential, axle 4 and axle 6 with transverse differential.

1.6 Suspension

All axles are hydro-pneumatically suspended with automatic level control.

Axle pressure compensation between axle pairs 1 and 2, 3 and 4, 5 and 6, 7 and 8.

Hydraulically lockable suspension.

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1.7 Tires

Tire size: 505/95 R 25

1.8 Steering

ZF semi-integral power steering, dual circuit system with hydraulic servo and auxiliary reserve pump, powered by the axle, acting on mechanically interconnected axles 1 to 4.

For on-road driving, the axles 5 to 8 are steered electro-hydraulically, depending on the speed, and from 30 km/h , axle 5 and axle 6 are affixed to straight forward driving.

Axles 7 and 8, depending on speed up to 60 km/h , are steered actively depending on the steering deflection of the front axle and set to straight forward driving above 60 km/h , whereby axle 7 is additionally blocked.

Steering according to EC Guideline 70/311/EEC.

1.9 Brakes

Service brake: All-wheel power-assisted compressed air brake, dual-circuit brake system.

Auxiliary brakes: Exhaust flap retention strap, retarder, in the TC-TRONIC transmission, Telma eddy current brake (optional).

Hand brake: Spring-loaded brake acting on all wheels of axle 3, axle 6 and axle 8.

Brakes conform to EC Directive 71/320/EEC.

1.10 Driver's cab

Spacious cab made of steel, corrosion-resistant through cataphoretic paint primer, elastically suspended and hydraulically cushioned.

Sound and heat insulating interior panelling according to EC-guideline, safety glass, operating and control instruments, luxury equipment.

1.11 Electrical system

Modern data bus technology, 24 V DC, 2 batteries, each with 170 Ah.

Lighting system according to German StVZO (Federal Motor Vehicle Safety Standards)

2 Crane superstructure

2.1 Frame

In-house manufactured, weight-optimized and distortion-resistant welded structure made from high-strength, close-grained structural steel. A 3-row roller slewing ring is used as the connecting element to the crane chassis, with quick connection, providing unlimited turning.

Quick-connect for easy separation from crane superstructure and crane chassis.

2.2 SA-frame disassembly device

For disassembly of the SA-frame, winch 4 and complete reeving.

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2.3 Diesel engine

Number of cylinders: 8

Make: LIEBHERR

Water cooled

Note

▶ Depending on one of the respective crane configurations, one of the following engine types is installed on the crane, see also the separate Diesel engine operating instructions!

2.3.1 Engine type D 9508 A7

Performance: 400 KW at 1800 rpm

Maximum torque: 2546 Nm at 1500 rpm

2.3.2 Engine type D 9508 A7 SCR

Performance: 450 KW at 1800 rpm

Maximum torque: 2671 Nm at 1500 rpm

2.4 Crane drive

Diesel-hydraulic via pump distributor gear with 6 axial piston pumps with power regulation, closed oil circuits.

2.5 Control

Servo control with electronic synchronous run device via 3 4-way joysticks and 2 2-way control lever. Stepless regulation of crane movements by adjusting the hydraulic pumps and additionally by changing the diesel engine speed.

2.6 Hoist gear 2 (winch 2)

Winch 2 as hoist gear, hydraulically driven rope drum via axial piston motor and planetary gear with spring-loaded hydraulic vented stop brake.

Wear-free brakes with vertical process via closed oil circuits.

2.7 Intake gear (winch 4)

Winch 4 as intake gear, hydraulically driven rope drum via axial piston motor and planetary gear with spring-loaded hydraulic vented stop brake.

Wear-free brakes with vertical process via closed oil circuits.

2.8 Assembly winch

To reeve the ropes.

2.9 Slewing gear

1 slewing gear (2 as option), hydraulically driven via axial piston adjusting motor and planetary gear with spring-loaded hydraulic vented stop brake. Wear-free brakes via closed oil-circuit.

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2.10 Crane operator's cab

Wide area cab in sheet-steel construction, swingable to the side and tiltable to the rear, with operating and control instruments and engine-independent hot water heating (air conditioning system as an option).

Crane operator's cab and sliding door are manufactured with a weight-optimized fibre composite construction.

2.11 Safety equipment

LICCON overload system with test system, hoist limitation, electronic incline display (inclinometer), safety valves against pipe and hose bursts, wind gauge.

2.12 Counterweight

170 t , consisting of 2 brackets each with 10 t and counterweight plates with a total of 150 t.

2.13 Electrical system

Modern data bus technology, 24 V DC, 6 batteries, each with 70 Ah.

3 Boom systems

Note

- ▶ Various boom systems and crane equipment are available for a wide range of application and use cases.
- ▶ The boom systems listed below are also available in a countless configurations. For these reasons, the following list of components is not meant to be complete.

3.1 S-/SL-/SX-/SXL-/SX2-/SX3- main boom systems

For certain S-/SL-/SX-/SXL-/SX2-/SX3- crane operating modes, additional reinforced lattice sections are required.

Note

- ▶ Observe the assembly drawings.
- ▶ Observe the rod plans.

3.1.1 S-main boom combinations

S-boom combinations

S2-boom combinations

S6-boom combinations

3.1.2 SL-main boom combinations

SL-boom combinations

SL7-boom combinations

SL8-boom combinations

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SL9-boom combinations

SL11-boom combinations

SL12-boom combinations

SL13-boom combinations

SL14-boom combinations

3.1.3 SX-main boom combinations

SX-boom combinations

SXZ-boom combinations

3.1.4 SXL-main boom combinations

SXL-boom combinations

SXZL-boom combinations

3.1.5 SX2-main boom combinations

SX2 - boom combinations

SX2Z-boom combinations

SX2L-boom combinations

3.1.6 SX3-main boom combinations

SX3 - boom combinations

SX3Z-boom combinations

SX3L-boom combinations

3.2 D-derrick boom

D-derrick boom 31.5 m
Pivot section
Intermediate section 14 m
End section
Luffing pulley block
Anti-relapse cylinder

D2-derrick boom 42 m
Like the D-derrick boom, in addition the D-intermediate section 10.5 m

D3-derrick boom 38.5 m
Like the D-derrick boom, in addition the D-intermediate section 7 m

D4-derrick boom 42 m
Like the D2-derrick boom, in addition the D-auxiliary guying

3.3 W-lattice jib (luffing lattice jib)

W 28 m to 105 m

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3.4 WV-lattice jib (heavy duty lattice jib)

WV 14 m to 21 m

3.5 F-lattice jib (fixed lattice jib)

F-lattice jib
F 12 m to 27 m

F2-lattice jib
Like the F-lattice jib, with fiber guy ropes

4 Auxiliary equipment

4.1 Hoist gear 1 (winch 1)

Winch 1 as hoist gear

4.2 Hoist gear 3 (winch 3)

Winch 3, control of main boom / D-operation

4.3 Hoist gear 5 (winch 5)

Winch 5, control of luffing lattice jib

4.4 Hoist gear 6 (winch 6)

Winch 6 as additional hoist gear

4.5 Counterweight

Additionally, six counterweight plates, each with 12.5 t in total 245 t

4.6 Derrick ballast - suspended ballast

B-suspended ballast (standard)
Suspended ballast pallet with equalization cylinders and hydraulic telescopeable guide for maximum 400 t derrick ballast with maximum 20 m counter boom radius.

B2-suspended ballast with separable suspended ballast pallet VarioTray
2- part suspended ballast pallet with equalization cylinders and hydraulic telescopic guide for maximum 400 t derrick ballast with maximum 22 m counter boom radius.

4.7 Turntable extension

Extension of turntable by 2.5 m. Increasing counterweight by 5 t in total 250 t.

4.8 Hydraulic assembly cylinder

For self-assembly / disassembly of crawler travel gear.

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4.9 Auxiliary guying frame Z

For SX- / SXL-boom combinations.

4.10 Mobile pin pulling device

For assembly / disassembly of the boom intermediate sections.

4.11 Boom noses

Boom nose 60 t , for installing on S-/L-/W-/WV- head.

4.12 Auxiliary jib HS (wind power peak)

Boom nose 120 t , for installing on L-head,

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1.03 Technical data

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Fig.195219

1 Dimensions and weights of the crane components

Note

- The following listed weights are reference values and may not match your crane exactly.
- The illustrations of crane components / crane parts are examples and may not apply exactly to your crane.

WARNING

Danger of accidents when handling crane components / crane parts!

- Make sure that the actual weight is known before fastening crane components / crane parts.
- Check the weight label on the crane components / crane parts.
- Fasten crane components / crane parts solely with approved and sufficiently load bearing fastening equipment.
- Make sure that crane components / crane parts are fastened only on the intended fastening points.

Note

- Quick Connection*: Quick connection for easy separation from crane superstructure and crawler travel gear.

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Fig.195219

2 Crane dimensions LG 1750

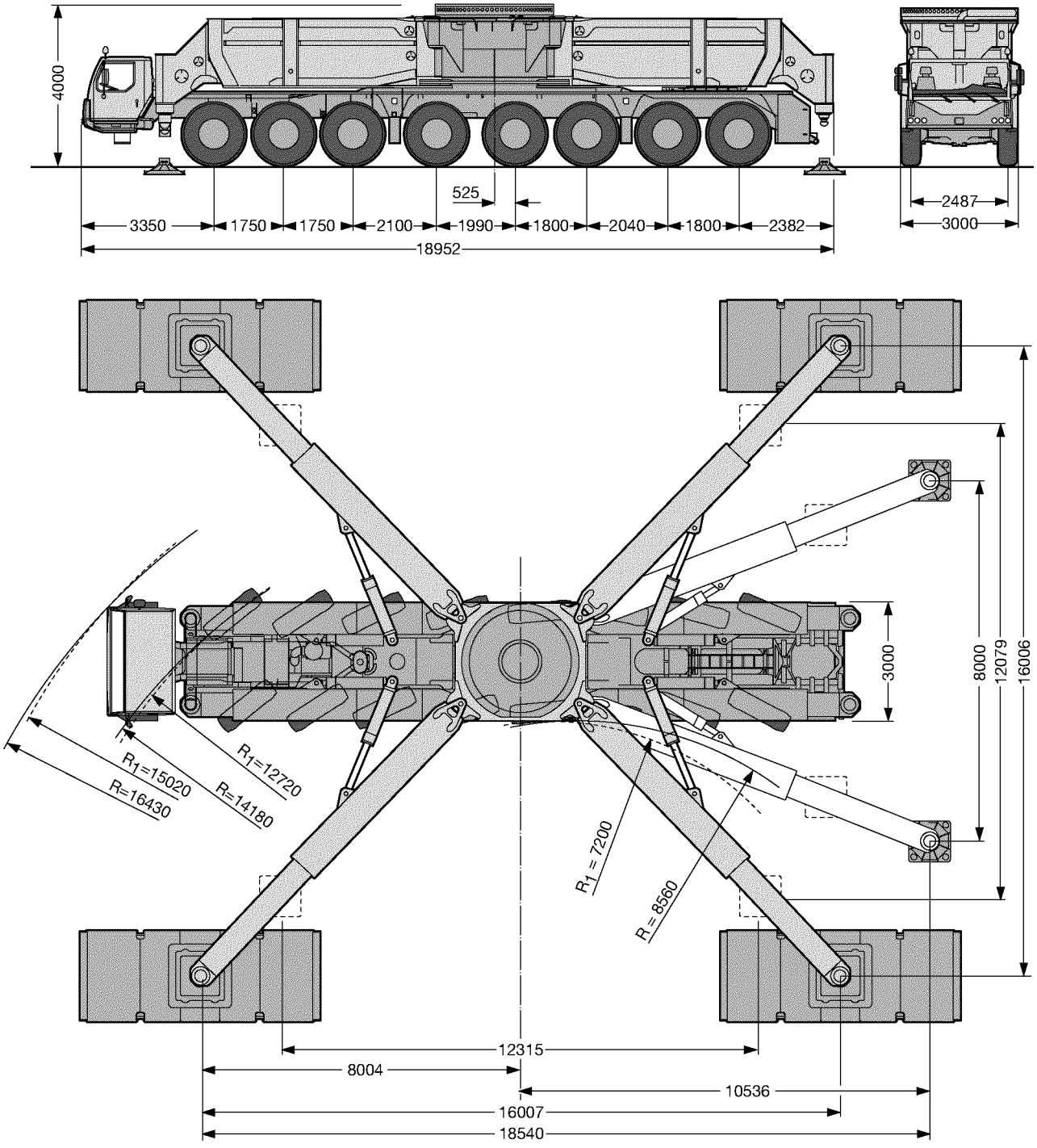

Fig.144322: Crane dimensions

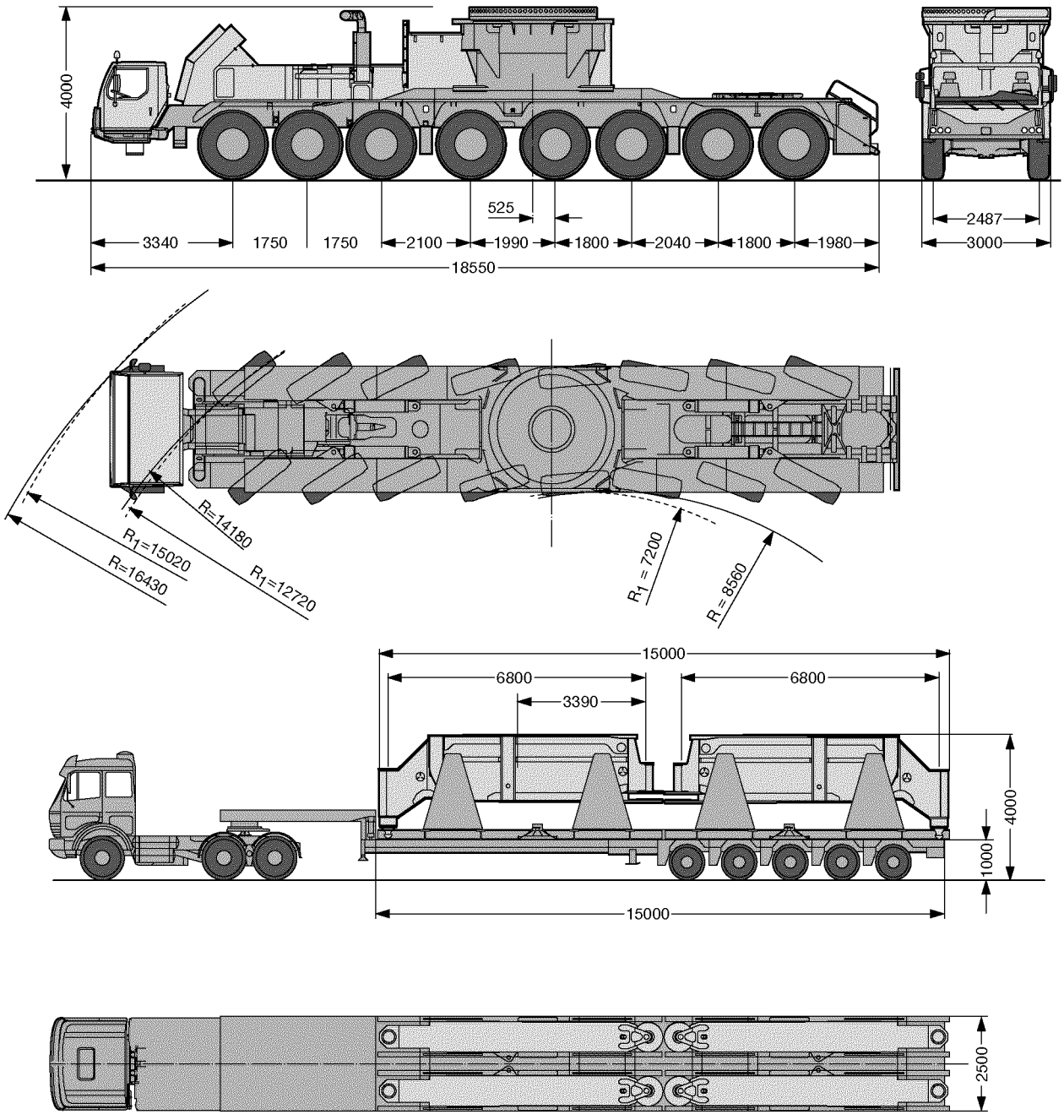

Fig.144323: Crane dimensions

3 Suspension path and incline LG 1750

Suspension path crane vehicle	Side incline
+ 150 mm / - 150 mm	+9°/-9°

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4 Tires LG 1750

Tire size	Wheel weight	Tire pressure for travel operation on public roads	Tire pressure for travel operation with equipment in place
505/95 R 25	467 kg	9 bar	10 bar

5 Axle loads LG 1750

5.1 Axle loads with folding beams

Note
▶ For travel condition of the crane with folding beams, see chapter 3.04.

5.2 Axle loads without folding beams

Note
▶ For travel condition of the crane without folding beams, see chapter 3.04.

6 Weights of the folding beams LG 1750

Component				
Total weight	Folding beam			
	1	2	3	4
48 t	12 t	12 t	12 t	12 t

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7 Crane dimensions LR 1750

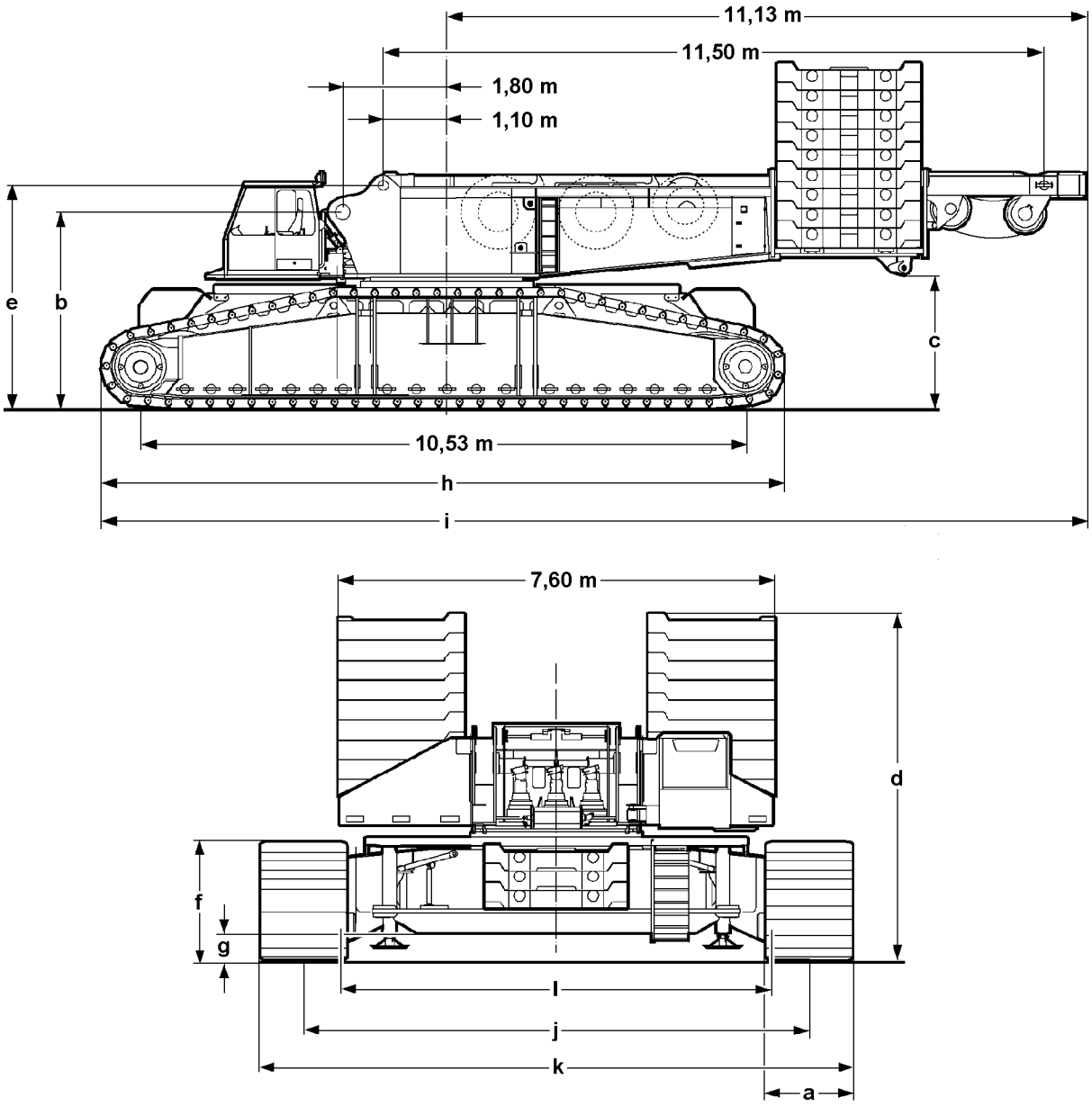

Fig.124359: Crane dimensions

Dimension	Track pad width	
a	1.50 m	2.00 m *

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Dimension	Without Quick connection		With Quick connection	
	Track pad width		Track pad width	
	1.50 m	2.00 m *	1.50 m	2.00 m *
b	3.48 m	3.53 m	3.75 m	3.80 m
c	2.38 m	2.43 m	2.65 m	2.70 m
d[1)]	5.76 m	5.81 m	6.03 m	6.08 m
e	3.95 m	4.00 m	4.22 m	4.27 m

1) Dimension **d** refers to a placed counterweight of 245 t

Dimension	Track pad width	
	1.50 m	2.00 m *
f	2.10 m	2.20 m
g	0.46 m	0.51 m
h	11.90 m	12.00 m
i	17.08 m	17.13 m

Dimension	Center section light		Center section for crane support*	
	Track pad width		Track pad width	
	1.50 m	2.00 m *	1.50 m	2.00 m *
j	8.80 m		8.88 m	
k	10.30 m	10.80 m	10.38 m	10.88 m
l	7.70 m		7.78 m	

8 Ground pressure LG 1750

8.1 Support pressure

	Max. support pressure per support	
	Support base 12 m x 12 m	Support base 16 m x 16 m
At nominal load	5000 kN	3730 kN
Without load, boom on minimum boom radius	2350 kN	2300 kN

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9 Ground pressure LR 1750

9.1 Crawler travel gear surface pressures

Maximum crawler travel gear surface pressures	Track pad width	
	1.50 m	2.00 m *
At nominal load	2400 kN/m²	1750 kN/m²

9.2 Hydraulic crane support surface pressure

Maximum surface pressure	Per support
At nominal load	4750 kN

10 Vibrations

Vibrations transferred to the operator	Value
Total vibration value to which the upper body limbs are exposed	Not more than 2.5 m/s²
Effective value of weighted acceleration to which the entire body is exposed	Not more than 0.5 m/s²

11 Workplace-related emission values

11.1 Sound pressure level LG 1750

Sound pressure level at nominal engine rpm	Stationary noise L_{pAeq}	
	Left ear	Right ear
Driver's cab, driver's side	73 db(A)	74 db(A)
Driver's cab, passenger side	75 db(A)	
Crane operator's cab	70 db(A)	

11.2 Sound pressure level LR 1750

Control platform Crane cab	
Sound pressure level [L_{pA}], according to EN13000	72 db(A)

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12 Load handling equipment

Note
▶ For load handling equipment, see load chart manual.

13 Speeds

13.1 Crane speeds Winches

Note
▶ The crane speeds refer to an engine rpm of 1900 rpm.

Drives	Infinitely variable
Winch 1	0 m/min to 130 m/min for single strand
Winch 2	0 m/min to 130 m/min for single strand
Winch 3	0 m/min to 130 m/min for single strand
Winch 4	0 m/min to 70 m/min for single strand (2-fold)
Winch 5	0 m/min to 130 m/min for single strand
Winch 6	0 m/min to 130 m/min for single strand

13.2 Crane speed slewing gear

Note
▶ The crane speeds refer to an engine rpm of 1900 rpm.

Drives	RPM
Slewing gear	0 rpm to 1.5 rpm

13.3 Crane speeds, luffing the main boom

Note
▶ The crane speeds refer to an engine rpm of 1900 rpm.

Drives	Infinitely variable
Luffing	Approx. 4 min , 0° to 87° boom position at 49 m boom length

13.4 Driving speed LG 1750

Note
▶ Driving speeds with 505/95 R 25 tires.

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Speed	Gear							
	1	2	3	4	5	6	7	8
Road gear	6.3 km/h	8.0 km/h	10.4 km/h	13.3 km/h	16.8 km/h	21.6 km/h	28.6 km/h	36.6 km/h

Speed	Gear						Maximum gradient
	9	10	11	12	R1	R2	
Road gear	47.4 km/h	60.7 km/h	76.9 km/h	80.0 km/h	6.8 km/h	8.7 km/h	33 %

14 Driving speed LR 1750

Note
▶ The crane speeds refer to an engine rpm of 1900 rpm.

15 Hoist ropes

Component	Rope diameter	Rope category number RCN
Winch 1	28 mm	See Rope certificate
Winch 2	28 mm	See Rope certificate
Winch 6	28 mm	See Rope certificate

16 Control ropes

Component	Rope diameter	Rope category number RCN
Winch 3	28 mm	See Rope certificate
Winch 4	28 mm	See Rope certificate
Winch 5	28 mm	See Rope certificate

17 Guy ropes

Component	Rope diameter	Rope category number RCN
Auxiliary guying	32 mm	See Rope certificate

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18 Assembly rope

Component	Rope diameter	Rope category number RCN
Assembly winch	8 mm	See Rope certificate

19 Crane chassis

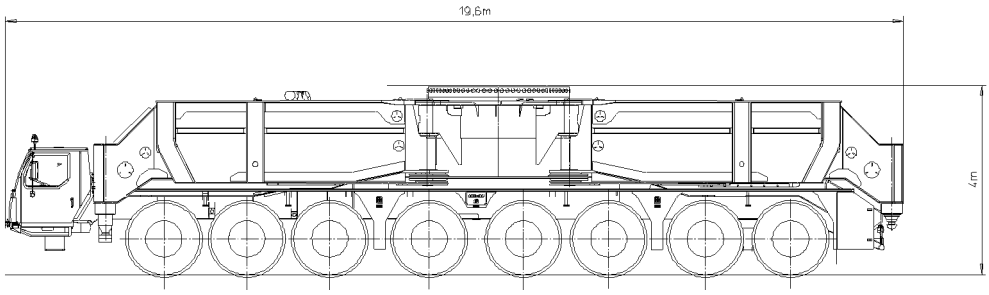

Fig.145295: Crane chassis

Component	Weight	Width
Crane chassis	96.0 t	3.00 m

20 Crane chassis

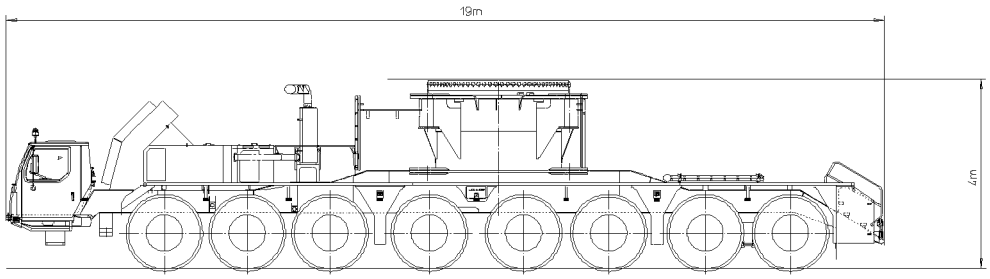

Fig.145296: Crane chassis

Component	Weight	Width
Crane chassis without support beams	50.0 t	3.00 m

21 Support beam LG 1750

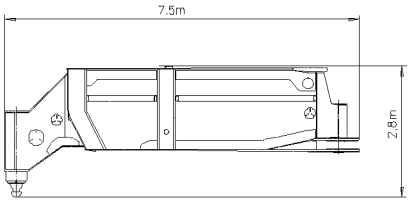

Fig.145304: Support beam

Component	Weight	Width
Support beam LG 1750	11.8 t	1.10 m

22 Crawler carrier

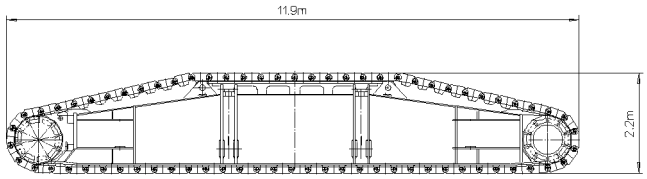

Fig.145311: Crawler carrier

Note
- ▶ Crawler carrier, light: no assembly of the hydraulic crane support* possible on crawler carrier.
- ▶ Crawler carrier, heavy*: Version for assembly of the hydraulic crane support* on crawler carrier.
- ▶ Hydraulic crane support*: for load capacity increase, reduction of ground pressures and leveling of crane.

Component	Track pad width	Weight	Width
Crawler carrier, light with two travel drives	1.50 m	46.0 t	1.55 m
Crawler carrier, light with two travel drives	2.00 m	55.0 t	2.00 m
Crawler carrier, heavy with two travel drives	1.50 m	48.0 t	1.55 m
Crawler carrier, heavy with two travel drives	2.00 m	57.0 t	2.00 m

Component	Track pad width	Weight	Width
Crawler carrier with one travel drive	1.50 m	47.0 t	1.55 m
Crawler carrier with one travel drive	2.00 m	56.0 t	2.00 m

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23 Mechanical auxiliary LR 1750*

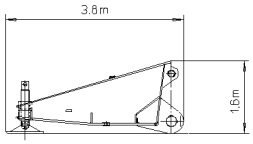

Fig.145319: Mechanical auxiliary support

Component	Weight	Width
Mechanical auxiliary support with support plate, version for light crawler carrier LR 1750	2.5 t	0.80 m
Mechanical auxiliary support with support plate, version for heavy crawler carrier LR 1750	2.8 t	

24 Hydraulic crane support LR 1750*

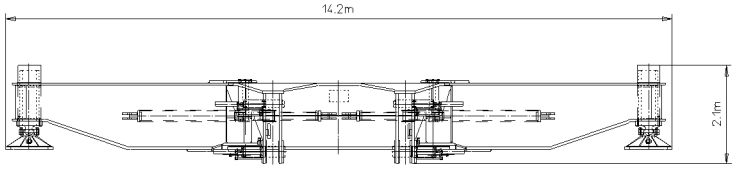

Fig.145318: Hydraulic crane support

Component	Weight	Width
Hydraulic crane support with support plates LR 1750	30.0 t	2.10 m

25 Support plate

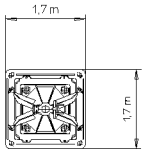

Fig.145369: Support plate

Component	Weight	Height
Support plate	1.2 t	0.50 m

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26 Support plate

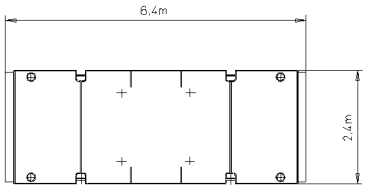

Fig.145370: Support plate

Component	Weight	Height
Support plate	7.8 t	0.30 m

27 Crawler center section

27.1 Crawler center section, light

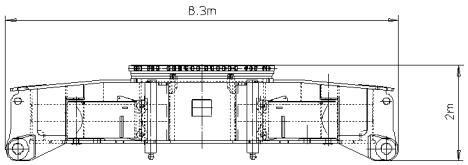

Fig.145312: Crawler center section

Version	Weight	Width
Crawler center section, light without quick connection	30.8 t	3.10 m
Crawler center section, light with quick connection	33.8 t	

27.2 Crawler center section for crane support*

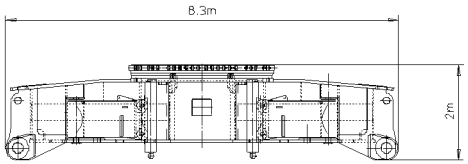

Fig.145312: Crawler center section for crane support

Note

▶ Center section for crane support*: reinforced center section for installation of hydraulic crane support*.

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Version	Weight	Width
Crawler center section for crane support without quick connection	42.5 t	3.10 m
Crawler center section for crane support with quick connection	45.5 t	

28 Crane superstructure

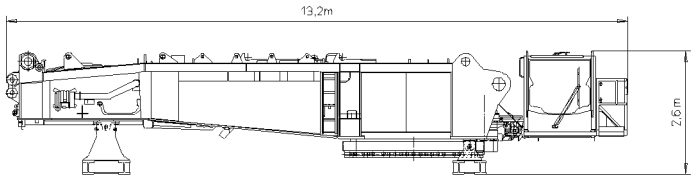

Fig.145297: Crane superstructure

For the weight data of assembly connections the following is valid:
- Without winch 1 and winch 2

Version	Weight	Width
Crane superstructure	42.6 t	3.00 m

29 SA-frame

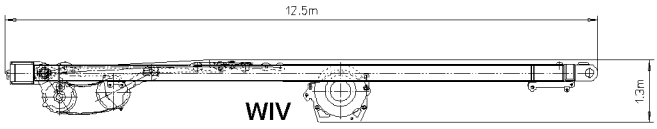

Fig.145298: SA-frame

Component	Weight	Width
SA-frame with winch 4 **WIV** including rope and roller set	18.0 t	2.30 m

30 Crane superstructure with SA-frame

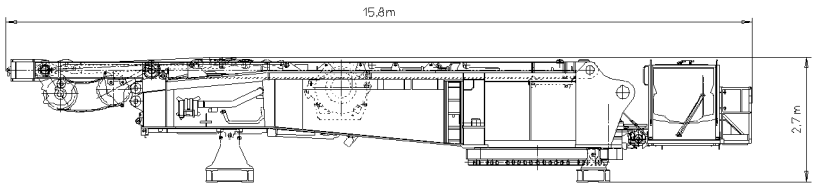

Fig.145299: Crane superstructure with SA-frame

For the weight data of assembly connections the following is valid:
- Without winch 1 and winch 2
- SA-frame with winch 4 including rope and roller set

Version	Weight	Width
Crane superstructure with SA-frame	60.6 t	3.00 m

31 Crane superstructure with SA-frame and crawler center section LR 1750

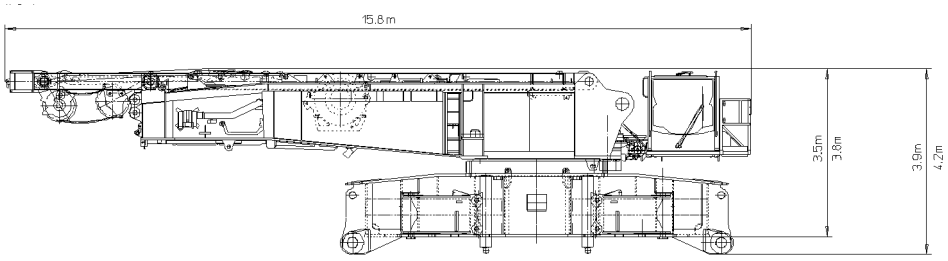

Fig.145315: Crane superstructure with SA-frame and crawler center section

For the weight data of assembly connections the following is valid:
- Including two slewing gears.
- Without winch 1 and winch 2
- SA-frame with winch 4 including rope and roller set

Version	Weight	Width
Without Quick connection	96.5 t	3.00 m
With Quick connection	100.3 t	

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32 Slewing gear

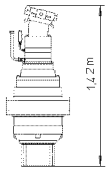

Fig.145320: Slewing gear

Component	Weight	Diameter
Slewing gear	0.9 t	0.57 m

33 Winch 1, Winch 2

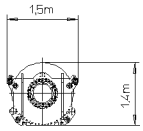

Fig.145300: Winch 1, Winch 2

Component	Weight	Width
Winch 1 **WI**, winch 2 **WII** including rope	9.2 t	1.8 m

34 Rail for D-relapse cylinder LR 1750

34.1 Variation 1

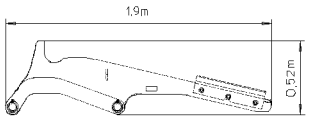

Fig.145321: Rail

Component	Weight	Width
Rail for D-relapse cylinder (derrick boom 38.5 m)	0.2 t	0.25 m

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34.2 Variation 2

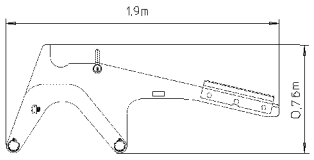

Fig.145322: Rail

Component	Weight	Width
Rail for D-relapse cylinder (derrick boom 42 m)	0.3 t	0.25 m

35 Turntable extension*

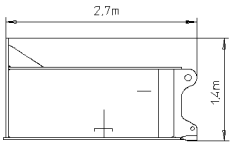

*Fig.145301: Turntable extension**

Component	Weight	Width
Turntable extension	5.0 t	3.0 m

36 Ballast pallet suspended ballast*

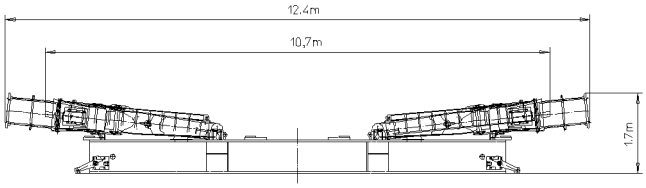

Fig.145302: Ballast pallet suspended ballast

Component	Weight	Width
Ballast pallet suspended ballast	14.5 t	2.50 m

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37 Divisible ballast pallet „VarioTray“ suspended ballast*

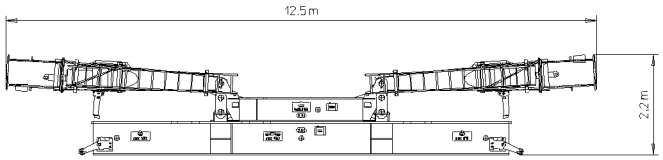

Fig.145303: Divisible ballast pallet „VarioTray“ suspended ballast

Component	Weight	Width
Divisible ballast pallet „VarioTray“ suspended ballast	17.0 t	2.50 m

38 Guide frame ballast pallet*

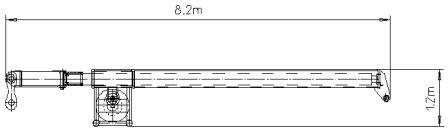

Fig.145305: Guide frame ballast pallet

Component	Weight	Width
Guide frame ballast pallet	8.6 t	3.00 m

39 Ballast trailer with wheel drive*

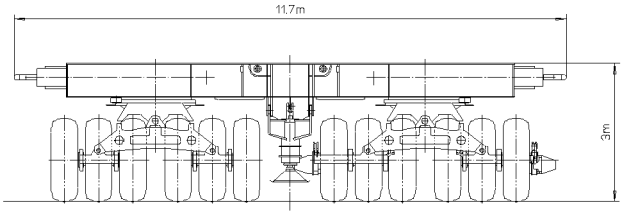

Fig.145316: Ballast trailer with wheel drive

Component	Weight	Width
Ballast trailer with wheel drive	53.0 t	3.00 m

40 Ballast trailer guide*

40.1 Variation 1

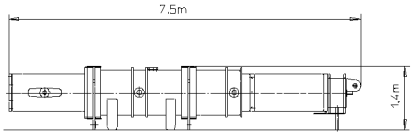

Fig.145317: Ballast trailer guide

Component	Weight	Width
Ballast trailer guide	17.5 t	2.60 m

40.2 Variation 2

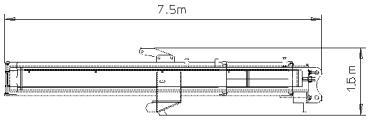

Fig.145371: Ballast trailer guide

Component	Weight	Width
Ballast trailer guide	13.5 t	2.70 m

41 Intermediate section 2 m for ballast trailer

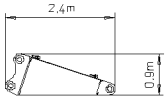

Fig.145372: Intermediate section 2 m for ballast trailer

Component	Weight	Width
Intermediate section 2 m for ballast trailer	2.4 t	2.50 m

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42 Central ballast base plate

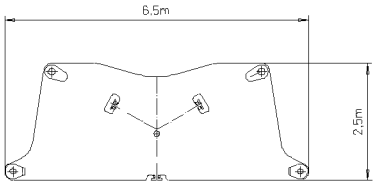

Fig.145310: Central ballast base plate

Component	Weight	Height
Central ballast base plate	10.0 t	0.60 m

43 Crane support console

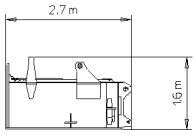

Fig.145307: Crane support console

Component	Weight	Width
Crane support console for central ballast	5.2 t	3.00 m

44 Bracket counterweight

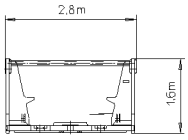

Fig.145306: Bracket counterweight

Component	Weight	Width
Console counterweight for turntable ballast	10.0 t	2.45 m

45 Ballast / counterweight

Variation 1 and variation 2 can be used as:
- Turntable counterweight
- Derrick ballast

Note
▶ Twist lock*: For comfortable assembly of the ballast / counterweight.

45.1 Variation 1

Note
▶ Illustration with Twist lock.

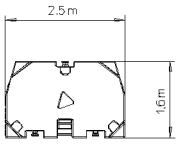

Fig.145309: Ballast / counterweight

Component	Weight	Height	
		without Twist lock	with Twist lock
Counterweight 5.0 t	5.0 t	0.24 m	0.26 m
Counterweight 7.5 t	7.5 t	0.35 m	0.37 m
Counterweight 10.0 t	10.0 t	0.45 m	0.47 m

45.2 Variation 2

Note
▶ Illustration without Twistlock.

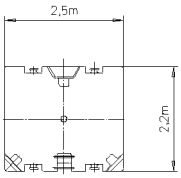

Fig.145308: Ballast / counterweight

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Component	Weight	Height	
		without Twist lock	with Twist lock
Counterweight 6.25 t	6.3 t	0.30 m	—
Counterweight 12.5 t	12.5 t	0.45 m	0.47 m
Counterweight 25.0 t	25.0 t	0.74 m	—

46 Catwalk LR 1750

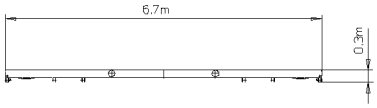

Fig.145313: Catwalk LR 1750

Component	Weight	Width
Catwalk LR 1750	1.4 t	2.30 m

47 Catwalk LR 1750

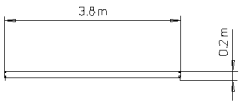

Fig.145314: Catwalk LR 1750

Component	Weight	Width
Catwalk LR 1750	0.4 t	2.20 m

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48 S-pivot section 12 m

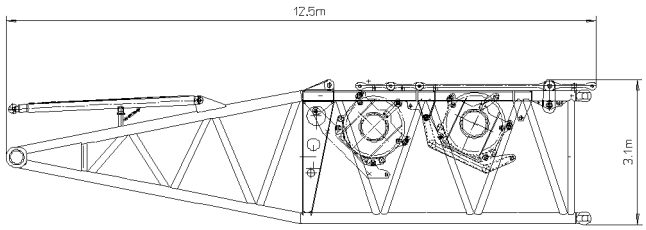

Fig.145323: S-pivot section 12 m

Component	Weight	Width
S-pivot section 12 m **2826.20** with **winch 5** and **6**	32.9 t	3.10 m
S-pivot section 12 m **2826.30** with **winch 5** and **6**	33.7 t	
S-pivot section 12 m **2826.50**	22.2 t	
S-pivot section 12 m **2826.50** with **winch 5**	31.9 t	
S-pivot section 12 m **2826.50** with **winch 5** and **6**	38.8 t	

49 SX-reducer RU 3.2 m

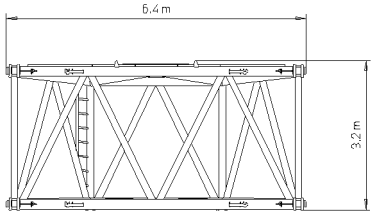

Fig.145324: SX-reducer RU 3.2 m

Component	Weight	Width
SX-reducer **6028.40** RU 3.2 m	7.9 t	3.50 m

50 SX-intermediate section 14 m

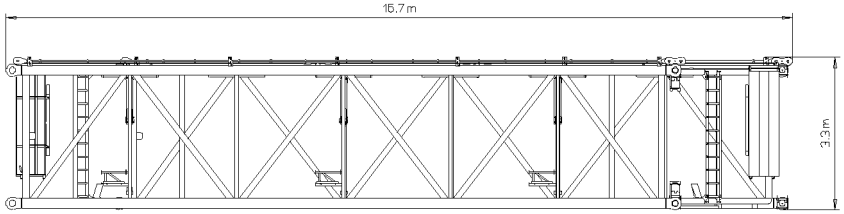

Fig.145325: SX-intermediate section 14 m

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Component	Weight	Width
SX-intermediate section **6028.25** 14 m	12.4 t	3.50 m

51 SX-reducer RO 3.2 m

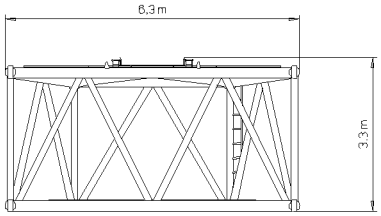

Fig.145326: SX-reducer RO 3.2 m

Component	Weight	Width
SX-reducer **6028.28** RO 3.2 m	7.1 t	3.50 m

52 S-intermediate section RU 14 m

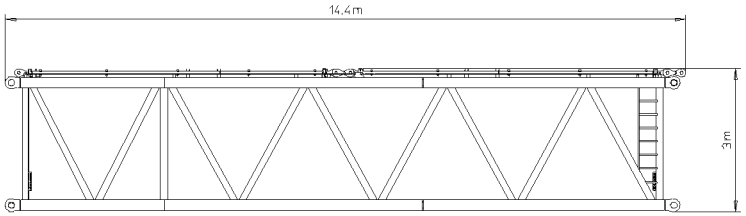

Fig.145327: S-intermediate section RU 14 m

Component	Weight	Width
S-intermediate section **3326.40** RU 14 m	15.9 t	3.50 m
S-intermediate section **3326.40** RU W 14 m	16.3 t	

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53 S-intermediate section 14 m

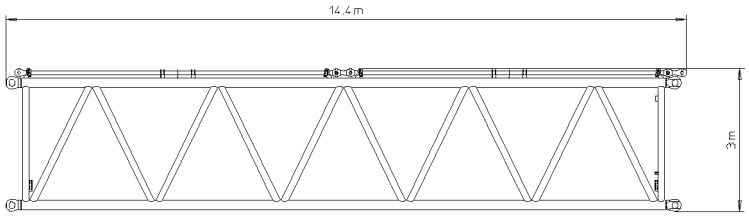

Fig.145328: S-intermediate section 14 m

Component	Weight	Width
S-intermediate section **3326.30** 14 m	13.0 t	3.50 m
S-intermediate section **3326.40** 14 m	15.3 t	
S-intermediate section **3326.50** 14 m	16.7 t	
S-intermediate section **3326.50** with WA-rods 14 m	17.9 t	

54 S-intermediate section RO 14 m

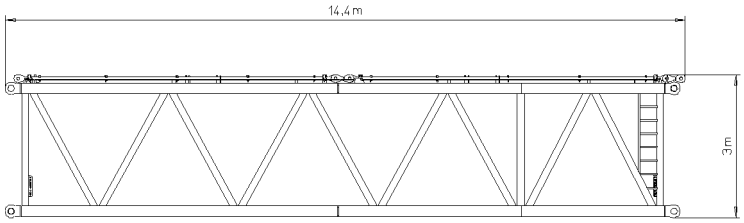

Fig.145329: S-intermediate section RO 14 m

Component	Weight	Width
S-intermediate section **3326.30** RO 14 m	13.4 t	3.50 m
S-intermediate section **3326.30** RO W 14 m	13.6 t	

55 S-intermediate section 3.5 m

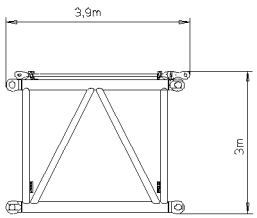

Fig.145330: S-intermediate section 3.5 m

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Component	Weight	Width
S-intermediate section **2826.30** 3.5 m	4.4 t	3.00 m

56 S-intermediate section 7.0 m

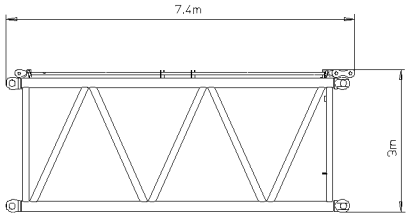

Fig.145331: S-intermediate section 7.0 m

Component	Weight	Width
S-intermediate section **2826.20** 7.0 m	7.0 t	3.00 m
S-intermediate section **2826.30** 7.0 m	7.5 t	

57 S-intermediate section 14.0 m

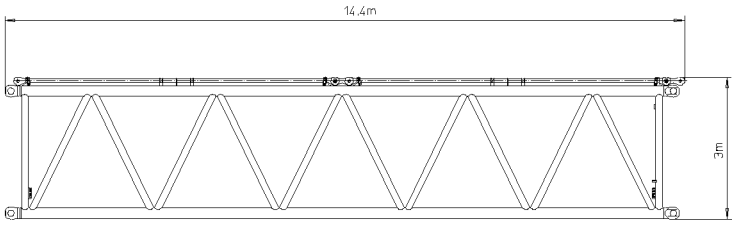

Fig.145332: S-intermediate section 14.0 m

Component	Weight	Width
S-intermediate section **2826.20** 14.0 m	12.8 t	3.00 m
S-intermediate section **2826.20** F 14.0 m	14.5 t	
S-intermediate section **2826.30** 14.0 m	13.8 t	
S-intermediate section **2826.50** 14.0 m	18.1 t	

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58 S-end section 9 m

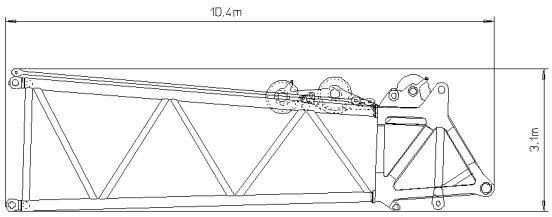

Fig.145333: S-end section 9 m

Component	Weight	Width
S-end section 9 m	13.5 t	3.00 m

59 S-end section 750 t

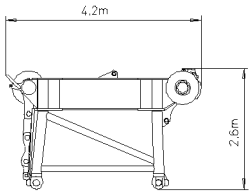

Fig.145334: S-end section 750 t

Component	Weight	Width
S-end section 750 t	8.6 t	3.00 m

60 LA-intermediate section 7.0 m

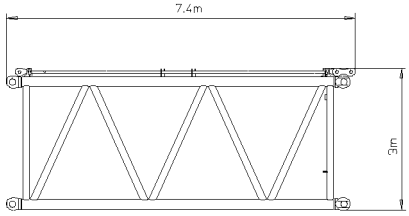

Fig.145336: LA-intermediate section 7.0 m

Component	Weight	Width
LA-intermediate section **2826.10** 7.0 m	5.5 t	3.00 m

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61 LA-intermediate section 14.0 m

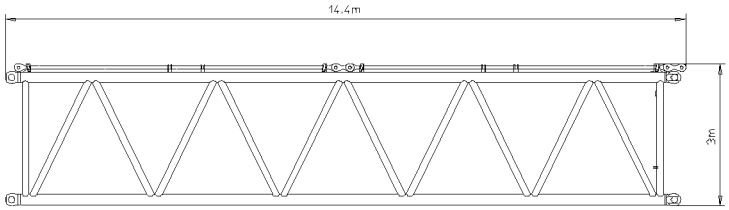

Fig.145337: LA-intermediate section 14.0 m

Component	Weight	Width
LA-intermediate section **2826.10** 14.0 m	8.4 t	3.00 m
LA-intermediate section **2826.15** F 14,0 m	9.5 t	

62 SL-reducer 7.0 m

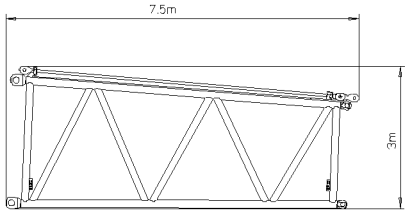

Fig.145335: SL-reducer 7.0 m

Component	Weight	Width
SL-reducer 7.0 m	4.4 t	3.00 m

63 LI-intermediate section 3.5 m

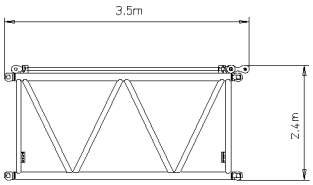

Fig.145340: LI-intermediate section 3.5 m

Component	Weight	Width
LI-intermediate section **2421.10** 3.5 m	3.2 t	2.60 m

64 LI-intermediate section 7.0 m

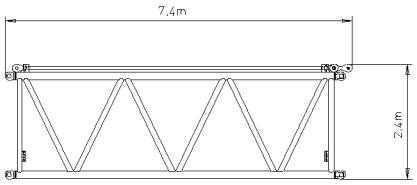

Fig.145338: LI-intermediate section 7.0 m

Component	Weight	Width
LI-intermediate section **2421.8** 7.0 m	3.2 t	2.60 m
LI-intermediate section **2421.10** 7.0 m	3.9 t	

65 LI-intermediate section 14.0 m

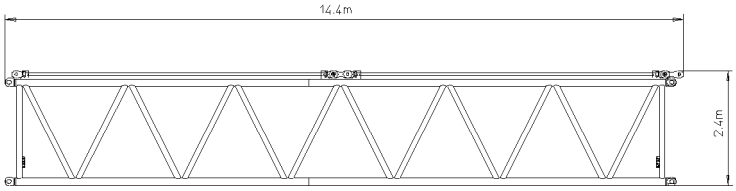

Fig.145339: LI-intermediate section 14.0 m

Component	Weight	Width
LI-intermediate section **2421.8** 14.0 m	5.9 t	2.60 m
LI-intermediate section **2421.10** 14.0 m	7.2 t	
LI-intermediate section **2421.10** F 14,0 m	7.8 t	

66 L-adapter 8.4 m

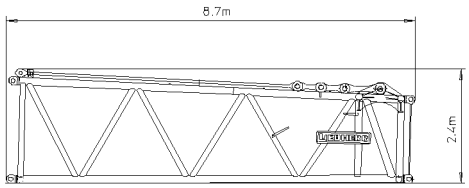

Fig.145342: L-adapter 8.4 m

Component	Weight	Width
L-adapter 8.4 m	5.4 t	2.60 m

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67 L-end section 400 t

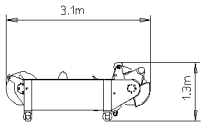

Fig.145341: L-end section 400 t

Component	Weight	Width
L-end section 400 t	3.5 t	2.30 m
L-end section 400 t for boom nose 120 t	3.6 t	

68 D-pivot section 10.5 m

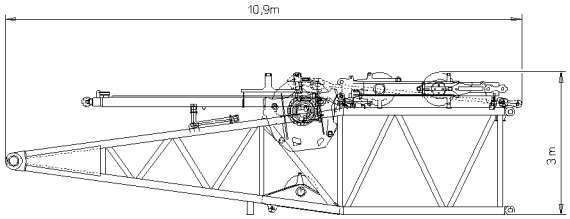

Fig.145343: D-pivot section 10.5 m

Component	Weight	Width
D-pivot section 10.5 m	25.0 t	2.80 m

69 D-intermediate section 3.5 m

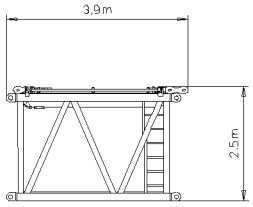

Fig.145344: D-intermediate section 3.5 m

Component	Weight	Width
D-intermediate section 3.5 m	2.9 t	2.70 m

70 D-intermediate section 7.0 m

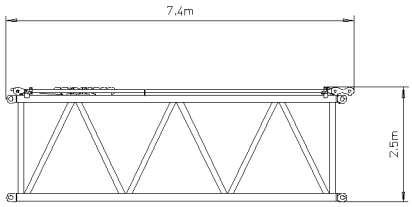

Fig.145345: D-intermediate section 7.0 m

Component	Weight	Width
D-intermediate section 7.0 m	4.9 t	2.70 m

71 D-intermediate section 10.5 m

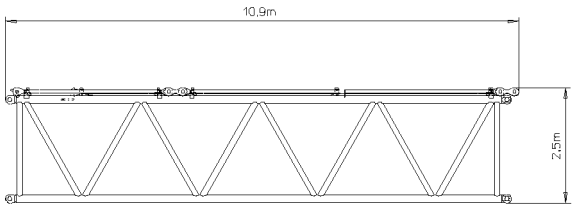

Fig.145346: D-intermediate section 10.5 m

Component	Weight	Width
D-intermediate section 10.5 m	7.1 t	2.70 m

72 D-intermediate section 14.0 m

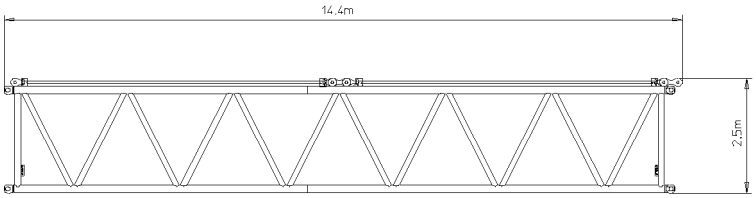

Fig.145347: D-intermediate section 14.0 m

Component	Weight	Width
D-intermediate section 14.0 m	8.8 t	2.70 m

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73 D-end section 7.0 m

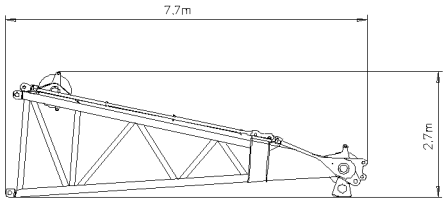

Fig.145348: D-end section 7.0 m

Component	Weight	Width
D-end section 7.0 m	8.6 t	2.70 m

74 W-pivot section 12 m with WA-frame 1 pivot section

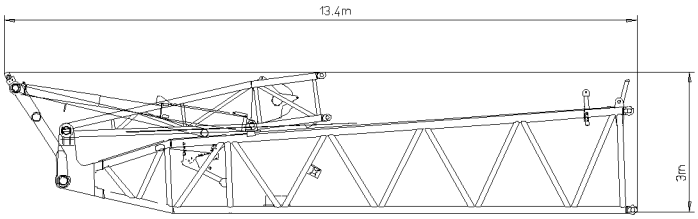

Fig.145349: W-pivot section 12 m with WA-frame 1 pivot section

Component	Weight	Width
W-pivot section 12 m with WA-frame 1 pivot section	11.2 t	2.80 m

75 WA-frame 2, pivot section

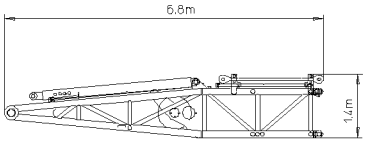

Fig.145350: WA-frame 2, pivot section

Component	Weight	Width
WA-frame 2, pivot section	3.5 t	2.80 m

76 WA-frame 1 and WA-frame 2 end sections

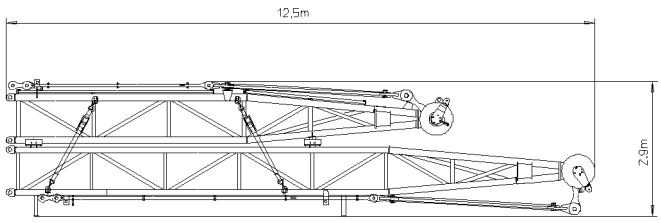

Fig.145351: WA-frame 1 and WA-frame 2 end sections

Component	Weight	Width
WA-frame 1 and WA-frame 2 end sections	9.6 t	2.70 m

77 Adapter for boom nose

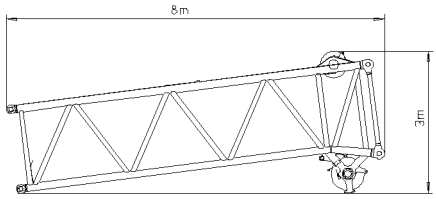

Fig.145352: Adapter for boom nose

Component	Weight	Width
Adapter for boom nose 100 t	3.5 t	2.40 m
Adapter for boom nose 120 t	3.8 t	

78 F-assembly unit with F-end section

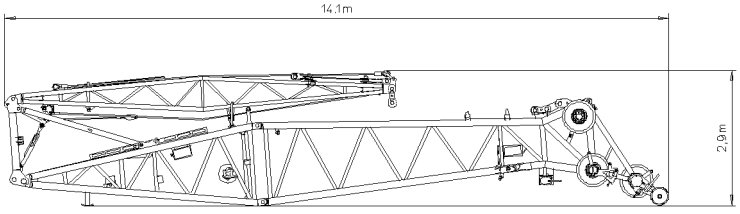

Fig.145353: F-assembly unit with F-end section

Component	Weight	Width
F-assembly unit with F-end section	5.4 t	2.70 m

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79 F-assembly unit

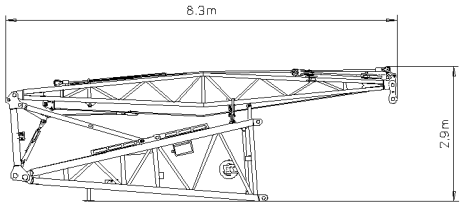

Fig.145354: F-assembly unit

Component	Weight	Width
F-assembly unit	3.0 t	2.50 m

80 F-intermediate section 3 m

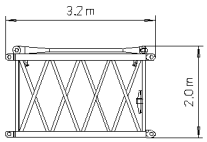

Fig.145356: F-intermediate section 3 m

Component	Weight	Width
F-intermediate section **2116.7** 3 m	0.8 t	2.30 m

81 F-intermediate section 6 m

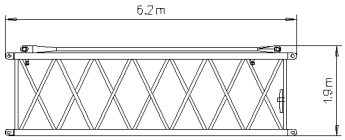

Fig.145357: F-intermediate section 6 m

Component	Weight	Width
F-intermediate section **2116.7** 6 m	1.2 t	2.30 m

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82 F-end section

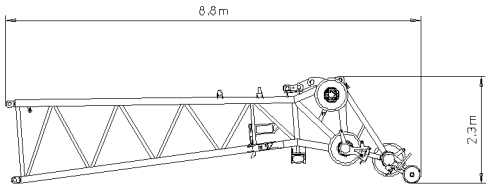

Fig.145355: F-end section

Component	Weight	Width
F-end section	2.4 t	2.30 m

83 F-connecting head

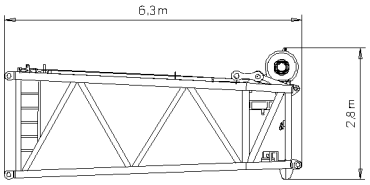

Fig.145358: F-connecting head

Component	Weight	Width
F-connecting head	3.5 t	2.60 m

84 Auxiliary guying frame

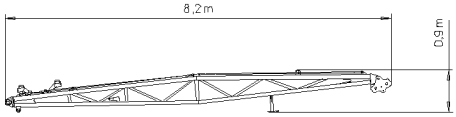

Fig.145359: Auxiliary guying frame

Component	Weight	Width
Auxiliary guying frame	0.9 t	2.90 m

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85 Assembly head 47 t

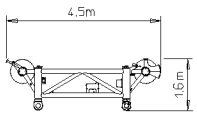

Fig.145360: Assembly head 47 t

Component	Weight	Width
Assembly head 47 t	2.3 t	3.00 m

86 Boom nose 60 t for S-end section

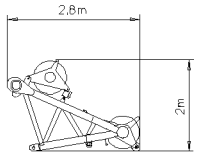

Fig.145361: Boom nose 60 t for S-end section

Component	Weight	Width
Boom nose 60 t for S-end section	1.1 t	2.20 m

87 Boom nose 60 t for L-end section / L-Adapter

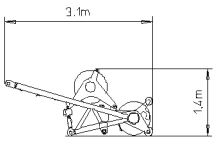

Fig.145362: Boom nose 60 t for L-end section / L-adapter

Component	Weight	Width
Boom nose 60 t for L-end section / L-adapter	0.8 t	0.80 m

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88 Boom nose 100 t for L-end section / L-Adapter

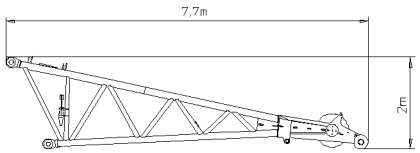

Fig.145363: Boom nose 100 t for L-end section / L-adapter

Component	Weight	Width
Boom nose 100 t for L-end section / L-adapter	2.4 t	2.30 m

89 Boom nose 120 t for L-end section / L-Adapter

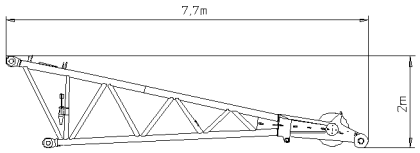

Fig.145363: Boom nose 120 t for L-end section / L-adapter

Component	Weight	Width
Boom nose 120 t for L-end section / L-adapter	2.5 t	2.30 m

90 Roller set 400 t

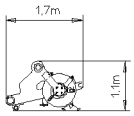

Fig.145364: Roller set 400 t

Component	Weight	Width
Roller set 400 t (S-end section)	2.1 t	1.80 m

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91 Roller set 600 t

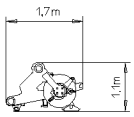

Fig.145365: Roller set 600 t

Component	Weight	Width
Roller set 600 t (S-end section)	2.8 t	2.60 m

92 W-adapter for roller set 600 t

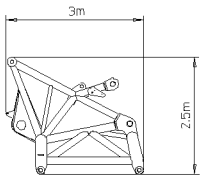

Fig.145366: W-adapter for roller set 600 t

Component	Weight	Width
W-adapter for roller set 600 t	4.6 t	2.50 m

93 Adapter

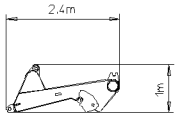

Fig.145367: Adapter

Component	Weight	Width
Adapter	1.3 t	2.20 m

94 Roller cart

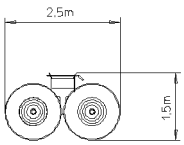

Fig.145368: Roller cart

Component	Weight	Width
Roller cart	1.8 t	3.40 m

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2 Safety

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2.01 Traffic regulations

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Fig.195219

1 Traffic regulations

1.1 General regulations

The traffic regulations are a combination of the **General traffic regulations** and the **National traffic regulations**.

WARNING
Danger of accident if traffic regulations are not adhered to!
▶ In the interest of road traffic safety and environmental protection, observe the specified traffic regulations for the mobile crane when driving on-road!

– The **General traffic regulations** are specified by the crane vehicle manufacturer, see chapter 2.01.10.

– The **National traffic regulations** are determined by the laws of the respective country, where the crane is used, see chapter 2.01.20.

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2.01.10 General traffic regulations

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Fig.195219

1 General traffic regulations

1.1 General safety instructions

The crane vehicle is approved for road travel when used in accordance with regional traffic regulations.

WARNING
Non-observance of general Safety instructions!
If the general safety instructions are not observed, there is a danger of accident!
- ▶ The crane cab may **not** be occupied by passengers while driving the crane!
- ▶ Make sure that the crane vehicle is brought to the respective permissible status as prescribed by the traffic regulations before driving on public roads, paths and squares!
- ▶ Make sure that the weights, axle loads and dimensions are observed as stated in the permit!
- ▶ Make sure that the weights, axle loads and dimensions as stated in the permit are **not** exceeded by added loads!

1.2 Axle loads

Axle loads must be differentiated between:
- – the permissible axle loads according to traffic regulations.
- – the axle loads which are technically possible.

WARNING
Exceeding the axle load and total weight increases the risk of accident!
Any increase in axle load and total weight reduces braking performance in direct proportion to the excess weight!
The wear on brake linings is increased and there is an increased danger of overheating the brakes.
This condition exceeds the specifications of the steering system, service and parking brakes and retarder and they therefore **no longer** meet the regulations!
It shortens the life of all components subjected to the increased axle load, such as brakes, tires, disk wheels and axles, as well as the entire drive, suspension and steering components!
- ▶ Do not exceed the specified axle load or total weight!
- ▶ In countries with EEC regulations, axle loads exceeding 12 t are **not** allowed to be driven on the roads!
- ▶ If the driver drives on-road with more than 12 t , then he bears the responsibility for the consequences!

Note
Driving with reduced axle loads!
For reduced axle loads the operating parameters of the crane change!
When the crane vehicle is driven for short distances without matching the axle loads, the driving behavior can change, depending on the road conditions!
- ▶ If the axle load is reduced due to easier driving permits, then the minimum permissible axle loads and total weights according to the permits part I and part II must be observed!

Applies **not** for LTF-cranes:
- ▶ When the crane vehicle is driven for longer distances with reduced axle loads, the pretension pressures of the axle suspension and tire air pressure must be matched accordingly!

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1.3 Hook block

WARNING
Danger of accident due to limited visibility!
- ▶ Make sure that the visibility of the driver is **not** limited by the hook block when driving the crane vehicle on public roads!

Carry the hook block along only when the following prerequisites are met:
- ▶ Make sure that the hook block is permitted for the respective driving condition of the crane vehicle, see Crane operating instructions, chapter 3.04!
- ▶ Make sure that the hook block has been reeved a maximum of four times!
- ▶ Make sure that the hook block is hooked and tightened with the intended eyehook or the fastening rope on the fastening points, see Crane operating instructions, chapter 3.02!

1.4 Boom nose*

WARNING
Danger of accident due to limited visibility!
- ▶ Make sure that the visibility of the driver is **not** limited by the boom nose* when driving the crane vehicle on public roads!

Carry the boom nose* along only when the following prerequisites are met:
- ▶ Make sure that the boom nose* is permitted for the respective driving condition of the crane vehicle, see Crane operating instructions, chapter 3.04!
- ▶ Make sure that the boom nose* is swung from working position into transport position to avoid restricting the visibility!
- ▶ Make sure that the boom nose* is secured in transport position with pin and spring retainer!

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2.01.20 National traffic regulations

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Fig.195219

1 National traffic regulations

1.1 Statutory regulations

Be sure to comply with all valid **national traffic regulations** when driving the crane!

In the case of transit journeys in or through Germany, observe:
- When driving on public roads within the scope of validity of the StVZO (Federal Motor Vehicle Safety Standards), the relevant regulations and conditions of the recommendations for § 70 of the StVZO must be observed.

In addition, the following regulations must be observed when driving on public roads:
- If applicable, any working floodlights that are present must be turned off.
- If travel condition with telescopic boom is permitted: The telescopic boom must be placed down into the telescope position defined during vehicle acceptance and mechanically secured there to prevent it from moving or twisting. Otherwise the telescopic boom must be removed.
- If applicable, any auxiliary equipment that is present (such as a folding jib, a hook block, auxiliary ballast, a rope winch or the like) must be properly secured in the intended locations as specified in the document assigned to the relevant vehicle or removed and transported separately.
- The sliding or swing beams must be mechanically secured in the intended position when driving on public roads.
- If travel condition with installed support plates is permitted: The existing support plates must be pushed into the intended position within the contour of the vehicle, where they must be mechanically locked and secured. Otherwise the support plates must be removed.
- Moveable crane parts (for example: load hook, rope guides, ropes, brackets) must be secured to prevent them from swinging back and forth and getting lost.
- Applies **not** for LTF-cranes:
  For driving on public roads, the „Travel condition suspended“ for the axle suspension must be set and the vehicle must be aligned via the level regulation.
- No persons may be in the crane operator’s cab while driving on public roads.
- Applies **not** for LTF-cranes:
  The „on-road driving“ steering program must be engaged.
- The differential locks must be turned off.
- If travel condition with installed turntable is permitted: The turntable must be set into the position determined at vehicle acceptance and mechanically secured to prevent turning. Otherwise the turntable must be removed.
- Applies **not** for LTF-cranes:
  The vehicle must be switched to chassis operation.
- The crane cab must be set in transport position, see Crane operating instructions, chapter 3.02.

In the case of transit journeys in or through Germany, observe:
- The set up configurations in which the permitted axle loads and overall weight are complied were defined by the officially recognized vehicle traffic expert during the assessment in accordance with §21 of the StVZO. Equipment parts may neither be removed nor added to this specified set up configuration.

The notes in the Crane operating instructions for set up of the vehicle for driving on public roads must be observed, see Crane operating instructions, chapter 3.02 and chapter 3.04.

At least 4 chocks of nominal size 66 in accordance with DIN 76051 Part 1 must be carried along.

Depending on the set up configuration, the part of the boom head or boom that protrudes at the front must be marked at both sides with red and white hatching. If it is dark it must also be marked with lights shining to the left and right sides (type approved side marker lights).

Warning paint or warning signs are to be attached according to the „guidelines for indication of excessively wide and long vehicles as well as protruding loads“ due to excessive width on the outer left and right front and rear side of the vehicle.

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1.2 Travel conditions of the crane

When driving with the crane, the respective valid **Travel condition of the crane** must be observed, see Crane operating instructions, chapter 3.04.

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2.02 Break-in instructions

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Fig.195219

1 First commissioning

1.1 Safety guidelines

This crane has been inspected before delivery in the manufacturing plant and is operational.

WARNING
Driving in case of a problem!
Death, severe injury, property damage.
▶ Monitor the temperature displays and the oil pressure displays constantly while driving.

When a problem is shown:
▶ Stop driving immediately.

WARNING
Overloaded brake system!
Death, severe injury, property damage.
▶ Do **not** carry out unnecessary forced or continuous braking maneuvers.

1.2 Inspecting the crane vehicle

Perform the following maintenance work after the first 50 km:

WARNING
Loose wheels due to **non-tightened** lug nuts!
Death, severe injury, property damage.
▶ Make sure that the tightening torque for the lug nuts is 600 Nm.
▶ Do not overtighten the lug nuts.

▶ Check the tightening torque of lug nuts.

Visual inspections:

▶ Check the tire condition and inflation.
▶ Check the coolant and hydraulic system for leaks.
▶ Check the engine, transmission and axles for leaks.

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2.03 Job planning

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Fig.195219

1 Planning Crane operation

In addition to a perfectly working crane and a well-trained crew, the **planning for crane operation** is an important principle for safe crane operation.

WARNING
Missing information!
Death, severe bodily injuries, property damage.
▶ Obtain the required information and adhere to it.

Obtain the following information before crane operation and adhere to it:
- Type of crane operation
- National laws and regulations
- Height and width clearance measurements
- When mobile crane: Job site, distance and travel route
- Space prerequisites at the job site
- Electrical transmission lines with voltage data
- Movement restrictions caused by buildings
- Weight and dimensions of the load(s) to be lifted
- Geometric form and air resistance coefficient of the load(s) to be lifted
- Required lifting height and boom projection
- Ground bearing capacity at the job site
- Required space for the assembly and disassembly of the crane
- Weather data and weather forecasts

Assemble the equipment for crane operation:
- Hook block / load hook
- Auxiliary boom
- Fastening equipment
- Counterweight
- Base materials for support plates

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2.04 Technical safety instructions

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Fig.195219

Note

▶ The illustrations in this chapter are only examples. The illustrations may differ depending on the crane model.

1 Dangers on the crane

1.1 California Proposition 65

Proposition 65 of the US State of California warns against chemicals that are known to cause cancer, birth defects and other reproductive harm.

For additional information, see the website: **www.P65Warnings.ca.gov**.

Proposition 65
WARNING: This product can expose you to chemicals, which are known to the State of California to cause cancer, birth defects or other reproductive harm. For more information see: www.P65Warnings.ca.gov.

Fig.147844: Example of a Proposition 65 sign for USA: Chemicals

Proposition 65 WARNING: This product can release chemicals that have been classified by the state of California to cause cancer, birth defects and other reproductive harm.

1.2 Exhaust emissions

Proposition 65 of the US State of California warns against chemicals that are known to cause cancer, birth defects and other reproductive harm.

Proposition 65
WARNING: This product can expose you to chemicals, including exhaust emissions, which are known to the State of California to cause cancer. For more information see: www.P65Warnings.ca.gov.

Fig.147842: Example of a Proposition 65 sign for USA: Exhaust emissions

WARNING

Exhaust emissions!

Damage to health such as cancer.

▶ Avoid exposure to exhaust emissions.
▶ Avoid breathing in exhaust emissions.
▶ **Always** work in properly ventilated spaces.
▶ Use personal protective equipment, such as dust masks with micro-particle filters.

1.3 Lead and lead compounds

Proposition 65 of the US State of California warns against chemicals that are known to cause cancer, birth defects and other reproductive harm.

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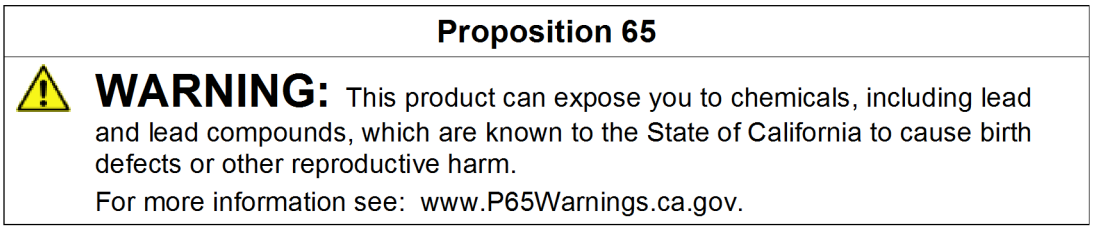

Fig.147843: Example of a Proposition 65 sign for USA: Lead and lead compounds

WARNING
Batteries, battery poles, battery terminals and other battery components contain lead and lead compounds!
Damage to health such as birth defects and other reproductive harm.
- ▶ Avoid direct contact with batteries and their components.
- ▶ Do not touch them with bare hands.
- ▶ Use personal protective equipment: **Always** wear protective gloves.
- ▶ After handling: Wash hands thoroughly.
- ▶ Dispose of disused batteries in an environmentally acceptable manner according to local regulations.

1.4 Hydraulic oil, diesel fuel, operating fluids

WARNING
Due to technical defects or open tank covers, hydraulic oil, diesel fuel or service fluids spill out!
Dirt from the road and ground.
Traffic endangerment: Danger of skidding, death, severe bodily injuries.
Environmental pollution: Death, severe damage to health.
- ▶ Remedy the technical defect immediately.
- ▶ Securely close the tank cover after refuelling.
- ▶ Immediately and thoroughly remove traces of hydraulic oil, diesel fuel, operating fluids.
- ▶ Avoid skin contact with hydraulic oil, diesel fuel and operating fluids.
- ▶ Use personal protective equipment, such as protective gloves.

1.5 Heated crane components

WARNING
Heated crane components! Hot surfaces!
Severe burns.
This applies in particular to exhaust systems, engines and transmissions.
- ▶ Let the components cool down before touching them.
- ▶ Proceed with special caution near heated crane components.
- ▶ Avoid skin contact with hot surfaces.
- ▶ Use personal protective equipment, such as protective gloves.

2 Danger zone of crane

2.1 Crane in operation

The danger zone of the crane is made up of the areas which are accessed during crane operation by the load or by movements of the crane or the crane components.

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WARNING
Do not stay in danger zone!
Personnel within the danger zone can be hit by falling loads or components.
Personnel in the danger zone can be caught by moving crane components or loads.
Fatal or severe injuries can be the result.
- ▶ Warn any personnel within the danger zone with the warning device of the crane.
- ▶ After the warning is issued, wait and ensure that no personnel remains within the danger zone.
- ▶ If required, block off the danger zone with a safety distance.

2.2 Crane out of service

Place the crane out of service, failure to comply with the regulations represents considerable danger for the entire area around the crane.

WARNING
Actual wind speed higher than the wind speed permitted for the crane set up configuration!
Personnel within the danger zone can be hit by a toppling crane or crane components.
- ▶ Make sure that the condition of the crane complies with the regulations and the wind speed charts.
- ▶ If required, block off the danger zone with a safety distance.

WARNING
Icing on the boom!
Personnel within the danger zone can be hit by a falling ice.
- ▶ Make sure that there are no persons within the danger zone.
- ▶ If required, block off the danger zone with a safety distance.

3 Traffic endangerment and environmental damage

WARNING
Danger of slipping and skidding!
If the road becomes contaminated due to technical defects, open tank covers or leaking hydraulic oil, then this would pose a severe traffic endangerment.
Fatal accidents can result.
- ▶ Remove oil immediately and thoroughly.

4 Endangering air traffic

When working with crane, heights are reached which could endanger air traffic. This applies especially to areas near airports.

WARNING
Endangering air traffic!
If no protective measures are taken, this can result in endangerment to air traffic.
- ▶ Get the approval from agency responsible for air traffic.
- ▶ Install the airplane warning light on the boom head and turn it on.
- ▶ If the airplane warning lights is operated for a longer period of time, with the engine turned off, then the battery can be discharged and as the result the airplane warning light turns off. To prevent the battery from discharging, an external electrical power supply must be established.

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5 Movement on the crane

WARNING
Danger of slipping and falling!
The traction of steps, walkways and hand rails changes due to effects of the weather, such as wetness, ice, snow, frost and dirt.
Personnel can be severely injured or killed.
The crane can be damaged.

- ▶ Step on the walkways and steps only by taking the present conditions into account, such as icing in winter or dirt.
- ▶ Step or place a load only on the approved walkways and steps.
- ▶ Observe the signage.
- ▶ Replace damaged safety signs (warning signs) immediately.

6 Emergency exit

6.1 Emergency exit - driver's cab

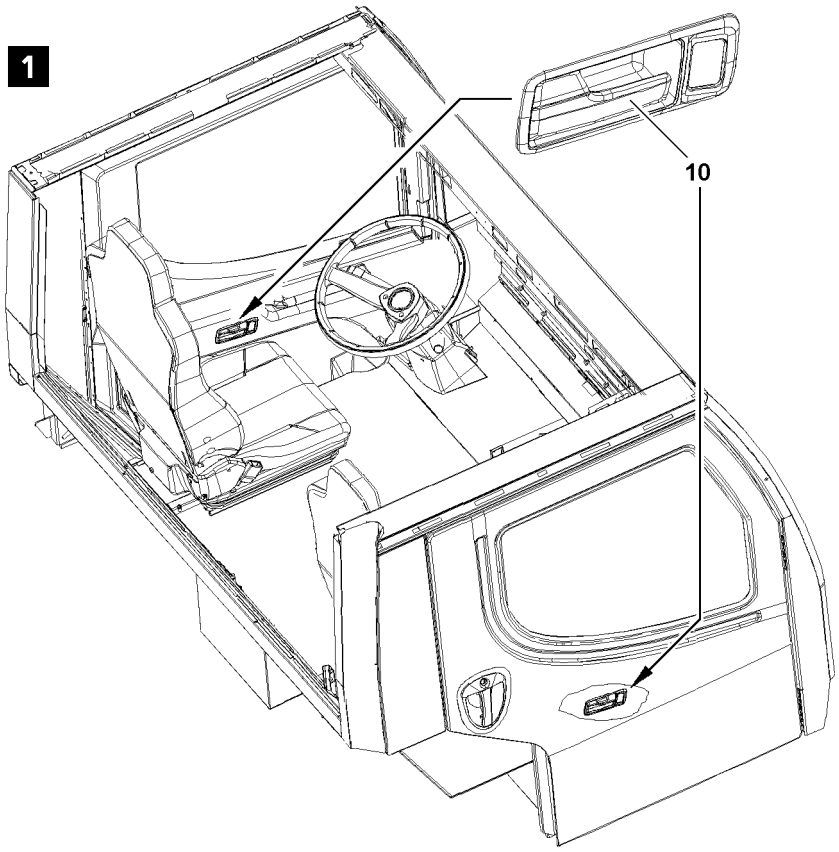

Fig.120932: Example for emergency exit - driver's cab

The driver's cab can be exited through the „left driver's door" or the „right passenger door", see illustration **1**.

Note

- ▶ Exit the driver's cab through the „left driver's door" or the „right passenger door", see illustration **1**: Pull and open the door handle **10** on the „left driver's door" or the „right passenger door".

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6.2 Emergency exist crane cab

WARNING
Danger of falling!
If the crane driver cannot leave the crane cab through the door or if the crane cab is tilted, then there is a danger of falling during the emergency exit.
Death or severe injuries.
▶ Exit carefully in an emergency.

During the emergency exit there is an increase danger of accidents:
▶ Accept third-party assistance.

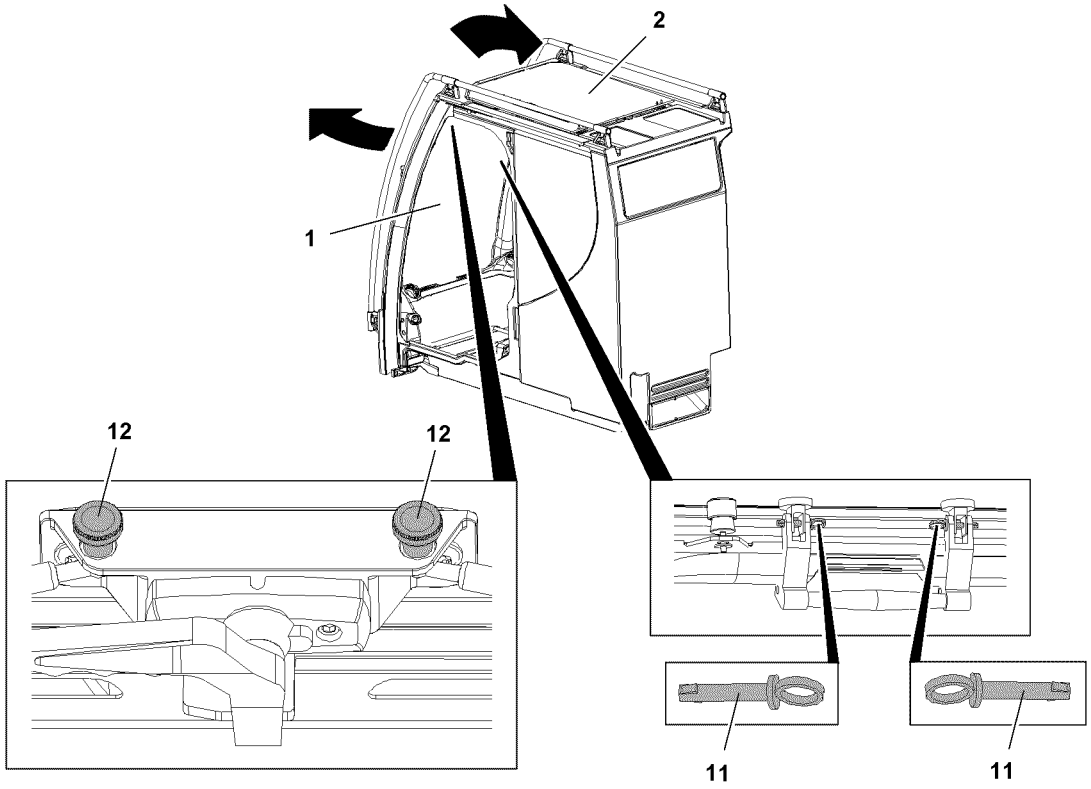

Fig.121111: Examples for emergency exit from the crane cab

If the emergency exit through the door is not possible, then the crane cab can be exited through additional openings.

The following openings are possible:
– **1** Front window
– **2** Roof window

6.2.1 Emergency exit through front window

– Unlock all turn handles.
– Open the front window **1**.
– Leave the crane cab through the front window **1**.

6.2.2 Emergency exit through the roof window

There are two ways to unlock the roof window **2** for the emergency exit:
– Unpin both pins **11**.
– Release both thumbscrews **12**.

– Unlock all turn handles.

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– Unlock the roof window **2** for the emergency exit.
– Open the roof window **2**.
– Leave the crane cab through the roof window **2**.

6.2.3 Emergency exit with EMERGENCY hammer*

Certain crane types carry an EMERGENCY hammer* in the crane cab.

– Knock the front window out with the EMERGENCY hammer* or a suitable object.
– Leave the crane cab.

7 Personal protective equipment

When working on the crane, the required personal protective equipment according to national regulations and accident prevention regulations must be provided and used.

Personal protective equipment includes the following:
– Supplied fall arrest system (safety harness and height safety equipment)
– Supplied height rescue system
– Head protection with chin strap
– Safety shoes
– Protective gloves
– Safety goggles
– Warning apparel
– Hearing protection

WARNING
Personal protective equipment when working on the crane not used!
Death, severe bodily injuries.

The crane operator must ensure the following:
▶ The personal protective equipment is made available.
▶ The provided personal protective equipment is taken along and used.
▶ The operating instructions and maintenance instructions of the manufacturer for the personal protective equipment are observed and complied with.
▶ The product identifications are regularly checked for damage.
▶ Personal protective equipment with damaged product identification is replaced immediately.
▶ Damaged fall arrest systems with height rescue systems will be replaced immediately and handed over to an authorized inspector.
▶ Personal protective equipment is checked for damage and completeness before use.
▶ Defective or damaged personal protective equipment is replaced immediately with functioning protective equipment.

7.1 Supplied fall arrest system

When no other safety measures are possible for working in the presence of a fall hazard, the supplied fall arrest system must be used.

A fall with a fall arrest system cannot exclude an injury. The fall arrest system reduces however the severity of the injuries.

WARNING
Persons not secured!
People can fall down. Death, severe bodily injuries.
▶ Use the supplied fall arrest system.

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WARNING
Fall arrest system damaged!
People can fall down. Death, severe bodily injuries.
▶ Do **not** use a damaged fall arrest system.
▶ Replace a damaged fall arrest system immediately with a new fall arrest system.
▶ Do **not** use the fall arrest system as fastening equipment for loads.
▶ Protect the fall arrest system from external influences.

The fall arrest system must be protected against the following external influences:
– Extreme temperatures
– Guiding the connecting devices over or around sharp edges
– Chemical influences
– Electrical influences
– Cuts, wear
– Climatic effects

Note
If the fall arrest system (safety harness and height safety equipment) is not available or is damaged:
▶ Order is from Liebherr-Werk Ehingen GmbH.

Identification and operating instructions
– The supplied fall arrest system must be clearly and permanently identified.
– If the identification is no longer legible, then the supplied fall arrest system must be immediately replaced and handed over to an authorized inspector.
– The operating instructions must be available in the language of the user country.
– If the crane and the relative personal protective equipment is sold to another country, then the purchaser must make sure that the complete documentation, such as the operating instructions, the manufacturer's operating instructions, inspection log and maintenance documents, are available in the language of the user country.

7.1.1 Safety harness with height safety equipment

The fall arrest system consists of the following components:
– Safety harness **1** approved according to **EN 361**
– Single strand height safety equipment **2** approved according to **EN 360** (for horizontal use and sharp edges)
– or two strand height safety equipment **3** approved according to **EN 360** (for horizontal use and sharp edges)

Fall arrest systems that are not obtained from Liebherr-Werk Ehingen GmbH are **not** designed for the crane structure.

WARNING
Impermissible fall arrest system!
People can fall down. Death, severe bodily injuries.
▶ Utilize exclusively a fall arrest system from Liebherr-Werk Ehingen GmbH.

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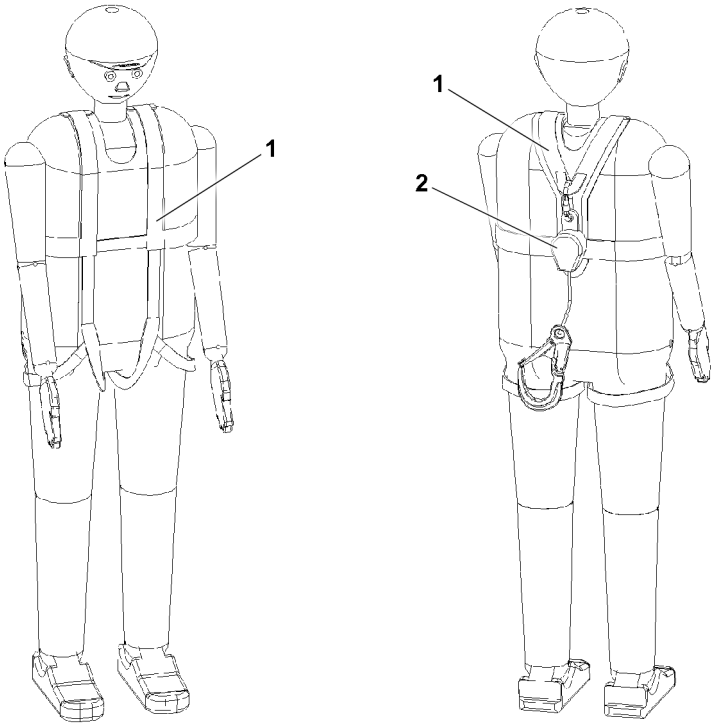

*Fig.146453: Example of a safety harness **1** with a single strand height safety equipment **2***

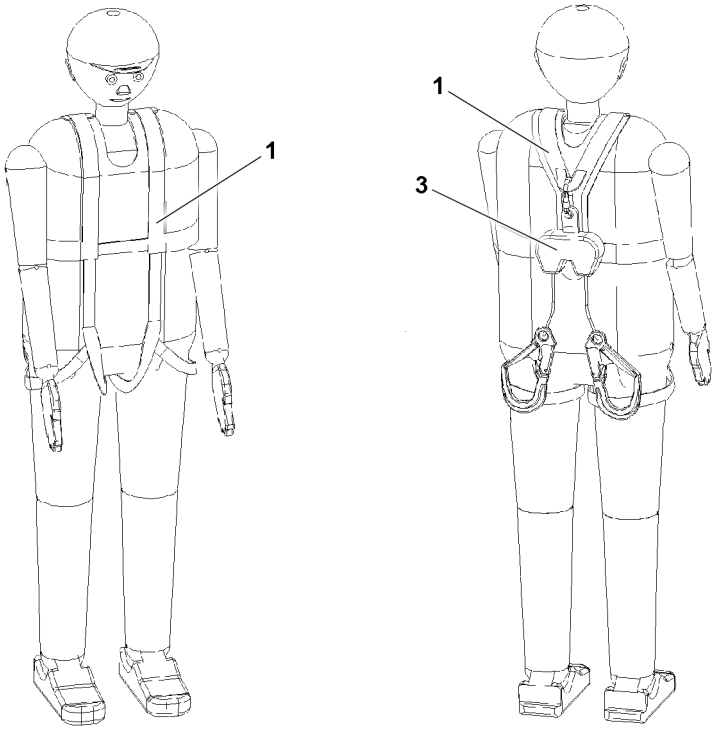

*Fig.146454: Example of a safety harness **1** with a two strand height safety equipment **3***

Prior to crane operation:
- Make sure that the fall arrest system is completely available and functional.
- Check the fall arrest system before use for visible defects. In the case of visible defects: Replace the fall arrest system immediately.

Handling the supplied fall arrest system:
- Observe and comply with the operating instructions of the fall arrest system.
- Check the fall arrest system before use for visible defects.

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- The fall arrest system must be work where no other fall protection equipment, such as railings, can be installed for technical reasons.
- The fall arrest system is effective from a height of 2.5 m. The fall space must be free of obstacles.
- Do **not** change the configuration of the fall arrest system.
- Do **not** lengthen or shorten the fall arrest rope.
- A fall absorber is integrated in the height safety equipment. Do **not** use an additional fall absorber.
- Fasten the fall arrest system only to the hook points, safety ropes and fastening points designed for this purpose. See chapter 2.06.

Behavior in the case of a fall, damage or impairment of the functionality:
- In the case of damage or impairment of the functionality: Replace the fall arrest systems immediately and hand then over to an authorized inspector.
- After every fall: Take down the fall arrest system immediately and hand it over to an authorized inspector. The results must be documented in the fall arrest system inspection log book.
- Only after a written approval may the fall arrest system be reused. The approval must be provided in writing and documented.
- Fall arrest systems that are no longer approved must **not** be used. Unapproved fall arrest systems must be disposed of and replaced with new fall arrest systems.

Storage of the fall arrest system:
- Store the fall arrest system dry and without the effect of UV radiation in the corresponding transport bag.

The operator must ensure the following:
- Personnel must be instructed at least once a year on how to use the supplied fall arrest system (safety harness and height safety equipment) with practical exercises. Performance of the instruction and exercises must be documented.
- The safety harness and height safety equipment must be checked at least once a year by an authorized inspector. The results must be documented in the fall arrest system inspection log book.

Single strand height safety equipment

The single strand height safety equipment is equipped with a belt strap. Single strand height safety equipment is provided for all cranes that do not have walking surfaces with safety ropes.

Use the supplied height safety equipment with extendable belt strap and snap hook with swivel according to **EN 362 Class A**.

Two strand height safety equipment

The two strand height safety equipment is equipped with two belt straps. Height safety equipment with two belt straps are provided for cranes with walking surfaces and two ropes as fastening device on the left and right hand side of the walking surface, for example lattice sections, lattice booms, possibly telescopic booms or assembly units.

Use the supplied height safety equipment with two extendable belt straps and snap hooks with swivel according to **EN 362 Class A**.

WARNING
Height safety equipment incorrectly used!
People can fall down. Death, severe bodily injuries.

When two safety ropes are present on the booms, lattice sections or other components:
- ▶ Only use the height safety equipment with two belt straps.
- ▶ Hook one belt strap with snap hook for the fall arrest system per safety rope.
- ▶ When transferring to new safety equipment, a snap hook for the fall arrest system must **always** be hooked.

7.2 Height rescue system

The height rescue system is only supplied on certain crane types.

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The height rescue system is an evacuation and rescue device. It is used to lift the fallen person to be able to unhook him from the height safety equipment and to lower him by rope.

The height rescue system consists of the following components:
- Rappelling rescue device
- Telescopic rod for hooking the snap hook on the safety harness

WARNING
Height rescue system not present!
Fallen person cannot be saved. Suspension trauma, death, severe bodily injuries.
▶ Always have the height rescue system ready.

WARNING
Height rescue system damaged!
Personnel cannot be saved.
▶ Do **not** use a damaged height rescue system.
▶ Replace a damaged height rescue system immediately with a new height rescue system.
▶ Protect the height rescue system from external influences.

The height rescue system must be protected against the following external influences:
- Extreme temperatures
- Chemical influences
- Electrical influences
- Cuts, wear
- Climatic effects

Prior to crane operation:
- Make sure that the height rescue system is completely available and functional.
- Check the height rescue system before use for visible defects. In the case of visible defects: Replace the height rescue system immediately.

Handling the height rescue system:
- Observe and comply with the operating instructions of the height rescue system.
- Do **not** change the configuration of the height rescue system.

Behavior in the case of a fall, damage or impairment of the functionality:
- In the case of damage or impairment of the functionality: Replace the height rescue system immediately and hand it over to an authorized inspector.
- After every use: Hand the height rescue system over to authorized inspector. The results must be documented in the height rescue system inspection log book.
- Only after a written approval may the height rescue system be reused. The approval must be provided in writing and documented.
- Height rescue systems that are no longer approved must **not** be used. Unapproved height rescue systems must be disposed of and replaced with new height rescue systems.

Storage of the height rescue system:
- Store the height rescue system dry and without the effect of UV radiation in the corresponding transport bag.

The operator must ensure the following:
- Personnel must be instructed at least once a year on how to use the height rescue system with practical exercises. Performance of the instruction and exercises must be documented.
- The height rescue system must be checked at least once a year by an authorized inspector. The results must be documented in the height rescue system inspection log book.

7.3 Hard hat

Wear a hard hat with a chin strap, if head injuries are possible. For example, due to:
- Striking
- Falling, tipping or flying objects
- Oscillating objects

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Replace the hard hat immediately if:
- If is struck with force
- It has visible defects
- When reaching the maximum service life specified by the manufacturer

An industrial hard hat can protect against striking fixed objects and falling or oscillating objects, but **not** against falling loads.

WARNING
Suspended and falling loads!
Death, severe bodily injuries.
▶ Do **not** remain under suspended loads.

7.4 Protective gloves

Wear protective gloves, if hand injuries are possible. For example, due to:
- Pointy or sharp objects
- Hot surfaces

When working with ropes: Protective gloves must be puncture proof.

7.5 Safety shoes

Wear safety shoes, if foot injuries are possible. For example, due to:
- Oscillating or falling parts
- Pointy or sharp objects
- Impact or trapping
- Slipping on slippery ground or surfaces

7.6 Warning apparel

Avoid accidents: Wear reflecting, signal color warning clothing, when personnel must be visible and recognizable.

The „warning clothing“ category includes, for example:
- Safety vest
- Safety jacket
- Safety pants

7.7 Safety goggles

Wear safety goggles when eye injuries are possible. For example, due to:
- Corrosive fluids
- Pressurized fluids
- Flying parts

7.8 Hearing protection

Wear hearing protection when there is a danger of hearing damage due to noise.

7.9 Aids for work at a height

All work at a height, when there is a danger of falling, must be carried out with suitable aids.

Part of the category „Aids for working at a height“ are, for example:
- Work platforms
- Scaffolding
- Assembly platform
- Catwalks
- Ladders

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When working at a height, working on a work platform, scaffolding, assembly platform, catwalk or similar is preferential to working on a ladder.

WARNING
Persons not secured when working at a height!
People can fall down. Death, severe bodily injuries.

When work platforms, scaffolding, catwalks or similar are not available and the work cannot be carried out from the ground:
▶ Secure personnel with the supplied fall arrest system to prevent falling.

When fall protection equipment such as hook points, safety ropes and fastening points are available on the crane:
▶ Secure personnel with the fall arrest system to the fall protection equipment. See chapter 2.06.

When stepping on a ladder:
▶ Do not hold any objects in your hands.
▶ Adhere to the 3-point support. See chapter 2.04.10.

Rules when using the aids:
– Step on the ladder only with clean shoes.
– Keep it free from heavy dirt deposits.
– Keep it free of snow and ice.

8 Securing persons to prevent them from falling

WARNING
Danger of falling!
▶ Wear the supplied fall arrest systems (safety harnesses and height safety equipment) correctly.
▶ When accessing a ladder, do not hold any objects in your hands.
▶ When accessing a ladder, adhere to the 3-point support. See the Crane operating instructions, chapter 2.04.10.

8.1 Working on the telescopic boom head and / or auxiliary boom

Reeve the hoist rope in or out on the pulley head:
– For ladder work, use the supplied ladder. For fastening and hook points, see Crane operating instructions, chapter 2.06.
– For cranes, which carry a ladder along **with** hook device:
Use the hook device to secure the ladder.
– For cranes, which carry a ladder along **without** hook device:
Use the rigging belt to secure the ladder.
– When ascending, the assembly personnel must ensure a 3-point support.
– If there is a danger of falling, the assembly personnel must hook themselves with the snap hooks of the fall arrest system on the fastening points and secure themselves against falling.

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8.2 Walking on the telescopic boom

WARNING
Danger of falling!
The assembly personnel can fall down by slipping on the telescopic boom and be killed or severely injured!

- ▶ The telescopic boom may only be accessed if assembly personnel is protected with suitable safety measures to prevent them from falling.
- ▶ If safety ropes are present on the telescopic boom, then the assembly personnel must hook themselves with the supplied fall arrest system on the safety ropes of the telescopic boom on the left and right with both snap hooks and secure themselves against falling.
- ▶ Without safety measures, it is **strictly** prohibited to step on the telescopic boom.

Assembly of the hoist rope or the TY-guying:

- During assembly, the assembly personnel must hook themselves on the fastening devices on the left and right with both snap hooks of the fall arrest system and secure themselves against falling.

8.3 Access to lattice sections or booms

Climbing the ladder:

- When ascending, the assembly personnel must ensure a 3-point support.

Changing from ladder to catwalk **without** transition aid:

- From a transition height above 1.8 m: **Before** transitioning, the assembly personnel must hook at least one snap hook of the fall arrest system on a safety rope and secure themselves against falling.

Changing from ladder to catwalk **with** transition aid:

- **After** transitioning, the assembly personnel must hook at least one snap hook of the fall arrest system on a safety rope and secure themselves against falling.

8.4 Walking on lattice sections or booms

Walking on catwalks:

- When walking on catwalks, the assembly personnel must hook themselves on the safety ropes on the left and right with both snap hooks of the fall arrest system and secure themselves against falling.
- When changing the fall arrest system over to a new lattice section, the assembly personnel must be hooked with at least one snap hook of the fall arrest system one safety device.

8.5 Working on lattice sections or booms

Pinning, unpinning the lattice sections of pull rods:

- During pinning, unpinning of lattice sections or pull rods, the assembly personnel must hook themselves on the safety ropes on the left and right with both snap hooks of the fall arrest system and secure themselves against falling.

Fastening the lattice sections:

- When fastening the lattice sections, the assembly personnel must hook themselves on the safety ropes on the left and right with both snap hooks of the fall arrest system and secure themselves against falling.

8.6 Descending from lattice sections or booms

Accessing the ladder **without** transition aid:

- From a transition height above 1.8 m: **Before** stepping on the ladder, the assembly personnel must hook at least one snap hook of the fall arrest system on a safety rope and secure themselves against falling.
- When stepping on the ladder, the assembly personnel must ensure a 3-point support.

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– The snap hook of the fall arrest system may only be unhooked after standing safely on the ladder (3-point support).

Accessing the ladder **with** transition aid:
– When stepping on the ladder, the assembly personnel must ensure a 3-point support.

Climbing down the ladder:
– When descending, the assembly personnel must ensure a 3-point support.

9 Rescuing the assembly personnel

The height rescue system is only supplied on certain crane types.

The height rescue system, consisting of the rappelling rescue device, is an evacuation and rescue device. It is used to lift the fallen person to be able to unhook him from the height safety equipment and to lower him by rope.

WARNING
Danger of falling!
▶ The assembly personnel must be instructed and trained properly in the correct handling of the height rescue system. Annual practice instructions and drills must be carried out.
▶ The supplied height rescue system must be kept available.
▶ The operating instructions of the manufacturer for the height rescue system must be observed and adhered to.
▶ The height rescue system must be inspected annually by authorized and trained expert personnel and documented in the inspection log book.

9.1 First aid measures after rescue

WARNING
Danger of fatal injury!
▶ After the rescue, the patient must be positioned with the upper body raised (in seated or squatting position).
▶ Immediate flat position or even shock position can be fatal.

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10 Crane cab

10.1 Entering and exiting with a retractable / extendable step

10.1.1 Crane superstructure in the 0° position or 180° position

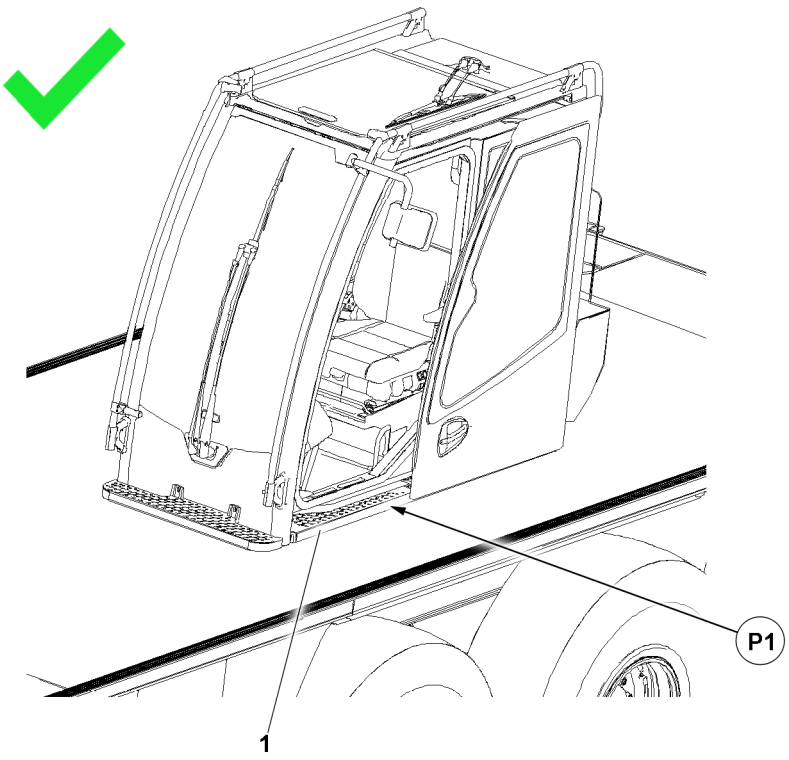

Fig.147868: Entering / exiting with the crane superstructure in the 0° position or 180° position Step retracted

Before entering or exiting the crane cab, the following prerequisites must be met:
- The crane superstructure is in the 0° position or 180° position.
- The step **1** under the crane cab is retracted in position **P1**.
- The crane cab with incline adjustment is in 0° position.
- Folding ladders are folded into the ascent and descent position.

Note

▶ When all folding ladders are folded into the ascent and descent position, then a safe descent is possible from every position. See also chapter 2.07.

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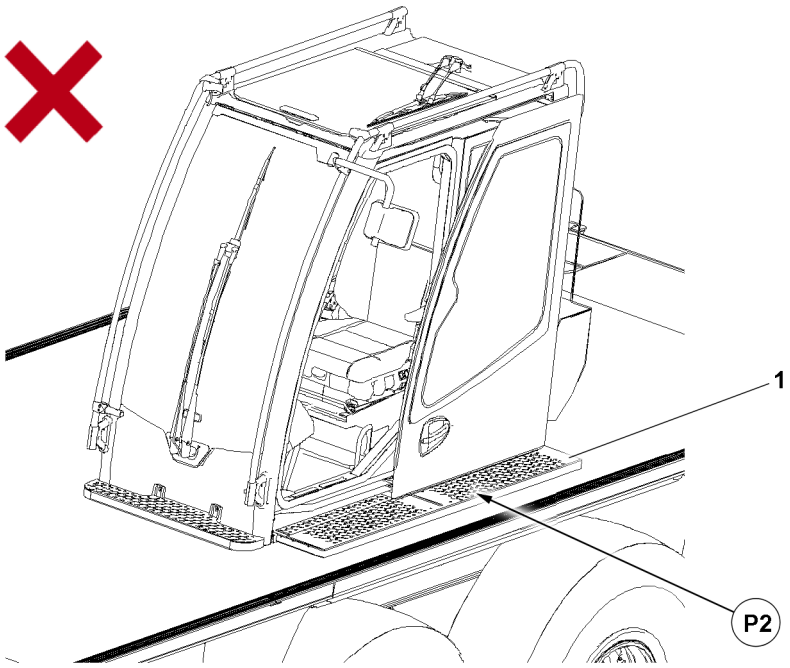

*Fig.147869: Entering / exiting with the crane superstructure in the 0° position or 180° position Step **not** retracted*

WARNING
The crane superstructure is in 0°-position or in 180°-position and the step **1** is **not** retracted!
Personnel can fall when entering / exiting.
Death, severe bodily injuries.
▶ Before entering or exiting: Retract the step **1** completely.

If the step **1 cannot** be retracted:
▶ Guarantee safe entry / exit: Set up suitable climbing aids, such as a ladder or a platform.

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10.1.2 Crane superstructure turned

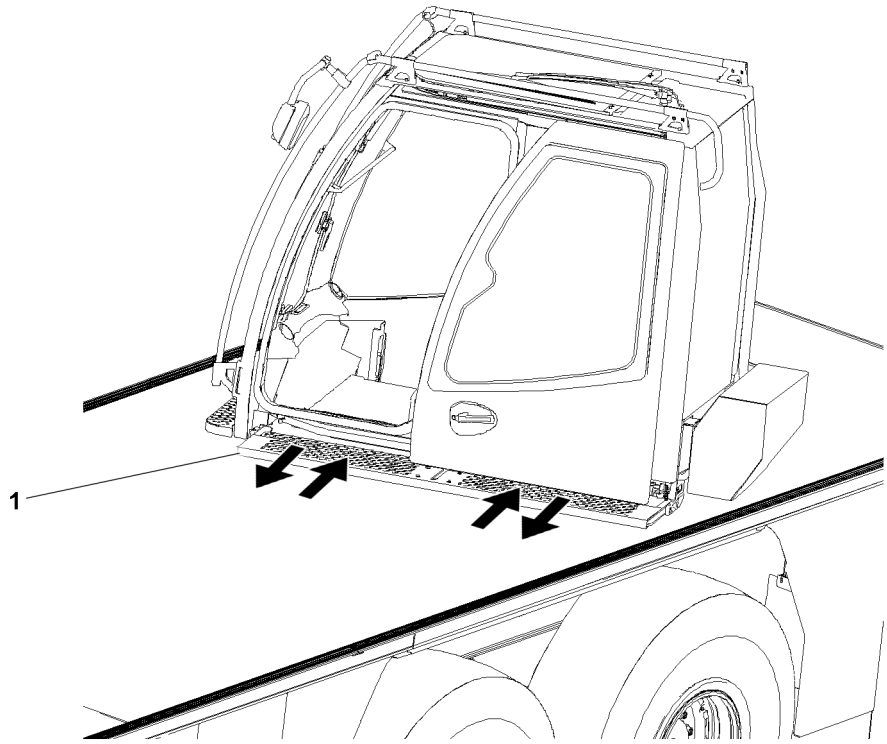

Fig.147870: Entering / exiting with a turned crane superstructure Step extended

Before entering or exiting the crane cab, the following prerequisites must be met:
- The crane superstructure is swung to the point where a safe access to walkable surfaces of the crane chassis is ensured.
- For the crane cab with incline adjustment, the crane cab is in 0° position.
- All folding ladders are folded into the ascent and descent position.

When all folding ladders are folded into the ascent and descent position, then a safe descent is possible from every position. See also chapter 2.07.

Note

The extendable **1** step allows comfortable entry into the crane cab as well as safe exit from the crane to the crane chassis.

▶ Use the extendable step **1**.

10.2 Crane cab with incline adjustment

WARNING

Danger of falling!

If the crane cab cannot be swung from an inclined position (for example 20° position) to the 0° position, for example due to a problem, then utmost caution must be used when entering / exiting the crane cab.

There is a danger of falling. Personnel can be severely injured or killed.

▶ For safety reasons, we recommend to take advantage of outside help.

▶ If necessary, have platforms or other suitable entry aids set up to ensure safe exit from the crane cab.

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WARNING
Danger of accident!
If the door of the crane cab is opened in inclined position, then the door can move back suddenly. Hands can be crushed or injured.
▶ When the crane cab is in inclined position, open the door carefully.

10.3 Securing bracket

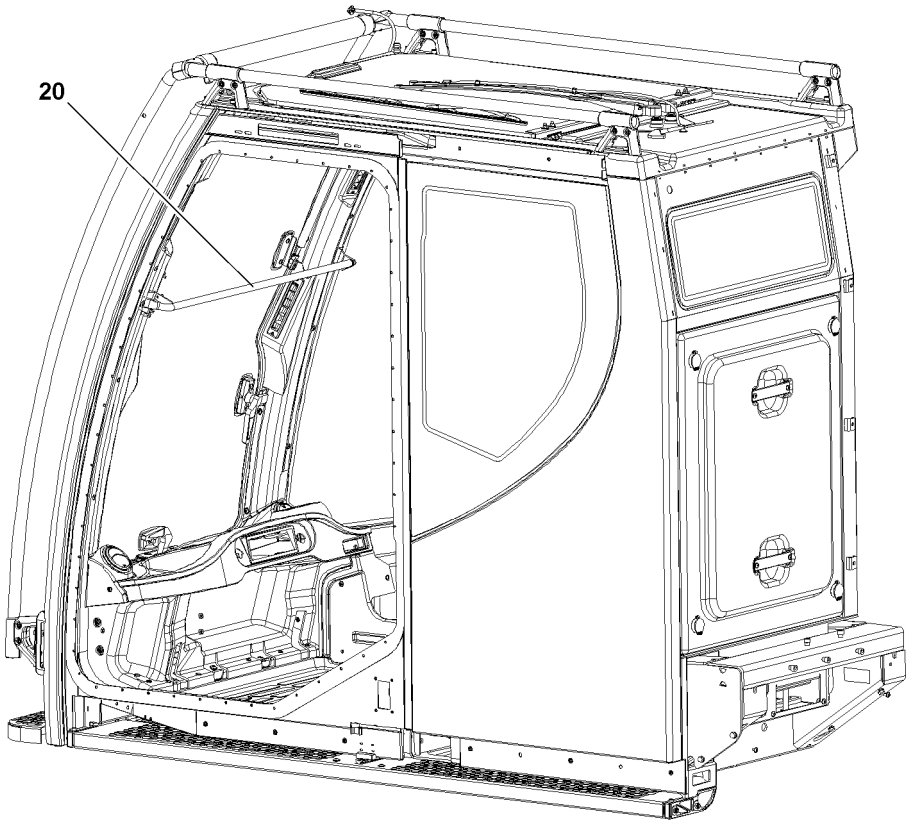

Fig.121158: Example for crane cab with securing bracket

Note
▶ The securing bracket **20** is installed to protect the crane operator from a danger of falling when the front window is open.
▶ Do not use the securing bracket **20** as a handle.

10.4 Closing the side window pane

WARNING
Danger of crushing!
Never close the side window pane carelessly or uncontrolled. Significant crushing injuries can occur.
▶ During closing, watch the side window pane as it moves up.
▶ Make sure that no personnel or objects are crushed.

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11 Transport

WARNING
Error during transport!
Death, severe bodily injuries, property damage.
▶ To avoid accidents, observe and follow the notes provided in the following sections.

11.1 Crane and crane components

Follow the notes provided below to safely transport the crane and crane components:
– Close the crane cab and all cover doors.
– Use suitable transport vehicles.
– Use rigging devices with sufficient load capacity.
– Regularly inspect the rigging and fastening points. See the Crane operating instructions, chapter 8.01.
– Properly support and secure the components on the transport vehicle.
– Use special transport devices. See the Crane operating instructions, chapter 3.80.

11.2 Lattice sections

Follow the notes provided below to safely transport the telescoped lattice sections:
– Securely rig the lattice sections on the transport vehicle and secure them together in at least two independent points.

11.3 Mobile cranes

Follow the notes provided below for the safe transport of mobile cranes.
– To ensure the largest possible frictional coefficient to the transport surface, clean the wheels before transport.
– When driving on the transport vehicle, check the easy movement of the vehicle with the aid of a guide to avoid hitting too hard.
– Apply the parking brake. See the Crane operating instructions, chapter 3.04.
– Lower the crane with the level control to obtain a center of gravity as low as possible. Level control, see Crane operating instructions, chapter 3.03
– Stopping the mobile crane: Place wedges under the wheels. See the Crane operating instructions, chapter 2.04.
– Close the driver's cab.

11.4 Accelerating, changing the load

NOTICE
Permissible acceleration exceeded!
Damage to crane.
▶ Observe the maximum permissible longitudinal acceleration of 1.0 g.
▶ Observe the maximum permissible lateral acceleration of 0.8 g.
▶ Offloading and running is prohibited during rail transport.

If higher accelerations are expected (rail transport, maneuvering operation):
▶ Carry out the special measures to secure the crane and crane components.

NOTICE
Frequent dynamic load change!
Premature fatigue of load bearing crane components.
▶ Demount and properly secure components with large masses.

Components with large masses are, for example:
– Folding jibs

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– Counterweights

12 Stops

WARNING
Defective fastening equipment or fastening points!
The load can fall down.
▶ Make sure that the fastening points and fastening equipment are in a perfect condition.
▶ Regularly inspect the rigging and fastening points. See the Crane operating instructions, chapter 8.01.
▶ Check the fastening equipment regularly. See the Crane operating instructions, chapter 8.01.

WARNING
Load bearing capacity of the fastening equipment is **not** sufficient!
The load can fall down.
▶ Determine the weight of the crane component to be fastened.
▶ Fasten the components solely with approved and sufficiently load bearing fastening equipment.

WARNING
Component incorrectly fastened!
The load can fall down.
▶ Attach the components only on the intended fastening points.

13 Heated crane components

WARNING
Danger of burns!
You can get severely burnt on the surfaces of hot components.
This applies especially to exhaust systems, the engines and the respective gears in the crane chassis and in the crane superstructure.
▶ Let the components cool down before touching them.
▶ Proceed with special caution near heated crane components.

14 Crane operator responsibilities

14.1 General

The crane operator’s primary responsibility is to use and operate the crane in a manner that is safe for both himself and others.

The following important safety guidelines will help you achieve this.

Many crane accidents are caused by crane control errors.

WARNING
Danger due to operating error!
▶ In your interest and in the interest of others, make sure that you know your crane. Also learn to recognize all dangers connected with the work to be carried out.

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Operating errors, which are made again and again while operating or driving a crane are especially careless while working, in particular:
- Slewing too quickly
- Stopping the load too quickly
- Pulling the load at an angle
- Allowing slack rope formation
- Overloading the crane
- Driving too fast with a load and / or equipment on an uneven road
- Fastening the load incorrectly
- Unsuitable operation; especially angular pulling, breaking away stuck loads
- Wind action on suspended loads
- Errors when driving on a road, for example:
  - Overspeeding the engine when driving downhill
  - Driving with turned on differential lock
- Crashing into bridges, roofs or high voltage wires due to insufficient headroom
- Inadequate support; support base, substructure under the support plates
- Errors during assembly or disassembly of booms
- Incorrect positioning of the crane when it is taken out of service
- Exceeding the permissible wind speeds in operation and when out of service

In many cases, crane damage is caused by improper maintenance:
- Insufficient oil, grease or antifreeze
- Contamination
- Broken cable wires, defective tires, worn components
- Emergency limit switch or load torque limiter (LMB) not operating properly
- Brake and clutch failure
- Hydraulic defects; for example cracked hoses
- Loose bolts

14.2 Working on the crane superstructure or boom

WARNING
Danger of falling!
When working on the crane superstructure or boom, personnel must be secured with appropriate safety measures to prevent them from falling. If this is not observed, working personnel can fall and be killed or severely injured.
- ▶ For all work on the crane where there is a danger of falling, suitable safety measures must be taken.
- ▶ The crane superstructure or the boom may not be accessed without suitable aids.
- ▶ Suitable aids are, for example: Lifting platforms, scaffoldings, ladders, assembly platforms, auxiliary crane.
- ▶ If railing are present on the crane superstructure, then they must be swung into operating position and secured for all work, see Crane operating instructions, chapter 2.06.
- ▶ Step on aids and stepping surfaces on the crane only with clean shoes.
- ▶ Keep aids and stepping surfaces on the crane clean and free from snow and ice.
- ▶ If the work cannot be carried out with such aids nor from the ground, then the assembly personnel must secure themselves with supplied fall arrest systems to avoid falling, see section „Personal protective equipment“.
- ▶ It is prohibited to step on the driver’s cab or crane cab roof and specially marked surfaces, see Crane operating instructions, chapter 2.05.

14.3 Obligations of the crane operator

1. Before starting to work, the crane operator must check the brake function and the emergency shut off devices. He must monitor the condition of the crane for obvious defects. On wireless controlled cranes, he must check the assignment of control unit and crane.
2. The crane operator must cease crane operation in case of problems endangering the safety.

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3. The crane operator must report all defects on the crane to the appropriate supervisor, also to his replacement in case of crane change.
4. The crane operator must make sure that:
   - All control systems are set to neutral or idle position before release of the energy supply to the drive components.
   - The control systems are set to neutral or idle position and the energy supply is shut off before leaving the control platform.
   - When taking down the control unit for wireless control, the control unit is secured to prevent unauthorized operation.
5. The crane operator must ensure that cranes subjected to wind are not operated past the limits which were set by the crane manufacturer, and that the boom is taken down at least when the critical wind speeds for the crane are reached and at the end of the work.
6. The crane operator must monitor the load during all crane movements or the load handling equipment when moving the crane without a load, if they could cause a dangerous situation. If observation is not possible, then the crane operator may move the crane only with the aid of a guide.
7. The crane operator must give warning signs when necessary.
8. The crane operator may not move loads over personnel.
9. Any loads attached by hand may only be moved by the crane operator after he received a clear sign from the person who attached the load, the guide or any other responsible party which was assigned to that task by the contractor. If signals must be used to communicate with the crane operator, then these signals must be agreed upon before use between the responsible party and the crane operator. If the crane operator determines that the loads are not properly attached, then he may not move these loads.
10. As long as a load is suspended on the crane, the crane operator must keep the control systems within reach. This does not apply for towing of vehicles with towing cranes.
11. The crane operator may not run up to end positions operationally, if they are limited by the emergency limit switches.
12. After a load torque limiter was triggered, the crane operator may not pick up an overload by pulling in / raising the boom.
13. The crane operator may **not** bypass the overload protection to increase the hoisting power of the crane.

15 Selecting the crane operating location

In the following illustrations 1 to 3 the possible situations are shown as an example.

It is very important to choose an appropriate placement location in order to minimize safety risks.

It must always be possible to take down the crane in order to take down the crane in a timely manner in the case of unexpected weather conditions.

It must always be possible to position the crane in a safe out of service position.

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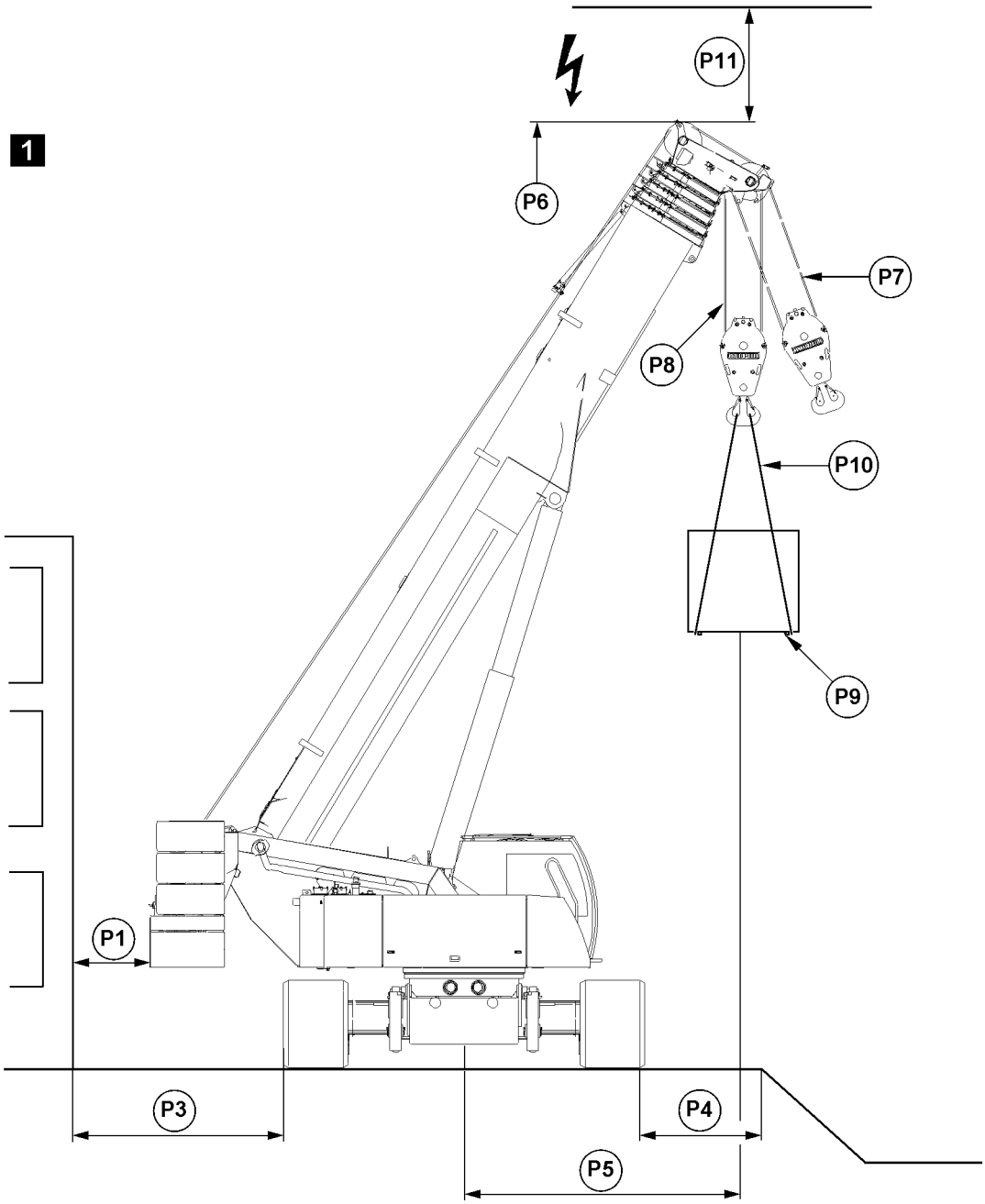

Fig.121166: Example for crawler crane with telescopic boom

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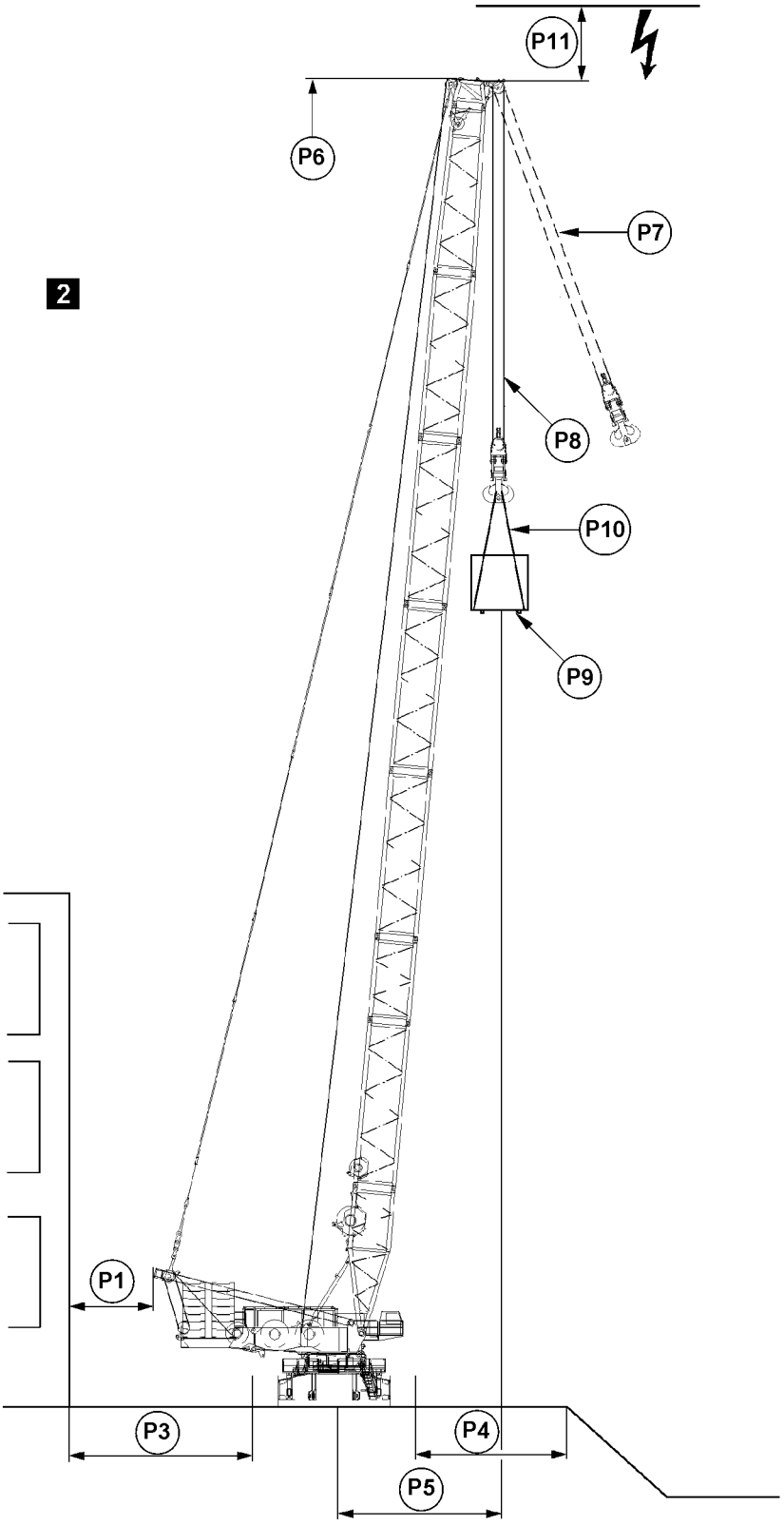

Fig.121167: Example for crawler crane with lattice mast boom

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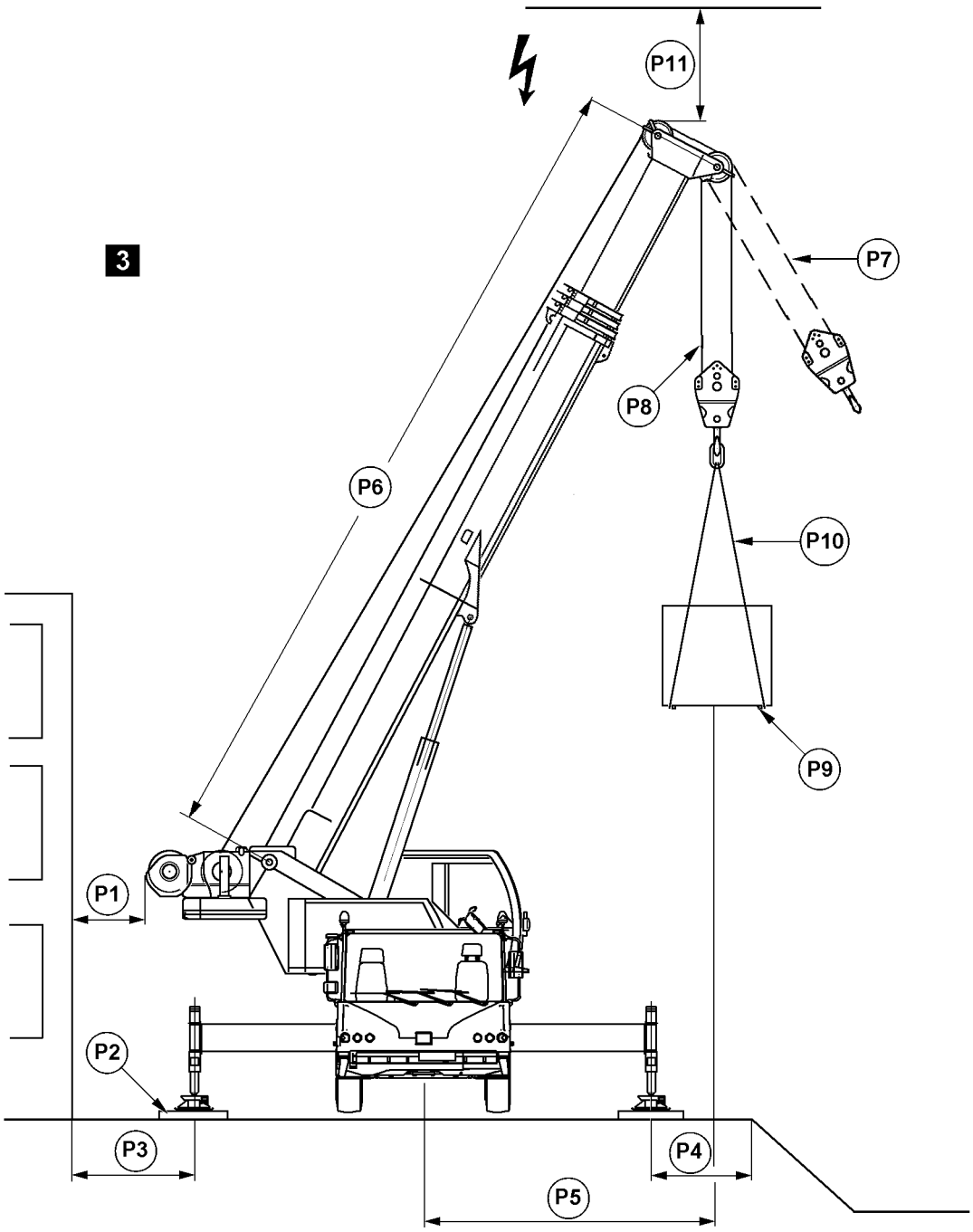

Fig.121168: Example for mobile cranes

DANGER
Danger of accidents due to ground with **insufficient** load bearing capacity!
If the crane is supported or driven on ground with **insufficient** load bearing capacity, then the crane can topple over and kill personnel.
- ▶ Only support or drive the crane on ground with sufficient load bearing capacity.
- ▶ Act responsibly when planning and selecting the crane location and route.
- ▶ Observe the following points.

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Sign	When selecting the placement location for the crane, observe and adhere to the following:
P1	Select the placement location in such a way that crane movements can be carried out without collision and that the supports can be extended to the support base specified in the load charts Make sure that no personnel is injured or killed. Always keep a safety distance of 0.5 m. If this is not possible, block the danger zone off.
P2	When crane support is required: Support the crane correctly and support the support plates large enough according to the load bearing capacity of the ground and the placement location.
P3	Maintain a safe distance from basements or similar
P4	Maintain a safe distance from slopes or similar
P5	Keep the boom radius as small as possible
P6	Select the correct boom length for the load case
P7	Angular pull is prohibited
P8	Select the correct reeving of the hoist rope for the load case
P9	Keep in mind the weight and the wind exposure surface of the load
P10	Select fastening equipment according to the weight of the load, the type of attachment and the incline angle
P11	Maintain a sufficient distance from electrical overhead wiring

16 Slopes and excavations

In the following illustrations 4 and 5 the possible situations are shown as an example.

The crane may not be set up too close to slopes or excavations. Maintain adequate safety distance **A** and safety distance **B** in accordance with the type of soil.

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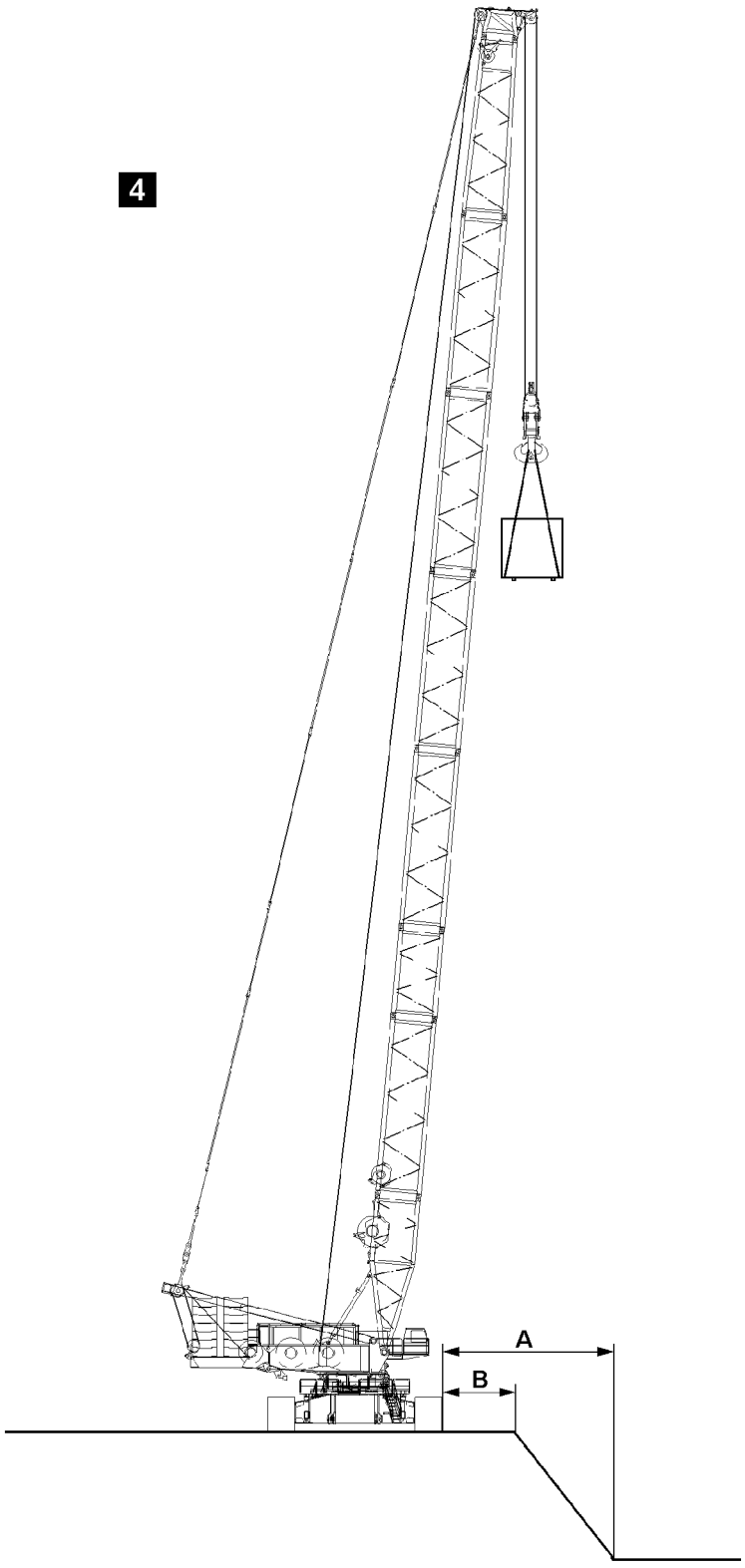

Fig.121162: Example for crawler cranes

A Distance to bottom of excavation

B Distance to excavation

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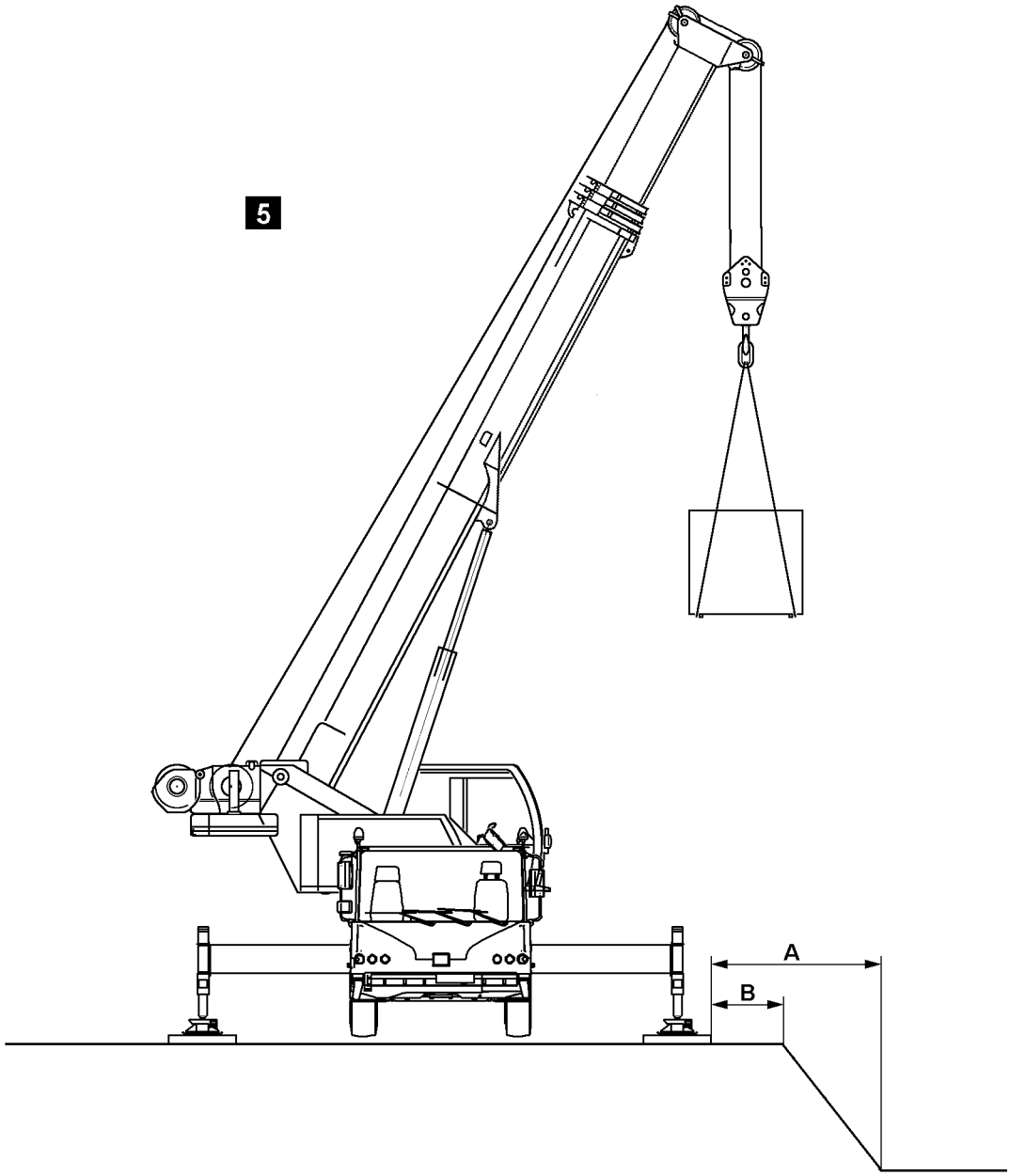

Fig.121163: Example for mobile cranes

A Distance to bottom of excavation

B Distance to excavation

WARNING
Safety distance **A** or safety distance **B** are too small!
The edge or the slope or the edge of the excavation can cave in.
The crane can topple over. Death, severe bodily injuries, property damage.
▶ Maintain the safety distance **A** and safety distance **B**.

Have the safety distance **A** and safety distance **B** calculated by an authorized inspector.

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17 Loads on the ground due to crane operation

Note

▶ Take into account that on a crane with high counterweight the crawler pressures or support forces at low load can be higher than at high load.

17.1 Load burdens on the ground on cranes on crawlers

For cranes on crawlers significant forces are transferred via the track pads of the crawlers into the ground (crawler pressures).

- The ground must be able to safely withstand the resulting pressure.
- If the area of the track pads is inadequate, then the crawlers must be supported from below according to the load bearing capacity of the ground.
- The required substructure can be calculated from the load bearing capacity of the ground and the crawler pressures of the crane.

WARNING

Load bearing capacity of the ground insufficient!
The ground can give, the crane can topple over.
Death or severe bodily injuries.

▶ Support large enough, according to the load bearing capacity of the ground with suitable materials, such as wooden beams or steel plates.

To obtain an even pressure distribution over the substructure surface:

▶ Set the crawlers centered on the substructure.

Note

▶ The respective ideal crawler pressure can be determined with the job planner program.

17.2 Load burdens on the ground on cranes on supports

When the crane is supported, significant forces (support forces) are transferred by the support cylinders via the support plates into the ground.

The ground must be able to safely withstand the resulting pressure.

If the support plate surface area is inadequate, then the support plates must be supported from below according to the load bearing capacity of the ground.

The required support surface areas can be calculated from the load bearing capacity of the ground and the support forces of the crane.

WARNING

Load bearing capacity of the ground insufficient!
The ground can give, the crane can topple over.
Death or severe bodily injuries.

▶ Support large enough, according to the load bearing capacity of the ground with suitable materials, such as wooden beams or steel plates.

To obtain an even pressure distribution over the substructure surface:

▶ Set the support plates centered on the substructure.

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17.3 Examples for the load bearing capacity of the ground

	Soil type	Permissible ground pressure [kN/m²]
1.	Organic ground:	
	Peat, sludge, muck	0
2.	Uncompacted fill:	
	Construction debris	0 to 100
3.	Non-cohesive ground:	
	Sand, gravel, rocks and mix	200
4.	Cohesive soil:	
	a) Clayed silt, mixed with topsoil	120
	b) Silt, consisting of poor clay and coarse clay	130
	c) Plastic clay, consisting of potter's clay and fill	
	Stiff	90
	Semi-solid	140
	Solid	200
	d) Mixed granular ground, clay to sand, gravel and rocky areas	
	Stiff	150
	Semi-solid	220
	Solid	330
5.	Rock in evenly solid condition:	
	a) Brittle, with traces of decomposition	1500
	b) Not brittle	4000

Examples: Permissible ground pressure of the ground

If there is any doubt about the load bearing capacity of the ground at the placement location, soil tests must be carried out by an authorized inspector, for example with a ram penetrometer.

17.4 Calculation examples

The following are general calculation examples. The values are used only to explain the calculation steps. The crane specific values are in chapter 1.03 of the crane operating instructions.

Example: Calculation of ground pressure of support plates for cranes on supports		□
Support force according to Crane operating instructions, chapter 1.03 for example: 720 kN	720 kN	
Surface of square support plate with 550 mm side length according to chapter 1.03, for example: 0.55 m x 0.55 m = 0.3 m²	0.3 m²	
80 % as carrying surface of support plate: 0.3 m² x 0.8 = 0.24 m²	0.24 m²	
Ground pressure = Support force / load bearing surface support plate	720 kN / 0.24 m² = 3000 kN/m²	
Ground pressure per support:	**3000 kN/m²**	

Example: Calculation of ground pressure

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- The value of the ground pressure is far higher than the permissible ground pressure for all types of granular soil.
- If this crane is utilized on bedrock, gravel type of ground, permissible ground pressure 200 kN/cm² , then the support surface must be increased.

Example: Calculation of required support surface for cranes on supports		□
Support force according to Crane operating instructions, chapter 1.03 for example: 720 kN	720 kN	
Ground pressure from chart *Permissible ground pressures* for example: 200 kN/m²	200 kN/m²	
Required support surface = Support force / permissible ground pressure	720 kN / 200 kN/m² = 3.6 m²	
Required support surface per support:	**3.6 m²**	

Example: Calculation of support surface

- The surface of the substructure for each support plate must be at least **3.6 m²**.
- The height of the substructure must be selected depending on the load distribution angle.

Note

▶ The corresponding ideal support forces can be determined with the Job planner.

17.5 LICCON job planner

The calculation of support forces and crawler pressures with the LICCON job planner are based on idealized assumptions: level and homogenous ground, rigid crane structure, no consideration in regard to wind.

Side deformations of the boom system due to wind, incline position and elastic compliance of the steel structure can lead to increase of support forces or to increase of crawler pressures.

The determination of the values, taking wind load on the crane and the load into account, as well as the elastic deformation of the crane can only be carried out by the crane manufacturer or a qualified authorized inspector.

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17.5.1 Example for crane on crawler with derrick boom, suspended ballast and short (main) boom system

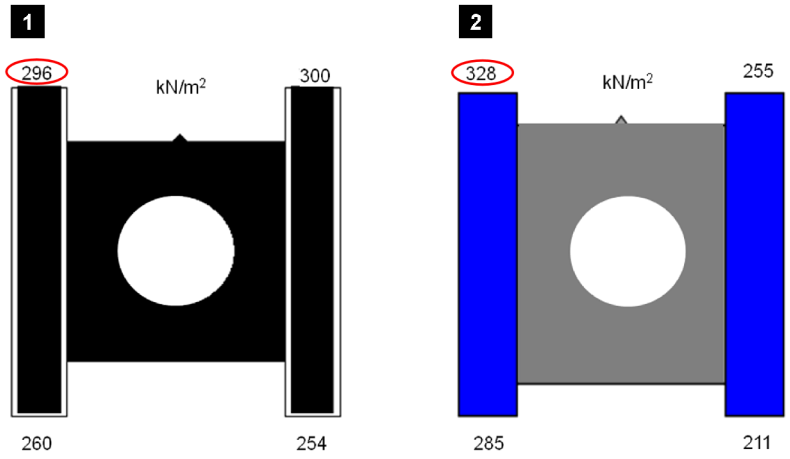

Fig.125052: Example for crane on crawler with derrick boom, suspended ballast and short (main) boom system

Illustration 1: Idealized crawler pressures from Job planner calculated with the aid of a rigid body system and no consideration regarding wind

Illustration 2: Idealized crawler pressures with consideration of elastic deformation and wind on crane and load

17.5.2 Example for crane on crawler with derrick boom, suspended ballast and long (main) boom system

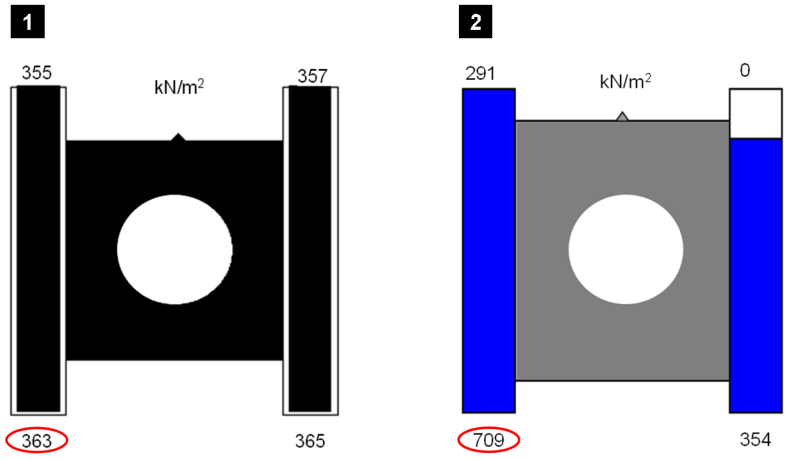

Fig.125053: Example for crane on crawler with derrick boom, suspended ballast and long (main) boom system

Illustration 1: Idealized crawler pressures from Job planner calculated with the aid of a rigid body system and no consideration regarding wind

Illustration 2: Idealized crawler pressures with consideration of elastic deformation and wind on crane and load

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17.5.3 Example for crane on supports

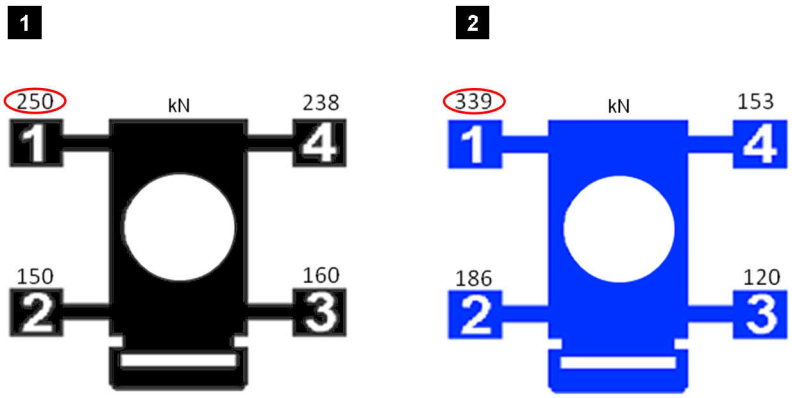

Fig.125054: Example for crane on supports

Illustration 1: Support forces from Job planner calculated with the aid of a rigid body system and no consideration regarding wind

Illustration 2: Support forces with consideration of elastic deformation and wind on crane and load

18 Support

18.1 Support plates

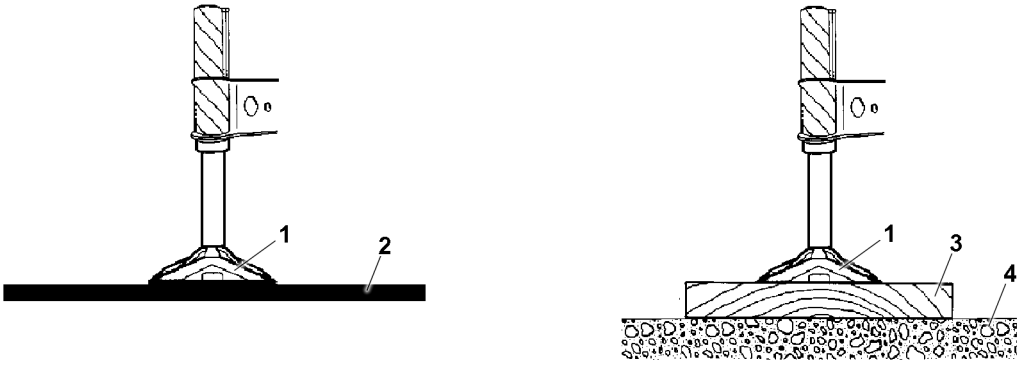

Fig.144244: Support plates

1 Support plate
2 Ground (**no** substructure necessary)
3 Substructure
4 Ground (substructure necessary)

When supporting the crane, the support plates must lay horizontally on the ground or on the substructure.

WARNING
The support plate are **not** laying horizontally!
The crane can topple over, death, property damage.
▶ Before supporting the crane, align the support plates horizontally.

18.2 Supporting the crane

WARNING
The crane is **not** horizontally aligned!
The crane can topple over, death, property damage.
▶ Align the crane horizontally to 0.0° during the support procedure.

DANGER
The crane can topple over!
When actuating the supports with attached load and / or at loaded derrick ballast guying, the incline and the force conditions of the entire boom system change.
There is **no** shut off by the LICCON overload protection.
The crane can topple over.
Personnel can be severely injured or killed.
▶ When a load is suspended it is prohibited to actuate the support.
▶ When the derrick ballast guying is loaded it is prohibited to actuate the support.

It is absolutely essential that the crane be supported with the support base exactly in accordance with the load chart to ensure safe crane operation.

The match of the sliding beams placement surfaces must be observed to ensure proper force transfer between the sliding beams.

The crane may only be supported in these extension conditions.

WARNING
The crane can topple over!
If only the sliding beams on the load side are extended, then the crane can topple over and kill personnel.
▶ Move all 4 sliding beams and support cylinders out according to the data in the load chart and pin.
▶ In intermediate positions between the support bases, do **not** support.
▶ Pin the sliding beams to support base according to the load chart.
▶ Fully insert and secure the pins.

WARNING
Risk of toppling the crane due to incorrect extension of the sliding beams!
The load suspended on the hook causes tension and deformation of the hoist rope and telescopic boom. The same applies for operation with lattice jib and guy ropes. If the load is dropped from the fastening ropes or if the fastening or hoist rope breaks in this situation, a sudden relief occurs. The boom snaps back quickly. This can cause the crane to topple over.
Despite previous assumption, it might become necessary to swing the load to the opposite side. This can cause the crane to topple over.
The boom and / or counterweight momentum may cause the crane to topple when turning from the longitudinal vehicle direction.
▶ Extend all 4 sliding beams and support cylinders according to the data in the load chart.

18.3 Supporting the crane with *variable support*

When supporting the crane with *variable support* special measures are required. These measures are described in detail in the Crane operating instructions, chapter 6.26.

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19 Aligning the crane

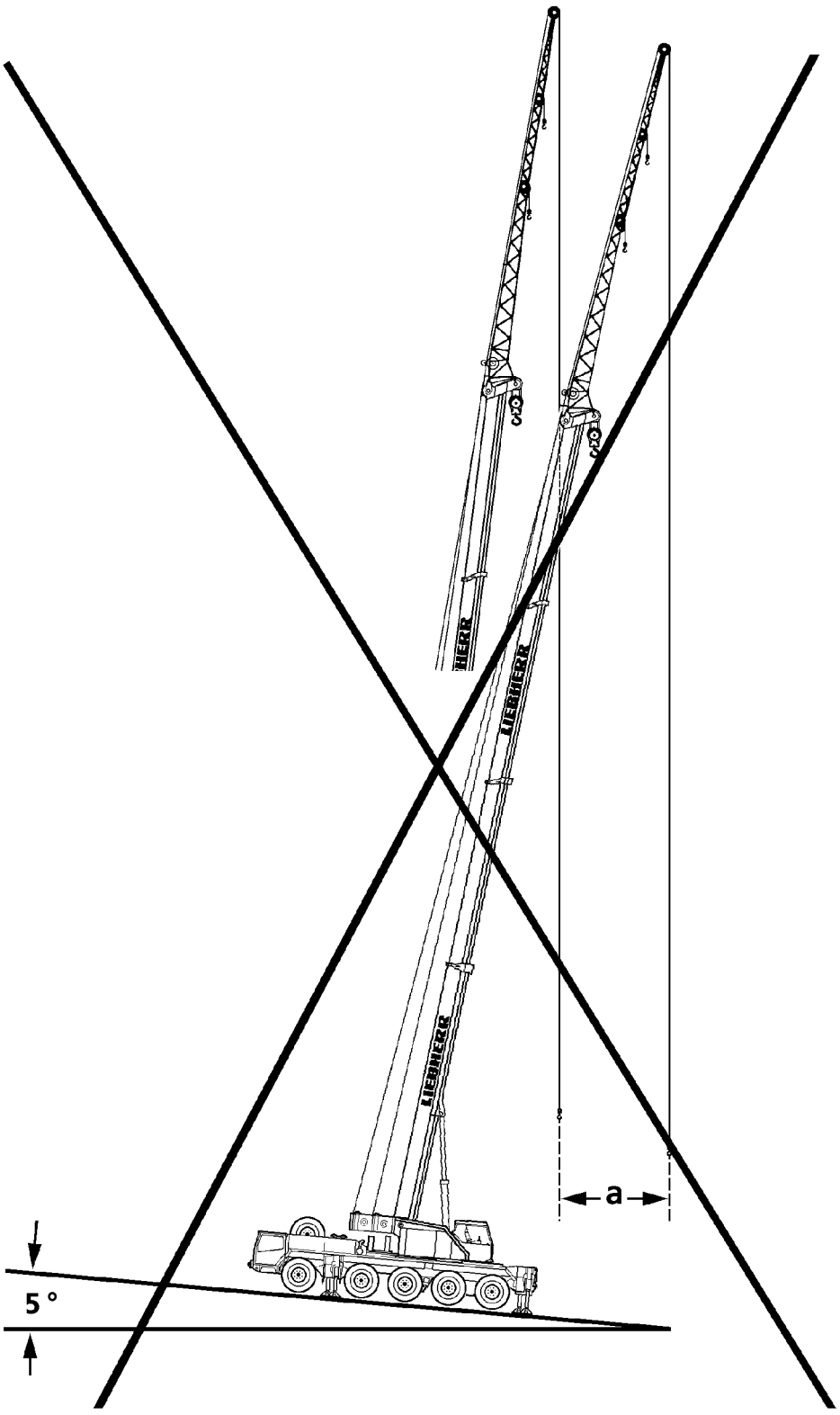

*Fig.121164: Example for **non-permissible** incline position*

In addition to the proper substructure for the supports, the horizontal alignment of the crane is of utmost importance for safe crane operation.

DANGER
The crane can topple over due to the incline position!
If the crane is positioned at an incline, and if the boom is turned towards the slope, then the boom radius is increased as a result.
It is possible that the slewing gear can no longer hold the crane superstructure and, in extreme cases, the crane can topple over.
Personnel can be severely injured or killed.
▶ Align the crane horizontally before starting crane operation.

If the horizontal alignment of the crane has to be readjusted:
▶ Set the load down on the ground before readjusting the crane.

For cranes on crawlers, readjustment is **not** possible:
▶ If possible, use load charts for limited terrain incline.

Example: At a boom length of 50 m , an incline position of the crane by only 5° at a boom radius of 10 m causes an increase of the radius of a = 4 m.

20 Checking the safety measures

- The placement location has been selected so that all planned lifts included in the load chart for the erected set up configuration can be lifted.
- The load bearing capacity of the ground is adequate.
- There is safe clearance to excavations and slopes.
- There are no live transmission wires within the working range of the crane.
- There are no obstacles that will hinder required crane movements.
- The crane is horizontally aligned.
- When crane support is required:
  - All four sliding beams and support cylinders have been extended according to the support base given in the load chart.
  - The sliding beams have been secured with pins to prevent them from moving.
  - The support plates are pinned and secured in operating position.
- On mobile cranes:
  - The axle suspension is blocked.
  - The axles are relieved, which means the tires do not touch the ground.

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21 Safety guidelines in case of external power supply

Fig.197720

A potential danger exists when supplying a crane with an external power supply from a low voltage distribution system (100 V AC to 400 V AC).

A special electrical hazard is present when a protective conductor is interrupted (caused by the mechanical stress on flexible supply lines or the service connection), loose terminal connections, high wire or contact resistance, mixed up conductors, defective or missing protective equipment (FI / fault interrupters) in combination with a body contact on the crane.

WARNING
Danger of fatal injury if the body conducts current!
Water and / or defective devices can cause hazardous stray voltages when touched. The person touching the crane is subject to lethal currents.
▶ The external supply cable must be in good working order.

Make sure that the external flexible supply cable is in good working order.

Where applicable, we recommend the use of a power isolating transformer.

22 Grounding

22.1 Grounding the crane

WARNING
Danger of fatal injury due to electric shock!
There is a danger of electrical shock, if the crane is not properly grounded.
▶ Properly ground the crane.
▶ Make sure that there is a potential equalization between the crane and the ground.

The crane must be grounded before start up:
– Near transmitters (radio and TV transmitters, radio stations, etc.)

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- Near high frequency switching stations
- In case of severe possibility of thunderstorms or potential thunderstorms

The crane can become electrostatically charged, especially if the crane is equipped with synthetic support mats or if the support mats are placed on insulating materials (such as wooden planks).

22.2 Grounding the load

WARNING
Danger of fatal injury due to electric shock!
There is a danger of electrical shock, if the load is not properly grounded.
▶ Properly ground the load.
▶ Make sure that there is a potential equalization between the load and the ground.

The load must be grounded before start up:
- Near transmitters (radio and TV transmitters, radio stations, etc.)
- Near high frequency switching stations
- In case of severe possibility of thunderstorms or potential thunderstorms

The load can become electrostatically charged, even if the crane is grounded. This applies in particular if a hook block with pulleys made of synthetic material and non-conductive fastening equipment (for example plastic or manila ropes) are used.

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23 Working in the vicinity of transmitters

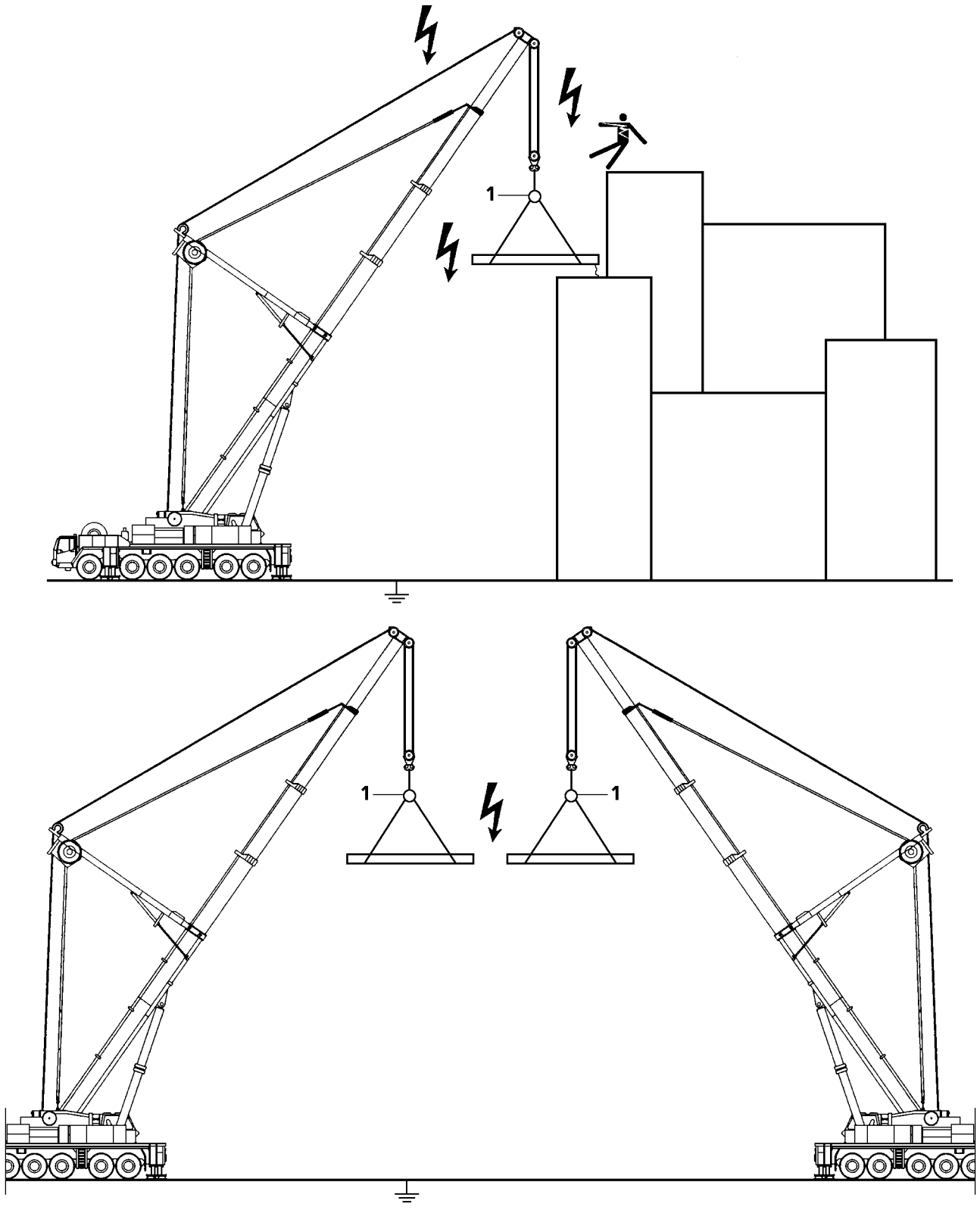

Fig.121165: Example for electrostatic charge

Strong electromagnetic fields are likely to be present if the construction site is close to a transmitter.

These electromagnetic fields can pose direct or indirect danger to persons or objects, for example:

- Effect on human organs due to temperature increase.

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- Danger of burns or inflammation due to temperature increase
- Spark or electric arc formation

DANGER
Danger due to electromagnetic fields!
▶ Before operating a crane in the vicinity of transmitters, be sure to consult with Liebherr-Werk Ehingen GmbH.
▶ Also consult a high frequency specialist.

High frequency (HF) radiation from a transmitter requires supplementary work safety protection and special environmental specifications for crane operators and personnel:

1. Each crane must be „fully“ grounded. Check visually or with a simple continuity tester to ensure that ladder, crane cab and rope pulleys are grounded.
2. All personnel working on the crane or with large metal objects must protect themselves from burns by wearing non-conductive synthetic gloves and suitable clothing while working.
3. There is no need to panic if you feel your hand warm up. Always work under the assumption that the respective workpiece, structural steel member or support is „hot“.
4. The temperature of objects affected by high frequency radiation depends on their „size“. Cranes, carriers and coverings, for example, are „hotter“.
5. Contact with other crane loads is not permitted when operating the crane (arcing). Since defects caused by burns considerably reduce rope’s load bearing capacity, any such occurrences must be reported immediately to the customer service of Liebherr-Werk Ehingen GmbH so that the ropes can be inspected.
6. An insulator **1** is required at all times between the crane load hook and fastening equipment. It is strictly prohibited to remove this insulator **1**.
7. Do not touch the ropes above the insulator **1**.
8. Loads that are attached to the crane may not be touched by any unprotected parts of the body after the load has been lifted or set down.
9. Do not work with a bare upper torso or in short pants, this is prohibited.
10. To minimize absorption of high-frequency radiation, larger loads should be transported horizontally if possible.
11. Loads must be grounded, or additional insulation used (rubber material between the object and gloves) when manual work is required.
12. Use a suitable measuring instrument to check the „temperature“ of the workpiece.
    For example, if 500 V can be measured on a workpiece at a distance of 1 cm to 2 cm , then the workpiece may not be touched with bare hands.
    The greater the distance, the higher is the voltage on the object:
    At 10 cm distance, approx. 600 V are present, at 30 cm distance approx. 2000 V are present.
13. When refueling the crane, it must be ensured that no sparks are created within a radius of 6 m , neither by handling larger metallic parts nor by other work.
14. To avoid secondary accidents, use personal protective equipment when working on components that are high off the ground.
15. Any accidents and unexpected events must immediately be reported to the local construction supervisor and the safety engineer.

24 Crane operation in case of thunderstorms

In weather conditions, which can include lightning:
- Stop work on the crane.
- If possible, take the load down.
- If possible, telescope the boom in and / or take it down in the boom receptacle and bring it into a safe condition.

If this is not possible, the crane cab must remain occupied by the crane operator to keep the crane and the load always under control.

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WARNING
Danger of accidents due to lightning strikes!
▶ Make sure that there are no persons near the immediate area of the crane.

25 Wind influences

Note
▶ The wind speeds are valid for a 360° wind direction for a 3-second wind gust at the highest point of the crane.

WARNING
Disregard of permissible wind speeds!
If the permissible wind speeds are disregarded, the crane can topple over. Personnel can be severely injured or killed.
▶ It is prohibited to erect the crane to measure the wind speed.
▶ Observe the permissible wind speeds depending on the assembly / crane conditions and act accordingly, see following chart.

Assembly / crane conditions	Reference for permissible wind speed
Erection and take-down of various boom configurations	Wind speed charts and / or erection and take-down charts
Crane operation	Load chart manual
When the permissible wind speed according to the load charts is exceeded in crane operation, then **crane operation is prohibited.**	Wind speed charts
Interruption of crane operation when crane remains equipped	Wind speed charts
Crane out of operation, when crane remains equipped	Wind speed charts

Note
No wind speed charts available!

For a set up configuration for which no wind speed charts are available:
▶ Observe and adhere the maximum wind speeds of the load charts.

The wind load on the crane boom has **not** been taken into account for the planning of crane operation with the LICCON job planner.
– As a result, the actual values of the support force and / or the crawler pressure can be significantly higher than the values determined with the LICCON Job planner.
– The wind affecting the crane and the load, the elastic distortion of the crane structure, incline position as well as wind exposure surface (A_w) per ton of hoist load larger than 1.2 m^2/t can significantly increase the support force and / or the crawler pressure.

WARNING
Increase of support force and / or the crawler pressure!
The resulting pressure on the ground becomes larger.
The permissible ground pressure can be exceeded.
▶ Do not exceed the permissible ground pressure.

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Note
- ▶ The determining factor for all crane work in the actual wind speed at the job site of the crane.
- ▶ The current wind speed can be checked at the nearest weather bureau.
- ▶ Be aware that the wind speed on the boom jib is higher than near the ground.
- ▶ Always observe the national valid regulations.

25.1 Wind speed charts for *variable support*

For *variable support*: Observe and adhere to the wind speed charts according to the support base for the smallest extension length of the sliding beams.

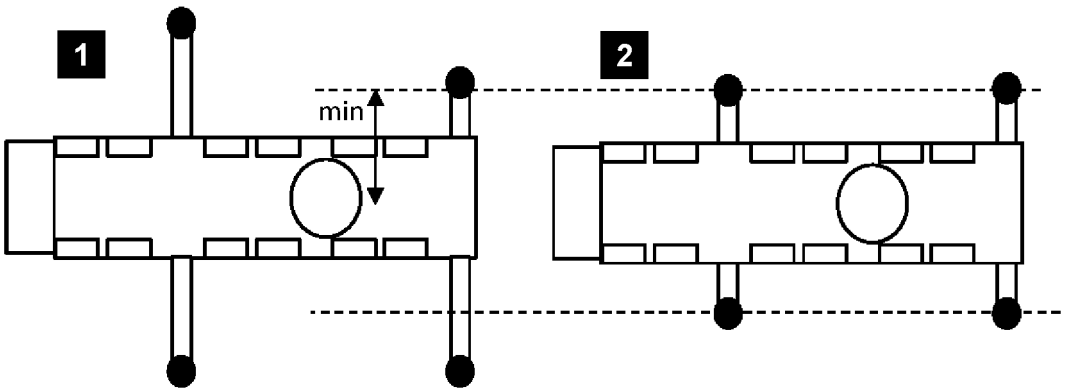

Fig.121577: Example for the selection of wind speed charts for variable support

Example for the selection of wind speed charts for *variable support*:
- The crane is supported with *variable support* according to illustration **1**.
- Select wind speed charts according to the support base in illustration **2**.

Note
No wind speed charts available!

If the smallest extension length of a sliding beam is less than those of the wind speed charts on hand:
- ▶ Observe and adhere the maximum wind speeds of the load charts.

25.2 Wind speed, wind gust speed and wind direction

The depiction of the wind is made by statement of wind speed (wind force), wind gust speed and wind direction.

High above the ground, the wind is less influenced by the surface condition of the ground. In the lower layers of the atmosphere, the wind speed is reduced by the ground friction. One differentiates between roughness of terrain, influence of obstacles and influence of terrain contours. Vegetation, buildings etc have great influence on the wind speed, wind gust speed and wind direction.

The site selection is thus especially important for wind measurement.

The wind speed, wind gust speed and wind direction are subject to significant time and local fluctuations. For that reason it is important to have reliable information regarding the expected wind speed, wind gust speed and wind direction during a load lift and to carry out exact wind measurements.

For mobile cranes, always assume a wind load of 360°. The determining factor is the „3 second gust speed“ on the highest point of the boom.

25.3 Measurement of wind speed

The anemometer installed on the crane boom measures the wind speed on the tip of the boom and shows the current wind speed in the crane cab.

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The function of the anemometer must be checked every time before erection of the boom by manually actuating the shell start for easy movement and proper function.

Before lifting a load, especially with large wind exposure surface, the wind speed and the wind direction expected during the lift must be known. Information can be obtained for example at the local weather bureau. The determining factor is the „3 second gust speed“ on the highest point of the boom.

WARNING
Overload of crane!
The acoustic wind warning is only issued if the standard wind exposure surface in the load chart is exceeded (wind surface per ton load: 1 m^2 , drag: 1.2) given wind speed.
If the permissible wind speed must be reduced for loads due to large wind exposure surfaces, no acoustic wind warning is issued.
There is no shut off of crane movement.

- ▶ The wind exposure surface and the wind resistance coefficient for the load to be lifted must be known.
- ▶ The maximum permissible wind speed specified in the load chart must be reduced for large wind exposure surfaces as described in the load chart manual chapter "Wind influences during crane operation".

For safe determination of wind speed, the crane must be turned before application by 360°. The highest measured value while doing so must be compared with the „maximum permissible wind speed“ for the load according to the load chart. Thus the possibility that the result of the measurement is distorted due to nearby buildings, cranes or components is eliminated.

In gusty wind conditions, the probability of sudden high wind speed increases. In gusty wind conditions no large surface loads may be lifted.

Note

- ▶ If in doubt and in case of questions for further information and / or training in the area of „Wind influences in crane operation“ contact the Customer Service at Liebherr-Werk Ehingen GmbH.

25.4 Conversion chart for wind force

Note

- ▶ The influence of the wind on the surrounding is described clearly in the Beaufort scale to provide an orientation for the crane driver.
- ▶ The wind force of the Beaufort scale refers to the wind speed determined over 10 minutes at a height of 10 m.

Wind force		Wind speed		Effect of the wind
Beaufort number	Designation	[m/s]	[km/h]	Inland
0	Calm	0 to 0.2	1	Calm, smoke rises vertically
1	Slight air movement (draft)	0.3 to 1.5	1 to 5	Wind direction is shown only by observing the trail of smoke, not by the wind sock
2	Light breeze	1.6 to 3.3	6 to 11	Wind can be felt on the face, the leaves rustle, wind sock moves slightly
3	Gentle breeze	3.4 to 5.4	12 to 19	Leaves and small twigs in constant motion Wind extends a flag
4	Moderate breeze	5.5 to 7.9	20 to 28	Swirls up dust and loose paper, moves twigs and thin branches

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Wind force		Wind speed		Effect of the wind
Beaufort number	Designation	[m/s]	[km/h]	Inland
5	Fresh breeze	8.0 to 10.7	29 to 38	Small deciduous trees begin to sway, whitecaps form at sea
6	Strong breeze	10.8 to 13.8	39 to 49	Thicker branches move; telephone lines begin to whistle, umbrellas are difficult to use
7	Near gale	13.9 to 17.1	50 to 61	Entire trees swaying; difficult to walk into wind
8	Gale force wind	17.2 to 20.7	62 to 74	Breaks branches off trees, impedes walking in open areas considerably
9	Gale	20.8 to 24.4	75 to 88	Minor damage to property (chimney caps and roofing tile are blown off)
10	Severe storm	24.5 to 28.4	89 to 102	Trees are uprooted, significant damage to property
11	Violent storm	28.5 to 32.6	103 to 117	Extensive, widespread storm damage
12	Hurricane	32.7 and more	118 and more	Major destruction

Beaufort scale

25.5 Height dependant wind speed

Note

- The maximum permissible wind speed (v_{max}) and the maximum permissible wind speed according to the load chart (v_{max_TAB}) always refer to the 3 second wind gust speed, which is present at the maximum height of the crane.
- Instead of the 3 second wind gust speed, weather information services often report a wind speed (v_m), which is averaged within a time period of 10 minutes (so-called 10 minute average). It refers to the wind force on the Beaufort scale, normally to the medium value of the wind speed, which is determined within a time from of 10 minutes at a height of 10 m above ground or above sea level.
- The determining factor for the calculation of the 3 second wind gust speed in maximum height of the crane is significantly higher than the medium value of the wind speed, which is determined over a time of 10 minutes at a height of 10 m above ground.

Note

- The following chart shows the 3-second wind gust speed depending on the height and the Beaufort number and / or the wind speed determined over a time of 10 minutes at a height of 10 m.
- With the aid of this chart the 3-second wind gust speed for a certain height can be determined.

Beaufort number	3	4	5[a]	5	6	7[a]	7	8	9	10
v_m [m/s[b]]	5.4	7.9	**10.1**	10.7	13.8	**14.3**	17.1	20.7	24.4	28.4
z [m]	v(z) [m/s]									
10	7.6	11.1	**14.1**	15.0	19.3	**20.0**	23.9	29.0	34.2	39.8
20	8.1	11.9	**15.2**	16.1	20.7	**21.5**	25.7	31.1	36.6	42.7
30	8.5	12.4	**15.8**	16.8	21.6	**22.4**	26.8	32.4	38.2	44.5
40	8.7	12.8	**16.3**	17.3	22.3	**23.1**	27.6	33.4	39.4	45.8
50	8.9	13.1	**16.7**	17.7	22.8	**23.6**	28.3	34.2	40.3	46.9

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Beaufort number	3	4	5[a]	5	6	7[a]	7	8	9	10
60	9.1	13.3	**17.0**	18.0	23.3	**24.1**	28.8	34.9	41.1	47.9
70	9.3	13.5	**17.3**	18.3	23.6	**24.5**	29.3	35.5	41.8	48.7
80	9.4	13.7	**17.6**	18.6	24.0	**24.8**	29.7	36.0	42.4	49.4
90	9.5	13.9	**17.8**	18.8	24.3	**25.1**	30.1	36.4	42.9	50.0
100	9.6	14.1	**18.0**	19.1	24.6	**25.4**	30.4	36.9	43.4	50.6
110	9.7	14.2	**18.2**	19.2	24.8	**25.7**	30.8	37.2	43.9	51.1
120	9.8	14.3	**18.3**	19.4	25.1	**25.9**	31.1	37.6	44.3	51.6
130	9.9	14.5	**18.5**	19.6	25.3	**26.2**	31.3	37.9	44.7	52.0
140	10.0	14.6	**18.7**	19.8	25.5	**26.4**	31.6	38.2	45.1	52.5
150	10.0	14.7	**18.8**	19.9	25.7	**26.6**	31.8	38.5	45.4	52.9
160	10.1	14.8	**18.9**	20.1	25.9	**26.8**	32.1	38.8	45.7	53.2
170	10.2	14.9	**19.1**	20.2	26.0	**27.0**	32.3	39.1	46.0	53.6
180	10.3	15.0	**19.2**	20.3	26.2	**27.1**	32.5	39.3	46.3	53.9
190	10.3	15.1	**19.3**	20.4	26.4	**27.3**	32.7	39.5	46.6	54.2
200	10.4	15.2	**19.4**	20.6	26.5	**27.4**	32.8	39.8	46.9	54.6

[a] Wind stages for the crane in operation:

1 light	v_m = 10.1 m/s	at z = 10 m	v(z) = 14.1 m/s	q(z) = 125 N/m²
2 normal	v_m = 14.3 m/s	at z = 10 m	v(z) = 20.0 m/s	q(z) = 250 N/m²

[b] Upper limit of Beaufort scale

3-second wind gust speed depending on the height and the Beaufort number and / or the wind speed determined over a time of 10 minutes at a height of 10 m

Sign	Unit	Definition
v_m	[m/s]	Wind speed determined over a time of 10 minutes at a height of 10 m
z	[m]	Height above level ground
v(z)	[m/s]	Speed effective at height z, decisive for the calculation of a 3 second gust
q(z)	[N/m²]	At a height z effective quasi-static back pressure, determined from v(z)

Symbol

25.6 Wind influences during erection and take-down

WARNING
The crane can topple over!
If a boom or a boom system is erected or taken down and the expected wind speeds are larger than the maximum permissible wind speeds according to the wind speed chart, then the crane can topple over and fatally injure personnel.

- ▶ If wind speeds are expected which are larger than the maximum permissible wind speeds for erection, then erection of the boom or erection of the boom system is prohibited.
- ▶ If wind speeds are expected, which are larger than the maximum permissible wind speeds for take-down, then the boom or the boom system must be taken down immediately.

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WARNING
Wind speed higher than permissible!
When the permissible wind speed for „Crane out of operation“ is higher than the permissible wind speed for take-down: Take-down of the boom is not permissible in case of unexpected increase of wind speed.
The crane can topple over. Death, severe injury, property damage.
- ▶ If wind speeds are expected which are higher than the maximum permissible wind speeds for "Crane out of operation", then take the equipment and the boom down.
- ▶ Always take the boom down for safety reasons if weather conditions are unclear, see Erection and take-down charts.
- ▶ Observe the permissible wind speeds for take-down.

25.7 Wind influences in crane operation

WARNING
The crane can topple over!
Unforeseeable factors, such as sudden wind gusts on the crane and the load cannot be exactly predicted in advance.
- ▶ The size and shape of the load has a significant influence on the permissible wind speed during crane operation.
- ▶ Carry out a professional job planning with authorized and trained expert personnel. All environmental conditions, such as weather forecast and wind speeds must be taken into account.
- ▶ The authorized and trained expert personnel must have sufficient knowledge in the area of „Wind influences in crane operation“.

Note
- ▶ Calculation examples are included in the load charts. If you need further information, contact Liebherr-Werk Ehingen GmbH.

Depending on crane application, for example:
1. Lifting of large surfaced loads.
2. Working with long boom combinations.
3. Erection and take-down of boom combinations.

The crane operator must check with appropriate information sources about the expected wind speeds, at:
1. The start of crane operation.
2. Interruption of crane operation.
3. Resumption of crane operation

WARNING
The crane can topple over!
If the crane is operated at wind speeds which are larger than the maximum permissible wind speeds according to the load chart, then the crane can topple over and kill personnel.
- ▶ If wind speeds are expected which are larger than the maximum permissible wind speeds for the equipped crane, then the equipment and the boom must be taken down.
- ▶ If wind speeds are expected which are larger than the maximum permissible winds speeds for crane operation, then it is prohibited to lift a load.

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25.8 Wind influences for „Crane out of operation“

WARNING
The crane can topple over. Death, severe injury, property damage!
If the crane is taken out of operation in set up condition and the expected wind speeds are higher than the maximum permissible wind speeds according to the wind chart, then the crane can topple over and fatally injure personnel.

- ▶ If wind speeds are expected which are higher than the maximum permissible wind speeds for „Crane out of operation“, then take the equipment and the boom down.
- ▶ Always take the boom down for safety reasons if weather conditions are unclear, see Erection and take-down charts.
- ▶ Observe the permissible wind speeds for take-down.

26 Lifting a load with two cranes

Before lifting a load with two cranes, the crane operator or a representative of the operator must determine the work sequence and assign a responsible supervisory person for the operation. The responsible supervisor must monitor the operation and remain in constant contact with the crane operators.

WARNING
Overload and toppling of the cranes!
If the load is not lifted or lowered exactly evenly by both cranes, then the center of gravity changes.
The cranes can be overloaded and topple over.
Personnel can be killed or seriously injured.

- ▶ Make sure that the cranes are horizontally aligned.
- ▶ Observe the national valid standards, regulations and accident prevention guidelines.
- ▶ Determine the utilization degree of the cranes in operation, depending on the complexity of the load lift.
- ▶ Plan for sufficient safety reserves.
- ▶ Avoid side load on the boom.
- ▶ Carry out crane movements synchronously and slowly.

Note

- ▶ The total weight and the center of gravity of the load must be known exactly.
- ▶ Carry out the job planning in detail and with care.
- ▶ Avoid fastening points below the center of gravity of the load.

When the operational conditions or the work to be carried out require:

- ▶ Set up an assembly plan and operating instructions for the operation.

In the drawing is shown how the center of gravity for the load changes if the load is lifted or lowered unevenly. Already a slight incline of the load can cause the crane to be overloaded.

If the load on crane 2 **(F_1)** is lowered, the load on crane 2 **(F_1)** increases. Crane 1 can thereby be overloaded.

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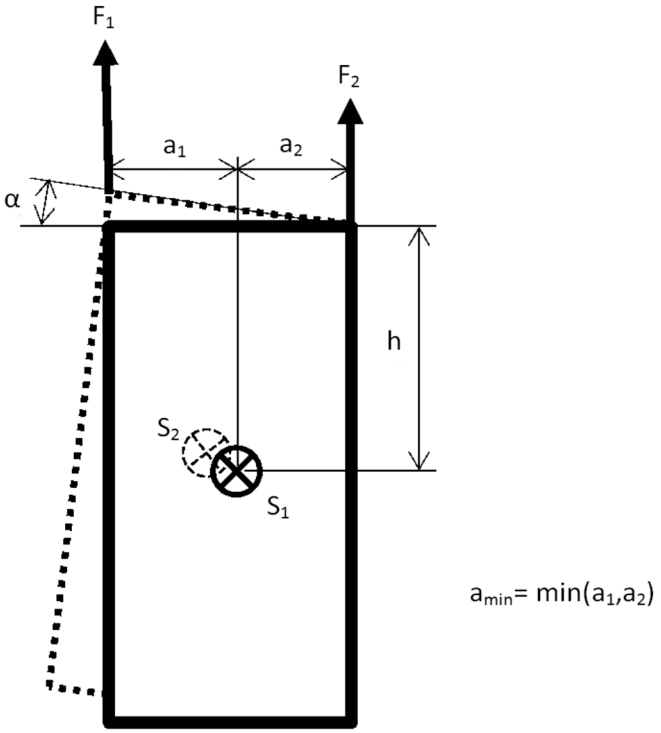

Fig.124126: Geometric conditions

F_1	Load on crane 1	**F_2**	Load on crane 2
S_1	Center of gravity of load	**S_2**	Center of gravity of load at incline position
h	Vertical distance between center of gravity of load and fastening points	**α**	Angle of load at incline position
a_1	Horizontal distance between center of gravity of load and fastening point crane 1	**a_2**	Horizontal distance between center of gravity of load and fastening point crane 2
a_{min}	Smallest horizontal distance between center of gravity of load and fastening point (minimum from a_1 and a_2)		

The following diagram shows the dependence of the ratio of h/a_{min} at a maximum permissible incline position of the load of 3° in reference to the permissible load utilization of cranes in percentages.

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Fig.124127: Maximum permissible load utilization

x Ratio of h to a_{min}

y Maximum permissible load utilization in percentages, if α is smaller or equal to 3°

Example: A ratio h to a_{min} of 6, when retaining the incline position of the load of maximum 3° results in a maximum permissible load utilization of both cranes of approx. 76 % each.

27 Working ranges of several cranes overlap

WARNING
Danger of collision!
If the working ranges of several cranes overlap, there is a danger of collision.
Personnel can be injured or killed.
Significant property damage can result.
- ▶ The contractor or his representative must determine the work sequence in detail in advance.
- ▶ The contractor or his representative must ensure flawless communication between crane operators.
- ▶ The crane operators must ensure through calm operating mode, that no collisions occur due to uncontrolled movements. The crane operators must have been trained and instructed accordingly.

If the communication between the crane operators is not ensured by sound or visual connection, then suitable measures must be taken, such as using radio communication, guides or similar. When using derrick booms or TY-guying, it is necessary to proceed with extreme caution as these components protrude far past the rear turning radius of the turntable.

Note
- ▶ If guides are used, then the signals must be agreed upon between them and the crane operators, see section „Hand signals for guidance“.

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28 Hand signals for guidance

For all crane movements, the crane operator must always keep the load as well as the crane hook or load handling equipment when the crane is not loaded, in his field of vision.

WARNING
Danger of accident if standing under suspended loads!
- ▶ Always keep loads in sight.
- ▶ Standing under suspended loads is prohibited.

If this is not possible, the crane operator may only operate the crane if he is signed by an assigned guide.

The operator may be guided by hand signals or a two-way radio. It must be ensured that there are no misunderstandings.

WARNING
Danger of accident caused by misunderstood hand signals!
- ▶ Hand signals must be mutually agreed upon and clearly executed.
- ▶ In any case, **national regulations** must be observed.

28.1 Hand signals

28.1.1 Start operation, follow my instructions

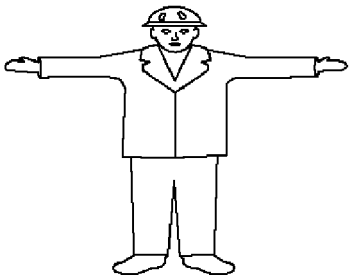

Fig.111700: Start operation, follow my instructions

Both arms stretched out horizontally with hands open and palms directed to the front.

28.1.2 Stop (normal stop)

Fig.144245: Stop (normal stop)

Arm stretched out, palm of hand facing down, move the arm horizontally backward and forward.

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28.1.3 Emergency stop (quick stop)

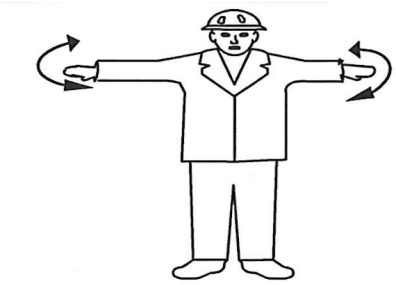

Fig.144246: Emergency stop (quick stop)

Both arms stretched out, both hand palms facing down, move arms horizontally backward and forward.

28.1.4 End operation, no longer follow my instructions

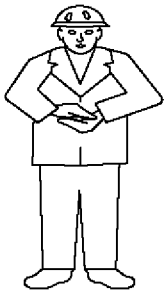

Fig.111703: End operation, no longer follow my instructions

Fold hands together at chest height in front of body.

28.1.5 Creeper gear or very slow movement

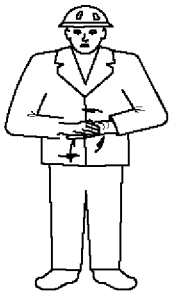

Fig.111704: Creeper gear or very slow movement

Rub palms together in circular motion. After this sign, all other applicable hand signals apply.

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28.2 Vertical movements

28.2.1 Showing the vertical distance

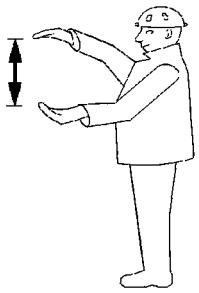

Fig.121364: Showing the vertical distance

Both arms stretched out in front of the body one on top of the other, with opposing palms.

28.2.2 Lifting / lowering a load with even speed

Fig.111706: Lifting / lowering a load with even speed

Lift one arm overhead with closed hand and index finger pointing upward, with small horizontal circular movements with forearm.

28.2.3 Lifting slowly

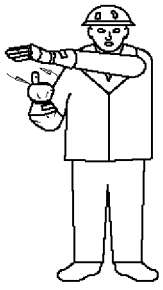

Fig.121365: Lifting slowly

Give lift signal with one hand, the other palm is not moving and positioned over the hand, which gives the signal.

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28.2.4 Lowering the load while stationary

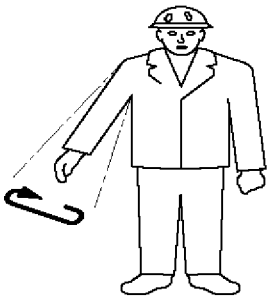

Fig.111708: Lowering the load while stationary

Point one arm away from the body, downward, with hand closed and index finger pointing down. Make small circular movements with forearm.

28.2.5 Lowering slowly

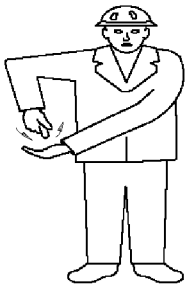

Fig.121366: Lowering slowly

Give lowering signal with one hand, do not move the other palm and hold it under the hand, pointing to the hand which gives the signal.

28.3 Horizontal movements

28.3.1 Moving / swinging in specified direction

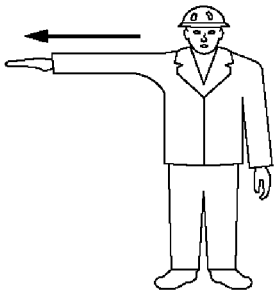

Fig.111710: Moving / swinging in specified direction

Hold stretched out arm horizontally into the desired direction, with the hand open and the palm pointing down.

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28.3.2 Moving away from me

Fig.111711: Moving away from me

Stretch out both arms simultaneously with forearms in front, with both hands open and the palms pointing down. Move the forearms repeatedly between the horizontal and vertical position up and down.

28.3.3 Moving toward me

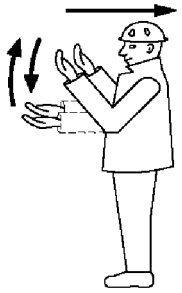

Fig.111712: Moving toward me

Stretch out both arms simultaneously with forearms vertically, with both hands open and the palms pointing to the rear. Move the forearms repeatedly up and down.

28.3.4 Moving both track chains

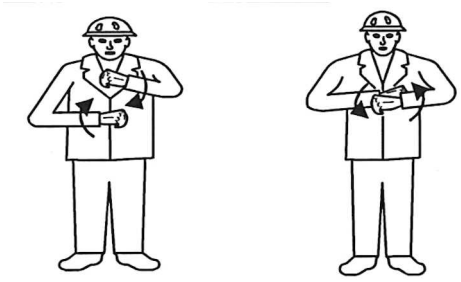

Fig.144247: Moving both track chains

Turn both fists around each other in front of the body in direction of the movement (forward or reverse).

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28.3.5 Moving one track chain

Fig.144248: Moving one track chain

Lift one fist to show blockage of chain on one side. Turn the other fist vertically in front of the body to signal movement of the opposite chain.

28.3.6 Showing the horizontal distance

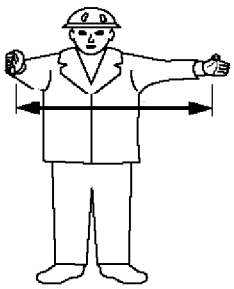

Fig.121380: Showing the horizontal distance

Keep both arms stretched out horizontally in front of the body with the palms opposite each other.

28.3.7 Transfer (between two cranes or two hooks)

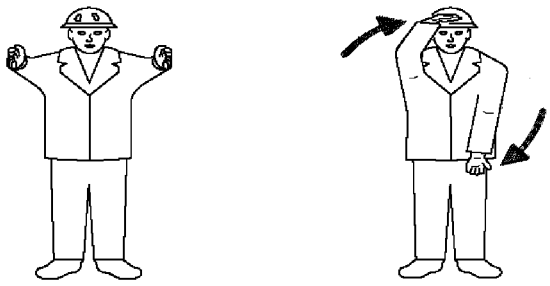

Fig.121368: Transfer (between two cranes or two hooks)

Hold both arms stretched out to the front, parallel and horizontally and turn by 90° in direction of the transfer.

WARNING
Load bearing capacity is **not** sufficient!
The crane can topple over, death, property damage.
▶ Make sure that the load bearing capacity of the individual crane and hook is sufficient even if the transfer of the load is suddenly asymmetric.

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28.4 Machine related movements

28.4.1 Lifting with main winch

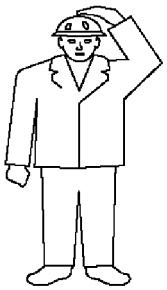

Fig.111719: Lifting with main winch

Place on hand on your head and hold the other arm on the side of the body.

After this signal all other hand signals apply only for the main winch.

Note

▶ If two or more main winches are present, then the signaller can show the number of the crane by pointing to it or signal with one finger.

28.4.2 Lifting with auxiliary winch

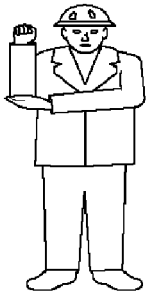

Fig.111720: Lifting with auxiliary winch

Hold one forearm vertically with closed hand and touch the elbow of this arm with the other hand.

After this signal all other hand signals apply only for the auxiliary winch.

28.4.3 Lifting the boom

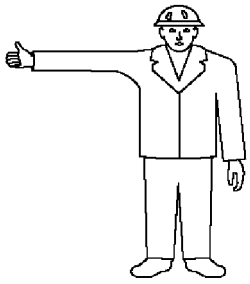

Fig.111721: Lifting the boom

Hold one arm horizontally with thumb directed upward.

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28.4.4 Lowering the boom

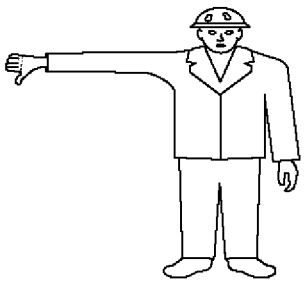

Fig.111722: Lowering the boom

Hold one arm horizontally with thumb directed downward.

28.4.5 Extending the boom

Fig.144249: Extending the boom

Hold both hands (with closed fists) stretched out to the front, with both thumbs directed away from each other.

28.4.6 Retracting the boom

Fig.144250: Retracting the boom

Hold both hands (with closed fists) stretched out to the front, with both thumbs directed toward each other.

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28.4.7 Lifting the boom and lower the load at the same time

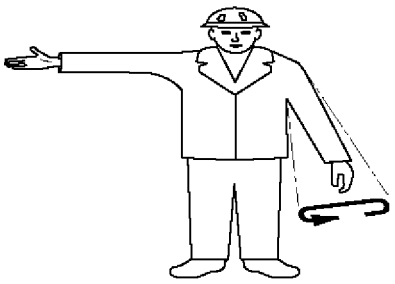

Fig.111725: Lifting the boom and lower the load at the same time

Hold one arm stretched out horizontally with thumb directed upward and stretch the other arm downward and away from the body, make small flat circles with the forearm.

28.4.8 Lowering the boom and lift the load at the same time

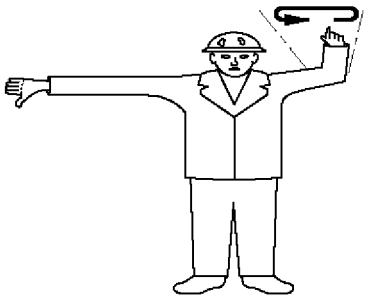

Fig.111726: Lowering the boom and lift the load at the same time

Hold one arm stretched out with thumb pointing down, stretch the other forearm upward and make small flat circles.

29 Travel operation

29.1 Starting to drive

Before starting to drive the crane
- Close all doors.
- Keep the doors closed during the travel operation.

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29.2 Turning / driving in reverse

WARNING
Danger of accidents when turning or driving in reverse!
When turning or driving in reverse, personnel can be overlooked and killed.
Objects can be severely damaged.
- ▶ When turning or driving in reverse, the driver must act in such a way that he does not endanger other traffic participants.
- ▶ The driver may only drive in reverse or reset when persons or devices are **not** endangered. If this can **not** be ensured, then he must use a guide.
- ▶ An acoustical back up warning device will never replace the guide.
- ▶ Make sure that there are no persons or objects behind the vehicle when driving in reverse.
- ▶ Make sure that no personnel is injured or killed.
- ▶ Make sure that no objects are damaged.
- ▶ Driving in reverse is only permissible at slow driving speed (maneuvering speed).
- ▶ Adhere to the national regulations.

29.3 Stopping the mobile crane

Make sure that the following prerequisites are met:
- – The mobile crane is standing on load bearing, level and tractive ground.
- – The parking brake is applied.

WARNING
Parking brake is **not** applied!
The mobile crane can roll off, death, property damage.
- ▶ Park the mobile crane exclusively with applied parking brake.

- – Turn off the ignition and pull out the ignition key.

When a battery master switch is present:
- – Turn off the battery master switch and remove the switch cams.

WARNING
Downhill or uphill slope is too large!
The mobile crane can roll off, death, property damage.
- ▶ Park the mobile crane at an downhill or uphill slope of no more than maximum 18 %.

Under the following conditions the mobile crane must be additionally secured with wheel chocks to prevent it from rolling off:
- – The mobile crane is parked on a slope or an incline.
- – The mobile crane is defective, particularly when the brake system is defective.

WARNING
Wheel chocks incorrectly placed!
The mobile crane can roll off, death, property damage.
- ▶ So that the wheel chocks have an immediate braking action and hold the mobile crane in park position: Place all wheel chocks tightly directly under the wheel.
- ▶ Place all specified wheel chocks.
- ▶ All wheel chocks must counteract the downhill slope force.

If necessary:
- – Place wheel chocks.

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30 Crane operation

30.1 Before starting to work

Before starting to work with the crane:
- Close all doors.
- Keep the doors closed during crane operation.

30.2 While working with the crane

WARNING
Defective crane!
Death, severe bodily injuries, property damage.

If an erroneous function of a crane movement is recognized during crane operation:
▶ Telescope the boom in completely and place it down, find the source of the problem and remedy it.

30.3 Crane operation with a load

WARNING
The crane can topple over!
If the crane is in condition which is **not** operationally safe, the crane can topple over or crane components can fall down.
Personnel can be severely injured or killed.
▶ Before starting to work, the crane operator must ensure that the crane is in operationally safe condition.
▶ If safe crane operation cannot be ensured by the crane operator, then crane operation is prohibited until an operationally safe condition for the crane is established.
▶ Safety equipment, for example: Load torque limiter, hoist limit switch, brakes must be fully functioning, otherwise crane operation is prohibited.

Make sure that the following prerequisites are met:
- The load torque limiter must be adjusted according to the current set up configuration of the crane.
- The loads given in the load chart may not be exceeded.
- The crane may never be subjected with a load which exceeds those specified in the load charts.
- The weight, center of gravity and dimensions of the load to be lifted must be known.
- Load carriers, load handling and fastening equipment must be in accordance with specified requirements.

Note
▶ Make sure that the weight of the hook block and the weight of the fastening equipment is subtracted from the load given in the load chart, see the following chart.

Example:		
Maximum permissible load according to chart		30.000 t
Weight of the hook block	350 kg	- 0.350 t
Weight of the fastening rope	50 kg	- 0.050 t
Actual load capacity of the crane		**= 29.600 t**

The weight of the load to be lifted, in this example, may not exceed **29.6 t.**

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DANGER
There is a high danger of accidents should the following points not be observed!
▶ Observe the following points.

Great danger of accidents exists if:
- The load torque limiter is not set in accordance with the current crane set up configuration and is therefore not able to provide proper protection.
- The load torque limiter is defective or taken out of operation.
- The hoist limit switches are defective or not functioning.
- For crawler cranes and mobile cranes with luffing lattice jib:
  The angle sensor and the force test brackets are not functioning.
- For mobile cranes and crawler cranes with support:
  The sliding beams of the hydraulic supports are not extended to the dimensions specified in the load chart.
- On crawler cranes:
  The crawlers are not supported with stable base material sufficiently large for the ground conditions.
- For mobile cranes and crawler cranes with support:
  The support plates are not supported with stable materials large enough for the ground conditions.
- Angular pulling is performed.
  Angular pulling to the side is particularly dangerous, because the boom has only minimal lateral resistance momentum.
  Angular pull is prohibited.
- Load attached during disassembly is too heavy and is freely suspended on the crane after release.
- The load hook is used to break away stuck loads.
  Even if the weight of a stuck load does not exceed the permissible load capacity, the crane can topple over backwards if the load is suddenly released due to the tension of the boom, which can cause it to tip backwards.
- Working when the wind is excessively strong.
  Comply with the load chart specifications.
- The crane is not levelled and the load is slewed in the direction of the slope.
- If improper control of crane movements cause the suspended load to swing like a pendulum.
- The loads and boom radii specified in the load charts are exceeded.
- When working in the vicinity of electricity transmission lines:
  - The electricity transmission lines were not turned off by expert electricians.
  - The danger zone was not covered or blocked off.

WARNING
Danger of current transfer!
If electricity transmission lines are not shut off nor covered nor blocked off, then there is an increased danger of accident due to current transfer.
▶ Adhere to the safety distance according to the following chart.

If the crane becomes electrified despite having taken all necessary precautions, proceed as follows:
▶ Remain calm!
▶ Do not leave the crane cab.
▶ Warn people outside: Stay in place and do not touch the crane.
▶ Move the crane away from the danger zone.

Nominal voltage	Safety clearance	
Up to 50 kV	4 m	10 ft
More than 50 kV to 200 kV	5 m	15 ft
More than 200 kV to 350 kV	7 m	20 ft
More than 350 kV to 500 kV	8 m	25 ft

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Nominal voltage	Safety clearance	
More than 500 kV to 750 kV	11 m	35 ft
More than 750 kV to 1000 kV	14 m	45 ft
More than 1000 kV	Determination by power supplier or authorized electrician	Determination by power supplier or authorized electrician

Safety distance to electrical power lines depending on the nominal voltage

30.3.1 Counterweight and / or ballast

The type of counterweight and / or ballast required depends on the weight of the load to be lifted and the boom radius required for crane operation. The deciding factor for the selection of the counterweight and / or ballast is the data in the corresponding load chart.

WARNING
The crane can topple over!
If the counterweight and / or ballast is not installed according to the load chart, then the crane can topple over and fatally injure personnel.
▶ Install the counterweight and / or ballast according to the load chart.

30.3.2 Hoist gear, hoist rope

The lifting capability of the crane depends on the pull force of the hoist gear and the number of possible hoist rope reevings. When using a single strand, the crane can only lift a load that is pulled by the hoist gear.

If the load to be lifted is heavier than the pull force if the hoist gear, then the hoist rope must be reeved as needed according to the principle of a pulley between the pulley head on the boom and the hook block.

When reeving, carefully observe the load chart specifications and the operating instructions.

WARNING
Hoist rope failure!
If the maximum pull force of the hoist gear is exceeded, the hoist rope can break or the hoist gear can be damaged.
The load can fall and kill personnel.
▶ Observe the maximum tensile force of the hoist gear.

30.3.3 Hydraulically adjustable auxiliary boom

WARNING
Impermissible luffing of the auxiliary boom.
Damage to the auxiliary boom due to collision with the ground or other objects. Component failure.
Death, severe bodily injuries, property damage.
▶ Do **not** luff the auxiliary boom down with hydraulic control rope or by luffing down the main boom on the ground or other objects.

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30.4 Interrupting crane operation

WARNING
Impermissible weather conditions!
If the crane is exposed to impermissible weather conditions during interruption of crane operation, situations can occur which could bring the crane into an unsafe condition.
Toppling crane, death, severe bodily injuries, property damage.
▶ Get the weather forecast for the entire period during which the crane is set up.

If the predicted wind speeds are above the permissible values according to the load chart and / or the wind speed chart:
▶ Take the boom and equipment down in time before impermissible wind speeds occur. See Crane operating instructions, wind speed charts and Erection and take down charts.

When wind conditions are present, which are above the permissible values of the wind speed chart and the boom can no longer be taken down:
▶ Make sure that there is no danger for persons, crane and surrounding area. Secure the crane and surrounding area of the crane far enough against access. Warn persons in the surrounding area and bring them in safety.

A weather forecast includes information about:
- Changing weather conditions
- Wind
- Ice
- Precipitation
- Flooding
- Lightning

WARNING
Defective crane!
Death, severe bodily injuries, property damage.

If a crane movement occurs during the interruption of crane operation:
▶ Make sure, when an unintentional crane movement occurs, for example as a result of leak, no danger for persons, crane and surrounding is created.

Leaks can occur all on pressurized hydraulic cylinders, for example on the following cylinders:
- Support cylinder
- Luffing cylinder
- Telescoping cylinder
- Control cylinder

Note
▶ Movements can occur on hydraulic cylinders also as a result of changing oil temperature.

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WARNING
Set up crane is not supervised!
Situations during interruption of crane operation may occur which could cause the crane to become unsafe if left unsupervised.
Toppling crane, death, severe bodily injuries, property damage.
▶ Always watch the crane and keep it under control.

If the crane is in set up condition:
▶ Do **not** leave the crane.

If the crane can **not** be constantly kept under control:
▶ Take the equipment down and telescope the boom in and place it down.
▶ The boom on the crane may only be placed down if the predicted wind speeds according to the wind speed charts are less than the maximum permissible wind speeds during assembly and disassembly.
▶ Before the crane is unsupervised: Establish an emergency plan.
▶ Carry out the measures listed below.

Note
▶ An emergency plan includes information how the crane is brought into a safe condition if an unforeseen event occurs.

If possible:
– Take down and secure the equipment, see the erection and take-down charts.
– Telescope the boom in and secure it. The crane boom may only be telescoped when the prevalent wind speed is lower than the wind speed indicated in the load chart for the boom.
– Take the boom down and secure it. The crane boom may only be placed down if the wind speeds are lower than the maximum permitted wind speeds according to the wind speed charts or does not exceed them according to the assembly / disassembly instructions.

On mobile cranes:
– Lift the axles to the maximum position and block the hydraulic suspension.

On lattice mast cranes:
– Set the Derrick ballast, if present, down on the ground.
– Place the load completely on the ground and unhook from the crane hook.
– Remove the fastening ropes from the hook.

– Place the load completely on the ground and unhook from the crane hook.
– Remove the fastening ropes from the hook.

When the hook block remains installed:
– Lift the hook block into the highest position.
– Make sure that the hook block does not touch other crane parts or obstacles.

– Make sure that all measures were taken to keep the crane in a safe condition if something happens.
– If possible, turn the engines off.
– Set all control levers into neutral position or into a locked position.
– Turn all secondary systems off, except systems, which are required for restart.
– Establish the energy supply and functionality of safety equipment.
– Close off all control devices, which are not in use.
– Disconnect all control devices, which are connected with cables, if possible, and secure them to prevent unauthorized use.
– Secure control devices without cables to prevent unauthorized use.
– Make sure that the batteries in control devices without cables are charged.
– Make sure that access to the crane and operation for unauthorized personnel is excluded: Lock the driver's cab and the crane cab.
– Secure all keys to prevent unauthorized access.

If the construction site has limited space:
– The decision not to take the boom down while the crane is unsupervised can only be made by an authorized and qualified crane operator, who is familiar with the construction site.

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– Make sure that no danger can occur for persons, crane and its surroundings should something unforeseen happen.
– Make sure for the duration of the interruption of crane operation, that the predicted wind speeds do not exceed the permissible values for the respective set up configuration, see wind speed chart.
– If the wind speed charts do not provide values for the set up condition, the permissible wind speed in the load chart shall be observed.

If crane operation with a set up crane is interrupted:
– Make sure measures are initiated in time by trained, qualified personnel to bring the crane into a safe condition if anything happens.
– Make sure that no danger can occur for persons, crane and its surroundings should something unforeseen happen.

If the predicted wind speeds are above the permissible values:
– Bring the boom and equipment in time into a permissible condition before impermissible wind speeds occur, depending on the predicted wind speed, or take it down completely on the ground. See Crane operating instructions, wind speed charts and Erection and take down charts.
– Telescope the telescopic boom in and luff down to 0°. Position the boom and auxiliary boom, see the Crane operating instructions, wind speed charts and erection and take-down charts.

Incidents are for example:
– Vandalism
– The ground giving way due to severe rain
– Melting ice under the supports
– Storm and thunderstorm
– Storm and wind
– Lightning
– Flooding
– Landslides
– Washouts
– For mobile cranes and crawler cranes with support:
  Slippage of support cylinders (leak, temperature changes)
– For cranes with a telescopic boom:
  Slippage of luffing cylinders (leak, temperature changes)

30.5 Resuming crane operation

Before resuming crane operation, the crane operator is obligated, among others, but not exclusively, to inspect the crane condition, the safety equipment, as well as the environmental conditions.

WARNING
Danger of accident!

When the crane operator leaves the crane cab:
▶ Before resuming work, check the operating mode setting and reset, if necessary.

30.6 Ending crane operation

Before the crane operator may leave the crane, the following prerequisites must be met:
– Place the load fully on the ground and unhook from the crane hook.
– On crane with telescopic boom: Telescope the telescopic boom all the way in and take down the boom in the boom receptacle.
– On crane with lattice mast boom: Take the lattice mast boom down and disassemble if necessary.
– Bring the control lever (master switch) to 0-position.
– Apply the parking brake on the crane chassis.
– Turn the engine off and pull out the ignition key.
– When a battery master switch is present: Turn off the battery master switch and remove the switch cams.
– Lock the crane cab.
– Secure the crane to prevent unauthorized use.

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- For mobile crane: Make sure that the driver's cab is **not** occupied. Lock the driver's cab. Secure the crane to prevent it from rolling off unintentionally, see section „Parking the vehicle".
- Make sure that no danger can occur for persons, crane and its surroundings should something unforeseen happen.

31 Lifting of personnel

31.1 Destined use

- The destined use of the crane is **lifting of loads**.
- **Lifting of personnel** is **not** considered to be destined use of the crane.

Note

▶ These instructions do **not** apply for work platforms, which are attached on the crane boom and are used to lift personnel. This subject is governed by international standards for mobile aerial work platforms.

WARNING

Non-designated use of the crane!

Personnel can be severely injured or killed.

▶ The crane is **not** intended to lift personnel.

▶ Lifting persons on the variable support is prohibited.

▶ The crane may **not** be used for recreational purposes and exhibitions, such as lifting personnel for shows, bungee jumping or Dinner in the sky.

▶ The crane may **not** be used for lifting of devices with personnel on them or under the device, such as lifting of tents.

▶ Exception: If lifting of personnel for special work situations is the least dangerous possibility to carry out the work, then personnel may be lifted or brought into a suspended position when using lifting cages (cherry pickers).

31.2 Prerequisites for lifting of personnel

Make sure that the following prerequisites are met:

- Lifting personnel with cranes is permissible by national and local laws in the country where this crane application is carried out.

DANGER

Lifting of personnel!

Accidents which occur when lifting personnel often result in severe injuries or even death.

▶ This exceptional application is within the scope of responsibility of the user and is only permitted if the requirements and instructions in the next sections are observed and adhered to.

▶ The company, the supervisor, the crane operator and auxiliary personnel must proceed especially carefully and safety conscious.

▶ Before the lifting procedure, a meeting must be held with all associated personnel.

▶ The following warning notes and safety regulations must be strictly observed.

31.2.1 Legal prerequisites

Make sure that the following prerequisites are met:

- Special arrangements were made for the use of the lifting cage (cherry picker) according to the requirements of national laws.
- If required by national laws: The use of the crane to lift personnel was reported to the state agency for occupational health and safety. The lifting procedure may possibly require a special permit.
- Before the implementation of the lifting procedure with the aid of a work-specific risk analysis for the possibility of rescuing personnel in emergencies was defined.

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- To rescue personnel in emergencies, precautionary measures must be present on the crane, if they are required by national laws.
- The measures for safe operation near power lines, depending on the conditions on the job site and the national laws / national regulations were observed and adhered to.

31.2.2 Prerequisites for crane equipment and accessories

Make sure that the following prerequisites are met:
- The hoist gear to lift personnel must also be able to be moved in emergency operation.
- Before lifting personnel, the crane was inspected. No damage was found.
- The lifting cage (cherry picker) is utilized according to national laws and / or standards and according to intended purpose.
- Before lifting personnel, the lifting cage (cherry picker) was carefully inspected. No damage was found.
- Every emergency rescue device was inspected and its operational readiness was determined, if required by national laws.
- Any hooks in use must be equipped with a latch, which prevents the hook mouth to open. According to national laws, the latch must be manually closable or lockable or must automatically close via a spring.

31.2.3 Inspection before start up

Make sure that the following inspections are made before starting up the lifting cage (cherry picker):
- On every new construction site and after every modification or repair: To ensure the operating safety of the lifting cage (cherry picker) and the lifting equipment, a test with 125 % of the nominal load carrying capacity of the lifting cage (cherry picker) without personnel must be carried out. During the test, the lifting cage (cherry picker) may only be lifted just above the ground.
- A test lift with loaded lifting cage (cherry picker) without personnel must be carried out. The weight in the lifting cage (cherry picker) for the test lift must be at least as large as the weight of the personnel and the weight with the work equipment carried along. For this test lift, the course of all planned movements of the lifting procedure must be simulated.
- This test lift must be carried out for every location on a construction site, where personnel must be carried.

31.2.4 Prerequisites for operation with lifting cage (cherry picker)

Make sure that the following prerequisites are met for operation with lifting cage (cherry picker):
- The personnel and technical prerequisites for safe use and operation of the emergency control of the crane are present.
- The emergency control for emergency rescue of the person in the lifting cage is functioning.
- The rope pull is limited to 50 % of the maximum rope pull.
- The crane is utilized only to 50 % of its maximum load bearing capacity of the valid load chart.

32 Securing personnel on shut off crane

32.1 Terms and abbreviations

- PSAgA: Personal protective equipment to prevent falling
- HSG: Height safety device

32.2 Destined use

Cranes are **not** designed to protect personnel against falling.

When the following prerequisites are met, the personnel protection may be permissible:
- A justified individual case is present.
- A project-specific written risk assessment and work procedure for the precise case by the employer is on hand.

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– The specific safety measures are strictly adhered to.
– The crane is intended by the manufacturer for personnel protection.

Limitations for movement and operation:
– Moving the secured person on the crane **from** job site and **to** job site is impermissible.
– Moving the secured person on the crane **from** job site and **to** job site is permissible only in case of a rescue operation.
– Operation of the crane by the secured person is impermissible.

32.3 Prerequisites

WARNING
Prerequisites for personnel protection are **not** met!
Danger of accident. Death, severe bodily injuries.
▶ Carry out the personnel protection on the shut off crane only when **all** prerequisites in this section have been met.

Make sure that the following prerequisites are met:
– The country-specific, legal regulations are being observed.
– The written risk assessment shows:
  • Technical protective measures with at least the same protective effect are **not** available.
  • The normal fastening devices can **not** be used.
  • Personnel protection on the shut off crane is the safest and most useful method to carry out this work.
– Last transport and personnel protection occur independent of each other:
  • Do **not** carry out personnel protection at the same time as load transport. Simultaneous personnel movement is impermissible.
  • Riding along on the load is impermissible.
– Determination of fastening points and rescue plan for the precise case is on hand from the employer.

32.3.1 Personnel and qualification

Make sure that the following prerequisites for personnel and qualification are met:
– The crane operator is suited and competent to operate the crane.
– Person, which is secured, must be trained in handling the PSAgA.
– The following persons are present on the job site and separately instructed:
  • A supervisor
  • The crane operator
  • The required number of rescue staff according to the rescue plan
– Access protection, fall protection on the shut off crane is made in accordance with the project-specific risk assessment on hand and the measures to be taken.
– The supervisor monitors the safe execution of work. He may **not** take part in the work.
– An effective communication must be ensured between crane operator and the secured person.

32.3.2 PSAgA, rescue equipment and tools

Make sure that the following prerequisites and measures are met:
– Use only HSG (height safety device) according to EN 360 in connection with a safety harness according to EN 361 to secure the person.
– Connecting device is suited for the occurring stress on the edges, see Manufacturer's documentation or device identification.
– Recurring inspections have been made. There are **no** visible defects present.
– At least 1 m connecting device of the maximum possible extension length of the HSG (height safety device) must remain in the housing.
– Fasten the HSG (height safety device) with two separate connecting devices (for example Securing on crane hook and on crane pulley block).

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- Position the crane in such a way that the HSG (height safety device) is at least 5 m and plumb **over** the person, which is being secured.
- Do **not** exceed the maximum permissible deflection of the HSG (height safety device).
- Keep the required space **underneath** the person, which is being secured.
- All required objects (tools, building material) for the work are secured to prevent them from falling.

32.3.3 Crane

Make sure that the following prerequisites are met:
- The maintenance intervals and periodic crane inspections have been adhered to. There are **no** visible defects present.
- The load on the crane hook in any possible position is at least 600 kg , see Load chart (take the crane pulley block into account).
- Ensure sufficient load bearing capacity: For the load cases catching, pendular fall and possible angular pull adhere to the manufacturer's instructions.
- The crane is secured against movements and inadvertent movement (remote control is deactivated, crane control is activated).
- Only for aligning loads in the end position: Carry out a minimum of crane movements with the least possible speed.
- The overload protection is active.
- Auxiliary booms are **not** used.

32.4 Fastening device

Make sure that the following prerequisites are met:
- The crane hook is equipped with the hook safety.
- On the carrying device two connecting devices separated from each other can be fastened.
- HSG (height safety device) is redundantly fastened.
- Suitable fastening devices according to EN 795 Type B are on hand:
  - Round sling or fastening rope with steel core
  - Belt loop
- Textile components must be protected against greases, oils and other aggressive substances.
- Use only steel carabiners according to EN 362 with Tri-Lock function.

32.5 Rescue

A person in an accident must be lifted or lowered with the aid of the crane.

Carry out the following measures to ensure a safe rescue operation:
- Determine the rescue plan and rescue chain at the preparation of the mission.
- Ensure the rescue of a person involved in an accident immediately with locally available means and trained personnel.
- Have the rescue mission coordinated by another person, with visual and voice contact to the crane operator, ground personnel as well as to the person, which is rescued.

32.6 Additional risks

Make sure that the following risks are taken into account:
- Wind effect and environmental influences.
- Crushing and shearing points.
- Endangerment by additional cranes, for example material transport.

33 Welding work on the load

Note
▶ The load must also be grounded.

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In case of welding work on the load, the screw clamp of the welding unit must be attached on the work piece to avoid current flow via hoist rope, crane superstructure or crane chassis.

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2.04.10 Ladders

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Fig.195219

1 Safety guidelines

The ladders have been built according to the present level of technology and recognized safety technical regulations. Despite that, during their use dangers to life and physical condition of the user and / or third parties can occur.

The ladders may exclusively be used in a flawless technical condition and according to their missions as well as with constant awareness of safety and dangers.

Changes on the structure may exclusively be made with written approval of the manufacturer.

The ladders are exclusively designated for the ascent and descent of personnel.

Any other use is not as intended and therefore prohibited.

The manufacturer is **not** liable for damages, which are caused by unintended use or improper usage.

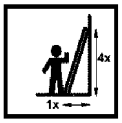
WARNING
Danger of falling!
If the following safety guidelines are not observed, personnel can fall down and be killed or severely injured.

- ▶ Observe and adhere to the assembly and safety guidelines for ladders.
- ▶ Observe and adhere to the safety signs on the ladders.
- ▶ Install and secure the ladders properly.
- ▶ Use ladders exclusively if you are healthy enough to do this.
- ▶ Climb up / down the ladder with the 3-point support.
- ▶ Use the rungs as handles.
- ▶ Step into the rungs deep enough.
- ▶ Never bring the ladder to a new position during use.
- ▶ Do not use damaged ladders and replace them immediately.
- ▶ Repair the ladder exclusively through authorized service facilities.

2 Safety signs

Note

- ▶ All safety signs on the ladders must be complete and always legible.
- ▶ Observe and adhere to the manufacturer's operating instructions.

Sign	Explanation
	Read the operating instructions.
	Maximum number of users on one ladder.
	Correct set up angle 65° to 75°.

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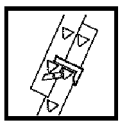
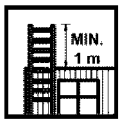
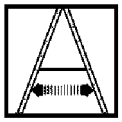
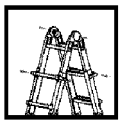
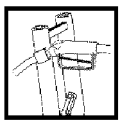
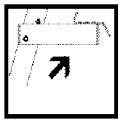
Sign	Explanation
	Before use: Engage the lift out safety.
	Ladder overhang above the exit level.
	Secure the upper / lower end of the ladder.
	Before use: Tension the safety struts on stepladders.
	Before use: Engage the locking pin joints and pull pin locks.
	To open / close the tank cover and to ascent / descent: Insert the fuel nozzle into the retainer.
	Fold the platform out before setting up the ladder.
	Before use: Check the ladder for damage.
	Check the legs of the ladder.
	Maximum load.

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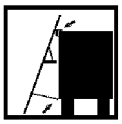
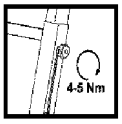
Sign	Explanation
	Do not use the three uppermost rungs of an extension ladders as rungs to stand on.
	Do not use the four uppermost rungs / steps of a stepladder without a platform to stand on.
	Do not use the two uppermost rungs of a stepladder with integrated extension ladder as rungs to stand on.
	If hinged ladders are used as stepladders: Spread the ladder legs to the stop.
	Place the upper placement angle flat. Hold the belt on tension.
	Hook the hook on the platform of the refueling ladder on the vehicle.
	Tighten the star knob on the beam extension tightly.
	Do **not** use a damaged ladder.
	Preclude any contaminants on the ground.
	Make sure the upper end of the ladder is placed correctly. Place the ladder only on safe surfaces.

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Sign	Explanation
	Only one person may climb up / down on any accessible leg of the ladder.
	Avoid leaning out to the side. The body's center of gravity should be between the ladder beams.
	Face the ladder when climbing up / down the ladder.
	Use the ladder only with suitable shoes.
	Do not use a stepladder as a leaning (extension) ladder.
	Do **not** use the inner section of multi-part hinged ladders without outer sections as a stepladder.
	Crushing danger.
	Set the ladder up on horizontal and solid ground.
	Set the ladder up on solid ground.
	Use the ladder in the correct set up direction.

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Sign	Explanation
	Do not carry along bulky objects or objects over 10 kg on the ladder.
	It is not permitted to step off the ladder to the side.
	During transport, pay attention to danger due to power lines.
	Do not use the ladder as a walkway.
	Do not transport snow and ice shovels over the ladder. Use hooks!
	Danger due to shearing point.
	Do not use a ladder to climb up to another lever.
	Make sure that both ladder sections are opened completely and secured. Avoid an incorrect ladder position.
	Only use the platform ladder with a locked spreader lock.
	Only permissible ladder rungs / platforms may be used as standing and stepping surfaces. Other surfaces such as placement surfaces for cable clips or attachment hooks may **not** be used as standing and stepping surfaces.

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Sign	Explanation
	If a crossbars is part of the scope of delivery of the mobile platform ladder: Only use the platform ladder with the crossbar assembled.
	If auxiliary weights are part of the scope of delivery of the mobile platform ladder: Only use the platform ladder with the auxiliary weights assembled.
	If a foot brake is installed on the mobile platform ladder: Use the foot brake.
	Make sure that the joint is locked.
	In unfavorable weather conditions, do **not** use the ladder in the open.

3 Ladder inspection

Make sure that the following conditions are met:
- All ladders are inspected at lease every 12 months. See chapter 8.17.
- The inspection may be made exclusively by authorized and trained expert personnel.

4 User guidelines

Make sure that the following prerequisites are met before using the ladder:
- A risk evaluation had been made.
  The national legal regulations have been taken into account.
- Use are able to use a ladder as far as your health is concerned.
- The ladder is suited for the respective application.
- The ladder is complete and not damaged (visual inspection).
- The ladder is free of contaminants, such as:
  - Ice
  - Snow
  - Frost
  - Wet paint
  - Lubricants
- The legs of the ladders are not worn.
- Screws and connections have been checked for tight seating.
- The base is:
  - Level
  - Horizontal
  - Slip-resistant

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- Unmoveable

Before setting the ladder up:
- Secure the locking devices of the ladder.
- Tension the spreaders of the stepladder.
- Do **not** set up the ladder from above.
- Do **not** set the ladder on braces or steps.

When using the ladder:
- Make sure that no children are playing on the ladders.
- Set the ladder up in the correct set up angle.
- Subject the ladder with no more than maximum 150 kg.
- Use the ladder exclusively as described in section „Ladder access“.
- Do **not** use the ladder outside in strong wind.
- Do **not** subject the ladder excessively to loads in side assembly work.
- Face the ladder when climbing up or down the ladder.
- Step on the ladder with suitable shoes.
- Do not use the ladder as a walkway.
- Secure the ladder to prevent it from being knocked over inadvertently.
- For leaning ladders, do not step on the uppermost three steps / rungs, in reference to the ladder placement point.
- For stepladders, do not step on the uppermost two steps / rungs.
- When working on a ladder, hold on tightly with one hand.
  If this is not possible: Take additional safety measures, such as: Use the WORK POSITIONING SYSTEM (WPS).

For repair, maintenance and storage of a ladder:
- Have repairs and maintenance made by expert personnel according to the manufacturer's instructions.
- Store the ladders according to the manufacturer's instructions.

Before transporting the ladders:
- Lock and secure the ladders in their provided transport retainers.

5 Ladder access

Wearing the personal protection equipment to prevent falling and the ladder safeguard depend on the type of work, among others.

5.1 Ladder safeguards

The ladder can be secured to prevent it from sliding away to the side by:
- Restraint device, for example: Tether or side stops on component
- Friction lock, for example: Rubber caps or plastic caps on the end of the ladder beam at direct placement on a surface

The ladder can be secured to prevent it from tipping to the rear by:
- the correct placement angle

5.2 3-point support

A 3-point support is ensured when:
- Two hands have a safe hold and one leg is standing safely.
- Two legs are standing safely and one hand has a safe hold.
- Two legs are standing safely in straddle position on a stepladder which can be accessed from both sides, on the third respective rungs / steps from the top. The user locks the ladder with the knees.
- Two legs are standing safely and at the same time, the body is leaned on higher rungs / steps of the leaning (extension) ladder. The center of gravity of the body must always be between the two ladder beams.

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– A WORK POSITIONING SYSTEM (WPS) is used.

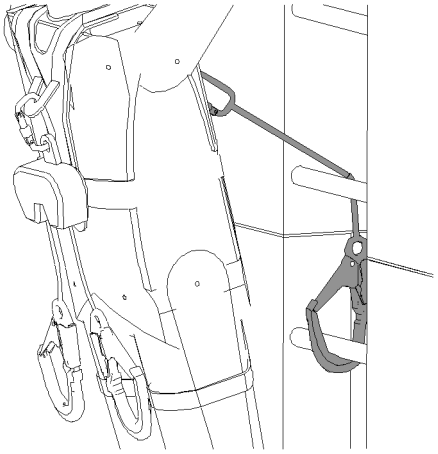

Fig.126746: Example of how to use the WPS

5.3 Light and / or heavy work

The following lists various light and heavy work

Examples for light work:
- Installing / removing retaining pins or spring retainers
- Fastening components, disengaging fastening equipment
- Pushing the transition aid out / in
- Establishing / disconnecting electrical or hydraulic connection between components
- Actuating the hand pump for the folding jib
- Reeving the auxiliary winch in / out
- Setting up / taking down foldable railings
- Carrying out maintenance and inspection work
- Refueling the crane chassis and / or crane superstructure

Examples for heavy work:
- Knocking the connector pins in / out
- Installing / removing the wind warning
- Reeving the hoist rope in / out
- Installing / removing the connector pin with assembly aid (hydraulic cylinder or mechanical assembly tool)
- Installing / removing the rope lock

5.4 Remove the end section on the leaning ladder

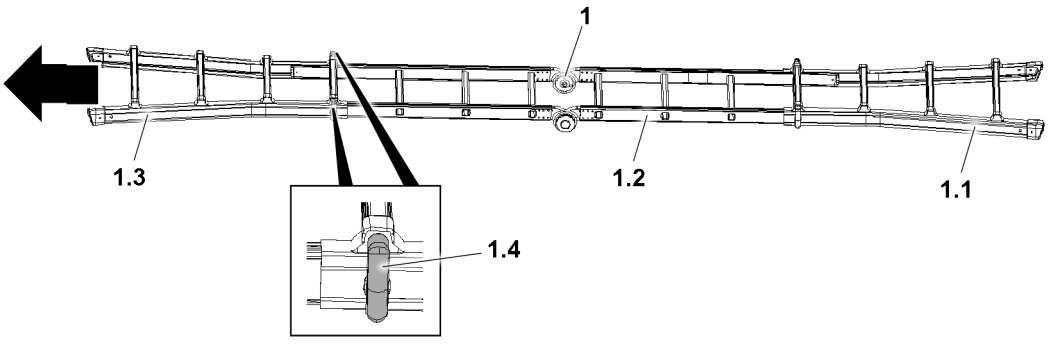

*Fig.126873: Leaning (extension) ladder **1***

The leaning ladder **1** consists of the following components:
- **1.1** Base
- **1.2** Center section
- **1.3** End section
- **1.4** Locks

When the end section **1.3** is wider than the leaning tube **2** or the intended placement surface, the leaning ladder **1** cannot be placed fully expanded. In order to position the leaning ladder **1** fully expanded, the end section **1.3** must be disassembled and removed.

CAUTION
Fingers in the spring range of the lock **1.4**!
Finger crushing when locking and unlocking.
▶ Grip the lock **1.4** outside of the spring range.

▶ Release the locks **1.4** on the left and right.
▶ Slide the end section **1.3** out of the center section **1.2** and remove it.

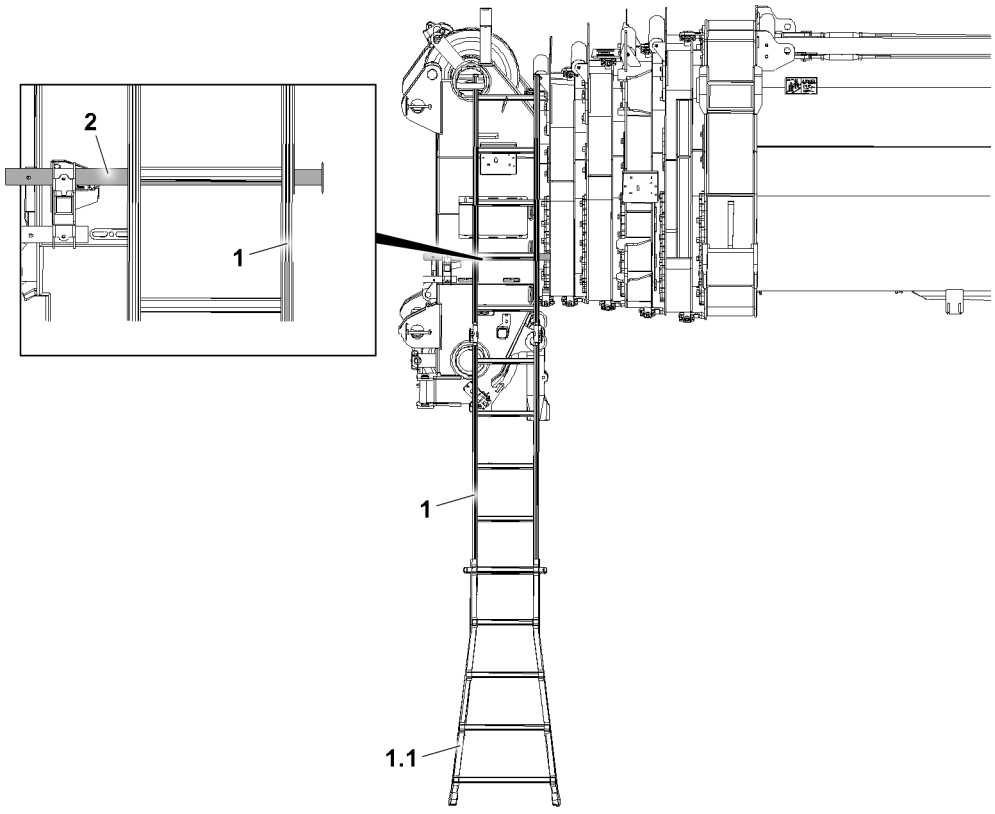

*Fig.126874: Leaning ladder **1** placed on the leaning tube **2***

When placing the leaning ladder **1**, the base **1.1** must be placed on the ground.

▶ Place the leaning ladder **1** on the leaning tube **2** or the intended placement surface.

WARNING
The leaning ladder **1** is wider than the leaning tube **2** or the intended placement surface!
Assembly personnel can fall when stepping on the leaning ladder **1** and be severely injured.
▶ When stepping on the leaning ladder **1** make sure that the leaning ladder **1 is not** wider than the leaning tube **2** or the intended placement surface.

▶ Climb on the leaning ladder **1**. Carry out the assembly work.

Before leaving the jobsite, the end section **1.3** must be reinstalled.

▶ Before leaving the jobsite: Install the end section **1.3**.

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▶ Secure the leaning ladder **1** in transport position.

5.5 Types of ladders

5.5.1 Stepladder

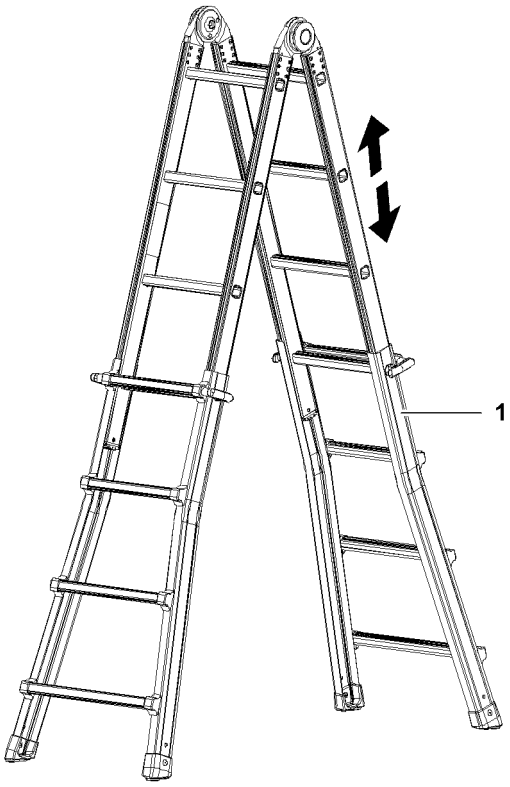

Fig.121175: Examples for stepladders

WARNING
Danger of falling when transitioning from a stepladder **1** to other components!
Personnel can fall down and be killed or severely injured.
▶ Do **not** transition from a stepladder **1** to other components.

WARNING
Danger of falling!
Personnel can fall down and be killed or severely injured.
▶ When using stepladders **1**, adhere to the 3-point support.
▶ Adhere to the prerequisites and conditions for the use of stepladders **1**.

Prerequisites for the use of stepladders **1**:
– Make sure that the weight of the tool carried along is not more than 10 kg.

Access	Work
Maximum rise to the third rung / step from the top	Maximum rise to the third rung / step from the top
3-point support required	3-point support required
	Rise to 1 m: Personal protective equipment to prevent falling not required

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Access	Work
	Rise above 1 m to 7 m **Light work**: Personal protective equipment to prevent falling not required
	Rise above 1 m to 7 m **Heavy work**: Personal protective equipment to prevent falling required

*Conditions for access and work on stepladders **1***

5.5.2 Leaning (extension) ladder

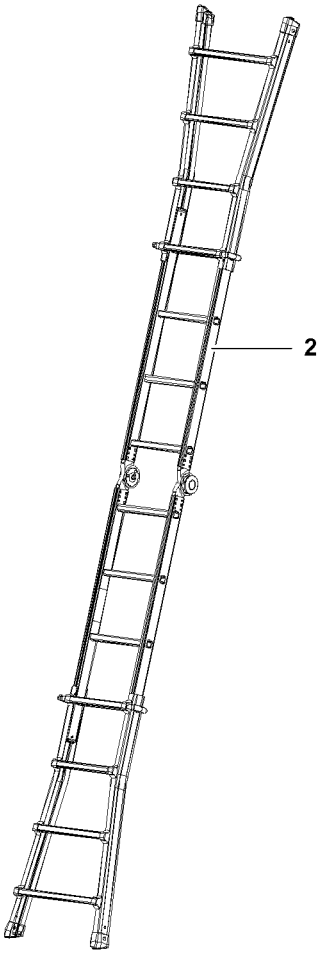

Fig.121176: Example for leaning (extension) ladders

WARNING
Danger of falling!
Personnel can fall down and be killed or severely injured.
▶ When using leaning (extension) ladders **2**, adhere to the 3-point support.
▶ Adhere to the prerequisites and conditions for the use of leaning (extension) ladders **2**.

Prerequisites for the use of leaning (extension) ladders **2**:
– Make sure that the leaning (extension) ladder **2** is positioned onto a level placement surface.

- Make sure that the leaning ladder **2** is placed in an incline angle of 65° to 75° (approx. 1:4) to the horizontal.
- Make sure that the ladder overhang when leaning it on components is selected in such a way that the leaning (extension) ladder **2** is safely placed when subjected to a load / flex due to ascending persons.
- Make sure that the weight of the tool carried along is not more than 10 kg.

Access	Work
Maximum rise to the fourth rung / step from the top, in reference to the placement point	Maximum rise to the fourth rung / step from the top, in reference to the placement point
3-point support required	3-point support required
	Rise to 1 m: Ladder safeguard not required Personal protective equipment to prevent falling not required
	Rise above 1 m to 7 m **Light work**: Ladder safeguard required Personal protective equipment to prevent falling not required
	Rise above 1 m to 7 m **Heavy work**: Ladder safeguard and protection to prevent it from tipping to the rear required Personal protective equipment to prevent falling required

*Conditions for access and work on leaning (extension) ladders **2***

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5.5.3 Leaning (extension) ladder with transition

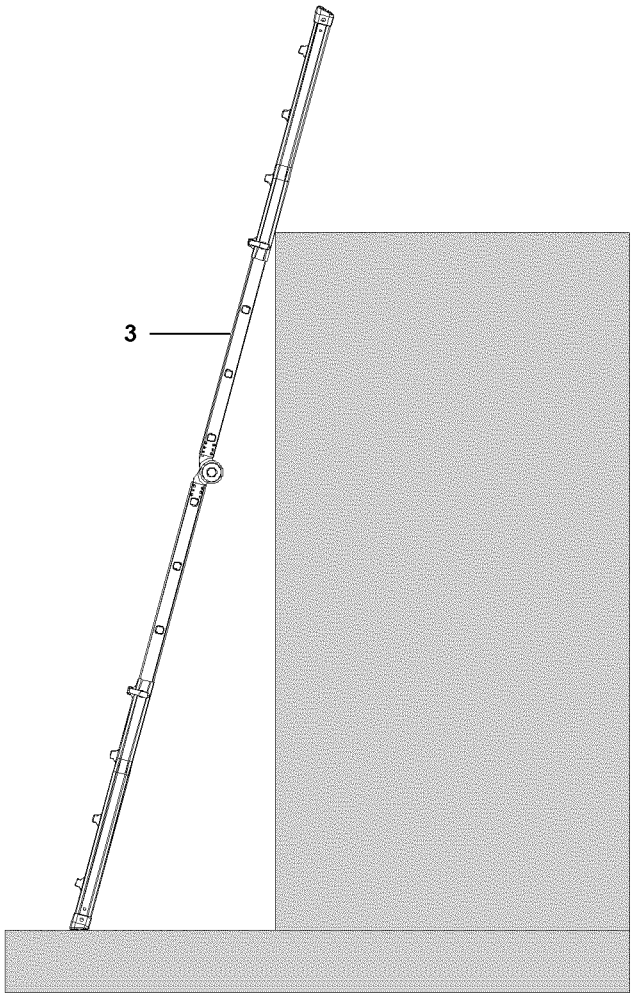

Fig.121177: Examples for leaning (extension) ladders with transition

WARNING
Danger of falling!
Personnel can fall down and be killed or severely injured.
- ▶ When transitioning, adhere to the 3-point support.
- ▶ Adhere to the prerequisites and conditions for the use of leaning (extension) ladders with transition **3**.

Prerequisites for the use of leaning (extension) ladders with transition **3**:
- – Make sure that the leaning (extension) ladder with transition **3** is positioned onto a level placement surface.
- – Make sure that the leaning ladder with transition **3** is placed in an incline angle of 65° to 75° (approx. 1:4) to the horizontal.
- – Make sure, for transitioning to higher work locations, when no other safehold possibilities are available, that the ladders beams of the leaning (extension) ladder go past the placement location by at least 1 m.
- – Make sure that the transition area is slip-resistant.
- – Make sure that the ladder position can be recognized from above.
- – Make sure that the ladder overhang when leaning it on components is selected in such a way that the leaning (extension) ladder is safely placed when subjected to a load / flex due to ascending persons.
- – Make sure that the weight of the tool carried along is not more than 10 kg.

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Access	Transition
Maximum rise to a rung / step below the placement edge	Maximum rise to a rung / step below the placement edge
3-point support required	3-point support required
Personal protective equipment to prevent falling not required	Personal protective equipment to prevent falling not required
	Rise to 1 m: Ladder safeguard not required
	Rise above 1 m to 7 m: Ladder safeguard required

*Conditions for access and transition to leaning (extension) ladders with transition **3***

5.5.4 Vertical ladder with transition aid

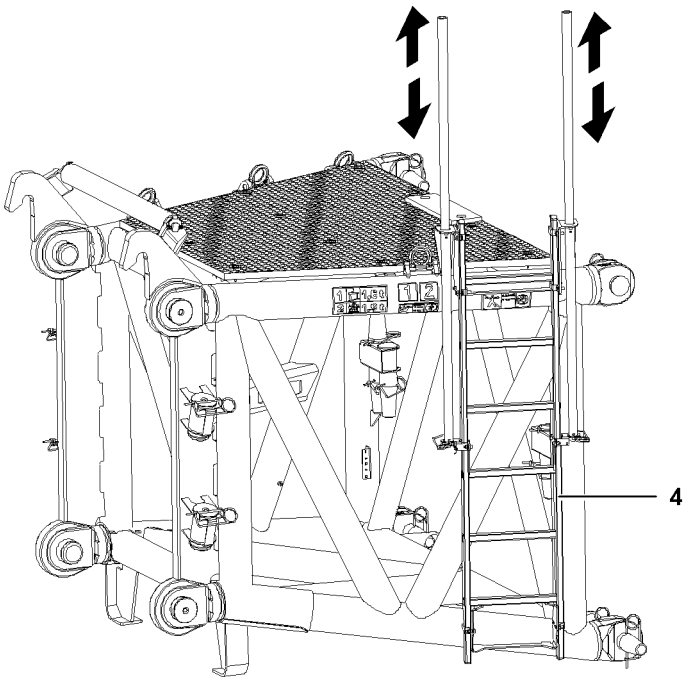

Fig.121178: Example for vertical ladder with transition aid

WARNING
Danger of falling!
Personnel can fall down and be killed or severely injured.

When using vertical ladders with transition aid **4**:
▶ Adhere to the 3-point support.

Before transitioning:
▶ Hook the personal protective equipment to prevent falling on a suitable location (for example: uppermost rung, safety rope or separate hook point).
▶ Adhere to the prerequisites and conditions for the use of vertical ladders with transition aid **4**.

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Prerequisites for the use of vertical ladders with transition aid **4**:
- Make sure, a centered grip reachable from the transition edge and a possibility to support oneself with the second hand is present for transitioning.
- Make sure that the transition area is slip-resistant.
- Make sure that the ladder position can be recognized from above.
- Make sure that the weight of the tool carried along is not more than 10 kg.

Access	Work
3-point support required	3-point support required
If necessary: use a WORK POSITIONING SYSTEM (WPS) at a suitable hook point.	If necessary: use a WORK POSITIONING SYSTEM (WPS) at a suitable hook point.

*Conditions for access and work on vertical ladders with transition aid **4***

Ascent	Transition
3-point support required	3-point support required
Rise to 5 m: Personal protective equipment to prevent falling not required	Rise to 1.8 m: Without transition aid: Personal protective equipment to prevent falling not required
Rise above 5 m: Fall arrest system with moving along fall arrest device or back protection required	Rise above 1.8 m: Without transition aid: Personal protective equipment to prevent falling required

*Conditions for ascent and transition to vertical ladders with / without transition aid **4***

5.5.5 Platform ladder

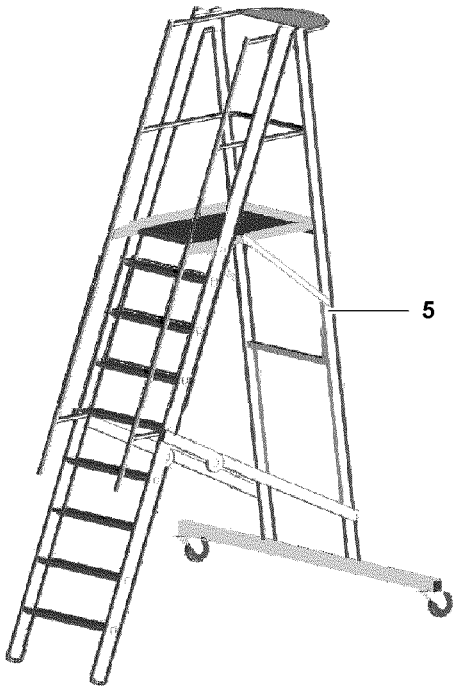

Fig.121179: Example for platform ladder

WARNING
Danger of falling when transitioning from a platform ladder **5** to other components!
Personnel can fall down and be killed or severely injured.
▶ Do **not** transition from a platform ladder **5** to other components.

WARNING
Danger of falling!
Personnel can fall down and be killed or severely injured.

For use of platform ladders **5**:
▶ Adhere to the 3-point support.
▶ Adhere to the prerequisite and conditions for the use of platform ladders **5**.

Prerequisite for the use of platform ladders **5**:
– Make sure that the weight of the tool carried along is not more than 10 kg.

Access	Working on the ladder	Working on the platform
Maximum rise to platform height	Maximum rise to platform height	Maximum height: Platform height
3-point support required	3-point support required	3-point support required
	Rise to 1 m: Personal protective equipment to prevent falling not required	
	Rise above 1 m to 7 m **Light work**: Personal protective equipment to prevent falling not required	Platform height **Light work**: Personal protective equipment to prevent falling not required
	Rise above 1 m to 7 m **Heavy work**: Personal protective equipment to prevent falling required	Platform height **Heavy work**: Personal protective equipment to prevent falling required

*Conditions for access and work on platform ladders **5***

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2.05 Signs on the crane

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Fig.195219

1 Signs

1.1 7725039 – Warning of high voltage

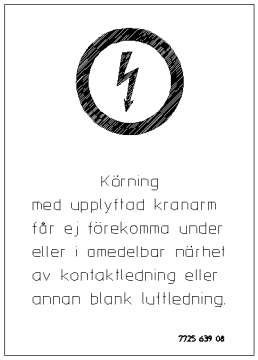

Fig.116269: Warning of high voltage

Note
▶ Only for certain countries.

1.2 772564008 – Slewing range

Fig.116270: Slewing range

Note
▶ Only for certain countries.

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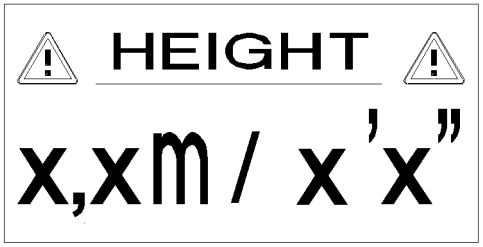
1.3 772580408 – Limitation of maximum travel speed

Fig.106035: Limitation of maximum travel speed

1.4 Vehicle height

	Vehicle height
970610408	
970629508	
970596108	
970608708	
979459108	

Vehicle height

Note
▶ Vehicle height x.x m (x.x ft)

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1.5 Note for assembly aid

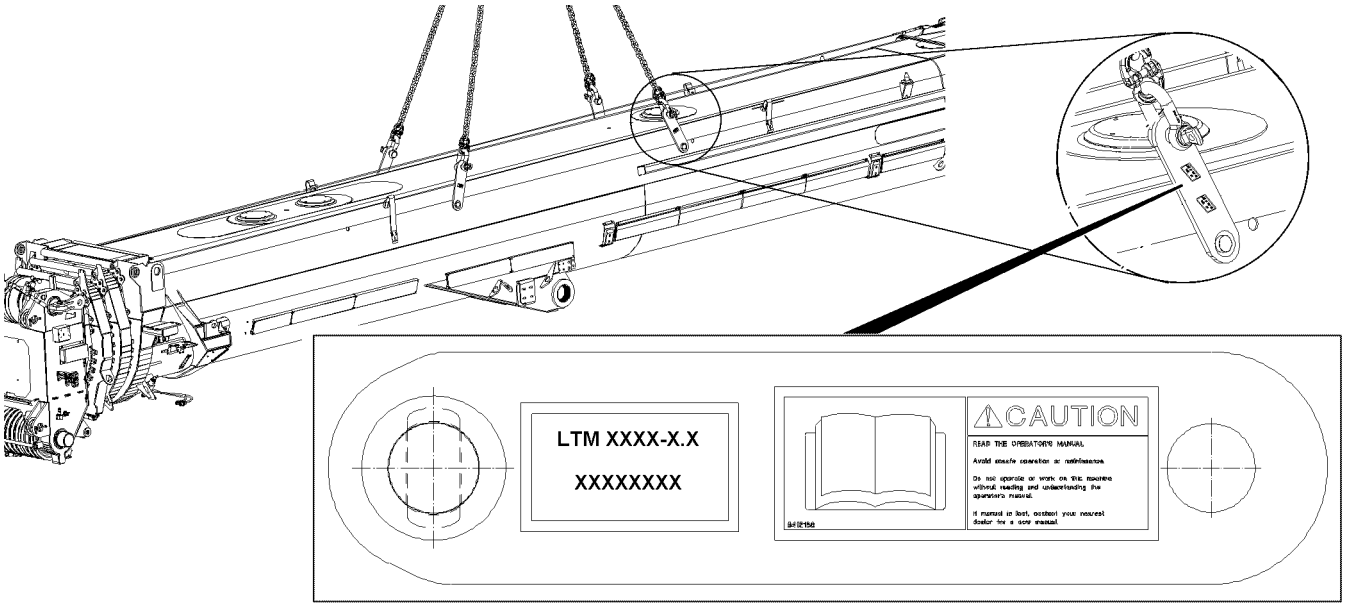

Fig.122741

Id. No.	Mobile crane
966713608	LTM 1750–9.1 LTM 1450-8.1
968483508	LTM 1500-8.1
962961708	LTM 11200-9.1, LTM 1400-7.1, LTM 1350-6.1, LTM 1300-6.2,
	LTM 1250-6.1, LTM 1250-5.1, LTM 1220-5.2, LTM 1200-5.1,
	LTM 1160-5.2, LTM 1160-5.1, LTM 1130-5.1, LTM 1100-4.2,
	LTM 1095-5.1, LTM 1090-4.1,
	LTR 11200, LTR 1220, LTR 1100

Note for assembly aid

WARNING
Incorrect assembly aids!
Falling telescopic boom, death, property damage.

To assemble and disassemble the telescopic boom:
▶ Use solely the assembly aids that belong to the crane.

1.6 9412158 – Reading the operating instructions

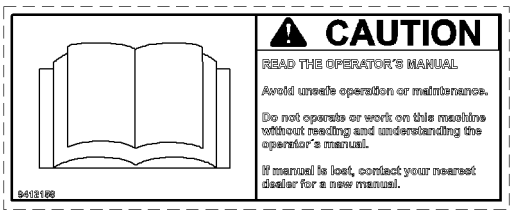

Fig.106048: Reading the operating instructions

WARNING
Danger of accident due to non-observance of operating instructions!
If the operating instructions are not read or understood, then this can lead to unsafe operation and improper maintenance.
Accidents with bodily injuries and property damage can result.
- ▶ The crane may only be operated if the contents of the operating instructions have been read and understood.
- ▶ Replace lost or incomplete operating instructions immediately.

1.7 97004046 – Safety harness, maximum two persons

Fig.115119: Safety harness, maximum two persons

DANGER
Danger of accidents due to overloaded safety ropes!
If safety ropes are used by more than two persons, then the safety ropes can be overloaded and fail in case of an accident.
Personnel can be severely injured or killed.
- ▶ Safety ropes are designed to secure a maximum of two persons against falling, one on the right and one on the left.

1.8 97017585 – Falling telescopic boom during disassembly / assembly

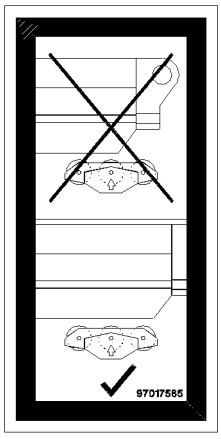

Fig.118467: Falling telescopic boom during disassembly / assembly

WARNING
Fatal accidents due to falling telescopic boom!
- ▶ Make sure that all pulleys are touching and carrying during the assembly and disassembly of the telescopic boom.

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1.9 97018351 – Falling telescopic boom during transport!

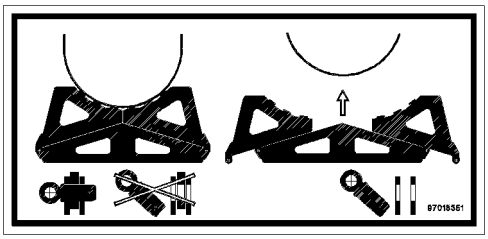

Fig.118466: Falling telescopic boom during transport

WARNING
Fatal accidents due to falling telescopic boom during transport!
▶ Pin and secure the transport bracket on the left and right.

1.10 97018564 – Falling telescopic boom during transport!

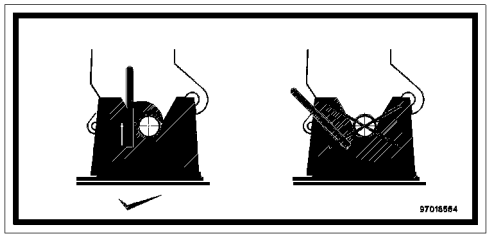

Fig.118533: Falling telescopic boom during transport

WARNING
Fatal accidents due to falling telescopic boom during transport!
▶ Lock the telescopic boom in the head receptacle.

1.11 97027147 – Overloading of the combi box is prohibited

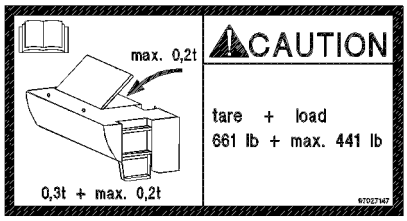

Fig.113829: Overloading of the combi box is prohibited

WARNING
Danger of overload!
If the combi box is subjected to a load of more than 0.2 t , the combi box can be damaged!
▶ The own weight of the combi box is 0.3 t and may be loaded with a maximum payload of 0.2 t.
▶ Do not subject the combi box to a weight of more than 0.2 t.

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1.12 97036733 – Fastening point

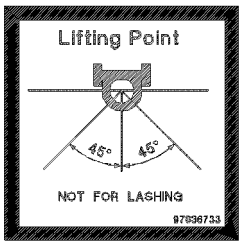
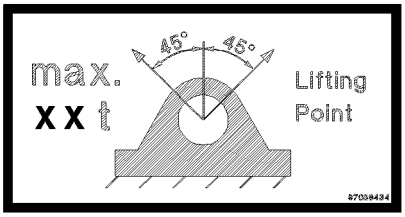


Fig.121184: Fastening point

WARNING
Damage to the fastening points!
- ▶ Use the fastening point solely to lift the load.
- ▶ Observe the maximum permissible fastening angle.

Note
- ▶ Fastening points and fastening angle.

1.13 Suspended load fastening point

	Suspended load fastening point
97038434	 *Fastening point*
97037482	
97039068	

WARNING
Mortal danger if the load falls down!
If the maximum suspended load or the maximum fastening angle is exceeded, the load can fall down and kill personnel.
- ▶ Observe the maximum permissible suspended load and fastening angle.

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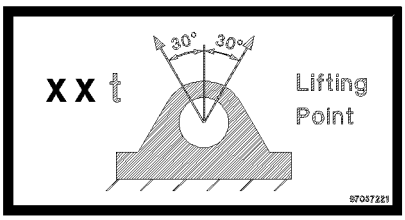
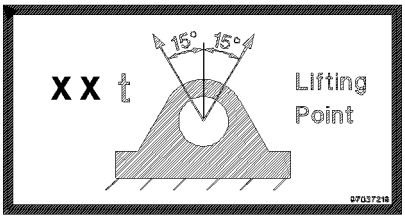
1.14 Suspended load fastening point

	Suspended load fastening point
97037221	 *Fastening point*
97037223	

WARNING
Mortal danger if the load falls down!
If the maximum suspended load or the maximum fastening angle is exceeded, the load can fall down and kill personnel.
▶ Observe the maximum permissible suspended load and fastening angle.

1.15 Suspended load fastening point

	Suspended load fastening point
97037219	 *Fastening point*

WARNING
Mortal danger if the load falls down!
If the maximum suspended load or the maximum fastening angle is exceeded, the load can fall down and kill personnel.
▶ Observe the maximum permissible suspended load and fastening angle.

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1.16 97037625 – Suspended load Fastening points / rigging points

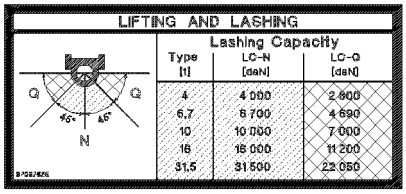

Fig.119988: Fastening points / rigging points

Note
▶ Fastening points and rigging points.

1.17 9402377 – Fastening point / lifting point

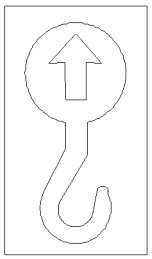

Fig.127586: Fastening point / lifting point

Note
▶ Fastening point / lifting point.

1.18 97106824 – Installing the N-assembly unit

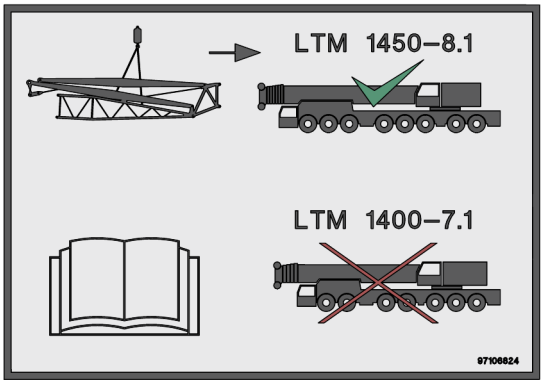

Fig.147594: Installing the N-assembly unit

WARNING
N-assembly unit installed on an impermissible crane type!
Death, severe bodily injuries, property damage.
▶ Use N-assembly units marked with this sign only for crane type LTM 1450-8.1.
▶ Observe and adhere to the operating instructions.

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1.19 97096132 – Fastening points for N-assembly unit

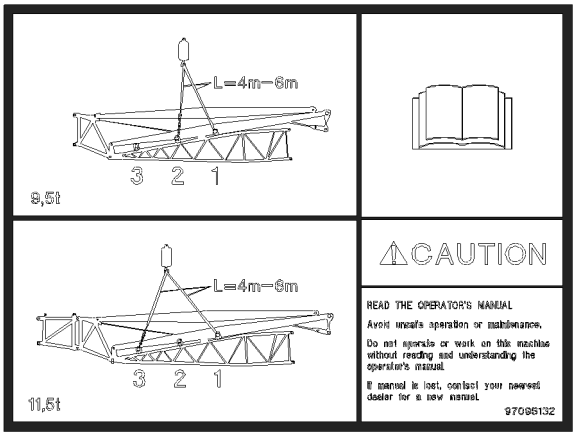

Fig.144774: Fastening points for N-assembly unit

WARNING
Incorrectly selected fastening points!
The N-assembly unit can tip over and kill personnel.
- ▶ Fasten the N-assembly unit only on the intended fastening points.
- ▶ Use fastening equipment with the correct strand length.
- ▶ Observe and adhere to the operating instructions.
- ▶ Replace lost or incomplete operating instructions immediately.

1.20 97036735 – Fastening point for lattice section

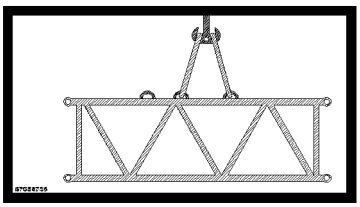

Fig.116266: Fastening point for lattice section

Note
- ▶ Fastening points for lattice section.

1.21 97036736 – Fastening point for lattice sections

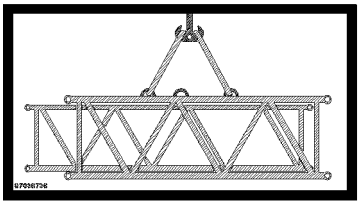

Fig.116267: Fastening point for lattice sections

Note
▶ Fastening points for lattice sections.

1.22 97038442 – Fastening point for lattice section

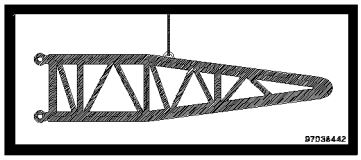

Fig.116288: Fastening point for lattice sections

Note
▶ Fastening point for lattice section.

1.23 97038452 – Fastening point for lattice sections

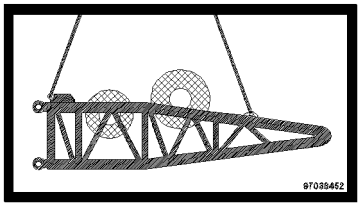

Fig.116289: Fastening point for lattice sections

Note
▶ Fastening points for lattice sections.

1.24 97038454 – Fastening point for lattice sections

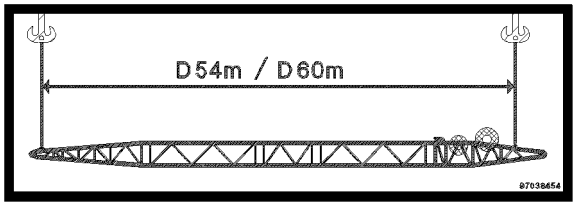

Fig.116290: Fastening point for lattice sections

Note
▶ Fastening points for lattice sections.

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1.25 97037871 – Fastening points for lattice sections

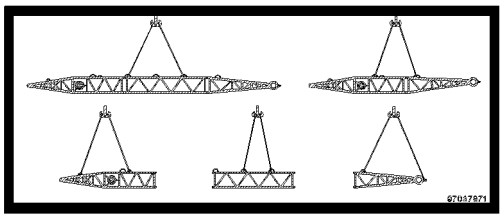

Fig.116292: Fastening points for lattice sections

Note
▶ Fastening points for lattice sections.

1.26 97057767 – Fastening points for lattice sections

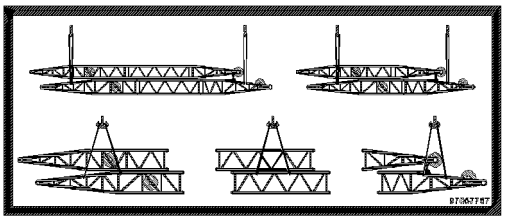

Fig.121181: Fastening points for lattice sections

Note
▶ Fastening points for lattice sections.

1.27 97057524 – Fastening point for assembly of lattice sections

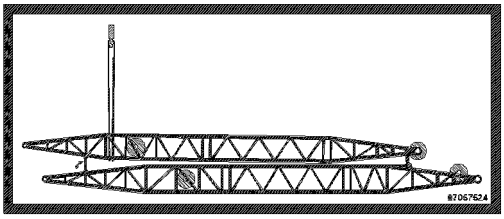

Fig.121182: Fastening point for assembly of lattice sections

Note
▶ Fastening point for assembly of lattice sections.

1.28 97057097 – Fastening point to turn the component

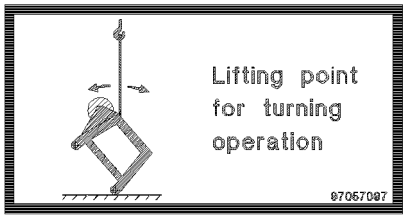

Fig.119987: Fastening point to turn the component

Note
▶ Fastening point to turn the component.

1.29 97039035 – Suspended load Assembly unit

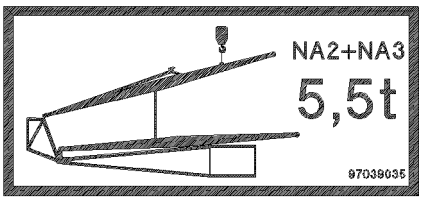

Fig.117348: Suspended load Assembly unit

Note
▶ Notice the suspended load.

1.30 97059339 – Suspended load Derrick pivot section

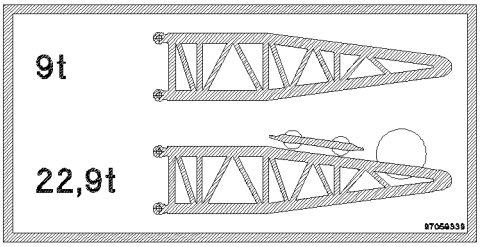

Fig.127469: Suspended load Derrick pivot section

Note
▶ Suspended load Derrick pivot section.
▶ Suspended load Derrick pivot section with rope winch and luffing pulley block.

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1.31 Fastening point for end section

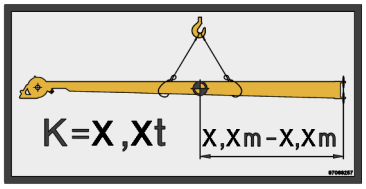

Fig.147595: Fastening point for end section

K = Weight in tons (t)

X.X to X.X = Distance of center of gravity in meters (m)

WARNING
End section improperly fastened!
The end section can tip over and fall down.
Death, severe bodily injuries, property damage.
- ▶ Fasten the end section only with two hooks.
- ▶ Select the fastening point such that the center of gravity is located within the fastening points.

1.32 97095312 – Suspended load and fastening points for counterweight frame

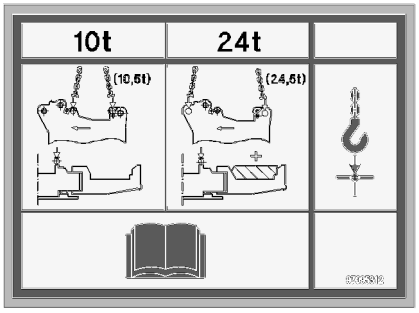

Fig.148126: Suspended load and fastening points for counterweight frame

Note
- ▶ Observe the suspended load and fastening points for counterweight frame.
- ▶ Observe and adhere to the operating instructions.

1.33 97003109 – Accessing the step ladder

Fig.109032: Accessing the step ladder

LWE/LG 1750-006/15409-07-02/en

WARNING
Danger of falling!
If the step ladder is accessed before it is completely folded out, the assembly personnel can fall and be fatally injured.
▶ Before accessing the step ladder, fold the lowest step out.

1.34 97003110 – Folding the step ladder in and out

Fig.109033: Folding the step ladder in and out

WARNING
Danger of falling!
When folding the step ladder in or out or when driving the crane, no persons may remain on the step ladder or within the entire danger zone! Persons can fall from the step ladder or be killed as the step ladder folds in or out.
▶ Fold the step ladder in and out only if there are no persons within the danger zone.

1.35 97006167 – Identifying the support base

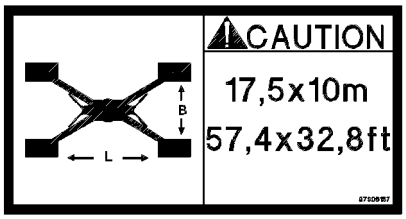

Fig.116285: Identifying the support base

Note
▶ The support beams are swung out / extended to a support base of 17.50 m x 10.0 m ; (57.4 ft x 32.8 ft).

1.36 97006167 – Identifying the support base

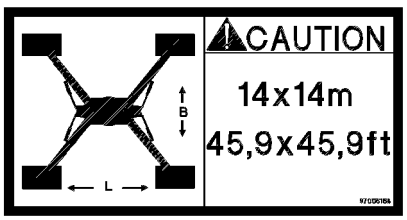

Fig.116286: Identifying the support base

LWE/LG 1750-006/15409-07-02/en

Note

▶ The support beams are swung out / extended to a support base of 14.0 m x 14.0 m ; (45.9 ft x 45.9 ft).

1.37 97008514 – Warning of head injuries

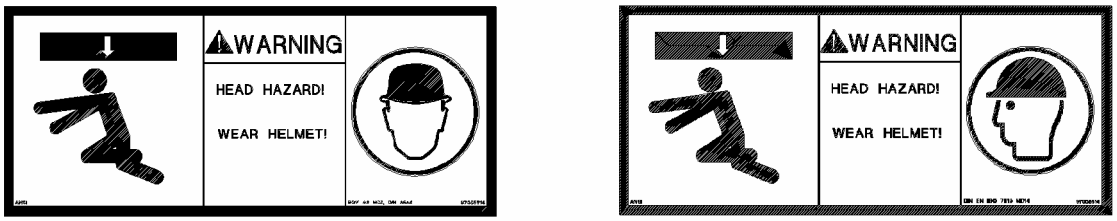

Fig.110550: Warning of head injuries

WARNING

Head injuries!

Due to falling parts, personnel can be killed or severely injured.

Hitting the head can cause injuries.

▶ Protect your head with a hard hat.

▶ Proceed in an aware and safe manner.

1.38 97009799 – Data logger

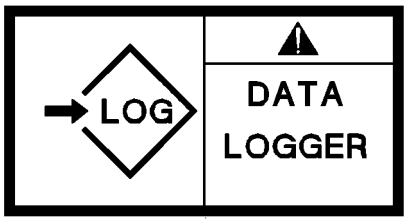

Fig.116261: Data logger

Note

▶ Data logger.

1.39 97012949 – Maximum load

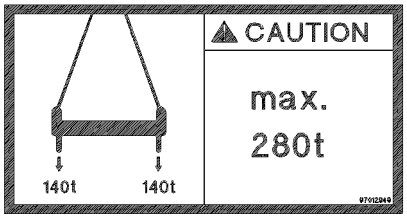

Fig.116263: Maximum load

LWE/LG 1750-006/15409-07-02/en

CAUTION
Property damage due to overload!
If the cross beam is subjected to a higher load than permissible, damage can occur.
▶ Do not overload the cross beam.

1.40 97012095 – Maximum load

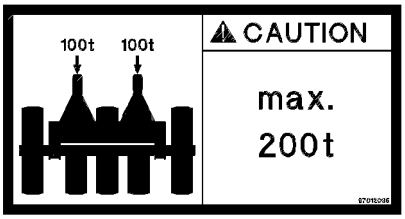

Fig.116265: Maximum load

CAUTION
Property damage due to overload!
If the roller cart is subjected to a higher load than permissible, damage can occur.
▶ Do not overload the roller cart.

1.41 97069053 – Storage boxes open

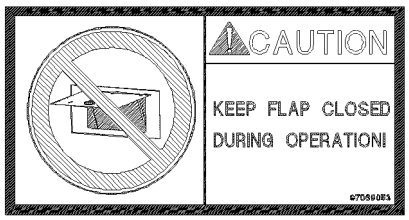

Fig.144736: Storage boxes open

NOTICE
Storage boxes open!
Damage of storage boxes.
▶ Before crane operation and before driving the crane, close the storage boxes.

1.42 97068370 – Closing the cab door

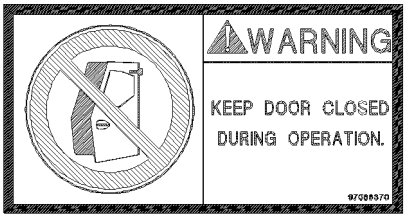

Fig.144737: Closing the cab door

LWE/LG 1750-006/15409-07-02/en

WARNING
Cab door during crane operation **not** closed!
The crane operator can fall down.
Death, severe bodily injuries.
▶ Close the cab door during crane operation.

1.43 97053409 – Entanglement hazard during winch operation

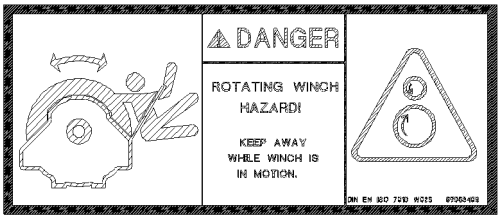

Fig.144738: Entanglement hazard during winch operation

DANGER
Entanglement hazard during winch operation!
Body parts can be caught and entangled.
Death, severe bodily injuries, property damage.
▶ Do **not** stand in the hazard area of the winch.

1.44 97011689 – Danger of crushing

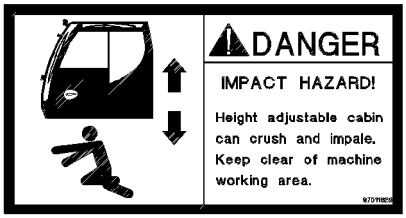

Fig.111047: Danger of crushing

DANGER
Danger of fatal injury!
▶ It is prohibited to remain within the danger zone of the cab.
▶ Stay away from the movement range of the cab.

1.45 97011690 – Overload of cab is prohibited

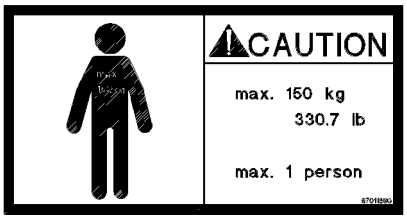

Fig.111048: Overload of cab is prohibited

WARNING
Danger of overload!
If the cab is subjected to a load of more than 150 kg then the cab or the telescoping arm can be damaged!
- ▶ Only one person at a time may remain in the cab!
- ▶ Do not subject the cab to a weight of more than 150 kg.

1.46 97016304 – Refueling

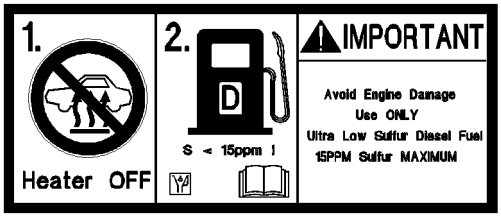

Fig.113766: Refueling

WARNING
Danger of fire and explosion!
- ▶ Turn the auxiliary heater* off approx. 3 min before refueling the fuel tank.
- ▶ Before refueling the fuel tank, turn the engine off.

NOTICE
Property damage to the engine!
If incorrect fuel is added, the engine can be severely damaged.
- ▶ Refuel with fuel according to the Engine manufacturer's operating instructions.

1.47 97046488 – Corrosion inhibitor - antifreeze fluids

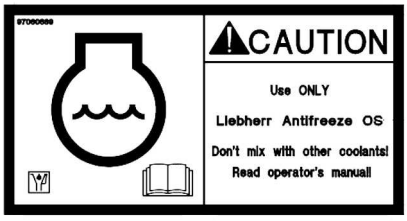

Fig.127585: Corrosion inhibitor - antifreeze fluids

NOTICE
Mixing of different corrosion inhibitor-antifreeze agents!
Damage to the cooling system!
- ▶ Fill the cooling system with corrosion inhibitor-antifreeze, see Service fill list.

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1.48 97016392 – Crushing danger for feet

Fig.112474: Crushing danger for feet

WARNING
Crushing danger for feet!
Feet can be trapped or crushed.
▶ Keep feet away from the crushing area.

1.49 97012737 – Danger of accident

Fig.111748: Danger of accident

WARNING
Danger of accident!
▶ Close the windshield when driving.

1.50 97023034 – Disassembling

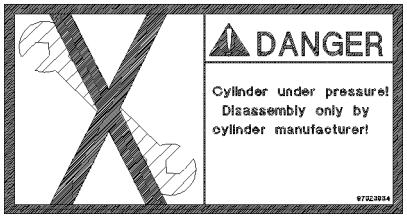

Fig.116264: Disassembling

DANGER
Danger of fatal injury due to repair!
Cylinder is pressurized.
Disassembly of the cylinder can result in death or serious injuries.
▶ The cylinder may only be removed by the manufacturer.

1.51 97036732 – Access via 3-point support

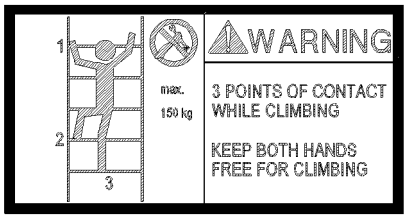

Fig.115172: Access via 3-point support

DANGER
Access via 3-point support!
While climbing up and down via a ladder, the assembly personnel can fall down and be injured severely.
- ▶ When climbing up and down, a 3-point support must be ensured.
- ▶ Use ladders only up to a weight of 150 kg.
- ▶ When climbing up and down, hands must be free.

A 3-point support is ensured when:
- – two legs are standing safely and one hand has a safe hold.
- – two hands have a safe hold and one leg is standing safely.

1.52 97003112 – Maximum suspended load

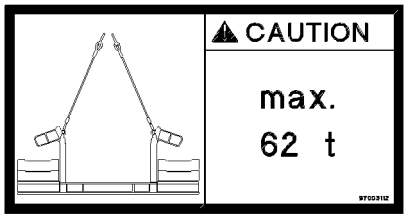

Fig.116282: Maximum suspended load

WARNING
Maximum suspended load!
If the maximum suspended load of 62 t is exceeded, the load can fall down and kill personnel.
- ▶ Observe the maximum permissible suspended load.

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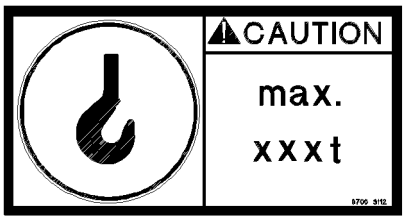
1.53 97036917 – Maximum suspended load

	Suspended load fastening point
97047630	
97036917	
97047630	

WARNING
Mortal danger if the load falls down!
If the maximum suspended load is exceeded, the load can fall down and kill personnel.
▶ Observe the maximum permissible suspended load.

1.54 97037383 – Urea

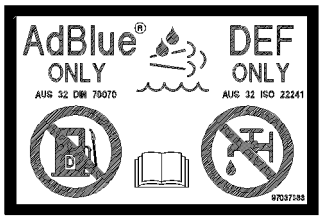


Fig.115173: Urea

CAUTION
Property damage due to incorrect operating fluids!
When refilling urea and the urea which is specified by the engine manufacturer is not used, then damage can occur.
▶ Refill **exclusively** urea.
▶ See engine manufacturer's operating instructions.

1.55 97037952 – Warning of fatal electric shock

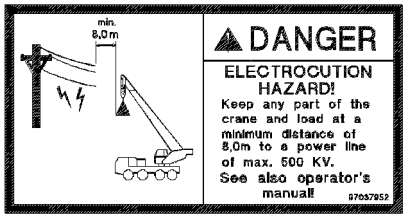


Fig.116280: Warning of fatal electric shock

DANGER
Danger of fatal injury due to electric shock!
If the boom or the hoist rope is under electric voltage, then death or severe injuries can occur if anyone touches the crane, the vehicle or the load.
▶ Keep a minimum distance of 8.0 m from current carrying parts.

1.56 97042730 – Falling luffing cylinder

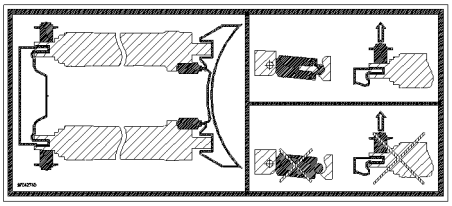


Fig.118465: Falling luffing cylinder

WARNING
Mortal danger if the luffing cylinders fall down!
▶ Make sure, before unpinning the luffing cylinder, that the erection cylinders are place don both luffing cylinders.

1.57 97047810 – Pinning brackets

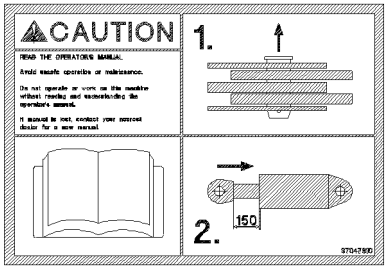


Fig.121709: Pinning brackets

NOTICE
Damage of brackets due to collision!
▶ Make sure, before pinning and unpinning, that the hydraulic cylinder is set to a distance of 150 mm.

1.58 97042797 – Overload of components

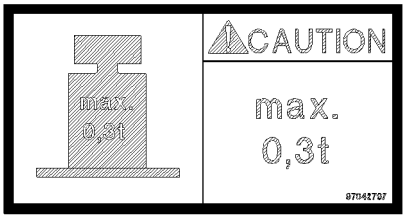


Fig.117347: Overload of components

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DANGER
Danger of falling due to overload!
If a component, such as a sliding beam platform, is subjected to a weight of more than 0.3 t , then the sliding beam platform can break.
Personnel can fall down and be severely injured or killed.
▶ Subject the component (sliding beam platform) to no more than maximum 0.3 t.

1.59 97041305 – Overload of components

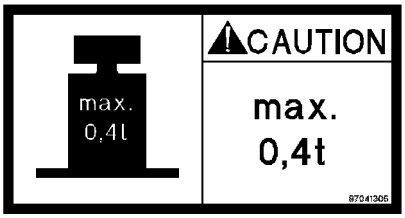

Fig.116792: Warning of overload of components

DANGER
Danger of falling due to overload!
If a component, such as a sliding beam platform, is subjected to a weight of more than 0.4 t , then the sliding beam platform can break.
Personnel can fall down and be severely injured or killed.
▶ Subject the component (sliding beam platform) to no more than maximum 0.4 t.

1.60 97070905 – Removing the auxiliary jib (boom nose)

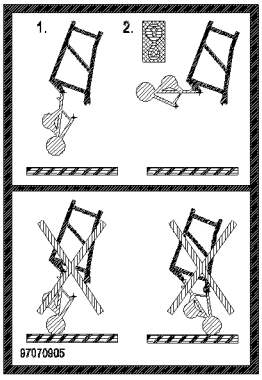

Fig.122645: Removing the auxiliary jib (boom nose)

NOTICE
Property damage

Before taking the N-head down:
▶ Remove the auxiliary jib (boom nose).

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1.61 97033982 – Assembling / disassembling the Derrick pivot section

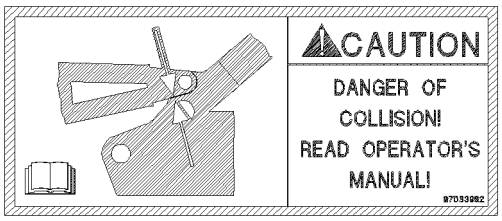
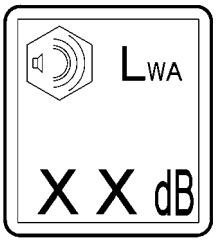


Fig.127470: Assembling / disassembling the Derrick pivot section

NOTICE
Derrick pivot section assembly procedure carried out incorrectly!

Damage to the Derrick pivot section receptacle.
▶ Perform the assembly procedure according to the operating instructions.

1.62 Maximum sound power level

	Maximum sound power level
975809508	 *Maximum sound power level*
971693308	
971693408	
971693508	
971693608	

Note
▶ The maximum sound power level can be read on the outside of the crane operator's cab or in the CE declaration of conformity.

1.63 97097951 – Counterweight

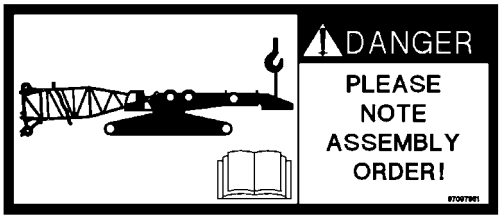


Fig.146805: Counterweight

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DANGER
Counterweight not secured!
Falling counterweight death, property damage.
- ▶ Observe and adhere to the operating instructions.
- ▶ Do not remove the auxiliary crane until the counterweight is pinned and secured on both sides with the turntable.

1.64 97107101 – Unlocking the telescopic boom locking pin

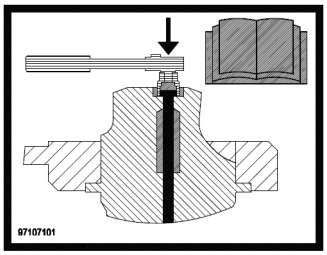

Fig.148421: Unlocking the telescopic boom locking pin

Note
- ▶ The locking pin may be unlocked according to the operating instructions.
- ▶ Observe and adhere to the operating instructions.

1.65 97107199 – Do not unlock the telescopic boom locking pin

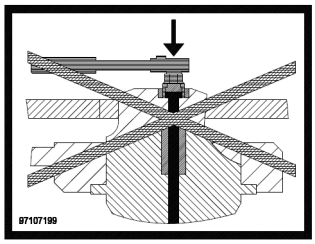

Fig.148422: Do not unlock the telescopic boom locking pin

WARNING
Impermissible telescopic boom locking pin unlocked!
The telescopic boom can retract in an uncontrolled manner.
Death, severe bodily injuries, property damage.

If a locking pin is marked with this sign:
- ▶ **Never** unlock the locking pin.

1.66 977055908 – Fastening point for swingable sliding beam

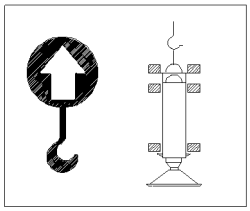

Fig.106894: Fastening point for swingable sliding beam

1.67 971494208 – Limitation of maximum travel speed

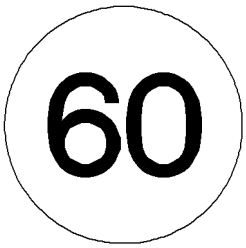

Fig.106034: Limitation of maximum travel speed

1.68 971539808 – Warning notice for unpinning the auxiliary boom on the pulley head

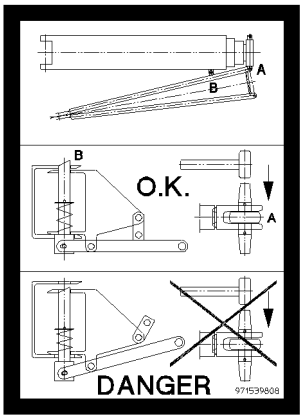

Fig.106040: Warning notice for unpinning the auxiliary boom on the pulley head

DANGER
Danger of fatal injury!
If the auxiliary boom is not locked correctly to the pivot section, it can fall down.
Personnel can be severely injured or killed.
▶ Unpinning the auxiliary boom on the pulley head is prohibited.

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1.69 971539908 – Warning notice for unlocking the auxiliary boom

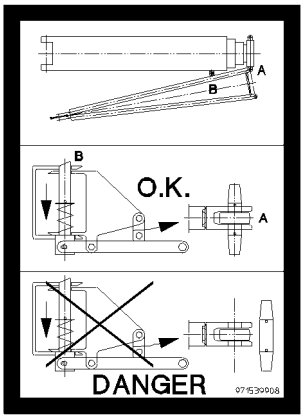

Fig.106041: Warning notice for unlocking the auxiliary boom

DANGER
Danger of fatal injury!
If the auxiliary boom is not locked correctly to the pulley head, it can fall down.
Personnel can be severely injured or killed.
▶ Unpinning the auxiliary boom on the pivot section is prohibited.

1.70 978673908 – Warning of suspended load

Fig.106026: Warning of suspended load

DANGER
Danger of fatal injury under suspended load!
▶ Standing under a suspended load is prohibited.
▶ Stay away from the working range of the machine.

1.71 978674008 – Access for unauthorized personnel prohibited

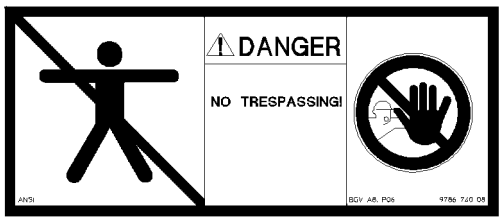

Fig.106037: Access for unauthorized personnel prohibited

DANGER
Danger of fatal injury!
If the crane or the working area is accessed by unauthorized personnel, life threatening injuries can occur as a result.
▶ It is prohibited for unauthorized personnel to enter the crane or the working area.

1.72 97039753 – Danger of stumbling

Fig.117346: Danger of stumbling

WARNING
Danger of stumbling!
▶ Move with caution.

1.73 978674108 – Warning of crushing danger

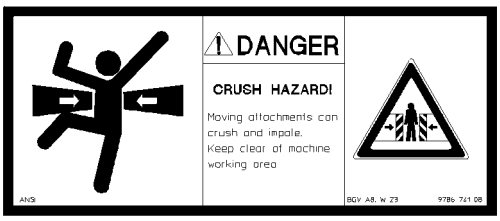

Fig.106027: Danger of crushing

DANGER
Danger of fatal injury when remaining in areas with crushing danger!
▶ It is prohibited for anyone to remain in areas where there is a crushing danger.
▶ Stay away from the working range of the machine.

1.74 97016911 – Danger of collision

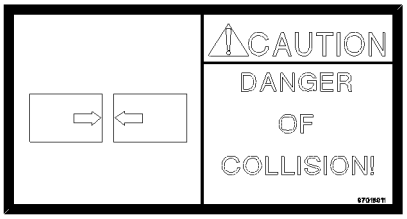

Fig.117344: Danger of collision

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NOTICE
Danger of collision!
▶ Avoid a collision.

1.75 978674308 – Radio remote control

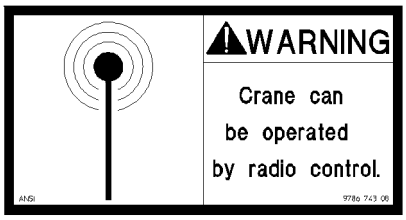

Fig.106047: Radio remote control

WARNING
Danger of injury due to crane operation with radio remote control!
▶ The crane can be operated with radio remote control!
▶ During crane operation, it is prohibited for anyone to remain in the danger zone!

1.76 978674408 – Danger of burns to hands

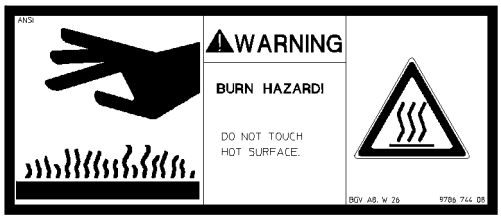

Fig.106028: Danger of burns to hands

WARNING
Danger of burns when touching hot surfaces!
▶ Do not touch hot surfaces.

1.77 978674508 – Warning of rotating parts

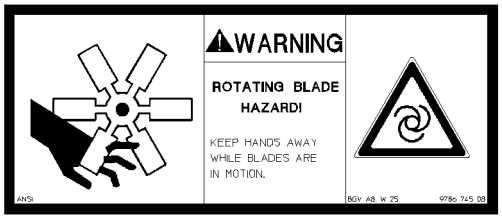

Fig.106029: Warning of rotating parts

WARNING
Rotating parts!
The rotating fan blade can cause finger and hand injuries.
▶ Keep your hands away from the rotating fan blade.

1.78 978674608 - Crushing danger for hands

Fig.106030: Crushing danger for hands

WARNING
Danger of injuries for hands!
Hands can be caught, trapped or crushed within the danger zone.
▶ Keep hands away from the danger zone!

1.79 978674808 – Personal protective equipment

Fig.123900: Personal protective equipment

DANGER
Danger of falling!
▶ Use personal protective equipment.

1.80 978674908 – Accessing the area is prohibited

Fig.106038: Accessing the area is prohibited

WARNING
Danger of accident!
If the prohibited area is accessed, accidents can occur.
Personnel can be severely injured or killed.
▶ Do not access the prohibited area.

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1.81 978675008 – Access prohibited

Fig.106039: Access prohibited

WARNING
Danger of falling!
If the crane is accessed by unauthorized personnel, life threatening injuries can occur.
▶ Do not get on the crane.

1.82 978687408 – Rigging point

Fig.112475: Rigging point

WARNING
Rigging point!
▶ Use the rigging point **solely** for rigging.
▶ Lifting on the rigging point is prohibited.

1.83 97036734 – Rigging point

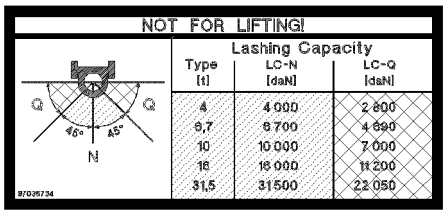

Fig.116287: Rigging point

WARNING
Rigging point!
▶ Use the rigging point **solely** for rigging.
▶ Lifting on the rigging point is **prohibited**.

1.84 978867108 – Warning of fatal electric shock

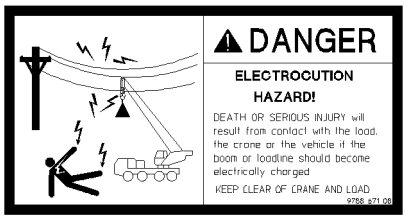

Fig.106814: Warning of fatal electric shock

DANGER
Danger of fatal injury due to electric shock!
If the boom or the hoist rope is under electric voltage, then death or severe injuries can occur if anyone touches the crane, the vehicle or the load.
▶ Stay away from the crane and load.

1.85 97094940 – Spark catcher

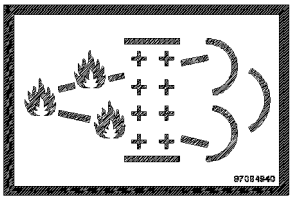

Fig.144735: Spark catcher

Note
▶ The exhaust system is equipped with an integrated spark catcher.

1.86 979383308 – Oil change

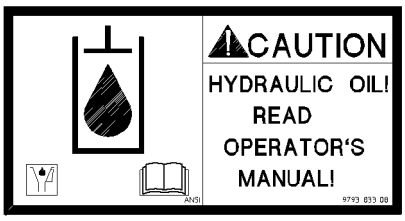

Fig.113827: Oil change

CAUTION
Property damage due to oil change!
If the oil specified in the operating instructions is not used during the oil change, it can lead to damage.
▶ See the Crane operating instructions, chapter 7.07.

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1.87 979561108 – Counterweight

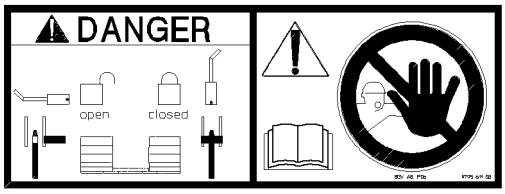

Fig.109026: Counterweight

WARNING
The counterweight can fall down!
If the auxiliary crane is removed on the counterweight before the counterweight is locked on both sides with the turntable, then the counterweight will fall down and can fatally injure assembly personnel.
▶ Do not remove the auxiliary crane until the counterweight is locked and secured on both sides with the turntable. See the Crane operating instructions, chapter 4.07.

1.88 97001802 – Falling platform

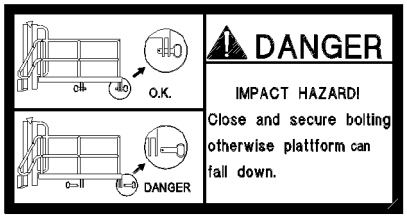

Fig.117345: Falling platform

WARNING
Falling platform!
▶ Pin and secure the platform in assembly / disassembly position.

1.89 973974408 - Transport weights of the components

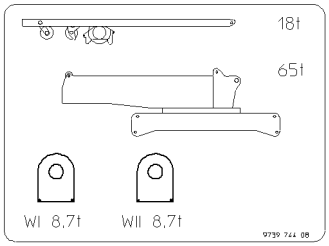

Fig.112440: Transport weights of the components

1.90 973974608 - Transport weights of the components

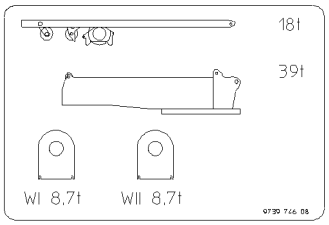

Fig.112441: Transport weights of the components

1.91 97011336 - Transport weights of the components

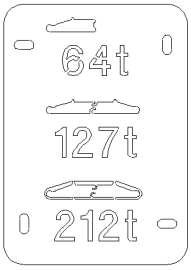

Fig.116271: Transport weights of the components

1.92 97068839 - Transport weights of the components / fastening length of the fastening equipment

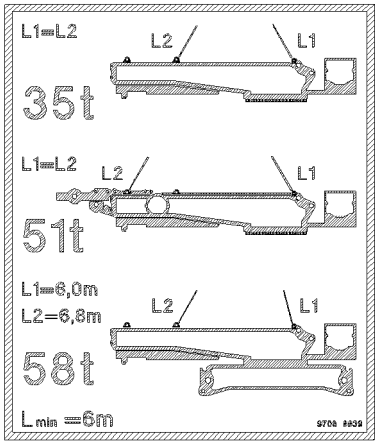

Fig.127587: Transport weights of the components / fastening length of the fastening equipment

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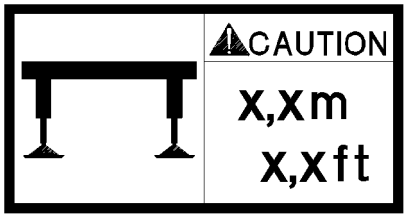
1.93 Identification of sliding beam

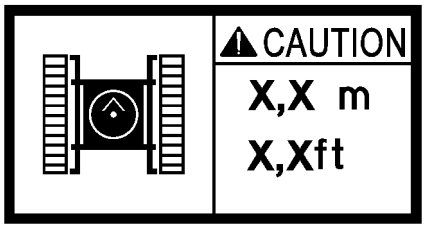
	Identification of sliding beam
978675108	 *Identification of sliding beam*
978675208	
978772808	
978772908	
978809308	
978809408	
978809508	
978818408	
978818508	
978875908	
978902608	
978903108	
97029203	
978903208	
979126008	
979126108	
979210508	
979210608	
979210608	
979210708	
979309108	
979309208	
97019140	
97003224	
979410808	

Identification of sliding beam

Note

▶ Extend the sliding beams to a support width of X.X m (X.X ft).

1.94 Identification Track width retracted

	Identification Track width retracted
97009840	 *Identification of track width*
97009841	
97017044	
97017045	
97017046	

Identification of track width

Note
▶ Track width retracted to x.xx m (x.x ft)

1.95 976624808 – Fastening the load

Fig.116283: Fastening the load

WARNING
Fastening the load is prohibited!
If the load is lifted on this point, the load can fall down and kill personnel.
▶ Lifting the load on unmarked locations is prohibited.

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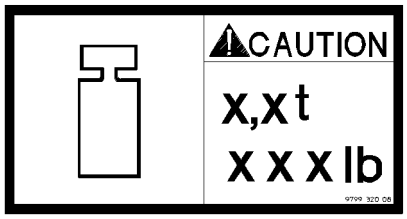
1.96 Note Weight sliding beams

	Weight of sliding beams
979932008	 *Weight of sliding beams*
979932108	
979932708	
979932808	

Note

▶ Pay attention to the weight of the sliding beams.

1.97 97047566 – Center of gravity of the counterweight

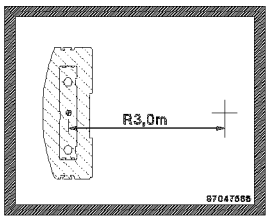


Fig.118491: Notice sign: Distance between center of gravity of counterweight and center of rotation

Note

▶ This notice sign indicates the distance between the center of rotation and the center of gravity of the counterweight.

1.98 97047566 – Center of gravity of the counterweight

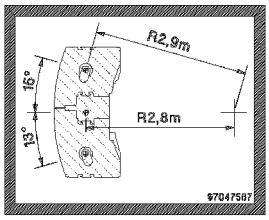


Fig.118492: Notice sign: Distance between center of gravity of counterweight and center of rotation

Note
▶ This notice sign indicates the distance between the center of rotation and the center of gravity of the counterweight.

1.99 97047566 – Center of gravity of the counterweight

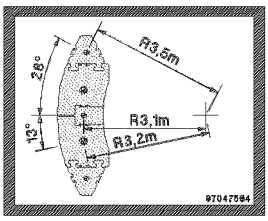


Fig.118493: Notice sign: Distance between center of gravity of counterweight and center of rotation

Note
▶ This notice sign indicates the distance between the center of rotation and the center of gravity of the counterweight.

1.100 97047566 – Center of gravity of the counterweight

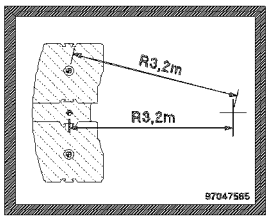


Fig.118494: Notice sign: Distance between center of gravity of counterweight and center of rotation

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Note
▶ This notice sign indicates the distance between the center of rotation and the center of gravity of the counterweight.

1.101 97047566 – Center of gravity of the counterweight

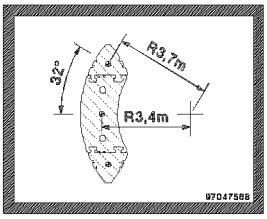

Fig.118495: Notice sign: Distance between center of gravity of counterweight and center of rotation

Note
▶ This notice sign indicates the distance between the center of rotation and the center of gravity of the counterweight.

1.102 97047566 – Center of gravity of the counterweight

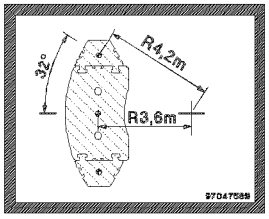

Fig.118496: Notice sign: Distance between center of gravity of counterweight and center of rotation

Note
▶ This notice sign indicates the distance between the center of rotation and the center of gravity of the counterweight.

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1.103 Minimum rope reeving / minimum hook block weight

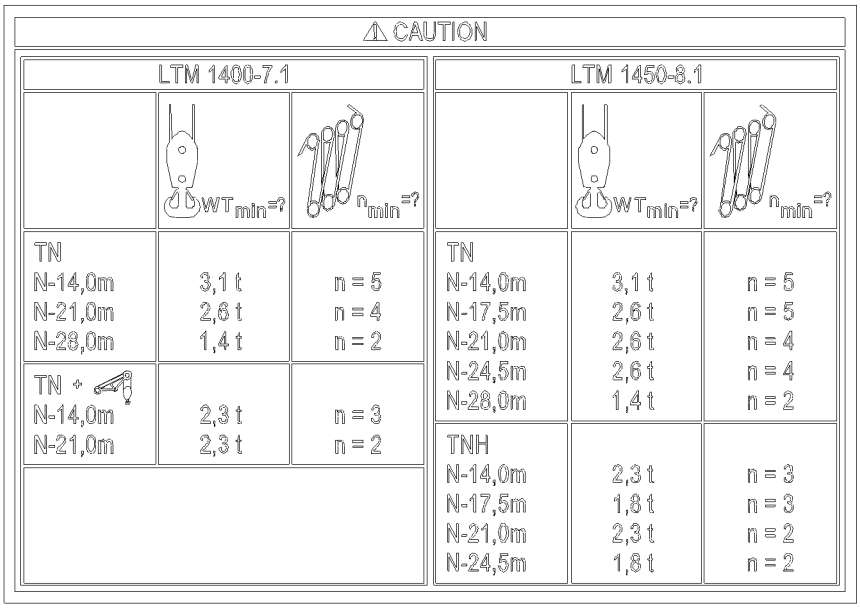

Fig.127972: Minimum rope reeving / minimum hook block weight with luffing lattice jib / boom nose

WARNING
Minimum rope reeving / minimum hook block weight not adhered to!
Too low hook block weight leads to the formation of slack rope.
Rope reeving too low, hoist rope is overloaded.
▶ Adhere to the hook block weight and hoist rope reeving.

Example: LTM 1400-7.1

With a luffing lattice jib -TN **N-21 m** a hook block with a weight of **2.6 t must** be installed and minimum rope reeving of **4** must be used.

With a luffing lattice jib **N-21 m** and boom nose a hook block with a weight of **2.3 t must** be installed and minimum rope reeving of **2** must be used.

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2.05.10 Labeling of the load carriers

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Fig.195219

1 Identifications on the hook block or load hook

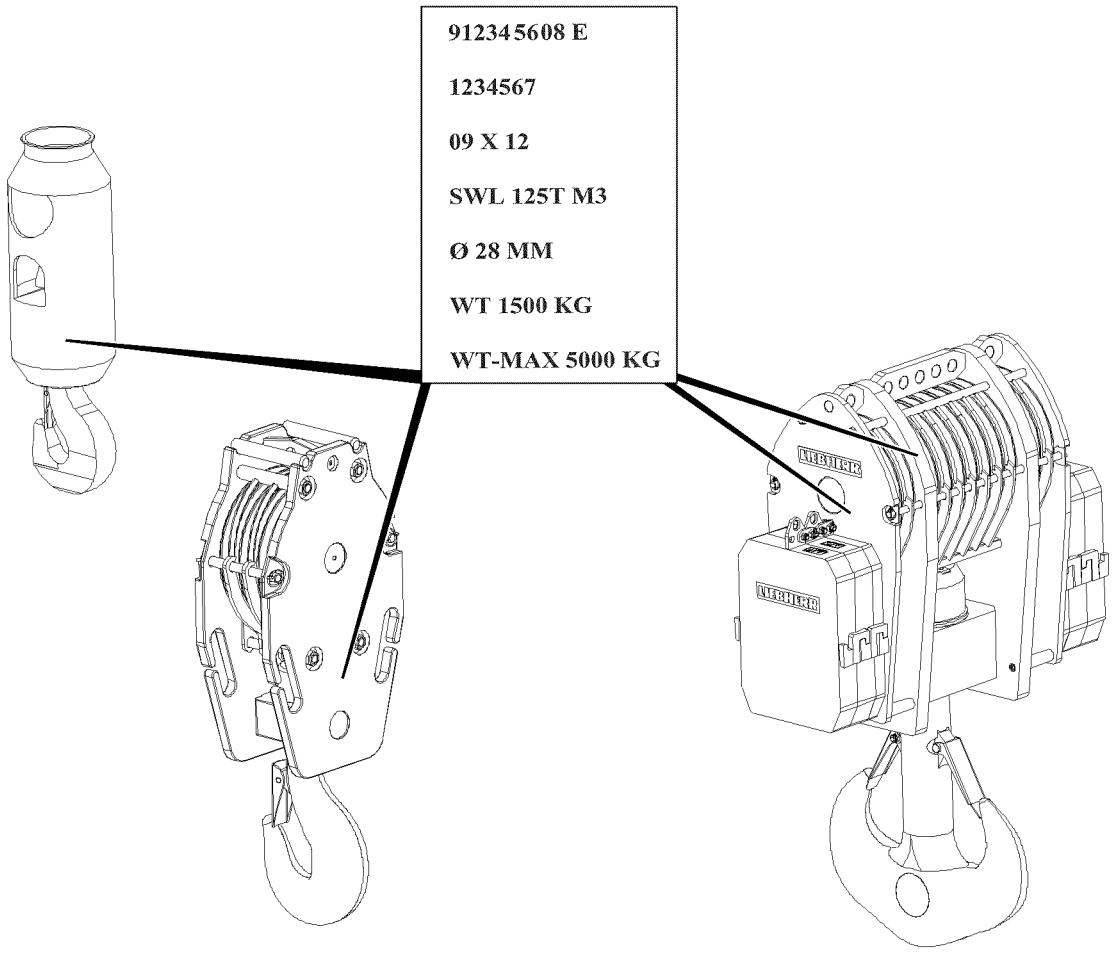

Fig.118509: Identifications on the hook block or load hook

Note

- ▶ The load hooks and hook blocks approved for this crane type can be found in the load chart.
- ▶ The hook blocks shown are examples only and can deviate from the existing hook block.

Punch mark area	Explanation
912345608 E	Liebherr ID no., „E = entschärft (deburred)“
123456	Series or factory test number
09 X 12	Month of construction / supplier marks / year of construction
SWL 125T M3	SWL (Safe Working Load) = Load carrying capacity for power train group M3
Ø 28 mm	Hoist rope diameter
WT 1500 Kg	WT (Weight Tare) = Own weight (without auxiliary weights)

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Punch mark area	Explanation
WT-MAX 5000 Kg	WT-Max = Maximum permissible own weight of lower pulley block and total number of progressively installed auxiliary weights
	Limits the number of installed auxiliary weights
	Determination via addition of assembled own weights (number of auxiliary weights + hook block)

Identifications on the hook block or load hook

2 Identifications on single hook or double hook

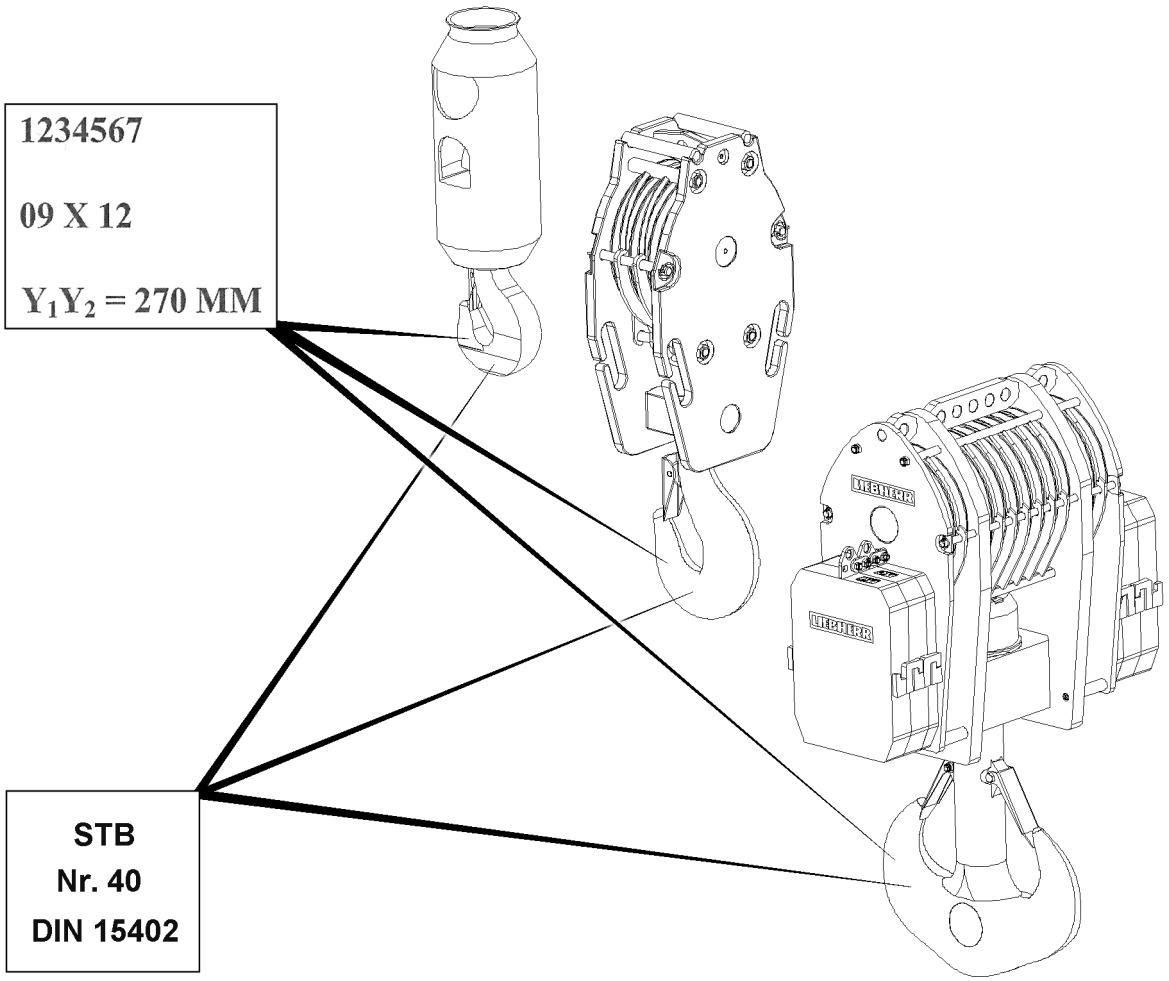

Fig.149061: Identifications on single hook or double hook

Punch mark area	Explanation
STB	Hook manufacturer
40-T	Hook number + strength class according to DIN 15 400
DIN	Hook shape according to DIN 15 401 /DIN 15 402
123456	Series or factory test number

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Punch mark area	Explanation
09 X 12	Month of construction / supplier marks / year of construction
Y1Y2 = 270 mm	Dimension Y or dimension Y1 and dimension Y2 according to DIN (= Test dimensions for recurrent tests)

Identifications on single hook or double hook

3 Identifications on auxiliary weights

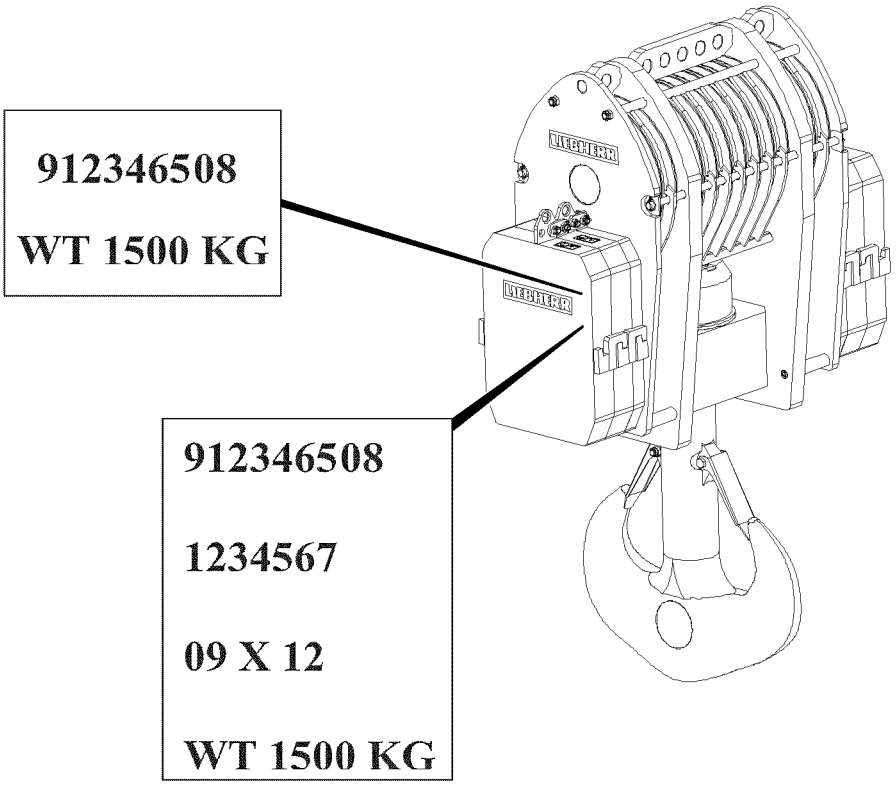

Fig.118511: Identifications on auxiliary weights

Note

▶ The own weight of the individual auxiliary weight is noted on the side on the respective auxiliary weight.

3.1 Identifications on auxiliary weights at delivery

Punch mark area	Explanation
912346508	Liebherr ID no.
WT 1500 Kg	WT (Weight Tare) = Own weight of individual auxiliary weight

Identifications of auxiliary weights at delivery

3.2 Identifications on auxiliary weights for reorder

Punch mark area	Explanation
912346508	Liebherr ID no.
123456	Series or factory test number
09 X 12	Month of construction / supplier marks / year of construction
WT 1500 Kg	WT (Weight Tare) = Own weight of individual auxiliary weight

Identifications of auxiliary weights at reorder

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2.06 Fall protection equipment on the crane

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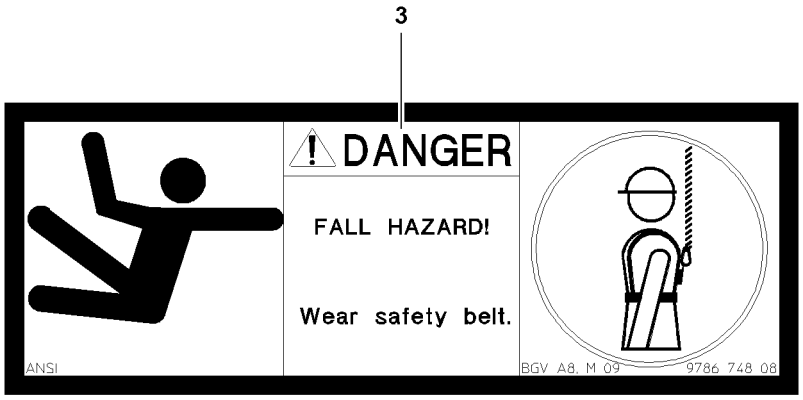

Fig.112104

1 Personal protective equipment

WARNING
Danger of falling!
During assembly / disassembly, inspection and maintenance work, assembly personnel must be secured with appropriate aids to prevent them from falling.
Death, severe bodily injuries.

- ▶ The assembly personnel must always move carefully and anticipatory on the crane, the crane components or lattice sections.
- ▶ All work aloft, where there is a danger of falling must be carried out with suitable aids.
- ▶ If fall protection equipment is available, then it must be used.
- ▶ If aids are not available and work cannot be carried out from the ground, then the assembly personnel must secure themselves with the permissible fall arrest system to prevent falling, see Crane operating instructions, chapter 2.04.
- ▶ The fall arrest system must be attached on the fastening and hook points as well as on the safety ropes.
- ▶ Only step on the aids, ladders and catwalks with clean shoes.
- ▶ Keep aids, ladders and catwalks free of heavy dirt, snow and ice.

Note

- ▶ The sign **3** marks the fastening points, where assembly personnel must hook in the fall arrest system to secure themselves against falling.

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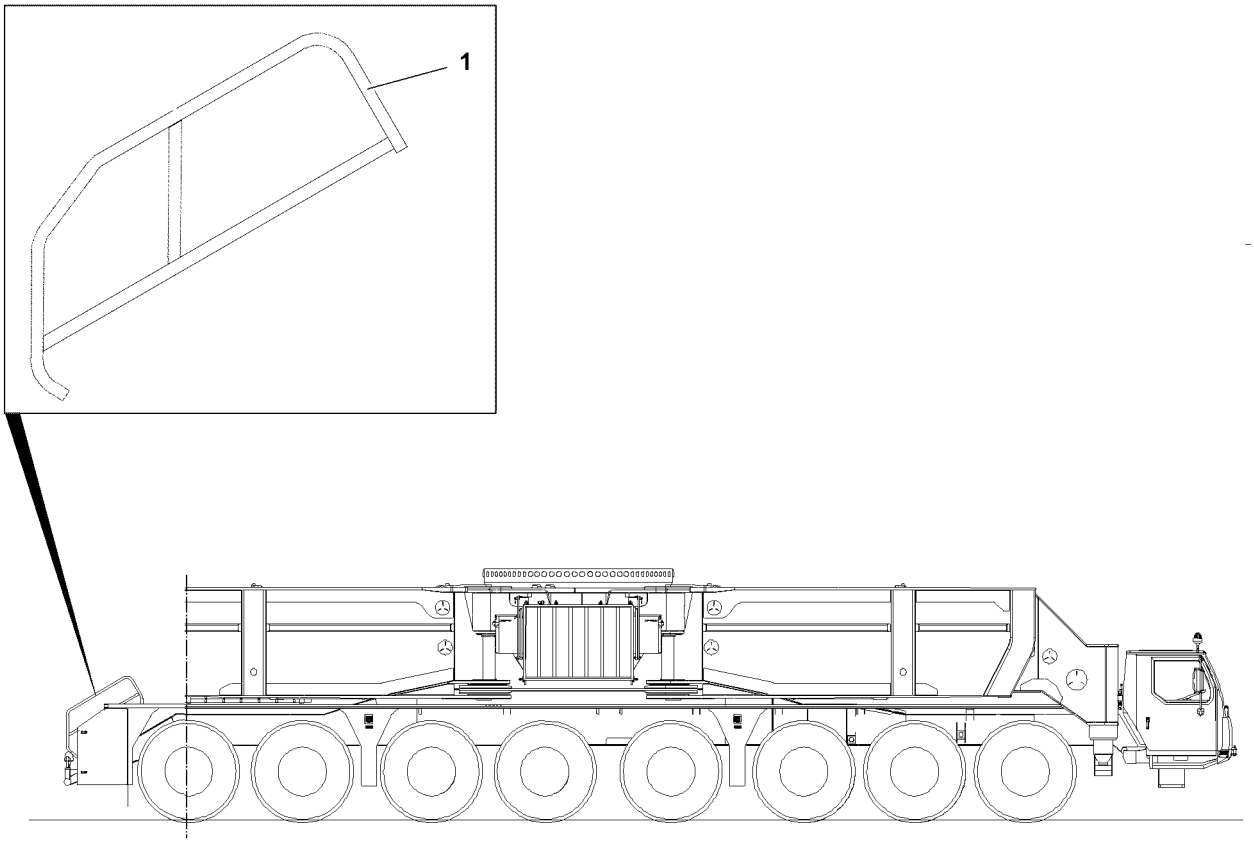

Fig.117191

2 Fall protection equipment on the crane chassis

WARNING
Danger of falling!
During assembly / disassembly, inspection and maintenance work, assembly personnel must be secured with appropriate aids to prevent them from falling.
Death, severe bodily injuries.
- ▶ For assembly / disassembly work, maintenance work and inspections, swing all railings and platforms into position and secure.
- ▶ Only step on the aids, ladders and catwalks with clean shoes.
- ▶ Keep aids, ladders and catwalks free of heavy dirt, snow and ice.
- ▶ Replace damaged ladders and platforms immediately.
- ▶ Assemble all ladders and platforms stable and safe to access.

2.1 Railings

2.1.1 Swinging the railings into operating position

WARNING
Danger of falling!
When working aloft, there is a risk of falling for the assembly personnel.
Death, severe bodily injuries.
- ▶ Even at assembly of safety devices, there is a risk of falling.
- ▶ For all work aloft, wear a fall arrest system and click it with the snap hook on the fastening points or safety ropes.
- ▶ Replace damaged ladders and platforms immediately.
- ▶ Keep aids, ladders and platforms free of heavy dirt, snow and ice.
- ▶ Assemble all ladders and platforms stable and safe to access.

- ▶ Swing and secure the railings **1** on the crane chassis during all assembly and disassembly work into operating position, see illustration.

2.1.2 Swinging the railings into transport position

Note
- ▶ After assembly / disassembly work and for transport, the railings must be assembled and secured in the transport position.

- ▶ Swing and secure the railings **1** on the crane chassis during all assembly and disassembly work and for transport into operating position, see illustration.

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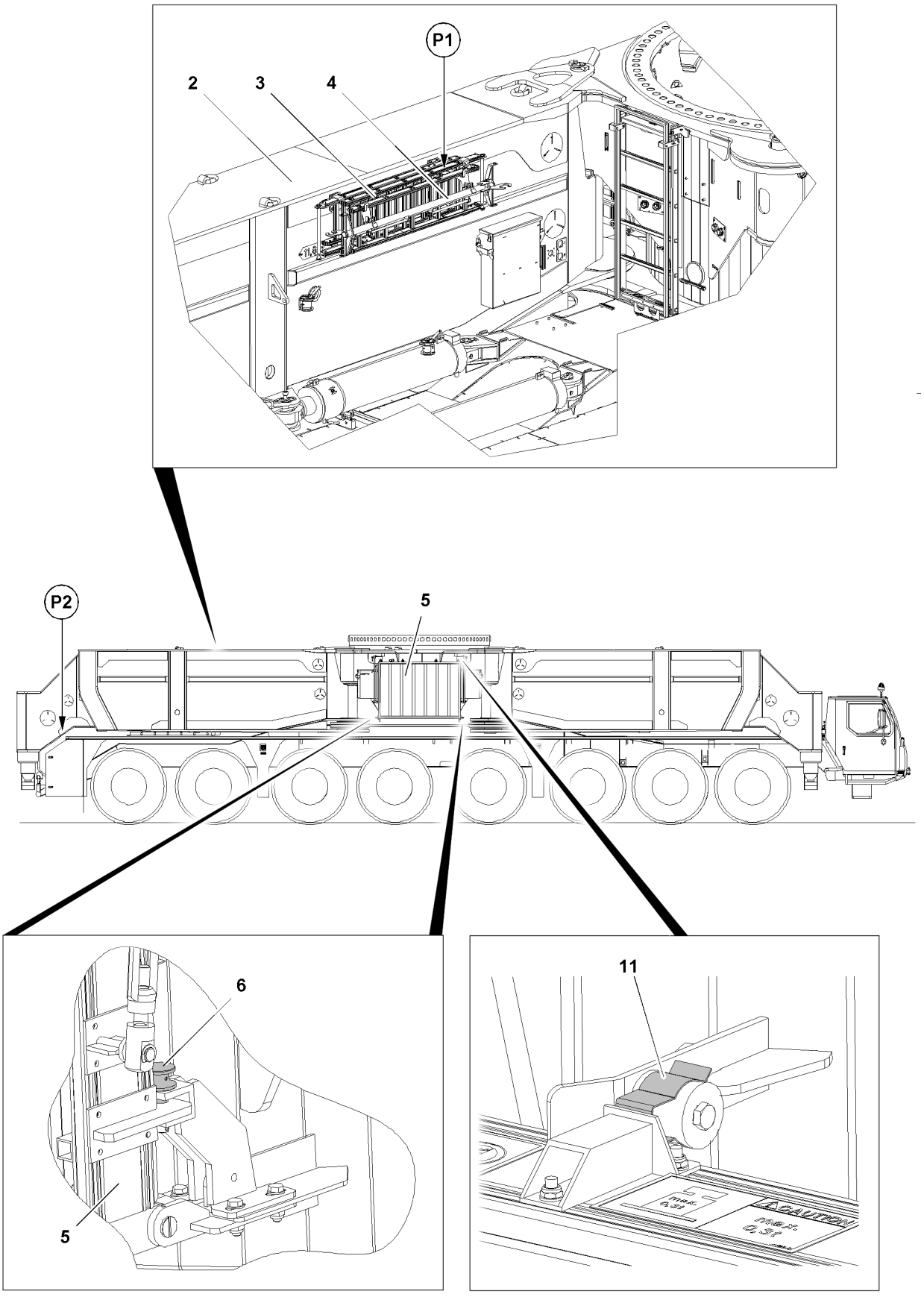

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Fig.127263

2.2 Platforms

WARNING
Danger of falling!
When working aloft, there is a risk of falling for the assembly personnel.
Death, severe bodily injuries.
- ▶ Even at assembly of safety devices, there is a risk of falling.
- ▶ For all work aloft, wear a fall arrest system and click it with the snap hook on the fastening points or safety ropes.
- ▶ Replace damaged ladders and platforms immediately.
- ▶ Keep aids, ladders and platforms free of heavy dirt, snow and ice.
- ▶ Assemble all ladders and platforms stable and safe to access.

NOTICE
Property damage!
Damage of ladders and platforms when in contact with the ground and simultaneous driving.
- ▶ Make sure that the ladder has at least 200 mm distance to the ground when in the operating position.

Make sure that the following prerequisites are met:
- The vehicle is standing on a level surface
- The vehicle is at the level setting for on-road driving

2.2.1 Folding the platforms into the operating position

Note
- ▶ The assembly procedure is described using the example of a platform.
- ▶ Ladder **3** and ladder support **4** are in transport position on the inside of the folding beam **2**.

▶ Remove the ladder **3** and ladder support **4** from the transport receptacle at point **P1**.

Note
- ▶ The catch **11** secures the platform **5** against tipping over by itself after unpinning the pin **6**.

▶ Release and unpin the pins **6** on both sides.

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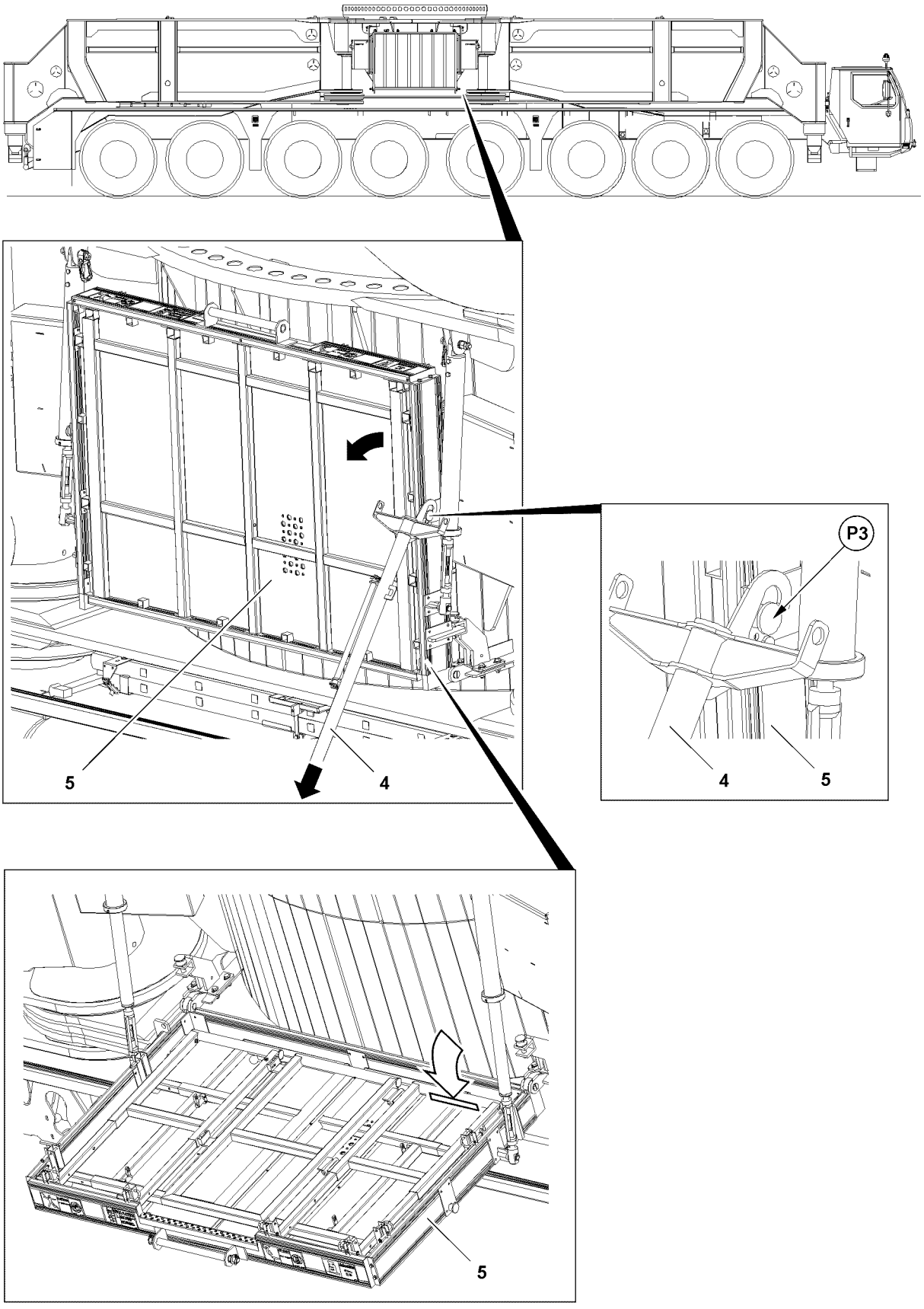

Fig.117143

▶ Hang the ladder support **4** on the platform **5** at point **P3**.

WARNING
Danger of injury due to the platform!
The assembly procedure can cause severe injuries.
▶ Make sure that there are no persons within the danger zone.

▶ Fold the platform **5** all the way down by pulling the ladder support **4**.
▶ Unhook the ladder support **4** on the platform **5**.

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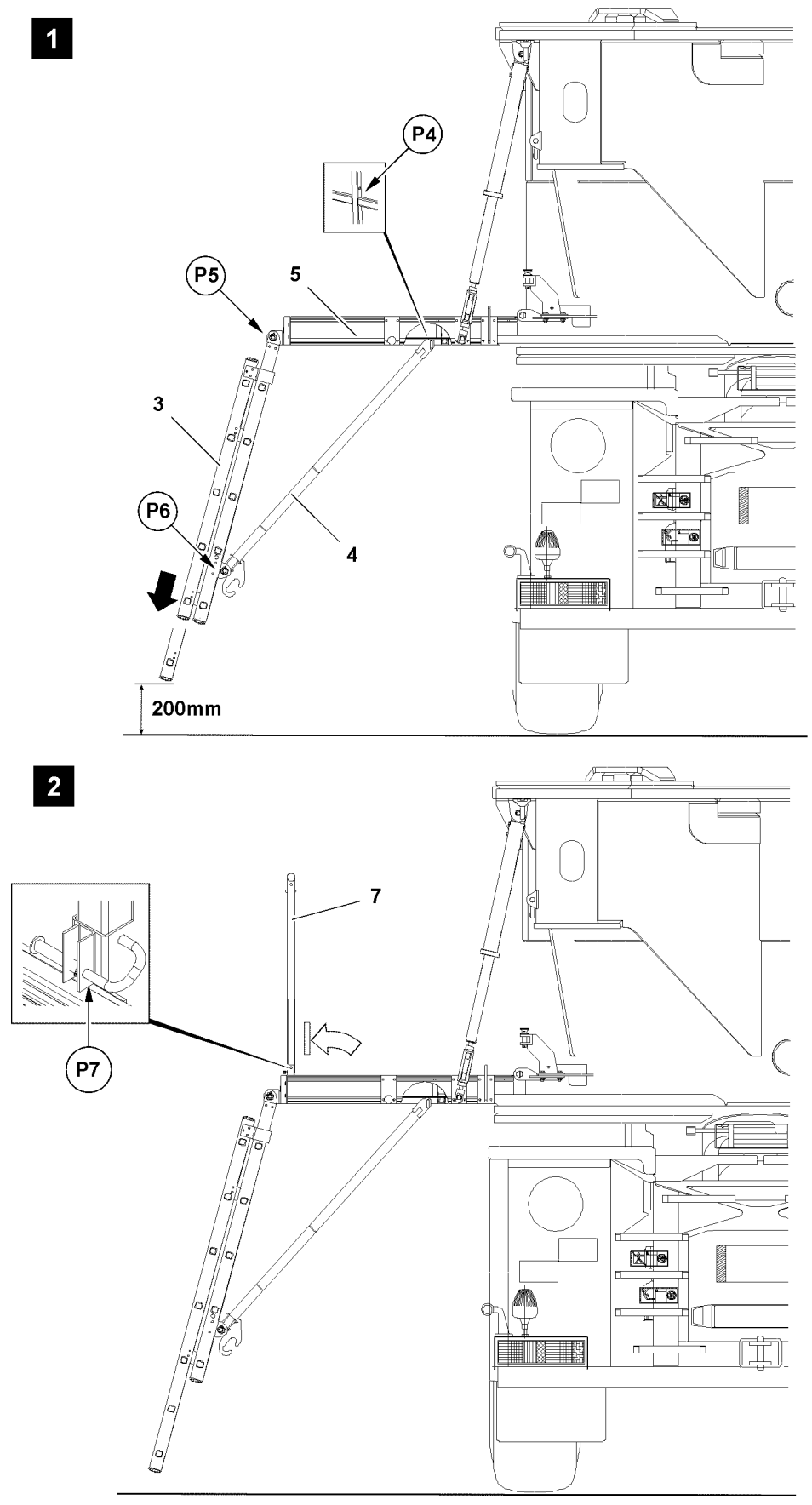

LWE/LG 1750-006/15409-07-02/en

Fig.117144

- ▶ Turn the ladder support **4**, see illustration **1**.
- ▶ Pin and secure the ladder support **4** on the platform **5** at point **P4**.
- ▶ Pin and secure the ladder **3** on the platform **5** at point **P5**.
- ▶ Pin and secure the ladder **3** with the ladder support **4** at point **P6**.
- ▶ Pull the ladder **3** out and lock in the operating position.

Result:

– The ladder can be accessed.

WARNING
Danger of falling!

Death, severe bodily injuries.
- ▶ Wear the supplied fall arrest system and hook on the intended fastening points.

- ▶ From the ladder **3** fold the railing **7** open completely, see illustration **2**.
- ▶ Pin and secure the railing **7** on the four points **P7**.

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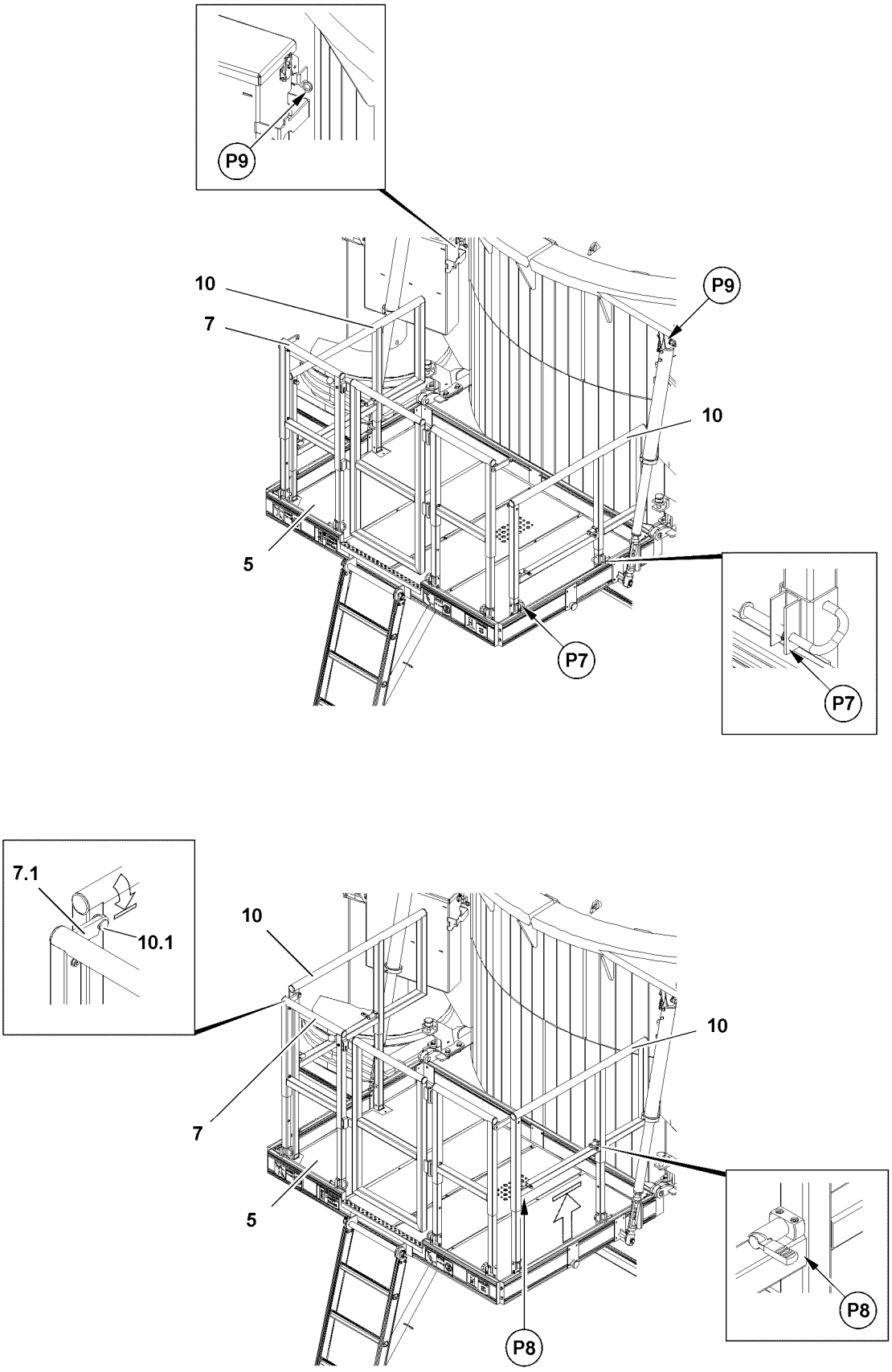

Fig.117145

NOTICE
Property damage!
Damage of platforms if load is too high.
▶ Make sure that the platforms are not subjected to a load of more than maximum 300 kg.

▶ Step on the platform **5** and hook the supplied fall arrest system on point **P9**.
▶ Fold the side railing **10** up.
▶ Pin and secure on points **P7**.
▶ Release the bajonet latch **P8**.
▶ Telescope the side railing **10** out.
▶ Pin and secure the bajonet latch **P8**.
▶ Connect the side railing **10** with the latch **7.1** and pin **10.1** on the railing **7**.

Result:

– The platform is operational.

▶ Repeat the procedure for the second platform.

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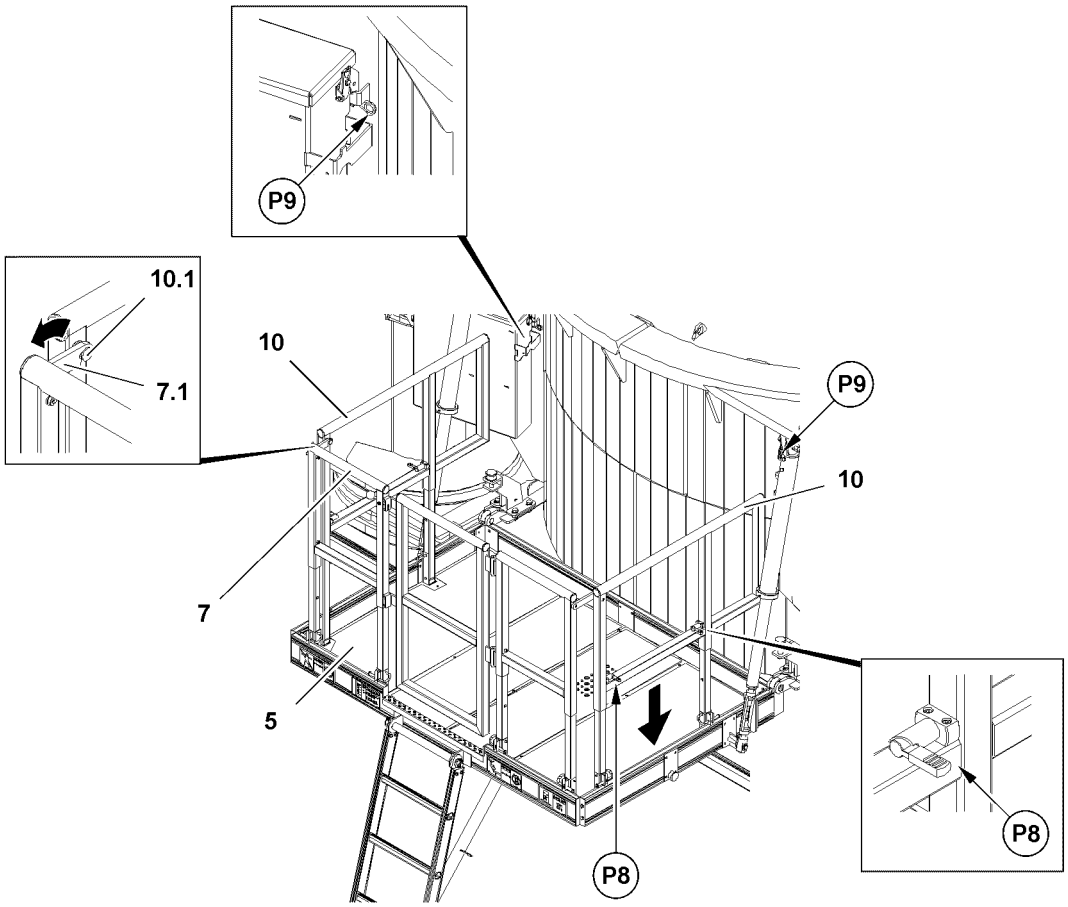

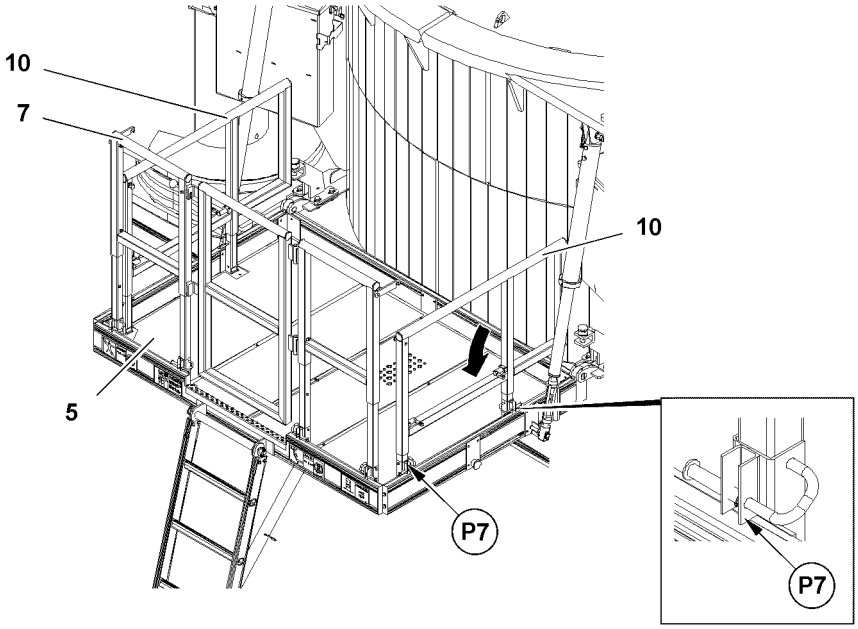

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Fig.117146

2.2.2 Folding the platforms into the transport position

Note

- ▶ After assembly / disassembly work and for transport, the railings, ladders and platforms must be assembled and secured in the transport position.
- ▶ The disassembly procedure is described using the example of a platform.

WARNING

Danger of falling!

When working aloft, there is a risk of falling for the assembly personnel.

Death, severe bodily injuries.

- ▶ Even at assembly of safety devices, there is a risk of falling.
- ▶ For all work aloft, wear a fall arrest system and click it with the snap hook on the fastening points or safety ropes.
- ▶ Replace damaged ladders and platforms immediately.
- ▶ Keep aids, ladders and platforms free of heavy dirt, snow and ice.
- ▶ Assemble all ladders and platforms stable and safe to access.

- ▶ Step on the platform **5** and hook the supplied fall arrest system on point **P9**.
- ▶ Unhook the retaining latch **7.1** on the side railing **10**.

WARNING

Danger of accident!

When telescoping in and folding the railing down, body parts can be caught.

- ▶ Telescope in and fold the railing down carefully.

- ▶ Release the bajonet latch **P8** on points **P8**.
- ▶ Telescope the side railing **10** in.
- ▶ Pin and secure the side railing **10** with the bajonet latch **P8** in the end position.
- ▶ Release the pins on points **P7** and fold the side railing **10** down.
- ▶ Repeat the procedure for the second side railing.
- ▶ Unhook the supplied fall arrest system on point **P9** and climb off the platform.

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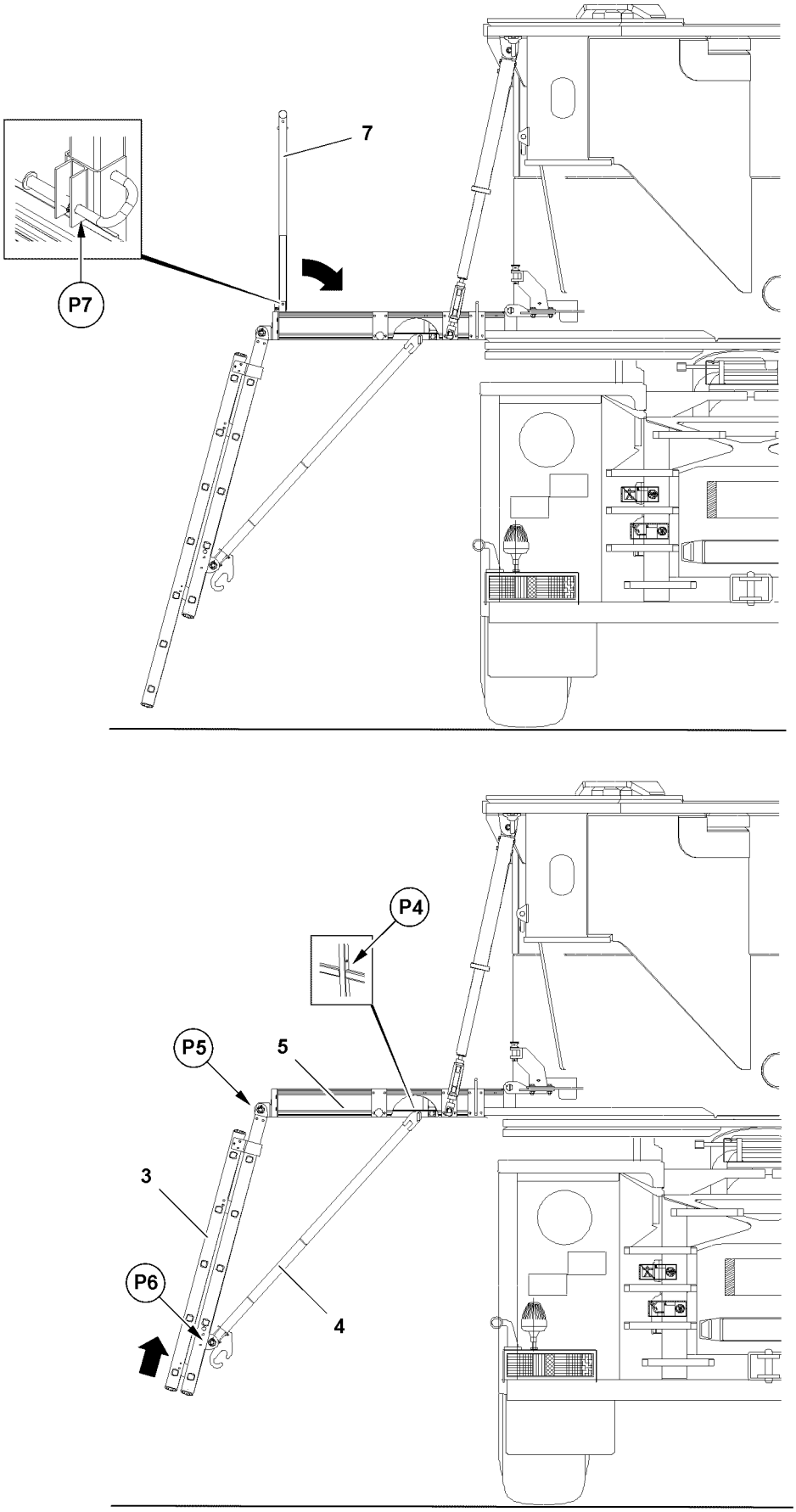

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Fig.117181

- ▶ Release the pins on points **P7** and fold the railing **7** down.
- ▶ Push the ladder **3** in completely and secure it.

WARNING
Danger of accident!
The ladder support **4** and ladder **3** can swing uncontrolled during the disassembly procedure.
- ▶ Make sure that there are no persons within the danger zone.

- ▶ Unpin the ladder support **4** on point **P6**.
- ▶ Unpin the ladder **3** on the platform **5** at point **P5** and take-down.
- ▶ Unpin the ladder support **4** on the platform **5** at point **P4** and take-down.

– The platform can be folded in the transport position.

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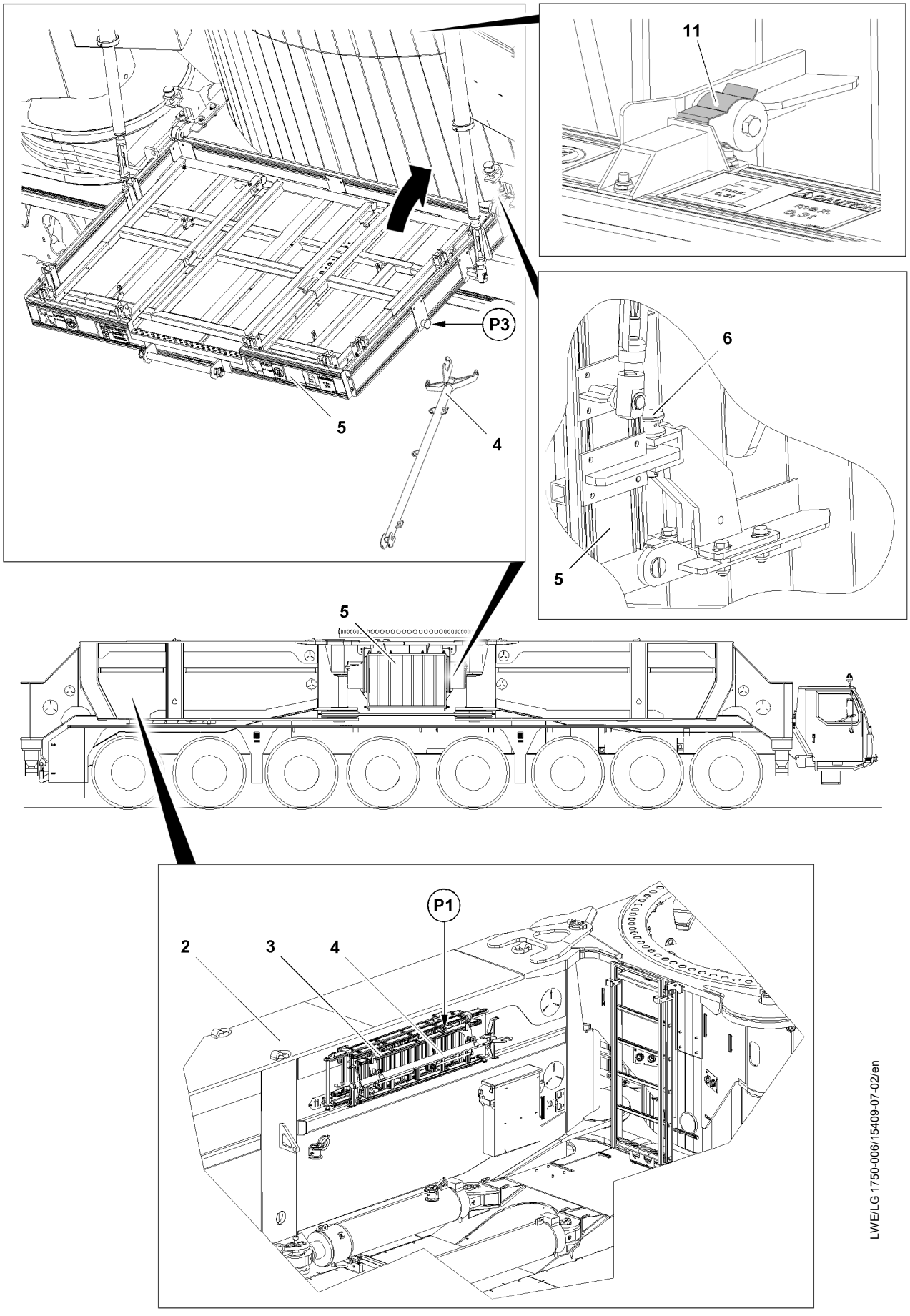

Fig.127264

▶ Turn the ladder support **4** and hook at point **P3**.

WARNING
Danger of injury!
Any objects remaining on the platform can fall down during the folding procedure.
▶ Make sure that no persons or objects are on the platform.

Note
▶ The platform **5** is secured by the catch **11** against tipping over by itself in the transport position.

▶ Fold up the platform **5** until the ladder support **4** until the catch **11** engages.
▶ Remove the ladder support **4**.
▶ Pin the platform **5** on both sides with pins **6** and secure.

WARNING
Danger of falling!
When working aloft, there is a risk of falling for the assembly personnel.
Death, severe bodily injuries.
▶ Even at assembly of safety devices, there is a risk of falling.
▶ For all work aloft, wear the supplied fall arrest system and click it with the snap hook on the fastening points or safety ropes.
▶ Replace damaged ladders and platforms immediately.
▶ Keep aids, ladders and platforms free of heavy dirt, snow and ice.
▶ Assemble all ladders and platforms stable and safe to access.

▶ Hang the ladder **3** and ladder support **4** in the transport receptacle on the folding beam **2** at point **P1** and secure.
▶ Repeat the procedure for the second platform.

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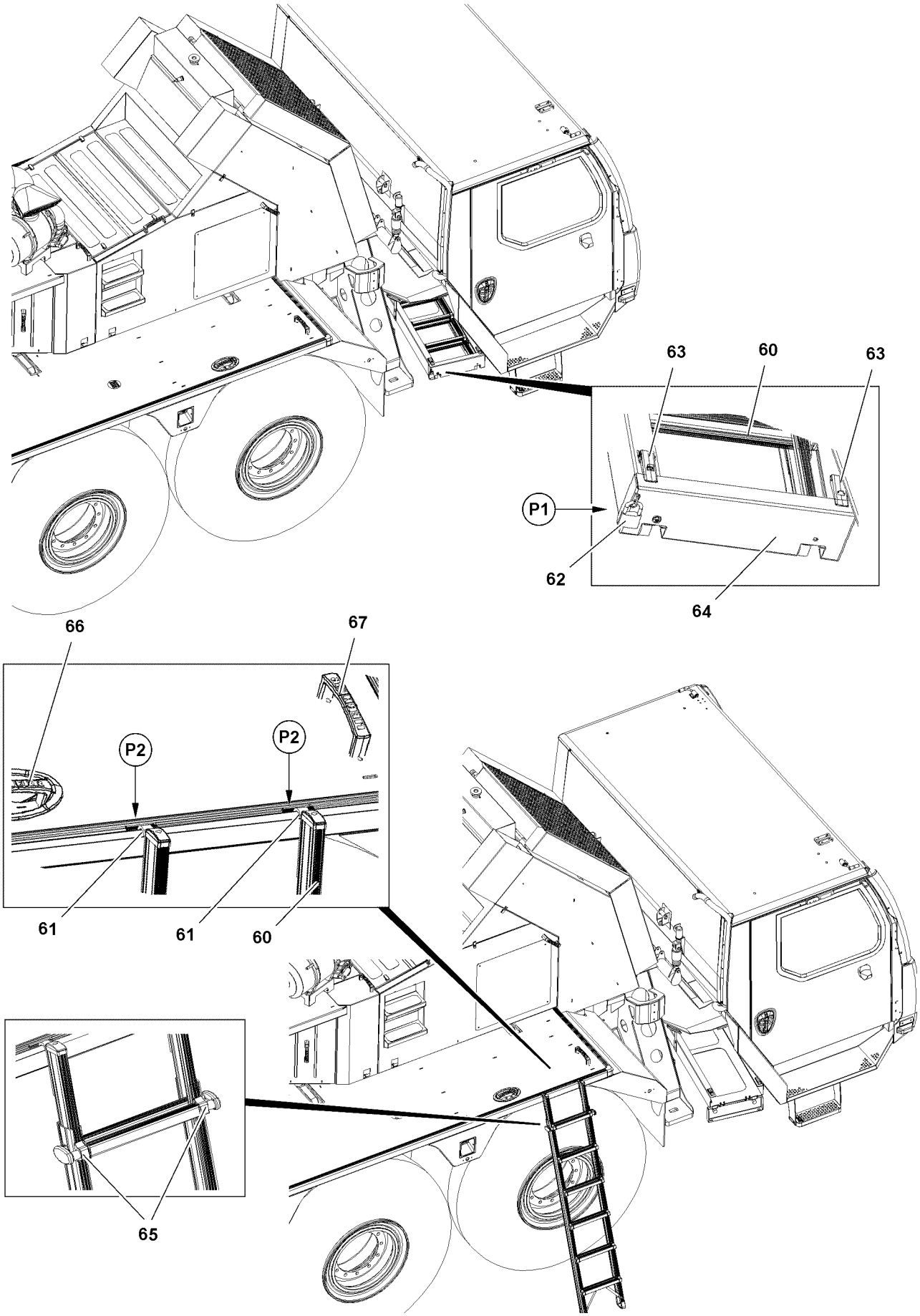

Fig.115694

LWE/LG 1750-006/15409-07-02/en

2.3 Bringing the hook ladder into the operating position

Make sure that the following prerequisites are met:
- The mobile crane is leveled for on road driving.
- The ground is level and of sufficient load bearing capacity.

CAUTION
Danger of crushing!
During assembly and disassembly of the hook ladder **60** fingers and hands can be crushed.
▶ Do not reach with your hands into the danger zone.
▶ Install the hook ladder **60** only from the ground.

▶ Remove the padlock **62** at point **P1**.
▶ Open the turnbuckles **63** and swing the cover **64** down.
▶ Remove the hook ladder **60** from the receptacle.
▶ Make sure that both retainers **65** are engaged on the hook ladder **60**.
▶ Hook the hook ladder **60** with the hook **61** in the receptacles on the border strip on points **P2**.

WARNING
Danger of falling!
While climbing up and down via a ladder, the assembly personnel can fall down and be injured severely.
▶ When ascending and descending, the assembly personnel must ensure a 3-point support.
▶ When ascending and descending, use rungs and ladder beams as handles.
▶ The assembly personnel must step into the rungs deep enough.
▶ When changing from the hook ladder to the walking surface, assembly personnel must secure themselves with the attached handle **66** and handle **67** to prevent falling.
▶ When changing from the walking surface to the hook ladder, assembly personnel must secure themselves with the attached handle **66** and handle **67** to prevent falling.

A 3-point support is ensured when:
– two legs are standing safely and one hand has a safe hold.
– two hands have a safe hold and one leg is standing safely.

▶ Adding service fluids, see Crane operating instructions, chapter 7.04.

2.4 Bringing the hook ladder into the transport position

CAUTION
Danger of crushing!
During assembly and disassembly of the hook ladder **60** fingers and hands can be crushed.
▶ Do not reach with your hands into the danger zone.
▶ Remove the hook ladder only from the ground.

▶ Unhook the hook ladder **60** from the receptacles on the border strip at points **P2**.
▶ Slide the hook ladder **60** with the hooks **61** downward into the receptacle.
▶ Swing the cover **64** up and secure with the turnbuckles **63**.
▶ Lock the hook ladder **60** with the padlock **62** at point **P1**.

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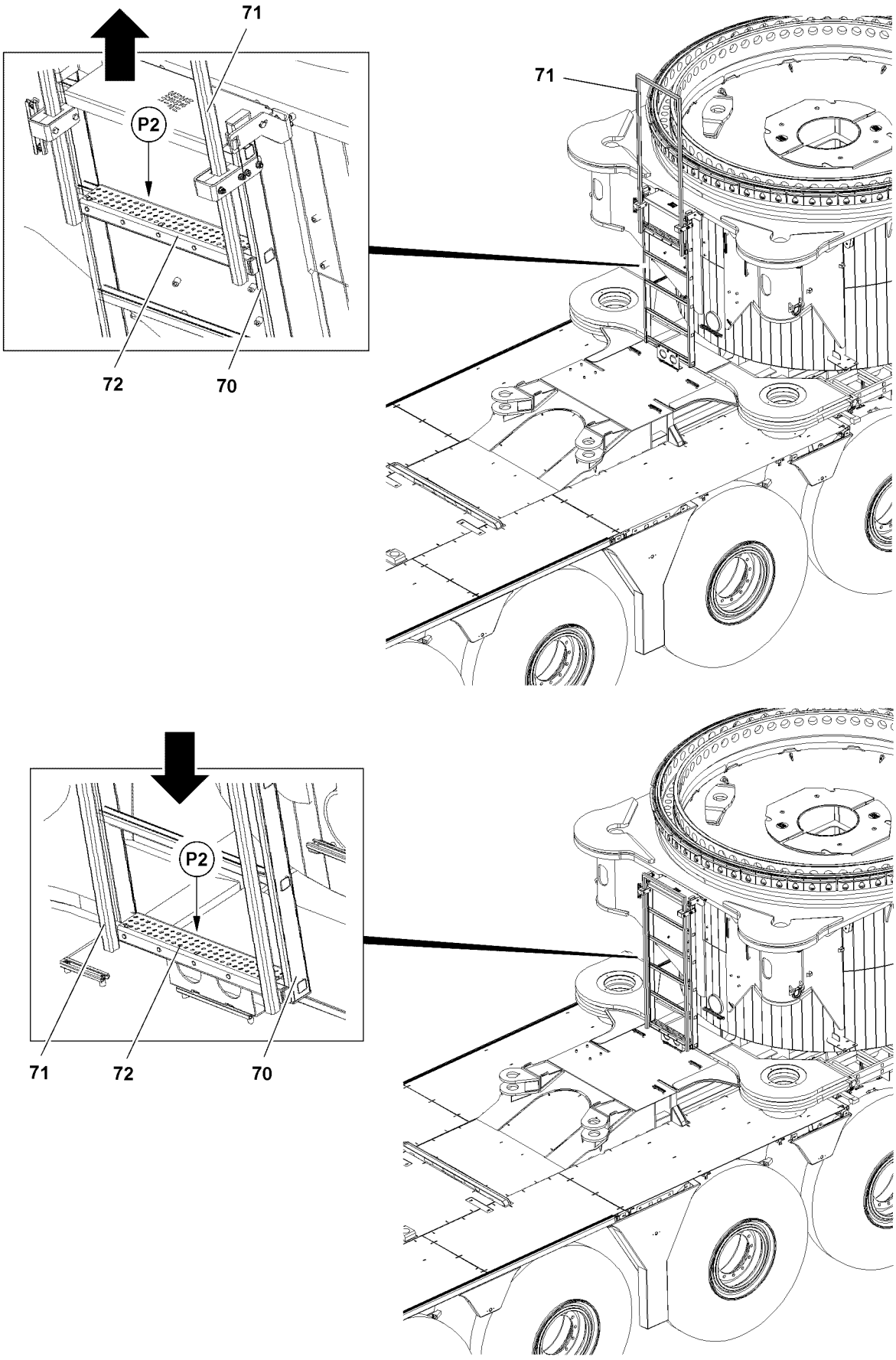

Fig.115695

2.5 Bringing the ladder on the pot into the operating position

CAUTION
Danger of crushing!
During assembly and disassembly of the ladder **70** fingers and hands can be crushed.
▶ Do not reach with your hands into the danger zone.

▶ Move the retaining bar **71** out and up.
▶ Affix the retaining bar **71** with the step **72** on the uppermost rung of the ladder **70** at point **P1**.

WARNING
Danger of falling!
While climbing up and down via a ladder, the assembly personnel can fall down and be injured severely.
▶ When ascending and descending, the assembly personnel must ensure a 3-point support.
▶ When ascending and descending, use rungs and ladder beams as handles.
▶ The assembly personnel must step into the rungs deep enough.
▶ When changing from the hook ladder to the walking surface, assembly personnel must secure themselves on the retaining bar **71** to prevent falling.
▶ When changing from the walking surface to the hook ladder, assembly personnel must secure themselves on the retaining bar **71** to prevent falling.

A 3-point support is ensured when:
– two legs are standing safely and one hand has a safe hold.
– two hands have a safe hold and one leg is standing safely.

▶ Carry out the assembly or disassembly work.

2.6 Bringing the ladder on the pot into the transport position

CAUTION
Danger of crushing!
During assembly and disassembly of the ladder **70** fingers and hands can be crushed.
▶ Do not reach with your hands into the danger zone.

WARNING
Falling retaining bar!
The retaining bar **71** can fall down due to its own weight when retracting it.
Personnel can be severely injured.
Fingers and hands can be crushed.
▶ Hold the retaining bar **71** when retracting it.

▶ Retract the retaining bar **71** downward.
▶ Affix the retaining bar **71** with the step **72** on the lowest rung of the ladder **70** at point **P2**.

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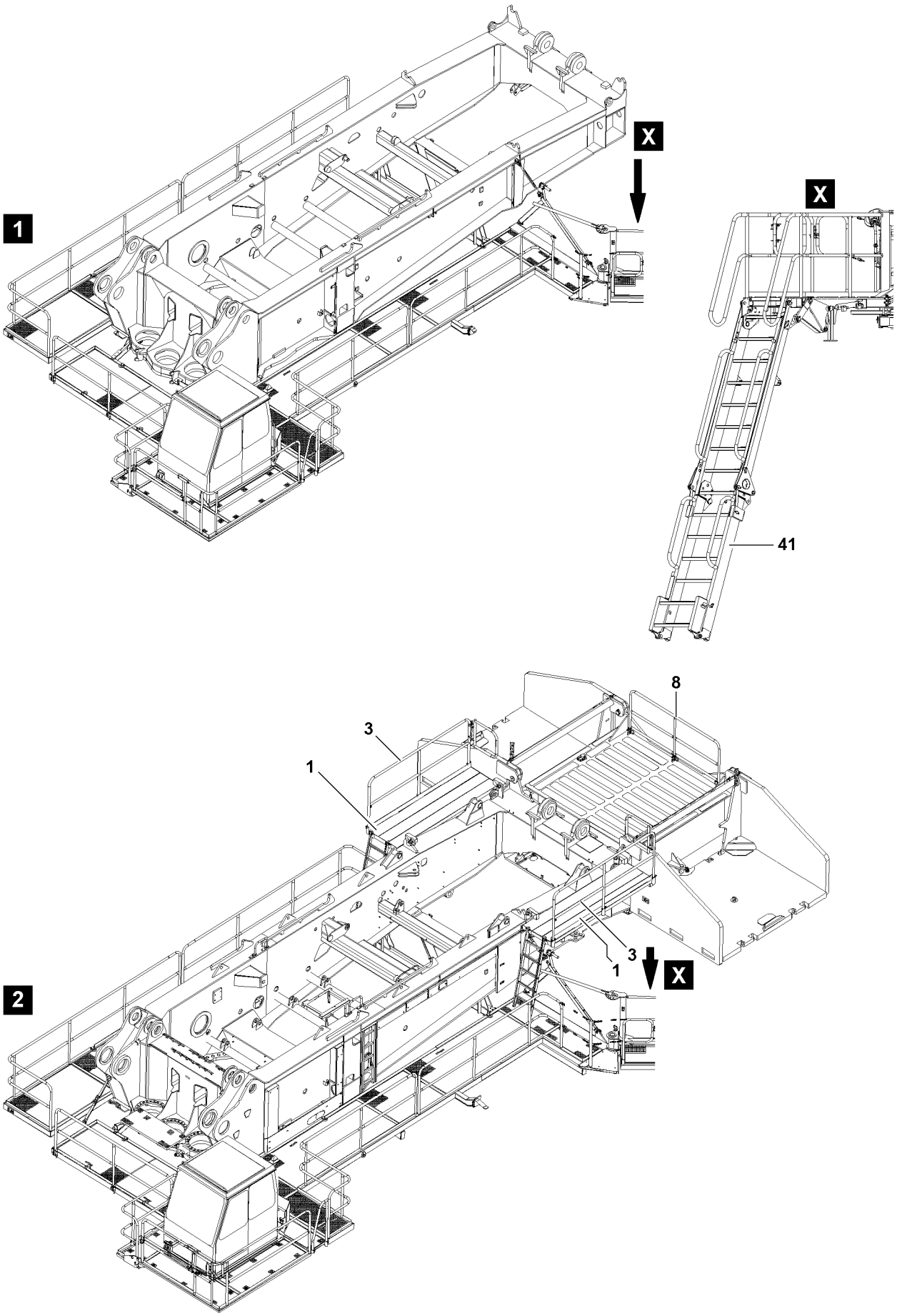

Fig.112374

LWE/LG 1750-006/15409-07-02/en

3 Fall protection equipment on the turntable

WARNING
Danger of falling!
During assembly / disassembly, inspection and maintenance work, assembly personnel must be secured with appropriate aids to prevent them from falling.
Death, severe bodily injuries.
- ▶ For assembly / disassembly work, maintenance work and inspections, swing all railings and platforms into position and secure.
- ▶ Only step on the aids, ladders and catwalks with clean shoes.
- ▶ Keep aids, ladders and catwalks free of heavy dirt, snow and ice.
- ▶ Replace damaged ladders and platforms immediately.
- ▶ Assemble all ladders and platforms stable and safe to access.

Note
- ▶ For a description of the ladder **41**, see Crane operating instructions, chapter 4.03.

3.1 Turntable without extension, illustration 1

3.2 Turntable with extension*, illustration 2

Note
- ▶ On the extension, additional catwalks **1**, railings **3** and railings **8** must be assembled.

- ▶ Assemble additional catwalks **1**, railings **3** and railings **8**, see section „Assembling catwalks and railings on extension“.

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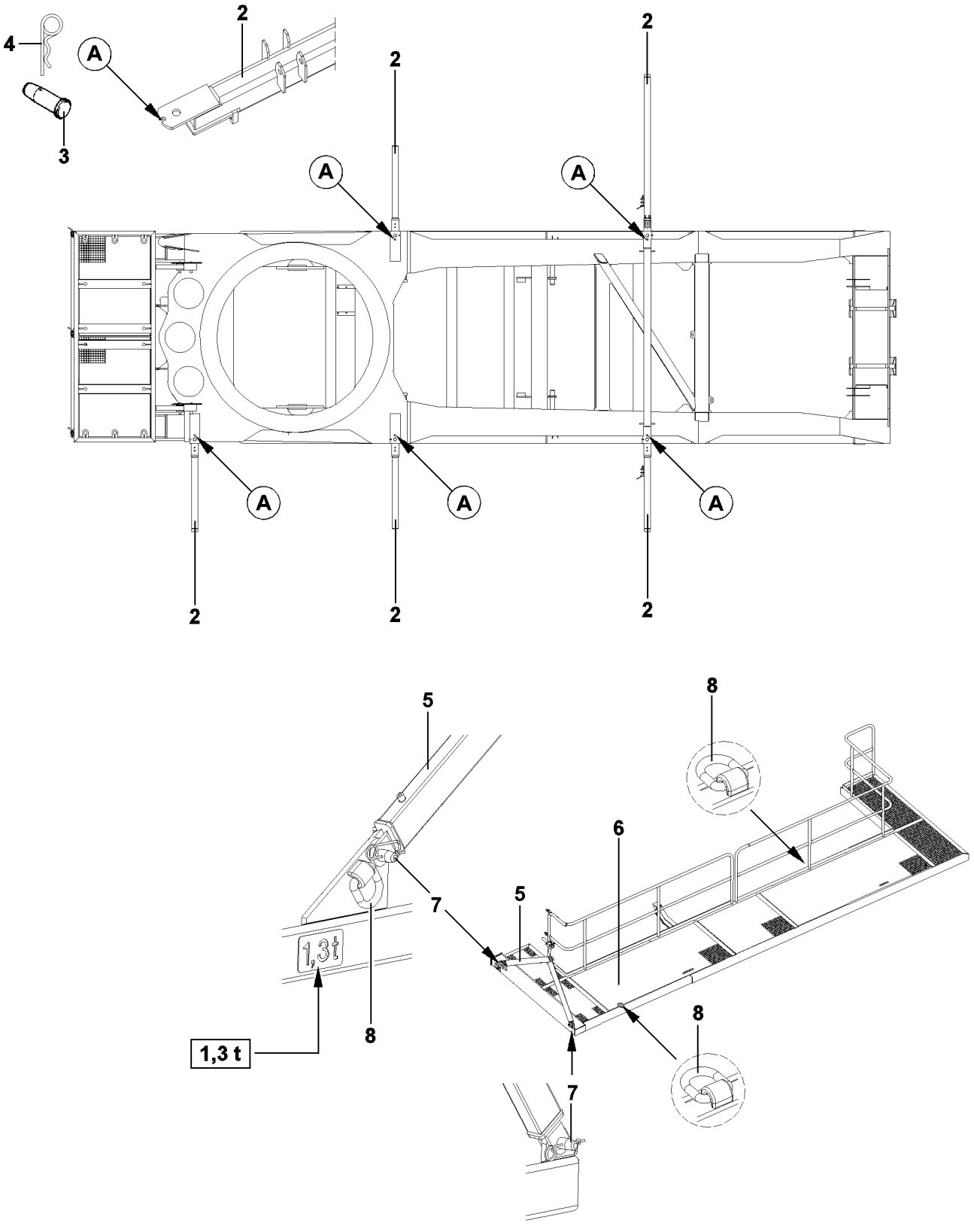

Fig.108299

LWE/LG 1750-006/15409-07-02/en

3.3 Assembling catwalks on the turntable

Make sure that the following prerequisite is met:
– The crane cab is swung into the operating position

WARNING
Danger of fatal injury due to falling catwalk!
The catwalk can fall down due to improper attachment or as the result of an assembly / disassembly error.
▶ During the assembly / disassembly process, remaining under the catwalk is prohibited.

▶ Swing out all supports **2** on the turntable and pin with the pins **3** onto the points **A** and secure with cotter pins **4**.
▶ Pin the support **5** on catwalk **6** with the pins **7** and secure with spring retainers.
▶ Hang the catwalk **6** onto the fastening points **8** properly onto an auxiliary crane.

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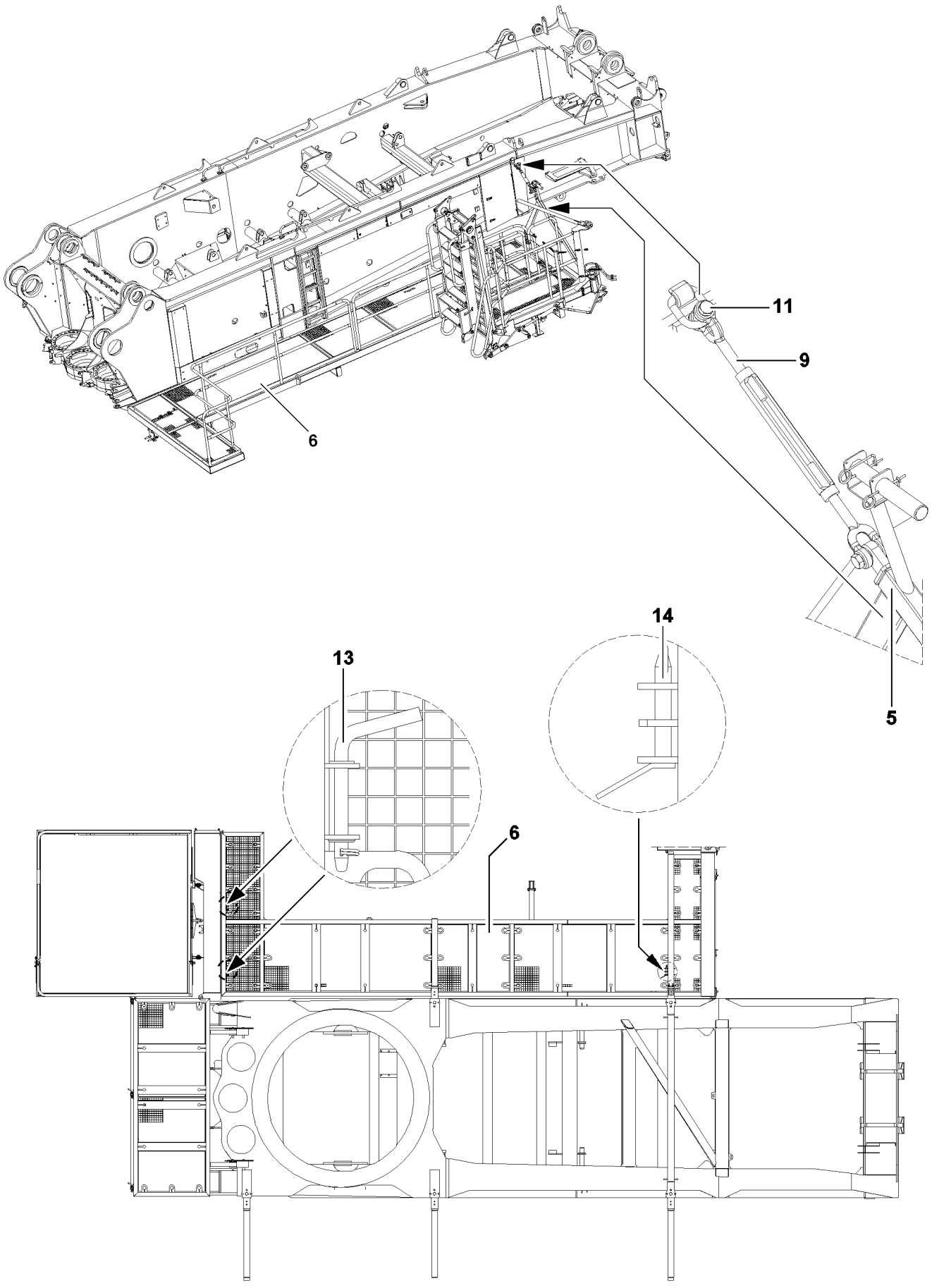

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Fig.112375

3.4 Assembling the left catwalk

Note

▶ Screw and secure the catwalk **6** initially on lug **10** „left“ onto the turntable.

▶ Bolt and secure the retainer **9** on lug **10** with screw **11**.
▶ Assemble the catwalk **6** „left“ onto the turntable.
▶ Pin and secure the catwalk **6** with the pins **13** and pins **14** on the turntable.

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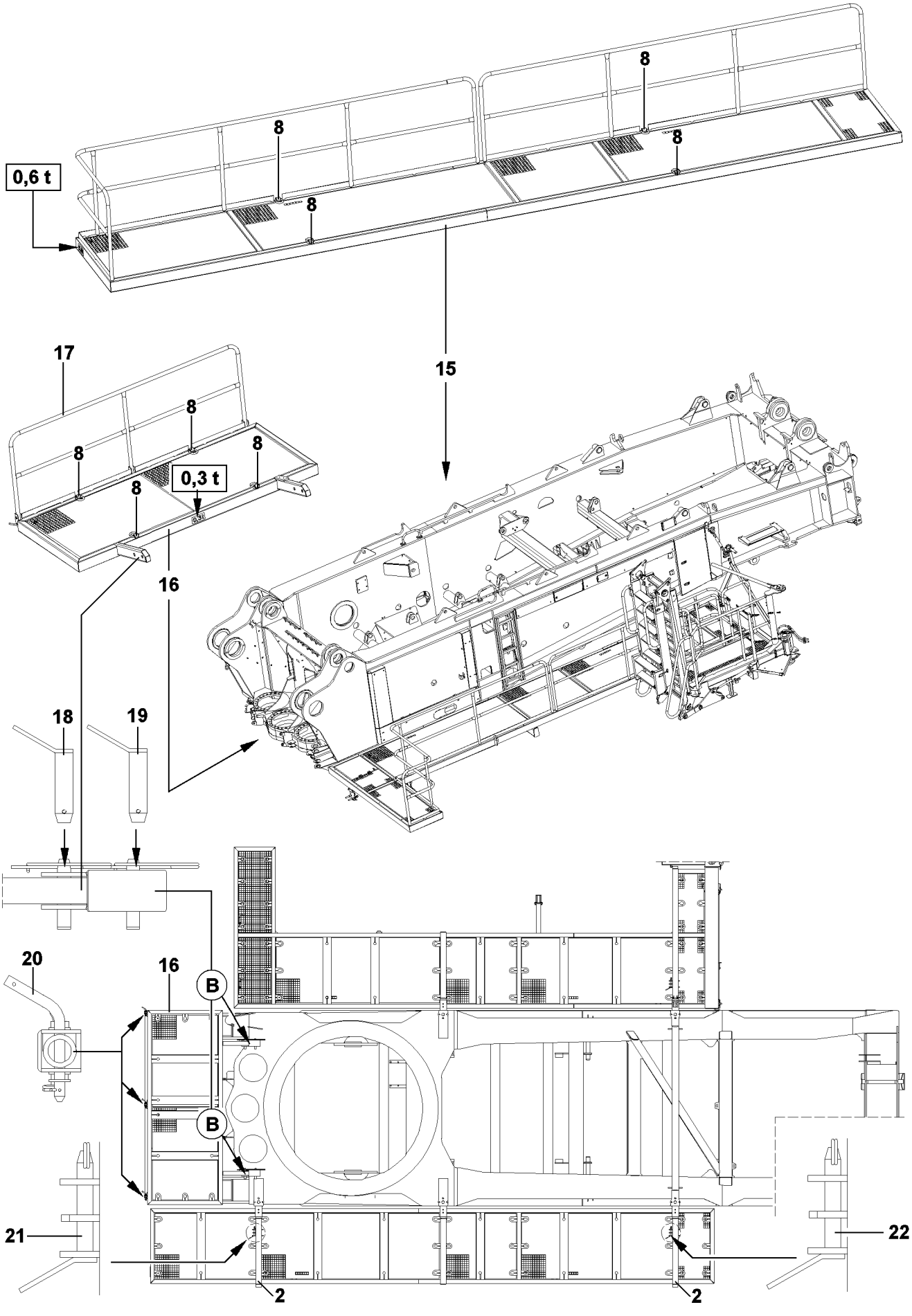

Fig.112376

LWE/LG 1750-006/15409-07-02/en

3.5 Assembling the catwalk on the right and front

- ▶ Hang the catwalk **15** onto the fastening points **8** properly onto an auxiliary crane.
- ▶ Assemble the catwalk **15** properly to the „right“ on the turntable.
- ▶ Pin and secure catwalk **15** with pins **21** and pins **22** onto the supports **2**.
- ▶ Hang the catwalk **16** onto the fastening points **8** properly onto an auxiliary crane.
- ▶ Assemble the catwalk **16** properly onto the „front“ on the turntable.
- ▶ Pin and secure all pins **18** and pins **19** on both sides on the points **B**.
- ▶ Swing the railings **17** on the catwalk **16** into the operating position and pin and secure all pins **20**.

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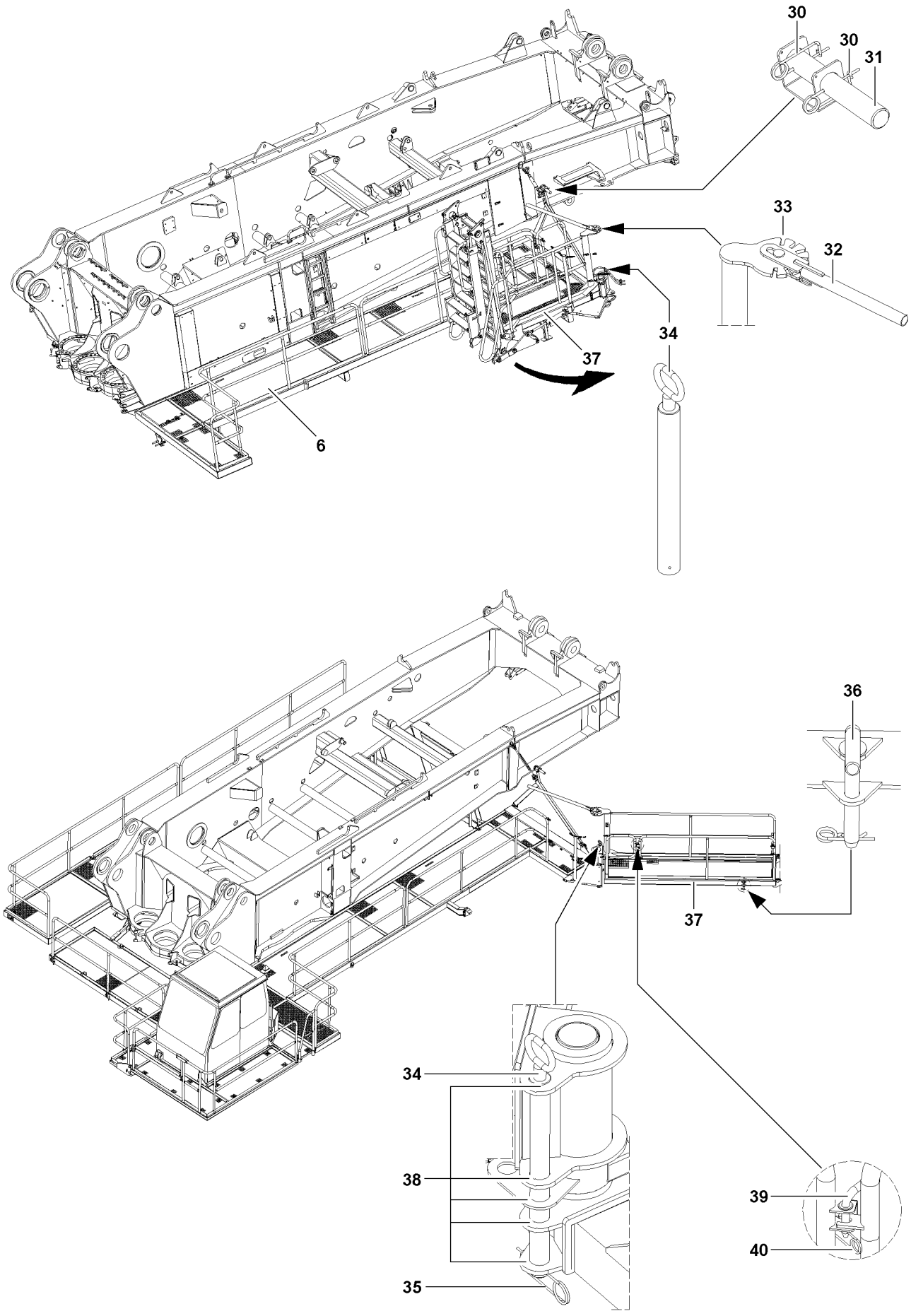

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Fig.112377

3.6 Swinging the catwalk into the operating position

Make sure that the following prerequisites are met:
- The crane is supported and horizontally aligned.
- The catwalk **6** is properly assembled with a catwalk **37** that can be swung on the turntable.

WARNING
The catwalk **37** can swing out unintentionally!
Death, severe bodily injuries.
- ▶ It is prohibited to remain in the swinging range and folding area of the catwalk.
- ▶ The crane must be supported and horizontally aligned.
- ▶ The catwalk **37** must be swung out carefully with the lever **32**.
- ▶ The pin **36** may only be unpinned when the lever **32** is securely engaged in the gear **33** and is held securely by a second person.
- ▶ Before the catwalk **6** is disassembled, the catwalk **37** must be swung back into the transport position and pinned and secured on pin **34** and pin **36** on the catwalk **6**.

- ▶ Remove the spring retainers **30** with the pipe **31** and engage the lever **32** into the gear **33**.
- ▶ Release and unpin the pin **34**.
- ▶ Release and unpin the pin **36**.
- ▶ Swing the catwalk **37** with the lever **32** into operating position until all bores **38** align.
- ▶ Insert the pin **34** and secure with the spring retainer **35**.
- ▶ Swing the railings into position, pin with pins **39** and secure with spring retainers **40**.
- ▶ Hook all chain locks on the railings.

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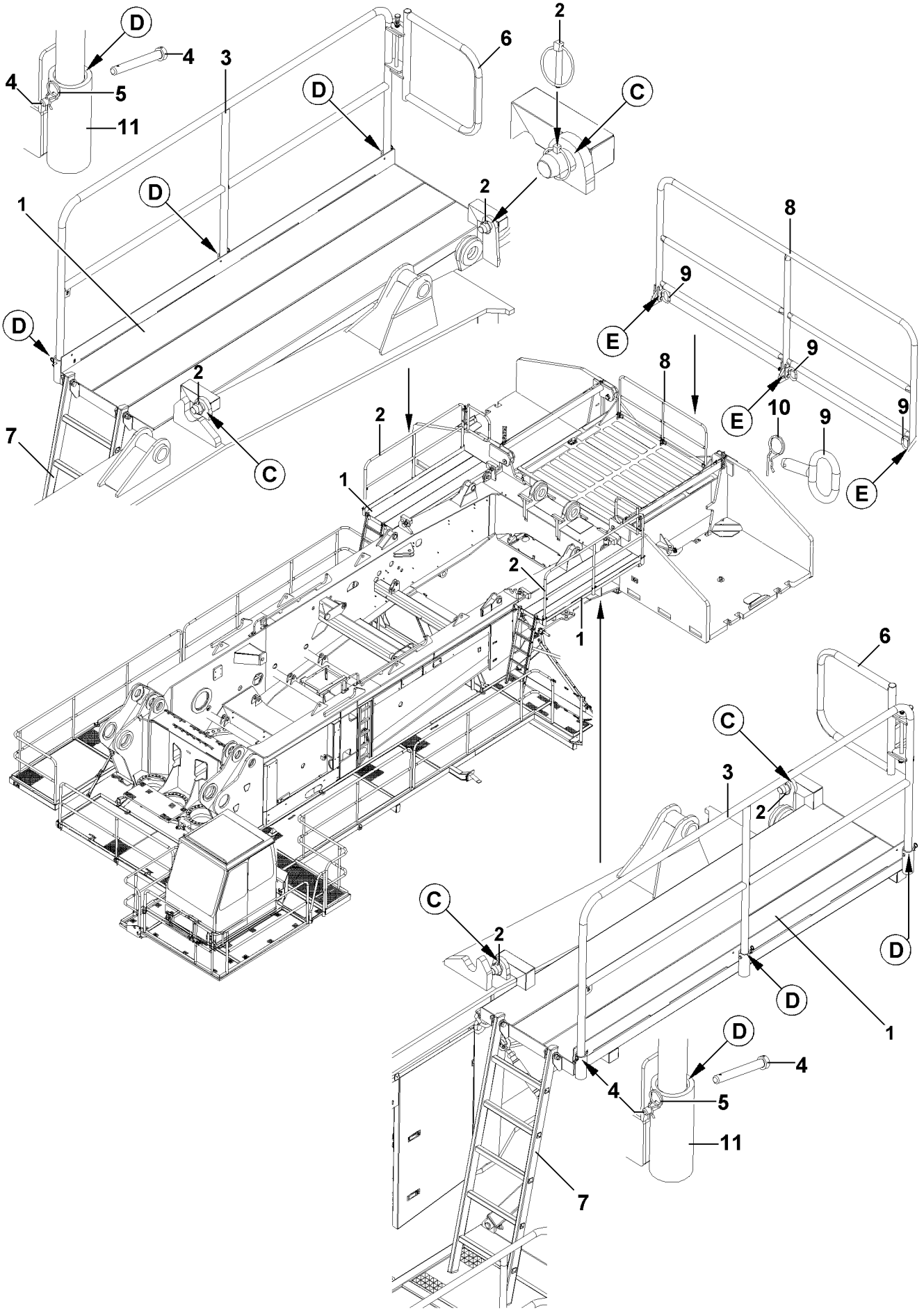

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Fig.108300

3.7 Assembling the catwalks and railings on the extension*

- ▶ Swing the catwalks **1** with the auxiliary crane on both sides to the pin points **C** on the rear onto the turntable, pin and secure with the locking pins **2**.
- ▶ Lower the catwalks **1** with the auxiliary crane until the rubber cushion touches the turntable frame.
- ▶ Insert the railings **3** on both sides on points **D** into the retainer **11**.
- ▶ Pin the railings **3** with pins **4** and secure with cotter pins **5**.
- ▶ Fold the bracket **6** on the railings **3** into position.
- ▶ Fold the ladder **7** on the catwalks **1** on both sides downward into position.
- ▶ Release and unpin all pins **9** on points **E** from the railings **8**.
- ▶ Swing the railings **8** upward into position.
- ▶ Pin all pins **9** on points **E** and secure with cotter pins **10**.

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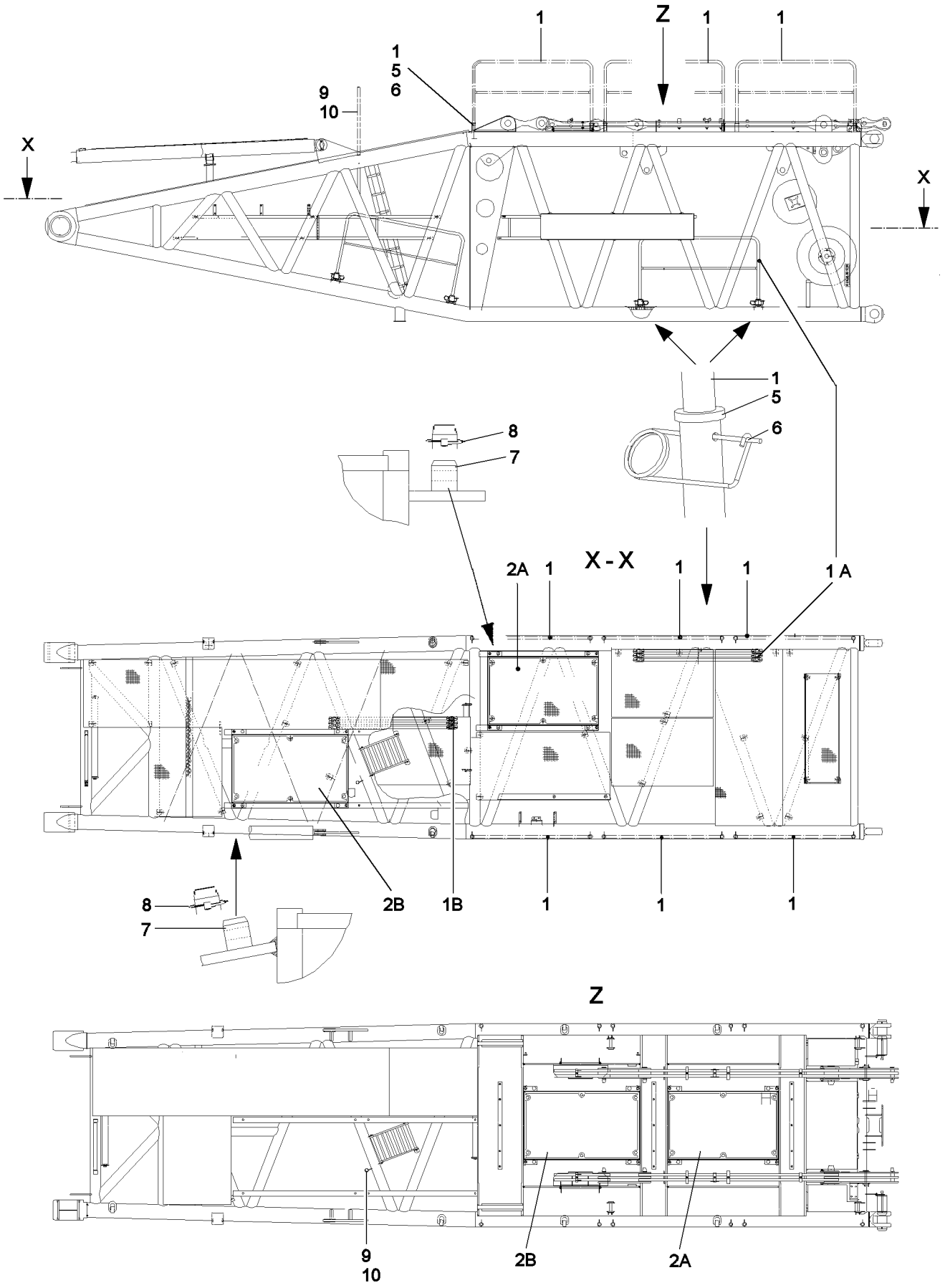

Fig.108139

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4 Fall protection equipment on the boom pivot sections and lattice sections

4.1 Assembling the railings and grating

4.1.1 Assembling the railing on the S-pivot section

WARNING
Danger of falling!
During assembly / disassembly, inspection and maintenance work, assembly personnel must be secured with appropriate aids to prevent them from falling.
Death, severe bodily injuries.
- ▶ For assembly / disassembly work, maintenance work and inspections on the S-pivot section, assemble all railings **1** and secure.
- ▶ Only step on the S-pivot section with „clean shoes“.

- ▶ Push the railings **1** into the holders **5** on the S-pivot section and secure with spring retainers **6**.
- ▶ Pull the grip handle **9** upward and secure with spring retainer **10**.

Note
- ▶ After assembly / disassembly work and for transport, the railings must be assembled and secured in the transport position.
- ▶ Push all railings **1** into the holders **5** on the S-pivot section and secure with spring retainers **6**.
- ▶ Slide in the grip handle **9** and secure with spring retainer **10**.

4.1.2 Assembling the grates

Note
- ▶ If both winches, winch 5 and winch 6, or only one winch is **not** installed in the S-pivot section or in transport position, then the openings must be closed with grates **2A** and grates **2B**.
- ▶ If one or both winches are installed, the above disassembled grates must be placed and secured in the receptacle **2A** and receptacle **2B**.

- ▶ Place the grates into the centering pins **7** and secure with safety locking pins **8**.

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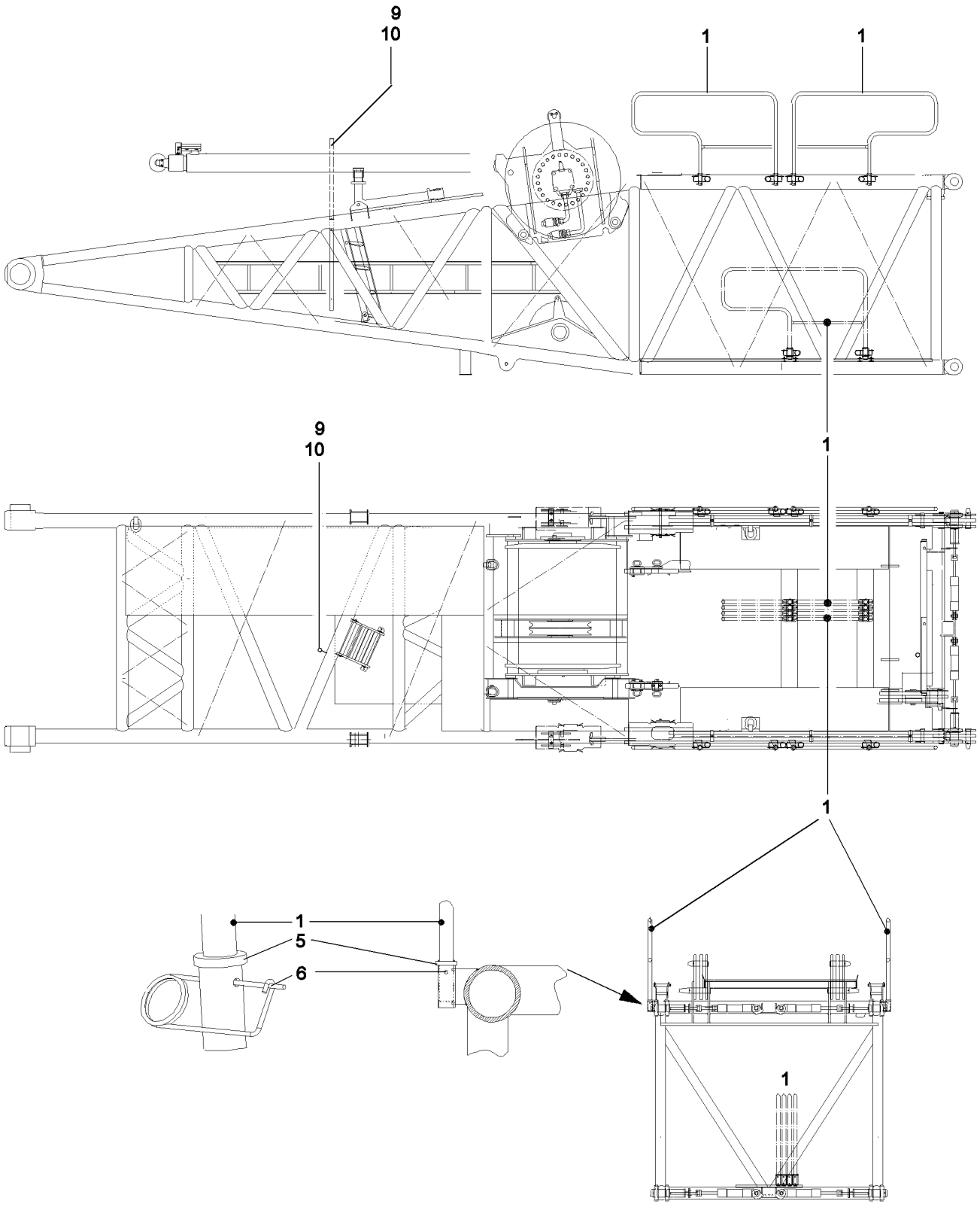

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Fig.108273

4.1.3 Assembling the railing on the D-pivot section

- ▶ Push the railings **1** into the holders **5** on the D-pivot section and secure with spring retainers **6**.
- ▶ Pull the grip handle **9** upward and secure with spring retainer **10**.

Note

- ▶ After assembly / disassembly work and for transport, the railings must be assembled and secured in the transport position.
- ▶ Push all railings **1** into the holders **5** on the D-pivot section and secure with spring retainers **6**.
- ▶ Slide in the grip handle **9** and secure with spring retainer **10**.

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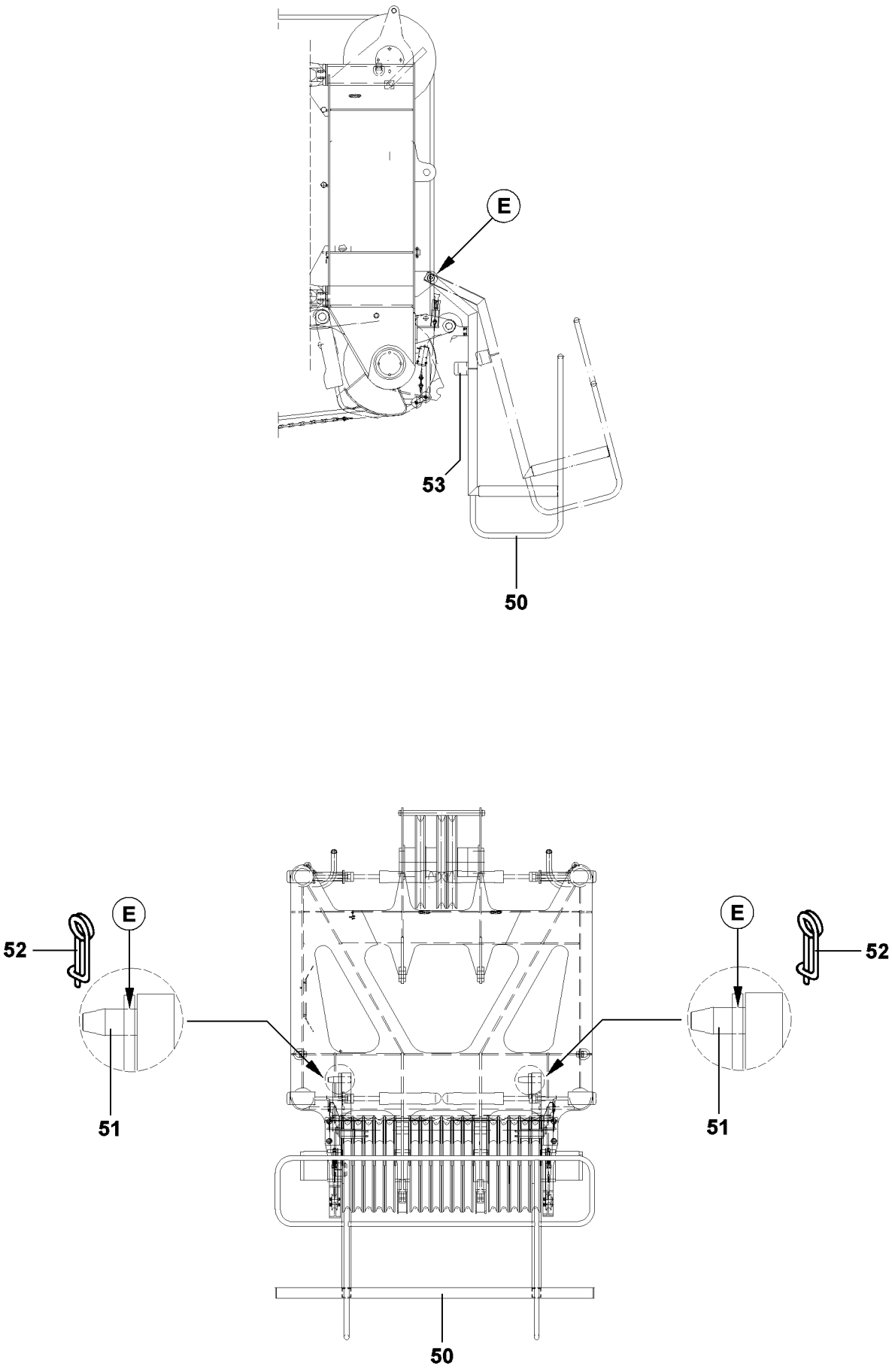

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Fig.198730

4.1.4 Assembling the platform on the pulley head

- ▶ Tilt the platform **50** and insert pins **51** on both sides into the bores **E** and secure with spring retainers **52**.
- ▶ Lower the platform **50** and affix on the side with the catches **53**.

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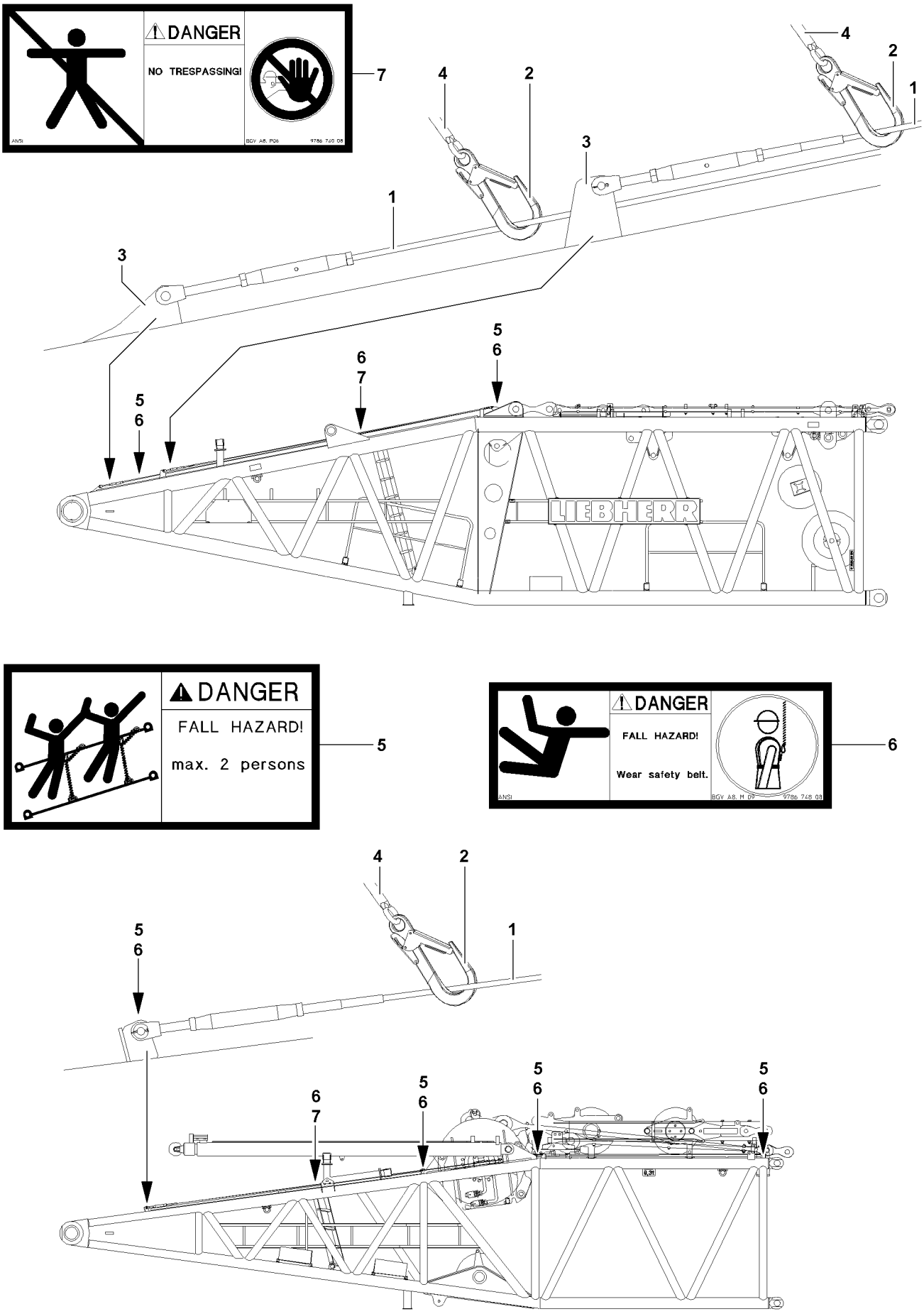

Fig.112370

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4.2 Safety ropes

4.2.1 Safety ropes on the S- and D-pivot section

On the lattice sections, on the upper left and right hand side, safety ropes **1** are installed as fall protection equipment.

NOTICE
Danger of damage!
By hanging loads or other objects on the safety ropes, they can be damaged and fail in case of an emergency.
- ▶ Never hang loads or objects on the safety ropes **1**.

WARNING
Danger of falling!
During assembly / disassembly, inspection and maintenance work, assembly personnel must be secured with appropriate aids to prevent them from falling.
Death, severe bodily injuries.
- ▶ All work aloft, where there is a danger of falling must be carried out with suitable aids.
- ▶ If the work cannot be carried out with such aids nor from the ground, then the assembly personnel must secure themselves with the fall arrest system **4** to avoid falling, see Crane operating instructions chapter 2.04.
- ▶ Assembly personnel must hook themselves for all assembly / disassembly work as well as maintenance and inspection work on the lattice mast boom with the fall arrest system **4** on the safety ropes **1** on the left and right hand side with both snap hooks **2** and secure themselves to prevent them from falling. (For example: Safety harness with self-actuating blocking function and an automatic tension and pull in device for the connectors)
- ▶ The connector must be set to a length as short as possible so that is it impossible to hit the ground in case of a fall.
- ▶ Fall absorbers may not be used, because they stretch too much in case of a fall.
- ▶ On the safety ropes **1** on the left and right hand side, no more than **maximum two persons** may hook themselves with the snap hooks **2** and secure themselves to prevent falls, see sign **5**.
- ▶ Changing the snap hooks **2** over is only permissible on the connecting points from lattice section to lattice section.
- ▶ When changing the snap hook **2** from lattice section to lattice section, one snap hook **2** must always be hooked on one safety rope **1**.
- ▶ Never release both snap hooks **2** simultaneously from the safety ropes **1**.
- ▶ Before any assembly / disassembly work, maintenance and inspection work it must be ensured that all obstacles below the work place have been removed and that there is sufficient clearance in case of a fall.
- ▶ During all assembly / disassembly work, maintenance work and inspections, travel or crane operation is prohibited.

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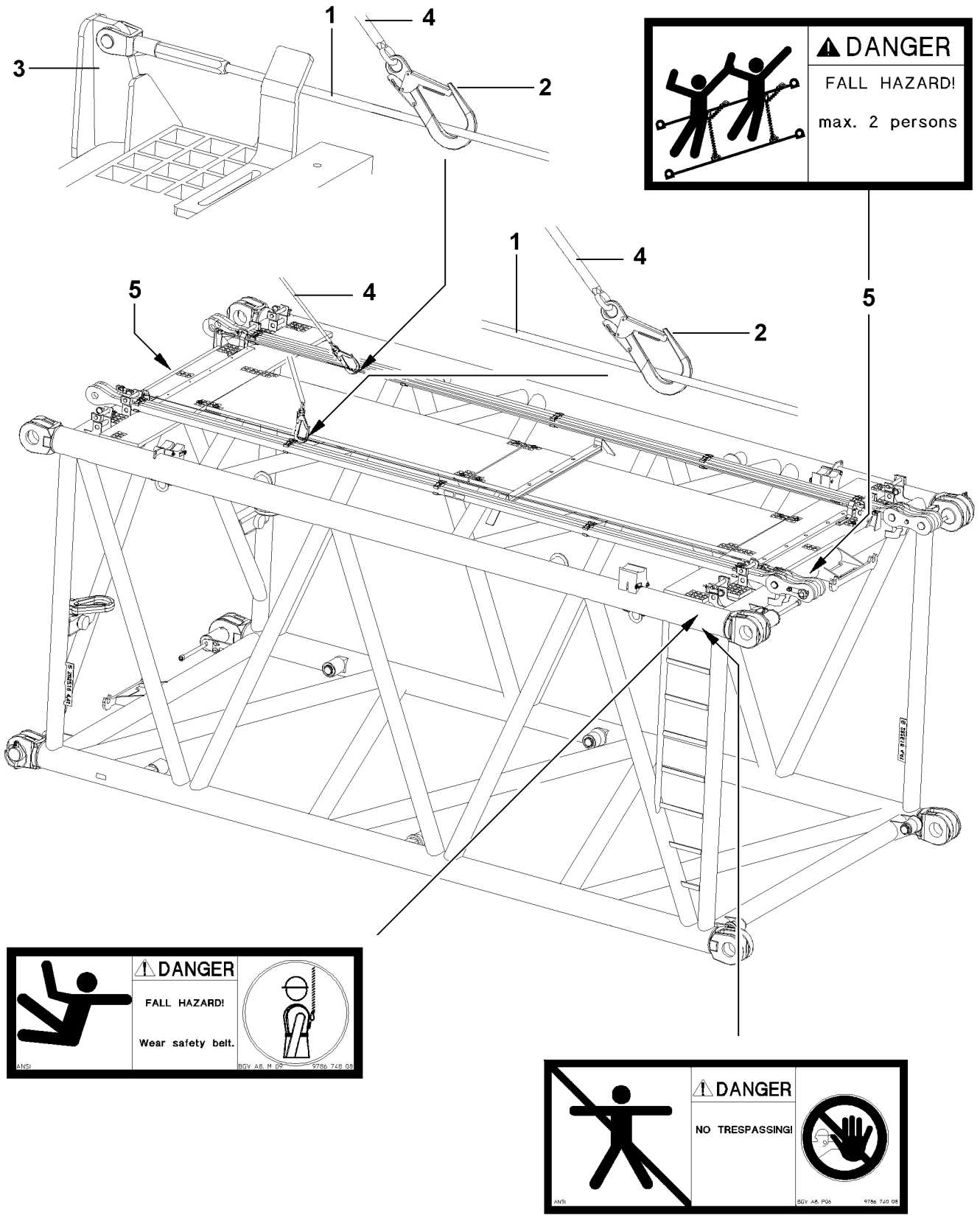

Fig.107341

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4.2.2 Safety ropes on the lattice sections

On the lattice sections, on the upper left and right hand side, safety ropes **1** are installed as fall protection equipment.

NOTICE
Danger of damage!
By hanging loads or other objects on the safety ropes, they can be damaged and fail in case of an emergency.
▶ Never hang loads or objects on the safety ropes **1**.

WARNING
Danger of falling!
During assembly / disassembly, inspection and maintenance work, assembly personnel must be secured with appropriate aids to prevent them from falling.
Death, severe bodily injuries.
▶ All work aloft, where there is a danger of falling must be carried out with suitable aids.
▶ If the work cannot be carried out with such aids nor from the ground, then the assembly personnel must secure themselves with the fall arrest system **4** to avoid falling, see Crane operating instructions chapter 2.04.
▶ Assembly personnel must hook themselves for all assembly / disassembly work as well as maintenance and inspection work on the lattice mast boom with the fall arrest system **4** on the safety ropes **1** on the left and right hand side with both snap hooks **2** and secure themselves to prevent them from falling. (For example: Safety harness with self-actuating blocking function and an automatic tension and pull in device for the connectors)
▶ The connector must be set to a length as short as possible so that is it impossible to hit the ground in case of a fall.
▶ Fall absorbers may not be used, because they stretch too much in case of a fall.
▶ On the safety ropes **1** on the left and right hand side, no more than **maximum two persons** may hook themselves with the snap hooks **2** and secure themselves to prevent falls, see sign **5**.
▶ Changing the snap hooks **2** over is only permissible on the connecting points from lattice section to lattice section.
▶ When changing the snap hook **2** from lattice section to lattice section, one snap hook **2** must always be hooked on one safety rope **1**.
▶ Never release both snap hooks **2** simultaneously from the safety ropes **1**.
▶ Before any assembly / disassembly work, maintenance and inspection work it must be ensured that all obstacles below the work place have been removed and that there is sufficient clearance in case of a fall.
▶ During all assembly / disassembly work, maintenance work and inspections, travel or crane operation is prohibited.

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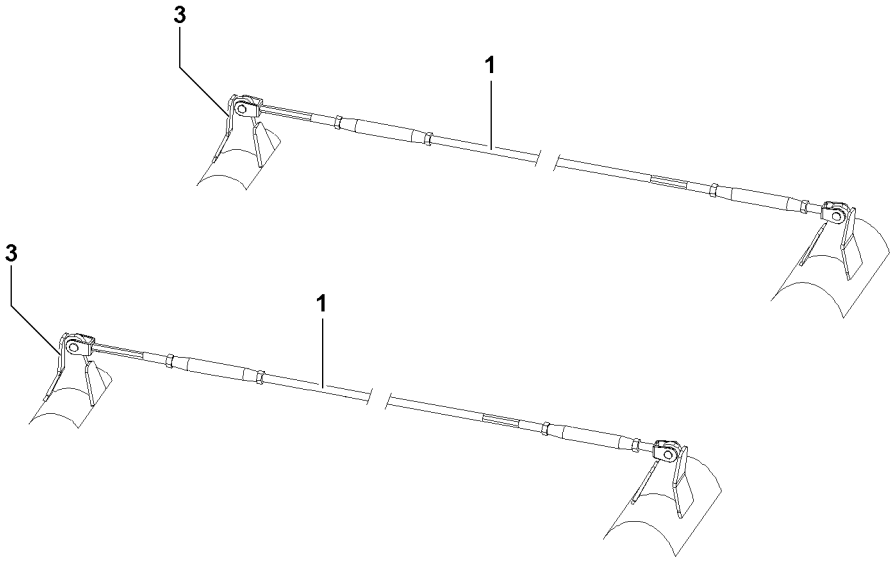

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Fig.112371

4.3 Inspecting and replacing safety ropes

4.3.1 Inspection of safety ropes and anchor points

WARNING
Danger of falls due to damaged safety ropes or anchor points!
The safety ropes **1** and anchor points **3** must be checked **at least once a year** by **expert personnel** for safety and damage.
If any defects are found on the safety ropes **1** or anchor points **3** during the inspections, then the safety ropes **1** or anchor points **3** must be replaced immediately by **expert personnel**. If this is not observed, assembly personnel could be killed or fatally injured in a fall.
▶ Have damaged safety ropes **1** or anchor points **3** replaced immediately by **expert personnel**.

4.3.2 Documenting the inspections in writing

Note
▶ The scope and results of tests should be documented to permit reproducibility.
▶ This documentation for test scope and test results forms part of the crane records and is to be safely stored during the entire service life of the crane.

4.3.3 Replacing safety ropes subjected to a fall

WARNING
Danger of accidents due to fall subjected safety ropes!
If safety ropes **1** subject to a fall are not replaced after a fall, then the safety ropes can fail in case of another fall.
Death, severe bodily injuries.
▶ **Expert personnel** must immediately replace any safety ropes **1** which were subjected to a fall and inspect the respective anchor points **3** for damage.
▶ If the anchor points **3** are damaged, then they must be replaced immediately by **expert personnel**.

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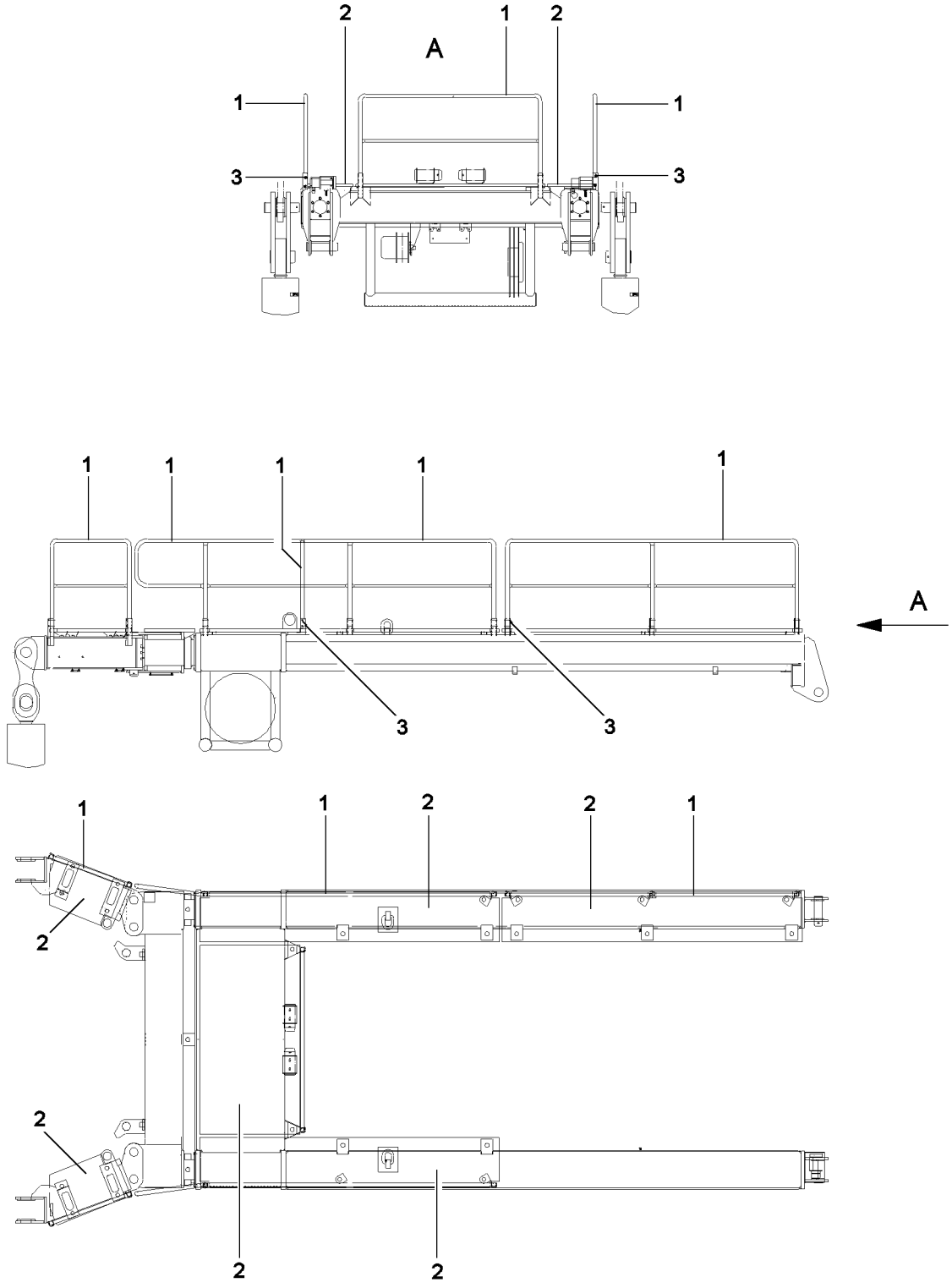

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Fig.108274

5 Fall protection equipment on suspended ballast guide frames

WARNING
Danger of falling!
During assembly / disassembly, inspection and maintenance work, assembly personnel must be secured with appropriate aids to prevent them from falling.
Death, severe bodily injuries.
- ▶ For assembly / disassembly work, maintenance work and inspections, assemble all railings **1**, ladders **3** and catwalks **2** properly, swing in position and secure.
- ▶ Only step on the aids, ladders and catwalks **2** with clean shoes.
- ▶ Keep aids, ladders and catwalks **2** free of heavy dirt, snow and ice.
- ▶ Replace damaged catwalks and railings immediately.

Note
- ▶ Before assembly of the guide frame on the turntable, position and secure railings **1** in operating position.

NOTICE
Damage to the railings **1**!
If the railings **1** are not brought and secured into operating position before assembly of the guide frame to the turntable, they can be severely damaged.
- ▶ Bring the railings **1** into operating position and secure them before assembly of the guide frame on the turntable.
- ▶ Remove the spring retainers **3** on the railings **1**.
- ▶ Swing the railings **1** upward into operating position and secure with spring retainers **3**.

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2.07 Accesses to the crane

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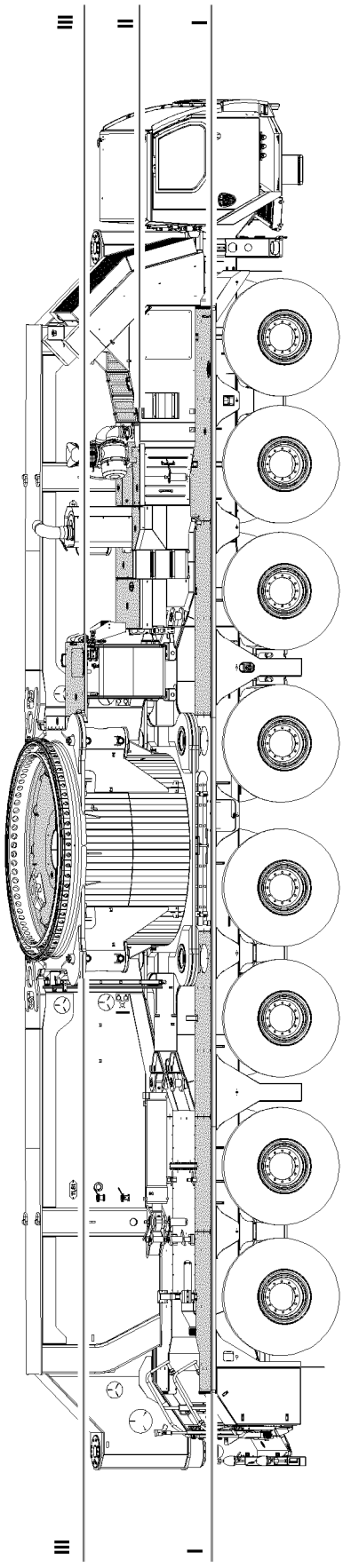

Fig.115687

LWE/LG 1750-006/15409-07-02/en

1 Ascent and descent on the chassis

WARNING
Danger of falling!
If the following guidelines are not observed, assembly personnel can fall down and be killed or severely injured!
- ▶ Ladders, walking and stepping surfaces are free of objects and obstacles!
- ▶ Step on ladders, walking and stepping surfaces only with sufficiently clear height!
- ▶ Step on ladders, walking and stepping surfaces only with clean shoes!
- ▶ Keep ladders, walking and stepping surfaces free of heavy dirt, snow and ice!
- ▶ During the folding and / or swing procedure of folding ladders, no personnel or objects may remain on the ladder or within the danger zone!
- ▶ Ladders, walking and stepping surfaces may not be subjected to a load of more than maximum 150 kg !
- ▶ Do not use handles as rigging points!
- ▶ Subject the handles with no more than maximum 100 kg !
- ▶ Do not step on damaged ladders, walking and stepping surfaces and replace them immediately!

WARNING
Danger of falling!
Assembly personnel can also fall down when walking on walking and stepping surfaces!
Personnel can be severely injured or killed!
- ▶ Keep clear from the outer edges of the walking and stepping surfaces.
- ▶ If possible, always walk on the walking and stepping surfaces in the center.
- ▶ Step on the walking and stepping surfaces always anticipatorily and with utmost caution.
- ▶ When walking on the walking and stepping surfaces, pay attention to any possible obstacles!

Note
- ▶ The walking surfaces of the chassis are split into three levels, see illustration!

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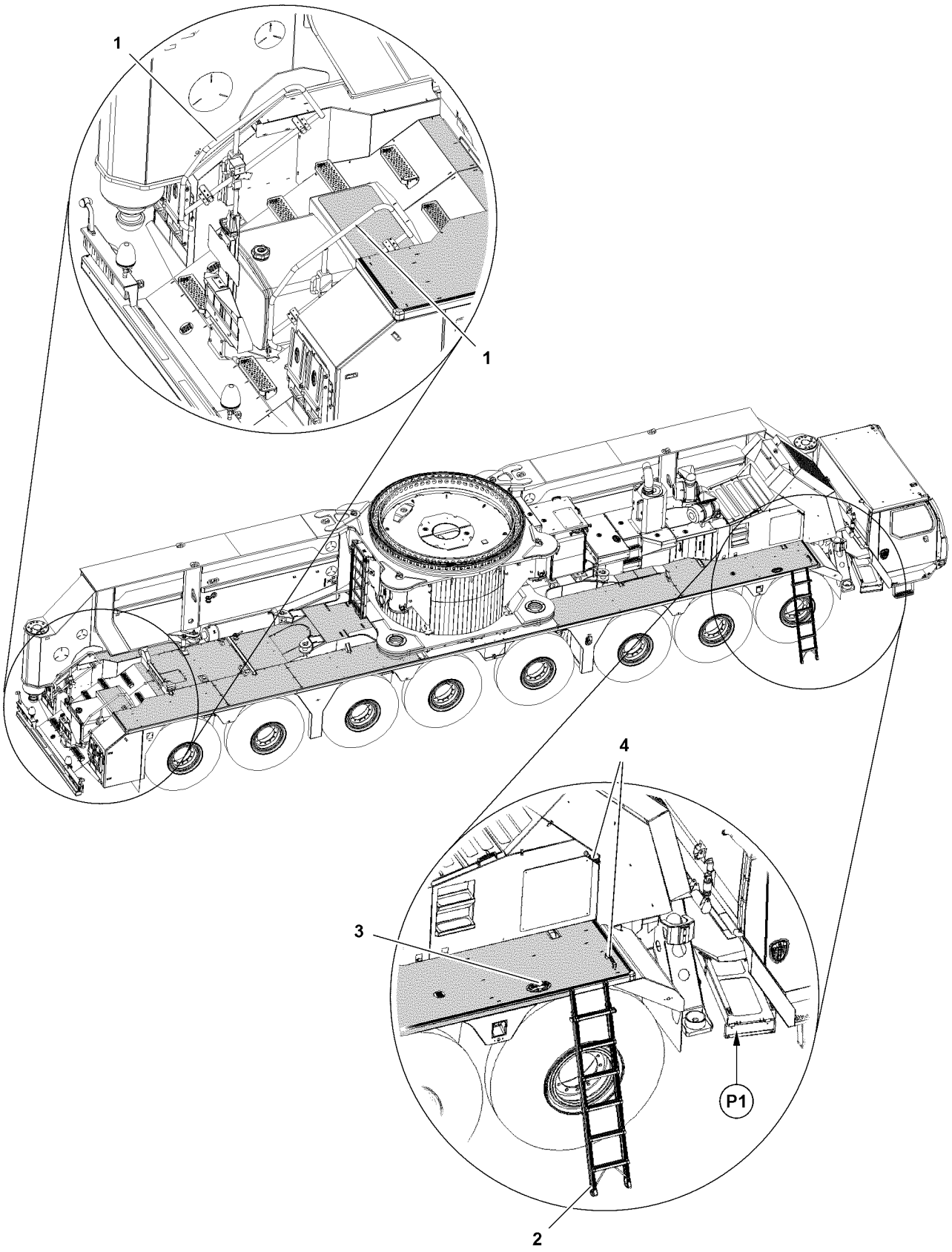

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Fig.115688

1.1 Ascent and descent on level I

1.1.1 Ascent and descent on the rear of the vehicle

Ascent / descent on the walking surface of level I via the permanently integrated access on the rear of the vehicle, see illustration.

WARNING
Danger of falling!
While climbing up and down via a the rear of the vehicle, the assembly personnel can fall down and be injured severely!
- ▶ When ascending and descending, the assembly personnel must ensure a 3-point support!
- ▶ The assembly personnel must step into the steps sufficiently deep!
- ▶ Make sure that the railings **1** are in operating position!

- ▶ Fold the railings **1** into operating position, see Crane operating instructions, chapter 2.06!
- ▶ Ascend on level I or descend from level I.

1.1.2 Ascending and descending via the hook ladder

Ascent / descent on the walking surface of level I via a hook ladder **2** on the right side of the vehicle, see illustration.

WARNING
Danger of falling!
While climbing up, changing over or climbing down via a hook ladder, assembly personnel can fall down!
Personnel can be severely injured or killed!
- ▶ When ascending and descending, the assembly personnel must ensure a 3-point support!
- ▶ When ascending and descending, use rungs and ladder beams as handles!
- ▶ The assembly personnel must step into the rungs sufficiently deep!
- ▶ When changing from the hook ladder to the walking surface, the assembly personnel must secure themselves with the handle **3** and handle **4** to prevent falling!
- ▶ When changing from the walking surface to the hook ladder, the assembly personnel must secure themselves with the handle **3** and handle **4** to prevent falling!

- ▶ Take the hook ladder **2** at point **P1** from transport position, see Crane operating instructions, chapter 2.06.
- ▶ Bring the hook ladder **2** into ascent / descent position and pay attention to proper retention, see Crane operating instructions, chapter 2.06.
- ▶ Ascend on level I or descend from level I.

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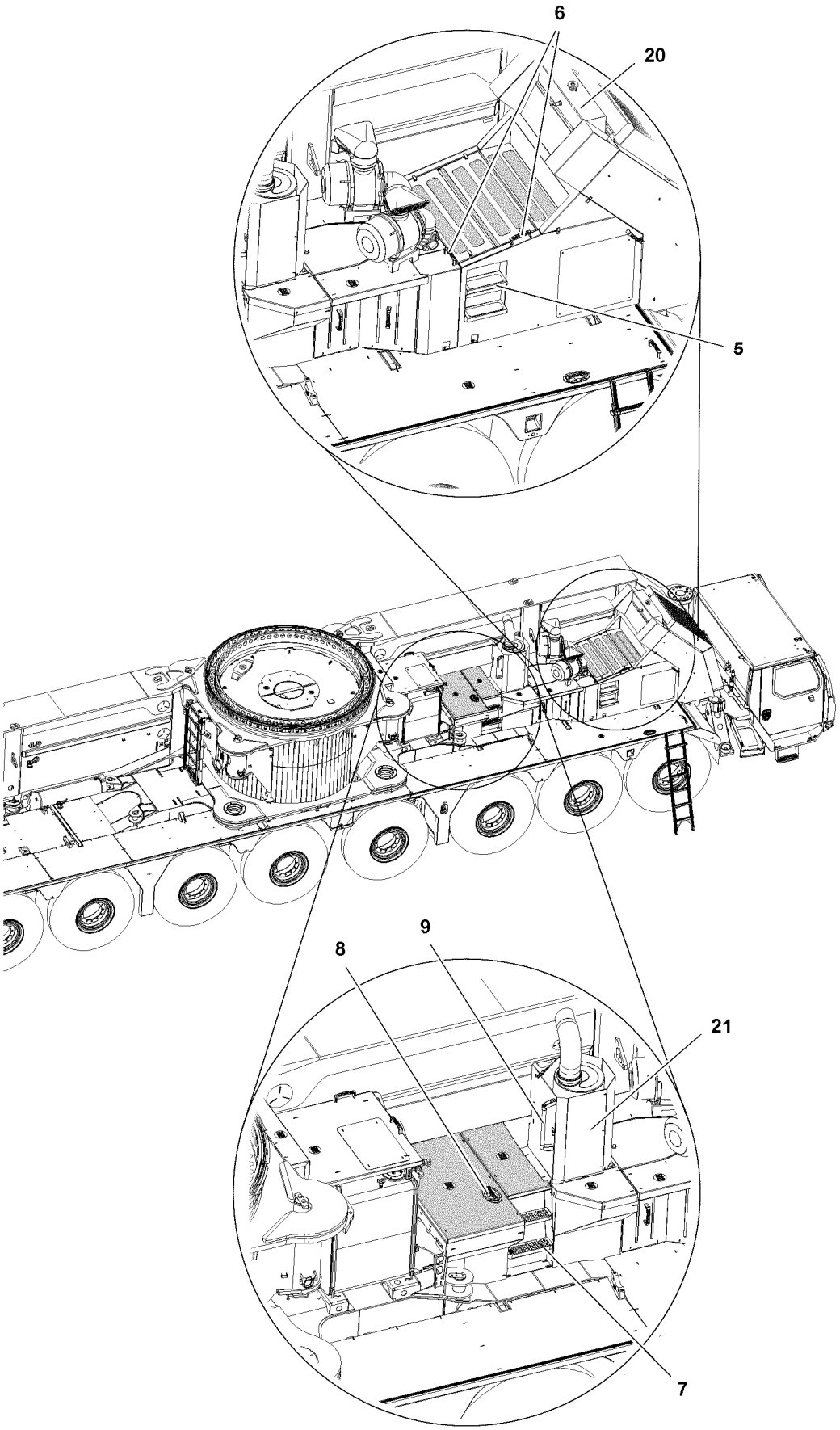

Fig.115689

1.2 Ascent and descent on level II

WARNING
Danger of burns and falling!
- ▶ Step on the engine cover only when the engine is cold and if the walking and stepping surfaces are slip resistant!
- ▶ Ascent to the engine cover is only required for disassembly or assembly purposes or for maintenance work!

1.2.1 Ascending and descending via the front steps

Ascent / descent from the walking surface of level I to the walking surface of level II via the permanently integrated steps **5**, see illustration.

WARNING
Danger of falling!
During ascent and descent via the permanently integrated steps **5** assembly personnel can fall down!
Personnel can be severely injured or killed!
- ▶ When ascending and descending, the assembly personnel must ensure a 3-point support!
- ▶ The assembly personnel must step into the steps sufficiently deep!
- ▶ When changing from the walking surface of level I to the walking surface of level II, the assembly personnel must secure themselves with the handles **6** to prevent falling!
- ▶ When changing from the walking surface of level II to the walking surface of level I, the assembly personnel must secure themselves with the handles **6** to prevent falling!

WARNING
Danger of burns!
Personnel can suffer severe burns when coming in contact with hot crane components!
- ▶ Near hot crane components always proceed with utmost caution!
- ▶ Let the coolant expansion tank **20** cool off before touching it!

- ▶ Ascend on level II or descend from level II.

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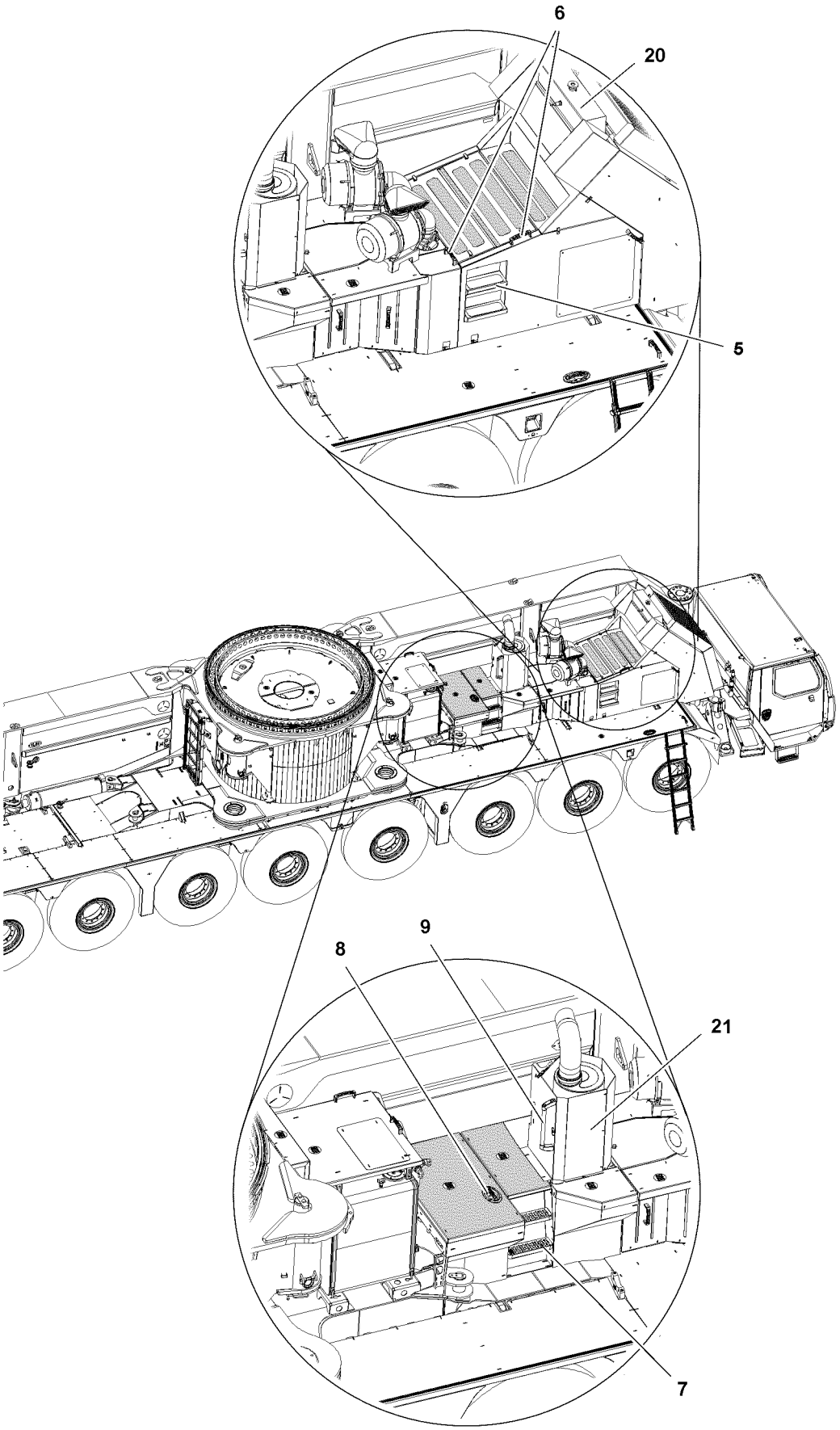

Fig.115689

1.2.2 Ascending and descending via the center steps

Ascent / descent from the walking surface of level I to the walking surface of level II via the permanently integrated steps **7**, see illustration.

WARNING
Danger of falling!
During ascent and descent via the permanently integrated steps assembly personnel can fall down!
Personnel can be severely injured or killed!
- ▶ When ascending and descending, the assembly personnel must ensure a 3-point support!
- ▶ The assembly personnel must step into the steps sufficiently deep!
- ▶ When changing from the walking surface of level I to the walking surface of level II, the assembly personnel must secure themselves with the handle **8** and handle **9** to prevent falling!
- ▶ When changing from the walking surface of level II to the walking surface of level I, the assembly personnel must secure themselves with the handle **8** and handle **9** to prevent falling!

WARNING
Danger of burns!
Personnel can suffer severe burns when coming in contact with hot crane components!
- ▶ Near hot crane components always proceed with utmost caution!
- ▶ Let the exhaust pot **21** cool off before touching it!
- ▶ Moving along the side of the exhaust pot **21** is not permissible!

- ▶ Ascend on level II or descend from level II.

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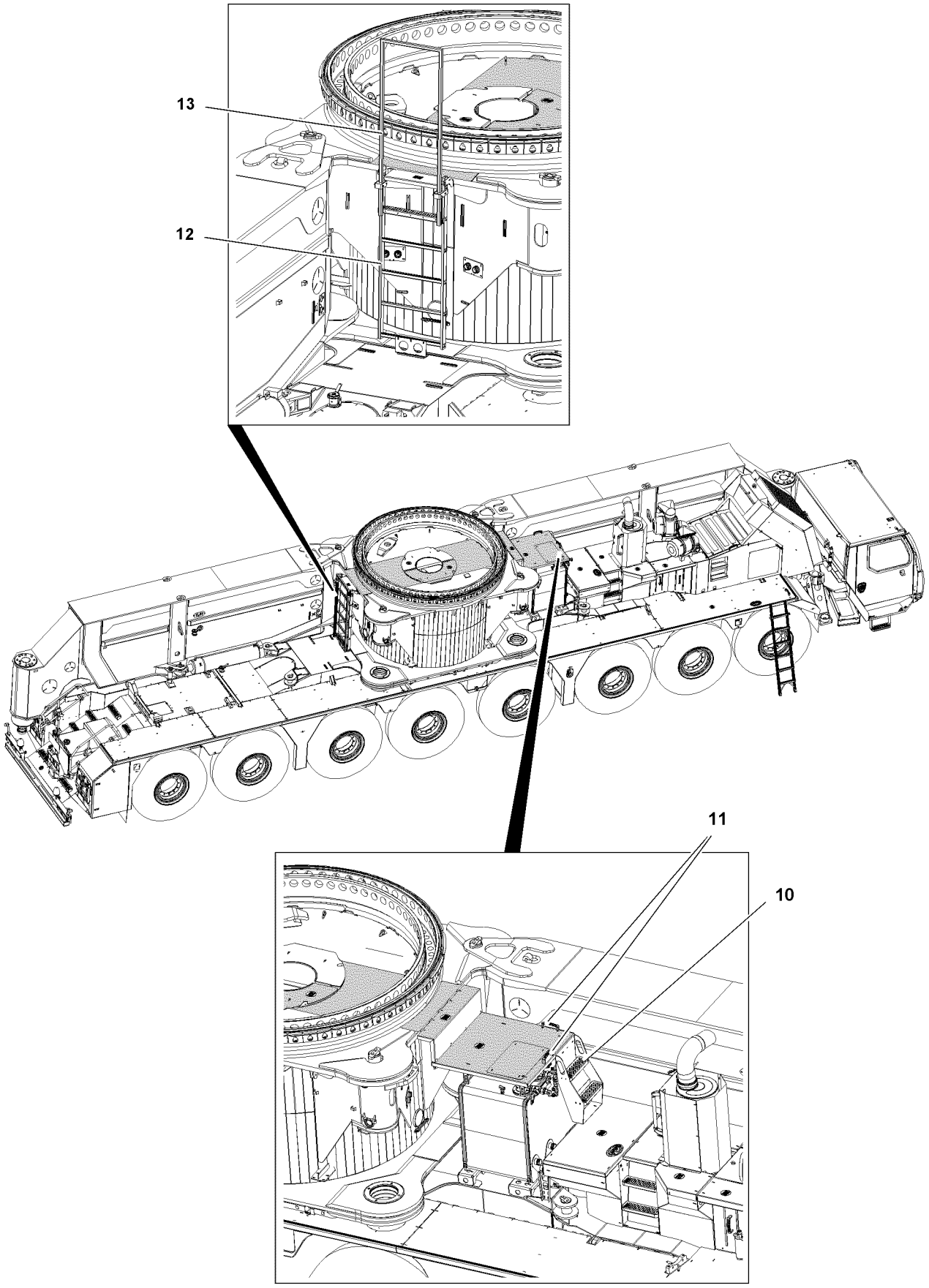

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Fig.115690

1.3 Ascent and descent on level III

WARNING
Danger of falling!
When crossing over the „pot“ assembly personnel can fall down.
Personnel can be severely injured or killed!
- ▶ Make sure that you cross the pot only on the surfaces designated as walking surfaces!
- ▶ Climbing on the „pot“ is only permissible for disassembly and assembly purposes!

1.3.1 Ascend and descend via steps

Ascent / descent from the walking surface of level II to the walking surface of level III via the permanently integrated steps **10**, see illustration.

WARNING
Danger of falling!
During ascent and descent via the permanently integrated steps **10** assembly personnel can fall down!
Personnel can be severely injured or killed!
- ▶ When ascending and descending, the assembly personnel must ensure a 3-point support!
- ▶ The assembly personnel must step into the steps sufficiently deep!
- ▶ When changing from the walking surface of level I to the walking surface of level II, the assembly personnel must secure themselves with the handles **11** to prevent falling!
- ▶ When changing from the walking surface of level II to the walking surface of level I, the assembly personnel must secure themselves with the handles **11** to prevent falling!

- ▶ Ascend on level III or descend from level III.

1.3.2 Ascend and descend via the permanently installed ladder

Ascent / descent on the walking surface of level III via the permanently installed ladder **12** on the „pot“, see illustration.

WARNING
Danger of falling!
During ascent and descent via the permanently installed ladder **12** assembly personnel can fall down!
Personnel can be severely injured or killed!
- ▶ When ascending and descending, the assembly personnel must ensure a 3-point support.
- ▶ When ascending and descending, use rungs and ladder beams as handles.
- ▶ The assembly personnel must step into the rungs sufficiently deep.
- ▶ When changing from the ladder to the walking surface, the assembly personnel must secure themselves with the grab bar **13** to prevent falling.
- ▶ When changing from the walking surface to the ladder, the assembly personnel must secure themselves with the grab bar **13** to prevent falling.

- ▶ Set the grab bar **13** to ascent and descent position, see Crane operating instructions, chapter 2.06.
- ▶ Ascend on level III or descend from level III.

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2 Walking and stepping surfaces

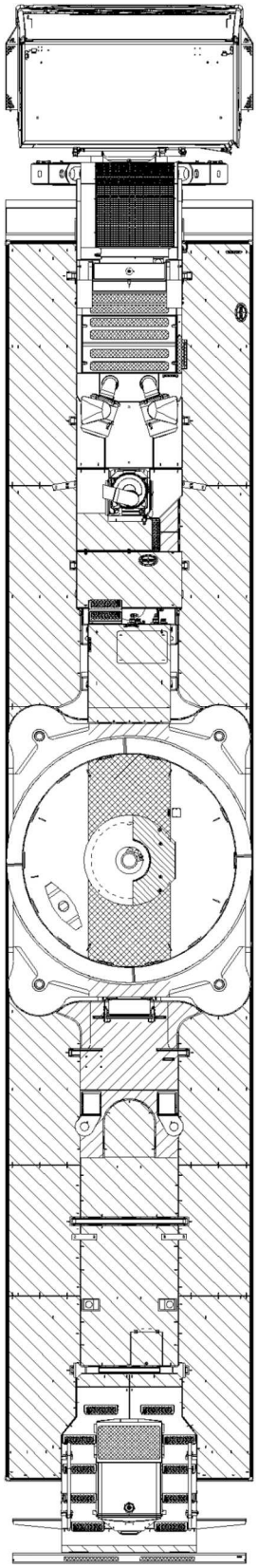

Fig.115691: Walking and stepping surfaces

WARNING
Danger of falling!
If the following guidelines are not observed, assembly personnel can fall down and be killed or severely injured.
- ▶ Ladders, walking and stepping surfaces are free of objects and obstacles.
- ▶ Step on ladders, walking and stepping surfaces only with sufficiently clear height.
- ▶ Do not trip over attachment parts.
- ▶ Step on ladders, walking and stepping surfaces only with clean shoes.
- ▶ Keep ladders, walking and stepping surfaces free of heavy dirt, snow and ice.
- ▶ Step on the engine cover only when the boom is luffed up and the engine is cold.
- ▶ Used only by persons, observe the maximum point load of 1500 N on the walking and stepping surfaces.
- ▶ It is prohibited to step on the roof of the driver's cab.
- ▶ Stepping on counterweight plates is prohibited.

2.1 Accessible walking and stepping surfaces

Fig.146606: Accessible walking and stepping surfaces

Note
- ▶ Accessible walking and stepping surfaces are marked with these cross hatches.

2.2 Non-accessible surfaces

WARNING
Danger of falling!
If the surfaces are accessed, which are **not** approved for access, personnel can slip and fall down.
Personnel can be killed or injured.
When accessing surfaces, which are **not** approved for access, crane components can be damaged.
- ▶ Only step on accessible walking and stepping surfaces.
- ▶ Access to surfaces, which are **not** approved for access is prohibited.
- ▶ Stepping on surfaces with an incline of more than 20° is prohibited.

Fig.114702: Non-accessible surfaces

Note
- ▶ The surfaces which are **not** approved for access are marked with these cross hatches.

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2.08 Working in low temperatures

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Fig.195219

1 Auxiliary equipment

Without „auxiliary equipment for working at low temperatures“, the crane can be operated and stored at ambient temperatures between -20 °C and +50 °C.

At ambient temperatures below -20 °C , the crane must be modified with „auxiliary equipment for working at low temperatures“.

WARNING
Working at low temperatures without the corresponding auxiliary equipment!
The crane components can be damaged and fail. The load can rip off.
Death or severe bodily injuries.

If the crane is operated at an ambient temperature lower than -20 °C:
- ▶ Make sure that the crane is equipped with the corresponding „auxiliary equipment for working at low temperatures“.
- ▶ Match the operating fluids in time to the ambient temperature.

2 Ambient temperatures below -20 °C

2.1 Winter operation

Low temperatures, such as snow, frost and ice can impair crane operation and cause problems on the crane. Freezing takes place often at low temperatures.

WARNING
Snow and ice on the crane components!
The crane components can be damaged and fail.
Personnel can fall from the accesses!
- ▶ Remove the snow and ice from all accesses, steps and catwalks.
- ▶ Remove the snow and ice from all rope pulleys and winches.
- ▶ Remove the snow and ice from the hose drum and limit switch.
- ▶ Remove the snow and ice from the crane.

WARNING
Snow and ice below the support plates or the crawler carriers!
The crane can slip and fatally injure personnel.
- ▶ Remove the snow and ice on top and below the support plates.
- ▶ Remove the snow and ice on top and below the crawler carrier.
- ▶ Remove the snow and ice from the travel gear.

Prerequisites for start up with the ambient temperature below -20 °C
- – The hose drum and cable are easily movable.
- – All rope pulleys are easily movable.
- – The view from the crane cab is free. The mirrors are free of snow and ice.
- – Fastening equipment is approved for the ambient temperatures present.
- – The load fastening points are approved for the ambient temperatures present.

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2.2 Preheating time

Crane components	Preheating time
Engine preheating up to start at -40 °C ambient temperature	45 minutes
Preheat the hydraulic system in the crane superstructure and the crane chassis	30 minutes
Preheat the crane cab / driver's cab for start up at the same time up to 5 °C	10 minutes
Total preheating time	**75 minutes**

2.3 Engine preheating

If the ambient temperature is lower than -20 °C the chassis engine and / or superstructure engine must be preheated before starting.

Depending on the crane type, a chassis engine and / or a superstructure engine is installed.

The preheating of the chassis engine is described in the Crane operating instructions, chapter 6.01.

The preheating of the superstructure engine is described in the Crane operating instructions, chapter 6.02.

▶ Preheat the chassis engine and / or the superstructure engine.
▶ Start the chassis engine and / or the superstructure engine.

When the chassis engine and / or the superstructure engine has reached its operating temperature:
▶ Turn off engine preheating.

2.4 Preheating the hydraulic oil

If the ambient temperature is lower than -20 °C the hydraulic oil must be preheated prior to crane operation.

NOTICE
Hydraulic oil **not** preheated!
The hydraulic system can be damaged during crane operation.
▶ Preheat the hydraulic oil to at least 20 °C before crane operation.
▶ Retract and extend all the hydraulic cylinders in an unloaded state over the entire stroke multiple times.

WARNING
Persons in the area of the hoist movement!
Personnel can be injured.
▶ Observe the area of the hoist movement.
▶ Make sure that there are **no** persons in the area of the hoist movement.

2.4.1 Turning the hydraulic oil preheating on

Make sure that the following prerequisites are met:
– The engine is running.
– Hydraulic oil preheating is available.

The hydraulic oil preheating is described in the Crane operating instructions, chapter 4.03.

▶ Turn the hydraulic oil preheating on.

When the hydraulic oil is preheated:
▶ Turn the hydraulic oil preheating off.

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2.4.2 Supporting the crane

The supporting of the mobile crane is described in the Crane operating instructions, chapter 3.05.

All support plates must be supported with suitable and stable materials.

If moveable support plates are not available, the support plates must be supported **on one side of the crane** with greased polyamide plates.

WARNING
No movable support plates or crane **not** supported with greased polyamide plates!
The sliding beams can bend. The support plates can suddenly move to the side.
The load can swing and fatally injure personnel.
▶ Use moveable support plates.

If there are no movable support plates available:
▶ Support the support plates **on one side of the crane** with greased polyamide plates.

When supporting the crane, extend the support cylinder a maximum of 50 %.

The wheels must not come in to contact with the ground after the crane is supported.

▶ Support the support plates when necessary.
▶ Support the crane.

2.4.3 Cranes with lattice mast boom

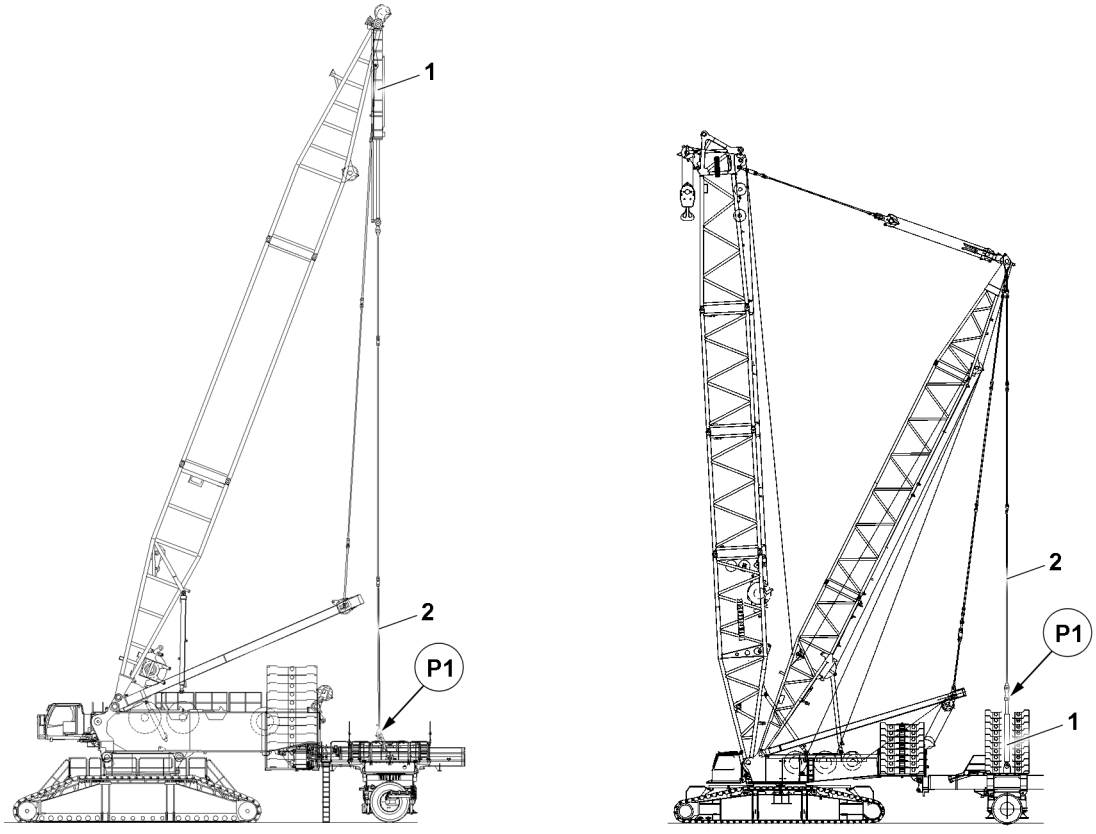

Fig.126875: Removing the guy rods on the derrick ballast

At ambient temperatures of less than -20 °C , the pull cylinders must be preheated by means of retraction and extension. Before the pull cylinders can be preheated, the guy rods **2** must be removed at position **P1** on the derrick ballast.

Disassembly and assembly of the guy rods **2** on the derrick ballast is described in the Crane operating instructions, chapter 5.35 and chapter 5.36.

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▶ Remove the guy rods **2** at position **P1** on the derrick ballast.

NOTICE
Danger of collision!
Damage of the guy rods, derrick ballast or other components.
▶ When retracting and extending the guy rods, avoid contact with other components.

▶ Retract and extend the pull cylinders **1** in an unloaded state over the entire stroke multiple times.

When additional hydraulic cylinders are installed on the crane with lattice mast:
▶ Retract and extend the hydraulic cylinders in an unloaded state over the entire stroke multiple times.

2.4.4 Cranes with telescopic boom

Make sure that the following prerequisites are met:
– The crane is supported and horizontally aligned.
– No load is hanging on the hook

▶ Retract and extend the luffing cylinder in an unloaded state over the entire stroke multiple times.
▶ Retract and extend the telescoping cylinder in an unloaded state over the entire stroke multiple times.

2.5 Assembling / disassembling the crane component

Below an ambient temperature of -20 °C the danger of damage is greater if the crane component is struck during assembly or disassembly. Especially the counterweight is subject to greater danger of damage if struck.

NOTICE
Striking of the crane component during assembly or disassembly!
Crane components can be damaged.
▶ Do **not** strike the crane component during assembly and disassembly
▶ Carry out all work slowly and with utmost caution.

2.6 Reduce rope pull

When working at an ambient temperature below -20 °C Liebherr-Werk Ehingen recommends reducing the rope pull.

The rope pull on the hoist rope can be reduced by increasing the rope reeving.

Note
Increase of rope reeving!
Due to the increased rope reeving, the hoist rope length may not be sufficient for lowering the hook block to the ground.
▶ Pay attention to rope length.

NOTICE
Rope reeving higher than specified in the load chart!
Danger of slack rope formation due to a too low hook block weight. Damage of hoist rope.
▶ Increase the hook block weight accordingly.

▶ Increase the rope reeving specified in the load chart.

2.7 Increase the hook block weight

The calculation of the minimum required hook block weight is described in the load chart.

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Ambient temperature	Increase the hook block weight
-21 °C to -30 °C	Increase the minimum required hook block weight by 10 %.
-31 °C to -40 °C	Increase the minimum required hook block weight by 15 %.

▶ Increase the minimum required hook block weight depending on the ambient temperature. Observe and adhere to the „hook block weight“ charts.

Note
▶ Observe and comply with the permissible hook block weights for erection and take down of the boom systems in the erection and take down charts.

2.8 Crane operation

In case of an ambient temperature below -20 °C , crane operation requires an anticipatory working procedure adapted to the weather conditions.

WARNING
Sudden acceleration and deceleration of crane movements!
Crane components can break.
Death or severe bodily injuries.
▶ Accelerate and decelerate crane movements sensitively and with utmost caution.

2.8.1 Decrease crane utilization

Cranes with lattice mast boom

In the case of cranes with pull cylinders in the derrick ballast guying, if the ambient temperature is between -30 °C and -40 °C the maximum derrick ballast must be reduced. The maximum load is also reduced due to the reduction of the maximum derrick ballast.

Note
▶ Take load reduction into account during job planning.

▶ Reduce the maximum derrick ballast between an ambient temperature of -30 °C and -40 °C by 15 %.

Cranes with telescopic boom

In the case of cranes with a telescopic boom, if the ambient temperature is between -30 °C and -40 °C crane utilization must be reduced.

▶ Reduce the crane utilization at an ambient temperature between -30 °C and -40 °C by 15 %.

3 Maintenance

3.1 Load bearing crane structures

Checking the load bearing crane structure is described in the Crane operating instructions, chapter 8.01.

▶ The load bearing crane structure must be subjected more frequently to a visual inspection.

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3.2 Rope pulleys and hydraulic cylinders

Checking the rope pulleys and the hydraulic cylinders is described in the Crane operating instructions, chapter 8.01.

▶ The rope pulleys and hydraulic cylinders must be subjected more frequently to a visual inspection.

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2.25 Crane on floating body

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Fig.195219

1 Non-destined use

WARNING
Non-destined use!
The boom can break off. The crane can topple over.
Death, severe injuries, property damage.
▶ Only use the crane as designated.
▶ Comply with the operating conditions and notes provided in this chapter.

Liebherr mobile cranes and crawler cranes are **not** designed for special requirements according to „EN 13852-2, Cranes - Offshore Cranes“ or other offshore specifications and regulations.

For a precise definition of **non**-destined use, see the preface to the crane operating instructions.

2 Destined use

Liebherr mobile cranes and crawler cranes are solely designed for assembly work and erection work and can only withstand a limited number of load cycles.

Liebherr mobile cranes and crawler cranes are designed for special characteristics and movements: evenly distributed drive forces, only occasional operation and load conditions according to „EN 13000, Cranes - Mobile Cranes“ and comparable international standards.

For a precise definition of destined use, see the preface to the crane operating instructions.

3 Floating device

The term floating device includes all floating devices such as barges, ships and freight barges.

The floating device must fulfil the requirements for crane operation.

4 Operating conditions

Observe the areas of responsibility:
– The crane contractor and crane operator are responsible for ensuring that the conditions for crane operation at the job site are fulfilled. Consulation of a naval engineer is strongly recommended.
– The correct functional, technical and static interaction between the crane and the floating device is the sole responsibility of the crane contractor and the crane operator. This must be clarified and checked before operating the crane on a floating device.

Observe the following to ensure the safe operation of the crane on floating devices:
– Comply with all country-specific, legal regulations and conditions.
– Perform a risk assessment to ensure safe working conditions.
– Outrigger forces or crawler pressures resulting from crane operation must be safely supported by the steel structure of the floating device.
– Assemble and operate the crane according to manufacturer specifications.
– Comply with the maximum permissible lateral deflection angle between the hoist rope and the rope pulley. The deflection angle consists of the lateral elastic deformation of the boom system, the inclination of the crane supporting surface and a possible diagonal pull on the hoist rope.

  Maximum permissible deflection angle:
  • 2.5° with a hoist rope diameter of less than 23 mm
  • 5° with a hoist rope diameter of 23 mm or more
– The conditions when working on a floating device must correspond with the conditions on land.

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– Lifting and lowering loads in very calm waters and on very calmly moving floating devices corresponds to lifting and lowering loads on land.

4.1 Floating device, supported/jacked up

Observe the following to ensure the safe operation of the crane on supported/jacked up floating devices:
– For crawler cranes, observe the maximum permissible ground inclination of ±0.3° for the crane, see the load charts.
– Supported/jacked up cranes must be horizontally levelled (0°).

4.2 Floating device, non-supported/non-jacked up

Observe the following to ensure the safe operation of the crane on **non**-supported/**non**-jacked up floating devices:
– Crane operation on a floating device is only permissible in very calm waters.
– Crane operation on a floating device is only permissible with a main boom (no derrick operation, no operation with a luffing jib permitted).
– Before the crane is operated on the floating device: The inclination of the floating device in the lateral and longitudinal direction must be calculated in advance. This inclination results from the interaction of the crane with the floating device.
– The inclination of the floating device shall **not** exceed the maximum permissible ground inclination of the crane according to the load chart.
– Comply with the maximum permissible ground inclination according to the load charts:
  • ±0.3° for cranes operating on crawler.
  • 0° for cranes operating on outriggers.
– Load values must be reduced when the above defined inclination values are exceeded.
– Load charts for higher permissible ground inclinations (for example 1°, 2°) can be provided upon request of LWE customers solely for operation with a „main boom“ and with a „main boom + auxiliary jib“.
– LTR 1060, LTR 1100 and LTR 1220 are programmed with load charts that permit operation up to a maximum ground inclination of 4°. The crane’s respective maximum permissible ground inclination depends on the crane’s operating mode.

5 Crane transport on floating devices

Observe the areas of responsibility:
– The crane contractor is solely responsible for transporting the crane on a floating device.
– The crane contractor and crane operator are responsible for the assembly and disassembly of the crane on the floating device.

Observe the following to ensure the safe transport of the crane on floating devices:
– When being „transported on a floating device“, the crane must be secured to prevent the following:
  • Damage to and loosening of crane components
  • Slipping of the crane
  • Inadvertent turning of the superstructure
  • Capsizing of the floating device
– Transport at sea can have a negative impact on the structural strength/stability and the fatigue strength of the crane.

  Ensure that before „transport on a floating device“ the following measures are carried out:
  • Lower the boom and and support it by adequate means.
  • For telescopic cranes: disassemble counterweight plates and secure them on the floating device.
  • For crawler cranes: support slewing platform and counterweight with adequate means and secure to prevent slipping.
  • Observe the instructions for transporting the crane and crane components, see chapter 3.80 of the crane operating instructions.

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6 Increased corrosion

Extremely salty air in a maritime environment can cause increased corrosion to the crane.

Increased corrosion can cause premature damage of components (for example the hydraulic cylinder, wire ropes, electrical and electronic components, driver's cab).

Submerging the hook block in water causes damage to the hook block and the rope.

Crane contractor and crane operator are solely responsible for avoiding increased corrosion.

Measures to avoid corrosion:
- Avoid direct contact of the crane and its components with salt water.
- Do **not** submerge the hook block in water.

Measures to recognize premature damage:
- Have the crane checked regularly and extensively by a qualified person.

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3 Operation of crane chassis

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3.01 Operating and monitoring instruments on the crane chassis

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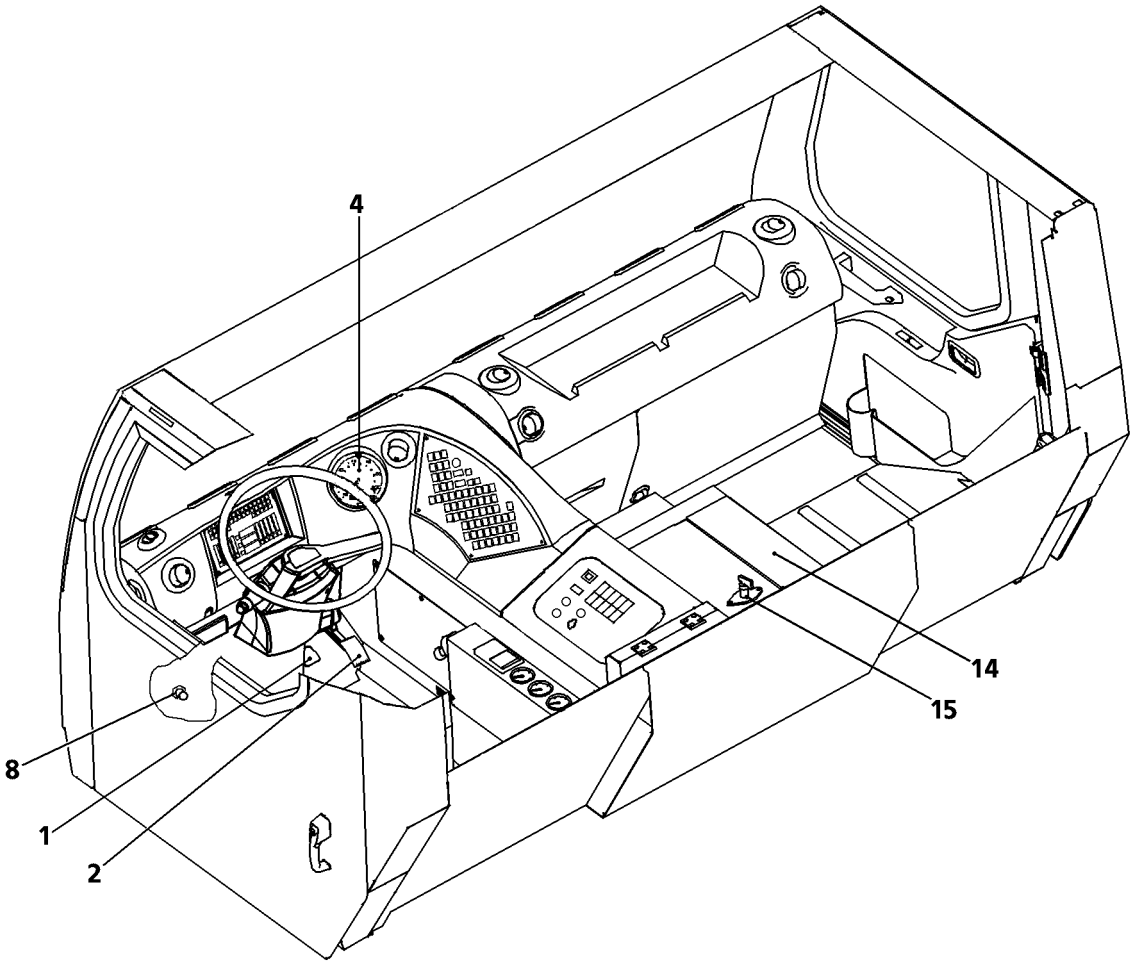

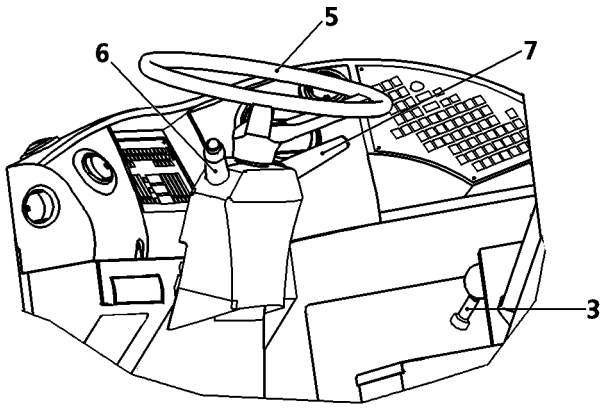

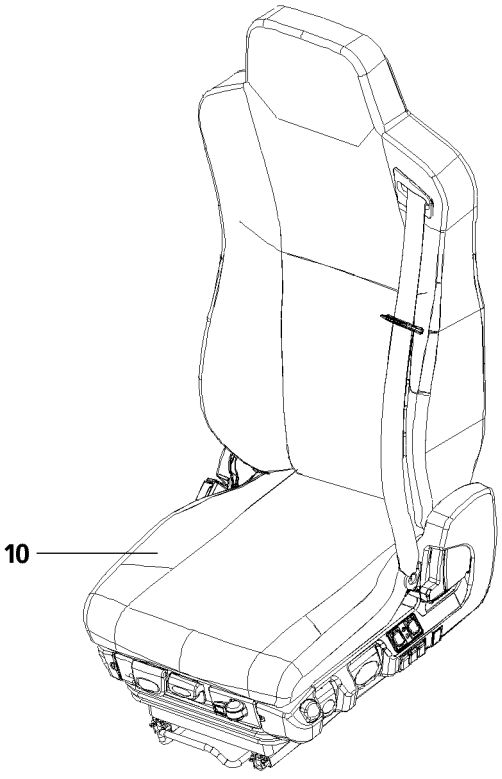

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Fig.116600

1 General operating elements

1 Service brake

2 Engine regulation

3 Parking brake

4 Tachograph
Speedometer
Odometer
Clock

5 Steering wheel

6 Left steering column switch
- Switch from low beam to high beam
- Operate the headlight flasher
- Operate the blinker (left / right)
- Operate the windshield wiper (0, intermittent, I, II)
- Operate the windshield washer system
- Operate the horn

7 Right steering column switch
- Retarder:
  Switch position 0, 1
  Switch position 2 to 5 (with eddy current brake*)
- Tempomat
- Temposet
- Manual throttle
- Shift 1 gear up or down with manual transmission

8 Foot button
- Pneumatic release for steering wheel incline and height adjustment

10 Driver's seat
Note:
For a description of „Adjusting the driver's seat", see Crane operating instructions, chapter 3.02.

14 Battery box

15 Battery master switch

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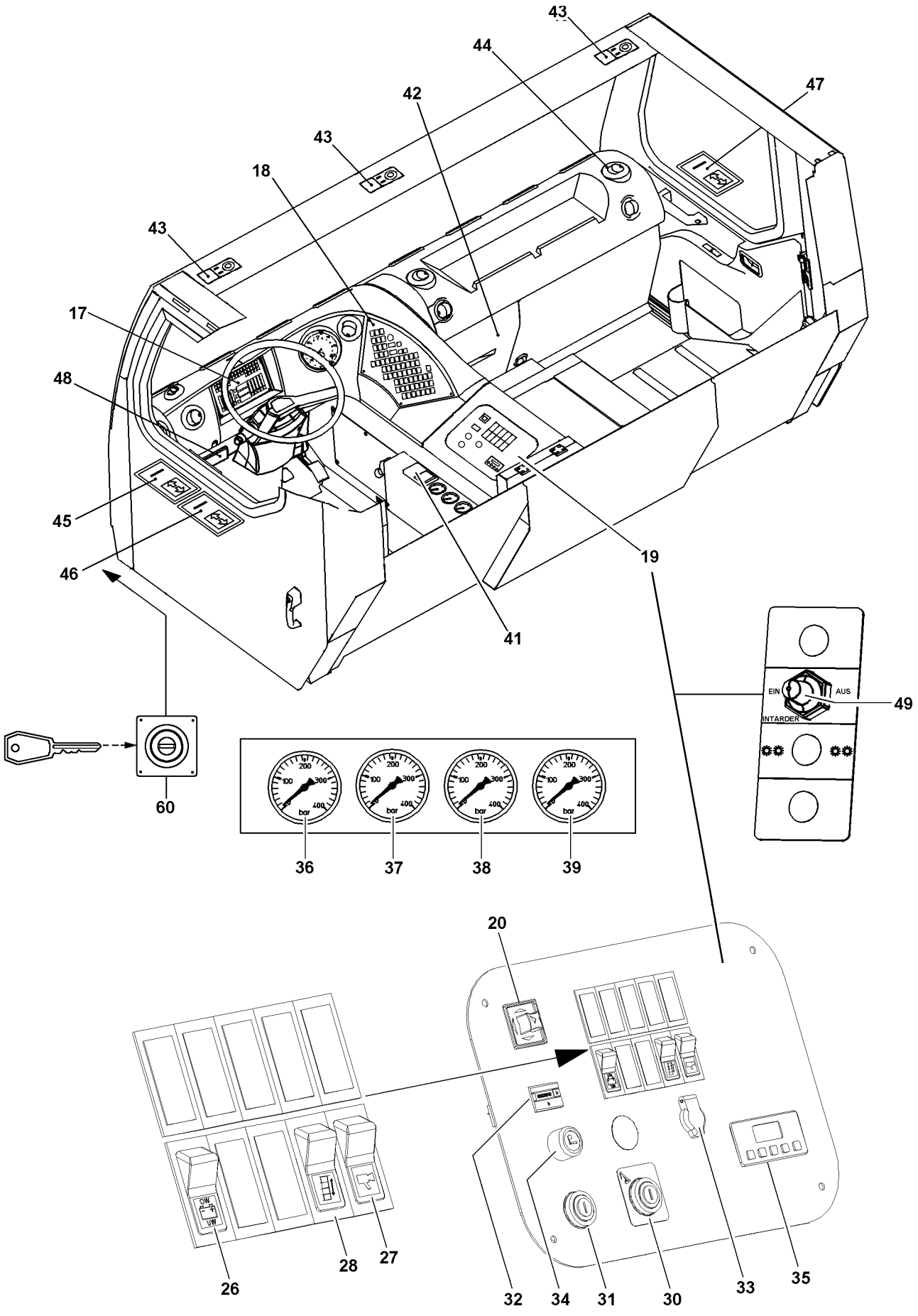

Fig.112378

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17 Display unit

18 Keyboard
- **The function control on the button lights up:** Function has been selected and carried out
- **The function control on the button blinks:** Function has been selected but not carried out
- **Acoustic signal (beep) sounds when button is pressed:** Impermissible function has been selected

19 Center console

20 Switch, button
- Switch: Switch between right / left outside mirror
- Button: Electric mirror adjustment

26 Switch*
- Change over battery charger
  - Chassis (UW)
  - Superstructure (OW)

27 Switch*
- Camera cleaning

28 Switch
- Access ladder
  - Access ladder UP
  - Access ladder DOWN

30 Ignition switch engine crane superstructure

Position:
- P = Ignition key can be pulled off
- 0 = Ignition key can be pulled off
- I = Ignition on
- II = Start the engine

31 Ignition switch engine crane chassis

Position:
- P = Ignition key can be pulled off
- 0 = Ignition key can be pulled off
- I = Ignition on
- II = Start the engine

32 Operating hour meter

33 Integrated socket 24 V

34 Cigarette lighter

35 Timer*
- Auxiliary heater / engine preheating

36 Axle pressure indicator
- Axles 1 and 2, left side
- Axles 1 to 4, left side, with axle pressure compensation

37 Axle pressure indicator
- Axles 1 and 2, right side
- Axles 1 to 4, right side, with axle pressure compensation

38 Axle pressure indicator
- Axles 7 to 8, left side
- Axles 5 to 8, left side with axle pressure compensation

39 Axle pressure indicator
- Axles 7 to 8, right side
- Axles 5 to 8, right side with axle pressure compensation

41 Ashtray

42 Reservoir
- Windshield washer fluid

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43 Interior lighting

44 Outlet nozzles
- For heat / ventilation / Climate control system*

45 Switch
- Left power window lift

46 Switch
- Right power window lift

47 Switch
- Right power window lift

48 Trip recorder

49 Switch
- Turn Intarder off
  Note:
  The switch **49** is under the center console.

60 EMERGENCY OFF switch*

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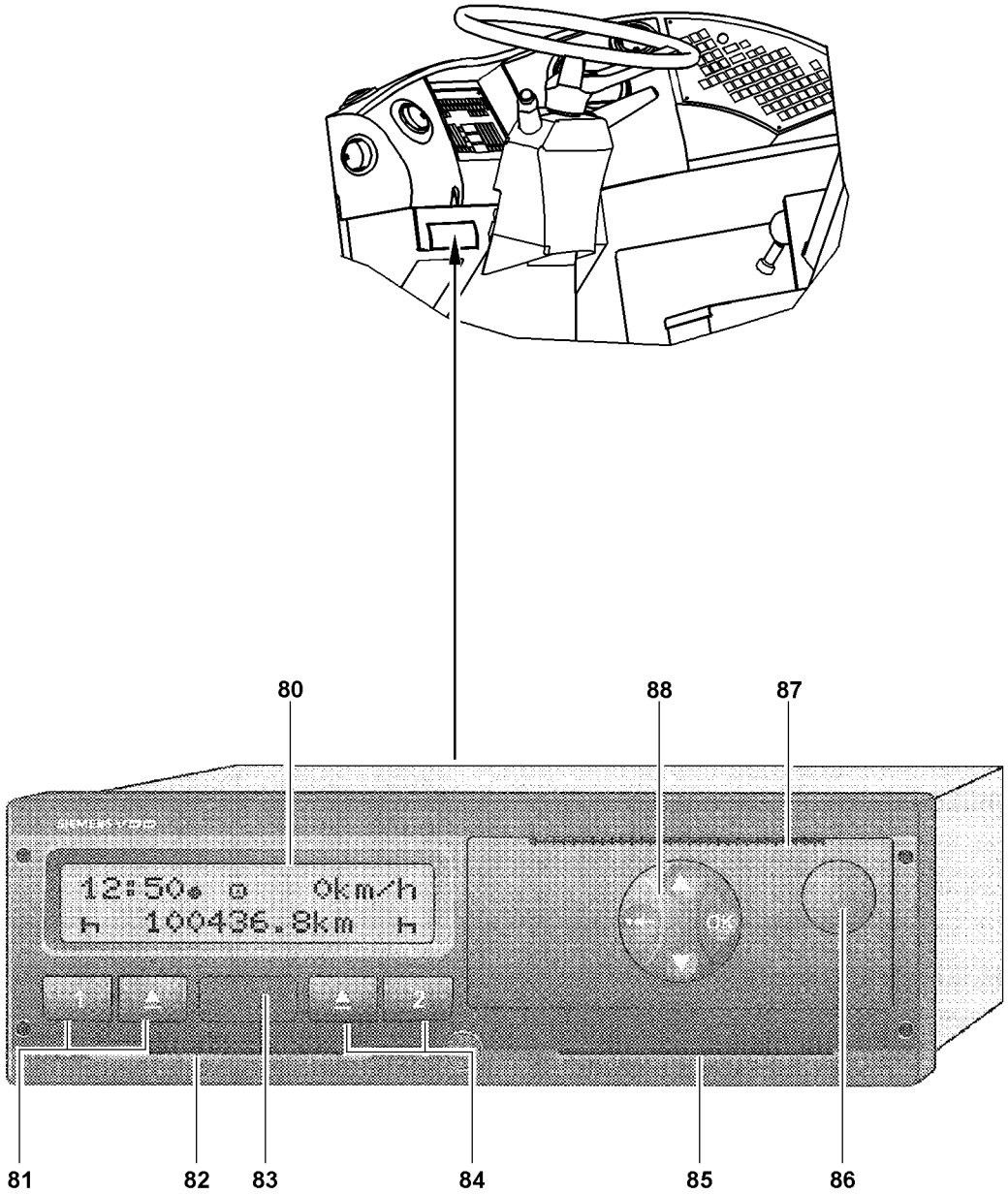

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Fig.104055

2 Operating elements DTCO trip recorder*

80 Display

81 Keypad, driver-1
- Activity button for driver-1
- Discharge button card slot-1

82 Card slot-1

83 Download interface / calibrate interface

84 Keypad, driver-2
- Activity button for driver-2
- Discharge button card slot-2

85 Card slot-2

86 Release button printer drawer

87 Tear-off edge

88 Menu keys

Note

▶ For detailed description of the DTCO trip recorder, refer to the supplied manufacturer's operating instructions.

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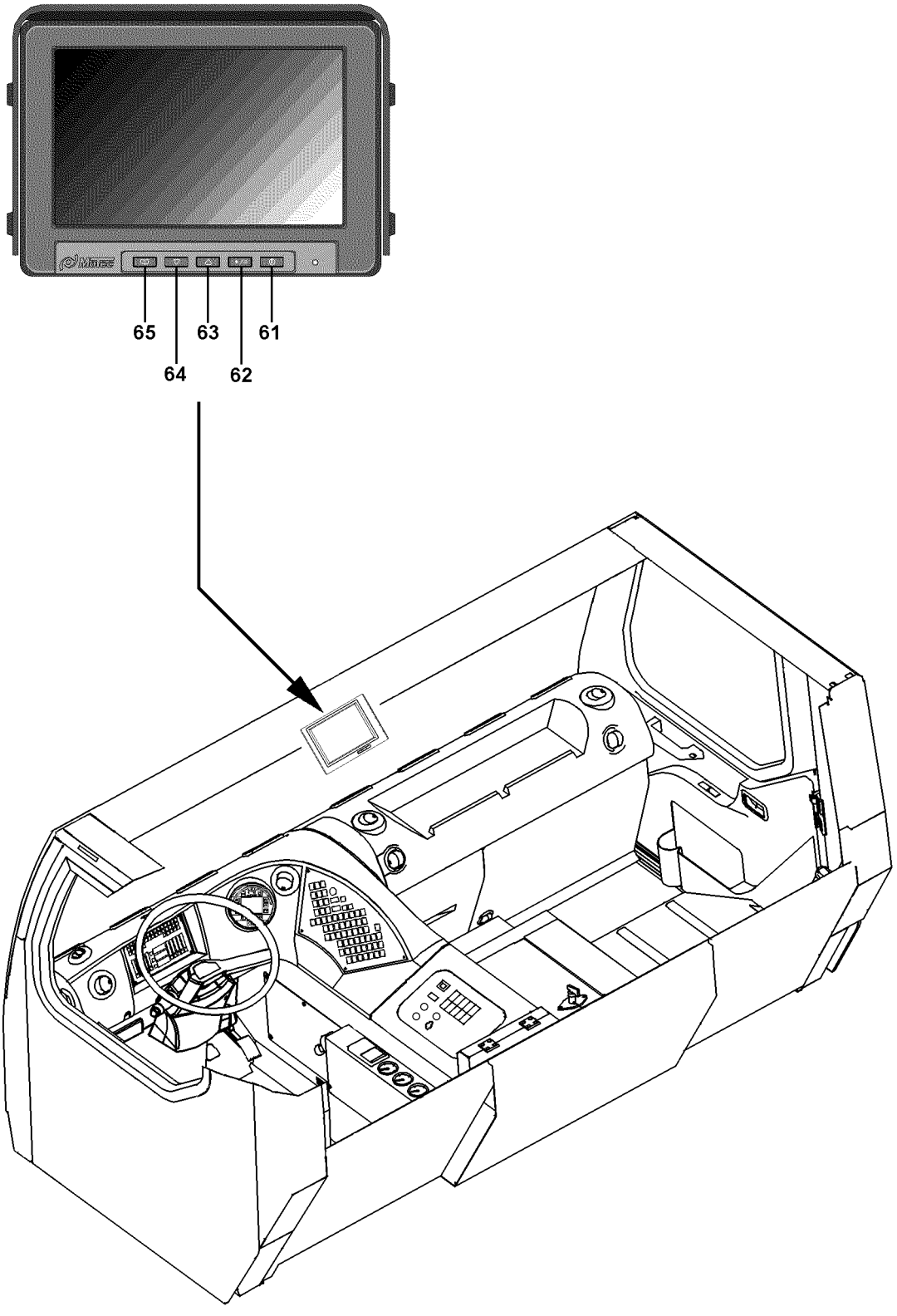

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Fig.107909

3 Operating elements camera monitoring*

61 Button
- Monitor On / Off

62 Button „Change between day / night“
- Press the button „Change over day / night“ to match the brightness of the display to the time of day.

63 „Plus“ key
- By pressing the „Plus“ key, the value of a setting is increased.

64 „Minus“ key
- By pressing the „Minus“ key, the value of a setting is reduced.

65 Button menu
- By pressing the „Menu“ button, menus for various adjustments are called up and changed over, in the following order:
  – Color: Adjustment of color saturation
  – Brightness: Brightness adjustment
  – Contrast: Contrast adjustment
  – Volume: Volume adjustment
  – Language: Language adjustment (English, French, German, Spanish, Italian, Portuguese)
  – Standard: Reset to default settings

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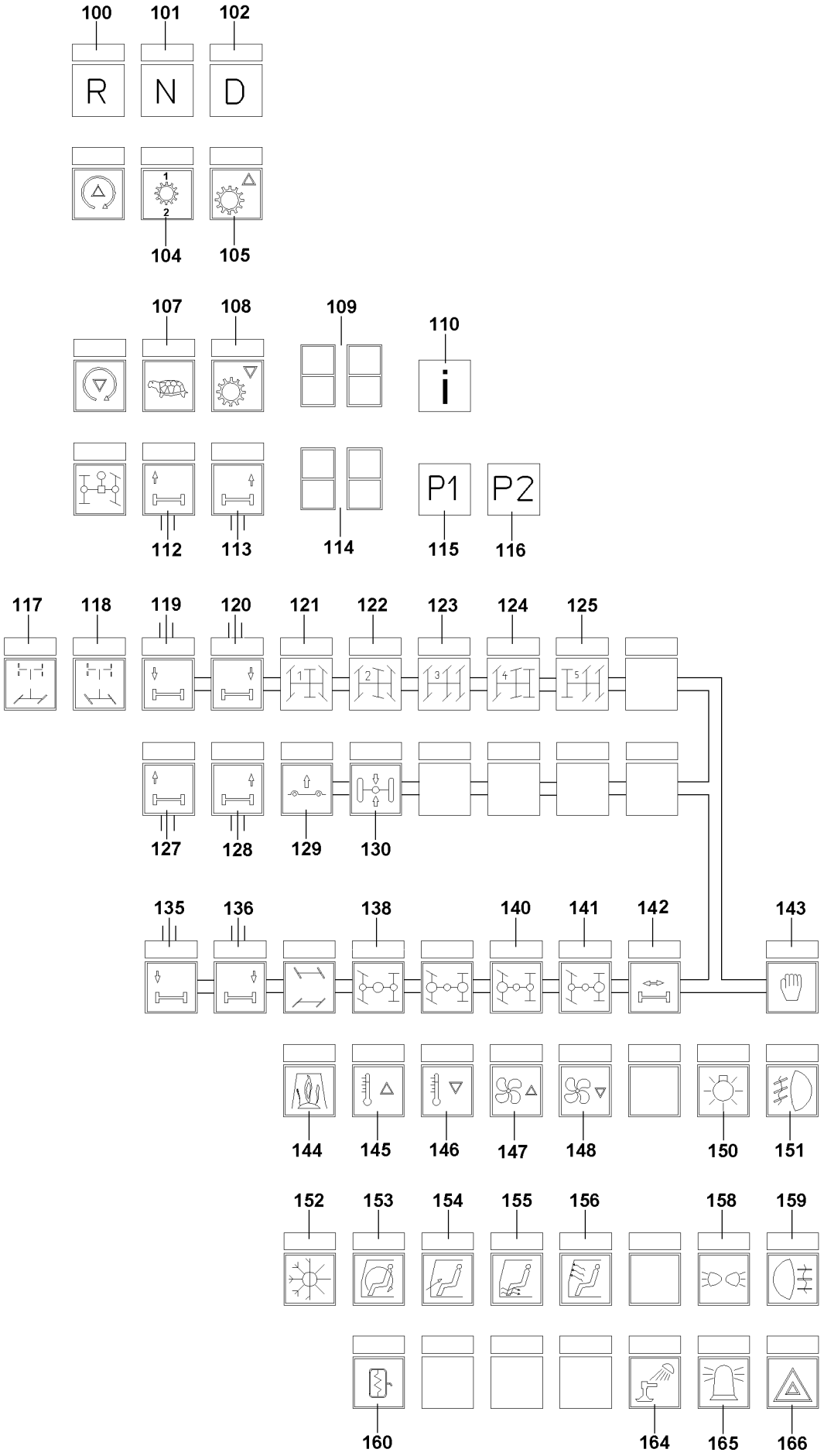

Fig.117567

4 Keyboard

100 Travel range switch
- Reverse „R“

101 Travel range switch
- Neutral „N“

102 Travel range switch
- Drive forward „D“

104 Button
- Shift, automatic / manual shift mode
  Function indicator light does not light up: Automatic shift mode
  Function indicator light lights up: Manual shift mode

105 Button
- Shift up 1 gear in manual shift mode

107 Button
- Enabling the maneuvering mode
  Function indicator light lights up: Maneuvering mode is added
  Function indicator light does not light up: Maneuvering mode is turned off
  Function control blinks: Error
  Function control blinks rapidly: Distributor gear switched to freewheel, button **50** pressed.

108 Button
- Shift down 1 gear in manual shift mode

109 Display
- Function code

110 Button
- Analog display of engine oil
  Note:
  When pressing the button **110**, the display **221** shows how much engine oil must be added or drained.
- Analog display of active system errors or service note
  Note:
  When pressing the button **110**, the active system error or service note is shown on the display **225**.

112 2-hand button
- Vehicle level, raise left front

113 2-hand button
- Vehicle level, raise right front

114 Display
- Heater stage, brightness stage

115 Button
- Display and keyboard brightness adjustment

116 Button
- Diagnostics

117 Button
- Independent rear axle steering, steering deflection to the right

118 Button
- Independent rear axle steering, steering deflection to the left

119 2-hand button
- Vehicle level, lower left front

120 2-hand button
- Vehicle level, lower right front

121 2-hand button
- Add „On road driving“ steering program

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122 2-hand button
- Add „All-wheel steering“ steering program

123 2-hand button
- Add „Crabwalk steering“ steering program

124 2-hand button
- Add „Reduced sheer out dimension“ steering program

125 2-hand button
- Add „Independent steering“ steering program

127 2-hand button
- Vehicle level, raise left rear

128 2-hand button
- Vehicle level, raise right rear

129 2-hand button
- Automatic level regulation for on-road driving

130 2-hand button
- Block the axle suspension

135 2-hand button
- Vehicle level, lower left rear

136 2-hand button
- Vehicle level, lower right rear

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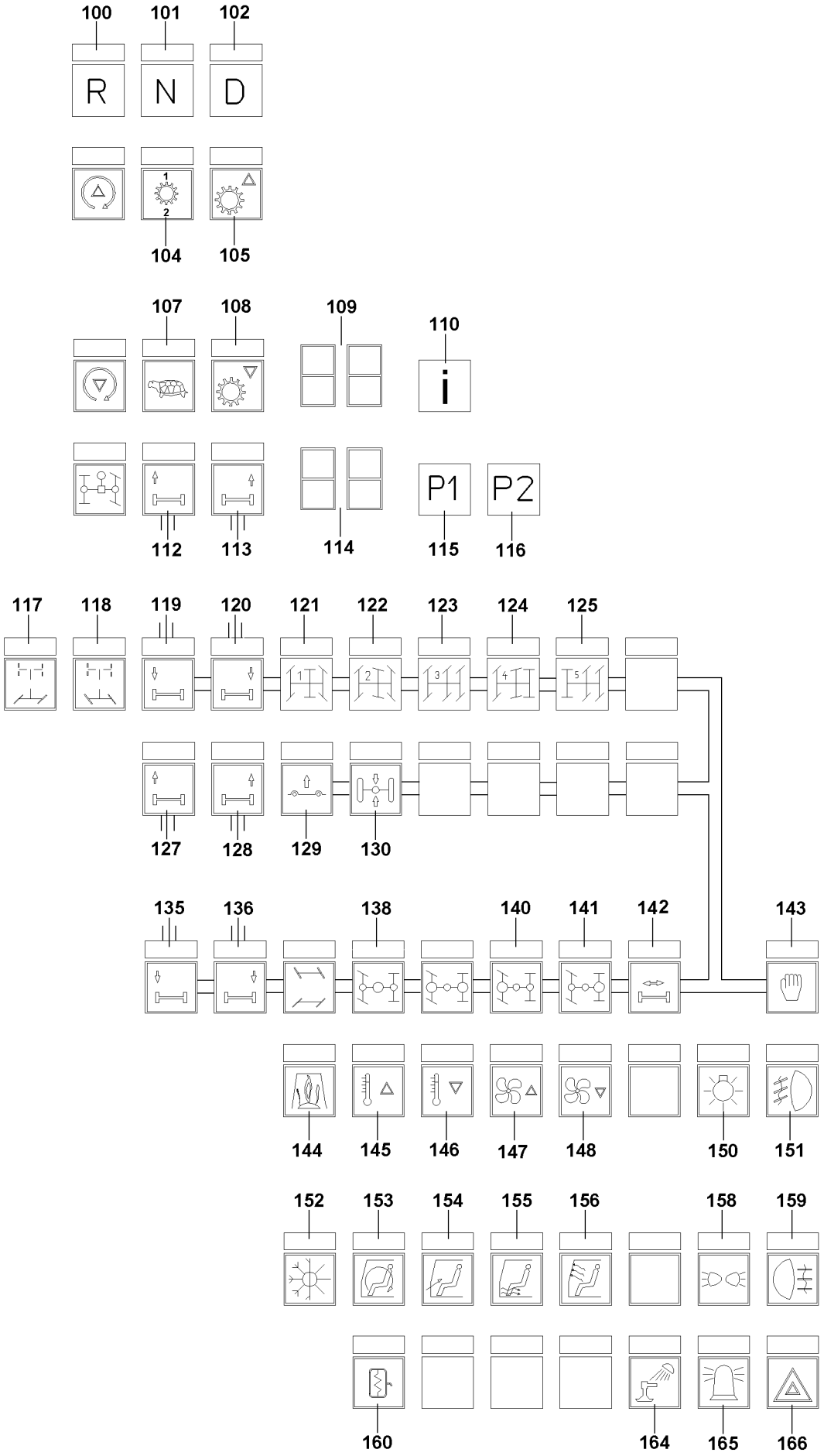

Fig.117567

138 2-hand button
- Longitudinal differential lock in distributor gear

140 2-hand button
- Addition of longitudinal differential lock axle 2 + axle 4

141 2-hand button
- Add transverse differential lock axle 4 + axle 6

142 2-hand button
- Axle pressure compensation one to four and five to eight

143 2-hand button
- Confirmation for 2-hand operation
  Note:
  The „2-hand button“ must be operated for:
  Vehicle level regulation
  Enable steering programs
  Enable differential locks
  Block the axle suspension

144 Button*
- Turn the auxiliary heater on / off

145 Button
- Driver’s cab heat warmer

146 Button
- Driver’s cab heat cooler

147 Button
- Fan speed (blower), faster

148 Button
- Fan speed (blower), slower

150 Button
- Headlight

151 Button*
- Fog lights

152 Button*
- Climate control system

153 Button
- Recirculating air

154 Button
- Fresh air

155 Button
- Air supply floorboard area

156 Button
- Air supply front windshield

158 Button
- Parking lights

159 Button
- Rear fog light

160 Button*
- Outside mirror heater

164 Button
- Sliding beam illumination, turn on / off manually

165 Button
- Rotating beacons

166 Button
- Hazard warning system

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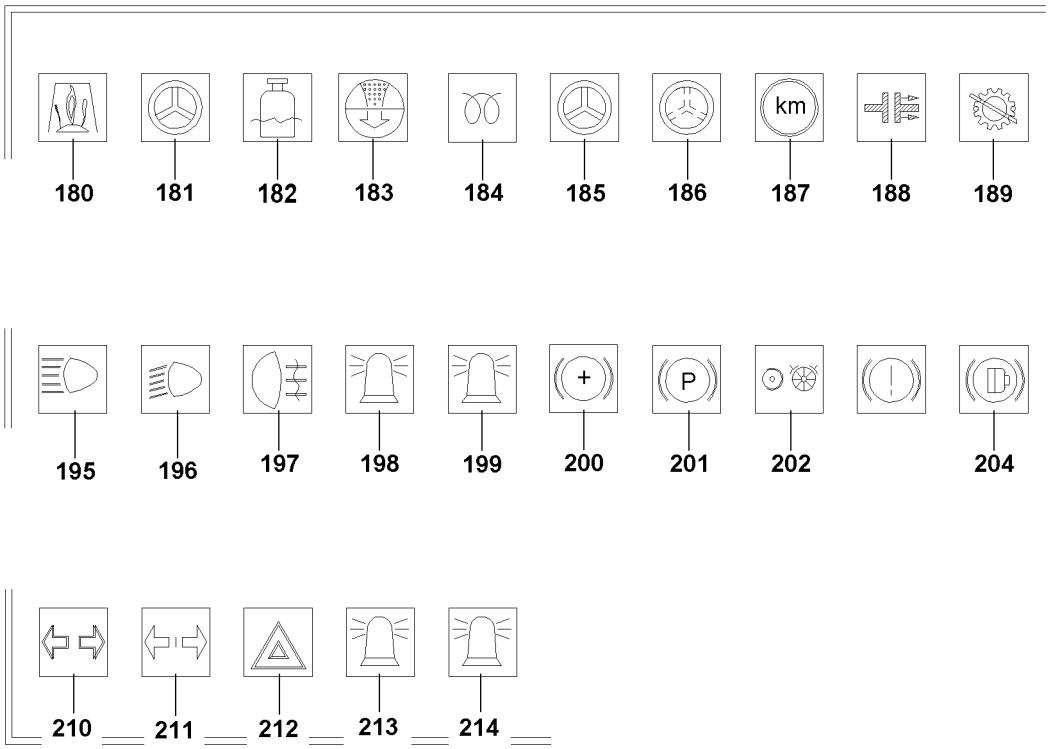

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Fig.116595

5 Display unit

180 Indicator light*
- Auxiliary heater
  Blinks: In case of a problem

181 Indicator light
- Steering
  Lights up: Steering operational
  Blinks fast: Error in steering system, with error code display
  Blinks slowly: LSB bus connection defective

182 Warning light
- Engine coolant level too low

183 Indicator light
- Air filter is dirty

184 Indicator light
- Diesel engine preglow system

185 Warning light
- Steering circuit (engine driven)

186 Warning light
- Steering circuit (wheel driven)

187 Warning light
- Speed limiter

188 Indicator light
- Torque converter clutch open
  Lights up: Torque converter clutch open
  Off: Torque converter clutch closed
  Blinks: CAN bus connection defective or oil temperature in the torque converter clutch is too high

189 Warning light
- Transmission error

191 Indicator light*
- Automatic brake force reduction

195 Indicator light
- High beam

196 Indicator light
- Low beam

197 Indicator light
- Rear fog light

198 Indicator light*
- Rotating beacon

199 Indicator light*
- Rotating beacon

200 Indicator light
- Engine brake active

201 Indicator light
- Parking brake applied

202 Indicator light
- Eddy current brake active

204 Warning light
- Brake pads worn

205 Warning light
- Request engine stop
  Note:
  If a warning occurrence is present, the warning light **205** lights up or blinks.

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If required: Turn the engine off!
Pay attention to system errors and remedy the cause of errors immediately.

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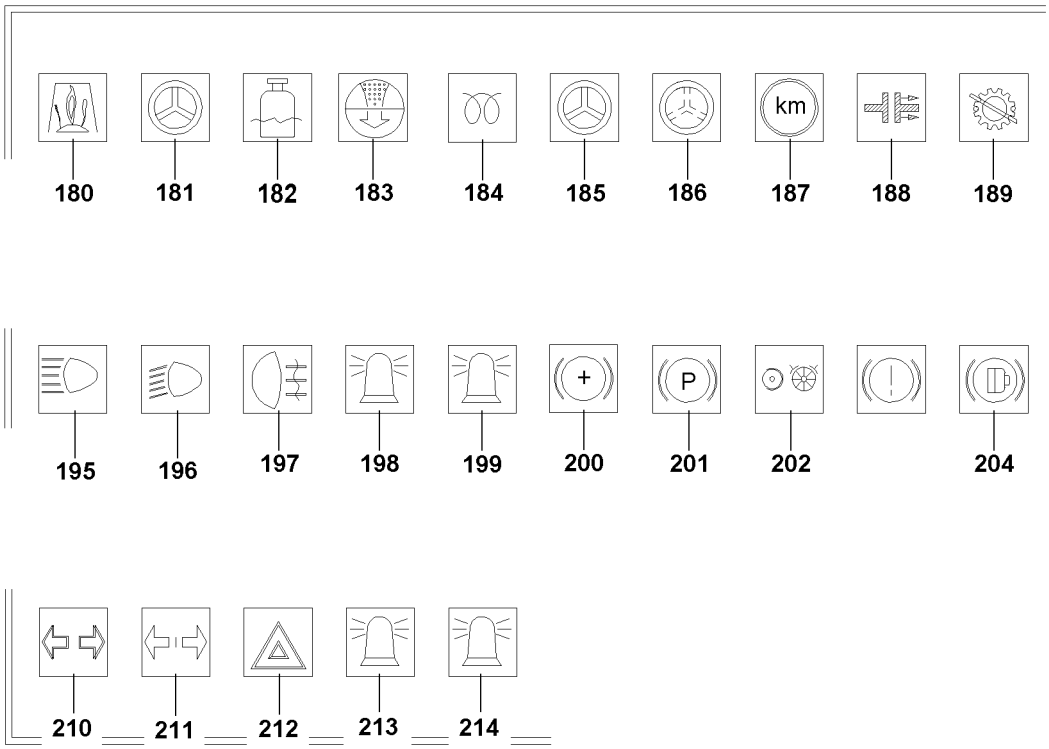

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Fig.116595

207 Indicator light*
- ABS on trailer
  ABS Antilock Brake System
  Lights up: ABS error
  Blinks: Communication error between ABS vehicle electronics
  At a travel speed in trailer mode of more than approx. 10 km/h , this warning light must turn off.

208 Indicator light
- CAN bus error

210 Display
- Driving direction vehicle left / right

211 Display*
- Driving direction of trailer left / right

212 Warning light
- Hazard warning system

213 Indicator light
- Rotating beacon

214 Indicator light
- Rotating beacon

217 Indicator light
- Exhaust aftertreatment (only for Diesel engine with exhaust aftertreatment system SCR)
- **Lights up yellow:**Advance warning: Exhaust aftertreatment
- **Blinks yellow:**Warning: Exhaust aftertreatment is no longer ensured

WARNING
Insufficient Urea in the Urea reservoir or faulty function in the SCR-exhaust aftertreatment system!
Due to insufficient Urea level or faulty function in the SCR-system, a reduction in engine power can be activated by the engine control or a start block of the engine can be triggered!
The crane can significantly obstruct traffic!
Crane and travel operation can be limited!
- ▶ Add missing Urea in the Urea reservoir in time!
- ▶ Remedy faulty function in the SCR-system immediately!
- ▶ Observe the national / regional regulations valid on the job site!

Note
- ▶ The type and scope of a power reduction of the engine depends on the respectively valid national / regional regulations. The engine can possible not be started any longer (start block).

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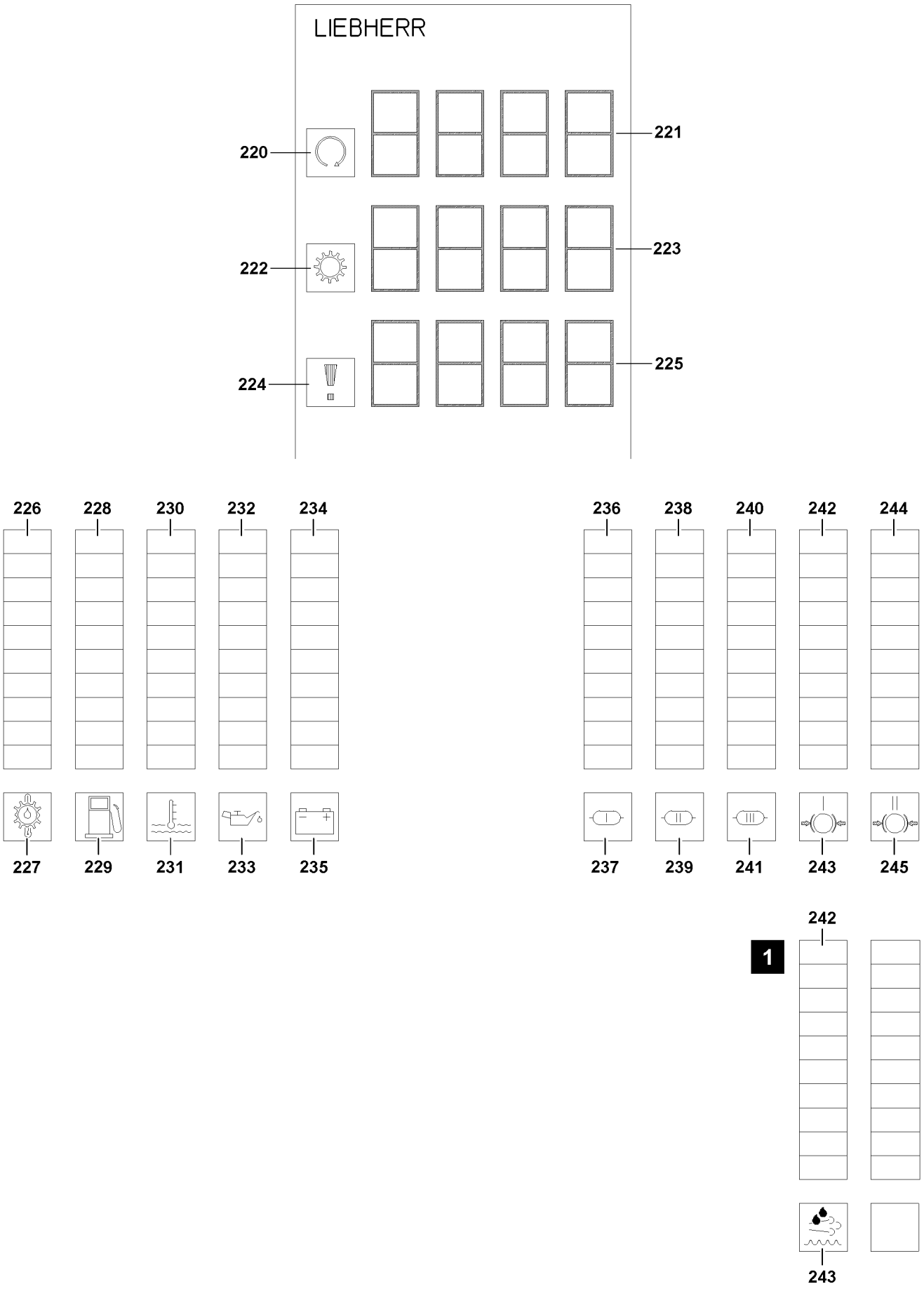

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Fig.116594

220 Indicator light
- Tempomat or Temposet active

221 Display
- Engine rpm
  or
- Analog display of engine oil
  Note:
  When pressing the button **110**, the display **225** shows how much engine oil must be added or drained.
  Example:
  If -1.0 is shown, then 1 l of engine oil must be drained.
  If +1.5 is shown, then 1.5 l of engine oil must be added.

222 Display
- Transmission in neutral „N“

223 Display
- Gear indicator
  Note:
  Brief display of Tempomat and Temposet speed settings

224 Warning light
- **Blinks:** Active system error or service note
  Pressing the „i-key“ **110** causes the system error or service note to appear on the display **225**.
- **Lights up:** Active operating error
  Operating error appears automatically on display **225**.

225 Display
- LICCON Error Code (LEC) with pressed „i-key“.

226 Bargraph
- Gear oil temperature, 50 °C to 140 °C

227 Warning light
- Gear oil temperature too high

228 Bargraph
- Fuel reserve, 0 % to 100 %

229 Warning light
- Fuel reserve less than 10%

230 Bargraph
- Coolant temperature engine, 30 °C to 120 °C

231 Warning light
- Engine coolant temperature or charge air temperature too high or engine error

232 Bargraph
- Engine oil pressure, 0 bar to 10 bar

233 Warning light
- Oil pressure too low / oil temperature too high

234 Bargraph
- Battery voltage, 21 V to 30 V

235 Warning light
- Charge monitoring

236 Bargraph
- Compressed air supply in brake circuit I 0 bar to 10 bar

237 Warning light
- Compressed air supply in brake circuit I less than 5.5 bar

238 Bargraph
- Compressed air supply in brake circuit II 0 bar to 10 bar

239 Warning light
- Compressed air supply in brake circuit II less than 5.5 bar

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240 Bargraph
- Compressed air supply in brake circuit III 0 bar to 10 bar

241 Warning light
- Compressed air supply in brake circuit III less than 5.5 bar

Note

▶ The bargraphs (Bargraph **242** and Bargraph **244**) for the brake pressures and the warning lights (warning light **243** and warning light **245**) for the respective brake pressure sensors are only available for engines, which are **not** equipped with an SCR exhaust aftertreatment system!

242 Bargraph*****
- Current brake pressure with actuated brake circuit I, 0 bar to 10 bar

243 Warning light*****
- **Blinks:** Brake pressure sensor in circuit I defective

244 Bargraph*****
- Current brake pressure with actuated brake circuit II, 0 bar to 10 bar

245 Warning light*****
- **Blinks:** Brake pressure sensor in circuit II defective

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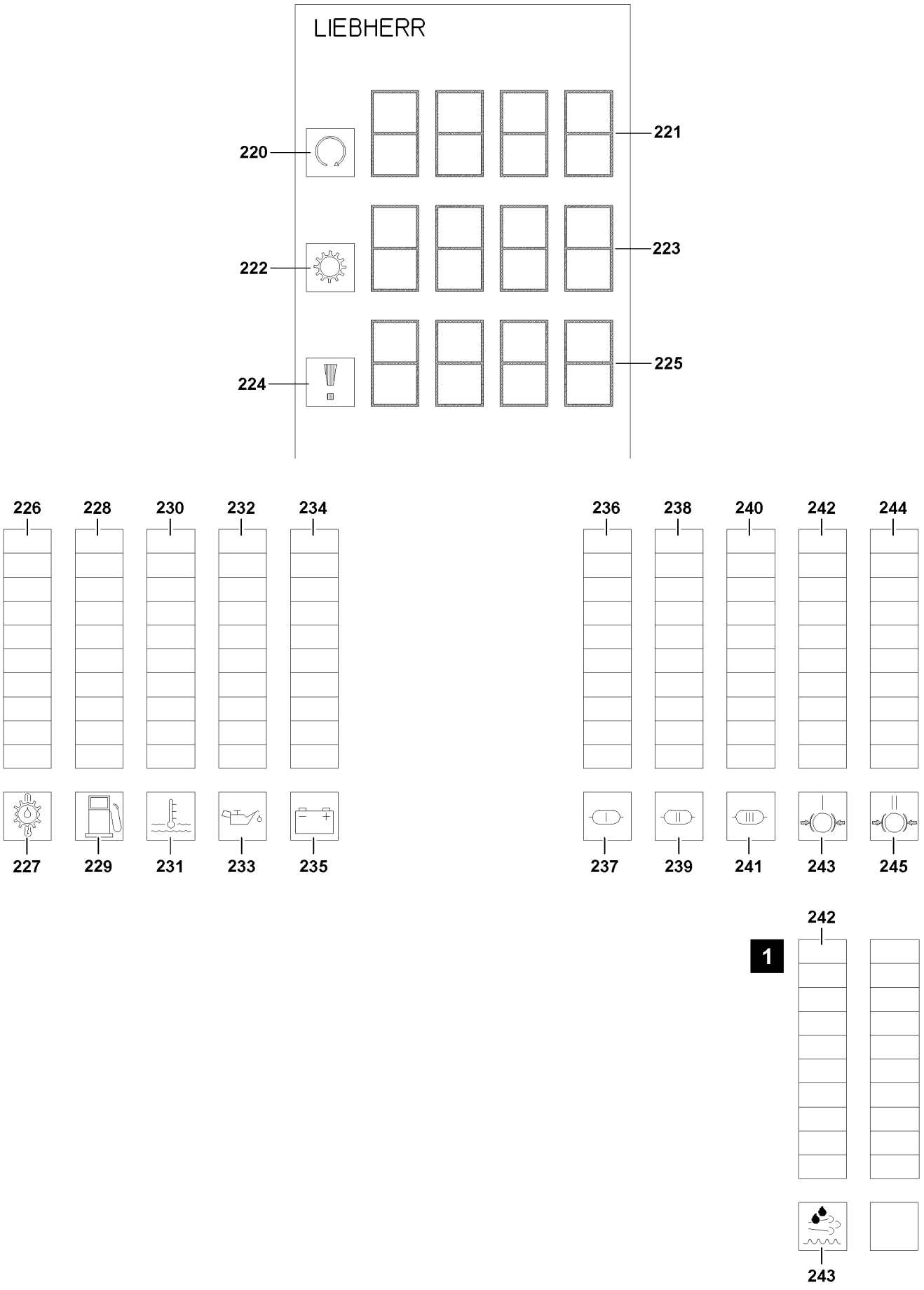

Fig.116594

Note

▶ The bargraph **242** for the urea reserve and the warning light **243** urea are only available on engines, which are equipped with a SCR exhaust aftertreatment system!

242 Bargraph*
- Urea reserve, 0 % to 100 %

243 Indicator light*
- See illustration **1**.
- Urea tank
  - Indicator light off: Urea available
  - Indicator light on statically: Urea is getting low or faulty function of the exhaust aftertreatment
  - The indicator light blinks: Urea almost empty or faulty function of the exhaust aftertreatment

WARNING

Insufficient Urea in the Urea reservoir or faulty function in the SCR-exhaust aftertreatment system!
Due to insufficient Urea level or faulty function in the SCR-system, a reduction in engine power can be activated by the engine control or a start block of the engine can be triggered!
The crane can significantly obstruct traffic!
Crane and travel operation can be limited!

▶ Add missing Urea in the Urea reservoir in time!
▶ Remedy faulty function in the SCR-system immediately!
▶ Observe the national / regional regulations valid on the job site!

Note

▶ The type and scope of a power reduction of the engine depends on the respectively valid national / regional regulations. The engine can possible not be started any longer (start block).

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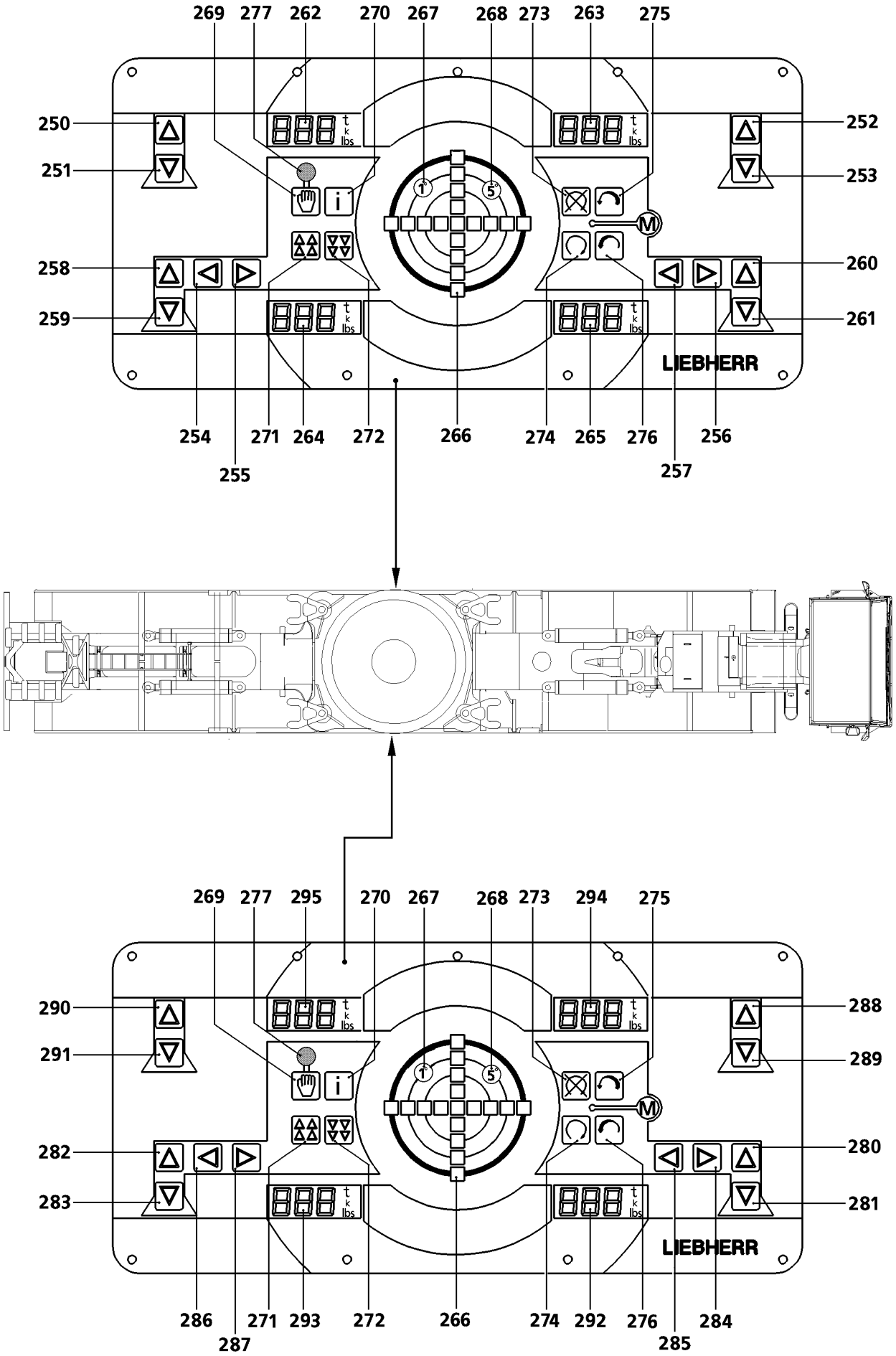

Fig.196112

6 Support control unit

6.1 Left support control unit

250 Button
- Retract right front support cylinder

251 Button
- Extend right front support cylinder

252 Button
- Retract right rear support cylinder

253 Button
- Extend right rear support cylinder

254 Button
- Extend left front sliding beam

255 Button
- Retract left front sliding beam

256 Button
- Extend left rear sliding beam

257 Button
- Retract left rear sliding beam

258 Button
- Retract left front support cylinder

259 Button
- Extend left front support cylinder

260 Button
- Retract left rear support cylinder

261 Button
- Extend left rear support cylinder

262 Display
- Right front support force display

263 Display
- Right rear support force display

264 Display
- Left front support force display

265 Display
- Left rear support force display

266 Display
- Incline indicator

267 LED 1°

268 LED 5°

269 Button
- Support control unit release
  Note:
  Before the support cylinders or the sliding beams can be moved, first the support control unit release **269** must be operated.

271 Button
- Retract all support cylinders and align horizontally

272 Button
- Extend all support cylinders and align horizontally

273 Button
- Engine off

274 Button
- Engine on

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275 Button
- Reduce engine rpm

276 Button
- Increase engine rpm

277 LED
- Lights up when support control unit is released

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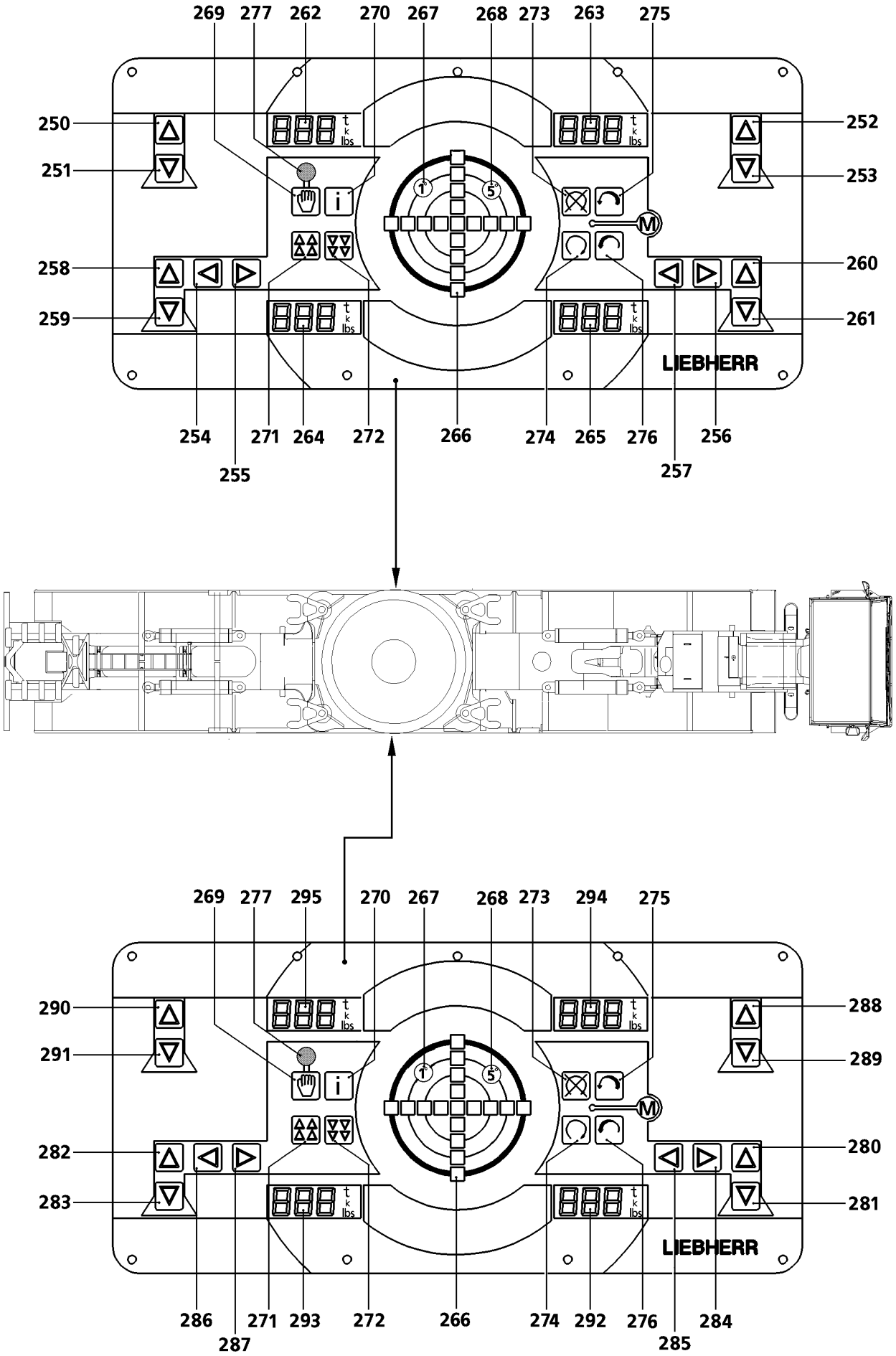

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Fig.196112

6.2 Right support control unit

266 Display
- Incline indicator

267 LED 1°

268 LED 5°

269 Button
- Support control unit release
  Note:
  Before the support cylinders or the sliding beams can be moved, first the support control unit release **269** must be operated.

271 Button
- Retract all support cylinders and align horizontally

272 Button
- Extend all support cylinders and align horizontally

273 Button
- Engine off

274 Button
- Engine on

275 Button
- Reduce engine rpm

276 Button
- Increase engine rpm

277 LED
- Lights up when support control unit is released

280 Button
- Retract right front support cylinder

281 Button
- Extend right front support cylinder

282 Button
- Retract right rear support cylinder

283 Button
- Extend right rear support cylinder

284 Button
- Extend right front sliding beam

285 Button
- Retract right front sliding beam

286 Button
- Extend right rear sliding beam

287 Button
- Retract right rear sliding beam

288 Button
- Retract left front support cylinder

289 Button
- Extend left front support cylinder

290 Button
- Retract left rear support cylinder

291 Button
- Extend left rear support cylinder

292 Display
- Right front support force display

293 Display
- Right rear support force display

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294 Display
- Left front support force display

295 Display
- Left rear support force display

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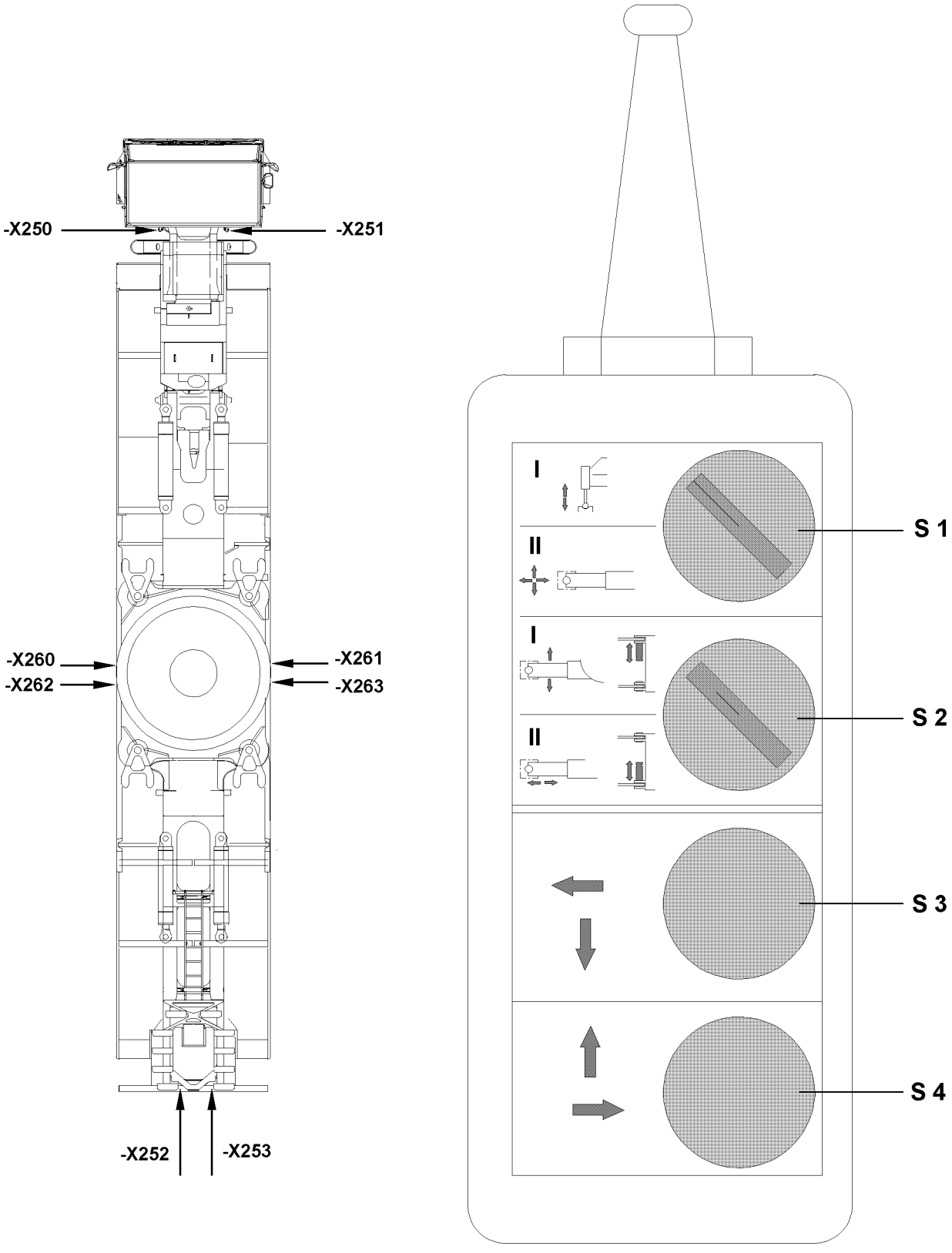

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Fig.196250

7 Remote control panel

Note
▶ Operate remote control panel, see Crane operating instructions, chapter 3.05!

7.1 Remote control panel connected on sockets -X250 to -X253

S1 Switch
- Position I: Select support cylinder function
- Position II: Select sliding beam / support beam function

S2 Switch
- Position I: Select support beam swing in / swing out function
- Position II: Select retract / extend sliding beam function

S3 Button
- Extend sliding beam / swing out support beam / extend support cylinder
- Position II: Select retract / extend sliding beam function

S4 Button
- Retract sliding beam / swing in support beam / extend support cylinder
- Position II: Select retract / extend sliding beam function

7.2 Remote control panel connected on sockets -X260 to -X263

S1 Switch
- Position I: No function
- Position II: Function pinning free

S2 Switch
- Position I: Select pin / unpin support beam „on top“ function
- Position II: Select pin / unpin support beam „on the bottom“ function

S3 Button
- Unpin support beam on top / on the bottom

S4 Button
- Pin support beam on top / on the bottom

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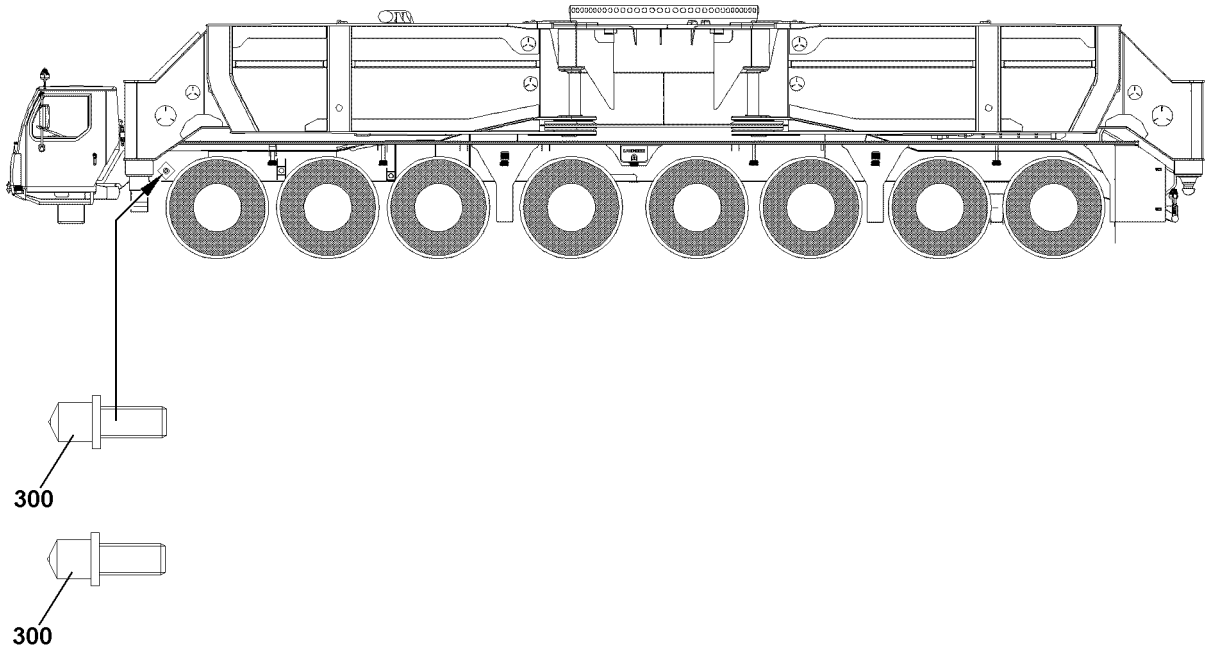

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Fig.108311

8 Grounding the mobile crane

Note

▶ To be able to ground the mobile crane, the pins **300** for the ground connection are installed!

▶ To ground the mobile crane, see Crane operating instructions, chapter 2.04!

300 Pin
- Ground connection

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3.02 Before starting to travel

LWE/LG 1750-006/15409-07-02/en

Fig.195219

1 General checks before starting to drive

Before every operation, various checks must be performed on the crane.

WARNING
Operating safety of the crane!
Defects on components, missing quantities or dirty filters affect the operating safety of the crane!
- ▶ If a defect on a component is found during the check, the defect must be remedied before operating the crane.
- ▶ If an item is low or lacking during an inspection, then it must be refilled or brought to normal status before operating the crane.
- ▶ If the inspection shows a very dirty filter, then it must be replaced before operating the crane.

WARNING
Heated crane components!
When the engine is running, crane components can heat up significantly!
This applies especially to exhaust systems, the engines, the coolant circuits and the respective gears in the crane chassis and in the crane superstructure!
Touching heated crane components can cause severe injuries!
- ▶ Carry out the checks before starting the crane, when the crane components are cold!
- ▶ Let already heated components cool off before checking!
- ▶ Proceed with special caution near heated crane components!

Note
- ▶ For detailed description of fill quantities, service items and lubricants, see Crane operating instructions, chapter 7.06 and chapter 7.07 and the separately supplied drawings!

1.1 Checking the coolant level

WARNING
Danger of burns due to hot coolant!
If the coolant reservoir is opened when the engine is at operating temperature, explosive hot steam or hot coolant can emerge and cause severe skin burns!
Personnel can be severely injured!
- ▶ The cooling system is under pressure.
- ▶ Never open the cap on the coolant reservoir as long as the engine is warm.
- ▶ To protect from skin burns caused by hot steam or hot coolant, place a large rag over the cover of the coolant reservoir when opening it.

- ▶ Check the coolant level.

When the coolant level is too low:
- ▶ Add coolant, see Crane operating instructions, chapter 7.04.

1.2 Checking the oil level and filters

Note
- ▶ The oil level and filter check is described in the Crane operating instructions, chapter 7.04!

- ▶ Check the oil level in the vehicle engine.
- ▶ Check the oil level on the automatic transmission and the distributor gear.
- ▶ Check the oil level in the hydraulic reservoir for steering, support and axle suspension.
- ▶ Check the filter on the hydraulic oil tank.

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1.3 Checking the fuel reserve

WARNING
Danger of fire and explosion!
- ▶ Turn the auxiliary heater* off approx. 3 min before refueling the fuel tank!
- ▶ Before refueling the fuel tank, turn the engine off!

Note
If the fuel tank has been run dry, then the fuel system must be bled.
- ▶ Do not run the fuel tank dry.

- ▶ Check the fuel supply on the display unit in the driver's cab.

1.4 Checking the urea reserve*

Note
- ▶ Check the urea reserve*, only for Diesel engines with exhaust aftertreatment system SCR (Selective Catalytic Reduction).

- ▶ Check the urea reserve on the bar graph in the display unit, see Crane operating instructions, chapter 3.01.

1.5 Checking the window cleaning fluid

NOTICE
Frozen window cleaning fluid!
If the window cleaning fluid is not frost resistant, then the windshield washer system can freeze during the cold time of the year!
Failure of the windshield washer system is the result!
The windshield washer system can be damaged!
- ▶ Change the window cleaning fluid in time to a frost resistant type!

Before the start of the cold season:
- ▶ Empty the container for the window cleaning fluid and refill it with a commercially available, frost resistant window cleaning fluid.

1.6 Checking the tires

While doing this, also check the spare tire*.

Note
- ▶ See Crane operating instructions, chapter 8.01.

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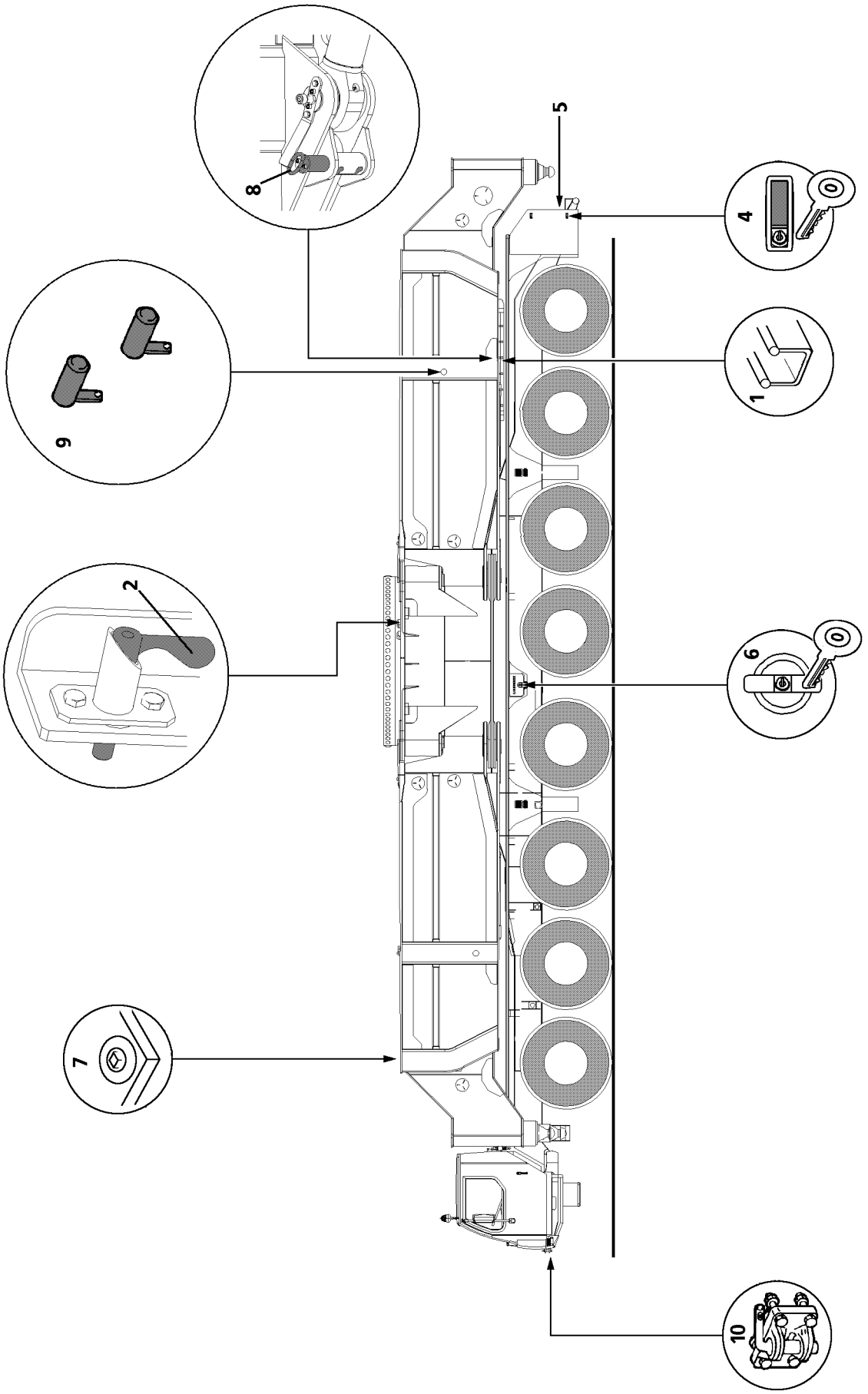

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Fig.196115

1.7 Checking the general transport condition

Note
Transport on public highways:
▶ For transport on public highways, observe the crane driving conditions to ensure that the maximum axle load does not exceed 12 t , see Crane operating instructions, chapter 3.04.

DANGER
Danger of accident due to improper transport condition!
▶ Locks, cotter pins and retaining pins must be installed and secured in such a way that they do not loosen up by themselves during travel and thereby cause damage.
▶ The safety measures, locking measures and checks described below must be performed!

Make sure that the following prerequisites for transporting the mobile crane are met:
– The folding ladders are placed on the vehicle frame and secured in the retainers **1**.
– The two platforms are folded up on the left and right and are secured with the locks **2**.
– All four support plates are disassembled.
– All four support cylinders are retracted all the way.
– The two folding beams on the front are swung in and secured in the calottes.
– the two folding beams behind are swung in and pinned and secured with the two pins **8** against unintended swinging out, and pinned and secured with the two locking pins **9** against unintended extending,
– The two pins **8** and the two locking pins **9** have been checked for proper seating.
– The pin in the front trailer coupling **10** is pinned and secured.
– The four chocks **5** are secured in the retainers.
– The switch boxes **6** for the left and right support control units are closed.
– The engine panels **7** are closed.
– All toolbox cabinet doors and panels **4** on the chassis are closed.
– All locking pins used for crane operation are checked for completeness and secured for transport.
– The axle blocking is turned off.

Perform the following checks before leaving the jobsite:

▶ Check if all four support plates have been removed.
▶ Check if all four support cylinders are fully retracted.
▶ Check if the folding beams are fully swung in, retracted, pinned and secured.
▶ Check if the axle suspension is set to the correct height for on-road driving. See Crane operating instructions, chapter 3.03.
▶ Check if the steering program „On-road driving“ is activated.
▶ Check if the chocks **5** are in their retainers.
▶ Check if the ladders are secured in the operating position.
▶ Check if the platforms are secured in transport position.
▶ Check if the spare wheel* has been properly secured.
▶ Check if all locks on tool boxes and cabinet doors are locked.
▶ Check if all locking pins used for crane operation are present and secured for transport.

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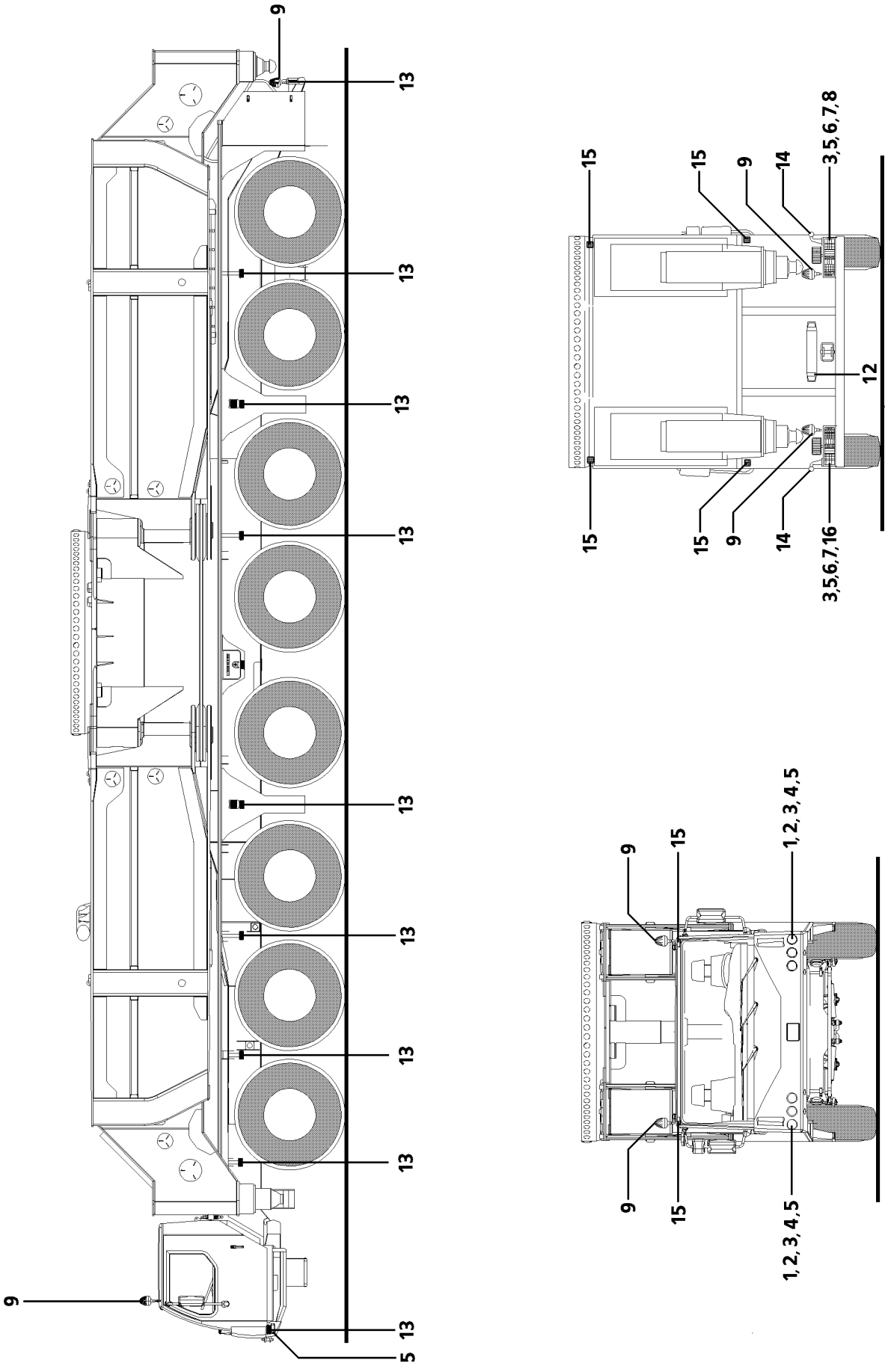

Fig.196116

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1.8 Checking the lights

Make sure that the battery master switch and the ignition are turned on.

DANGER
Danger of accident if lights are defective!
▶ Have any defective lights repaired by an expert before starting to travel!

Lighting of the crane:
– **1** Low beam
– **2** High beam
– **3** Front and rear parking lights
– **4** Fog lights*
– **5** Turn signals
– **6** Tail light
– **7** Brake lights
– **8** Back up light
– **9** Rotating beacons
– **12** License plate illumination
– **13** Side marking lights
– **14** Course holding light
– **15** Outline lights
– **16** Rear fog light

▶ Check all lights before starting to travel.

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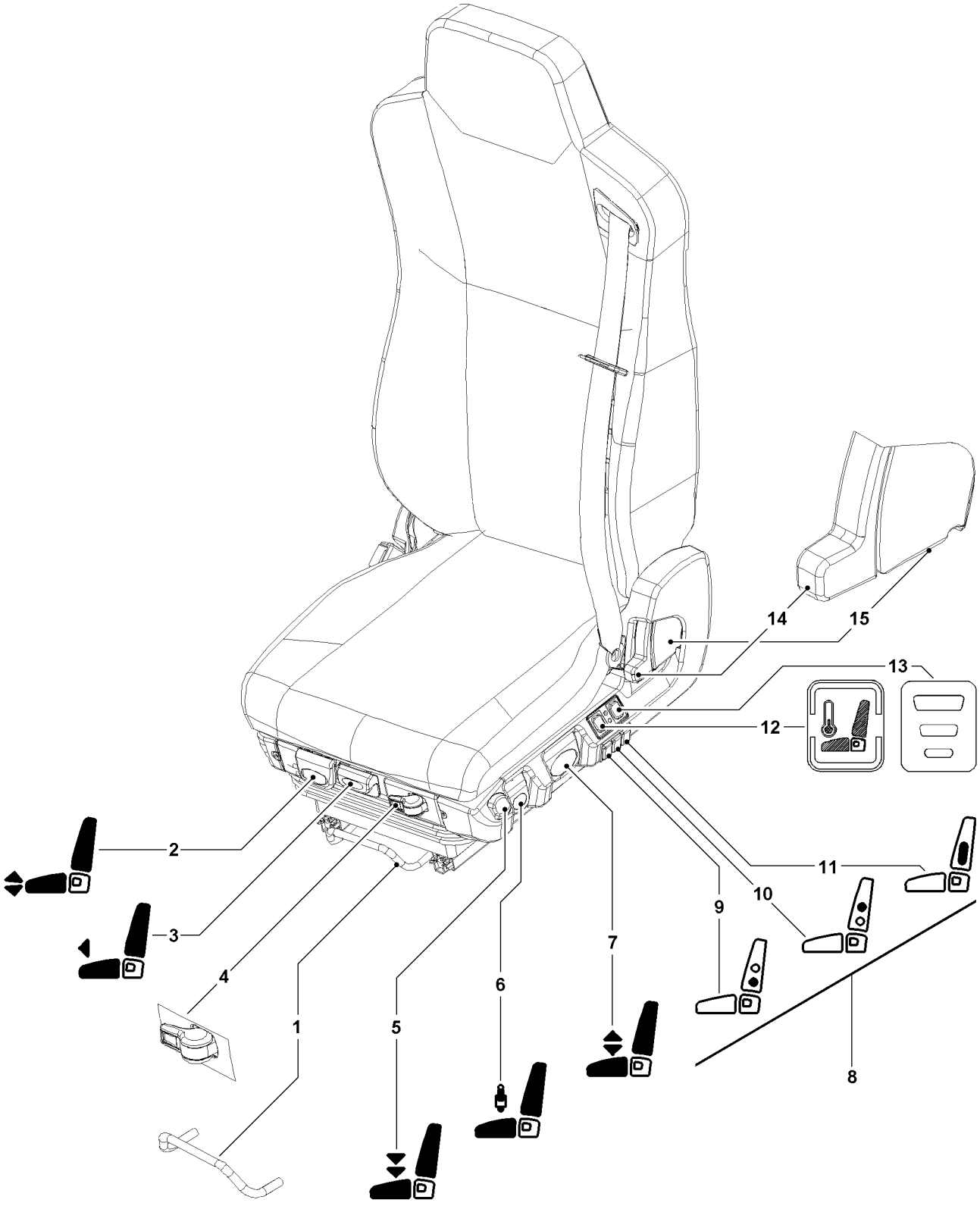

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Fig.103209

2 Work station - Driver's cab

WARNING
Danger of accidents due to incorrect adjustment of driver's seat, mirrors or steering wheel!
▶ Adjust the driver's seat, mirrors and steering wheel **before starting to travel**.
▶ Never adjust or readjust the driver's seat, the mirror or the steering wheel while driving.

2.1 Adjusting the driver's seat

The pneumatically suspended driver's seat can be adjusted to suit any body size.

If desired, the driver's seat can be equipped with IPS* (Integrated Pneumatic System). IPS* provides additional side lumbar support.

1 Horizontal adjustment
- Pull up the lever and position the seat.
- Let the lever latch back in position.

2 Incline adjustment
- Pull up the lever and adjust the seat incline by inflating or releasing the front of the seat cushion.

3 Seat cushion adjustment
- Pull up the lever and slide the seat cushion forward / backward.

4 Horizontal suspension
- Lever to right: Horizontal suspension unlocked.
- Lever to left: Horizontal suspension blocked.

5 Lowering
- Push the lever down: The seat is lowered.
- Pull the lever up: The seat moves to the set height.

6 Damper adjustment
- Use the damper setting to optimally adjust the vibration characteristic of the seat to any road surface and driver.
- Lever up: Minimum damper force.
- Lever down: Maximum damper force.

7 Height adjustment
- Pull or push the lever to set the desired seat height.

8 Integrated pneumatic system (IPS)*
- The „Integrated Pneumatic System" (IPS) allows the optimum adjustment of the rear support contour to the body shape, see positions **9**, **10** and **11**.

9 Lower lumbar area support*
- Press button to inflate or vent the air chamber in the „lower lumbar area support".

10 Upper lumbar area support*
- Press button to inflate or vent the air chamber in the „upper lumbar area support".

11 Side support*
- Press button to inflate or vent the air chamber in the „side support".

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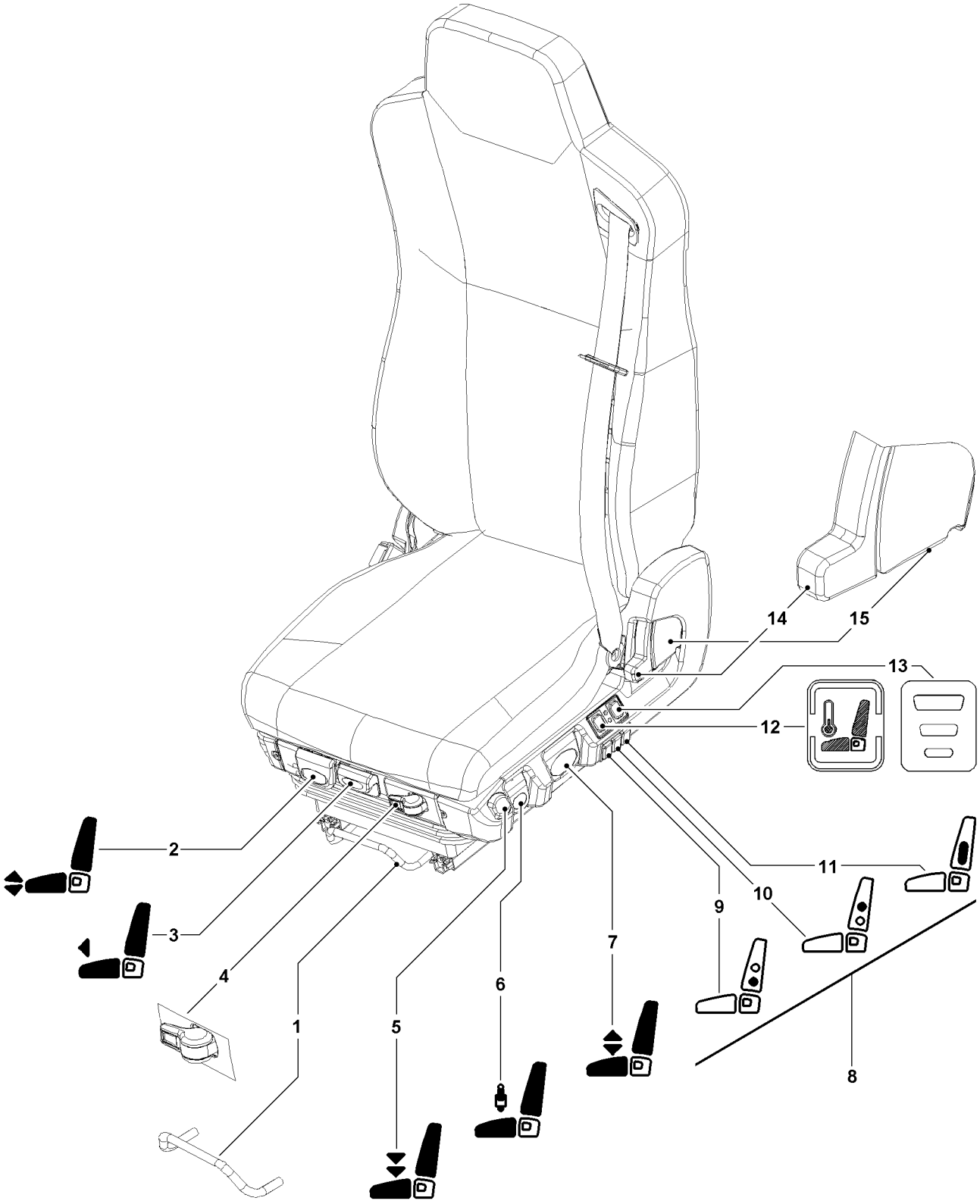

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Fig.103209

12 Seat heater / seat climate control*****
- **Switch position up:**
  Seat cushion and arm rest heater is turned on.
  Thermostatically regulated seat cushion and armrest heater.
- **Switch position neutral (center position):**
  No function, switch position „OFF“.
- **Switch position down:**
  Seat cushion and arm rest climate control turned on.

13 Fan*****
- Press the button to set the fan stage
  Note:
  The fan is only available in conjunction with the seat heater / climate control*****.

14 Shoulder adjustment
- Pull up the lever and use your body weight to move the upper half of the backrest to the desired position.

15 Backrest adjustment
- Pull up the lever and use your body weight to move the backrest to the desired position.

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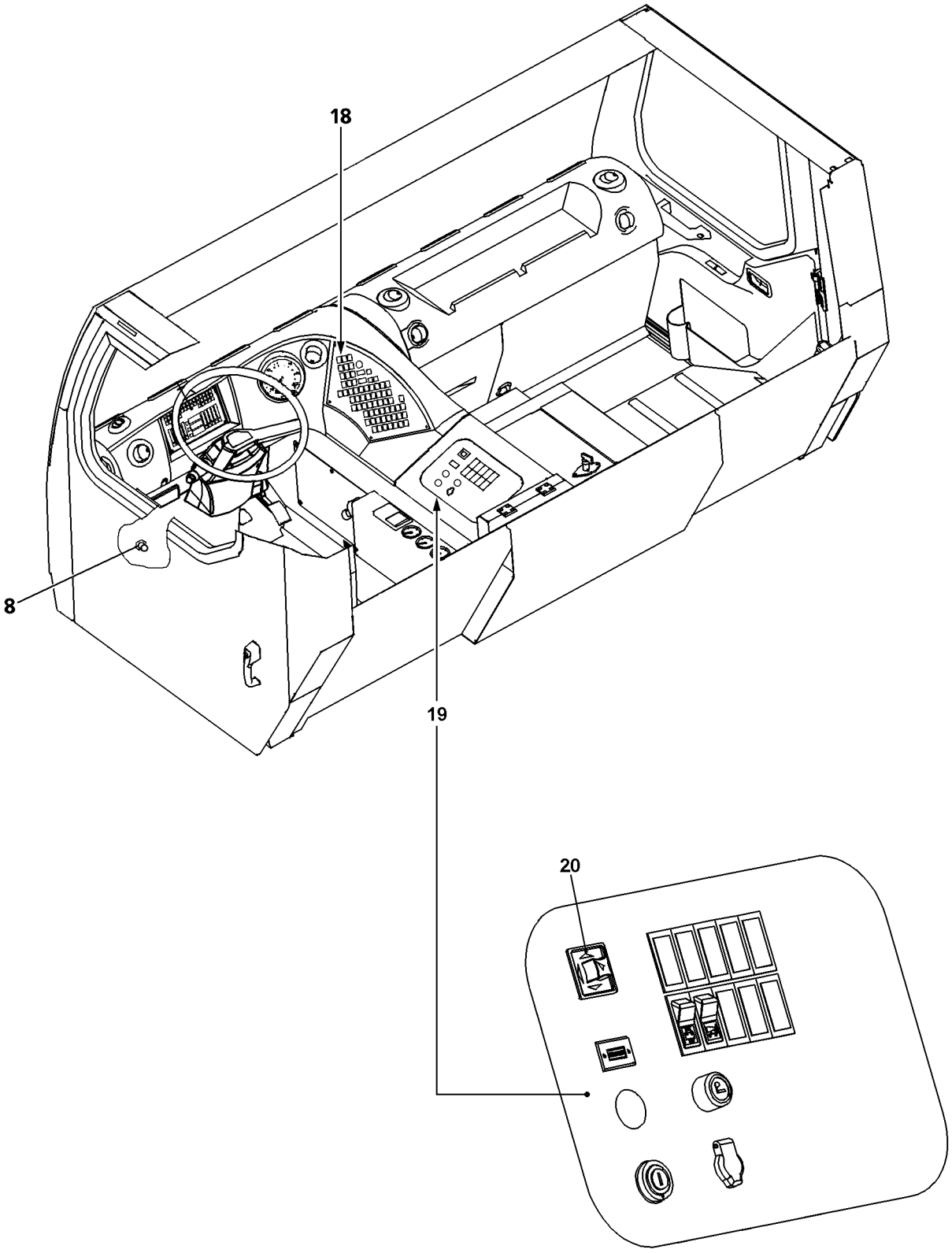

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Fig.194744

2.2 Adjusting the mirrors

Clean outside mirrors before starting to travel and adjust to suit the driver's field of view.

The switch **20** on the center bracket **19** can be used to switch between the left and right outside mirrors.

▶ Actuate the switch **20**.

Result:

– The mirror is adjusted accordingly.

2.3 Adjusting the steering wheel

The steering wheel is unlocked pneumatically.

▶ Press the button **8**.

Result:

– The steering wheel lock is released.
– The incline and height of the steering wheel can be adjusted accordingly.

2.4 Turning the heater / ventilation on

The driver's cab can be heated or ventilated to the desired temperature.

For a detailed description see Crane operating instructions, chapter 6.01.

▶ To adjust the heater or ventilation, use the keypad **18**.

2.5 Fastening the seatbelt

WARNING
Seatbelt not worn!
If the seatbelt is not worn while driving, then occupants can be killed or severely injured during an accident, driving maneuver or braking procedure!
▶ When starting to drive and for the duration of travel, all occupants must be belted.

▶ All occupants must wear the seat belt.

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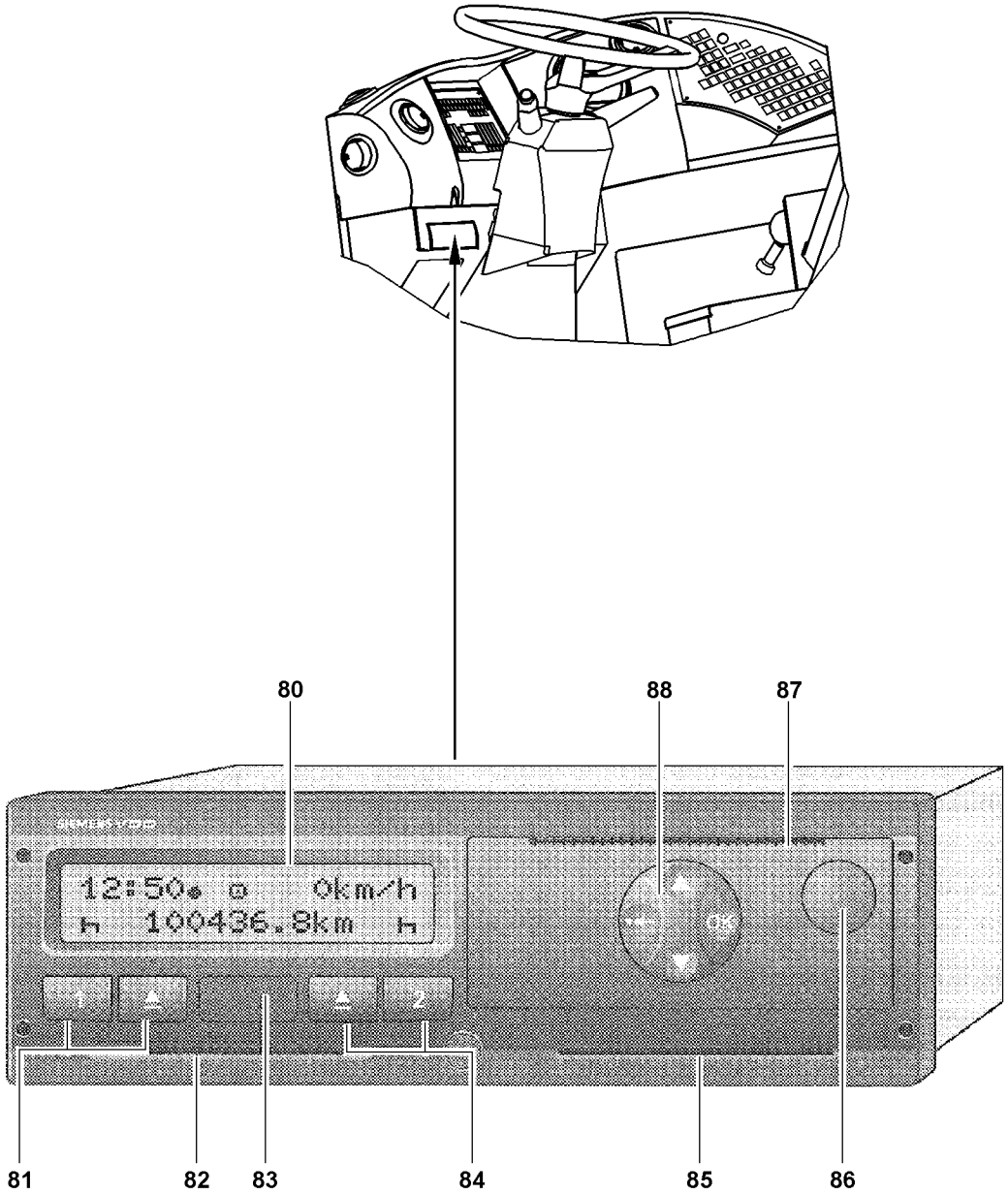

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Fig.104055

2.6 DTCO trip recorder*

Note
Data loss on DTCO trip recorder!
If the buffer battery is not replaced within two years by a service location of the manufacturer (Siemens-VDO), then a power failure can lead to a loss of all data! In this case, the trip recorder is defective and the maximum driving speed can be limited.
- ▶ Make sure to have the buffer battery replaced in time.
- ▶ For detailed description of the DTCO trip recorder, refer to the supplied manufacturer's operating instructions.

2.6.1 Initial calibration

Note
Calibration of the DTCO trip recorder
- ▶ After delivery of the crane, the calibration of the DTCO trip recorder should be carried out by one of the manufacturer's service locations (Siemens-VDO).

2.6.2 Company / driver card

The company / driver card(s) must be requested by the crane operator / driver at the respective authority in the member state.

Company card

The company card identifies a company.

Note
- ▶ After the initial calibration, the company must register with the company card on the DTCO trip recorder.
- ▶ The main memory data of the DTCO trip recorder must be downloaded and secured every 3 months with the company card in the specified intervals!

Driver card

The driver card is personal and in possession of the driver. The activities of the driver (steering and resting times) are saved on the driver card. Before starting to travel, the driver card must be inserted in the card slot **82** or card slot **85**.

Note
- ▶ The data of the driver card(s) must be secured in the specified intervals!

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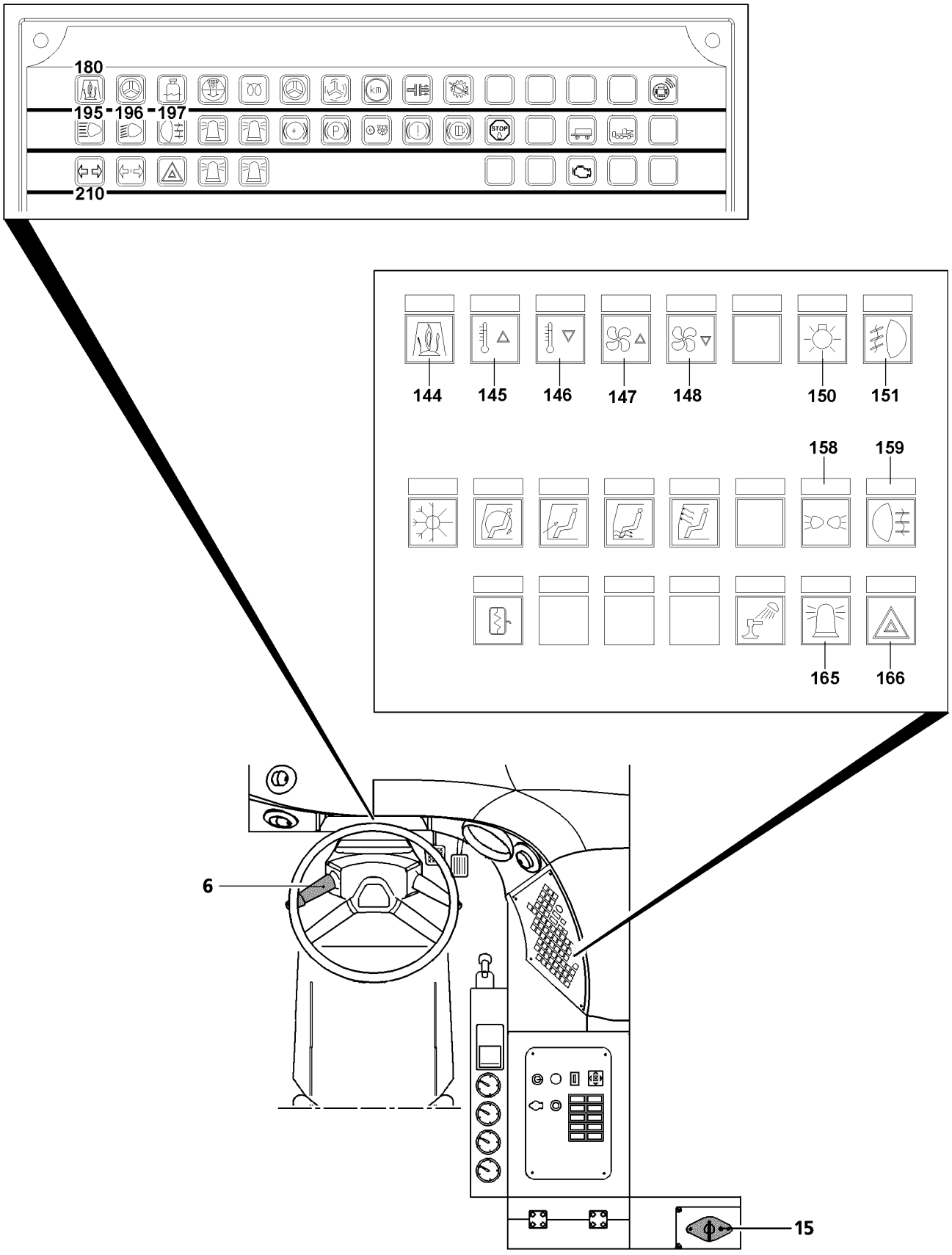

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Fig.114007

2.7 Checking the important operating instruments

DANGER
Danger of fatal injury due to defective operating instruments!
▶ Arrange to have any defective functions repaired by an expert before starting to travel.

Make sure that the battery master switch **15** is turned on. Otherwise the controls cannot be checked.

For some checks, the ignition must also be turned on.

2.7.1 Checks with the ignition turned off

▶ Hazard warning system: Press button **166** with function control and check.
▶ Rotating beacons: Press button **165** with function control and check.
▶ Parking lights: Press button **158** with function control and check.

2.7.2 Check with ignition switched on (ignition switch at position „1“)

▶ Headlight: Press the button **150** with function control, check indicator light **195** and indicator light **196**.
▶ Fog lights* (only with head light or parking light turned on): Press button **151** with function control and check.
▶ Rear fog light* (only with head light or parking light turned on): Press button **159** with function control and check indicator light **197**.
▶ Heater: To increase temperature, press button **145** with function control and check.
▶ Heater: To reduce temperature, press button **146** with function control and check.
▶ Auxiliary heater*: Press button **144** with function control and check indicator light **180**.
▶ Fan: Press button **147** and button **148** with function control and check.
▶ Windshield wiper / washer system: Check steering column switch **6** with windshield washer system reservoir.
▶ Check the horn **6**.
▶ Turn signals: Operate steering column switch **6** with indicator light **210** and check.

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3.03 Axle suspension system

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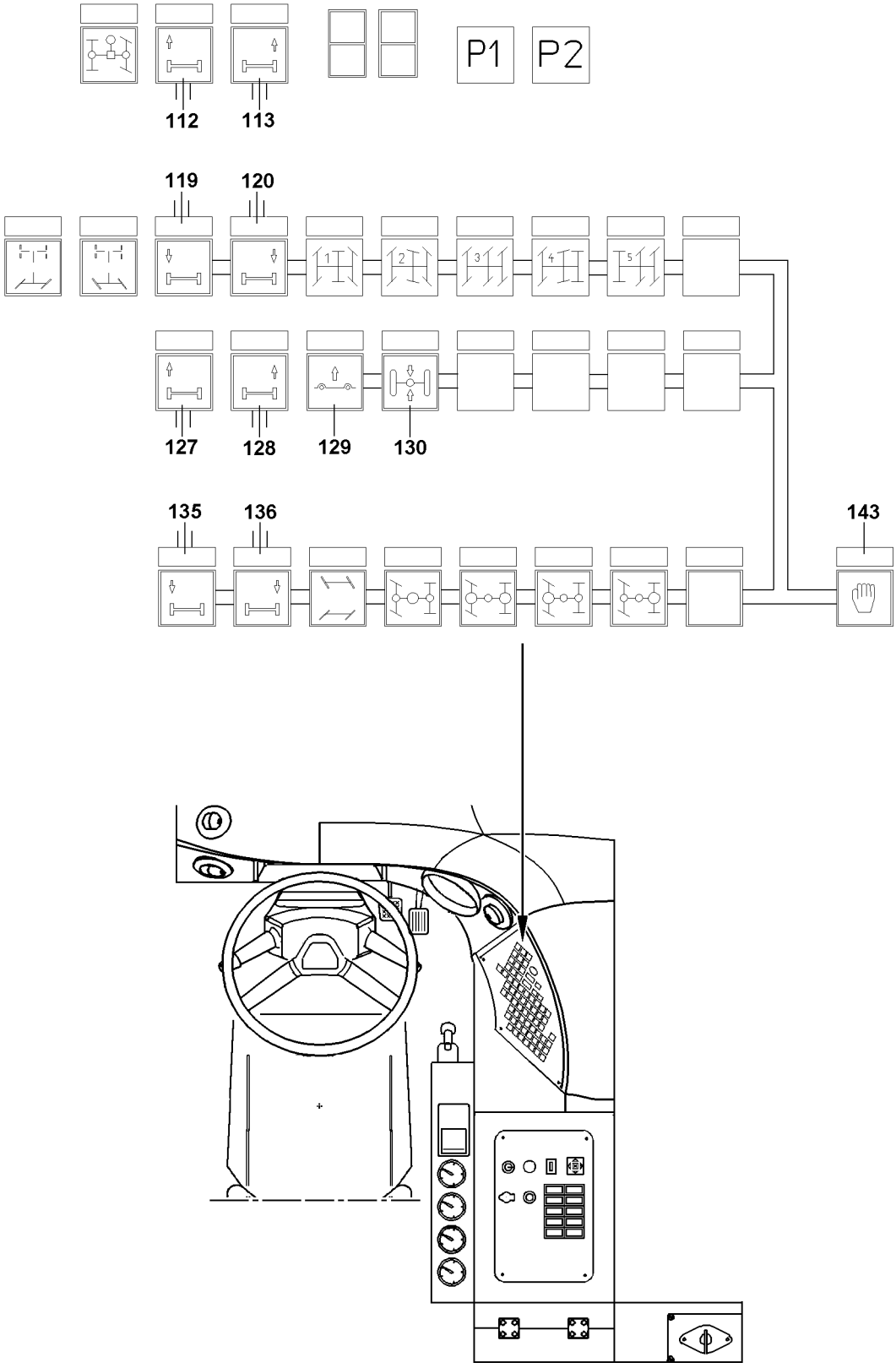

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Fig.107919

1 Crane vehicle axles suspended

The crane vehicle axles must be suspended in the following situations to equalize uneven ground conditions and level differences:
- For driving on public roads, see Crane operating instructions, chapter 3.04.
- For off road driving, see Crane operating instructions, chapter 3.04.

The side stability of the vehicle when cornering is ensured by the axle suspension.

1.1 Turning the axle suspension on

NOTICE
Risk of damage to axle suspension!
If the axle suspension is turned on without the wheels being in contact with the ground, then the axle suspension can be damaged if the axles drop down!
▶ Do not turn axle suspension off until all wheels are in contact with the ground!

DANGER
Risk of injury when operating the axle suspension!
▶ Ensure that no persons are present within the crane danger zone!

▶ Press button **143** and button **130**.

Result:

- Function control on button **130** does not light up.
- All axles are suspended in this position.
- The level of the crane can be regulated.

2 Crane vehicle axles blocked

The crane vehicle axles must be blocked in the following situations to avoid tipping the crane over or damage to the axle suspension:
- „For driving with the equipment in place“, see Crane operating instructions, chapter 15.01.
- For supporting the crane, see Crane operating instructions, chapter 3.05.

2.1 Blocking the axle suspension

DANGER
Risk of injury when operating the axle suspension!
▶ Ensure that no persons are present within the crane danger zone!

▶ Press button **143** and button **130**.

Result:

- The function indicator on the button **130** lights up.
- All axles are blocked in the current position.
- The level of the crane can be regulated manually.

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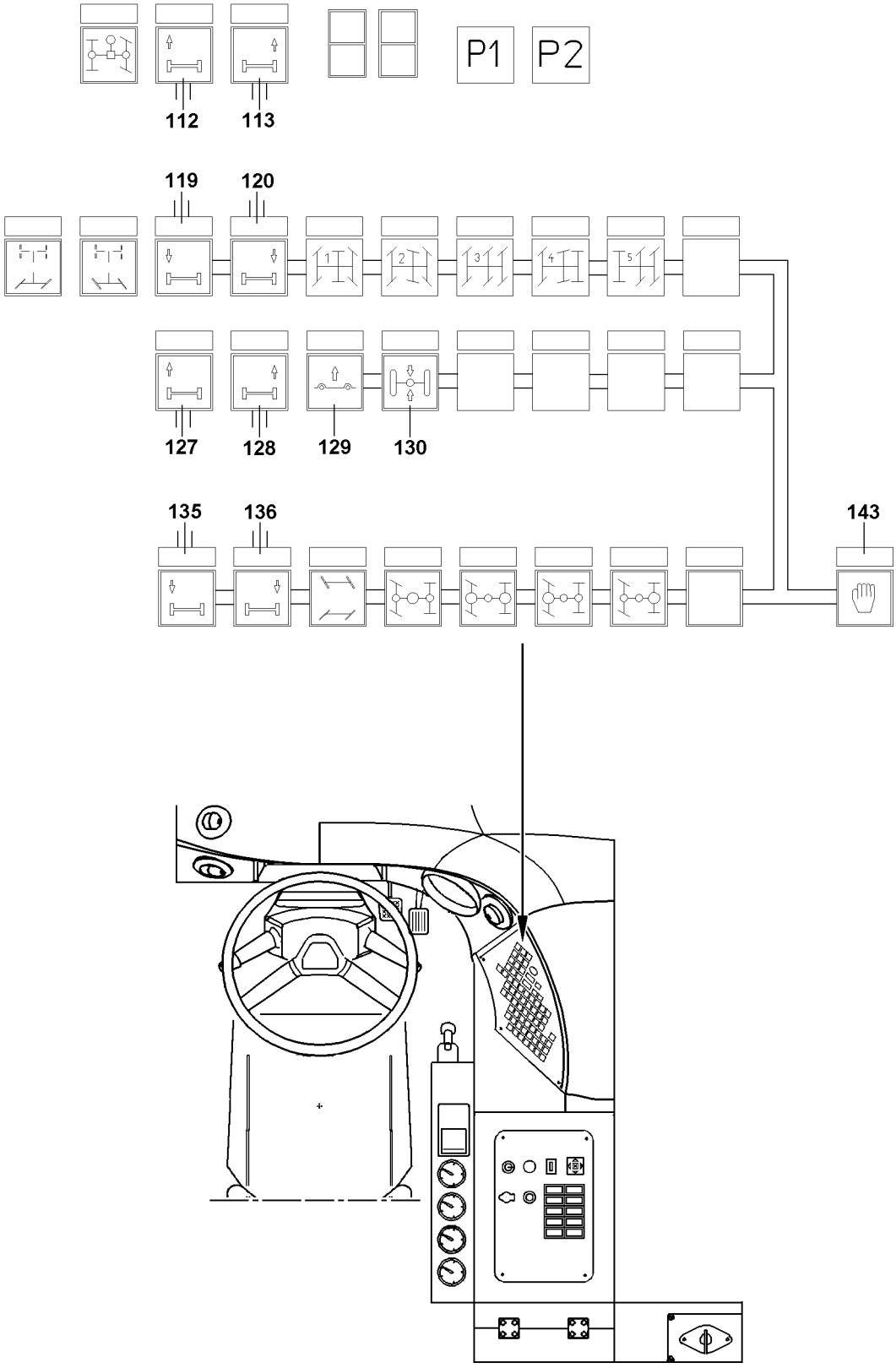

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Fig.107919

3 Level regulation

Note

▶ To improve the fording ability, the crane vehicle can be raised and to reduce the overall height, it can be lowered. On slopes, the crane vehicle can be inclinded. For the suspension path and the side incline angle, refer to the Crane operating instructions, chapter 1.03.

The level can be regulated manually or automatically.

Make sure that the following prerequisites are met:
- the vehicle is on a level surface,
- the crane engine is running,
- the transmission is in neutral position „N“.

NOTICE

Danger of damage!

▶ Do not level the vehicle, unless the vehicle is at a standstill!
▶ Carry out the level regulation on a level and load-bearing surface.
▶ Never raise or lower the vehicle fully when driving on an uneven road surface.

The function control on the button **129** must light up during the level regulation procedure.
- If the function control does not light up, stop the procedure immediately!
- Arrange to have the problem remedied by an expert.

When the level regulation procedure is complete, the function control must turn off when releasing the button **129**.

Note

▶ If the function control does not turn off when releasing the button **129**, have the problem remedied by an expert.

3.1 Level regulation from the driver’s cab

3.1.1 Automatic level regulation

Button **143** and button **129** operate the automatic level regulation. The crane is automatically moved to a level position (driving height for road driving) by the level switches attached to the suspension cylinders.

Ensure that the following prerequisite is met:
- the axle suspension is turned on.

▶ Press button **143** and button **129** simultaneously until the function control on the button **129** blinks.

Result:

– The function control on the button **129** lights during automatic level regulation and blinks when the end position is reached.
– The function controls for manual level control (button **112**, button **113**, button **119**, button **120**, button **127**, button **128**, button **135** and button **136**) blink when the corresponding suspension cylinders have reached the level position for on road driving.

Note

▶ After releasing button **143** and button **129**, the function controls on button **112**, button **113**, button **119**, button **120**, button **127**, button **128**, button **135** and button **136** turns off.
▶ The function control on button **129** continues to light up and turns off when driving.

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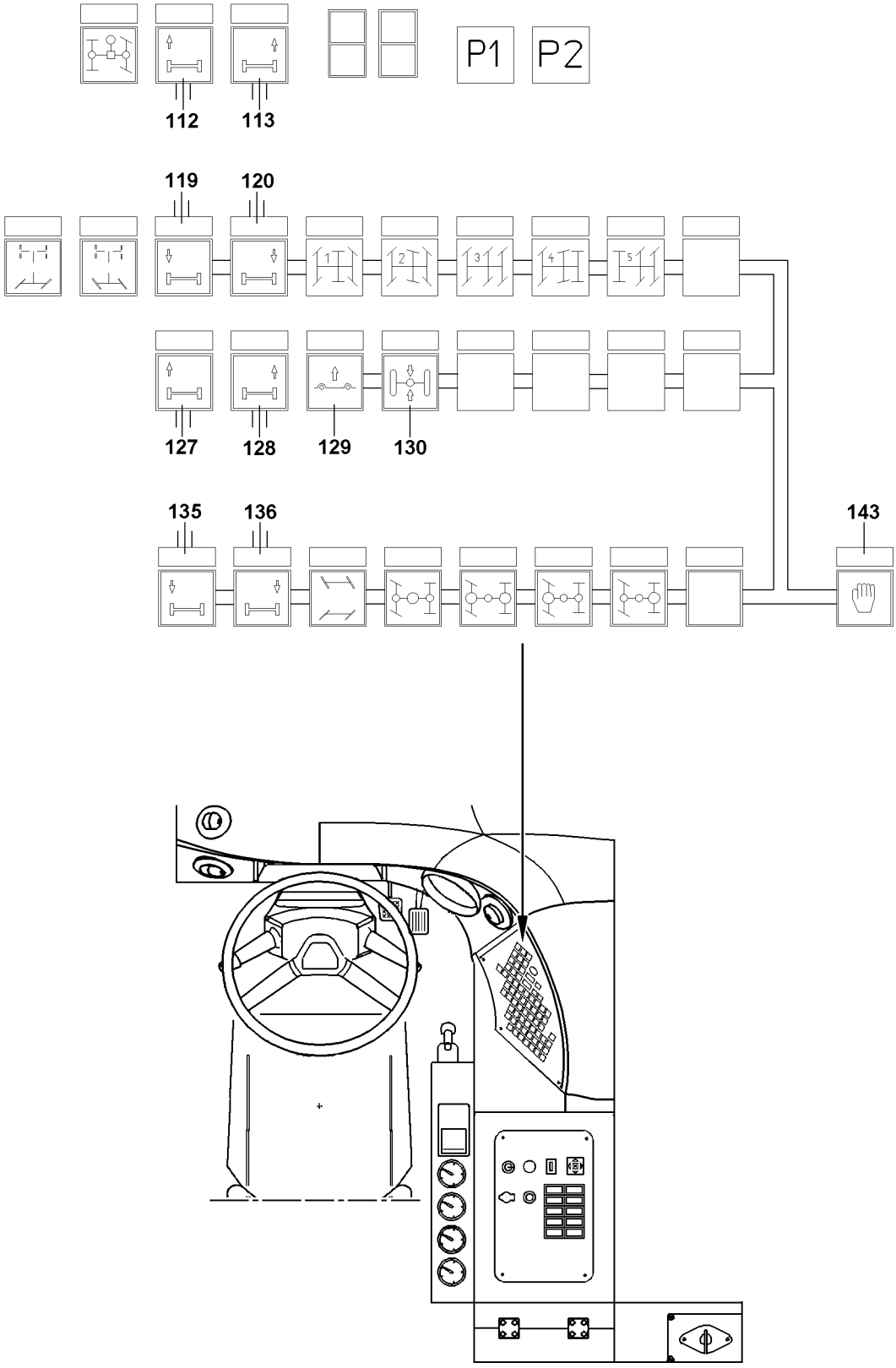

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Fig.107919

3.1.2 Manual level regulation

The level position is adjusted manually by pressing the 2-hand button **143** for manual level regulation. The suspension cylinders are filled or emptied.

WARNING
Risk of accident!
Manual level regulation in public traffic is only permitted in order to adapt the crane to special situations, such as lowering the crane to reduce the height in order to drive under a bridge.
▶ Carry out the level regulation only in special situations and when the vehicle is at a standstill!

Note
▶ The crane vehicle can only be levelled manually when the axle suspension is turned on.

Raising the vehicle

▶ Press and hold down button **143** and then press button **112**.

Result:

– The left front vehicle level is raised.

▶ Press and hold down button **143** and then press button **113**.

Result:

– The right front vehicle level is raised.

▶ Press and hold down button **143** and then press button **127**.

Result:

– The left rear vehicle level is raised.

▶ Press and hold down button **143** and then press button **128**.

Result:

– The right rear vehicle level is raised.

Raising the entire vehicle

▶ Press and hold down button **143** and then press button **112**, button **113**, button **127**, button **128**.

Result:

– The vehicle level is fully raised.

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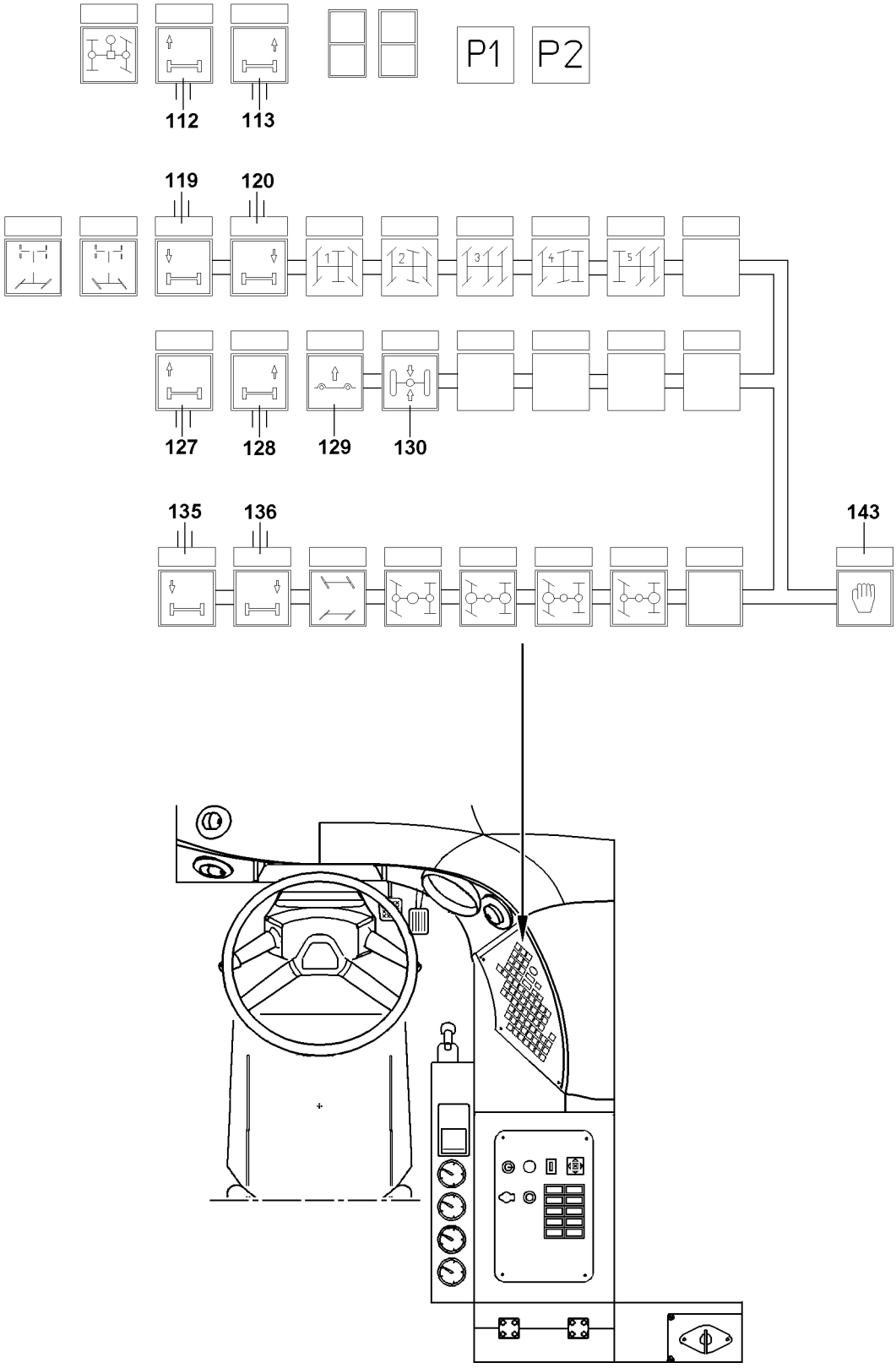

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Fig.107919

Lowering the vehicle

▶ Press and hold down button **143** and then press button **119**.

Result:

– The left front vehicle level is lowered.

▶ Press and hold down button **143** and then press button **120**.

Result:

– The right front vehicle level is lowered.

▶ Press and hold down button **143** and then press button **135**.

Result:

– The left rear vehicle level is lowered.

▶ Press and hold down button **143** and then press button **136**.

Result:

– The right rear vehicle level is lowered.

Lowering the entire vehicle

▶ Press and hold down button **143** and then press button **119**, button **120**, button **135**, button **136**.

Result:

– The vehicle level is fully lowered.

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3.04 Travel operation

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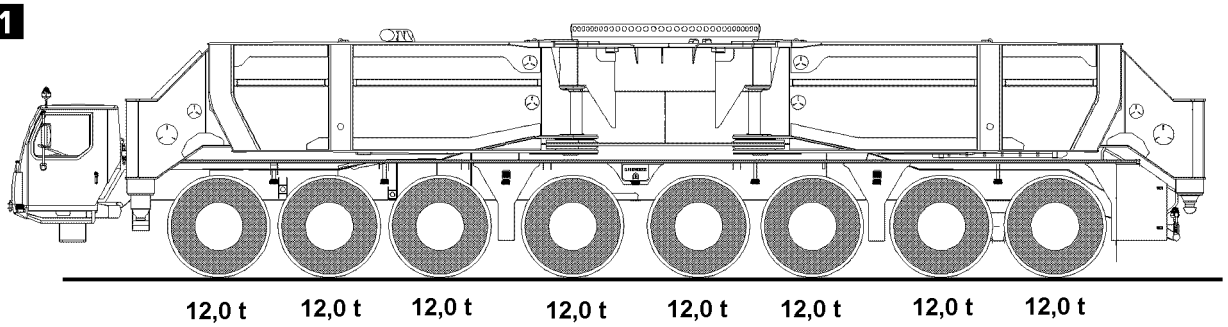

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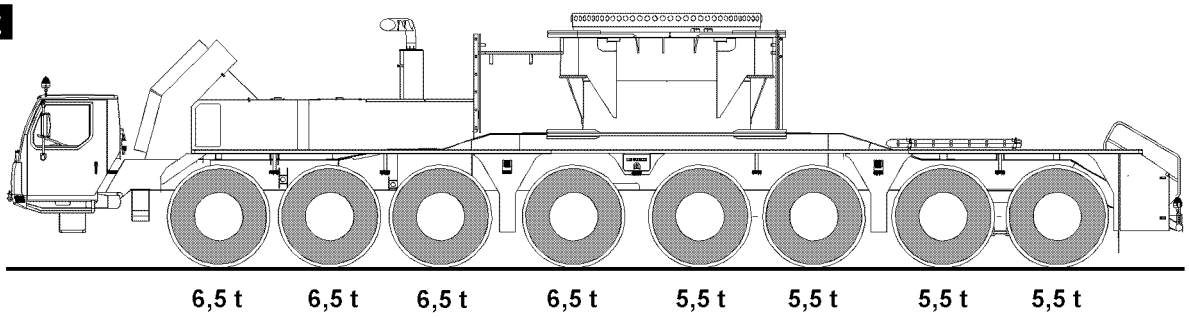

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Fig.196118

1 Driving conditions of the crane

Before the crane may be driven on public roads, the two sliding beams must be extended on the rear by 300 mm and secured with two retaining pins, see Crane operating instructions, chapter 3.02.

Note
- ▶ The pins for Quick connection may not remain on the vehicle during „On-road driving“, otherwise the permissible total weight will be exceeded!
- ▶ The boxes on the pot and on the folding beams serve only as intermediate storage during assembly and disassembly work!

Note
Driving on public highways!
- ▶ Observe **national regulations** at all times!

1.1 Axle loads up to 12 t

Before the crane can be driven on public highways and motorways, in order to comply with the axle load limit of 12 t per axle, the travel condition must be established as shown in the illustration and the chart.

Make sure that the following prerequisites are met:
- Both sliding beams on the rear are extended 300 mm and pinned.
- The axle suspension system has been set to „Suspended“.
- The vehicle is at the level setting for on-road driving.

1.1.1 Driving condition 1, illustration 1

Set up condition								
With:	4 folding beams							
Without:	Support plates							
Total weight	**Axle load**							
	1	2	3	4	5	6	7	8
96.0 t	12 t	12 t	12 t	12 t	12 t	12 t	12 t	12 t

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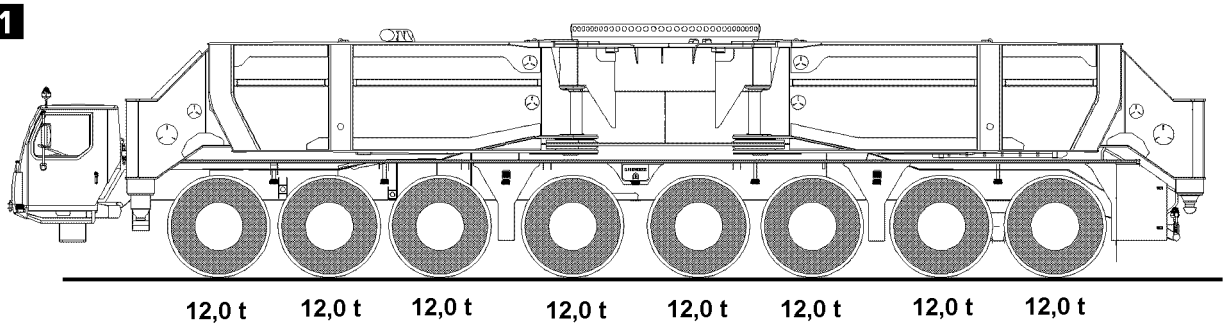
1



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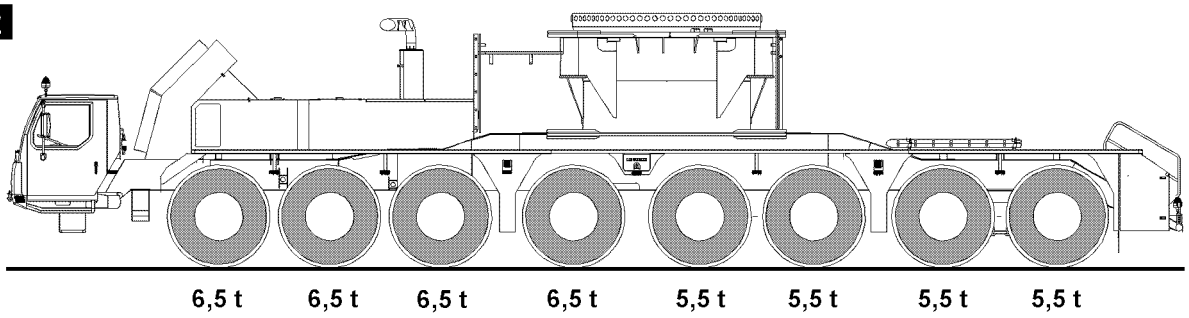

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Fig.196118

1.1.2 Driving condition 2, illustration 2

Set up condition								
Without:	4 folding beams							
Total weight	**Axle load**							
	1	2	3	4	5	6	7	8
48.0 t	6.5 t	6.5 t	6.5 t	6.5 t	5.5 t	5.5 t	5.5 t	5.5 t

1.2 Axle loads above 12 t

DANGER
Increased danger of accidents!
The braking distance is longer due to the higher overall weight!
Wear on brake linings is greater and there is an increased danger of brake overheating!
The steering system, service brake, parking brake and retarder no longer meet the regulations!
The service life of all components affected by the increased axle load such as: Brakes, tires, wheel rims, axles as well as the entire drive, suspension and steering components are reduced!
▶ Check the affected parts more frequently!

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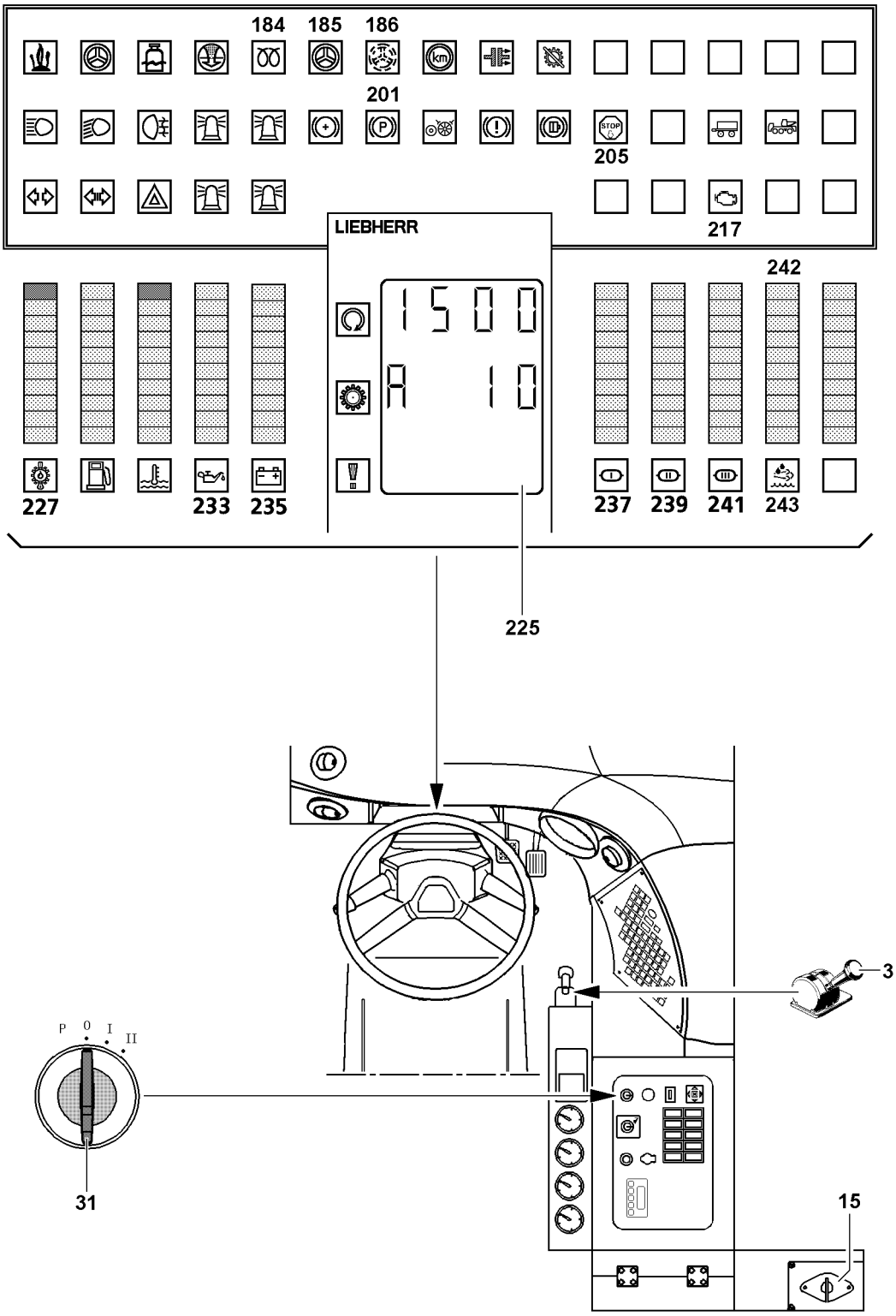

LWE/LG 1750-006/15409-07-02/en

Fig.116604

2 Starting and stopping the engine

The engine can only be subjected to a full load after the operating temperature has been reached.

2.1 Starting the engine

Make sure that the following prerequisites are met:
- The battery master switch **15** is turned on.
- The parking brake **3** is applied.
- The transmission is in neutral position „N“.

▶ Turn the ignition switch **31** to position „I“.

Result:

– The indicator light **184** blinks.
– The charge indicator light **235** lights up.
– The engine is ready to start.

▶ Turn the ignition switch **31** to position „II“ and start the engine.

Problem remedy
The engine does not start after a maximum of 10 seconds?
▶ Wait for 1 minute. The starter can be operated three times for 10 seconds per attempt with a one minute break in between.

Note
Functionality of the battery in the cold season.
The starting capacity of the battery is considerably reduced in cold temperatures: For example, at a temperature of -10 °C , it has only 66 % of its normal capacity.
▶ Once the engine has been turned off, store the batteries in a heated room, if possible.

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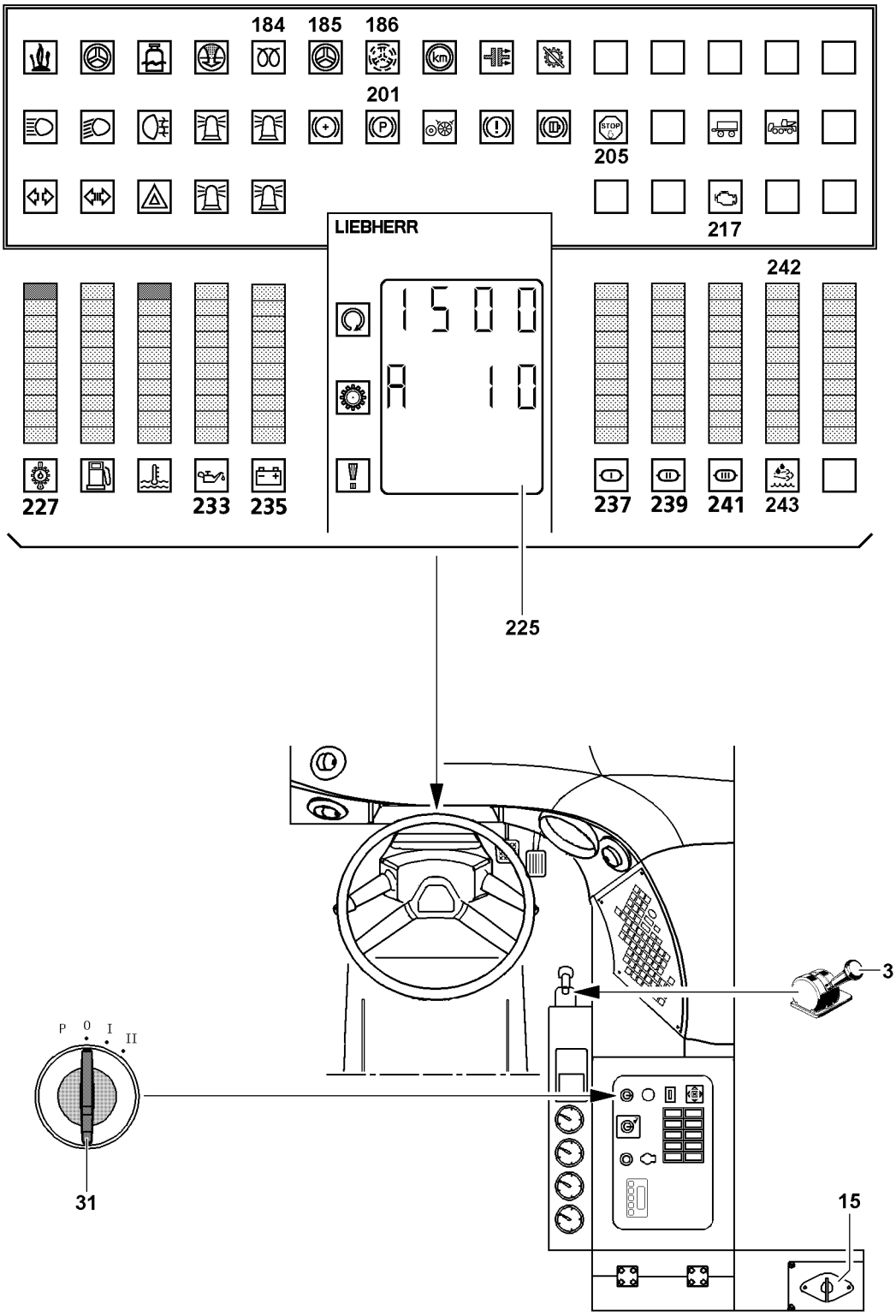

LWE/LG 1750-006/15409-07-02/en

Fig.116604

2.2 With flame start system at coolant temperature of less than 20 °C

To improve the cold start process and the warm-up phase, the engine is equipped with a flame start system. The flame start system turns on automatically at a coolant temperatures **below** 20 °C.

The flame start system turns off automatically if:
- The engine is not started when it is ready.
- The engine is started while the indicator light **184** lights up.
- The coolant temperature reaches 20 °C while the engine is running.

Note
Functionality of the battery in the cold season!
The starting capacity of the battery is considerably reduced in cold temperatures: For example, at a temperature of -10 °C , it has only 66 % of its normal capacity!
▶ Once the engine has been turned off, store batteries in a heated room, if possible!

▶ Turn the ignition switch **31** to position „I“.

Result:

– The indicator light **184** lights up first and then starts to blink after a short time.
– The charge indicator light **235** lights up.
– The engine is ready to start.

▶ Turn the ignition switch **31** to position „II“ and start the engine.

Problem remedy
Is the indicator light **184** blinking **quickly**?
The flame start control unit has identified a problem on the flame start system. An interruption in the flame glow plug heating coil, missing supply voltage on terminal 30 or a defective fuse of the flame start control unit will be identified as a problem.
▶ Remedy the problem.

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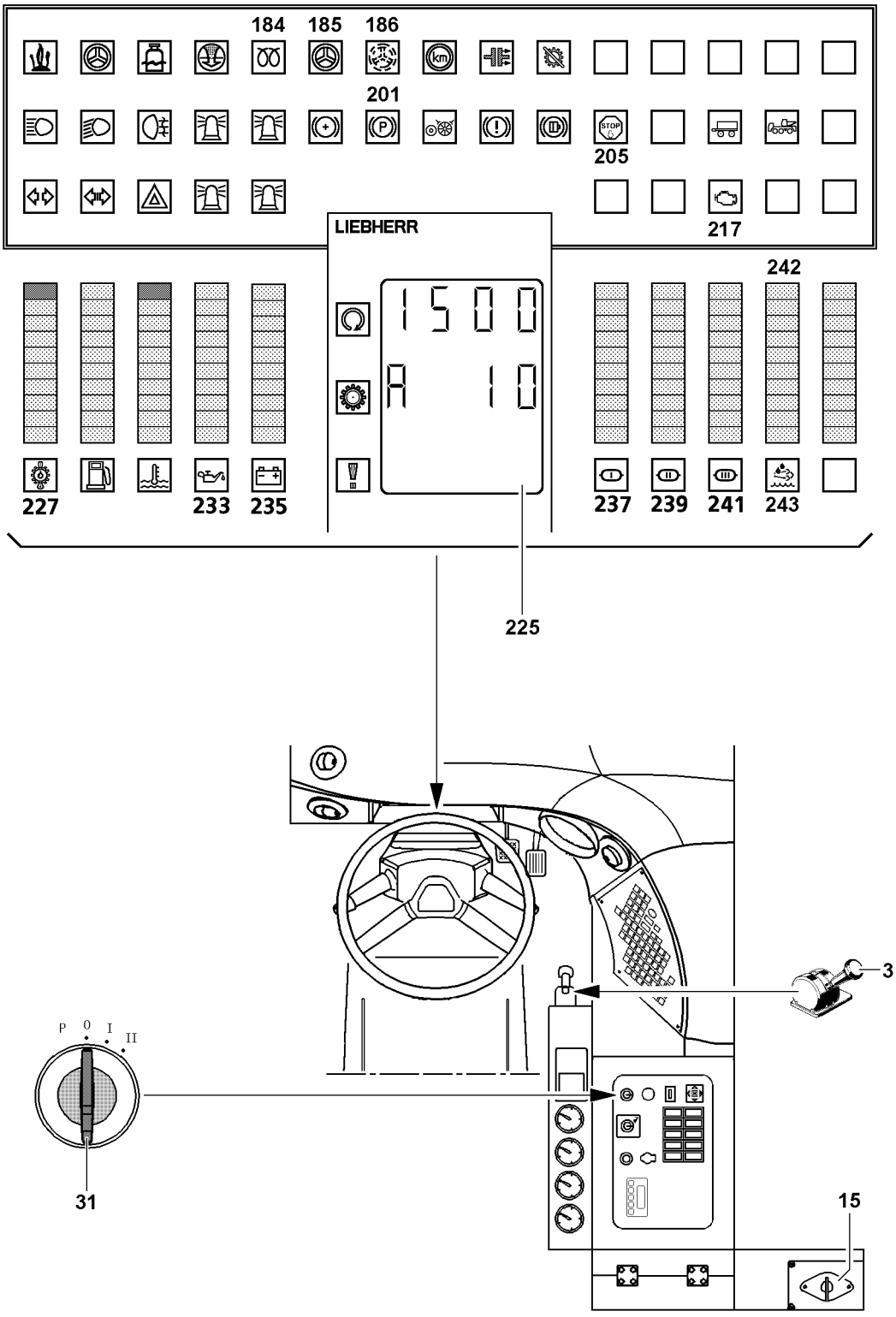

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Fig.116604

2.3 Checking the instruments after starting the engine

The following indicator lights must turn off when the engine is running:

▶ Check the indicator light for the engine oil pressure **233**.

Problem remedy
Does the engine oil pressure indicator light **233** still light up or is no oil pressure displayed?
There is a danger of engine damage.
▶ Turn the engine off immediately!

▶ Check the preheat indicator light **184**.
▶ Check the charge indicator light **235**.
▶ Check the indicator light for the gear oil temperature **227**.

Note
▶ The warning light **185** turns off after engine start!

▶ Check the warning light **185**.

Note
▶ The warning light **186** turns off from a certain driving speed of the crane.

▶ Check the warning light **186**.
▶ Check the indicator light for air pressure circuit I **237**.
▶ Check the indicator light for air pressure circuit II **239**.
▶ Check the indicator light for air pressure circuit III **241**.
▶ Check the indicator light severe engine problem **205**.

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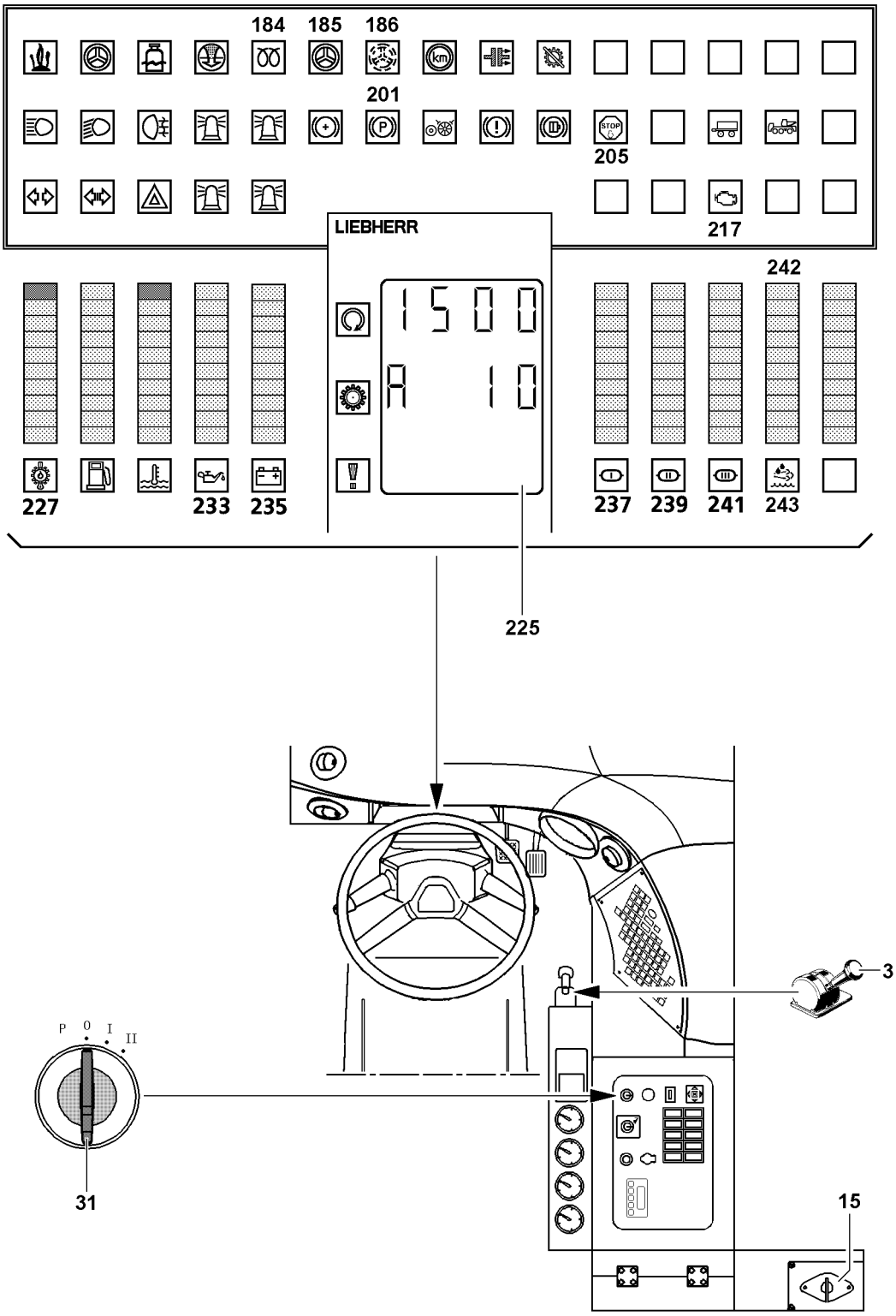

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Fig.116604

▶

Problem remedy
The indicator light severe engine problem **205** lights up?
▶ Turn the engine off immediately and remedy the problem!

Note
▶ Check the indicator lights urea***** **243** or indicator light exhaust aftertreatment***** **217** , only for Diesel engines with exhaust aftertreatment system SCR (Selective Catalytic Reduction).

▶ Check the indicator light urea***** **243**.

Problem remedy
The indicator light urea***** **243** lights up yellow?
Urea is getting low.
▶ Refill Urea.

Problem remedy
indicator light urea***** **243** blinks yellow?
Urea almost empty.
▶ Refill urea immediately.

▶ Check the indicator light exhaust aftertreatment***** **217**.

Problem remedy
The indicator light exhaust aftertreatment***** **217** lights up **or** blinks yellow?
Advance warning exhaust aftertreatment **or** exhaust aftertreatment no longer ensured.
▶ Check exhaust aftertreatment!

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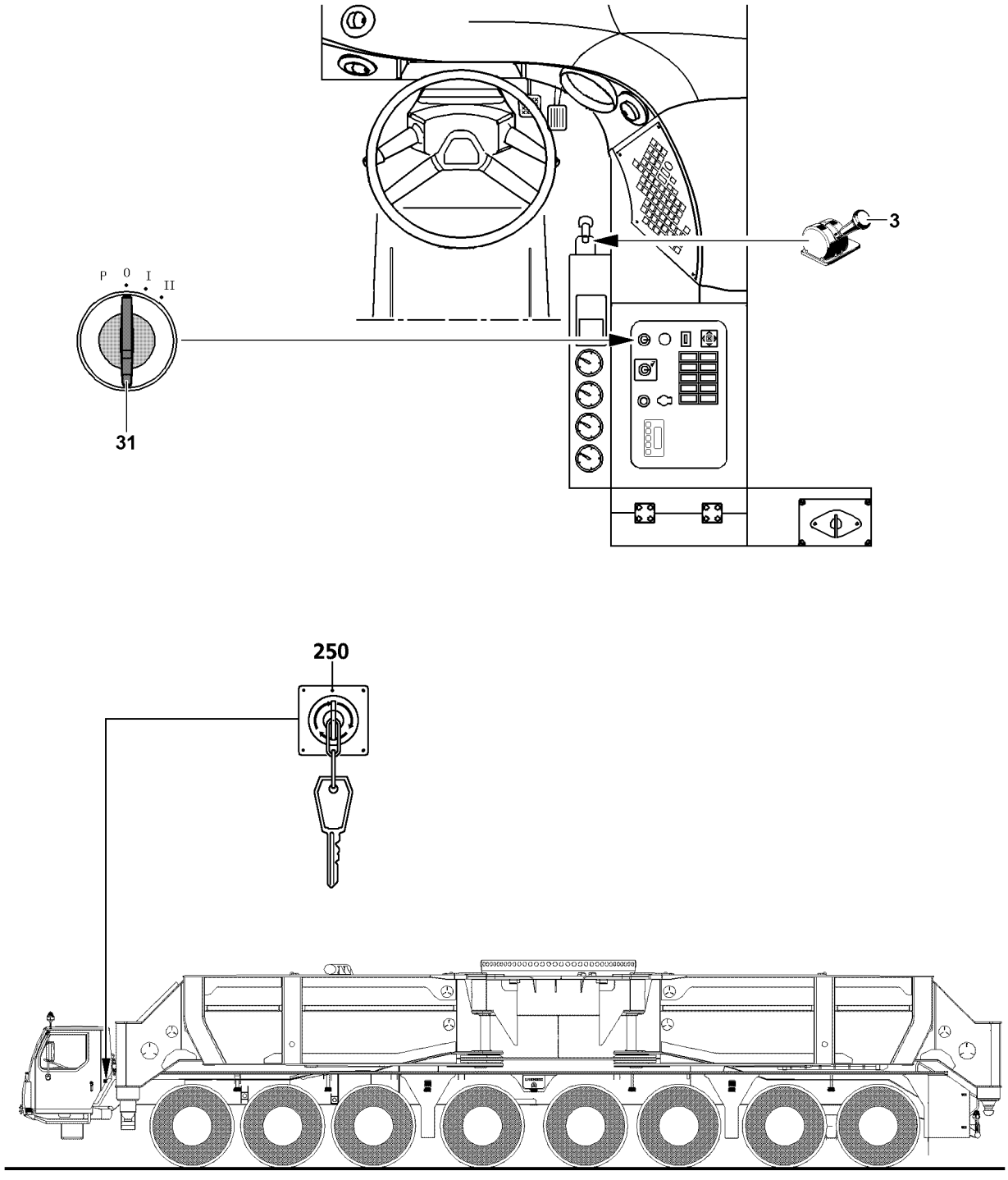

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Fig.116605

2.4 Turning the engine off

NOTICE
Danger of damaging the engine!
In the event of dropping or sharply fluctuating engine oil pressure, reduced performance and speed without a throttle change, the appearance of large amounts of smoke, increasing coolant temperature or suddenly occurring abnormal engine noises the engine can be severely damaged!
▶ Turn the engine off immediately!

See also section „Stopping the vehicle (Parking)“.

Make sure that the following prerequisites are met:
– The parking brake **3** is applied.
– The transmission is in neutral position „N“.

2.4.1 Turning the engine off in the driver’s cab

▶ Turn the ignition switch **31** back to the stop.
▶ Pull the ignition switch **31** off and store it.

2.4.2 Turning off the engine in case of danger

In the event of danger, the engine can be turned off immediately by pressing the emergency stop switch***** **250**.

WARNING
Operation of the emergency stop switch***** **250**!
▶ Only use the emergency stop switch***** **250** in the event of a clear emergency.
▶ Use of the emergency stop switch***** **250** for normal operation is not permitted.

▶ Press the emergency stop switch***** **250**.

Result:

– The engine is turned off immediately.

To turn the emergency stop switch***** **250** off again after activation:
▶ Unlock the emergency stop switch***** **250** with the corresponding key.

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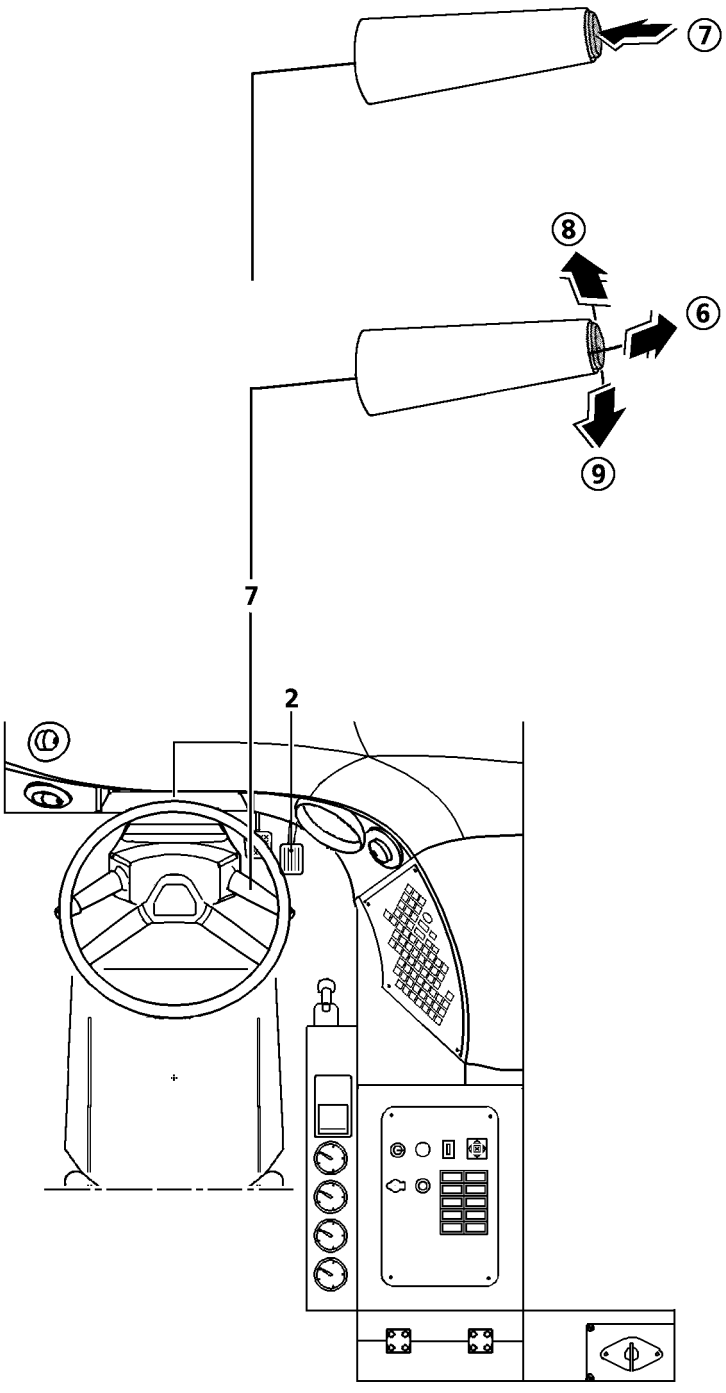

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Fig.108369

3 Driving the crane vehicle

3.1 Changing the idling speed

The idling speed increase will be automatically reduced after preselecting the travel range switch „D“ or „R“.

3.1.1 Changing the idling speed with the steering column switch

If required, the idling speed can be changed with the steering column switch **7** when the vehicle is at a standstill and the transmission is in neutral position „N“.

After the engine is started, the idling speed will be automatically regulated, depending on the coolant temperature.

▶ Hold the steering column switch **7** in position **8**.

Result:

– The idling speed increases cyclically by approx. 50 rpm.

▶ Tap the steering column switch **7** in position **8**.

Result:

– The idling speed increases by approx. 50 rpm.

▶ Release the steering column switch **7**.

Result:

– The engine runs at the attained rpm.

▶ Hold the steering column switch **7** in position **9**.

Result:

– The idling speed reduces cyclically by approx. 50 rpm.

▶ Tap the steering column switch **7** in position **9**.

Result:

– The idling speed reduces by approx. 50 rpm.

▶ Release the steering column switch **7**.

Result:

– The engine runs at the attained rpm.

▶ Tap the steering column switch **7** in position **6**.

Result:

– The idling speed increase is turned off.

3.1.2 Changing the idling speed with engine regulation

▶ Set the idling speed with the engine regulation **2**.
▶ Press button **7**.

Result:

– Engine runs at the set rpm.

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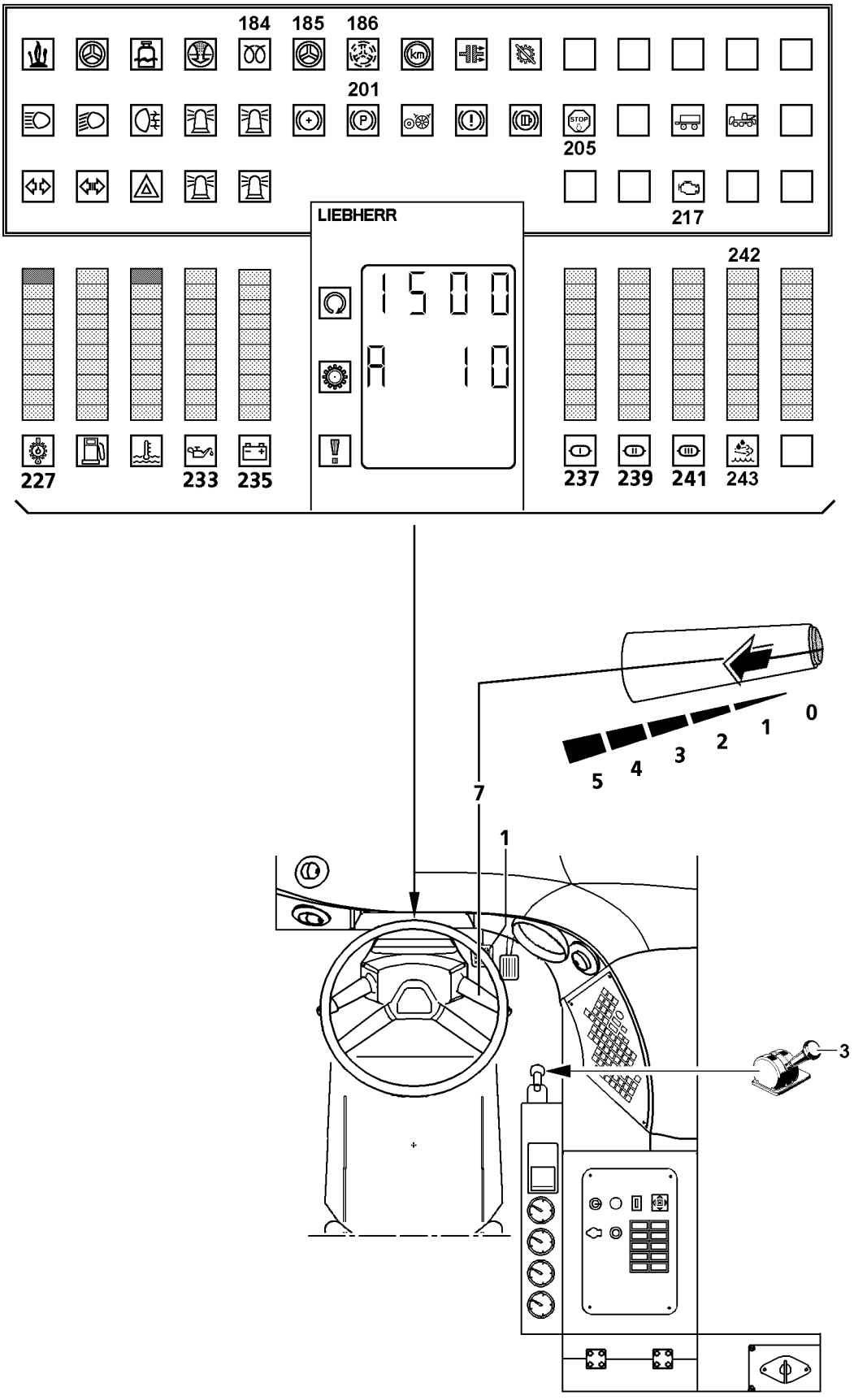

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Fig.116606

3.2 Parking brake

3.2.1 Applying

WARNING
The vehicle can roll off uncontrollably!
If the manual lever **3** is not correctly engaged when the parking brake is applied, then the vehicle can roll off uncontrollably and fatally injure personnel!
▶ Make sure that the hand lever **3** is correctly engaged.
▶ The hand lever **3** may not be permitted to be pushed forward (without being pulled out first)!

▶ Pull the hand lever **3** back until it engages.

Result:

– The parking brake is applied.
– The indicator light **201** lights up.

3.2.2 Releasing

Ensure that the required brake release pressure is present in brake circuit III.

WARNING
The vehicle can roll off uncontrollably!
When the parking brake is released, the crane can start to move immediately and fatally injure personnel!
▶ When the parking brake is released, brake the crane with the service brake or accelerate using the throttle!

▶ Pull the hand lever **3** out to the stop in the lever's longitudinal direction and push forward.

Result:

– The parking brake is released.
– The indicator light **201** turns off.

Problem remedy
The parking brake does not release, even though the manual lever **3** has been pushed forward?
The required brake release pressure is not present in brake circuit III. The warning light **241** lights up.
▶ Pull the hand lever **3** back again.
▶ Fill brake circuit III until the warning light **241** turns off.

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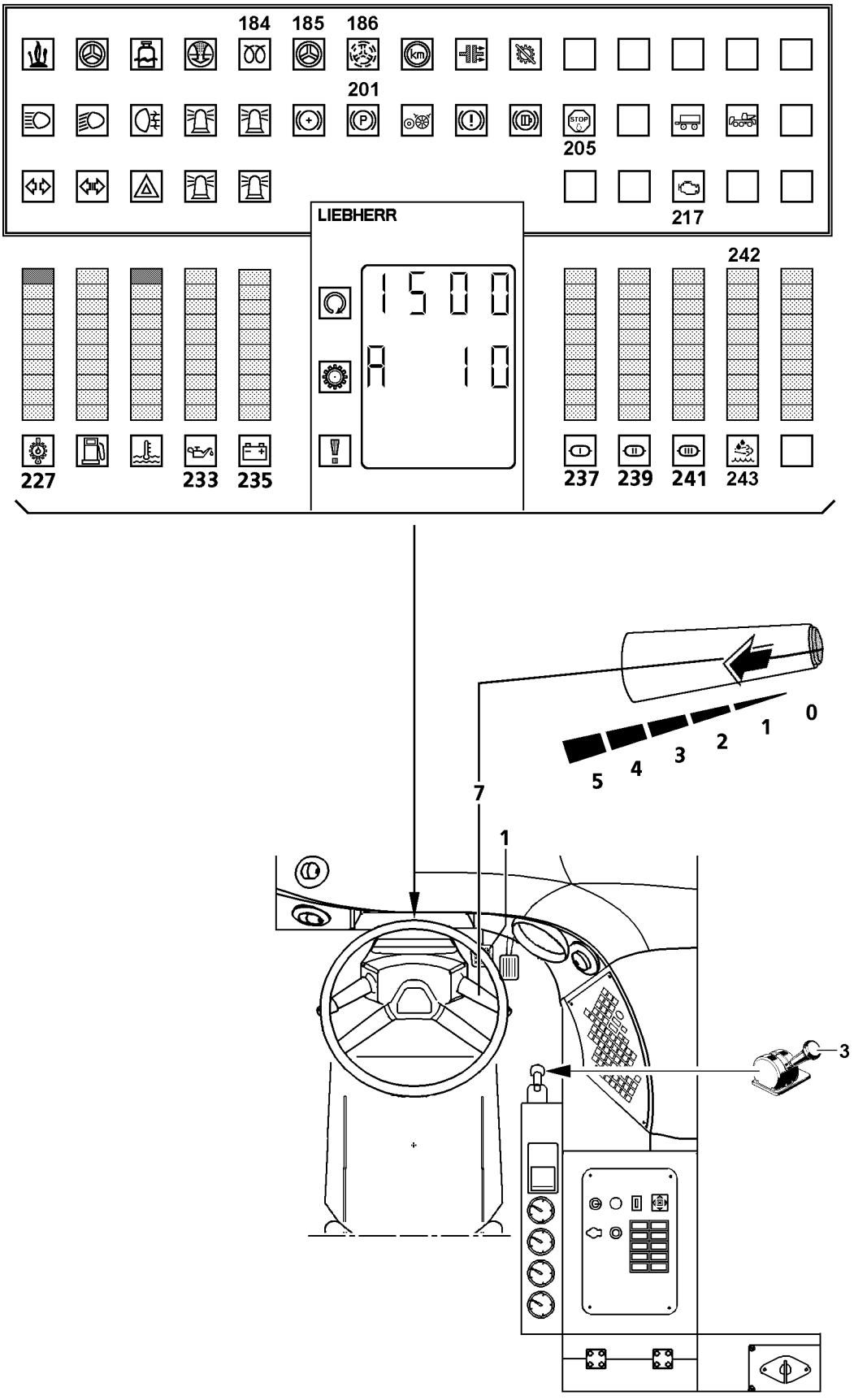

LWE/LG 1750-006/15409-07-02/en

Fig.116606

3.3 Service brake

DANGER
Danger of fatal injury due to defective service brake!
▶ Carry out a brake test immediately after starting to drive!

▶ Depress the pedal **1** and check the service brake.

Result:

– The displays on bar graph **242** and on bar graph **244** must move proportional to the pedal path of the service brake.

3.4 Retarder

The retarder consists of the engine brake, the hydraulic intarder and the eddy current brake.

3.4.1 Operating conditions

The retarder can only be operated with the engine turned on. If the retarder is being actuated, it is not possible to accelerate.

Sensible use of the retarder with foresighted driving methods reduces wear on the service brake and thereby reduces operating costs.

DANGER
The utmost caution should be used when operating the retarder!
▶ Switch through the individual stages one by one while constantly observing the vehicle's handling characteristics!

On long downhill slopes

On long downhill slopes, select a shift that leaves further shift stages available for additional braking procedures, which may be required.

If the braking effect is not sufficient, slow down the vehicle with the service brake and shift down.

On snow, ice and dirty road surfaces

DANGER
Danger of fatal injury!
▶ In the event that the wheels lock when operating the retarder, select a lower shift stage!

Careful use of the retarder will ensure safe and sure deceleration even under bad road surface conditions.

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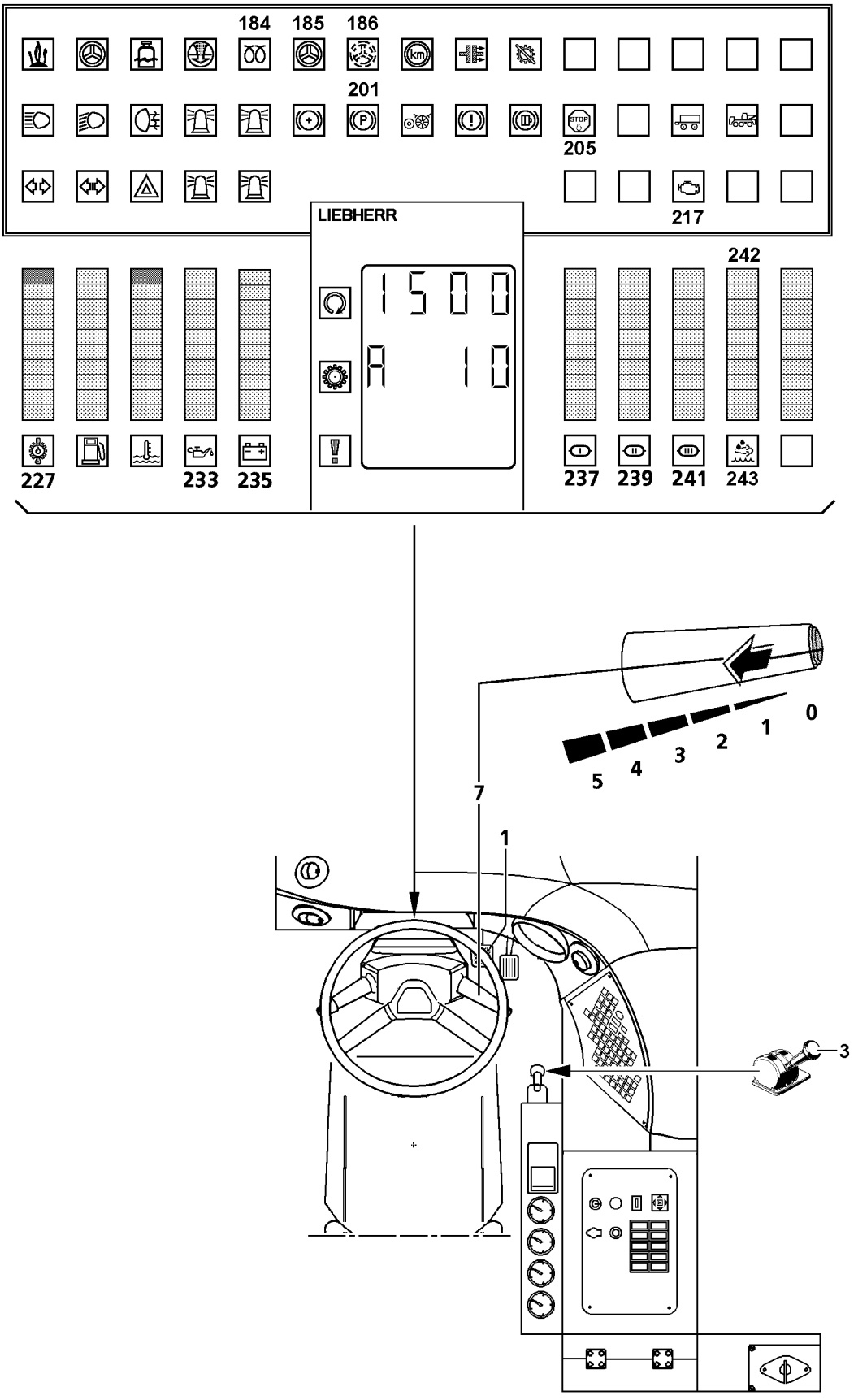

LWE/LG 1750-006/15409-07-02/en

Fig.116606

3.4.2 Operating the retarder

The retarder is operated using the 6-stage steering column switch **7**. Five switch settings are available.

Change the steering column switch **7** stage by stage and not jerkily in order to avoid any overbraking.

▶ Actuate the steering column switch **7**.

Result:

– In switch position 1, the intarder is active. The last travelled speed is retained.
– In switch settings 2 to 5, the intarder, the engine brake and the eddy current brake are active.

If the road surface is wet:
▶ Engage briefly in each shift position to avoid locking the wheels.

WARNING
Danger of overheating!
▶ As soon as the vehicle is stationary or no more deceleration is required, turn off the retarder!

The steering column switch **7** may be reset with one pull without pauses between the stages.

▶ Reset the steering column switch **7** to stage 0.

Result:

– The retarder is turned off.

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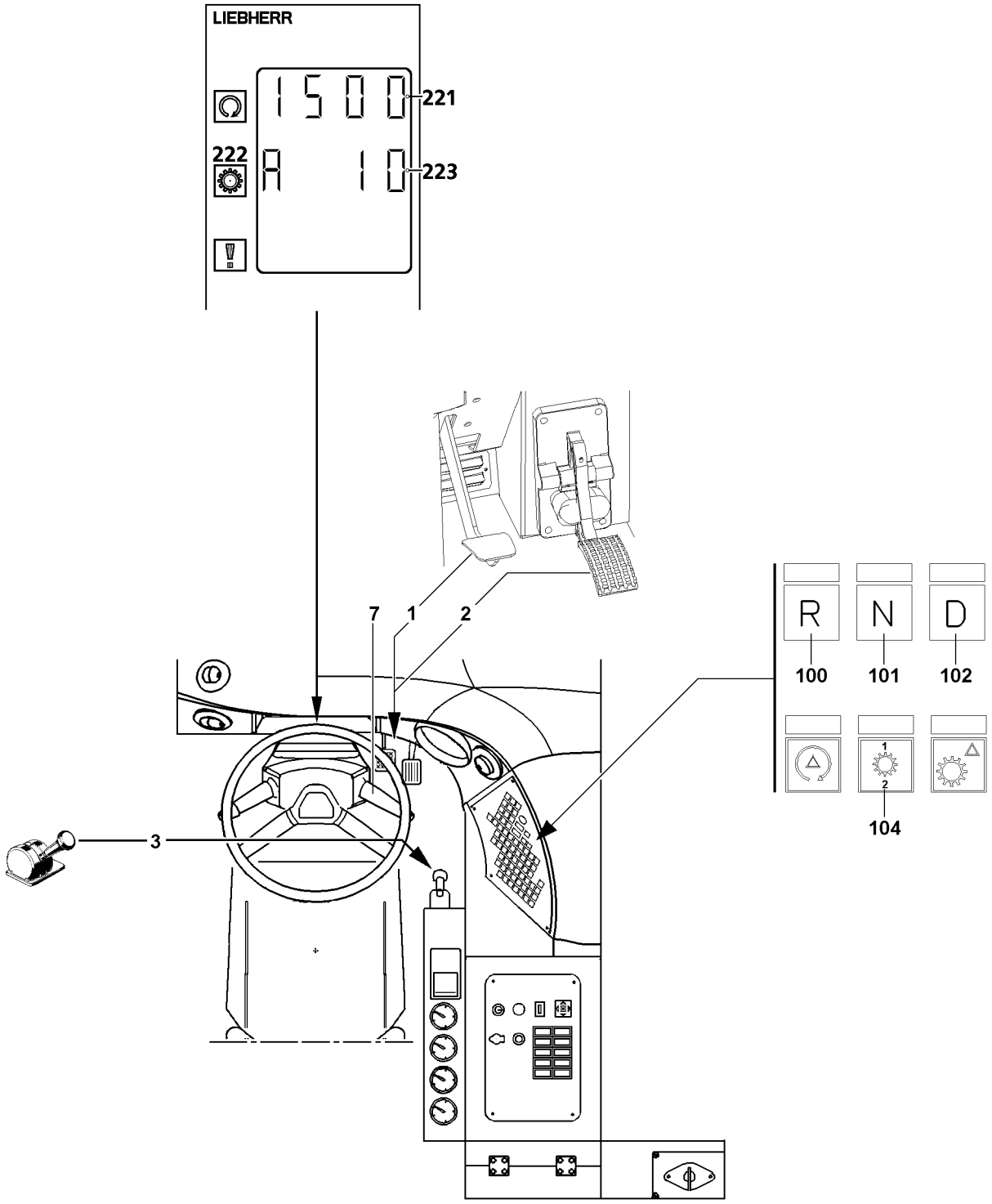

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Fig.116676

3.5 Automatic transmission

3.5.1 General

The automatic transmission can be used in automatic or in manual shift mode. The transmission has 12 forward gears and 2 reverse gears. The current gear positions will be indicated on the display **223**.

3.5.2 Switching between automatic and manual shift mode

When the ignition is turned on, the automatic mode is activated automatically. In the neutral „N“ and reverse „R“ travel range, the manual mode is always activated.

▶ Press button **104** to change between automatic and manual shift mode.

Result:

– The indicator light on button **104** does **not light up**: Automatic mode
– The indicator light on button **104 lights up**: Manual shift mode

3.5.3 Starting to drive

DANGER
Danger of fatal injury due to rolling crane!
When the parking brake **3** is released, the vehicle starts to roll immediately.
▶ When the parking brake **3** is released, brake the crane with the service brake **1** or accelerate using the throttle **2**!

The starting gear is automatically set by the transmission according to the preceding travel resistance. It can be manually corrected upwards as far as 4th gear or downwards as far as 1st gear. To do so, change to manual shift mode. Thereafter it is possible to change immediately back to automatic mode.

In starting mode, the dry clutch is open in case of non-activated throttle. The dry clutch will close if the throttle is lightly opened. The vehicle obtains a propulsive thrust from the converter which becomes greater, the lower the selected starting gear is.

Make sure that the following prerequisites are met:
– The crane is at a standstill.
– The transmission is in neutral position „N“.
– The parking brake **3** has been applied.

▶ Apply the service brake **1** gently.
▶ Select the travel range using button R **100** for reverse or button D **102** for forward.

If necessary:
▶ Correct the starting gear.
▶ Release the service brake **1**.
▶ Activate the engine regulation **2** gently.

Result:

– The dry clutch closes. This is indicated by a slight jerk.

▶ Release the parking brake **3** and activate engine regulation **2** as required.

Result:

– The vehicle begins to roll.

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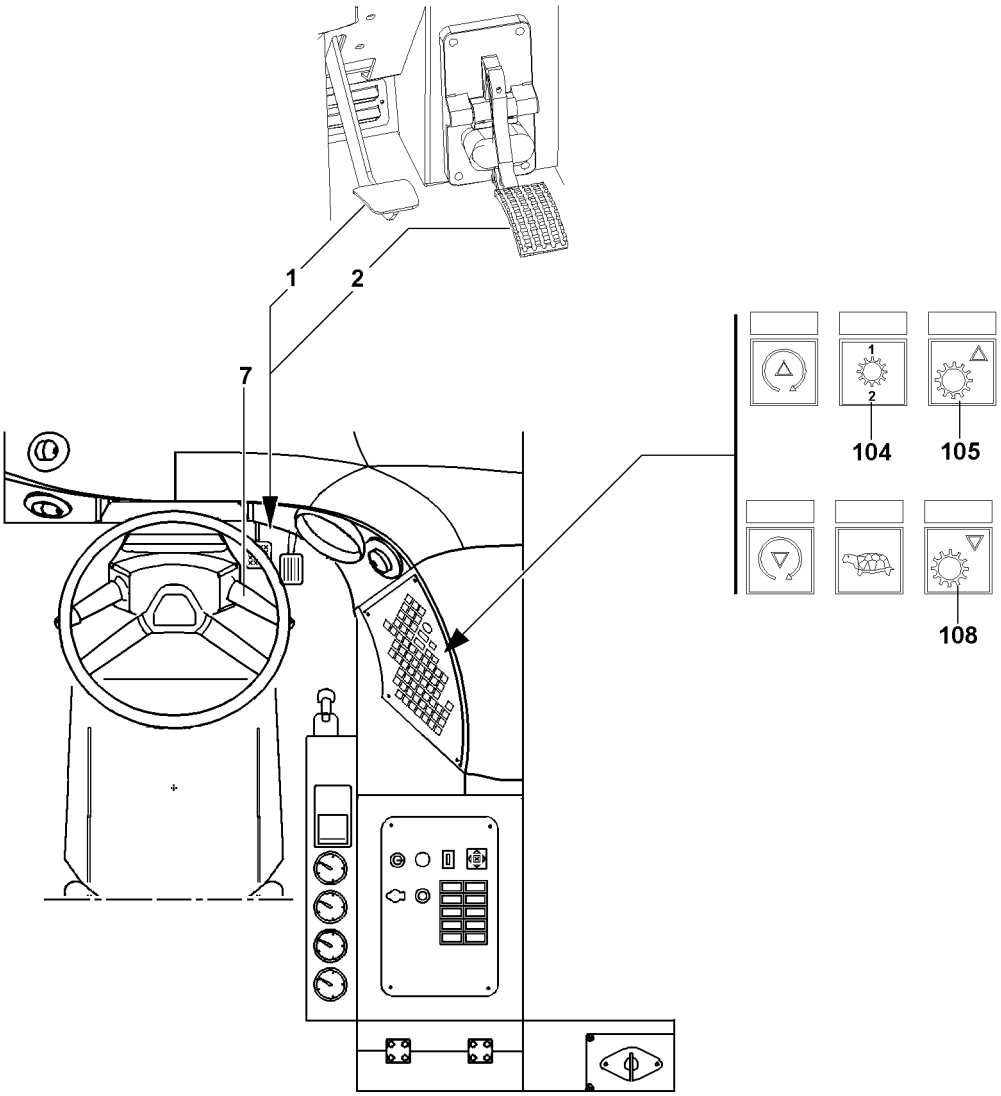

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Fig.105640

3.5.4 Uphill or downhill driving

If the engine regulation **2** is brought back to the 0 position due to the traffic situation on ascending and descending gradients, the transmission initially switches back to the starting gear. Shortly before the vehicle comes to a stop in this gear, the dry clutch is released and the tractive power or brake force is interrupted. This can result in the vehicle suddenly rolling back or accelerating. Operating the engine regulation **2** again will not immediately provide tractive power, since the dry clutch must be closed first.

On uphill slopes:

▶ Apply the service brake **1** after releasing the dry clutch.

On a descending gradient, expect a reduction in braking effort when opening the dry clutch:

▶ Apply the service brake **1** more firmly.

3.5.5 Driving downhill with an ascending gradient following on shortly afterwards

In the event of driving downhill with an ascending gradient following on shortly afterwards, the automatic transmission does not immediately recognize that the vehicle is located on an ascending gradient.

▶ Press the button **104**.

Result:

– The manual shift mode is engaged.

▶ Shift down using the steering column switch **7**.
or
Shift down using button **108**.
▶ Select the gear according to the slope.
▶ Press the button **104**.

Result:

– The automatic mode will be engaged.

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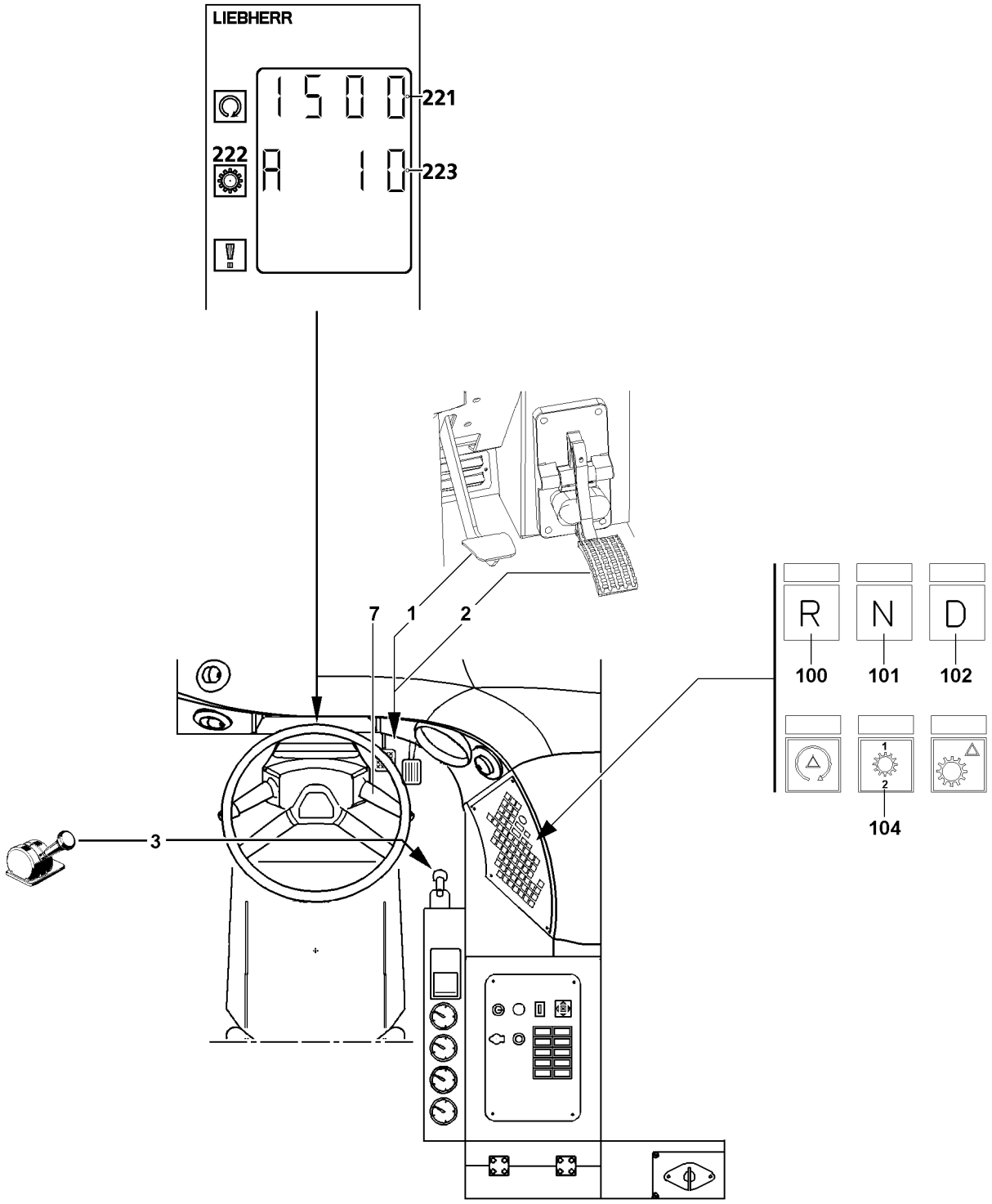

LWE/LG 1750-006/15409-07-02/en

Fig.116676

3.5.6 Selecting the driving direction

Make sure that the vehicle is at a standstill.

Reverse driving direction „R“

This setting is used to move the vehicle backwards.

▶ Press the button **100**.

Result:

– The indicator light on button **100** lights up.

Neutral position „N“

This setting is used to start the engine and for idling operation.

Use the neutral position also if the vehicle is not occupied and the engine is running.

DANGER
Danger of fatal injury due to rolling crane!
▶ In the event that the driver is required to leave the crane while the engine is running, ensure that the parking brake is applied correctly and that the wheels are chocked!

▶ Press the button **101**.

Result:

– The indicator light on button **101** lights up.
– The indicator light **222** lights up.

Driving direction forward „D“

This driving range is selected for general driving in a forward direction.

▶ Press the button **102**.

Result:

– The indicator light on button **102** lights up.

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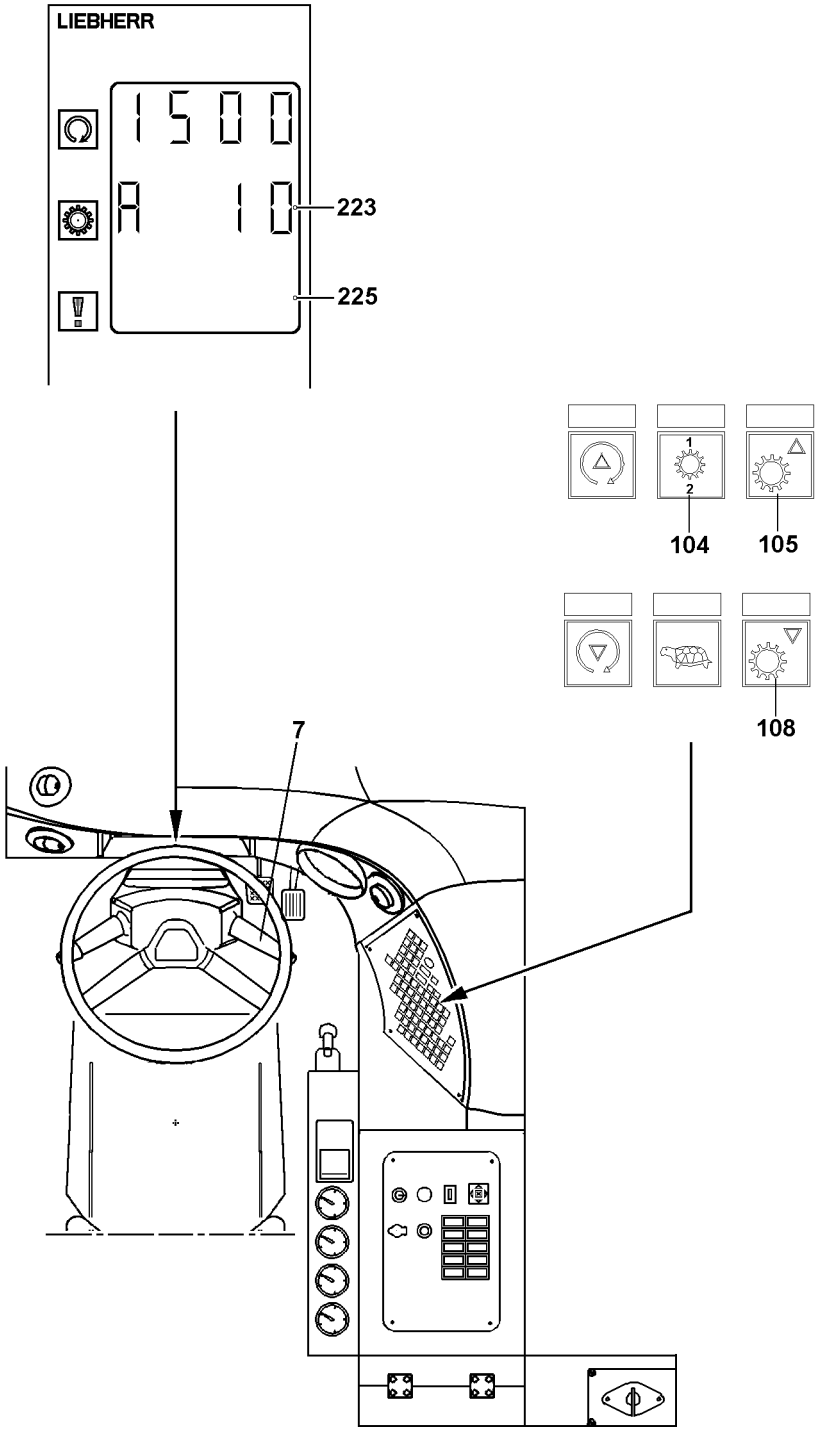

Fig.108372

3.5.7 Automatic mode

In automatic mode, the driver operates only the engine regulation or the brake. Gear shifts are carried out automatically by the system depending on driving condition and usage. Depending on the preset driving direction, the transmission automatically selects a starting gear. It can be manually adjusted to the driving conditions.

Apply the service brake before switching from neutral „N“ to a travel range. If this is not done, an acoustic warning signal sounds and an operating instruction appears on the display unit **225**.

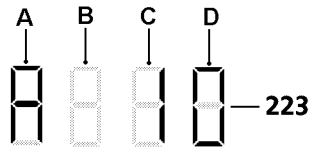

Fig.197532

The display **223** contains the following information:
- **A** Automatic mode:
- **B** Not assigned:
- **C** Gear engaged:
- **D** Gear engaged:

3.5.8 Manual shift mode

In manual mode the gears are selected by the driver using the steering column switch **7** or the button **105** and the button **108**.

Apply the service brake before switching from neutral „N“ to a travel range. If this is not done, an acoustic warning signal sounds and an operating instruction appears on the display unit **225**.

In manual shift operation, it is not possible to drive with the Tempomat or Temposet.

If an attempt is made to shift up in the 12th forward gear or an attempt is made to shift down in the 1st forward gear or the 1st reverse gear, an acoustic signal is heard and an operating instruction appears on the display unit **225**.

In the event that an attempt is made to shift down further than the gear permitted by the transmission, an acoustic signal will sound and a notice will appear on the display unit **225**.

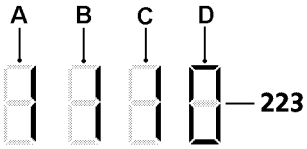

Fig.197533

The display **223** contains the following information:
- **A** Gear selected:
- **B** Gear selected:
- **C** Gear engaged:
- **D** Gear engaged:

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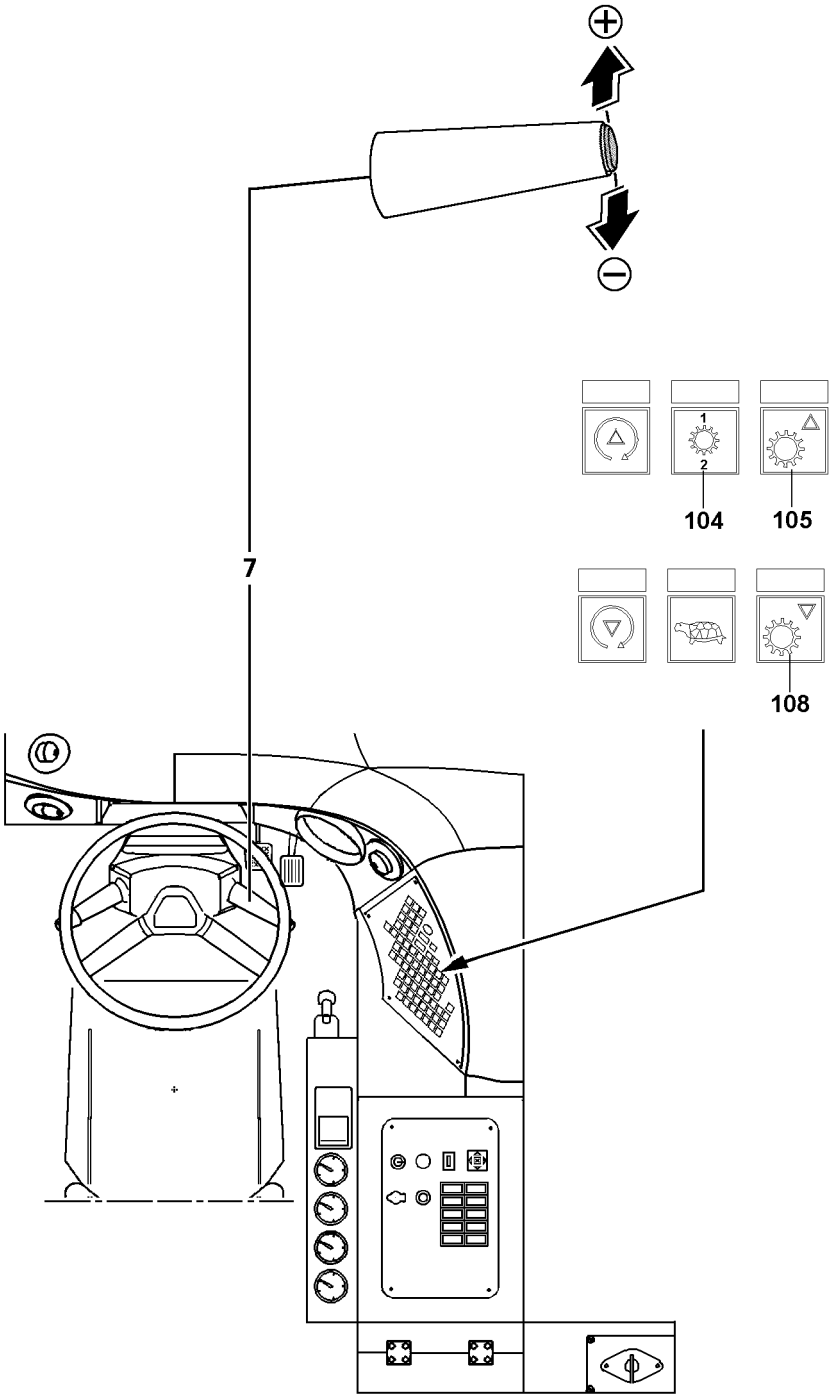

LWE/LG 1750-006/15409-07-02/en

Fig.105642

Selecting the gear with the steering column switch

The steering column switch can be used to shift through one or more gears simultaneously. The steering column switch returns to the initial setting after each operation.

Shifting up

▶ Push the hand lever **7** briefly upward.

Result:

– Shift up by one gear.

▶ Push the hand lever **7** up and hold.

Result:

– The gears are shifted up cyclically in 1/2 second intervals.

Shifting down

▶ Push the hand lever **7** briefly downward.

Result:

– Shift down by one gear.

▶ Push the hand lever **7** downward and hold.

Result:

– The gears are shifted down cyclically in 1/2 second intervals.

Selecting the gear with the buttons

With button **105** and button **108**, can be one or more gears shifted up or down simultaneously.

Shifting up

▶ Press the button **105** briefly.

Result:

– Shift up by one gear.

▶ Press and hold button **105**.

Result:

– The gears are shifted up cyclically in 1/2 second intervals.

Shifting down

▶ Press the button **108** briefly.

Result:

– Shift down by one gear.

▶ Press and hold button **108**.

Result:

– The gears are shifted down cyclically in 1/2 second intervals.

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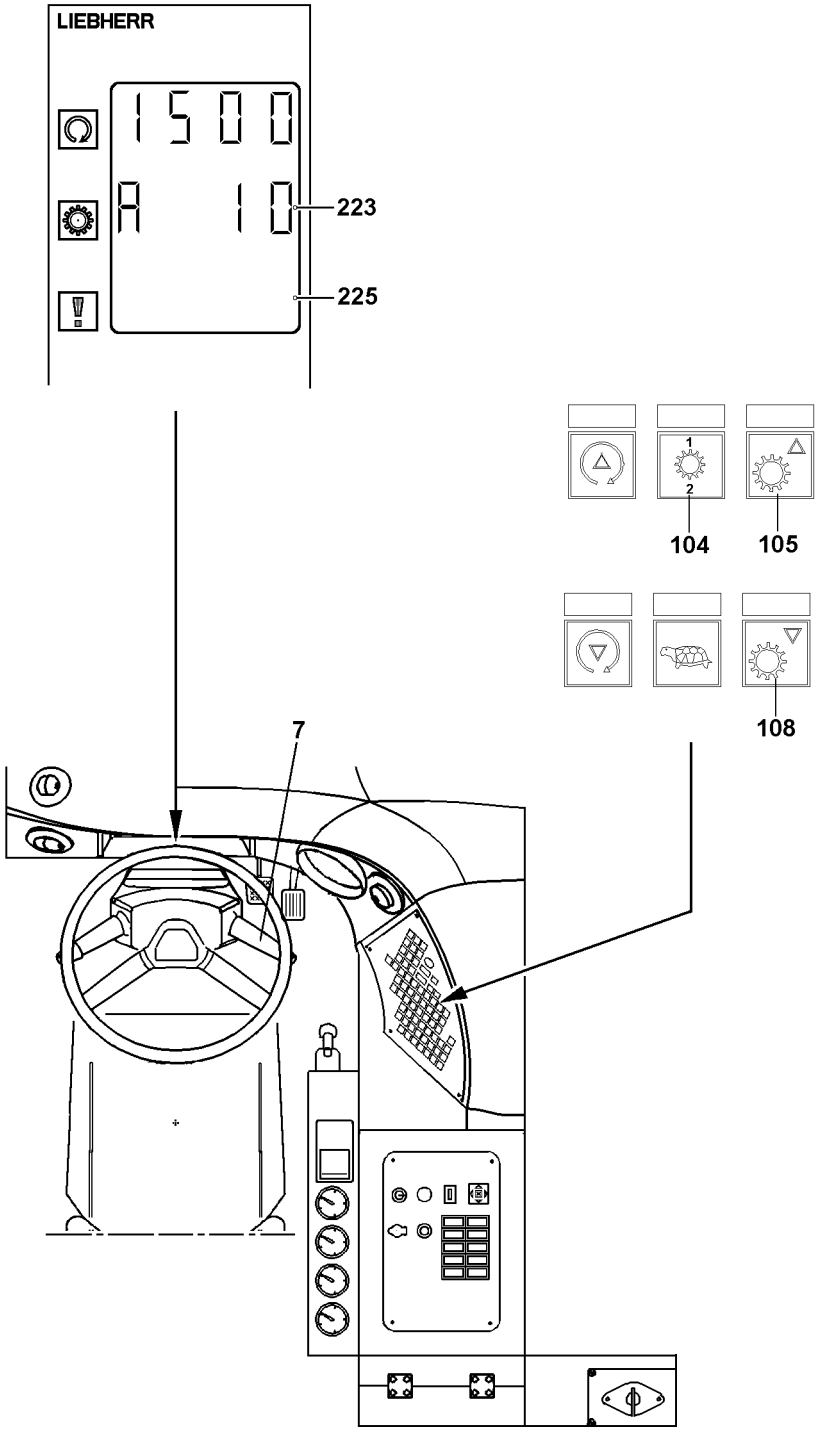

Fig.108372

3.5.9 Warning display

Transmission error

The transmission carries out a self-check as soon as the ignition is turned on. If there is a transmission error, the error message „CH“ will appear on the display **223** either immediately or soon after the ignition has been turned on.

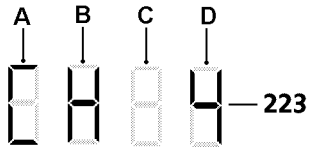

Fig.197535

The display **223** contains the following information:
– **A** Transmission error:
– **B** Transmission error:
– **C** Gear engaged:
– **D** Gear engaged:

▶ Turn the engine off and remedy the transmission error.

Loss of air pressure

In the event of loss of air pressure, the transmission may no longer be able to shift.

This is shown via the display **223** „AL“.

The engine will stall if the clutch does not open due to insufficient air pressure when stopping.

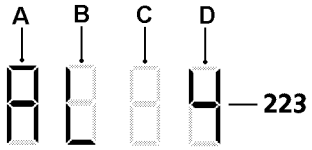

Fig.197536

The display **223** contains the following information:
– **A** Loss of air pressure:
– **B** Loss of air pressure:
– **C** Gear engaged:
– **D** Gear engaged:

▶ Start to drive only if there is sufficient air pressure.

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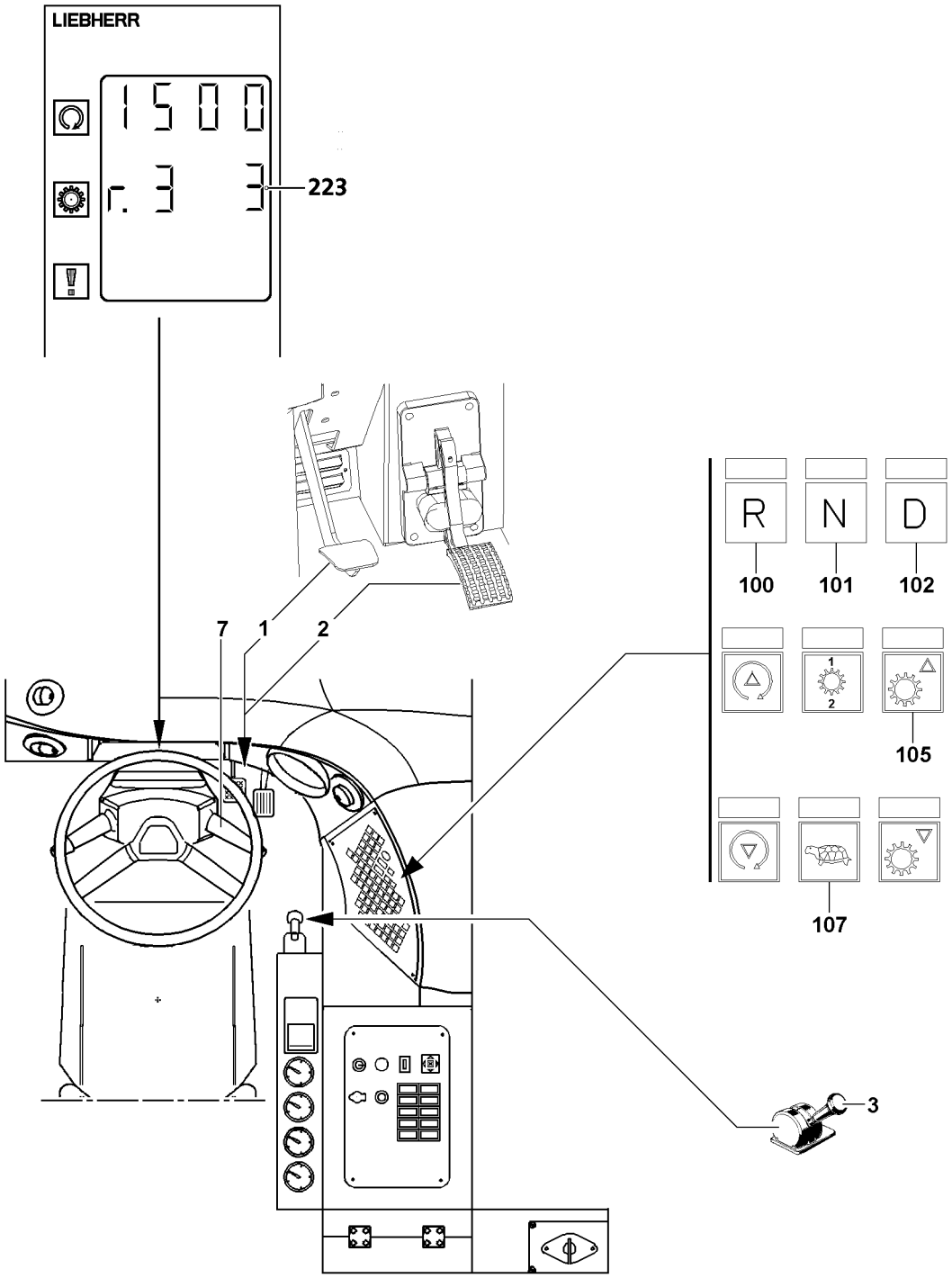

Fig.116607

3.6 Maneuvering mode

The maneuvering mode is only designed for the following driving situations:
- Slow driving (maneuvering) in restricted spaces.
- Slow parking in and out.
- Driving mode with the equipment in place.
- Starting to drive on uphill gradients.

NOTICE
Damage to transmission!
If the maneuvering mode is added when the vehicle is stuck, the transmission can be damaged!
▶ Maneuvering mode with a stuck crane vehicle is prohibited!
▶ Only select the maneuvering mode when absolutely necessary!

3.6.1 Enabling the maneuvering mode

When the maneuvering mode is selected, the 3rd gear is automatically placed. The gears V4, V2 and V1 and R1 or R2 can be manually selected as required.

In maneuvering mode, the dry clutch closes independently of the accelerator pedal position after the relevant gear has been placed.

Make sure that the following prerequisites are met:
- The crane is at a standstill.
- The transmission is in neutral position „N“.
- The parking brake **3** has been applied.

▶ Apply the service brake **1** gently and hold down.
▶ Actuate the button **100** for reverse driving or the button **102** for forward driving.
▶ Press the button **107**.

Result:

- The maneuvering mode is added.
- The transmission automatically selects 3rd gear and the clutch engages. This is indicated by a slight jerk.

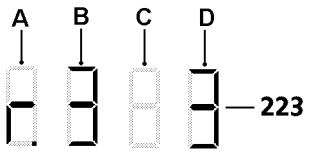

Fig.103497

The display **223** contains the following information:
- **A** Maneuvering mode:
- **B** Gear selected:
- **C** Not assigned:
- **D** Gear engaged:

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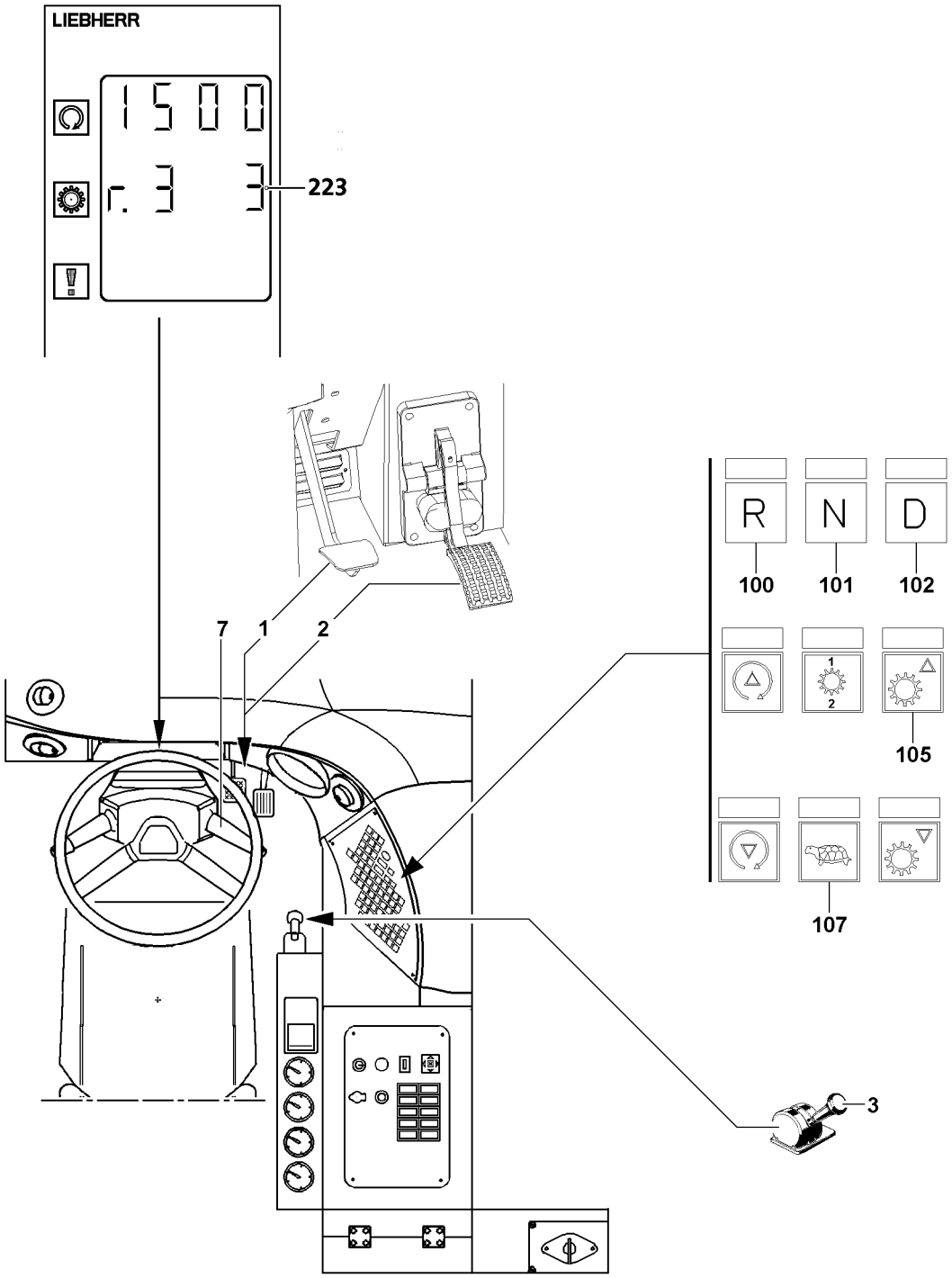

Fig.116607

▶ Release the parking brake **3**.
▶ Release the service brake **1**.

Result:

– The vehicle begins to move.
  The lower the gear, the higher the acceleration.

If the vehicle is to be driven at higher speeds and under conditions of higher driving resistances (loose subsoil and / or an ascending gradient):
▶ Activate the engine regulation **2**.

If necessary:
▶ Actuate the steering column switch **7** or button **105** or button **108** and place another gear.

Note
Driving in torque converter mode!
Driving in torque converter mode creates heat which is discharged through the converter oil!
▶ When driving under conditions of high driving resistance such as on loose subsoil and / or steep ascending gradients, monitor the temperature of the torque converter oil!

If the temperature of the torque converter oil is too high:
▶ Let the torque converter oil cool off with the gear in neutral position and at increased engine rpm.

3.6.2 Turning off

▶ Press the button **107**.

Result:

– The maneuvering mode is turned off.

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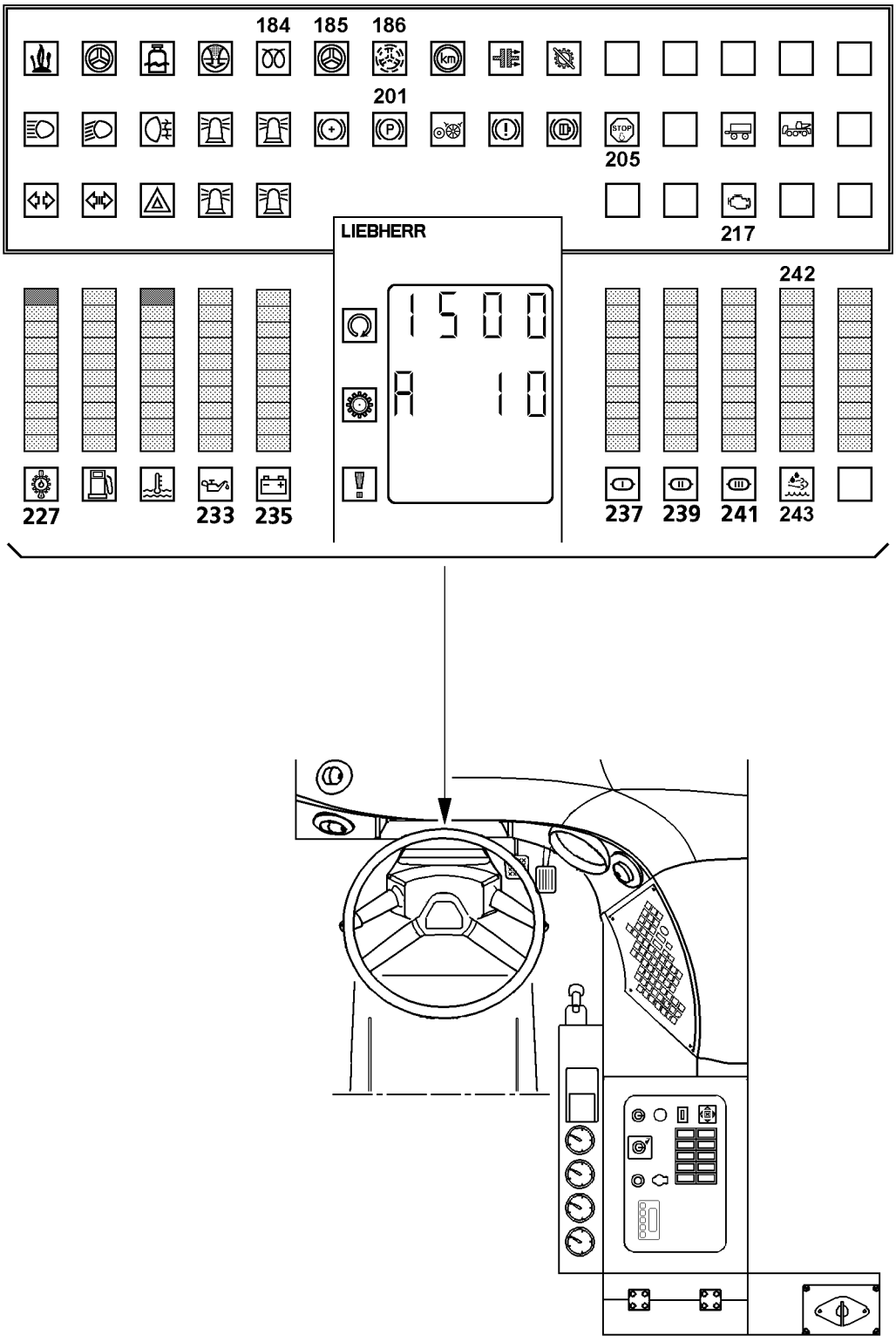

LWE/LG 1750-006/15409-07-02/en

Fig.116677

3.7 Important indicator instruments while driving

3.7.1 Checking the steering circuit

At a driving speed of approximately 10 km/h the warning light **186** turns off.

▶ Check the warning light **186**.

Problem remedy
Are warning light **185** and warning light **186** blinking?
A sensor error is present.
▶ Remedy the cause of the error.

Problem remedy
The warning light **186** does not turn off?
The steering circuit is not functioning.
▶ Immediately bring the crane to a standstill and remedy the cause of the problem.

3.7.2 Checking the engine oil pressure

Engine oil pressure display on bar graph **232** from 0 bar to 10 bar.

▶ Check the warning light **233** and the bar graph **232**.

Problem remedy
Does the oil pressure drop while driving and not increase even when increasing the rpm?
The engine is not lubricated if there is insufficient or no oil pressure. This causes engine damage.
▶ Bring the crane to a standstill immediately and turn the engine off.

3.7.3 Checking compressed air supply I, II and III

The warning lights **237, 239, 241** do not light up.

▶ Check the warning lights **237, 239, 241**.

Problem remedy
All or one of the warning lights **237, 239, 241** light up?
The brake system is not operational.
▶ Immediately bring the crane to a standstill and remedy the cause of the problem.

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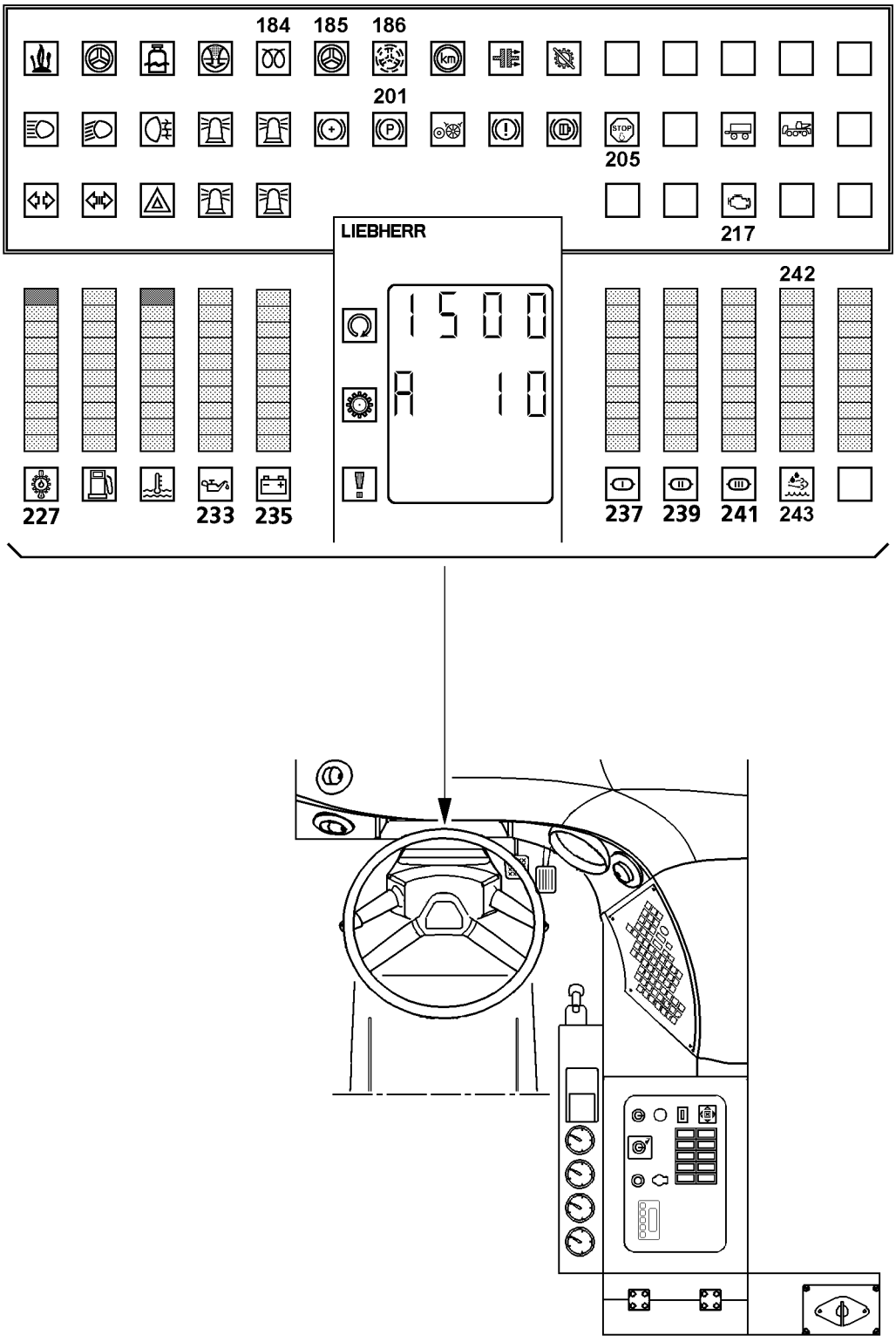

LWE/LG 1750-006/15409-07-02/en

Fig.116677

3.7.4 Checking the fuel reserve

Do not drive until the fuel tank is empty, otherwise the fuel system will have to be bled.

Fuel quantity displayed on bar graph **228** in percent (%), 0 to 100 %

If the fuel reserve is below 10 % (approx. 34 l) the yellow indicator light **229** lights up.

▶ Check the indicator light **229**.

If the yellow indicator light **229** lights up:
▶ Add fuel to the fuel tank.

Problem remedy
The indicator light **229** blinks.
A sensor error is present.
▶ Remedy the error.

3.7.5 Checking the urea reserve

Display of the urea quantity on bar graph **242** in percent (%), 0 to 100 %

If the urea quantity is too low, the yellow indicator light **243** lights up.

▶ Check the indicator light **243**.

Problem remedy
When the indicator light **243** lights up yellow:
Urea reserve is getting low.
▶ Add urea.

Problem remedy
When the indicator light **243** blinks:
Urea reserve is almost empty.
▶ Add urea.

3.7.6 Checking the coolant temperature

Display of coolant temperature on bar graph **230** from 30 °C to 120 °C.

▶ Check the warning light **231** and the bar graph **230**.

If the coolant temperature is too high while driving:
▶ First try to reduce the temperature to the permissible range of between 85 °C and 90 °C first by load reduction and engine rpm increase.

Problem remedy
Does the warning light **231** light up while driving?
Excessive coolant temperature causes excessive engine temperature. This causes engine damage.
▶ Bring the crane to a standstill immediately and turn the engine off.

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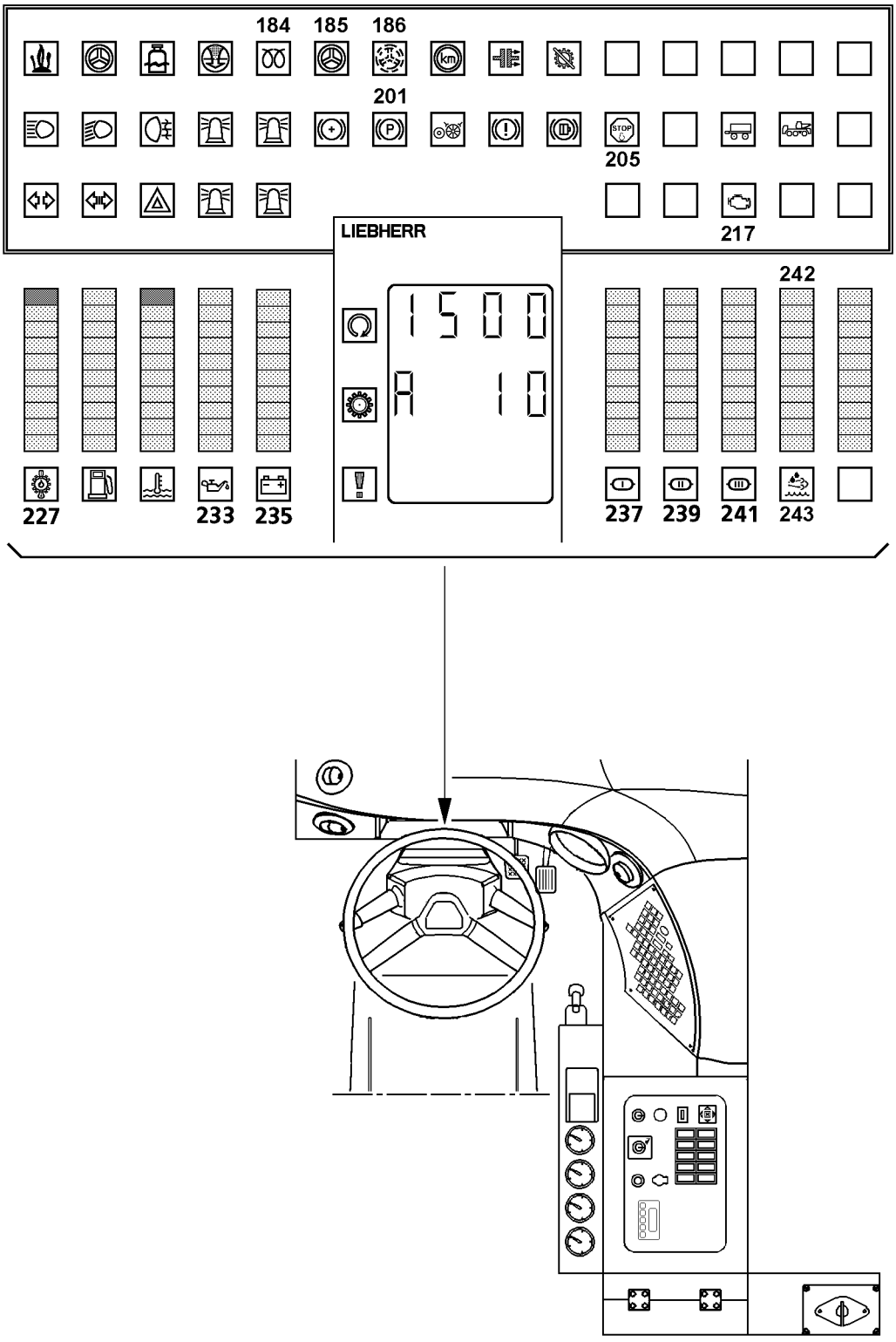

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Fig.116677

3.7.7 Checking the gear oil temperature

Display of gear oil temperature on bar graph **226** from 50 °C to 140 °C.

The temperature display on bar graph **226** must be within the approved range for normal driving mode.

▶ Check the warning light **227** and bar graph **226**.

Problem remedy
Does the warning light **227** blink?
A sensor error is present.
▶ Remedy the error.

Problem remedy
Does the warning light **227** light up while driving?
▶ Bring the crane to a standstill immediately and turn the engine off.

Problem remedy
Does the display on bar graph **226** reach the red zone?
▶ Immediately bring the crane to a standstill.
▶ Shift the transmission into neutral position „N“.
▶ Allow engine to run at approx. 1500 rpm.

If the oil temperature does **not** drop into the approved temperature range within a short time:
▶ Turn the engine off completely.

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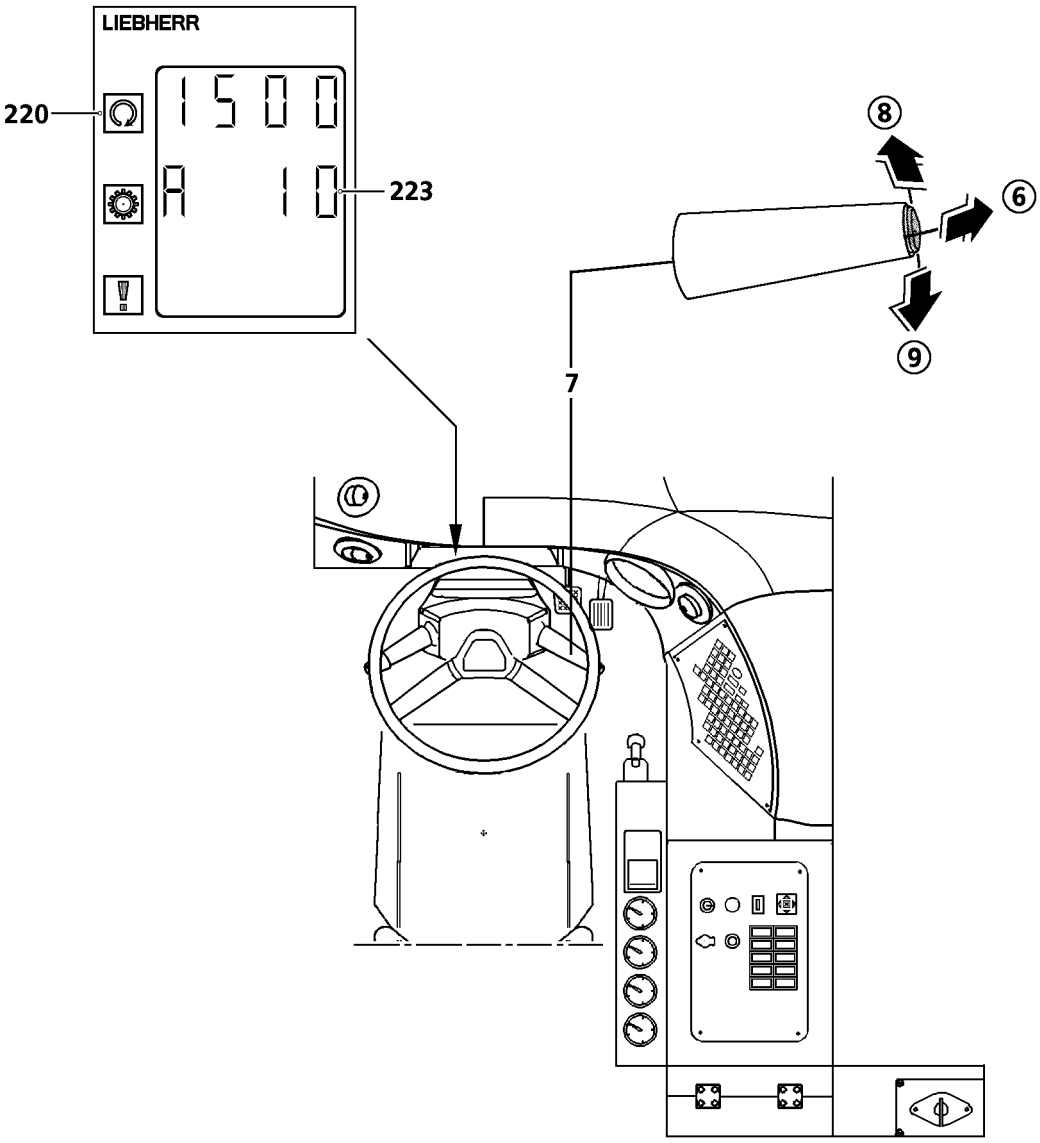

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Fig.108374

3.8 Tempomat

A driving speed of more than 20 km/h can be stored using the Tempomat. The Tempomat is operated with the steering column switch **7**. When the Tempomat is activated, the indicator light **220** lights up and the speed setting will be indicated for a brief period on the display **223**.

Use the Tempomat only when traffic conditions permit a steady speed. It may not be possible to maintain the speed on ascending or descending gradients.

Take the foot off the gas pedal when the Tempomat is turned on.

DANGER
Danger of skidding on slippery road surfaces!
▶ Do not use Tempomat on slippery road surfaces!

Make sure that the following prerequisites are met:
- The automatic mode is turned on.
- The driving speed is greater than 20 km/h.
- The service brake and the retarder are not activated.

3.8.1 Saving the Tempomat speed

Ensure that Tempomat is not activated.

▶ Accelerate the vehicle to the desired speed.
▶ Operate the steering column switch **7** in direction **8** or direction **9**.

Result:

– The stored speed will be briefly indicated on the display **223**.
– The indicator light **220** lights up.

3.8.2 Displaying the current Tempomat speed

Ensure that Tempomat is activated. The indicator light **220** lights up.

▶ Operate the steering column switch **7** in direction **8** or direction **9**.

Result:

– The stored speed will be briefly indicated on the display **223**.

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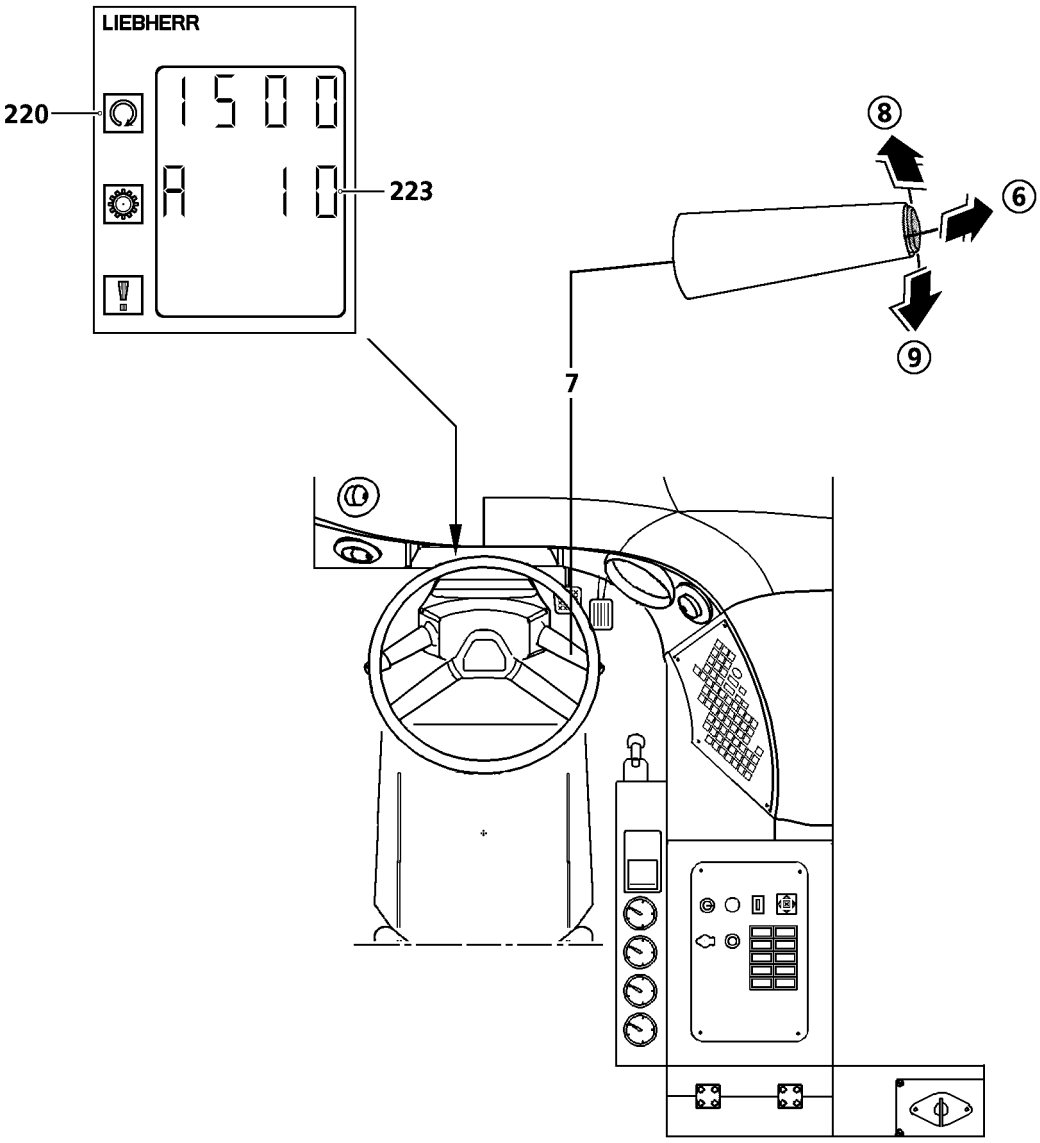

LWE/LG 1750-006/15409-07-02/en

Fig.108374

3.8.3 Changing the current Tempomat speed

▶ Operate the steering column switch **7** in direction **8 and** again within 10 seconds in direction **8**.

Result:

– The speed is increased by 2 km/h.

▶ Hold the steering column switch **7** in position **8**.

Result:

– The speed is continuously increased by 2 km/h.

▶ Operate the steering column switch **7** in direction **9 and** again within 10 seconds in direction **9**.

Result:

– The speed is reduced by 2 km/h.

▶ Hold the steering column switch **7** in position **9**.

Result:

– The speed is continuously reduced by 2 km/h.

3.8.4 Turning the Tempomat off

▶ Accelerate the engine regulation for more than 10 sec.

If the engine regulation is used to accelerate for less than 10 sec. , the crane will brake back to the speed stored in the Tempomat when the engine regulation is released.

The stored speed is deleted when the ignition switch is turned back to position „0“.

▶ Move the steering column switch **7** in direction **6**.
▶ Apply the service brake or retarder.
▶ The speed drops below 10 km/h.

3.8.5 Reusing the old Tempomat speed

If the Tempomat has been turned off but the ignition switch has not been turned back to „0“, the previous driving speed can be resumed.

▶ Move the steering column switch **7** in direction **9**.

Result:

– The speed will blink on the display **223**.

▶ Move the steering column switch **7** again in direction **9 within 2 seconds**.

Result:

– The displayed speed will be resumed.

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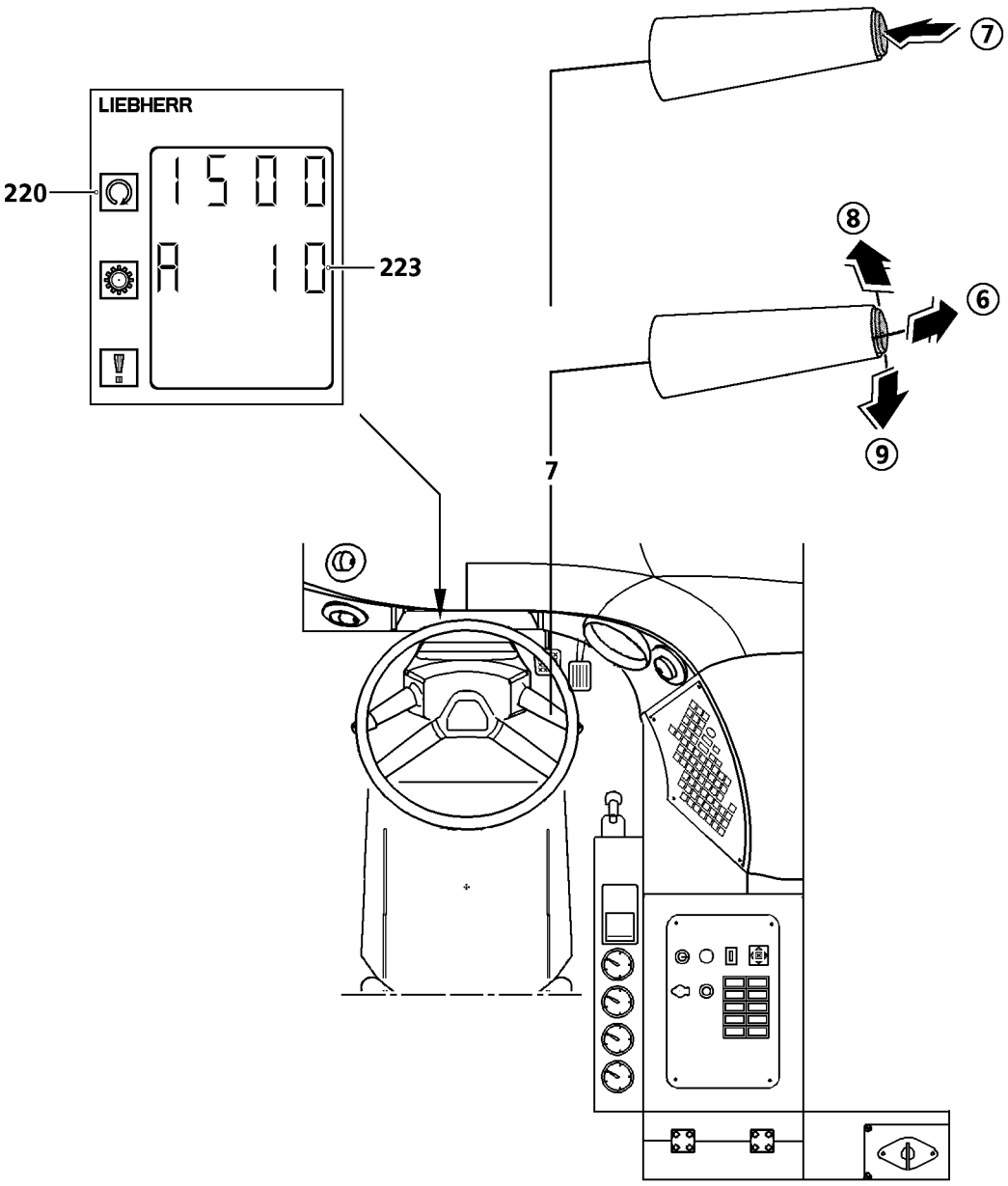

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Fig.108375

3.9 Temposet

With the Temposet, the driving speed can be limited from a speed of 10 km/h. The Temposet is operated with the steering column switch **7**. When the Temposet is activated, the indicator light **220** lights up and the speed setting will be indicated for a brief period on the display **223**.

Make sure that the following prerequisites are met:
- The automatic mode is turned on.
- The driving speed is greater than 10 km/h.

3.9.1 Saving the Temposet speed

Ensure that Temposet is not activated.

▶ Accelerate the vehicle to the desired speed.
▶ Press the button **7**.

Result:

– The stored speed will be briefly indicated on the display **223**.
– The indicator light **220** lights up.

3.9.2 Displaying the current Temposet speed

Ensure that Temposet is activated. The indicator light **220** lights up.

▶ Press the button **7**.

Result:

– The stored speed will be briefly indicated on the display **223**.

3.9.3 Changing the current Temposet speed

▶ Press the button **7** and move the steering column switch **7** in direction **8**. Within 10 seconds, push it in direction **8** again.

Result:

– The speed is increased by 2 km/h.

▶ Press the button **7** and hold the steering column switch **7** in position **8**.

Result:

– The speed is continuously increased by 2 km/h.

▶ Press the button **7** and move the steering column switch **7** in direction **9**. Within 10 seconds, push it in direction **9** again.

Result:

– The speed is reduced by 2 km/h.

▶ Press the button **7** and hold the steering column switch **7** in position **9**.

Result:

– The speed is continuously reduced by 2 km/h.

3.9.4 Turning the Temposet off

The Temposet speed is deleted at ignition starter switch position „0“ and the vehicle-specific speed is activated.

▶ Push the steering column switch **7** for more than 3 seconds in direction **6**.

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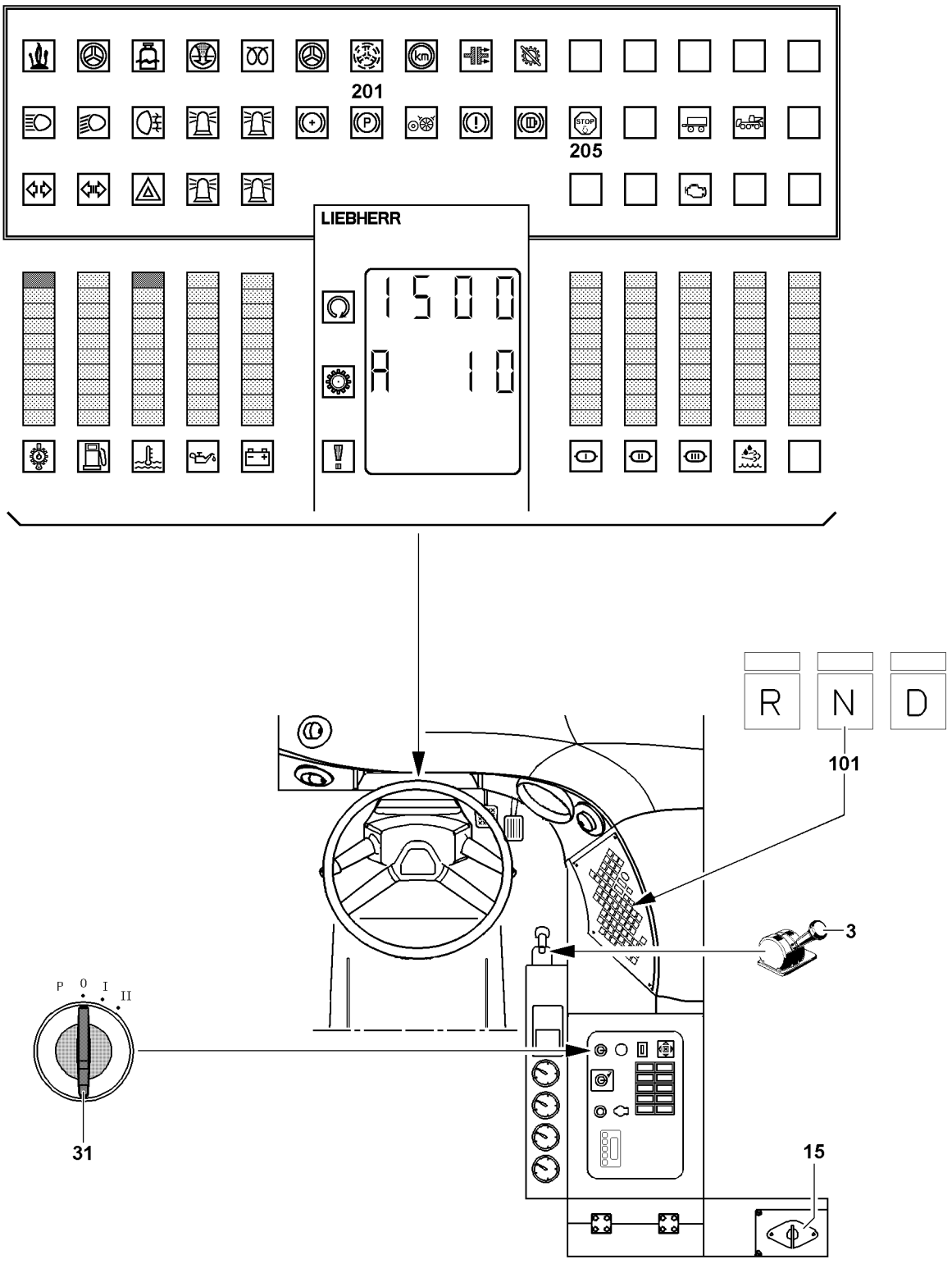

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Fig.116608

3.10 Ending driving

NOTICE
Inadequate lubrication will damage the automatic transmission!
Do not let the vehicle roll out in neutral position, this eliminates the engine braking action and the gear lubrication is insufficient!
The automatic transmission can be severely damaged!
▶ Do not shift the vehicle to neutral until it is at a standstill!

3.10.1 Stopping

▶ Slow down the crane until it comes to a standstill.
▶ The selected driving range can remain turned on.

For longer stops (more than 1 minute), use the button **101** to shift the transmission into neutral position „N“. This will reduce clutch wear and increase the service life of the clutch.

▶ Use the service or parking brake to ensure that the crane does not roll away.

3.10.2 Interrupting driving while the engine is running

▶ Slow down the crane until it comes to a standstill.
▶ Press the button **101** and shift the transmission into neutral „N“.
▶ Apply the parking brake **3**.

Result:

– The indicator light **201** lights up.

3.10.3 Parking the vehicle when the engine is running

▶ Slow down the crane until it comes to a standstill.
▶ Press the button **101** and shift the transmission into neutral „N“.
▶ Apply the parking brake **3**.

Result:

– The indicator light **201** lights up.

If the crane has been operated at full engine output or if the coolant temperature is above 95 °C:
▶ Allow the engine to run without load at idling speed for 1 to 2 minutes.

If special functions (parking light, rotating beacons, hazard warning lights, auxiliary heater*) are turned on:
▶ Turn the special functions off.
▶ Turn off the ignition **31** and pull out the ignition key.
▶ Turn off the battery master switch **15** and remove the trip cam.
▶ Lock the driver’s cab.
▶ Secure the vehicle with chocks against uncontrolled rolling away.

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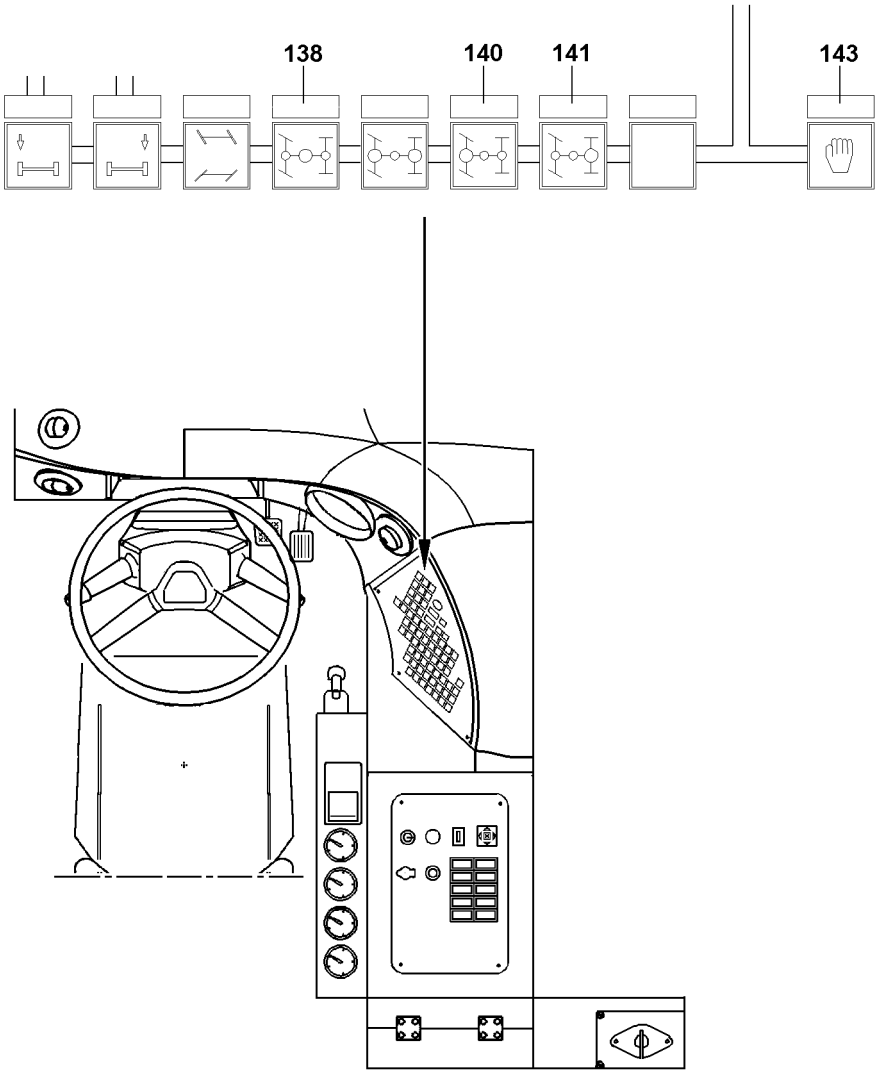

LWE/LG 1750-006/15409-07-02/en

Fig.116678

4 Differential locks

This vehicle is equipped with differential locks, which can be added for off road driving, on unpaved roadways and in wintery conditions.

With the differential locks enabled, a speed restriction of up to 40 km/h is active.

The differential locks may only be added when the vehicle is at a standstill and in the following sequence:
1. Longitudinal differential lock in distributor gear.
2. Longitudinal differential lock axle 2 and axle 4.
3. Transversal differential lock axle 4 and axle 6.

NOTICE
Danger of damage to drive axles!
- ▶ Turn the differential locks on and off only when the vehicle is at a standstill!
- ▶ **Never** turn the differential locks on when the drive wheels are turning!
- ▶ Drive carefully, do not start jerkily, do not drive at full throttle!
- ▶ Drive only straight away and not around corners!
- ▶ Only enable cross differential locks, if the corresponding steering axles are set in **straight-ahead position**!
- ▶ Drive with differential locks only on difficult terrain (such as sand, slush, loose or slippery subsoil etc.)!

4.1 Engaging the longitudinal differential lock in the distributor gear

Make sure that the following prerequisites are met:
- – The vehicle is at a standstill.
- – The transmission is in neutral position „N“.

▶ Press button **138** and button **143**.

Result:

- – The function control on the button **138** lights up.
- – The longitudinal differential lock in transfer gearbox is engaged.

Problem remedy
The function control on the button **138** blinks.
The gears of the differential are in a tooth-on-tooth position.
▶ Place the gear and start to drive carefully.

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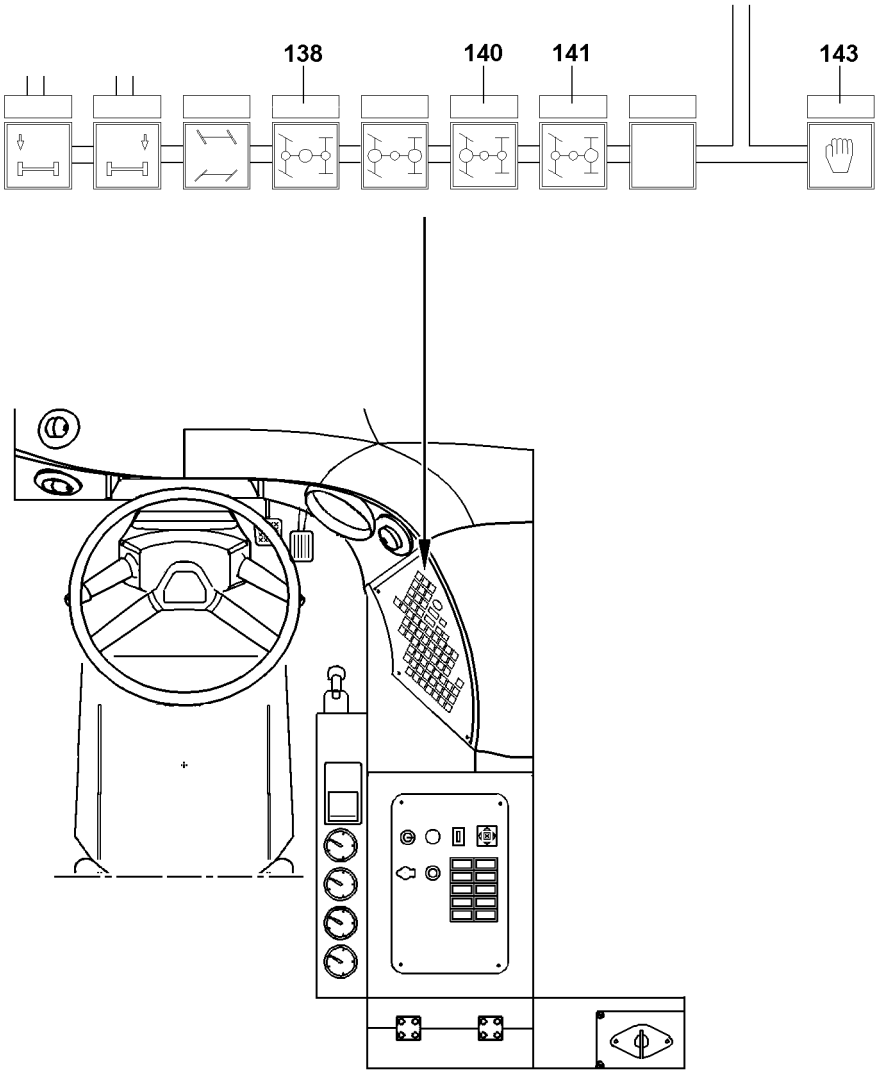

LWE/LG 1750-006/15409-07-02/en

Fig.116678

4.2 Engaging the longitudinal differential lock axle 2 and axle 4

Make sure that the following prerequisites are met:
- The vehicle is at a standstill.
- The transmission is in neutral position „N“.
- The longitudinal differential lock in the distributor gear is engaged.

▶ Press button **140** and button **143**.

Result:

– The function control on the button **140** lights up.
– The longitudinal differential lock axle 2 and axle 4 is engaged.

Problem remedy
The function control on the button **140** blinks.
The gears of the differential are in a tooth-on-tooth position.
▶ Place the gear and start to drive carefully.

4.3 Adding the transverse differential lock for axle 4 and axle 6

Make sure that the following prerequisites are met:
- The vehicle is at a standstill.
- The transmission is in neutral position „N“.
- The longitudinal differential lock axle 2 and axle 4 is engaged.

▶ Press button **141** and button **143**.

Result:

– The function control on the button **141** lights up.
– The transverse differential lock for axle 4 and axle 6 is engaged.

Problem remedy
The function control on the button **141** blinks.
The gears of the differential are in a tooth-on-tooth position.
▶ Place the gear and start to drive carefully.

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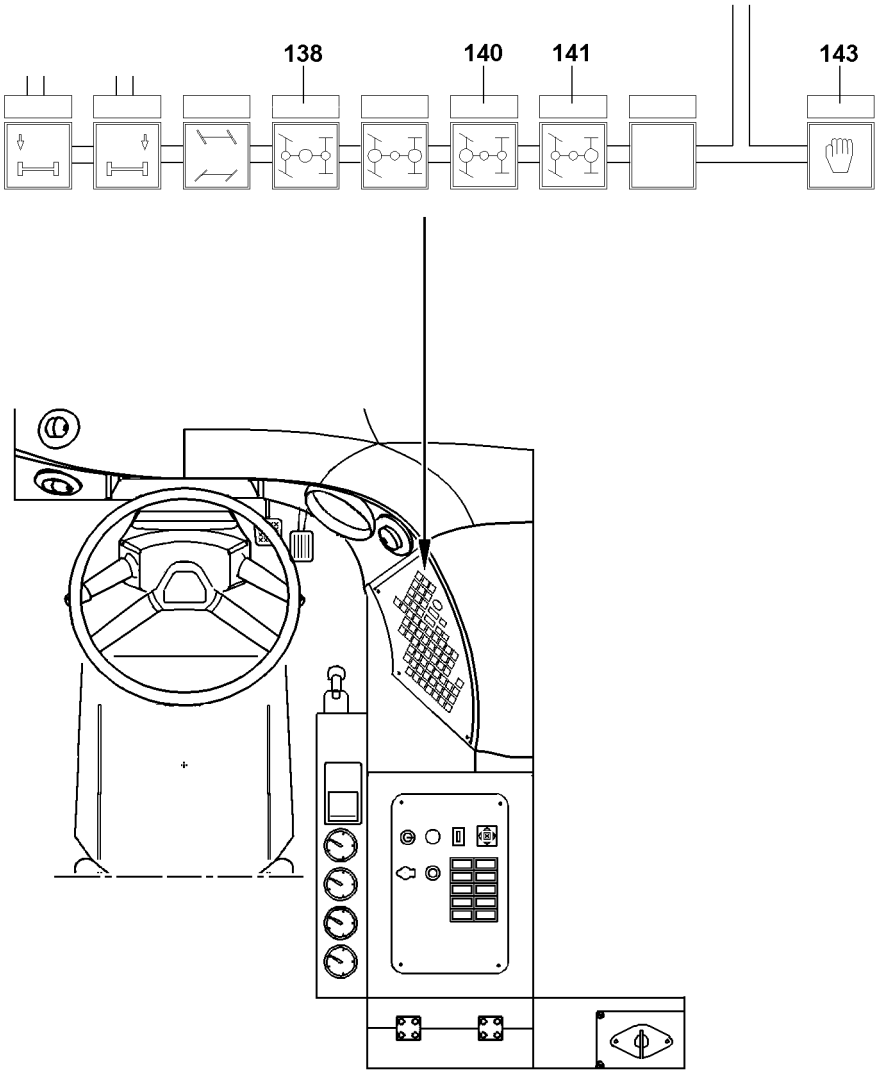

LWE/LG 1750-006/15409-07-02/en

Fig.116678

4.4 Turning the differential locks off

NOTICE
Danger of damage to drive axles as well as the entire drive train!
Considerable damage can be caused by driving on solid subsoil with a good grip when a differential lock is on!
▶ Turn the differential locks off again as soon as possible!

Make sure that the following prerequisites are met:
– The vehicle is at a standstill.
– The transmission is in neutral position „N“.

Turning off the longitudinal differential locks automatically turns off any transverse differential locks that are active.

▶ Press button **138** and button **143**.

Result:

– The function controls on button **138**, button **140** and button **141** turn off.
– All differential locks are turned off.

▶ Press button **141** and button **143**.

Result:

– The function control on the button **141** turns off.
– The transverse differential lock for axle 4 and axle 6 is turned off.

▶ Press button **140** and button **143**.

Result:

– The function control on the button **140** turns off.
– The longitudinal differential lock axle 2 and axle 4 is turned off.

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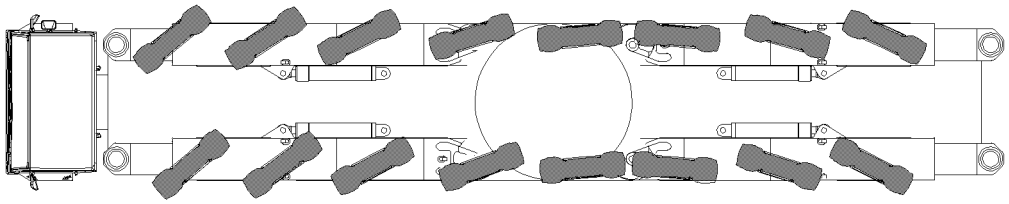
1



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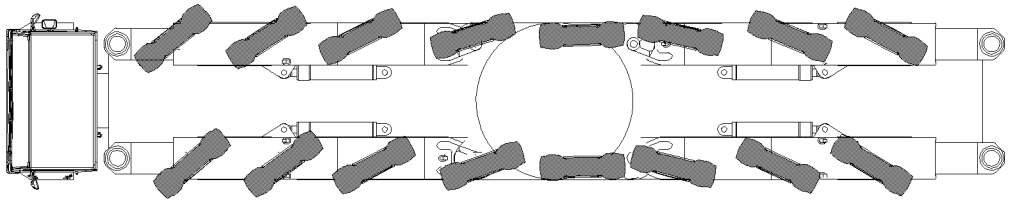

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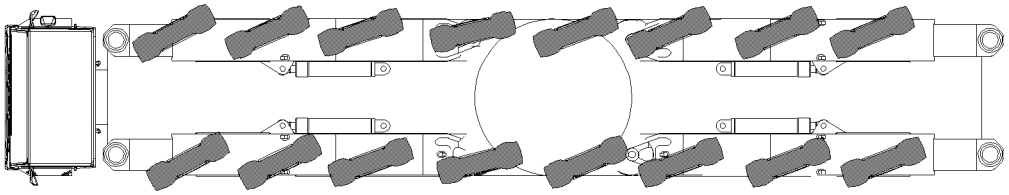

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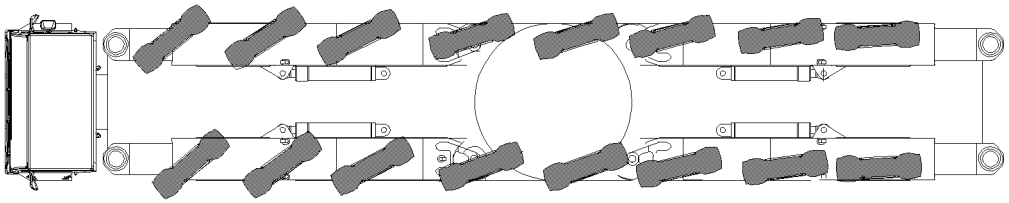

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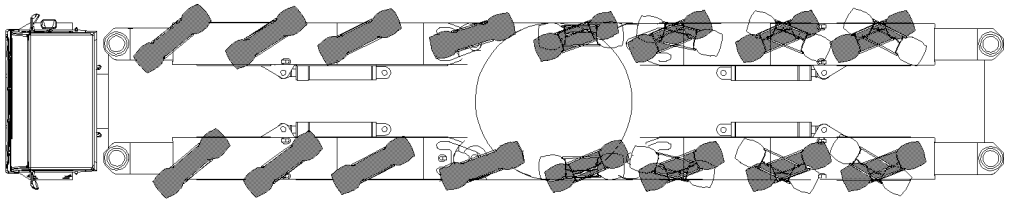

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Fig.105491

5 Steering

There are 5 operating modes for steering the crane:
1. On-road driving, illustration **1**
2. All-wheel steering, illustration **2**
3. Crab steering, illustration **3**
4. Reduced sheer out rate, illustration **4**
5. Independent steering, illustration **5**

Note
On public roads!
▶ Only drive in „On road driving“ mode on public roads!

5.1 General

WARNING
Danger of crushing!
If any persons are within the danger zone of the crane when starting the crane or when placing a gear, personnel can be severely injured or killed!
▶ Make sure that there are no persons between the wheels when starting the crane!
▶ Make sure that there are no persons between the wheels when placing a gear!

Approval to shift between the individual operating modes is checked each time by the system. If a shift change is not permitted, an acoustic signal will sound and an operating error message (LEC) will be shown on the display unit **225**.

A shift change in operating mode is only possible up to a speed of 18 km/h. The operating mode can only be activated if the wheels are in a position which permits a direct transition to the selected operating mode.

When the power supply is turned on, the operating mode which was last selected is activated.

If the steering deflection of the wheels correspond to the selected operating mode, then the selected operating mode is activated.

If the steering deflection of the wheels does not correspond to the last selected operating mode, then the function check on the button for the last selected operating mode will blink. Operating mode „Independent steering“ will be set. This means that the respective operating mode can be selected indirectly.

From a temperature of -20 °C operate steering several times before driving off to allow the oil in the steering cylinders to get warm.

Note
Steering at standstill!
To ensure steering of the electrically steered rear axles at a speed of less than 5 km/h , a hydro accumulator is actuated and charged with pressurized fluid every time the engine is started and subsequently periodically after every steering request!
This can cause that slightly larger steering powers must be exerted for a short time for steering!
▶ This procedure has no influence on the safety of the steering system, the steering system continues to be fully functioning!

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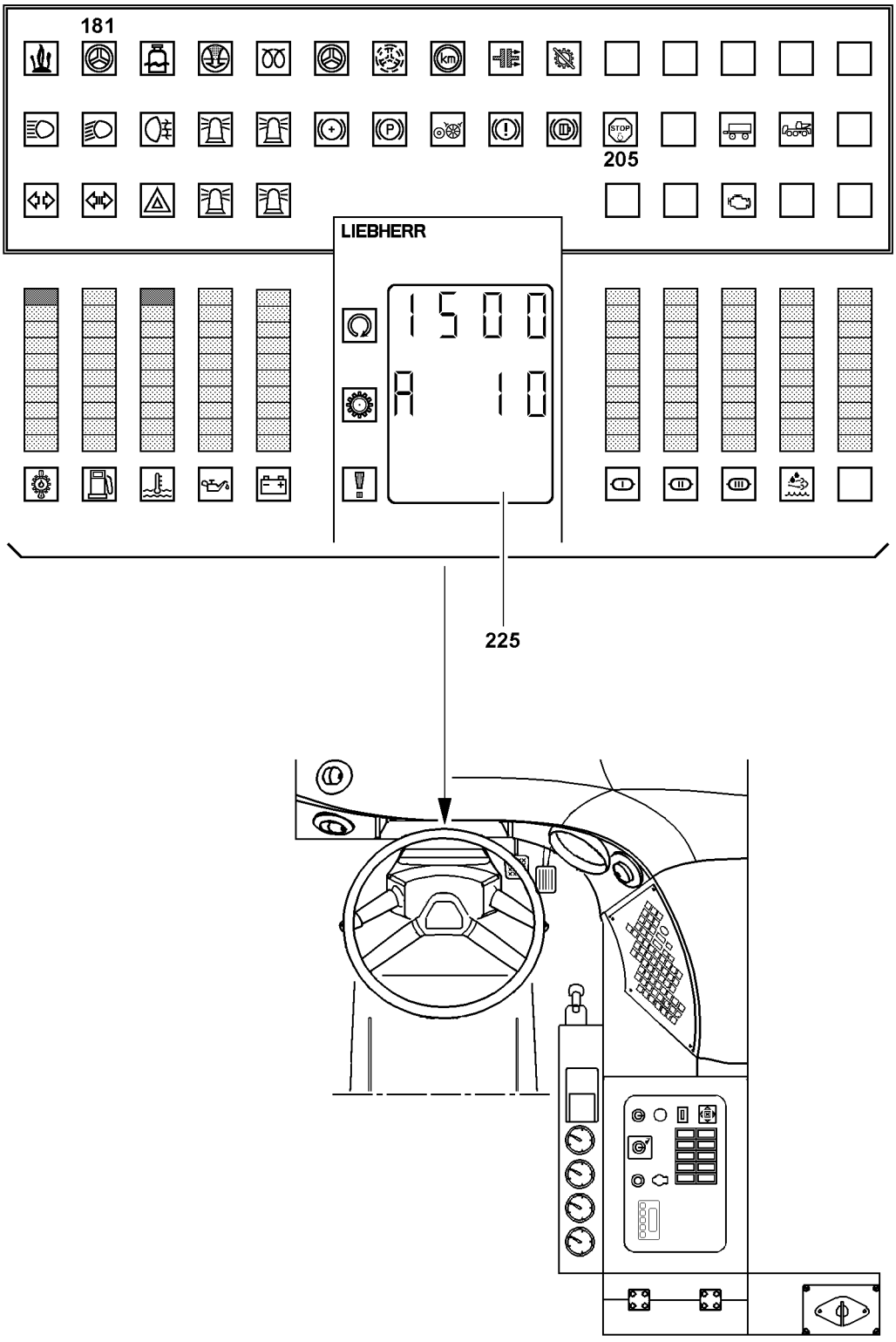

LWE/LG 1750-006/15409-07-02/en

Fig.116679

5.1.1 Limiting the speed in the event of defects in the active rear axle steering

If an error occurs in the steering, the maximum driving speed is limited to 40 km/h unless a restriction of less than 40 km/h is already in effect and the vehicle is not moving at a speed of up to 40 km/h .

If an error occurs while driving and the speed is greater than 40 km/h , the maximum speed is reduced to the current driving speed. This means that the driver will be able to continue to drive at the current speed until the speed is reduced. However, he can no longer accelerate. If a speed of 40 km/h or less is reached the limit remains at 40 km/h . This is designed to ensure that the vehicle does not suddenly lose power and therefore is suddenly slowed down.

5.1.2 Function controls

▶ The function control on the button lights up.

Result:

– Operating mode is activated.

▶ The function control on button does not light up.

Result:

– Operating mode is not activated.

▶ The function control on the button blinks slowly.

Result:

– Operating mode has been selected, but has not yet been accepted by the control.
– The function control will continue to blink until it is possible to transfer to the operating mode.

Problem remedy
The function control on the button for the active operating mode lights up, but the function control on the button for the selected operating mode blinks slowly?
The selected operating mode does not correspond to the active operating mode because the control has not (yet) approved the change.
▶ Move the wheels into a position that will permit a change.
▶ Or select operating mode indirectly.

Problem remedy
The function control on the button blinks fast?
There is a defect in the steering system. The operation of the button will be suppressed and an acoustic signal or an error message will be indicated on the display unit **225** if necessary.
▶ Remedy the error.

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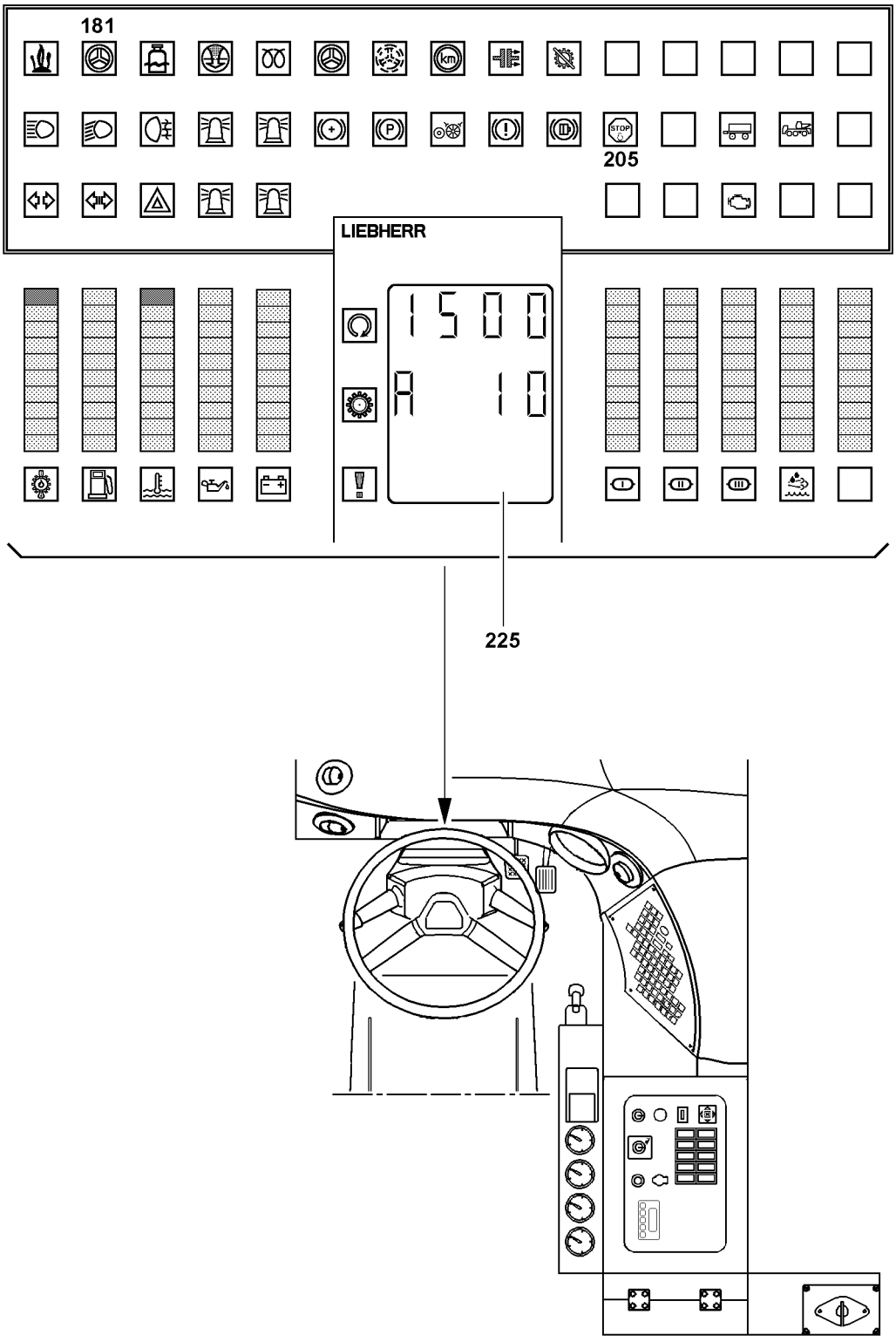

LWE/LG 1750-006/15409-07-02/en

Fig.116679

5.1.3 Indicator lights

The indicator light **181** shows the condition of the steering:
- The indicator light **181** lights up: Steering ok.
- The indicator light **181** blinks fast: Error in steering system with error code.
- The indicator light **181** blinks slowly: Error in the LSB bus connection.

DANGER
Danger of accident!
A defect in the steering will be indicated by the blinking indicator light **181** and fast blinking on all 5 buttons for the steering operating modes!
In addition, a signal sounds every 3 s !
The rear steering axles center and move automatically back to the 0° position!
If the vehicle is cornering at this time, this action will only take place when the crane changes direction!
The turning radius of the crane will be greater due to the 0° position of the rear steering axles!
- ▶ Changing operating modes is no longer possible!
- ▶ Ensure that only a short distance is travelled at a reduced speed and bring the vehicle to a stop as quickly as possible!
- ▶ Have problems remedied immediately by authorized, trained expert personnel!

▶ Set the ignition to „ON“.

Result:

- A bulb test will be carried out on the display unit and the keyboard.
- The indicator light **181** „Steering“ will be off for a short period.

Note
▶ If no defect in the „Active rear axle steering“ is signalled at the keyboard or display unit, then the crane may be driven!

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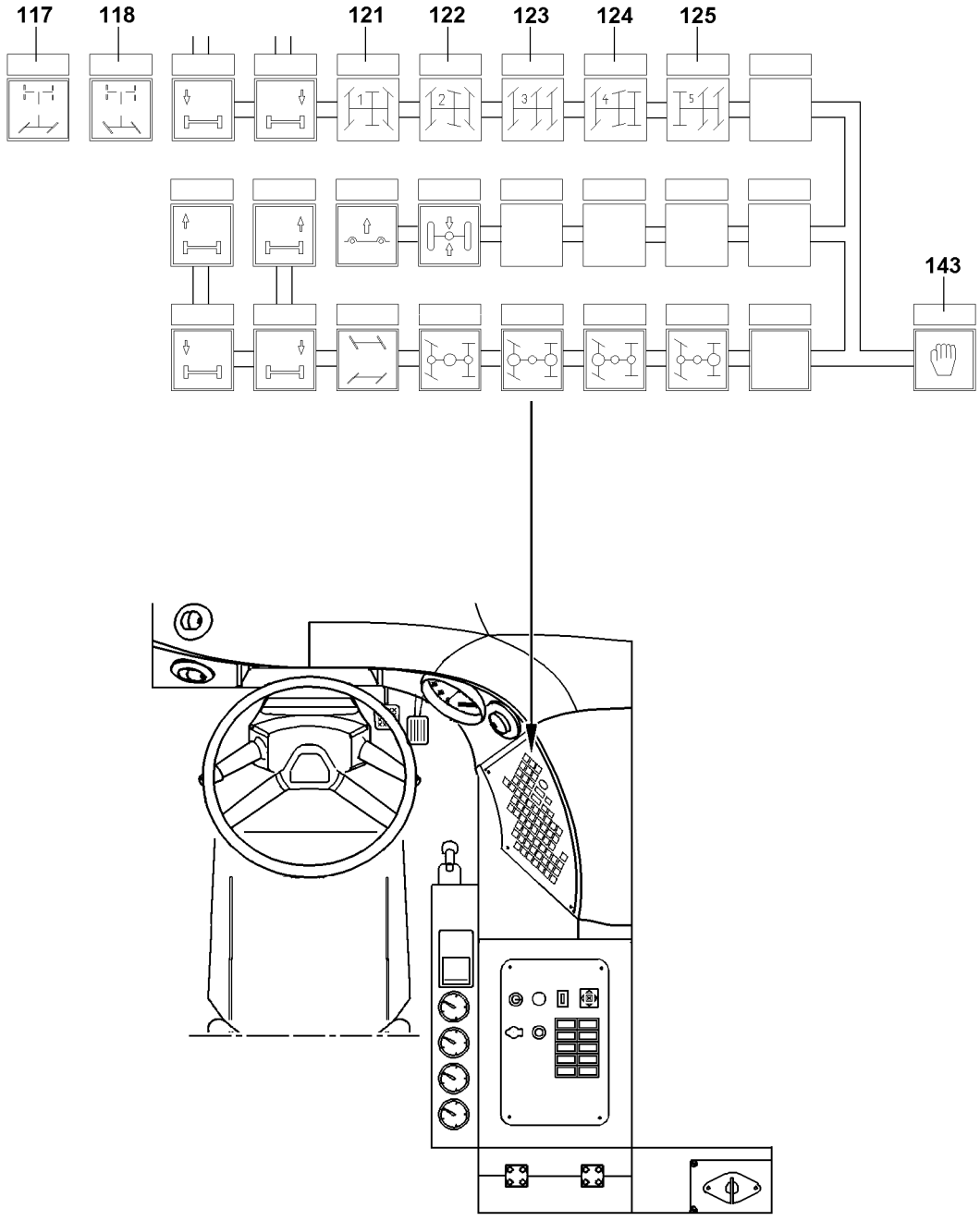

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Fig.116680

5.2 Changing between operating modes

5.2.1 Direct selection

Select the desired operating mode using the button **143** and the operating mode button. Turn the steering wheel until the wheels of the front axles go through the 0° position. The wheels of the rear axle will be automatically aligned. When the desired operating mode has been obtained, the indicator light on the operating mode button lights up continuously.

5.2.2 Indirect selection using the operating mode „Independent steering“

The operating mode can also be changed without changing the current steering effort of the wheels on the front axle. To do this, first select the operating mode „Independent steering“. When the „Independent steering“ operating mode has been accepted, the button **143** and the desired operating mode button must both be pressed until the wheels of the rear axles have achieved their specified position. When the desired operating mode has been obtained, the indicator light on the operating mode button lights up continuously.

5.3 On-road driving

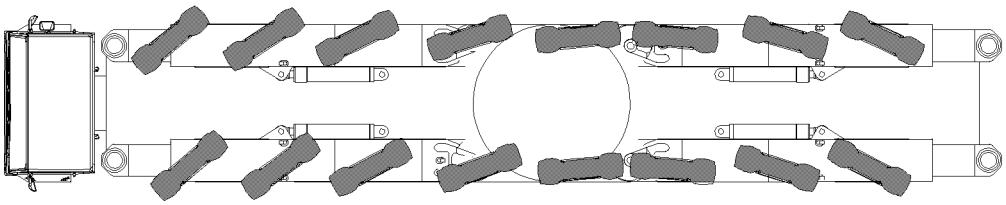

Fig.108377

The „on-road driving“ operating mode is the default setting. In this mode, the rear steering axles are steered depending on the steering deflection of the front axles. The steering angle reduces as the vehicle accelerates. Steering axles 3 and 4 are moved back to the 0º position when the speed reaches 30 km/h. Steering axle 5 is moved back to the 0º position when the speed reaches 60 km/h.

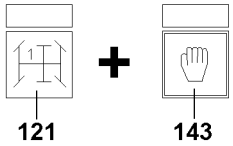

Fig.197512

▶ Press button **143** and button **121**.

5.4 All wheel steering

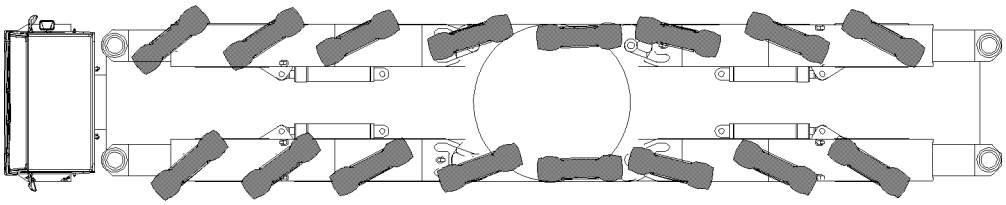

Fig.108378

In the „All-wheel steering“ operating mode, the rear steering axles are steered dependent on the steering effort of the front axles so that the vehicle attains as small a turn as possible.

The maximum driving speed is limited to 20 km/h.

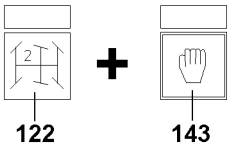

Fig.197514

▶ Press button **143** and button **122**.

5.5 Crab steering

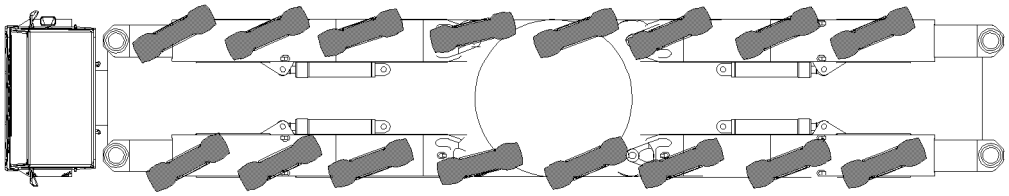

Fig.108379

In the „Crab steering“ operating mode, the rear steering axles are steered in the same direction as the front axles. The maximum steering effort of the rear steering axles is restricted by the maximum steering effort of the first rear steering axle.

The maximum driving speed is limited to 20 km/h.

The wheels could grind if the front axles are locked harder than the maximum possible angle of the rear steering axles. This is also dependent on weight distribution of the crane.

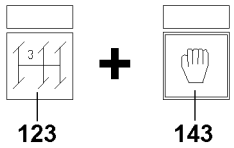

Fig.197516

▶ Press button **143** and button **123**.

5.6 Reduced sheer out rate

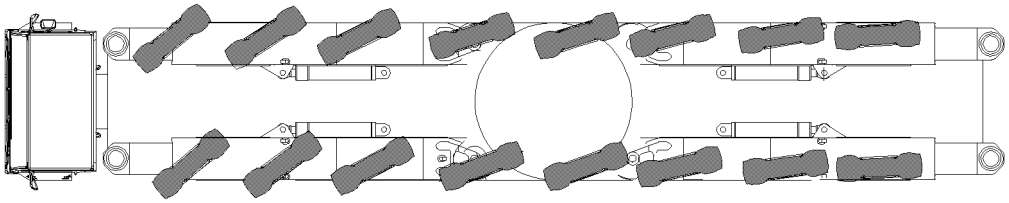

Fig.108380

In the „Reduced sheer out rate“ operating mode, the rear steering axles are locked depending on the front axles so that the sheer out rate of the rear of the vehicle is reduced to a minimum. This operating mode would typically be selected when driving away from the edge of a group of houses.

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The maximum driving speed is limited to 20 km/h.

Only restricted turns are possible in this operating mode.

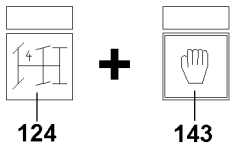

Fig.197518

▶ Press button **143** and button **124**.

5.7 Independent steering

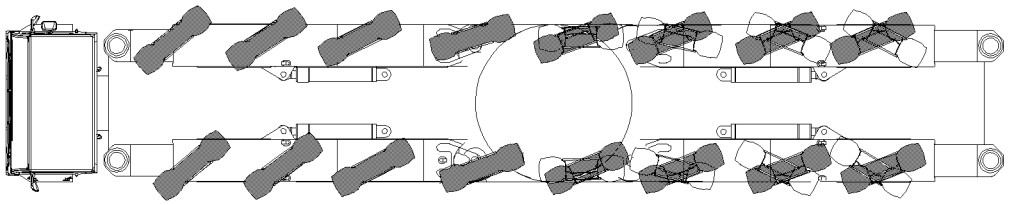

Fig.108389

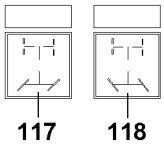

Fig.197523

In the „Independent steering“ operating mode, the rear steering axles are steered independent of the steering effort of the front axles using the key **117** and the key **118**. The rear steering axles lock in parallel if the front axles and the rear steering axles all lock in the same direction. For locks in the opposite direction, the steering axles are proportioned as for cornering. The „Independent steering“ operating mode can be enabled in all wheel positions.

The maximum driving speed is limited to 20 km/h.

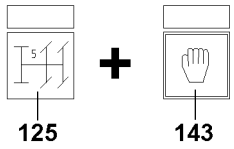

Fig.197520

▶ Press button **143** and button **125**.

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3.05 Crane at the job site

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Fig.195219

1 General

Note

- ▶ Depending on the delivery condition of the crane, the buttons (button **130** and button **143**) may look different.
- ▶ The same applies for buttons and displays that are mentioned further on in this chapter.

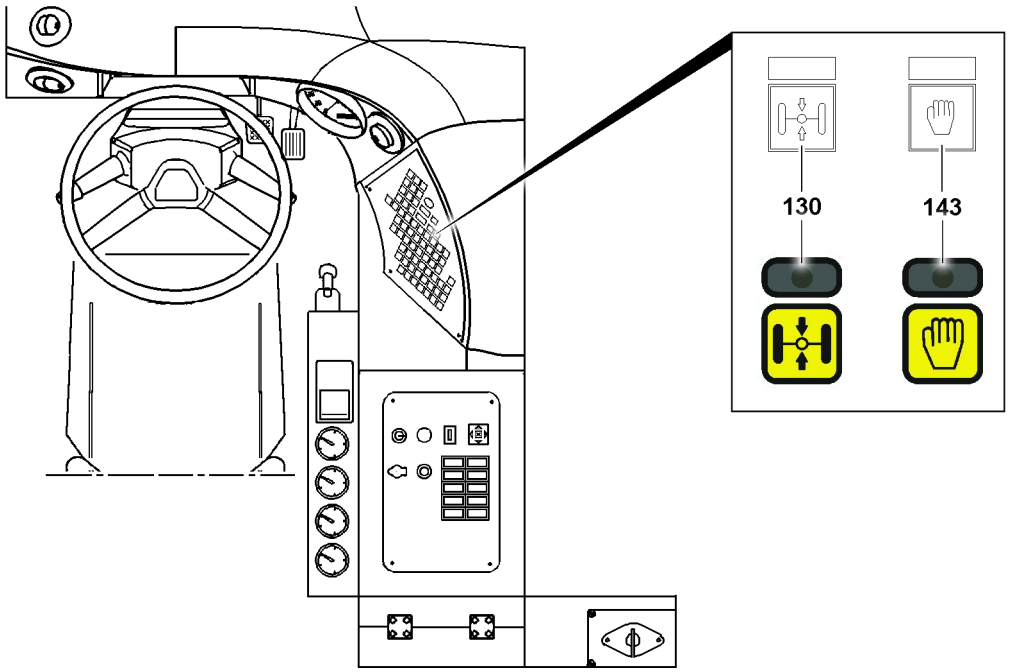

Fig.149252: Driver's cab with driver's seat and operator buttons on the keyboard

1.1 Selecting the location

Note

- ▶ Chapter 2.04, „Technical safety instructions“ must be observed and complied with.

- ▶ Select the operating location for the crane in such a way that the supports can be extended to the support base specified in the load chart and the crane can be aligned horizontally.

1.2 Changing from travel operation to crane operation

Make sure that the following prerequisites are met:

- The crane is positioned on a level and load-bearing surface.
- The parking brake is applied.
- The transmission is in neutral position „N“.
- The engine is running.

1.2.1 Blocking the axle suspension

The axle suspension must be blocked before the crane is supported.

- ▶ Press the button **130** and the button **143**.

Result:

- The function check on the button **130** lights up.
- The axle suspension is blocked.

- ▶ Extend the support cylinders and sliding beams.

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1.3 Changing from crane operation to travel operation

Make sure that the following prerequisites are met:
- The crane is supported and horizontally aligned.
- The wheels are not in contact with the ground.
- The axle suspension is blocked.
- The transmission is in neutral position „N“.

1.3.1 Turning axle blocking off

NOTICE
Damage to the axle suspension!
If the axle block is turned off without the wheels being in contact with the ground, then the axle suspension can be damaged if the axles fall down.
▶ Do not turn axle blocking off until all wheels are in contact with the ground.

▶ Retract support cylinders until all wheels are in contact with the ground.
▶ Press the button **130** and the button **143**.

Result:

- The function check on the button **130** turns off.
- The axle suspension is active.

2 Crane support

The hydraulic crane support consists of:
- Center section with receptacles for support beams
- Four fold-out and extendible support beams with support and slewing cylinders
- Support plates
- Track pads

WARNING
The crane can topple over!
If support bases are used for the erection and take-down of the boom system that are different than what is specified in the erection / take-down charts, the crane can topple over.
If support bases are used for crane operation that are different than what is specified in the load charts, the crane can topple over.
Death, severe bodily injuries, property damage.
▶ Erection / take-down: Only use the support bases required in the erection / take-down charts.
▶ Crane operation: Only use the support bases required in the load charts, 12.0 m x 12.0 m and 16.0 m x 16.0 m .

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2.1 Reduced support base 12.0 m x 12.0 m

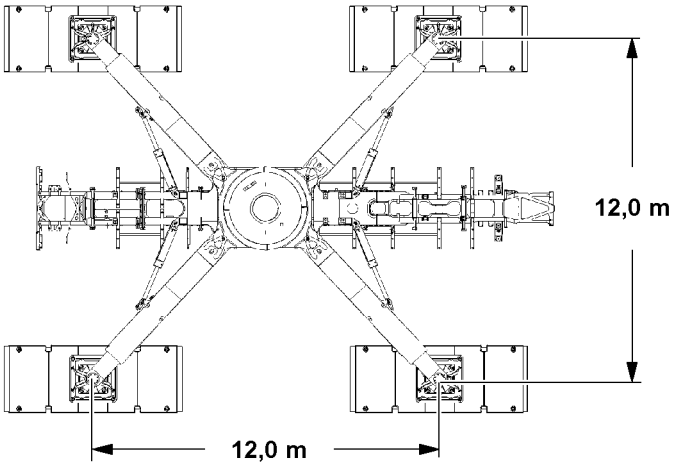

Fig.149253: Reduced support base 12.0 m x 12.0 m

2.2 Wide support base, 16.0 m x 16.0 m

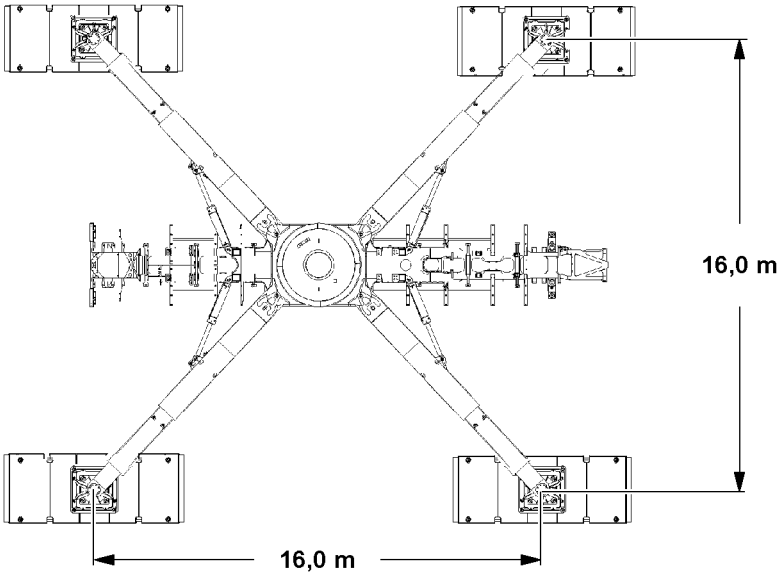

Fig.149254: Wide support base 16.0 m x 16.0 m

2.3 Asymmetric support base 8.0 m / 16 m x 18.5 m

WARNING
The crane can topple over!
The asymmetric support base is **prohibited** for crane operation.
The asymmetric support base may only be used for the erection and take-down of long booms / boom systems.
If this is not observed, the crane can topple over.
Death, severe bodily injuries, property damage.
▶ Use asymmetric support bases only for the erection and take-down of long booms / boom systems.

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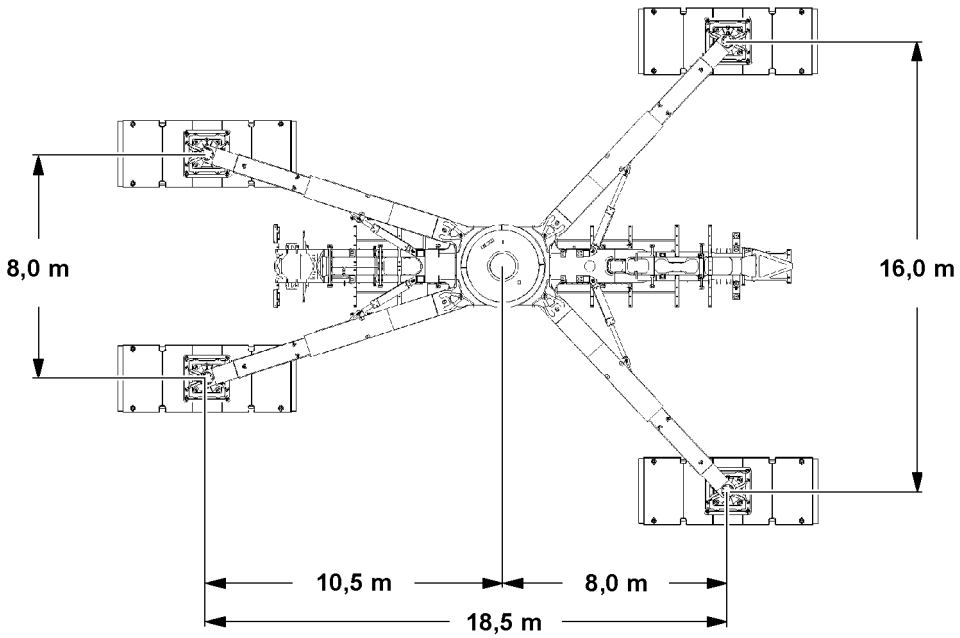

Fig.149255: Using only a asymmetric support base 8.0 m / 16 m x 18.5 m for erecting and taking down long boom systems

Note

▶ Bring support beams behind after erecting to the support width required for crane operation, see chapter 3.06.

2.4 Operating the crane support using the remote control panel

Note

▶ Depending on the delivery condition of the crane, one of the following remote control panels **1** is provided with the crane.

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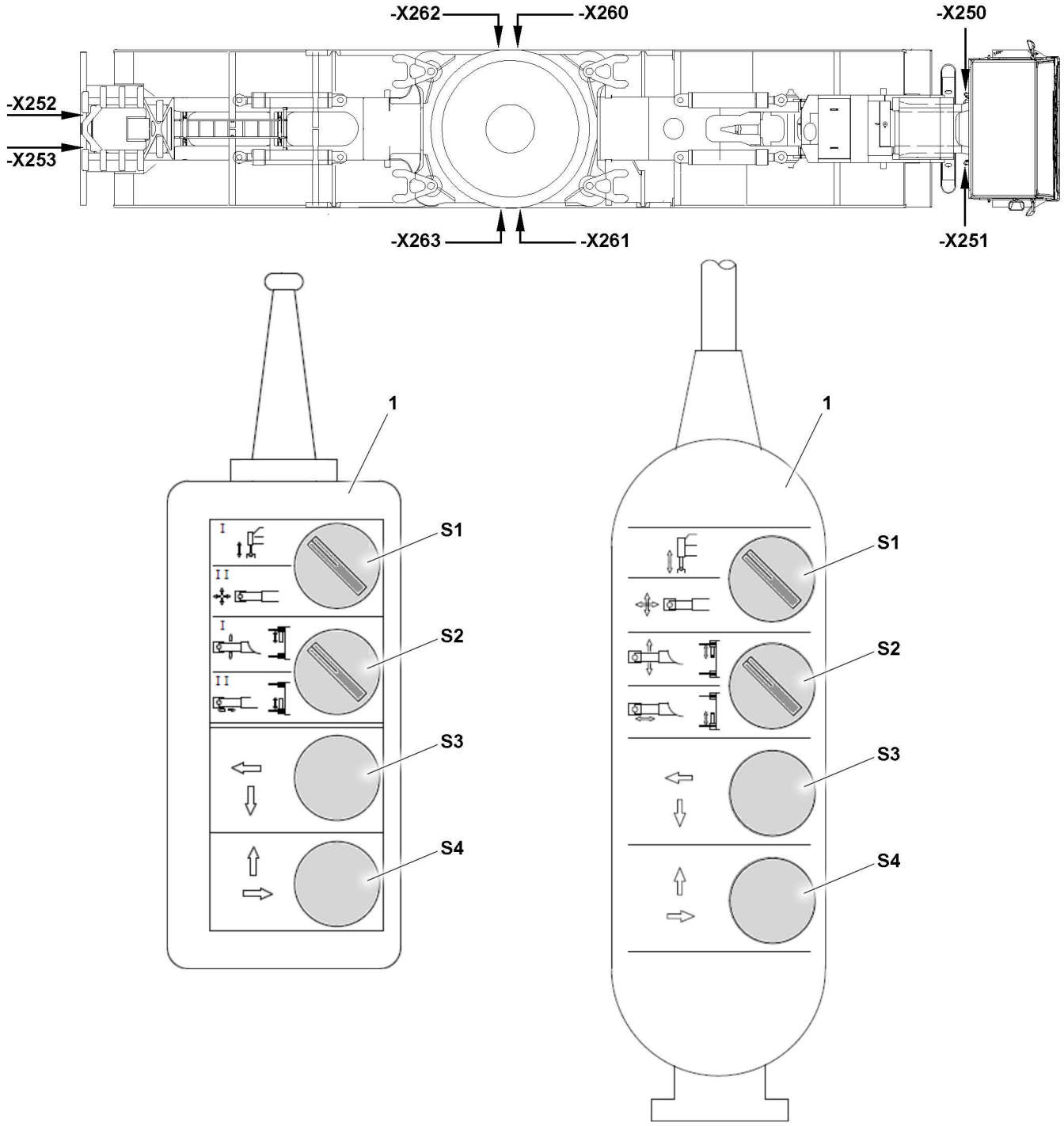

Fig.149256: Operating the remote control panel

Note

- Swinging the support beams out or in to approx. 10° is only possible with the remote control panel. After the remote control panel has been connected to a socket, the support control units on the left and right on the vehicle frame are no longer active. The pressure supply is set to approx. 10 bar.
- Only one support beam can be actuated respectively with the remote control panel. During support, it can only be fixed, extended and slewed. Lifting the crane with the remote control panel is not possible.

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2.4.1 Extending / retracting the support cylinders

Make sure that the following prerequisite is met:
– The remote control panel is plugged in a socket **-X250** up to socket **-X253**.

▶ Set the switch **S1** to position I.
▶ Actuate the switch **S3**.

Result:

– The support cylinder extends.

▶ Actuate the switch **S4**.

Result:

– The support cylinder retracts.

2.4.2 Swinging the support beam out / in

Make sure that the following prerequisite is met:
– The remote control panel is plugged in a socket **-X250** up to socket **-X253**.

▶ Set the switch **S1** to position II.
▶ Set the switch **S2** to position I.
▶ Actuate the switch **S3**.

Result:

– The support beam swings in.

▶ Actuate the switch **S4**.

Result:

– The support beam swings out.

2.4.3 Extending / retracting the sliding beam

Make sure that the following prerequisite is met:
– The remote control panel is plugged in a socket **-X250** up to socket **-X253**.

▶ Set the switch **S1** to position II.
▶ Set the switch **S2** to position II.
▶ Actuate the switch **S3**.

Result:

– The sliding beam extends.

▶ Actuate the switch **S4**.

Result:

– The sliding beam retracts.

2.4.4 Pinning / unpinning the support beam on the top

Make sure that the following prerequisite is met:
– The remote control panel is plugged in a socket **-X260** up to socket **-X263**.

▶ Set the switch **S1** to position II.
▶ Set the switch **S2** to position I.
▶ Actuate the switch **S3**.

Result:

– The support beam is pinned on top.

▶ Actuate the switch **S4**.

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Result:

– The support beam is unpinned on top.

2.4.5 Pinning / unpinning the support beam on the bottom

Make sure that the following prerequisite is met:
– The remote control panel is plugged in a socket **-X260** up to socket **-X263**.

▶ Set the switch **S2** to position II.
▶ Actuate the switch **S3**.

Result:

– The support beam is unpinned on the bottom.

▶ Actuate the switch **S4**.

Result:

– The support beam is pinned on the bottom.

2.5 Swinging the support beam out

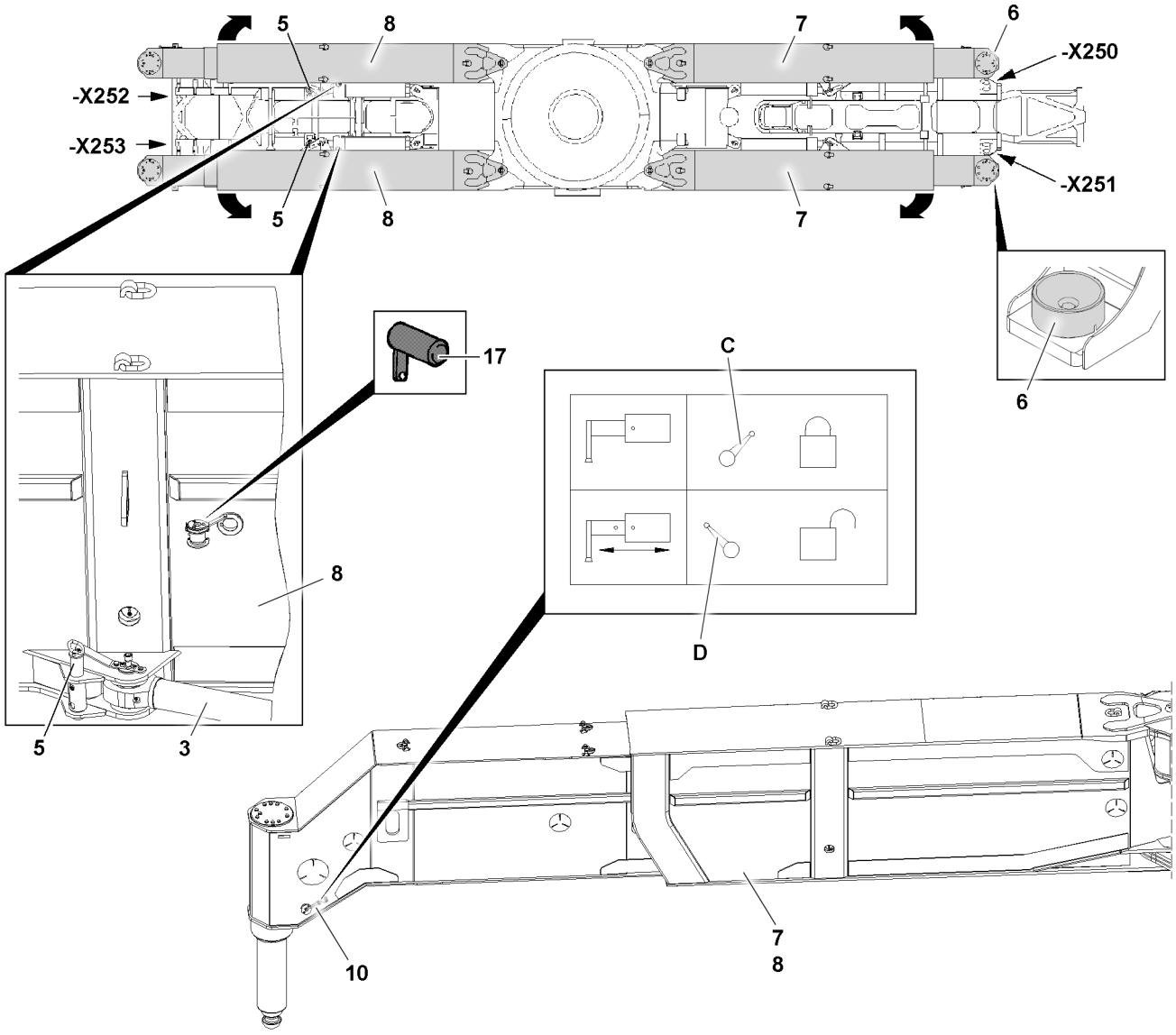

Fig.149257: Swinging the support beam out

WARNING
Danger of accident!
Death, severe bodily injuries, property damage.
- ▶ No persons or objects may be found in the danger zone.
- ▶ The operator must monitor the swinging out / swinging in of the support beams.

Note
- ▶ The swing cylinders **3** have a stop position damping and therefore drive very slowly shortly before the stop position.
- ▶ Observe the colored markings on the base belt of the support beam.
- ▶ If the slewing range is greater than 10°, then sliding beams sliding out / sliding in and support cylinder extending / retracting is actuated on the support control unit on the vehicle.

Make sure that the following prerequisites are met:
- – The support beams are in the transport position.
- – The „front“ support beams **7** are secured in the transport position by the support cylinders in the calottes **6**.
- – The „rear“ support beams **8** are pinned and secured in the transport position with the pins **17** and with the pins **5**.

2.5.1 Swinging the support beam out to the front

- ▶ Plug in the remote control panel to the front left at socket **-X250** or right at socket **-X251**.
- ▶ Retract the support cylinder until it is found outside the calotte **6**.
- ▶ Swing the support beams **7** out with the remote control panel onto the corresponding support base.

2.5.2 Swinging out support beam to the rear

- ▶ Plug in the remote control panel to the rear left at socket **-X252** or right at socket **-X253**.
- ▶ Release and unpin both pins **5**.
- ▶ Swing the support beams **8** out with the remote control panel onto the corresponding support base.

2.5.3 Extending the sliding beams

WARNING
Danger of accident!
Death, severe bodily injuries, property damage.
- ▶ No persons or objects may be found in the danger zone.
- ▶ The operator must monitor the extension / retraction of the sliding beams.
- ▶ The sliding beams must be secured again manually with the levers **10** against extending / retracting.
- ▶ Set all four levers **10** in position **C**, and pin the sliding beams.
- ▶ Do not support in intermediate positions.

- ▶ Secure both pins **17**, unpin and take down in the transport retainer.
- ▶ Set all four levers **10** into position **D**.

Result:

- – All sliding beams are unpinned.

- ▶ Extend the sliding beams to the corresponding support base.
- ▶ Set all four levers **10** into position **C**.

Result:

- – All sliding beams are repinned and secured.

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2.6 Support plates

The support plates **19** can be used without and with the track pads **18**. By using the track pads **18**, the support surface is increased and the support pressure is reduced.

Type of plates	Weight
Support plate	1.2 t
Support plate with track pad	8.0 t

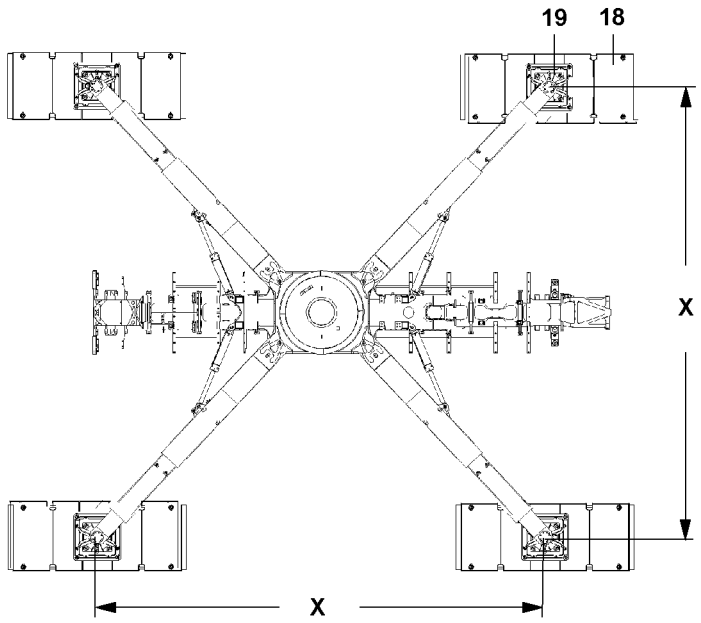

Fig.149258: Assembling the support plates

The support plates **19** consist of a revolving steel frame **23** and a welded on steel plate. A plastic plate is screwed onto it. In this way, the support plate can glide 120 mm to each side.

The steel frame **23** is laid on the track pad and locked with four socket pins **20**. The support plate has three eyes, two are symmetrical and one arranged off-center for vertical transport.

CAUTION
Damage to the support plates!
If the support plates **19** are used for support without the track pads **18**, the ground must be correspondingly load bearing, so that the power is transferred over the dimensions of the support plates **19** onto the ground.
If the ground is deformed, the frame or glide plate is bent.
▶ When supporting with the support plates **19** make sure the ground is sufficiently load-bearing.

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2.6.1 Installing the support plates on the support cylinders

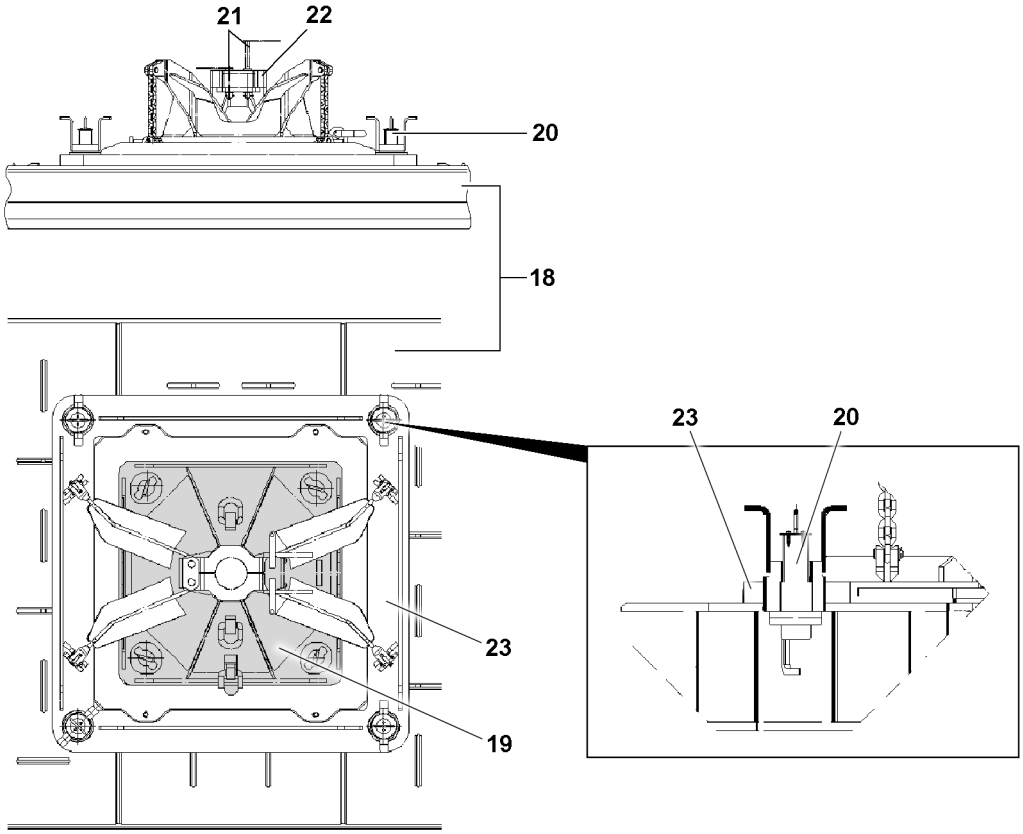

Fig.149259: Installing the support plates on the support cylinders

WARNING
Danger of accident!
Death, severe bodily injuries, property damage.
▶ Ensure that no persons or objects are within the danger zone when extending / retracting the support cylinders.

If the track pads **18** are used:
▶ Take down the track pads **18** on the ground with an auxiliary crane.

WARNING
The crane can topple over!
If the support plates **19** and the track pads **18** are not centered under the support cylinders, then the crane can sink in and topple over.
Death, severe bodily injuries, property damage.
▶ Place the support plates **19** and track pads **18** in the center under the support cylinders.
▶ Take the support plates **19** down in such a way on the track pads **18** that the bores of the support plates **19** and the track pads **18** align.
▶ During crane operation, the support plates **10** may **not** be pinned with the track pads **11**.

▶ Take the support plates **19** down in the center on the track pads **18**.
▶ Attach the steel frame **23** on the track pads **18** with pins **20** and secure.
▶ Take the track pads **18** down on the necessary support base with an auxiliary crane.
or

If no track pads **18** are used:
Take down the support plates **19** on the ground.
▶ Release and unpin the pin **21**.
▶ Open the clamps **22**.

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- ▶ Retract the support cylinder into the support plates **19**.
- ▶ Close the clamps **22**.
- ▶ Pin the clamps **22**: Insert and secure the pin **21**.

2.6.2 Driving with the track pads

Note

- ▶ The support plates **19** must be pinned while „driving with the equipment in place“ securely with the track pads **18**.
- ▶ Retract the support cylinders / track pad with the support plates only to approximately 50 mm above the ground.
- ▶ This can reduce the risk of the crane toppling over.

WARNING

The crane can topple over!
If the support plates **19** are not securely pinned with the track pads **18** when driving with the equipment in place, the crane can topple over.
Death, severe bodily injuries, property damage.

- ▶ Before „driving with the equipment in place“: Securely pin the support plates **19** with the track pads **18**.
- ▶ Do not exceed the permissible inclines from the travel charts.
- ▶ Retract the support cylinders / track pad with the support plates only to approximately 50 mm above the ground.
- ▶ During crane operation, the support plates **19** may **not** be pinned with the track pads **18**.

- ▶ Pin all support plates **19** with all track pads **18**: Unpin the pins **20** on the steel frame **A** and pin in the support plate **B**, turn 90° and lock.

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2.7 Swinging in the support beams

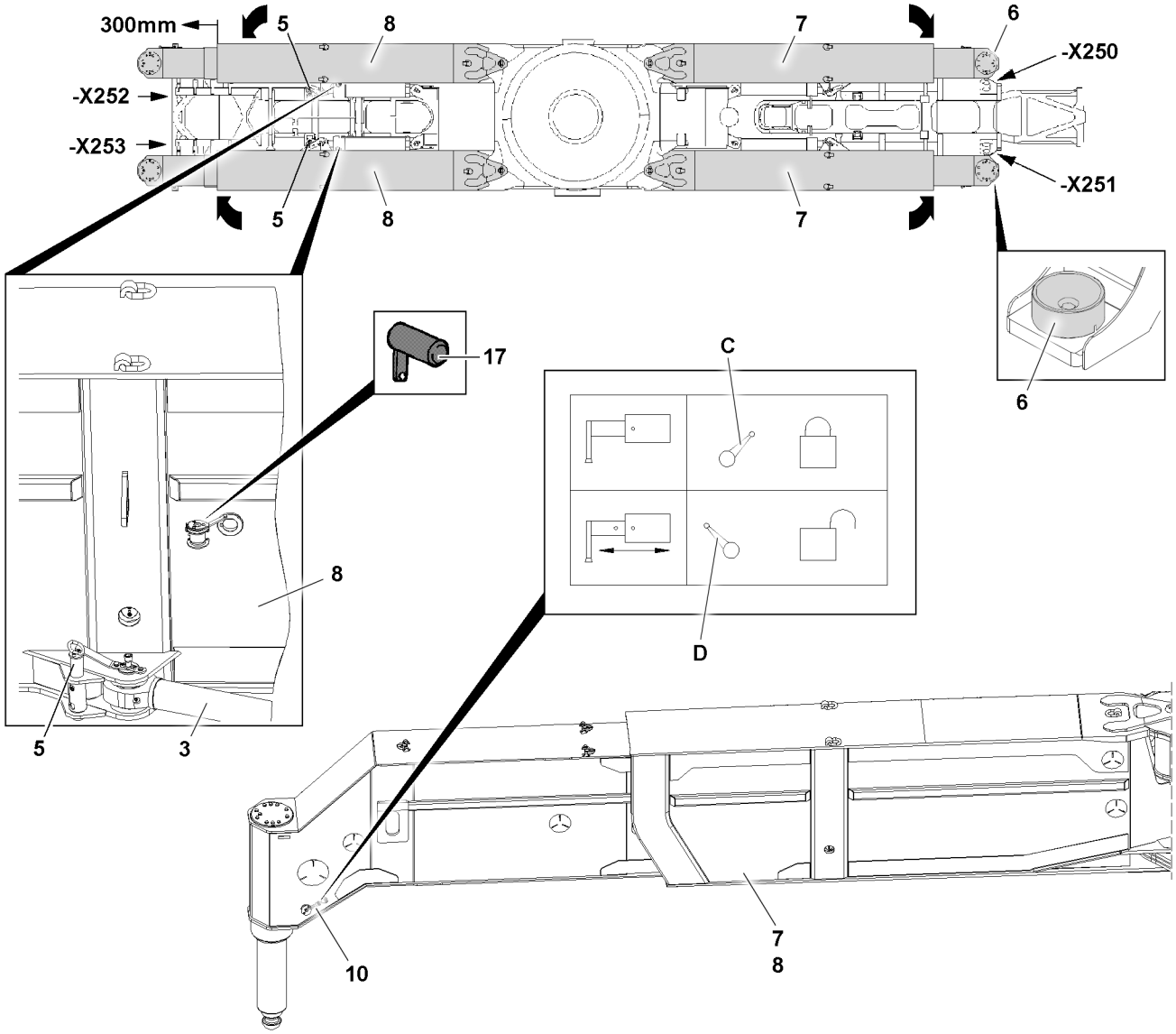

Fig.149260: Swinging the support beams in and securing them in the transport position

WARNING
Danger of accident!
Death, severe bodily injuries, property damage.
- ▶ No persons or objects may be found in the danger zone.
- ▶ The operator must monitor the swinging out / swinging in of the support beams.

2.7.1 Swinging the support beams in to the front to the transport position

- ▶ Plug in the remote control panel to the front left at socket **-X250** or right at socket **-X251**.
- ▶ Set both levers **10** on the sliding beams to the front into position **D**.

Result:

– Both sliding beams to the front are unpinned.

- ▶ Completely retract the sliding beams to the front individually, see section „Operating the remote control panel“.
- ▶ Completely swing the „front“ support beams **7** in individually, see section „Operating the remote control panel“.

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▶ Secure the „front“ support beams **7**, see also extending the support cylinders into the calotte **6**.
▶ Set both levers **10** on the sliding beams to the front into position **C**.

Result:

– Both front sliding beams are pinned and secured.

2.7.2 Swing in support beam to the rear into the transport position

▶ Plug in the remote control panel to the rear left at socket **-X252** or right at socket **-X253**.
▶ Set both levers **10** on the front sliding beams into position **D**.

Result:

– Both rear sliding beams are unpinned.

▶ Completely retract the sliding beams to the rear individually, see section „Operating the remote control panel“.
▶ Swing „rear“ support beams **8** in all the way individually, see section „Operating the remote control panel“.

WARNING
Danger of accident!
The „rear“ support beams **8**must be secured on both sides with pins **5** to prevent them from swinging out.
Before the crane may be driven on public roads, the two rear sliding beams must be extended 300 mm into the „transport position“.
The rear sliding beams must be pinned and secured on both sides in the „transport position“ with the pins **17** to prevent them from extending.
Death, severe bodily injuries, property damage.
▶ Insert the pins **5** on both sides and secure the „rear“ sliding beams **8** against swinging out.
▶ Insert the pins **17** completely on both sides and secure the sliding beams against extending.

▶ Insert both pins **5** and secure.
▶ Extend the rear sliding beams 300 mm into the „transport position“.

When the „rear“ support beams **8** are swung in all the way on both sides:
▶ Insert both pins **17** inside and secure.

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3 Support control unit

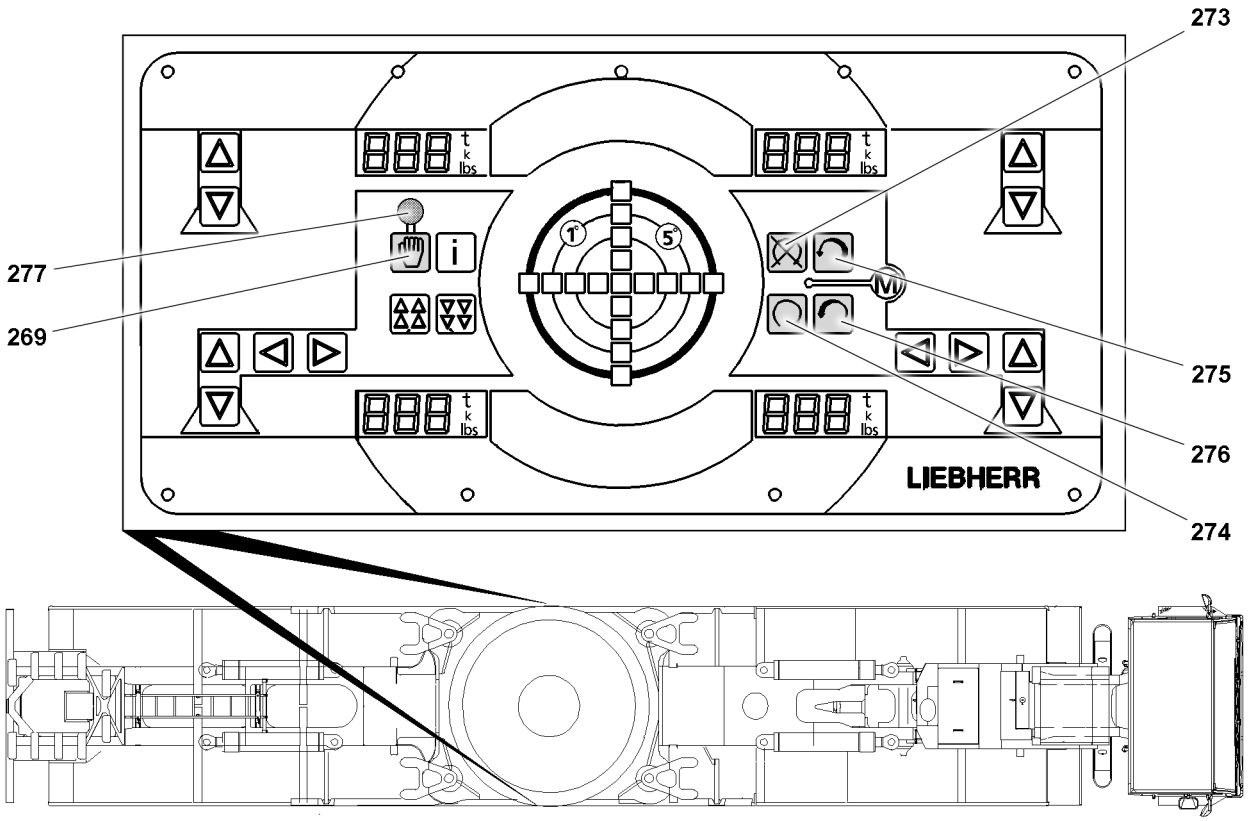

Fig.149261: Support control unit on both sides

The crane may be supported by support control units on the chassis as well as from the crane cab.

A support control unit (switch box) with buttons is attached to both sides of the vehicle for operating the support.

WARNING
The crane can topple over!
If the crane is not supported with the support base according to the load chart, or if the incorrect load chart is entered into the LICCON overload protection, the crane can topple over.
Death, severe bodily injuries, property damage.
- ▶ Set the corresponding load chart for the respective support base in the LICCON overload protection.
- ▶ Support the crane with the support base according to the load chart.
- ▶ The support plates must be supported as specified.

– The support beams are swung out with the remote control panel onto the corresponding support base.
– The remote control panel is unplugged.

▶ Turn the ignition on.
▶ Actuate the support control unit **269** release.

Result:

– All buttons and the green „support control unit release“ LED **277** illuminate.
– The support control unit is activated.
– The release turns off if no other button is pressed for 120 s or if the support control unit release **269** is pressed again.
– The deactivation of the support control unit is shown by the blinking button and when the green LED **277** turns off.

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▶ The engine can be started using the button **274** or turned off using the button **273**. The engine rpm can be varied during the supporting procedure using the button **276** and the button **275**.

3.1 Turning the sliding beam illumination on

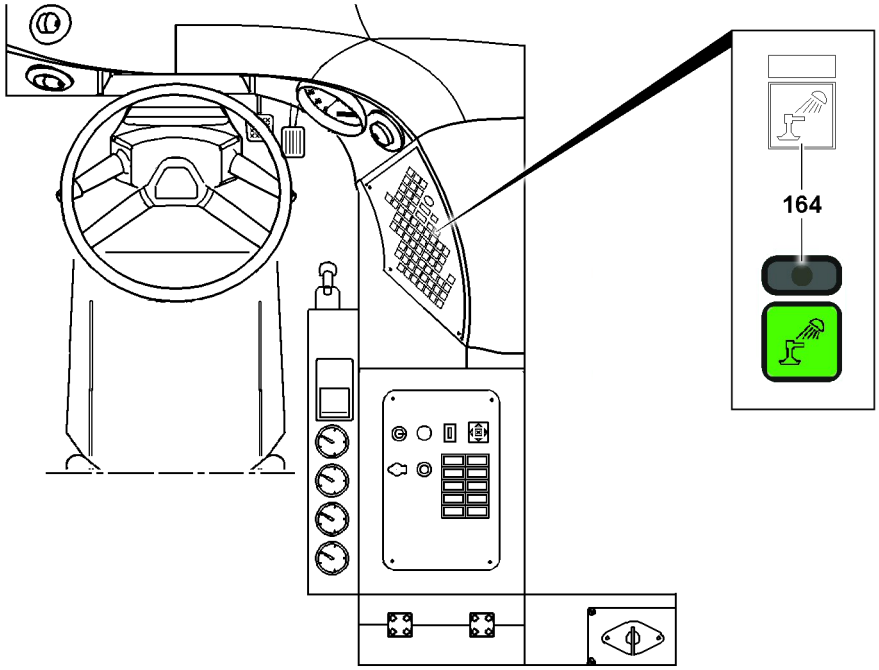

Fig.149265: Turning the sliding beam illumination on

At a speed of more than 3 km/h , the sliding beam illumination is blocked.

The sliding beam illumination is also turned off and blocked if the engine is turned off. However, the „Automatic sliding beam illumination active / inactive“ status is noted.

3.1.1 Manual

Make sure that the following prerequisites are met:
- The engine is ON.
- The vehicle is stationary.

▶ Press the button **164** on the keyboard.

Result:

– The sliding beam illumination is turned off or on.

3.1.2 Automatic

Make sure that the following prerequisites are met:
- The vehicle is in support mode (transmission in the neutral position „N“ and button pressed on the support control unit).
- The engine is ON.
- The vehicle is stationary.

▶ Press any button on the support control unit.

Result:

– The sliding beam illumination is turned on.

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Problem remedy

The sliding beam illumination cannot be turned on automatically?

If the sliding beam illumination has been automatically turned on and then turned off in the chassis using the button **164** on the keyboard, automatic sliding beam illumination is deactivated.

▶ Turn the sliding beam illumination on again using the button **164** on the keyboard. The automatic sliding beam illumination is active again.

3.2 Extending the sliding beams with the support control unit

The sliding beams on the left side of the vehicle can only be operated using the support control unit attached on this side.

The sliding beams on the right side of the vehicle can only be operated using the support control unit attached on this side.

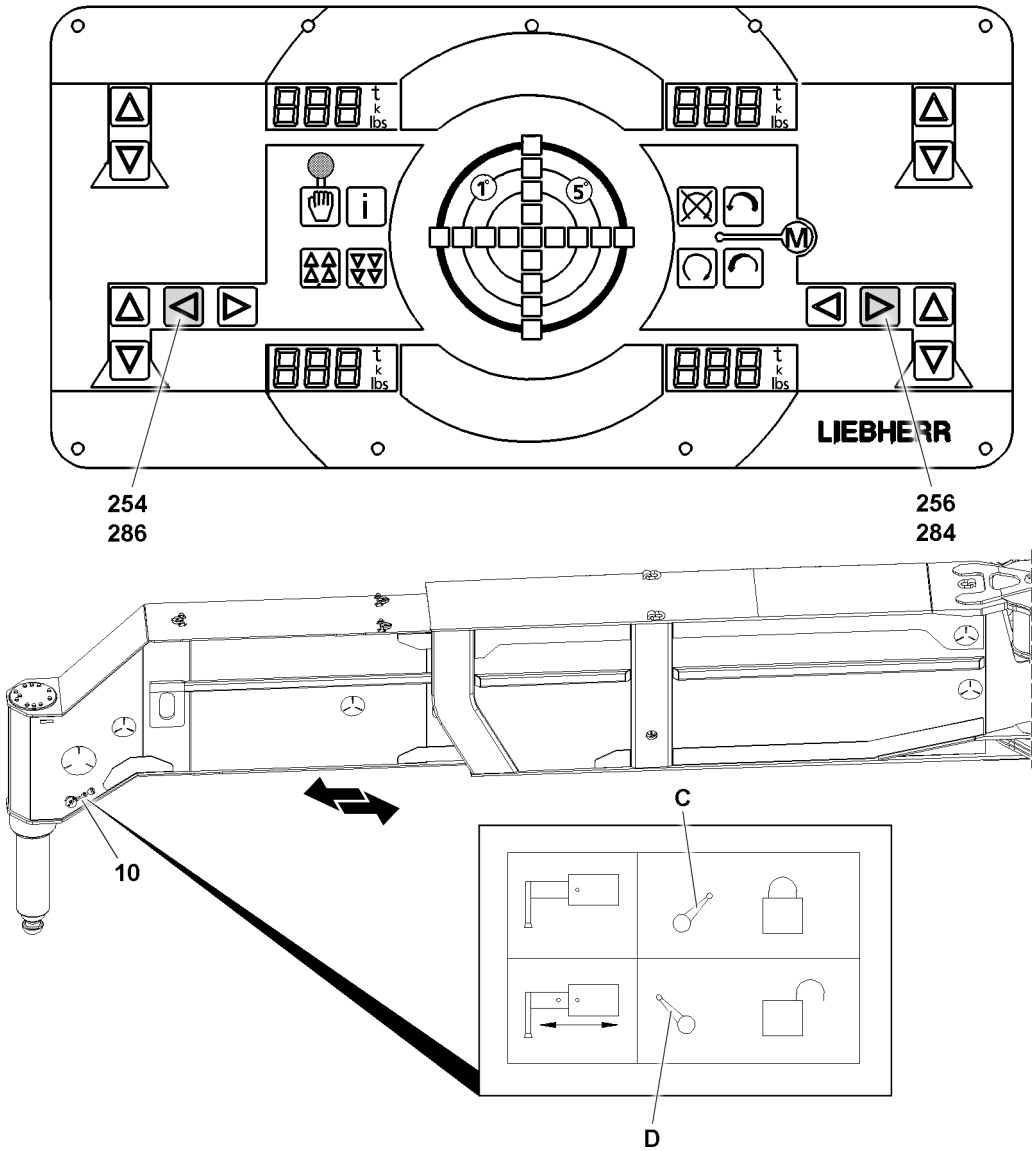

Fig.149262: Extending the sliding beams with the support control unit

WARNING
Danger of fatal injury when extending and retracting the sliding beams!
Death, severe bodily injuries, property damage.
- ▶ The operator must monitor the extending and retracting of the sliding beams.
- ▶ Ensure that no persons or objects are within the danger zone when the sliding beams are extended and retracted.

▶ Set all four levers **10** on the sliding beam into position **D**.

Result:

– All sliding beams are unpinned.

Extend the sliding beams to the support base as specified in the load chart.

- ▶ Left support control unit: Press the button **254** and the button **256**.
- ▶ Right support control unit: Press the button **284** and the button **286**.

WARNING
The crane can topple over!
If the following conditions are not met, the crane can topple over.
Death, severe bodily injuries, property damage.
- ▶ The sliding beams must be pinned to prevent movement of the bearing surfaces after positioning.
- ▶ Lock all levers **10** in position **D**.
- ▶ Do not support in intermediate positions.

▶ Set all four levers **10** into position **D**.

Result:

– All four sliding beams are pinned and secured against extending / retracting.

3.3 Extending the support cylinders with the support control unit

WARNING
Danger of accident when supporting!
Death, severe bodily injuries, property damage.
- ▶ Ensure that there are no persons or objects within the danger zone when the support cylinders are extended and retracted.
- ▶ Lift the crane until the wheels are no longer touching the ground.
- ▶ Do not extend the support cylinders all the way during crane operation (up to stop). If the support cylinders have been extended all the way, retract them again at least 10 mm.

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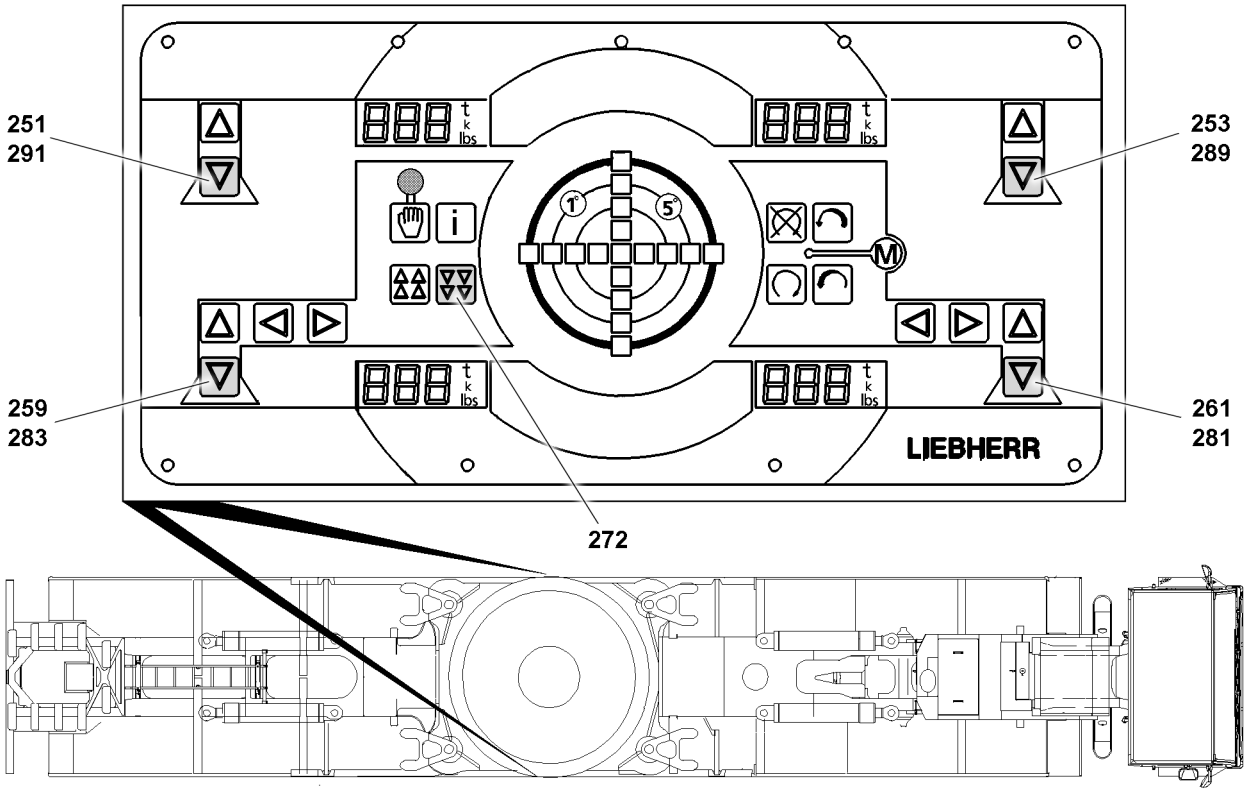

Fig.149263: Extending the support cylinders with the support control unit

Make sure that the following prerequisite is met:
– Lift the crane until the wheels are no longer touching the ground.

3.3.1 Supporting manually

Supporting the crane

Extend the individual support cylinders evenly by pressing the corresponding button and support the crane.

The support cylinders initially move at a minimum speed and accelerate to maximum speed after 2.5 s.

▶ Left support control unit: Press the button **251**, button **253**, button **259** and button **261**.
▶ Right support control unit: Press the button **281**, button **283**, button **289** and button **291**.

Align the crane horizontally

WARNING
The crane can topple over!
If the crane is not aligned horizontally, it can tip over.
Death, severe bodily injuries, property damage.
▶ The crane must be aligned horizontally to 0.0°.

▶ Extend and retract individual support cylinders until the innermost light emitting diode (LED) lights up.

Result:

– The crane is horizontal.

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3.3.2 Supporting automatically

WARNING
Danger of accident!
When the automatic support is operated, the crane is leveled automatically.
Death, severe bodily injuries, property damage.
- ▶ Make sure that the alignment is within the permissible tolerance and that all four support plates are touching the ground.
- ▶ Make sure that there are no persons within the danger zone.

As long as the chassis is inclined (5° range) the support cylinders are actuated at approx. 75 % speed. When reaching the 1° range, the speed is reduced to 50 %.

▶ Press the button **272**.

Result:

– All support cylinders are extended.
– The crane is aligned horizontally.

3.3.3 Checking the supports

In order to minimize the danger of an accident, the extension conditions and the following safety regulations must be adhered to.

WARNING
Danger of fatal injury if crane falls over!
The load suspended on the hook causes tension and deformation of the hoist rope and boom (also applies to the jib boom and guy ropes, if operated). If the load drops from the fastening ropes in this situation, or if the fastening or hoist rope breaks, a sudden relief occurs. The boom snaps back quickly. If only the sliding beams on the load side are moved out, the crane could topple over.
Despite previous assumption, it may become necessary to swing the load to the opposite side. If only the sliding beams on the load side are moved out, the crane could topple over.
When turning out of the longitudinal vehicle direction, the boom or counterweight momentum could tip over the crane unless all four sliding beams are moved out.
Death, severe bodily injuries, property damage.
- ▶ Always extend all four sliding beams of the supports, also those on the side opposite the load.

- ▶ Check the extension conditions.
- ▶ Make sure that all four sliding beams have been extended.

3.4 Retracting the support cylinders with the support control unit

WARNING
Danger of crushing when extending and retracting the support cylinders!
Death, severe bodily injuries, property damage.
- ▶ Ensure that there are no persons or objects in the danger zone.

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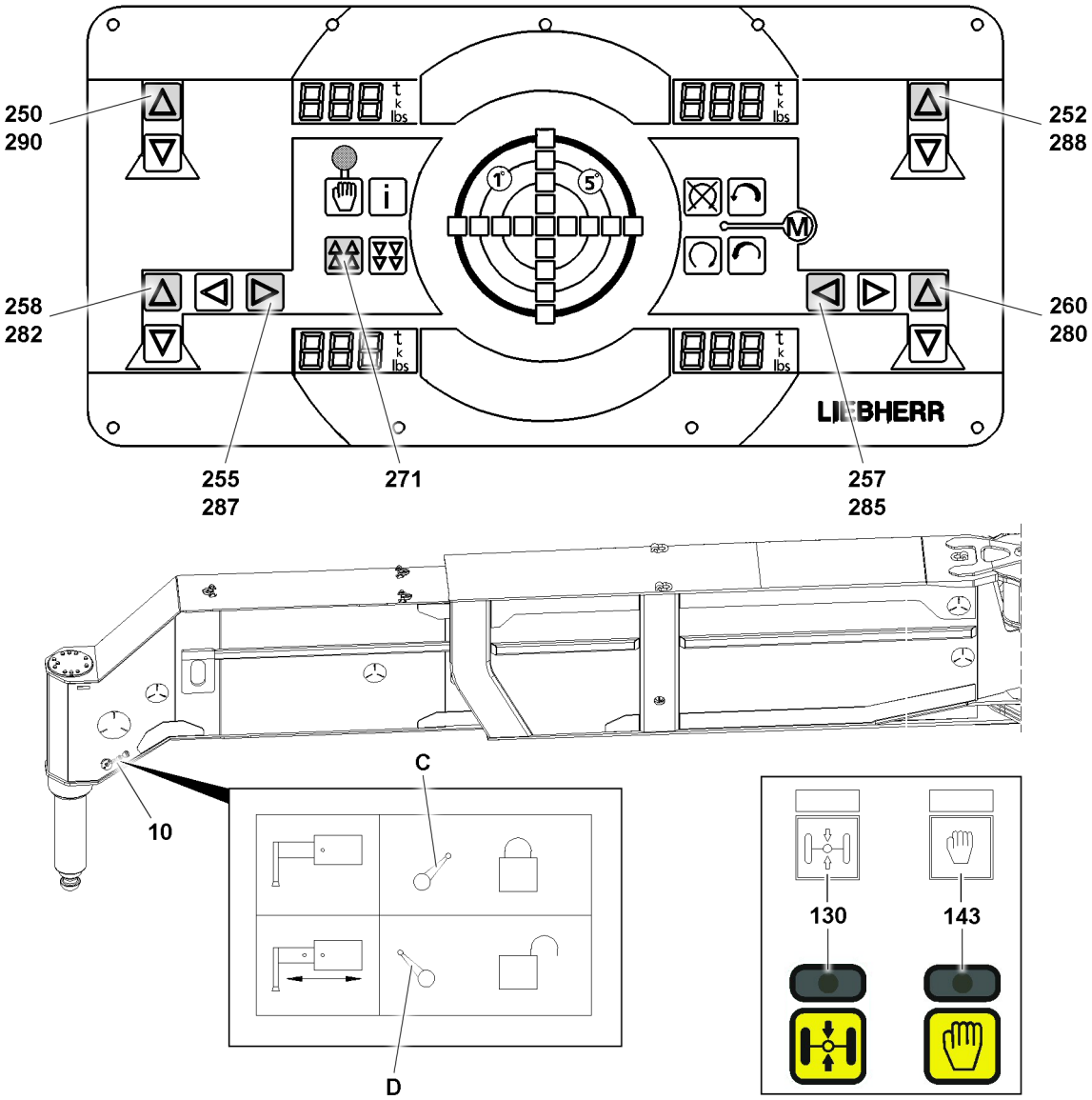

Fig.149264: Retracting the support cylinders with the support control unit

▶ Start the engine.

Evenly retract the support cylinders by pressing the corresponding buttons until the wheels are touching the ground.

▶ Left support control unit: Press the button **250**, button **252**, button **258** and button **260**.
▶ Right support control unit: Press the button **280**, button **282**, button **288** and button **290**.
or

If all support cylinders are to be retracted together:
Press the button **271** until the wheels are in contact with the ground.

NOTICE
Damage to the axle suspension!
If the axle block is turned off without the wheels being in contact with the ground, then the axle suspension can be damaged if the axles fall down.
▶ Do not turn axle blocking off until all wheels are in contact with the ground.

▶ Press the button **130** and button **143** and turn off axle locking.
▶ Retract all four support cylinders all the way.

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3.5 Retracting the sliding beams with the support control unit

The sliding beams on the left side of the vehicle can only be operated using the left support control unit.

The sliding beams on the right side of the vehicle can only be operated using the right support control unit.

WARNING
Danger of crushing when extending and retracting the sliding beams.
Death, severe bodily injuries, property damage.
▶ Only operate the sliding beams that you can see.
▶ Ensure that there are no persons or objects in the danger zone.

▶ Set all four levers **10** on the sliding beam into position **D**.

Result:

– All sliding beams are unpinned.

▶ Left support control unit: Press the button **255** and the button **257**.

Result:

– The sliding beams on the left side of the vehicle are retracted individually.

▶ Right support control unit: Press the button **285** and the button **287**.

Result:

– The sliding beams on the right side of the vehicle are retracted individually.

▶ Set all four levers **10** into position **D**.

Result:

– All four sliding beams are pinned and secured against extending.

4 Before leaving the jobsite

4.1 Checks to be performed

After a longer period of time on the construction site, all the checks described in chapter 3.02 must be carried out before starting to travel.

WARNING
Danger of accident due to improper transport condition!
Improper transport conditions can result in property damage to the crane and endanger others on the road.
Death, severe bodily injuries, property damage.
▶ Make sure that the crane is secured in the correct transport condition before starting to travel.

▶ Ensure proper transport condition.

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3.06 Assembly conditions

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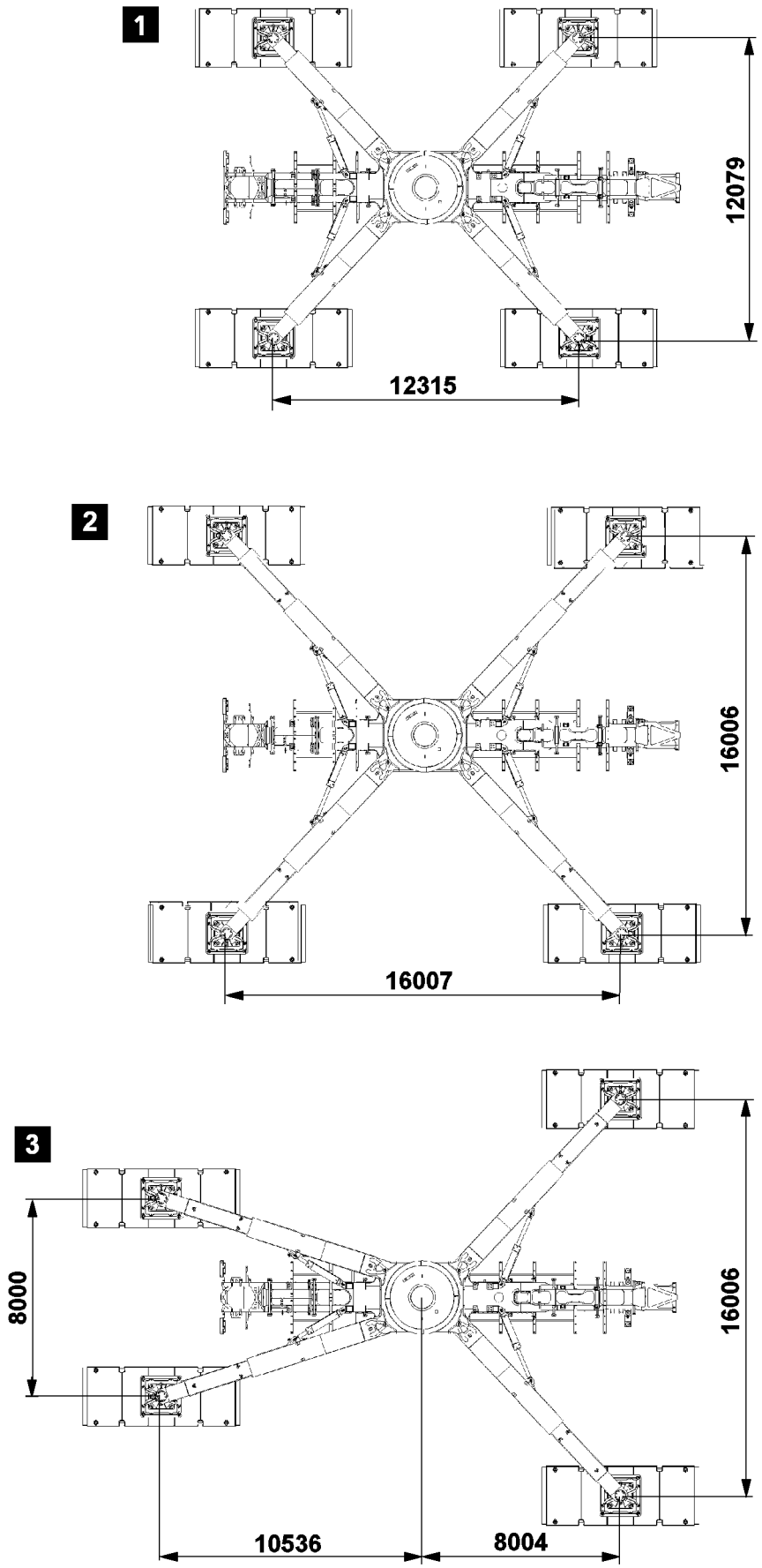

Fig.198599

1 Assembly conditions

1.1 General

Make sure that the following prerequisites are met:
- the SA-frame is place down,
- winch 1, winch 2 and winch 4 are assembled.

WARNING
The crane can topple over!
This support base „illustration 3“ is prohibited for crane operation and may only be used for raising and lowering long booms!
Before raising and lowering long booms, the support beams must be set „behind“ onto a support width of 8 m.
After erecting the support beam must be set „behind“ upon the required support base for the crane operation, see „illustration 2“.
If this is not observed, the crane can topple over!
▶ Use support base „illustration 3“ exclusively for raising and lowering long booms!

▶ Use support base „illustration 1“ or „illustration 2“ for crane operation.

1.2 Permissible turntable ballast for 360°

WARNING
The crane can topple over!
If any other counterweight combination than the one noted in the charts is turned, the crane can topple over!
▶ Turn with permissible turntable ballast, see following charts.

Support base, illustration 1	Turntable	Maximum ballast
12.315 m x 12.079 m	without extension	245 t
	with extension	150 t

Support base, illustration 2	Turntable	Maximum ballast
16.007 m x 16.006 m	without extension	245 t
	with extension	250 t

Support base, illustration 3	Turntable	Maximum ballast
	without extension	245 t
	with extension	125 t

▶

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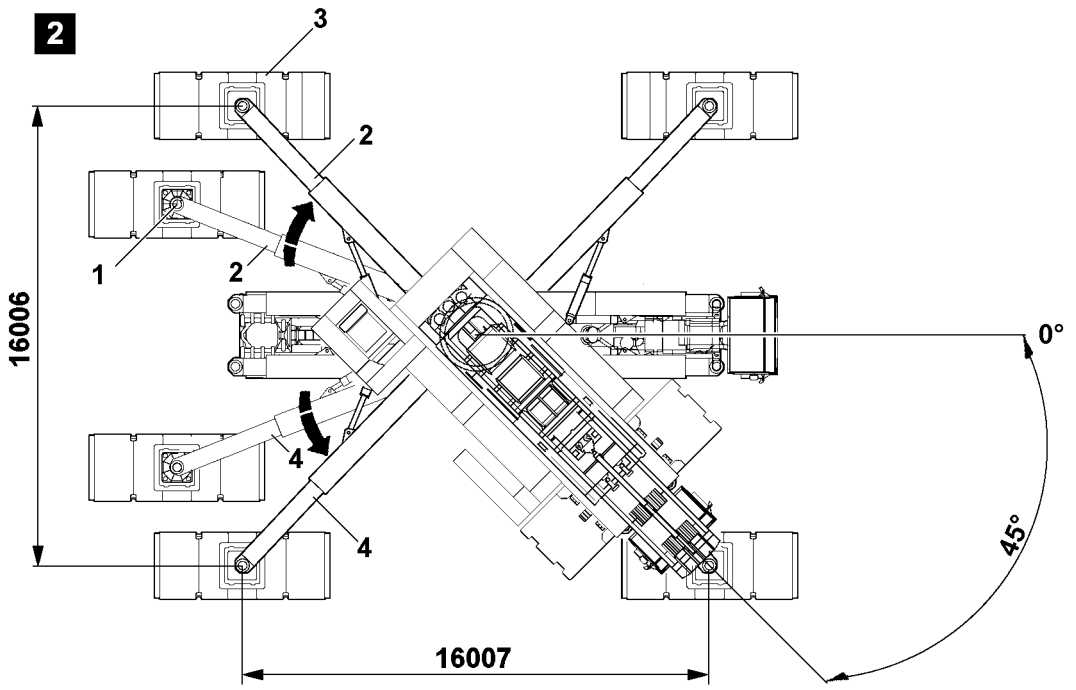

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Fig.108407

1.3 Set support beam behind on support base for crane operation

WARNING
The crane can topple over!
Support beam **2** and support beam **4** „behind“ must be set according to the erection of long booms upon the required support base for the crane operation, see „illustration 2“.
The turntable with a maximum turntable ballast may be turned at most 45° until the stand over a support beam „forward“, see „illustration 2“.
If the turntable is turned more than 45°, the crane can topple!
▶ Maintain permissible turntable ballast and turn turntable a maximum 45°!

Make sure that the following prerequisites are met:
– the turntable is in the 0° position,
– the main boom and auxiliary boom are luffed up into steepest position.

▶ Turn turntable a maximum 45°, until the counterweight is found over the opposite-lying support beam, see illustration **2**.
▶ Retract support cylinders **1**, that are opposite to the counterweight as far in as the support beam **2** is unloaded.
▶ Swing out support beam **2** corresponding support base in the load chart.
▶ Observe that the support plate **3** remain close over the load-bearing ground.
▶ Extend retracted support cylinder **1** and level crane.
▶ Turn the turntable into 0° position.
▶ Swing out the support beam **4** as support beam **2** corresponding to the support base in the load table.

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3.07 Towing the crane

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Fig.195219

1 Safety notes for towing

For towing, special expert knowledge is assumed, which cannot be provided in these Operating instructions.

Note

▶ Have the crane vehicle towed exclusively by authorized and trained expert personnel.

Observe the following safety notes:

- To tow the crane vehicle:
  Use the maneuvering coupling on the front
- Tow solely with the towing rod
- Before towing:
  Agree on clear communication signs with the driver of the towing vehicle
- Turn the emergency blinker system on
- Before towing:
  Release the parking brake
- Adjust the driving style to the difficult conditions

2 Defective engine

Observe the following towing instructions in case of a defective engine:

- Towing speed: maximum 20 km/h
- Towing distance: maximum 100 km

WARNING

Death due to limited steering behavior!

In case of a defective engine, the crane vehicle can only be steered from a speed of 5 km/h to 10 km/h.

▶ Allow for the limited steering behaviour when starting to drive.

2.1 Measures in case of a defective engine

If the engine is defective, a pressure supply must be established from the towing vehicle to the mobile crane. For the pressure supply of the crane vehicle to be towed, a coupling head is installed on the front under the bumper.

WARNING

Insufficient braking power!

Death, severe injuries, property damage

▶ Make sure that the pressure supply from the towing vehicle is at least 6 bar.

▶ Establish the pressure supply from the towing vehicle to the crane vehicle.

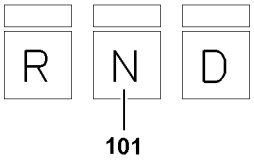

*Fig.120838: Button **101** for neutral position of transmission*

▶ Press the button **101** and shift the transmission into neutral „N“.

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3 Defective transmission

Observe the following towing instructions in case of a defective transmission:
- Towing speed: maximum 20 km/h
- Towing distance: unlimited

For towing with a defective transmission, two variations are differentiated:
- Transmission can be shifted into neutral position
- Transmission can **not** be shifted into neutral position

3.1 Transmission can be shifted into neutral position

▶ Remove the gear shaft between the transmission and the distributor gear.

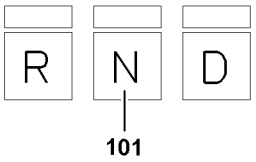

*Fig.120838: Button **101** for neutral position of transmission*

▶ Press the button **101** and shift the transmission into neutral „N“.
▶ Start the engine and let it run at low idle.

3.2 Transmission can not be shifted into neutral position

▶ Remove the gear shaft between the transmission and the distributor gear.

NOTICE
Severe damage of transmission!

If the transmission can not be shifted into neutral position:
▶ Do **not** tow the crane vehicle with the crane engine running.

If the vehicle can **not** be towed with the crane engine running, then a pressure supply must be established from the towing vehicle to the mobile crane. For the pressure supply of the crane vehicle to be towed, a coupling head is installed on the front under the bumper.

WARNING
Insufficient braking power!
Death, severe injuries, property damage
▶ Make sure that the pressure supply from the towing vehicle is at least 6 bar.

▶ Establish the pressure supply from the towing vehicle to the crane vehicle.
▶ Observe and adhere to the notes and danger notes in section „Defective engine“.

4 Defective distributor gear

Observe the following towing instructions in case of a defective distributor gear:
- Towing speed: maximum 20 km/h
- Towing distance: unlimited

4.1 Measures in case of a defective distributor gear

▶ Remove the gear shafts from the distributor gear to the axles.

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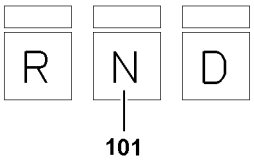

*Fig.120838: Button **101** for neutral position of transmission*

- ▶ Press the button **101** and shift the transmission into neutral „N“.
- ▶ Start the engine and let it run at low idle.

5 Defective axle(s)

5.1 Measures in case of defective axle(s)

Solely authorized and trained expert personnel can carry out the measures in case of defective axles.

- ▶ Assign authorized and trained expert personnel.

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3.08 Turntable assembly

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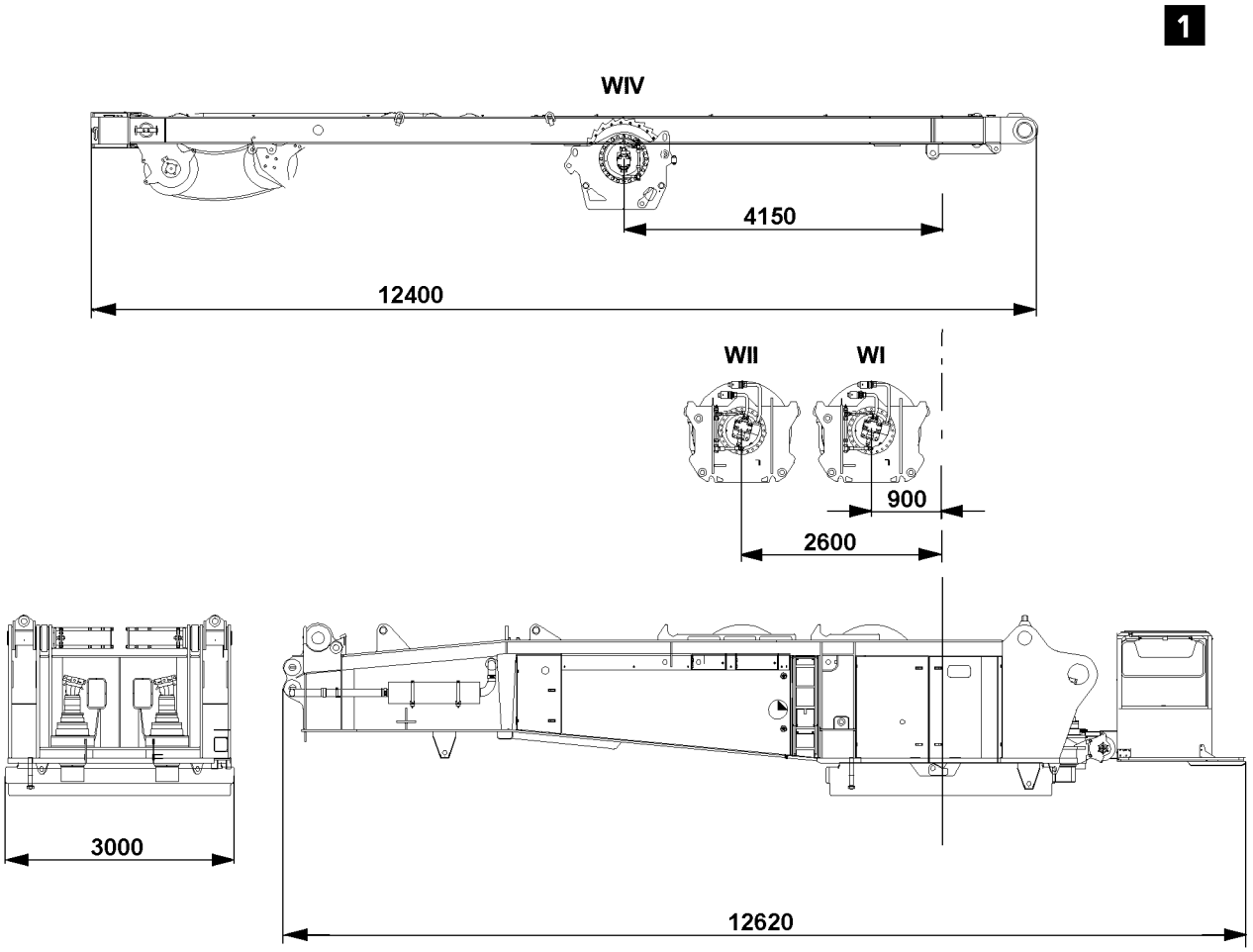

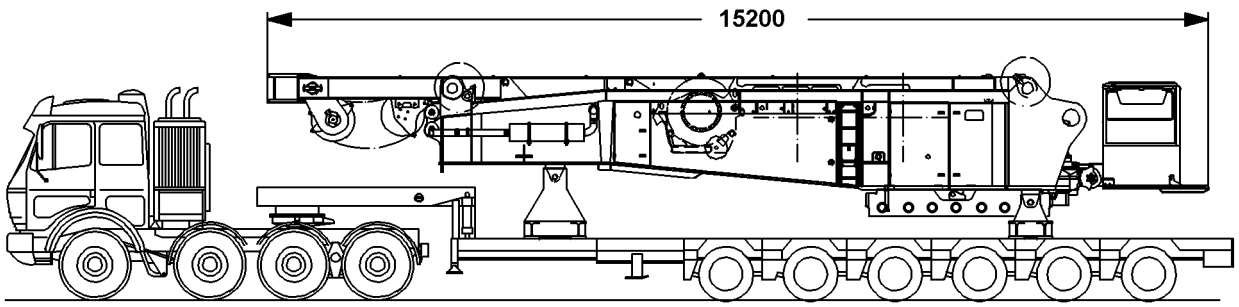

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Fig.111154

1 Transport weights and fastening points on the turntable

1.1 Transport weights turntable

Installed are:
- Assembly winch with rope
- Upper section of the roller ring connection with Quick Connection
- 1 to 3 slewing gears, depending on the equipment

Status	Turntable with platform	Winch 1 including rope	Winch 2 including rope	SA-frame with winch 4
I	Weight approx. 37.0 t	—	—	—
II	Weight approx. 54.0 t	—	—	X
III	Weight approx. 63.0 t	—	X	X
IV	Weight approx. 72.0 t	X	X	X

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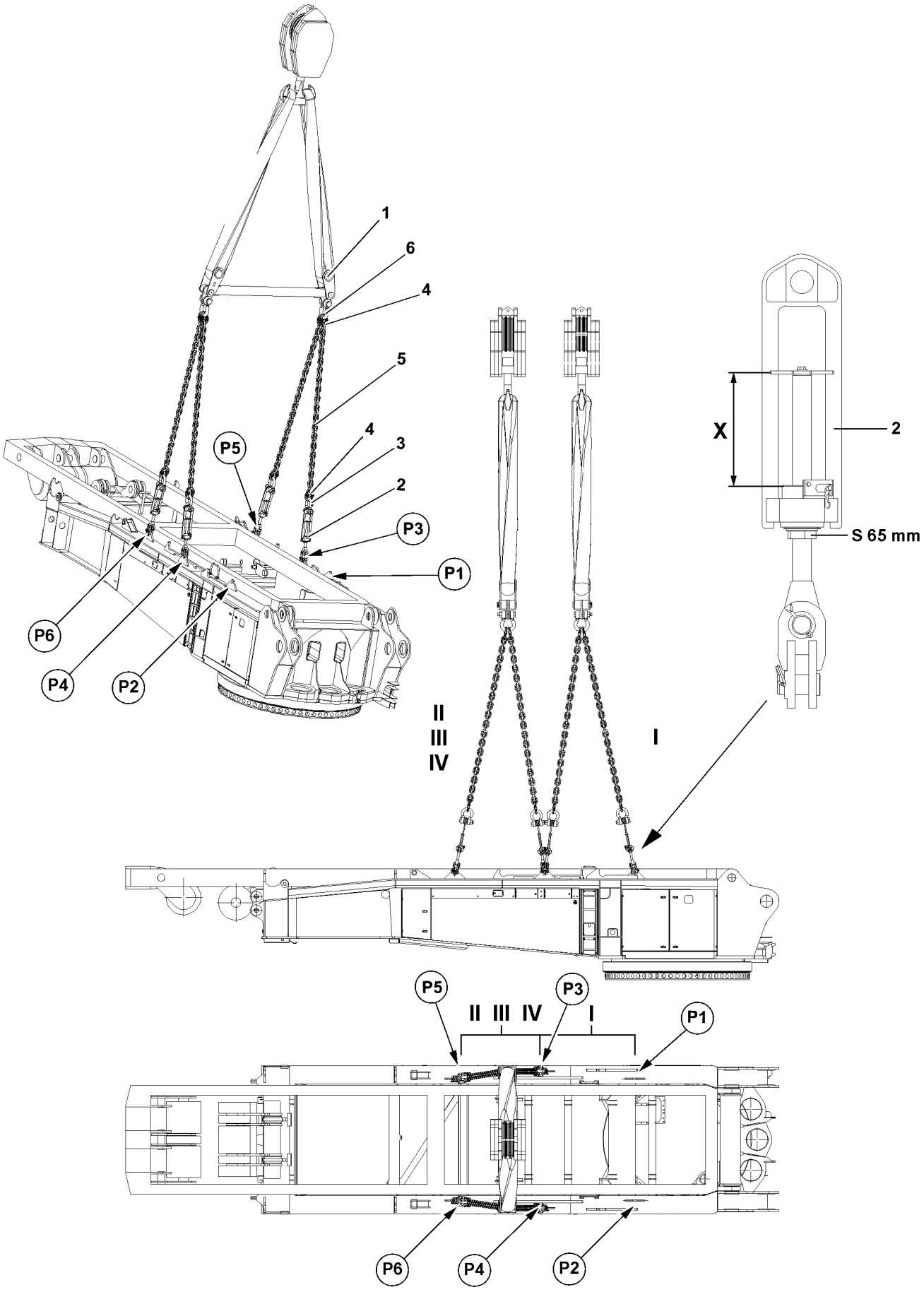

Fig.111155

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1.2 Fastening points on the turntable

1.2.1 Components of lifting device

1 Cross beam
2 Tension device
3 Shackle
4 Connector link
5 Fastening chain
6 Shackle

1.2.2 Adjustments on tensioning devices

WARNING
Danger of accident due to incorrect attachment!
Life-threatening situations can arise if the turntable is incorrectly or improperly attached.
Death, severe injury, property damage.
- ▶ Set the tensioning devices according to the data in the chart.
- ▶ Attach the turntable according to the data in the chart on the intended fastening points.
- ▶ Make sure that the fastening equipment is correctly attached on the turntable and that it is secured sufficiently to prevent it from loosening up.

Status	P1	P2	P3	P4	P5	P6
I	205 mm	95 mm	255 mm	145 mm	—	—
II	—	—	315 mm	245 mm	135 mm	75 mm
III	—	—	315 mm	240 mm	115 mm	50 mm
IV	—	—	370 mm	305 mm	80 mm	20 mm

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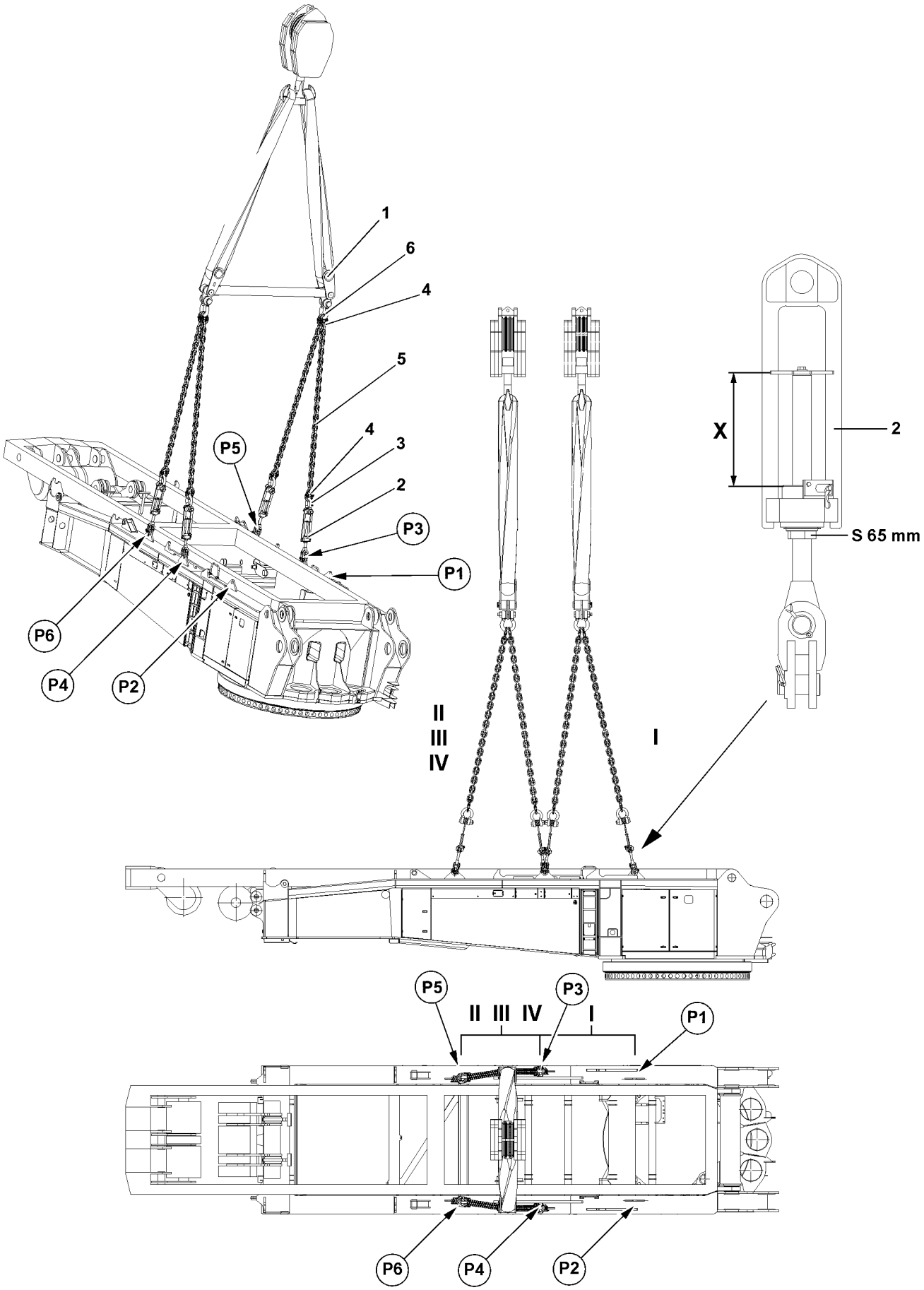

Fig.111155

LWE/LG 1750-006/15409-07-02/en

2 Assembling the turntable

WARNING
Danger of falling!
During assembly / disassembly, inspection and maintenance work, personnel must be secured with appropriate aids to prevent them from falling.
Death, severe injury, property damage.
- ▶ All work aloft, where there is a danger of falling must be carried out with suitable aids.
- ▶ If aids are not available and work cannot be carried out from the ground, then the assembly personnel must secure themselves with the supplied fall arrest system to prevent falling, see Crane operating instructions, chapter 2.04.
- ▶ If fall protection equipment is available, then it must be used, see Crane operating instructions, chapter 2.06.
- ▶ When lifting, lowering, swinging crane parts in and out, no persons may remain in the danger zone.
- ▶ If railings are present on the components, then they must be brought into the corresponding position and secured for assembly / disassembly work.
- ▶ It is prohibited to lean the auxiliary ladder against the component being disassembled.
- ▶ Only step on the aids, ladders and catwalks with clean shoes.
- ▶ Keep aids, ladders and catwalks free of heavy dirt, snow and ice.
- ▶ During all assembly and disassembly work, maintenance work and inspections, travel or crane operation is prohibited.
- ▶ Remaining on a suspended load is prohibited.
- ▶ Stepping or walking on crane components and lattice sections, which have an incline of more than 20° is prohibited.
- ▶ For all assembly work, the crane operator of the main crane must be in voice contact with the crane operator / crane operators of the auxiliary crane / auxiliary cranes.
- ▶ For assembly / disassembly tasks, the crane operator may only initiate crane movements when the responsible guide has explicitly released the movement.

WARNING
Danger of impact / crushing!
When installing / removing crane components with the auxiliary crane, crane components can start to swing back and forth.
When lifting / lowering and positioning crane components, there is an increased danger of impacts / crushing.
Death, severe injury, property damage.
- ▶ Make sure that personnel cannot be caught by components.
- ▶ When working in danger zones: Use aids to protect limbs.
- ▶ Guide components with suitable aids to minimize oscillation.

DANGER
The components can fall down!
If the corresponding component is disengaged from the auxiliary crane before the corresponding component is pinned, then the corresponding component can fall down.
Death, severe injury, property damage.
- ▶ Do not disengage the auxiliary crane until the respective component is pinned and secured.

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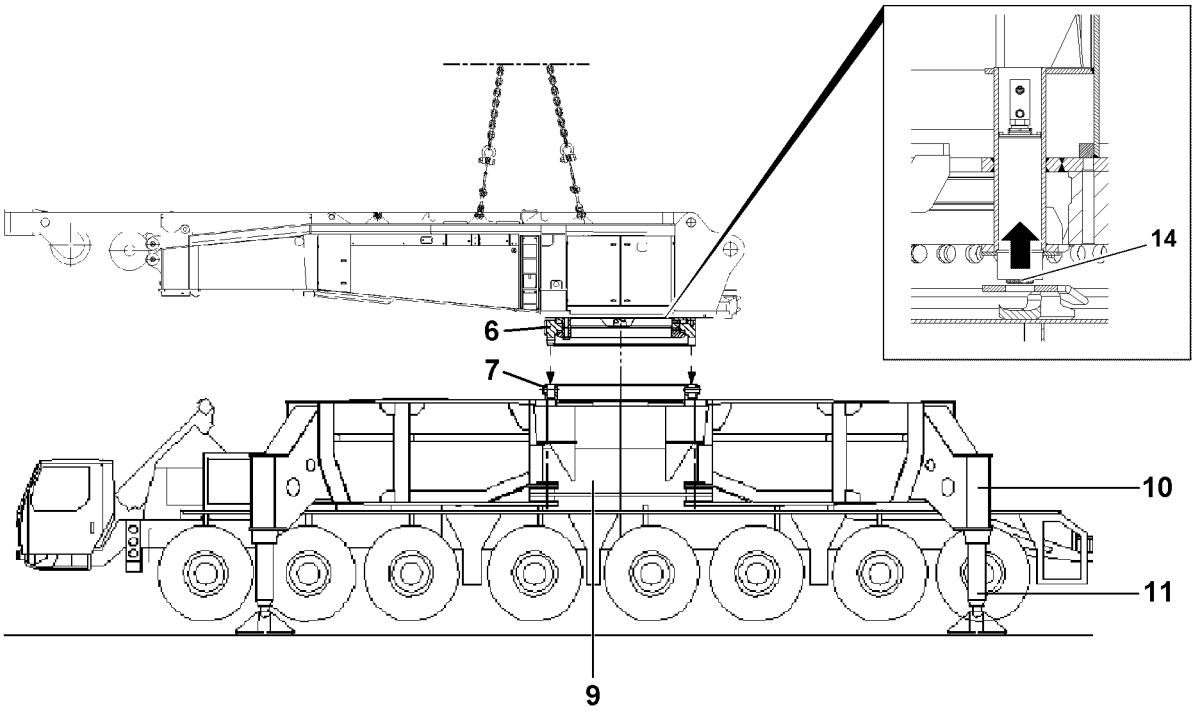

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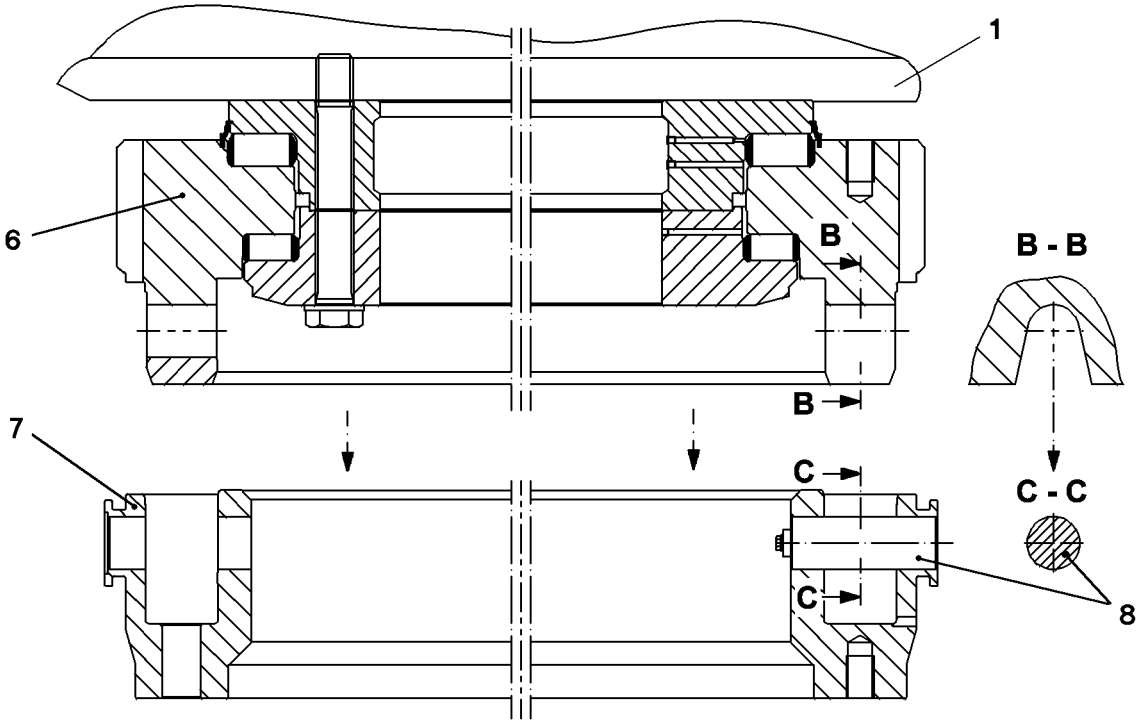

LWE/LG 1750-006/15409-07-02/en

Fig.122697

2.1 Lifting the turntable from the flatbed trailer

Make sure that the following prerequisites are met:
- An auxiliary crane with sufficient load carrying capacity is available.
- The placement location must be level and have adequate load-bearing capacity.
- The crane chassis is horizontally aligned.
- The turntable and the tensioning devices are attached and set on the fastening points according to the data in the chart, see section „Adjustments on the tensioning devices“.

▶ Attach the fastening equipment on the receptacle points.
▶ Bring the fastening chains to „tension“ with the auxiliary crane.
▶ Release and remove the transport retainers on the turntable.

WARNING
Falling components!
When lifting the turntable from the flatbed trailer, components or the turntable can fall down.
Death, severe injury, property damage.
▶ Make sure that there are no persons within the danger zone.

▶ Lift the turntable with the auxiliary crane from the flatbed trailer.

2.2 Cleaning the slewing ring connection

NOTICE
Damage to the roller ring connection!
If the roller ring connection is dirty, then it can be damaged.
▶ Clean the components thoroughly before installation.

▶ Clean the placement and contact surfaces on the upper **6** and lower section **7** of the roller ring connection before installation.
▶ Clean the pin bores on the upper and lower section of the roller ring connection before installation.

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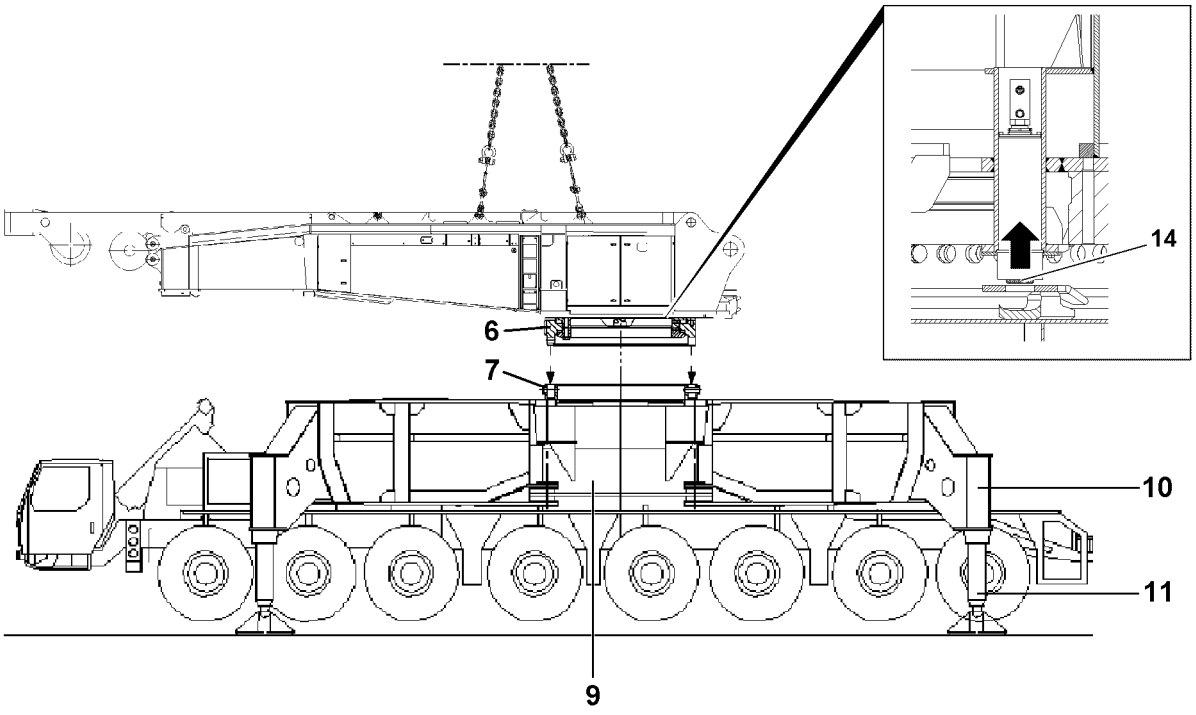

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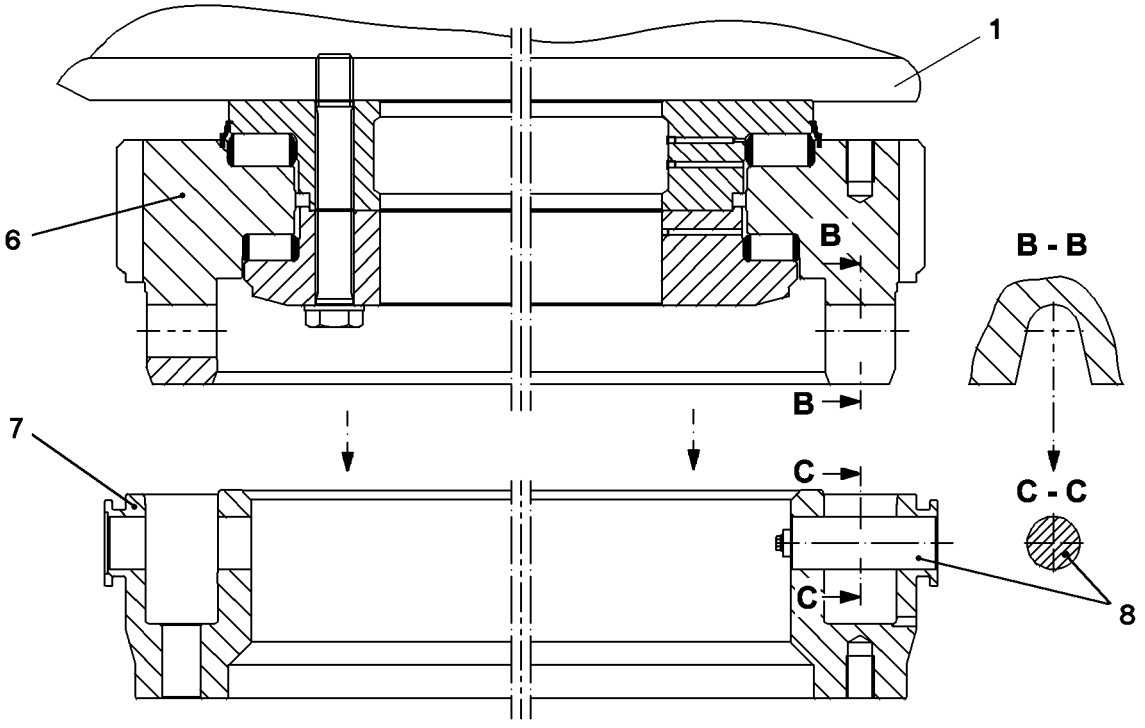

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Fig.122697

2.3 Placing the turntable on the crawler center section

WARNING
The crane can topple over!
When setting the turntable on the crane chassis, the hydraulic supports can sink into the ground due to the increased weight, this can cause the crane to topple over.
Death, severe injury, property damage.
▶ Make sure that the ground is level and of sufficient load bearing capacity.
▶ If necessary, support the support plates with suitable materials.

NOTICE
Danger of property damage!
▶ Make sure that when swinging in the turntable and placing it on the crane chassis that it does not collide with the crane chassis or any other crane component.

Make sure that the following prerequisites are met:
– The hydraulic supports **10** on the crane chassis **9** are swung out, pinned and secured.
– The support cylinders **11** are extended.
– The crane chassis **9** is aligned in horizontal direction.
– The upper **6** and lower section **7** of the roller ring connection have been cleaned.
– The two centering pins **8** are installed and secured on the lower section **7** of the roller ring connection.
– The centering pins **8** are greased with water repellent grease.
– The turntable lock locking pin **14** is completely retracted.

WARNING
Danger of accident when swinging in and lowering the turntable.
When swinging in and lowering the turntable on the crane chassis, limbs can be crushed or even severed.
Death, severe injury, property damage.
▶ Make sure that there are no persons within the danger zone.
▶ Do not reach with your hands into the danger zone.

▶ Swing the turntable with the auxiliary crane in over the crane chassis.

Note
▶ Pay attention to the alignment of the turntable or the receptacles **B-B** to the centering pins **8**.
▶ Before lowering the turntable, bring it into position in such a way that the receptacles **B-B** are positioned over the centering pins **8** on the lower section **7**.

▶ Slowly lower the turntable.

When the turntable is aligned:
▶ Carefully place the turntable onto the crane chassis.
▶ Lower the turntable completely to the stop on the lower section **7**.

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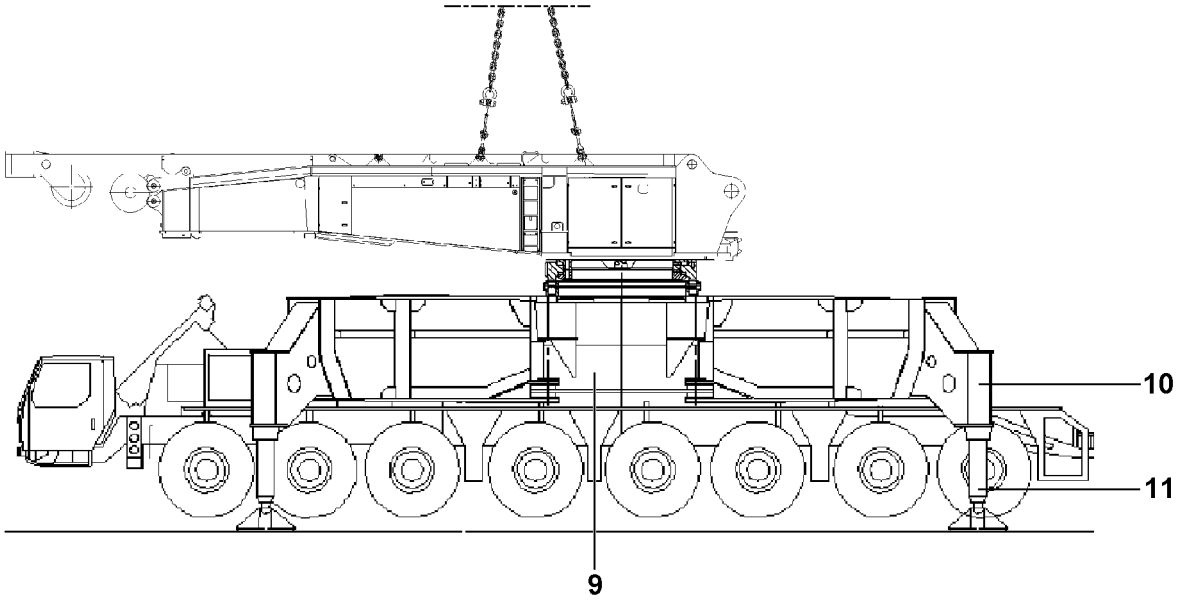

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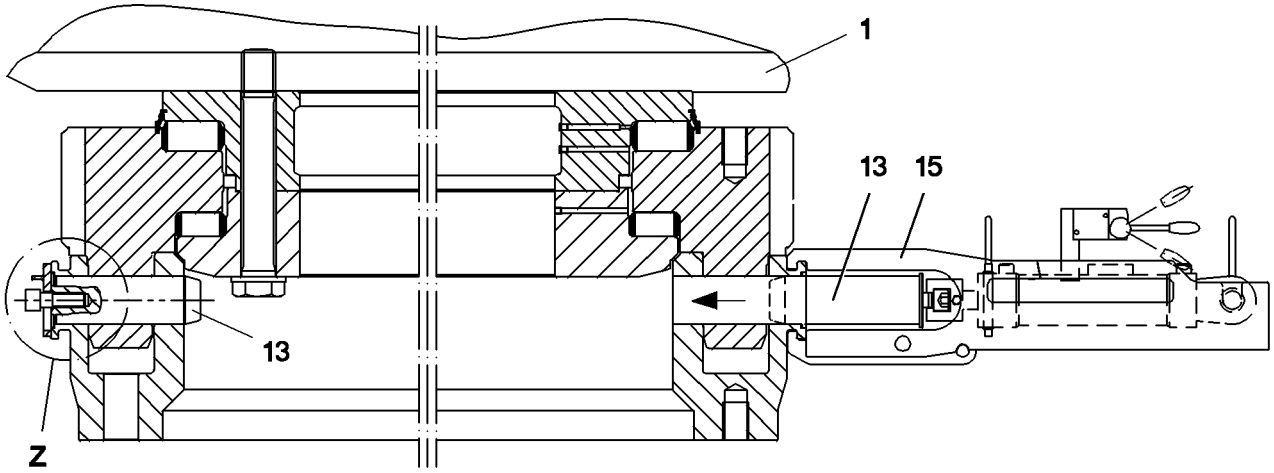

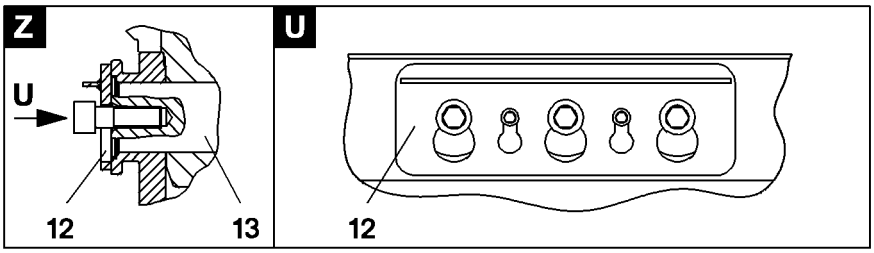

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Fig.198590

2.4 Pinning the turntable with the quick connection

Make sure that the following prerequisites are met:
- The turntable **1** is seated on the crane chassis **9**.
- The fastening chains between the turntable and the auxiliary crane are „tensioned“.
- The pin bores are clear on the circumference of the roller ring connection.

▶ Grease the connector pins **13** with water repellent grease.
▶ Insert the connector pins by hand completely.

Note
▶ If the connector pins **13** move with difficulty, use a pin pulling device **15**, see illustration **5**.

WARNING
The connector pins can loosen up by themselves!
▶ Secure connector pins **13** immediately after pinning with circlips **12**.

When all connector pins are completely pinned:
▶ Attach the circlips **12** and secure the connector pins **13**, see illustration **U**.
▶ Remove the fastening equipment on the turntable.

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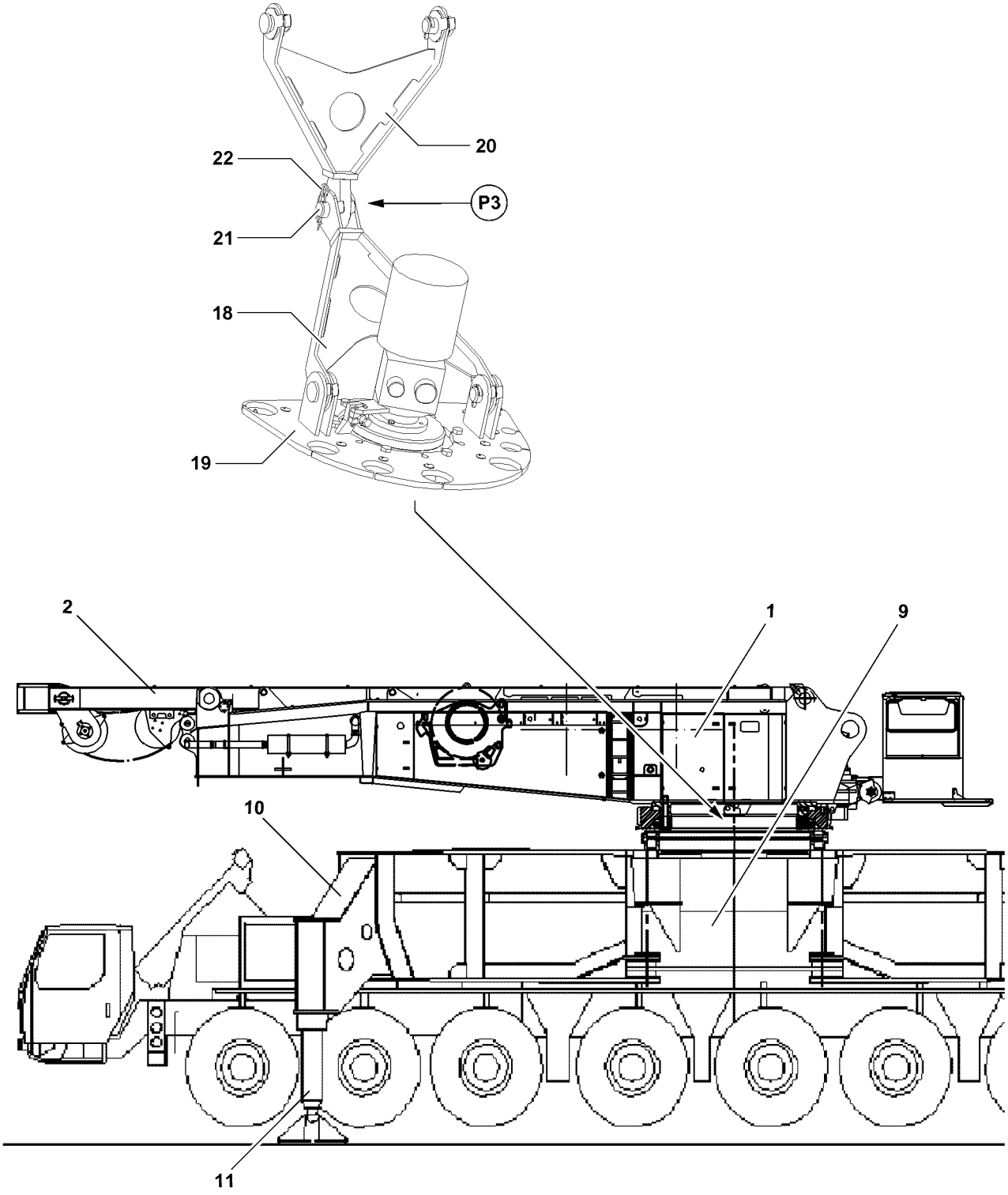

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Fig.111156

2.5 Establishing the connections to the turntable

Make sure that the following prerequisites are met:
- The upper and lower section of the quick connection are pinned and secured.
- The bar **18** is pinned with the actuator **19**.
- The bar **20** is pinned with the turntable.

2.5.1 Pinning the bar on the rotary connection

▶ Pin the bar **18** on the bar **20**.
▶ Insert the pin **21** on point **P3** and secure with spring retainer **22**.

2.5.2 Establishing the hydraulic connections to the turntable

The hydraulic connections on the turntable are established on the rotary connection.

When connecting hydraulic lines with quick couplings, make sure that the coupling procedure is carried out correctly.

WARNING
Pressure in the hydraulic lines!
If the pressure supply is not interrupted before connecting / releasing the hydraulic lines, the hydraulic oil can escape with high pressure.
Death, severe injury, property damage.
▶ Release the pressure in the hydraulic system before connecting / disconnecting: Interrupt the pressure supply and wait for a short time.

WARNING
Loss of pressure or leakage!
Incorrectly coupled or self-loosening quick couplings (particularly return lines) can result in serious accidents due to component failure.
Death, severe injury, property damage.
▶ Check that the quick couplings have been properly connected before using the crane.

▶ Connect the coupling components (sleeve and connector) and screw together with the knurled nut.
▶ Tighten the hydraulic coupling by hand. Rotate the knurled nut until it reaches a tangible, fixed stop position.
▶ Create the hydraulic connection with the turntable.

2.5.3 Establishing the electrical connections to the turntable

▶ Establish the electrical connections to the turntable on the rotary connections, see separate electric wiring diagram.

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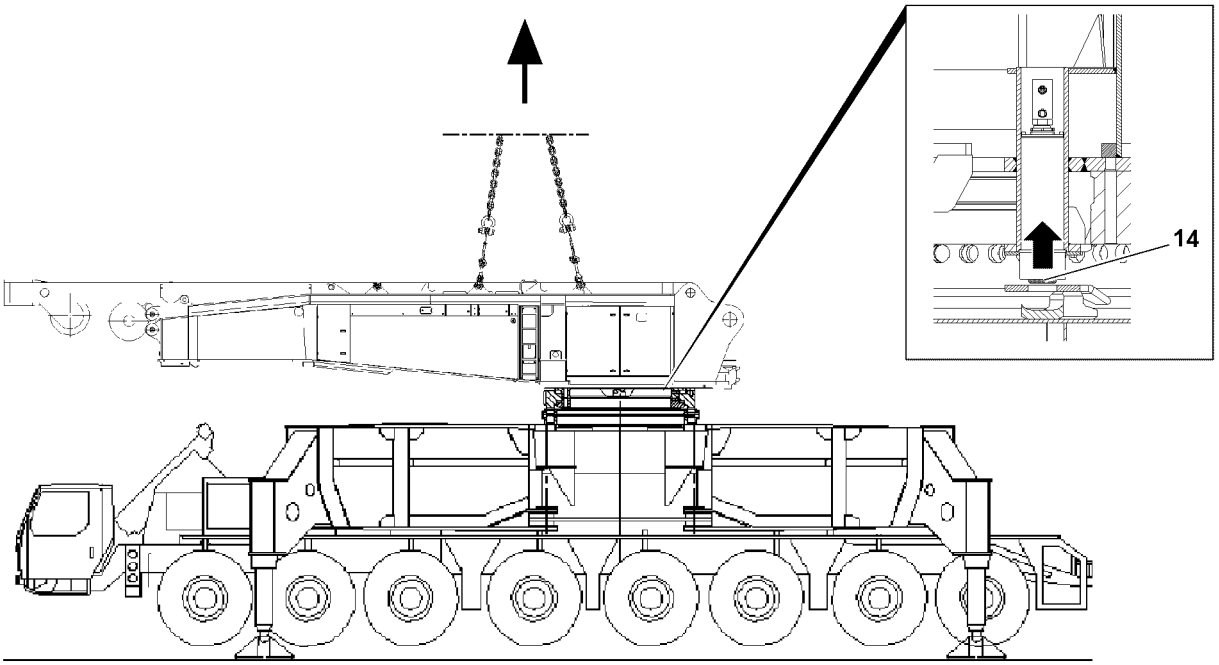

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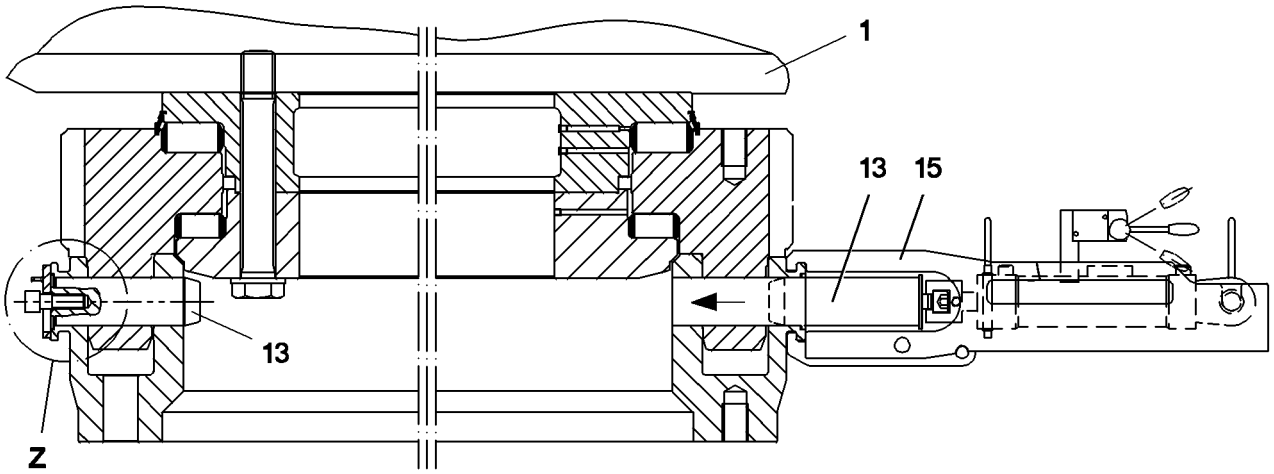

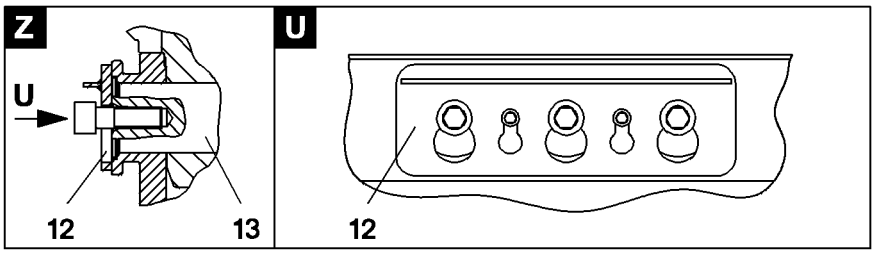

Fig.122698

3 Removing the turntable

WARNING
Danger of falling!
During assembly / disassembly, inspection and maintenance work, personnel must be secured with appropriate aids to prevent them from falling.
Death, severe injury, property damage.
- ▶ All work aloft, where there is a danger of falling must be carried out with suitable aids.
- ▶ If aids are not available and work cannot be carried out from the ground, then the assembly personnel must secure themselves with the supplied fall arrest system to prevent falling, see Crane operating instructions, chapter 2.04.
- ▶ If fall protection equipment is available, then it must be used, see Crane operating instructions, chapter 2.06.
- ▶ When lifting, lowering, swinging crane parts in and out, no persons may remain in the danger zone.
- ▶ If railings are present on the components, then they must be brought into the corresponding position and secured for assembly / disassembly work.
- ▶ It is prohibited to lean the auxiliary ladder against the component being disassembled.
- ▶ Only step on the aids, ladders and catwalks with clean shoes.
- ▶ Keep aids, ladders and catwalks free of heavy dirt, snow and ice.
- ▶ During all assembly and disassembly work, maintenance work and inspections, travel or crane operation is prohibited.
- ▶ Remaining on a suspended load is prohibited.
- ▶ Stepping or walking on crane components and lattice sections, which have an incline of more than 20° is prohibited.
- ▶ For all assembly work, the crane operator of the main crane must be in voice contact with the crane operator / crane operators of the auxiliary crane / auxiliary cranes.
- ▶ For assembly / disassembly tasks, the crane operator may only initiate crane movements when the responsible guide has explicitly released the movement.

WARNING
Danger of impact / crushing!
When installing / removing crane components with the auxiliary crane, crane components can start to swing back and forth.
When lifting / lowering and positioning crane components, there is an increased danger of impacts / crushing.
Death, severe injury, property damage.
- ▶ Make sure that personnel cannot be caught by components.
- ▶ When working in danger zones: Use aids to protect limbs.
- ▶ Guide components with suitable aids to minimize oscillation.

DANGER
The components can fall down!
If the corresponding component is disengaged from the auxiliary crane before the corresponding component is pinned, then the corresponding component can fall down.
Death, severe injury, property damage.
- ▶ Do not disengage the auxiliary crane until the respective component is pinned and secured.

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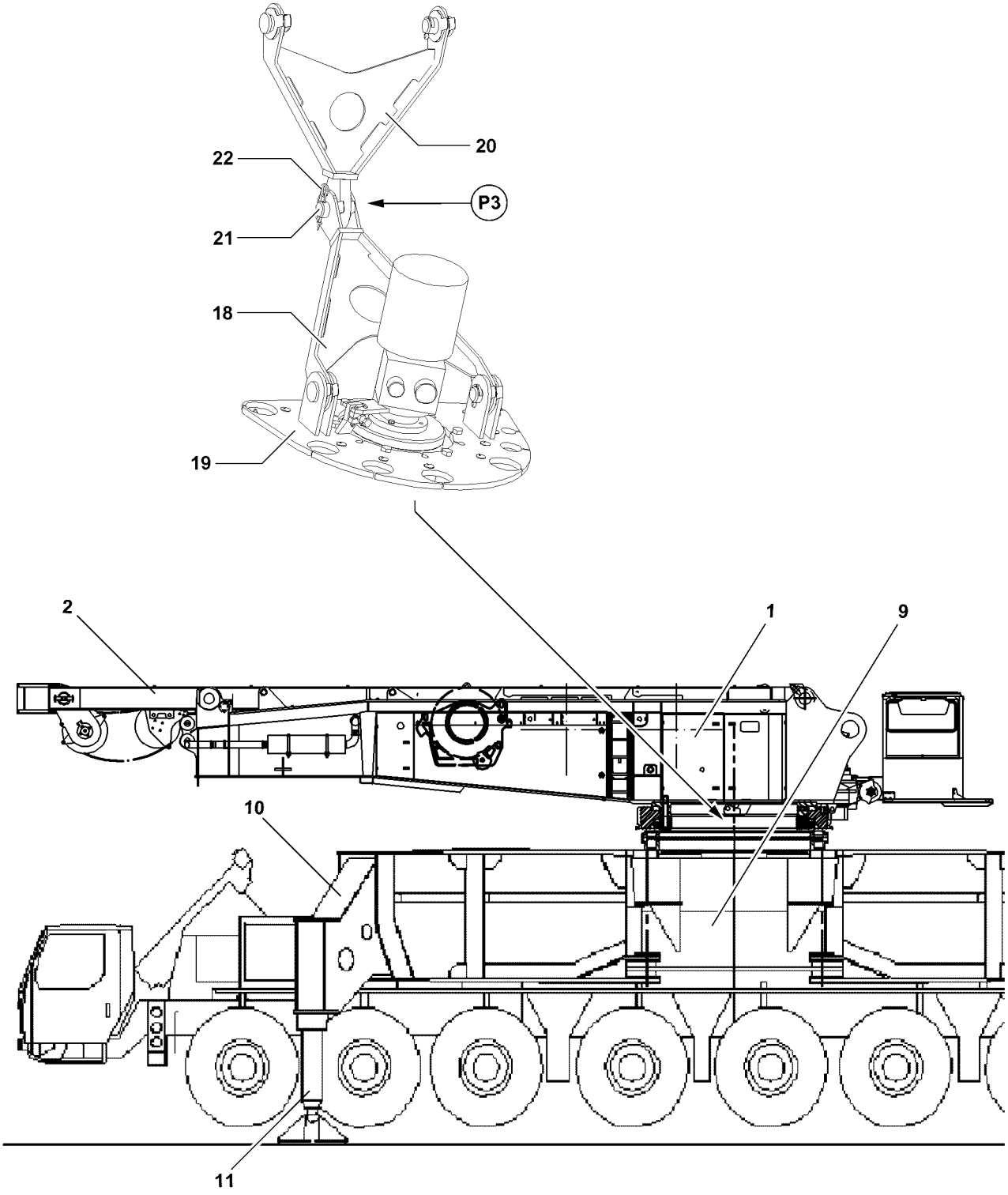

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Fig.111156

3.1 Disconnecting the connections to the turntable

Make sure that the following prerequisites are met:
- The counterweight and boom systems are disassembled.
- The hydraulic supports **10** on the crane chassis **9** are swung out, pinned and secured.
- The support cylinders **11** are extended.
- The crane chassis **9** is aligned in horizontal direction.
- The SA-frame **2** is placed on the turntable **1**.

3.1.1 Disconnecting the hydraulic connections to the turntable

When releasing hydraulic lines with quick couplings, make sure that the uncoupling procedure is carried out correctly.

WARNING
Pressure in the hydraulic lines!
If the pressure supply is not interrupted before connecting / releasing the hydraulic lines, the hydraulic oil can escape with high pressure.
Death, severe injury, property damage.
▶ Release the pressure in the hydraulic system before connecting / disconnecting: Interrupt the pressure supply and wait for a short time.

▶ Release the hydraulic coupling by hand.
▶ Disconnect the hydraulic connection to the turntable on the rotary connection.

3.1.2 Disconnecting the electrical connections to the turntable

▶ Disconnect the electrical connection to the turntable on the rotary connection.

3.1.3 Unpinning the bar on the rotary connection

▶ Remove the spring retainer **22** on point **P3**.
▶ Unpin the pin **21** on point **P3**.
▶ Disconnect the bar **18** on the bar **20**.

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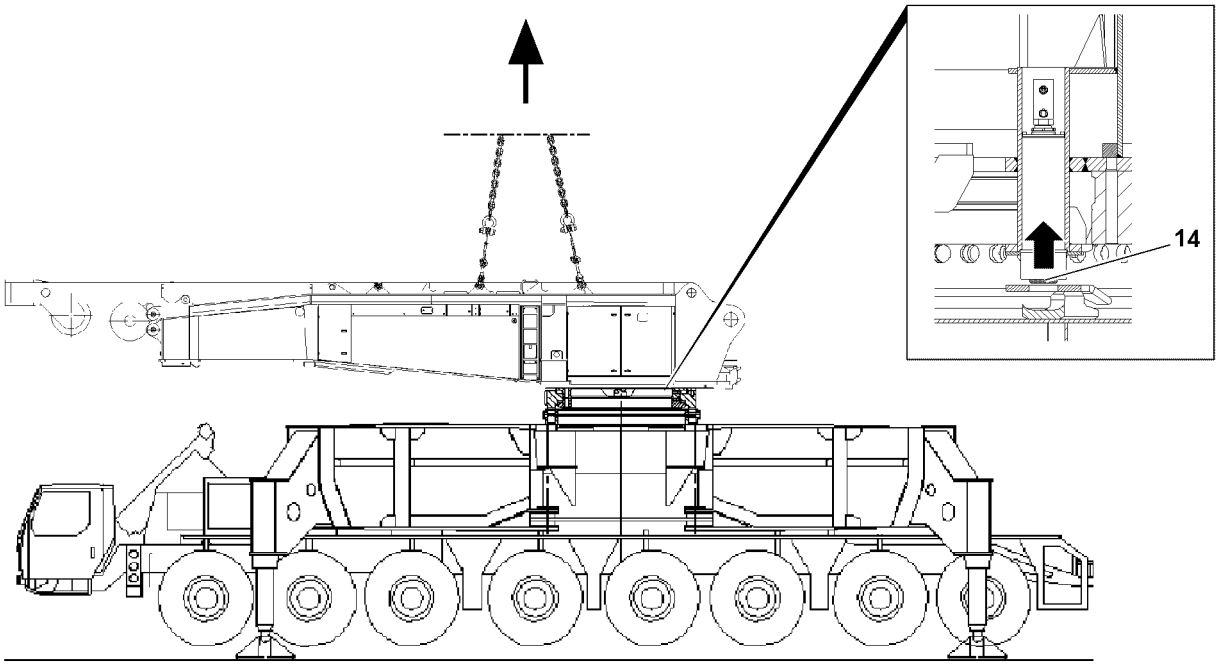

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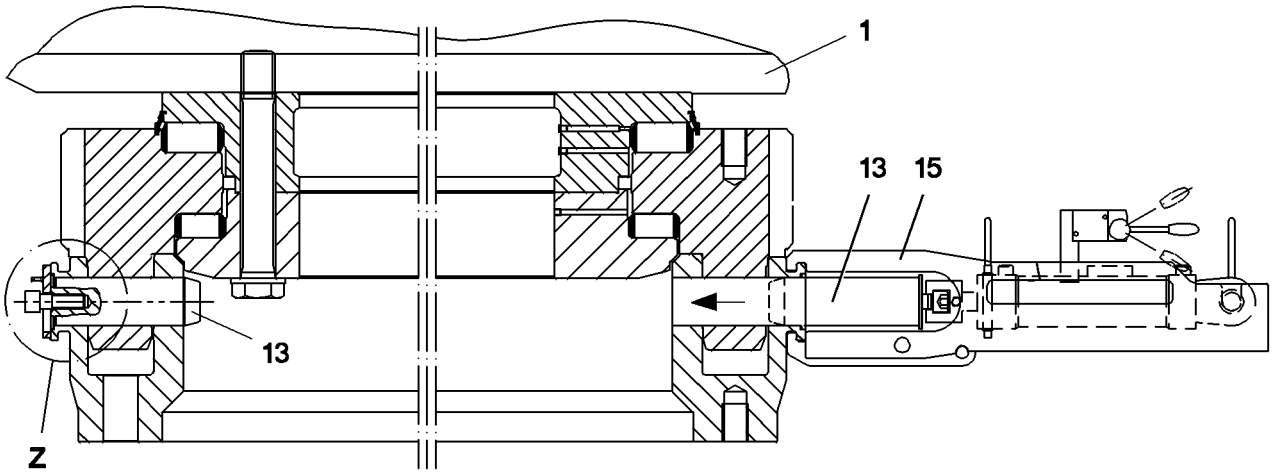

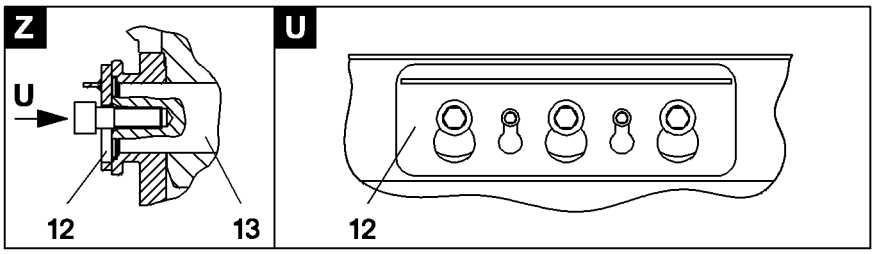

Fig.122698

3.2 Disconnecting the turntable with the quick connection

WARNING
Danger of accident due to incorrect attachment!
Life-threatening situations can arise if the turntable is incorrectly or improperly attached.
Death, severe injury, property damage.
- ▶ Set the tensioning devices according to the data in the chart.
- ▶ The turntable and the tensioning devices are attached and set on the fastening points according to the data in the chart, see section „Adjustments on the tensioning devices“.
- ▶ Make sure that the fastening equipment is correctly attached on the turntable and that it is secured sufficiently to prevent it from loosening up.

NOTICE
Danger of property damage!
- ▶ Make sure that when lifting the turntable and swinging it out from the crane chassis that it does not collide with the crane chassis or any other crane component.

Make sure that the following prerequisites are met:
- The hydraulic connections on the rotary connection are disconnected.
- The fastening equipment is attached to the corresponding receptacle points of the turntable.
- The turntable lock locking pin **14** is completely retracted (the locking pin **14** is completely unpinned on the chassis)

- ▶ Bring the fastening chains to „tension“ with the auxiliary crane.
- ▶ Release and remove the retaining bars **12**, illustration **U**.
- ▶ Unpin the connector pins **13** all the way by hand.

Note
- ▶ If the connector pins **13** are hard to move, use a pin pulling device **15**.

NOTICE
Damage to the connector parts!
By lifting the turntable, the connection lines and the quick connection can be damaged.
- ▶ Make sure that all hydraulic and electrical connections are disconnected.
- ▶ Make sure that all connector pins of the quick connection have been removed.

When all connector pins are removed:
- ▶ Carefully lift the turntable with the auxiliary crane.

WARNING
Falling components!
When lifting the turntable from the crane chassis, components or the turntable can fall down.
Death, severe injury, property damage.
- ▶ Make sure that there are no persons within the danger zone.

When the turntable is lifted completely off the crane chassis:
- ▶ Set the turntable on the flatbed trailer.
- ▶ Remove the auxiliary crane.

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3.09 Hoist winch assembly

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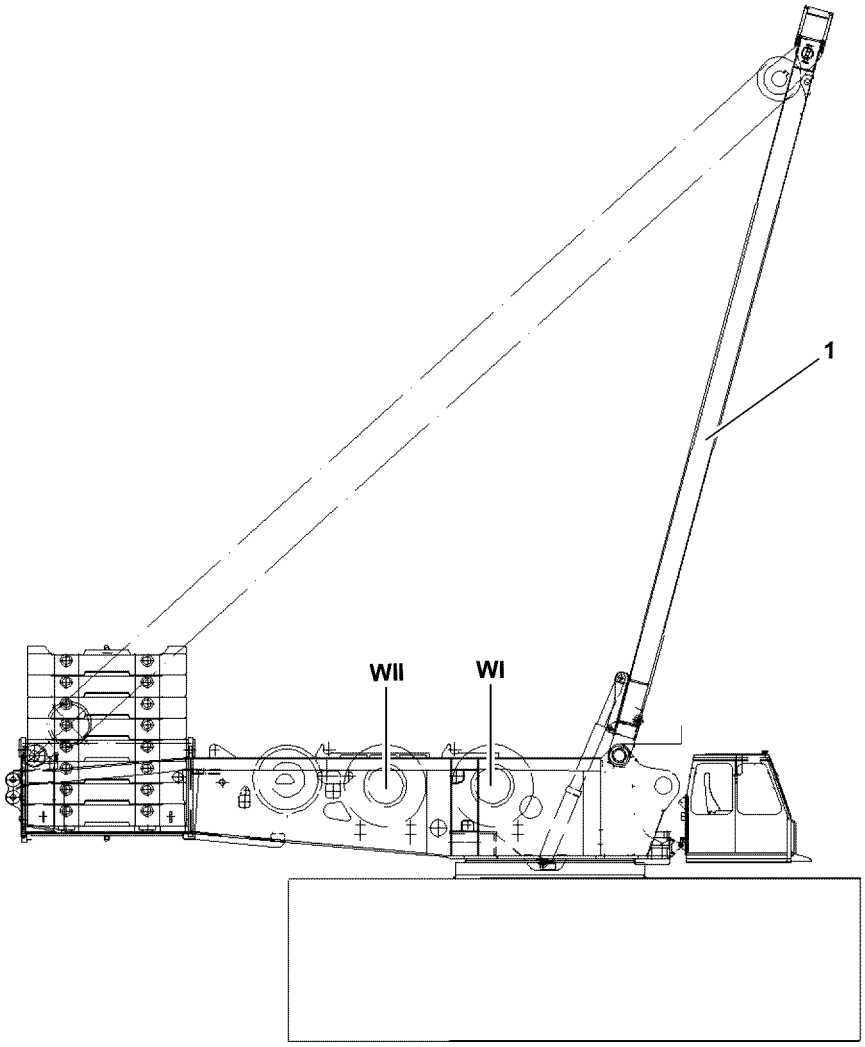

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Fig.110974

1 Component overview

1 SA-frame
WI Winch 1
WII Winch 2

2 Dimensions and weights

Note
▶ See Crane operating instructions, chapter 1.03!

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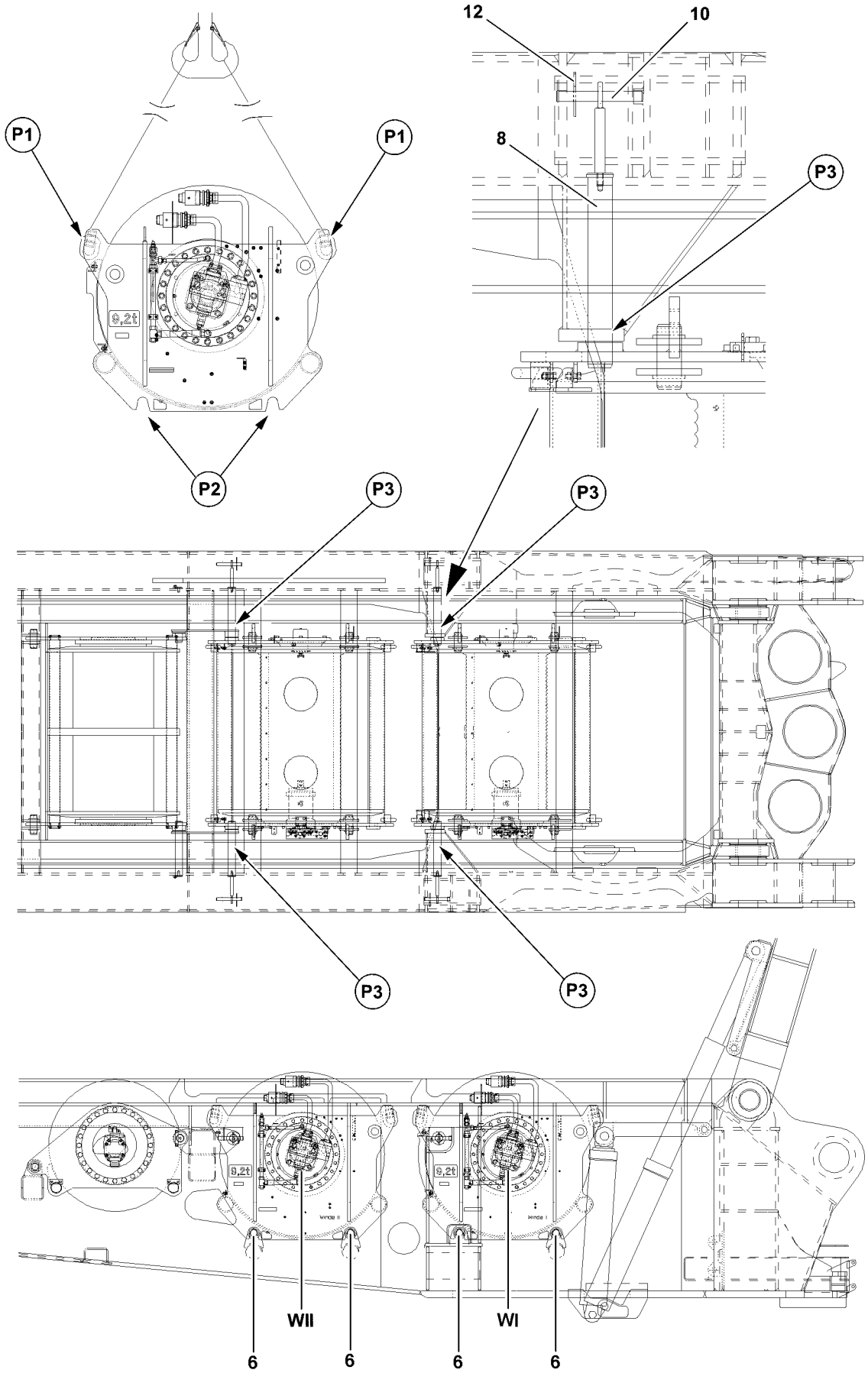

Fig.110973

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3 Installing winch 1

WARNING
Danger of falling!
During assembly / disassembly work, personnel must be secured with appropriate aids to prevent them from falling. If this is not observed, assembly personnel can fall and suffer life-threatening or fatal injuries!

- ▶ Any assembly work, where there is a danger of falling must be carried out with suitable aids (for example lifting platform, scaffolding, ladder, auxiliary crane)!
- ▶ If the work cannot be carried out with such aids nor from the ground, then the assembly personnel must secure themselves with approved fall arrest systems to avoid falling, see Crane operating instructions, Chapter 2.04!
- ▶ Approved fall arrest systems must be hung into the respective fastening points on the crane, see Crane operating instructions, chapter 2.06!
- ▶ If railings are present on the components, then they must be brought into the corresponding position and secured for assembly / disassembly work!
- ▶ Step on aids and fall protection equipment only with clean shoes!
- ▶ Keep aids and fall protection equipment clean and free from snow and ice!
- ▶ During all assembly and disassembly work, maintenance work and inspections, travel and crane operation is prohibited!

WARNING
Components not pinned and secured!
If a component is released from the auxiliary crane before having been pinned and secured, the component will fall down! Personnel can be severely injured or killed!

- ▶ Do not disengage the auxiliary crane until the corresponding component is pinned and secured!

WARNING
Danger of impact / crushing!
When installing / removing counterweight components with the auxiliary crane, crane components can start to swing back and forth!
When lifting / lowering and positioning crane components, there is an increased danger of impacts / crushing!
Personnel can be caught and severely injured or killed!

- ▶ Make sure that personnel cannot be caught by components!
- ▶ When working in danger zones: Use aids to protect limbs!
- ▶ Guide components with suitable aids to minimize oscillation!

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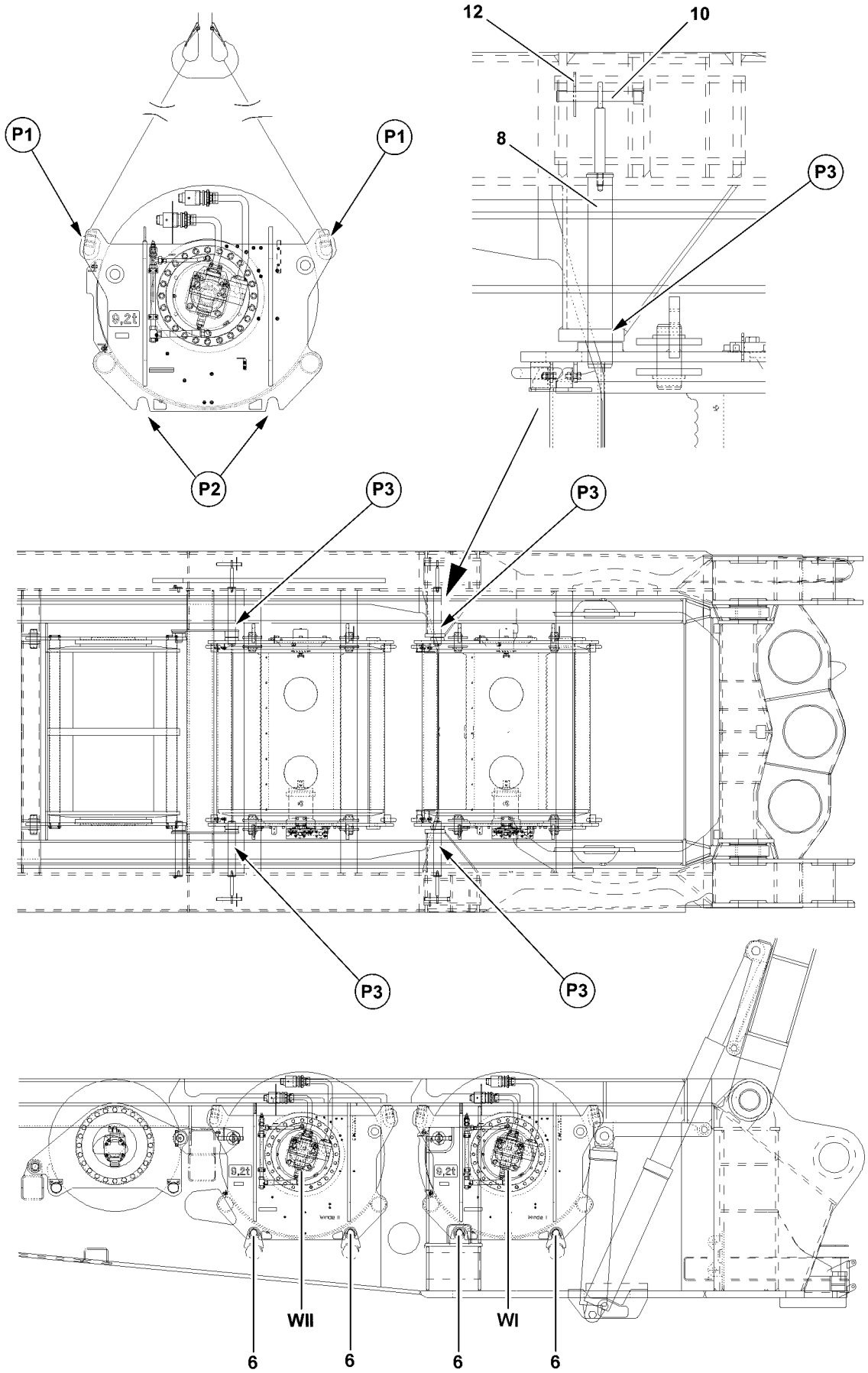

Fig.110973

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3.1 Lifting winch 1 from the flatbed trailer

Make sure that the following prerequisites are met:
- The installation of the turntable is completed.
- The crane is aligned in horizontal direction.
- An auxiliary crane with sufficient load carrying capacity is available.

WARNING
Danger of accident due to incorrect attachment!
Life-threatening situations can arise if the winch 1 is incorrectly or improperly attached!
Personnel can be severely injured or killed!
- ▶ Winch 1 must be attached on the intended receptacle points, point **P1**!
- ▶ Make sure that the fastening equipment is correctly attached on winch 1 and that it is secured sufficiently to prevent it from loosening up!

- ▶ Attach the fastening equipment on the receptacle points, point **P1**.
- ▶ Bring the fastening equipment to „tension“ with the auxiliary crane.
- ▶ Release and remove the transport retainers on the flatbed trailer.

WARNING
Falling components!
When lifting winch 1 from the flatbed trailer, components or winch 1 can fall down!
Personnel can be severely injured or killed!
- ▶ Make sure that there are no persons within the danger zone!

- ▶ Lift winch 1 with the auxiliary crane from the flatbed trailer.

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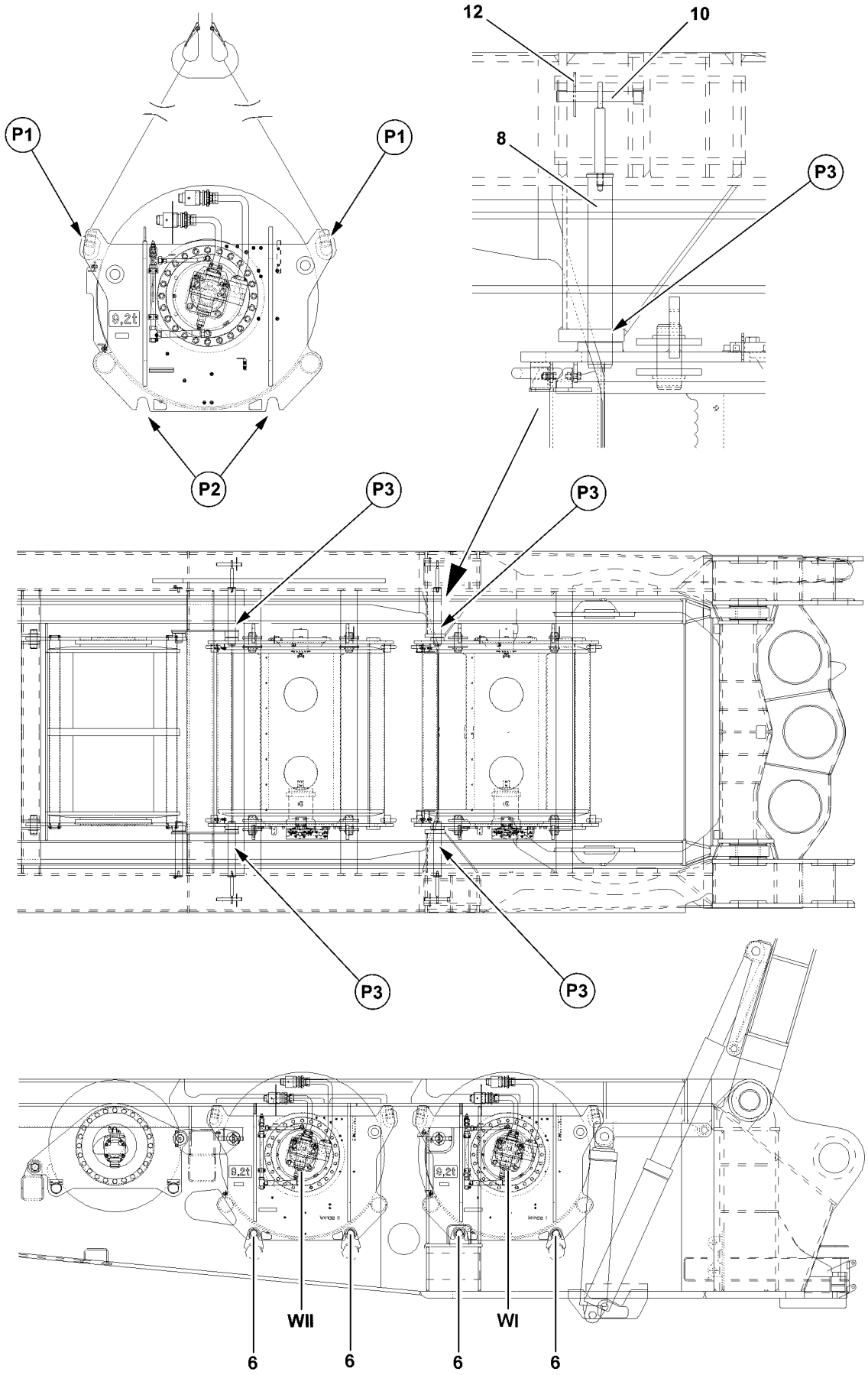

Fig.110973

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3.2 Setting winch 1 into the turntable

Make sure that the following prerequisites are met:
- The SA-frame is aligned / placed down to the point where the assembly area of winch 1 is easily accessible.
- The pin bores are clear.

WARNING
Danger of accident when swinging in and lowering winch 1!
When swinging in and lowering winch 1 on the turntable, limbs can be crushed or severed!
Personnel can be severely injured or killed!
▶ Make sure that there are no persons within the danger zone!
▶ Do not reach with your hands into the danger zone!

NOTICE
Property damage!
If the following note is not observed, damage can result to the crane or winch 1!
▶ When moving winch 1 in with the SA-frame, it must be ensured that winch 1 does not hit against the SA-frame!

Note
▶ Check to ensure that the alignment of winch 1 or the receptacles, point **P2** to the pins **6** on the turntable is exact!
▶ Before lowering, bring winch 1 into position that the receptacles, point **P2** are above the pins **6** on the turntable!

▶ Move winch 1 in with the auxiliary crane between the SA-frame.
▶ Lower winch 1 slowly.

When winch 1 is aligned:
▶ Set winch 1 carefully on the pins **6** on the turntable.

3.3 Pinning winch 1 with the turntable

Make sure that the following prerequisites are met:
- Winch 1 is seated on the pins **6**.
- The tackle between winch 1 and the auxiliary crane is „tensioned“.

▶ Insert the pins **8**, point **P3**.

WARNING
The pins can loosen up by themselves!
▶ Secure the pins **8** immediately after pinning with pins **10** and cotter pins **12**!

When all pins **8** are completely pinned:

▶ Insert pin **8** with pin **10** and secure with cotter pin **12**.
▶ Remove the tackle on winch 1.

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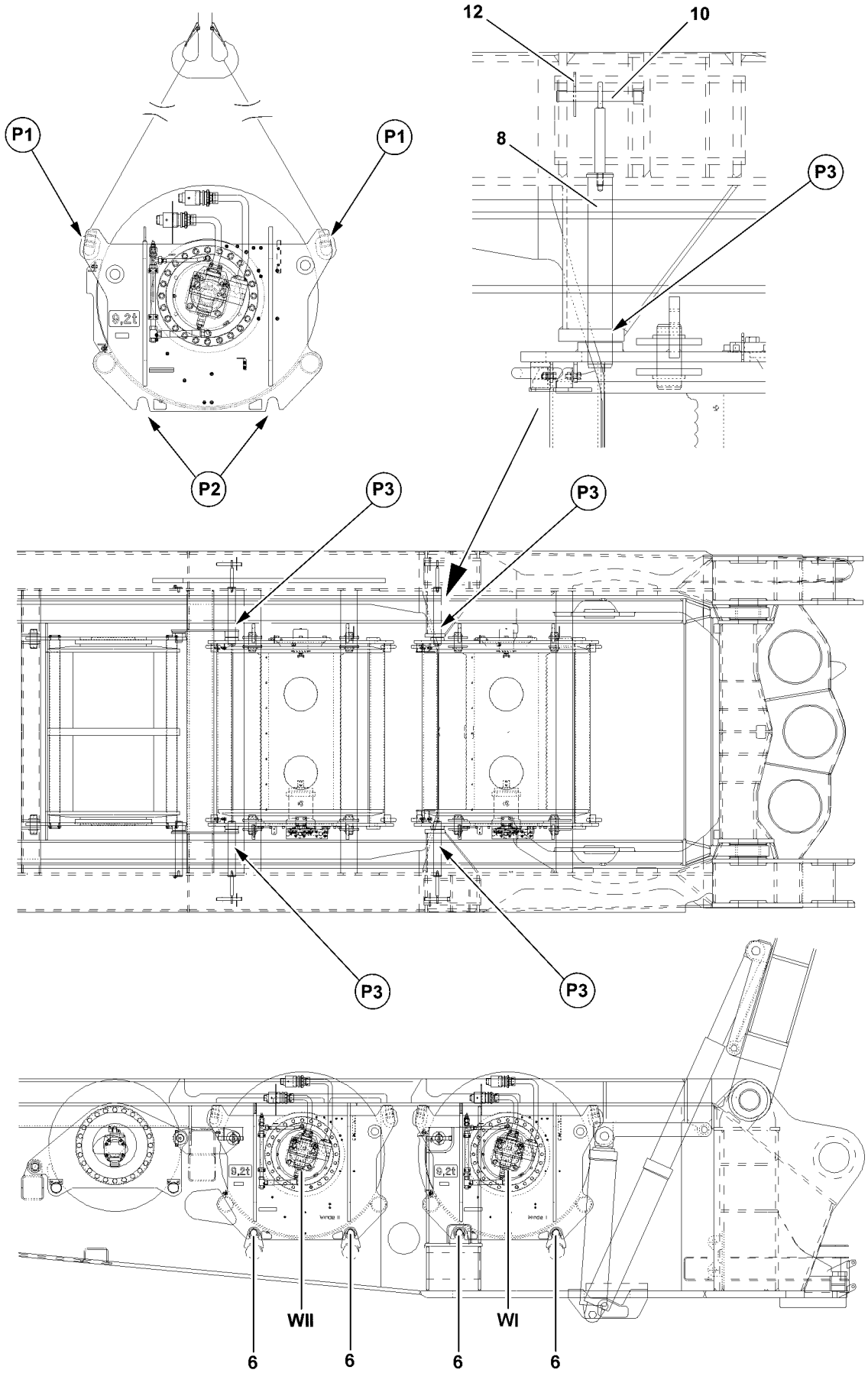

Fig.110973

LWE/LG 1750-006/15409-07-02/en

3.4 Establishing the connections to the turntable

Make sure that the following prerequisite is met:
– The winch is properly installed, pinned and secured.

3.4.1 Establishing the hydraulic connections to winch 1

The hydraulic connections of winch 1 are made with quick couplings.

When connecting hydraulic lines with quick couplings, make sure that the coupling procedure is carried out correctly.

WARNING
Pressure in the hydraulic lines!
If the pressure supply is not interrupted before connecting / releasing the hydraulic lines, the hydraulic oil can escape with high pressure!
Personnel can be severely injured or killed!
▶ Release the pressure in the hydraulic system before connecting / disconnecting: Interrupt the pressure supply and wait for a short time!

WARNING
Loss of pressure or leakage!
Incorrectly coupled or self-loosening quick-release couplings (particularly return lines) can result in serious accidents due to component failure!
▶ Check that the quick couplings have been properly connected before using the crane!

▶ Connect the coupling components (sleeve and connector) and screw together with the hand-tightened nut.
▶ Tighten the hydraulic coupling by hand. Rotate the hand-tightened nut until it reaches a tangible, fixed stop position.
▶ Establish the hydraulic connection to winch 1.

3.4.2 Establishing the electrical connections to winch 1.

▶ Establish the electrical connections to winch 1, see Electric wiring diagram.

3.4.3 Establishing the connections of the central lubrication system to winch 1

▶ Establish the connections of the central lubrication system to winch 1.

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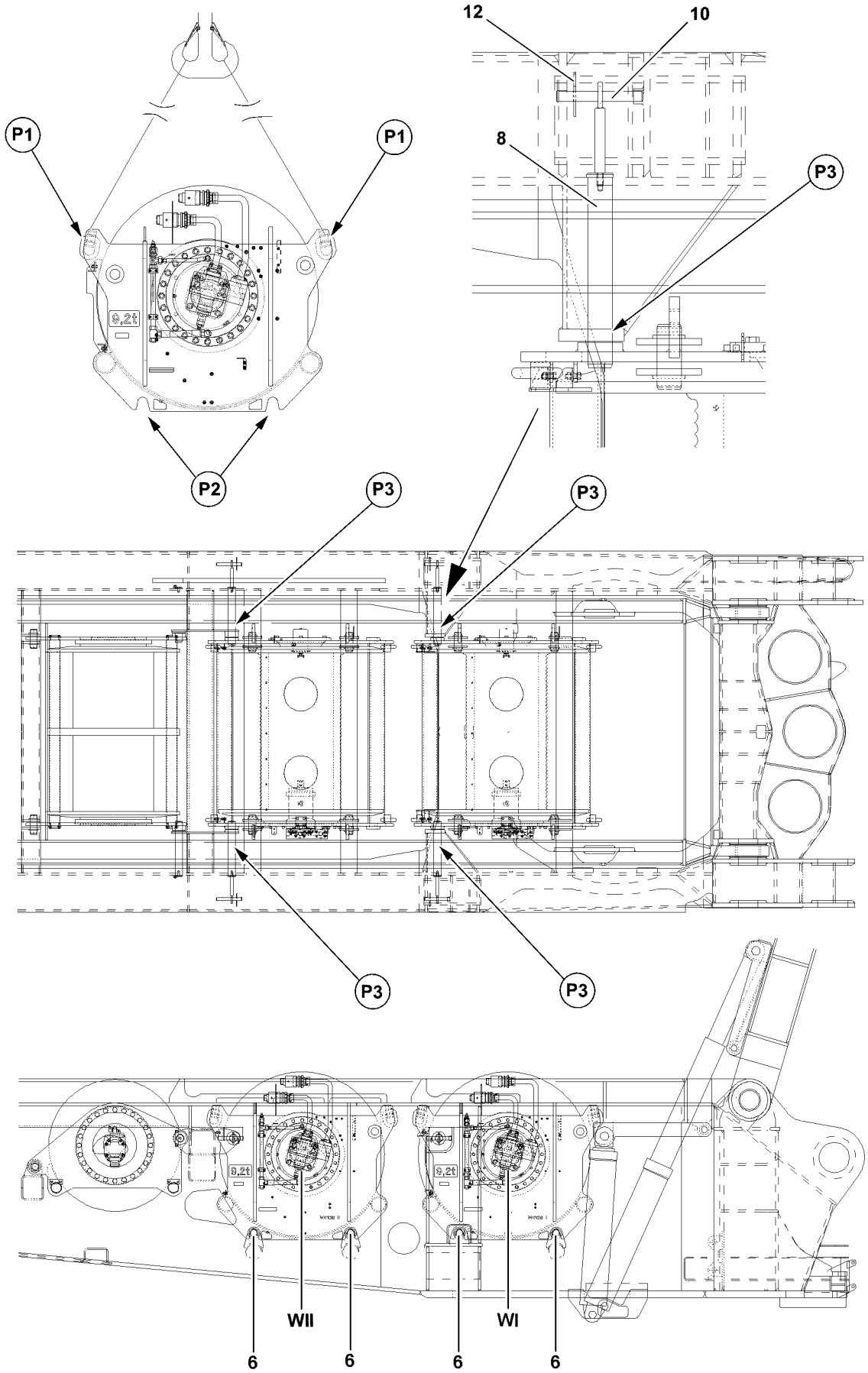

Fig.110973

LWE/LG 1750-006/15409-07-02/en

4 Removing winch 1

WARNING
Danger of falling!
During assembly / disassembly work, personnel must be secured with appropriate aids to prevent them from falling. If this is not observed, assembly personnel can fall and suffer life-threatening or fatal injuries!

- ▶ Any assembly work, where there is a danger of falling must be carried out with suitable aids (for example lifting platform, scaffolding, ladder, auxiliary crane)!
- ▶ If the work cannot be carried out with such aids nor from the ground, then the assembly personnel must secure themselves with approved fall arrest systems to avoid falling, see Crane operating instructions, Chapter 2.04!
- ▶ Approved fall arrest systems must be hung into the respective fastening points on the crane, see Crane operating instructions, chapter 2.06!
- ▶ If railings are present on the components, then they must be brought into the corresponding position and secured for assembly / disassembly work!
- ▶ Step on aids and fall protection equipment only with clean shoes!
- ▶ Keep aids and fall protection equipment clean and free from snow and ice!
- ▶ During all assembly and disassembly work, maintenance work and inspections, travel and crane operation is prohibited!

WARNING
Components not pinned and secured!
If a component is released from the auxiliary crane before having been pinned and secured, the component will fall down! Personnel can be severely injured or killed!

- ▶ Do not disengage the auxiliary crane until the corresponding component is pinned and secured!

WARNING
Danger of impact / crushing!
When installing / removing counterweight components with the auxiliary crane, crane components can start to swing back and forth!
When lifting / lowering and positioning crane components, there is an increased danger of impacts / crushing!
Personnel can be caught and severely injured or killed!

- ▶ Make sure that personnel cannot be caught by components!
- ▶ When working in danger zones: Use aids to protect limbs!
- ▶ Guide components with suitable aids to minimize oscillation!

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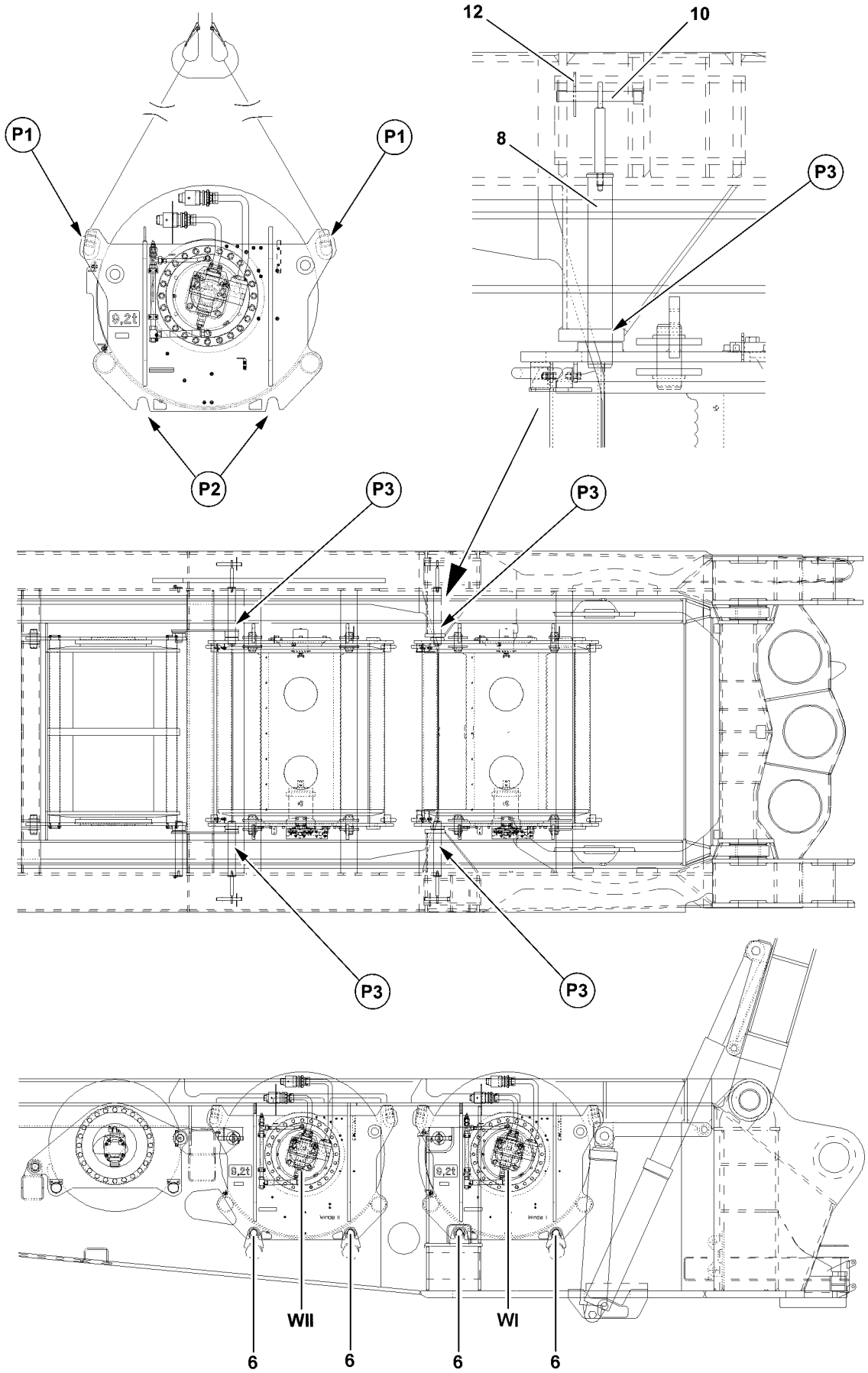

Fig.110973

LWE/LG 1750-006/15409-07-02/en

4.1 Disconnecting the connections to winch 1

Make sure that the following prerequisite is met:
– The hoist rope is completely spooled up.

4.1.1 Disconnecting the hydraulic connections to winch 1

When releasing hydraulic lines with quick couplings, make sure that the uncoupling procedure is carried out correctly.

WARNING
Pressure in the hydraulic lines!
If the pressure supply is not interrupted before connecting / releasing the hydraulic lines, the hydraulic oil can escape with high pressure!
Personnel can be severely injured or killed!
▶ Release the pressure in the hydraulic system before connecting / disconnecting: Interrupt the pressure supply and wait for a short time!

▶ Release the hydraulic coupling by hand.
▶ Disconnect the hydraulic connection to winch 1.

4.1.2 Disconnecting the electrical connections to winch 1

▶ Disconnect the electrical connections to winch 1.

4.1.3 Disconnecting the connections of the central lubrication system to winch 1

▶ Disconnect the connections to winch 1.

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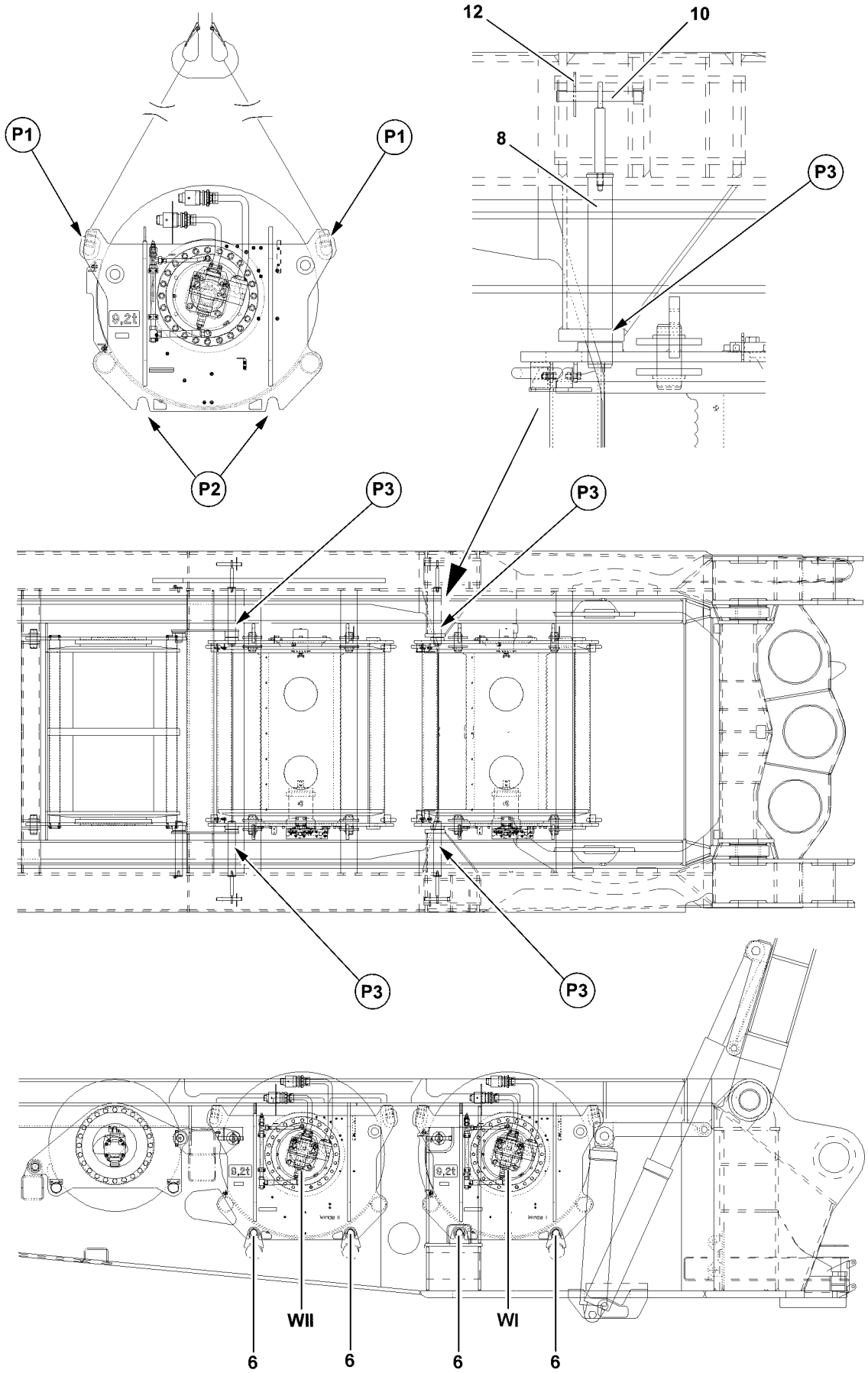

Fig.110973

LWE/LG 1750-006/15409-07-02/en

4.2 Unpinning winch 1 on the turntable

Make sure that the following prerequisites are met:
- The hydraulic connections are disconnected.
- The electrical connections are disconnected.
- The connections of the central lubrication system are disconnected.
- The SA-frame is aligned / placed down to the point where the assembly area of winch 1 is easily accessible.
- An auxiliary crane with sufficient load carrying capacity is available.
- The tackle is attached on the receptacle points, point **P1** of winch 1.

▶ Bring the fastening equipment to „tension“ with the auxiliary crane.
▶ Release the pin **10**.
▶ Release the pin **8**.
▶ Unpin the pin **8**.

NOTICE
Damage to the connector parts!
By lifting winch 1, the connector lines can be damaged!
▶ Make sure that all hydraulic and electrical connections are disconnected!
▶ Make sure that the connections to the central lubrication system as disconnected!
▶ Make sure that all pins are removed!

NOTICE
Property damage!
If the following note is not observed, damage can result to the crane or winch 1!
▶ When moving winch 1 out with the SA-frame, it must be ensured that winch 1 does not hit against the SA-frame!

When the pins **8** are unpinned:

▶ Lift winch 1 carefully with the auxiliary crane.

WARNING
Falling components!
When lifting winch 1 from the turntable, components or winch 1 can fall down!
Personnel can be severely injured or killed!
▶ Make sure that there are no persons within the danger zone!

▶ Move winch 1 out.

When winch 1 is moved out:
▶ Set winch 1 on the flatbed trailer.
▶ Remove the auxiliary crane.

5 Assembly and disassembly of winch 2

The assembly or disassembly of winch 2 is to be carried out according to the assembly or disassembly of winch 1.

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3.10 SA-frame assembly

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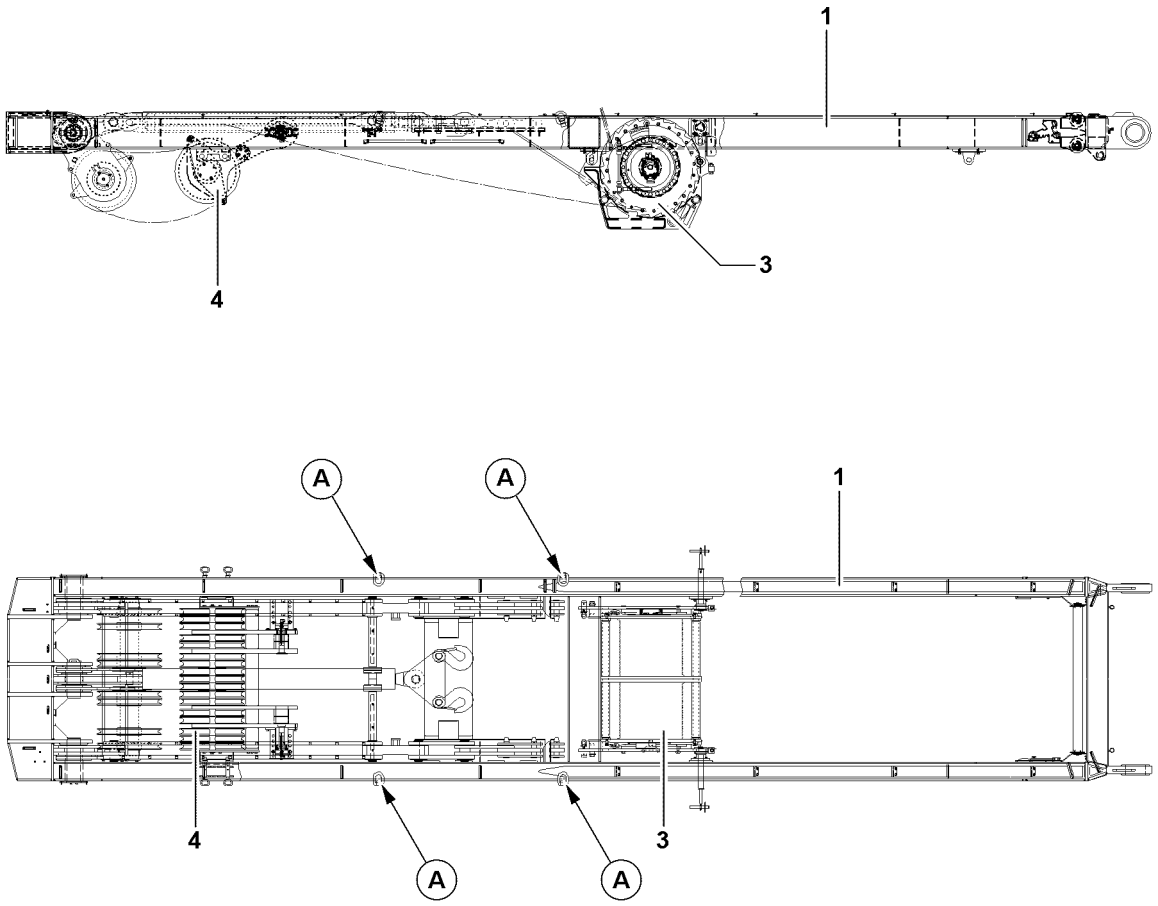

Fig.107469

1 Component overview SA-frame

Position	Component	Weight
1	SA-frame	
3	Intake gear winch 4	
4	Roller bearings	
	SA-frame complete	17.8 t

2 Attachment points SA-frame

WARNING
Danger of accident due to incorrect attachment!
Life-threatening situations can arise due to improper or incorrect attachment of the corresponding components!
▶ The corresponding components must be attached on the intended points **A**!

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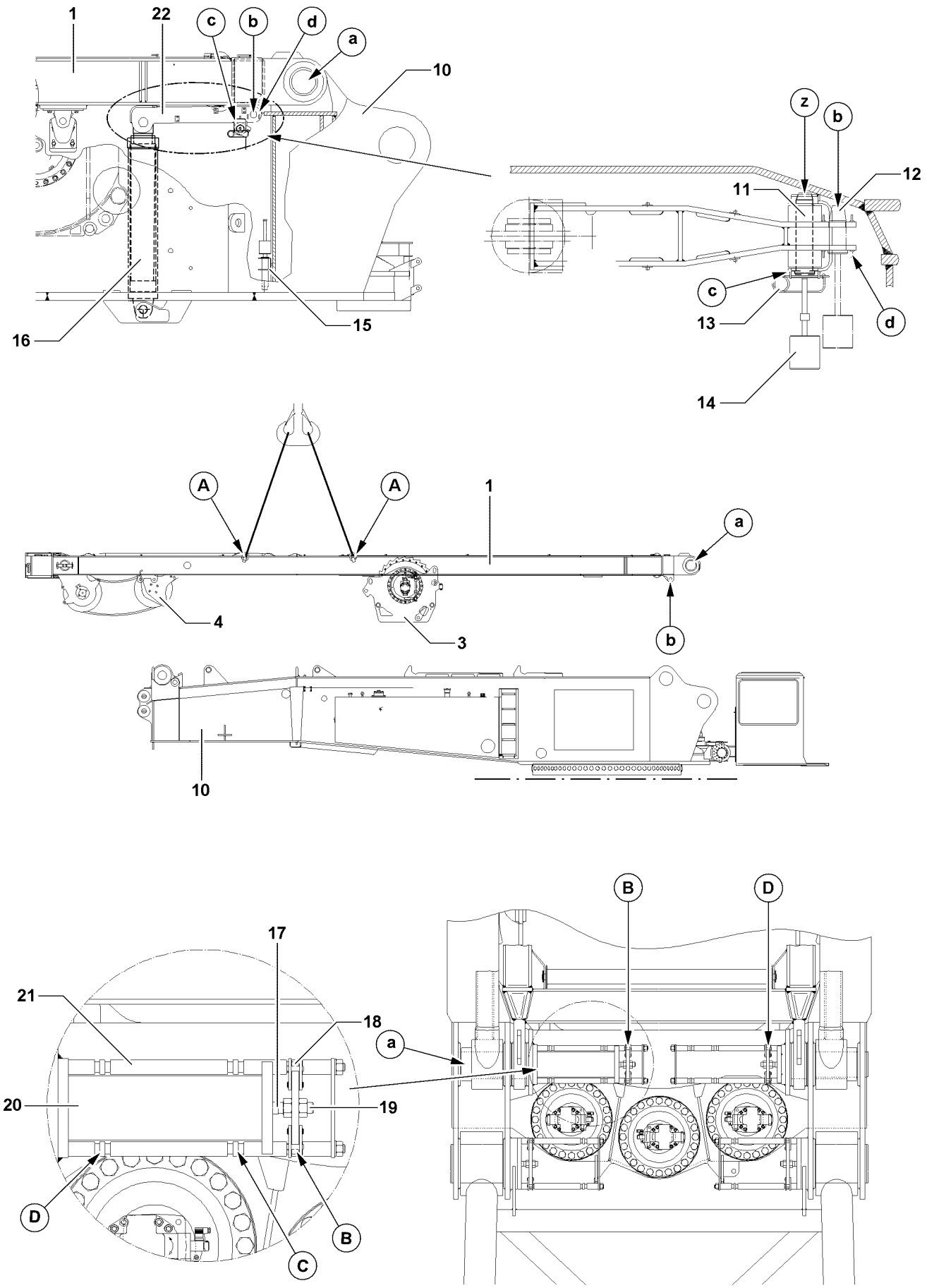

Fig.108271

3 Assembling SA-frame

Note
▶ Guarantee equally long attachment equipment such that the SA-frame can be horizontally positioned over the turntable!

Note
▶ Control of radio remote control, see chapter 5.08 of the crane operating instructions!

3.1 Pinning the SA-frame on the turntable

NOTICE
Collision of components!
If the SA-frame is positioned with the auxiliary crane on the turntable, roller bearings and hoist gear can collide with the turntable. Components can be damaged!
▶ Make sure that the roller bearing **4** does not collide with the turntable **10**!
▶ Make sure that the intake gear winch 4 **3** does not collide with the turntable **10**!

Make sure that the following prerequisites are met:
– pins **20** are unpinned on both sides at position **a**,
– pins **12** are unpinned on both sides at position **b**,
– securing hooks **18** are hung on both sides on the guide at the point **B**.

▶ Attach SA-frame **1** with auxiliary crane on the attachment points **A**.
▶ Position SA-frame **1** with auxiliary auxiliary crane on the turntable **10** so that pinning points **a** and pinning points **b** align.
▶ Pin in the pins **20**: Activate radio remote control.
▶ Fold up securing hooks **18** at the point **B**.

Note
▶ Likewise, if the derrick boom is assembled, the pins **20** must be secured at the points **C** with the securing hooks **18**!
▶ For derrick boom assembly, see chapter 5.05 of the crane operating instructions!

▶ Retract cylinder: Activate remote control operation, until securing hooks **18** can be hung on point **D**.

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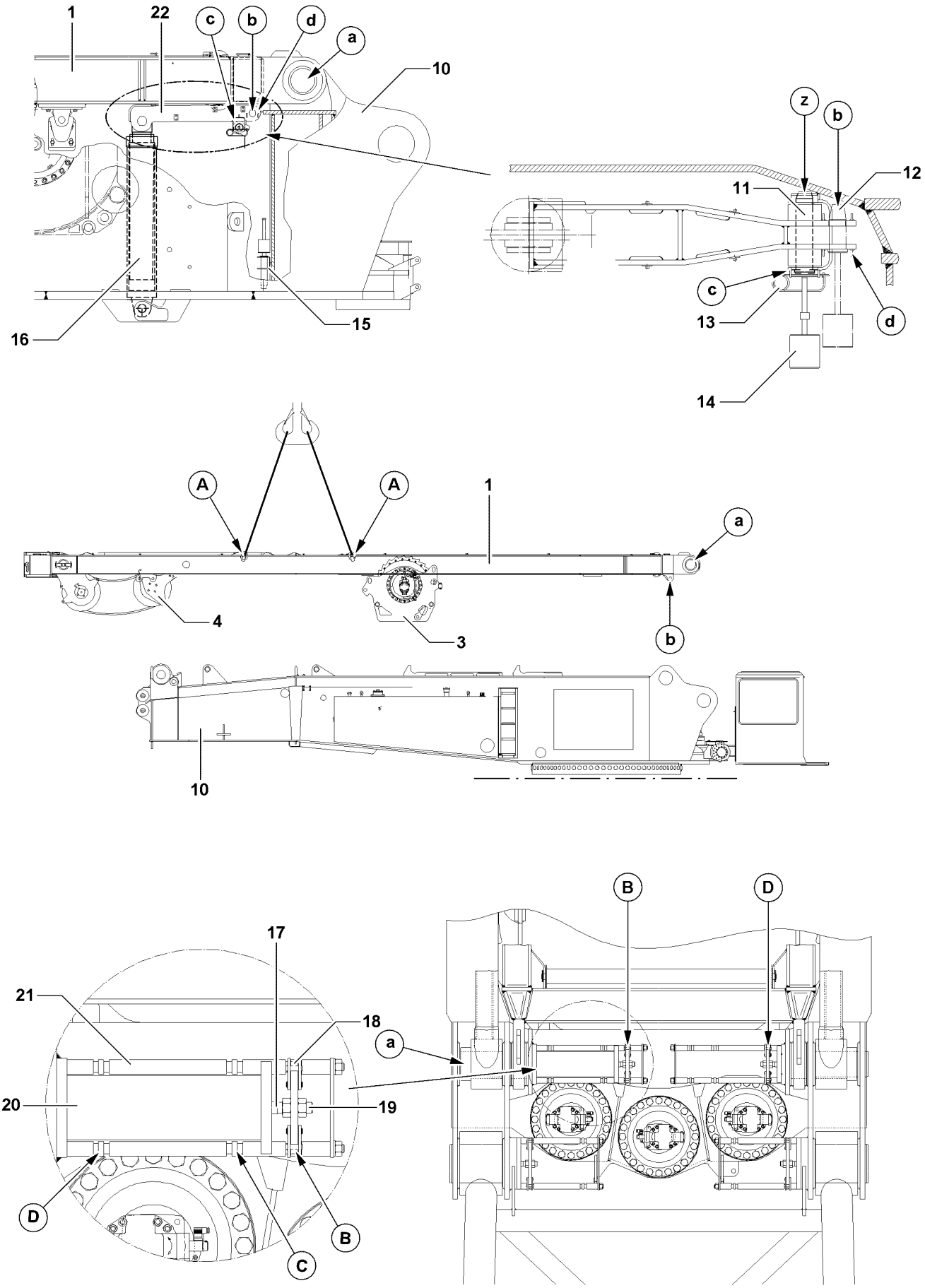

Fig.108271

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WARNING
Unsecured pin!
If the pins **20** are not secured, the pins can loosen. Personnel can be severely injured or killed!
▶ Secure pin **20** with securing hooks **18**!

▶ Hang securing hooks **18** on the point **D**.

Result:

– The pin **20** is secured.

▶ Pin in and secure pins **20** on both sides.
▶ Pin in the pins **12** on both sides with pin device **14** at position **b**.
▶ Remove spring retainer **13** on point **c**.
▶ Secure pins **12** on both sides with spring retainer **13** in position **d**.
▶ Unpin pins **11** with pin device **14**.
▶ Insert pins **11** with pin device **14** in receptacle **15**.
▶ Lay down SA-frame **1** completely with auxiliary crane.
▶ Separate and remove SA-frame **1** from tackle and auxiliary crane.

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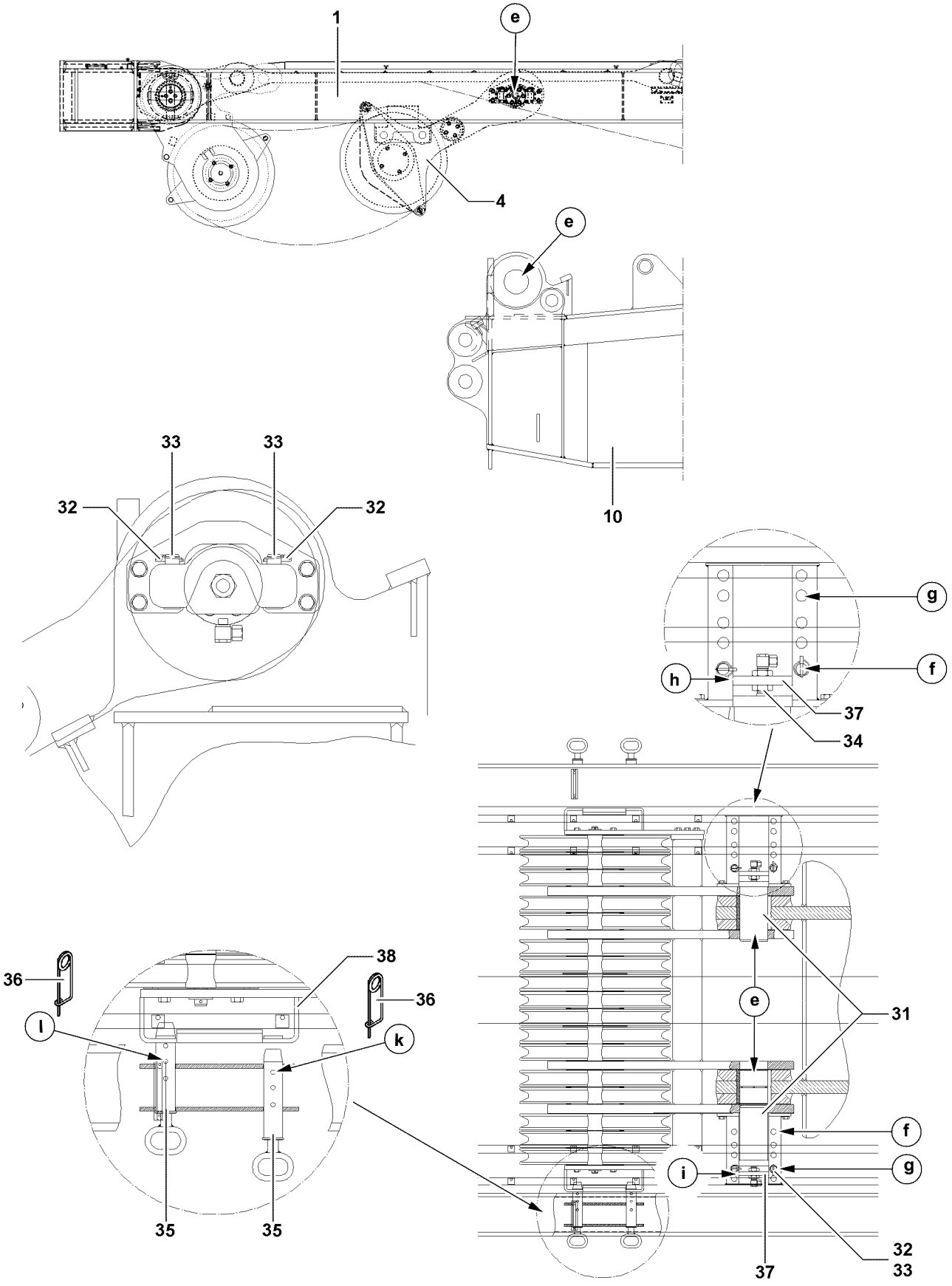

Fig.107471

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3.2 Pin roller bearings.

Ensure that the following prerequisites are met:
- align pinning points **e**,
- pins **31** are unpinned on both sides,
- retaining pins **33** are pinned on both sides on the point **g** and secured with linch pins **32**.

▶ Pin in the pins **31**: Activate radio remote control.
▶ Unpin the linch pin **32** on both sides and unpin the pins **33**.
▶ Retract cylinder **34**: Activate radio remote control until metal **37** stands at position **h** and retaining pins **33** can be pinned at point **f**.
▶ Pin in the pins **33** on both sides and secure with spring retainers **32**.
▶ Secure the pin **31**: Pin in the retaining pins **33** on both sides at the point **f** and secure with linch-pins **32**.
▶ Hang roller bearing **4** on the auxiliary crane and and lightly lift until the socket pins **35** may be unpinned.
▶ Remove spring retainer **36** on point **l**.
▶ Unpin socket pins **35** on metal **38**, so that roller bearing **4** is separated from SA-frame **1**.
▶ Secure socket pins **35** on the point **k** with spring retainer **36**.
▶ Lower pulley set **4** with auxiliary crane, until pulley set **4** hangs completely in the rope reeving.
▶ Remove the auxiliary crane.

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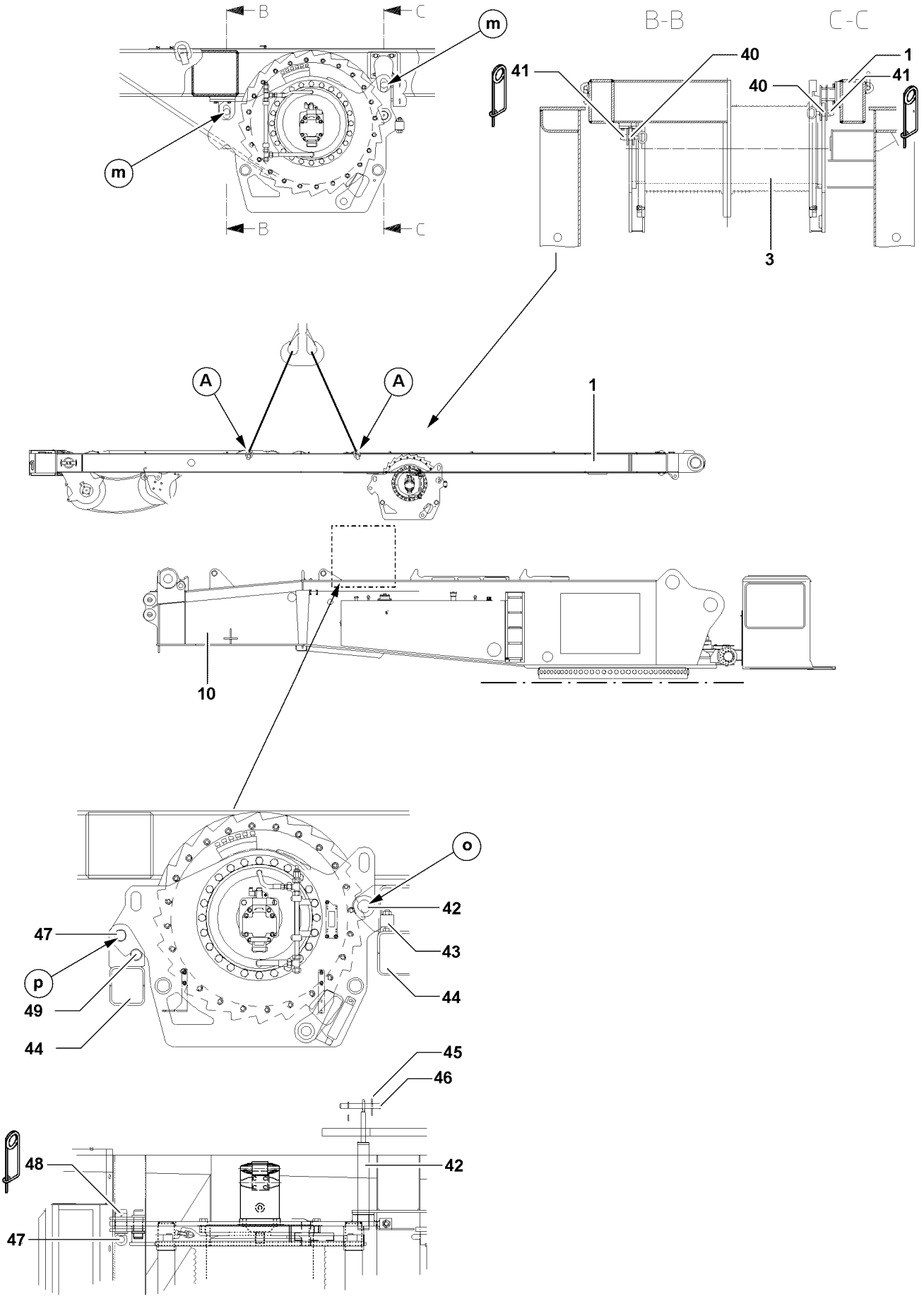

Fig.108272

3.3 Pin intake gear winch 4 on turntable

Make sure that the following prerequisites are met:
- align pin points **o** between intake gear winch 4 **3** and turntable **10**,
- align pin points **p** between intake gear winch 4 **3** and turntable **10**,
- intake gear winch 4 **3** lies with pins **49** and stop **43** on turntable frame **44** up.

▶ Pin in the socket pins **42** at the pin points **o** and secure with retaining pins **46**.
▶ Secure the retaining pins **46** on both sides with cotter pins **45**.
▶ Secure socket pins **47** at the pin points **p** and pin with retaining pins **48**.
▶ Separate intake gear winch 4 **3** from SA-frame **1**: Remove pin points **m** on both sides spring retainer **41** and unpin stick pins **40**.

3.4 Establishing the electrical connections

Note
▶ For production of the electrical connections on the SA-frame, the separate electrical diagram is to be employed!

▶ Establish electric connections between turntable and SA-frame.
▶ Establish electrical connections between turntable and intake gear winch 4.

3.5 Establish the hydraulic connections

When hydraulic lines are connected and disconnected with quick-release couplings, make sure that the coupling procedure is carried out correctly.

DANGER
Risk of accident due to loss of pressure or leakage!
Incorrectly coupled or self-loosening quick-release couplings (particularly return lines) as well as self-loosening of quick-release couplings can result in serious injury due to component failure!
▶ Check that the quick-release couplings have been properly connected before using the crane!

Note
▶ To connect or loosen the hydraulic lines with quick couplers, see chapter 5.01 of the crane operating instructions!

▶ Release the pressure in the hydraulic system before connecting and disconnecting. Turn the engine off and wait for short time.
▶ Assembling coupling components (sleeve and connector) by using hand-tightened nut.
▶ Combine coupling components.

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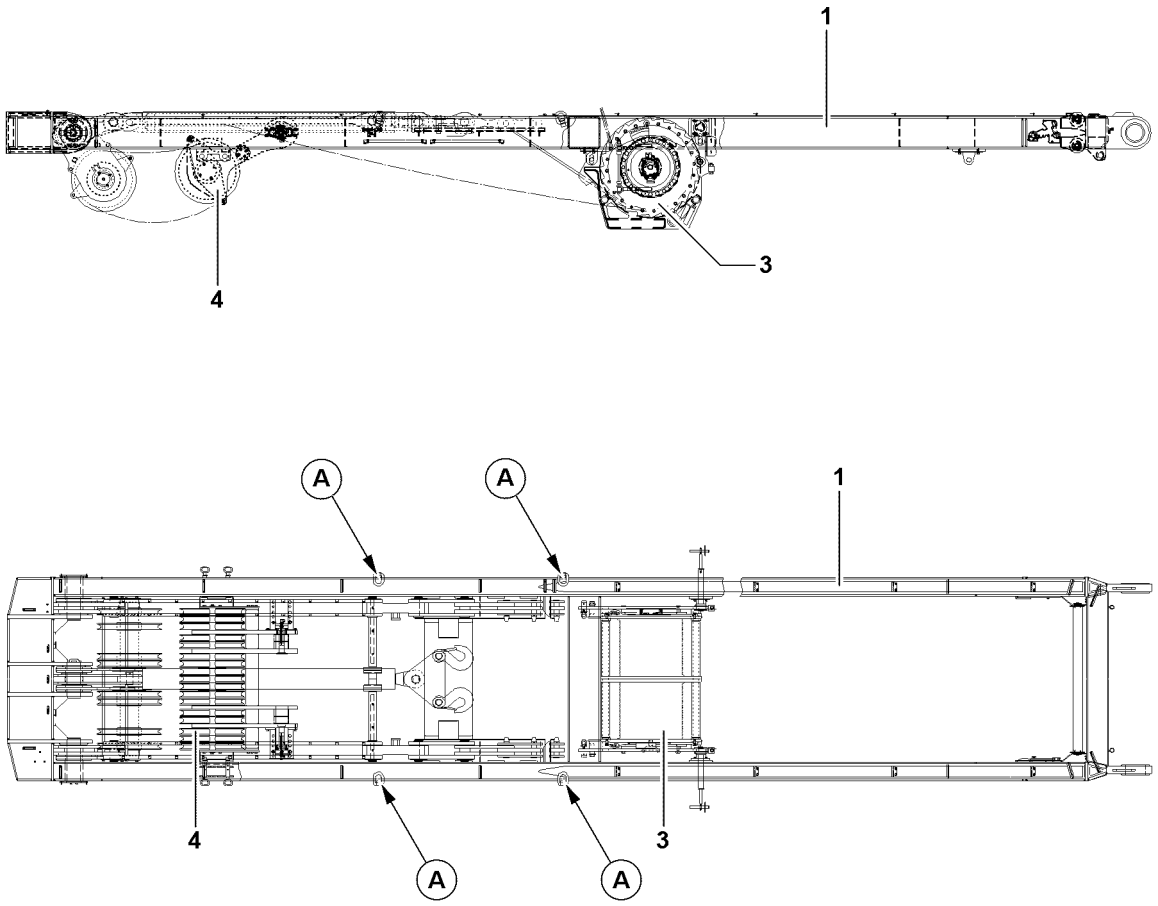

Fig.107469

4 Disassembling SA-frame

Note
▶ Guarantee equally long tackle such that the SA-frame can be horizontally lifted from the turntable!

Note
▶ Control of radio remote control, see chapter 5.08 of the crane operating instructions!

Ensure that the following prerequisite is met:
– roller bearings are found in transport position: SA-frame is found in the 0° position.

4.1 Disconnect the electrical connections

▶ Separate and properly store electrical connections between turntable and SA-frame.
▶ Separate and properly store electrical connections between turntable and winch 4.

4.2 Disconnect the hydraulic connections

When hydraulic lines are connected and disconnected with quick-release couplings, make sure that the coupling procedure is carried out correctly.

Note
▶ To connect or loosen the hydraulic lines with quick couplers, see chapter 5.01 of the crane operating instructions!

▶ Release the pressure in the hydraulic system before connecting and disconnecting. Turn the engine off and wait for short time.
▶ Loosen coupling components (sleeve and connector) by using hand-tightened nut.
▶ Separate coupling components.
▶ Properly store hydraulic hoses on the the SA-frame on the turntable.
▶ Fitting the coupling components with protective caps against contamination and damage.

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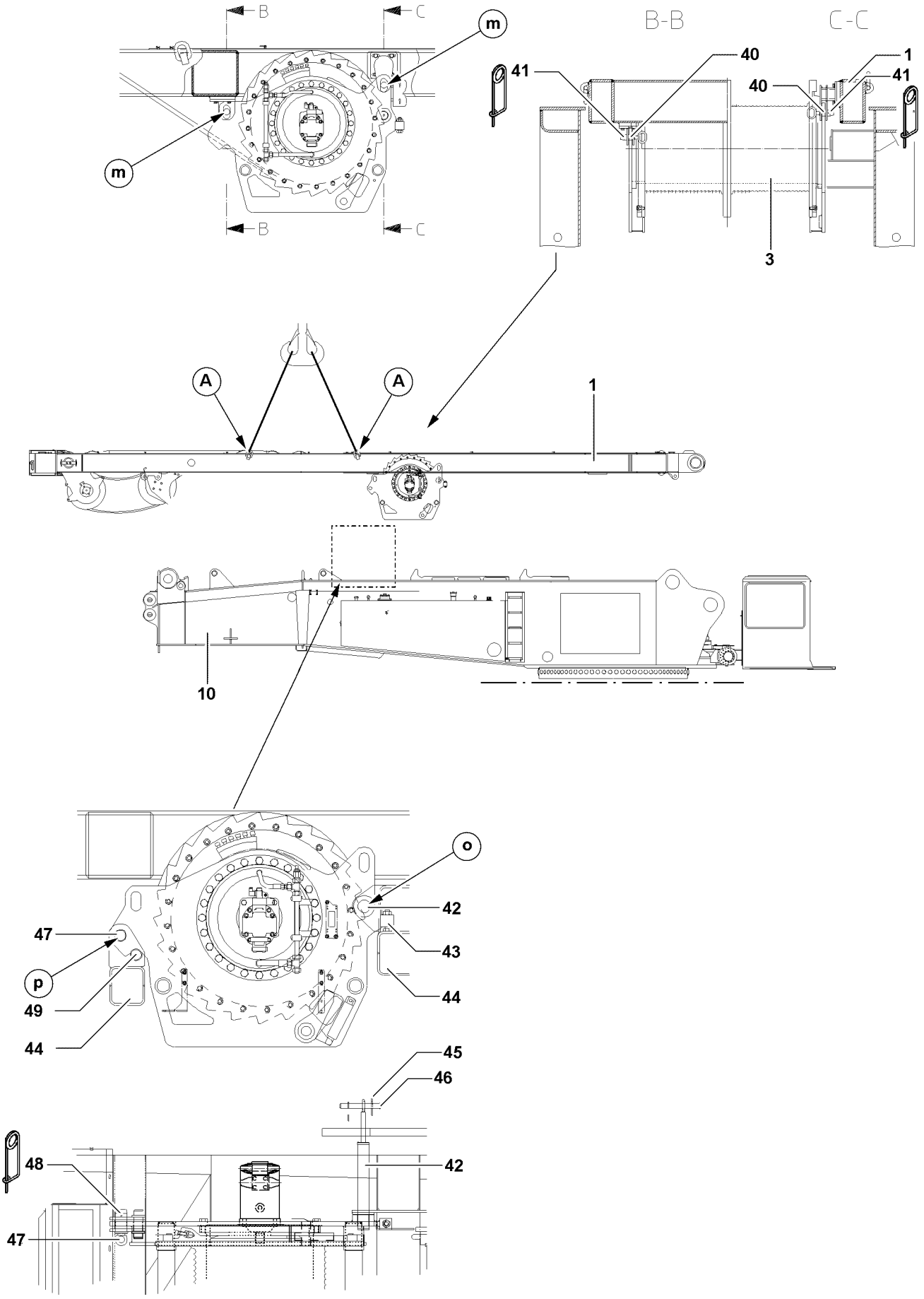

Fig.108272

4.3 Prepare intake gear winch 4 for transport

Ensure that the following prerequisite is met:
- align pin points **m** between intake gear winch 4 **3** and SA-frame **1**.

▶ Secure socket pins **40** at the pin points **m** and pin with retaining pins **41**.
▶ Separate intake gear winch 4 **3** from turntable **10**:
▶ Remove cotter pins **45** on both sides at the pin points **o** and unpin retaining pins **46**.
▶ Unpin the pins **42** on both sides.
▶ Remove spring retainers **48** on both sides on the pin points **p** and unpin socket pins **47**.

Result:

– Intake gear winch 4 **3** is separated from SA-frame **1**.

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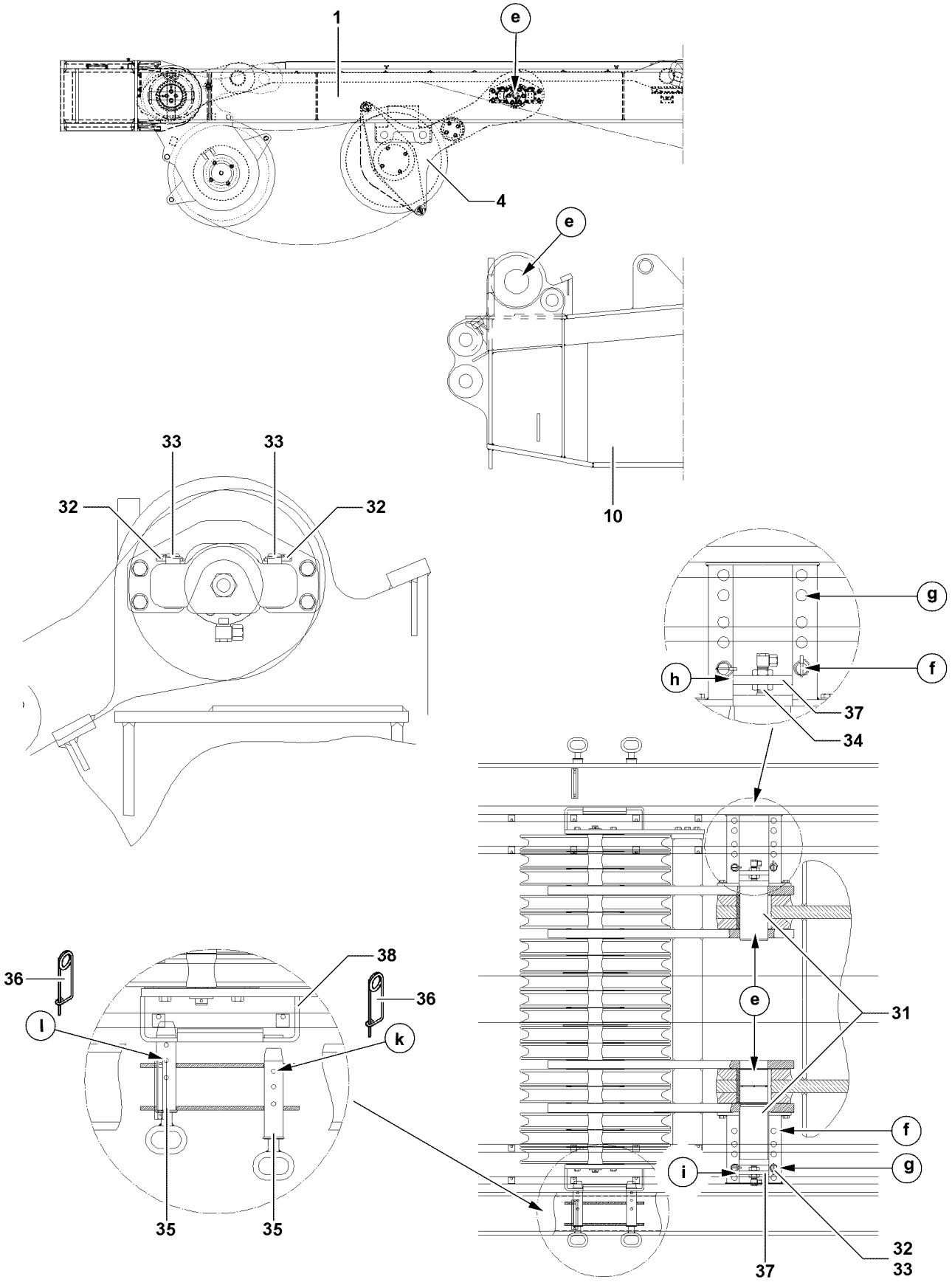

Fig.107471

LWE/LG 1750-006/15409-07-02/en

4.4 Preparing the roller bearings for transport

Ensure that the following prerequisites are met:
- align pinning points **k**,
- pins **35** are unpinned on both sides,
- retaining pins **33** are pinned on both sides on the point **f** and secured with linch pins **32**.

▶ Hang roller bearing **4** on the auxiliary crane and and lightly lift until the socket pins **35** may be unpinned.
▶ Remove spring retainer **36** on point **k**.
▶ Unpin socket pins **35** on metal **38**, so that roller bearing **4** is connected with SA-frame **1**.
▶ Unpin the linch pin **32** on both sides and unpin the pins **33**.
▶ Extend cylinder **34**: Activate radio remote control until metal **37** stands at position **i** and retaining pins **33** can be pinned at point **g**.
▶ Pin in the pins **33** on both sides and secure with spring retainers **32**.
▶ Unpin the pins **31**: Activate radio remote control.
▶ Remove auxiliary crane and tackle.

Result:

– The roller bearing **4** is connected with the SA-frame **1**.

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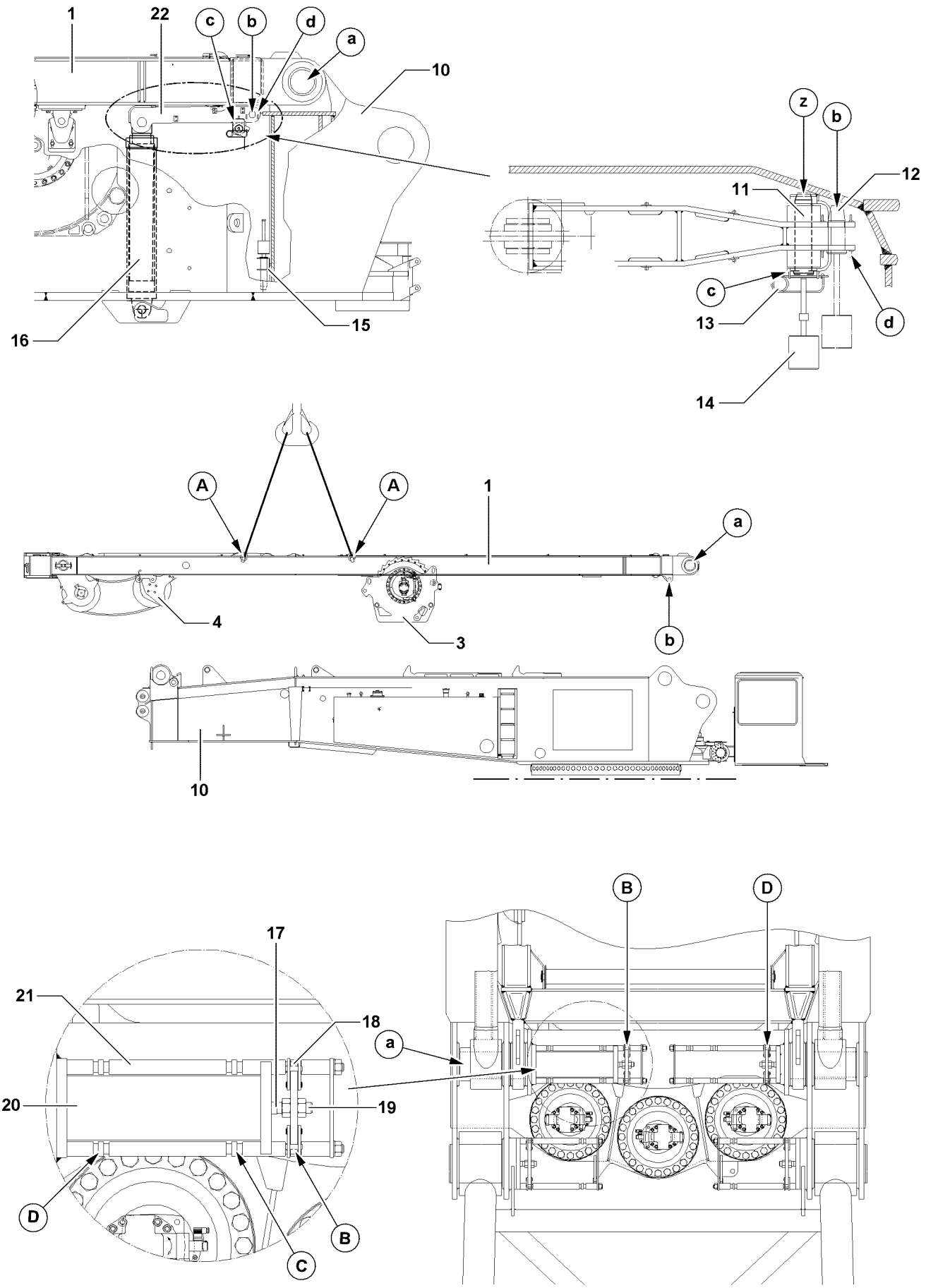

Fig.108271

LWE/LG 1750-006/15409-07-02/en

4.5 Unpin the SA-frame on the turntable

NOTICE
Collision of components!
If the SA-frame is lifted with the auxiliary crane on the turntable, roller bearings and hoist gear can collide with the turntable. Components can be damaged!
▶ Make sure that the roller bearing **4** does not collide with the turntable **10**!
▶ Make sure that the intake gear winch 4 **3** does not collide with the turntable **10**!

Ensure that the following prerequisite is met:
– securing hooks **18** are hung on both sides on the guide at the point **D**,

▶ attach and secure SA-frame **1** with auxiliary crane on the attachment points **A**.
▶ Pin in the pins **11** with pin device **14** in position **z**.
▶ Remove spring retainer **13** in position **c**.
▶ Pin in the pins **11** and secure spring retainer **13** in position **c**.
▶ Unpin pins **12** on both sides with pin device **14** in position **b** and insert in receptacle **15**.

Result:

– Erection cylinder **16** is separated from SA-frame **1** and secured on flap **22**.

DANGER
Unpinned derrick boom!
If the SA-frame is unpinned, as long as the derrick boom is still assembled, the derrick boom topples! Personnel can be severely injured or killed!
▶ Disassemble derrick boom before disassembly of the SA-frame!

Note
▶ For derrick boom assembly, see chapter 5.05 of the crane operating instructions!

▶ Fold up securing hooks **18** at the point **D**.
▶ Extend cylinder: Activate remote control operation, until securing hooks **18** can be hung on point **B**.
▶ Unpin the pins **20**: Actuate radio remote control.
▶ Hang in the securing hooks **18** on both sides on the point **B**.

Result:

– The pin **20** is secured.

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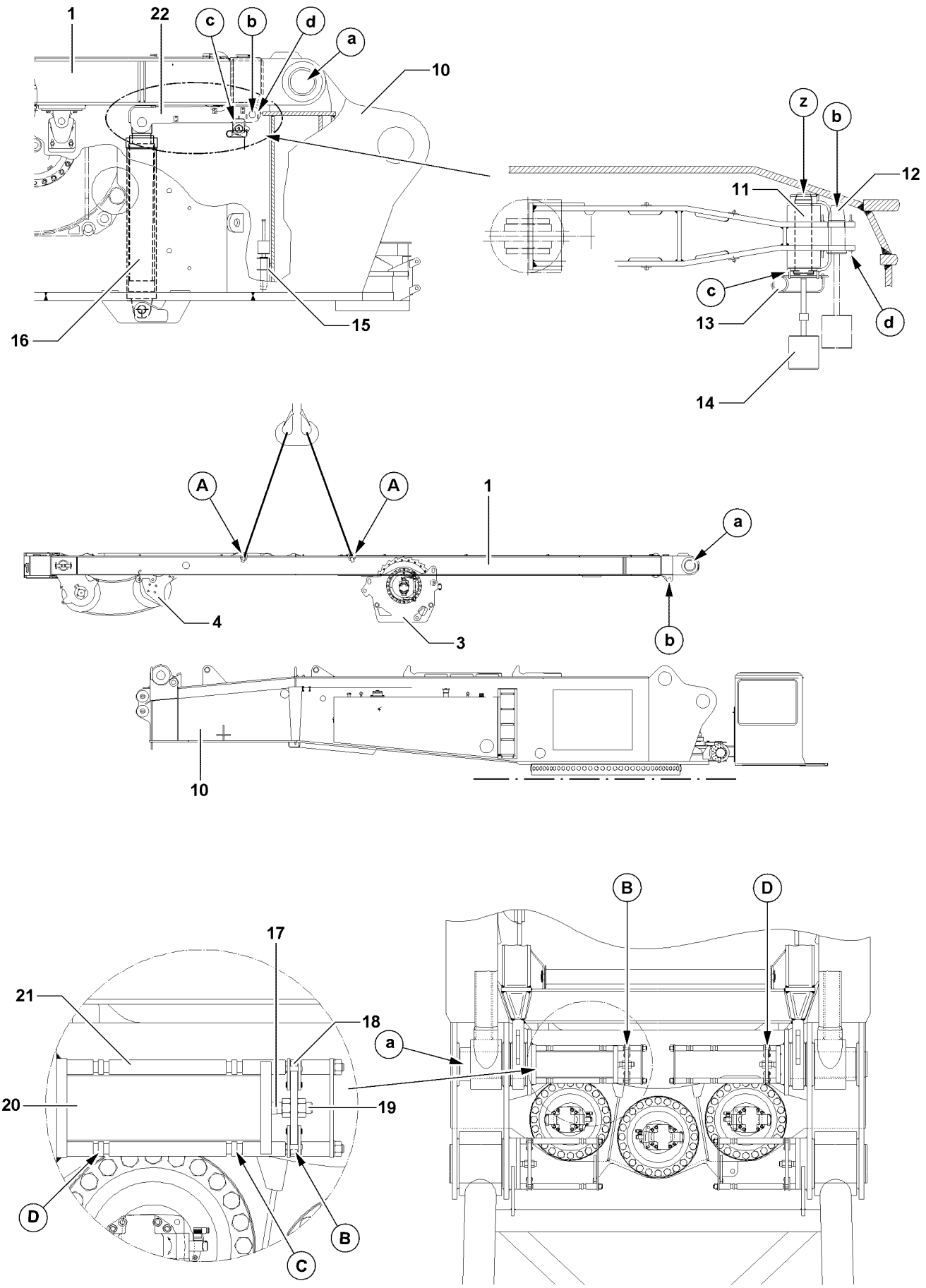

Fig.108271

4.6 Remove the SA-frame from the turntable

Note

▶ Guarantee equally long tackle such that the SA-frame can be horizontally lifted from the turntable!

NOTICE

Collision of components!

If the SA-frame is lifted with the auxiliary crane on the turntable, roller bearings and hoist gear can collide with the turntable. Components can be damaged!

▶ Make sure that the roller bearing **4** does not collide with the turntable **10**!

▶ Make sure that the intake gear winch 4 **3** does not collide with the turntable **10**!

▶ Attach SA-frame **1** with auxiliary crane on the attachment points.

▶ Carefully lift and remove SA-frame **1**.

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3.80 Crane and crane component transport

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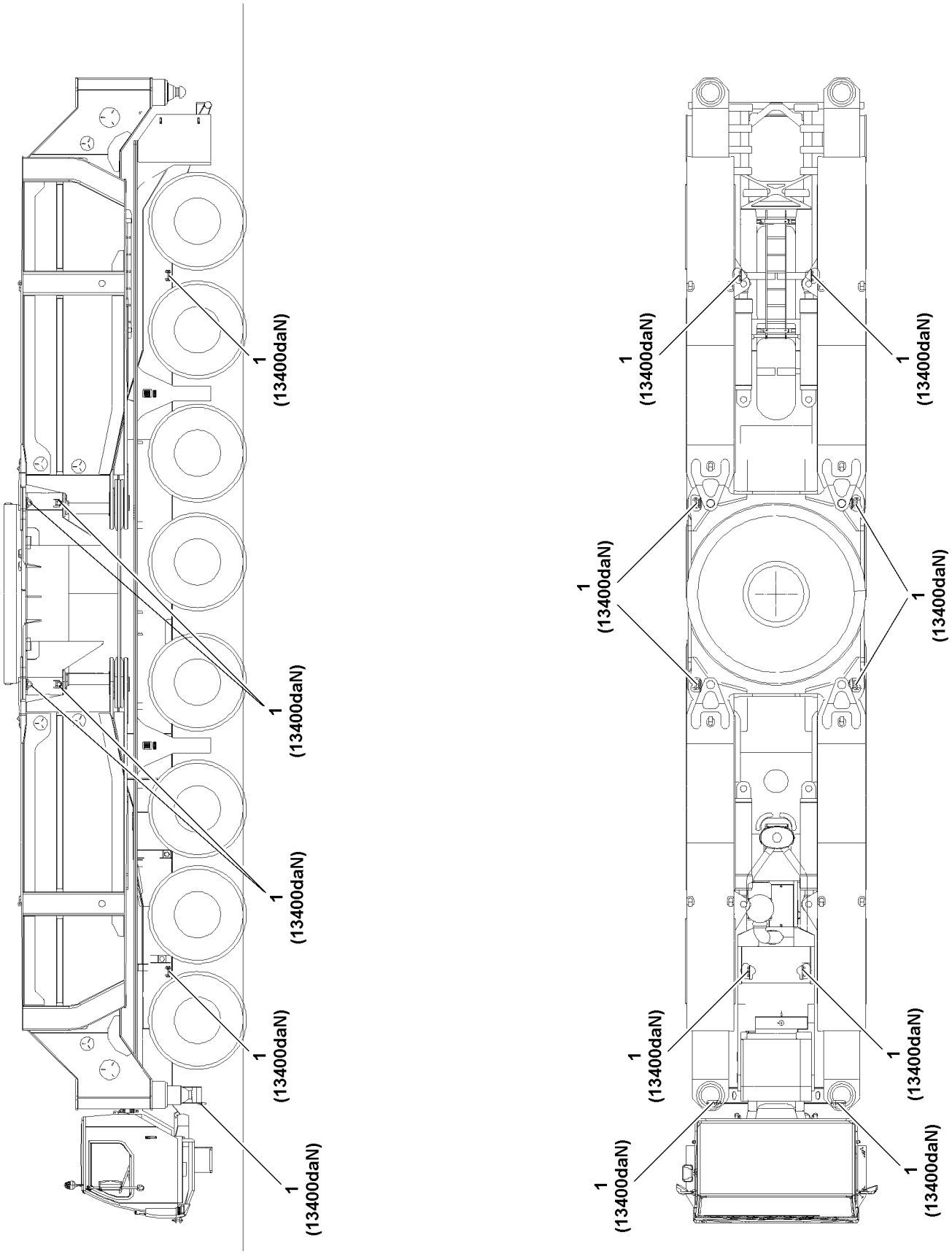

Fig.115441

1 Transporting the crane

1.1 Checking the rigging points

Before every operation and at regular intervals, check the rigging points for cracks of the welding seam, significant corrosion, wear and distortion.

The inspection criteria are:
- Completeness of rigging point.
- Distortion of carrying parts.
- Mechanical damage such as severe nicks.
- Changes in diameter due to wear.
- Significant corrosion (pitting).
- Cracks on carrying parts.
- Cracks or other damage on the welding seam.

WARNING
Danger of accident!
When using rigging points which are not operationally safe, severe personnel damage and property damage can occur!
- ▶ Have rigging points which are not operationally safe replaced with new rigging points by authorized and trained expert personnel!
- ▶ When hooking and unhooking the rigging (such as rigging chain), handle carefully to avoid crushing, sheering, catch and impact points!
- ▶ Eliminate damage of rigging due to sharp edged stress!

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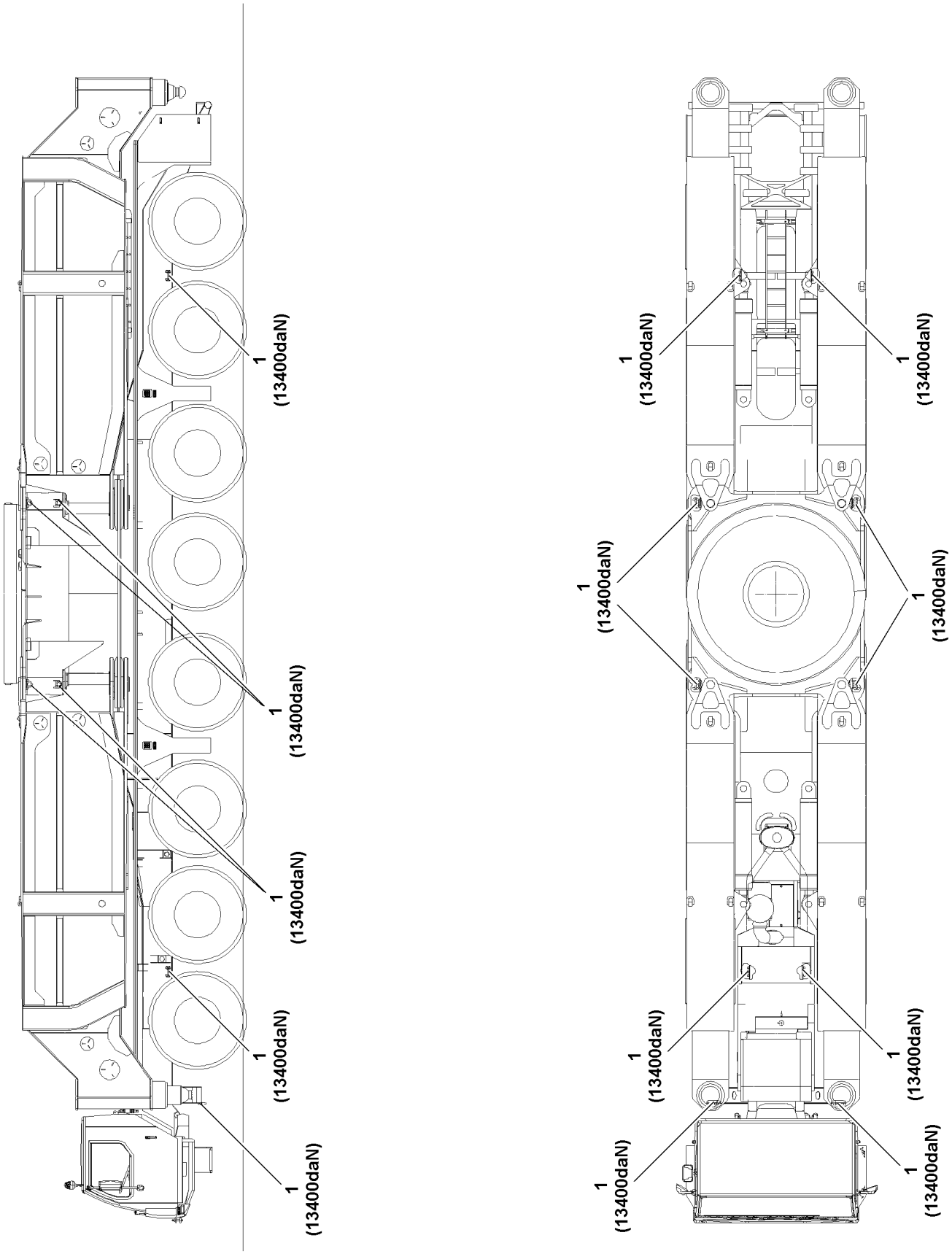

Fig.115441

1.2 Transporting the crane safely

Observe the following notes for safe crane transport:
- For transport, use a suitable transport vehicle.
- Clean the wheels before transport to obtain the greatest possible friction value to the transport surface.
- When driving on the transport vehicle, check the easy movement of the vehicle with the aid of a guide to avoid hitting too hard.
- The transport location must be horizontal and level.
- Apply the parking brake. See Crane operating instructions, chapter 3.04.
- Lower the crane with the levelling regulation („axle suspension system“) to obtain a center of gravity as low as possible. See Crane operating instructions, chapter 3.03.
- Place wedges under the wheels. See Crane operating instructions, chapter 2.04.
- Close the driver's cab as well as all cover doors.

NOTICE
Damage to crane!
The rigging eyehooks **1** may only be used to rig the crane!
The rigging eyehooks **1** may **not** be used to lift the crane and **not** to lift loads!
▶ Use the rigging eyehooks **1** only to rig the crane.

- Secure the vehicle on the rigging eyehooks **1** (13400 daN maximum nominal load) according to the illustration, permissible load and valid regulations for loading and load retention.
  Use suitable rigging devices with sufficient capacity.

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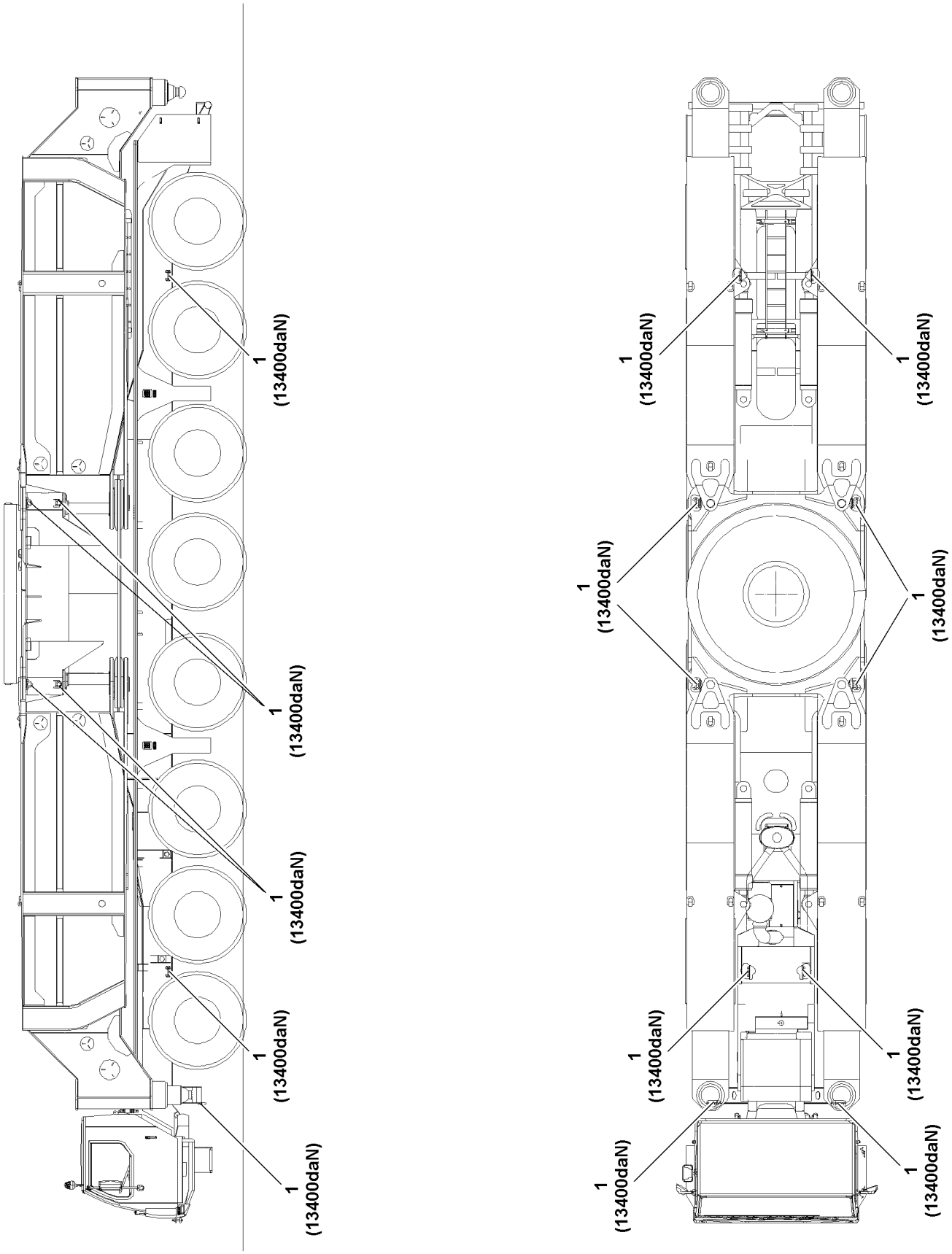

Fig.115441

1.3 Driving the crane on the transport vehicle

Make sure that the following prerequisites are met:
- The support beams are properly locked in transport position with the crane chassis.
- A guide is available.

NOTICE
Damage to vehicle!
▶ Have the guide check that the vehicle does not collide with the transport vehicle or hits it!

▶ Drive the crane carefully on the transport vehicle.
▶ Drive the crane carefully to the transport location.
▶ Apply the parking brake. See Crane operating instructions, chapter 3.04.
▶ Lower vehicle. See Crane operating instructions, chapter 3.03.

Result:

- By lowering the vehicle, a center of gravity as low as possible can be reached for the vehicle.

▶ Turn the engine off and pull the ignition key.
▶ Place wedges under vehicle, see Crane operating instructions, chapter 2.04.
▶ Close the driver's cab and all cover doors and hand the ignition key to an authorized person.

1.4 Securing the crane

DANGER
The vehicle can roll off uncontrollably!
If the vehicle is not correctly secured on the transport location, the vehicle can roll off uncontrolled or even topple over!
Personnel can be killed or injured!
▶ Secure the crane to prevent it from rolling off or falling over!
▶ Place the wedges carried along on the crane!
▶ Use tension belts or tension chains according to the illustration, permissible load and the valid regulations for loading and load retention.
▶ Attach tension belts or tension chains on the rigging eyehooks **1** according to the illustration!
▶ Retain the angle and radii according to the illustration!

▶ Secure the crane with tension belts or tension chains on the rigging eyehooks **1**.
▶ Attach the tension belts or tension chains on the transport vehicle.

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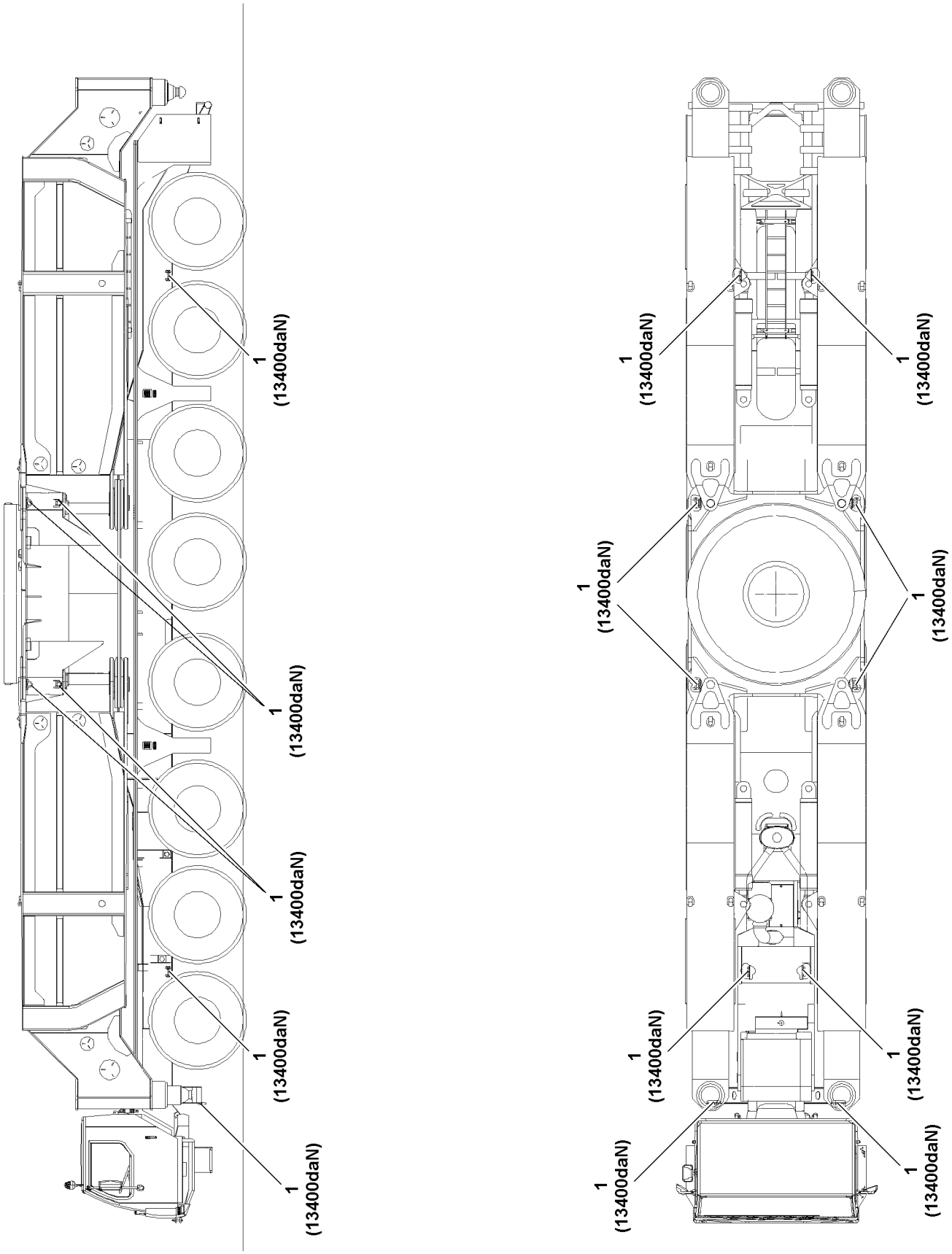

Fig.115441

1.5 Unloading the crane safely

Make sure that the following prerequisites are met:
- The support beams are properly locked in transport position with the crane chassis.
- A guide is available.

▶ Remove all transport retainers.
▶ Level the vehicle for on road driving. See Crane operating instructions, chapter 3.03.
▶ Release the parking brake. See Crane operating instructions, chapter 3.04.

NOTICE
Damage to vehicle!
▶ Have the guide check that the vehicle does not collide with the transport vehicle or hits it!

▶ Carefully drive the crane from the transport vehicle.

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4 Operation of crane superstructure

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4.01 Operating and monitoring instruments on the crane superstructure

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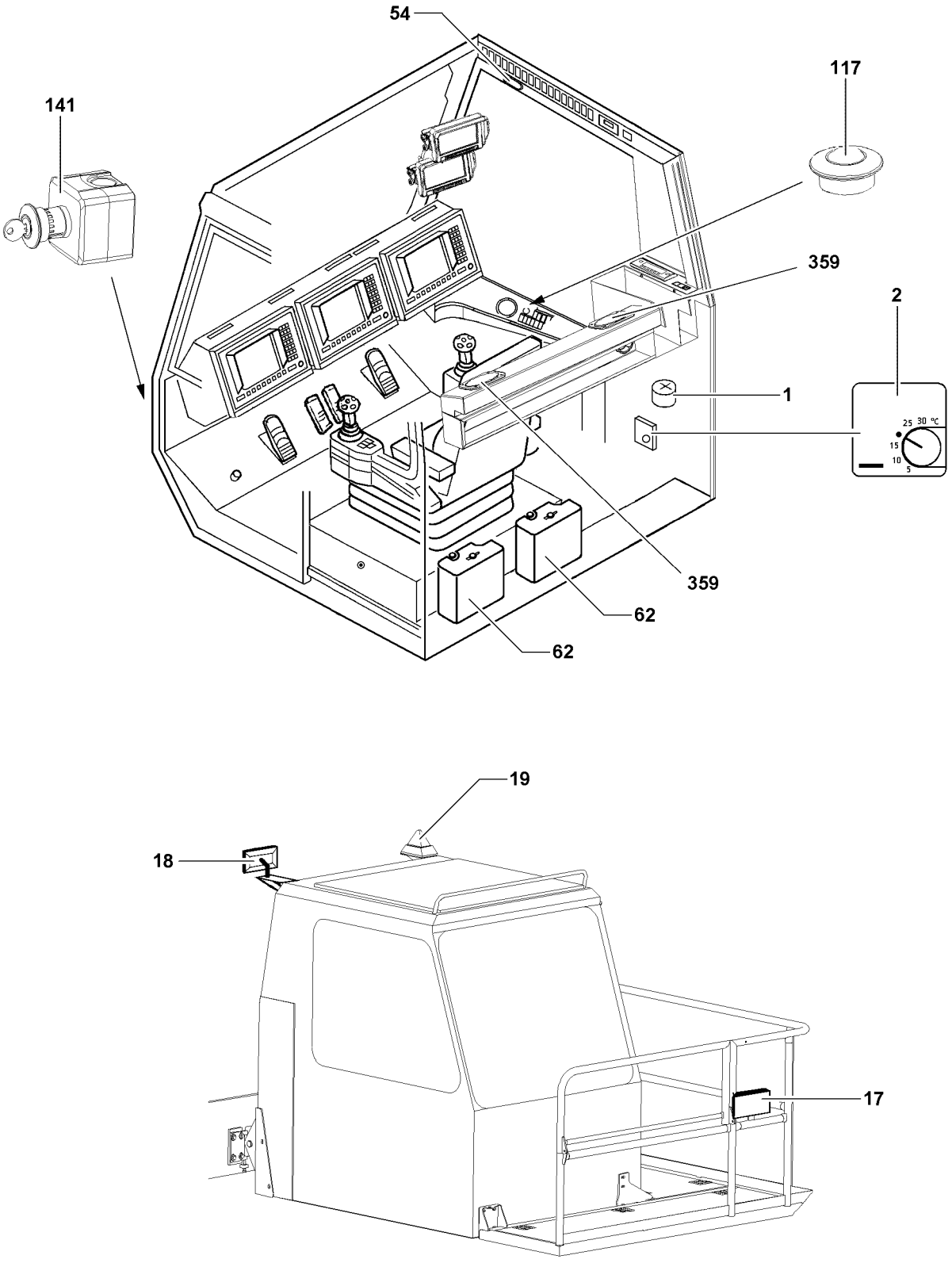

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Fig.122702

1 Operating and control instruments

This chapter describes the elements in the cab and is divided into:
- General equipment in the cab
- Operating units in the cab

2 Equipment in the cab

2.1 Installations in the cab

17 Working floodlight, front

18 Working floodlight, rear

19 Flashing beacon

62 Reservoir for window cleaning fluid

2.2 Emergency equipment

117 Palm button
- EMERGENCY OFF

141 Palm button
- EMERGENCY OFF

2.3 Interior equipment

1 Pressure gauge
- Erection cylinder with A-frame

2 Thermostat
- Auxiliary heater

54 Cab lighting

359 Speaker

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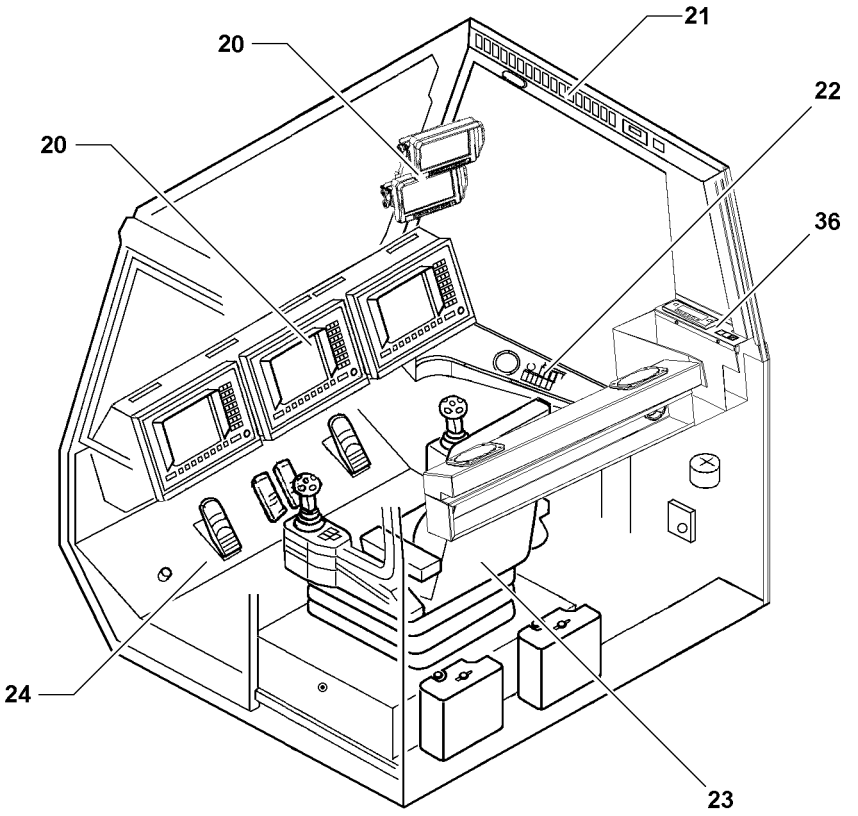

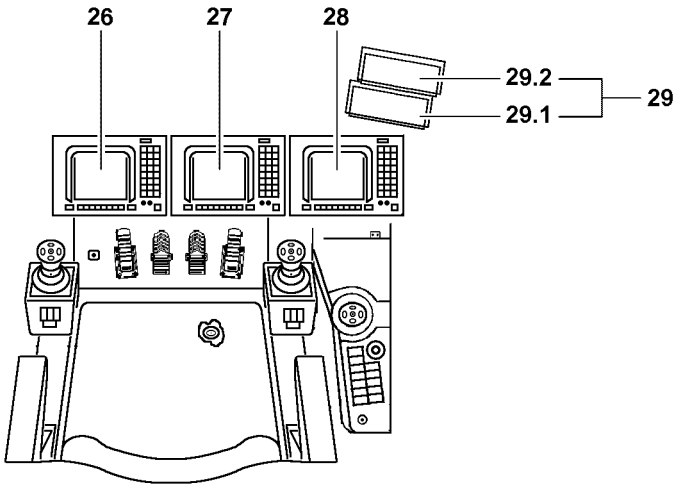

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Fig.122700

3 Overview operating units in cab

The following operating units are in the cab:

20 Monitors and displays
21 Roof console
22 Instrument panel
36 Instrument panel expansion Radio console
23 Control helm
24 Pedal carrier

3.1 Monitors and displays

3.1.1 Monitors LICCON computer system

Note
▶ For detailed descriptions of the operating element and functions on the LICCON monitors, see Crane operating instructions, chapter 4.02.

26 LICCON monitor 1
- User interface for operation with „Derrick“ boom

27 LICCON monitor 0
- User interface for entry of equipment configurations and for crane operation

28 LICCON monitor 2*****
- User interface for „LICCON job planner“

3.1.2 Camera monitoring

Assignment of cameras to monitors **29**, see Electrical wiring diagram.

For description of operating buttons of monitor, see documentation from the manufacturer.

Location of monitors in the cab:

29.1 Monitor 1
29.2 Monitor 2

3.2 Roof console

Note
▶ The indicator lights as well as the operating buttons of the roof console are described in detail in the following sections.
▶ The number of operating buttons in the roof console depends on the respective crane equipment and can differ from crane to crane.

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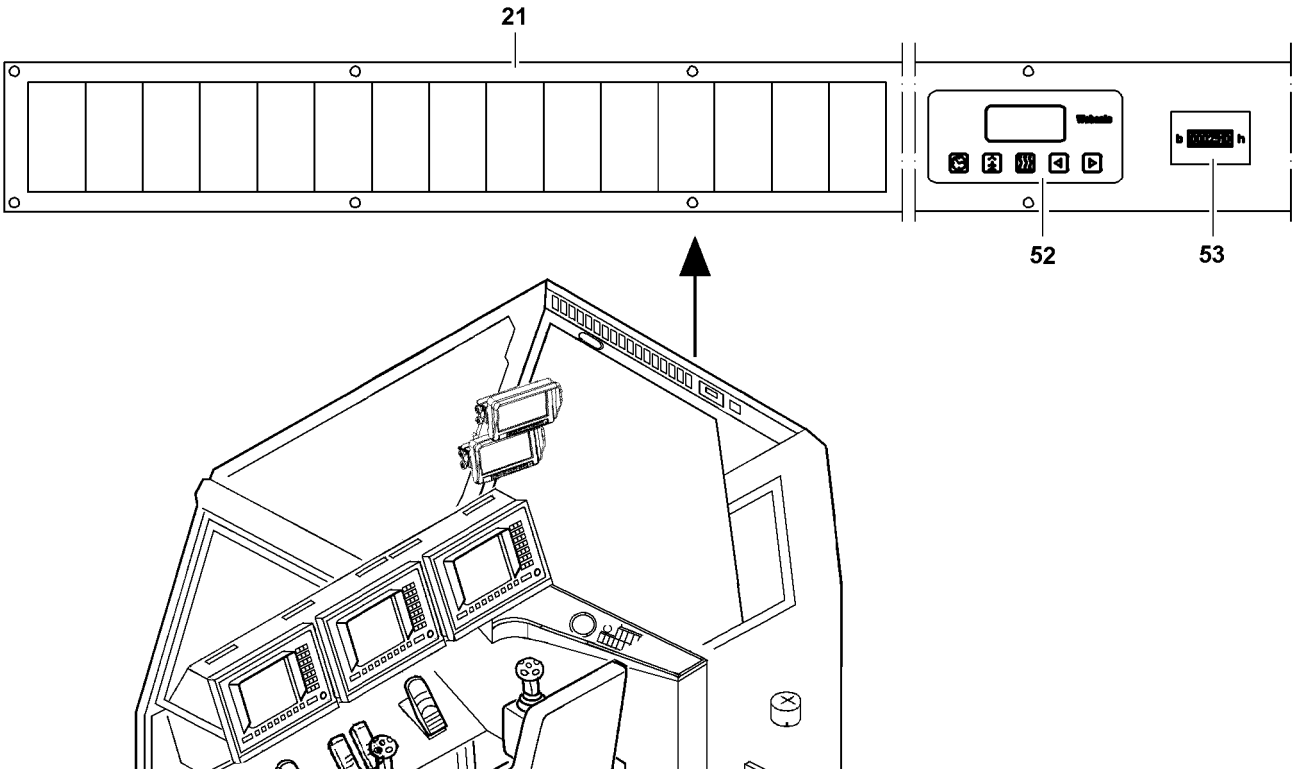

Fig.122704: Roof console

21 Roof console
- Housing with indicator lights and operating buttons

52 Operating section auxiliary heater
- Shown are:
  Time and day of the week
  Problem in auxiliary heater
  Air temperature
  Preselection of heating operation of auxiliary heater with three preselection times (every preselection time can be programmed in advance of up to seven days)

53 Operating hour meter

3.2.1 Indicator lights on the roof console

Position	Indicator light	LED condition	Description
33		Red: Blinks once after engine start	Control of function, operational readiness
		Green: Blinks once after engine start	
		Red: Off	Pump on, lubrication active
		Green: Lights up during the lubrication time	
		Red: Blinks	Error monitoring time, lubrication time

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Position	Indicator light	LED condition	Description
		Green: Blinks	
	  Central lubrication system	Red: Blinks fast Green: Off	Error CPU / memory

Position	Indicator light	LED condition	Description
49	 Auxiliary heater	Lights up	Auxiliary heater in operation

Position	Indicator light	LED condition	Description
51	 Climate control system	Lights up	Air conditioning system is in operation

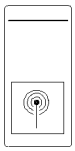
Position	Indicator light	LED condition	Description
55*	 Hydraulic oil preheating	Lights up	Hydraulic oil preheating is in operation

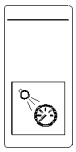
3.2.2 Operating buttons on the roof console

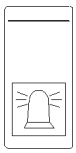
Note

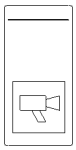
▶ With the LEDs in the operating buttons, the operating conditions and problems can be recognized quickly and reliably by the crane operator.

Position	Operating element	Function	LED	Description
30	 Shut off LMB bell	Off		By pressing the button
		On		By pressing the button

Position	Operating element	Function	LED	Description
32		Off		By actuating the switch
	Radio remote control LR-operation	On		By actuating the switch

Position	Operating element	Function	LED	Description
34			**Note:**	The reading lights can be turned on and off with a separate switch on the reading light.
	Instrument panel illumination, reading light	On		By actuating the switch
		Off		By actuating the switch

Position	Operating element	Function	LED	Description
35		Off		By actuating the switch
	Airplane warning	On		By actuating the switch

Position	Operating element	Function	LED	Description
37				There are two different illumination areas: 0: Camera illumination „Off“ 1: Illumination winches „On“ 2: Illumination of winches remains active and the illumination to the rear is „On“ Every time the switch is actuated, the illumination stage changes. „Illumination to the rear“ can only be turned on in connection with „Illumination winches“.
	Camera illumination			

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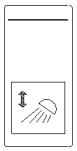
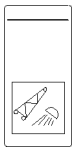
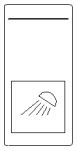
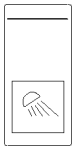
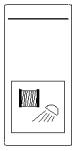
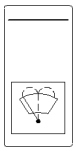
Position	Operating element	Function	LED	Description
39	 Swing the floodlight pivot section			There are two swing directions: 0: Swing the floodlight „Out“ 1: Swing the floodlight „Down“ 2: Swing the floodlight „Up“ As long as the button is pressed, the floodlight swings.

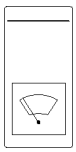
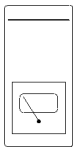
Position	Operating element	Function	LED	Description
40		Off		By actuating the switch
	Floodlight pivot section	On		By actuating the switch

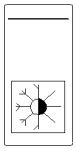
Position	Operating element	Function	LED	Description
41		Off		By actuating the switch
	Working floodlight pedestal cab	On		By actuating the switch

Position	Operating element	Function	LED	Description
42		Off		By actuating the switch
	Working light roof cab rear	On		By actuating the switch

Position	Operating element	Function	LED	Description
43		Off		By actuating the switch
	Floodlight turntable Mirror heater	On		By actuating the switch

Position	Operating element	Function	LED	Description
46	 Windshield washer system „Front“	On		Clean the window: By pressing and holding the button „Front“ or „Roof“. The windshield wipers are activated at the same time.
				Note: After releasing the switch „Front“ or „Roof“, three additional wipe movements are carried out before the wiper blades return to their original position.
44	 Windshield washer system „Roof“	Off		By releasing the button „Front“ or „Roof“

Position	Operating element	Function	LED	Description
47	 Windshield wiper „Front“			There are two different wipe stages: 0: Wiper „Off“ 1: Wiper „On“: Intermittent operation
45	 Windshield wiper „Roof“			2: Continuous operation Every time the switch „Front“ or „Roof“ is actuated, the wipe stages change incrementally.
		On		By actuating the switch „Front“ or „Roof“
		Off		By actuating the switch „Front“ or „Roof“

Position	Operating element	Function	LED	Description
48	 Climate control system	Off		By actuating the switch
		On		By actuating the switch

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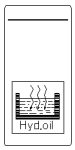
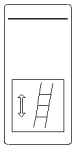
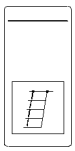
Position	Operating element	Function	LED	Description
56*		Off		By actuating the switch
	Hydraulic oil preheating	On		By actuating the switch

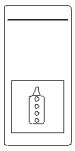
3.2.3 Alternative operating buttons in LG-operation

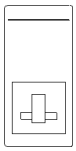
Note

▶ Depending on the version, either a folding ladder or a sliding ladder is installed as an access ladder.

Position	Operating element	Function	LED	Description
31			**Note:**	Only folding ladder: The movement of the ladder when it folds in and out stops by itself when the respective end position is reached.
	Ladder	Up / down		By pressing the button
		Stop		By pressing the button

Position	Operating element	Function	LED	Description
31			**Note:**	Only sliding ladder: The movement of the ladder when moving in and out stops by itself when the ladder is moved in or out completely.
	Ladder	Up / down		By pressing the button
		Stop		By pressing the button

Position	Operating element	Function	LED	Description
32		Off		By actuating the switch
	Radio remote control	On		By actuating the switch

Position	Operating element	Function	LED	Description
38	 Turntable lock		**Note:**	As long as the button is pressed, the locking pin moves out / in until the end position is reached.
				There are two locking positions: 1: Insert the locking pin on the chassis 2: Remove the locking pin on the chassis

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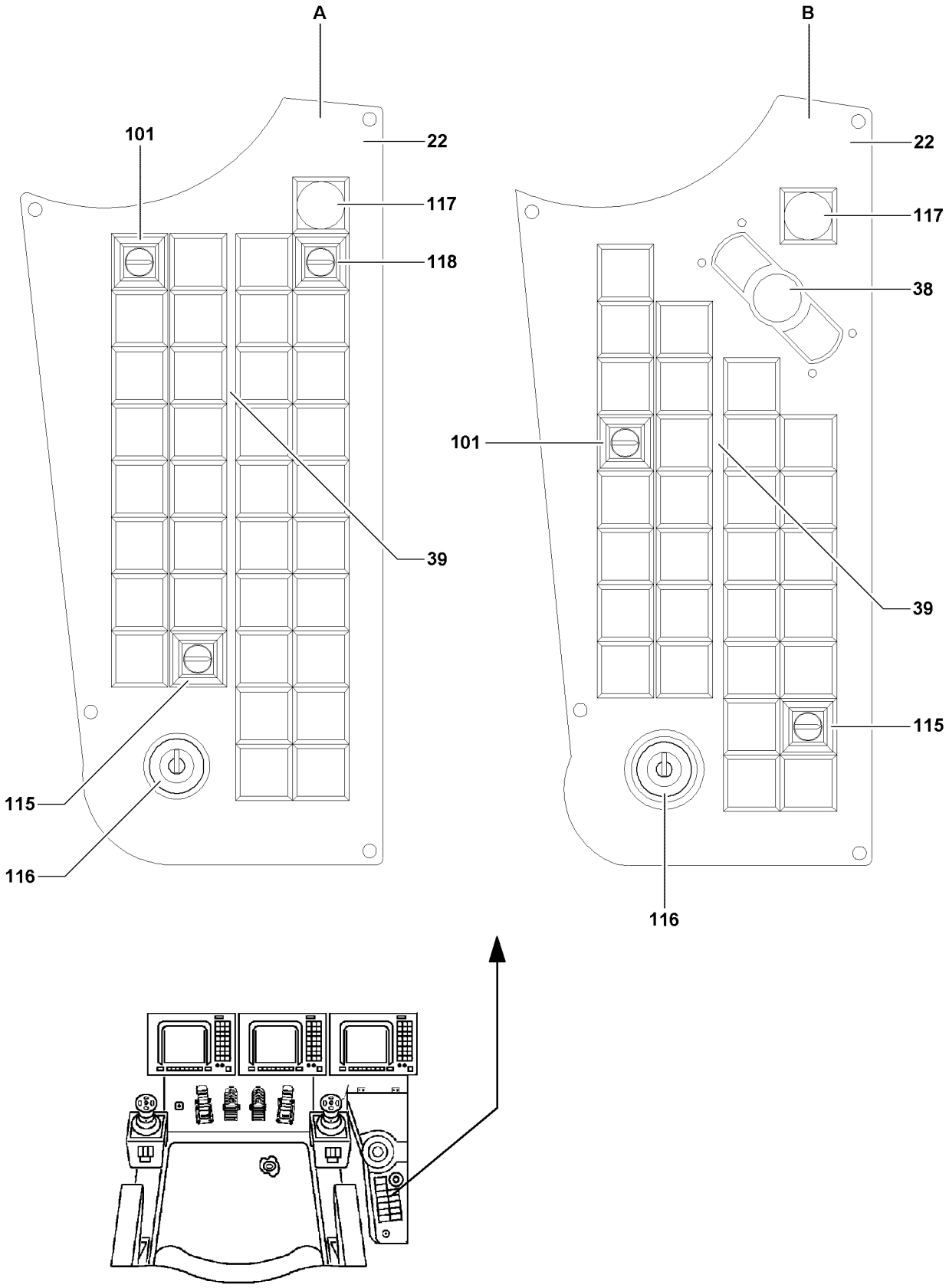


Fig.111003

3.3 Instrument panel

Note

- The instrument panel **22** is available in two versions.
- Version **A** and version **B** differ in the arrangement of the operating buttons and additional operating elements.
- The number of operating buttons on the instrument panel **22** depends on the respective crane equipment and can differ from crane to crane.

The instrument panel **22** consists of the following elements:

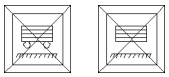
38 Micro module (Mouse)
- Operation LICCON job planner

39 Keypad
- Indicator lights and operating buttons

116 Ignition key switch

117 EMERGENCY OFF button

3.3.1 Indicator lights and operating buttons

Position	Operating element	Function	LED	Description
100	 *(BT) or (B)* Button with warning light „Derrick ballast lifted off“		**Note:**	Derrick ballast: Ballast on ballast trailer (BT) or suspended ballast (B).
			Blinks	Briefly pressing the key button **101** activates the operating mode „Derrick ballast lifted off“ (self retention). The derrick ballast icon on LICCON monitor 1 is represented suspended.
		Off	Off	Pressing the button momentarily deactivates the operating mode „Derrick ballast lifted off:“ Ballast trailer symbol is shown on LICCON monitor 1 on the ground.
101	 Key button „Derrick ballast lifted off“		**DANGER!**	**The crane can topple over!** **If the derrick ballast lifts off the ground during towing, the turntable can turn to the side. Death, severe injury, property damage.** **Activate „Derrick ballast lifted off“ after lift off of the ballast trailer. Keep under constant visual control. See Crane operating instructions, chapter 5.11 or 5.35 or 5.36.**

Position	Operating element	Function	LED	Description
102	 Button BT Manual steering correction to the left		Lights up	Operating mode manual steering correction: When pressing and holding the button, the ballast trailer wheels turn to the left to drive on tight construction sites.

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Position	Operating element	Function	LED	Description
103	 Button BT Manual steering correction to the right		Lights up	Operating mode manual steering correction: When pressing and holding the button, the ballast trailer wheels turn to the right to drive on tight construction sites.

Position	Operating element	Function	LED	Description
104	 Button BT towing		Blinks	Pressing and holding the button sets the ballast trailer wheels in travel position
			Lights up	Ballast trailer wheels in travel position

Position	Operating element	Function	LED	Description
106	 Button BT turning position		Blinks	Press and hold the button to turn the ballast trailer wheels in turning position
			Lights up	Ballast trailer wheels in turning position

Position	Operating element	Function	LED	Description
107	 Button BT Parallel position		Blinks	Turn ballast trailer wheels into parallel position (crab walk)
			Lights up	Ballast trailer wheels in parallel position

Position	Operating element	Function	LED	Description
108	 Button Block ballast cylinder **A**	On		Pressing and holding the button blocks cylinder A on the derrick ballast
		Off		Releasing the button releases **cylinder A** on the derrick ballast

Position	Operating element	Function	LED	Description
109	 Button Block ballast cylinder **B**	On		Pressing and holding the button blocks cylinder B on the derrick ballast
		Off		Releasing the button releases **cylinder B** on the derrick ballast

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Position	Operating element	Function	LED	Description
110	 Button derrick ballast down	On Off		Pressing and holding the button lowers the derrick ballast Releasing the button interrupts the movement

Position	Operating element	Function	LED	Description
111	 Button derrick ballast up	On Off		Pressing and holding the button lifts the derrick ballast Releasing the button interrupts the movement

Position	Operating element	Function	LED	Description
112	 Button Telescope derrick ballast in	On Off		Pressing and holding the button telescopes the derrick ballast out Releasing the button interrupts the movement

Position	Operating element	Function	LED	Description
113	 Button Telescope derrick ballast out	On Off		Pressing and holding the button telescopes the derrick ballast in Releasing the button interrupts the movement

Position	Operating element	Function	LED	Description
114	 Button Crawler assembly off	Off		Pressing the button deactivates the self retention of operating mode crawler assembly, key button **115**
115	 Key button crawler assembly		**DANGER!**	**In operating mode crawler assembly there is no overload shut off for the assembly cylinder as well as for the crane. Death, severe injury, property damage.**
			Prerequisite:	The set up key **D** is pressed: The assembly icon on the LICCON monitor blinks.
		On	Button **114** lights up	Briefly pressing the key button activates the operating mode crawler assembly with hydraulic cylinder (self retention).

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Position	Operating element	Function	LED	Description
119		On	Lights up	Radio remote control „On“
	Indicator light radio remote control	Off	Off	Radio remote control „Off“
118		Off		Position 0 (horizontal): Radio remote control pinning „Off“.
	Key button radio remote control pinning	On		Position 1 (vertical): Radio remote control pinning „On“.

Position	Operating element	Function	LED	Description
120		On		Pressing and holding the button spools the assembly winch up
	Button Spool the assembly winch up	Off		Releasing the button interrupts the movement

Position	Operating element	Function	LED	Description
121		On		Pressing and holding the button spools the assembly winch out
	Button Spool assembly winch out	Off		Releasing the button interrupts the movement

Position	Operating element	Function	LED	Description
123			**Note**:	For all functions, which are actuated with the hydraulic manual control levers, the pressure supply must be changed over.
	Switch Pressure supply auxiliary user	On		Pressing the button establishes the pressure supply to the auxiliary users: - Erection cylinder SA-frame - Support cylinder assembly - Crawler assembly cylinder in SA-frame
		Off		Pressing the button interrupts the pressure supply to the auxiliary users

Position	Operating element	Function	LED	Description
124		On		By pressing and holding the button the support cylinder ballast trailer front moves out
	Button BT support front down	Off		Releasing the button interrupts the movement

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Position	Operating element	Function	LED	Description
125	 Button BT support front up	On Off		By pressing and holding the button the support cylinder ballast trailer front moves in Releasing the button interrupts the movement

Position	Operating element	Function	LED	Description
126	 Button BT support rear down	On Off		By pressing and holding the button the support cylinder ballast trailer rear moves out Releasing the button interrupts the movement

Position	Operating element	Function	LED	Description
127	 Button BT support rear up			By pressing and holding the button the support cylinder ballast trailer rear moves in

Position	Operating element	Function	LED	Description
128	 Warning light support moved in		Lights up	Shows when the support ballast trailer is moved in

Position	Operating element	Function	LED	Description
129	 Warning light suspended ballast on the ground		Lights up	Shows when the suspended ballast is on the ground

Position	Operating element	Function	LED	Description
130	 Switch Test system BT		**Note:**	Can only be turned on with „Engine off“.
		On	Lights up	Actuating the switch switches from LICCON monitor 1 to Test system control ballast trailer

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Position	Operating element	Function	LED	Description
131	 Warning light		Lights up	Control ballast trailer does not run or One of the pressure sensors or length sensor for the ballast trailer is defective or missing, see Crane operating instructions, chapter 5.11 or 5.35.

Position	Operating element	Function	LED	Description
134	 Indicator light engine preheating		Lights up	Shows that the engine is preheated

Position	Operating element	Function	LED	Description
135	 Switch Fuel preheating	On	Lights up	Actuating the switch activates fuel preheating
		Off	Off	Actuating the switch deactivates fuel preheating

Position	Operating element	Function	LED	Description
135	 Button Starting aid engine			Starting aid for engine: Additional pressurized air support when starting in high altitudes

Position	Operating element	Function	LED	Description
136	 Charge indicator light		Lights up	When the engine is running: Erroneous function charge regulator Before / at engine start: Shows that the battery is not being charged.

Note

- The indicator lights (indicator light **142** Urea and indicator light **143** SCR-exhaust aftertreatment) are only available on engines which are equipped with a SCR-exhaust aftertreatment system.
- If a warning occurrence is present, the indicator lights light up or blink and a signal sounds.

WARNING

Insufficient Urea in the Urea reservoir or faulty function in the SCR-exhaust aftertreatment system!
Due to insufficient Urea level or faulty function in the SCR-system, a reduction in engine power can be activated by the engine control or a start block of the engine can be triggered.
The crane operation can be limited.

- Add missing Urea in the Urea reservoir in time.
- Remedy faulty function in the SCR-system immediately.
- Observe the national / regional regulations valid on the job site.

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Note

▶ The type and scope of a power reduction of the engine depends on the respectively valid national / regional regulations. The engine can possible not be started any longer (start block).

Position	Indicator light	Function	LED	Description
142	 Urea		Off	Urea available
			Statically on	Urea is getting low or faulty function of the exhaust aftertreatment **Note:** Add urea or remedy the faulty function of the exhaust aftertreatment.
			Blinks	Urea almost empty or faulty function of the exhaust aftertreatment **Note:** Add urea or remedy the faulty function of the exhaust aftertreatment.

Position	Indicator light	Function	LED	Description
143	 Exhaust aftertreatment		Off	Exhaust aftertreatment OK.
			Blinks	Advance warning: Exhaust aftertreatment
			Statically on	Exhaust aftertreatment is no longer ensured

3.3.2 Alternative operating buttons in LG-operation

Note

▶ Depending on the version, either a folding ladder or a sliding ladder is installed as an access ladder.

Position	Operating element	Function	LED	Description
31	 Button ladder		**Note:**	Only folding ladder: The movement of the ladder when it folds in and out stops by itself when the respective end position is reached.
		Up / down		By pressing the button
		Stop		By pressing the button

Position	Operating element	Function	LED	Description
31	 Button ladder		**Note:**	Only sliding ladder: The movement of the ladder when moving in and out stops by itself when the ladder is moved in or out completely.
		Up / down		By pressing the button
		Stop		By pressing the button

Position	Operating element	Function	LED	Description
119			Lights up	Shows that the radio remote control is activated
	Indicator light radio remote control		Off	Shows that the radio remote control is deactivated
118		Off		Pressing the key button deactivates the radio remote control for pinning: Position 0 (horizontal)
	Key button radio remote control pinning	On		Pressing the key button activates the radio remote control for pinning: Position 1 (vertical)

3.4 Instrument panel expansion Radio console

The instrument panel expansion radio console **36** consists of the following elements.

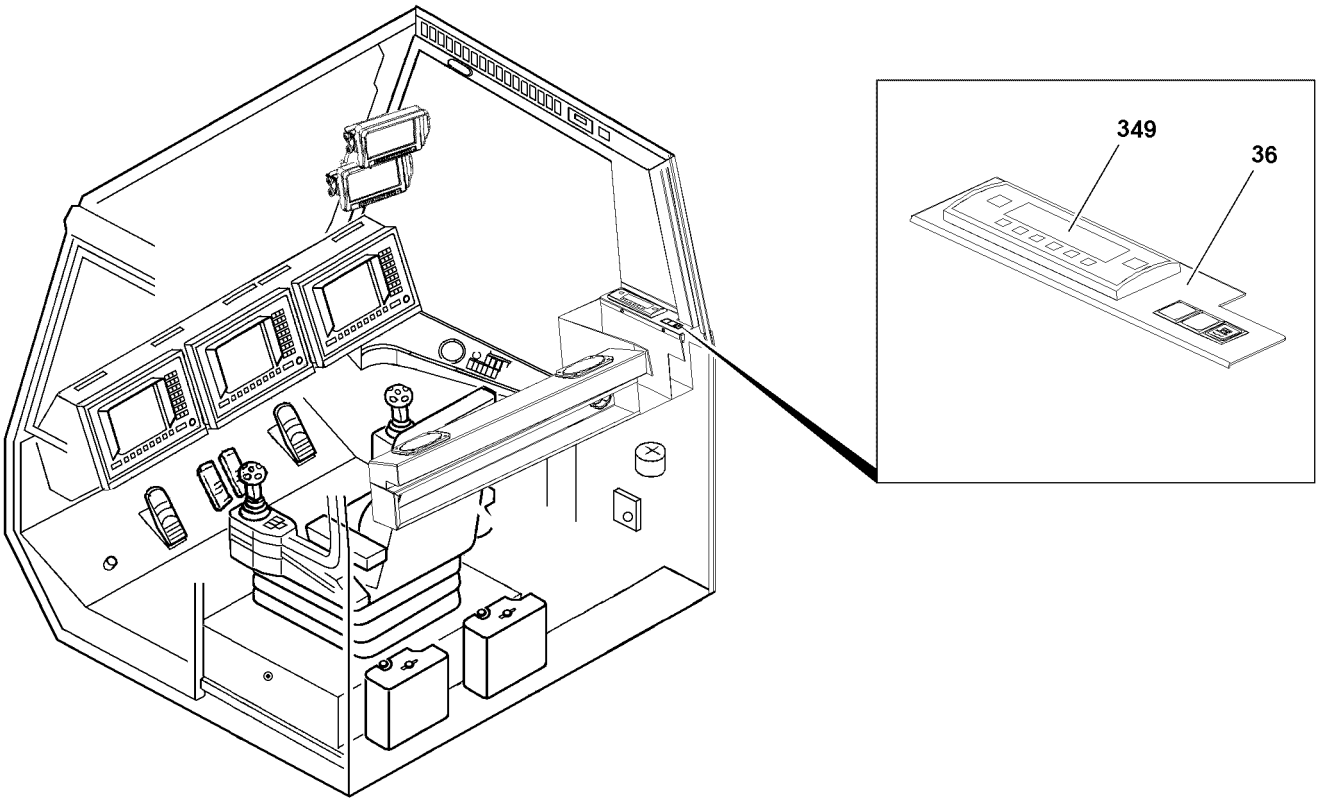

Fig.122701: Instrument panel expansion Radio console

349 Radio*****

3.4.1 Operating buttons on the instrument panel expansion radio console

Position	Button / switch	Function	LED	Description
737*		On	On	By actuating the switch: Drive for ballast trailer is added. See Crane operating instructions, chapter 5.35.
	Switch Drive Ballast trailer	Off	Off	By actuating the switch: Drive for ballast trailer is turned off.

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3.5 Operating elements on control platform

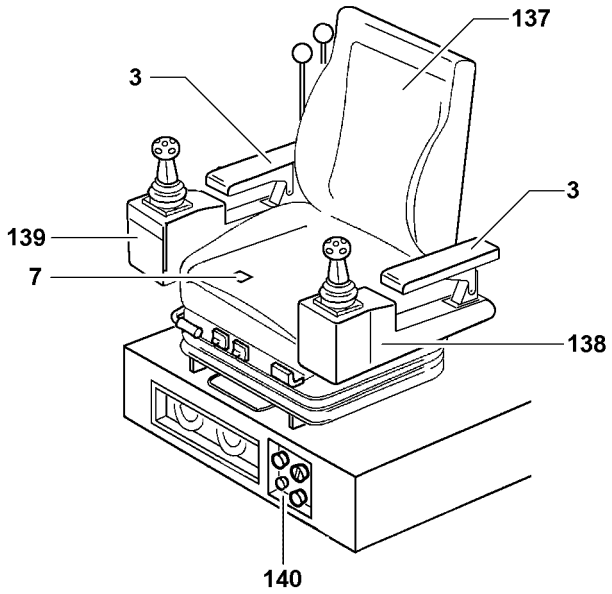

Fig.122703: Operating elements on control platform

The control platform consists of the following elements:

- **3** Armrests
- **7** Seat contact button
- **137** Crane operator's seat
- **138** Control console, left
- **139** Control console, right
- **140** Climate control system / cab heater

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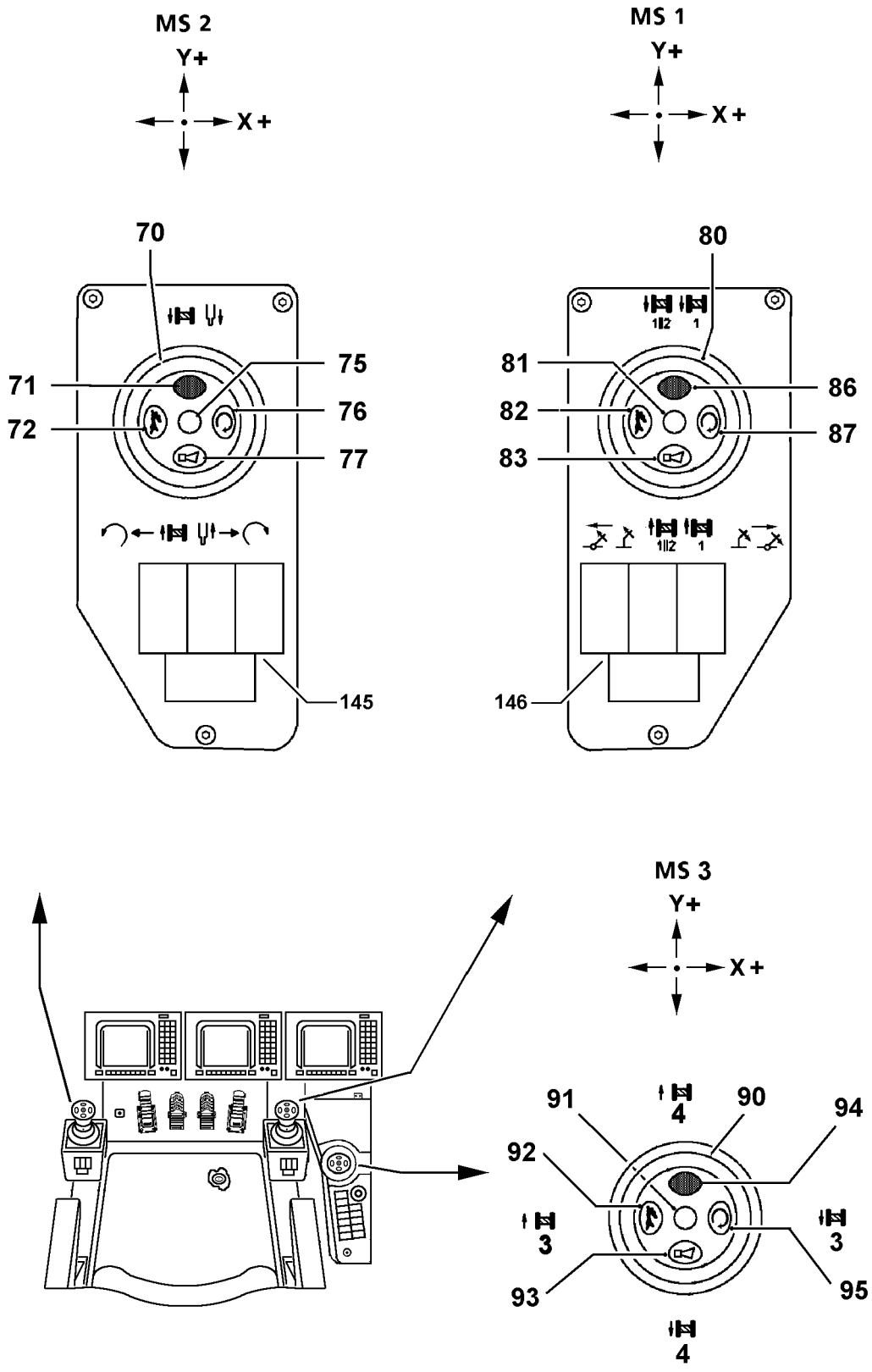

LWE/LG 1750-006/15409-07-02/en

Fig.107829

3.5.1 Operating elements on control consoles

Control console, left

Master switch assignment MS 2:

70 Master switch left (MS 2)
- **Note:**
  For assignment of master switches to operating modes, see Crane operating instructions, chapter 4.05.

71 Button
- Bypass of seat contact button. **Or** if the seat contact button is actuated: Addition of the vibration sensor **75**

72 Button
- Power Plus addition, crane operation

75 Vibration sensor
- Turn sensor: Slewing gear and winch 2, winch 5, winch 6

76 Button
- Engine rpm lock
  Note:
  By pressing the button **76** the engine rpm is locked in the current state.

77 Button
- Horn

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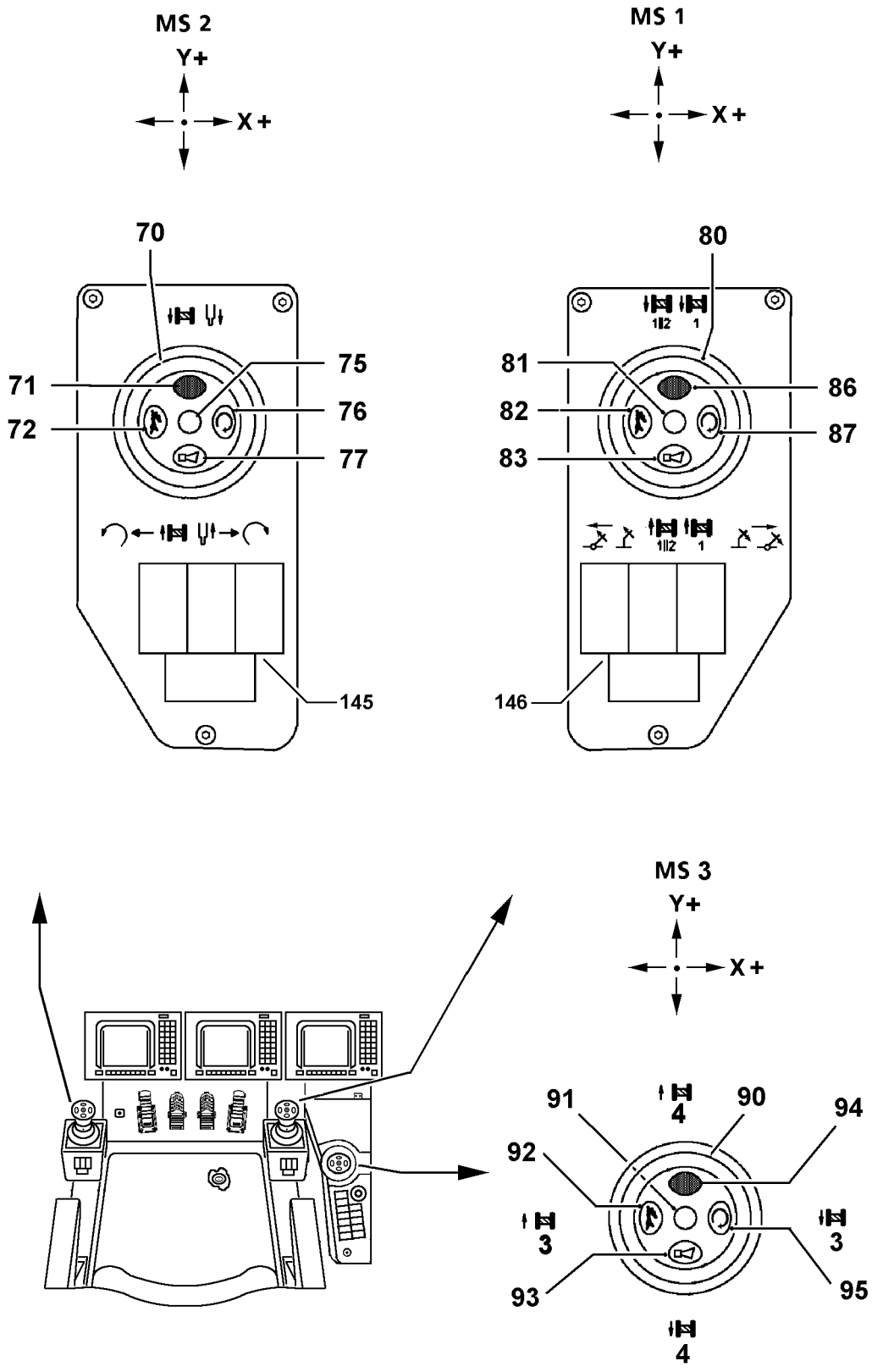
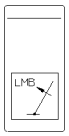
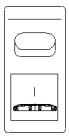


LWE/LG 1750-006/15409-07-02/en

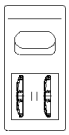
Fig.107829

Instruments **145** control console:

Position	Button / switch	Function	LED	Description
73			**DANGER!**	**The exceedance of the overload protection may only be carried out if the overload has been caused by luffing down at freely suspended load and the crane operator is absolutely certain that he can leave the overload range by luffing up.**
	Button „Luffing in with suspended load“	On		Pressing the button releases „Luffing in with suspended load“.

Position	Button / switch	Function	LED	Description
74			**Note:**	After crawler operation, you must switch back to crane operation.
	Switch Crawler operation		**DANGER!**	**Damage of crane support!** **If the crawler travel gear is turned on when using the crane support, the support will be severely damaged when actuating the pedals for the crawler travel gears. The crane can topple over. Death, severe injury, property damage.** **When working with crane support: Turn crawler operation off.**
		On		Releasing and actuating the switch activates the operating mode „Crawler operation“.
		Off		By actuating the switch: Position 0

Position	Button / switch	Function	LED	Description
78		On		Actuating the switch activates the operating mode „Rapid gear“
	Switch Crawler rapid gear	Off		By actuating the switch: Position 0

Position	Button / switch	Function	LED	Description
79		On		Actuating the switch activates the operating mode „Parallel driving“: The left and right tracks move at the same speed.
	Switch Crawler parallel travel	Off		By actuating the switch: Position 0

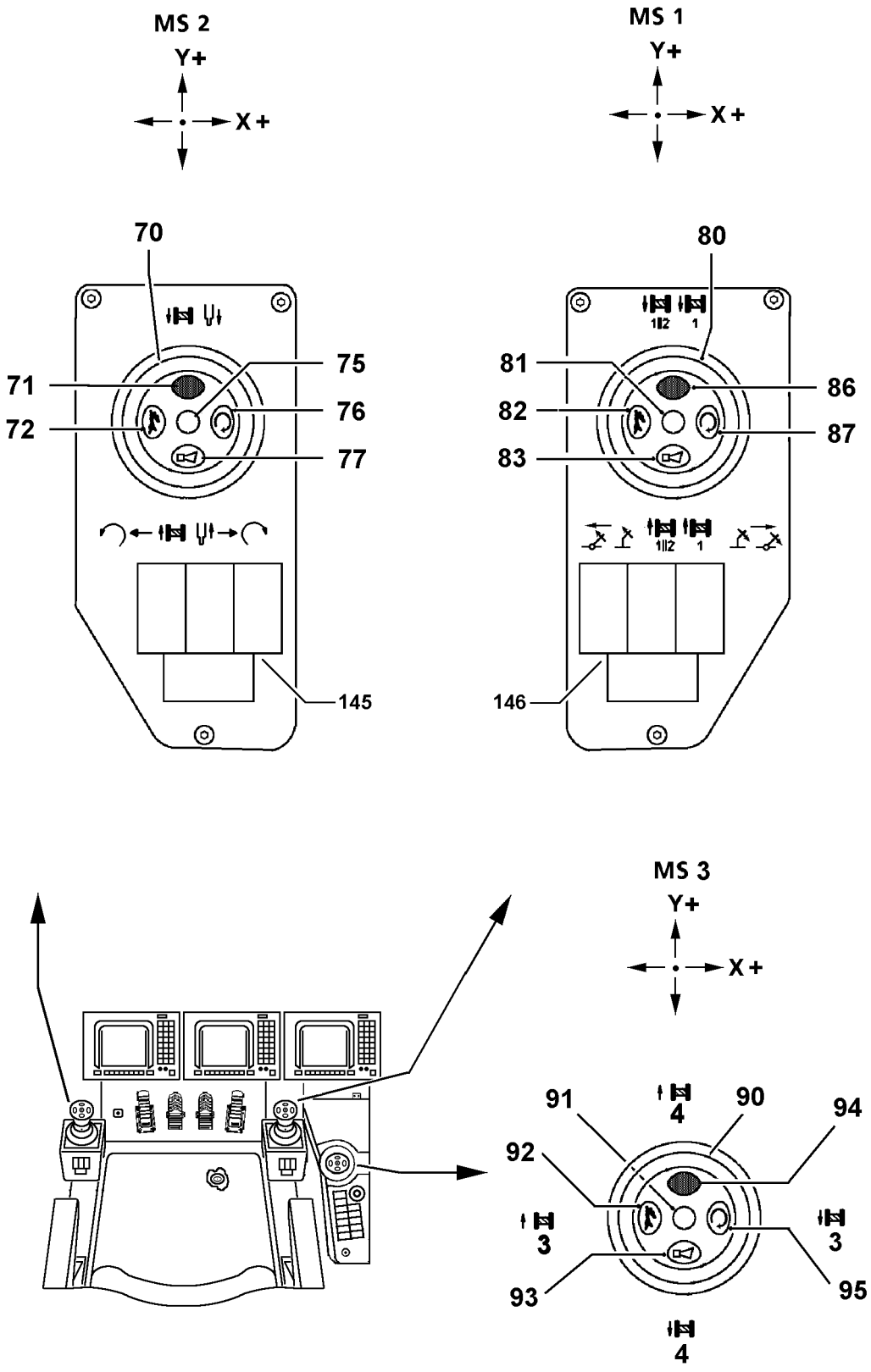


Fig.107829

Control console, right

Master switch assignment MS1:

80 Master switch right (MS1)
- **Note:**
  For assignment of master switches to operating modes, see Crane operating instructions, chapter 4.05.

81 Vibration sensor
- Turn sensor: Slewing gear and winch 3, winch 4, winch 5

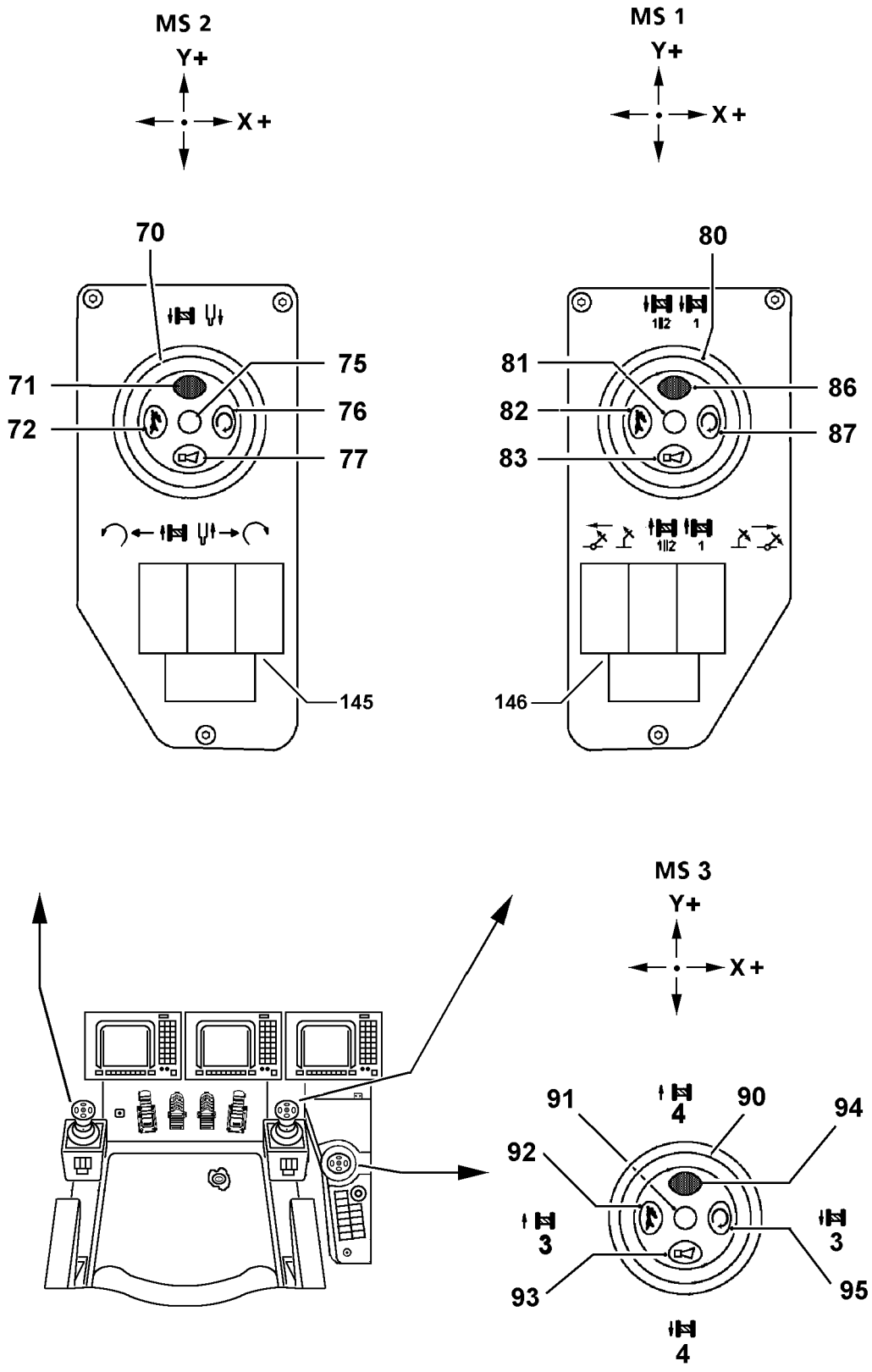
82 Button
- Power Plus addition, crane operation

83 Button
- Horn

86 Button
- Bypass of seat contact button. **Or** if the seat contact button is actuated: Addition of the vibration sensor **81**

87 Button
- Engine rpm lock
  Note:
  By pressing the button **87** the engine rpm is locked in the current state.

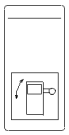
LWE/LG 1750-006/15409-07-02/en

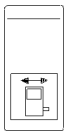


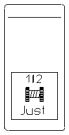
LWE/LG 1750-006/15409-07-02/en

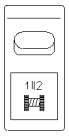
Fig.107829

Instruments **146** control console:

Position	Button / switch	Function	LED	Description
84	 Button Tilt cab	Off		By releasing the button: Position 0 (center)
		Up		By pressing the button the cab tilts up: Position 2 (front)
		Down		By pressing the button the cab tilts down: Position 1 (rear)

Position	Button / switch	Function	LED	Description
85	 Button Swing the cab	Off		By releasing the button: Position 0 (center)
		Transport		Pressing the button swings the cab into transport position: Position 2 (front)
		Work		Pressing the button swings the cab into working position: Position 1 (rear)

Position	Button / switch	Function	LED	Description
88	 Button Adjusting the parallel control		**Note:**	Adjust only with parallel hook blocks, parallel control Winch 1 II 2.
		On		Pressing the button activates the „Adjustment of the parallel control“ of winch 1 and winch 2
		Off		By releasing the button

Position	Button / switch	Function	LED	Description
89	 Switch Parallel operation	On		Actuating the switch activates the „Parallel operation“ of winch 1 and winch 2
		Off		By actuating the switch

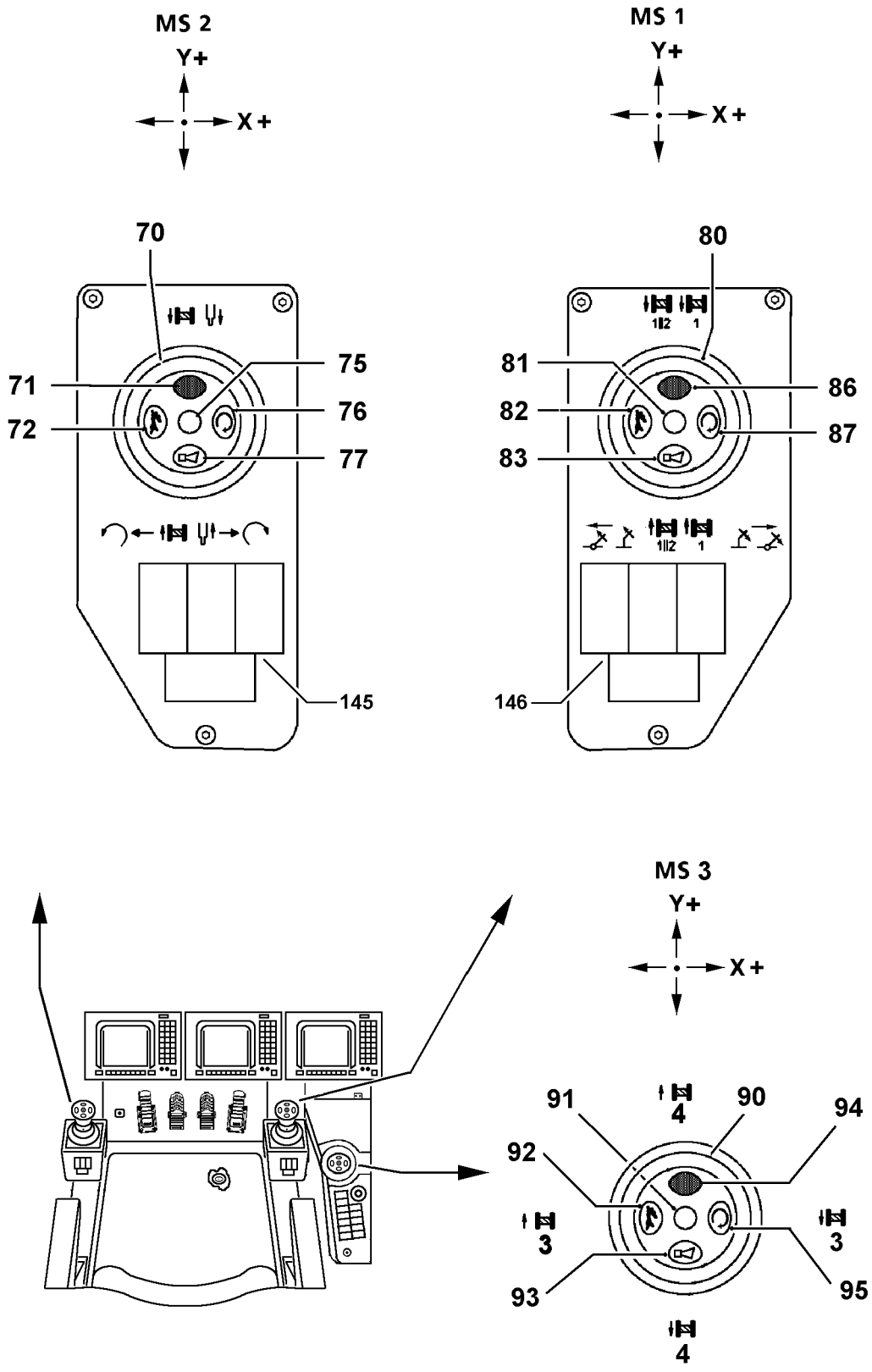


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Fig.107829

3.5.2 Operating elements Master switch (MS) 3

90 Master switch (MS3)
- **Note:**
  For assignment of master switches to operating modes, see Crane operating instructions, chapter 4.05.

91 Vibration sensor
- Turn sensor and winches

92 Button
- Power Plus addition, crane operation

93 Button
- Horn

94 Button
- Bypass of seat contact button. **Or** if the seat contact button is actuated: Addition of the vibration sensor **91**

95 Button
- Engine rpm lock
  Note:
  By pressing the button **95** the engine rpm is locked in the current state.

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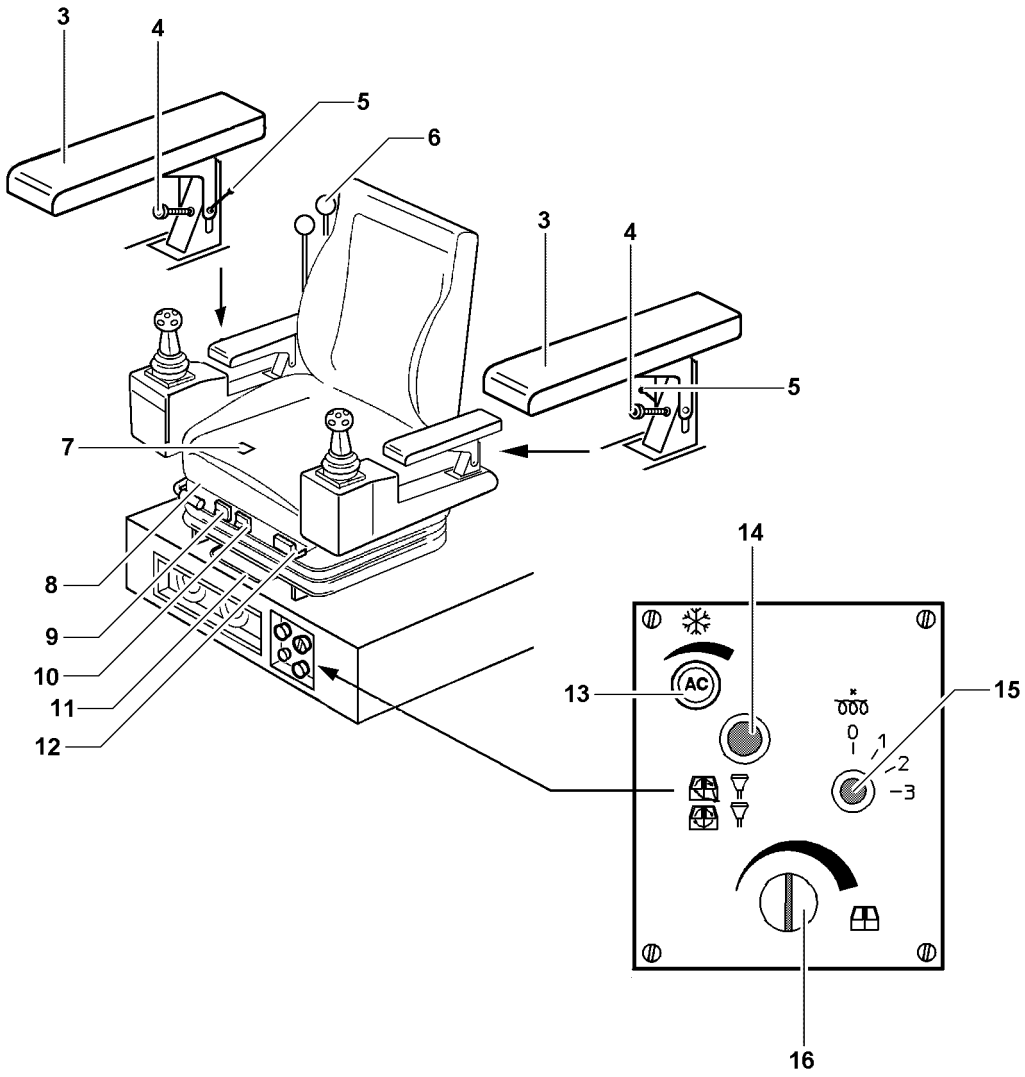

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Fig.107828

3.5.3 Operating elements crane operator's seat

3 Armrest

4 Set screw
- Adjustment of armrest incline

5 Locking lever
- Armrest height adjustment

6 Manual control lever
- Control Crawler travel gears left and right
  Note:
  The crawler travel gears can also be controlled via the manual control levers. To do so, they must be inserted into the foot rocker **58** or foot rocker **59**.

7 Seat contact button

8 Hand lever
- Adjustment of seat cushion incline

9 Button
- Lumbar support in lower part of backrest

10 Button
- Lumbar support in upper part of backrest

11 Hand lever
- Lock for horizontal seat adjustment

12 Hand lever
- Lock for backrest incline

13 Regulator knob
- Climate control system

14 Switch
- Switching between fresh air / recirculated air, air quantity

15 Rotary switch
- Three stage blower

16 Regulator knob
- Temperature Cab heater

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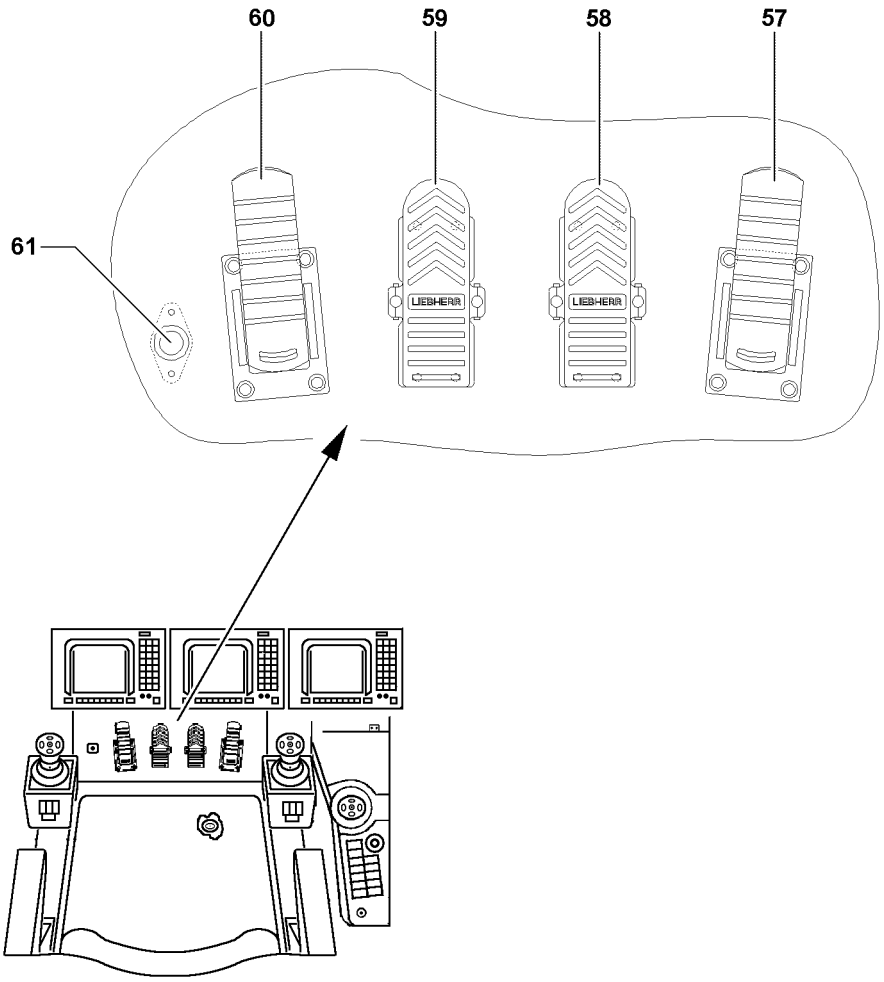

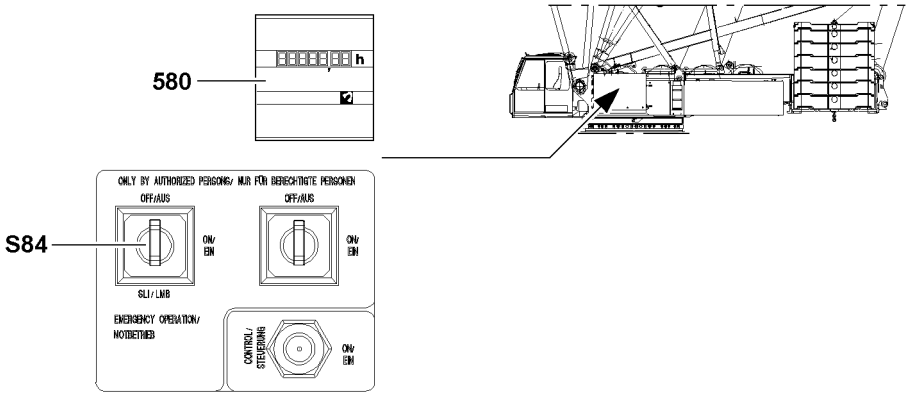

Fig.113290

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3.6 Pedal carrier

57 Pedal
- Engine regulation

58 Master switch foot rocker (MS 5)
- Move the crawler forward or backward on the right hand side
  Note:
  Only for LR-operation.

59 Master switch foot rocker (MS 4)
- Move the crawler forward or backward on the left hand side
  Note:
  Only for LR-operation.

60 Pedal
- Slewing gear brake

61 Foot button
- Coasting slewing gear

4 Operating elements switch cabinet

580 Operating hour meter
- Recording of crawler operating hours

S84 Key button
- LMB emergency operation

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4.02 LICCON computer system

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Fig.199898

1 General

Note

- ▶ The monitor illustrations in this chapter are only examples.
- ▶ The numerical values in the individual icons and charts do not have to necessarily match the crane exactly.
- ▶ Numbers and letters can be replaced by place holders.
- ▶ In addition, many of the illustrations show the maximum configuration of the LICCON monitor with icons.
- ▶ In normal crane operation, an identical display will **not** appear on the LICCON monitor.

The LICCON computer system is a computer system for controlling and monitoring mobile and crawler cranes. In addition to the overload protection (Load torque limiter = **LMB**) there are a number of application programs that can be used for controlling and monitoring the crane movements.

Currently the LICCON computer system includes the following application programs:

- Set up program
- Crane operation program
  - Crane operation program on monitor 0
  - Crane operation program on monitor 1
- Support* program
- Working range limitation* program
- Control parameter program
- Engine monitoring program

The electrical and electronic components are linked via data bus transmission technology (Liebherr System Bus = LSB).

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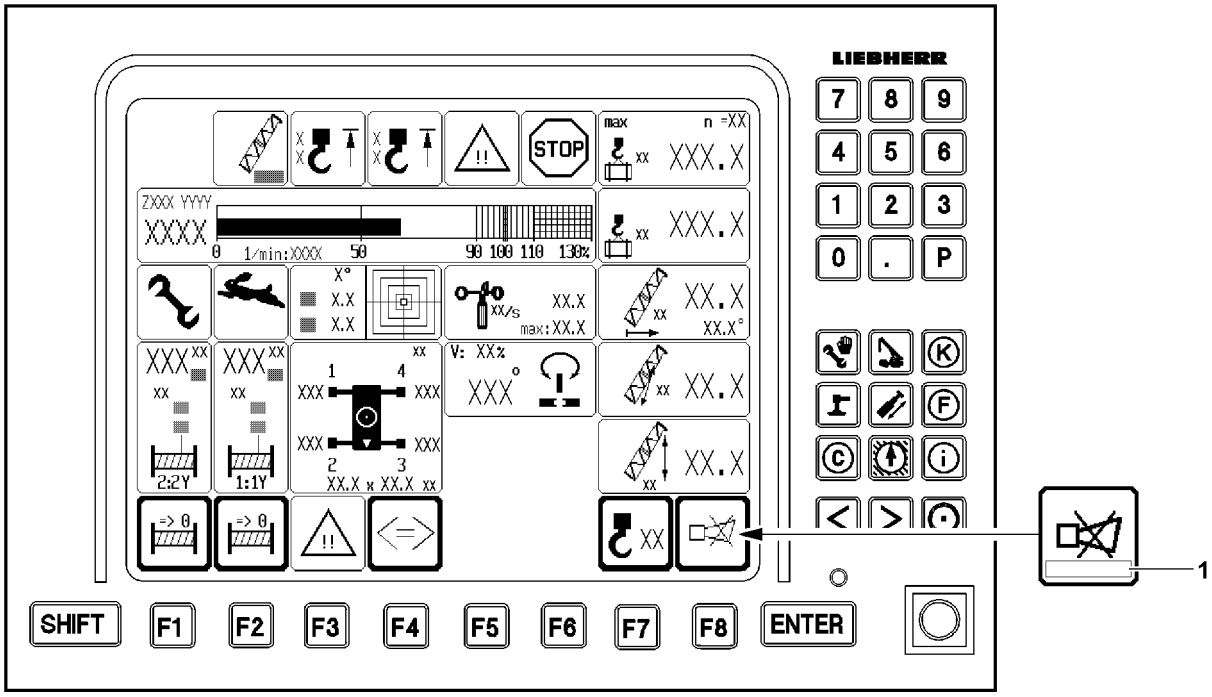

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Fig.111937

1.1 Overload protection (LMB)

The overload protection is implemented in microprocessor CPU 0 of base assembly 0. The LICCON computer system works on the principle of comparing the current / actual load with the „maximum permissible load according to the load chart and reeving“.

1.1.1 Actual load

The current load is determined by recording variable values.

The **load on the crane** results from the load momentum and the boom momentum together. It exerts a force in the boom guying, which is measured by force test sensors.

The **boom momentum** is calculated from angle sensor information (boom angle) and the crane data (boom weights) for the set operating mode.

The **radius** is calculated with data from the angle sensors (boom angle) and the geometric data for the set operating mode. This also takes into account the boom flexation due to its own weight and the weight of the load.

The actual load is calculated from the total load, the boom momentum and the boom radius.

1.1.2 Maximum load according to load chart and reeving

Crane data such as load charts, boom weights and geometry data are stored in the central data memory of the LICCON computer system.

The „maximum load according to the load chart and reeving“ is constantly determined for the set up configuration, for the set reeving and for the calculated boom radius, based on the load charts.

1.1.3 Comparison

The actual load and the „maximum load according to the load chart and reeving“ are compared. When they approach the specified limit, an advance warning is issued. If the specified limit is exceeded, a LMB STOP is triggered due to overload. When a LMB STOP is triggered, load moment increasing crane movements are shut off.

1.2 Error messages

The LICCON computer system monitors the crane permanently for operating / system errors.

If errors occur, error messages **1** are issued. Error messages appear in the horn icon of LICCON monitor 0.

Note

- ▶ Always pay attention to error messages **1**.
- ▶ For procedure in case of error messages, see Diagnostics manual and the respective chapter in the Crane operating instructions.

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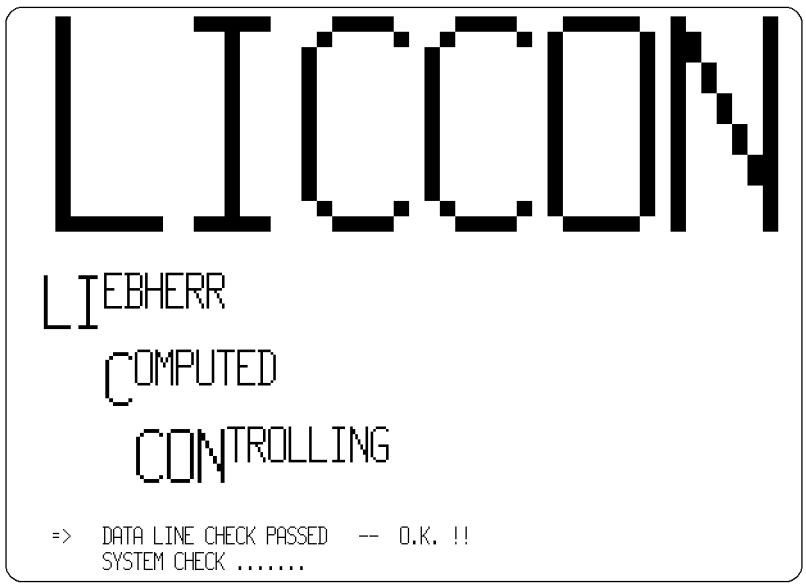
1



2

3

Fig.199899

LWE/LG 1750-006/15409-07-02/en

2 LICCON computer system boot up

After it is turned on, the LICCON computer system performs a self test.

First the connections from the microprocessor CPU (ZE 0) to the monitor are checked. If no error is found during the test, the monitor shows this image:

```
=>   DATA LINE CHECK PASSED   --  O.K. !!
     SYSTEM CHECK .......
```

Fig.199926

If the test finds no connection problems, there is a system test of all the microprocessor CPUs (ZE). The incremental sequence of the self test can be monitored on the 7 segment displays of the CPUs. If no errors are found during the system test, the monitor shows this image:

```
=>   DATA LINE CHECK PASSED   --  O.K. !!
     SYSTEM CHECK .......PASSED   --  O.K. !!
```

Fig.199927

Subsequently the general initialization screen appears on the monitor momentarily:

```
LIEBHERR-WERK      EHINGEN
```

Fig.199928

Note
Errors during LICCON computer system boot up!
If an advance warning, warning or STOP event occurs in the engine monitoring while the LICCON computer system boots up, it switches automatically to the engine monitoring program.
▶ Refer to section „Engine monitoring program“ for additional information.

3 Operating mode preselection on the LICCON computer system

WARNING
Danger of accident due to deviating set up configuration!
If the set up configuration and the operating mode of the crane set on the LICCON computer system does **not** match, then the crane can be overloaded unnoticed and topple over.
Death, severe bodily injuries, property damage.
▶ In the operating mode preselection, only the operating mode may be selected which actually corresponds to the set up configuration of the crane.

When the starting procedure is completed successfully after a successful self test of the LICCON computer system, the following appears on:

- **LICCON monitor 0** for approx. 3 seconds the operating mode preselection screen.
- **LICCON monitor 1** the title screen with the words: **„LIEBHERR-WERK EHINGEN“**

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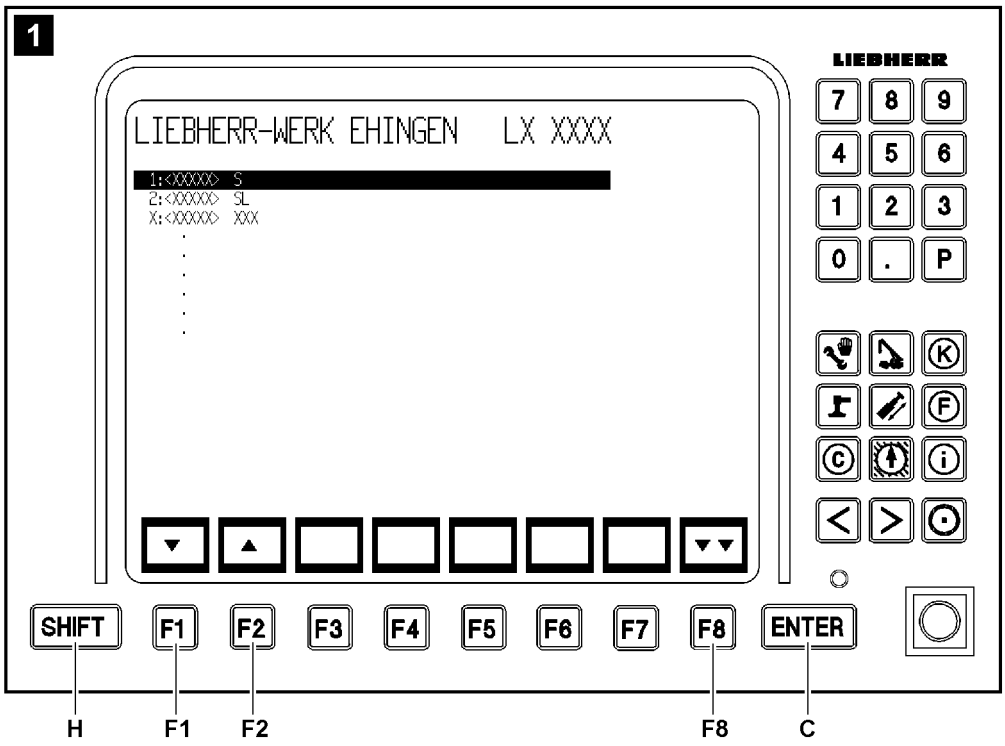

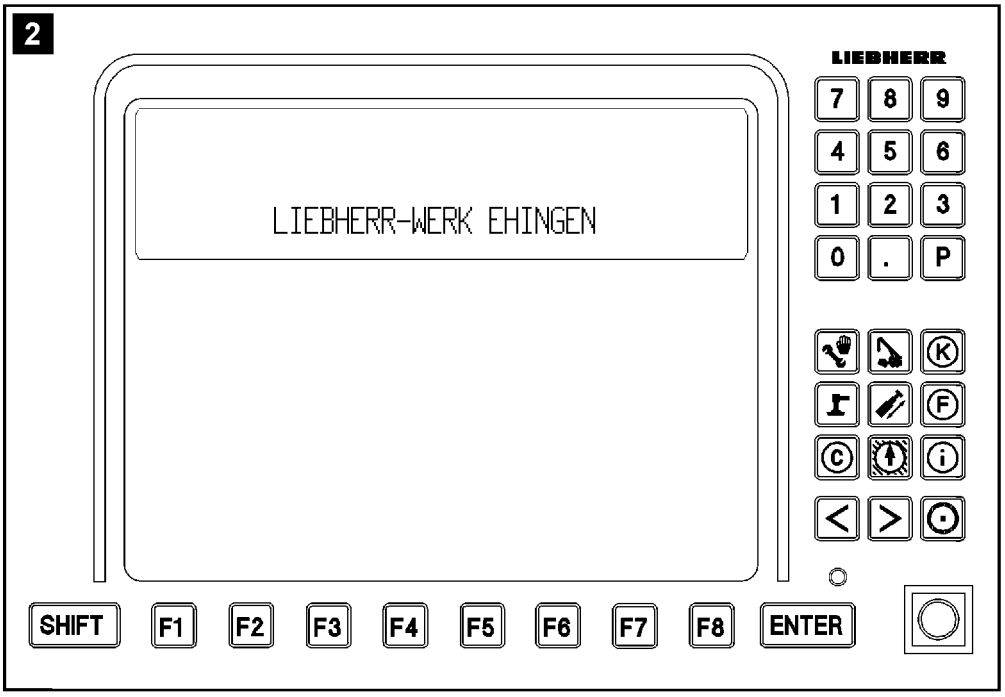

LWE/LG 1750-006/15409-07-02/en

Fig.111918

3.1 LICCON monitor 0

After successful starting procedure, the operating mode preselection screen appears on the **LICCON monitor 0** for approximately three seconds, see illustration **1**.

Note

- ▶ The operating mode preselection screen is skipped if the crane only has one level. For example: The crane has only one S-boom (only S-operation possible). In this case, the system changes directly into the set up screen for the only possible level.
- ▶ If the memory loses its data (for example as a result of a cold start) the previous operating mode is „rejected“ and the first operating mode in the operating mode selection menu is activated. In this case, the corresponding set up screen appears.

The function key **F1** or the function key **F2** is pressed within three seconds when the operating mode preselection screen appears.

Result:

– The operating mode preselection screen is retained until the settings are confirmed by pressing the function key **F8** or the ENTER key **C**.

Note

- ▶ If neither the function key **F1** nor the function key **F2** are pressed within three seconds, then the last active operating mode remains set. The corresponding set up screen appears automatically.

To select the required operating mode group for crane operation, press the function key **F1** (cursor down) or function key **F2** (cursor up).

Note

- ▶ The selected operating mode group is highlighted in black in the operating mode preselection screen on the monitor.

Press the function key **F8** or the ENTER key **C**.

Result:

– The set operating mode group is taken over into the LICCON computer system and the set up program appears with the corresponding set up screen.

3.2 LICCON monitor 1

After successful starting procedure, the title screen with the words appears on the **LICCON monitor 1**: **„LIEBHERR-WERK EHINGEN“**, see illustration **2**.

Note

- ▶ Depending on the set up configuration of the crane, it is possible that a note for an operating mode appears.

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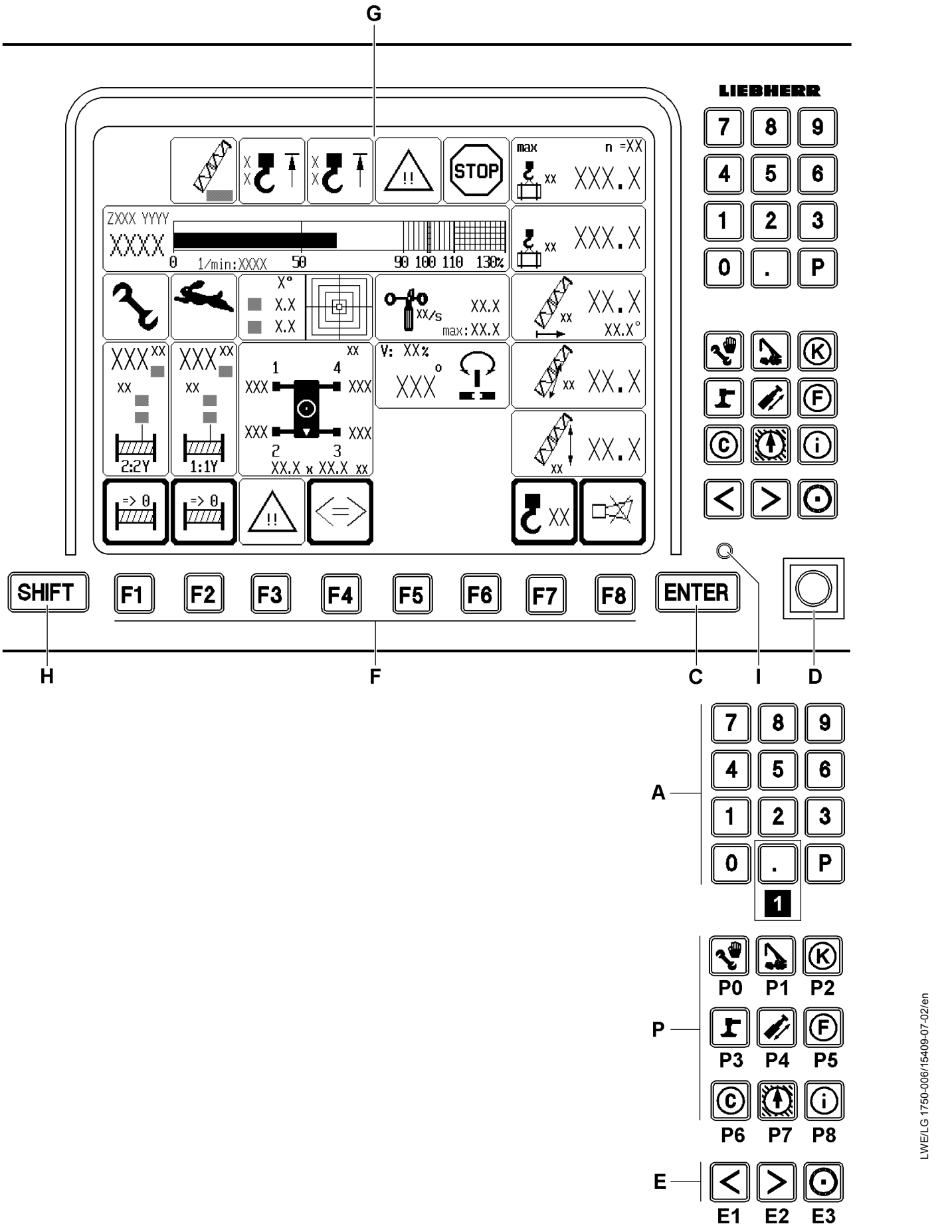

Fig.111900

4 Operating elements of the LICCON computer system on monitor 0

The functions of the individual monitor operating elements are program-dependent and can differ, depending on the LICCON program which is currently running. This will be described in more detail in the description of the individual LICCON programs.

A Keypad

P Program keys
- Selection of the individual LICCON programs

P0 Set up
- SHIFT **H** and program key **P0**: Engine monitoring

P1 Crane operation

P2 Crane acceptance
- Correction coefficients (program blocked - for LIEBHERR service personnel only)

P3 Crane support

P4 —
- Program key not assigned.

P5 Input window hook block weight

P6 Control parameters

P7 Working range limitation

P8 Test system
- **Note:**
  Description Test system, see Diagnostics manual.

C Input key ENTER
- Confirmation of changes

D Set up key
- Zero position (not actuated):
  Normal operation.
- Touching:
  Function „Exceedance of shut off limits of LICCON overload protection“ is released and / or the hoist limit switch is bypassed

Note
Double function set up key!
If the crane has **no** CE-mark, when actuating the set up key **D**, the release for the „Emergency operation LICCON overload protection“ is automatically engaged.

▶ Take into account, when actuating the set up key **D**, that the „Emergency operation LICCON overload protection“ is automatically released.

Note

▶ By actuating the set up key **D**, all erection / take down procedures can be carried out within the erection / take down charts, for which no load charts are available.

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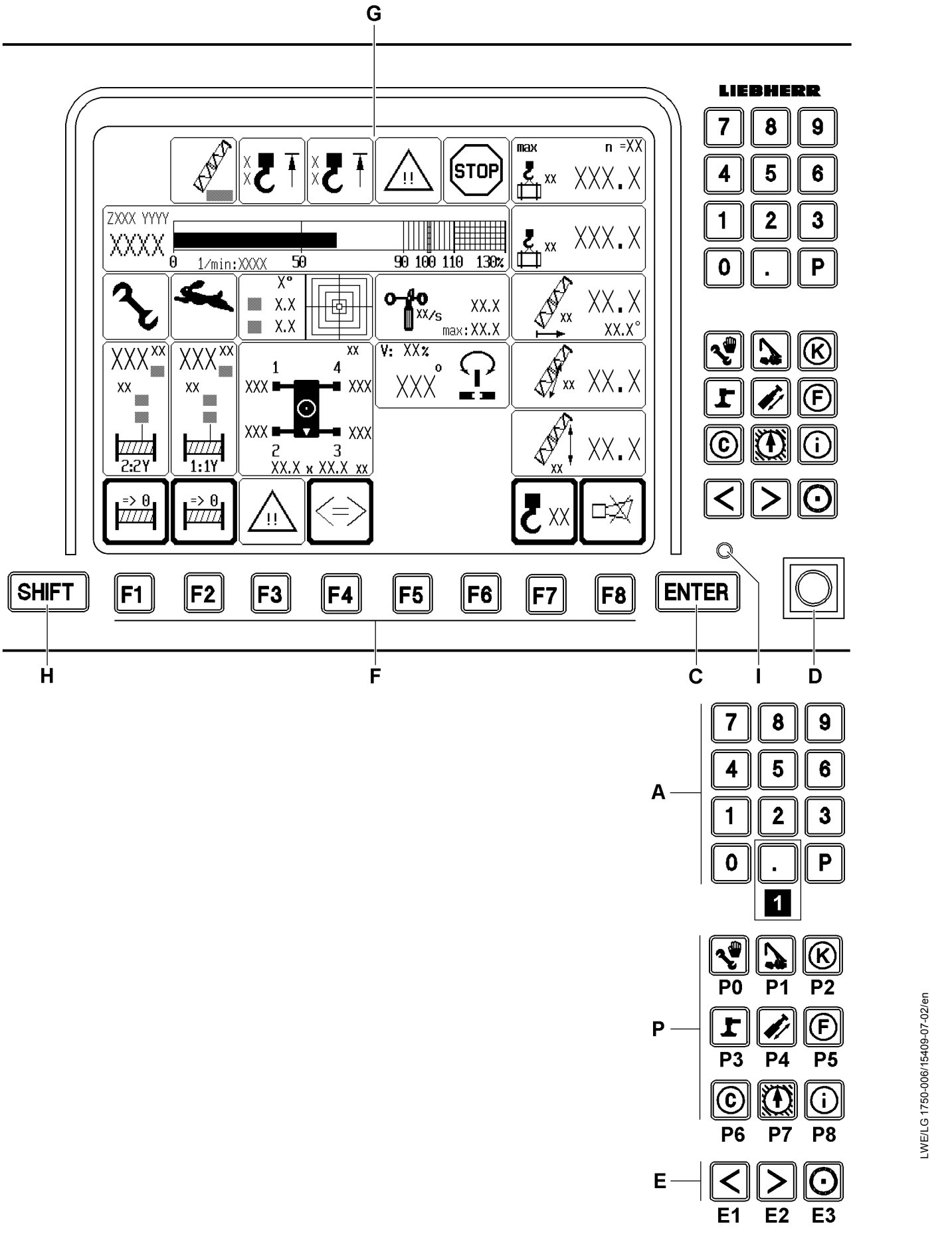


Fig.111900

LWE/LG 1750-006/15409-07-02/en

E Special function keys
- Monitor brightness adjustment
- Key combination **E3** and **E1**: Turn background illumination on / off
- Key combination **E3** and **E2**: Brightness adjustment in three stages
- **Note:**
  Additional functions of the special function keys are program-dependent and are further explained in the descriptions of the individual LICCON programs.

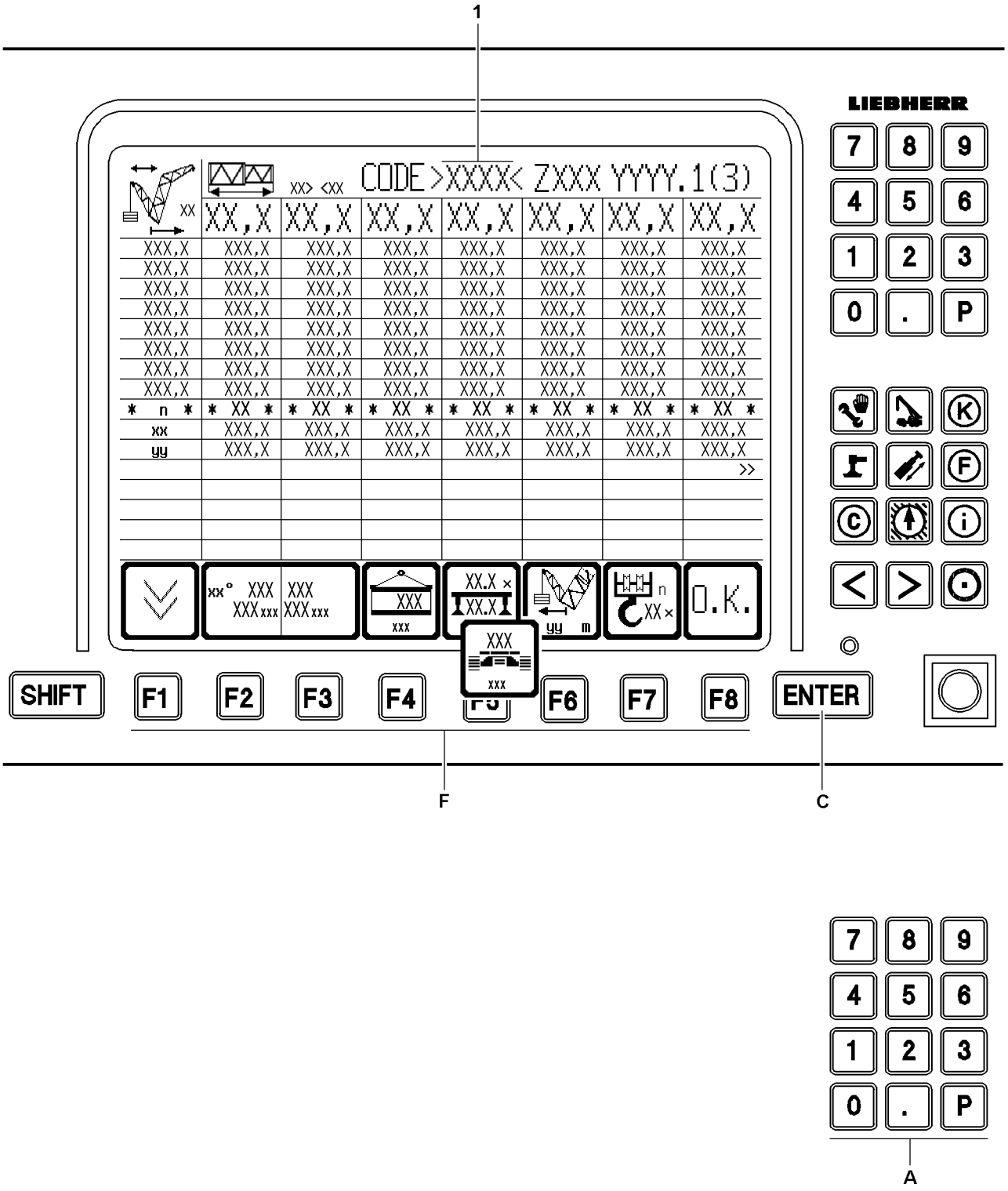
F Function keys
- The function keys should always be viewed in conjunction with the function key icon line displayed on the monitor.

G Display
- Display of the individual programs (example: Crane operation program).

H SHIFT key
- Second-level key assignments, for example „Supervisory function“

I LED display
- Monitor supply voltage present

LWE/LG 1750-006/15409-07-02/en



LWE/LG 1750-006/15409-07-02/en

Fig.111919

5 The set up program

After the LICCON computer system boots up correctly, it changes automatically into the set up program.

Note

▶ All entries and settings, which are to be made by the crane operator in the Set up program can only be carried out on **LICCON monitor 0**.

Note

Adjustment and display of set up configuration and reeving!

▶ Normally, the most recently run set up configuration and the reeving used at that time will be automatically set and displayed.

▶ If the computer system is started for the first time after set up of the crane, then the first valid set up configuration appears in the set up screen (first valid operating mode and reeving number „0“).

▶ After a new start of the computer system, due to a „cold start“ (for example: battery or CPU change), the first valid set up configuration appears in the set up screen (first valid operating mode and reeving number „0“).

Using the set up program, the crane operator can set to the current operating mode, the current set up configuration of the crane and the reeving number of the hoist rope.

In addition, in the set up program he can also see all the load charts programmed into the LICCON computer system.

5.1 Setting the operating mode and set up configuration

The crane operator can select the operating mode and the set up configuration with the function keys **F** or by entering a 4-digit short code **1**.

5.1.1 Setting the operating mode and set up configuration via the function keys

The function keys **F** are explained in the section „Function key line“ in this chapter.

▶ Select the respective function keys **F**.

▶ Press the ENTER key **C** to confirm and accept the settings.

Result:

– The data of the selected load chart can be viewed.

5.1.2 Setting the operating mode and set up configuration via the 4-digit short code

▶ Enter a 4-digit short code **1** with the keypad **A** on the **LICCON monitor 0**.

▶ Press the ENTER key **C** to confirm and accept the settings.

Result:

– The data of the selected load chart can be viewed.

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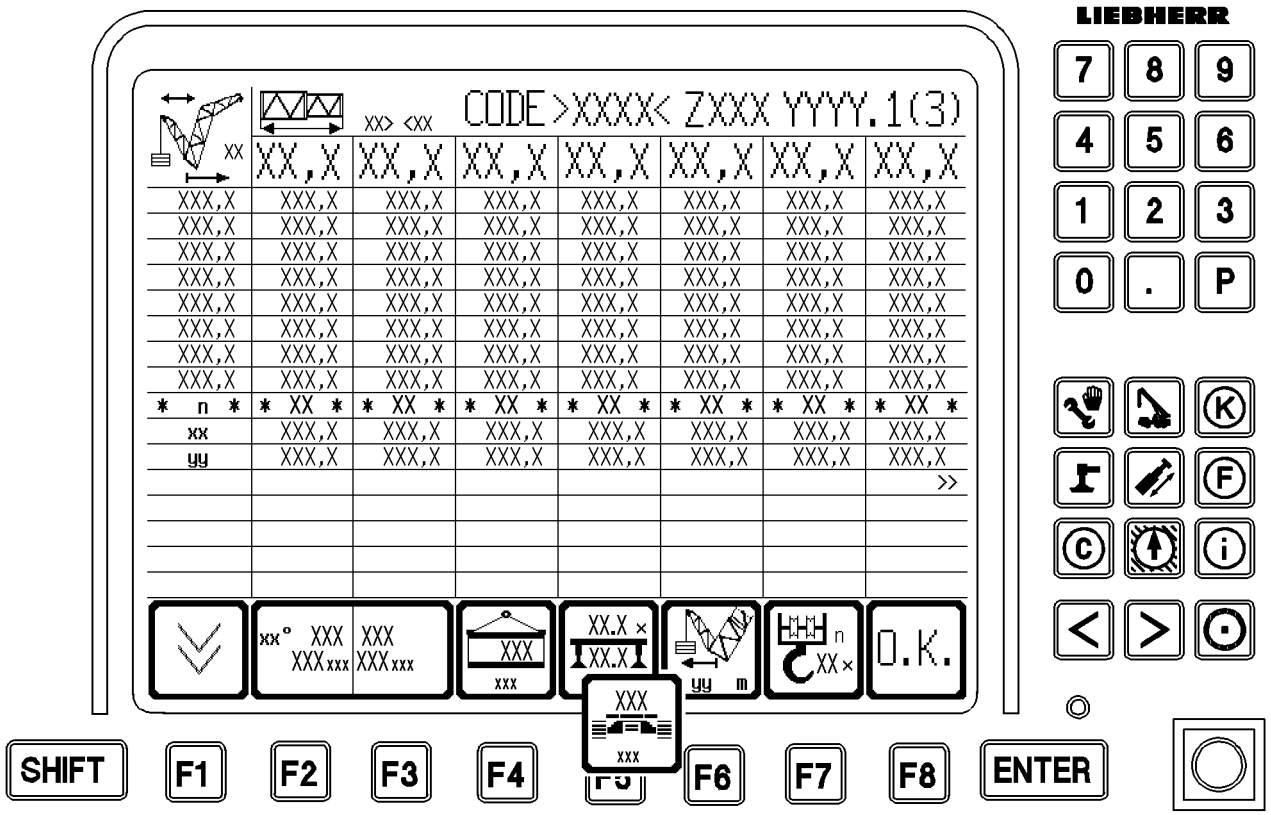

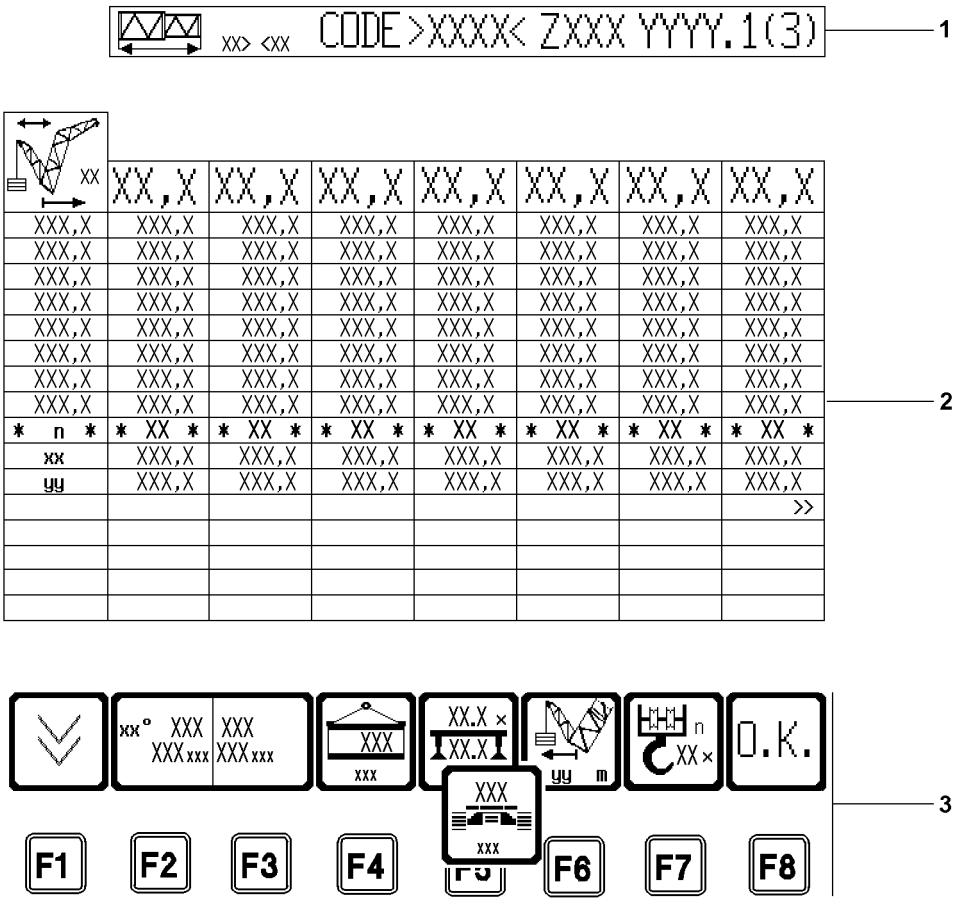

Fig.111296

5.2 Set up program areas

Note

- ▶ The monitor illustrations in this chapter are only examples.
- ▶ The numerical values in the individual icons and charts do not have to necessarily match the crane exactly.
- ▶ Numbers and letters can be replaced by place holders.
- ▶ The programmed load charts for the crane are binding.

The monitor is divided into three areas in the set up program:

1 General information line

2 Display area of load chart values

3 Function key line with assigned icons

5.2.1 General information line

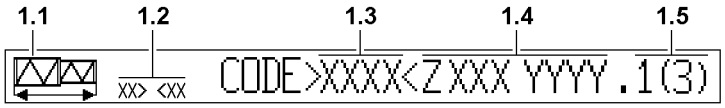

Fig.111920

1.1 Main boom length icon
- The icon is identical for all operating modes.

1.2 Measuring unit
- For the programmed length units (LE) and weight units (GE)

1.3 4-digit short code
- It is located next to the text „CODE“ inside angled brackets
- Each short code uniquely identifies a crane set up configuration. The valid set up configuration and their associated short code numbers for the crane can be found in the load chart manual of the crane.

1.4 Organization number
- For internal Liebherr load chart administration

1.5 Page number
- Relates to the currently displayed part of the load chart
- Is separated from the organization number with „.“
- The total number of pages in this load chart is in parentheses

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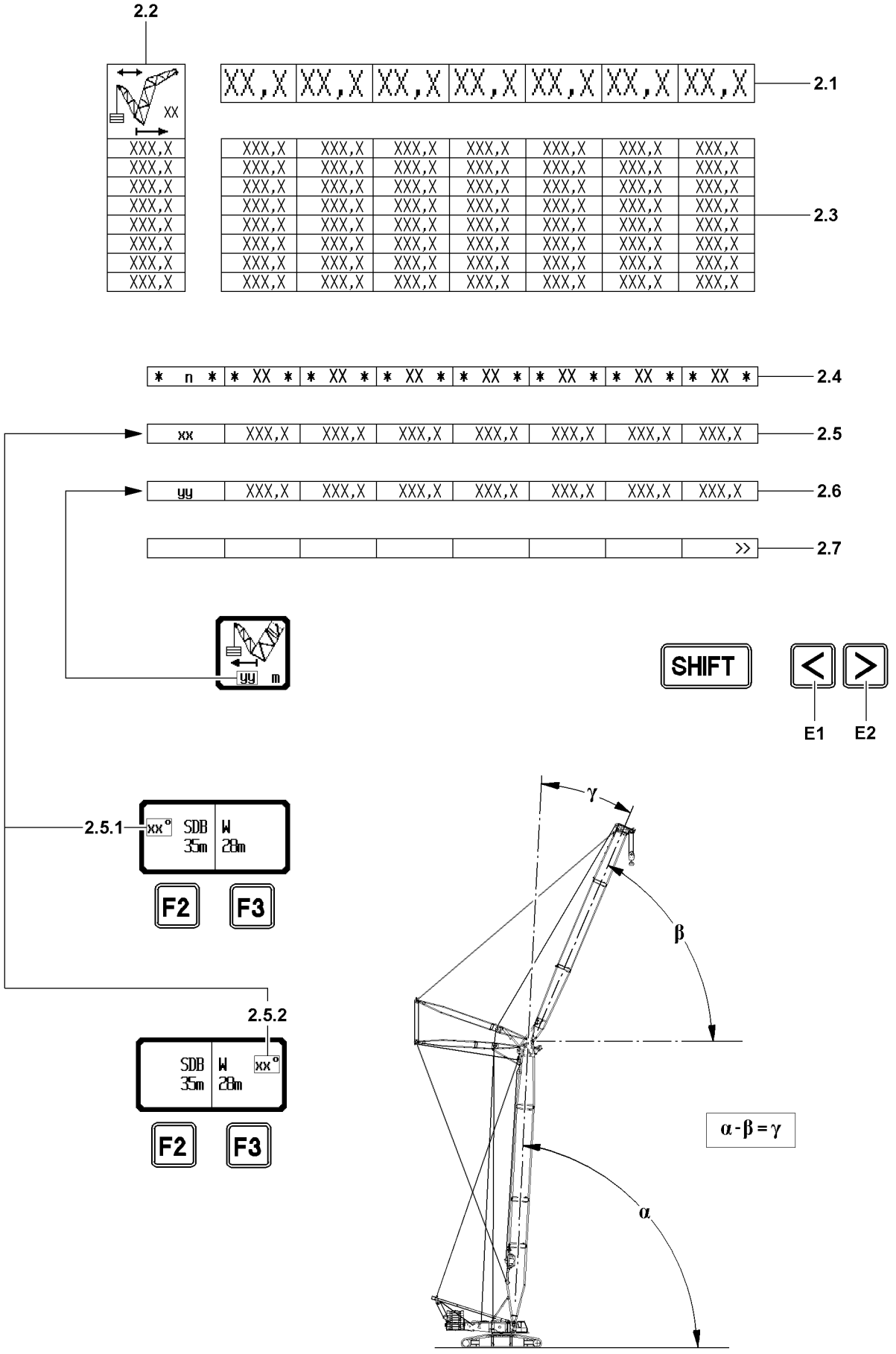

Fig.111297

LWE/LG 1750-006/15409-07-02/en

5.2.2 Display area of load chart values

2.1 Main boom lengths
- In [m] or [ft]
- Maximum of 7 columns per display page

Note
View „Boom radius“ icon **2.2**!
- ▶ Depending on the operating mode of the crane, the view changes from the „Boom radius“ icon **2.2**.
- ▶ In the illustration, the „Boom radius“ icon **2.2** shows an operating mode with (luffing) auxiliary boom / accessory, derrick boom and derrick ballast.

2.2 „Boom radius“ icon
- In [m] or [ft]
- Maximum 10 lines of radius values
- Vertical axis of load value field

2.3 Load value field
- Columns under the main boom lengths and in the lines to the right of radius values
- Load values depending on boom length and radius

2.4 Reeving number of hoist rope
- *n*
  n = Reeving number of the hoist rope between the boom head and hook block, in order to be able to lift the maximum load in the corresponding load chart column in single winch operation
- Enter and confirm the reeving on the LICCON monitor 0, according to the reeving on the boom head

NOTICE
Special equipment necessary!
- ▶ If a load value in the column exceeds that of a load that can be lifted with the maximum possible reeving, then there is an exclamation mark beside the reeving number („!“). This mark indicates that special equipment is needed to lift this load.

Note
Parallel operation of hoist winches!
- ▶ For parallel operation of hoist winches (1**II**2), during hoist rope reeving, enter the total reeving of winch 1 and winch 2 on the LICCON computer system.
- ▶ **Example**: Winch 1 and winch 2 are each reeved 7ways, the total reeving is therefore n=14.
- ▶ The total reeving **must** always show an even number value in parallel operation.

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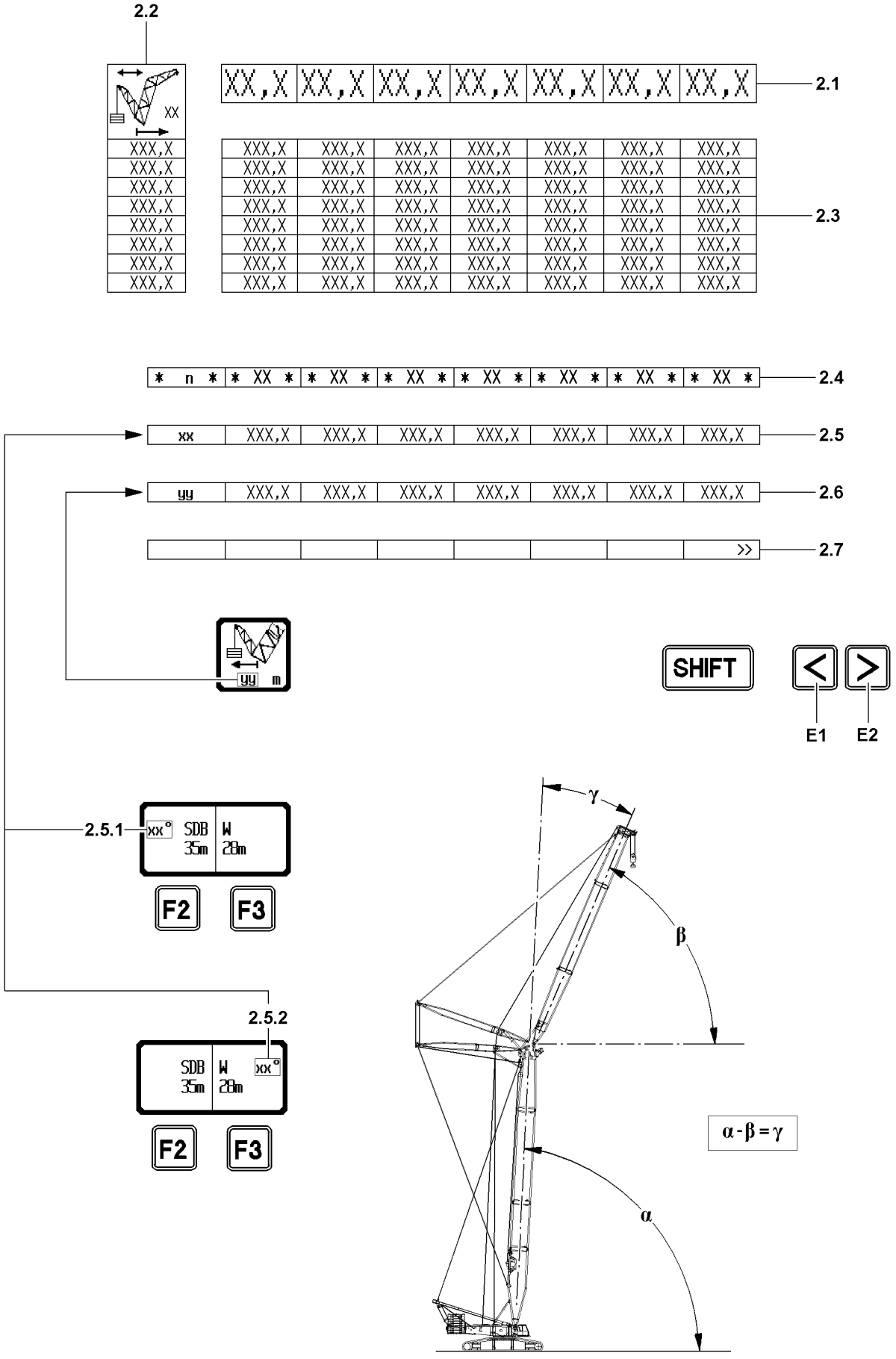

Fig.111297

2.5 Boom angle
- Line **xx**
- In [°]
- **Note:**
  Appears **only** in operating modes with luffing auxiliary boom / accessory.

2.5.1 Main geometry
- Appears „**xx°**“ in main geometry status icon (for example: **„xx° SDB“**) means **„xx°“** = main boom angle **α** in [°].
- In the line **xx** the main boom angles are listed, which must be set in order to be able to lift the load values in the corresponding load chart column

2.5.2 Auxiliary geometry
- Appears „**xx°**“ in auxiliary geometry icon (for example: **„W“ „xx°“**) then means **„xx°“** = relative angle auxiliary boom / accessory **γ** in [°].
- In the load chart columns, the relative angles auxiliary boom / accessory, which must be set to be able to lift the load values in the corresponding load chart column are listed next to each other.

Note
- ▶ Main boom angle **α**: The angle of the main boom to the placement surface of the crane.
- ▶ Angle auxiliary boom / accessory **β**: The angle of the auxiliary boom / accessory to the placement surface of the crane.
- ▶ Relative angle auxiliary boom / accessory **γ**: The angle of the auxiliary boom / accessory is determined relative to the main boom.

2.6 Derrick ballast radius
- Line **yy**
- In [m] or [ft]
- **Note:**
  Appears **only** in operating modes with derrick ballast.
- In the line **yy** the derrick ballast radii are listed, which must be set in order to be able to lift the load values in the corresponding load chart column.

2.7 Line for special displays
- If a load chart consists of more than seven columns, it cannot be fully displayed because of the size of the monitor. In that case, the marking arrows in the first or the seventh field indicate that there are additional columns to the left or right of the displayed chart. They can be shown by pressing the key **E1** or the key **E2**.
- **Note:**
  Using the key combination **SHIFT** and **E1** or **SHIFT** and **E2**, you can, where possible, scroll left or right by seven load chart columns (corresponds to 1 page).

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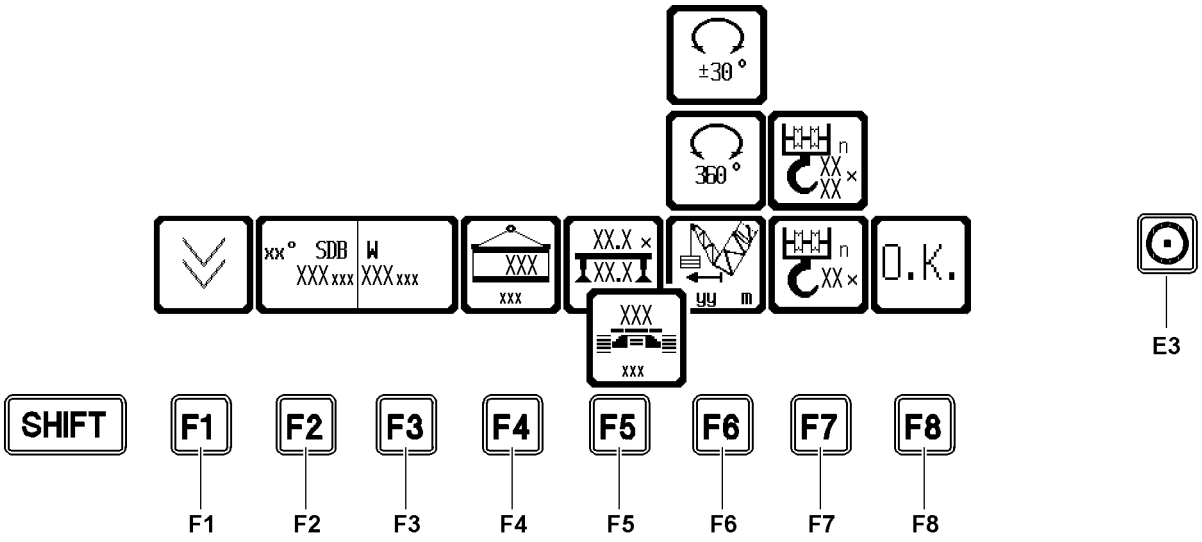

Fig.111298

5.2.3 Function key line in the set up program

The function key line consists of function keys **F1** to **F8** and the function key icon bar above it. The function keys correspond to the various function key icons above them.

Various functions are indicated by the function key icons, or they may refer to changes of:
- Operating mode and
- set up configuration.

Not all function keys have to be assigned icons on the LICCON monitor. This depends on the program selection.

Pressing a function key changes the appearance of the icon above, its meaning, or its textual content.

F1 Vertical paging
- Depending on the size of the monitor, up to 10 load chart lines can be displayed at once. If a chart consists of more than 10 lines, then the display is spread over several pages. When pressing a key, the next page of the load chart will be displayed, and the number of the current page in the „general information line“ will be counted up by 1. When the last page is reached, page 1 will appear again after pressing the function key **F1**.

F2 Main boom geometry
- Adjustment possibility of different main boom operating modes and main boom lengths of the crane (if available). The types are described by abbreviations (for example: **SDB** = heavy main boom, derrick boom and suspended ballast) and length data in the icon.

SHIFT and **F2**
- Previous main boom geometry (if available)

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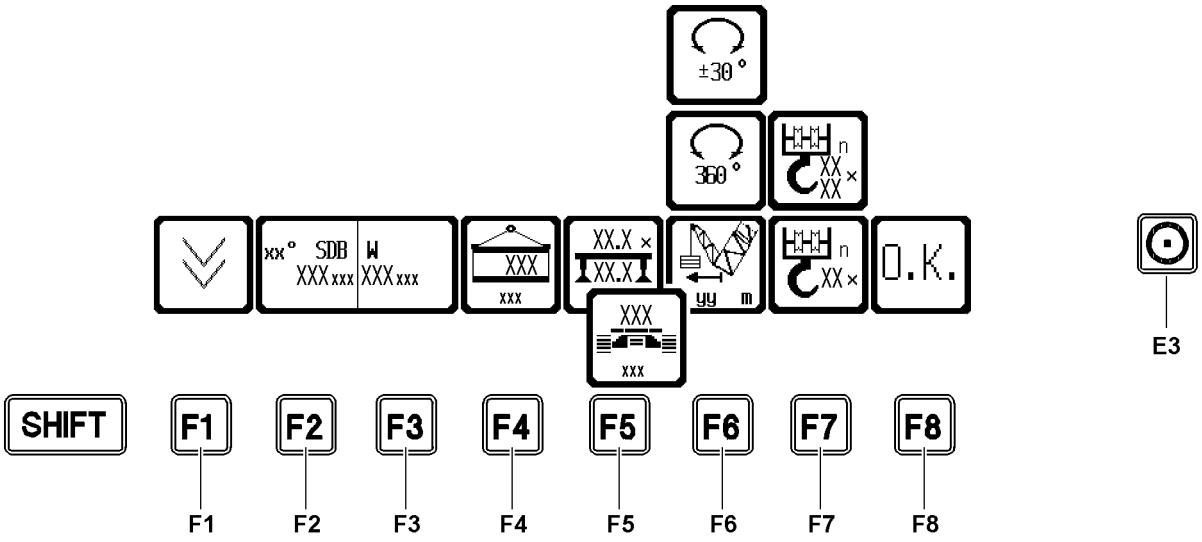

Fig.111298

F3 Boom geometry auxiliary boom / accessory
- Adjustment possibility of different auxiliary boom operating modes and auxiliary boom lengths of the crane (if available). The types are described by abbreviations (for example: **W** = luffing lattice jib) and length data in the icon.
  Possibly additional angle data is noted in the icon.
- **Note:**
  Pressing the function key **F2** and / or the function key **F3** removes all data (operating mode, set up configuration) from the monitor and sets the short code in the general information line to „CODE >????<".
- **Operating mode data:**
  - Boom length icon in the general information line
  - Length units and weight units
  - Load chart organization number
  - Boom radius icon
  - Boom length data
- **Set up dependent data:**
  - Numbering of current page number and total number of pages in load chart
  - Radius values in length units
  - Load values in weight units

SHIFT and **F3**
- Previous auxiliary boom geometry (if available)

F4 Counterweight
- Adjustment possibility for current counterweight, which must be on the turntable in order to obtain the values in the current chart. When pressing a key, the following icon appears with additional text in the counterweight icon.
- Example:
  „ 110 t " = total counterweight of 110 t

F5 Crane chassis
- Adjustment possibility „Set up configuration crane chassis" (for example: crawler, support, central ballast).
- In operating modes, where there are various crane chassis versions (for example: Ballast on crawler travel gear), this can be set with the function key **F5**.

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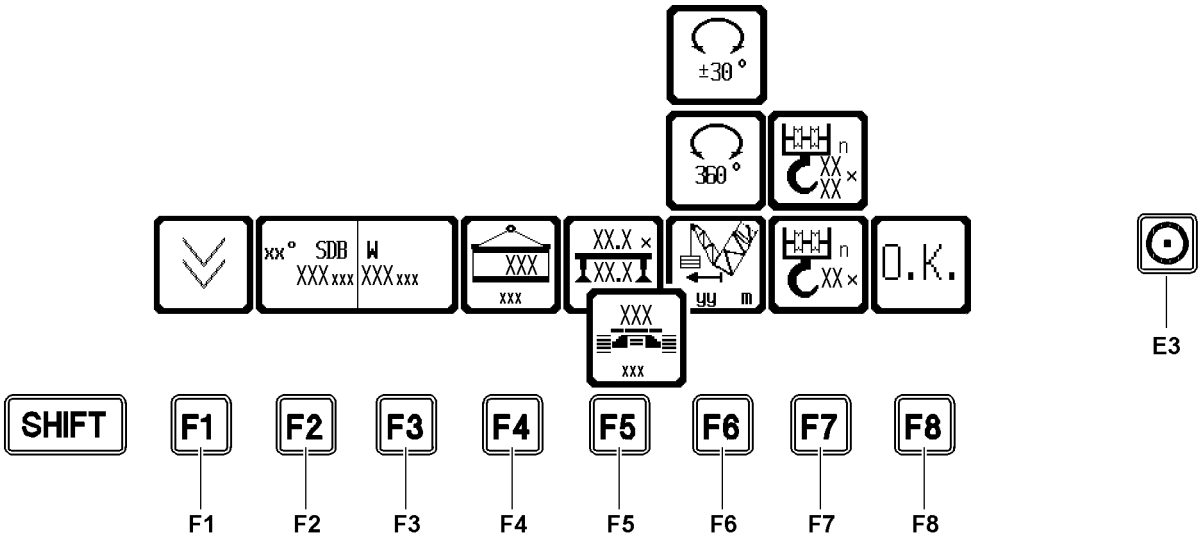

LWE/LG 1750-006/15409-07-02/en

Fig.111298

Note

▶ For crane operating modes without derrick ballast, the slewing range icon crane superstructure appears at **F6**.

▶ For crane operating modes with derrick ballast, the derrick ballast radius icon appears at **F6**.

F6 Slewing range crane superstructure

- „Slewing range icon 360°“

  or

- „Slewing range icon to the side (±30°)“
- **Note:**
  For the limited slewing range to the side (±30°) there is a separate load chart with higher load capacities. When turning away from this angle range, the load moment limiter (LMB) switches automatically to the load chart for slewing range 360°.

Note

▶ If the current load can only be lifted with a limited slewing range to the side (±30°), then the rotational speed is reduced toward the limit of the slewing range up to „zero“. An overload of the crane is thereby avoided by turning the crane superstructure, see section „Automatic slewing range change“.

or

F6 Derrick ballast radius

- Set the set up configuration derrick ballast radius **yy** in [m] or [ft]

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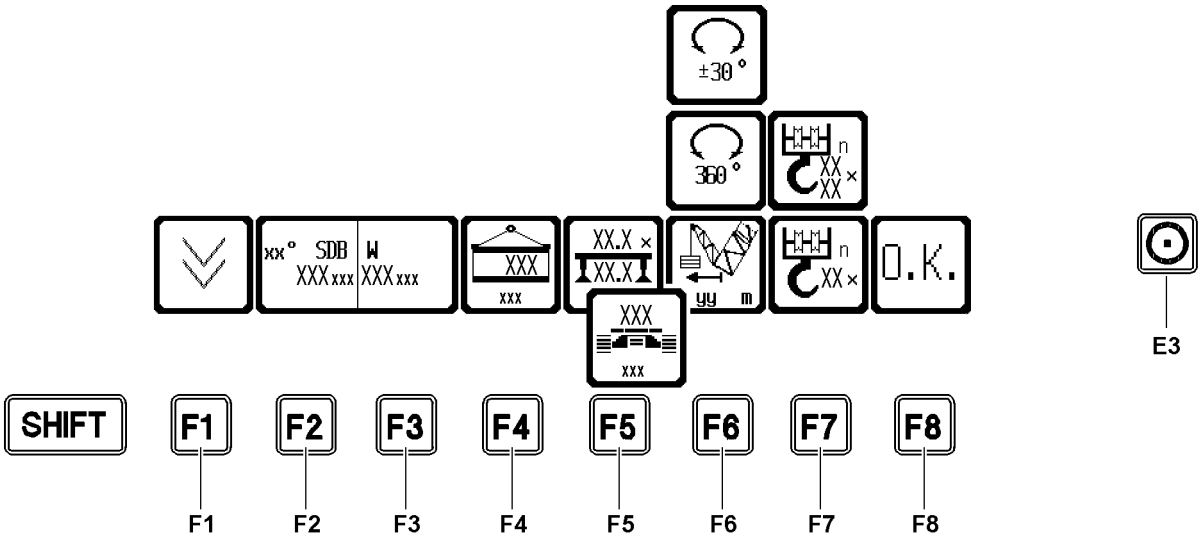

Fig.111298

F7 Hoist rope reeving
- Adjustment possibility for the **number of hoist rope strands on the boom** to obtain a certain load carrying capacity.
- Press the key: Reeving number on boom is increased by 1.

SHIFT and **F7**
- Press the key: Reeving number on boom is reduced by 1.

Note
- ▶ The displayed number of hoist rope strands (reeving) in the icon will be increased with every keystroke by one counter, up to a fixed maximum value (depending on operating mode). If the maximum value is exceeded, the counter starts again at the minimum value.
- ▶ If the set value is still within the minimum and maximum values when switching to another operating mode within that range, it remains valid. Otherwise it will be set to the minimum value for the new operating mode.
- ▶ After a „cold start“ (for example, loss of data in the memory), the display of the hoist rope reeving is at „0“.

Note
Parallel operation of hoist winches!
- ▶ For parallel operation of hoist winches (1**II**2), during hoist rope reeving, enter the total reeving of winch 1 and winch 2 on the LICCON computer system.
- ▶ **Example**: Winch 1 and winch 2 are each reeved 7ways, the total reeving is therefore n=14.
- ▶ The total reeving **must** always show an even number value in parallel operation.

E3 and **F7**
- Adjustment possibility for the **number of hoist rope strands on the boom nose** to obtain a certain load carrying capacity.
- Press the key: Reeving number on boom nose***** (upper number in „Hoist rope reeving“ icon) is increased by 1.

SHIFT and **E3** and **F7**
- Press the key: Reeving number on boom nose***** (upper number in „Reeving“ icon) is reduced by 1.

Note
Display reeving boom nose!
- ▶ The reeving for the boom nose is only shown if the boom nose is assembled.
- ▶ If the boom nose is assembled during operation, then the reeving of the boom nose must be correctly entered in the set up program.

LWE/LG 1750-006/15409-07-02/en

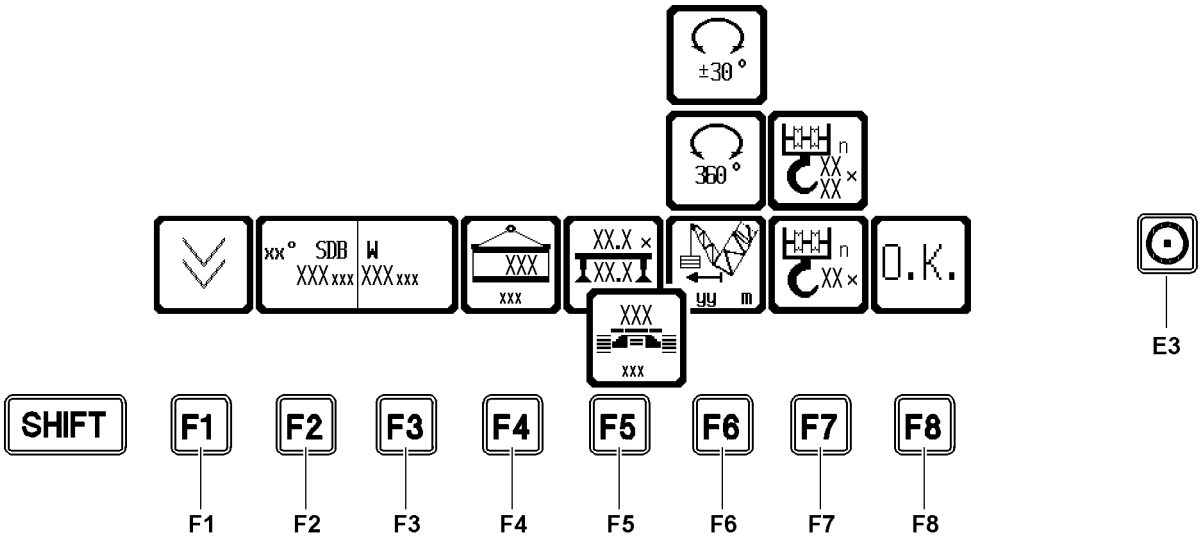

Fig.111298

LWE/LG 1750-006/15409-07-02/en

F8 Confirmation key
- For confirmation of selected set up configuration
- **Prerequisites:**
  - The entry of the set up configuration must be completed all the way. A valid short code is shown and in the chart field are load values.
  - The external conditions for this set up configuration, if stipulated, must be met.
  - The crane may not be utilized by more than 20 % in the previous set up configuration or the load suspended on the hook may not be heavier then 0.5 t. Switching to the crane operation program can otherwise only be done with the program key **P1**. In that case, the newly entered set up configuration is not accepted.

Note

▶ Make sure that the selected set up configuration (short code) and the hoist rope reevings are taken over after switching into the operating screen.

Note

Display of operating errors from the set up program!

▶ Operating errors created in the set up program are displayed in the icon above the function key **F8** and are saved in the error stack for about 5 seconds.

▶ If the function key **F8** is pressed within 5 seconds, the program will switch automatically to the error determination screen in the test system and the error is displayed in documentary form.

▶ The operating error will not be saved.

▶ Operating errors are always placed on top in the error stack, see Diagnostics manual.

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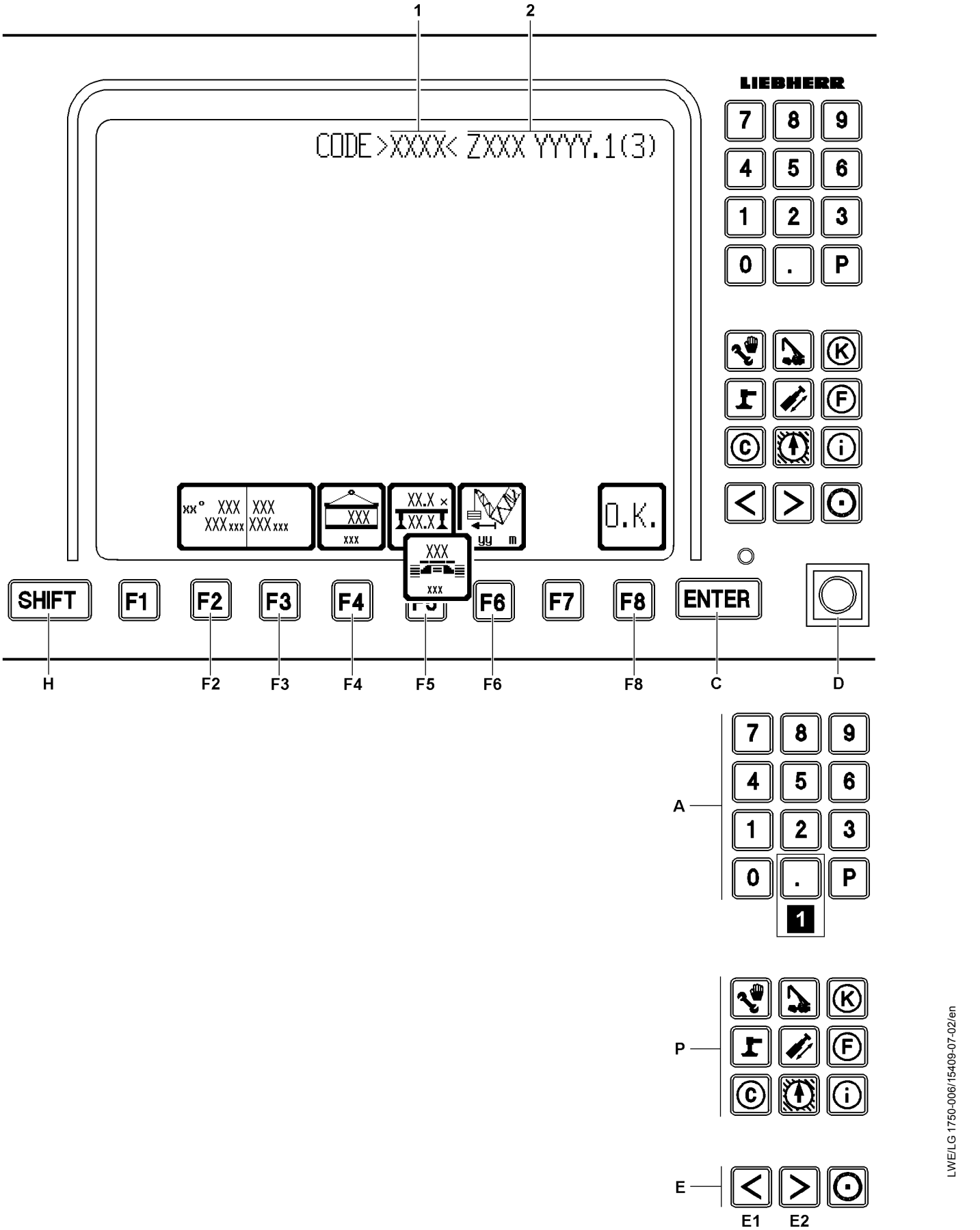

Fig.111922

5.2.4 Operating errors in the set up program

A Keypad
- Pressing the keypad deletes all operating mode and set up dependent data from the monitor.
- The keys **0** to **9** on the keypad can be used to enter the short code directly into the LICCON monitor.
- The key **P** and the key „**.**“ (illustration **1**) have no function in the set up program.

P Program keys
- Selection of individual programs. The settings in the set up program are discarded and the set up configuration and reeving, which were last confirmed with the function key **F8** (OK) are continued to be used.
  A program that is currently running **cannot** be called up again using its program key.

C Input key ENTER
- Confirmation of input both for short codes **1** as well as for any change in the set up configuration via the function keys.
- **ENTER** after entering the short code, the short code **1** is searched for in all stored load charts. If the matching load chart has been programmed, it will be displayed in full. Otherwise there is an error message in the form of „????“ in the second part of the organization number **2** and the acoustic signal „Horn“ sounds.
- **ENTER** after a changing the operating mode using the function key **F2** and the function key **F3** searches for this operating mode. If successful, sets its first set up configuration and displays the load chart and its short code **1**. In the event of an error, the short code **1** remains on „CODE ????“, the organization number **2** is displayed as „ZXXX????“ and the acoustic signal „Horn“ sounds.
- **ENTER** after a change in the set up configuration with the function keys **F4** and **F5** as well as the function key **F6** this load chart (if the chart exists) displays with short code **1** on the monitor. In the event of error, the short code **1** remains on „CODE ????“ and the acoustic signal „Horn“ sounds.

Note
Use of place holders!
▶ The Short code **1** and the Organization number **2** are shown in this chapter with place holders (for example XXXX or ZXXX) instead of real numbers and letters.

D Set up key
- Has no function in the set up program

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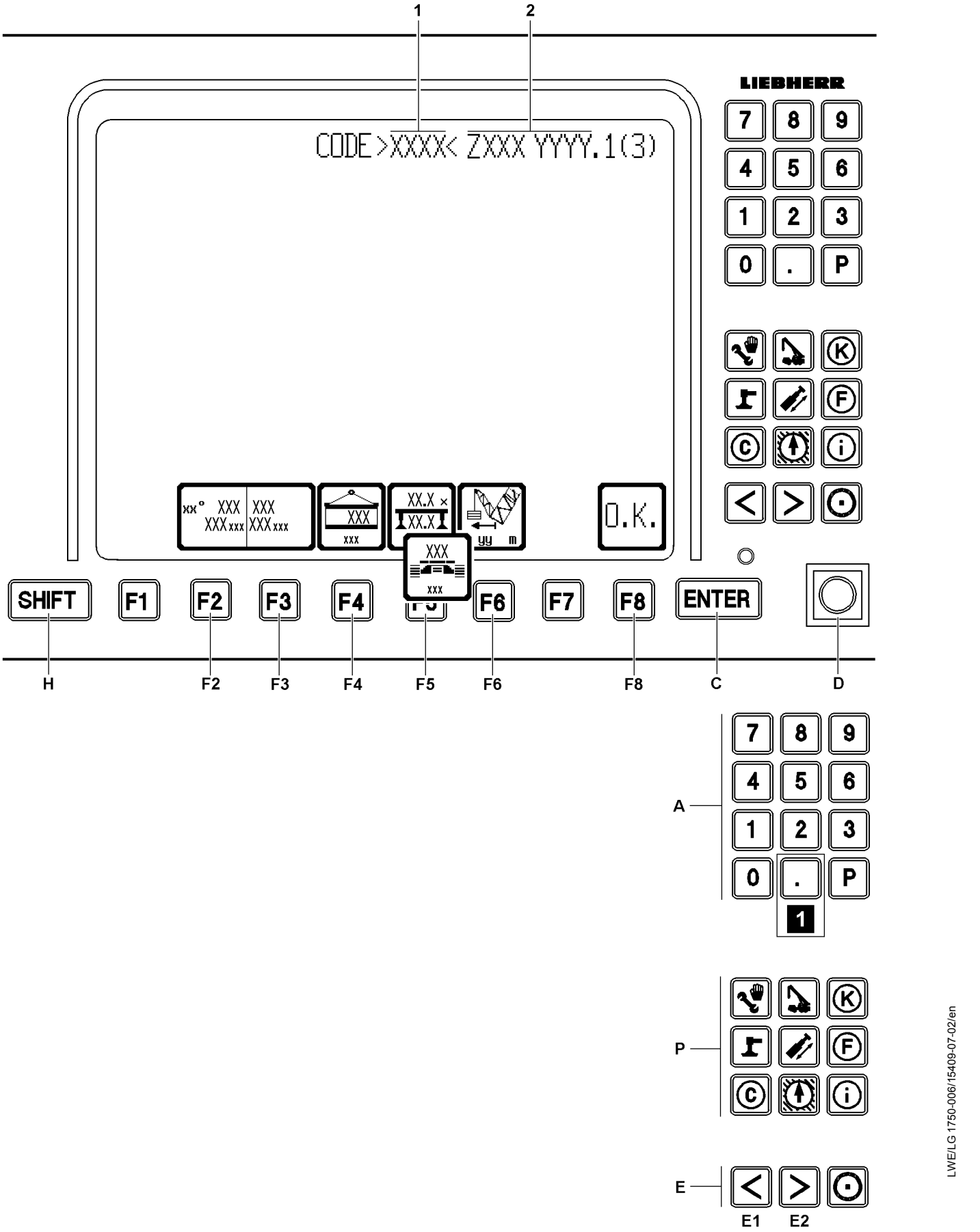

Fig.111922

E Horizontal paging
- **Note:**
  The key **E1** and key **E2** only have a function if this is indicated in the „Line for special displays“.
- If a load chart consists of more than 7 columns, the first display of the set up configuration only shows columns 1 to 7
- Pay attention to the double arrow on the right (>>) and / or on the left (<<) edge of the line of the load chart. It points to additional columns in the respective direction.
- Press the key **E1** to display the next left chart column.
- Press the key **E2** to display the next right chart column.
- **Note:**
  Using the key combination **SHIFT** and **E1** or **SHIFT** and **E2**, you can, where possible, scroll left or right by seven load chart columns (corresponds to 1 page).

H SHIFT key
- For example Supervisory function
- By pressing and holding down the **SHIFT** key and then pressing one of the function keys, which must correspond to the corresponding function, the previous main boom geometry, the auxiliary boom geometry and the previous reeving are reset.
- **Note:**
  See section „The function key line“ in the set up program.

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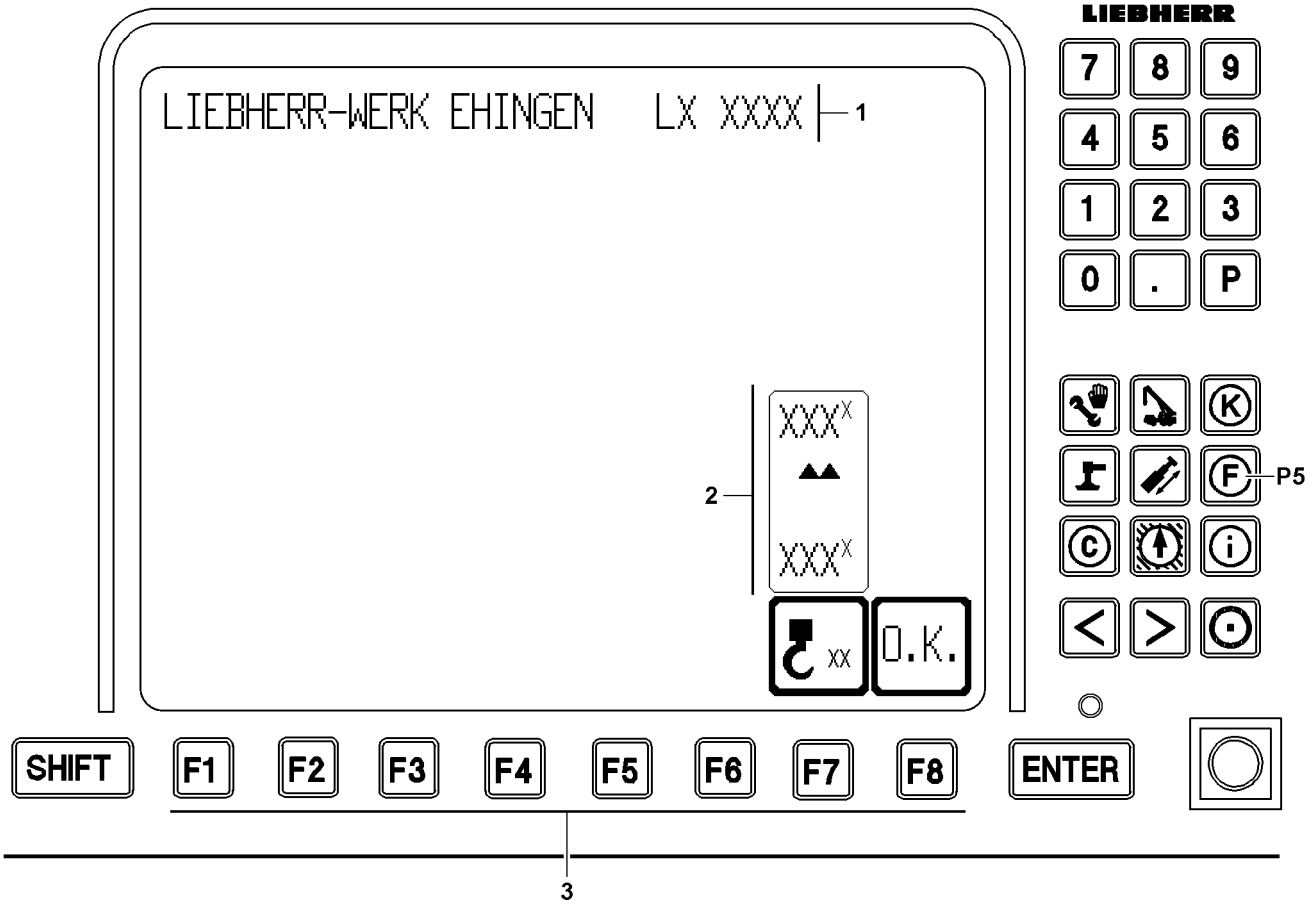


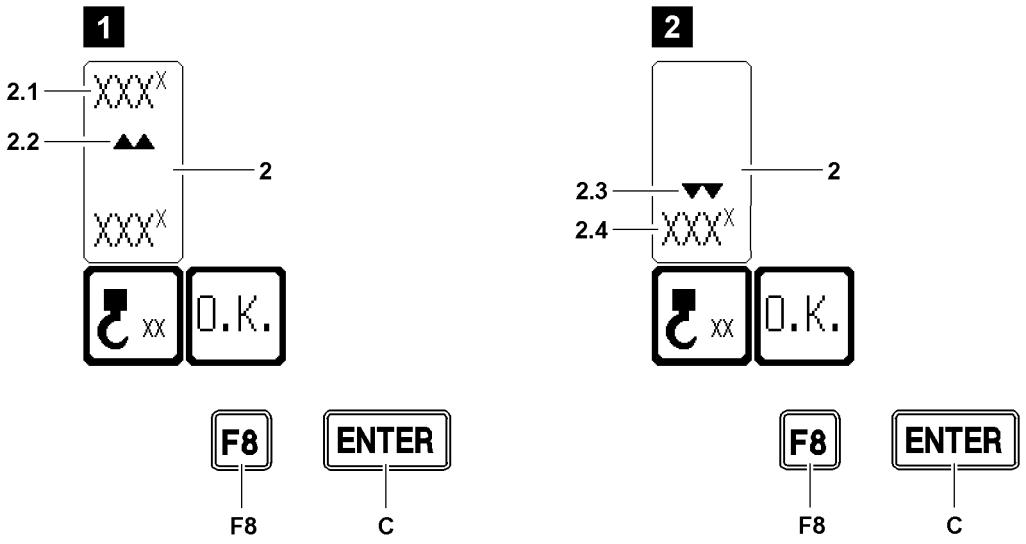


Fig.111891

5.3 Input window hook block weight

After the selected set up configuration was confirmed in the set up program with the function key **F8**, the set up parameters are taken over by the LICCON computer system. Then the input window hook block weight **2** appears automatically.

WARNING
Deviation from specifications of erection and take down charts!
In case of a deviation from the specifications of the erection and take down charts, the crane can be overloaded and topple over.
Death, severe bodily injuries, property damage.
- ▶ The entered value must be taken from the erection and take down charts, depending on the selected set up configuration.
- ▶ If the actual weight of the hook block exceeds the permissible hook block weight, then the hook block must be carried along for erection / take down of the boom.
- ▶ The entered hook block weight is recorded with the data logger.

5.3.1 Starting the input window hook block weight

In the input window hook block weight **2**, the crane operator must determine a hook block weight corresponding on the operating mode for erection / take down of the boom systems according to the erection / take down charts.

▶ Press the function key **F8** in the set up screen.
or
Press the program key **P5**.

Result:

– The input window hook block weight **2** appears.

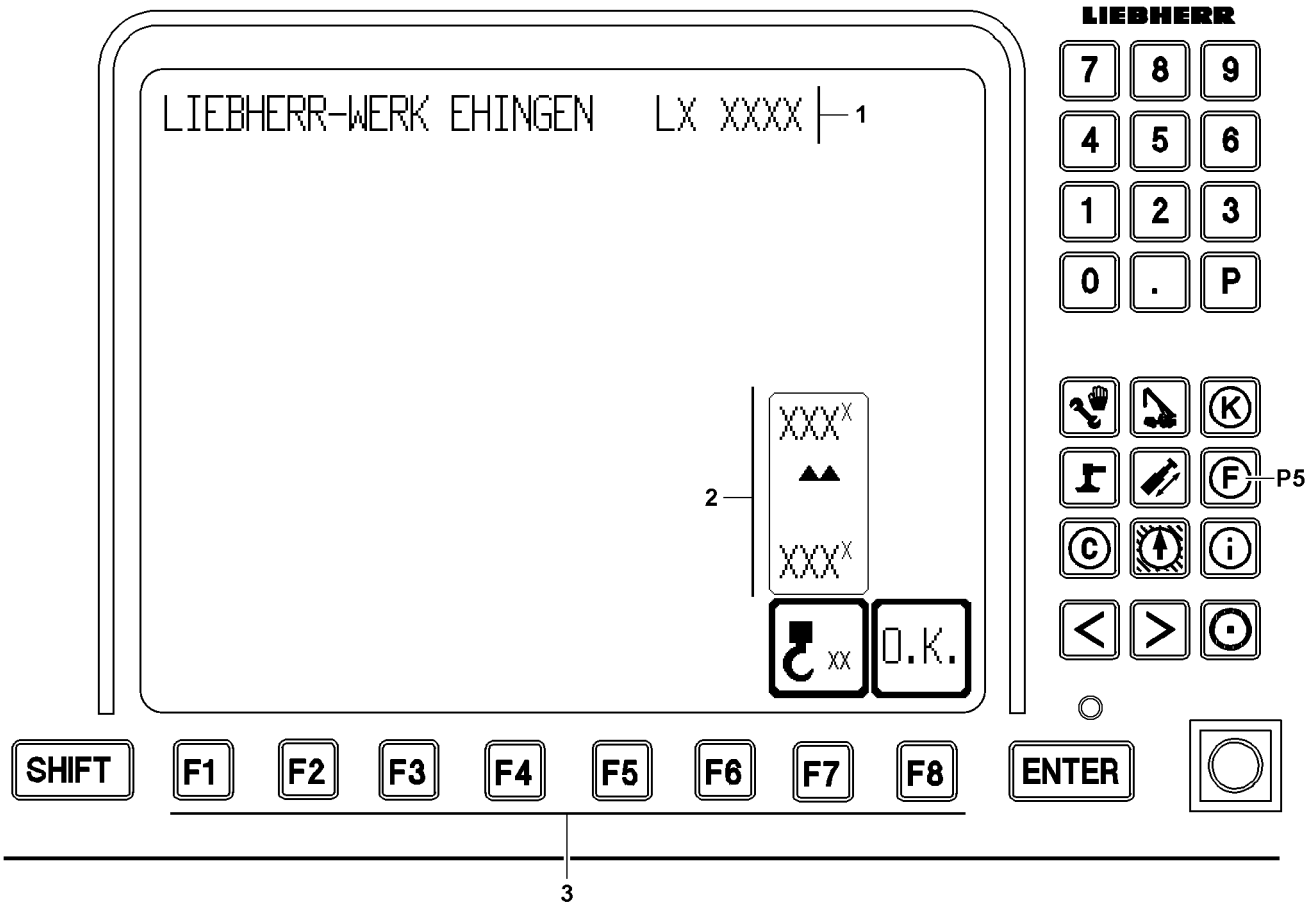
5.4 Operating interface

1 Crane type identification
2 Input window hook block weight
2.1 Input field for the hook block weight
2.2 Double arrow pointing up
- Input field is active, illustration **1**

2.3 Double arrow pointing down
- Current input value is active, illustration **2**

2.4 Current input value of hook block weight
3 Function key line

LWE/LG 1750-006/15409-07-02/en



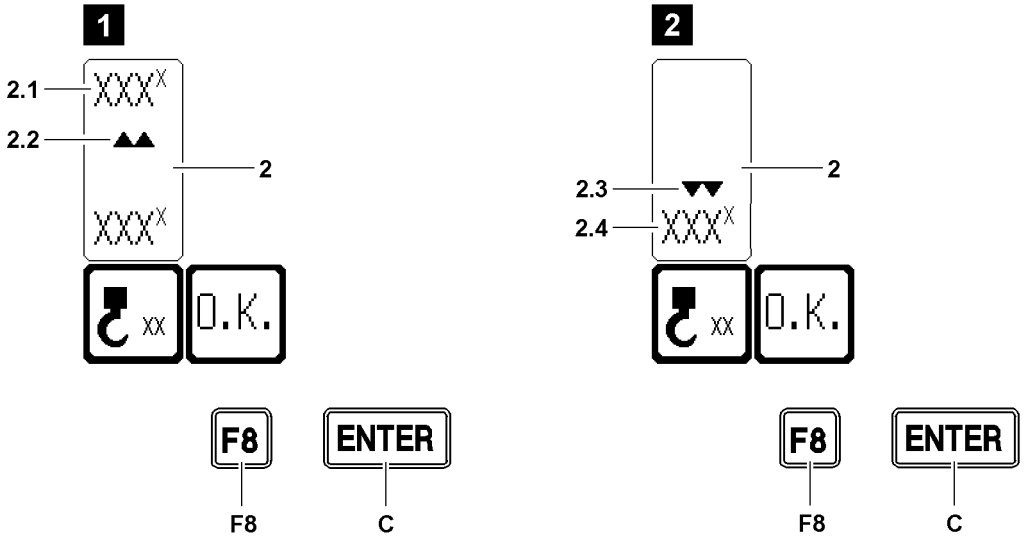


Fig.111891

5.5 Entering the hook block weight

To be able to erect / take down a boom system, a valid hook block weight must first be entered in the input window hook block weight on the LICCON computer system and confirmed.

Take the weight of the hook block must be taken according to the selected set up configuration from the erection and take down charts.

Make sure that the following prerequisite is met:
– A valid set up configuration is entered and confirmed.

Double arrow up **2.2** is shown:
▶ Enter the hook block weight via the keypad.

When the entered hook block weight is shown in the input field hook block weight **2.1**:
▶ Press the ENTER **C** input key.

Result:

– The hook block weight is taken over as current input value hook block weight **2.4**, illustration **2**.
– The input field hook block weight **2.1** is faded out.
– Double arrow down **2.3** is shown.

When the entered hook block weight has been accepted:
▶ Press the function key **F8** (OK).

Result:

– The entered hook block weight is accepted into the LICCON computer system.
– The crane operating screen appears.

Problem remedy
When luffing the boom up / down **with the hook block**, the maximum load according to the load chart and reeving is exceeded and a LMB stop is triggered?
▶ Place the hook block down and carry it along.

Problem remedy
When erecting / taking down the boom **with the hook block**, a higher value than the actual weight on the hook block is shown in the „Current load“ icon (crane operating screen)?
▶ For further procedure, see section „Adapt the input value hook block weight“.

Problem remedy
When erecting / taking down the boom **without the hook block** (load weighting), a value of more than 0 t is shown in the „Current load“ icon (crane operating screen)?
▶ For further procedure, see section „Adapt the input value hook block weight“.

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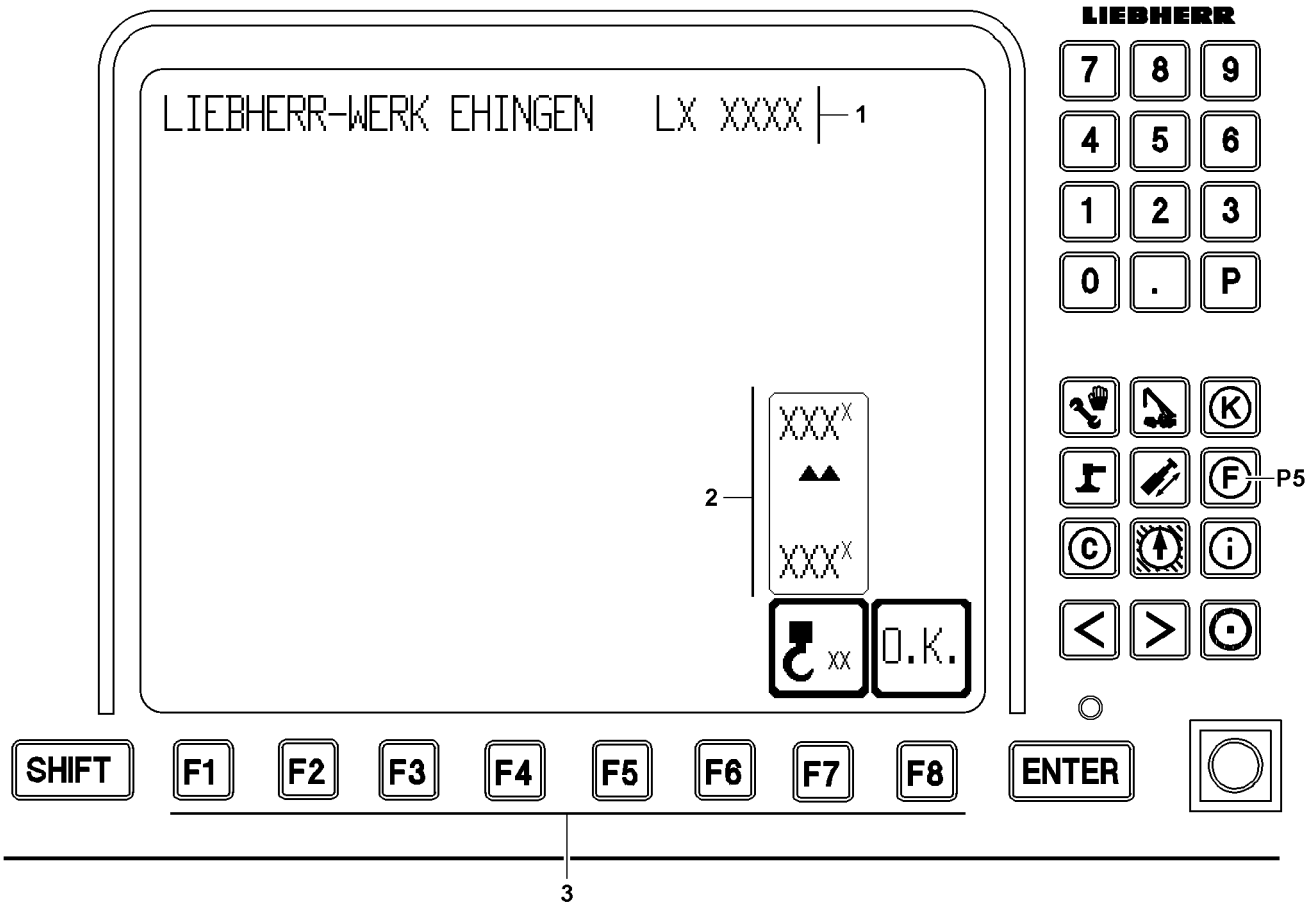

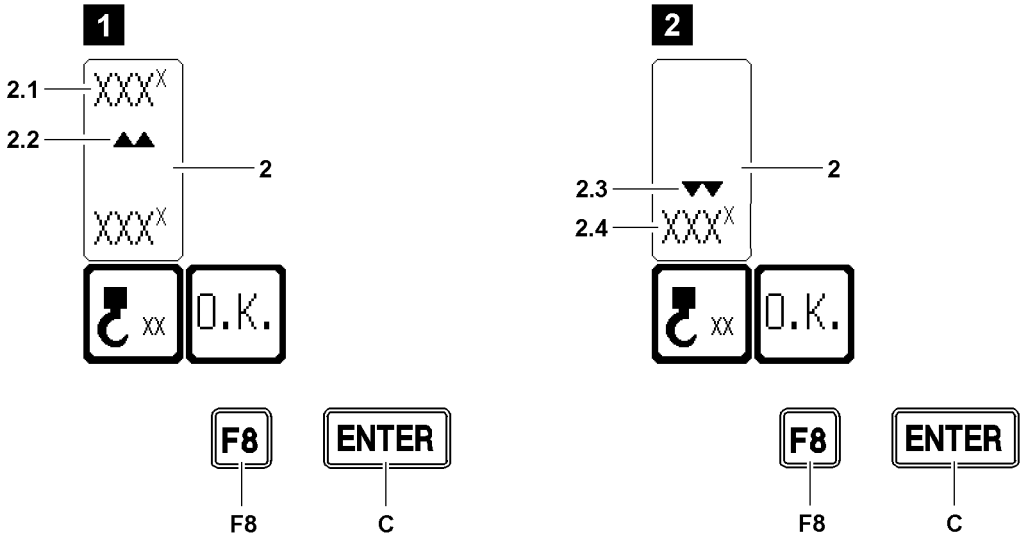

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Fig.111891

5.6 Adapting the input value hook block weight

It may be possible that the crane movement is shut off due to overload when trying to erect / take down the boom.

The reason for the shut off may be a weighing error.

Note
Weighing error!
- ▶ A weighing error is a combination of environmental influences, manufacturing and sensor tolerances.
- ▶ This combination can cause an increased display value in the „Current load“ icon (crane operating screen).

A weighing error can be compensated for by adapting the input value hook block weight.

WARNING
All-inclusive adaptation of the hook block weight!
If the input value hook block weight is adapted and no weighing error was determined, then the crane can be overloaded and topple over.
Death, severe bodily injuries, property damage.
- ▶ Before adapting the input value hook block weight, an existing weighing error must have been found.
- ▶ Only the determined weighing error may be added to the permissible hook block weight.

If a weighing error is suspected, then the crane operator must ensure, before carrying out additional steps, that:
- A valid set up configuration has been entered on the LICCON computer system.
- The assembled boom system matches the entered set up configuration of the crane.
- The boom system is assembled according to the rod plans.
- All attachment parts on the boom have been removed.
- No guy rods are on the boom.
- The boom is free of snow and ice.
- The wind influence on the boom is not too great.
- The weighing error is plausible and comprehensible.

If it is ensured that the above listed prerequisites are adhered to, then the determined weighing error may be added to the permissible hook block weight and entered in the hook block weight icon.

- ▶ Enter the adapted hook block weight, see section „Entering the hook block weight“.

Problem remedy
The adapted value of the hook block weight is **not** taken over into the LICCON computer system, even though the weighing error is plausible and comprehensible?
- ▶ For erection of the boom system, carry the hook block along.

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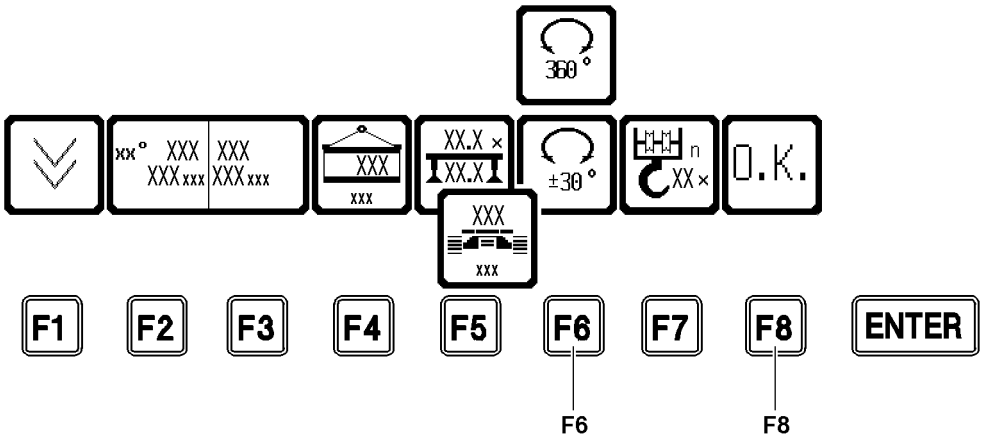

LWE/LG 1750-006/15409-07-02/en

Fig.111299

6 Automatic slewing range change

Note

▶ Applies only for cranes with the respective load charts.

There are set up configurations, which have different load charts for different slewing ranges of the crane superstructure. For example: Crane with crane support, support base 16 m x 12 m , **SL8HS**. On this support base there are load charts to the side (±30°), which permit higher loads.

When turning away from this angle range, the load moment limiter (LMB) switches automatically to the load chart for slewing range 360°.

6.1 Activation of slewing range change

Note

▶ The activation of the slewing range change is only possible in load charts to the side (±30°).

▶ If the 360° load chart is selected, there is no slewing range change. Within the entire 360° slewing range, only the load for the 360° load chart can be lifted.

NOTICE

Shut off of slewing movement!

If the current load can only be lifted with a limited slewing range to the side (±30°), then the rotational speed is reduced toward the limit of the slewing range up to „zero“ and shut off.

▶ Turning the crane superstructure outside the slewing range to the side (±30°) is not possible under these circumstances with the current load.

▶ Select load charts to the side (±30°) and actuate with the function key **F8**.

Result:

– The slewing range change is active.
  If there is a load chart for the slewing range 360° for the current load, then the load moment limiter (LMB) switches automatically to the load chart for the slewing range 360° when turning out of the angle range to the side (±30°).

Note

Freewheeling slewing gear!

▶ When the slewing range change is set and the foot button „Freewheeling slewing gear“ is actuated, then the load from the load chart for the slewing range 360° is valid.

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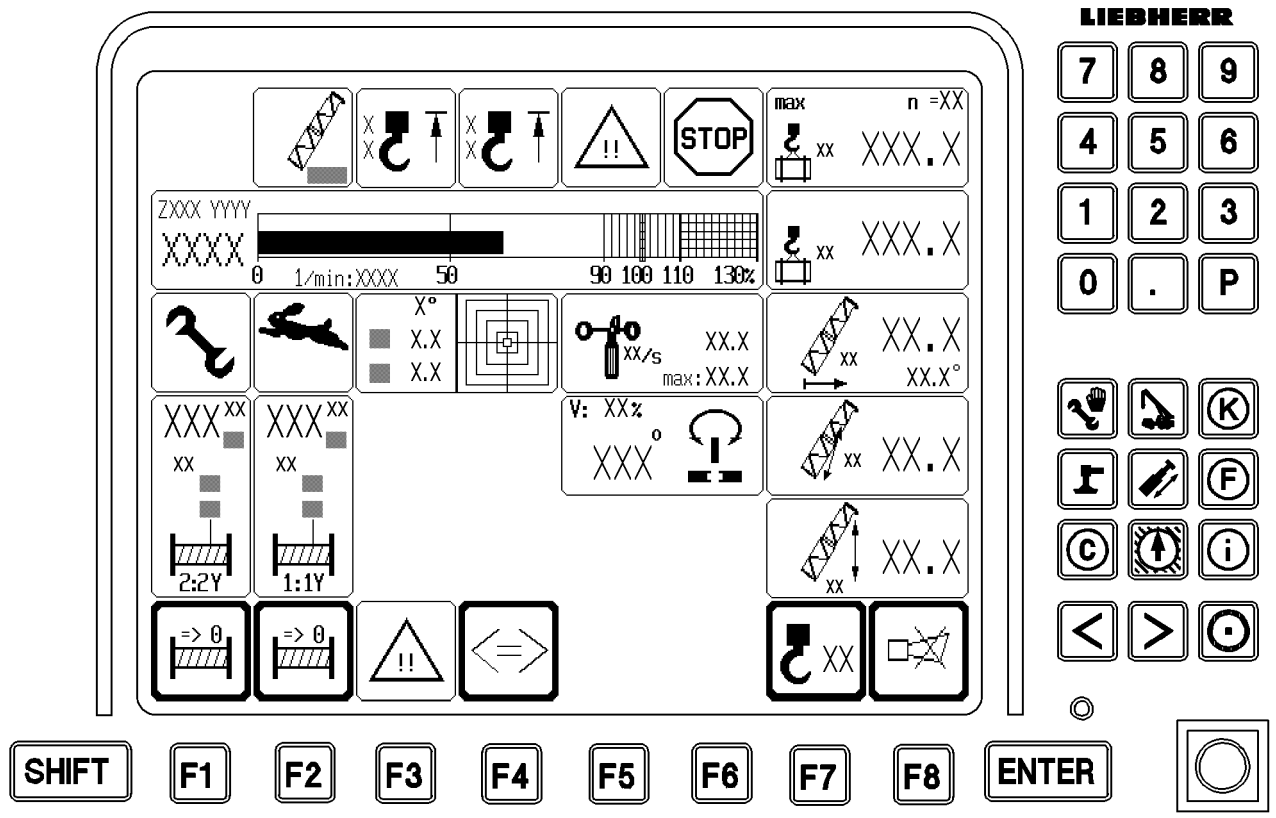

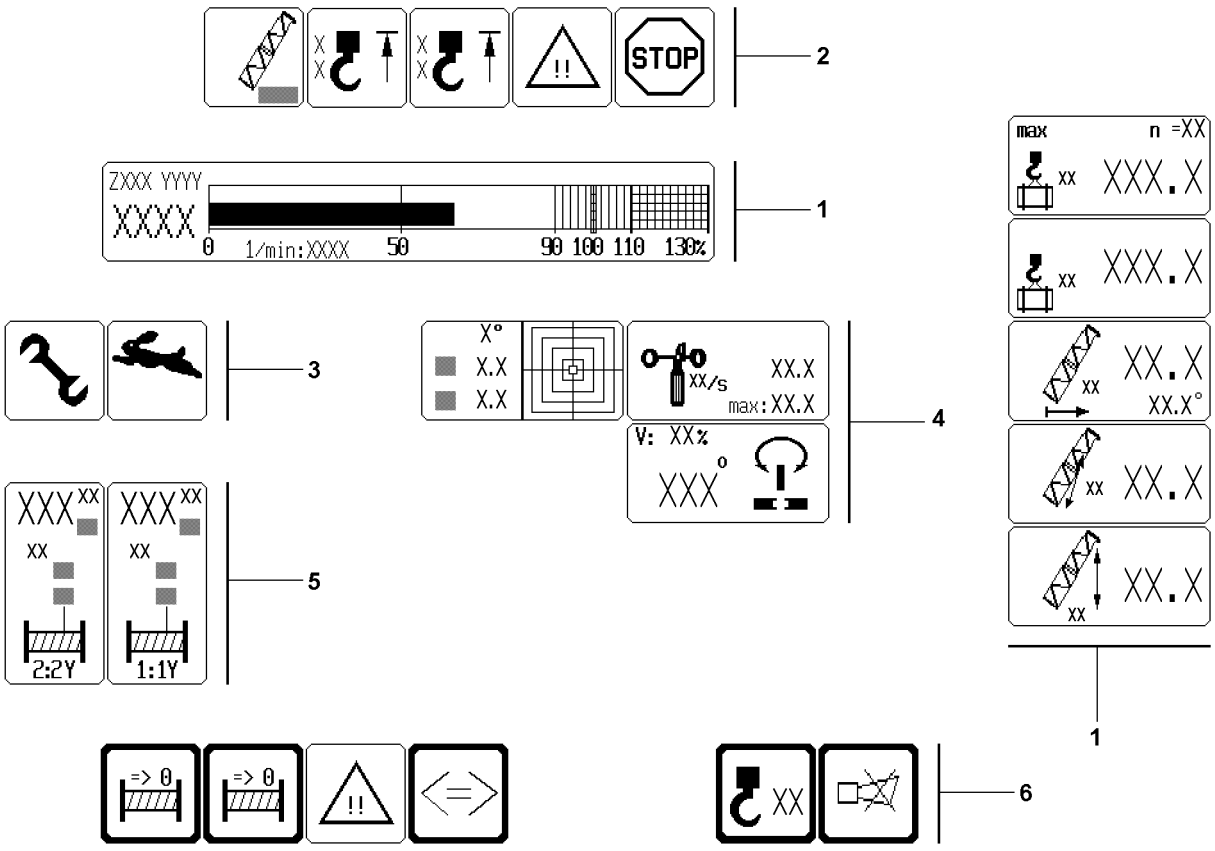

Fig.111892

7 The Crane operation program on monitor 0

The LICCON program Crane operation assists the crane operator by displaying the data needed for operating the crane clearly on **monitor 0**. An acoustic signal accompanies all critical displays. Depending on the equipment, a range of other icons may also be turned on as additional displays, either as required by the crane operator, or automatically in the event of a problem.

It also alerts the crane operator to imminent overload conditions. In the event of overload and many error conditions, which could be hazardous during crane operation, the system shuts off.

The LICCON monitor is divided into six areas in the crane operation program:

1 Crane geometry and load information

2 Alarm functions

3 Special functions

4 Monitored auxiliary functions

5 Winch display
- Winch 1 and winch 2

6 Function key line

Note
- ▶ The monitor illustrations in this chapter are only examples.
- ▶ The numerical values in the individual icons and charts do not have to necessarily match the crane exactly.
- ▶ The configuration of the LICCON monitor with icons is only descriptive.
- ▶ An identical icon display will **not** appear during crane operation.

7.1 Crane geometry and load information

Note
- ▶ The crane illustrations in this section are only examples and are generalized.
- ▶ They may differ from the crane type and equipment.

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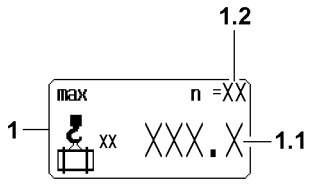

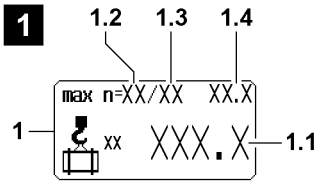

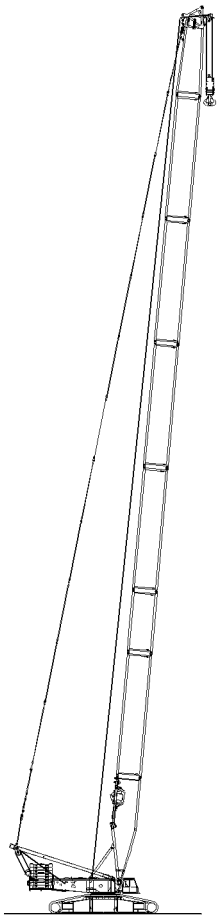

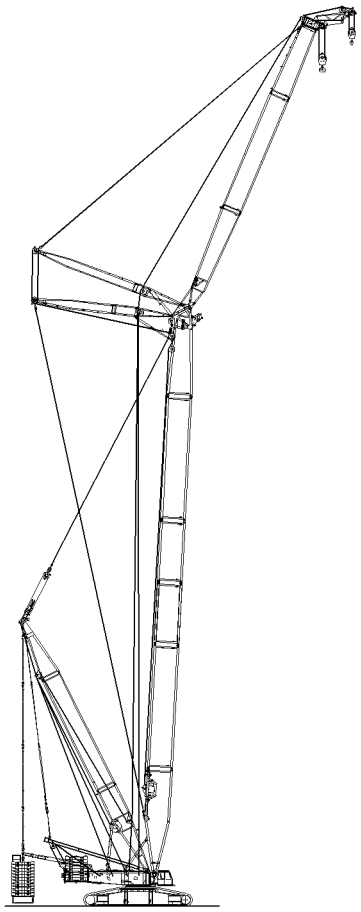

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Fig.111931

7.1.1 Maximum load

According to the set up configuration, the following changes:
- The illustration of the icon
- The position of values in the icon, see sample illustration **1**.

1 „Maximum load“ icon
- In [t] or [lbs]

1.1 Maximum load on the boom
- In [t] or [lbs]
- The load capacity depends on:
  - The selected operating mode
  - The selected set up configuration (load chart)
  - The boom radius
  - The various boom angles
  - The derrick ballast radius*****
  - The currently pulled derrick ballast*****
  - The reeving of the hoist rope on the boom
- **Note:**
  The maximum load on the boom (also: maximum load according to the load chart and the reeving on the boom) is the load, which the crane can lift in its current operating condition with the maximum utilized ballast / counterweight.
- **Note:**
  „? ? ? . ?“ is shown when no load chart value can be accessed.
  An error message is issued, see Diagnostics manual.
  - Example:
    The crane is not in the range of the load chart.
    or
    The value cannot be calculated / determined.

1.2 Reeving number hoist rope on boom
- n = reeving number of hoist rope on the pulley head selected via the load chart. The reeving number has been set first in the set up program.

1.3 Reeving number of hoist rope on the boom nose*****
- n = reeving number of hoist rope on the installed boom nose*****. The reeving number has been set first in the set up program.

1.4 Maximum load of the installed boom nose*****
- In [t] or [lbs]
- **Note:**
  The „Maximum load carrying capacity“ of the boom nose***** depends on the set reeving of the boom nose*****.
- **Note:**
  The maximum load carrying capacities on the boom (1.1) and on the boom nose***** (1.4) are monitored simultaneously.
  If the load on one position is exceeded, then an LMB stop is issued.

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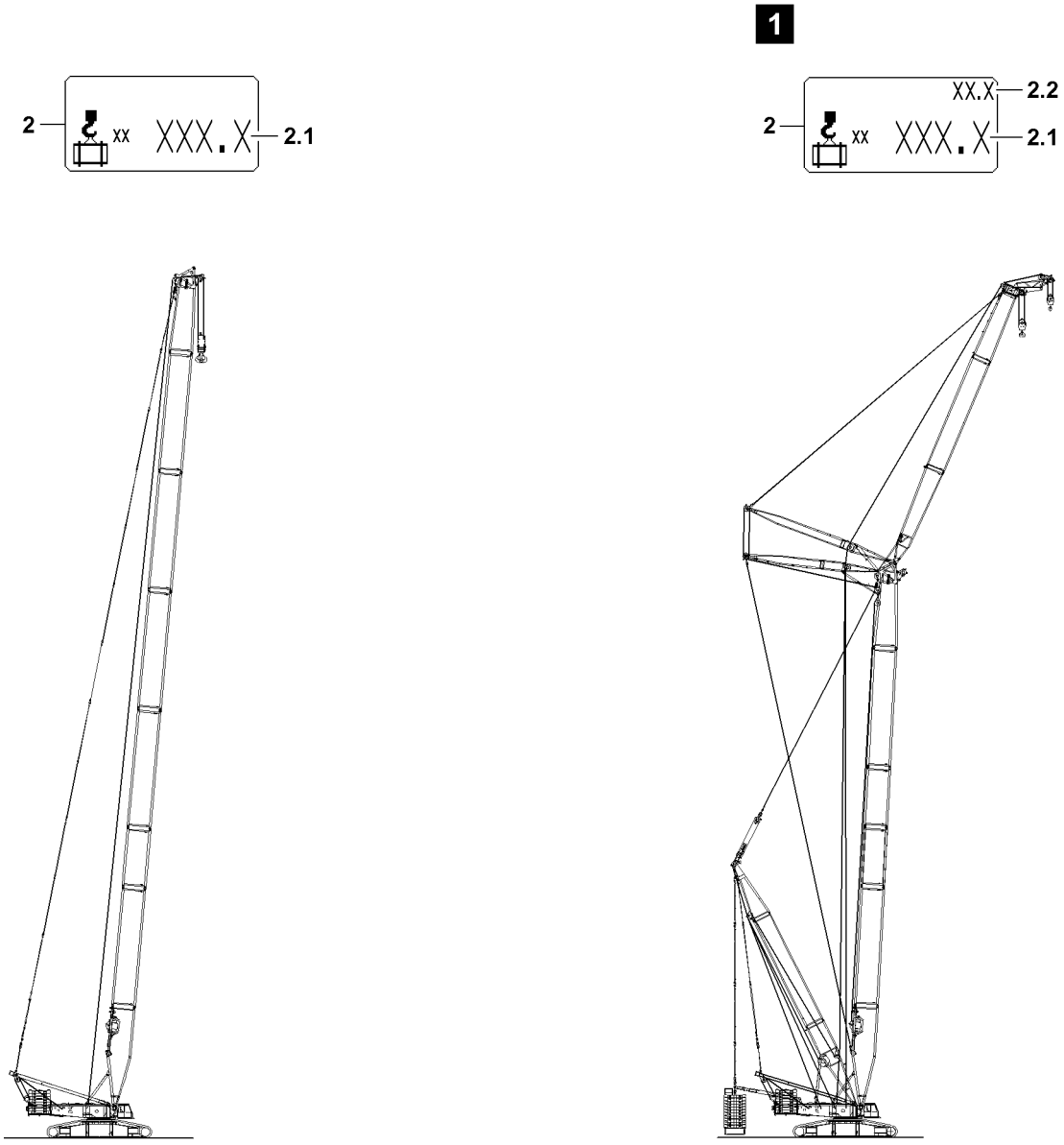

Fig.111932

7.1.2 Current load

According to the set up configuration, the following changes:
- The illustration of the icon
- The position of values in the icon, see sample illustration **1**.

2 „Current load“ icon
- In [t] or [lbs]

2.1 Current load on the boom
- Actual load display = current load in [t] or [lbs] on the selected boom.
- Display of the calculated total load including the weights of the carrying equipment, the lifting equipment (hook block) and / or the fastening equipment, but **without** the nominal weight of the hoist rope.
- **Note:**
  „? ? ? . ?“ is shown if the value cannot be calculated / determined.
  An error message is issued, see Diagnostics manual.

2.2 Current load on the boom nose*
- Actual load display = current load in [t] or [lbs] on the boom nose*.
- Display of the calculated total load on the boom nose*, including the weights of the carrying equipment, the lifting equipment (hook block) and / or the fastening equipment, **including** the hoist rope.
- **Note:**
  „? ? ? . ?“ is shown if the value cannot be calculated / determined.
  An error message is issued, see Diagnostics manual.

WARNING
Tolerances at actual load display!
Due to tolerances, there may be a deviation in the actual load display in the „Current load“ icon **2**.
The current load display in the „Current load“ icon **2** is no calibrated weighing device.
▶ Always observe the actual weight of the load in connection with the load charts and the set up configuration.

Note
Net load display in the „Current load“ icon **2**!
▶ By using the function „Tare“ (see description of function key **F7** in section „Function key icon line“) the display can be changed over to display the net load. In the icon appears additionally the word „Net“.

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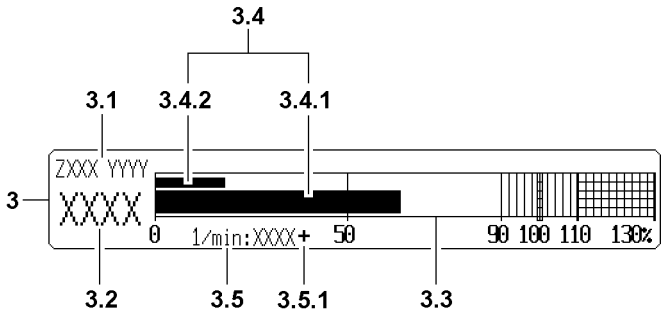

Fig.111933

7.1.3 Dynamic utilization bar

3 „Dynamic utilization bar“ icon
- In percent [%]

3.1 Organization number
- For internal Liebherr load chart administration

3.2 Short code
- Identifies the selected set up configuration

3.3 Utilization scale
- Marking from a utilization of 90 %: **Advance warning**
- Marking at a utilization of 100 %: **STOP shut off**

3.4 Utilization bar

3.4.1 Utilization bar of crane
- According to load chart and reeving
- **Note:**
  The utilization bar is the measurement for the current utilization of the crane.

Utilization of crane according to load chart and reeving		
Utilization of crane according to load chart and reeving	=	Current load on the boom head / Maximum load according to load chart and reeving

3.4.2 Boom nose* utilization bar
- **Note:**
  Maximum load carrying capacity of the boom nose*: Load which can be lifted by the boom nose* alone.
  Prerequisite: Sufficiently high load capacity on the boom head.

Utilization of the boom nose*		
Utilization of the boom nose*	=	Current load carrying capacity of the boom nose* / Maximum load carrying capacity of the boom nose*

3.5 Engine rpm
- In [rpm] or [n/min]
- **Note:**
  „????“ is displayed in case of an error in rpm value for approximately 5 seconds.
  Then the nominal rpm for the diesel engine is set for the output regulation of the drives.
  The set nominal rpm is shown blinking.
  An error message is issued.

3.5.1 Engine rpm lock
- The engine rpm can be locked on the master switch. If the engine rpm has been locked, the icon „+“ appears behind the rpm display.

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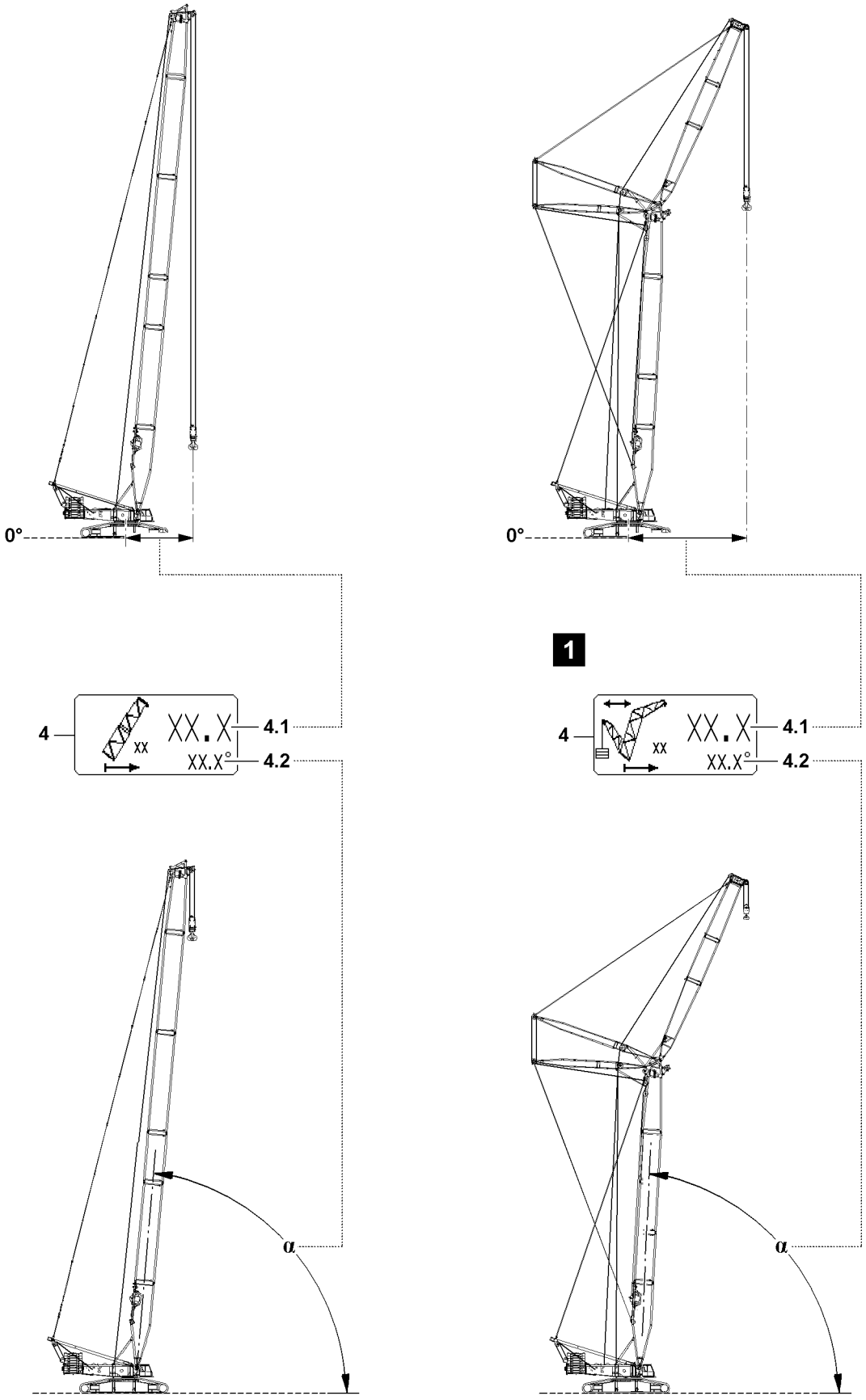

Fig.112633

7.1.4 Boom radius

According to the set up configuration, the following changes:
- The illustration of the icon
- The position of values in the icon, see sample illustration **1**.

4 „Boom radius“ icon

4.1 Boom radius
- In [m] or [ft]
  Denotes the horizontal distance of the load hook from the center of rotation of the crane superstructure, measured on the ground. This also takes into account the boom flexation due to its own weight and the suspended weight of the load.
- **Note:**
  „? ? ? . ?“ is shown if the value cannot be calculated / determined.
  An error message is issued, see Diagnostics manual.

4.2 Main boom angle
- In [°]
- Displayed is the medium value of the angle sensor in the main boom pivot section and the angle sensor in the main boom pulley head.
- **Note:**
  „? ? ? . ?“ is shown if the value cannot be calculated / determined.
  An error message is issued, see Diagnostics manual.

Note

▶ Main boom angle **α**: The angle of the main boom to the placement surface of the crane.

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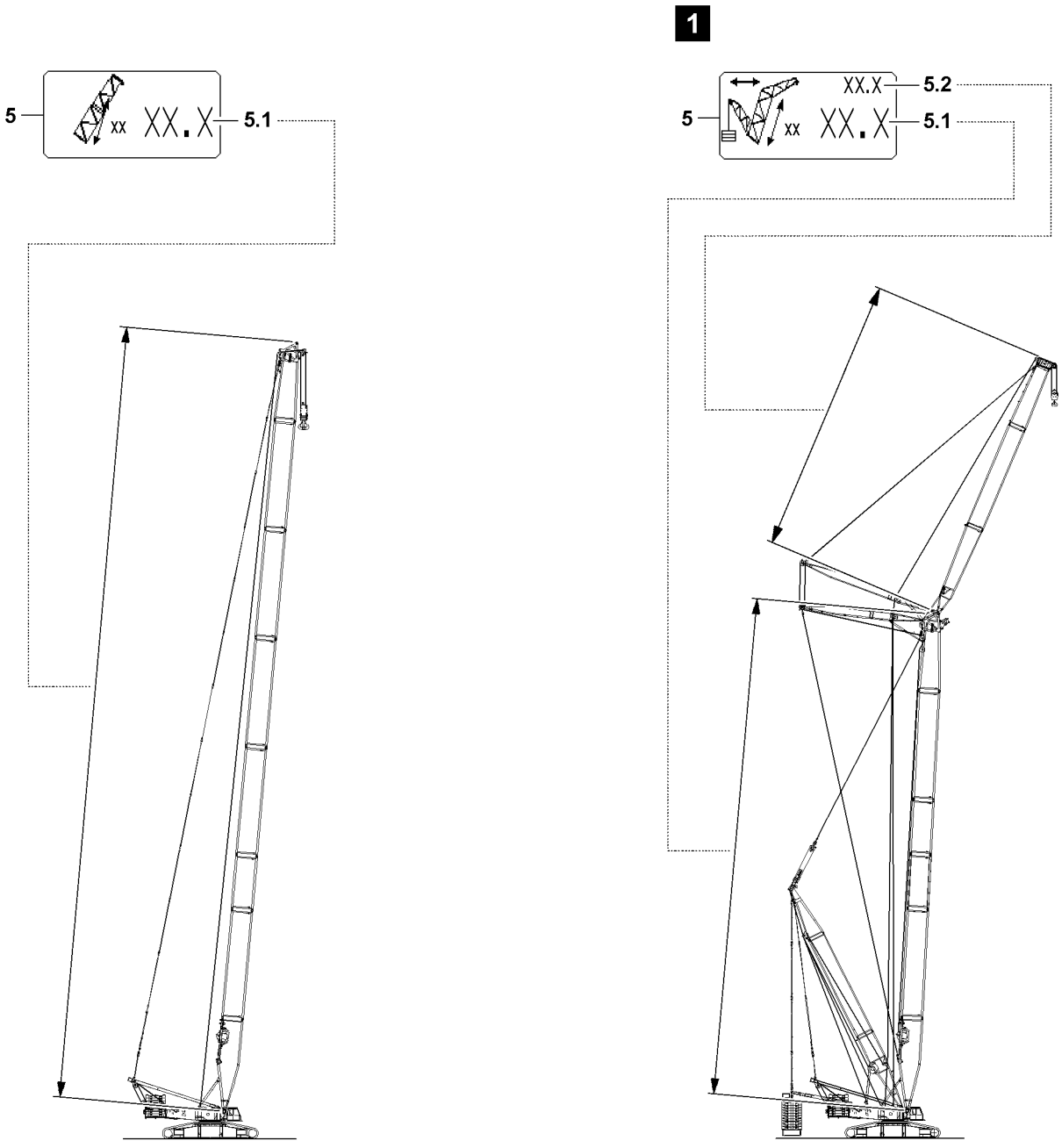

Fig.112638

7.1.5 Boom length

According to the set up configuration, the following changes:
- The illustration of the icon
- The position of values in the icon, see sample illustration **1**.

5 „Boom length“ icon

5.1 Length of main boom
- In [m] or [ft]

5.2 Length of auxiliary boom / accessory
- In [m] or [ft]

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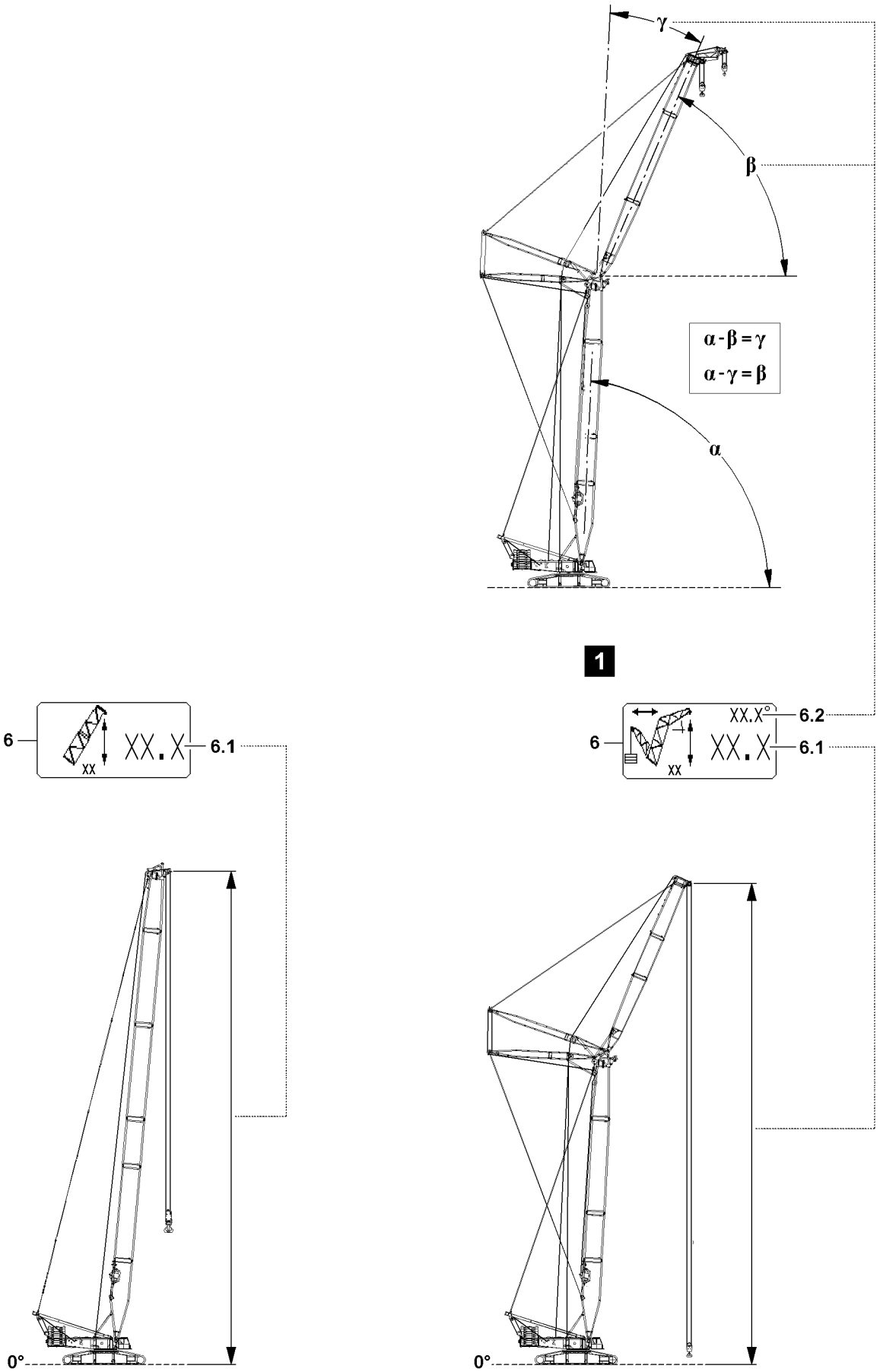

Fig.112639

7.1.6 Pulley head height

Note

- ▶ Main boom angle **α**: The angle of the main boom to the placement surface of the crane.
- ▶ Angle auxiliary boom / accessory **β**: The angle of the auxiliary boom / accessory to the placement surface of the crane.
- ▶ Relative angle auxiliary boom / accessory **γ**: The angle of the auxiliary boom / accessory is determined relative to the main boom.

According to the set up configuration, the following changes:

- The illustration of the icon
- The position of values in the icon, see sample illustration **1**.

6 „Pulley head height“ icon

6.1 Pulley head height
- In [m] or [ft]
- Marks the vertical distance from the placement surface of the crane to the selected pulley head axle.
  The displayed maximum load is valid for the selected pulley head axle.
- **Note:**
  „? ? ? . ?“ is shown if the value cannot be calculated / determined.
  An error message is issued, see Diagnostics manual.

6.2 Angle auxiliary boom / accessory
- In [°]
- **Note:**
  „? ? ? . ?“ is shown if the value cannot be calculated / determined.
  An error message is issued, see Diagnostics manual.

Note

- ▶ Depending on the set up configuration and the load chart, a differentiation is made between an absolute angle display or a relative angle display.

β Absolute angle auxiliary boom / accessory
- The angle of the auxiliary boom / accessory to the horizontal (placement surface of the crane) in [°]
- Display absolute angle: For operating modes with load chart for a fixed defined main boom angle.

or

γ Relative angle auxiliary boom / accessory
- Angle between the main boom and the auxiliary boom / accessory in [°]
- Display relative angle: For operating modes with load chart for a fixed defined angle auxiliary boom / accessory.

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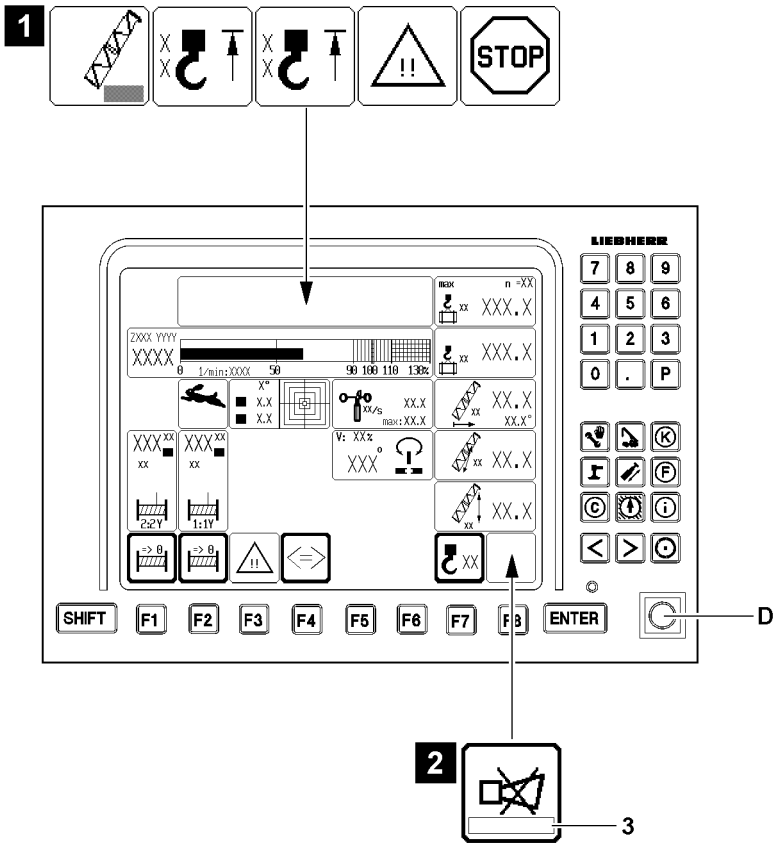

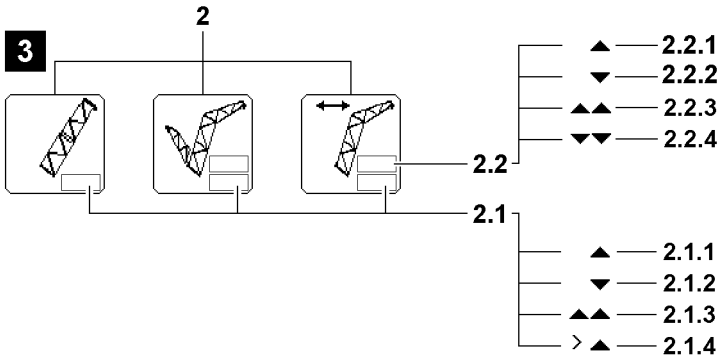

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Fig.124668

7.2 Alarm functions

NOTICE
Triggered alarm function!
If an alarm function is triggered (for example a advance warning occurrence or LMB Stop), the cause must be determined.
▶ Always pay attention to triggered alarm functions.
▶ Alarm functions can flash over the monitor.

The limit ranges of the crane movements are monitored. When the limit ranges are reached, the crane operator is warned by the alarm functions.

The alarm functions are shown by the LICCON monitor:

– Optically with icons, see illustration **1**.
– Acoustically by a warning sound „Horn“, see illustration **2**.

In case of a failure of the relevant sensors / limit switches, special error messages **3** are added.

7.2.1 Boom limitation

See illustration **3**

Limit signs main boom

Note
▶ The „Boom limitation“ icon **2** can change in different operating modes, but it is shown always at the same position in the LICCON monitor.
▶ The field **2.1** „on the bottom“ refers to the main boom.
▶ The field **2.2** „on the top“ refers to the auxiliary boom / accessory.

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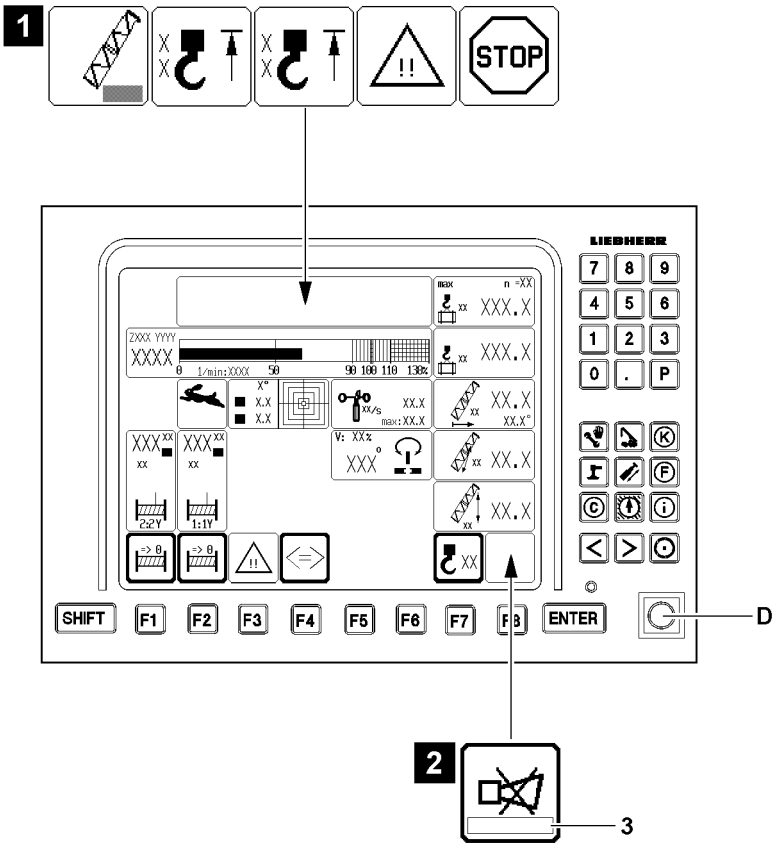

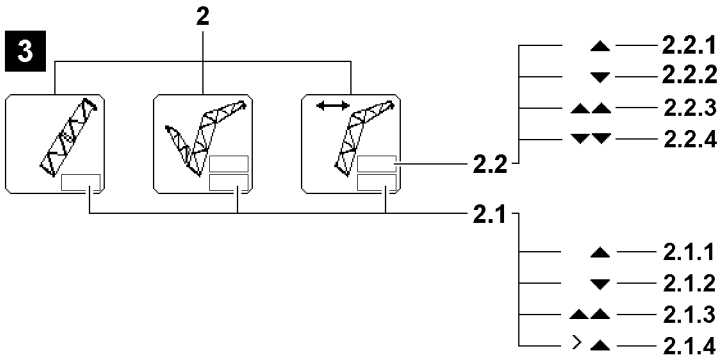

LWE/LG 1750-006/15409-07-02/en

Fig.124668

2.1 „Boom limitation main boom“ icon
- The luffing range of the main boom is limited both upward and downward.
- This icon appears if an end position determined by the load chart is reached when luffing the boom or when luffing the boom is disabled by a proximity switch.
- Exclamation marks show when an associated sensor is defective.

Position	Icon	Description
2.1.1	▲	The shut off „Luffing up the main boom“ is made by running against the upper load chart limit **or** Utilization larger than **95 %** and falling load carrying capacity when luffing up the main boom. **Note:** Luffing down the main boom is still possible.
2.1.4	› ▲	The shut off „Upper limit shut off angle“ (OGAW) was made by running on the upper limit angle. **Note:** The „upper limit shut-off angle“ (OGAW) appears only for certain operating modes or boom configurations.
2.1.2	▼	The shut off „Luffing down the main boom“ is made by running against the lower load chart limit. **Note:** Luffing up the main boom is still possible.

WARNING
Alarm function deactivated!
When the set up key **D** is actuated, there is no shut off of crane movement via position **2.1.2**.
▶ Observe the Crane operating instructions, chapter 4.20.

Position	Icon	Description
2.1.3	▲▲	The shut off „Luffing up the main boom“ is triggered by running against the block limit switch of the main boom relapse cylinders (RFP) on the left / right (boom steep) **or** due to an error in one block limit switch of the main boom relapse cylinders. **Note:** Luffing down the main boom is still possible.

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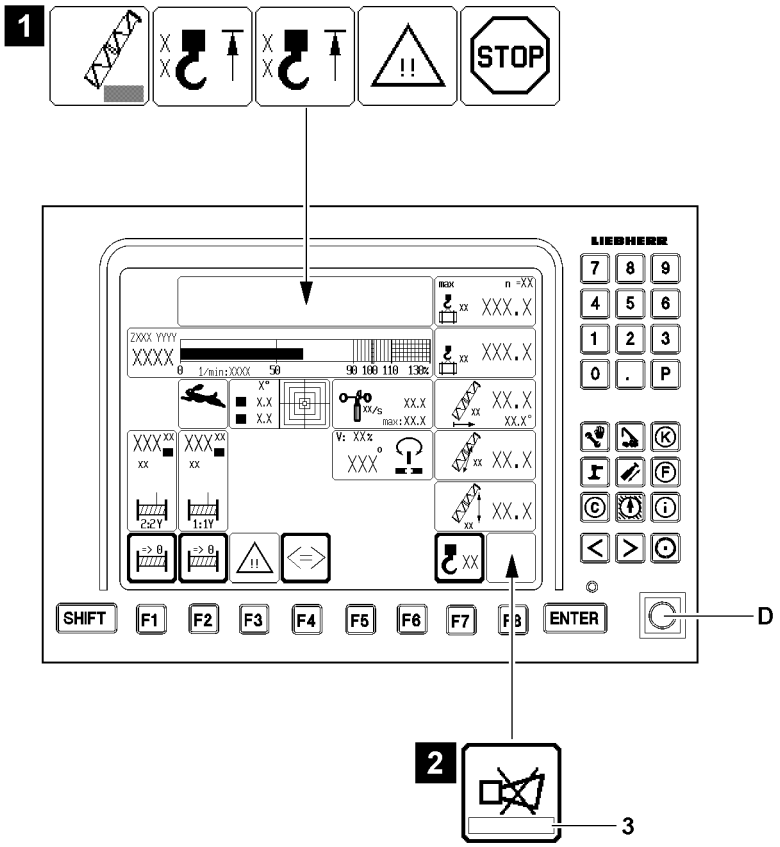

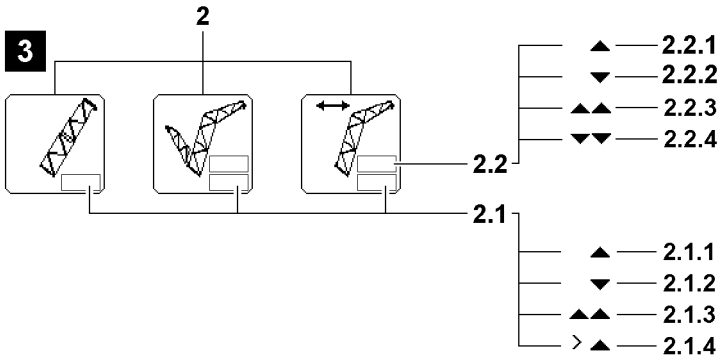

LWE/LG 1750-006/15409-07-02/en

Fig.124668

Limit sign auxiliary boom / accessory

Note

- ▶ The „Boom limitation“ icon **2** can change in different operating modes, but it is shown always at the same position in the LICCON monitor.
- ▶ The field **2.1** „on the bottom“ refers to the limit sign main boom.
- ▶ The field **2.2** „on the top“ refers to the limit sign auxiliary boom / accessory.

2.2 „Boom limitation Auxiliary boom / accessory“ icon

- The luffing range of the auxiliary boom / accessory is limited both upward and downward.
- This icon appears if an end position determined by the load chart is reached when luffing the auxiliary boom / accessory or when luffing is disabled by a limit switch.
- Exclamation marks show when an associated sensor is defective.

Position	Icon	Description
2.2.1	▲	The shut off „Luffing up the auxiliary boom / accessory“ is triggered by running against the upper load chart limit. **Note:** Luffing the auxiliary boom / accessory down remains possible.
2.2.2	▼	The shut off „Luffing down the auxiliary boom / accessory“ is triggered by running against the lower load chart limit. **Note:** Luffing the auxiliary boom / accessory up remains possible.

WARNING

Alarm function deactivated!

When the set up key **D** is actuated, there is no shut off of crane movement via position **2.2.2**.

- ▶ Observe the Crane operating instructions, chapter 4.20.

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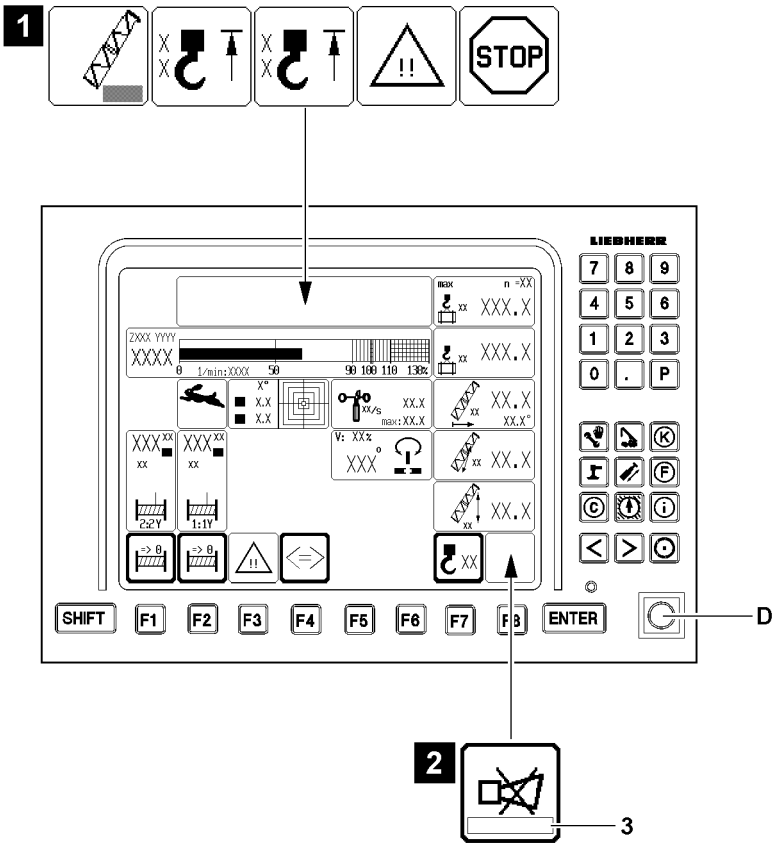

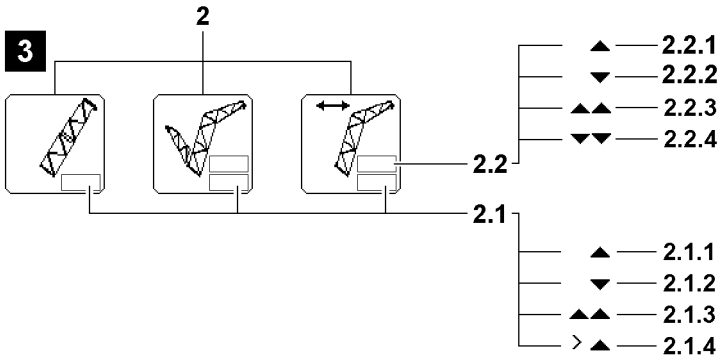

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Fig.124668

Position	Icon	Description
2.2.3		The shut off „Luffing up the auxiliary boom / accessory“ is triggered by running against a block limit switch of the luffing jibs relapse cylinder (RFP) **or** the retaining flap **or** an error on one limit switch occurs. **Note:** Luffing the auxiliary boom / accessory down remains possible.
2.2.4		The shut off „Luffing down the auxiliary boom / accessory“ is triggered by running against a block limit switch („Auxiliary boom / accessory lower left / right“) **or** an error on one of these limit switches occurs. **Note:** Luffing the auxiliary boom / accessory up remains possible.

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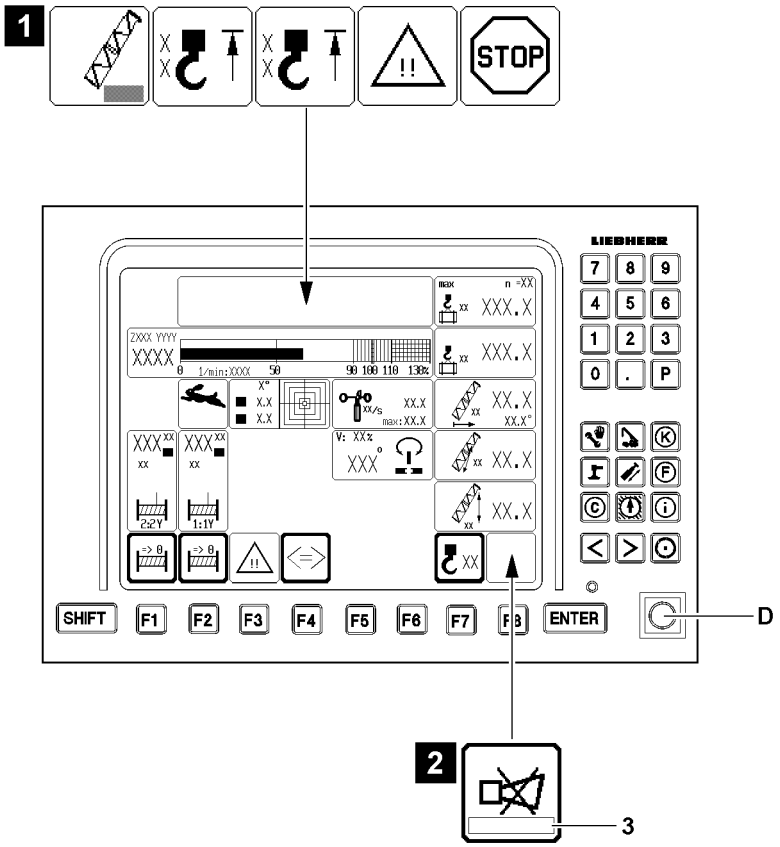

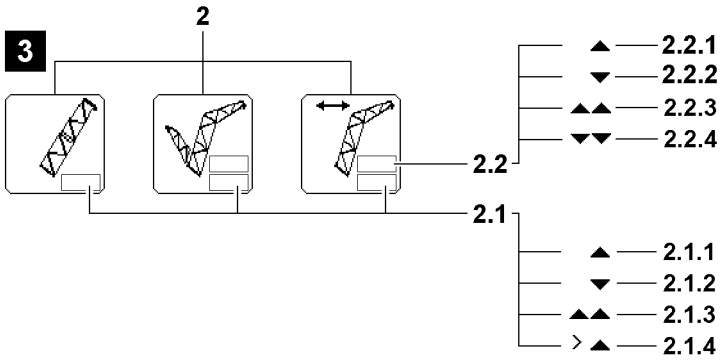

LWE/LG 1750-006/15409-07-02/en

Fig.124668

7.2.2 Failure of sensor / limit switch!

NOTICE
Failure of sensor / limit switch!
Depending on the classification of the sensor / limit switch, the crane can continue to be operated with limitation or is shut off by the control.
If an error message is issued in the horn icon **3**, see illustration **2**.
The error message shows defective sensors / limit switches, see Diagnostics manual.
- ▶ The error must be remedied immediately.
- ▶ Crane movements after a failure of a sensor / limit switch must be carried out anticipatorily and with extreme caution.

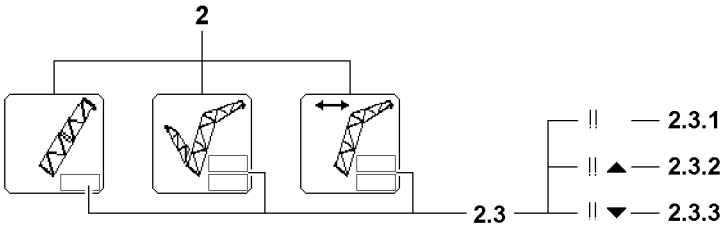

Fig.124670

Position	Icon	Description
2.3.1	!!	On the auxiliary boom / accessory, at least one associated sensor / limit switch is defective / missing. If an alarm function occurs at the same time, then the icon can be shown differently, see position **2.3.1**, position **2.3.2** or position **2.3.3**.
2.3.2	!!▲	
2.3.3	!!▼	**Note**: Not every failure of a sensor / limit switch on the boom is shown in the „Boom limitation“ icon **2**. Observe the error message in the horn icon **3**.

Note
- ▶ Depending on the classification of the sensor / limit switch, the respective crane movement is shut off in case of a failure **unbypassably**.
- ▶ When deflecting the master switch, an error message is issued in the horn icon **3**. The error message shows defective sensors / limit switches.
- ▶ If the error cannot be remedied by yourself, contact Liebherr Service.

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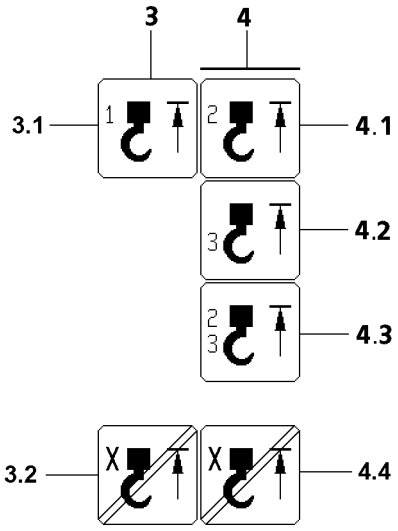

Fig.111096

7.2.3 Hoist top limit switch HES1

3 „Hoist top on HES1“ icon
- In order to prevent the crane from being operated without hoist limit switches (HES), the minimum hoist limit switch configuration is continuously monitored. If a hoist limit switch required for a particular operating mode is not plugged in, therefore not active on the LSB bus system, a LMB STOP is triggered and an error message is also issued.
- **Note:**
  HES1 must be present for all operating modes with main boom.
  HES1A + HES1B turn the same functions off as the remaining hoist limit switches.

3.1 HES1(1A / 1B)
- Location HES1A: Main boom head left
  Bus address: 27
- Location HES1B: Main boom head right
  Bus address: 28
- The **„HES1“** icon appears if:
  - The hook block moves against the HES1A on the left hand side of the main boom head.
  - HES1A is not active, although it must be present on the bus.
  - HES1A has an internal error.
  - The hook block moves against the HES1B on the right hand side of the main boom head.
  - HES1B is not active, although it must be present on the bus.
  - HES1B has an internal error.
- **Note:**
  The crane movements spool the hoist winches up, luff the boom down as well as luff the derrick boom down are turned off.

3.2 „Hoist top on boom bypassed“ icon
- The icon appears when the „Hoist top shut off“ is bypassed.

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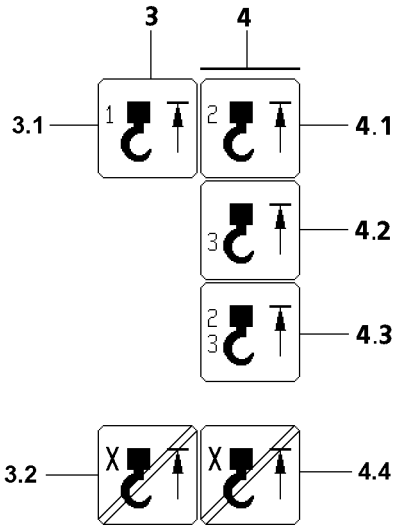

Fig.111096

7.2.4 Hoist top limit switch HES2 and HES3

4 „Hoist top on HES2 / HES3“ icon

- In order to prevent the crane from being operated without hoist limit switches (HES), the minimum hoist limit switch configuration is continuously monitored. If a hoist limit switch required for a particular operating mode is not plugged in, therefore not active on the LSB bus system, a LMB STOP is triggered and an error message is also issued.

4.1 „Hoist top on HES2 (2A / 2B)“ icon*****

- Location HES2A: Auxiliary boom / accessory, left*****
  Bus address: 27
- Location HES2B: Auxiliary boom / accessory, right*****
  Bus address: 28
- The **„HES2“** icon appears if:
  - The hook block moves against the HES2A on the auxiliary boom / accessory.
  - HES2A is not active, although it must be present on the bus.
  - HES2A has an internal error.
  - The hook block moves against the HES2B on the auxiliary boom / accessory.
  - HES2B is not active, although it must be present on the bus.
  - HES2B has an internal error.
- **Note:**
  The crane movements spool the hoist winches up, luff the boom down as well as luff the derrick boom down are turned off.

Note

▶ HES2 must be present for all operating modes with auxiliary boom / accessory.

▶ If HES2 is missing despite having to be present, a „LMB STOP“ is triggered. In addition, an error message is issued.

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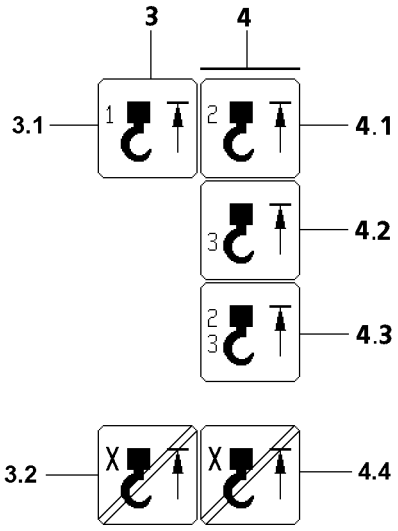

Fig.111096

4.2 „Hoist top on HES3“ icon

Installation location(s):

- Main boom boom nose 1, bus address: 24*****
- Main boom boom nose 2, bus address: 25*****
- Auxiliary boom / accessory boom nose 1, bus address: 24*****
- Auxiliary boom / accessory boom nose 2, bus address: 25*****
- The **„HES3“** icon appears if:
  - The hook block runs against the HES3 at the boom nose.
  - HES3 is not active, although it must be present on the bus.
  - HES3 has an internal error.
- **Note:**
  The crane movements spool the hoist winches up, luff the boom down as well as luff the derrick boom down are turned off.
- **Note:**
  HES3 must be present for all operating modes with „boom nose“.
  If this is not the case, a „LMB STOP“ is triggered and an error message is also issued.

4.3 HES2 and HES3

- The icon appears when icon HES2 and HES3 appear simultaneously.

4.4 „Hoist top on boom bypassed“ icon

- The icon appears when the „Hoist top shut off“ is bypassed.

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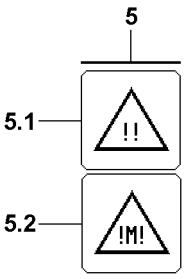

Fig.112366

7.2.5 Advance warning LMB / advance warning engine monitoring

5 „Advance warning“ icon

5.1 Advance warning LMB
- The current load chart utilization is calculated from the „current load“ and the „maximum load according to the load chart and the reeving“.
- The „Advance warning“ icon appears if:
  - The current load chart utilization of the crane, according to the „load chart and reeving“ exceeds the programmed limit (**90 %**) for the advance warning.
    or
  - The current utilization of the boom nose***** exceeds the programmed limit (**90 %**) for the advance warning.

5.2 Advance warning engine monitoring
- If a warning event occurs in the engine monitoring system, the „Engine monitoring advance warning“ icon is displayed on the LICCON monitor.

NOTICE
Shut off engine monitoring!
Outside of the crane operation program, the engine monitoring is turned off.
When the engine monitoring is turned off, problems and warning occurrences are not recognized.
This could result in crane failure.
▶ If work has to be carried out for a longer period outside of the crane operation program, with the engine running, then switch regularly into the engine monitoring screen.

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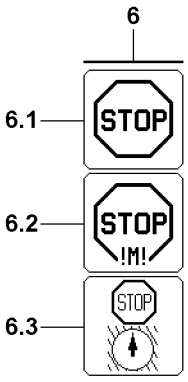

Fig.113264

7.2.6 LMB STOP / Engine monitoring STOP

6 „STOP“ icon

6.1 LMB STOP
- The „STOP“ icon appears when the load chart utilization exceeds the **100 % mark** (LMB STOP).
- **Note:**
  All crane movements that increase the load momentum are shut off.

or

6.1 Sensor error
- The „STOP“ icon appears when a sensor which is required to monitor the load chart has an error (LMB STOP is actuated).
- **Note:**
  All crane movements that increase the load momentum are shut off.

or

6.1 No load chart
- The „STOP“ icon appears if no load chart is available (LMB STOP is actuated).
- **Note:**
  All crane movements that increase the load momentum are shut off.

6.2 Engine monitoring STOP
- If a STOP event occurs in the engine monitoring system, the system automatically switches over (from the Crane operation program) to the Engine monitoring program.

NOTICE
Shut off engine monitoring!
Outside of the crane operation program, the engine monitoring is turned off.
When the engine monitoring is turned off, problems and warning occurrences are not recognized.
This could result in crane failure.
▶ If work has to be carried out for a longer period outside of the crane operation program, with the engine running, then switch regularly into the engine monitoring screen.

6.3 Working range limitation*
- If a programmed working range limit* is reached, then this condition is indicated by the STOP icon working range limitation* **6.3** instead of the standard „STOP“ icon **6**.

Note
▶ If an LMB-STOP occurs simultaneously, the STOP Working range limitation* **6.3** icon continues to be displayed.
▶ The LMB-STOP is identifiable if the utilization bar exceeds 100 % or if a maximum load carrying capacity of 0 t is permitted.

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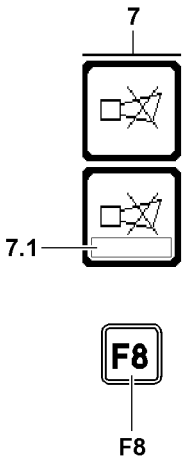

Fig.111270

7.2.7 Acoustic warning on monitor 0

Acoustic warnings on monitor 0 are indicated by the warning sound „Horn“.

The warning sound „Horn“ is divided into two categories:
- „Horn“ is a beeping sound of a duration of approximately 0.5 seconds, which is repeated in a second cycle.
- „Short horn“ is a beeping sound of a duration of approximately 0.1 seconds, which is repeated in a second cycle.

7 Horn icon
- When the horn icon is shown in the LICCON monitor, any acoustic signals which will occur can be shut off by the LICCON monitor **0** by pressing the function key **F8**.
- If an error message is shown in the horn icon **7** in field **7.1**, then the present error can be determined through it in the diagnostics manual. Pressing the function key **F8** twice, automatically changes to the error determination screen of the test system. The error is displayed there in documentary form.

Acoustic signal „Horn“

1. Sounds in addition to the visual display of an error message in field **7.1** in case of operational errors are found, which lead to a shut off of a crane movement.
   Operational errors are:
   - Overload
   - Boom outside of the angle / radius range of the load chart
2. In case of application errors with error number (LICCON Error Code LEC). For example sensor errors, which occur due to insufficient sensor signals or a defective sensor.
   The following sensors are monitored:
   - Hoist limit switch
   - Length sensors
   - Angle sensors
   - Pressure sensors
   - Pull test brackets (force test boxes)
   - Wind sensor
   - Battery voltage
   - Inductive sensors

Acoustic signal „Short horn“

Sounds in addition to the visual display of error messages without an error number and which do not lead directly to crane movement shut off by the LICCON overload protection.
Monitored error messages are:
- Maximum permissible wind speed exceeded (only for activated wind sensor*****).
- Maximum or minimum support force exceeded (only with active support force monitoring*****).
- Crane utilization value for „Advance warning“ (90 %) reached

Priority acoustic signal

- The „Horn“ alarm has higher priority than the „Short horn“ alarm, i.e. „Horn“ takes preference over „Short horn“.
- The „Horn“, as well as the „Short horn“ immediately become active again if an error recurs.

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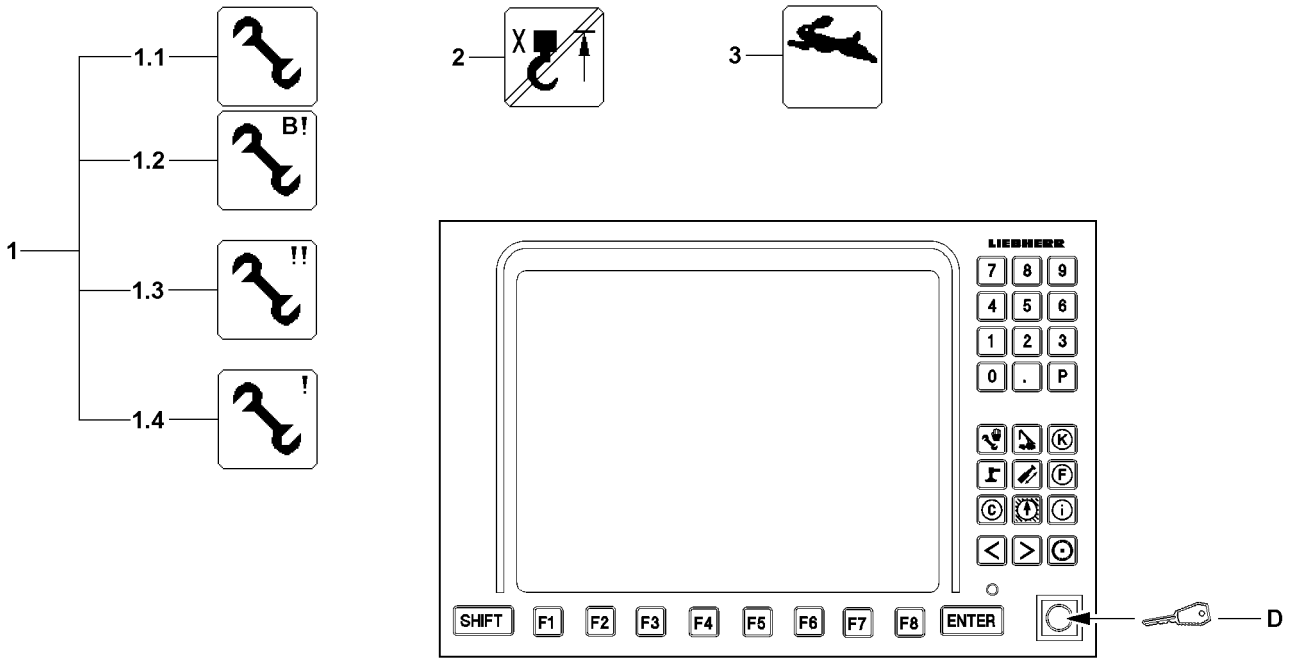

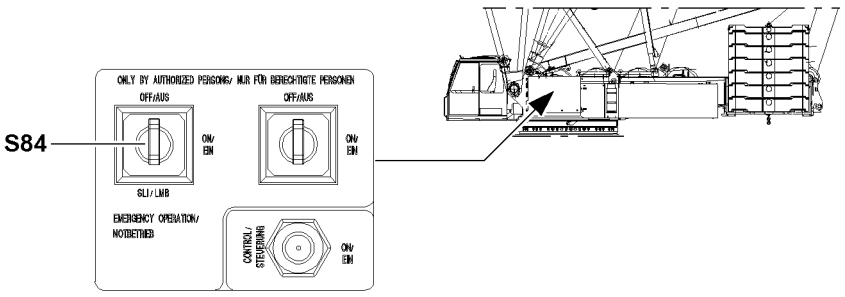

LWE/LG 1750-006/15409-07-02/en

Fig.113292

7.3 Special functions

Note
Double function set up key!
If the crane has **no** CE-mark, when actuating the set up key **D**, the release for the „Emergency operation LICCON overload protection“ is automatically engaged.
▶ Take into account, when actuating the set up key **D**, that the „Emergency operation LICCON overload protection“ is automatically released.

Note
▶ The various icons **1** are shown on the same position in the LICCON monitor, depending on the operating mode, illustration **2**.
▶ For operation and specifications for using the set up key **D** see Crane operating instructions, chapter 4.20 and 7.15.

7.3.1 Exceeding the shut off limits of the LICCON overload protection

1.1 Exceeding the shut off limits of the LICCON overload protection
- The icon appears:
  - When the shut off limits of the LICCON overload protection are bypassed via the set up key **D**.
  - **Note**:
    The Crane operation program is locked, meaning, no other program can be turned on via the program keys.

7.3.2 No load chart is available

1.2 No load chart is available
- The icon appears:
  - When the shut off limits of the LICCON overload protection are bypassed via the set up key **D and** no load chart is available.
  - **Note**:
    By actuating the set up key **D**, all erection / take down procedures can be carried out within the erection / take down charts, for which no load charts are available.

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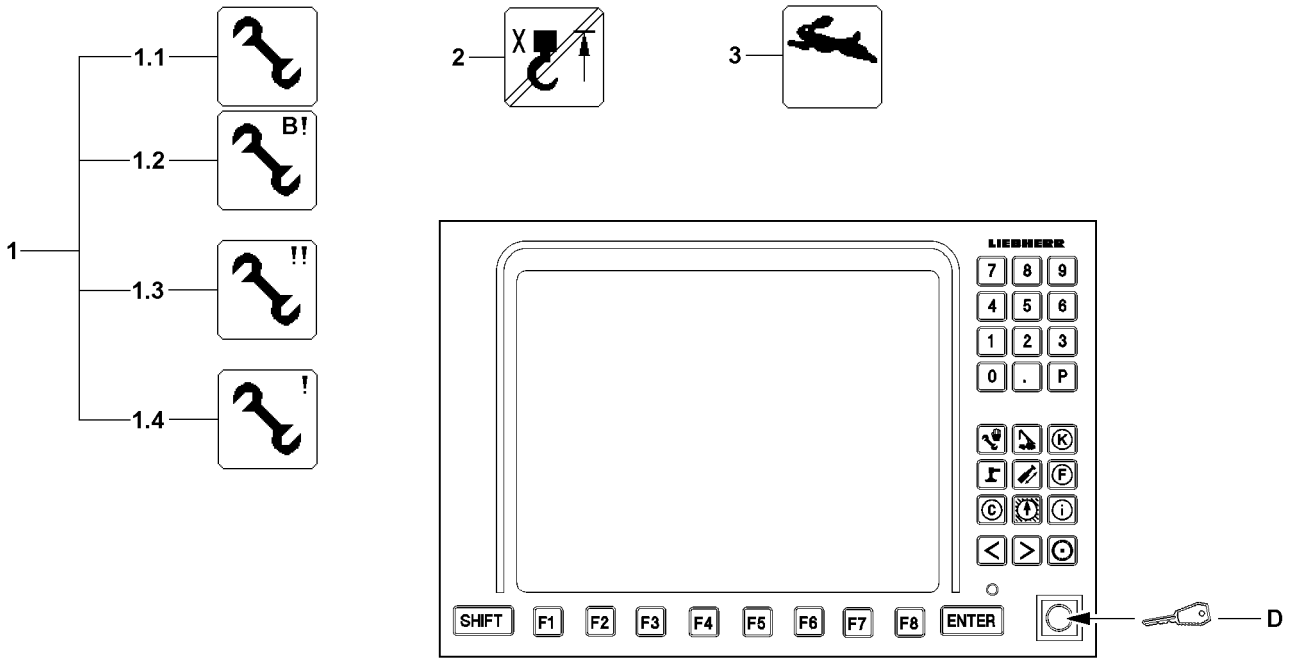

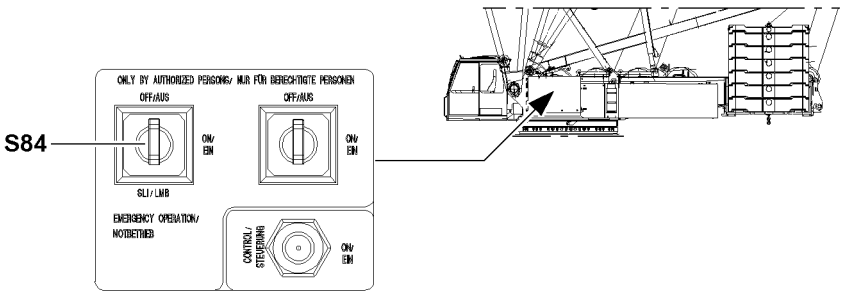

LWE/LG 1750-006/15409-07-02/en

Fig.113292

7.3.3 Emergency operation LICCON overload protection (according to EN 13000:2010)

1.3 LMB emergency operation activated
- The icon appears:
  - when the LMB-emergency operation is activated via the key button **S801**.
  - **Note**:
    The Crane operation program is locked, meaning, no other program can be turned on via the program keys.

7.3.4 Emergency operation LICCON overload protection (crane without CE mark)

Note
If the crane has **no** CE mark, then the functions of the „Emergency operation of the LICCON overload protection“ are also engaged by the set up key **D**.

▶ Only crane without CE-mark: If the emergency operation LICCON overload protection is needed, actuate the key button **S801** or the set up key **D**.

1.3 LMB emergency operation activated
- Icon appears:
  - when the LMB emergency operation is activated by the key button **S801** or the set up key **D**.
  - **Note**:
    Depending on the reason for the LMB emergency operation, the icon for no load chart available **1.2** can also appear.
  - **Note**:
    The Crane operation program is locked, meaning, no other program can be turned on via the program keys.

7.3.5 Additional emergency operating modes

WARNING
Erroneous operation of the crane!
If one of the icons for additional emergency operating modes **1.4** appears, then there is a risk of accidents due to erroneous operation of the crane.
Death, severe bodily injuries, property damage.

▶ Deactivate additional operating modes **1.4** again or contact Liebherr Service and coordinate further procedure.

1.4 Additional emergency operating modes
- Icon **1.4** appears if additional emergency operating modes were activated.

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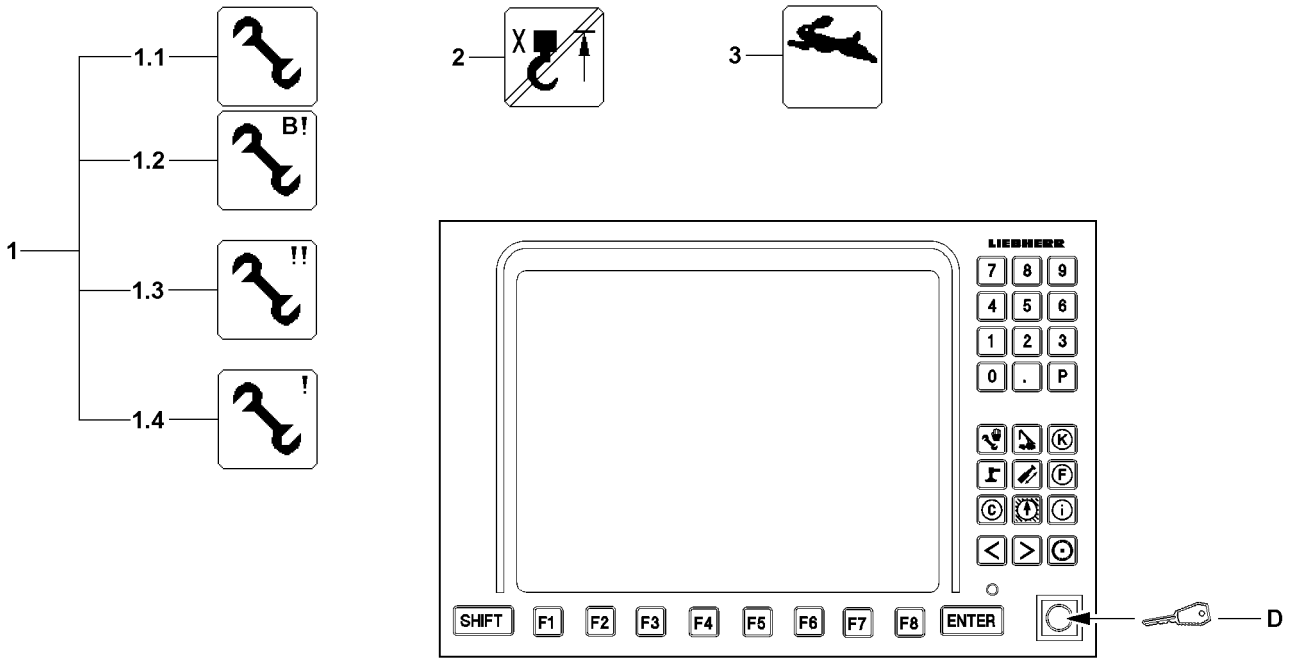

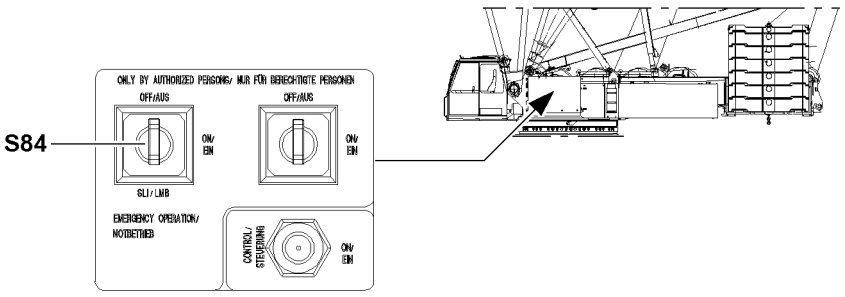

LWE/LG 1750-006/15409-07-02/en

Fig.113292

7.3.6 Bypass „Hoist top“

2 Bypass „Hoist top“
- The icon appears:
  - When the shut off „hoist top“ is bypassed via the set up key **D**
  - **Note**:
    The Crane operation program is locked, meaning, no other program can be turned on via the program keys.

7.3.7 Rapid gear

3 „Rapid gear“ icon
- The icon appears if the rapid gear is enabled during a crane movement
- This is possible for the following crane movements:
  - Lift / lower hoist gears
  - Luff the boom up / down

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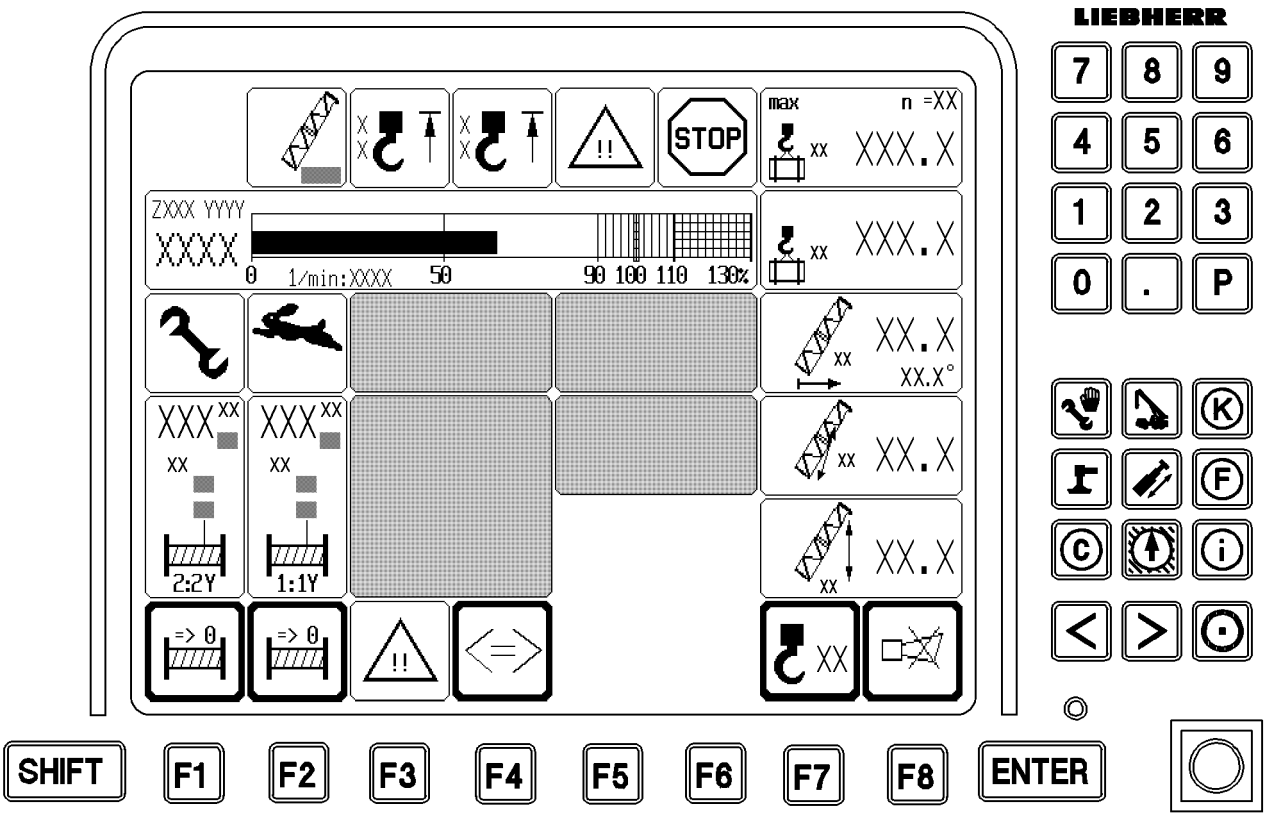

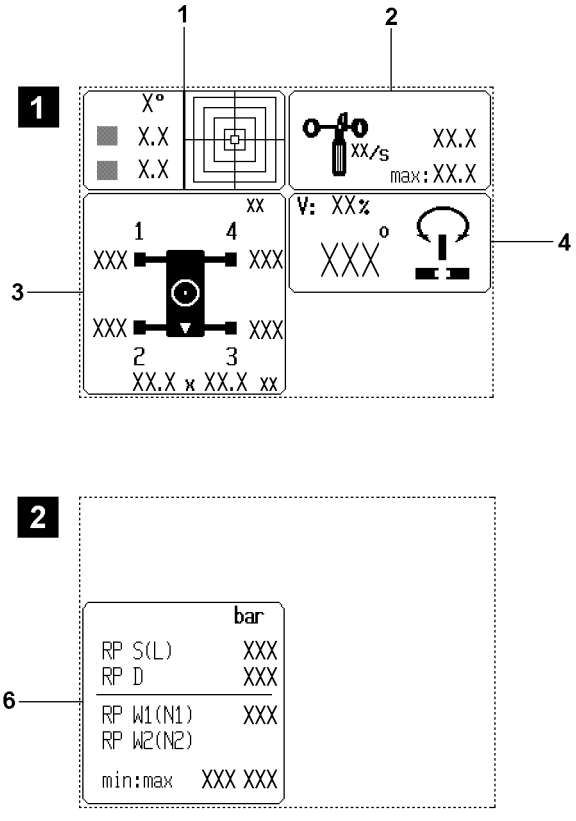

Fig.111895

7.4 Monitored auxiliary functions for crane operation

There are several monitored auxiliary functions, which can be displayed when needed or automatically.

The monitoring of all auxiliary functions is always active, only the icons may be hidden. The icons of the monitored auxiliary functions have their fixed place on the LICCON monitor.

Note

▶ Using the function key **F3**, you can show the icons for the monitored auxiliary functions. Since not all icons of the auxiliary functions fit on one page (at maximum assignment), they are split over two pages. The icons on page 2 (if available) can be shown with the function key **F4**.

Page 1 (illustration **1):**

1 Crane incline
2 Wind speed
3 Support force monitoring
4 Slewing range

Page 2 (illustration **2):**

6 Relapse cylinder monitoring

Note

▶ Depending if the monitored auxiliary functions are turned off or on, the illustration of the monitored auxiliary functions differs.

Monitored auxiliary functions turned off:

- No error:
  Icons are not shown.
- Only error in one function on page 1:
  Icon is displayed on page 1.
- Only error in one function on page 2:
  Icon is displayed on page 2.
- Error in a function on page 1 and 2:
  Icon is displayed on page 1 and icon for **F4** blinks (= indicates an error in a function on page 2).

Monitored auxiliary functions turned on:

- No error:
  Optional icons (customer request) are displayed.
  If there are also optional icons on page 2, the icon „Change page“ of the **F4** key is activated (= indication for switching option).
- Error in one function on page 2:
  Icon „Change page“ blinks (= indication regarding an error of a function on the other page).
- Error in a function on page 1 and 2:
  Icon is displayed on page 1.
  Icon „Change page“ blinks (= indication regarding an error of a function on the other page).

LWE/LG 1750-006/15409-07-02/en

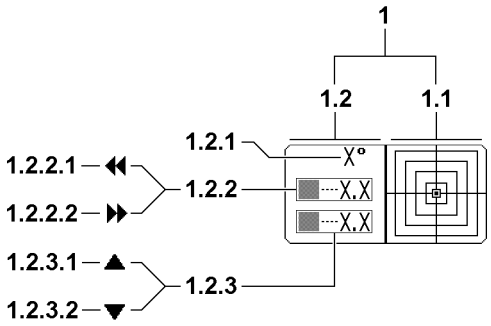

Fig.111929

7.4.1 General

Note
„?“ instead of display value!
- ▶ The value cannot be determined due to an error.
- ▶ If an error occurs and an error message is issued, see Diagnostics manual.
- ▶ Always pay attention to error messages.
- ▶ Remedy the error always as quick as possible.

7.4.2 Crane incline

1 „Incline“ icon
- Display of the incline of the crane to the horizontal in longitudinal and lateral direction. The display is graphic as well as numeric.
- The direction data refers to the driving direction of the crane chassis.

1.1 Graphic part
- The graphic display is in the form of a spirit level, with a moving dot (small square) representing the air bubble. The center of the dot shows the precise incline value.

1.2 Numeric part

1.2.1 Incline range
- Value either 1° or 5°
  This value describes the definition of the graphic illustration and can only assume the two values „1°“ or „5°“ If the incline is less than 1° in the lateral direction **and** in the longitudinal direction, the spirit level moves within the 1° range If at least one value exceeds the 1° limit, it switches to the 5° range.
  The range change is automatic.

1.2.2 Crane incline
- In [°] in lateral direction
- **1.2.2.1** Double arrow left
  - The crane is inclined to the left
- **1.2.2.2** Double arrow right
  - The crane is inclined to the right

1.2.3 Crane incline
- In [°] in longitudinal direction
- **1.2.3.1** Arrow pointing up
  - The crane is inclined to the rear
- **1.2.3.2** Arrow pointing down
  - The crane is inclined to the front

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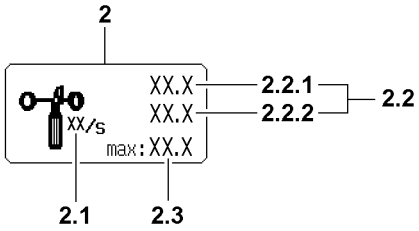

Fig.111265

7.4.3 Wind speed

2 „Wind speed“ icon
- The wind speeds are displayed in [m/sec.] or [ft/sec.] depending on the units of measurement shown in the load chart

2.1 „Wind speed“ unit
- [m/s] or [ft/s]

2.2 Current wind speed

Note
- ▶ Depending on the set up configuration of the crane, a certain number of wind sensors must be present on the LSB bus.
- ▶ If a wind sensor does not have to be present, then no display value appears in the „Wind speed“ icon **2**.
- ▶ If no value can be determined for a wind sensor which must be present, then current wind speed „???“ appears in the display.

2.2.1 Current wind speed

2.2.2 Current wind speed
- If several wind sensors are active, two values are shown.

WARNING
Crane operation without display value of wind speed!
If the current wind speed **2.2** „???“ appears in the display, then a wind sensor which must be present is missing or there is an error in the wind sensor.
- ▶ Pay attention to the error message and remedy the error immediately.
- ▶ If an error cannot be remedied, then it must be ensured that the wind speed is monitored otherwise.

Note
- ▶ If several wind sensors are attached to the LSB bus, the location of the wind sensor determines the corresponding display in the icon „Wind speed“.
- ▶ The priority depends on the installation location of the wind sensor, from „outside“ (for example luffing jib) to „inside“ (for example boom head). The wind speed of the „exterior“ wind sensor is displayed in **2.2.1** and the wind speed of the „interior“ wind sensor is displayed in **2.2.2**.
- ▶ The priority of wind sensor 2 is larger than that of wind sensor 3, this means: If both wind sensors are present, then the value of wind sensor 2 is shown.

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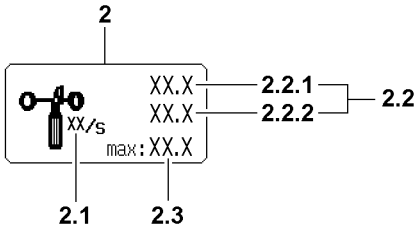

Fig.111265

2.3 Maximum permissible wind speed
- With icon text „max“:
- The value depends on the operating mode and the set up configuration.
- **Note:**
  If access to a load chart is not possible, then the maximum value starts to blink and the acoustic alarm „Short horn“ sounds.
  If the current wind speed value exceeds the displayed maximum value, the maximum value starts to blink and the acoustic alarm „Short horn“ sounds.

WARNING
Wind speed too high!
If the maximum permissible wind speed is exceeded with erected boom system, there is a danger of accidents.
Dangerous situations can arise, such as oscillating load or shaking crane.
The crane can topple over.
Death, severe bodily injuries, property damage.
▶ **The crane movements will not be shut off.**
▶ Observe the danger notes in the Crane operating instructions, chapter 2.04.

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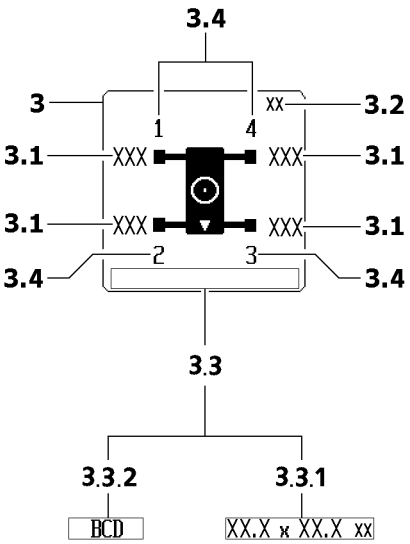

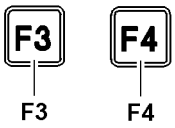

LWE/LG 1750-006/15409-07-02/en

Fig.111896

7.4.4 Support force display

DANGER
The crane can topple over!
When reaching the programmed minimum / maximum support forces, no automatic shut off of the crane movements occurs.
The displayed support force values of the support force display depend on the fluctuating influences of operator and environment.
The resulting expanded tolerance field of the determined values may not be utilized by the support force display to determine the tipping limit of the crane.

- ▶ The displayed support force values of the support force display may not be used to utilize the crane up to the tipping limit.
- ▶ Make sure that all support force values are within the minimum / maximum support forces.

Note

- ▶ The support force display icon **3** appears only when the crane is supported. For crane operation on crawler, the support force display icon **3** does not appear.

3 Support force display icon*

- The LICCON support force monitoring system continuously records the current hydraulic pressure present in all 4 support cylinders during crane operation using a pressure sensor, and converts this into a support force [t] value for each support.
- If needed, the support force display icon* **3** can be shown in the crane operation program with the function key **F3** or function key **F4**.
- If a critical support force value occurs, then the support force display icon* **3** appears automatically with the alarm signal „Short horn“.
- The respective critical support force value is shown blinking when:
  - A support has reached or exceeds the maximum force.
  - A support has reached or exceeds the minimum force.
  - The sum of the two lowest support force values is less than 15 % of the total support forces.

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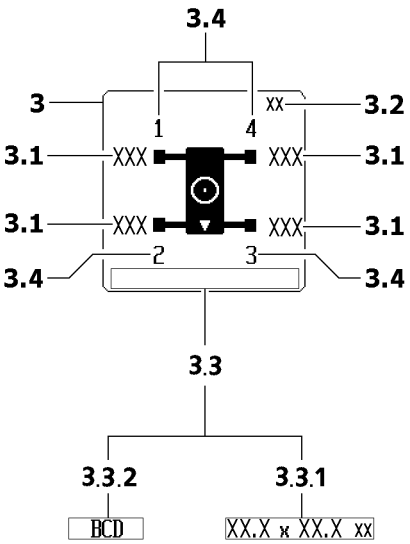

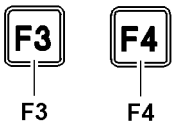

LWE/LG 1750-006/15409-07-02/en

Fig.111896

3.1 Display of current support force
- Display of support force for each support

Note
- ▶ The same maximum support force and a common minimum support force is programmed for each support at the factory.
- ▶ In the support program, these 5 values can be changed depending on the situation, see section „The support program“.

WARNING
Tolerances and erroneous operation of the support force monitoring!
Due to the friction forces in different directions and non-measurable lateral forces in the support cylinders, a test falsification up to ± 2 % in relation to the maximum load bearing capacity of the crane is possible.
If the support cylinders are moved on „block bottom“ or „block top“, then the display of the support forces is erroneous.
- ▶ Make sure that there is no block position on the support cylinders.
- ▶ Take the tolerances in the display value into account.

3.2 Weight unit of support force
- In [t] or [lbs]

3.3 Display of support base

3.3.1 Support base LG **3.3.1**:
- Only LG 1750
- Support bases are shown in their dimensions, for example 12.0 m x 12.0 m

3.3.2 Support base LR **3.3.2**:
- Only LR 1750
- The various support bases are shown by letters or letter combinations, for example: B, C, D.
- **Note:**
  The respective letters and letter combinations arise from the assembly conditions.

3.4 Numbering support cylinder **3.4**:
- Support cylinder 1 to 4

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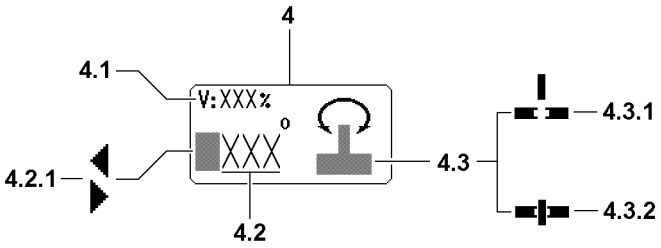

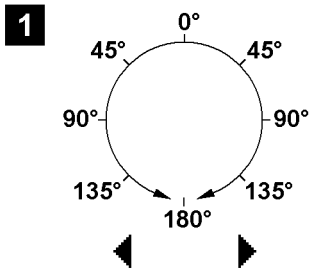

LWE/LG 1750-006/15409-07-02/en

Fig.111266

7.4.5 Slewing range

DANGER
Danger of accidents in case of excessive rotational speed!
▶ Make the preselection of the slewing speed according to the specifications in the load chart manual.

4 „Slewing range“ icon

4.1 Maximum rotational speed
- V: [%]
- Identifies the current (selected) „Maximum rotational speed“ of the slewing gear with a fully deflected master switch, relating to the maximum attainable rotation speed of the slewing gear.
  This value may be preselected in fixed percentage stages in the LICCON program control parameter.

4.2 Current position of the crane superstructure*
- In relation to the main working direction (0 [°])
  Increasing to the maximum value of 180°, see illustration **1**

4.2.1 Direction of deviation
- The arrow in front of the value indicates the direction of the deviation.
  - Arrow to the right: Turn to the right.
  - Arrow to the left: Turn to the left.

4.3 Crane superstructure lock
- Status of lock between crane superstructure and crane chassis
- **Note:**
  Only crane type **LG 1750**.

4.3.1 Locking pin on top
- Crane superstructure unpinned

4.3.2 Locking pin on the bottom
- Crane superstructure pinned

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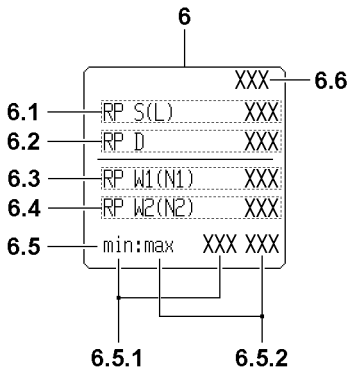

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Fig.111897

7.4.6 Monitoring of relapse cylinders

Note
Display values pressure display!
- ▶ Pressure display = „0“, if these relapse cylinders are not present for the set operating mode.
- ▶ Pressure display = „???“, if the pressure sensor signal is erroneous. There is an error display with error number.

6 „Monitoring relapse cylinder“ icon

6.1 Pressure display RP S(L)
- Relapse cylinder S-, SL- or L-boom

6.2 Pressure display RP D
- Relapse cylinder Derrick boom

6.3 Pressure display RP W1(N1)
- Pressure W1-relapse cylinder (=RP W1) at W-operation
  or
- Pressure N1-relapse cylinder (=RP N1) at N-operation

6.4 Pressure display RP W2(N2)
- Pressure W2-relapse cylinder (=RP W2) at W-operation
  or
- Pressure N2-relapse cylinder (=RP N2) at N-operation

6.5 Pressure limits
- Monitored pressure limits of relapse cylinders (W/N)
  Minimum / maximum pressure for RP W1(N1) and RP W2(N2)

6.5.1 Minimum pressure (W/N)
- If a pressure limit value is being exceeded, then this is shown by a blinking pressure actual value and an additional error message.
- This monitored minimum pressure is calculated from the angle of the main boom and the auxiliary boom / accessory. If one of the angles is invalid and is shown in the display with „???“, then no monitoring of the minimum pressure can occur.

6.5.2 Maximum pressure (W/N)
- If a pressure limit value is being exceeded, then this is shown by a blinking pressure actual value and an additional error message.

6.6 „Monitoring relapse cylinder“ measuring unit

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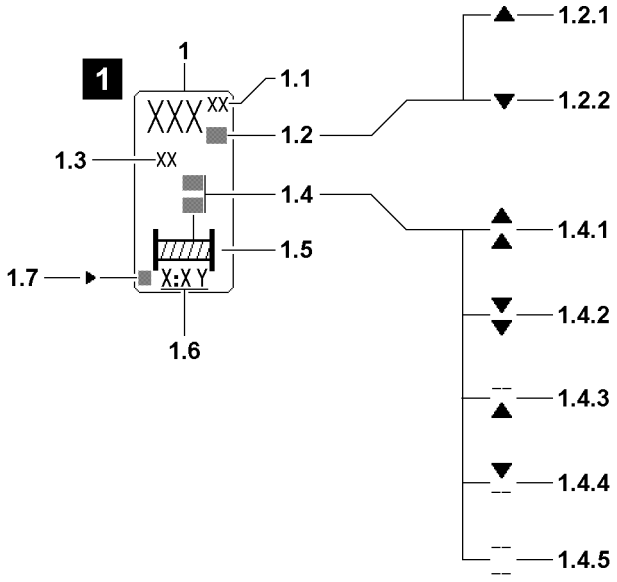

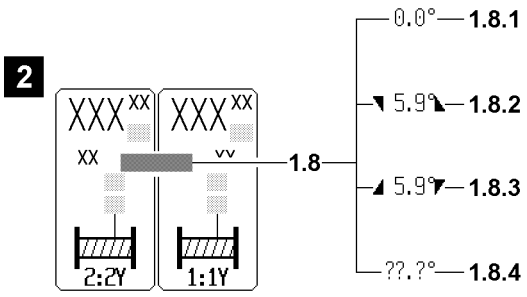

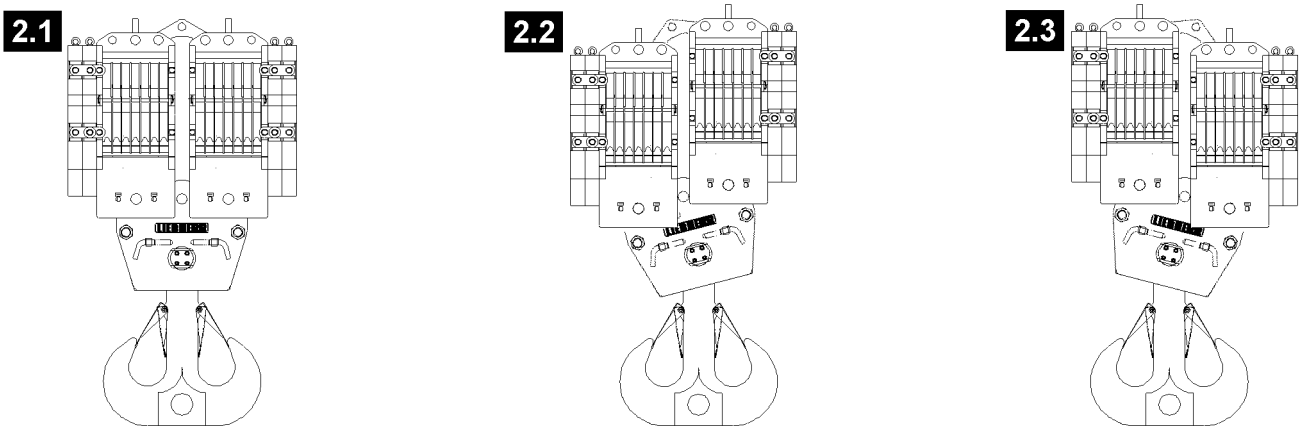

Fig.144026

LWE/LG 1750-006/15409-07-02/en

7.5 „Winch display“ icon

1 Winch icon
- The winch 1 and winch 2 icons have the same meaning and are explained on one icon.

1.1 Travelled distance
- In [m] or [ft]
  From a zero point to be determined
- For single operation with the reeving set in the Set up program: completed hook path.
- For parallel operation with the set total reeving made in the set up program: distance completed by the hook block.
- The positions before the decimal point are displayed with a maximum of three large digits. The digits after the decimal point are displayed with small digits (Setting to zero point, see section „The function key line“).
- A prerequisite for a correct display is that the reeving value entered equals the actual number of rope strands between the boom head and the hook block.

Note
Display area winch displays!
- ▶ The „completed path“ display **1.1** has only three positions before the comma, any positions before that are cut off. The crane operator must evaluate for himself if, for example 200 m rope are spooled up on a winch or 1200 m. **The display in both cases with 200 m is identical.**
- ▶ The hook path calculation only works accurately if the load is suspended freely and is not luffed during the lifting procedure. Not taken into account are flexation and rope expansion.
- ▶ The length display (hook path display) is only accurate and the layer sheer is only taken into account correctly if the winch has been calibrated and no interruptions of the CPU power supply have occurred (cold start). The hook travel display is calibrated by spooling the rope up or out until the calibration switch reacts.

1.2 Direction of hook movement

The arrows on the length value show the direction of the hook movement in relation to the zero point:
- Arrow up **1.2.1**: Hook moves upward from the zero point
- Arrow down **1.2.2**: Hook moves downward from the zero point

1.3 Measuring unit hook path display

1.4 Winch status display
- There are five winch status icons (all blinking):

1.4.1 Spool out

1.4.2 Spool up

1.4.3 Spooled out
- Spooling out is blocked

1.4.4 Spooled up
- Spooling up is blocked

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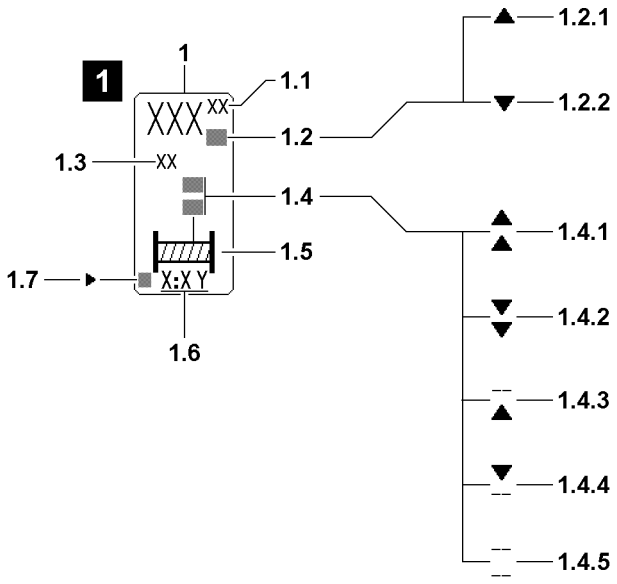

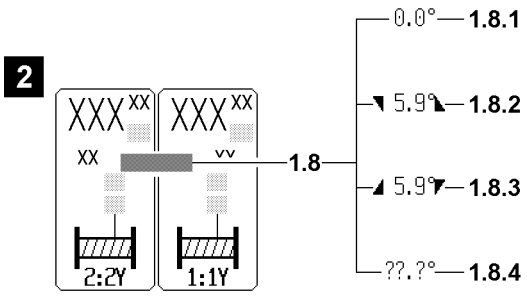

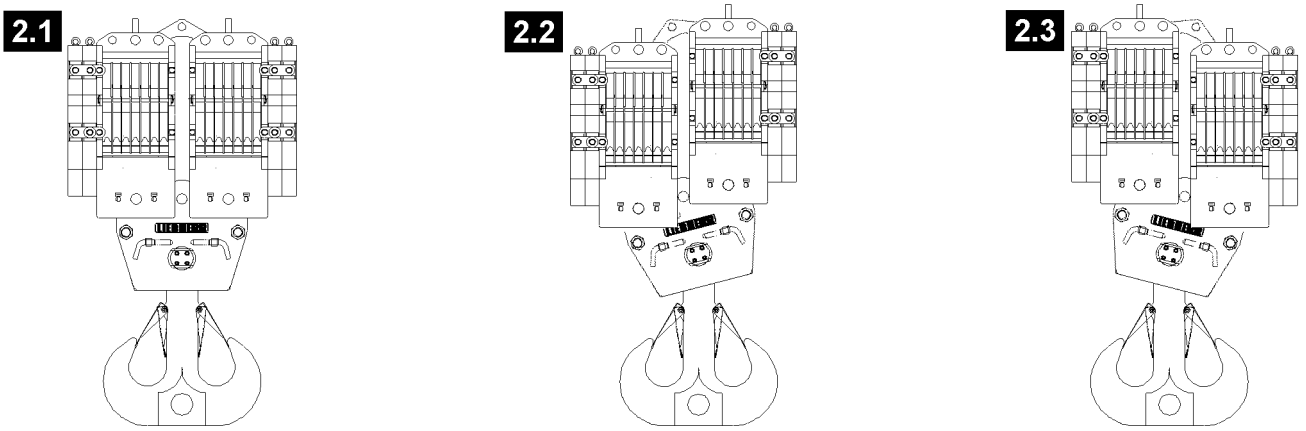

Fig.144026

LWE/LG 1750-006/15409-07-02/en

1.4.5 Winch is deactivated or unplugged
- Spooling up and spooling out are blocked (via Control parameter program)
- **Note:**
  If no winch status icon appears, the activated winch is inactive and is neither spooled up nor spooled out.

1.5 Winch icon
- (with rope end for winch status icon)

1.6 Winch number with master switch number and master switch operating direction
- Example: 1 : 1 Y.
  First digit: Winch number.
  Second digit: Master switch number.
  Letter: Master switch operating direction.

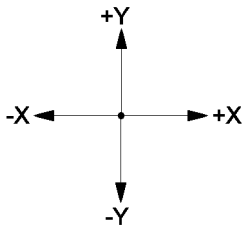

Fig.195422

1.7 Vibration sensor
- If the vibration sensor for a winch is added on the master switch, then an arrow appears in this winch icon for the added vibration sensor.
- **Note:**
  The vibration sensor is added at the first actuated crane function.

Icon „Winch display“ in parallel operation W1IIW2, see illustration **2**

1.8 Hook block Inclination Display
- Note: Only for crane types with radio incline indicator***** for hook blocks

1.8.1 Horizontal hook block
- The hook block is hanging vertically - inclination 0.0°, see illustration **2.1**

1.8.2 Hook block inclined to the left
- From the perspective of the crane cab: the hook block is inclined to the left by the displayed value, see illustration **2.2**
- A too high value is displayed blinking

1.8.3 Hook block inclined to the right
- From the perspective of the crane cab: the hook block is inclined to the right by the displayed value, see illustration **2.3**
- A too high value is displayed blinking

1.8.4 Faulty sensor / input signal
- In the case of an available but faulty sensor / input signal, blinking questions marks will be displayed.

Note

▶ As soon as the connection to the sensor or the input signal is interrupted, the display for the hook block inclination **1.8** will disappear.

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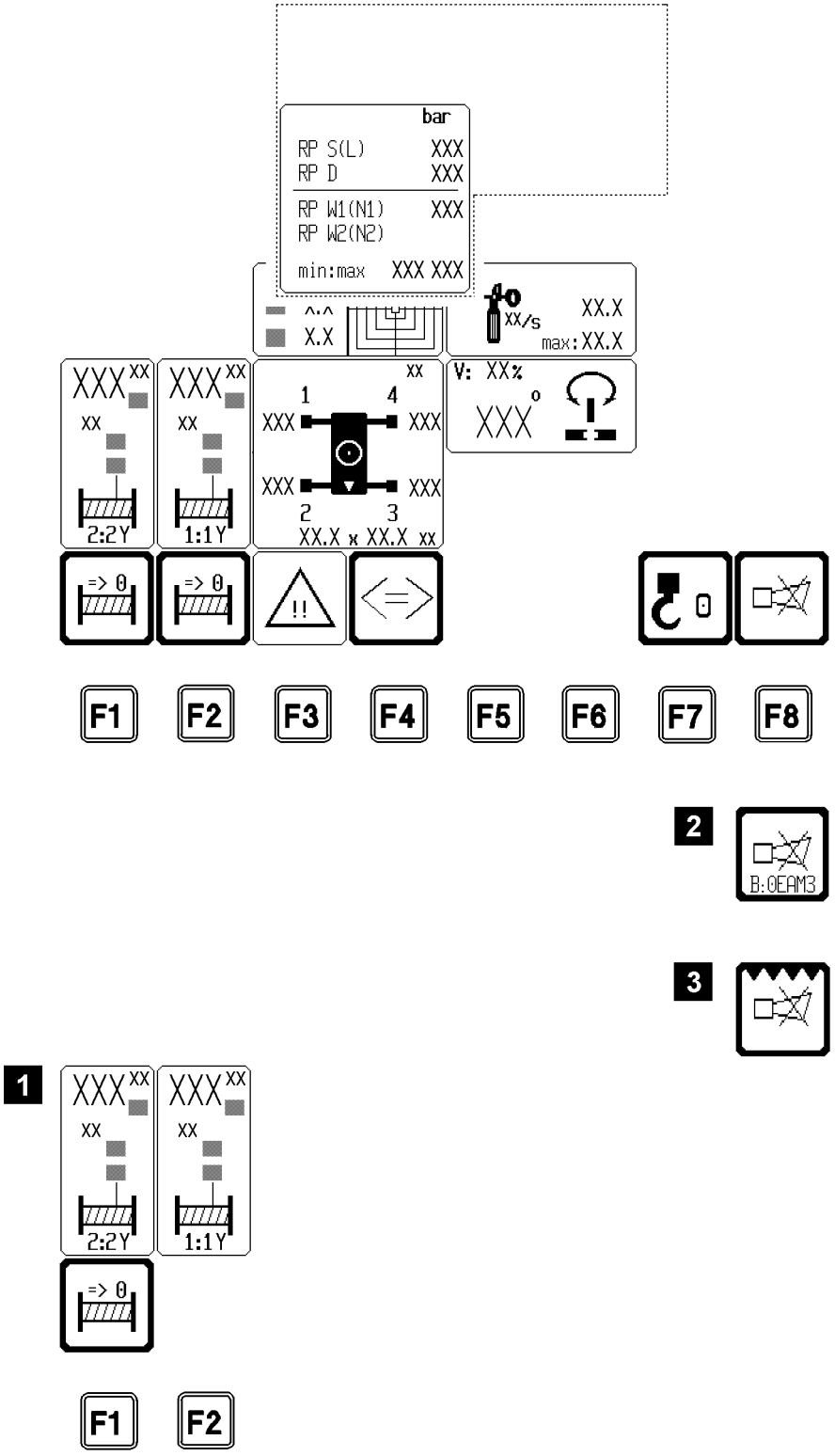

Fig.111899

7.6 The function key line in the crane operation program

The function key line consists of function keys **F1** to **F8** and the function key icon bar above it. The function keys correspond to the various function key icons above them.

The function key icons may trigger a function or they change their appearance upon the push of a key (function keys) and thereby their definition.

Not all function keys must have assigned icons. This depends on the „active“ program selection.

Pressing a function key changes the appearance of the icon above, its meaning, or its textual content.

F1 Function key
- Zero point for hook path display, winch 2
- Pressing the function key **F1** causes the „Set winch display to zero“ icon to appear, i.e. the winch 2 hook path display in the winch icon above is set to „000.00“ when the key is pressed. The path measurement begins here.

F2 Function key
- Zero point for hook path display, winch 1
- Pressing the function key **F2** causes the „Set winch display to zero“ icon to appear, i.e. the winch 1 hook path display in the winch icon above is set to „000.00“ when the key is pressed. The path measurement begins here.
- **Note:**
  When winch 1 and winch 2 work in parallel operation, then the lengths displays of winch 1 and winch 2 can only be set together with the function key **F1** to „000.00“. The function key **F2** has no function, see illustration **1**.

F3 Function key
- Turn monitoring icons on / off
- The function key **F3** can be used to turn all the monitored auxiliary functions in the crane on or off
- The appearance of the icon changes according to the status:
  „Thick border“ = auxiliary function icons turned off
  „Thin border“ = auxiliary function icons turned on
- **Note:**
  The monitoring of all auxiliary functions is always active, even if the monitoring icons are hidden.
  When a monitored limit is exceeded, then an acoustic warning (horn) sounds and the respective icon is shown.

F4 Function key
- Change monitoring page (if present)
  See also section „Monitored auxiliary functions“

F5 Function key
- Not assigned

F6 Function key
- Not assigned

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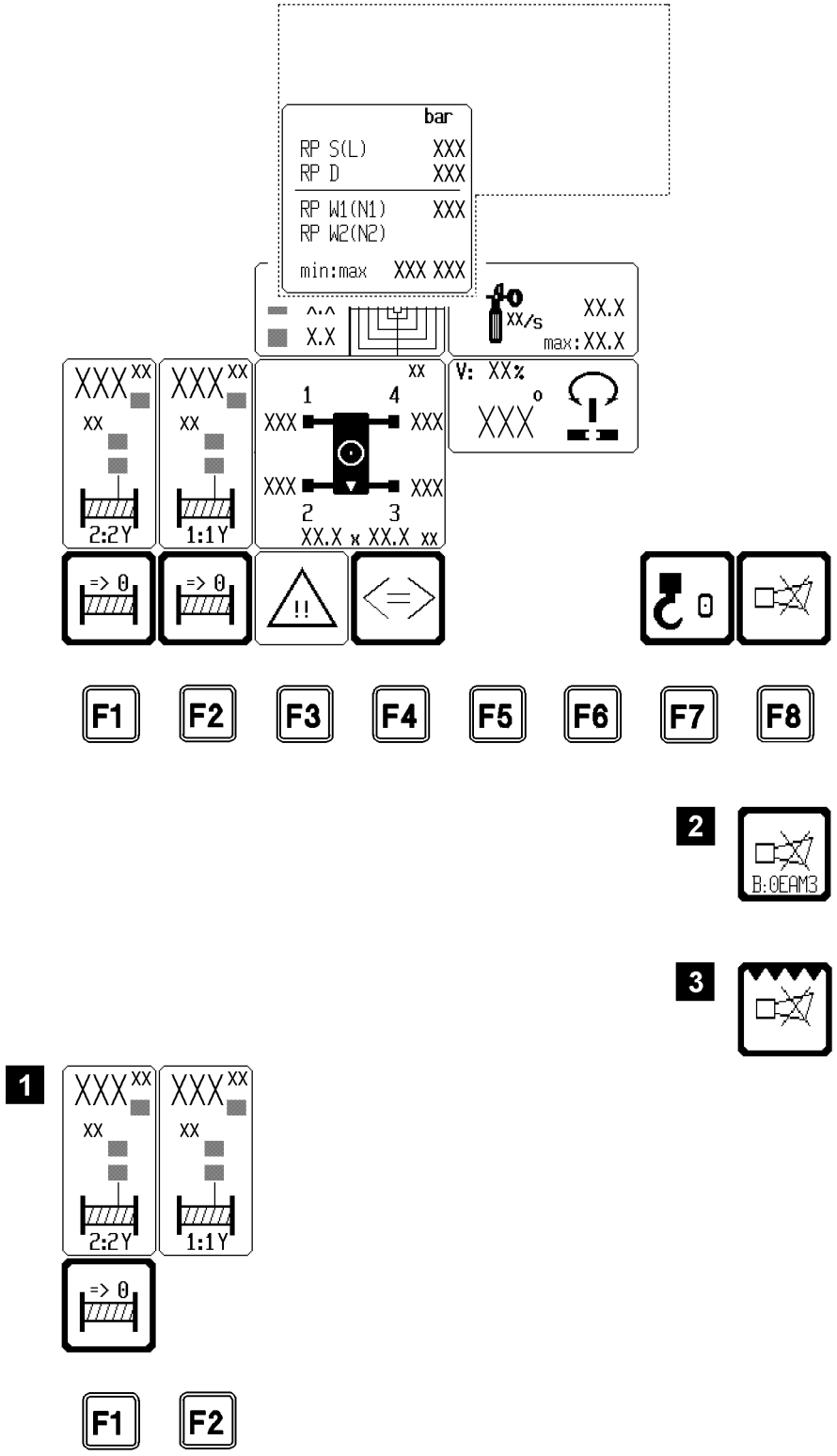

Fig.111899

F7 Function key
- Taring
- When the function key **F7** is pressed, the actual load display is set to „zero“. At the same time, the word „net“ appears in the icon of the actual load display. This function, for example, makes it possible to eliminate the weights of the hoist rope, load carriers, load handling and fastening equipment and only display the weight of the load that must be lifted (net load).
  If the taring is cancelled, the word „net“ disappears from the icon „Actual load display“ and the gross load value is displayed.
- Tare is cancelled by one of the following two actions:
  1.By pressing the function key **F7** again.
  2.By luffing by more than ±4°.
- **Note:**
  The function key **F7** acts the same way to the actual load display of the boom nose, if the boom nose is installed.

F8 Function key
- Turn off horn / error diagnostics
- Turn off the acoustic warning
  The „Horn“ and „Short horn“ acoustic warnings can be turned off by pressing the function key **F8**
- **Note:**
  A new error turns the acoustic warning on again.
- Error message in „Horn“ icon
  If a system, application or operating error occurs, an error message appears in the „Horn“ icon, see illustration **2**.
- By pressing the function key **F8** twice, the acoustic warning is turned off and the Test system program switches to the error determination screen where the error is documented. (see Diagnostics manual)

WARNING
Malfunctions in the crane control!
A special program is available for LIEBHERR crane acceptance in the LICCON computer system. This program is blocked after completion of crane acceptance.
If an additional marking is displayed in the „Horn“ icon (talons along the upper margin, see illustration **3**), then the special program is activated.
▶ Contact Liebherr Service immediately.
▶ In order to prevent error functions, access to the special program is only permitted for trained Liebherr personnel.

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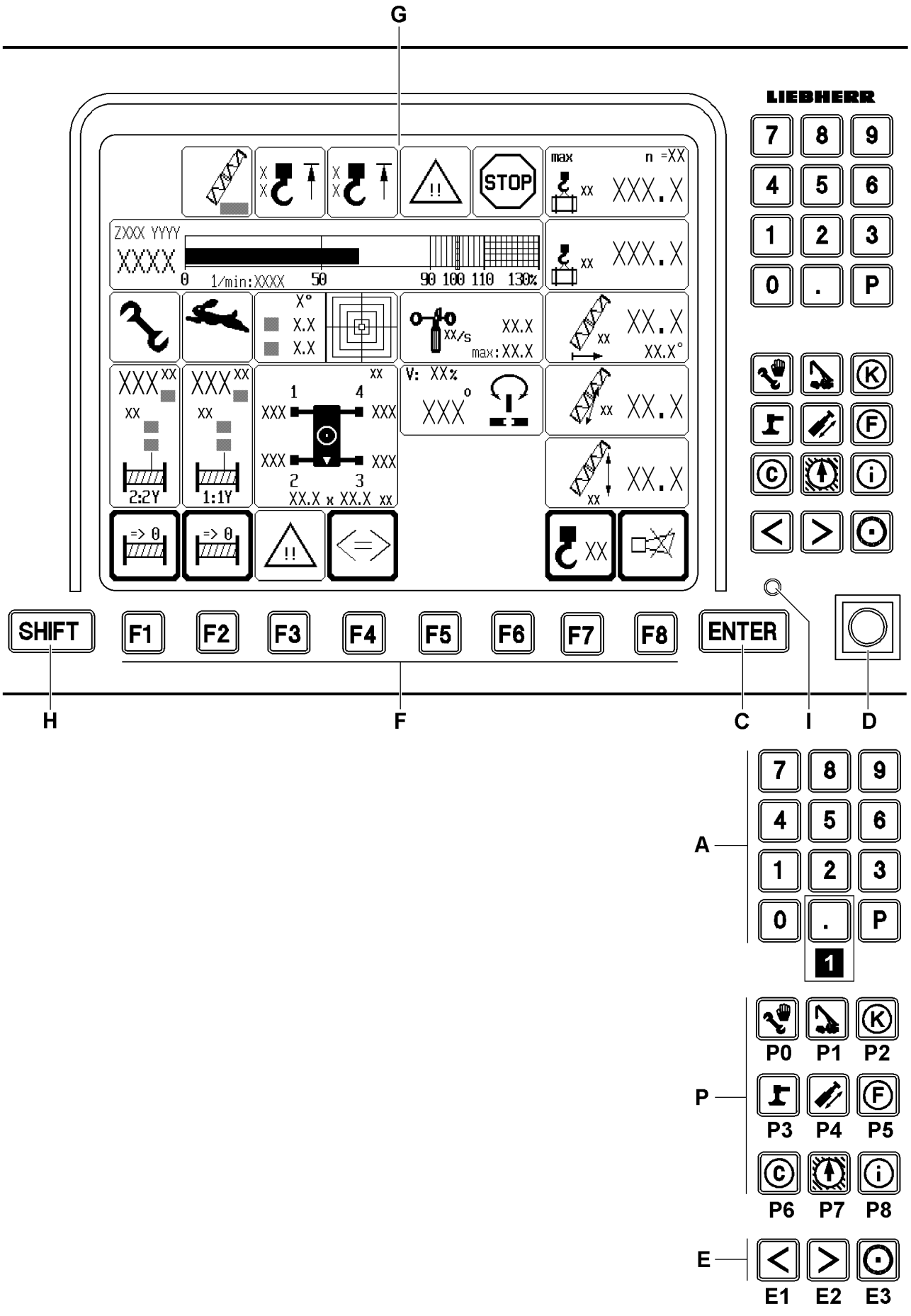

Fig.111900

7.7 Other operating elements

The following functions are assigned to the other operating elements of the display and operating unit of the LICCON computer system in the crane operation program.

A Keypad
- Keys „0“ to „9“ and „P“ have no function in the crane operation program
- Key „.“, illustration **1**
  With the key „.“ the so-called test screen function is turned on and off. All existing icons appear with a test value on the LICCON monitor.
- **Note:**
  The monitored auxiliary functions must be opened in the desired page to appear in the test screen.
  The test screen display can be held by pressing the SHIFT key **H** and the key „.“.
  By pressing the key „.“ again, the normal crane operating screen appears again.
  If the test screen is not held, then the normal crane operating screen appears after 10 seconds.

P Program keys
- The program keys are used to select individual programs. However, the appropriate program-specific features (for example, switching from set up to crane operation once with „O.K.“) must be noted.
- **Note:**
  The program currently running **cannot** be called up again using its program key.
  The programs can only be called up with their program key when the set up key was not actuated before.

C Input key ENTER
- No function in crane operation program

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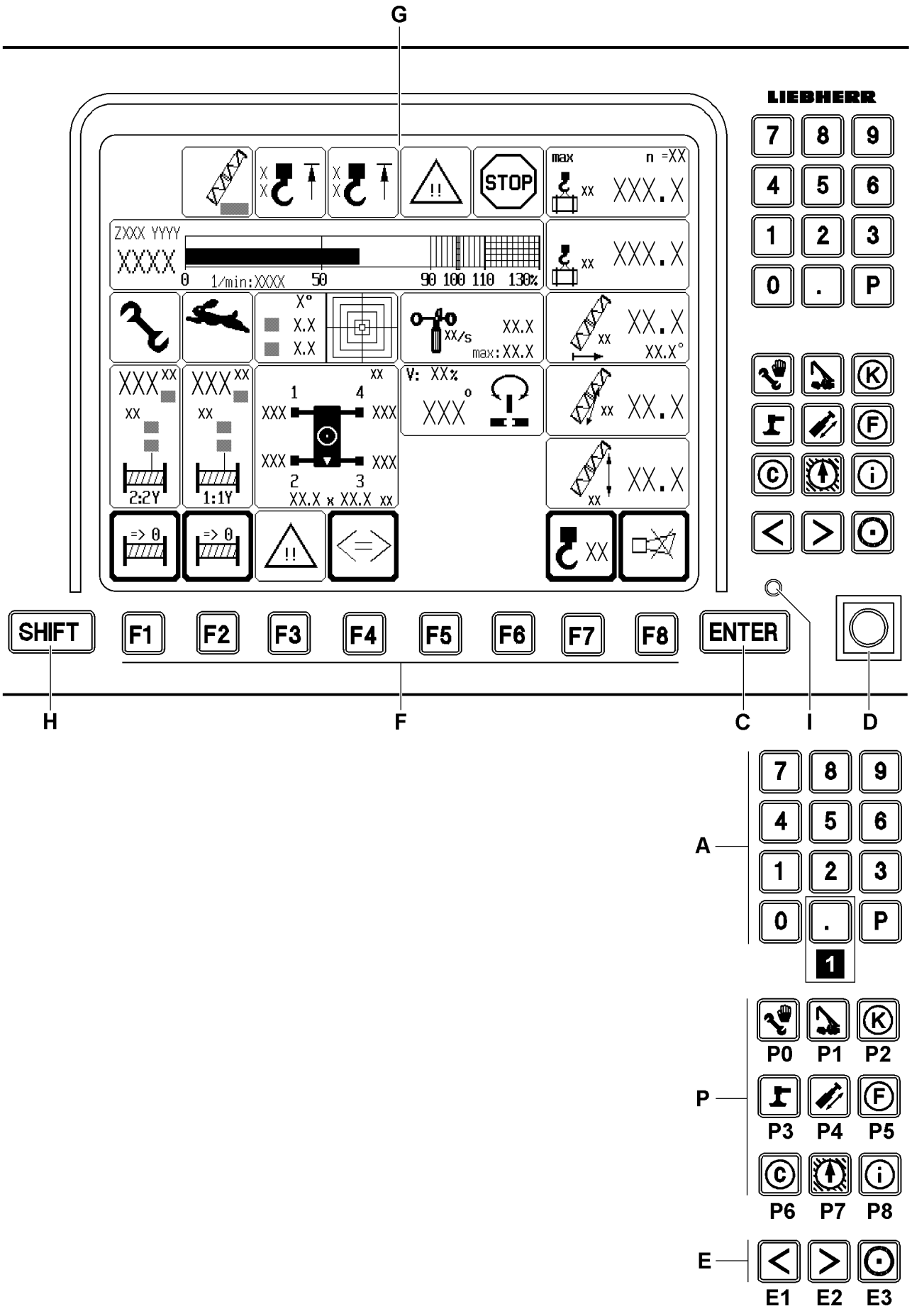

Fig.111900

D Set up key
- Zero position (not actuated):
  Normal operation.
- Touching:
  Function „Exceedance of shut off limits of the LICCON overload protection“ released.
- **Exceeding the shut off limits of the LICCON overload protection.**
  If the shut off limits of the LICCON overload protection are exceeded, the LICCON overload protection shuts the crane movements off.
  These shut offs can be exceeded by the set up key **D** in the „right touching“ position.
  Observe the Crane operating instructions, chapter 4.20.

Note
Double function set up key!
If the crane has **no** CE-mark, when actuating the set up key **D**, the release for the „Emergency operation LICCON overload protection“ is automatically engaged.
▶ Take into account, when actuating the set up key **D**, that the „Emergency operation LICCON overload protection“ is automatically released.

Note
Carry out the erection / take down procedures!
▶ By actuating the set up key **D**, all erection / take down procedures can be carried out within the erection / take down charts, for which no load charts are available.

- **Bypass of the hoist top shut off**
  If the hook block touches the hoist limit switch weight during the upward movement, the hoist limit switch reacts. The crane movement „spool up winches“ and others are turned off. This shut off can be bypassed by the set up key **D** in the „right touching“ position. Observe the Crane operating instructions, chapter 4.20.

E Special function keys
- Monitor brightness adjustment
- Key combination **E3** and **E1**: Turn background illumination on / off
- Key combination **E3** and **E2**: Brightness adjustment in three stages

Note
▶ Additional functions of the special function keys **E** are program-dependent and are further explained in the description of the individual LICCON programs.

H SHIFT key
- Second level key assignments

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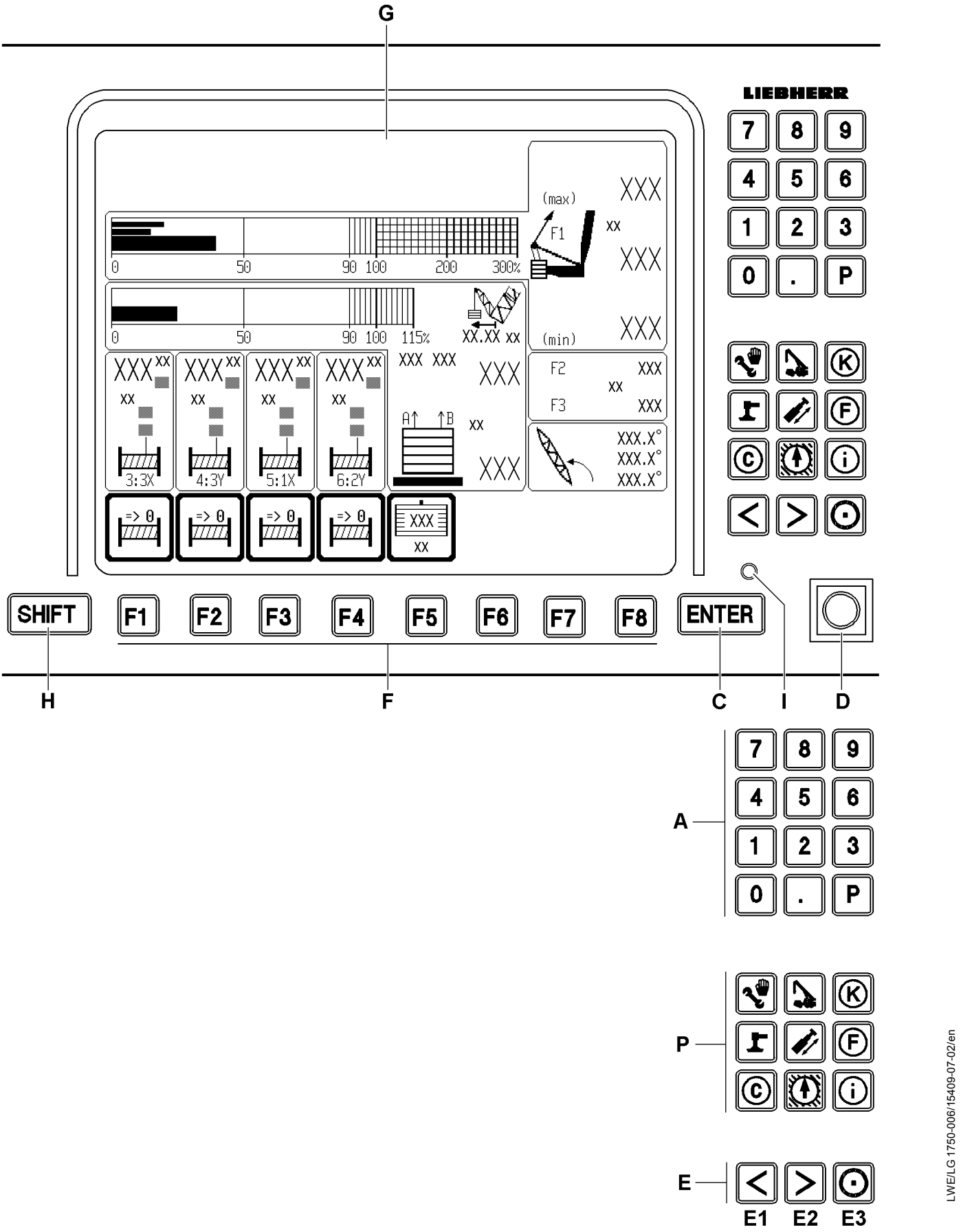

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Fig.111902

8 Operating elements of the LICCON computer system on monitor 1

A Keypad
- To edit the derrick ballast input values

P Program keys
- No function

C Input key ENTER
- Confirmation of changes

D Key button
- Acoustic signals which can be shut off of bell / horn turntable can be shut off.

E Special function keys
- Monitor brightness adjustment
- Key combination **E3** and **E1**: Turn background illumination on / off
- Key combination **E3** and **E2**: Brightness adjustment in three stages

Note

▶ Additional functions of the special function keys **E** are program-dependent and are further explained in the description of the individual LICCON programs.

F Function keys
- The function keys should always be viewed in conjunction with the function key icon line displayed on the monitor.

G Display
- In the display appears „normally“ the crane operating screen of monitor 1.
  Note:
  For diagnostics purposes, the monitor of the ballast trailer control* can be assigned (only optional for LR1750).

H SHIFT key
- No function

I LED display
- Monitor supply voltage present

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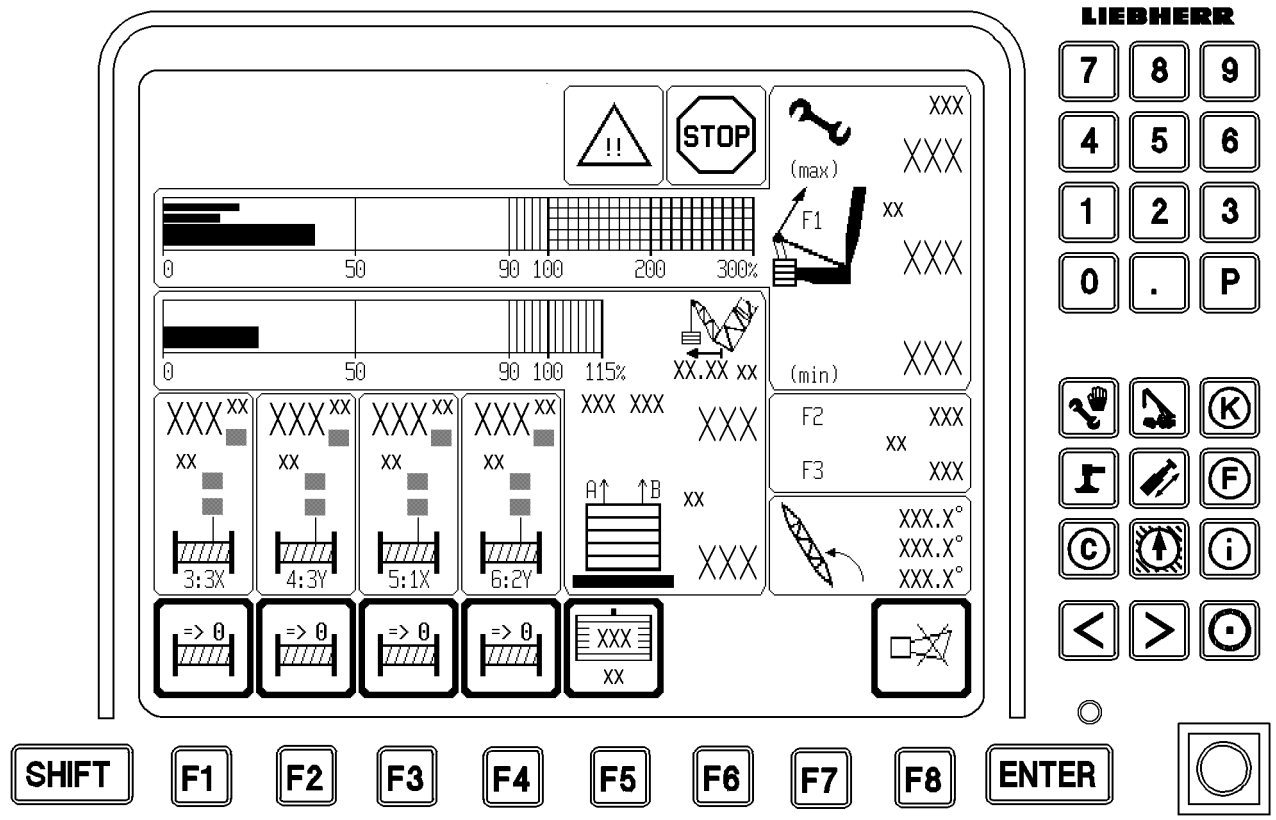

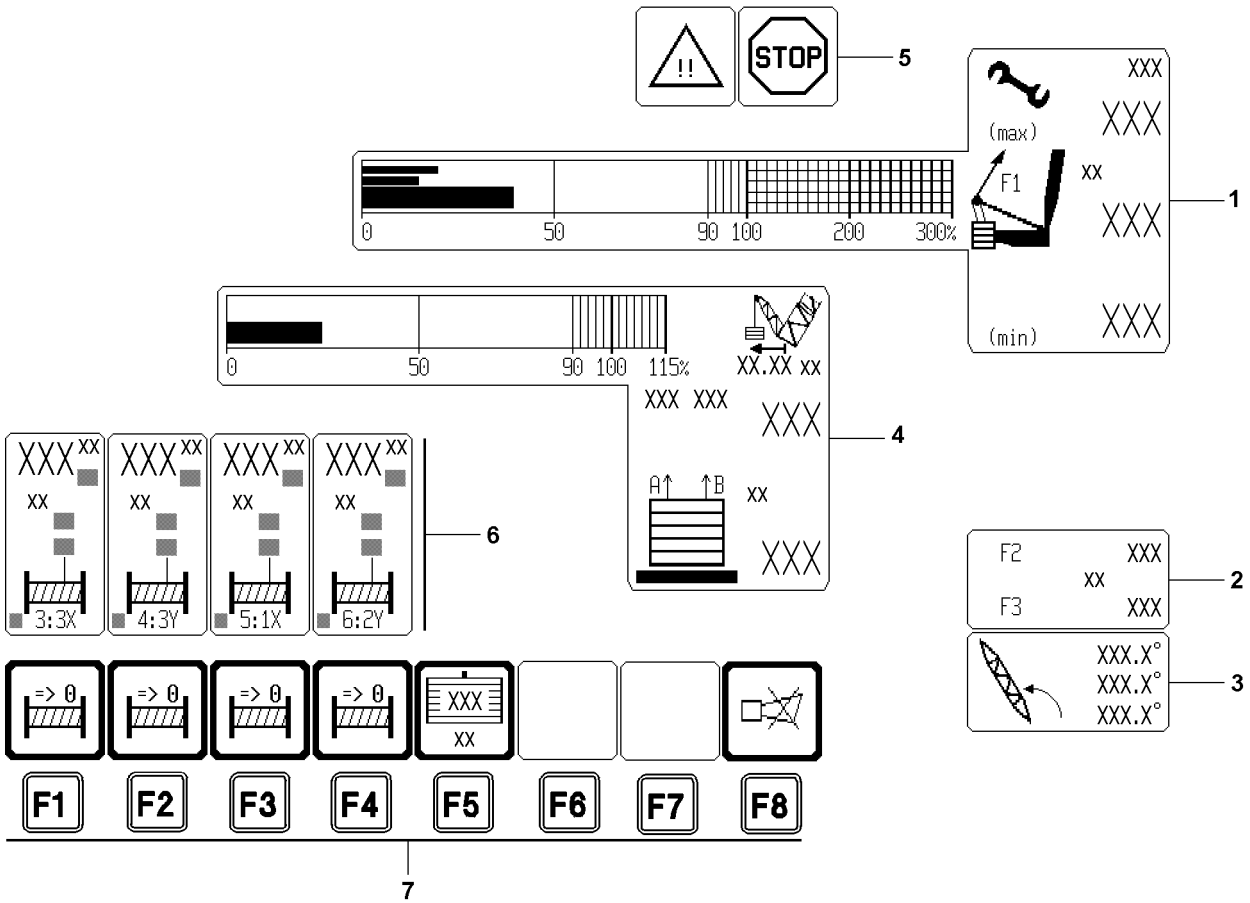

Fig.111911

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9 The Crane operation program on monitor 1

The maximum or minimum load required to balance the crane can be increased or decreased on cranes with a derrick ballast* operating under load by increasing or reducing the derrick ballast.

Note

- ▶ The suspended ballast and the ballast trailer* (only optional for LR1750) are generally described as **derrick ballast**.
- ▶ The fixed compensation weight that is assembled on the turntable is generally described as the **counterweight**.

In the crane operation program on monitor 1, the monitor is divided into eight areas:

1 Test point 1 = F1
- Pull test brackets on test point 1A and test point 1B in the SA-frame guying

2 Test points 2 / 3 = F2 / F3
- Pull test brackets on test point 2A and test point 2B in the N/W guying
- Pull test brackets on test point 3A and test point 3B in the S-guying in derrick operation

3 Derrick boom angle

4 Derrick ballast, weight and utilization
- Derrick ballast, placed and pulled.
- Derrick ballast radius
- Derrick ballast utilization.
- Forces in derrick ballast guyings A and B

5 Alarm functions
- „Advance warning“ and **„STOP“** icons.

6 Winch displays
- Winch 3*
- Winch 4
- Winch 5*
- Winch 6*

7 Function key line
- Function keys always refer to the icon shown directly above
- **Note:**
  If no icon is shown in the line directly above the function key, then no function is assigned in the program to the function key.
  See for example function key F6 and function key F7.

9.1 Test point 1 = F1

DANGER

Overload of crane in assembly operation!
If the crane is utilized in assembly operation past the assembly limit, then crane components can be overloaded.
The crane can topple over.
Death, severe bodily injuries, property damage.

- ▶ In assembly operation, the crane operator must make sure that the crane is not subjected to loads to the assembly limit.
- ▶ The crane may always only be erected / taken down **without load**, according to the data in the operating instructions and the erection and take down charts.

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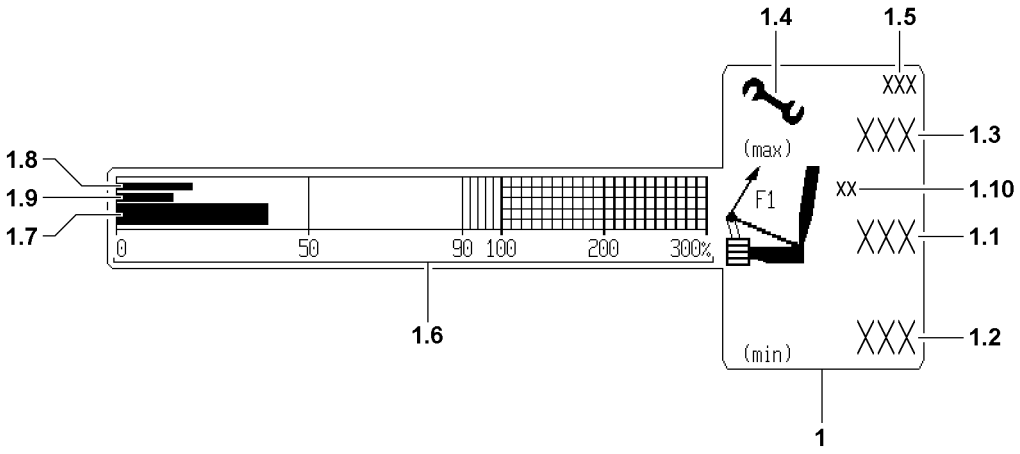

Fig.111912

9.1.1 F1-assembly maximum force

The F1-assembly-maximum force is abbreviated in the chapter as $F1_{max\text{-}assembly}$.

Note

- ▶ A load chart is available in the operating range of the crane. Outside of the operating range, no load chart is available, the specifications for assembly operation apply.
- ▶ $F1_{max\text{-}assembly}$ **1.5** can be larger within the operating range for static reasons than $F1_{max\text{-}assembly}$ **1.5** outside the operating range.
- ▶ When luffing out of the operating range with load chart, the value $F1_{max\text{-}assembly}$ **1.5** can therefore be significantly reduced.

DANGER

Failure of angle sensor!
If angle sensor on the boom for the LMB are defective, then the LMB uses the highest permissible $F1_{max\text{-}assembly}$ **1.5** as the non-bypassable maximum value.
This ensures that the boom can always be taken down, even with a defective angle sensor.
If the crane is not taken down after a failure of the angle sensors exactly according to the data in the operating instructions and the erection / take down charts, then it can be overloaded.
The crane can topple over.
Death, severe bodily injuries, property damage.

- ▶ Take the crane down if needed exactly according to the data in the operating instructions and the erection / take down charts.

Operating modes without derrick boom

For operating modes without derrick boom, there is a unbypassable F1-limit value:

- – **1.5** $F1_{max\ assembly}$
  As upper limit for erection / take down of the boom
  and
  for crane operation with load chart

Operating modes with derrick boom

For operating modes with derrick boom there are two F1-limit values

- – $F1_{max\text{-}assembly}$ **1.5** outside the operating range
  For erection and assembly of the crane (unbypassable)
- – **1.3** $F1_{max\text{-}operation}$
  As upper limit for crane operation with load chart (and a few angle degrees next to it)

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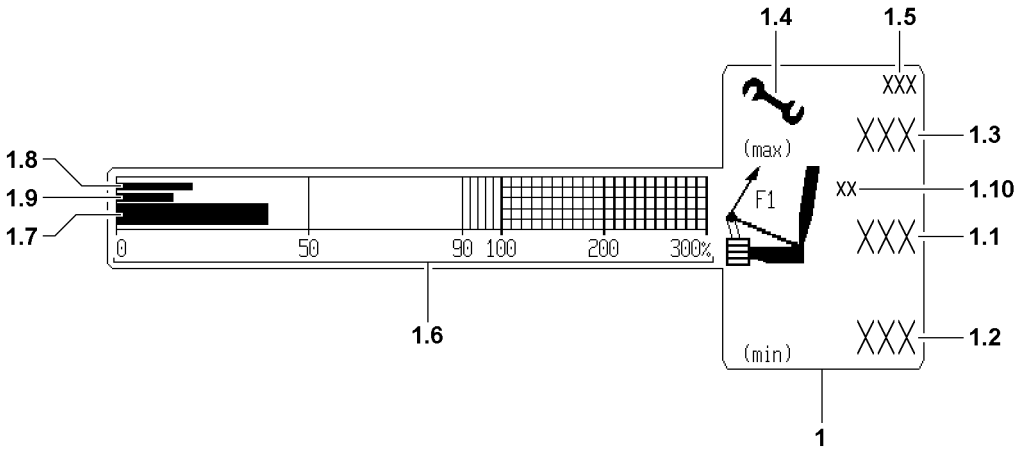

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Fig.111912

9.1.2 Test point 1 = F1 / icon description

Pull test brackets Test point 1A and test point 1B are in the SA-frame guying

Position	Icons / display values	Type of display	Is shown
1	Icon „Test point 1“	Static	Always
1.1	F1 actual force =	Static	For valid value
	$F1_{actual}$ $F1_{actual} = F1A_{actual} + F1B_{actual}$ $F1A_{actual}$ = F1-actual force test point 1A (SA-frame left) $F1B_{actual}$ = F1-actual force test point 1B (SA-frame right)	„???“ blinking	For invalid value
1.2	F1-minimum force = $F1_{min}$	Static	Always when $F1_{min}$ is larger than 0 **Note:** A shut off occurs when falling below $F1_{min}$ If no value is shown $F1_{min}$ = 0.
1.3	F1-operational maximum force = $F1_{max\text{-}operation}$	Static	Only in operating modes with derrick ballast (DB/DBW) **Note:** $F1_{max\text{-}operation}$ is the maximum value which may be reached in crane operation.

Note
Shut off $F1_{min}$!

- If the utilization of the derrick ballast is below 50 %, then there is no immediate shut off when falling below $F1_{min}$ **1.2**.
- The acoustical and optical warnings remain unaffected by the utilization of the derrick ballast.

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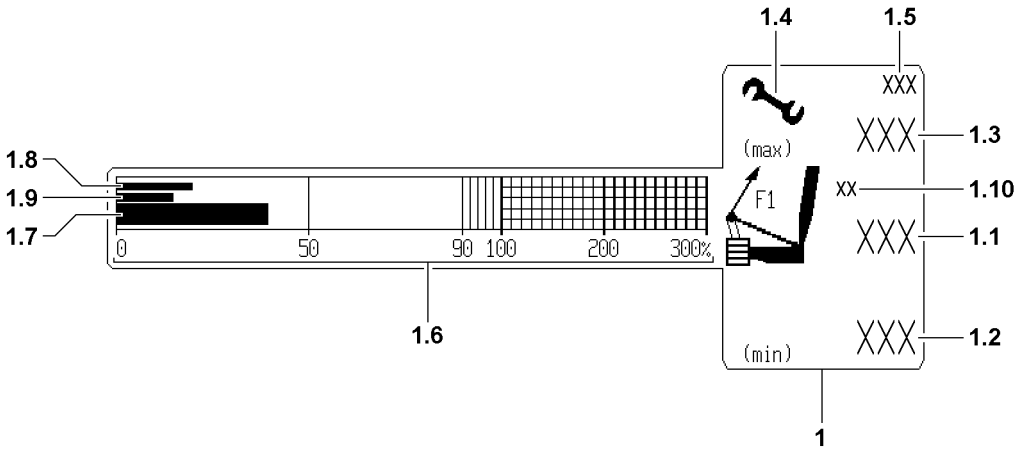

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Fig.111912

Position	Icons / display values	Type of display	Is shown
1.4	Assembly icon	Static / blinking	In „assembly operation: Boom not in operating range“ **and / or** Advance warning / shut off: Observe F1 limit values.
1.5	F1-assembly maximum force = $F1_{max\ assembly}$	Static / blinking	In „assembly operation: Boom not in operating range“ **and / or** Advance warning / shut off: Observe F1 limit values. Appears if $F1_{actual}$ is larger than 90 % of $F1_{max\text{-}assembly}$
1.6	F1-utilization scale in percent [%]	Static	Always
1.7	F1-utilization bar = Ratio $F1_{actual}$ to $F1_{max\text{-}operation}$ No display (0 percent) at: $F1_{max\text{-}operation}$ = 0 **or** No value **or** $F1_{min}$ = invalid	Dynamic	In operating modes with derrick ballast (DB/DBW)

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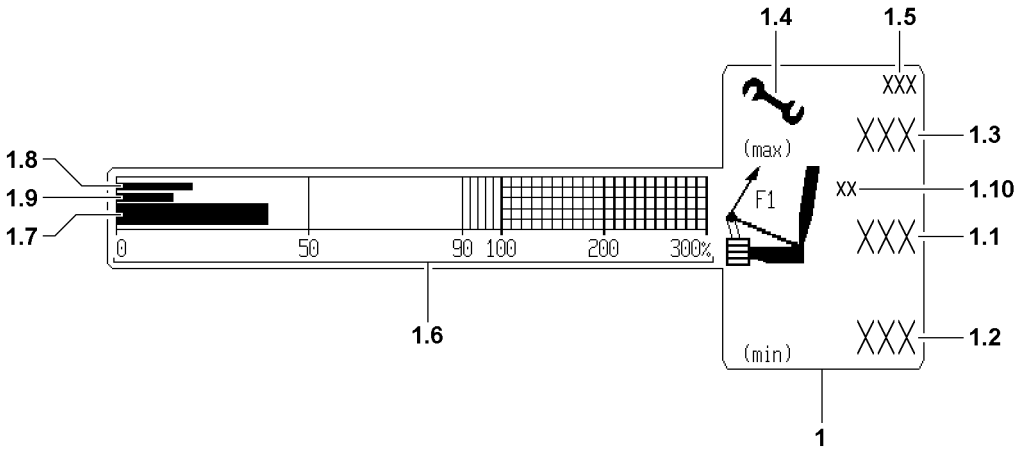

Fig.111912

Position	Icons / display values	Type of display	Is shown
1.8	F1-Min-warning bar = Ratio $F1_{min\text{-}warning\ value}$ to $F1_{max\text{-}operation}$ ($F1_{min\text{-}warning\ value} = F1_{min} + \Delta_{F1}$) No display (0 percent) at: $F1_{max\text{-}operation} = 0$ **or** No value **or** $F1_{max\ operation}$ = invalid	Dynamic	In operating modes with derrick ballast (DB/DBW) Δ_{F1} = 15 t for cranes with max- load smaller than 1000 t
1.9	F1-Min-Stop bar = Ratio $F1_{min}$ to $F1_{max\text{-}operation}$ 0 percent [%] for: $F1_{max\text{-}operation} = 0$ **or** No value **or** $F1_{max\text{-}operation}$ = invalid	Dynamic	In operating modes with derrick ballast (DB/DBW)
1.10	Measuring unit icon	Static	Always

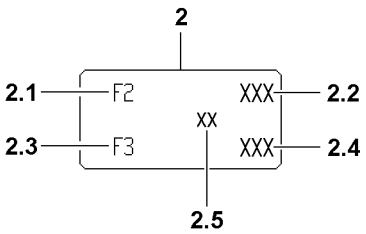

Fig.111913

9.2 Test point 2 = F2 and test point 3 = F3

Pull test brackets test point 2A and 2B are in the guying auxiliary boom / accessory on the NA-frame I (WA-frame I).

Pull test brackets test point 3A and 3B are in the guying derrick boom / main boom on the main boom head

Position	Icons / display values	Type of display	Is shown
2	Icon for N/W-guy force and main boom guy force in derrick operation	Static	In operating modes with auxiliary boom / accessory and / or derrick boom
2.1	Icon F2 for N/W-guy force test point 2	Static	In operating modes with auxiliary boom / accessory
2.2	F2-actual force = $F2_{actual}$	Static	In operating modes with auxiliary boom / accessory and valid F2-value
	$F2_{actual} = F2A_{actual} + F2B_{actual}$ Test point 2A = left Test point 2B = right	„???“ blinking	In operating modes with auxiliary boom / accessory and invalid F2-value
2.3	Icon F3 for main boom guy force test point 3	Static	In operating modes with derrick boom
2.4	F3-actual force = $F3_{actual}$	Static	In operating modes with derrick boom and valid F3-value
	$F3_{actual} = F3A_{actual} + F3B_{actual}$ Test point 3A = left Test point 3B = right	„???“ blinking	In operating modes with derrick boom and invalid F3-value
2.5	Measuring unit icon	Static	Always

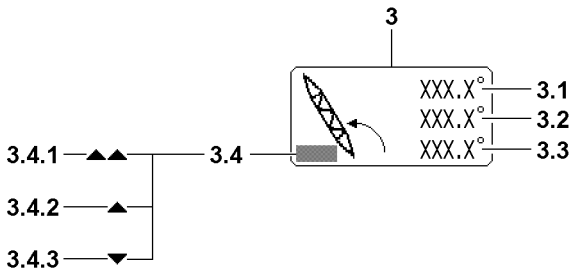

Fig.111914

9.3 Derrick boom angle

Position	Icons / display values	Type of display	Is shown
3	Derrick boom angle icon	Static	In operating modes with derrick boom
3.1	Maximum derrick boom angle in crane operation = angle-D_{max} in [°]	Static	In operating modes with derrick boom and angle-$D_{current}$ smaller or same as angle-D_{max}
		Blinking	In operating modes with derrick boom and angle-$D_{current}$ larger than angle-D_{max}
3.2	Current derrick boom angle = angle-$D_{current}$ in [°]	Static	In operating modes with derrick boom and valid value
		„???“ blinking	In operating modes with derrick boom and invalid value
3.3	Minimum derrick boom angle during crane operation = angle-D_{min} in [°]	Static	In operating modes with derrick boom and angle-$D_{current}$ larger or same as angle-D_{min}
		Blinking	In operating modes with derrick boom and angle-$D_{current}$ smaller than angle-D_{min}
3.4	Alarm functions derrick boom		Limitation / monitoring of relapse cylinders **Note:** As an icon appears, an error message is issued.
3.4.1	Two arrows pointing up	Static	Relapse cylinder on block (limit switch actuated) or sensor / limit switch defective
3.4.2	Arrow pointing up	Static	At angle-$D_{current}$ larger than angle-D_{max}
3.4.3	Arrow pointing down	Static	At angle-$D_{current}$ smaller than angle-D_{min}

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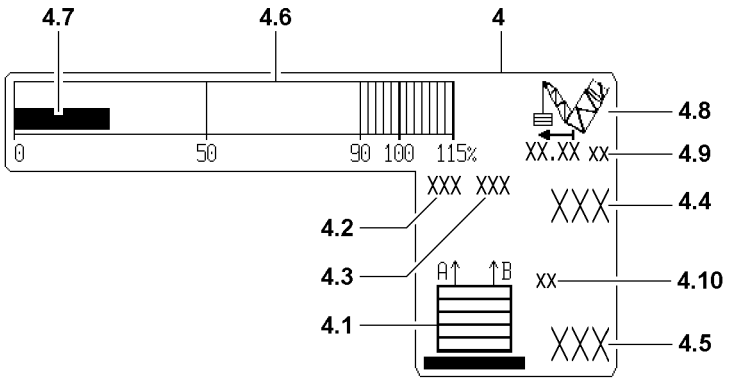

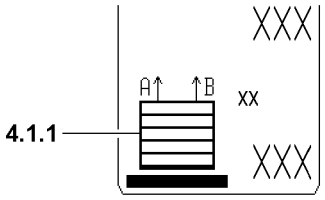

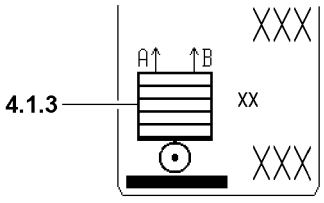

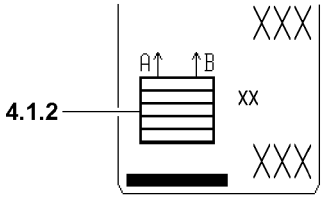

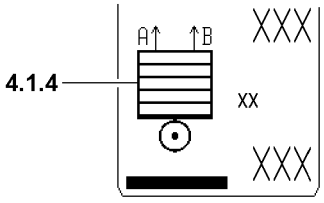

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Fig.111915

9.4 Derrick ballast, weight and utilization

Note
- ▶ Ballast trailer*: Only optional for LR1750.
- ▶ In crane operation with ballast trailer* observe the respective chapters.

Test points derrick ballast guying A are:
- Test point 4A = pressure sensor ring surface left F4A
- Test point 5A = pressure sensor piston surface left F5A

Test points derrick ballast guying B are:
- Test point 4B = pressure sensor ring surface right F4B
- Test point 5B = pressure sensor piston surface right F5B

Position	Icons / display values	Type of display	Is shown
4	„Derrick ballast, weight and utilization“ icon	Static	In operating modes with derrick ballast
4.1	„Derrick ballast“ icon	Static	In operating modes with derrick ballast, depending on the type and the condition of the derrick ballast (see 4.1.1 - 4.1.4)

Note
- ▶ The view of the „derrick ballast“ **4.1** icon changes depending on if the derrick ballast is set up as a suspended ballast or as a ballast trailer.
- ▶ During crane operation observe the respective chapters for suspended ballast or ballast trailer in the Crane operating instructions.

Position	Icons / display values	Type of display	Is shown
4.1.1	„Suspended ballast on the ground“ icon	Static	Ground contact sensor reports „Suspended ballast **not suspended**“
4.1.2	„Suspended ballast suspended“ icon	Static	Ground contact sensor reports „Suspended ballast **suspended**“
4.1.3	„Ballast trailer on the ground“ icon	Static	Key button ballast trailer in position „Ballast trailer **not suspended**“
4.1.4	„Ballast trailer suspended“ icon	Static	Key button ballast trailer in position „Ballast trailer **suspended**“

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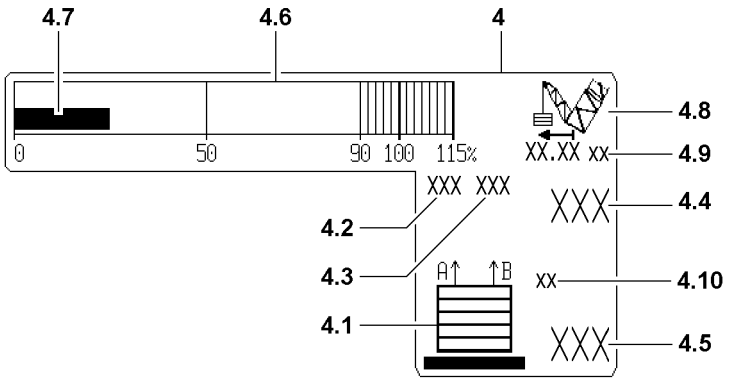

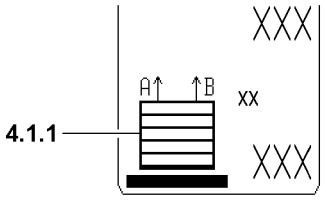

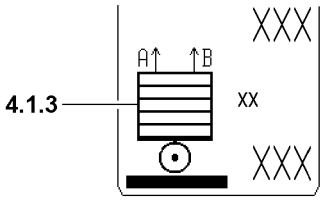

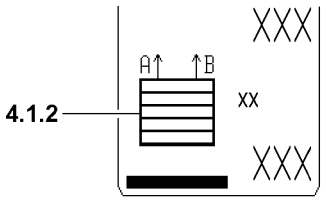

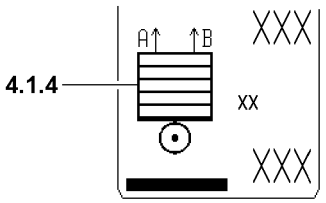

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Fig.111915

Position	Icons / display values	Type of display	Is shown
4.2	Force in derrick ballast guying A (left) Test point 4A Test point 5A	Static	In operating modes with derrick ballast **and** „Values test points“ valid
		Blinking	In operating modes with derrick ballast **and** „Values test points“ valid **and** Difference between guy force A and B is larger than permissible
		„???“ blinking	In operating modes with derrick ballast **and** At least one „Value test point“ invalid
4.3	Force in derrick ballast guying B (right) Test point 5A Test point 5B	Static	Valid in operating modes with derrick ballast and **F4B** **and** „Values test points“ valid
		Blinking	In operating modes with derrick ballast **and** „Values test points“ valid **and** Difference between guy force A and B is larger than permissible
		„???“ blinking	In operating modes with derrick ballast **and** At least one „Value test point“ invalid

Note
Failure of pressure sensor!
- ▶ If only one pressure sensor fails, for example F5A (test point 5A) invalid, then the LICCON takes F5A = F5B in the interim.
- ▶ An error message is issued.
- ▶ The error must be remedied immediately.

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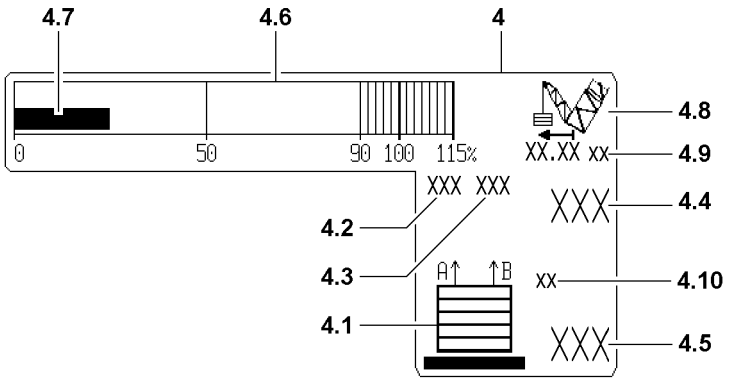

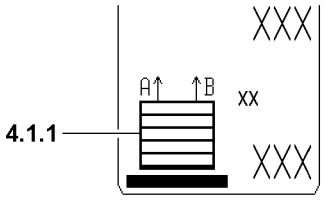

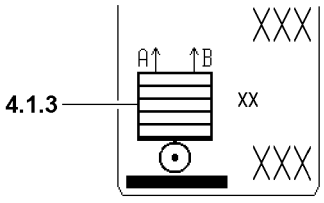

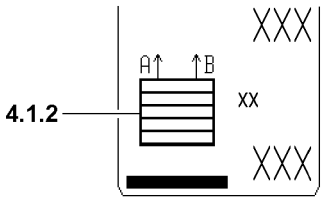

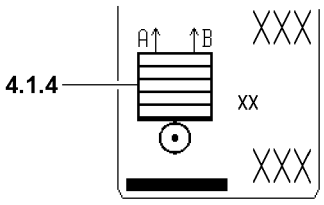

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Fig.111915

Position	Icons / display values	Type of display	Is shown
4.4	Pulled derrick ballast = BA_{pulled} = vertical force components in derrick ballast guying, calculated from test points 4A, 4B, 5A and 5B **Note:** The sum of forces in the derrick ballast guying A and B is larger or the same as the pulled derrick ballast (BA_{pulled}).	Static	In operating modes with derrick ballast, if value valid
		„???“ blinking	In operating modes with derrick ballast, if value invalid **or** Operating mode with BW and derrick ballast radius invalid
4.5	Placed derrick ballast = BA_{placed} **Note:** This value has been entered manually and confirmed with the **ENTER** key. The value is saved when turning off and is valid again after turning on until it is changed with the function key **„F5“**.	Static	In operating modes with derrick ballast, if value BA_{placed} is permissible
		Blinking	In operating modes with derrick ballast, if value BA_{placed} is questionable
		„???“ blinking	In operating modes with derrick ballast, if value invalid

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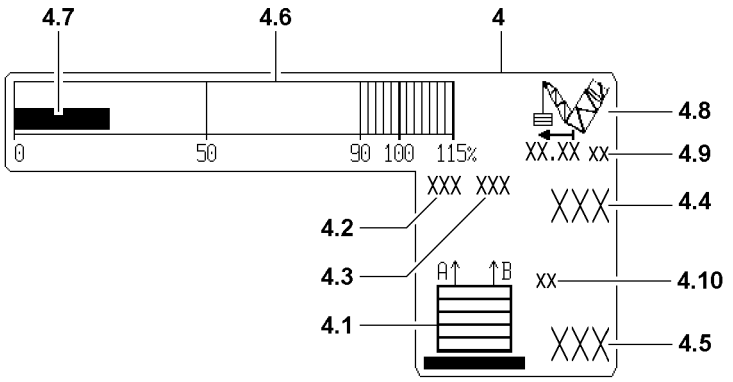

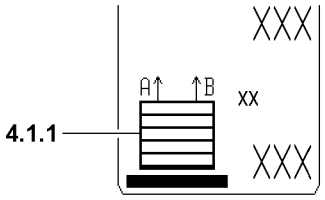

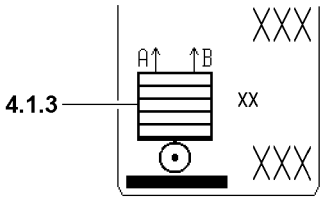

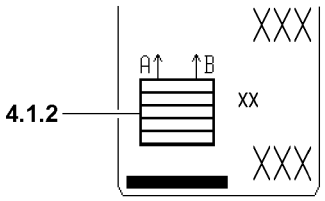

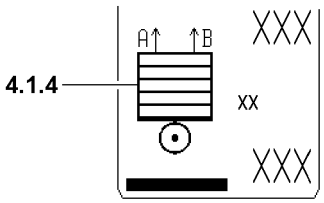

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Fig.111915

Position	Icons / display values	Type of display	Is shown
4.6	Ballast utilization scale	Static	Always
4.7	Derrick ballast utilization bar = BA_{pulled} / BA_{placed} in percentages [%] Derrick ballast utilization bar is 0 at: BA_{placed} smaller than BA_{placed_min} **or** Pulled off = invalid	Dynamic	In operating modes with derrick ballast **Note:** The utilization bar can show max. 115 %. **Note:** BA_{placed_min} 5 t for cranes with max-load smaller than 1000 t. BA_{placed_min} 10 t for cranes with max. load larger or same as 1000 t.
4.8	„Derrick ballast radius“ icon	Static	In operating modes with derrick ballast
4.9	Measuring unit Derrick ballast radius	Static	Valid in operating modes with derrick ballast and derrick ballast radius value
		Blinking	Invalid in operating modes with derrick ballast and derrick ballast radius value
4.10	Measuring unit Derrick ballast weight	Static	Always

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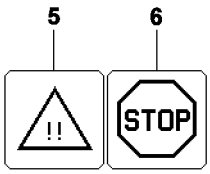

Fig.199940

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9.5 Alarm functions

NOTICE
Triggered alarm function!
If an alarm function is triggered (for example a advance warning occurrence or LMB Stop), the cause must be determined.
- ▶ Always pay attention to triggered alarm functions.
- ▶ Alarm functions can flash over the monitor.

Note
Shut off delay LMB Stop!
- ▶ A LMB stop with shut off delay remains for a certain period of time. Possible fluctuating movements of the crane can be thereby minimized.

Position	Icons / display values	Type of display	Is shown
5	„Advance warning“ icon	Blinking	At $F1_{\text{min advance warning}}$ ($F1_{is}$ smaller than $F1_{\text{min-warning value}}$)
6	„STOP“ icon	Blinking	At $F1_{\text{min-stop}}$ ($F1_{is}$ smaller than $F1_{min}$) with shut off delay 3 s **or** At $F1_{\text{max-operation stop}}$ ($F1$ larger or same as $F1_{\text{max-operation shut off value}}$) with three seconds shut off delay **or** $F1_{\text{max-assembly-stop}}$ ($F1_{is}$ larger or same as $F1_{\text{max-assembly}}$) with three seconds shut off delay

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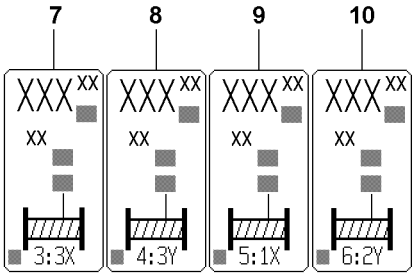

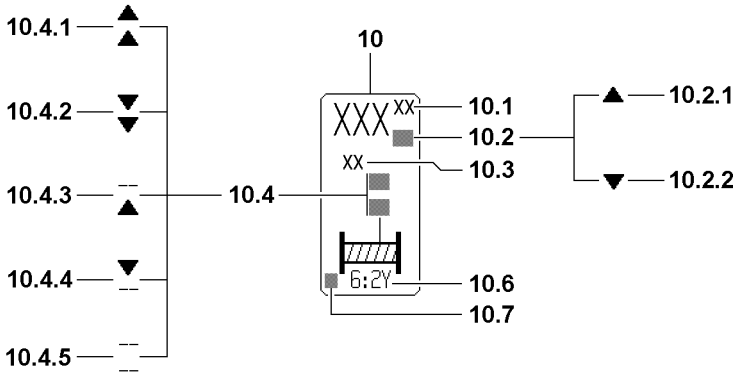

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Fig.111916

9.6 Winch displays

9.6.1 Winches 3 to 6

The icons for winch 3*, winch 4, winch 5* and winch 6* are only shown on monitor 1, if the crane is equipped with these winches.

The display of winches is the same as the display of winch 1 and 2 on LICCON monitor 0.

Position	Icons / display values	Type of display	Is shown
7	Winch display winch 3*	Static	With installed and plugged in winch 3 and winch speed sensor active* **or** If emergency operation is turned on
8	Winch display winch 4	Static	With installed and plugged in winch 4 and winch speed sensor active **or** If emergency operation is turned on
9	Winch display winch 5*	Static	With installed and plugged in winch 5 and winch speed sensor active* **or** If emergency operation is turned on
10	Winch display winch 6*	Static	With installed and plugged in winch 6 and winch speed sensor active* **or** If emergency operation is turned on

Note

Assignment control winch / hoist winch!

- „Winch 3*“ and „Winch 4“ are always calculated as control winches.
- „Winch 5*“ is calculated as control winch in crane operation with auxiliary boom / accessory.
- „Winch 5*“ is calculated as hoist winch in crane operation without auxiliary boom / accessory.
- „Winch 6*“ is always calculated as hoist winch.

Note

When „Winch 5*“ or „Winch 6*“ is calculated as hoist winch and:

- No boom nose is installed, then the hook path calculation is made with the reeving of the boom.
- The boom nose is installed, then the hook path calculation is made with the reeving of the boom nose.

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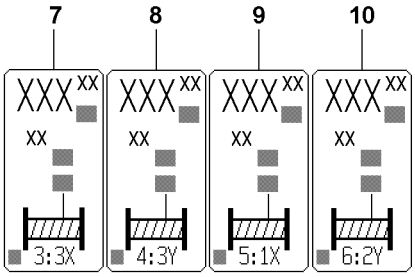

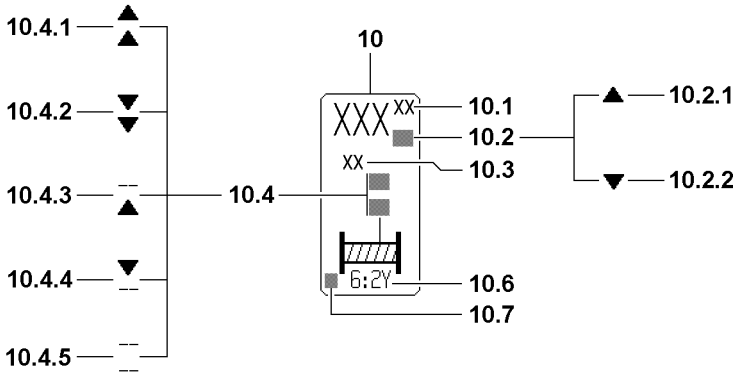

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Fig.111916

9.6.2 Winch display icon

The winch 3 and winch 6 icons have the same meaning, which are explained for the „Winch 6“ **10** icon.

Note
Display area winch displays!
- ▶ The display values **10.1** have only three positions before the comma, any positions before that are cut off. The crane operator must evaluate for himself if, for example 200 m rope is on a winch or 1200 m. **The display in both cases with 200 m is identical.**
- ▶ The hook path calculation only works accurately if the load is suspended freely and is not luffed during the lifting procedure. Not taken into account are flexation and rope expansion.
- ▶ The length display (hook path display) is only accurate and the layer sheer is only taken into account correctly if the winch has been calibrated and no interruptions of the CPU power supply have occurred (cold start). The hook travel display is calibrated by spooling the rope up or out until the calibration switch reacts.

Note
- ▶ If one of the winches is used as hoist winch according to the set operating mode, then the **completed hook path** is shown in the winch icon. The value, which was tared by the corresponding function key is still shown unchanged, even after turning off and on or after an operating mode change.
- ▶ If one of the winches is used as a control winch, then the current **rope length on the winch drum** is shown, not the hook path. Then taring is possible, but after turning on and off again or after an operating mode change, the original value „rope length on the rope drum“ is shown again.

10 „Winch 6“ icon

10.1 Completed hook path
- In [m] or [ft]
  From a zero point to be determined
- **Note:**
  Is statically shown when the winch is calculated as **hoist winch** and a manually entered reeving must be assigned to this winch.

or

10.1 Rope length of the winch drum
- In [m] or [ft]
- **Note:**
  Is statically shown when the winch is calculated as **control winch**.
- **Note:**
  For the intake gear, the rope length is valid equally for the left and the right half of the rope drum.

Note
Error in winch path measurement!
- ▶ In case of an error in the winch path measurement, blinking „???“ appear as display value **10.1**.
- ▶ If an error occurs and an error message is issued, see Diagnostics manual.

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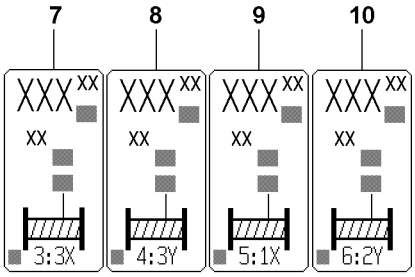

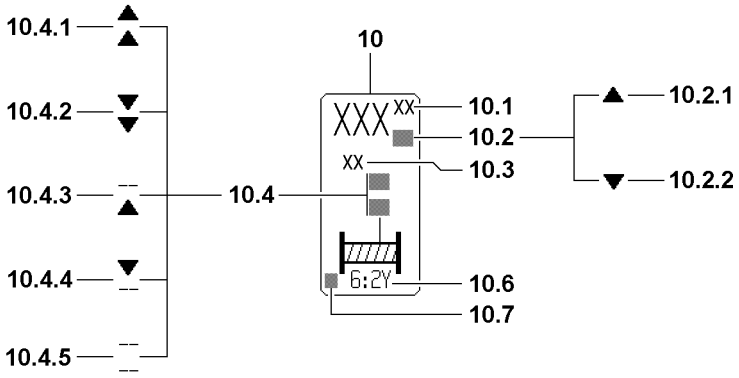

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Fig.111916

10.2 Direction of hook movement

The arrows on the length value show the direction of the hook movement in relation to the zero point:
- Arrow up **10.2.1**: Hook has moved upward from the zero point.
- Arrow up **10.2.2**: Hook has moved down from the zero point.

10.3 Length unit for hook path display
- In [m] or [ft]

10.4 Winch status display
- There are five winch status icons (all blinking):

10.4.1 Spool out

10.4.2 Spool up

10.4.3 Spooled out
- Spooling out is blocked

10.4.4 Spooled up
- Spooling up is blocked

10.4.5 Winch is deactivated
- Spooling up and spooling out are blocked (via Control parameter program)
- **Note:**
  If no winch status icon appears, the activated winch is inactive and is neither spooled up nor spooled out.

10.5 Winch icon
- (with rope end for winch status icon)

10.6 Winch number with master switch number and master switch operating direction
- Example: 6:2Y
  First digit: Winch number.
  Second digit: Master switch number.
  Letter: Master switch operating direction.

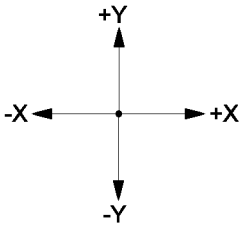

Fig.199930

10.7 Vibration sensor
- If the vibration sensor for a winch is added on the master switch, then the arrow **10.7** appears in this winch icon for the added vibration sensor.
- **Note:**
  The vibration sensor is added at the first actuated crane function.

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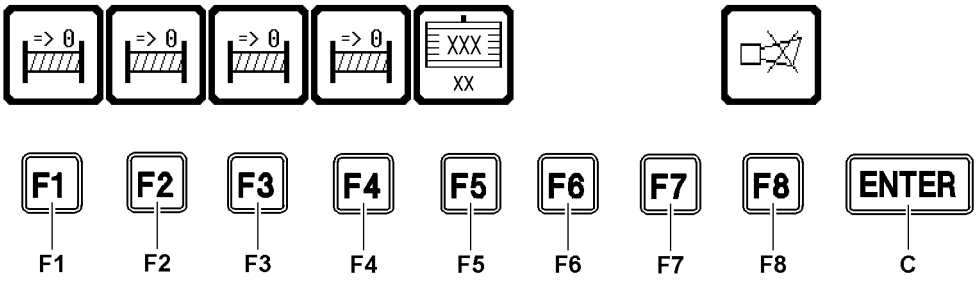

Fig.111917

9.7 Function key line

Position	Function / function key line	Type of display	Is shown
F1	Tare the length display of winch 3* **Note:** Tare = length display is set to **0**.	Static	If winch display for winch 3* is shown
F2	Tare the length display of winch 4 **Note:** Tare = length display is set to **0**.	Static	If winch display for winch 4 is shown
F3	Tare the length display of winch 5* **Note:** Tare = length display is set to **0**.	Static	If winch display for winch 5* is shown
F4	Tare the length display of winch 6 **Note:** Tare = length display is set to **0**.	Static	If winch display for winch 6* is shown

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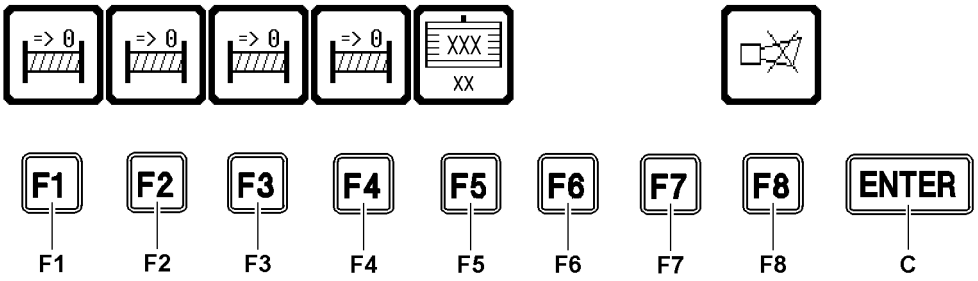

Fig.111917

Position	Function / function key line	Type of display	Is shown
F5	Ballast editing key*****	Static	In operating modes with derrick ballast
	When pressing function key F5, the thick icon frame changes to a thin icon frame. A blinking cursor appears in the ballast editing field. The value for the placed ballast can only be entered in the displayed weight unit [t] or [lbs] via the keypad on monitor 1.		
	The ballast editing can be ended with:		
	- Pressing the ENTER key **C**.		
	= take over value. The entered value appears now as value for the placed ballast (BA_{placed}) in the ballast icon		
	or		
	- Pressing the „F5“ key.		
	= End editing. The change is discarded. The old value of BA_{placed} remains in the ballast icon.		

Note

▶ When editing the ballast, make sure to observe the respective section regarding the derrick ballast in the Crane operating instructions, chapter 4.03.

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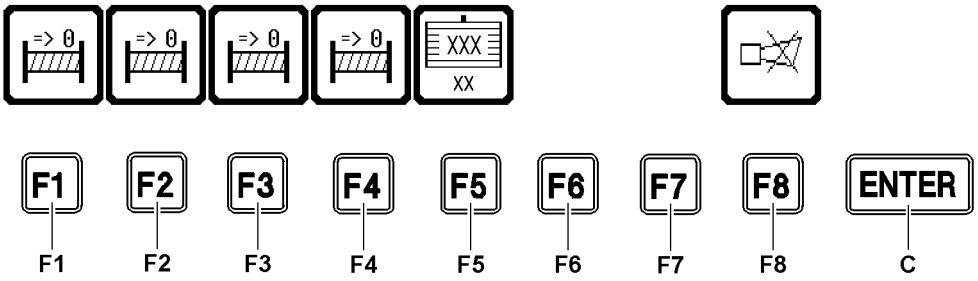

Fig.111917

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Position	Function / function key line	Type of display	Is shown
F5*	Ballast input value (BA_{edit})* = edited ballast value in function key icon of „F5“	Static	For **valid** ballast input value
		„???“ blinking	For **invalid** ballast input value
F6	Not assigned		
F7	Not assigned		
F8	„Horn“ icon - Turn off the acoustic signal „Horn“ on monitor 1 by pressing the „F8“ key.	Blinking	If the acoustic signal „Horn“ sounds on monitor 1. See paragraph „Acoustic warning on monitor 1“.

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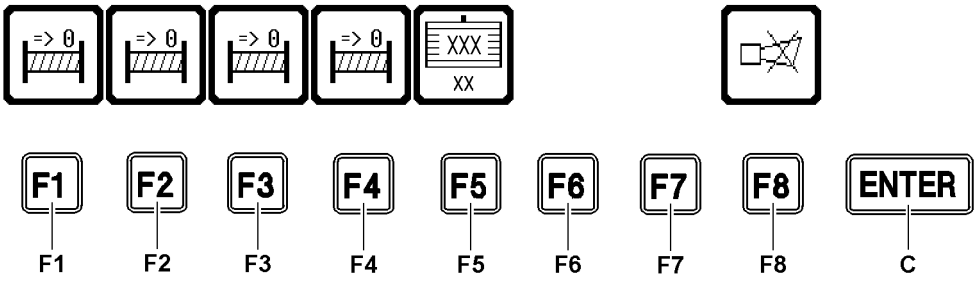

Fig.111917

9.8 Acoustic warning on monitor 1

Acoustic warnings on monitor **1** are indicated by the warning sound „Horn“.

Error messages are shown in the horn icon of LICCON monitor **0**.

The warning sound „Horn“ is divided into two categories:
- „Horn“ is a beeping sound of a duration of approximately 0.5 seconds, which is repeated in a second cycle.
- „Short horn“ is a beeping sound of a duration of approximately 0.1 seconds, which is repeated in a second cycle.

F8 „Horn“ icon
- When the horn icon is shown in the LICCON monitor, any acoustic signals which will occur can be shut off by the LICCON monitor **1** by pressing the function key **F8**.

9.8.1 Acoustic signal „Horn“

For some operational errors found on the CPU 1, which can lead to a shut off of a movement, it is important to check the operating screen on monitor 1. These errors are also reported by the acoustical signal „Horn“, in addition to the optical display.

Operational errors are:
- Exceeding of test point 1 - assembly maximum threshold.
- Exceeding of test point 1 - operation -max- shut off threshold.
- Exceeding of test point 1 - minimum threshold.
- Exceeding of maximum derrick boom angle.
- Falling below minimum derrick boom angle.

Operational errors with error messages (LICCON-Error-Code LEC) are:
- Derrick ballast input error.
- Derrick ballast guy force: Difference between right (A) and left (B) too large.

Note

▶ The sensor monitored by CPU1 (pull test brackets, pressure sensors, angle sensors) are shown in case of an error by an error message on LICCON monitor 0.

▶ There is **no** acoustical signal „Horn“ on monitor 1.

9.9 Acoustic signal „Short horn“

Sounds in addition to the visual display of error messages without an error number and which do not lead directly to crane movement shut off by the LICCON overload protection.

Monitored error messages are:
- Advance warning threshold of test point 1 - minimum force has been reached

9.10 Priority acoustic signal

- The „Horn“ alarm has higher priority than the „Short horn“ alarm, i.e. „Horn“ takes preference over „Short horn“.
- The „Horn“, as well as the „Short horn“ immediately become active again if an error recurs.

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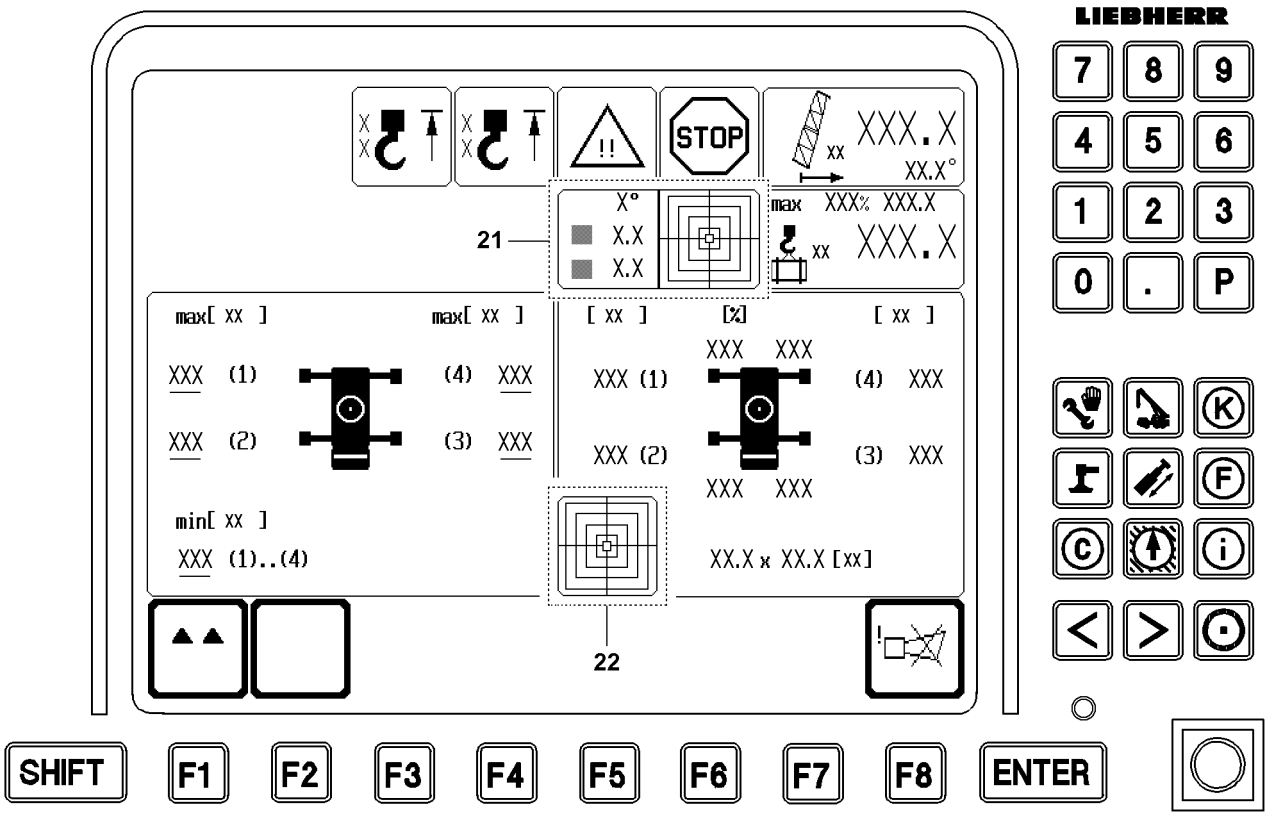

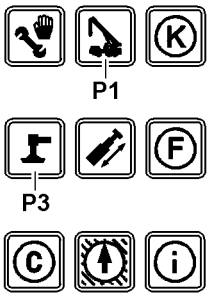

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Fig.111906

10 The Support program

The support program can contain up to two separate and independent parts (optional).

The monitor screen shows the complete configuration of the support program. Depending on the optional, the individual parts of the program are inactive and therefore not visible on the LICCON monitor. The numerical values in the icons are only examples and may differ from the crane.

Note

In the support program, the incline of the crane is shown in two different icons:

- ▶ Incline of the crane in relation to the alignment of the crane superstructure: „Incline crane superstructure“ icon **21**.
- ▶ Incline of the crane in relation to the alignment of the crane chassis: „Incline crane chassis“ icon **22**.
- ▶ Example: If the crane superstructure is turned by 90°, then the „Incline crane superstructure“ icon **21** adjusts to the changed position of the crane superstructure, the display in the „Incline crane chassis“ icon **22** keeps its direction.

10.1 Starting / stopping the program

10.1.1 Starting the program

Note

- ▶ Support the crane / automatically, see Crane operating instructions, chapter 3.05.

- ▶ Press the program key **P3**.

Result:

– The support program is started.

10.1.2 Stopping the program

- ▶ Press the program key **P1**.

Result:

– The support program is terminated.
– System switches back to the crane operation program.

10.1.3 Program configuration

- **Support force monitoring***
  Display and monitoring of support force of all four support cylinders during crane operation.
- **Sliding beam monitoring***
  Only optional for LG 1750.
  Display and monitoring of extension conditions of all four sliding beams during crane operation.

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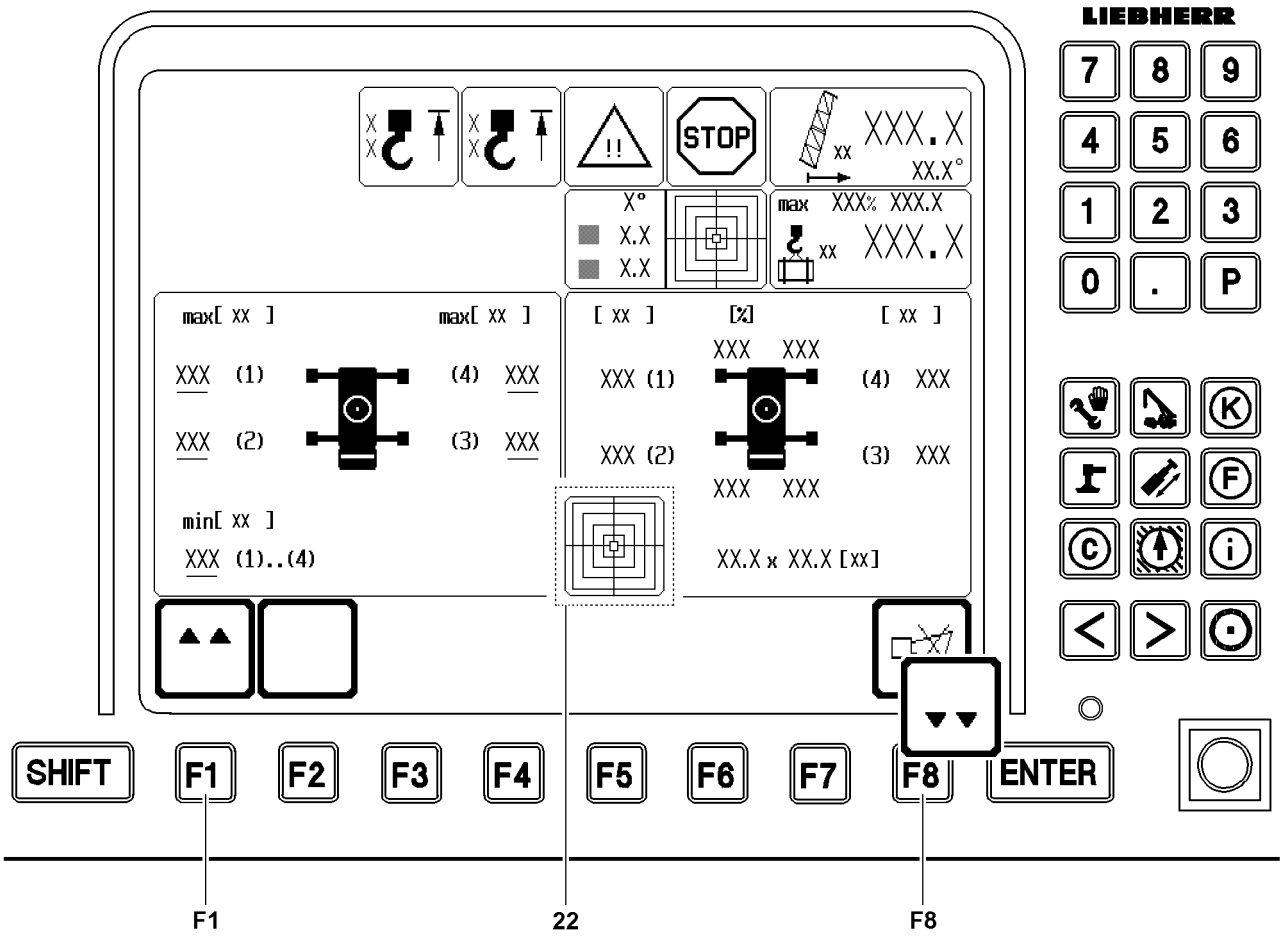

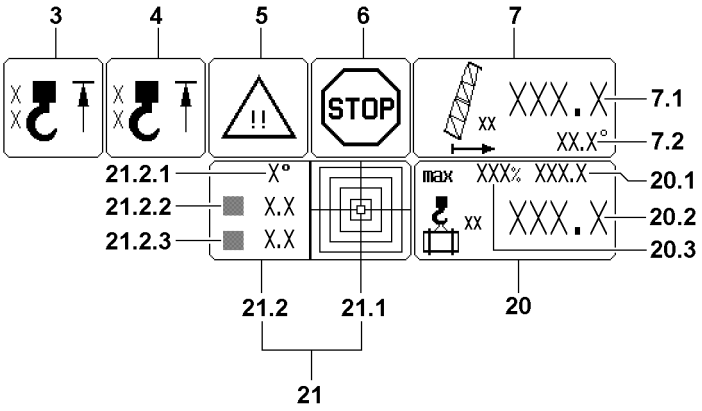

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Fig.111904

10.2 Crane operation in Support program

Note

- ▶ This function is only enabled for the „Support force monitoring“* option.
- ▶ For more detailed description of icons 3 to 6, see section „Alarm functions“ in the crane operation program.

WARNING

Missing display values for wind speed!

No wind speed is shown in the support program during crane operation.

- ▶ If wind conditions are unclear, crane operation in the support program is not permissible.

WARNING

Missing display values for crane operation with boom nose!

The utilization of the boom nose during crane operation in the support program in not shown.

- ▶ Crane operation with boom nose is not permissible in the support program.

3 „Hoist top“ icon
- On HES1

4 „Hoist top“ icon
- On HES2 and / or HES3

5 „Advance warning“ icon

6 „STOP“ icon

7 „Boom radius and main boom angle“ icon
- See section „Crane geometry and load information“

7.1 Boom radius

7.2 Boom angle

20 „Maximum load“ icon

20.1 Maximum load on the boom
- In [t] or [lbs]

20.2 Current load on the boom
- In [t] or [lbs]

20.3 Utilization of main boom
- In percent [%]

21 „Incline crane superstructure“ icon

21.1 Graphic part

21.2 Numeric part

21.2.1 Incline range
- 1° or 5°

21.2.2 Incline
- Of crane in lateral direction

21.2.3 Incline
- Of crane in longitudinal direction

22 „Incline crane chassis“ icon

F1 Function key
- Switching over into the adjustment field for support limit forces (refer to section „Support force monitoring“)
- **Note:**
  At actuation, an LMB STOP is triggered. All hoist and luffing moments are stopped and the icons for crane operation disappear.

F8 Function key
- Turn off acoustical signal / error determination screen

or

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- End adjustment mode

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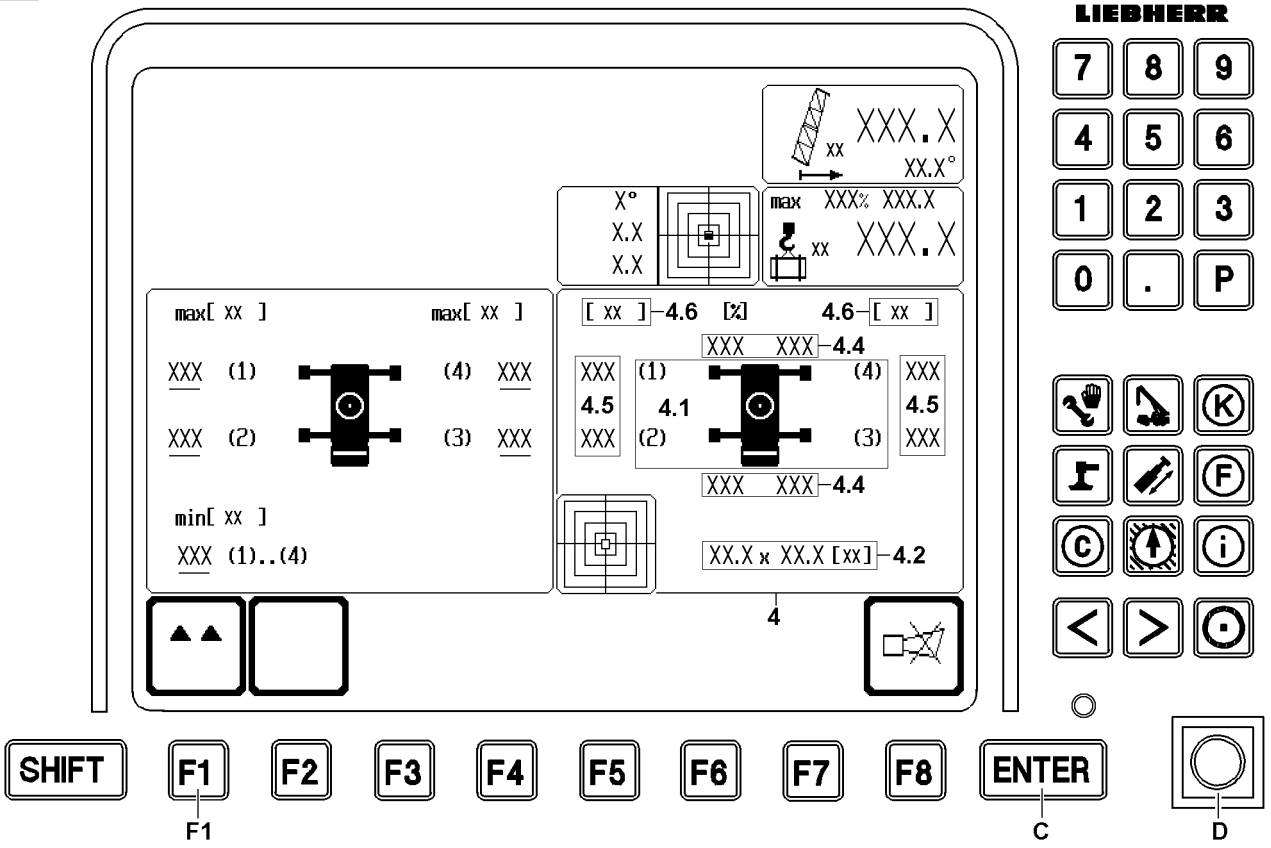
Empty page!

LWE/LG 1750-006/15409-07-02/en

1



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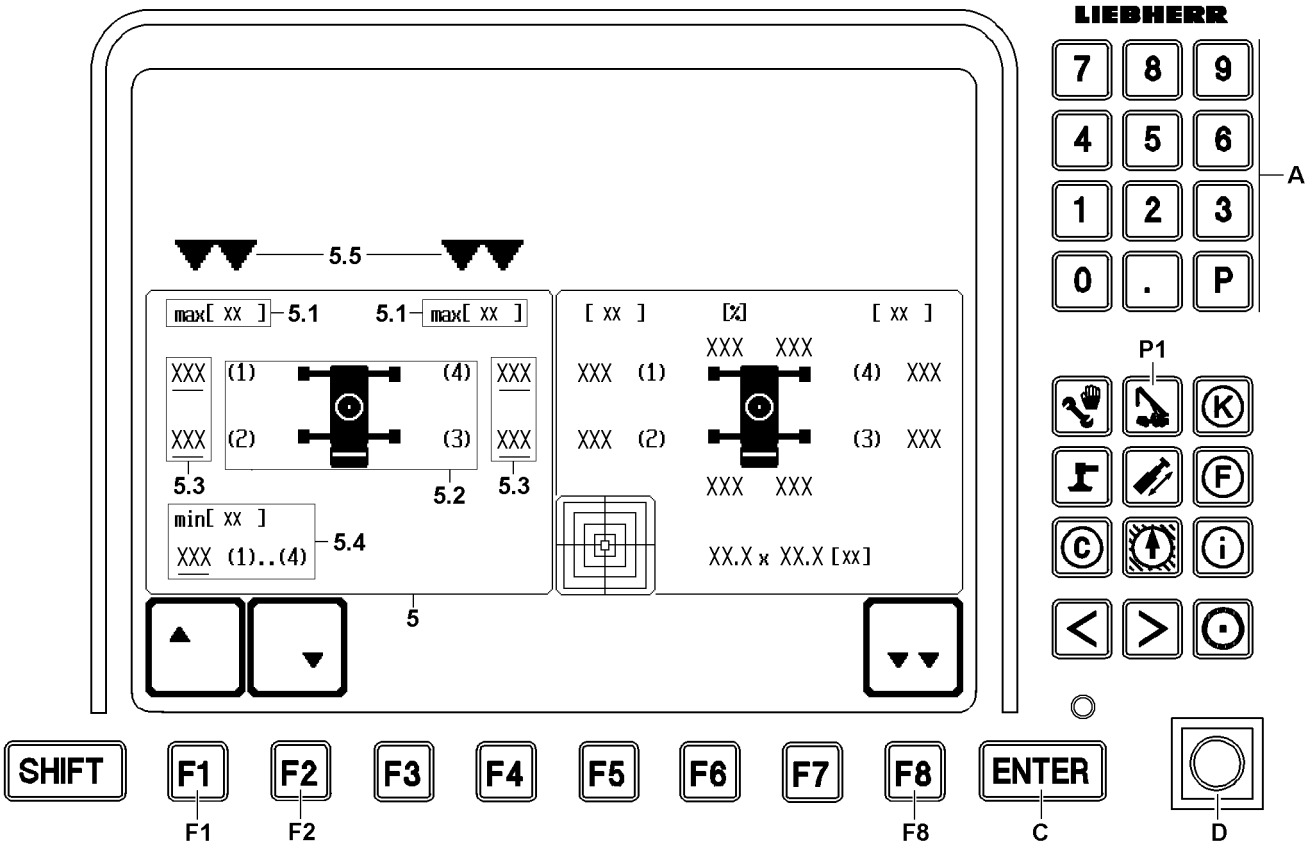


Fig.111905

10.3 Support force monitoring*

DANGER
Danger of accident!
▶ The LICCON support force monitoring is only an aid. It does **not** prevent a potential crane overload.
▶ Never use Support force monitoring in order to use the crane up to its tipping limit.

The support force monitoring constantly determines the current pressure on all 4 support cylinders during operation. The support force for each support is determined from that.

Due to the possibility to specify limit values, the support force monitoring can be utilized for individual advance warning.

Example: For application under certain placement conditions, the:
– Maximum permissible total force is 100 t
– Desired advance warning 10 % before
Which results in: maximum support limit force value to be programmed is 90 t.

10.3.1 Monitoring mode / control mode

See illustration **1**.

4 Monitoring and control field

4.1 Crane icon with support numbers
- **Note:**
The icon can vary depending on crane type (LG or LR).

4.2 Support base
- **Note:**
Depending on crane type (LG or LR), as letter code or as number value.

4.4 Extension length sliding beam
- **Note:**
Only optional for LG 1750.

4.5 Support force values
- In [t] or [kibs]

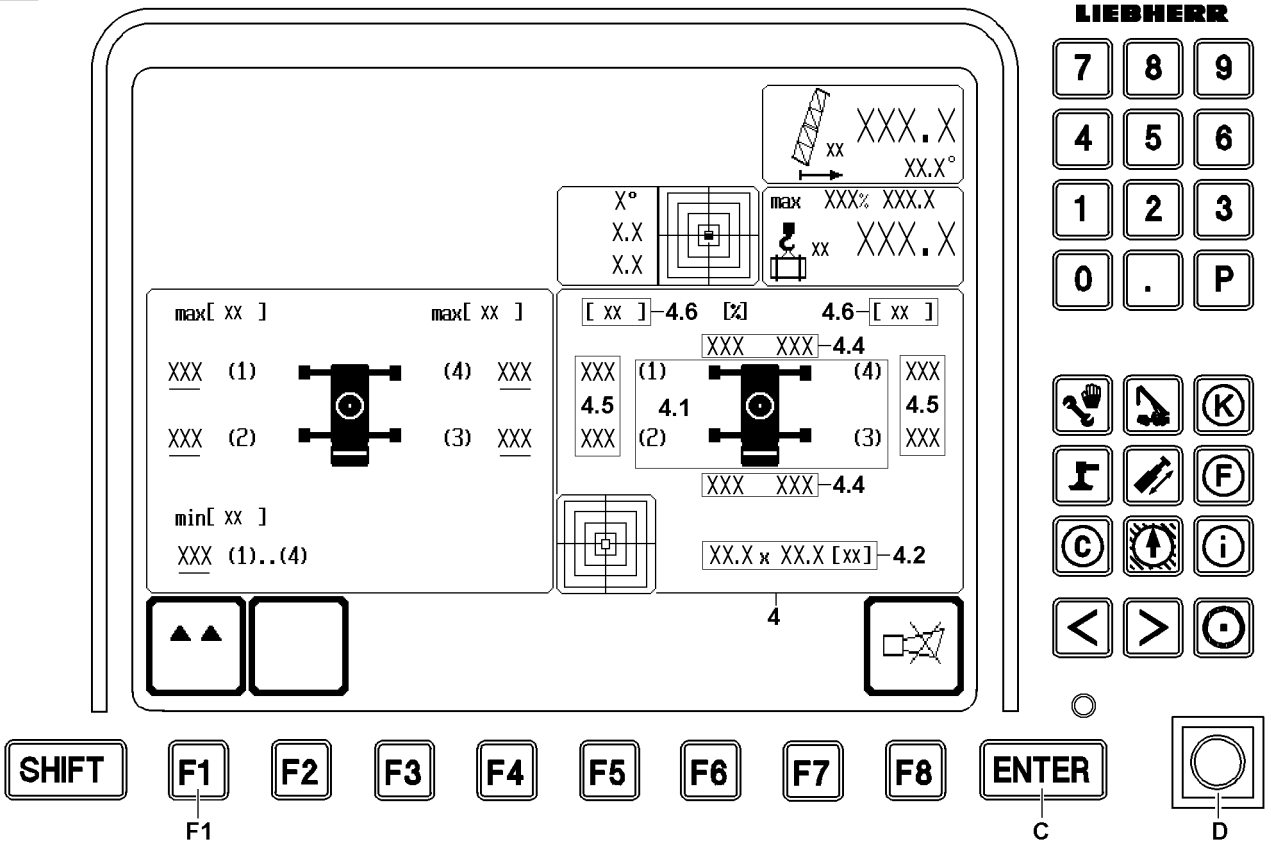
4.6 Unit of displayed support forces
- In [t] or [kibs]

F1 Function key
- Switch to the setting field for support limit forces.

F8 Function key
- Press once:
Turn the acoustic signal off.
- Press twice:
In the „Horn“ icon, fields are automatically displayed on the error determination screen (see Diagnostics manual)

LWE/LG 1750-006/15409-07-02/en

1



2

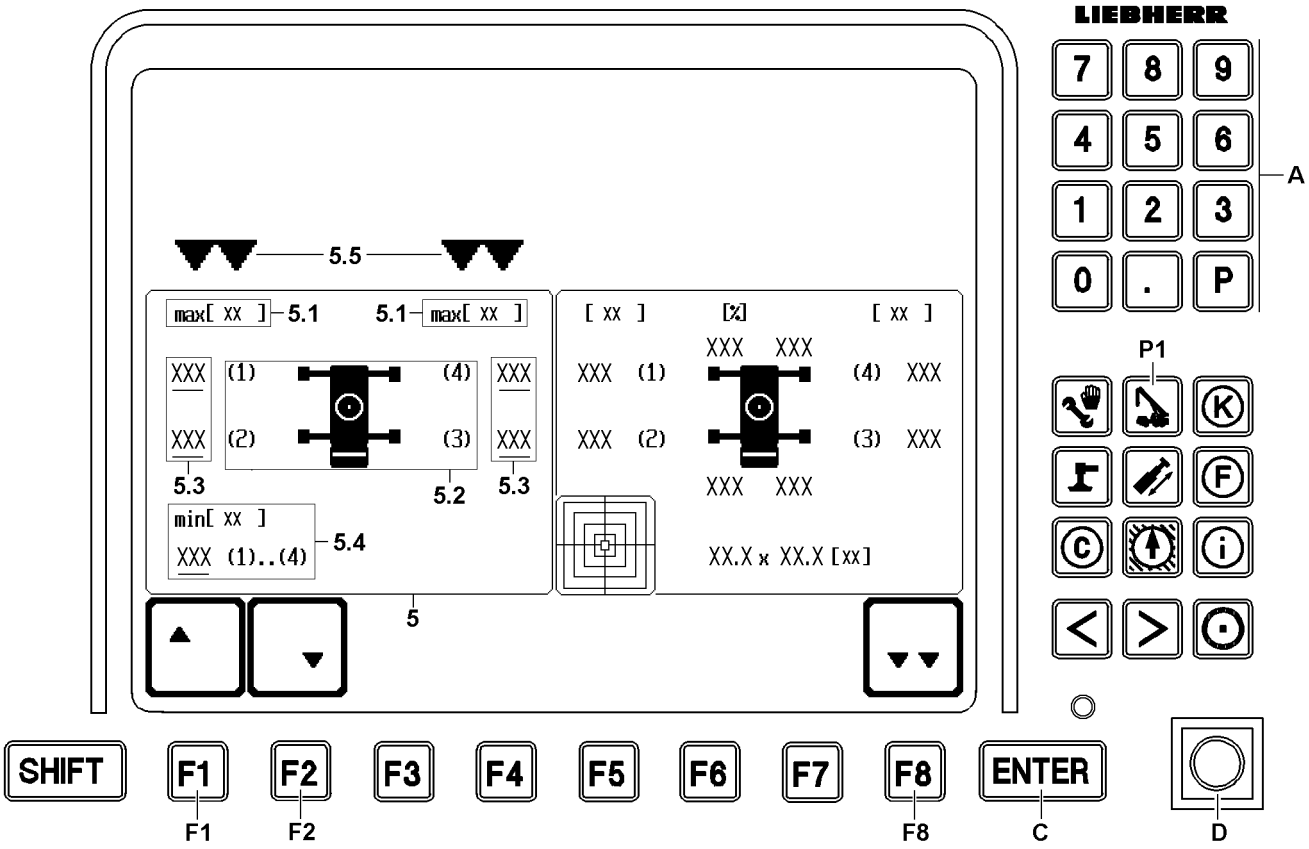


Fig.111905

10.3.2 Setting mode

See illustration **2**.

5 Setting field for support limit forces

5.1 Unit of maximum support force limit values
- In [t] or [kibs]

5.2 Crane icon with support numbers

5.3 Maximum support force limit values
- Maximum value in [t] or [kibs]

5.4 Minimum support force limit value
- Minimum value in [t] or [kibs]
  Valid for all four supports

5.5 Selector arrows
- Point to the active settings field

F1 Function key
- Move cursor (input pointer) to next support force limit value

F2 Function key
- Move cursor (input pointer) to previous support force limit value

F8 Function key
- Switch back to Monitoring and control field **4**

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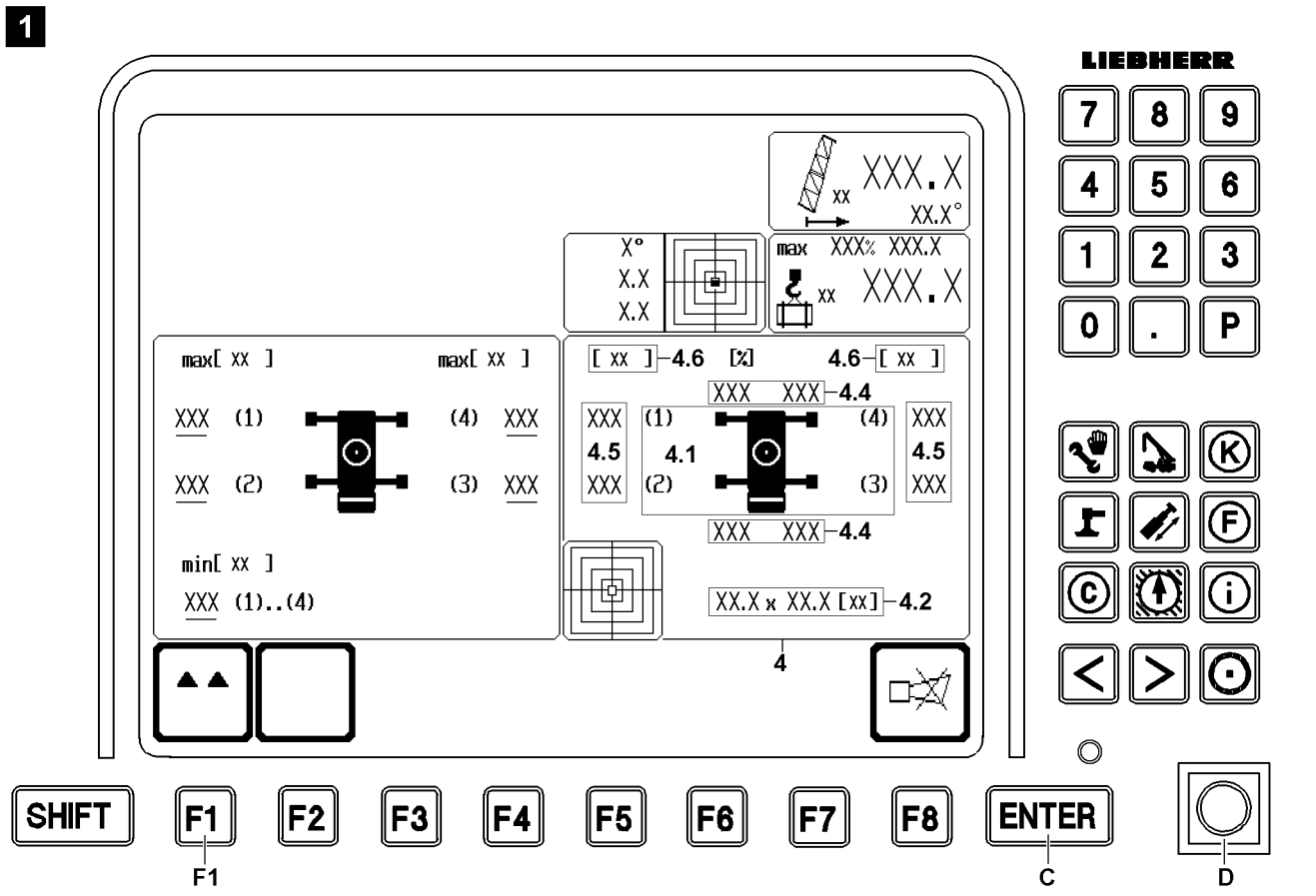

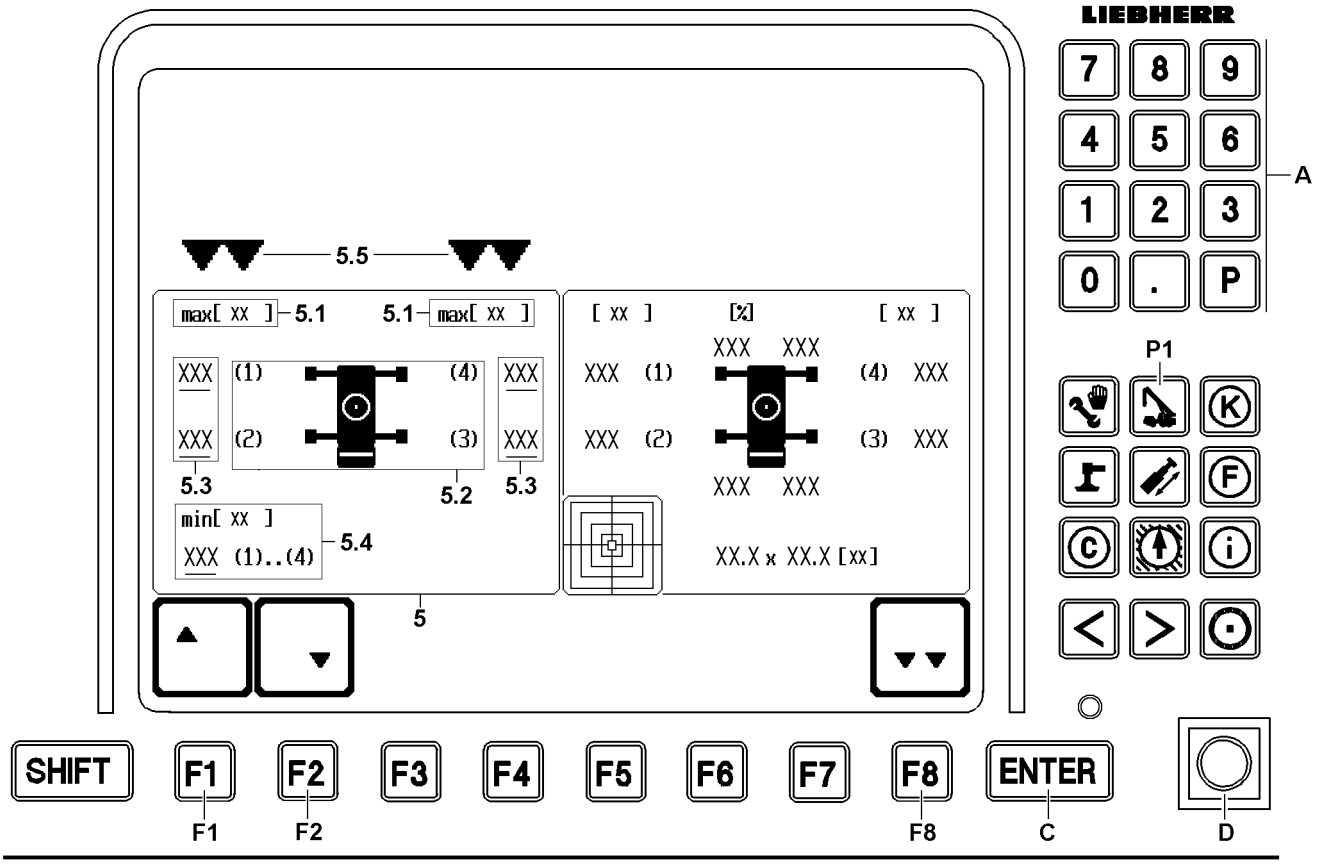

Fig.111905

10.3.3 Display current support forces

Note

▶ Display current support forces in crane operating screen, see „Monitored auxiliary functions for crane operation“.

The current support force values **4.5** are shown in the monitoring and control field **4**.

10.3.4 Remarks

Because of the option to determine limit values yourself, the LICCON support force monitoring can also be used as an advance warning device:

- Any trends in changes of the support forces during crane operation can be quickly recognized.
- Advance warning limits for the support forces can be individually programmed.

WARNING

Tolerances and erroneous operation of the support force monitoring!

For technical reasons, a test deviation of up to ± 2 % in relation to the maximum load bearing capacity of the crane is possible.

If the support cylinders are moved on „block bottom“ or „block top“, then the display of the support forces is erroneous.

▶ Make sure that there is no block position on the support cylinders.

▶ Take the tolerances in the display value into account.

▶ Take additional influences onto the tolerance field into account.

The tolerance field expands:

- In case of large support forces.
- In case of far extended support cylinders.
- When extending the support cylinders and up to 15 minutes afterwards.

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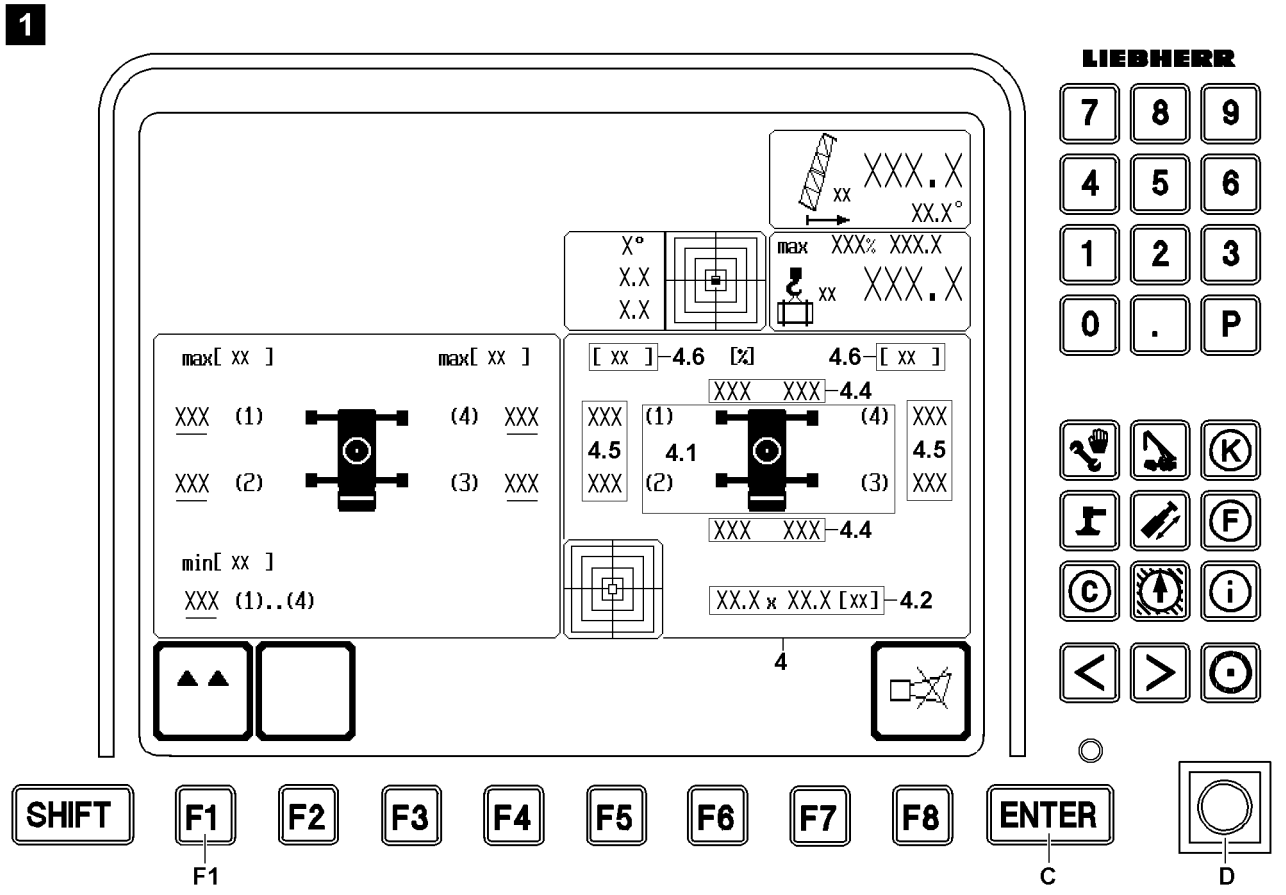

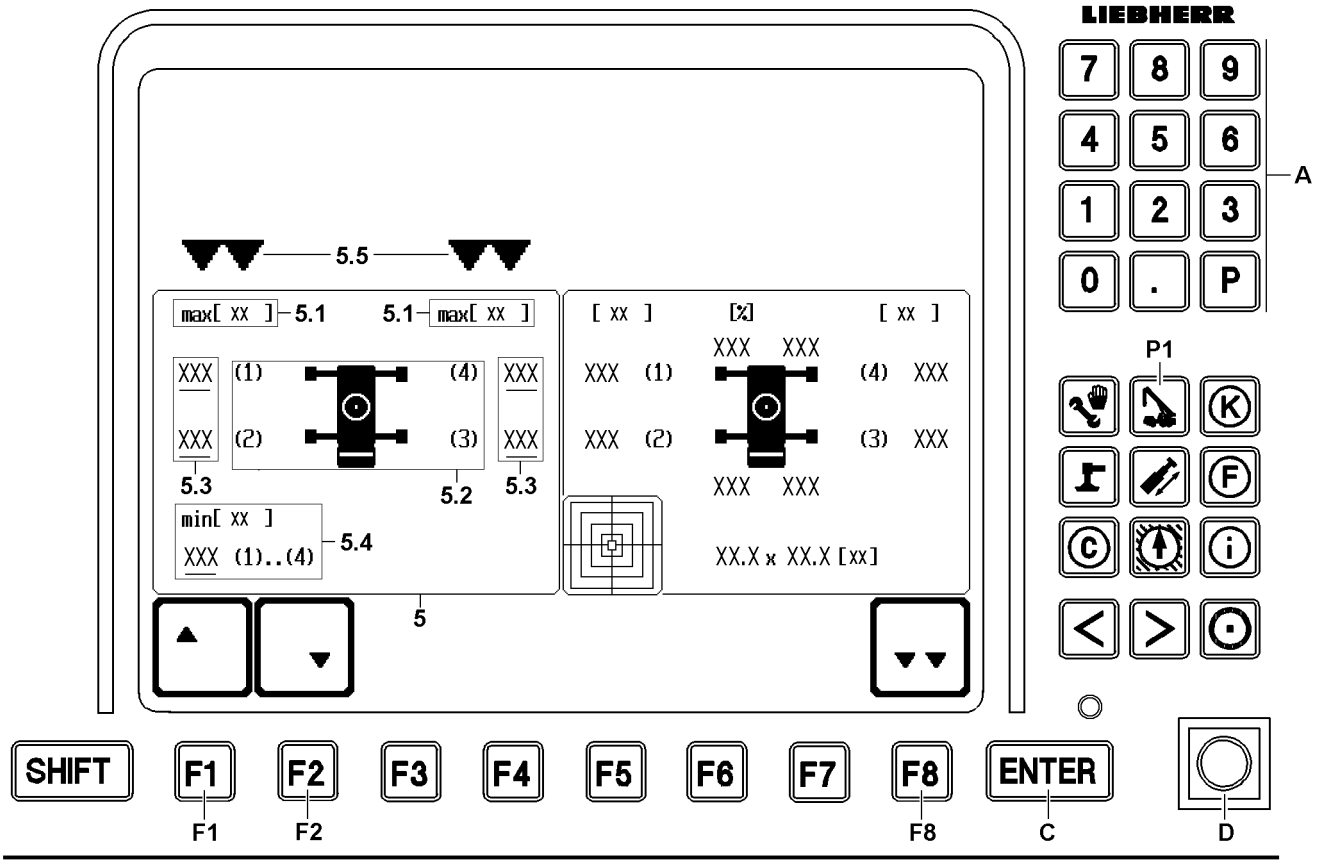

Fig.111905

10.3.5 Changing minimum and maximum support limit forces

As an additional safety precaution, this program monitors the set up key **D**. If the set up key **D** is actuated, the system switches back to the crane operation program.

In the Monitoring and control field **4** the current support force values are displayed.

If one or more of the values are below or above the programmed maximum values for the support force limits, then they are displayed blinking.

The programmed maximum / minimum values for the support force limits are displayed in the setting field **5**.

Make sure that:
- The crane is supported and horizontally aligned.
- The set up key **D** is not pressed.

The program initially runs in monitoring mode. All icons relevant to crane operation are displayed.

Note
Switching to the adjustment field for support limit forces.
▶ By pressing the function key **F1**, an LMB STOP / operating error is triggered immediately. All hoist and luffing moments are stopped and the icons for crane operation disappear.

When pressing the function key **F1**, the two double arrows **5.5** point to the settings field **5** for support limit forces. The cursor appears on the maximum value of the support limit force on support 1.

By pressing the function key **F1** or function key **F2** you switch the cursor to the next or previous maximum value for the support limit force or the minimum value for the support limit force (valid for all four support cylinders).

Note
Testing the validity ranges for the support limit force values.
Every newly entered support limit force value will be tested for its validity range.
▶ If valid, the value entered will be accepted.
▶ If invalid, the value will be rejected as too small or too big with an „ERROR“ message.

With the keypad **A** you can change the support limit force values and then close the input function using the ENTER key **C**.

Use the function key **F8** to switch back to the Monitoring and control field **4**.

Use the program key **P1** to switch back to the crane operation program.

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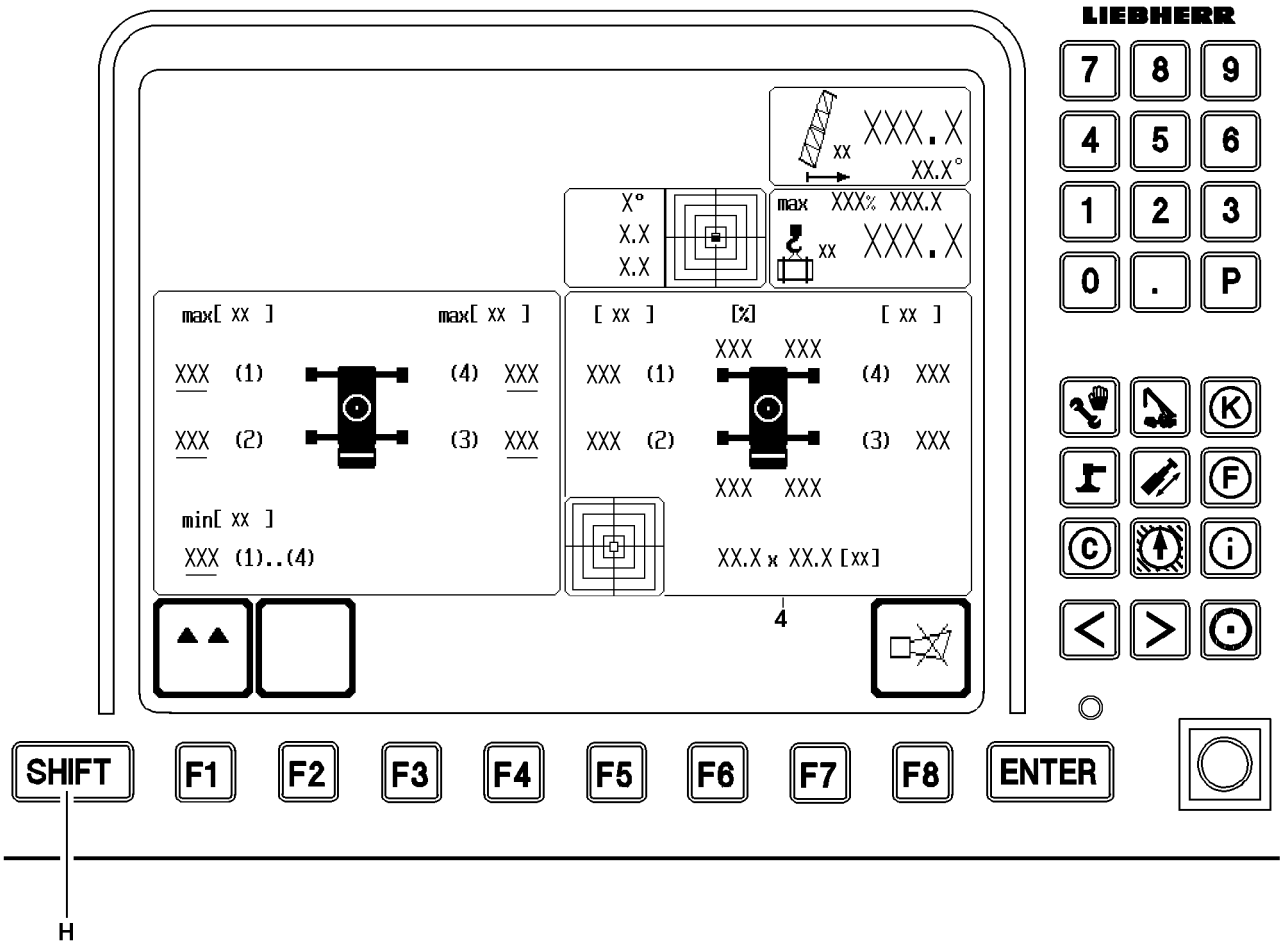

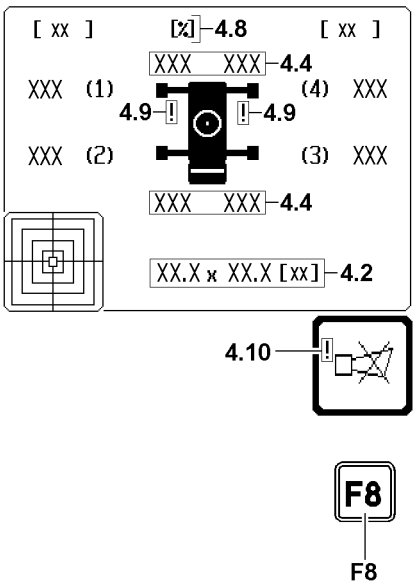

LWE/LG 1750-006/15409-07-02/en

Fig.111907

10.4 Sliding beam monitoring*

Note

▶ Only optional for LG 1750.

4 Monitoring and control field

4.2 Support base
- In [m] or [ft]

4.4 Sliding beam length values
- As a percentage of the maximum extension length
- The sliding beam length values blink in the ranges that are unsuitable for supporting
  0 – Sliding beam retracted
  100 – Sliding beam widely extended

4.8 Percentage sign
- Unit for sliding beam length display

4.9 Exclamation mark „!“
- Sliding beam length monitoring is bypassed
  Note:
  An exclamation mark „!“ **4.09** will appear on the support screen **and** crane operating screen when the sliding beam length monitoring is bypassed.

4.10 Exclamation mark „!“
- Sliding beam length monitoring can be bypassed
  Note:
  An exclamation mark „!“ **4.10** will only appear in the horn icon when it is possible to bypass the sliding beam length monitoring.

F8 Function key
- Press once:
  Turn the acoustic signal off.
- Press twice:
  Fields that are displayed visually in the „Horn“ icon are automatically displayed in the error determination screen.

SHIFT and **F8**
- Sliding beam length monitoring is bypassed
- Note:
  By pressing the key combination SHIFT **H** and function key **F8** again, the sliding beam length monitoring is activated again.

WARNING

Increased accident risk when bypassing sliding beam length monitoring!
The position of the sliding beams is no longer monitored when the sliding beam length monitoring is bypassed. In case of insufficient support base, the crane can topple over.
Death, severe bodily injuries, property damage.

▶ The sliding beam length monitoring may only be bypassed by personnel who are aware of the consequences of the bypass.

▶ The crane operator must ensure that the sliding beam position corresponds to the data given in the load chart and LICCON.

▶ The crane operator must ensure that the crane is supported with the support base as specified in the load chart.

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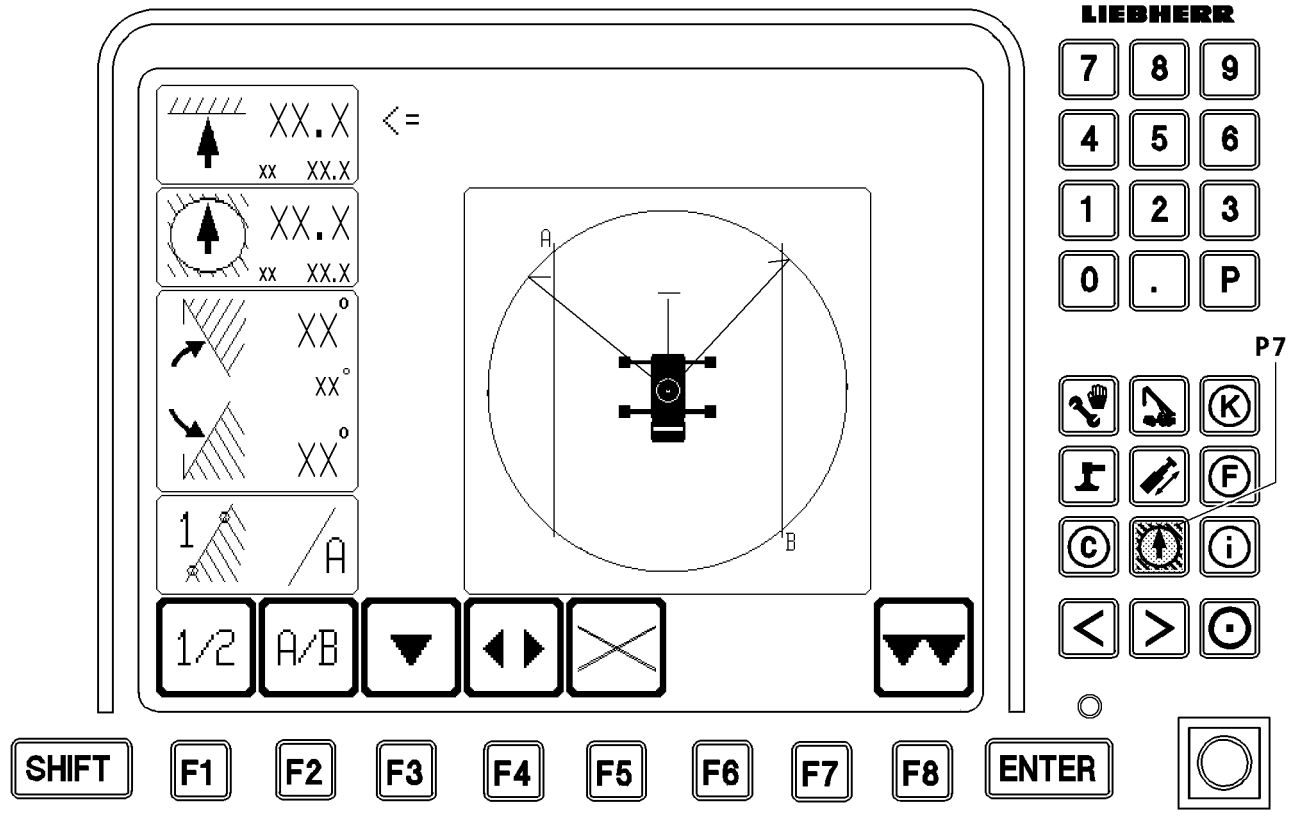

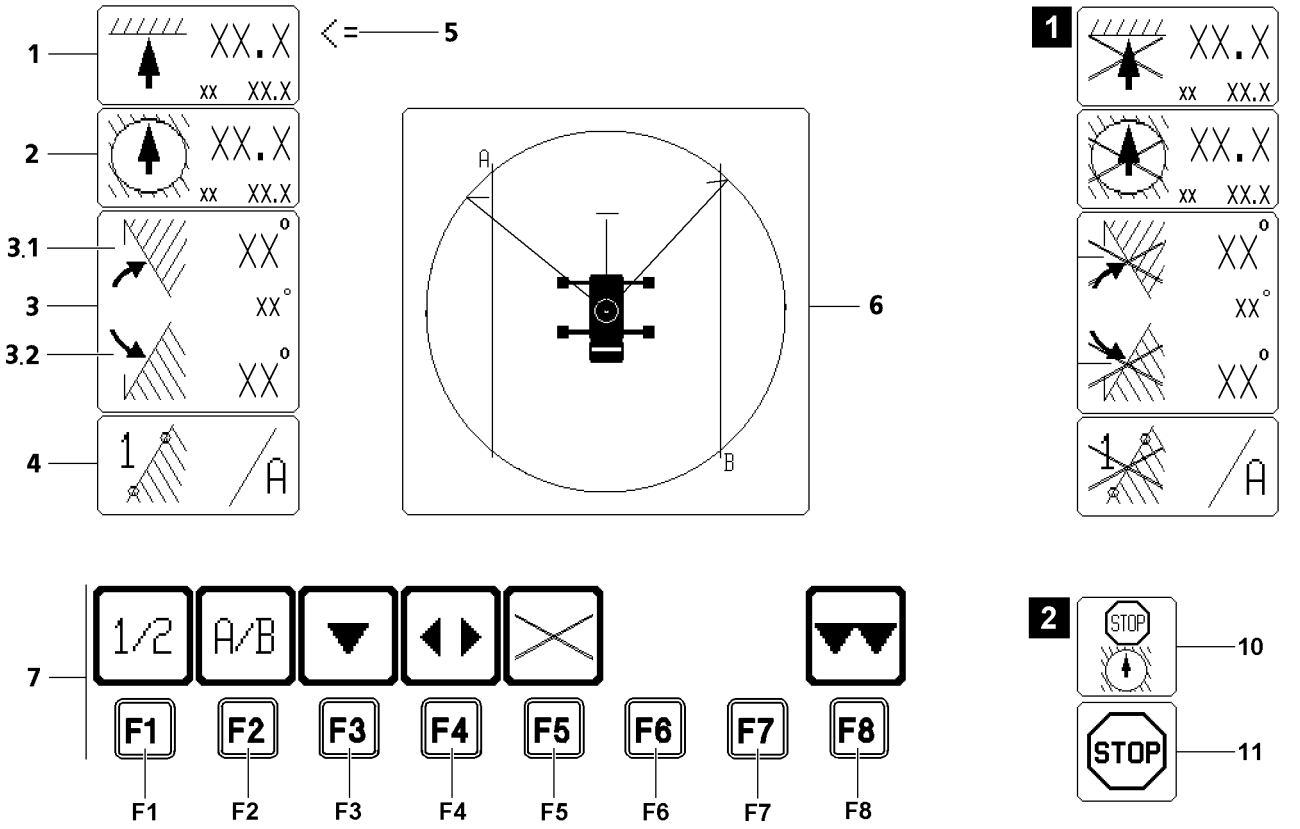

Fig.111257

LWE/LG 1750-006/15409-07-02/en

11 The Working range limitation program*

Note
▶ For detailed description of the working range limitation, see the „Working range limitation“ manual.

11.1 Starting the program

▶ Press the program key **P7**.

11.2 Operating interface

1 „Pulley head height limitation“ icon
2 „Radius limitation“ icon
3 „Slewing limit stop“ icon
3.1 Right slewing limit stop
3.2 Left slewing limit stop
4 „Edge limitation with edge and point selection“ icon
5 Function selector
- For selecting limiting functions

6 „Graphic display of programmed limits“ icon
- **Note:**
  Depending on crane type, either the crane icon crane chassis or crawler travel gear are shown.

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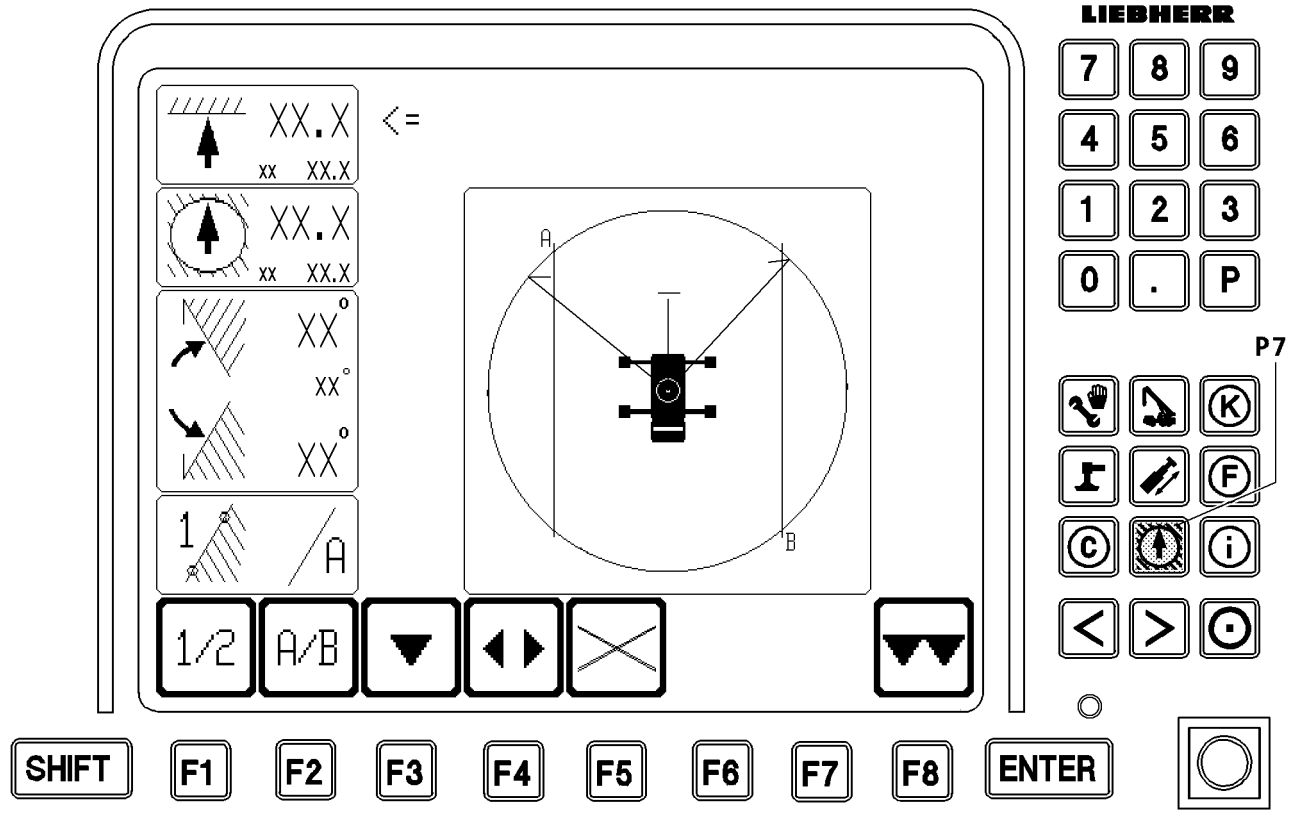

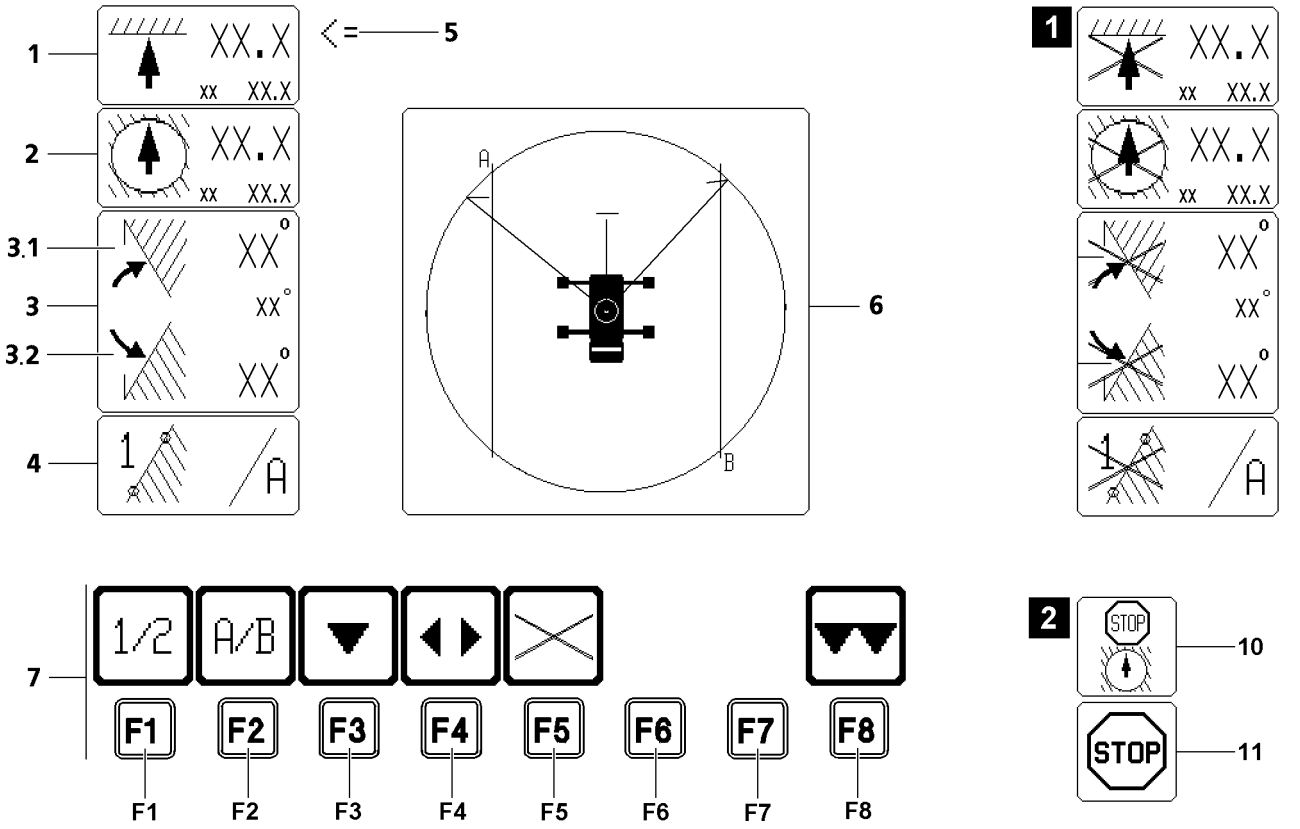

Fig.111257

11.2.1 Function key line

The function key line **7** is operated via the function key located below.

F1 Function key
- Selection of point 1 or 2 of selected edge A or B

F2 Function key
- Selection of edge A or B that is being programmed

F3 Function key
- The function selector is moved down by one limit function

F4 Function key
- The limit function selected with the function selector changes its status. If previously active, it will now be inactive when the function key **F4** is pressed, and vice versa. An inactive limit function is identified by a crossed out icon. If the function selector shows a slewing limit to the left or the right, then both limits will always be switched.
- **Note:**
  For the edge limit, only the preselected edge will be switched. The edge that is not displayed can be active or inactive at the same time.

F5 Function key
- All limit functions become inactive, icons crossed out - see illustration **1**

F6 Function key
- Not assigned in the working range limitation program

F7 Function key
- Not assigned in the working range limitation program

F8 Function key
- Exit the program and return to the crane operation program

11.3 Displays in the crane operation program

If a programmed working range limitation is activated, then this status is indicated in the „Crane operation“ program by an alternative STOP icon **10** on the position of the normal LMB STOP icon **11**, see illustration **2**.

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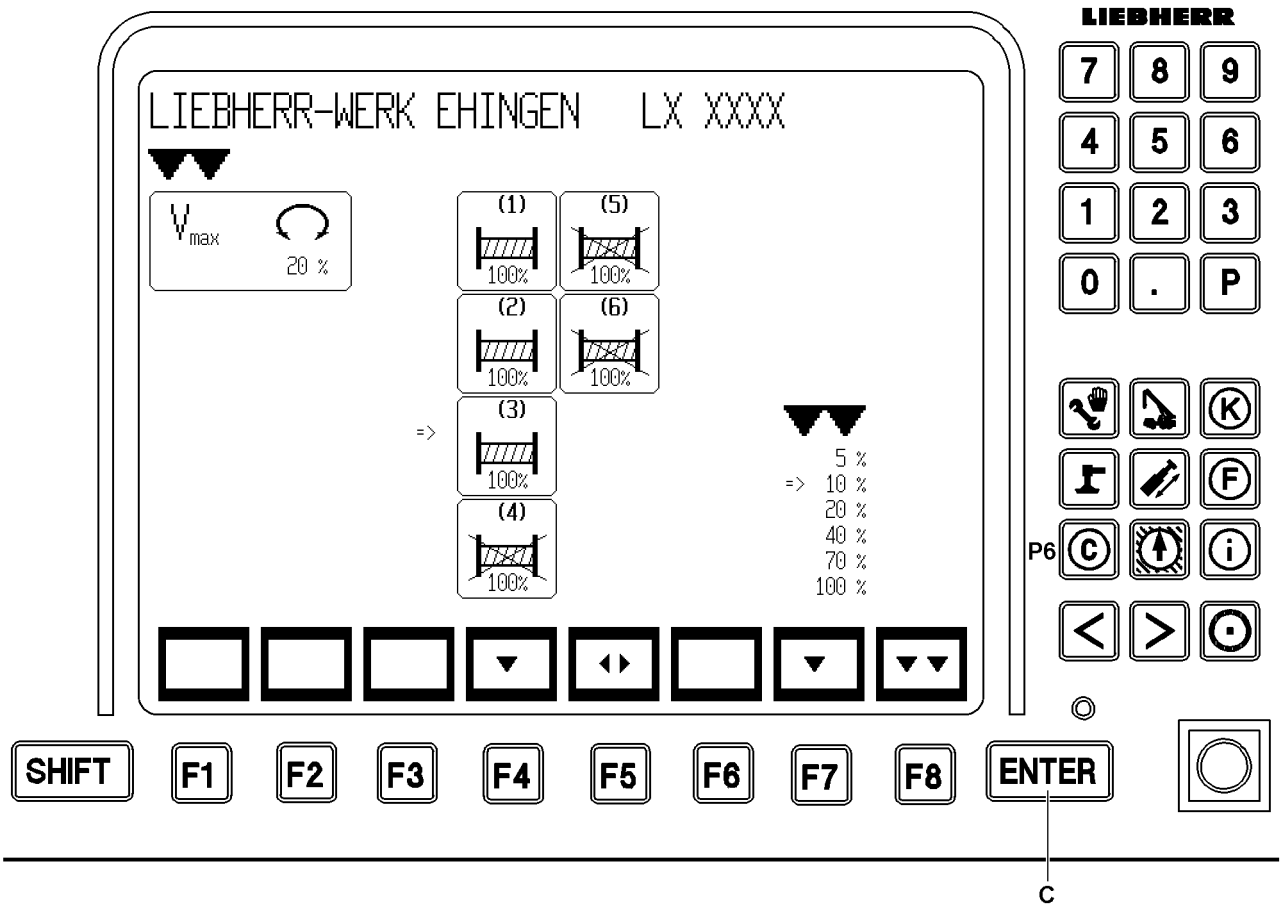

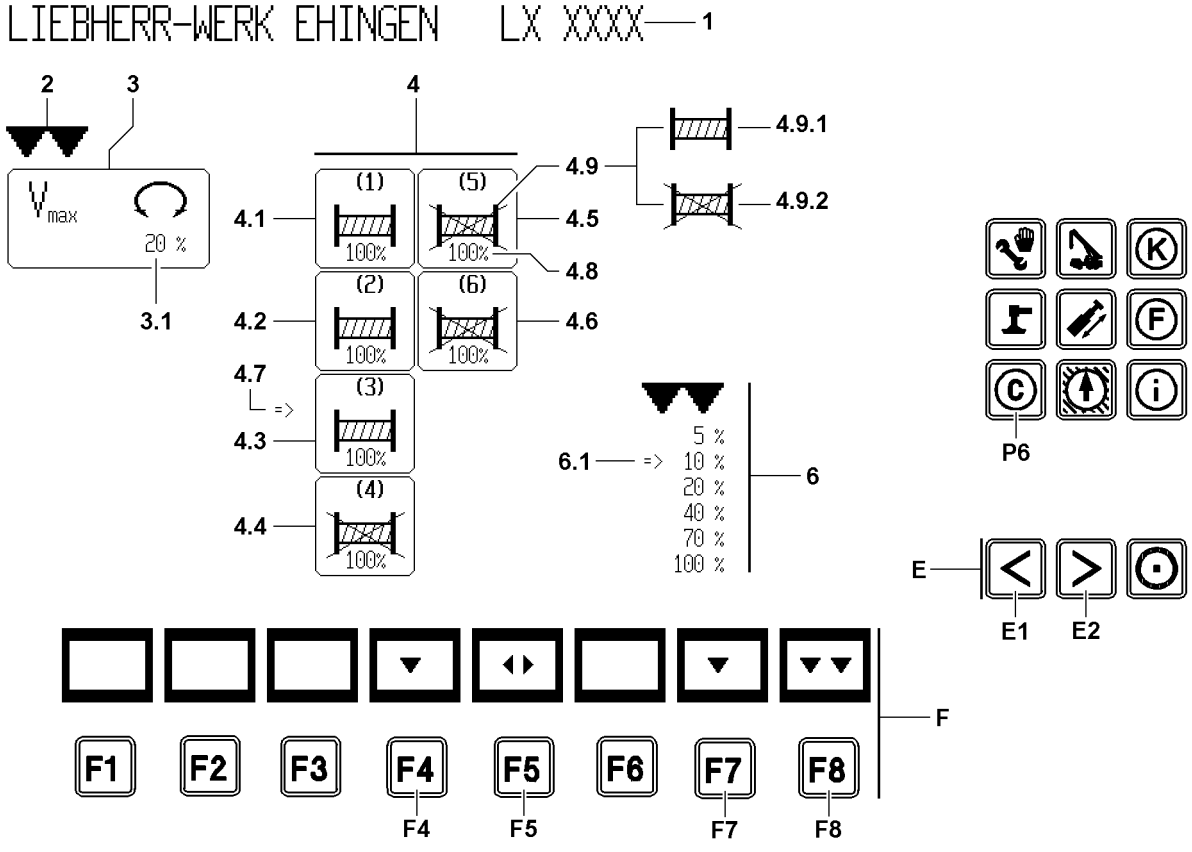

Fig.111903

LWE/LG 1750-006/15409-07-02/en

12 The Control parameter program

The Control parameter program offers the following possibilities:
- Preselection of maximum rotational speed of slewing gear.
- Preselection of maximum rotational speed of individual winches.
- Activation / deactivation of individual winches.

The bypass switches are monitored during the control parameter program. If one of these switches is activated during the program, the system immediately switches back to the crane operation program.

DANGER
Danger of accident!
▶ **Never** change the speeds or the activation / de-activation of the winches while actuating a crane movement.

12.1 Starting the program

▶ Press the program key **P6**.

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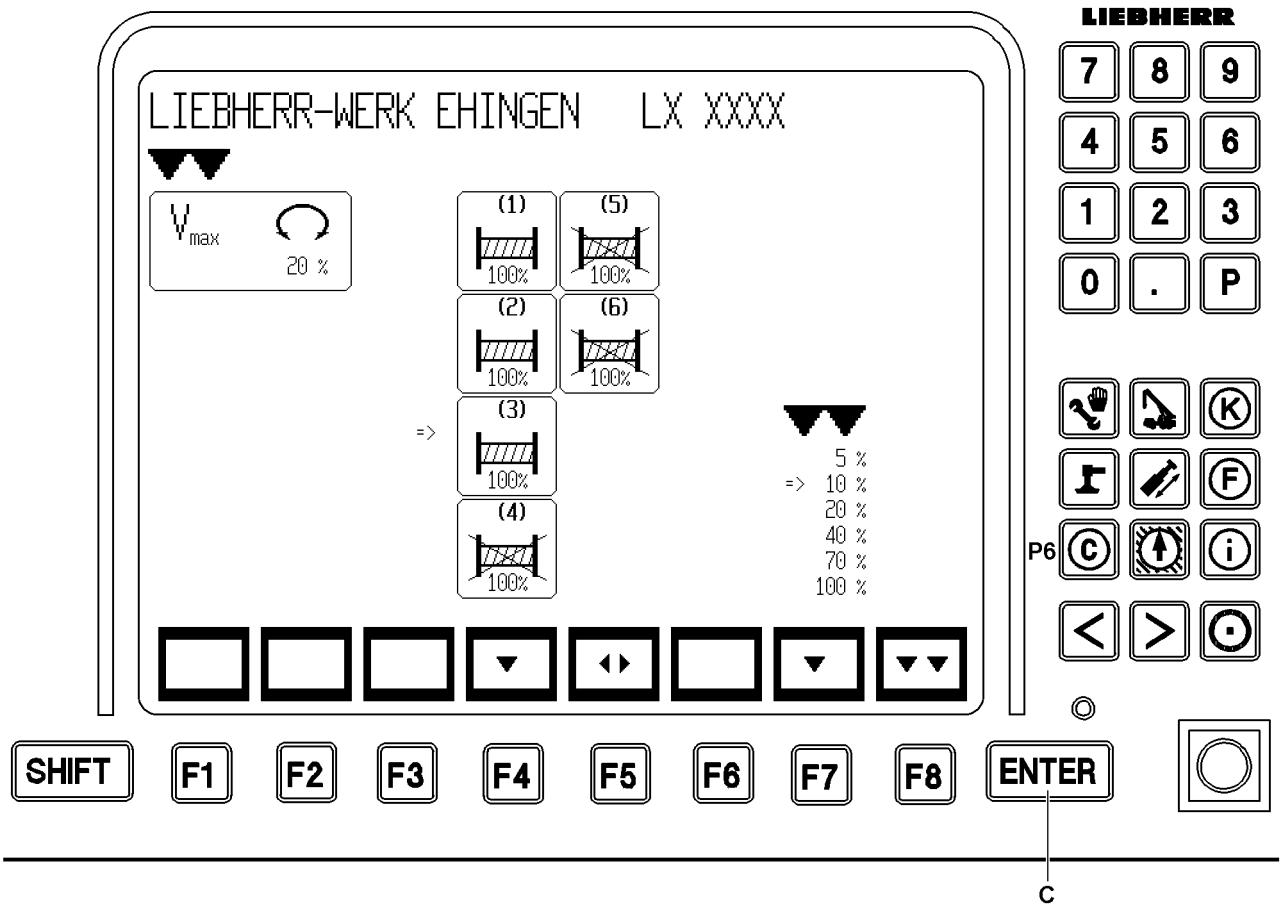

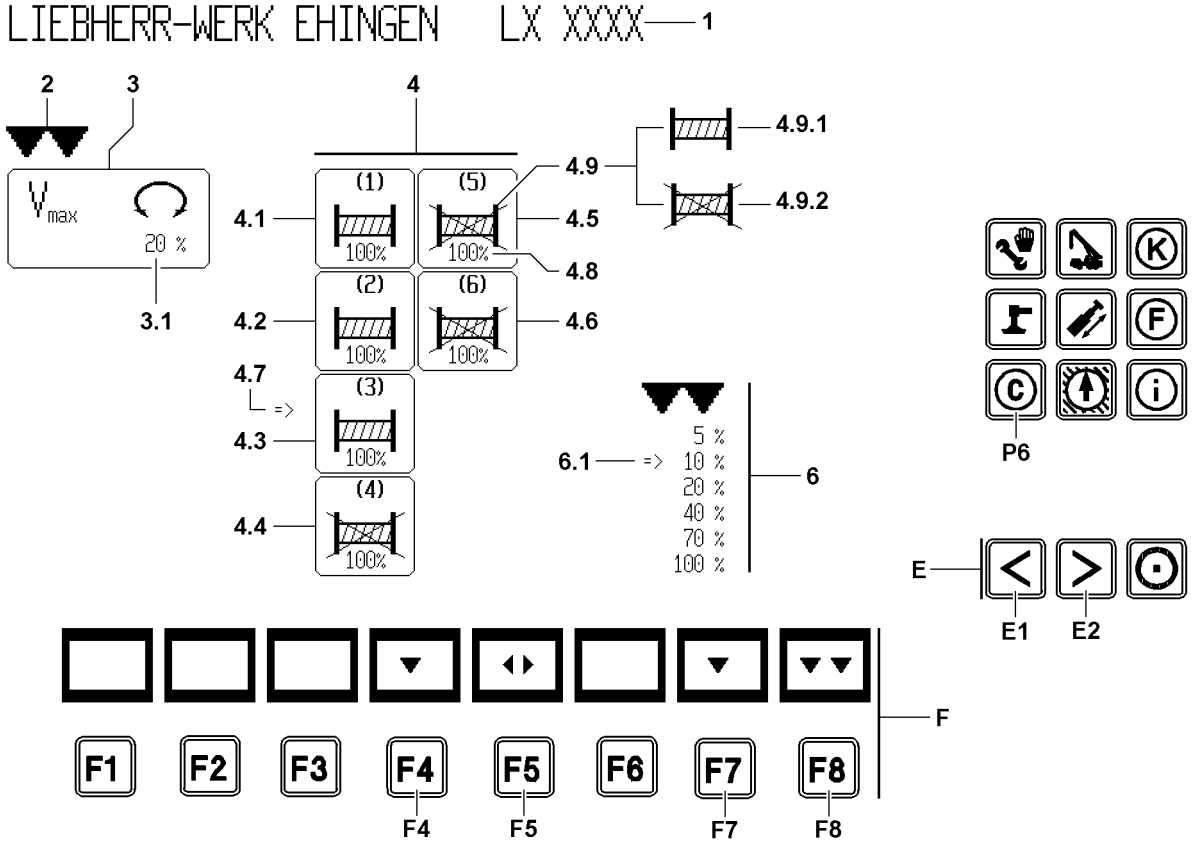

Fig.111903

LWE/LG 1750-006/15409-07-02/en

12.2 Operating interface

1 Crane type

2 „Icon selection“ selector
- Double arrow pointing down
- Select icon.

3 „Slewing gear“ icon

3.1 „Maximum rotational speed“
- V_{max} in percent [%]

4 „Winch“ icon group

Note

▶ The setting possibilities are the same for all winches and are explained on the Winch 5***** icon **4.5**.

4.1 Winch 1

4.2 Winch 2

4.3 Winch 3*****

4.4 Winch 4

4.5 Winch 5*****

4.6 Winch 6*****

4.7 Winch selector
- Arrow to the right
- Select the winch, for which the „properties“ are to be changed.

4.8 Speed
- In percent [%]
- See value field with selector

4.9 Winch icon

4.9.1 Winch activated

4.9.2 Winch deactivated

6 Value field with selector
- The percentage values relate to the speed with maximum deflection of the manual control lever, always in relation to the maximum achievable speed of the drive, with 100 % preselected speed. Six stages may be preselected.

6.1 Speed selector
- Arrow to the right
- Select percentage value(s) for speed stages.

F Function key line

F4 Function key
- Select winch.

F5 Function key
- Activate / deactivate selected winch(es).

F7 Function key
- Select percentage value of corresponding speed in value field.

F8 Function key
- Return to the crane operation program and take over parameter.

C Input key ENTER
- Take over the selected speed setting for the preset functions.

E Special function keys

E1 Special function key
- Move the selector **2** for selecting icons to the left

E2 Special function key
- Move the selector **2** for selecting icons to the right

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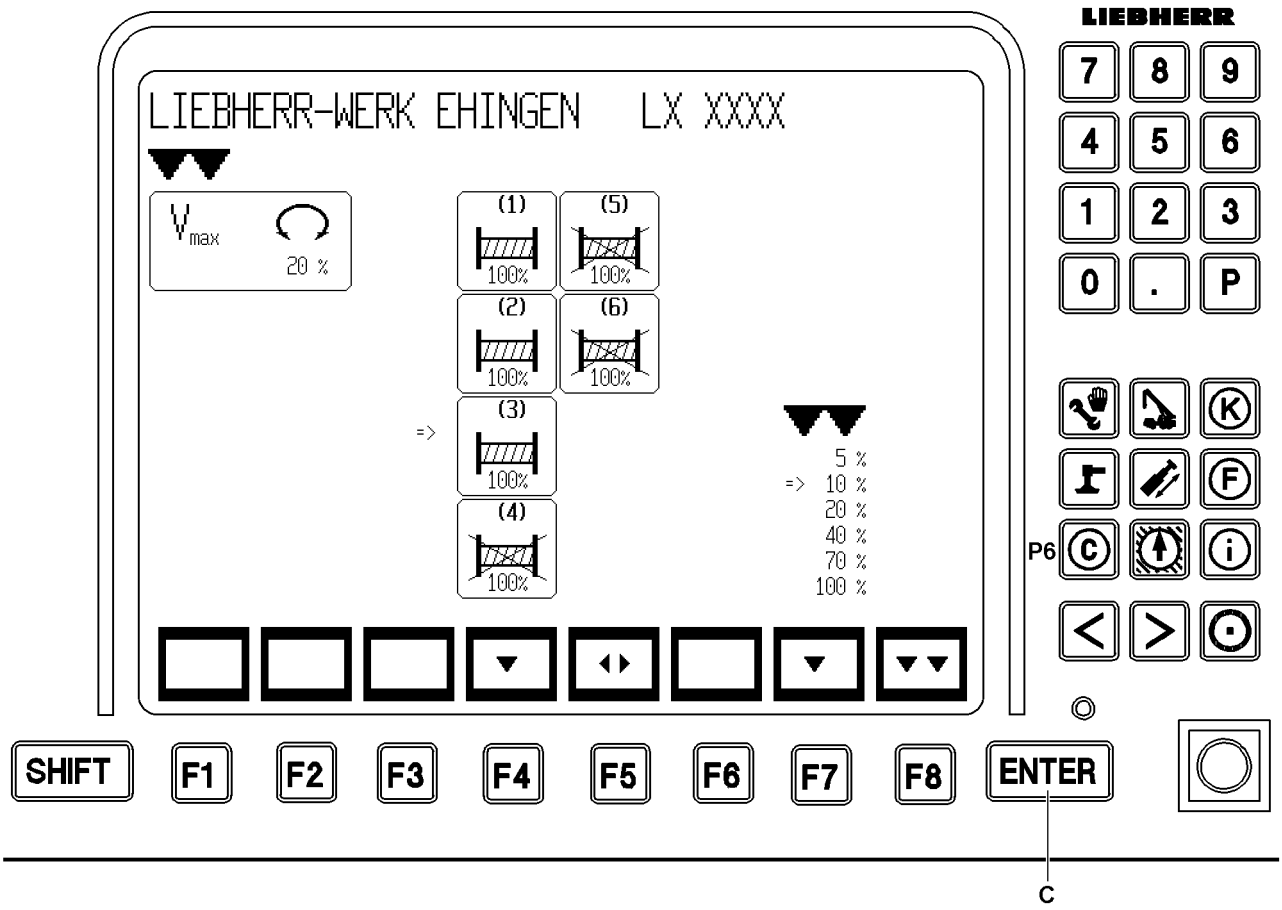

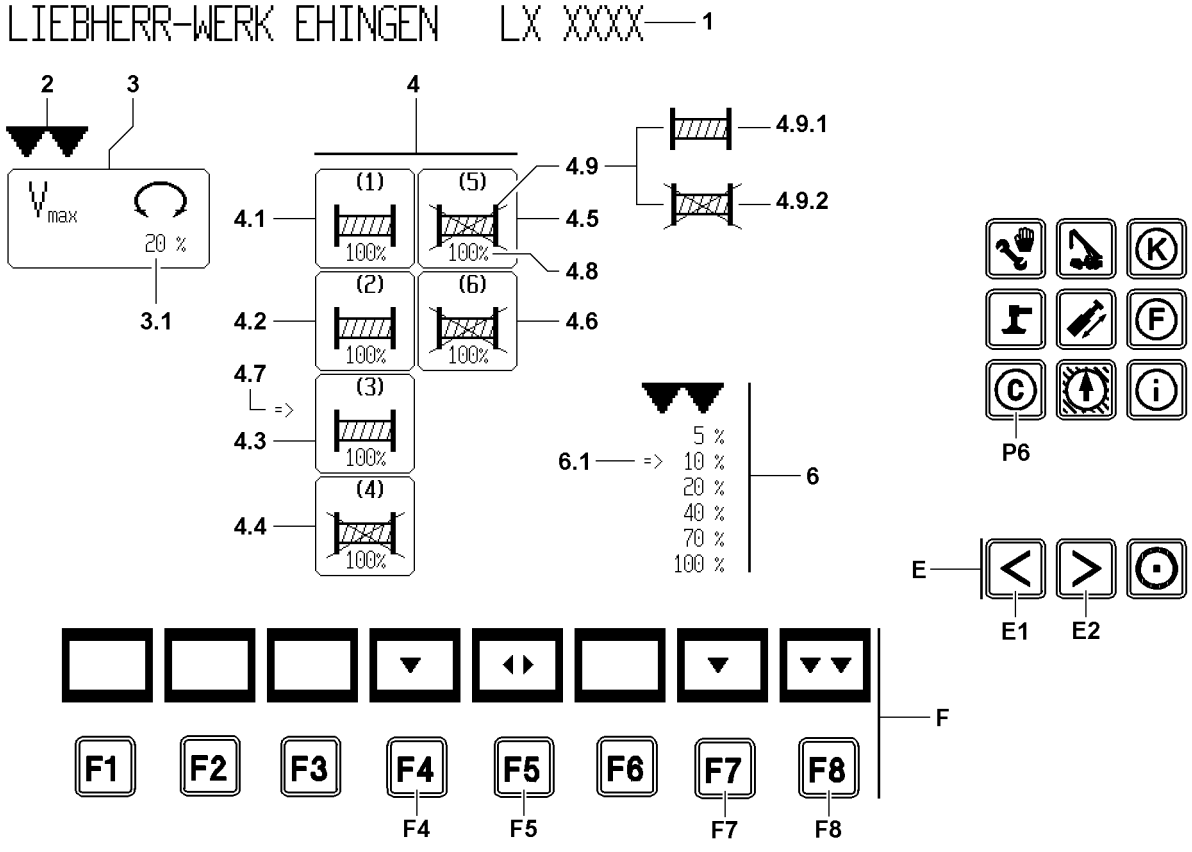

Fig.111903

LWE/LG 1750-006/15409-07-02/en

12.3 Changing the maximum rotational speed of slewing gear

DANGER
Danger of accident!
- ▶ During crane operation with load, always adhere to the maximum rotational speeds depending on boom length and operating modes (according to load charts).
- ▶ The longer and heavier the boom is and the greater the load, the smaller the set „Maximum rotational speed“ must be.
- ▶ **Never** deflect the master switch for the slewing gear to the stop at maximum load.

▶ Use the special function key **E1** or special function key **E2** to select the „Slewing gear“ icon **3**.

Result:

– Selector (double arrow down) **2** appears above the „Slewing gear“ icon **3**.

▶ Select the maximum rotational speed in percent [%] with function key **F7**.

Result:

– Selector (arrow to right) **6.1** shows the selected percentage value.

▶ Use the ENTER key **C** to confirm the selected „Maximum rotational speed“.

Result:

– The value of the „Maximum rotational speed“ is shown in the icon and taken over into the control.

12.4 Winches

12.4.1 Changing maximum winch speed

▶ Using the special function key **E1** or special function key **E2**, select the icon group „Winches“ **4**.

Result:

– Selector (double arrow down) **2** appears above the icon group „Winches“.

▶ With the function key **F4**, select the icon for „winch 1“, **or** „winch 2“, **or** „winch 3“*****, **or** „winch 4“, **or** „winch 5“*** or** „winch 6“*****.

Result:

– Selector (arrow to right) **4.7** shows the selected winch.

▶ Select the „Maximum winch speed“ in percent [%] with function key **F7**.

Result:

– Selector (arrow to right) **6.1** shows the selected percentage value.

▶ Use the ENTER key **C** to confirm the selected „Maximum winch speed“.

Result:

– The value of the „Maximum winch speed“ is shown in the selected winch icon and taken over into the control.

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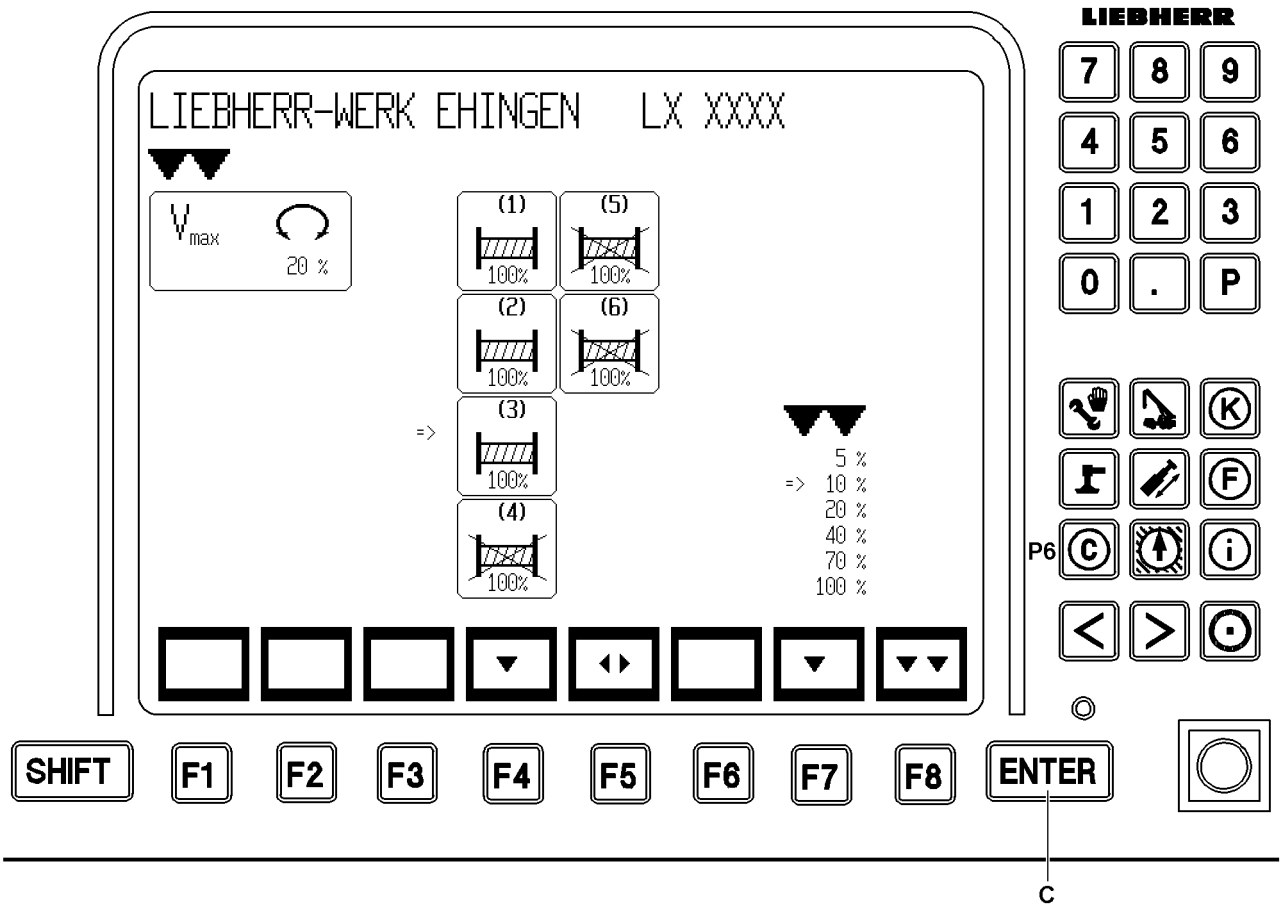

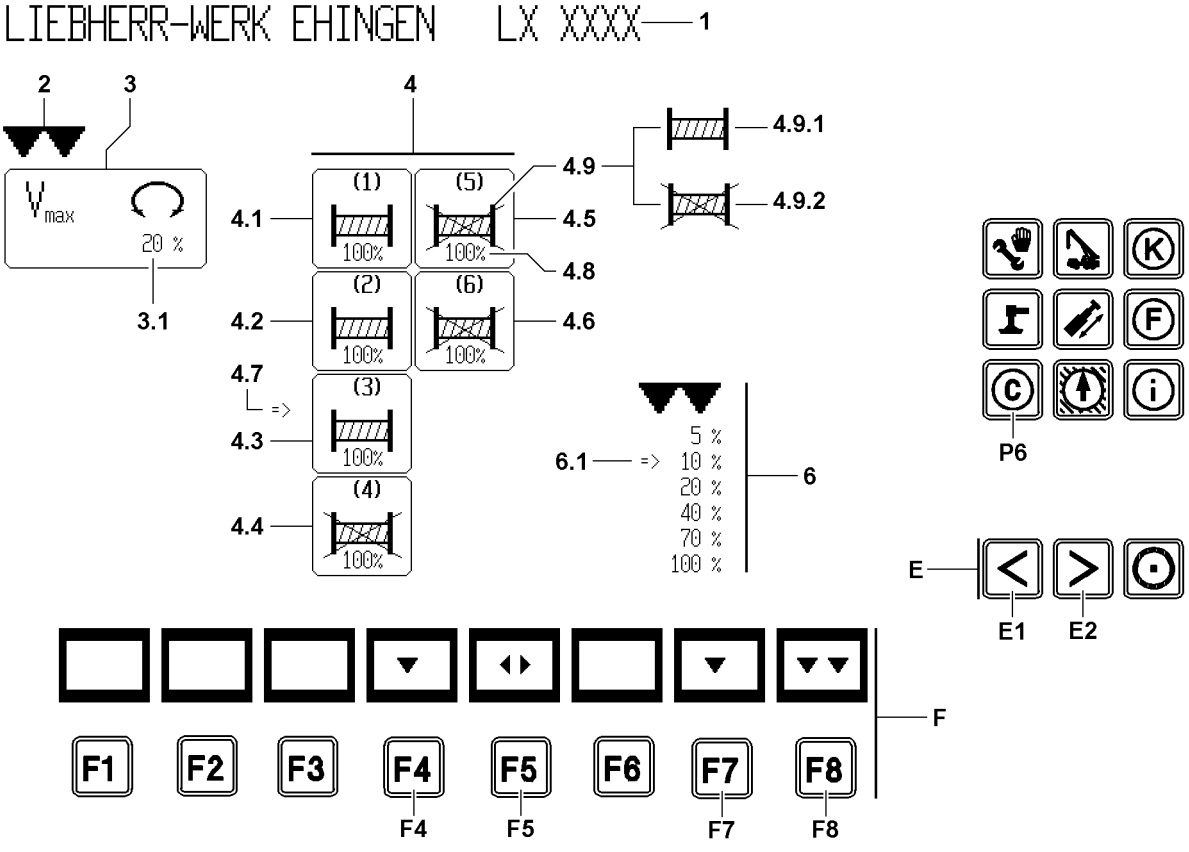

Fig.111903

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12.4.2 Activating / deactivating individual winches

In order to prevent unintentional activation of a winch that is currently not required, deactivate individual winches.

▶ Using the special function key **E1** or special function key **E2**, select the icon group „Winches“ **4**.

Result:

– Selector (double arrow down) **2** appears above the icon group „Winches“ **4**.

▶ With the function key **F4**, select the icon for „winch 1“, **or** „winch 2“, **or** „winch 3“*****, **or** „winch 4“, **or** „winch 5“*** or** „winch 6“*****.

Result:

– Selector (arrow to right) **4.7** shows the selected winch.

▶ Using the function key **F5**, activate or deactivate the selected winch.

Result:

– The winch icon in the icon changes the appearance.

Winch icon not crossed out = winch activated **4.9.1**.
Winch icon crossed out = winch deactivated **4.9.2**.

12.5 Switching back to the crane operation program

▶ Press the function key **F8**.

Result:

– The parameters previously confirmed with the ENTER key **C** will be taken over into the control.

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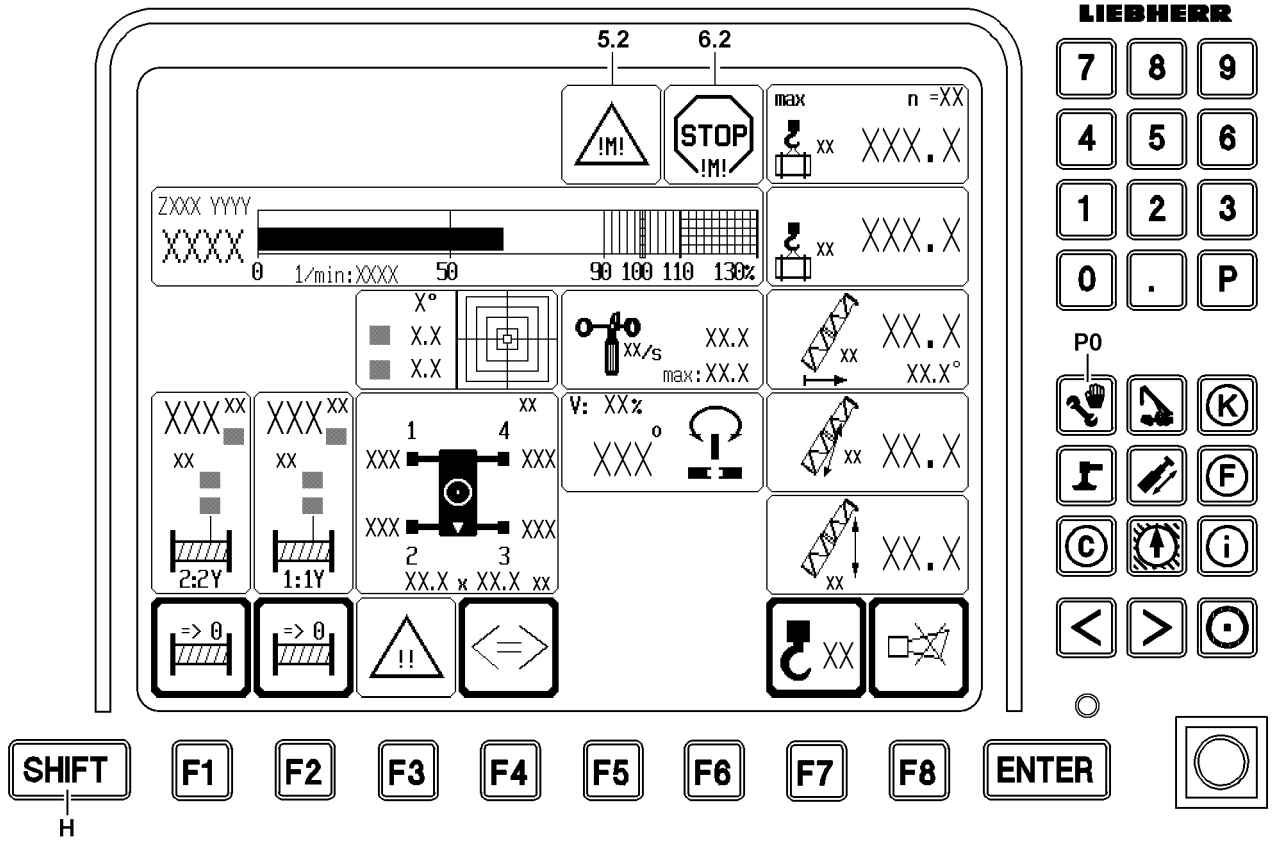

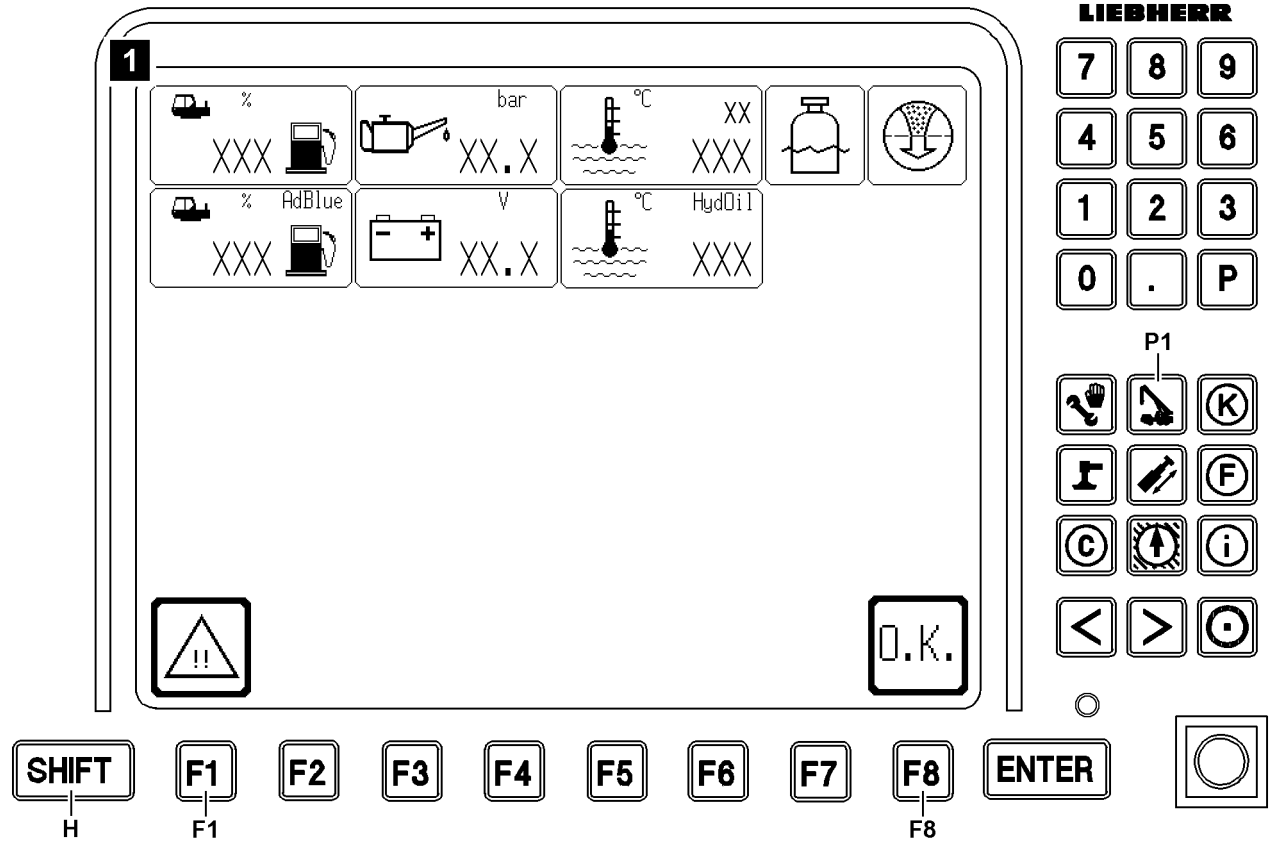

Fig.126906

LWE/LG 1750-006/15409-07-02/en

13 The Engine monitoring program

All engine-related data is displayed by the engine monitoring program, such as the engine oil pressure, coolant temperature etc. The change from the crane operation into the engine monitoring program is made automatically is case of a problem.

13.1 Starting the program

NOTICE
Danger of severe engine damage!
If the engine monitoring program reports a problem and / or warning occurrence, then you must react immediately and remedy the problem!
- ▶ React to problems and / or warning occurrences immediately and remedy the problem!
- ▶ If necessary, stop crane operation and turn the engine off!

NOTICE
Shut off engine monitoring!
Outside of the crane operation program, the engine monitoring is turned off!
When the engine monitoring is turned off, problems and warning occurrences are not recognized!
This could result in crane failure!
- ▶ If work is not carried out in the crane operation program, then turn the crane engine off and operate the LICCON computer system in stand-by mode, see section „LICCON computer system in stand-by mode“!
- ▶ If work has to be carried out for a longer period outside of the crane operation program, with the engine running, then switch regularly into the engine monitoring screen!

The program starts automatically:

- ▶ Once if a STOP event of the engine monitoring takes place during **crane operation** on the crane operation program (at least one master switch is deflected or activated). The engine monitoring screen is displayed for approx. 5 seconds and then automatically reverts to the crane operating screen.
  or
  At an advance warning, warning or STOP event of the engine monitoring during the boot up of the LICCON computer system.

This is how you start the program at the prompt:

- ▶ Press the key combination SHIFT **H** + program key **P0**.

Result:

- – The engine monitoring screen is displayed, see illustration **1**.
- – All **load moment increasing** crane movements are blocked or turned off.

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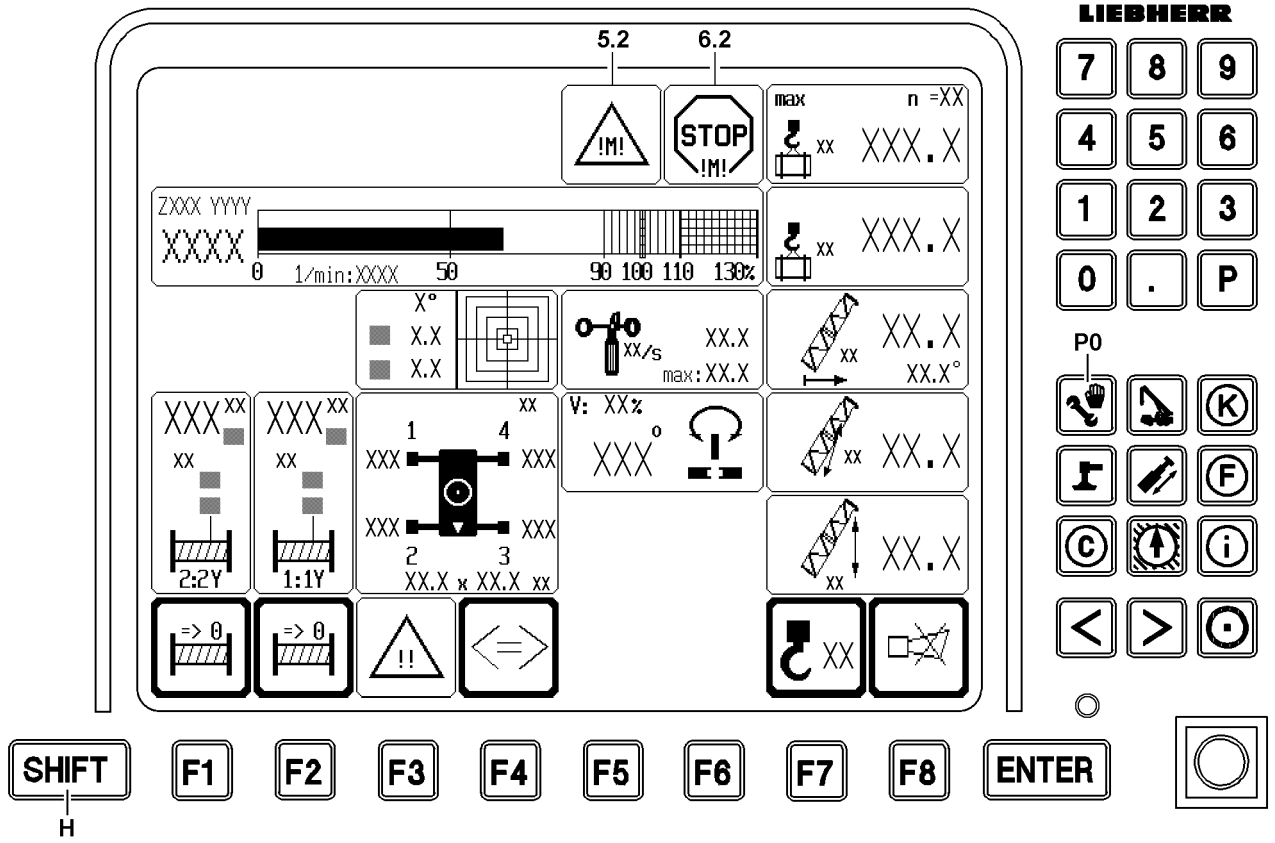

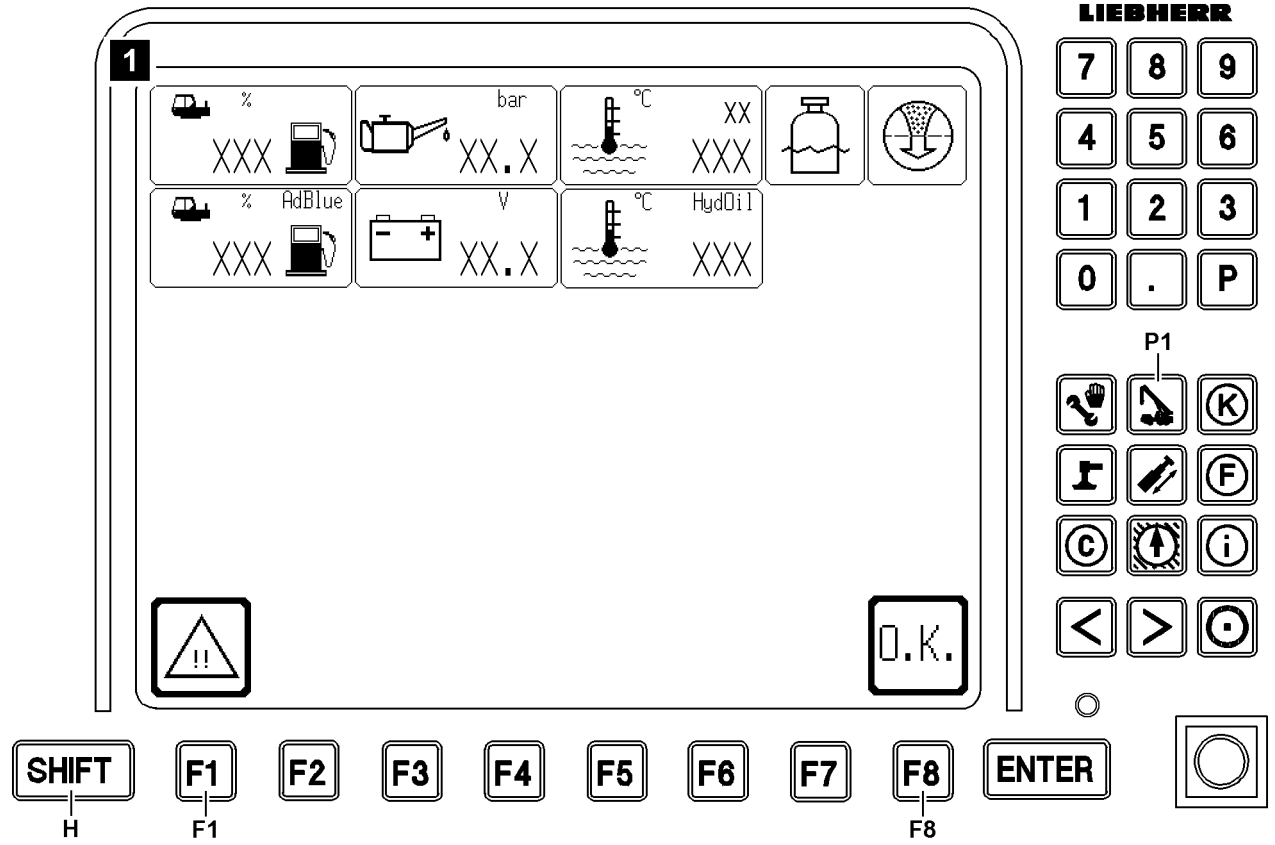

Fig.126906

13.2 Possible engine monitoring advance warning, warning and STOP events

Events	**Advance warning**	Warning **5.2**	STOP **6.2**
Engine oil pressure (display value) missing		x	
Erroneous engine oil pressure (display value)		x	
Engine oil pressure warning active			x
Coolant / charge air temperature (display value) missing		x	
Erroneous coolant / charge air temperature (display value)		x	
Coolant / charge air temperature warning active			x
Coolant level warning active			x
Hydraulic oil temperature (display value) missing	x		
Erroneous hydraulic oil temperature (display value)	x		
Hydraulic oil temperature (display value) too high		x	
Air filter monitoring		x	
Battery voltage (display value) missing	x		
Erroneous battery voltage (display value)	x		
Battery voltage not between 16 V and 36 V	x		
Fuel reserve (display value) missing	x		
Erroneous fuel reserve (display value)	x		
Fuel reserve (display value) 10 % or less	x		
Fuel reserve (display value) 6 % or less		x	
Fuel reserve (display value) 1 % or less			x

If the system automatically switches to the „Engine monitoring“ program when an engine STOP event occurs, there is an option for retaining the engine monitoring screen within 5 seconds (retaining the engine monitoring screen is achieved by pressing the function key **F1**) (illustration **1**). Switch back to the operating screen using the function key **F8** (OK) or the program key **P1** (crane operation). If the engine monitoring screen is **not** retained, then after 5 seconds the system switches back automatically to the „Crane operation“ program.

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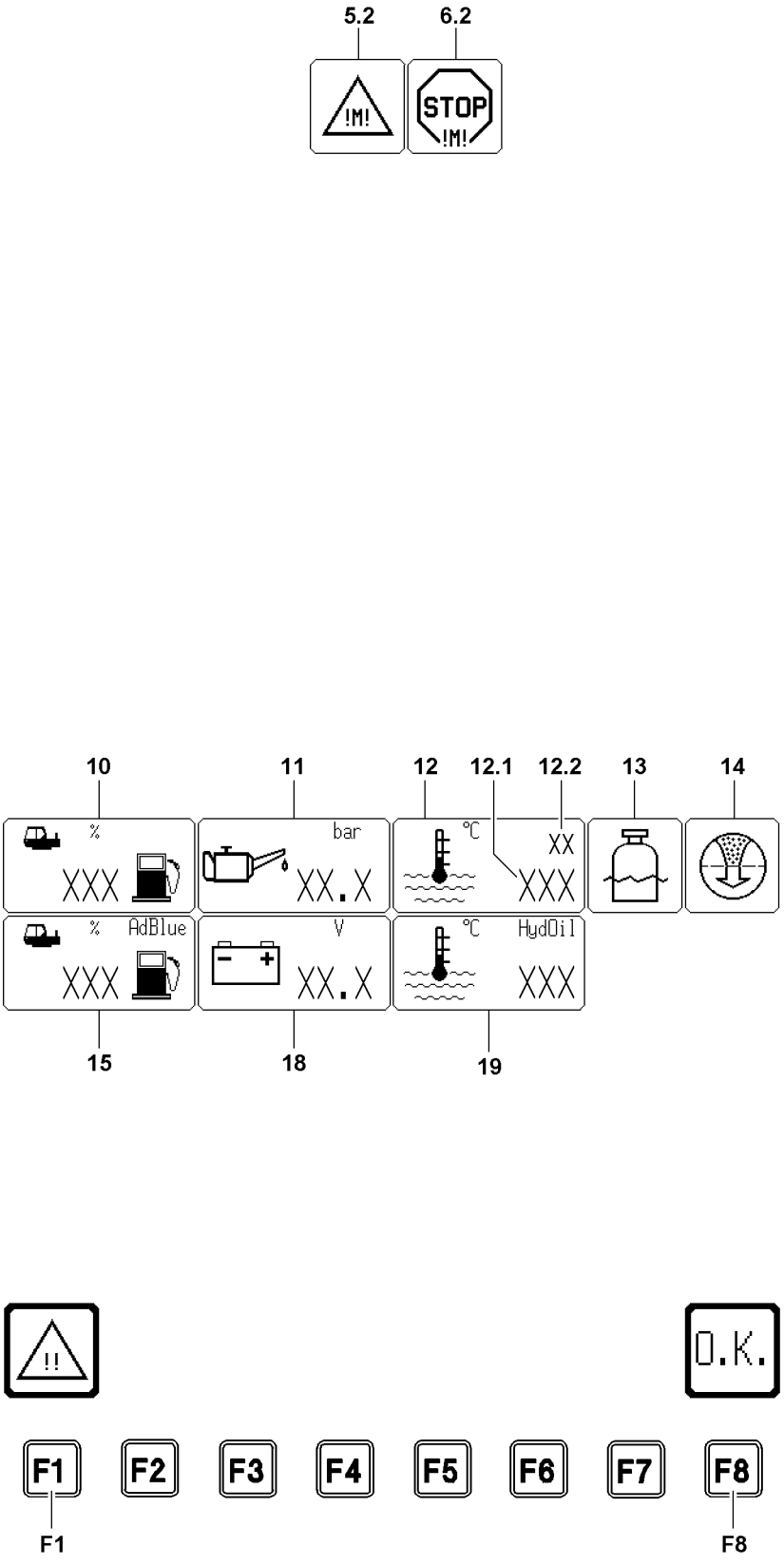

Fig.126907

13.3 Retaining the engine monitoring screen

The automatic change over into the engine monitoring screen is only made from the „Crane operation“ program.

If you confirm a monitoring event in the engine monitoring screen with the function key **F8**, then there will be **no** automatic change over to the engine monitoring screen for the same event.

On switching back to the „Crane operation“ program, the STOP icon **6.2** or the Advance warning icon **5.2** appears. The system does **not** alert again to other advance warnings in the „Crane operation“, since the advance warning already exists.

WARNING
There is a danger of severe damage to the engine if STOP events are ignored!
If other programs are used for extended periods of time, for example the „Set up“ or „Test system“, it is essential to switch occasionally to the engine monitoring screen in order to ensure that no engine monitoring events have occurred, which could lead to damage or destruction of the engine.
▶ Switch over occasionally to the engine monitoring screen!

The automatic change over in the engine monitoring screen has been made:
▶ Press the function key within 5 seconds **F1**.

Result:

– Retain the engine monitoring screen.
– Icon frames are displayed with a thin border.
– All load torque increasing crane movements will be turned off or locked.

Switch back to the „Crane operation“ program:
▶ Press the function key **F8**.

Result:

– System switches back to the „crane operation“ program.
– The block of the load moment increasing crane movements will be lifted.
– The advance warning or STOP icons are faded into the „Crane operation“ program.

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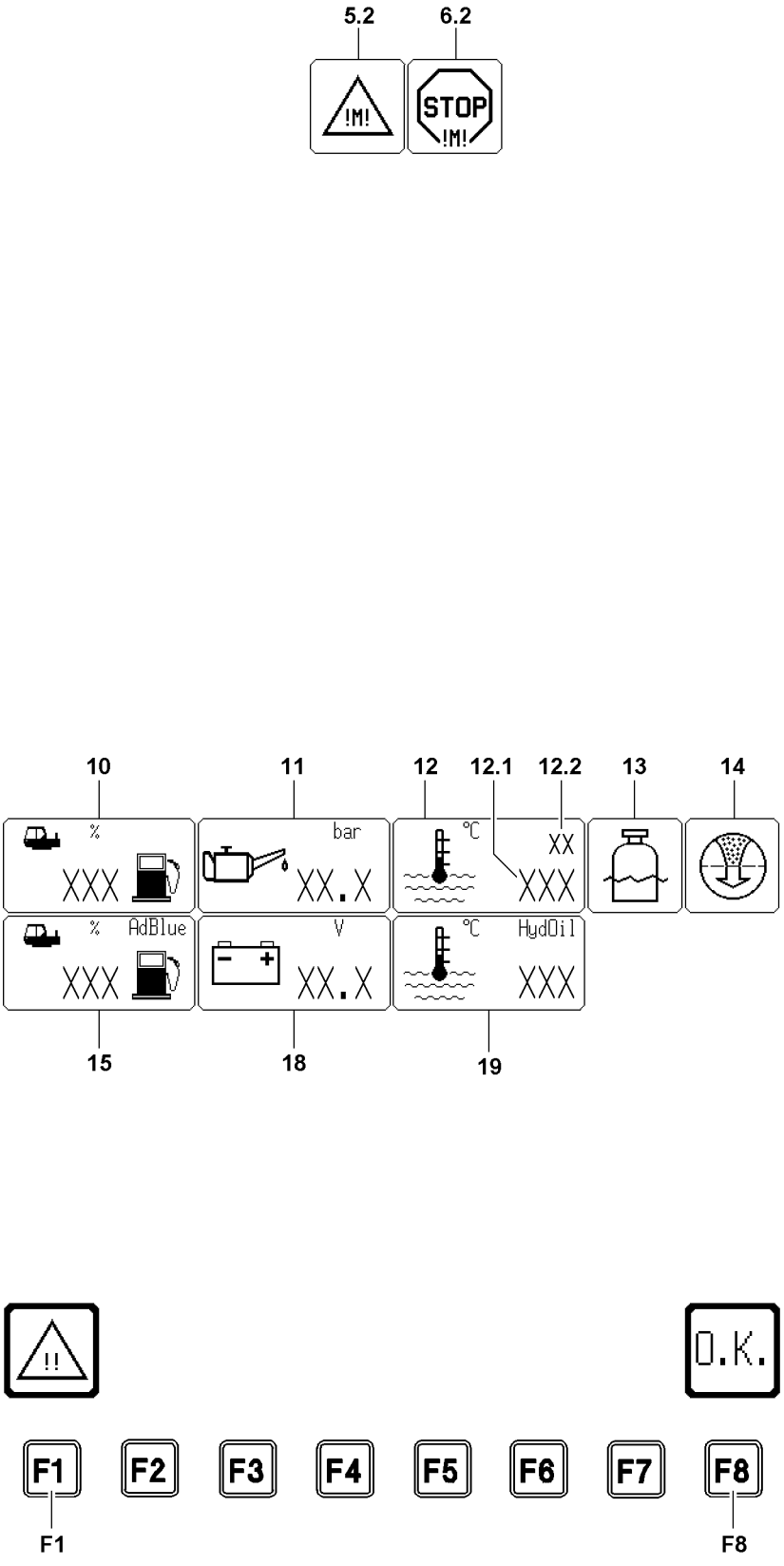

Fig.126907

13.4 Engine monitoring icons

13.4.1 Crane engine

10 Tank content
- In [%]
  Icon blinks when the fuel reserve of the crane engine has reached insufficient fill level

11 Oil pressure
- In [bar]
  Numeric display in icon blinks if the engine oil pressure is too low

12 Coolant / charge air temperature
- In [°C]

12.1 Coolant temperature
- Numeric display blinks if the coolant temperature is too high

12.2 Charge air temperature
- Numeric display blinks if the charge air temperature is too high

13 Coolant level too low
- Icon appears if the coolant level is too low

14 Air filter is dirty
- Icon appears if the air filter is dirty

15 Urea reserve
- **Note:** Only for crane types with SCR exhaust aftertreatment
- In [%]
- Observe the respective indicator lights in the roof console Crane operator's cab, see Crane operating instructions, chapter 4.01.

18 Battery voltage
- In [V]
  Numeric display in icon blinks if the operating voltage is less than 16 V or above 36 V

19 Hydraulic oil temperature
- In [°C]
- Numeric display blinks if the hydraulic oil temperature is too high

13.5 Function key line

F1 Function key
- Retaining the engine monitoring screen

F8 Function key
- Switching back to the crane operation program

Note
▶ The function keys **„F2“** to **„F7“** are **not** used in the engine monitoring program!

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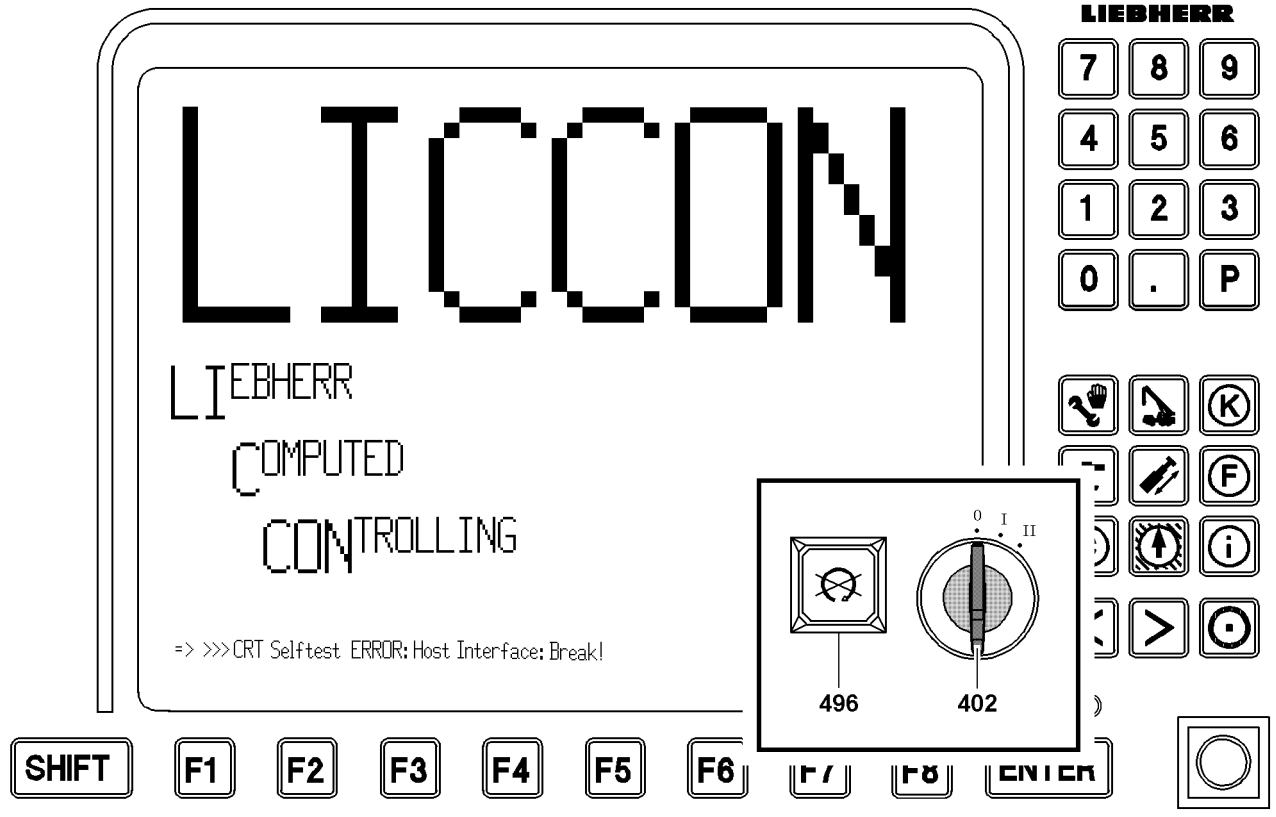

Fig.105190

LWE/LG 1750-006/15409-07-02/en

14 LICCON computer system in stand-by mode

14.1 Starting the LICCON computer system in stand-by mode

There are two ways of achieving stand-by mode with the LICCON computer system.

Starting the LICCON computer system without the engine running:

▶ Turn the ignition switch **402** to position „I“ and leave it there.

Result:

– The LICCON computer system runs and the LICCON monitor shows the set up screen, or alternatively for a stop / warning / advance warning, the engine monitoring screen.

▶ Press function key **F8** (O.K.).

Result:

– System switches to the „Crane operation“ program.

Turning off the running engine with the engine stop button:

▶ Press the button **496**.
▶ Leave the ignition switch **402** in position „I“.

Result:

– The engine is turned off, the LICCON computer system continues to run.

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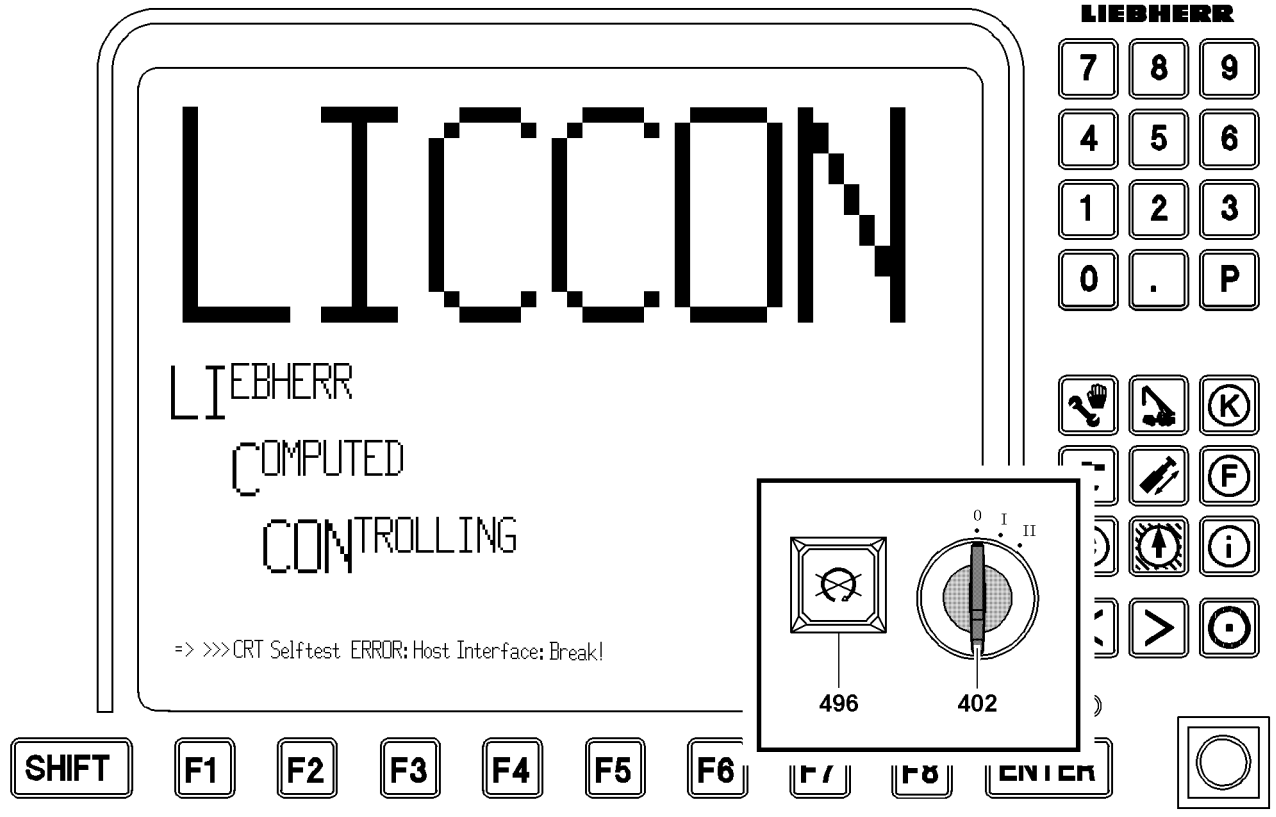

Fig.105190

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14.2 Active stand-by operation / alarm

The operating programs and the monitor displays function exactly the same as in the turn-on procedure for the LICCON computer system with engine start (crane operation).

No crane movements are possible. If despite this a crane movements is selected, a message appears on the LICCON monitor.

Example: **Control turning shut off, the crane engine is not running.**

The duration of the stand-by operation is 15 minutes, of which 3 minutes are the stand-by alarm. Operating the LICCON computer system during stand-by operation automatically extends the stand-by time.

▶ In **stand-by operation no** keys are pressed on the monitor.

Result:

– The stand-by alarm (horn) is reached after 12 minutes.
– This screen appears on the monitor: **STANDBY** (see illustration).

▶ Now press any key on the LICCON monitor.

Result:

– System switches back to the interrupted program.
– The stand-by time is extended by another 15 minutes.

▶ During the **stand-by alarm** (Duration: 3 minutes) **no** keys on the monitor are pressed.

Result:

– The LICCON computer system shuts completely off. The shut off is announced by acoustical signals 60 seconds in advance (short horn) and 30 seconds in advance (long horn). The power supply of the LICCON computer system turns off.
– This screen appears on the LICCON monitor: **CRT Selftest ERROR: Host Interface: Break!** (see illustration). This is not an error message from the LICCON computer system, the error message appears only on the monitor because the connection between the monitor and the CPU is broken.

14.3 Start prevention

Starting the engine again after complete shut down of the LICCON computer system:

▶ Return the ignition switch **402** first to position „0“.
▶ Turn the ignition switch **402** to position „I“ (note the preheating time).
▶ Turn the ignition switch **402** briefly to position „II“.

Result:

– The engine starts.

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Empty page!

LWE/LG 1750-006/15409-07-02/en

4.03 Start up and shut down of crane

LWE/LG 1750-006/15409-07-02/en

LWE/LG 1750-006/15409-07-02/en

Fig.195219

1 Checks before start up

Various checks must be performed before start up.

Make sure that the following prerequisites are met:
- The engine is off.
- The LICCON computer system is in stand-by mode.

Note

▶ The LICCON computer system in stand-by mode, see the Crane operating instructions, chapter 4.02.

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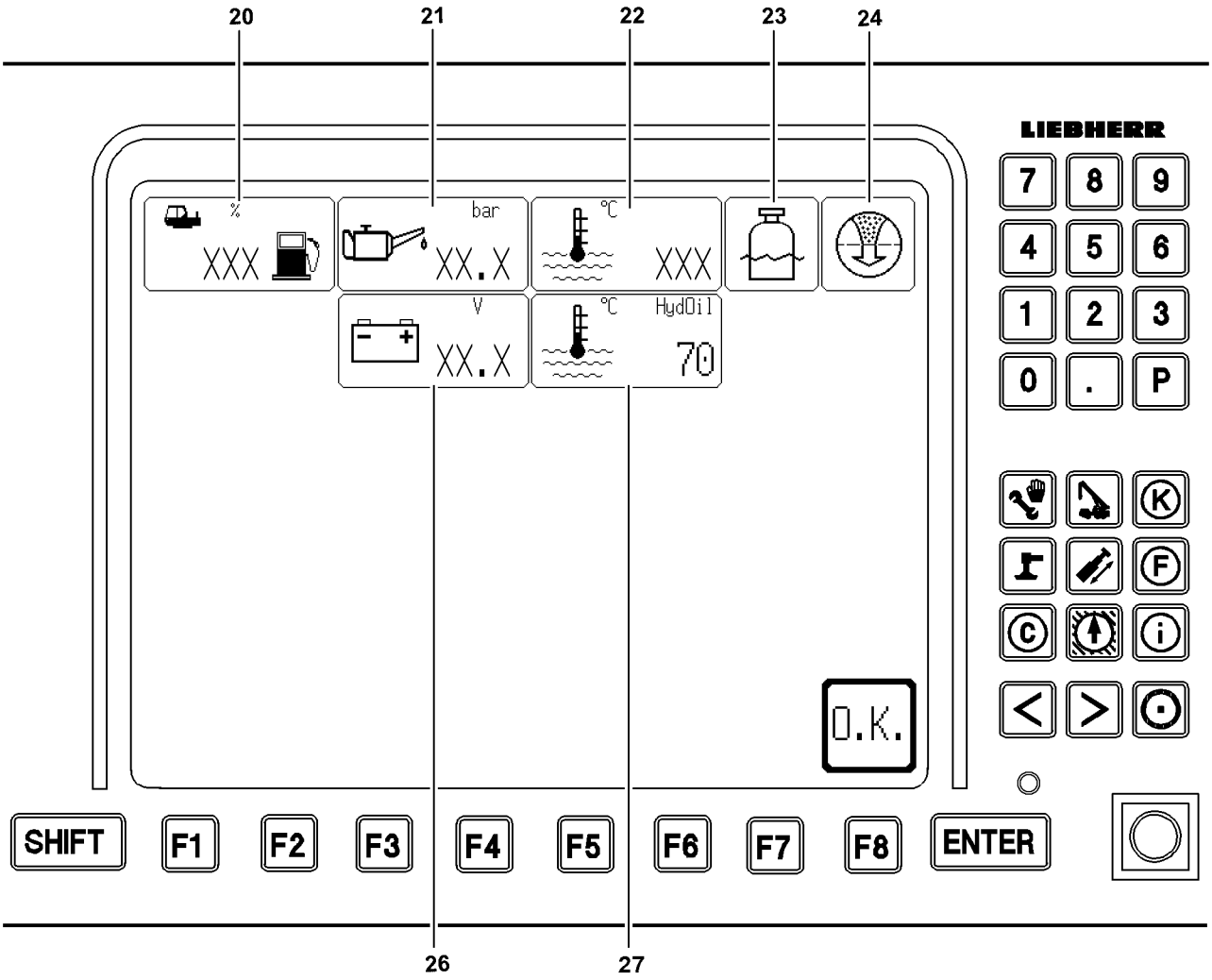

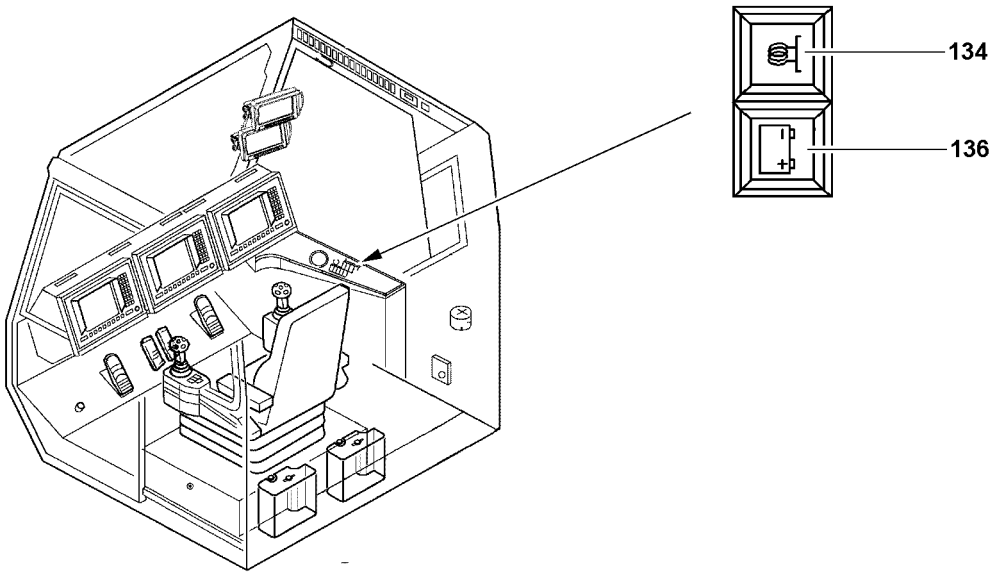

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Fig.124524

1.1 Checking the oil level and filters

- ▶ Check the oil level on the crane engine.
- ▶ Check the oil level in the hydraulic tank.
- ▶ Check the filter on the hydraulic tank.

1.2 Checking the urea level

- ▶ Check the urea level before crane operation.

1.3 Checking the fuel level

Note
Fuel tank empty!
If the fuel tank has been run dry, then the fuel system must be bled.
▶ Refuel in time.

On the LICCON monitor, the amount of fuel left in the tank is shown in the form of a numerical display in percentages [%], see icon **20**.

▶ Check the tank contents on LICCON monitor.

1.4 Checking the coolant level

For detailed description of lubricants and fill quantities, see Crane operating instructions, chapter 7.06 and chapter 7.07.

WARNING
Danger of burns due to hot coolant!
Coolant at operating temperature is under pressure. If the cooling system is opened, there is the danger of scalding.
▶ Check the coolant level only when the engine is cold.

NOTICE
Property damage due to insufficient cooling!
▶ Check the coolant level.

If the coolant level of the coolant expansion tank falls below the overflow on the filler neck:
▶ Add coolant.

1.5 Checking the battery voltage

Note
The battery voltage must be checked in regular intervals, especially if the crane has been „out of service“ for a longer period of time and users, such as the airplane warning lights - and the battery must be recharged if necessary.
▶ Recharge the battery, see Crane operating instructions, chapter 7.05.

Note
Reduced battery performance requires greater power requirements!
▶ Ensure that batteries are well charged, particularly during the colder months.

▶ Check the battery voltage, see icon **26**.

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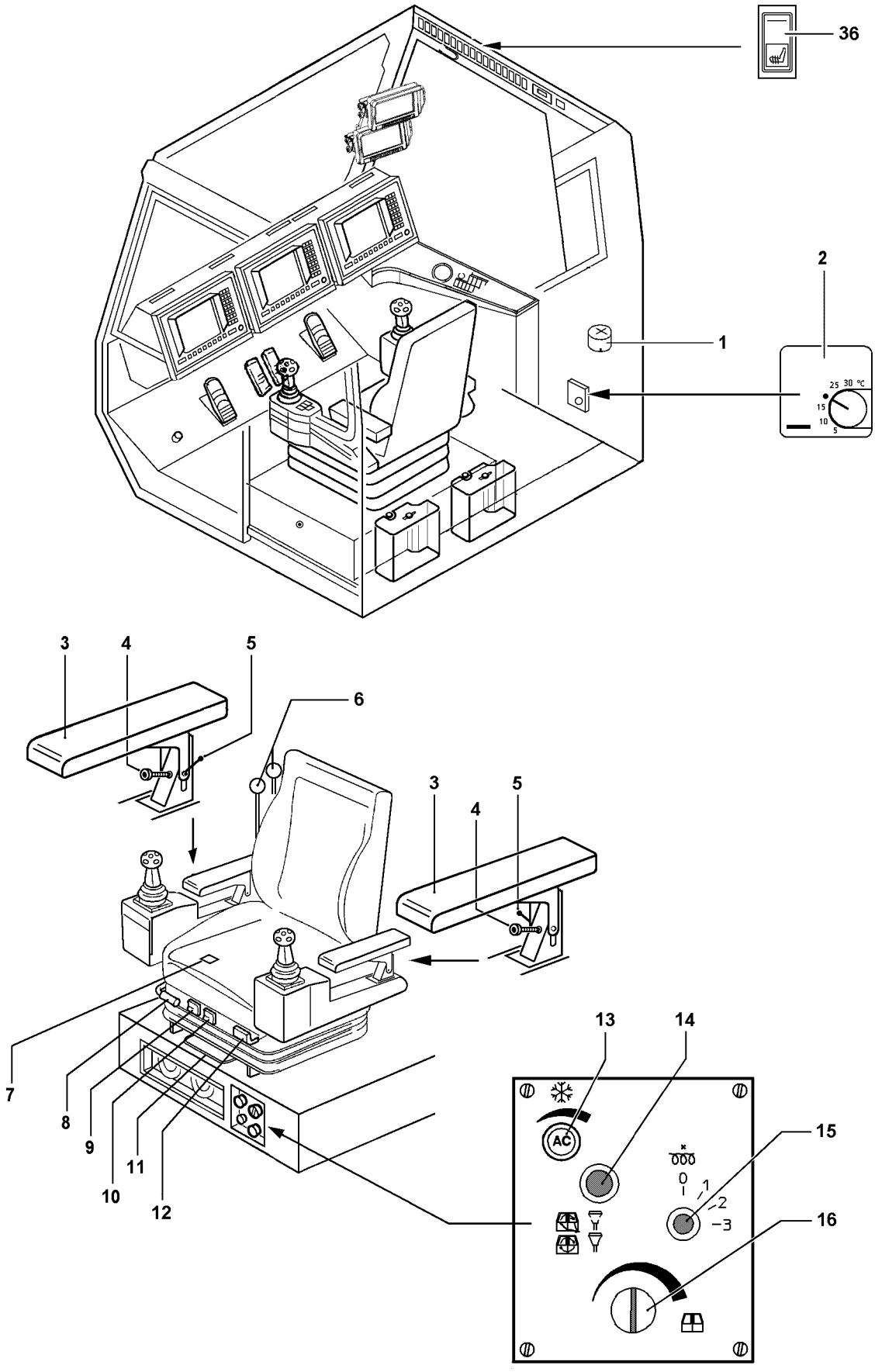

LWE/LG 1750-006/15409-07-02/en

Fig.110610

1.6 Checking the central lubrication system

For detailed description of lubricants and fill quantities, see Crane operating instructions, chapter 7.06 and chapter 7.07.

NOTICE
Property damage due to insufficient lubrication!
▶ Check the fill quantity of the grease containers.

If the fill quantity falls below the marked minimum amount:
▶ Fill the grease container with grease.

1.7 Checking the general condition of the crane

WARNING
Danger of fatal injury due to falling parts!
Death, severe bodily injuries, property damage.
▶ Before erecting the boom: Make sure that there are no loose parts on the boom system, such as pins, spring retainers or ice.
▶ Make sure that the cable / rope drum and the limit switches are free of snow, frost and ice.

▶ Make sure that the crane is horizontally aligned.
▶ Make sure that the gear ring of the slewing ring connection is clean and greased.
▶ Make sure that the air supply to the oil and water cooler is clear.
▶ Make sure that side covers are closed and locked.
▶ Make sure that no persons or objects are within the danger zone of the crane.

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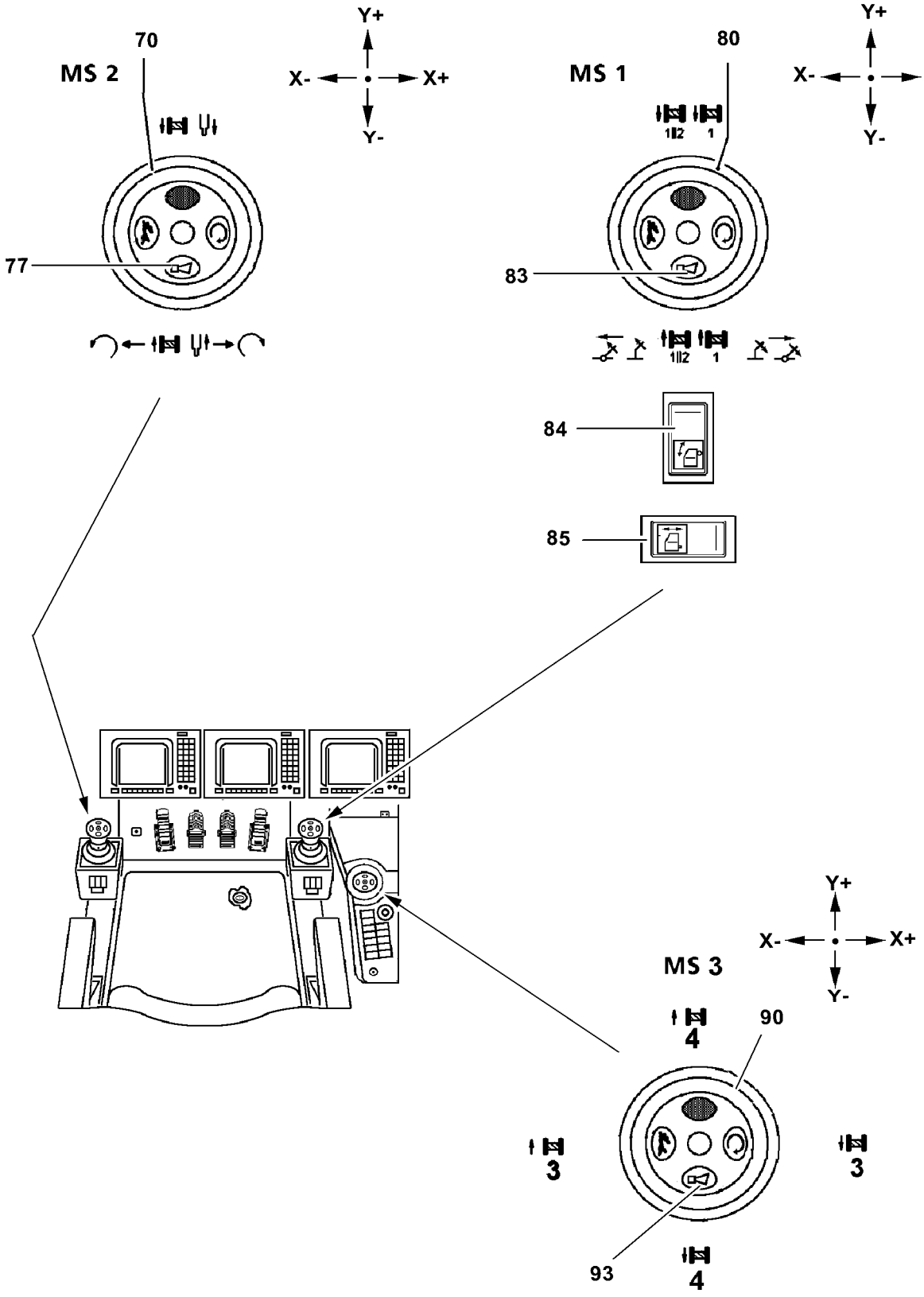

LWE/LG 1750-006/15409-07-02/en

Fig.110613

2 Moving the crane operator’s cab

WARNING
Danger of crushing!
When swinging the crane operator’s cab in and out, make sure that there are no persons or objects within the danger zone.
Death, severe bodily injuries, property damage.
▶ Make sure that personnel cannot be caught by the crane operator’s cab.

2.1 Swinging the crane operator’s cab into the operating position

The crane operator’s cab is swung during transport in front of the turntable.

▶ Swinging the crane operator’s cab out into the operating position: Press the button **85**.

Result:

– The crane operator’s cab swings out.

2.2 Swinging the crane operator’s cab into the transport position

Swing the crane operator’s cab in from the operating position into the transport position.

▶ Swing the crane operator’s cab all the way in: Press the button **85**.

Result:

– The crane operator’s cab swings in.

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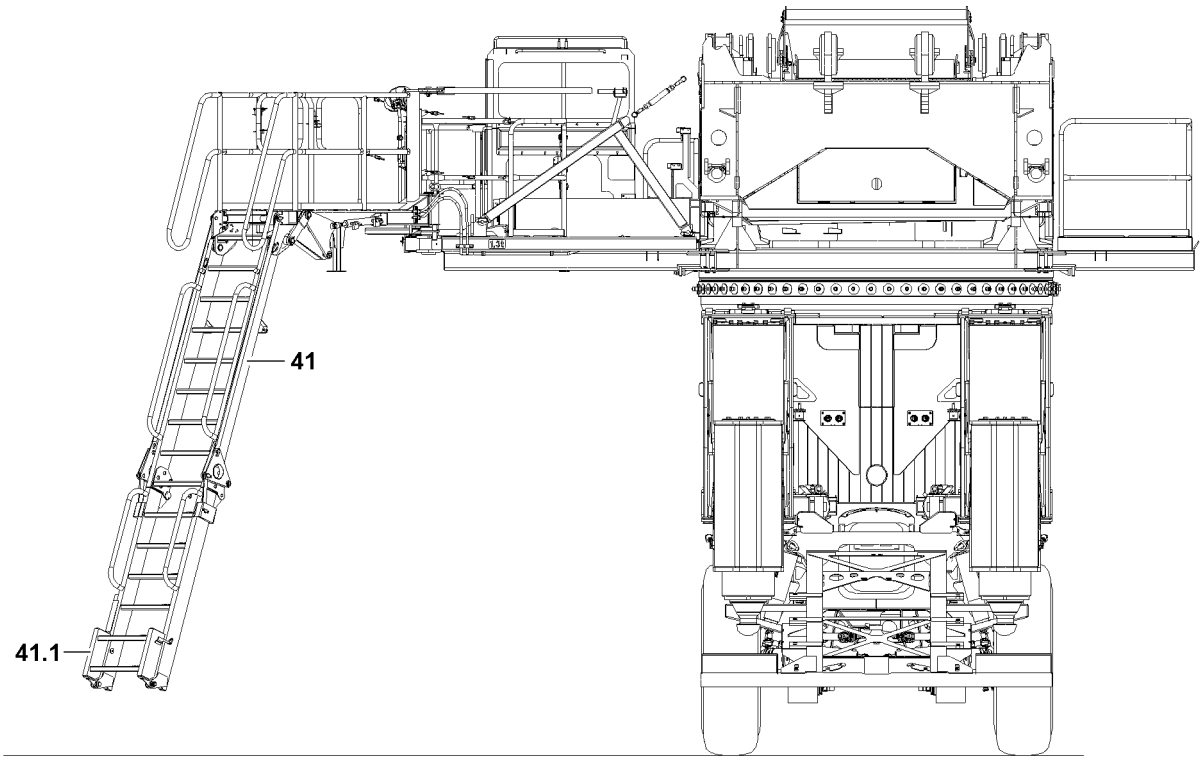

Fig.112381

3 Operating the access ladder

WARNING
Danger of crushing!
When lowering / lifting the access ladder **41**, make sure that there are no persons or objects in the danger zone.
Death, severe bodily injuries, property damage.
- ▶ Make sure that personnel cannot be caught by the access ladder **41**.
- ▶ When lowering / lifting the access ladder **41** without direct visual contact by the operator, all movements must be monitored by a guide.

NOTICE
Danger of collision!
If the crane superstructure is turned with a folded down step **41.1** or lowered access ladder **41**, there is a danger of collision.
The access ladder and other crane components can be significantly damaged.
- ▶ When the step **41.1** is folded down: Fold the step **41.1** up and lock.
- ▶ Before unpinning the crane superstructure from the crane chassis, always raise the access ladder **41** all the way.
- ▶ When the access ladder **41** is lowered, an acoustical warning signal sounds, but there is no shut-off.

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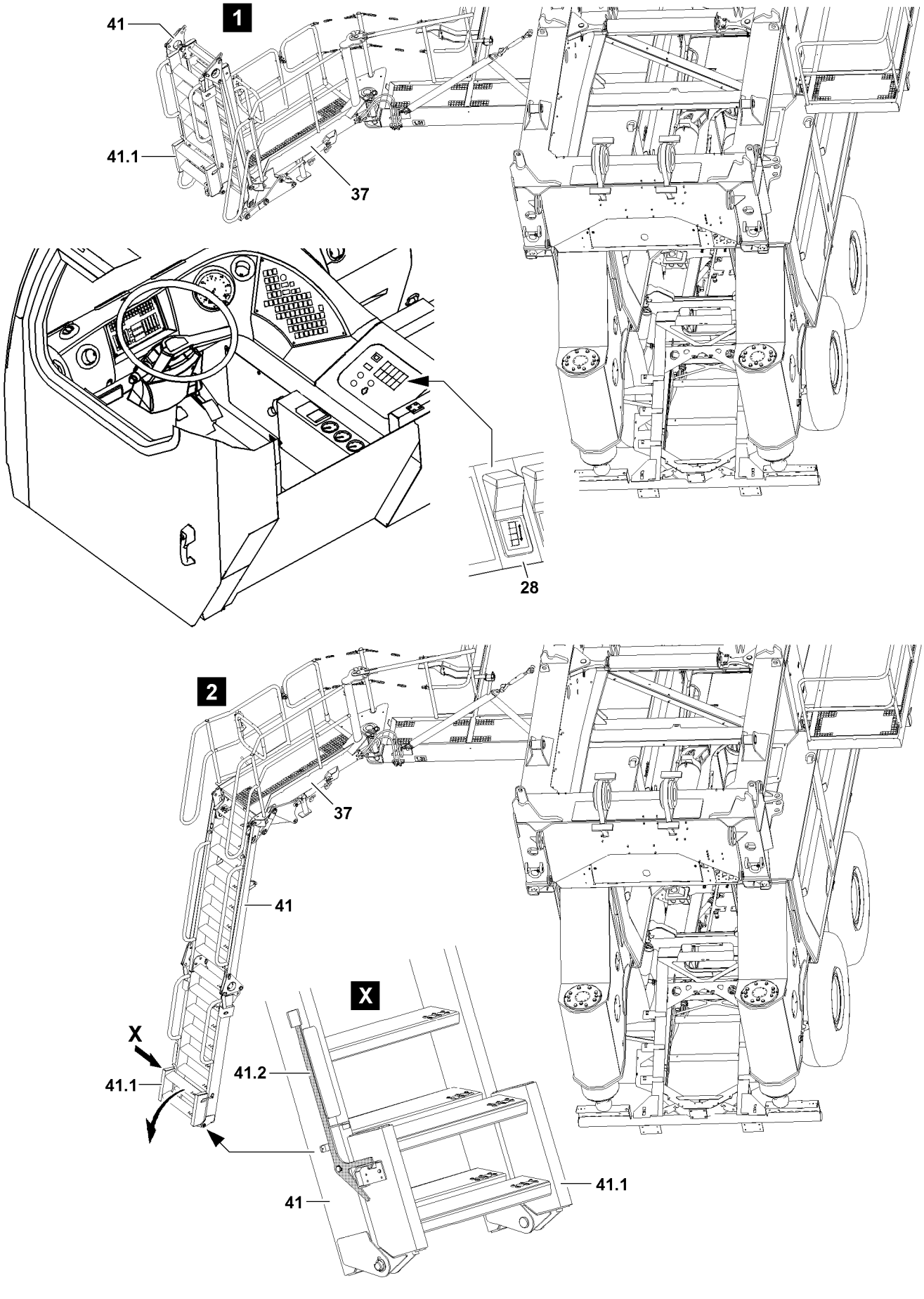

Fig.112384

3.1 Operating the access ladder from the driver's cab

Note
▶ As a rule, the following prerequisites must be observed when operating the access ladder.

Make sure that the following prerequisites are met:
- The crane superstructure is locked with the crane chassis in longitudinal direction.
- The catwalk **37** is swung out into the operating position, pinned and secured, see the Crane operating instructions, chapter 2.06.
- The engine in the crane superstructure is running.
  (Starting the engine in the crane superstructure, see the Crane operating instructions, chapter 3.04.)

WARNING
Danger of crushing!
When the step **41.1** folds down, legs can be hit or fingers can be crushed.
▶ Do not reach with fingers or hands into the turning range of the step **41.1**.
▶ Standing in the folding area of the step **41.1** is prohibited.

3.1.1 Lowering the access ladder into the operating position

▶ Lower the access ladder **41**: Press the button **28** in the center console until the access ladder has reached the „bottom“ end position, see illustration **2**.

Note
▶ When the end position is reached, the control turns the „Lowering“ movement off by itself.

To simplify crane superstructure ascent and descent, the step **41.1** can be folded down.

▶ Actuate the hand lever **41.2** and fold the step **41.1** down.

3.1.2 Lifting the access ladder into the transport position

Before lifting the access ladder **41**, the step **41.1** must be brought to the transport position.

▶ Fold the step **41.1** up and engage it in the transport position.
▶ Lift the access ladder **41**: Press the button **28** in the center console until the access ladder has reached the „top“ end position, see illustration **1**.

Note
▶ When the end position is reached, the control turns the „Lifting“ movement off by itself.

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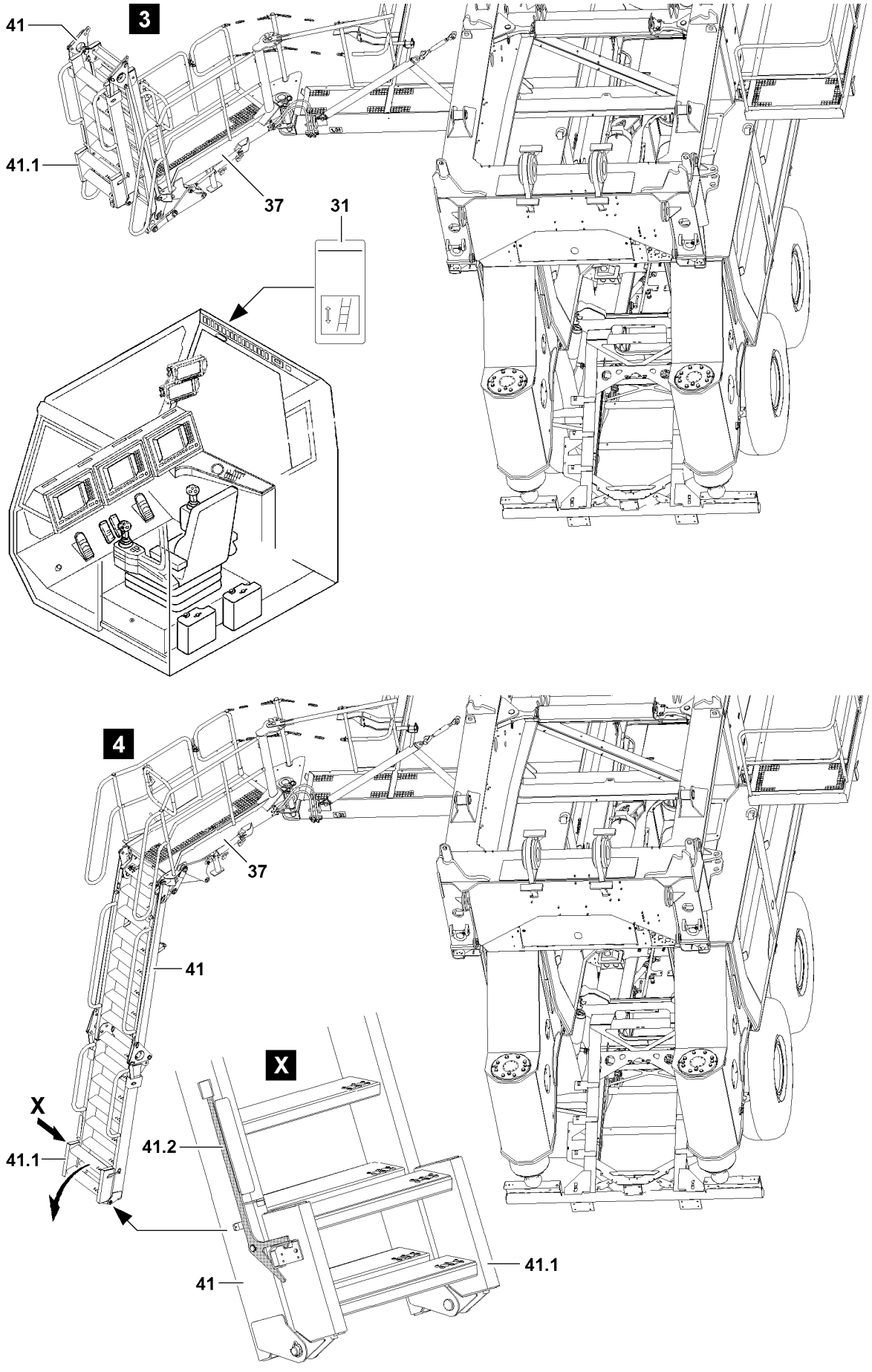

Fig.112383

3.2 Operating the access ladder from the crane operator's cab

Note
▶ As a rule, the following prerequisites must be observed when operating the access ladder.

Make sure that the following prerequisites are met:
- The crane superstructure is locked with the crane chassis in longitudinal direction.
- The catwalk **37** is swung out into the operating position, pinned and secured, see the Crane operating instructions, chapter 2.06.
- The engine in the crane superstructure is running.
  (Starting the engine in the crane superstructure, see the Crane operating instructions, chapter 3.04.)

WARNING
Danger of crushing!
When the step **41.1** folds down, legs can be hit or fingers can be crushed.
▶ Do not reach with fingers or hands into the folding range of the step **41.1**.
▶ Standing in the folding area of the step **41.1** is prohibited.

3.2.1 Lowering the access ladder into the operating position

▶ Lower the access ladder **41**: Press the button **31** in the roof console until the access ladder has reached the „bottom" end position, see illustration **4**.

Note
▶ When the end position is reached, the control turns the „Lowering" movement off by itself.

To simplify crane superstructure ascent and descent, the step **41.1** can be folded down.

▶ Actuate the hand lever **41.2** and fold the step **41.1** down.

3.2.2 Lifting the access ladder into the transport position

Before lifting the access ladder, the step **41.1** must be brought to the transport position.

▶ Fold the step **41.1** up and engage it in the transport position.
▶ Lift the access ladder **41**: Press the button **31** in the roof console until the access ladder has reached the „top" end position, see illustration **3**.

Note
▶ When the end position is reached, the control turns the „Lifting" movement off by itself.

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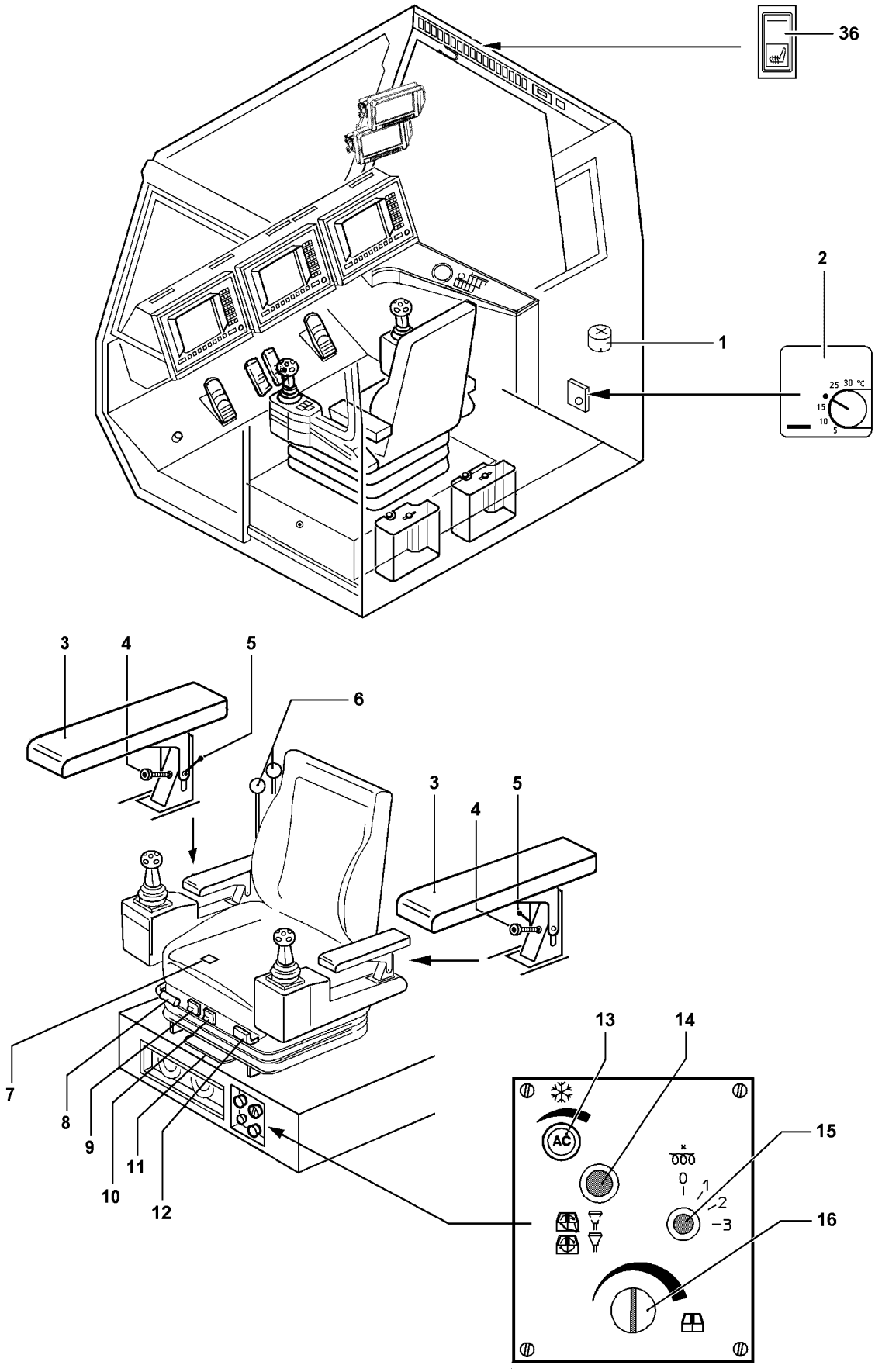

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Fig.110610

4 Work station - Crane operator’s cab

4.1 Adjusting the crane operator’s seat

The crane operator’s seat can be adjusted to suit different body sizes.

4.1.1 Adjust the seat position

- ▶ Adjust the armrest incline with the locking lever **5**.
- ▶ Adjust the seat surface incline with the hand lever **8**.
- ▶ With the button **9** adjust the lumbar area support „on the bottom“.
- ▶ With the button **10** adjust the lumbar area support „on top“.
- ▶ Unlock the horizontal seat adjustment with the bracket **11**.
- ▶ Adjust the backrest incline with the hand lever **12**.

Note

- ▶ To ensure fatigue free and concentrated work with the crane, the armrests should be adjusted in such a way that you can comfortably reach and operate the master switches.

4.1.2 Seat heater*

The crane operator’s seat can be heated with the seat heater.

- ▶ Turn the seat heater on or off with the switch **36**.

4.2 Turning the heater and ventilation on

The crane operator’s cab can be heated or ventilated depending on the desired temperature.

Note

- ▶ For a detailed description, see Crane operating instructions, chapter 6.01.

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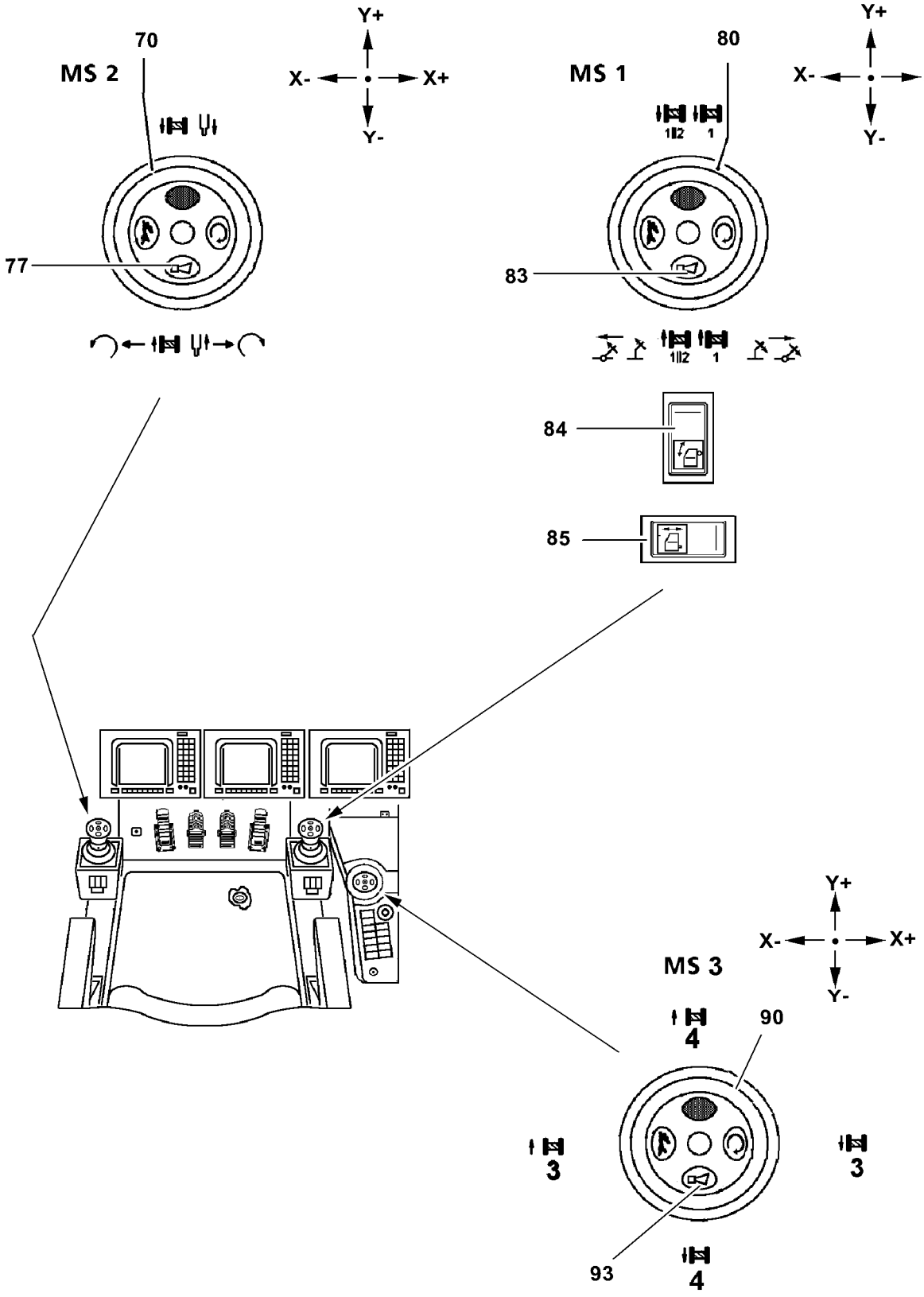

Fig.110613

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4.3 Tilting the crane operator’s cab

To give the crane driver a better field of view, the crane operator’s cab can be tilted upward.

WARNING
Danger of crushing!
When the crane operator’s cab is tilted, the cab doors will open more quickly and hit the backstop.
Death, severe bodily injuries, property damage.
- ▶ Hold the crane operator’s cab only on the handle provided for this purpose.
- ▶ Hold the cab door by the handle and open slowly.

4.3.1 Tilting the crane operator’s cab up

▶ Push the button **84** „upward“.

Result:

– The crane operator’s cab swings upward.

4.3.2 Positioning the crane operator’s cab horizontally

▶ Press the button **84** „downward“.

Result:

– The crane operator’s cab swings downward.

Note
▶ After ending crane operation: Positioning the crane operator’s cab horizontally

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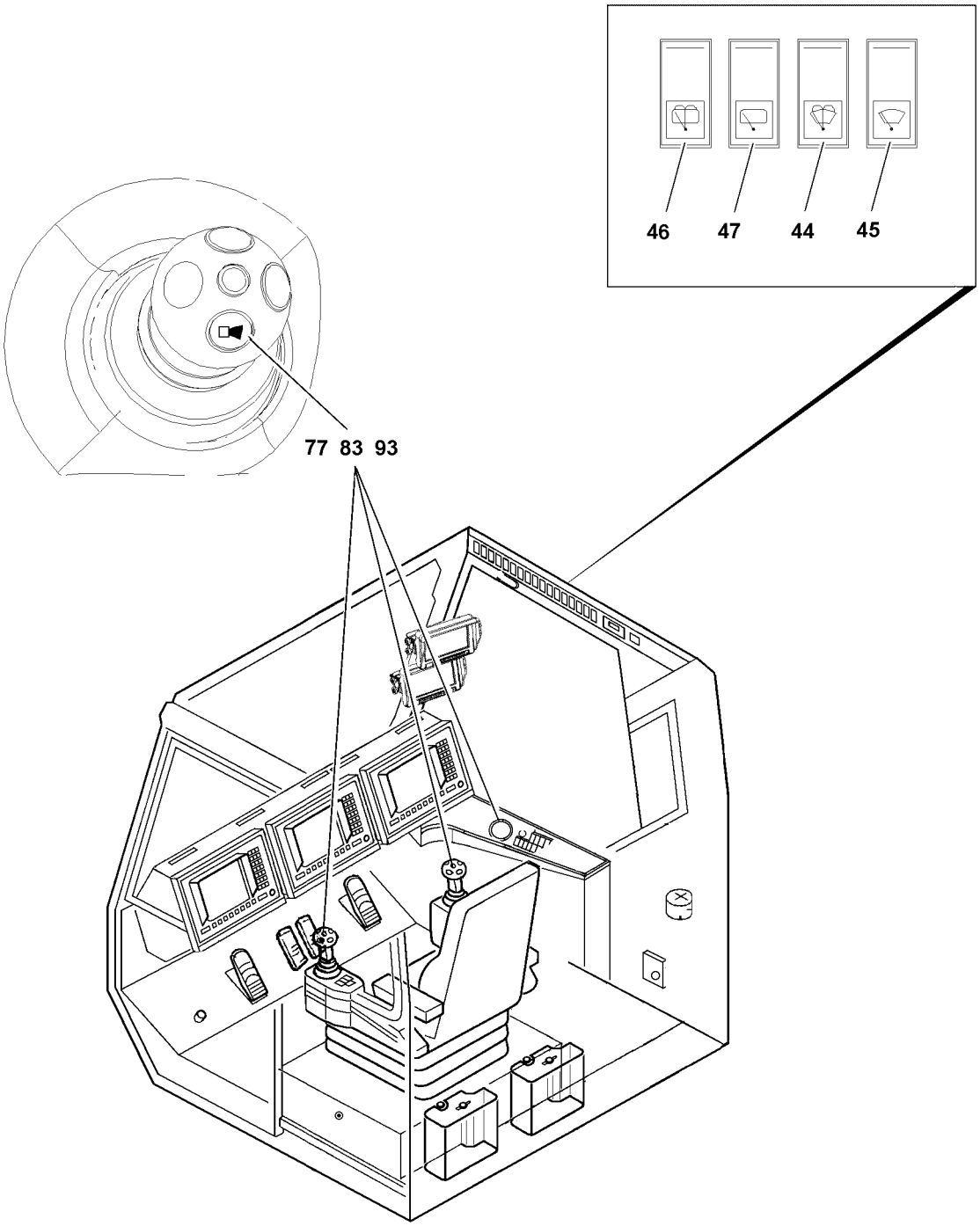

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Fig.117643

4.4 Operating the window wiper / window washer system

4.4.1 Operating the window wipers

The window wipers on the front and roof window can be actuated with the two-stage switch:
- Switch position I: Intermittent
- Switch position II: wipe

▶ Turn the window wiper on the front window on: Actuate the switch **45**.
▶ Turn the window wiper on the roof window on: Actuate the switch **47**.

4.4.2 Operating the window washer system

The window wipers on the front and roof windows can be assisted by a window washer system.

Note
▶ Before the start of the cold season, fill the container for the window washer fluid with standard anti-freeze mix.

▶ Turn the windshield washer system for the front window on: Press the button **44**.
▶ Turn the windshield washer system for the roof window on: Press the button **46**.

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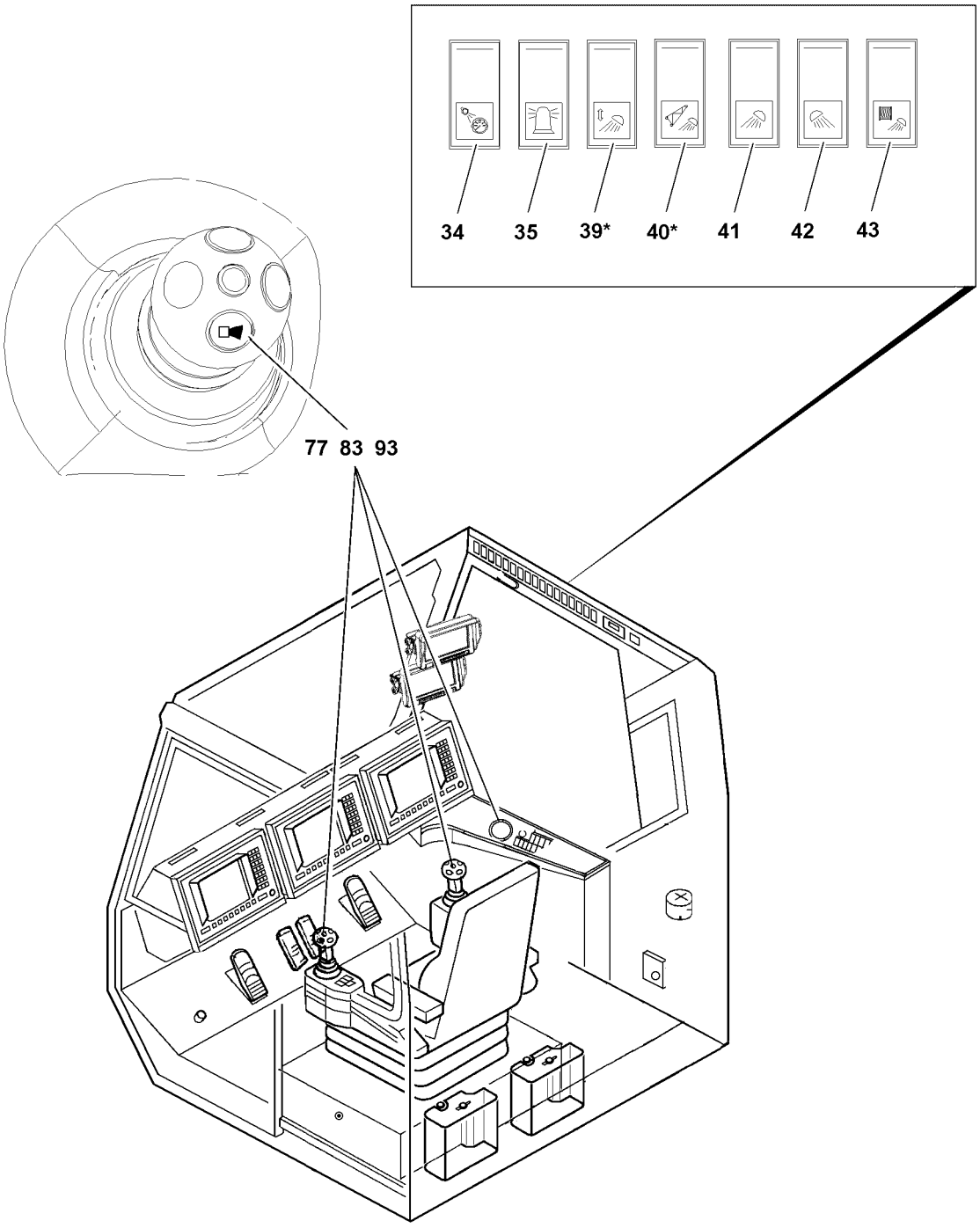

Fig.117644

4.5 Opening the front window

WARNING
Danger of hand injury due to trapping!
▶ Be careful with your hands when closing the front window.

A pair of nitrogen gas cylinders supports the lifting movement of the front window.

▶ To open from inside, just press on the front window.
or

If you only want to partly open the window:
Adjust the window in the desired position with the provided perforated belt.

4.6 Checking the horn

Note
Use of the horn!
▶ Only use the horn in dangerous situations to maintain its warning effect.

Before starting to work, check that the horn is functioning:

▶ Press the button **77**.
or
Press the button **83**.
or
Press the button **93**.

4.7 Turning the lighting on / off

▶ With the switch **34** turn the instrument panel lighting on / off.
▶ With the switch **35** turn the airplane warning light on / off.
▶ Align the working floodlight on the pivot section with the button***** **39**.
▶ With the switch***** **40** turn the working floodlight on the pivot section on / off.
▶ With the switch **41** turn the working floodlight on the crane operator's cab pedestal on / off.
▶ With the switch **42** turn the working floodlight on the crane operator's cab roof on the front and rear on / off.
▶ With the switch **43** turn the working floodlight for the hoist winch and the mirror heater on / off.

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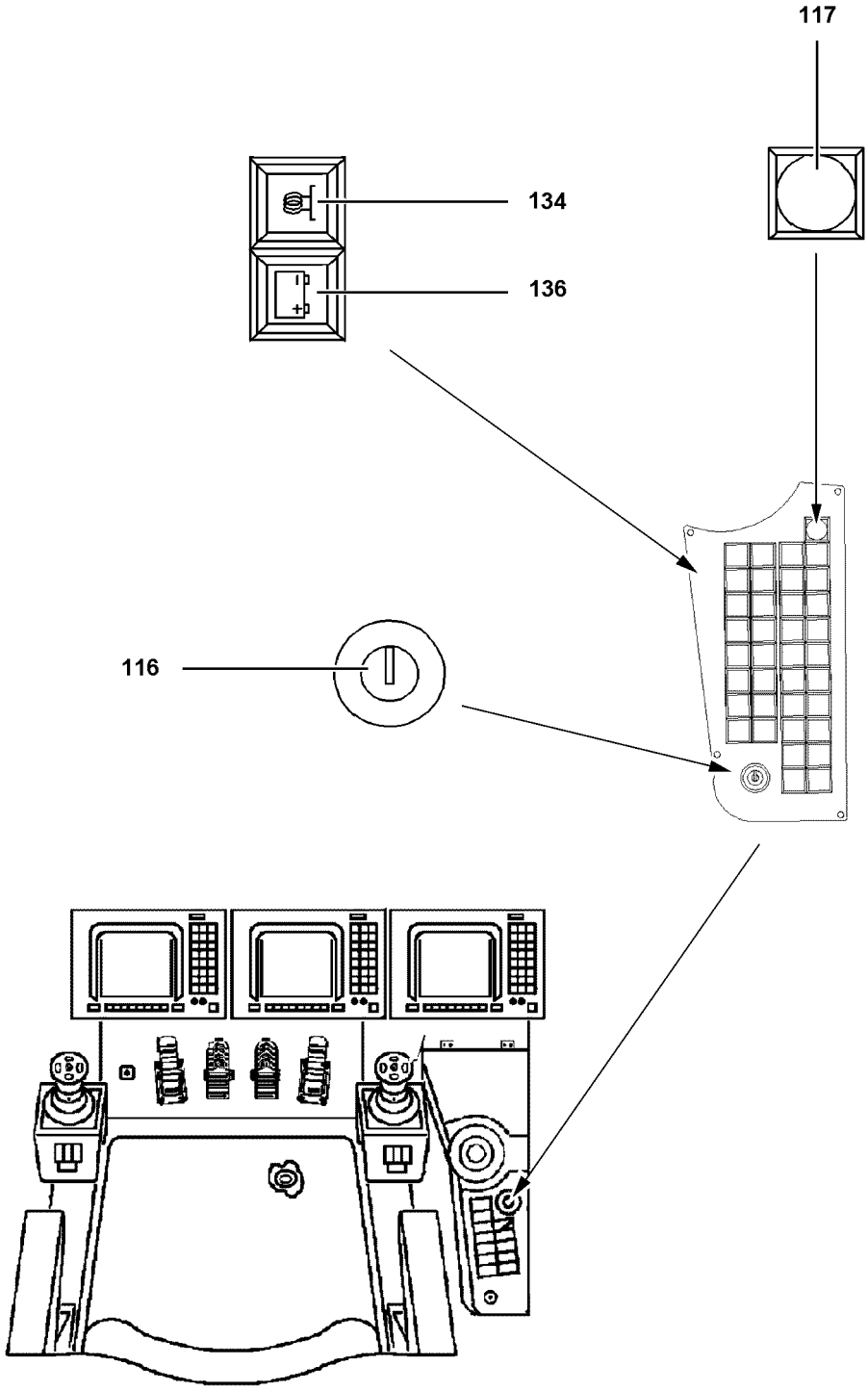

LWE/LG 1750-006/15409-07-02/en

Fig.110612

5 Starting and turning off the engine

Note
▶ The engine must be operated according to the separately supplied Engine Operating instructions.

5.1 Starting the engine

▶ Turn the ignition switch **116** to position „I“.

Result:

– The indicator light **134** blinks.
– The engine is ready to start.

NOTICE
Property damage!
▶ Start the engine only when the warning light **136** lights up and the indicator light **134** blinks.

▶ Turn the ignition switch **116** to position „II“.
▶ Start the engine.

Problem remedy
The engine does not start after a maximum of 10 seconds.
▶ Wait for 1 minute. The starter can be operated three times for 10 seconds per attempt with a pause in between of one minute each time.

Problem remedy
The engine stops again after running for 4 seconds.
▶ Turn the ignition switch **116** to position „0“.
▶ Preheat the engine for approx. 10 seconds, then restart.
▶ The engine control now runs with default values. Make sure to observe any error message and contact Liebherr Service, if necessary.

▶ Check the instruments after starting the engine.

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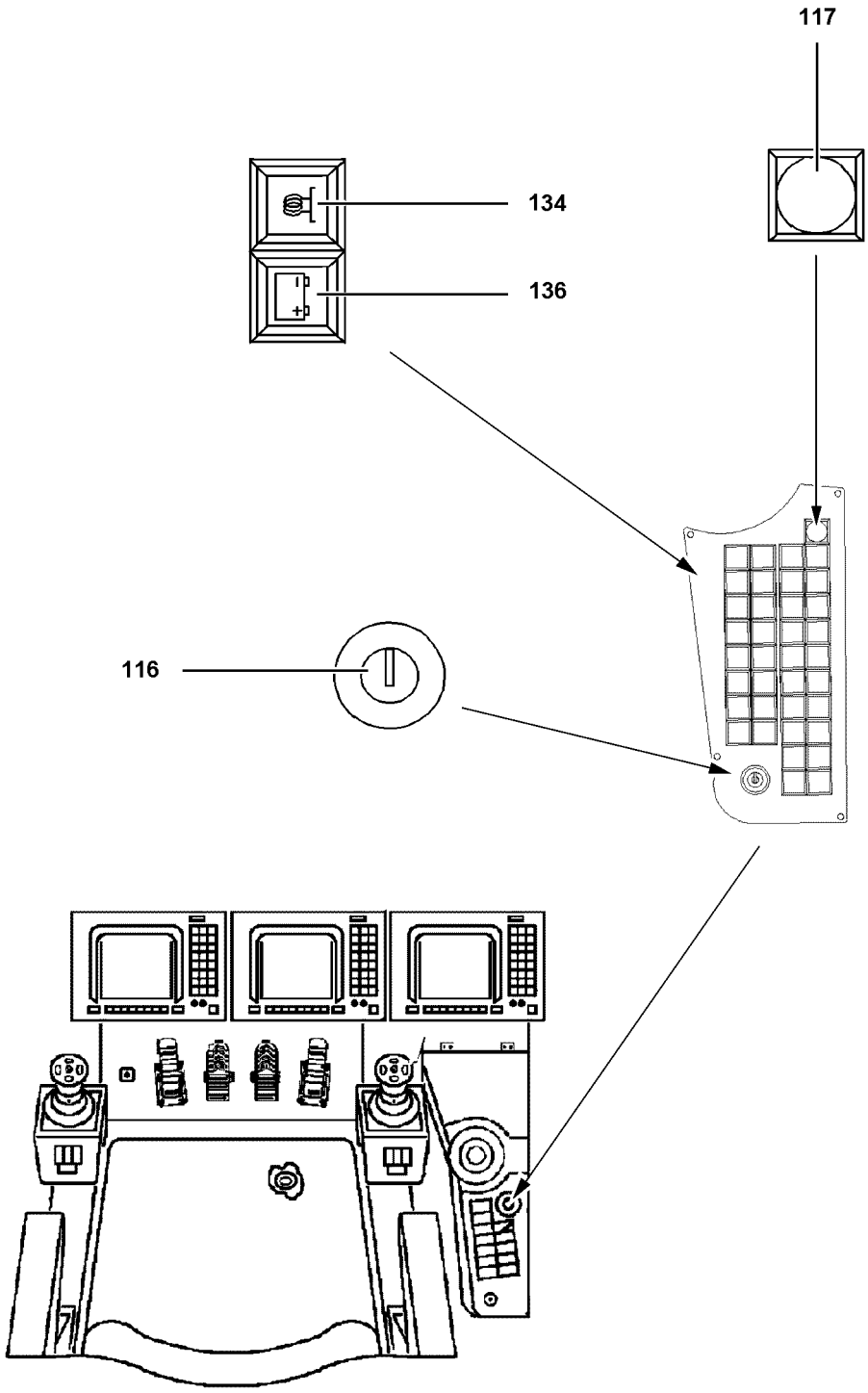

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Fig.110612

5.2 Starting the engine with the flame start system

To improve the cold start procedure, the engine is equipped with a flame start system. The flame start control turns on automatically at a coolant temperature below 15 °C and remains in operation until a coolant temperature of 25 °C has been reached.

At a coolant temperature above 15 °C , the flame start system does not turn on.

The flame start system turns off automatically if:
- The crane engine is not started when it is ready.
- The crane engine is started while the indicator light **134** lights up.
- The coolant temperature reaches 25 °C while the engine is running.

Note
Functionality of the battery in the cold season!
The starting capacity of the battery is considerably reduced in cold temperatures: for example, at a temperature of -10 °C , the battery is at only 66 % of its normal capacity.
▶ After the engine has been turned off, store the batteries in a heated room, if possible.

5.2.1 Starting the engine

▶ Turn the ignition switch **116** to position „I“.

Result:

- The indicator light **134** turns on first and then starts to blink after a short time.
- The engine is ready to start.

▶ Turn the ignition switch **116** to position „II“.
▶ Start the engine.

5.2.2 Error on the flame start system

Note
▶ If the indicator light **134** blinks too fast, then the control unit has recognized an error on the flame start control.

As errors are recognized:
- Interruption of the flame glow plug heating coil.
- Missing supply voltage on terminal 30.
- Defective flame start control unit fuse.

▶ Remedy the error or contact Liebherr Service.

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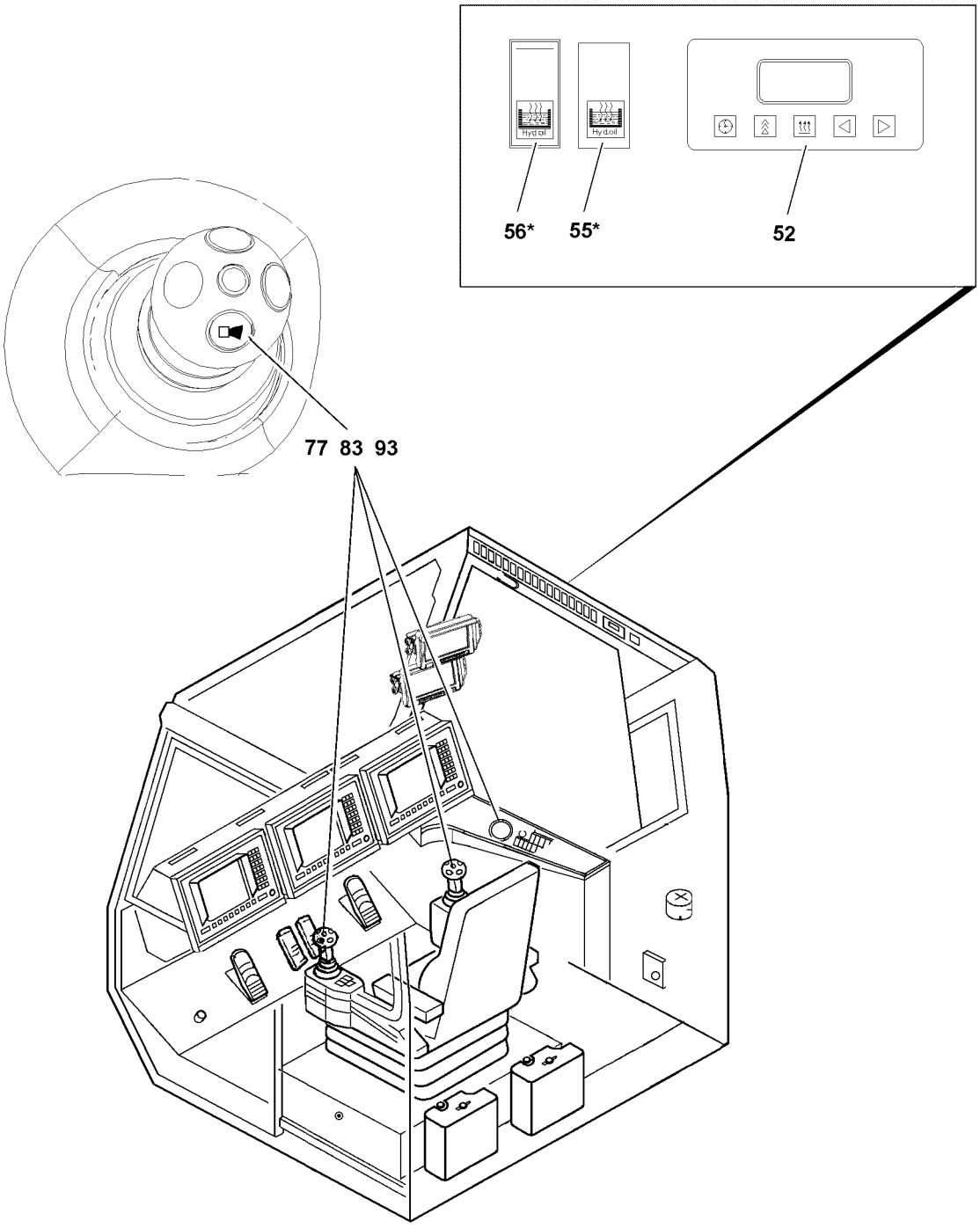

Fig.117645

5.3 Crane engine preheating with timer

Note
▶ Refer to the separate WEBASTO operating instructions.

▶ Up to approx. 75 minutes before engine start, depending on the ambient temperature, turn the auxiliary heater on: turn on the auxiliary heater on the timer **52**.

Result:

– The auxiliary heater starts approx. 10 seconds after turn on.

▶ Turn the auxiliary heater off after completion of the preheat time: turn off the auxiliary heater on the timer **52**.

Result:

– A shut off delay of the auxiliary heater will run up to 150 seconds.

5.4 Hydraulic oil preheating* at low temperature

Before operating the crane in low temperatures between -25 °C and -40 °C , preheat the hydraulic oil before crane operation.

NOTICE
Damage to hydraulic components!
▶ Make sure that the hydraulic oil is preheated before starting to work with the crane.
▶ Depending on the outside temperature, the hydraulic oil preheating must be turned on manually by the crane operator - an appropriate time period **before** starting to work with the crane.
▶ Make sure that all hydraulic cylinders are preheated before starting to work with the crane.

▶ Turn on hydraulic oil preheating: Actuate the switch***** **56**.

Result:

– The indicator light***** „Hydraulic oil preheating“ **55** lights up.

When the hydraulic oil is preheated:
▶ Turn the hydraulic oil preheating off: Actuate the switch***** **56**.

Result:

– The indicator light***** „Hydraulic oil preheating“ **55** turns off.

When the hydraulic oil is preheated:
▶ Warm up the hydraulic cylinder.

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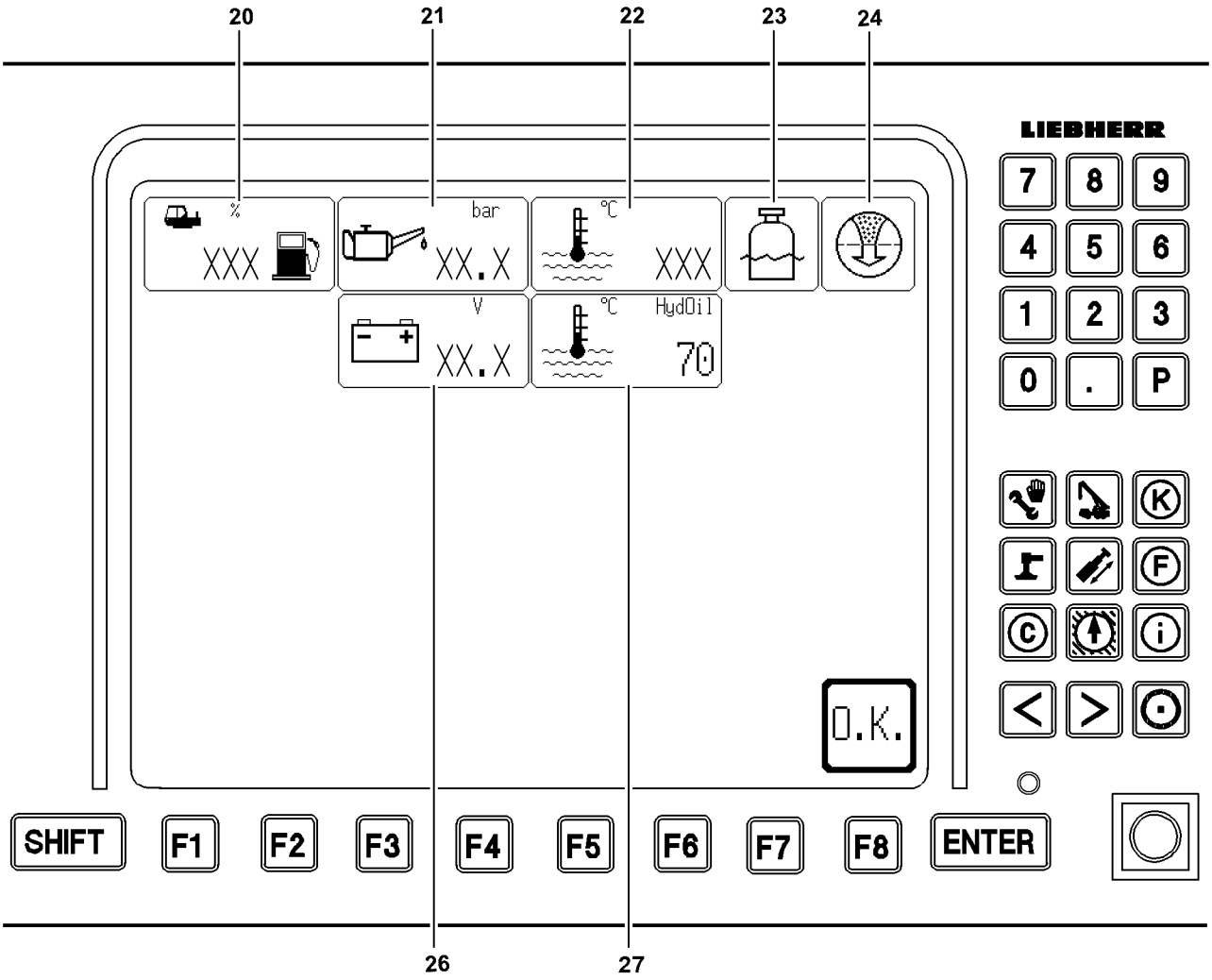

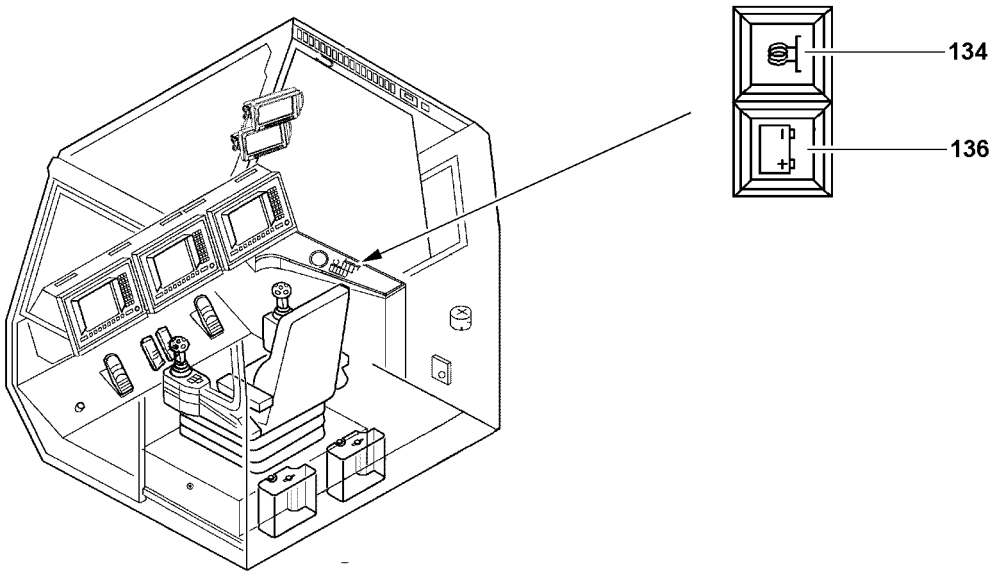

LWE/LG 1750-006/15409-07-02/en

Fig.124524

5.5 After engine start: Checking the instruments on the LICCON monitor

As soon as a stable voltage is present with the engine running, the electric crane control and the LICCON computer system are turned on automatically. A self-test of the microprocessor system follows and after a few seconds the set up configuration screen appears on the monitor.

Note

▶ Do not put a full load on the engine until it is at operating temperature.

The following icons must turn off when the engine is running:

▶ Warning light **134** „Preheat the crane engine“.
▶ Warning light **136** „Charge indicator“.

Check the following icons when the engine is running:

▶ Check the icon **21** „Engine oil pressure“ on the LICCON monitor.

Problem remedy

The numerical display for the engine oil pressure in the icon **21** blinks after approximately 10 seconds or starts to blink during crane operation.
The engine oil pressure is too low. The engine can be damaged as a result of insufficient oil pressure.
▶ Turn the engine off immediately and determine the cause.

▶ Check the icon **22** for „Coolant temperature“.

Problem remedy

The numerical display for the „Coolant temperature“ in the icon **22** blinks during operation.
The coolant temperature is too high. Excessive coolant temperature can lead to engine damage.
▶ Turn the engine off immediately.

▶ Check the icon **20** for „fuel content“.
▶ Check the icon **23** for „coolant level“.
▶ Check the icon **24** for „air filter“.
▶ Check the icon **26** for „battery voltage“.
▶ Check the icon **27** for „hydraulic oil temperature“.

5.6 Engine monitoring

Note

▶ For a detailed description about engine monitoring, refer to the Crane operating instructions, chapter 4.02.

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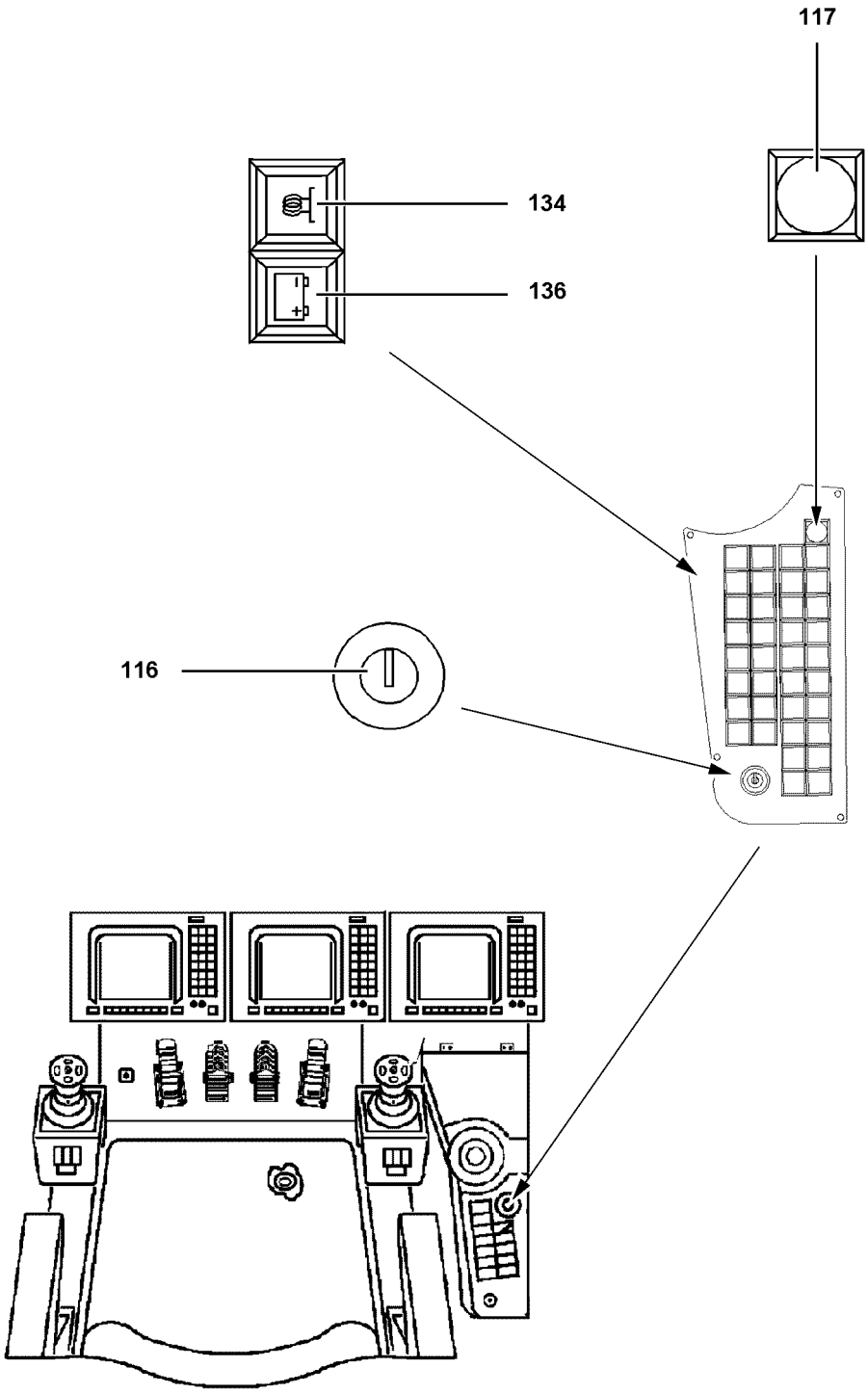

LWE/LG 1750-006/15409-07-02/en

Fig.110612

5.7 Turning the engine off

5.7.1 Turning the engine off in the event of danger

WARNING
Danger of accident due to falling loads!
If crane movements are stopped via EMERGENCY OFF, loads can start to swing and fall down.
Death, severe bodily injuries, property damage.
- ▶ Operational use of the EMERGENCY OFF button **117** is prohibited.
- ▶ Only use the EMERGENCY OFF button **117** in clear emergency situations.

▶ Press the EMERGENCY OFF button **117**.

Result:

– The engine will be turned off immediately.

5.7.2 Turning the engine off with the ignition key

Note
- ▶ If the crane has been operated at full engine output or at very high coolant temperatures (above 95 °C), let the engine run without a load for 1 to 2 minutes at idling speed.

▶ Turn the ignition switch **116** back to the stop in position „0“.

Result:

– The engine is turned off.

▶ Pull the ignition key and store it in a safe place.

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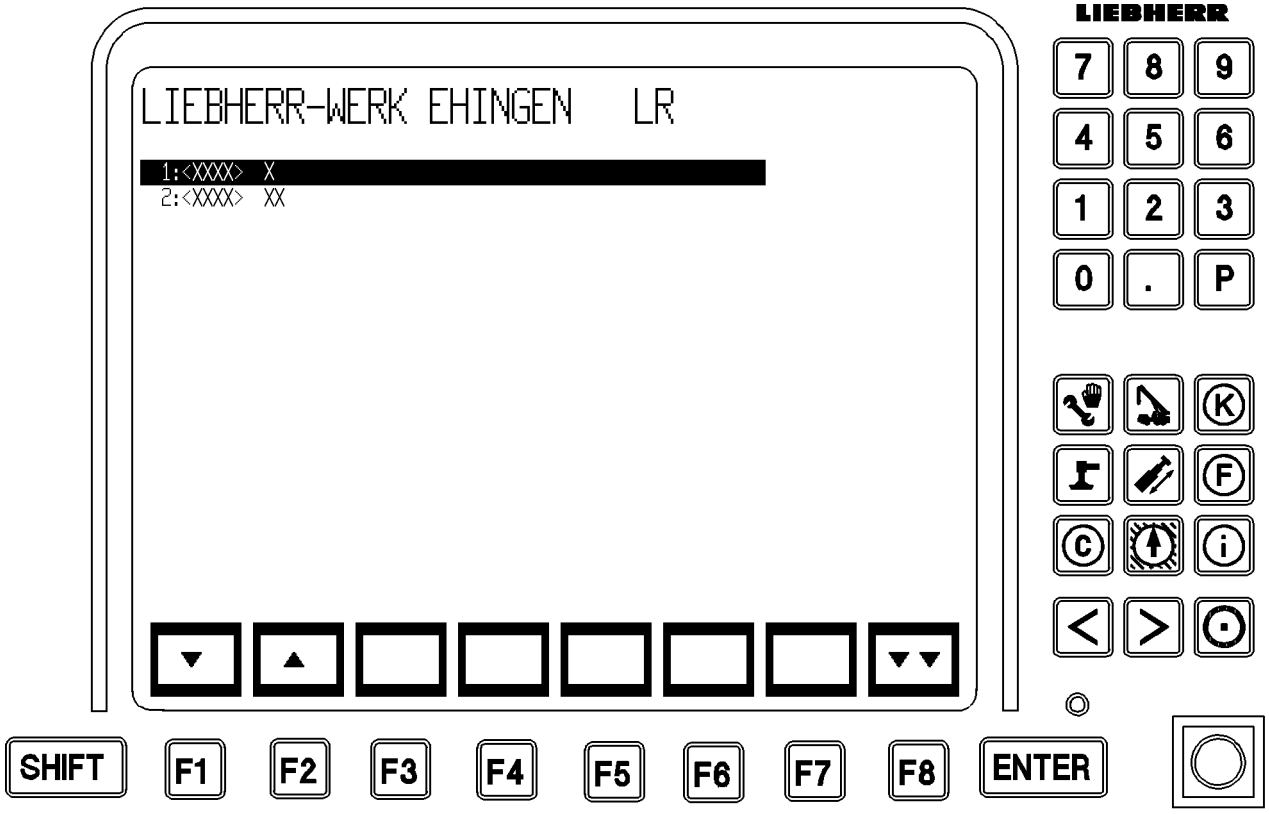

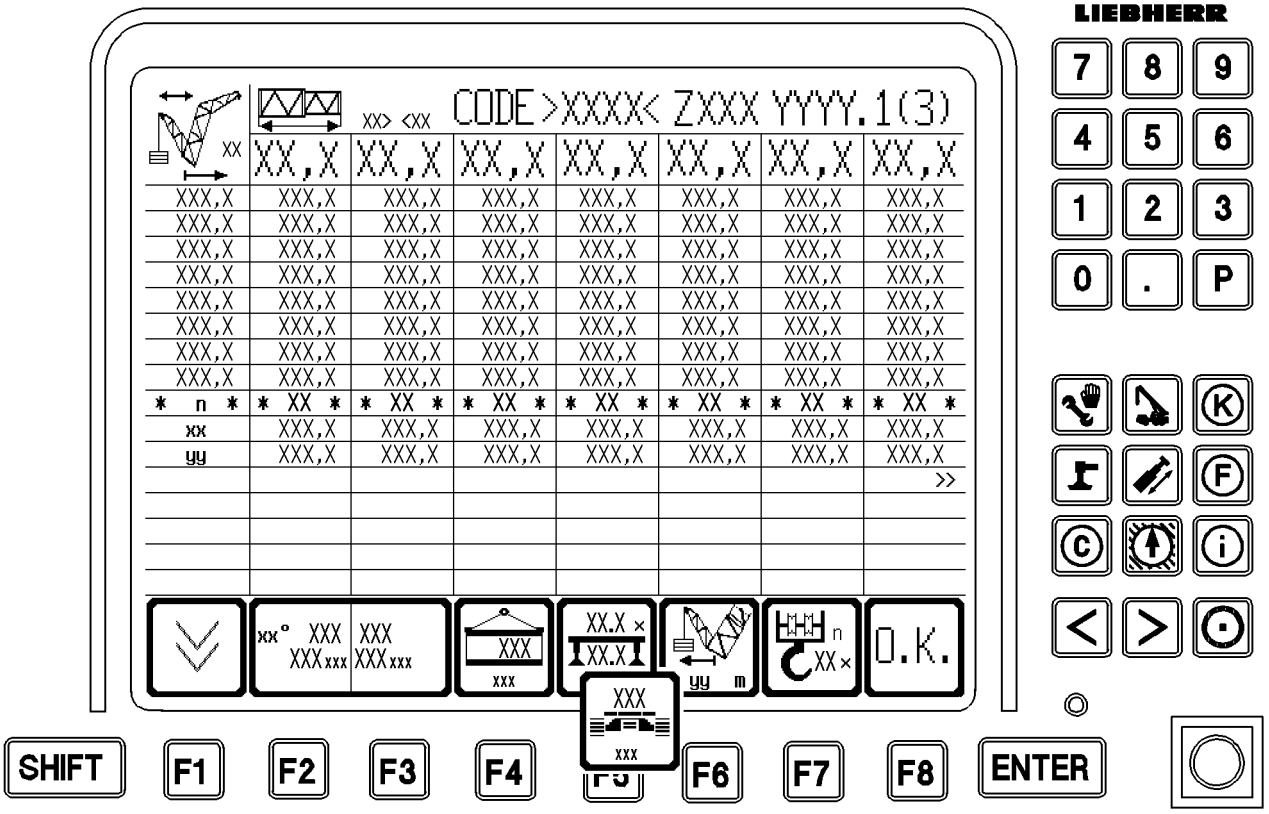

LWE/LG 1750-006/15409-07-02/en

Fig.112385

6 LICCON computer system after engine start

6.1 Waiting for the boot up phase

Note

▶ After being turned on, the LICCON computer system boots up and carries out a self-test, see the Crane operating instructions, chapter 4.02.

▶ Wait for the boot up phase.

Result:

– The operating mode preselection appears.
– After approx. 3 seconds: The set up screen appears on the LICCON monitor.
– Normally, the most recently set equipment set up configuration and reeving number will be displayed.

If a master switch is moved away from the zero position during the boot up phase, then the function circuit of the electrical safety chain is interrupted.

In this case:

▶ Turn the engine and ignition off and then restart, so that the crane control can carry out a valid test of the electrical safety chain.

Problem remedy

An error message appears on the LICCON monitor.

▶ Turn off the engine and ignition and then start again.
▶ The LICCON computer system automatically displays the error determination screen.

Problem remedy

The LICCON monitor does **not** show the most recently set equipment set up configuration and the most recently set reeving number.
If there has been a data loss in the memory (cold start), then the first valid set up configuration appears in the set up screen. The reeving number is set to „0“.

▶ Set the set up configuration and reeving number again.

6.2 Taking over the previously selected set up configuration and hoist rope reeving

Check in the set up screen if the correct short code and the correct reeving number have been set, see Crane operating instructions, chapter 4.02.

If the settings on the set up screen are correct:

▶ Press the function key **F8**.

Result:

– The „Set up“ program is terminated and the adjusted parameters are accepted for the newly started „Operation“ program.

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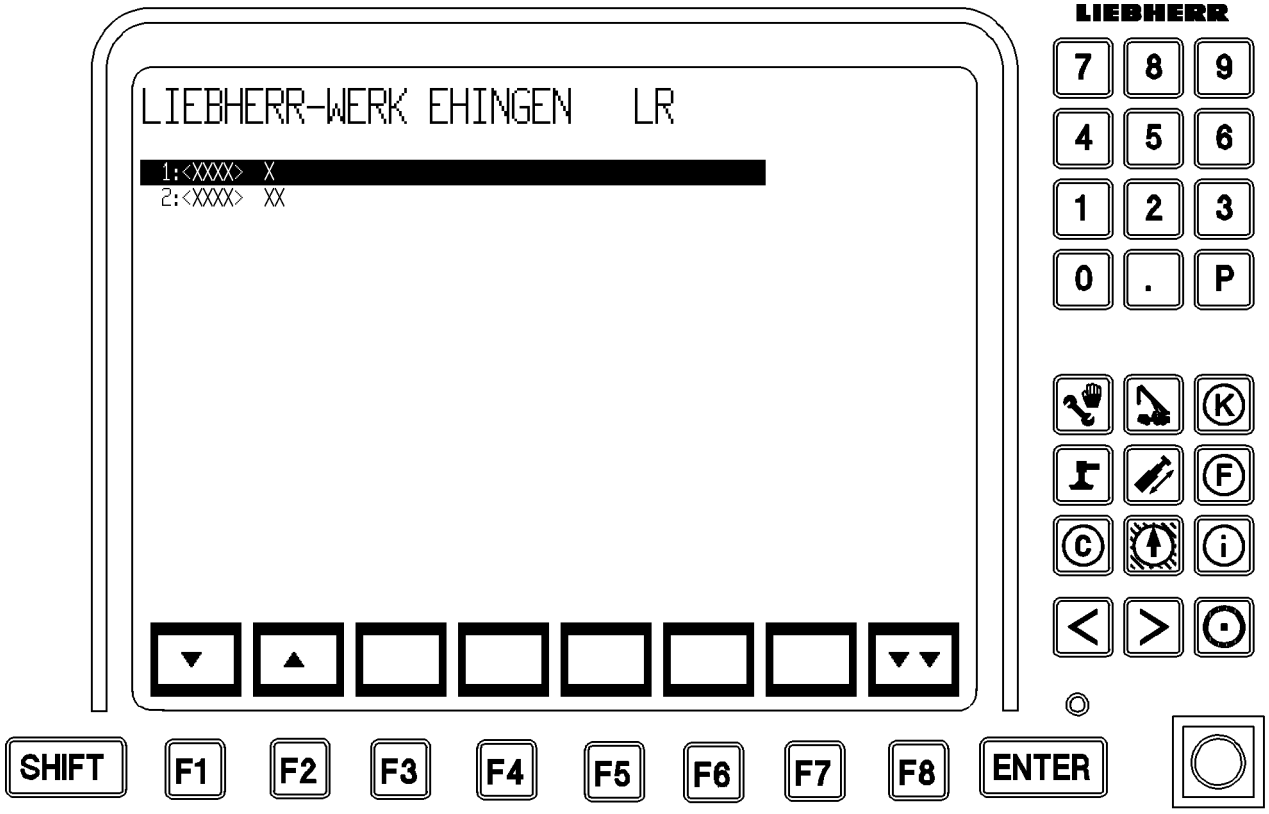

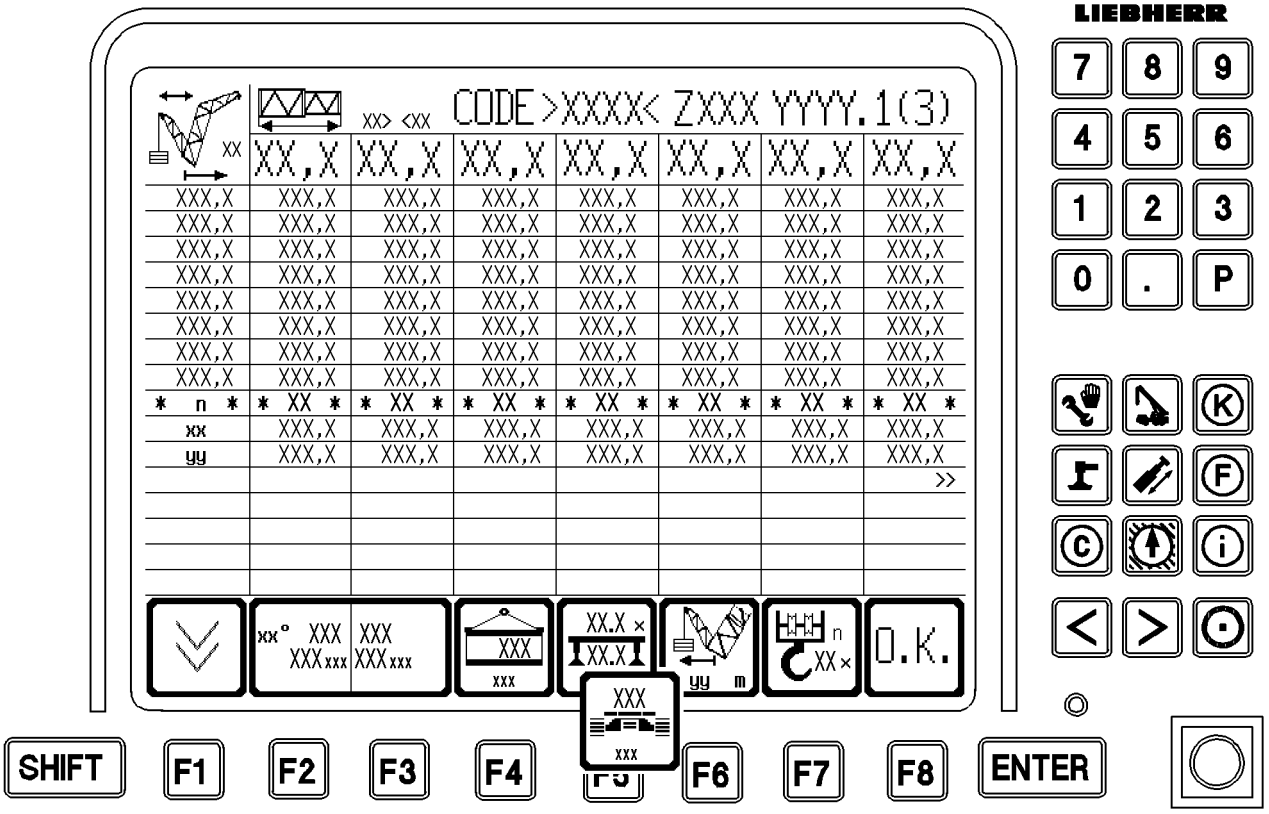

LWE/LG 1750-006/15409-07-02/en

Fig.112385

6.3 Changing the set up configuration and hoist rope reeving

The selected and displayed set up configuration can be changed with the function keys or by entering the short code.

6.3.1 Setting the set up configuration with the function keys

- ▶ Press the function key **F2** until the desired main geometry status is selected.
- ▶ Press the function key **F3** until the desired accessory status is selected.
- ▶ Press the function key **F4** until the desired counterweight is selected.
- ▶ Press the function key **F5** until the desired central ballast is selected.
- ▶ For crane operation **without** derrick ballast: Press the function key **F6** until the desired turning range is selected.
- ▶ For crane operation **with** derrick ballast: Press the function key **F6** until the desired derrick ballast radius or the derrick ballast weight is selected.
- ▶ Press the **ENTER** key.
- ▶ Check the set load chart.

6.3.2 Selecting the set up configuration with short code

The short code is taken from the load chart manual or from the job planner.

- ▶ Entering the 4-digit short code with keypad.
- ▶ Confirm with the **ENTER** key.

Result:

– The data of the selected load chart can be viewed.

For a more detailed description of the „Set up“ program, see Crane operating instructions, chapter 4.02.

- ▶ Check the set load chart.

6.3.3 Setting the hoist rope reeving

- ▶ Press the function key **F7** until the desired reeving number is selected.
  or
  Press the function key **SHIFT** and the function key **F7** until the desired reeving numbers are selected.

6.3.4 Checking and accepting the changed set up configuration and hoist rope reeving

If the settings on the set up screen are correct:

- ▶ Press the function key **F8**.

Result:

– The „Set up“ program is terminated and the adjusted parameters are accepted for the newly started „Operation“ program.

- ▶ Check in the operating screen if the correct short code and the correct reeving number have been set, see Crane operating instructions, chapter 4.02.

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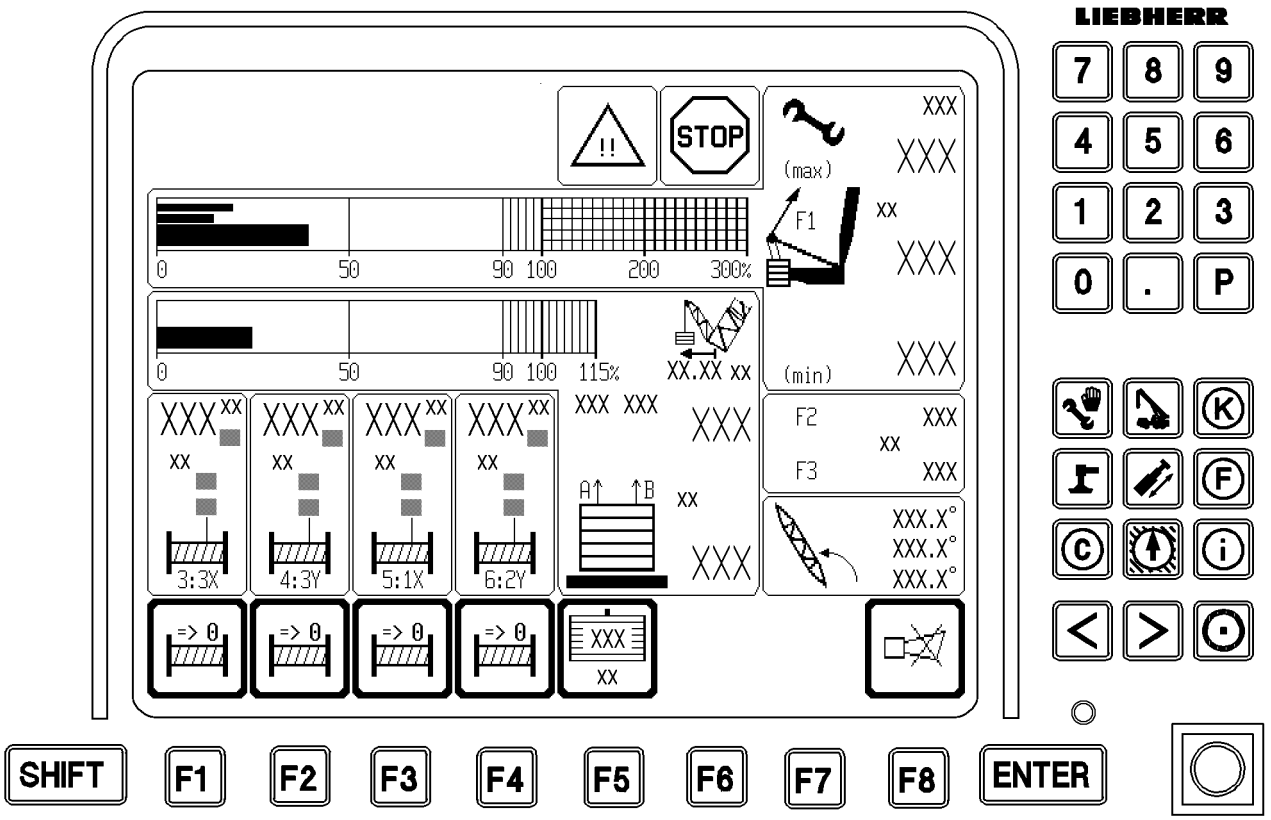

Fig.112386

6.4 Adjusting the control parameters

Note

▶ For detailed description to adjust the control parameters, see Crane operating instructions, chapter 4.02.

6.5 Setting the derrick ballast

For detailed description to adjust the derrick ballast, see Crane operating instructions, chapter 4.02.

The weight of the derrick ballast consists of:
- The weight of the empty ballast pallet or the empty ballast trailer
- The weight of the placed derrick ballast plates

WARNING

Danger of accident due to toppling crane!
If an incorrect derrick ballast value is entered, the safety shut offs from test point 1 ($F1_{min}$) become ineffective.
The crane can topple over.
Death, severe bodily injuries, property damage.

▶ If a derrick ballast value is set, which is too low, then the displayed derrick ballast utilization is too large.
▶ If a derrick ballast value is set, which is too large, then the displayed derrick ballast utilization is too small.
▶ Make sure that the set derrick ballast value matches the actually installed derrick ballast weight.

Note

While the derrick ballast is adjusted, the remaining monitor displays cannot be updated.
The crane operating screen on the monitor is frozen and can even show incorrect values.

▶ Quickly complete the derrick ballast adjustment.

If a master switch is actuated during the adjustment of the derrick ballast, the adjustment procedure is automatically aborted. The old value of the placed ballast (BA_{placed}) remains in the ballast icon.

▶ LICCON monitor 1: Enter the derrick ballast with key **F5**.

7 Adjusting the winches

All rope winches are equipped with an incremental counter for relative path measurement. To ensure that the LICCON computer system is able to calculate the absolute path between the rope length in lengths units, the rope length in a certain winch position (adjusting position) must be known to the LICCON system.

The rope length and the current angle radius for this winch position are saved with the remaining geometric data on the program memory card on the CPU 0 and CPU 1.

When the winch is in this winch position (adjustment position) is recognized by winch 1 to winch 6 via an adjustment switch (cam limit switch).

Note

▶ Winch 4 has no adjustment switch (cam limit switch).

The cam limit switches of the winches are set in such a way that they switch from „0“ to „1“ exactly in this winch position (adjustment position) when the rope is spooled out.

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DANGER
When the rope is changed make sure to avoid the following cases, otherwise the adjustment switch (cam limit switch) must be readjusted again!
▶ Pull the rope from the stationary winch.
▶ Turn the winch without a rope.

Note
▶ If the adjustment switch (cam limit switch) must be readjusted, consult with Liebherr Service.

7.1 Adjusting the winches

Winches must always be readjusted when the absolute path information of the incremental sensor in the memory was lost.

Adjust all winches:
– When the LICCON computer system is disconnected from the power supply.
– When the power supply is pulled out at basic component group „0“.

Adjust winch 1 and winch 2:
– When the CPU „1“ is pulled out.
– When there is a calculation error or an incremental sensor error.

Adjust winch 3 and winch 4:
– When the CPU „3“ is pulled out.
– When there is a calculation error or an incremental sensor error.

Adjust winch 5 and winch 6:
– When the CPU „4“ is pulled out.
– When there is a calculation error or an incremental sensor error.

Note
▶ Description of error remedy, see Diagnostics manual.

Note
Erroneous winch moment!
If the winch is adjusted, then the LICCON computer system calculates the current winch coil radius and therefore the correct winch turning moment.
If the winch is adjusted incorrectly or not at all, then the LICCON computer system works with an erroneous winch moment. This causes the brakes of the winches to open a little too early or too late when starting out which can cause a slight jerk.
▶ Adjust the winches.

7.2 Adjusting the winches, not winch 4

Note
▶ A rope layer is considered to be full when the rope „jumps“ for the first time from the previous row into a new layer when spooling the rope up.

▶ Spool the winch up or out until the adjustment position (see chart).
▶ Check the distance **„d“**.
▶ Spool the winch up and run past the adjustment point by a few turns.
▶ Then spool the winch out and run again past the adjustment point by a few turns.
▶ Check the winch display.

7.3 Adjusting winch 4

▶ Spool the winch up or out until the adjustment position (see chart).
▶ Check the distance **„d“**.

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- ▶ Actuate the adjustment button in the control cabinet by hand.
- ▶ Check the winch display.

7.4 Adjustment positions

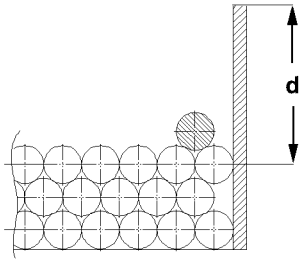

Fig.110696

Winch	Adjustment position at	Distance d[1)]	Rise
Winch 1, 2, 3	Layer 8 full (approx. 960 m)	116 mm	Right hand rise
Winch 4	Layer 5 full (approx. 560 m)	80 mm	Left hand rise [2)]
Winch 5	Layer 9 full (approx. 1112 m)	91 mm	Left hand rise
Winch 6	Layer 3 full (approx. 306 m)	244 mm	Left hand rise

1) **d**: Distance between center of rope of full layer to the edge of the flanged wheel.
2) The left drum half is valid.

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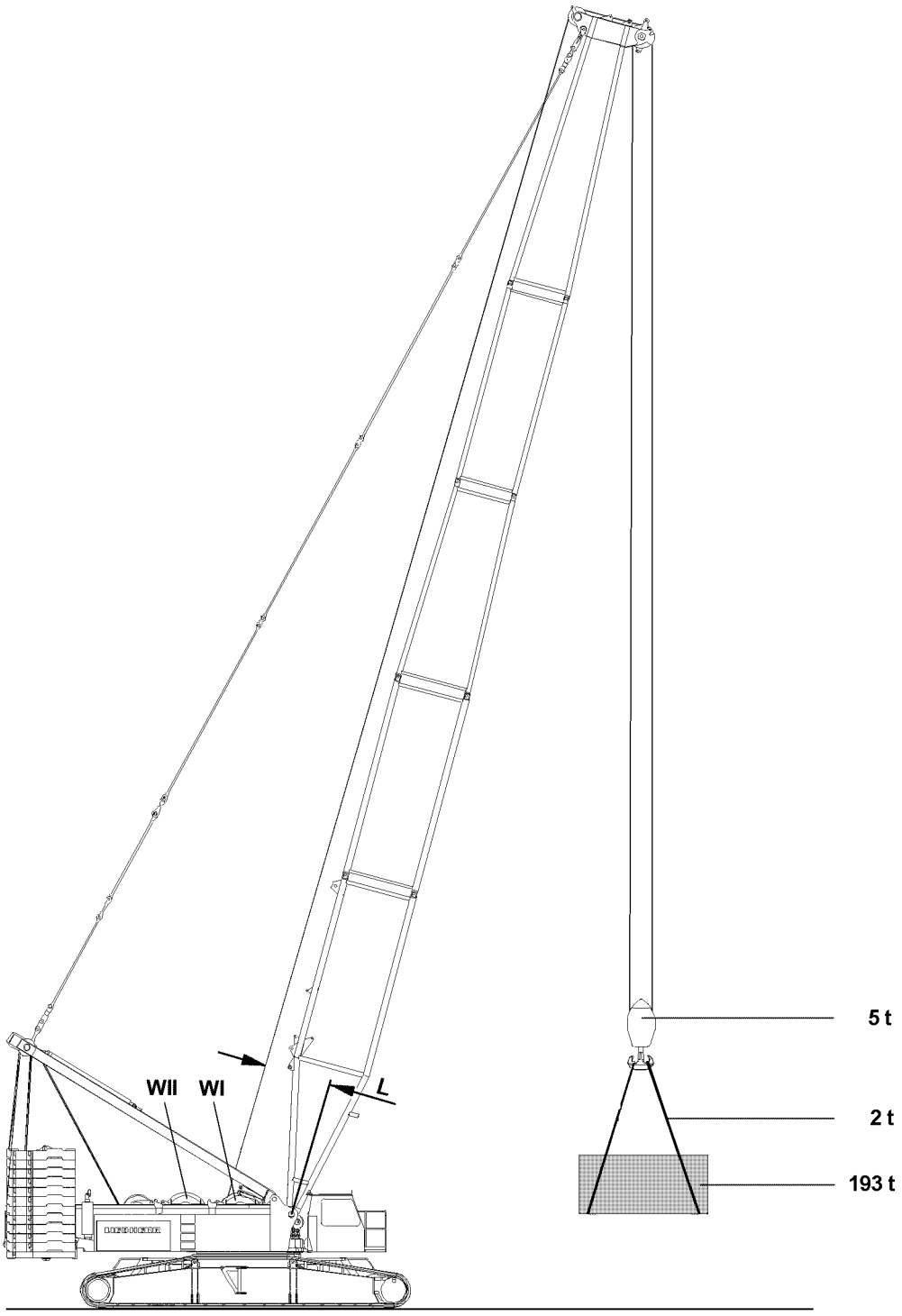

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Fig.103667

8 Load weighing and load display

In the loads stated in the load chart, the weight of the lifting equipment (hoist rope at nominal reeving) has been taken into account.

Note

▶ The weight of the hook block and the weights of the fastening equipment must be subtracted from the load given in the load chart.

Example:		
Maximum permissible load according to chart		200 t
Weight of the hook block	5t	- 5 t
Weight of the fastening rope	2t	- 2 t
Actual load capacity of the crane		= 193 t

In this case, the load to be lifted may not exceed **193 t**.

Note

▶ In the LMB calculation, the lever arm to winch 2 **WII** is not used, always use the lever arm **L** to winch 1 **WI**.

▶ For that reason, to ensure an exact load weighing to lift the load on the main boom and on the fixed accessories (for example the fixed jib), winch 1 **WI** must be used.

DANGER

Danger of accident due to overload!

In case of inaccurate load weighing or load display, a danger exists due to unrecognized overload of the crane.

▶ The crane operator must know the weight, the center of gravity and the dimensions of the load to be lifted before operating the crane.

▶ The crane driver must check, before lifting the load, if he may even lift the load according to the data in the load chart.

DANGER

Danger of accident due to incorrect reeving!

If winch 1 **WI** is used for lifting the load on the fixed accessory because the ropes of winch 1 **WI** and winch 2 **WII** would cross otherwise, then you can assume that the load display is too small, especially for small reevings.

▶ For the small boom radii, select the largest possible reeving for winch 2 **WII**.

▶ Select the reeving that is required for the maximum load in this boom radius range.

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Fig.195219

8.1 Load weighing

Make sure that the following prerequisites are met:
- The angle sensors are functioning.
- The incline sensors are functioning.
- The turn sensor in the turntable is functioning.
- The pressure sensors are functioning.
- The pull test brackets are functioning.

The boom position where the relapse cylinders are actuated must be recognized by the LICCON precisely via the sensors, because otherwise the relapse cylinders have a strong effect on the load - weighing error.

Note
- ▶ If only one of these sensors is not functioning, the LEC error display is issued, then the load display and the load weighing are not exact.
- ▶ The calculation is made anyway, but the result is not exact.

8.1.1 Possible weighing errors

For an exact load weighing, exact signals of the pull test bracket, angle sensor, incline sensors and pressure sensors are required.

Since all sensor values are always within a certain tolerance, a weighing error can occur.

The weighing error is increasingly larger if:
- The hoist winch sits in the turntable instead of in the main boom.
- The reeving is small.
- The hoist winch sits far to the rear in the turntable.
- Several hoist winches are used (parallel operation).
- The boom, on which the load is suspended, is short.
- The boom, on which the load is suspended, is standing steeply.

DANGER
Danger of accident due to overload!
Overload due to weighing error.
- ▶ When the prerequisites for small weighing errors not given, special caution must be exercised.

8.1.2 Adjustment of reeving

The number of reevings must be correctly set on the LICCON. The reeving should not be higher than the nominal reeving, otherwise the hoist ropes reeved above the nominal reeving count as part of the load.

Note
- ▶ The nominal reeving determines for which reeving the load chart values of a load chart are valid.
- ▶ If the crane is in a position outside of the load chart, the hoist rope is added to the load, because no nominal reeving is recognized outside the load chart.

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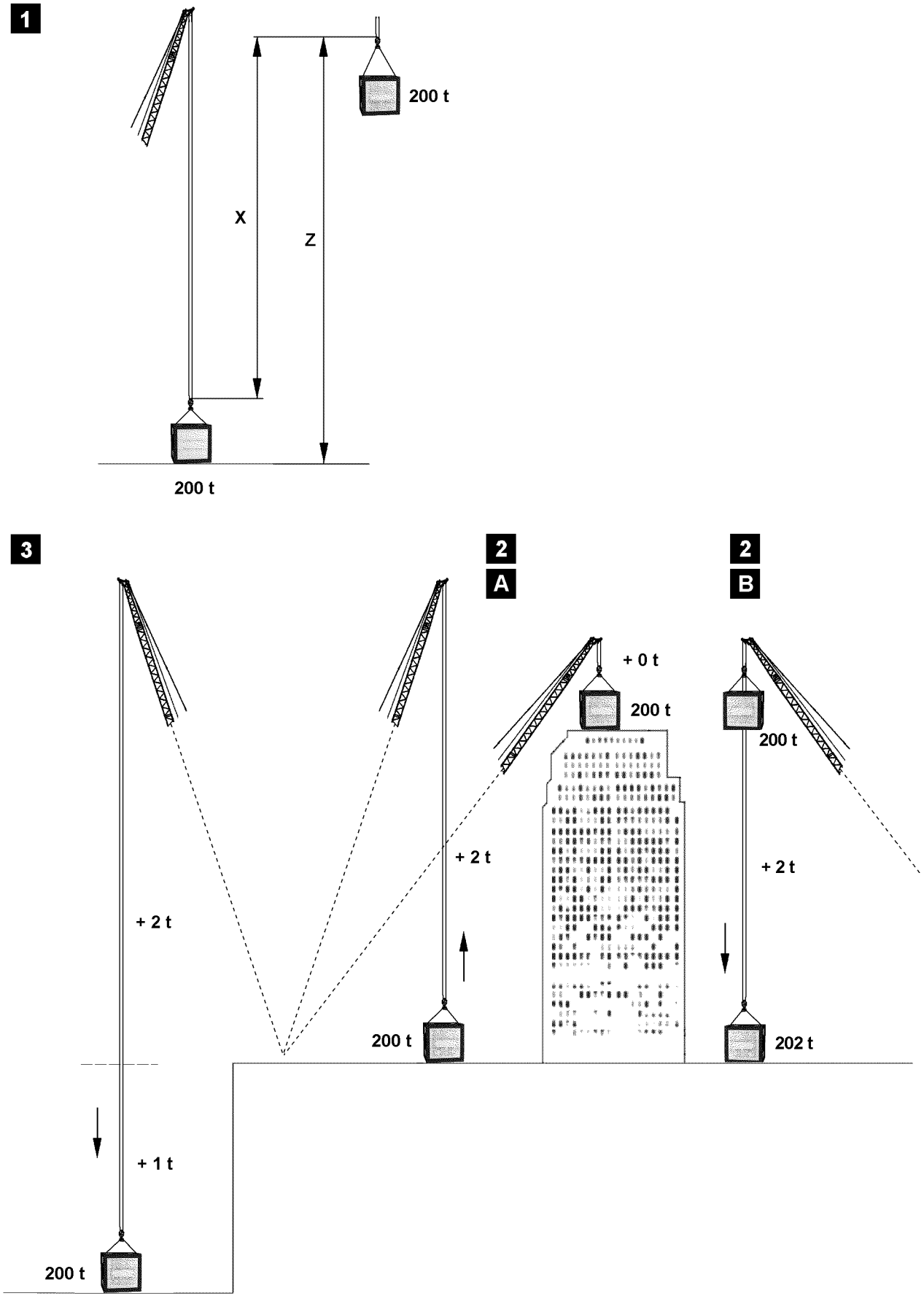

Fig.103643

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8.2 Load display

8.2.1 Lifting, illustration 1

For the calculation of the displayed actual load, the weight of the hoist rope to the ground is deducted from the total load **Z**, which hangs on the pulley head **X**, see illustration **1**.

In that case, the number of the reevings set on the LICCON are taken into account, but no more than the nominal reeving.

Note

▶ If the load is raised far above the ground, see illustration **1**, then the load display is too small by the weight of the hoist rope from the load to the ground.

8.2.2 Lifting above ground level, illustration 2A

When the load is lifted above the crane level (high rise), then the hoist rope to the ground is always deducted anyway for the display, therefore the load seems increasing lighter when lifting than it did on the ground.

Therefore a somewhat larger load can be lifted in large heights than on the ground, without triggering the LMB overload shut off at 100 %.

This poses no danger because the load stress for the crane is the same if, for example 200 t if load on the bottom and 2 t rope or 202 t load on top and 0 t rope hang on the pulley head.

8.2.3 Load take up on high rise, illustration 2B

When a load is taken up on the high rise on top (=100 %), for example 200 t, and then lowered to the ground, the weight of the hoist rope below the high rise level is calculated as load and displayed.

8.2.4 Lifting below ground, illustration 3

When a load is lowered below the crane level (excavation), then the hoist rope below the crane level is calculated as load and displayed.

DANGER

Danger of accident due to overload!

It must be noted that the load display in illustration 2B and illustration 3 is correct, the overload of the crane is also shown in the utilization bar, but no shut-off of the lowering movement occurs.

▶ At LMB overload, all crane movements are shut-off, which would increase the danger of overload, however, lowering the load at 100 % -LMB shut off remains clear because one normally assumes that the overload was caused by lifting the load.

▶ However, the crane can also be overloaded by lowering the load, especially in case of high reevings with high hoist rope weight on the pulley head. The crane driver must know this, so that he can relieve the crane by careful lifting again in this special case, even though the lifting and not the lowering of the load is automatically shut off.

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4.04 Safety equipment

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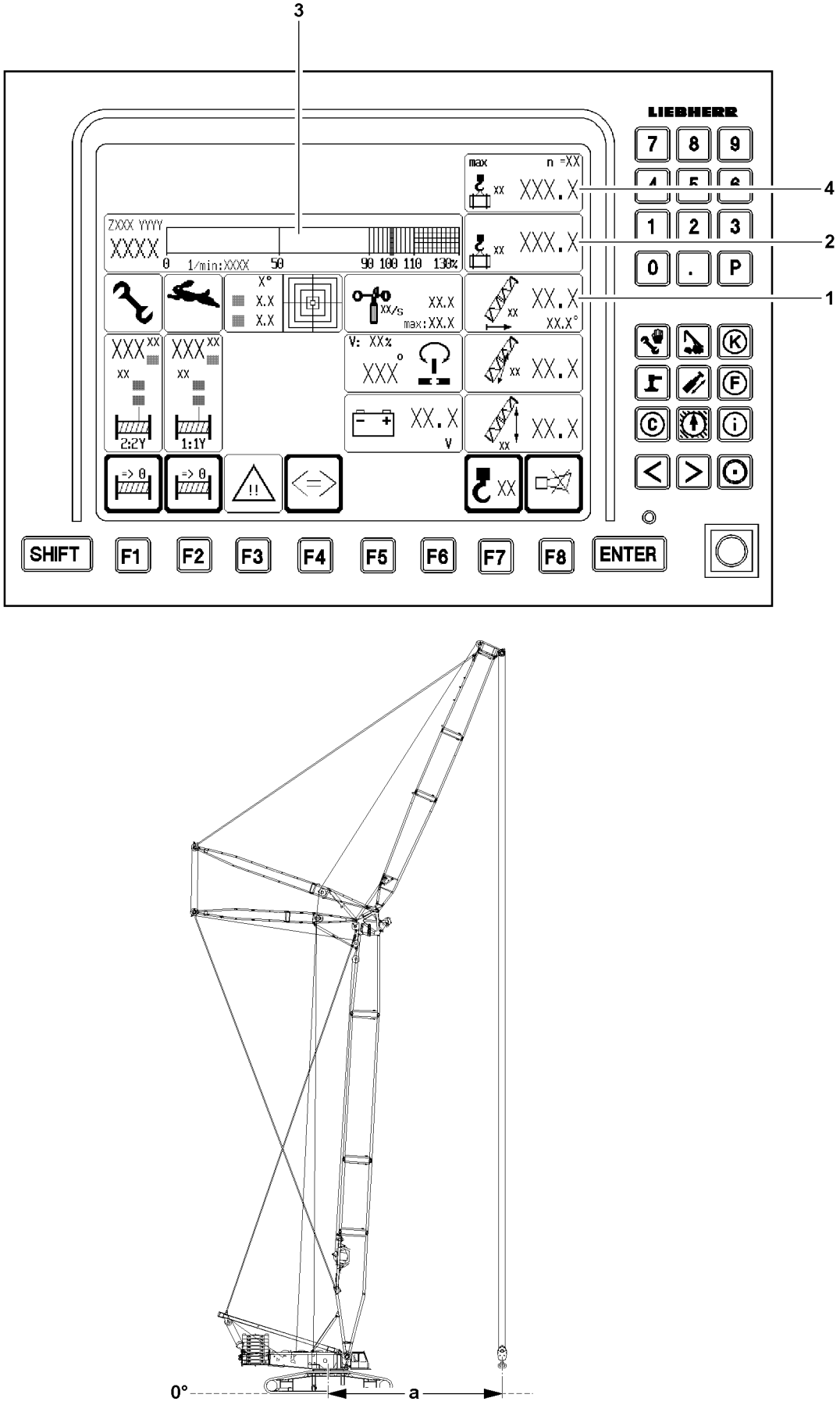

Fig.112968

1 General

The crane operator is obligated before every crane operation to ensure that the warning and safety devices are functioning.

WARNING
Danger of accident due to defective warning and safety systems!
If the crane is operated with defective warning and safety devices, then there is a danger of accidents!
Personnel can be killed or seriously injured!
This could result in property damage!
▶ Make sure that all warning and safety devices are functioning.
▶ Make sure that the overload protection is functioning.

2 Quick test Crane geometry

Make sure that the following prerequisites are met:
– The crane is aligned in horizontal direction.
– The set up status has been entered correctly into the LICCON computer system.
– There is no load on the hook.

Measure the horizontal distance of the load hook from the center of rotation of the crane superstructure on the ground:
– The value display radius **1** must match the measured value **a**.

3 Quick test Overload protection

Lift a known weight completely, such as the hook block or a counterweight plate and then set it down.

Make sure that the following prerequisite is met:
– The crane is aligned in horizontal direction.

The respective displayed values must be plausible:
– **2** Actual load display
– Utilization bar **3**: Ratio of value of Actual load display **2** to maximum load value **4**
– Example:
  Value Actual load display **2** is 40 t.
  Maximum load value **4** is 80 t.
  Utilization bar **3** shows 50 %.

4 LICCON computer system

The LICCON computer system is a system for controlling and monitoring mobile cranes. In addition to the LICCON overload protection (Load torque limiter = LMB), there are a number of application programs that can be used for controlling and monitoring the crane movements. For a detailed description see Crane operating instructions, chapter 4.02 and chapter 4.20.

4.1 LICCON overload protection

The LICCON overload protection is programmed to **shut off** the crane movements if the permissible load moment is exceeded (LMB-STOP).

The LICCON overload protection may not be used as an operational shut off device for crane movements of any kind.

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An overload protection cannot detect all occurring conditions by itself. Careful and diligent crane operation by the crane operator is important.

The basis for the calculation of the utilization of the crane are:
- The currently data and values recorded by the crane control.
- The set up configuration entered by the crane operator.

Direct influence has, for example:
- Failure of a test device (for example: Pull test brackets, angle sensor, pressure sensor).
- A set up configuration incorrectly entered by the crane operator.
- Environmental influences not considered (such as wind influence, ground with insufficient load bearing capability).
- Assembly and operating errors.

WARNING
Danger of accident due to assembly and operating errors!
Due to assembly and operating errors it is possible that the overload protection is not effective or shut off is delayed!
A set up configuration which deviates from the load chart cannot be detected by the overload protection!
Environmental influences which are not considered cannot be detected by the overload protection!
Dangerous situations and accidents can result!
Personnel can be killed or seriously injured!
This could result in property damage!
▶ Always assemble and operate the crane carefully!

WARNING
Operational utilization of the overload protection!
If the LICCON overload protection is utilized as an operational shut off device for crane movements, then there is a danger of accidents!
For example, crane movements can be shut off abruptly or uncontrolled!
The behavior of load and crane cannot be foreseen in such a case!
Personnel can be killed or seriously injured!
This could result in property damage!
▶ Do not use the LICCON overload protection as an operational shut off device for crane movements!

WARNING
Lifting of unknown loads!
The presence of the overload protection does not relieve the crane operator of his obligation for care and attention!
The crane may not only be operated according to the displays of the LICCON overload protection!
Lifting of loads with unknown weight and unknown properties can lead to accidents!
Personnel can be killed or seriously injured!
This could result in property damage!
▶ Before lifting a load, its weight and properties must be known to the crane operator!
▶ The crane operator must check with the load chart if the crane is able to carry out the work safely!

The LICCON computer system detects various values, which result in optical and acoustical warnings if exceeded:

Within the crane operator's cab:
- Acoustic warning „Horn / short horn“ on the LICCON monitor
- Optical warning „blinking value / display“ on the LICCON monitor

Outside the crane operator's cab:
- Acoustic warning via the horn on the slewing platform
- Optical warning via the warning light on the slewing platform

All warnings, even those which do not lead to an immediate shut off must be noted by the crane operator and personnel within the danger zone.

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The overload protection can **not** detect (examples of cases):
- The hooking of the load or the load suspension equipment.
- Excessive retarding forces.
- Loads falling onto the rope.
- Angular pulling.
- Driving the crane on ground with large slope.
- Collapsing ground.

4.1.1 Failure of the overload protection

WARNING
Crane operation without overload protection!
If the LICCON overload protection is no longer functioning properly because of one or more errors, then there is a danger of accidents if crane operation is continued!
Due to operation of the crane with failed LICCON overload protection, the crane can be overloaded and collapse!
Personnel can be killed or seriously injured!
This could result in property damage!
- ▶ Crane operation without overload protection is prohibited!
- ▶ Do not take up crane operation again until the overload protection is functioning again!

A failed overload protection:
- Must be repaired before the crane can be operated again.
- May only be bypasses in emergency cases or emergency situations.

4.2 Bypass of overload protection

The overload protection can be bypassed in case of:
- Failure of the overload protection.
- In an emergency situation (according to EN 13000:2010).

4.2.1 Bypass of overload protection: Failure of the overload protection

Note
- ▶ Does **not** apply for cranes with CE-mark and configuration according to EN 13000:2010!

To bring the crane into safe condition after failure of a component required for the overload protection, it can be necessary that the overload protection has to be bypassed.

WARNING
Bypassed overload protection!
If the overload protection is bypassed, crane movements are no longer monitored!
The crane can be overloaded and collapse!
Personnel can be killed or seriously injured!
This could result in property damage!
- ▶ Only carry out crane movements within the range of the load chart as well as the erection / take down charts!

Note
- ▶ For procedure in case of problems, see Crane operating instructions, chapter 7.15.
- ▶ For procedure of shut off of crane movement, see Crane operating instructions, chapter 4.20.

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4.2.2 Bypass of overload protection: Failure of overload protection (according to EN 13000:2010)

Note
▶ Applies **only** apply for cranes configuration according to EN 13000:2010!

To bring the crane into safe condition after failure of a component required for the overload protection, it can be necessary that the overload protection has to be bypassed.

With the specification that:
– The bypass is automatically reset at engine stop.
– The bypass is automatically reset after no later than 30 minutes.
– The bypass of the overload protection limits the working speed to no more than maximum 15%.

WARNING
Bypassed overload protection!
If the overload protection is bypassed, crane movements are no longer monitored!
The crane can be overloaded and collapse!
Personnel can be killed or seriously injured!
This could result in property damage!
▶ Only carry out crane movements within the range of the load chart as well as the erection / take down charts!

Note
▶ For procedure in case of problems, see Crane operating instructions, chapter 7.15.
▶ For procedure of shut off of crane movement, see Crane operating instructions, chapter 4.20.

4.2.3 Bypass of overload protection: Emergency situation (according to EN 13000:2010)

In an emergency situation, a bypass of the overload protection may become necessary.

With the specification that:
– The bypass is automatically reset at engine stop.
– The bypass is automatically reset after no later than 30 minutes.
– The bypass of the overload protection limits the working speed to no more than maximum 15%.

DANGER
Overload of crane!
After a bypass of the overload protection, the crane movements are no longer shut off in case of a danger of overload of the crane!
A bypass of the crane can result in severe damage or collapse!
Personnel can be killed or seriously injured!
This could result in property damage!
▶ Do not subject the crane to such a load that it collapses!
▶ Clear and secure the danger zone of the crane!

Note
▶ Location of bypass device, see Crane operating instructions, chapter 4.01 and chapter 4.02.

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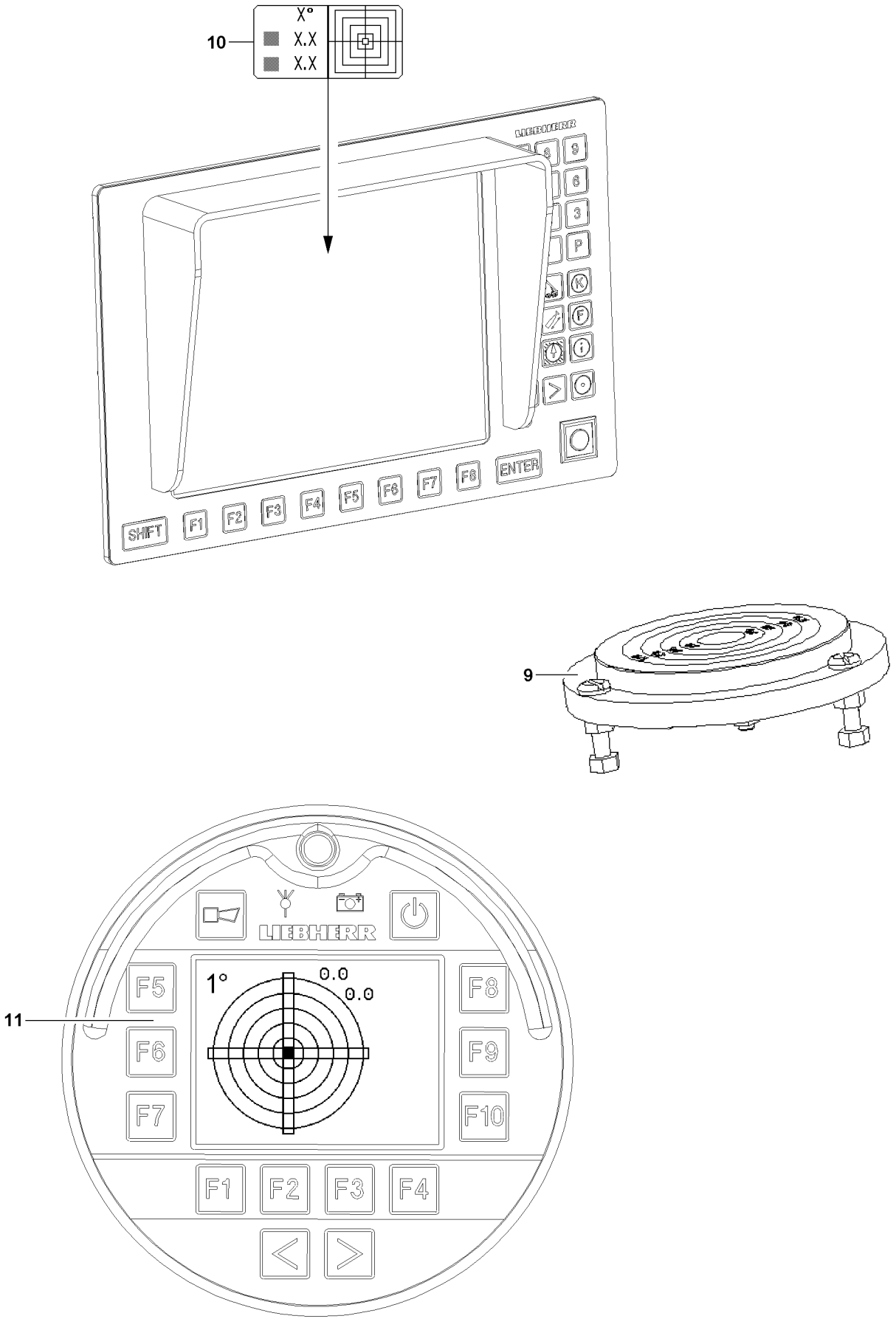

Fig.112969

5 Safety devices on the crane

5.1 Leveling instruments

To ensure the working safety of the crane, the crane must be aligned on level ground with sufficient load bearing capacity according to the load chart.

The current values are continuously shown in the Incline icon **10**, see Crane operating instructions, chapter 4.02.

The incline is shown manually in the sight gauge **9** on the crawler travel gear.

WARNING
The crane can topple over!
If the leveling instruments are defective or incorrectly adjusted, there is a danger that the crane is not aligned according to the load chart!
A crane which is not aligned according to the load chart can topple over!
Personnel can be killed or seriously injured!
This could result in property damage!
▶ Make sure to align the crane according to the load chart!

5.1.1 Leveling instruments in the LICCON monitor

The incline of the crane is shown in the Incline icon **10** graphically as well as numerically, see Crane operating instructions, chapter 4.02.

5.1.2 Leveling instrument in the BTT

Only LR1600/2-W.

The incline of the crane is shown in the Incline display menu **11** graphically as well as numerically, see Crane operating instructions, chapter 3.10 and chapter 5.31.

5.1.3 Quick test Leveling instrument

Note
The horizontal alignment of the crane can be checked with a spirit level on the top of the slewing ring, for example.
▶ The alignment of the top of the slewing ring is the determining factor for the incline display.

Make sure that the following prerequisites are met:
- The crane is aligned in horizontal direction.
- There is no load on the hook.

For horizontally aligned crane:
- The sight gauge **9** on the crawler travel gear must show 0°.
- In the incline icon **10** 0° must be shown.

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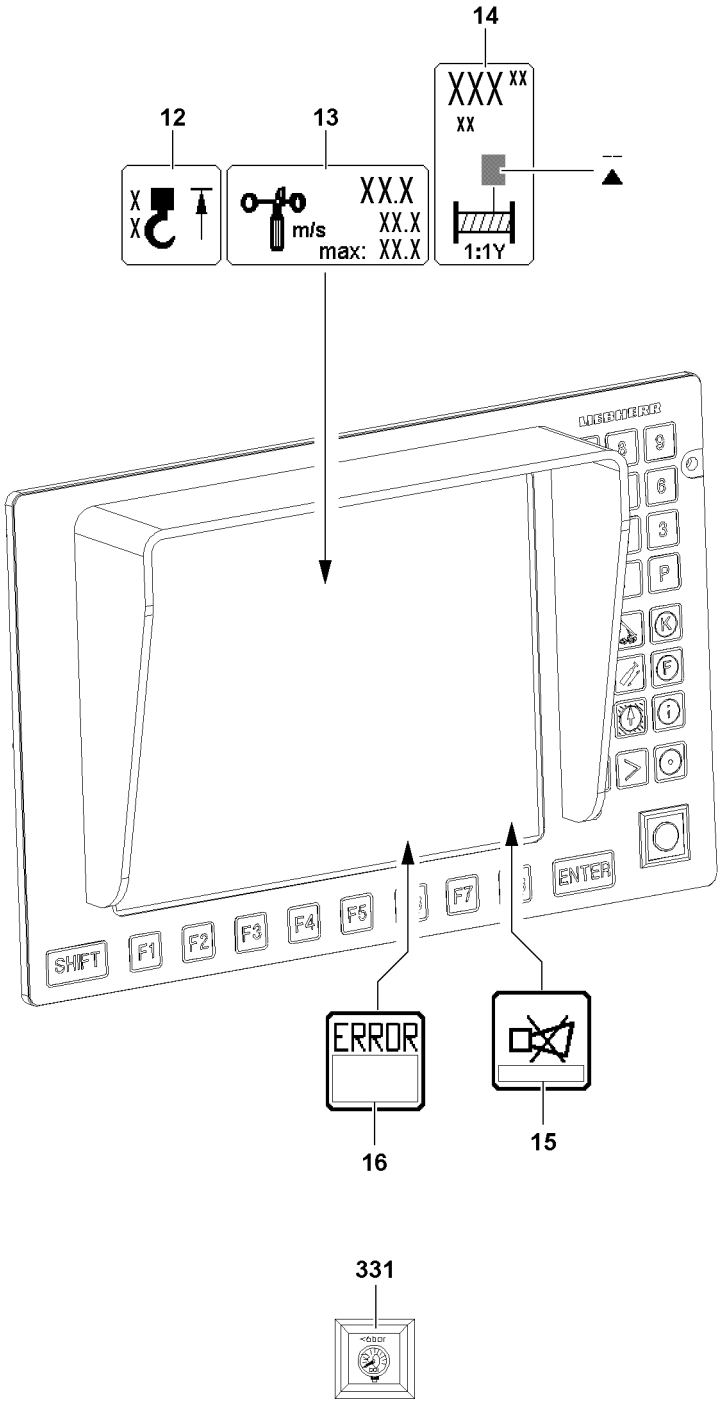

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Fig.112972

5.2 Acoustic and optical warning devices

Note

▶ Overview of acoustic and optical warnings, see Crane operating instructions, chapter 4.20.

– The acoustic and optical warning devices must be functioning and operational.
– Take care of any possible detriments in function, such as snow on the warning lights.

5.3 Hoist limit switch „Hoist top“

The hoist limit switch is intended to prevent the hook block from running against the boom head.

Before every crane application, the function of the hoist limit switch must be checked by running against the switch weight with the hook block.

For installation purposes and in emergency cases, the hoist limit switch can be bypassed, see Crane operating instructions, chapter 4.20.

WARNING
Falling load and property damage!
If the hoist limit switch is defective, there is the danger that the hook block or the load hook is pulled against the pulley head!
Falling load and property damage can result!
Personnel can be severely injured or killed!
▶ Crane operation without or with defective hoist limit switch is prohibited!
▶ Repair or replace a defective hoist limit switch!

The hoist limit switch must actuate when the hoist limit switch weight is lifted by the load hook / hook block:
– When the hoist limit switch is actuated, the icon **12** „Hoist top“ appears in the operating screen. The crane movement „Spool winch up“ as well as other crane movements which have an influence on the hoist rope are shut off.

5.3.1 Quick test Hoist limit switch

When the hoist limit switch weight is lifted:
– The icon **12** „Hoist top“ must appear in the operating screen.
– The actuated crane movement must be shut off.

5.4 Error messages by the LICCON computer system

Two types are differentiated (all crane types except LR1400/2):
– Operating errors
  • Displayed in field **15** by error number / LEC: B.....
– System errors in LICCON computer system
  • Displayed in field **15** by error number / LEC: E.....

Only LR1400/2:
– Error messages
  • Displayed in field **16**

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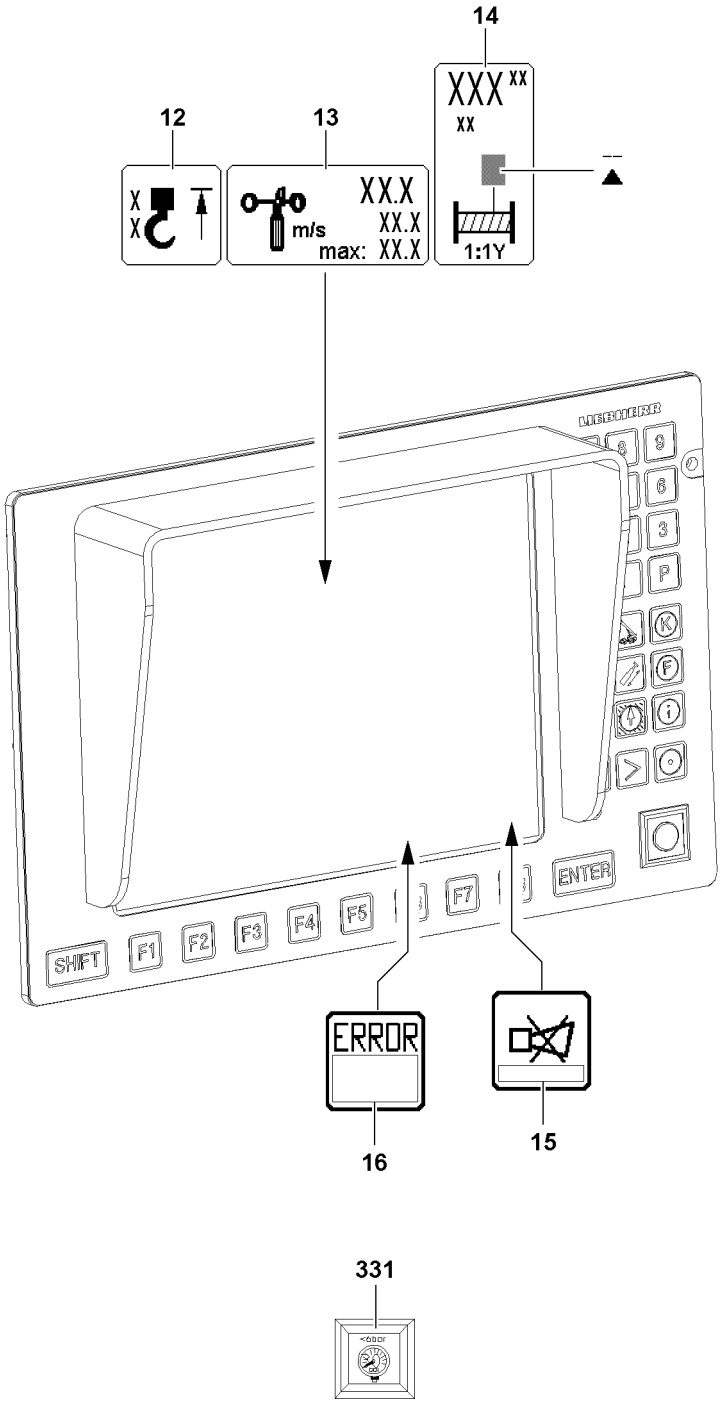

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Fig.112972

5.5 Wind speed sensor

The wind warning by the warning speed sensor appears in the operating screen of the LICCON computer system.

WARNING
The crane can topple over!
If the crane is operated with a defective wind speed sensor, then there is the danger that excessively high wind speeds are not recognized!
The crane can topple over!
Personnel can be killed or seriously injured!
This could result in property damage!
▶ Crane operation with a defective wind speed sensor is prohibited!
▶ Repair / replace a defective wind speed sensor!

If wind occurs, then the wind speed sensor must report it speed:
– If the actual wind speed value exceeds the displayed maximum value, the value in the icon **13** „Wind speed“ starts to blink and the acoustic alarm „Short horn“ sounds on the LICCON monitor. But there is **no shut off** of crane movements.

5.5.1 Quick test Wind speed sensor

When blowing in the cups:
– The wind speed sensor must start to move.
– An actual value must be shown in the icon **13**„ Wind speed“.

5.6 Limit switch winch spooled out

The limit switches for the winches are adjusted at the factory. If used properly, the winches will not need readjustment.

Note
Minimum rope coils on the shut off point!
For the winches, a minimum of three rope coils are set for each drum.
▶ The shut off must occur **before** reaching the third minimum rope coil.

WARNING
The load can fall off!
If the limit switch „Winch spooled out“ does not turn off **before** three minimum rope coils are reached, then there is the danger, when it is further spooled out, that the rope mounting locks are ripped out and the load falls down!
Falling load can cause the crane to sway and / or topple over!
Personnel can be severely injured or killed!
This could result in property damage!
▶ Crane operation with an incorrectly or non-adjusted winch is strictly prohibited!
▶ If the winch falls below the three minimum rope coils per winch, have it readjusted by **Liebherr Service**!

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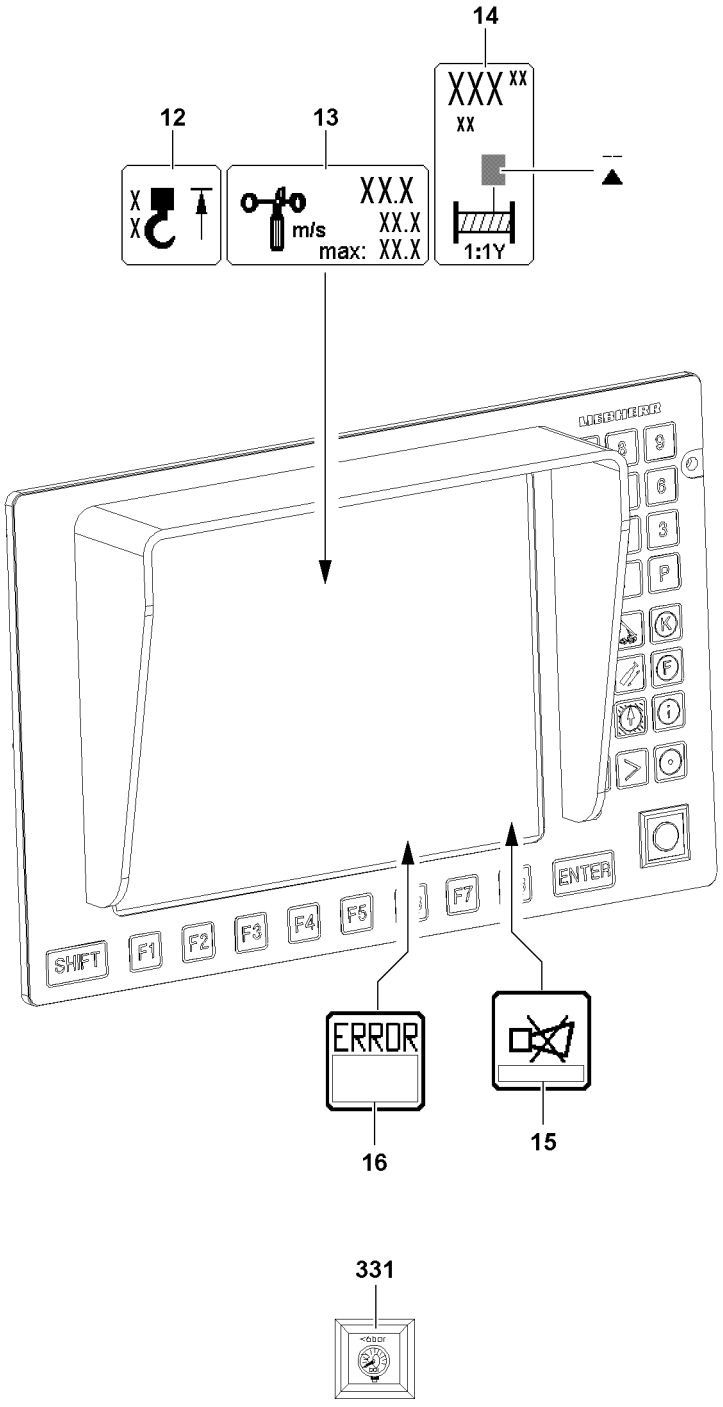

LWE/LG 1750-006/15409-07-02/en

Fig.112972

WARNING
The load can fall off!
If the rope is not spooled up or out properly, then the adjustment of the limit switch „Winch spooled out“ is changed!
If the adjustment of the limit switch „Winch spooled out“ has changed, then the minimum rope coils are fallen below!
The load call fall down!
Falling load can cause the crane to sway and / or topple over!
Personnel can be severely injured or killed!
This could result in property damage!
- ▶ **Never** pull the end of rope underneath the winch by spooling up the rope winch!
- ▶ **Never** pull the rope from the „stationary“ winch!
- ▶ If you suspect that the limit switch „Winch spooled out“ is not adjusted correctly: Check the shut off without a load on the hook!

The limit switch „Winch spooled out“ must shut off when the minimum rope coils for the winch are reached:
- When the minimum rope coil for the winch is reached, then the display „Winch spooled out“ appears in the Winch icon **14**, see illustration. The crane movement „Spool winch out“ is shut off.

5.6.1 Quick test Limit switch winch

When the minimum rope coil is reached:
- The display „Winch spooled out“ must appear in the Winch icon **14**.
- The crane movement „Spool winch out“ must be shut off.

5.7 Servo oil pressure monitoring in the winches

All crane types except LR1400/2:
- If no servo oil pressure is present when the master switch is actuated, a corresponding error message appears in field **15**.

Only LR1400/2:
- If the servo oil pressure is too low, then the indicator light **331** in the right instrument panel appears.

5.8 Pressure monitoring in the relapse cylinders

Pressure sensors are installed in the hydraulic cylinders. The pressure measured with the pressure sensor is shown on the LICCON monitor, see Crane operating instructions, chapter 4.02.

WARNING
Risk of accident due to crane toppling over or destruction of the crane!
If the pressure drops, the relapse cylinder can no longer stabilize the boom!
The crane can topple over or be destroyed!
Personnel can be severely injured or killed!
- ▶ During crane operation: Constantly monitor the pressure in the relapse cylinders!

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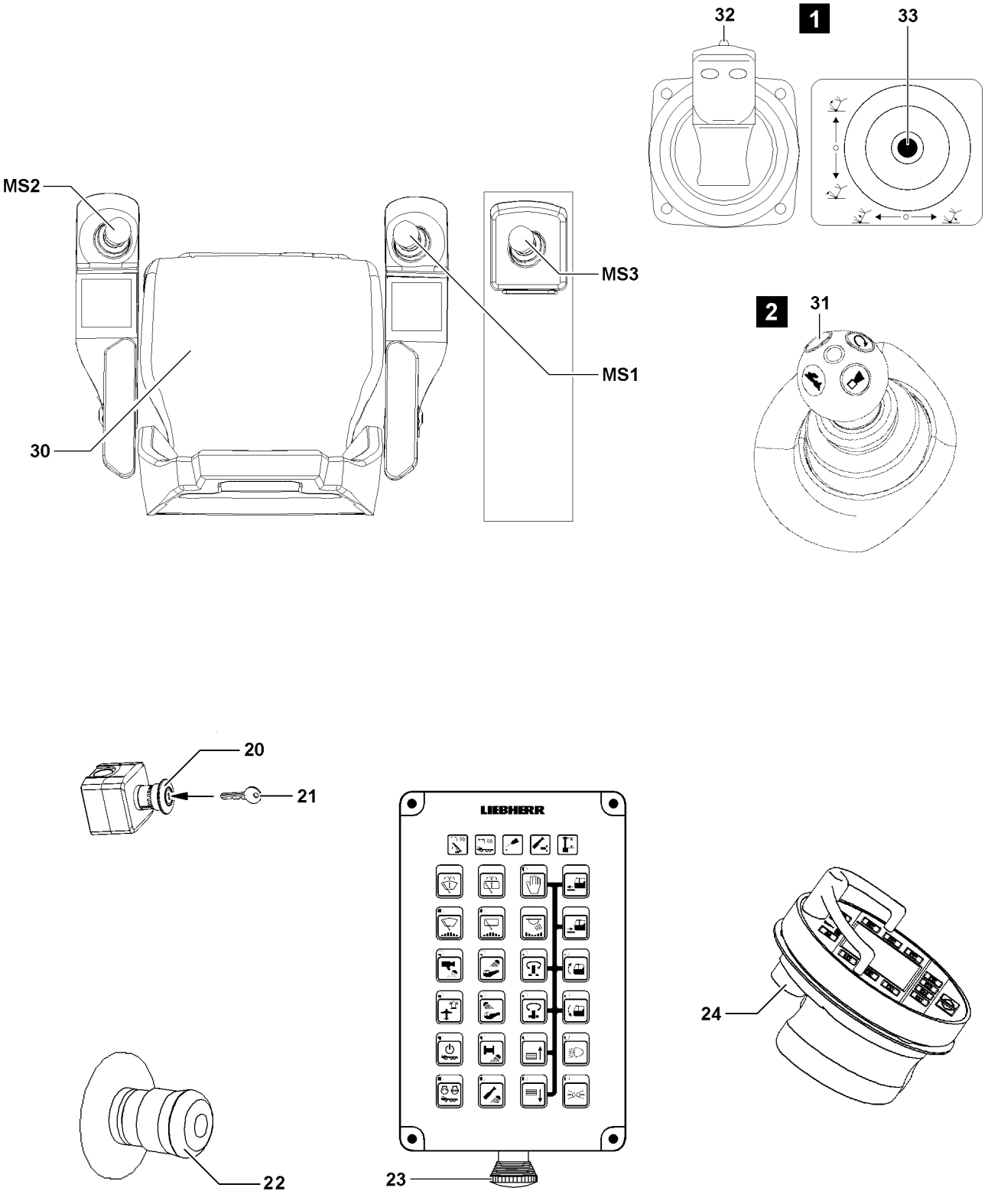

Fig.112970

5.9 EMERGENCY STOP switch / EMERGENCY OFF switch

If an EMERGENCY STOP switch / EMERGENCY OFF switch is actuated, then the crane movement can be stopped with it.

WARNING
Defective EMERGENCY STOP switch / EMERGENCY OFF switch!
If the crane is operated with a defective EMERGENCY STOP switch / EMERGENCY OFF switch, then the crane movement cannot be stopped by actuating the EMERGENCY STOP switch!
This could result in accidents!
Personnel can be killed or seriously injured!
This could result in property damage!
- ▶ Crane operation with a defective EMERGENCY STOP switch / EMERGENCY OFF switch is prohibited!
- ▶ Repair or replace a defective EMERGENCY STOP switch / EMERGENCY OFF switch!

NOTICE
Operational actuation of the EMERGENCY STOP switch / EMERGENCY OFF switch
Actuation of the EMERGENCY STOP switch / EMERGENCY OFF switch causes the crane movement to stop abruptly!
Abruptly stopping the crane movement can cause the load to swing!
Swinging loads can cause accidents!
- ▶ Do not use the EMERGENCY STOP switch / EMERGENCY OFF switch operationally!
- ▶ Use the EMERGENCY STOP switch / EMERGENCY OFF switch only in emergency situations!

The EMERGENCY STOP switch / EMERGENCY OFF switch is available in various versions, depending on the crane type:
- After actuation of a switch of version*** 20**, the release is only obtained by an authorized person with key **21** and by subsequently turning the ignition „Off - On“ momentarily.
- After actuation of the switch of version*** 22**, the release is obtained by turning and unlocking the knob and subsequently turning the ignition „Off - On“ momentarily.
- After actuation of the switch of version*** 23**, the release is obtained by turning and unlocking the knob and subsequently turning the ignition „Off - On“ momentarily.
- After actuation of the switch of version*** 24**, the release is obtained by turning and unlocking the knob and subsequently turning the ignition „Off - On“ momentarily.

Note
- ▶ Which EMERGENCY STOP switch / EMERGENCY OFF switch is on the crane depends on the crane type.
- ▶ The switch **24** on the BTT is only activated when working with the BTT.

5.9.1 Quick test EMERGENCY STOP switch / EMERGENCY OFF switch

After actuation of the EMERGENCY STOP switch / EMERGENCY OFF switch:
- The crane movements must be stopped.
- No crane movements must be possible until the release was issued by turning and unlocking the knob and then turning the ignition „Off - On“ momentarily.

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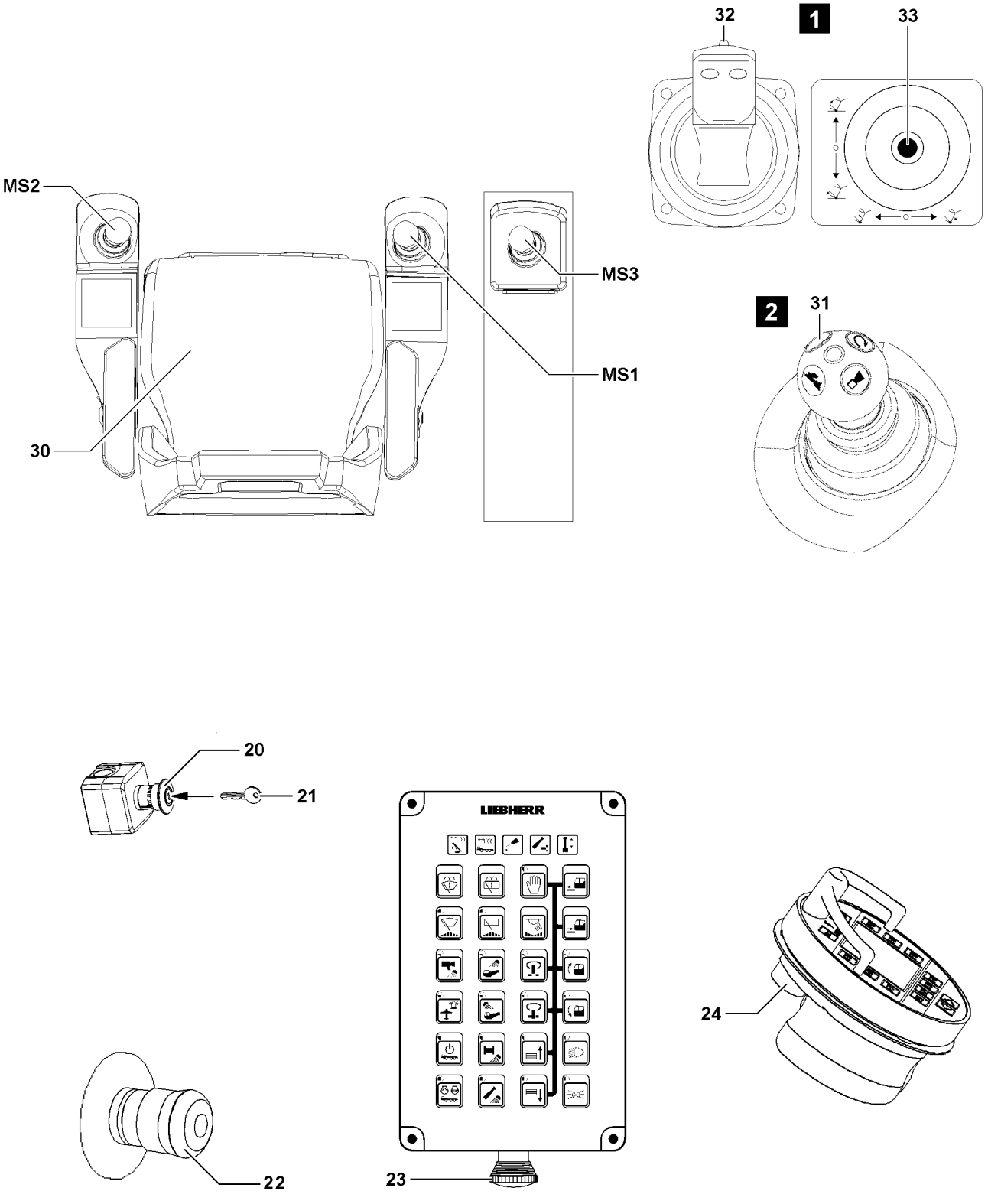

Fig.112970

5.10 Control release

The control release can be made via three switches:
- **30** Seat contact button
- Button **31** on master switch **MS1** and **MS2** and **MS3**.
  or
- Button **32** on master switch **MS1** and **MS2** (only LR1400/2)
- Button **33** on master switch **MS3** (only LR1400/2)

The seat contact button **30** shuts down the crane control as soon as the crane operator gets up from the seat.

This prevents unintended crane movements by accidentally touching the master switch, for example when getting in or out of the cab.

Button **31** or button **32** and the button **33** bypass the seat contact switch **30**, if necessary, for example, when work must be performed standing.

5.11 Hydraulic safety valves

A differentiation is made between three types:
- Pressure relief valves
  - Prevent pipe and hose bursts due to excessive pressure.
- Shut off valves
  - Control and secure the working cylinders.
- Check valves
  - Control and secure the flow direction.

5.12 Gravity actuated relapse retainer

Note
▶ Only for cranes with luffing accessories.

The gravity actuated relapse retainer (oscillation guard / flap / relapse support) prevent luffing accessory from tipping to the rear in „steepest position“.

WARNING
The crane can topple over!
If the gravity actuated relapse retainer (oscillation guard / flap / relapse support) is hard to move, then it will no longer function.
Shut off and limit functions can be set out of service!
The crane can be overloaded and topple over!
Personnel can be killed or seriously injured!
This could result in property damage!
▶ Before erecting the crane, check the relapse retainer for easy movement!
▶ Crane operation with hard to move relapse retainer is prohibited!

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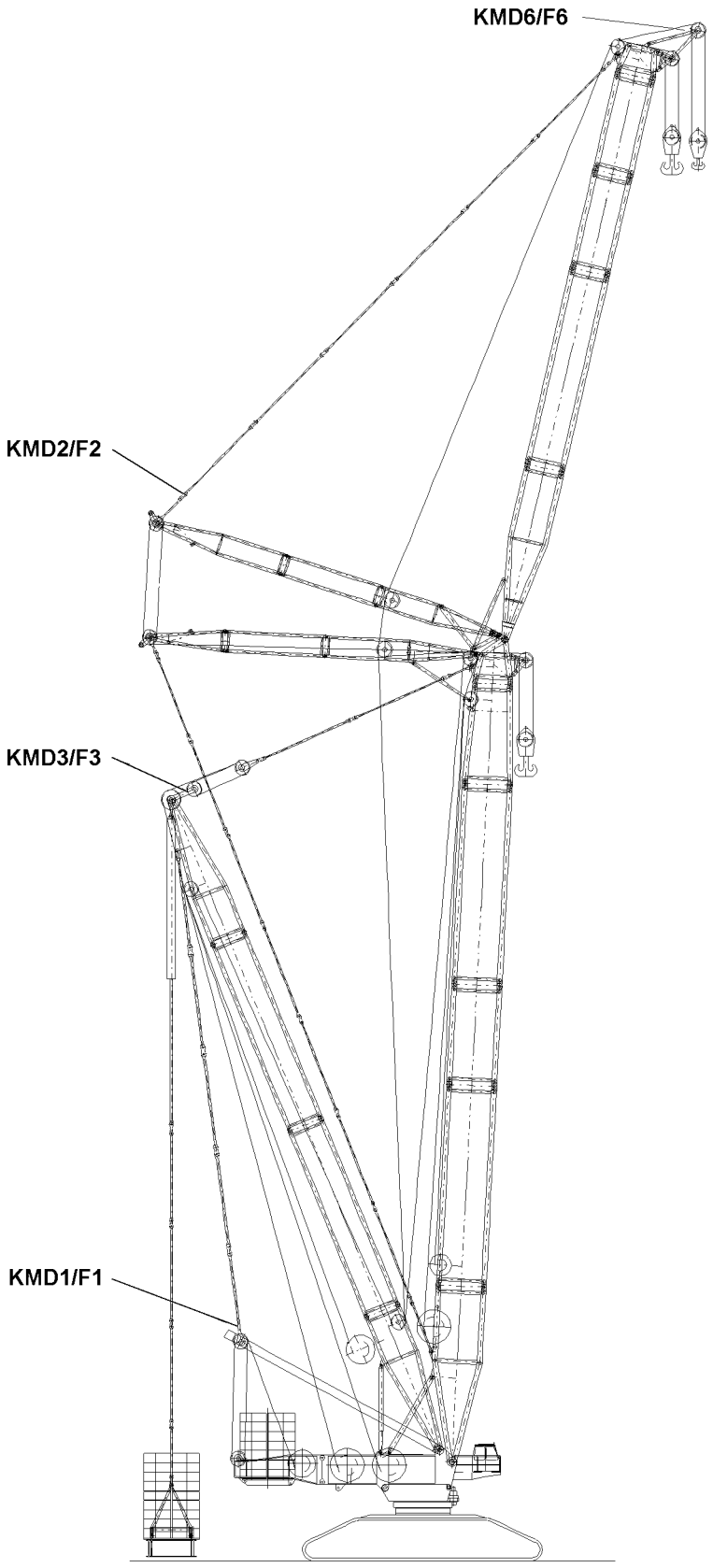

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Fig.112971

5.13 Angle sensors

Component	Description - Angle sensor (WG)
S-pivot section	Main boom bottom
S/W-end section, if used on boom	Main boom top
S/W-end section, if used on luffing jib	Luffing jib up
W-pivot section	Luffing jib bottom
W-connector head	Main boom top
D-pivot section	Derrick bottom
D-end section	Derrick top
SA-frame	SA-frame

5.14 Test brackets (KMD = force test box)

The test brackets measure the force in the guying, which results from the load and the boom momentum.

The test brackets are located:
- **KMD 1**, in the boom guying, SA-frame to boom for all operating modes **without** derrick
- **KMD 1**, in the derrick guying, SA-frame to derrick for all operating modes **with** derrick
- **KMD 2**, in the lattice jib guying, WA-frame 1 to lattice jib end section
- **KMD 3**, in the boom guying, derrick to boom for all operating modes **with** derrick
- **KMD 6**, in the boom nose (not LR1400/2)

5.15 Limit switch Boom system

WARNING
Danger of toppling or destroying the crane!
If the crane movement is stopped by the block limit switches, then the load forces cannot be absorbed and calculated by the control!
The crane can be overloaded and topple over!
Personnel can be hit and killed or seriously injured!
This could result in property damage!
- ▶ Do **not** use the hoist limit switch as an operational shut off device!
- ▶ Do not actuate the block limit switches!

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4.05 Crane operation

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Fig.195219

1 LICCON computer system

WARNING
Danger of accidents due to overload!
- ▶ Constantly monitor the displays on the LICCON monitor.
- ▶ Observe changing utilization conditions and forces.

WARNING
Danger of accident!
- ▶ The crane operator must evaluate constantly if the data shown in the crane operating screen can even be correct. He may not rely blindly on the LICCON system but must think for himself and must recognize a possible error or overload conditions.

Note
- ▶ For a detailed description of the LICCON computer system, see Crane operating instructions, chapter 4.02.

2 Winch and master switch assignment to operating modes

The assignment of the master switches to the winches is different, according to the operating modes. The assignments are shown in the winch icons on the LICCON monitor.

Note
- ▶ The crane operator must know and observe the assignments, see Electric wiring diagram.

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3 Function check and control measures

Make sure that the following prerequisites are met:
- The crane is supported.
  (only in connection with crane support or for LG-cranes)
- The crane is aligned in horizontal direction.
- The counterweight is installed and secured according to the data in the load chart.
- The ground is able to carry the weight of the crane, the load and the load handling equipment.
- The hook block is correctly reeved as shown in reeving plan.
- The crawler operation is turned off: Switch **74** in 0-position
  (only for LR-cranes)
- No bypass of the LICCON computer system or exceedance of overload protection is active
- The LICCON computer system is in the normal operation.
- The engine is running.
- All safety equipment has been adjusted according to the data in the load chart.
- There are no persons or objects in the danger zone.

WARNING
Danger of accident!
Death, severe bodily injuries, property damage.
- ▶ In order to protect the crane and reduce the danger of accidents, always operate the master switch slowly and sensitively.
- ▶ Ensure that there are no obstacles in the working range of the crane and that there are no persons within the danger zone.
- ▶ Give a warning signal before initiating a crane movement.
- ▶ Observe the danger notes for crane operation, see Crane operating instructions, chapter 5.01.

3.1 Checking the function of the safety equipment before crane operation

The following checks must be made before crane operation:

- ▶ Check the function of the overload protection by running against the operating positions „on top“ and „bottom“.
- ▶ Check the function of the hoist limit switch „on top“ by running against the hoist limit switch weight.
- ▶ Check the function of the limit switch „Boom steep“ on running on the relapse cylinder.
- ▶ Check the function of the limit switch „Derrick“ on running on the relapse cylinder.
- ▶ Check the function of the limit switch „Lattice jib steep“ on running on the relapse cylinder.

WARNING
Tipping of W-lattice jib!
If the relapse retainer is not moving easily, then the mechanical relapse support cannot engage correctly in steep lattice jib position.
The lattice jib can tip backward uncontrolled and cause the crane to topple over.
Death, severe bodily injuries, property damage.
- ▶ Make sure that the pedal can be easily moved before erecting the W-boom system.

Carry out the following checks additionally before crane operation with the W-lattice jib:

- ▶ Check the function of the limit switch on the flap (pendulum).
- ▶ Check that the mechanical relapse support moves into the flap.

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3.2 Control measures before crane operation

WARNING
The crane can topple over!
If the control measures are not carried out before crane operation, then the crane can topple over or be damaged.
Death, severe bodily injuries, property damage.
- ▶ Crane operation with safety devices which are **not** functioning correctly is strictly prohibited.
- ▶ Start crane operation only after all safety devices have been checked and are functioning correctly.
- ▶ Start crane operation only if the overload protection has been set according to the data in the load chart.
- ▶ Start crane operation only if the crane is properly supported and horizontally aligned.

Note
- ▶ If the crane operator leaves the cab, even for a short time, the operating mode setting must be checked and reset if necessary before resuming crane operation.

3.2.1 Guy rods of lattice sections in crane operation

Note
- ▶ Guy rods on lattice sections in crane operation, see Crane operating instructions, chapter 5.01.

3.2.2 Dangerous conditions without shut off

Block position of relapse cylinders when setting down the load.

NOTICE
Damage to boom or relapse cylinder!
If the block position of the relapse cylinders is triggered by the boom or the derrick with attached, freely suspended load, then there is a danger of damaging the boom or the relapse cylinders when setting the load on the ground. By setting down the load, the crane is relieved, which causes the boom system to move to the rear.
There is no shut off of the spooling out function of the winch.
- ▶ Operational running on the block position is prohibited.

If the crane should be in block position once:
- ▶ Actuate the opposite direction of movement which caused the block position and eliminate the block position.

4 Releasing the crane control

The crane control is stopped by a seat contact button **7** as soon as the crane operator gets up from his seat so that no inadvertent crane movements are carried out when entering or exiting the cab due to inadvertent movement of the master switch.

Note
- ▶ If the crane operator must work while standing up, then the seat contact button **7** can be bypassed by button **71**, button **86** and button **94** on the respective master switch.

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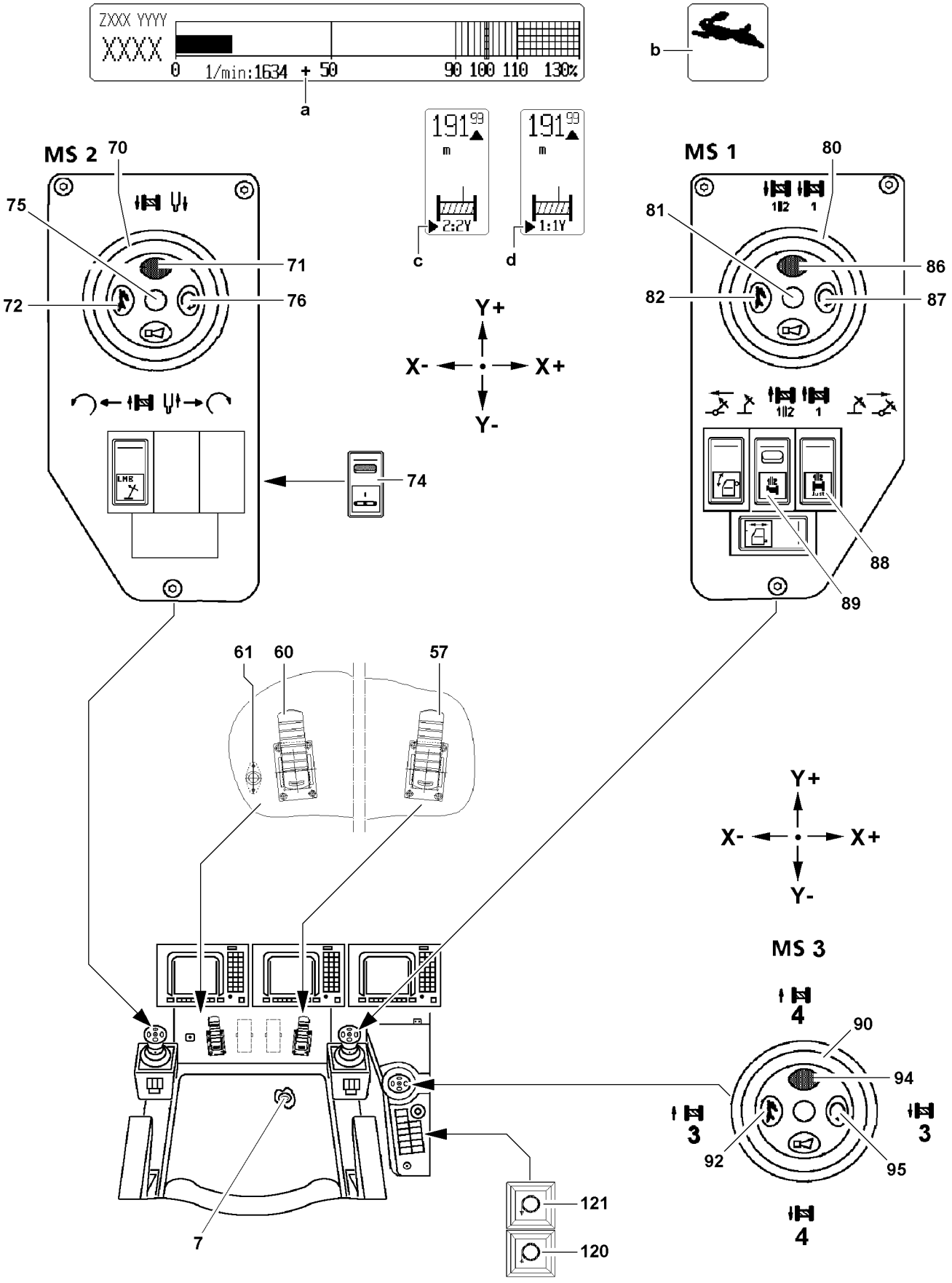

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Fig.110601

5 Regulating the engine rpm

5.1 Locking the engine rpm

Locking the engine rpm relieves the crane operator if he needs to work for an extended period with constant rpm. The engine rpm can be locked in any position.

▶ Press the pedal **57** down for the engine regulation until the desired rpm is reached.
▶ Press the button **76**.
or
Press the button **87**.
or
Press the button **95**.

Result:

– The pedal **57** is locked and the engine rpm is saved.
– The icon **a** appears on the monitor.

5.2 Increasing the engine rpm via the pedal

Make sure that the following prerequisite is met:
– The maximum rpm has not yet been reached.

When the engine rpm is locked, the engine rpm can be increased with the pedal.

When the pedal is no longer actuated, the engine rpm drops to the saved value.

▶ Press the pedal **57** and increase the engine rpm.

When this engine rpm is to be saved:
▶ Press the button **76**.
or
Press the button **87**.
or
Press the button **95**.

5.3 Releasing the engine rpm lock

If the engine rpm is locked:

▶ Do no longer press down the pedal for the engine regulation **57**.
▶ Press the button **76**.
or
Press the button **87**.
or
Press the button **95**.

Result:

– The lock is released.
– The icon **a** turns off on the monitor.
– The rpm reduces to low idle rpm.

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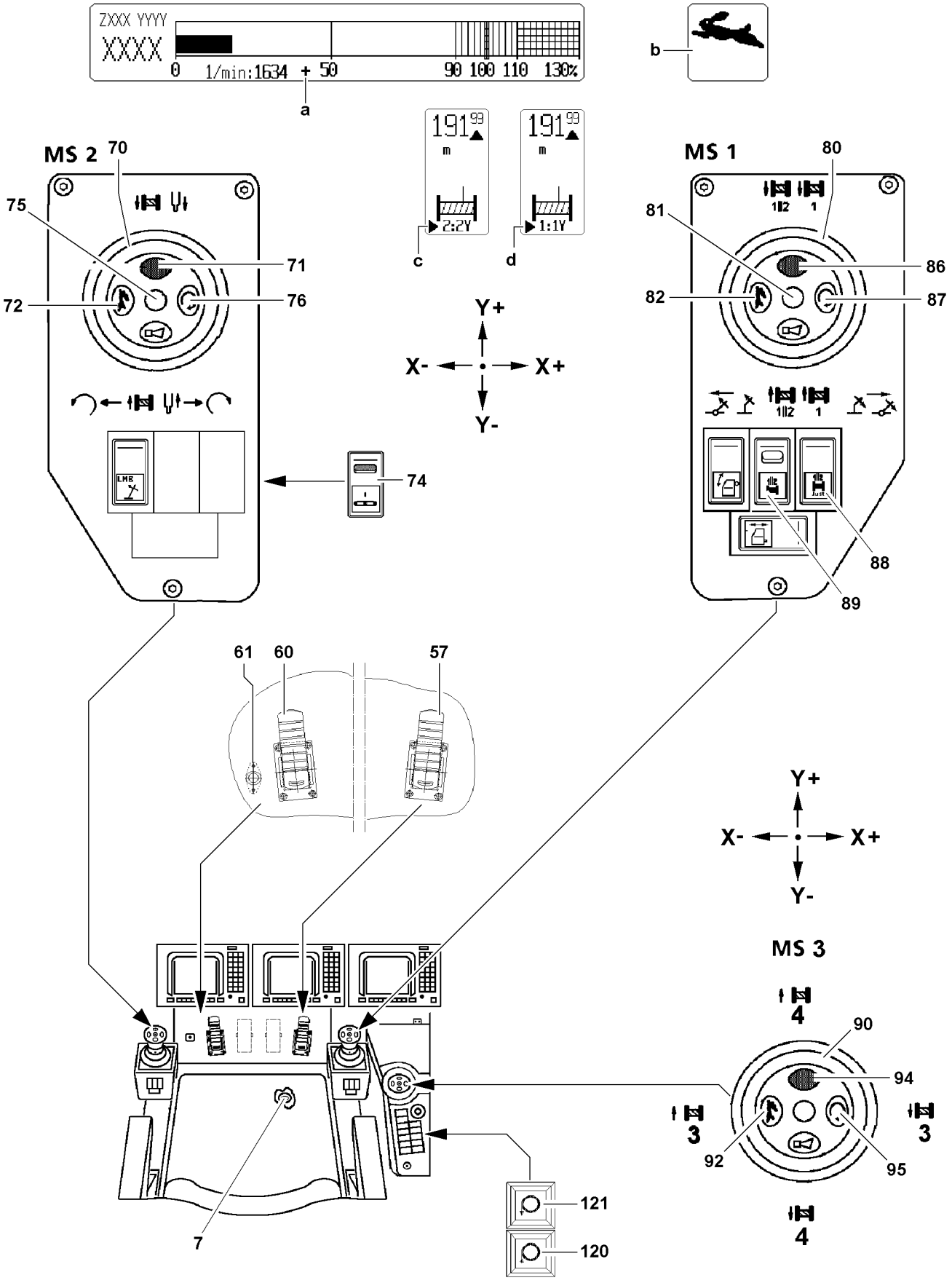

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Fig.110601

5.4 „Power Plus“

Note
When „Power Plus“ is turned on, observe the following:
- ▶ If a crane movement has reached its maximum speed due to the current utilization, then no speed increase is possible by adding the „Power Plus“.
- ▶ If the total power requirement of all actuated crane movements is larger than the available power, then those crane movements are reduced which require the most power.
- ▶ If another crane movement is added or taken back to one or more actuated crane movements then this has an influence on the other movements. For that reason we recommend in situations in which an interference of the individual crane movements is troublesome, not to turn the „Power Plus“ on to turn the „Power Plus“ off.

5.4.1 Adding „Power Plus“

The speed of the „lift / lower“ crane movement is increased with the button **72**, button **82** or button **92**.

WARNING
Danger of accidents in case of single to triple sheave reeving!
- ▶ Do **not** add „Power Plus“ if the crane is utilized by more than 50 % of its maximum permissible load carrying capacity for the corresponding radius.

▶ Press the button **72**.
or
Press the button **82**.
or
Press the button **92**.

Result:

– „Power Plus“ is added.
– The icon **b** appears on the LICCON monitor.

5.4.2 Turning the „Power Plus“ off

If the „Power Plus“ is added:

▶ Press the button **72** again.
or
Press the button **82** again.
or
Press the button **92** again.

Result:

– „Power Plus“ is turned off.
– The icon **b** turns off on the LICCON monitor.

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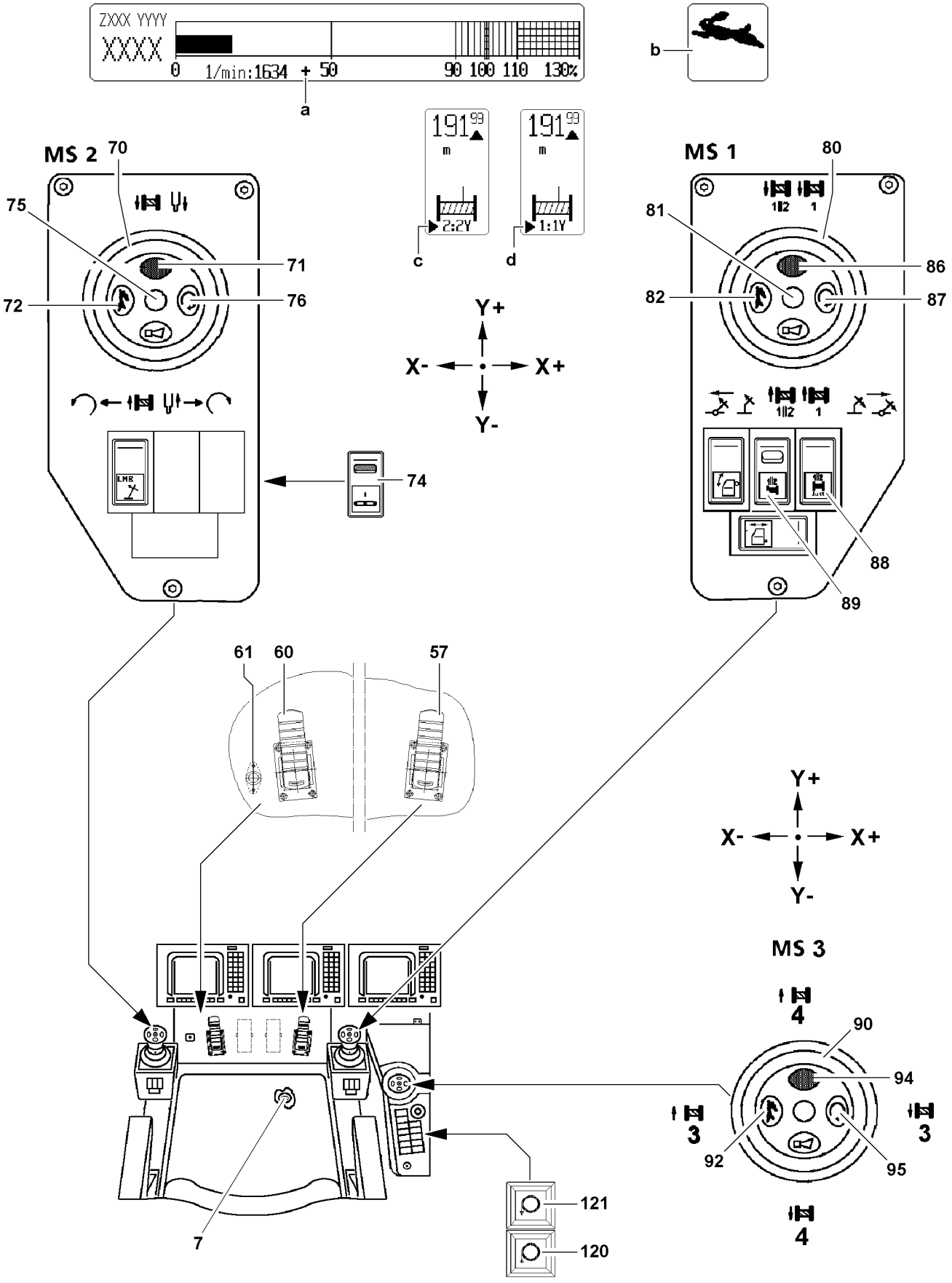

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Fig.110601

6 Vibration sensor*

By adding the vibration sensor, a crane movements can be detected by vibration of the master switch.

Make sure that the following prerequisite is met:
- The seat contact button **7** is actuated.

6.1 Vibration sensor winch 1

Adding the vibration sensor

▶ Press the button **86**.

Result:

– The vibration sensor **81** is turned on.
– The icon **d** appears on the LICCON monitor.

Turning the vibration sensor off

When the vibration sensor **81** is turned on:

▶ Press the button **86** again.

Result:

– The vibration sensor **81** is turned off.
– The icon **d** turns off on the LICCON monitor.

6.2 Vibration sensor winch 2 or slewing gear

If winch 2 and the slewing gear are operated, then the vibration sensor **75** will react to the first deflected movement.

Adding the vibration sensor

▶ Press the button **71**.

Result:

– The vibration sensor **75** is turned on.
– The icon **c** appears on the LICCON monitor.

Turning the vibration sensor off

When the vibration sensor **75** is turned on:

▶ Press the button **71** again.

Result:

– The vibration sensor **75** is turned off.
– The icon **c** turns off on the LICCON monitor.

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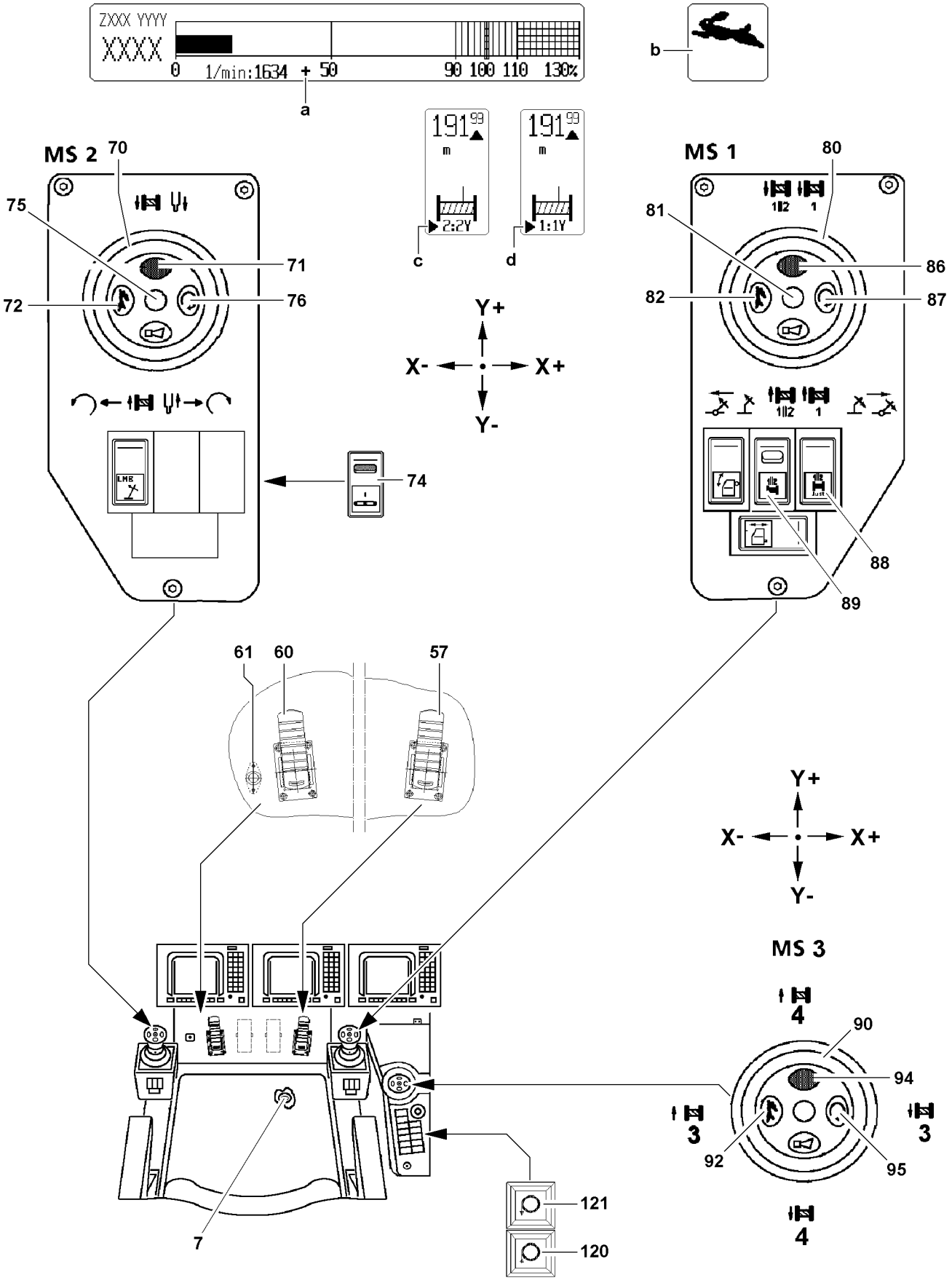

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Fig.110601

7 Lifting / lowering a load

NOTICE
Rope damage due to slack rope!
▶ When spooling the winches up or out, make sure that no slack rope forms.

The speed of crane movement „lifting and lowering“ is controlled via the deflection of the corresponding master switch and via the pedal **57** of the engine regulation.

In the „Control Parameter“ program, it is possible to preselect the maximum winch speed. It is also possible to deactivate or activate the individual winches.

See Crane operating instructions, chapter 4.02.

Make sure that the following prerequisite is met:
– The winches are correctly assigned to the respective pulley heads, see Crane operating instructions, chapter 4.02.

7.1 Operating winch 1 - hoist winch

In the winch icon is shown with the arrow icons that the winch is turning, even if no hook movement is visible due to multiple reeving and low speed.

▶ Deflect master switch 1 **80** in direction Y+.

Result:

– Winch 1 spools out and the load is lowered.

▶ Deflect master switch 1 **80** in direction Y-.

Result:

– Winch 1 spools up and the load is lifted.

7.2 Operating winch 2 - hoist winch

In the winch icon is shown that the winch is turning, even if no hook movement is visible due to multiple reeving and low speed.

▶ Deflect master switch 2 **70** in direction Y+.

Result:

– Winch 2 spools out and the load is lowered.

▶ Deflect master switch 2 **70** in direction Y-.

Result:

– Winch 2 spools up and the load is lifted.

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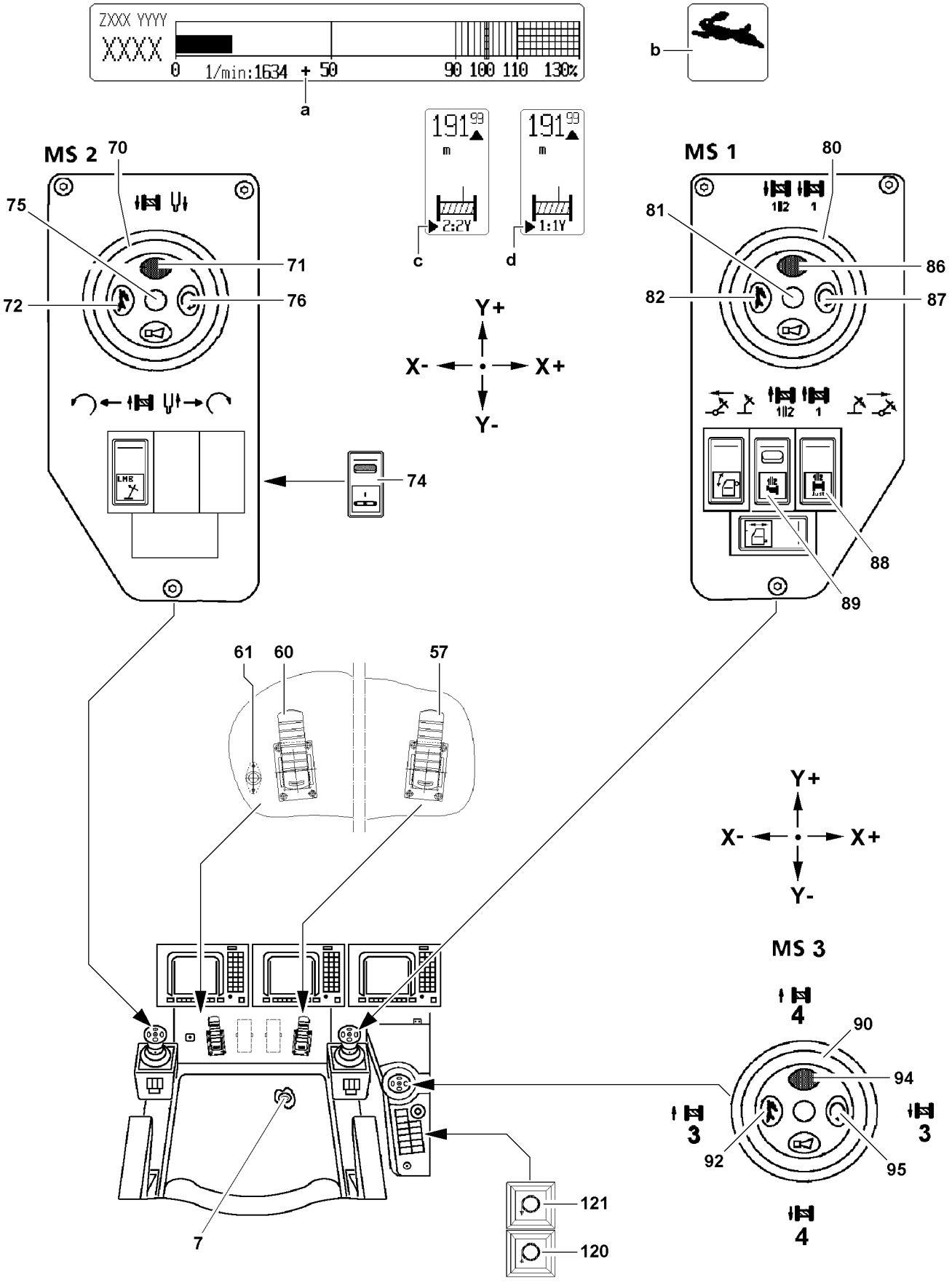

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Fig.110601

7.3 Winch 1II2 - Parallel operation

7.3.1 Setting up parallel operation

For parallel operation, winch 1 and winch 2 are used.

In parallel operation, actuation of winch 1 and winch 2 is made only together with master switch 1 **80**.

Make sure that the following prerequisites are met:
- The double hook blocks are installed together, see Crane operating instructions, chapter 4.06.
- The double hook blocks are reeved according to the load charts.
- The double hook blocks are properly reeved according to the reeving plan, see separate reeving plan.
- The total reeving has been entered on the LICCON monitor.
- The reeving number on both winches 1 and 2 must be the same and even.

WARNING
Danger of accident!
Death, severe bodily injuries, property damage.
- ▶ The total reeving number on both winches 1 and winch 2 must be the same and even in parallel operation. If the minimum value of the reeving is uneven, then - in parallel operation - the next higher, even reeving must be selected.
- ▶ Remove the transporting pin on the hook blocks prior to the horizontal alignment and prior to the crane operation.
- ▶ Make sure that there are no persons within the danger zone.

Aligning the hook blocks horizontally

Make sure that the following prerequisites are met:
- Individual operation for winch 1 and winch 2 is set.
- The parallel operation switch **89** is turned off.
- There is no load on the hook.

Align the hook blocks visually in horizontal direction. To do so, spool the winches manually up or out.

▶ Deflect master switch 1 **80** or master switch 2 **70** in direction Y.

Result:

– Winch 1 or winch 2 spools out or up until the hook blocks are horizontally aligned.

Adjusting the parallel control of winch 1 and winch 2

Make sure that the following prerequisites are met:
- The double hook blocks are horizontally aligned, check visually.
- There is no load on the hook.

▶ Turn on the switch **89** for the parallel operation.
▶ Press the button **88**.

Result:

– The parallel control of winch 1 and winch 2 is adjusted.

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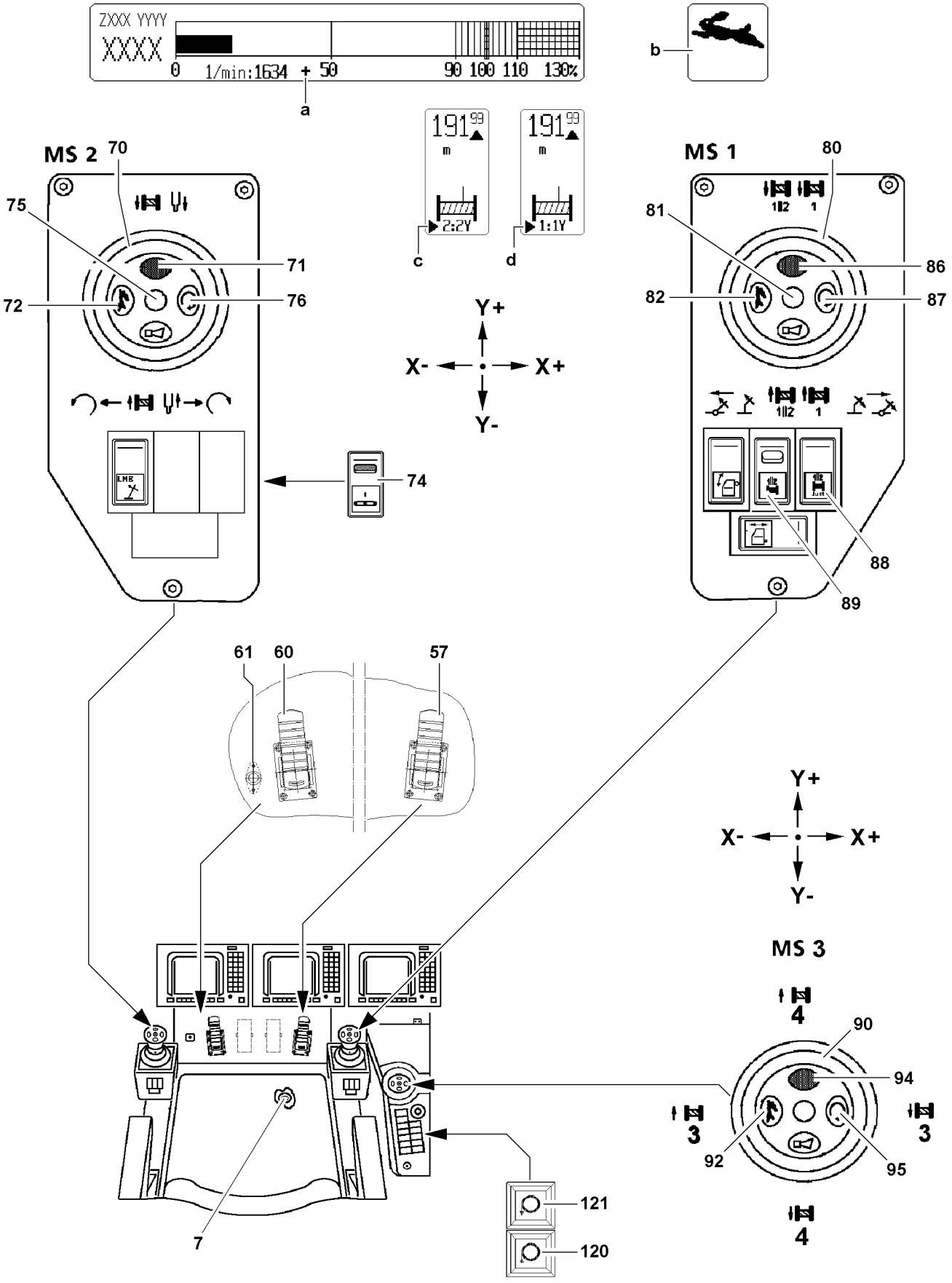

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Fig.110601

7.3.2 Parallel operation: Lifting / lowering a load

WARNING
Danger of accidents due to overload!
If the compensation cross bar is inclined, then significant load increases will occur on the individual hook blocks.
If this is not observed, then the hook block, boom or rope can be overloaded, resulting in property damage and personal injury.
Death, severe bodily injuries, property damage.
▶ Make sure that the compensation cross bar is always aligned horizontally on the double hook blocks.

WARNING
Danger of accidents due to different level of hook blocks!
The electronic parallel control only monitors the same rotational speed of the two winches, however, it does **not** consider the following errors:
- Uneven rope length
- Different rope diameters
- Different winding behavior
- Uneven reeving

▶ The crane operator must verify and is responsible despite electronic monitoring that the hook blocks are always at the same level.

Note
▶ The winch movement is shut off if the difference range of the parallel control is being exceeded. In that case, the winches must be again parallel adjusted.

Make sure that the following prerequisites are met:
– The double hook blocks are horizontally aligned, check visually.
– There is no load on the hook.
– Parallel control of winches is adjusted.
– The button **89** for parallel operation is turned on.

▶ Deflect master switch 1 **80** in direction Y+.

Result:

– Winch 1 and winch 2 spool out together: The load is lowered.

▶ Deflect master switch 1 **80** in direction Y-.

Result:

– Winch 1 and winch 2 spool up together: The load is lifted.

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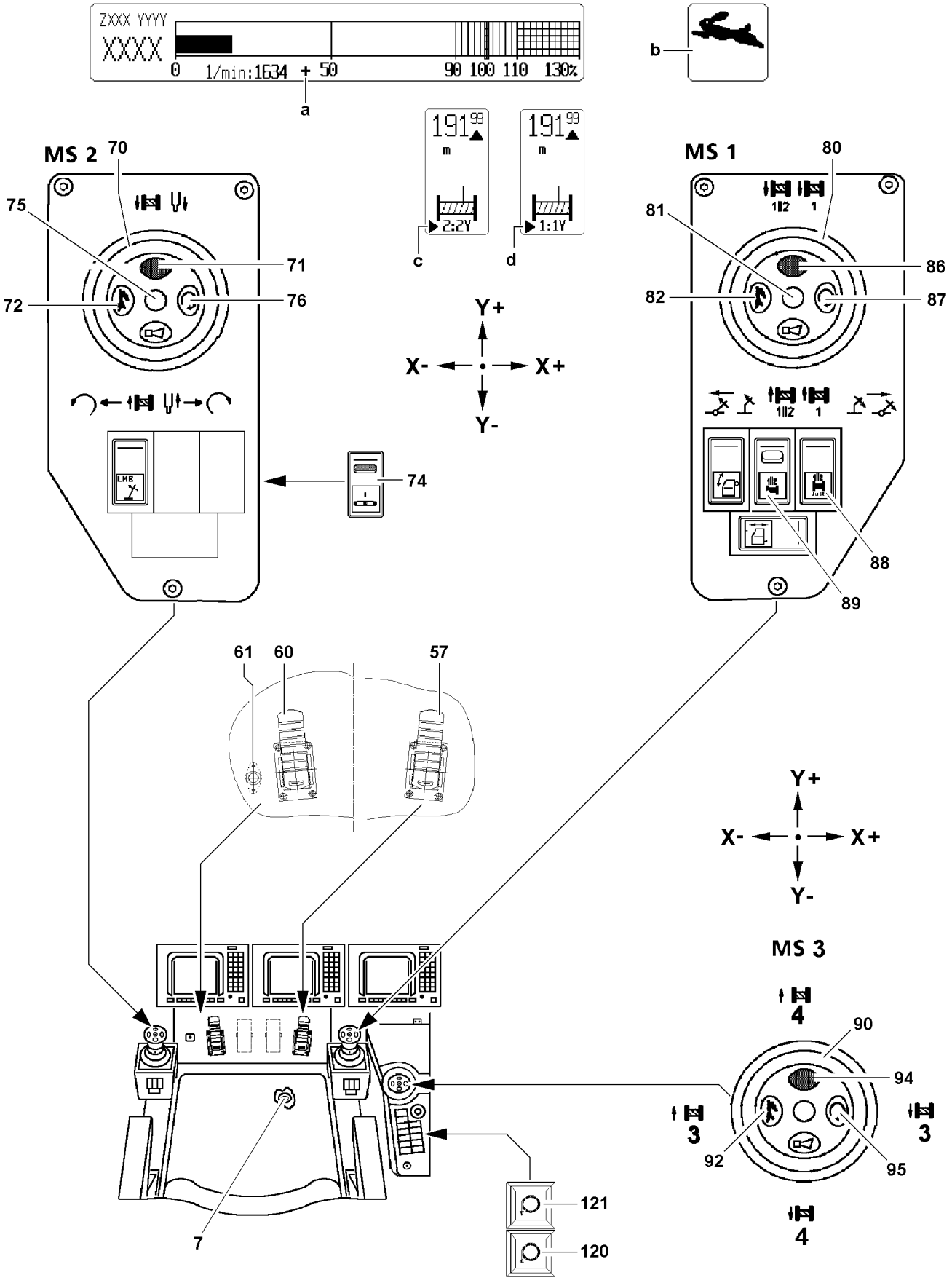

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Fig.110601

7.4 Operating winch 6 - hoist winch

In the winch icon is shown that the winch is turning, even if no hook movement is visible due to multiple reeving and low speed.

Note

- ▶ In individual operation of winch 1 and winch 2, no master switch is assigned to winch 6.
- ▶ In parallel operation, winch 1 and winch 2 are actuated with the master switch 1 **80**.
- ▶ When the switch **89** is turned on, then the master switch 2 **70** is assigned to winch 6.

7.4.1 Operating winch 6 in parallel operation of winch 1 and winch 2

Make sure that the following prerequisite is met:

– Switch **89** is turned on.

▶ Deflect master switch 2 **70** in direction Y+.

Result:

– Winch 6 spools out and the load is lowered.

▶ Deflect master switch 2 **70** in direction Y-.

Result:

– Winch 6 spools up and the load is lifted.

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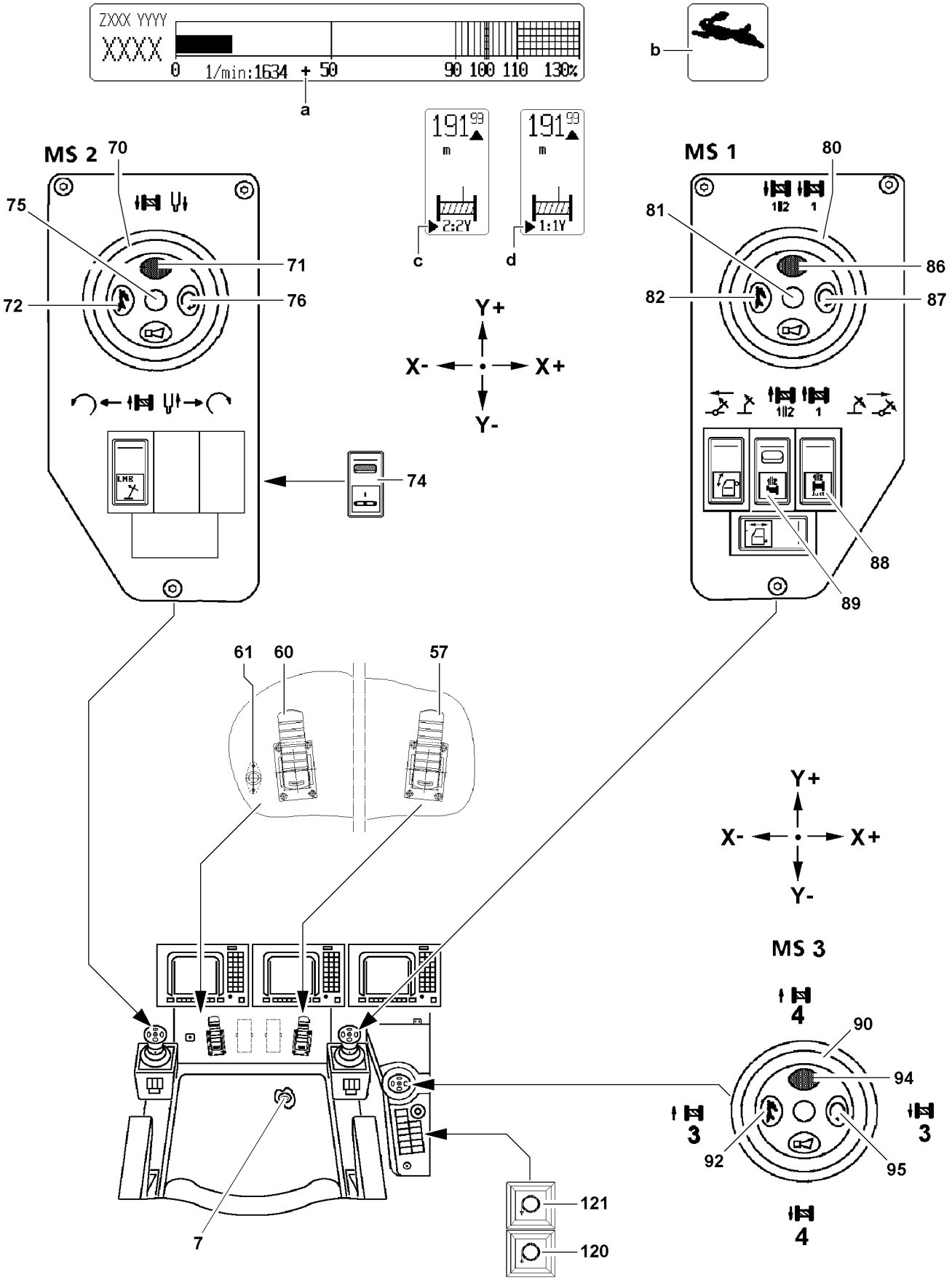

Fig.110601

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7.5 Operating winch 6 as winch 5

7.5.1 Crane operation with winch 6

In operating modes, except SDW-operation, winch 6 must be connected on the hydraulic and electrical system of winch 5, because winch 6 and winch 4 are supplied by the same pump.

Note

▶ Winch 6 and winch 4 cannot be moved simultaneously if they are connected to the same pump.

If winch 6 is connected to the pump 5 of winch 5, then winch 6 and winch 4 can be moved separately.

Note

▶ If winch 6 is moved as hoist winch with the hydraulic and electrical connections of winch 5, then winch 6 is operated as winch 5.
▶ In the LICCON crane operating screen, winch 6 is then shown as winch 5.
▶ The hook path display is then not correct for winch 6.

WARNING

Danger of accident due to falling load!
If the wind speed sensor does not turn off on the minimum rope coil, then the rope mount can be ripped out and the load can fall down.
Death, severe bodily injuries, property damage.

▶ Crane operation with an incorrectly or non-adjusted winch is strictly prohibited.
▶ Make sure that the winches are correctly adjusted: Check the shut off without a load on the hook.

If it is found during operation or when changing a rope that there is no shut off at the minimum rope coil:

▶ Have the winch speed sensor readjusted by **Liebherr Service**.

If winch 5 is operated again on pump 5, then the hook path display is incorrect until winch 5 is readjusted.

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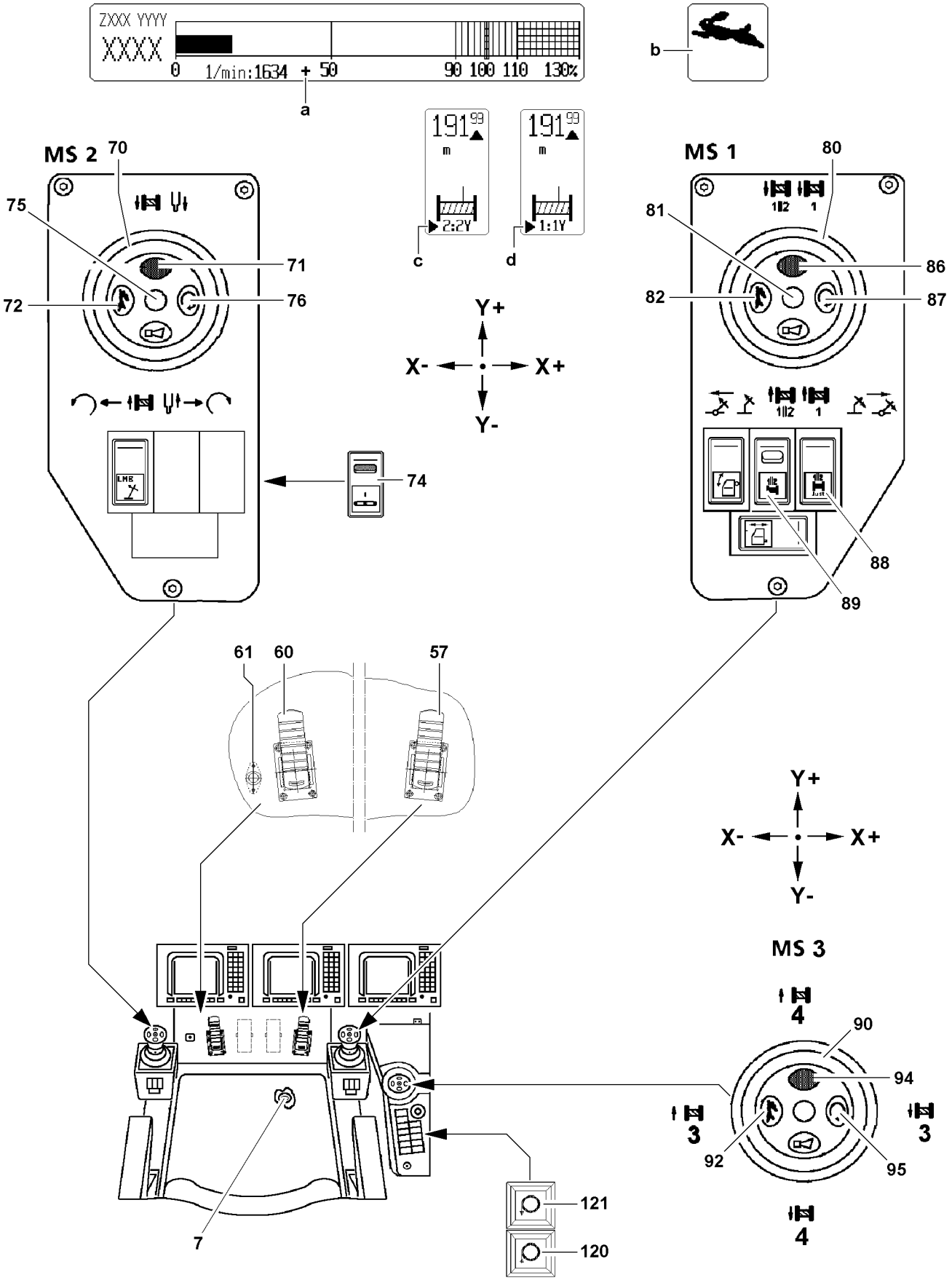

Fig.110601

7.5.2 Crane operation without winch 6

If winch 6 is not installed, then the hoist rope is placed normally on the W-control winch (winch 5)* which allows constant operation for control operation only for maximum 2 months.

NOTICE
Damage to the hoist rope!
If a hoist rope is placed on winch 5 and it is used for W-control, then significant wear and a shorter service life for the rope is the result.
The hoist rope can fail in crane operation and rip off.
- ▶ Make sure that someone checks before every crane operation which type of rope is placed on winch 5.
- ▶ Observe the Crane operating instructions, chapter 8.04.

WARNING
Falling W-lattice jib!
If a hoist rope is used as a control rope on the W-control winch (winch 5) in long-term applications of more / equal to two months, then the rope can fail in crane operation and rip off.
The W-lattice jib can fold down uncontrolled.
Death, severe bodily injuries, property damage.
- ▶ Carry out regular visual inspections.
- ▶ Check the rope regularly and unreeve no later than after two month in operation and reeve in again.
- ▶ Replace a damaged rope.

Note
- ▶ Important inspection and maintenance notes for ropes, see Crane operating instructions, chapter 7.05.50 and chapter 8.04.

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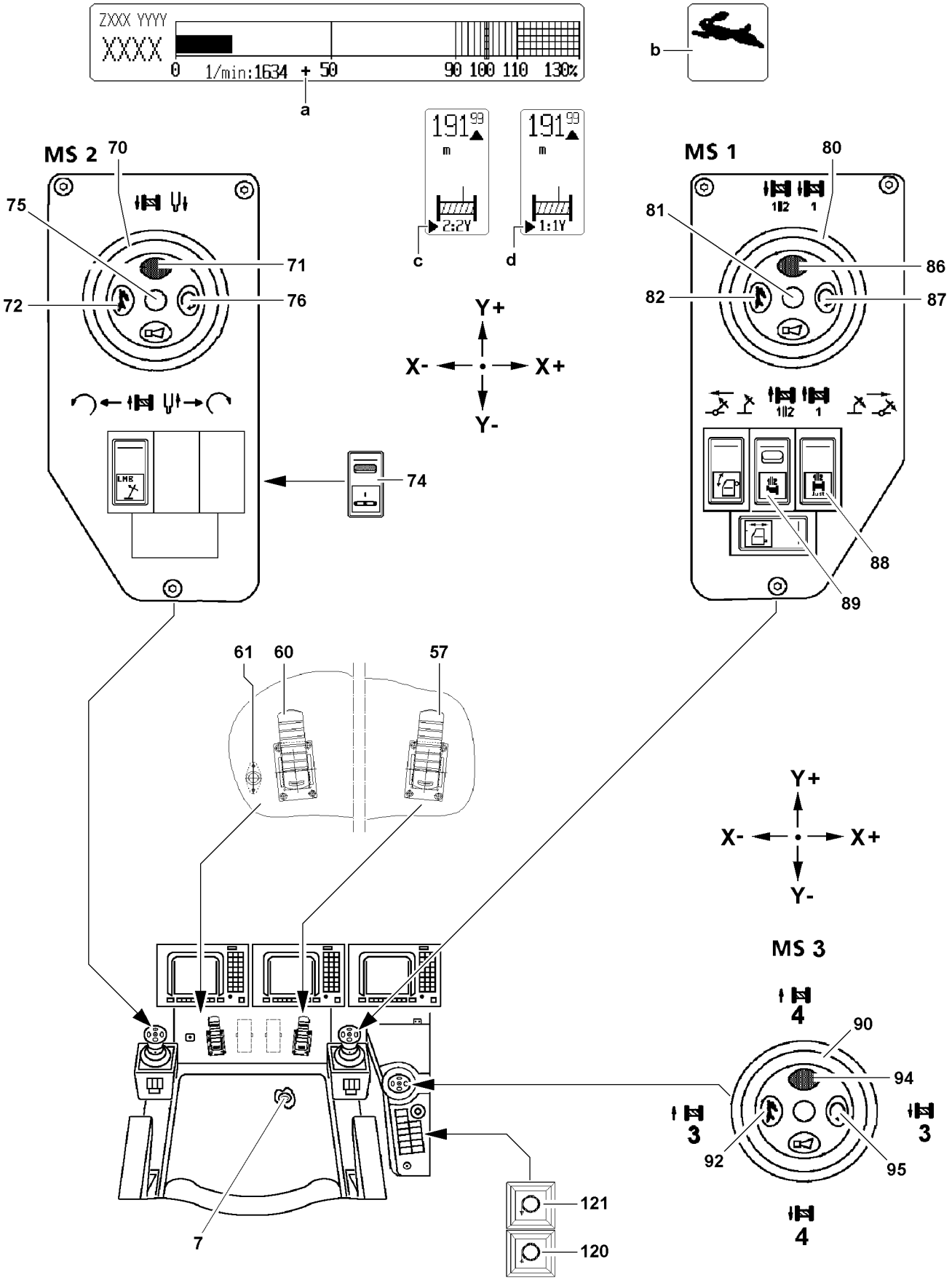

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Fig.110601

7.6 Operating the assembly winch

Spool assembly winch out:

▶ Press the button **121** and hold.

Result:

– The assembly winch spools out.

Stop the assembly winch:
▶ Stop pressing the button **121**.

Result:

– The assembly winch is stopped.

Spool the assembly winch up:

▶ Press the button **120** and hold.

Result:

– The assembly winch spools up.

Stop the assembly winch:
▶ Stop pressing the button **120**.

Result:

– The assembly winch is stopped.

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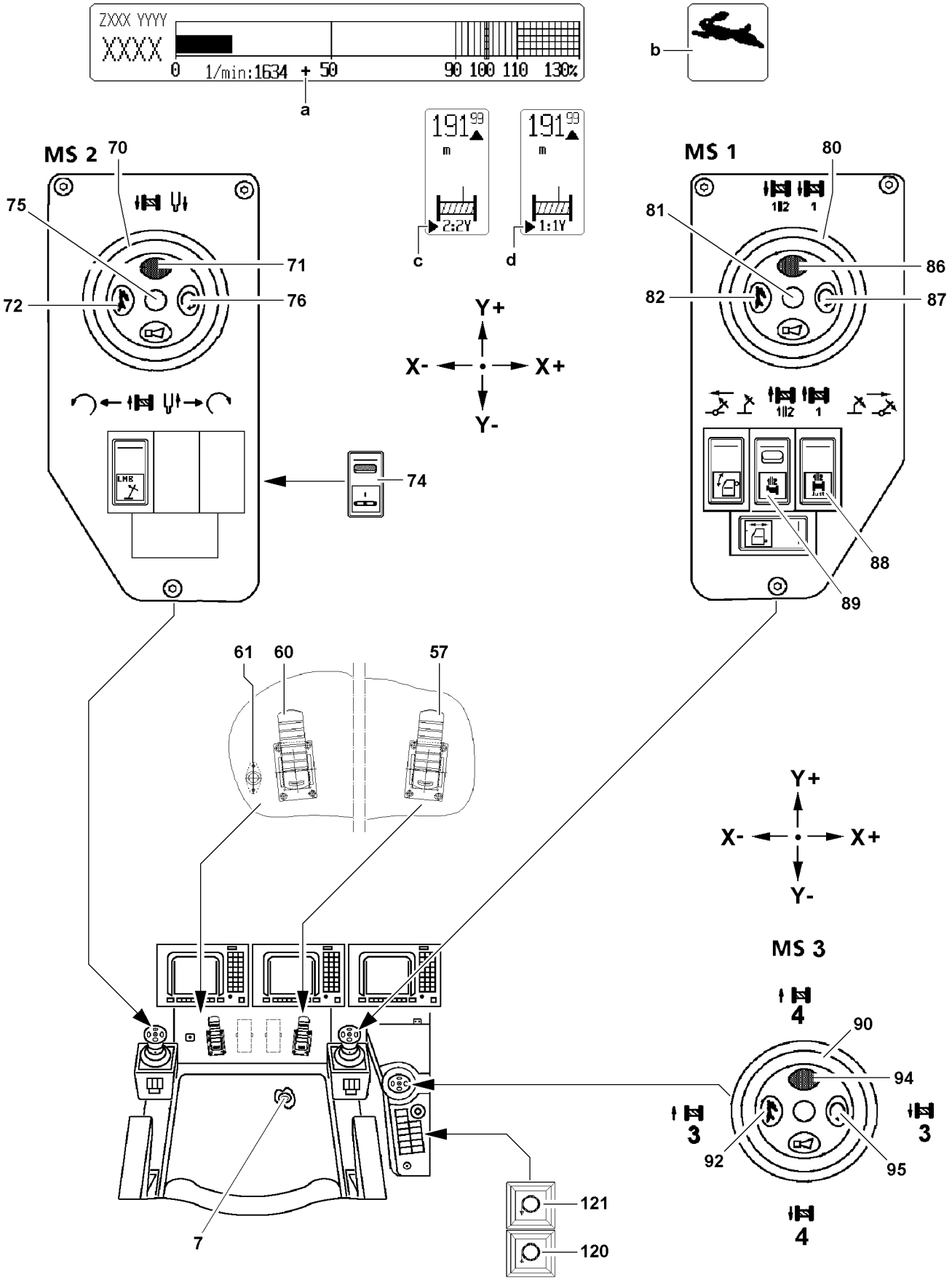

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Fig.110601

8 Luffing the boom

DANGER
Danger of accident due to toppling crane!
If the LICCON overload protection turns off while trying to lift the load with the winch, then a subsequent luffing movement can cause the crane to topple over or damage it.
Death, severe bodily injuries, property damage.
▶ Do not lift the load by luffing up the boom, see Crane operating instructions, chapter 4.04.

The speed of crane movement „Luffing“ is controlled by the deflection of the corresponding master switch and the pedal **57**.

Note
▶ The operating modes are explained in the load chart manual.

Note
▶ Observe the pump - master switch assignment in the electric wiring diagram.

8.1 Luffing the main boom in operating mode S/SL

▶ Deflect the master switch 1 **80** in direction X-.

Result:

– The boom is luffed up.

▶ Deflect the master switch 1 **80** in direction X+.

Result:

– The boom is luffed down.

8.2 Luffing the main boom in operating mode SW

▶ Deflect master switch 3 **90** in direction Y-.

Result:

– The boom is luffed up.

▶ Deflect master switch 3 **90** in direction Y+.

Result:

– The boom is luffed down.

8.3 Luffing the main boom in operating mode SDW

▶ Deflect the master switch 3 **90** in direction X-.

Result:

– The boom is luffed up.

▶ Deflect the master switch 3 **90** in direction X+.

Result:

– The boom is luffed down.

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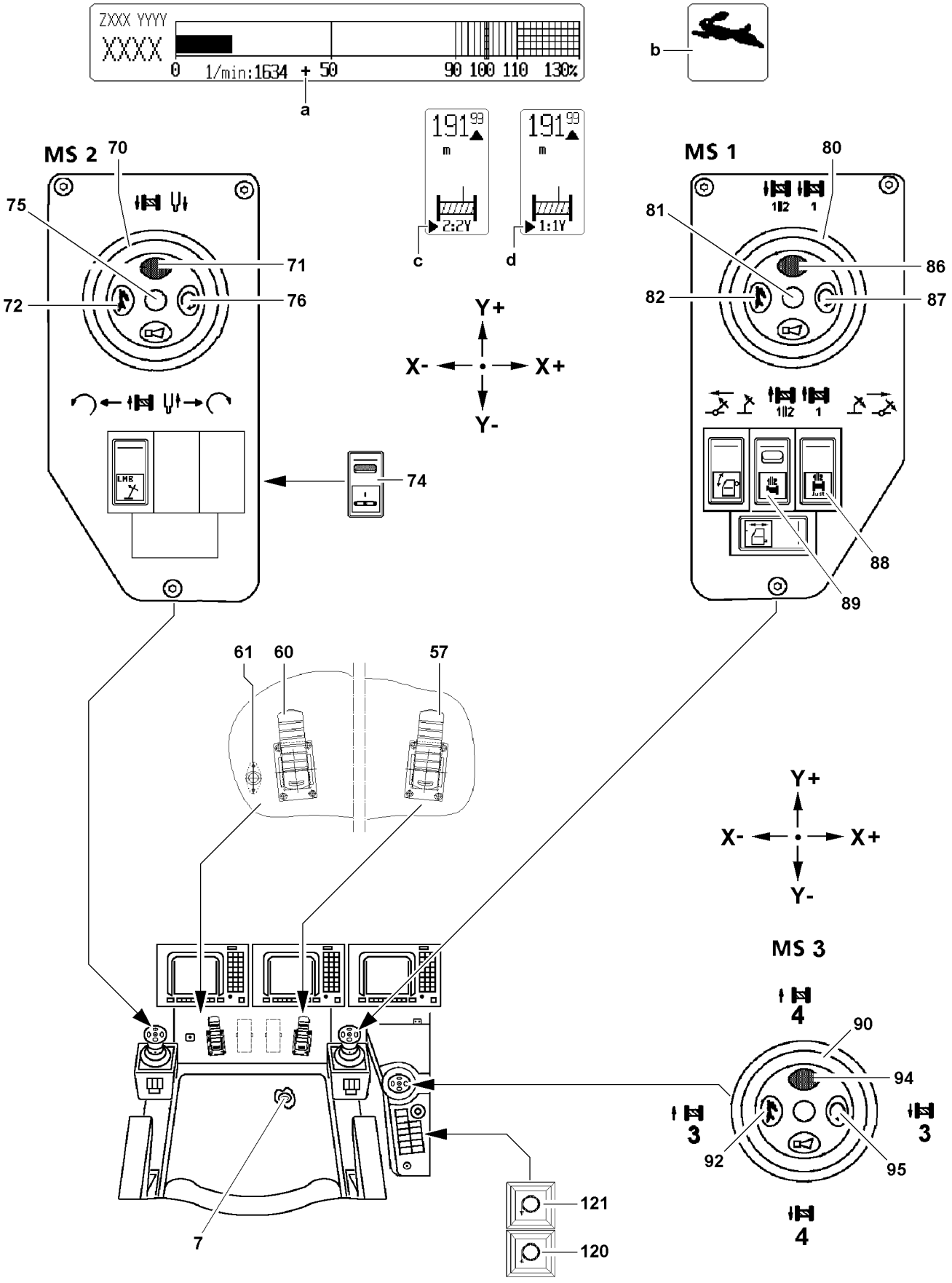

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Fig.110601

8.4 Luffing the lattice jib in operating mode SW/SDW

▶ Deflect the master switch 1 **80** in direction X-.

Result:

– The lattice jib is luffed up.

▶ Deflect the master switch 1 **80** in direction X+.

Result:

– The lattice jib is luffed down.

8.5 Luffing the lattice jib in operating mode SDWV/SLK

▶ Deflect the master switch 3 **90** in direction X-.

Result:

– The lattice jib is luffed up.

▶ Deflect the master switch 3 **90** in direction X+.

Result:

– The lattice jib is luffed down.

8.6 Luffing the derrick, for all D-operating modes

▶ Deflect master switch 3 **90** in direction Y-.

Result:

– The derrick is luffed up.

▶ Deflect master switch 3 **90** in direction Y+.

Result:

– The derrick is luffed down.

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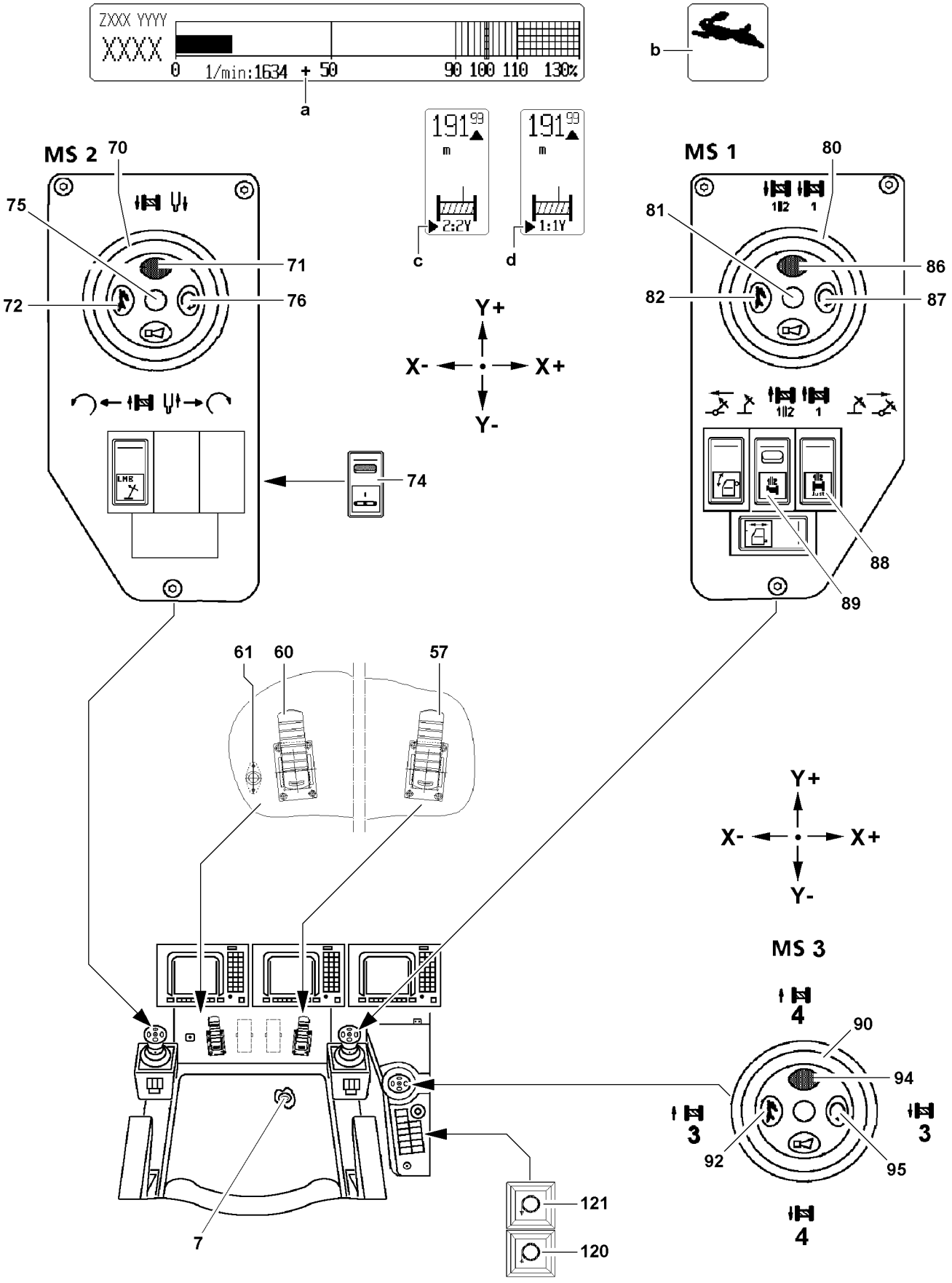

LWE/LG 1750-006/15409-07-02/en

Fig.110601

9 Running / slowing down the slewing movement with the pedal

NOTICE
Danger of property damage on the slewing ring connection!
When actuating the slewing gear brake with the pedal **60**, only part of the braking momentum of the slewing gear brake can be created.
- ▶ Use the pedal **60** to actuate the slewing gear brake only at minimum slewing speeds, which means the master switch 2 **70** is almost in zero position.
- ▶ Do not brake the turning movement of the crane by moving the master switch 2 **70** back to the neutral position and / or by abruptly applying the slewing brake with the pedal **60**.

Use the pedal **60** to actuate the slewing gear brake only in the following cases:
- Starting the slewing movement in strong side wind
- Stopping the slewing movement in strong side wind

9.1 Starting the slewing movement in strong side wind

When turning against the wind in strong side wind and with a long boom systems, then the superstructure, due to leakage in the hydraulic motor, will turn into the opposite direction, in relation to the deflection of the master switch.

This can be avoided as follows:

- ▶ Actuate the pedal **60** and deflect the master switch 2 **70** into the desired turning direction.
- ▶ Slowly release the pedal **60** until the superstructure turns in the desired turning direction.

9.2 Stopping the slewing movement in strong side wind

- ▶ Slow down the crane with master switch 2 **70** to minimum slewing speed.
- ▶ Apply the pedal **60** carefully, until the crane has come to a standstill at the desired position.

Note
- ▶ Preselection of slewing speed, see Crane operating instructions, chapter 4.02!

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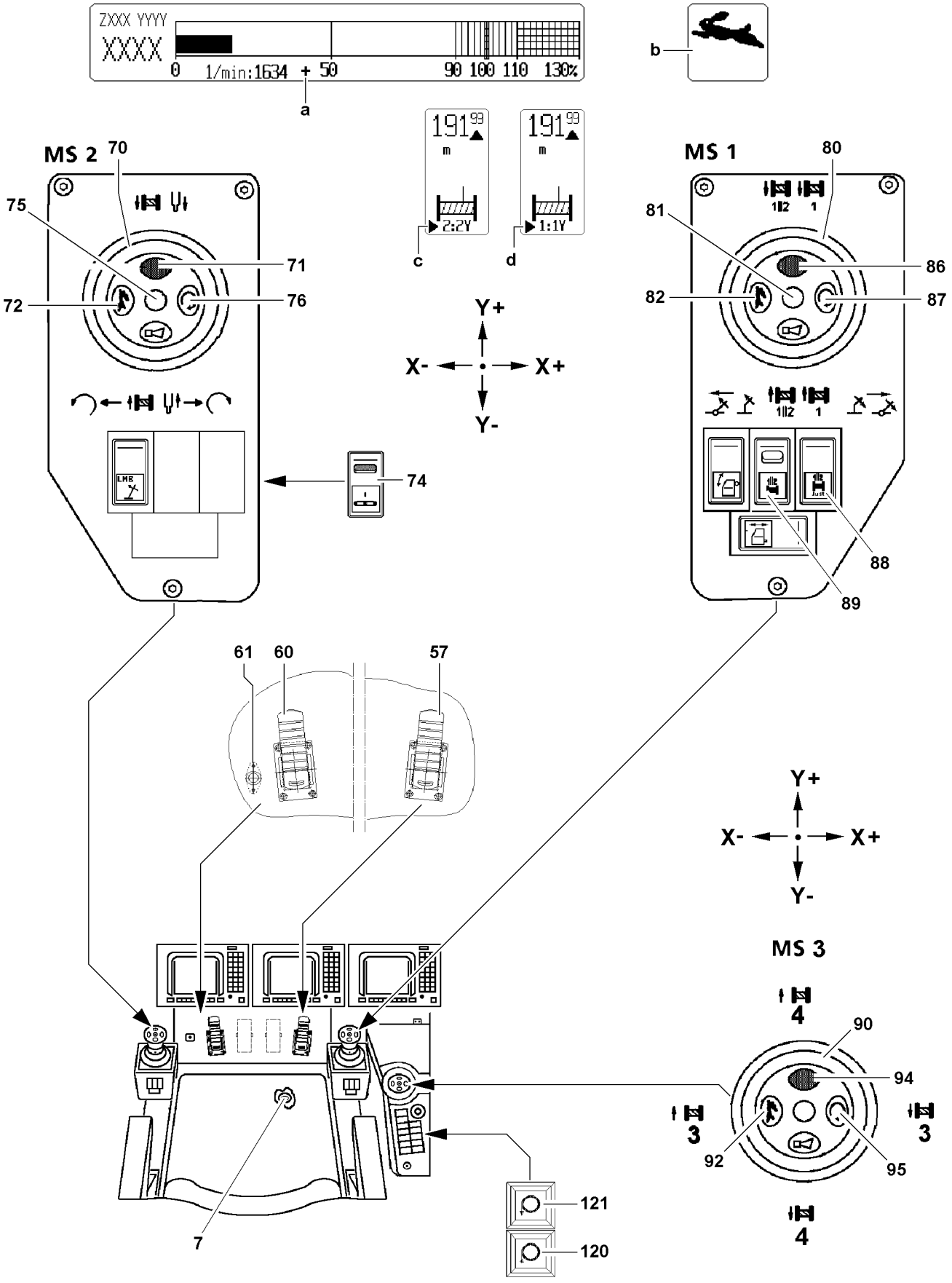

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Fig.110601

10 Switching the slewing gear to freewheeling / coasting

In order to position the boom over the load more easily, the slewing gear can be switched to freewheeling.

The master switch 2 **70** may not be deflected while doing so.

The slewing gear **cannot** be switched to coasting in these situations:
- Slewing gear shut off by the LICCON overload protection.
- Activated working range limitation.

▶ Press the foot button **61**.

Result:

– The slewing gear is switched to freewheeling / coasting.

Problem remedy
With the slewing gear released, the superstructure turns unintentionally (for example due to wind).
▶ Continue to hold the foot button **61**.
▶ Deflect the master switch 2 **70** in slewing direction and then no longer press the foot button **61**.
▶ Slow down the slewing movement by slowly resetting the master switch 2 **70**.

11 Turning the crane superstructure

WARNING
Danger of accident!
Death, severe bodily injuries, property damage.
▶ Ensure that there are no obstacles in the turning range for the crane and that there are no persons within the danger zone.
▶ Give a short warning signal (horn) before starting a crane movement.

WARNING
Danger of accident due to toppling crane!
If the slewing speed is exceeded, there is the danger that the loads start to swing.
The crane can be damaged or topple over.
Death, severe bodily injuries, property damage.
▶ Turning with a load: Initiate and slow down a turning movement extremely sensitively.
▶ Longer boom and larger load: Operate the crane with lower slewing speed.
▶ Observe and adhere to the values in the load chart manual.

The speed of the „turning“ crane movement is controlled via the deflection of master switch 2 **70** and via the pedal **57** of the engine regulation.

In the „Control Parameter“ program, it is possible to preselect the maximum rotational speed.

See Crane operating instructions, chapter 4.02.

▶ Deflect the master switch 2 **70** in direction X+.

Result:

– The crane superstructure turns to the right.

▶ Deflect the master switch 2 **70** in direction X-.

Result:

– The crane superstructure turns to the left.

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Note

▶ Preselection of slewing speed, see Crane operating instructions, chapter 4.02!

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4.06 Rope reeving

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Fig.195219

1 Wire ropes and rope end connections

1.1 Wire ropes

Check if a **rotating resistant** or a **non-rotating** rope is required for the application. The selected type of rope then requires the corresponding rope end connections, see Crane operating instructions, chapter 8.04.

Note

▶ Correct choice and use of the wire rope and the rope end connections are a decisive precondition for proper and accident-free crane operation.

DANGER

Incorrect rope type!

Danger of severe injuries to personnel and property damage.

▶ **Never** use rotation-resistant ropes with a rotating rope end connection.

▶ **Never** install a twist compensator / swivel.

1.2 Rope end connections

Rope end connections are grouped into:

– Rope end connections with locking clamp or locking cast sleeve
– The L-shaped rope end connection with locking clamp or locking cast sleeve (LR 11000 only)
– Rope end connection **without** locking clamp or locking cast sleeve

Note

▶ The locking clamp **8** is pressed on the rope.

▶ The locking cast sleeve **8** is cast with the rope.

1.2.1 Rope end connections with locking clamp or locking cast sleeve

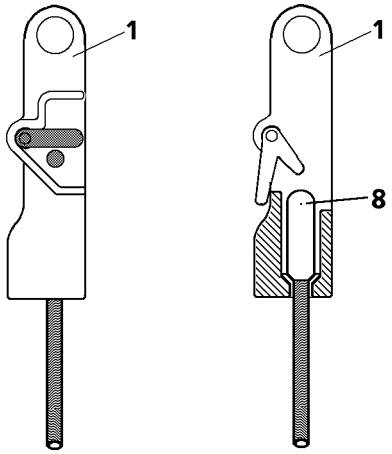

*Fig.144019: Rope end connections with locking clamp **8** or locking cast sleeve **8***

– Rope end connections **with** locking clamp **8** or locking cast sleeve **8**.
A rope end connection **1** or an L-shaped rope end connection **24** should be used for this.

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1.2.2 The L-shaped rope end connection with locking clamp or locking cast sleeve (LR 11000 only)

WARNING
Load can be ripped off!
Death, severe bodily injuries, property damage.
- ▶ The L-shaped rope end connection **24** is only permitted for use on LR 11000.
- ▶ It is prohibited to use the L-shaped rope end connection **24** on other crane types.
- ▶ Make sure that the L-shaped rope end connection is only used for **reeving with a even number of strands**.

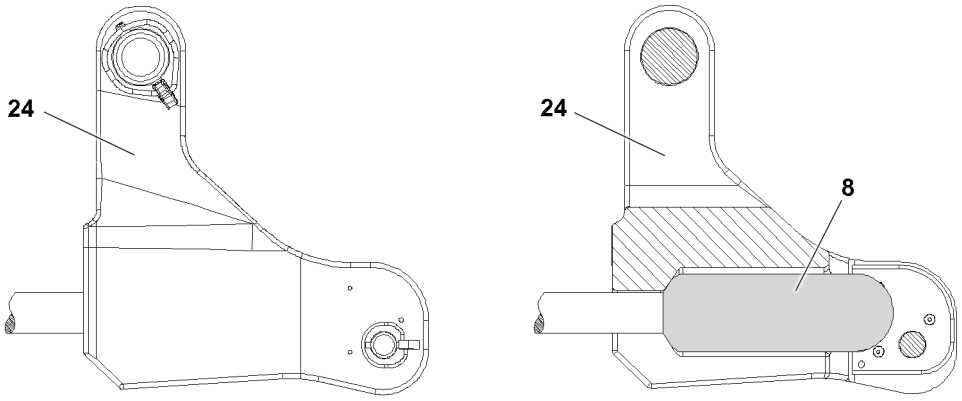

*Fig.144020: L-shaped rope end connection **24** with locking clamp **8** or locking cast sleeve **8***

– Rope end connections **with** locking clamp **8** or locking cast sleeve **8**.
An L-shaped rope end connection **24** or a rope end connection **1** should be used for this.

1.2.3 Rope end connection without locking clamp or locking cast sleeve

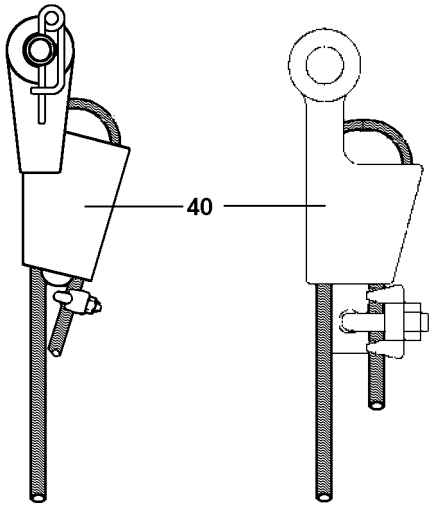

Fig.144021: Rope end connection without locking clamp or locking cast sleeve

– Rope end connections **without** locking clamp **8** or locking cast sleeve **8**.
For that, use a wedge lock **40**.

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2 Reeving in the hoist rope

WARNING
Slipping at assembly work!
Danger of falling.
Death, severe injury, property damage.
- ▶ The boom system may only be accessed if the assembly personnel is protected with suitable safety measures to prevent them from falling.
- ▶ If retaining ropes are present on the boom system, then the assembly personnel must hang an approved fall arrest system to the retaining ropes of the boom system on the left and right with both snap hooks and secure themselves to prevent them from falling.
- ▶ Without appropriate safety measures it is **strictly** prohibited to step on the boom system.
- ▶ If railings are present for the crane, then they must be brought into the corresponding position and secured for assembly / disassembly.
- ▶ Carry out all assembly work from a safe location.
- ▶ Observe the assembly guidelines in the Crane operating instructions, chapter 5.01.

Make sure that the following prerequisites are met:
- The ground is level and of sufficient load carrying capacity.
- **Only for cranes with crane support:** The crane is properly supported.
- The crane is horizontally aligned.
- The crane is ballasted according to the load chart.
- The LICCON overload protection has been set according to the load chart.
- The slewing gear brake is applied.
- The boom end section is just above the ground.

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2.1 Reeving in the hoist rope with the assembly winch

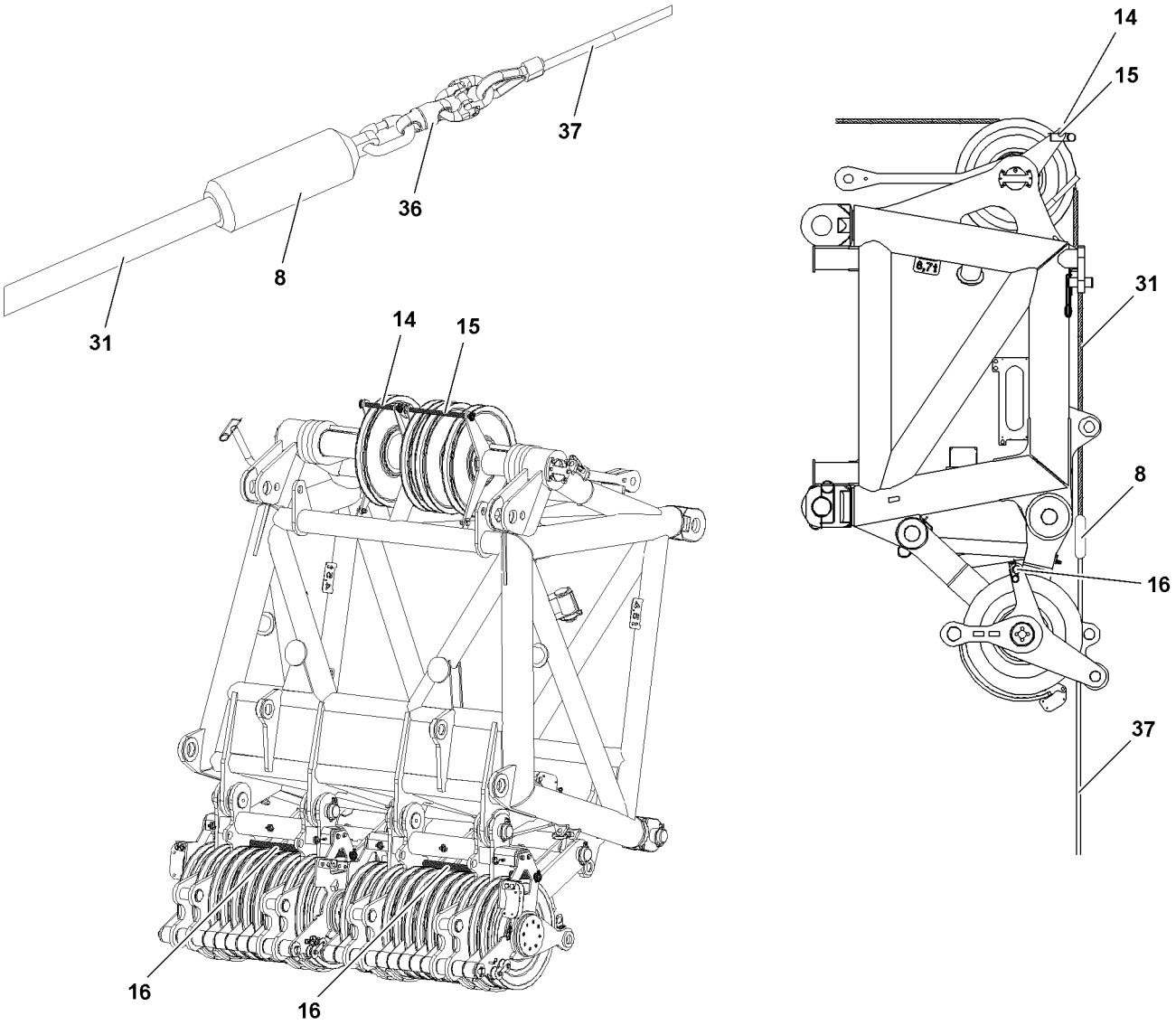

Fig.121853: Reeving in with assembly winch

- ▶ Wear approved fall arrest system and protective equipment, see Crane operating instructions, chapter 2.04.
- ▶ Bring the fall protection equipment on the crane superstructure and on the lattice boom in operating position and secure, see Crane operating instructions, chapter 2.06.
- ▶ Properly hang the fall arrest system on the intended safety ropes and / or fastening points.
- ▶ Switch the assembly winch to freewheeling.
- ▶ Remove the rope retaining pin **14**, rope retaining pin **15** and rope retaining pin **16**.
- ▶ Connect the auxiliary rope **37** with the auxiliary reeving rope (hemp rope).
- ▶ Reeve in the auxiliary rope **37** in the reverse direction between the hook block and the pulley head.
- ▶ Bring the auxiliary rope **37** with the auxiliary reeving rope (hemp rope) upward over the back pulley, which is to be reeved according to the reeving plan.
- ▶ Pull the auxiliary rope **37** to the rear to the hoist winch.
- ▶ Release the auxiliary reeving rope (hemp rope) from the auxiliary rope **37**.

When the auxiliary rope is on the hoist winch:

- ▶ Connect the auxiliary rope **37** with the hoist rope **31**: Open the connecting link **36**, connect it with the eyehook of the lock clamp **8** and close the connecting link **36**.
- ▶ Turn the freewheeling off on the assembly winch.

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NOTICE
Hoist rope tension too low!
Slack rope formation.
▶ Permit no slack rope on the hoist winch and the assembly winch.

▶ Reeve in the hoist rope **31**: Spool the hoist rope **31** from the hoist winch and simultaneously spool up the auxiliary rope **37** on the assembly winch.

When the hoist rope **31** is reeved:
▶ Release the auxiliary rope **37** from the hoist rope **31**.
▶ Spool the auxiliary rope on the assembly winch.
▶ Pin and secure the rope retaining pin **14**, rope retaining pin **15** and rope retaining pin **16**.
▶ Hang the hoist rope properly in on the rope lock, see section „Hanging the hoist rope in on the rope lock“.

When the hoist rope is properly hung in on the rope lock:
▶ Attach the hoist limit switch weight, see section „Attaching the hoist limit switch weight“.

Note
Parallel operation of winch 1 and winch 2!
▶ Repeat the above described reeving procedure with the second hoist rope.
▶ Observe the reeving plan.

3 Reeving the hook block in and out

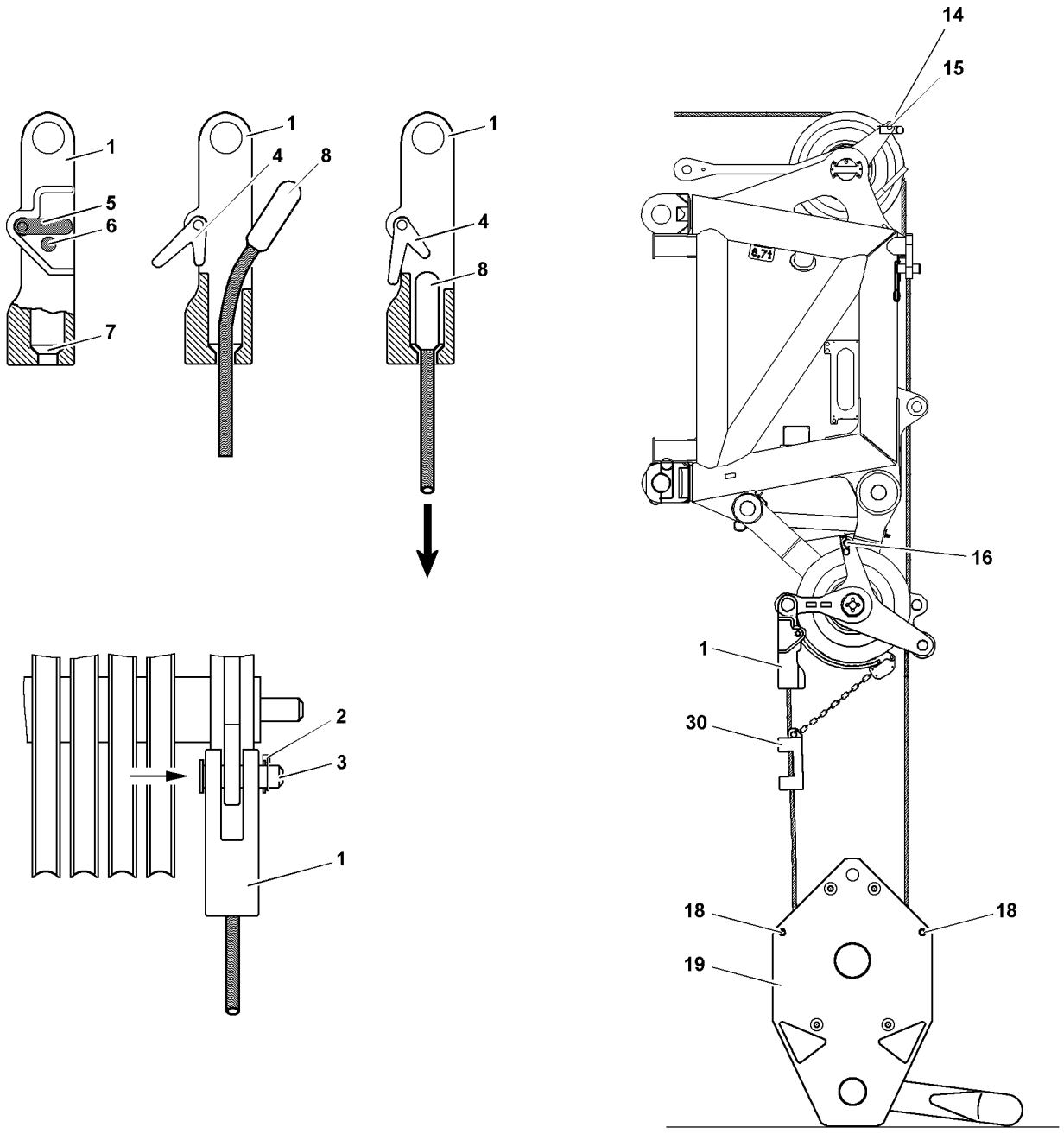

Fig.144024: Details Reeving Hook block

3.1 Reeving in the hook block

WARNING
Toppling of hook block!
If the retaining pins are **not** pinned in the roller block / the pulley blocks of the hook block before placing the hook block down, then the pulley blocks / the hook block can topple over when unreeving the hoist rope.
Death, severe injury, property damage.
▶ Pin the retaining pins, see Crane operating instructions, chapter 5.19 or separate operating instructions.

3.1.1 Preparing the hook block

Make sure that the following prerequisites are met:
– The crane is horizontally aligned.
– The slewing gear brake is applied.
– The hook block is set down on the ground properly.
– The boom is luffed down to the point where the pulley head is above the hook block.
– An assistant is present to guide the hoist rope.

WARNING
Danger of accident due to side wind!
If the slewing gear brake is released after reeving in / reeving out the hook block / the load hook, then the crane can turn uncontrolled in strong side wind.
Death, severe injury, property damage.
The crane can collide with close-by structures or objects.
▶ Make sure that the current wind speed does not exceed the values from the wind speed chart when releasing the slewing gear brake.

NOTICE
Hook block incorrectly reeved!
Damage to the hoist rope.
▶ Carry out the reeving of the hoist rope according to the reeving plan.
▶ Select the rope fixed point on the hook block is in such a way that the last strand runs parallel to the remaining rope strands, as much as possible.

▶ Set the required hook block under the boom head.
▶ At the hook block **19**, remove the spring retainers **18** for both rope retaining pins and pull them both out.

WARNING
Slipping at assembly work!
Danger of falling.
Death, severe injury, property damage.
▶ The boom system may only be accessed if the assembly personnel is protected with suitable safety measures to prevent them from falling.
▶ If retaining ropes are present on the boom system, then the assembly personnel must hang an approved fall arrest system to the retaining ropes of the boom system on the left and right with both snap hooks and secure themselves to prevent them from falling.
▶ Without appropriate safety measures it is **strictly** prohibited to step on the boom system.
▶ If railings are present for the crane, then they must be brought into the corresponding position and secured for assembly / disassembly.
▶ Carry out all assembly work from a safe location.
▶ Observe the assembly guidelines in the Crane operating instructions, chapter 5.01.

▶ Reeve the hook block.
▶ Insert the rope retaining pins again and secure with spring retainers.

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3.1.2 Hooking the hoist rope on the rope lock

NOTICE
Hoist rope is incorrectly installed!
Damage to the hoist rope.
▶ Always insert the pins **3** from „inside to outside“ and secure from the outside.

▶ The rope lock **1** must be pinned in either at the pulley head or on the hook block and secured with locking pins **2**, depending on reeving.
▶ On the rope lock **1**, push the safety pin **6** in.
▶ Swing the lever **5** „down“ and hold it in this position.

Result:

– The latch **4** is swung „downward“.

▶ Attach the rope end with the locking clamp **8** in the rope lock **1** and pull „down“ firmly (in direction of arrow), until the locking clamp **8** is touching in the cone **7**.

WARNING
Locking clamp is incorrectly installed!
Danger of accident.
Death, severe injuries, property damage.
▶ The locking clamp **8** must touch on the cone **7** after hanging it into the rope lock **1** and must be secured by the latch **4**.

▶ Release the lever **5**.

Result:

– The lever **5** returns to the initial position and is locked by the safety pin **6**.

▶ Check the rope retainer. Visual check.

3.2 Unreeving the hook block

WARNING
Toppling of hook block!
If the retaining pins are **not** pinned in the roller block / the pulley blocks of the hook block before placing the hook block down, then the pulley blocks / the hook block can topple over when unreeving the hoist rope.
Death, severe injury, property damage.
▶ Pin the retaining pins, see Crane operating instructions, chapter 5.19 or separate operating instructions.

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Make sure that the following prerequisites are met:
- The ground is level and of sufficient load carrying capacity.
- **Only for cranes with crane support:** The crane is properly supported.
- The crane is horizontally aligned.
- The crane is ballasted according to the load chart.
- The LICCON overload protection has been set according to the load chart.
- The slewing gear brake is applied.
- The boom end section is just above the ground.

WARNING
Danger of accident due to side wind!
If the slewing gear brake is released after reeving in / reeving out the hook block / the load hook, then the crane can turn uncontrolled in strong side wind.
Personnel can be severely injured or killed.
The crane can collide with close-by structures or objects.
▶ Make sure that the current wind speed does not exceed the values from the wind speed chart when releasing the slewing gear brake.

3.2.1 Lowering the hook block

WARNING
Crushing of hands!
When unreeving the hook block, it can topple over.
Death, severe injury, property damage.
▶ Use the handles in the safe area of the hook block.
▶ Make sure the hook block is safely positioned.

▶ Lower the hook block and set it on the ground.
▶ Remove the hoist limit switch weight.

3.2.2 Detaching the hoist rope

▶ On the rope lock **1**, push the safety pin **6** in.
▶ Swing the lever **5** „down“ and hold it in this position.

Result:

- The latch **4** is swung downward.
- The locking clamp **8** is released.

▶ Push the hoist rope up and detach the locking clamp **8**.
▶ Release and unpin the rope retaining pin on the hook block.
▶ Unreeve the hoist rope from the hook block and the pulley head.
▶ Insert the rope retaining pins again and secure with spring retainers.

4 Reeving in / reeving out the hook block, L-shaped rope end connection (LR 11000 only)

WARNING
Load can be ripped off!
Death, severe bodily injuries, property damage.
▶ The L-shaped rope end connection **24** is only permitted for use on LR 11000.
▶ It is prohibited to use the L-shaped rope end connection **24** on other crane types.
▶ Make sure that the L-shaped rope end connection is only used for **reeving with a even number of strands**.

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Depending on the number of rope strands, with the even reeving of the hook block, the L-shaped rope end connection must be installed on one of the pin points (pin point **P1** to pin point **P4**) on the roller set / roller sets.

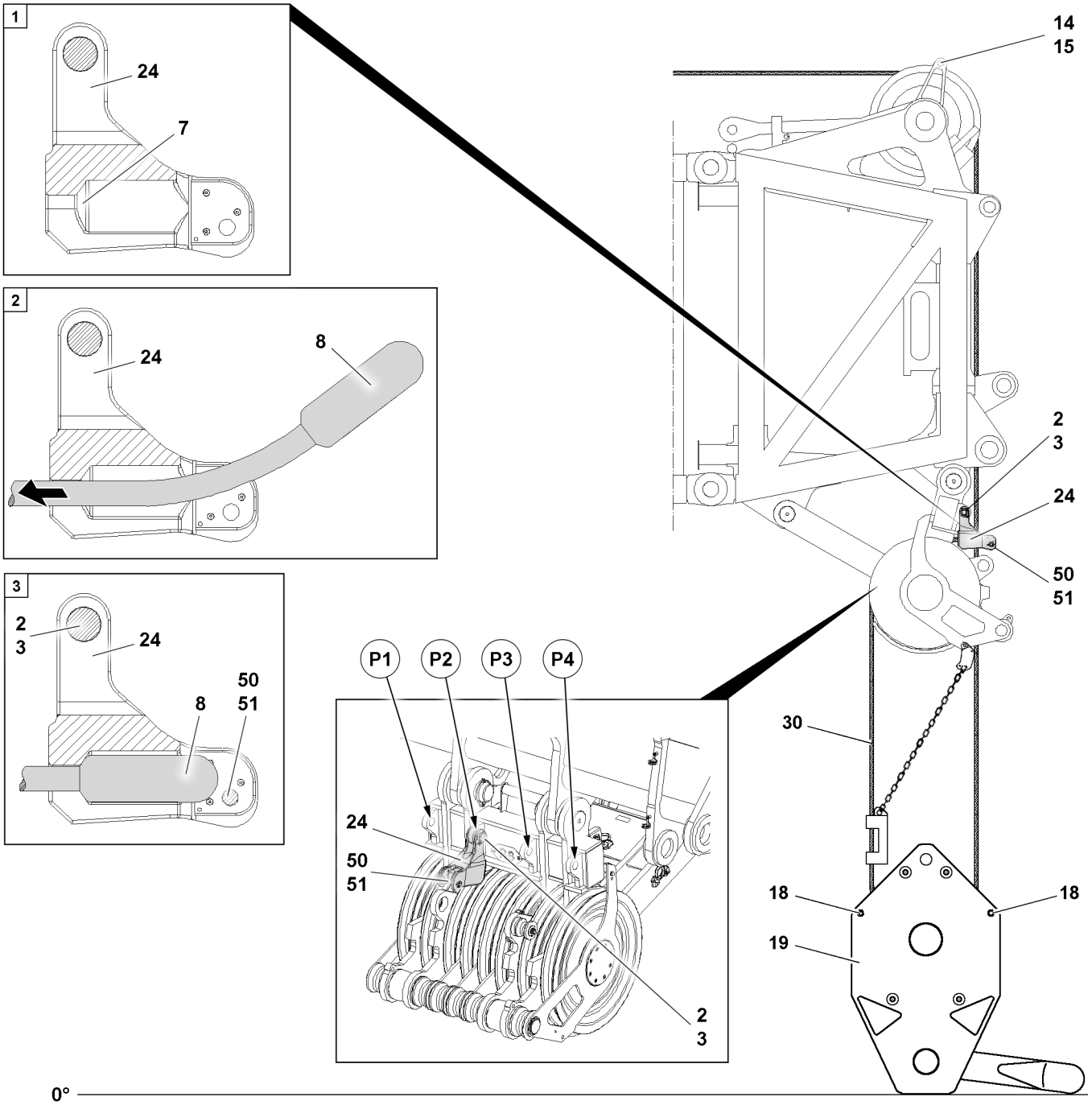

*Fig.144022: Details reeving hook block, L-shaped rope end connection **24***

4.1 Reeving in the hook block

WARNING
Toppling of hook block!
If the retaining pins are **not** pinned in the roller block / the pulley blocks of the hook block before placing the hook block down, then the pulley blocks / the hook block can topple over when unreeving the hoist rope.
Death, severe injury, property damage.
▶ Pin the retaining pins, see Crane operating instructions, chapter 5.19 or separate operating instructions.

4.1.1 Preparing the hook block

Make sure that the following prerequisites are met:
– The crane is horizontally aligned.
– The slewing gear brake is applied.
– The hook block is set down on the ground properly.
– The boom is luffed down to the point where the pulley head is above the hook block.
– An assistant is present to guide the hoist rope.

WARNING
Danger of accident due to side wind!
If the slewing gear brake is released after reeving in / reeving out the hook block / the load hook, then the crane can turn uncontrolled in strong side wind.
Death, severe injury, property damage.
The crane can collide with close-by structures or objects.
▶ Make sure that the current wind speed does not exceed the values from the wind speed chart when releasing the slewing gear brake.

NOTICE
Hook block incorrectly reeved!
Damage to the hoist rope.
▶ Carry out the reeving of the hoist rope according to the reeving plan.
▶ Select the rope fixed point on the hook block is in such a way that the last strand runs parallel to the remaining rope strands, as much as possible.

▶ Set the required hook block under the boom head.
▶ At the hook block **19**, remove the spring retainers **18** for both rope retaining pins and pull them both out.

WARNING
Slipping at assembly work!
Danger of falling.
Death, severe injury, property damage.
▶ The boom system may only be accessed if the assembly personnel is protected with suitable safety measures to prevent them from falling.
▶ If retaining ropes are present on the boom system, then the assembly personnel must hang an approved fall arrest system to the retaining ropes of the boom system on the left and right with both snap hooks and secure themselves to prevent them from falling.
▶ Without appropriate safety measures it is **strictly** prohibited to step on the boom system.
▶ If railings are present for the crane, then they must be brought into the corresponding position and secured for assembly / disassembly.
▶ Carry out all assembly work from a safe location.
▶ Observe the assembly guidelines in the Crane operating instructions, chapter 5.01.

▶ Reeve the hook block.
▶ Insert the rope retaining pins again and secure with spring retainers.

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4.1.2 Fitting the hoist rope on the rope lock, L-shaped rope end connection

NOTICE
Hoist rope is incorrectly installed!
Damage to the hoist rope.
▶ Always insert the pins **50** from „inside to outside“ and secure from the outside.

▶ Only pin the rope lock **24** on the roller set / roller sets and secure with a locking pin **2**.
▶ On the rope lock **24**, release and unpin the retaining pin **50**.
▶ Fit the rope end with the locking clamp **8** in the rope lock **24** and pull the rope firmly in the direction of the arrow, until the locking clamp **8** contacts the cone **7**.

WARNING
Locking clamp is incorrectly installed!
Danger of accident.
Death, severe injuries, property damage.
▶ The locking clamp **8** must touch on the cone **7** after fitting it into the rope lock **24** and must be secured by the retaining pin **50**.

▶ Insert the retaining pin **50** and secure properly with the retaining element **51**.
▶ Check the rope retainer. Visual check.

4.2 Unreeving the hook block

WARNING
Toppling of hook block!
If the retaining pins are **not** pinned in the roller block / the pulley blocks of the hook block before placing the hook block down, then the pulley blocks / the hook block can topple over when unreeving the hoist rope.
Death, severe injury, property damage.
▶ Pin the retaining pins, see Crane operating instructions, chapter 5.19 or separate operating instructions.

Make sure that the following prerequisites are met:
– The ground is level and of sufficient load bearing capacity.
– **Only for cranes with crane support:** The crane is properly supported.
– The crane is horizontally aligned.
– The crane is ballasted according to the load chart.
– The LICCON overload protection has been set according to the load chart.
– The slewing gear brake is applied.
– The boom end section is just above the ground.

WARNING
Danger of accident due to side wind!
If the slewing gear brake is released after reeving in / reeving out the hook block / the load hook, then the crane can turn uncontrolled in strong side wind.
Personnel can be severely injured or killed.
The crane can collide with close-by structures or objects.
▶ Make sure that the current wind speed does not exceed the values from the wind speed chart when releasing the slewing gear brake.

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4.2.1 Lowering the hook block

WARNING
Crushing of hands!
When unreeving the hook block, it can topple over.
Death, severe injury, property damage.
- ▶ Use the handles in the safe area of the hook block.
- ▶ Make sure the hook block is safely positioned.

- ▶ Lower the hook block and set it on the ground.
- ▶ Remove the hoist limit switch weight.

4.2.2 Detaching the hoist rope

- ▶ On the rope lock **24**, release and unpin the retaining pin **50**.

Result:

– The locking clamp **8** is released.

- ▶ Push the hoist rope forward and detach the locking clamp **8**.
- ▶ Release and unpin the rope retaining pin on the hook block.
- ▶ Unreeve the hoist rope from the hook block and the pulley head.
- ▶ Insert the rope retaining pins again and secure with spring retainers.

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5 Attaching and removing the load hook*

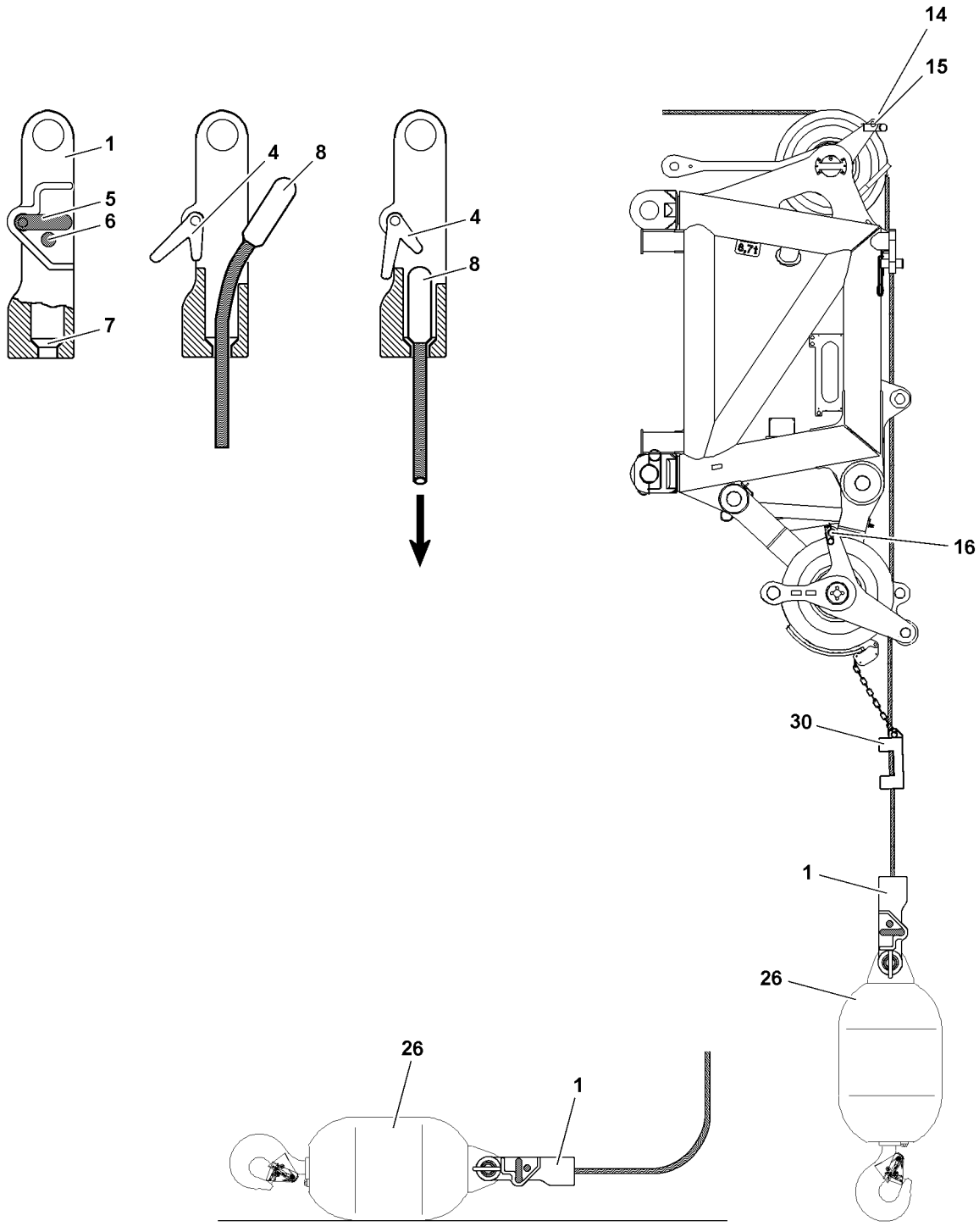

Fig.121854: Fastening load hook

5.1 Fastening the load hook*

5.1.1 Assembling the load hook*

- ▶ Place the load hook under the pulley head of the boom.
- ▶ Release and unpin the rope retaining pins on the back pulley and on the pulley head.

WARNING
Slipping at assembly work!
Danger of falling.
Death, severe injury, property damage.
- ▶ The boom system may only be accessed if the assembly personnel is protected with suitable safety measures to prevent them from falling.
- ▶ If retaining ropes are present on the boom system, then the assembly personnel must hang an approved fall arrest system to the retaining ropes of the boom system on the left and right with both snap hooks and secure themselves to prevent them from falling.
- ▶ Without appropriate safety measures it is **strictly** prohibited to step on the boom system.
- ▶ If railings are present for the crane, then they must be brought into the corresponding position and secured for assembly / disassembly.
- ▶ Carry out all assembly work from a safe location.
- ▶ Observe the assembly guidelines in the Crane operating instructions, chapter 5.01.

- ▶ Place the hoist rope over the back pulley on the boom head.
- ▶ Insert the rope retaining pins again and secure with spring retainers.
- ▶ Pin the rope lock **1** in the load hook **26** and secure with spring retainers.

5.1.2 Fastening the hoist rope

Make sure that the following prerequisites are met:
- The crane is horizontally aligned.
- The slewing gear brake is applied.
- The hook block is set down on the ground properly.
- The boom is luffed down to the point where the pulley head is above the hook block.
- An assistant is present to guide the hoist rope.

WARNING
Danger of accident due to side wind!
If the slewing gear brake is released after reeving in / reeving out the hook block / the load hook, then the crane can turn uncontrolled in strong side wind.
Personnel can be severely injured or killed.
The crane can collide with close-by structures or objects.
- ▶ Make sure that the current wind speed does not exceed the values from the wind speed chart when releasing the slewing gear brake.

- ▶ On the rope lock **1**, push the safety pin **6** in.
- ▶ Swing the lever **5** „down“ and hold it in this position.

Result:

- The latch **4** is swung „downward“.

- ▶ Attach the rope end with the locking clamp **8** in the rope lock and pull „down“ firmly (in direction of arrow), until the locking clamp **8** is touching in the cone **7**.

WARNING
Locking clamp is incorrectly fastened!
Damage to locking clamp.
Death, severe injuries, property damage
- ▶ The locking clamp **8** must touch on the cone **7** after hanging it into the rope lock **1** and must be secured by the latch **4**.

- ▶ Release the lever **5**.

Result:

- The lever **5** returns to the initial position and is locked by the safety pin **6**.

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5.2 Removing the load hook*

Make sure that the following prerequisites are met:
- The ground is level and of sufficient load carrying capacity.
- **Only for cranes with crane support:** The crane is properly supported.
- The crane is horizontally aligned.
- The slewing gear brake is applied.
- The load hook is prepared for assembly.
- An assistant is present to guide the hoist rope.

5.2.1 Lowering the load hook

WARNING
Crushing of hands!
When unreeving the hook block, it can topple over.
Death, severe injury, property damage.
▶ Use the handles in the safe area of the hook block.
▶ Make sure the hook block is safely positioned.

▶ Place the load hook **26** on the ground.
▶ Remove the hoist limit switch weight.

5.2.2 Detaching the hoist rope

WARNING
Danger of accident due to side wind!
If the slewing gear brake is released after reeving in / reeving out the hook block / the load hook, then the crane can turn uncontrolled in strong side wind.
Death, severe injury, property damage.
The crane can collide with close-by structures or objects.
▶ Make sure that the current wind speed does not exceed the values from the wind speed chart when releasing the slewing gear brake.

▶ On the rope lock **1**, push the safety pin **6** in.
▶ Swing the lever **5** „down“ and hold it in this position.

Result:

- The latch **4** is swung „downward“.
- The locking clamp **8** is released.

▶ Push the hoist rope in the direction of the load hook and detach the locking clamp **8**.
▶ Remove the rope retaining pins on the pulley head and on the back pulley.
▶ Lift the hoist rope from the rope pulleys.
▶ Insert the rope retaining pins again and secure with spring retainers.

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6 Attaching / removing the hoist limit switch weight

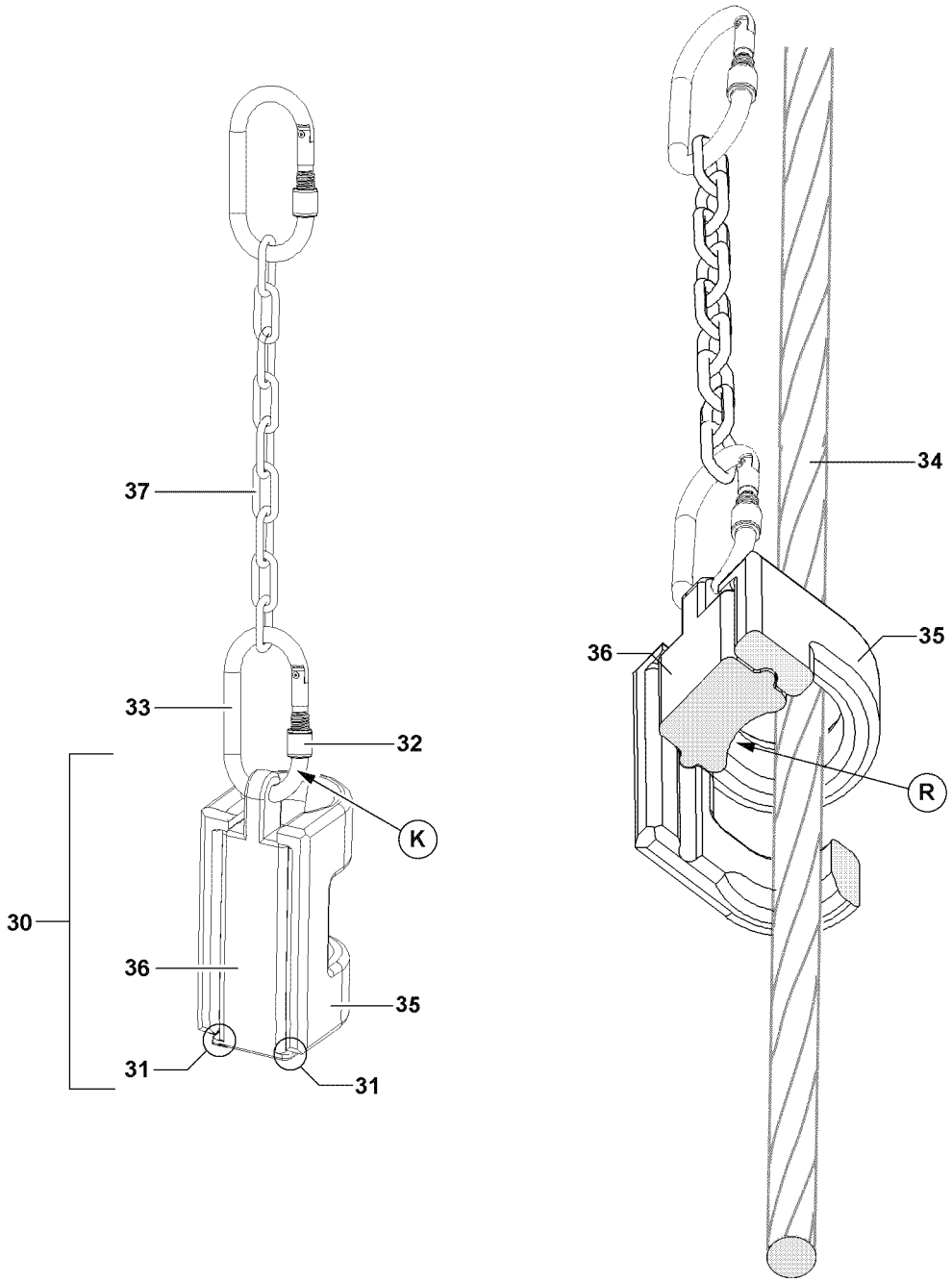

Fig.122728: Details Hoist limit switch weight

6.1 Attaching the hoist limit switch weight

The hoist limit switch weight **30** consists of two parts, which are pushed into each other:
- The weight **35**
- The carrier section **36**

▶ Loosen and open the screw retainer **32**.

WARNING
Hoist limit switch weight is incorrectly installed!
Hoist limit switch weight can fall down. Death, severe injuries.
- ▶ Do not replace the snap hook **33** with other parts, such as a shackle or similar.
- ▶ When detaching or attaching the hoist limit switch weight **30** make sure that the weight **35** and the carrier section **36** do not fall down.
- ▶ Make sure that the curvature **R** of the carrier section **36** points to the hoist rope **34**.
- ▶ Make sure that the noses **31** of the carrier section **36** is placed on the weight **35**.
- ▶ Make sure that the screw retainer **32** can be turned to be closed from top to bottom, point **K**.

The attachment of the hoist limit switch weight **30** depends on the position of the rope fixed point.

Rope fixed point on the pulley head:
– In the event of multiple hoist rope reeving, the hoist limit switch weight **30** must always be laid around the „stationary rope strand“, in other words around the rope strand that leads directly to the cable lock.

Rope fixed point on hook block:
– The hoist limit switch weight **30** is laid around the outer strand which shows the least angular pull, i.e. the one with the smallest angle between the hanging hoist limit switch weight and the hoist rope.

Note
- ▶ The chain **37** must be attached in full length during crane operation and may not be shortened.

- ▶ Push the weight **35** with one hand on the hoist rope **34** and hold.
- ▶ With the other hand, guide the carrier section **36** behind the hoist rope **34** and under the weight **35**. The curvature **R** of the carrier section **36** must point to the hoist rope **34**.
- ▶ Push the weight **35** on the carrier section **36**.
- ▶ Hang in the hoist limit switch weight **30** with the carrier section **36** in the snap hook **33**.

The snap hook **33** must be secured with the screw retainer **32**.

- ▶ Screw the screw retainer **32** closed on the snap hook **33**.

6.2 Removing the hoist limit switch weight

WARNING
Hoist limit switch weight is incorrectly installed!
Hoist limit switch weight can fall down. Death, severe injuries.
- ▶ When detaching or attaching the hoist limit switch weight **30** make sure that the weight **35** and the carrier section **36** do not fall down.
- ▶ It is prohibited to remain within the danger zone.

- ▶ Release and open the screw retainer **32** on the snap hook **33**.
- ▶ Detach the hoist limit switch weight **30** from the snap hook **33**.
- ▶ Hold the weight **35** with one hand and with the other hand, push the carrier section **36** from the weight **35**.
- ▶ Store the weight **35** and carrier section **36** safely.

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7 Assembling / disassembling the wedge lock

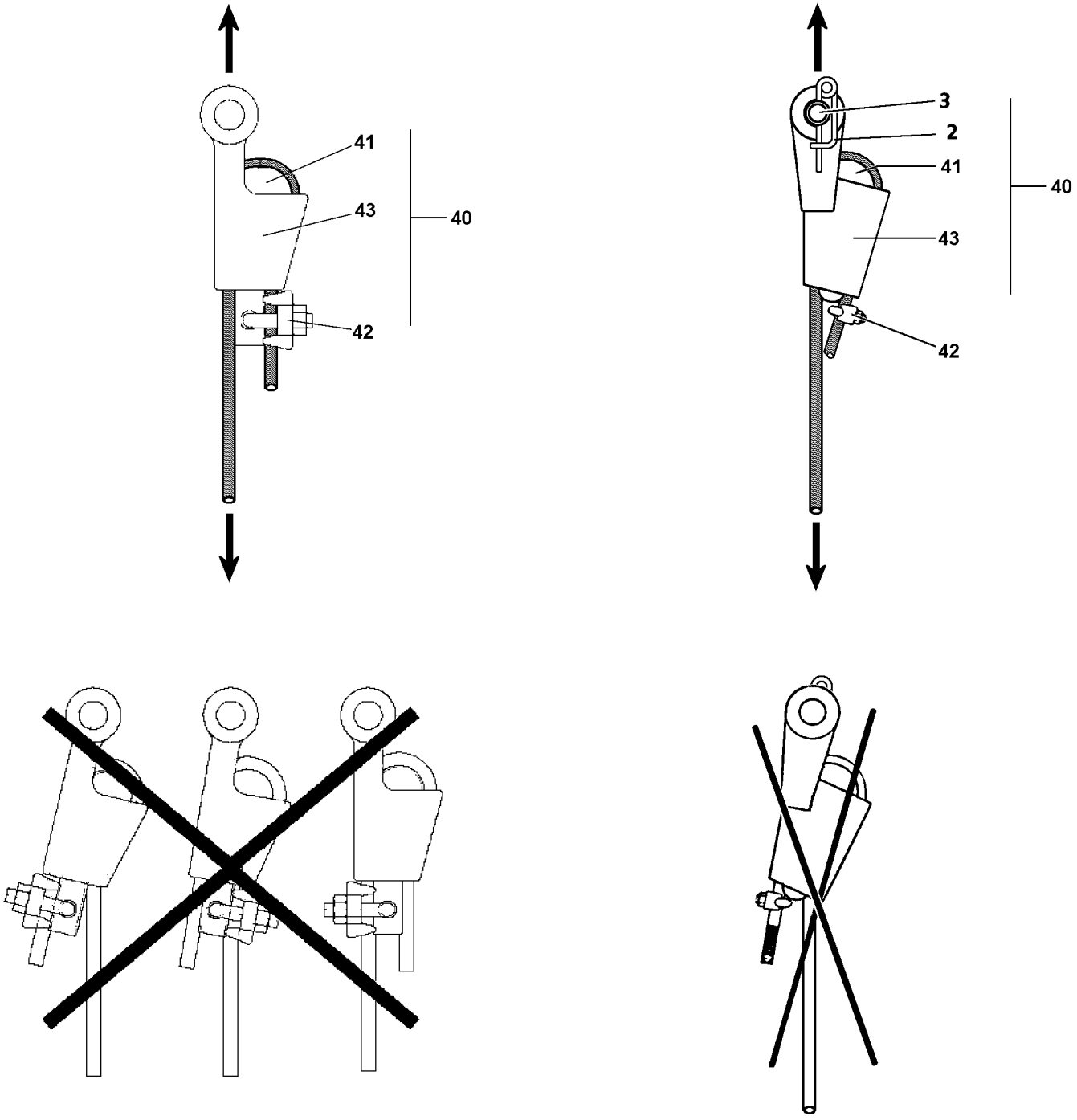

Fig.122729: Wedge lock

Make sure that the following prerequisites are met:
- The rope clamp is cut off on the hoist rope.
- The hook block or the load hook is ready for assembly.

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7.1 Installing the wedge lock

WARNING
Wedge lock is incorrectly installed!
Hook block or load can fall down. Death, severe injuries, property damage.
- ▶ Use only a wedge lock **40** approved by Liebherr-Werk Ehingen.
- ▶ Install the wedge lock **40** correctly.
- ▶ Place the hoist rope with the wedge **41** into the housing **43** in such a way that the rope strand runs in the pull axle of the wedge lock **40**.
- ▶ The dead end of the rope must be secured by the clamp **42** to prevent it from being pulled through.
- ▶ It is prohibited for personnel to remain in the danger zone.

- ▶ Take a matching wedge lock **40** from the tool box.
- ▶ Place the hoist rope with the wedge **41** into the housing **43**.
- ▶ If possible, assemble the clamp **42** through the wedge **41** on the dead end of the rope.

NOTICE
Damage to the hoist rope!
If the pin **3** has been assembled incorrectly, the hoist rope may rub against the pin **3** or on the linch pin **2**.
- ▶ Always insert the pins **3** from „inside to outside“ and secure from the outside.

- ▶ Pin and secure the wedge lock **40** on the fixed point of the pulley head or on the fixed point of the hook block or on the load hook, depending on the reeving plan.

7.2 Removing the wedge lock

- ▶ Unpin the wedge lock **40** on the fixed point.
- ▶ Remove the clamp **42** and pull the hoist rope with the wedge from the housing.
- ▶ Store the wedge lock **40**.

8 Rope reeving

Note
- ▶ See separate reeving plans.

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4.07 Counterweight

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Fig.195219

1 Component overview

The ballast installed on the turntable is generally referred to as the counterweight.

The components are marked with their own weight.

Description of the **turntable extension**, see chapter 4.07.10.

Dimensions and weights, see chapter 1.03.

1.1 Counterweight

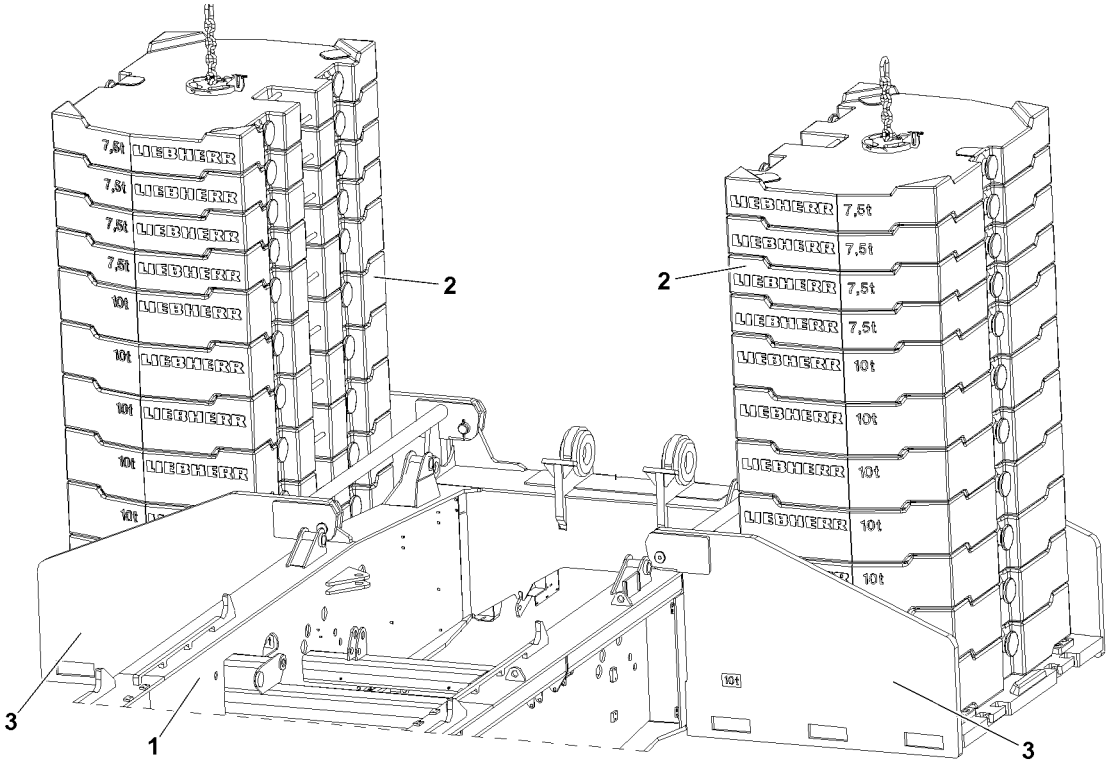

Fig.145391: Component overview counterweight

1 Turntable
2 Counterweight plates
3 Counterweight bracket

1.2 Counterweight plates

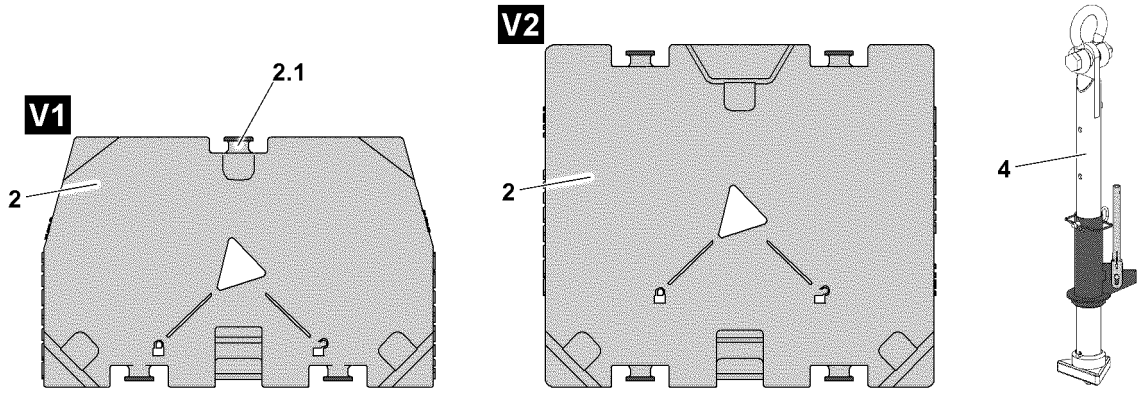

Fig.145394: Counterweight plates

2 Counterweight plates
2.1 Bitt
4 Receptacle stud

Counterweight plates are available in variation **V1** and variation **V2**:

Component	Weight
Variation **V1**	5.0 t 7.5 t 10.0 t
Variation **V2**	12.5 t

2 Fastening points

WARNING
Danger of falling!
Death, severe bodily injuries, property damage.
- ▶ Make sure that the fastening equipment is properly fastened on the fastening points.
- ▶ Make sure that the fastening equipment has a sufficient length.
- ▶ Make sure that there are no persons or obstacles within the danger zone.
- ▶ Pay attention to the labels of the fastening points.

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2.1 Counterweight bracket

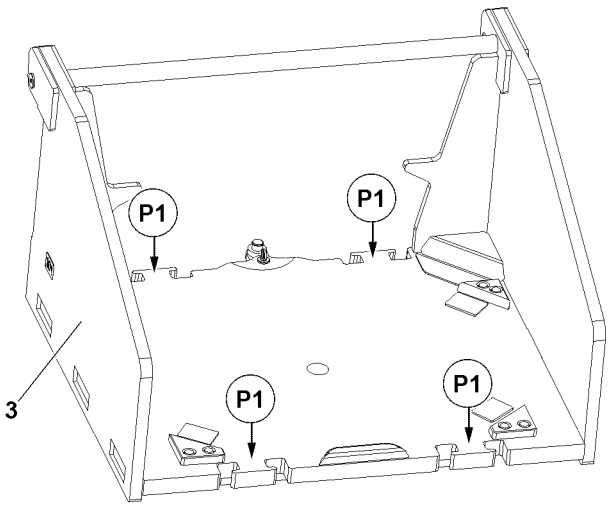

Fig.145392: Fastening points Counterweight bracket

Fastening points	
P1	Counterweight bracket

2.2 Counterweight plates

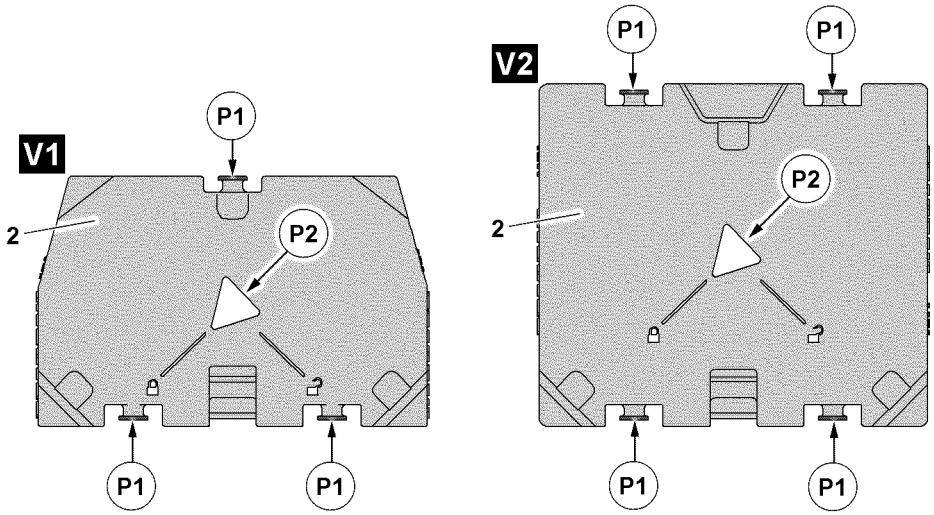

Fig.145393: Fastening points Counterweight plates

„Bitt“ fastening system	
P1	Counterweight plates variation V1 and V2

„Twistlock“ fastening system (with help of the receptacle stud)	
P2	Counterweight plates variation V1 and V2

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3 Permissible counterweight assemblies

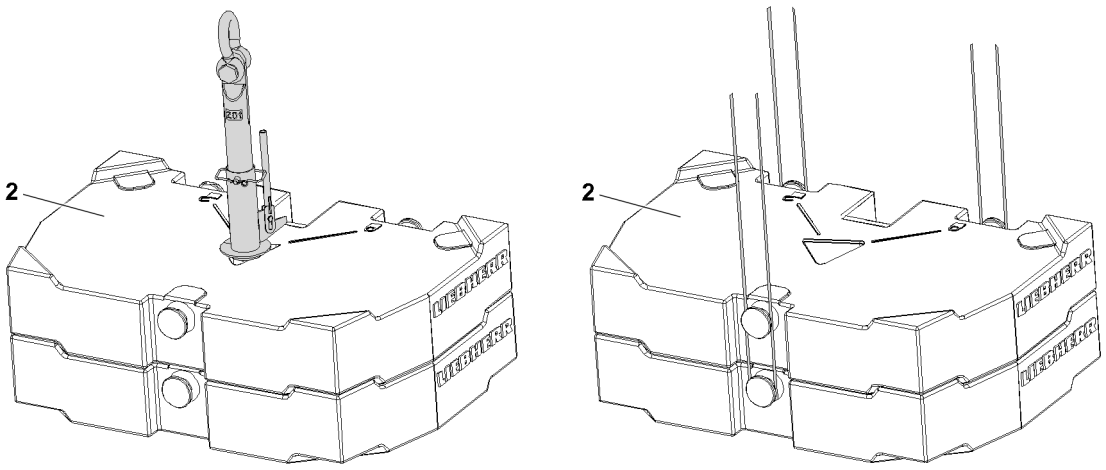

Fig.147047: Example of a counterweight assembly

WARNING
Overload of fastening points counterweight plates!
If more than the permissible number of counterweight plates are lifted together, then the bitt or the receptacle stud can be overloaded.
The counterweight plates and components can fall down.
Death, severe bodily injuries, property damage.
▶ Fasten only the maximum permissible number of counterweight plates per lift.

WARNING
Incorrect structure of counterweight assemblies!
When lifting mixed weight counterweight assemblies, and the heavier counterweight plates are placed on top, the fastening points can be overloaded.
The counterweight plates and components can fall down.
Death, severe bodily injuries, property damage.
▶ Always stack the heavier counterweight plate on the bottom in the counterweight assembly.

Individual weight Counterweight plate	Maximum number of same counterweight plates per lift over	
	„Twistlock“	„Bitt“
5.0 t	2	1
7.5 t	2	2
10.0 t	2	2
12.5 t	1	2

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4 Installing the counterweight

WARNING
Danger of falling!
During assembly / disassembly, inspection and maintenance work, personnel must be secured with appropriate aids to prevent them from falling.
If this is not observed, assembly personnel could fall and be killed or seriously injured.
- ▶ All work at a height, when there is a danger of falling, must be carried out with suitable aids.
- ▶ If aids are not available and work cannot be carried out from the ground, then the assembly personnel must secure themselves with the supplied fall arrest system to prevent falling, see the Crane operating instructions, chapter 2.04.
- ▶ If fall protection equipment is available, then it must be used, see the Crane operating instructions, chapter 2.06.
- ▶ When lifting, lowering, swinging crane parts in and out, no persons may remain in the danger zone.
- ▶ If railings are present on the components, then they must be brought into the corresponding position and secured for assembly / disassembly work.
- ▶ Only step on the aids, ladders and catwalks with clean shoes.
- ▶ Keep aids, ladders and catwalks free of heavy dirt, snow and ice.
- ▶ During all assembly and disassembly work, maintenance work and inspections, travel or crane operation is prohibited.
- ▶ Remaining on a suspended load is prohibited.
- ▶ Stepping or walking on crane components and lattice sections, which have an incline of more than 20° is prohibited.
- ▶ For all assembly work, the crane operator of the main crane must be in voice contact with the crane operator / crane operators of the auxiliary crane / auxiliary cranes.
- ▶ For assembly / disassembly tasks, the crane operator may only initiate crane movements when the responsible guide has explicitly released the movement.

WARNING
Danger of impact / crushing!
When installing / removing crane components with the auxiliary crane, crane components can start to swing back and forth.
When lifting / lowering and positioning crane components, there is an increased danger of impacts / crushing.
Personnel can be caught and severely injured or killed.
- ▶ Make sure that personnel cannot be caught by components.
- ▶ When working in danger zones: Use aids to protect limbs.
- ▶ Guide components with suitable aids to minimize oscillation.

DANGER
The components can fall down!
If the corresponding components are disengaged from the auxiliary crane before the corresponding component is pinned, the corresponding component can fall down and fatally injure personnel.
- ▶ Do not disengage the auxiliary crane until the respective component is pinned and secured.

WARNING
The crane can topple over!
If the turntable with installed counterweight is turned without the boom installed, then the crane can topple over.
Death, severe bodily injuries, property damage.
- ▶ Always leave the turntable with an installed counterweight and without a boom in travel position.

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Make sure that the following prerequisites for **LR 1750** are met:
- The crane is horizontally aligned.
- The turntable is positioned in the „travel direction“ (parallel to the crawler travel gear).
- The central ballast is properly installed.
- The SA-frame is erected.
- The boom is not assembled.
- An auxiliary crane is available.

Make sure that the following prerequisites for **LG 1750** are met:
- The crane is properly supported.
- The crane is horizontally aligned.
- The turntable is positioned in „travel direction“ (parallel to the travel gear).
- The SA-frame is erected.
- The boom is not assembled.
- An auxiliary crane is available.

4.1 Assembling the counterweight brackets

Note

▶ The assembly / disassembly of the counterweight brackets is explained on a counterweight bracket as an example.

Make sure that the following prerequisite is met:
- The pins **6** on the counterweight bracket are inserted and secured with the retaining element **7**.

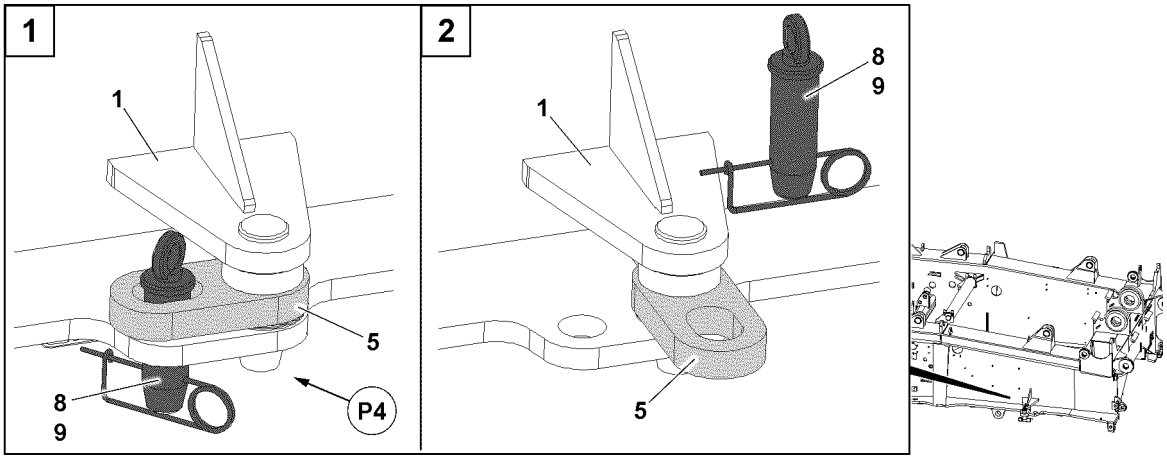

Fig.145398: Swinging the bracket

▶ Remove the retaining element **9** at point **P4** and unpin the pin **8**.
▶ Swing the bracket **5**.

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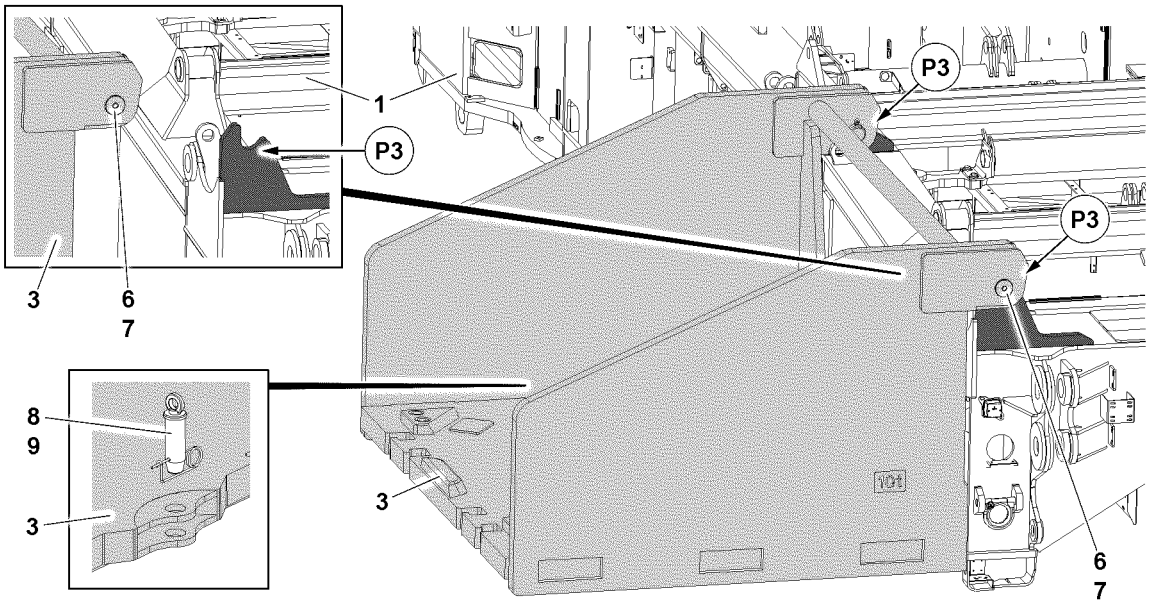

Fig.145396: Hanging the counterweight brackets

- ▶ Fasten the counterweight bracket **3** to the auxiliary crane.
- ▶ Hang the counterweight bracket **3** with the auxiliary crane on points **P3** on the side on the turntable **1**.

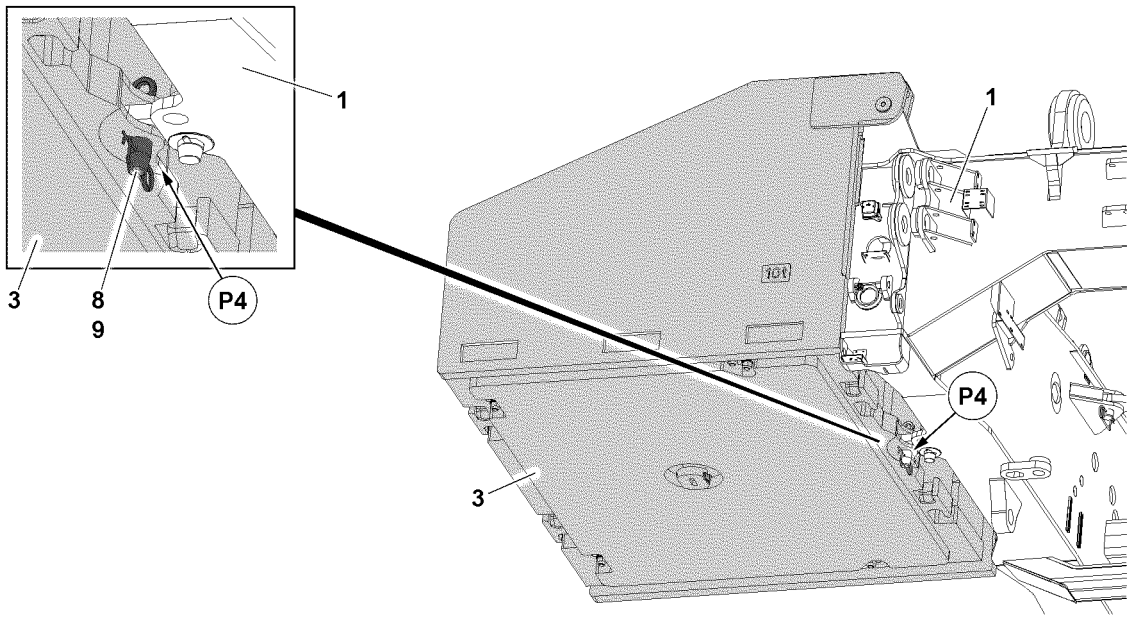

Fig.145397: Pinning the counterweight brackets

- ▶ Pin the counterweight bracket **3** on the turntable **1**: Insert the pin **8** on point **P4** and secure with the retaining element **9**.
- ▶ Release and remove the fastening equipment.
- ▶ Properly assemble the second counterweight bracket.

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4.2 Placing the counterweight plates

WARNING
Damaged counterweight plates!
Damage on the counterweight plates can cause the fastening equipment to release.
The counterweight plates and components can fall down.
Death, severe bodily injuries, property damage.
▶ Do not use damaged counterweight plates and replace them immediately.

WARNING
Impermissible combination of counterweight plates!
Combining counterweight plates of variation **V1** and variation **V2** creates instability in the counterweight stack.
The counterweight plates can tip from the counterweight brackets and cause the crane to topple over.
Death, severe bodily injuries, property damage.
▶ **Only** counterweight plates of the same variation may be stacked on each other.

WARNING
Counterweight too low / too high!
If the placed counterweight deviates from the specified data in the load charts or the assembly condition, then the crane can be damaged or topple over.
The maximum counterweight is 250 t.
Death, severe bodily injuries, property damage.
▶ Place the counterweight according to the data in the load chart.
▶ Before placing the counterweight plates, observe the maximum permissible counterweight depending on the assembly conditions, see chapter 3.06.

WARNING
Asymmetrical counterweight distribution!
If more than 20 t are asymmetrically placed on / removed from the counterweight stacks, the crane can topple over.
Death, severe bodily injuries, property damage.
▶ A weight difference between the right and left counterweight stack of more than 20 t is prohibited.
▶ Place / remove the counterweight assemblies alternately symmetrically on the left and right on the counterweight stack.

WARNING
Toppling counterweight stack!
Lopsided stacked counterweight plates create instability in the counterweight stack.
The counterweight plates can tip from the counterweight brackets and cause the crane to topple over.
Death, severe bodily injuries, property damage.
▶ Make sure that the counterweight plates are placed correctly in the centerings.

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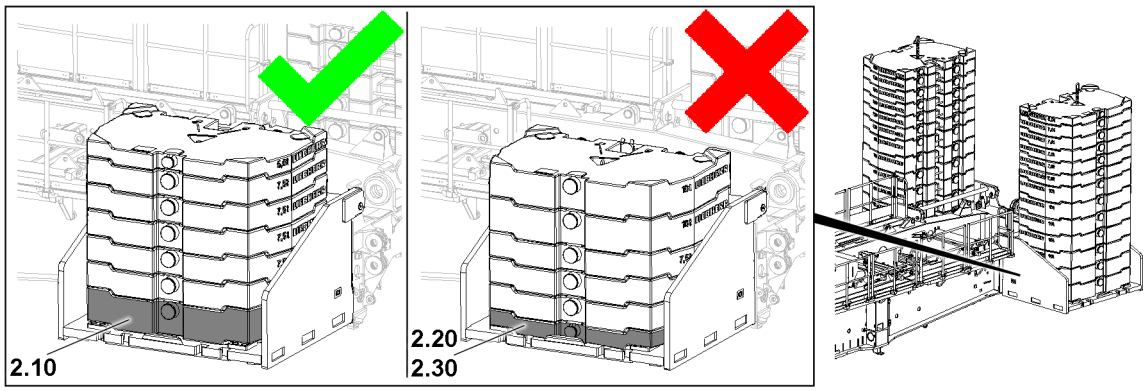

Fig.147010: Ballasting the counterweight stack

WARNING
Falling counterweight plates!
If the ballasting sequence is not adhered to when placing the counterweights on the counterweight brackets, the counterweight plate located at the bottom of the counterweight stack may be damaged. The counterweight plates can fall down from the counterweight stack.
Death, severe bodily injuries, property damage.

- ▶ Make sure that the counterweight stack is only started with 10 t counterweight plates **2.10**.
- ▶ Make sure that the counterweight stack is never started with 5.0 t counterweight plates **2.20** or 7.5 t counterweight plates **2.30**.
- ▶ Further ballasting from the first 10 t counterweight plates **2.10** in the counterweight stack can be continued with 5.0 t or 7.5 t counterweight plates.

Make sure that the following prerequisites are met:
– The counterweight brackets are properly pinned and secured on the turntable.
– There are no obstacles, objects or personnel in the danger zone.

4.2.1 Placing the counterweight plates, fastening system: „Twistlock“

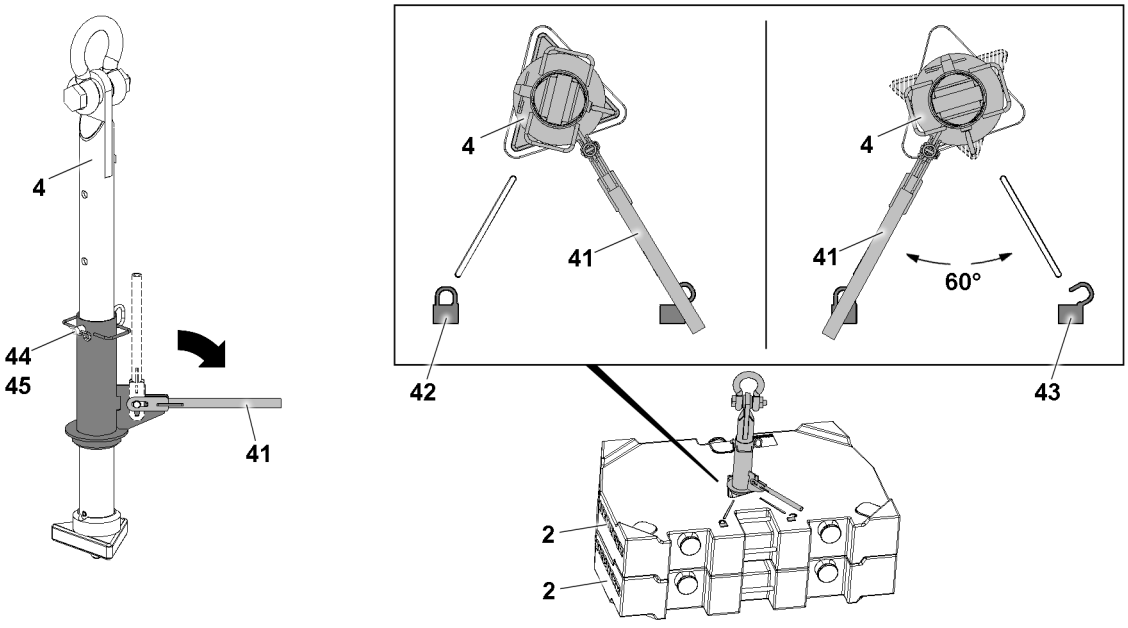

Fig.147005: Counterweight plates, fastening system: „Twistlock“

WARNING
Danger of accident!
If more than the permissible two counterweight plates are lifted with the receptacle stud, the receptacle stud will be overloaded and can be damaged.
Death, severe bodily injuries, property damage.
▶ Make sure that the counterweight plates are placed correctly in the centerings.
▶ Replace damaged counterweight plates.

WARNING
The Twistlock system opens by itself!
If the receptacle stud is not correctly locked, the Twistlock system can open by itself.
Counterweight plates can fall down.
Death, severe bodily injuries, property damage.
▶ Make sure, when initiating a lift, that the lever points directly to the „Locked“ icon.

WARNING
Damage of receptacle stud and counterweight plates!
If two counterweight plates are lifted which do not lay correctly in their centerings, the receptacle stud and the counterweight plates can be damaged.
Damage can cause the counterweight plates to fall down.
Death, severe bodily injuries, property damage.
▶ Make sure that the counterweight plates to be lifted are placed correctly in the centerings.

Note
▶ During a lift, the locked Twistlock system cannot release by itself due to its gravitational retention.
▶ During a lift, the locked Twistlock system cannot be released by hand due to its gravitational retention.

To stack the counterweight plate(s), use the receptacle stud **4**.

Before the receptacle stud **4** is guided into the counterweight plates, it must be ensured that the length of the receptacle stud is set correctly. The length of the receptacle stud **4** can be adjusted with the pin **44**.

If the length of the receptacle stud **4** is to be adjusted:
▶ Release and unpin the pin **44**.
▶ Adjust the length of the receptacle stud by moving the receptacle stud **4**.
▶ Insert the pin **44** and secure it with the retaining element **45**.
▶ Fasten the receptacle stud **4** to the auxiliary crane and guide it into the counterweight plate(s) **2**.
▶ Pull the lever **41** up and fold it down.
▶ Turn the lever **41** by 60° until the lever **41** points to the icon **42**.

Result:

– The receptacle stud **4** is locked with the counterweight plate(s) **2**.

▶ Lift the counterweight plate(s) **2** with the receptacle stud **4** and take down carefully onto the centerings on the counterweight bracket.

When the counterweight plate(s) are taken down:
▶ Turn the lever **41** by 60° until the lever **41** points to the icon **43**.

Result:

– The receptacle stud **4** is unlocked.

▶ Carefully pull the receptacle stud **4** out from the counterweight plate(s) **2**.
▶ Stack the counterweight plate(s) **2** alternately on both sides according to the load chart, observe the danger notes.

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4.2.2 Placing the counterweight plates, fastening points: Bitt

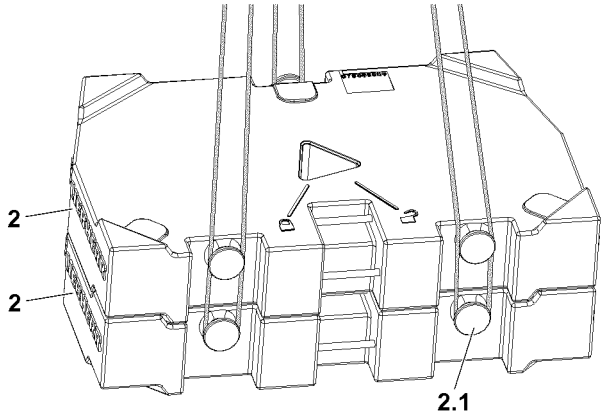

Fig.147006: Counterweight plates, fastening system: „Bitt“

WARNING
Falling counterweight plates!
If more than the permissible loads are lifted, then the bitts **2.1** are overloaded and the counterweight plates can fall down.
Death, severe bodily injuries, property damage.
- ▶ Place the counterweight plates individually or as a package, maximum 20 t , 3 fastening points.
- ▶ Replace damaged counterweight plates immediately.

WARNING
Incorrect handling of the fastening equipment!
If fastening equipment cannot be attached correctly and if it is not secured sufficiently to prevent it from loosening up, loads can fall down.
Death, severe bodily injuries, property damage.
- ▶ Make sure that the fastening equipment is correctly attached on the bitts **2.1** and that it is secured sufficiently to prevent it from loosening up.

- ▶ Fasten the counterweight plate(s) **2** to the auxiliary crane.
- ▶ Place the counterweight plate **2** individually or in an assembly of maximum two plates with the auxiliary crane on the centerings on the counterweight bracket.
- ▶ Stack the counterweight plate(s) **2** alternately on both sides according to the load chart, observe the danger notes.

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4.3 Securing the counterweight

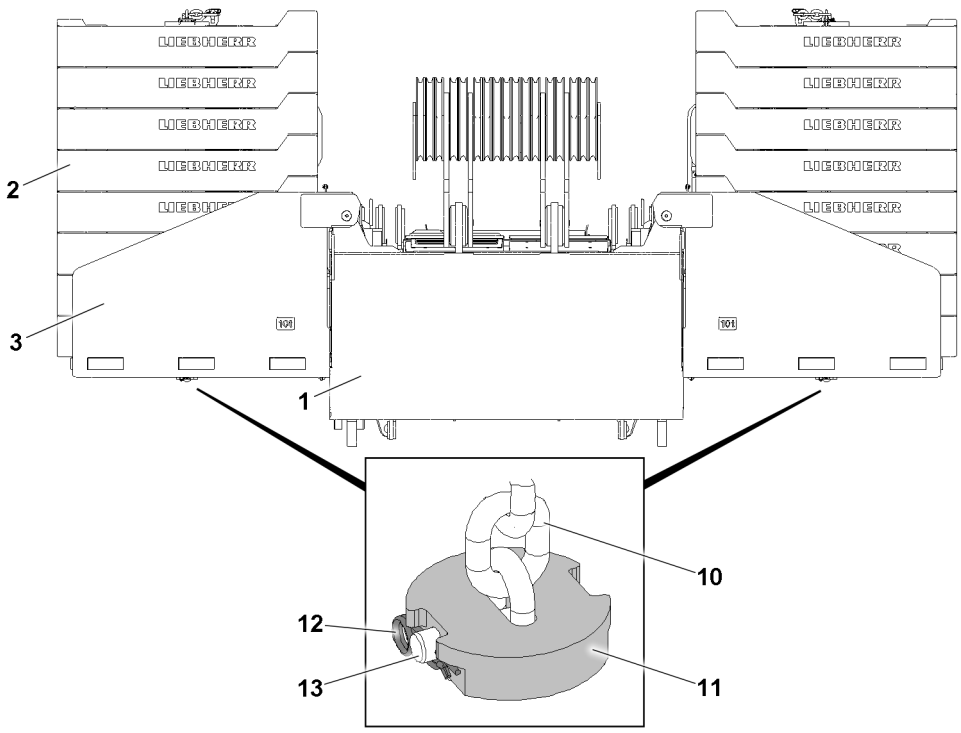

Fig.147007: Securing the counterweight stack

WARNING
Unsecured counterweight plates!
If the counterweight is not or not correctly secured, then it can fall down.
Death, severe bodily injuries, property damage.
▶ Before starting crane operation, the complete counterweight must be secured.

Make sure that the following prerequisite is met:
– The counterweight has been stacked according to the load chart and the operating instructions.

▶ Guide the retaining chain **10** carefully on the auxiliary crane from top through the counterweight stack.
▶ Pin the retaining chain **10** on the bottom with the retaining plate **11**: Insert the pin **13** in the lowest chain link and secure with the retaining element **12**.
▶ Carefully tighten the retaining chain **10** with the auxiliary crane vertically.

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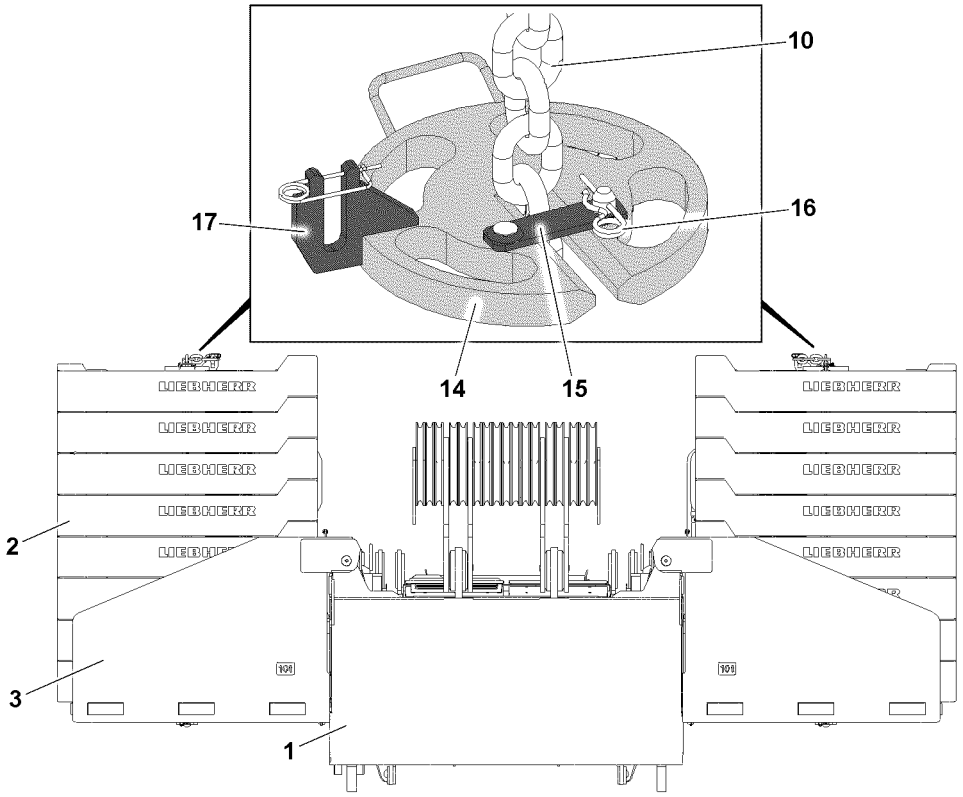

Fig.147008: Securing the counterweight stack

Note

▶ To optimally secure the counterweight stack, keep the retaining chain **10** between the retaining plate **11** and the retaining plate **14** as short as possible!

▶ Push the retaining plate **14** on top on the side over the retaining chain **10**.
▶ Insert the retaining plate **15** in the retaining plate **14**.
▶ Secure the retaining plate **15** with the retaining element **16**.

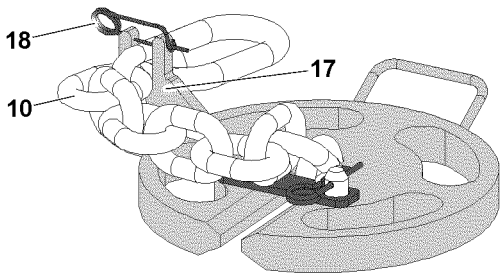

Fig.147009: Securing the chain overhang

WARNING

Danger of accidents due to chain overhang!
If the stack height of the counterweight plates is not high enough, the chain overhang of the retaining chain **10** on the side on the counterweight stack can fall down.
Death, severe bodily injuries, property damage.

▶ Secure the chain overhang from falling down.

▶ Hang the chain overhang of the retaining chain **10** into the fork **17** and secure with retaining element **18** to prevent it from falling down.

5 Disassembling the counterweight

WARNING
Danger of falling!
During assembly / disassembly, inspection and maintenance work, personnel must be secured with appropriate aids to prevent them from falling.
If this is not observed, assembly personnel could fall and be killed or seriously injured.
- ▶ All work at a height, when there is a danger of falling, must be carried out with suitable aids.
- ▶ If aids are not available and work cannot be carried out from the ground, then the assembly personnel must secure themselves with the supplied fall arrest system to prevent falling, see the Crane operating instructions, chapter 2.04.
- ▶ If fall protection equipment is available, then it must be used, see the Crane operating instructions, chapter 2.06.
- ▶ When lifting, lowering, swinging crane parts in and out, no persons may remain in the danger zone.
- ▶ If railings are present on the components, then they must be brought into the corresponding position and secured for assembly / disassembly work.
- ▶ Only step on the aids, ladders and catwalks with clean shoes.
- ▶ Keep aids, ladders and catwalks free of heavy dirt, snow and ice.
- ▶ During all assembly and disassembly work, maintenance work and inspections, travel or crane operation is prohibited.
- ▶ Remaining on a suspended load is prohibited.
- ▶ Stepping or walking on crane components and lattice sections, which have an incline of more than 20° is prohibited.
- ▶ For all assembly work, the crane operator of the main crane must be in voice contact with the crane operator / crane operators of the auxiliary crane / auxiliary cranes.
- ▶ For assembly / disassembly tasks, the crane operator may only initiate crane movements when the responsible guide has explicitly released the movement.

WARNING
Danger of impact / crushing!
When installing / removing crane components with the auxiliary crane, crane components can start to swing back and forth.
When lifting / lowering and positioning crane components, there is an increased danger of impacts / crushing.
Personnel can be caught and severely injured or killed.
- ▶ Make sure that personnel cannot be caught by components.
- ▶ When working in danger zones: Use aids to protect limbs.
- ▶ Guide components with suitable aids to minimize oscillation.

DANGER
The components can fall down!
If the corresponding components are disengaged from the auxiliary crane before the corresponding component is pinned, the corresponding component can fall down and fatally injure personnel.
- ▶ Do not disengage the auxiliary crane until the respective component is pinned and secured.

WARNING
The crane can topple over!
If the turntable with installed counterweight is turned without the boom installed, then the crane can topple over.
Death, severe bodily injuries, property damage.
- ▶ Always leave the turntable with an installed counterweight and without a boom in travel position.

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Make sure that the following prerequisites for **LR 1750** are met:
- The crane is horizontally aligned.
- The turntable is positioned in the „travel direction“ (parallel to the crawler travel gear).
- The central ballast is properly installed.
- The SA-frame is erected.
- The boom is not assembled.
- An auxiliary crane is available.

Make sure that the following prerequisites for **LG 1750** are met:
- The crane is properly supported.
- The crane is horizontally aligned.
- The turntable is positioned in „travel direction“ (parallel to the travel gear).
- The SA-frame is erected.
- The boom is not assembled.
- An auxiliary crane is available.

5.1 Releasing the counterweight

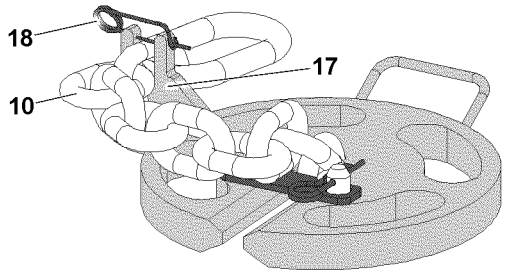

Fig.147009: Releasing the chain overhang

With a secured chain overhang:
▶ Remove the retaining element **18**, unhook the retaining chain **10** from the fork **17**.

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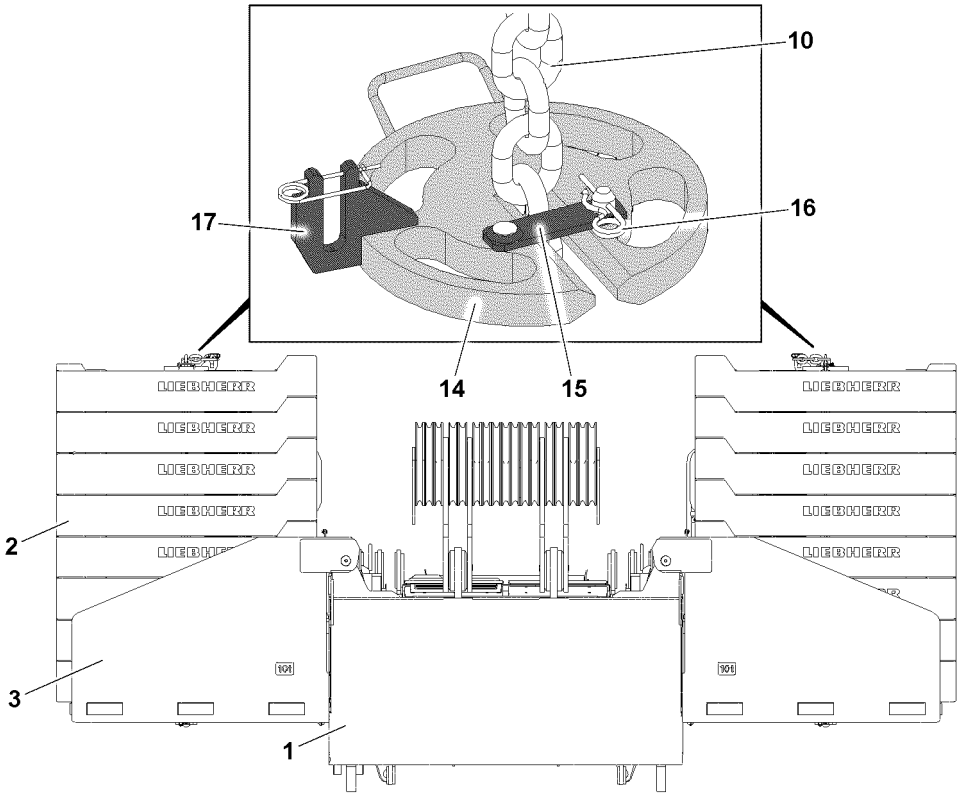

Fig.147008: Releasing the counterweight

- ▶ Fasten the retaining chain **10** to the auxiliary crane and tension it slightly.
- ▶ Release and remove the retaining plate **15**: Remove the retaining element **16**.
- ▶ Remove the retaining plate **14** on the side.

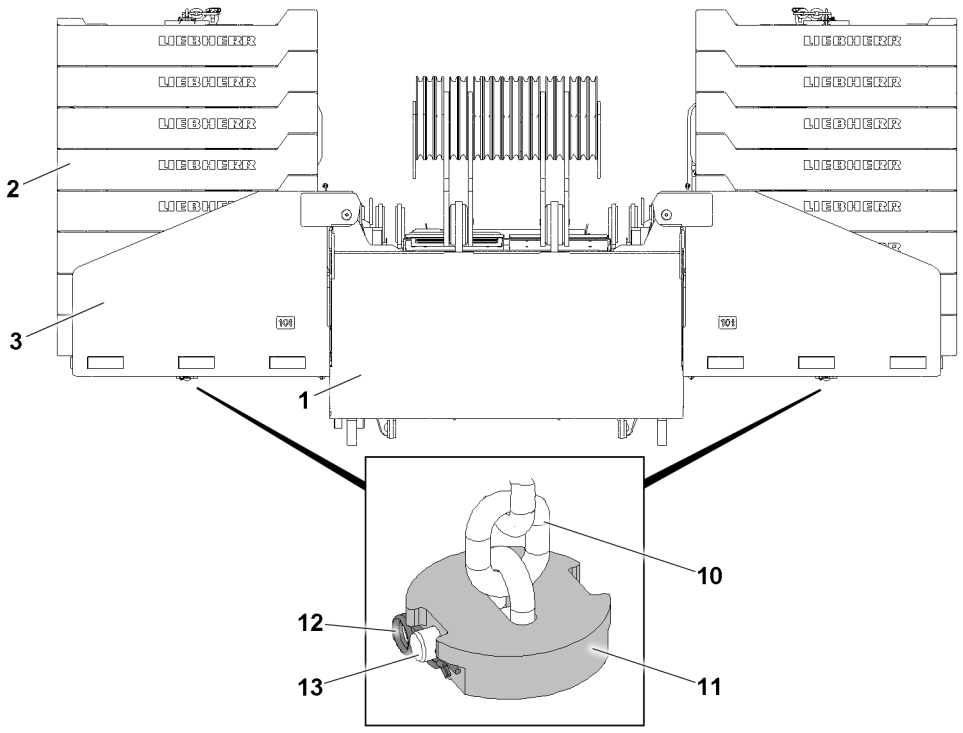

Fig.147007: Releasing the counterweight

- ▶ Lower the retaining chain **10** until the lower retaining plate **11** is freely accessible.
- ▶ Remove the retaining element **12** and unpin the pin **13**.

▶ Remove the retaining plate **11**.
▶ Carefully pull the retaining chain **10** through upward and remove it.

5.2 Removing the counterweight plates

WARNING
Damaged counterweight plates!
Damage on the counterweight plates can cause the fastening equipment to release.
The counterweight plates and components can fall down.
Death, severe bodily injuries, property damage.
▶ Do not use damaged counterweight plates and replace them immediately.

WARNING
Asymmetrical counterweight distribution!
If more than 20 t are asymmetrically placed on / removed from the counterweight stacks, the crane can topple over.
Death, severe bodily injuries, property damage.
▶ A weight difference between the right and left counterweight stack of more than 20 t is prohibited.
▶ Place / take-down the counterweight assemblies alternately symmetrically on the left and right on the counterweight stack.

Note
▶ The counterweight plates are marked with their own weights!

Make sure that the following prerequisite is met:
– The retaining chains are disassembled.

5.2.1 Removing the counterweight plates, fastening system: „Twistlock“

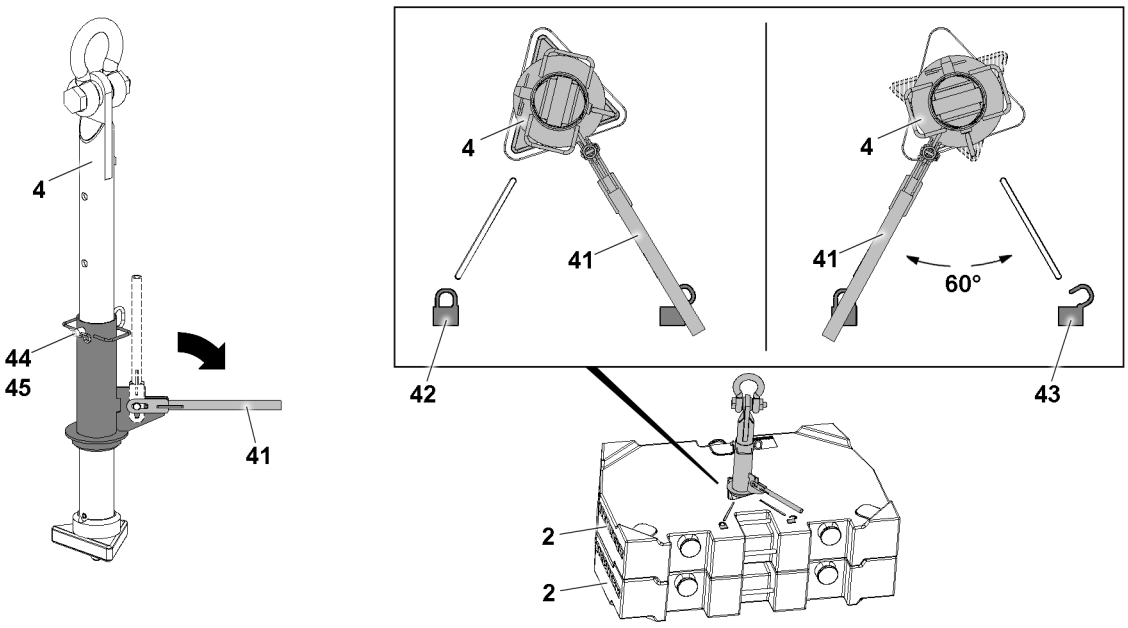

Fig.147005: Counterweight plates, fastening system: „Twistlock“

WARNING
Danger of accident!
If more than the permissible two counterweight plates are lifted with the receptacle stud, the receptacle stud will be overloaded and can be damaged.
Death, severe bodily injuries, property damage.
▶ Make sure that the counterweight plates are placed correctly in the centerings.
▶ Replace damaged counterweight plates.

WARNING
The Twistlock system opens by itself!
If the receptacle stud is not correctly locked, the Twistlock system can open by itself.
Counterweight plates can fall down.
Death, severe bodily injuries, property damage.
▶ Make sure, when initiating a lift, that the lever points directly to the „Locked“ icon.

WARNING
Damage of receptacle stud and counterweight plates!
If two counterweight plates are lifted which do not lay correctly in their centerings, the receptacle stud and the counterweight plates can be damaged.
Damage can cause the counterweight plates to fall down.
Death, severe bodily injuries, property damage.
▶ Make sure that the counterweight plates to be lifted are placed correctly in the centerings.

Note
▶ During a lift, the locked Twistlock system cannot release by itself due to its gravitational retention.
▶ During a lift, the locked Twistlock system cannot be released by hand due to its gravitational retention.

To remove the counterweight plate(s), use the receptacle stud **4**.

Before the receptacle stud **4** is guided into the counterweight plate(s) **2**, it must be ensured that the length of the receptacle stud is set correctly. The length of the receptacle stud **4** can be adjusted with the pin **44**.

If the length of the receptacle stud **4** is to be adjusted:
▶ Release and unpin the pin **44**.
▶ Adjust the length of the receptacle stud by moving the receptacle stud **4**.
▶ Insert the pin **44** and secure it with the retaining element **45**.
▶ Fasten the receptacle stud **4** to the auxiliary crane and guide it into the counterweight plate(s) **2**.
▶ Pull the lever **41** up and fold it down.
▶ Turn the lever **41** by 60° until the lever **41** points to the icon **42**.

Result:

– The receptacle stud **4** is locked with the counterweight plate(s) **2**.

▶ Lift the counterweight plate(s) **2** with the receptacle stud **4** and remove it from the counterweight stack.

When the counterweight plate(s) **2** are taken down:
▶ Turn the lever **41** by 60° until the lever **41** points to the icon **43**.

Result:

– The receptacle stud **4** is unlocked from the counterweight plate(s) **2**.

▶ Carefully pull the receptacle stud **4** out from the counterweight plate(s) **2**.
▶ Alternately remove the counterweight plate(s) **2** from both sides.

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5.2.2 Removing the counterweight plates, fastening points: Bitt

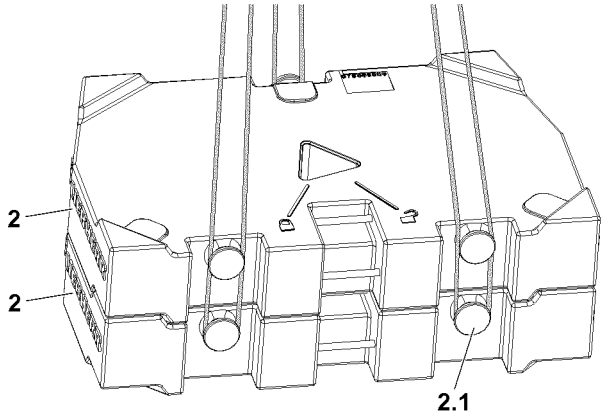

Fig.147006: Counterweight plates, fastening points: Bitt

WARNING
Falling counterweight plates!
If more than the permissible loads are lifted, then the bitts **2.1** are overloaded and the counterweight plates can fall down.
Death, severe bodily injuries, property damage.
- ▶ Place the counterweight plates individually or as a package, maximum 20 t , 3 fastening points.
- ▶ Replace damaged counterweight plates immediately.

WARNING
Incorrect handling of the fastening equipment!
If fastening equipment cannot be attached correctly and if it is not secured sufficiently to prevent it from loosening up, loads can fall down.
Death, severe bodily injuries, property damage.
- ▶ Make sure that the fastening equipment is correctly attached on the bitts **2.1** and that it is secured sufficiently to prevent it from loosening up.

- ▶ Lift the counterweight plate **2** or maximum two plates in an assembly and remove from the counterweight stack.
- ▶ Alternately remove the counterweight plate(s) **2** from both sides.

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5.3 Disassembling the counterweight bracket

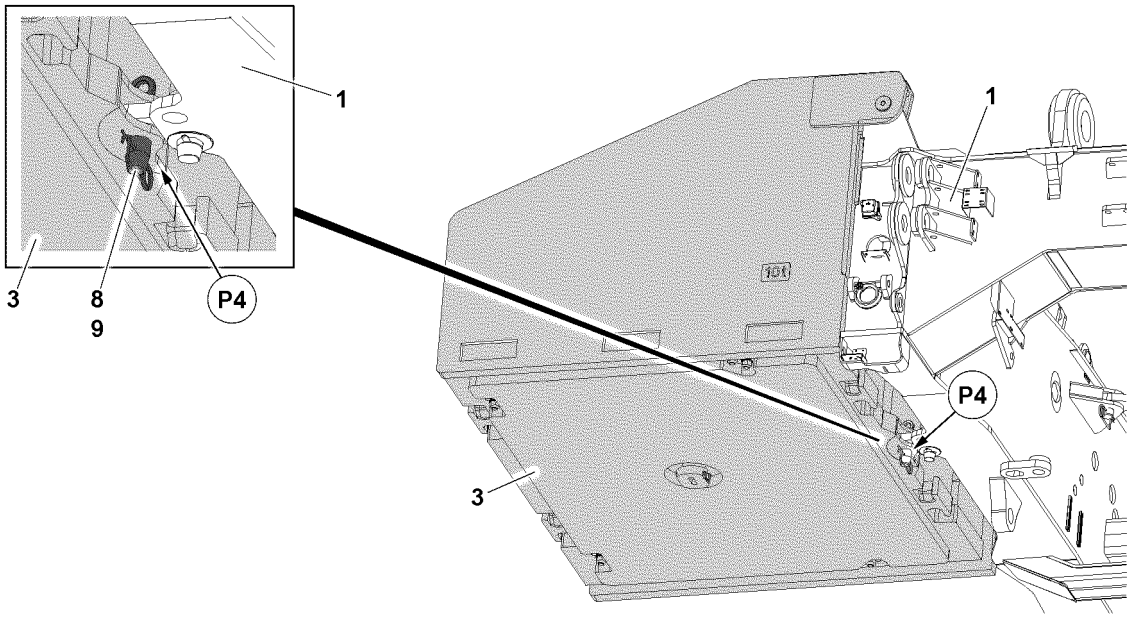

Fig.145397: Unpinning the counterweight bracket

Note

▶ The assembly / disassembly of the counterweight brackets is explained on a counterweight bracket as an example.

Make sure that the following prerequisite is met:

– There are no counterweight plates in the counterweight bracket **3**.

▶ Fasten the counterweight bracket **3** to the auxiliary crane.

▶ Unpin the counterweight bracket **3** on the turntable **1**: Remove the retaining element **9** at point **P4** and unpin the pin **8**.

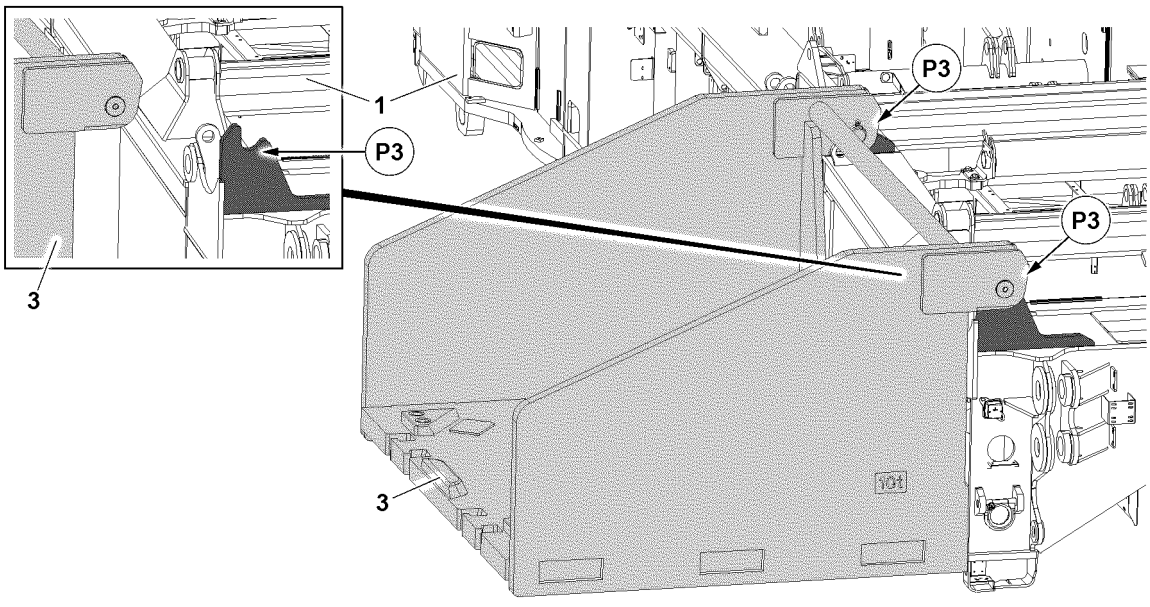

Fig.147012: Detaching the counterweight bracket

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- ▶ Lift the counterweight bracket **3** with the auxiliary crane in points **P3** ans swing it out to the side from the turntable **1**.
- ▶ Take the counterweight bracket **3** down in a suitable storage location.

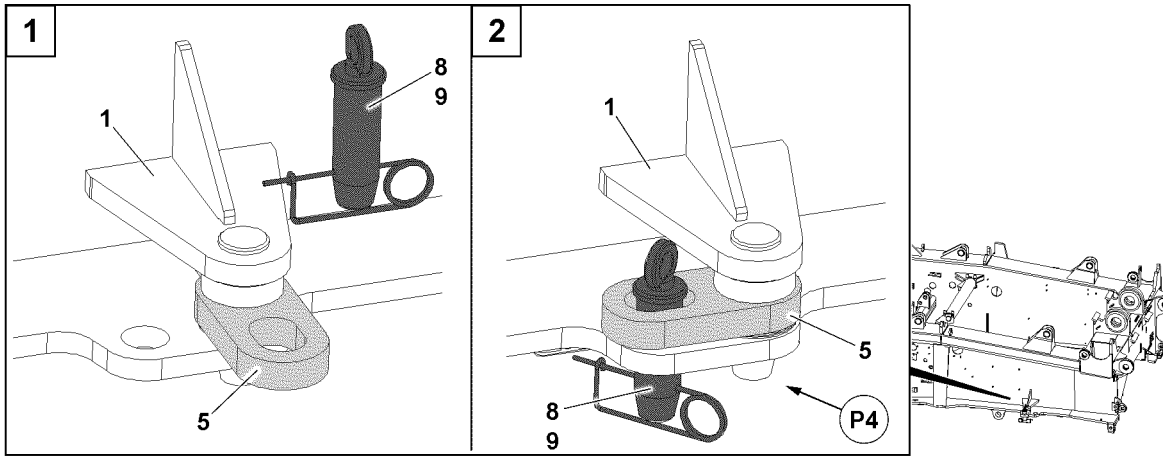

Fig.147011: Securing the bracket

- ▶ Swing the bracket **5**.
- ▶ Insert the pin **8** and secure it with the retaining element **9**.
- ▶ Properly disassemble the second counterweight bracket.

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4.07.10 Turntable extension

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Fig.195219

1 Component overview

The ballast installed on the turntable is generally referred to as the counterweight.

The components are marked with their own weight.

Description of the **counterweight**, see chapter 4.07.

Dimensions and weights, see chapter 1.03.

1.1 Counterweight

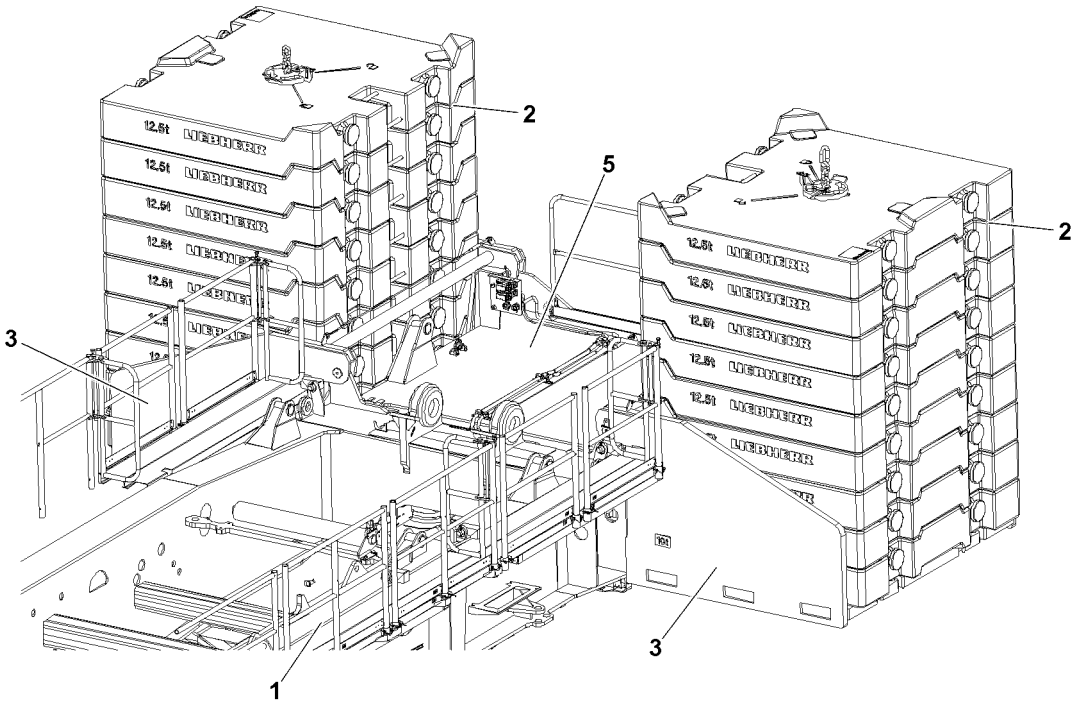

Fig.147013: Component overview counterweight

1 Turntable
2 Counterweight plates
3 Counterweight bracket
5 Turntable extension

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1.2 Counterweight plates

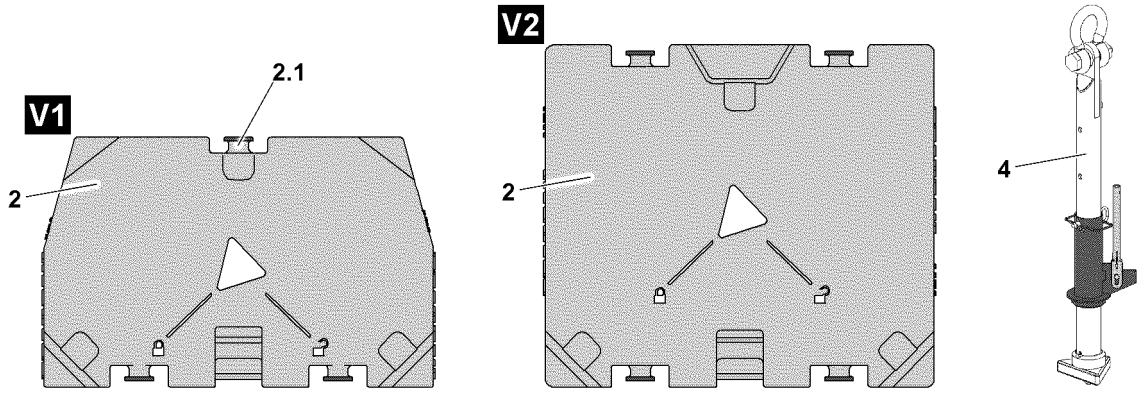

Fig.145394: Component overview counterweight plates

2 Counterweight plates
2.1 Bitt
4 Receptacle stud

Counterweight plates are available in variation **V1** and variation **V2**:

Component	Weight
Variation **V1**	5.0 t 7.5 t 10.0 t
Variation **V2**	12.5 t

2 Fastening points

WARNING
Danger of falling!
Death, severe bodily injuries, property damage.
- ▶ Make sure that the fastening equipment is properly fastened on the fastening points.
- ▶ Make sure that the fastening equipment has a sufficient length.
- ▶ Make sure that there are no persons or obstacles within the danger zone.
- ▶ Pay attention to the labels of the fastening points.

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2.1 Turntable extension

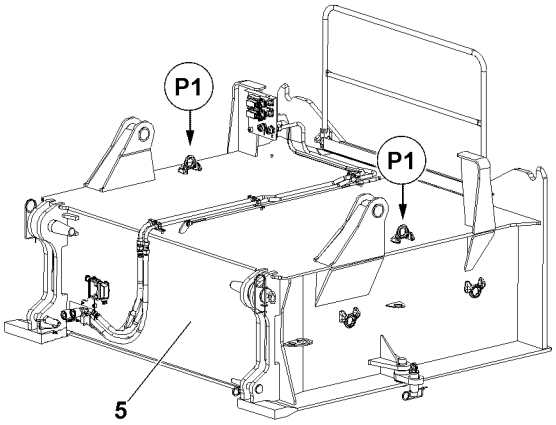

Fig.147014: Turntable extension fastening points

Fastening points	
P1	Turntable extension

2.2 Counterweight plates

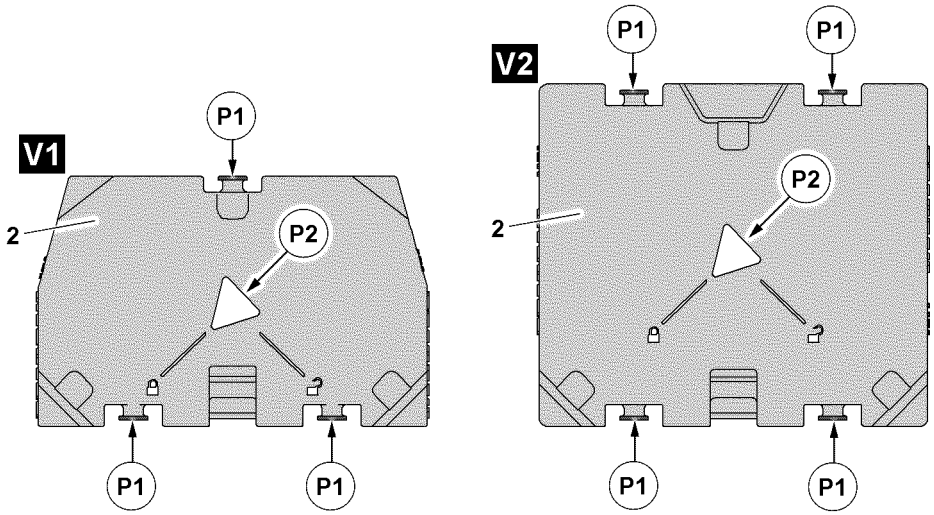

Fig.145393: Fastening points Counterweight plates

„Bitt“ fastening system	
P1	Counterweight plates variation V1 and V2

„Twistlock“ fastening system (with help of the receptacle stud)	
P2	Counterweight plates variation V1 and V2

3 Permissible counterweight assemblies

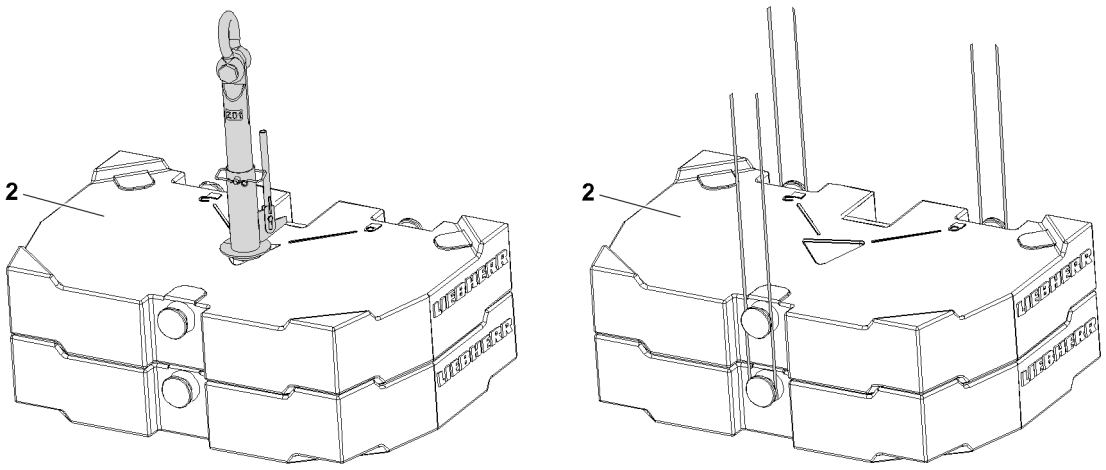

Fig.147047: Example of a counterweight assembly

WARNING
Overload of fastening points counterweight plates!
If more than the permissible number of counterweight plates are lifted together, then the bitt or the receptacle stud can be overloaded.
The counterweight plates and components can fall down.
Death, severe bodily injuries, property damage.
▶ Fasten only the maximum permissible number of counterweight plates per lift.

WARNING
Incorrect structure of counterweight assemblies!
When lifting mixed weight counterweight assemblies, and the heavier counterweight plates are placed on top, the fastening points can be overloaded.
The counterweight plates and components can fall down.
Death, severe bodily injuries, property damage.
▶ Always stack the heavier counterweight plate on the bottom in the counterweight assembly.

Individual weight Counterweight plate	Maximum number of same counterweight plates per lift over	
	„Twistlock“	„Bitt“
5.0 t	2	1
7.5 t	2	2
10.0 t	2	2
12.5 t	1	2

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4 Assembling the turntable extension

WARNING
Danger of falling!
During assembly / disassembly, inspection and maintenance work, personnel must be secured with appropriate aids to prevent them from falling.
Death, severe bodily injuries, property damage.
- ▶ All work at a height, when there is a danger of falling, must be carried out with suitable aids.
- ▶ If aids are not available and work cannot be carried out from the ground, then assembly personnel must secure themselves with the supplied fall arrest system to prevent falling, see Crane chapter 2.04.
- ▶ If fall protection equipment is available, then it must be used, see Crane chapter 2.06.
- ▶ When lifting, lowering, swinging crane parts in and out, no persons may remain in the danger zone.
- ▶ If railings are present on the components, then they must be brought into the corresponding position and secured for assembly / disassembly work.
- ▶ Only step on the aids, ladders and catwalks with clean shoes.
- ▶ Keep aids, ladders and catwalks free of heavy dirt, snow and ice.
- ▶ During all assembly and disassembly work, maintenance work and inspections, travel or crane operation is prohibited.
- ▶ Remaining on a suspended load is prohibited.
- ▶ Stepping or walking on crane components and lattice sections, which have an incline of more than 20° is prohibited.
- ▶ For all assembly work, the crane operator of the main crane must be in voice contact with the crane operator / crane operators of the auxiliary crane / auxiliary cranes.
- ▶ For assembly / disassembly tasks, the crane operator may only initiate crane movements when the responsible guide has explicitly released the movement.

WARNING
Danger of impact / crushing!
When installing / removing crane components with the auxiliary crane, crane components can start to swing back and forth.
When lifting / lowering and positioning crane components, there is an increased danger of impacts / crushing.
Death, severe bodily injuries, property damage.
- ▶ Make sure that personnel cannot be caught by components.
- ▶ When working in danger zones: Use aids to protect limbs.
- ▶ Guide components with suitable aids to minimize oscillation.

DANGER
The components can fall down!
If the corresponding component is disengaged from the auxiliary crane before the corresponding component is pinned, then the corresponding component can fall down.
Death, severe bodily injuries, property damage.
- ▶ Do not disengage the auxiliary crane until the respective component is pinned and secured.

WARNING
The crane can topple over!
If the turntable with installed counterweight is turned without the boom installed, then the crane can topple over.
Death, severe bodily injuries, property damage.
- ▶ Always leave the turntable with an installed counterweight and without a boom in travel position.

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Make sure that the following prerequisites for **LR 1750** are met:
- The crane is horizontally aligned.
- The turntable is positioned in the „travel direction“ (parallel to the crawler travel gear).
- The central ballast is properly installed.
- The SA-frame is erected.
- The boom is not assembled.
- An auxiliary crane is available.

Make sure that the following prerequisites for **LG 1750** are met:
- The crane is properly supported.
- The crane is horizontally aligned.
- The turntable is positioned in „travel direction“ (parallel to the travel gear).
- The SA-frame is erected.
- The boom is not assembled.
- An auxiliary crane is available.

4.1 Bringing the railing on the turntable extension into the operating position

The turntable extension is located on the ground or on a substructure with load bearing capacity:
▶ Bring the railing into the operating position, see chapter 2.06.

4.2 Bringing the railing on the turntable into the operating position

▶ Bring the railing into the operating position, see chapter 2.06.

4.3 Assembling the turntable extension on the turntable

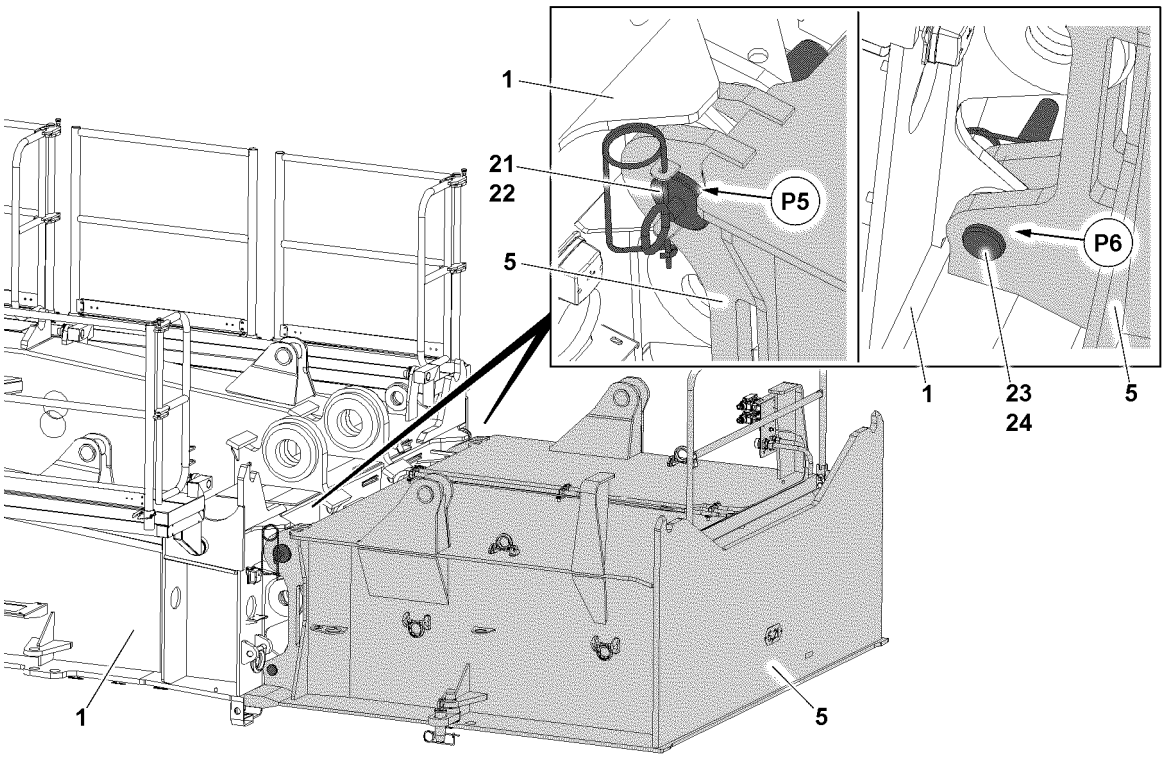

Fig.147016: Assembling the turntable extension on the turntable

Make sure that the following prerequisites are met:
- The retaining elements **22** and pins **21** are removed in the pinning point **P5**.
- The retaining elements **24** and pins **23** are removed in the pinning point **P6**.

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▶ Fasten the turntable extension **5** properly to the auxiliary crane, see section „Fastening points“.
▶ Swing the turntable extension **5** in with the auxiliary crane to the pin points **P6** on the turntable.

When the pin bores align on pin points **P6**:
▶ Insert the pin **23** on both sides completely and secure with retaining element **24**.
▶ Adjust the turntable extension **5** with the auxiliary crane until pinning is possible in the pin points **P5**.

When the pin bores align on pin points **P5**:
▶ Insert the pin **21** on both sides completely and secure with retaining element **22**.

Result:

– The turntable extension **5** is pinned with the turntable.

▶ Release the fastening equipment on the turntable extension and remove the auxiliary crane.

4.4 Assembling the counterweight brackets

Note
▶ The assembly / disassembly of the counterweight brackets is explained on a counterweight bracket as an example.

Make sure that the following prerequisites are met:
– The turntable extension is pinned and secured with the turntable.
– The pins **6** on the counterweight bracket are inserted and secured with the retaining element **7**.

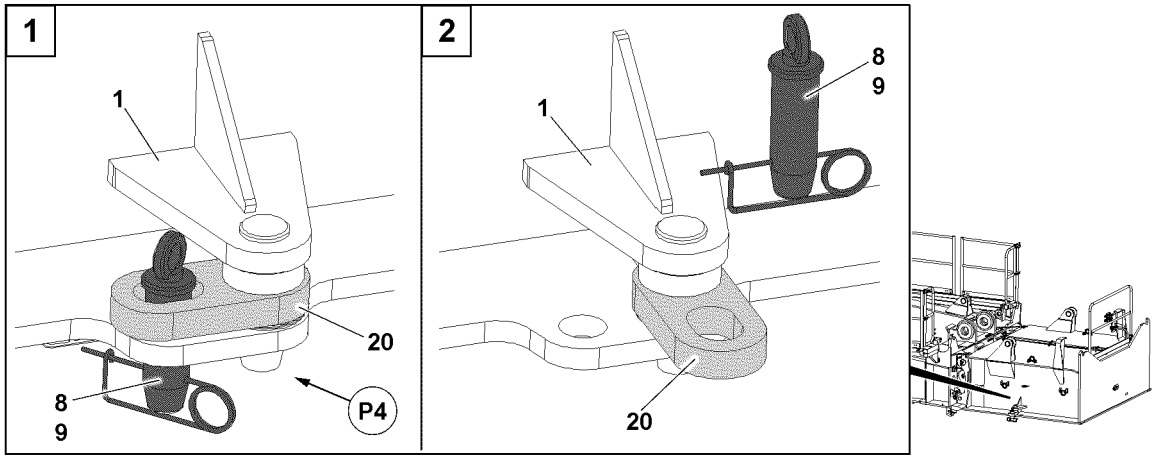

Fig.147015: Swinging the bracket

▶ Remove the retaining element **9** at point **P4** and unpin the pin **8**.
▶ Swing the bracket **20**.

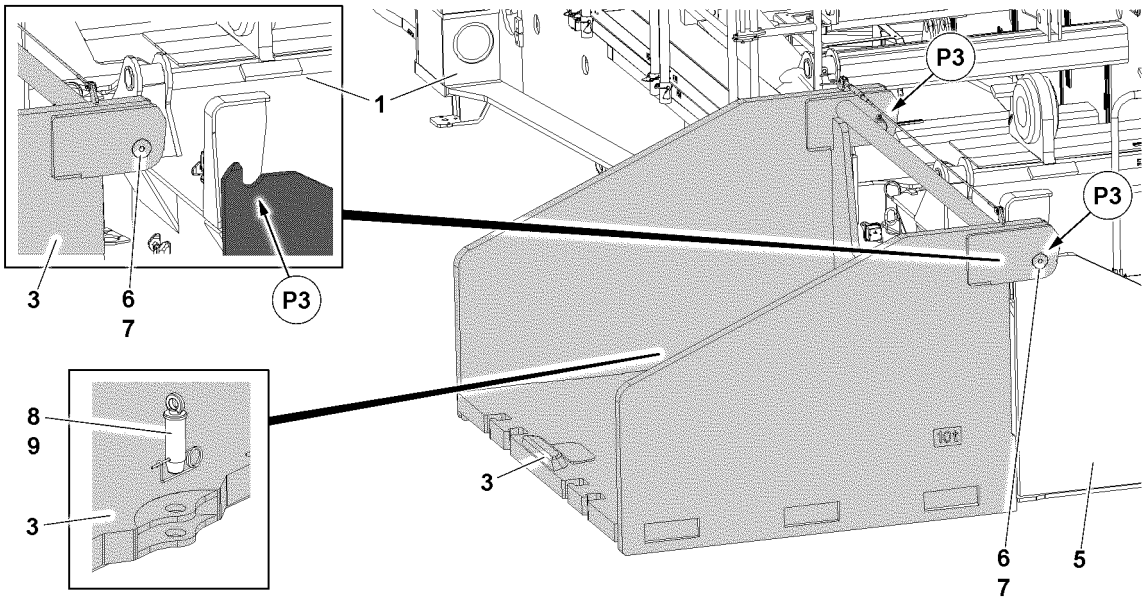

Fig.147017: Hanging the counterweight brackets

- ▶ Fasten the counterweight bracket **3** to the auxiliary crane.
- ▶ Hang the counterweight bracket **3** with the auxiliary crane on points **P3** on the side on the turntable extension **5**.

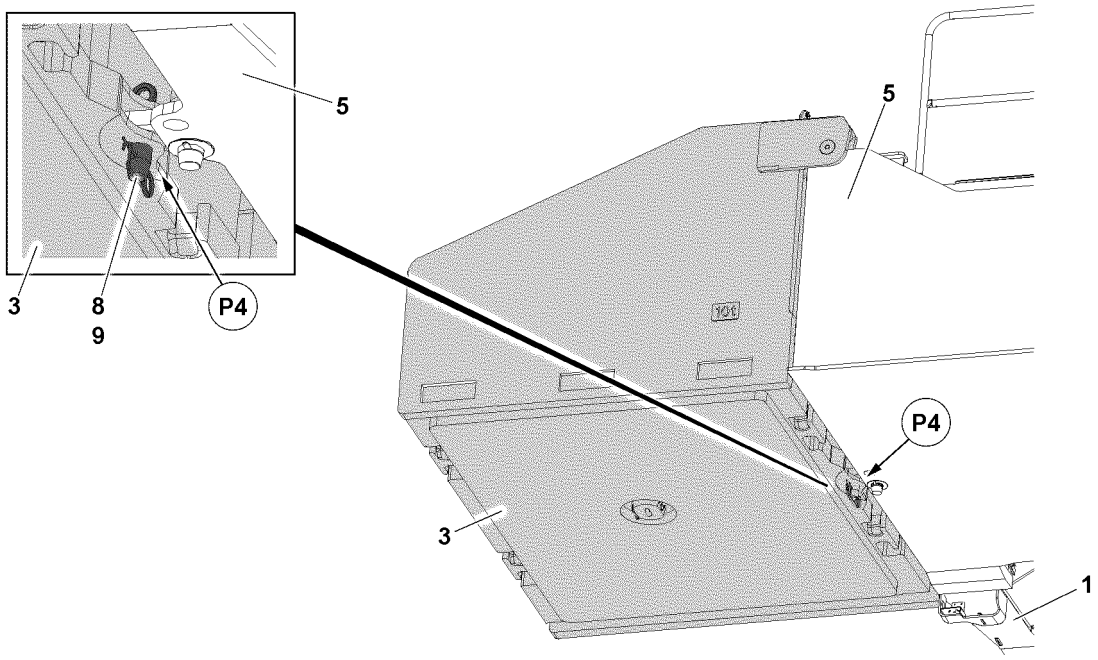

Fig.147018: Pinning the counterweight brackets

- ▶ Pin the counterweight bracket **3** on the turntable extension **5**: Insert the pin **8** on point **P4** and secure with the retaining element **9**.
- ▶ Release and remove the fastening equipment.
- ▶ Properly assemble the second counterweight bracket.

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4.5 Placing the counterweight plates

WARNING
Damaged counterweight plates!
Damage on the counterweight plates can cause the fastening equipment to release.
The counterweight plates and components can fall down.
Death, severe bodily injuries, property damage.
▶ Do not use damaged counterweight plates and replace them immediately.

WARNING
Impermissible combination of counterweight plates!
Combining counterweight plates of variation **V1** and variation **V2** creates instability in the counterweight stack.
The counterweight plates can tip from the counterweight brackets and cause the crane to topple over.
Death, severe bodily injuries, property damage.
▶ **Only** counterweight plates of the same variation may be stacked on each other.

WARNING
Counterweight too low / too high!
If the placed counterweight deviates from the specified data in the load charts or the assembly condition, then the crane can be damaged or topple over.
Death, severe bodily injuries, property damage.
▶ Place the counterweight according to the data in the load chart.
▶ Before placing the counterweight plates, observe the maximum permissible counterweight depending on the assembly conditions, see chapter 3.06.

WARNING
Asymmetrical counterweight distribution!
If more than 20 t are asymmetrically placed on / removed from the counterweight stacks, the crane can topple over.
Death, severe bodily injuries, property damage.
▶ A weight difference between the right and left counterweight stack of more than 20 t is prohibited.
▶ Place / remove the counterweight assemblies alternately symmetrically on the left and right on the counterweight stack.

WARNING
Toppling counterweight stack!
Lopsided stacked counterweight plates create instability in the counterweight stack.
The counterweight plates can tip from the counterweight brackets and cause the crane to topple over.
Death, severe bodily injuries, property damage.
▶ Make sure that the counterweight plates are placed correctly in the centerings.

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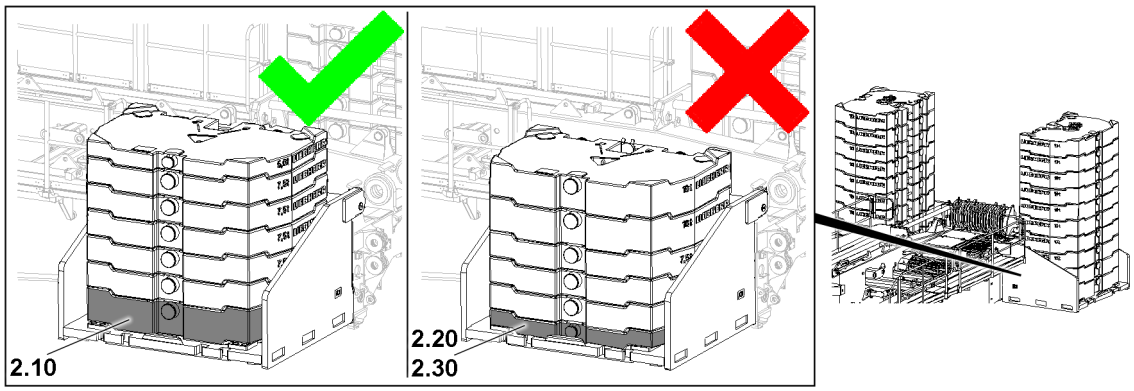

*Fig.147596: Ballasting the counterweight stack (only for the counterweight plate variation **V1**)*

WARNING
Falling counterweight plates!
If the ballasting sequence is not adhered to when placing the counterweights on the counterweight brackets, the counterweight plate located at the bottom of the counterweight stack may be damaged. The counterweight plates can fall down from the counterweight stack.
Death, severe bodily injuries, property damage.

- ▶ Make sure that the counterweight stack is only started with 10 t counterweight plates **2.10**.
- ▶ Make sure that the counterweight stack is never started with 5.0 t counterweight plates **2.20** or 7.5 t counterweight plates **2.30**.
- ▶ Further ballasting from the first 10 t counterweight plates **2.10** in the counterweight stack can be continued with 5.0 t or 7.5 t counterweight plates.

Make sure that the following prerequisites are met:

- – The counterweight brackets are properly pinned and secured on the turntable.
- – There are no obstacles, objects or personnel in the danger zone.

4.5.1 Placing the counterweight plates, fastening system: „Twistlock“

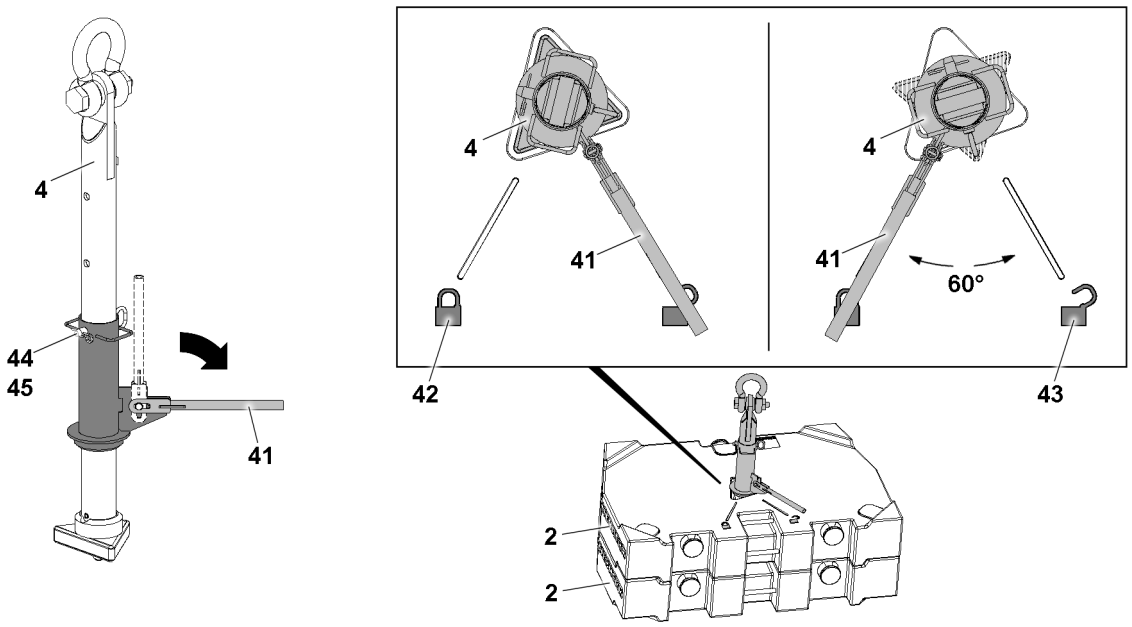

Fig.147005: Counterweight plates, fastening system: „Twistlock“

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WARNING
Danger of accident!
If more than the permissible two counterweight plates are lifted with the receptacle stud, the receptacle stud will be overloaded and can be damaged.
Death, severe bodily injuries, property damage.
▶ Make sure that the counterweight plates are placed correctly in the centerings.
▶ Replace damaged counterweight plates.

WARNING
The Twistlock system opens by itself!
If the receptacle stud is not correctly locked, the Twistlock system can open by itself.
Counterweight plates can fall down.
Death, severe bodily injuries, property damage.
▶ Make sure, when initiating a lift, that the lever points directly to the „Locked“ icon.

WARNING
Damage of receptacle stud and counterweight plates!
If two counterweight plates are lifted which do not lay correctly in their centerings, the receptacle stud and the counterweight plates can be damaged.
Damage can cause the counterweight plates to fall down.
Death, severe bodily injuries, property damage.
▶ Make sure that the counterweight plates to be lifted are placed correctly in the centerings.

Note
▶ During a lift, the locked Twistlock system cannot release by itself due to its gravitational retention.
▶ During a lift, the locked Twistlock system cannot be released by hand due to its gravitational retention.

To stack the counterweight plate(s), use the receptacle stud **4**.

Before the receptacle stud **4** is guided into the counterweight plates, it must be ensured that the length of the receptacle stud is set correctly. The length of the receptacle stud **4** can be adjusted with the pin **44**.

If the length of the receptacle stud **4** is to be adjusted:
▶ Release and unpin the pin **44**.
▶ Adjust the length of the receptacle stud by moving the receptacle stud **4**.
▶ Insert the pin **44** and secure it with the retaining element **45**.
▶ Fasten the receptacle stud **4** to the auxiliary crane and guide it into the counterweight plate(s) **2**.
▶ Pull the lever **41** up and fold it down.
▶ Turn the lever **41** by 60° until the lever **41** points to the icon **42**.

Result:

– The receptacle stud **4** is locked with the counterweight plate(s) **2**.

▶ Lift the counterweight plate(s) **2** with the receptacle stud **4** and take down carefully onto the centerings on the counterweight bracket.

When the counterweight plate(s) are taken down:
▶ Turn the lever **41** by 60° until the lever **41** points to the icon **43**.

Result:

– The receptacle stud **4** is unlocked.

▶ Carefully pull the receptacle stud **4** out from the counterweight plate(s) **2**.
▶ Stack the counterweight plate(s) **2** alternately on both sides according to the load chart, observe the danger notes.

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4.5.2 Placing the counterweight plates, fastening points: Bitt

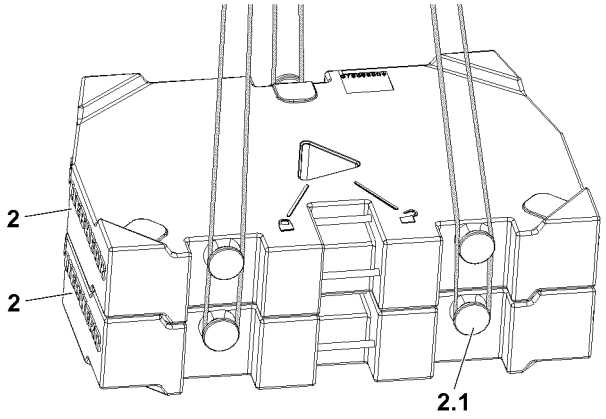

Fig.147006: Counterweight plates, fastening system: „Bitt“

WARNING
Falling counterweight plates!
If more than the permissible loads are lifted, then the bitts **2.1** are overloaded and the counterweight plates can fall down.
Death, severe bodily injuries, property damage.
- ▶ Place the counterweight plates individually or as a package, maximum 20 t , 3 fastening points.
- ▶ Replace damaged counterweight plates immediately.

WARNING
Incorrect handling of the fastening equipment!
If fastening equipment cannot be attached correctly and if it is not secured sufficiently to prevent it from loosening up, loads can fall down.
Death, severe bodily injuries, property damage.
- ▶ Make sure that the fastening equipment is correctly attached on the bitts **2.1** and that it is secured sufficiently to prevent it from loosening up.

- ▶ Fasten the counterweight plate(s) **2** to the auxiliary crane.
- ▶ Place the counterweight plate **2** individually or in an assembly of maximum two plates with the auxiliary crane on the centerings on the counterweight bracket.
- ▶ Stack the counterweight plate(s) **2** alternately on both sides according to the load chart, observe the danger notes.

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4.6 Securing the counterweight

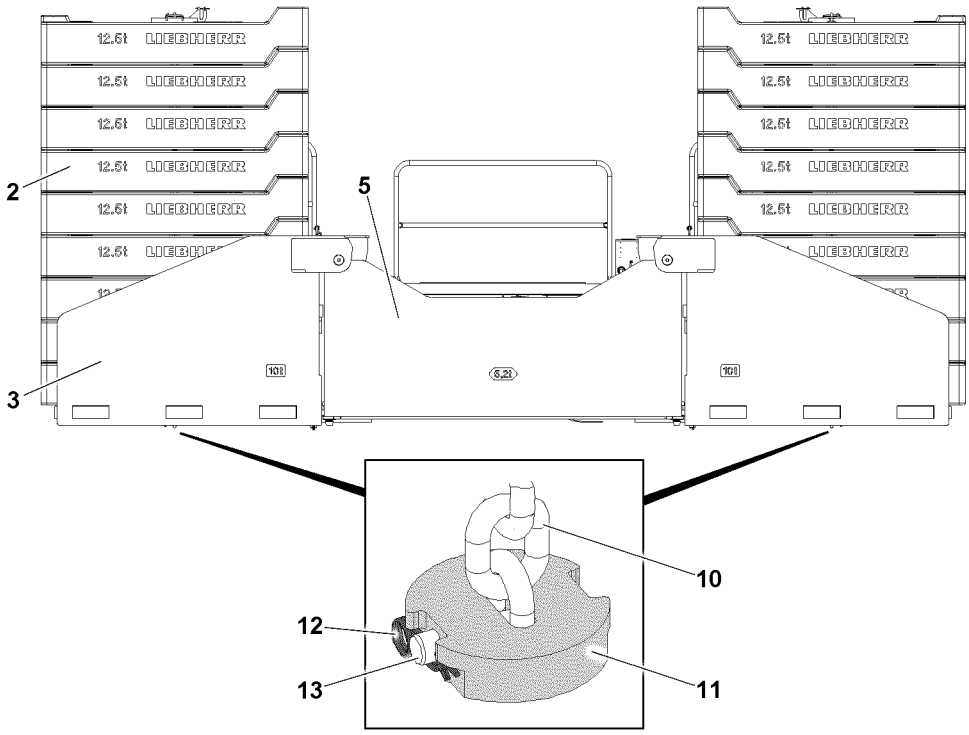

Fig.147020: Securing the counterweight stack

WARNING
Unsecured counterweight plates!
If the counterweight is not or not correctly secured, then it can fall down.
Death, severe bodily injuries, property damage.
▶ Before starting crane operation, the complete counterweight must be secured.

Make sure that the following prerequisite is met:
– The counterweight has been stacked according to the load chart and the operating instructions.

▶ Guide the retaining chain **10** carefully on the auxiliary crane from top through the counterweight stack.
▶ Pin the retaining chain **10** on the bottom with the retaining plate **11**: Insert the pin **13** in the lowest chain link and secure with the retaining element **12**.
▶ Carefully tighten the retaining chain **10** with the auxiliary crane vertically.

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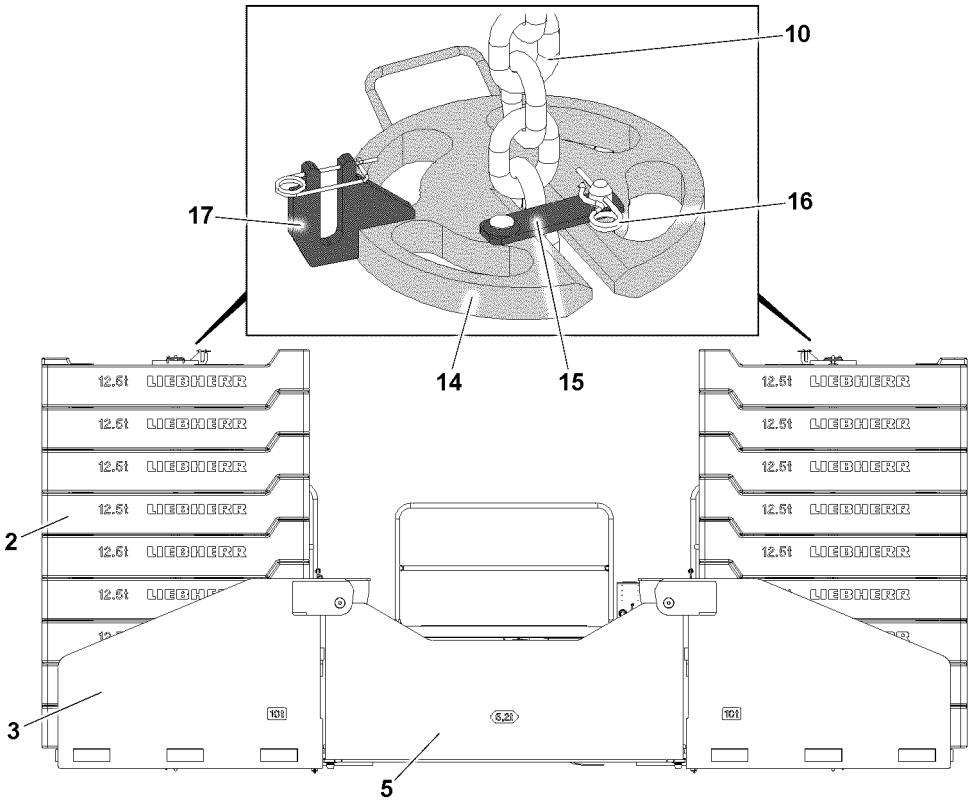

Fig.147021: Securing the counterweight stack

Note

▶ To optimally secure the counterweight stack, keep the retaining chain between the retaining plate and the retaining plate as short as possible!

▶ Push the retaining plate **14** on top on the side over the retaining chain **10**.
▶ Insert the retaining plate **15** in the retaining plate **14**.
▶ Secure the retaining plate **15** with the retaining element **16**.

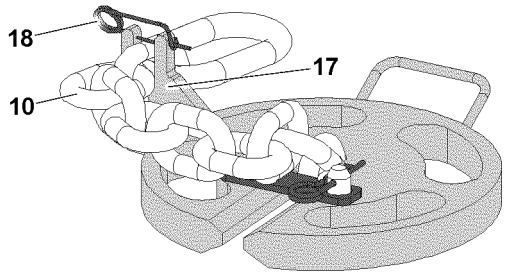

Fig.147009: Securing the chain overhang

WARNING

Danger of accidents due to chain overhang!
If the stack height of the counterweight plates is not high enough, the chain overhang of the retaining chain **10** on the side on the counterweight stack can fall down.
Death, severe bodily injuries, property damage.

▶ Secure the chain overhang from falling down.

▶ Hang the chain overhang of the retaining chain **10** into the fork **17** and secure with retaining element **18** to prevent it from falling down.

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5 Disassembling the turntable extension

WARNING
Danger of falling!
During assembly / disassembly, inspection and maintenance work, personnel must be secured with appropriate aids to prevent them from falling.
Death, severe bodily injuries, property damage.
- ▶ All work at a height, when there is a danger of falling, must be carried out with suitable aids.
- ▶ If aids are not available and work cannot be carried out from the ground, then assembly personnel must secure themselves with the supplied fall arrest system to prevent falling, see Crane chapter 2.04.
- ▶ If fall protection equipment is available, then it must be used, see Crane chapter 2.06.
- ▶ When lifting, lowering, swinging crane parts in and out, no persons may remain in the danger zone.
- ▶ If railings are present on the components, then they must be brought into the corresponding position and secured for assembly / disassembly work.
- ▶ Only step on the aids, ladders and catwalks with clean shoes.
- ▶ Keep aids, ladders and catwalks free of heavy dirt, snow and ice.
- ▶ During all assembly and disassembly work, maintenance work and inspections, travel or crane operation is prohibited.
- ▶ Remaining on a suspended load is prohibited.
- ▶ Stepping or walking on crane components and lattice sections, which have an incline of more than 20° is prohibited.
- ▶ For all assembly work, the crane operator of the main crane must be in voice contact with the crane operator / crane operators of the auxiliary crane / auxiliary cranes.
- ▶ For assembly / disassembly tasks, the crane operator may only initiate crane movements when the responsible guide has explicitly released the movement.

WARNING
Danger of impact / crushing!
When installing / removing crane components with the auxiliary crane, crane components can start to swing back and forth.
When lifting / lowering and positioning crane components, there is an increased danger of impacts / crushing.
Death, severe bodily injuries, property damage.
- ▶ Make sure that personnel cannot be caught by components.
- ▶ When working in danger zones: Use aids to protect limbs.
- ▶ Guide components with suitable aids to minimize oscillation.

DANGER
The components can fall down!
If the corresponding component is disengaged from the auxiliary crane before the corresponding component is pinned, then the corresponding component can fall down.
Death, severe bodily injuries, property damage.
- ▶ Do not disengage the auxiliary crane until the respective component is pinned and secured.

WARNING
The crane can topple over!
If the turntable with installed counterweight is turned without the boom installed, then the crane can topple over.
Death, severe bodily injuries, property damage.
- ▶ Always leave the turntable with an installed counterweight and without a boom in travel position.

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Make sure that the following prerequisites for **LR 1750** are met:
- The crane is horizontally aligned.
- The turntable is positioned in the „travel direction“ (parallel to the crawler travel gear).
- The central ballast is properly installed.
- The SA-frame is erected.
- The boom is not assembled.
- An auxiliary crane is available.

Make sure that the following prerequisites for **LG 1750** are met:
- The crane is properly supported.
- The crane is horizontally aligned.
- The turntable is positioned in „travel direction“ (parallel to the travel gear).
- The SA-frame is erected.
- The boom is not assembled.
- An auxiliary crane is available.

5.1 Releasing the counterweight

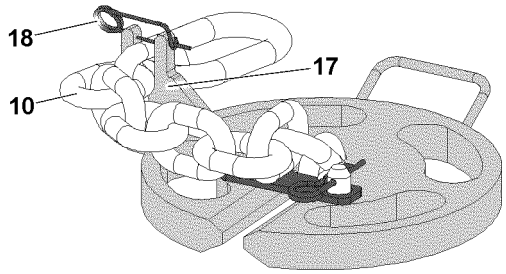

Fig.147009: Releasing the chain overhang

With a secured chain overhang:
▶ Remove the retaining element **18**, unhook the retaining chain **10** from the fork **17**.

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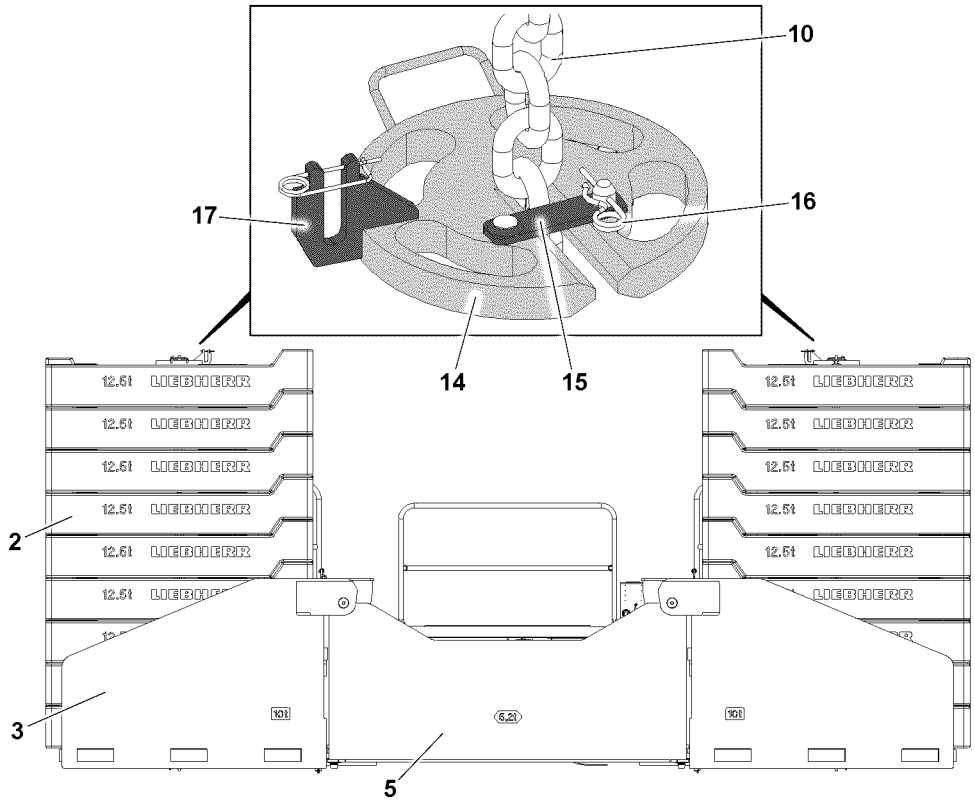

Fig.147021: Releasing the counterweight

- ▶ Fasten the retaining chain **10** to the auxiliary crane and tension it slightly.
- ▶ Release and remove the retaining plate **15**: Remove the retaining element **16**.
- ▶ Remove the retaining plate **14** on the side.

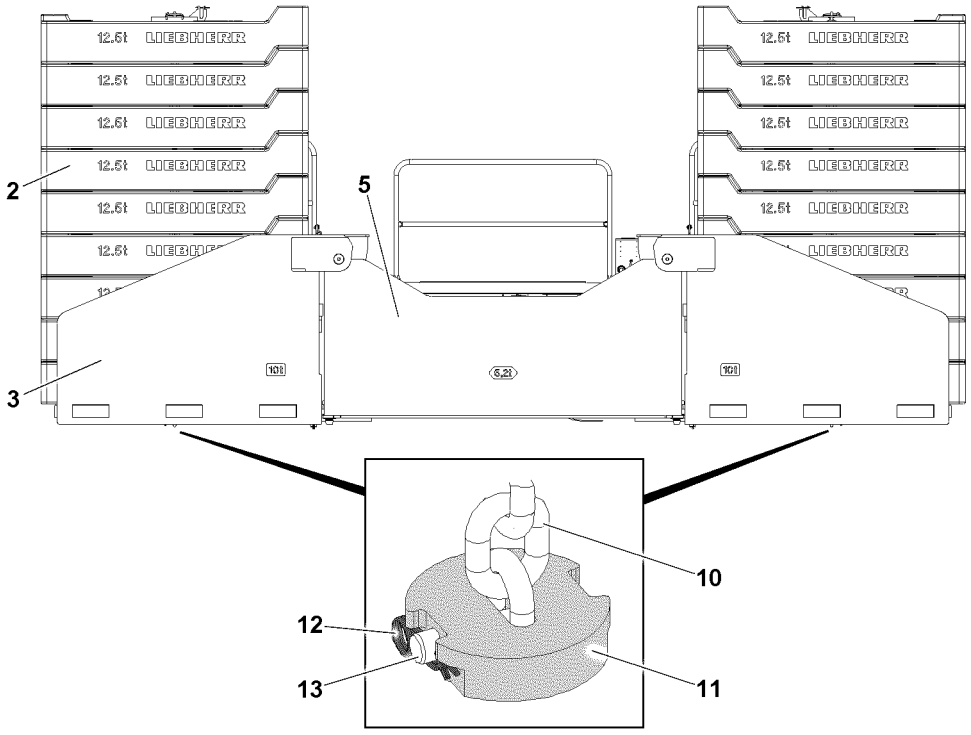

Fig.147020: Releasing the counterweight

- ▶ Lower the retaining chain **10** until the lower retaining plate **11** is freely accessible.
- ▶ Remove the retaining element **12** and unpin the pin **13**.

- ▶ Remove the retaining plate **11**.
- ▶ Carefully pull the retaining chain **10** through upward and remove it.

5.2 Removing the counterweight plates

WARNING
Damaged counterweight plates!
Damage on the counterweight plates can cause the fastening equipment to release.
The counterweight plates and components can fall down.
Death, severe bodily injuries, property damage.
- ▶ Do not use damaged counterweight plates and replace them immediately.

WARNING
Asymmetrical counterweight distribution!
If more than 20 t are asymmetrically placed on / removed from the counterweight stacks, the crane can topple over.
Death, severe bodily injuries, property damage.
- ▶ A weight difference between the right and left counterweight stack of more than 20 t is prohibited.
- ▶ Place / take-down the counterweight assemblies alternately symmetrically on the left and right on the counterweight stack.

Note
- ▶ The counterweight plates are marked with their own weights!

Make sure that the following prerequisite is met:
- – The retaining chains are disassembled.

5.2.1 Removing the counterweight plates, fastening system: „Twistlock“

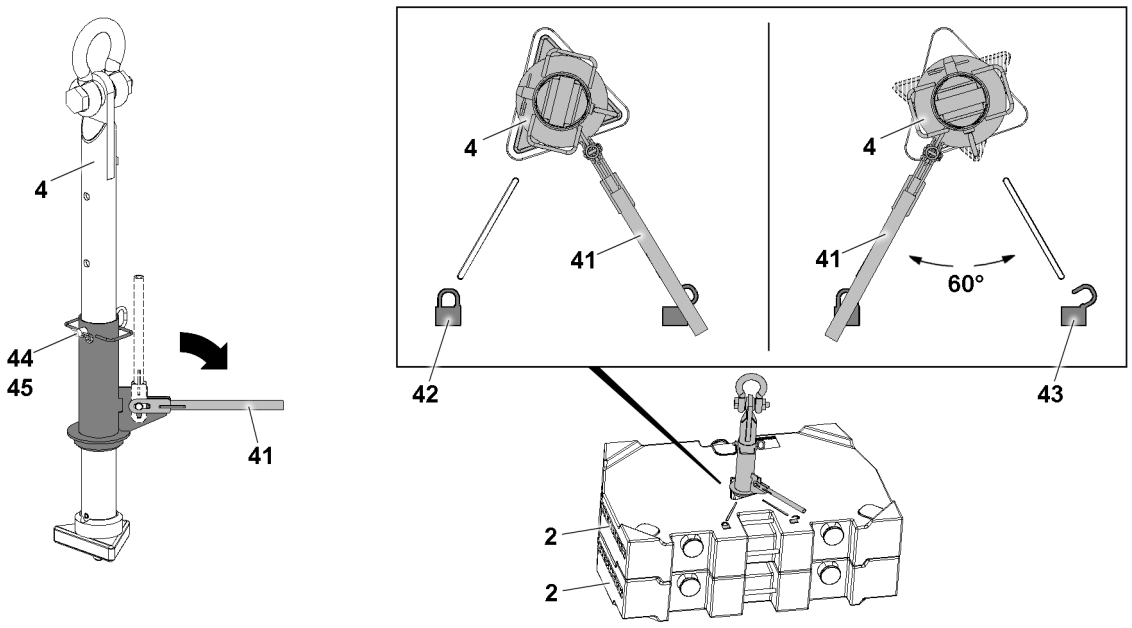

Fig.147005: Counterweight plates, fastening system: „Twistlock“

WARNING
Danger of accident!
If more than the permissible two counterweight plates are lifted with the receptacle stud, the receptacle stud will be overloaded and can be damaged.
Death, severe bodily injuries, property damage.
▶ Make sure that the counterweight plates are placed correctly in the centerings.
▶ Replace damaged counterweight plates.

WARNING
The Twistlock system opens by itself!
If the receptacle stud is not correctly locked, the Twistlock system can open by itself.
Counterweight plates can fall down.
Death, severe bodily injuries, property damage.
▶ Make sure, when initiating a lift, that the lever points directly to the „Locked“ icon.

WARNING
Damage of receptacle stud and counterweight plates!
If two counterweight plates are lifted which do not lay correctly in their centerings, the receptacle stud and the counterweight plates can be damaged.
Damage can cause the counterweight plates to fall down.
Death, severe bodily injuries, property damage.
▶ Make sure that the counterweight plates to be lifted are placed correctly in the centerings.

Note
▶ During a lift, the locked Twistlock system cannot release by itself due to its gravitational retention.
▶ During a lift, the locked Twistlock system cannot be released by hand due to its gravitational retention.

To remove the counterweight plate(s), use the receptacle stud **4**.

Before the receptacle stud **4** is guided into the counterweight plate(s) **2**, it must be ensured that the length of the receptacle stud is set correctly. The length of the receptacle stud **4** can be adjusted with the pin **44**.

If the length of the receptacle stud **4** is to be adjusted:
▶ Release and unpin the pin **44**.
▶ Adjust the length of the receptacle stud by moving the receptacle stud **4**.
▶ Insert the pin **44** and secure it with the retaining element **45**.
▶ Fasten the receptacle stud **4** to the auxiliary crane and guide it into the counterweight plate(s) **2**.
▶ Pull the lever **41** up and fold it down.
▶ Turn the lever **41** by 60° until the lever **41** points to the icon **42**.

Result:

– The receptacle stud **4** is locked with the counterweight plate(s) **2**.

▶ Lift the counterweight plate(s) **2** with the receptacle stud **4** and remove it from the counterweight stack.

When the counterweight plate(s) **2** are taken down:
▶ Turn the lever **41** by 60° until the lever **41** points to the icon **43**.

Result:

– The receptacle stud **4** is unlocked from the counterweight plate(s) **2**.

▶ Carefully pull the receptacle stud **4** out from the counterweight plate(s) **2**.
▶ Alternately remove the counterweight plate(s) **2** from both sides.

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5.2.2 Removing the counterweight plates, fastening points: Bitt

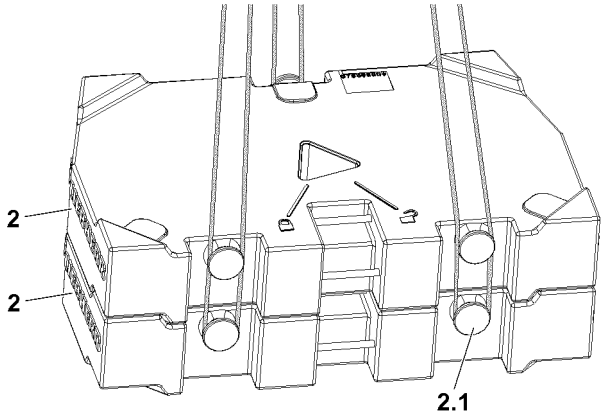

Fig.147006: Counterweight plates, fastening points: Bitt

WARNING
Falling counterweight plates!
If more than the permissible loads are lifted, then the bitts **2.1** are overloaded and the counterweight plates can fall down.
Death, severe bodily injuries, property damage.
- ▶ Place the counterweight plates individually or as a package, maximum 20 t , 3 fastening points.
- ▶ Replace damaged counterweight plates immediately.

WARNING
Incorrect handling of the fastening equipment!
If fastening equipment cannot be attached correctly and if it is not secured sufficiently to prevent it from loosening up, loads can fall down.
Death, severe bodily injuries, property damage.
- ▶ Make sure that the fastening equipment is correctly attached on the bitts **2.1** and that it is secured sufficiently to prevent it from loosening up.

- ▶ Lift the counterweight plate **2** or maximum two plates in an assembly and remove from the counterweight stack.
- ▶ Alternately remove the counterweight plate(s) **2** from both sides.

5.3 Bringing the railing on the turntable extension into the transport position

Note
- ▶ Bring the railing into the transport position, see chapter 2.06.

5.4 Bringing the railing on the turntable into the transport position

Note
- ▶ Bring the railing into the transport position, see chapter 2.06.

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5.5 Disassembling the counterweight bracket

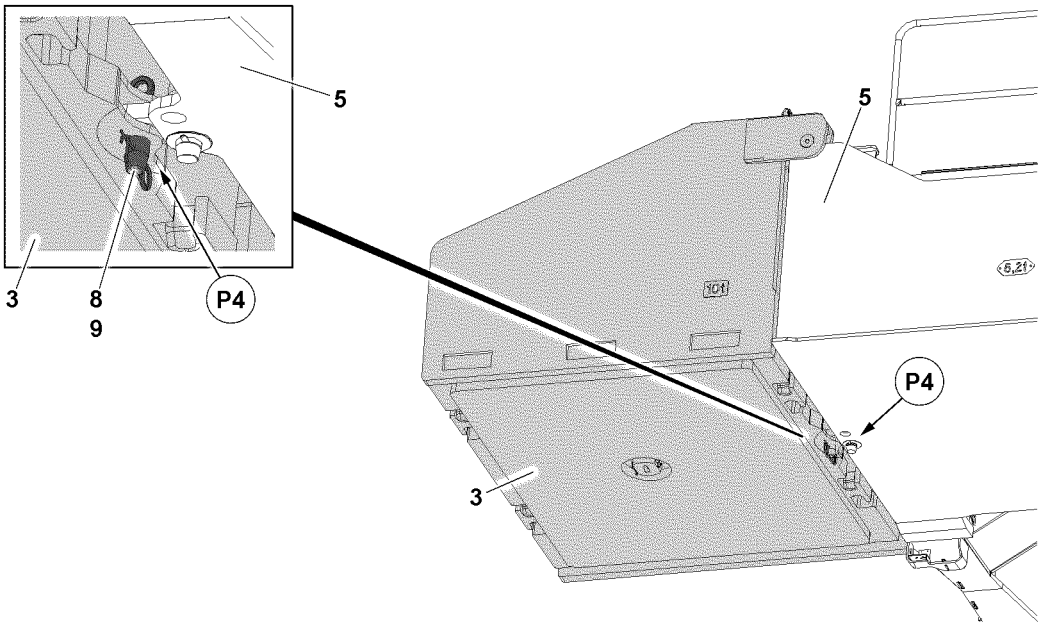

Fig.147025: Unpinning the counterweight bracket

Note

▶ The assembly / disassembly of the counterweight brackets is explained on a counterweight bracket as an example.

Make sure that the following prerequisite is met:

– There are no counterweight plates in the counterweight bracket **3**.

▶ Fasten the counterweight bracket **3** to the auxiliary crane.

▶ Unpin the counterweight bracket **3** on the turntable extension **5**: Remove the retaining element **9** at point **P4** and unpin the pin **8**.

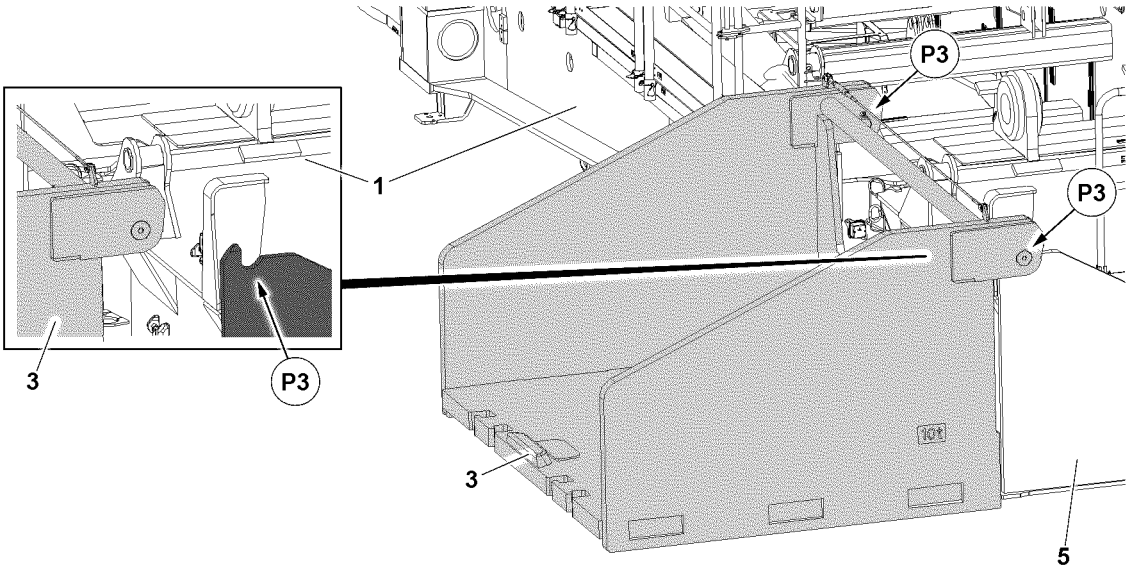

Fig.147023: Detaching the counterweight bracket

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- ▶ Lift the counterweight bracket **3** with the auxiliary crane in points **P3** and swing it out to the side from the turntable extension **5**.
- ▶ Take the counterweight bracket **3** down in a suitable storage location.

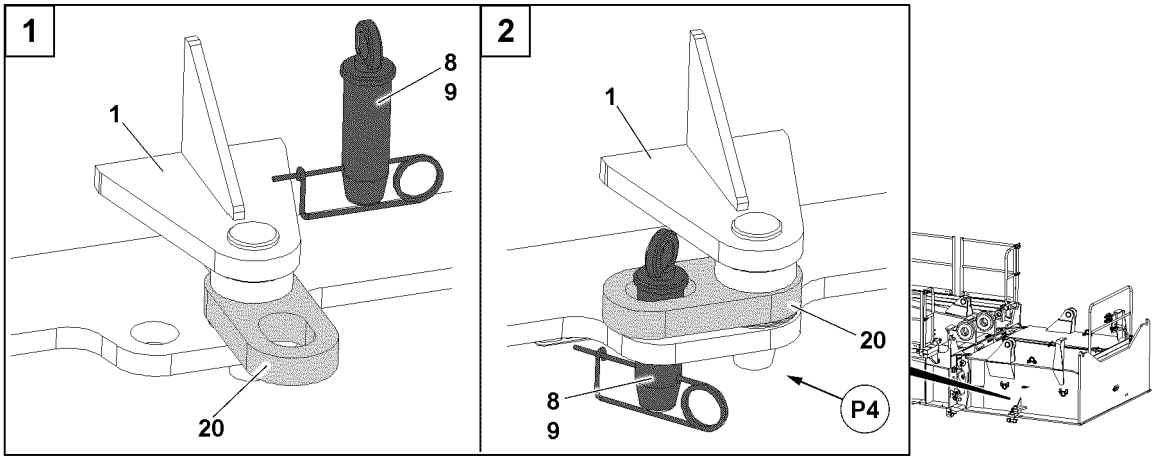

Fig.147024: Securing the bracket

- ▶ Swing the bracket **20**.
- ▶ Insert the pin **8** and secure it with the retaining element **9**.
- ▶ Properly disassemble the second counterweight bracket.

5.6 Disassembling the turntable extension on the turntable

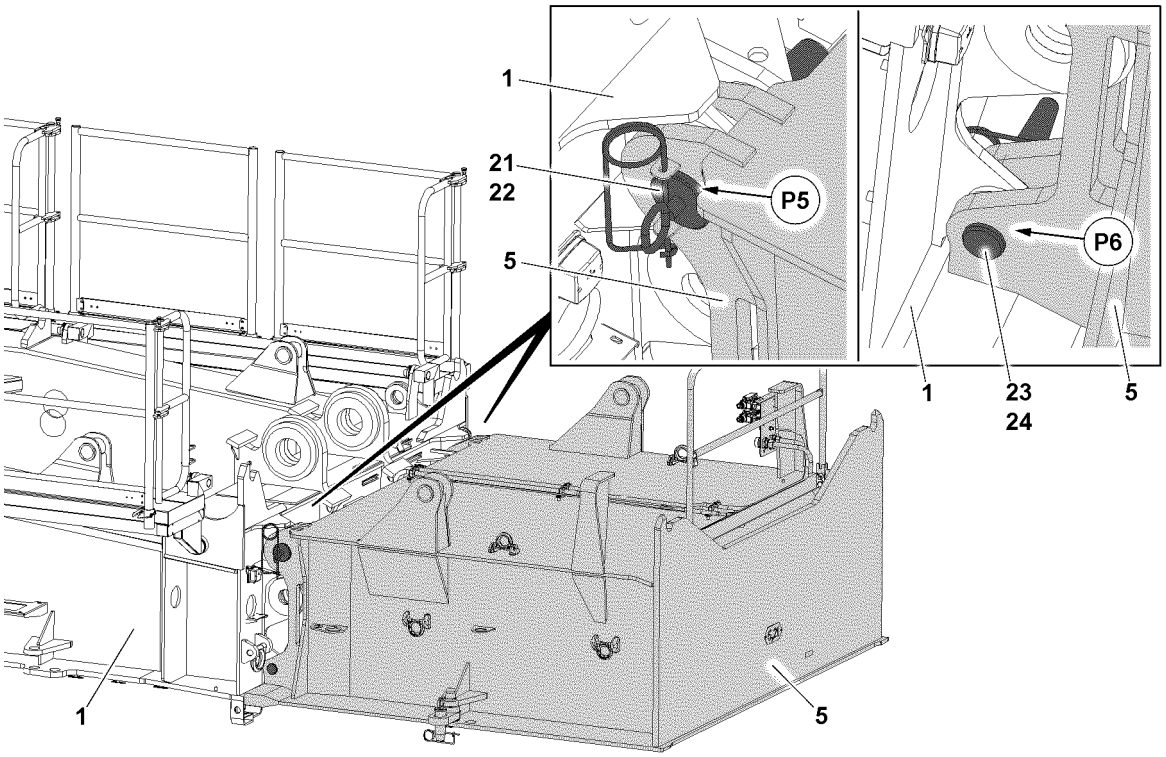

Fig.147016: Releasing the turntable extension on the turntable

- ▶ Fasten the turntable extension **5** to the auxiliary crane, see section „Fastening points“.

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WARNING
Tipping of the turntable extension!
Death, severe bodily injuries, property damage.
- ▶ Make sure that the fastening equipment has a sufficient length.
- ▶ Make sure that there are no persons within the danger zone when lifting the turntable extension.
- ▶ Make sure that the fastening equipment between the turntable extension and the auxiliary crane is tensioned before the turntable extension is unpinned on the turntable.

When the fastening equipment is tensioned properly on the turntable extension **5**:
- ▶ Remove the retaining element **24** on both sides at the pin points **P6** and unpin the pins **23**.
- ▶ Remove the retaining element **22** on both sides at the pin points **P5** and unpin the pins **21**.

When the pins are fully unpinned on both sides:
- ▶ Lift the turntable extension **5** with the auxiliary crane and swing out.
- ▶ Set the turntable extension **5** on a load bearing substructure or on a flatbed trailer.

When the turntable extension **5** is properly set on the substructure or on the flatbed trailer:
- ▶ Remove the fastening equipment and the auxiliary crane.
- ▶ Insert and secure the pin **21** and pin **23** in the park position.

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4.08 Working with a load

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Fig.195219

1 Safety guidelines

In addition, observe the general technical safety instructions in chapter 2.04.

In steep boom positions for which no loads are specified in the load charts, there is a danger of tipping to the rear to the counterweight side.

The danger of tipping to the rear exists especially in case of:
- Crane operation on tires
- Supported, with retracted sliding beams
- Reduced support base

WARNING
Crane operation in steep boom positions for which no loads are specified in the load charts!
The crane can tip to the rear and fatally injure personnel.
- ▶ Comply with the boom radius specified in the load chart.
- ▶ Crane operation outside the permissible set up configurations, boom radii and slewing ranges according to the load chart is prohibited.

WARNING
Incorrect reeving number set up!
If the reeving number on the pulley head is less than the reeving number set on the LICCON computer system, it can result in an overload of the hoist rope.
The hoist rope can rip. The load can fall down and fatally injure personnel.
- ▶ Comply with the reeving numbers specified in the load chart for maximum loads.
- ▶ Make sure that the reeving on the pulley head and the reeving set on the LICCON computer system match.

The minimum rope coils must remain on the rope winches. The number of minimum rope coils depends on if the rope winch is equipped with a cam limit switch or a winch speed sensor.

WARNING
Minimum rope coils fallen below!
The rope will be ripped out. The load falls down.
Personnel can be killed.
- ▶ Make sure that the minimum rope coils remain on the rope winch.
- ▶ Observe and comply with the number of the minimum rope coils in chapter 5.01.

WARNING
Lift the load by luffing up!
The crane can topple over and fatally injure personnel.
- ▶ Lift the load with the hoist gear.

Always comply with the maximum loads specified in the load chart.

The weight of the hook block according the load chart must be taken into account. Subtract the weight of the hook block from the load chart value. The minimum hook block weight must be determined according to the reeving number and the data in the load charts.

For the lift, use the hook block which is suited best for the existing set up configuration in connection with the load chart.

Initiate all crane movements carefully. Also slow down the crane movements carefully. That way you can avoid a swinging or pendulum motion in the suspended load.

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2 Checks before starting to work with the crane

Before starting work with the crane, the crane operator must carry out a further inspection to satisfy himself about the crane's operational safety:
- Check that the crane is properly supported and level.
- Check that the set up configuration set in the control matches the actual set up configuration.
- Check that all values in the load chart that apply to the current equipment configuration have been entered and met.
- Ensure that there are no people or objects within the danger zone of the crane.

WARNING
Persons in the slewing range!
Crushing danger, death, severe bodily injuries.
▶ Monitor the slewing range.
▶ Make sure that there are **no** persons within the slewing range.
▶ Block off the slewing range if necessary.

WARNING
Obstacle in the slewing range!
Property damage on crane and on obstacle.
▶ Make sure that there are **no** obstacles within the turning range of the crane and the crane components.

2.1 Visual check for damage

WARNING
Danger of accident!
If the crane is operated despite existing defects, personnel can be severely injured or killed.
▶ In the event of deficiencies which threaten operational safety, stop crane operation immediately.

The following deficiencies threaten the crane's operational safety:
- Damage to load-bearing parts of the crane design, such as booms, supports etc.
- Failure of the hoist gear brake and consequent slipping of the load
- Functional failures in the crane control system
- Functional defects in the indicator and warning lights
- Damage to the hoist ropes
- Safety defects in the safety equipment
- Leaks on safety relevant components of the crane hydraulic

Inform the appropriate supervisor about the deficiencies on the crane and also inform your relief when crane operators are changed.

2.2 Telescopic boom distortion because of sunshine on one side

A temperature difference occurs between the side facing the sun and the side facing away from the sun for cranes with telescopic booms. This causes telescopic boom side distortion, which can reduce the load bearing capacity of the telescopic boom.

For example, a temperature difference between the two boom sides of 30 °C and a boom length of 60 m results in a length difference caused by the temperature difference between the two sides of the telescopic boom of approximately 22 mm. With narrow boom parts, this causes the profiles to bend sideways.

If the maximum load is being utilized when a telescopic boom extension such as a fixed lattice jib, luffing lattice jib or folding jib is being used, then it must be ensured through a visual inspection before picking up the load that the boom is not showing signs of side deformation due to one-sided sun exposure.

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WARNING
Danger of accident due to component overload!
If the telescopic boom has become distorted because of one-sided sunlight, this can cause component overload and therefore accidents.
▶ Turn the crane so that both sides of the boom are heated up equally, eliminating side deformation due to temperature difference.

3 Crane movement - Telescoping

If the telescopic boom is telescoped with the jib boom or telescopic boom extension, before the telescoping procedure, ensure that:
– The crane is properly supported and horizontally aligned.
– The telescopic boom is evenly warmed up by solar radiation.
– There is no strong side wind.

WARNING
Damage to the telescopic boom or the hoist rope!
If these 3 factors are not adhered to, damage of the telescopic boom or the hoist rope can occur and lead to accidents.
▶ Support the crane properly and align it horizontally.
▶ Keep both sides of the boom at about the same temperature.
▶ Telescope only to the permissible wind speed according to the load chart.
▶ If the actual wind speed is higher than the permissible wind speed noted on the load chart, telescoping is prohibited.

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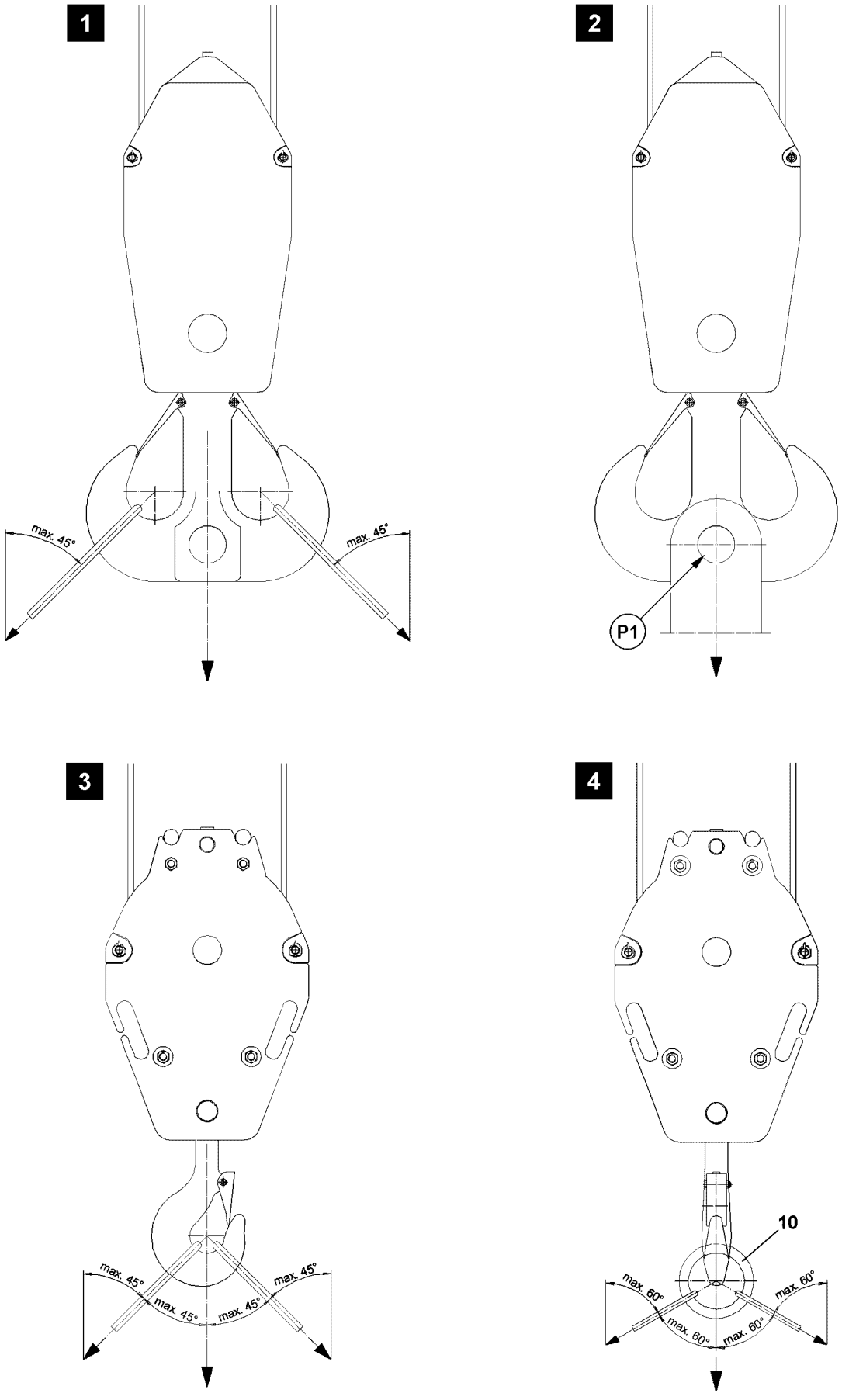

Fig.121650

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4 Taking on a load

The crane must always be operated in such a way that its load-bearing parts are not destroyed or damaged and its stability is ensured.

Make sure that the following prerequisites are met:
- The crane is supported and horizontally aligned.
- The LICCON overload protection has been set according to the load chart and the set up configuration.
- The LICCON overload protection is active.
- In the case of cranes with central ballast: The central ballast is installed according to the load chart.
- The counterweight is installed according to the load chart.
- In the case of cranes with derrick ballast: The derrick ballast is installed according to the load chart.
- The hook block or the load hook is correctly reeved.

4.1 Fastening the load

WARNING
Load can be ripped off!
If impermissible fastening and / or load handling equipment is used when taking on a load on the centric bore on the double hook at point **P1** (illustration **2**), then the double hook as well as the hook block can be damaged.
The load can rip off and fall down.
Personnel can be severely injured or killed.
▶ Lift the load via the centric bore on the double hook (point **P1**): For the technical requirements and the technical design of the fastening and / or load handling equipment contact the hook block manufacturer.

WARNING
The crane can topple over!
If the following conditions are not met, the crane can topple over.
Personnel can be severely injured or killed.
This could result in high property damage.
▶ Pay attention to the own weight of the load handling equipment.
▶ Pay attention to the load bearing capacity of the load handling equipment!
▶ The maximum permissible incline of the strands fastened on the single or double hook in the hook jaws is 45°. See illustration **1** and illustration **3**.

If necessary for the single hook:
▶ Use fastening equipment with a suspension link **10**. The maximum permissible incline in this case is 60°. See illustration **4**.
▶ Load a single and double hook symmetrically. A maximum deviation of ±3° from the direction of the center of gravity is permissible.

If necessary:
▶ Use cross beam or two cranes for taking on the load.

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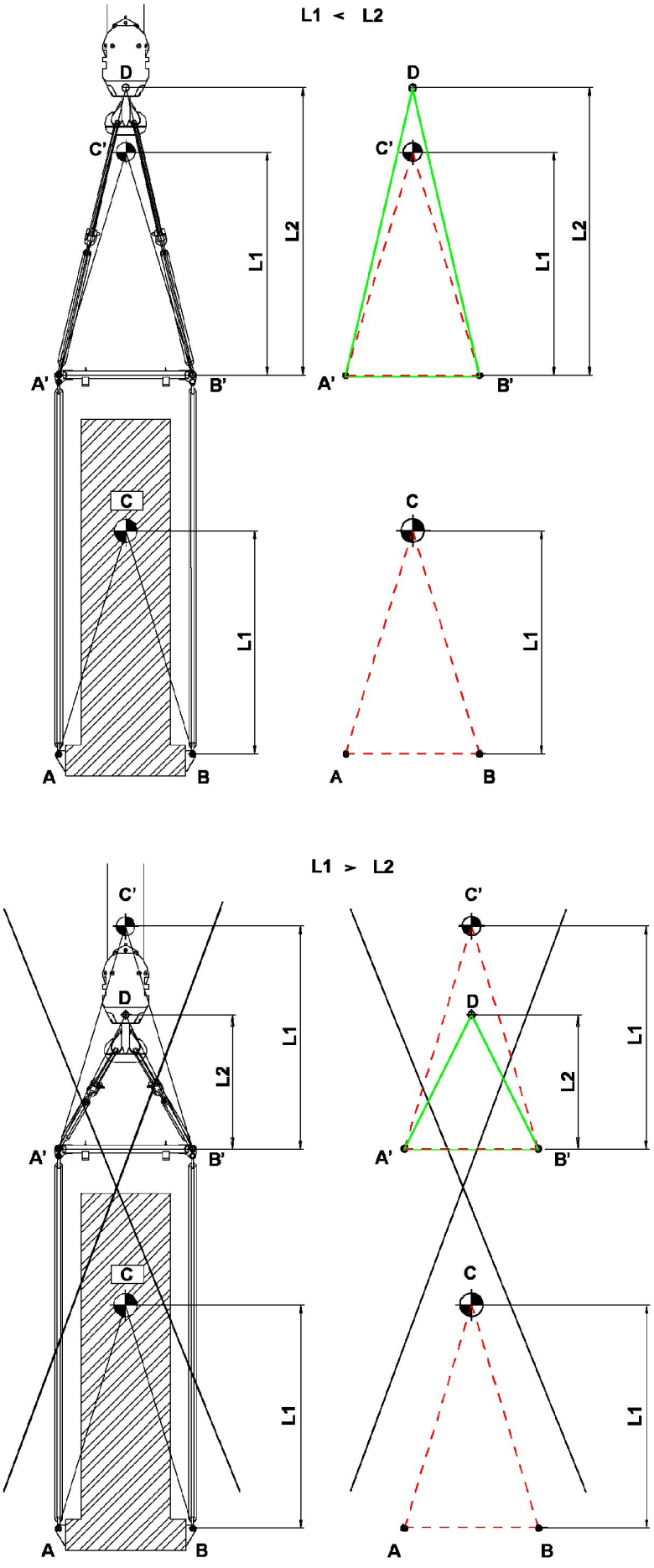

Fig.116274

4.2 Taking on a load with cross beam

Cross beam are load handling equipment between crane hook and load.

The distance of the center of gravity **L1** is the vertical dimension from the fastening point of the load to the center of gravity of the load.

The cross beam height **L2** is the vertical dimension from the point of rotation of the crane hook to the next lower linkage point of the cross bar.

WARNING
Tipping of load to the side!
If fastening ropes are used which are too short, so that the load center of gravity is above the fastening point, then there is a danger of the load tipping to the side.
Personnel can be severely injured or killed.
- ▶ The load center of gravity must be below the crane hook.
- ▶ The distance of the center of gravity **L1** must be smaller than the cross beam height **L2** (L1 < L2).
- ▶ The triangle **A'B'C'** must be within the triangle **A'B'D**.

4.3 Transporting the hook block

WARNING
Danger of accident!
If a hook block is fastened incorrectly for transport, personnel can be injured.
- ▶ Fasten the hook block for transport on the fixed point in the center.
- ▶ Fastening the complete hook block on the auxiliary weights is prohibited.
- ▶ When setting down, secure the hook block against falling over.
- ▶ Prevent the load hook from rolling away.

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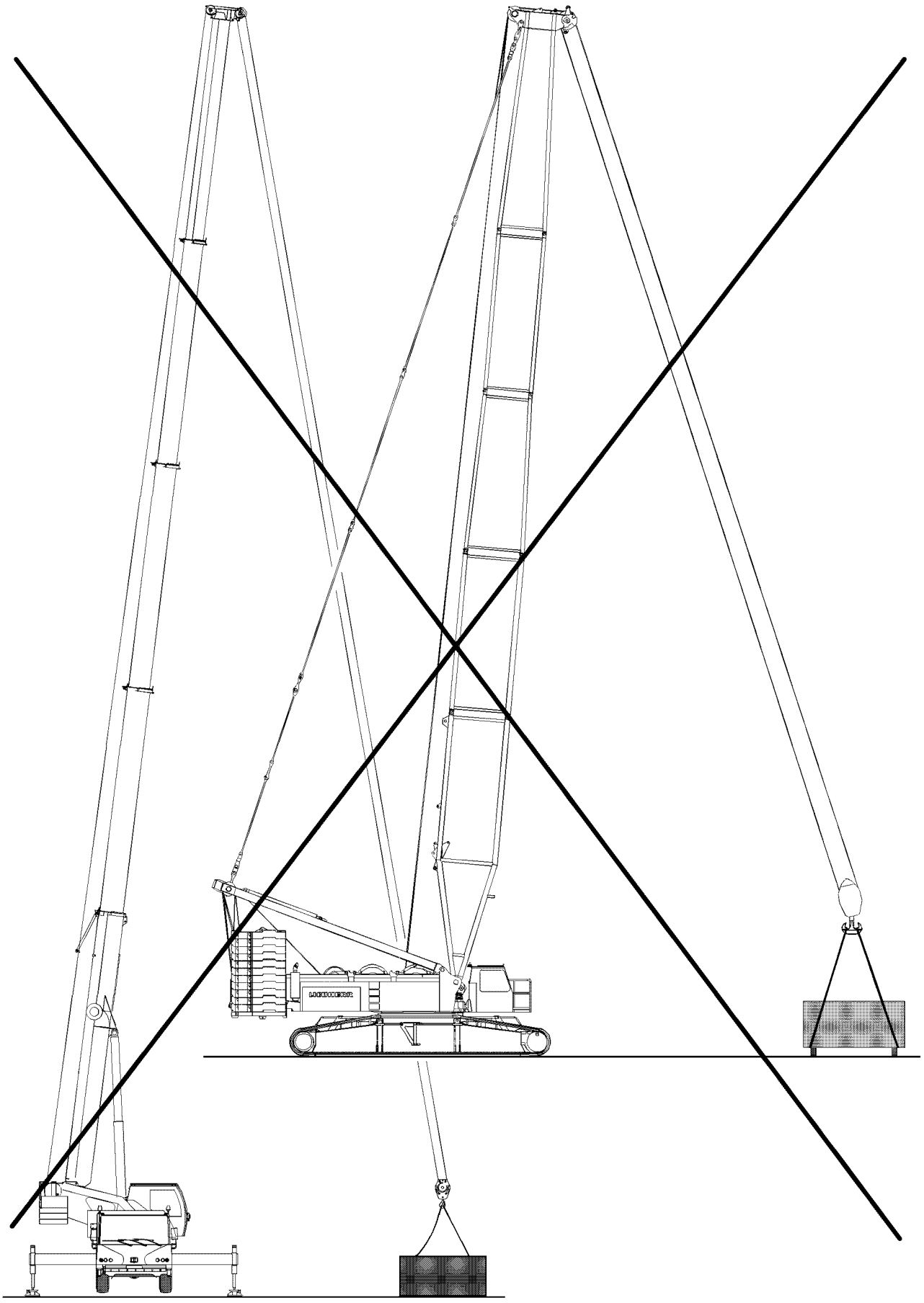

Fig.102716

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4.4 Lifting the load

WARNING
Danger of crushing for people in the load zone!
If personnel is located between the load to be lifted and a possible interfering edge (such as a wall of a building or similar) when the load is lifted, personnel can be severely injured or killed.
- ▶ Before lifting the load it must be ensured that there are no persons within the danger zone.
- ▶ It is prohibited to remain in the danger zone.
- ▶ It is prohibited for anyone to be under the load. Maintain a safe distance.
- ▶ Swinging the load is prohibited.
- ▶ Exercise extreme caution when lifting a load.

WARNING
The crane can topple over!
If an attempt to lift a load over the hoist gear causes the LICCON overload protection to turn off, then the load may not be lifted by luffing up the boom. This causes overload or toppling the crane.
Personnel can be severely injured or killed.
- ▶ Do not lift the load by luffing up the boom off the ground.

Note
When using the assembly winch* observe the following:
- ▶ Use the assembly winch* only for assembly and not for lifting loads.
- ▶ Lifting of loads with the auxiliary winch is prohibited.

If the fastening rope is manually attached by an assistant to the load to be lifted:
- – Make sure that the assistant's hands are not crushed by the tightened ropes between the load and the fastening rope.
- – Make sure that the assistant's body parts (hands, legs etc.) are not crushed by a swaying movement of the load during lifting.

4.5 Angular pulling

WARNING
The crane can topple over!
Angular pulling can destroy the crane or cause it to topple over.
Personnel can be severely injured or killed.
- ▶ Fasten (hang) the hook block always vertically over the center of gravity of the load to be lifted.
- ▶ Do not use the slewing gear to pull and set up loads.
- ▶ When lifting, compensate for boom deflection.
- ▶ Angular pull is prohibited.

The crane is designed only to lift loads vertically. During angular pulling, regardless of whether this is done in the same direction as the boom or laterally, horizontal forces are generated from the load in addition to the vertical forces, for which the boom is not designed.

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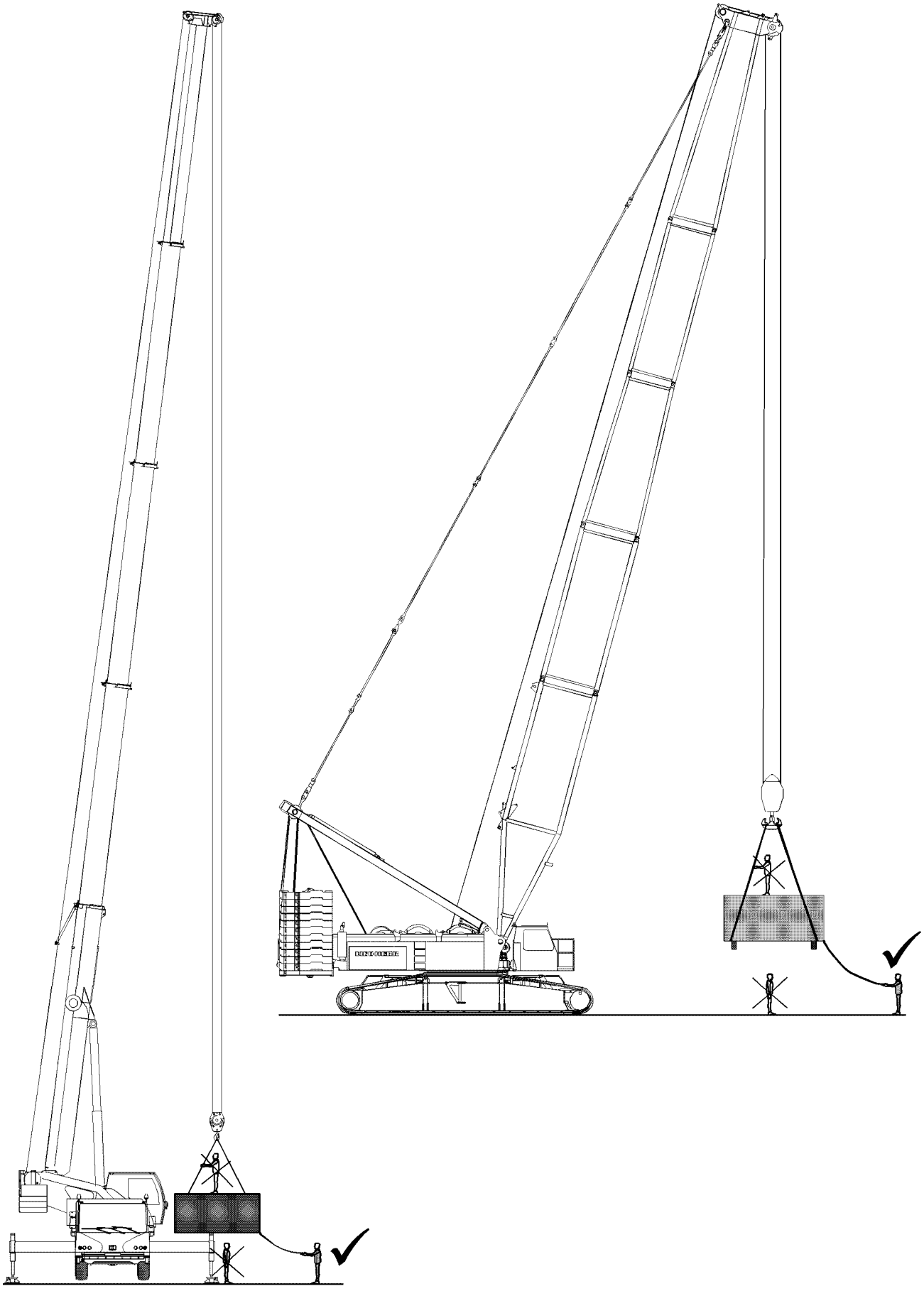

Fig.102717

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4.6 Breaking away fixed loads

WARNING
The crane can topple over!
Ripping stuck loads free can destroy the crane or cause it to topple over.
Personnel can be severely injured or killed.
▶ Ripping stuck loads free is prohibited.

5 Crane operation

The maximum load capacity of the crane is not just limited by the stability, but in many cases a load-bearing component breaks when the crane is overloaded **before** the crane topples over. Components that are susceptible to buckling such as the telescopic boom may fail suddenly **without showing signs of distortion beforehand** if the crane is overloaded.

WARNING
Danger of accidents for cranes with luffing cylinders!
When the luffing cylinder is on block position, the overload protection is not functioning.
▶ Crane operation at block position of luffing cylinders is prohibited.

5.1 General

A suspended load must always be kept under control. A fundamental requirement for this is the safe and delicate control of the crane's functions.

WARNING
Danger of accident due to swaying loads!
A swaying load can damage the crane and cause it to topple.
▶ All crane movements must be executed slowly and delicately.
▶ Initiate all crane movements slowly.
▶ Apply the brakes slowly in all crane movements.
▶ Crane operation with swaying load is prohibited.

NOTICE
Damage of rope pulleys!
▶ Place down hook blocks, booms, folding jibs, jib booms and boom noses in such a way that the rope pulleys do not lie on the ground and are damaged.

5.2 Guiding the load

The use of guide ropes is recommended to help the crane operator manage the load more precisely and to prevent the load from swaying. This will prevent undesirable movements of the load and consequent damage.

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5.3 Danger of crushing

WARNING
Danger of fatal injury!
Extreme care is needed when lowering a load. Danger of fatal injury exists for personnel in the immediate area of the load being lowered.
Personnel can be severely injured or killed.
- ▶ Standing under a suspended loads is strictly prohibited.
- ▶ Observe the danger of tipping when setting down the load. For example, small support surfaces or unsuitable ground.

5.4 Danger of falling

WARNING
Danger of fatal injury!
If persons are on the suspended load, then they can fall down and be severely injured or killed.
- ▶ Remaining on a suspended load is strictly prohibited.
- ▶ Remaining on or within crane components (for example: At assembly of boom sections, lattice sections) which are moved during lifting, lowering, turning or closing procedures is strictly prohibited.

5.5 Working in the vicinity of electricity transmission lines

If there are electricity transmission lines in the immediate vicinity of the building site, then the electrical transmission lines must be turned off by qualified electricians. If this is not possible, the danger area must be covered over or cordoned off.

WARNING
Danger of current transfer!
If electricity transmission lines are not shut off nor covered nor blocked off, then there is an increased danger of accident due to current transfer.
- ▶ For rated voltages to 500 kV AC: Adhere to a safety distance of 8 m.

If the crane becomes electrified despite having taken all necessary precautions, proceed as follows:
- ▶ Remain calm!
- ▶ Do not leave the crane cab.
- ▶ Warn people outside: Stay in place and do not touch the crane.
- ▶ Move the crane away from the danger zone.

5.6 Ram work or pulling sheet piles

Vibration can be transmitted to the supporting steel structure of the crane during ram work or when pulling sheet piles with the crane. This vibration can cause premature fatigue of the material and therefore cracks in the supporting steel structure.

DANGER
Important instructions for „ram work“ or „pulling sheet piles“.
If the crane is used for ram work or pulling sheet piles, then the following instructions must be followed. Failure to follow the instructions can result in damage to the crane.
- ▶ The ramming equipment may not pass on vibrations into the boom.
- ▶ When pulling sheet piles, the maximum pull force of the crane is limited according to the load chart. Restricting the maximum pull force via the crane overload protection **only** is prohibited. The pull force must be additionally checked by measuring.

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6 Crane rope pretension

Damage that can occur with multi layer spooling:
- Friction
- Broken wires and loop formation
- Flattenings, deformations

NOTICE
Crane rope pretension too low!
Loosely coiled rope layers.
Rope damage. Reduced service life of the crane rope.
Cutting of the crane rope into the lower rope layers. The load can not be lowered any further.
▶ To maximize the service life of the crane rope, carry out the measures in the following sections.

Note
▶ Liebherr recommends to shorten crane ropes with damage in the cross over area of the coils, in order to lengthen the service life. Shortening the crane rope, see Crane operating instructions, chapter 7.05.50.

6.1 Working with a high rope pull

If multiple lifts are performed with a high rope pull, loosen the lower rope layers that are rarely or never spooled out.

NOTICE
Loosely spooled out rope layers!
Rope damage.
Upper rope layers with a high rope pull deform the lower rope layers in the cross over area of the crane rope.
Spooling deformed rope sections over rope pulleys reduces the service life of the crane rope.
▶ Place a shorter crane rope.

When the lower rope layers are **not** used during repeat work:
▶ Increase the pretension of the lower rope layers: Spool out the entire rope length and then spool back up with the highest rope pull possible. See section „Increasing the hoist rope pretension“.

6.1.1 Placing a shorter crane rope

Note
▶ Liebherr recommends using the entire rope length.

Unused rope sections cause the loosening of the lower rope layers.

When only a part of the crane rope length is used for a longer period of time:
▶ Place a shorter crane rope.

6.1.2 Reducing rope unwinding

Telescopic boom

When telescoping out less, then the smallest amount of fixed coiled up crane rope is spooled out.

▶ Telescope out as little as possible.

Picking up the fastening equipment

If the fastening equipment with a flat boom system must be picked up, then the smallest possible amount of crane rope is spooled up loose.

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- ▶ Establish a flat boom system: Telescope out or luff up the boom.
- ▶ Pick up the fastening equipment.

6.1.3 Restoring hoist rope pretension

Brief description

If a multi-pulley hook block is reeved, then the entire hoist rope length can be spooled out from the rope drum.

- ▶ Spool the hoist rope out until three safety coils.
- ▶ Create 10 % maximum strand pull: Attach the load.

While the hoist rope is spooled up:
- – Hold the load just off the ground.
- – In the permissible range of the load chart of the relevant set up configuration: Increase the load radius by luffing down.

- ▶ Spool the hoist rope up.

Description using the example LR 1600-2, SL3F

This section explains the procedure with the help of the set up configuration for LR 1600-2 with boom system SL3F.

The crane-specific parameters ensure that rope is spooled out until four rope coils and as many rope coils with pretension as possible can be spooled up.

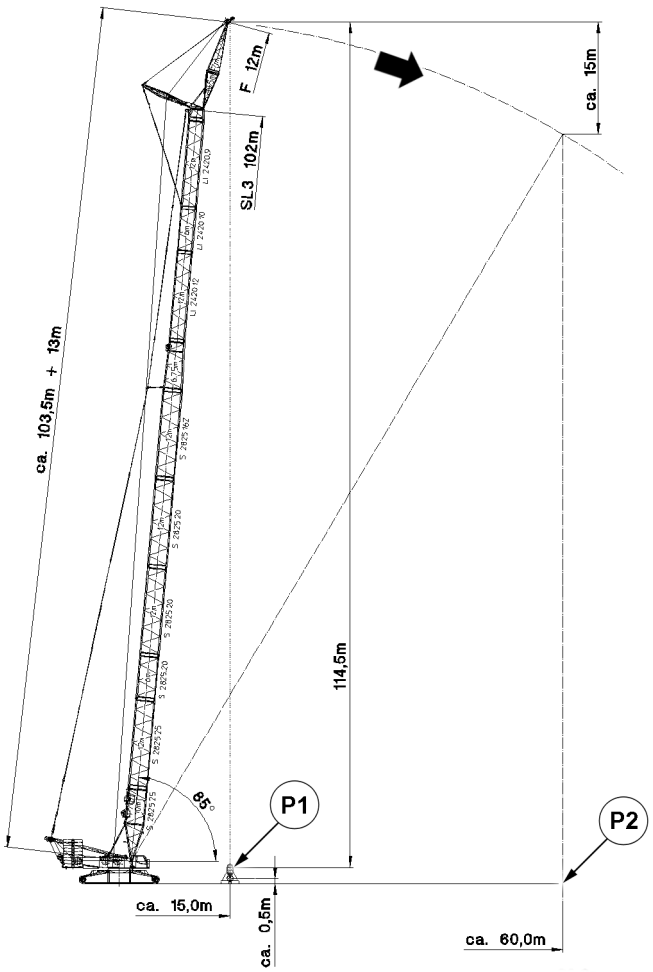

Fig.127131: LR 1600-2, SL3F: Spooling up hoist rope with pretension

Boom radius	Load	10 % of maximum strand pull
60 m	14.4 t	1.8 t

Load example: LR 1600-2, SL3 102, F12, according to the load charts

Hoist rope for this example:
– Hoist rope with a length of 1050 m

Hook block for this example:
– Hook block 200 DM, 5-pulley, reeved 8 times
– The weight of the hook block with ten auxiliary weights is 7.0 t

To reach sufficient rope pull, another load must be hung in addition to the hook block.

Make sure that the following prerequisites are met when hanging the load:
– Load is hung as short as possible.
– For a boom radius of 15.0 m , the hoist rope can be spooled out on the winch until four coils.
– The load is suspended over the ground.

▶ Pick up the load with 7.4 t.
▶ Set the boom system to boom radius 15.0 m.
▶ Spool the hoist rope out.

Result:
– In position **P1** there are 9 m of hoist rope (four coils) on the hoist winch:

Spooled out rope section	Length
8-way reeving, distance of ground to the F-jib with boom radius 15 m	8 x 114,5 m = 916,0 m
Winch to FA-frame	103.5 m
F-head	13.0 m
Rope pulleys	7.5 m
Total of spooled out hoist rope	1040.0 m

*Rope lengths in position **P1***

While the hoist rope is spooled up:
– Hold the load just off the ground.
– In the permissible range of the load chart of the relevant set up configuration: Increase the load radius by luffing down.

▶ Spool up the hoist rope and luff down the boom at the same time until boom radius 60.0 m is reached.
▶ Set down the load.

Result:

– The pretension of the first and second position of the rope coils is restored.
– In position **P2** there are 130 m of hoist rope (23 coils) on the hoist winch:

Spooled up rope section	Length
Four coils initial situation	9 m
8-way reeving, F-jib height difference with boom radius 60 m	8 x 15 m = 120 m
Total of spooled up hoist rope	130 m

*Rope lengths in position **P2***

▶ Make sure that the hoist rope on the winch remains pretensioned: Reeve out the hook block and reeve in with slower reeving. See Reeving plan.

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6.2 Picking up and lowering overhead loads

The load is picked up overhead in the following application examples:
- Repowering wind power plants
- Disassembly of slewing tower cranes

NOTICE
Load picked up overhead with loosely coiled rope layers!
The rope pull increases when the load is picked up. The rope coils in the lower rope layers move laterally and are compressed. The hoist rope can cut into the lower rope layers.
▶ Spool up the hoist rope without a load only with rope pretension.

NOTICE
Load lowered with cut in rope layers!
The hoist rope is pulled jerkily from the lower rope layers. Vibrations are introduced into the crane system.
Cut in hoist rope clamped between the lower rope layers. The load can **not** be lowered any further.
▶ To prevent the cutting in of the hoist rope, carry out the measures in the following sections.

6.2.1 Increasing the reeving number

NOTICE
Higher reeving number than indicated on the load chart!
Slack rope formation.
The crane load drops due to additional weight from the rope strands and hook block.
If a higher reeving number is not considered in the set up configuration, the load display on the LICCON monitor no longer corresponds.
▶ Redetermine the hook block weight according to the load chart manual and adjust if necessary.
▶ Check if the crane load is sufficient for higher reeving.
▶ After telescoping out, check if the hook block can still reach the desired position for putting down the load.

A higher reeving number reduces the rope pull. A lower rope pull prevents the cutting in of the hoist rope in the lower rope layers.

▶ Select the highest reeving number possible for the hoist rope.

6.2.2 Increasing the hook block weight

NOTICE
Lift the hook block without a load!
The hoist rope is spooled up with a low rope pull. The rope layers are spooled up loose on the rope pulley.
▶ Increase the rope pull: Increase the hook block weight.

A higher hook block weight increases the rope pull.

▶ Increase the hook block weight.

If the crane load is sufficient:
▶ Attach an auxiliary weight between the load and hook block.

6.2.3 Pretensioning the hoist rope with pretensioning ballast with two hook operation

The pretensioning ballast is **not** included in the Liebherr scope of delivery.

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NOTICE
Lift the hook block without a load!
The hoist rope is spooled up with a low rope pull. The rope layers are spooled up loose on the rope drum.
▶ Pretension the hoist rope with pretensioning ballast with two hook operation.

Make sure that the following prerequisites are met:
– The crane is equipped for two hook operation.
– The pretensioning ballast is present.

Properties of the pretensioning ballast:
– Developed by Liebherr.
– The weight is 4 t.
– Special tow coupling

▶ Fasten the pretensioning ballast on the main hook and on the auxiliary hook.

The pretensioning ballast is lifted with the main hook, the auxiliary hook is carried along without a load.

▶ Lift the pretensioning ballast.

When the main hook has reached the required height:
▶ Stop the main hook.

After the load is completely transferred to the auxiliary hook, the main hook fastening ropes release automatically.

▶ Lift the auxiliary hook until the pretensioning ballast hangs completely on the auxiliary hook.

When the main hook fastening ropes have released:
▶ Lower the pretensioning ballast with the auxiliary hook and place it on the ground.

Result:

– The full load is present on the main hook.

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4.20 Procedure for shut-off of crane movement

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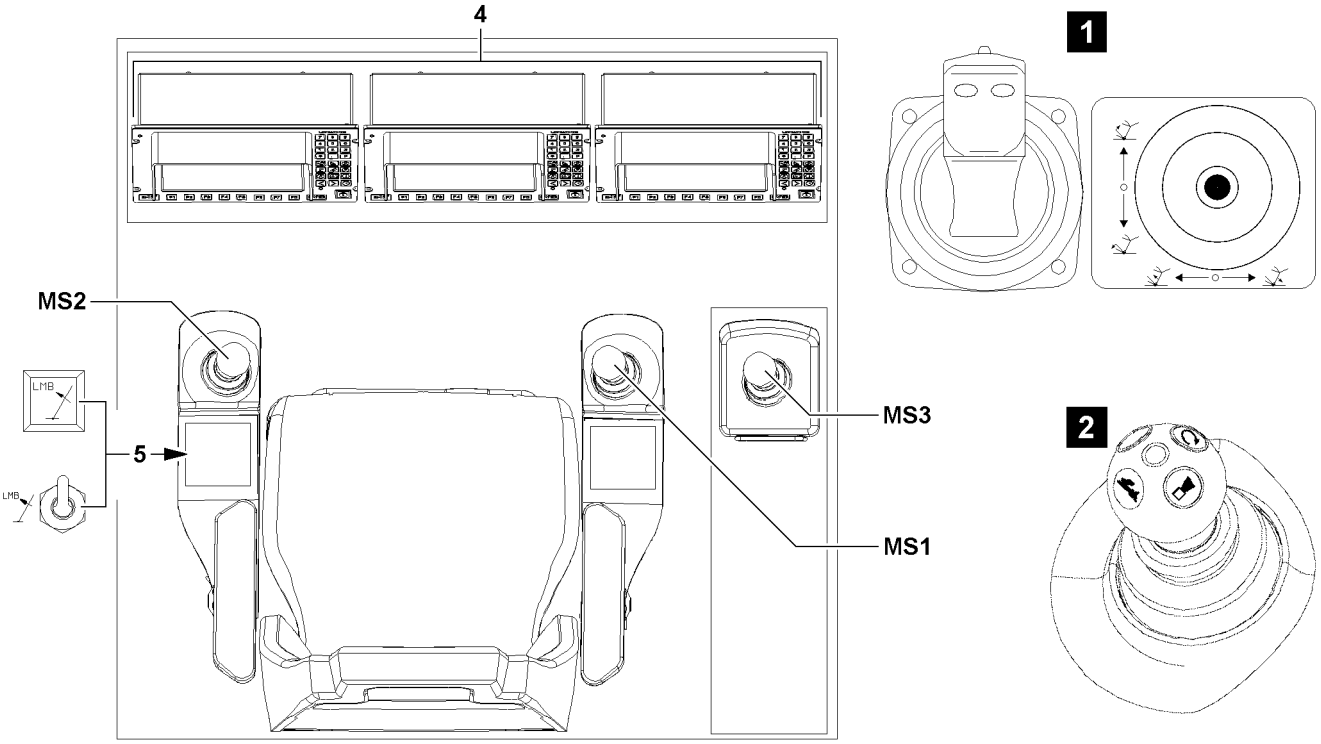

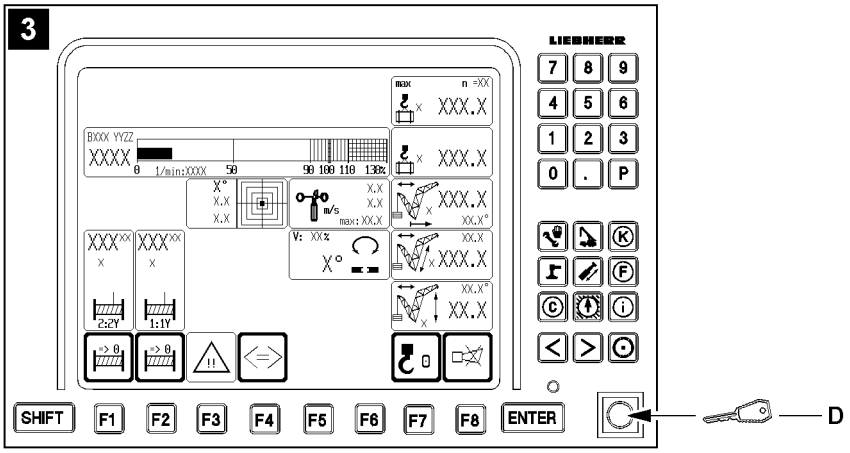

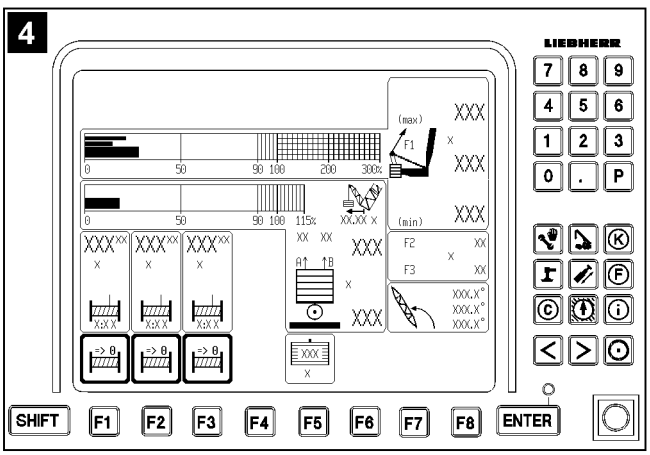

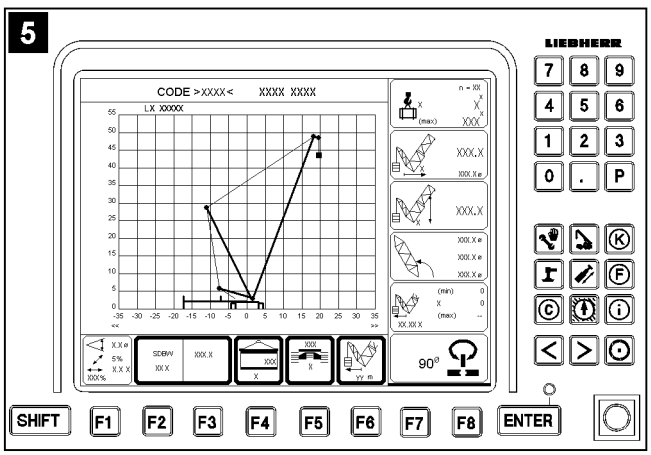

Fig.112332

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1 General

To operate the crane, three manually actuated master switches (MS1, MS2, MS3) are available.

- **MS1** Master switch
  - Right control console
- **MS2** Master switch
  - Left control console
- **MS3** Master switch
  - Right instrument panel

To monitor the crane, depending on the crane type, two or three LICCON monitors **4** are in the instrument panel.

- LICCON monitor, illustration **3**
  - User interface for entry of equipment configurations and for crane operation (crane operating screen), also described as LICCON monitor 0
- LICCON monitor, illustration **4**
  - User interface for operation with „Derrick“ boom, also described as LICCON monitor 1
- LICCON monitor, illustration **5**
  - User interface for „LICCON job planner“ (only for crane types with three monitors), also described as LICCON monitor 2

Equipment in the crane cab		
Crane type	**Manually actuated master switches**	**LICCON monitors**
LR 1350/1	Three (version illustration **2**)	Two (three*****)
LR 1400/2	Three (versions illustration **1**)	Two
LR 1600/2	Three (version illustration **2**)	Three
LR 1600/2–W	Three (version illustration **2**)	Three
LR 1750	Three (version illustration **2**)	Three
LR 1750/2	Three (version illustration **2**)	Three
LG 1750	Three (version illustration **2**)	Three
LR 11350	Three (version illustration **2**)	Three

In the crane operator's cab, two buttons are installed to make it possible to bring the crane from an emergency situation after a shut off of the LICCON overload protection.

- Set up key **D** (Function „Exceeding the shut off limits for the LICCON overload protection“) on the LICCON monitor with crane operating screen, illustration **3**
- Button **5** „Luffing in with suspended load“ in the left control console

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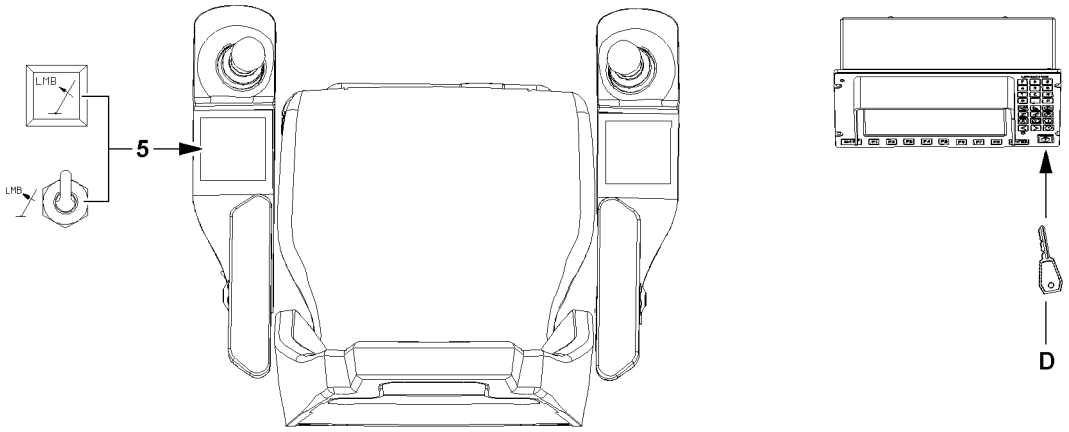

Fig.112333

The function „Exceedance of shut off limits of the LICCON overload protection“, which is activated with the set up key **D** includes the following:

- Exceedance of the maximum permissible load moment
- Bypass of the hoist top shut off
- Exceedance of limit values from load charts
- Exceedance of maximum value test point 1 (force F1)
- Allowance of individual, limited crane movements after LMB STOP (error message)
- Completion of crane movements outside of load charts (erection / take down procedures)

NOTICE

Multi action function „Exceedance of shut off limits of the LICCON overload protection“!
If the set up key **D** is actuated, then it is possible to exceed several shut off limits of the LICCON overload protection simultaneously.
The LICCON overload protection as a whole is deactivated or limited.
There is no additional protection against crane overload.

▶ When the set up key **D** is actuated, it must be taken into account that the LICCON overload protection as a whole is deactivated or limited.

Note

The set up key **D** has two functions, independent of each other:

▶ If no crane movement can be carried out due to the shut off of crane operation by the LICCON overload protection, then by pressing the set up key **D**, a 100 % utilization can be exceeded and / or an active shut off can be bypassed. The crane can thereby be controlled again in normal operating status (utilization below 100 % and no active shut off).

▶ When the set up key **D** is actuated, all erection / take down procedures can be carried out within the erection / take down charts (assembly operation).

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WARNING
Danger of accident due to function „Exceedance of shut off limits of the LICCON overload protection“!
If the shut off limits of the LICCON overload protection are exceeded, there is no additional protection against crane overload.
Due to erroneous operation or deliberate misuse, the crane could collapse, the boom can break off or the crane can topple over.
Personnel can be severely injured or killed.

- ▶ The button **5** „Luffing in with suspended load“ and the set up key **D** may only be actuated when it is ensured that no normal operating condition (utilization below 100 % and no active shut off) can be reached without the function „Exceedance of shut off limits of the LICCON overload protection“!
- ▶ Actuate the set up key **D** only when no normal operating condition (utilization below 100 % and no active shut off) can be reached with the button **5** „Luffing in with suspended load“.
- ▶ The function „Exceeding the shut off limits of the LICCON overload protection“ is only permissible in emergencies and for assembly purposes.
- ▶ The set up key **D** may only be actuated by persons who are aware of the effects of their acts regarding the function „Exceeding the shut off limits of the LICCON overload protection“.
- ▶ The function „Exceeding the shut off limits of the LICCON overload protection“ requires the presence of an authorized person and must be performed with utmost caution.
- ▶ Crane operation with activated function „Exceeding the shut off limits of the LICCON overload protection“ is prohibited.

WARNING
Expanded working / danger zone of the crane!
Due to the function „Exceedance of shut off limits of the LICCON overload protection“ it is possible that the working / danger zone of the crane is significantly expanded.
If these circumstances are not observed, collisions and accidents can occur.
Personnel can be severely injured or killed.

- ▶ With activated function „Exceedance of shut off limits of the LICCON overload protection“ take an expanded working / danger zone of the crane into account and monitor it.

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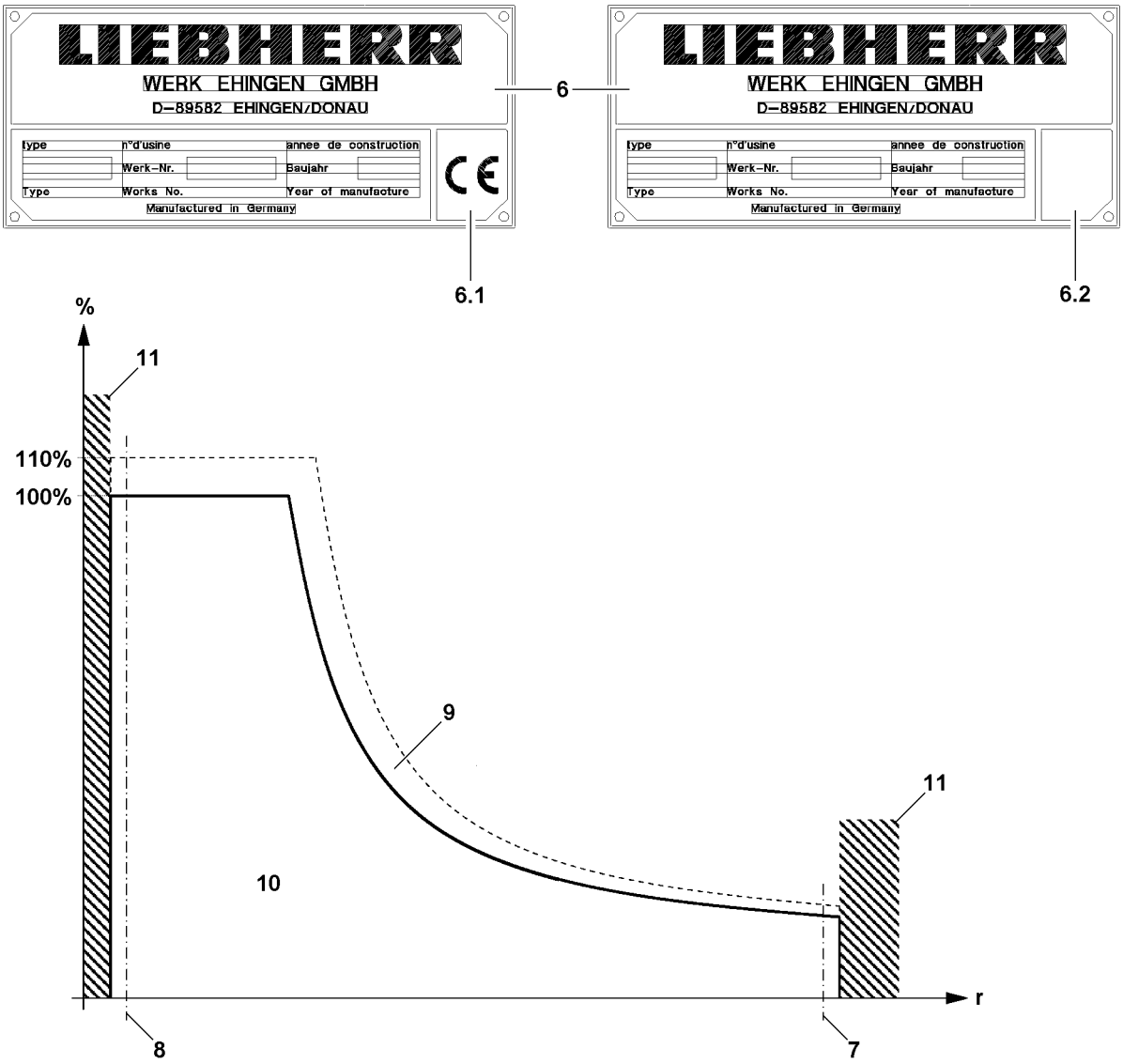

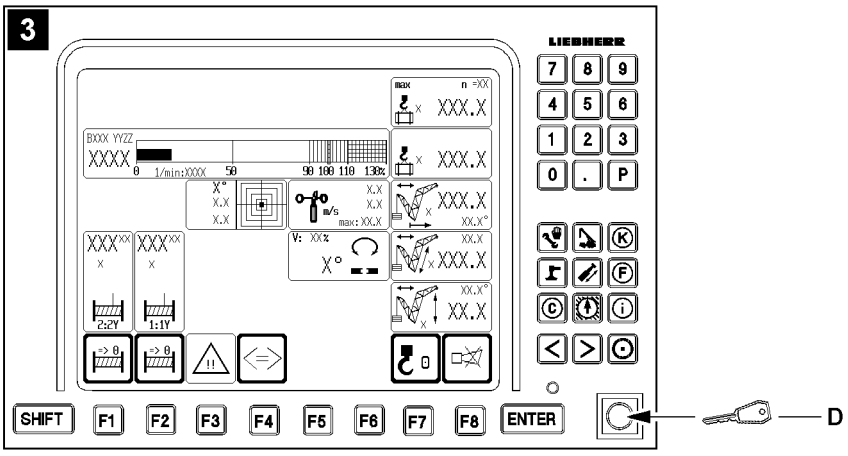

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Fig.111211

2 Instructions for resuming crane movements for cranes with CE mark

WARNING
Danger of accident!
If the following points are not observed, personnel can be severely injured or killed.
- ▶ The crane operator bears the sole and full responsibility for the adherence to measures to be taken in case of shut off of crane movement.
- ▶ The crane operator must make sure, before crane operation, that he is using the correct description for the current programming.

Note
- ▶ Check the data tag **6** to determine if your crane has a CE mark.
- ▶ The following section applies to a crane with CE mark, see data tag **6.1**.
- ▶ If your crane does not have a CE mark, see data tag **6.2**, then you must observe the description in section „Instructions for resuming a crane movement for cranes without CE mark“.

2.1 Overview load chart for cranes with CE mark

Axle	Description
r	Radius boom (working radius)
%	Utilization of the crane in percentages

Position	Description
7	Lower limit angle load chart
8	Upper limit angle load chart
9	Utilization up to 110 % with reduced working speed
10	Range „Load chart available“
11	Range „No load chart available“

Note
- ▶ If the set up key **D** (LICCON monitor with crane operating screen, illustration **3**) is actuated in the area „load chart available“, then the working speed is reduced and all displays of the LICCON overload protection remain functional.
- ▶ If the set up key **D** is actuated in the area „no load chart available“, then the working speed is not reduced.

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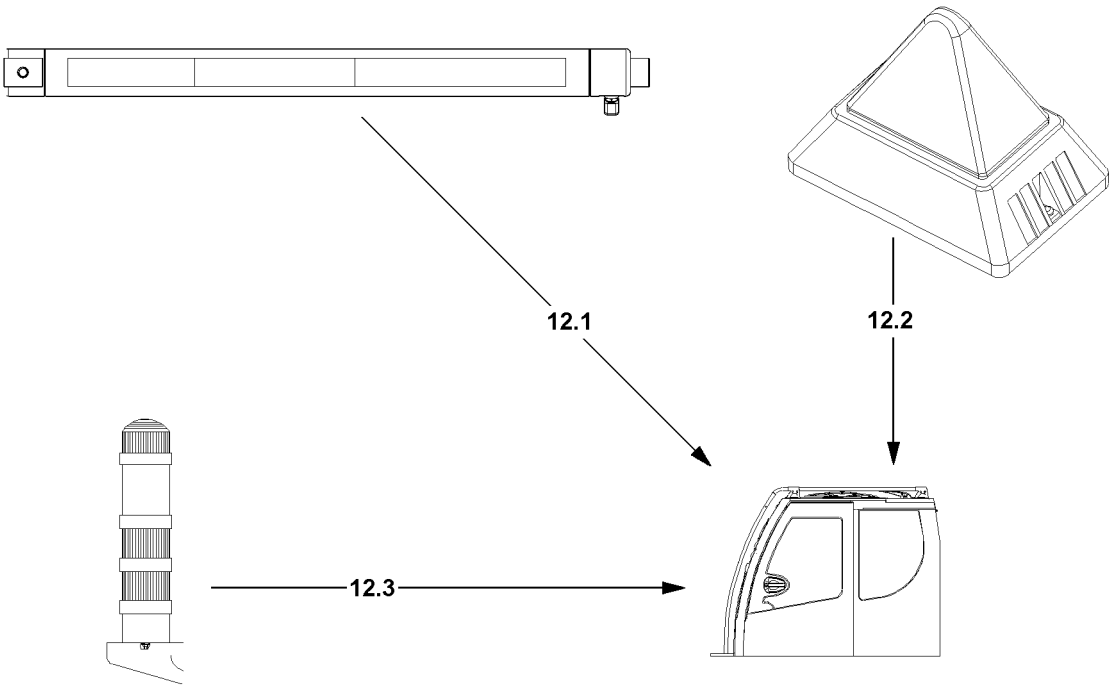

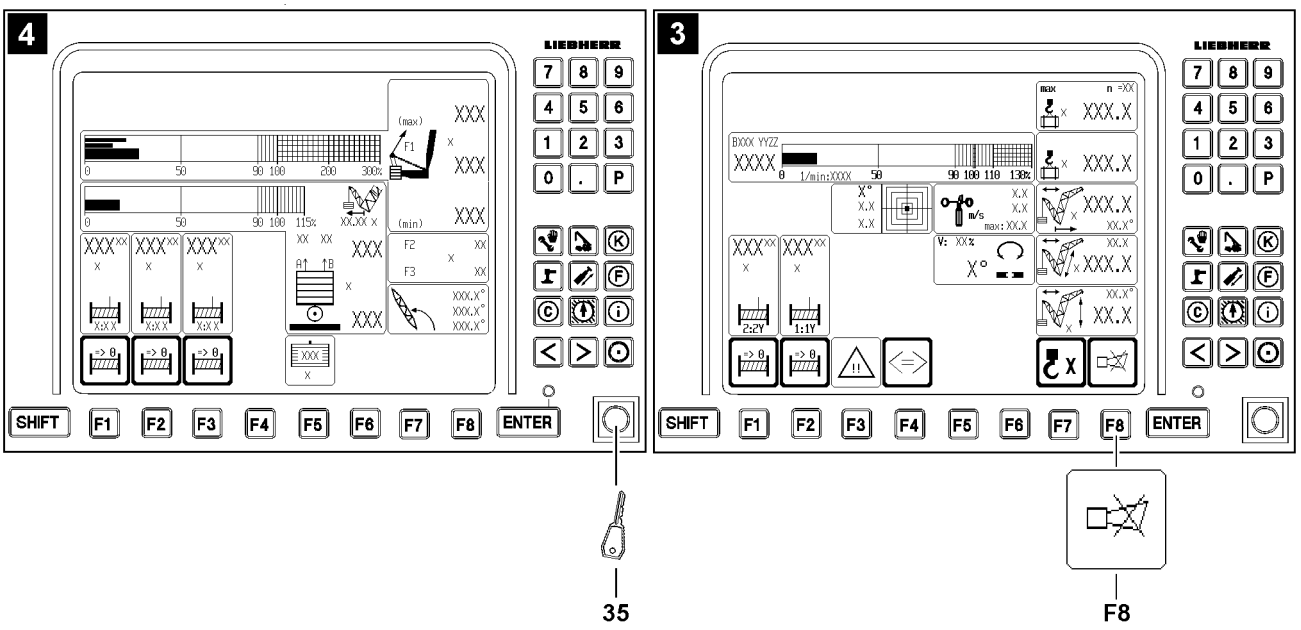

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Fig.111212

2.2 Overview of acoustic / visual warnings for cranes with CE mark

- Depending on the crane type, either a warning light **12.1** or a flashing beacon **12.2** or a combination of flashing beacon **12.2** and warning light*** 12.3** are installed.
- The acoustic warnings within the crane operator's cab are turned off by pressing the button **F8** on the LICCON monitor with crane operating screen (illustration **3**).
- The acoustic warnings outside the crane operator's cab are turned off by actuating the key button **35** on the LICCON monitor with derrick operating screen (illustration **4**).

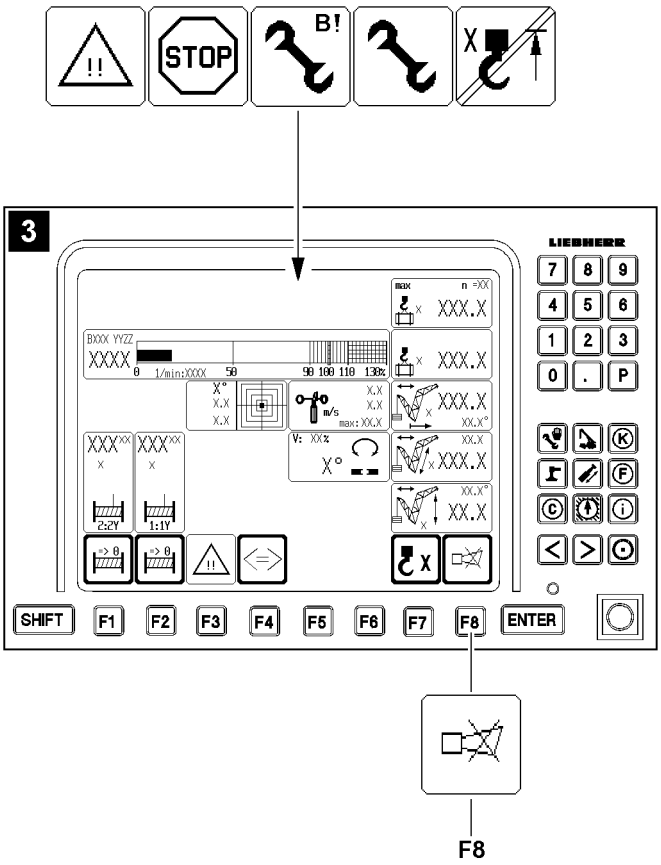
2.2.1 Description of acoustic / visual warnings

The case numbers from the chart „Overview of case numbers“ are valid for the following charts in this chapter:

- „Acoustic / visual warnings on the LICCON monitor“
- „Warning light 12.1“
- „Flashing beacon 12.2“
- „Warning light 12.3“

Overview of case numbers	
Case number	**Description Case**
Case 001	Utilization of crane from 0 % to 89 %
Case 002	Utilization of crane from 90 % to 100 %
Case 003	Utilization of crane over 100 %
Case 004	Shut off of crane movements - LMB STOP
Case 005	Luffing in with suspended load
Case 006	Participating sensor (LMB) defective
Case 010	Exceeding the shut off limits of the LICCON overload protection
Case 011	Bypass of shut off hoist top
Case 016	Bypass of shut off luffing down the boom / auxiliary boom / accessories, „Load chart available“
Case 018	Bypass of shut off luffing down the boom / auxiliary boom / accessories, „No load chart available“
Case 020	Exceeding the shut off limits of the LICCON overload protection during erection / take down procedures, „No load chart available“

LWE/LG 1750-006/15409-07-02/en



LWE/LG 1750-006/15409-07-02/en

Fig.111209

2.2.2 Acoustic / visual warnings within the crane operator's cab

Note
▶ Description of individual case numbers, see chart „Overview of case numbers“.

Acoustic / visual warnings on the LICCON monitor									
Case number	**Acoustic warning LICCON monitor at utilization of crane**			**Visual warning LICCON monitor**					
	Short sound	**Long sound**	**Long sound**	**Utilization of crane**		**Occurrence**			
	From 90 %	**Above 100 %**	**Always**	**From 90 %**	**Above 100 %**	**LMB STOP**	**Appears if the set up key D is actuated**		
									
Case 001							—	—	—
Case 002	X[2]			O			—	—	—
Case 003		X[2]		O	O		—	—	—
Case 004			X[2]		O		—	—	—
Case 005	X[2]	X[2]		O	O		—	—	—
Case 006			X[2]			O	Cannot be bypassed[5]		
Case 010	X[2]	X[2]		O	O		O		
Case 011			X[2]	O	O	O	O		O
Case 016	X[2]	X[2]		O	O		O		
Case 018			X[2]			O		O	
Case 020			X[2]			O		O	

O = cannot be turned off

X[2] = can be turned off immediately on the LICCON monitor key **F8**

Cannot be bypassed[5] = contact Liebherr Service

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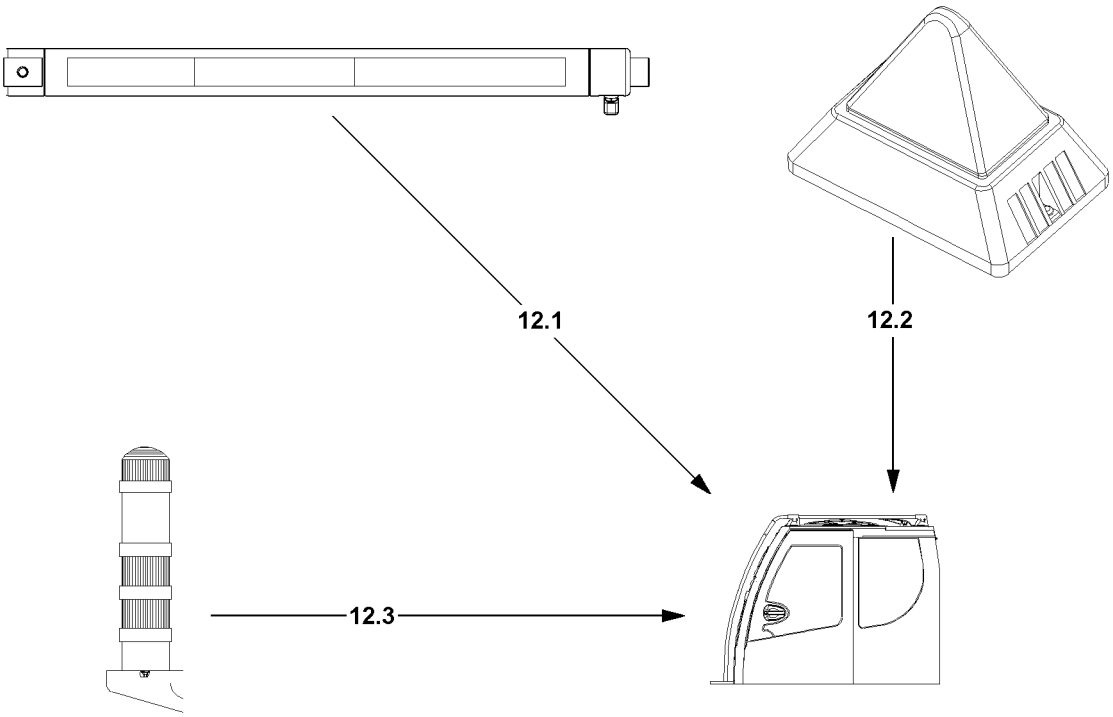

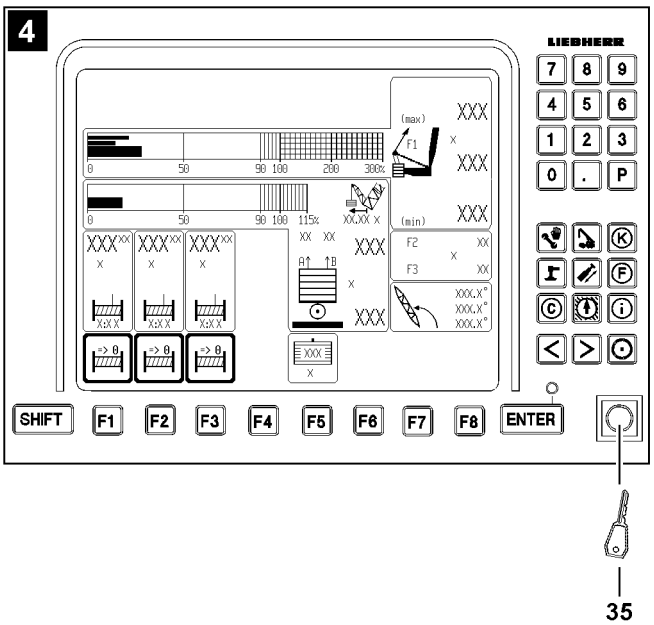

LWE/LG 1750-006/15409-07-02/en

Fig.111206

2.2.3 Acoustic / visual warnings outside the crane operator's cab

Note
▶ Description of individual case numbers, see chart „Overview of case numbers“.

Warning light 12.1					
Case number	**At utilization of crane**	**Acoustic warning**	**Visual warning**		
		Signal turntable	**Green**	**Yellow**	**Red**
Case 001	From 0 % to 89 %		O[1]		
Case 002	From 90 % to 100 %			O[1]	
Case 003	Above 100 %	X[1]			O[1]
Case 004	-				O[1]
Case 005	From 0 % to 89 %		O[1]		
Case 005	From 90 % to 100 %			O[1]	
Case 005	Above 100 %	X[1]			O[2]
Case 006	-				O[1]
Case 010	From 0 % to 89 %		O[1]		
Case 010	From 90 % to 100 %			O[1]	
Case 010	Above 100 % to 110 %			O[2]	
Case 010	Above 110 %	X[1]			O[1]
Case 011	Up to 110 %			O[2]	
Case 011	Above 110 %	O			O[2]
Case 016	From 0 % to 89 %		O[1]		
Case 016	From 90 % to 100 %			O[1]	
Case 016	Above 100 % to 110 %			O[2]	
Case 016	Above 110 %	X[1]			O[1]
Case 018	No value available			O[2]	
Case 020	No value available			O[2]	

O = cannot be turned off

O[1] = warning light **12.1** lights up

O[2] = warning light **12.1** blinks

X[1] = can be turned off by actuating (right touching) the key button **35** on the LICCON monitor with the derrick operating screen (illustration **4**), effective after at least 5 seconds

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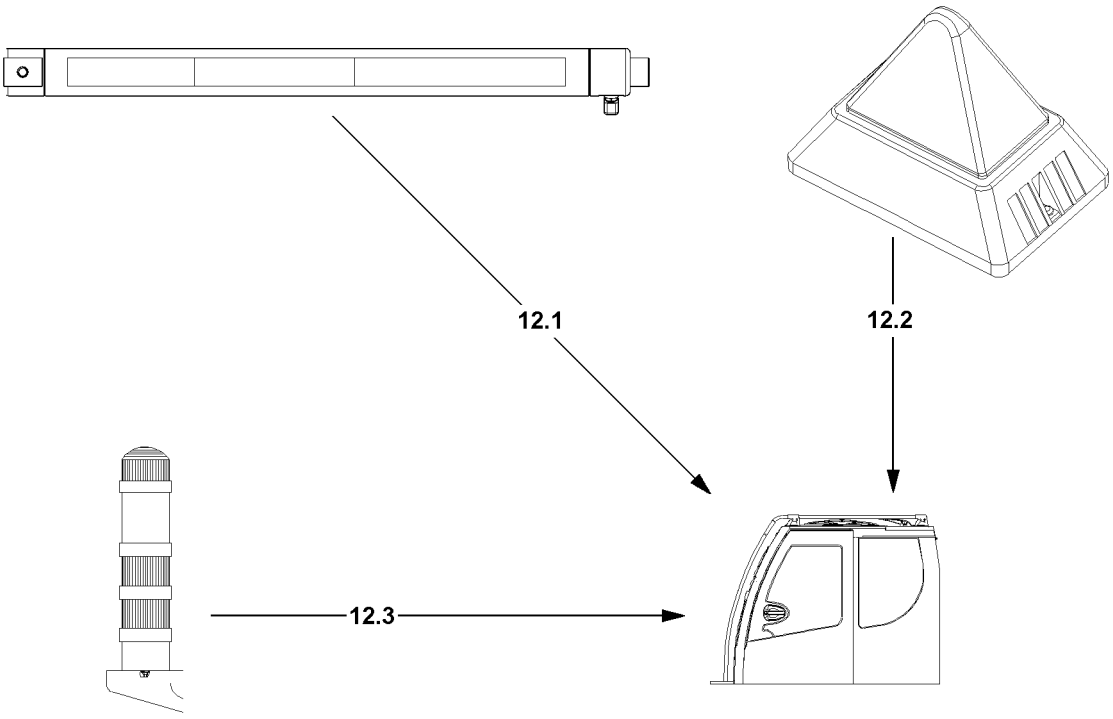
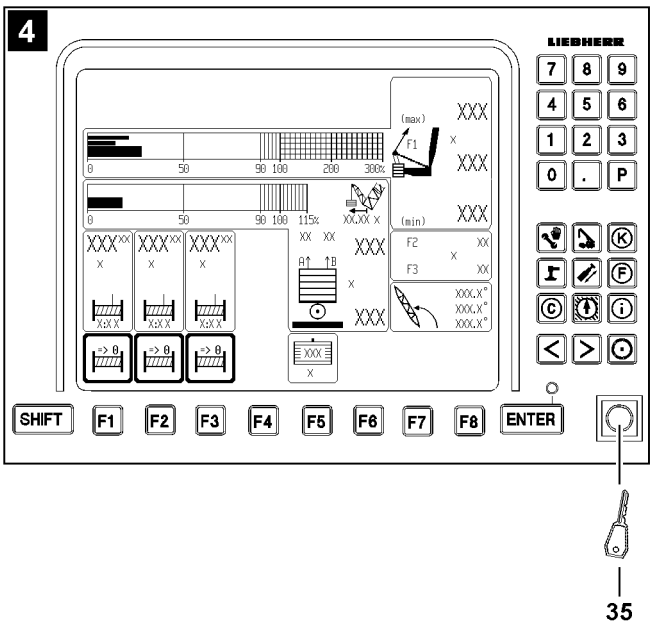




LWE/LG 1750-006/15409-07-02/en

Fig.111206

Note
▶ Description of individual case numbers, see chart „Overview of case numbers“.

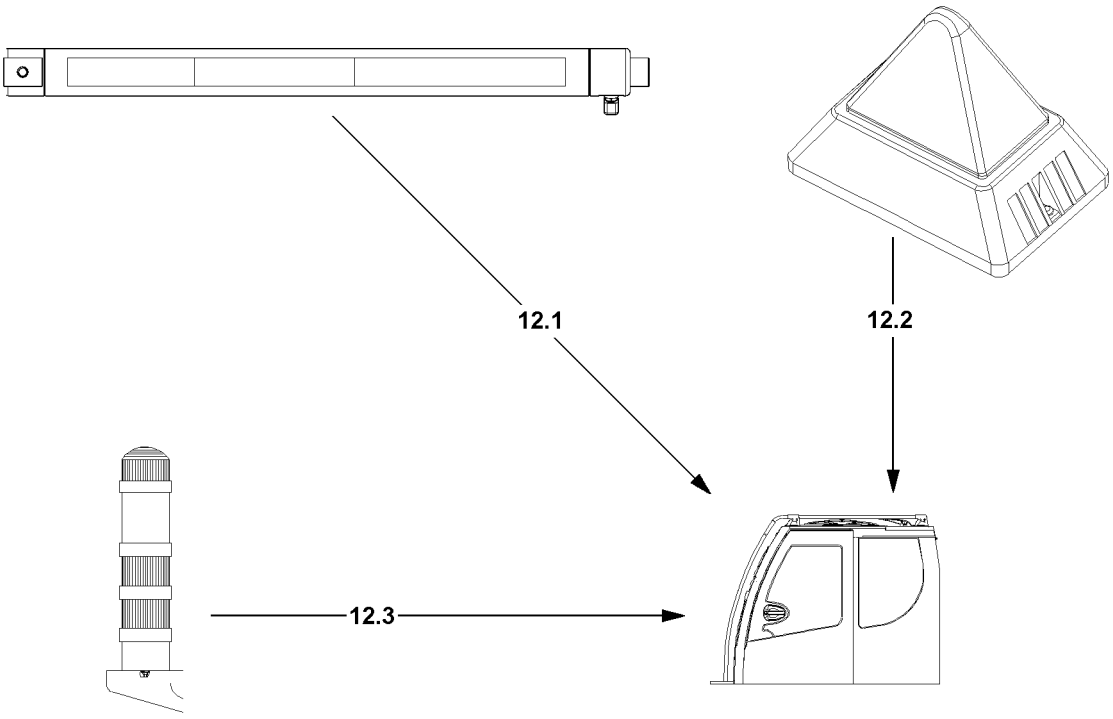
Flashing beacon 12.2			
Case number	**At utilization of crane**	**Acoustic warning**	**Visual warning**
		Signal turntable	**Red**
Case 001	0 % to 89 %	-	-
Case 002	90 % to 100 %	-	-
Case 003	Above 100 %	X[1]	O[2]
Case 004	-		O[2]
Case 005	Above 100 %	X[1]	O[2]
Case 006	-		O[2]
Case 010	Above 110 %	X[1]	O[2]
Case 011	Above 110 %	X[1]	O[2]
Case 016	Above 110 %	X[1]	O[2]
Case 018	No value available		O[2]
Case 020	No value available		O[2]

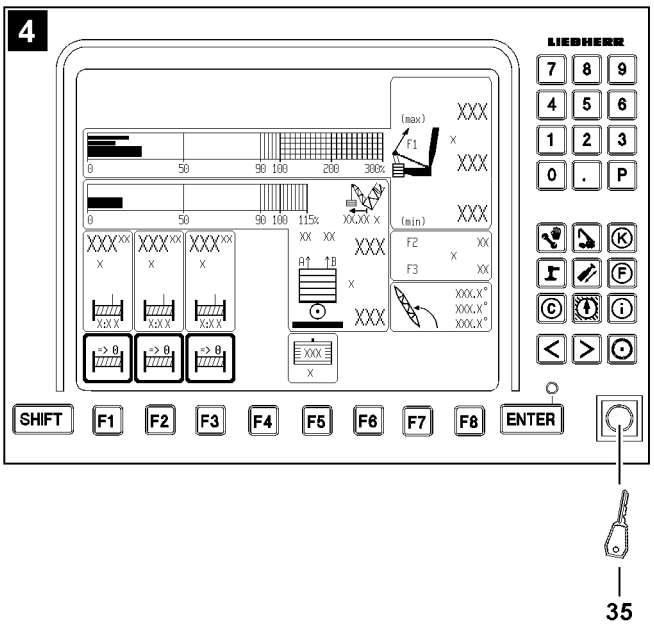
O = cannot be turned off

O[2] = flashing beacon **12.2** blinks

X[1] = can be turned off by actuating (right touching) the key button **35** on the LICCON monitor with the derrick operating screen (illustration **4**), effective after at least 5 seconds

LWE/LG 1750-006/15409-07-02/en





LWE/LG 1750-006/15409-07-02/en

Fig.111206

Note
▶ Description of individual case numbers, see chart „Overview of case numbers“.

Warning light 12.3					
Case number	**At utilization of crane**	**Acoustic warning**	**Visual warning**		
		Signal turntable	**Green**	**Yellow**	**Red**
Case 001	From 0 % to 89 %		O[1]		
Case 002	From 90 % to 100 %			O[1]	
Case 003	Above 100 %	X[1]			O[2]
Case 004	-				O[2]
Case 005	From 0 % to 89 %		O[1]		
Case 005	From 90 % to 100 %			O[1]	
Case 005	Above 100 %	X[1]			O[2]
Case 006	-				O[2]
Case 010	From 0 % to 89 %		O[1]		
Case 010	From 90 % to 110 %			O[1]	
Case 010	Above 110 %	X[1]			O[2]
Case 011	Up to 110 %			O[1]	
Case 011	Above 110 %	X[1]			O[2]
Case 016	From 0 % to 89 %		O[1]		
Case 016	From 90 % to 110 %			O[1]	
Case 016	Above 110 %	X[1]			O[2]
Case 018	No value available				O[2]
Case 020	No value available				O[2]

O = cannot be turned off

O[1] = warning light **12.3** lights up

O[2] = warning light **12.3** blinks

X[1] = can be turned off by actuating (right touching) the key button **35** on the LICCON monitor with the derrick operating screen (illustration **4**), effective after at least 5 seconds

2.3 Monitoring of crane movement

Note
▶ If the LICCON overload protection turns the crane movement off, then the exact cause for the shut off must be determined first.
▶ As a first step, try to rescind the crane movement which has caused a shut off.
▶ If it is not possible to rescind the affected crane movement, then the additional steps are described in the following sections of the chapter.

Note
▶ For detailed description of the individually listed symbols, see Crane operating instructions, chapter 4.02.

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The LICCON overload protection carries out the following shut offs if a limit value is exceeded in crane operation:
- Shut off luffing the main boom up / down
- Shut off Upper limit shut off angle (OGAW)
- Shut off Luffing the auxiliary boom / accessory up / down
- Shut off maximum / minimum value test point 1 (force F1)
- Shut off spooling the winch up / out
- Shut off Hoist top
- Shut off due to error message

The LICCON overload protection warns if the limit values are exceeded, but does not turn off:
- Minimum / maximum support forces

2.3.1 Shut off luffing the main boom up / down

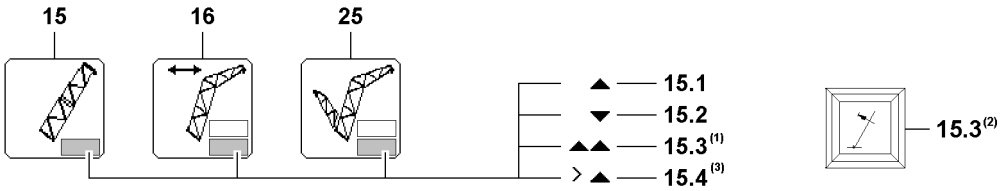

Fig.124701

(1)not LR 1400/2
(2)only LR 1400/2
(3)Only for certain crane types

In symbol **15**, or symbol **16**, or symbol **25** appears in the lower field symbol **15.1**, or symbol **15.2** or symbol **15.4** and the LICCON overload protection has shut the crane movement off.

„Luffing the main boom up“ (symbol **15.1**) or „Luffing the main boom down“ (symbol **15.2**) or „upper limit shut off angle“ reached (symbol **15.4**), was shut off because the upper / lower limit angle of the selected load chart was exceeded / fallen below.

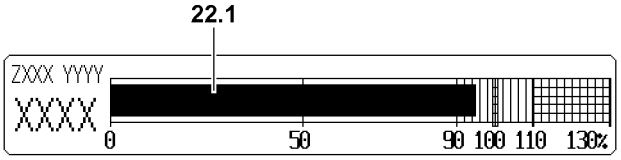

Fig.112340

Note
▶ If the utilization of the crane is more than 95 % (utilization bar **22.1** exceeds 95 %) and the maximum load according to the load chart (falling load capacity) drops by continuing to luff up the boom, then the symbol **15.1** also appears and the crane movement „Luffing the main boom up“ is turned off.

If the symbol / warning light **15.3** appears, then:
- **either** it was luffed up to a limit switch or the limit switch has turned off the crane movement „Luffing the main boom up“
- **or** there is an error on one of the limit switches „Main boom top“

The symbol **15.1** appears and the crane movement „Luffing the main boom up“ was turned off:

▶ Luff the main boom down.

Result:

– Crane operation is possible again.

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The symbol **15.2** appears and the crane movement „Luffing the main boom down“ was turned off:

▶ Luff the main boom up.

Result:

– Crane operation is possible again.

The symbol / warning light **15.3** appears and the crane movement „Luffing the main boom up“ was turned off:

▶ Luff the main boom down.

Result:

– Crane operation is possible again.

Problem remedy
The symbol / warning light **15.3** appears continuously?
If a symbol / warning light **15.3** appears without having luffed the main boom up to a limit switch, then there may be an error in the limit switches „Main boom top“.
▶ Check if there is an error message from the LICCON computer system, see Diagnostics manual.
▶ If yes: Remedy the error immediately.

The symbol **15.4** appears and the crane movement „Luffing the main boom up“ (upper limit shut off angle) was turned off:

▶ Luff the main boom down.

Result:

– Crane operation is possible again.

WARNING
Limited warning functions!
If one of the double version limit switches is not ok and the crane is continued to be operated, then the warning functions of the LICCON overload protection are limited.
▶ The crane can only be operated in an emergency after failure of a double version limit switch.

▶ Carry out crane movements in such a way that no repeated shut off by the LICCON overload protection occurs.

2.3.2 Shut off Luffing the auxiliary boom / accessory up / down

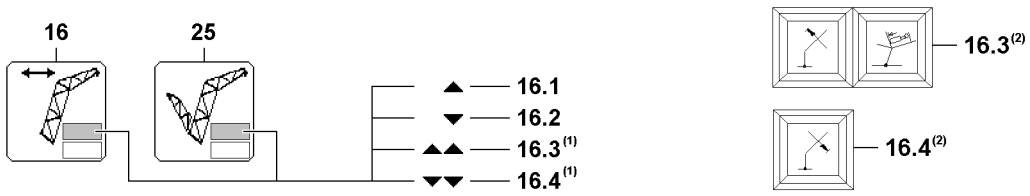

Fig.124702

(1)not LR 1400/2 (2)only LR 1400/2

In symbol **16** or symbol **25** appear in the upper field symbol **16.1** or symbol **16.2** and the LICCON overload protection has shut off the crane movement.

„Luffing the auxiliary boom / accessory up“ (symbol **16.1**) or „Luffing the auxiliary boom / accessory down“ (symbol **16.2**) was shut off because the upper / lower limit angle of the selected load chart was exceeded / fallen below.

If the symbol / warning light **16.3** appears, then:
– **either** it was luffed up to a limit switch or the limit switch has turned off the crane movement „Luffing the auxiliary boom / accessory up“

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– **or** the mechanical relapse support has turned off the crane movement „Luffing the auxiliary boom / accessory up“
– **or** there is an error on one of the limit switches „Auxiliary boom / accessory top“.

If the symbol / warning light **16.4** appears, then:
– **either** it was luffed down to a limit switch „Auxiliary boom / accessory bottom“ and the limit switch has turned off the crane movement „Luffing the auxiliary boom / accessory up“
– **or** there is an error on one of the limit switches „Auxiliary boom / accessory bottom“

The symbol **16.1** appears and the crane movement „Luffing the auxiliary boom / accessory up“ was turned off:

▶ Luff the auxiliary boom / accessory down.

Result:

– Crane operation is possible again.

The symbol **16.2** appears and the crane movement „Luffing the auxiliary boom / accessory down“ was turned off:

▶ Luff the auxiliary boom / accessory up.

Result:

– Crane operation is possible again.

The symbol / warning light **16.3** appears and the crane movement „Luffing the auxiliary boom / accessory up“ was turned off:

▶ Luff the auxiliary boom / accessory down.

Result:

– Crane operation is possible again.

Problem remedy
The symbol / warning light **16.3** appears continuously?
If a symbol / warning light **16.3** appears without having luffed up to a limit switch, then there may be an error in the limit switches „Auxiliary boom / accessory top“.
▶ Check if there is an error message from the LICCON computer system, see Diagnostics manual.
▶ If yes: Remedy the error immediately.

The symbol / warning light **16.4** appears and the crane movement „Luffing the auxiliary boom / accessory down“ was turned off:

▶ Luff the auxiliary boom / accessory up.

Result:

– Crane operation is possible again.

Problem remedy
The symbol / warning light **16.4** appears continuously?
If a symbol / warning light **16.4** appears without having luffed down to a limit switch, then there may be an error in the limit switches „Auxiliary boom / accessory bottom“.
▶ Check if there is an error message from the LICCON computer system, see Diagnostics manual.
▶ If yes: Remedy the error immediately.

WARNING
Limited warning functions!
If one of the double version limit switches is not ok and the crane is continued to be operated, then the warning functions of the LICCON overload protection are limited.
▶ The crane can only be operated in an emergency after failure of a double version limit switch.

▶ Carry out crane movements in such a way that no repeated shut off by the LICCON overload protection occurs.

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2.3.3 Shut off maximum / minimum value test point 1 (force F1)

Note

- The force determined on test point 1 is generally described as $F1_{actual}$ (actual value F1).
- In the icon **17** (F1-load display), the force relationship as well as the number values are shown in number values as well as a bar display (called F1-bar display).
- The value $F1_{max\text{-}operation}$ **17.3** corresponds to 100 % in the F1-bar display.
- The F1-utilization bar **17.1** shows the relationship $F1_{actual}$ **17.2** to $F1_{max\text{-}operation}$ **17.3**.
- In crane operation without derrick ballast, fewer values may be shown in the icon **17** (F1-load display).

Shut off maximum value F1 in crane operation

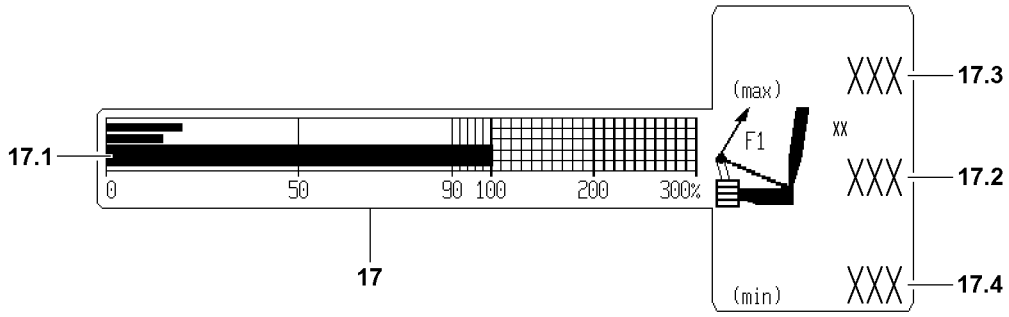

Fig.110991

In the icon **17**(F1-load display) the F1-utilization bar **17.1** exceeds the 100 % mark and the LICCON overload protection has shut off the crane movement. The value $F1_{actual}$ **17.2** has exceeded the value $F1_{max\text{-}operation}$ **17.3**.

All further movements, which lead to an increase of the force F1(value $F1_{actual}$) are shut off.

- Reverse any crane movement which has caused the shut off.
  or
  Initiate an alternative crane movement, which lowers the force F1 (value $F1_{actual}$).

Result:

– Crane operation is possible again.

Problem remedy

The crane operation is limited because the value $F1_{max\text{-}operation}$ apparently is being reached too early?

- Make sure that a valid set up status has been entered on the LICCON computer system.
- Make sure that the crane is assembled according to the assembly drawings.
- Make sure that the actual set up status and the entered set up status of the crane match.
- Make sure that all attachment parts and guy rods on the boom system, which are not needed, have been removed (weight).
- Make sure that the boom system is free of snow and ice (weight).
- Make sure that the wind influence onto the boom is not too great.

If no irregularities can be found:

- Contact Liebherr Service.

Shut off minimum value F1 in crane operation

Note

- A shut off minimum value F1 ($F1_{min}$) only occurs in operating modes with derrick ballast. The status $F1_{actual} = F1_{min}$ cannot be reached in all other operating modes.

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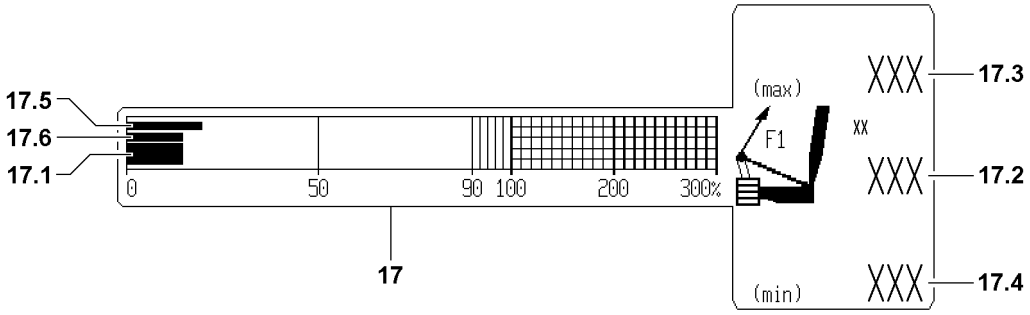

Fig.110992

In the icon **17** (F1-load display), when falling below the $F1_{min}$ advance warning bar **17.5**, a warning of the upcoming shut off is issued by the F1-utilization bar **17.1**.

If the F1-utilization bar **17.1** falls below the $F1_{min}$-STOP bar **17.6**, then the LICCON overload protection shuts off the crane movement. The value $F1_{actual}$ **17.2** has fallen below the value $F1_{min}$ **17.4**.

Note
Shut off $F1_{min}$

▶ If the utilization of the derrick ballast is below 50 %, then there is no immediate shut off when falling below value $F1_{min}$.

All further movements, which lead to an decrease of the force F1 (value $F1_{actual}$) are shut off.

▶ Reverse any crane movement which has caused the shut off.
or
Initiate an alternative crane movement, which increases the force F1 (value $F1_{actual}$).

Result:

– Crane operation is possible again.

Problem remedy
The crane operation is limited because the value $F1_{min}$ apparently is being reached too early?

▶ Make sure that a valid set up status has been entered on the LICCON computer system.
▶ Make sure that the crane is assembled according to the assembly drawings.
▶ Make sure that the actual set up status and the entered set up status of the crane match.
▶ Make sure that all attachment parts and guy rods on the boom system, which are not needed, have been removed (weight).
▶ Make sure that the boom system is free of snow and ice (weight).
▶ Make sure that the wind influence onto the boom is not too great.

If no irregularities can be found:

▶ Contact Liebherr Service.

2.3.4 Shut off spooling the winch up / out

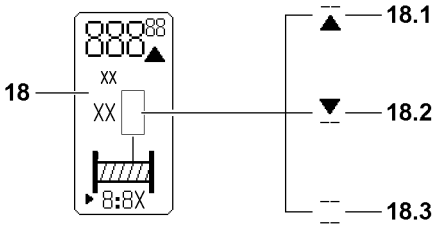

Fig.110878

In symbol **18** appears symbol **18.1**, symbol **18.2** or symbol **18.3** and the LICCON overload protection has shut off the crane movement.

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„Spooling the winch out“ (symbol **18.1**) or „spooling the winch up“ (symbol **18.2**) was shut off because the upper / lower limit value of the rope for the selected winch was exceeded or fallen below.

If symbol **18.3** appears blinking in the symbol **18**, then the affected winch is deactivated.

The symbol **18.1** appears and the crane movement „Spooling the winch out“ was turned off:

▶ Spool the winch up.

Result:

– Crane operation is possible again.

The symbol **18.2** appears and the crane movement „Spooling the winch up“ was turned off:

▶ Spool the winch out.

Result:

– Crane operation is possible again.

The line / line **18.3** appear and the winch is deactivated:

▶ Activate the winch, see Crane operating instructions, chapter 4.02.

Result:

– Crane operation is possible again.

2.3.5 Shut off hoist top

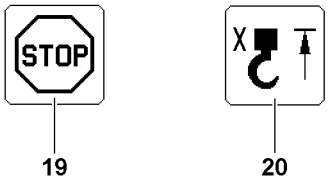

Fig.110875

The symbol **19** and hoist top icon **20** appear in the LICCON monitor and the LICCON overload protection has turned the crane movement off.

Spooling the hoist winch up was turned off because the hook block or the load hook has run against a hoist limit weight during the upward movement and the affected hoist limit switch was triggered.

WARNING
Property damage / falling load!
▶ After shut off spool hoist winch up (hoist top), for every further crane movement, the distance between the hook block / load hook and the boom head must be checked.

Note
▶ After a hoist top shut off occurred, further crane movements, which affect the length of the hoist rope are also shut off.

▶ Spool the hoist winch out.

Result:

– Crane operation is possible again.

2.3.6 Shut off due to error message

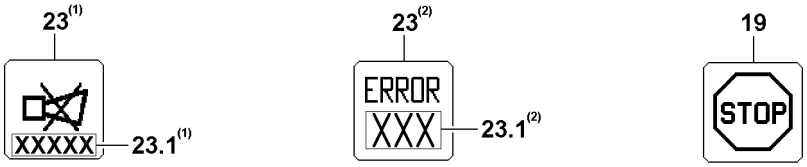

Fig.112331

(1)not LR 1400/2 (2)only LR 1400/2

In the icon **23** appears an error message, the icon **19** appears in the LICCON monitor and the LICCON overload protection has turned off crane movement.

- ▶ Determine the existing error with the help of the error message from the error field **23.1** in icon **23**, see Diagnostics manual.
- ▶ Remedy the error.

If the error cannot be remedied:

- ▶ Contact Liebherr Service.

Problem remedy

The erection of the crane, for example after assembly on a new job site or with another equipment configuration, is not possible due to an error message?

- ▶ Evaluate the error message.
- ▶ Make sure that all electrical connections are established correctly.
- ▶ Check if all sensors or dummy plugs with integrated electric have been connected properly.

Note

- ▶ If there is a defect on a participating sensor (LMB), then the crane can no longer be operated in normal operating condition. Contact Liebherr Service and fix / replace the sensors.

2.3.7 Minimum / maximum support forces

Note

- ▶ Applies only for cranes with support force monitoring*.
- ▶ Description of support force monitoring, see Crane operating instructions, chapter 4.02.

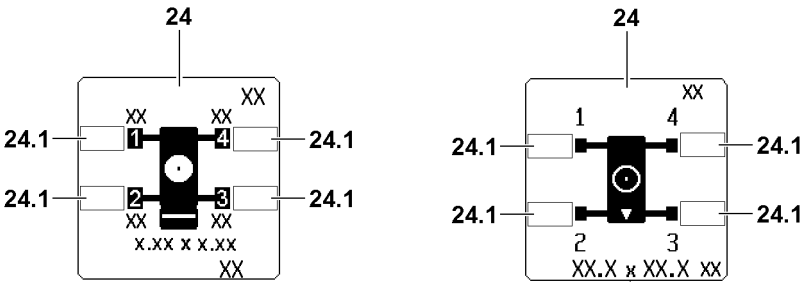

Fig.110881

WARNING
The crane can topple over!
When reaching the programmed minimum / maximum support forces there is no automatic shut off of crane movements.
The displayed support force values are subjected to fluctuating influences, for example crane operation, surrounding and environmental influences.
The resulting tolerance field of the determined values may not be utilized by the support force display to determine the tipping limit of the crane.
If this is disregarded, then the crane can topple over.
Personnel can be severely injured or killed.

- ▶ The displayed support force values of the support force display may not be used to utilize the crane up to the tipping limit.
- ▶ Make sure that all support force values are within the minimum / maximum support forces.

The icon **24** (depending on the crane, similar to the left or right illustration) is shown in the LICCON monitor with blinking value in one or several fields **24.1**. Blinking values in the fields **24.1** signal exceedance of the minimum / maximum support forces.

- ▶ Reverse the crane movements, which caused the support forces to be outside the minimum / maximum values.

Result:

- – All values in the fields **24.1** are within the minimum / maximum support forces.

- ▶ Carry out crane movements in such a way that the support forces always remain within the minimum / maximum values.

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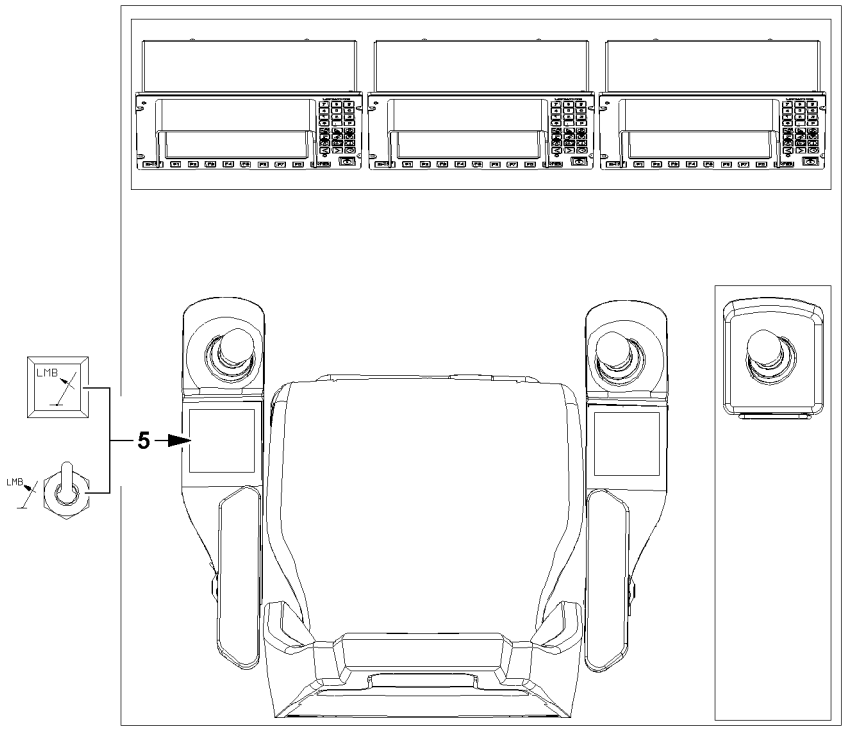

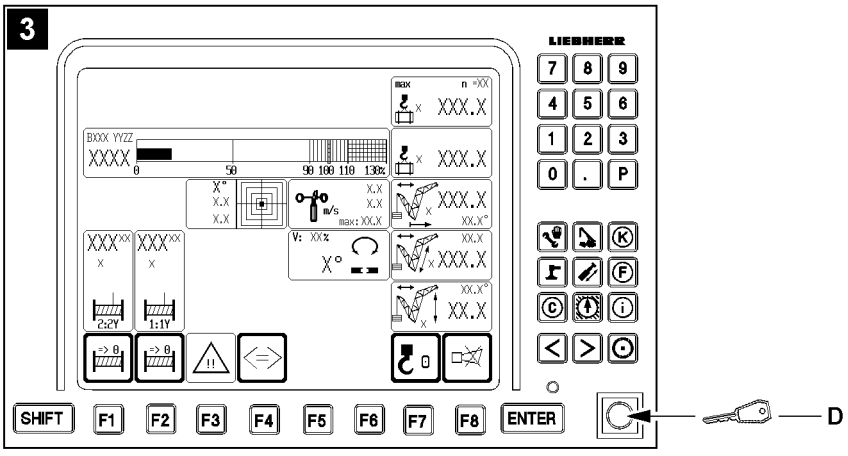

LWE/LG 1750-006/15409-07-02/en

Fig.112334

2.4 Shut off of crane movement: LMB STOP by LICCON overload protection

WARNING
Risk of overload and toppling the crane!
If the shut off limits of the LICCON overload protection are exceeded without knowing the exact cause for the shut off by the LICCON overload protection, then the crane can be overloaded and topple over.
Personnel can be severely injured or killed.

- ▶ Before activating the function „Exceedance of shut off limits of the LICCON overload protection“ determine the exact cause for the shut off.

WARNING
Danger of accident due to function „Exceedance of shut off limits of the LICCON overload protection“!
If the shut off limits of the LICCON overload protection are exceeded, there is no additional protection against crane overload.
Due to erroneous operation or deliberate misuse, the crane could collapse, the boom can break off or the crane can topple over.
Personnel can be severely injured or killed.

- ▶ The button **5** „Luffing in with suspended load“ and the set up key **D** may only be actuated when it is ensured that no normal operating condition (utilization below 100 % and no active shut off) can be reached without the function „Exceedance of shut off limits of the LICCON overload protection“!
- ▶ Actuate the set up key **D** only when no normal operating condition (utilization below 100 % and no active shut off) can be reached with the button **5** „Luffing in with suspended load“.
- ▶ The function „Exceeding the shut off limits of the LICCON overload protection“ is only permissible in emergencies and for assembly purposes.
- ▶ The set up key **D** may only be actuated by persons who are aware of the effects of their acts regarding the function „Exceeding the shut off limits of the LICCON overload protection“.
- ▶ The function „Exceeding the shut off limits of the LICCON overload protection“ requires the presence of an authorized person and must be performed with utmost caution.
- ▶ Crane operation with activated function „Exceeding the shut off limits of the LICCON overload protection“ is prohibited.

WARNING
Expanded working / danger zone of the crane!
Due to the function „Exceedance of shut off limits of the LICCON overload protection“ it is possible that the working / danger zone of the crane is significantly expanded.
If these circumstances are not observed, collisions and accidents can occur.
Personnel can be severely injured or killed.

- ▶ With activated function „Exceedance of shut off limits of the LICCON overload protection“ take an expanded working / danger zone of the crane into account and monitor it.

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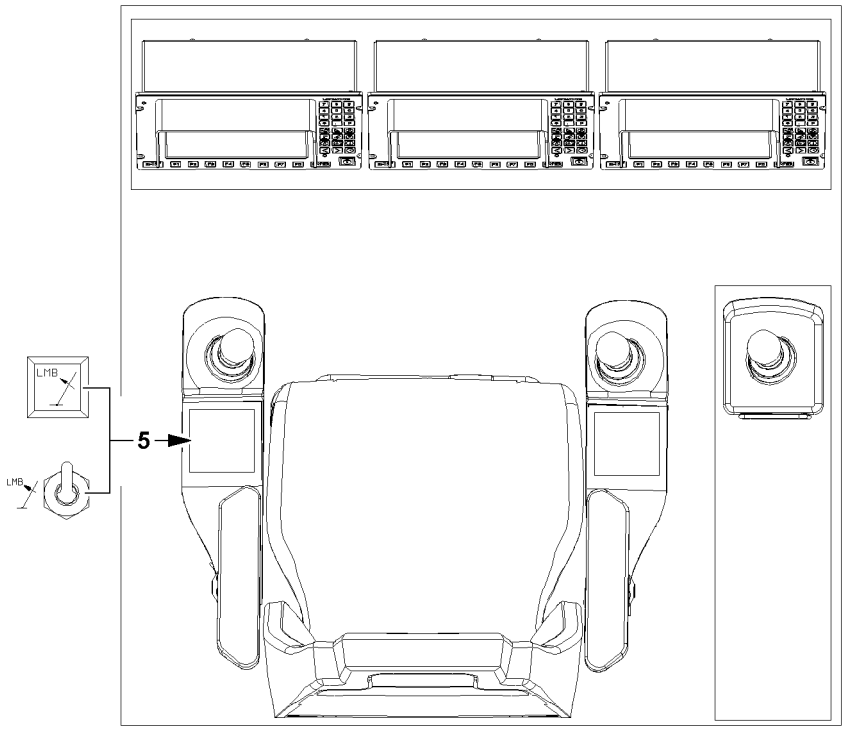

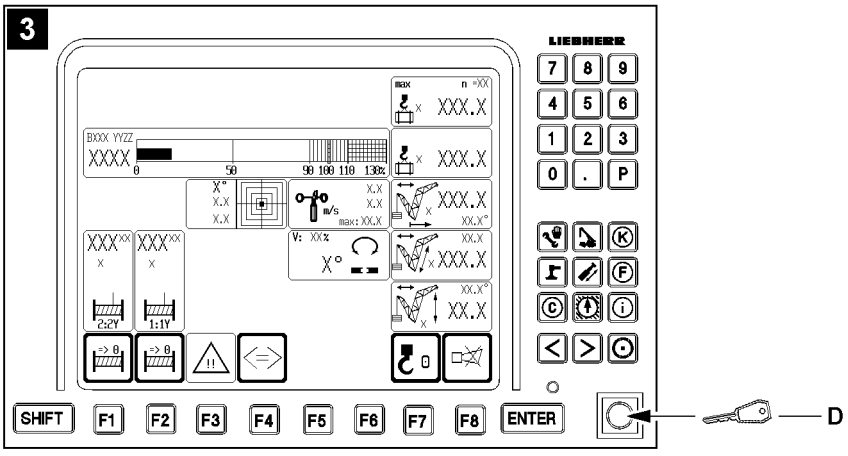

LWE/LG 1750-006/15409-07-02/en

Fig.112334

WARNING
Overload of crane!
When taking on a load by luffing the boom up, the crane can be overloaded.
This could result in serious accidents.
▶ Taking on load by luffing up the boom is prohibited.
▶ Take on a load only with the hoist gear.

Note
▶ If the set up key **D** is actuated in the area „load chart available“, then the working speed is reduced.
▶ If the set up key **D** is actuated in the area „no load chart available“, then the working speed is not reduced.

There are two possibilities to exceed the shut off limits of the LICCON overload protection after LMB STOP:
– With button **5** „Luffing in with suspended load“ in the left control console
– With the set up key **D** on the LICCON monitor with crane operating screen, see illustration **3**

NOTICE
Danger of mix up!
The function „Exceedance of shut off limits of LICCON overload protection“ can only be activated with the set up key **D** on the LICCON monitor with crane operating screen, see illustration **3**.
The key buttons on the other monitors are not assigned with this function.
▶ Do not mix up the set up key **D** with the other key buttons.
▶ In case of mix up: Deactivate the activated function.

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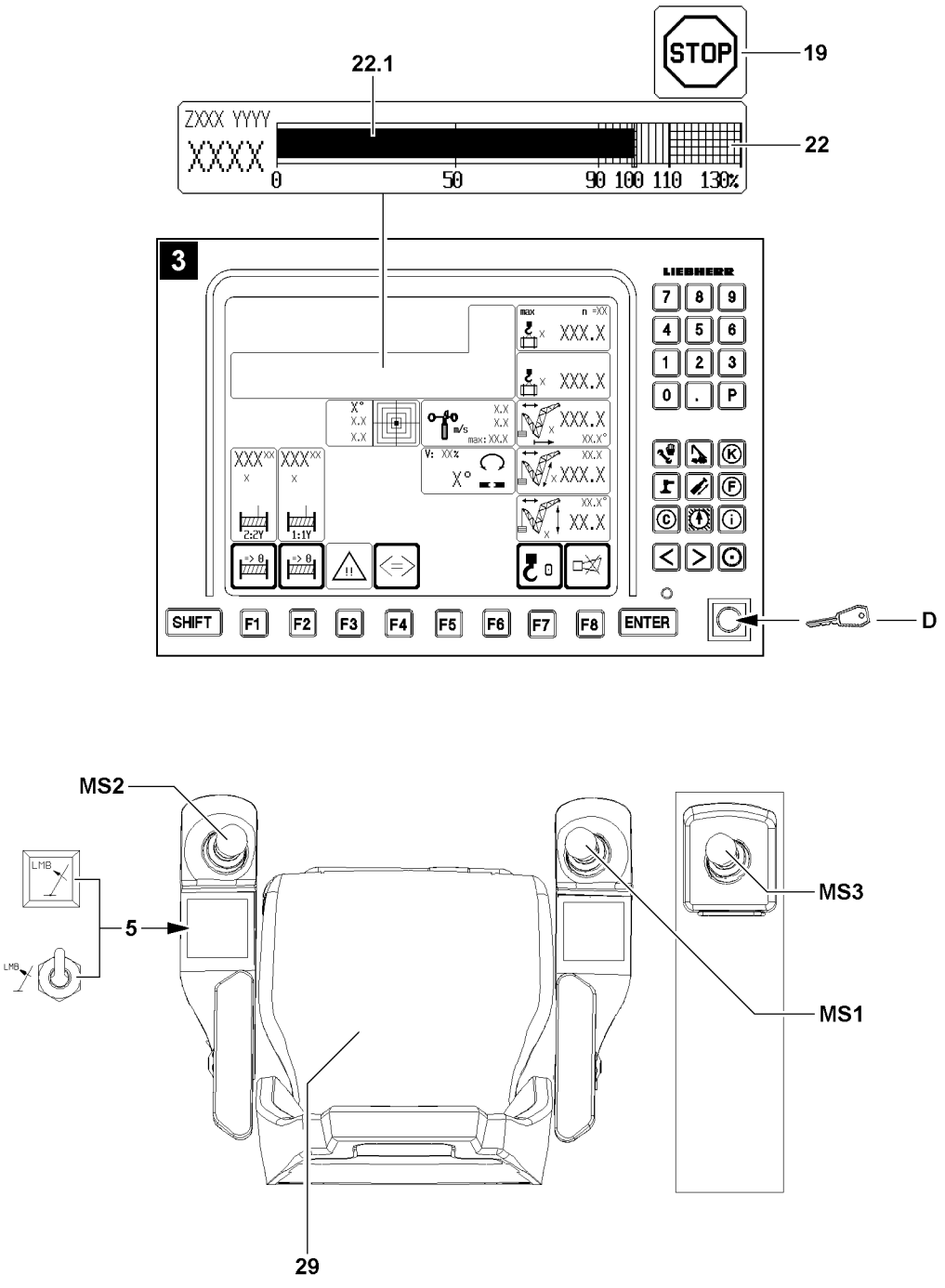

Fig.112335

2.4.1 Luffing in with suspended load

If the maximum permissible load torque is exceeded, the LICCON overload protection turns off all crane movements that increase load torque.

In the icon **22** (load moment display) the utilization bar **22.1** has exceeded the 100 % mark and in the LICCON monitor appears the icon **19**.

This shut off limit can be exceeded by actuating the button **5** „Luffing in with suspended load“.

Make sure that the following prerequisite is met:
– Either the seat contact button **29** or one of the buttons **1** of the master switches (MS1, MS2, MS3) is actuated.

Note
▶ If the load is reduced by luffing up, then the button **5** „Luffing in with suspended load“ is possibly not functioning.
▶ For the procedure when the button **5** „Luffing in with suspended load“ is not functioning, see section „Exceedance of maximum permissible load moment“.

▶ Press the function key **5** „Luffing in with suspended load“ and hold it.

Result:

– The LICCON overload protection is inactive.

▶ Luff the load in.

Result:

– If the crane reaches a normal operation status (utilization below 100 % and no active shut off) then the icon **19** turns off, normal crane operation is possible again.

The function „Luffing in with suspended load“ is deactivated:
– When the function key **5** „Luffing in with suspended load“ is not longer actuated.
– When neither the seat contact button **29** nor one of the buttons **1** of the master switches (MS1, MS2, MS3) is actuated.
– In case of defect of an associated sensor (LMB).
– At engine stop.

The function „Luffing in with suspended load“ is deactivated:
– The LICCON overload protection is active.

▶ Carry out crane movements in such a way that no repeated shut off by the LICCON overload protection occurs.

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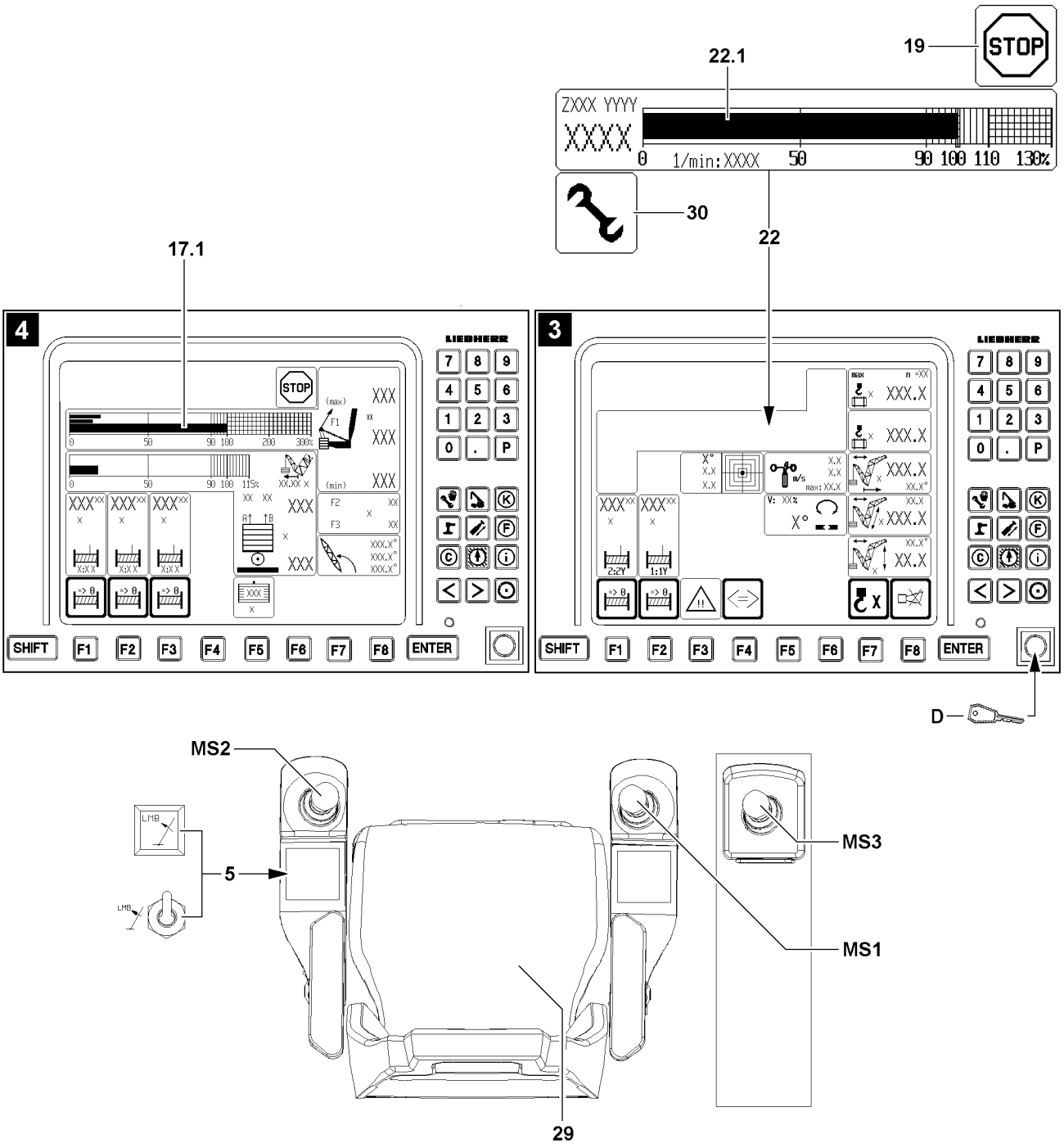

Fig.112336

LWE/LG 1750-006/15409-07-02/en

2.4.2 Exceedance of the maximum permissible load moment

If the maximum permissible load torque is exceeded, the LICCON overload protection turns off all crane movements that increase load torque.

In the icon **22** (load moment display) the utilization bar **22.1** has exceeded the 100 % mark and in the LICCON monitor appears the icon **19**.

This shut off can be exceeded by the set up key **D** in the „right touching“ position.

WARNING
Shut off safety device!
If the function „Exceedance of shut off limits of LICCON overload protection“ is activated by actuating the set up key **D** then it is possible to exceed the maximum permissible load moment. The function „Exceedance of maximum value test point 1“ is automatically activated too. Thus there is no shut off when exceeding the maximum value test point 1.

▶ All notes regarding the function „Exceedance of shut off limits of LICCON overload protection“ must be observed.
▶ The utilization bar $F1_{actual}$ **17.1** of the F1 load display must be observed.

Note

▶ In emergency situations, the function „Exceedance of shut off limits of the LICCON overload protection“ can be activated with the set up key **D** and the maximum permissible load moment can be exceeded by 10 % to maximum 110 %.

The set up key **D** on the LICCON monitor has two positions:
- Operating position (not actuated): Crane is in normal operation
- Position to right (touching): The function „Exceedance of shut off limits of the LICCON overload protection“ is activated, the assembly icon **30** appears in the LICCON monitor.

Make sure that the following prerequisites are met:
- With the button **5** „Luffing in with suspended load“ no normal operating status (utilization below 100 % and no active shut off) can be reached.
- All master switches (MS1, MS2, MS3) are in zero position (not deflected).
- Either the seat contact button **29** or one of the buttons **1** of the master switches (MS1, MS2, MS3) is actuated.
- Radio operation* is not active.
- The load moment display 110 % has not been reached and a load chart is available.

▶ Turn the set up key **D** to the right (touching).

Result:

- The LICCON overload protection is inactive.
- The assembly icon **30** appears in the LICCON monitor.
- The working speed in the area „Load chart available“ is reduced for all functions.

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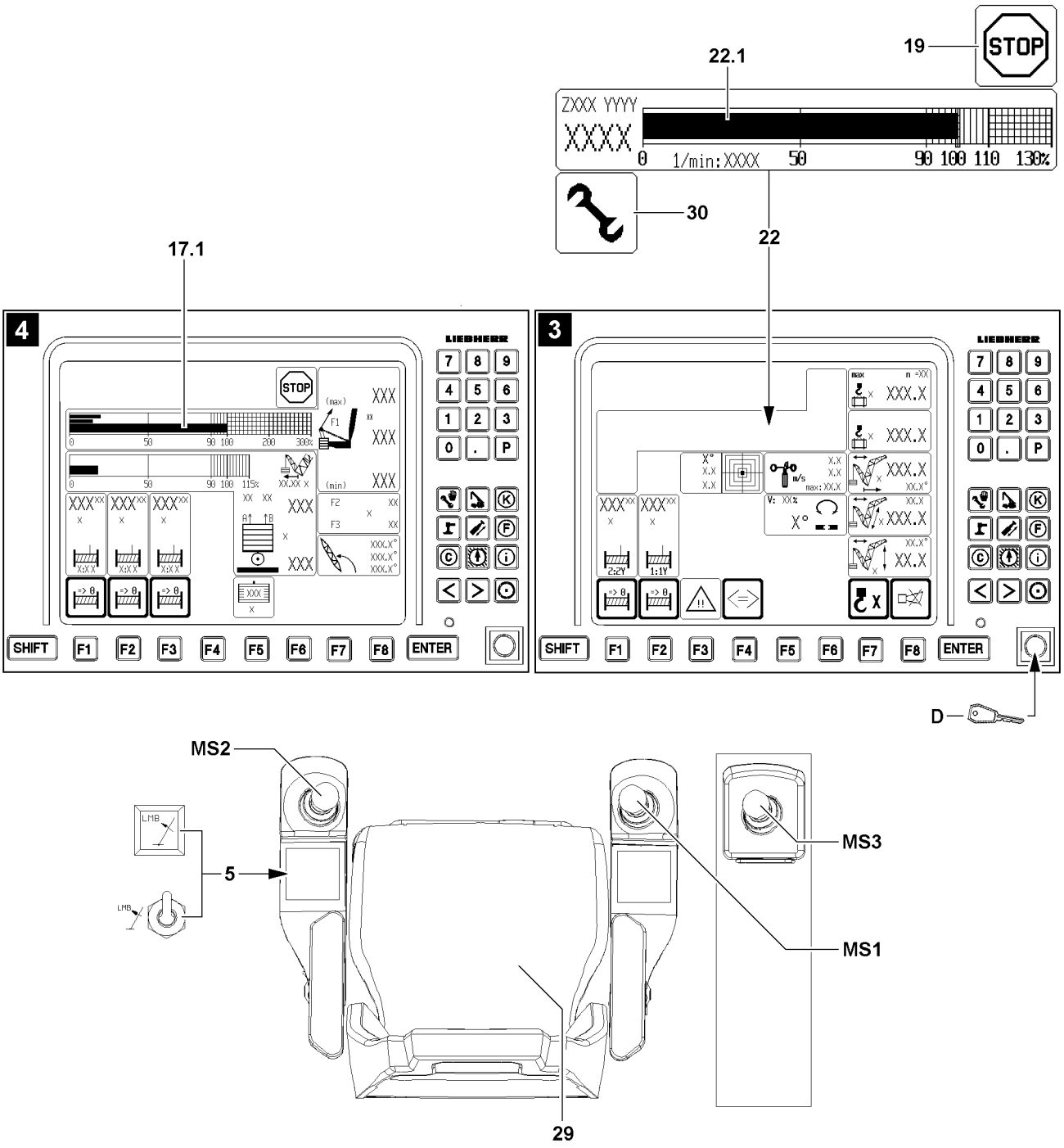

Fig.112336

▶ Initiate crane movements which directly lead to a normal operating status (utilization below 100 % and no active shut off).

Result:

– If a crane reaches a normal operation status (utilization below 100 % and no active shut off), then the function „Exceedance of shut off limits of the LICCON overload protection“ shuts off, the assembly icon **30** and icon **19** in the LICCON monitor turn off.

In addition, the function „Exceedance of shut off limits of LICCON overload protection“ turns off immediately:
– If the set up key **D** is actuated again.
– If all master switches (MS1, MS2, MS3) are in neutral position for 10 seconds (with load chart available).
– When neither the seat contact button **29** nor one of the buttons **1** of the master switches (MS1, MS2, MS3) is actuated.
– If radio operation***** is activated.
– At engine stop.
– At hoist top shut off.
– When leaving the angle range of the load chart.
– When the utilization bar **22.1** (load moment display) exceeds a utilization of 110 %.

Note
▶ The function „Exceedance of shut off limits of the LICCON overload protection“ is only turned off when the assembly icon **30** in the LICCON monitor turns off.
▶ If the function „Exceedance of shut off limits of the LICCON overload protection“ does not turn off after pressing the set up key **D** once, then press the set up key **D** again until the assembly icon **30** in the LICCON monitor turns off.

The function „Exceedance of shut off limits of the LICCON overload protection“ has / was shut off:
– The assembly icon **30** in the LICCON monitor turns off.
– The working speed is reduced until all master switches (MS1, MS2, MS3) are in zero position at the same time.

▶ Make sure that the assembly icon **30** does no longer appear in the LICCON monitor.
▶ Carry out crane movements in such a way that no repeated shut off by the LICCON overload protection occurs.

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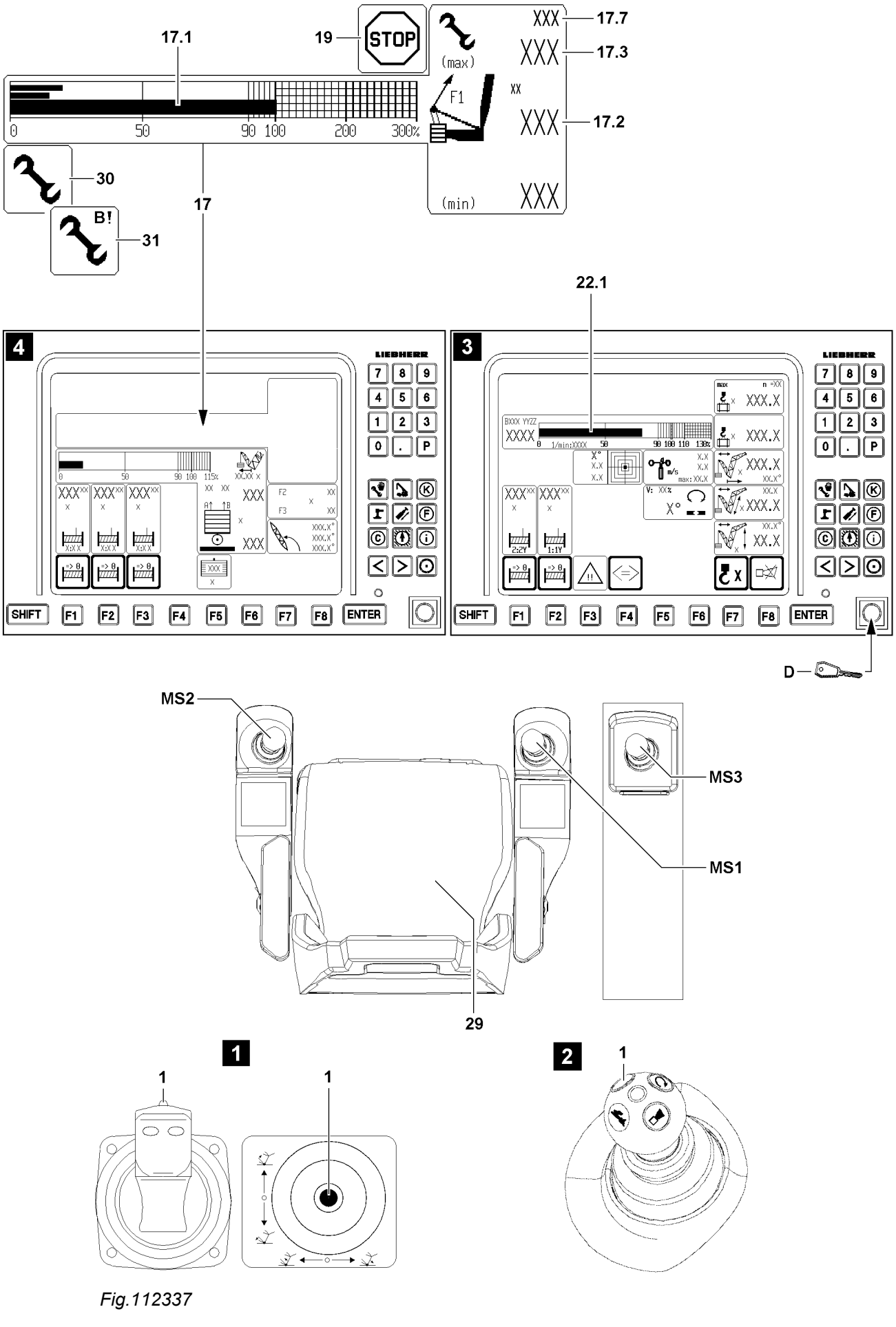

Fig.112337

2.4.3 Exceedance of maximum value test point 1 (force F1) in crane operation

WARNING
Leaving the load chart with load on hook!
If, by actuating the set up key **D**, the shut off is bypassed by value $F1_{max\text{-}operation}$ **17.3** and exceeded by more than 110 %, then the crane is in assembly operation, the assembly icon **31** appears in the LIC-CON monitor.
There is no load chart available any longer and various display values may not be shown any longer in the crane operating screen.
The load on the hook is no longer monitored by the load chart.
Severe accidents due to crane overload can result.
Personnel can be severely injured or killed.
▶ In assembly operation, the data in the erection / take down charts is binding.

WARNING
Shut off safety device!
If, by actuating the set up key **D**, the function „Exceedance of maximum value test point 1“ is activated, then the function „Exceedance of shut off limits of LICCON overload protection“ is also activated automatically. Thus there is no shut off if the maximum permissible load moment is exceeded.
▶ All notes regarding the function „Exceedance of shut off limits of LICCON overload protection“ must be observed.
▶ The utilization bar **22.1** of the load moment display must be observed.

Note
▶ The force determined on test point 1 is generally described as $F1_{actual}$ (actual value F1).
▶ In the icon **17** (F1-load display), the force relationship as well as the number values are shown in number values as well as a bar display (called F1-bar display).
▶ The value $F1_{max\text{-}operation}$ **17.3** corresponds to 100 % in the F1-bar display.
▶ The F1-utilization bar **17.1** shows the relationship $F1_{actual}$ **17.2** to $F1_{max\text{-}operation}$ **17.3**.
▶ In crane operation without derrick ballast, fewer values may be shown in the icon **17** (F1-load display).
▶ If the actual load is **larger** than the permissible hook block weight according to the erection / take down charts, then it can be exceeded up to maximum 110 % of $F1_{max\text{-}operation}$ **17.3**.
▶ If the actual load is **smaller** than the permissible hook block weight according to the erection / take down charts, then the assembly operation becomes active above 110 % of $F1_{max\text{-}operation}$ **17.3**. In assembly operation, there is no load chart available.
▶ The value $F1_{max\text{-}assembly}$ **17.7** appears in crane operation when 90 % of its nominal value is exceeded.

In the icon **17**(F1 load display) the utilization bar $F1_{actual}$ **17.1** exceeds the 100 % mark and the LICCON overload protection has shut off the crane movement. The value $F1_{actual}$ **17.2** has exceeded the value $F1_{max\text{-}operation}$ **17.3**.

All further movements, which lead to an increase of the force (value $F1_{actual}$) are shut off.

In the LICCON monitor with the derrick operating screen (illustration **4**) appears the icon **19**.

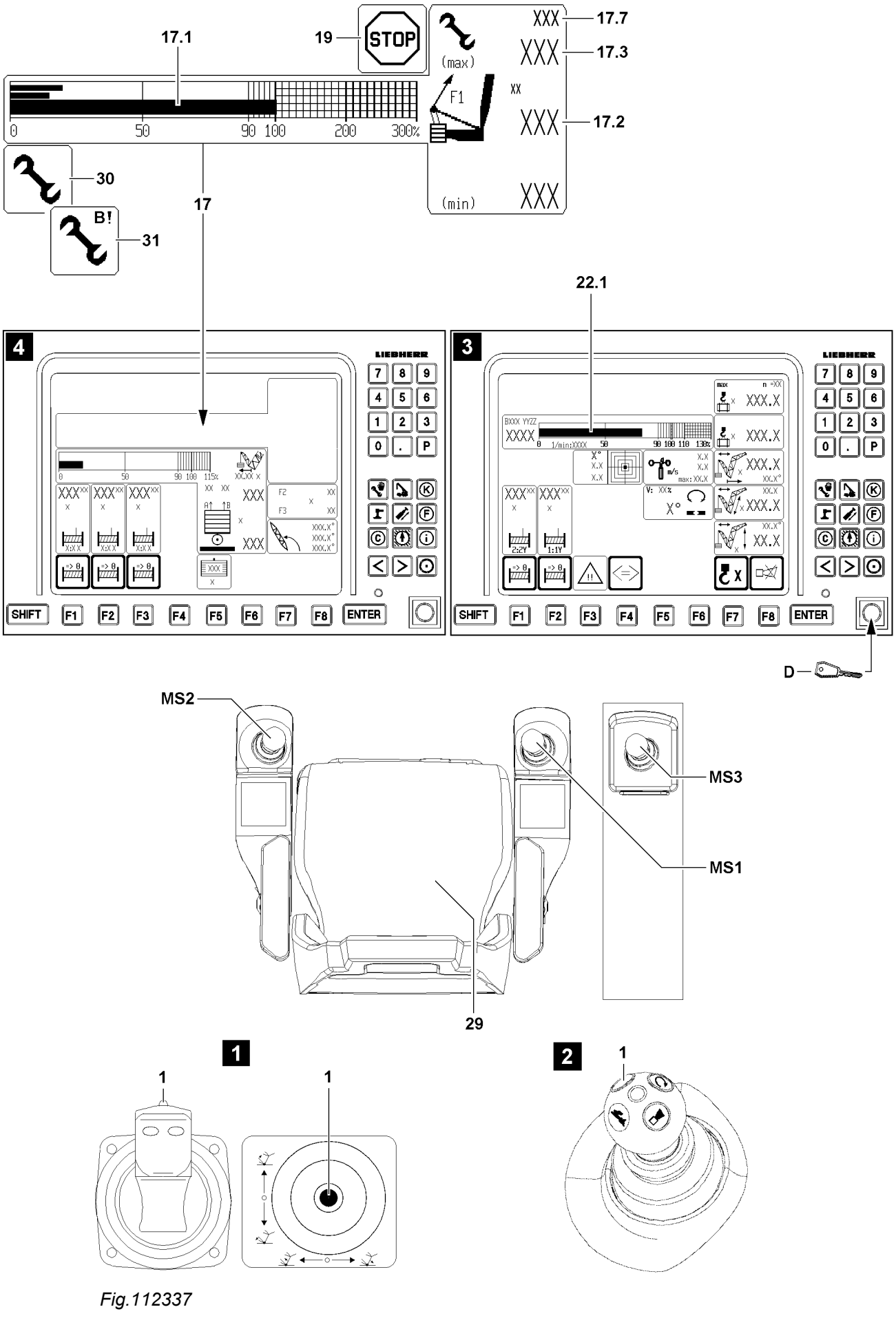

Fig.112337

Make sure that the following prerequisites are met:
- All master switches (MS1, MS2, MS3) are in zero position (not deflected).
- Either the seat contact button **29** or one of the buttons **1** of the master switches (MS1, MS2, MS3) is actuated.
- Radio operation***** is not active.
- The F1 load display 110 % has not been reached and a load chart is available.

▶ Turn the set up key **D** to the right (touching).

Result:

– The function „Exceedance of maximum value test point 1“ is activated in connection with the function „Exceedance of the shut off limits of the LICCON overload protection“.
– $F1_{max\text{-}operation}$ **17.3** can be exceeded.

The function „Exceedance of shut off limits of the LICCON overload protection“ in connection with the function „Exceedance of the maximum value test point 1“ also shuts off immediately:
– If the set up key **D** is actuated again.
– If all master switches (MS1, MS2, MS3) are in neutral position for 10 seconds (with load chart available).
– When neither the seat contact button **29** nor one of the buttons **1** of the master switches (MS1, MS2, MS3) is actuated.
– If radio operation***** is activated.
– At engine stop.
– At hoist top shut off.

Note
▶ The function „Exceedance of shut off limits of the LICCON overload protection“ is only turned off when the assembly icon **30** in the LICCON monitor turns off.
▶ If the function „Exceedance of shut off limits of the LICCON overload protection“ does not turn off after pressing the set up key **D** once, then press the set up key **D** again until the assembly icon **30** in the LICCON monitor turns off.

The function „Exceedance of shut off limits of the LICCON overload protection“ has / was shut off:
– The assembly icon **30** in the LICCON monitor turns off.
– The working speed is reduced until all master switches (MS1, MS2, MS3) are in zero position at the same time.

▶ Make sure that the assembly icon **30** does no longer appear in the LICCON monitor.
▶ Carry out crane movements in such a way that no repeated shut off by the LICCON overload protection occurs.

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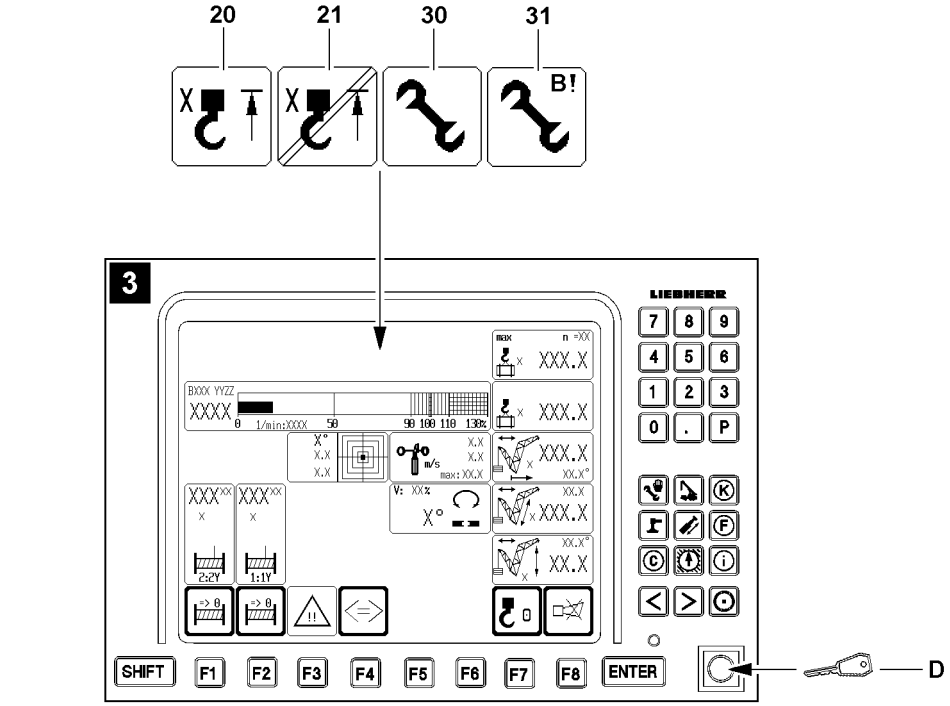

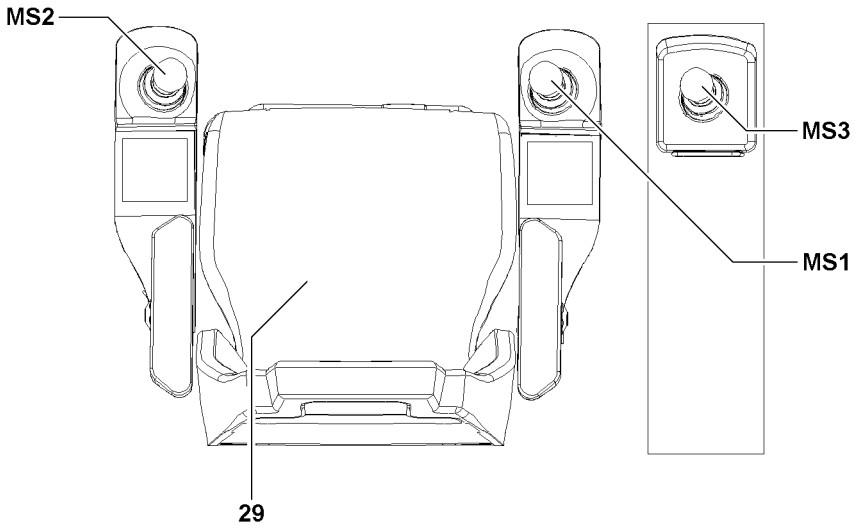

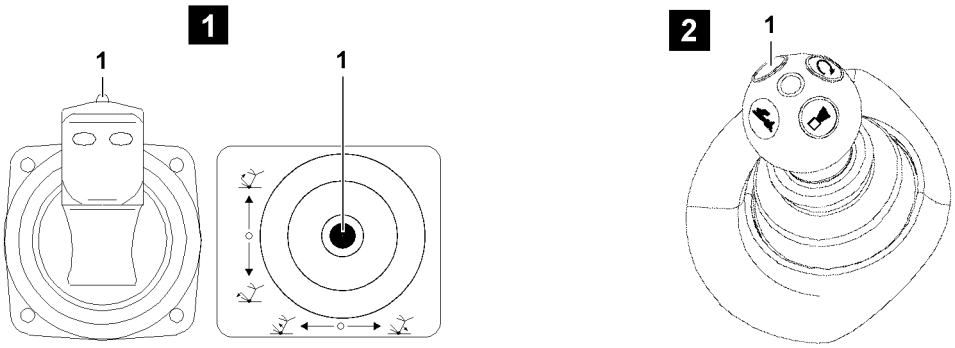

Fig.111230

LWE/LG 1750-006/15409-07-02/en

2.5 Bypass of the hoist top shut off

WARNING
Improper use of the function „Bypass of hoist top shut off“!
▶ The function „Bypass of hoist top shut off“ may never be used to increase the lifting height during crane operation.

WARNING
Property damage and falling load!
If the function „Bypass of hoist top shut off“ is activated, there is the danger that the hook block or the load hook is pulled against the pulley head.
This danger exists especially when the hoist winch is continued to be spooled up and for crane movements which have an influence on the hoist rope, for example luffing the boom, the auxiliary boom / accessory or the derrick boom.
Property damage and falling load can result.
Personnel can be severely injured or killed.
▶ The function „Bypass of hoist top shut off“ may only be carried out by an authorized person, along with a guide. The guide must be in direct contact with the crane operator and must continually monitor the distance between the hook block / load hook and the boom head.
▶ Carry out all crane movements with utmost caution.

Note
▶ The activation of the function „Bypass of hoist top shut off“ is only possible if the hoist limit switch was touched and the hoist top shut off has occurred.
▶ If the hoist limit switch is triggered when the set up key **D** is actuated (function „Exceedance of shut off limits of the LICCON overload protection“ is active, the assembly icon **30** or the assembly icon **31** appear), then a hoist top shut off occurs and the function „Exceedance of shut off limits of the LICCON overload protection“ is deactivated.
▶ For assembly purposes or in emergency cases, if the activation of the function „Bypass of hoist top shut off“ **and** activation of the function „Exceedance of shut off limits of the LICCON overload protection“ is necessary, then the set up key **D** must be actuated until the icon **21** and assembly icon **30** or assembly icon **31** (assembly operation) appear.

Make sure that the following prerequisites are met:
– A hoist top shut off has occurred, the hoist top icon **20** appears in the LICCON monitor.
– Either the seat contact button **29** or one of the buttons **1** of the master switches (MS1, MS2, MS3) is actuated.
– All master switches (MS1, MS2, MS3) are in zero position (not deflected).
– The radio operation***** is not active.

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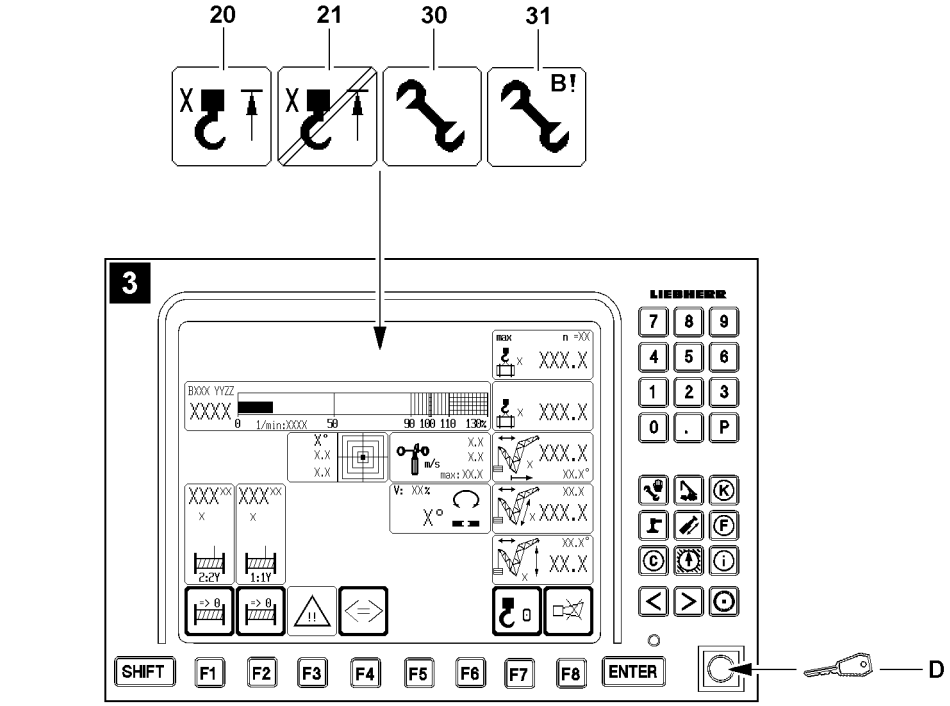

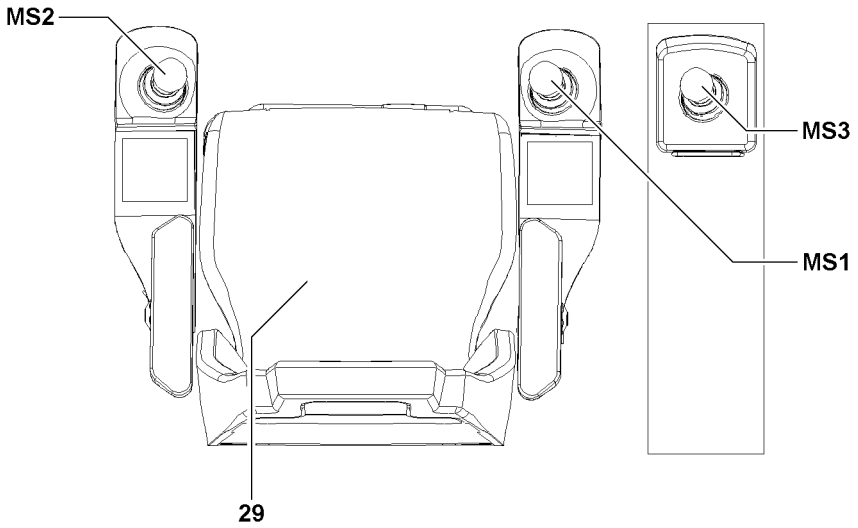

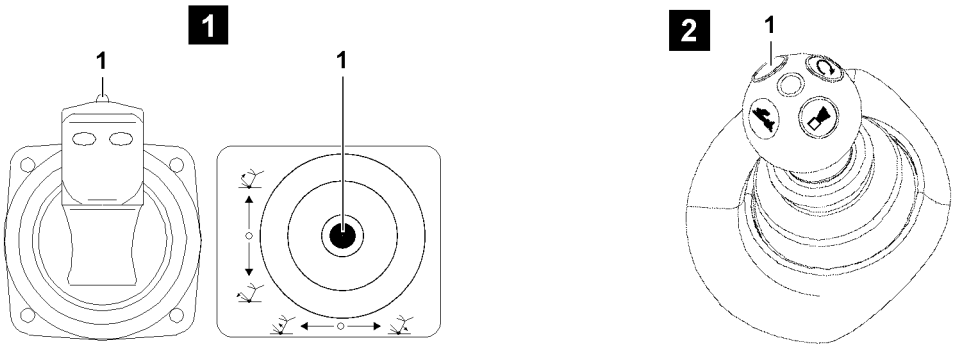

Fig.111230

LWE/LG 1750-006/15409-07-02/en

▶ Turn the set up key **D** to the right (touching).

Result:

– The assembly icon **30** or the assembly icon **31** (assembly operation) appear in the LICCON monitor.
– The hoist top icon **20** in the LICCON monitor changes to the icon **21**.
– The working speed is reduced for all functions (if load chart is available).
– All hoist limit switches are bypassed.

▶ Carry out a crane movement with bypassed hoist limit switches with utmost caution and by taking the safety guidelines into account.

The function „Bypass of the hoist top shut off“ turns off:
– If the set up key **D** is actuated again.
– When no master switch (MS1, MS2, MS3) was deflected for 10 seconds.
– When neither the seat contact button **29** nor one of the buttons **1** of the master switches (MS1, MS2, MS3) is actuated.
– If there is no longer a shut off of a hoist limit switch.
– If the radio operation***** is active.
– At engine stop.

The function „Bypass of the hoist top shut off“ has / was turned off:
– The assembly icon **30** or the assembly icon **31** (assembly operation) in the LICCON monitor turn off.
– The icon **21** on the LICCON monitor turns off.
– The working speed is reduced until all master switches (MS1, MS2, MS3) are in zero position at the same time.

▶ Make sure that the assembly icon **30** or the assembly icon **31** (assembly operation) as well as the icon **21** no longer appear in the LICCON monitor.
▶ Carry out the crane movements in such a way that no repeated hoist top shut off occurs.

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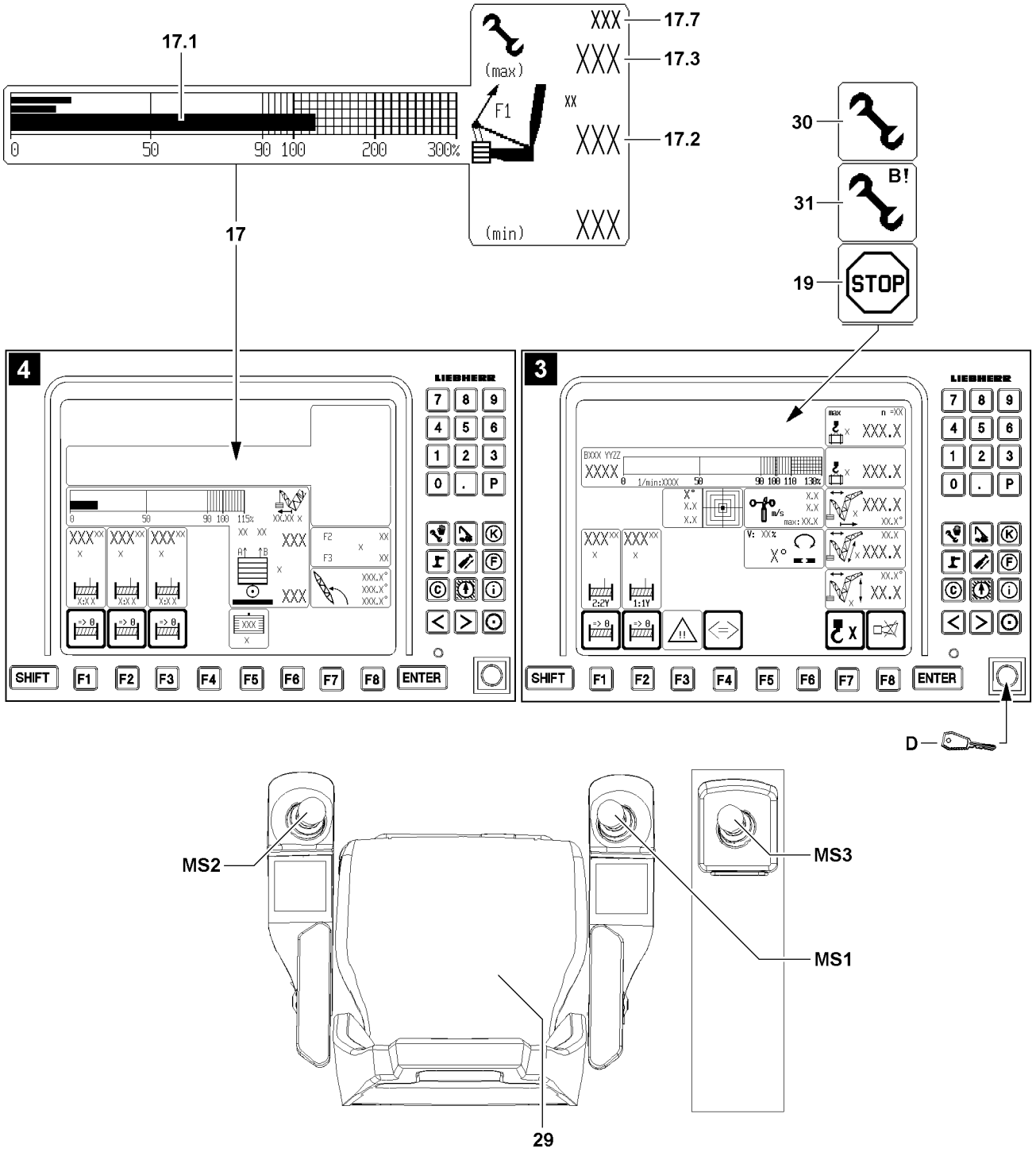

Fig.112343

2.6 Exceeding the shut off limits of the LICCON overload protection during erection / take down procedures (assembly operation)

Note

- If the crane is in the range „No load chart available“ then there is a shut off of the crane control by the LICCON overload protection. The icon **19** appears in the LICCON monitor.
- By an actuated set up key **D**, the function „Exceedance of shut off limits of the LICCON overload protection“ can be activated, all erection / take down procedures can be carried out within the erection / take down charts, for which no load charts are available.

WARNING

Danger of accident during erection / take down procedures!
If the erection / take down charts are not observed, the crane could collapse, the boom can break off or the crane can topple over.
Personnel can be severely injured or killed.

- The erection / take down charts must be observed.
- Press the set up key **D** only when the configuration status has been entered correctly in the LICCON computer system and matches the actual situation.

Note

- The force determined on test point 1 is generally described as $F1_{actual}$ (actual value F1).
- In the icon **17** (F1-load display), the force relationship as well as the number values are shown in number values as well as a bar display (called F1-bar display).
- The value $F1_{max\text{-}operation}$ **17.3** corresponds to 100 % in the F1-bar display.
- The F1-utilization bar **17.1** shows the relationship $F1_{actual}$ **17.2** to $F1_{max\text{-}operation}$ **17.3**.
- In crane operation without derrick ballast, fewer values may be shown in the icon **17** (F1-load display).
- If a load chart is available, then the value $F1_{max\ operation}$ **17.3** is valid as the limit value for a shut off of crane operation.
- When leaving the area „Load chart available“, the assembly icon **30** turns off and the assembly icon **31** appears.
- When leaving the area „Load chart available“ then $F1_{max\ assembly}$ **17.7** is valid as the upper limit value.
- $F1_{max\text{-}assembly}$ **17.7** might only appear when 90 % of its nominal value is exceeded.

2.6.1 Carrying out erection procedures (assembly operation)

Make sure that the following prerequisites are met:

- All master switches (MS1, MS2, MS3) are in zero position (not deflected).
- Either the seat contact button **29** or one of the buttons **1** of the master switches (MS1, MS2, MS3) is actuated.
- Radio operation* is not active.
- The set up configuration corresponds to the erection / take down charts.
- The set up status has been entered correctly into the LICCON computer system.

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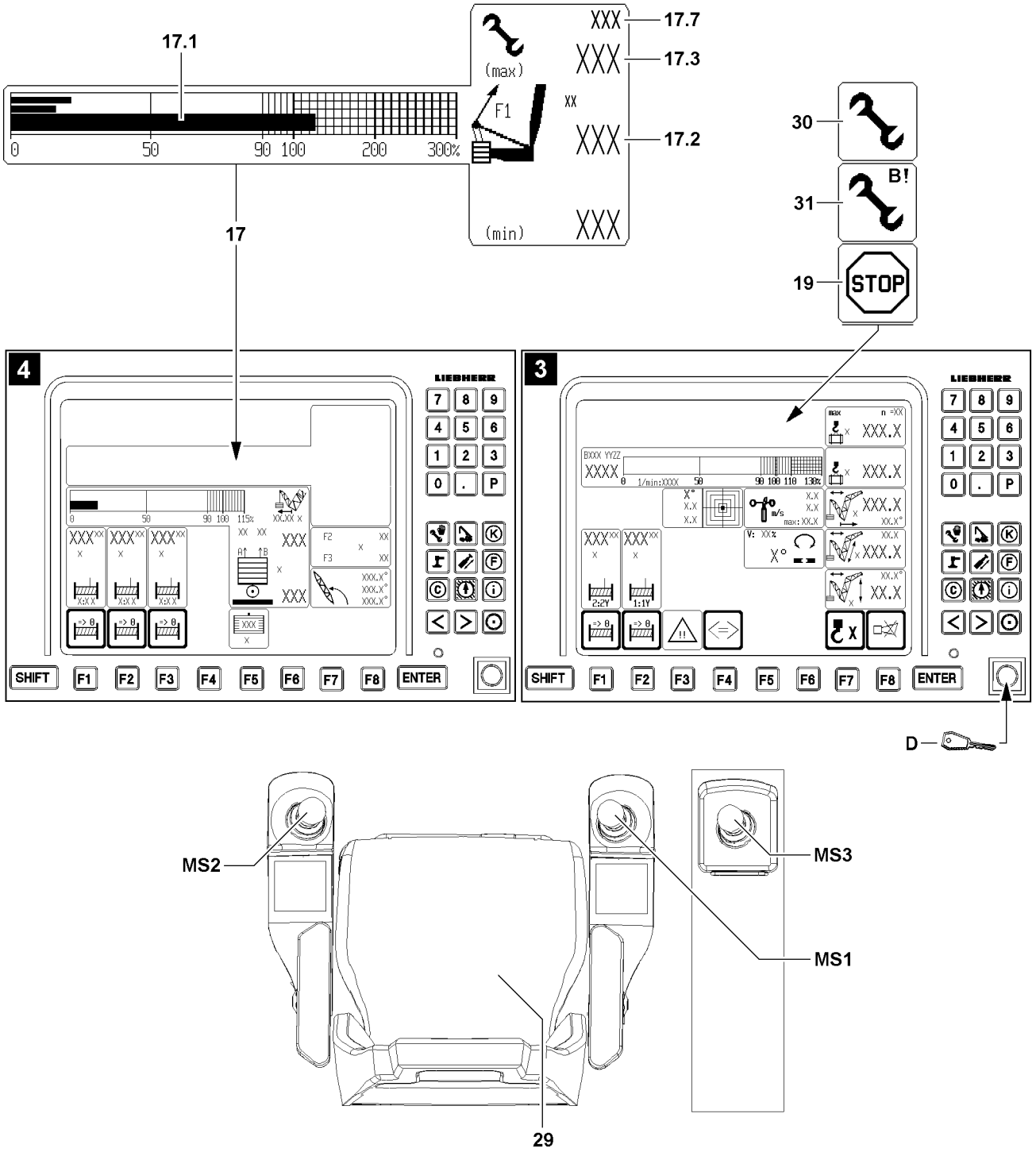

Fig.112343

▶ Turn the set up key **D** to the right (touching).

Result:

– The assembly icon **31** appears in the area „No load chart available“.
– The erection / take down procedures can be carried out.

▶ Watch the icon **17** (F1-load display), the value $F1_{actual}$ **17.2** may not exceed the value $F1_{max\text{-}assembly}$ **17.7**.

Problem remedy
The erection / take down procedure cannot be carried out due to shut off „$F1_{max\text{-}assembly}$ **17.7** exceeded“?
▶ See section „Danger of exceeding $F1_{max\ assembly}$“.

Problem remedy
The function „Exceedance of shut off limits of the LICCON overload protection“ can not be activated during erection / take down procedures?
▶ Check the error messages.
▶ Check the electrical connections.
▶ Check if all sensors or dummy plugs with integrated electric have been connected properly.

The function „Exceedance of shut off limits of the LICCON overload protection“ turns off:
– If the set up key **D** is actuated again.
– When an range with existing load chart is reached (erection procedure).
– If all master switches (MS1, MS2, MS3) are in neutral position for 10 seconds (with „Load chart available“).
– When neither the seat contact button **29** nor one of the buttons **1** of the master switches (MS1, MS2, MS3) is actuated.
– At engine stop.

The function „Exceedance of shut off limits of the LICCON overload protection“ has / was shut off:
– The assembly icon **30** or the assembly icon **31** in the LICCON monitor turns off.

▶ After completion of the erection / take down procedures, make sure that the assembly icon **30** or the assembly icon **31** no longer appear in the LICCON monitor.

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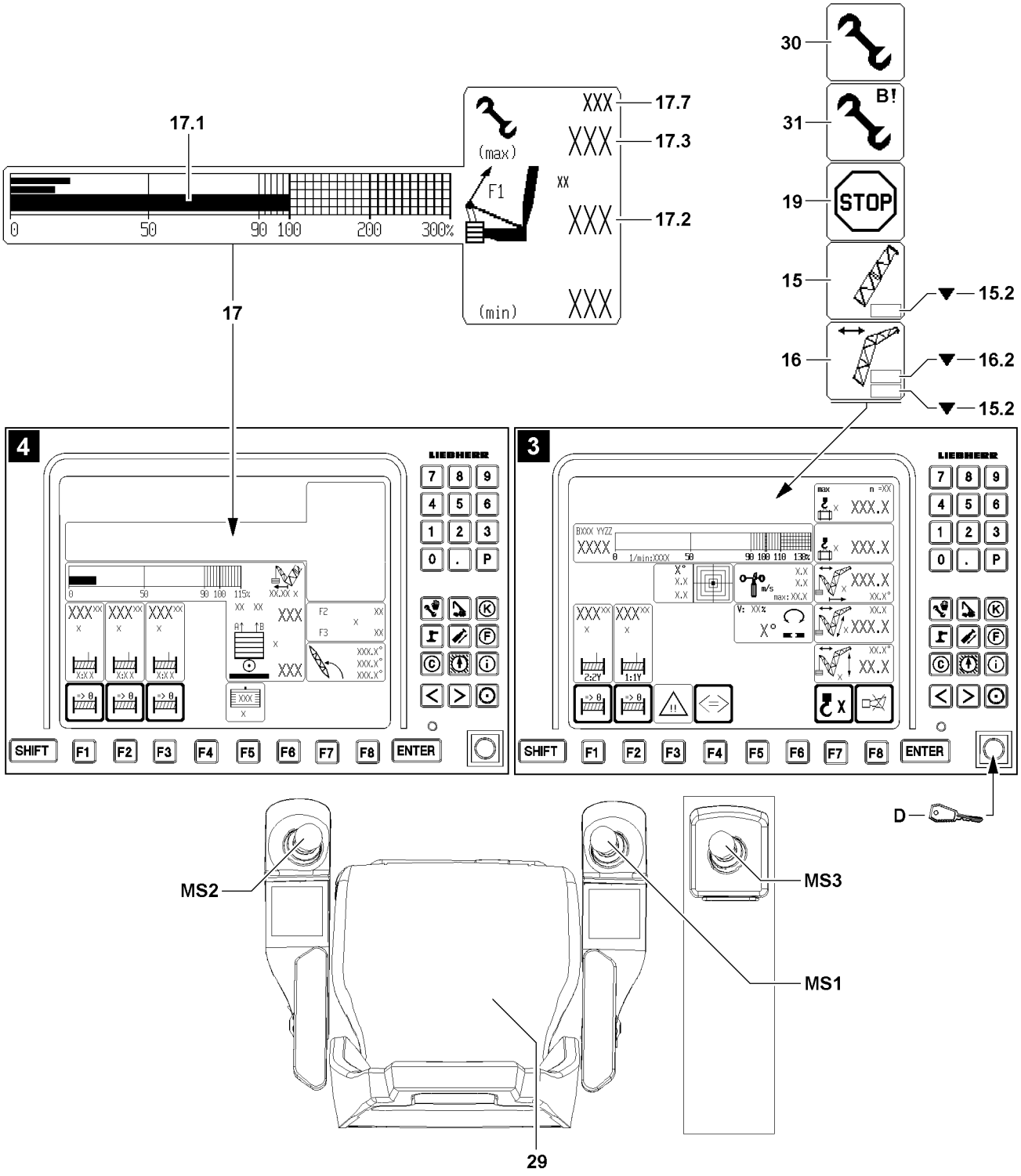

Fig.112341

2.6.2 Carrying out take down procedures (assembly operation)

WARNING
Increased danger of accidents due to bypass of shut off of luffing the main boom / auxiliary boom / accessory down!
When the shut off luffing the main boom / auxiliary boom / accessory down is bypassed, then the LICCON overload protection as a whole is deactivated or limited.
When the shut off luffing the main boom / auxiliary boom / accessory down is bypassed and the main boom and / or the auxiliary boom / accessory is further luffed down, then there is no load chart available any longer.
Crane operation with bypassed shut off luffing the main boom / auxiliary boom / accessory down is prohibited, since severe accidents can result.
Personnel can be severely injured or killed.

- ▶ Activate the bypass of the shut off luffing the main boom / auxiliary boom / accessory down only in emergency cases or for erection / take down procedures with erection / take down charts.
- ▶ Carry out all crane movements with utmost caution.

Make sure that the following prerequisites are met:

- In symbol **15** or symbol **16** appear symbol **15.2** or symbol **16.2** and the LICCON overload protection has shut off the crane movement.
- Either the seat contact button **29** or one of the buttons **1** of the master switches (MS1, MS2, MS3) is actuated.
- All master switches (MS1, MS2, MS3) are in zero position (not deflected).
- The radio operation* is not active.

▶ Turn the set up key **D** to the right (touching).

Result:

- The assembly icon **30** appears in the LICCON monitor.
- The function „Exceedance of shut off limits of the LICCON overload protection“ is activated and has bypassed the shut off luffing the main boom / auxiliary boom / accessory down.

Note

- ▶ If a load chart is available, then the value $F1_{max\ operation}$ **17.3** is valid as the limit value for a shut off of crane operation.
- ▶ When leaving the area „Load chart available“, the assembly icon **30** turns off and the assembly icon **31** appears.
- ▶ When leaving the area „Load chart available“ then $F1_{max\ assembly}$ **17.7** is valid as the upper limit value.
- ▶ If no derrick boom is installed, then the icon **17** only shows $F1_{actual}$ **17.1** and $F1_{max\text{-}assembly}$ **17.7**.
- ▶ $F1_{max\text{-}assembly}$ **17.7** might only appear when 90 % of its nominal value is exceeded.

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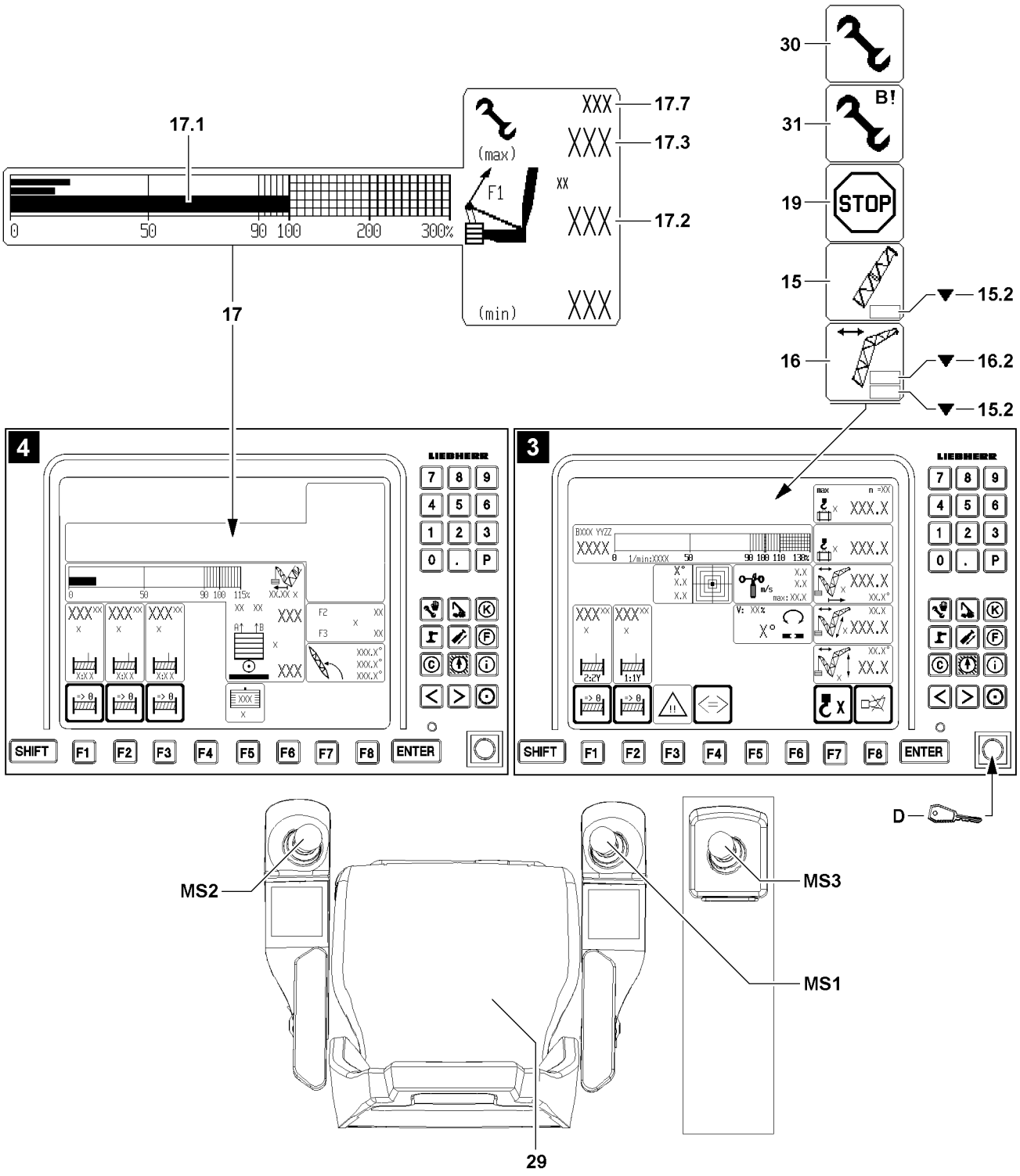

Fig.112341

DANGER
The crane can topple over!
There is **no** shut off of the luff down movement after reaching the limit value $F1_{max\ assembly}$ **17.7**.
If the warnings by the LICCON overload protection are ignored, then the crane will be overloaded or topples over.
Personnel can be severely injured or killed.

- ▶ The symbol **17** (F1-load display) must be watched permanently. It must be ensured that the value $F1_{actual}$ **17.2** is smaller than the value $F1_{max\ assembly}$ **17.7**.
- ▶ The luff down movement must be stopped before the value $F1_{actual}$ **17.2** exceeds the limit value $F1_{max\ assembly}$ **17.7**.

▶ During the take down procedure watch the icon **17** (F1-load display).

Problem remedy
The take down procedure cannot be carried out due to danger of exceeding the $F1_{max\ assembly}$ **17.7**?
▶ See section „Danger of exceeding $F1_{max\ assembly}$“.

The bypass of the shut off luffing the main boom / auxiliary boom / accessory down turns off:
– If the set up key **D** is actuated again.
– When neither the seat contact button **29** nor one of the buttons **1** of the master switches (MS1, MS2, MS3) is actuated.
– When an area with existing load chart is reached.
– If the radio operation* is active.
– At engine stop.

The bypass of the shut off luffing the main boom / auxiliary boom / accessory down has / was turned off:
– The assembly icon **31** or the assembly icon **30** in the LICCON monitor turns off.

▶ Make sure that the assembly icon **30** or the assembly icon **31** no longer appear in the LICCON monitor.

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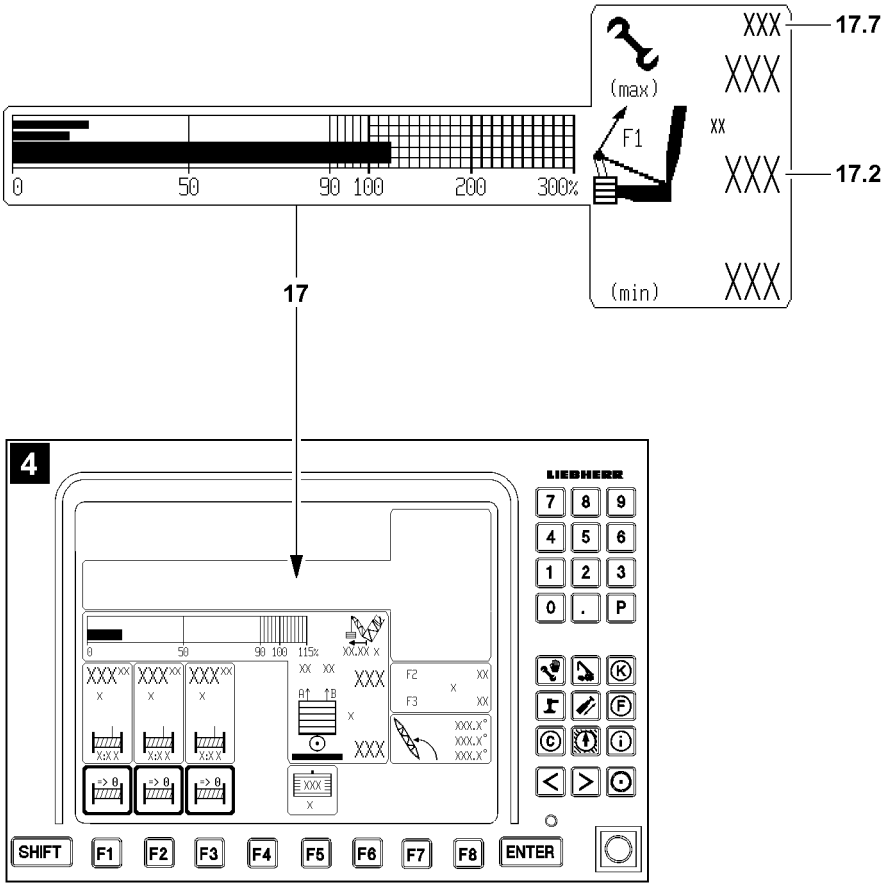

Fig.112344

2.6.3 Danger of exceeding $F1_{max\ assembly}$

Note

▶ $F1_{max\text{-}assembly}$ **17.7** might only appear when 90 % of its nominal value is exceeded.

DANGER

The crane can topple over!

There is **no** shut off of the luff down movement after reaching the limit value $F1_{max\ assembly}$ **17.7**.

If the warnings by the LICCON overload protection are ignored, then the crane will be overloaded or topples over.

Personnel can be severely injured or killed.

▶ The luff down movement must be stopped before the value $F1_{actual}$ **17.2** exceeds the limit value $F1_{max\ assembly}$ **17.7**.

In the icon **17** (F1-load display), the value $F1_{actual}$ **17.2** has reached the upper limit value $F1_{max\text{-}assembly}$ **17.7**.

▶ Check if a crane movement, which can lower the force F1 (value $F1_{actual}$ **17.2**) can be initiated, for example setting down the hook block / load hook.
▶ Check if the correct set up configuration has been entered on the LICCON computer system.
▶ Check if the actual set up configuration matches the entered set up configuration.
▶ Check if the correct hook block weight has been entered.
▶ Check if the respective hook block / load hook is installed.
▶ Check if all attachment parts and guy rods on the boom system, which are not needed, have been removed.
▶ Check if environmental influences (wind, snow or ice) on the crane are not too great.

Note

▶ Hook block weight entry and correction of weighing errors, see Crane operating instructions, chapter 4.02.

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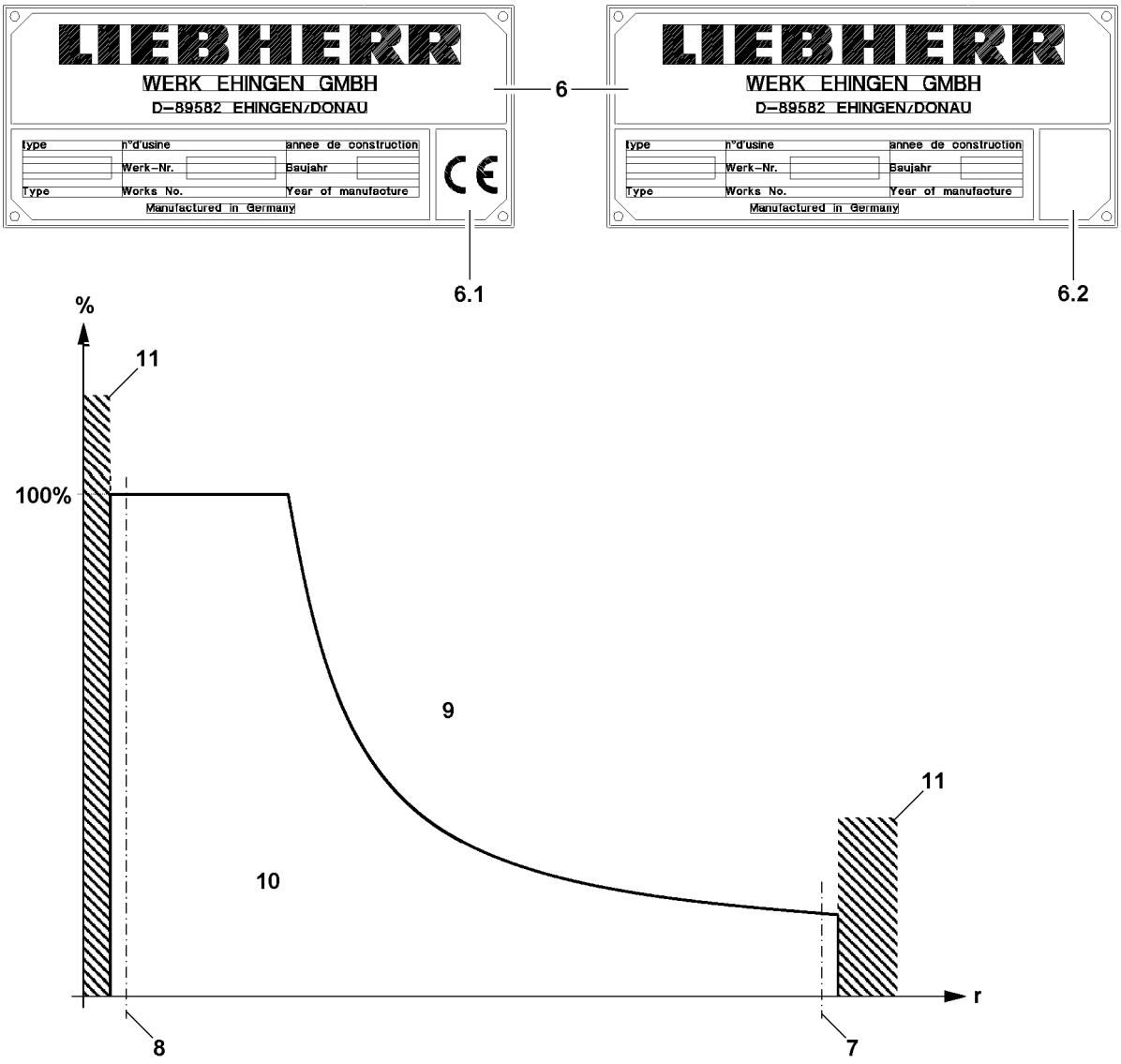

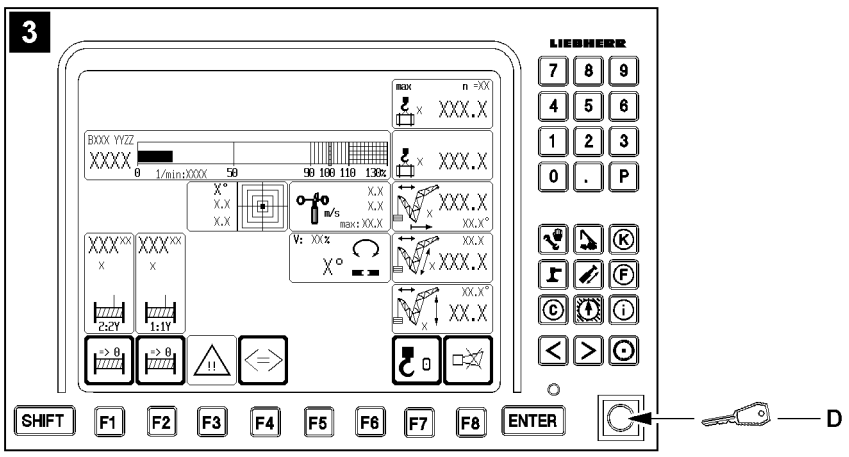

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Fig.111208

3 Instructions for resuming crane movements for cranes without CE mark

WARNING
Danger of accident!
If the following points are not observed, personnel can be severely injured or killed.
- ▶ The crane operator bears the sole and full responsibility for the adherence to measures to be taken in case of shut off of crane movement.
- ▶ The crane operator must make sure, before crane operation, that he is using the correct description for the current programming.

Note
- ▶ Check the data tag **6** to determine if your crane has a CE mark.
- ▶ The following section applies to a crane without CE mark, see data tag **6.2**.
- ▶ If your crane does have a CE mark, see data tag **6.1**, then you must observe the description in section „Instructions for resuming a crane movement for cranes with CE mark“.

3.1 Overview load chart for cranes without CE mark

Axle	Description
r	Radius boom (working radius)
%	Utilization of the crane in percentages

Position	Description
7	Lower limit angle load chart
8	Upper limit angle load chart
9	Area „Exceeding the overload protection“
10	Range „Load chart available“
11	Range „No load chart available“

Note
- ▶ If the set up key **D** (LICCON monitor with crane operating screen, illustration **3**) is actuated, the working speed is not reduced.

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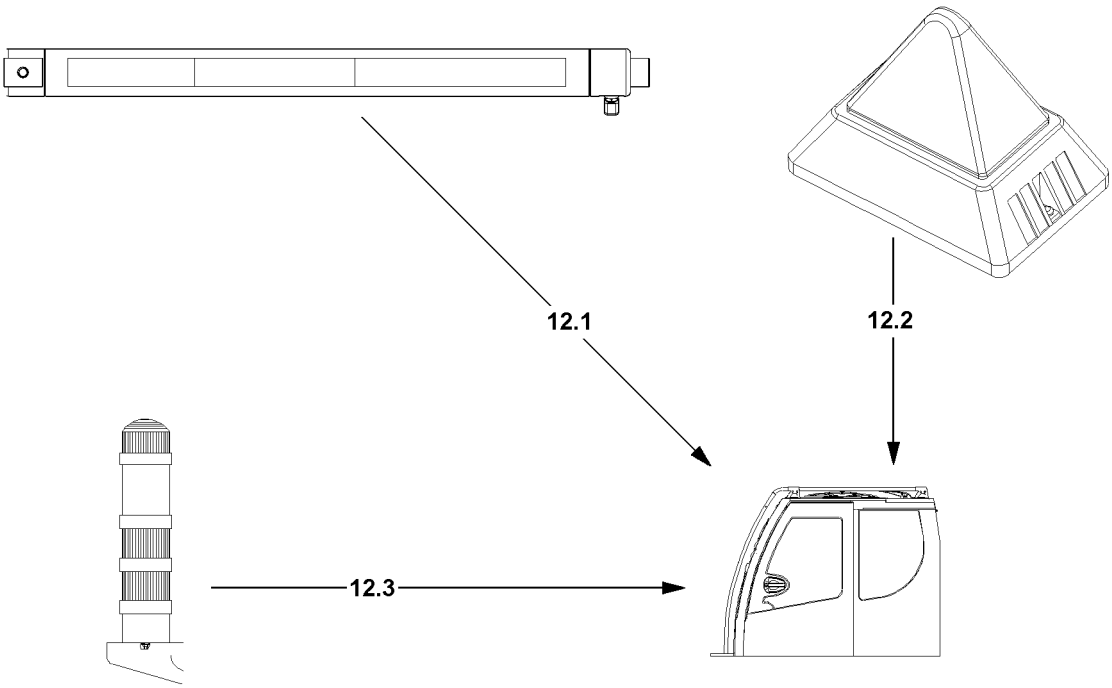

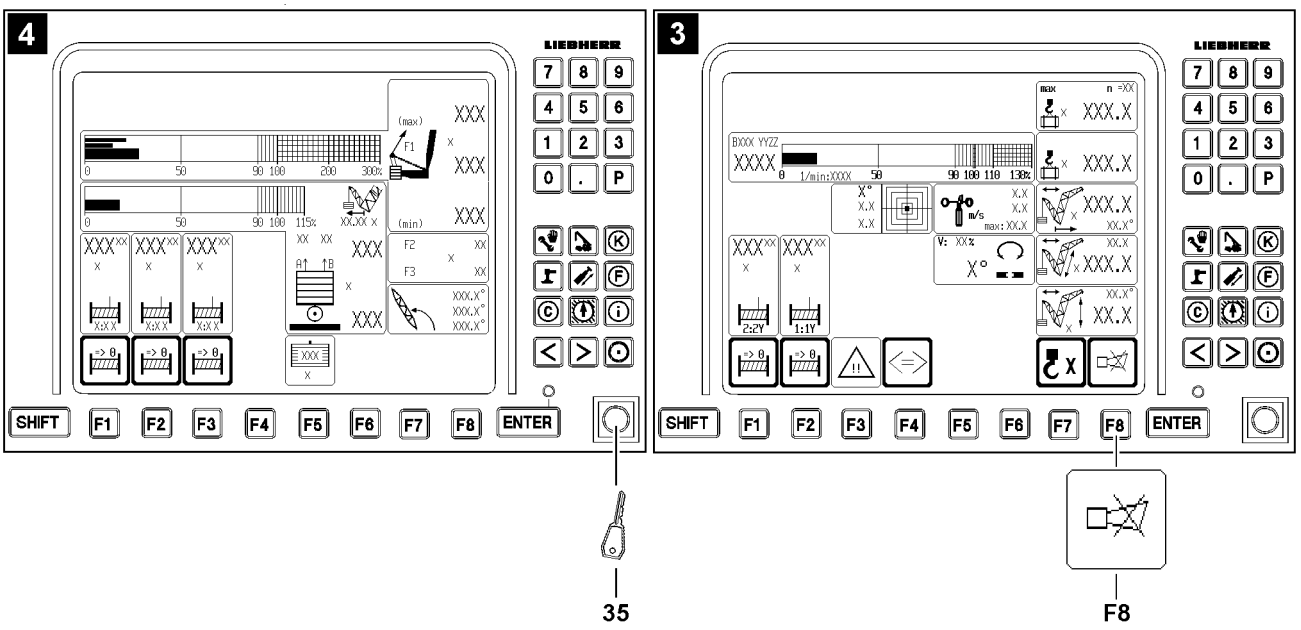

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Fig.111212

3.2 Overview of acoustic / visual warnings for cranes without CE mark

- Depending on the crane type, either a warning light **12.1** or a flashing beacon **12.2** or a combination of flashing beacon **12.2** and warning light*** 12.3** are installed.
- The acoustic warnings within the crane operator's cab are turned off by pressing the button **F8** on the LICCON monitor with crane operating screen (illustration **3**).
- The acoustic warnings outside the crane operator's cab are turned off by actuating the key button **35** on the LICCON monitor with derrick operating screen (illustration **4**).

3.2.1 Description of acoustic / visual warnings

The case numbers from the chart „Overview of case numbers“ are valid for the following charts in this chapter:

- „Acoustic / visual warnings on the LICCON monitor“
- „Warning light 12.1“
- „Flashing beacon 12.2“
- „Warning light 12.3“

Overview of case numbers	
Case number	**Description Case**
Case 001	Utilization of crane from 0 % to 89 %
Case 002	Utilization of crane from 90 % to 100 %
Case 003	Utilization of crane over 100 %
Case 004	Shut off of crane movements - LMB STOP
Case 005	Luffing in with suspended load
Case 006	Participating sensor (LMB) defective
Case 010	Exceeding the shut off limits of the LICCON overload protection
Case 011	Bypass of shut off hoist top
Case 016	Bypass of shut off luffing down the boom / auxiliary boom / accessories, „Load chart available“
Case 018	Bypass of shut off luffing down the boom / auxiliary boom / accessories, „No load chart available“
Case 020	Exceeding the shut off limits of the LICCON overload protection during erection / take down procedures, „No load chart available“

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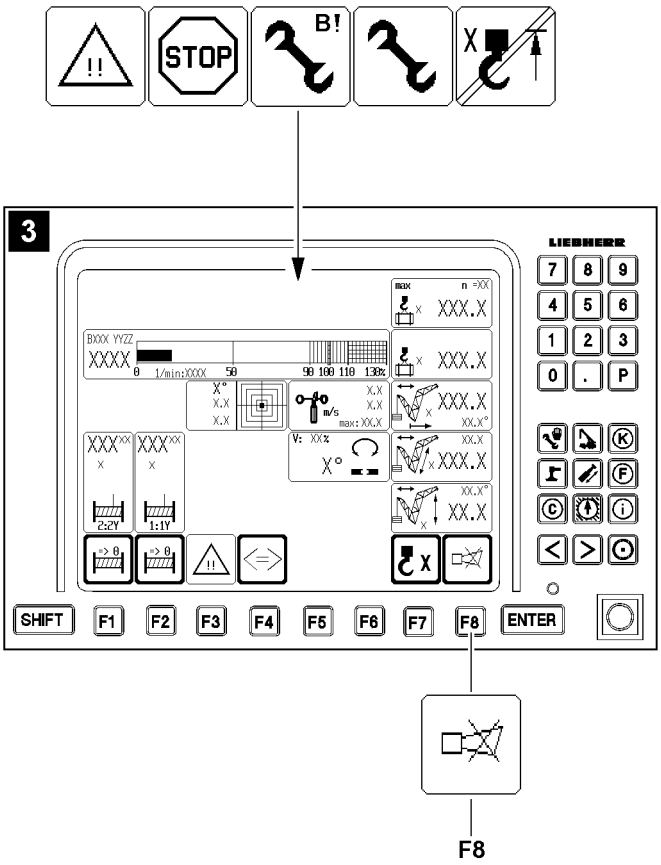

LWE/LG 1750-006/15409-07-02/en

Fig.111209

3.2.2 Acoustic / visual warnings within the crane operator's cab

Note
▶ Description of individual case numbers, see chart „Overview of case numbers“.

Acoustic / visual warnings on the LICCON monitor									
Case number	Acoustic warning LICCON monitor at utilization of crane			Visual warning LICCON monitor					
	Short sound	Long sound	Long sound	Utilization of crane		Occurrence			
	From 90 %	Above 100 %	Always	From 90 %	Above 100 %	LMB STOP	Appears if the set up key D is actuated		
									
Case 001							—	—	—
Case 002	X²			O			—	—	—
Case 003		X²		O	O		—	—	—
Case 004			X²		O		—	—	—
Case 005	X²	X²		O	O		—	—	—
Case 006			X²			O		O	
Case 010	X²	X²		O	O		O		
Case 011			X²	O	O	O	O		O
Case 016	X²	X²		O	O		O		
Case 018			X²			O		O	
Case 020			X²			O		O	

O = cannot be turned off

X² = can be turned off immediately on the LICCON monitor key **F8**

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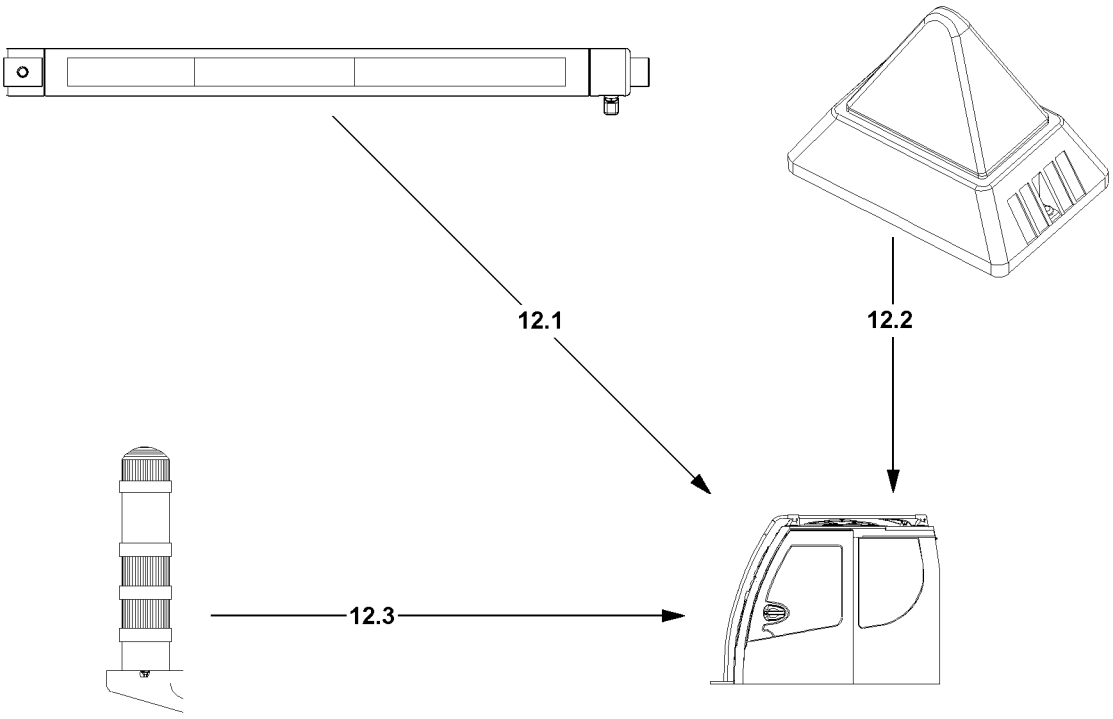

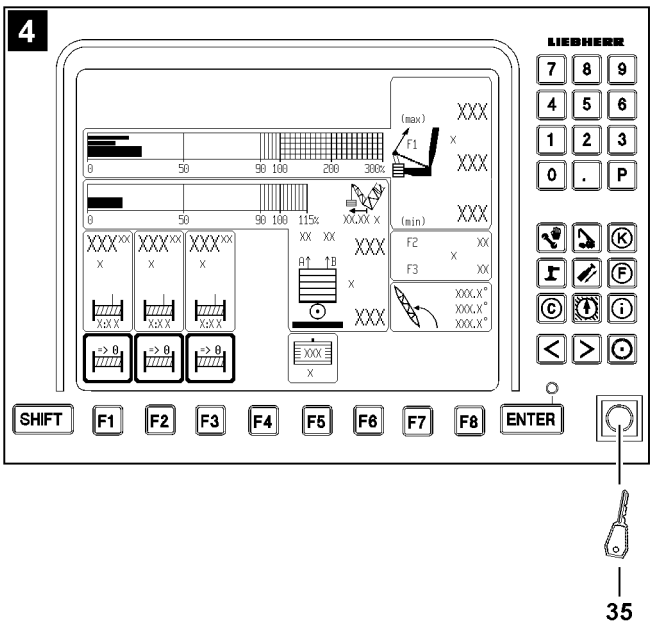

LWE/LG 1750-006/15409-07-02/en

Fig.111206

3.2.3 Acoustic / visual warnings outside the crane operator's cab

Note
▶ Description of individual case numbers, see chart „Overview of case numbers“.

Warning light 12.1					
Case number	**At utilization of crane**	**Acoustic warning**	**Visual warning**		
		Signal turntable	**Green**	**Yellow**	**Red**
Case 001	From 0 % to 89 %		O[1]		
Case 002	From 90 % to 100 %			O[1]	
Case 003	Above 100 %	X[1]			O[1]
Case 004	-				O[1]
Case 005	From 0 % to 89 %		O[1]		
Case 005	From 90 % to 100 %			O[1]	
Case 005	Above 100 %	X[1]			O[2]
Case 006	-			O[2]	
Case 010	From 0 % to 89 %		O[1]		
Case 010	From 90 % to 100 %			O[1]	
Case 010	Above 100 %	O			O[2]
Case 011	From 0 % to 100 %			O[2]	
Case 011	Above 100 %	O			O[2]
Case 016	Up to 90 %		O[1]		
Case 016	Above 90 % to 100 %			O[1]	
Case 016	Above 100 %	O			O[2]
Case 018	No value available			O[2]	
Case 020	No value available			O[2]	

O = cannot be turned off

O[1] = warning light **12.1** lights up

O[2] = warning light **12.1** blinks

X[1] = can be turned off by actuating (right touching) the key button **35** on the LICCON monitor with the derrick operating screen (illustration **4**), effective after at least 5 seconds

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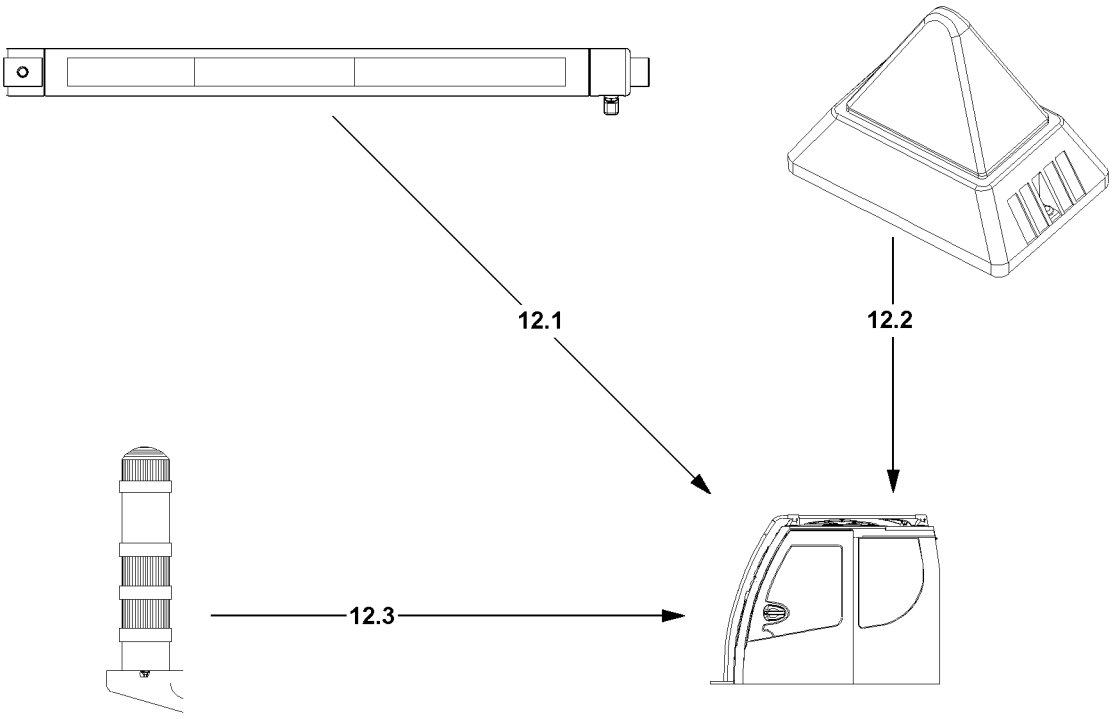
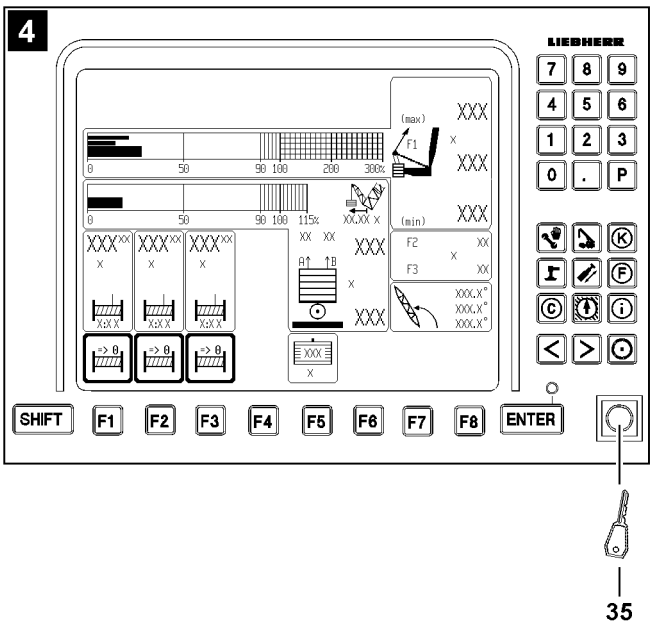




LWE/LG 1750-006/15409-07-02/en

Fig.111206

Note
▶ Description of individual case numbers, see chart „Overview of case numbers“.

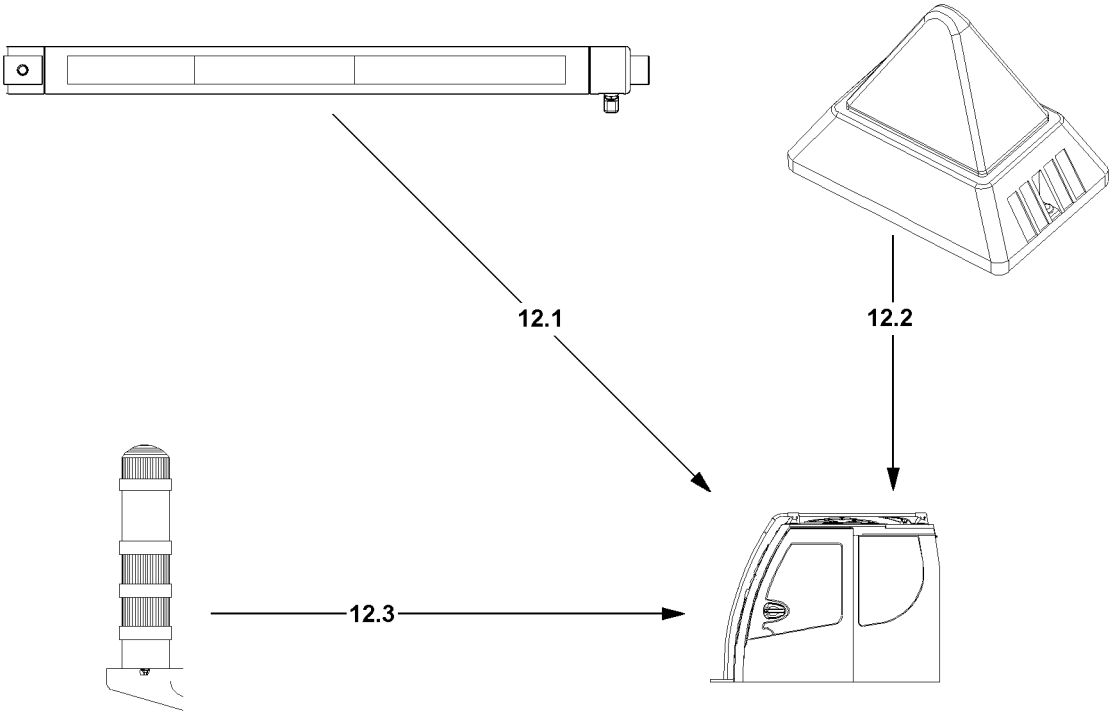
Flashing beacon 12.2			
Case number	**At utilization of crane**	**Acoustic warning**	**Visual warning**
		Signal turntable	**Red**
Case 001	0 % to 89 %	-	-
Case 002	90 % to 100 %	-	-
Case 003	Above 100 %	X[1]	O[2]
Case 004	-		O[2]
Case 005	Above 100 %	X[1]	O[2]
Case 006	-		O[2]
Case 010	Above 100 %	O	O[2]
Case 011	Above 100 %	O	O[2]
Case 016	Above 100 %	O	O[2]
Case 018	No value available		O[2]
Case 020	No value available		O[2]

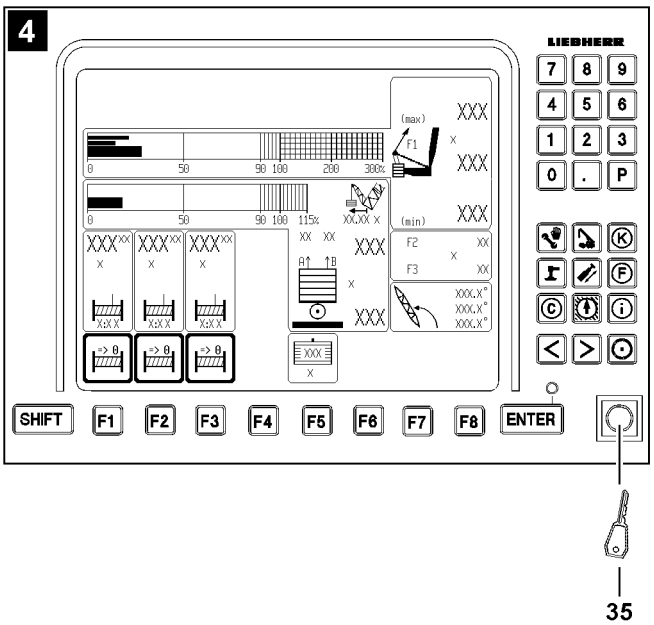
O = cannot be turned off

O[2] = flashing beacon **12.2** blinks

X[1] = can be turned off by actuating (right touching) the key button **35** on the LICCON monitor with the derrick operating screen (illustration **4**), effective after at least 5 seconds

LWE/LG 1750-006/15409-07-02/en





LWE/LG 1750-006/15409-07-02/en

Fig.111206

Note
▶ Description of individual case numbers, see chart „Overview of case numbers“.

Warning light 12.3					
Case number	**At utilization of crane**	**Acoustic warning**	**Visual warning**		
		Signal turntable	**Green**	**Yellow**	**Red**
Case 001	From 0 % to 89 %		O[1]		
Case 002	From 90 % to 100 %			O[1]	
Case 003	Above 100 %	X[1]			O[2]
Case 004	-				O[2]
Case 005	From 0 % to 89 %		O[1]		
Case 005	From 90 % to 100 %			O[1]	
Case 005	Above 100 %	X[1]			O[2]
Case 006	-				O[2]
Case 010	From 0 % to 89 %		O[1]		
Case 010	From 90 % to 100 %			O[1]	
Case 010	Above 100 %	O			O[2]
Case 011	From 0 % to 100 %			O[1]	
Case 011	Above 100 %	O			O[2]
Case 016	From 0 % to 89 %		O[1]		
Case 016	From 90 % to 100 %			O[1]	
Case 016	Above 100 %	O			O[2]
Case 018	No value available				O[2]
Case 020	No value available				O[2]

O = cannot be turned off

O[1] = warning light **12.3** lights up

O[2] = warning light **12.3** blinks

X[1] = can be turned off by actuating (right touching) the key button **35** on the LICCON monitor with the derrick operating screen (illustration **4**), effective after at least 5 seconds

3.3 Monitoring of crane movement

Note
▶ If the LICCON overload protection turns the crane movement off, then the exact cause for the shut off must be determined first.
▶ As a first step, try to rescind the crane movement which has caused a shut off.
▶ If it is not possible to rescind the affected crane movement, then the additional steps are described in the following sections of the chapter.

Note
▶ For detailed description of the individually listed symbols, see Crane operating instructions, chapter 4.02.

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The LICCON overload protection carries out the following shut offs if a limit value is exceeded in crane operation:
- Shut off luffing the main boom up / down
- Shut off Upper limit shut off angle (OGAW)
- Shut off Luffing the auxiliary boom / accessory up / down
- Shut off maximum / minimum value test point 1 (force F1)
- Shut off spooling the winch up / out
- Shut off Hoist top
- Shut off due to error message

The LICCON overload protection warns if the limit values are exceeded, but does not turn off:
- Minimum / maximum support forces

3.3.1 Shut off luffing the main boom up / down

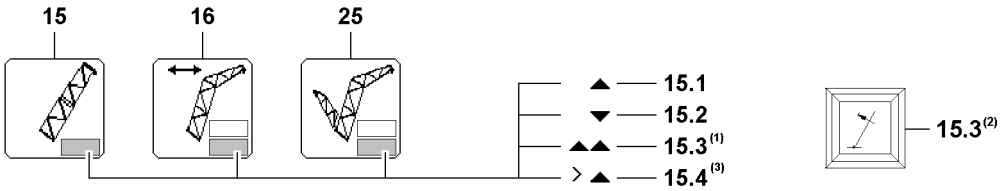

Fig.124701

(1)not LR 1400/2
(2)only LR 1400/2
(3)Only for certain crane types

In symbol **15**, or symbol **16**, or symbol **25** appears in the lower field symbol **15.1**, or symbol **15.2** or symbol **15.4** and the LICCON overload protection has shut the crane movement off.

„Luffing the main boom up“ (symbol **15.1**), „Luffing the main boom down“ (symbol **15.2**) or „upper limit shut off angle“ reached (symbol **15.4**), was shut off because the upper / lower limit angle of the selected load chart was exceeded / fallen below.

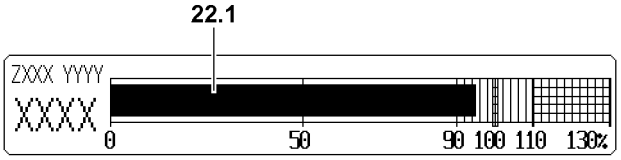

Fig.112340

Note
▶ If the utilization of the crane is more than 95 % (utilization bar **22.1** exceeds 95 %) and the maximum load according to the load chart (falling load capacity) drops by continuing to luff up the boom, then the symbol **15.1** also appears and the crane movement „Luffing the main boom up“ is turned off.

If the symbol / warning light **15.3** appears, then:
- **either** it was luffed up to a limit switch or the limit switch has turned off the crane movement „Luffing the main boom up“
- **or** there is an error on one of the limit switches „Main boom top“

The symbol **15.1** appears and the crane movement „Luffing the main boom up“ was turned off:

▶ Luff the main boom down.

Result:

– Crane operation is possible again.

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The symbol **15.2** appears and the crane movement „Luffing the main boom down“ was turned off:

▶ Luff the main boom up.

Result:

– Crane operation is possible again.

The symbol / warning light **15.3** appears and the crane movement „Luffing the main boom up“ was turned off:

▶ Luff the main boom down.

Result:

– Crane operation is possible again.

Problem remedy
The symbol / warning light **15.3** appears continuously?
If a symbol / warning light **15.3** appears without having luffed the main boom up to a limit switch, then there may be an error in the limit switches „Main boom top“.
▶ Check if there is an error message from the LICCON computer system, see Diagnostics manual.
▶ If yes: Remedy the error immediately.

The symbol **15.4** appears and the crane movement „Luffing the main boom up“ (upper limit shut off angle) was turned off:

▶ Luff the main boom down.

Result:

– Crane operation is possible again.

WARNING
Limited warning functions!
If one of the double version limit switches is not ok and the crane is continued to be operated, then the warning functions of the LICCON overload protection are limited.
▶ The crane can only be operated in an emergency after failure of a double version limit switch.

▶ Carry out crane movements in such a way that no repeated shut off by the LICCON overload protection occurs.

3.3.2 Shut off Luffing the auxiliary boom / accessory up / down

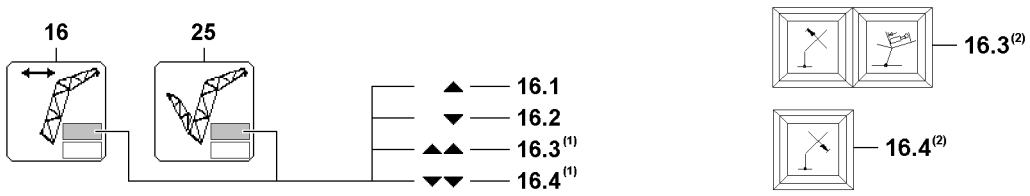

Fig.124702

(1)not LR 1400/2 (2)only LR 1400/2

In symbol **16** or symbol **25** appear in the upper field symbol **16.1** or symbol **16.2** and the LICCON overload protection has shut off the crane movement.

„Luffing the auxiliary boom / accessory up“ (symbol **16.1**) or „Luffing the auxiliary boom / accessory down“ (symbol **16.2**) was shut off because the upper / lower limit angle of the selected load chart was exceeded / fallen below.

If the symbol / warning light **16.3** appears, then:
– **either** it was luffed up to a limit switch or the limit switch has turned off the crane movement „Luffing the auxiliary boom / accessory up“

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– **or** the mechanical relapse support has turned off the crane movement „Luffing the auxiliary boom / accessory up“
– **or** there is an error on one of the limit switches „Auxiliary boom / accessory top“.

If the symbol / warning light **16.4** appears, then:
– **either** it was luffed down to a limit switch „Auxiliary boom / accessory bottom“ and the limit switch has turned off the crane movement „Luffing the auxiliary boom / accessory up“
– **or** there is an error on one of the limit switches „Auxiliary boom / accessory bottom“

The symbol **16.1** appears and the crane movement „Luffing the auxiliary boom / accessory up“ was turned off:

▶ Luff the auxiliary boom / accessory down.

Result:

– Crane operation is possible again.

The symbol **16.2** appears and the crane movement „Luffing the auxiliary boom / accessory down“ was turned off:

▶ Luff the auxiliary boom / accessory up.

Result:

– Crane operation is possible again.

The symbol / warning light **16.3** appears and the crane movement „Luffing the auxiliary boom / accessory up“ was turned off:

▶ Luff the auxiliary boom / accessory down.

Result:

– Crane operation is possible again.

Problem remedy
The symbol / warning light **16.3** appears continuously?
If a symbol / warning light **16.3** appears without having luffed up to a limit switch, then there may be an error in the limit switches „Auxiliary boom / accessory top“.
▶ Check if there is an error message from the LICCON computer system, see Diagnostics manual.
▶ If yes: Remedy the error immediately.

The symbol / warning light **16.4** appears and the crane movement „Luffing the auxiliary boom / accessory down“ was turned off:

▶ Luff the auxiliary boom / accessory up.

Result:

– Crane operation is possible again.

Problem remedy
The symbol / warning light **16.4** appears continuously?
If a symbol / warning light **16.4** appears without having luffed down to a limit switch, then there may be an error in the limit switches „Auxiliary boom / accessory bottom“.
▶ Check if there is an error message from the LICCON computer system, see Diagnostics manual.
▶ If yes: Remedy the error immediately.

WARNING
Limited warning functions!
If one of the double version limit switches is not ok and the crane is continued to be operated, then the warning functions of the LICCON overload protection are limited.
▶ The crane can only be operated in an emergency after failure of a double version limit switch.

▶ Carry out crane movements in such a way that no repeated shut off by the LICCON overload protection occurs.

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3.3.3 Shut off maximum / minimum value test point 1 (force F1)

Note

- The force determined on test point 1 is generally described as $F1_{actual}$ (actual value F1).
- In the icon **17** (F1-load display), the force relationship as well as the number values are shown in number values as well as a bar display (called F1-bar display).
- The value $F1_{max\text{-}operation}$ **17.3** corresponds to 100 % in the F1-bar display.
- The F1-utilization bar **17.1** shows the relationship $F1_{actual}$ **17.2** to $F1_{max\text{-}operation}$ **17.3**.
- In crane operation without derrick ballast, fewer values may be shown in the icon **17** (F1-load display).

Shut off maximum value F1 in crane operation

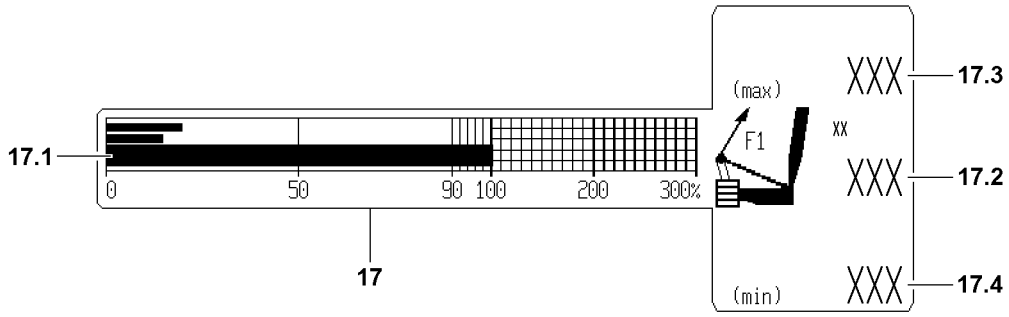

Fig.110991

In the icon **17**(F1-load display) the F1-utilization bar **17.1** exceeds the 100 % mark and the LICCON overload protection has shut off the crane movement. The value $F1_{actual}$ **17.2** has exceeded the value $F1_{max\text{-}operation}$ **17.3**.

All further movements, which lead to an increase of the force F1(value $F1_{actual}$) are shut off.

- Reverse any crane movement which has caused the shut off.
  or
  Initiate an alternative crane movement, which lowers the force F1 (value $F1_{actual}$).

Result:

– Crane operation is possible again.

Problem remedy

The crane operation is limited because the value $F1_{max\text{-}operation}$ apparently is being reached too early?

- Make sure that a valid set up status has been entered on the LICCON computer system.
- Make sure that the crane is assembled according to the assembly drawings.
- Make sure that the actual set up status and the entered set up status of the crane match.
- Make sure that all attachment parts and guy rods on the boom system, which are not needed, have been removed (weight).
- Make sure that the boom system is free of snow and ice (weight).
- Make sure that the wind influence onto the boom is not too great.

If no irregularities can be found:

- Contact Liebherr Service.

Shut off minimum value F1 in crane operation

Note

- A shut off minimum value F1 ($F1_{min}$) only occurs in operating modes with derrick ballast. The status $F1_{actual} = F1_{min}$ cannot be reached in all other operating modes.

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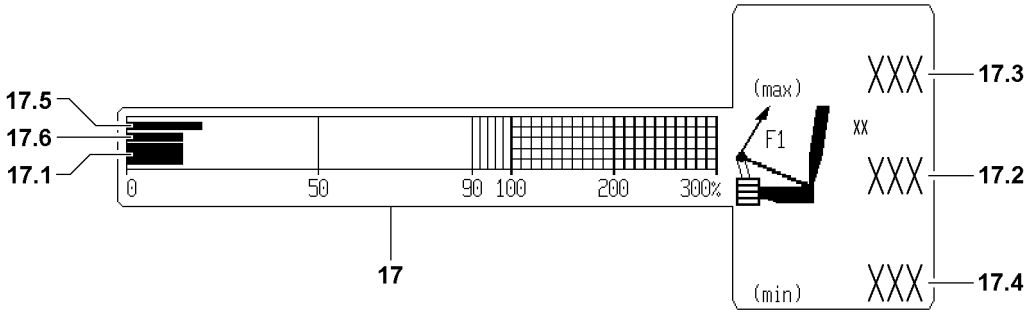

Fig.110992

In the icon **17** (F1-load display), when falling below the $F1_{min}$ advance warning bar **17.5**, a warning of the upcoming shut off is issued by the F1-utilization bar **17.1**.

If the F1-utilization bar **17.1** falls below the $F1_{min}$-STOP bar **17.6**, then the LICCON overload protection shuts off the crane movement. The value $F1_{actual}$ **17.2** has fallen below the value $F1_{min}$ **17.4**.

Note
Shut off $F1_{min}$!

▶ If the utilization of the derrick ballast is below 50 %, then there is no immediate shut off when falling below value $F1_{min}$ **17.4**.

All further movements, which lead to an decrease of the force F1 (value $F1_{actual}$) are shut off.

▶ Reverse any crane movement which has caused the shut off.
or
Initiate an alternative crane movement, which increases the force F1 (value $F1_{actual}$).

Result:

– Crane operation is possible again.

Problem remedy
The crane operation is limited because the value $F1_{min}$ apparently is being reached too early?

▶ Make sure that a valid set up status has been entered on the LICCON computer system.
▶ Make sure that the crane is assembled according to the assembly drawings.
▶ Make sure that the actual set up status and the entered set up status of the crane match.
▶ Make sure that all attachment parts and guy rods on the boom system, which are not needed, have been removed (weight).
▶ Make sure that the boom system is free of snow and ice (weight).
▶ Make sure that the wind influence onto the boom is not too great.

If no irregularities can be found:

▶ Contact Liebherr Service.

3.3.4 Shut off spooling the winch up / out

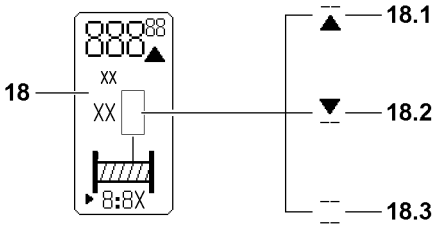

Fig.110878

In symbol **18** appears symbol **18.1**, symbol **18.2** or symbol **18.3** and the LICCON overload protection has shut off the crane movement.

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„Spooling the winch out“ (symbol **18.1**) or „spooling the winch up“ (symbol **18.2**) was shut off because the upper / lower limit value of the rope for the selected winch was exceeded or fallen below.

If symbol **18.3** appears blinking in the symbol **18**, then the affected winch is deactivated.

The symbol **18.1** appears and the crane movement „Spooling the winch out“ was turned off:

▶ Spool the winch up.

Result:

– Crane operation is possible again.

The symbol **18.2** appears and the crane movement „Spooling the winch up“ was turned off:

▶ Spool the winch out.

Result:

– Crane operation is possible again.

The symbol **18.3** appears and the winch is deactivated:

▶ Activate the winch, see Crane operating instructions, chapter 4.02.

Result:

– Crane operation is possible again.

3.3.5 Shut off hoist top

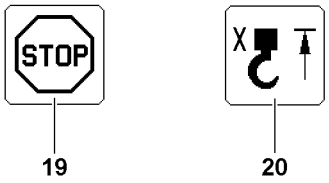

Fig.110875

The symbol **19** and hoist top icon **20** appear in the LICCON monitor and the LICCON overload protection has turned the crane movement off.

Spooling the hoist winch up was turned off because the hook block or the load hook has run against a hoist limit weight during the upward movement and the affected hoist limit switch was triggered.

WARNING
Property damage / falling load!
▶ After shut off spool hoist winch up (hoist top), for every further crane movement, the distance between the hook block / load hook and the boom head must be checked.

Note
▶ After a hoist top shut off occurred, further crane movements, which affect the length of the hoist rope are also shut off.

▶ Spool the hoist winch out.

Result:

– Crane operation is possible again.

3.3.6 Shut off due to error message

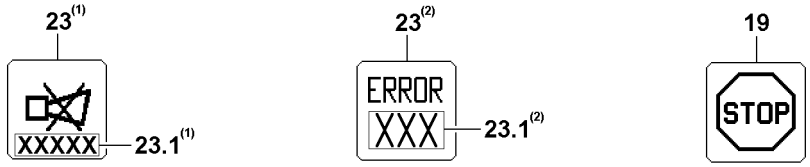

Fig.112331

(1)not LR 1400/2 (2)only LR 1400/2

In the icon **23** appears an error message, the icon **19** appears in the LICCON monitor and the LICCON overload protection has turned off crane movement.

WARNING
Limited warning functions!
If there is a defect on a participating sensor (LML) and the crane is continued to be operated by bypassing the sensor other otherwise, then the warning functions and the shut offs of the LICCON overload protection are deactivated.
- ▶ If there is a defect on a participating sensor (LMB), then the crane may be operated further only in emergency cases.
- ▶ Fix / replace the sensor before starting crane operation again.

- ▶ Determine the existing error with the help of the error message from the error field **23.1** in icon **23**, see Diagnostics manual.
- ▶ Remedy the error.

Problem remedy
The erection of the crane, for example after assembly on a new job site or with another equipment configuration, is not possible due to an error message?
- ▶ Evaluate the error message.
- ▶ Make sure that all electrical connections are established correctly.
- ▶ Check if all sensors or dummy plugs with integrated electric have been connected properly.

If the error cannot be remedied:
- ▶ Contact Liebherr Service.

3.3.7 Minimum / maximum support forces

Note
- ▶ Applies only for cranes with support force monitoring*.
- ▶ Description of support force monitoring, see Crane operating instructions, chapter 4.02.

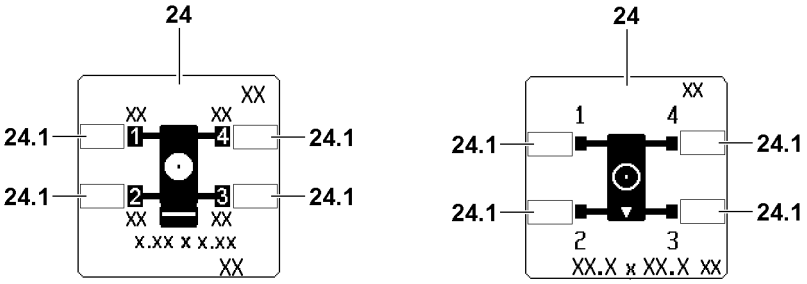

Fig.110881

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WARNING
The crane can topple over!
When reaching the programmed minimum / maximum support forces there is no automatic shut off of crane movements.
The displayed support force values are subjected to fluctuating influences, for example crane operation, surrounding and environmental influences.
The resulting tolerance field of the determined values may not be utilized by the support force display to determine the tipping limit of the crane.
If this is disregarded, then the crane can topple over.
Personnel can be severely injured or killed.

- ▶ The displayed support force values of the support force display may not be used to utilize the crane up to the tipping limit.
- ▶ Make sure that all support force values are within the minimum / maximum support forces.

The icon **24** (depending on the crane, similar to the left or right illustration) is shown in the LICCON monitor with blinking value in one or several fields **24.1**. Blinking values in the fields **24.1** signal exceedance of the minimum / maximum support forces.

- ▶ Reverse the crane movements, which caused the support forces to be outside the minimum / maximum values.

Result:

- – All values in the fields **24.1** are within the minimum / maximum support forces.

- ▶ Carry out crane movements in such a way that the support forces always remain within the minimum / maximum values.

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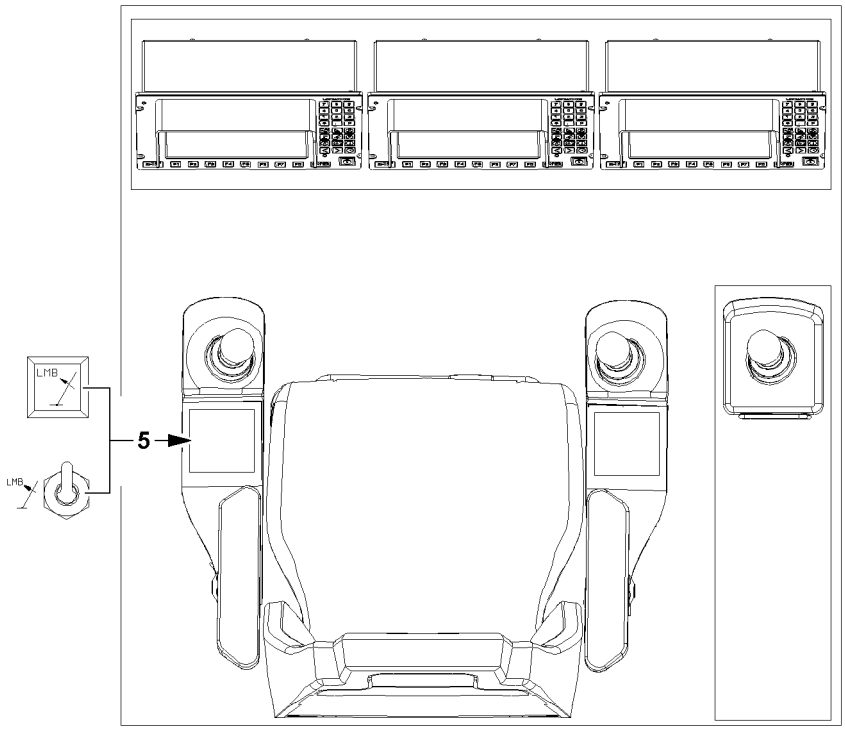

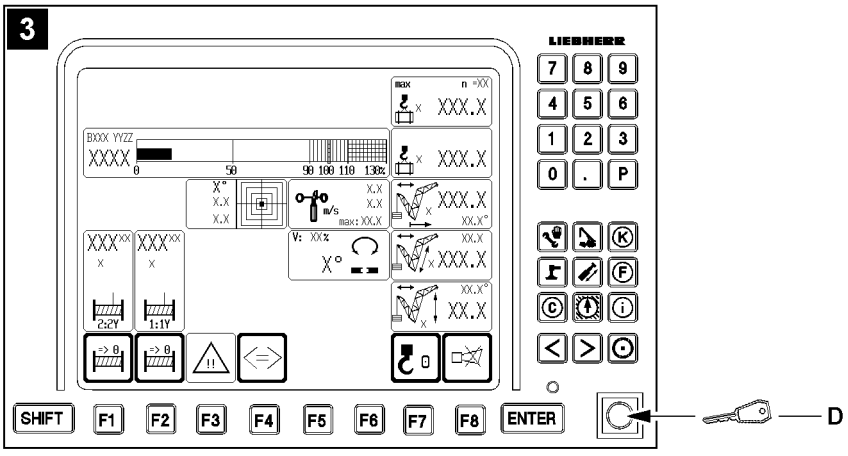

LWE/LG 1750-006/15409-07-02/en

Fig.112334

3.4 Shut off of crane movement: LMB STOP by LICCON overload protection

WARNING
Risk of overloading and toppling of the crane!
If the shut off limits of the LICCON overload protection are exceeded without knowing the exact cause for the shut off by the LICCON overload protection, then the crane can be overloaded and topple over.
Personnel can be severely injured or killed.

- ▶ Before activating the function „Exceedance of shut off limits of the LICCON overload protection“ determine the exact cause for the shut off.

WARNING
Danger of accident due to function „Exceedance of shut off limits of the LICCON overload protection“!
If the shut off limits of the LICCON overload protection are exceeded, there is no additional protection against crane overload.
Due to erroneous operation or deliberate misuse, the crane could collapse, the boom can break off or the crane can topple over.
Personnel can be severely injured or killed.

- ▶ The button **5** „Luffing in with suspended load“ and the set up key **D** may only be actuated when it is ensured that no normal operating condition (utilization below 100 % and no active shut off) can be reached without the function „Exceedance of shut off limits of the LICCON overload protection“!
- ▶ Actuate the set up key **D** only when no normal operating condition (utilization below 100 % and no active shut off) can be reached with the button **5** „Luffing in with suspended load“.
- ▶ The function „Exceeding the shut off limits of the LICCON overload protection“ is only permissible in emergencies and for assembly purposes.
- ▶ The set up key **D** may only be actuated by persons who are aware of the effects of their acts regarding the function „Exceeding the shut off limits of the LICCON overload protection“.
- ▶ The function „Exceeding the shut off limits of the LICCON overload protection“ requires the presence of an authorized person and must be performed with utmost caution.
- ▶ Crane operation with activated function „Exceeding the shut off limits of the LICCON overload protection“ is prohibited.

WARNING
Expanded working / danger zone of the crane!
Due to the function „Exceedance of shut off limits of the LICCON overload protection“ it is possible that the working / danger zone of the crane is significantly expanded.
If these circumstances are not observed, collisions and accidents can occur.
Personnel can be severely injured or killed.

- ▶ With activated function „Exceedance of shut off limits of the LICCON overload protection“ take an expanded working / danger zone of the crane into account and monitor it.

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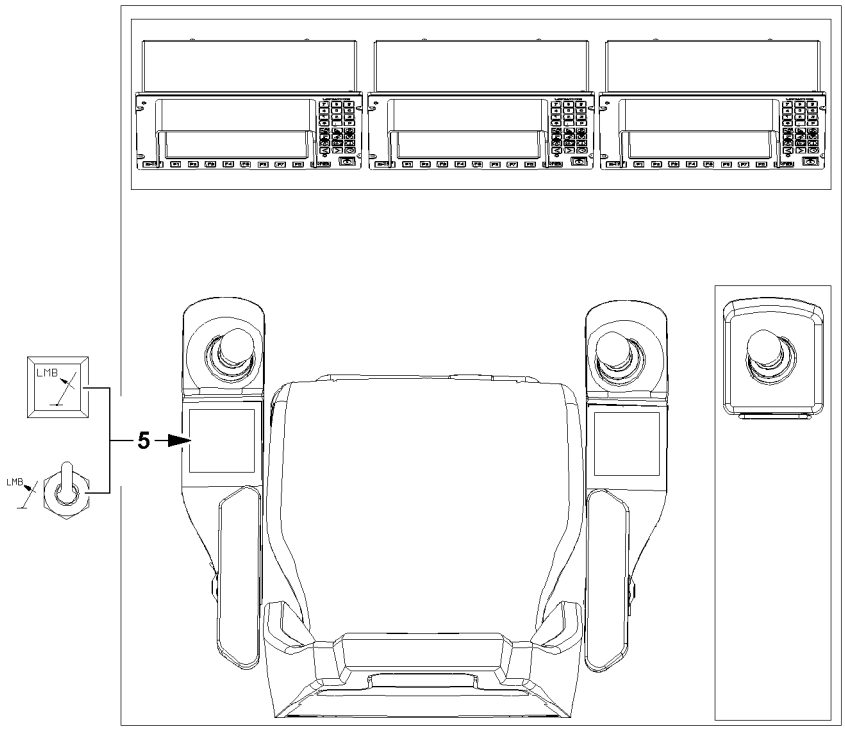

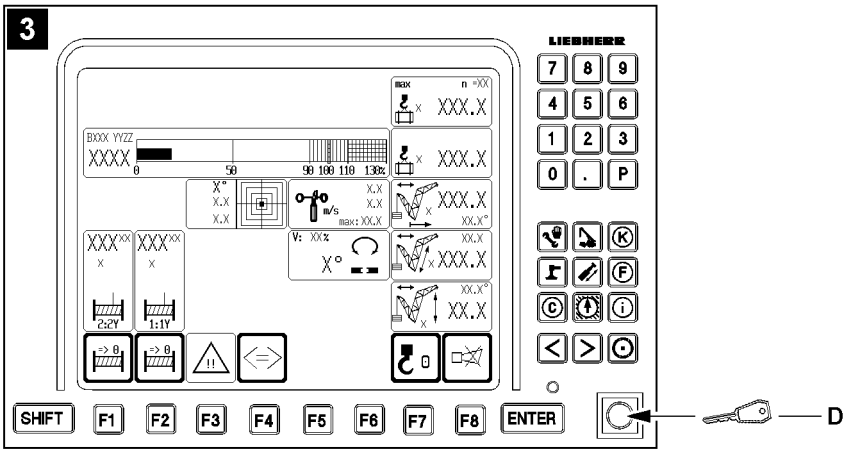

LWE/LG 1750-006/15409-07-02/en

Fig.112334

WARNING
Overload of crane!
When taking on a load by luffing the boom up, the crane can be overloaded.
This could result in serious accidents.
▶ Taking on load by luffing up the boom is prohibited.
▶ Take on a load only with the hoist gear.

There are two possibilities to exceed the shut off limits of the LICCON overload protection after LMB STOP:
– With button **5** „Luffing in with suspended load“ in the left control console
– With the set up key **D** on the LICCON monitor with crane operating screen, see illustration **3**

NOTICE
Danger of mix up!
The function „Exceedance of shut off limits of LICCON overload protection“ can only be activated with the set up key **D** on the LICCON monitor with crane operating screen, see illustration **3**.
The key buttons on the other monitors are not assigned with this function.
▶ Do not mix up the set up key **D** with the other key buttons.
▶ In case of mix up: Deactivate the activated function.

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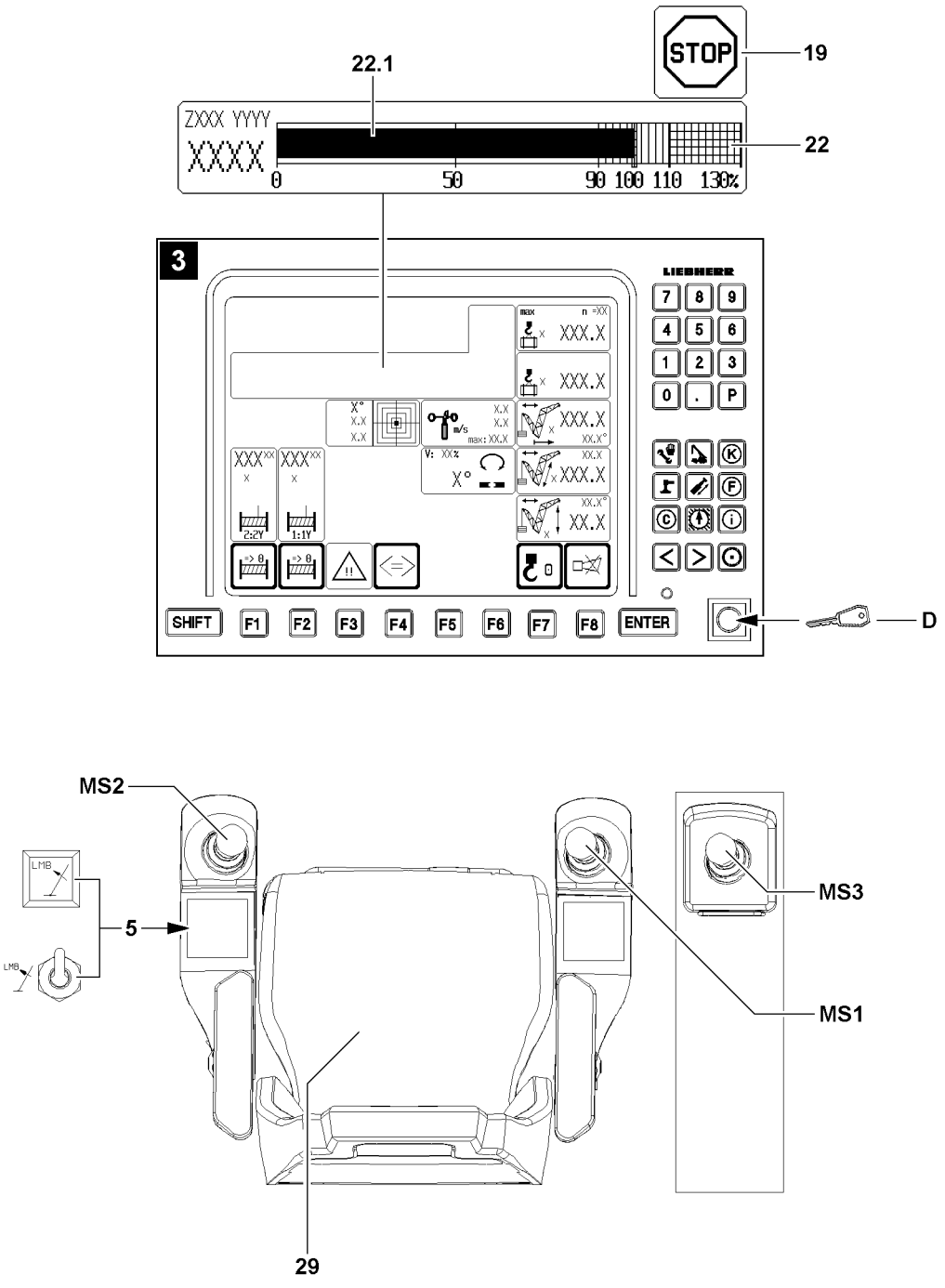

Fig.112335

3.4.1 Luffing in with suspended load

If the maximum permissible load torque is exceeded, the LICCON overload protection turns off all crane movements that increase load torque.

In the icon **22** (load moment display) the utilization bar **22.1** has exceeded the 100 % mark and in the LICCON monitor appears the icon **19**.

This shut off limit can be exceeded by actuating the button **5** „Luffing in with suspended load“.

Make sure that the following prerequisite is met:
– Either the seat contact button **29** or one of the buttons **1** of the master switches (MS1, MS2, MS3) is actuated.

Note
▶ If the load is reduced by luffing up, then the button **5** „Luffing in with suspended load“ is possibly not functioning.
▶ For the procedure when the button **5** „Luffing in with suspended load“ is not functioning, see section „Exceedance of maximum permissible load moment“.

▶ Press the function key **5** „Luffing in with suspended load“ and hold it.

Result:

– The LICCON overload protection is inactive.

▶ Luff the load in.

Result:

– If the crane reaches a normal operation status (utilization below 100 % and no active shut off) then the icon **19** turns off, normal crane operation is possible again.

The function „Luffing in with suspended load“ is deactivated:
– When the function key **5** „Luffing in with suspended load“ is not longer actuated.
– When neither the seat contact button **29** nor one of the buttons **1** of the master switches (MS1, MS2, MS3) is actuated.
– At engine stop.

The function „Luffing in with suspended load“ is deactivated:
– The LICCON overload protection is active.

▶ Carry out crane movements in such a way that no repeated shut off by the LICCON overload protection occurs.

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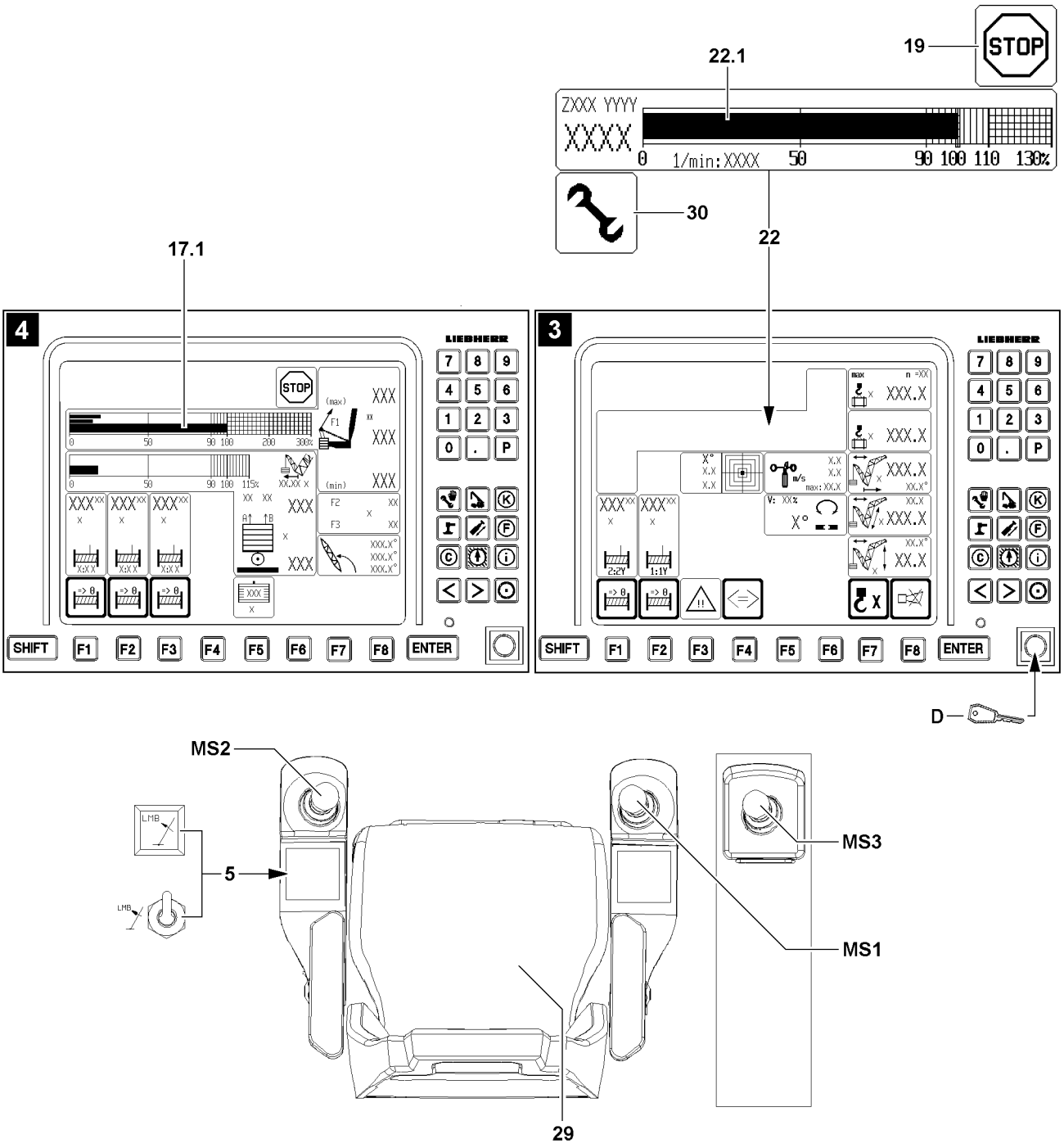

Fig.112336

LWE/LG 1750-006/15409-07-02/en

3.4.2 Exceedance of the maximum permissible load moment

If the maximum permissible load torque is exceeded, the LICCON overload protection turns off all crane movements that increase load torque.

In the icon **22** (load moment display) the utilization bar **22.1** has exceeded the 100 % mark and in the LICCON monitor appears the icon **19**.

This shut off can be exceeded by the set up key **D** in the „right touching“ position.

WARNING
Shut off safety device!
If the function „Exceedance of shut off limits of LICCON overload protection“ is activated by actuating the set up key **D** then it is possible to exceed the maximum permissible load moment. The function „Exceedance of maximum value test point 1“ is automatically activated too. Thus there is no shut off when exceeding the maximum value test point 1.

▶ All notes regarding the function „Exceedance of shut off limits of LICCON overload protection“ must be observed.
▶ The utilization bar $F1_{actual}$ **17.1** of the F1 load display must be observed.

Note

▶ In emergency situations, the function „Exceedance of shut off limits of the LICCON overload protection“ can be activated with the set up key **D** and the maximum permissible load moment of 100 % can be exceeded.

The set up key **D** on the LICCON monitor has two positions:
– Operating position (not actuated): Crane is in normal operation
– Position to right (touching): The function „Exceedance of shut off limits of the LICCON overload protection“ is activated, the assembly icon **30** appears in the LICCON monitor.

Make sure that the following prerequisites are met:
– With the button **5** „Luffing in with suspended load“ no normal operating status (utilization below 100 % and no active shut off) can be reached.
– All master switches (MS1, MS2, MS3) are in zero position (not deflected).
– Either the seat contact button **29** or one of the buttons **1** of the master switches (MS1, MS2, MS3) is actuated.
– Radio operation* is not active.

▶ Turn the set up key **D** to the right (touching).

Result:

– The LICCON overload protection is inactive.
– The assembly icon **30** appears in the LICCON monitor.

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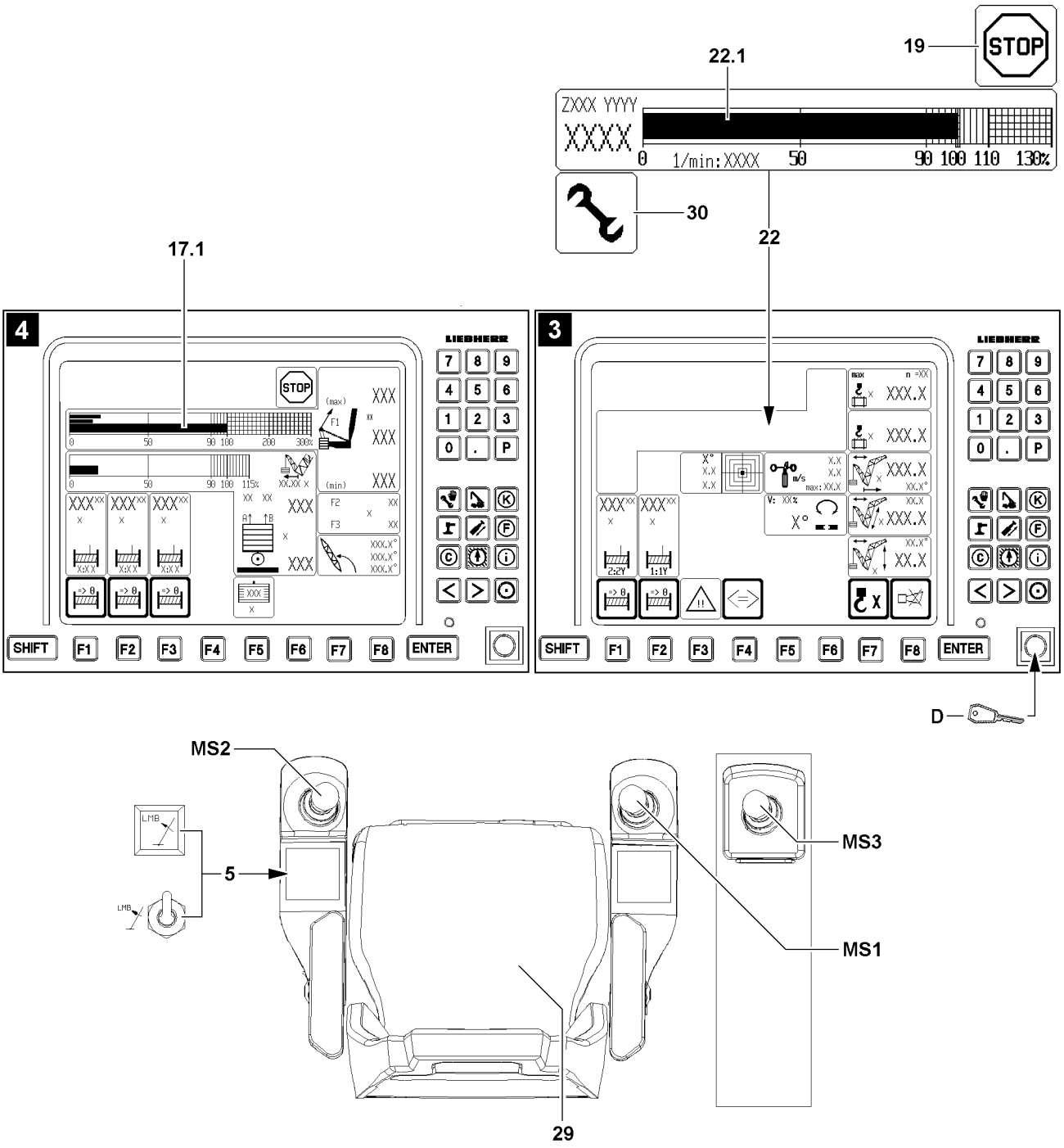

Fig.112336

▶ Initiate crane movements which directly lead to a normal operating status (utilization below 100 % and no active shut off).

Result:

– If a crane reaches a normal operation status (utilization below 100 % and no active shut off), then the function „Exceedance of shut off limits of the LICCON overload protection“ shuts off, the assembly icon **30** and icon **19** in the LICCON monitor turn off.

In addition, the function „Exceedance of shut off limits of LICCON overload protection“ turns off immediately:
– If the set up key **D** is actuated again.
– If all master switches (MS1, MS2, MS3) are in neutral position for 10 seconds (with load chart available).
– When neither the seat contact button **29** nor one of the buttons **1** of the master switches (MS1, MS2, MS3) is actuated.
– If radio operation***** is activated.
– At engine stop.
– At hoist top shut off.
– When leaving the angle range of the load chart.

Note
▶ The function „Exceedance of shut off limits of the LICCON overload protection“ is only turned off when the assembly icon **30** in the LICCON monitor turns off.
▶ If the function „Exceedance of shut off limits of the LICCON overload protection“ does not turn off after pressing the set up key **D** once, then press the set up key **D** again until the assembly icon **30** in the LICCON monitor turns off.

The function „Exceedance of shut off limits of the LICCON overload protection“ has / was shut off:
– The assembly icon **30** in the LICCON monitor turns off.

▶ Make sure that the assembly icon **30** does no longer appear in the LICCON monitor.
▶ Carry out crane movements in such a way that no repeated shut off by the LICCON overload protection occurs.

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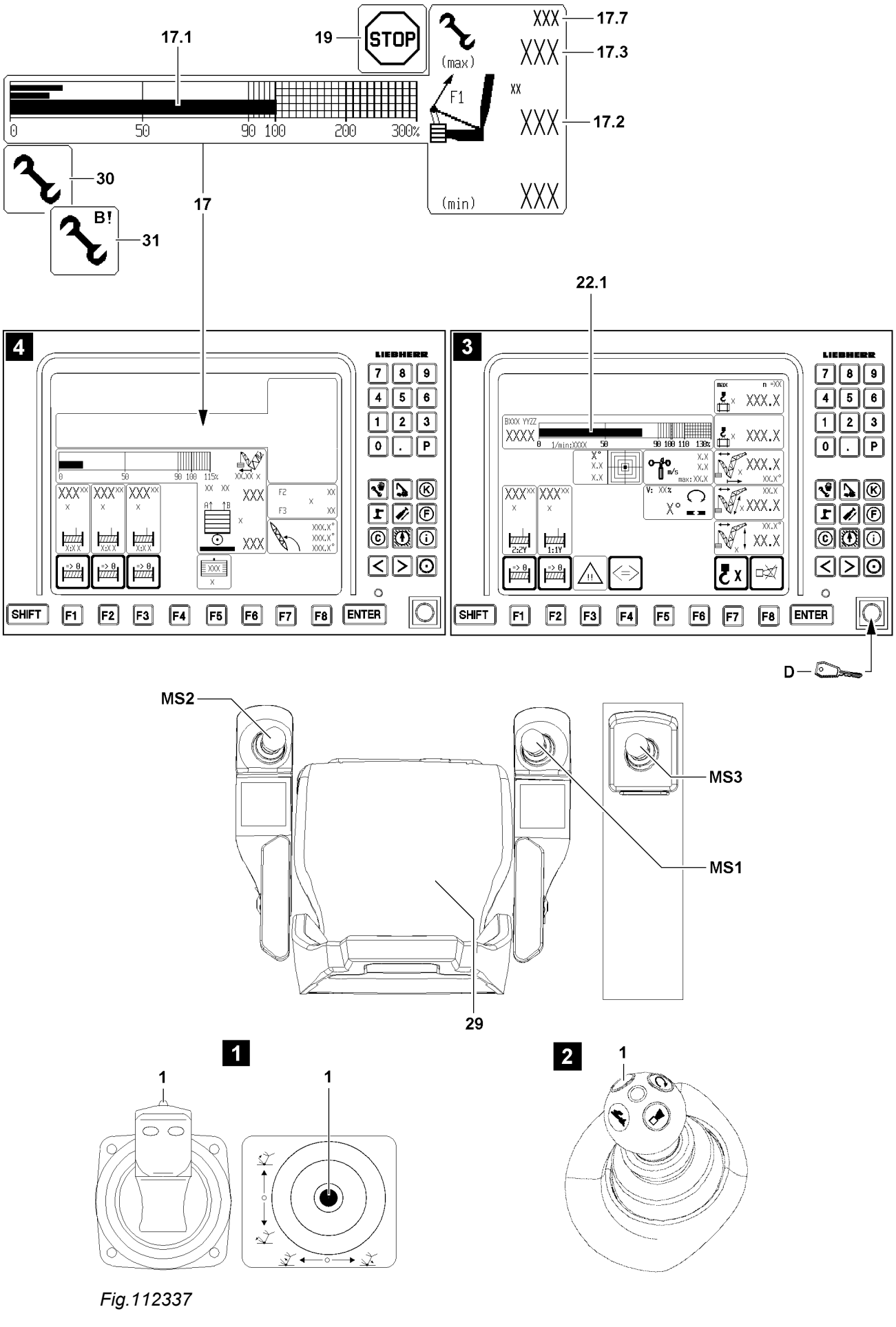

Fig.112337

3.4.3 Exceedance of maximum value test point 1 (force F1) in crane operation

WARNING
Leaving the load chart with load on hook!
If, by actuating the set up key **D**, the shut off is bypassed by value $F1_{max\text{-}operation}$ **17.3** and exceeded by more than 110 %, then the crane is in assembly operation, the assembly icon **31** appears in the LIC-CON monitor.
There is no load chart available any longer and various display values may not be shown any longer in the crane operating screen.
The load on the hook is no longer monitored by the load chart.
Severe accidents due to crane overload can result.
Personnel can be severely injured or killed.
▶ In assembly operation, the data in the erection / take down charts is binding.

WARNING
Shut off safety device!
If, by actuating the set up key **D**, the function „Exceedance of maximum value test point 1“ is activated, then the function „Exceedance of shut off limits of LICCON overload protection“ is also activated automatically. Thus there is no shut off if the maximum permissible load moment is exceeded.
▶ All notes regarding the function „Exceedance of shut off limits of LICCON overload protection“ must be observed.
▶ The utilization bar **22.1** of the load moment display must be observed.

Note
▶ The force determined on test point 1 is generally described as $F1_{actual}$ (actual value F1).
▶ In the icon **17** (F1-load display), the force relationship as well as the number values are shown in number values as well as a bar display (called F1-bar display).
▶ The value $F1_{max\text{-}operation}$ **17.3** corresponds to 100 % in the F1-bar display.
▶ The F1-utilization bar **17.1** shows the relationship $F1_{actual}$ **17.2** to $F1_{max\text{-}operation}$ **17.3**.
▶ In crane operation without derrick ballast, fewer values may be shown in the icon **17** (F1-load display).
▶ If the actual load is **larger** than the permissible hook block weight according to the erection / take down charts, then it can be exceeded up to maximum 110 % of $F1_{max\text{-}operation}$ **17.3**.
▶ If the actual load is **smaller** than the permissible hook block weight according to the erection / take down charts, then the assembly operation becomes active above 110 % of $F1_{max\text{-}operation}$ **17.3**. In assembly operation, there is no load chart available.
▶ The value $F1_{max\text{-}assembly}$ **17.7** appears in crane operation when 90 % of its nominal value is exceeded.

In the icon **17**(F1 load display) the utilization bar $F1_{actual}$ **17.1** exceeds the 100 % mark and the LICCON overload protection has shut off the crane movement. The value $F1_{actual}$ **17.2** has exceeded the value $F1_{max\text{-}operation}$ **17.3**.

All further movements, which lead to an increase of the force (value $F1_{actual}$) are shut off.

In the LICCON monitor with the derrick operating screen (illustration **4**) appears the icon **19**.

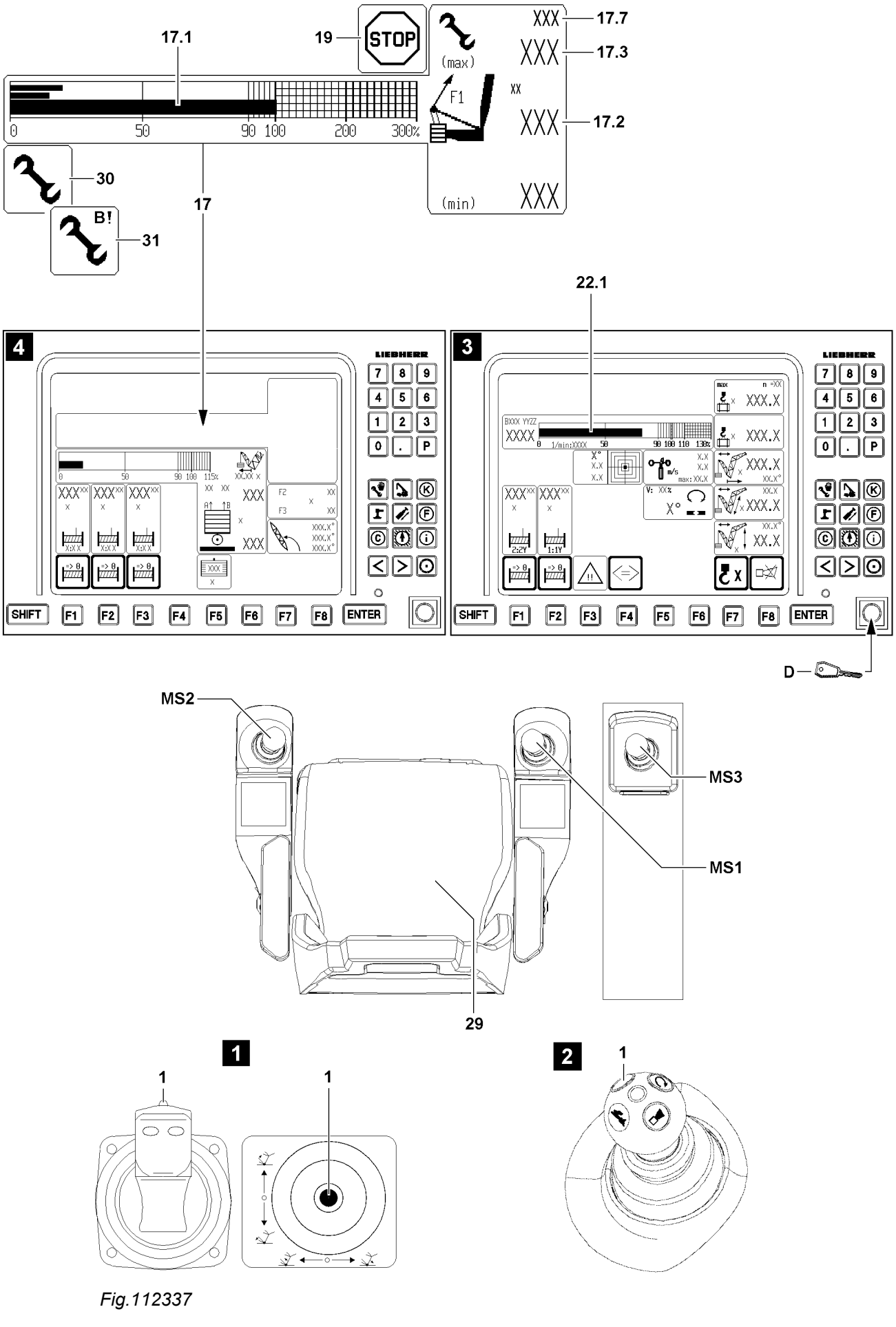

Fig.112337

Make sure that the following prerequisites are met:
- All master switches (MS1, MS2, MS3) are in zero position (not deflected).
- Either the seat contact button **29** or one of the buttons **1** of the master switches (MS1, MS2, MS3) is actuated.
- Radio operation***** is not active.
- The F1 load display 110 % has not been reached and a load chart is available.

▶ Turn the set up key **D** to the right (touching).

Result:

– The function „Exceedance of maximum value test point 1“ is activated in connection with the function „Exceedance of the shut off limits of the LICCON overload protection“.
– $F1_{max\text{-}operation}$ **17.3** can be exceeded.

The function „Exceedance of shut off limits of the LICCON overload protection“ in connection with the function „Exceedance of the maximum value test point 1“ also shuts off immediately:
– If the set up key **D** is actuated again.
– If all master switches (MS1, MS2, MS3) are in neutral position for 10 seconds (with load chart available).
– When neither the seat contact button **29** nor one of the buttons **1** of the master switches (MS1, MS2, MS3) is actuated.
– If radio operation***** is activated.
– At engine stop.
– At hoist top shut off.

Note
▶ The function „Exceedance of shut off limits of the LICCON overload protection“ is only turned off when the assembly icon **30** in the LICCON monitor turns off.
▶ If the function „Exceedance of shut off limits of the LICCON overload protection“ does not turn off after pressing the set up key **D** once, then press the set up key **D** again until the assembly icon **30** in the LICCON monitor turns off.

The function „Exceedance of shut off limits of the LICCON overload protection“ has / was shut off:
– The assembly icon **30** in the LICCON monitor turns off.
– The working speed is reduced until all master switches (MS1, MS2, MS3) are in zero position at the same time.

▶ Make sure that the assembly icon **30** does no longer appear in the LICCON monitor.
▶ Carry out crane movements in such a way that no repeated shut off by the LICCON overload protection occurs.

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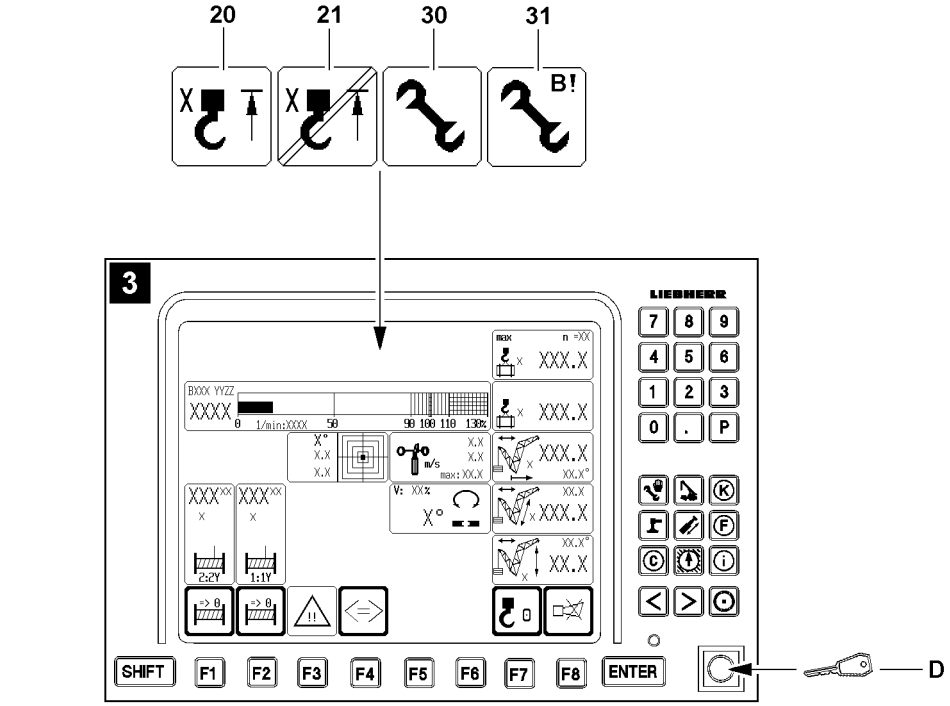

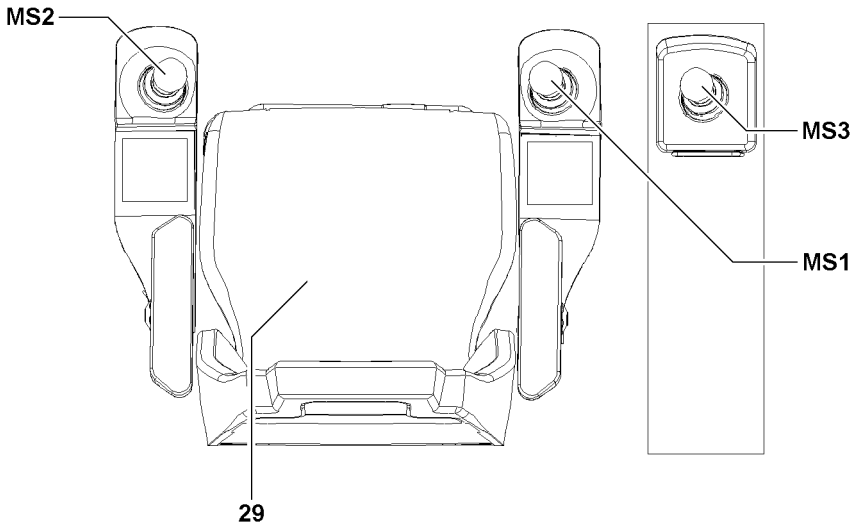

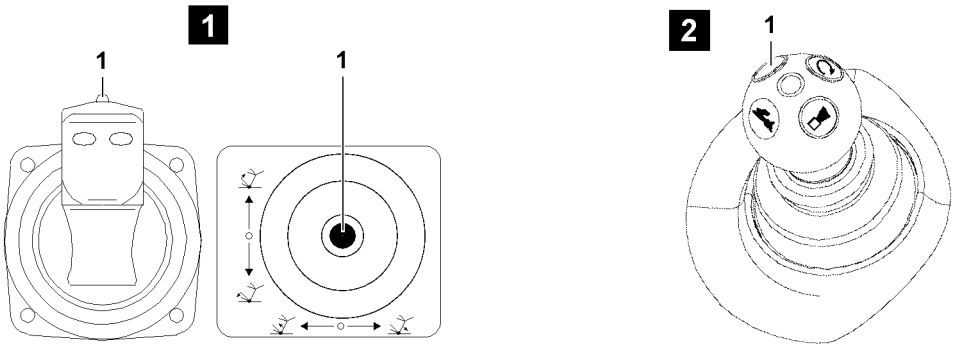

Fig.111230

LWE/LG 1750-006/15409-07-02/en

3.5 Bypass of the hoist top shut off

WARNING
Improper use of the function „Bypass of hoist top shut off“!
▶ The function „Bypass of hoist top shut off“ may never be used to increase the lifting height during crane operation.

WARNING
Property damage and falling load!
If the function „Bypass of hoist top shut off“ is activated, there is the danger that the hook block or the load hook is pulled against the pulley head.
This danger exists especially when the hoist winch is continued to be spooled up and for crane movements which have an influence on the hoist rope, for example luffing the boom, the auxiliary boom / accessory or the derrick boom.
Property damage and falling load can result.
Personnel can be severely injured or killed.
▶ The function „Bypass of hoist top shut off“ may only be carried out by an authorized person, along with a guide. The guide must be in direct contact with the crane operator and must continually monitor the distance between the hook block / load hook and the boom head.
▶ Carry out all crane movements with utmost caution.

Note
▶ The activation of the function „Bypass of hoist top shut off“ is only possible if the hoist limit switch was touched and the hoist top shut off has occurred.
▶ If the hoist limit switch is triggered when the set up key **D** is actuated (function „Exceedance of shut off limits of the LICCON overload protection“ is active, the assembly icon **30** or the assembly icon **31** appear), then a hoist top shut off occurs and the function „Exceedance of shut off limits of the LICCON overload protection“ is deactivated.
▶ For assembly purposes or in emergency cases, if the activation of the function „Bypass of hoist top shut off“ **and** activation of the function „Exceedance of shut off limits of the LICCON overload protection“ is necessary, then the set up key **D** must be actuated until the icon **21** and assembly icon **30** or assembly icon **31** (assembly operation) appear.

Make sure that the following prerequisites are met:
– A hoist top shut off has occurred, the hoist top icon **20** appears in the LICCON monitor.
– Either the seat contact button **29** or one of the buttons **1** of the master switches (MS1, MS2, MS3) is actuated.
– All master switches (MS1, MS2, MS3) are in zero position (not deflected).
– The radio operation***** is not active.

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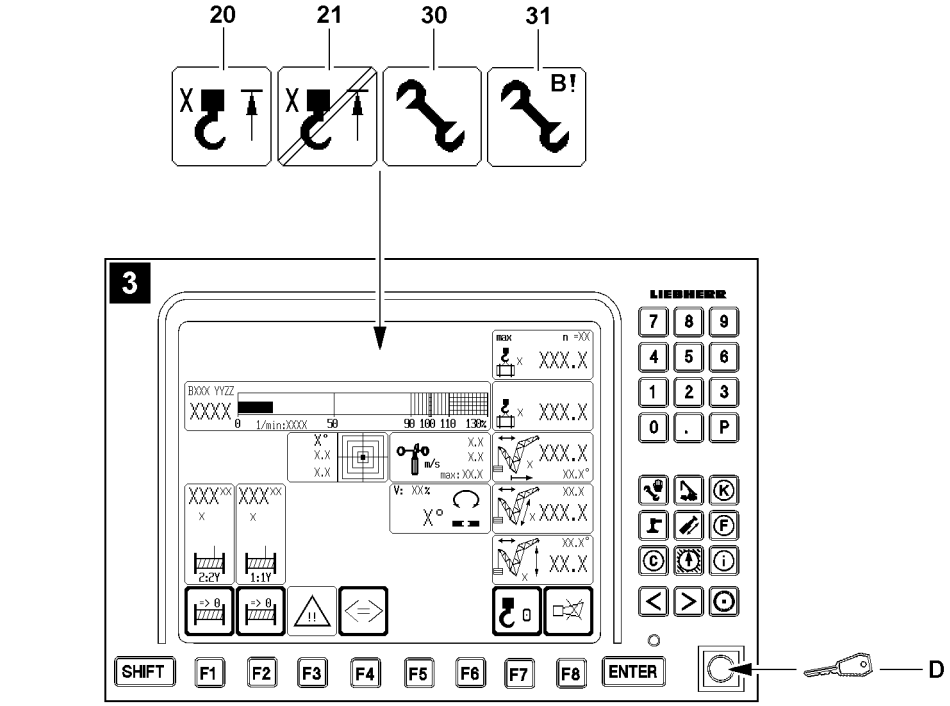

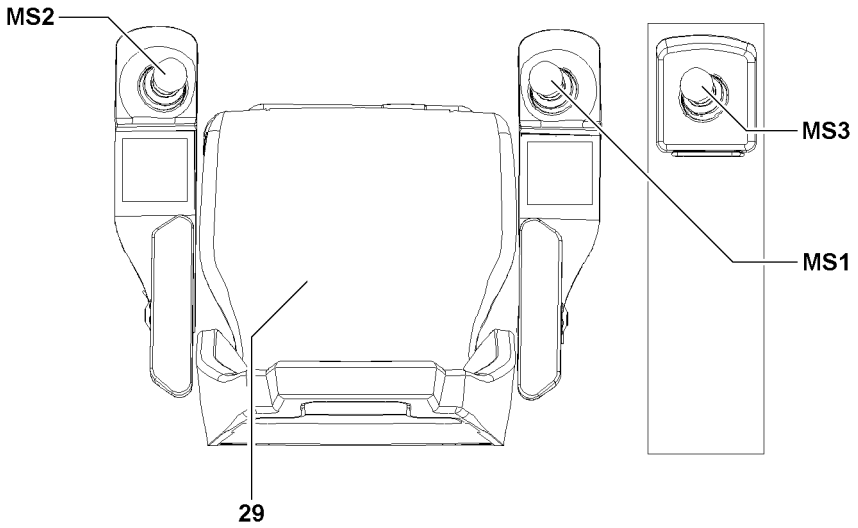

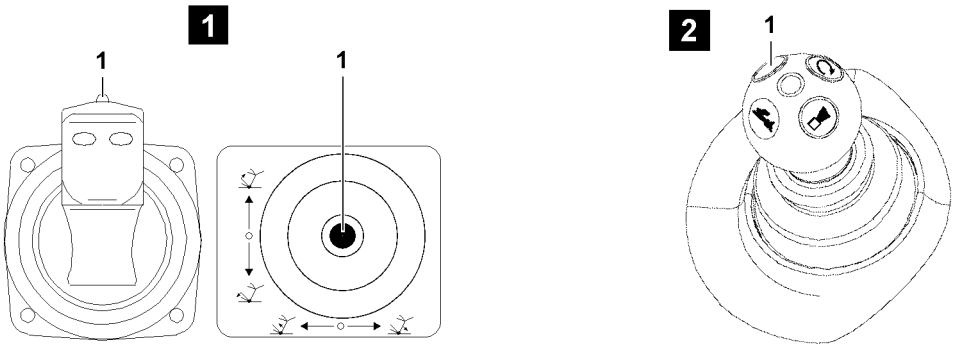

Fig.111230

LWE/LG 1750-006/15409-07-02/en

▶ Turn the set up key **D** to the right (touching).

Result:

– The assembly icon **30** or the assembly icon **31** (assembly operation) appear in the LICCON monitor.
– The hoist top icon **20** in the LICCON monitor changes to the icon **21**.
– All hoist limit switches are bypassed.

▶ Carry out a crane movement with bypassed hoist limit switches with utmost caution and by taking the safety guidelines into account.

The function „Bypass of the hoist top shut off“ turns off:
– If the set up key **D** is actuated again.
– When no master switch (MS1, MS2, MS3) was deflected for 10 seconds.
– When neither the seat contact button **29** nor one of the buttons **1** of the master switches (MS1, MS2, MS3) is actuated.
– If there is no longer a shut off of a hoist limit switch.
– If the radio operation***** is active.
– At engine stop.

The function „Bypass of the hoist top shut off“ has / was turned off:
– The assembly icon **30** or the assembly icon **31** (assembly operation) in the LICCON monitor turn off.
– The icon **21** on the LICCON monitor turns off.

▶ Make sure that the assembly icon **30** or the assembly icon **31** (assembly operation) as well as the icon **21** no longer appear in the LICCON monitor.
▶ Carry out the crane movements in such a way that no repeated hoist top shut off occurs.

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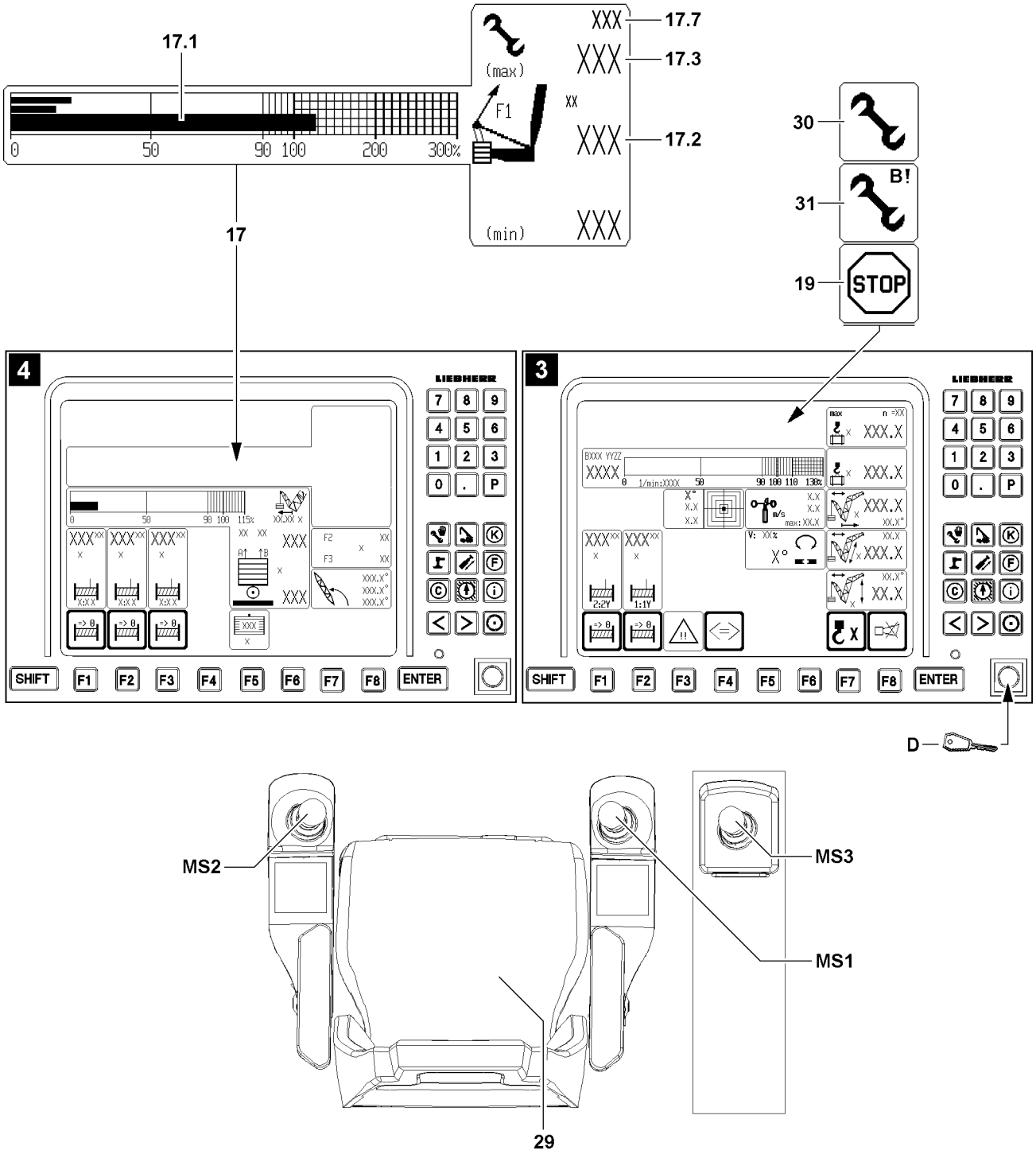

Fig.112343

3.6 Exceeding the shut off limits of the LICCON overload protection during erection / take down procedures (assembly operation)

Note

- If the crane is in the range „No load chart available“ then there is a shut off of the crane control by the LICCON overload protection. The icon **19** appears in the LICCON monitor.
- By an actuated set up key **D**, the function „Exceedance of shut off limits of the LICCON overload protection“ can be activated, all erection / take down procedures can be carried out within the erection / take down charts, for which no load charts are available.

WARNING

Danger of accident during erection / take down procedures!
If the erection / take down charts are not observed, the crane could collapse, the boom can break off or the crane can topple over.
Personnel can be severely injured or killed.

- The erection / take down charts must be observed.
- Press the set up key **D** only when the configuration status has been entered correctly in the LICCON computer system and matches the actual situation.

Note

- The force determined on test point 1 is generally described as $F1_{actual}$ (actual value F1).
- In the icon **17** (F1-load display), the force relationship as well as the number values are shown in number values as well as a bar display (called F1-bar display).
- The value $F1_{max\text{-}operation}$ **17.3** corresponds to 100 % in the F1-bar display.
- The F1-utilization bar **17.1** shows the relationship $F1_{actual}$ **17.2** to $F1_{max\text{-}operation}$ **17.3**.
- In crane operation without derrick ballast, fewer values may be shown in the icon **17** (F1-load display).
- If a load chart is available, then the value $F1_{max\ operation}$ **17.3** is valid as the limit value for a shut off of crane operation.
- When leaving the area „load chart available“, the assembly icon **30** turns off and the assembly icon **31** appears.
- When leaving the area „Load chart available“ then $F1_{max\ assembly}$ **17.7** is valid as the upper limit value.
- $F1_{max\text{-}assembly}$ **17.7** might only appear when 90 % of its nominal value is exceeded.

3.6.1 Carrying out erection procedures (assembly operation)

Make sure that the following prerequisites are met:

- All master switches (MS1, MS2, MS3) are in zero position (not deflected).
- Either the seat contact button **29** or one of the buttons **1** of the master switches (MS1, MS2, MS3) is actuated.
- Radio operation* is not active.
- The set up configuration corresponds to the erection / take down charts.
- The set up status has been entered correctly into the LICCON computer system.

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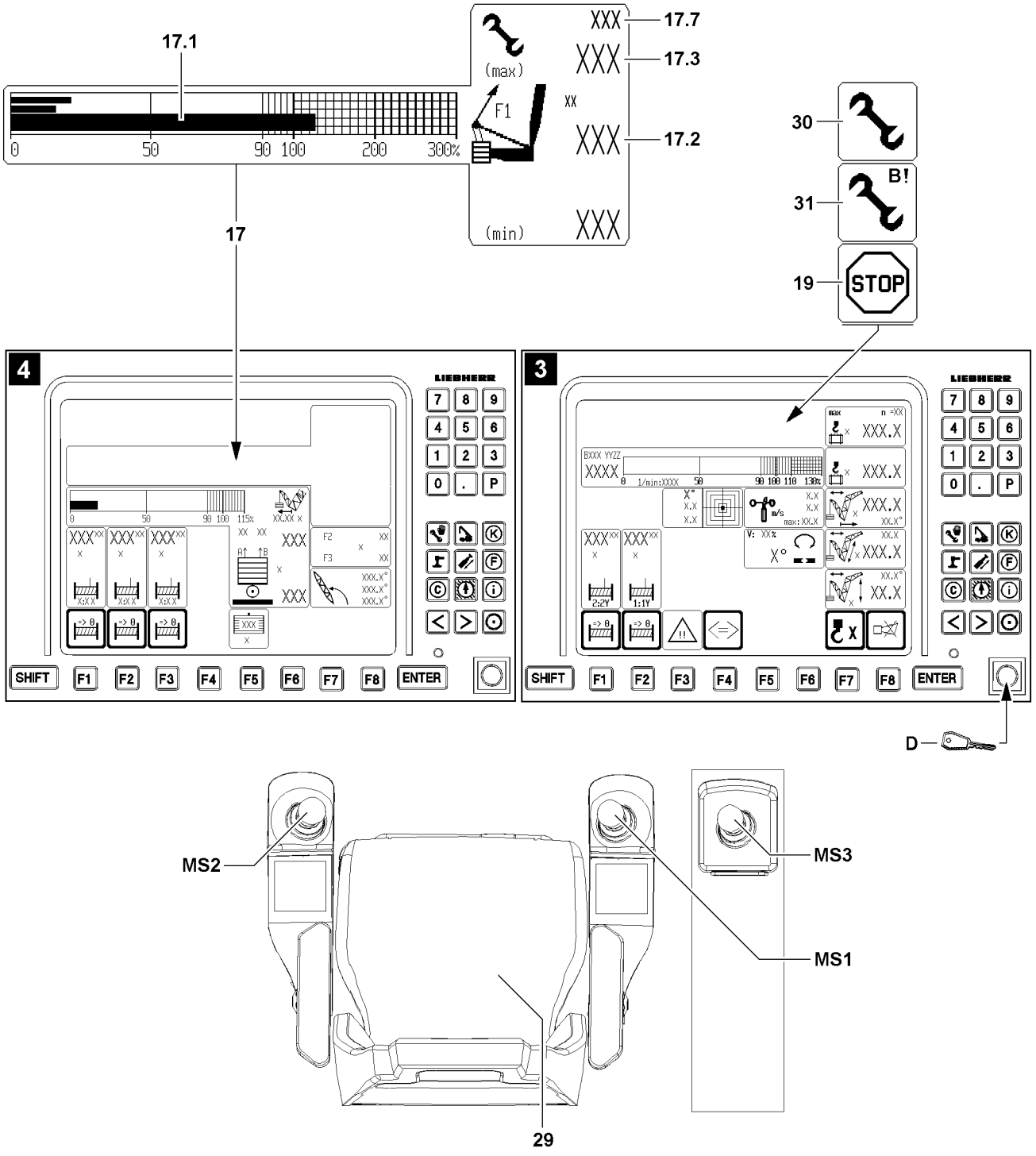

Fig.112343

▶ Turn the set up key **D** to the right (touching).

Result:

– The assembly icon **31** appears in the area „No load chart available“.
– The erection / take down procedures can be carried out.

▶ Watch the icon **17** (F1-load display), the value $F1_{actual}$ **17.2** may not exceed the value $F1_{max\text{-}assembly}$ **17.7**.

Problem remedy
The erection / take down procedure cannot be carried out due to shut off „$F1_{max\text{-}assembly}$ **17.7** exceeded“?
▶ See section „Danger of exceeding $F1_{max\ assembly}$“.

Problem remedy
The function „Exceedance of shut off limits of the LICCON overload protection“ can not be activated during erection / take down procedures?
▶ Check the error messages.
▶ Check the electrical connections.
▶ Check if all sensors or dummy plugs with integrated electric have been connected properly.

The function „Exceedance of shut off limits of the LICCON overload protection“ turns off:
– If the set up key **D** is actuated again.
– When an range with existing load chart is reached (erection procedure).
– If all master switches (MS1, MS2, MS3) are in neutral position for 10 seconds (with „Load chart available“).
– When neither the seat contact button **29** nor one of the buttons **1** of the master switches (MS1, MS2, MS3) is actuated.
– At engine stop.

The function „Exceedance of shut off limits of the LICCON overload protection“ has / was shut off:
– The assembly icon **30** or the assembly icon **31** in the LICCON monitor turns off.

▶ After completion of the erection / take down procedures, make sure that the assembly icon **30** or the assembly icon **31** no longer appear in the LICCON monitor.

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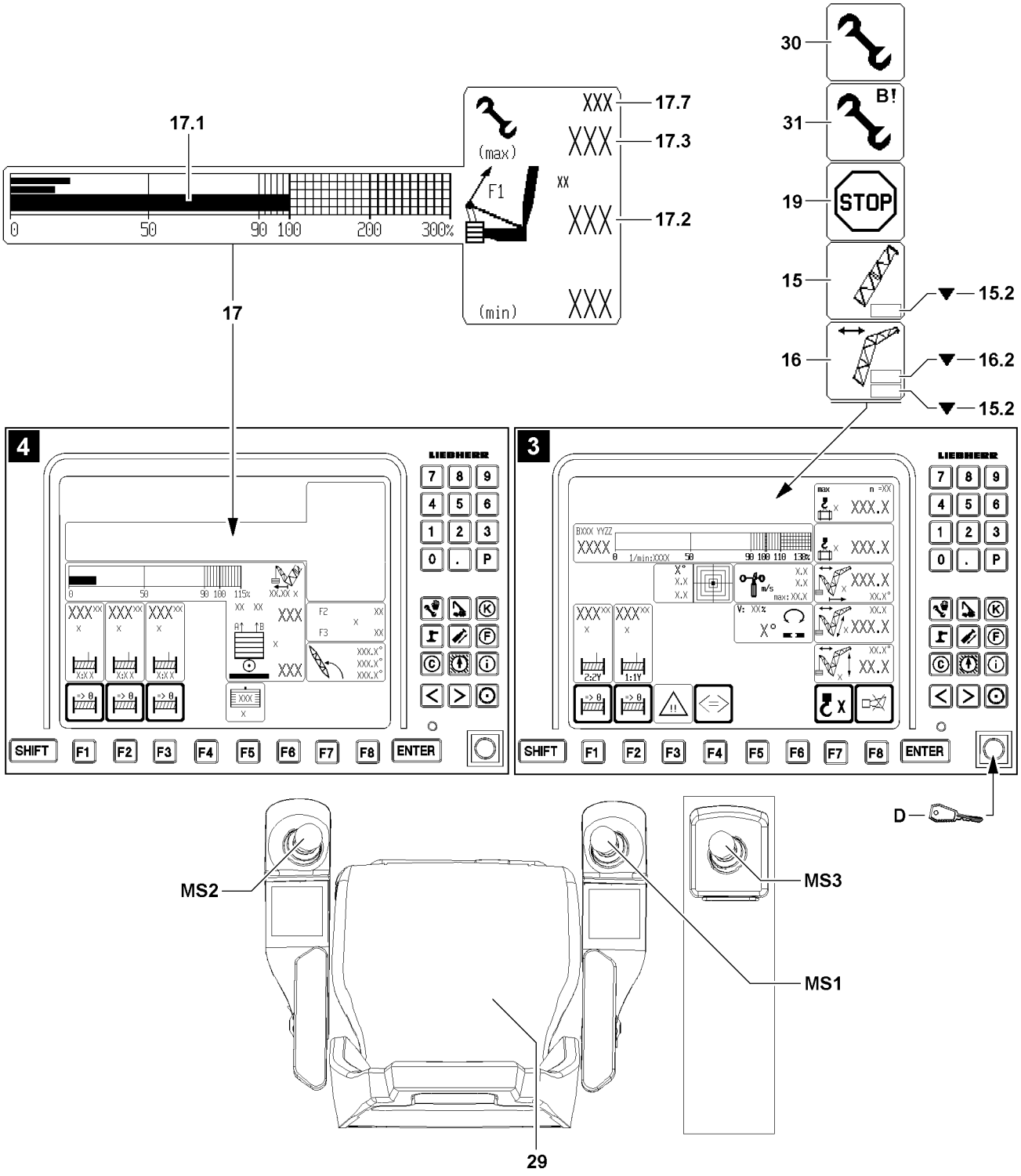

Fig.112341

3.6.2 Carrying out take down procedures (assembly operation)

WARNING
Increased danger of accidents due to bypass of shut off of luffing the main boom / auxiliary boom / accessory down!
When the shut off luffing the main boom / auxiliary boom / accessory down is bypassed, then the LICCON overload protection as a whole is deactivated or limited.
When the shut off luffing the main boom / auxiliary boom / accessory down is bypassed and the main boom and / or the auxiliary boom / accessory is further luffed down, then there is no load chart available any longer.
Crane operation with bypassed shut off luffing the main boom / auxiliary boom / accessory down is prohibited, since severe accidents can result.
Personnel can be severely injured or killed.
- ▶ Activate the bypass of the shut off luffing the main boom / auxiliary boom / accessory down only in emergency cases or for erection / take down procedures with erection / take down charts.
- ▶ Carry out all crane movements with utmost caution.

Make sure that the following prerequisites are met:
- In symbol **15** or symbol **16** appear symbol **15.2** or symbol **16.2** and the LICCON overload protection has shut off the crane movement.
- Either the seat contact button **29** or one of the buttons **1** of the master switches (MS1, MS2, MS3) is actuated.
- All master switches (MS1, MS2, MS3) are in zero position (not deflected).
- The radio operation* is not active.

▶ Turn the set up key **D** to the right (touching).

Result:

- The assembly icon **30** appears in the LICCON monitor.
- The function „Exceedance of shut off limits of the LICCON overload protection“ is activated and has bypassed the shut off luffing the main boom / auxiliary boom / accessory down.

Note
- ▶ If a load chart is available, then the value $F1_{max\ operation}$ **17.3** is valid as the limit value for a shut off of crane operation.
- ▶ When leaving the area „load chart available“, the assembly icon **30** turns off and the assembly icon **31** appears.
- ▶ When leaving the area „Load chart available“ then $F1_{max\ assembly}$ **17.7** is valid as the upper limit value.
- ▶ If no derrick boom is installed, then the icon **17** only shows $F1_{actual}$ **17.1** and $F1_{max\text{-}assembly}$ **17.7**. $F1_{max\text{-}assembly}$ **17.7** might only appear when 90 % of its nominal value is exceeded.

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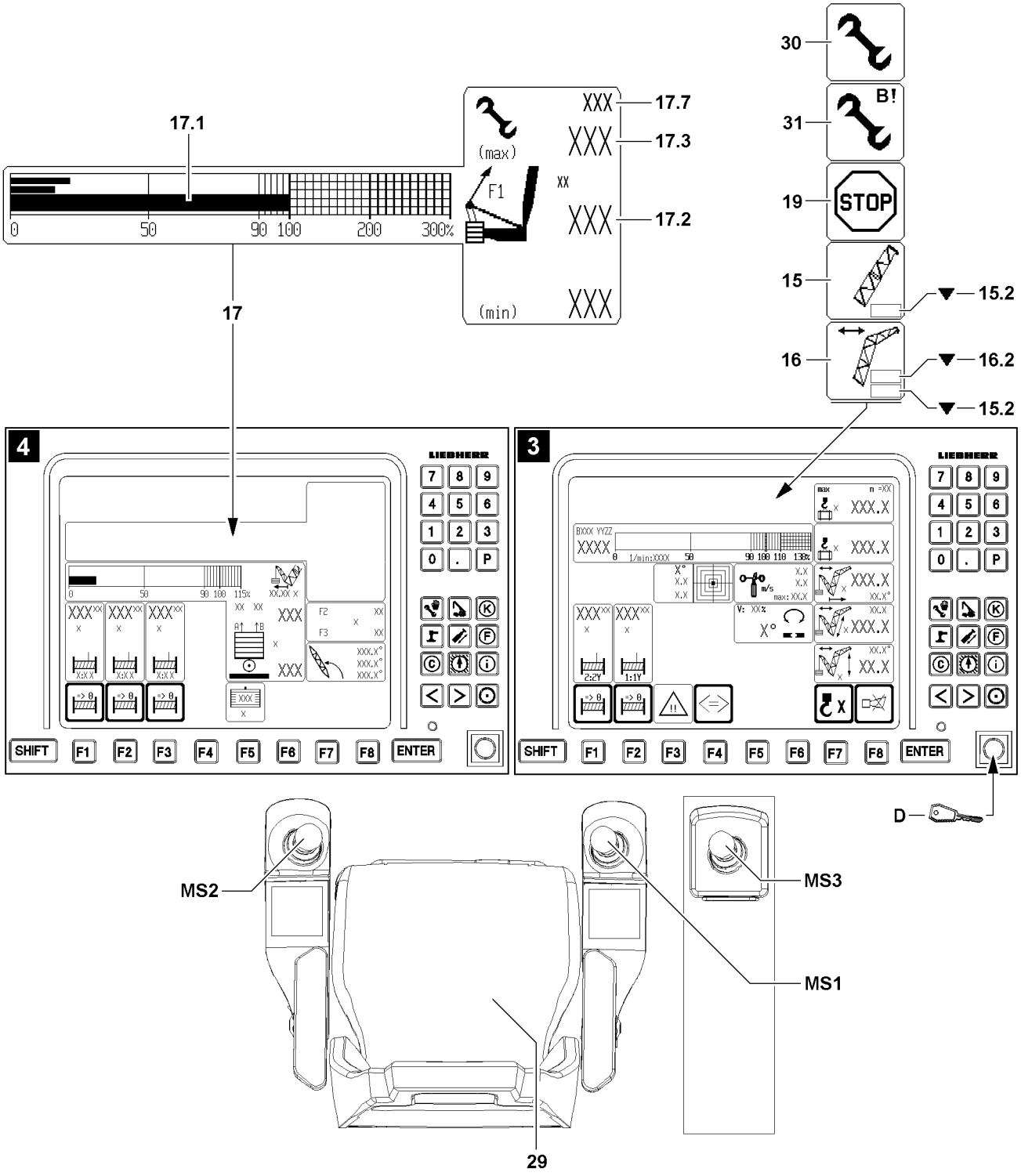

Fig.112341

DANGER
The crane can topple over!
There is **no** shut off of the luff down movement after reaching the limit value $F1_{max\ assembly}$ **17.7**.
If the warnings by the LICCON overload protection are ignored, then the crane will be overloaded or topples over.
Personnel can be severely injured or killed.

- ▶ The symbol **17** (F1-load display) must be watched permanently. It must be ensured that the value $F1_{actual}$ **17.2** is smaller than the value $F1_{max\ assembly}$ **17.7**.
- ▶ The luff down movement must be stopped before the value $F1_{actual}$ **17.2** exceeds the limit value $F1_{max\ assembly}$ **17.7**.

▶ During the take down procedure watch the icon **17** (F1-load display).

Problem remedy
The take down procedure cannot be carried out due to danger of exceeding the $F1_{max\ assembly}$ **17.7**?
▶ See section „Danger of exceeding $F1_{max\ assembly}$“.

The bypass of the shut off luffing the main boom / auxiliary boom / accessory down turns off:
– If the set up key **D** is actuated again.
– When neither the seat contact button **29** nor one of the buttons **1** of the master switches (MS1, MS2, MS3) is actuated.
– When an area with existing load chart is reached.
– If the radio operation* is active.
– At engine stop.

The bypass of the shut off luffing the main boom / auxiliary boom / accessory down has / was turned off:
– The assembly icon **31** or the assembly icon **30** in the LICCON monitor turns off.

▶ Make sure that the assembly icon **30** or the assembly icon **31** no longer appear in the LICCON monitor.

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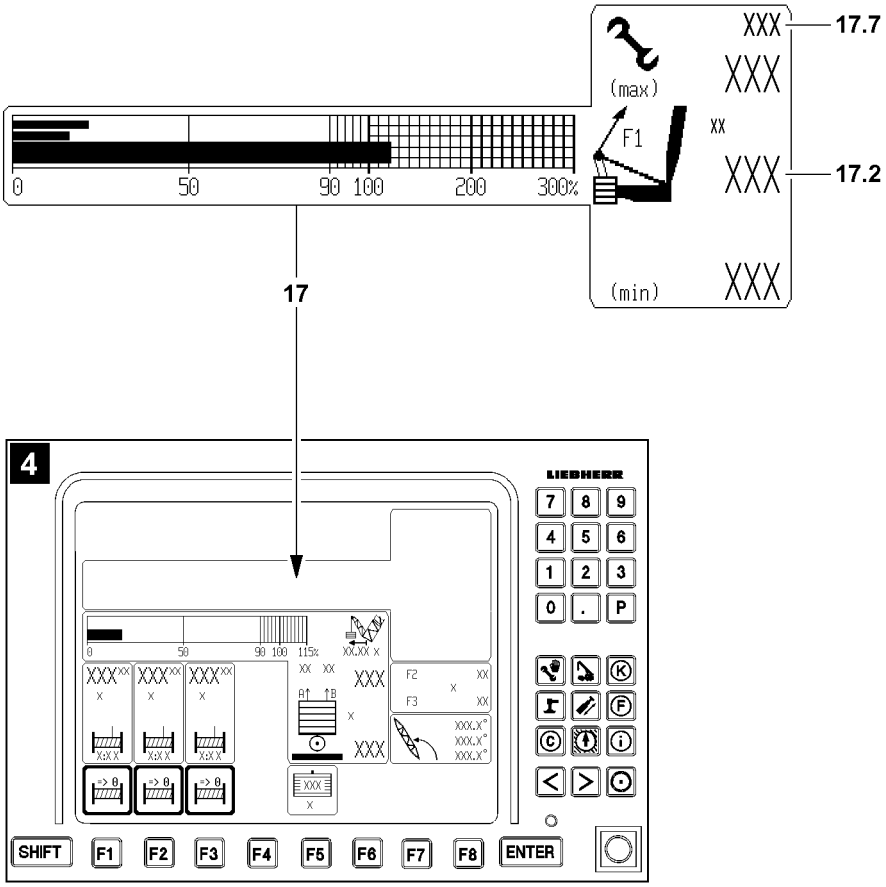

Fig.112344

3.6.3 Danger of exceeding $F1_{max\ assembly}$

Note

▶ $F1_{max\text{-}assembly}$ **17.7** might only appear when 90 % of its nominal value is exceeded.

DANGER

The crane can topple over!

There is **no** shut off of the luff down movement after reaching the limit value $F1_{max\ assembly}$ **17.7**.

If the warnings by the LICCON overload protection are ignored, then the crane will be overloaded or topples over.

Personnel can be severely injured or killed.

▶ The luff down movement must be stopped before the value $F1_{actual}$ **17.2** exceeds the limit value $F1_{max\ assembly}$ **17.7**.

In the icon **17** (F1-load display), the value $F1_{actual}$ **17.2** has reached the upper limit value $F1_{max\text{-}assembly}$ **17.7**.

▶ Check if a crane movement, which can lower the force F1 (value $F1_{actual}$ **17.2**) can be initiated, for example setting down the hook block / load hook.
▶ Check if the correct set up configuration has been entered on the LICCON computer system.
▶ Check if the actual set up configuration matches the entered set up configuration.
▶ Check if the correct hook block weight has been entered.
▶ Check if the respective hook block / load hook is installed.
▶ Check if all attachment parts and guy rods on the boom system, which are not needed, have been removed.
▶ Check if environmental influences (wind, snow or ice) on the crane are not too great.

Note

▶ Hook block weight entry and correction of weighing errors, see Crane operating instructions, chapter 4.02.

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5 Equipment

LWE/LG 1750-006/15409-07-02/en

LWE/LG 1750-006/15409-07-02/en

5.01 Technical safety instructions for assembly and disassembly

LWE/LG 1750-006/15409-07-02/en

Fig.195219

1 Rope pulleys

WARNING
Danger of crushing due to rotating rope pulleys!
Arms and legs can be caught and crushed or severed between the rope pulley and the rope due to rotating rope pulleys.
- ▶ It is prohibited to touch the ropes or rope pulleys during operation.
- ▶ Adhere to the safety distance to ropes and rotating rope pulleys.

2 Ropes

WARNING
Danger of accident!
- ▶ The ropes must be checked by an expert before assembly and checks must be performed at regular intervals in order to detect possible damage or wear and tear at an early stage. See Crane operating instructions, chapter 8.04.

The ropes must be removed immediately if any of the following damage is detected:
- Breakage of a strand
- Wire breaks
- Broken wire nests
- Reduction in the rope diameter by 10 % or more of the nominal size
- Rope deformations

2.1 Placing the hoist rope or the control rope

In order to guarantee safety and operating characteristics, only original Liebherr replacement parts or parts approved by Liebherr may be used.

NOTICE
Damage to the hoist rope or the control rope!
If a hoist rope or control rope is placed with worn rope pulleys, damage can occur.
- ▶ Before placing a rope, check the rope pulleys. See the Operating instructions, chapter 8.01.
- ▶ Replace worn or damaged rope pulleys.

2.2 Minimum rope coils

NOTICE
If the following notes are not observed, the cam limit switch / winch speed sensor must be readjusted!
- ▶ When the hoist rope is spooled up, the end of the hoist rope must remain in front of the winch and may not be pulled over the winch.
- ▶ Pull the hoist rope end never under the winch by spooling the winch up.
- ▶ Pull the hoist rope never off from the „stationary“ winch.
- ▶ The winch speed sensor must also be readjusted, if it is determined during operation or when changing the hoist rope that the winch does not shut off when the minimum rope coils are reached.

2.2.1 Cranes with cam limit switch

The cam limit switch is adjusted at the factory that it turns off before the minimum rope coils are reached (three hoist rope coils on the winch).

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WARNING
Danger of accident due to falling load!
If the following instructions are not observed, the hoist rope end attachment may be torn out, causing the load to topple.
- ▶ If a new hoist rope is used, the cam limit switch must be reset.
- ▶ The cam limit switch must be adjusted so that it turns off when only 3 hoist rope coils remain on the winch.

2.2.2 Cranes with winch speed sensor

The winch speed sensor is adjusted at the factory that it turns off before the minimum rope coils are reached (four hoist rope coils on the winch). If used properly, the winch turn sensor will not need readjustment.

WARNING
Danger of accident due to falling load!
If the following instructions are not observed, the hoist rope end attachment may be torn out, causing the load to topple.
- ▶ If a new hoist rope is placed, the winch speed sensor must be checked.
- ▶ The winch speed sensor must be set to turn off when only 4 hoist rope coils remain on the winch.

3 Control measures

WARNING
The crane can topple over!
If the control measures are not carried out before crane operation, then accidents can occur. The crane can topple over, be overloaded or damaged.
Personnel can be killed or injured.
- ▶ Crane operation with safety equipment which are **not** functioning correctly is strictly prohibited.
- ▶ Start crane operation only after all safety equipment have been checked and are functioning correctly.
- ▶ Start crane operation only if the overload protection has been set according to the data in the load chart.
- ▶ Start crane operation only if the crane is properly supported and horizontally aligned.

WARNING
Interruption of crane operation!
If the following specifications for interruption of crane operation are not observed, accidents can occur.
- ▶ If the crane operator leaves the crane cab even if for just a short time, the crane must be secured to prevent unauthorized access.
- ▶ Before starting to work again with the crane, the crane operator is obligated to check the operating mode settings and to reset them, if necessary.

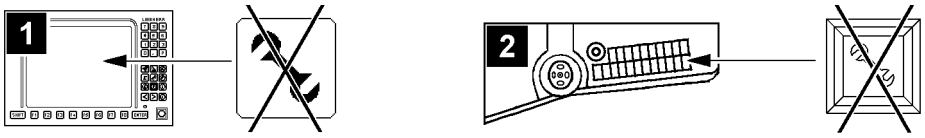

Fig.113437: Control displays

Make sure that the following prerequisites are met:
- – The overload protection is not bypassed.
- – No assembly operation is activated.

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3.1 General controls before crane operation

- Make sure that no visible damage is present on the crane.
- Make sure that there are no loose parts on the boom, crane chassis and crane superstructure.
- Make sure that exposed rope pulleys are free of snow, frost and ice.
- Make sure that the cable / rope drums as well as the limit switches are free of snow and ice.
- Make sure that the gear ring of the slewing ring connection is clean and greased.
- Make sure that the air supply to the oil and water cooler is clear.
- Make sure that steps, ladders and platforms are in the correct position for crane operation.
- Make sure that all tool boxes, compartments, coverings, covers and cabinet doors are closed.
- Make sure that no persons or objects are within the danger zone of the crane.
- Make sure that the crane is standing on level, load bearing ground.
- Make sure that the crane is sufficiently supported depending on the load case and the ground conditions.
- Make sure that there is a sufficient safety distance to excavations and slopes.
- Make sure that no obstacles are within the working range of the crane, which obstruct the required crane movements.
- Make sure that the crane has sufficient distance to live power lines.
- Make sure that the LICCON overload protection is set according to the data in the load chart.
- Make sure that the overload protection is set according to the actual set up configuration of the crane.
- Make sure that the electrical connections, the connector plug, the pull release, the cables and the protective insulation function. Replace missing or defective parts.
- Make sure that the cable routings on the electrical connections are seated tightly. If necessary, tighten loose screw connections.
- Make sure that the existing safety equipment is functioning.
- Make sure that the overload protection is functioning.
- Make sure that the hoist limit switches are functioning.
- Make sure that the limit switch boom „steepest position“ is functioning.
- Make sure that the wind speed sensor easily moves and is functioning.

3.2 Additional controls for cranes with crane support

- Make sure that the folding / sliding beams are secured with pins to prevent them from sliding.
- Make sure that the support plates are secured in the operating position.
- Make sure that the crane is properly supported.
- Make sure that the crane is horizontally aligned.
- Make sure that the axle suspension is blocked (mobile crane).
- Make sure that the tires have no contact to the ground (mobile crane).
- Make sure that the track chains are secured to prevent them from sagging (crawler crane).

3.3 Additional controls for cranes on tires on the front and supported on the rear

- Make sure that the rear folding / sliding beams are secured with pins to prevent them from sliding.
- Make sure that the rear support plates are secured in the operating position.
- Make sure that the crane is properly supported on the rear.
- Make sure that the axle pressure compensation is correctly switched.
- Make sure that the axle suspension is blocked.
- Make sure that the tires of the rear axle group have no contact with the ground.
- Make sure that a sufficient tire pressure is present in the tires.
- Make sure that the ground for the front axle group is sufficiently level and has a sufficient load bearing capacity.

3.4 Additional controls for cranes supported on the front and on tires on the rear

- Make sure that the front folding / sliding beams are secured with pins to prevent them from sliding.

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- Make sure that the front support plates are secured in the operating position.
- Make sure that the crane is properly supported on the front.
- Make sure that the axle pressure compensation is correctly switched.
- Make sure that the axle suspension is blocked.
- Make sure that the tires of the front axle group have no contact with the ground.
- Make sure that a sufficient tire pressure is present in the tires.
- Make sure that the ground for the rear axle group is sufficiently level and has a sufficient load bearing capacity.

3.5 Additional controls for freestanding crane operation (on tires)

- Make sure that all prerequisites for freestanding crane operation are met.
- Make sure that sufficient tire pressure is in all tires for crane operation on tires.
- Make sure that the ground is sufficiently level for crane operation on tires and has a sufficient load bearing capacity.

3.6 Additional controls for cranes with a derrick boom

- Make sure that the shut-off via the limit switch - derrick is functioning.
- Make sure that the entire slewing range of the suspended ballast / ballast trailer is free of personnel and obstacles.

3.7 Additional controls for cranes with luffing auxiliary boom / accessories

- Make sure that the shut-off via the limit switch luffing auxiliary boom / accessories „steepest position“ is functioning.
- Make sure that the shut-off via the limit switch luffing auxiliary boom / accessories „lowest position“ is functioning.
- Make sure that the shut-off via the limit switch flap in „steepest position“ position is functioning.
- Make sure that the pendulum of the mechanical relapse retainer moves easily over the entire slewing range and is functioning.

3.8 Additional controls for certain crawler cranes

For existing crawler assembly key button:
- Make sure that the crawler assembly key button is turned off.

4 Relapse cylinder

4.1 Block position of the relapse cylinders when setting down the load

NOTICE
Damage to the boom or the relapse cylinders!
If the block position of the relapse cylinders is triggered by the boom or the derrick with attached, freely suspended load, then there is a danger of damaging the boom or the relapse cylinders when setting the load on the ground. By setting down the load, the crane is relieved, and this movement causes the boom system to move to the rear.
There is no shut-off of the hoist gear lowering function.
▶ Actuate the opposite direction of movement which caused the block position and eliminate the block position.

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5 Pneumatic springs

Pneumatic springs are installed on various crane components to simplify the assembly of these components.

WARNING
Danger of crushing!
Defective pneumatic springs no longer provide the supporting properties on the movable components.
Due to falling components, personnel can be killed or severely injured.
High danger of accident.

- ▶ Always check pneumatic springs for damage before actuating the corresponding components.
- ▶ Do not use components with defective pneumatic springs. Replace defective pneumatic springs immediately.
- ▶ Make sure that no persons or objects are in the movement range of the moving components which is supported by the pneumatic spring.
- ▶ It is strictly prohibited to remain or place any objects in the movement or other danger zone of the moving crane components which are supported by the pneumatic spring.

6 Manual rope winches

Manual rope winches are installed on various components to simplify the assembly or disassembly of these components.

WARNING
Danger of crushing!
Defective manual rope winches no longer provide the supporting action on the movable components.
Due to falling components, personnel can be killed or severely injured.
High danger of accident.

- ▶ Always check manual rope winches for external and functional damage before actuating the respective components.
- ▶ Check the rope of the manual rope winch for damage.
- ▶ At least two rope coils must always remain on the rope drum.
- ▶ Do not use components with defective manual rope winches. Replace defective manual rope winches.
- ▶ It is strictly prohibited for personnel or objects to remain within the movement range of the components, which are supported by the manual rope winch.
- ▶ It is prohibited for personnel or objects to remain within the danger zone of the moveable components.

7 Weights

Note

- ▶ The weight of each component is specified in the chapter 1.03 or the respective chapter in the Crane operating instructions or is stated on the tag attached to the corresponding component.
- ▶ If components are pushed into one another (for example the boom intermediate sections) or folded together (for example the folding jib), then the total weight is given by the sum of the individual components.

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NOTICE
False estimation of weights
- ▶ Contact the Service department at **Liebherr-Werk Ehingen GmbH** if the weight of the respective component is not stated on the tag or in the Crane operating instructions.
- ▶ Use an auxiliary crane with sufficient load carrying capacity including judicious reserve.

8 Guy rods

WARNING
Boom can break off!
The arrangement of the guy rods for the boom or boom systems is stipulated in the rod plan. If the arrangement of the guy rods according to the rod plan is not observed, the crane can collapse, the boom can break off or the crane can topple over.
Personnel can be severely injured or killed.
- ▶ Always carry out the arrangement of the guy rods according to the rod plan.
- ▶ If an auxiliary guying is required for a certain boom length, then it must always be installed according to the rod plan on the position defined in the rod plan.

WARNING
Unutilized guy rods on boom!
If guy rods are on the lattice sections which are not used for operation, then there is a danger of accident.
Unused guy rods can loosen up and fall down.
Personnel can be severely injured or killed.
The load chart is invalid.
The load display of the LICCON computer system shows an incorrect value.
The weight of the boom is too heavy for erection.
- ▶ Disassemble and remove the guy rods that are not needed on the transport retainers before erecting the boom.

Note
- ▶ Inspection and maintenance of guy rods, see Crane operating instructions, chapter 8.15.
- ▶ In reference to the guy rods, observe section „Erection / take-down“.

9 Auxiliary guying

The auxiliary guying is of significant importance for safe crane operation.

The auxiliary guying is a deciding factor in relieving the boom, or the boom system during erection and take-down as well as during crane operation.

WARNING
The crane can topple over!
If the auxiliary guying is not installed or not installed on the position specified in the rod plan, then the crane can collapse, the boom can break off or the crane can topple over.
- ▶ If an auxiliary guying is specified in the rod plan for the required boom length, then it must be installed on the respective position.
- ▶ Make sure that the auxiliary guying is always completely installed and that all pins are properly pinned and secured.

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10 Bypassing the overload protection

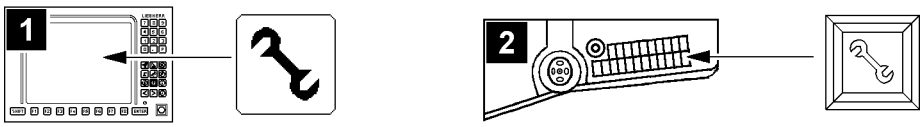

Fig.113438: Bypassing the overload protection

- Illustration **1**: LICCON monitor (only certain crane types).
- Illustration **2**: Indicator light „Assembly“ in instrument panel crane cab (only certain crane types).

The overload protection is considered bypassed for:
- all types of assembly operations.
- all types of exceeded shut off limits of the overload protection.
- all types of emergency operation.
- all types of crane operation with deactivated or defective sensors and limit switches.
- all types of deviation from specified set up configuration of the crane.

DANGER
Increased danger of accident due to bypass of the overload protection!
Proper and destined use of the crane is ensured due to the construction of the overload protection system and observance of the information in the Crane operating instructions. All **sensibly foreseeable erroneous operations** of the crane have been taken into consideration.
Impermissible crane operation with bypassed overload protection – with the aim of increasing the maximum load bearing capacity of the crane above the rated value in the load chart or of extending the designated working range of the crane – does not constitute a **reasonably foreseeable erroneous operation**, rather **deliberate improper use with high danger of accident**.
The possible risks and consequences of such improper use are detailed in the Crane operating instructions.
Such deliberate improper use can neither be prevented by means of the structural design nor by means of information in the Crane operating instructions.
- ▶ Bypass the overload protection only according to the Crane operating instructions.
- ▶ Exceed the shut off limits of the overload protection only according to the Crane operating instructions.
- ▶ Any other use of the crane with bypassed overload protection than that described in the Crane operating instructions is prohibited.

If the maximum permissible load moment is exceeded, the overload protection turns all load moment increasing crane movements off.

This shut-off can be bypassed or exceeded various ways, for example:
- exceeding the shut off limits (utilization more than 100 % or leaving the load chart).
- activating an assembly operation.
- activating an emergency operation.

The displays of the LICCON overload protection remain functioning when all associated sensors and limit switches are active and a load chart is available.

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WARNING
Increased danger of accident due to bypass of the overload protection!
If the overload protection is bypassed, there is no longer any protection against crane overload.
In the event of improper use, the crane could collapse, the boom can break off or the crane can topple over.
Personnel can be killed.
This could result in high property damage.
- ▶ It is only permitted to bypass the overload protection for assembly or in emergencies.
- ▶ The bypass of the overload protection may only be carried out by persons who are aware of the effects of their acts.
- ▶ Bypassing the overload protection requires the presence of a person authorized by the crane operator and must be performed with utmost caution.
- ▶ It is strictly prohibited to operate the crane when the overload protection is bypassed.

10.1 Bypassing the LICCON overload protection

Note
- ▶ Applies only for cranes with LICCON overload protection.

Depending on the crane version, one or more operating elements are available to bypass the overload protection:
- Button in the control panel.
- Key button on the LICCON monitor.
- Key button in the instrument panel.
- Key button in the control cabinet.
- Sensor for transponder on the crane cab.

The functions of the operating elements are described in chapter 4.20.

▶ Actuate the respective operating element.

Result:

- The LICCON overload protection is bypassed / inactive.
- The „Assembly“ icon appears on the LICCON monitor.
- Depending on the circumstances, acoustic and / or optical warning signals (blinkers, flashing lights, bells and horns) sound.

If the LICCON overload protection is to be reactivated:
▶ No longer actuate the respective operating element or reset.

Result:

- The LICCON overload protection is active.
- The „Assembly“ icon no longer appears on the LICCON monitor.
- The acoustic and / or optical warning signals which were triggered by the bypass are turned off again.

10.2 Bypassing the PAT overload protection

Note
- ▶ Applies only for cranes with PAT overload protection.

▶ Actuate the bypass key button and turn the PAT overload protection off.

Result:

- The PAT overload protection is bypassed / inactive.

▶ Actuate the bypass key button and turn the PAT overload protection on.

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Result:

– The PAT overload protection is active.

11 Bypassing the hoist top shut-off

Note

▶ Applies only for cranes with hoist limit switch.

If the hook block touches the hoist limit switch weight during the upward movement, the hoist limit switch reacts. The crane movements „Spool up winches“, „Luff boom down“ and „Telescope telescopic boom out“ are turned off. The shut-off can be bypassed.

WARNING

Danger of accidents due to bypass of Hoist top shut-off!

When bypassing the hoist top shut-off, there is the danger that the hook block may be pulled against the pulley head when continuing to lift or luffing down the boom. This may damage the pulleys and cause the loads to fall.

▶ The bypass of the hoist top shut-off in crane operation with a load may only be carried out by a person authorized by the crane operator with the aid of a „Guide“. The guide must be in direct contact with the crane operator and must continually monitor the distance between the hook block and the boom head.

▶ Carry out all crane movements with maximum caution and minimum speed.

12 Pin connections

WARNING

Pin connections **not** lubricated!

If pins or pin connections are not properly greased or lubricated before assembly, then they can corrode.

The pins can be stuck in the pin bores and be damaged.

During the unpinning procedure, the pins can suddenly release.

Death, severe bodily injuries, property damage.

▶ Make sure that all pins, which are not supplied with grease via the central lubrication system are sufficiently greased before assembly.

▶ Make sure that all lube points, which are equipped with a grease fitting, are properly greased at assembly and according to the respective interval specification.

▶ Never insert or unpin pins by force.

WARNING

Pin **not** secured to prevent it from loosening up by itself!

The pin connection could loosen up suddenly.

Death, severe bodily injuries, property damage.

▶ Secure all pins with retaining elements against loosening up by itself.

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WARNING
Distorted pin!
Angular pull or excessive or low hoisting force of the auxiliary crane may result in distortion of the pins.
Distorted parts can suddenly fly off when the pins are unpinned.
Death, severe bodily injuries, property damage.
- ▶ When the pins are unpinned, the lifting force of the auxiliary crane must be adapted to the weight of the components being lifted.
- ▶ Do **not** unpin difficult to remove pins by force.
- ▶ Remedy the cause of the distortion.

12.1 Pinning the collar pin

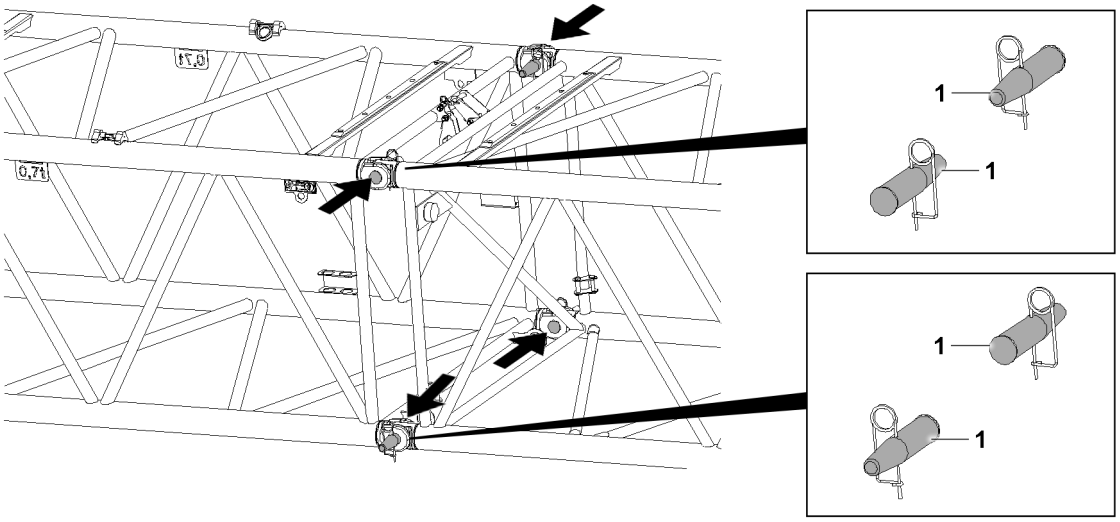

Fig.143114: Pinning the collar pin

WARNING
The collar pin is incorrectly pinned!
Death, severe bodily injuries, property damage.
- ▶ Insert or unpin both pins at the same horizontal level, i.e. **left and right**.
- ▶ Pin the upper collar pin **1** from the **outside to the inside** and unpin from the **inside to the outside**.
- ▶ Pin the lower collar pin **1** from the **inside to the outside** and unpin from the **outside to inside**.

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12.2 Assembling the double cone pins horizontally

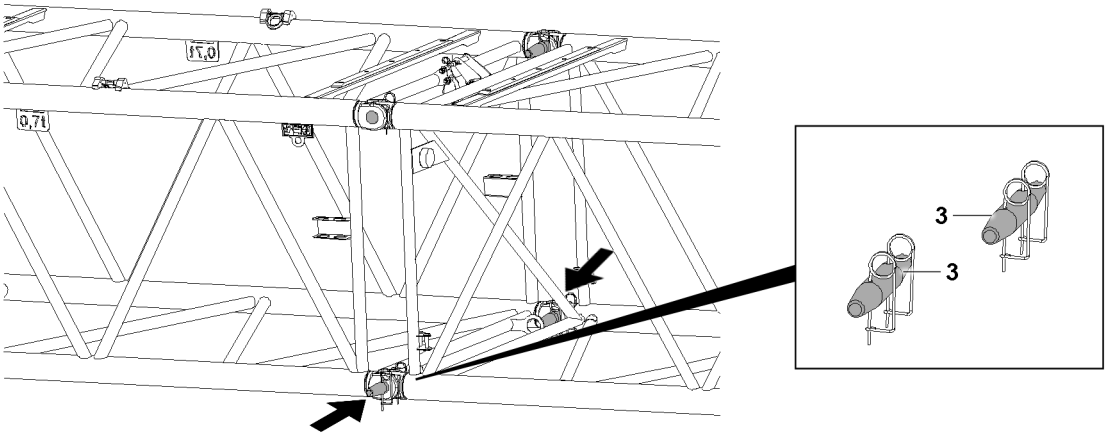

Fig.143115: Pinning the double cone pins horizontally

WARNING
Double cone pins incorrectly pinned!
Death, severe bodily injuries, property damage.
▶ Insert or unpin both pins at the same horizontal level, i.e. **left and right**.
▶ Pin and unpin horizontally installable double cone pins **3** from the **outside to the inside**.

12.3 Assembling the double cone pins vertically

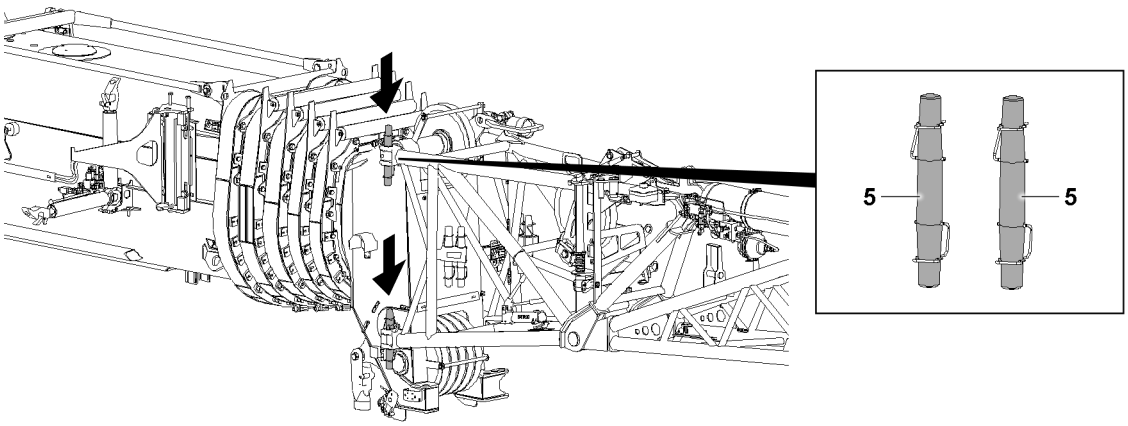

Fig.143116: Assembling the double cone pins vertically

WARNING
Double cone pins incorrectly pinned!
Death, severe bodily injuries, property damage.
▶ Pin and unpin vertically installable double cone pins **5** from the **top to the bottom**.

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12.4 Impact protection

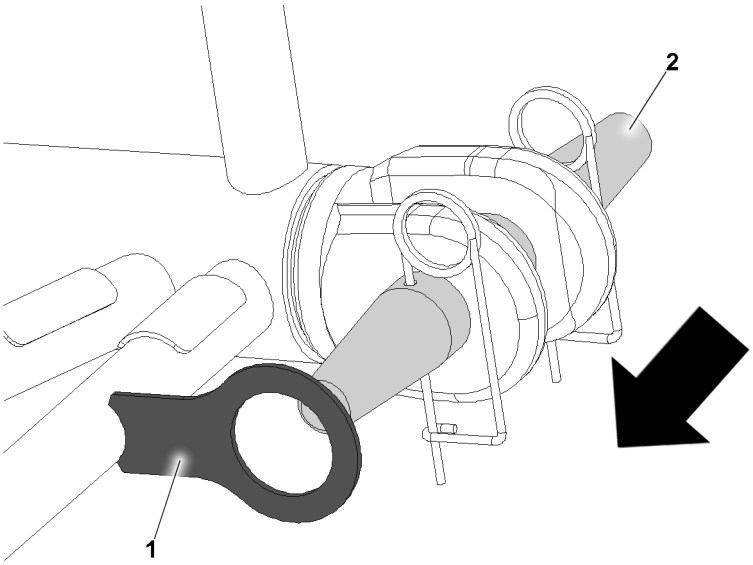

Fig.148194: Lattice section impact protection

Impact protection **1** is installed on certain lattice sections. The impact protection **1** should prevent the pins from being unpinned from the **inside to the outside**.

If impact protection **1** is installed:
- ▶ Only use double cone pins **2**.
- ▶ Only pin and unpin the double cone pins **2** from the **outside to the inside**.

13 Retaining elements

13.1 Checking the retaining elements

Retaining elements are used to secure the pins. Due to mechanical damage / distortion, the function of the retaining elements can be compromised. In addition, the spring force of the retaining elements can be reduced significantly. Do **not** re-use retaining elements if there is insufficient spring force. The pin retainer must be secured with a correctly **functioning** retaining element.

WARNING
Mechanical damage or deformation of the retaining element!
The retaining elements can fail.
The pin can unpin by itself.
Death, severe bodily injury, property damage.
- ▶ Use exclusively functioning retaining elements in a proper condition.
- ▶ Replace defective retaining elements.

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13.2 Overview of the retaining elements

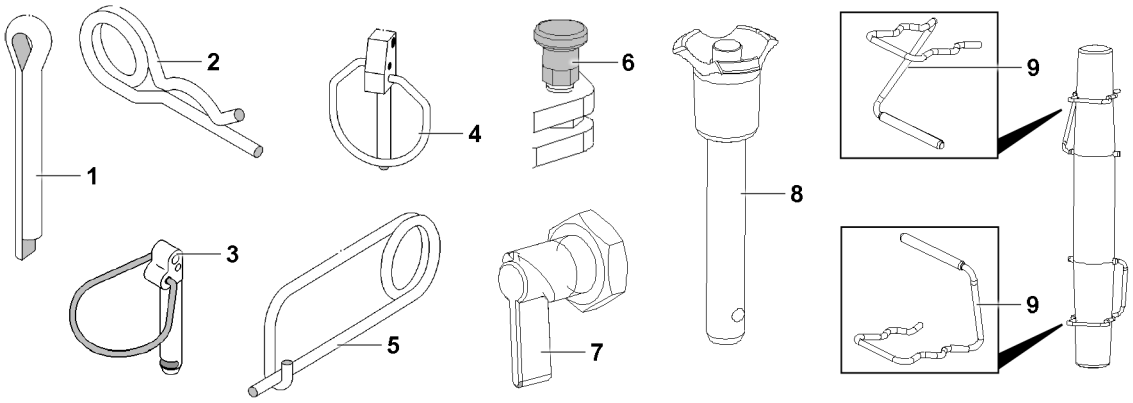

Fig.143102: Retaining elements

1 Split pin
2 Cotter pin
3 Safety locking pin
4 Linch pin
5 Spring retainer
6 Detent pin
7 Latch
8 Ball locking pin
9 Retaining clip

13.3 Split pin

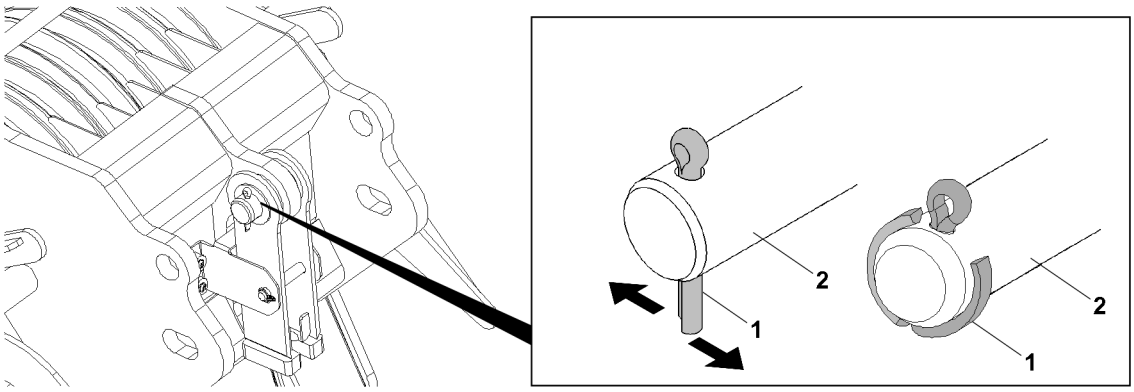

Fig.143105: Split pin

1 Split pin
2 Pin

WARNING
Multiple use of a split pin **1**!
The split pin **1** can break.
▶ Assemble the split pin **1** only once.
▶ Use a correctly sized split pin **1**.

▶ Secure the pin **2**: Insert the split pin **1**.
▶ Bend the end of the split pin **1** toward the outside.

Problem remedy
Split pin **1** defective!
▶ Replace the split pin **1**.

13.4 Cotter pin

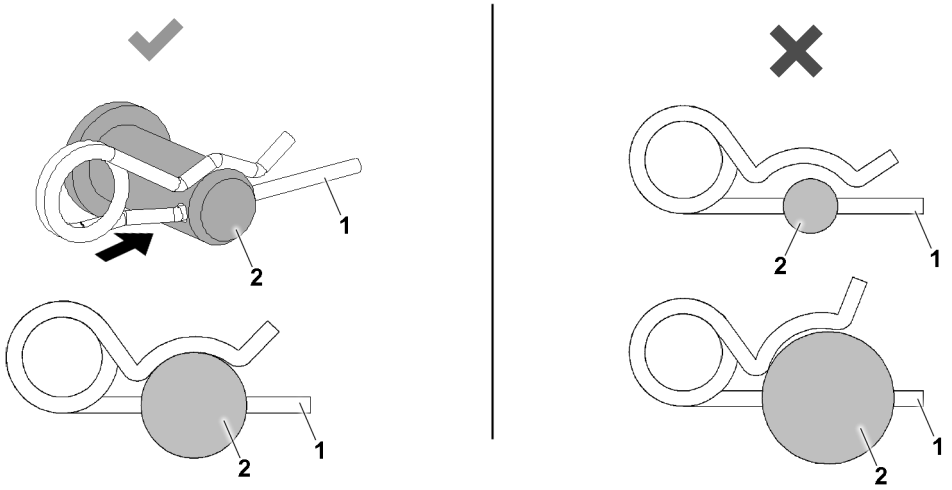

Fig.143106: Cotter pin, correct and incorrect dimensions

1 Cotter pin **2** Pin

WARNING
Improper dimensions of the cotter pin **1**!
The cotter pin **1** can loosen up by itself.
▶ Use a correctly sized cotter pin **1**.

▶ Secure the pin **2**: Insert the cotter pin **1**.

Problem remedy
Spring tension is too low?
The cotter pin **1** is defective.
▶ Replace the cotter pin **1**.

13.5 Safety locking pin

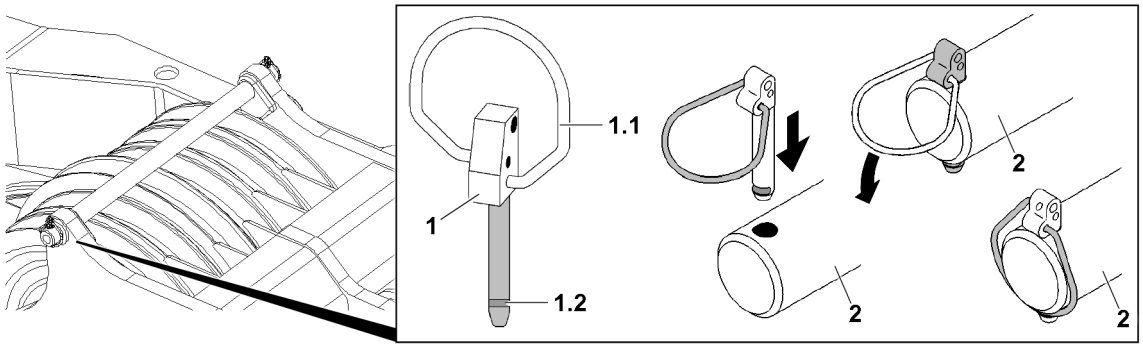

Fig.143103: Safety locking pin

1 Safety locking pin **1.2** Groove
1.1 Spring clip **2** Pin

Increased effort is necessary for opening the safety locking pin **1**.

WARNING
Spring clip **1.1 not** engaged!
The safety locking pin **1** can loosen up by itself.
▶ Engage the spring clip **1.1** completely in the groove **1.2**.

▶ Secure the pin **2**: Insert the safety locking pin **1**.
▶ Close the spring clip **1.1** and engage it completely in the groove **1.2**.

Problem remedy
The spring clip **1.1** does **not** engage completely?
Tension of the spring clip **1.1** is too low.
▶ Replace the safety locking pin **1**.

13.6 Linch pin

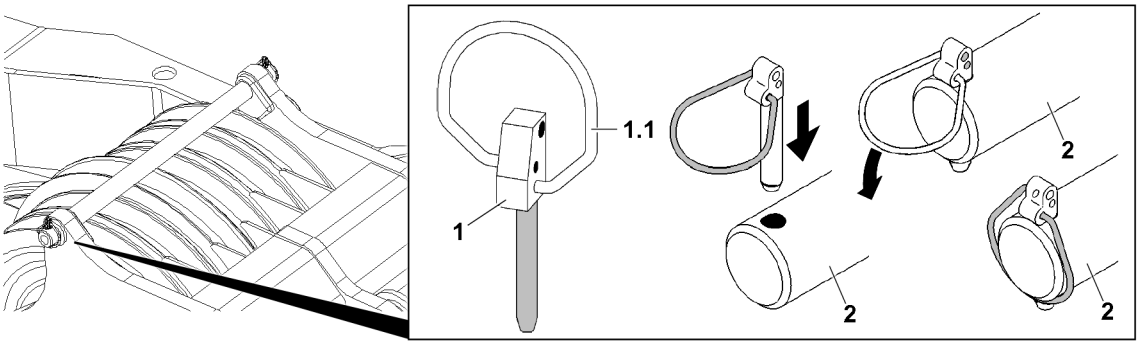

Fig.143104: Linch pin

1 Safety locking pin
1.1 Spring clip
2 Pin

WARNING
The locking pin **1** is **not** completely closed!
The locking pin **1** can loosen up by itself.
▶ Close the spring clip **1.1** completely.

▶ Secure the pin **2**: Insert the locking pin **1**.
▶ Close the spring clip **1.1** completely.

Problem remedy
The spring clip **1.1** does not close completely?
Tension of the spring clip **1.1** is too low.
▶ Replace the locking pin **1**.

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13.7 Spring retainer

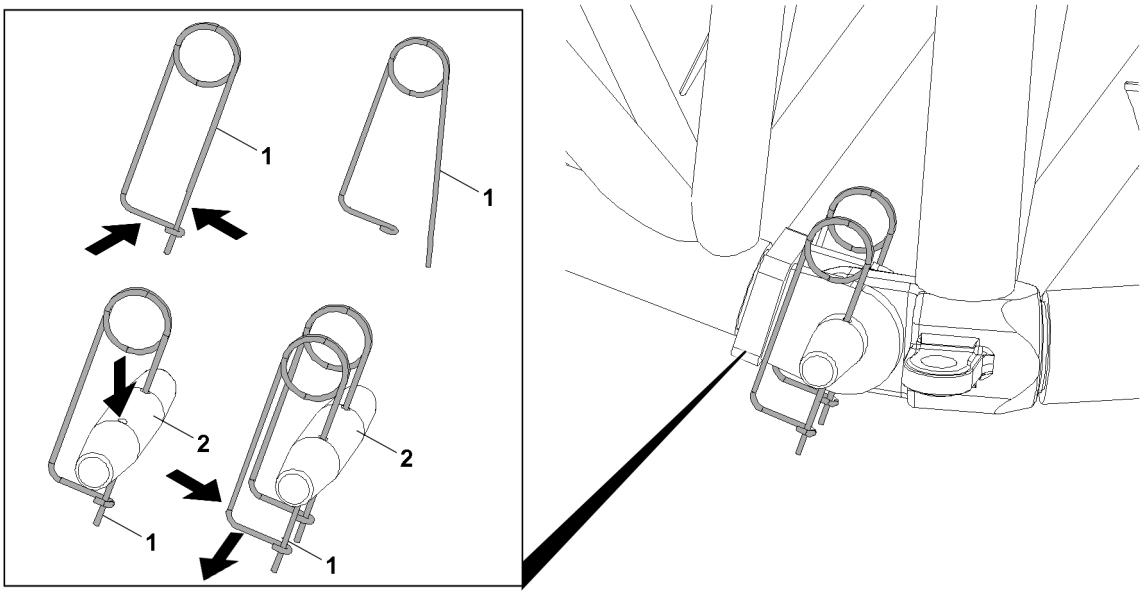

Fig.143108: Spring retainer

1 Spring retainer

WARNING
The spring retainer **1** is **not** closed!
The spring retainer **1** can loosen up by itself.
▶ Close the spring retainer **1**.

▶ Secure the pin: **2**Insert the spring retainer **1**.
▶ Close the spring retainer **1**.

Problem remedy
Spring tension is too low?
The spring retainer **1** is defective.
▶ Replace the spring retainer **1**.

13.8 Detent pin

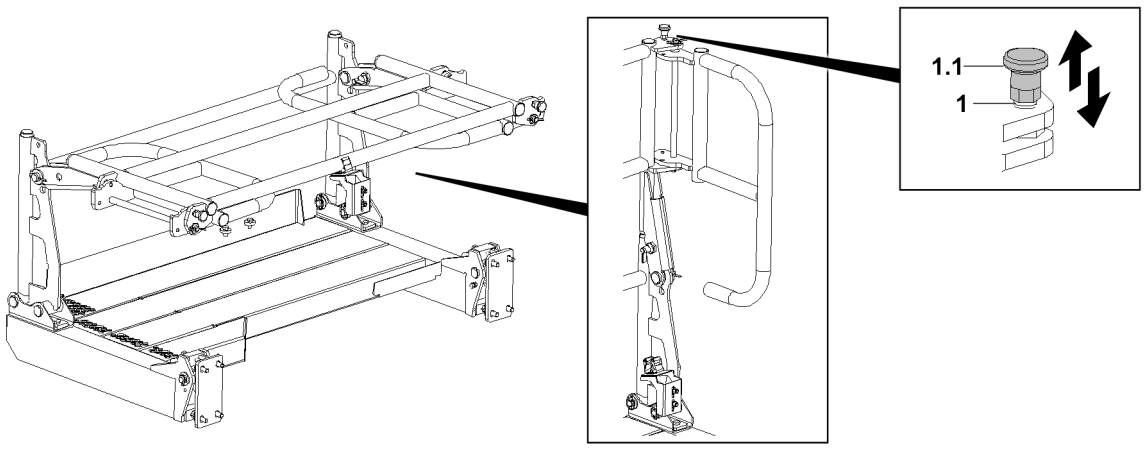

Fig.143110: Detent pin

1 Detent pin

1.1 Handle

WARNING
The handle **1.1** is **not** locked!
The detent pin **1** can loosen up by itself.
▶ Lock the detent pin **1**.

▶ Pull the handle **1.1**.

Result:
– The detent pin **1** is unlocked.

▶ Insert the detent pin **1**: Release the handle **1.1**.

Result:
– The detent pin **1** is pinned.

Problem remedy
The handle **1.1** cannot be pulled.
The detent pin **1** is defective.
▶ Replace the detent pin **1**.

13.9 Latch

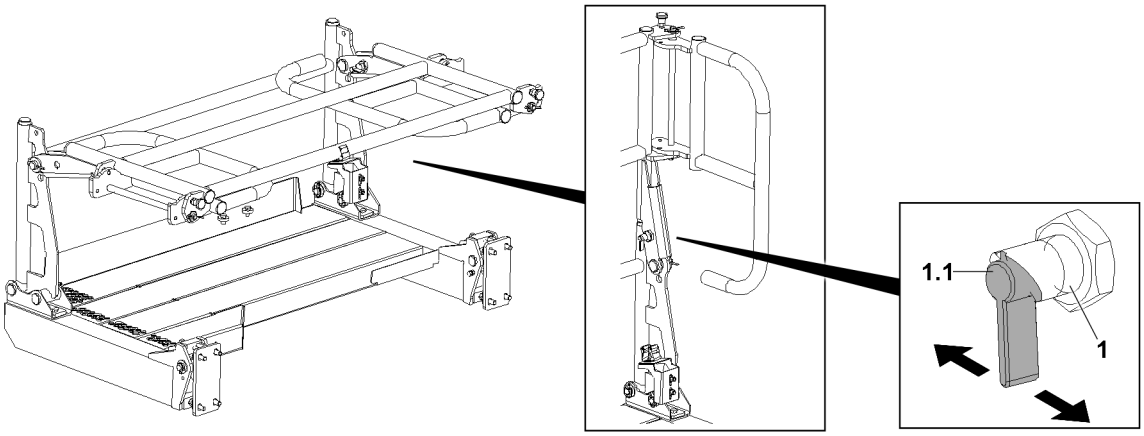

Fig.143111: Latch

1 Latch **1.1** Lever

WARNING
The latch **1** is **not** locked!
The latch **1** can loosen up by itself.
▶ Lock the latch **1**.

▶ Operate the lever **1.1**.

Result:
– The latch **1** is unlocked.

▶ Pin the latch **1**: Release the lever **1.1** and swing the railing until the latch is pinned.

Problem remedy
The lever **1.1** cannot be actuated?
The latch **1** is defective.
▶ Replace the latch **1**.

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13.10 Ball locking pin

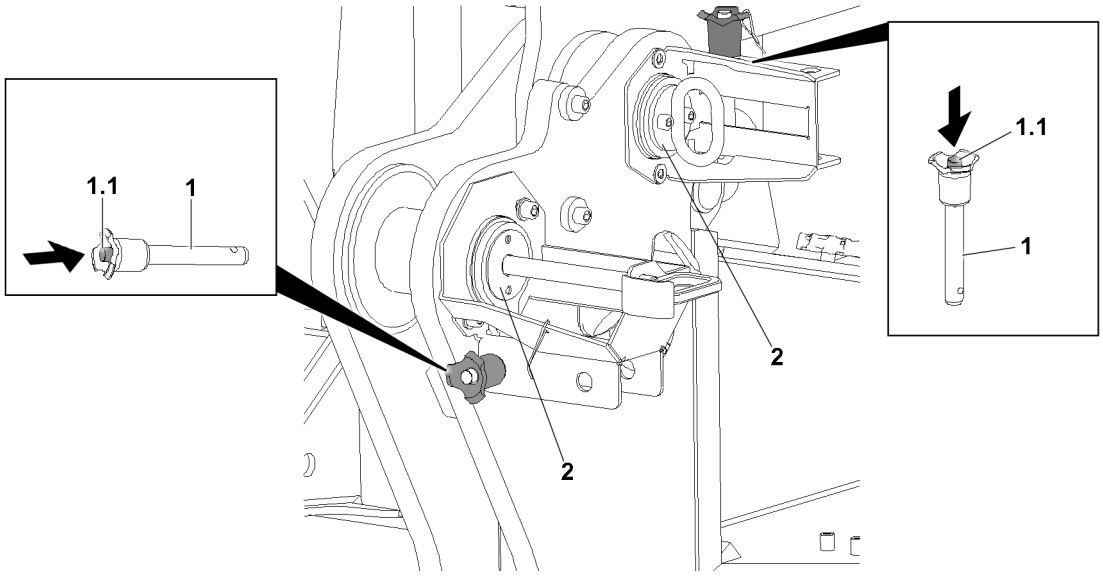

Fig.143109: Ball locking pin

1 Ball locking pin
1.1 Press button
2 Pin

WARNING
The ball locking pin **1** is **not** locked!
The ball locking pin **1** can loosen up by itself.
▶ Lock the ball locking pin **1**.

▶ Secure the pin **2**: Actuate the press button **1.1**.

Result:
– The ball locking pin **1** is unlocked.

▶ Pin the ball locking pin **1** and release the press button **1.1**.

Result:
– The ball locking pin **1** is pinned and secured.

Problem remedy
The press button **1.1** cannot be actuated?
The ball locking pin **1** is defective.
▶ Replace the ball locking pin **1**.

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13.11 Retaining clips

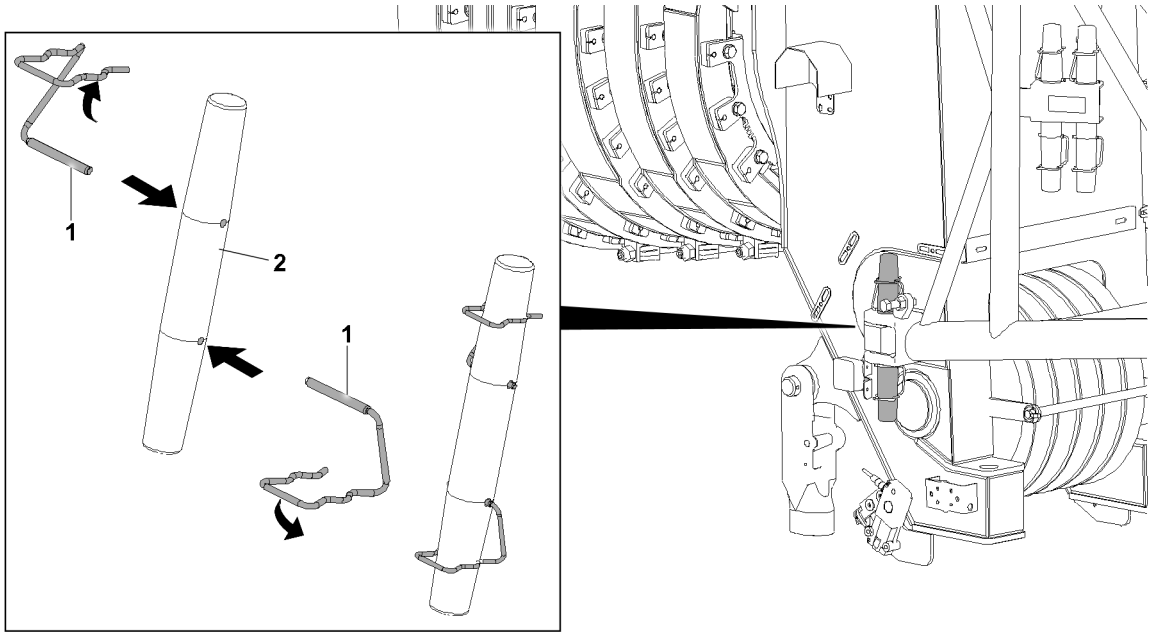

*Fig.143107: Retaining clips **1***

1 Retaining clip **2** Pin

WARNING
Incorrect retaining element!
Shearing off of the retaining element.
▶ To secure the folding jib pinning: Use retaining clips **1**.
▶ The use of other retaining elements is **prohibited**.

WARNING
Retaining clip **not** engaged!
The retaining clip **1** can loosen up by itself.
▶ Engage the retaining clip **1**.

▶ Secure the pin **2**: Insert the retaining clip **1**.
▶ Engage the retaining clip **1**.

Problem remedy
Retaining clip **1** defective?
The spring force of the retaining clip **1** is too low.
▶ Replace the retaining clip **1**.

14 Assembling / disassembling

WARNING
Danger of fatal injury due to incorrect assembly or disassembly!
The assembly / disassembly of lattice sections and / or components may never be performed by untrained personnel.
An erroneous assembly / disassembly of lattice sections and / or components can cause damage on load carrying crane structures.
Crane components can fail due to improper assembly / disassembly.
Death, severe bodily injuries, property damage.

- ▶ Make sure that the assembly / disassembly of lattice sections and / or components is carried out only by authorized and trained expert personnel.
- ▶ Make sure that the fastening equipment on lattice sections and / or components is always fastened properly.
- ▶ Make sure that lattice sections and / or components are always properly pinned and secured at assembly.
- ▶ For assembly / disassembly of individual components, also observe the chapters relating to those components.
- ▶ The boom combinations must be assembled according to the separately supplied rod plans.
- ▶ All components which must be transported separately must be transported with suitable auxiliary cranes and fastening equipment near ground level.

WARNING
Failure of auxiliary winch!

- ▶ Only use the auxiliary winch (assembly or reeving winch) for assembly and not to lift loads.
- ▶ Lifting of loads with the auxiliary winch is prohibited.

WARNING
Danger of impact / crushing!
When installing / removing crane components with the auxiliary crane, crane components can start to swing back and forth.
When lifting / lowering and positioning crane components, there is an increased danger of impacts / crushing.
Death, severe bodily injuries, property damage.

- ▶ Make sure that personnel cannot be caught by components.
- ▶ Make sure that the crane is horizontally aligned.
- ▶ When working in danger zones: Use aids to protect limbs.
- ▶ Guide components with suitable aids to minimize oscillation.
- ▶ During assembly / disassembly no one may be in the dangerous area around or underneath the suspended components before the load has been secured.

Part of the category „Aids for working at a height“ are, for example:

- Lifting platforms
- Scaffolding
- Auxiliary cranes
- Ladders

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WARNING
Danger of falling!
During assembly / disassembly, inspection and maintenance work, assembly personnel must be secured with appropriate aids to prevent them from falling.
Death, severe bodily injuries, property damage.
- ▶ All work at a height, when there is a danger of falling, must be carried out with suitable aids.
- ▶ If aids are not available and work cannot be carried out from the ground, then assembly personnel must secure themselves with the supplied fall arrest system to prevent falling, see the Crane operating instructions, chapter 2.04.
- ▶ If fall protection equipment is available, then it must be used, see the Crane operating instructions, chapter 2.06.
- ▶ When lifting, lowering, swinging crane parts in and out, no persons may remain in the danger zone.
- ▶ When closing or opening boom systems during boom assembly or boom disassembly, no persons may remain on the boom system or in the danger zone.
- ▶ If railings are present on the components, then they must be brought into the corresponding position and secured for assembly / disassembly work.
- ▶ Only step on the aids, ladders and catwalks with clean shoes.
- ▶ Keep aids, ladders and catwalks free of heavy dirt, snow, frost and ice.
- ▶ During all assembly and disassembly work, maintenance work and inspections, travel or crane operation is prohibited.
- ▶ Remaining on a suspended load is prohibited.
- ▶ Stepping and walking on crane components and lattice sections, which have an incline of more than 20° is prohibited.
- ▶ For all assembly work, the crane driver of the main crane must be in voice contact with the crane driver / crane drivers of the auxiliary crane / auxiliary cranes.
- ▶ For all assembly work, the crane driver of the main crane must be in voice contact with the assembly personnel.
- ▶ For assembly tasks, the crane driver may only initiate crane movements when the responsible guide has explicitly released the movement.

DANGER
The components can fall down!
If the corresponding component is disengaged from the auxiliary crane before the corresponding component is pinned, then the corresponding component can fall down.
Death, severe bodily injuries, property damage.
- ▶ Do not disengage the auxiliary crane and the fastening equipment until the respective component is pinned and secured.

WARNING
The components can fall down!
If the corresponding component is unpinned without being secured by an auxiliary crane, the corresponding component can fall down.
Death, severe bodily injuries, property damage.
- ▶ Do not unpin the components until they are secured by an auxiliary crane.

WARNING
Falling components and tools!
Whenever working at a height, for example on the crane or on an aerial platform, components or tools can fall down.
Death, severe bodily injuries, property damage.
- ▶ Make sure that the danger zone under the work area is blocked off and marked and that no personnel is located within it.

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14.1 Assembly drawings

WARNING
Use of assembly drawings!
Due to sole use of assembly drawings, dangerous situations can arise up to toppling of the crane.
Death, severe bodily injuries, property damage.
- ▶ Assembly drawings should only be considered to be **additional** and **supplementary** information.
- ▶ The respective chapters in the crane operating instructions are decisive for the assembly and disassembly of crane structures, lattice sections or crane components.
- ▶ The detailed information and danger notes in the respective chapters must be observed.

14.2 Guiding crane structures, lattice sections or crane components

WARNING
Danger due to oscillating load!
During the assembly of crane structures, lattice sections or crane components with the auxiliary crane, they can start to swing back and forth.
Death, severe bodily injuries, property damage.
- ▶ To guide and position crane structures, lattice sections or crane components always use a guide rope.
- ▶ Make sure that there are no persons or obstacles within the danger zone.
- ▶ Make sure that the guide rope is long enough.

14.3 Assembling / disassembling the electrical lines

WARNING
The crane can topple over!
If mechanical crane components, which have electrical connections are not immediately electrically connected after assembly, then the limit switches and / or electrical sensors are not functioning.
Safety relevant shut offs are not recognized by the LICCON computer system.
Any errors or safety relevant messages which might occur are not shown on the LICCON computer system.
Death, severe bodily injuries, property damage.
- ▶ Make sure that the electrical connections are made immediately after installation of the respective crane components on the crane.
- ▶ Make sure that the procedure to make the electrical connections to the boom end sections in the respective assembly and set up chapters are observed.

NOTICE
Danger of damage to the electrical connections!
If the following measures are not adhered to, the electrical connections can be damaged.
- ▶ Do not plug in the plug connection or unplug them under tension.
- ▶ Do not pinch or crush electrical connections.

When pulling the cable out:
- ▶ Hold the plug and not the cable. Do not pull on the cable to release the plug connection.
- ▶ Relieve the electrical connections in operating condition.
- ▶ In case of defective or faulty electrical lines, contact Customer Service at Liebherr-Werk Ehingen GmbH.

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WARNING
Malfunction if dummy plugs are not installed!
If the dummy plugs on the non-required electrical connections are not installed, then malfunctions or functional limitations can occur on the crane.
- ▶ Make sure that all non-required electrical connections, which have a dummy plug, are closed off with dummy plugs.
- ▶ Pay attention to the Electrical wiring diagram.

NOTICE
Property damage due to dirt and / or corrosion!
The plug connections are only protected when plugged in. If the plug connections are not plugged in, then the contact surfaces can corrode.
This could result in malfunctions.
- ▶ Always plug or screw the plug connections together properly.
- ▶ Keep plug connections clean and dry. Clean contact surfaces provide the best signal transfer.
- ▶ Close off the plug connections that are not used with dust caps.

- ▶ Establish the electrical connections to the installed crane components properly.
- ▶ As a rule, close off on-required electrical connections (for example for accessories which are not installed) with the respective dummy plugs.
- ▶ Properly close off electrical connections, which have no dummy plugs, with the corresponding protective dust or cover caps.

If a pull release for the cable drum is present:
- ▶ Hang the pull release in on the fixed point and relieve the plug connections from the pull strain.

After installing the plug connections:
- ▶ Check all plug connections for proper connection.

If a plug connection is not properly connected:
- ▶ Plug or screw the plug connection together properly.

After removing the plug connections:
- ▶ Protect the electrical connections with protective dust or cover caps or place them in intended storage retainers.
- ▶ After unplugging the electrical plug connections, install the dummy plugs, see Electrical wiring diagram.

If locking brackets are present:
- ▶ Close the locking bracket.

14.4 Assembling / disassembling the hydraulic lines

When connecting and releasing hydraulic lines with quick couplings, make sure that the coupling procedure is carried out correctly.

WARNING
Danger of accident due to loss of pressure or leakage!
Incorrectly coupled or self-loosening quick couplings (particularly return lines) can result in serious accidents due to component failure.
Death, severe bodily injuries, property damage.
- ▶ Check the quick couplings after assembly for correct connection.
- ▶ Make sure that the sleeve and plug after fastened after assembly with the knurled nut.

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WARNING
Pressure in the hydraulic lines!
If the pressure supply is not interrupted before releasing the hydraulic lines, the hydraulic oil can escape with high pressure.
Death, severe bodily injuries, property damage.
▶ Release the pressure in the hydraulic system before releasing. Interrupt the pressure supply and wait for a short time.

▶ Release the pressure in the hydraulic system before connecting or disconnecting: Turn the engine off and wait for short time.
▶ Connect the coupling components (sleeve and connector) and screw together with the knurled nut.
▶ Tighten the hydraulic coupling by hand. Turn the knurled nut until it reaches a tangible, fixed stop position.

14.5 Bypass when assembling / disassembling the crawler

Note
▶ Applies only for cranes with crawler assembly key button.

WARNING
High danger of accident in case of actuated crawler assembly key button!
If the crawler assembly key button is actuated, the overload protection is bypassed. No shut-off at overload will occur in assembly operation nor in crane operation.
In the event of misuse, the crane can topple over.
Death, severe bodily injuries, property damage.
▶ The crawler assembly key button may only be actuated for assembly tasks.
▶ All other usage of the crawler assembly key button other than as described in the operating instructions is prohibited.
▶ Operating the crane with the crawler assembly key button enabled is strictly prohibited.

14.5.1 Activating the bypass at crawler assembly and crawler disassembly

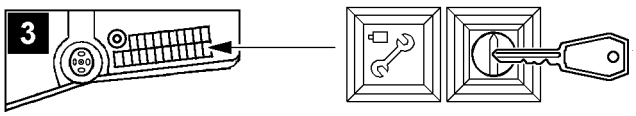

Fig.113441: Activating the bypass

– Illustration **3**: Crawler assembly key button and indicator light *Crawler assembly* with touch function *Crawler assembly off*

▶ Actuate the crawler assembly key button.

Result:

– The LICCON overload protection is inactive.
– The indicator light *Crawler assembly* lights up.

14.5.2 Deactivating the bypass at crawler assembly and crawler disassembly

Make sure that the following prerequisites are met:
– The LICCON overload protection is bypassed / inactive and the „Bypass at assembly and disassembly“ is activated.
– The indicator light *Crawler assembly* lights up.

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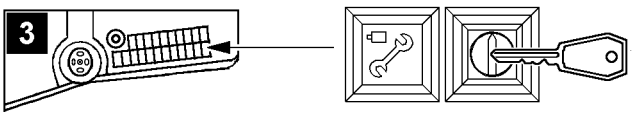

Fig.113441: Deactivating the bypass

If the bypass at crawler assembly is to be turned off:

▶ Turn the crawler assembly off by pressing the off button *Crawler assembly off*.

Result:

– The indicator light in the button *Crawler assembly* turns off.

14.6 Bypass when assembling / disassembling

Depending on the crane version, the „Bypass at assembly and disassembly“ is activated by:

– The set up button (key button) on the LICCON monitor.
– The assembly key button in the instrument panel.

Note

▶ Applies only for cranes with LICCON overload protection.
▶ Indicator light *Assembly* is only present in the instrument panel for certain crane types.

WARNING

High danger of accident at crane operation with activated „Bypass at assembly and disassembly“!
At activated „Bypass at assembly and disassembly“ the overload protection and possibly bypassed hoist limit switches.
In the event of improper use, the crane could collapse, the boom can break off or the crane can topple over.
Personnel can be killed.
This could result in high property damage.

▶ The activation of the „Bypass at assembly and disassembly“ is only permissible for assembly and disassembly purposes.
▶ All other usage of the „Bypass at assembly and disassembly“ other than as described in the operating instructions is prohibited.
▶ The „Bypass at assembly and disassembly“ may only be activated by persons who are aware of the consequences of a bypass.
▶ Crane operation with activated „Bypass at assembly and disassembly“ is strictly prohibited.
▶ The „Bypass at assembly and disassembly“ must be deactivated immediately after assembly and disassembly work.
▶ The crane operator or a person authorized by him must make sure that no misuse of the bypass device is possible (remove the key and store it safely, if necessary).

14.6.1 Activating the bypass at assembly and disassembly

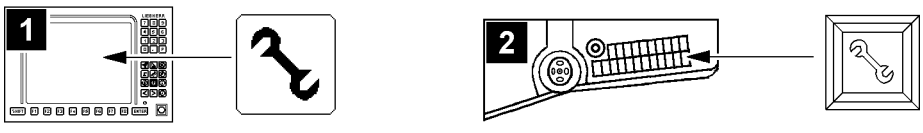

Fig.113438: Activating the bypass at assembly and disassembly

– Illustration **1**: LICCON monitor (only certain crane types).
– Illustration **2**: Indicator light „Assembly“ in instrument panel crane cab (only certain crane types).

▶ Actuate the respective operating element.

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Result:

– The LICCON overload protection is bypassed / inactive and the „Bypass at assembly and disassembly“ is activated.
– The „Assembly“ icon appears in the LICCON monitor and / or the indicator light „Assembly“ in the instrument panel lights up.
– Depending on the circumstances, acoustic and / or optical warning signals (blinkers, flashing lights, bells and horns) sound.

14.6.2 Bypass at assembly and disassembly

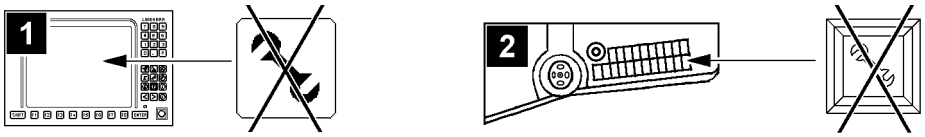

Fig.113437: Bypass at assembly and disassembly

▶ No longer actuate the respective operating element or reset.

Result:

– The LICCON overload protection is active and the „Bypass at assembly and disassembly“ is deactivated.
– The „Assembly“ icon turns off in the LICCON monitor and / or the indicator light „Assembly“ in the instrument panel no longer lights up.
– The acoustic and / or optical warning signals which were triggered by the bypass are turned off again.

14.7 Actuating of winch and / or crane movements during assembly / disassembly

Note

▶ The winches and / or crane movements can be controlled from the crane cab or, depending on the crane set up configuration, with the Bluetooth™ Terminal (BTT) or the radio remote control*.
▶ Observe the Crane operating instructions, chapter 4.05, chapter 5.31 and chapter 6.08.

WARNING

Uncoordinated procedure for assembly tasks!
Death, severe bodily injuries, property damage.

▶ Before starting the assembly tasks, define the course of action and agree on all steps with all involved personnel.
▶ Monitor all steps and continuously check the course of action.
▶ In the case of unforeseen events, stop the course of action and agree on the new situation with all involved personnel.
▶ Make sure that winches and / or crane movements are only controlled by people who are aware of the effects on the crane and / or boom system as well as the connected dangers.
▶ Make sure that no persons, objects or obstacles are within the danger zone of the crane.
▶ Prewarn persons within the surrounding area of the crane, for example via a horn signal.
▶ Perform all winch and / or crane movements anticipatorily and at a low speed.

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14.8 Assembling / disassembling of booms

WARNING
The crane can topple over!
Angular pull can overload the crane.
Overload can cause destruction of the crane or cause it to topple over.
Death, severe bodily injuries, property damage.
- ▶ The hook block must always be attached (hooked) vertically over the center of gravity of the load to be lifted.
- ▶ Angular pull is prohibited.

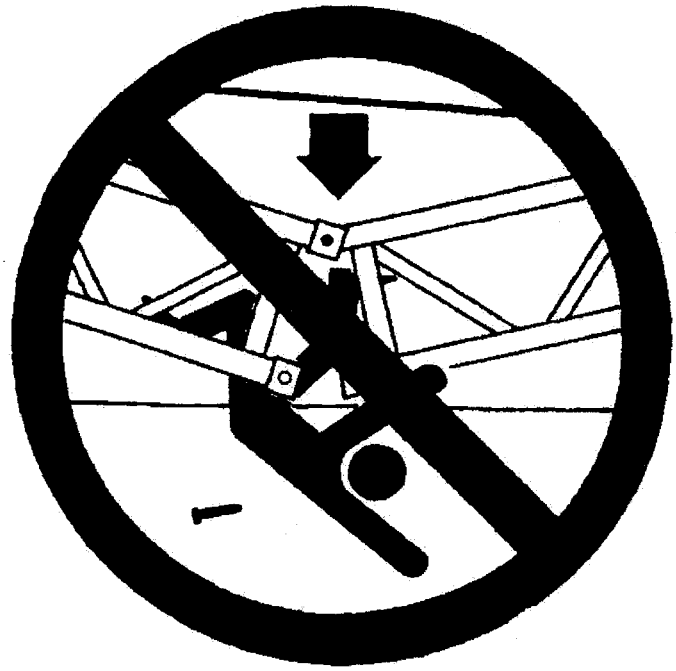

Fig.113444: Danger of accident during assembling / disassembling

WARNING
Danger of accident at assembly / disassembly of booms!
When you disassemble unsecured or unsupported booms, they can fall down.
Death, severe bodily injuries, property damage.
- ▶ Never unpin the pins under unsecured or unsupported booms.
- ▶ Never unpin the connecting pins on unsecured or unsupported booms.
- ▶ Do not stand under the booms or within the complete danger zone during the pinning and unpinning procedure of the booms.
- ▶ Secure the pins in the storage locations and in the receptacles.
- ▶ The railing at assembly and disassembly of booms must be horizontal.
- ▶ Do not lean the ladder against the component being disassembled.

Make sure that the following prerequisites are met for the closing assembly:
- – If parts of the equipment (for example lattice sections) are not in contact with the ground during assembly / disassembly, then they must be supported with suitable, stable materials.
- – Take down the parts of the equipment with rope pulleys in such a way that the rope pulleys are not damaged.
- – During disassembly make sure that the auxiliary crane can lift the load vertically.
- – Have an auxiliary crane with sufficient load carrying capacity available to be able to hold the load at a respective radius.

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14.9 Fastening positions for assembling / disassembling of the lattice jib

WARNING
Danger of fatal accidents due falling components!
The maximum permissible tensile load on the fastening eye is engraved on the fastening eye.
The maximum permissible fastening load of the respective components can differ to the maximum permissible tensile load of the fastening eye.
Components can be damaged at overload and fall down during lifting.
- ▶ Observe the maximum permissible fastening load according to the operating instructions and the tags on the components.
- ▶ Fasten the lattice jib only according to the following descriptions.
- ▶ Do not overload the components.

14.9.1 Closing the end section

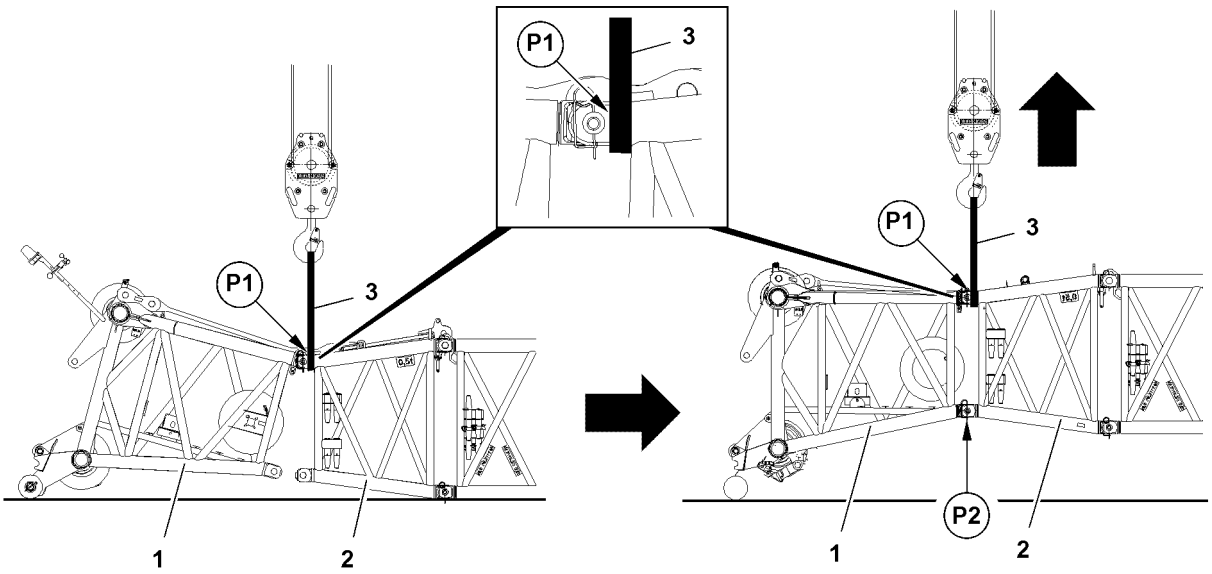

Fig.117840: Closing the end section

For closing the end section, observe the following:
- – Use textile type fastening equipment **3**.
- – Loop the textile type fastening equipment **3** on the left and right around on the pin points.

Before fastening:
- ▶ Check the position of the spring retainers and correct, if necessary.
- ▶ Fasten the textile type fastening equipment **3** on the upper pin points **P1** between the end section **1** and the pinned components **2**.
- ▶ Lift the lattice jib until the lower pin points **P2** align between the end section **1** and components **2**.
- ▶ Pin the end section **1** and components **2** on the lower pin points **P2** on the left and right.

After pinning:
- ▶ Remove the textile type fastening equipment **3**.

14.9.2 Taking the lattice jib down into the roller cart

Note
- ▶ The following illustrations are examples and may not match your crane exactly.

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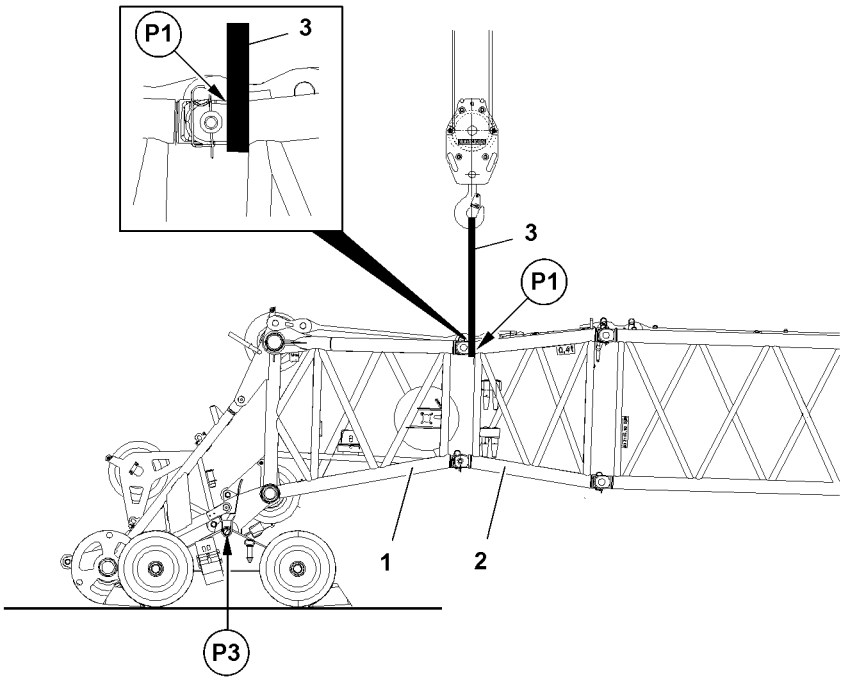

Fig.117842: Taking the lattice jib down into the roller cart (telescopic crane with lattice jib)

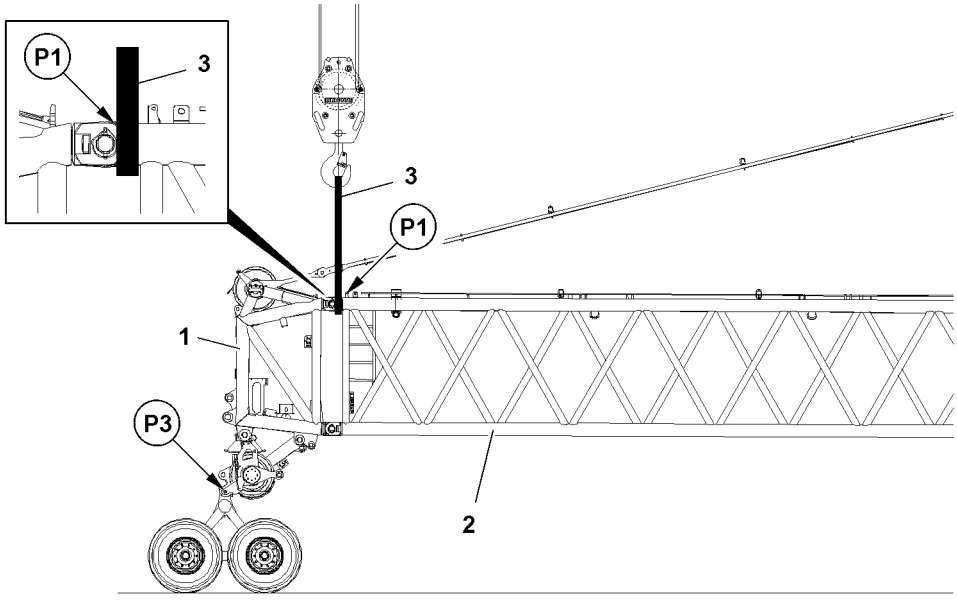

Fig.121550: Taking the lattice jib down into the roller cart (crane with lattice mast)

When taking it down into the roller cart, observe the following:
- The end section **1** is completely installed.
- Use textile type fastening equipment **3**.
- Loop the textile type fastening equipment **3** on the left and right around on the pin points.

Before fastening:
- ▶ Check the position of the spring retainers and correct, if necessary.
- ▶ Fasten the textile type fastening equipment **3** on the upper pin points **P1** between the end section **1** and the pinned components **2**.
- ▶ Lift the lattice jib and take it down in the roller cart **4**.
- ▶ Pin the end section **1** with the roller cart **4** on the pin points **P3** on the left and right.
- ▶ Remove the textile type fastening equipment **3**.

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Note
▶ The disassembly and removal of the pulley cart **4** is handled accordingly.

14.9.3 Opening the end section

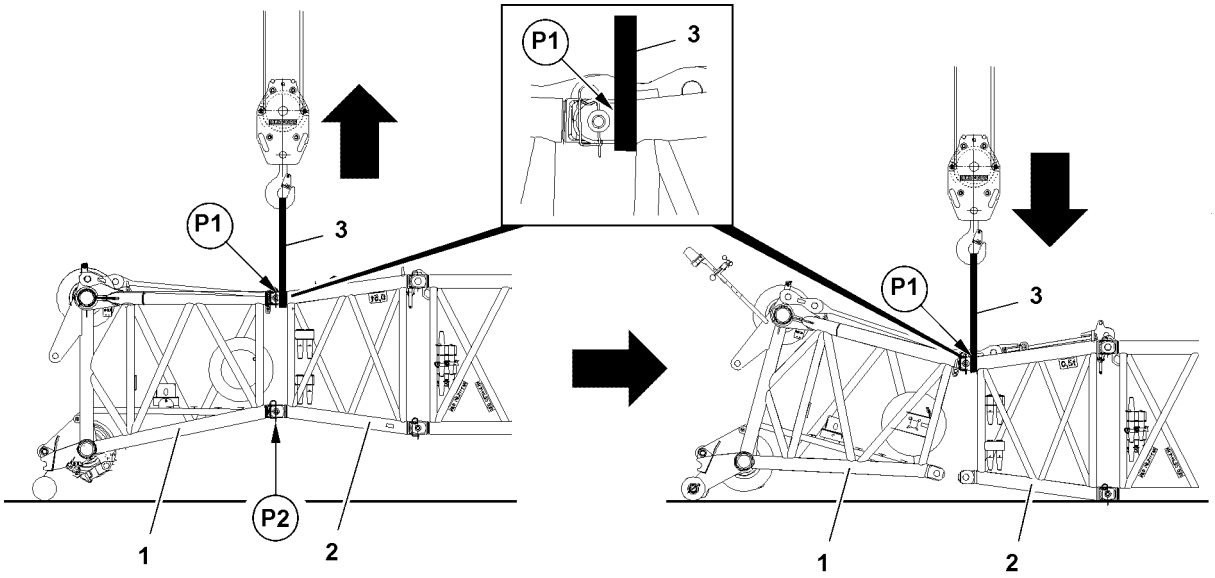

Fig.117841: Opening the end section

For opening the end section, observe the following:
- The roller cart is disassembled and removed.
- Use textile type fastening equipment **3**.
- Loop the textile type fastening equipment **3** on the left and right around on the pin points.

Before fastening:
▶ Check the position of the spring retainers and correct, if necessary.
▶ Fasten the textile type fastening equipment **3** on the upper pin points **P1** between the end section **1** and the pinned components **2**.
▶ Lift the lattice jib and relieve the pins on the lower pin points **P2**.
▶ Unpin the end section **1** and components **2** on the lower pin points **P2** on the left and right.
▶ Take the lattice jib down on the ground.
▶ Remove the textile type fastening equipment **3**.

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14.9.4 Holding the luffing lattice jib

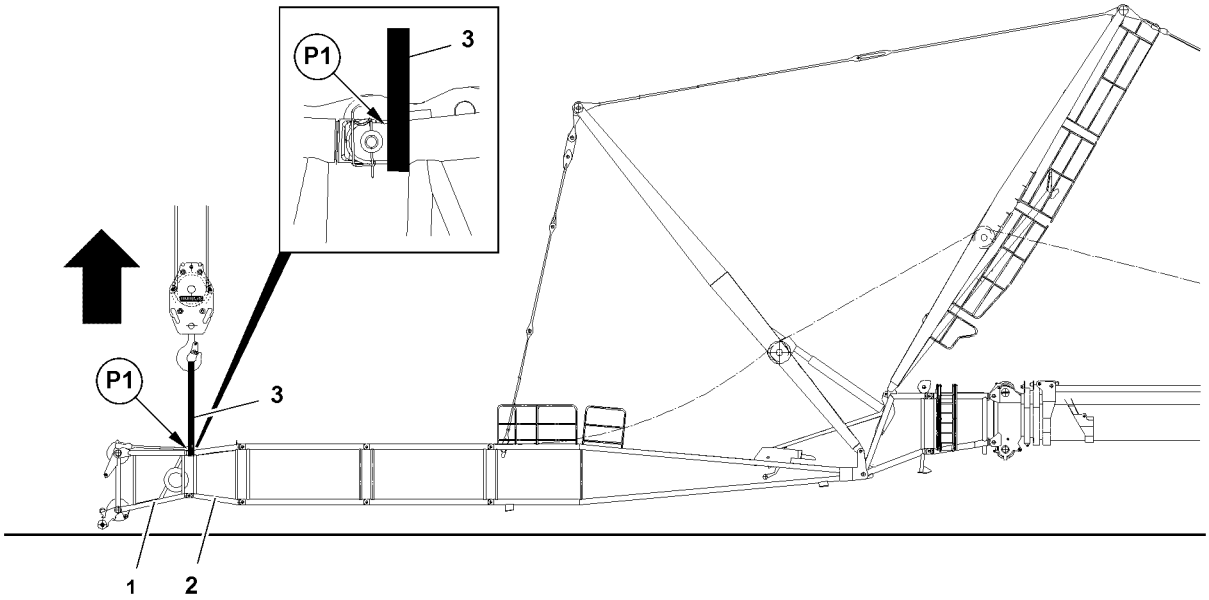

Fig.117843: Holding the luffing lattice jib

To be able to install or remove the guy rods and "flying assembly", the luffing lattice jib must be held on the upper pin points **P1**.

When holding the luffing lattice jib, observe the following:
- The lattice jib has been completely assembled.
- Use textile type fastening equipment **3**.
- Loop the textile type fastening equipment **3** on the left and right around on the pin points.

Before fastening:
- ▶ Check the position of the spring retainers and correct, if necessary.
- ▶ Fasten the textile type fastening equipment **3** on the upper pin points **P1** between the end section **1** and the pinned components **2**.
- ▶ Lift the lattice jib and install the guy rods.

When the guy rods are installed:
- ▶ Remove the textile type fastening equipment **3**.

Note
- ▶ The removal of the guy rods is handled accordingly.

14.9.5 Assembling the fixed lattice jib on the TF-adapter

WARNING
Mortal danger if the lattice jib tilts over!
Due to unfavorable center of gravity, only certain lattice jib lengths can be installed / removed as an assembled lattice jib.
If a lattice jib length cannot be installed / removed as an assembled lattice jib, then they must be installed / removed individually in flying mode.
- ▶ Check if the respective lattice jib length can be installed / removed as an assembled lattice jib. See charts in the Crane operating instructions, chapter 5.01.10.

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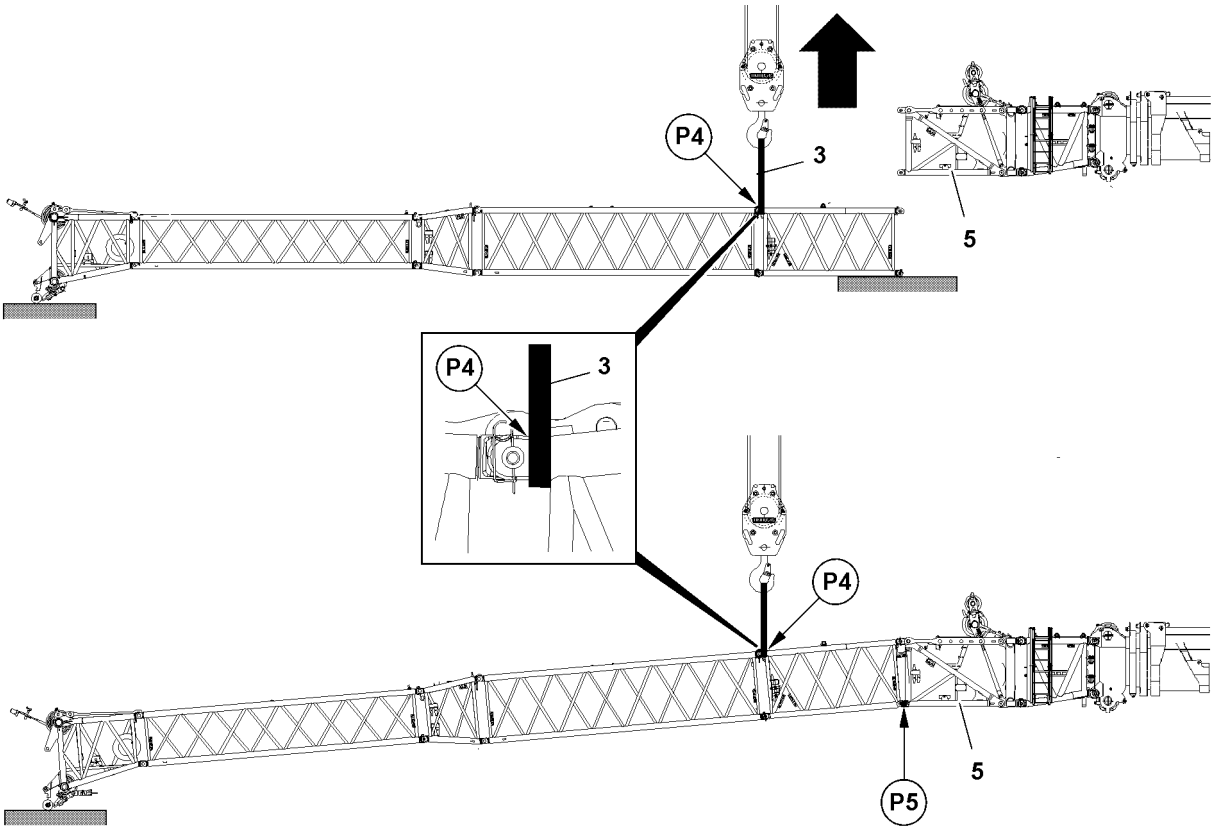

Fig.117844: Assembling the lattice jib on the TF-adapter

For installation on the TF-adapter, observe the following:
- The lattice jib has been assembled.
- The TF-adapter **5** is installed.
- Use textile type fastening equipment **3**.
- Loop the textile type fastening equipment **3** on the left and right around on the pin points.

Before fastening:
▶ Check the position of the spring retainers and correct, if necessary.

Fasten between the lattice sections, which are installed directly on the TF-adapter.

▶ Fasten the textile type fastening equipment **3** on the upper pin points **P4**.
▶ Lift the lattice jib and affix on the lower pin point **P5** on the TF-adapter **5**.
▶ Pin the lattice jib on the lower pin point **P5** with the TF-adapter **5**.

After pinning:
▶ Remove the textile type fastening equipment **3**.

WARNING
Mortal danger if the lattice jib tilts over!
▶ Make sure to always observe the permissible lattice jib length at disassembly.

▶ Disassemble accordingly.

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14.9.6 Closing the fixed lattice jib

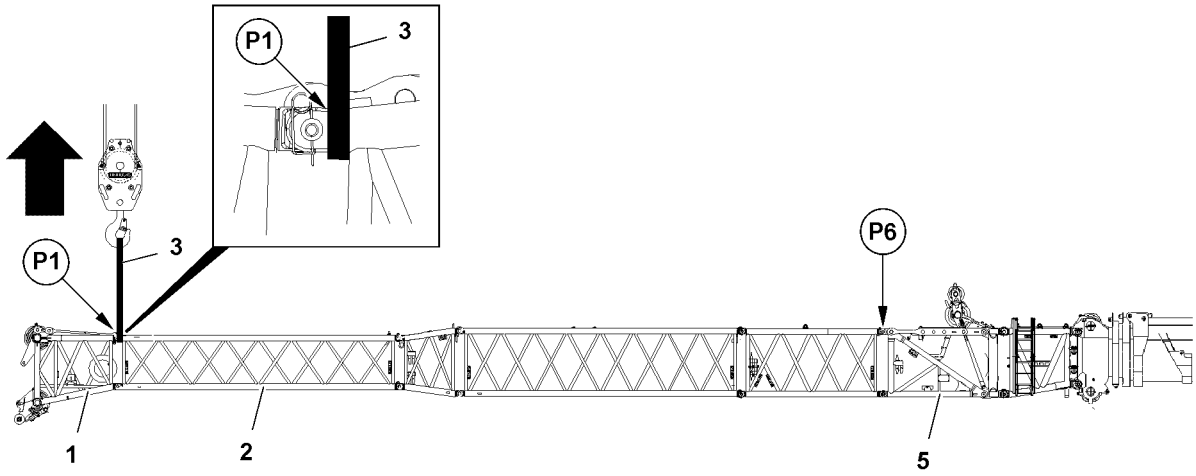

Fig.117850: Closing the lattice jib

For installation on the TF-adapter, observe the following:
- The lattice jib is pinned on the lower pin points of the TF-adapter **5**.
- Use textile type fastening equipment **3**.
- Loop the textile type fastening equipment **3** on the left and right around on the pin points.

Before fastening:
- ▶ Check the position of the spring retainers and correct, if necessary.
- ▶ Fasten the textile type fastening equipment **3** on the upper pin points **P1** between the end section **1** and the pinned components **2**.
- ▶ Lift the lattice jib and affix on the upper pin point **P6** on the TF-adapter **5**.
- ▶ Pin the lattice jib on the upper pin point **P6** with the TF-adapter **5**.

After pinning:
- ▶ Remove the textile type fastening equipment **3**.

Note
- ▶ Disassemble accordingly.

14.9.7 Angle adjustment on the fixed lattice jib with mechanical adjustment

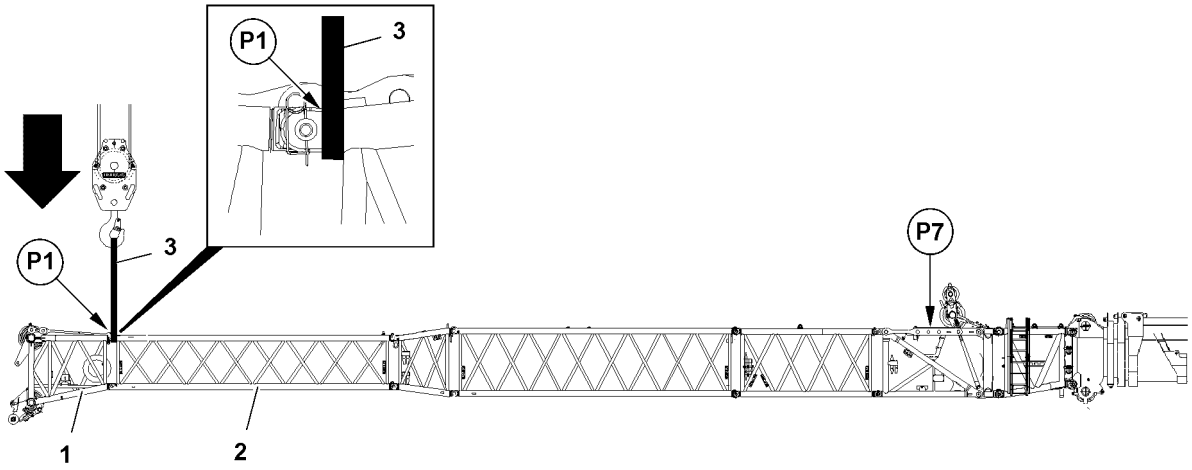

Fig.117851: Angle adjustment on the fixed lattice jib

For the angle adjustment on the fixed lattice jib, observe the following:
- The lattice jib has been completely assembled.
- Use textile type fastening equipment **3**.
- Loop the textile type fastening equipment **3** on the left and right around on the pin points.

Before fastening:
- ▶ Check the position of the spring retainers and correct, if necessary.
- ▶ Fasten the textile type fastening equipment **3** on the upper pin points **P1** between the end section **1** and the pinned components **2**.
- ▶ Lift the lattice jib and relieve the pins on the angle adjustment **P7**.
- ▶ Unpin the angle adjustment **P7**, see Crane operating instructions, chapter 5.03.
- ▶ Set and pin a New angle on the angle adjustment **P7**, see Crane operating instructions, chapter 5.03.
- ▶ Lower the lattice jib.

After lowering:
- ▶ Remove the textile type fastening equipment **3**.

14.9.8 Loading the preassembled lattice jib

For loading the lattice jib, observe the following:
- The lattice jib has been preassembled.
- Use textile type fastening equipment.
- Loop the textile type fastening equipment on the left and right around on the pin points.

Before fastening:
- ▶ Check the position of the spring retainers and correct, if necessary.
- ▶ Fasten the preassembled lattice jib according to the fastening points in the Crane operating instructions, chapter 5.03.

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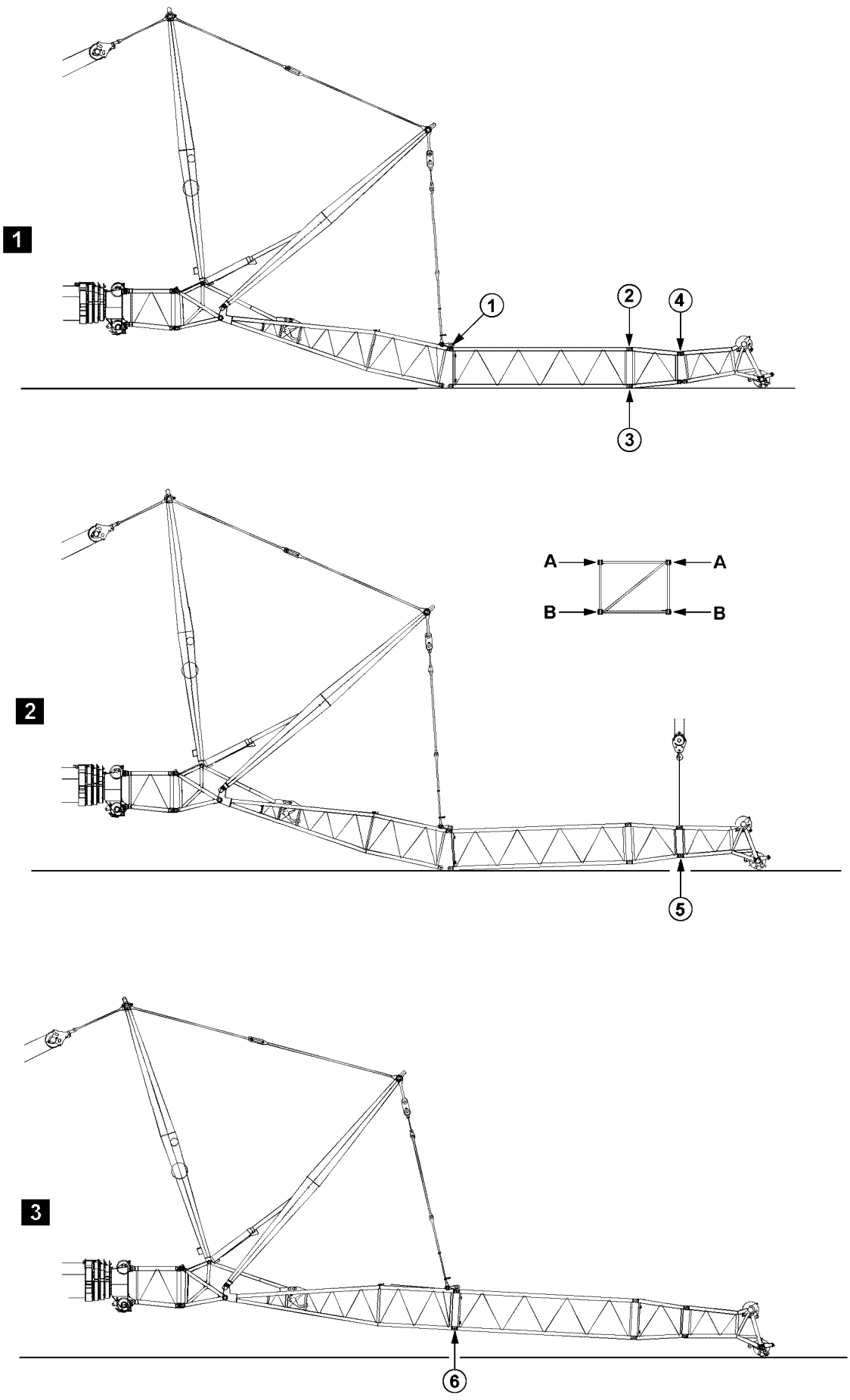

Fig.197718: Example for cranes with telescopic boom

14.10 Assembling / disassembling the lattice sections on telescopic cranes with a luffing lattice jib

14.10.1 Assembling the lattice sections on a luffing lattice jib

The illustrations serve as examples. The illustrations may differ depending on the crane.

WARNING
Danger of fatal injury when assembling auxiliary booms!
If the pins are not pinned in the given sequence, then lattice sections may suddenly fold down or fall down.
Death, severe bodily injuries, property damage.
▶ Pins must be pinned in the order specified.

▶ Pin and secure pins at both sides (level **A**) at point **1**, illustration **1**.
▶ Pin and secure pins at both sides (level **A**) at point **2**, illustration **1**.
▶ Pin and secure pins at both sides (level **B**) at point **3**, illustration **1**.
▶ Pin and secure pins at both sides (level **A**) at point **4**, illustration **1**.
▶ Close the end section with the auxiliary crane, illustration **2**.
▶ Pin and secure pins at both sides (level **B**) at point **5**, illustration **2**.
▶ Lift the lattice sections, illustration **3**.
▶ Pin and secure pins at both sides (level **B**) at point **6**, illustration **3**.

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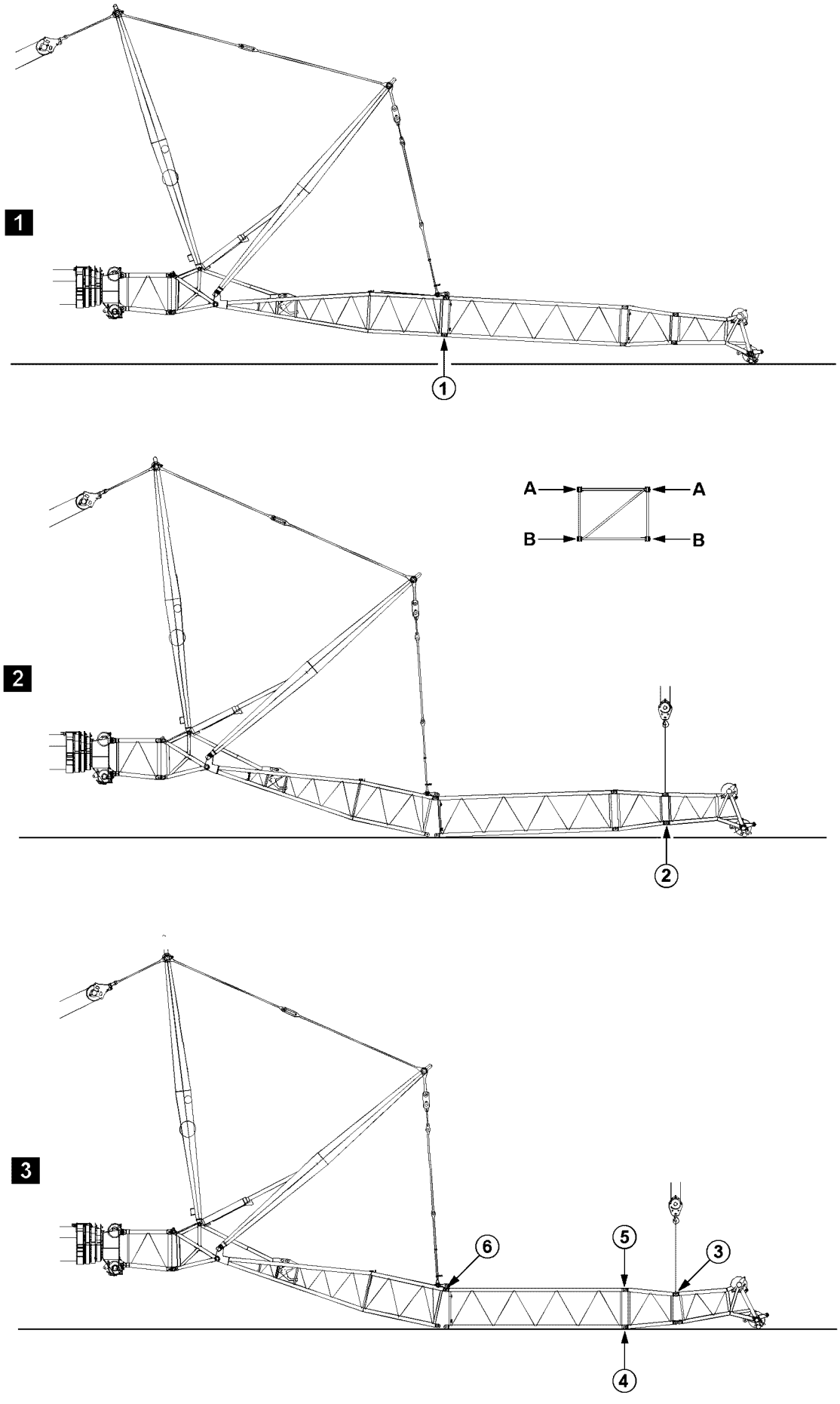

Fig.197719: Example for cranes with telescopic boom

14.10.2 Disassembling the lattice sections on a luffing lattice jib

The illustrations serve as examples. The illustrations may differ depending on the crane.

WARNING
Danger of fatal injury when disassembling auxiliary booms!
If the pins are not unpinned in the given sequence, then lattice sections may suddenly fold down or fall down.
Death, severe bodily injuries, property damage.
▶ Pins must be unpinned in the order specified.

▶ Luff the boom down until the end section touches the ground slightly, illustration **1**.
▶ Guy the boom with NA-frame I, illustration **1**.
▶ Release and unpin the pins on both sides (level **B**) at point **1**, illustration **1**.
▶ Open the boom with the NA-frame I and completely take down the boom, illustration **2**.
▶ Lift the end section with the auxiliary crane, illustration **2**.
▶ Release and unpin the pins on both sides (level **B**) at point **2**, illustration **2**.
▶ Release and unpin the pins on both sides (level **A**) at point **3**, illustration **3**.
▶ Release and unpin the pins on both sides (level **B**) at point **4**, illustration **3**.
▶ Release and unpin the pins on both sides (level **A**) at point **5**, illustration **3**.
▶ Release and unpin the pins on both sides (level **A**) at point **6**, illustration **3**.

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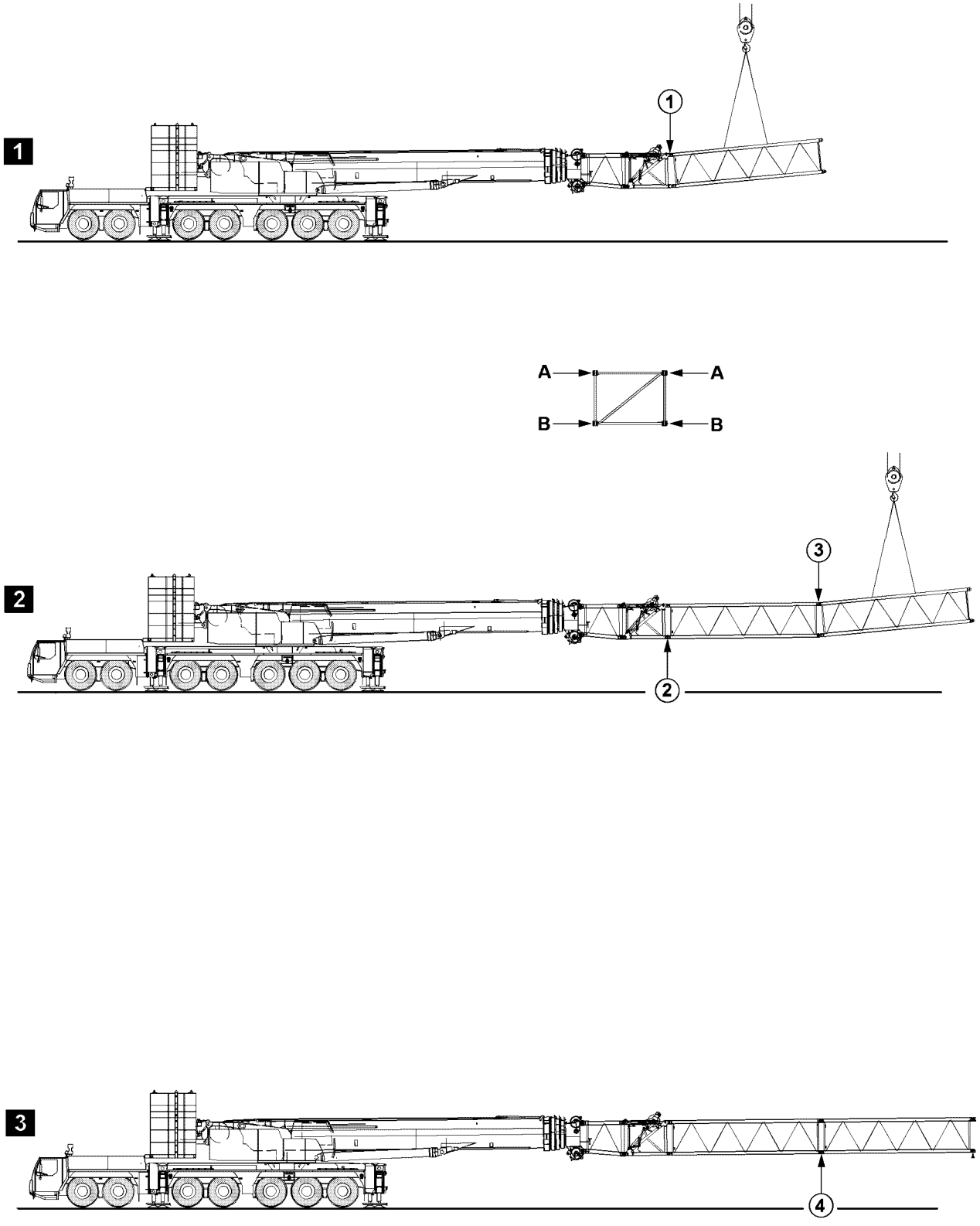

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Fig.197705: Example for cranes with telescopic boom

14.11 Assembling / disassembling the lattice sections on telescopic cranes with an auxiliary boom, with an auxiliary crane

14.11.1 Assembling the lattice sections on an auxiliary boom with an auxiliary crane

The illustrations serve as examples. The illustrations may differ depending on the crane.

WARNING
Danger of fatal injury when assembling auxiliary booms!
If the pins are not pinned in the given sequence, then lattice sections may suddenly fold down or fall down.
Death, severe bodily injuries, property damage.
▶ Pins must be pinned in the order specified.

▶ Pin and secure pins at both sides (level **A**) at point **1**, illustration **1**.
▶ Pin and secure pins at both sides (level **B**) at point **2**, illustration **2**.
▶ Pin and secure pins at both sides (level **A**) at point **3**, illustration **2**.
▶ Pin and secure pins at both sides (level **B**) at point **4**, illustration **3**.

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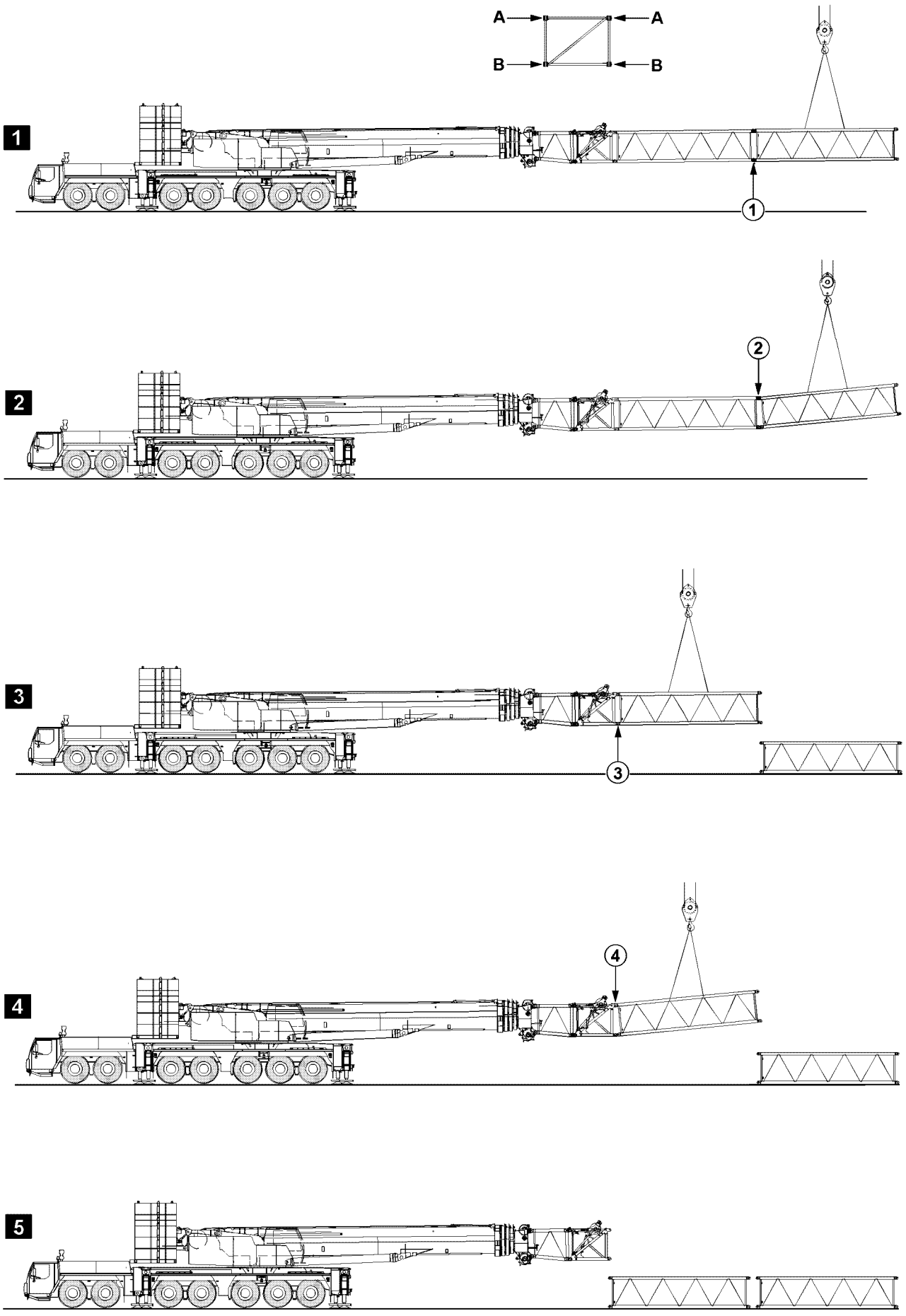

Fig.105510: Example for cranes with telescopic boom

14.11.2 Disassembling the lattice sections on an auxiliary boom with an auxiliary crane

The illustrations serve as examples. The illustrations may differ depending on the crane.

WARNING
Danger of fatal injury when disassembling auxiliary booms!
If the pins are not unpinned in the given sequence, then lattice sections may suddenly fold down or fall down.
Death, severe bodily injuries, property damage.
▶ Pins must be unpinned in the order specified.

▶ Release and unpin the pins on both sides (level **B**) at point **1**, illustration **1**.
▶ Release and unpin the pins on both sides (level **A**) at point **2**, illustration **2**.
▶ Release and unpin the pins on both sides (level **B**) at point **3**, illustration **3**.
▶ Release and unpin the pins on both sides (level **A**) at point **4**, illustration **4**.

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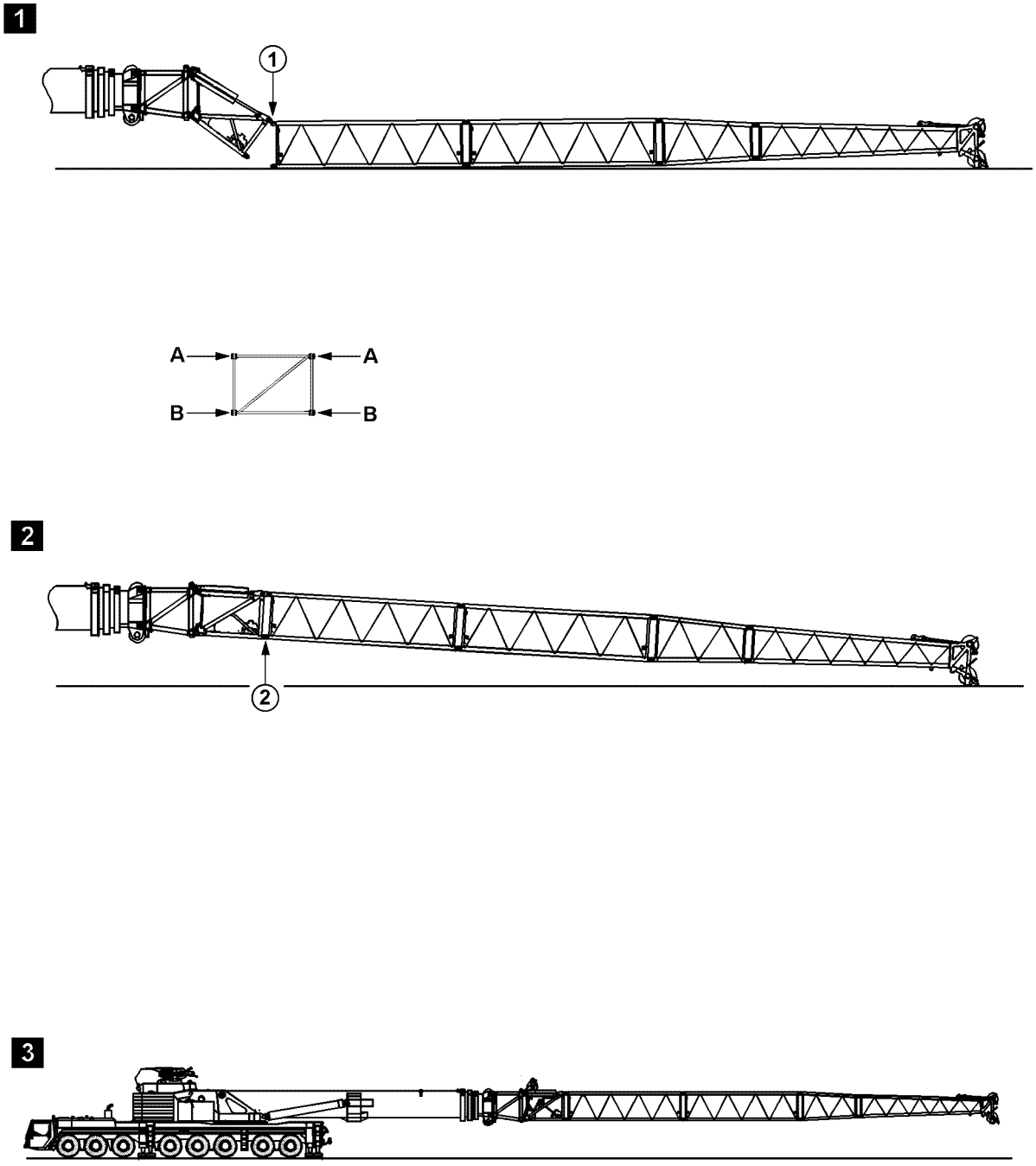

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Fig.197712: Example for cranes with telescopic boom

14.12 Assembling / disassembling the lattice sections on telescopic cranes with an auxiliary boom, without an auxiliary crane

14.12.1 Assembling the lattice sections on an auxiliary boom without an auxiliary crane

The illustrations serve as examples. The illustrations may differ depending on the crane.

WARNING
Danger of fatal injury when assembling auxiliary booms!
If the pins are not pinned in the given sequence, then lattice sections may suddenly fold down or fall down.
Death, severe bodily injuries, property damage.
▶ Pins must be pinned in the order specified.

For cranes with hydraulic angle adjustment and self-supporting auxiliary boom, the assembly / disassembly of additional lattice sections may be performed using the crane itself.

In order to do so, proceed as follows.

▶ Assemble the lattice sections to the required length.
▶ Pin and secure pins at both sides (level **A**) at point **1**, illustration **1**.
▶ Close the auxiliary boom until the pins can be pinned at point **2**, illustration **2**.
▶ Pin and secure pins at both sides (level **B**) at point **2**, illustration **2**.

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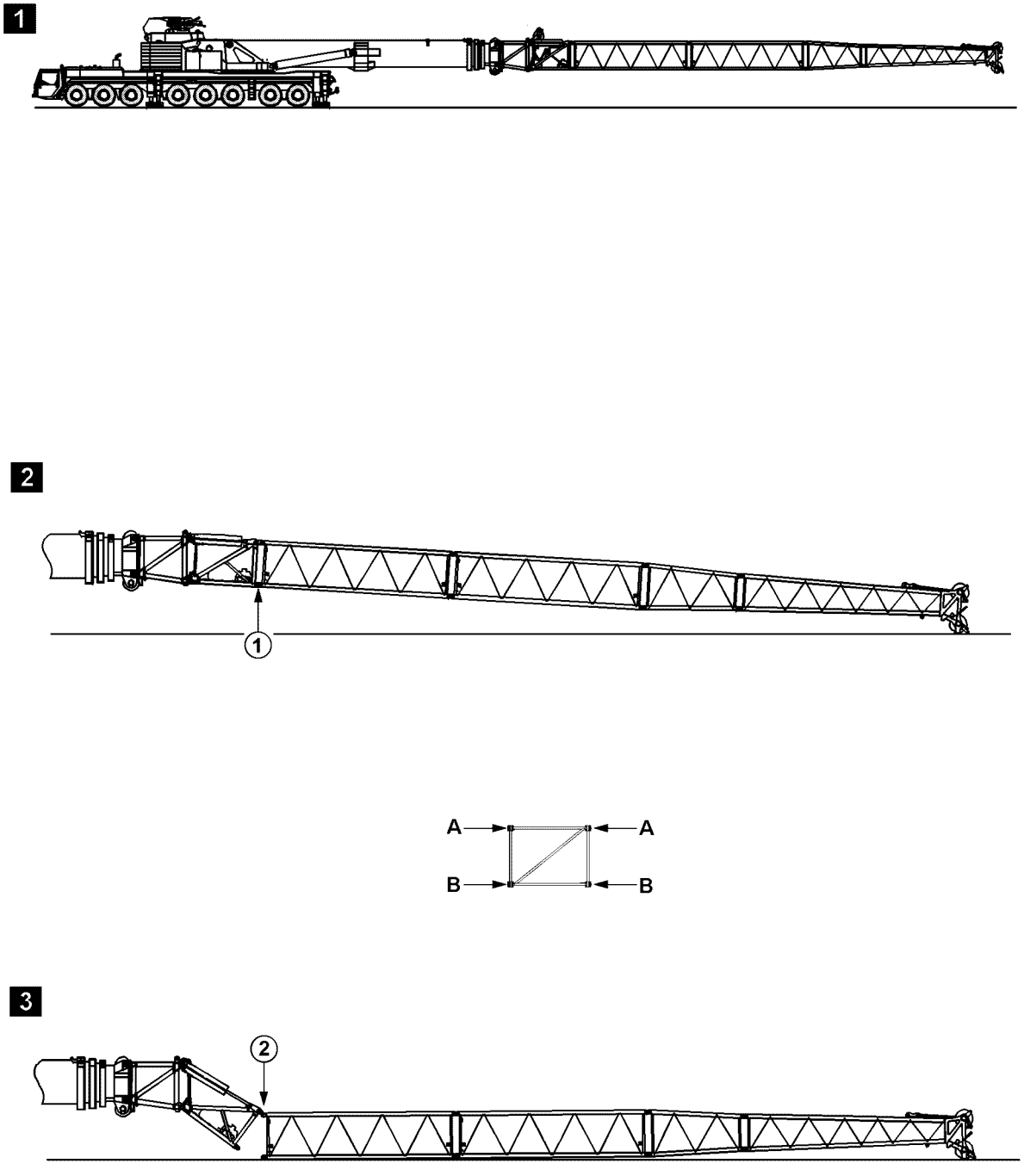

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Fig.197713: Example for cranes with telescopic boom

14.12.2 Disassembling the lattice sections on an auxiliary boom without an auxiliary crane

The illustrations serve as examples. The illustrations may differ depending on the crane.

WARNING
Danger of fatal injury when disassembling auxiliary booms!
If the pins are not unpinned in the given sequence, then lattice sections may suddenly fold down or fall down.
Death, severe bodily injuries, property damage.
▶ Pins must be unpinned in the order specified.

For cranes with hydraulic angle adjustment and self-supporting auxiliary boom, the assembly / disassembly of additional lattice sections may be performed using the crane itself.

In order to do so, proceed as follows.

NOTICE
Damage of hydraulic cylinders on the TF-adapter!
▶ As soon as the lattice jib is placed, stop the luff down movement.
▶ It is prohibited to set down the fixed lattice jib „hard“.

▶ Luff the main boom down until the end section touches the ground slightly, illustration **2**.

If it is not possible to luff down that far:
▶ Adjust the TF-adapter until the end section touches the ground slightly, illustration **2**.
▶ Release and unpin the pins on both sides (level **B**) at point **1**, illustration **2**.

NOTICE
Damage of hydraulic cylinders on the TF-adapter.
▶ As soon as the lattice jib is placed, stop the opening movement.

▶ Open the auxiliary boom until the lattice sections to be removed are laying completely on the ground, illustration **3**.
▶ Release and unpin the pins on both sides (level **A**) at point **2**, illustration **3**.
▶ Completely remove the auxiliary boom.

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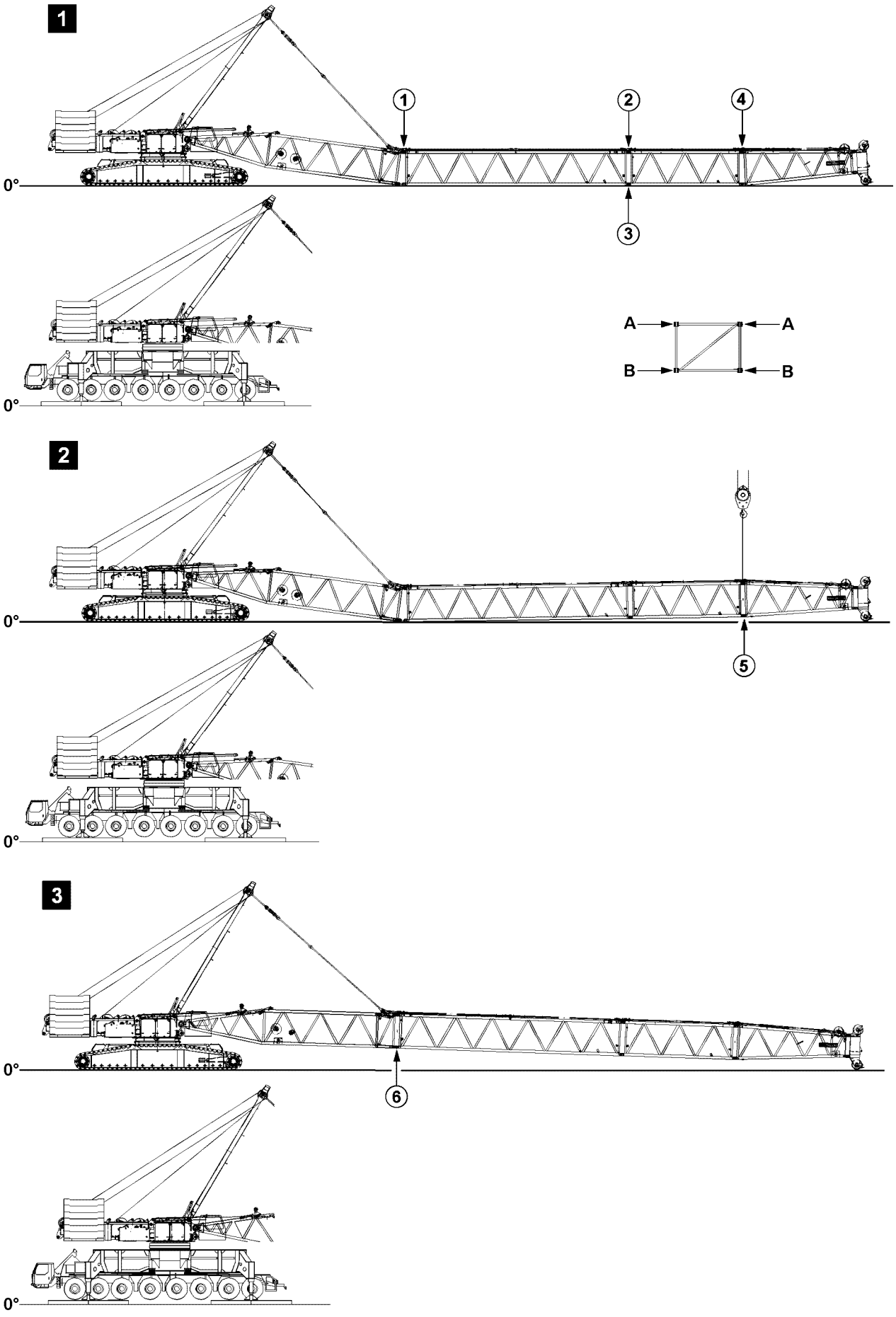

Fig.121633: Example for cranes with lattice mast booms

14.13 Assembling / disassembling of lattice sections for lattice mast cranes

14.13.1 Assembling of lattice sections

The illustrations serve as examples. The illustrations may differ depending on the crane.

WARNING
Danger of fatal injury when assembling booms!
If the pins are not pinned in the given sequence, then lattice sections may suddenly fold down or fall down.
Personnel can be killed or seriously injured.
▶ Pins must be pinned in the order specified.

▶ Pin and secure pins at both sides (level **A**) at point **1**, illustration **1**.
▶ Pin and secure pins at both sides (level **A**) at point **2**, illustration **1**.
▶ Pin and secure pins at both sides (level **B**) at point **3**, illustration **1**.
▶ Pin and secure pins at both sides (level **A**) at point **4**, illustration **1**.
▶ Lift the end section with the auxiliary crane, illustration **2**.
▶ Pin and secure pins at both sides (level **B**) at point **5**, illustration **2**.
▶ Close the boom system with the SA-frame, illustration **3**.
▶ Pin and secure pins at both sides (level **B**) at point **6**, illustration **3**.

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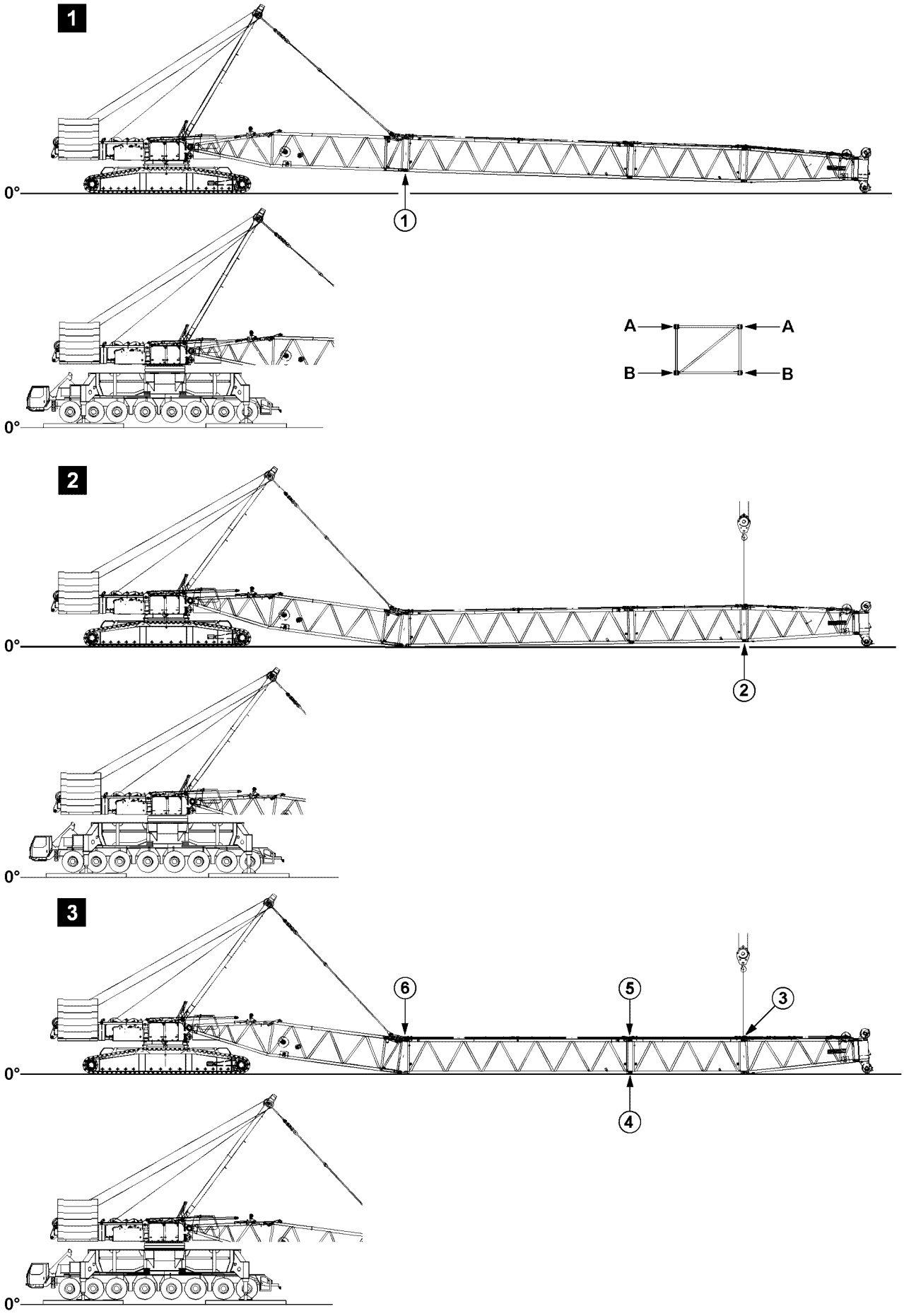

Fig.121634: Example for cranes with lattice mast booms

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14.13.2 Disassembling of lattice sections

The illustrations serve as examples. The illustrations may differ depending on the crane.

WARNING
Danger of fatal injury when disassembling booms!
If the pins are not unpinned in the given sequence, then lattice sections may suddenly fold down or fall down.
Personnel can be killed or seriously injured.
- ▶ Make sure that the SA-frame guying is tensioned before the pins are unpinned at point **1**, see illustration **1**.
- ▶ Pins must be unpinned in the order specified.

- ▶ Luff the boom down until the end section touches the ground slightly, illustration **1**.
- ▶ Guy the boom with SA-frame, illustration **1**.
- ▶ Release and unpin the pins on both sides (level **B**) at point **1**, illustration **1**.
- ▶ Open the boom system with the SA-frame, illustration **2**.
- ▶ Take the lattice sections down completely, illustration **2**.
- ▶ Lift the end section with the auxiliary crane, illustration **2**.
- ▶ Release and unpin the pins on both sides (level **B**) at point **2**, illustration **2**.
- ▶ Release and unpin the pins on both sides (level **A**) at point **3**, illustration **3**.
- ▶ Release and unpin the pins on both sides (level **B**) at point **4**, illustration **3**.
- ▶ Release and unpin the pins on both sides (level **A**) at point **5**, illustration **3**.
- ▶ Release and unpin the pins on both sides (level **A**) at point **6**, illustration **3**.

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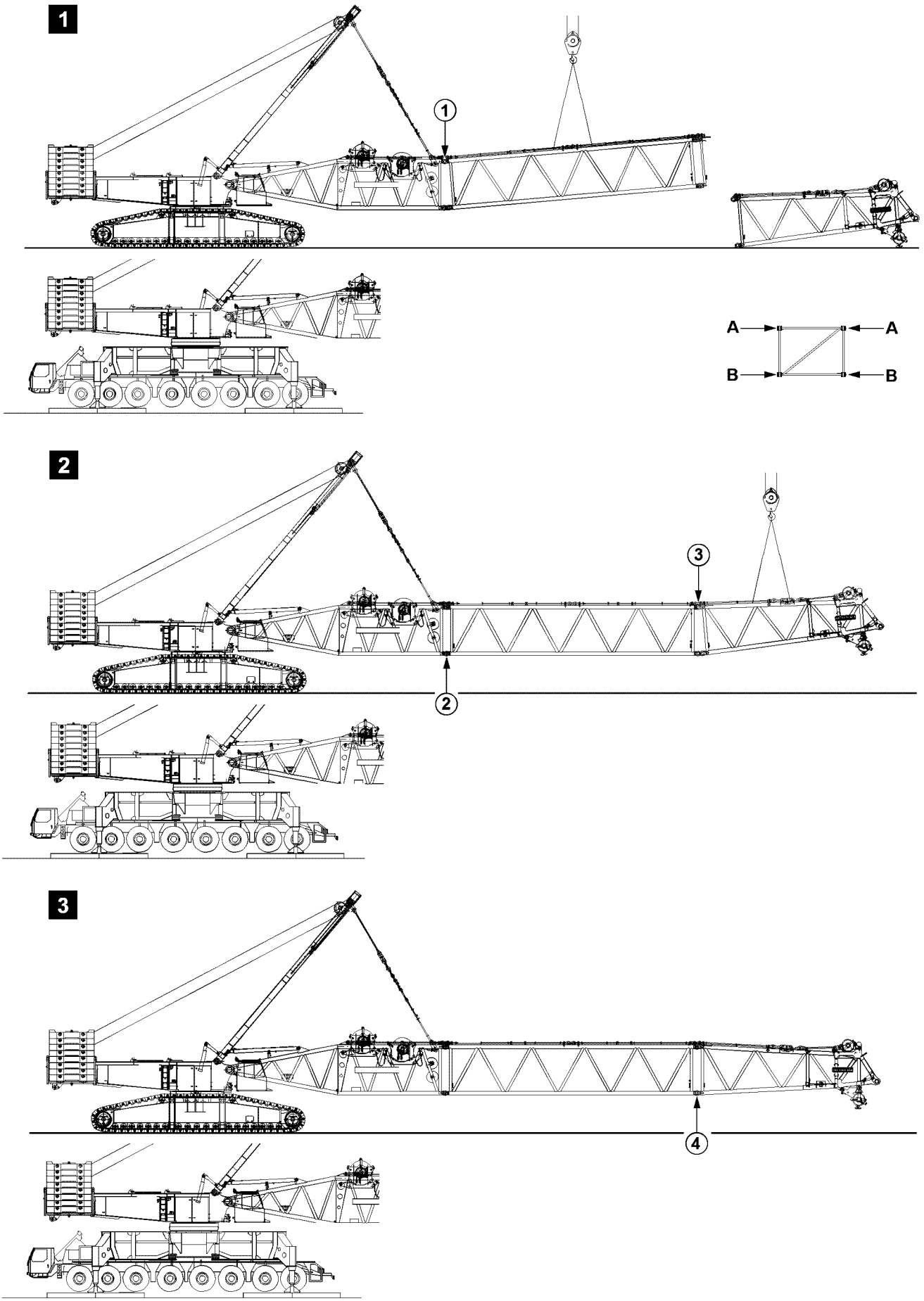

Fig.198182: Example for cranes with lattice mast booms

14.14 Flying assembly / disassembly of lattice sections

14.14.1 Flying assembly of lattice sections

The illustrations serve as examples. The illustrations may differ depending on the crane.

WARNING
Danger of fatal injury when assembling booms!
If the pins are not pinned in the given sequence, then lattice sections may suddenly fold down or fall down.
Personnel can be killed or seriously injured.
▶ Pins must be pinned in the order specified.

▶ Pin and secure pins at both sides (level **A**) at point **1**, illustration **1**.
▶ Pin and secure pins at both sides (level **B**) at point **2**, illustration **2**.
▶ Pin and secure pins at both sides (level **A**) at point **3**, illustration **2**.
▶ Pin and secure pins at both sides (level **B**) at point **4**, illustration **3**.

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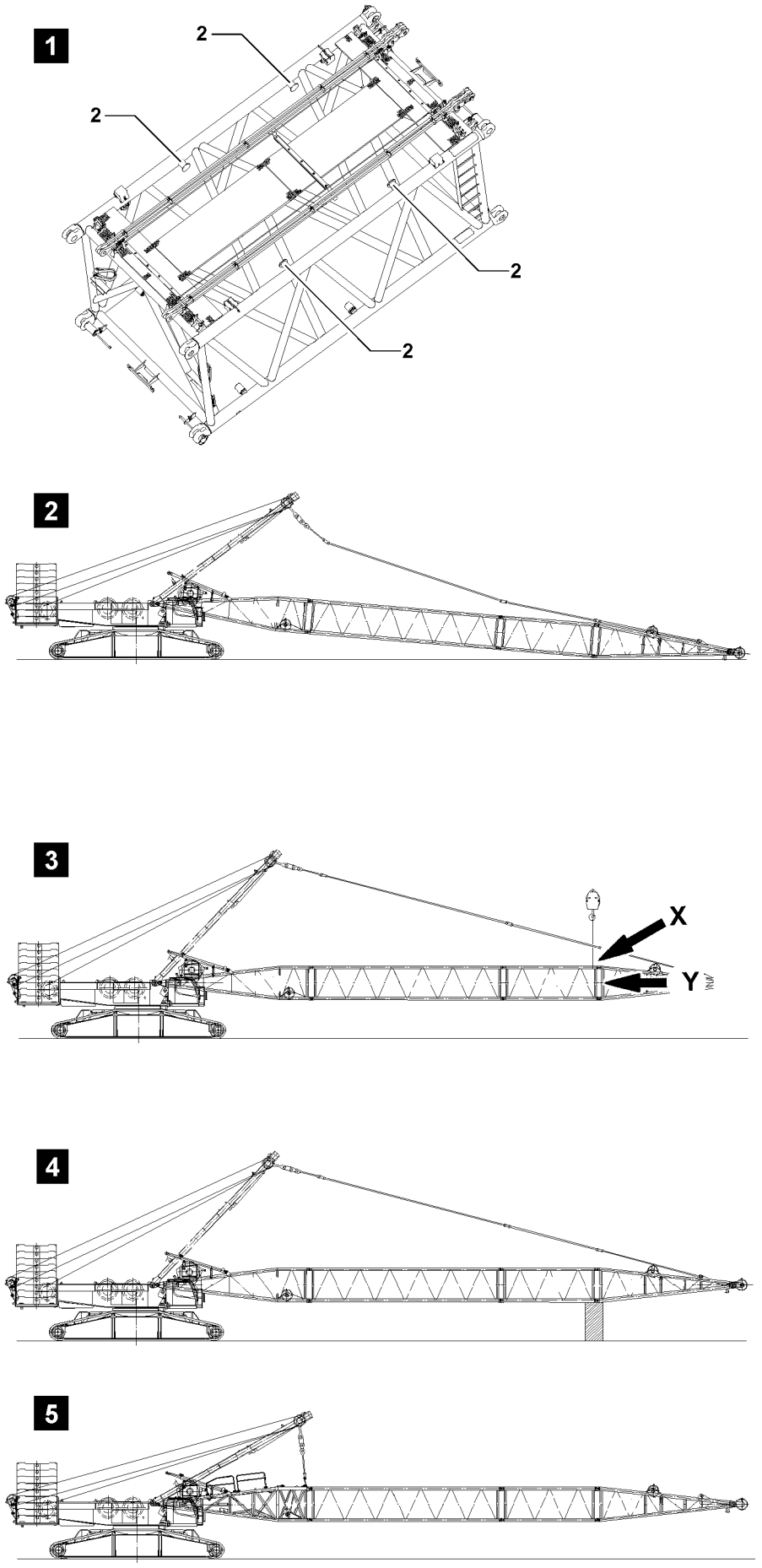

Fig.111448: Guying the pivot section with the SA-frame

14.14.2 Flying disassembly of lattice sections

The illustrations serve as examples. The illustrations may differ depending on the crane.

The flying disassembly of lattice sections can be used on:
– Derrick boom
– Main boom

Make sure that the following prerequisite is met:
– Before guying the pivot section, secure the boom properly to prevent it from falling down!

Guying the pivot section in flying mode with the SA-frame

There are three ways to change the guying point for flying disassembly:
– Take down the boom on the ground.
– Secure the boom with the auxiliary crane.
– Support the boom.

▶ Take down the boom on the ground, see illustration **2**.
or

WARNING
Lattice section incorrectly attached!
If the fastening equipment is attached on the bitts **2** when securing the boom, then the bitts will be overloaded. The lattice section will be damaged.
The boom can fall down.
Personnel can be severely injured or killed.

If an auxiliary crane is used to secure the boom for flying disassembly:
▶ Do **not** fasten the lattice section on the bitts **2**, see illustration **1**.
▶ Attach the fastening equipment in the area of point **P1** on both sides on the lattice section, see detail **X**.
▶ Make sure that the long fastening equipment is used, so that the angle between the cross section of the lattice section and guyed fastening equipment is at least 60°, see detail **Y**.

Secure the boom with the auxiliary crane, see illustration **3**.
or

WARNING
Falling boom!
If the boom is not properly and securely supported from below, then the boom can fall down.
▶ Support the boom properly and safely with suitable material.

Support the boom, see illustration **4**.

Result:

– The guy rods can be disassembled.

▶ Take down, secure and disassemble the guy rods.
▶ Pin and secure the guy rods SA-frame on the pivot section.
▶ Tighten the guy rods SA-frame until the boom is in horizontal position.

Result:

– Pivot section is guyed in flying mode with the SA-frame, see illustration **5**.
– The lattice sections can be disassembled in flying mode.

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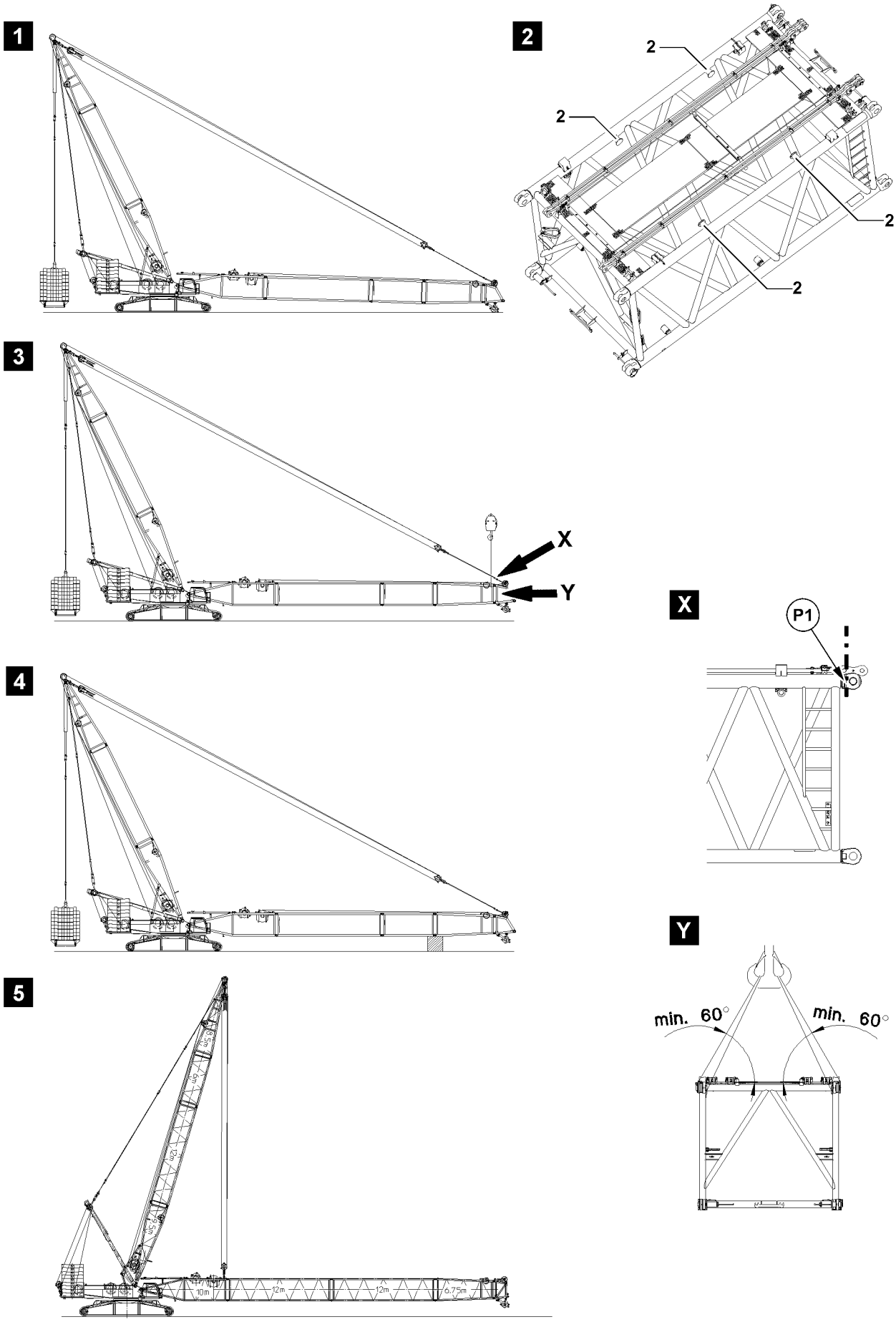

Fig.111449: Guying the pivot section with the derrick boom

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Guying the pivot section in flying mode with the derrick boom

There are three ways to change the guying point for flying disassembly:
- Take down the boom on the ground.
- Secure the boom with the auxiliary crane.
- Support the boom.

▶ Take down the boom on the ground, see illustration **1**.
or

WARNING
Lattice section incorrectly attached!
If the fastening equipment is attached on the bitts **2** when securing the boom, then the bitts will be overloaded. The lattice section will be damaged.
The boom can fall down.
Personnel can be severely injured or killed.

If the auxiliary crane is used to secure the boom for flying disassembly:
▶ Do **not** fasten the lattice section on the bitts **2**, see illustration **2**.
▶ Attach the fastening equipment in the area of point **P1** on both sides on the lattice section, see detail **X**.
▶ Make sure that the long fastening equipment is used, so that the angle between the cross section of the lattice section and guyed fastening equipment is at least 60°, see detail **Y**.

Secure the boom with the auxiliary crane, see illustration **3**.
or

WARNING
Falling boom!
If the boom is not properly supported from below, then the boom can fall down.
▶ Support the boom properly and safely with suitable material.

Support the boom, see illustration **4**.

Result:

- The guy rods can be disassembled.

▶ Take down, secure and disassemble the guy rods.
▶ Pin and secure the luffing pulley block on the pivot section.
▶ Tighten the control rope until the boom is in horizontal position.

Result:

- Pivot section is guyed in flying mode with the derrick boom, see illustration **5**.
- The lattice sections can be disassembled in flying mode.

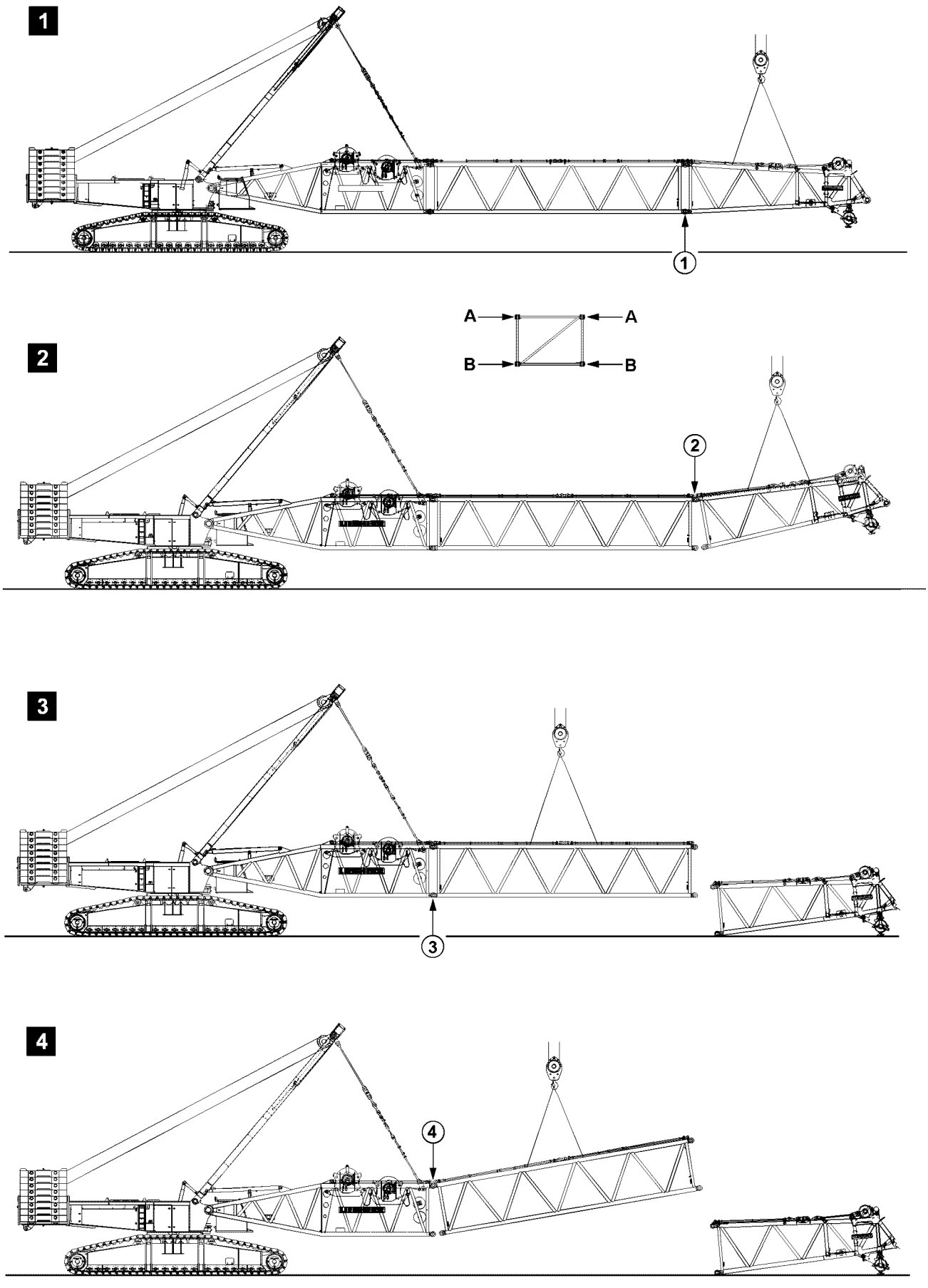

Fig.105511: Example for cranes with lattice mast booms

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Unpinning the lattice components

WARNING
Danger of fatal injury when disassembling booms!
If the pins are not unpinned in the given sequence, then lattice sections may suddenly fold down or fall down.
Personnel can be killed or seriously injured.
▶ Pins must be unpinned in the order specified.

▶ Release and unpin the pins on both sides (level **B**) at point **1**, illustration **1**.
▶ Release and unpin the pins on both sides (level **A**) at point **2**, illustration **2**.
▶ Release and unpin the pins on both sides (level **B**) at point **3**, illustration **3**.
▶ Release and unpin the pins on both sides (level **A**) at point **4**, illustration **4**.

14.15 Assembling / disassembling of boom systems for supporting on ascending terrain (assembly / disassembly schematic)

Note
▶ The following assembly steps are simplified and are examples and may not match your crane exactly.

WARNING
Danger of fatal injury when assembling / disassembling booms!
If the pins are not pinned / unpinned in the specified sequence, then lattice sections may suddenly fold down or fall down.
Personnel can be killed or seriously injured.
▶ Pin / unpin pins in the specified sequence, see section „Assembly of lattice sections“.
▶ Observe all safety technical notes in section „Assembly / disassembly“.
▶ Make sure that there are no persons within the danger zone.

WARNING
Horizontal movement of the boom!
▶ Make sure that there are no persons within the danger zone.

14.15.1 Assembling of boom systems on ascending terrain

Make sure that the following prerequisites are met:
– An auxiliary crane with sufficient load bearing capacity is available.

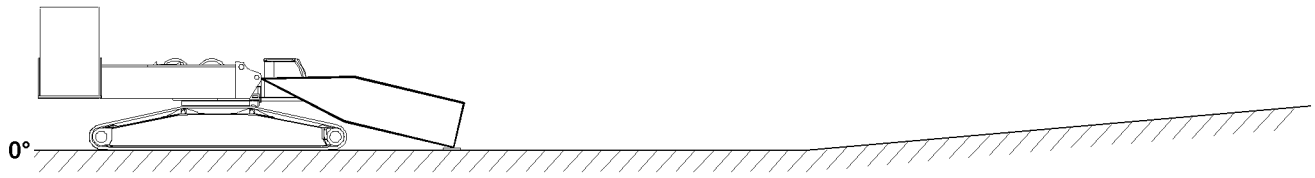

Fig.121635: Boom - pivot section installed on turntable and placed on the ground

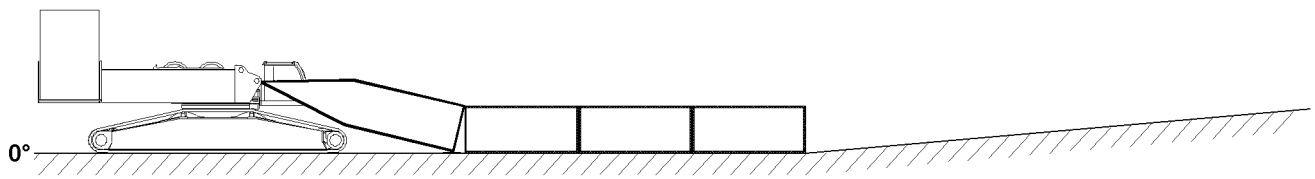

Fig.121636: Boom - intermediate sections installed on boom - pivot section and placed on the ground

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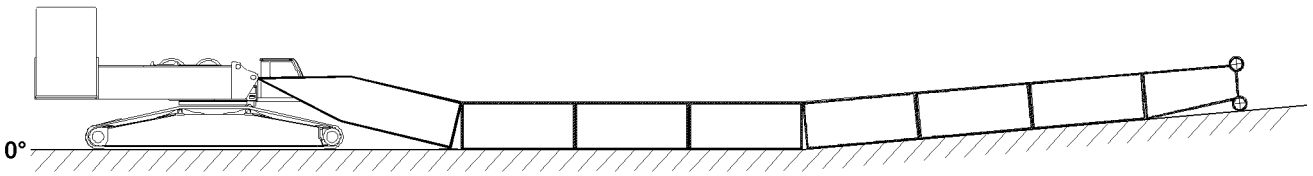

Fig.121637: Boom - intermediate sections installed and placed in ascending terrain

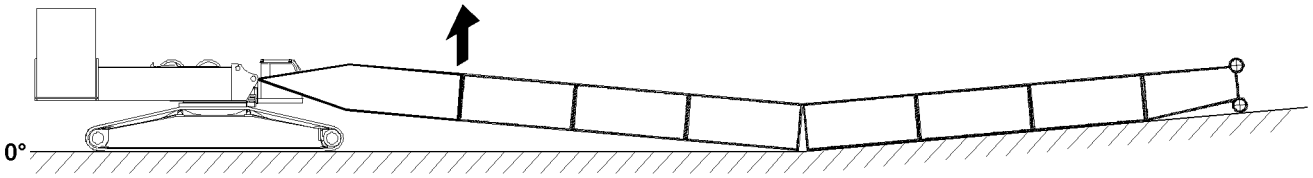

Fig.121638: Lifting and close the boom system in the area of the boom - pivot section

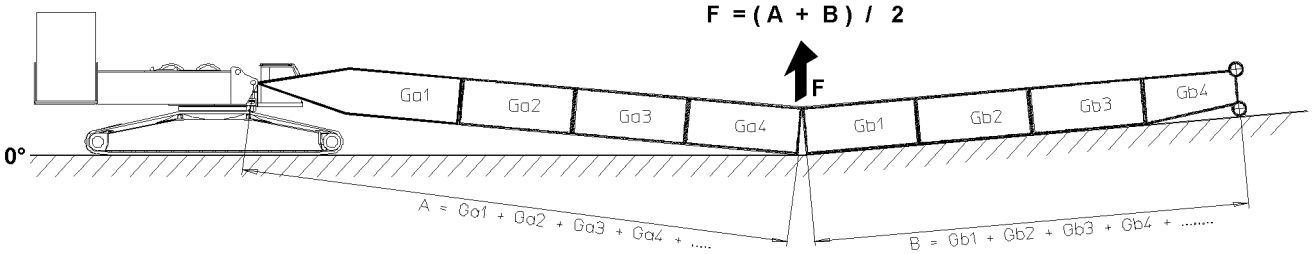

Fig.145512: Calculation of force for the closing procedure of the boom system

Note

- ▶ The abbreviations Ga1, Ga2, ... and Gb1, Gb2, ... are for the weights of the individual lattice sections.
- ▶ The weights of the lattice sections are noted on the welded on weight tags on the lattice sections.

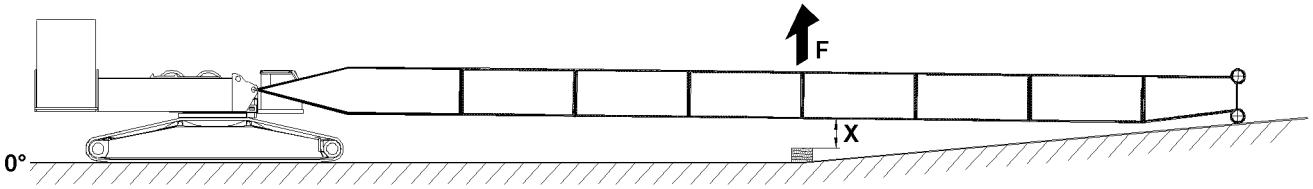

Fig.121639: Lifting and close the boom system // Support the boom system

Note

- ▶ The height of the substructure or dimension **X** is noted on the respective boom assembly chapter, see Crane operating instructions, chapter 5.38 or chapter 5.39.

- ▶ Support the boom system properly after the closing procedure.

14.15.2 Disassembly of boom systems on ascending terrain

Make sure that the following prerequisites are met:

– An auxiliary crane with sufficient load bearing capacity if available.

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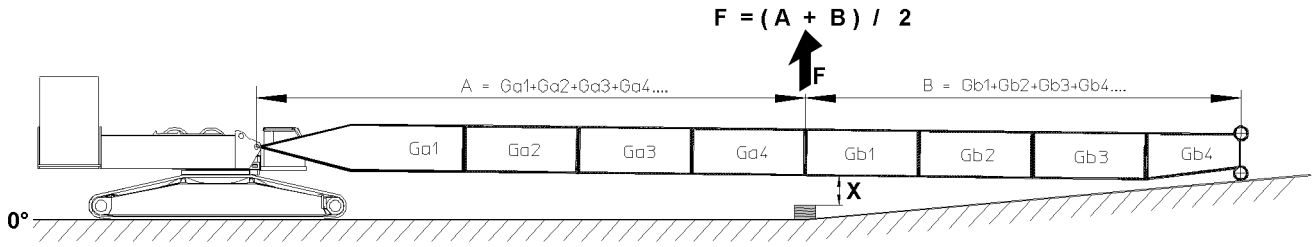

Fig.145513: Calculation of force for opening the boom system // Lift the boom system // Remove the substructure // Open the boom system

Note

- The abbreviations Ga1, Ga2, ... and Gb1, Gb2, ... are for the weights of the individual lattice sections.
- The weights of the lattice sections are noted on the welded on weight tags on the lattice sections.

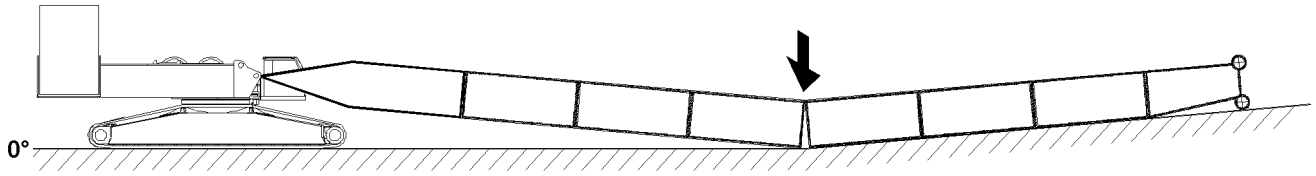

Fig.121657: Taking the boom system down

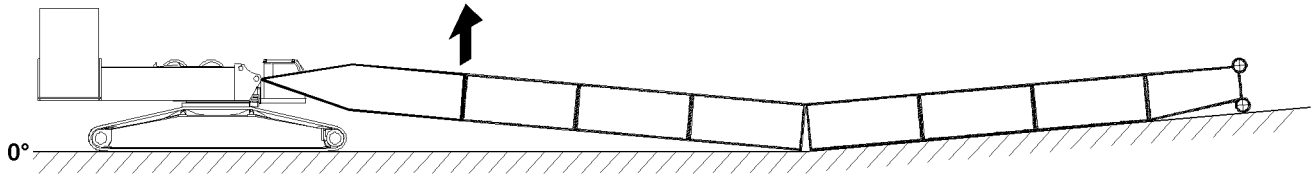

Fig.121652: Lifting and opening the boom system

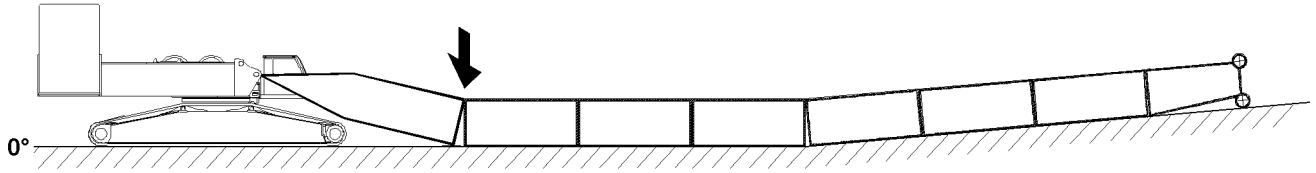

Fig.121653: Taking the boom system down

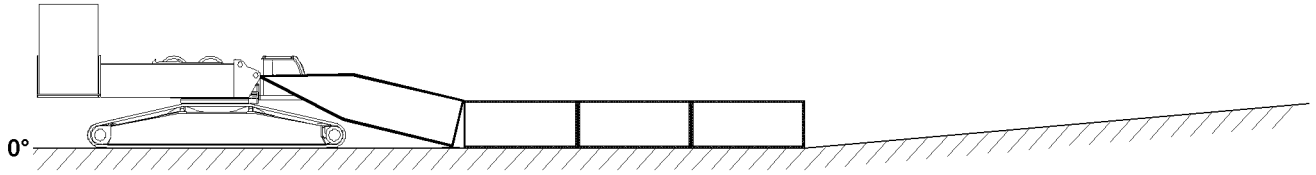

Fig.121636: Disassembling and removing the boom - intermediate sections with the end section

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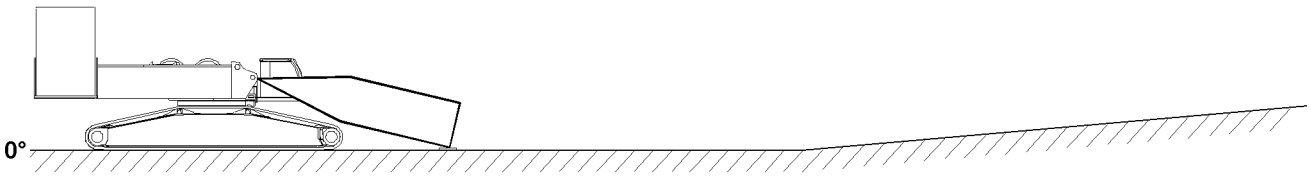

Fig.121635: Disassembling and removing the boom - intermediate sections to the boom - pivot section

▶ Disassemble and remove the boom - pivot section.

14.16 Assembling / disassembling of boom systems for supporting on descending terrain (assembly / disassembly schematic)

Note

▶ The following assembly steps are simplified and are examples and may not match your crane exactly.

WARNING

Danger of fatal injury when assembling / disassembling booms!
If the pins are not pinned / unpinned in the specified sequence, then lattice sections may suddenly fold down or fall down.
Personnel can be killed or seriously injured.

▶ Pin / unpin pins in the specified sequence, see section „Assembly of lattice sections“.
▶ Observe all safety technical notes in section „Assembly / disassembly“.
▶ Make sure that there are no persons within the danger zone.

14.16.1 Assembling of boom systems on descending terrain

Make sure that the following prerequisites are met:
– The lattice sections are properly assembled.
– An auxiliary crane with sufficient load bearing capacity if available.

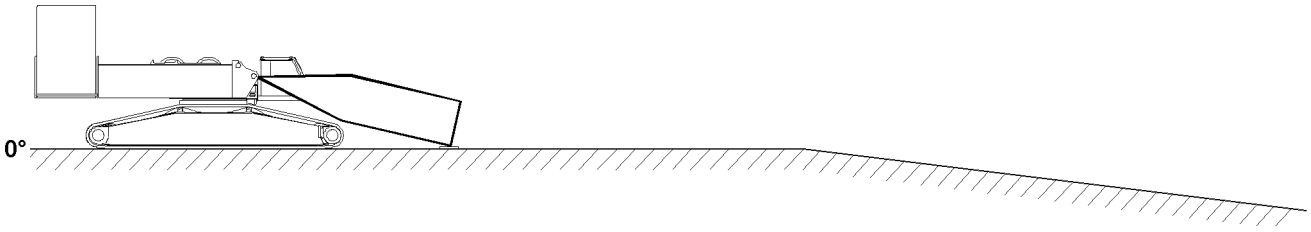

Fig.121640: Boom - pivot section installed on turntable and placed on the ground

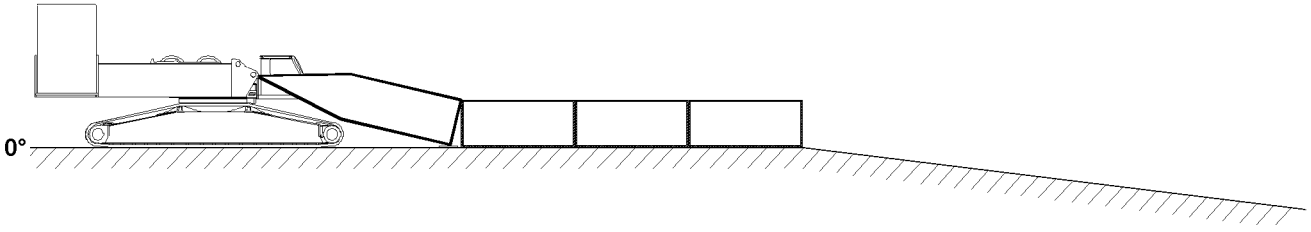

Fig.121641: Boom - intermediate sections installed on boom - pivot section and placed on the ground

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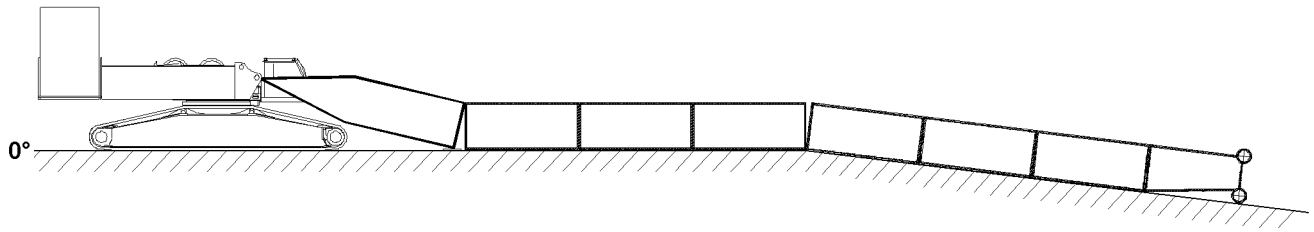

Fig.121642: Boom - intermediate sections installed and placed in descending terrain

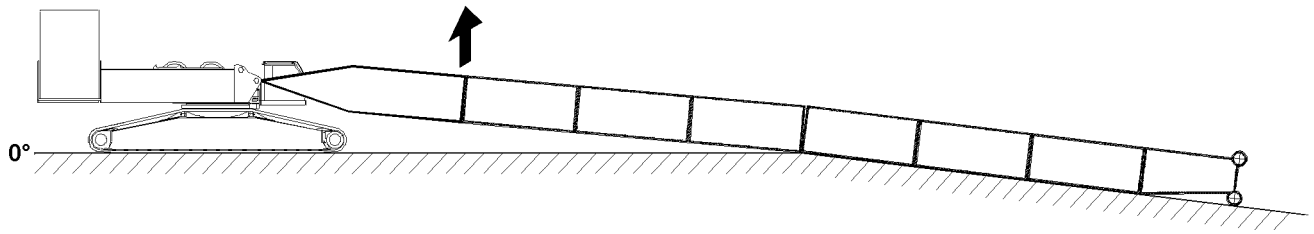

Fig.121643: Lifting and close the boom system in the area of the boom - pivot section

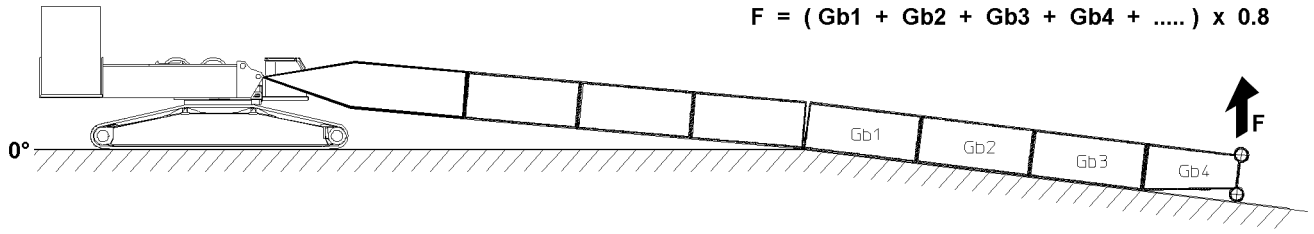

Fig.145514: Calculation of force for the closing procedure of the boom system

Note
- ▶ The abbreviations Gb1, Gb2, ... are for the weights of the individual lattice sections.
- ▶ The weights of the lattice sections are noted on the welded on weight tags on the lattice sections.

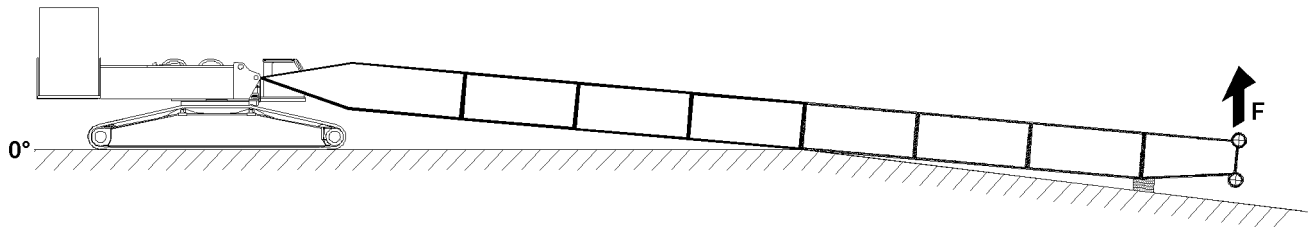

Fig.121644: Lifting and close the boom system // Support the boom system

Note
- ▶ The height of the substructure depends on the lay of the terrain and the resulting incline of the boom system.

- ▶ Support the boom system properly after the closing procedure.

14.16.2 Disassembly of boom systems on descending terrain

Make sure that the following prerequisite is met:
- An auxiliary crane with sufficient load bearing capacity if available.

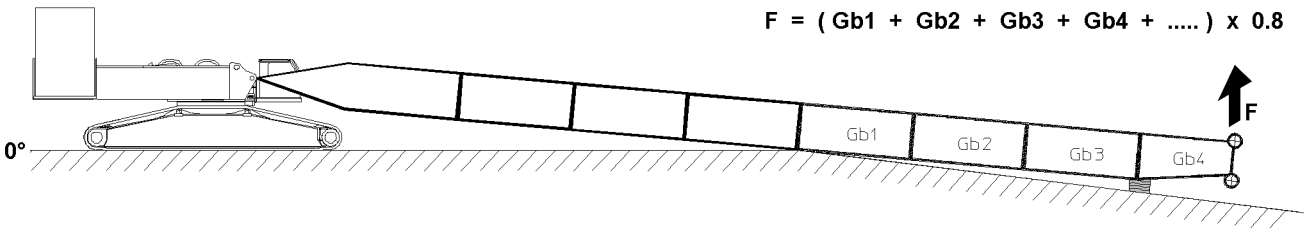

Fig.145515: Calculation of force for opening the boom system // Lift the boom system // Remove the substructure // Open the boom system

Note

- The abbreviations Gb1, Gb2, ... are for the weights of the individual lattice sections.
- The weights of the lattice sections are noted on the welded on weight tags on the lattice sections.

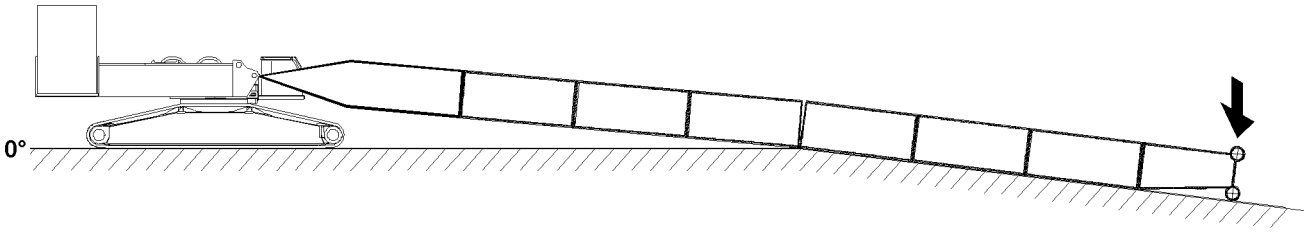

Fig.121658: Taking the boom system down

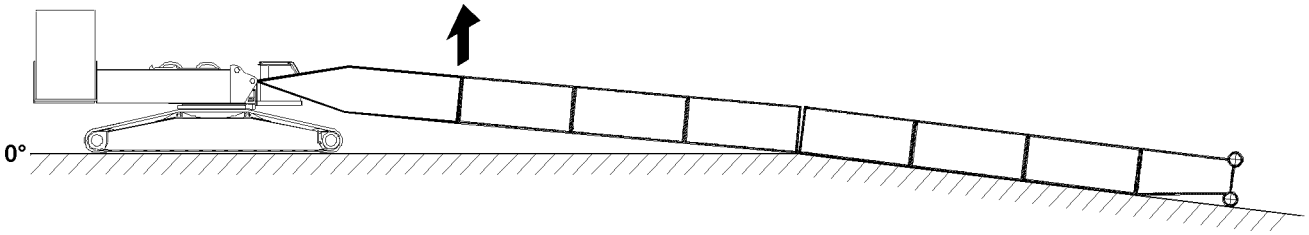

Fig.121655: Lifting and opening the boom system

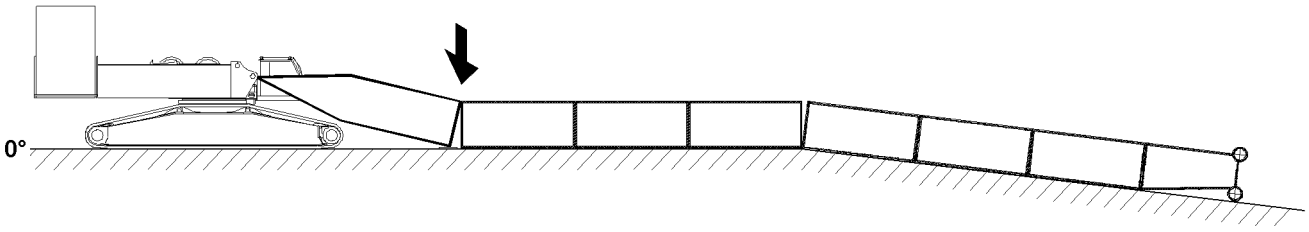

Fig.121656: Taking the boom system down

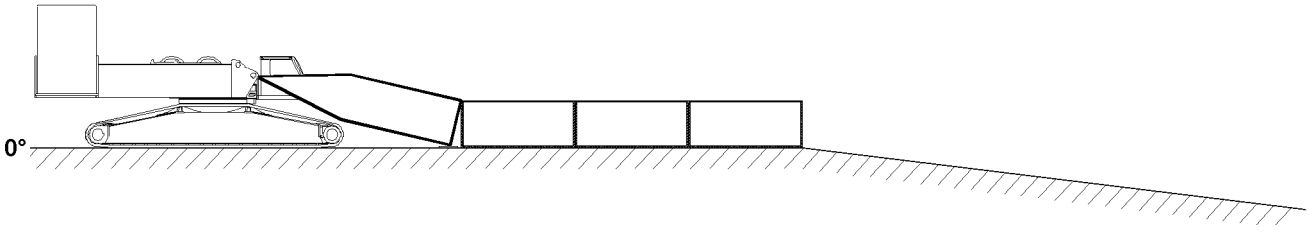

Fig.121641: Disassembling and removing the boom - intermediate sections with the end section

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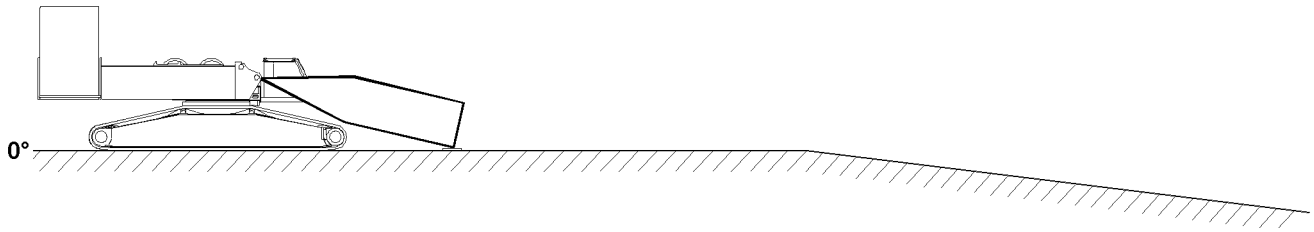

Fig.121640: Disassembling and removing the boom - intermediate sections to the boom - pivot section

▶ Disassemble and remove the boom - pivot section.

15 Erecting / taking down

WARNING
The crane can topple over!
Due to an unforeseen occurrence, for example: Sudden strong wind or storm can lead to dangerous operating situations, up to toppling the crane.
Personnel can be severely injured or killed.
▶ The boom must be able to be placed down at any time with its current equipment, observe the erection and take down charts. Observe the job planner.
▶ The counterweights and / or ballasts required for this must always be in direct vicinity of the crane.
▶ The crane operator must ensure that the required counterweight and / or the required ballast is carried along when driving the crane with the equipment in place and that the boom can be placed down at any time.

WARNING
Danger of fatal injury!
▶ Incorrectly installed or non-functioning limit switches as well as falling parts (pins, cotter pins, ice etc.) can cause accidents.

15.1 Erecting / taking down for mobile cranes

Make sure that the following prerequisites are met:
– The crane is properly supported.
– The crane is horizontally aligned.
– The counterweight has been installed on the turntable according to the load chart or the erection / take down charts.
– In the case of cranes with derrick ballast: The derrick ballast (suspended ballast or ballast trailer ballast) is installed according to the load chart or the erection / take down charts.
– For cranes with a telescopic boom: The telescopic boom is telescoped in all the way.
– The boom has been installed according to the load chart and the Crane operating instructions.
– The hoist rope has been correctly placed in the rope pulleys and prevented from jumping out with the rope retaining pins.
– All limit switches have been correctly assembled and are fully operational.
– All pin connections are secured.
– No persons in the danger zone.
– No loose parts on the boom or the auxiliary boom.
– The exposed rope pulleys are free of snow and ice.
– The boom and its components (limit switches, cable drums, airplane warning light, wind speed sensor etc.) must be kept free of ice and snow.

▶ Check if all prerequisites have been met.

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15.2 Erecting / taking down for crawler cranes

Make sure that the following prerequisites are met:
- Comply with the maximum permissible incline of the crane specified in the load chart manual.
- For cranes with a support: The crane is properly supported.
- For cranes with a support: The crane is horizontally aligned.
- The counterweight has been installed on the turntable according to the load chart.
- The central ballast is installed according to the load chart.
- The counterweight is installed according to the load chart or the erection / take down charts.
- In the case of cranes with derrick ballast: The derrick ballast (suspended ballast or ballast trailer ballast) is installed according to the load chart or the erection / take down charts.
- For cranes with a telescopic boom: The telescopic boom is telescoped in all the way.
- The boom has been installed according to the load chart and the Crane operating instructions.
- The hoist rope has been correctly placed in the rope pulleys and prevented from jumping out with the rope retaining pins.
- All limit switches have been correctly assembled and are fully operational.
- All pin connections are secured.
- No persons in the danger zone.
- No loose parts on the boom or the auxiliary boom.
- The exposed rope pulleys are free of snow and ice.
- The boom and its components (limit switches, cable drums, airplane warning light, wind speed sensor etc.) must be kept free of ice and snow.

▶ Check if all prerequisites have been met.

15.3 Rigging the guy rods on lattice booms on placed down boom system

WARNING
Danger of fatal injury due to damaged guy rods!
If the boom system is placed on the ground or a load bearing substructure in strong wind or longer downtime, the guy rods can be damaged due to wind influence on the boom guying. This wind influenced oscillations can lead to fatigue on the guy rods.
As a result, the guy rods could break or rip off under load - for example when erecting the boom system or in crane operation. The boom system can therefore fall uncontrolled forward onto the ground. Personnel can be severely injured or killed.
- ▶ Make sure that the guy rods are placed completely on the lattice sections and relieved when the boom systems are placed on the ground.
- ▶ Make sure that freely suspended guy rods are rigged on the lattice boom.
- ▶ Make sure that the upper pulley block is rigged on the lattice boom in Derrick operating modes.
- ▶ Make sure, that the guying on the luffing lattice jib is removed on lattice mast cranes.
- ▶ Make sure that the guy rods are inspected before resuming crane operation and that no damage or cracks are present.
- ▶ Make sure that the maintenance intervals of the guy rods are adhered to.

Note
- ▶ In case of strong wind or longer downtimes of the crane, the boom system must be placed on the ground or on a load bearing substructure.
- ▶ The guying must be relieved and the guy rods must be placed on the transport receptacles.
- ▶ The following illustrations are examples and may not match your crane exactly.

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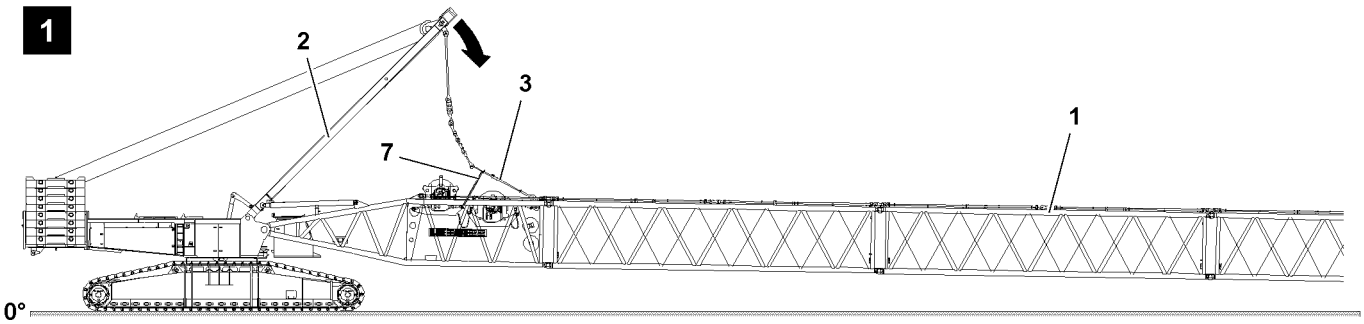

Fig.120722: Guying placed in transport receptacle and SA-frame guying relieved

- ▶ Take the guy rods down on the lattice sections **1**: Luff the SA-frame **2** to the front until the guying is placed completely in the transport receptacles on the lattice sections and the SA-frame guying **3** is relieved, see illustration **1**.
- ▶ To minimize side oscillation of the SA-frame guying **3** due to wind influence: Rig the SA-frame guying **3** with suitable rigging straps / ropes **7** against the boom, see illustration **1**.

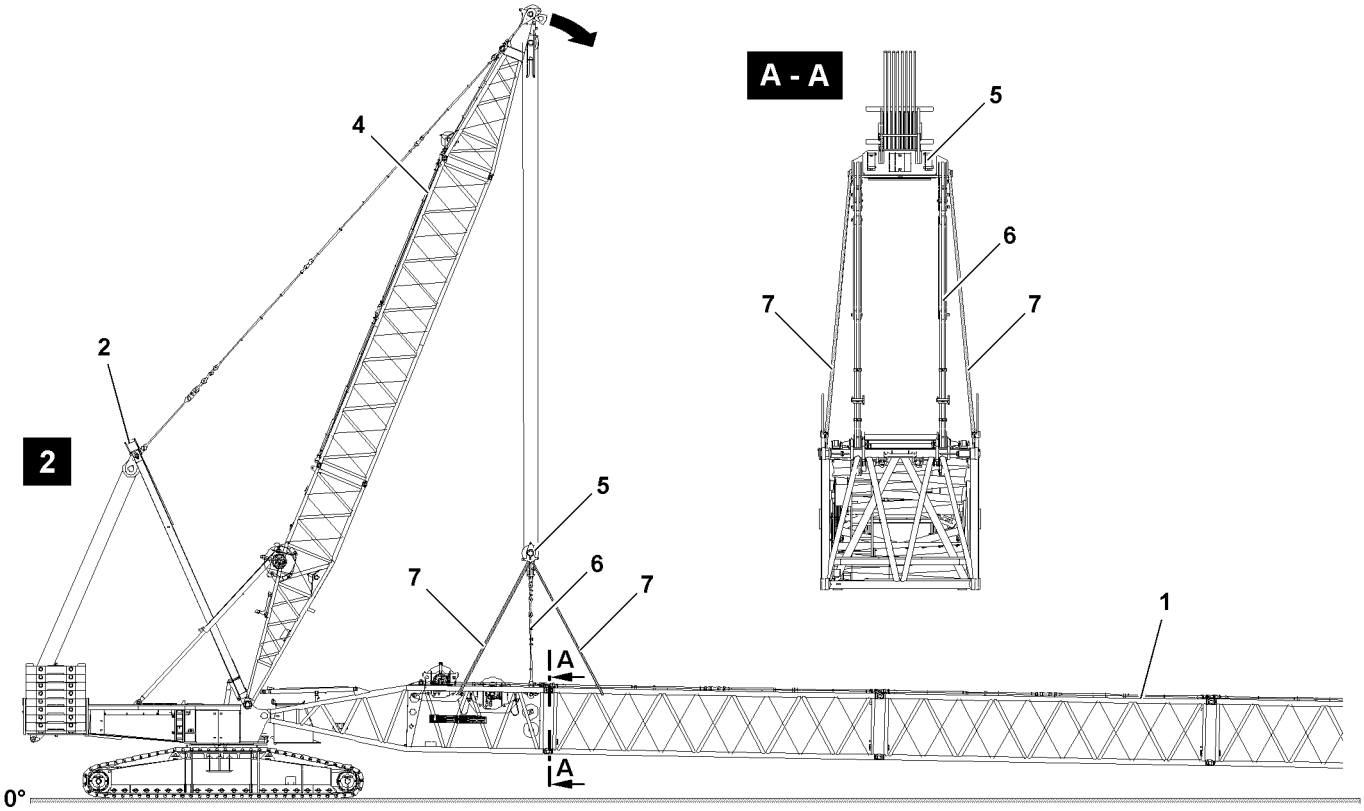

Fig.120771: Guying placed in transport receptacle and upper pulley block rigged against the boom

- ▶ Take the boom system down and - if present - release the derrick guying to the derrick ballast.
- ▶ Take the guy rods down on the lattice sections **1**: Luff the D-boom **4** down to the front until the main boom guying is placed completely in the transport receptacles on the lattice sections and the upper pulley block **5** is positioned over the S-pivot section, see illustration **2**.
- ▶ To minimize side oscillation of the upper pulley block **5** due to wind influence: Rig the upper pulley block **5** with suitable rigging straps / ropes **7** against the boom, see illustration **2**.

For lattice mast cranes with luffing lattice jib the following applies:

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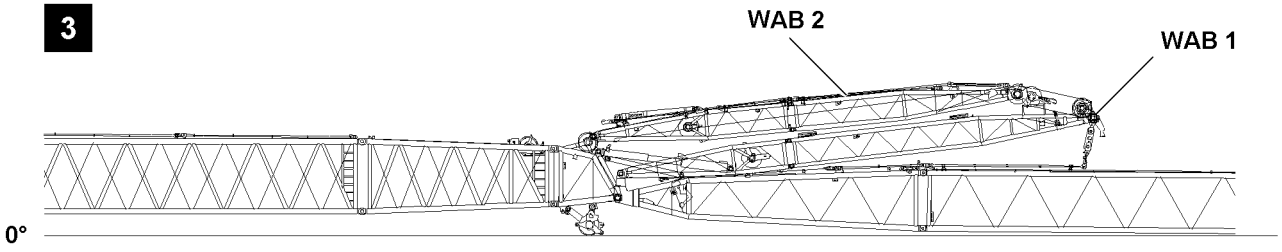

Fig.120821: Guying in transport receptacle(s) and WA-frames placed down to the front (example crane with lattice mast)

WARNING
Danger of accident when removing the W-guying!
When taking down and removing the guying dangerous situations can arise.
▶ Make sure that the danger notes in the respective chapter of the Crane operating instructions are observed.

▶ Remove the guy rods on the luffing lattice jib and take them down into the transport receptacles.
▶ Take the WA-frames (WA-frame 1 **WAB 1** and WA-frame 2 **WAB 2**) down to the front.

For telescopic cranes with luffing lattice jib the following applies:

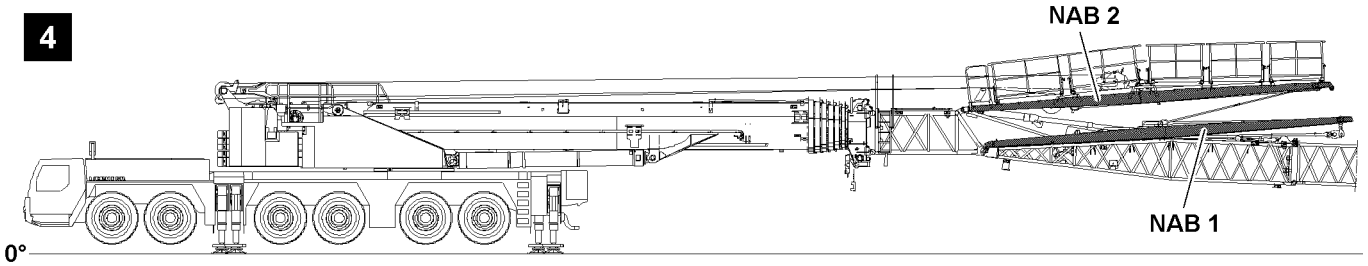

Fig.121261: Guying in transport receptacle(s) and NA-frames placed down to the front (example telescopic crane)

WARNING
Danger of accident when taking the NA-frames down!
When taking the guy rods as well as the NA-frames down dangerous situations can arise.
▶ Make sure that the danger notes in the respective chapter of the Crane operating instructions are observed.

▶ Spool the jib control winch out and take the NA-frames down to the front so that the guy rods are relieved.

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5.02 SA-frame

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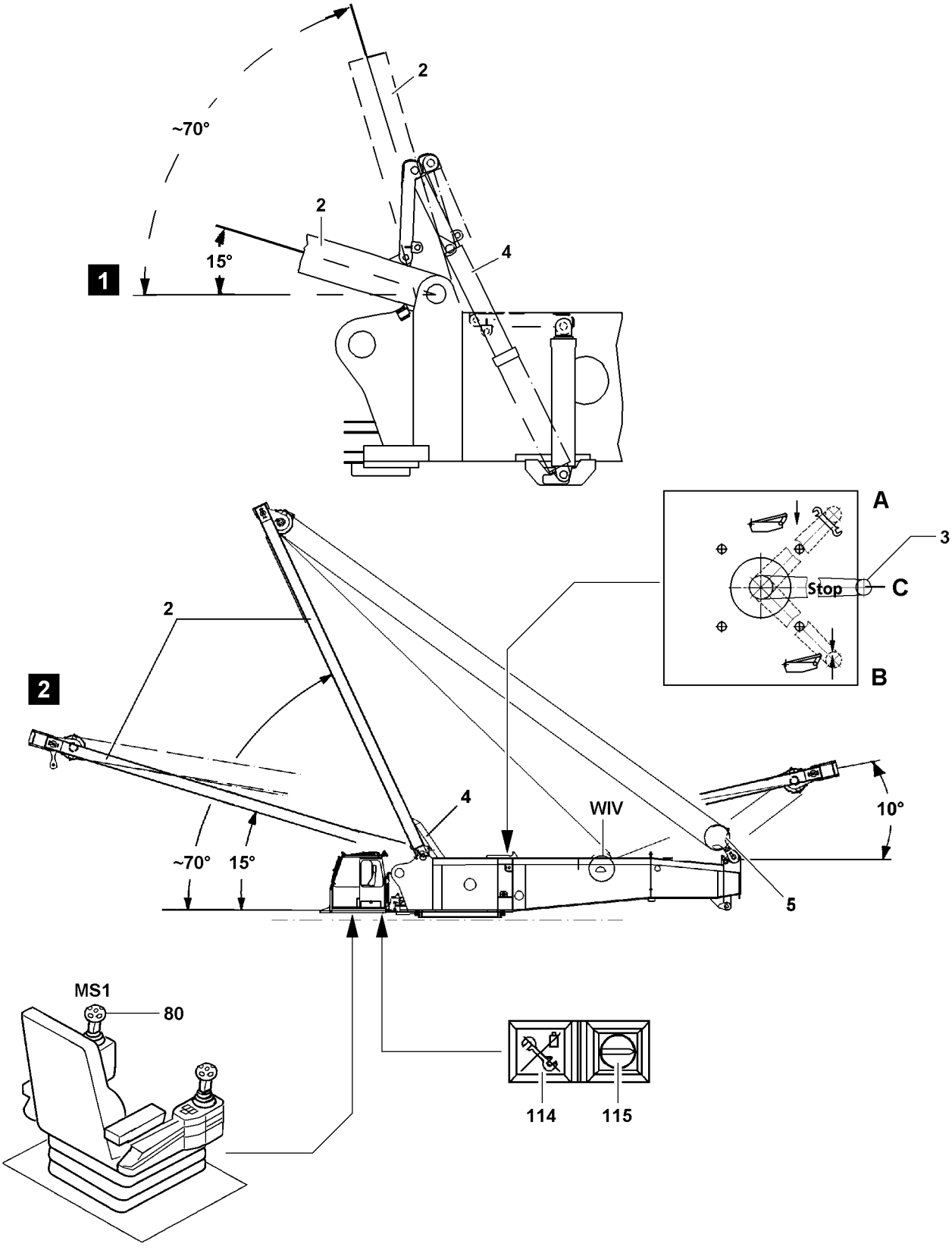

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Fig.120944

1 SA-frame

Note

- The SA-frame is used in assembly operation to install the crawler travel gear, see Crane operating instructions, chapter 3.01!
- In addition, the SA-frame is used in assembly operation for closing boom systems and for guying the boom in flying assembly of lattice sections, see Crane operating instructions, chapter 5.38!

Switch positions of the ball valve **3:**		
Switch position	**Function**	
A	Lower the SA-frame	Transport position
C	SA-frame stop, cylinder stop,	Erection cylinders are blocked
B	Erecting the SA-frame	Assembly and operating position

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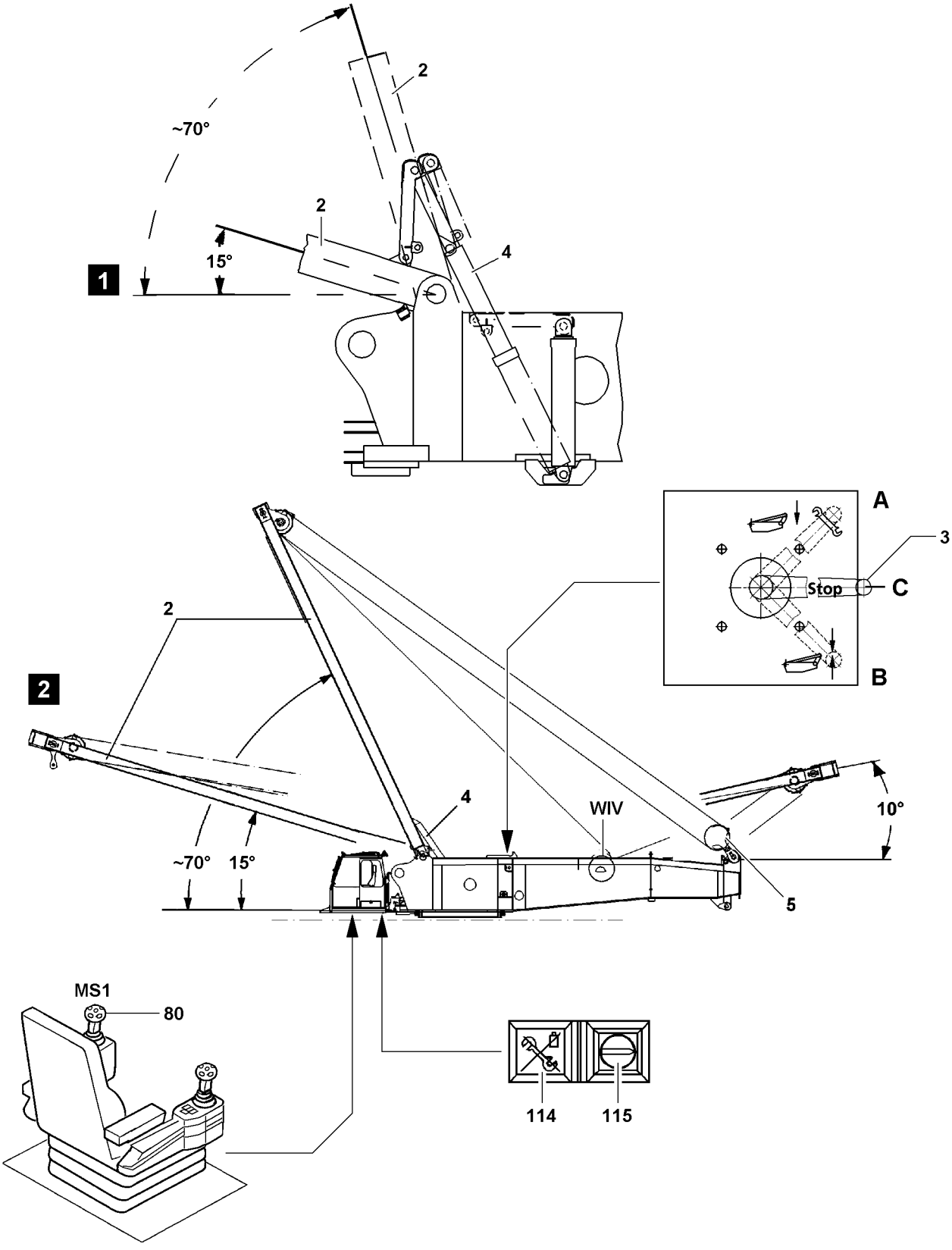

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Fig.120944

1.1 Erecting the SA-frame

1.1.1 Erection procedure

Make sure that the following prerequisites are met:
- The turntable is installed.
- The SA-frame is in transport position.
- Winch 1 and winch 2 are installed in the turntable.
- There is no counterweight on the turntable.
- Winch 4 is reeved on the pulley set of the SA-frame.
- The engine is running.
- Assembly operation is engaged, the assembly icon blinks on the LICCON monitor, see Crane operating instructions, chapter 4.02.
- The crawler assembly key button **115** is actuated, the indicator light in the button **114** lights up.
- Observe the assembly conditions.

Note
▶ When the erection cylinders are extended, the SA-frame is located approx. 70° to the horizontal to the front, illustration **1**!

Note
▶ Due to the own weight of the SA-frame and by spooling out winch 4 simultaneously, the SA-frame is lowered to the front!
▶ After reaching SA-frame position 15°, the „spool out“ movement of winch 4 occurs and an operating error is displayed!
▶ If the minimum pressure of 30 bar falls below in the erection cylinder, the winch 4 is shut off and an operating error is displayed!

WARNING
Independent lowering of the SA-frame!
Due to an incorrect ball valve position during the erection procedure, the SA-frame can lower backward by itself!
Personnel can be severely injured or killed!
It can result in slack rope build-up!
▶ The ball valve **4** must be positioned in position **B** during assembly and crane operation!
▶ Ball valve position **A** „lower“ and ball valve position **C** „stop“ are only permissible when lowering the SA-frame onto the turntable (transport position)!

▶ Set the ball valve **3** into position **B**.
▶ Secure the ball valve **3** in position **B**, for example with a padlock, against unauthorized activation!
▶ Move master switch MS1 **80** in direction X+.

Result:

– Spool out winch 4 **WIV** and SA-frame **2** is erected through the erection cylinder **4** up to 70° forward, see illustration **1**.

When the SA-frame is erected forward to 70°:
▶ Move master switch MS1 **80** in direction X+.

Result:

– Spool out winch 4 **WIV** and the SA-frame is lowered forward by its own weight.

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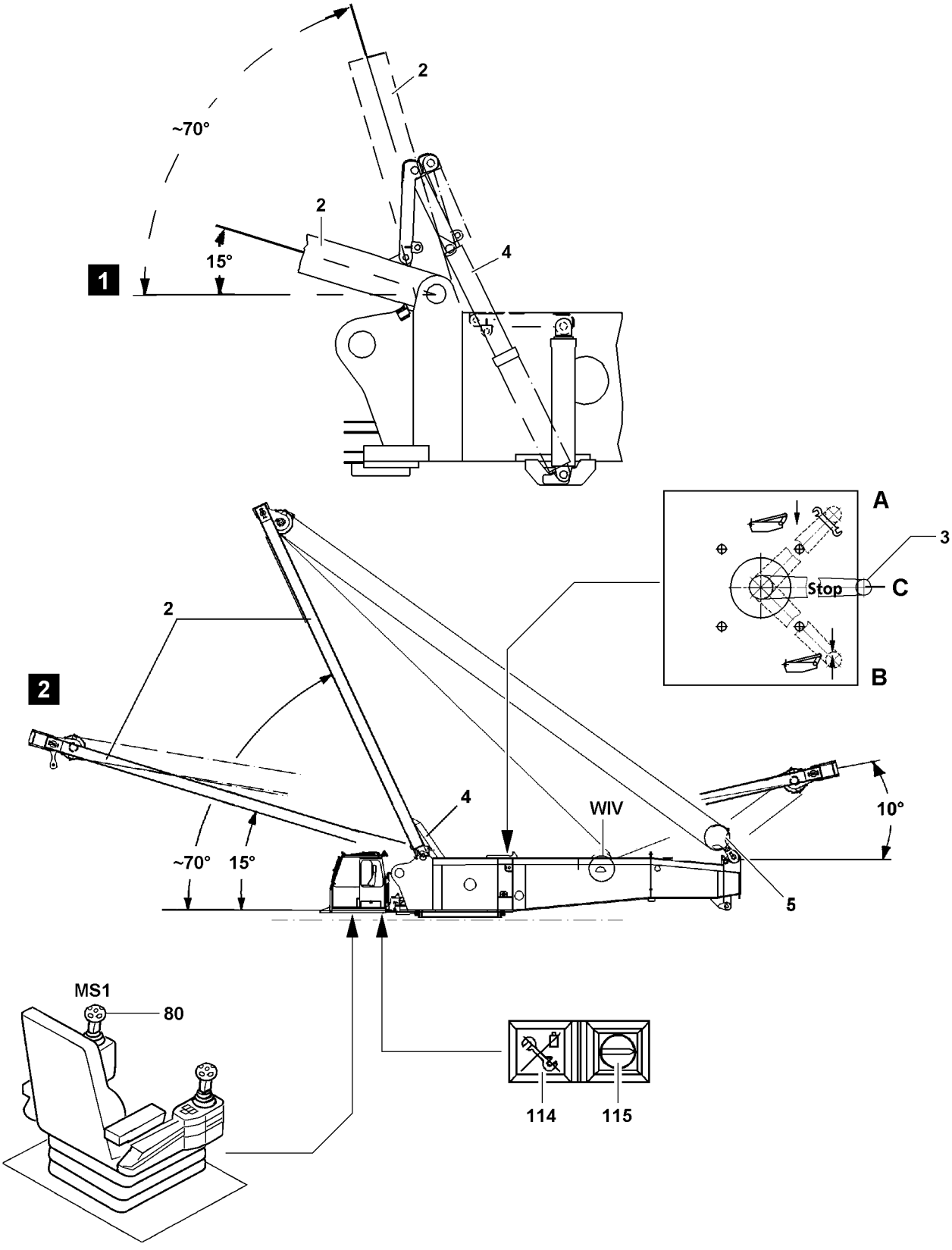

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Fig.120944

1.2 Placing the SA-frame onto the turntable

1.2.1 Take down procedure

Make sure that the following prerequisites are met:
- The ball valve **3** is in position **B**.
- The ball valve **3** is secured in position **B** against unauthorized operation.

WARNING
Danger of fatal injury due to SA-frame!
During the take down of the SA-frame, personnel can be severely injured or killed!
▶ The crane operator must make sure that no persons or objects are within the danger zone!

▶ Move master switch MS1 **80** in direction X-.

Result:

- Winch 4 spools up.
- The SA-frame **2** is pulled back against the pressure in the erection cylinder.

When the SA-frame **2** is approx. 10° before transport position, illustration **2**:
▶ Set the master switch MS1 **80** to zero position.

WARNING
Independent lowering of the SA-frame!
Due to an incorrect ball valve position, the SA-frame can lower backward by itself!
Personnel can be severely injured or killed!
It can result in slack rope build up and to destruction of crane components!
▶ The ball valve **4** must be positioned in position **B** during assembly and crane operation!
▶ Ball valve position **A** „lower“ and ball valve position **C** „stop“ are only permissible when lowering the SA-frame onto the turntable (transport position)!

▶ Switch over ball valve **3** from position **B** after position **A**.

Result:

- The SA-frame **2** lowers itself slowly on the turntable.

When the SA-frame **2** is lowered completely onto the turntable:
▶ Carefully spool up winch 4 in order to avoid slack rope build up.
▶ Place the SA-frame **2** completely on the turntable.
▶ Secure the ball valve **3** in position **A**, for example with a padlock, against unauthorized operation.

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5.03 Boom systems

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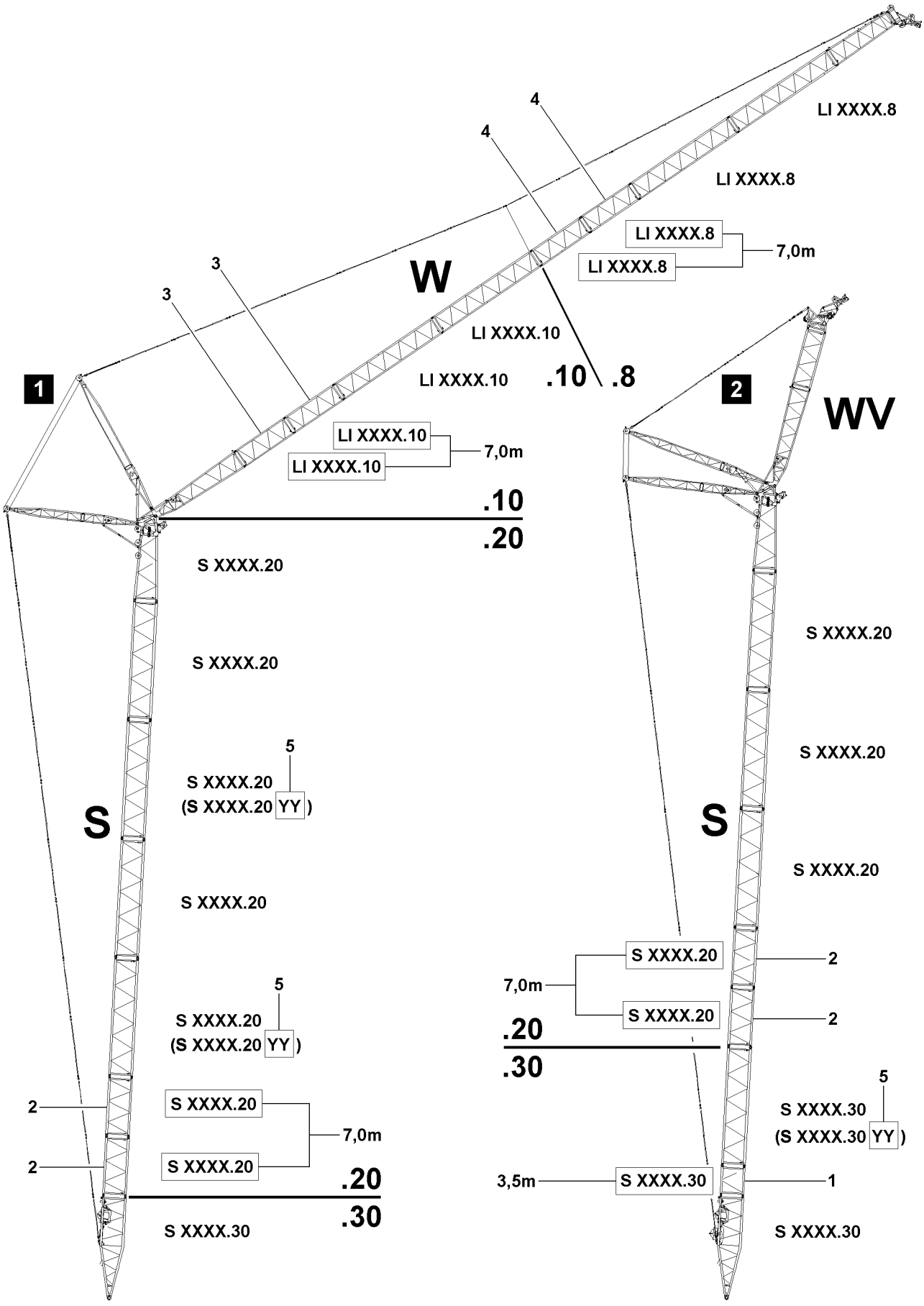

Fig.116151

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1 Boom components

Note

- For boom components including associated system dimensions, lengths and component weights refer to the Crane operating instructions, chapter 1.03.

2 Arrangement of intermediate sections on the boom

Note

- The following description is an example and may not exactly match to your crane.
- Lengths, weights and system dimensions of the intermediate sections are examples and my differ from the data on your crane.
- For exact crane data refer to the respective rod plan.
- For dimensions and weights of crane components, see Crane operating instructions, chapter 1.03.

WARNING

Boom can break off!

The arrangement of the intermediate sections on booms or boom systems are based on extensive static calculations. If the arrangement of the intermediate sections according to the rod plan is not observed, the crane can collapse, the boom can break off or the crane can topple over.

Death, severe bodily injuries, property damage.

- Always carry out the arrangement of the intermediate sections according to the rod plan.
- If an auxiliary guying is required for a certain boom length, then it must always be installed according to the rod plan on the position defined in the rod plan.

General specifications for the configuration of booms or boom systems:

- With the same system dimension, two short intermediate sections with a length of 3.5 m are heavier than one single intermediate section with a length of 7.0 m.
- With the same system dimension, two short intermediate sections with a length of 7.0 m are heavier than one single intermediate section with a length of 14.0 m.
- With the same system dimension, two short intermediate sections with a length of 3.5 m can be replaced by one single intermediate section with a length of 7.0 m.
- With the same system dimension, two short intermediate sections with a length of 7.0 m can be replaced by one single intermediate section with a length of 14.0 m.
- For intermediate sections with the same system dimension but different lengths, always install the short intermediate sections on the bottom in the boom, due to their weight, in direction of the slewing ring, see also illustration **1** and illustration **2**.
- The heavier one intermediate section is, the higher is the value of the last two digits on the system dimension plate.
- Pay attention to the last two letters following the letter combinations (YY) **5** on the last two letters on the system dimension plate and observe them.

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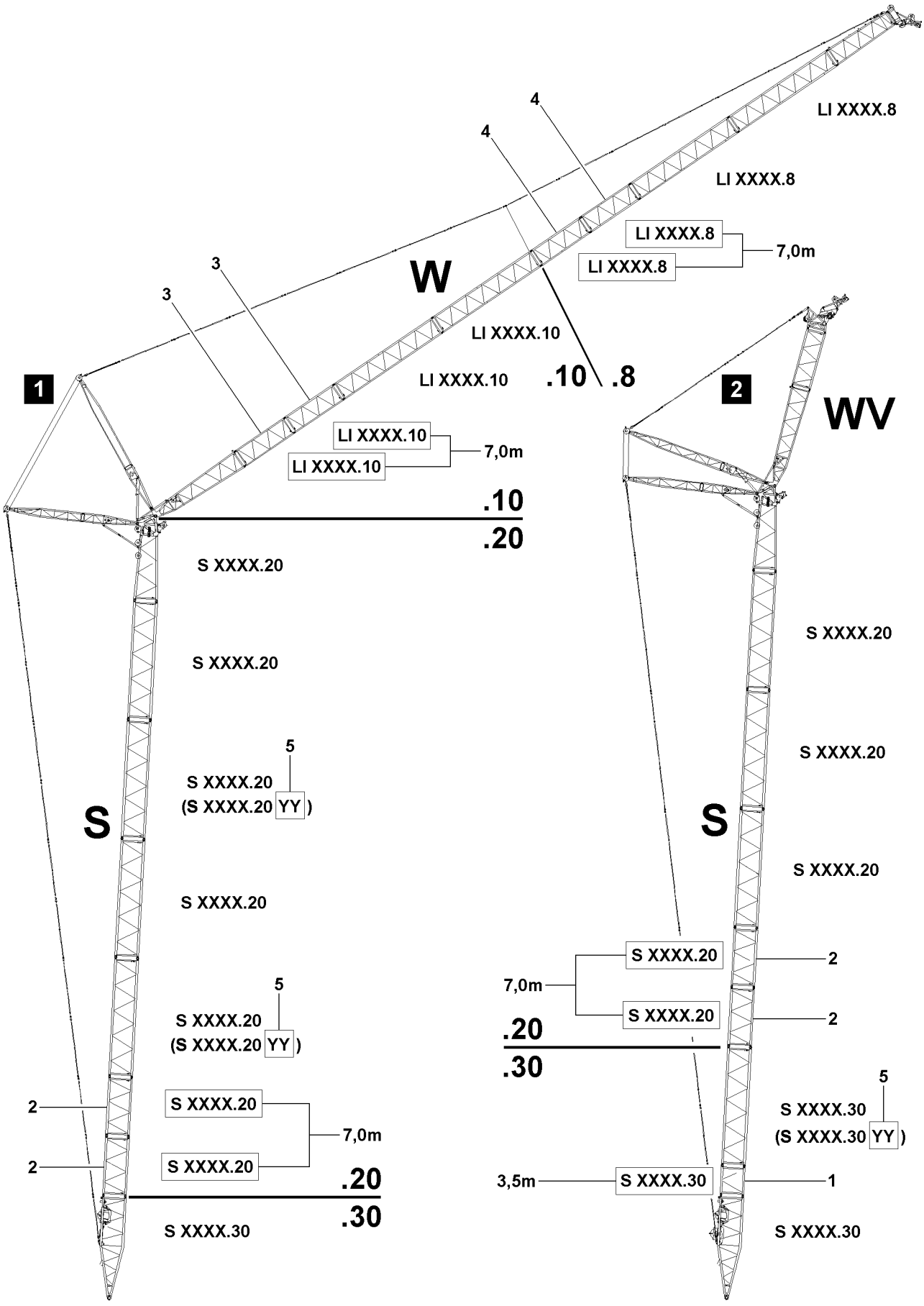

Fig.116151

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System dimensions and assignment			
Position	System	Heavy	Light
1	S XXXX **.30**	X	
2	S XXXX **.20**		X
3	LI XXXX **.10**	X	
4	LI XXXX **.8**		X
5	S XXXX **.40** YY	X	

2.1 Arrangement of intermediate sections

WARNING
Danger of accidents due to incorrectly assembled intermediate sections!
- ▶ Any other arrangement of the intermediate sections and guy rods than specified in the operating instructions or the rod plans is prohibited.
- ▶ There is the danger that intermediate sections are mixed up, they are differently sized and do not differ externally.
- ▶ The intermediate sections differ externally only by the welded on plates (.8, .10, .12, .16, .20, .25, .30, .40 **YY**).
- ▶ When assembling the boom, it must be ensured that the intermediate sections are arranged and installed according to their description as stated on the rod plan.
- ▶ Observe and adhere to the additional letter combinations (YY) **5** on the system dimension plate of the intermediate sections at assembly of the intermediate sections.

WARNING
Arrangement of intermediate sections!
If the arrangement of the intermediate sections is not carried out according to the rod plan, then the boom can be overloaded, bend down and break off.
Death, severe bodily injuries, property damage.
This could result in high property damage.
- ▶ For intermediate sections with the same system dimension but different length the shorter intermediate sections must always be installed on the bottom in the boom, in direction of the rotary connection, except if another installation position is specified in the rod plan.
- ▶ The specifications in the rod plan must be adhered to in any case.

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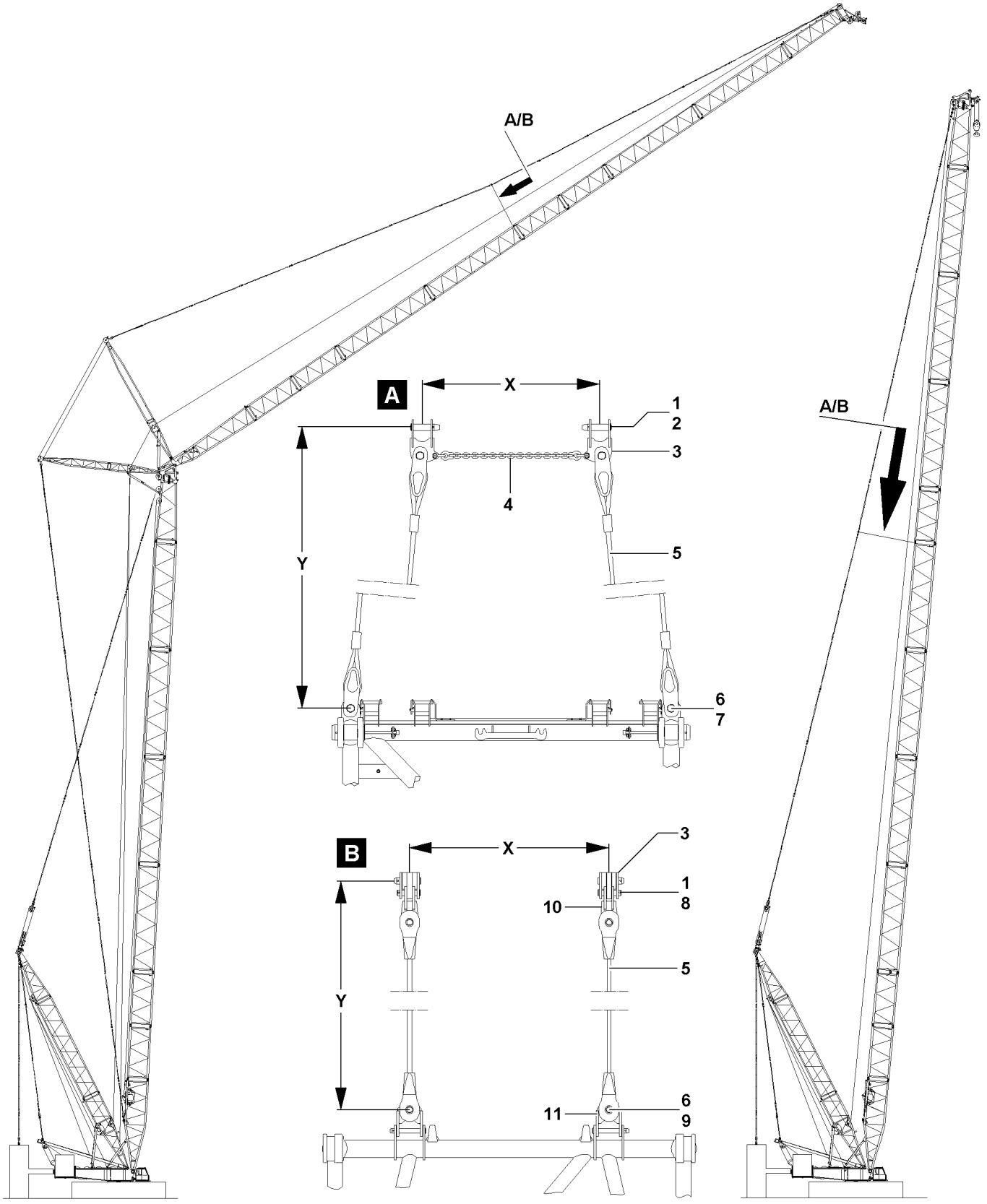

Fig.112270

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3 Auxiliary guying

Note
- ▶ The following description is an example and may not exactly match to your crane.
- ▶ For exact crane data refer to the respective rod plan.

3.1 Installing the auxiliary guying

The auxiliary guying, in regards to safe crane operation - especially for long boom systems - is of vital importance.

The auxiliary guying is a deciding factor in relieving the boom, or the boom system during erection and take down as well as during crane operation.

WARNING
The crane can topple over!
If the auxiliary guying is not installed or not installed on the position specified in the rod plan, then the crane can collapse, the boom can break off or the crane can topple over.
- ▶ If an auxiliary guying is specified in the rod plan for the required boom length, then it must be installed on the respective position.
- ▶ Make sure that the auxiliary guying is always completely installed and that all pins are properly pinned and secured.

Note
- ▶ The boom lengths, for which an auxiliary guying is required, can be seen in the rod plan.
- ▶ Depending on the crane type: To install the auxiliary guying, remove the standard lugs and install the „Lugs for the auxiliary guying“.

Components of auxiliary guying, illustration **A**	
Position	**Description**
1	Pin
2	Spring retainer
3	Bracket
4	Chain
5	Rope
6	Pin
7	Spring retainer

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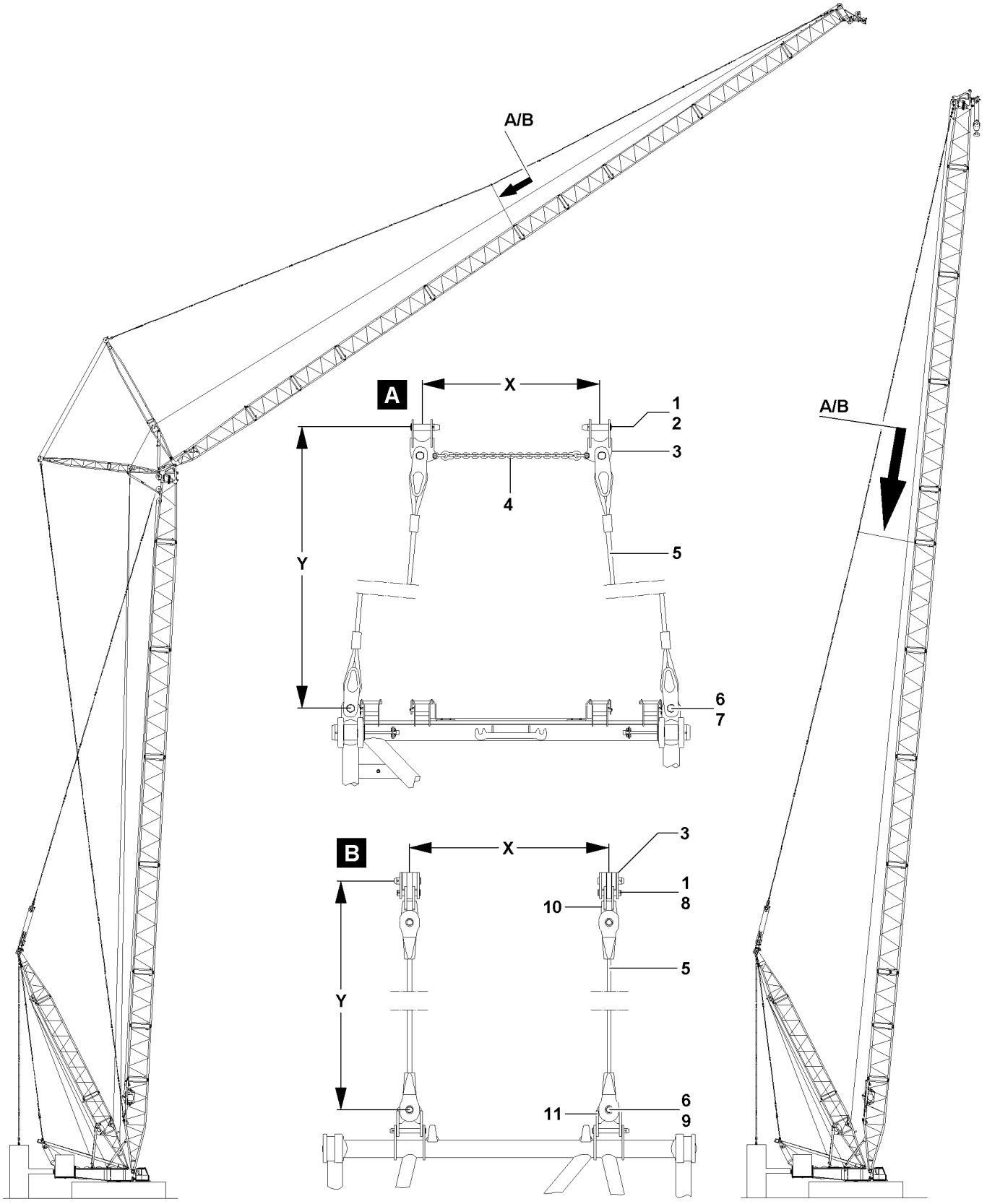

Fig.112270

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Components of auxiliary guying, illustration **B**	
Position	**Description**
1	Pin
3	Bracket
5	Rope
6	Pin
8	Locking pin
9	Locking pin
10	Cross-shaped lug
11	Cross-shaped lug

The lugs **3** must be installed in the guying instead of the standard lugs. The auxiliary guying is installed on the lugs **3**.

The guy ropes **5** are pinned on top on the lugs **3** of the guying or on the cross-shaped lugs **10**. The guy ropes **5** are pinned on the bottom on the lugs / connector points on the boom, see illustration **A** or on the cross-shaped lugs **11**, see illustration **B**.

▶ Install the guy ropes: Pin the guy ropes on top on the guying with pin **1** and secure with spring retainer **2**, see illustration **A**.
or
Install the guy ropes: Pin the guy ropes on top on the guying with pin **1** and secure with locking pin **8**, see illustration **B**.

When the guy ropes **5** are pinned and secured on the lugs **3** of the guying or on the cross-shaped lugs **10**:

▶ Pin the guy ropes **5** on the lugs / connection points on the boom, see illustration **A** with pin **6** and secure with locking spring **7**.
or
Pin the guy ropes **5** on the cross-shaped lugs **11** on the boom, see illustration **B** with pin **6** and secure with locking pin **9**.

WARNING
The crane can topple over!
If the chain **4** is not installed in connection with the auxiliary guying, then the guying can be damaged, the boom can break off and the crane can topple over.
Personnel can be severely injured or killed.
▶ The auxiliary guying must be installed according to the rod plans.
▶ If a chain **4** is specified in the rod plan, then it must always be installed in connection with the auxiliary guying, otherwise the guy rods will be pulled apart.

▶ Recheck the proper and complete assembly of the auxiliary guying before erecting the boom / boom system.

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5.05 D-boom

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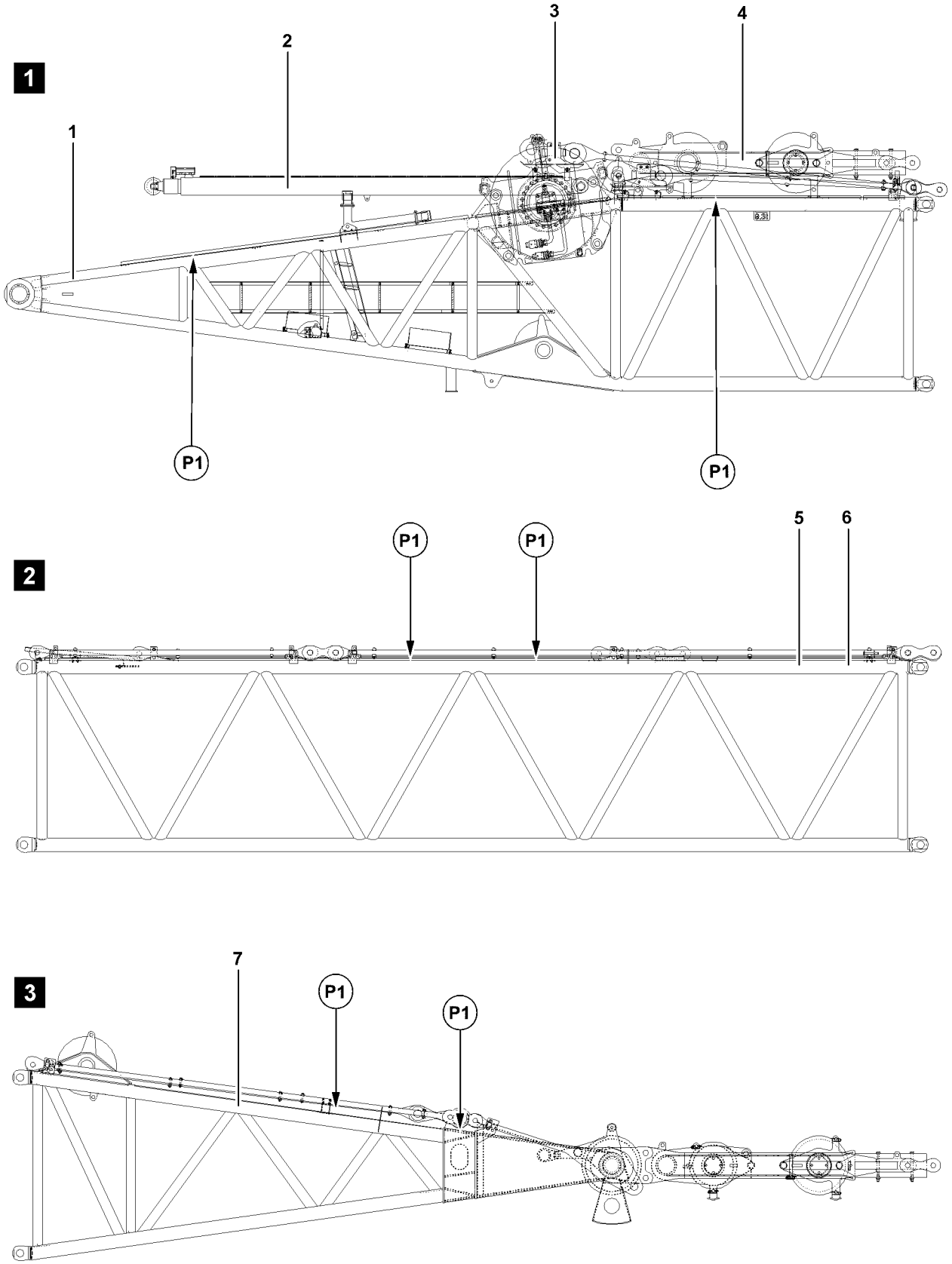

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Fig.111658

1 Components and fastening points

1.1 D-pivot section

The D-pivot section consists of:

Position	Component	Weight[1)]
1	D-pivot section without rods	6.3 t
2	D-relapse cylinder - 2x	1.8 t
3	Winch 3 with rope	8.8 t
4	D-pulley blocks	4.5 t

1) The stated weights are approximate

1.2 D-intermediate section

Position	Component	Weight[1)]
5	D-intermediate section 10 m	7.0 t
6	D-intermediate section 14 m	8.6 t

1) The stated weights are approximate

1.3 D-end section

Position	Component	Weight[1)]
7	D-end section	12.0 t

1) The stated weights are approximate

1.4 Fastening points D-pivot section

WARNING
Danger of accident due to incorrect attachment!
Life-threatening situations can arise due to improper or incorrect attachment of the corresponding components.
Personnel can be severely injured or killed.
▶ Attach the components on the intended fastening points **P1**.

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2 Assembly

WARNING
Danger of falling!
During assembly and disassembly, assembly personnel must be secured with appropriate aids to prevent them from falling. If this is not observed, assembly personnel could fall and suffer life-threatening or fatal injuries.

- ▶ Any work, where there is a danger of falling, must be carried out with suitable aids (for example: lifting platforms, scaffoldings, ladders, auxiliary crane).
- ▶ If the work cannot be carried out with such aids nor from the ground, then the assembly personnel must secure themselves with approved fall arrest systems to avoid falling, see Crane operating instructions chapter 2.04.
- ▶ If railings are present on the components, then they must be brought into the corresponding position and secured for assembly / disassembly work.
- ▶ Step on aids and fall protection equipment only with clean shoes.
- ▶ Keep aids and fall protection equipment clean and free from snow and ice.
- ▶ During all assembly and disassembly work, maintenance work and inspections, travel or crane operation is prohibited.

WARNING
Falling components!
If unsecured or non-supported components are assembled or disassembled, they can fall down.
Personnel can be severely injured or killed.

- ▶ During pinning and unpinning of the lattice sections, it is prohibited for anyone to remain **under** or **on** the components as well as within the entire danger zone.
- ▶ Support the boom and components before pinning / unpinning.
- ▶ Pin or unpin both pins laying in a horizontal, i.e. **left** and **right**.
- ▶ Secure the pins in the storage locations and in the receptacles.
- ▶ Do not disengage the auxiliary crane until the respective component is pinned and secured.
- ▶ It is prohibited to lean a ladder against the component being disassembled.

WARNING
Danger of impact / crushing!
When installing / removing crane components with the auxiliary crane, crane components can start to swing back and forth.
When lifting / lowering and positioning crane components, there is an increased danger of impacts / crushing.
Personnel can be severely injured or killed.

- ▶ Make sure that personnel cannot be caught by components.
- ▶ Make sure that the crane is aligned in horizontal position to avoid the support beams from swinging by themselves.
- ▶ When working in danger zones: Use aids to protect limbs.
- ▶ Guide components with suitable aids to minimize oscillation.

NOTICE
Damage of derrick boom and SA-frame!
If the SA-frame is pulled by winch 4 (intake gear) to the rear in direction of the turntable, then the derrick boom and the SA-frame can be severely damaged.
Expensive and extensive repairs can result.

- ▶ As long as the guying between the SA-frame and the assembled D-pivot section or between the SA-frame and the assembled D-boom is **not** assembled and guyed, do not pull the SA-frame to the rear in direction of the turntable.

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Make sure that the following prerequisites are met:
- The crane is supported.
  (only in connection with crane support or for LG-cranes)
- The crane is horizontally aligned.
- An auxiliary crane is available.
- An assembly scaffolding / work platform is available.
- The counterweight has been installed on the turntable according to the load chart.
- The LICCON overload protection has been set according to the data in the load chart.
- The LICCON overload protection settings have been compared with the actual set up configuration.
- No main boom is assembled on the turntable.

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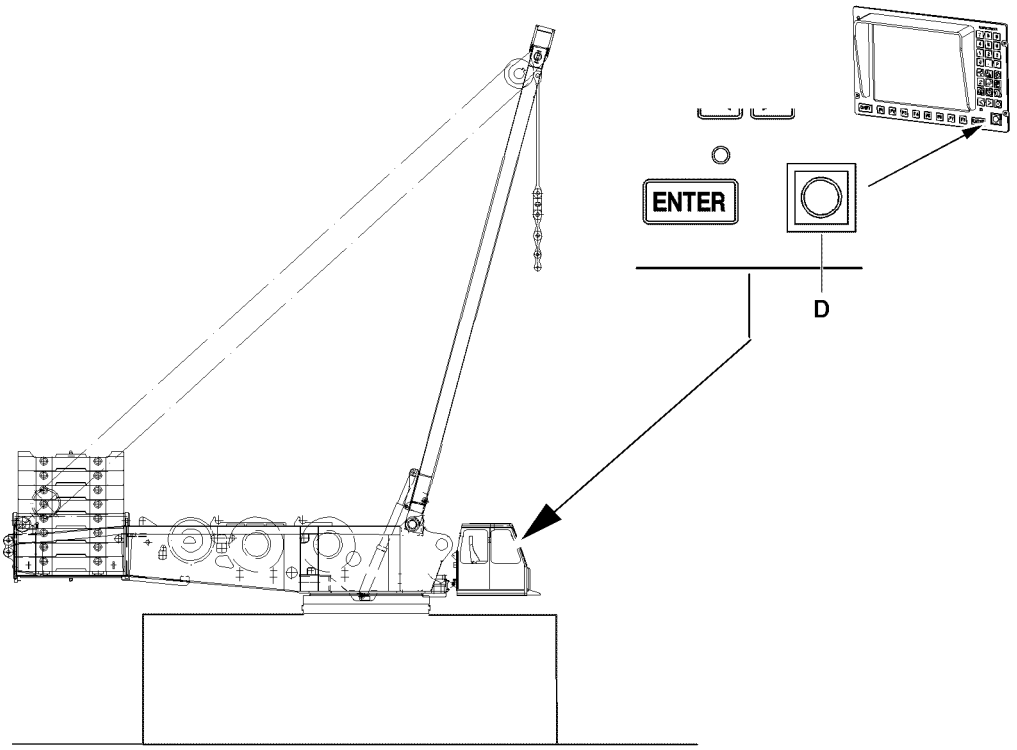

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Fig.120945

2.1 Assembling the D-boom

2.1.1 Turning the turntable into assembly position

DANGER
The crane can topple over!
If the following conditions are not met before turning the turntable - **without** installed D-boom, the crane can topple over.
Personnel can be severely injured or killed.
▶ Observe the specifications in the erection and take down charts.

▶ Turn the turntable in longitudinal direction of the travel gear or to the side.

2.1.2 Exceeding the shut off limits of the LICCON overload protection for assembly operation

WARNING
Danger of accident due to function „Exceedance of shut off limits of the LICCON overload protection“!
If the shut off limits of the LICCON overload protection are exceeded, there is no additional protection against crane overload.
Due to erroneous operation or deliberate misuse, the crane could collapse, the boom can break off or the crane can topple over.
Personnel can be severely injured or killed.
▶ The function „Exceedance of shut off limits of the LICCON overload protection“ is only permissible in emergencies and for assembly purposes.
▶ The function „Exceeding the shut off limits of the LICCON overload protection“ may only be actuated by persons who know the effects of their actions regarding the function „Exceeding the shut off limits of the LICCON overload protection“.
▶ The function „Exceedance of shut off limits of the LICCON overload protection“ requires the presence of an authorized person and must be performed with utmost caution.
▶ Crane operation with activated function „Exceedance of shut off limits of the LICCON overload protection“ is prohibited.

▶ Exceeding the shut off limits of the LICCON overload protection: Engage assembly operation.

Result:

– The shut off limits of the LICCON overload protection are exceeded.
– The assembly icon appears on the LICCON monitor.

Note
▶ See Crane operating instructions, chapter 4.02.

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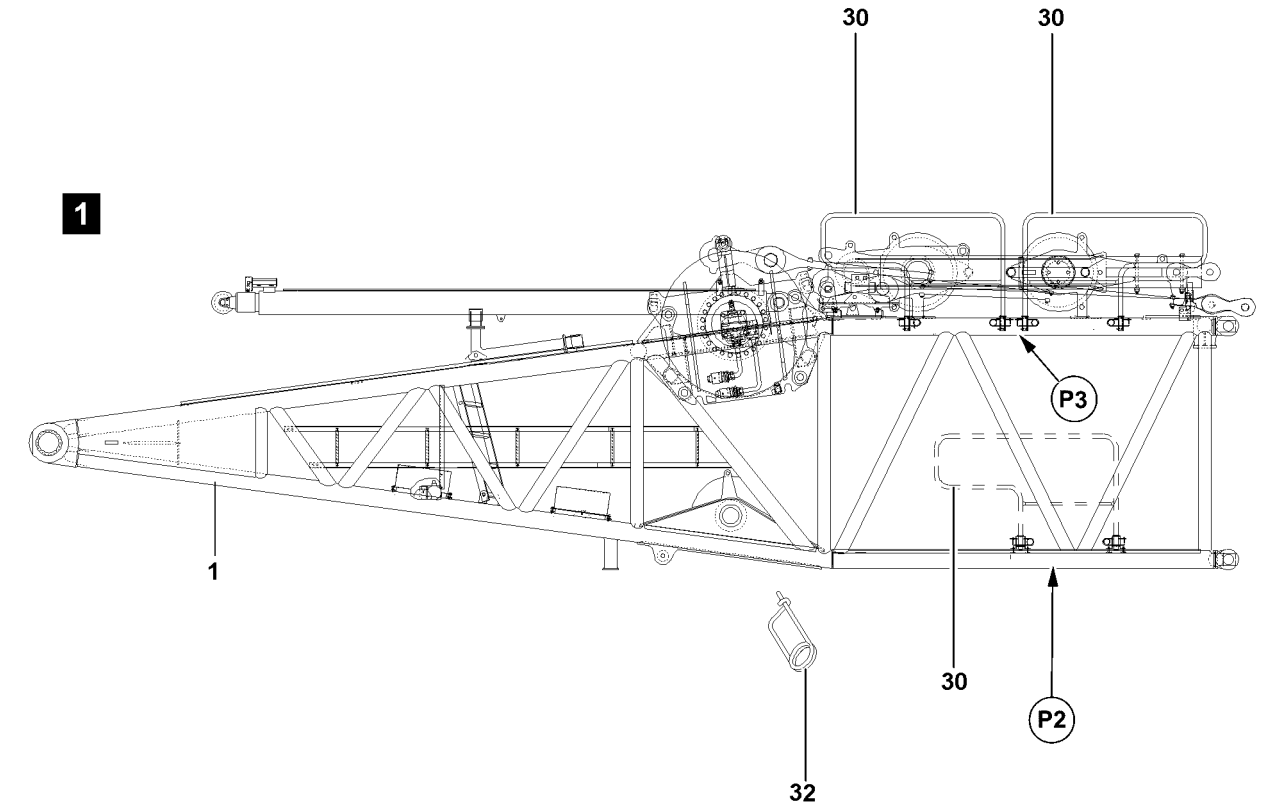

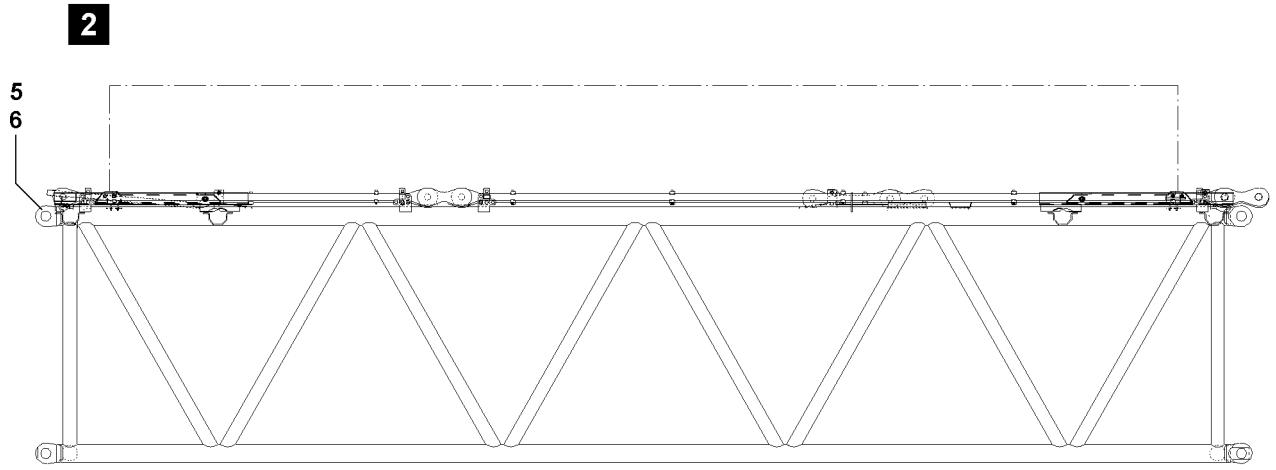

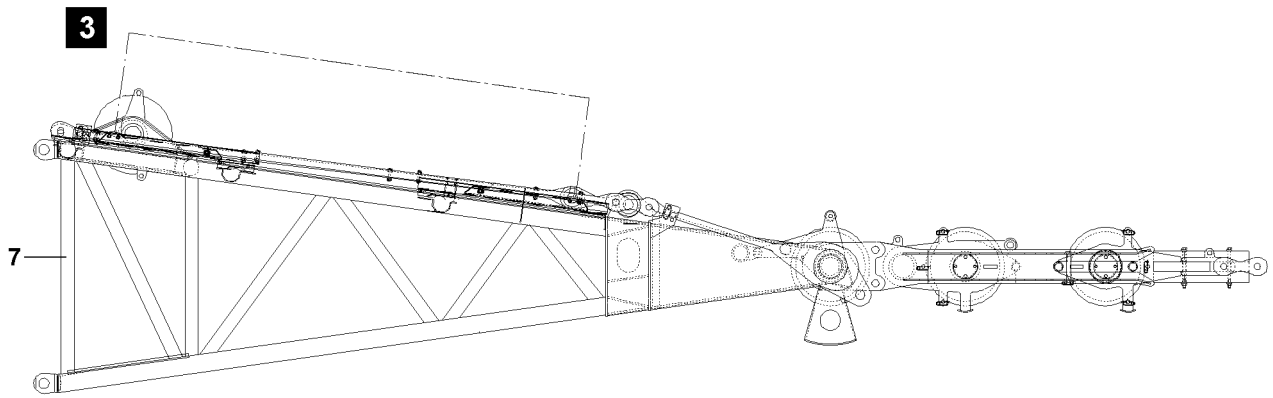

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Fig.111660

2.2 Assembling the fall protection equipment on the D-pivot section

- ▶ Release the railing in the transport receptacle point **P2** on the D-pivot section **1**: Remove the spring retainers **32**, see illustration **1**.
- ▶ Remove the railing from the transport receptacle point **P2** and insert into the intended fastening points, point **P3** on the D-pivot section **1**.
- ▶ Secure the railing **30** in the fastening points, point **P3**, with spring retainers **32**.

2.3 Assembling the fall protection equipment on the D-intermediate section and on the D-end section

See illustration **2** and illustration **3**.

Note

- ▶ Observe the notes, see Crane operating instructions, chapter 2.06 and / or chapter 6.50.

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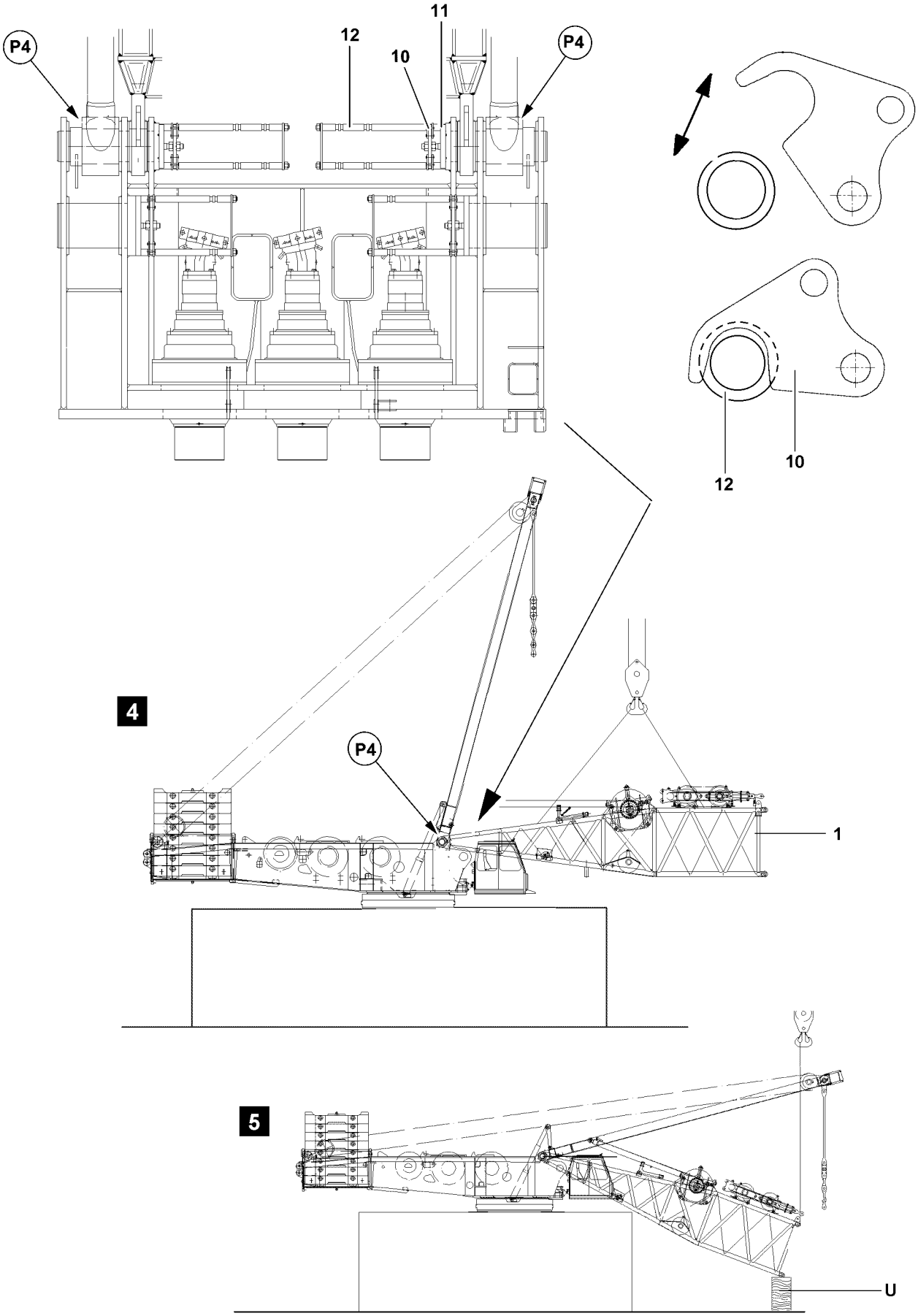

Fig.111661

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2.4 Pinning the D-pivot section on the turntable

DANGER
Danger of fatal injury due to toppling components!
If the pin connections are not visually inspected, the pins can loosen up by themselves and cause components to fall down.
Personnel can be severely injured or killed.
▶ All pins must be secured after assembly with the intended safety elements. Check visually.
▶ The guy rods must be inspected regularly, see Crane operating instructions, chapter 8.15.

Make sure that the following prerequisites are met:
– The SA-frame is erected to approx. 100°.
– The pins **11** on the turntable are unpinned.

▶ Hang the D-pivot section **1** onto the auxiliary crane and swing in to the pin points **P4** on the turntable, see illustration **4**.

WARNING
Falling D-pivot section!
Due to non-secured or insufficiently secured connector pins, the D-pivot section can fall down.
Personnel can be severely injured or killed.
▶ The pins **11** must be secured after the pinning procedure on the turntable by folding the retaining hooks **10** into the guide **12**.

▶ Move the D-pivot section **1** in on the turntable.
▶ Fold both retaining hooks **10** from the guide **12**.

Note
▶ Operation of radio remote control (only available for the LR-crane), see Crane operating instructions, chapter 6.08.

▶ Actuate the radio remote control and insert the connector pins **11**.
▶ Secure the pins **11** by folding the retaining hooks **10** into the guide **12**.

NOTICE
Damage to the D-pivot section!
Property damage can occur on the pivot section by placing the assembled D-pivot section on the ground.
▶ The D-pivot section may not be placed directly on the ground.
▶ When placing the D-pivot section down, always use a sufficiently load bearing and large enough substructure.

▶ Place the D-pivot section carefully with the auxiliary crane on the substructure **U**.
▶ Remove the auxiliary crane.

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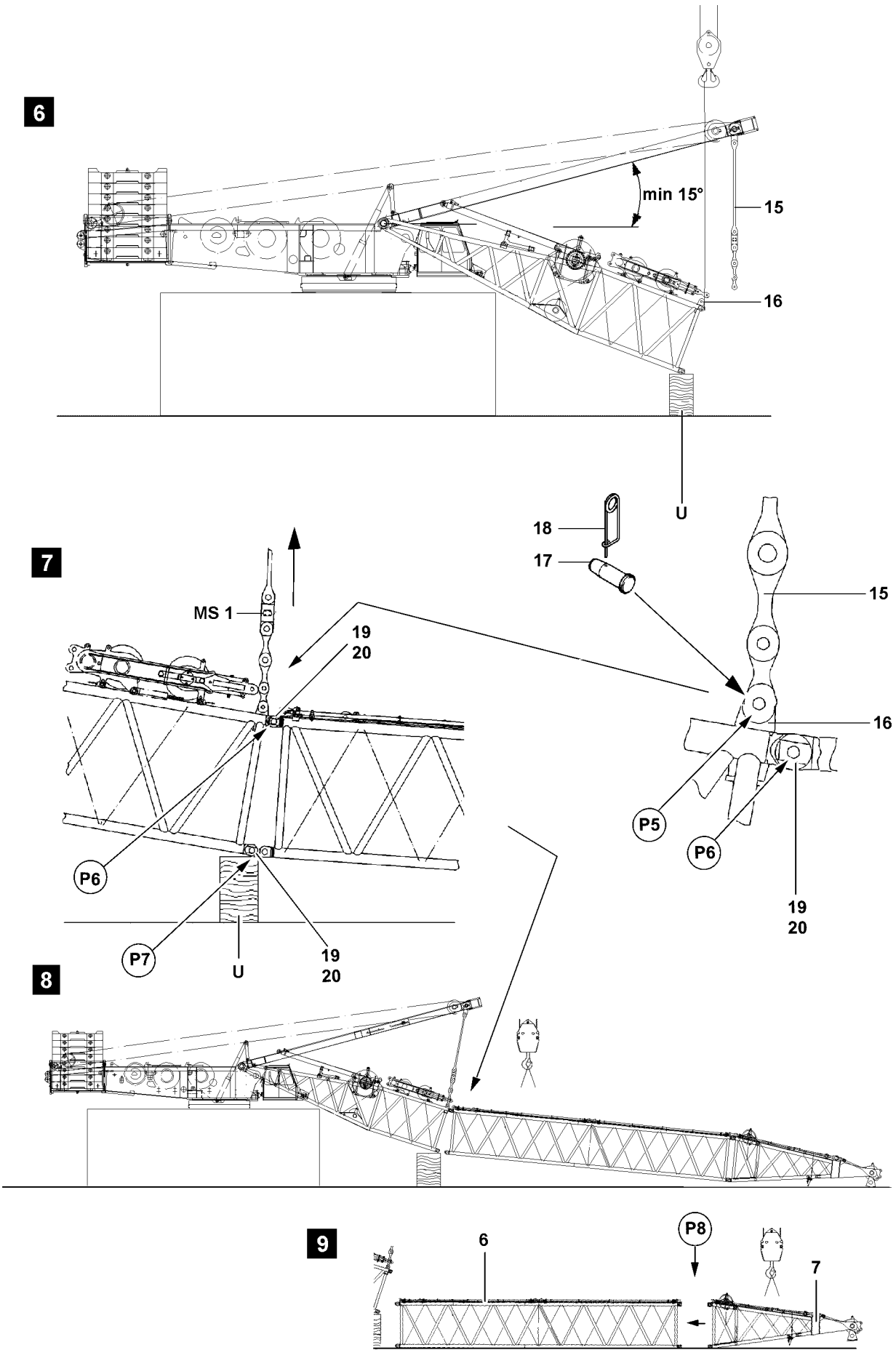

Fig.111662

2.5 Assembling the guy rods from the SA-frame

Make sure that the following prerequisites are met:
- The D-pivot section is pinned and secured on the turntable.
- The D-pivot section is placed on the substructure **U**.

▶ Luff the SA-frame down to the front, see Crane operating instructions, chapter 5.02.

Connect the guy rods **15** on the assembly bracket **16** on the D-pivot section, point **P5**:
▶ Insert the pin **17** and secure with spring retainer **18**, see illustration **7**.

2.6 Installing the D-lattice sections on the D-pivot section

Make sure that the following prerequisite is met:
- The guy rods **15** are pinned and secured on the assembly bracket **16** on the D-pivot section, point **P5**.

Note
▶ Always support the D-lattice sections sufficiently for easier assembly.
▶ Pin and secure the D-lattice sections with the pin pulling device, see Crane operating instructions, chapter 5.30.

▶ Attach the D-end section **7** on the auxiliary crane and align on the D-intermediate section **6**.

When the pin bores on the D-intermediate section and on the D-end section, point **P8** align:
▶ Insert and secure the pins on top and bottom and secure with spring retainer.
▶ Assemble the D-lattice sections and the respective guy rods to the required length.
▶ Hook the derrick boom on the auxiliary crane and align on the D-pivot section.

When the pin bores on the D-pivot section and on the derrick boom, point **P6** align:
▶ Insert the pin **19** and secure with the spring retainer **20**.
▶ Luff the D-pivot section up until it can be pinned on the D-pivot section, point **P7**, see illustration **7**.
▶ Erect the SA-frame until the pin bores on the D-pivot section and on the D-intermediate section "on the bottom" align point **P7**: Insert the pins **19** on both sides at point **P7** and secure with spring retainers **20**, illustration **7**.

When the pins are properly pinned and secured on all D-lattice sections:
▶ Luff the SA-frame down and unpin the guy rods **15** on the assembly bracket **16** on the D-pivot section.

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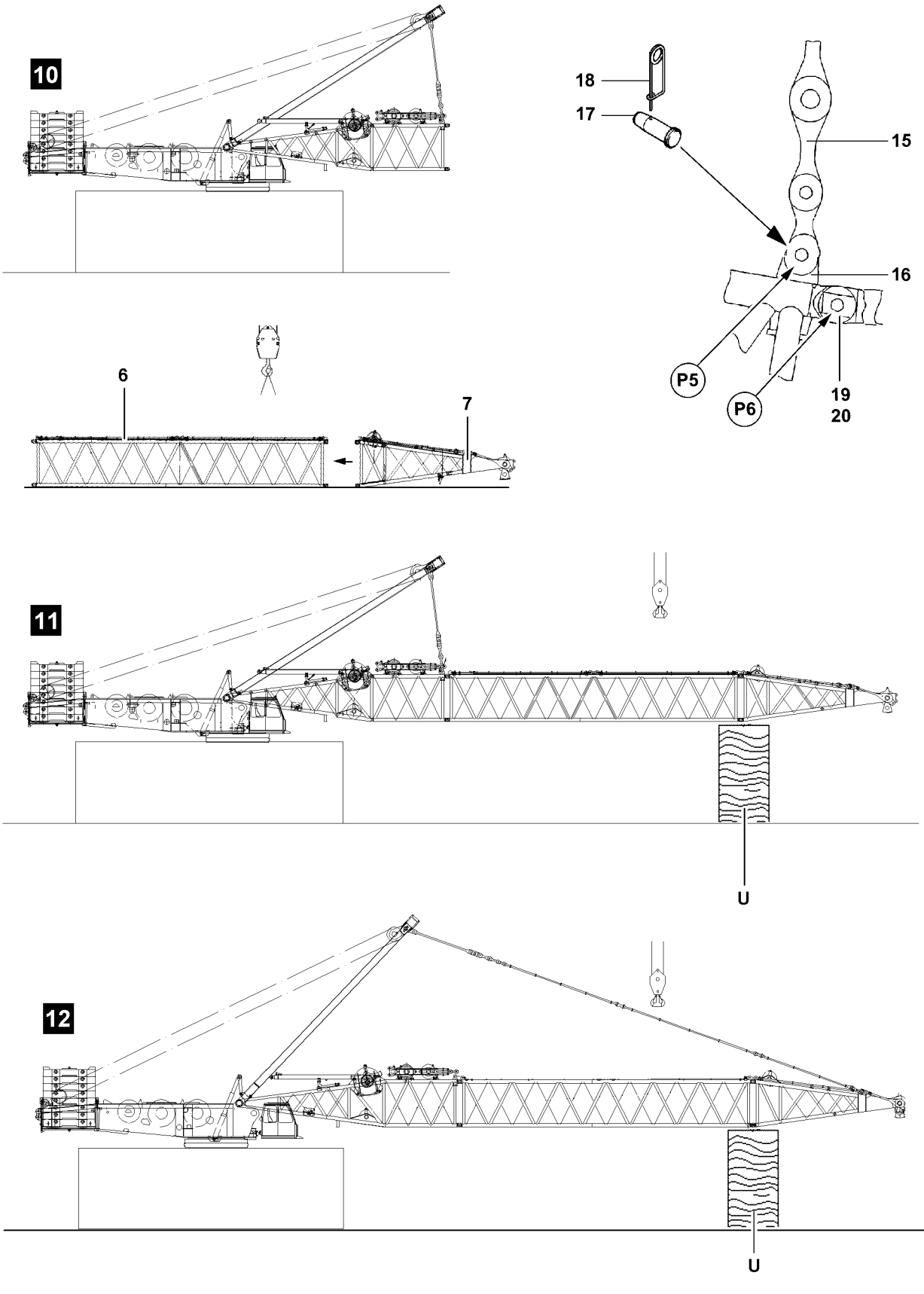

Fig.111663

2.7 Assembling the derrick boom in flying mode

Make sure that the following prerequisites are met:
- The D-pivot section is pinned and secured on the turntable.
- The guy rods **15** are pinned and secured on the assembly brackets **16** on the D-pivot section.
- The D-pivot section is horizontally guyed.

Pin and secure the D-intermediate section and the D-end section or the D-intermediate section and the complete D-end section on the D-pivot section.

▶ Insert and secure the pins on top and bottom.

WARNING
Mortal danger due to folding down of derrick boom!
If the derrick boom is not properly supported with stable materials or held by an auxiliary crane before unpinning the guy rods, then the derrick boom can fold down suddenly.
In addition, the derrick boom can be severely damaged.
Personnel can be severely injured or killed.
▶ The crane operator must ensure that the derrick boom is supported properly with stable materials or that it is held by an auxiliary crane.

When the D-lattice sections or the preassembled assembly unit are installed and secured on the D-pivot section:
▶ Fasten the derrick boom on the auxiliary crane or support it with stable materials.
▶ Lower the SA-frame to the front, see Crane operating instructions, chapter 5.02.

Result:

– The guy rods are relieved.

Separate the guy rods **15** on the assembly bracket **16**:
▶ Remove the spring retainer **20** and unpin the pin **19**.
▶ Lower the SA-frame to the front.

Connect the guy rods from the D-boom with the guy rods from the SA-frame:
▶ Insert the pin and secure with the spring retainer.
▶ Erect the SA-frame and tension the guy rods between the SA-frame and the D-boom.

DANGER
Mortal danger due to folding down of derrick boom!
▶ Before removing the auxiliary crane, the crane operator must ensure that the derrick boom is safely held by the guy rods.

When the guy rods are tensioned between the SA-frame and the D-end section:
▶ Remove the auxiliary crane.

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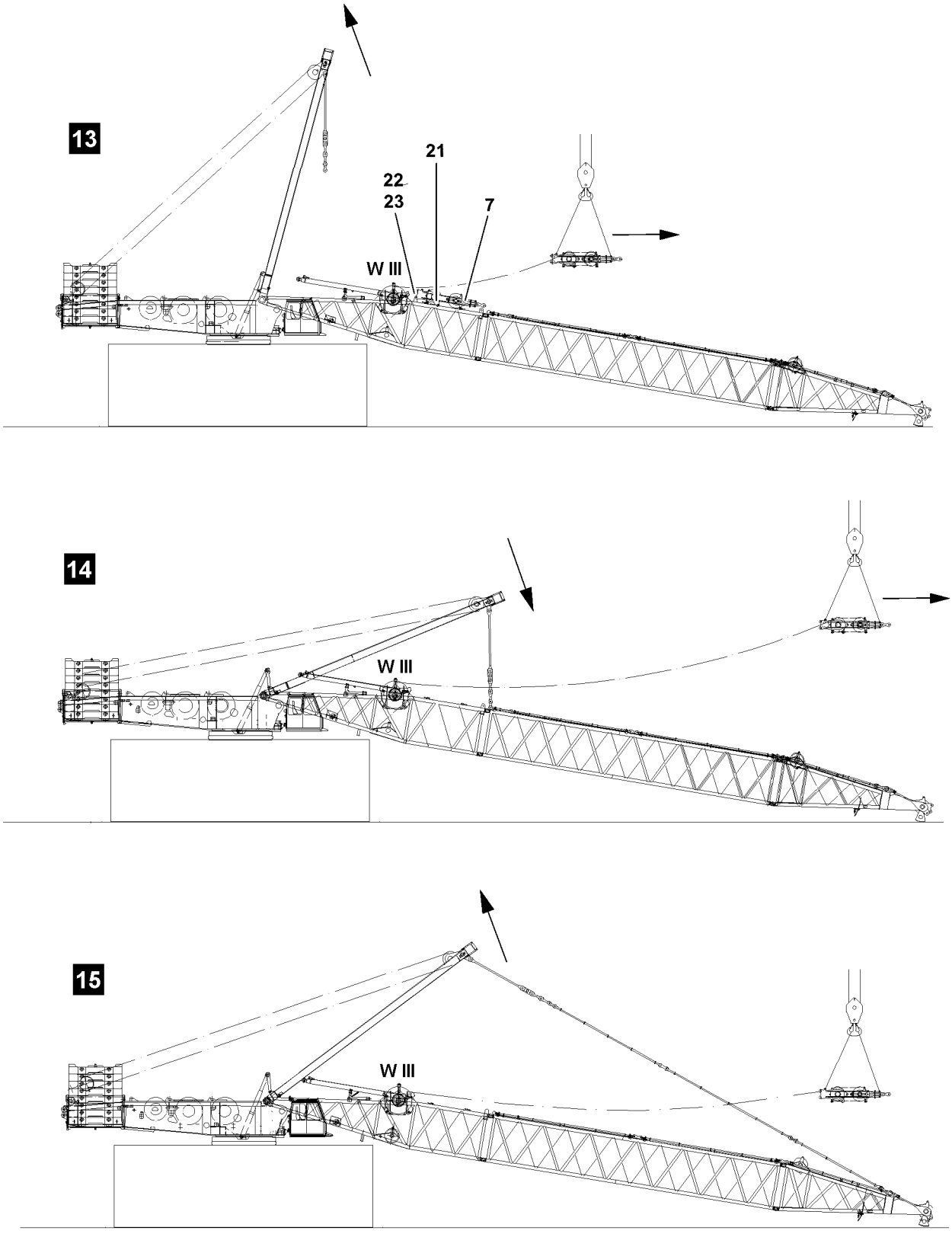

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Fig.111664

2.8 Assembling the guy rods

Note

▶ Assemble the D-guy rods according to the rod plan.

▶ The numbering on the rod plan must be identical to the numbering on the guy rods.

WARNING

Neglectful inspection and maintenance of guy rods!

If the regular inspection and maintenance of the guy rods is not carried out or is carried out only in irregular intervals, then severe accidents can occur due to existing and unrecognized damage to the guy rods.

Personnel can be severely injured or killed.

▶ Check the guy rods before every assembly, see Crane operating instructions, chapter 8.15.

Make sure that the following prerequisite is met:

– The derrick boom is placed on the ground.

▶ Luff the SA-frame up for easier assembly of the luffing pulley block **7**.

WARNING

Slipping luffing pulley block!

By unpinning the luffing pulley block on the D-pivot section, the luffing pulley block can start to slip.

Personnel can be severely injured or killed.

▶ The luffing pulley block must be secured by an auxiliary crane before unpinning on the D-pivot section.

▶ Fasten the luffing pulley block on the auxiliary crane.

▶ Unpin the luffing pulley block on the D-pivot section: **22**Release and unpin the pin **22** on the transport receptacle **21**.

NOTICE

Danger of slack rope formation!

If winch 3 is spooled out too quickly when pulling the luffing pulley block, slack rope can form.

▶ The hoist rope must be tensioned during the entire pulling procedure.

▶ Pull the luffing pulley block with the auxiliary crane to the D-end section while spooling out winch 3 at the same time, see illustration **13**.

DANGER

Danger of accident!

▶ The pins of the derrick guy rods may only be pinned from the „inside“ to the „outside“.

▶ Luff the SA-frame down to the front and pin and secure the guy rods from the SA-frame with the guy rods from the derrick boom, see illustration **14**.

Tension the guy rods between the SA-frame and the D-end section.

▶ Actuate winch 4, see illustration **15**.

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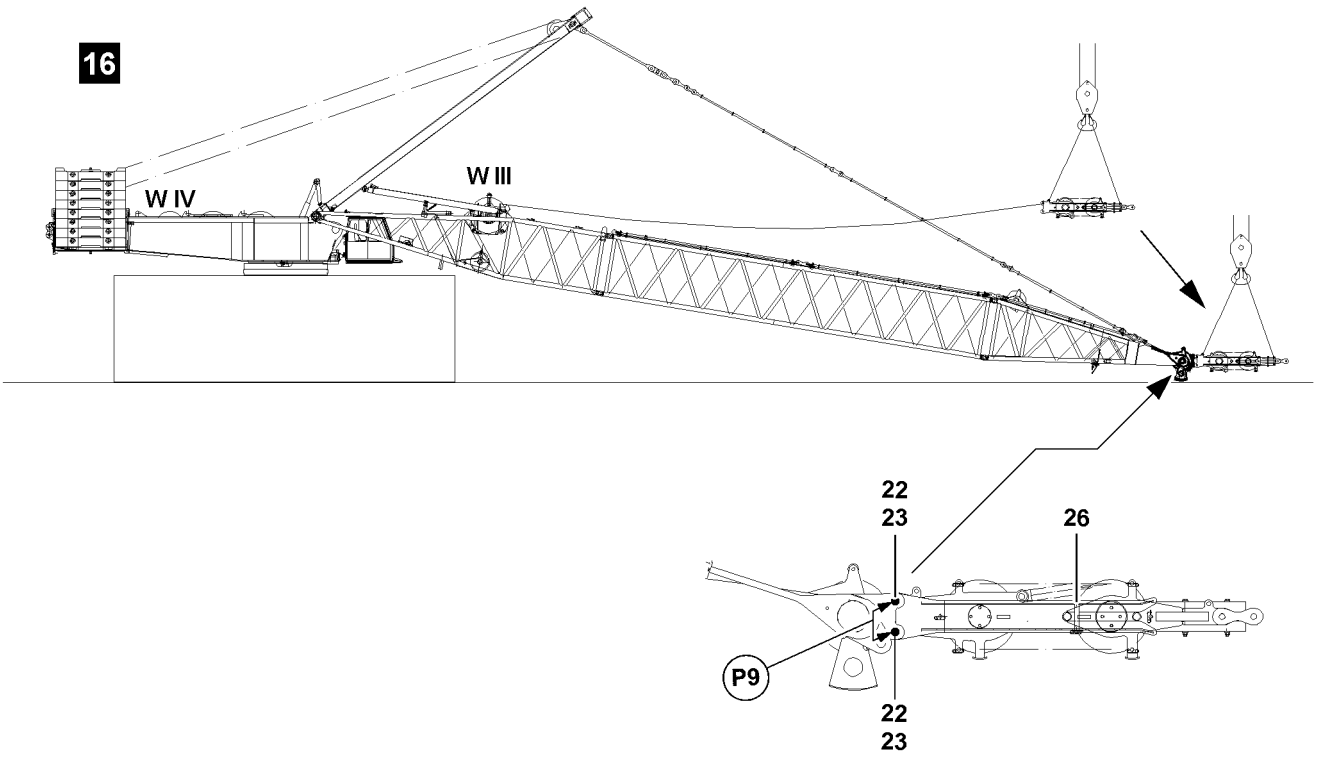

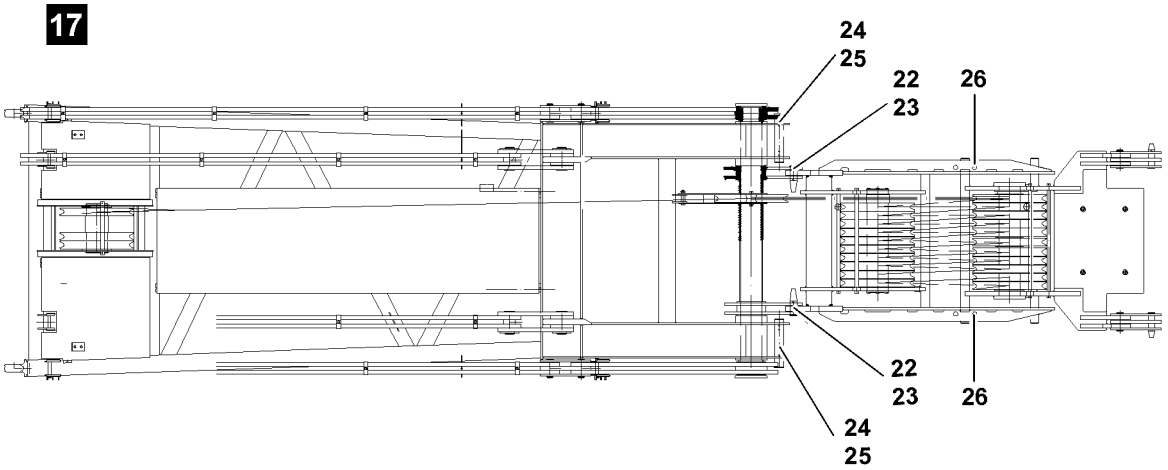

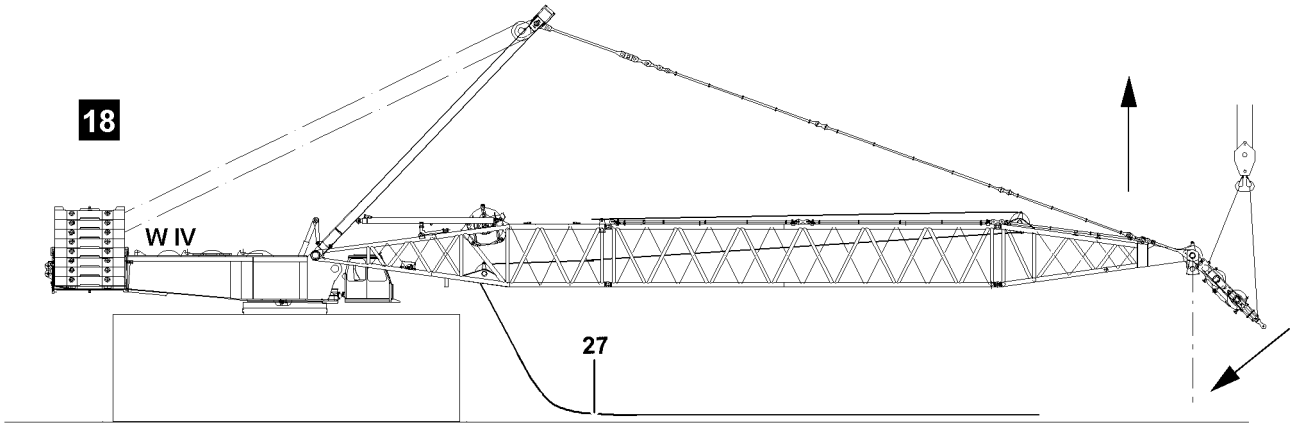

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Fig.111665

2.9 Assembling the luffing pulley block

For assembly move the luffing pulley block with the auxiliary crane from the D-pivot section to the D-end section and pin on the D-end section in horizontal direction. When the D-boom is lifted off the ground, the lock of the luffing pulley block is released and lowered with the auxiliary crane into „down“ position.

Make sure that the following prerequisites are met:
- The D-boom is placed on the ground.
- The guy rods between the SA-frame and the D-end section are tensioned
- The luffing pulley block hangs on the auxiliary crane.

▶ Pull the luffing pulley block with the auxiliary crane to the D-end section while spooling out winch 3 **WIII** at the same time and align on the pin bores, points **P9**, see illustration **16**.
▶ Insert the pins **22** on both sides „on top“ and „bottom“ and secure with spring retainers **23**, point **P9**.

Lock the luffing pulley block horizontally on the D-end section.

▶ Insert the pins **24** on both sides and secure with spring retainers **25**.

Luff the derrick boom up to the horizontal, see illustration **17**:
▶ Spool winch 4 up.

When the derrick boom is erected to the horizontal:
▶ Fasten the luffing pulley block on the auxiliary crane.

When the luffing pulley block is safely held by the auxiliary crane:
▶ Release and unpin the pins **24** on both sides.
▶ Lower the luffing pulley block carefully with the auxiliary crane, see illustration **17**.
▶ Spool up winch 3 **W III** until the control rope is slightly tensioned between the upper pulley block and the lower pulley block.
▶ Unpin the pins **26** on both sides.

Result:

– The upper and the lower pulley block are held by the control rope.

▶ Remove the auxiliary crane.

DANGER
Falling hoist rope!
If the following conditions are not met before erecting the D-boom, the hoist rope can fall down due to its own weight.
Personnel can be severely injured or killed.
▶ Enough hoist rope must be guided over the rope pulleys so that the hoist rope is **not** pulled back and falls down when erecting the D-boom.

▶ Pull the hoist rope **27** with the assembly winch over the rope pulleys in the D-end section and the D-pivot section, see Crane operating instructions, chapter 4.06.
▶ Luff the D-boom up until the luffing pulley block hangs freely.

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Fig.195219

2.10 Establishing the electrical connections

Make sure that the following prerequisite is met:
– The D-boom is completely assembled.

Note
▶ To establish the electrical connections, see Electric wiring diagram.

▶ Establish the electrical connections.
▶ Make sure that all electrical connections on the boom are established.

2.11 Establishing the hydraulic connections

The hydraulic connections are made with quick couplings.

When connecting hydraulic lines with quick couplings, make sure that the coupling procedure is carried out correctly.

WARNING
Pressure in the hydraulic lines!
If the pressure supply is not interrupted before connecting / releasing the hydraulic lines, the hydraulic oil can escape with high pressure.
Personnel can be severely injured or killed.
▶ Release the pressure in the hydraulic system before connecting / disconnecting: Interrupt the pressure supply and wait for a short time.

WARNING
Loss of pressure or leakage!
Incorrectly coupled or self-loosening quick couplings (particularly return lines) can result in serious accidents due to component failure.
▶ Check that the quick couplings have been properly connected before using the crane.

▶ Connect the coupling components (sleeve and connector) and screw together with the knurled nut.
▶ Tighten the hydraulic coupling by hand. Rotate the knurled nut until it reaches a tangible, fixed stop position.
▶ Establish the hydraulic connection to the D-relapse cylinders.

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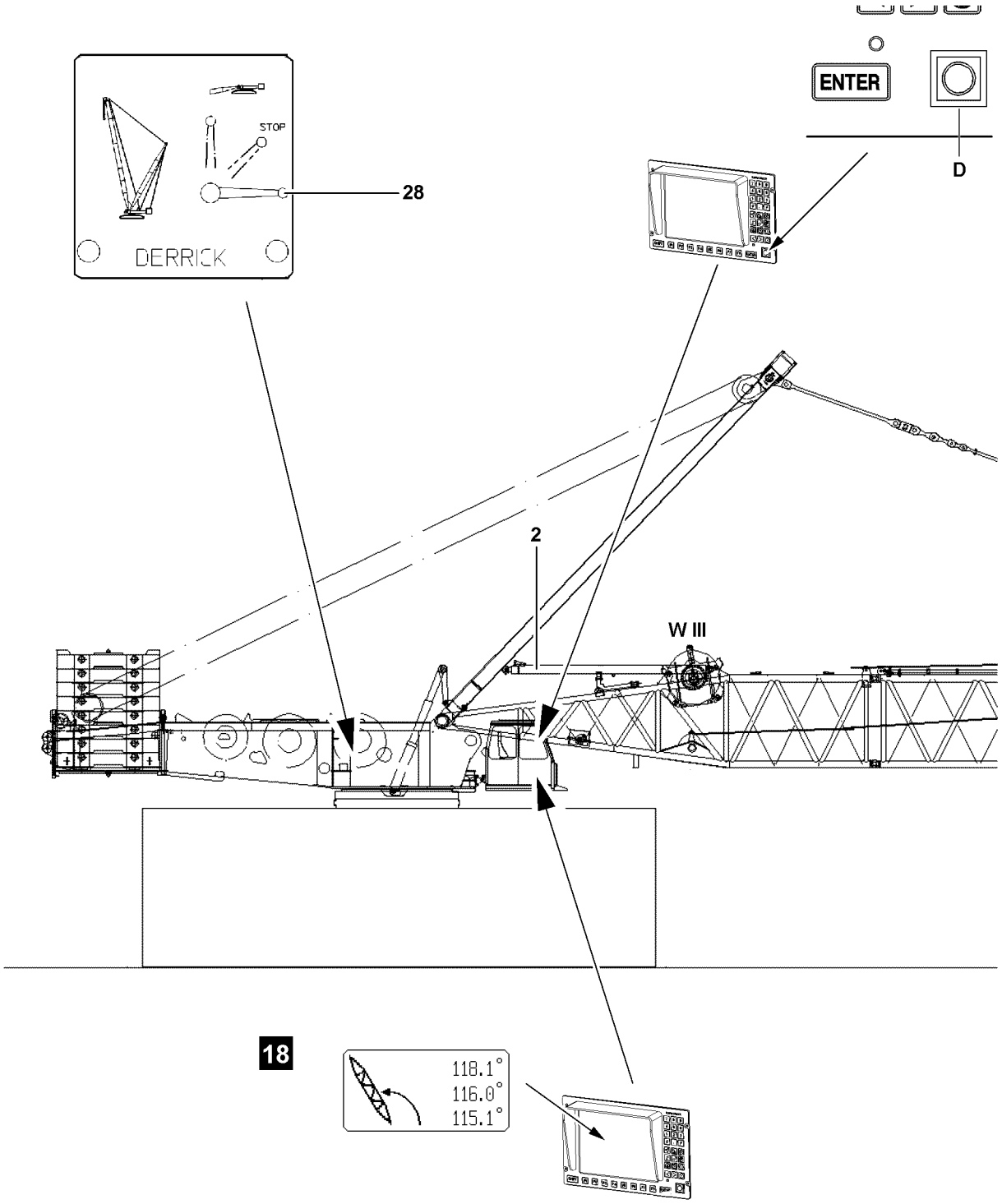

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Fig.120952

2.12 Checking the function of the safety equipment

WARNING
Non-functioning safety equipment!
If the function of the safety equipment is defective, personnel can be severely injured or killed.
▶ Crane operation with non-functioning safety equipment is **prohibited**.

Note
▶ The function of the individual limit switches must be checked before erection.
▶ The function of the limit switch initiators must be checked in the test system, see Diagnostics manual.

Note
▶ If a function check on the limit switches or on the safety equipment does not lead to the desired shut offs, then the plug connections on the connector boxes or the components itself must be checked.
▶ If no visible connection errors or component defects can be found, contact **LIEBHERR** Service.

Make sure that the following prerequisites are met:
– All electrical connections have been made.
– The crane engine is running.
– The corresponding operating mode is set on the LICCON monitor.

2.12.1 Checking the limit switch D-boom „Steepest position“

Note
▶ The limit switch functions have to be checked individually before erection.

▶ Cover the limit switch initiators on the D-relapse cylinders individually with a metal plate.

Result:

– The spool up function of the hoist winch turns off.
– The icon „Derrick boom angle“ appears on LICCON monitor 1, see illustration **18**.
– The limit switch is functioning.

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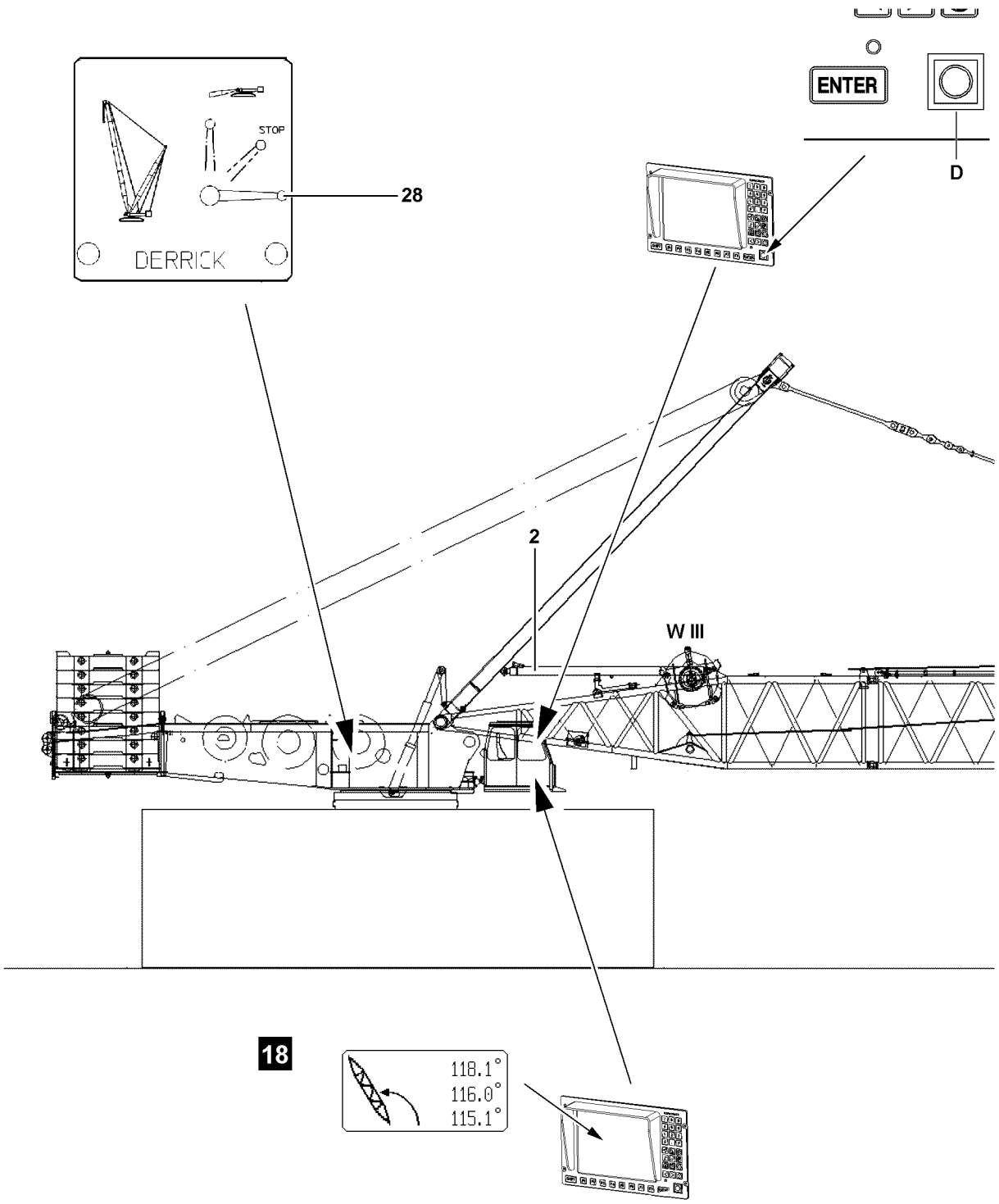

LWE/LG 1750-006/15409-07-02/en

Fig.120952

2.13 Erecting the D-boom

DANGER
The crane can topple over!
- ▶ It is not permitted to turn the crane during the erection procedure.
- ▶ Observe the specifications in the erection and take down charts.

WARNING
The crane can topple over!
If the following conditions are not met before erecting the D-boom, the crane can topple over.
Personnel can be severely injured or killed.
- ▶ Observe the technical safety instructions, see Crane operating instructions, chapter 5.01.
- ▶ Extend the D-relapse cylinder **2** before erection.
- ▶ Do not allow slack rope to build up on the winch 3.
- ▶ The ball valve cabinet must be locked.
- ▶ Always pull the key on the ball valve cabinet and hand it to an authorized person.

WARNING
Falling hoist rope!
If the hoist rope before the erection procedure is not properly secured onto the corresponding length on the D-boom, it can fall down backward on the basis of its own weight.
Personnel can be severely injured or killed.
- ▶ Reeve the hoist rope before the erection procedure with sufficient length on the D-boom.
- ▶ The hoist rope must be constantly monitored during erection.
- ▶ Do not step into the danger zone.

Make sure that the following prerequisites are met:
- – The crane is supported.
  (only in connection with crane support or for LG-cranes)
- – The crane is horizontally aligned.
- – All electrical connections have been made.
- – All limit switches are functioning.
- – A central ballast of **at least** 45 t has been installed on the crane.
- – A counterweight of **at least** 35 t has been installed on the turntable.
- – All pin connections have been secured.
- – The folding brackets of the D-relapse cylinders are in operating position.
- – The D-relapse cylinders on the D-pivot section are extended.
- – The hoist rope has been correctly placed in the rope pulleys and is prevented from jumping out with the rope retaining pins.
- – The LICCON overload protection has been set according to the data in the load chart.
- – The LICCON overload protection settings have been compared with the actual set up configuration.
- – The LICCON overload protection is exceeded.
- – The assembly icon is visible on the LICCON monitor.
- – No personnel is within the danger zone.

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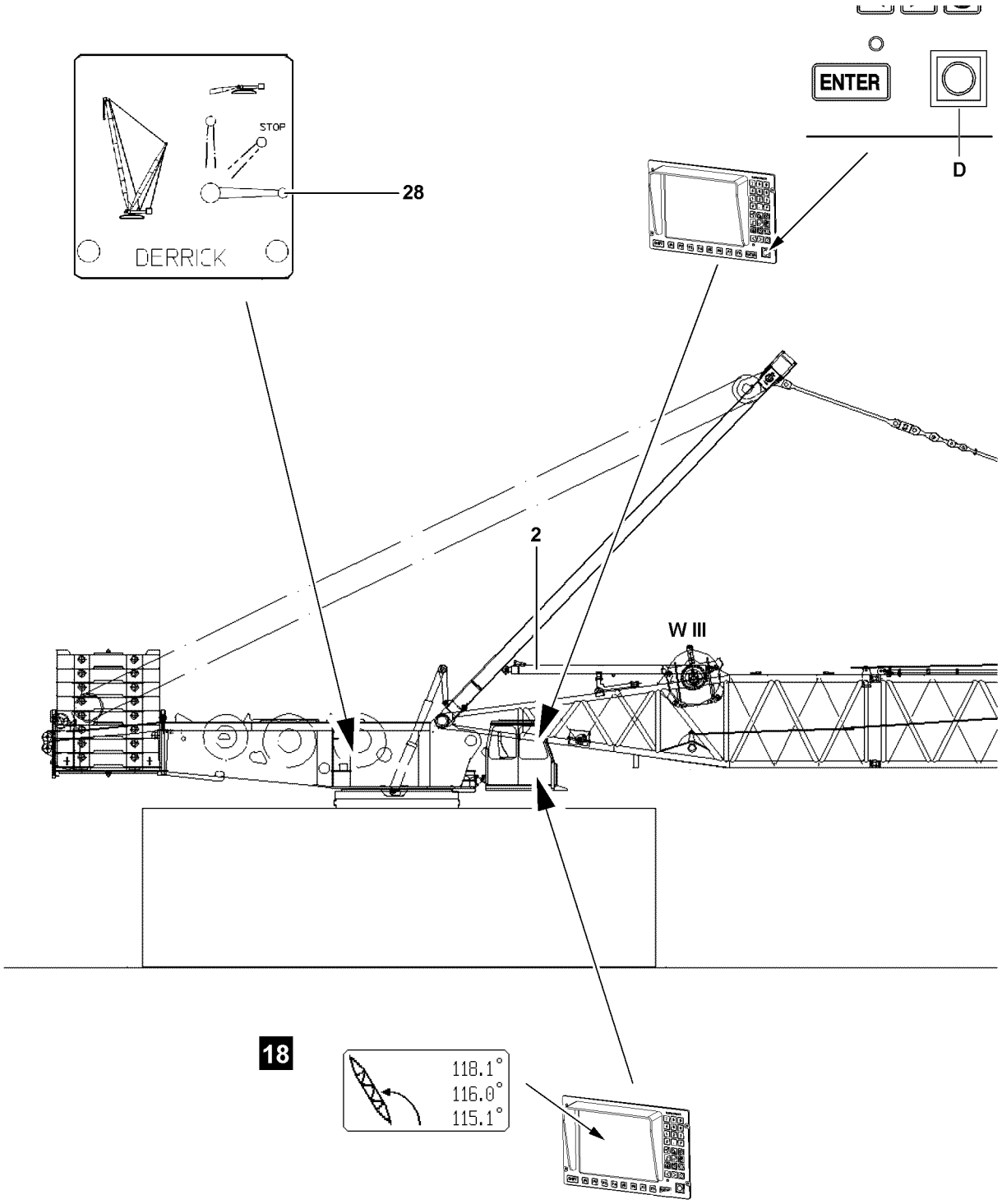

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Fig.120952

2.13.1 Extending the D-relapse cylinder

WARNING
Mortal danger due to the D-boom!
If the D-relapse cylinders are not extended before erecting the D-boom, then the D-boom can fall backward.
Personnel can be severely injured or killed.
▶ The D-relapse cylinders must be extended before erection of the D-boom.
▶ The ball valve must be secured during crane operation to prevent unintended actuation.

The piston rod on the D-relapse cylinder must be extended by actuating the ball valve **28**.

Ball valve positions	
Horizontal	Crane operation, extend the piston rod
Vertical	Assembly, retract the piston rod
45°	STOP (the piston rod cannot be retracted / extended)

Make sure that the following prerequisite is met:
– All hydraulic connections have been made.

▶ Move the ball valve **28** into horizontal position.

Result:

– The piston rods of the D-relapse cylinders **2** extend.

Note
▶ The ball valve is secured by closing the cabinet door and removing the key.

▶ Close the cabinet door and pull the key.
▶ Hand the key to an authorized person.

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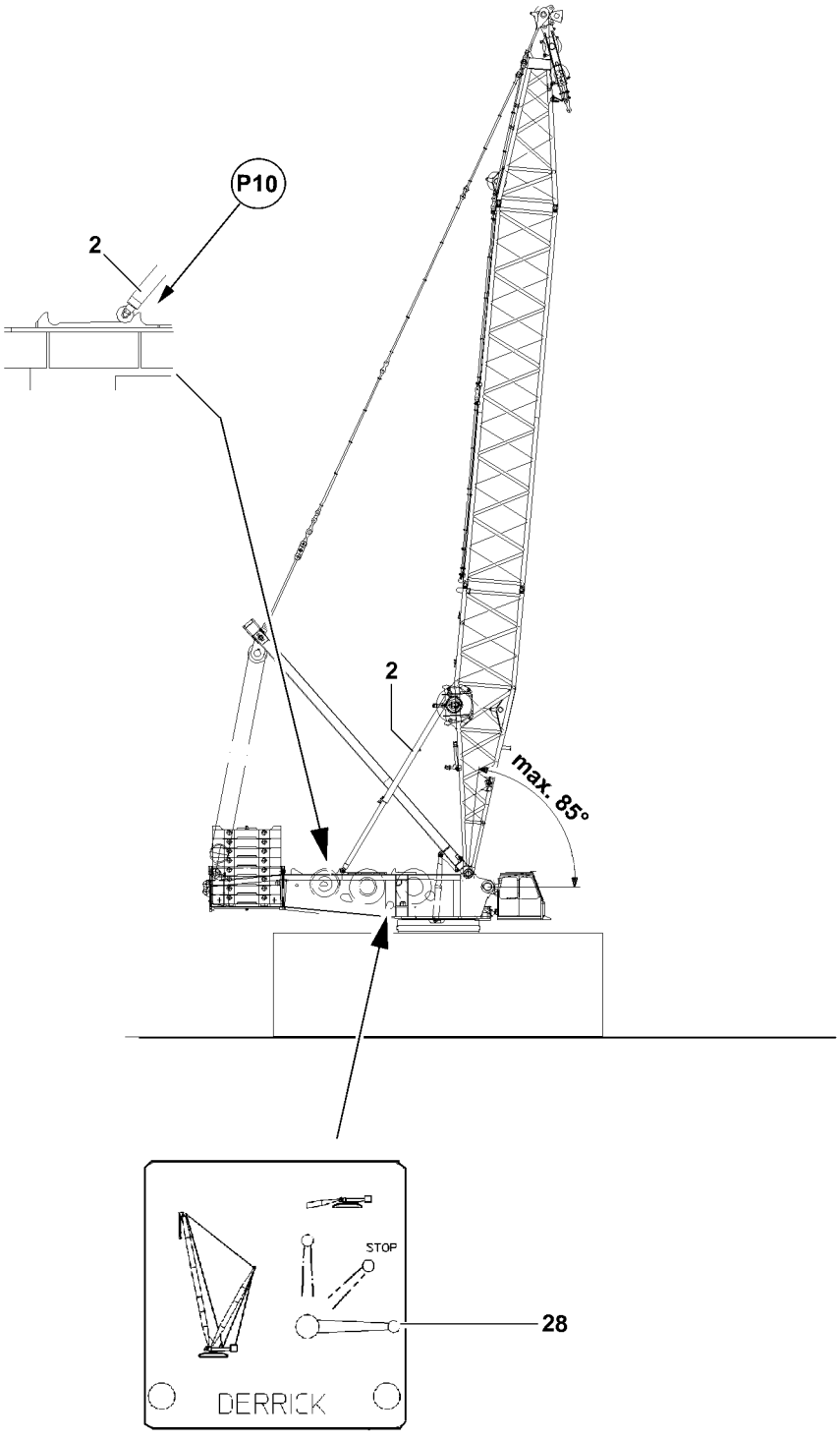

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Fig.111667

2.13.2 Erection procedure

Make sure that the following prerequisites are met:
- The D-relapse cylinders **2** are fully extended before erection.
- The control rope of winch 3 is properly reeved on the luffing pulley block and properly secured on the rope fixed point.
- The pins between the upper pulley block and the lower pulley block are unpinned.

Note

▶ During the erection procedure it must be ensured that the D-relapse cylinders **2** engage past the first stop (point **10**) into the second stop rail on the D-relapse retainer.

DANGER

The crane can topple over!

▶ It is prohibited to turn the crane superstructure during the erection procedure.

▶ Do not allow slack rope to build up on the winch 3.

▶ Do not erect the D-boom further than maximum 85° to the horizontal.

▶ Actuate winch 4 and erect the D-boom to an angle range of 75° to 85°.

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Fig.195219

3 Disassembly

WARNING
Danger of falling!
During assembly and disassembly, assembly personnel must be secured with appropriate aids to prevent them from falling. If this is not observed, assembly personnel could fall and suffer life-threatening or fatal injuries.

- ▶ Any work, where there is a danger of falling, must be carried out with suitable aids (for example: lifting platforms, scaffoldings, ladders, auxiliary crane).
- ▶ If the work cannot be carried out with such aids nor from the ground, then the assembly personnel must secure themselves with approved fall arrest systems to avoid falling, see Crane operating instructions chapter 2.04.
- ▶ If railings are present on the components, then they must be brought into the corresponding position and secured for assembly / disassembly work.
- ▶ Step on aids and fall protection equipment only with clean shoes.
- ▶ Keep aids and fall protection equipment clean and free from snow and ice.
- ▶ During all assembly and disassembly work, maintenance work and inspections, travel or crane operation is prohibited.

WARNING
Falling components!
If unsecured or non-supported components are assembled or disassembled, they can fall down.
Personnel can be severely injured or killed.

- ▶ During pinning and unpinning of the lattice sections, it is prohibited for anyone to remain **under** or **on** the components as well as within the entire danger zone.
- ▶ Support the boom and components before pinning / unpinning.
- ▶ Pin or unpin both pins laying in a horizontal, i.e. **left** and **right**.
- ▶ Secure the pins in the storage locations and in the receptacles.
- ▶ Do not disengage the auxiliary crane until the respective component is pinned and secured.
- ▶ It is prohibited to lean a ladder against the component being disassembled.

WARNING
Danger of impact / crushing!
When installing / removing crane components with the auxiliary crane, crane components can start to swing back and forth.
When lifting / lowering and positioning crane components, there is an increased danger of impacts / crushing.
Personnel can be severely injured or killed.

- ▶ Make sure that personnel cannot be caught by components.
- ▶ Make sure that the crane is aligned in horizontal position to avoid the support beams from swinging by themselves.
- ▶ When working in danger zones: Use aids to protect limbs.
- ▶ Guide components with suitable aids to minimize oscillation.

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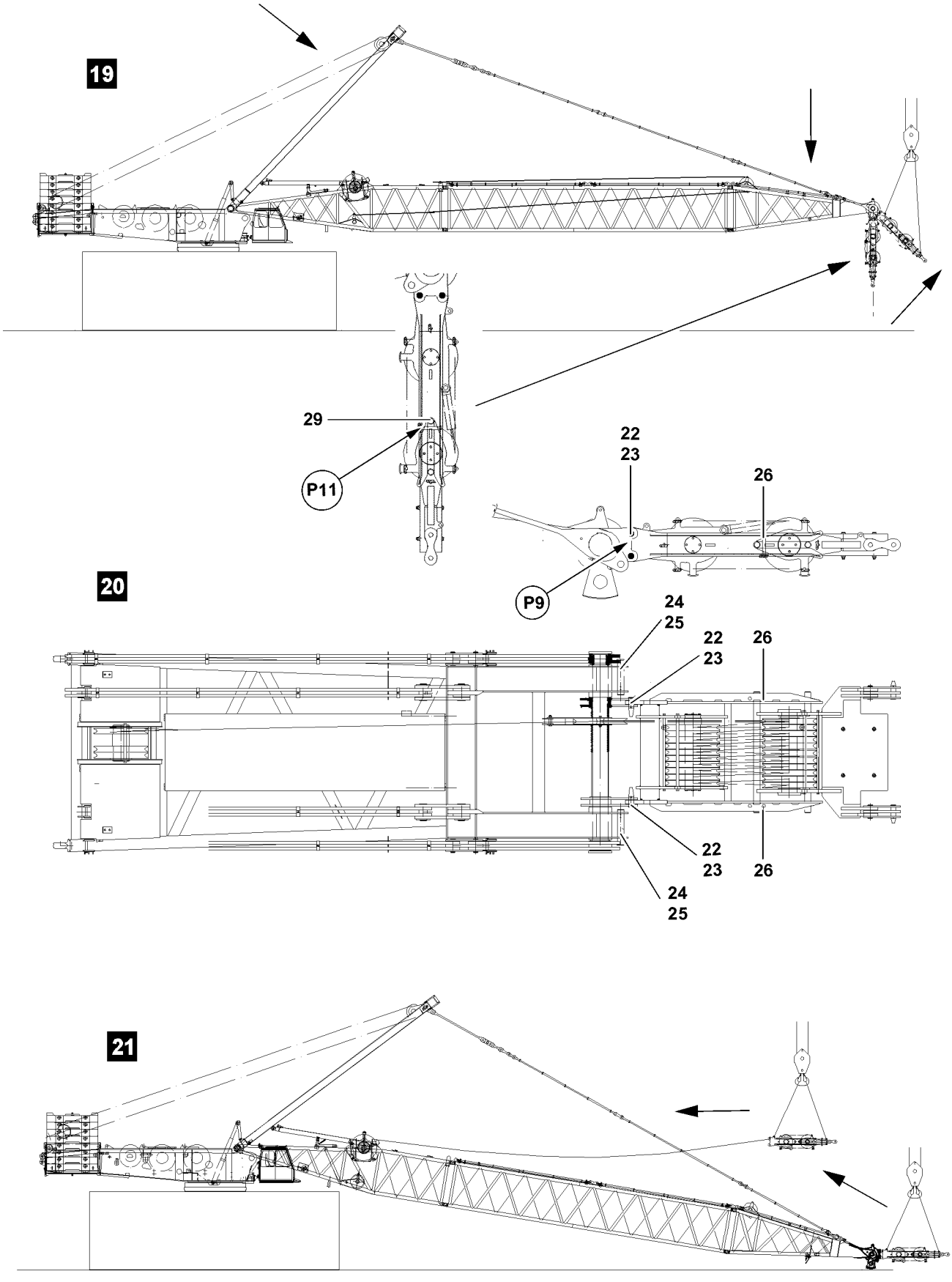

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Fig.111668

3.1 Disassembling the D-boom

WARNING
Falling boom!
If the D-boom is not properly supported before disassembly or held with an auxiliary crane, then the D-boom can fall down when it is unpinned.
Personnel can be severely injured or killed.
▶ Before supporting the D-boom, the ground condition must be checked regarding load bearing capacity and level.

If the ground condition is not classified as sufficient:
▶ Support the D-boom properly and safely with suitable material.

3.1.1 Luffing the D-boom down

NOTICE
Damage to the luffing pulley block!
If the D-boom is luffed down too quickly „to the front“, significant damage can occur on the luffing pulley block and on the D-end section.
▶ Luff the D-boom down carefully to the front.

▶ Luff the D-boom down to the front until the luffing pulley block is just above the ground.

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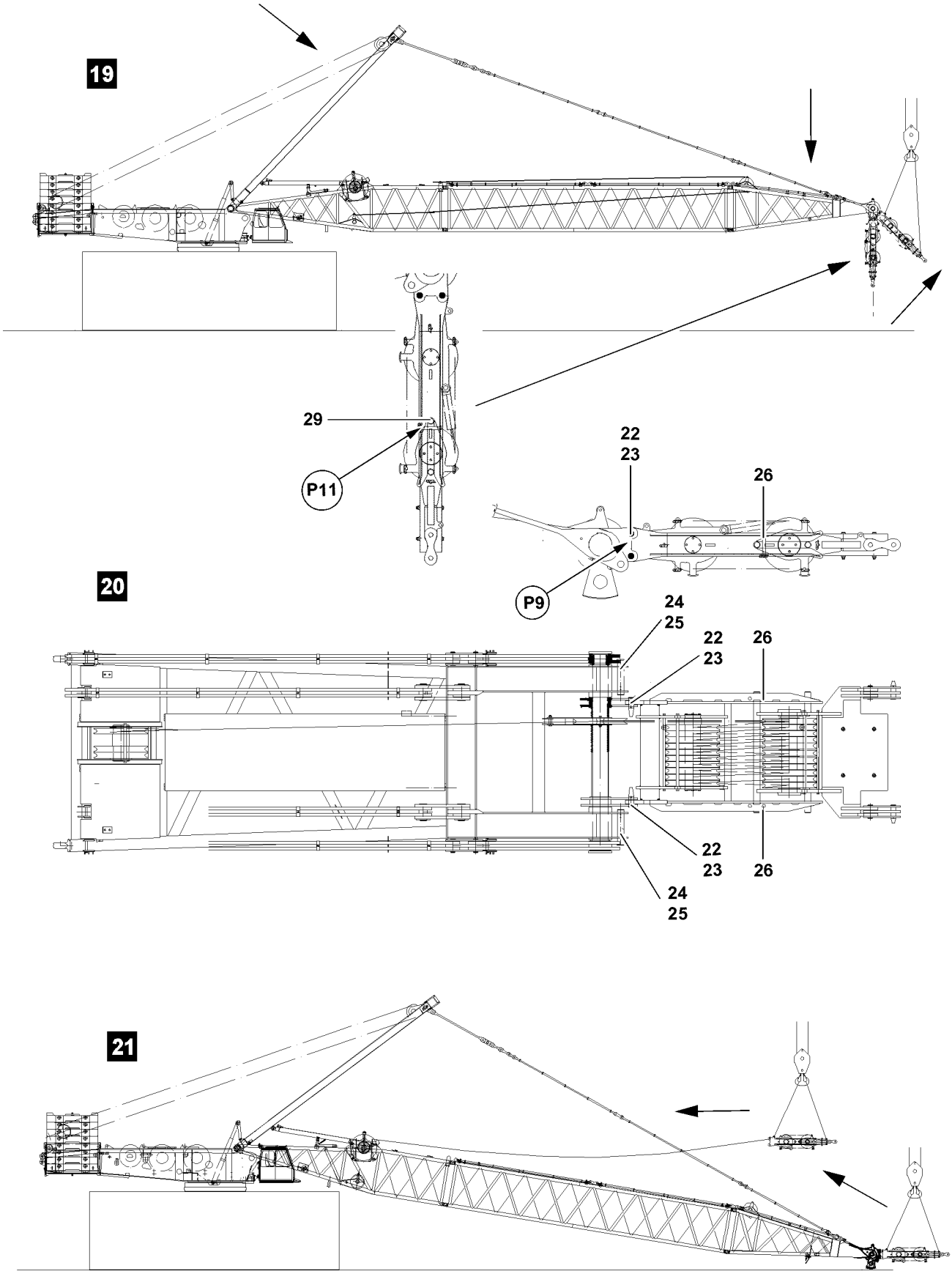

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Fig.111668

3.1.2 Pinning the upper pulley block with the lower pulley block

Make sure that the following prerequisites are met:
- The main boom is completely disassembled.
- The upper pulley block hangs in reeved condition above the ground level.
- The pins **26** on the bracket of the lower pulley block are unpinned.

The upper pulley block must be pinned with the lower pulley block before the complete luffing pulley block can be placed in the transport receptacle on the D-pivot section.

▶ Luff the D-boom down slowly and spool up winch 3 at the same time until the upper pulley block has moved together with the lower pulley block.

When the upper pulley block is approx. 150 mm before the stop of the lower pulley block:
▶ Luff the D-boom down slowly and carefully until the upper pulley block is in contact with the ground.

NOTICE
Danger of property damage on the luffing pulley block!
If the D-boom is luffed down too quickly, then significant property damage can occur on the upper as well as the lower pulley block.
▶ Always use a guide when connecting the upper and lower pulley block.
▶ Carry out all crane movements slowly and with utmost caution.
▶ When the guide pin **29** reaches the stop at point **11**, stop the luff down movement of the D-boom immediately.

When the upper pulley block is in contact with the ground:
▶ Luff the D-boom down slowly and carefully until the guide pin **29** is entered to the stop at point **11**.

When the guide pin touches on the stop, point **11**, of the lower pulley block:
▶ Stop the luff down movement immediately.
▶ Pin the pins **26** on both sides on the bracket of the lower pulley block and secure with spring retainer.

Result:

– The upper pulley block is connected with the lower pulley block and now forms the „Transport unit“ luffing pulley block.

3.1.3 Disassembling the luffing pulley block

▶ Pull the luffing pulley block up with the auxiliary crane, see illustration **19**.
▶ Luff the derrick down until the D-end section is laying on the ground, see illustration **21**.

Note

The luffing pulley block can be fastened on both sides horizontally on the D-end section with the pin **24**.
▶ Insert the pins **24** on both sides and secure with spring retainers **25**.
▶ When the luffing pulley block is fastened, it must be hung again on the auxiliary crane before unpinning.
▶ Remove spring retainers **25** and unpin the pins **24** on both sides.

Remove the luffing pulley block from the D-end section:
▶ Remove the spring retainers **22** and unpin the pins **24** on both sides.
▶ Swing the luffing pulley block out with the auxiliary crane.

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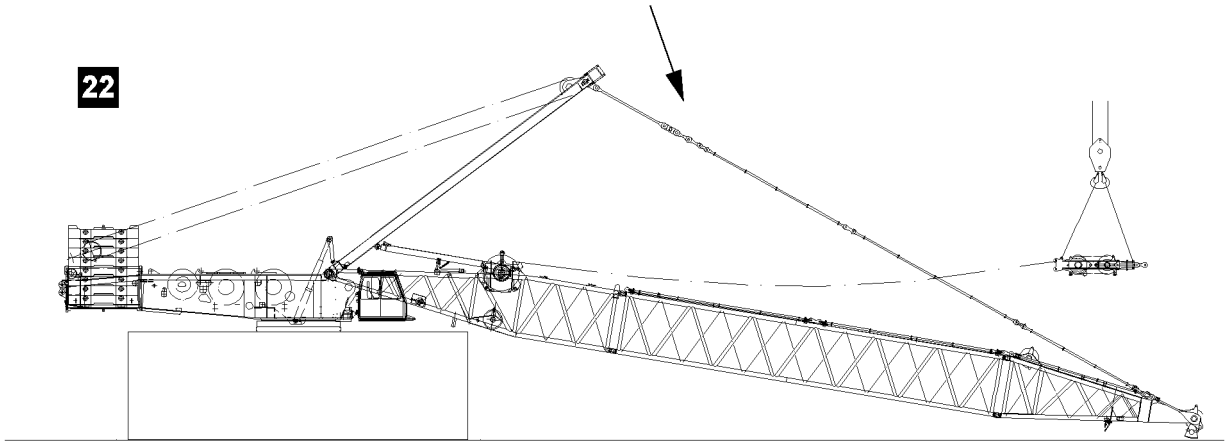

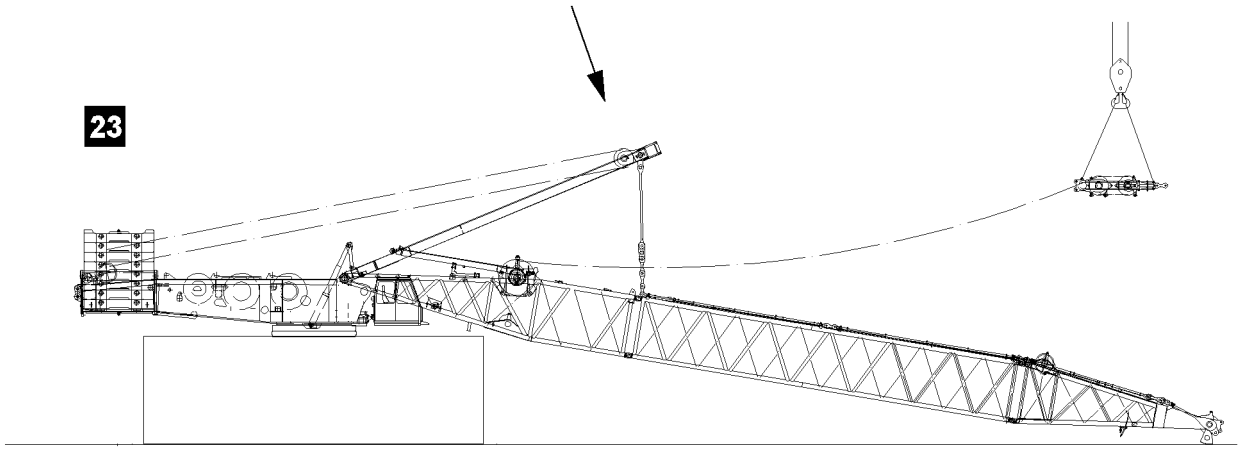

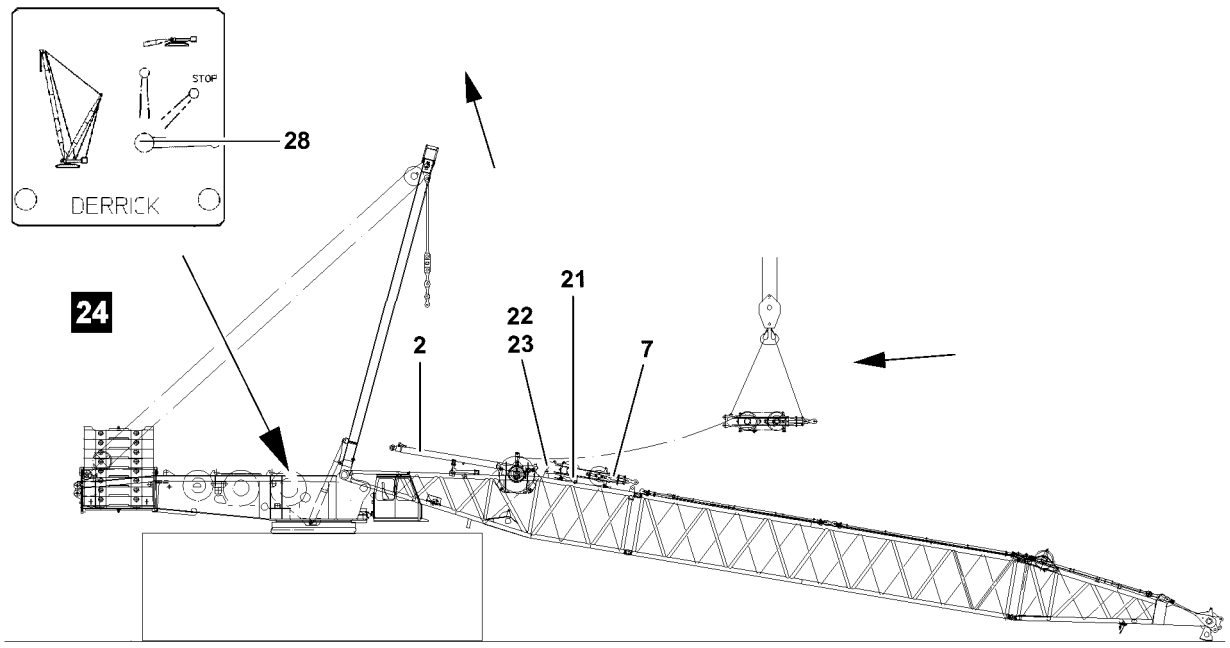

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Fig.111669

3.1.4 Disassembling the D-guy rods

- ▶ Place the guy rods into the transport retainers of the D-intermediate sections: Lower the SA-frame to the front.
- ▶ Luff the SA-frame forward until it can be unpinned on the guy rods, see illustration **23**.
- ▶ Pin and secure the guy rods in the transport retainers.
- ▶ Luff the SA-frame for easier assembly of the pulley blocks on the D-pivot section, see illustration **24**.

3.1.5 Placing the luffing pulley block into the transport receptacle on the D-pivot section

Make sure that the following prerequisites are met:
- The lower and the upper pulley block are pinned together as a "Transport unit" luffing pulley block.
- The rope retaining pins on the D-end section are released and unpinned.
- The guy rods are placed in the transport retainers and secured.
- The SA-frame is luffed up to approx. 75° to 85°.
- The D-boom is laying fully on the ground (on the substructure).

NOTICE
Danger of slack rope formation!
If winch 3 is spooled up too slowly when pulling the luffing pulley block, slack rope can form.
- ▶ The hoist rope must be slightly tensioned during the entire pulling procedure.

- ▶ Pull the luffing pulley block **7** with the auxiliary crane to the D-pivot section while spooling out winch 3 at the same time.
- ▶ Place the luffing pulley block into the transport receptacle **21** on the D-pivot section, see illustration **24**.

Secure the luffing pulley block in the transport receptacle:
- ▶ Insert the pin **22** and secure with the spring retainer **23**.

3.1.6 Retracting the D-relapse cylinder

The piston rod on the D-relapse cylinder must be retracted by actuating the ball valve **28**.

- ▶ Move the ball valve **28** into vertical position.

Result:

- The piston rod of the D-relapse cylinder retracts.

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Fig.195219

3.1.7 Disconnecting the electrical connections

▶ Disconnect all electrical connections on the D-boom properly and store the plug and cable properly.

3.1.8 Disconnecting the hydraulic connections

When releasing hydraulic lines with quick couplings, make sure that the uncoupling procedure is carried out correctly.

WARNING
Pressure in the hydraulic lines!
If the pressure supply is not interrupted before connecting / releasing the hydraulic lines, the hydraulic oil can escape with high pressure.
Personnel can be severely injured or killed.
▶ Release the pressure in the hydraulic system before connecting / disconnecting: Interrupt the pressure supply and wait for a short time.

▶ Release the hydraulic coupling by hand.
▶ Disconnect the hydraulic connection.

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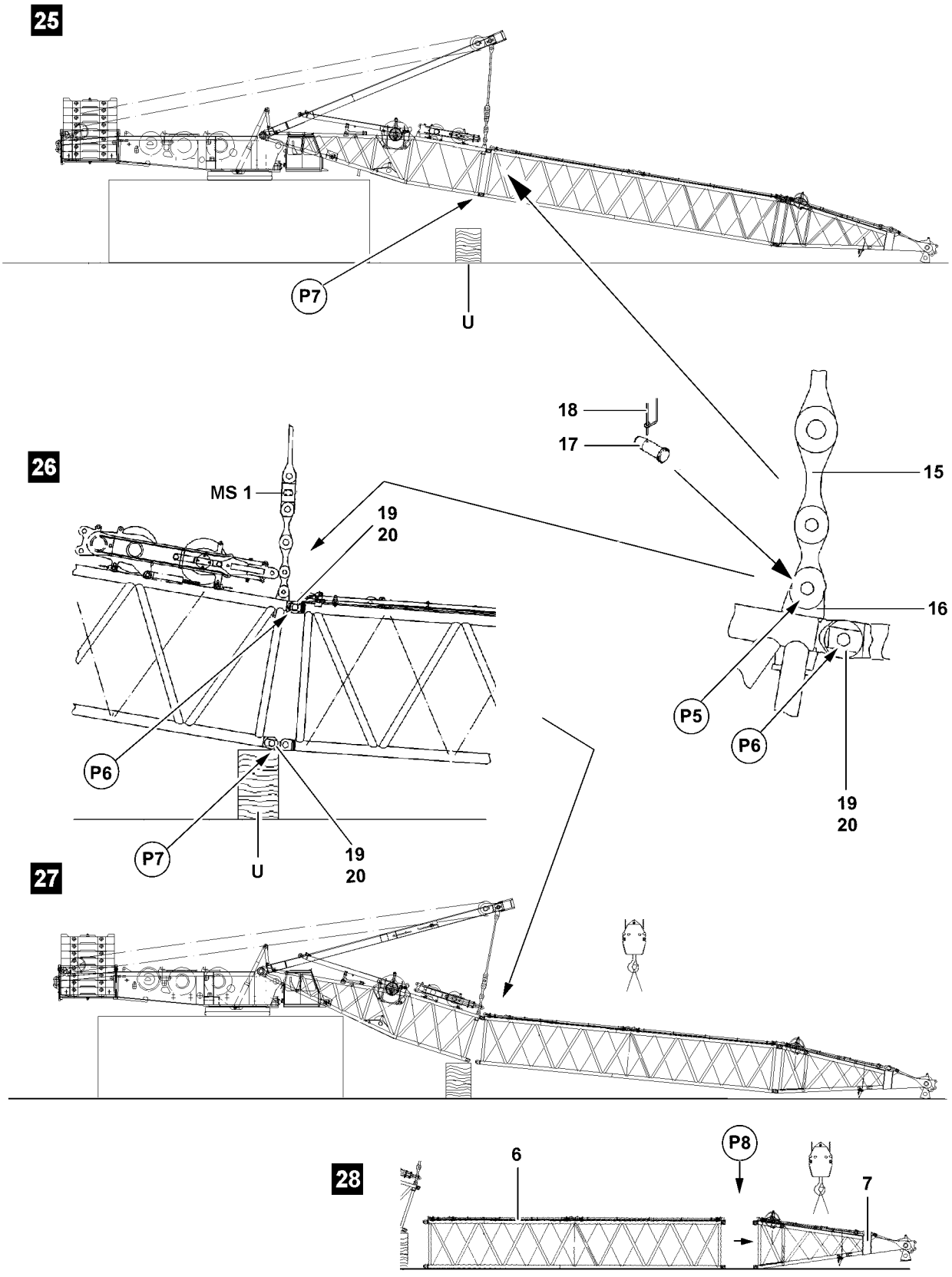

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Fig.111670

3.1.9 „Opening“ the D-boom and placing it down

Make sure that the following prerequisites are met:
- The guy rods are placed in the transport retainers and secured.
- The luffing pulley block is pinned and secured in the transport receptacle.
- The D-relapse cylinders are retracted.
- The substructure **U** is positioned under the D-pivot section.

▶ Luff the SA-frame down to the front, see Crane operating instructions, chapter 5.02.

Connect the guy rods **15** from the SA-frame on the assembly bracket **16** on the D-pivot section, point **P5**:
▶ Insert the pin **17** and secure with the spring retainer **18**.
▶ Luff the SA-frame up until the guying between the SA-frame and the D-pivot section is tensioned.

WARNING
Falling D-boom!
When unpinning the D-boom on the D-pivot section, the D-boom can fall down.
Personnel can be severely injured or killed.
▶ It is prohibited for anyone to remain under the D-boom during the unpinning procedure.
▶ Make sure that the D-boom is safely held by the guying.

▶ Unpin the D-pivot section and the D-intermediate section: Release and unpin the pins **19** on both sides „on the bottom“.
▶ Luff the SA-frame down and place the D-pivot section carefully on the substructure **U**, see illustration **26**.
▶ Fasten the D-boom on the auxiliary crane.

When the D-boom is safely held by the auxiliary crane:
▶ Release and unpin the pins **19** on both sides „on top“.
▶ Place the D-boom carefully on the ground, see illustration **28**.

WARNING
Tipping lattice sections!
When the lattice sections are unpinned, they can tip over, depending on the ground or the substructure.
Personnel can be severely injured or killed.
▶ The lattice sections must be safely held by the auxiliary crane before unpinning them.
▶ The fastening equipment must be tensioned before unpinning.

▶ Disassemble the D-end section and the D-intermediate section, point **P8**, see illustration **28**.

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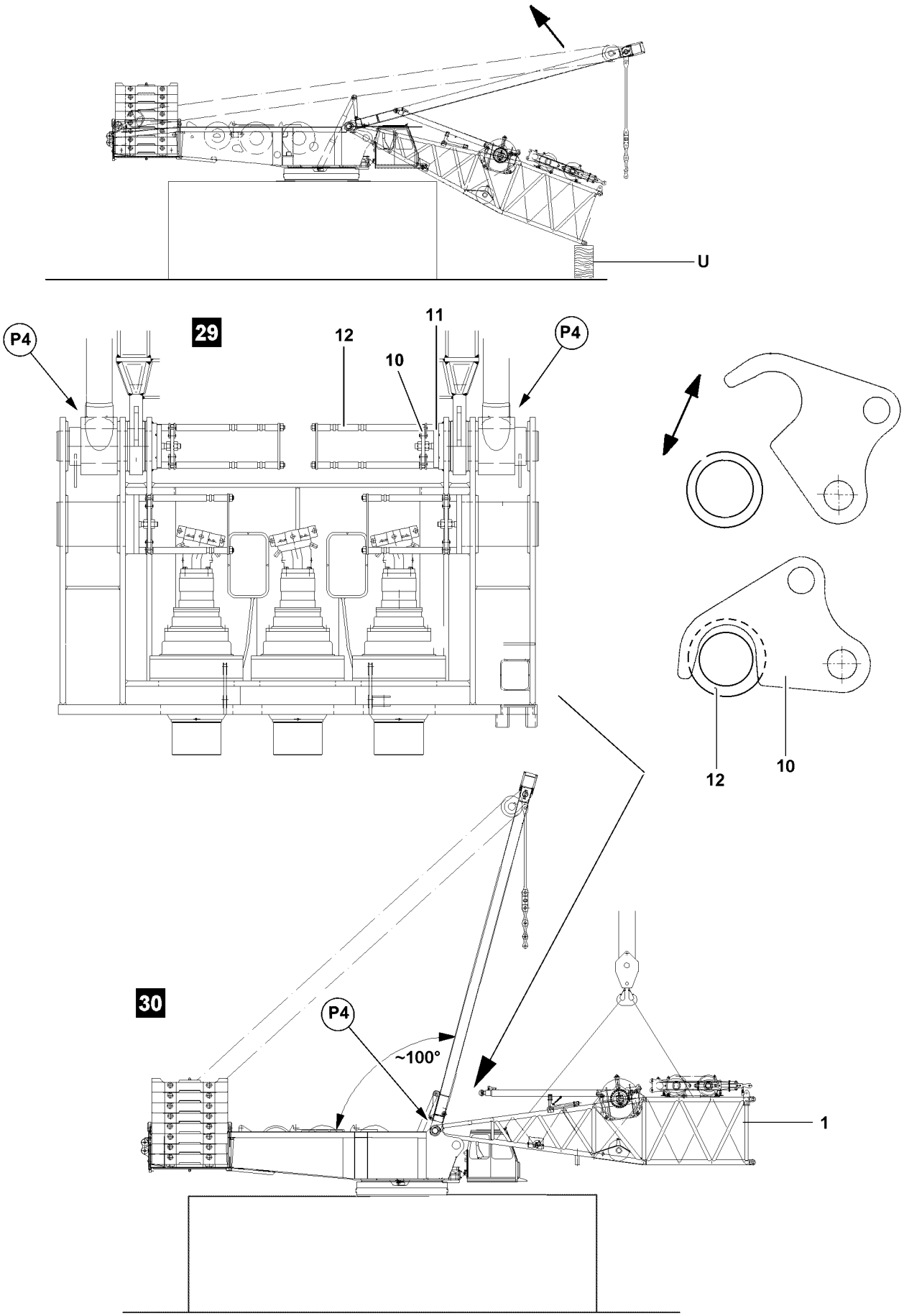

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Fig.111671

3.1.10 Unpinning the D-pivot section

Make sure that the following prerequisite is met:
– The SA-frame is erected to approx. 100°.

▶ Fasten the D-pivot section on the fastening points on the auxiliary crane, see illustration **30**.
▶ Pull the D-pivot section up with the auxiliary crane to the horizontal.
▶ Fold both retaining hooks **10** from the guide **12**.

Note
▶ Operation of radio remote control (only available for the LR-crane), see Crane operating instructions, chapter 6.08.

▶ Actuate the radio remote control and unpin the pin **11**.
▶ Secure the pins **11** by folding the retaining hooks **10** into the guide **12**.
▶ Carefully swing the D-pivot section out from the turntable with the auxiliary crane and place it on the ground.
▶ Remove the auxiliary crane.

3.2 Disassembling the fall protection equipment on the D-pivot section

Note
▶ To retain the transport dimensions on the D-pivot section, remove the fall protection equipment.

The railings must be removed after disassembly of the D-pivot section and stored in the transport receptacle.

▶ Insert the railings in the intended transport retainers on the D-pivot section and secure with spring retainers.

3.3 Disassembling the fall protection equipment on the D-boom

Note
▶ Observe the notes, see Crane operating instructions, chapter 2.06 and / or chapter 6.50.

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5.07 SW/SDW boom combination

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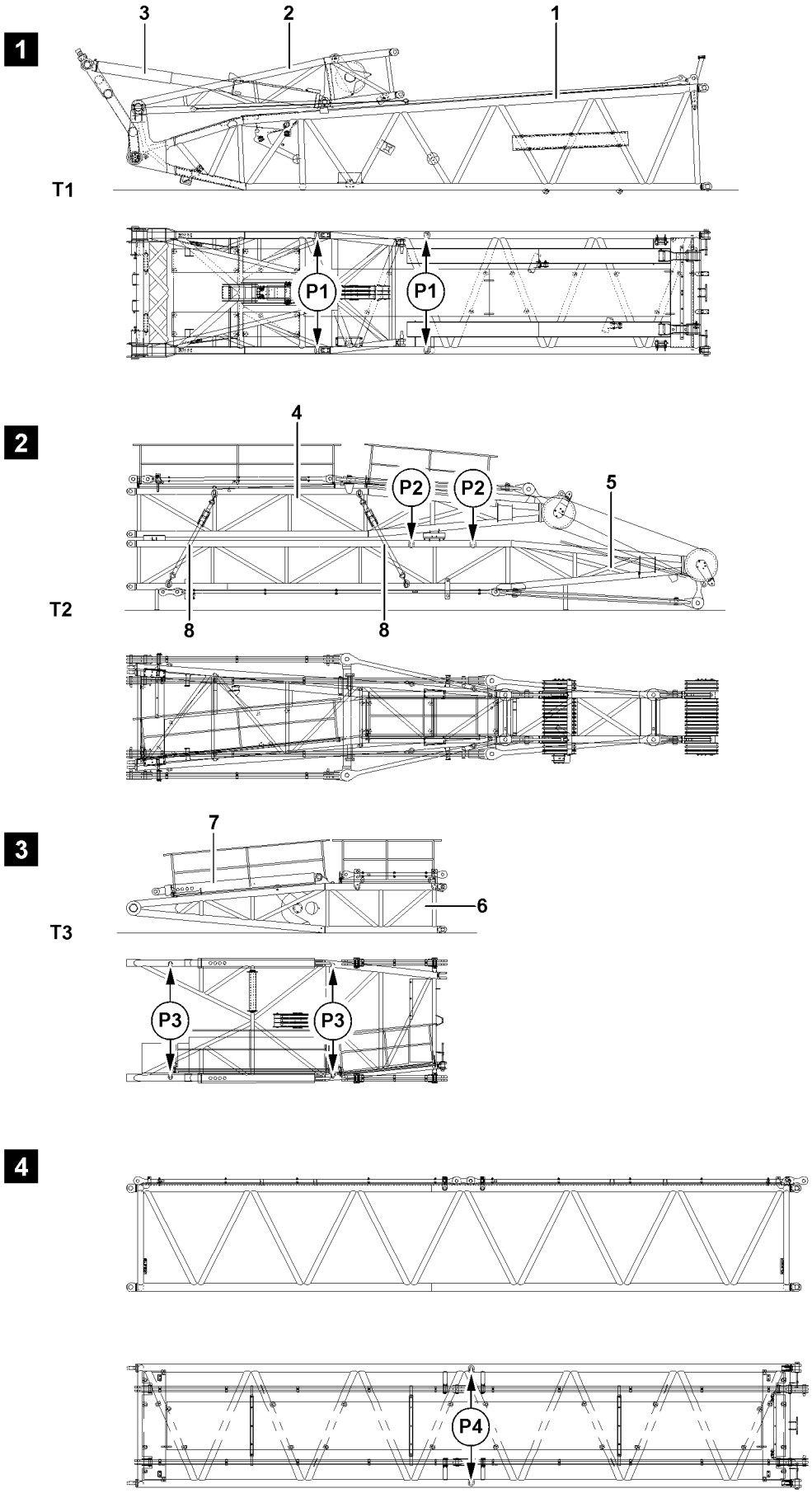

Fig.111632

1 Component overview W-boom system

The transport unit **T1** consists of:
- **1** W-pivot section
- **2** WA-frame 1, pivot section
- **3** W-relapse retainer

The transport unit **T2** consists of:
- **4** WA-frame 2, end section
- **5** WA-frame 1, end section
- **8** Lashing belts

The transport unit **T3** consists of:
- **6** WA-frame 2, pivot section
- **7** Relapse support

2 Weights W-transport units

Position	Component	Weight
T1	Transport unit 1	10.6 t
T2	Transport unit 2	8.4 t
T3	Transport unit 3	2.2 t

3 Fastening points components W-system

Fastening points	
P1	For transport unit 1, see illustration **1**
P2	For transport unit 2, see illustration **2**
P3	For transport unit 3, see illustration **3**
P4	LI-intermediate section, see illustration **4**

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4 Assembly W-boom system

WARNING
Danger of falling!
During assembly / disassembly work, personnel must be secured with appropriate aids to prevent them from falling. If this is not observed, assembly personnel could fall and suffer life-threatening or fatal injuries.

- ▶ Any work, where there is a danger of falling must be carried out with suitable aids (for example lifting platform, scaffolding, ladder, auxiliary crane).
- ▶ If the work cannot be carried out with such aids nor from the ground, then the assembly personnel must secure themselves with approved fall arrest systems to avoid falling, see Crane operating instructions, chapter 2.04.
- ▶ Approved fall arrest systems must be hung into the respective fastening points on the crane, see Crane operating instructions, chapter 2.06.
- ▶ If railings are present for the crane, then they must be brought into the corresponding position and secured for assembly / disassembly work.
- ▶ Step on aids and fall protection equipment only with clean shoes.
- ▶ Keep aids and fall protection equipment clean and free from snow and ice.
- ▶ Stepping or walking on crane components and lattice sections, which have an incline of more than 20° is prohibited.
- ▶ During all assembly and disassembly work, maintenance work and inspections, travel and crane operation is prohibited.

WARNING
Falling components!
If unsecured or non-supported components are assembled or disassembled, they can fall down.
Personnel can be severely injured or killed.

- ▶ During pinning and unpinning of the lattice sections, it is prohibited for anyone to remain **under** or **on** the components as well as within the entire danger zone.
- ▶ Support the boom and components before pinning / unpinning.
- ▶ Pin or unpin both pins laying in a horizontal, i.e. **left** and **right**.
- ▶ Secure the pins in the storage locations and in the receptacles.
- ▶ Do not disengage the auxiliary crane until the respective component is pinned and secured.
- ▶ It is prohibited to lean a ladder against the component being disassembled.

WARNING
Danger of impact / crushing!
When installing / removing crane components with the auxiliary crane, crane components can start to swing back and forth.
When lifting / lowering and positioning crane components, there is an increased danger of impacts / crushing.
Personnel can be severely injured or killed.

- ▶ Make sure that personnel cannot be caught by components.
- ▶ Make sure that the crane is aligned in horizontal position to avoid the support beams from swinging by themselves.
- ▶ When working in danger zones: Use aids to protect limbs.
- ▶ Guide components with suitable aids to minimize oscillation.

WARNING
Neglected inspection and maintenance on guy rods!
If the regular inspection and maintenance of the guy rods is not carried out or is carried out only in irregular intervals, then severe accidents can occur due to existing and unrecognized damage to the guy rods.
Personnel can be severely injured or killed.

- ▶ Check the guy rods before every assembly, see Crane operating instructions, chapter 8.15.

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WARNING
Neglected inspection and maintenance on guy rods!
If the regular inspection and maintenance of the guy rods is not carried out or is carried out only in irregular intervals, then severe accidents can occur due to existing and unrecognized damage to the guy rods.
Personnel can be severely injured or killed.
▶ Check the guy rods before every assembly, see Crane operating instructions, chapter 8.15.

NOTICE
Property damage!
▶ Always pin in the pins of the guy rods from the „inside“ to the „outside“.

Note
▶ By supporting the components during assembly / disassembly, ground unevenness is compensated for and the material is protected.
▶ The W-intermediate sections are pinned and unpinned with the aid of the pin pulling device, see Crane operating instructions, chapter 5.30.

Note
▶ Assembly of boom combinations, see rod plans.
▶ Assembly and retention of S-guy rods, see rod plans. The numbering on the rod plans must be identical to the numbering on the guy rods.

The W-boom system can be assembled on the following basic configurations:
– S-boom
– SDB-boom systems

Make sure that the following prerequisites are met:
– The crane is properly supported (LG-crane or LR-crane as „Pedestal Crane“)
– The crane is aligned in horizontal direction.
– An assembly scaffolding / work platform is available.
– The S-boom is assembled.
– The derrick boom and derrick ballast are assembled.
– The counterweight is installed on the turntable and placed on the derrick ballast according to the load chart.
– The LICCON overload protection has been set according to the data in the load chart.
– The LICCON overload protection settings have been compared with the actual set up configuration.
– An auxiliary crane with an adequate load-bearing capacity is available.

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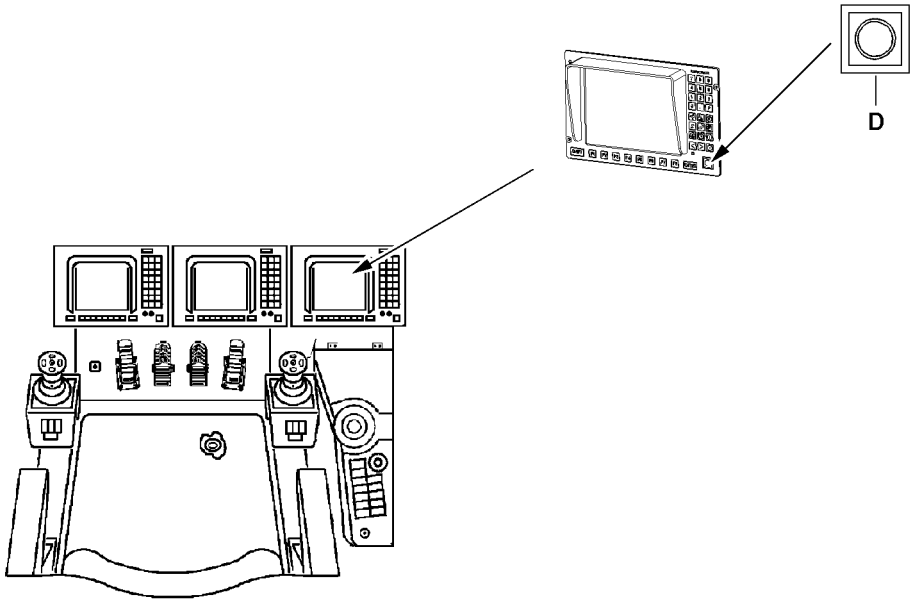

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Fig.120506

4.1 Exceeding the LICCON overload protection for assembly

WARNING
Danger of accident due to function „Exceeding the shut off limits of the LICCON overload protection“!
If the shut off limits of the LICCON overload protection are exceeded, there is no additional protection against crane overload.
Due to erroneous operation or deliberate misuse, the crane could collapse, the boom can break off or the crane can topple over.
Personnel can be severely injured or killed.

- ▶ The function „Exceeding the shut off limits of the LICCON overload protection“ is only permissible in emergencies and for assembly purposes.
- ▶ The function „Exceeding the shut off limits of the LICCON overload protection“ may only be actuated by persons who know the effects of their actions regarding the function „Exceeding the shut off limits of the LICCON overload protection“.
- ▶ The function „Exceeding the shut off limits of the LICCON overload protection“ requires the presence of an authorized person and must be performed with utmost caution.
- ▶ Crane operation with activated function „Exceeding the shut off limits of the LICCON overload protection“ is prohibited.

When the S-boom has reached the „lowest“ operating position:

- ▶ Exceeding the shut off limits of the LICCON overload protection: Engage assembly operation.

Result:

- – The shut off limits of the LICCON overload protection are exceeded.
- – The assembly icon appears on the LICCON monitor.

Note

- ▶ See Crane operating instructions, chapter 4.02.

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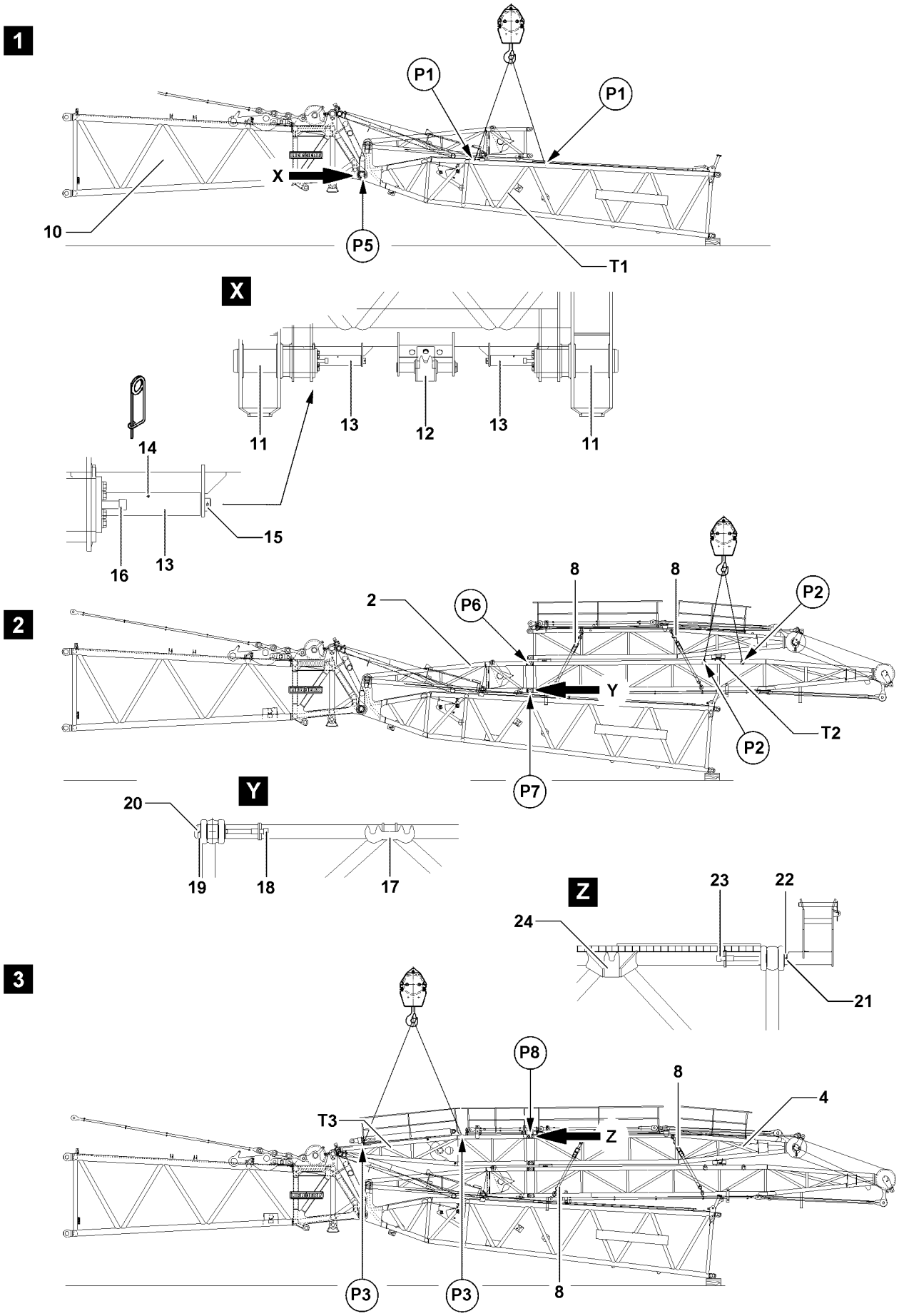

Fig.111634

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4.2 Assembling the W-transport units

4.2.1 Assembling the W-transport unit 1

Illustration **1**:

- ▶ Attach the auxiliary crane on the fastening points **P1** on the transport unit **T1**.
- ▶ Remove the retaining plate **13**: Remove the spring retainer **14** and pull the retaining plate **13** from the pin.

Result:

– The pin **11** can be pinned.

Note

- ▶ The retainer **12** can be offset to the left or right when the piston stroke of the pin pulling cylinder is not sufficient to pin or unpin the pin **11** completely.

- ▶ Hang the pin pulling cylinder on the retainer **12** and screw **16**, see detail **X**.
- ▶ Pin the transport unit **T1** on the S-end section **10**: Insert the pins **11** on both sides on point **P5**.
- ▶ Secure the pin **11**: Slide the retaining plate **13** over the pin **15** and secure with spring retainer **14**.

4.2.2 Assembling the W-transport unit 2

Illustration **2**:

Make sure that the following prerequisite is met:
– The lashing belts **8** are tightly rigged on transport unit 2.

WARNING
Slipping component!
If the lashing belts are not present or insufficiently secured while raising the transport unit 2, the end section of the WA-frame 2 can slide down.
Personnel can be severely injured or killed.

- ▶ Make sure that the lashing belts **8** on the transport unit **T2** are tightly secured.

- ▶ Attach the auxiliary crane on the fastening points **P2** on the transport unit **T2**.
- ▶ Hang the pin pulling cylinder on the retainer **17** and screw **18**, see detail **Y**.
- ▶ Pin the transport unit **T2** on the WA-frame 1 pivot section **2** „on top“: Insert the pin **19** on both sides on points **P6** and secure with spring retainer **20**.
- ▶ Pin the transport unit **T2** on the WA-frame 1 pivot section **2** „on the bottom“:

4.2.3 Assembling the W-transport unit 3

Illustration **3**:

- ▶ Attach the auxiliary crane on the fastening points **P3** on the transport unit **T3**.
- ▶ Hang the pin pulling cylinder on the retainer **24** and screw **23**, see detail **Z**.
- ▶ Pin the transport unit **T3** on the WA-frame 2 end section **4**: Insert the pin **22** on both sides at point **P8** and secure with spring retainer **21**.
- ▶ Remove lashing belts **8** on the transport unit **T2**.

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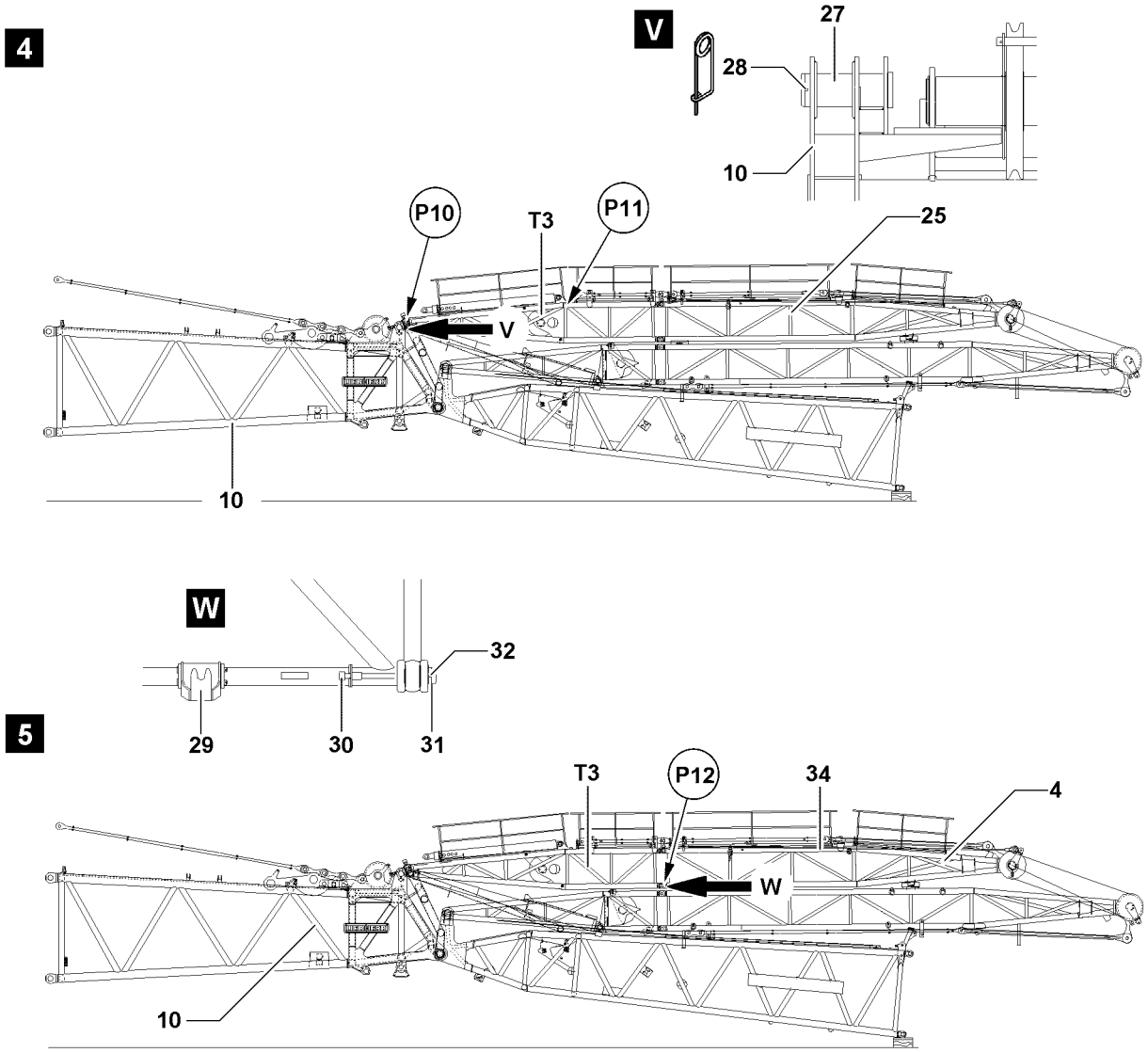

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Fig.111635

4.2.4 Pinning the W-transport units together

Make sure that the following prerequisite is met:
– The pins **33** are released, see detail **V**.

Illustration **4**:

▶ Attach the auxiliary crane on the fastening point **P11** on the transport unit **T3**.

The pinning position between the transport unit and the S-end section is established by:
– Luffing the S-boom up or down.
– Positioning of the WA-frame 2 **25** with the auxiliary crane.

▶ Position the WA-frame 2 **25** until the pin points **P10** align.
▶ Pin the transport unit **T3** on the S-end section **10**: Insert the pin **27** on both sides at point **P10** and secure with spring retainer **28**.

Illustration **5**:

▶ Lift the transport unit **T3** with auxiliary crane until the pin points **P12** align.
▶ Hang the pin pulling cylinder on the retainer **29** and on the screw **30**.
▶ Pin the transport unit **T3** on the WA-frame 2 end section **4**: Insert the pin **31** on both sides at point **P12** and secure with spring retainer **32**.

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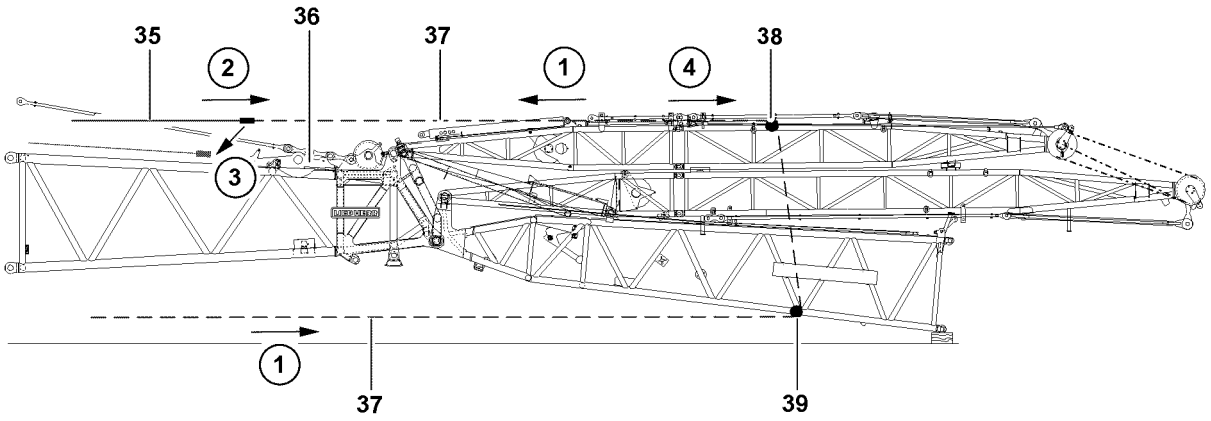

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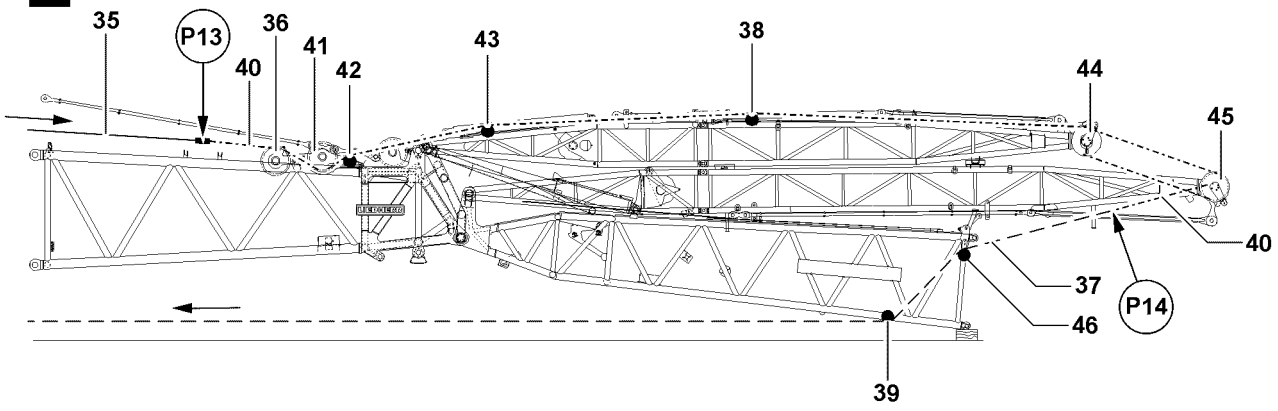

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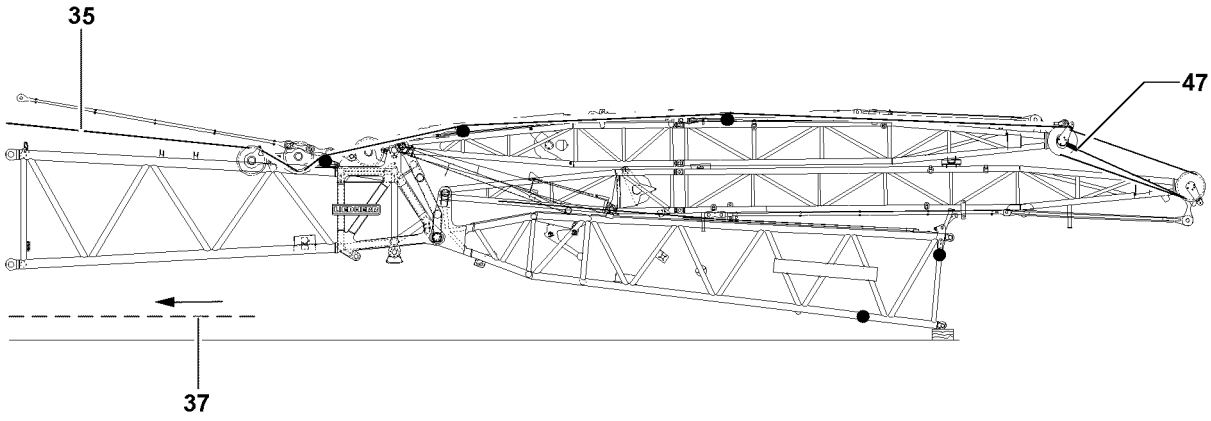

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Fig.111982

4.3 Reeving the W-control rope in

NOTICE
Slack rope formation!
The control rope can become damaged due to slack rope formation.
- ▶ Make sure that the rope does not slacken up when spooling the W-control rope out.
- ▶ Make sure that the W-control rope remains tensioned when spooling out.

Note
- ▶ Reeving, see reeving plan.

4.3.1 Getting the W-control rope with the assembly rope

Rope run for the assembly rope **37**, see illustration **6**.

- ▶ Pull the assembly rope **37** for the assembly winch over the roller **39** and the roller **38** up to winch 5, action step **1**.
- ▶ Connect the assembly rope **37** with the W-control rope **35** from winch 5.
- ▶ Pull the W-control rope **35** up to the rope pulley **36** on the S-boom: Spool the assembly winch up and simultaneously spool winch 5 out, action step **2**.
- ▶ Separate the W-control rope **35** from the assembly rope **37** and lay it down in front of the rope pulley **36**, action step **3**.
- ▶ Pull the assembly rope **37** back up to the roller **39** and lay on the ground, action step **4**.

4.3.2 Reeving the W-control rope in

Make sure that the following prerequisites are met:
- The intake ropes are interconnected on the WA-frame 2.
- The intake role is reeved in on the W-pulley sets.

Note
- ▶ Before reeving in the W-control rope, the rope retaining pins of the rope pulley **42**, pulley set **44** and pullet set **45** must be released and unpinned.

Note
- ▶ For simplify the reeving, the W-pulley sets are raised with an auxiliary crane.

Rope run for the intake rope **40** and the assembly rope **37**, see illustration **7**.

- ▶ Connect the W-control rope **35** and the intake rope **40** on point **P13**.
- ▶ Lay the intake rope **40** on the rope pulley **36** and the under the rope pulley **41**.
- ▶ Pull the assembly rope **37** over the roller **46** to the point **P14**.
- ▶ Connect the assembly rope **37** and the intake rope **40** on point **P14**.

Illustration **8**:

- ▶ Pull the W-control rope **35** in and hook it on the rope fixed point **47**.
- ▶ Spool the assembly rope **37** on the assembly winch.

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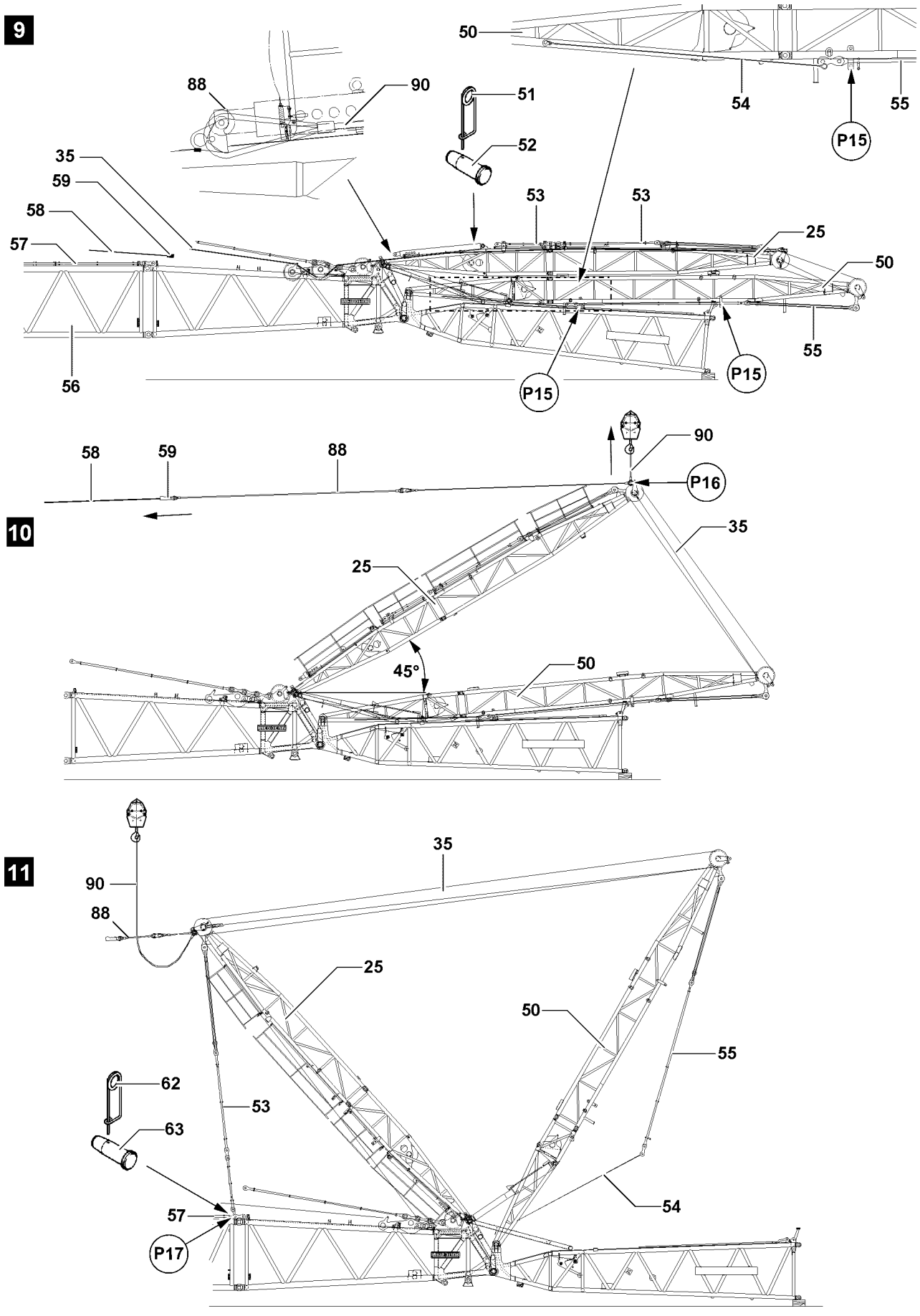

Fig.120514

4.4 Assembling the guy rods WA-frame 2

NOTICE
Property damage!
▶ Always pin in the pins of the guy rods from the „inside“ to the „outside“.

Make sure that the following prerequisite is met:
– The WA-frame 2 **25** is laying on the WA-frame 1 **50**.

Note
▶ Additional guy rods for certain operating modes, see Rod plan.

Fastened on the pulley set on point **P16**, see illustration **10**, are the two ropes **61**:
– The first rope is used to lift the WA-frame 2 **25** with the auxiliary crane.
– The second rope is used to erect the WA-frame 2 **25** with the hoist rope **58**.

Illustration **9**:

▶ Release and unpin transport retainers of the W-guy rods **57** on the S-lattice sections **56** on both sides.

If required according to the rod plan:
▶ Pin and secure the additionally required guy rods.
▶ Release and unpin the transport retainers for the W-guy rods **53** on the WA-frame 2 **25** on both sides.
▶ Pin the W-guy rods **53** on the WA-frame 2 **25** together: Insert the pin **52** on both sides from the „inside“ to the „outside“ and secure with spring retainer **51**.
▶ Hook the rope **59** on the lock **88** and secure.

Note
▶ Make sure that the connector elements on rope **88** are connected and secured.

▶ Hang the hoist rope **58** in the lock **59** on the rope **88** and secure.

Result:

– The WA-frame 2 is connected with the hoist rope.

▶ Ensure that the WA-frame 1 **50** and the guy rods **55** are secured with the assembly ropes **54**, see illustration **11**.
▶ Release and unpin the transport retainers on the guy rods **55** on point **P15**.

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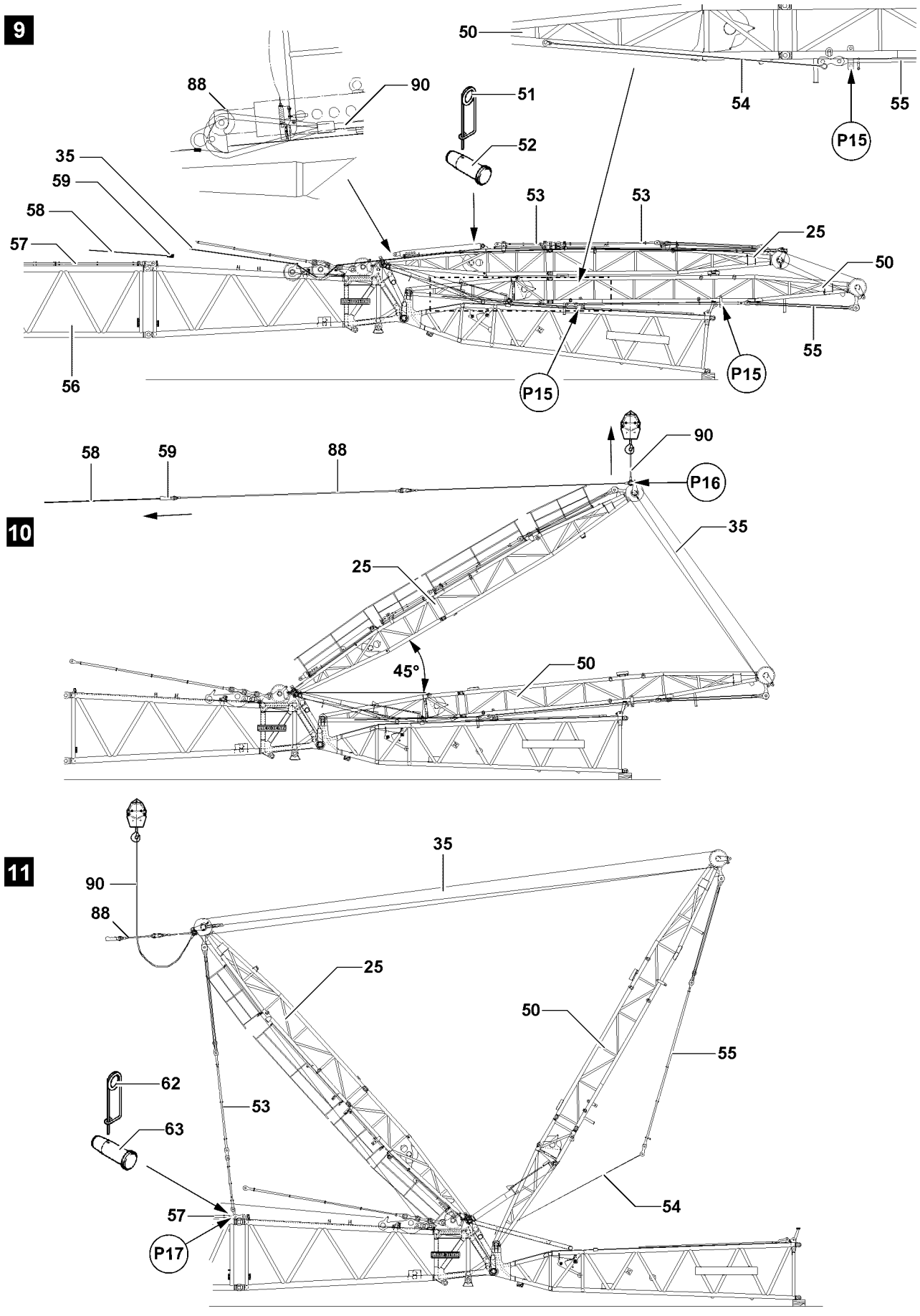

Fig.120514

Illustration **10**:

NOTICE
Danger of slack rope formation!
During erection of the WA-frame 2 **25** slack rope can form if the control winch (winch 5) spools out too fast.

- ▶ Make sure that the spool out speed of the control winch - to avoid slack rope formation - is matched to the erection speed of WA-frame 2.

- ▶ Attach the rope **90** on the auxiliary crane.
- ▶ Spool out the W-control rope **35** and simultaneously lift the WA-frame 2 **25** with auxiliary crane to approximately 45°.
- ▶ Tension the hoist rope **58** until the WA-frame 2 **25** is held by the hoist rope.

Illustration **11**:

- ▶ Relieve the rope **90**. Lower the auxiliary crane.
- ▶ Offset the auxiliary crane so that the WA-frame 2 can be pulled back, see illustration.
- ▶ Spool the W-control rope **35** out and pull the WA-frame 2 **25** back at the same time with the hoist rope until the W-guy rods move away from the WA-frame 2 and hang down vertically.
- ▶ Remove the auxiliary crane.
- ▶ Spool the W-control rope **35** out and simultaneously pull back the WA-frame 2 **25** with the hoist rope until the guy rods **53** and the W-guy rods **57** can be pinned together on point **P17**.
- ▶ Pin the W-guy rods **53** on the W-guy rods **57**: Insert the pin **63** on both sides at point **P17** from the „inside“ to the „outside“ and secure with spring retainer **62**.

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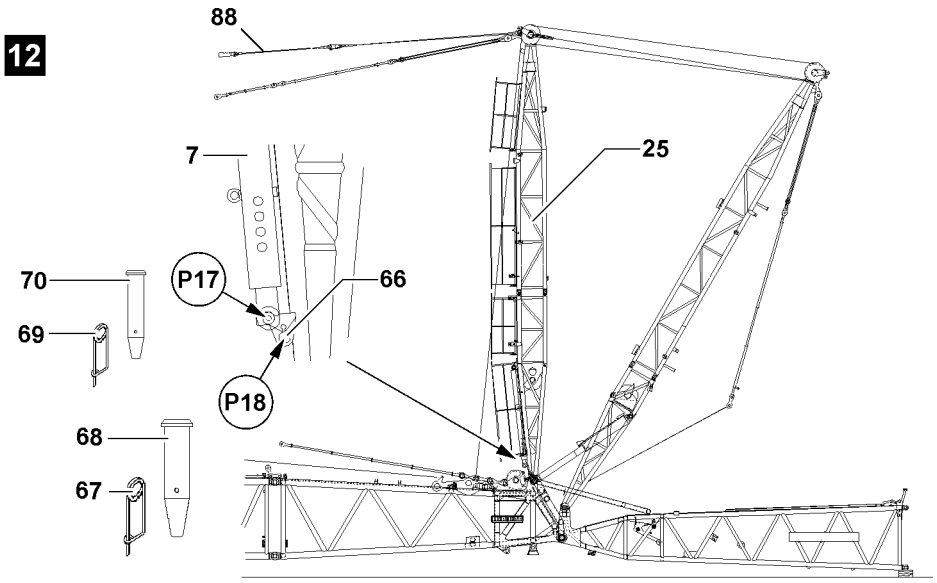

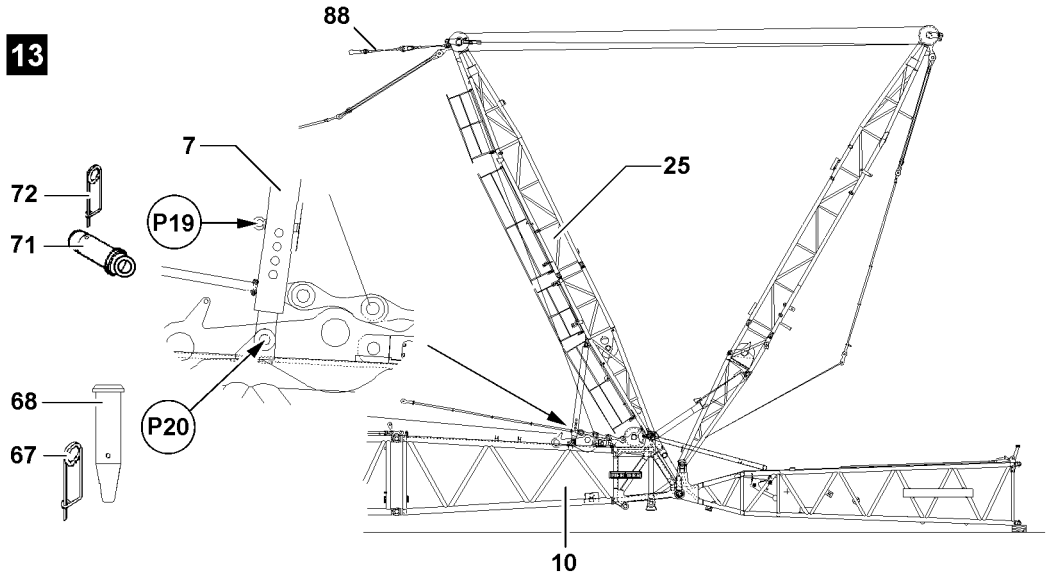

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Fig.120515

4.5 Pinning the relapse supports

Illustration **12**:

▶ Erect the WA-frame 2 **25** vertically: Spool the W-control rope up and simultaneously spool out the hoist rope.

WARNING
Uncontrolled swinging of the relapse supports!
If the relapse supports are unpinned without the WA-frame 2 standing vertically, the relapse supports can swing uncontrolled.
Personnel can be severely injured or killed.
▶ Make sure that the relapse supports **7** are unpinned only after the WA-frame 2 **25** is erected vertically.

▶ Unpin the relapse supports **7** on point **P17**: Remove the spring retainer **69** and unpin the pin **70**.

The pin **68** and the spring retainer **67** to pin the relapse support are in the retainer **66**.

Illustration **13**:

▶ Spool the W-control rope out and pull the WA-frame 2 **25** back with the hoist rope at the same time until the relapse supports **7** can be pushed in by hand to point **P20** on the S-end section **10**.
▶ Pin the relapse supports **7** on point **P20**: Insert the pins **68** on both sides and secure with spring retainers **67**.

NOTICE
Damage of WA-frame 2!
If the pin for the connection is not unpinned before erection of WA-frame 2, the WA-frame 2 can be damaged.
▶ Unpin the pin **71** before erection of the WA-frame 2 **25**.

▶ Unpin the relapse supports: Remove the spring retainer **72** and unpin the pin **71** on point **P19**.

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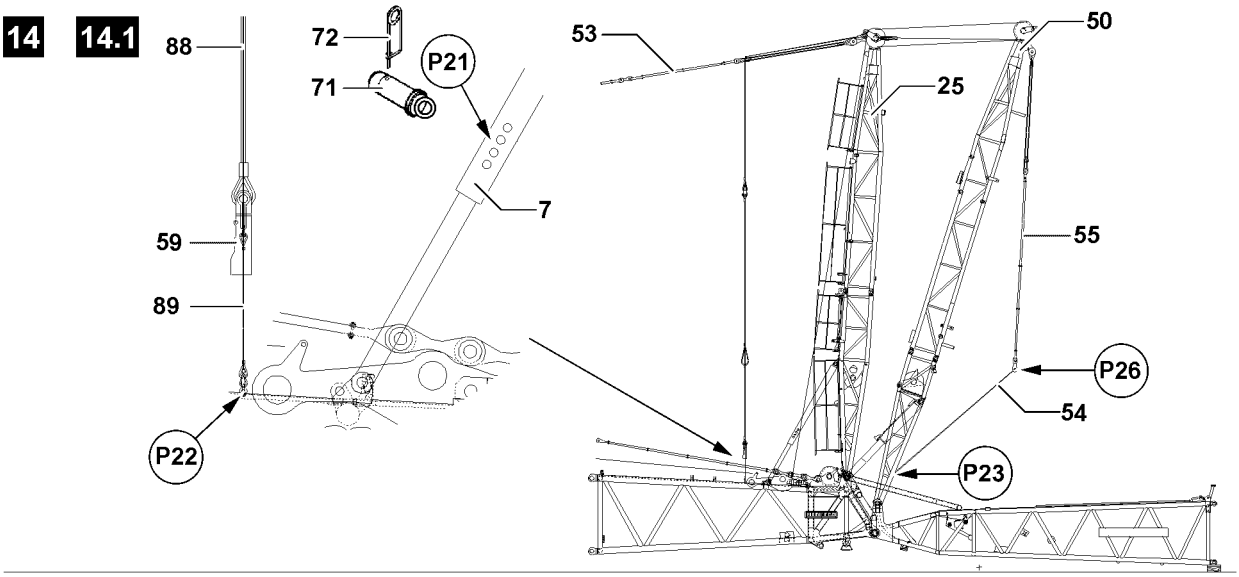

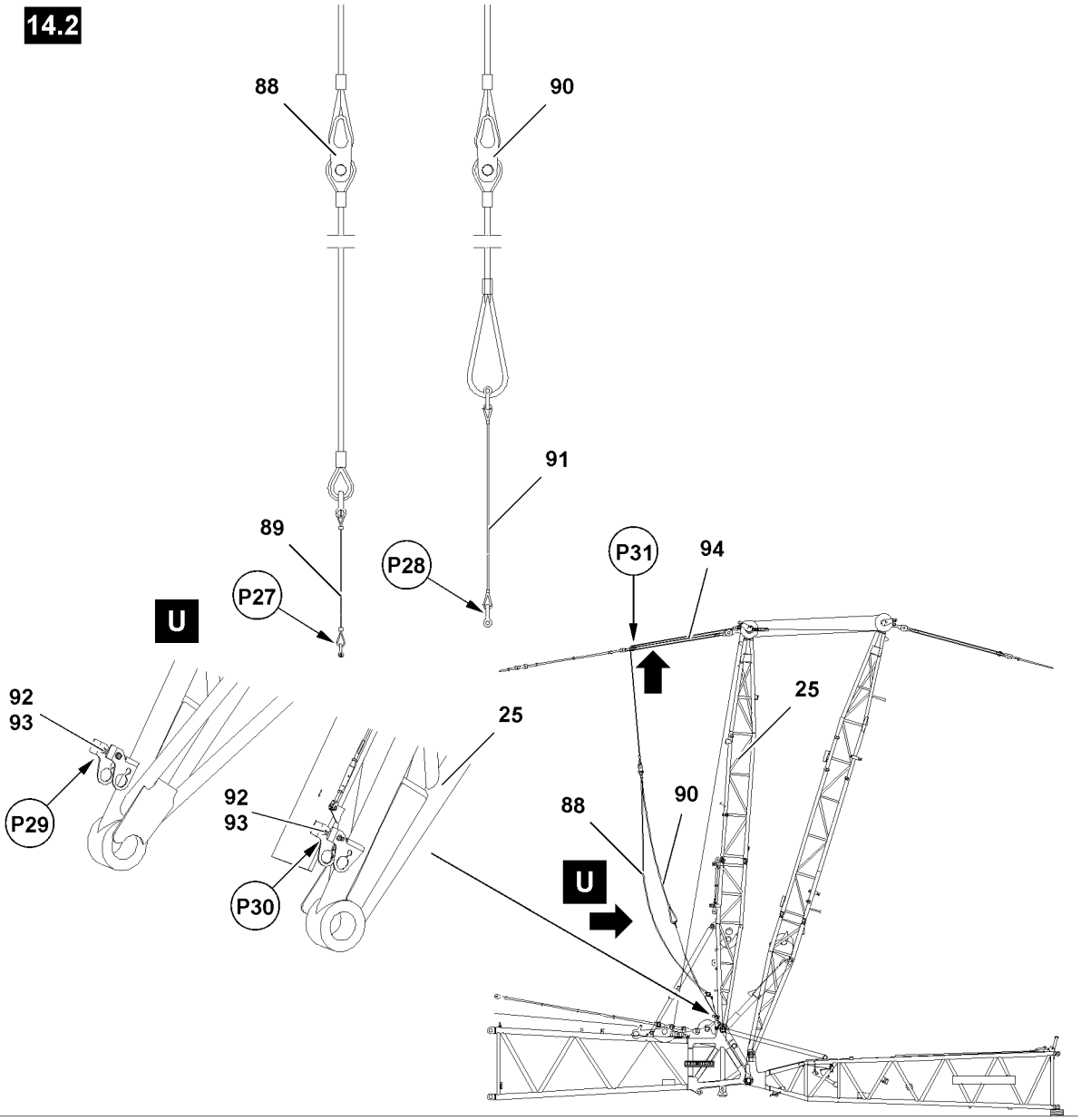

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Fig.120513

Illustration **14**:

- ▶ Erect the WA-frame 2 **25** until the guy rods **53** tension and the WA-frame 2 **25** is standing vertically: Spool the W-control rope up.
- ▶ Lower the WA-frame 1 **50** until the LICCON computer system turns the movement off.
- ▶ Lower the WA-frame 1 **50** and pin the relapse supports **7** on both sides in the maximum possible length: Insert the pin **71** on bore at point **P21** and secure with spring retainer **72**.

Result:

– The relapse supports are extended as far as possible and can be pinned.

- ▶ Raise / lower the WA-frame 1 **50** until the guy rods hang vertically.
- ▶ Unhook the rope **54** on point **P23**.
- ▶ Spool the hoist rope up and place it on the S-boom until the rope **88** hangs vertically.
- ▶ Unpin the hoist rope on the lock **59**.
- ▶ Hook the rope **89** on the lock **59** and secure.

NOTICE
Danger of property damage!
The cross bar **94** moves upward when tensioning the W-guying.
If the ropes (rope **88** and rope **90**) are fastened with insufficient length on points (point **P29** and point **P30**), then significant property damage can occur when tensioning the W-guying.

- ▶ Make sure that the ropes (rope **88** and rope **90**) are fastened with sufficient residual rope on points (point **P29** and point **P30**).

- ▶ Fasten the rope **88** with safety rope **89** at point **P29** on the WA-frame 2 **25**. Use pin **92** and spring retainer **93**.
- ▶ Fasten the rope **90** with safety rope **91** at point **P30** on the WA-frame 2 **25**. Use pin **92** and spring retainer **93**.
- ▶ Lower the WA-frame 1 **50** until the rope **54** can be unhooked.
- ▶ Unhook the rope **54** on point **P26**.

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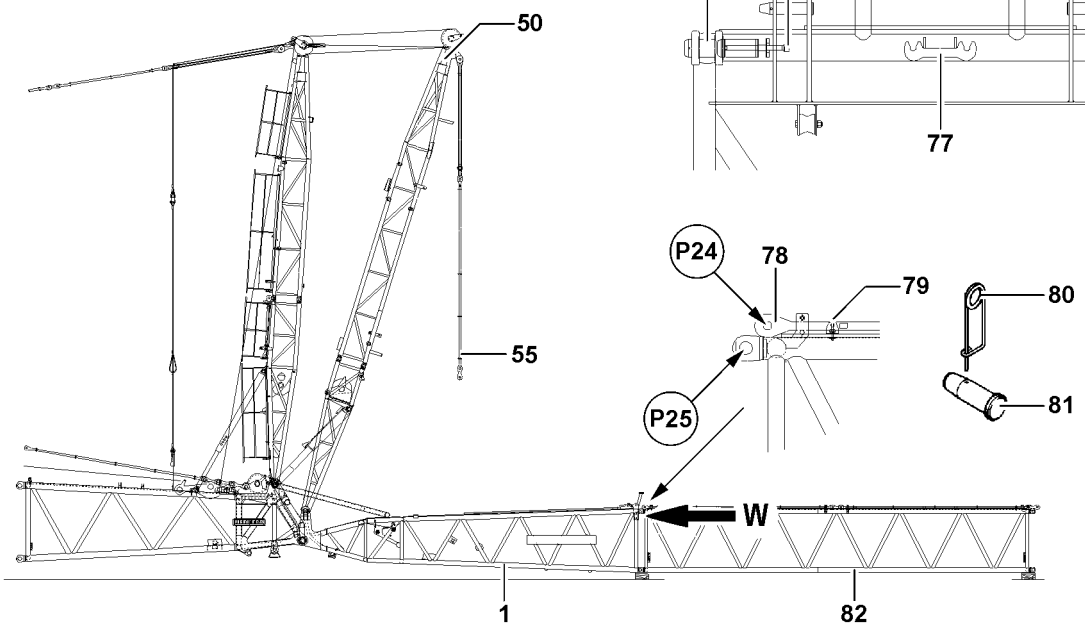

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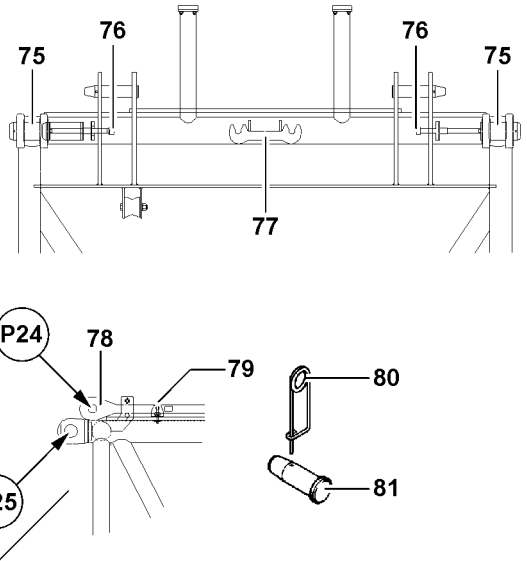

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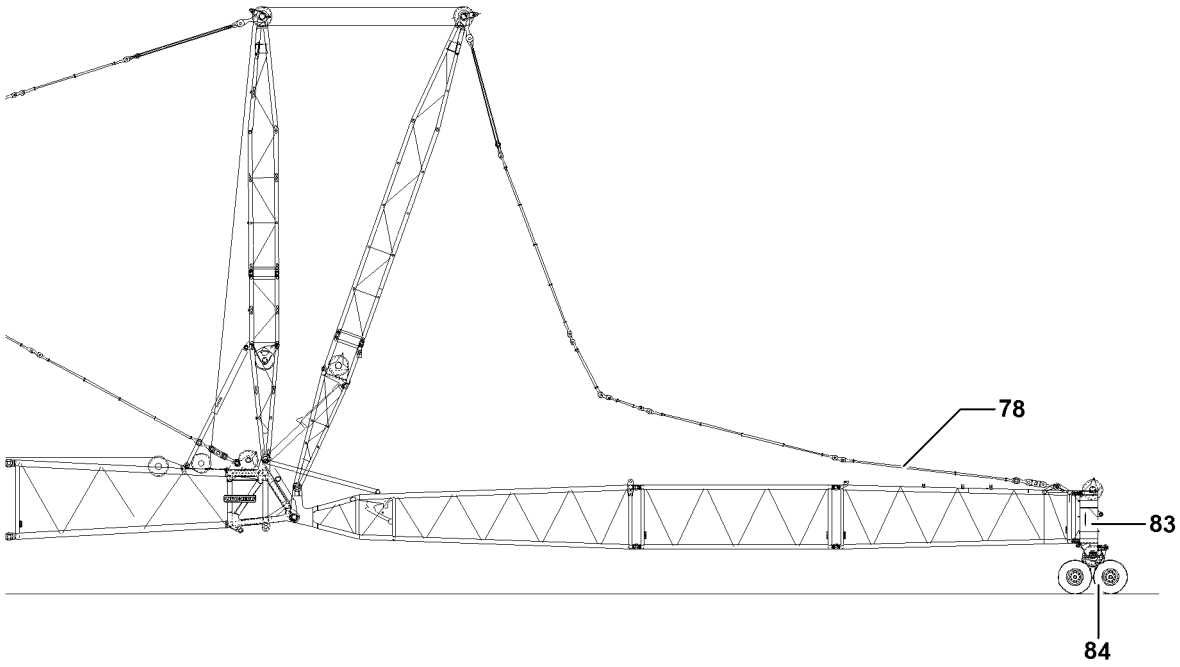

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Fig.111985

4.6 Assembling the W-lattice jib

Note

▶ During assembly of the W-lattice jib, adhere to the pin sequence, see Crane operating instructions, chapter 5.01.

4.6.1 Assembling the W-lattice sections

Illustration **15**:

▶ Position the LI-intermediate section **82** with the auxiliary crane on the W-pivot section **1** until the pin points on point **P25** align.
▶ Hang the pin pulling cylinder in the retainer **77** and screw **76**, see detail **W**.
▶ Pin the LI-intermediate section **82** on the W-pivot section **1** „on top“: Insert the pin **81** on both sides at point **P25** and secure with spring retainer **80**.
▶ Pin the LI-intermediate section **82** on the W-pivot section **1** „on the bottom“.

Make sure that the following prerequisite is met, illustration **16**:
– The L-end section **83** has been placed in the pulley cart **84** at assembly of the W-lattice jib, see Crane operating instructions, chapter 5.15.

Note

▶ The air pressure in the tires of the pulley cart is 9 bar.

WARNING
Falling components!
If the intermediate sections are incompletely pinned, then components can fall down.
Personnel can be severely injured or killed.
▶ Make sure that all components of the boom are completely pinned and secured.

▶ Assemble the W-lattice jib to the required length.
▶ Spool the hoist rope out and pull it to the L-end section, see reeving plan.

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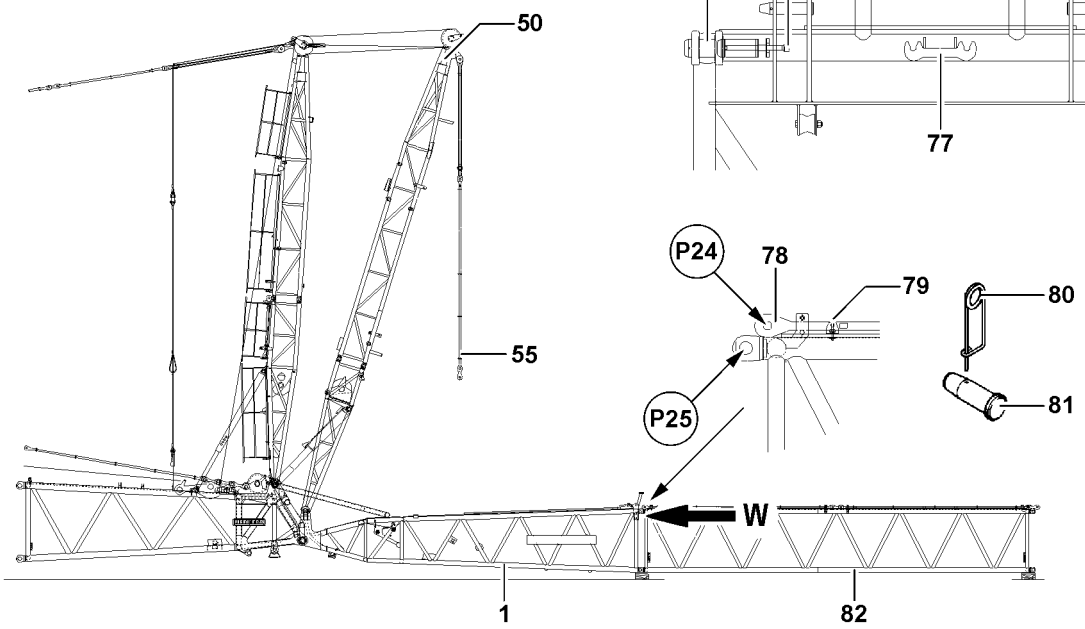

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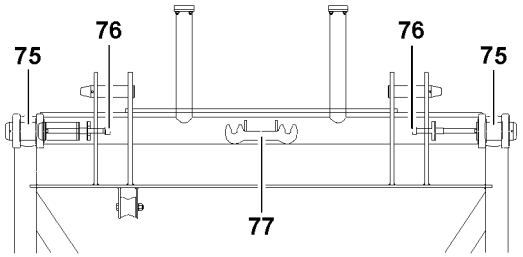

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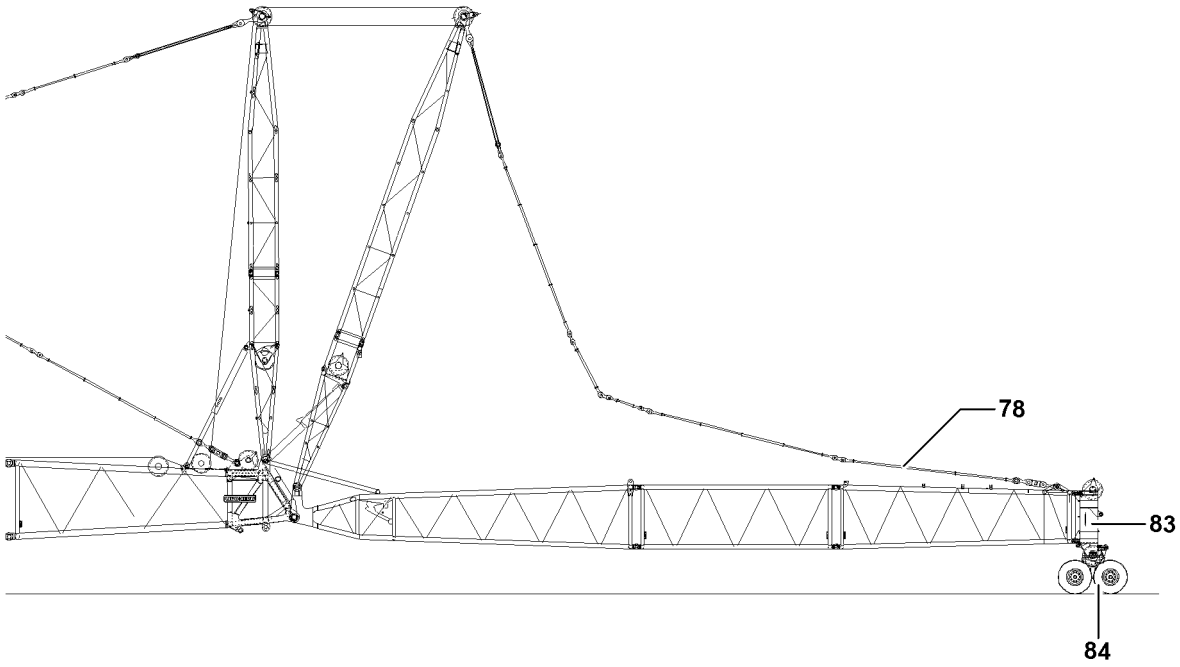

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Fig.111985

4.6.2 Assembling the W-guy rods

The W-guy rods are placed and secured for transport on the W-lattice sections. Before assembly of the W-guy rods, the transport retainers must be released.

Illustration **15**:

▶ Release and unpin the transport retainers **79** of the W-guy rods **78**.

Note

▶ The guy rods for the LI-intermediate sections are pinned to each other starting from the fixed point on the end section of the boom.

NOTICE

Property damage!

▶ Always pin in the pins of the guy rods from the „inside“ to the „outside“.

▶ Pin and secure the guy rods for all LI-intermediate sections.

When all guy rods for the W-boom system are pinned together:

▶ Lower the WA-frame 1 **50** until the guy rods **55** can be pinned on the guy rods **78** on point **P24**: Spool the W-control rope out.

▶ Pin the guy rods **55** on the guy rods **78**: Insert the pin **81** on both sides at point **P24** and secure with spring retainer **80**.

▶ Lift the W-guy rods: Spool the W-control rope up.

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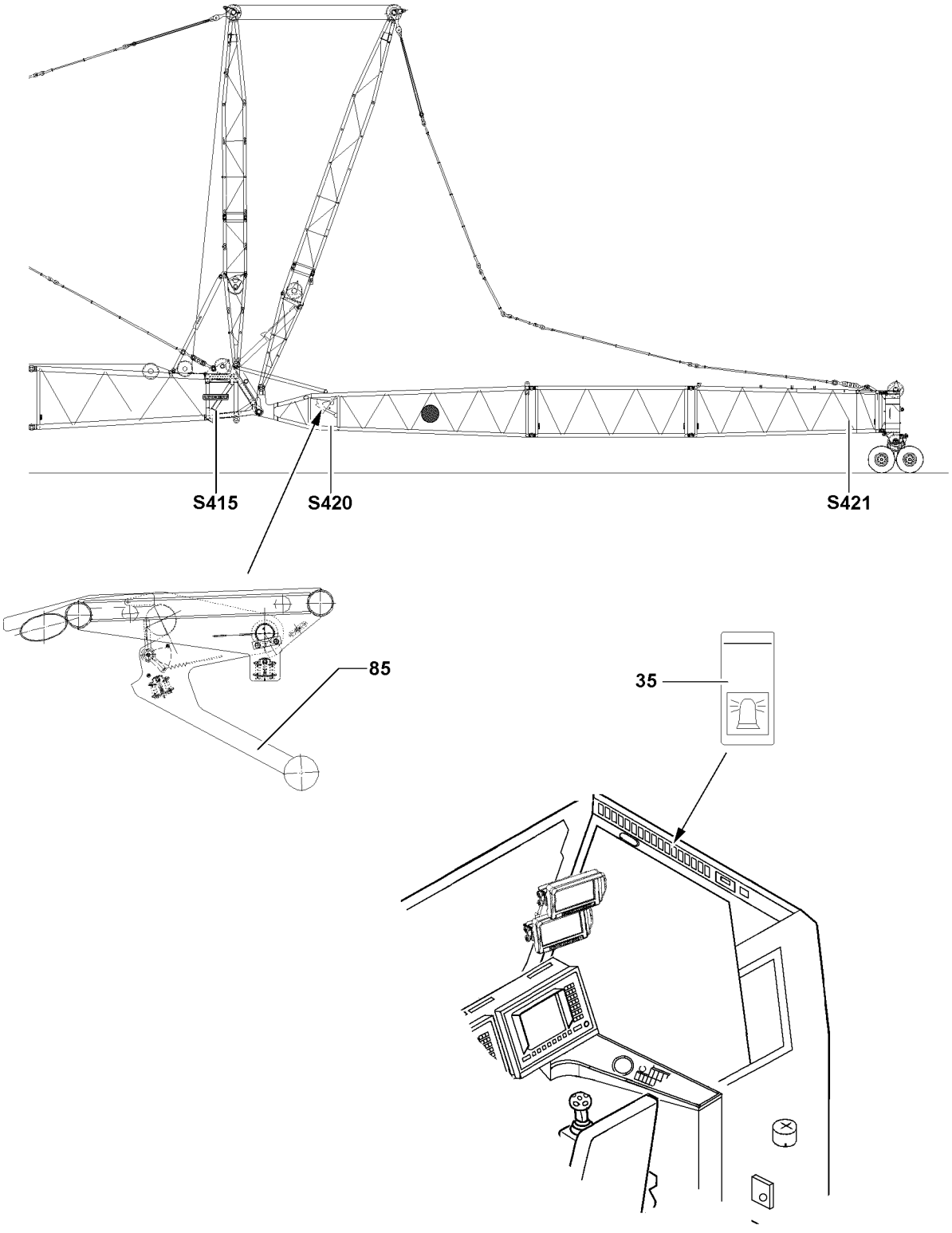

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Fig.111987

4.7 Establishing the electrical connections

Make sure that the following prerequisite is met:
- The W-boom is completely assembled.
- The airplane warning light and the wind speed sensors are installed.

CAUTION
Damage to the electrical connection on the cable drum!
If the electrical connection from the cable drum to the terminal box on the W-pivot section is established first before the connection to the terminal box on the L-end section, then the electrical connection will be damaged when spooling out the cable drum.
▶ Establish first the electrical connection from the cable drum on the W-pivot section to the terminal box on the L-end section and then the electrical connection from the terminal box to the cable drum on the W-pivot section.

Note
▶ To establish the electrical connections on the W-boom, see Electric wiring diagram.

▶ Establish the electrical connections.
▶ Make sure that all electrical connections on the boom are established.

4.8 Checking the function of the safety devices

WARNING
Non-functioning safety devices!
If the function of the safety devices is defective, personnel can be severely injured or killed.
▶ Crane operation with non-functioning safety devices is **prohibited**.

Note
▶ The function of the individual limit switches must be checked before erection.
▶ The function of the limit switch initiators must be checked in the test system, see Diagnostics manual.

Note
▶ If a function check on the limit switches or on the safety devices does not lead to the desired shut offs, then the plug connections on the connector boxes or the components itself must be checked.
▶ If no visible connection errors or component defects can be found, contact **LIEBHERR** Service.

Make sure that the following prerequisites are met:
- All electrical connections have been made.
- The crane engine is running.
- The corresponding operating mode is set in the LICCON computer system.

4.8.1 Checking the wind speed sensor

▶ Check the movement and the function of the wind speed sensor.

4.8.2 Checking the airplane warning light

▶ Turn on the airplane warning light on with the switch **35**.
▶ Check the function visually.

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4.8.3 Checking the oscillation guard

DANGER
Tipping lattice jib!
If the easy movement on the pendulum of the mechanical relapse support is not checked before erection or not re-established, if necessary, then the mechanical relapse support will not engage in steep lattice jib position. As a result, the lattice jib can tip to the rear.
Personnel can be severely injured or killed.

- ▶ Check the easy movement of the pendulum **5** of the mechanical relapse support in the entire swing range before erection.
- ▶ If the pendulum does not move easily: Make the pendulum **5** easy to move.

- ▶ Check the oscillation guard **5** for easy movement.

4.8.4 Checking the hoist limit switch on the pulley head

Note

- ▶ When replacing or changing a hoist limit switch (HES), the corresponding hoist limit switch must have the correct bus address and the correct software version in order to be detected again by the bus system (LSB).

- ▶ Actuate the hoist limit switch manually on the pulley head.

Result:

- The spool up function of the hoist winch turns off.
- The „Hoist top“ icon appears on the LICCON monitor.
- The limit switch is functioning.

4.8.5 Checking the limit switches

Note

- ▶ The limit switch functions have to be checked individually before erection.

Testing the limit switch W-lattice jib „Steepest position“, relapse cylinder

- ▶ Cover the limit switch actuators individually with a metal plate, see Crane operating instructions, chapter 8.12.

Result:

- The „Boom limitation“ icon appears on the LICCON monitor.
- The spool up function of winch 5 turns off.

Testing the limit switch W-lattice jib „Lowest position“, relapse cylinder

- ▶ Cover the limit switch actuators individually with a metal plate, see Crane operating instructions, chapter 8.12.

Result:

- The „Boom limitation“ icon appears on the LICCON monitor.
- The spool up function of winch 5 turns off.

Testing the limit switch flap W-lattice jib „Steepest position“, relapse cylinder

- ▶ Cover the limit switch actuators individually with a metal plate, see Crane operating instructions, chapter 8.12.

Result:

- The „Boom limitation“ icon appears on the LICCON monitor.
- The spool up function of winch 5 turns off.

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4.8.6 Checking the limit switch S-boom „Steepest position“

▶ Cover the limit switch initiators on the S-relapse cylinders individually with a metal plate.

Result:

– The limit switch is actuated manually.
– The spool up function of winch 4 (control winch) turns off.
– The „Boom limitation“ icon appears on the LICCON monitor.
– The limit switch is functioning.

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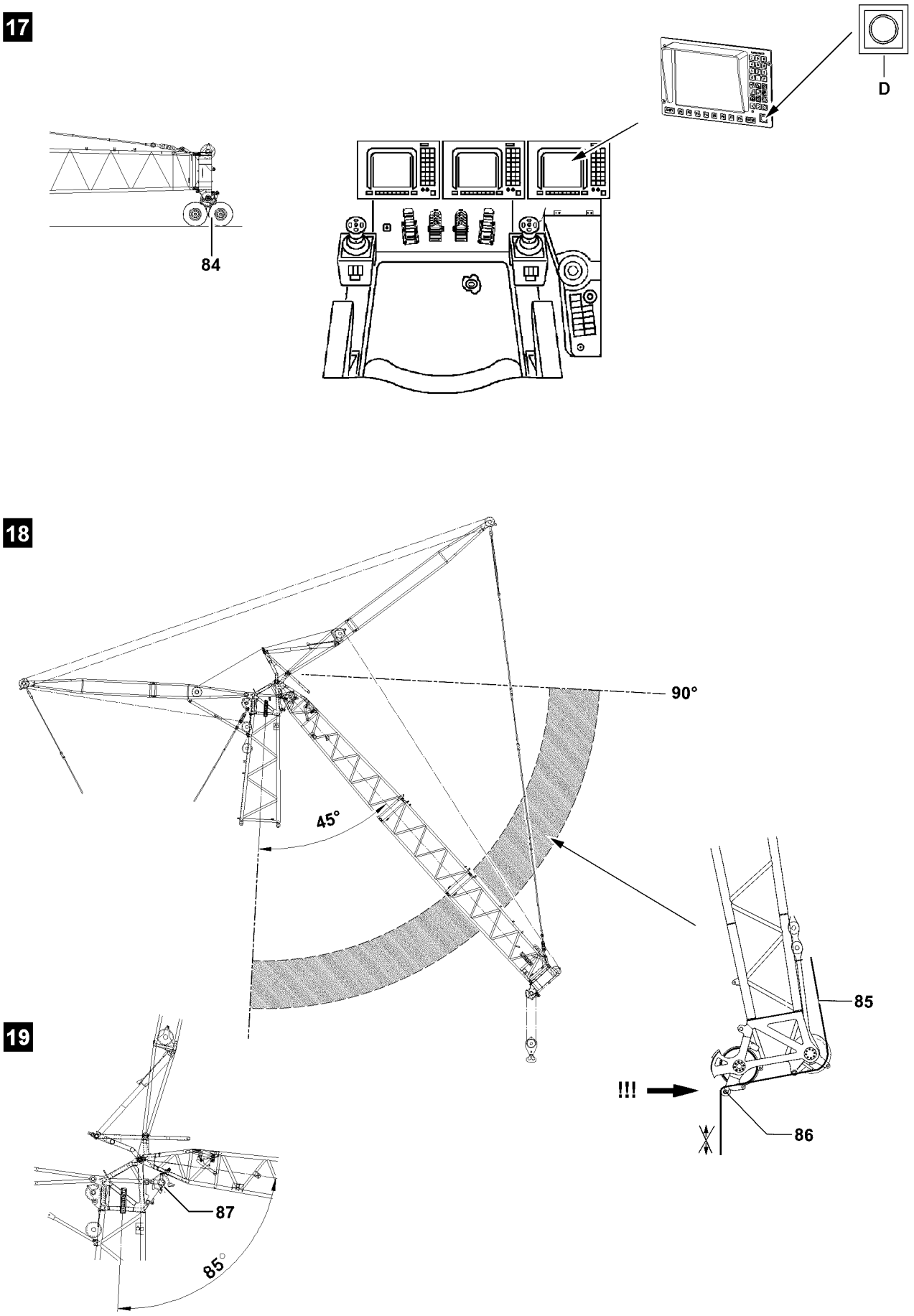

Fig.120507

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4.9 Erecting the boom

DANGER
The crane can topple over!
- ▶ It is not permitted to turn the crane during the erection procedure.
- ▶ Observe the data in the erection and take down charts!
- ▶ Observe the technical safety notes, see Crane operating instructions, chapter 5.01.

DANGER
Danger of tipping over if the oscillation guard is hard to move!
If the oscillation guard is hard to move, the mechanical relapse retainer will no longer function. The W-lattice jib can tip backwards uncontrolled and cause the crane to topple over.
- ▶ Crane operation with hard to move oscillation guard is prohibited.

WARNING
The crane can topple over!
If the following conditions are not met before erecting the boom, the crane can topple over.
Personnel can be severely injured or killed.
- ▶ The lattice jib must roll on the ground with its entire weight.
- ▶ Spool the lattice jib adjustment out in such a way that the guy rods sag slightly.
- ▶ Do not allow slack rope formation on the control winch.
- ▶ Extend the relapse cylinder before erection.

WARNING
Falling hoist rope!
If the hoist rope before the erection procedure is not properly secured onto the corresponding length on the W-lattice jib, it can fall down backward on the basis of its own weight.
Personnel can be severely injured or killed.
- ▶ Reeve in the hoist rope with sufficient length on the W-lattice jib before the erection procedure.
- ▶ The hoist rope must be constantly monitored during erection.
- ▶ Do not step into the danger zone.

WARNING
The SW-system is overloaded!
If the maximum forces on the SW-boom system are exceeded, personnel can be severely injured or killed.
- ▶ Adjust the W-lattice jib control so that the maximum forces are not exceeded.
- ▶ Make sure that the maximum permissible forces on the W-guying (test point 2) are not exceeded, see Erection and take down chart.
- ▶ Do not allow slack rope formation on the control winch.

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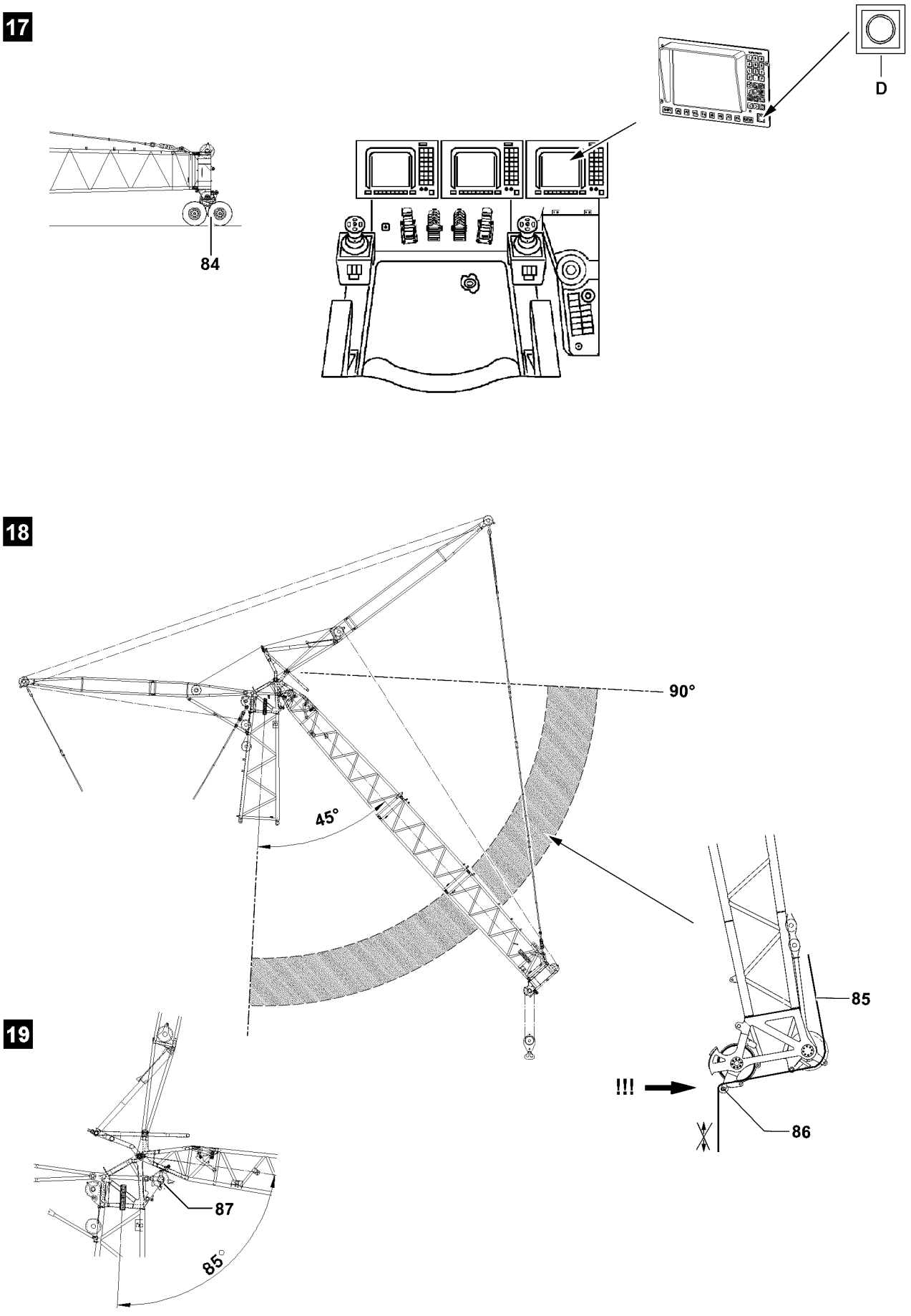

Fig.120507

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Make sure that the following prerequisites are met:
- The W-lattice jib is fully assembled.
- The pulley cart **84** is assembled on the L-end section, see illustration **17**.
- No personnel is within the danger zone.
- The crane is aligned in horizontal direction.
- All electrical connections have been established.
- All limit switches are functioning.
- The oscillation guard has been checked and is easily movable.
- The counterweight has been installed on the turntable and on the derrick, according to the load chart.
- All pin connections have been secured.
- The hoist rope has been correctly placed in the rope pulleys and is prevented from jumping out with the rope retaining pins.
- There are no loose parts on the boom or the lattice jib.
- Boom, lattice jib and safety devices are free from snow and ice.
- The LICCON overload protection has been set according to the data in the load chart.
- The LICCON overload protection settings have been compared with the actual set up configuration.
- The LICCON overload protection is exceeded.
- The assembly icon **11** is visible on the LICCON monitor.

4.9.1 Reeving in the hook block

The erection process is carried out until:
- Without pulley set on the S-end section: Until the S-boom and the W-lattice jib form an angle of approximately 45° (switch position „W-lattice jib bottom“), see illustration **18**.
- **or** with pulley set **87** on the S-end section: Until the S-boom and the W-lattice jib form an angle of approximately 85° (switch position „W-lattice jib bottom“), see illustration **19**.
- **or** the L-end section lifts off from the ground.

▶ Luff the S-boom up and simultaneously spool the W-control rope out so that the L-end section remains on the ground with the pulley cart.
▶ When the erection angle is reached or before the L-end section lifts off the ground:
▶ Release the pulley cart from the L-end section: Remove the pulley cart, see Crane operating instructions, chapter 5.15.
▶ Luff the S-boom up until the L-end section lifts off the pulley cart.
▶ Check the actual load on the LICCON monitor.

Problem remedy

Actual load on the LICCON monitor is larger than 0.0 t ?

▶ Observe the notes for input of hook block weight, see Crane operating instructions, chapter 4.02.

▶ Reeve in the hook block properly and secure the hoist rope on the rope fixed point, for reeving, see reeving plan.
▶ Attach the hoist limit switch weight.
▶ Enter the weight of the hook block into the LICCON computer system.

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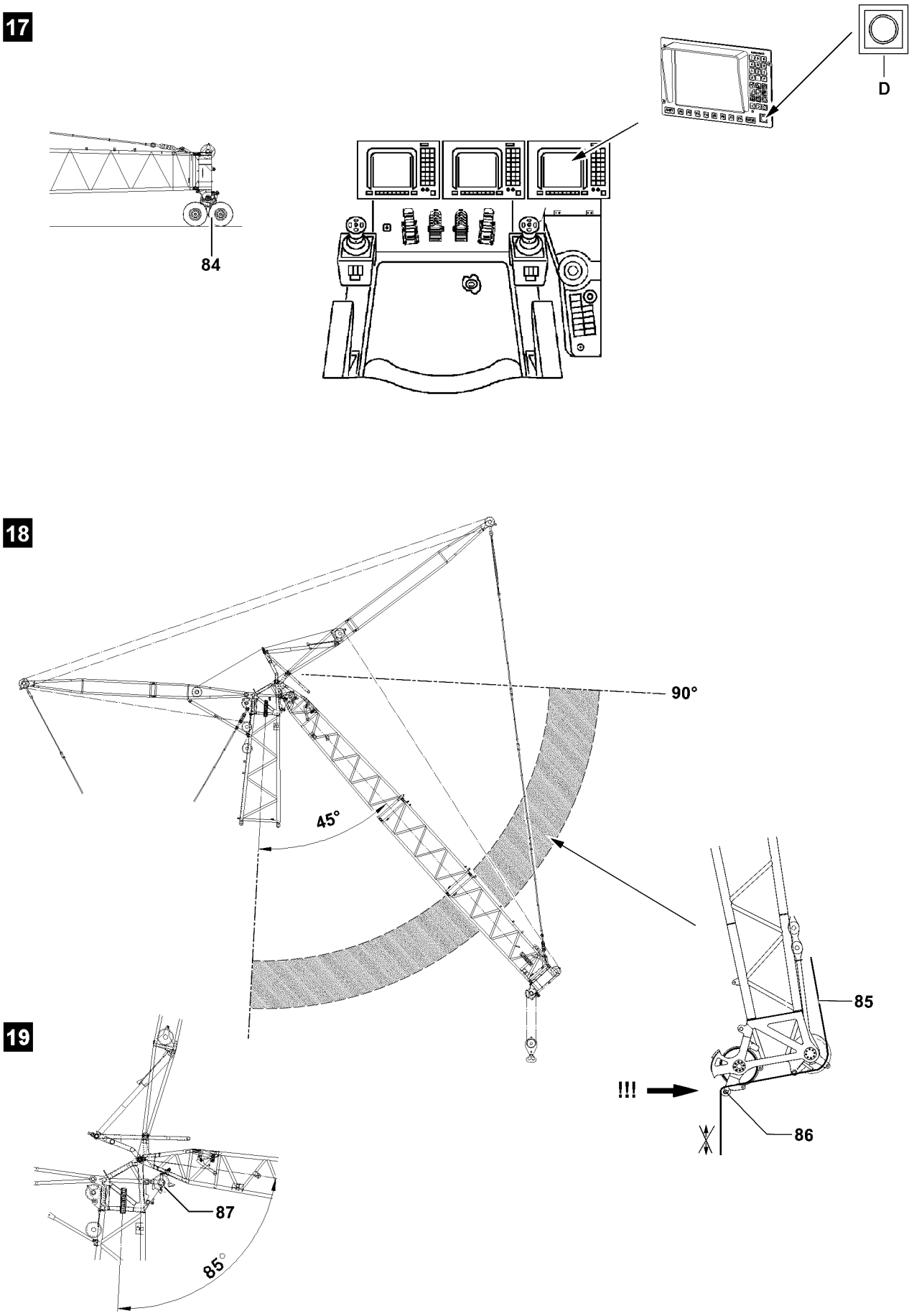

Fig.120507

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4.9.2 Erecting the boom

Make sure that the following prerequisite is met:
– The weight of the hook block has been entered into the LICCON computer system.

DANGER
The crane can topple over!
In crane operation with exceeded LICCON overload protection, the crane can topple over.
Personnel can be severely injured or killed.
▶ The radii listed in the load chart may not be exceeded or fallen below, even if there is no load on the hook.

WARNING
Unutilized guy rods on boom!
If guy rods are on the lattice sections which are not used for operation, then there is a danger of accidents.
Personnel can be severely injured or killed.
Guy rods can loosen up and fall down.
The load chart is invalid.
The load display of the LICCON computer system shows the incorrect value.
The weight of the boom is too large for erection.
▶ Disassemble and remove unutilized guy rods on the transport retainers before erecting the boom.

NOTICE
Damage to the hoist rope!
If the hoist rope **85** are reeved on the hook block and redirected over the small guard rollers **86**, the hoist gear may no longer be driven. During spooling up or spooling out, the hoist rope can become damaged.
▶ Do not spool up or spool out hoist rope **85**, if the angle between S-boom and W-lattice jib amounts to less than 90°, see illustration **18**.

Note
▶ When the lowest operating position of the W-lattice jib is reached, the LICCON overload protection is activated.
▶ In the maximum load icon appears a load number in „t“ instead of the display „???“.

▶ Luff the boom up to the lowest operating position.

When the boom has reached the lowest operating position:
▶ Make sure that the assembly icon **11** on the LICCON monitor turns off.

Result:

– The LICCON overload protection is active.

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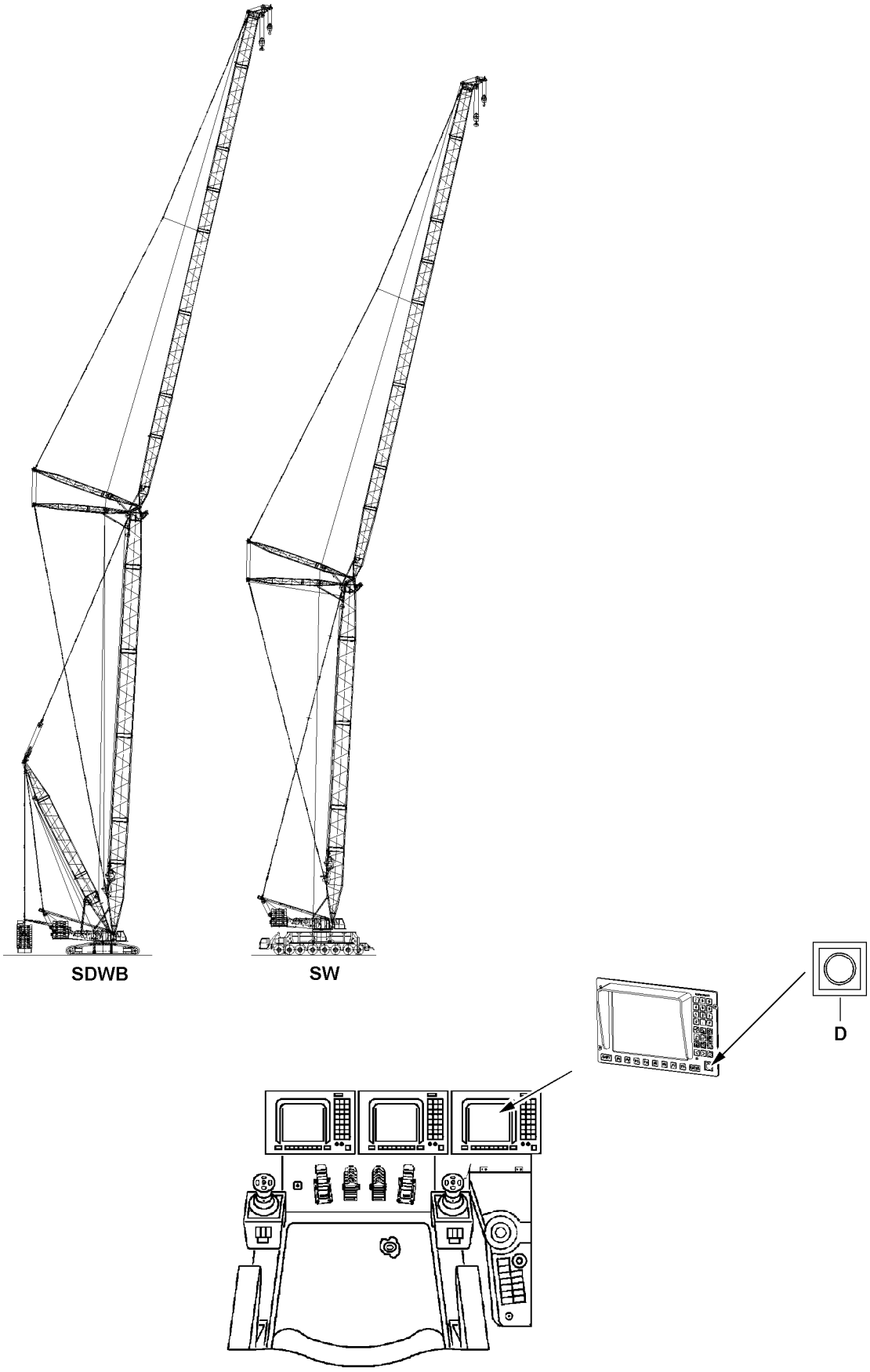

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Fig.120508

5 Operating the crane

5.1 Preparing for crane operation

Note

▶ Observe the notes, see Crane operating instructions, chapter 4.05, chapter 4.08 and chapter 5.01.

Make sure that the following prerequisites are met:
- The LICCON overload protection is active.
- The LICCON overload protection has been set according to the data in the load chart.

WARNING

The crane can topple over!

▶ Check the horizontal position of the crane before and during operation.

▶ If the crane operator leaves the cab, even for a short time, the operating mode setting must be checked and reset if necessary before resuming crane operation.

5.2 Checking the settings

▶ Check the function of the overload protection by running against the operating positions „on top“ and „bottom“.

▶ Check the hoist limit switch by running against the hoist limit switch weight.

▶ Check the function of the limit switches on the relapse cylinders.

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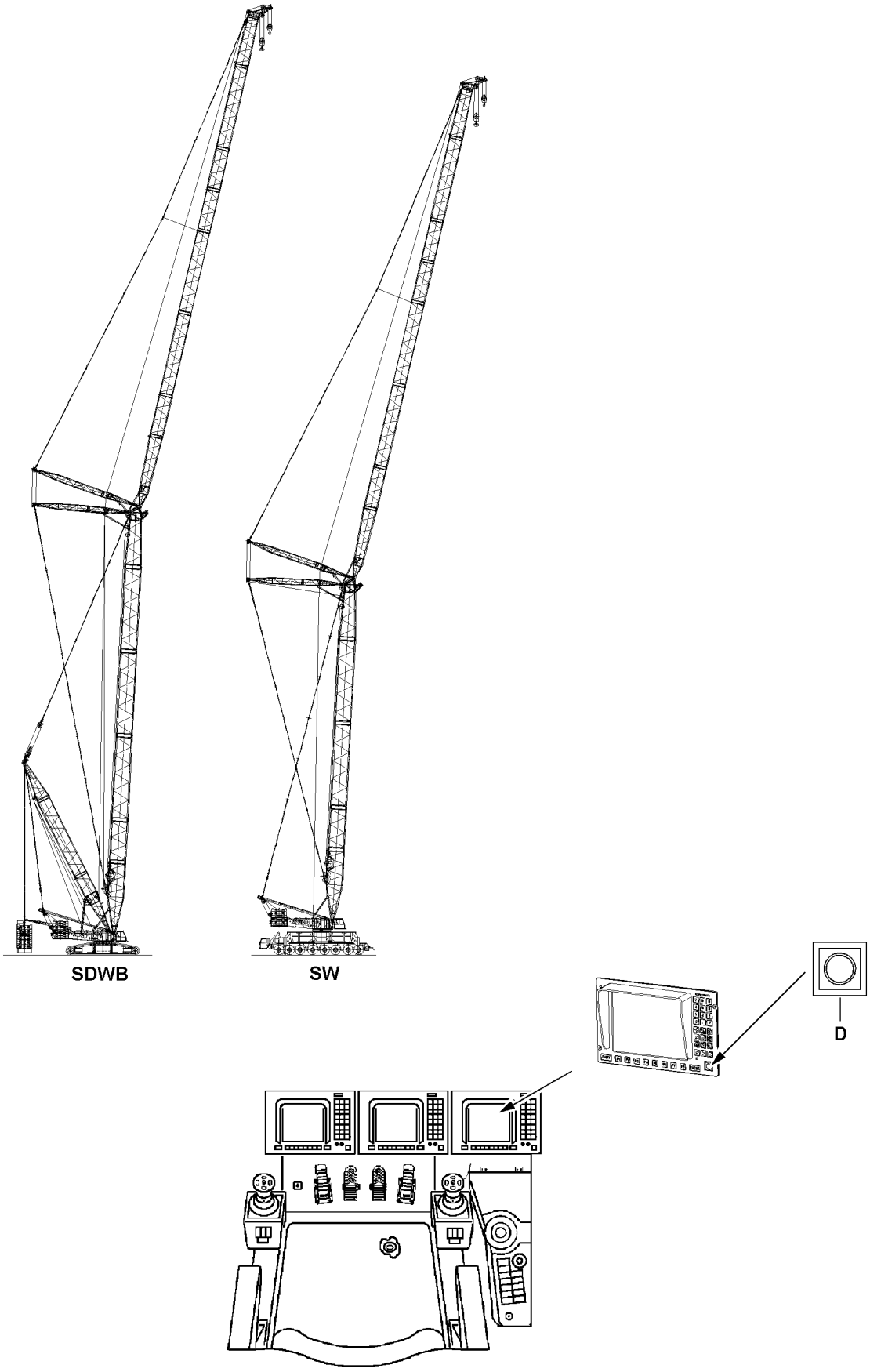

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Fig.120508

6 Disassembly W-boom system

WARNING
Danger of falling!
During assembly / disassembly work, personnel must be secured with appropriate aids to prevent them from falling. If this is not observed, assembly personnel could fall and suffer life-threatening or fatal injuries.

- ▶ Any work, where there is a danger of falling must be carried out with suitable aids (for example lifting platform, scaffolding, ladder, auxiliary crane).
- ▶ If the work cannot be carried out with such aids nor from the ground, then the assembly personnel must secure themselves with approved fall arrest systems to avoid falling, see Crane operating instructions, chapter 2.04.
- ▶ Approved fall arrest systems must be hung into the respective fastening points on the crane, see Crane operating instructions, chapter 2.06.
- ▶ If railings are present for the crane, then they must be brought into the corresponding position and secured for assembly / disassembly work.
- ▶ Step on aids and fall protection equipment only with clean shoes.
- ▶ Keep aids and fall protection equipment clean and free from snow and ice.
- ▶ Stepping or walking on crane components and lattice sections, which have an incline of more than 20° is prohibited.
- ▶ During all assembly and disassembly work, maintenance work and inspections, travel and crane operation is prohibited.

WARNING
Falling components!
If unsecured or non-supported components are assembled or disassembled, they can fall down.
Personnel can be severely injured or killed.

- ▶ During pinning and unpinning of the lattice sections, it is prohibited for anyone to remain **under** or **on** the components as well as within the entire danger zone.
- ▶ Support the boom and components before pinning / unpinning.
- ▶ Pin or unpin both pins laying in a horizontal, i.e. **left** and **right**.
- ▶ Secure the pins in the storage locations and in the receptacles.
- ▶ Do not disengage the auxiliary crane until the respective component is pinned and secured.
- ▶ It is prohibited to lean a ladder against the component being disassembled.

WARNING
Danger of impact / crushing!
When installing / removing crane components with the auxiliary crane, crane components can start to swing back and forth.
When lifting / lowering and positioning crane components, there is an increased danger of impacts / crushing.
Personnel can be severely injured or killed.

- ▶ Make sure that personnel cannot be caught by components.
- ▶ Make sure that the crane is aligned in horizontal position to avoid the support beams from swinging by themselves.
- ▶ When working in danger zones: Use aids to protect limbs.
- ▶ Guide components with suitable aids to minimize oscillation.

WARNING
Neglected inspection and maintenance on guy rods!
If the regular inspection and maintenance of the guy rods is not carried out or is carried out only in irregular intervals, then severe accidents can occur due to existing and unrecognized damage to the guy rods.
Personnel can be severely injured or killed.

- ▶ Check the guy rods before every assembly, see Crane operating instructions, chapter 8.15.

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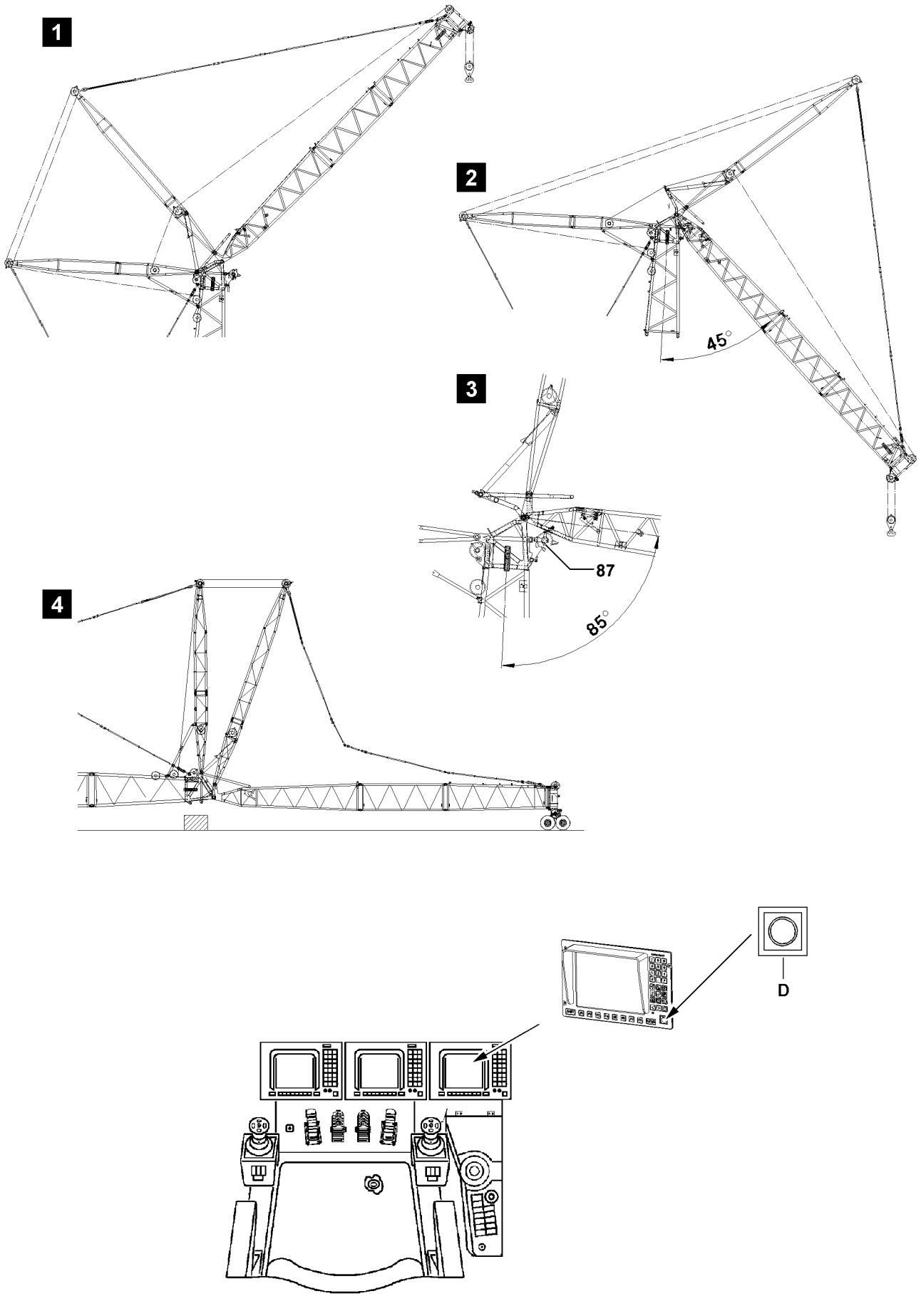

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Fig.120509

Note

▶ By supporting the components during assembly / disassembly, ground unevenness is compensated for and the material is protected.

Note

▶ The LI-intermediate sections are pinned and unpinned with the aid of the pin pulling device, see Crane operating instructions, chapter 5.30.

WARNING

Danger of accident!
Personnel can be severely injured or killed.

▶ For pinning and unpinning with the pin pulling device, observe and follow the warning guidelines, see Crane operating instructions, chapter 5.30.

6.1 Placing the W-lattice jib down

WARNING

The crane can topple over!
If the following conditions are not met before taking down the boom, the crane can topple over and fatally injure personnel.

▶ Observe the technical safety notes, see Crane operating instructions, chapter 5.01.
▶ Observe the specifications in the erection and take down charts.

WARNING

The SW-system is overloaded!
If the maximum forces on the SW-boom system are exceeded, personnel can be severely injured or killed.

▶ Adjust the W-lattice jib control so that the maximum forces are not exceeded.
▶ Make sure that the maximum permissible forces on the W-guying (test point 2) are not exceeded, see Erection and take down chart.
▶ Do not allow slack rope formation on the control winch.

NOTICE

Damage of boom components!
Taking down the boom system can lead to a collision between the hook block and the pulley head.
Boom components can be severely damaged.

▶ Luff the boom system down at the same time and spool the hoist winch out.

Make sure that the following prerequisite is met:

– The S-boom is in operating position, see illustration **1**.
– The LICCON overload protection has been set according to the data in the load chart.
– The hook block is approx. 5 m below the pulley head of the lattice jib.
– The pulley cart is available.
– An auxiliary crane with an adequate load-bearing capacity is available.

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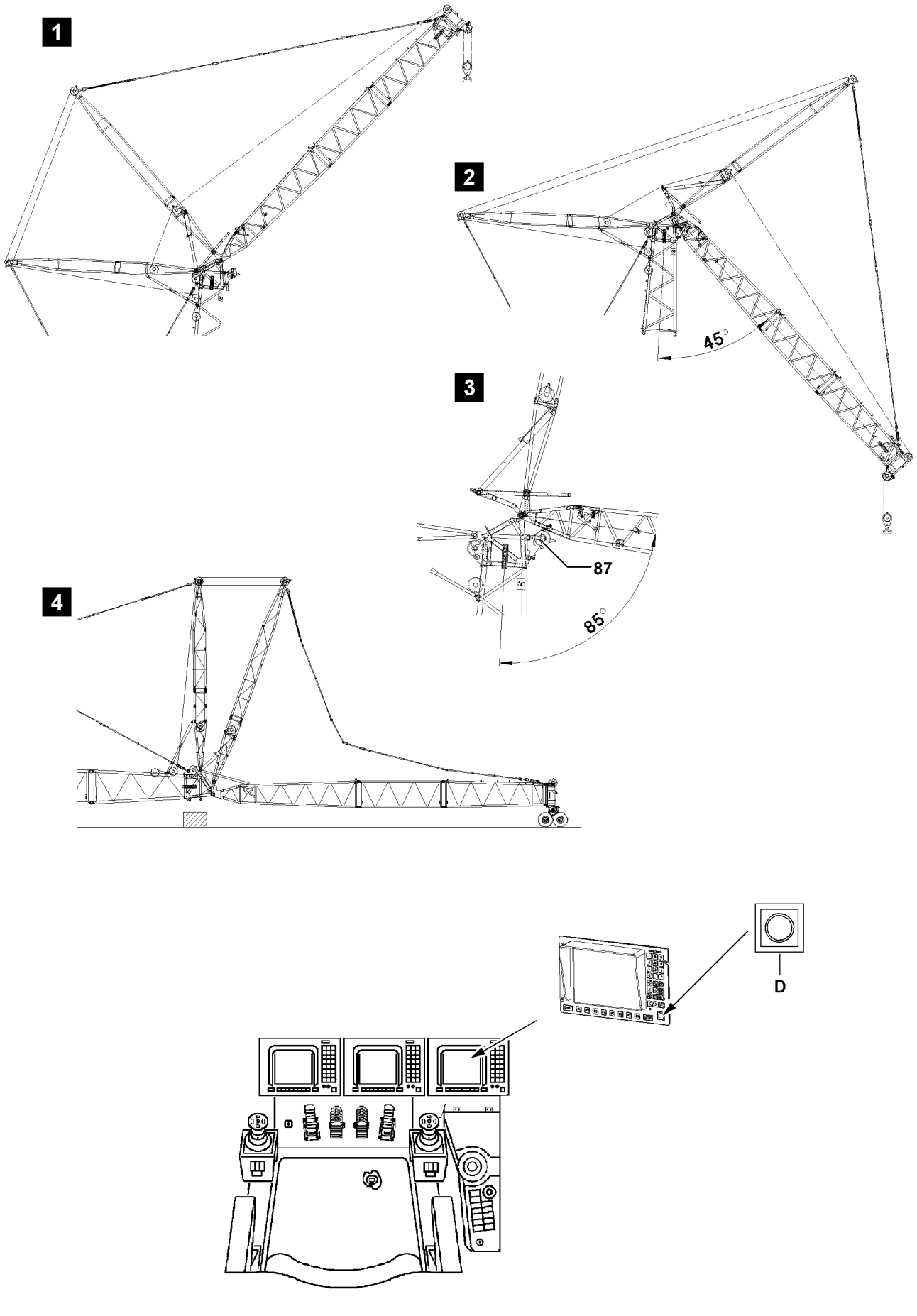

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Fig.120509

6.1.1 Luffing the W-lattice jib down

Note

- ▶ The luff down movement is turned off as soon as the lowest operating position is reached.
- ▶ When the lowest operating position of the W-lattice jib is reached, the load display in the maximum load icon turns off and instead of the load display appears the display „???“.
- ▶ In the crane operating screen appear alarm functions.

▶ Luff the W-lattice jib down to the „lowest“ operating position.

Result:

– The luff down movement is turned off.
– The „STOP“ icon appears on the LICCON monitor.
– The horn icon appears on the LICCON monitor.

WARNING

Danger of accident due to function „Exceeding the shut off limits of the LICCON overload protection“!
If the shut off limits of the LICCON overload protection are exceeded, there is no additional protection against crane overload.
Due to erroneous operation or deliberate misuse, the crane could collapse, the boom can break off or the crane can topple over.
Personnel can be severely injured or killed.

- ▶ The function „Exceeding the shut off limits of the LICCON overload protection“ is only permissible in emergencies and for assembly purposes.
- ▶ The function „Exceeding the shut off limits of the LICCON overload protection“ may only be actuated by persons who know the effects of their actions regarding the function „Exceeding the shut off limits of the LICCON overload protection“.
- ▶ The function „Exceeding the shut off limits of the LICCON overload protection“ requires the presence of an authorized person and must be performed with utmost caution.
- ▶ Crane operation with activated function „Exceeding the shut off limits of the LICCON overload protection“ is prohibited.

When the S-boom has reached the „lowest“ operating position:

▶ Exceeding the shut off limits of the LICCON overload protection: Engage assembly operation.

Result:

– The shut off limits of the LICCON overload protection are exceeded.
– The assembly icon appears on the LICCON monitor.

Note

- ▶ See Crane operating instructions, chapter 4.02.

The luff down procedure is carried out until:

– Without pulley set on the S-end section: Until the S-boom and the W-lattice jib form an angle of approximately 45° (switch position „W-lattice jib bottom“), see illustration **2**.
– **or** with pulley set **87** on the S-end section: Until the S-boom and the W-lattice jib form an angle of approximately 85° (switch position „W-lattice jib bottom“), see illustration **3**.
– **or** the hook block can be reeved out.

▶ Luff the W-lattice jib down as specified.

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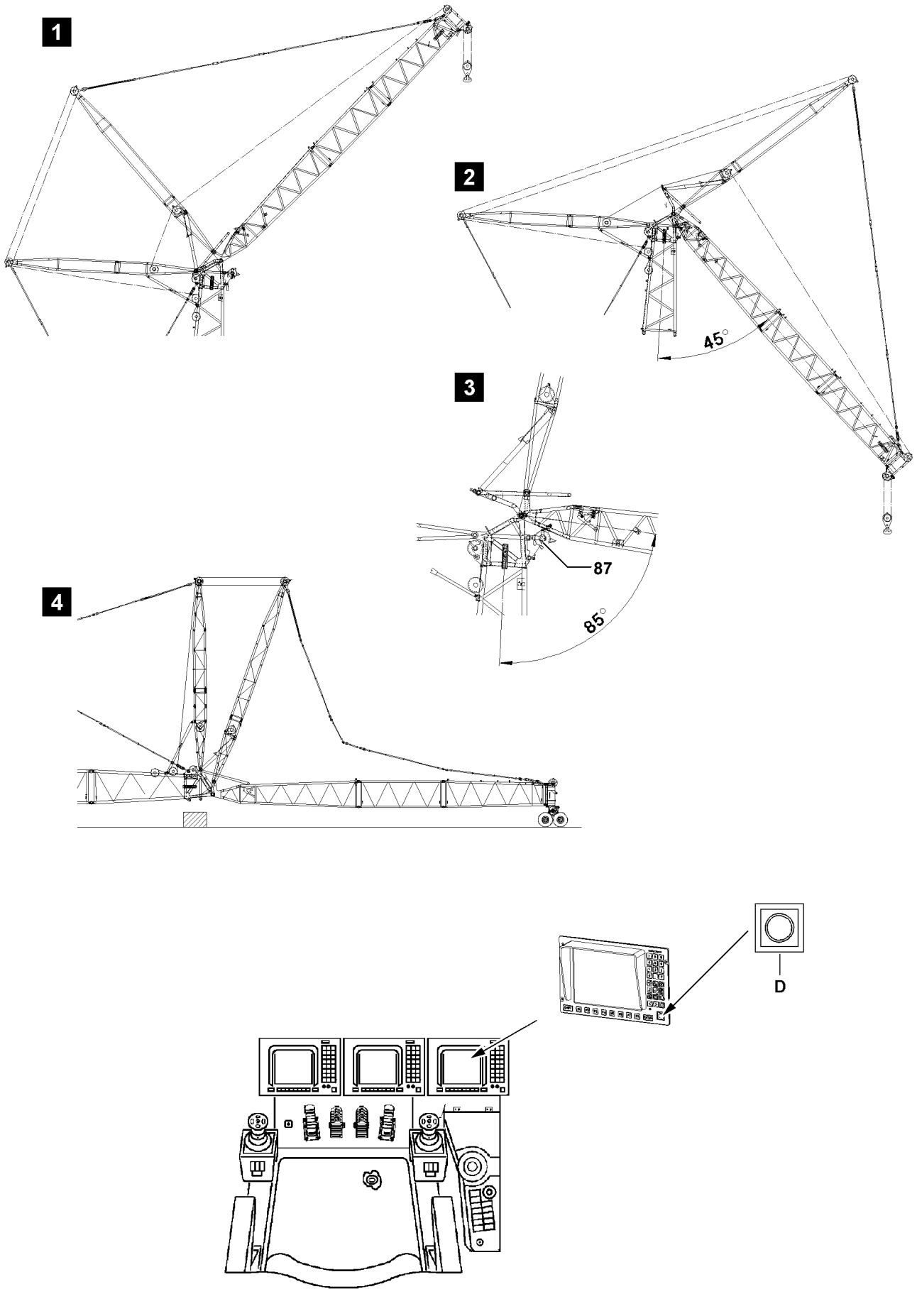

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Fig.120509

6.1.2 Placing the W-lattice jib into the pulley cart

If the hook block has not yet touched the ground:

- ▶ At the same time, spool the hoist winch out and luff the S-boom down until the hook block touches the ground.
- ▶ Remove the hoist limit switch weight.
- ▶ Unreeve and remove the hook block.

Note

- ▶ The air pressure in the tires of the pulley cart is 9 bar.

If the W-lattice jib is vertically on the pulley cart, the W-guying is tensioned slightly so that the pulley cart rolls forward.

- ▶ Luff the S-boom up until the S-end section lies on the roller cart.
- ▶ Assemble the L-end section on pulley cart, see Crane operating instructions, chapter 5.15.

WARNING

The crane can topple over!
If the following conditions are not met before taking down the boom, the crane can topple over.
Personnel can be severely injured or killed.

- ▶ Spool the lattice jib adjustment out in such a way that the guy rods sag slightly.
- ▶ The lattice jib must roll on the ground with its entire weight.
- ▶ Do not allow slack rope formation on the control winch.
- ▶ Do not pull the hook block along on the ground.

- ▶ Continue to luff down the S-boom and simultaneously spool the W-control rope out so that the guy rods sag slightly.
- ▶ Lower the S-boom until the S-boom head is laying the support on the ground, see illustration **4**.

WARNING

Danger of accident!

- ▶ No one may be present in the danger zone.
- ▶ Secure the hoist rope with the assembly rope and spool it up slowly over the rope pulleys of the WA-frame to the S-end section.

- ▶ Place the hoist rope on the S-end section.

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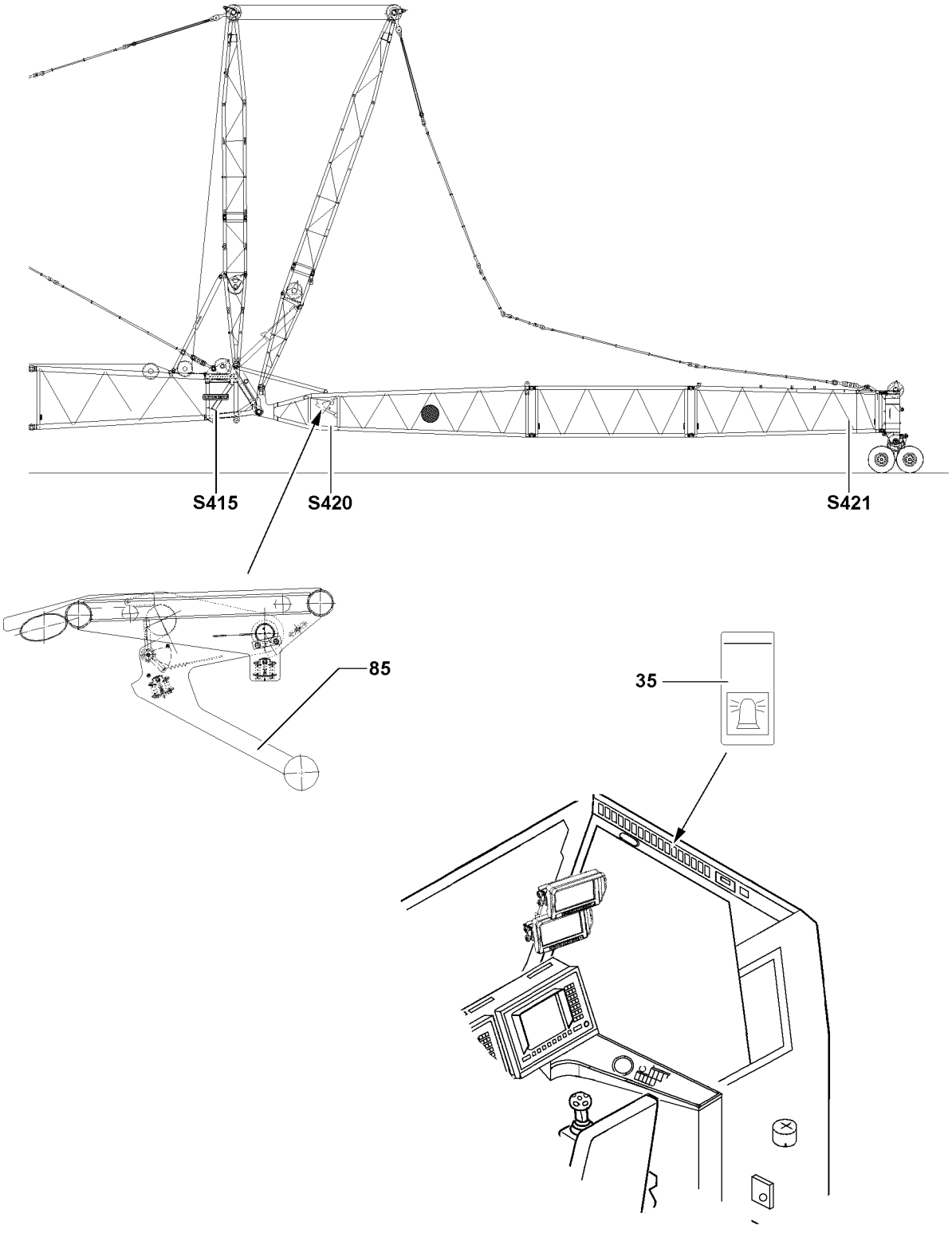

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Fig.111987

6.2 Disconnecting the electrical connections

Make sure that the following prerequisite is met:
– The S-boom has been placed down.

NOTICE
Damage to cable drum or cable!
If the electrical connection between the terminal box W-pivot section and cable drum is not separated before spooling up the cable drum, the electrical connection will be damaged.
If the cable of the cable drum is not properly spooled up on the cable drum after unplugging the L-end section, then the cable drum or the cable can be significantly damaged.
▶ Disconnect the electrical connection from the cable drum to the terminal box on the W-pivot section first and then disconnect the electrical connection from the terminal box on the L-end section to the cable drum.
▶ After unplugging, spool the cable onto the cable drum.

▶ Disconnect the electrical connections.
▶ After unplugging, spool the cable onto the cable drum and secure it to prevent it from spooling out inadvertently.
▶ Secure the cable: Reestablish the electrical connection between the terminal box and the cable drum on the W-pivot section.

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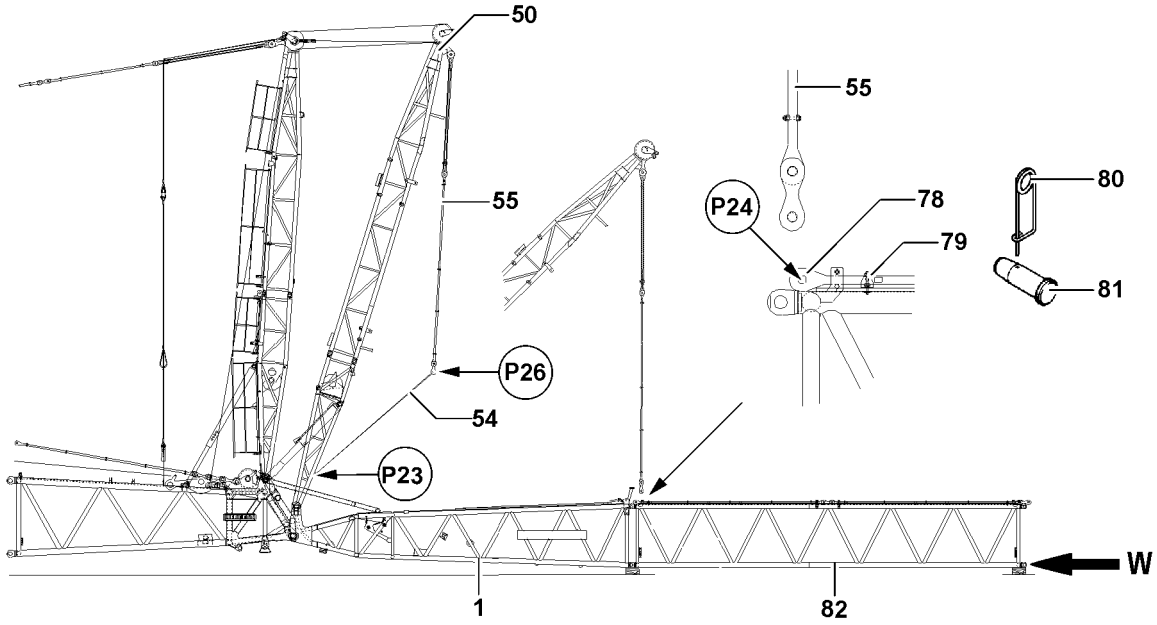
5



W

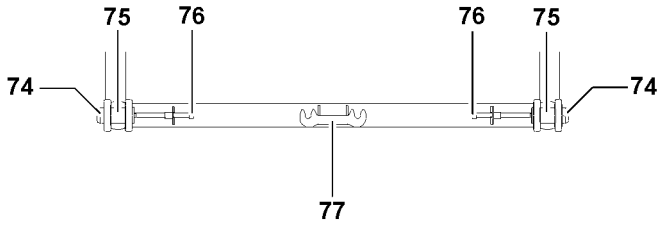


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Fig.111991

6.3 Disassembling the W-lattice jib

WARNING
Falling components!
If unsecured or non-supported components are assembled or disassembled, they can fall down.
Personnel can be severely injured or killed.

- ▶ During pinning and unpinning of the lattice sections, it is prohibited for anyone to remain **under** or **on** the components as well as within the entire danger zone.
- ▶ Support the remaining assembled boom or secure it with the auxiliary crane.
- ▶ Secure the components which are being removed with the auxiliary crane.
- ▶ Pin or unpin both pins laying in a horizontal, i.e. **left** and **right**.
- ▶ Secure the pins in the storage locations and in the receptacles.
- ▶ It is prohibited to lean a ladder against the component being disassembled.
- ▶ During disassembly of the W-lattice jib, adhere to the unpinning sequence, see Crane operating instructions, chapter 5.01.

6.3.1 Disassembling the W-guy rods

Make sure that the following prerequisite is met:
– The transport retainers on the LI-lattice sections are unpinned.

- ▶ Place the W-guy rods in the transport retainers on the LI-intermediate sections: Lower the WA-frame 1 **50**.
- ▶ Lower the WA-frame 1 **50** until the guy rods **78** and guy rods **55** in point **P24** can be unpinned: Spool the W-control rope out.
- ▶ Separate the guy rods **78** and the guy rods **55** on both sides on point **P24**: Remove the spring retainer **80** and unpin the pin **81**.
- ▶ Hook the assembly rope **54** on point **P26**.
- ▶ Erect the WA-frame 1 **50** until the assembly rope **54** can be hooked on point **P23**: Spool the W-control rope up.
- ▶ Hook the assembly rope **54** on point **P23**.
- ▶ Unpin the W-guy rods on the LI-intermediate sections from each other.

When all W-guy rods are separated:
- ▶ Secure the W-guy rods in the transport retainers on the LI-intermediate sections.

6.3.2 Disassembling the W-lattice section

Illustration **5**:

- ▶ Support the W-boom or secure it with the auxiliary crane.
- ▶ Release the pulley cart from the L-end section: Remove the pulley cart, see Crane operating instructions, chapter 5.15.
- ▶ Secure the components for disassembly with the auxiliary crane.
- ▶ Hook the pin pulling cylinder on the retainer **77** and on the screw **76**, see detail **W**.
- ▶ Unpin the L-end section and the LI-intermediate sections „on the bottom“: Remove the spring retainer **74** and unpin the pin **75**.
- ▶ Unpin the L-end section and the LI-intermediate sections „on top“.
- ▶ Disassemble the W-lattice jib to the W-pivot section **1**.

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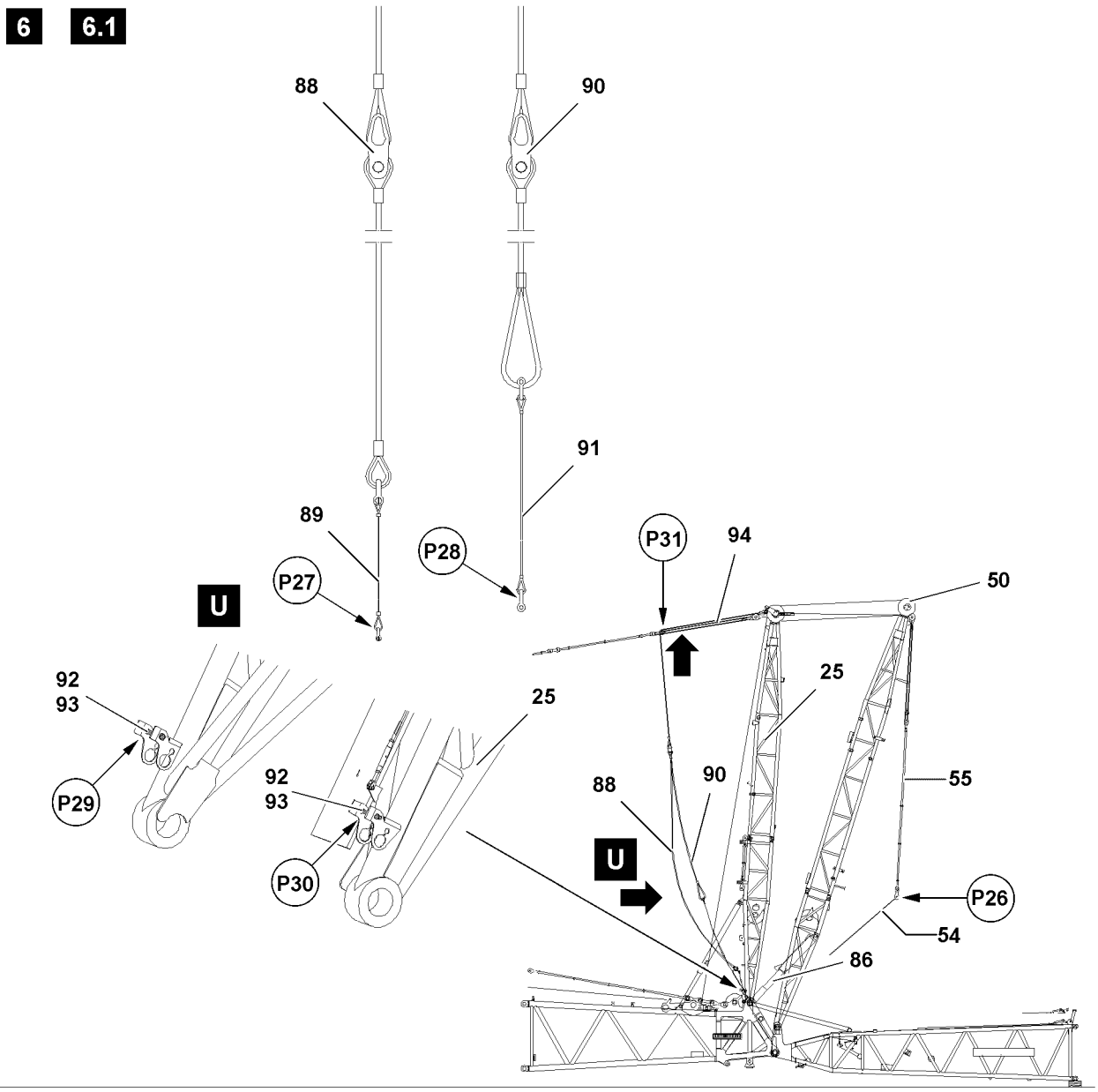

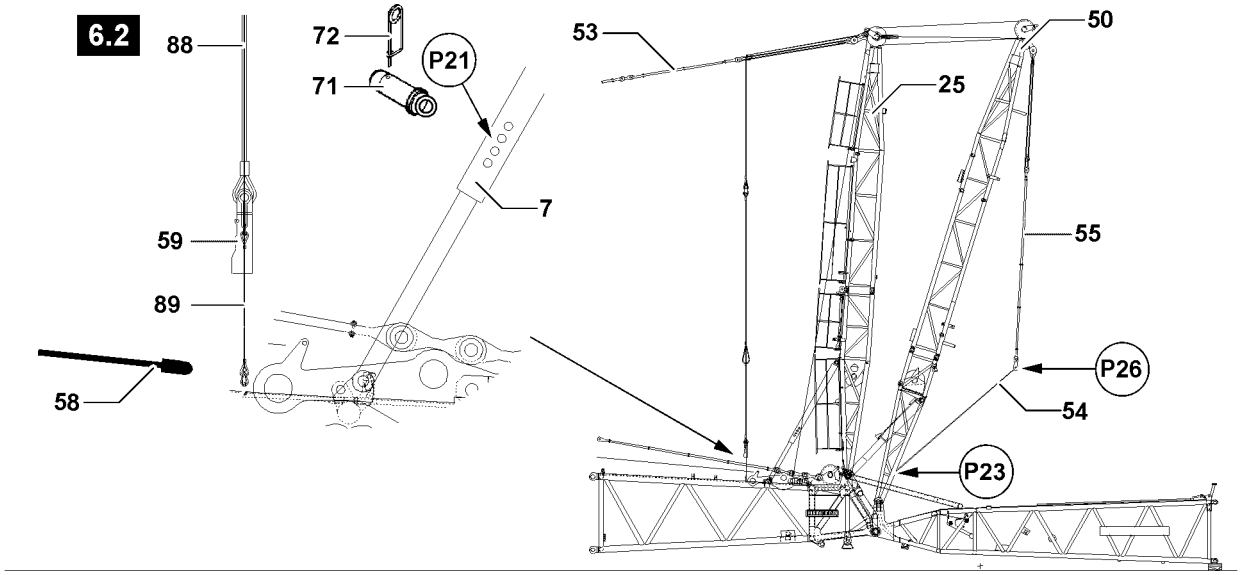

Fig.120518

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6.4 Unpinning the relapse supports

Illustration **6**:

▶ Erect the WA-frame 1 **50** until the relapse cylinder **86** is completely retracted.

Result:

– The relapse supports **7** are relieved: The pin **71** can be unpinned.

NOTICE
Damage of WA-frame 2!
If the pin **71** on the relapse supports **7** is pinned when the WA-frame 2 **25** is not pulled back, then the WA-frame 2 can be damaged.
▶ Unpin the pins **71** on both sides before the WA-frame 2 **25** is pulled back.

▶ Remove the spring retainer **72** on both sides and unpin the connecting pins **71**.

On the S-end section on points (point **P29** and point **P30**) see illustration **6**, the two ropes (rope **88** and rope **90**) are attached:
– Rope **88** is used to pull back the WA-frame 2 **25** with the hoist rope **58**.
– Rope **90** is used to secure the WA-frame 2 **25** with the auxiliary crane at take down.

▶ Unhook the rope **88** on point **P29**: Remove the spring retainer **93** and unpin the pin **92**.
▶ Hook the hoist rope **58** in the lock **59** on rope **88**.

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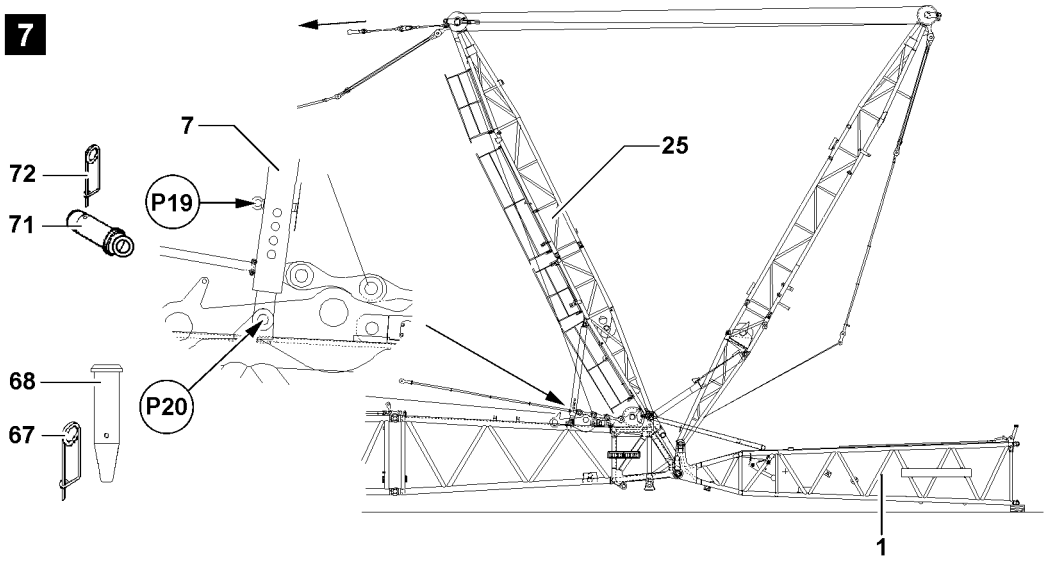

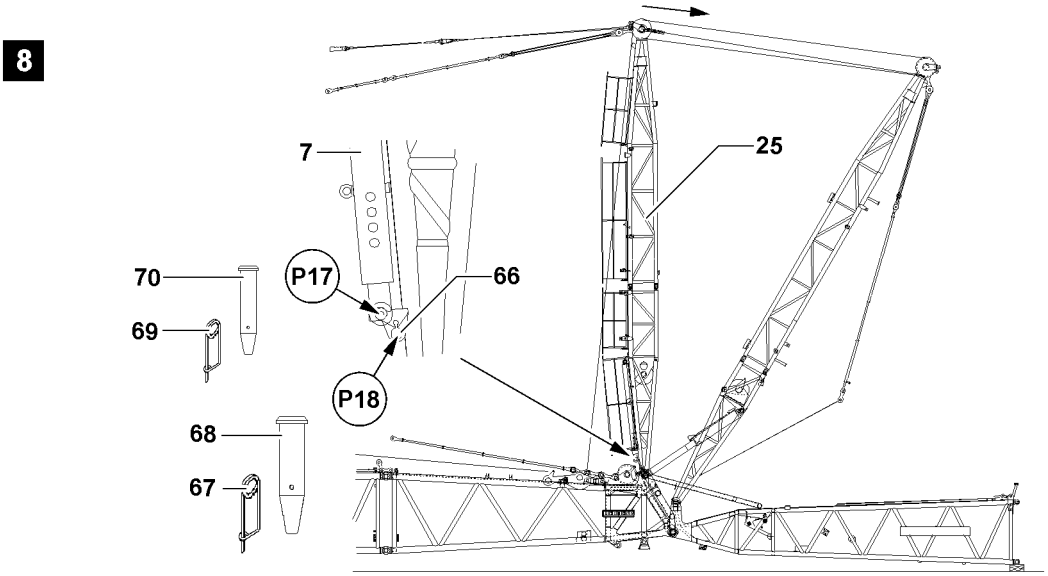

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Fig.120516

Illustration **7**:

- ▶ Pull the WA-frame 2 **25** backward: Spool the W-control rope out and spool the hoist rope **58** up until the relapse supports **7** are pushed in and can be pinned.
- ▶ Insert the pin **71** on point **P19** and secure with spring retainer **72**.
- ▶ Unpin the relapse supports **7** on both sides on the point **P20**: Remove the spring retainer **67** and unpin the pin **68**.

Illustration **8**:

- ▶ Erect the WA-frame 2 **25** vertically: Spool the W-control rope up and simultaneously spool out the hoist rope **60**.
- ▶ Pin the relapse supports **7** on both sides on point **P17**: Insert the pin **70** and secure with spring retainer **69**.
- ▶ Insert the pin **68** on point **P18** on retainer **66** and secure with spring retainer **67**.

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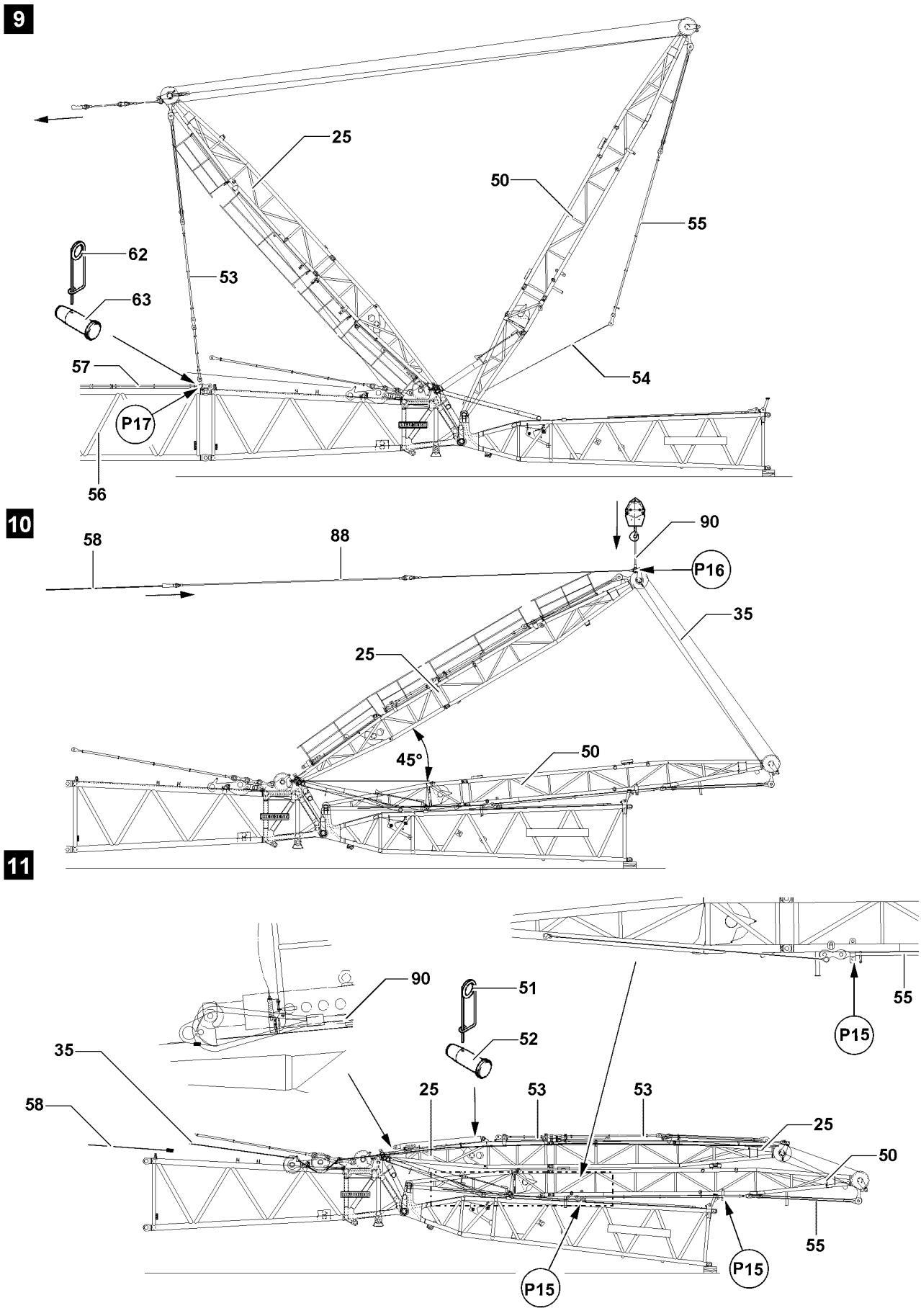

Fig.120517

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6.5 Disassembling the WA-frame 2 W-guy rods

Illustration **9**:

- ▶ Pull the WA-frame 2 **25** back until the W-guy rods **53** hang down vertically: Spool the W-control rope out and simultaneously spool up the hoist rope.
- ▶ Release the transport retainers of the W-guy rods on the S/SL-boom and unpin.
- ▶ Place the W-guy rods **57** in the transport retainers on the S/SL-boom **56**.
- ▶ Separate the W-guy rods **57** on the point **P17** from the W-guy rods **53**: Remove the spring retainer **62** and unpin the pin **63**.
- ▶ Secure the W-guy rods **57** in the transport retainers on the S/SL-boom **56**.

Illustration **10**:

WARNING
WA-frame 2 folding downward!
If WA-frame 2 is not held with the auxiliary crane at 45° while placing down, it can fold downward.
Personnel can be severely injured or killed.
- ▶ Fasten the WA-frame 2 **25** on the auxiliary crane and secure.

Note
- ▶ While spooling up the W-control rope, hold the WA-frame 2 **25** with the auxiliary crane on tension to prevent slack rope formation.

- ▶ Erect the WA-frame 2 **25** and tilt it forward by 45°: Spool the W-control rope **35** up and simultaneously spool out the hoist rope **58**.
- ▶ Secure the WA-frame 2 **25**: Fasten the second rope **61** on the auxiliary crane.
- ▶ Position the auxiliary crane vertically over point **P16** and tension the rope **61**.
- ▶ Spool the hoist rope **58** out until the rope **61** is relieved and the WA-frame 2 **25** can be placed down.

Illustration **11**:

- ▶ Place the WA-frame 1 **50** down.
- ▶ Secure the W-guy rods **55** in retainers on point **P15** on the WA-frame 1 **50**.
- ▶ Place the WA-frame 2 **25** down with the auxiliary crane on the WA-frame 1 **50**, spool the W-control rope **35** up and simultaneously spool the hoist rope **58** out.
- ▶ Secure the rope **61** on the WA-frame 2 **25** and separate it from the hoist rope **58**.
- ▶ Spool the hoist rope **58** up.
- ▶ Separate the W-guy rods **53** on the WA-frame 2 **25**: Remove the spring retainer **51** and unpin the pin **52**.
- ▶ Secure the W-guy rods **53** with transport retainers on the WA-frame 2 **25**.

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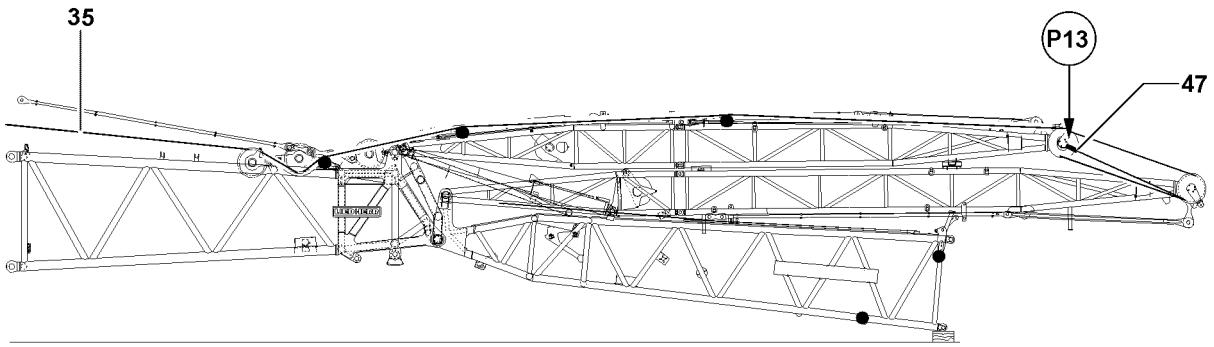

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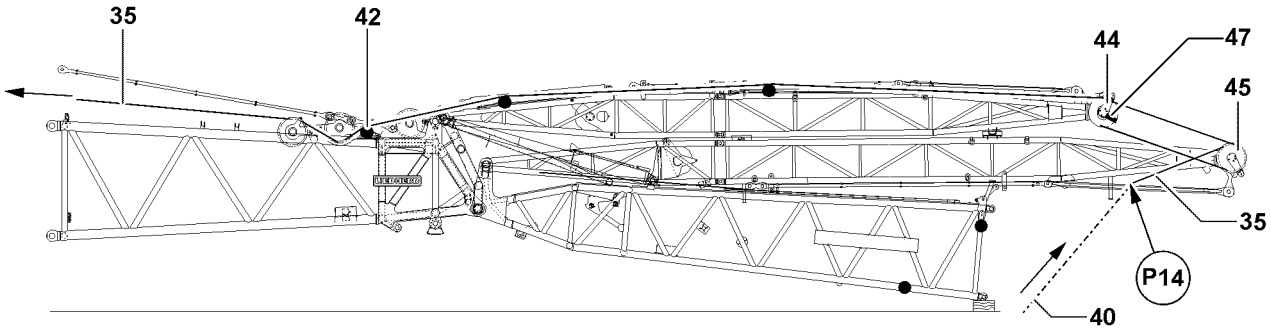

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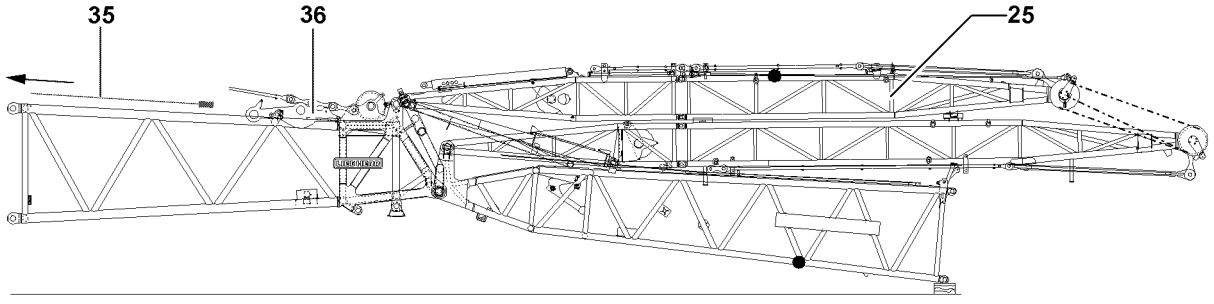

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Fig.112153

6.6 Unreeving the W-control rope

NOTICE
Slack rope formation!
The control rope can become damaged due to slack rope formation.
- ▶ Do not allow slack rope formation while spooling the W-control rope up.
- ▶ When spooling the W-control rope up, keep the rope tight.

Note
- ▶ Before unreeving in the W-control rope, the rope retaining pins of the rope pulley **42**, pulley set **44** and pullet set **45** must be released and unpinned, see illustration **13**.

6.6.1 Unreeving the W-control rope on the pulley sets

Make sure that the following prerequisite is met:
– The intake rope for the pulley sets is available.

Illustration **12**:

- ▶ Unhook the W-control rope **35** on point **P13** on the lock **47**.

Illustration **13**:

- ▶ Pull the intake rope **40** to point **P14**.
- ▶ Connect the intake rope **40** and the W-control rope **35** on point **P14**.
- ▶ Spool the W-control rope **35** up and pull the intake rope in on the pulley set **44** and on the pulley set **45**.
- ▶ Hook the intake rope **40** on the lock **47**.
- ▶ Separate the W-control rope **35** on the pulley set **44** from the intake rope **40**.
- ▶ Pin and secure the rope retaining pins on the pulley sets.

6.6.2 Pulling the W-control rope from the WA-frame 2

Make sure that the following prerequisite is met:
– The intake rope for the WA-frame 2 is available.

Illustration **14**:

- ▶ Pull the W-control rope **35** from the WA-frame 2 **25** and spool onto winch 5.
- ▶ Pin and secure the rope retaining pins on the rope pulley **42**.

Result:

– The W-assembly units can be disassembled.

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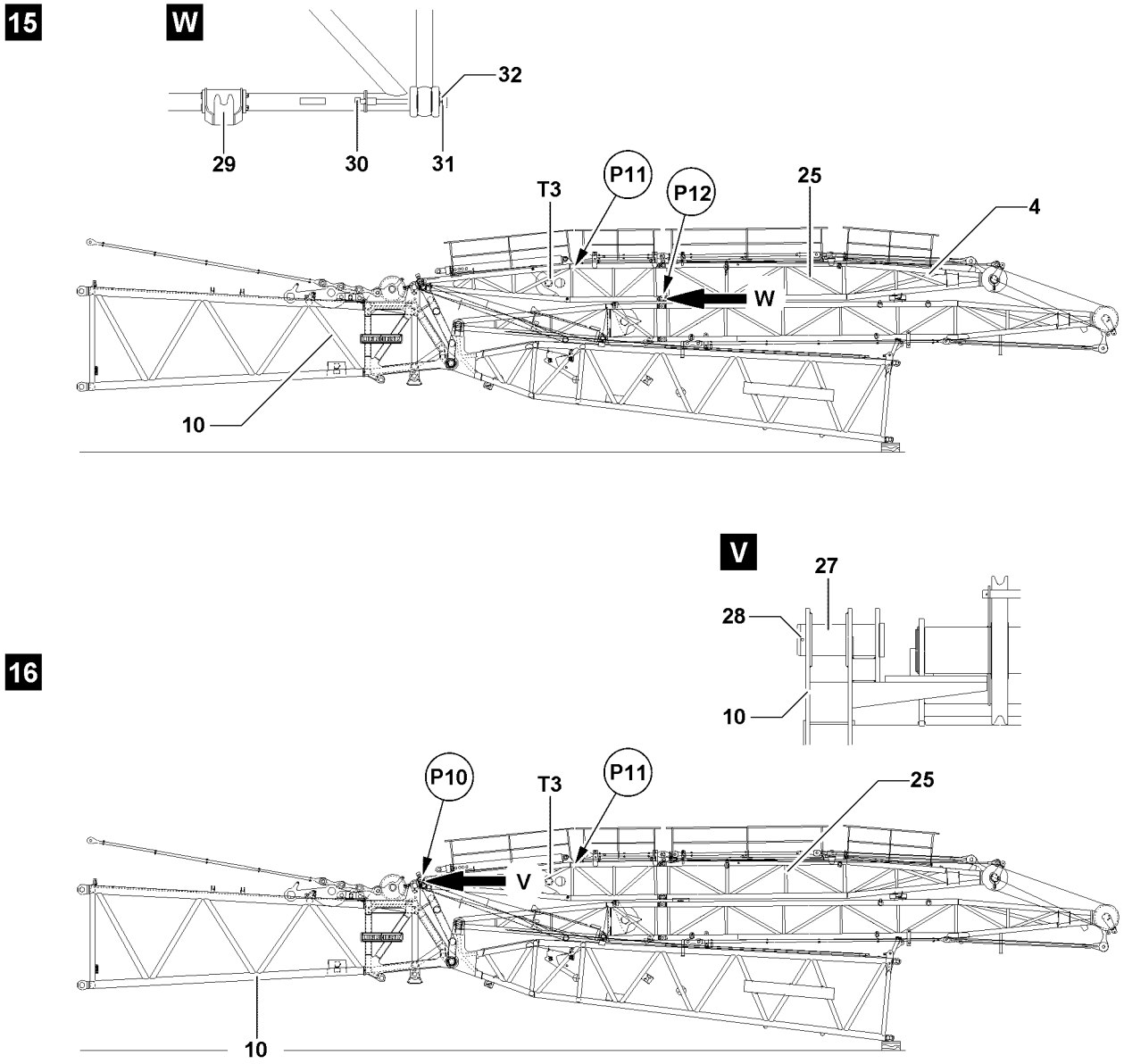

Fig.112154

6.7 Disassembling the W-transport units

6.7.1 Separating the WA-frame 2

Illustration **15**:

- ▶ Secure and slightly lift the WA-frame 2 **25** with the auxiliary crane on point **P11** until it can be unpinned on point **P12**.
- ▶ Hang the pin pulling cylinder on the retainer **29** and on the screw **30**.
- ▶ Disconnect the transport unit **T3** and the WA-frame 2 end section **4**: Remove the spring retainer **31** on both sides on point **P12** and unpin the pin **32**.

Illustration **16**:

- ▶ Disconnect the transport unit **T3** and the S-end section **10**: Remove the spring retainer **28** on both sides on point **P10** and unpin the pin **27**.

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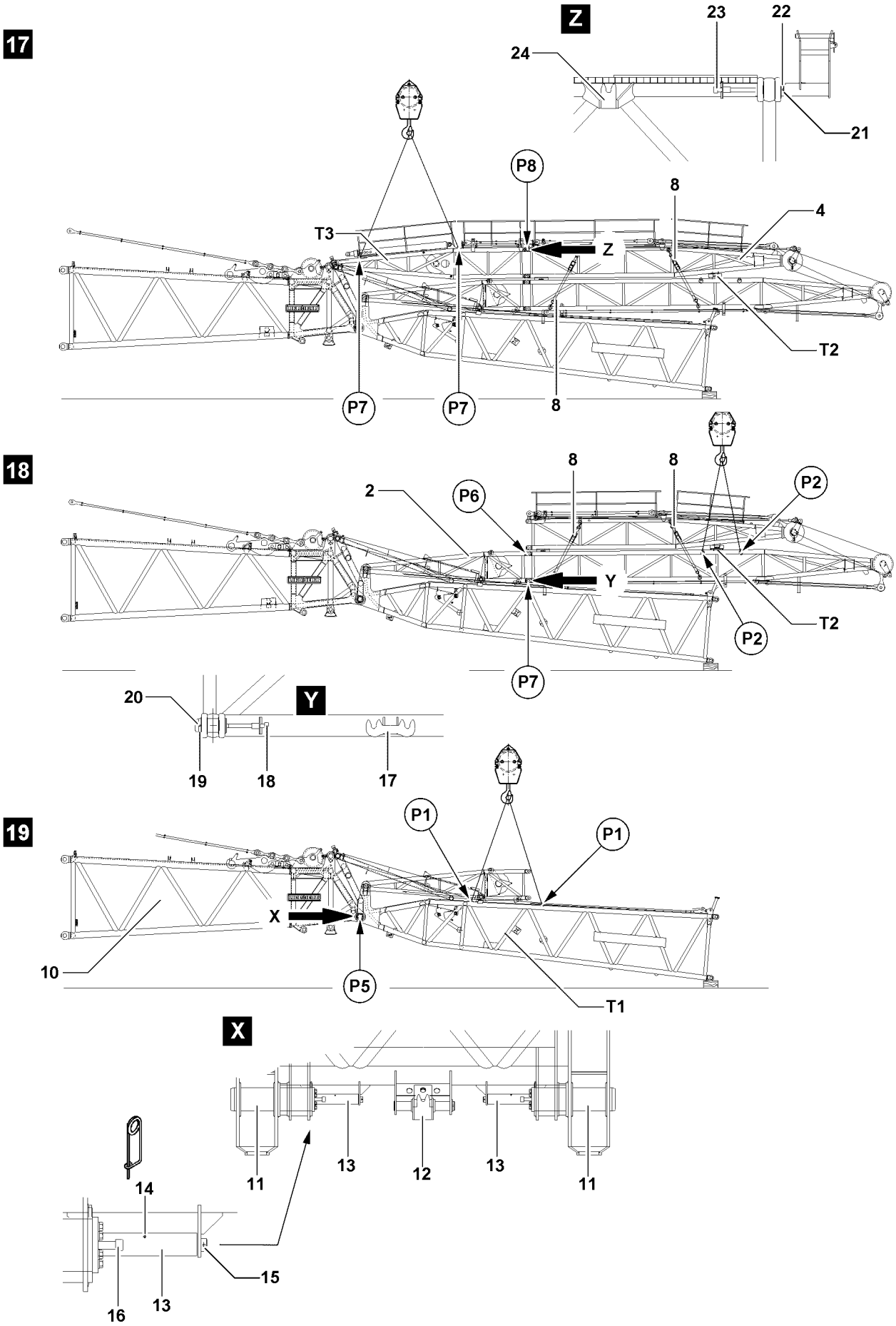

Fig.112155

6.7.2 Disassembling the W-transport unit 3

Illustration **17**:

- ▶ Secure the transport unit **T2** with the lashing belts **8**.
- ▶ Attach and secure the auxiliary crane on the fastening points **P7** on the transport unit **T3**.
- ▶ Hang the pin pulling cylinder on the retainer **24** and on the screw **23**.
- ▶ Disconnect the transport unit **T3** and the WA-frame 2 end section **4** „on top“: Remove the spring retainer **21** on both sides on point **P8** and insert the pin **22**.
- ▶ Remove the transport unit **T3** with the auxiliary crane.

6.7.3 Disassembling the W-transport unit 2

Illustration **18**:

Make sure that the following prerequisite is met:

– The lashing belts **8** are tightly rigged on the transport unit **T2**.

WARNING
Slipping component!
If the lashing belts are not present or insufficiently secured while raising the transport unit **T2**, the end section of the WA-frame 2 can slide down.
Personnel can be severely injured or killed.

- ▶ Make sure that the lashing belts **8** on the transport unit **T2** are tightly secured.

- ▶ Attach and secure the auxiliary crane on the fastening points **P2** on the transport unit **T2**.
- ▶ Hang the pin pulling cylinder on the retainer **17** and on the screw **18**.
- ▶ Disconnect the transport unit **T2** and the WA-frame 1 pivot section **2** „on the bottom“: Remove the locking pin **19** on both sides on point **P7** and unpin the pin **18**.
- ▶ Disconnect the transport unit **T2** and the WA-frame 1 pivot section **2** „on top“ on point **P6**.
- ▶ Remove the transport unit **T2** with the auxiliary crane.

6.7.4 Disassembling the W-transport unit 1

Illustration **19**:

- ▶ Attach and secure the auxiliary crane on the fastening points **P1** on the transport unit **T1**.
- ▶ Remove the retaining plate **13**: Remove the spring retainer **14** and pull the retaining plate **13** from the pin **15**.

Result:

– The pin **11** can be unpinned.

Note

- ▶ The retainer **12** can be offset to the left or right when the piston stroke of the pin pulling cylinder is not sufficient to pin or unpin the pin **11** completely.

- ▶ Hang the pin pulling cylinder on the retainer **12** and screw **16**, see detail **X**.
- ▶ Disconnect the transport unit **T1** and the S-end section **10**: Unpin pin **11** on both sides on point **P5**.
- ▶ Remove the transport unit **T1** with the auxiliary crane.
- ▶ Secure the pins **11** when they are unpinned: Slide the retaining plate **13** on both sides over the pin **15** and secure with spring retainer **14**.

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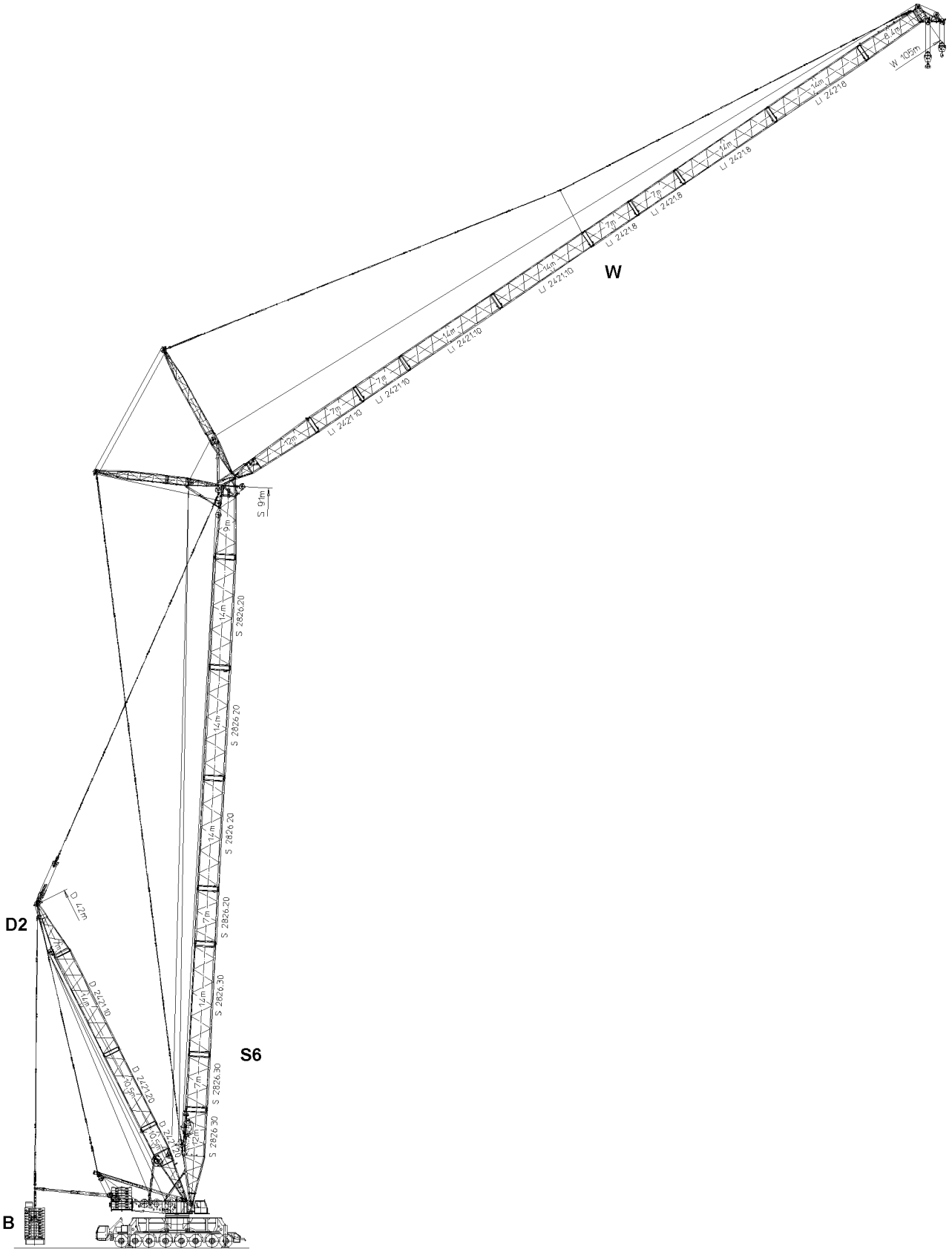

Fig.114937: S6D2W / S6D2WB

7 W-lattice jib in operating mode S6D2WB (only for LG 1750)

The operating mode **S6D2WB** differs from the operating mode SDWB by a reinforced S-boom and by another derrick boom length of 42.0 m (**D2**). The W-guying however is identical.

Derrick boom lengths	
SD-operation	S6**D2**-operation
31.5 m	42.0 m

WARNING
The crane can topple over!
If danger notes are not observed, the crane can topple over.
Personnel can be severely injured or killed.
▶ Observe and adhere to the danger notes during assembly / disassembly of the S6D2WB-boom system.

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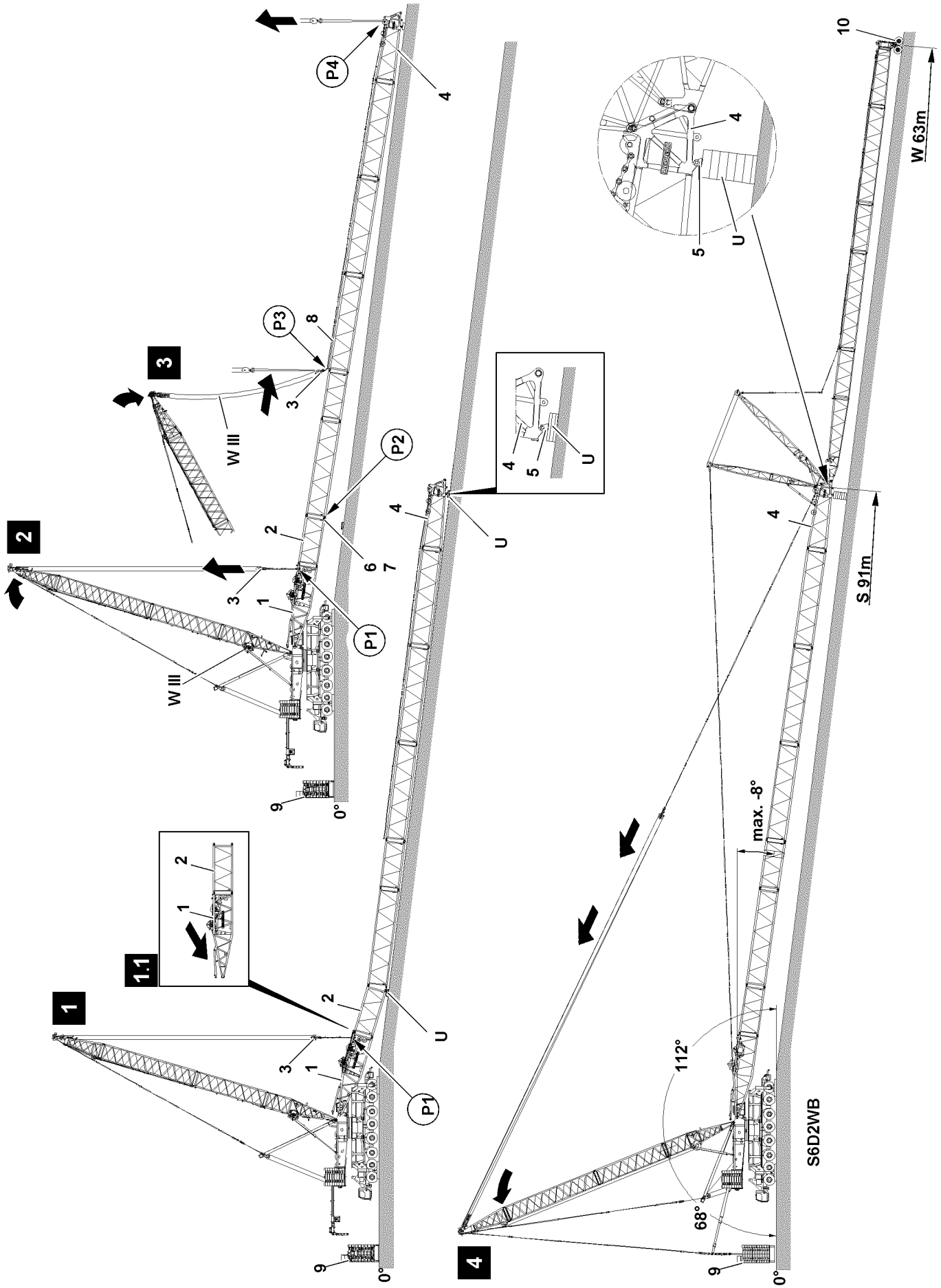

Fig.120510

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7.1 Assembling the W-lattice jib

Note

▶ The assembly of the W-lattice jib on the S6D2-boom system is identical to the assembly on the SD-boom system.

7.1.1 Assembling the S6D2-boom system in an incline

WARNING

The crane can topple over!

If the crane is not horizontal, then it can be overloaded when erecting the boom system and topple over.

Personnel can be severely injured or killed.

▶ Make sure that the placement level of the crane is level and horizontal.
▶ Make sure that the crane is completely supported and horizontally aligned.
▶ Make sure that the maximum permissible incline of the main boom angle of -8° is not exceeded at boom assembly.
▶ Make sure that all movements of the crane are actuated slowly and anticipatorily.
▶ Support the boom systems with suitable material of sufficient load bearing capacity.

NOTICE

Damage to crane!

The installation of the luffing lattice jib can be more difficult or affected if a support **U** is made too high or too low.

▶ Make sure that the support **U** is made in such a way that the incline of the main boom is limited to maximum -8°, illustration **4**.

Make sure that the following prerequisites are met:

– The crane is properly supported and horizontally aligned.
– The counterweight has been installed on the turntable according to the load chart.
– The LICCON overload protection has been set according to the data in the load chart.
– The LICCON overload protection settings have been compared with the actual set up configuration.
– The derrick boom is properly installed.
– An auxiliary crane with sufficient load carrying capacity is available.

Note

▶ For the piecing of the entire boom system refer to the rod plan.
▶ For the assembly of the main boom system, observe the danger notes in the Crane operating instructions, chapter 5.39.

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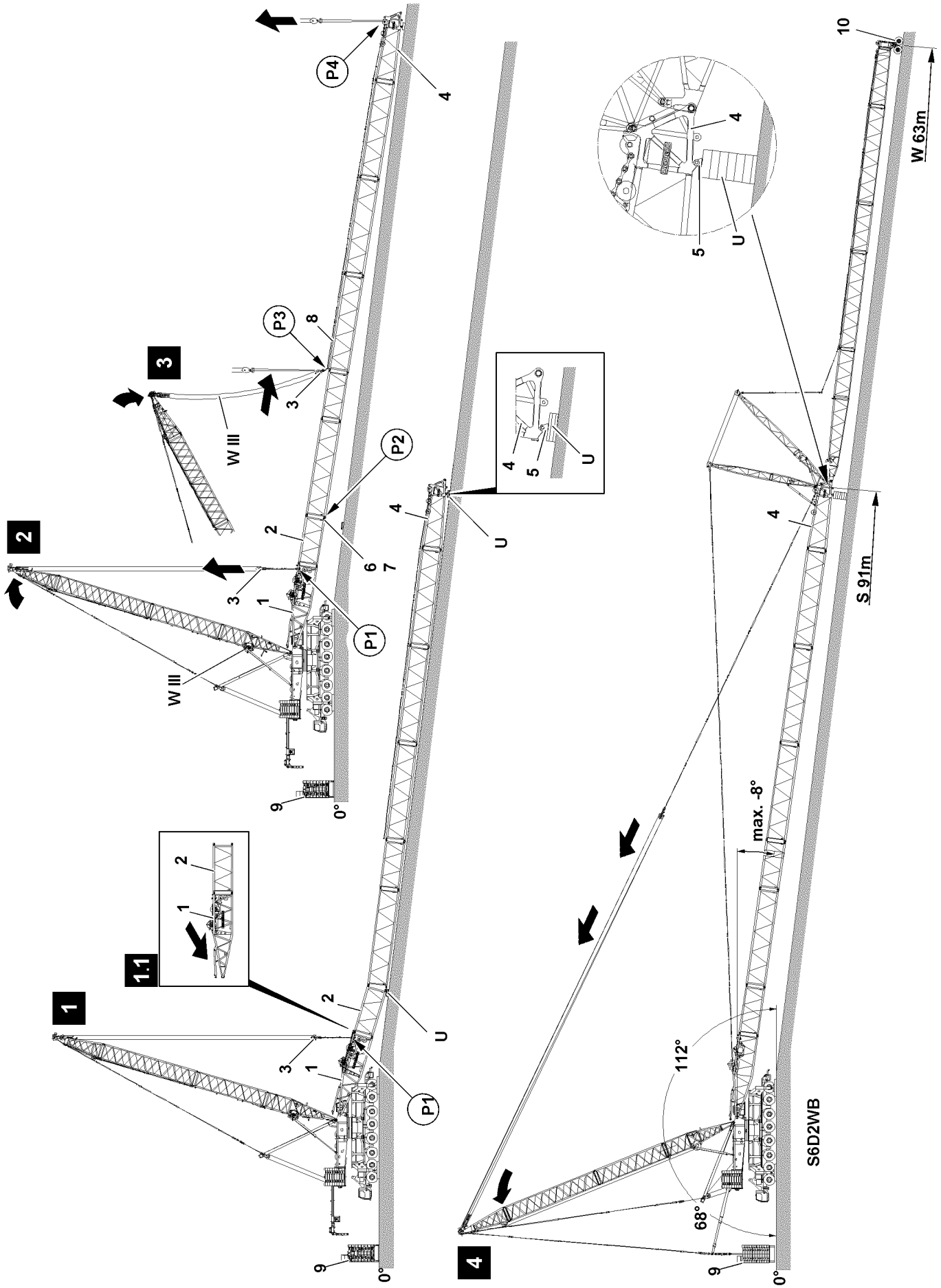

Fig.120510

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NOTICE
Danger of property damage!
At assembly of the S-boom system, lattice sections as well as the crane chassis can be damaged due to collision.
- ▶ Make sure that the preassembled boom unit (illustration **1.1**), consisting of S-pivot section **1** and 7 m -intermediate section **2** is swung in on the turntable slowly and with utmost caution and pinned.
- ▶ Make sure that the lattice sections are properly supported after assembly.

- ▶ Swing the preassembled boom unit (S-pivot section **1** and 7 m -intermediate section **2**) in with the auxiliary crane to the turntable.
- ▶ Pin the S-pivot section properly on the turntable and secure, see Crane operating instructions, chapter 5.39.
- ▶ Place the preassembled boom unit on the support **U** and remove the auxiliary crane, see illustration **1**.

Note
- ▶ For further assembly of the S-boom system and the assembly of the upper pulley block **3** on the S-pivot section **1**, observe the Crane operating instructions, chapter 5.39.

- ▶ Pin the upper pulley block **3** with the guying on the S-pivot section **1** at point **P1**.
- ▶ Assemble the S-boom system completely to the required length, see illustration **1**.
- ▶ Place the boom end section **4** with the placement frame **5** on the support **U**, see illustration **1**.
- ▶ Close the S-boom system: Spool up winch 3 **W III** and lift the upper pulley block **3**, see Crane operating instructions, chapter 5.39.

When the boom system is closed:
- ▶ Pin the boom system at point **P2** with pin **6** and secure with spring retainer **7**, illustration **2**.

When the boom system is properly pinned and secured at point **P2**:
- ▶ Unpin the upper pulley block **3** on the S-pivot section **1**, illustration **2**.

NOTICE
Danger of property damage!
The lattice sections / boom components can be significantly damaged due to improper fastening and lifting with the auxiliary crane.
Lattice sections / boom components can be damaged due to collision with the upper pulley block or the hook block of the auxiliary crane.
- ▶ Make sure that the upper pulley block **3** does not „run up“ on the lattice sections.
- ▶ Make sure that the upper pulley block **3** does not start to swing back and forth.
- ▶ Make sure that the preassembled boom systems or partial booms are properly fastened when lifting and / or securing them with the auxiliary crane. Observe the Crane operating instructions, chapter 5.01.

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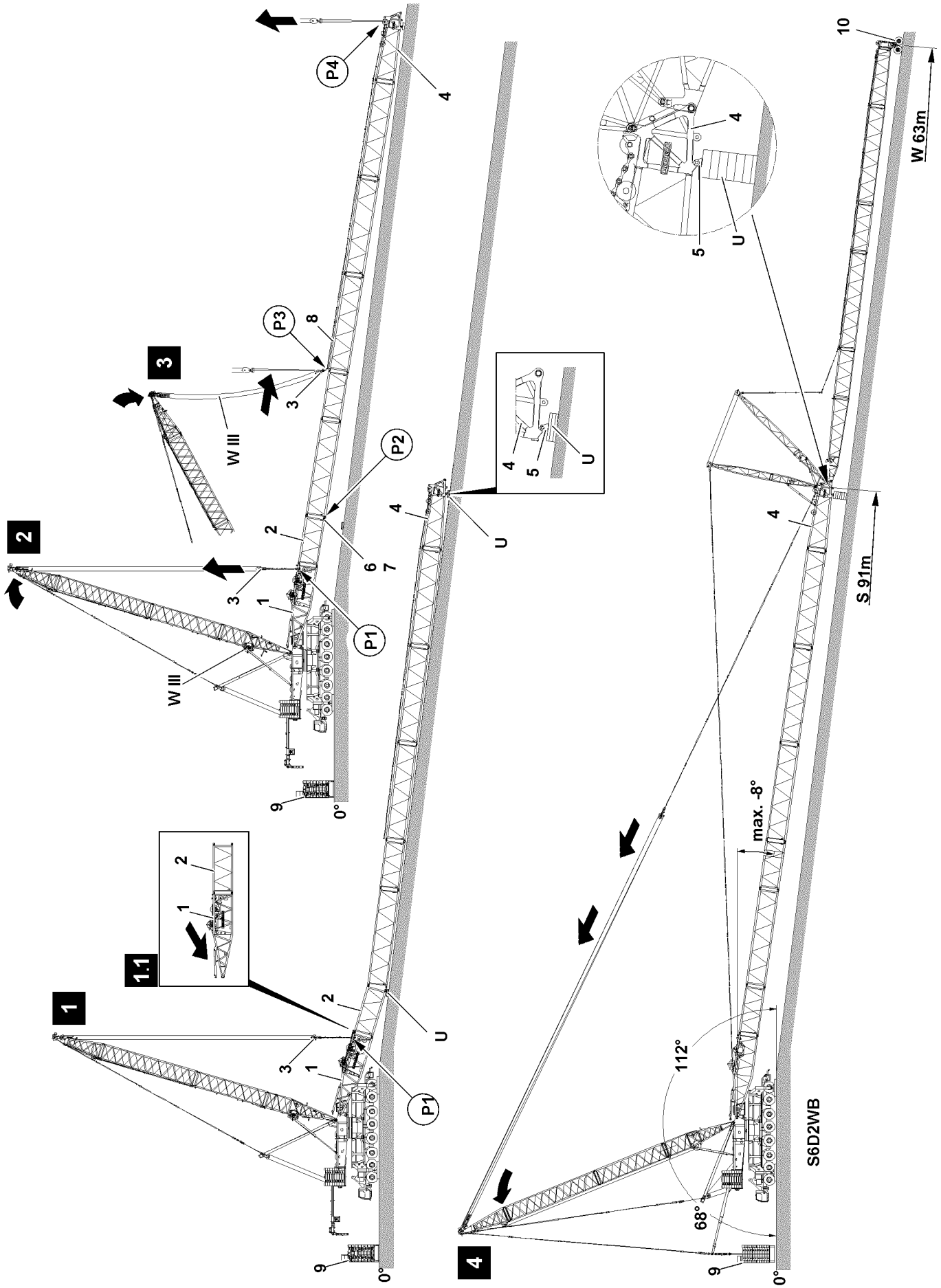

Fig.120510

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- ▶ Assemble the guy rods at point **P3**, see Crane operating instructions, chapter 5.39.
- ▶ Fasten the S-boom at point **P4** on the auxiliary crane, observe the Crane operating instructions, chapter 5.01.

NOTICE
Danger of slack rope formation!
- ▶ Make sure that no slack rope forms when lifting the S-boom with the auxiliary crane on winch 3 **W III**.

NOTICE
Danger of property damage!
- ▶ Make sure that the incline on the S-boom **after supporting does not exceed -8°**. Lower inclines are permissible.
- ▶ Make sure that the ground is sufficiently load bearing in the area of the support to be able to take on the support as well as the weight of the boom safely.
- ▶ Make sure that the support on the boom end section **4** is safely made with stable and load bearing materials.

When the S-boom is properly fastened on the auxiliary crane:
- ▶ Lift the S-boom with the auxiliary crane.
- ▶ Make the support **U** on the boom end section **4** in such a way that the placement frames **5** are laying in the center on the support **U**, see detail in illustration **4**.
- ▶ Lower the S-boom slowly and carefully with the auxiliary crane on the support **U**.

When the S-boom is laying with the placement frame **5** completely on the support **U**:
- ▶ Remove the auxiliary crane.

7.1.2 Assembling the W-boom system

Note
- ▶ For the assembly of the W-boom system, observe section „Assembling the W-boom system“ in this chapter.
- ▶ For the combination of the W-boom system refer to the rod plan.

Make sure that the following prerequisites are met:
- The S-boom is properly assembled.
- The S-boom is properly supported.
- The incline of the S-boom is maximum -8°.
- The pulley cart is available.

- ▶ Assemble the W-boom system properly.
- ▶ Place the boom end section **4** on the W-boom in the pulley cart **10**, illustration **4**.

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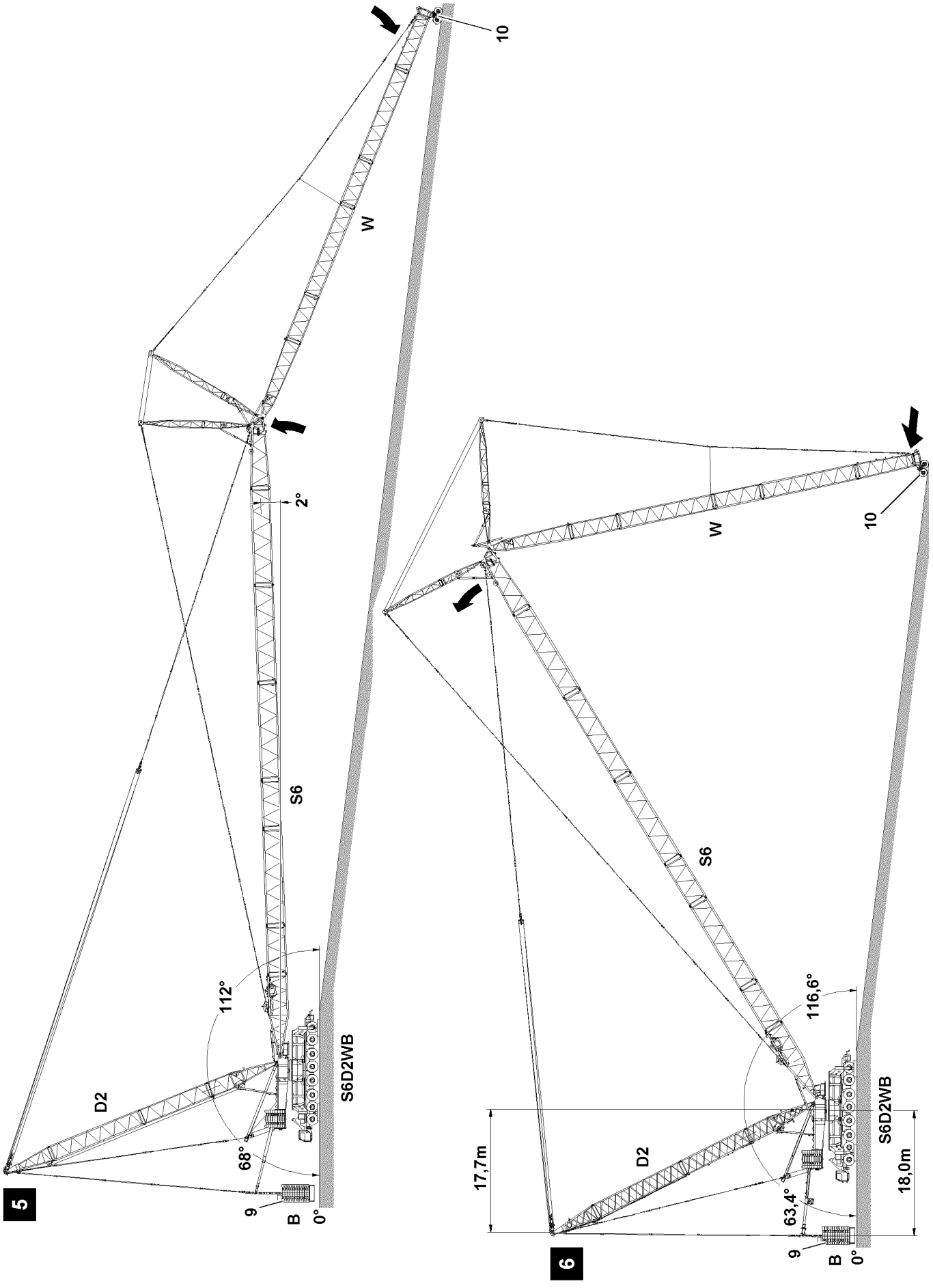

Fig.120511

When the W-boom system is properly assembled:

▶ Set the derrick boom to **68°**.

WARNING
The crane can topple over!

▶ Pay attention to the maximum permissible hoisting height when lifting the suspended ballast **9** off the ground, see Crane operating instructions, chapter 5.36.

▶ Assemble and lift the suspended ballast **9** properly, see Crane operating instructions, chapter 5.36.

DANGER
The crane can topple over!
In crane operation with exceeded LICCON overload protection, the crane can topple over.
Personnel can be severely injured or killed.

▶ The radii listed in the load chart may not be exceeded or fallen below, even if there is no load on the hook.

WARNING
The crane can topple over!
If the specifications in the erection and take down charts are disregarded, the crane can topple over.
Personnel can be severely injured or killed.

▶ Observe the Erection and take down charts.

When the suspended ballast is lifted off the ground:

▶ Erect the S-boom to **minimum** 0° to **maximum** 4° to the horizontal, illustration **5**.

When the S-boom is between 0° and 4° to the horizontal:

▶ Set the derrick boom to 63.4° to the rear.

Result:

– The derrick boom is on a derrick radius of 17.7 m.

Note

▶ For the erection of the boom system, observe the erection and take down charts as well as section „Erecting the boom“ in this chapter.

▶ Observe hazard warnings.

▶ Erect the boom system properly, illustration **6**.

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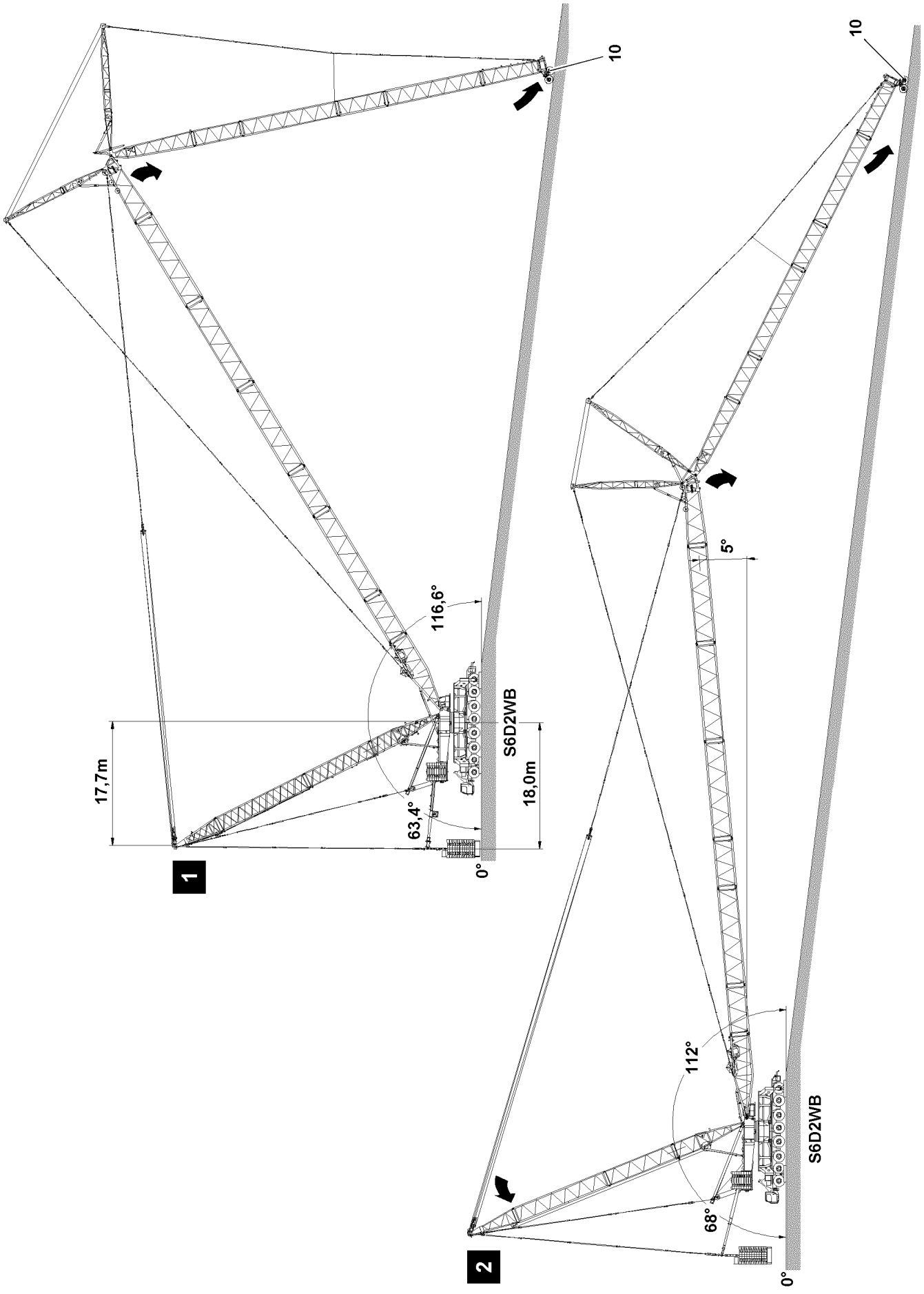

Fig.120519

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7.2 Disassembling the W-lattice jib

Note

▶ The disassembly of the W-lattice jib on the S6D2-boom system is identical to the disassembly on the SD-boom system.

7.2.1 Placing the boom system down in an incline

Make sure that the following prerequisites are met:
- The crane is properly supported and horizontally aligned.
- The suspended ballast has been lifted off the ground.
- The counterweight has been installed on the turntable according to the load chart.
- The LICCON overload protection has been set according to the data in the load chart.
- The LICCON overload protection settings have been compared with the actual set up configuration.
- The derrick boom is at 63.4°.
- An auxiliary crane with sufficient load carrying capacity is available.

WARNING

The crane can topple over!

If the boom system is luffed down too far at a derrick boom angle of 63.4°, then the crane can be overloaded.

Personnel can be severely injured or killed.

▶ Luff the main boom down to maximum 5°.

▶ Make sure that the erection and take down charts are observed.

▶ Luff the W-lattice jib down and place the boom end section in the pulley cart **10**, see section „Placing the W-lattice jib down“. Illustration **1**

▶ Luff the W-lattice jib down to the „lowest“ operating position.

Result:

- The luff down movement is turned off.
- The „STOP“ icon appears on the LICCON monitor.
- The „horn“ icon appears on the LICCON monitor.

WARNING

The crane can topple over!

▶ Make sure that the danger notes for assembly operation are observed.

When the W-lattice jib has reached the „lowest“ operating position:

▶ Activate assembly operation, see Crane operating instructions, chapter 4.02.

When the boom end section of the W-lattice jib is properly placed in the pulley cart **10**:

▶ Luff the S-boom down to 5°, see illustration **2**.

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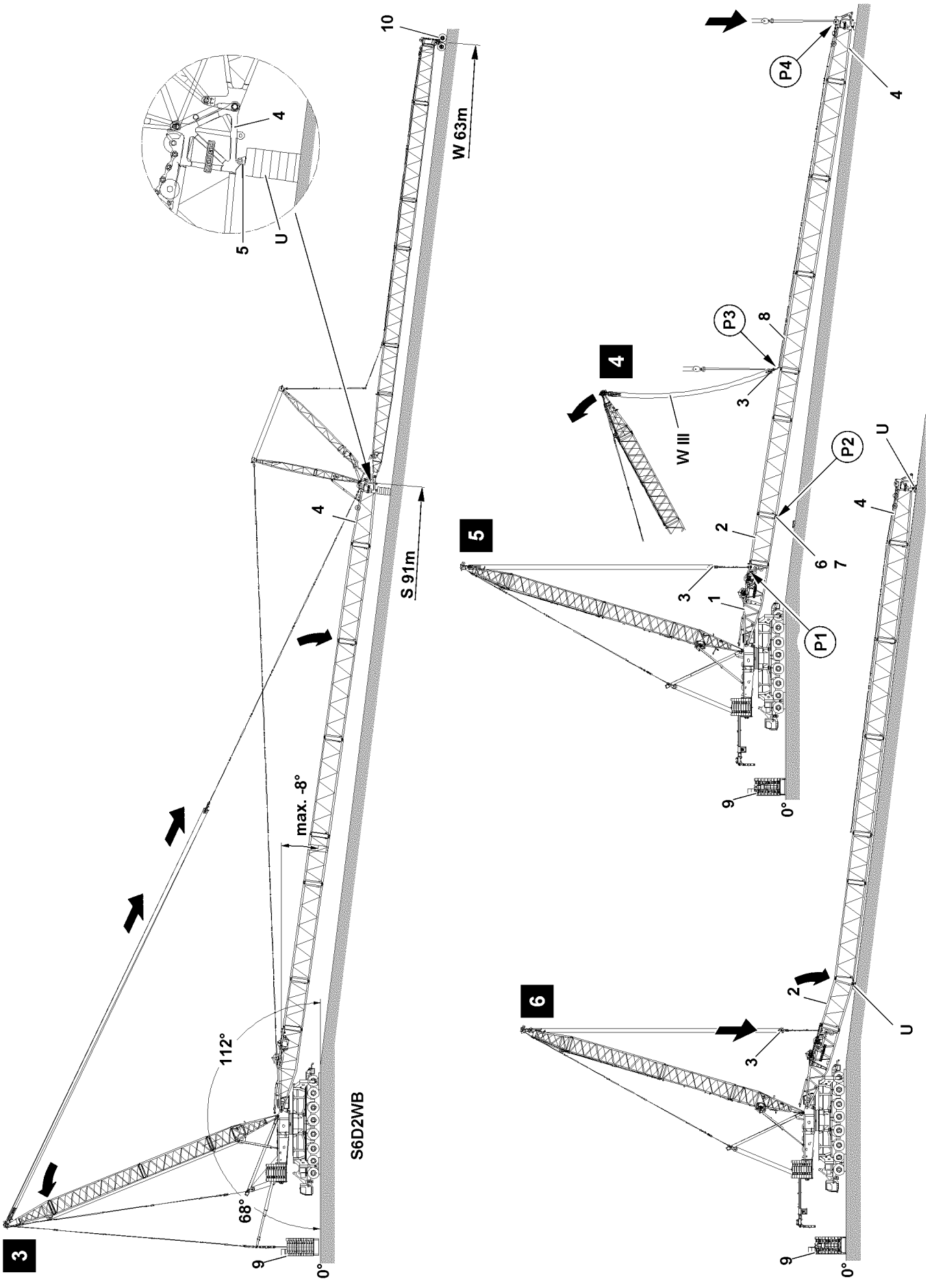

Fig.120520

WARNING
Danger of accident due to boom!
During the derrick boom adjustment, if the main boom is luffed down at the same time, then dangerous situations can arise.
Personnel can be severely injured or killed.
- ▶ Make sure during the adjustment of the derrick boom to 68°, that the main boom is held to 5°.
- ▶ Make sure that the S-boom support is carried out properly.
- ▶ Make sure that the S-boom support limits the incline of the **placed down** S-boom at maximum -8°.

When the S-boom is at 5° to the horizontal:
- ▶ Set the derrick boom to 68° to the rear.

When the derrick boom is at 68°:
- ▶ Place the S-boom down on the support to maximum -8° to the horizontal, see detail in illustration **3**.

When the S-boom is properly placed on the support **U**:
- ▶ Set the suspended ballast **9** down on the ground.
- ▶ Disassemble the suspended ballast **9** on the derrick boom, see Crane operating instructions, chapter 5.36.

7.2.2 Disassembling the W-lattice jib

Note
- ▶ For the disassembly of the W-boom system, observe section „Disassembling the W-boom system“ in this chapter.

- ▶ Disassemble the W-boom system properly.

7.2.3 Disassembling the S-boom

Note
- ▶ For the disassembly of the S-boom system, observe the Crane operating instructions, chapter 5.39.

- ▶ Disassemble the S-boom system properly.

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5.08 WV-lattice jib

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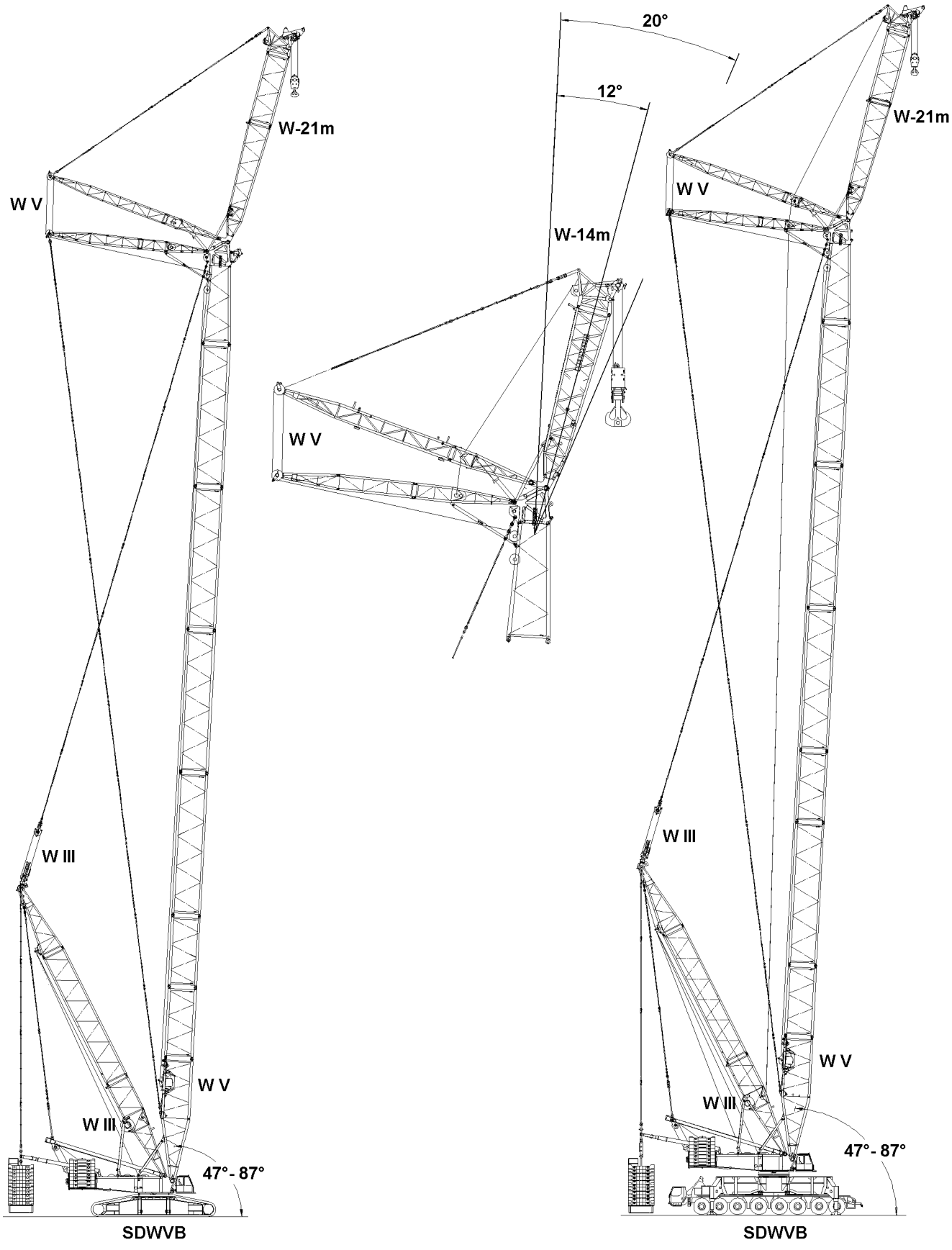

Fig.111641

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1 WV-lattice jib

This chapter refers to the SDW-boom systems with the following WV-lattice jib lengths:
- 14 m
- 21 m

Note
▶ For the WV-lattice jibs W-14 and W-21 additional guy rods must be installed according to the rod plan.

The operating positions of the WV-lattice jib to the S-boom are:
- 12 °
- **or** 20 °

The adjustment of the WV-lattice jib is made by winch 5 **W V**.

The adjustment of the S-boom, together with the WV-lattice jib is made by winch 3 **W III**.

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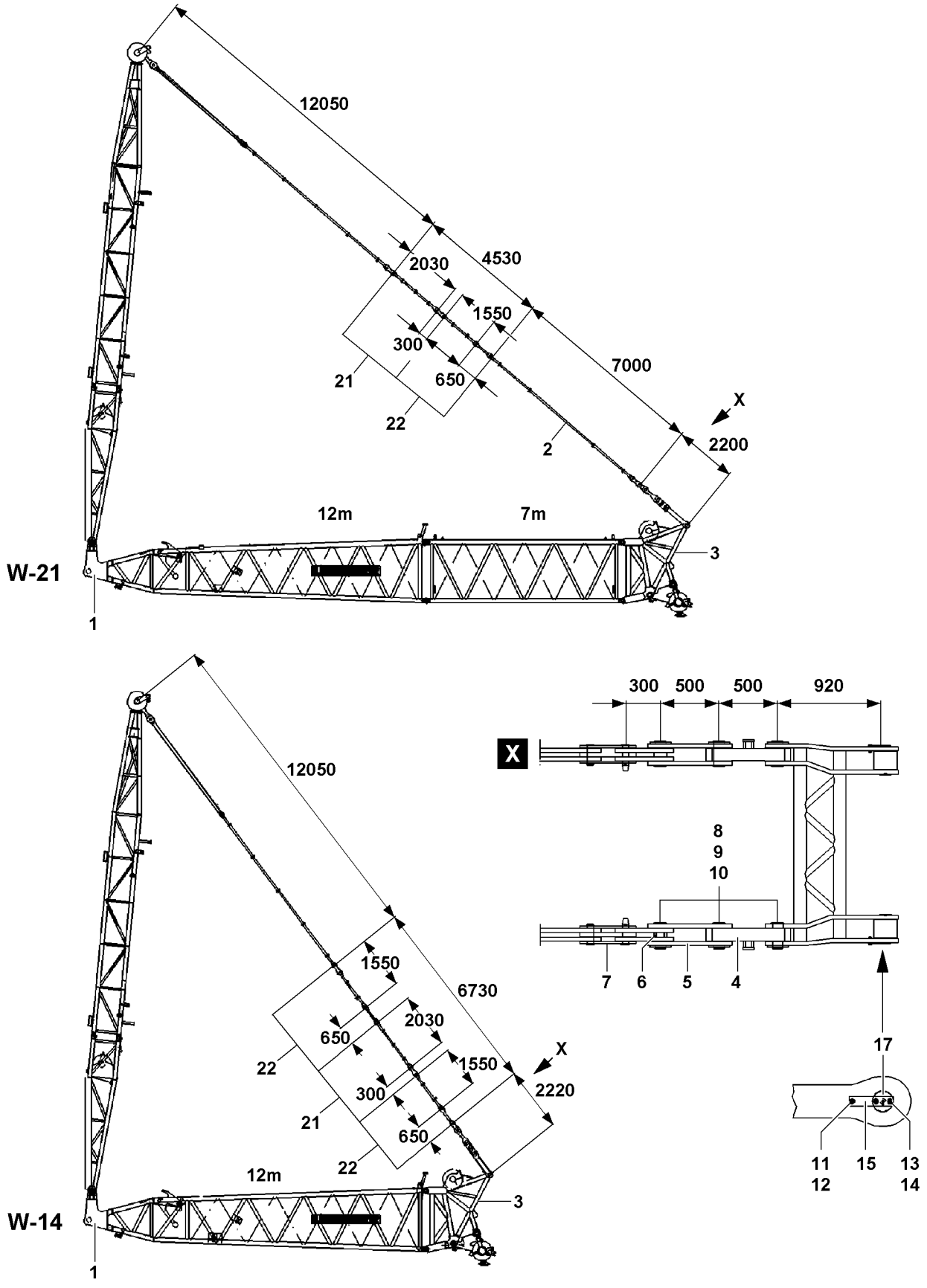

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Fig.111647

1.1 Components

Component overview	
Position	**Description**
1	Assembly unit, consisting of three transport units
2	Guy rod 7000 mm
3	W-adapter for pulley head 600 t / 400 t
4	Pull test bracket
5	Lug 500 mm
6	Pipe
7	Lug 300 mm
8	Pin
9	Retaining ring
10	Washer
11	Nut
12	Screw
13	Lock washer
14	Screw
15	Plate
16	Pin
21	Guy rod 2330 mm
22	Guy rod 2200 mm

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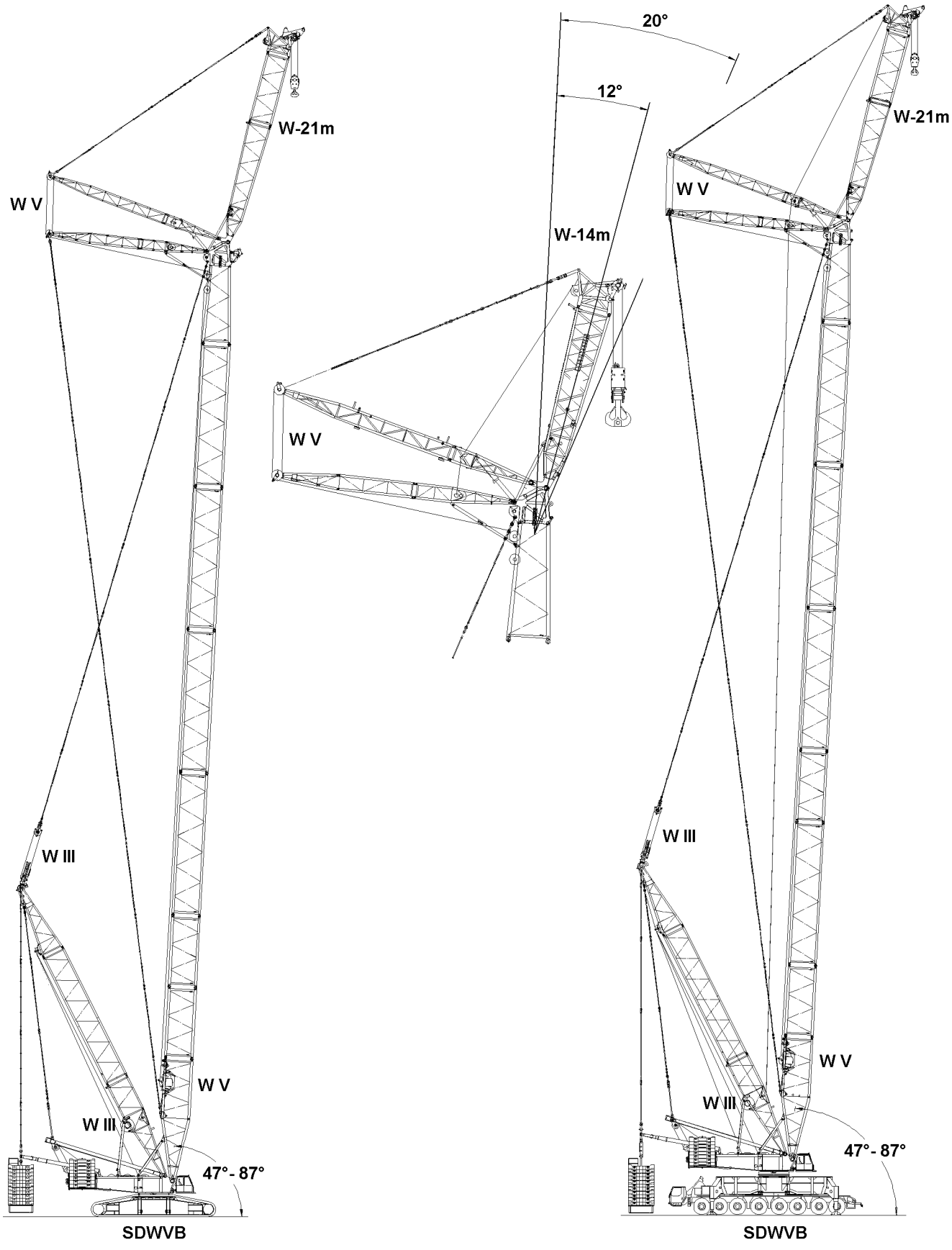

Fig.111641

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2 Assembling the WV-boom system

WARNING
Danger of falling!
During assembly / disassembly work, personnel must be secured with appropriate aids to prevent them from falling. If this is not observed, assembly personnel could fall and suffer life-threatening or fatal injuries.

- ▶ All assembly work must be carried out using suitable aids (ladders, lifting platforms, scaffolding, auxiliary crane, etc.).
- ▶ If work cannot be carried out on the ground or using such aids, then assembly personnel must be secured with the personal fall arrest system (see Crane operating instructions, chapter 2.04) to protect against falling. The personal fall arrest system must be attached in the corresponding fastening points on the crane (see Crane operating instructions, chapter 2.06).
- ▶ If railings are present for the crane, then they must be brought into the corresponding position and secured for assembly / disassembly work.
- ▶ Step on aids and fall protection equipment only with clean shoes.
- ▶ Keep aids and fall protection equipment clean and free from snow and ice.

WARNING
Falling components!
If unsecured or non-supported components are assembled or disassembled, they can fall down. Personnel can be severely injured or killed.

- ▶ During pinning and unpinning of the lattice sections, it is prohibited for anyone to remain **under** or **on** the components as well as within the entire danger zone.
- ▶ Support the boom and components before pinning / unpinning.
- ▶ Pin or unpin both pins laying in a horizontal, i.e. **left** and **right**.
- ▶ Secure the pins in the storage locations and in the receptacles.
- ▶ Do not disengage the auxiliary crane until the respective component is pinned and secured.
- ▶ It is prohibited to lean a ladder against the component being disassembled.

WARNING
Danger of crushing!
Components can swing during assembling. Hands can be crushed or severed.

- ▶ Make sure that the components do not swing back and forth during assembly.

WARNING
Neglected inspection and maintenance on guy rods!
If the regular inspection and maintenance of the guy rods is not carried out or is carried out only in irregular intervals, then severe accidents can occur due to existing and unrecognized damage to the guy rods.
Personnel can be severely injured or killed.

- ▶ Check the guy rods before every assembly, see Crane operating instructions, chapter 8.15.

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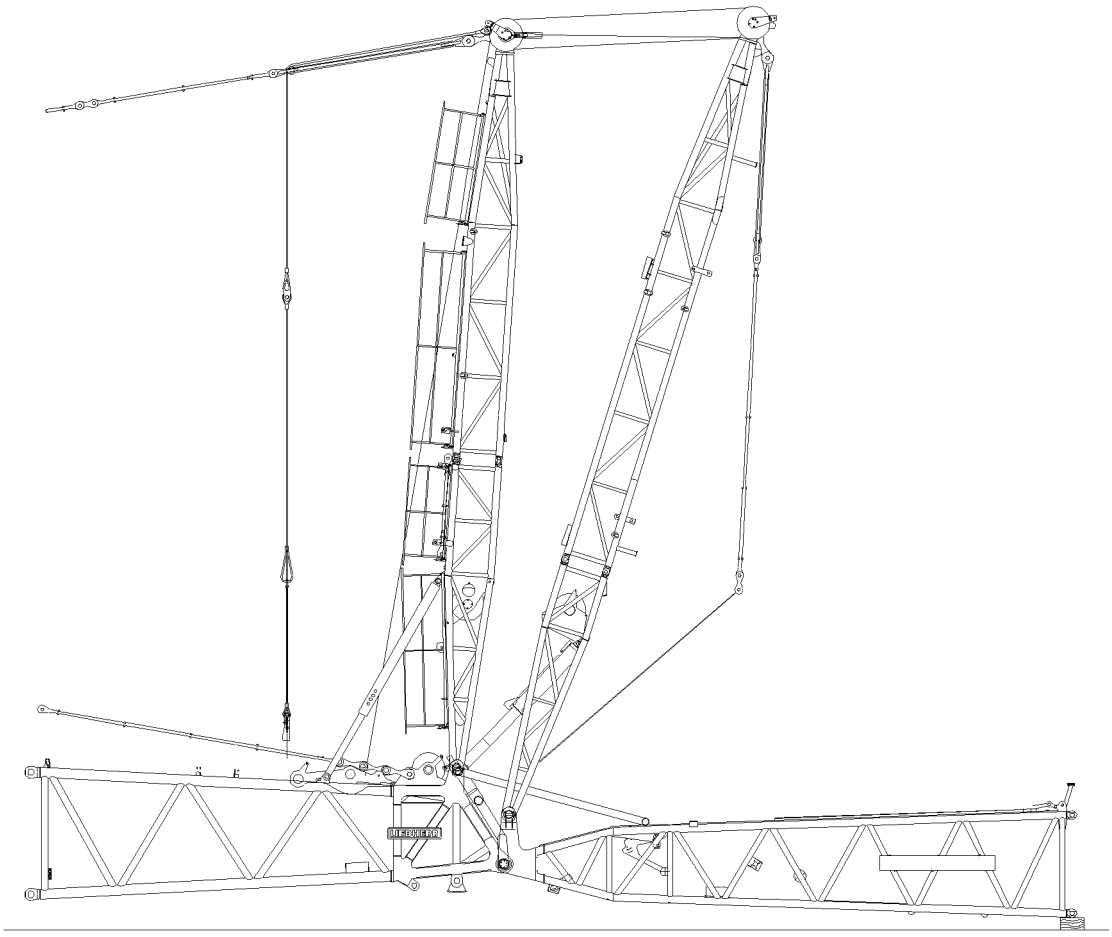

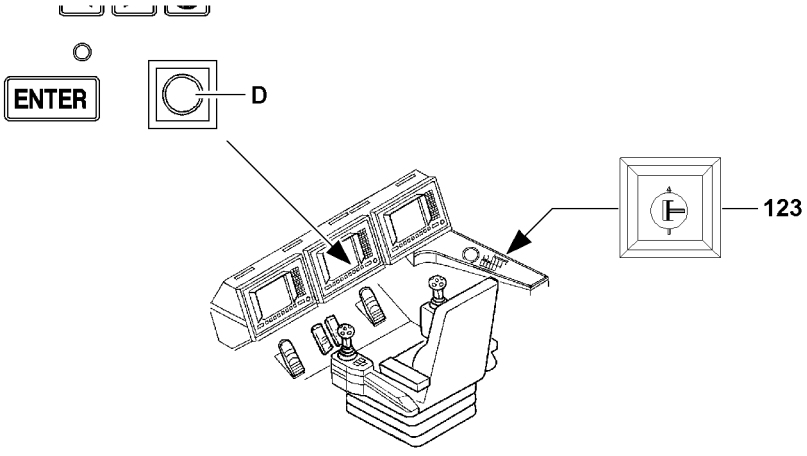

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Fig.120946

Note

▶ By supporting the components during assembly / disassembly, ground unevenness is compensated for and the material is protected.

Note

▶ The intermediate sections are pinned and unpinned with the aid of the pin pulling device, see Crane operating instructions, chapter 5.30.

NOTICE

Property damage!

▶ Always pin in the pins of the guy rods from the „inside“ to the „outside“.

Note

▶ The boom combinations must be installed according to the rod plans.

WARNING

Danger of accident due to function „Exceeding the shut off limits of the LICCON overload protection“!
If the shut off limits of the LICCON overload protection are exceeded, there is no additional protection against crane overload.
Due to erroneous operation or deliberate misuse, the crane could collapse, the boom can break off or the crane can topple over.
Personnel can be severely injured or killed.

▶ The function „Exceeding the shut off limits of the LICCON overload protection“ is only permissible in emergencies and for assembly purposes.
▶ The function „Exceeding the shut off limits of the LICCON overload protection“ may only be actuated by persons who know the effects of their actions regarding the function „Exceeding the shut off limits of the LICCON overload protection“.
▶ The function „Exceeding the shut off limits of the LICCON overload protection“ requires the presence of an authorized person and must be performed with utmost caution.
▶ Crane operation with activated function „Exceeding the shut off limits of the LICCON overload protection“ is prohibited.

Make sure that the following prerequisites are met:

– The crane is supported.
  (only in connection with crane support or for LG-cranes)
– The crane is aligned in horizontal direction.
– The SD-boom combination is assembled, see Crane operating instructions, chapter 5.04 or chapter 5.38 and chapter 5.05.
– The counterweight has been installed on the turntable according to the load chart.
– The derrick ballast is placed on the suspended ballast or the ballast trailer according to the load chart.
– The LICCON overload protection has been set according to the data in the load chart.
– The LICCON overload protection settings have been compared with the actual set up configuration.
– The LICCON overload protection is exceeded.
– Observe the Erection and take down charts.
– The assembly icon is visible on the LICCON monitor.
– An auxiliary crane is available.

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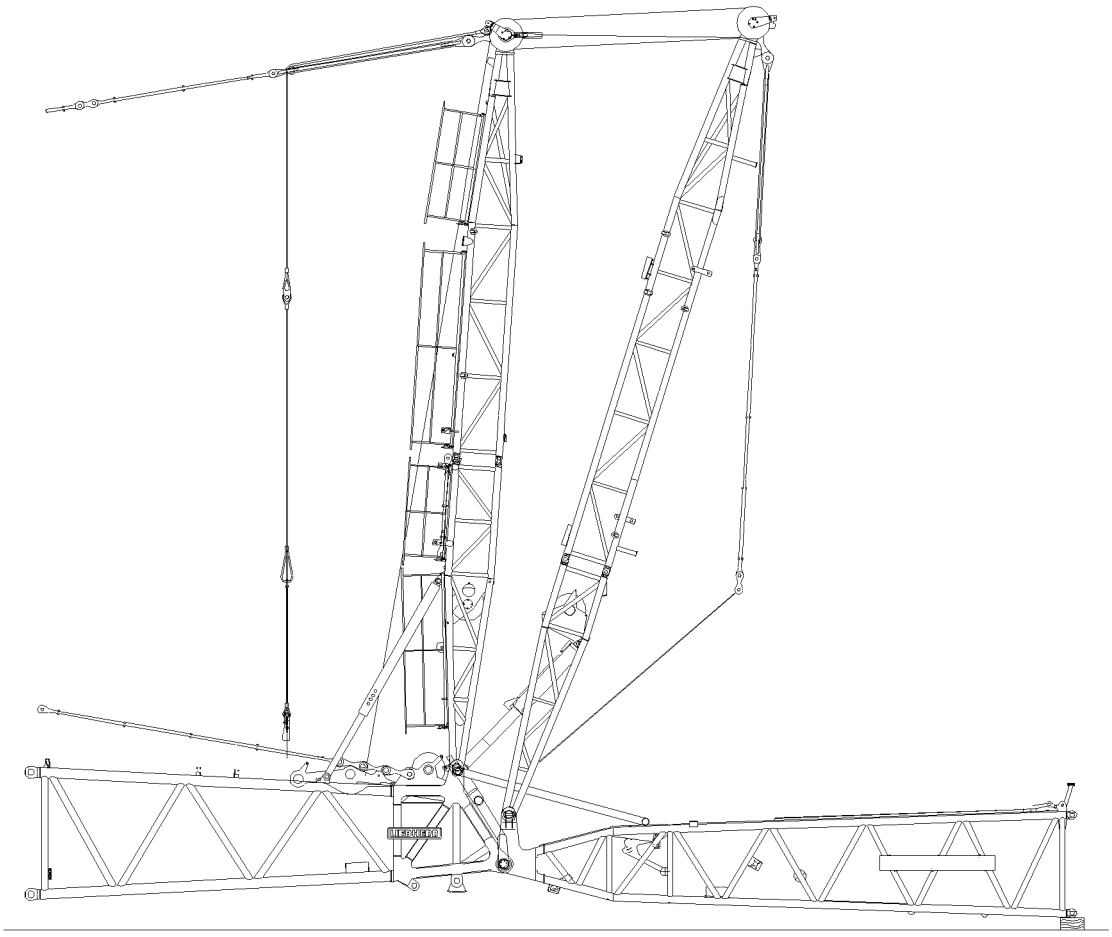

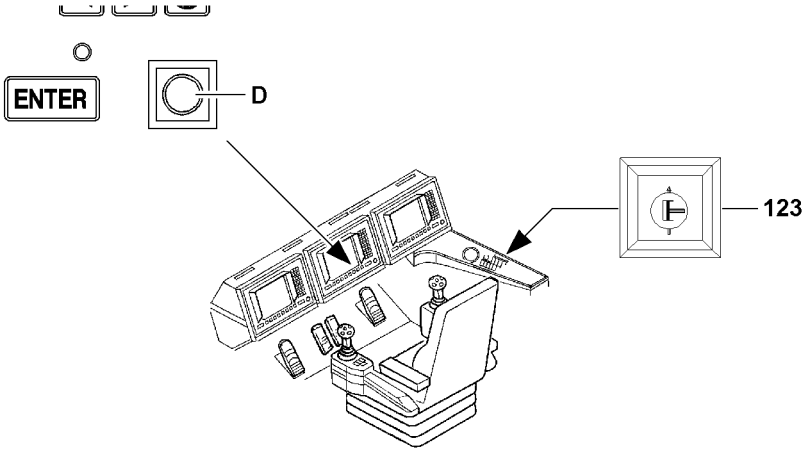

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Fig.120946

2.1 Assembling the W-transport units

Note
▶ Observe the instructions, see Crane operating instructions, chapter 5.07.

2.2 Reeving the W-control rope in

Note
▶ Observe the instructions, see Crane operating instructions, chapter 5.07.

2.3 Assembling the guy rods WA-frame 2

Note
▶ Observe the instructions, see Crane operating instructions, chapter 5.07.

2.4 Pinning the relapse supports

Note
▶ Observe the instructions, see Crane operating instructions, chapter 5.07.

2.5 Assembling the WV-lattice jib

Note
▶ Observe the instructions, see Crane operating instructions, chapter 5.07.

2.6 Establishing the electrical connections

Note
▶ Observe the instructions, see Crane operating instructions, chapter 5.07.
▶ Additionally observe the electric wiring diagram.

2.7 Checking the function of the safety devices

Note
▶ Observe the instructions, see Crane operating instructions, chapter 5.07.

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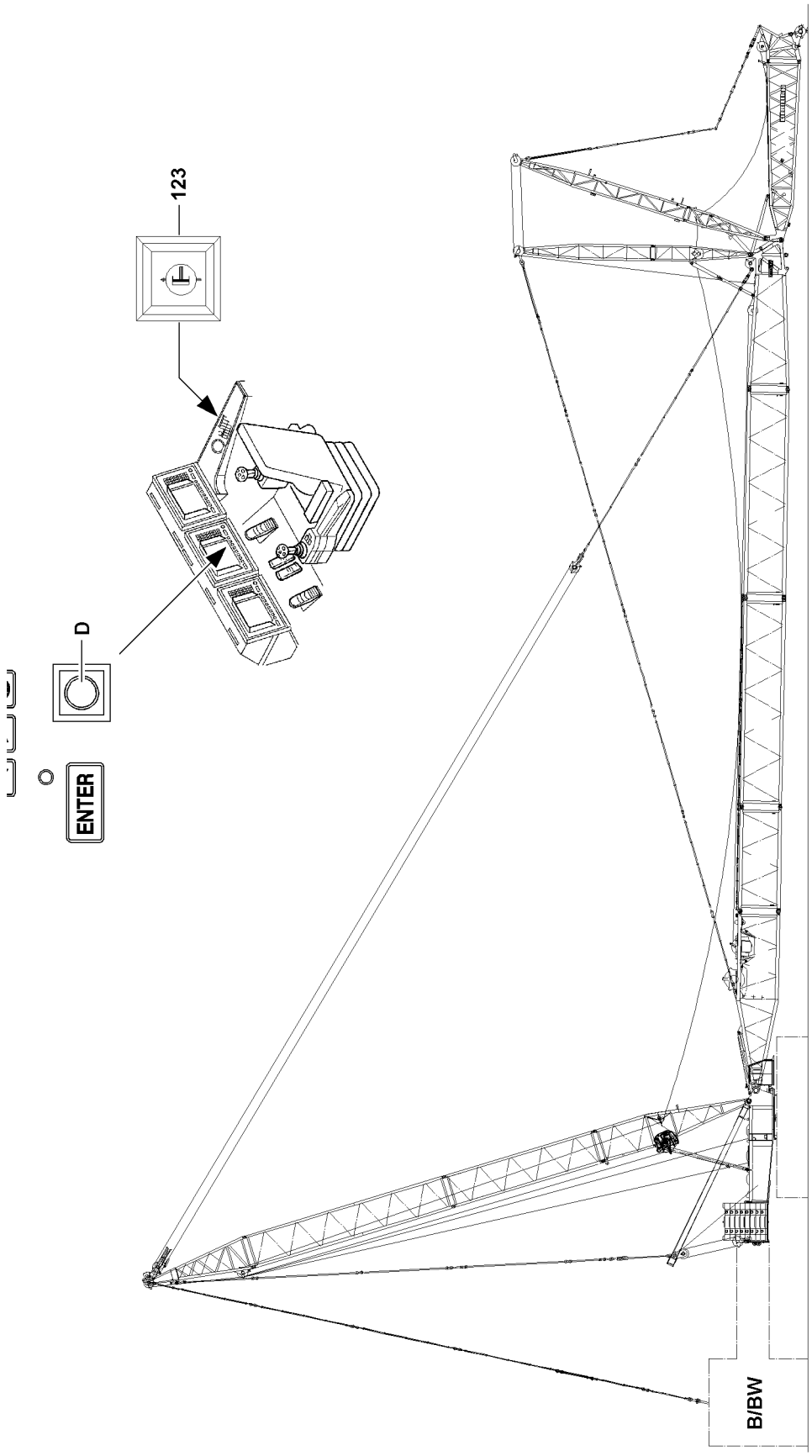

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Fig.120953

2.8 Erecting the boom

Note

▶ The erection procedure in this chapter refers to the WV-lattice jibs W-14 and W-21.

DANGER

The crane can topple over!

▶ It is not permitted to turn the crane during the erection procedure.
▶ Observe the specifications in the erection and take down charts.
▶ Observe the technical safety notes, see Crane operating instructions, chapter 5.01.

DANGER

The crane can topple over!

For certain boom lengths, the mechanical auxiliary supports must be assembled (only for LR-crane), see Erection and take down charts.

▶ The boom must be erected or taken down „to the side“ „in the direction“ of the mechanical auxiliary supports.
▶ Always erect or take down according to the data in the **Erection and take down charts**.

DANGER

Tipping lattice jib!

If the easy movement on the pendulum of the mechanical relapse support is not checked before erection or not re-established, if necessary, then the mechanical relapse support will not engage in steep lattice jib position. As a result, the lattice jib can tip to the rear.

Personnel can be severely injured or killed.

▶ Check the easy movement on the pendulum **40** of the mechanical relapse support before erection.
▶ If the pendulum does not move easily: Make the pendulum **40** easy to move.

WARNING

The crane can topple over!

If the following conditions are not met before erecting the boom, the crane can topple over.

Personnel can be severely injured or killed.

▶ Spool the lattice jib adjustment out in such a way that the guy rods sag slightly.
▶ Do not allow slack rope formation on the control winch.
▶ Extend the relapse cylinder before erection.

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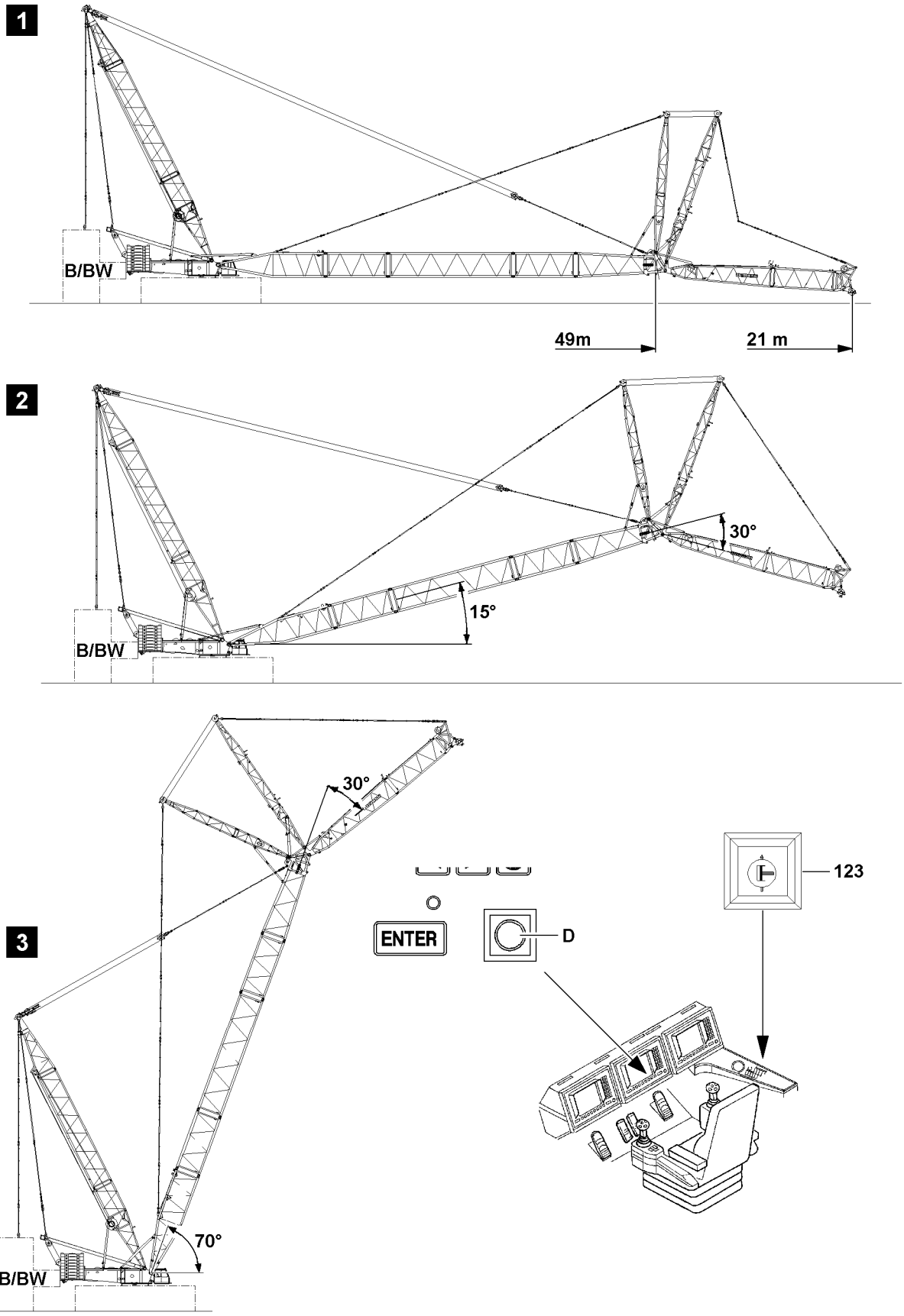

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Fig.120954

Make sure that the following prerequisites are met:
- The WV-lattice jib is fully assembled.
- No personnel is within the danger zone.
- The crane is supported.
  (only in connection with crane support or for LG-cranes)
- The crane is aligned in horizontal direction.
- All electrical connections have been established.
- All limit switches are functioning.
- The counterweight has been installed to the turntable according to the load chart.
- The derrick ballast is placed according to the data in the erection and take down charts.
- All pin connections have been secured.
- The hoist rope has been correctly placed in the rope pulleys and is prevented from jumping out with the rope retaining pins.
- There are no loose parts on the boom or the lattice jib.
- Boom, lattice jib and safety devices are free from snow and ice.
- The LICCON overload protection has been set according to the data in the load chart.
- The LICCON overload protection settings have been compared with the actual set up configuration.
- The LICCON overload protection is exceeded.
- The assembly icon is visible on the LICCON monitor.

WARNING
Falling hoist rope!
If the hoist rope before the erection procedure is not properly secured onto the corresponding length on the WV-lattice jib, it can fall down backward on the basis of its own weight.
Personnel can be severely injured or killed.
- ▶ Reeve in the hoist rope with sufficient length on the WV-lattice jib before the erection procedure.
- ▶ The hoist rope must be constantly monitored during erection.
- ▶ Do not step into the danger zone.

WARNING
The crane can topple over!
If the S-relapse cylinders are not extended before erecting the boom, then the boom can fall down towards the rear during crane operation and the crane can topple over.
Personnel can be severely injured or killed.
- ▶ Extend the S-relapse cylinder before erecting the boom, see Crane operating instructions, chapter 5.07.

- ▶ Luff the S-boom down until the hook block can be reeved.
- ▶ Reeve in the hook block properly and secure the hoist rope on the rope fixed point, for reeving, see separate reeving plans.
- ▶ Attach the hoist limit switch weight.

See illustration **2**.

- ▶ Luff the S-boom up to 15 °.

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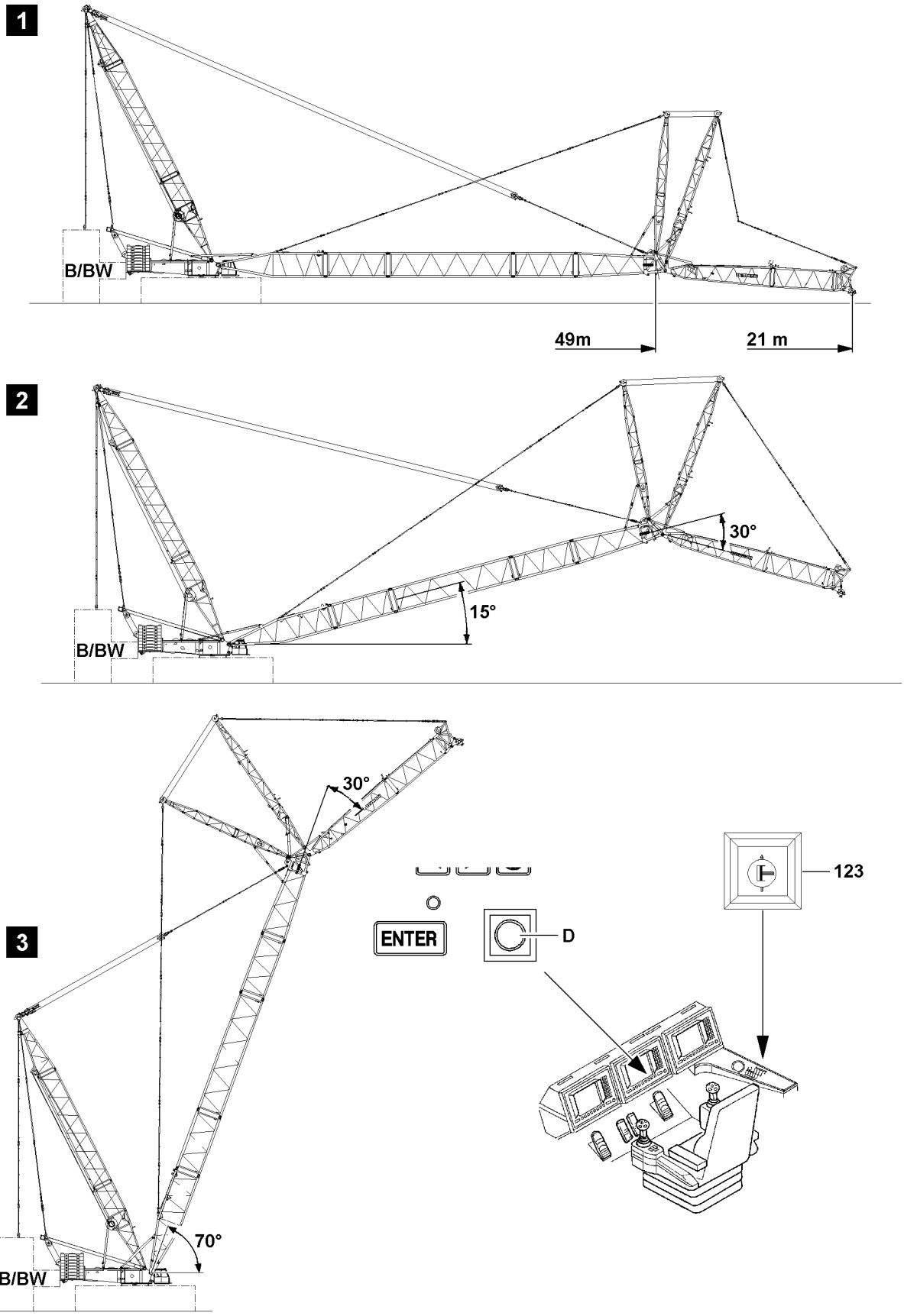

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Fig.120954

WARNING
The crane can topple over!
If the angle between the boom and the lattice jib is smaller than or equal to 30 ° , then the mechanical relapse support will collide with the flap on the oscillating guard. The crane can topple over.
Personnel can be severely injured or killed.
- ▶ Make sure that the angle between the S-boom and the WV-lattice jib is more than 30 ° during the erection procedure.
- ▶ The angle between the S-boom and the WV-lattice jib may not fall below 30 ° during the erection procedure.
- ▶ Perform a visual inspection during erection.

▶ Lower the WV-boom to - 15 ° (the angle between the S-boom and the WV-lattice jib is 30 °).

See illustration **3**.

DANGER
The crane can topple over!
In crane operation with exceeded LICCON overload protection, the crane can topple over.
Personnel can be severely injured or killed.
- ▶ Crane operation with exceeded overload protection is prohibited.
- ▶ The radii listed in the load chart may not be exceeded or fallen below, even if there is no load on the hook.

Note
- ▶ When the lowest operating position of the WV-lattice jib is reached, the LICCON overload protection is activated.
- ▶ In the maximum load icon appears a load number in „t“ instead of the display „???“.

▶ Luff the S-boom up to the lowest operating position.

When the S-boom has reached the lowest operating position:
▶ Make sure that the assembly icon on the LICCON monitor turns off.

Result:

– The LICCON overload protection is active.

▶ Luff the S-boom up to 70°.
▶ Luff the WV-lattice jib to 12° or 20° operating position.
▶ Luff the S-boom up into operating position.

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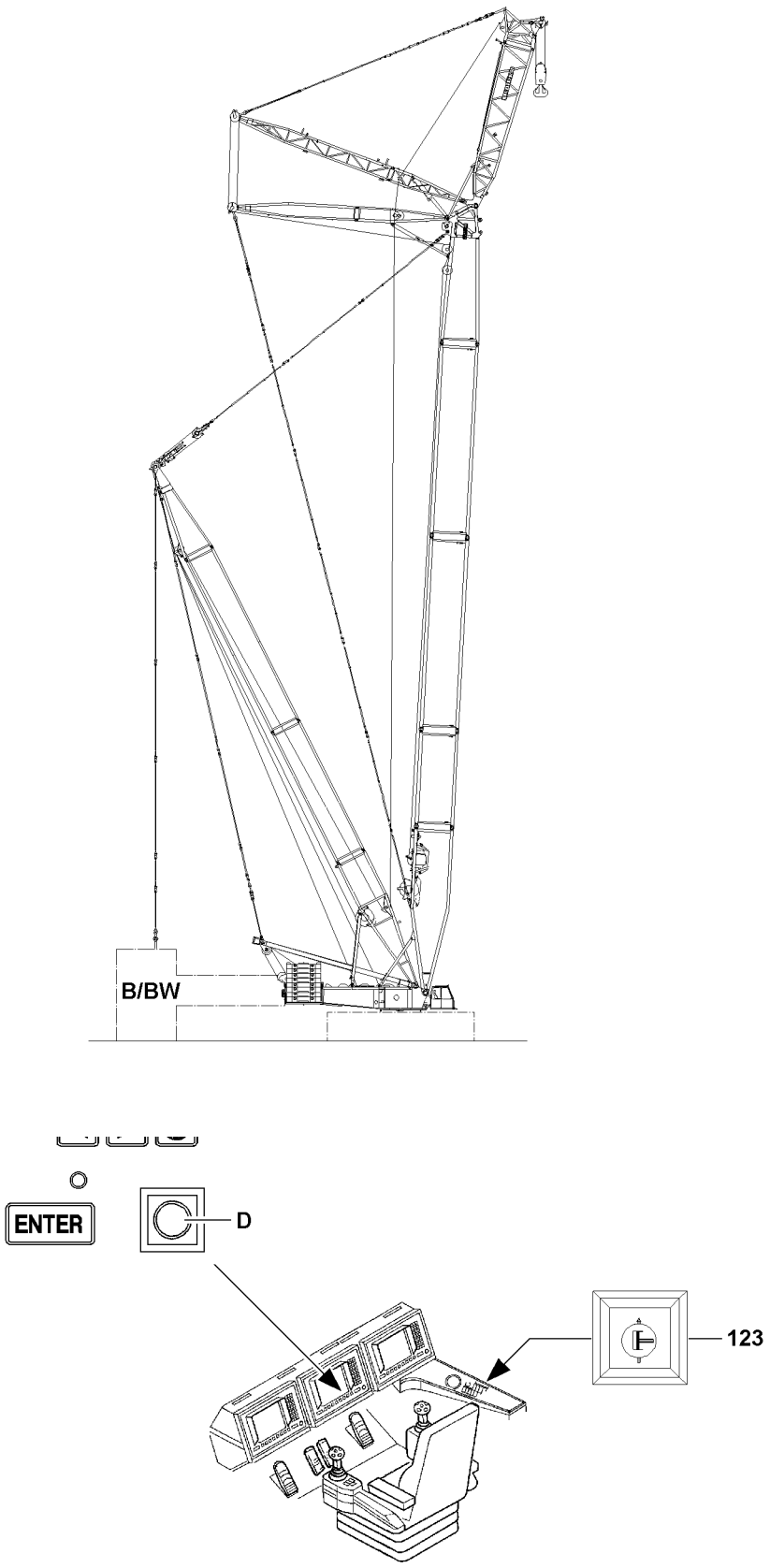

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Fig.120955

3 Operating the crane

3.1 Preparing for crane operation

Note

▶ Observe the notes, see Crane operating instructions, chapter 4.05, chapter 4.08 and chapter 5.01.

Make sure that the following prerequisites are met:
- The LICCON overload protection is active.
- The LICCON overload protection has been set according to the data in the load chart.

WARNING

The crane can topple over!

▶ Check the horizontal position of the crane before and during operation.

▶ If the crane operator leaves the cab, even for a short time, the operating mode setting must be checked and reset if necessary before resuming crane operation.

3.2 Checking the settings

▶ Check the function of the overload protection by running against the operating positions „on top“ and „bottom“.

▶ Check the hoist limit switch by running against the hoist limit switch weight.

▶ Check the function of the limit switches on the relapse cylinders.

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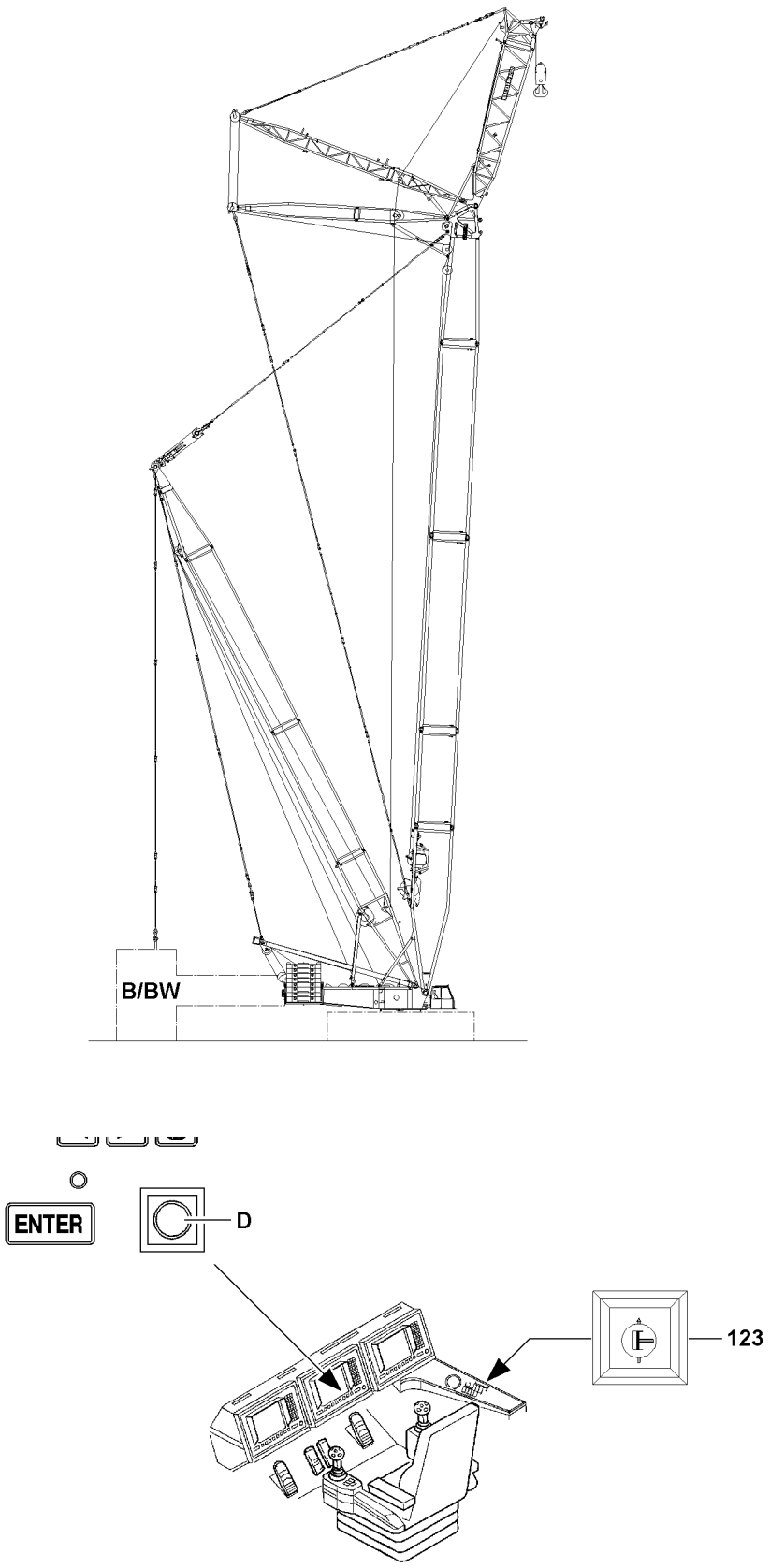

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Fig.120955

4 Disassembling the WV-boom system

WARNING
Danger of falling!
During assembly / disassembly work, personnel must be secured with appropriate aids to prevent them from falling. If this is not observed, assembly personnel could fall and suffer severe or fatal injuries.

- ▶ All assembly work must be carried out using suitable aids (ladders, lifting platforms, scaffolding, auxiliary crane, etc.).
- ▶ If work cannot be carried out on the ground or using such aids, then assembly personnel must be secured with the personal fall arrest system (see Crane operating instructions, chapter 2.04) to protect against falling. The personal fall arrest system must be attached in the corresponding fastening points on the crane (see Crane operating instructions, chapter 2.06).
- ▶ If railings are present for the crane, then they must be brought into the corresponding position and secured for assembly / disassembly work.
- ▶ Step on aids and fall protection equipment only with clean shoes.
- ▶ Keep aids and fall protection equipment clean and free from snow and ice.

WARNING
Falling components!
If unsecured or non-supported components are assembled or disassembled, they can fall down. Personnel can be killed or seriously injured.

- ▶ During pinning and unpinning of the lattice sections, it is prohibited for anyone to remain **under** or **on** the components as well as within the entire danger zone.
- ▶ Support the boom and components before pinning / unpinning.
- ▶ Pin or unpin both pins laying in a horizontal, i.e. **left** and **right**.
- ▶ Secure the pins in the storage locations and in the receptacles.
- ▶ Do not disengage the auxiliary crane until the respective component is pinned and secured.
- ▶ It is prohibited to lean a ladder against the component being disassembled.

WARNING
Danger of crushing!
Components can swing during assembling. Hands can be crushed or severed.

- ▶ Make sure that the components do not swing back and forth during assembly.

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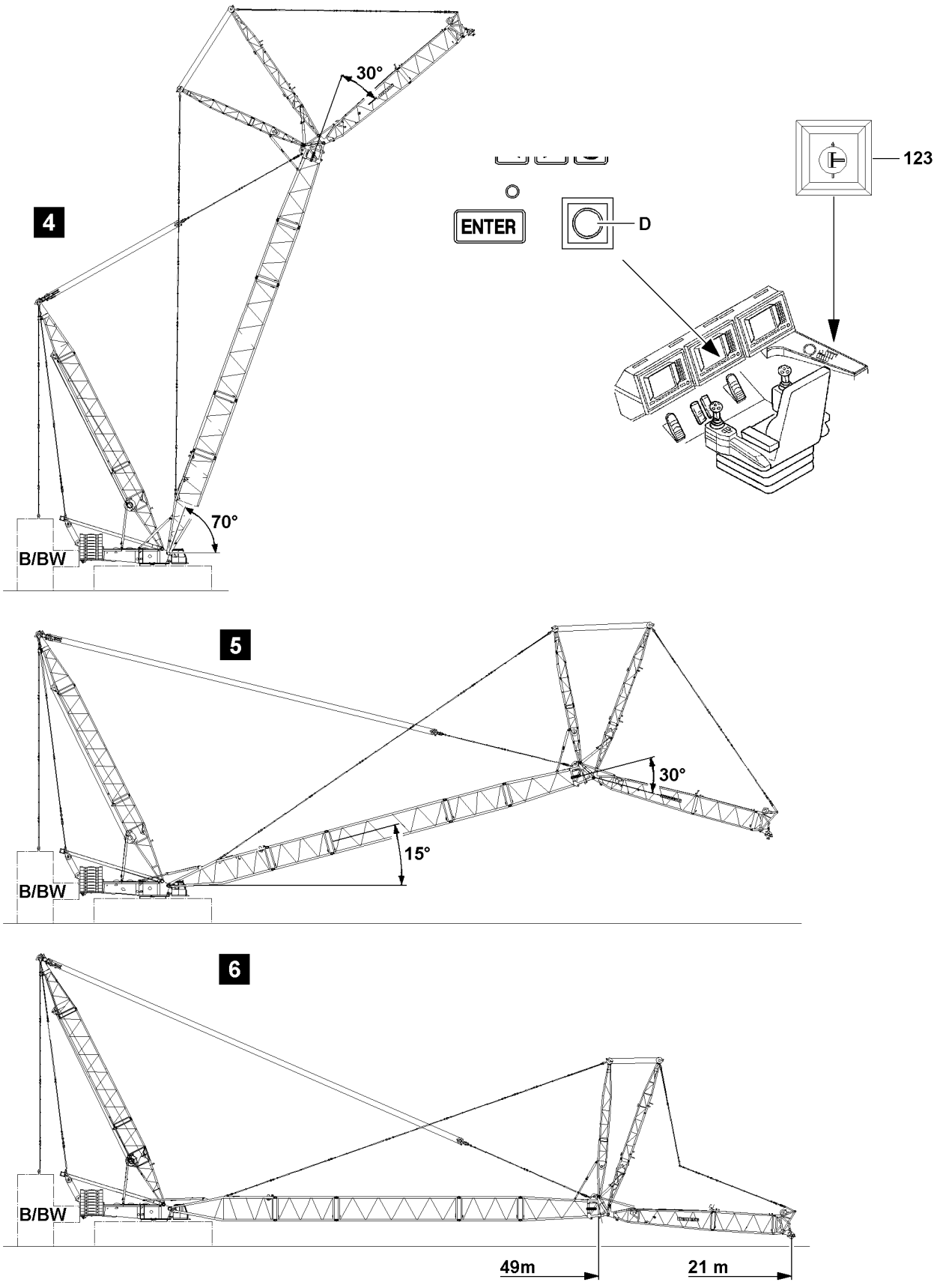

Fig.120947

LWE/LG 1750-006/15409-07-02/en

Note

▶ By supporting the components during assembly / disassembly, ground unevenness is compensated for and the material is protected.

Note

▶ The intermediate sections are pinned and unpinned with the aid of the pin pulling device, see Crane operating instructions, chapter 5.30.

WARNING

Danger of accident!
Personnel can be severely injured or killed.

▶ For pinning and unpinning with the pin pulling device, observe and follow the warning guidelines, see Crane operating instructions, chapter 5.30.

Make sure that the following prerequisites are met:

– The LICCON overload protection is exceeded.
– The LICCON overload protection has been set according to the data in the load chart.
– The assembly icon is visible on the LICCON monitor.
– An auxiliary crane is available.

4.1 Placing the WV-lattice jib down

DANGER

The crane can topple over!
For certain boom lengths, the mechanical auxiliary supports must be assembled (only for LR-crane), see Erection and take down charts.

▶ The boom must be erected or taken down „to the side“ „in the direction“ of the mechanical auxiliary supports.
▶ Always erect or take down according to the data in the **Erection and take down charts**.

WARNING

The crane can topple over!
If the following conditions are not met before taking down the boom, the crane can topple over.
Personnel can be severely injured or killed.

▶ Observe the technical safety notes, see Crane operating instructions, chapter 5.01.
▶ Observe the specifications in the erection and take down charts.

NOTICE

Damage of boom components!
Taking down the boom system can lead to a collision between the hook block and the pulley head.
Boom components can be severely damaged.

▶ Luff the boom system down at the same time and spool the hoist winch out.

Make sure that the following prerequisites are met:

– The S-boom is in operating position.
– The hook block is approx. 5 m below the pulley head of the lattice jib.

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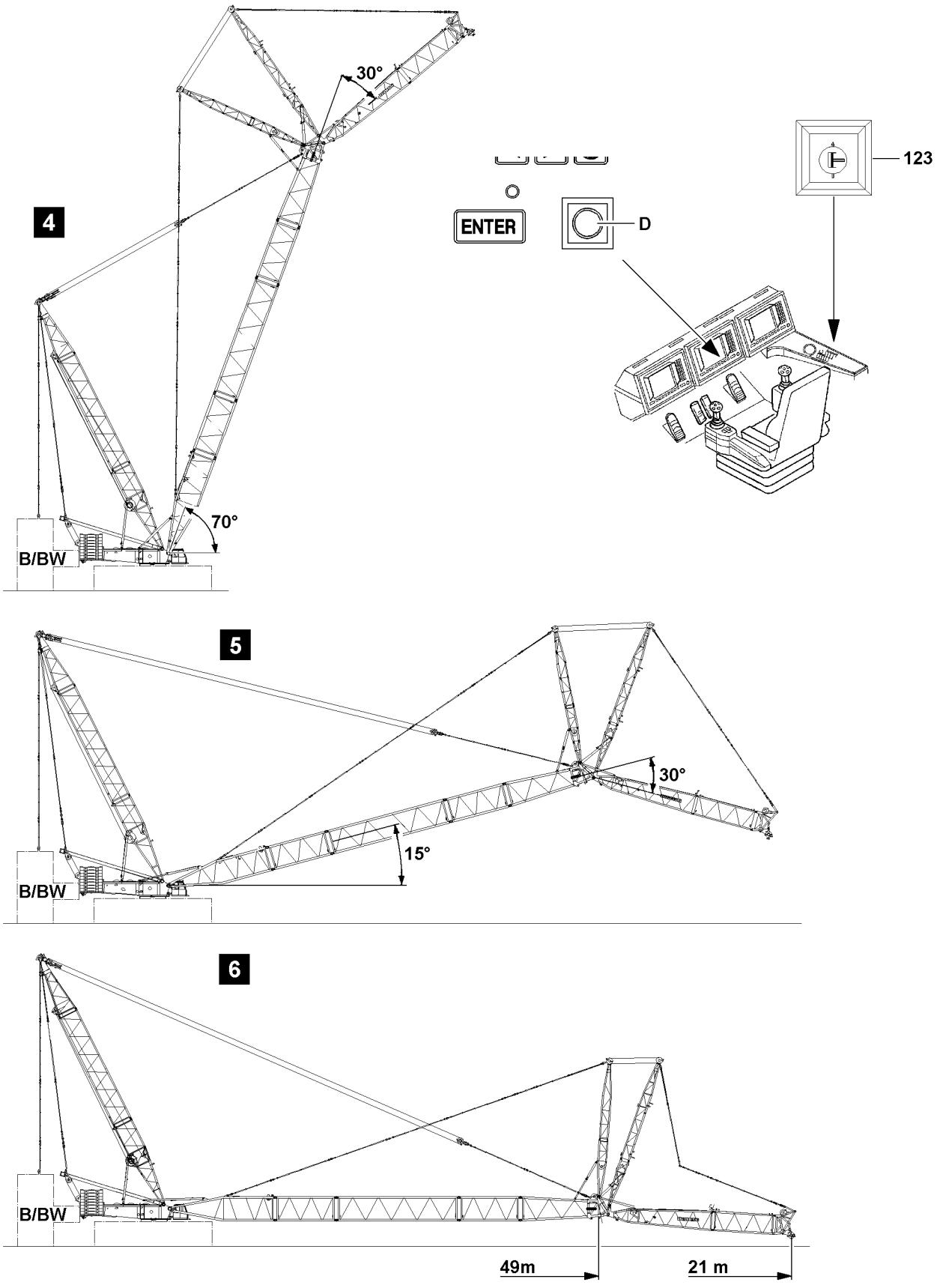

Fig.120947

4.1.1 Luffing the WV-lattice jib down

▶ Luff the S-boom down to 70°, see illustration **4**.

WARNING
The crane can topple over!
If the angle between the boom and the lattice jib is smaller than or equal to 30°, then the mechanical relapse support will collide with the flap on the oscillating guard.
The crane can topple over.
Personnel can be severely injured or killed.
▶ Make sure that the angle between the S-boom and the WV-lattice jib is larger than 30° during the erection procedure.
▶ The angle between the S-boom and the WV-lattice jib may not fall below 30° during the take down procedure.
▶ Perform a visual inspection during erection.

▶ Luff the WV-lattice jib down to approx. 30° to the S-boom, see illustration **5**.

Note
▶ The luff down movement is turned off as soon as the lowest operating position is reached.
▶ When the lowest operating position of the WV-lattice jib is reached, the load display in the maximum load icon turns off and instead of the load display appears the display „???“.
▶ In the crane operating screen appear alarm functions.

▶ Luff the WV-lattice jib down to the „lowest“ operating position.

Result:

– The luff down movement is turned off.
– The „STOP“ icon appears on the LICCON monitor.
– The horn icon appears on the LICCON monitor.

WARNING
Danger of accident due to function „Exceeding the shut off limits of the LICCON overload protection“!
If the shut off limits of the LICCON overload protection are exceeded, there is no additional protection against crane overload.
Due to erroneous operation or deliberate misuse, the crane could collapse, the boom can break off or the crane can topple over.
Personnel can be severely injured or killed.
▶ The function „Exceeding the shut off limits of the LICCON overload protection“ is only permissible in emergencies and for assembly purposes.
▶ The function „Exceeding the shut off limits of the LICCON overload protection“ may only be actuated by persons who know the effects of their actions regarding the function „Exceeding the shut off limits of the LICCON overload protection“.
▶ The function „Exceeding the shut off limits of the LICCON overload protection“ requires the presence of an authorized person and must be performed with utmost caution.
▶ Crane operation with activated function „Exceeding the shut off limits of the LICCON overload protection“ is prohibited.

When the WV-lattice jib has reached the „lowest“ operating position:
▶ Exceeding the shut off limits of the LICCON overload protection: Engage assembly operation.

Result:

– The shut off limits of the LICCON overload protection are exceeded.
– The assembly icon appears on the LICCON monitor.

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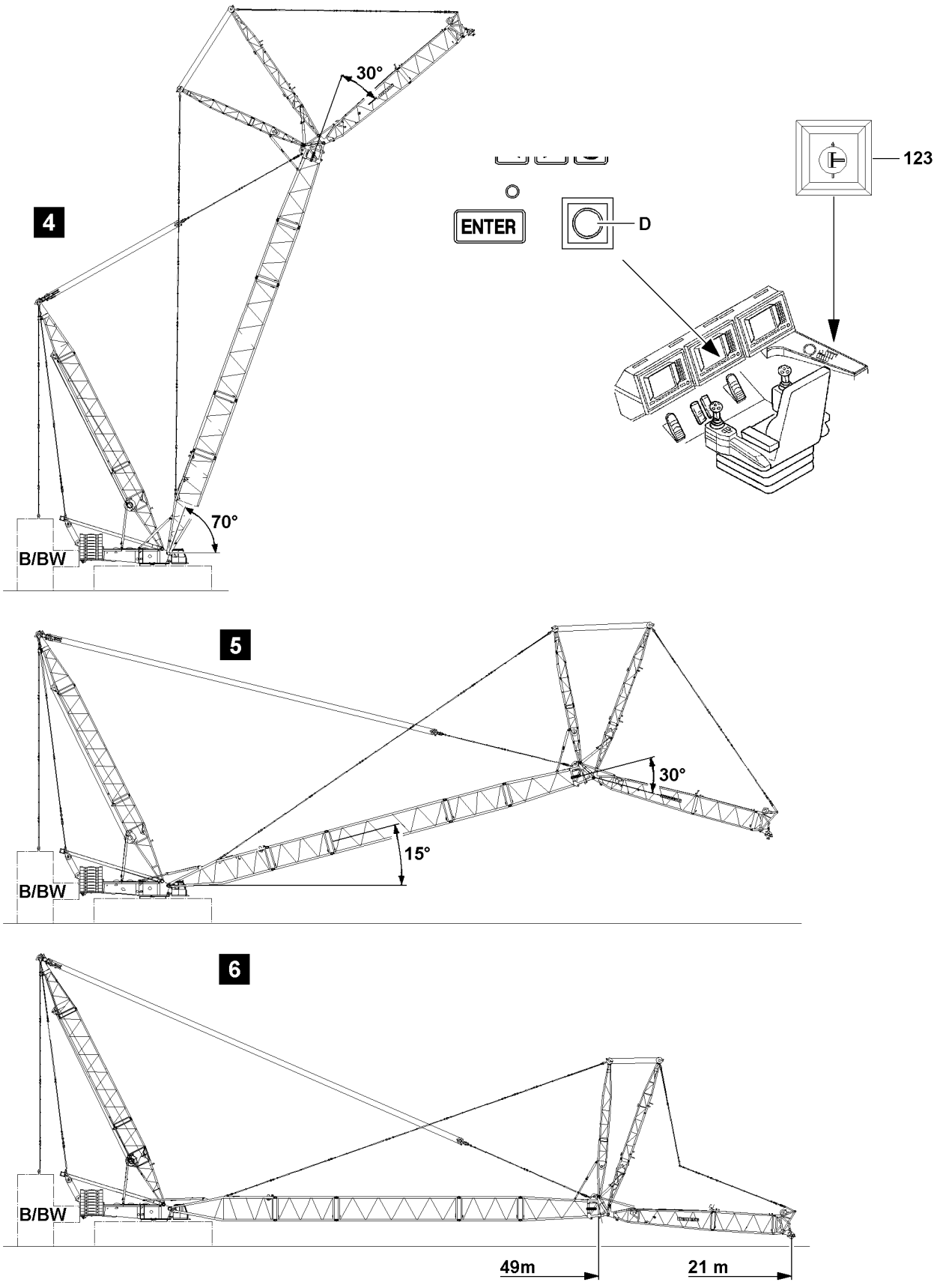

Fig.120947

4.1.2 Placing the WV-lattice jib down

If the hook block has not yet touched the ground:

- ▶ At the same time, spool the hoist winch out and luff the S-boom down until the hook block touches the ground.
- ▶ Remove the hoist limit switch weight.
- ▶ Unreeve the hook block.
- ▶ Luff the S-boom down until SW-end section is laying on the ground.

WARNING
The crane can topple over!
If the following conditions are not met before taking down the boom, the crane can topple over.
Personnel can be severely injured or killed.

- ▶ Spool the lattice jib adjustment out in such a way that the guy rods sag slightly.
- ▶ Do not allow slack rope formation on the control winch.
- ▶ Do not pull the hook block along on the ground.

- ▶ Continue to luff down the S-boom and simultaneously spool the WV-lattice jib control out so that the guy rods sag slightly.
- ▶ Luff the S-boom down until the S-boom head is laying on the support on the ground.

WARNING
Danger of accident!

- ▶ No one may be present in the danger zone.
- ▶ Secure the hoist rope with the assembly rope and pull it back slowly over the rope pulleys in the WA-frames and lower it toward the W-connector head.

- ▶ Place the hoist rope down.

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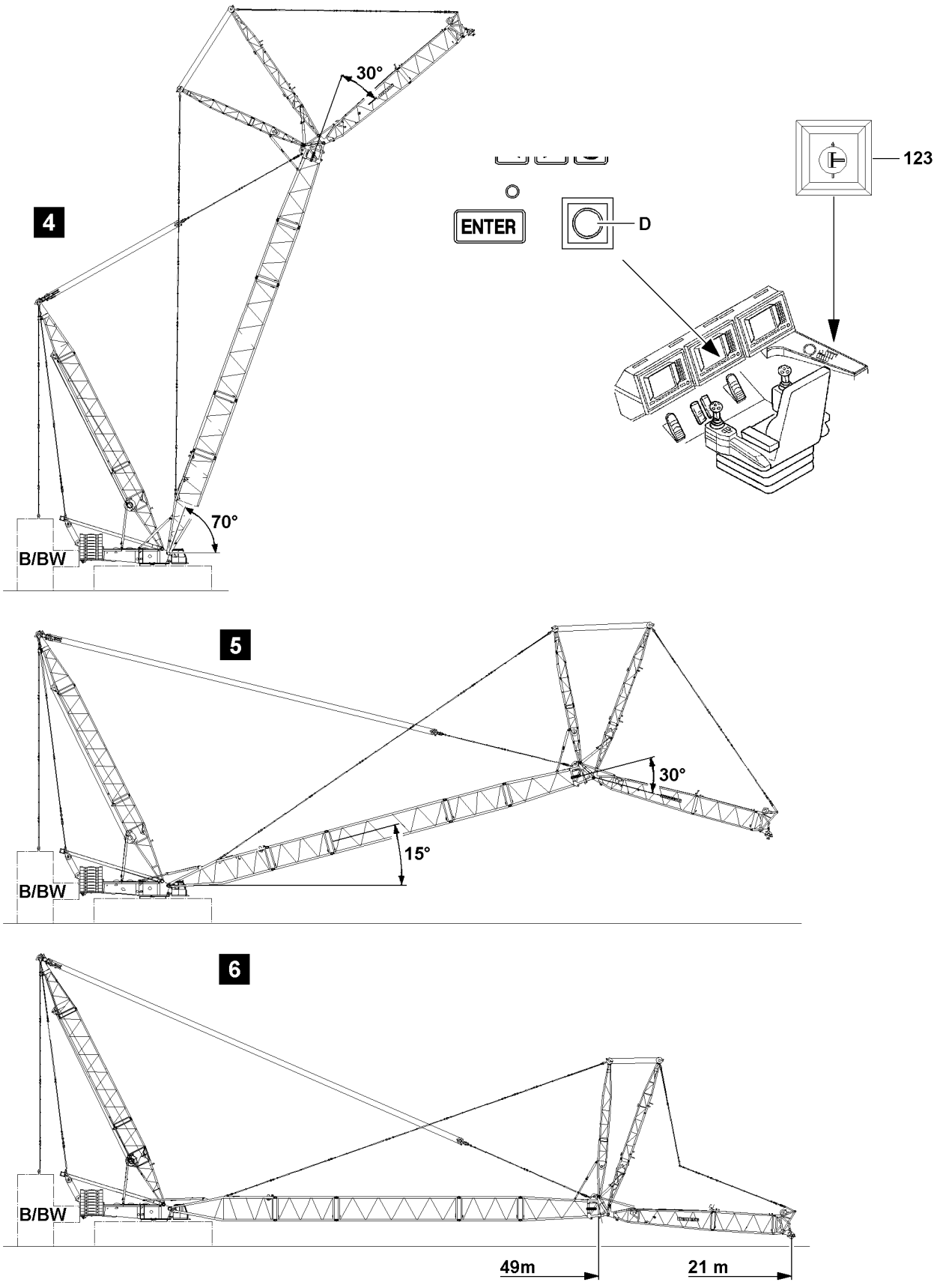

Fig.120947

4.2 Disconnecting the electrical connections

Note
▶ Observe the instructions, see Crane operating instructions, chapter 5.07.

4.3 Disassembling the WV-lattice jib

Note
▶ Observe the instructions, see Crane operating instructions, chapter 5.07.

4.4 Unpinning the relapse supports

Note
▶ Observe the instructions, see Crane operating instructions, chapter 5.07.

4.5 Disassembling the WA-frame 2 guy rods

Note
▶ Observe the instructions, see Crane operating instructions, chapter 5.07.

4.6 Unreeving the W-control ropes

Note
▶ Observe the instructions, see Crane operating instructions, chapter 5.07.

4.7 Disassembling the W-transport units

Note
▶ Observe the instructions, see Crane operating instructions, chapter 5.07.

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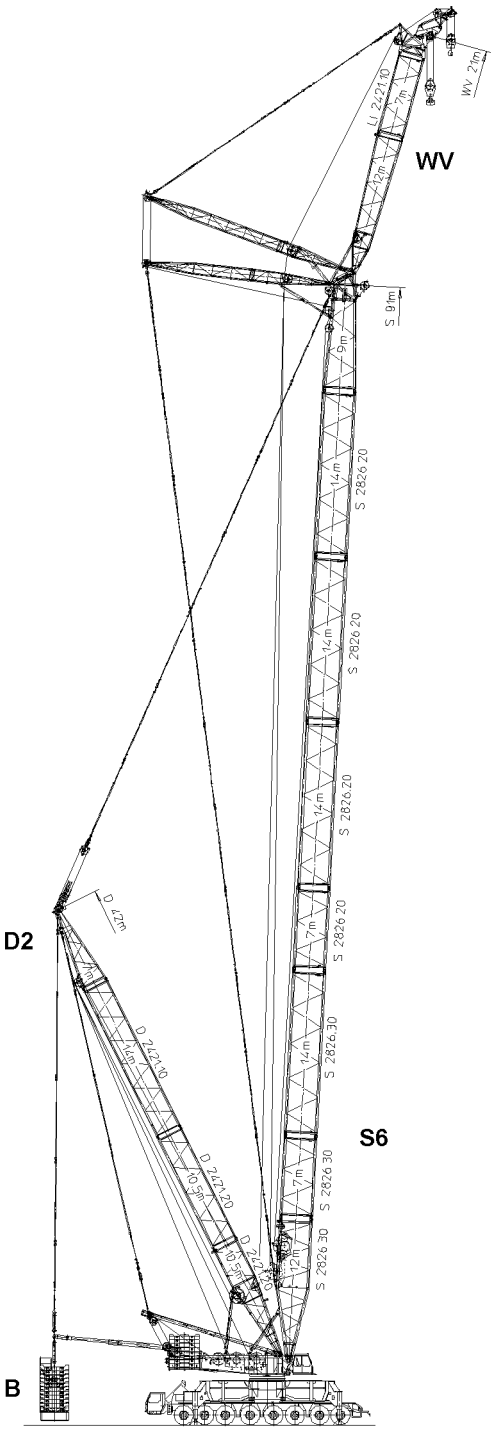

Fig.114936: S6D2WV / S6D2WVB

5 WV-lattice jib in operating mode S6D2WVB (only for LG 1750)

The operating mode **S6D2WVB** differs from the operating mode SDWVB by a reinforced S-boom and by another derrick boom length. The WV-guying however is identical.

Derrick boom lengths	
SD-operation	S6**D2**-operation
31.5 m	42.0 m

5.1 Assembling the WV-lattice jib

WARNING
The crane can topple over!
If danger notes are not observed, the crane can topple over.
Personnel can be severely injured or killed.
▶ Observe and adhere to the danger notes during assembly of the S6D2WVB-boom system.

Note
▶ The assembly of the WV-lattice jib on the S6D2-boom system is identical to the assembly on the SD-boom system.

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5.10 Boom nose lattice boom

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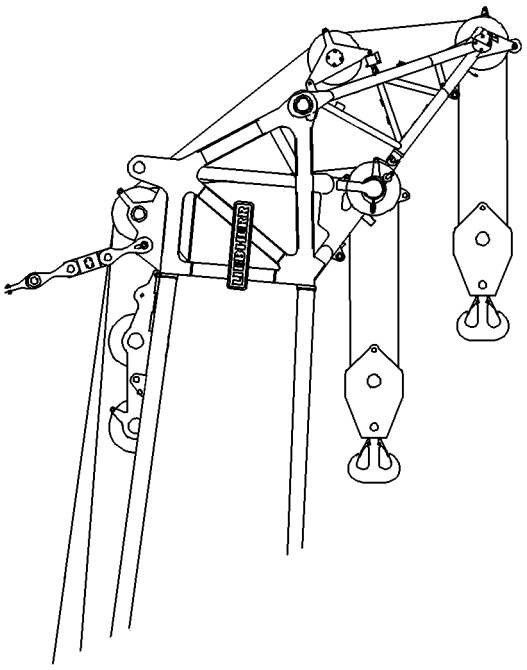
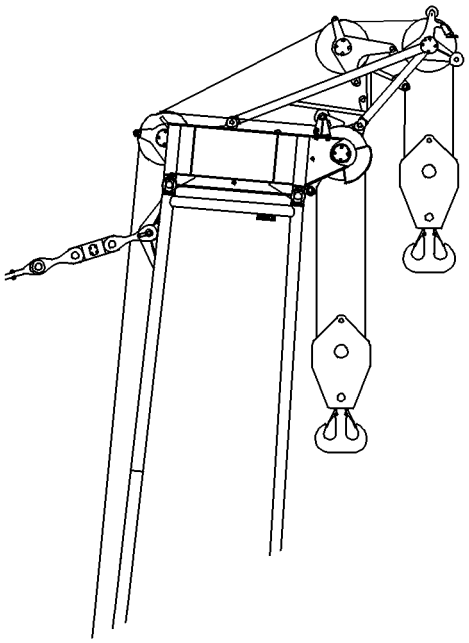
S



L- (W-)



WV

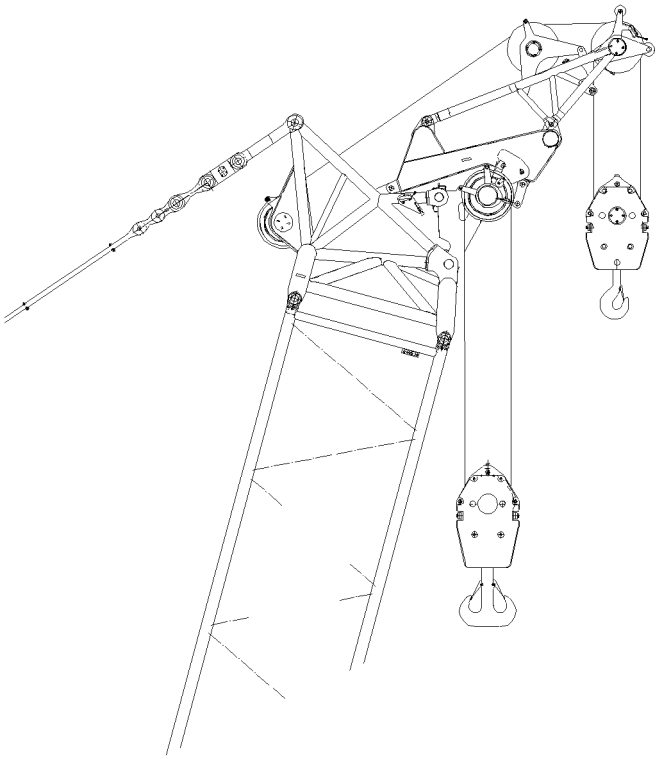


Fig.104486

LWE/LG 1750-006/15409-07-02/en

1 Installing the boom nose 60 t on the boom

1.1 Installing the boom nose

WARNING
Risk of falling!
During assembly / disassembly work, personnel must be secured with appropriate aids to prevent them from falling. If this is not observed, assembly personnel can fall and suffer life-threatening or fatal injuries!

- ▶ Any work, where there is a danger of falling must be carried out with suitable aids (for example lifting platform, scaffolding, ladder, auxiliary crane)!
- ▶ If the work cannot be carried out with such aids nor from the ground, then the assembly personnel must secure themselves with approved fall arrest systems to avoid falling, see Crane operating instructions, chapter 2.04!
- ▶ Approved fall arrest systems must be hung into the respective fastening points on the crane, see Crane operating instructions, chapter 2.06!
- ▶ If railings are present on the components, then they must be brought into the corresponding position and secured for assembly / disassembly work!
- ▶ Step on aids and fall protection equipment only with clean shoes!
- ▶ Keep aids and fall protection equipment clean and free from snow and ice!
- ▶ During all assembly and disassembly work, maintenance work and inspections, travel and crane operation is prohibited!

WARNING
Falling components!
If unsecured or non-supported components are assembled or disassembled, they can fall down. Personnel can be severely injured or killed!

- ▶ During pinning and unpinning of the lattice sections, it is prohibited for anyone to remain **under** or **on** the components as well as within the entire danger zone!
- ▶ Support the boom and components before pinning / unpinning!
- ▶ Pin or unpin both pins at the same horizontal level, i.e. **left** and **right**!
- ▶ Secure the pins in the bearing points and in the receptacles!
- ▶ Do not disengage the auxiliary crane until each component is pinned on and secured!
- ▶ It is prohibited to lean a ladder against the component being disassembled!

WARNING
Danger of impact / crushing!
When installing / removing counterweight components with the auxiliary crane, crane components can start to swing back and forth!
When lifting / lowering and positioning crane components, there is an increased danger of impacts / crushing!
Personnel can be caught and severely injured or killed as a result!

- ▶ Make sure that personnel cannot be caught by components!
- ▶ When working in danger zones: Use aids to protect limbs!
- ▶ Guide components with suitable aids to minimize oscillation!

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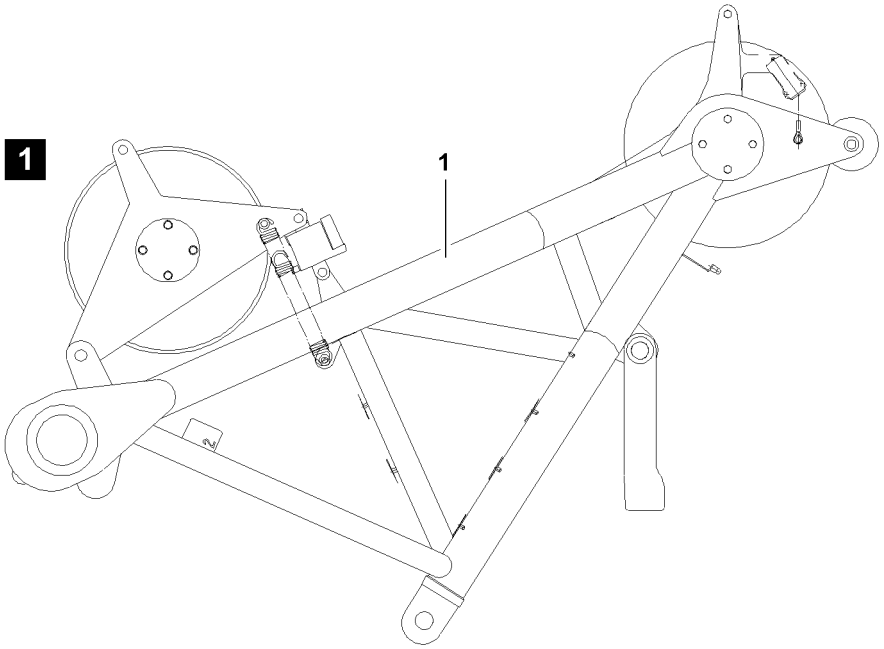

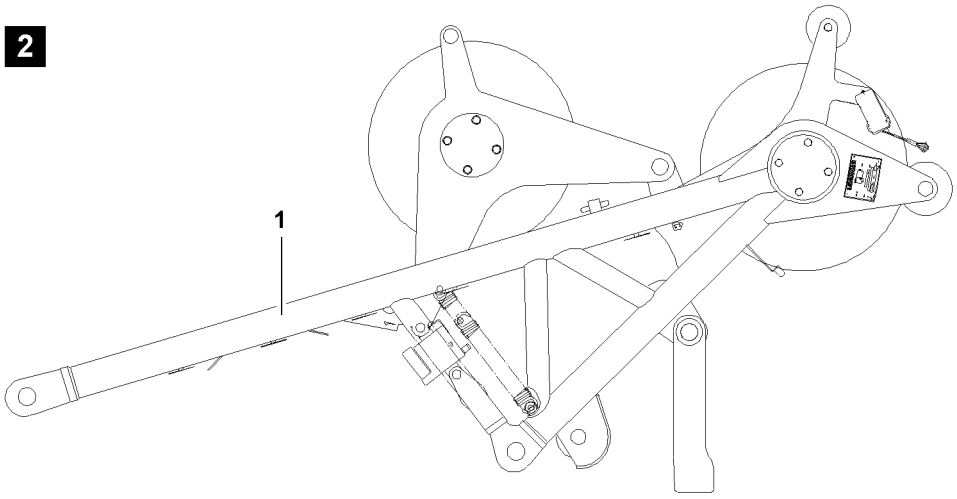

LWE/LG 1750-006/15409-07-02/en

Fig.111812

Note
- ▶ The respective boom combination, in connection with the boom nose 60 t , must be assembled according to the supplied rod plans!
- ▶ Assembling the boom combination, see Crane operating instructions, chapter 5.38 or chapter 5.39 or chapter 5.07 or chapter 5.08!

1.2 Variations of boom nose and their use

Note
- ▶ The boom nose 60 t **1** is available in two variations!
- ▶ The boom nose variation of the S-end section can **not** be installed on the L-, W or WV-end section, see illustration **1**!
- ▶ The boom nose variation for the L-end section can be installed on the W- as well as on the W-adapter, see illustration **2**!

	Use of boom nose 60 t	
	Variation 1 (illustration **1**)	**Variation 2** (illustration **2**)
S-end section	X	
L-end section		X
W-end section		X
W-adapter		X

1.3 Assembly prerequisites for boom nose(s)

WARNING
Assembly with bypassed / exceeded LICCON overload protection!
With bypassed / exceeded LICCON overload protection, the crane can collapse due to overload, the boom can break off or the crane can topple over!
Personnel can be severely injured or killed!
This could result in high property damage!
- ▶ The LICCON overload protection may only be bypassed / exceeded by persons who are aware of the consequences of a bypass!
- ▶ Bypass / exceed the LICCON overload protection only when the set up status of the crane has been correctly entered into the LICCON computer system!
- ▶ Observe the erection / take down charts!
- ▶ Crane operation with bypassed / exceeded LICCON overload protection is strictly prohibited!

Make sure that the following prerequisites are met:
- – The crane is supported.
  (only in connection with crane support or for LG-cranes)
- – The crane is aligned in horizontal direction.
- – The boom including the respective end section **1** are installed.
- – The boom is placed on a load-bearing support.
- – The counterweight has been installed on the turntable according to the load chart.
- – The LICCON overload protection has been set according to the data in the load chart.
- – The LICCON overload protection is exceeded.
- – The assembly icon is visible on the LICCON monitor.
- – An auxiliary crane is available.

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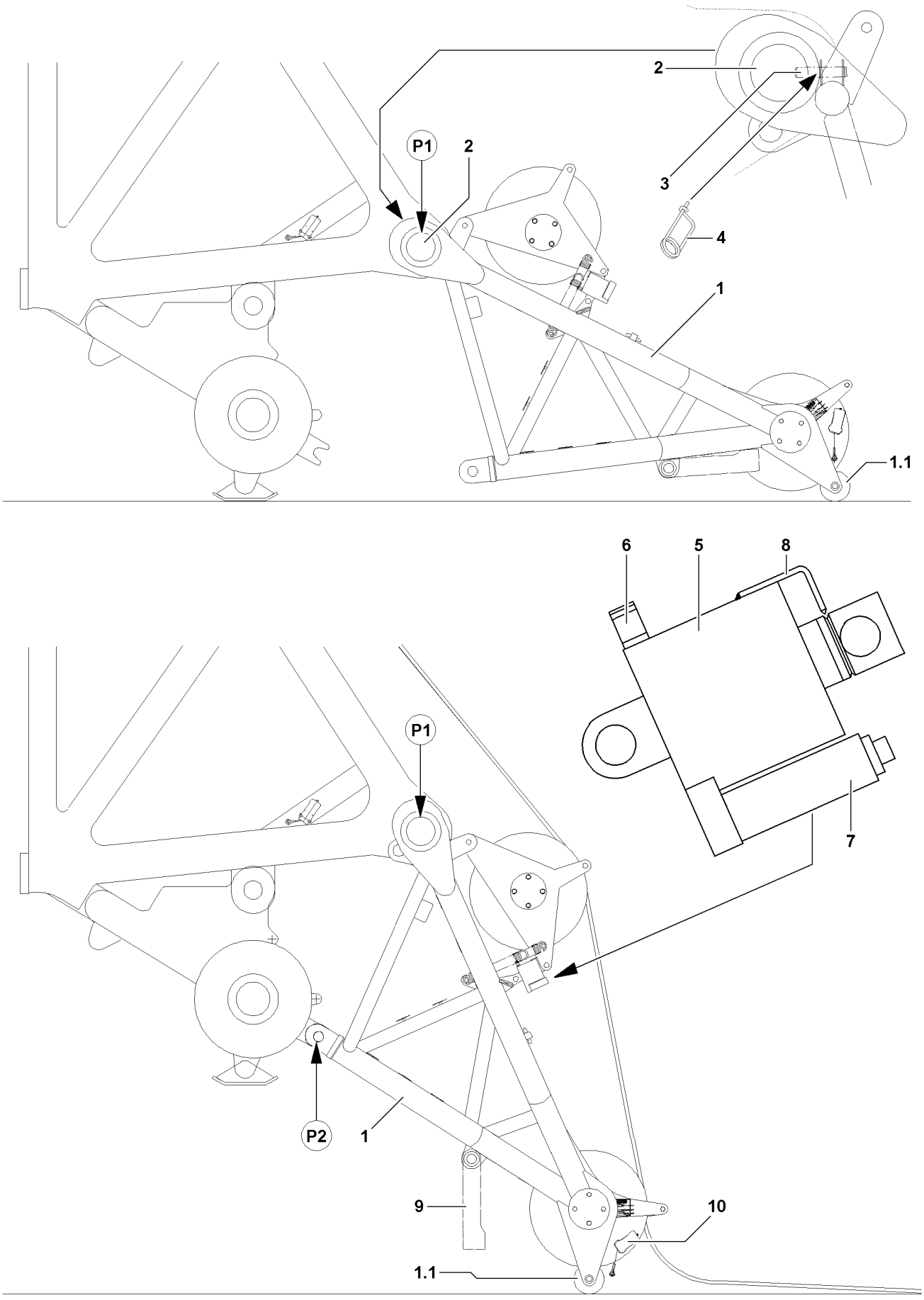

Fig.111811

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2 Boom nose 60 t on S-end section

2.1 Installing the boom nose 60 t on the S-end section

Position	Description
1	Boom nose 60 t
1.1	Roller
2	Pin
3	Retaining pin
4	Spring retainer
5	Test cylinder
6	Measuring point
7	Pressure sensor
8	Pointer
9	Rope fixed point (rope lock)
10	Hoist limit switch
20	S-end section

Weight of boom nose 60 t
1100 kg

Make sure that the following prerequisites are met:
- The boom head is laying on the ground.
- An auxiliary crane is available.

▶ Swing the boom nose 60 t **1** with the auxiliary crane in to the pin points, point **P1**, on the S-end section **20**.
▶ Pin the boom nose 60 t on the S-end section **20** on both sides at point **P1** „on top“: Insert the pins **2**.

When the pins **2** are pinned on both sides:
▶ Secure the pins **2** on both sides with retaining pins **3** and locking pins **4**.
▶ Carefully place the boom nose 60 t **1** with the auxiliary crane on the ground.
▶ Remove the auxiliary crane.
▶ Pull the hoist rope over the rope pulleys of the boom nose 60 t **1**, see Reeving plan.

Note
▶ When the boom nose 60 t is installed and reeved on the S-end section, continue the assembly according to section „Lifting the boom off the ground“!

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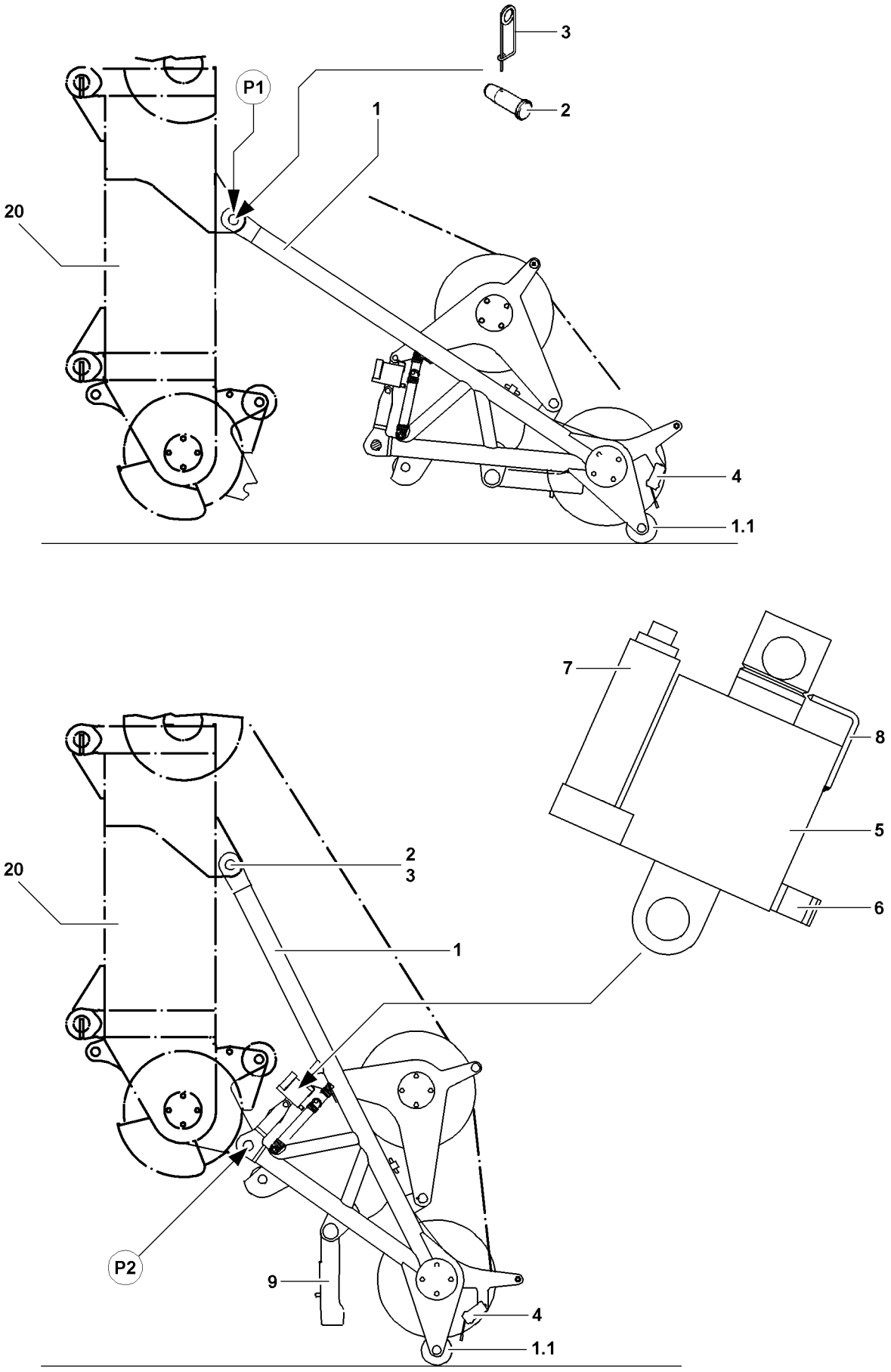

Fig.111813

3 Boom nose 60 t on the L- / W-end section

3.1 Installing the boom nose 60 t on the L- / W-end section

Position	Description
1	Boom nose 60 t
1.1	Roller
2	Pin
3	Spring retainer
4	Hoist limit switch
5	Test cylinder
6	Measuring point
7	Pressure sensor
8	Pointer
9	Rope fixed point (rope lock)
20	L-end section / W-end section

Weight of boom nose 60 t
770 kg

Make sure that the following prerequisites are met:
- The boom head is laying on the ground.
- An auxiliary crane is available.

▶ Swing the boom nose 60 t **1** with the auxiliary crane in to the pin points, point **P1**, on the L- / W-end section **20**.
▶ Pin the boom nose 60 t on the L- / W-end section **20** on both sides at point **P1** „on top“: Insert the pins **2**.

When the pins **2** are pinned on both sides:
▶ Secure the pins **2** on both sides with spring retainers **3**.
▶ Carefully place the boom nose 60 t **1** with the auxiliary crane on the ground.
▶ Remove the auxiliary crane.
▶ Pull the hoist rope over the rope pulleys of the boom nose 60 t **1**, see Reeving plan.

Note
▶ When the boom nose 60 t is installed and reeved on the L- / W-end section, continue the assembly according to section „Lifting the boom off the ground“!

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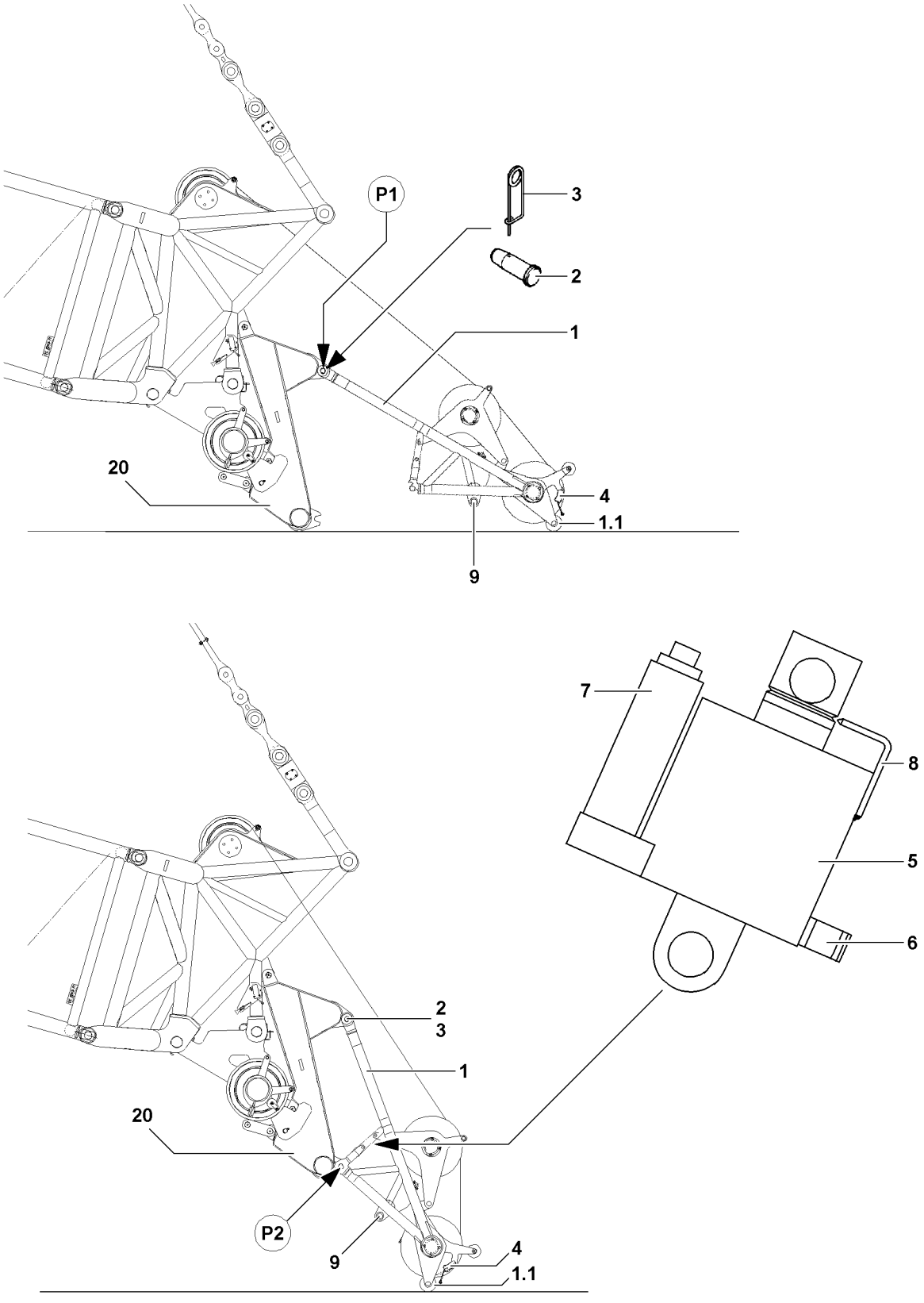

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Fig.111814

4 Boom nose 60 t on the SW-adapter

4.1 Installing the boom nose 60 t on the W-adapter

Position	Description
1	Boom nose 60 t
1.1	Roller
2	Pin
3	Spring retainer
4	Hoist limit switch
5	Test cylinder
6	Measuring point
7	Pressure sensor
8	Pointer
9	Rope fixed point (rope lock)
20	W-adapter

Weight of boom nose 60 t
770 kg

Make sure that the following prerequisites are met:
- The boom head is laying on the ground.
- An auxiliary crane is available.

▶ Swing the boom nose 60 t **1** with the auxiliary crane in to the pin points, point **P1**, on the W-adapter **20**.
▶ Pin the boom nose 60 t on the W-adapter **20** on both sides at point **P1** „on top“: Insert the pins **2**.

When the pins **2** are pinned on both sides:
▶ Secure the pins **2** on both sides with spring retainers **3**.
▶ Carefully place the boom nose 60 t **1** with the auxiliary crane on the ground.
▶ Remove the auxiliary crane.
▶ Pull the hoist rope over the rope pulleys of the boom nose 60 t **1**, see Reeving plan.

Note
▶ When the boom nose 60 t is installed and reeved on the W-adapter, continue to assembly according to section „Lifting the boom off the ground“!

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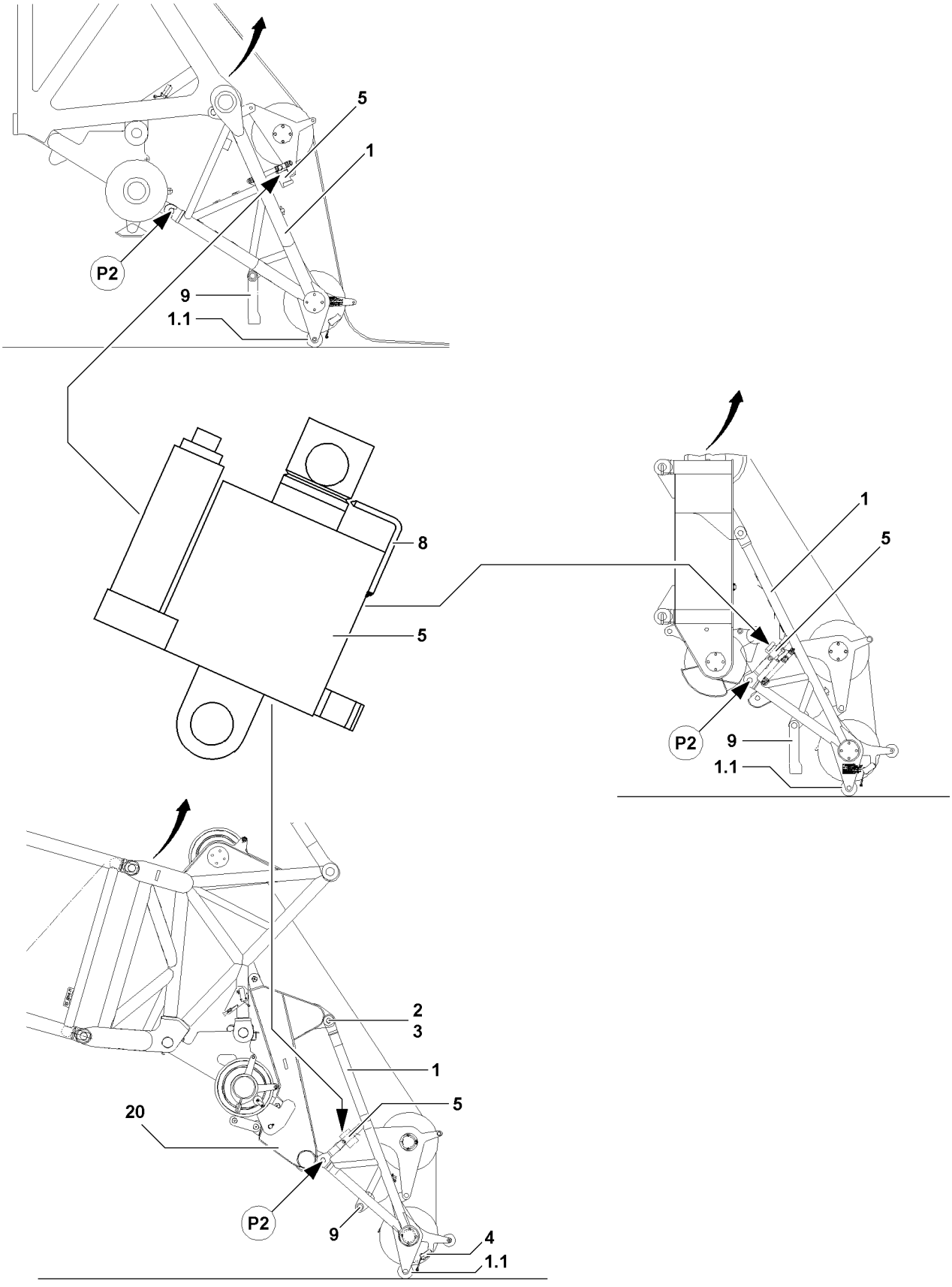

Fig.111815

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5 Lifting the boom off the ground

5.1 Lifting the boom off

WARNING
The crane can topple over!
During erection of the respective boom or the boom systems, the crane can be overloaded and topple over!
Personnel can be severely injured or killed!
▶ Observe the data in the erection and take down charts!
▶ It is prohibited to turn the crane superstructure while erecting the boom!

▶ Luff the boom up carefully.

Result:

– Due to its own weight, the boom nose 60 t runs on the rollers **1.1** slowly toward the „inside“.

▶ Luff up the boom until the boom nose 60 t **1** lifts off the ground.

Result:

– The boom nose 60 t **1** supports itself at point **P2** on the respective end section or on the W-adapter.

NOTICE
Damage of boom nose 60 t !
After the boom nose 60 t **1** is installed on the end section **20**, the boom combination may be placed on the ground again only with utmost caution, otherwise the boom nose 60 t can be severely damaged!
▶ Place the boom combination on the ground only with utmost caution!

▶ Carefully place the boom combination down.

Result:

– The boom nose 60 t **1** folds out automatically when it is placed down and runs on the rollers **1.1** toward the „outside“.

6 Establishing the electrical connections

6.1 Establishing the connections

NOTICE
Damage to the electrical connection on the cable drum!
If the electrical connection from the cable drum on the S-pivot section to the terminal box on the S-pivot section is established first before the connection to the terminal box on the respective end section, the electrical connection can be damaged when spooling out the cable drum!
▶ Establish first the electrical connection from the cable drum in the S-pivot section to the terminal box on the respective end section and then the electrical connection from the terminal box in the S-pivot section to the cable drum in the S-pivot section!

Note
▶ To establish the electrical connections, use the electrical wiring diagram!

Make sure that the following prerequisites are met:
– The boom is fully assembled.
– The airplane warning light and the wind speed sensor are assembled.

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▶ Establish the electrical connections.
▶ Make sure that all electrical connections on the boom are established.

7 Checking the function of the safety devices

7.1 Checking the safety devices

WARNING
Non-functioning safety devices!
If the function of the safety devices is defective, personnel can be severely injured or killed!
▶ Crane operation with non-functioning safety devices is **prohibited**!

Note
▶ The function of the individual limit switches must be checked before erection!
▶ The function of the limit switch initiators must be checked in the test system, see Diagnostics manual!

Note
▶ If a function check on the limit switches or on the safety devices does not lead to the desired shut offs, then the plug connections on the terminal boxes or the components itself must be checked!
▶ If no visible connection errors or component defects can be found, contact **LIEBHERR** Service!

Make sure that the following prerequisites are met:
– All electrical connections have been made.
– The crane engine is running.
– The corresponding operating mode is set on the LICCON monitor.

7.1.1 Checking the wind speed sensor

▶ Test the movement and the function of the wind speed sensor.

7.1.2 Checking the airplane warning light

▶ Turn the airplane warning light on.
▶ Visually check functionality.

7.1.3 Checking the hoist limit switch on the pulley head

Note
▶ When replacing or changing a hoist limit switch (HES), the corresponding hoist limit switch must have the correct bus address and the correct software version in order to be detected again by the bus system (LSB)!

▶ Actuate the hoist limit switch manually on the pulley head.

Result:

– The spool up function of the hoist winch turns off.
– The icon „Hoist top“ appears on the LICCON monitor 0.
– The limit switch is functioning.

7.1.4 Checking the limit switch S-boom „Steepest position“

Note
▶ The limit switch functions have to be checked individually before erection!

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▶ Cover the limit switch initiators on the S-relapse cylinders individually with a metal plate.

Result:

– The limit switch is actuated manually.
– The spool up function of winch 4 turns off.
– The icon „Boom limitation“ appears on the LICCON monitor 0.
– The limit switch is functioning.

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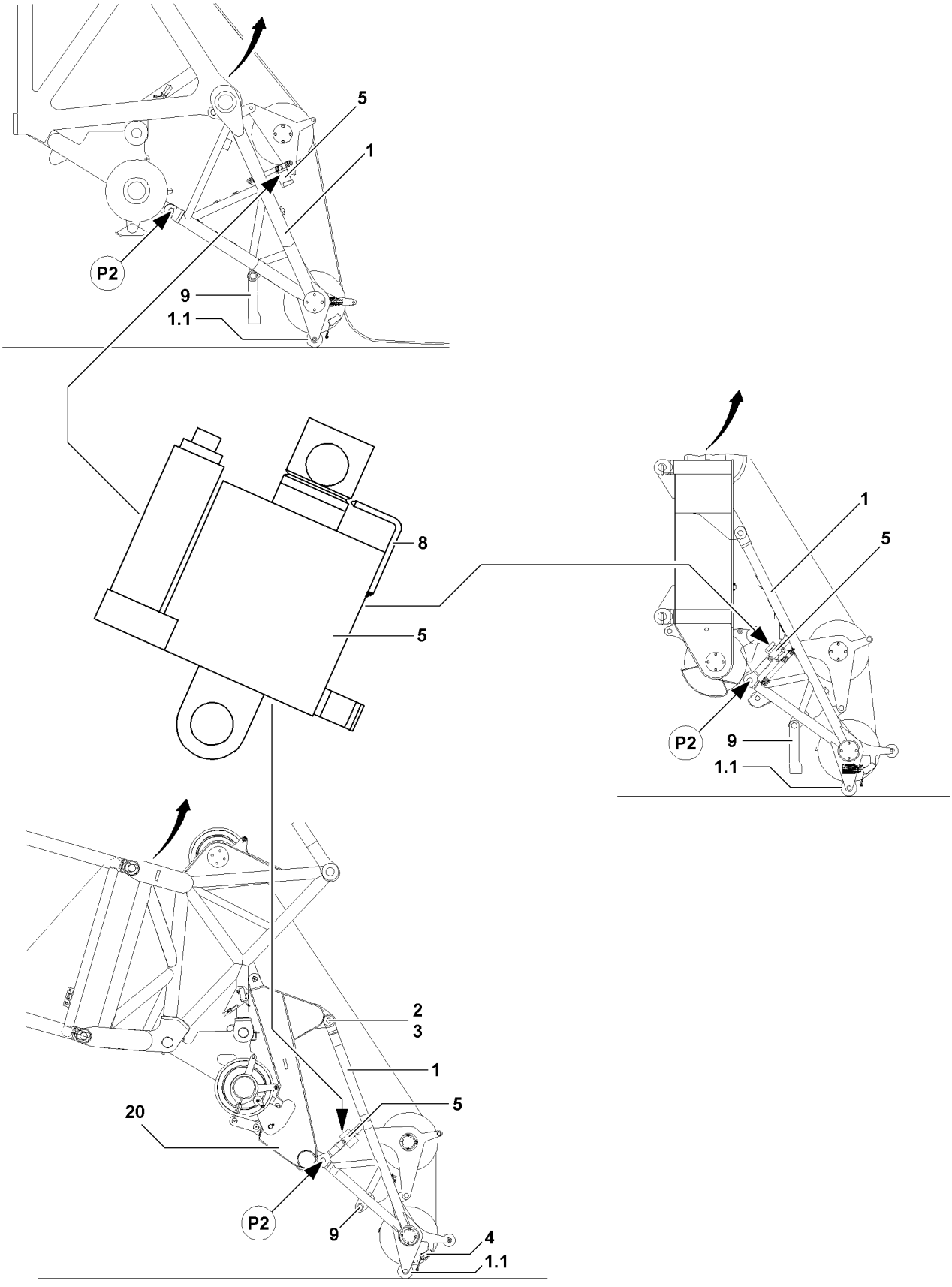

Fig.111815

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8 Erecting the boom

8.1 Erection procedure

DANGER
The crane can topple over!
▶ It is prohibited to turn the crane superstructure while erecting the boom!
▶ Observe the data in the erection and take down charts!

WARNING
The crane can topple over!
If the following conditions are not met before erecting the boom, the crane can topple over!
Personnel can be severely injured or killed!
▶ Observe the safety technical notes, see Crane operating instructions, chapter 5.01!
▶ Extend the S-relapse cylinders before erecting the boom combinations!
▶ Do not allow slack cable to build up on the control winch!

WARNING
Falling hoist rope!
If the hoist rope is not reeved before the erection procedure with the corresponding length on the boom nose 60 t , then it can fall down backward due to its own weight!
Personnel can be severely injured or killed!
▶ Reeve the hoist rope with sufficient length on the boom nose 60 t before the erection procedure!
▶ The hoist rope must be constantly monitored during the erection procedure!
▶ Do not step into the danger zone!

Make sure that the following prerequisites are met:
– The crane is supported.
(only in connection with crane support or for LG-cranes)
– The crane is aligned in horizontal direction.
– All electrical connections have been established.
– All limit switches are functioning.
– The counterweight has been installed to the turntable according to the data in the erection and take down chart.
– All pin connections have been secured.
– The hoist rope has been correctly placed in the rope pulleys and is prevented from jumping out with the rope retaining pins.
– There are no loose parts on the boom.
– The LICCON overload protection has been set according to the data in the load chart.
– The LICCON overload protection settings have been compared with the actual crane configuration.
– The LICCON overload protection is exceeded.
– The assembly icon is visible on the LICCON monitor.

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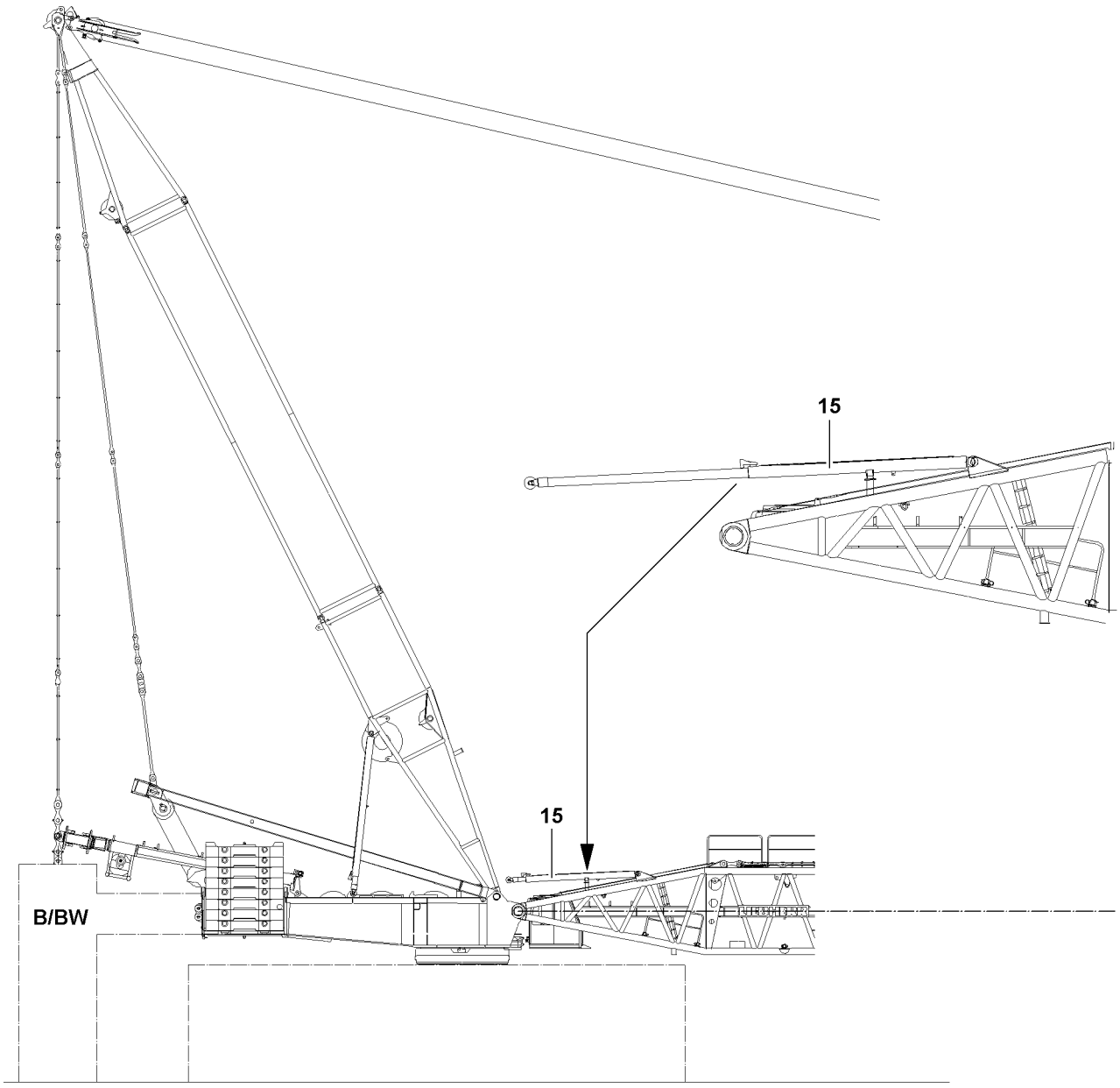

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Fig.111819

8.1.1 Extending the S-relapse cylinder

WARNING
The crane can topple over!
If the S-relapse cylinders **15** are not extended before erecting the boom, then the boom can fall down towards the rear during crane operation and the crane can topple over!
Personnel can be severely injured or killed!
▶ Extend the S-relapse cylinders **15** before erecting the boom!

WARNING
The crane can topple over!
If the danger notes for erection of the boom or the boom systems in the following chapters are not observed, then the crane can topple over!
Personnel can be severely injured or killed!

Boom nose installed on S-end section:
▶ Observe and adhere to the danger notes for erection in the Crane operating instructions, chapter 5.38 and chapter 5.39!

Boom nose installed on L-end section:
▶ Observe and adhere to the danger notes for erection in the Crane operating instructions, chapter 5.38 and chapter 5.39!

Boom nose installed on W-end section:
▶ Observe and adhere to the danger notes for erection in the Crane operating instructions, chapter 5.07!

Boom nose installed on W-adapter:
▶ Observe and adhere to the danger notes for erection in the Crane operating instructions, chapter 5.07 and chapter 5.08!

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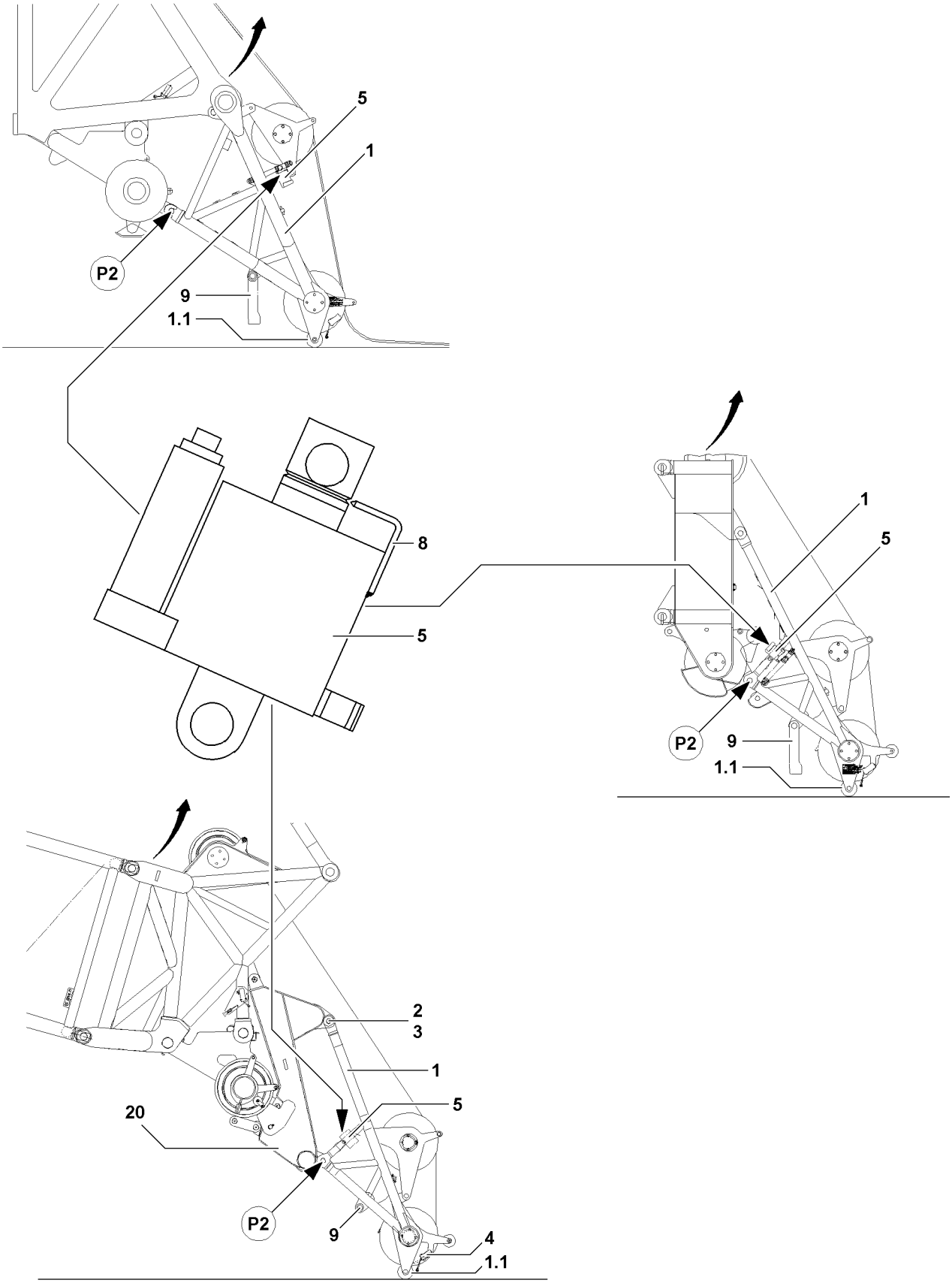

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Fig.111815

8.1.2 Erecting the boom

WARNING
Overload of crane!
If the pointer **8** is not at the height of the zero mark (notch) of the test cylinder **5** at operation of the boom nose 60 t **1**, non-exact or incorrect values will be determined when the load is weighed, due to incorrect test values!
The load display on the LICCON monitor does not match the actual load on the load hook or on the hook block!
The crane can be overloaded and topple over!
Personnel can be severely injured or killed!
- ▶ Make sure that the pointer **8** before erecting the boom or before operating the boom nose 60 t **1** is exactly on the zero mark (notch) of the test cylinder **5**!
- ▶ If the pointer **8** is not on the zero mark of the test cylinder **5**, contact the Service Department at LIEBHERR-Werk Ehingen GmbH!

DANGER
The crane can topple over!
- ▶ It is prohibited to turn the crane superstructure while erecting the boom!
- ▶ Observe the data in the erection and take down charts!

Reeving in the hook block

- ▶ Reeve in the hook block properly and secure the hoist rope on the rope fixed point with the required rope end connection, for reeving, see Reeving plans.
- ▶ Insert and secure the rope retaining pin.
- ▶ Attach the hoist limit switch weight, see section Crane operating instructions, chapter 4.06!

Erection

WARNING
The crane can topple over!
In crane operation with exceeded LICCON overload protection, the crane can topple over!
Personnel can be severely injured or killed!
- ▶ The radii listed in the load chart may not be exceeded or fallen below, even if there is no load on the hook!

Note
- ▶ When the lowest operating position of the boom is reached, the LICCON overload protection is activated!
- ▶ In the maximum load icon appears a load number in „t“ instead of the display „???“!

- ▶ Luff the boom up to the lowest operating position.

When the boom has reached the lowest operating position:
- ▶ Make sure that the assembly icon turns off on the LICCON monitor.

Result:

– The LICCON overload protection is active.

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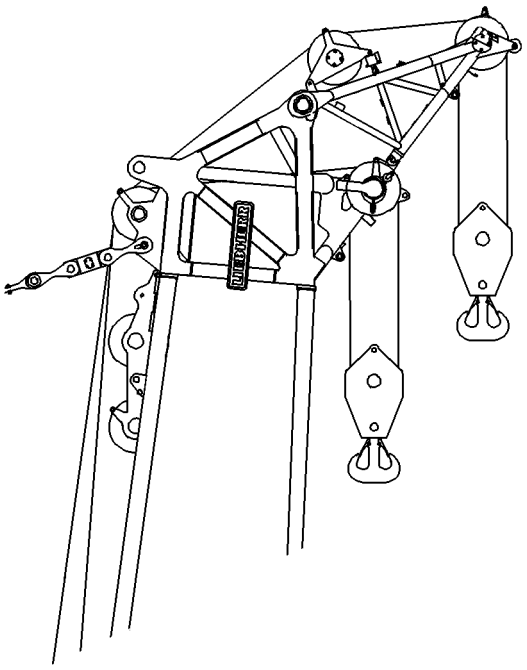
S



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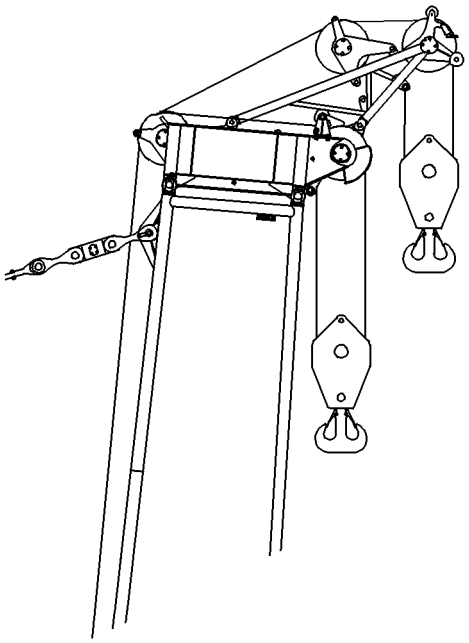

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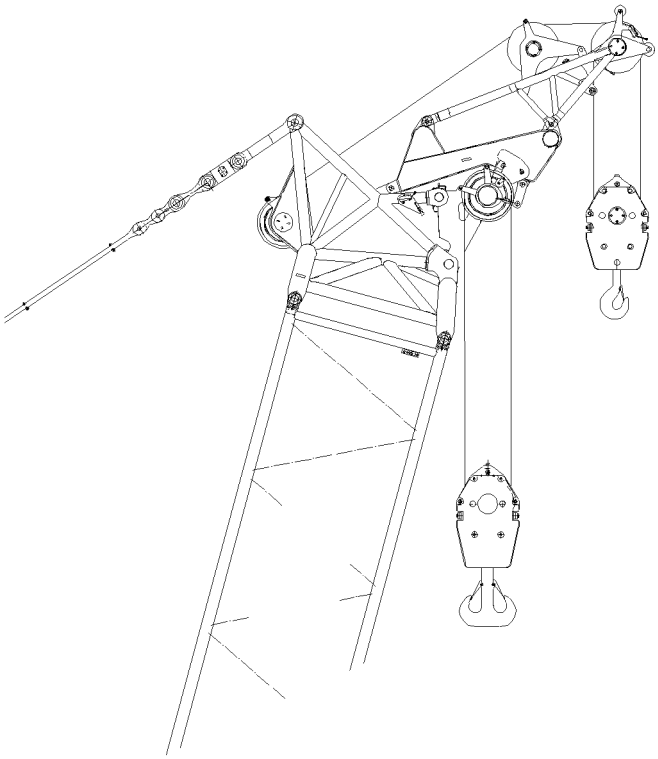

Fig.104486

9 Operating the crane

9.1 Preparing for crane operation

Note

▶ Observe the notes, see Crane operating instructions, chapter 4.05, chapter 4.08 and chapter 5.01!

Make sure that the following prerequisites are met:
- The LICCON overload protection is active.
- The LICCON overload protection has been set according to the data in the load chart.

WARNING

The crane can topple over!

▶ Check the horizontal position of the crane before and during operation!

▶ If the crane operator leaves the cab, even for a short time, the operating mode setting must be checked and reset if necessary before resuming crane operation!

9.2 Checking the settings

▶ Check the function of the overload protection by running against the operating positions „on top“ and „bottom“.

▶ Check the hoist limit switch by running against the hoist limit switch weight.

▶ Check the function of the limit switches on the relapse cylinders.

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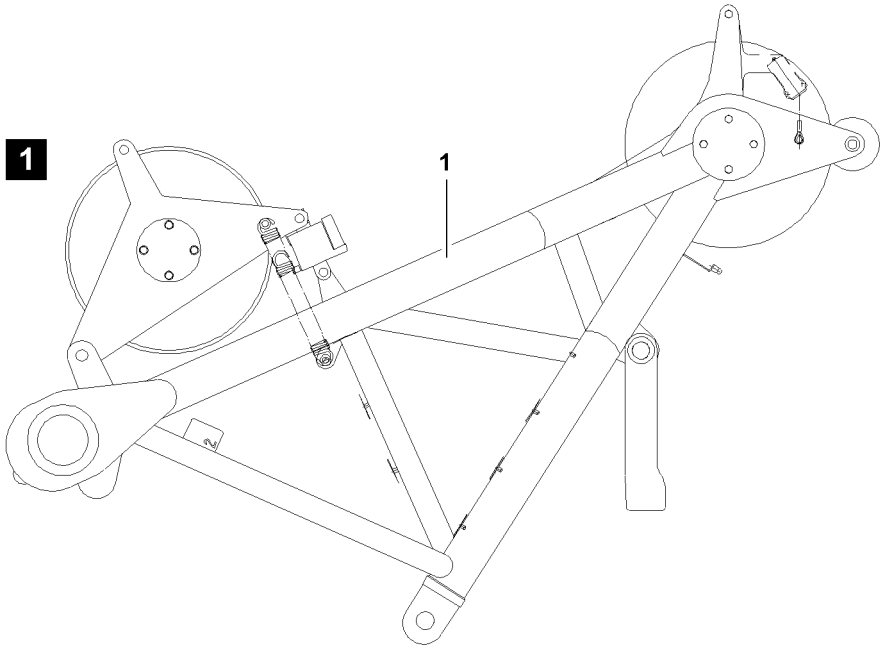

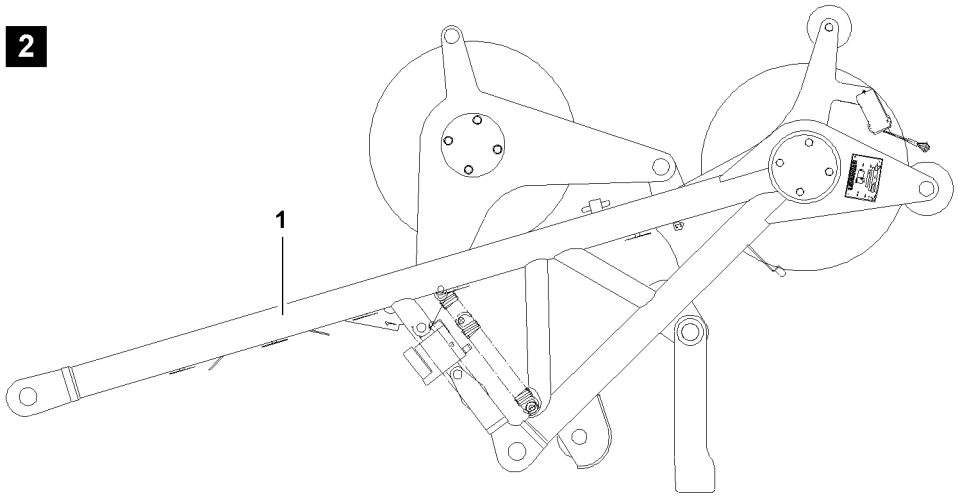

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Fig.111812

10 Disassembling the 60 t boom nose

WARNING
Risk of falling!
During assembly / disassembly work, personnel must be secured with appropriate aids to prevent them from falling. If this is not observed, assembly personnel can fall and suffer life-threatening or fatal injuries!

- ▶ Any work, where there is a danger of falling must be carried out with suitable aids (for example lifting platform, scaffolding, ladder, auxiliary crane)!
- ▶ If the work cannot be carried out with such aids nor from the ground, then the assembly personnel must secure themselves with approved fall arrest systems to avoid falling, see Crane operating instructions, chapter 2.04!
- ▶ Approved fall arrest systems must be hung into the respective fastening points on the crane, see Crane operating instructions, chapter 2.06!
- ▶ If railings are present on the components, then they must be brought into the corresponding position and secured for assembly / disassembly work!
- ▶ Step on aids and fall protection equipment only with clean shoes!
- ▶ Keep aids and fall protection equipment clean and free from snow and ice!
- ▶ During all assembly and disassembly work, maintenance work and inspections, travel and crane operation is prohibited!

WARNING
The lattice sections can fall down!
If the lattice sections are not pinned and secured correctly, then they can fall down and fatally injure personnel!

- ▶ Pin or unpin both pins at the same horizontal level, i.e. **left and right**!
- ▶ Do not stand under the booms or within the entire danger zone during the boom pinning and unpinning procedure!
- ▶ Safely secure the pins in the bearing points as well as receptacles!
- ▶ It is prohibited to lean the ladder against the component being disassembled!

WARNING
Danger of crushing!
When assembling crane components, limbs can be crushed or even severed due to oscillation of components!

- ▶ Make sure that the components do not swing back and forth during assembly!

DANGER
The components can fall down!
If the corresponding components are disengaged from the auxiliary crane before the corresponding component is pinned, the corresponding component can fall down and fatally injure personnel!

- ▶ Do not disengage the auxiliary crane until the corresponding component is pinned and secured!

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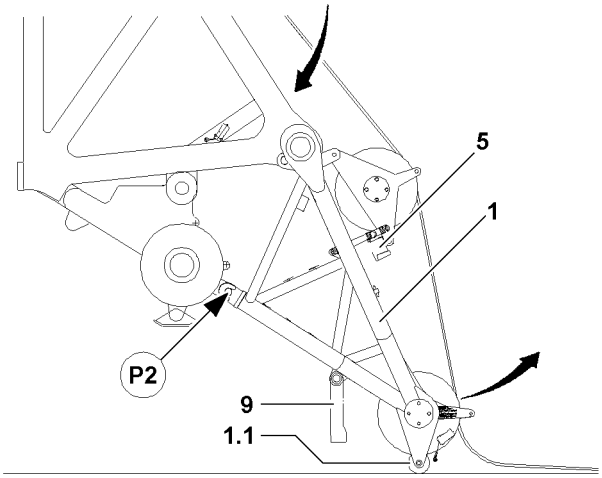

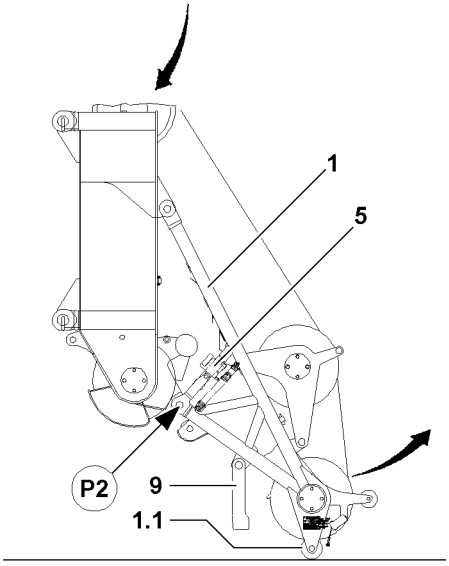

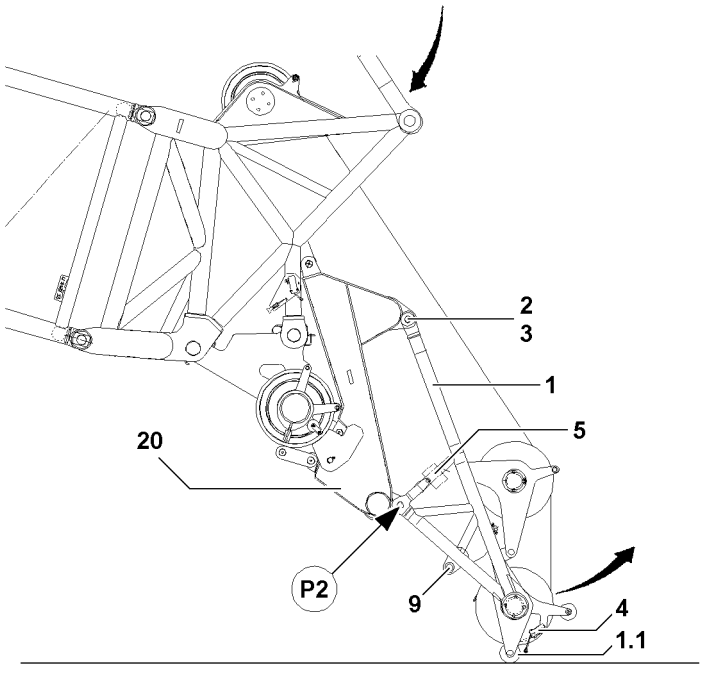

Fig.111816

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10.1 Placing the boom down

WARNING
The crane can topple over!
If the following conditions are not met before taking down the boom, the crane can topple over and fatally injure personnel!
- ▶ Observe the safety technical notes, see Crane operating instructions, chapter 5.01!
- ▶ Observe the data in the erection and take down charts!

NOTICE
Damage of boom components!
Taking down the boom system can lead to a collision between the hook block and the pulley head. The boom components can be severely damaged!
- ▶ Luff the boom system down at the same time and spool the hoist winch out!

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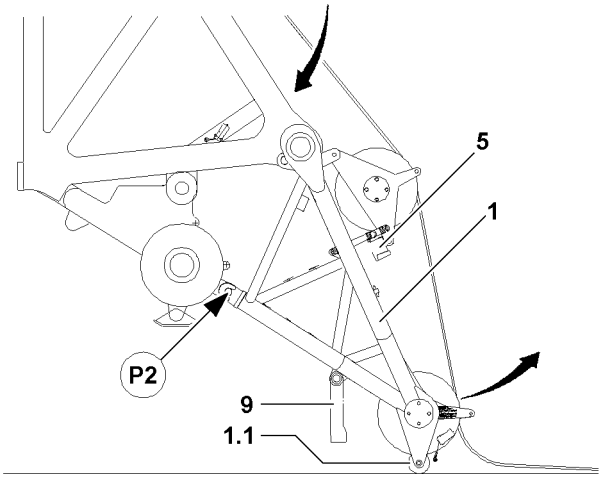

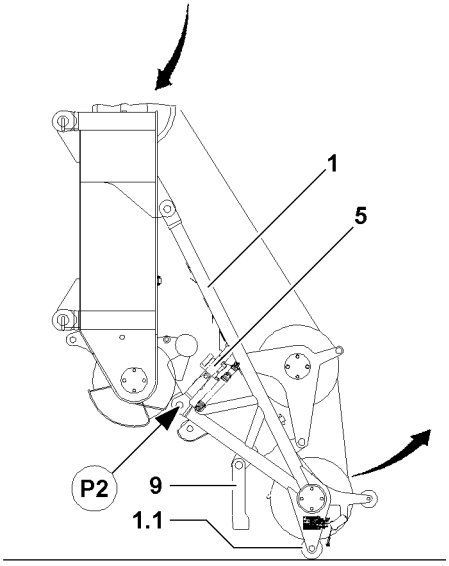

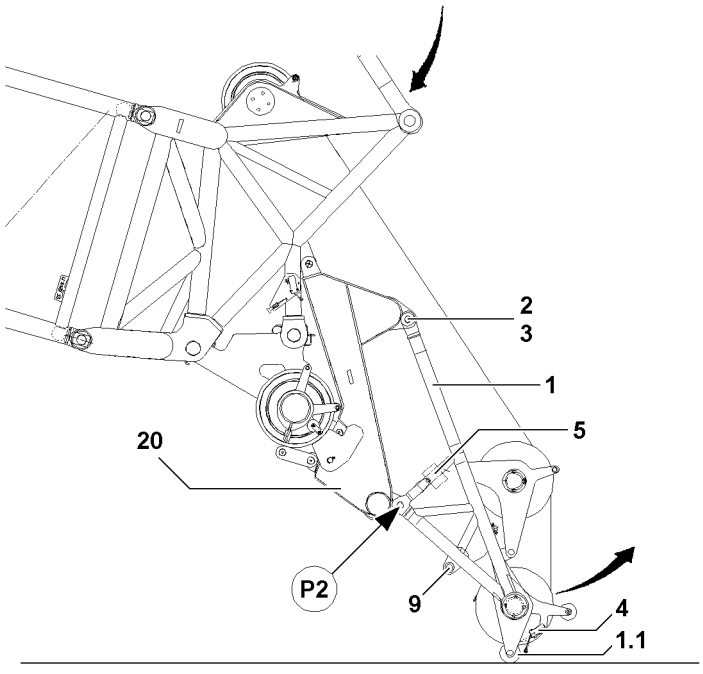

Fig.111816

LWE/LG 1750-006/15409-07-02/en

10.1.1 Lower boom

WARNING
The crane can topple over!
If the danger notes for take down of the boom or the boom systems in the following chapters are not observed, then the crane can topple over!
Personnel can be severely injured or killed!

Boom nose installed on S-end section:
▶ Observe and adhere to the danger notes in the Crane operating instructions, chapter 5.38 and chapter 5.39!

Boom nose installed on L-end section:
▶ Observe and adhere to the danger notes in the Crane operating instructions, chapter 5.38 and chapter 5.39!

Boom nose installed on W-end section:
▶ Observe and adhere to the danger notes in the Crane operating instructions, chapter 5.07!

Boom nose installed on W-adapter:
▶ Observe and adhere to the danger notes in the Crane operating instructions, chapter 5.07 and chapter 5.08!

▶ Luff the boom down according to the instructions in the above chapters.

WARNING
Assembly with bypassed / exceeded LICCON overload protection!
With bypassed / exceeded LICCON overload protection, the crane can collapse due to overload, the boom can break off or the crane can topple over!
Personnel can be severely injured or killed!
This could result in high property damage!
▶ The LICCON overload protection may only be bypassed / exceeded by persons who are aware of the consequences of a bypass!
▶ Bypass / exceed the LICCON overload protection only when the set up status of the crane has been correctly entered into the LICCON computer system!
▶ Observe the erection / take down charts!
▶ Crane operation with bypassed / exceeded LICCON overload protection is strictly prohibited!

▶ At the same time, spool the hoist winch out and luff the boom down until the hook block touches the ground.

10.1.2 Unreeving the hook block

▶ Remove the hoist limit switch weight and unreeve the hook block.
▶ Carefully luff the boom down until the boom nose 60 t is just above the ground with the rollers **1.1**.

When the rollers **1.1** are just above the ground:
▶ Luff the boom down slowly until the boom nose 60 t folds out by itself.
▶ Continue to luff down the boom.

Result:

– The boom nose 60 t runs on the rollers **1.1** toward the „outside“.

▶ Place the boom on the support base.

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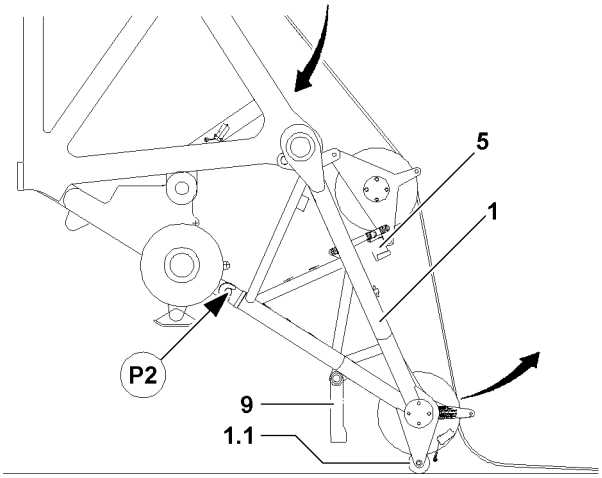

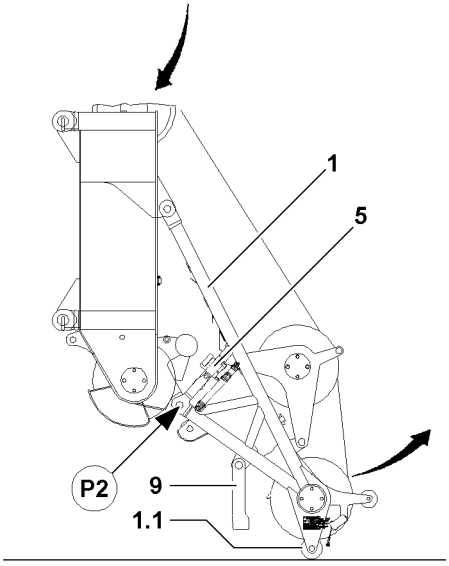

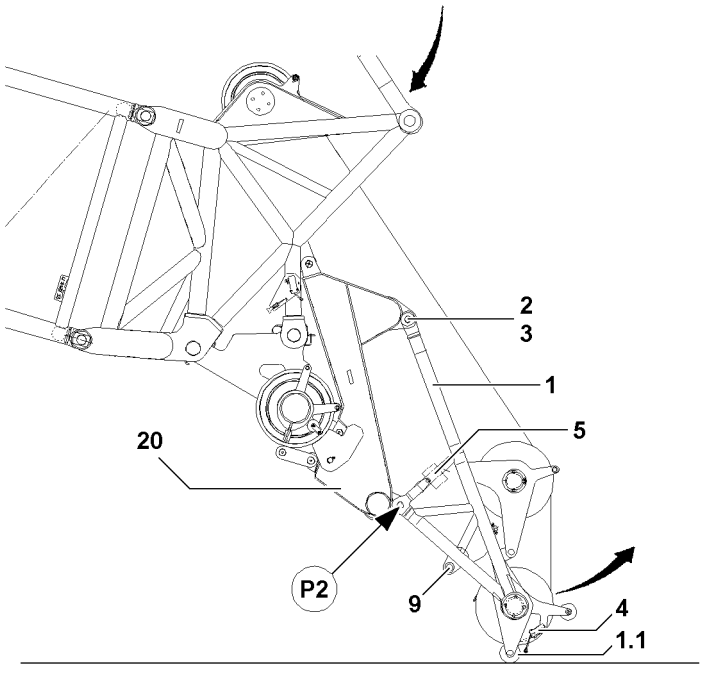

Fig.111816

10.1.3 Spool the hoist rope up

WARNING
Falling hoist rope!
By spooling the hoist rope up, personnel can be severely injured or killed!
- ▶ All rope retaining pins / pipes on the boom nose 60 t **1** have been removed!
- ▶ All rope retaining pins / pipes on the respective end section / W-adapter **20** and on the boom have been removed!
- ▶ Slowly spool up the hoist rope over the rope pulleys back to the winch!
- ▶ Make sure that no personnel is within the danger zone!

NOTICE
Overspooled winch!
If the rope is pulled under the winch when spooling up, then the adjustment of the cam limit switch changes!
A new adjustment by **LIEBHERR Service** must be made!
- ▶ Stop the winch in time, with sufficient rope reserve!
- ▶ Do not overspool the winch!

- ▶ Spool the hoist rope up.

10.2 Disconnecting the electrical connections

Make sure that the following prerequisite is met:
- – The boom is properly placed down as specified.

NOTICE
Damage to the electrical connections on the cable drum!
If the electrical connection from the cable drum on the S-pivot section to the terminal box on the respective end section is disconnected and spooled up, then the electrical connection from the cable drum to the terminal box on the S-pivot section can be damaged!
- ▶ Disconnect the electrical connection from the cable drum to the terminal box on the S-pivot section first and then the electrical connection from the terminal box to the respective end section!

- ▶ Store the cable from the terminal box on the S-pivot section properly.
- ▶ Spool the cable drum up and secure it to prevent inadvertent spooling out.

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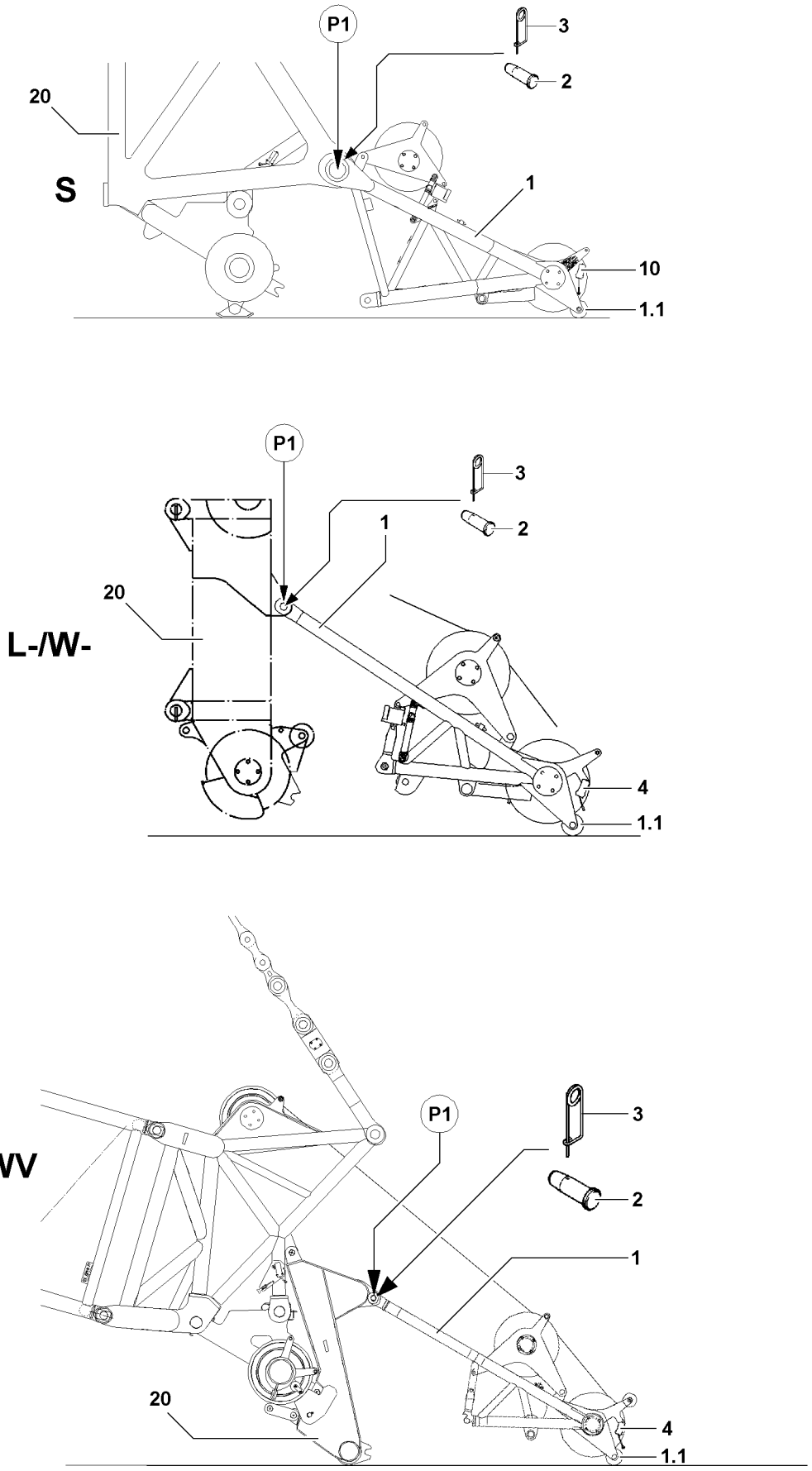

Fig.111821

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10.3 Disassembling the 60 t boom nose

WARNING
Folding down boom!
If the following conditions are not met before disassembling the boom nose 60 t **1**, the boom can fold down!
Personnel can be severely injured or killed!
▶ Support the boom during disassembly with suitable materials!

Make sure that the following prerequisites are met:
– The boom is placed on a load-bearing support.
– The boom nose 60 t **1** is laying on the ground.
– All electrical connections are separated on the boom.

▶ Attach the boom nose 60 t **1** on the auxiliary crane.
▶ Lift the boom nose 60 t **1** with the auxiliary crane until the boom nose 60 t hangs horizontally.
▶ Release and unpin the pins **2** on the boom nose 60 t **1** at point **P1**.

When the pins **2** are unpinned:
▶ Remove the boom nose 60 t **1** with the auxiliary crane.

Note
▶ Disassembling the boom, see Crane operating instructions, chapter 5.38 or chapter 5.39 or chapter 5.07 or chapter 5.08!

▶ Disassemble the boom properly.

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5.13 SLF-boom combination

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Fig.195219

1 Component overview

1.1 Fastening points

WARNING
Danger of accident due to incorrect attachment!
Life-threatening situations can arise due to improper or incorrect attachment of the corresponding components.
▶ The corresponding components must be attached on the intended points **P1**.

1.2 F-assembly unit, see illustration 1

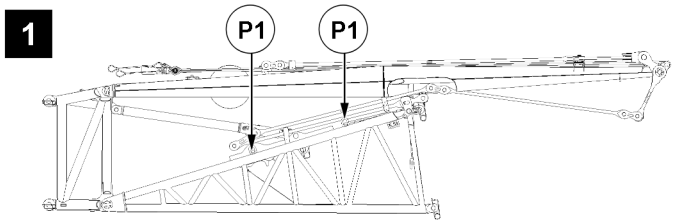

Fig.126306: F-assembly unit

Description	Abbreviation	Weight
F-assembly unit	—	5.5 t

1.3 F-end section, see illustration 2

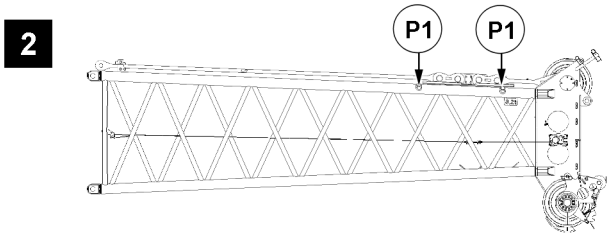

Fig.126307: F-end section

Description	Abbreviation	Weight
F-end section	—	3.2 t

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1.4 F-intermediate section 6 m , see illustration 3

3

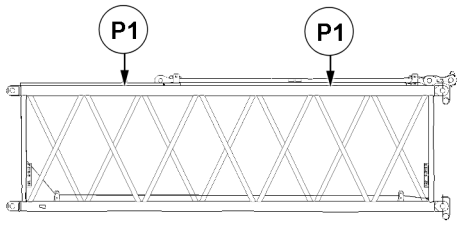

Fig.126308: F-intermediate section 6 m

Description	Abbreviation	Weight
F-intermediate section 6 m	F 2116.9	1.5 t

1.5 F-intermediate section 3 m , see illustration 4

4

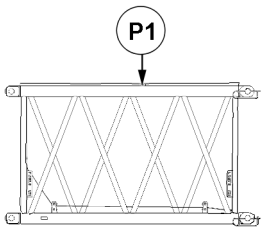

Fig.126309: F-intermediate section 3 m

Description	Abbreviation	Weight
F-intermediate section 3 m	F 2116.9	1.0 t

2 Assembly F-auxiliary jib

DANGER
The crane can topple over!
At assembly of the intermediate sections, make sure that they are assembled according to their description, if this is not observed, the boom can break and boom sections can fall down.
- ▶ Assemble the lattice sections and guy rods as noted in the set up drawings.
- ▶ Assemble the boom combinations according to the assembly drawings, see Assembly plans.
- ▶ Any other arrangement of the lattice sections and the guy rods than specified in the Assembly and Rod plans is prohibited.

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WARNING
Danger of falling!
During assembly / disassembly work, personnel must be secured with appropriate aids to prevent them from falling. If this is not observed, assembly personnel could fall and suffer life-threatening or fatal injuries.
- ▶ Any work, where there is a danger of falling must be carried out with suitable aids (for example lifting platform, scaffolding, ladder, auxiliary crane).
- ▶ If the work cannot be carried out with such aids nor from the ground, then the assembly personnel must secure themselves with approved fall arrest systems to avoid falling, see Crane operating instructions, chapter 2.04.
- ▶ Approved fall arrest systems must be hung into the respective fastening points on the crane, see Crane operating instructions, chapter 2.06.
- ▶ If railings are present on the components, then they must be brought into the corresponding position and secured for assembly / disassembly work.
- ▶ Step on aids and fall protection equipment only with clean shoes.
- ▶ Keep aids and fall protection equipment clean and free from snow and ice.
- ▶ Stepping or walking on crane components and lattice sections, which have an incline of more than 20° is prohibited.
- ▶ During all assembly and disassembly work, maintenance work and inspections, travel and crane operation is prohibited.

WARNING
Falling components!
If unsecured or non-supported components are assembled or disassembled, they can fall down.
Personnel can be severely injured or killed.
- ▶ During pinning and unpinning of the lattice sections, it is prohibited for anyone to remain **under** or **on** the components as well as within the entire danger zone.
- ▶ Support the boom and components before pinning / unpinning.
- ▶ Pin or unpin both pins laying in a horizontal, i.e. **left** and **right**.
- ▶ Secure the pins in the storage locations and in the receptacles.
- ▶ Do not disengage the auxiliary crane until the respective component is pinned and secured.
- ▶ It is prohibited to lean a ladder against the component being disassembled.

WARNING
Danger of impact / crushing!
When installing / removing crane components with the auxiliary crane, crane components can start to swing back and forth.
When lifting / lowering and positioning crane components, there is an increased danger of impacts / crushing.
Personnel can be severely injured or killed.
- ▶ Make sure that personnel cannot be caught by components.
- ▶ Make sure that the crane is aligned in horizontal position to avoid the support beams from swinging by themselves.
- ▶ When working in danger zones: Use aids to protect limbs.
- ▶ Guide components with suitable aids to minimize oscillation.

WARNING
Neglected inspection and maintenance on guy rods!
If the regular inspection and maintenance of the guy rods is not carried out or is carried out only in irregular intervals, then severe accidents can occur due to existing and unrecognized damage to the guy rods.
Personnel can be severely injured or killed.
- ▶ Check the guy rods before every assembly, see Crane operating instructions, chapter 8.15.

Note
- ▶ The F-auxiliary jib is **not** adjustable in crane operation.

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Make sure that the following prerequisites are met:
- The crane is fully supported and horizontally aligned.
- The derrick boom is installed in the required length on the crane, see Crane operating instructions, chapter 5.05.
- The SL-boom combination is installed in the required length on the crane and placed on the ground or on the substructure.
- All WA-frame guy rods have been removed on the SL-boom combination.
- The suspended ballast pallet is near the crane.
- The suspended ballast pallet is aligned to the center of rotation of the crane.
- The suspended ballast is placed on the suspended ballast pallet according to the erection and take down chart.
- The LICCON overload protection has been set according to the data in the load chart.
- The LICCON overload protection settings match the actual set up configuration of the crane.
- The LICCON overload protection is exceeded.
- The assembly icon is visible on the LICCON monitor.
- An auxiliary crane is available.

Note
- ▶ The F-auxiliary jib is available in lengths of 12 m , 15 m , 18 m , 21 m and 24 m.
- ▶ The assembly of the F-auxiliary jib on the SLD-boom combinations is described in two different versions, which depend on the situation on the assembly location.

WARNING
The crane can topple over!
If the dangers described in this chapter are not observed, then the crane can topple over.
Personnel can be severely injured or killed.
- ▶ Make sure that the procedures described in this chapter are observed.
- ▶ Improvisations are prohibited.

Assembly variations of SLF-boom combinations:
1. Assemble the SL9D2FB / SL12D2FB-boom with substructure.
2. Assemble the SL9D2FB / SL12D2FB-boom system in an incline

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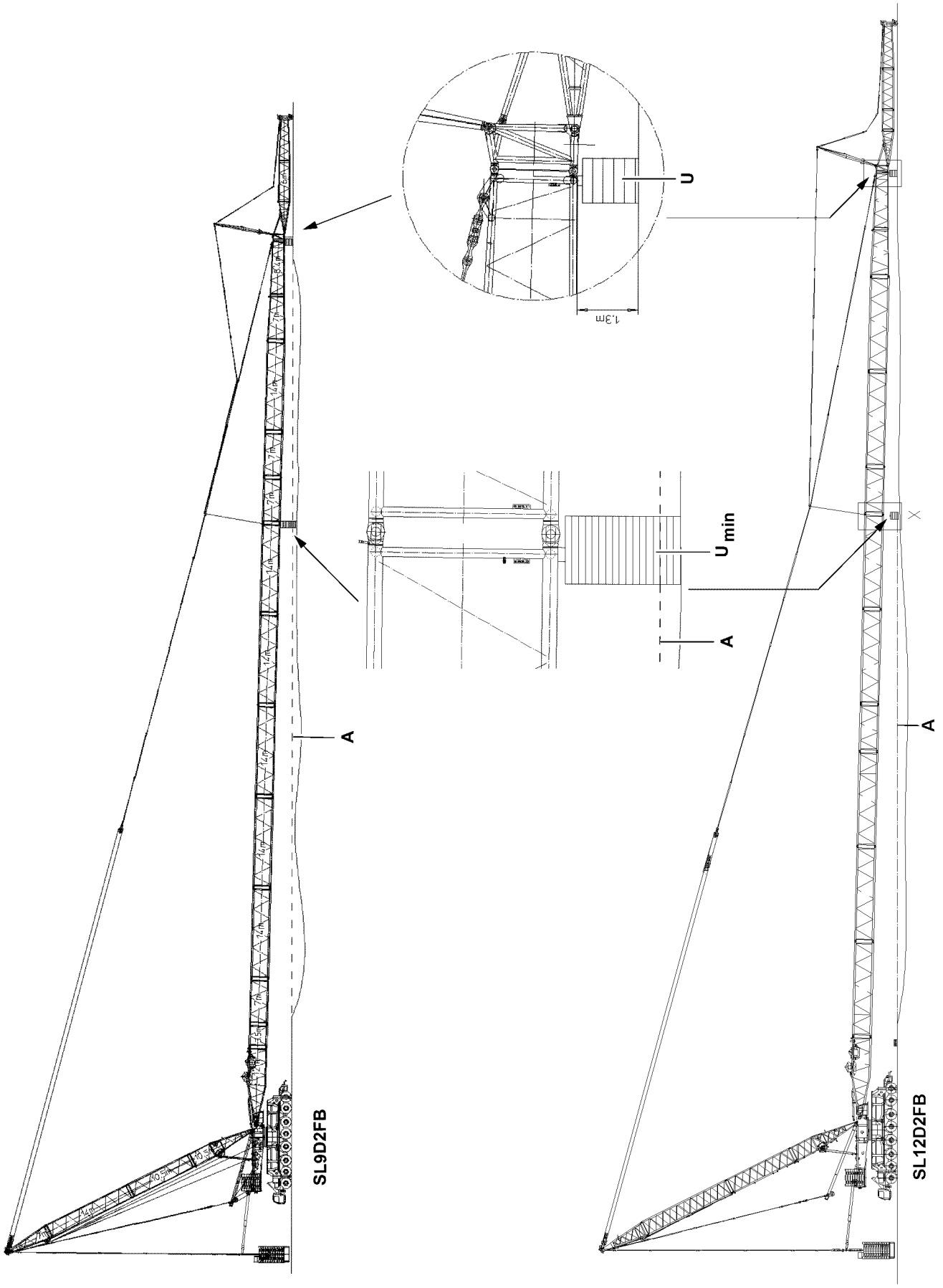

Fig.116336

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2.1 Assemble the SL9D2FB / SL12D2FB-boom with substructure.

NOTICE
Overload of boom!
If the SLF-boom is not supported before the erection procedure, then the boom will be overloaded.
The crane will be damaged.
▶ Support the boom with suitable material of sufficient load bearing capacity.

Substructure on the L-head (light) 1.3 m		
SL9D2FB	136.5 m	> 0.8 m
SL12D2FB	136.5 m	
SL12D2FB	140.0 m	

Note
▶ The substructure of the boom systems is required from a length of 136.5 m.

The substructure **U** is independent of the length of the F-auxiliary jib.

Note
▶ The alignment level **A** is the placement level of the crane.

Note
▶ The upper edge of the substructure **U** must be at least 0.80 m above the alignment level **A**.

▶ Assemble the D2-boom, see Crane operating instructions, chapter 5.05.
▶ Assemble the SL9 or SL12-boom, see Crane operating instructions, chapter 5.39.
▶ Assemble the suspended ballast, see Crane operating instructions, chapter 5.36.
▶ Assemble the F-auxiliary jib on the SL9D2B / SL12D2B-boom system, see section „Assembling the F-auxiliary jib“.

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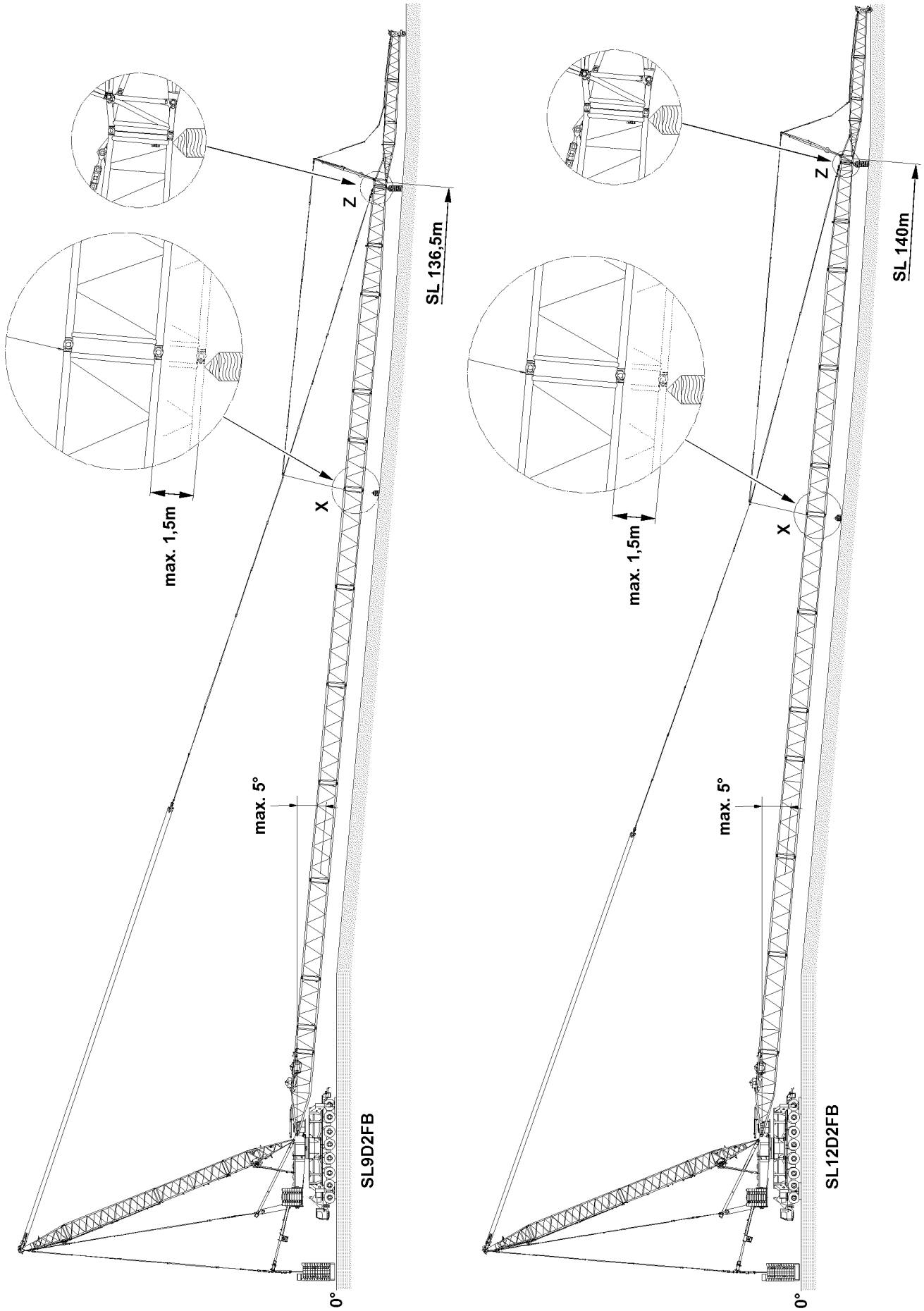

Fig.119777

LWE/LG 1750-006/15409-07-02/en

2.2 Assemble the SL9D2FB / SL12D2FB-boom system in an incline

WARNING
The crane can topple over!
If the crane is not horizontal, then it can be overloaded when erecting the boom system and topple over.
Personnel can be severely injured or killed.
- ▶ Make sure that the placement level of the crane is level and horizontal.
- ▶ Make sure that the crane is completely supported and horizontally aligned.
- ▶ Make sure that the maximum permissible incline of the main boom angle of -5° is not exceeded at boom assembly.
- ▶ Make sure that the maximum permissible deflection of the respective boom system of 1.5 m is not being exceeded, see the following chart and detail **X**.
- ▶ Make sure that all movements of the crane are actuated slowly and anticipatorily.
- ▶ Support the boom systems with suitable material of sufficient load bearing capacity.

Maximum permissible deflection of boom system		
Boom system	**Length**	**Maximum permissible deflection at X**
SL9D2FB	136.5 m	1.5 m
SL12D2FB	112.0 m to 140.0 m	

NOTICE
Damage to crane!
If the substructure of the boom system at **X** is not carried out properly and in the required height, then the boom system can be damaged due to excessive deflection.
- ▶ Make sure that the substructure at **X** is carried out in such a way that the deflection does **not** exceed the maximum permissible value.

Note
- ▶ Assemble the SL9D2 or SL12D2-boom according to Crane operating instructions, chapter 5.39.

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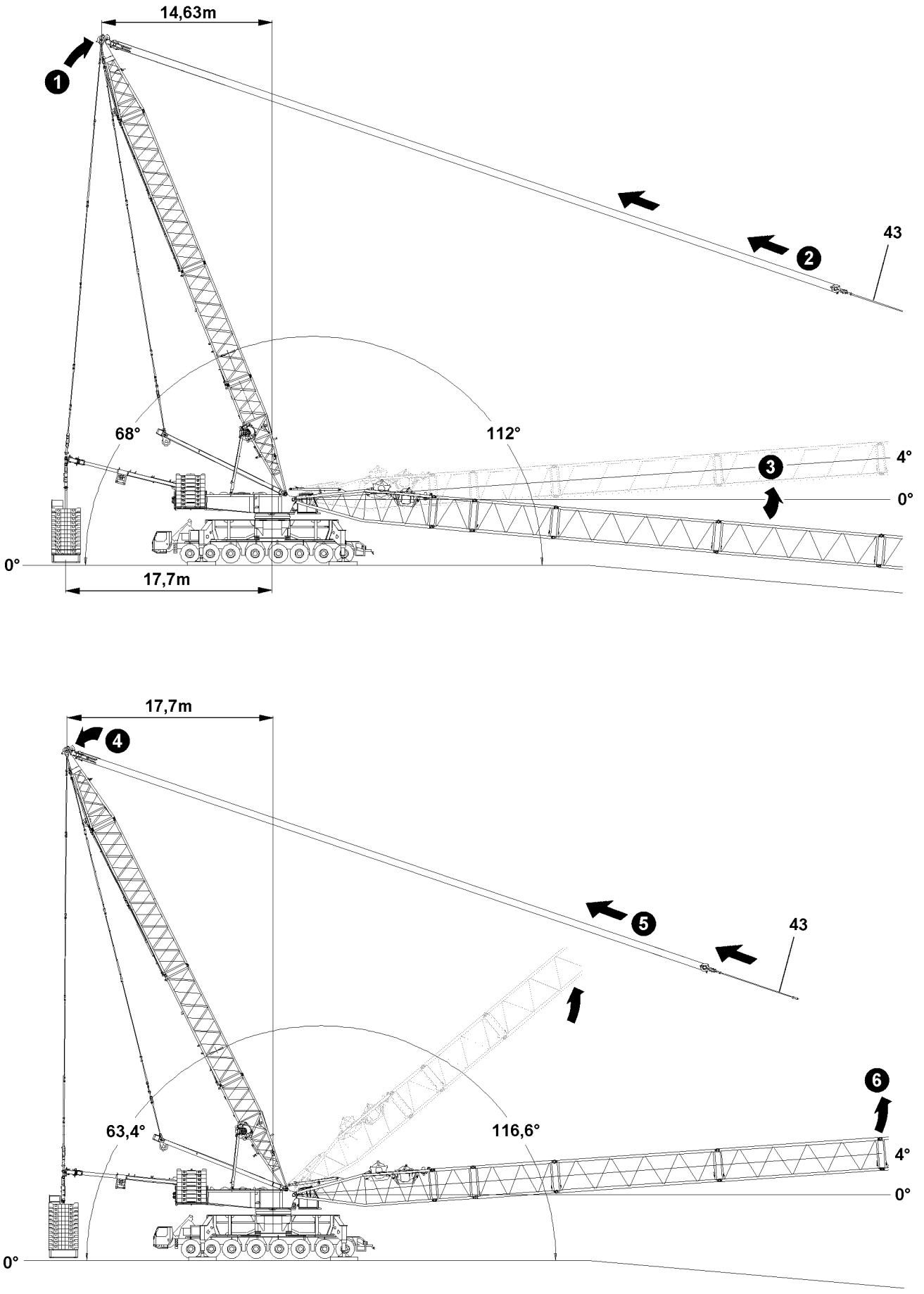

Fig.119778

LWE/LG 1750-006/15409-07-02/en

2.2.1 Erecting the SL9D2F / SL12D2F-boom to the horizontal

Make sure that the following prerequisites are met:
- The required boom system is properly assembled and secured.
- The boom system is properly supported.

DANGER
The crane can topple over!
In crane operation with exceeded LICCON overload protection, the crane can topple over.
Personnel can be severely injured or killed.
▶ The radii listed in the load chart may not be exceeded or fallen below, even if there is no load on the hook.

WARNING
The crane can topple over!
If the specifications in the erection and take down charts are disregarded, the crane can topple over.
Personnel can be severely injured or killed.
▶ Observe the Erection and take down charts.

▶ Assemble the guy rods on the SLD-boom system, see Crane operating instructions, chapter 5.39.

When the guy rods on the SLD-boom are properly installed and secured:
▶ Set the derrick boom to **68°**.
▶ Assemble and lift the suspended ballast properly, see Crane operating instructions, chapter 5.36.
▶ Assemble the F-auxiliary jib and guy rods properly, see section „Assembling the F-auxiliary jib“.

When the F-auxiliary jib is properly installed and secured:
▶ Erect the boom system to **minimum** 0° to **maximum** 4° to the horizontal.

When the boom system is between 0° and 4° to the horizontal:
▶ Set the derrick boom to **63.4°** to the rear.

Result:

– The derrick boom is on a derrick radius of 17.7 m.

When the derrick boom and the derrick ballast are on a derrick / derrick ballast radius of 17.7 m:
▶ Erect the boom system, see Erection and take down charts and section „Erecting the boom system“.

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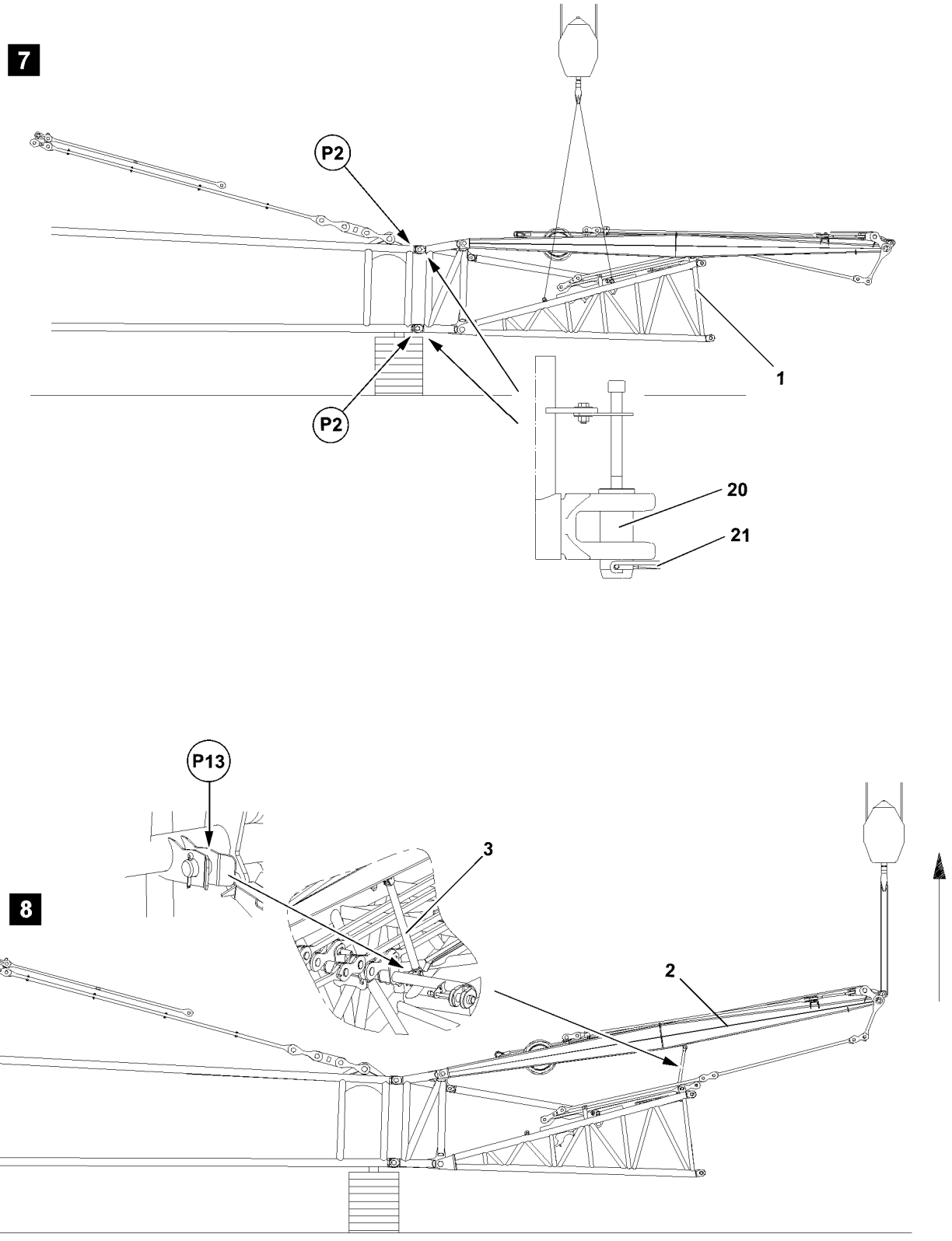

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Fig.120172

2.3 Assembling the F-auxiliary jib

▶ Hang the F-assembly unit **1** on the auxiliary crane and swing it in to the pin points **P2**, see illustration **7**.

WARNING
Falling components!
If the components are incompletely pinned or secured, then components can fall down.
Personnel can be severely injured or killed.
▶ Make sure that all components are completely pinned and secured.

▶ Insert the pins **20** on points **P2** and secure with spring retainer **21**, see illustration **7**.
▶ Lift the FA-frame **2** with the auxiliary crane and set it down slowly on the support **3** into the intended receptacle, point **P13**, see illustration **8**.

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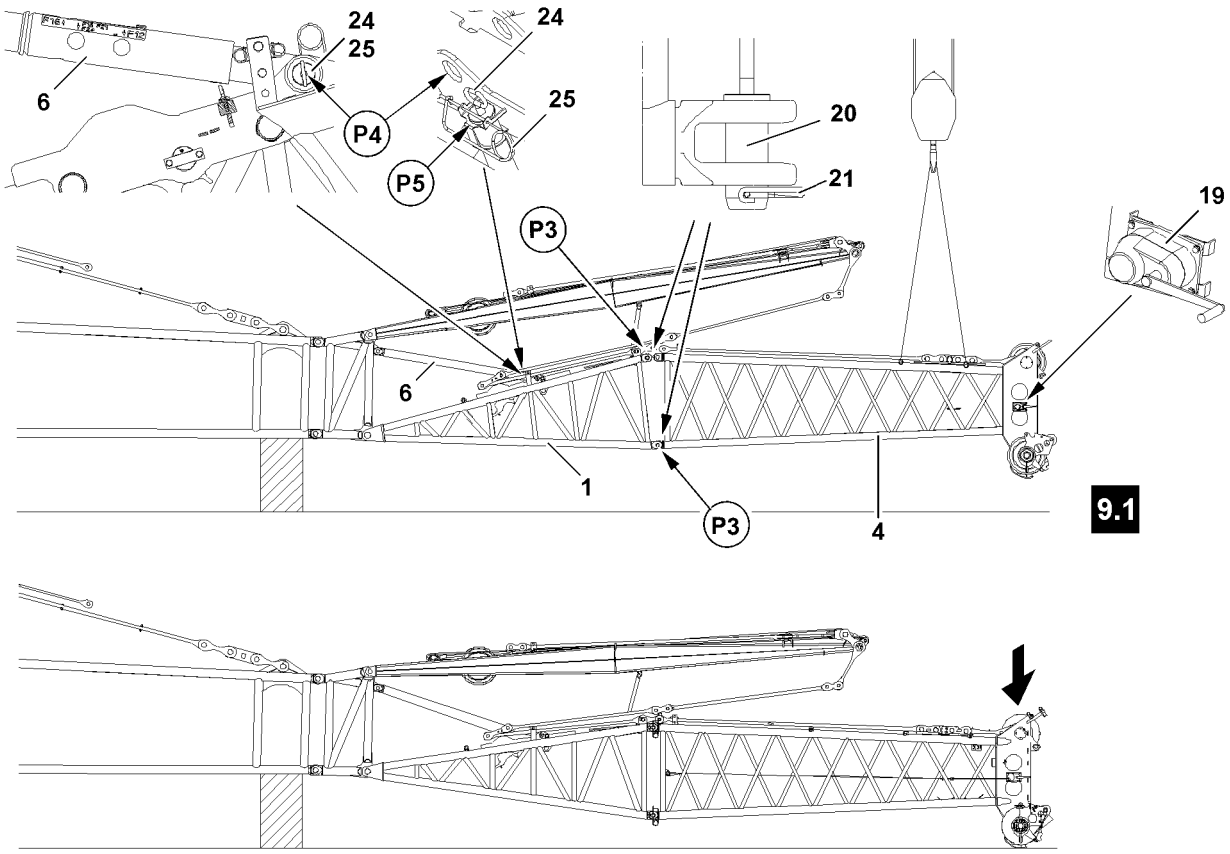

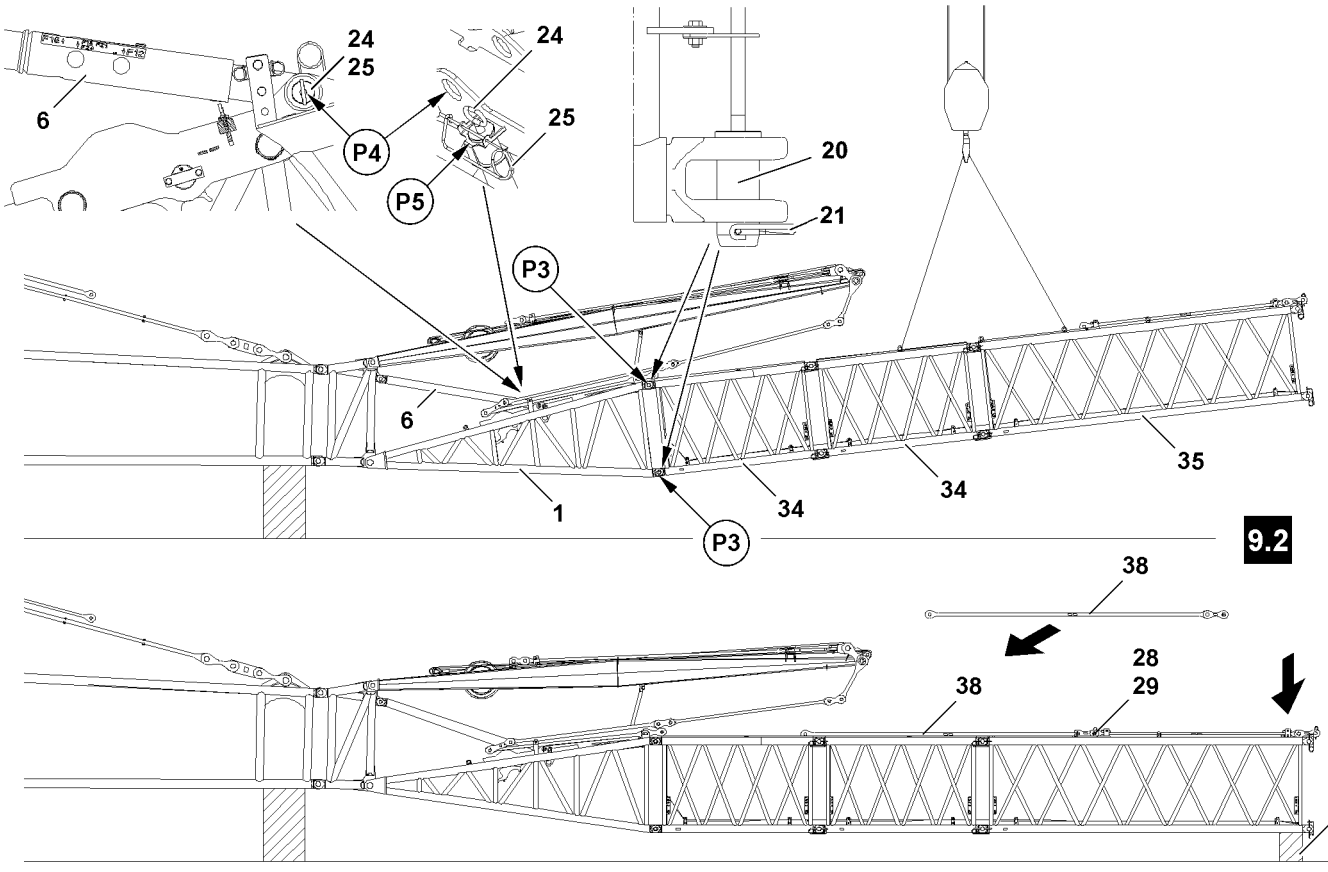

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Fig.120173

▶ Hang the F-end section **4** on the auxiliary crane and swing it in to the pin points **P3** on the F-pivot section **1**, see illustration **9.1**.
or
Hang the preassembled F-intermediate sections (intermediate section(s) **34** and intermediate section **35**) on the auxiliary crane and swing it in to the pin points **P3** on the F-pivot section **1**, see illustration **9.2**.

When the F-end section **4** or the preassembled F-intermediate sections are positioned on the F-pivot section **1**:

▶ Insert the pins **20** on points **P3** and secure with spring retainer **21**, see illustration **9.1** or illustration **9.2**.

WARNING
Overload of F-relapse retainer!
If the F-relapse retainer **6** is not unpinned after assembly of the F-end section **4** or the assembly of the preassembled F-intermediate sections at point **P4**, then the F-relapse retainer **6** can be overloaded and damaged.
Personnel can be severely injured or killed.

▶ Make sure that there are no persons under the assembled F-intermediate sections (section jib of F-intermediate sections) or under the assembled F-end section.
▶ Place the assembled F-end section **4** (for F-auxiliary jib 12 m) or the assembled F-intermediate sections (after assembly on the F-pivot section) on the substructure on the ground.

When the F-end section **4** or the additional F-intermediate sections are assembled on the F-pivot section **1**:

▶ Leave the auxiliary crane on the respective component.

NOTICE
Danger of property damage!
By lifting the F-lattice jib or the section jib with the auxiliary crane, crane components can be damaged.

▶ Lift the F-lattice jib or the section jib only slightly with the auxiliary crane.

▶ Lift the F-auxiliary jib or the section jib slightly with the auxiliary crane.
▶ Release and unpin the transport retaining pin **24** of the F-relapse retainer **6** at point **P4**.
▶ Insert the transport retaining pin **24** at point **P5** in park position and secure with spring retainer **25**.

When the transport retaining pin **24** is pinned and secured in park position:

▶ Place the F-auxiliary jib down on the ground (for F-auxiliary jib length 12 m).
or
Place the section jib (consisting of F-pivot section, F-intermediate section **without** F-end section) on the substructure **U** on the ground.
▶ Place the rods **38** in the F-intermediate section, pin with pin **28** and secure with spring retainer **29**.

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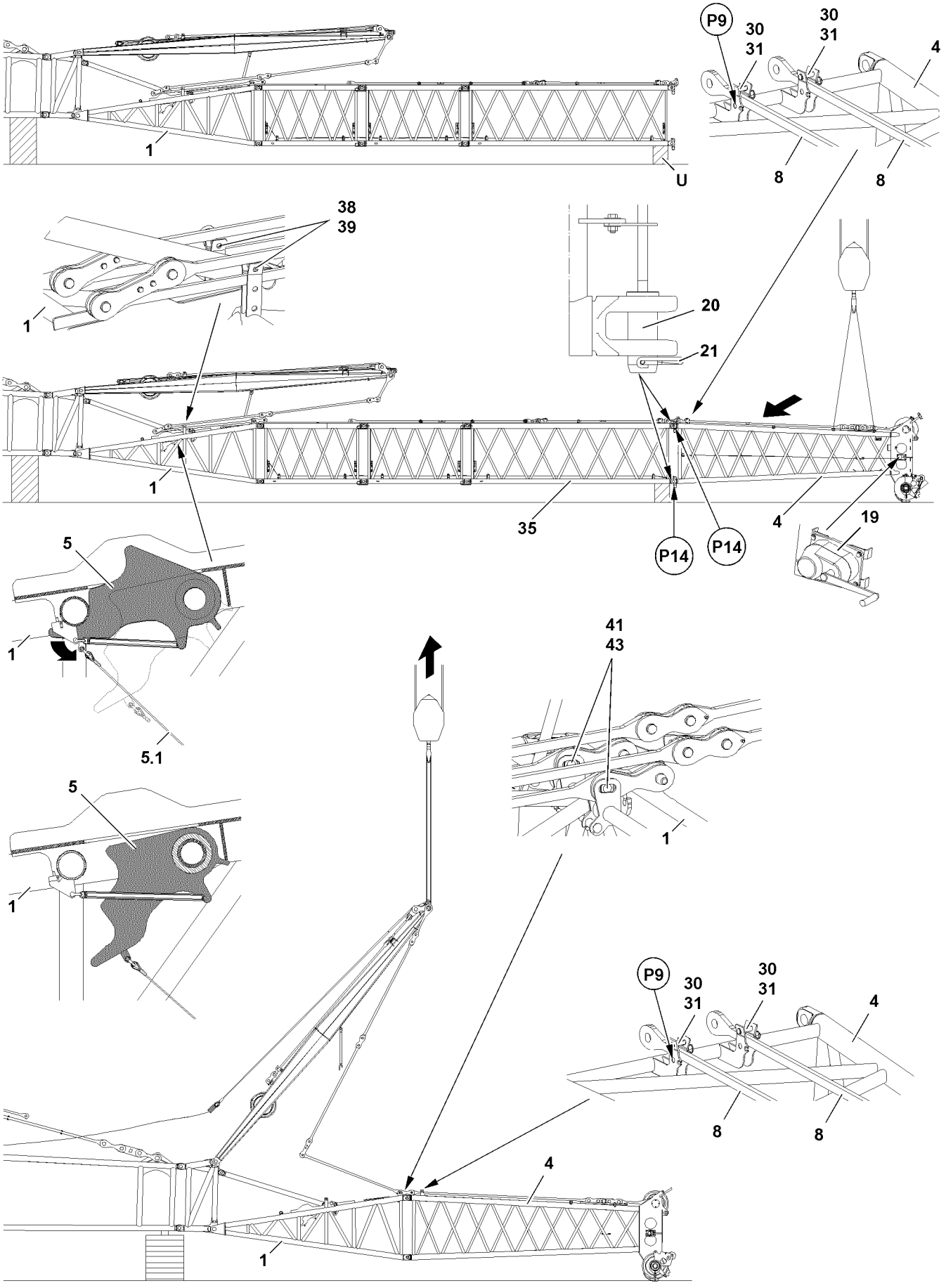

Fig.120174

When the section jib is properly laying on the substructure **U**:

▶ Install the F-end section **4** on F-intermediate section **35**: Insert pin **20** on points **P14** and secure with spring retainer **21**.

When the F-end section is properly installed and secured:

▶ Release the rods **8** of the F-end section **4** in the transport receptacles: Remove the locking pin **30** and spring retainer **31**.

▶ Pin locking pin **30** into park position **P9** and secure with spring retainer **31**.

For F-auxiliary jib lengths of more than 12 m:

▶ Pin and secure the rods **8** of the F-end section **4** properly with the rods of the F-intermediate sections.

▶ Connect the rope strand **5.1** from the flap **5** between the F-intermediate sections and the manual rope winch **19** on the F-end section **4**.

When the rope strand **5.1** is connected properly up to the manual rope winch **19**:

▶ Actuate the manual rope winch **19** and set the flap **5** on the F-pivot section **1** into „down“ position.

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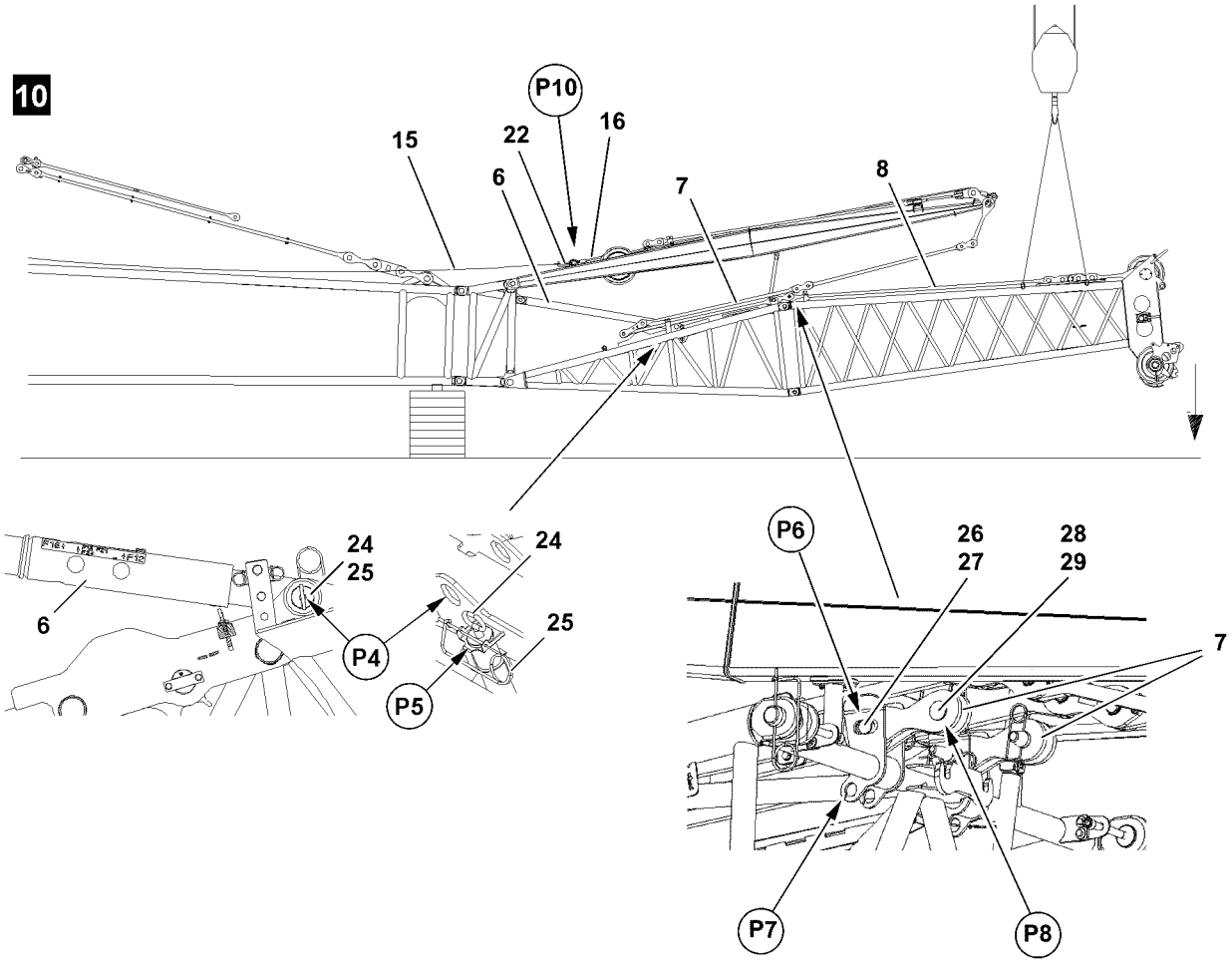

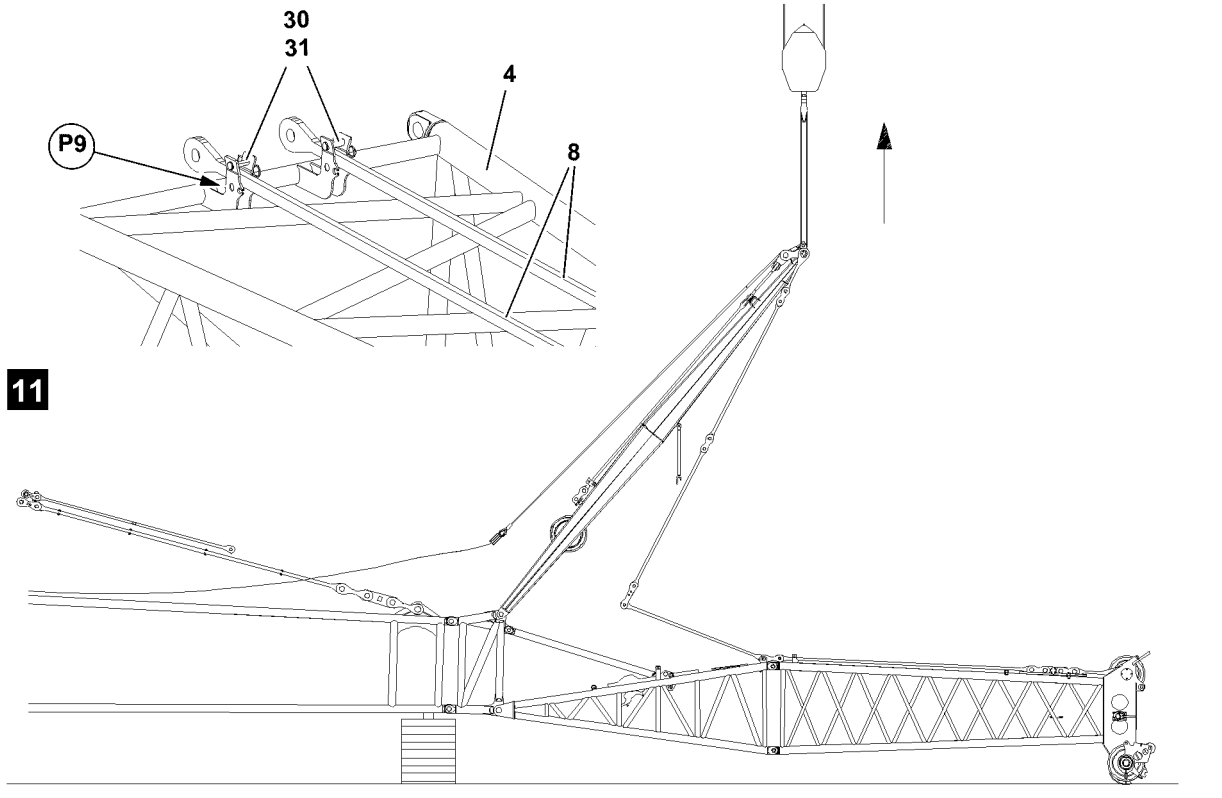

Fig.120178

- ▶ Release the auxiliary rope **16** on the FA-frame in park position.
- ▶ Pin the lock **22** on the auxiliary rope **16** properly.
- ▶ Pull the hoist rope **15** forward to the FA-frame and place the lock **22** at point **P10**.

WARNING
Falling components!
If the components are incompletely pinned and / or secured, then components can fall down.
Personnel can be severely injured or killed.
- ▶ Make sure that all components are completely pinned and secured.

Set the F-relapse retainer **6** to the required length, depending on the required F-auxiliary jib length.

- ▶ Set the F-relapse retainer **6** and plunger **6.1** to the required length: Insert the pin **6.2** and secure with locking pin **6.3**.

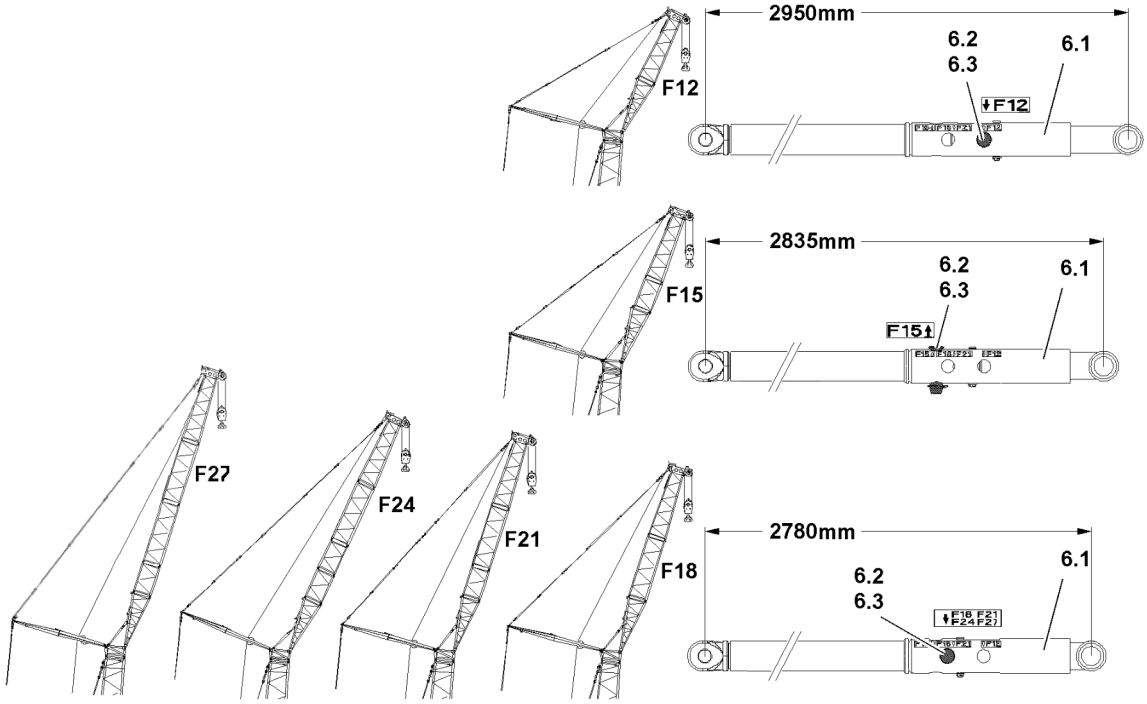

Fig.124671: Adjust the F-relapse retainer to F-auxiliary jib length

Note
- ▶ The setting possibilities of the F-relapse retainer **6** depend on the delivery status of the crane.

NOTICE
Danger of slack rope formation!
- ▶ When erecting the FA-frame, watch for slack rope formation on the hoist winch.

- ▶ Install the airplane warning light properly on the F-end section.
- ▶ Install the wind speed sensor properly on the F-end section.

NOTICE
Damage to the electrical connection on the cable drum!
If the electrical connection of the cable drum to the terminal box is made in incorrect sequence, then the electrical connection can be damaged when spooling the cable drum out.
- ▶ When establishing the electrical connections, pay attention to the sequence.

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Note

▶ To establish the electrical connections on the F-auxiliary jib, see Electric wiring diagram.

▶ Establish the electrical connections.
▶ Make sure that all electrical connections on the boom are established.

WARNING

Danger due to locking pin **26**!
If the locking pins **26** are not removed in time when erecting the FA-frame, then they can be overloaded and be ripped off.
Personnel can be severely injured or killed.
▶ Make sure that the guy rods are not tensioned during the erection procedure of the FA-frame.
▶ Erect the FA-frame carefully and at slow speed.

▶ Lift the FA-frame with the auxiliary crane to approx. 40°, see illustration **11**.

When the FA-frame has reached the 40° position:
▶ Release the locking pin **26** at point **P6** and unpin.
▶ Lift the FA-frame with the auxiliary crane to at least 50°.

When the FA-frame has reached the 50° position:
▶ Pin and secure the F-guy rods of the FA-frame with the F-guy rods of the F-auxiliary jib.

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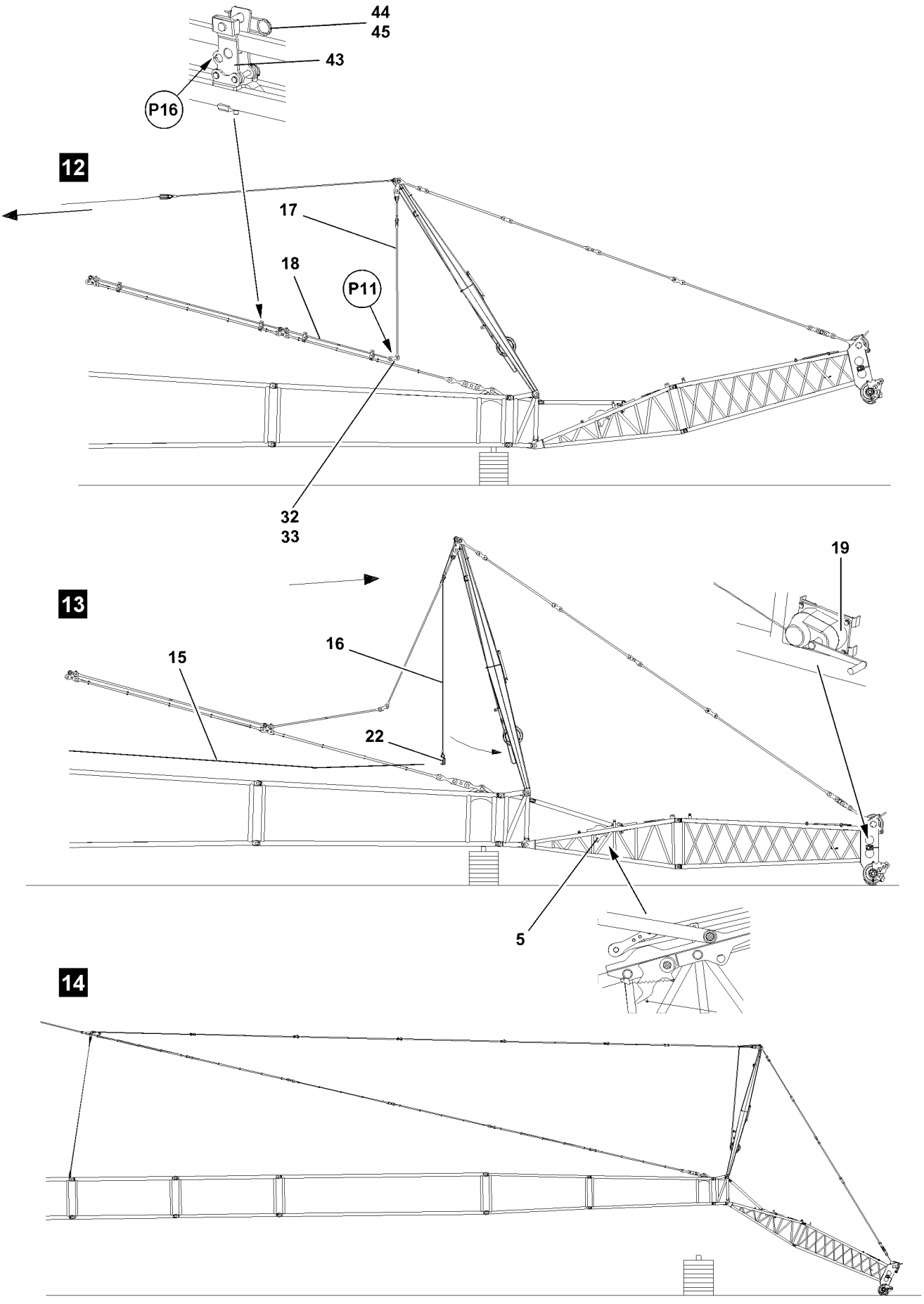

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Fig.120485

Note

▶ The pinning of the FAB-guy rods is identical for all F-auxiliary jib lengths and is described on the example of the F-auxiliary jib 12 m.

When the F-guy rods are properly pinned and secured between the FA-frame and the F-end section:

▶ Spool the hoist winch up until the F-auxiliary jib lifts off the ground, see illustration **12**.

▶ Continue to spool up the hoist winch until the guy rods can be pinned on point **P11**, see illustration **12**.

NOTICE

Danger of property damage!

If the transport retaining pins **44** are not unpinned before connecting the FAB-guy rods, then the transport retaining pins can rip off.

The transport retainers **43** as well as the guy rods can be severely damaged.

▶ Make sure that the pins **44** are unpinned on all transport retainers **43** of the FAB-guy rods.

▶ Remove the spring retainer **45** and unpin the transport retainer pins **44**.

Result:

– The FAB-guy rods are released.

▶ Insert the transport retaining pin **44** in park position, point **16** and secure.

Connect the rods **17** with the F-rods **18** at point **P11**:

▶ Insert the pin **32** and secure with the spring retainer **33**.

▶ Remove the auxiliary crane on the FA-frame.

When the FAB-guying is properly pinned and secured:

▶ Spool the hoist winch out until the F-boom is laying on the ground.

▶ Relieve the hoist winch rope **15** and remove it from the lock **22**.

▶ Unpin the lock **22** on the auxiliary rope **16** and remove.

▶ Affix the auxiliary rope **16** on the FA-frame.

▶ Reeve in the hoist rope, see Reeving plan.

WARNING

Mortal danger due to F-auxiliary jib!

If the flap **5** is not in „up“ position, then the F-auxiliary job can fall backward uncontrolled when erecting the boom system and in crane operation.

Personnel can be severely injured or killed.

▶ Make sure that the flap **5** is in „up“ position immediately before lift off of the F-end section or when erecting the boom.

▶ Make sure that the crank of the manual rope winch **19** has been removed.

▶ Set the flap **5** with the manual rope winch **19** in „up“ position.

Result:

– The mechanical relapse retainer of the F-auxiliary jib is activated.

▶ Remove the crank of the manual rope winch **19** and place it into the tool box.

2.4 Checking the function of the safety equipment

WARNING

Non-functioning safety equipment!

If the function of the safety equipment is defective, personnel can be severely injured or killed.

▶ Crane operation with non-functioning safety equipment is **prohibited**.

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Note
- ▶ The function of the individual limit switches must be checked before erection.
- ▶ The function of the limit switch initiators must be checked in the test system, see Diagnostics manual.

Note
- ▶ If a function check on the limit switches or on the safety equipment does not lead to the desired shut offs, then the plug connections on the connector boxes or the components itself must be checked.
- ▶ If no visible connection errors or component defects can be found, contact Liebherr Service.

Make sure that the following prerequisites are met:
- The electrical connections are established.
- The crane engine is running.
- The corresponding operating mode is set on the LICCON monitor.

2.4.1 Wind speed sensor*

▶ Check the movement and the function of the wind speed sensor.

Result:

– The icon „wind speed“ appears on LICCON monitor, see Crane operating instructions, chapter 4.02.

2.4.2 Airplane warning light*

▶ Turn the airplane warning light on, see Crane operating instructions, chapter 4.01.
▶ Check the function visually.

2.4.3 Hoist limit switch

Note
- ▶ When replacing or changing a hoist limit switch (HES), the corresponding hoist limit switch must have the correct bus address and the correct software version in order to be detected again by the bus system (LSB).

▶ Actuate the hoist limit switch manually on the pulley head.

Result:

– The spool up function of the hoist winch turns off.
– The „Hoist top“ icon appears on the LICCON monitor 0.
– The limit switch is functioning.

2.4.4 Checking the limit switch S-boom „steepest position“

Note
- ▶ The limit switch functions have to be checked individually before erection.

▶ Cover the limit switch initiators on the S-relapse cylinders individually with a metal plate.

Result:

– The limit switch is actuated manually.
– The spool up function of winch 4 (control winch) turns off.
– The „Boom limitation“ icon appears on LICCON monitor 0, see Crane operating instructions, chapter 4.02.
– The limit switch is functioning.

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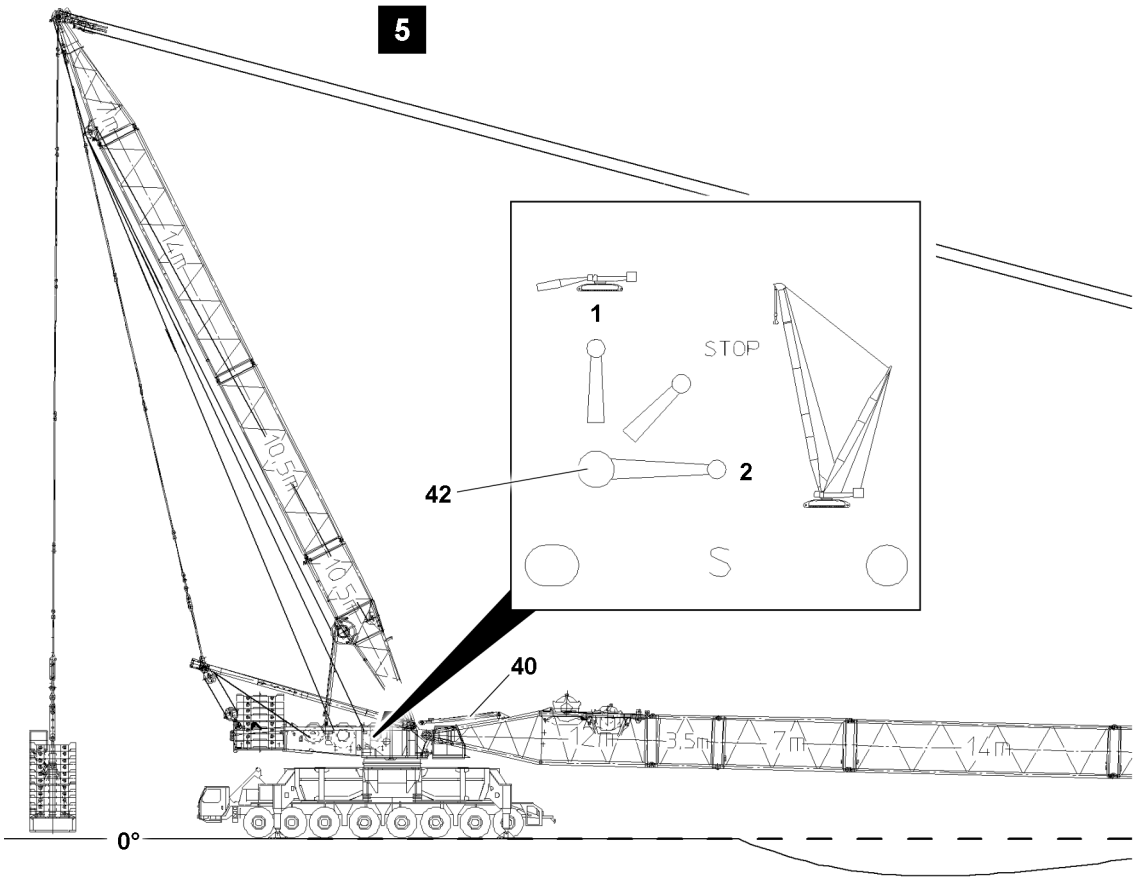

Fig.124672: Ball valve positions

3 Erecting the boom system

WARNING
The crane can topple over!
If the following conditions are not met before erecting the boom, the crane can topple over and fatally injure personnel.
- ▶ It is not permitted to turn the crane during the erection procedure.
- ▶ Observe the technical safety instructions, see Crane operating instructions, chapter 5.01.
- ▶ Observe the specifications in the erection and take down charts.
- ▶ Extend the relapse cylinder before erection.
- ▶ Do not allow slack rope formation on the control winch.
- ▶ The ball valve cabinet must be locked. Always pull the key and hand it to an authorized person.

WARNING
Falling hoist rope!
If the hoist rope before the erection procedure is not properly secured onto the end section, it can fall down backward on the basis of its own weight.
Personnel can be severely injured or killed.
- ▶ Secure the hoist rope properly on the end section before the erection procedure.

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Make sure that the following prerequisites are met:
- The crane is fully supported and horizontally aligned.
- All electrical connections have been established.
- All limit switches are functioning.
- The counterweight has been installed to the turntable according to the load chart.
- All pin connections have been secured.
- The hoist rope has been correctly placed in the rope pulleys and is prevented from jumping out with the rope retaining pins.
- The mechanical relapse retainer (flap **5**) of the F-auxiliary jib is in „up“ position.
- There are no loose parts on the boom.
- The LICCON overload protection has been set according to the data in the load chart.
- The LICCON overload protection settings have been compared with the actual set up configuration.
- The LICCON overload protection is exceeded.
- The assembly icon is visible on the LICCON monitor.

3.1 Moving the S-relapse cylinders out

WARNING
The crane can topple over!
If the S-relapse cylinders are not extended before erecting the SL-boom, then the SL-boom can fall down towards the rear during crane operation and the crane can topple over.
Personnel can be severely injured or killed.
▶ Extend the S-relapse cylinders **40** before erecting the SL-boom.
▶ Secure the ball valve **42** during crane operation to prevent inadvertent actuation.

Ball valve positions	
2	Crane operation, extend the piston rod
1	Assembly, retract the piston rod
STOP	The piston rod cannot be retracted / extended

The piston rods on the S-relapse cylinders **40** can be moved out with the ball valve **42**.

▶ Set the ball valve **42** to **Position 2**.

Result:

– The piston rods of the S-relapse cylinders **40** move out.

Note
▶ The ball valve **42** is secured by closing the cabinet door and removing the key.

▶ Close the cabinet door and pull the key.
▶ Hand the key to an authorized person.

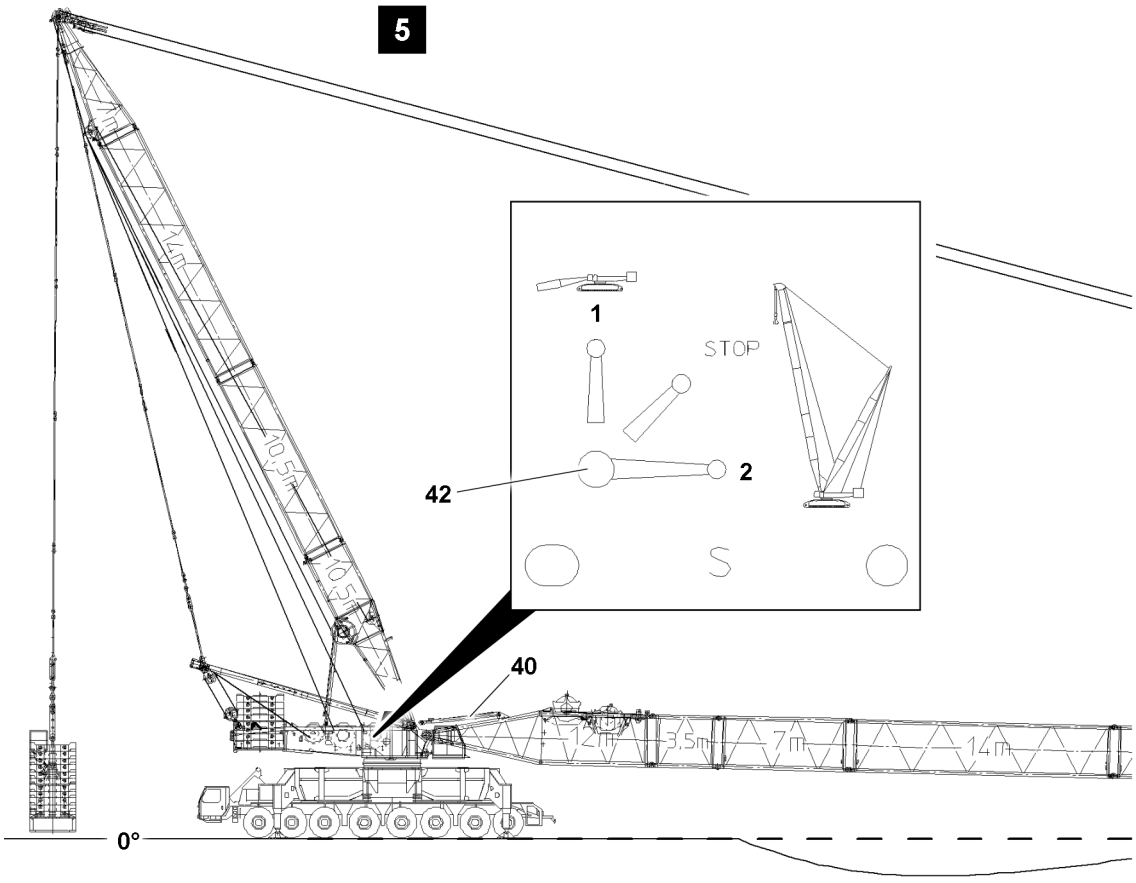

Fig.124672: Ball valve positions

3.2 Erection procedure

DANGER
The crane can topple over!
- ▶ It is prohibited to turn the crane superstructure during the erection procedure.
- ▶ Observe the data in the Erection and take down charts.

Make sure that the following prerequisites are met:
- The required SLD-boom is properly assembled and secured.
- The SLD-boom system is properly supported.
- The S-relapse cylinders are extended.

WARNING
The crane can topple over!
If the specifications in the erection and take down charts are disregarded, the crane can topple over.
Personnel can be severely injured or killed.
- ▶ Observe the Erection and take down charts.

- ▶ Erect the boom until the end section lifts off the ground.

Note
- ▶ Hoist rope reevings, see Crane operating instructions, chapter 4.06 and Reeving plan.

- ▶ Reeve the hook block properly and secure it on the rope fixed point.
- ▶ Attach the hoist limit switch weight.

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DANGER
The crane can topple over!
In crane operation with exceeded LICCON overload protection, the crane can topple over.
Personnel can be severely injured or killed.
▶ The radii listed in the load chart may not be exceeded or fallen below, even if there is no load on the hook.

Note
▶ When the lowest operating position of the boom is reached, the LICCON overload protection is activated.
▶ In the maximum load icon appears a load number in „t“ instead of the display „???“.

▶ Luff the boom up to the lowest operating position.

When the boom has reached the lowest operating position:
▶ Make sure that the assembly icon on the LICCON monitor turns off.

Result:

– The LICCON overload protection is active.

4 Operating the crane

Note
▶ Observe the notes in the chapters, see Crane operating instructions, chapter 4.05, chapter 4.08 and chapter 5.01.

Make sure that the following prerequisites are met:
– The LICCON overload protection is active.
– The LICCON overload protection has been set according to the data in the load chart.

WARNING
The crane can topple over!
▶ Check the horizontal position of the crane before and during operation.
▶ If the crane operator leaves the cab, even for a short time, the operating mode setting must be checked and reset if necessary before resuming crane operation.

4.1 Checking the settings

▶ Check the function of the overload protection by running against the operating positions „on top“ and „bottom“.
▶ Check the hoist limit switch by running against the hoist limit switch weight.
▶ Check the function of the limit switches „Boom steep“ on the relapse cylinders.

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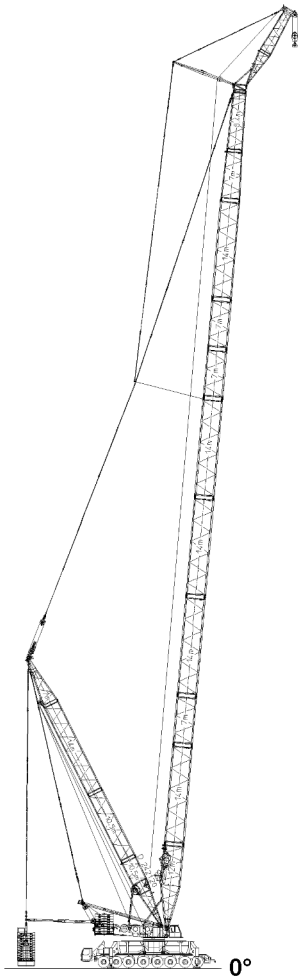

Fig.124673: Crane

5 Placing the boom system down

WARNING
Danger of accident!
If the following instructions are not observed, personnel can be severely injured or killed.
- ▶ The turntable may not be turned during the assembly of the boom.
- ▶ Observe the technical safety instructions, see Crane operating instructions, chapter 5.01.
- ▶ Observe the specifications in the erection and take down charts.

NOTICE
Damage of boom components!
Taking down the boom system can lead to a collision between the hook block and the pulley head.
There is the danger that boom components may be significantly damaged.
- ▶ When taking down the boom system, always spool out the hoist winch at the same time.

Note
- ▶ When placing the boom systems down, pay attention to the following listed possibilities.

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WARNING
The crane can topple over!
If the dangers described in this chapter are not observed, then the crane can topple over.
Personnel can be severely injured or killed.
- ▶ Make sure that the procedures described in this chapter are observed.
- ▶ Improvisations are prohibited.

Place the SLF-boom combinations down:
1. Place the SL9D2FB / SL12D2FB-boom system down in an incline
2. Place the SL9D2FB / SL12D2FB-boom system down

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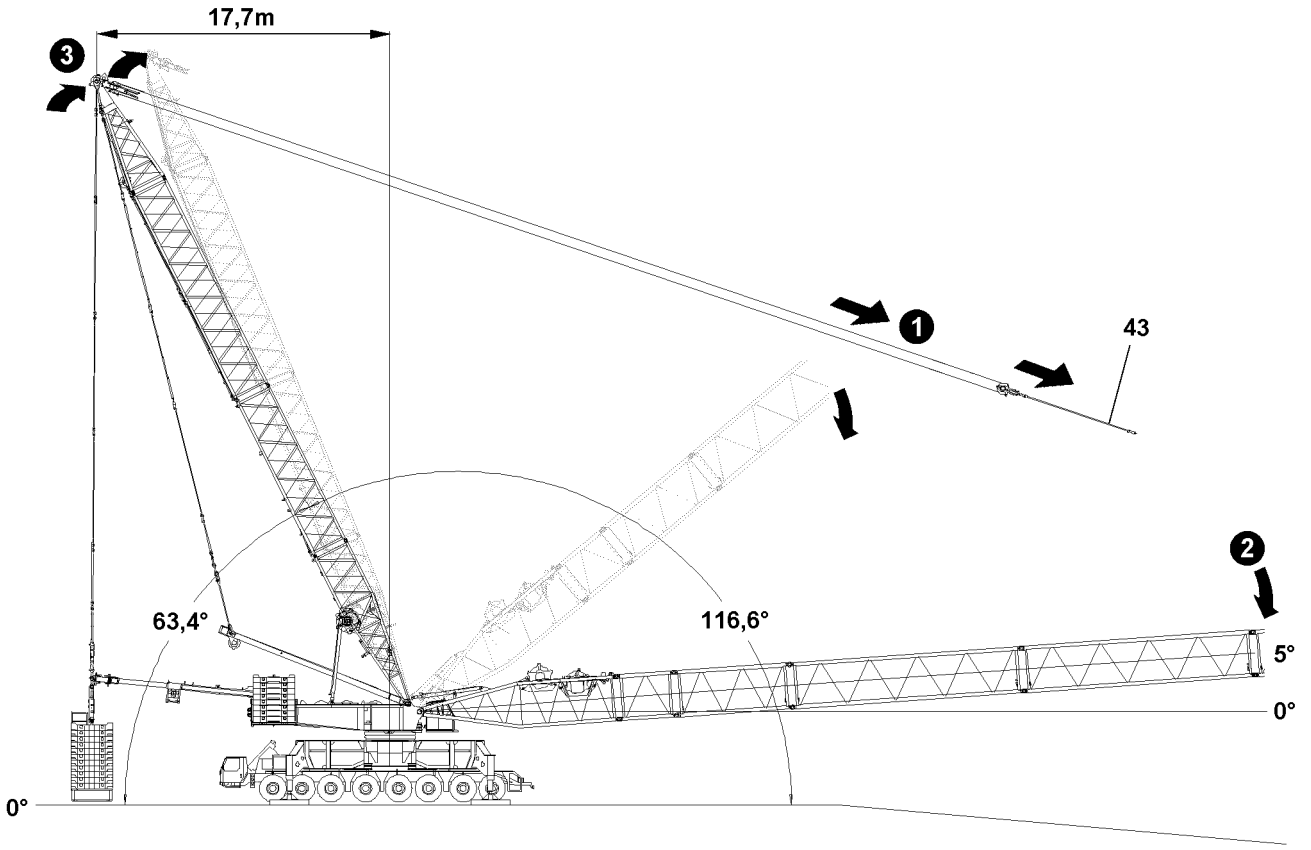

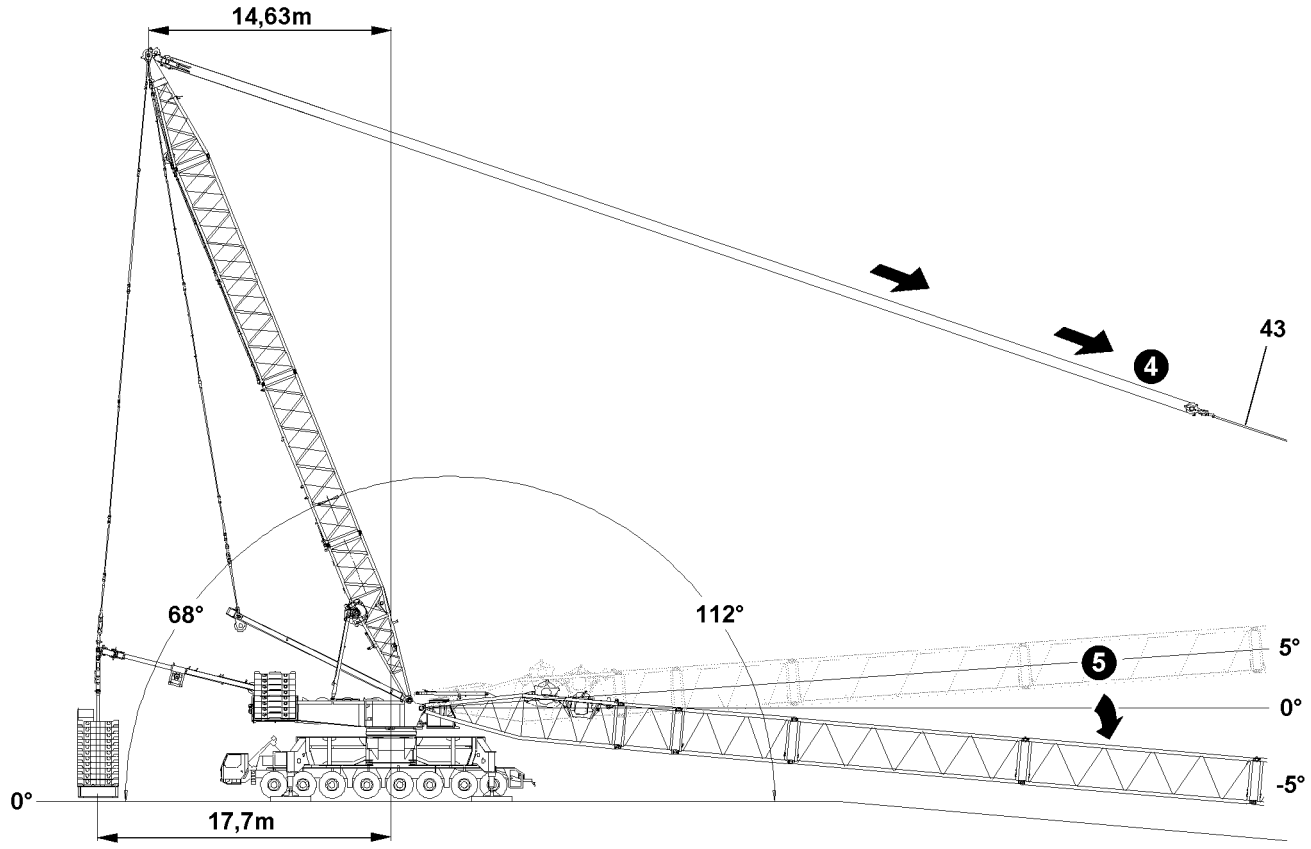

Fig.119779

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5.1 Place the SL9D2FB / SL12D2FB-boom system down in an incline

WARNING
The crane can topple over!
If the crane is not horizontal, then it can be overloaded when erecting the boom system and topple over.
Personnel can be severely injured or killed.
- ▶ Make sure that the placement level of the crane is level and horizontal.
- ▶ Make sure that the crane is completely supported and horizontally aligned.
- ▶ Make sure that the maximum permissible incline of the main boom angle of -5° is not exceeded at boom disassembly.
- ▶ Make sure that the maximum permissible deflection of the respective boom system of 1.5 m is not being exceeded, see the following chart and detail **X**.
- ▶ Make sure that all movements of the crane are actuated slowly and anticipatorily.
- ▶ Support the boom systems with suitable material of sufficient load bearing capacity.

Maximum permissible deflection of boom system		
Boom system	**Length**	**Maximum permissible deflection at X**
SL9D2FB	136.5 m	1.5 m
SL12D2FB	112.0 m to 140.0 m	

Make sure that the following prerequisites are met:
- The D-boom is at 63.4°.
- The substructure on the SLF-boom system are properly made.

▶ Luff the SLF-boom system down to the „lowest“ operating position.

Result:

- The luff down movement is turned off.
- The „STOP“ icon appears on the LICCON monitor.
- The „horn“ icon appears on the LICCON monitor.

WARNING
Overload of crane!
If the boom system is luffed down too far at a D-boom angle of 63.4°, then the crane can be overloaded.
Personnel can be severely injured or killed.
- ▶ Luff the SLF-boom system down to maximum 5°.

▶ Luff the SLF-boom system down to a 5° main boom angle.

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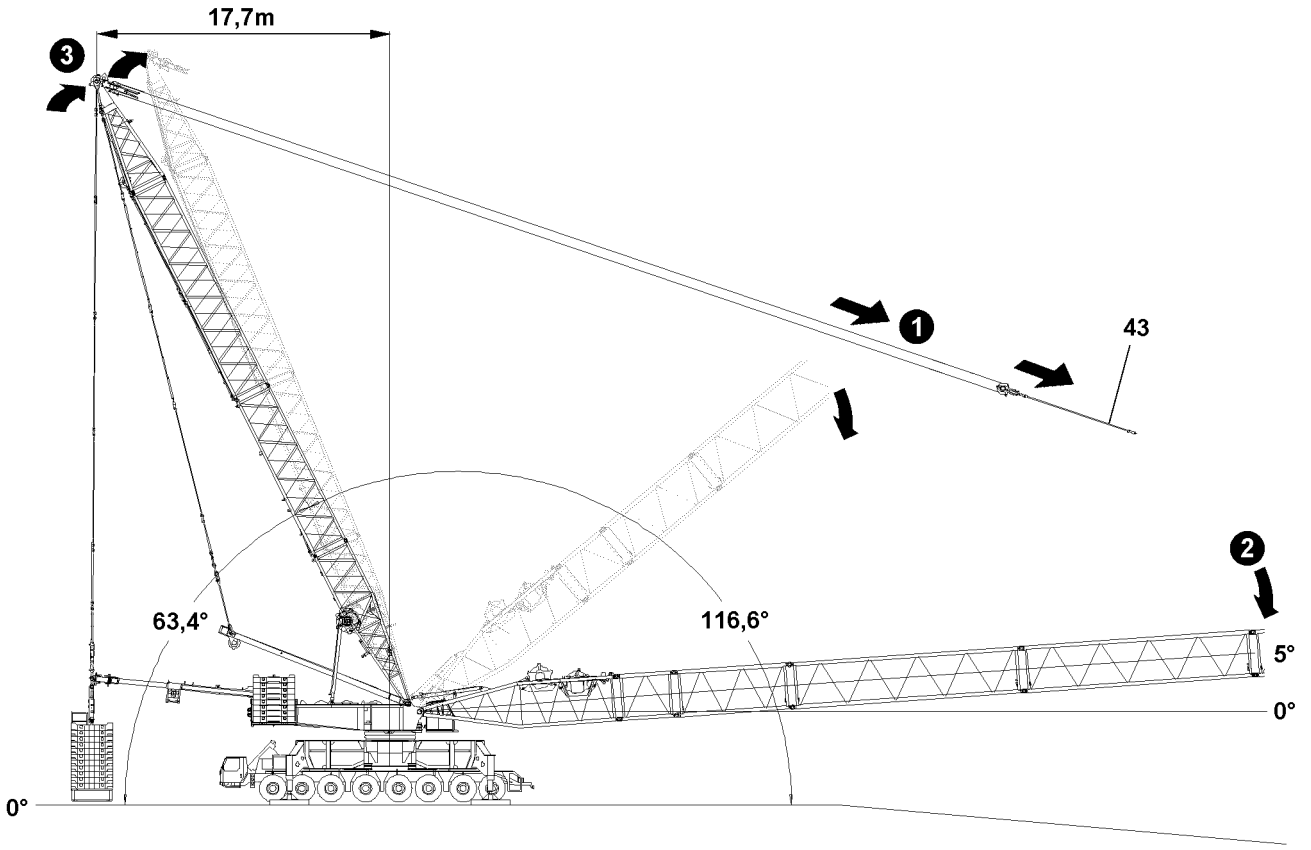

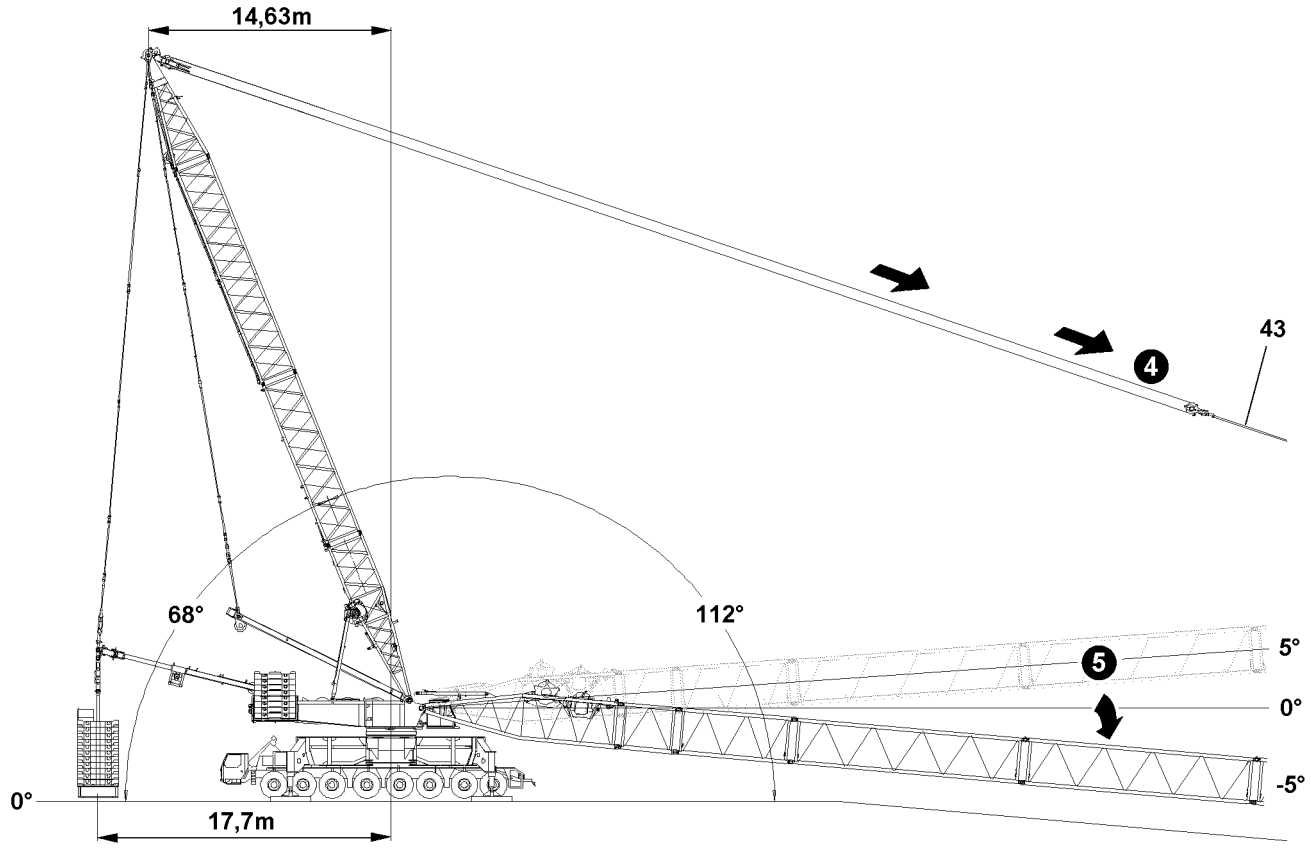

Fig.119779

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WARNING
Danger of accident due to boom!
During the D-boom adjustment, if the SLF-boom system is luffed down at the same time, then dangerous situations can arise.
Personnel can be severely injured or killed.
- ▶ Make sure during the adjustment of the D-boom to 68°, that the SLF-boom system is held to 5°.
- ▶ Make sure that the substructures are properly made, pay attention to the chart with the maximum permissible deflection of the boom systems.

When the SLF-boom system at on a 5° main boom angle:
- ▶ Set the D-boom to 68°.

When the D-boom is at 68°:
- ▶ Place the SLF-boom system down to maximum -5° to the horizontal.

When the boom system is properly placed down:
- ▶ Set the suspended ballast pallet down on the ground.
- ▶ Disassemble the suspended ballast, see Crane operating instructions, chapter 5.36.

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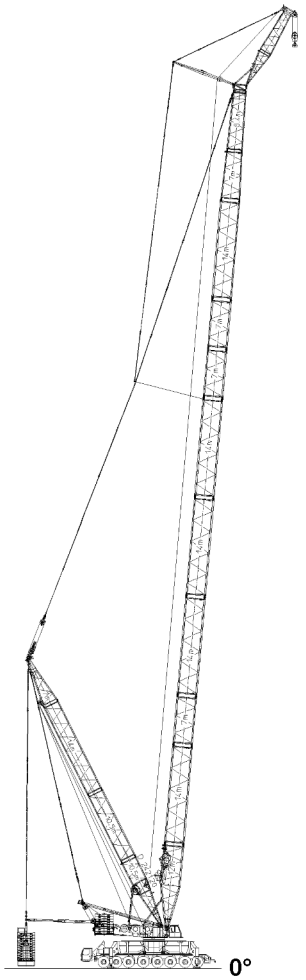

Fig.124673: Crane

5.2 Place the SL9D2FB / SL12D2FB-boom system down

Make sure that the following prerequisites are met:
- The crane is fully supported and horizontally aligned.
- An auxiliary crane is available.
- An assembly scaffolding / work platform is available.
- The counterweight has been installed to the turntable according to the erection chart.
- The LICCON overload protection has been set according to the data in the load chart.

▶ Turn the turntable in longitudinal axle of the crawler travel gear against the travel direction or vertically to the crawler travel gear, see Erection and take down chart.

Note
▶ The luff down movement is turned off as soon as the lowest operating position is reached.
▶ When the lowest operating position of the boom is reached, the load display in the maximum load icon turns off and instead of the load display appears the display „???“.
▶ In the crane operating screen appear alarm functions.

▶ Luff the SLF-boom system down to the „lowest“ operating position.

Result:

- The luff down movement is turned off.
- The „STOP“ icon appears on the LICCON monitor.
- The „horn“ icon appears on the LICCON monitor.

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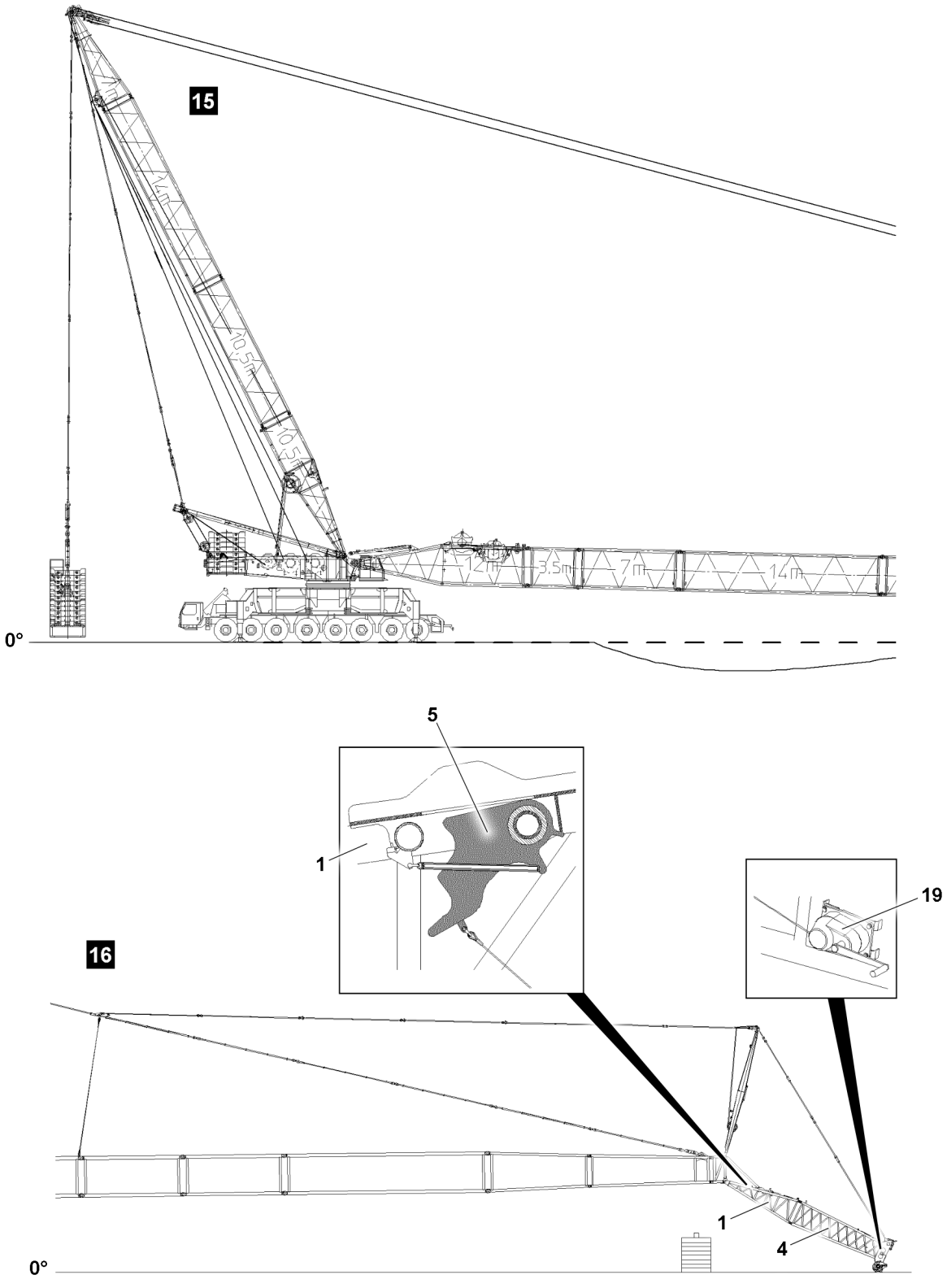

Fig.124674

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WARNING
Danger of accident due to function „Exceedance of shut off limits of the LICCON overload protection“!
If the shut off limits of the LICCON overload protection are exceeded, there is no additional protection against crane overload.
Due to erroneous operation or deliberate misuse, the crane could collapse, the boom can break off or the crane can topple over.
Personnel can be severely injured or killed.

- ▶ The function „Exceedance of shut off limits of the LICCON overload protection“ is only permissible in emergencies and for assembly purposes.
- ▶ The function „Exceeding the shut off limits of the LICCON overload protection“ may only be actuated by persons who know the effects of their actions regarding the function „Exceeding the shut off limits of the LICCON overload protection“.
- ▶ The function „Exceedance of shut off limits of the LICCON overload protection“ requires the presence of an authorized person and must be performed with utmost caution.
- ▶ Crane operation with activated function „Exceedance of shut off limits of the LICCON overload protection“ is prohibited.

When the S-boom has reached the „lowest“ operating position:

- ▶ Exceeding the shut off limits of the LICCON overload protection: Engage assembly operation.

Result:

- – The shut off limits of the LICCON overload protection are exceeded.
- – The assembly icon appears on the LICCON monitor.

Note

- ▶ See Crane operating instructions, chapter 4.02.

- ▶ At the same time, spool the hoist winch out and continue to luff the SLF-boom down until the hook block touches the ground.
- ▶ Remove the hoist limit switch weight and reeve the hook block out.

NOTICE
Danger of property damage on the mechanical relapse retainer!
If the mechanical relapse retainer (flap **5**) of the F-auxiliary jib, when setting down the F-end section **4** on the ground, is in „up“ position, then the mechanical relapse retainer will be damaged.

- ▶ Make sure that the flap **5** is in „down“ position before the F-end section **4** sets down on the ground.

- ▶ Set the flap **5** on the F-pivot section **1** with the manual rope winch **19** into „down“ position.
- ▶ Luff the boom down until the SLF-boom is laying on the substructure.

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6 Disassembly of the F-auxiliary jib

WARNING
Danger of falling!
During assembly and disassembly, assembly personnel must be secured with appropriate aids to prevent them from falling. If this is not observed, assembly personnel could fall and suffer life-threatening or fatal injuries.

- ▶ Any work, where there is a danger of falling, must be carried out with suitable aids (for example: lifting platforms, scaffoldings, ladders, auxiliary crane).
- ▶ If the work cannot be carried out with such aids nor from the ground, then the assembly personnel must secure themselves with approved fall arrest systems to avoid falling, see Crane operating instructions chapter 2.04.
- ▶ If railings are present on the components, then they must be brought into the corresponding position and secured for assembly / disassembly work.
- ▶ Step on aids and fall protection equipment only with clean shoes.
- ▶ Keep aids and fall protection equipment clean and free from snow and ice.
- ▶ Stepping or walking on crane components and lattice sections, which have an incline of more than 20° is prohibited.
- ▶ During all assembly and disassembly work, maintenance work and inspections, travel or crane operation is prohibited.

WARNING
Falling components!
If unsecured or non-supported components are assembled or disassembled, they can fall down.
Personnel can be severely injured or killed.

- ▶ During pinning and unpinning of the lattice sections, it is prohibited for anyone to remain **under** or **on** the components as well as within the entire danger zone.
- ▶ Support the boom and components before pinning / unpinning.
- ▶ Pin or unpin both pins laying in a horizontal, i.e. **left** and **right**.
- ▶ Secure the pins in the storage locations and in the receptacles.
- ▶ Do not disengage the auxiliary crane until the respective component is pinned and secured.
- ▶ It is prohibited to lean a ladder against the component being disassembled.

WARNING
Danger of impact / crushing!
When installing / removing crane components with the auxiliary crane, crane components can start to swing back and forth.
When lifting / lowering and positioning crane components, there is an increased danger of impacts / crushing.
Personnel can be severely injured or killed.

- ▶ Make sure that personnel cannot be caught by components.
- ▶ Make sure that the crane is aligned in horizontal position to avoid the support beams from swinging by themselves.
- ▶ When working in danger zones: Use aids to protect limbs.
- ▶ Guide components with suitable aids to minimize oscillation.

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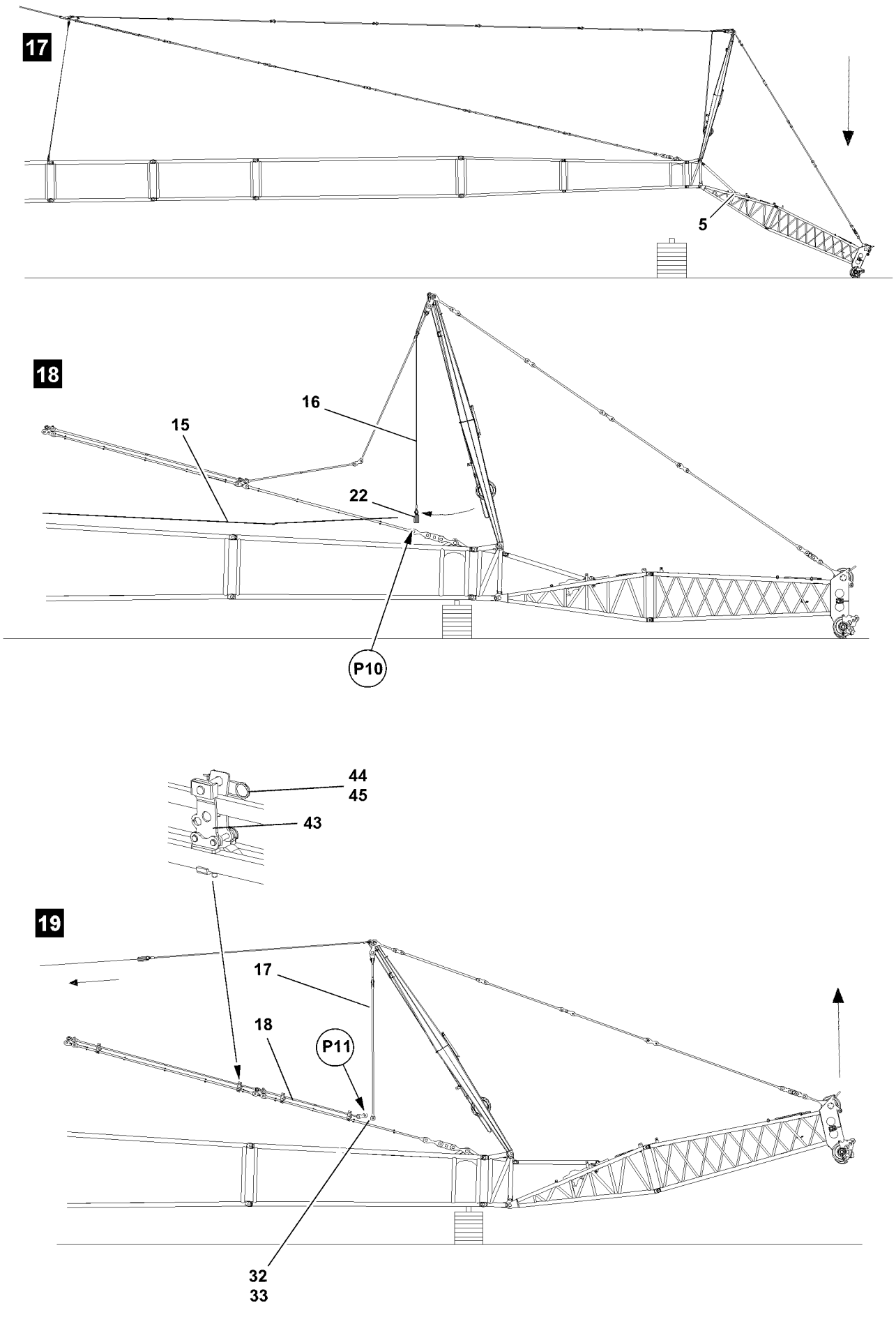

Fig.120177

6.1 Disconnecting the electrical connections on the F-auxiliary jib

Make sure that the following prerequisite is met:
- The SLF-boom has been placed down.

▶ Disconnect the electrical connections.

NOTICE
Damage to cable drum or cable!
If the cable of the cable drum is not properly spooled up on the cable drum after unplugging, then the cable drum or the cable can be significantly damaged.
▶ Make sure that the cable drum is completely spooled up after unplugging.

▶ Spool the cable drum up and secure it to prevent inadvertent spooling out.
▶ Make sure that all electrical connections on the boom have been disconnected.

6.2 Disassembling the F-auxiliary jib

Note
▶ The disassembly of the F-auxiliary jib is described on the example of the 12 m jib.

Make sure that the following prerequisites are met:
- The SLF-boom has been placed down.
- The electrical connections are separated.
- An auxiliary crane is available.
- The flap **5** is in „down“ position.

▶ Release the auxiliary rope **16** on the FA-frame from the park position.
▶ Pin the lock **22** on the auxiliary rope **16**.
▶ Place the hoist winch rope **15** into the lock **22** at point **P10**.
▶ Spool the hoist winch up until the FAB-guying can be unpinned at point **P11**, see illustration **19**.

Separate the guy rods **17** and the guy rods **18** on point **P11**:
▶ Remove the spring retainer **33** and unpin the pin **32**.
▶ Secure the FAB-guy rods properly in the transport retainers **43** with pin **44** and spring retainer **45**.

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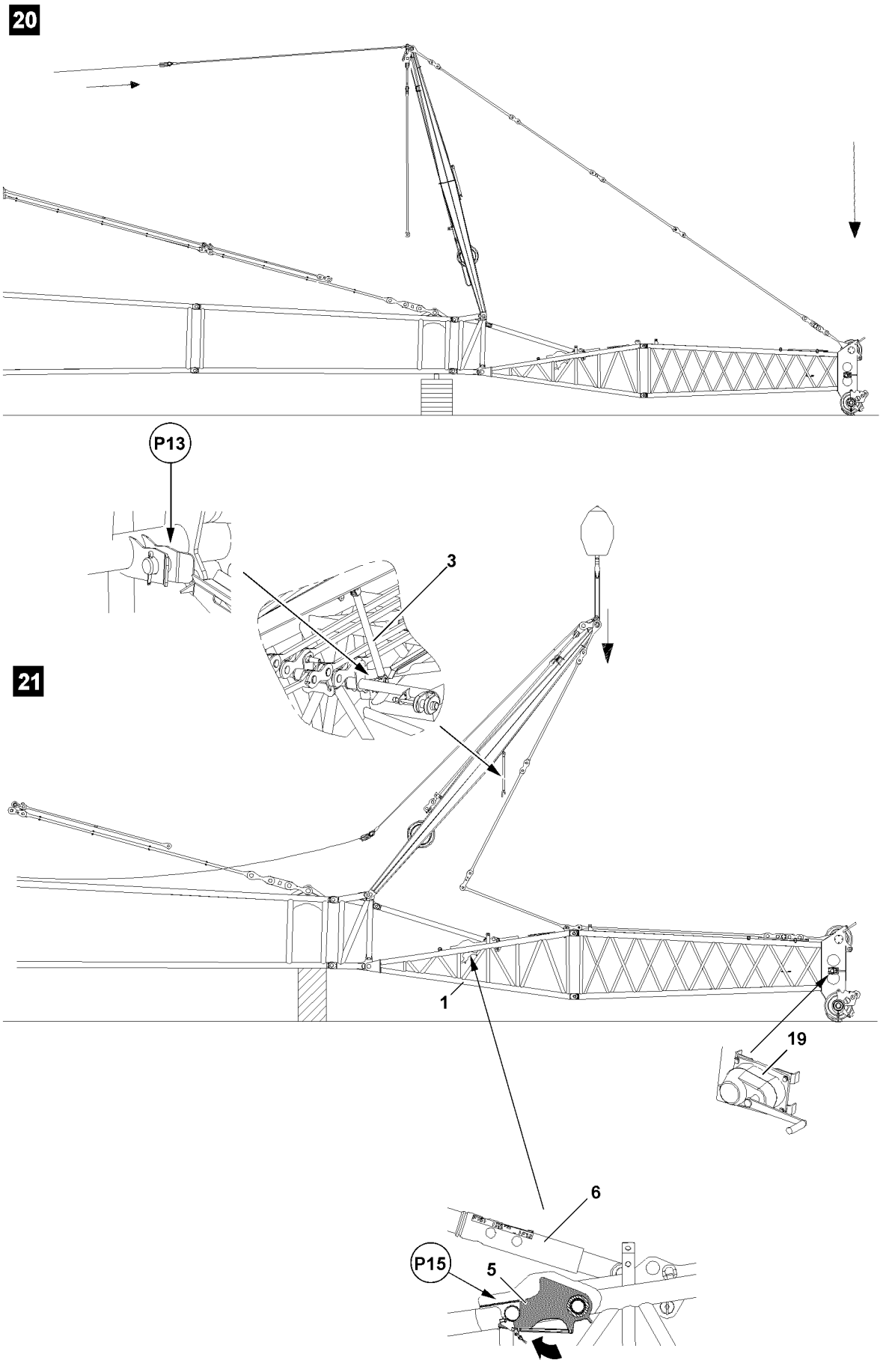

Fig.120180

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When the FAB-guy rods are properly unpinned:

▶ Spool the hoist winch out until the F-end section is laying on the ground, see illustration **20**.

WARNING
FA-frame folding downward!
If FA-frame is not held with the auxiliary crane while placing down, it can fold downward.
Personnel can be severely injured or killed.

▶ Make sure that the FA-frame is fastened properly on the auxiliary crane when placing the F-auxiliary jib down, see illustration **21**.

▶ Fasten the FA-frame on the auxiliary crane.

NOTICE
Danger of slack rope formation!
If the hoist winch is spooled out too quickly during the take down procedure of the FA-frame, slack rope can form.

▶ Make sure that the hoist rope is tensioned during the entire take down procedure.
▶ The spool out speed of the hoist winch must be matched to the take down speed of the FA-frame.

▶ Swing the FA-frame with the auxiliary crane „carefully forward in direction of the F-boom“ while spooling the hoist winch out at the same time, see illustration **21**.
▶ Lower the FA-frame with the auxiliary crane onto the support **3** at point **P13**.

NOTICE
Danger of property damage!
If the flap **5** is in „up“ position and the F-relapse retainer **6** is at point **P15**, then the F-relapse retainer **6** can be severely damaged at disassembly of the FAB-guying.

▶ Make sure that the F-relapse retainer **6** is standing to the right of the flap **5** at disassembly of the FAB-guying, see illustration **21**.

When the FA-frame is lowered on the support **3** and the F-relapse retainer **6** is standing on the right of flap **5**:

▶ Set the flap **5** with the manual rope winch **19** in „up“ position.
▶ Remove the crank of the manual rope winch **19** and place it into the tool box.
▶ Disconnect the rope strand from the flap **5** to the manual rope winch **19** on the respective lattice section.

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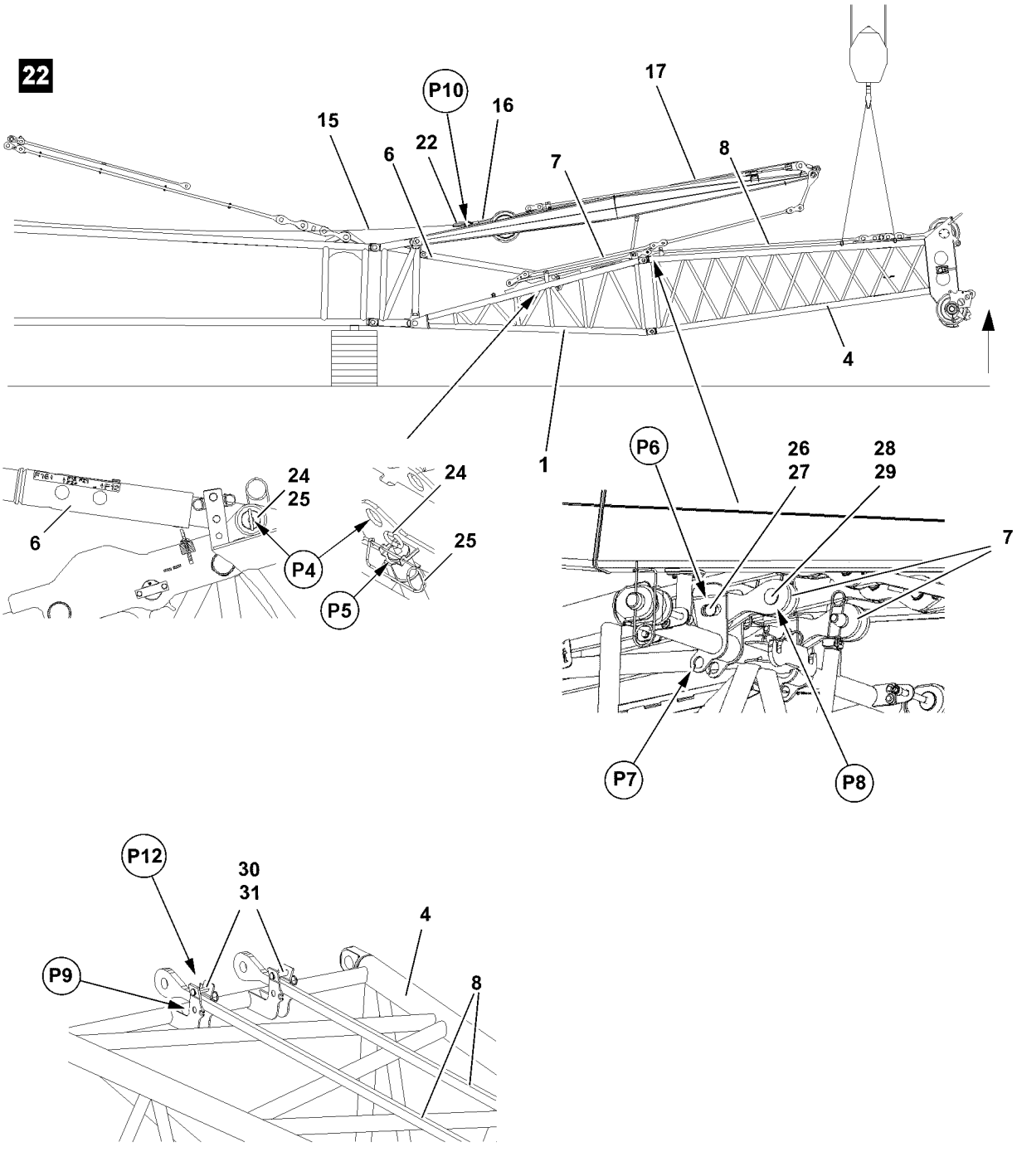

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Fig.120179

- ▶ For F-auxiliary jib lengths of more than 12 m: Fasten the F-end section **4** on the auxiliary crane and remove it properly.
- ▶ Fasten the section jib on the auxiliary crane and lift.
  or
  For F-auxiliary jib lengths of 12 m: Fasten the F-end section **4** on the auxiliary crane and lift, see illustration **22**.
- ▶ Unpin the pin **24** of the FA-frame relapse retainer **6** from park position, point **P5**.

WARNING
Falling components!
If the components are incompletely pinned or secured, then components can fall down.
Personnel can be severely injured or killed.
- ▶ Make sure that all components are completely pinned and secured.

WARNING
Overload of F-relapse retainer!
If the F-intermediate sections are not held by the auxiliary crane after pinning the F-relapse retainer **6** on the F-pivot section **1**, then the F-relapse retainer **6** can be overloaded and damaged.
Personnel can be severely injured or killed.
- ▶ Make sure that the F-intermediate sections (section jib of F-intermediate sections) on the F-pivot section **1** are held by an auxiliary crane as soon as the F-relapse retainer **6** is pinned on the F-pivot section **1**.
- ▶ Fasten the F-auxiliary job for lifting with the auxiliary crane in such a way that the F-intermediate sections can be disassembled and lifted out directly with the auxiliary crane without having to change then over.

- ▶ Insert the pin **24** of the FA-frame relapse retainer **6** on point **P4** and secure with spring retainer **25**.

Result:

– The F-assembly unit is secured in transport position.

- ▶ Unpin the F-intermediate sections on the F-pivot section **1** and swing out with the auxiliary crane.
- ▶ Set the F-intermediate sections on the ground with the auxiliary crane.
- ▶ Relieve the hoist winch rope **15** and remove it from the lock **22**.
- ▶ Unpin the lock **22** on the auxiliary rope **16** and remove.
- ▶ Affix the auxiliary rope **16** on the FA-frame in park position.
- ▶ Secure the FA-frame rods **17** on the FA-frame.

Disconnect the FA-frame rods **7** from the F-head rods **8**:
- ▶ Release the spring retainers **29** and unpin the pin **28** at point **P8**.
- ▶ Release and unpin the locking pin **26** of the FA-frame rods **7** at point **P7**.
- ▶ Insert the locking pin **26** on point **P6** and secure with spring retainer **27**.
- ▶ Release and unpin the locking pin **30** of the FA-end section rods **8** from park position, point **P9**.
- ▶ Insert the locking pin **30** on point **P12** and secure with spring retainer **31**.

Result:

– The guy rods are secured in the receptacle.

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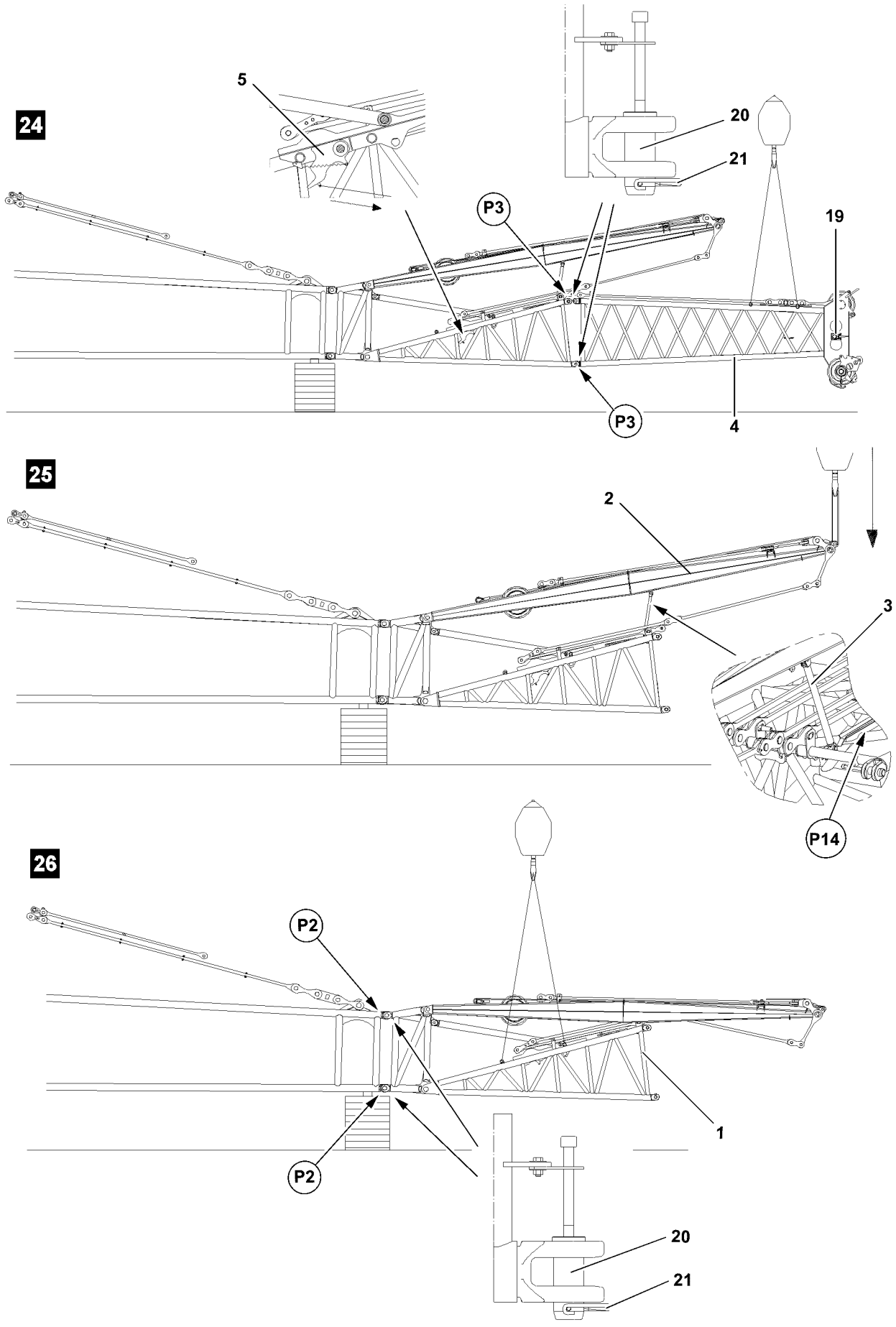

Fig.111592

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WARNING
Danger of accident at disassembly of the F-auxiliary jib!
- ▶ Make sure that the F-end section **4** or the F-intermediate sections are safely held by the auxiliary crane before unpinning on the F-pivot section.

- ▶ Release the spring retainers **21** and unpin the pin **20** at point **P3**.
- ▶ Remove the F-end section **4** with the auxiliary crane from the F-assembly unit and place it down.
  or
  Remove the F-intermediate sections with the auxiliary crane from the F-assembly unit and place down.
- ▶ Lift the FA-frame with the auxiliary crane, position the support **3** over the placement sheeting, point **14**, see illustration **25**.
- ▶ Place the FA-frame **2** completely down on the assembly unit.
- ▶ Fasten the auxiliary crane on the F-assembly unit.
- ▶ Release the spring retainers **21** and unpin the pin **20** at point **P2**.
- ▶ Remove the F-assembly unit with the auxiliary crane from the SL-boom and place it down.

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5.13.20 SLF boom combination- fiber guy ropes

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Fig.195219

1 Component overview

Note
▶ The assembly sections are marked with their own weight.

Note
▶ Dimensions and weights, see chapter 1.03.

1.1 F-pivot section

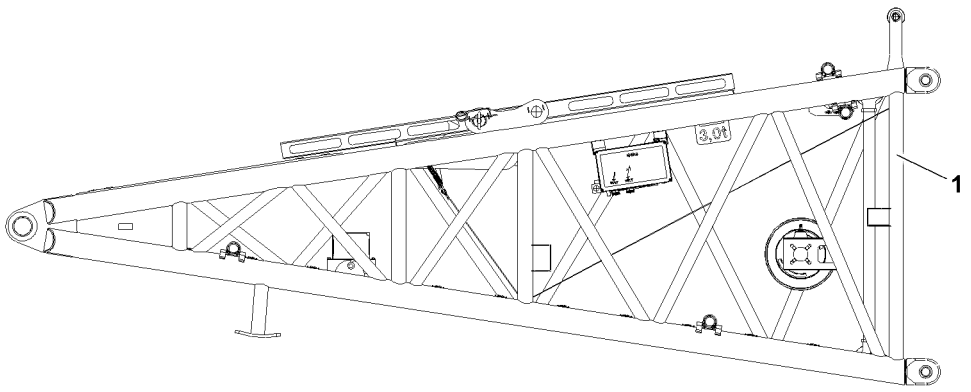

Fig.144383: F-pivot section

Position	Component
1	F-pivot section

1.2 F-intermediate section 6 m

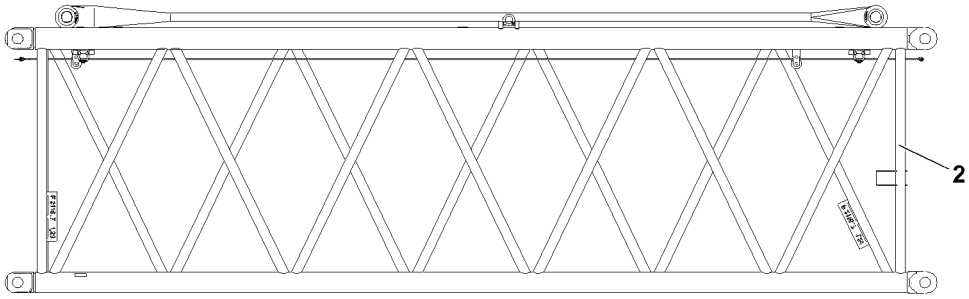

Fig.144384: F-intermediate section 6 m

Position	Component
2	F-intermediate section 6 m

1.3 F-end section 6 m

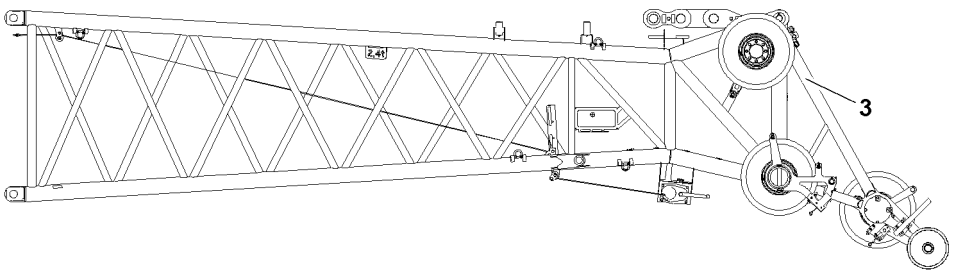

Fig.144385: F-end section 6 m

Position	Component
3	F-end section 6 m

1.4 F-end section 13 m

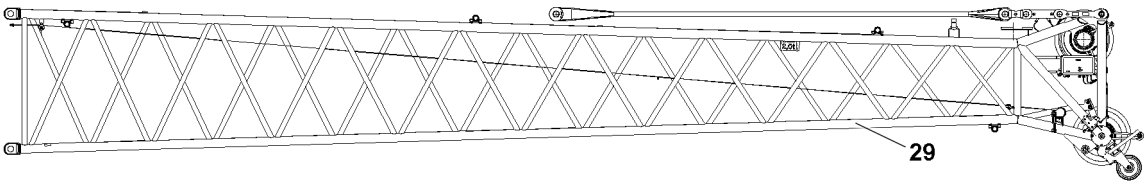

Fig.147790: F-end section 13 m

Position	Component
29	F-end section 13 m

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1.5 F-assembly unit

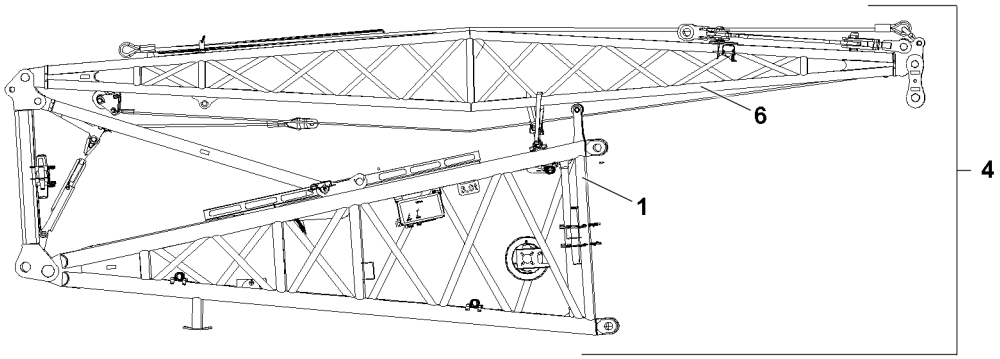

Fig.144386: F-assembly unit

Position	Component
1	F-pivot section
4	F-assembly unit
6	FA-frame

2 Fastening points for the F-jib

WARNING
Falling lattice sections!
Death, severe bodily injuries, property damage.
- ▶ Make sure that the lattice sections are properly fastened on the respective fastening points.
- ▶ Make sure that the fastening equipment has the appropriate length and a sufficient load bearing capacity.
- ▶ Pay attention and adhere to the labels on the fastening points on the lattice sections and crane components.

Note
- ▶ The recommended length for the fastening equipment is 6 m.

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2.1 F-pivot section

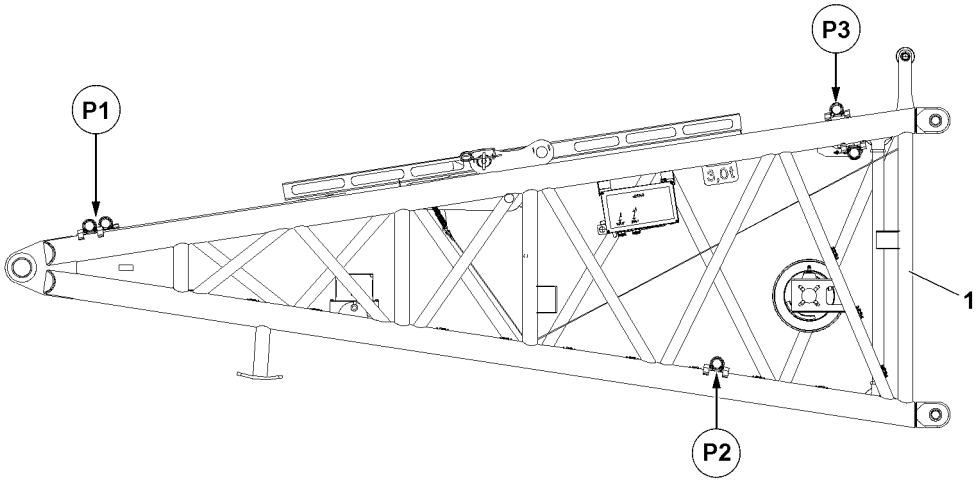

Fig.144387: F-pivot section

Fastening points	
P1 and **P2**	F-pivot section
P3	„Close“ or „open“ the F-jib

2.2 F-intermediate section 6 m

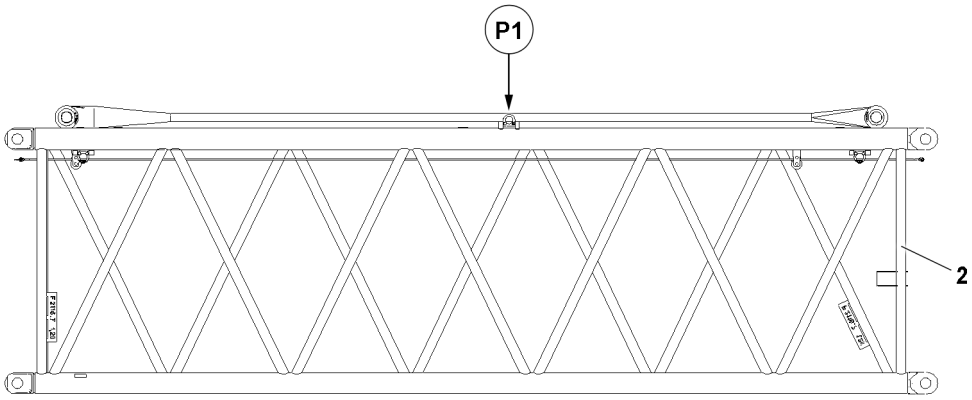

Fig.144388: F-intermediate section 6 m

Fastening points	
P1	F-intermediate section 6 m

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2.3 F-end section 6 m

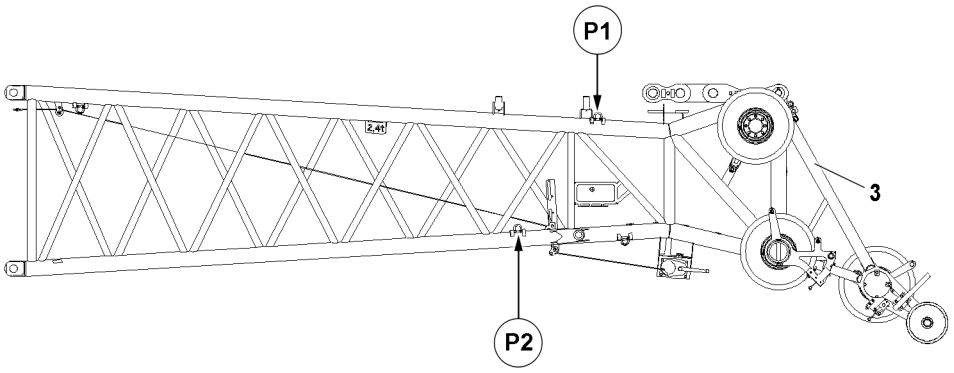

Fig.144389: F-end section 6 m

Fastening points	
P1	F-end section 6 m
P2	F-jib

2.4 F-end section 13 m

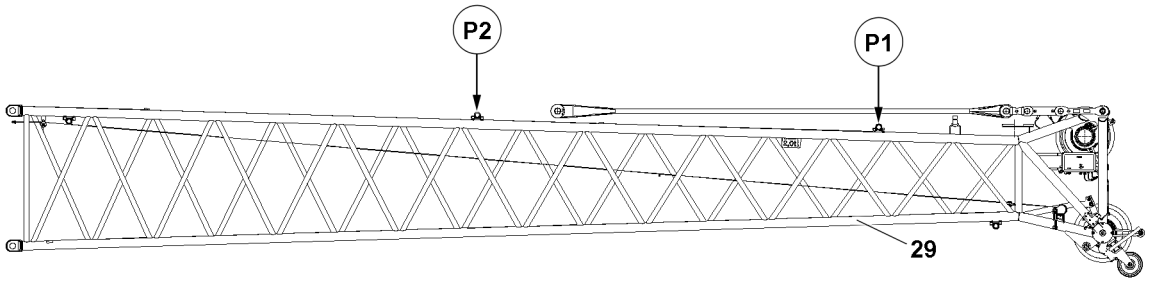

Fig.147791: F-end section 13 m

Fastening points	
P1 and P2	F-end section 13 m

2.5 F-assembly unit

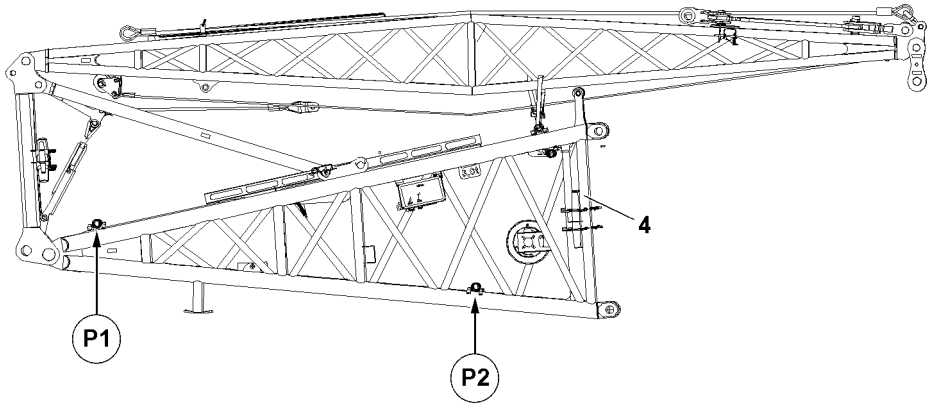

Fig.144390: F-assembly unit

Fastening points	
P1 and **P2**	F-assembly unit

2.6 F-jib

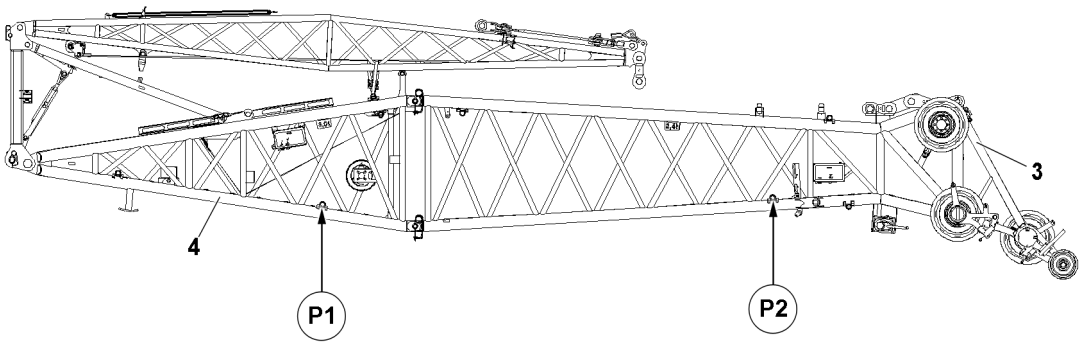

Fig.144391: F-assembly unit with F-end section

Fastening points	
P1 and **P2**	F-jib

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3 Assembling the F-jib

WARNING
Danger of falling!
During assembly / disassembly, inspection and maintenance work, personnel must be secured with appropriate aids to prevent them from falling.
Death, severe bodily injuries, property damage.
- ▶ All work at a height, when there is a danger of falling, must be carried out with suitable aids.
- ▶ If aids are not available and work cannot be carried out from the ground, then assembly personnel must secure themselves with the supplied fall arrest system to prevent falling, see chapter 2.04.
- ▶ If fall protection equipment is available, then it must be used, see chapter 2.06.
- ▶ When lifting, lowering, swinging crane parts in and out, no persons may remain in the danger zone.
- ▶ If railings are present on the components, then they must be brought into the corresponding position and secured for assembly / disassembly work.
- ▶ It is prohibited to lean the ladder against the component being disassembled.
- ▶ Only step on the aids, ladders and catwalks with clean shoes.
- ▶ Keep aids, ladders and catwalks free of heavy dirt, snow and ice.
- ▶ During all assembly and disassembly work, maintenance work and inspections, travel or crane operation is prohibited.
- ▶ Remaining on a suspended load is prohibited.
- ▶ Stepping or walking on crane components and lattice sections, which have an incline of more than 20° is prohibited.
- ▶ For all assembly work, the crane operator of the main crane must be in voice contact with the crane operator / crane operators of the auxiliary crane / auxiliary cranes.
- ▶ For assembly / disassembly tasks, the crane operator may only initiate crane movements when the responsible guide has explicitly released the movement.

WARNING
Danger of impact / crushing!
When installing / removing crane components with the auxiliary crane, crane components can start to swing back and forth.
When lifting / lowering and positioning crane components, there is an increased danger of impacts / crushing.
Death, severe bodily injuries, property damage.
- ▶ Make sure that personnel cannot be caught by components.
- ▶ When working in danger zones: Use aids to protect limbs.
- ▶ Guide components with suitable aids to minimize oscillation.
- ▶ Do not reach with your hands into the danger zone!

DANGER
The components can fall down!
If the corresponding component is disengaged from the auxiliary crane before the corresponding component is pinned, then the corresponding component can fall down.
Death, severe bodily injuries, property damage.
- ▶ Do not disengage the auxiliary crane until the respective component is pinned and secured.

WARNING
The lattice sections can fall down!
If the lattice sections are not pinned and secured correctly, then they can fall down.
Death, severe bodily injuries, property damage.
- ▶ Insert or unpin both pins at the same horizontal level, i.e. **left and right**.
- ▶ Do not stand under the lattice sections or within the entire danger zone during the pinning and unpinning procedure of the boom.
- ▶ Safely secure the pins in the storage locations as well as in the receptacles.

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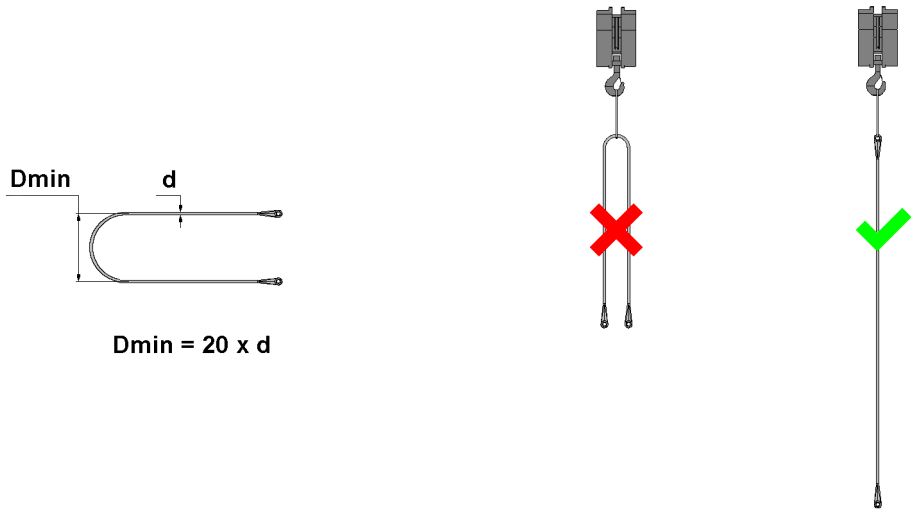

Fig.144404: Attaching the fiber guy ropes

WARNING
The fiber guy ropes can rip off!
If the fiber guy ropes are installed twisted in longitudinal axis, then the load bearing capacity can be significantly reduced as a result and the fiber guy ropes can rip off.
Death, severe bodily injuries, property damage.

- ▶ Make sure that the fiber guy ropes are **never** kinked, knotted or twisted.
- ▶ Make sure the kinked, knotted or twisted fiber guy ropes are **never** installed.
- ▶ Make sure that the fiber guy ropes are never pulled over the ground or sharp edges.
- ▶ Make sure that no damaged fiber guy ropes are installed.
- ▶ Make sure that the numbering in the rod plan is identical to the numbering on the fiber guy ropes.
- ▶ Make sure that minimum bending diameter of **20** x rope diameter on the fiber guy ropes is **never** fallen below.
- ▶ Check the fiber guy ropes before every assembly.
- ▶ When using fiber guy ropes: Inspect the fiber guy ropes regularly, see chapter 8.16.
- ▶ Make sure that the fiber guy ropes are not twisted at assembly. Pay attention to the twist display - marker line along the longitudinal axis of the rope braid.

WARNING
Damage to the fiber guy ropes during storage and transport!
If the following prerequisites for storage and transport are not observed, then the load bearing capacity can be significantly reduced and the fiber guy ropes can rip off.
Death, severe bodily injuries, property damage.

- ▶ Make sure that minimum bending diameter during storage and transport of **20** x rope diameter on the fiber guy ropes is **never** fallen below.
- ▶ Make sure that the fiber guy ropes are **not** kicked or knotted during storage and transport.
- ▶ Make sure that the fiber guy ropes are **not** twisted during storage and transport. Pay attention to the twist display - marker line along the longitudinal axis of the rope braid.
- ▶ Make sure that the fiber guy ropes do **not** lie over sharp edges during storage and transport.
- ▶ Make sure that the fiber guy ropes are **not** in contact with chemicals or acids during storage and transport.
- ▶ Make sure that the fiber guy ropes are **not** stored or transported together with other components.
- ▶ Store and transport the fiber guy ropes in a closed wooden crate.

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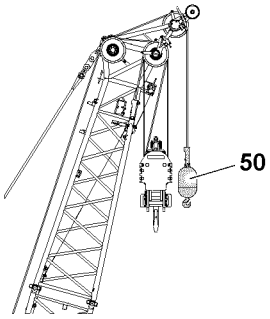

Fig.144411: Using the load hook on the boom nose

NOTICE
Danger of property damage!
If this danger note is not observed, this can lead to a danger of collision and damage to the boom nose.
▶ Make sure that the load hook **50** may only be attached to the integrated boom nose, see illustration.

WARNING
Failure to observe the danger note!
If the danger note is not observed, dangerous situations can arise.
Death, severe bodily injuries, property damage.
▶ Make sure that during assembly, no hook block may be suspended on the F-jib.

Note
▶ The F-jib is **not** adjustable during crane operation.
▶ This crane can be equipped with an F-jib. The F-jib can be assembled at an angle of 12°, 18° to the SL-boom.
▶ The assembly and disassembly of the F-jibs is described using the example of only one length.
▶ Observe and adhere to the Rod plan.

Make sure that the following prerequisites are met:
– The crane is completely supported and horizontally aligned.
– The derrick boom is installed in the required length on the crane, see chapter 5.05.
– The SL-boom combination is installed in the required length on the crane and placed on the ground or on the substructure.
– All WA-frame guy rods have been removed on the SL-boom combination.
– The suspended ballast pallet is near the crane.
– The suspended ballast pallet is aligned with the center of rotation of the crane.
– The suspended ballast is placed on the suspended ballast pallet according to the erection and take-down chart.
– The LICCON overload protection has been set according to the data in the load chart.
– The LICCON overload protection settings match the actual set up configuration of the crane.
– The LICCON overload protection is exceeded.
– The assembly icon is visible on the LICCON monitor.
– All unnecessary function keys and manual control levers are blocked on the radio remote control, see chapter 5.31 and chapter 6.08.
– An auxiliary crane is available.

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3.1 Assembling the F-jib — assembly variants

WARNING
Maximum permissible assembly lengths!
If the maximum permissible assembly lengths are not complied with when assembling the F-jib, then dangerous situations can arise.
Death, severe bodily injuries, property damage.
▶ Make sure that the maximum permissible assembly lengths are adhered to.

WARNING
Non-compliance with the assembly descriptions!
Death, severe bodily injuries, property damage.
▶ The F-jib must always be assembled in accordance with the respective description in the respective section.
▶ Make sure that the danger notes in the respective assembly description are observed.

3.1.1 Assembly variant V1

Assembling the F-jib in parts
– For assembly variant V1, the F-jib is assembled in individual parts.

3.1.2 Assembly variant V2

Assemble the complete F-jib (maximum length of 12 m) on the ground
– For assembly variant V2, assembly takes place using a hoist rope.

3.1.3 Assembly variant V3

Assemble the complete F-jib (maximum length of 12 m) in flying mode
– For assembly variant V3, flying assembly takes place using the assembly winch rope.

3.1.4 Assembly variant V4

Assemble the complete F-jib (maximum length of 12 m) in flying mode
– For assembly variant V4, flying assembly takes place using a hoist rope.

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3.2 Assembly variant V1 — Assembling the F-jib in parts

3.2.1 Assembling the F-assembly unit

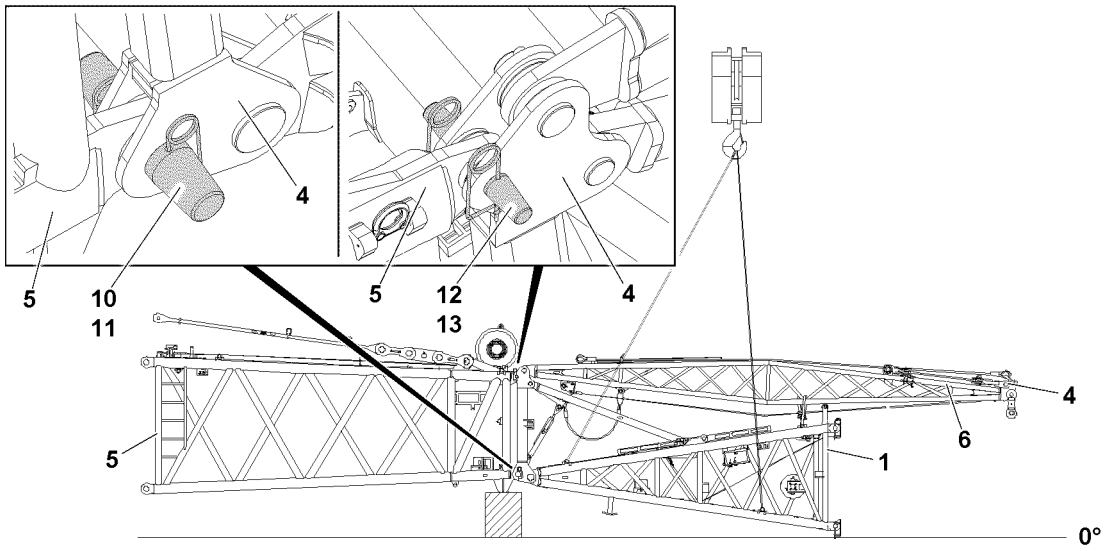

Fig.144392: Pin the F-assembly unit

- ▶ Fasten the F-assembly unit **4** to the auxiliary crane.
- ▶ Remove the rigging belts between the F-pivot section **1** and FA-frame **6**.

The F-assembly unit **4** is pinned four times on F-connector head **5**. Every pin point is present on both sides of the component on one level.

- ▶ Position the F-assembly unit **4** with the auxiliary crane on the F-connector head **5** so that it can be pinned in the pin locations.
- ▶ Insert the pins **12** on both sides and secure with the retaining element **13**.

WARNING
Crushing / shearing of limbs!
While performing boom system assembly tasks, limbs can be crushed and / or sheared off.
Death, severe bodily injuries, property damage.
- ▶ Make sure that no crane movements are performed while pinning in the area of the lower pin points.

- ▶ Insert the pins **10** on both sides and secure with the retaining element **11**.

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3.2.2 Releasing the F-relapse support

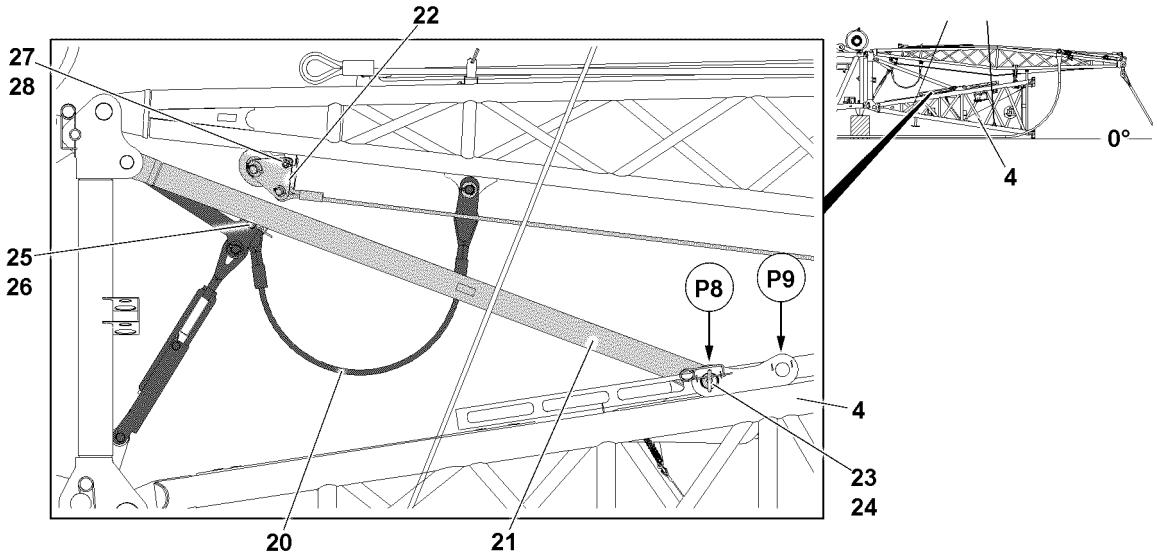

Fig.144393: F-relapse support and FA-frame relapse retainers in the transport position

Release the F-relapse support **21** from the transport position:

- ▶ Remove the retaining element **24** at point **P8** and unpin the pin **23**.
- ▶ Insert pin **23** in the stop position at point **P9** and secure with retaining element **24**.

3.2.3 Separating the FA-frame relapse retainers

WARNING
Falling and swinging FA-frame relapse retainer!
The FA-frame relapse retainer consists of a guy rope **20** and a turnbuckle.
The guy rope **20** of the FA-frame relapse retainer can fall down due to its own weight during unpinning.
Death, severe bodily injuries, property damage.
- ▶ Make sure when unpinning the FA-frame relapse retainer, that the guy rope **20** is safely held.
- ▶ Assembly personnel must be at the side of the assembly unit.

NOTICE
Danger of property damage!
If the FA-frame relapse retainer is not separated, then it will be damaged during erection of the FA-frame.
- ▶ Make sure that the FA-frame relapse retainer is separated during the erection of the FA-frame.

Separate the FA-frame relapse retainer:

- ▶ Remove the retaining element **26** and unpin the pin **25**.
- ▶ Take the guy rope **20** down.
- ▶ Insert the pin **25** again and secure with the retaining element **26**.

When the FA-frame relapse retainer is separated and the F-relapse support is released:
- ▶ Slowly lower the F-assembly unit.
- ▶ Remove the auxiliary crane.

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3.2.4 Preparing the rope pulley retainer for the assembly of the F-jib

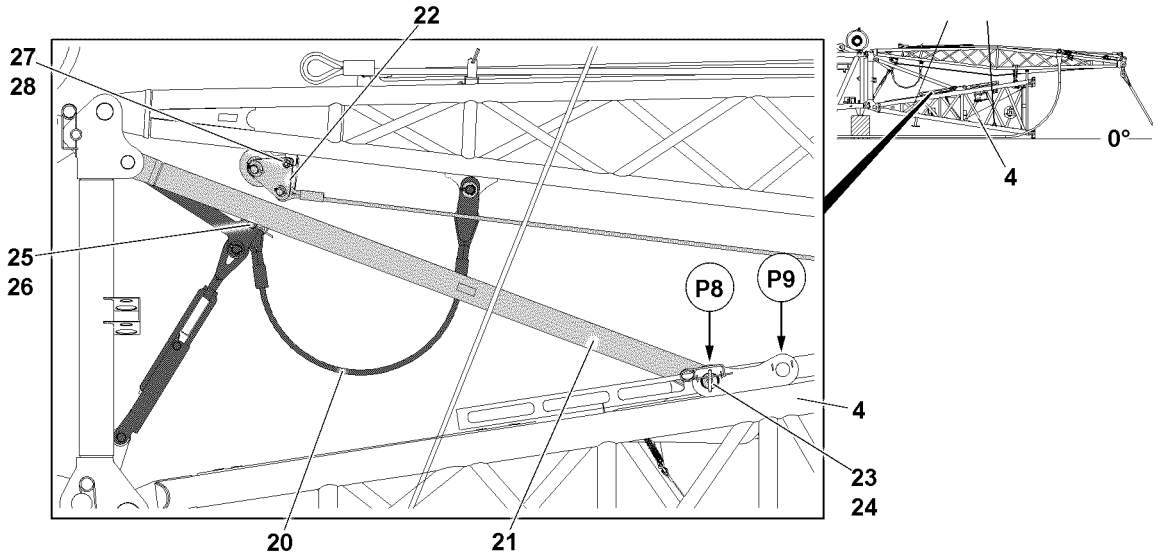

Fig.144393: Rope pulley retainer in the transport position

WARNING
Falling rope pulley retainer!
The rope pulley retainer **22** can fall down due to its own weight when unpinning it.
Death, severe bodily injuries, property damage.
- ▶ Make sure that the rope pulley retainer **22** is held during unpinning.
- ▶ Assembly personnel must be at the side of the assembly unit.

Releasing the rope pulley retainer **22** from the FA-frame:

- ▶ Remove the retaining element **28** and unpin the pin **27**.
- ▶ Take the rope pulley retainer **22** down with the rope on the open end of the F-assembly unit.

3.2.5 Assembling the F-guy ropes and the FAB-guy ropes

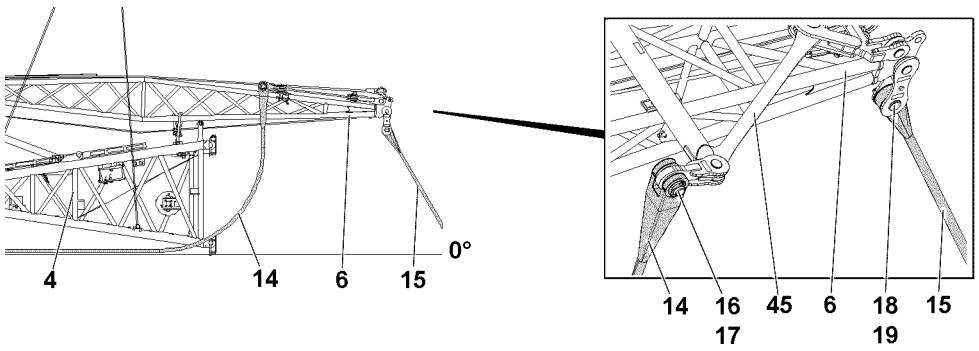

Fig.144394: F-guy ropes and FAB-guy ropes

- ▶ Swing the F-guy rope **15** in to the brackets on the FA-frame **6**.
- ▶ Pin the F-guy rope **15** on the brackets: Insert the pin **18** and secure it with the retaining element **19**.

When the first F-guy rope is properly installed and secured:
- ▶ Pin the second F-guy rope.
- ▶ Take down the free ends of the F-guy ropes to the side from the boom.
- ▶ Swing the FAB-guy rope **14** in to the swing **45** on the FA-frame **6**.
- ▶ Pin the FAB-guy rope **14** on the swing **45**: Insert the pin **16** and secure it with the retaining element **17**.

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When the first FAB-guy rope is properly installed and secured:
- ▶ Pin the second FAB-guy rope.
- ▶ Take down the free ends of the FAB-guy ropes to the side from the boom.

3.2.6 Erecting the FA-frame

Make sure that the following prerequisites are met:
- – The FA-frame relapse retainers are separated.
- – F-relapse support is released.
- – The guy ropes are installed.
- – The rope pulley retainer is released from the FA-frame.

Setting the flap „downward“

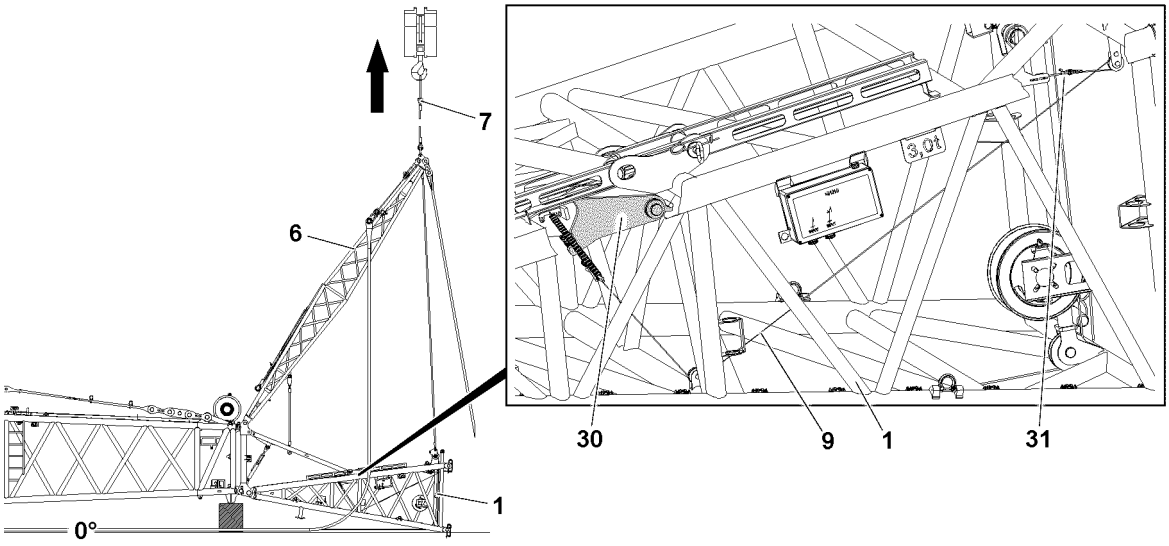

Fig.144396: Flap

WARNING
Automatic swinging of the FA-frame!
If the fastening rope **7** on the FA-frame **6** is not held under tension during assembly, the FA-frame **6** can swing suddenly to the side.
Death, severe bodily injury, property damage.
- ▶ Make sure that there are no persons within the danger zone.
- ▶ Make sure that the fastening rope **7** never sags during assembly / disassembly operations.

- ▶ Release the fastening rope **7** from the transport retainer on the FA-frame **6**.
- ▶ Fasten the FA-frame **6** with the fastening rope **7** to the auxiliary crane.
- ▶ Lift FA-frame **6** with auxiliary crane.
- ▶ Pull the flap **30** on the F-pivot section **1** with the control rope **9** „downwards“ and fix it with the hook closure **31**.

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Connecting the assembly winch rope with the rope pulley retainer

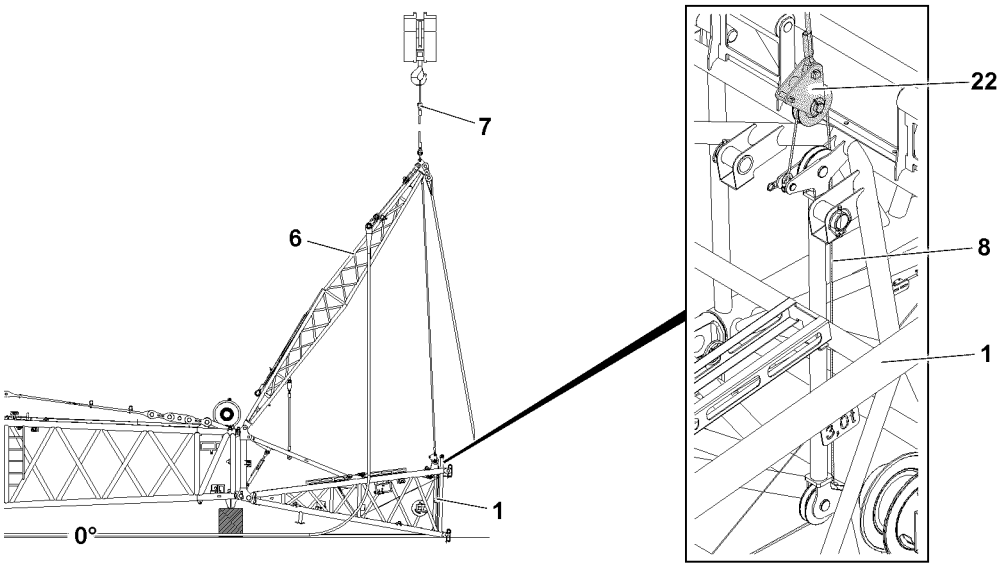

Fig.144395: Assembly winch rope with the rope pulley retainer

▶ Reeve in the assembly winch rope **8** on the rope pulley retainer **22** and secure on the F-pivot section **1**.

Pinning the FAB-guy ropes with the lugs of the L-intermediate section

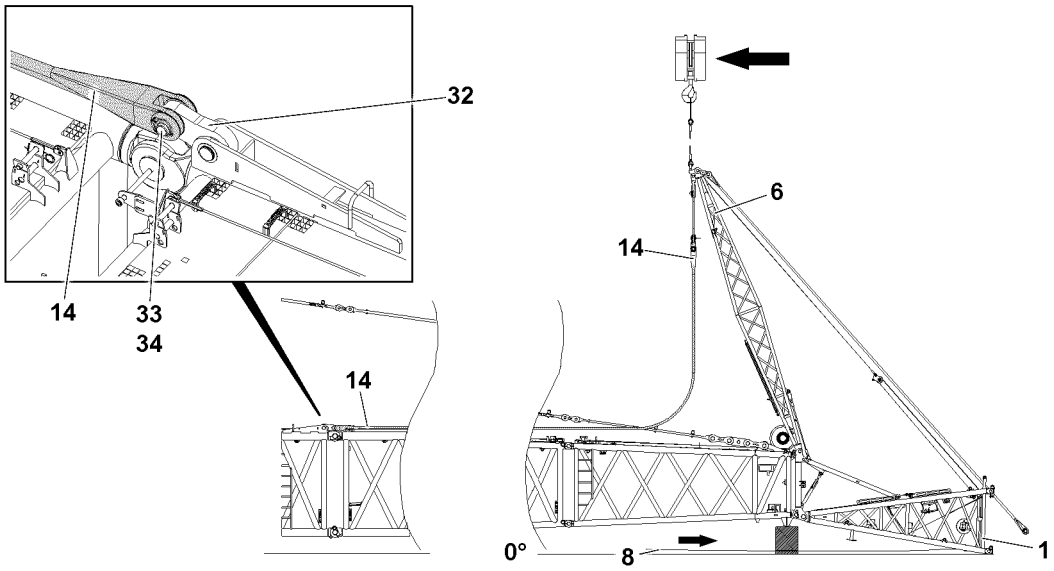

Fig.144397: FAB-guy ropes

NOTICE
Danger of property damage!
When swinging the FA-frame **6** in the direction of the main boom, damage may occur to the FA-frame **6**, the F-connector head, as well as the rope pulley retainer.
▶ Make sure that a guide supervises the swinging process of the FA-frame.
▶ Make sure that the guide is constantly in visual and acoustic contact with the crane operator.
▶ Make sure that the assembly winch rope **8** is spooled out during the swinging process of the FA-frame **6**.

▶ Carefully swing the FA-frame **6** with the auxiliary crane in direction of the main boom and spool the assembly winch rope **8** out at the same time until it can be pinned at the pin location.
▶ Swing the FAB-guy rope **14** in to the FAB-lugs **32** of the L-intermediate section.

Pin the FAB-guy rope **14** with the FAB-lugs **32** of the L-intermediate section:

▶ Insert the pin **33** and secure it with the retaining element **34**.
▶ Pin the second FAB-guy rope.

3.2.7 Setting the FA-frame in the operating position

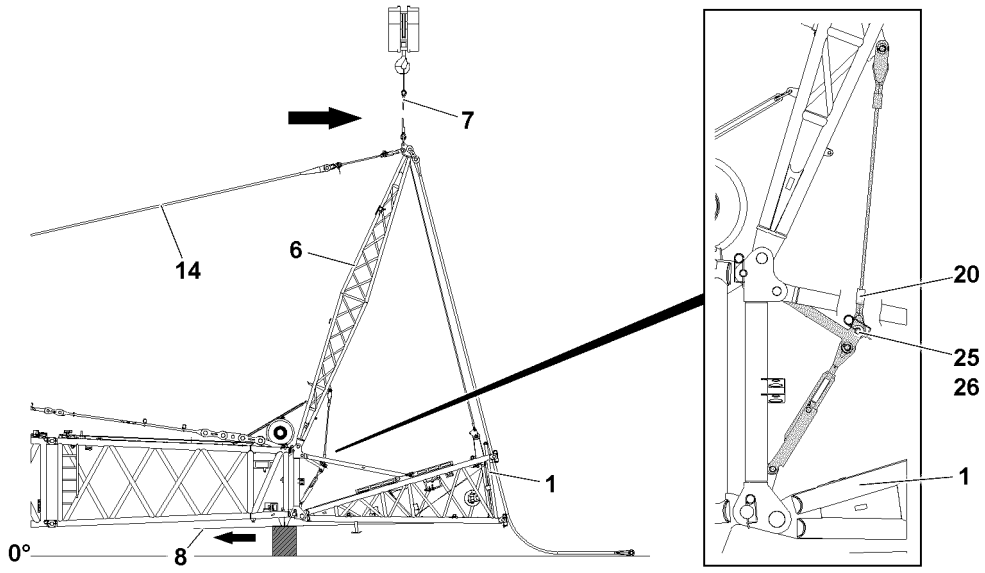

Fig.144398: Bringing the FA-frame into operating position

Make sure that the following prerequisite is met:
– The FAB-guy ropes are properly pinned and secured.

▶ Pull the FA-frame **6** with the assembly winch rope **8** in direction of the F-pivot section **1**.

Connect the FA-frame relapse retainer:
▶ Swing the guy rope **20** to the FA-frame relapse retainer.
▶ Insert the pin **25** and secure it with the retaining element **26**.

When the FA-frame relapse retainer is properly pinned and secured:
▶ Tighten the turnbuckle and secure it to prevent twisting.

Result:

– The turnbuckle is secured to prevent it from twisting in crane operation.
– Affix the FA-frame **6** in the operating position.

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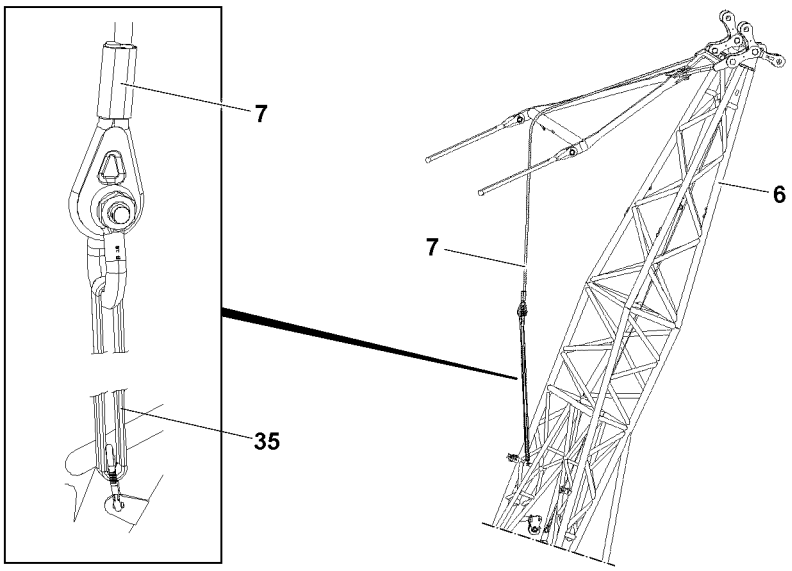

Fig.144399: Securing the fastening rope on the FA-frame for crane operation

NOTICE
Swinging fastening rope!
If the fastening rope **7** is not properly secured, then the fastening rope **7** can start to swing back and forth in crane operation and damage components.

- ▶ Make sure that the fastening rope **7** is secured on the FA-frame before starting to work with the crane.

- ▶ Place the fastening rope **7** over the linkage.
- ▶ Connect the fastening rope **7** with the roundsling **35** with the shackle.
- ▶ Fasten the roundsling **35** with the carabiner on the lug of the FA-frame **6**.

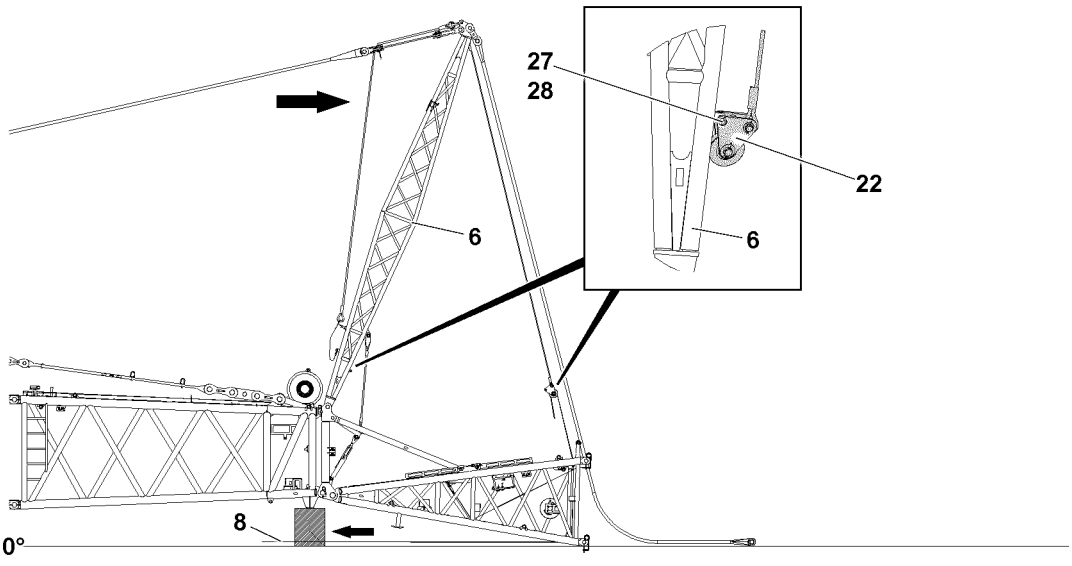

Fig.144400: Lowering the F-pivot section

Lower the F-pivot section **1**:

- ▶ Spool out the assembly winch rope **8**.
- ▶ Release and reeve out the assembly winch rope **8**.

Swing and pin the rope pulley retainer **22** on the FA-frame **6**:

- ▶ Insert the pin **27** and secure it with the retaining element **28**.

3.2.8 Assembling the lattice sections

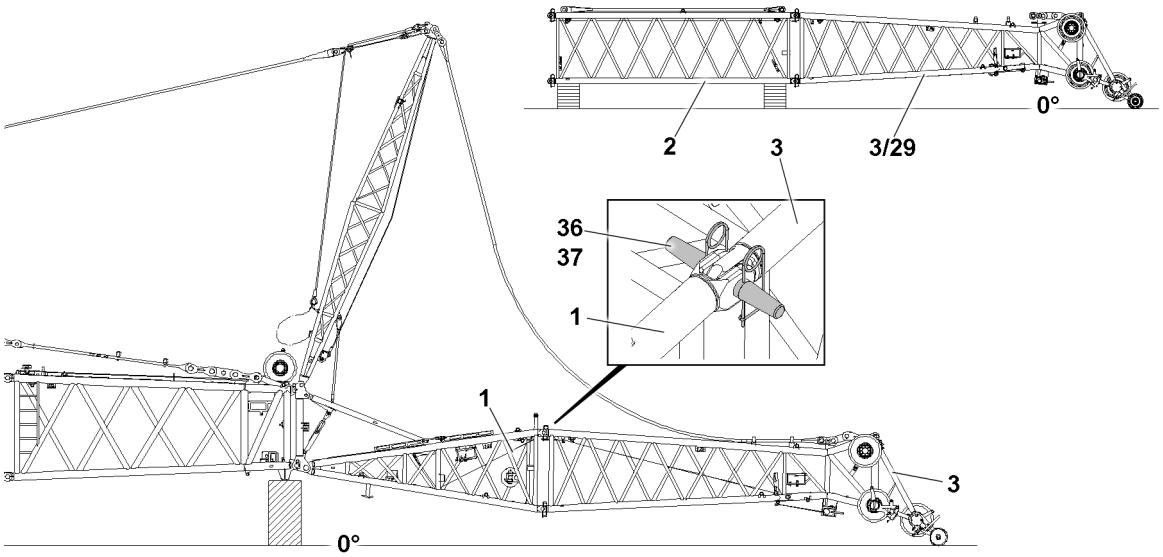

Fig.147792: Pinning the lattice sections

▶ Fasten the F-end section **3** or the F-end section **29** and the F-intermediate sections **2** (if applicable) to the auxiliary crane and install and pin on the F-pivot section **1**.

The F-end section is pinned four times on the F-pivot section **1**. Every pin point is present on both sides of the component on one level.

▶ Insert the pin **36** in the pin points on both sides and secure with the retaining element **37**.

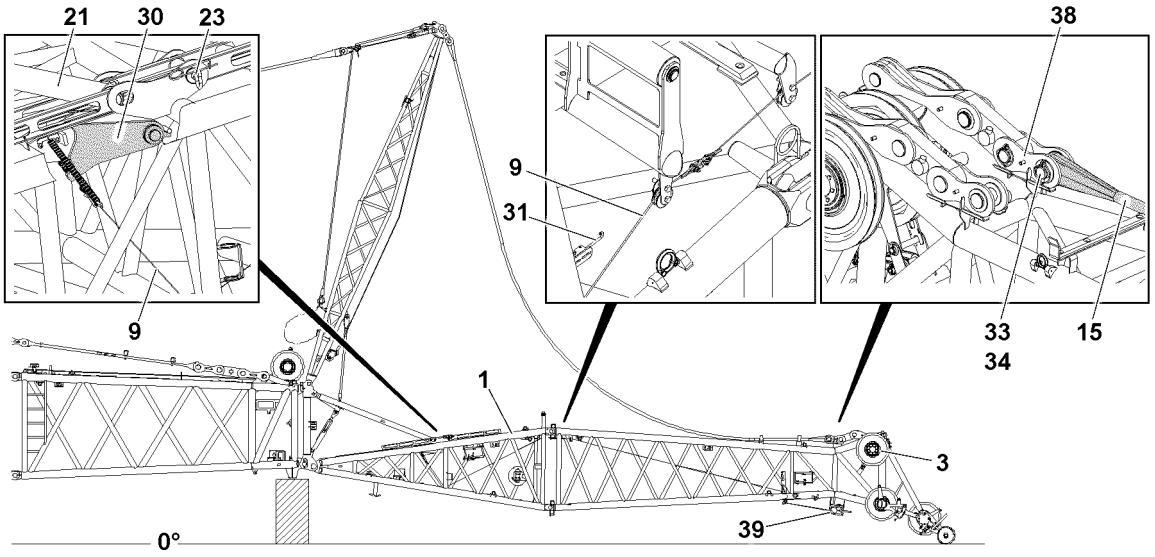

Fig.144402: Pinning the F-guy ropes

Note

▶ The pin **23** remains pinned in the „operating position“ during crane operation.

Note

▶ If the F-intermediate sections are installed, then the additional guy ropes for the F-intermediate sections must be assembled, pinned and secured.

▶ For the combination of the guy rope refer to the rod plan.

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Pin the F-guy rope **15** with the lugs **38** of the F-end section **3**:
- ▶ Insert the pin **33** and secure it with the retaining element **34**.
- ▶ Pin the second F-guy rope.

Connect the rope strand from the flap on the F-pivot section with the manual rope winch **39** on the F-end section:
- ▶ Release the control rope **9** on the hook closure **31**.
- ▶ Connect the control rope **9** between the flap and the manual rope winch **39** with the shackle.
- ▶ Pull the flap **30** with the aid of the manual rope winch **39** „downwards“.

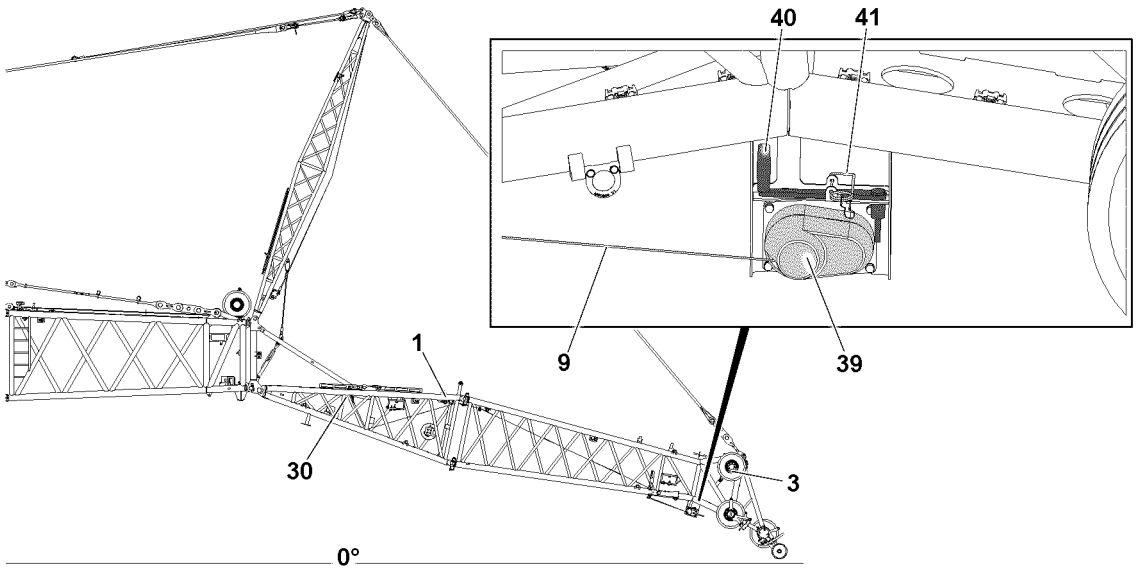

Fig.144403: Manual rope winch

WARNING
Danger of fatal injury due to F-auxiliary jib!
If the flap **30** is not in „up“ position, then the F-auxiliary job can fall backward uncontrolled when erecting the boom system and in crane operation.
Death, severe bodily injuries, property damage.
- ▶ Make sure that the flap **30** is in the „up“ position immediately before lifting the F-end section or when erecting the boom.
- ▶ Make sure that the crank of the manual rope winch has been removed.

- ▶ Lift the main boom.

Immediately after the F-jib lifts off the ground, move the flap **30** „upwards“:
- ▶ Actuate the manual rope winch **39** and spool out the control rope **9**.
- ▶ Take down the crank **40** in the park position and secure with the retaining element **41**.

3.3 Assembly variant V2 — Assembling the complete F-jib (maximum length of 12 m) on the ground

WARNING
Impermissible F-assembly length(s)!
Death, severe bodily injuries, property damage.
- ▶ Make sure that the assembly of the F-jib as a complete F-assembly unit with the F-end section does not exceed 12 m.
- ▶ During assembly, no hook block may be reeved in on the F-jib.
- ▶ The F-jib must always be assembled in accordance with the respective description in the respective section.
- ▶ Observe and adhere to the Rod plan.

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3.3.1 Assembling the FAB-guy ropes

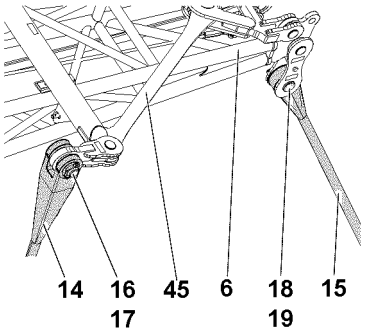

Fig.144419: FAB-guy ropes

- ▶ Swing the FAB-guy rope **14** in to the swing **45** on the FA-frame **6**.
- ▶ Pin the FAB-guy rope **14** on the swing **45**: Insert the pin **16** and secure it with the retaining element **17**.

When the first FAB-guy rope is properly installed and secured:

- ▶ Pin the second FAB-guy rope.
- ▶ Take down the free ends of the FAB-guy ropes **14** to the side from the boom.

3.3.2 Assembling the F-assembly unit with F-end section

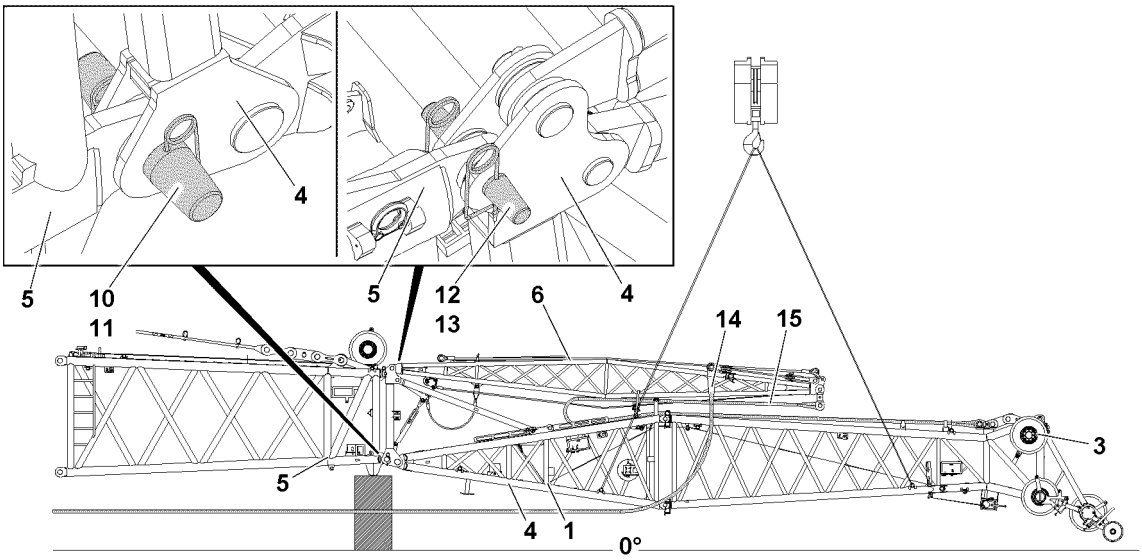

Fig.144405: Pinning the F-jib

Make sure that the following prerequisite is met:

- The F-guy ropes **15** between the F-end section **3** and the F-frame **6** are properly pinned and secured. (If necessary, release the F-guy ropes **15** from the transport retainers on the F-pivot section **1** and pin with the lugs on the F-end section **3** and with lugs on the FA-frame **6**, see section Assembly variant V1.

- ▶ Fasten the F-assembly unit **4** with the F-end section **3** to the auxiliary crane.
- ▶ Remove the rigging belts between the F-pivot section **1** and FA-frame **6**.

The F-assembly unit **4** is pinned four times on F-connector head **5**. Every pin point is present on both sides of the component on one level.

- ▶ Position the F-assembly unit **4** with F-end section **3** with the auxiliary crane on the F-connector head so that it can be pinned in the pin locations.
- ▶ Insert the pins **12** on both sides and secure with the retaining element **13**.

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WARNING
Crushing / shearing of limbs!
While performing boom system assembly tasks, limbs can be crushed and / or sheared off.
Death, severe bodily injuries, property damage.
▶ Make sure that no crane movements are performed while pinning in the area of the lower pin points.

▶ Insert the pins **10** on both sides and secure with the retaining element **11**.

3.3.3 Releasing the F-relapse support

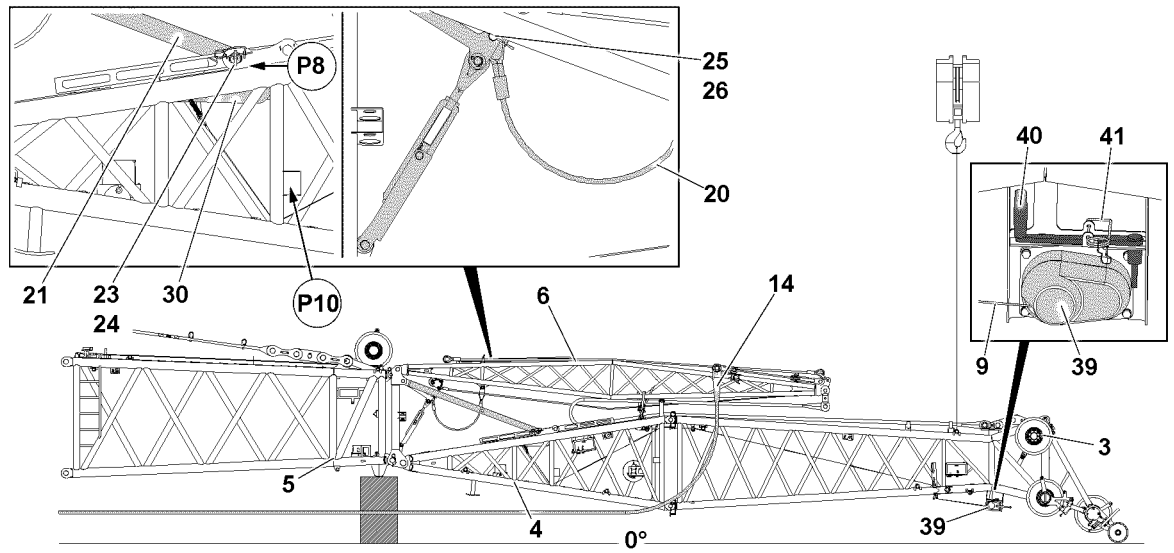

Fig.144406: F-relapse support and FA-frame relapse retainer

▶ Fasten the F-end section **3** to the auxiliary crane.

Release the F-relapse support **21** from the transport position:

▶ Remove the retaining element **24** at point **P8** and unpin the pin **23**.
▶ Insert pin **23** in the park position at point **P10** and secure with retaining element **24**.

3.3.4 Separating the FA-frame relapse retainers

WARNING
Falling and swinging FA-frame relapse retainer!
The FA-frame relapse retainer consists of a guy rope **20** and a turnbuckle.
The guy rope **20** of the FA-frame relapse retainer can fall down due to its own weight during unpinning.
Death, severe bodily injuries, property damage.
▶ Make sure when unpinning the FA-frame relapse retainer, that the guy rope **20** is safely held.
▶ Assembly personnel must be at the side of the assembly unit.

NOTICE
Danger of property damage!
If the FA-frame relapse retainer is not separated, then it will be damaged when pulling up the F-jib.
▶ Make sure that the FA-frame relapse retainer is separated during the erection of the FA-frame.

Separate the FA-frame relapse retainer:

▶ Remove the retaining element **26** and unpin the pin **25**.
▶ Take the guy rope **20** down.
▶ Insert the pin **25** again and secure with the retaining element **26**.

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When the FA-frame relapse retainer is separated:
- ▶ Lower the F-jib slowly on the ground.
- ▶ Remove the auxiliary crane.

3.3.5 Setting the flap „downward“

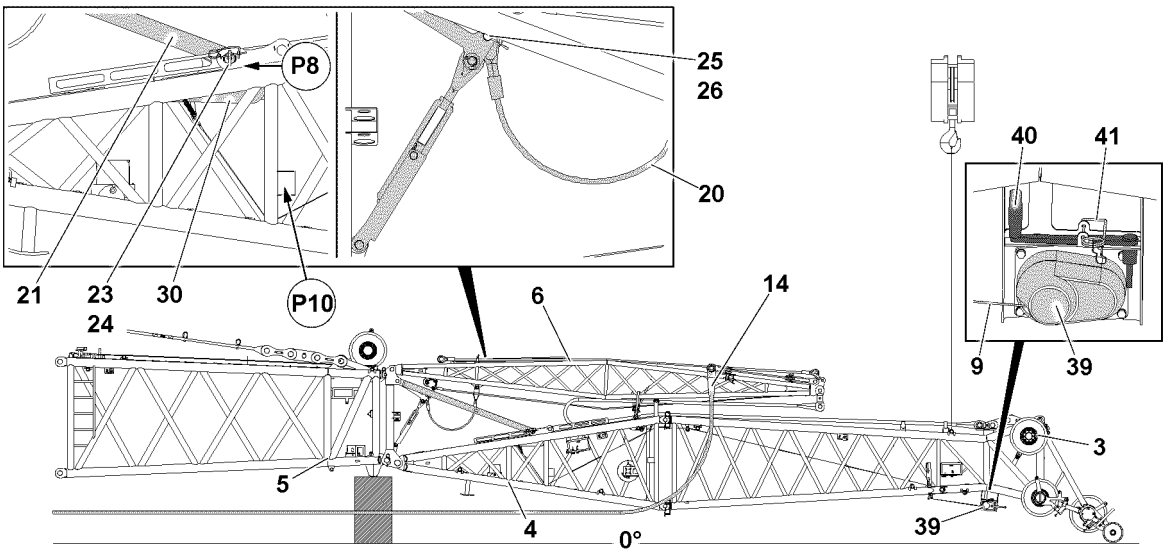

Fig.144406: Flap and manual rope winch

Make sure that the following prerequisite is met:
- – The control rope **9** of the F-end section **3** and the F-pivot section **1** are connected.

- ▶ Remove the crank **40** from the parking position.

Set the flap „downward“:
- ▶ Actuate the manual rope winch **39** and spool up the control rope **9**.
- ▶ Take down the crank **40** in the park position and secure with the retaining element **41**.
- ▶ Fasten the F-jib to the auxiliary crane, see illustration „Flap and manual rope winch“.

3.3.6 Erecting the FA-frame

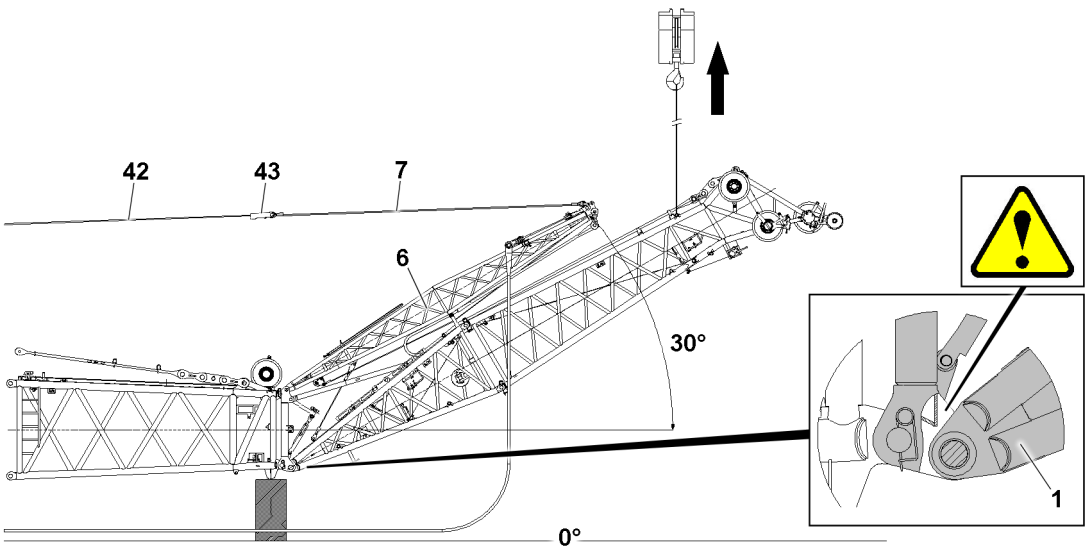

Fig.144407: Erecting the FA-frame

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NOTICE
Danger of property damage!
If the FA-frame relapse retainer is not separated, then it will be damaged during erection of the FA-frame.
▶ Make sure that the FA-frame relapse retainer is separated during the erection of the FA-frame.

Make sure that the following prerequisites are met:
– The F-guy ropes are properly installed and secured between the FA-frame and the F-end section.
– The FA-frame relapse retainer is separated.

▶ Fasten the auxiliary crane properly on the eyehooks of the F-end section **3**.

NOTICE
Danger of collision on the F-pivot point!
When lifting the F-jib in direction of the main boom there is a danger of collision of the FA-pivot section with the attachment parts of the F-pivot point.
▶ When lifting the FA-jib, a guide must be used.
▶ The guide must be in constant visual and acoustic contact with the crane operator.

▶ Lift the F-jib with the auxiliary crane on the F-end section **3** until the angle between the FA-frame **6** and the main boom is at least 30°.
▶ Connect the fastening rope **7** of the FA-frame **6** by using the lock **43** with the hoist rope **42**.
▶ Spool up the hoist rope **42** until the FA-frame **6** is held approx. in the 40° position by the hoist rope.

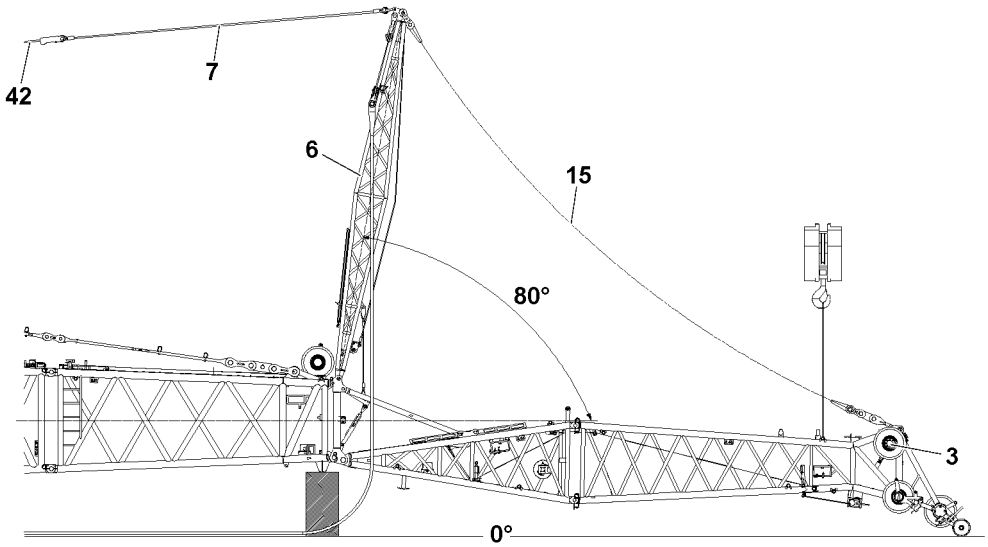

Fig.144408: Lowering the F-jib with the auxiliary crane

▶ Lower the F-jib with the auxiliary crane to the horizontal.

NOTICE
Danger of collision on the F-pivot point!
When swinging the FA-frame in direction of the main boom there is a danger of collision of the FA-frame with the attachment parts of the L-end section or the F-connector head.
▶ When swinging the FA-frame, a guide must be used.
▶ The guide must be in constant visual and acoustic contact with the crane operator.

NOTICE
Hoist rope contact with cross binders of the main boom auxiliary guying!
▶ Make sure that the hoist rope does not scrape the cross binder of the main boom auxiliary guying when erecting the FA-frame.

If the hoist rope scrapes:
▶ Take the main boom down on the ground or on a load bearing substructure.
▶ Release the main boom guying and unhook the cross binder of the auxiliary guying.

▶ Pull the FA-frame **6** further with the hoist rope **42** in direction of the main boom until the angle between the FA-frame **6** and the main boom is maximum 80°.
▶ Lower the F-jib with the auxiliary crane until the F-guy ropes **15** are tensioned or the F-jib lies on the ground.
▶ Unhook and remove the fastening equipment (fastening rope) of the auxiliary crane.

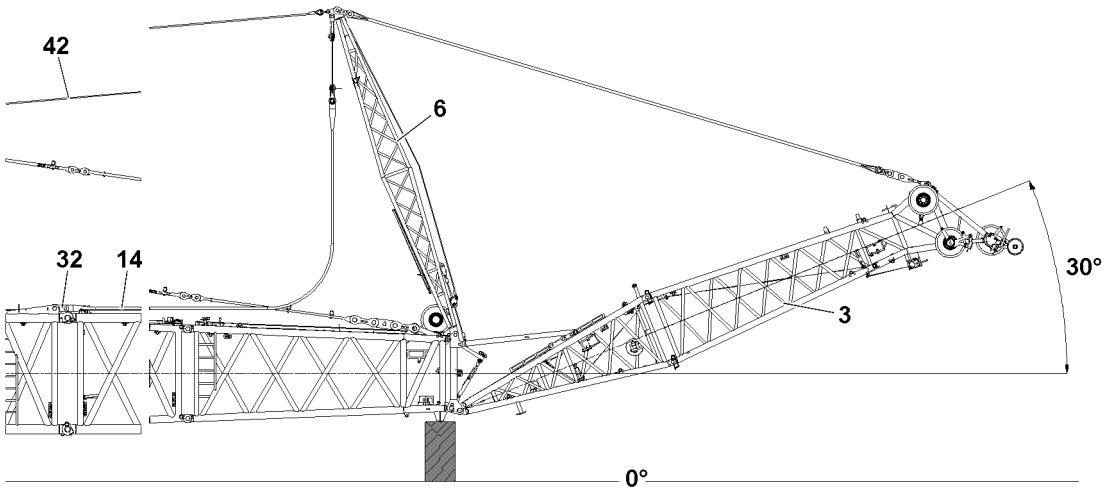

Fig.144409: Pinning the FAB-guy ropes

NOTICE
Danger of collision on the F-pivot point!
When swinging the FA-frame in direction of the main boom there is a danger of collision of the FA-pivot section with the attachment parts of the F-pivot point.
▶ When swinging the FA-frame, a guide must be used.
▶ The guide must be in constant visual and acoustic contact with the crane operator.
▶ When swinging the FA-frame, the F-jib may be lifted maximum 30° to the main boom.

NOTICE
Danger of collision!
When swinging the FA-frame in direction of the main boom there is a danger of collision of the FA-frame with the attachment parts of the L-end section or the F-connector head.
▶ When swinging the FA-frame, a guide must be used.
▶ The guide must be in constant visual and acoustic contact with the crane operator.

▶ Continue to swing the FA-frame **6** further with the hoist rope **42** in direction of the main boom until it can be pinned at the pin location.

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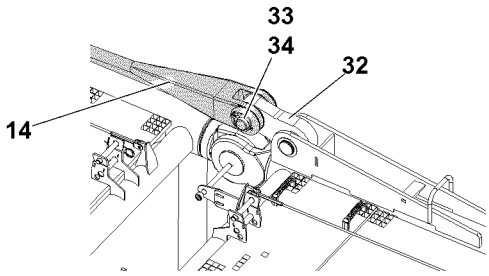

Fig.144420: FAB-guy ropes

▶ Swing the FAB-guy rope **14** in to the FAB-lugs **32** of the L-intermediate section.

Pin the FAB-guy rope **14** with the FAB-lugs **32** of the L-intermediate section:

▶ Insert the pin **33** and secure it with the retaining element **34**.
▶ Pin the second FAB-guy rope.

3.3.7 Setting the FA-frame in the operating position

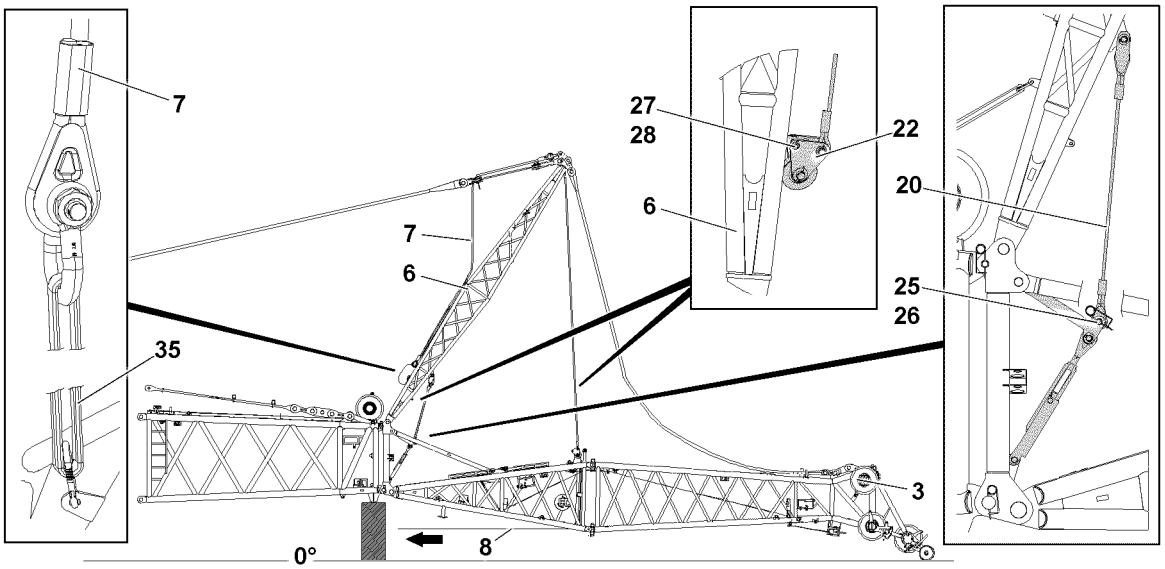

Fig.144410: Bringing the FA-frame into operating position // Assembling the FA-frame relapse retainer

Make sure that the following prerequisite is met:
– The FAB-guy ropes are properly pinned and secured.

NOTICE
Danger of slack rope formation!
▶ When spooling the hoist rope out, make sure that no slack rope forms.

▶ Lower the FA-frame **6** to the operating position (to the front): Spool out the hoist rope until the FA-frame **6** is in the operating position.

The FA-frame **6** can be pulled into the operating position as follows:

▶ By using the assembly winch rope **8** over the rope pulley retainer **22**, see section „Assembly variant V1 — Assembling the F-jib in parts“.
or
By lifting the main boom. Use an aerial platform to tension the FA-frame relapse retainer.
▶ Pull the FA-frame **6** into the operating position.

Pin the FA-frame relapse retainer:
▶ Swing the guy rope **20** to the FA-frame relapse retainer.

▶ Insert the pin **25** and secure it with the retaining element **26**.

When the FA-frame relapse retainer is properly pinned and secured:
▶ Tighten the turnbuckle and secure it to prevent twisting.

Result:

– The turnbuckle is secured to prevent it from twisting in crane operation.
– Affix the FA-frame **6** in the operating position.

When the FA-frame relapse retainer is pinned and secured:
▶ Continue to spool out the hoist rope until the fastening rope **7** is completely relieved.
▶ Separate the hoist rope and the fastening rope **7**.

NOTICE
Swinging fastening rope!
If the fastening rope **7** is not properly secured, then the fastening rope can start to swing back and forth in crane operation and damage components.
▶ Make sure that the fastening rope **7** is properly secured on the FA-frame before starting to work with the crane.

▶ Place the fastening rope **7** over the linkage.
▶ Connect the fastening rope **7** with the roundsling **35** with the shackle.
▶ Fasten the roundsling **35** with the carabiner on the lug of the FA-frame **6**.

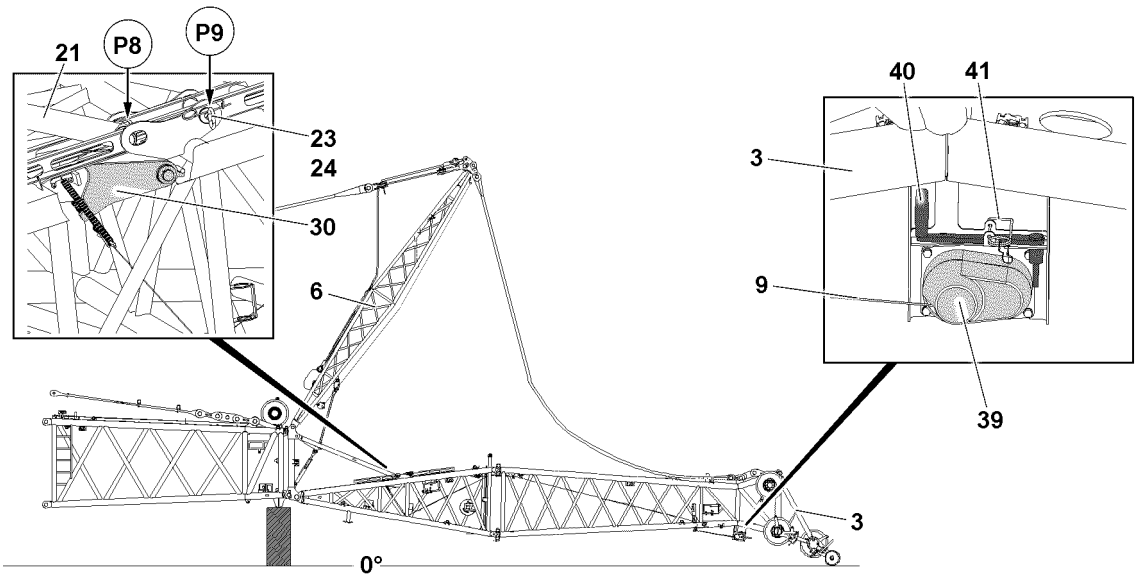

Fig.144418: Flap

▶ Insert the pin **23** for crane operation in the stop position at point **P9** and secure with the retaining element **24**.
▶ Properly hang the cross binder of the main boom auxiliary guying and secure.

WARNING
Danger of fatal injury due to F-auxiliary jib!
If the flap is not in „up“ position, then the F-auxiliary job can fall backward uncontrolled when erecting the boom system and in crane operation.
Death, severe bodily injuries, property damage.
▶ Make sure that the flap is in the „up“ position immediately before lifting the F-end section or when erecting the boom.
▶ Make sure that the crank of the manual rope winch has been removed.

▶ Lift the main boom.

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Immediately after the F-jib lifts off the ground, move the flap **30** „upwards“:
- ▶ Actuate the manual rope winch **39** and spool out the control rope **9**.
- ▶ Take down the crank **40** in the park position and secure with the retaining element **41**.

3.4 Assembly variant V3 — Assembling the complete F-jib (maximum length of 12 m) in flying mode

WARNING
Impermissible F-assembly length(s)!
Death, severe bodily injuries, property damage.
- ▶ Make sure that the flying assembly length of the F-jib as a complete F-assembly unit with the F-end section does not exceed 12 m.
- ▶ During assembly, no hook block may be reeved in on the F-jib.
- ▶ The F-jib must always be assembled in accordance with the respective description in the respective section.
- ▶ Observe and adhere to the Rod plan.

3.4.1 Assembling the FAB-guy ropes

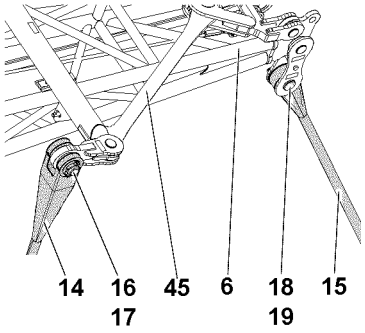

Fig.144419: FAB-guy ropes

- ▶ Swing the FAB-guy rope **14** in to the swing **45** on the FA-frame **6**.
- ▶ Pin the FAB-guy rope **14** on the swing **45**: Insert the pin **16** and secure it with the retaining element **17**.

When the first FAB-guy rope is properly installed and secured:
- ▶ Pin the second FAB-guy rope.
- ▶ Take down the free ends of the FAB-guy ropes **14** to the side from the boom.

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3.4.2 Assembling the F-assembly unit with F-end section

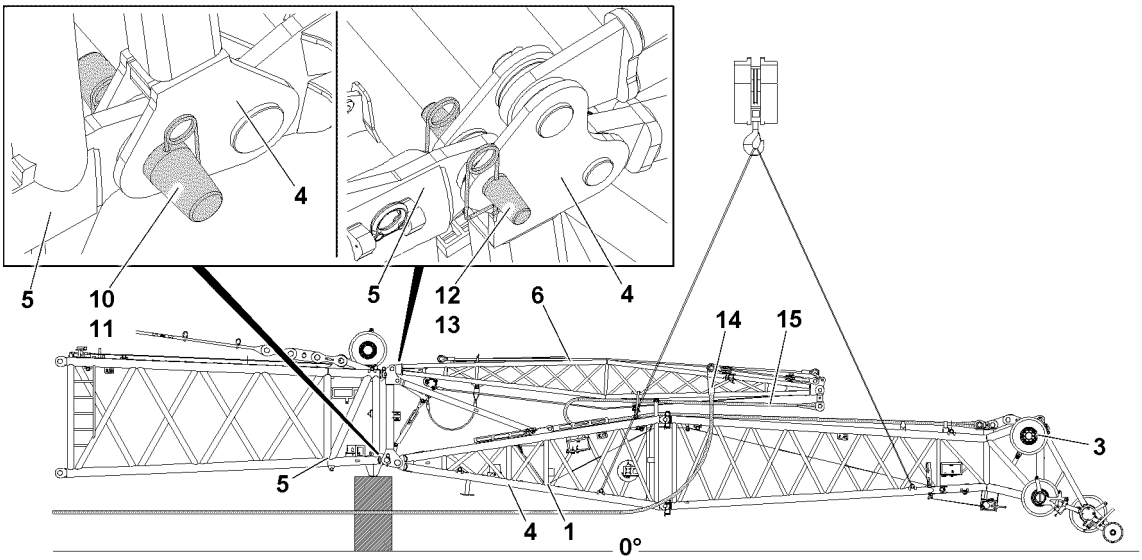

Fig.144405: Pinning the F-jib

Make sure that the following prerequisite is met:

– The F-guy ropes **15** between the F-end section **3** and the F-frame **6** are properly pinned and secured. (If necessary, release the F-guy ropes **15** from the transport retainers on the F-pivot section **1** and pin with the lugs on the F-end section **3** and with lugs on the FA-frame **6**, see section Assembly variant V1.

▶ Fasten the F-assembly unit **4** with the F-end section **3** to the auxiliary crane.
▶ Remove the rigging belts between the F-pivot section **1** and FA-frame **6**.

The F-assembly unit **4** is pinned four times on L-end section or on the F-connector head. Every pin point is present on both sides of the component on one level.

▶ Position the F-assembly unit **4** with F-end section **3** with the auxiliary crane on the F-connector head so that it can be pinned in the pin locations.
▶ Insert the pins **12** on both sides and secure with the retaining element **13**.

WARNING
Crushing / shearing of limbs!
While performing boom system assembly tasks, limbs can be crushed and / or sheared off.
Death, severe bodily injuries, property damage.
▶ Make sure that no crane movements are performed while pinning in the area of the lower pin points.

▶ Insert the pins **10** on both sides and secure with the retaining element **11**.

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3.4.3 Setting the flap „downward“

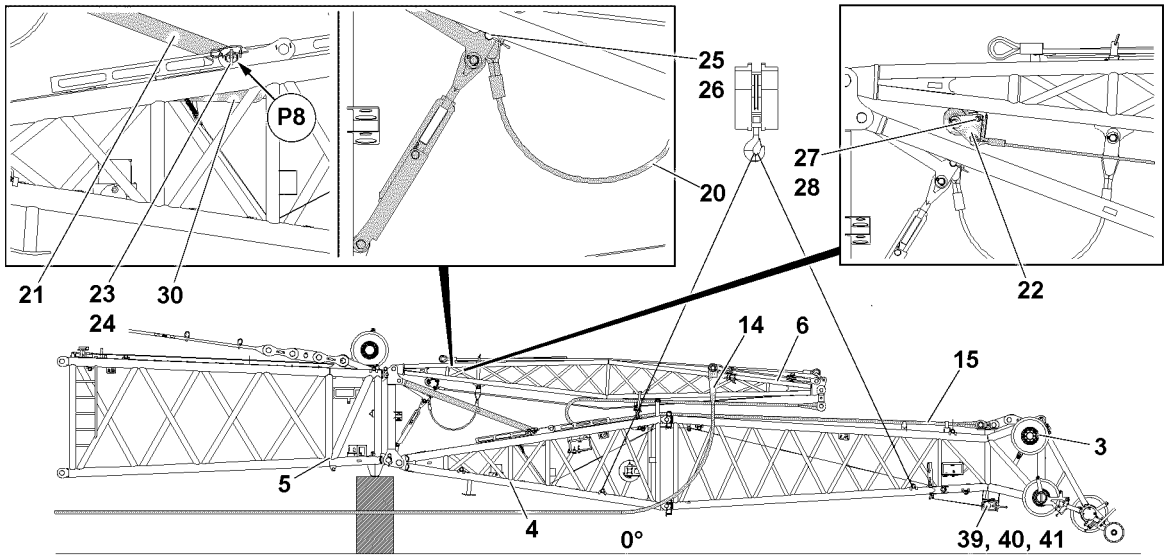

Fig.144412: F-relapse support and FA-frame relapse retainers

▶ Remove the crank **40** from the parking position.

Set the flap **30** „downward“:

▶ Actuate the manual rope winch **39** and spool up the control rope **9**.

▶ Take down the crank **40** in the park position and secure with the retaining element **41**.

3.4.4 F-relapse support

WARNING
Automatic swinging of the F-jib!
If the pin **23** of the F-relapse support **21** is unpinned at point **P8**, before the F-guy rope **15** is properly assembled and secured, the F-jib could fall down by itself.
Death, severe bodily injuries, property damage.

▶ Make sure that the F-relapse support **21** remains pinned at point **P8** until the F-guy rope **15** is properly pinned and secured on the FA-frame **6** and on the F-end section **3**.

▶ Do **not** unpin the F-relapse support **21** at point **P8**.

▶ Make sure that the F-relapse support **21** is properly pinned and secured in the transport position at point **P8** with pin **23**.

3.4.5 Separating the FA-frame relapse retainers

WARNING
Falling and swinging FA-frame relapse retainer!
The FA-frame relapse retainer consists of a guy rope **20** and a turnbuckle.
The guy rope **20** of the FA-frame relapse retainer can fall down due to its own weight during unpinning.
Death, severe bodily injuries, property damage.

▶ Make sure when unpinning the FA-frame relapse retainer, that the guy rope **20** is safely held.

▶ Assembly personnel must be at the side of the assembly unit.

NOTICE
Danger of property damage!
If the FA-frame relapse retainer is not separated, then it will be damaged when pulling up the F-jib.

▶ Make sure that the FA-frame relapse retainer is separated during the erection of the FA-frame.

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Separate the FA-frame relapse retainer:

- ▶ Remove the retaining element **26** and unpin the pin **25**.
- ▶ Take the guy rope **20** down.
- ▶ Insert the pin **25** again and secure with the retaining element **26**.
- ▶ Remove the auxiliary crane.

3.4.6 Preparing the rope pulley retainer for the assembly of the F-jib

WARNING
Falling rope pulley retainer!
The rope pulley retainer **22** can fall down due to its own weight when unpinning it.
Death, severe bodily injuries, property damage.
- ▶ Make sure that the assembly winch rope **22** is secured against falling down when unpinning.

Releasing the rope pulley retainer **22** from the FA-frame **6**:

- ▶ Remove the retaining element **28** and unpin the pin **27**.
- ▶ Take the rope pulley retainer **22** down with the rope on the F-assembly unit.

3.4.7 Erecting the FA-frame

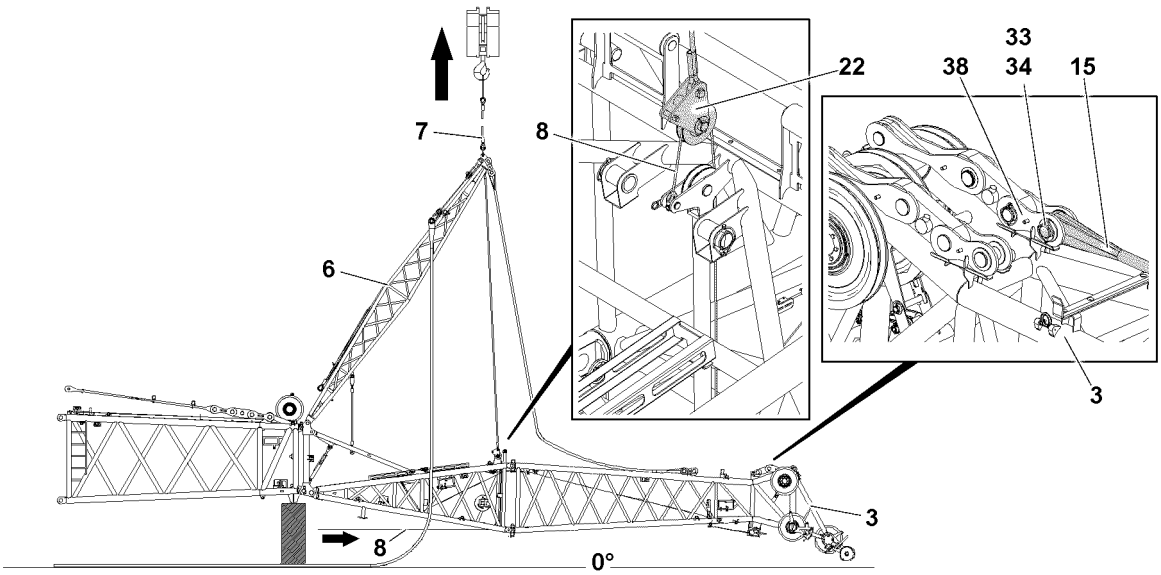

Fig.144413: Erecting the FA-frame

Make sure that the following prerequisite is met:
– The FA-frame relapse retainer is separated.

Unpin the F-guy rope **15** on the FA-end section **3**:
- ▶ Remove the retaining element **34** on both sides and unpin the pin **33** on both sides.
- ▶ Release the fastening rope **7** in the transport position on the FA-frame **6**.
- ▶ Fasten the FA-frame **6** with the fastening rope **7** to the auxiliary crane.
- ▶ Lift FA-frame **6** with auxiliary crane.
- ▶ Reeve in the assembly winch rope **8** at the rope pulley retainer **22** and secure on the F-pivot section **1**.

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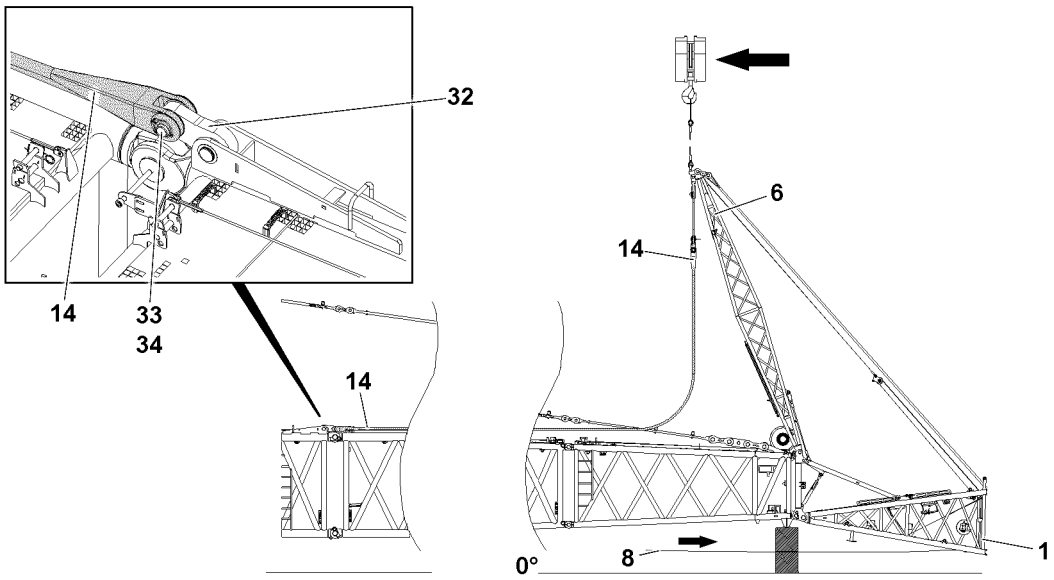

Fig.144414: Pinning the FAB-guy rods

NOTICE
Danger of property damage!
When swinging the FA-frame **6** in the direction of the main boom, damage may occur to the FA-frame **6**, the F-connector head, as well as the rope pulley retainer.

- ▶ Make sure that a guide supervises the swinging process of the FA-frame.
- ▶ Make sure that the guide is constantly in visual and acoustic contact with the crane operator.
- ▶ Make sure that the assembly winch rope **8** is spooled out during the swinging process of the FA-frame **6**.
- ▶ Make sure that the F-guy rope **15** is unpinned on the FA-end section **3**.

- ▶ Carefully swing the FA-frame **6** with the auxiliary crane in direction of the main boom and spool the assembly winch rope **8** out at the same time until it can be pinned at the pin location.
- ▶ Swing the FAB-guy rope **14** in to the FAB-lugs **32** of the L-intermediate section.

Pin the FAB-guy rope **14** with the FAB-lugs **32** of the L-intermediate section:

- ▶ Insert the pin **33** and secure it with the retaining element **34**.
- ▶ Pin the second FAB-guy rope.

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3.4.8 Setting the FA-frame in the operating position

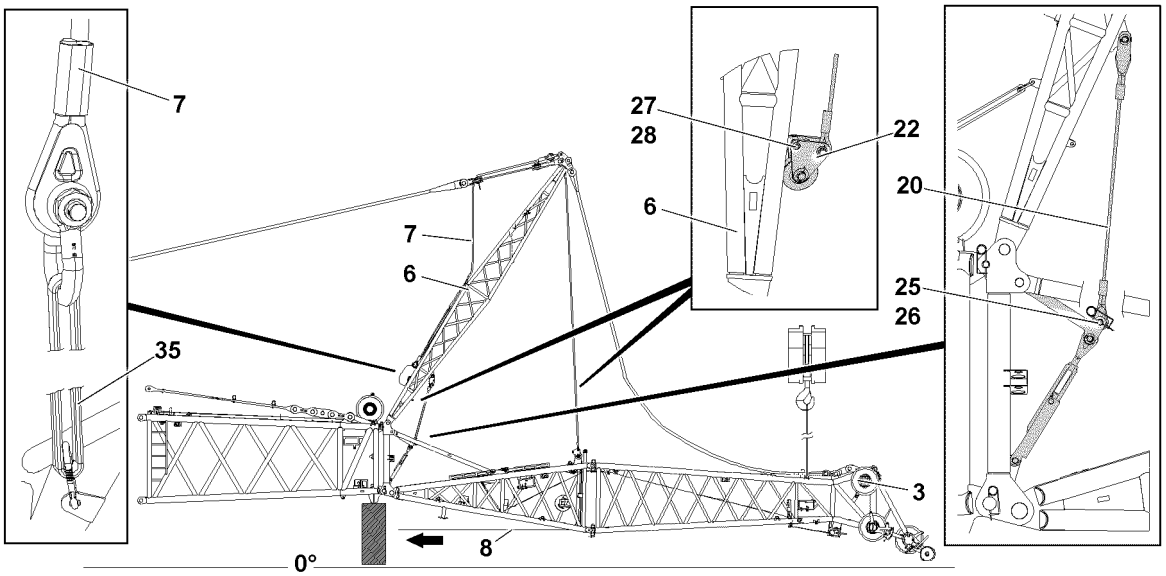

Fig.144415: Setting the FA-frame in the operating position

Make sure that the following prerequisite is met:
– The FAB-guy ropes are properly pinned and secured.

▶ Pull the FA-frame **6** with the assembly winch rope **8** in direction of the F-pivot section.

Connect the FA-frame relapse retainer:
▶ Swing the guy rope **20** to the FA-frame relapse retainer.
▶ Insert the pin **25** and secure it with the retaining element **26**.

When the FA-frame relapse retainer is properly pinned and secured:
▶ Tighten the turnbuckle and secure it to prevent twisting.

Result:

– The turnbuckle is secured to prevent it from twisting in crane operation.
– Affix the FA-frame **6** in the operating position.

NOTICE
Swinging fastening rope!
If the fastening rope **7** is not properly secured, then the fastening rope **7** can start to swing back and forth in crane operation and damage components.
▶ Make sure that the fastening rope **7** is properly secured on the FA-frame before starting to work with the crane.

▶ Place the fastening rope **7** over the linkage.
▶ Connect the fastening rope **7** with the roundsling **35** with the shackle.
▶ Fasten the roundsling **35** with the carabiner on the lug of the FA-frame **6**.
▶ Fasten the F-jib to the auxiliary crane.
▶ Carefully bring the fastening equipment to tension.

When the fastening equipment is tensioned:
▶ Release and reeve out the assembly winch rope **8**.

Pin the rope pulley retainer **22** on the FA-frame **6**:

▶ Insert the pin **27** and secure it with the retaining element **28**.

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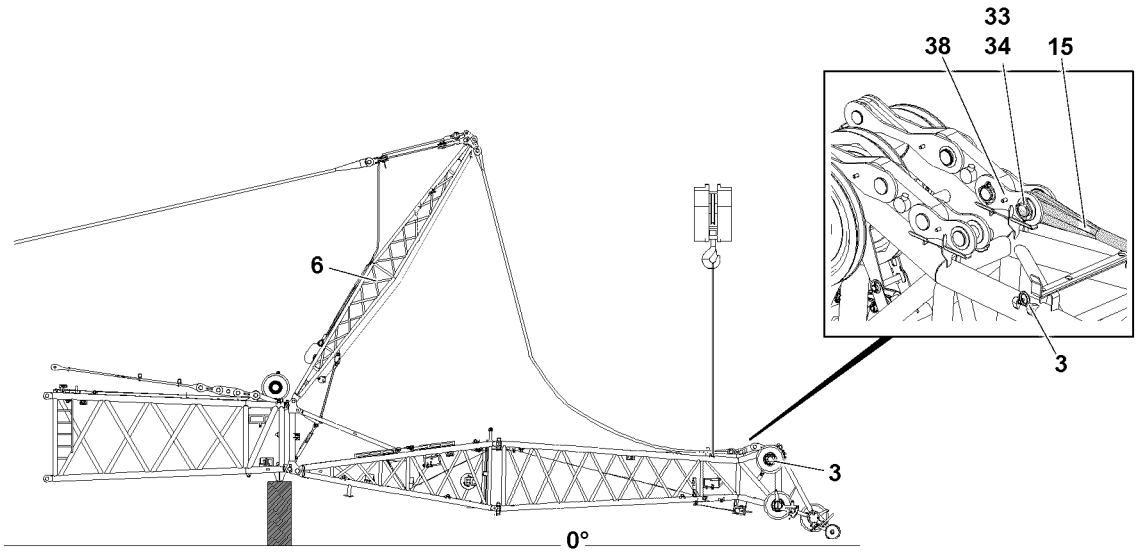

Fig.144416: Assembling the F-guy rope on the F-end section

- ▶ Pin the F-guy ropes **15** on the F-end section **3** with the lugs **38**.
- ▶ Insert the pin **33** and secure it with the retaining element **34**.

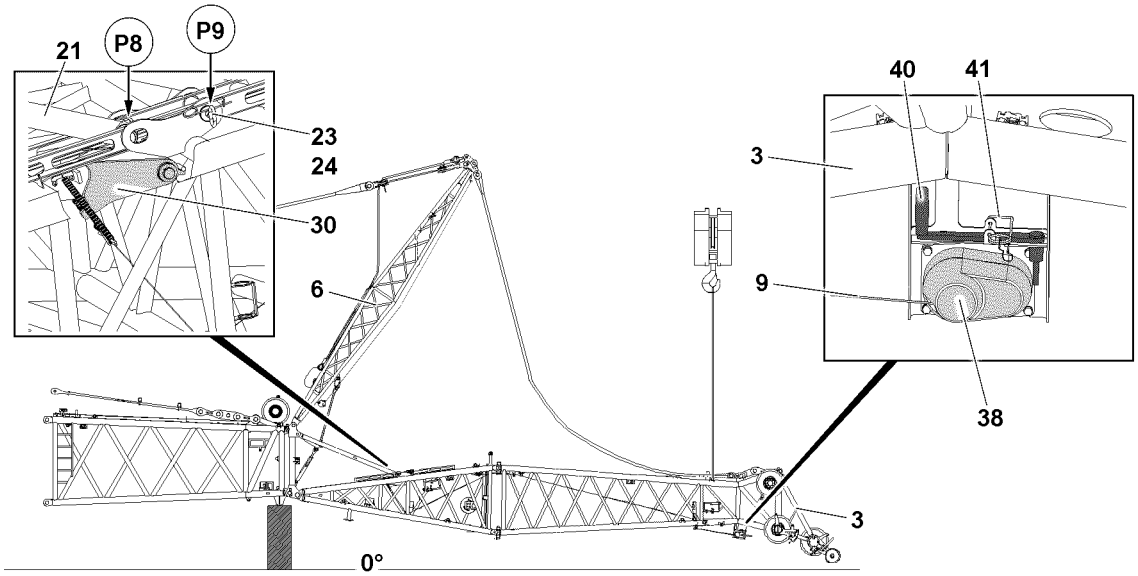

Fig.144417: Unpinning the F-relapse support

Unpin the F-relapse support **21** in the transport position in point **P8**.

When the F-jib is safely held by the auxiliary crane:

- ▶ Remove the retaining element **24** at point **P8** and unpin the pin **23**.
- ▶ Insert the pin **23** in the stop position at point **P9** and secure with retaining element **24**.
- ▶ Lower the F-jib slowly on the ground with the auxiliary crane.

When the F-jib is laying on the ground:

- ▶ Remove the auxiliary crane.

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WARNING
Danger of fatal injury due to F-auxiliary jib!
If the flap is not in „up“ position, then the F-auxiliary job can fall backward uncontrolled when erecting the boom system and in crane operation.
Death, severe bodily injuries, property damage.
- ▶ Make sure that the flap is in the „up“ position immediately before lifting the F-end section or when erecting the boom.
- ▶ Make sure that the crank of the manual rope winch has been removed.

▶ Lift the main boom.

Immediately after the F-jib lifts off the ground, move the flap **30** „upwards“:
- ▶ Actuate the manual rope winch **39** and spool out the control rope **9**.
- ▶ Take down the crank **40** in the park position and secure with the retaining element **41**.

3.5 Assembly variant V4 — Assembling the complete F-jib (maximum length of 12 m) in flying mode

WARNING
Impermissible F-assembly length(s)!
Death, severe bodily injuries, property damage.
- ▶ Make sure that the assembly of the F-jib as a complete F-assembly unit with the F-end section does not exceed 12 m.
- ▶ During assembly, no hook block may be reeved in on the F-jib.
- ▶ The F-jib must always be assembled in accordance with the respective description in the respective section.
- ▶ Observe and adhere to the Rod plan.

3.5.1 Assembling the FAB-guy ropes

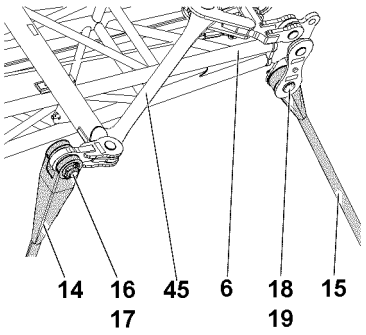

Fig.144419: FAB-guy ropes

- ▶ Swing the FAB-guy rope **14** in to the swing **45** on the FA-frame **6**.
- ▶ Pin the FAB-guy rope **14** on the swing **45**: Insert the pin **16** and secure it with the retaining element **17**.

When the first FAB-guy rope is properly installed and secured:
- ▶ Pin the second FAB-guy rope.
- ▶ Take down the free ends of the FAB-guy ropes **14** to the side from the boom.

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3.5.2 Assembling the F-assembly unit with F-end section

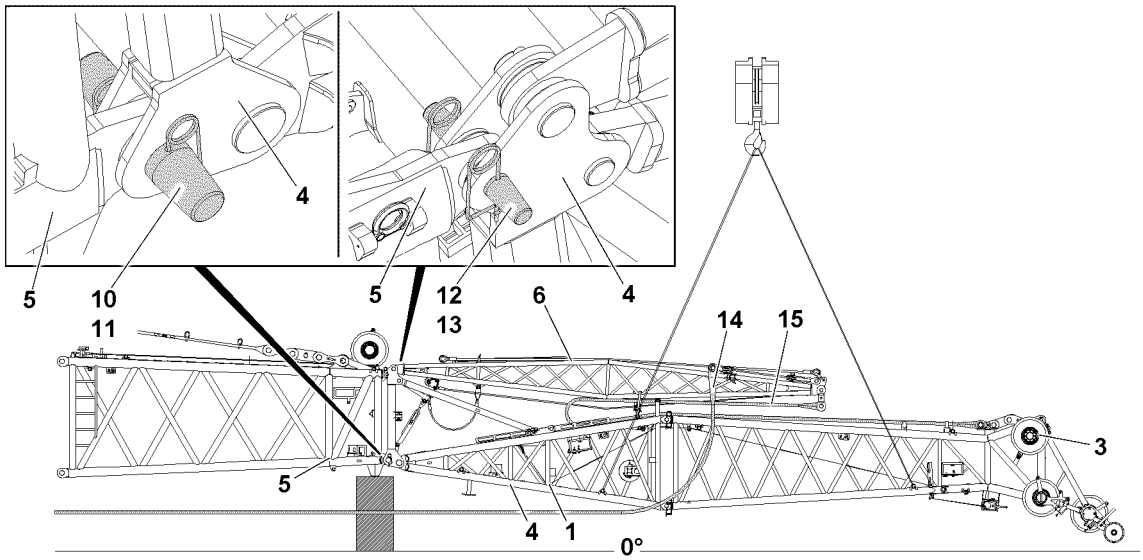

Fig.144405: Pinning the F-jib

Make sure that the following prerequisite is met:

– The F-guy ropes **15** between the F-end section **3** and the F-frame **6** are properly pinned and secured. (If necessary, release the F-guy ropes **15** from the transport retainers on the F-pivot section **1** and pin with the lugs on the F-end section **3** and with lugs on the FA-frame **6**, see section Assembly variant V1.

▶ Fasten the F-assembly unit **4** with the F-end section **3** to the auxiliary crane.
▶ Remove the rigging belts between the F-pivot section **1** and FA-frame **6**.

The F-assembly unit is pinned four times on L-end section or on the F-connector head. Every pin point is present on both sides of the component on one level.

▶ Position the F-assembly unit **4** with F-end section **3** with the auxiliary crane on the F-connector head **5** so that it can be pinned in the pin locations.
▶ Insert the pins **12** on both sides and secure with the retaining element **13**.

WARNING
Crushing / shearing of limbs!
While performing boom system assembly tasks, limbs can be crushed and / or sheared off.
Death, severe bodily injuries, property damage.
▶ Make sure that no crane movements are performed while pinning in the area of the lower pin points.

▶ Insert the pins **10** on both sides and secure with the retaining element **11**.
▶ Remove the auxiliary crane.

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3.5.3 Releasing the F-relapse support

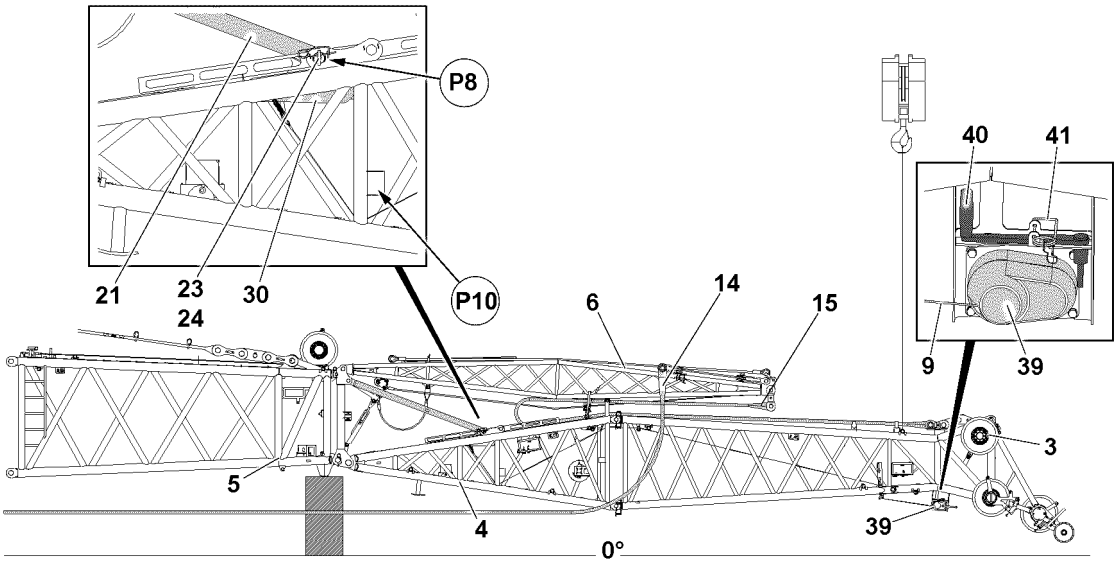

Fig.144421: F-relapse support and FA-frame relapse retainers

Make sure that the following prerequisites are met:
- The F-jib is properly pinned and secured on the F-connector head **5**.
- The F-guy ropes **15** are properly pinned and secured between the FA-frame **6** and the F-end section **3**.
- The F-jib is properly fastened on the F-end section **3** on the auxiliary crane.

▶ Fasten the F-jib on the F-end section **3** to the auxiliary crane.

Release the F-relapse support **21** from the transport position:

▶ Remove the retaining element **24** at point **P8** and unpin the pin **23**.
▶ Insert pin **23** in the park position at point **P10** and secure with retaining element **24**.

3.5.4 Setting the flap „downward“

▶ Remove the crank **40** from the parking position.

Set the flap „downward“:
▶ Actuate the manual rope winch **39** and spool up the control rope **9**.
▶ Take down the crank **40** in the park position and secure with the retaining element **41**.

3.5.5 Separating the FA-frame relapse retainers

WARNING
Falling and swinging FA-frame relapse retainer!
The FA-frame relapse retainer consists of a guy rope **20** and a turnbuckle.
The guy rope **20** of the FA-frame relapse retainer can fall down due to its own weight during unpinning.
Death, severe bodily injuries, property damage.
▶ Make sure when unpinning the FA-frame relapse retainer, that the guy rope **20** is safely held.
▶ Assembly personnel must be at the side of the assembly unit.

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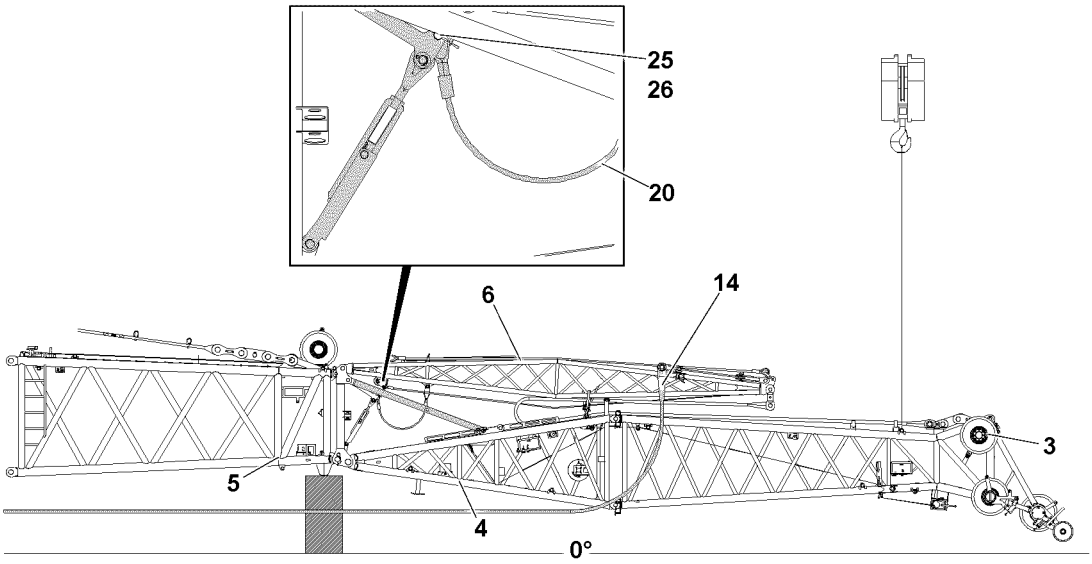

Fig.144422: FA-frame relapse retainer

NOTICE
Danger of property damage!
If the FA-frame relapse retainer is not separated, then it will be damaged when pulling up the F-jib.
▶ Make sure that the FA-frame relapse retainer is separated during the erection of the FA-frame.

Separate the FA-frame relapse retainer:

▶ Remove the retaining element **26** and unpin the pin **25**.
▶ Take the guy rope **20** down.
▶ Insert the pin **25** again and secure with the retaining element **26**.

When the FA-frame relapse retainer is separated:
▶ Lower the F-jib slowly on the ground.

3.5.6 Erecting the FA-frame

Note
▶ Erect the „FA-frame“, see description of assembly variant V2.

WARNING
Non-observance of safety guidelines!
If the safety guidelines are not observed, dangerous situations can arise.
Death, severe bodily injuries, property damage.
▶ Make sure that all danger notes in the section „Erecting the FA-frame“ are observed.

3.5.7 Setting the FA-frame in the operating position

Note
▶ „Setting the FA-frame in the operating position“, see description of assembly variant V2.

WARNING
Non-observance of safety guidelines!
If the safety guidelines are not observed, dangerous situations can arise.
Death, severe bodily injuries, property damage.
▶ Make sure that all danger notes in the section „Setting the FA-frame in the operating position“ are observed.

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4 Establishing the electrical connections

Make sure that the following prerequisites are met:
- The F-jib is completely assembled.
- The airplane warning light and the wind speed sensor are installed.

NOTICE
Damage to the electrical connection on the cable drum!
If the electrical connection from the cable drum on the F-pivot section to the terminal box on the L-end section or on the F-connector head is established first before the connection to the terminal box on the F-end section, the electrical connection can be damaged when spooling out the cable drum.
▶ Establish the electrical connection from the cable drum on the F-pivot section to the terminal box on the F-end section first and then the electrical connection from the terminal box on the F-connector head or on the L-end section to the cable drum on the F-pivot section.

Note
▶ Establish the electrical connections to the F-jib, see Electrical wiring diagram.

▶ Establish the electrical connections.
▶ Make sure that all electrical connections on the boom are established.

5 Checking the function of the safety equipment

WARNING
Malfunctioning safety equipment!
Death, severe bodily injuries, property damage.
▶ Crane operation with non-functioning safety equipment is **prohibited**.

Note
▶ The function of the individual limit switches must be checked before erection of the boom system.
▶ The function of the limit switch initiators must be checked in the test system, see the „Diagnostics manual“.

Note
▶ If a function check on the limit switches or on the safety equipment does not lead to the desired shut offs, then the plug connections on the connector boxes or the components itself must be checked. If no visible connection errors or component defects can be found, contact **Liebherr** Service.

Make sure that the following prerequisites are met:
- All electrical connections have been made.
- The crane engine is running.
- The corresponding operating mode is set on the LICCON monitor.

5.1 Checking the wind speed sensor

▶ Check the movement and the function of the wind speed sensor.

5.2 Checking the airplane warning light

▶ Turn the airplane warning light on in the crane cab, see chapter 4.01.
▶ Check the function visually.

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5.3 Checking the hoist limit switch on the pulley head

Note

▶ When replacing or changing a hoist limit switch (HES), the corresponding hoist limit switch must have the correct bus address and the correct software version in order to be detected again by the bus system (LSB).

▶ Actuate the hoist limit switch manually on the pulley head.

Result:

– The spool up function of the hoist winch turns off.
– The icon „Hoist top“ appears on the LICCON monitor 0.
– The limit switch is functioning.

5.4 Checking the limit switches in general

Note

▶ The limit switch functions have to be checked individually before erection.
▶ To check the limit switches, see corresponding chapter in the Crane operating instructions.

6 Erecting the boom

WARNING
The crane can topple over!
For certain boom lengths, the mechanical auxiliary supports must be assembled, see Erection and take down charts.
Death, severe bodily injuries, property damage.
▶ Observe the specifications in the erection and take-down charts.

WARNING
The crane can topple over!
If the following conditions are not met before erecting the boom, the crane can topple over.
Death, severe bodily injuries, property damage.
▶ Observe the technical safety instructions, see chapter 5.01.
▶ Extend the relapse cylinder before erection.
▶ Do not allow slack rope formation on the control winch.

WARNING
Falling hoist rope!
If the hoist rope before the erection procedure is not properly secured onto the end section, it can fall down backward on the basis of its own weight.
Death, severe bodily injuries, property damage.
▶ Secure the hoist rope properly on the end section before the erection procedure.

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Make sure that the following prerequisites are met:
- The crane is horizontally aligned.
- All electrical connections have been established.
- All limit switches are functioning.
- The central ballast is placed according to the data in the erection and take-down charts.
- The counterweight has been installed to the turntable according to the data in the erection and take-down charts.
- All pin connections are secured.
- The hoist rope has been correctly inserted in the rope pulleys and is prevented from jumping out with the rope retaining pins.
- There are no loose parts on the boom.
- The LICCON overload protection has been set according to the data in the load chart.
- The LICCON overload protection settings have been compared with the actual set up configuration.
- The LICCON overload protection is exceeded.
- The assembly icon is visible on the LICCON monitor.

6.1 Erection procedure

WARNING
The crane can topple over!
Death, severe bodily injuries, property damage.
▶ It is prohibited to turn the crane superstructure while erecting the boom.
▶ Observe the data in the Erection and take down charts.

6.1.1 Reeving in the hook block

Make sure that the following prerequisites are met:
- The crane is horizontally aligned.
- The slewing gear brake is applied.

WARNING
Danger of accident due to side wind!
If the slewing gear brake is released after reeving in / reeving out the hook block / load hook, then the crane can turn uncontrolled in strong side wind.
Death, severe bodily injuries, property damage.
The crane can collide with close-by structures or objects.
▶ Make sure that the current wind speed does not exceed the values from the wind speed chart when releasing the slewing gear brake.

▶ Luff up the boom until the F-jib lifts off the ground.
▶ Reeve in the hook block properly, see chapter 4.06 and the separate reeving plans.
▶ Properly secure the hoist rope on the rope fixed point, see chapter 4.06.
▶ Attach the hoist limit switch weight, see chapter 4.06.

6.1.2 Erecting the boom

DANGER
The crane can topple over!
Death, severe bodily injuries, property damage.
▶ The boom radii listed in the load chart may not be exceeded or fallen below, even if there is no load on the hook.

Note
▶ When the lowest operating position of the boom is reached, the set load chart of the LICCON overload protection is activated.
▶ In the maximum load icon, a load number appears in „t“ instead of the display „???“.

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▶ Luff the boom up to the lowest operating position.

When the boom has reached the lowest operating position:
▶ Make sure that the assembly icon on the LICCON monitor turns off.

Result:

– The LICCON overload protection is active.

7 Operating the crane

7.1 Preparing for crane operation

Note
▶ Observe the notes, see chapter 4.05, chapter 4.08 and chapter 5.01.

Make sure that the following prerequisites are met:
– The LICCON overload protection is active.
– The LICCON overload protection has been set according to the data in the load chart.

WARNING
The crane can topple over!
Death, severe bodily injuries, property damage.
▶ Check the horizontal position of the crane before and during operation.
▶ If the crane operator leaves the crane cab, even for a short time, the operating mode setting must be checked and reset, if necessary, before resuming crane operation.

7.2 Checking the settings

▶ Check the function of the overload protection by running against the operating positions „on top“ and „bottom“.
▶ Check the hoist limit switch by running against the hoist limit switch weight.

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8 Disassembling the F-jib

WARNING
Danger of falling!
During assembly / disassembly, inspection and maintenance work, personnel must be secured with appropriate aids to prevent them from falling.
Death, severe bodily injuries, property damage.
- ▶ All work at a height, when there is a danger of falling, must be carried out with suitable aids.
- ▶ If aids are not available and work cannot be carried out from the ground, then assembly personnel must secure themselves with the supplied fall arrest system to prevent falling, see chapter 2.04.
- ▶ If fall protection equipment is available, then it must be used, see chapter 2.06.
- ▶ When lifting, lowering, swinging crane parts in and out, no persons may remain in the danger zone.
- ▶ If railings are present on the components, then they must be brought into the corresponding position and secured for assembly / disassembly work.
- ▶ It is prohibited to lean the ladder against the component being disassembled.
- ▶ Only step on the aids, ladders and catwalks with clean shoes.
- ▶ Keep aids, ladders and catwalks free of heavy dirt, snow and ice.
- ▶ During all assembly and disassembly work, maintenance work and inspections, travel or crane operation is prohibited.
- ▶ Remaining on a suspended load is prohibited.
- ▶ Stepping or walking on crane components and lattice sections, which have an incline of more than 20° is prohibited.
- ▶ For all assembly work, the crane operator of the main crane must be in voice contact with the crane operator / crane operators of the auxiliary crane / auxiliary cranes.
- ▶ For assembly / disassembly tasks, the crane operator may only initiate crane movements when the responsible guide has explicitly released the movement.

WARNING
Danger of impact / crushing!
When installing / removing crane components with the auxiliary crane, crane components can start to swing back and forth.
When lifting / lowering and positioning crane components, there is an increased danger of impacts / crushing.
Death, severe bodily injuries, property damage.
- ▶ Make sure that personnel cannot be caught by components.
- ▶ When working in danger zones: Use aids to protect limbs.
- ▶ Guide components with suitable aids to minimize oscillation.

WARNING
The components can fall down!
If the corresponding component is disengaged from the auxiliary crane before the corresponding component is pinned, then the corresponding component can fall down.
Death, severe bodily injuries, property damage.
- ▶ Do not disengage the auxiliary crane until the respective component is pinned and secured.

WARNING
The lattice sections can fall down!
If the lattice sections are not pinned and secured correctly, then they can fall down.
Death, severe bodily injuries, property damage.
- ▶ Insert or unpin both pins at the same horizontal level, i.e. **left and right**.
- ▶ Do not stand under the lattice sections or within the entire danger zone during the pinning and unpinning procedure of the boom.
- ▶ Safely secure the pins in the storage locations as well as in the receptacles.
- ▶ It is prohibited to lean the ladder against the component being disassembled.

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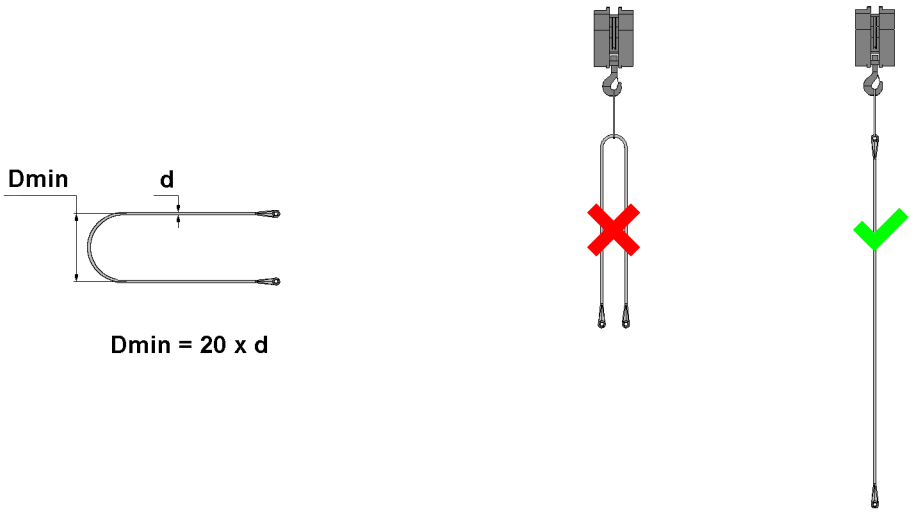

Fig.144404: Attaching the fiber guy ropes

WARNING
The fiber guy ropes can rip off!
If the fiber guy ropes are installed twisted in longitudinal axis, then the load bearing capacity can be significantly reduced as a result and the fiber guy ropes can rip off.
Death, severe bodily injuries, property damage.

- ▶ Make sure that the fiber guy ropes are **never** kinked, knotted or twisted.
- ▶ Make sure the kinked, knotted or twisted fiber guy ropes are **never** installed.
- ▶ Make sure that the fiber guy ropes are never pulled over the ground or sharp edges.
- ▶ Make sure that no damaged fiber guy ropes are installed.
- ▶ Make sure that the numbering in the rod plan is identical to the numbering on the fiber guy ropes.
- ▶ Make sure that minimum bending diameter of **20** x rope diameter on the fiber guy ropes is **never** fallen below.
- ▶ Check the fiber guy ropes before every assembly.
- ▶ When using fiber guy ropes: Inspect the fiber guy ropes regularly, see chapter 8.16.
- ▶ Make sure that the fiber guy ropes are not twisted at assembly. Pay attention to the twist display - marker line along the longitudinal axis of the rope braid.

WARNING
Damage to the fiber guy ropes during storage and transport!
If the following prerequisites for storage and transport are not observed, then the load bearing capacity can be significantly reduced and the fiber guy ropes can rip off.
Death, severe bodily injuries, property damage.

- ▶ Make sure that minimum bending diameter during storage and transport of **20** x rope diameter on the fiber guy ropes is **never** fallen below.
- ▶ Make sure that the fiber guy ropes are **not** kicked or knotted during storage and transport.
- ▶ Make sure that the fiber guy ropes are **not** twisted during storage and transport. Pay attention to the twist display - marker line along the longitudinal axis of the rope braid.
- ▶ Make sure that the fiber guy ropes do **not** lie over sharp edges during storage and transport.
- ▶ Make sure that the fiber guy ropes are **not** in contact with chemicals or acids during storage and transport.
- ▶ Make sure that the fiber guy ropes are **not** stored or transported together with other components.
- ▶ Store and transport the fiber guy ropes in a closed wooden crate.

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Make sure that the following prerequisites are met:
- The S-boom is luffed down to the „lowest“ operating position.
- The LICCON overload protection has been set according to the data in the load chart.
- The LICCON overload protection is exceeded.
- The assembly icon is visible on the LICCON monitor.
- All unnecessary function keys and manual control levers are blocked on the radio remote control, see chapter 5.31 and chapter 6.08.
- An auxiliary crane is on hand.

8.1 Disassembling the F-jib — disassembly variants

WARNING
Non-compliance with the disassembly descriptions!
Death, severe bodily injuries, property damage.
- ▶ The F-jib must always be disassembled in accordance with the respective description in the respective section.
- ▶ Make sure that the danger notes in the respective disassembly description are observed.

8.1.1 Disassembly variant V1

Disassembling the F-jib in parts
- For disassembly variant V1, the F-jib is disassembled in individual parts.

8.1.2 Disassembly variant V2

Disassemble the complete F-jib (maximum length of 12 m) in flying mode
- For disassembly variant V2, flying disassembly takes place using a hoist rope.

8.2 Taking the S-boom down

WARNING
The crane can topple over!
If the following conditions are not met before taking down the boom, the crane can topple over.
Death, severe bodily injuries, property damage.
- ▶ Observe the technical safety instructions, see chapter 5.01.
- ▶ Observe the specifications in the erection and take-down charts.
- ▶ During disassembly, no hook block may be reeved on the F-jib.

NOTICE
Damage of boom components!
Taking down the boom system can lead to a collision between the hook block and the pulley head.
Boom components can be severely damaged.
- ▶ Luff the boom system down at the same time and spool the hoist winch out.

8.2.1 Luffing the S-boom down

Note
- ▶ The luff down movement is turned off as soon as the lowest operating position is reached.
- ▶ When the lowest operating position of the S-boom is reached, the load display in the maximum load icon turns off and instead of the load display appears the display „???“.
- ▶ Alarm functions appear on the crane operation screen.

- ▶ Luff the S-boom down to the „lowest“ operating position.

Result:

- The luff down movement is turned off.

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– The „STOP“ icon appears on the LICCON monitor.
– The horn icon appears on the LICCON monitor.

WARNING
The crane can topple over!
In assembly operation the LICCON overload protection is deactivated.
In the event of deliberate improper use, the crane could collapse, the boom can break off or the crane can topple over.
Death, severe bodily injuries, property damage.
▶ Activate the assembly operation only when the consequences are known.
▶ Enter the set up configuration correctly into the LICCON computer system.
▶ Observe the erection / take down charts.
▶ Crane operation with deactivated LICCON overload protection is prohibited.
▶ In assembly operation only load torque reducing crane movements may be carried out until a permissible operating and load range.
▶ The crane operator carries complete and sole responsibility for his actions if the LICCON overload protection is deactivated.

When the boom has reached the „lowest“ operating position:
▶ Activate assembly operation, see chapter 4.02.

Result:

– The LICCON overload protection is deactivated.
– The assembly icon appears on the LICCON monitor.

▶ At the same time, luff down the boom system and spool out the hoist winch until the hook block touches the ground.

When the hook block touches the ground:
▶ Properly take down / set down the hook block onto the floor or a suitable substructure.

When the hook block is properly set down:
▶ Disassemble the hoist limit switch weight.
▶ Reeve out the hook block, see chapter 4.06.
▶ Carefully spool the hoist rope up.
▶ Remove the hook block with the auxiliary crane.

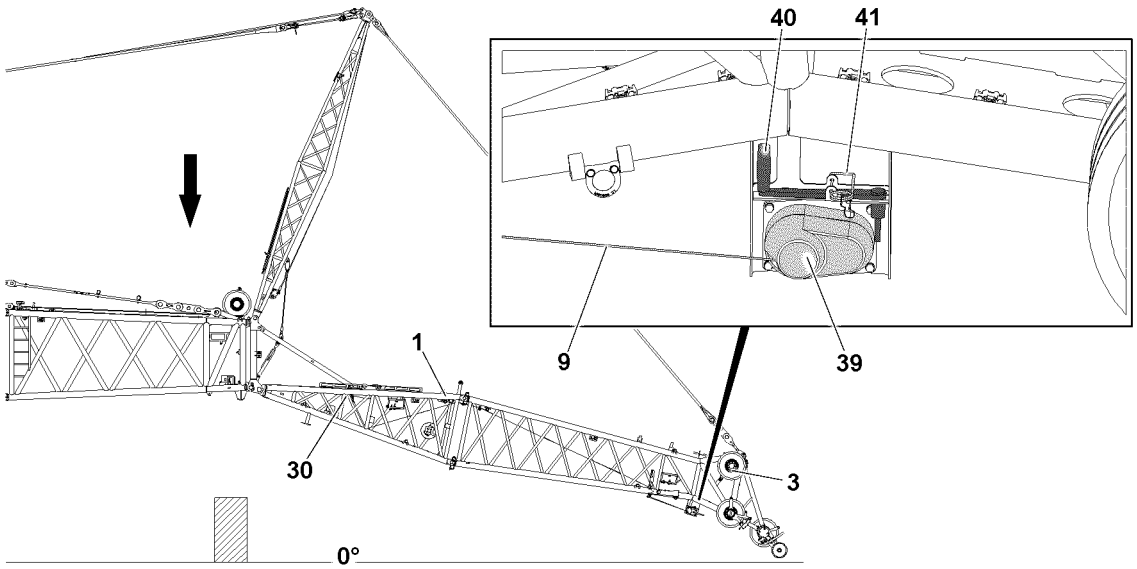

Fig.144424: Taking the boom system down

When the hook block is removed under the F-jib:
▶ Carefully luff the boom system down until the F-jib comes into contact with the ground.

NOTICE
Danger of property damage!
If the flap **30** is not in the „down“ position, the components will be damaged when taking down the F-jib.
▶ Make sure that the flap **30** is in „down“ position immediately before taking down the F-jib.

▶ Pull the flap **30** with the aid of the manual rope winch **39** „downwards“.
▶ Take down the crank **40** in the park position and secure with the retaining element **41**.

NOTICE
Damage to the boom system!
▶ Make sure that the boom system is carefully luffed down at a slow speed.
▶ When the F-jib comes into contact with the ground, carefully luff the beam system down further until the main boom lies on a load bearing substructure.

▶ Take the boom system down on the substructure.

8.3 Disconnecting the electrical connections

Make sure that the following prerequisite is met:
– The boom system is properly taken down.

NOTICE
Damage to the electrical connection on the cable drum!
If the electrical connection between the F-connector head or the L-end section **and** the F-pivot section is not separated before spooling up the cable drum, the electrical connection will be damaged.
If the cable of the cable drum is not properly spooled up on the cable drum after unplugging the F-end section, then the cable drum or the cable can be significantly damaged.
▶ Disconnect the electrical connection from the cable drum on the F-pivot section to the terminal box on the L-connector head or the L-end section first **and** then the electrical connection from the terminal box on the F-end section to the cable drum.
▶ After unplugging, spool up the cable onto the cable drum.

▶ Properly disconnect the electrical connections, see the Electric wiring diagram.
▶ After unplugging, spool up the cable onto the cable drum and secure it to prevent it from spooling out inadvertently.
▶ Secure the cable: Reestablish the electrical connection between the F-connector head or the L-end section and the cable drum.
▶ Close the electrical connections off properly with dummy plugs or protective caps.

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8.4 Disassembly variation V1 — Disassembling the F-jib in parts

8.4.1 Disassembling the lattice sections

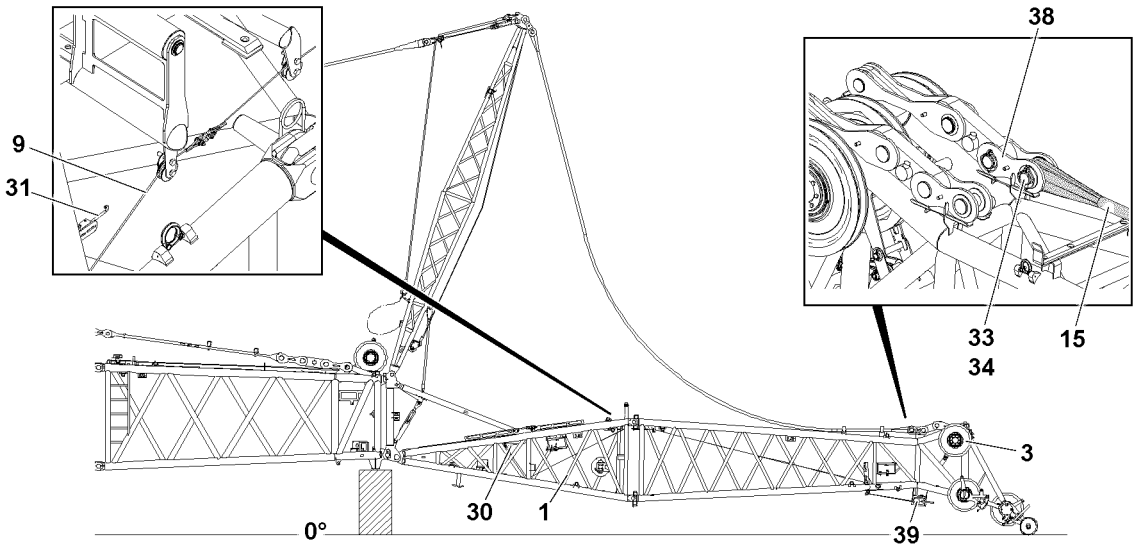

Fig.144423: Setting the flap „downward“

Unpin the F-guy rope **15** with the lugs **38** of the F-end section **3**:

- ▶ Remove the retaining element **34** and unpin the pin **33**.
- ▶ Take the F-guy rope **15** down to the side from the boom.
- ▶ Unpin the second F-guy rope.

Disconnect the rope strand from the flap on the F-pivot section from the manual rope winch on the F-end section:

- ▶ Open the shackle.
- ▶ Pull the flap **30** on the F-pivot section **1** with the control rope **9** „downwards“ and fix it with the hook closure **31**.

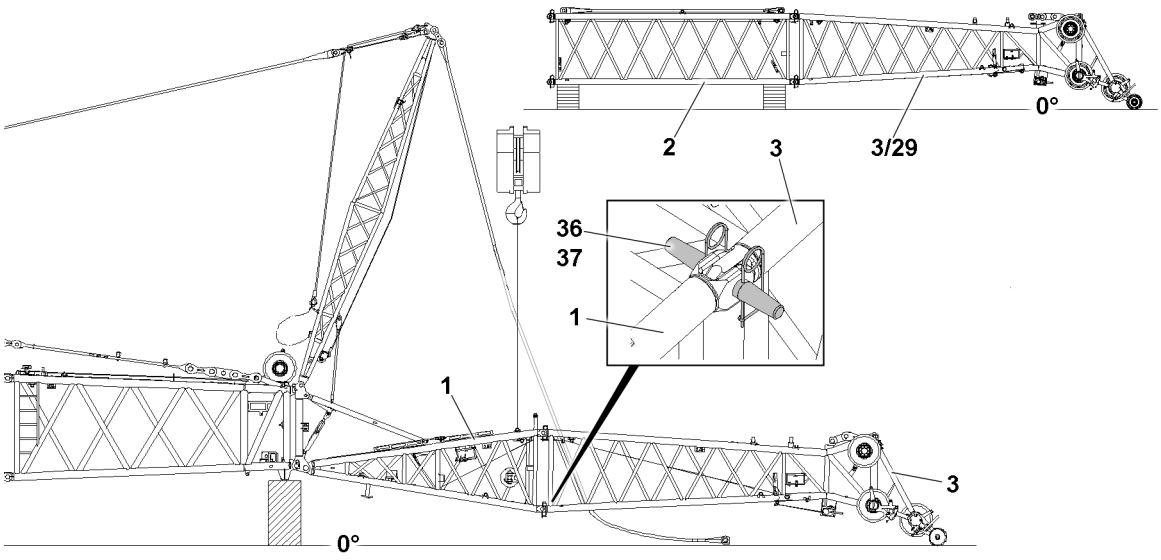

Fig.147793: Unpinning the F-end section

Note

▶ If F-intermediate sections are installed on the F-jib, then the additional guy ropes for the F-intermediate sections must be removed.

▶ Fasten the F-end section **3** or the F-end section **29** and the F-intermediate sections **2** (if applicable) properly to the auxiliary crane and disassemble.

The F-end section is pinned four times on F-pivot section **1**. Every pin location is present on both sides of the component on one level.

▶ Fasten the auxiliary crane on the F-pivot section **1** in order to „open“ the F-jib, see section „Fastening points for the F-jib“.

WARNING

Falling F-jib!

When unpinning the F-jib on the F-pivot section **1**, the F-jib can fall down.

Death, severe bodily injuries, property damage.

▶ It is prohibited for anyone to remain under the F-jib during the unpinning procedure.

▶ Make sure that the F-pivot section **1** is safely held by the auxiliary crane.

▶ Release and unpin the F-pivot section and F-end section on the „bottom“ on both sides: Remove the retaining element **37** and unpin the pin **36**.

▶ „Open“ the F-jib: Carefully take down the F-pivot section **1** on the substructure.

▶ Remove the auxiliary crane.

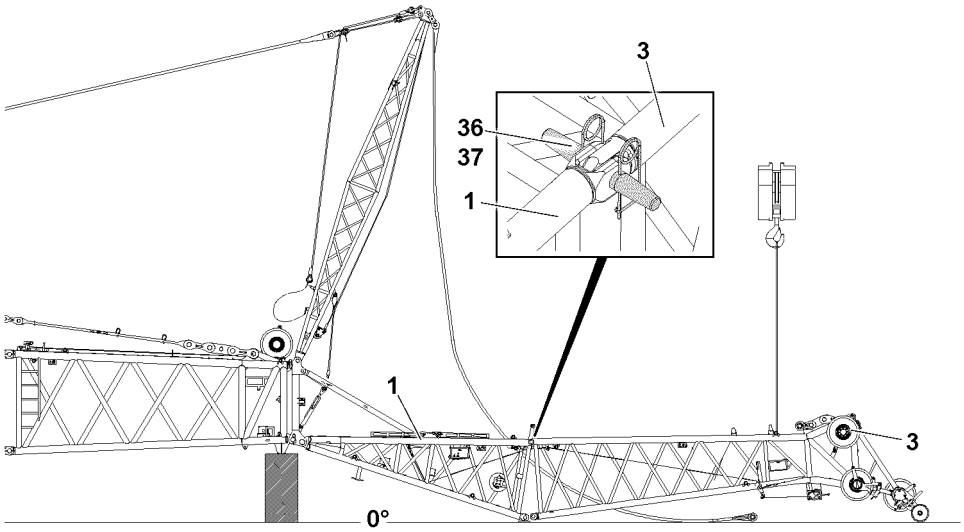

Fig.144426: Unpinning the F-end section

▶ Fasten the F-end section **3** to the auxiliary crane.

WARNING

Tipping lattice sections!

When the lattice sections are unpinned, they can tip over, depending on the ground or the substructure.

Death, severe bodily injuries, property damage.

▶ The lattice sections must be safely held by the auxiliary crane before unpinning them.

▶ The fastening equipment must be tensioned before unpinning.

▶ It is prohibited to remain in the danger zone.

▶ Release and unpin the F-pivot section **1** and F-end section **3** on the „top“ on both sides: Remove the retaining element **37** and unpin the pin **36**.

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When all connector pins are unpinned:

- ▶ Swing out the F-end section **3** and the F-intermediate section (if applicable) with the auxiliary crane and take it down on a load bearing substructure.
- ▶ Remove the auxiliary crane.

8.4.2 Disassembling the FAB-guy rope

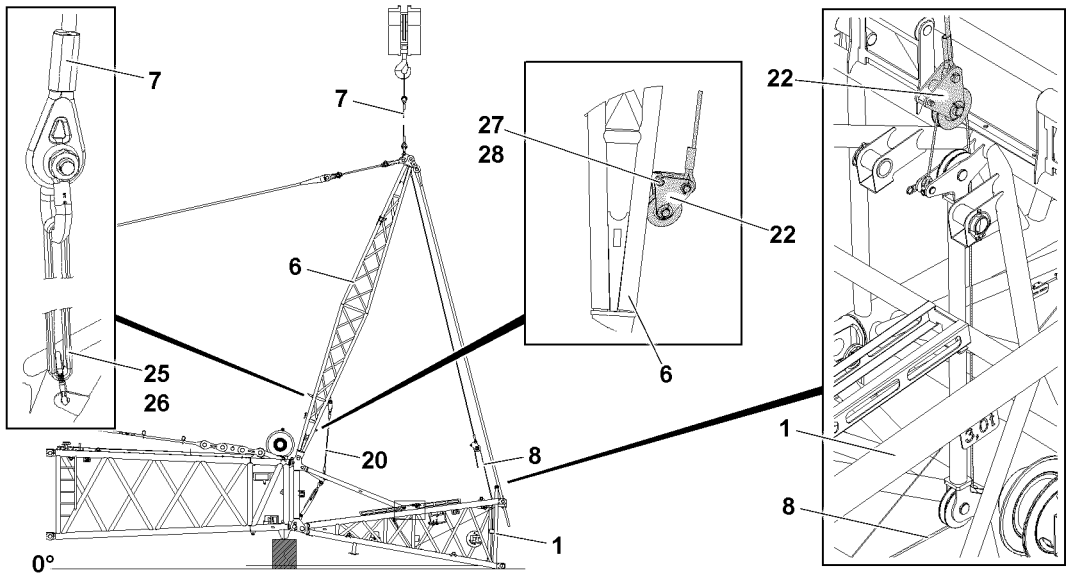

Fig.144427: Disassembling the FAB-guy rope

- ▶ Release the fastening rope **7** on the FA-frame **6**.
- ▶ Fasten the fastening rope **7** to the auxiliary crane.
- ▶ Position the auxiliary crane over the FA-frame **6** and carefully tension the fastening rope **7**.

WARNING
Swinging rope pulley retainer!
The rope pulley retainer **22** can swing due to its own weight when unpinning it.
Death, severe bodily injuries, property damage.

- ▶ Make sure that the rope pulley retainer **22** is held during unpinning.

Release the rope pulley retainer **22** on the FA-frame: **6**

- ▶ Remove the retaining element **28** and unpin the pin **27**.
- ▶ Reeve in the assembly winch rope **8** on the rope pulley retainer **22** and secure on the F-pivot section **1**.

NOTICE
Danger of property damage!
If the FA-frame relapse retainers are not separated, then they will be damaged during erection of the FA-frame **6**.

- ▶ Make sure that the FA-frame relapse retainers are properly separated during the erection of the FA-frame.

WARNING
Swinging FA-frame relapse retainer!
The FA-frame relapse retainer consists of a guy rope and a turnbuckle.
The guy rope **20** of the FA-frame relapse retainer can swing forward due to its own weight during unpinning.
Death, severe bodily injuries, property damage.

- ▶ Make sure when unpinning the FA-frame relapse retainer, that the guy rope **20** is safely held.
- ▶ Assembly personnel must be at the side of the assembly unit.

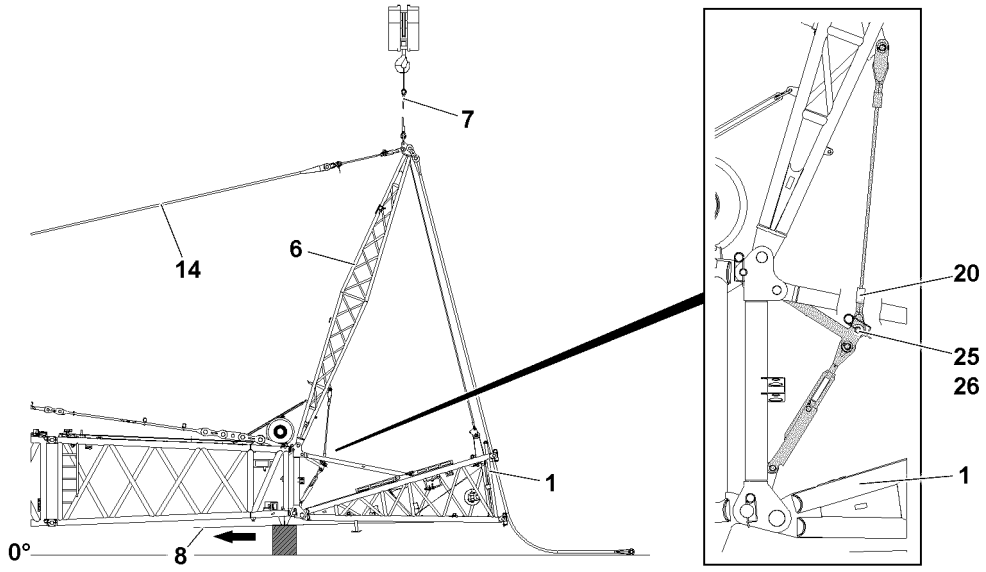

Fig.144428: Separating the FA-frame relapse retainers

Separate the FA-frame relapse retainer:

▶ Carefully spool up the assembly winch rope **8**.

Result:

– The F-pivot section **1** is pulled in the direction of the FA-frame **6** and lifted off the ground.
– The FA-frame relapse retainer is relieved.

When the FA-frame relapse retainer is relieved:

▶ Remove the retaining element **26** and unpin the pin **25**.
▶ Remove the guy rope **20**.
▶ Insert the pin **25** again and secure with the retaining element **26**.
▶ Carefully spool out the assembly winch rope **8**.

Result:

– Place the F-pivot section **1** on the ground.

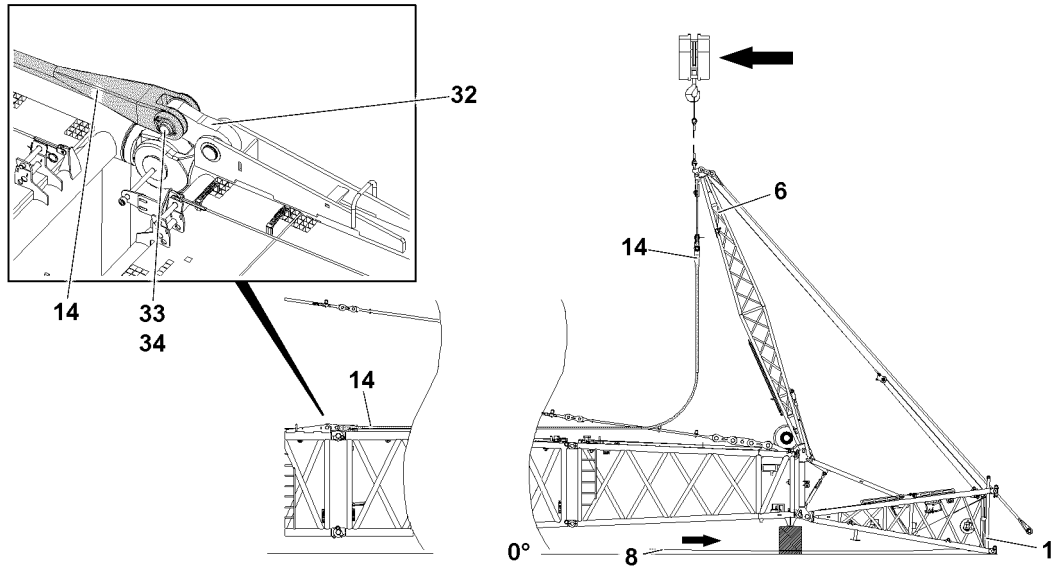

Fig.144429: Unpinning the FAB-guy rope

NOTICE
Danger of property damage!
When swinging the FA-frame **6** in the direction of the main boom, damage may occur to the FA-frame **6**, the F-connector head **5**, as well as the rope pulley retainer **22**.
- ▶ Make sure that a guide supervises the swinging process of the FA-frame.
- ▶ Make sure that the guide is constantly in visual and acoustic contact with the crane operator.
- ▶ Make sure that the assembly winch rope **8** is spooled out during the swinging process of the FA-frame.

- ▶ Carefully swing the FA-frame **6** with the auxiliary crane in direction of the main boom and spool out the assembly winch rope **8** at the same time until the FAB-guy rope **14** can be unpinned.

Unpin the FAB-guy rope **14** from the FAB-lugs **32**:

- ▶ Remove the retaining element **34** and unpin the pin **33**.
- ▶ Take down the FAB-guy rope **14** to the side from the boom.
- ▶ Unpin the second FAB-guy rope.

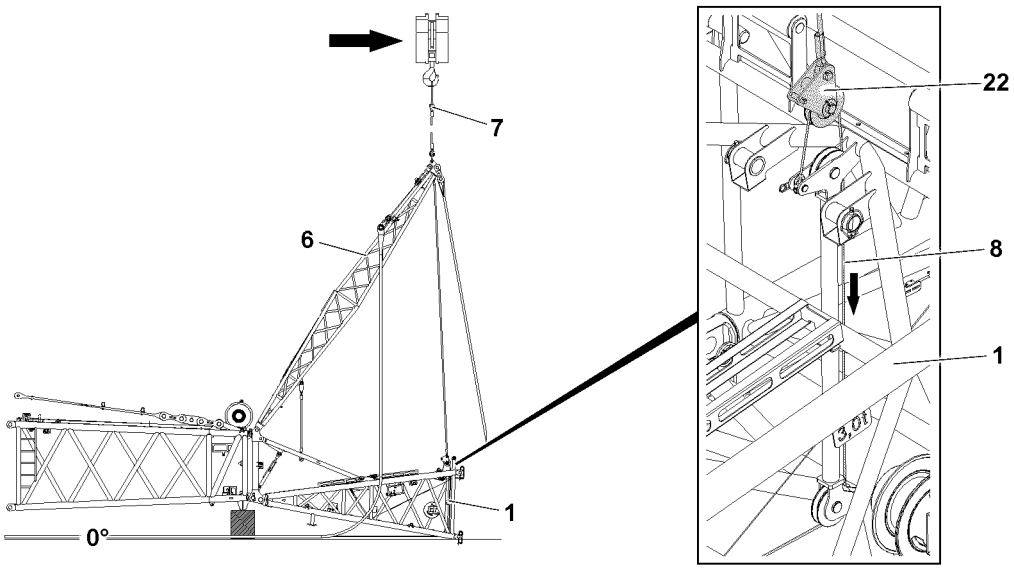

Fig.144430: Pulling the FA-frame in direction of the F-pivot section

WARNING
Automatic swinging of the FA-frame!
If the fastening rope **7** on the FA-frame **6** is not held under tension during assembly / disassembly operations, the FA-frame **6** can swing suddenly to the side.
Death, severe bodily injury, property damage.
- ▶ Make sure that there are no persons within the danger zone.
- ▶ Make sure that the fastening rope **7** never sags during assembly / disassembly operations.

- ▶ Pull the FA-frame **6** with the assembly winch rope **8** in direction of the F-pivot section **1**.
- ▶ Carefully spool up the assembly winch rope **8**.
- ▶ Guide the auxiliary crane.
- ▶ Lower the FA-frame **6** to approx. 40°.

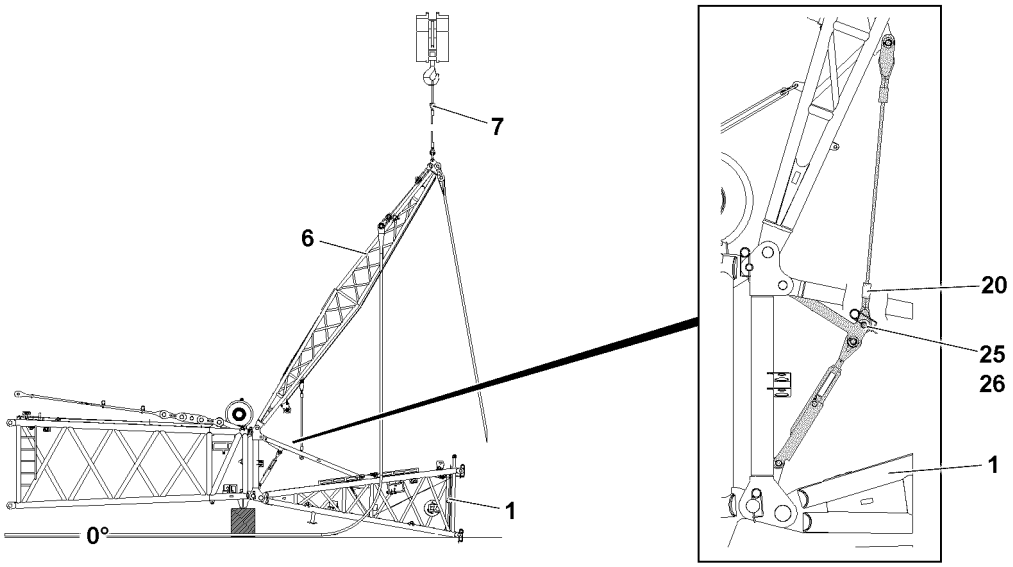

Fig.144431: Connecting the FA-frame relapse retainer

Connect the FA-frame relapse retainer:

- ▶ Swing the guy rope **20** to the FA-frame relapse retainer.
- ▶ Insert the pin **25** and secure it with the retaining element **26**.

8.4.3 Taking the FA-frame down

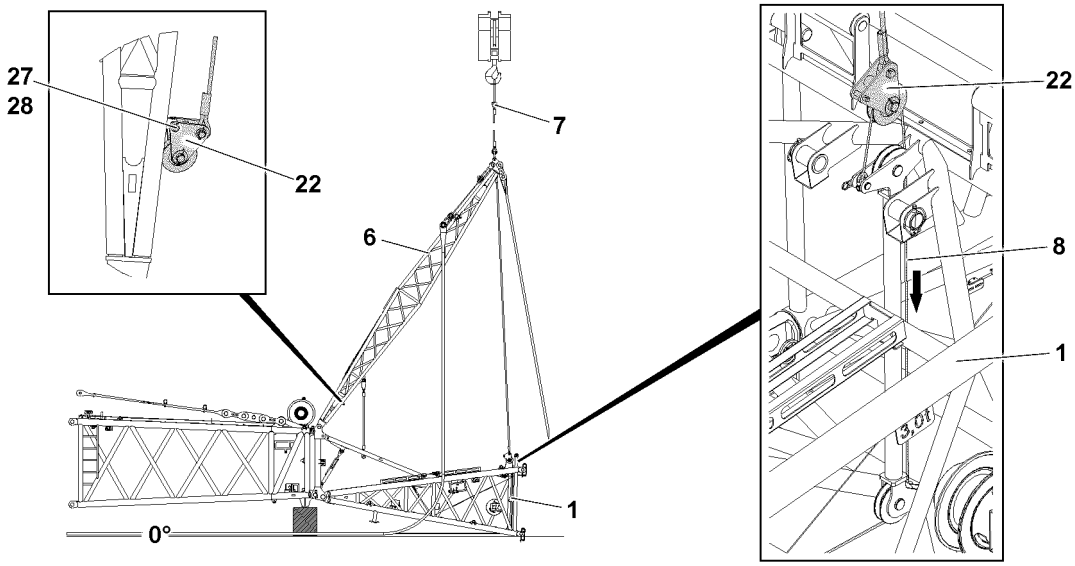

*Fig.144432: Pinning the rope pulley retainer **22** on the FA-frame*

Make sure that the following prerequisite is met:
- The FA-frame is lowered to approx. 40°.

- ▶ Release and reeve out the assembly winch rope **8**.

Swing and pin the rope pulley retainer **22** on the FA-frame **6**:

- ▶ Insert the pin **27** and secure it with the retaining element **28**.
- ▶ Spool the assembly winch rope **8** up.

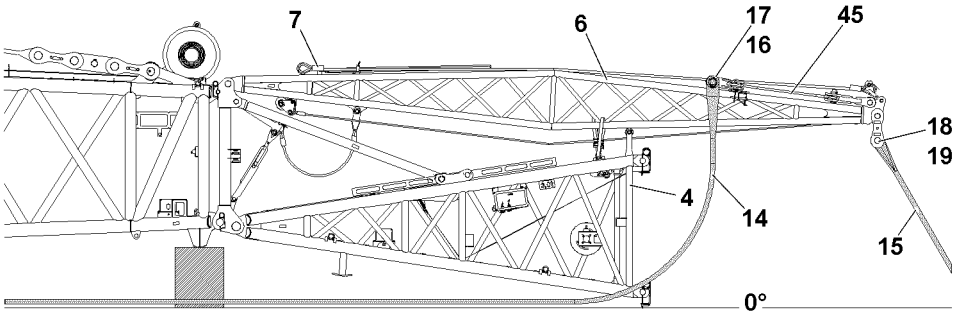

Fig.144433: Guy ropes

NOTICE
Damage to the fiber guy ropes!
Depending on the degree of severity, a damaged fiber guy rope can rip off in crane operation.
- ▶ Make sure that the fiber guy ropes are not kinked, crushed or damaged in any other way when taking down the FA-frame.
- ▶ If visible slight damage is determined on a fiber guy rope, observe chapter 8.16 and thoroughly inspect the rope.
- ▶ Make sure that a damaged fiber guy rope will only continued to be used, depending on the scope of the damage, after it has been thoroughly inspected and released by the rope manufacturer.

- ▶ Take down the FA-frame **6** with the auxiliary crane on the F-pivot section **1**.
- ▶ Remove the auxiliary crane.
- ▶ Attach the fastening rope **7** on the FA-frame **6**.

Unpin the FAB-guy rope **14** on the swing **45** on the FA-frame **6**:

- ▶ Remove the retaining element **17** and unpin the pin **16**.
- ▶ Take the FAB-guy rope down.
- ▶ Unpin the second FAB-guy rope.

Unpin the F-guy rope **15** with lugs on the FA-frame **6**:

- ▶ Remove the retaining element **19** and unpin the pin **18**.
- ▶ Take the F-guy rope down.
- ▶ Unpin the second F-guy rope.

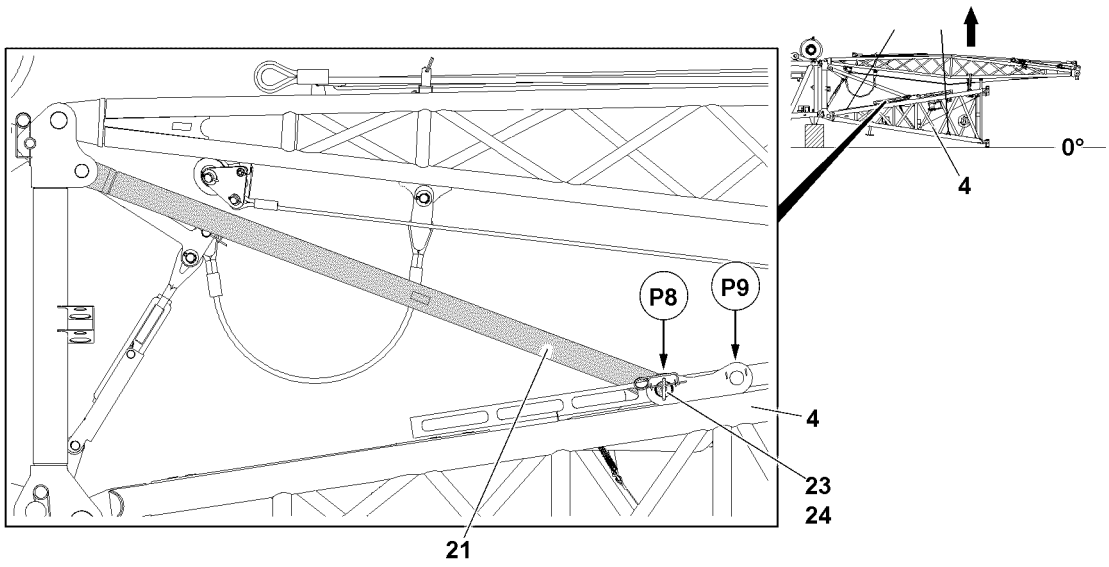

Fig.144434: Position of the F-relapse support

- ▶ Fasten the F-assembly unit **4** to the auxiliary crane.

▶ Lift the F-assembly unit **4** with the auxiliary crane until the F-relapse support **21** can be pinned at point **P8** in transport position.
▶ Remove the retaining element **24** at point **P9** and unpin the pin **23**.

Secure the F-relapse support **21** in the transport position:

▶ Pin the pin **23** in point **P8** and secure with the retaining element **24**.

8.4.4 Disassembling the F-assembly unit

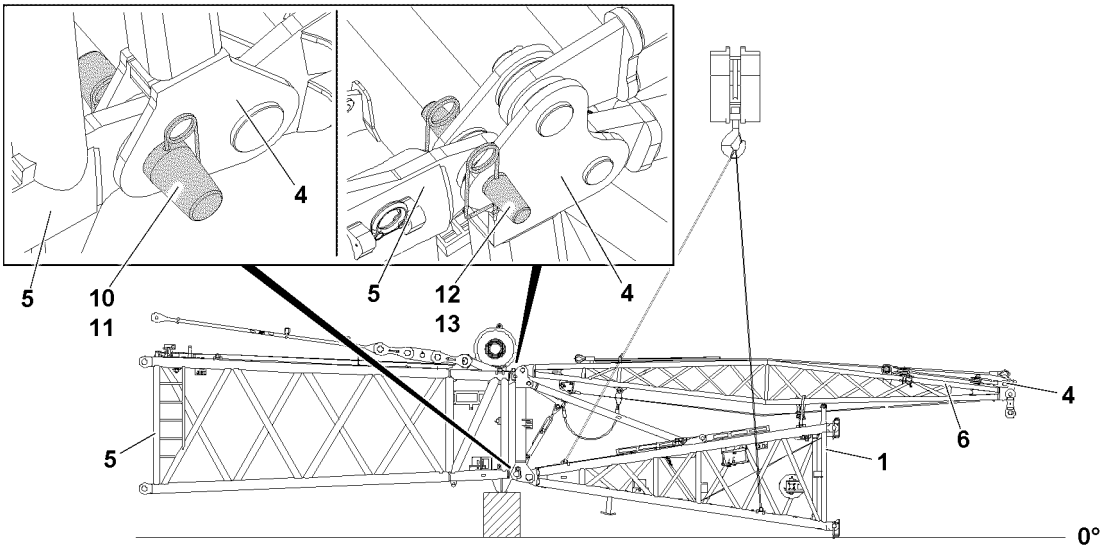

Fig.144392: Unpinning the F-assembly unit

Make sure that the following prerequisite is met:
– The F-assembly unit **4** is properly fastened on the auxiliary crane.
– The fastening equipment is tensioned.

▶ Remove the retaining element **11** on both sides and unpin the pin **10**.
▶ Remove the retaining element **13** on both sides and unpin the pin **12**.

When all pins of the are properly unpinned on both sides:
▶ Swing out the F-assembly unit **4** with the auxiliary crane and take it down on the ground or on a load bearing substructure.
▶ Attach the rigging belts between the F-pivot section **1** and FA-frame **6**.
▶ Insert pin **10** and pin **12** again and secure.

8.5 Disassembly variant V2 — Disassembling the F-jib completely as the F-assembly unit with the F-end section (maximum length 12 m)

WARNING
Impermissible assembly length(s)!
Death, severe bodily injuries, property damage.
▶ Make sure that the assembly of the F-jib as a complete F-assembly unit with the F-end section does not exceed 12 m.

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8.5.1 Setting the flap „downward“

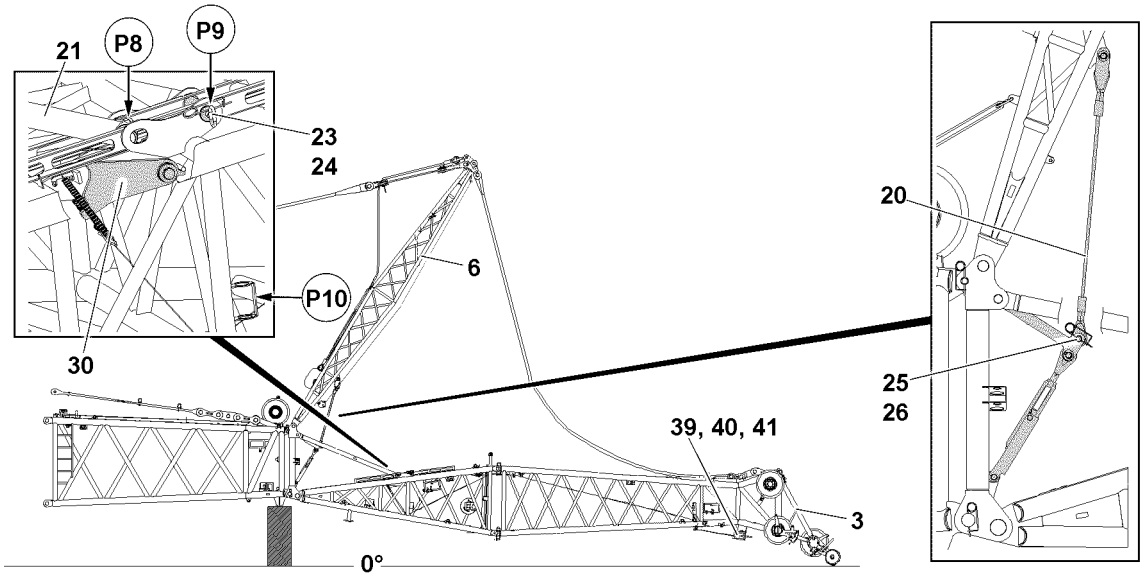

Fig.144435: F-relapse support and FAB-guy rope

▶ Remove the crank **40** from the parking position.

Set the flap „downward“:

▶ Actuate the manual rope winch **39** and spool up the control rope **9**.

▶ Take down the crank **40** in the park position and secure with the retaining element **41**.

8.5.2 Disassembling the FAB-guy rope

NOTICE

Damage of F-relapse support!

If the pin **23** is not unpinned before disassembling the FAB-guy ropes **14** from the stop position **P9**, the F-relapse retainer can be damaged.

▶ Make sure that the pin **23** is unpinned before disassembling the FAB-guy ropes from the stop position **P9**.

▶ Unpin the pin **23** from the stop position **P9** and insert it in the park position at point **P10** and secure.

NOTICE

Danger of property damage!

If the FA-frame relapse retainer is not separated, then it will be damaged during erection of the FA-frame.

▶ Make sure that the FA-frame relapse retainer is separated during the erection of the FA-frame.

WARNING

Falling and swinging FA-frame relapse retainer!

The FA-frame relapse retainer consists of a guy rope **20** and a turnbuckle.

The guy rope **20** of the FA-frame relapse retainer can fall down due to its own weight during unpinning.

Death, severe bodily injuries, property damage.

▶ Make sure when unpinning the FA-frame relapse retainer, that the guy rope **20** is safely held.

▶ Assembly personnel must be at the side of the assembly unit.

Separate the FA-frame relapse retainer:

▶ Remove the retaining element **26** and unpin the pin **25**.

▶ Insert the pin **25** again and secure with the retaining element **26**.

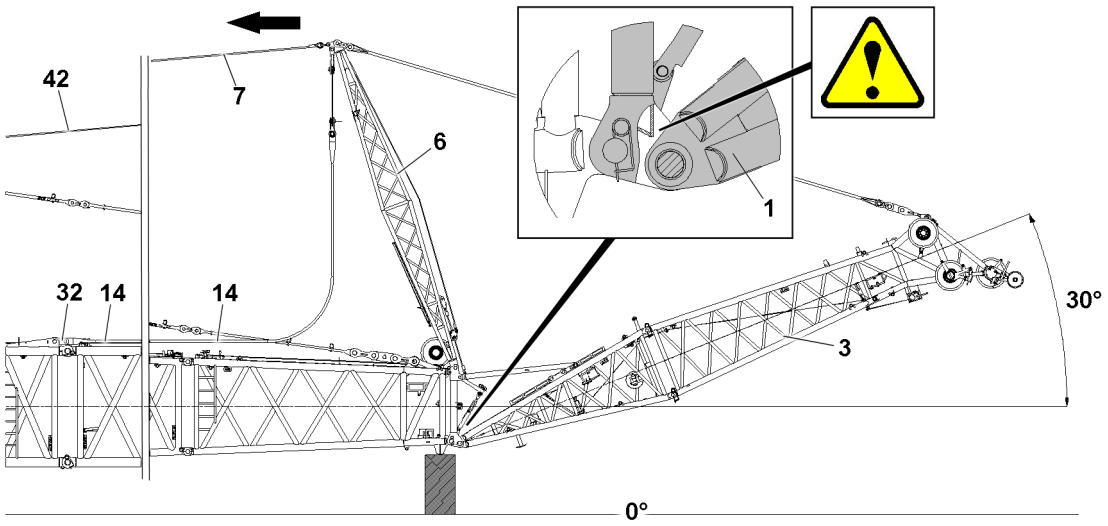

Fig.144436: FAB-guy ropes

- ▶ Release the fastening rope **7** on the FA-frame **6**.
- ▶ Connect the fastening rope **7** of the FA-frame **6** using the link with the hoist rope **42**.

NOTICE
Danger of property damage!
When swinging the FA-frame **6** in direction of the main boom there is a danger of collision of the FA-frame with the attachment parts of the L-end section or the F-connector head.
- ▶ When swinging the FA-frame, a guide must be used.
- ▶ The guide must be in constant visual and acoustic contact with the crane operator.

NOTICE
Danger of collision on the F-pivot point!
When lifting the F-assembly unit with the F-end section in direction of the main boom there is a danger of collision of the FA-pivot section with the attachment parts of the F-pivot point.
- ▶ When lifting the F-assembly unit with the F-end section, a guide must be used.
- ▶ The guide must be in constant visual and acoustic contact with the crane operator.

- ▶ Spool the hoist rope **42** up until the FAB-guy rope **14** can be unpinned in the pin location.

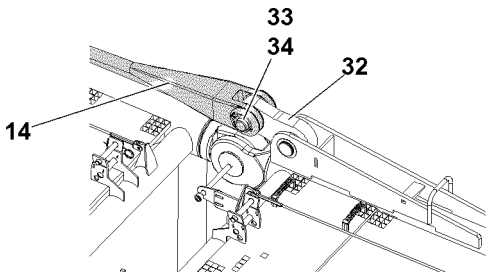

Fig.144420: Unpinning the FAB-guy ropes

Unpin the FAB-guy rope **14** from the FAB-lugs **32** of the L-intermediate section:
- ▶ Remove the retaining element **34** and unpin the pin **33**.
- ▶ Take down the FAB-guy rope **14** to the side from the boom.
- ▶ Unpin the second FAB-guy rope.

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8.5.3 Taking the FA-frame down

NOTICE
Damage to the fiber guy ropes!
Depending on the degree of severity, a damaged fiber guy rope can rip off in crane operation.
- ▶ Make sure that the fiber guy ropes are not kinked, crushed or damaged in any other way when taking down the FA-frame.
- ▶ If visible slight damage is determined on a fiber guy rope, observe chapter 8.16 and thoroughly inspect the rope.
- ▶ Make sure that a damaged fiber guy rope will only continued to be used, depending on the scope of the damage, after it has been thoroughly inspected and released by the rope manufacturer.

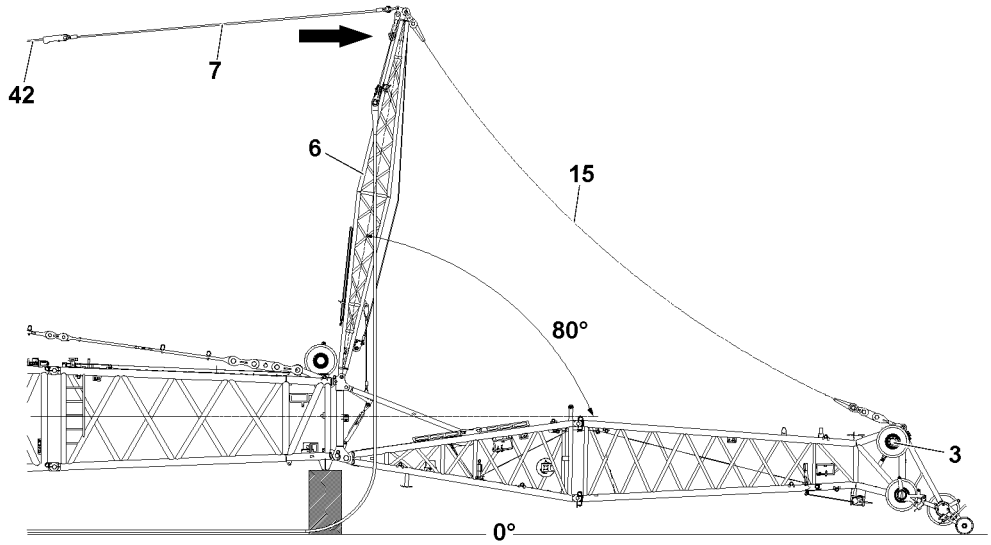

Fig.144437: Lowering the FA-frame to the front in direction of the F-pivot section

Make sure that the following prerequisite is met:
– The FAB-guy ropes are separated.

- ▶ Lower the FA-frame **6** with the hoist rope **42** in direction of the F-jib until the angle between the FA-frame and the main boom is approx. 80° and the F-jib lies on the ground.

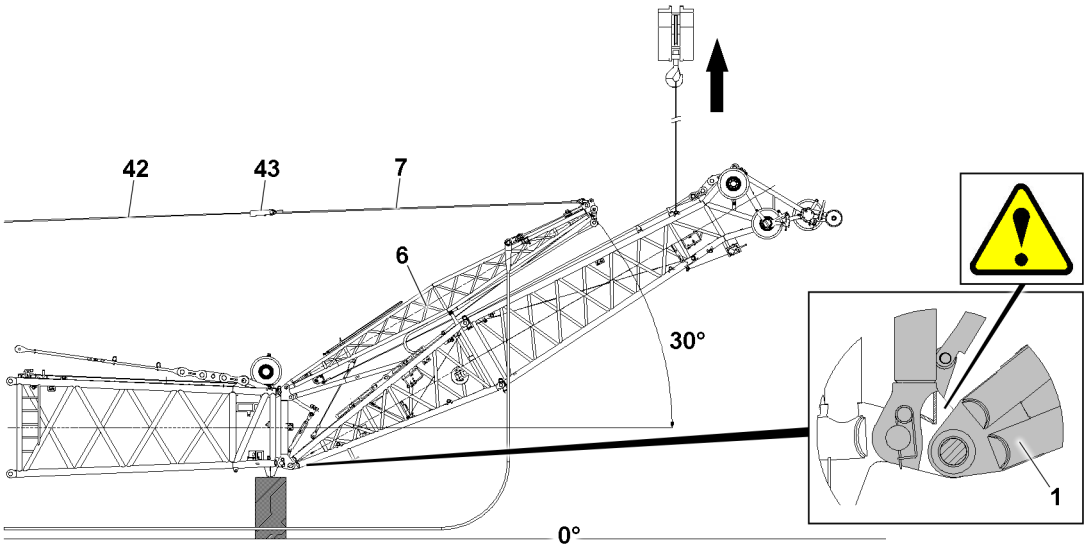

Fig.144407: Pulling up the F-assembly unit with F-end section

- ▶ Lower the FA-frame **6** with the hoist rope **42** in direction of the F-jib until the angle between the FA-frame **6** and the main boom is approx. 30°.
- ▶ Fasten the F-jib to the auxiliary crane.

NOTICE
Danger of collision on the F-pivot point!
When lifting the F-assembly unit with the F-end section in direction of the main boom there is a danger of collision of the FA-pivot section with the attachment parts of the F-pivot point.
- ▶ When lifting the F-assembly unit with the F-end section, a guide must be used.
- ▶ The guide must be in constant visual and acoustic contact with the crane operator.

- ▶ Pull up the F-assembly unit with the F-end section with the auxiliary crane to the FA-frame **6**.

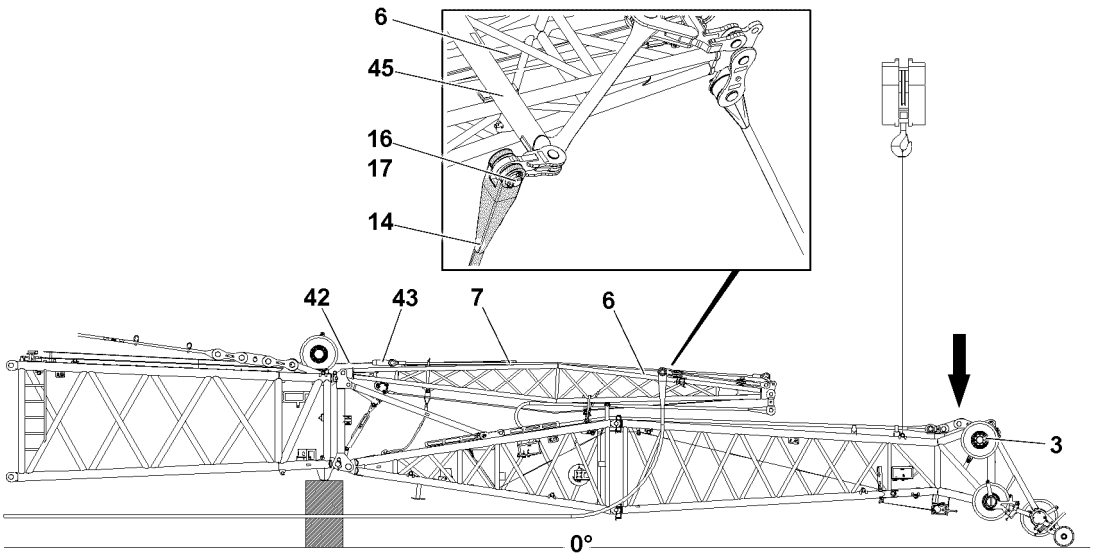

Fig.144438: Taking the F-assembly unit with F-end section down

NOTICE
Danger of slack rope formation!
When spooling the hoist rope **42** out, slack rope can form.
- ▶ When spooling out the hoist rope **42**, make sure there is no slack rope.

When the F-assembly unit with the F-end section is safely held with the auxiliary crane:
- ▶ Spool the hoist rope **42** out until the hoist rope **42** is relieved.
- ▶ Separate the hoist rope **42** and the fastening rope **7**: Open the lock **43**.
- ▶ Fasten the fastening rope **7** on the transport retainer on the FA-frame **6**.
- ▶ Take the F-assembly unit down with the F-end section on the ground completely with the auxiliary crane.
- ▶ Remove the auxiliary crane on the F-end section **3**.
- ▶ Fasten the FAB-guy rope **14** to the auxiliary crane.

Unpin the FAB-guy rope **14** on the swing **45** on the FA-frame **6**:

- ▶ Remove the retaining element **17** and unpin the pin **16**.
- ▶ Take the FAB-guy rope **14** down.
- ▶ Unpin the second FAB-guy rope.
- ▶ Fasten the F-guy rods **15** to the transport retainers on the F-pivot section. (If necessary, unpin the F-guy ropes **15** on the F-end section **3** and on the FA-frame **6** and remove, see the section Disassembly variant V1.

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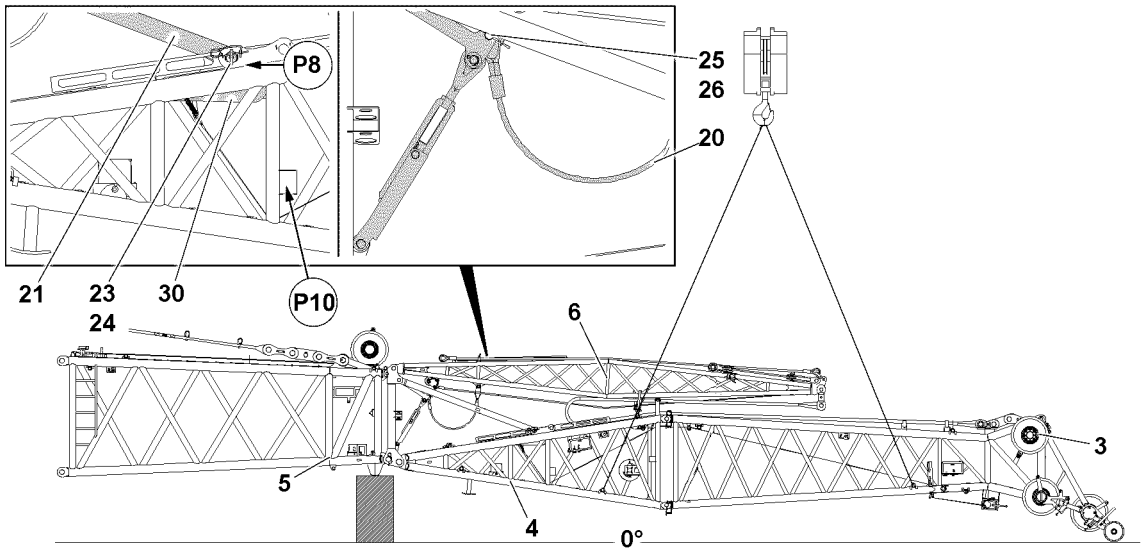

Fig.144439: FA-frame relapse retainer and F-relapse support

▶ Fasten the F-assembly unit with the F-end section on the corresponding fastening points for the disassembly, see section Fastening points.

When the F-assembly unit is properly fastened with the F-end section on the fastening points to the auxiliary crane:

▶ Slowly and carefully lift the F-assembly unit with F-end section with the auxiliary crane until the pin bores of the F-relapse support **21** align on the pin point **P8**.
▶ Unpin the pin **23** from the park position at point **P10**: Remove the retaining element **24** and unpin the pin **23**.
▶ Insert the pin **23** at point **P8** in the transport position and secure with the retaining element **24**.
▶ Pin the FA-frame relapse retainer: Pin the guy rope **20** with the turnbuckle with the pin **25** and secure with the retaining element **26**.

8.5.4 Disassembling the F-assembly unit with F-end section

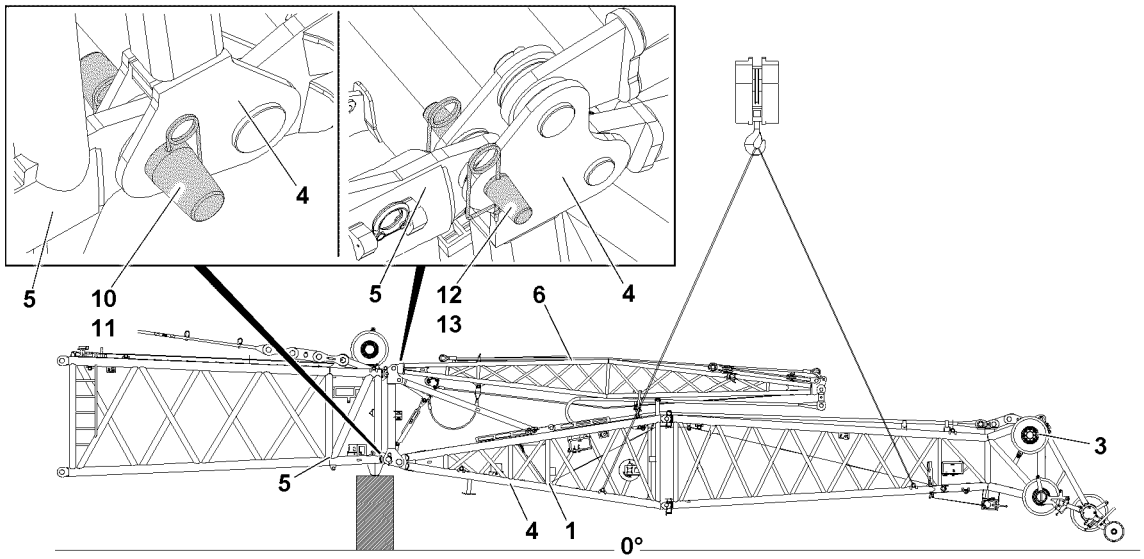

Fig.144440: Unpinning the F-assembly unit with the F-end section on the L-end section or on the F-connector head

When the F-assembly unit with the F-end section is safely held in position by the auxiliary crane:

▶ Remove the retaining element **11** on both sides and unpin the pin **10**.

▶ Remove the retaining element **13** on both sides and unpin the pin **12**.

When all four pins between the F-assembly unit with the F-end section and L-end section or F-connector head are unpinned:

▶ Swing out the F-assembly unit with F-end section with the auxiliary crane and take it down.
▶ Remove the auxiliary crane.
▶ Attach the rigging belts properly between the F-pivot section **1** and FA-frame **6**.
▶ Tighten the rigging belts.
▶ Insert and secure the pin **10** and pin **12** on both sides in the park position.

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5.14 Roller set

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Fig.195219

1 Roller sets overview

Note
- ▶ The roller sets are marked with their own weight.
- ▶ Dimensions and weights, see the Crane operating instructions, chapter 1.03.

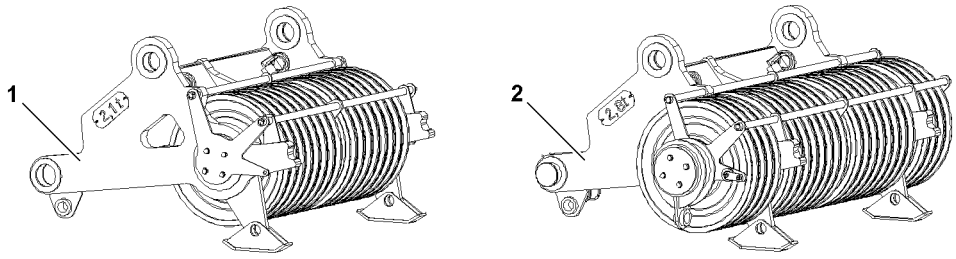

*Fig.123928: Roller set 400 t **1** // Roller set 600 t **2***

Position	Component
1	Roller set 400 t
2	Roller set 600 t

Overview of roller sets 400 t and 600 t

2 Component overview

Note
- ▶ The component overview is shown using the example of the roller set 600 t **2**.

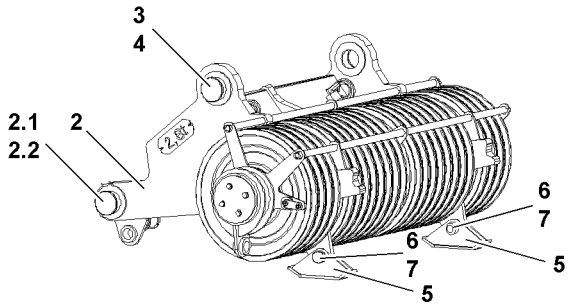

Fig.123929: Component overview roller set 600 t

Position	Component
2	Roller set 600 t
2.1	Pin
2.2	Spring retainer
3	Pin
4	Spring retainer

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Position	Component
5	Placement frame
6	Pin
7	Spring retainer

Component overview roller set 600 t

3 Fastening points

WARNING
Component incorrectly fastened!
Life-threatening situations can arise due to improper or incorrect attachment of the corresponding components.
Death, severe bodily injuries, property damage.
- ▶ Fasten the components only on the intended fastening points **on both sides**.
- ▶ Fastening of components and description of fastening points, see Crane operating instructions, chapter 5.01.

3.1 Fastening points on roller set 400 t and roller set 600 t

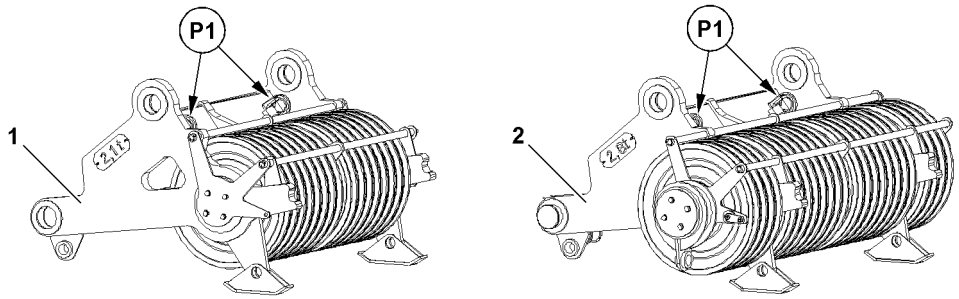

Fig.123930: Fastening points on roller set 400 t and roller set 600 t

Point	Component
P1	Roller set 400 t
P1	Roller set 600 t

Fastening points on roller set 400 t and roller set 600 t

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3.2 S-end section fastening points

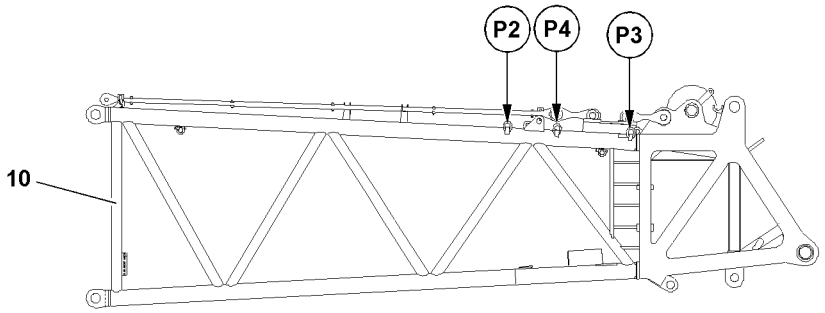

Fig.123932: S-end section fastening points

Point	Component
P2 + P3	S-end section without roller set
P3 + P4	S-end section with roller set

S-end section fastening points

4 Boom heads and roller sets

There are 2 roller sets that can be installed individually in the S-end section. The W-adapter can be operated with one of the two roller sets. The determining factor for the calculation of load charts is the respective boom configuration, see chart „Boom configurations for the calculation of load charts“.

Note

▶ Select boom heads and roller sets according to the chart „Boom configurations for the calculation of load charts“.

WARNING

Load reduction!

For the configurations without a roller set on the S-end section, the load chart value is reduced when installing a roller set by the own weight of this additional roller set.

Death, severe bodily injuries, property damage.

▶ Observe the Erection and take down charts.

▶ Observe the load charts.

Roller sets	Net weight
400 t	2.1 t
600 t	2.8 t

Net weight of roller sets

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Boom	Operating modes	Boom head
S and S6 without auxiliary jib boom	S, SD, S6D2, ...	S-end section with roller set 600 t
S and S6 with W-boom	SW, SDW, S6D2W, ...	S-end section with roller set 600 t
S and S6 with WV-boom	SDWV, S6D2WV, ...	S-end section without roller set
S2	S2D, ...	S-end section 750 t
W	SW, SDW, S6D2W, ...	L-end section 400 t
WV	SDWV, S6D2WV, …	W-adapter with roller set 600 t
SL	SL, SLD, ...	L-end section 400 t
SL with auxiliary jib 120 t	SL8HS, SL7DHS, SL8DHS	Adapter for auxiliary jib 120 t
Auxiliary jib 120 t HS-6.0	SL8HS, SL7DHS, SL8DHS, SLK1	Auxiliary jib 120 t
SL9 and SL12	SL9D2F, SL12D2F, …	L-end section light
SL11, SL13 and SL14	SL11D2, SL13D2, SL14D2, …	L-end section 400 t
F	SL9D2F, SL12D2F, …	F-end section 150 t
S in SLK1	SLK1	K-adapter
K	SLK1	Adapter for auxiliary jib 120 t

Boom configurations for the calculation of load charts

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5 Installing the roller set

WARNING
Danger of falling!
During assembly / disassembly, inspection and maintenance work, personnel must be secured with appropriate aids to prevent them from falling.
Death, severe bodily injuries, property damage.
- ▶ All work at a height, when there is a danger of falling, must be carried out with suitable aids.
- ▶ If aids are not available and work cannot be carried out from the ground, then assembly personnel must secure themselves with the supplied fall arrest system to prevent falling, see the Crane operating instructions, chapter 2.04.
- ▶ If fall protection equipment is available, then it must be used, see the Crane operating instructions, chapter 2.06.
- ▶ When lifting, lowering, swinging crane parts in and out, no persons may remain in the danger zone.
- ▶ If railings are present on the components, then they must be brought into the corresponding position and secured for assembly / disassembly work.
- ▶ It is prohibited to lean the auxiliary ladder against the component being disassembled.
- ▶ Only step on the aids, ladders and catwalks with clean shoes.
- ▶ Keep aids, ladders and catwalks free of heavy dirt, snow and ice.
- ▶ During all assembly and disassembly work, maintenance work and inspections, travel or crane operation is prohibited.
- ▶ Remaining on a suspended load is prohibited.
- ▶ Stepping or walking on crane components and lattice sections, which have an incline of more than 20° is prohibited.
- ▶ For all assembly work, the crane operator of the main crane must be in voice contact with the crane operator / crane operators of the auxiliary crane / auxiliary cranes.
- ▶ For assembly / disassembly tasks, the crane operator may only initiate crane movements when the responsible guide has explicitly released the movement.

WARNING
Danger of impact / crushing!
When installing / removing crane components with the auxiliary crane, crane components can start to swing back and forth.
When lifting / lowering and positioning crane components, there is an increased danger of impacts / crushing.
Death, severe bodily injuries, property damage.
- ▶ Make sure that personnel cannot be caught by components.
- ▶ When working in danger zones: Use aids to protect limbs.
- ▶ Guide components with suitable aids to minimize oscillation.

DANGER
The components can fall down!
If the corresponding component is disengaged from the auxiliary crane before the corresponding component is pinned, then the corresponding component can fall down.
Death, severe bodily injuries, property damage.
- ▶ Do not disengage the auxiliary crane until the respective component is pinned and secured.

WARNING
Falling roller set!
If the roller set is not properly assembled / disassembled, then it can fall down.
Death, severe bodily injuries, property damage.
- ▶ Pin or unpin both pins, which are laying in one horizontal level.
- ▶ It is prohibited to stand under the roller set or within the complete danger zone during the pinning and unpinning procedure of the roller set.
- ▶ Safely secure the pins in the storage locations as well as in the receptacles.

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5.1 Assembling the roller set 600 t on the S-end section

Note

▶ The assembly of the roller sets (roller set 600 t and roller set 400 t) is identical and is described using the example of the roller set 600 t .

WARNING

Impermissible fastening equipment!
The boom can fall down.
Death, severe bodily injuries, property damage.

▶ Use only inspected fastening equipment.
▶ Make sure that the ground in the assembly area has a sufficient load bearing capacity.
▶ Make sure that the S-end section **10** is properly fastened to the auxiliary crane, see section „Fastening points“.
▶ Make sure that there are no persons or obstacles within the danger zone.

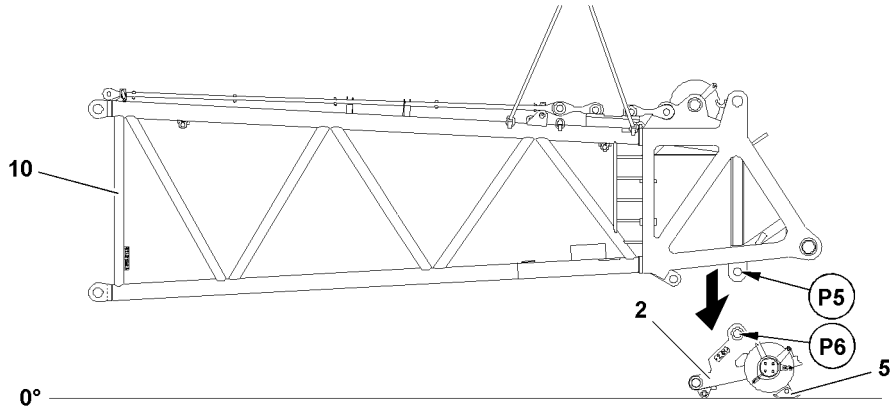

Fig.123931: Assembling the roller set on the S-end section

Make sure that the following prerequisites are met:

– The auxiliary crane is aligned in the horizontal direction
– The placement frames **5** are properly installed and secured on the roller set **2**
– The roller set **2** is placed on the ground
– The pins on the S-end section are unpinned on both sides at point **P5**
– The S-end section **10** is properly fastened to the auxiliary crane

▶ Swing the S-end section **10** in with the auxiliary crane over the roller set 600 t **2**.
▶ Position the S-end section **10** over the roller set 600 t **2**.
▶ Lower the S-end section **10** with the auxiliary crane until the pin bores of the S-end section **10** (point **P5**) align with the pin bores of the roller set 600 t **2** (point **P6**).

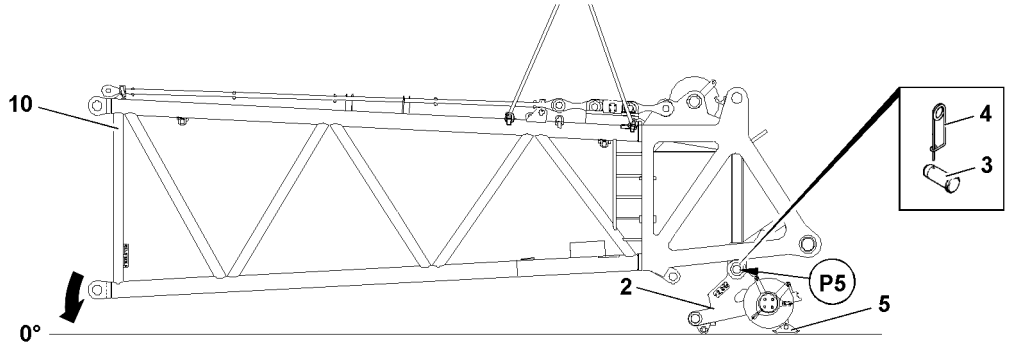

Fig.123933: Pinning the S-end section on the roller set / taking-down the S-end section on the ground

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▶ Pin the S-end section **10** with the roller set 600 t **2**: Insert the pin **3** at point **P5** on both sides and secure with the spring retainer **4**.

When the S-end section **10** is properly pinned and secured on both sides with the roller set 600 t **2**:
▶ Set the S-end section **10** with the auxiliary crane on the ground.

When the S-end section **10** is placed completely on the ground:
▶ Change the fastening equipment from point **P2** to point **P4**, see section „S-end section fastening points“.

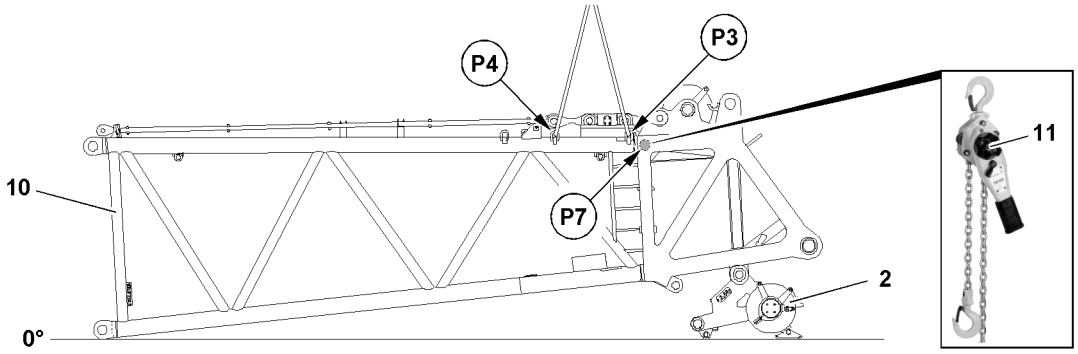

Fig.123934: Changing the fastening equipment / hanging in the manual chain pull

▶ Hang the manual chain pull **11** properly at point **P7**.
▶ Carefully lift the S-end section **10** with the auxiliary crane off the ground.

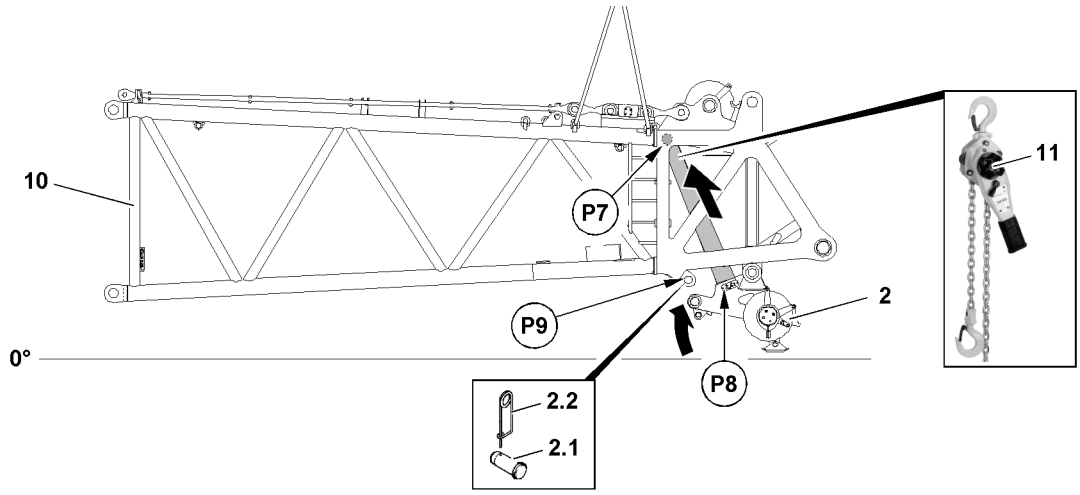

Fig.123935: Installing the manual chain pull and lifting the roller set

When the S-end section **10** has lifted off the ground:
▶ Hang the manual chain pull **11** on the bottom at point **P8** on the roller set.
▶ Actuate the manual chain pull **11** and pull the roller set **2** up until the pin bores align at point **P9**.

When the pin bores align at point **P9**:
▶ Insert the pin **2.1** on both sides and secure with the spring retainer **2.2**.

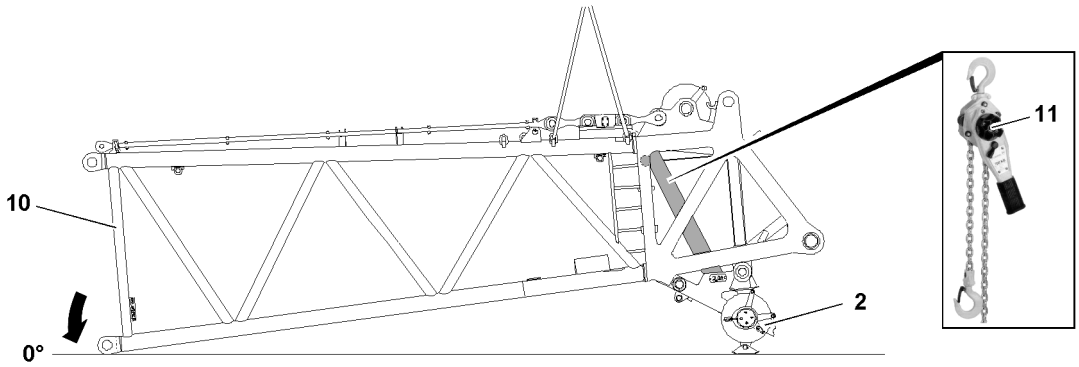

Fig.123936: S-end section set down on the ground / roller set is assembled

- ▶ Set the S-end section **10** with the auxiliary crane on the ground.
- ▶ Unhook and remove the manual chain pull **11**.

Result:

- – The roller set **2** is assembled on the S-end section **10**.
- – The S-end section **10** can be assembled on the boom system.

6 Disassembling the roller set

WARNING
Danger of falling!
During assembly / disassembly, inspection and maintenance work, personnel must be secured with appropriate aids to prevent them from falling.
Death, severe bodily injuries, property damage.

- ▶ All work at a height, when there is a danger of falling, must be carried out with suitable aids.
- ▶ If aids are not available and work cannot be carried out from the ground, then assembly personnel must secure themselves with the supplied fall arrest system to prevent falling, see the Crane operating instructions, chapter 2.04.
- ▶ If fall protection equipment is available, then it must be used, see the Crane operating instructions, chapter 2.06.
- ▶ When lifting, lowering, swinging crane parts in and out, no persons may remain in the danger zone.
- ▶ If railings are present on the components, then they must be brought into the corresponding position and secured for assembly / disassembly work.
- ▶ It is prohibited to lean the auxiliary ladder against the component being disassembled.
- ▶ Only step on the aids, ladders and catwalks with clean shoes.
- ▶ Keep aids, ladders and catwalks free of heavy dirt, snow and ice.
- ▶ During all assembly and disassembly work, maintenance work and inspections, travel or crane operation is prohibited.
- ▶ Remaining on a suspended load is prohibited.
- ▶ Stepping or walking on crane components and lattice sections, which have an incline of more than 20° is prohibited.
- ▶ For all assembly work, the crane operator of the main crane must be in voice contact with the crane operator / crane operators of the auxiliary crane / auxiliary cranes.
- ▶ For assembly / disassembly tasks, the crane operator may only initiate crane movements when the responsible guide has explicitly released the movement.

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WARNING
Danger of impact / crushing!
When installing / removing crane components with the auxiliary crane, crane components can start to swing back and forth.
When lifting / lowering and positioning crane components, there is an increased danger of impacts / crushing.
Death, severe bodily injuries, property damage.
- ▶ Make sure that personnel cannot be caught by components.
- ▶ When working in danger zones: Use aids to protect limbs.
- ▶ Guide components with suitable aids to minimize oscillation.

DANGER
The components can fall down!
If the corresponding component is disengaged from the auxiliary crane before the corresponding component is pinned, then the corresponding component can fall down.
Death, severe bodily injuries, property damage.
- ▶ Do not disengage the auxiliary crane until the respective component is pinned and secured.

WARNING
Falling roller set!
If the roller set is not properly assembled / disassembled, then it can fall down.
Death, severe bodily injuries, property damage.
- ▶ Pin or unpin both pins, which are laying in one horizontal level.
- ▶ It is prohibited to stand under the roller set or within the complete danger zone during the pinning and unpinning procedure of the roller set.
- ▶ Safely secure the pins in the storage locations as well as in the receptacles.

6.1 Disassembling the roller set 600 t on the S-end section

Note
- ▶ The disassembly of the roller sets (roller set 600 t and roller set 400 t) is identical and is described using the example of the roller sett 600 t .

WARNING
Impermissible fastening equipment!
The boom can fall down.
Death, severe bodily injuries, property damage.
- ▶ Use only inspected fastening equipment.
- ▶ Make sure that the ground in the assembly area has a sufficient load bearing capacity.
- ▶ Make sure that the S-end section **10** is properly fastened to the auxiliary crane, see section „Fastening points“.
- ▶ Make sure that there are no persons or obstacles within the danger zone.

Make sure that the following prerequisites are met:
- The auxiliary crane is aligned in the horizontal direction
- The placement frames **5** are properly installed and secured on the roller set **2**
- The S-end section **10** is laying on the ground
- The S-end section **10** is properly fastened to the auxiliary crane
- The manual chain pull is available

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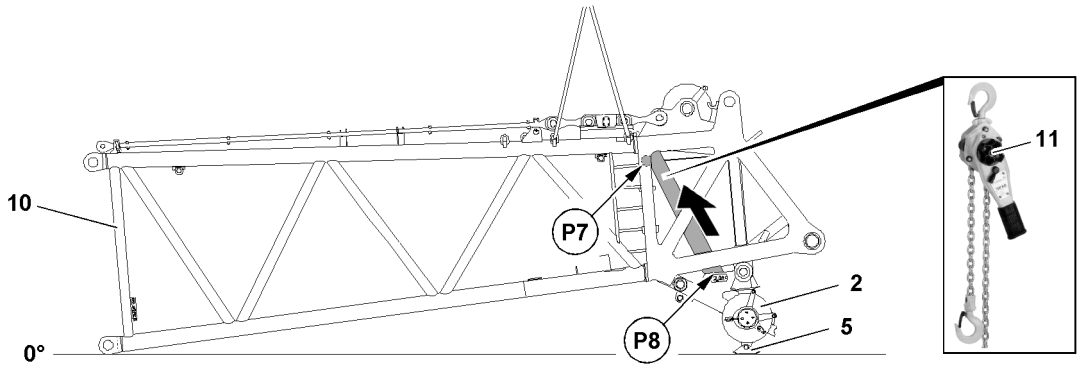

Fig.123937: Assembling the manual chain pull and pretensioning the roller set

▶ Hang the manual chain pull **11** properly at point **P7** on the S-end section **10**.

When the manual chain pull **11** is properly hung at point **P7** on the S-end section **10**:
▶ Hang the manual chain pull **11** properly at point **P8** on the roller set **2**.
▶ Actuate the manual chain pull **11** and tension the chain.

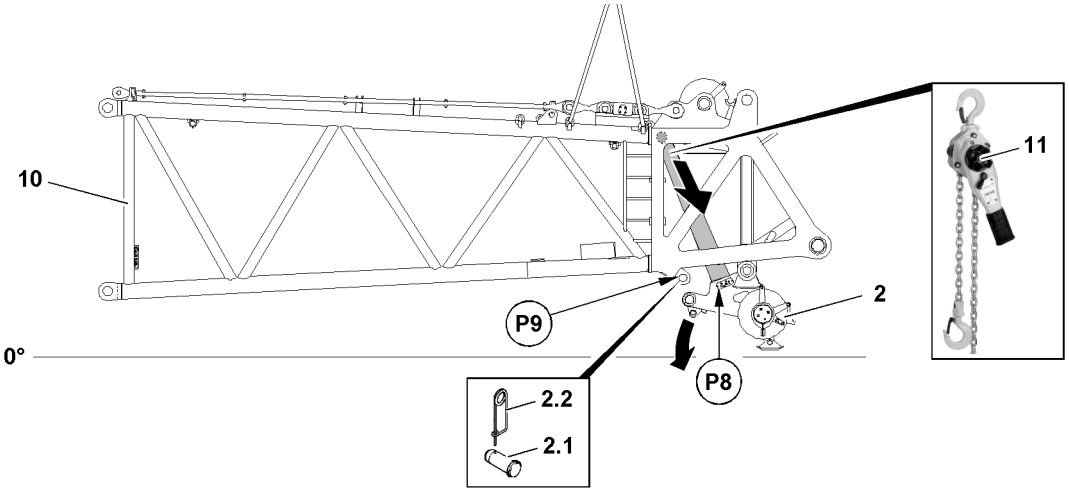

Fig.123951

▶ Lift the S-end section **10** with the auxiliary crane off the ground.

WARNING
Tipping roller set!
Death, severe bodily injuries, property damage.
▶ Make sure that the pins **2.1** are only unpinned when the roller set **2** is safely held in position by the manual chain pull **11**.

When the S-end section **10** has lifted off the ground:
▶ Release pins **2.1** on both sides at point **P9** and unpin.
▶ Actuate the manual chain pull **11** and carefully lower the roller set **2**.

When the roller set **2** is in the down position:
▶ Unhook the manual chain pull **11** at point **P8**.

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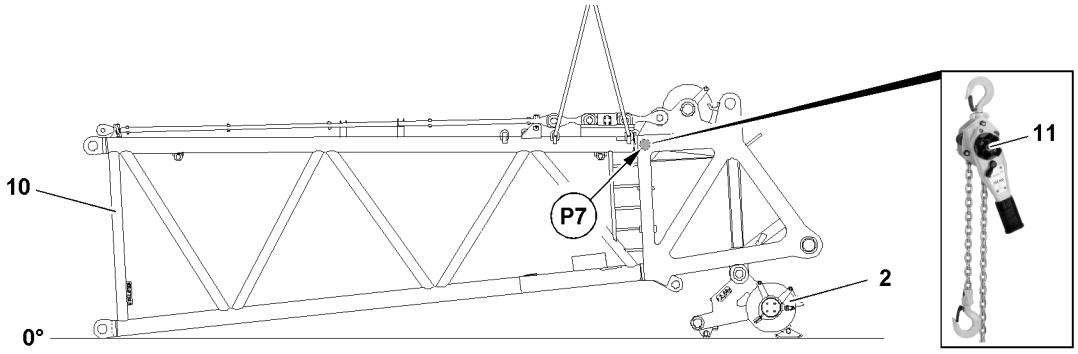

Fig.123952

▶ Set the S-end section **10** with the auxiliary crane on the ground.

When the S-end section **10** is placed on the ground:
▶ Unhook the manual chain pull **11** at point **P7** and remove.

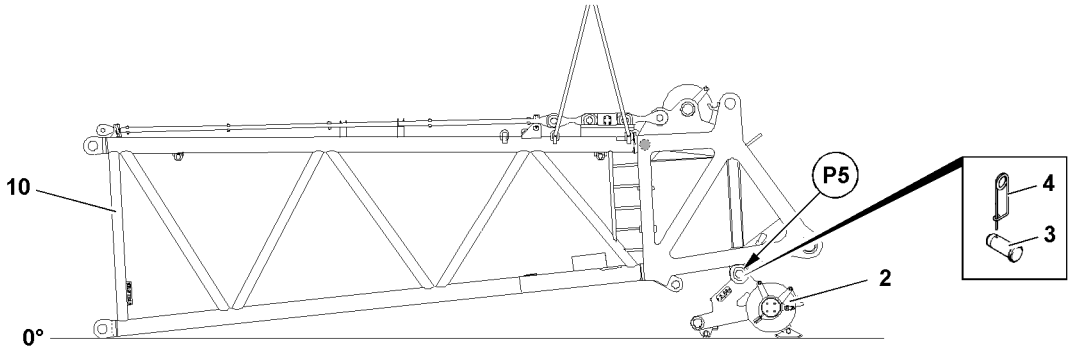

Fig.123953

▶ Release pins **3** on both sides at point **P5** and unpin.

When the pins **3** at point **P5** are released and unpinned on both sides:
▶ Lift the S-end section **10** with the auxiliary crane and swing out.

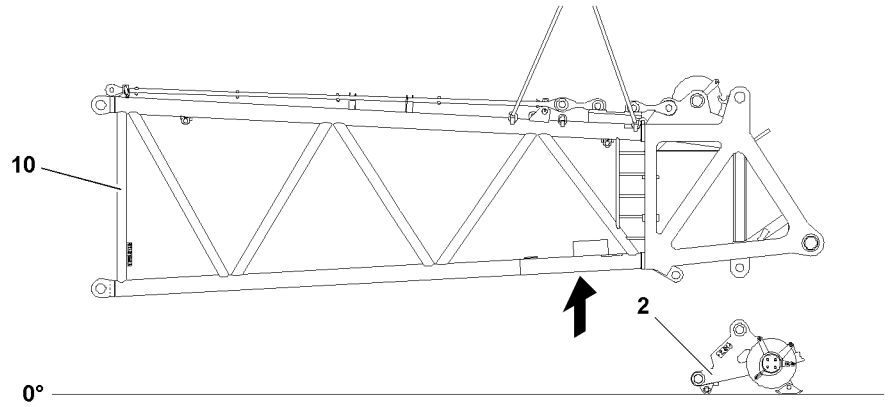

Fig.123954

▶ Place the S-end section **10** on the substructure or on the transport vehicle.
▶ Remove the auxiliary crane.

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5.17 Sliding beam disassembly / assembly

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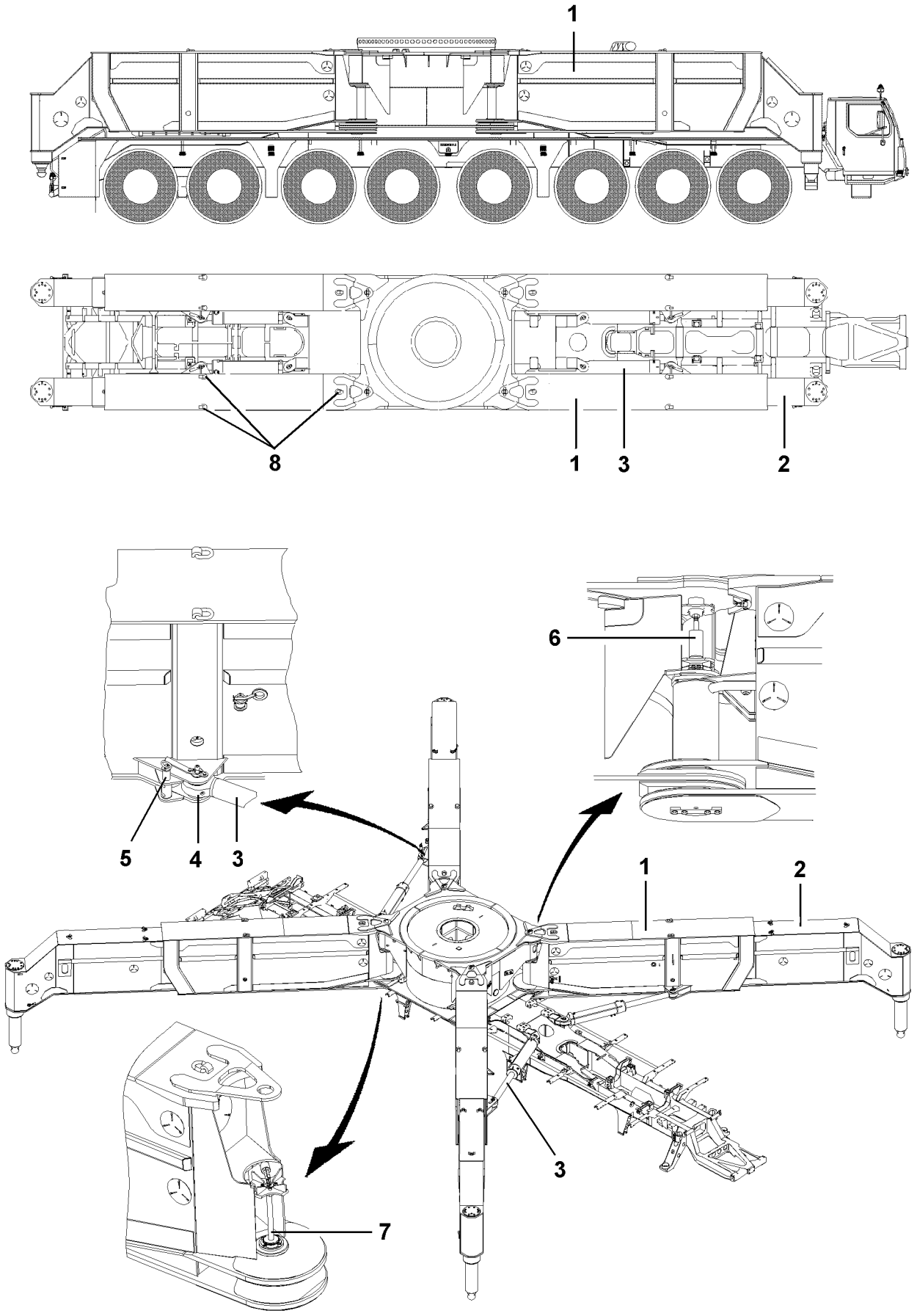

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Fig.196246

1 General

In order to reduce the axle loads for this crane, the support beams can be removed.

1.1 Component overview

Components	
1	Support beams
2	Sliding beams
3	Swing cylinder
4	Pinning of swing cylinder
5	Pins for transport retainer
6	Pinning „top“
7	Pinning „bottom“
8	Eyehooks

1.2 Tackle points support beams

To attach the support beams, 3 eyehooks **8** each are installed.

Note

▶ The„supplied tackle chains“ must be used for the removal and installation of the support beams!

1.3 Weights

Component	Weight
Support beam 1	12 t
Support beam 2	12 t
Support beam 3	12 t
Support beam 4	12 t

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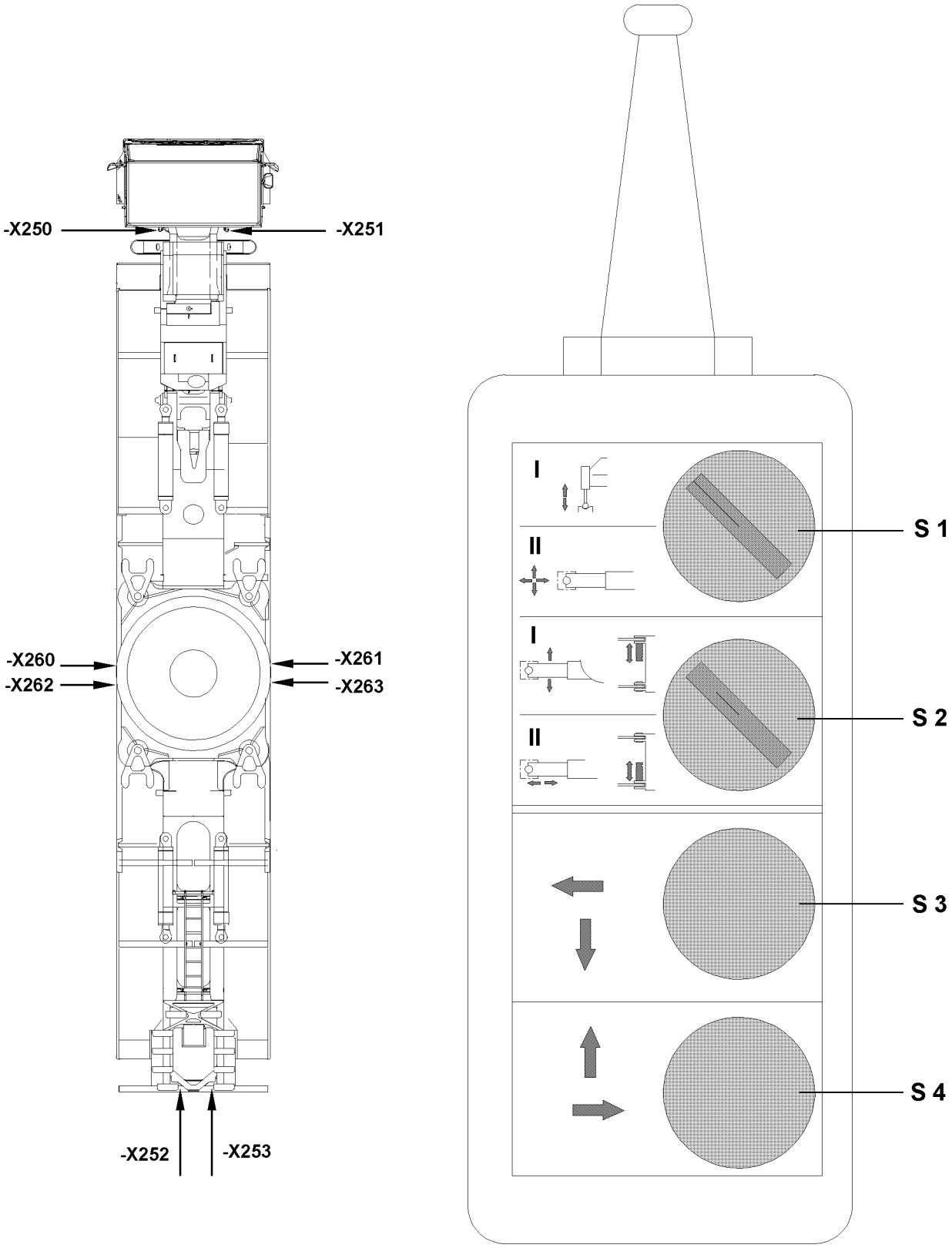

Fig.196250

2 Remote control panel

Note
- ▶ Swinging the support beams out or in to approx. 10 ° is only possible with the remote control panel.
- ▶ After the remote control panel has been connected to a socket, the support control units on the left and right on the vehicle frame are no longer active.
- ▶ The pressure supply is set to approx. 10 bar.
- ▶ Remote control panel, see also „Chapter 3.05“.

2.1 Functions on the remote control panel

2.1.1 Extending / retracting the support cylinders

Note
- ▶ The remote control panel is plugged into corresponding socket (-X250 to -X253).

Extend / retract the support cylinders	
S1	Position I
S3	Extend the support cylinders
S4	Retract the support cylinders

2.1.2 Swinging the support beam out / in

Note
- ▶ The remote control panel is plugged into corresponding socket (-X250 to -X253).

Swing the support beam out / in	
S1	Position II
S2	Position I
S3	Swing the support arm in
S4	Swing the support arm out

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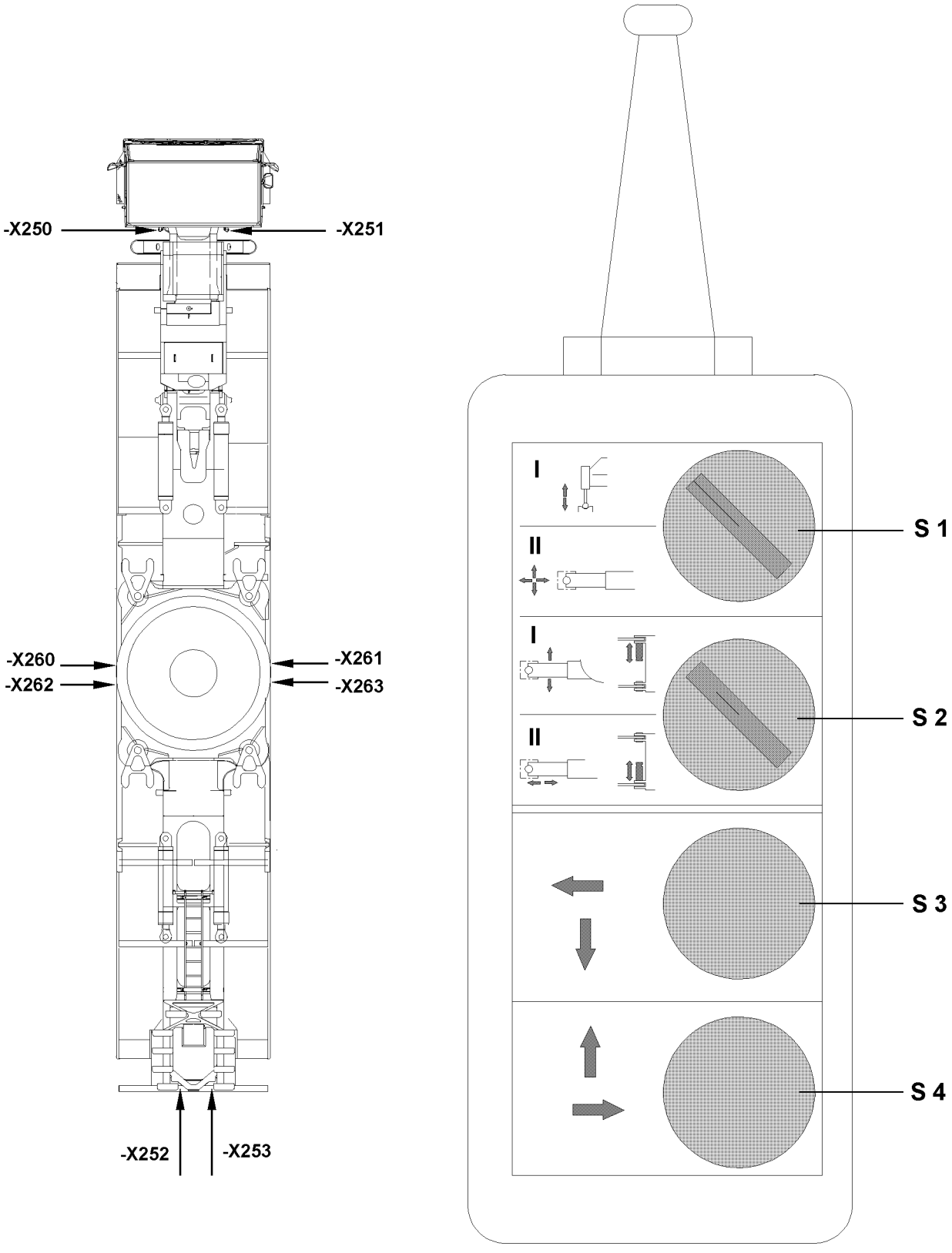

Fig.196250

2.1.3 Pushing the sliding beam out / in

Note
▶ The remote control panel is plugged into corresponding socket (-X250 to -X253).

Push the sliding beam out / in	
S1	Position II
S2	Position II
S3	Push the sliding beam out
S4	Push the sliding beam in

2.1.4 Pin / unpin the support beams ON TOP

Note
▶ The remote control panel is plugged into corresponding socket (-X260 to -X263).

Pin / unpin the support beams ON TOP	
S1	Position II
S2	Position I
S3	Pin the support beams ON TOP
S4	Unpin the support beams ON TOP

2.1.5 Pin / unpin the support beams ON THE BOTTOM

Note
▶ The remote control panel is plugged into corresponding socket (-X260 to -X263).

Pin / unpin the support beams ON THE BOTTOM	
S2	Position II
S3	Unpin the support beams ON THE BOTTOM
S4	Pin the support beams ON THE BOTTOM

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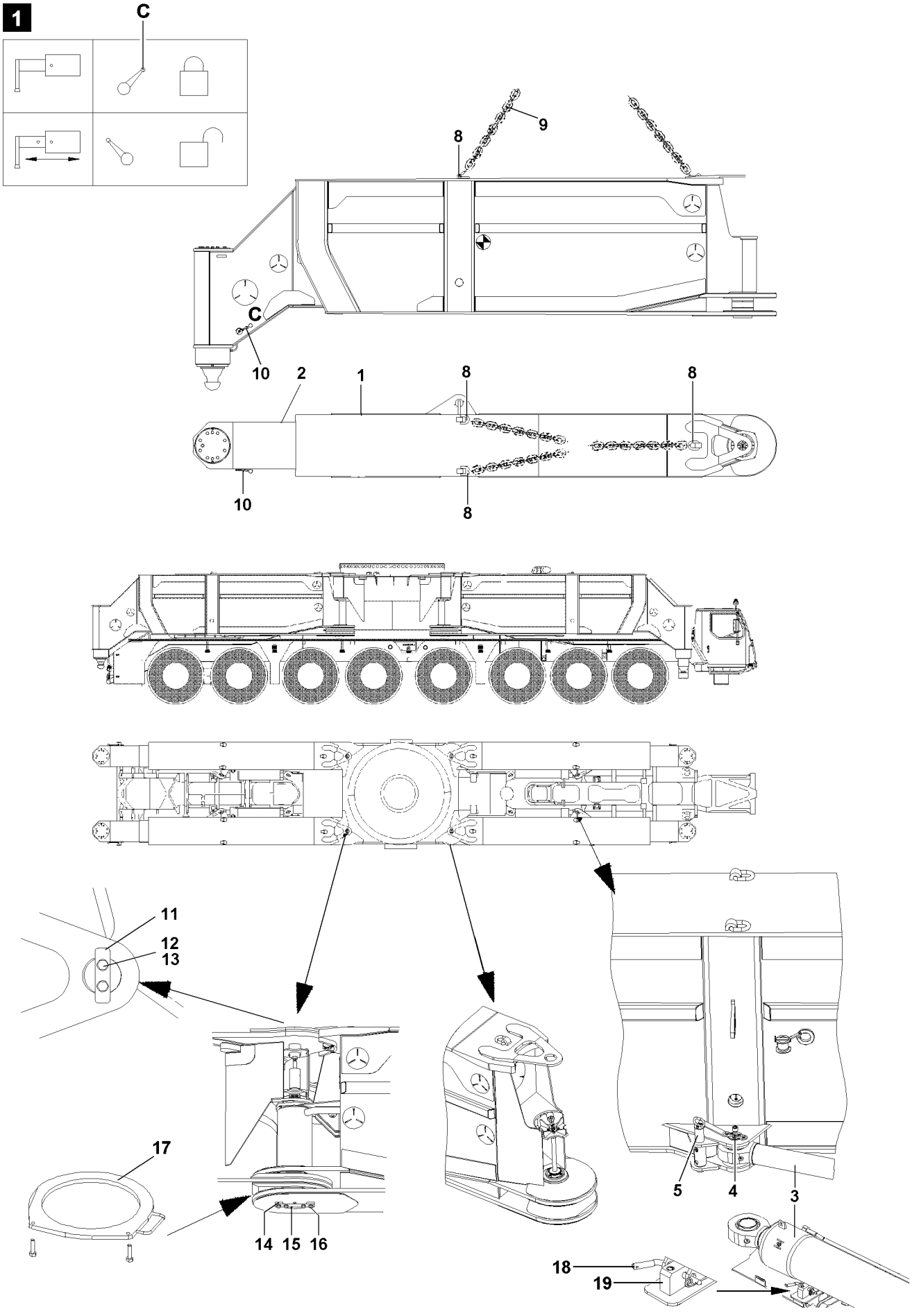

Fig.105294

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3 Removal of support beams

DANGER
Risk of accident!
It is prohibited for anyone to remain between the support beams and the vehicle frame or the center section during the swing procedure!
The crane must be aligned horizontally to prevent the support beams from swinging out by themselves!
Remove the support beams only crosswise, i.e. the left front, then the right rear or the right front, then the left rear!
If this is not observed, the crane can topple over!

- ▶ Retract the rear sliding beams completely and set all levers **10** to position **C**, see fig. **1**.
- ▶ Remove the support beams crosswise, i.e. the left front, then the right rear or the right front, then the left rear.

Note

- ▶ The removal of the support beams is identical for all 4 support beams.

Ensure that the following prerequisites are met:

- the crane is positioned on level ground and is horizontally aligned
- the rear sliding beams are fully retracted and manually pinned with the levers **10**
- all levers **10** are in pinned position **C**, see fig. **1**
- an auxiliary crane is available

3.1 Removing the support beams

- ▶ Start the engine.
- ▶ Swing the support beam out a little with the remote control, so that the swing cylinder **3** can be unpinned.

DANGER
Uncontrolled swinging of the support beam!
The support beam can swing uncontrolled to the side and fatally injure personnel as soon as the swing cylinder **3** is unpinned on the support beam!

- ▶ Before the swing cylinder **3** is unpinned, extend the support cylinder from the support beam to the ground and secure it to prevent uncontrolled swinging!

- ▶ Hang the swing cylinder **3** onto the auxiliary crane.
- ▶ Unpin the pin **4** on the swing cylinder **3**, for example with a pin pulling device.
- ▶ Place the swing cylinder **3** in the receptacle **19**, pin with pin **18** and secure with cotter pin.
- ▶ Hang the support beam on the tackle points **8** with the „supplied tackle chains **9** “on the auxiliary crane.
- ▶ Remove the spacer plate **17** (2 screws M12).
- ▶ Remove the pin retainers „on top“ and „on the bottom“. Unscrew the axle retainer **11** and axle retainer **14**.
- ▶ Lightly lift the support beam with the auxiliary crane until the support beam touches on „on top“.
- ▶ Plug in the remote control panel on the corresponding socket, see „Remote control panel section“.
- ▶ Unpin the support beam first „on top“, then „on the bottom“.
- ▶ Remove all hydraulic connections, 2 x quick couplers.

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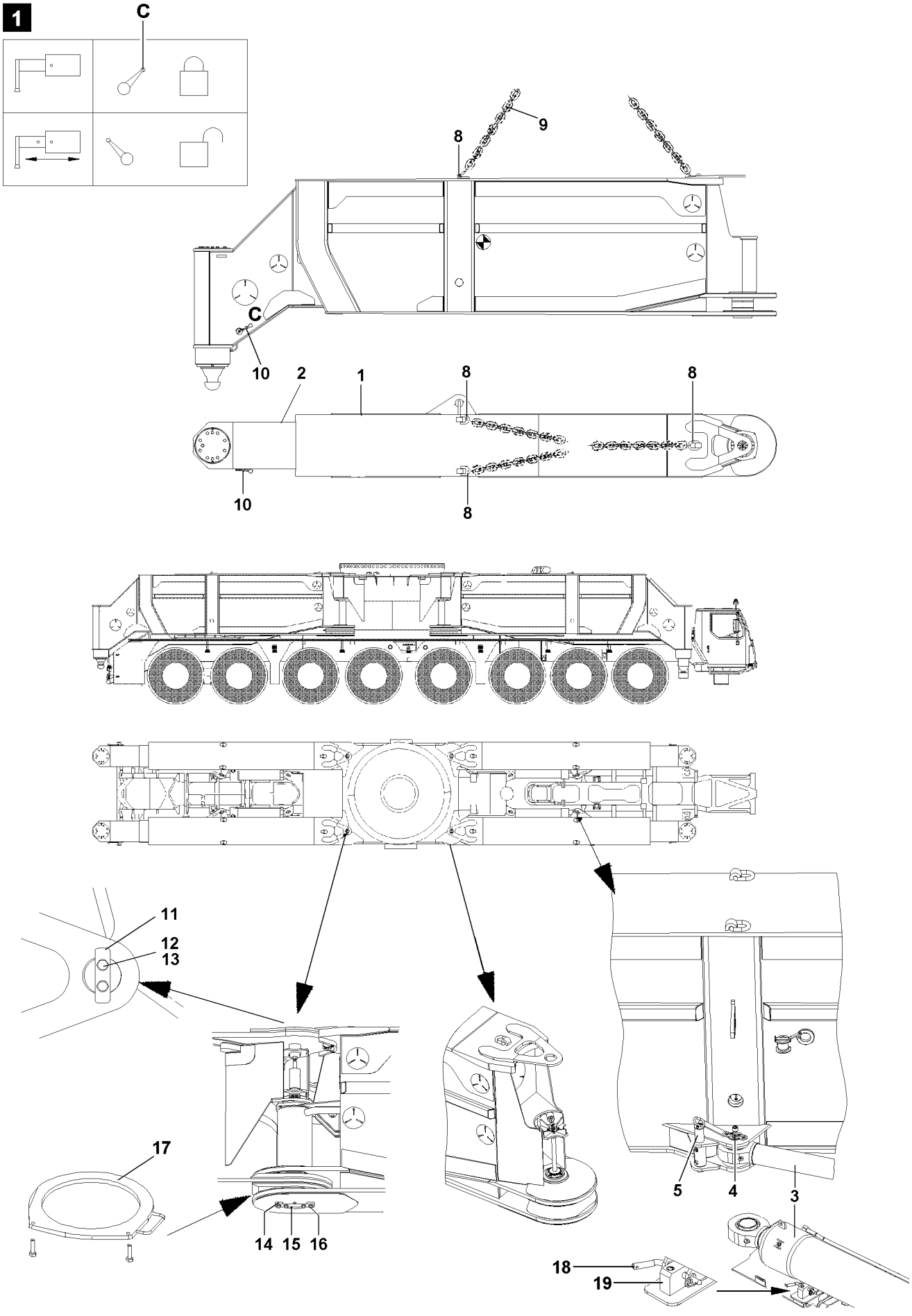

Fig.105294

LWE/LG 1750-006/15409-07-02/en

▶ Unplug all electrical connections.

Note

▶ There are two electrical connections per support beam. One plug each must be plugged in on the center section for the brake force reduction. It is not possible to mix up the plugs.

▶ Place the support beam on the transport vehicle and secure.

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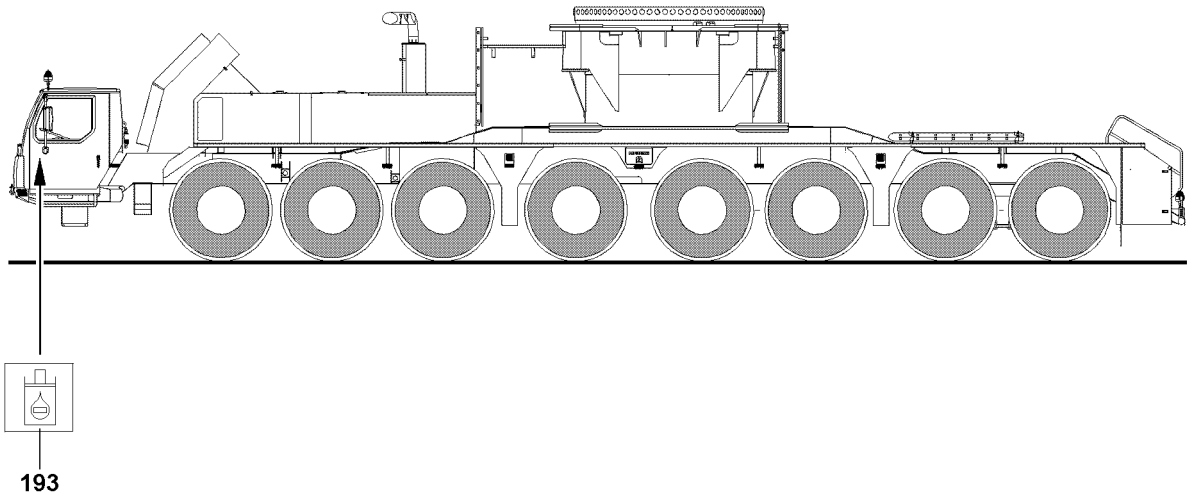

Fig.105295

3.2 Travel operation without support beams

WARNING
Danger of accident due to excess breaking the crane vehicle!
If the brake force reduction is not activated with removed support beams, then the brake of the crane vehicle is oversized!
▶ Driving with removed support beams is only permitted if the brake force reduction is activated!

When all 4 support beams are removed and all electrical connections are plugged into the dummy plugs, the brake force reduction is active.

▶ Plug all electrical connections into the dummy plugs.

Result:

– The control light **193** lights up.
– The brake force reduction is active.

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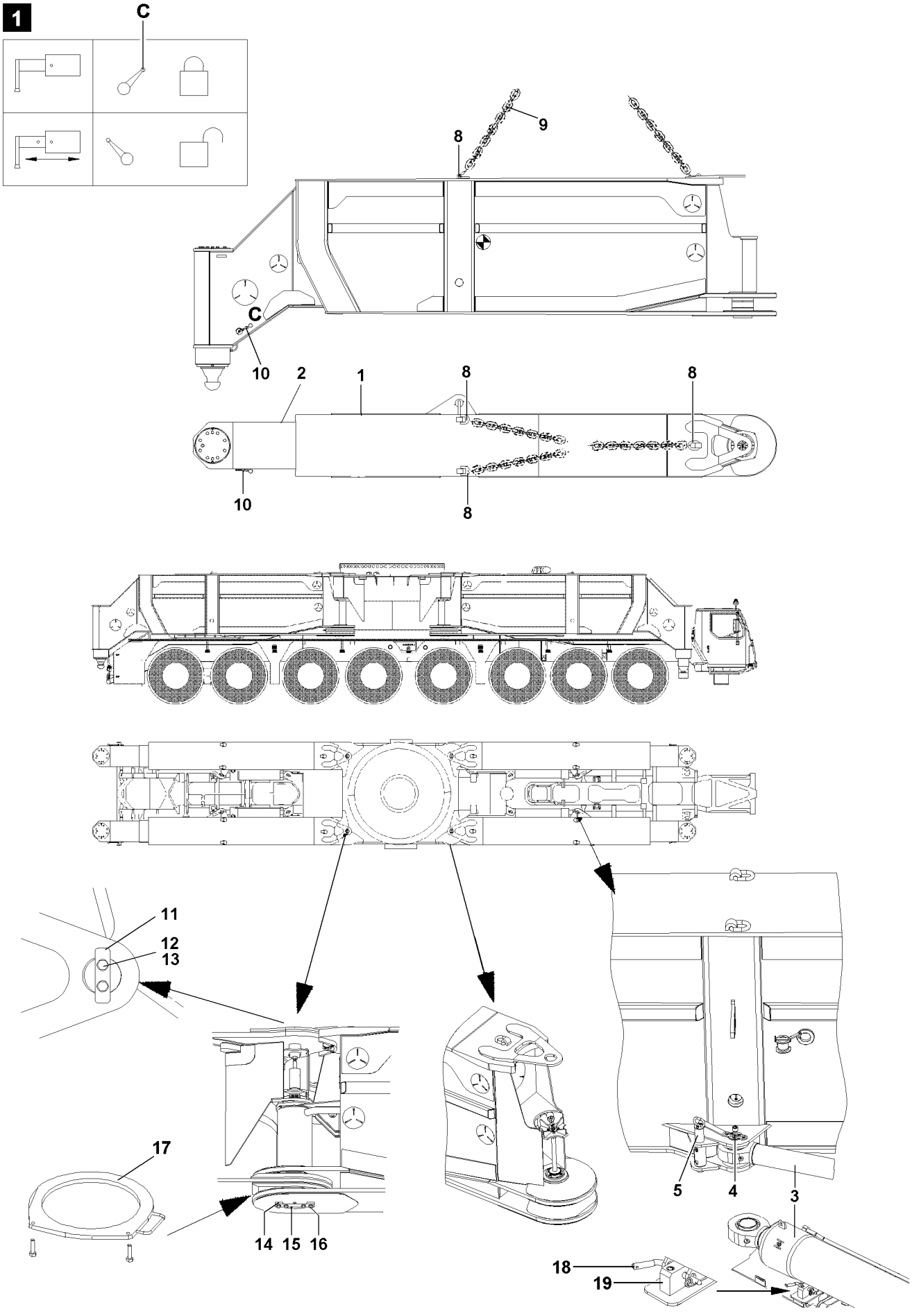

Fig.105294

LWE/LG 1750-006/15409-07-02/en

4 Installation of support beams

DANGER
Risk of accident!
It is prohibited for anyone to remain between the support beams and the vehicle frame or the center section during the swing procedure!
The crane must be aligned horizontally to prevent the support beams from swinging out by themselves!
Install the support beams only crosswise, i.e. the left front, then the right rear or the right front, then the left rear!
If this is not observed, the crane can topple over!

- ▶ Set all levers **10**to position **C**, see fig. **1**.
- ▶ Install the support beams crosswise, i.e. the left front, then the right rear or the right front, then the left rear.

Note

- ▶ The installation of the support beams is identical for all 4 support beams.

Ensure that the following prerequisites are met:

- the crane is positioned on level ground and is horizontally aligned
- the sliding beams are fully retracted and manually pinned with the levers **10**
- all levers **10** are in pinned position **C**, see fig. **1**
- an auxiliary crane is available

4.1 Installing the support beams

- ▶ Hang the „supplied tackle chain **9**“ on the eyehooks **8** on the support beam **1**.
- ▶ Swing the support beam with the auxiliary crane to the center section and swing it carefully into the pin receptacles „on top“ and „bottom“ until the bores align.
- ▶ Lightly lift the support beam with the auxiliary crane until the support beam touches on „on top“.
- ▶ Establish all hydraulic connections, 2 x quick couplers.
- ▶ Establish all electrical connections.
- ▶ Turn the ignition on.
- ▶ Start the engine.
- ▶ Plug in the remote control panel, see „Remote control panel section“.

Note

- ▶ The remote control panel must be plugged in on the side on which the support beam is being pinned.

- ▶ Actuate the remote control panel and pin the support beam on the center section with pins, first „on top“ and then „on the bottom“.
- ▶ Secure the pin „on top“ with axle retainer **11**, washer **12** and screw **13** and „on the bottom“ with axle retainer **14**, washer **15** and screw **16**.

Note

- ▶ When pinning, pay attention to he position of the groove on the pin. The groove must align with the retaining plate (axle retainer **14**).

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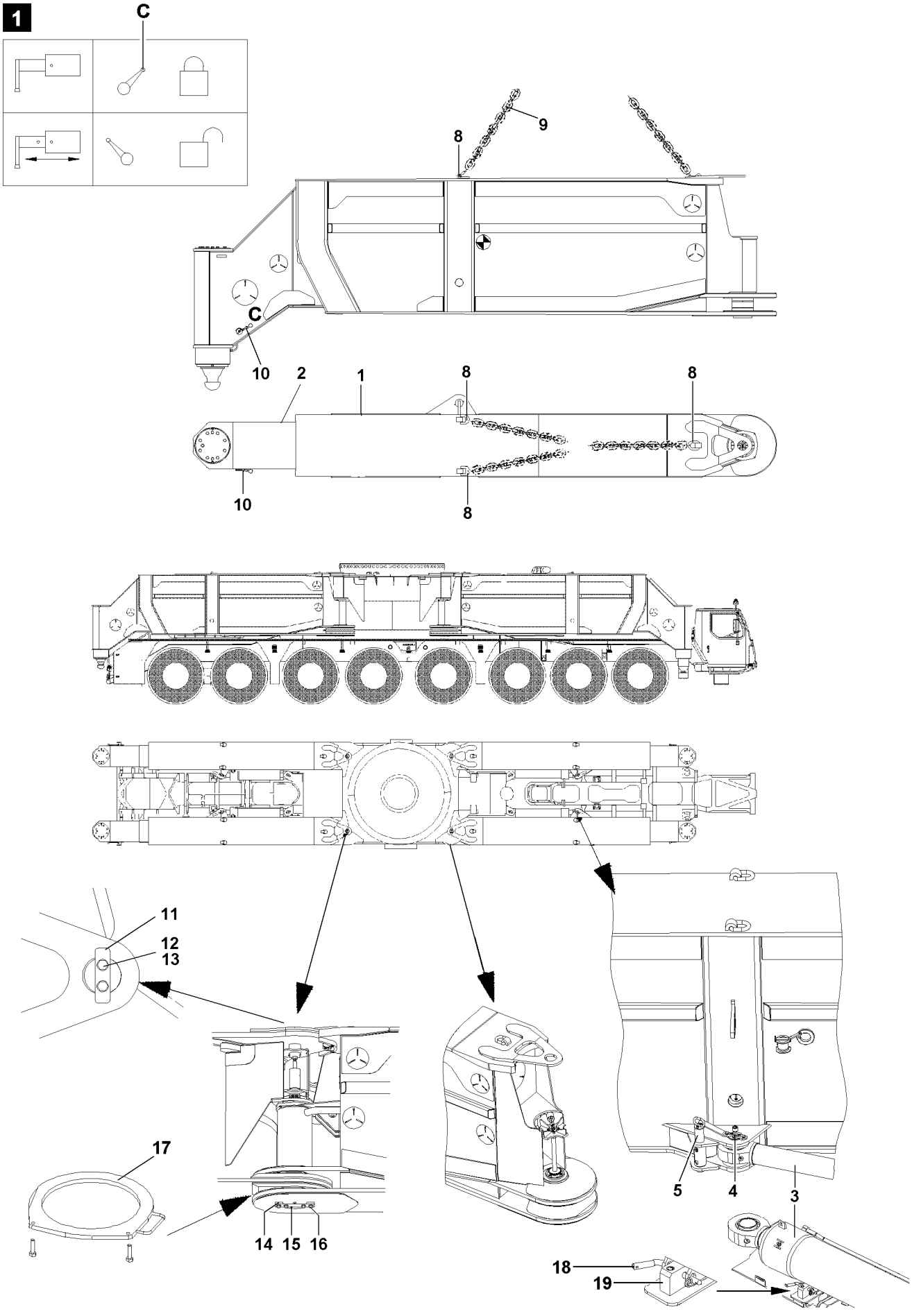

Fig.105294

LWE/LG 1750-006/15409-07-02/en

DANGER
Risk of accident!
▶ Before unpinning, it must be ensured that the pin receptacle is clear.

▶ After pinning, secure the pins.
▶ Install the spacer plate **17** (2 screws M12).
▶ Fold the support beam all the way in with the auxiliary crane, secure and pin and secure the swing cylinder **3** on the support beam **1** with pin **4**.

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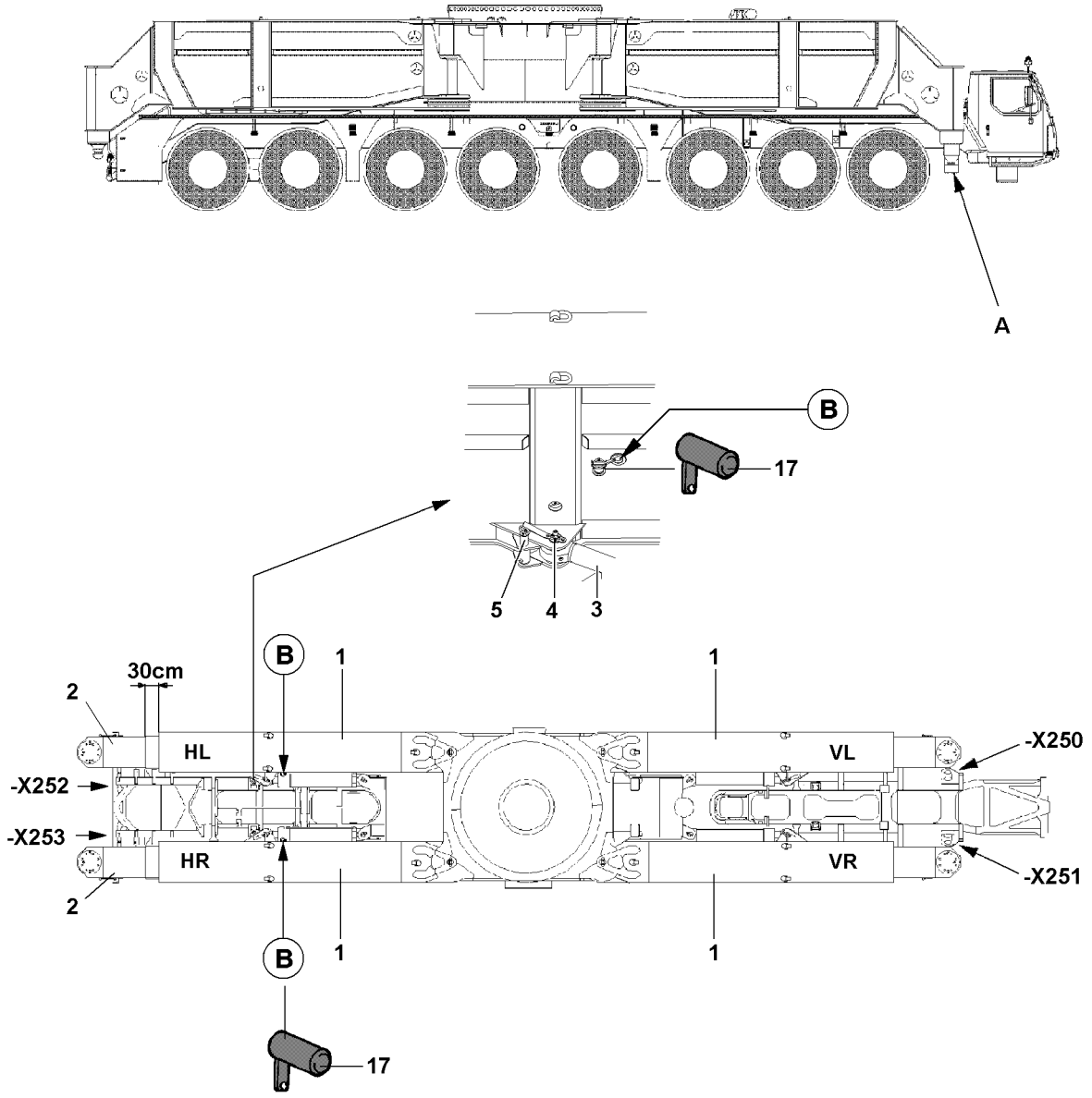

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Fig.198585

4.2 Bringing the support beams into transport position

4.2.1 Support beams front

- ▶ Plug the remote control panel on the left front into the socket **-X250**.
- ▶ Swing the left front support beam **VL** in.
- ▶ Plug the remote control panel on the right front into the socket **-X251**.
- ▶ Swing the right front support beam **VR** in.
- ▶ Secure the support beam by extending the support cylinder into the calotte **A**.

4.2.2 Rear support beams

DANGER
Risk of accident!
The sliding beams on the rear support beams must be pushed out approx. 300 mm for even distribution of the axle pressure during transport and secured with the pins **17** to prevent them from sliding out.

- ▶ Secure the rear support beams on both sides with pins **5** to prevent them from swinging out.
- ▶ Secure the rear support beams on both sides with pins **17** on points **B** to prevent them from sliding out.

- ▶ Plug the remote control panel on the left rear into the socket **-X252**.
- ▶ Unlock the sliding beam and extend it approx. 300 mm.
- ▶ Pin the sliding beam from the inside and secure.
- ▶ Swing the left support beam **HL** in and secure it with pin **5** to prevent it from swinging out.
- ▶ Insert the pin **17** on point **B** and secure the support beam **HL** to prevent it from sliding out.
- ▶ Plug the remote control panel on the right rear into the socket **-X253**.
- ▶ Unlock the sliding beam and extend it approx. 300 mm.
- ▶ Pin the sliding beam from the inside and secure.
- ▶ Swing the right support beam **HR** in and secure it with pin **5** to prevent it from swinging out.
- ▶ Insert the pin **17** on point **B** and secure the support beam **HR** to prevent it from sliding out.

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5.19 Hook blocks

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Fig.195219

1 Procedure in case of slack rope

1.1 Lowering the hook block if slack rope forms

If the hook block can no longer be lowered due to slack rope formation, then the following steps must be carried out.

1.1.1 Spooling op loose hoist rope

▶ Spool up loose hoist rope between the boom head and the wind carefully onto the winch.

Note

▶ A slight rope slack must remain between the boom head and the winch!

1.1.2 Luffing the boom down

NOTICE

Danger of collision!

When luffing the boom down, the hoist rope length can shorten and pull the hook block against the boom head.

▶ Monitor the distance of the hook block to the boom head!

▶ Luff the boom down carefully.

Result:

– The hoist rope between the boom head and the winch is tensioned.

1.1.3 Lowering the hook block

▶ Lower the hook block carefully with the hoist gear.

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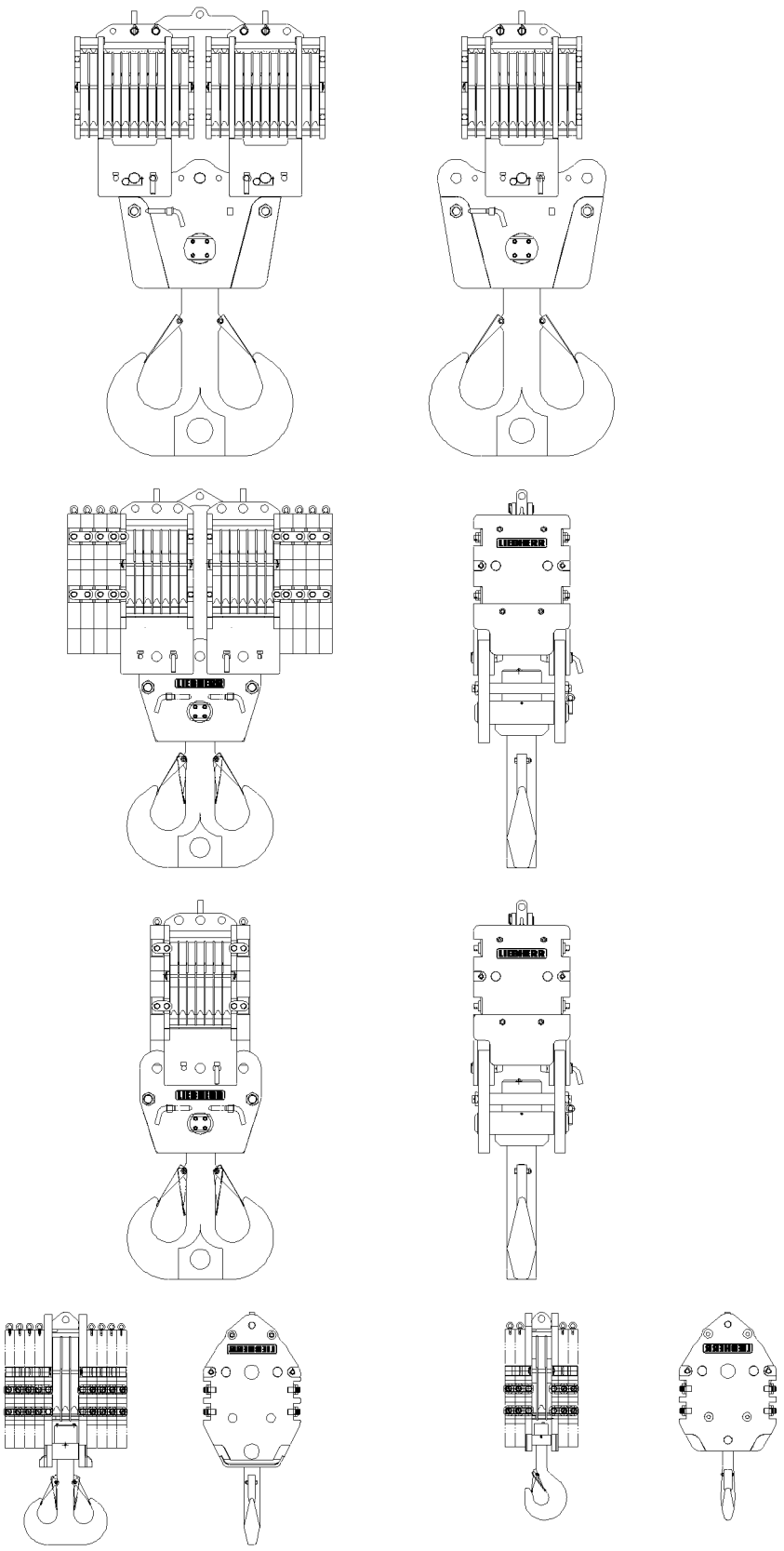

Fig.108122

2 Hook block overview

2.1 Handling of hook blocks

Note

- ▶ For the load hooks and hook blocks approved for this crane type refer to the separate load chart manual!
- ▶ The hook blocks shown in this chapter are only examples and can differ from your hook block in type and number of rope pulleys. The different assembly and disassembly procedures are therefore only an example of the description for a number of different hook blocks!

DANGER

Hook block weights!

If the data in the erection and take down charts as well as the load charts are not observed, dangerous situations up to toppling of the crane can occur!

Personnel can be severely injured or killed, in addition, high property damage can result!

- ▶ Observe the data in the erection and take down charts!
- ▶ The specifications in the load charts must be adhered to!
- ▶ The crane operator bears the sole and full responsibility for the adherence to the data in the erection and take down charts as well as the load charts!

Differently sized hook blocks can be used for various loads.

NOTICE

Rope damage due to insufficient hook block weight!

If the hook block weight is too low to tighten the hoist rope sufficiently, spooling problems may occur on the winches when lowering and lifting the hook block due to slack rope formation!

The hoist rope can be damaged!

- ▶ In order to prevent spooling problems on the winches, the hook block weight may be increased with auxiliary weights, if necessary!
- ▶ If problems develop in the assembly and set up conditions due to the weight increase of the hook block, auxiliary weights must be removed again!

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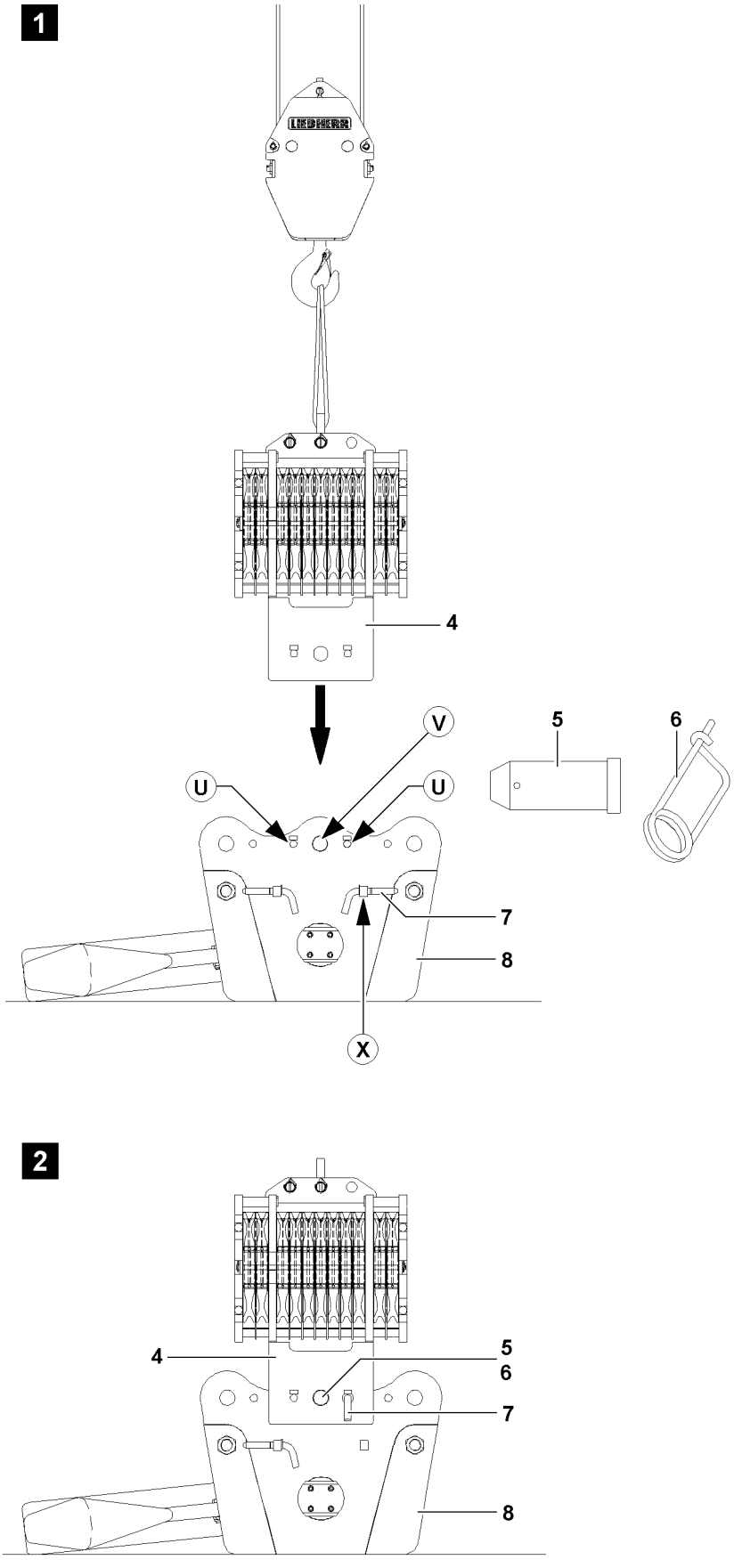

Fig.108123

3 Installing a double hook block for single operation

3.1 Installing the hook block

If the hook blocks are to be used in single operation, then the pulley block **4** must be installed centered on the cross brace **8**.

3.1.1 Installing the pulley block on cross brace

Make sure that the following prerequisites are met:
- The ground is sufficiently load bearing to take on the weight of the hook block safely.
- The ground is level and horizontal.
- The cross brace **8** is placed on the ground, see illustration **1**.

DANGER
Risk of tipping the pulley block!
If the retaining pins **7**, during assembly of the pulley block **4** are not pinned on the cross brace, then the pulley block tips to the side when the auxiliary crane is removed!
Personnel remaining in the danger zone can be severely injured or killed!
- ▶ Insert the retaining pins **7** into the bores **U** on the hook block!
- ▶ Make sure before removing the auxiliary crane that the pulley block is properly pinned and secured!

- ▶ Attach the pulley block **4** onto the auxiliary crane, illustration **1**.
- ▶ Position pulley block **4** on the cross brace **8** and align the pin bore **V**.
- ▶ Insert the pin **5** on point **V** and secure with spring retainer **6**.
- ▶ Unpin the retaining pin **7** from the transport receptacle (point **X**).
- ▶ Insert the retaining pins **7** into one of the bores (point **U**) on the cross brace **8**, illustration **1**.

When the pulley block **4** is secured by the retaining pins **7** at point **U**:
- ▶ Remove the auxiliary crane.

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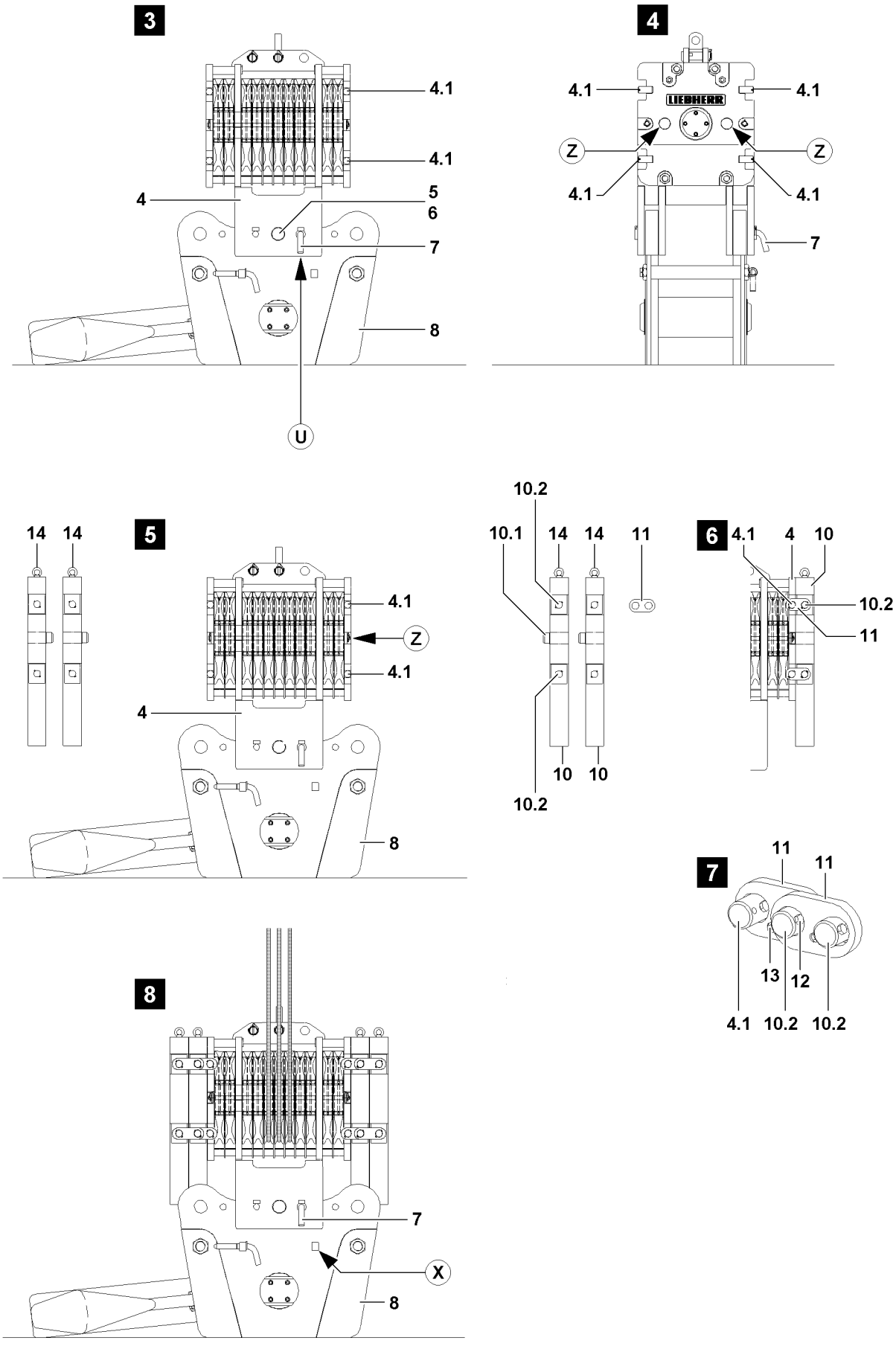

Fig.108141

3.1.2 Installing the auxiliary weights

Note

▶ The own weight for each auxiliary weight is marked on the auxiliary weight!

WARNING

Toppling of hook block!
If the auxiliary weights are installed one-sided, the hook block can topple over!
Personnel can be severely injured or killed!

▶ The auxiliary weights may only be installed **individually** and alternating left and right on the pulley block!
▶ When the required auxiliary weight is installed on the pulley block, the difference between the left and right side may never be more than one auxiliary weight!
▶ Asymmetrical installation of auxiliary weights is prohibited!
▶ Do not exceed the maximum permissible own weight of the hook block! The maximum permissible own weight is engraved on ballastable hook blocks. See „Engraving WT max.“.

Make sure that the following prerequisites are met:

– The hook block is placed on the ground.
– The pulley block **4** is properly installed and secured.
– The retaining pin **7** is pinned and secured at point **U**.

WARNING

Falling auxiliary weights!
If the auxiliary weights are not properly installed on the pulley block, then they can fall down during installation or in crane operation!
Personnel can be severely injured or killed!

▶ Standing under a suspended auxiliary weight is prohibited!
▶ Make sure that the auxiliary weights are properly installed and secured!
▶ Crane operation with insufficiently secured auxiliary weights is prohibited!

▶ Attach the auxiliary weight **10** on the ring screw **14** on the auxiliary crane, illustration **5**.

WARNING

Danger of crushing!
When swinging the auxiliary weights to the pulley block, personnel can be severely injured or killed!
Fingers, hands and arms can be crushed or severed!

▶ It is prohibited for anyone to remain between the pulley block and the auxiliary weight!
▶ Swing auxiliary weights in to the pulley block with utmost caution and at the least possible speed!

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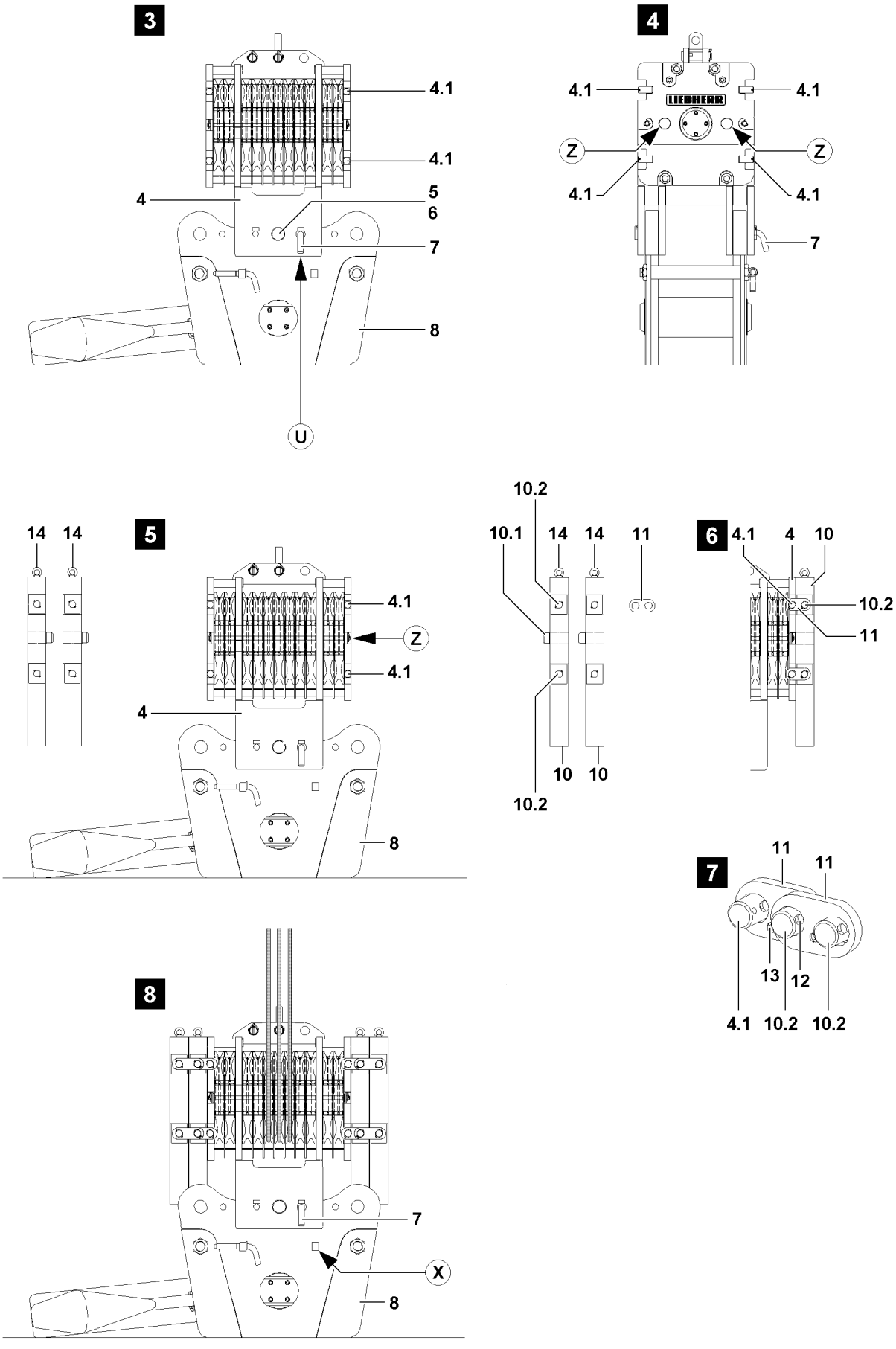

Fig.108141

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- ▶ Align the auxiliary weight **10** on the pulley block **4**.
- ▶ Move the centering pin **10.1** of the auxiliary weight into the centering bores **Z** on the pulley block **4**, illustration **6**.

WARNING
Falling auxiliary weights!
If all mounting brackets **11** are removed simultaneously on an unsecured auxiliary weight, then the auxiliary weight can fall down!
Personnel can be severely injured or killed!
- ▶ Never remove all mounting brackets **11** of an unsecured auxiliary weight at the same time!
- ▶ Always install or remove the mounting brackets **11** alternately!

- ▶ Install the mounting brackets **11** on the side and connect the pulley block **4** with the auxiliary weight **10**, illustration **7**.
- ▶ Secure the mounting brackets **11** with screws **12** and lock nuts **13**, illustration **7**.

Note
- ▶ Additional auxiliary weights must be connected with the mounting brackets **11**!

WARNING
Falling auxiliary weights!
The auxiliary weights can fall down by removing the auxiliary crane!
Personnel can be severely injured or killed!
- ▶ Remove the auxiliary crane only when it is ensured that the auxiliary weight **10** is properly secured with the mounting brackets **11**!

When the respective auxiliary weight is properly installed and secured:
- ▶ Remove the auxiliary crane.

3.1.3 Preparing the hook block for crane operation

Note
- ▶ The reeving of the hook blocks is described in chapter 4.06 of the Crane operating instructions!
- ▶ Observe the „permissible hook block weights“ in the erection and take down charts!

- ▶ Reeve the hoist rope according to the instructions in chapter 4.06 of the Crane operating instructions and the reeving plans!

NOTICE
Retaining pins **7** pinned when lifting the load!
If the retaining pin **7** is not unpinned before crane operation, then the retaining pin **7** may be shorn off when lifting the load!
- ▶ Unpin the retaining pin **7** from the hook block before crane operation!

When the hook block is properly reeved and has been lifted off the ground:
- ▶ Unpin the retaining pin **7** and pin and secure into the transport receptacle (point **X**), illustration **8**.

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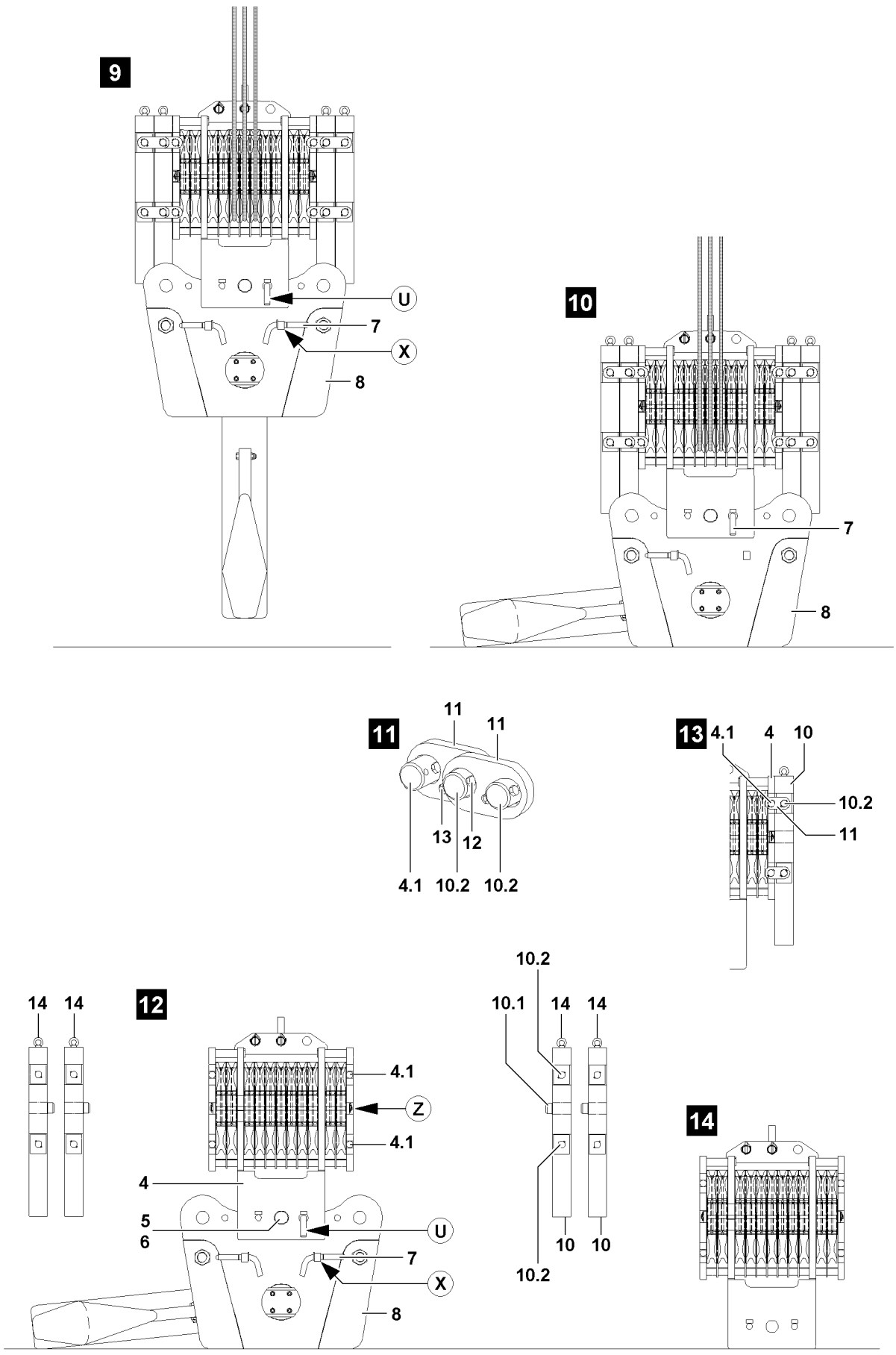

Fig.108142

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3.2 Removing the hook block

3.2.1 Preparing the hook block for removal

Note
▶ The unreeving of the hook blocks is described in chapter 4.06 of the Crane operating instructions!
▶ Observe the „permissible hook block weights“ in the erection and take down charts!

NOTICE
Retaining pin **7** unpinned when setting down the hook block!
If the retaining pin **7** - before setting the hook block on the ground - is not pinned, then the pulley block tips away to the side when it is set down!
Personnel can be severely injured or killed!
▶ Insert and secure the retaining pin **7**, before setting the hook block on the ground, at point **U**!

Make sure that the following prerequisites are met:
– The ground is sufficiently load bearing to take on the weight of the hook block and the auxiliary weights safely.
– The ground is level and horizontal.

▶ Lower the hook block completely to the ground.

When the hook block was placed down on the ground properly:
▶ Unreeve the hoist rope according to chapter 4.06 of the Crane operating instructions!

3.2.2 Removing the auxiliary weights

Note
▶ The own weight for each auxiliary weight is marked on the auxiliary weight!

WARNING
Toppling of hook block!
If the auxiliary weights are removed one-sided, the hook block can topple over!
Personnel can be severely injured or killed!
▶ The auxiliary weights may only be removed **individually** and alternating left and right on the pulley block!
▶ The difference between the left and the right side at removal of the auxiliary weights may never be more than one auxiliary weight!
▶ Asymmetrical removal of auxiliary weights is prohibited!

Make sure that the following prerequisite is met:
– The retaining pin **7** is pinned and secured at point **U**.

WARNING
Falling auxiliary weights!
If the auxiliary weights on the pulley block are not properly removed, then they can fall down at removal!
Personnel can be severely injured or killed!
▶ Standing under a suspended auxiliary weight is prohibited!

▶ Attach the auxiliary weight **10** on the ring screw **14** on the auxiliary crane.
▶ Tension the fastening equipment carefully.

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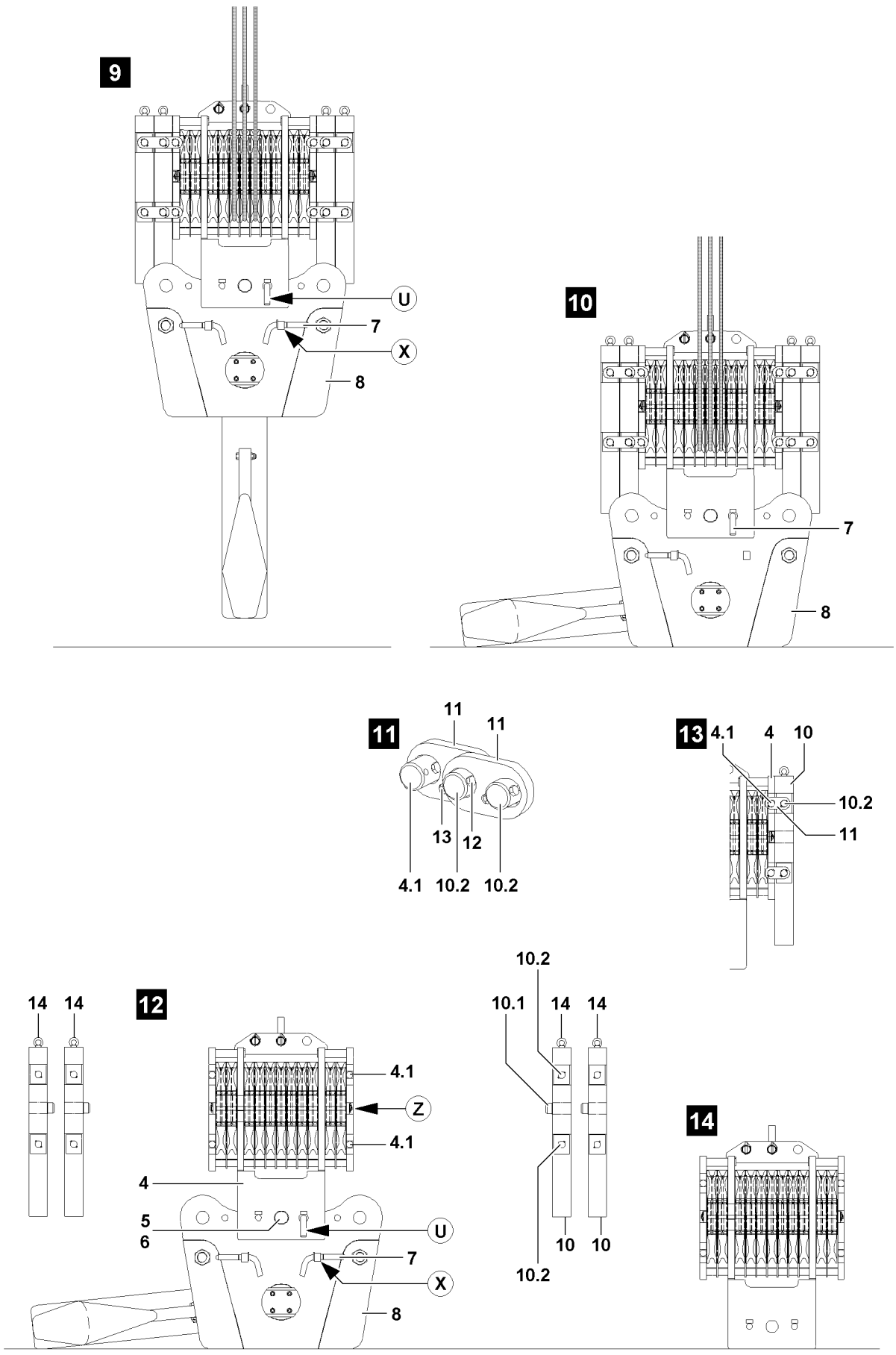

Fig.108142

LWE/LG 1750-006/15409-07-02/en

WARNING
Oscillating auxiliary weights!
During the removal of the auxiliary weights, the auxiliary weights can start to swing back and forth!
Personnel can be severely injured or killed!
- ▶ It is prohibited for anyone to remain in the danger zone!
- ▶ Make sure that the auxiliary weight which is being removed is properly attached on the auxiliary crane before releasing the mounting brackets!
- ▶ Angular pull is prohibited!

When the fastening equipment is tensioned on the auxiliary weight:
- ▶ Release the screw connection on the mounting brackets of the outermost auxiliary weight and remove the screws.

WARNING
Falling auxiliary weights!
If all mounting brackets **11** are removed simultaneously on an unsecured auxiliary weight, then the auxiliary weight can fall down!
Personnel can be severely injured or killed!
- ▶ Never remove all mounting brackets **11** of an unsecured auxiliary weight at the same time!
- ▶ Always install or remove the mounting brackets **11** alternately!

- ▶ Pull the mounting brackets **11** off to the side.

WARNING
Falling auxiliary weights!
If additional auxiliary weights which are being removed are released, then these auxiliary weights can fall down!
Personnel can be severely injured or killed!
- ▶ Make sure, before removing the outermost auxiliary weight, that the other auxiliary weights are secured with the mounting brackets!

If additional mounting brackets must be removed to release the outermost auxiliary weight:
- ▶ Reinstall the mounting brackets again immediately, so that only the auxiliary weight which is being removed is released.
- ▶ Lift the auxiliary weight with the auxiliary crane from the pulley block.
- ▶ Place the auxiliary weight onto the ground.
- ▶ Remove the auxiliary crane.
- ▶ Remove additional auxiliary weights as described above.

3.2.3 Removing the pulley block on cross brace

Make sure that the following prerequisite is met:
- – The auxiliary weights have been removed.

- ▶ Attach the pulley block **4** on the auxiliary crane.
- ▶ Tension the fastening equipment carefully.
- ▶ Unpin the retaining pin **7** at point **U** and pin into the transport receptacle on the cross brace, point **X**, illustration **12**.
- ▶ Release and unpin the pin **5**.
- ▶ Swing the pulley block **4** out with auxiliary crane.
- ▶ Place the pulley block **4** on the ground, illustration **14**.
- ▶ Remove the auxiliary crane.

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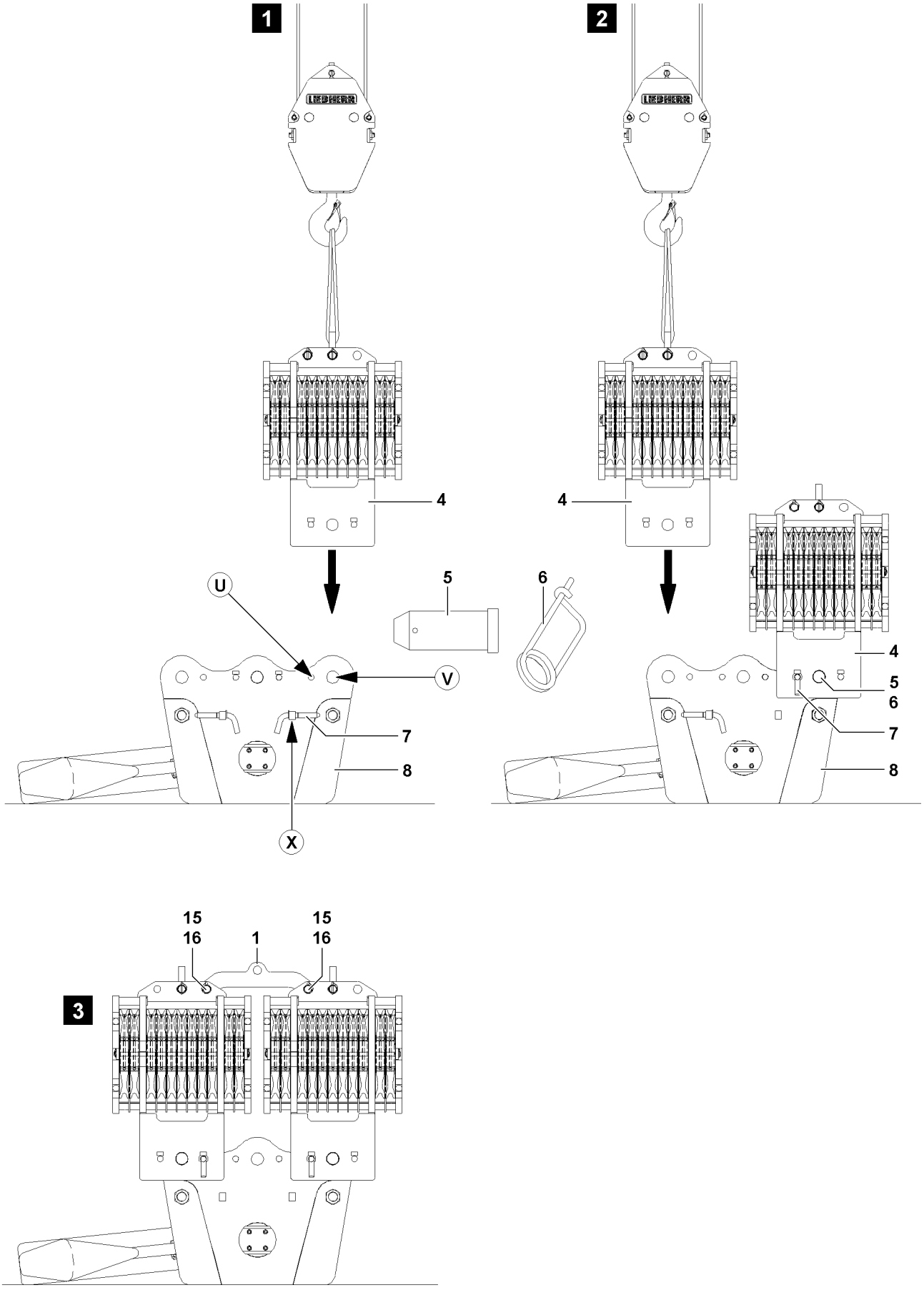

Fig.108121

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4 Installing a double hook block for parallel operation

4.1 Installing the hook block

If the hook blocks are to be used in parallel operation, then the pulley blocks **4** must be installed on the left and right on the cross brace **8**.

4.1.1 Installing the pulley blocks on the cross brace

Make sure that the following prerequisites are met:
- The ground is sufficiently load bearing to take on the weight of the hook block safely.
- The ground is level and horizontal.
- The cross brace **8** is placed on the ground, see illustration **1**.

DANGER
Risk of tipping the pulley blocks!
If the retaining pins **7**, during assembly of the pulley blocks **4** are not pinned on the cross brace, then the pulley blocks tip to the side when the auxiliary crane is removed!
Personnel remaining in the danger zone can be severely injured or killed!
- ▶ Insert the retaining pins **7** into the bores **U** on the hook block!
- ▶ Make sure before removing the auxiliary crane that the pulley blocks are properly pinned and secured!

Note
- ▶ The installation of two pulley blocks **4** is identical and is described on the example of one pulley block!

- ▶ Attach the pulley block **4** onto the auxiliary crane, illustration **1**.
- ▶ Position pulley block **4** on the cross brace **8** and align the pin bore **V**.
- ▶ Insert the pin **5** on point **V** and secure with spring retainer **6**.
- ▶ Unpin the retaining pin **7** from the transport receptacle (point **X**).
- ▶ Insert the retaining pins **7** into the bores (point **U**) on the cross brace **8**, illustration **1**.

When the pulley block **4** is secured by the retaining pins **7** at point **U**:
- ▶ Remove the auxiliary crane, illustration **2**.
- ▶ Install the second pulley block.

4.1.2 Installing the block connector

Make sure that the following prerequisite is met:
- The two pulley blocks **4** are installed and secured on the cross brace **8**.

Both pulley blocks **4** are pinned with the block connector **1**.

- ▶ Attach the block connector **1** on the auxiliary crane.
- ▶ Position the block connector **1** with auxiliary crane in pin position, illustration **3**.
- ▶ Insert the pins **15** on both sides on the pulley blocks **4** and secure with linch pin **16**, illustration **3**.

When the block connector **1** is pinned and secured properly:
- ▶ Remove the auxiliary crane.

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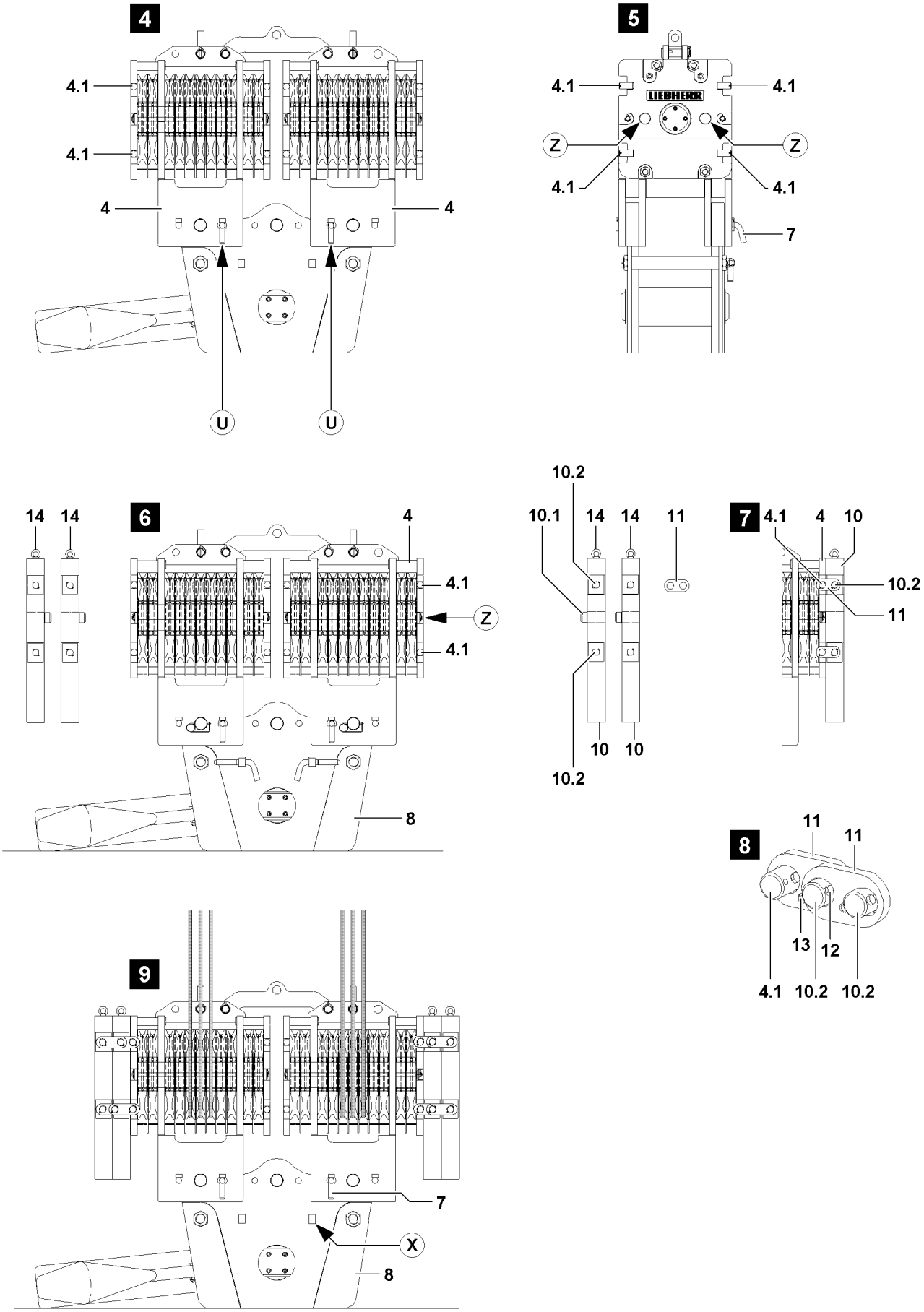

Fig.108120

4.1.3 Installing the auxiliary weights

Note

▶ The own weight for each auxiliary weight is marked on the auxiliary weight!

WARNING

Toppling of hook block!
If the auxiliary weights are installed one-sided, the hook block can topple over!
Personnel can be severely injured or killed!

▶ The auxiliary weights may only be placed **individually** and alternating left and right on the pulley blocks of the hook block!
▶ When the required auxiliary weight is installed on the pulley blocks, the difference between the left and right side may never be more than one auxiliary weight!
▶ Asymmetrical installation of auxiliary weights is prohibited!
▶ Do not exceed the maximum permissible own weight of the hook block! The maximum permissible own weight is engraved on ballastable hook blocks. See „Engraving WT max.“.

Make sure that the following prerequisites are met:

– The hook block is placed on the ground.
– The pulley blocks **4**are properly installed and secured.
– The retaining pins **7** are pinned in and secured at point **U**.
– The block connector **1** is properly installed and secured.

WARNING

Falling auxiliary weights!
If the auxiliary weights on the pulley blocks are not properly installed, then they can fall down during installation or during crane operation!
Personnel can be severely injured or killed!

▶ Standing under a suspended auxiliary weight is prohibited!
▶ Make sure that the auxiliary weights are properly installed and secured!
▶ Crane operation with insufficiently secured auxiliary weights is prohibited!

▶ Attach the auxiliary weight **10** on the ring screw **14** on the auxiliary crane.

WARNING

Danger of crushing!
When swinging the auxiliary weights to the pulley block, personnel can be severely injured or killed!
Fingers, hands and arms can be crushed or severed!

▶ It is prohibited for anyone to remain between the pulley blocks and the auxiliary weight!
▶ Swing auxiliary weights in to the pulley block with utmost caution and at the least possible speed!

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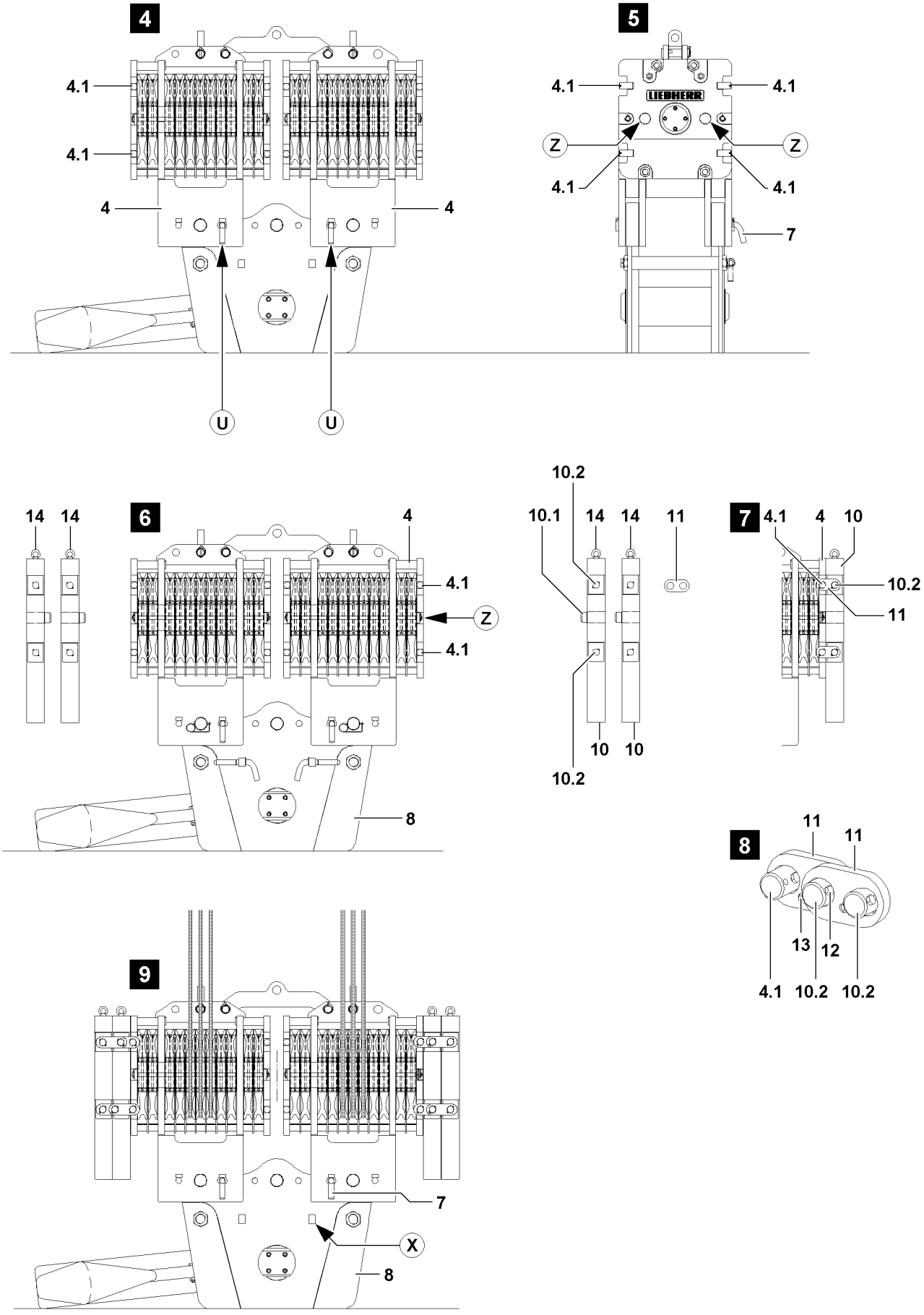

Fig.108120

- ▶ Align the auxiliary weight **10** on the pulley block **4**.
- ▶ Move the centering pin **10.1** of the auxiliary weight into the centering bores **Z** on the pulley block **4**, illustration **7**.

WARNING
Falling auxiliary weights!
If all mounting brackets **11** are removed simultaneously on an unsecured auxiliary weight, then the auxiliary weight can fall down!
Personnel can be severely injured or killed!
- ▶ Never remove all mounting brackets **11** of an unsecured auxiliary weight at the same time!
- ▶ Always install or remove the mounting brackets **11** alternately!

- ▶ Install the mounting brackets **11** on the side and connect the pulley block **4** with the auxiliary weight **10**, illustration **8**.
- ▶ Secure the mounting brackets **11** with screws **12** and lock nuts **13**, illustration **8**.

Note
- ▶ Additional auxiliary weights must be connected with the mounting brackets **11**!

WARNING
Falling auxiliary weights!
The auxiliary weights can fall down to the side when the auxiliary crane is removed!
Personnel can be severely injured or killed!
- ▶ Remove the auxiliary crane only when it is ensured that the auxiliary weight **10** is properly secured with the mounting brackets **11**!

When the respective auxiliary weight is properly installed and secured:
- ▶ Remove the auxiliary crane.

4.1.4 Preparing the hook block for crane operation

Note
- ▶ The reeving of the hook blocks is described in chapter 4.06 of the Crane operating instructions!
- ▶ Observe the „permissible hook block weights“ in the erection and take down charts!

- ▶ Reeve the hoist rope according to the instructions in chapter 4.06 of the Crane operating instructions and the reeving plans!

NOTICE
Retaining pins **7** pinned when lifting the load!
If the retaining pins **7** are not unpinned before the crane operation, then the retaining pins **7** may be shorn off when lifting the load!
- ▶ Unpin the retaining pin **7** from the hook block before crane operation!

When the hook block is properly reeved and has been lifted off the ground:
- ▶ Unpin the retaining pin **7** and pin and secure into the transport receptacle (point **X**), illustration **9**.

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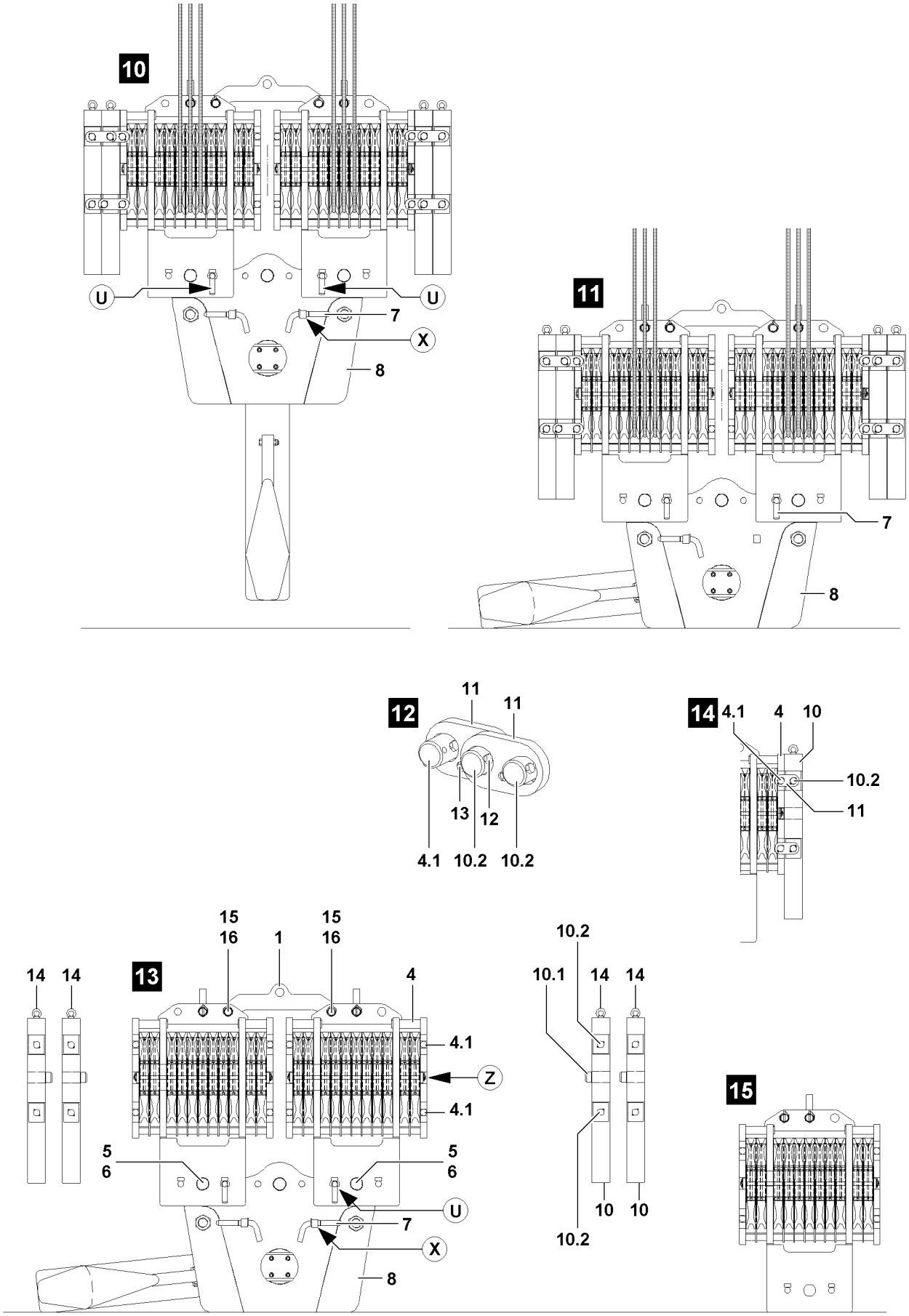

Fig.108143

4.2 Removing the hook block

4.2.1 Preparing the hook block for removal

Note

▶ The unreeving of the hook blocks is described in chapter 4.06 of the Crane operating instructions!

▶ Observe the „permissible hook block weights“ in the erection and take down charts!

NOTICE

Retaining pin **7** unpinned when setting down the hook block!
If the retaining pin **7** - before setting the hook block on the ground - is not pinned, then the pulley blocks tip away to the side when the hoist rope is unreeved!
Personnel can be severely injured or killed!

▶ Before setting the hook block on the ground, insert and secure the retaining pins **7** on both pulley blocks at point **U**!

Make sure that the following prerequisites are met:

– The ground is sufficiently load bearing to take on the weight of the hook block and the auxiliary weights safely.
– The ground is level and horizontal.

▶ Lower the hook block completely to the ground.

When the hook block was placed down on the ground properly:

▶ Unreeve the hoist rope(s) according to chapter 4.06 of the Crane operating instructions!

4.2.2 Removing the auxiliary weights

Note

▶ The own weight for each auxiliary weight is marked on the auxiliary weight!

WARNING

Toppling of hook block!
If the auxiliary weights are removed one-sided, the hook block can topple over!
Personnel can be severely injured or killed!

▶ The auxiliary weights may only be removed **individually** and alternating left and right on the pulley blocks of the hook block!

▶ The difference between the left and the right side at removal of the auxiliary weights may never be more than one auxiliary weight!

▶ Asymmetrical removal of auxiliary weights is prohibited!

Make sure that the following prerequisites are met:

– The retaining pins **7** are pinned and secured on both sides at point **U**.
– The block connector **1** has been removed.

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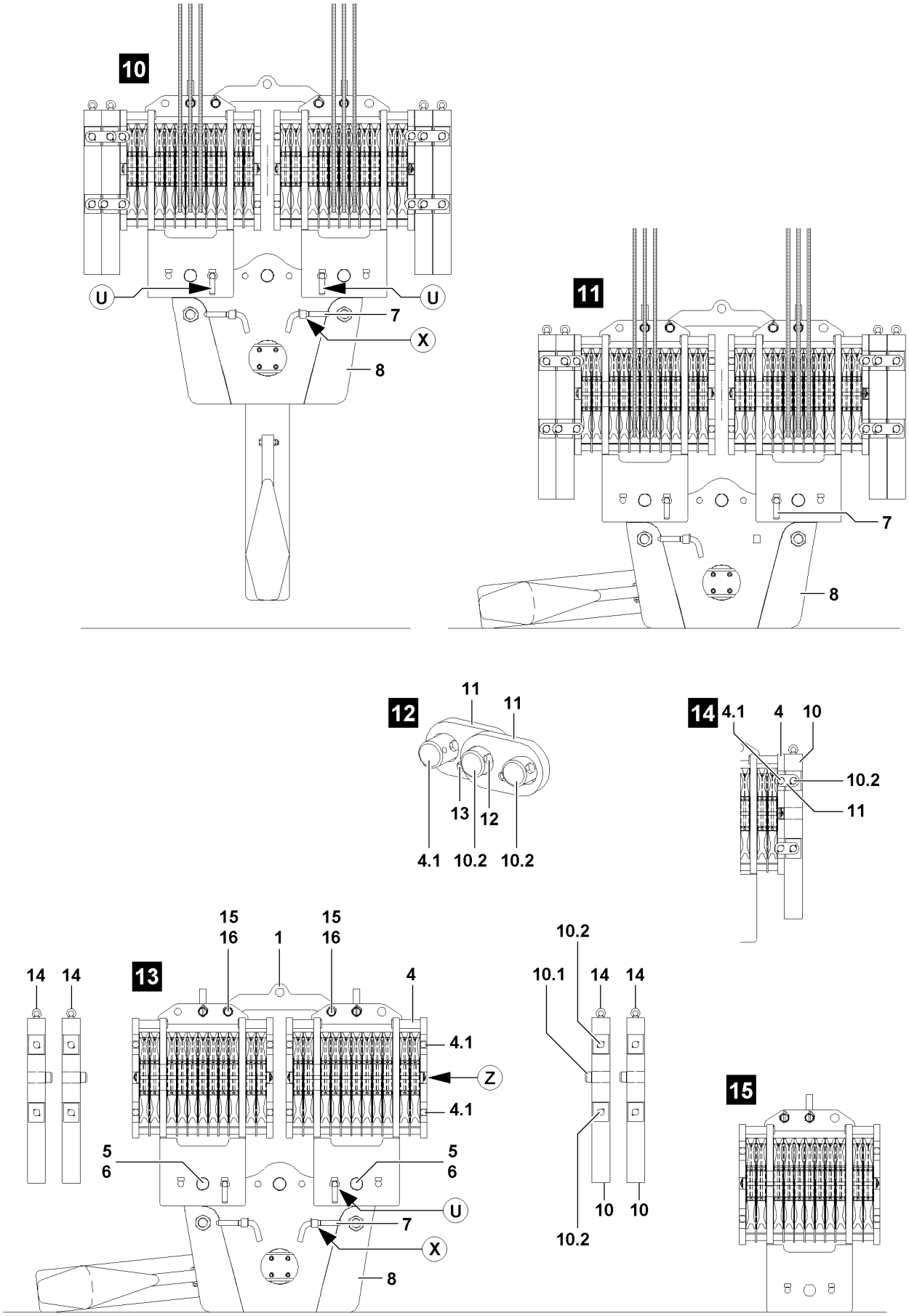

LWE/LG 1750-006/15409-07-02/en

Fig.108143

WARNING
Falling auxiliary weights!
If the auxiliary weights on the pulley blocks are not properly removed, then they can fall down at removal!
Personnel can be severely injured or killed!
▶ Standing under a suspended auxiliary weight is prohibited!

▶ Attach the auxiliary weight **10** on the ring screw **14** on the auxiliary crane.
▶ Tension the fastening equipment carefully.

WARNING
Oscillating auxiliary weights!
During the removal of the auxiliary weights, the auxiliary weights can start to swing back and forth!
Personnel can be severely injured or killed!
▶ It is prohibited for anyone to remain in the danger zone!
▶ Make sure that the auxiliary weight which is being removed is properly attached on the auxiliary crane before releasing the mounting brackets!
▶ Angular pull is prohibited!

When the fastening equipment is tensioned on the auxiliary weight:
▶ Release the screw connection on the mounting brackets of the outermost auxiliary weight and remove the screws.

WARNING
Falling auxiliary weights!
If all mounting brackets **11** are removed simultaneously on an unsecured auxiliary weight, then the auxiliary weight can fall down!
Personnel can be severely injured or killed!
▶ Never remove all mounting brackets **11** of an unsecured auxiliary weight at the same time!
▶ Always install or remove the mounting brackets **11** alternately!

▶ Pull the mounting brackets **11** off to the side.

WARNING
Falling auxiliary weights!
If additional auxiliary weights which are being removed are released, then these auxiliary weights can fall down!
Personnel can be severely injured or killed!
▶ Make sure, before removing the outermost auxiliary weight, that the other auxiliary weights are secured with the mounting brackets **11**!

If additional mounting brackets **11** must be removed to release the outermost auxiliary weight:
▶ Reinstall the mounting brackets again immediately, so that only the auxiliary weight which is being removed is released.
▶ Lift the auxiliary weight with the auxiliary crane from the pulley block.
▶ Place the auxiliary weight onto the ground.
▶ Remove the auxiliary crane.
▶ Remove additional auxiliary weights as described above.

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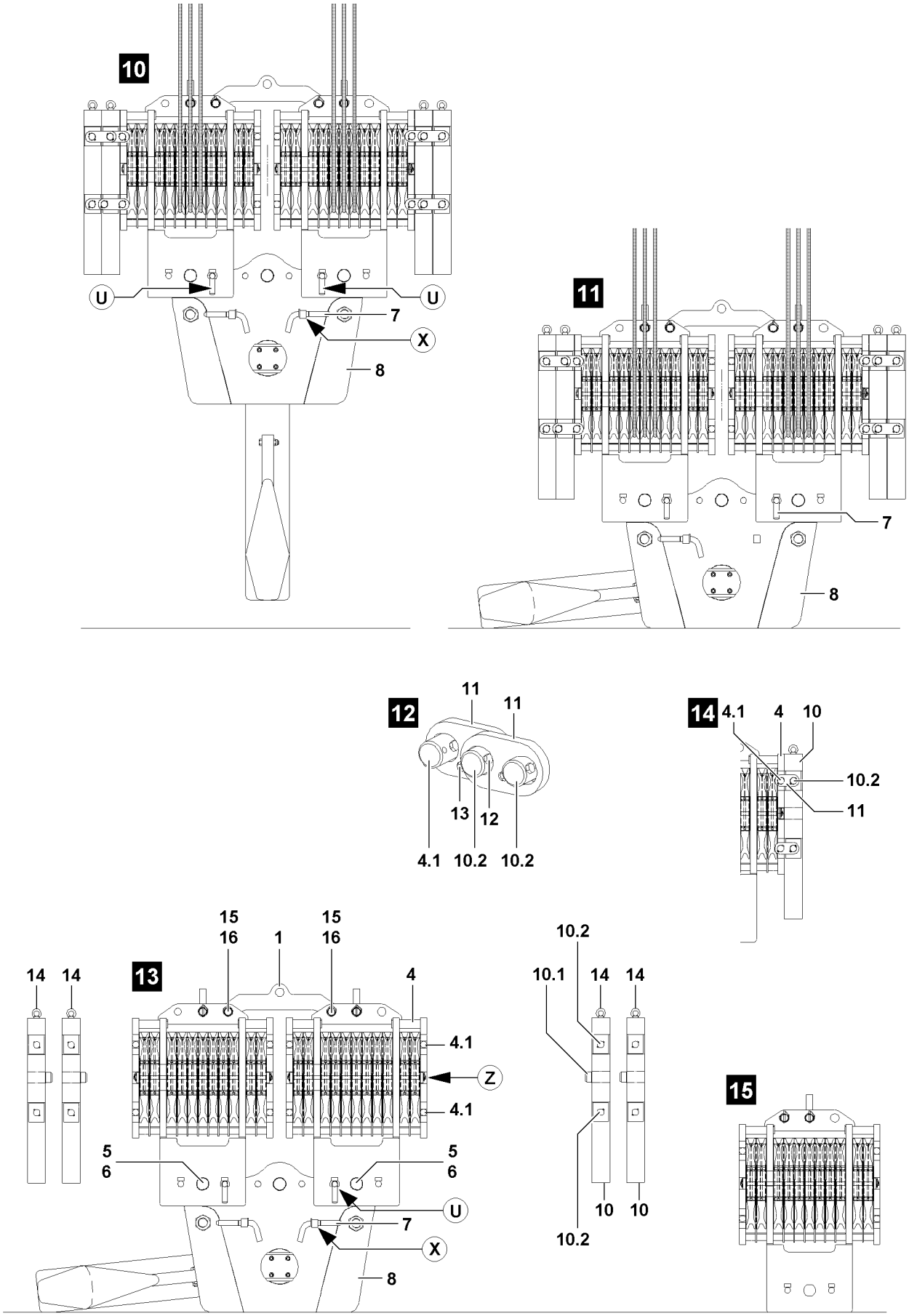

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Fig.108143

4.2.3 Removing the block connector

▶ Attach the block connector **1** on the auxiliary crane.

DANGER
Risk of tipping the pulley blocks!
If the retaining pins **7**, during removal of the block connector **1** are not pinned on the pulley blocks, then the pulley blocks tip to the side when the block connector is removed!
Personnel remaining in the danger zone can be severely injured or killed!
▶ Insert the retaining pins **7** into the bores **U** on the hook block!
▶ Make sure before removing the block connector that the pulley blocks are properly pinned and secured!

▶ Release and unpin the pins **15** on both sides on the pulley blocks **4**.
▶ Remove the block connector **1** on the auxiliary crane.
▶ Place the block connector **1** onto the ground.
▶ Remove the auxiliary crane.

4.2.4 Removing the pulley blocks on the cross brace

Note
▶ The removal of two pulley blocks is identical and is described on the example of one pulley block!

Make sure that the following prerequisites are met:
– The auxiliary weights have been removed.
– The block connector has been removed.

▶ Attach the pulley block **4** on the auxiliary crane.
▶ Tension the fastening equipment carefully.
▶ Unpin the retaining pin **7** at point **U** and pin into the transport receptacle on the cross brace, point **X**, illustration **13**.
▶ Release and unpin the pin **5**.
▶ Swing the pulley block **4** out with auxiliary crane.
▶ Place the pulley block **4** on the ground.
▶ Remove the auxiliary crane.
▶ Remove the second pulley block.

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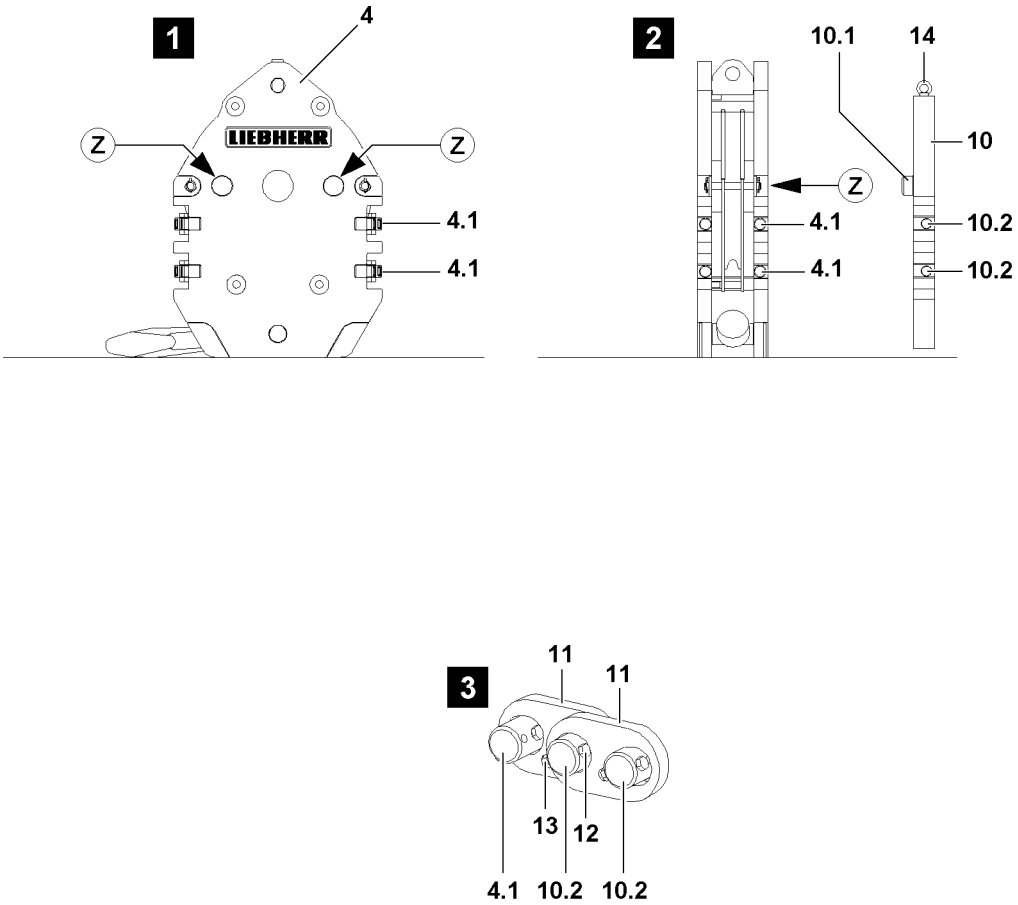

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Fig.108146

5 Single hook blocks

5.1 Installing the single blocks

5.1.1 Installing the auxiliary weights

Note
▶ The own weight for each auxiliary weight is marked on the auxiliary weight!

WARNING
Toppling of hook block!
If the auxiliary weights are installed one-sided, the hook block can topple over!
Personnel can be severely injured or killed!
▶ The auxiliary weights may only be installed **individually** and alternately on the left and right on the hook block!
▶ When the required auxiliary weight is installed on the hook block, the difference between the left and right side may never be more than one auxiliary weight!
▶ Asymmetrical installation of auxiliary weights is prohibited!
▶ Do not exceed the maximum permissible own weight of the hook block! The maximum permissible own weight is engraved on ballastable hook blocks. See „Engraving WT max.“.

Make sure that the following prerequisite is met:
– The hook block is placed on the ground.

WARNING
Falling auxiliary weights!
If the auxiliary weights are not properly installed on the hook block, then they can fall down during installation or in crane operation!
Personnel can be severely injured or killed!
▶ Standing under a suspended auxiliary weight is prohibited!
▶ Make sure that the auxiliary weights are properly installed and secured!
▶ Crane operation with insufficiently secured auxiliary weights is prohibited!

▶ Attach the auxiliary weight **10** on the ring screw **14** on the auxiliary crane.

WARNING
Danger of crushing!
When swinging the auxiliary weights to the hook block, personnel can be severely injured or killed!
Fingers, hands and arms can be crushed or severed!
▶ It is prohibited for anyone to remain between the hook block and the auxiliary weight!
▶ Swing auxiliary weights in to the hook block with utmost caution and at the least possible speed!

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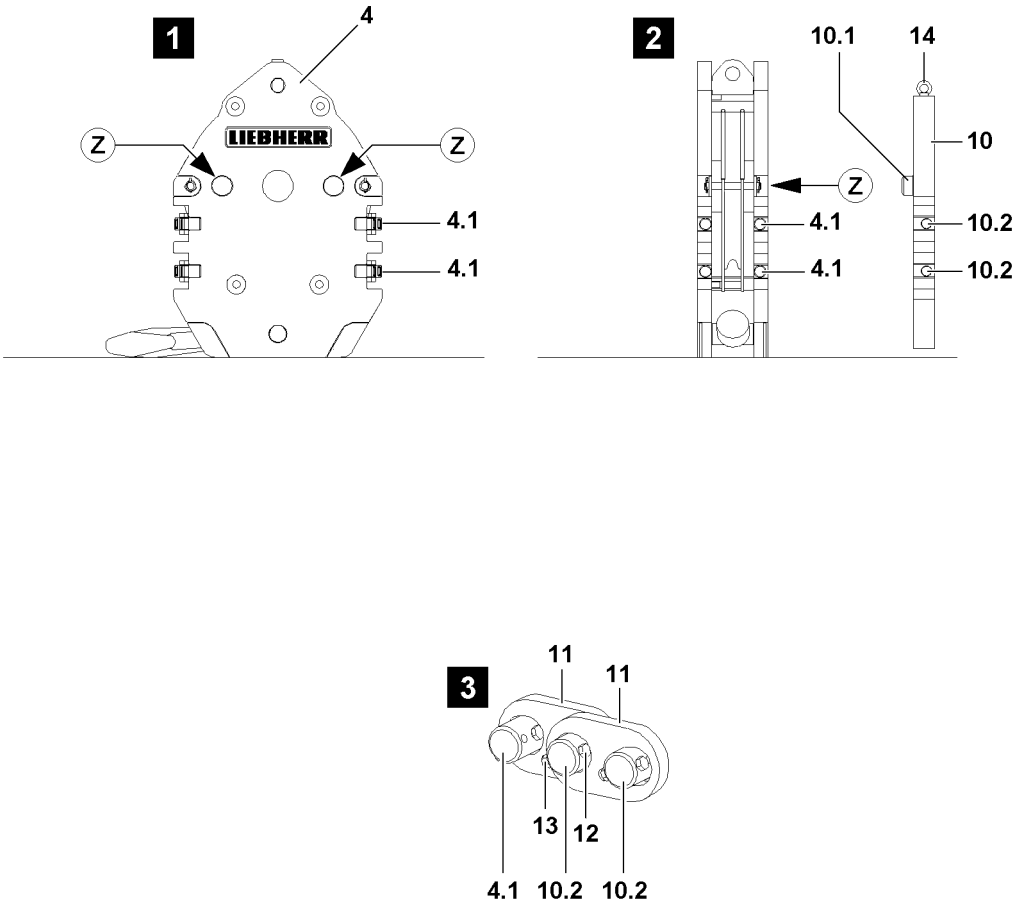

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Fig.108146

- ▶ Align the auxiliary weight **10** on the hook block.
- ▶ Move the centering pin **10.1** of the auxiliary weight into the centering bores **Z** on the hook block.

WARNING
Falling auxiliary weights!
If all mounting brackets **11** are removed simultaneously on an unsecured auxiliary weight, then the auxiliary weight can fall down!
Personnel can be severely injured or killed!
- ▶ Never remove all mounting brackets **11** of an unsecured auxiliary weight at the same time!
- ▶ Always install or remove the mounting brackets **11** alternately!

- ▶ Install the mounting brackets **11** on the side and connect the hook block with the auxiliary weight **10**, illustration **3**.
- ▶ Secure the mounting brackets **11** with screws **12** and lock nuts **13**, illustration **3**.

Note
- ▶ Additional auxiliary weights must be connected with the mounting brackets **11**!

WARNING
Falling auxiliary weights!
The auxiliary weights can fall down by removing the auxiliary crane!
Personnel can be severely injured or killed!
- ▶ Remove the auxiliary crane only when it is ensured that the auxiliary weight **10** is properly secured with the mounting brackets **11**!

When the respective auxiliary weight is properly installed and secured:
- ▶ Remove the auxiliary crane.

5.1.2 Preparing the hook block for crane operation

Note
- ▶ The reeving of the hook blocks is described in chapter 4.06 of the Crane operating instructions!
- ▶ Observe the „permissible hook block weights“ in the erection and take down charts!

- ▶ Reeve the hoist rope according to the instructions in chapter 4.06 of the Crane operating instructions and the reeving plans!

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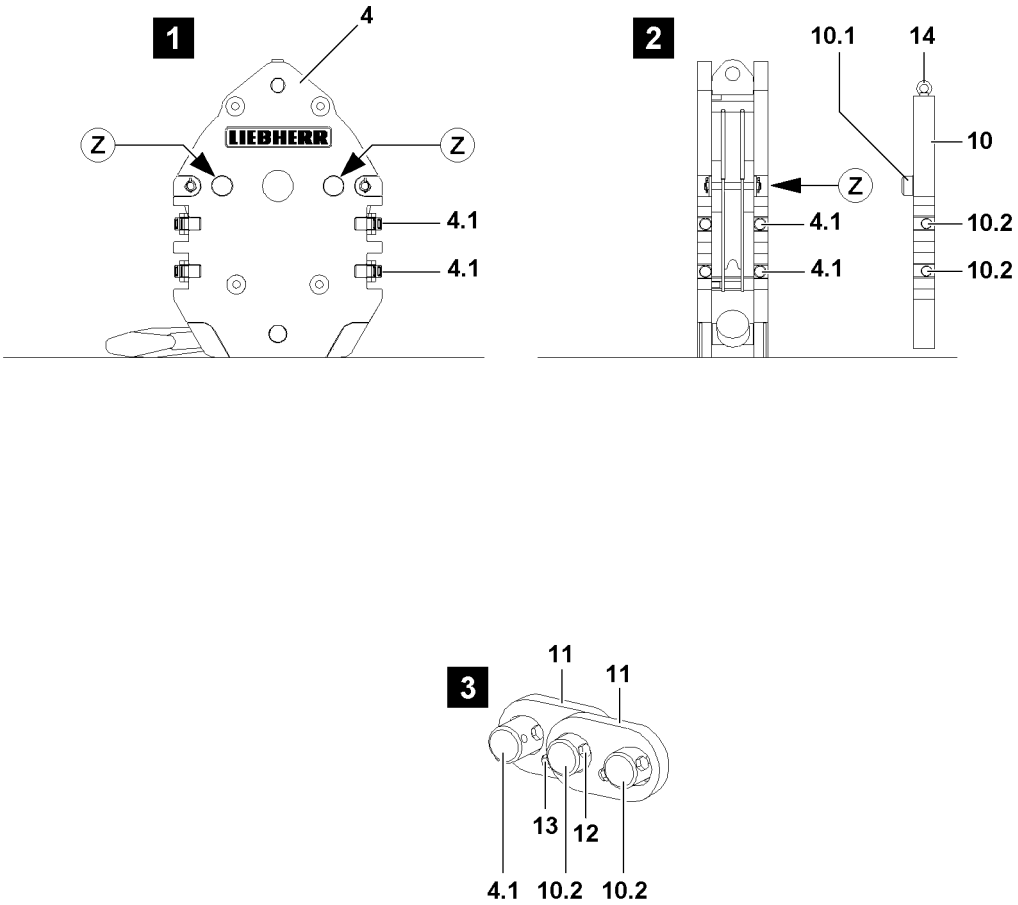

LWE/LG 1750-006/15409-07-02/en

Fig.108146

5.2 Removing the single blocks

5.2.1 Preparing the hook block for removal

Note
- ▶ The unreeving of the hook blocks is described in chapter 4.06 of the Crane operating instructions!
- ▶ Observe the „permissible hook block weights“ in the erection and take down charts!

Make sure that the following prerequisites are met:
- The ground is sufficiently load bearing to take on the weight of the hook block and the auxiliary weights safely.
- The ground is level and horizontal.

▶ Lower the hook block completely to the ground.

When the hook block was placed down on the ground properly:
▶ Unreeve the hoist rope according to chapter 4.06 of the Crane operating instructions!

5.2.2 Removing the auxiliary weights

Note
- ▶ The own weight for each auxiliary weight is marked on the auxiliary weight!

WARNING
Toppling of hook block!
If the auxiliary weights are removed one-sided, the hook block can topple over!
Personnel can be severely injured or killed!
- ▶ The auxiliary weights may only be removed **individually** and alternately on the left and right on the hook block!
- ▶ The difference between the left and the right side at removal of the auxiliary weights may never be more than one auxiliary weight!
- ▶ Asymmetrical removal of auxiliary weights is prohibited!

WARNING
Falling auxiliary weights!
If the auxiliary weights on the pulley block are not properly removed, then they can fall down at removal!
Personnel can be severely injured or killed!
- ▶ Standing under a suspended auxiliary weight is prohibited!

▶ Attach the auxiliary weight **10** on the ring screw **14** on the auxiliary crane.
▶ Tension the fastening equipment carefully.

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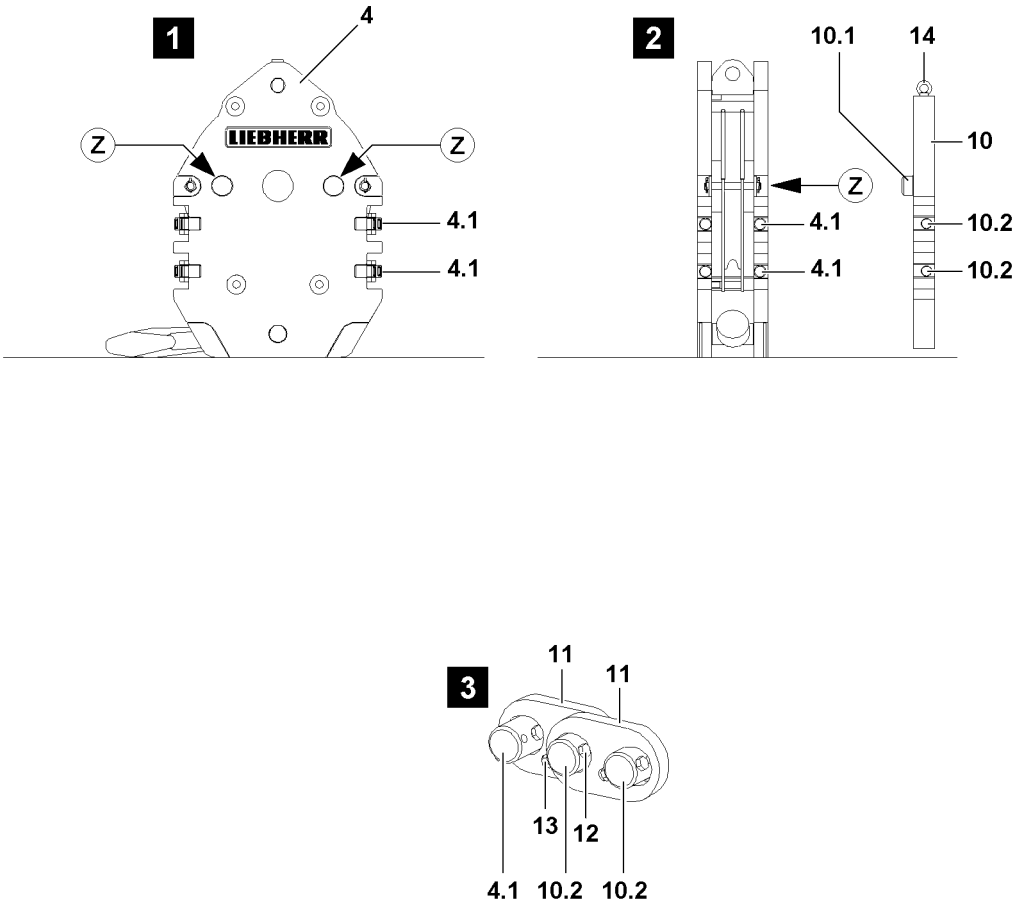

LWE/LG 1750-006/15409-07-02/en

Fig.108146

WARNING
Oscillating auxiliary weights!
During the removal of the auxiliary weights, the auxiliary weights can start to swing back and forth!
Personnel can be severely injured or killed!
- ▶ It is prohibited for anyone to remain in the danger zone!
- ▶ Make sure that the auxiliary weight which is being removed is properly attached on the auxiliary crane before releasing the mounting brackets!
- ▶ Angular pull is prohibited!

When the fastening equipment is tensioned on the auxiliary weight:
- ▶ Release the screw connection on the mounting brackets of the outermost auxiliary weight and remove the screws.

WARNING
Falling auxiliary weights!
If all mounting brackets **11** are removed simultaneously on an unsecured auxiliary weight, then the auxiliary weight can fall down!
Personnel can be severely injured or killed!
- ▶ Never remove all mounting brackets **11** of an unsecured auxiliary weight at the same time!
- ▶ Always install or remove the mounting brackets **11** alternately!

- ▶ Pull the mounting brackets **11** off to the side.

WARNING
Falling auxiliary weights!
If additional auxiliary weights which are being removed are released, then these auxiliary weights can fall down!
Personnel can be severely injured or killed!
- ▶ Make sure, before removing the outermost auxiliary weight, that the other auxiliary weights are secured with the mounting brackets!

If additional mounting brackets must be removed to release the outermost auxiliary weight:
- ▶ Reinstall the mounting brackets **11** again immediately, so that only the auxiliary weight which is being removed is released.
- ▶ Lift the auxiliary weight with the auxiliary crane from the hook block.
- ▶ Place the auxiliary weight onto the ground.
- ▶ Remove the auxiliary crane.
- ▶ Remove additional auxiliary weights as described above.

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5.19.10 Hook block incline sensors

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Fig.195219

1 Assembling the receiver-incline sensor*

The installation of the radio receiver on the respective boom head is required to provide an additional aid for the crane driver in parallel operation of winch 1 and winch 2 (1II2) to manually monitor the incline of the hook block via the incline display in the respective winch icons.

Note

- ▶ The assembly of the radio receiver is described in this chapter as an example and may not apply exactly to your crane.
- ▶ The representation of the various mounting positions of the radio receiver are examples and may not apply exactly to your crane.
- ▶ Depending on the crane type and / or equipment, the assembly plate of the radio receiver may be constructed with a different design, see variation 1 and variation 2.

Note

- ▶ When using the radio receiver, the sender batteries must be sufficiently charged.

Note

- ▶ The LICCON computer system monitors in parallel operation the incline / incline position of the hook block, see the Crane operating instructions chapter 4.02 and chapter 4.05.

WARNING

Load ripping off!

If the hook block gets into an impermissible incline / incline position in parallel operation of winch 1 and winch 2 (1II2), then the hook block can be overloaded.

Death, severe bodily injuries, property damage.

- ▶ Make sure that the radio receiver is properly installed on the boom head / lattice section.
- ▶ Make sure that the incline display in the LICCON computer system is constantly monitored in crane operation, see Crane operating instructions, chapter 4.02.

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1.1 Variation 1: Installing / removing the radio receiver on the boom end section / lattice section

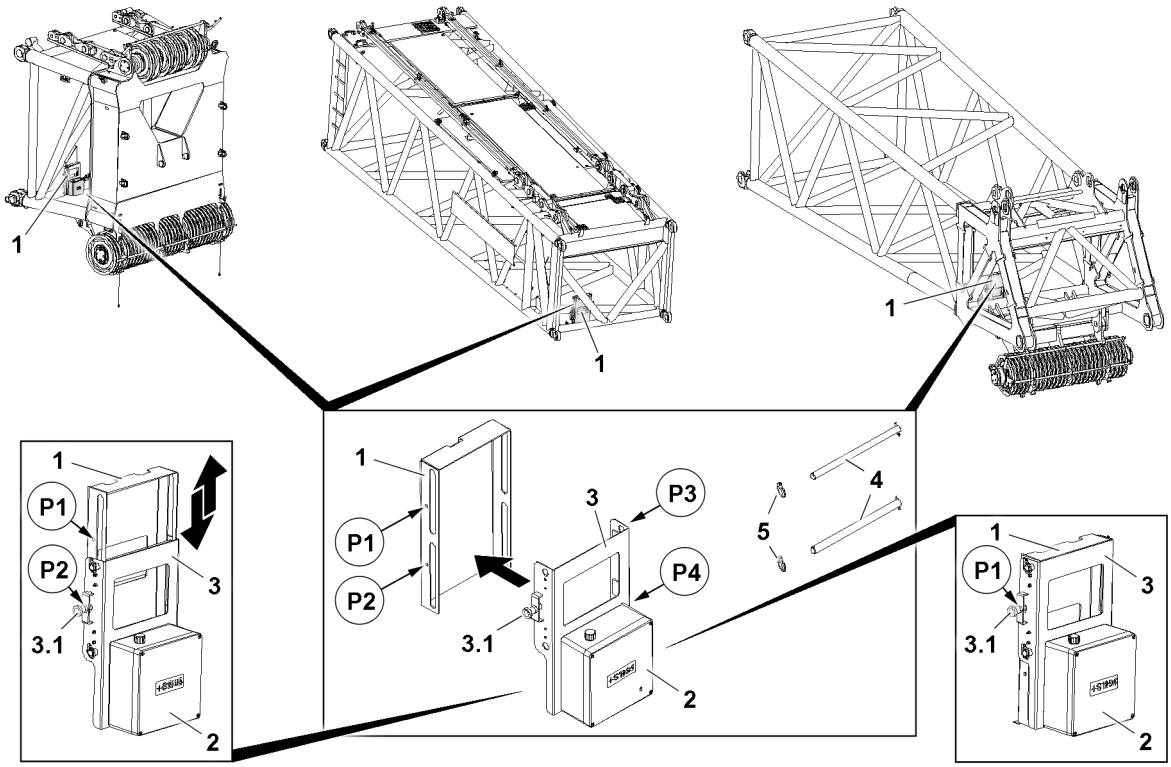

*Fig.128140: Variation 1: Installing the radio receiver **2** on the boom end section / lattice section*

Point **P1** = transport position lock

Point **P2** = operating position lock

The radio receiver **2** is screwed firmly with the assembly plate **3**.

If the assembly plate **3** is assembled properly on the boom end section / lattice section, then the radio receiver **2** can be moved and locked twice within the slotted holes on the support **1**.

1.1.1 Assembling the radio receiver

▶ Pull the detent pin **3.1** on the assembly plate **3** and position and hold the radio receiver **2** with the assembly plate **3** on the support **1**.

When the assembly plate **3** is properly set on the support **1**:

▶ Release the detent pin **3.1** and make sure that the detent pin **3.1** is properly locked in point **P1**.

▶ Properly insert the pins **4** at the points (point **P3** and point **P4**) and secure with the retaining element **5**.

Result:

– The radio receiver **2** is properly pinned and secured on the support **1**.
– The radio receiver **2** is properly locked in the transport position at point **P1**.

When the radio receiver **2** is properly pinned and locked:

▶ Connect the radio receiver **2** electrically, see Electric wiring diagram.

NOTICE
Damage of the radio receiver **2**!

▶ Make sure that the radio receiver **2**, when handling and / or placing down the respective boom end section / lattice section on the ground, is always in the transport position, see the section „Bringing the radio receiver to the transport position from the operating position“.

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▶ Protect the radio receiver **2** from damage.

1.1.2 Bringing the radio receiver to the operating position from the transport position

WARNING
Interruption of radio connection!
If the radio receiver **2** is left in the transport position during crane operation, the radio connection can break off.
▶ Make sure that the radio receiver **2** is in the operating position during crane operation.

The radio receiver **2** must be brought to the operating position before erecting the boom system and locked at point **P2**.

▶ Hold the radio receiver **2**, pull the detent pin **3.1** and slowly lower the radio receiver **2** in the operating position until the detent pin **3.1** engages at point **P2**.

Result:

– The radio receiver **2** is in the operating position.

1.1.3 Bringing the radio receiver to the transport position from the operating position

The radio receiver **2** must be brought to the transport position before disassembling the boom system and locked at point **P1**.

▶ Hold the radio receiver **2**, pull the detent pin **3.1** and slowly push the radio receiver **2** up to the transport position until the detent pin **3.1** engages at point **P1**.

Result:

– The radio receiver **2** is in the transport position.

1.1.4 Disassembling the radio receiver

▶ Disconnect the electrical connection between the terminal box and the radio receiver **2**.
▶ Properly store the electrical connection.

When the electrical connection is properly disconnected:
▶ Remove the retaining element **5** on the pins **4**.
▶ Hold the radio receiver **2** and unpin the pin **4**.
▶ Pull the detent pin **3.1** lift the radio receiver **2** with the assembly plate **3** from the support **1**.
▶ Insert the pin **4** on the assembly plate **3** and secure properly with the retaining element **5**.

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1.2 Variation 2: Installing the radio receiver on the boom end section

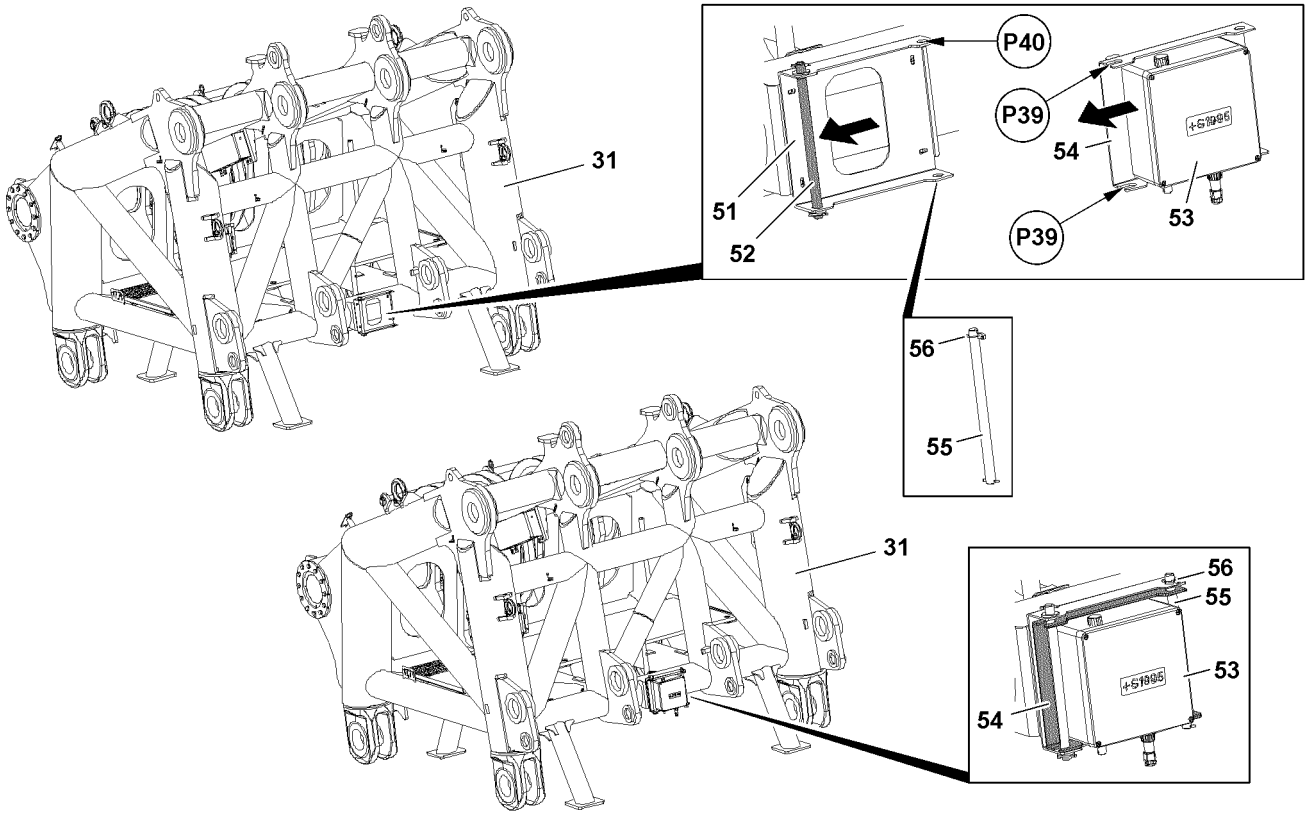

*Fig.120089: Variation 2: **53**Installing the radio receiver **53** on the boom end section*

The radio receiver **53** is screwed on the assembly plate **54**.

▶ Move the assembly plate **54** of the radio receiver **53** with the fork connections at point **P39** on the axle **52** of the retainer **51**.

When the assembly plate **54** of the radio receiver **53** is properly in the retainer **51**:

▶ Insert the pin **55** at point **P40** and secure properly with the locking pin **56**.

▶ Connect the radio receiver **53** electrically, see Electric wiring diagram.

NOTICE

Damage of the radio receiver **53**!

▶ Make sure that the radio receiver **53** is not damaged when handling and / or setting down the respective boom head on the ground.

▶ Protect the radio receiver **53** from damage.

2 Assembling the sending unit-incline sensor* on the hook block

So that the inclination of the hook block can be recorded in parallel operation by the crane control, the radio sending unit must be properly assembled on the hook block.

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Note

- The assembly of the radio sending unit is described in this chapter as an example and may not apply exactly to your crane.
- The representation of the various mounting positions of the hook blocks are examples and may not apply exactly to your crane.

Note

- The LICCON computer system monitors in parallel operation the incline / incline position of the hook block, see the Crane operating instructions chapter 4.02 and chapter 4.05.

WARNING

Load ripping off!

If the hook block gets into an impermissible incline / incline position in parallel operation of winch 1 and winch 2 (1II2), then the hook block can be overloaded.

Death, severe bodily injuries, property damage.

- Make sure that the radio sending unit is properly installed on the hook block.
- Make sure that the incline display in the LICCON computer system is constantly monitored in crane operation, see Crane operating instructions, chapter 4.02.

2.1 Assembling the radio sending unit on the hook block

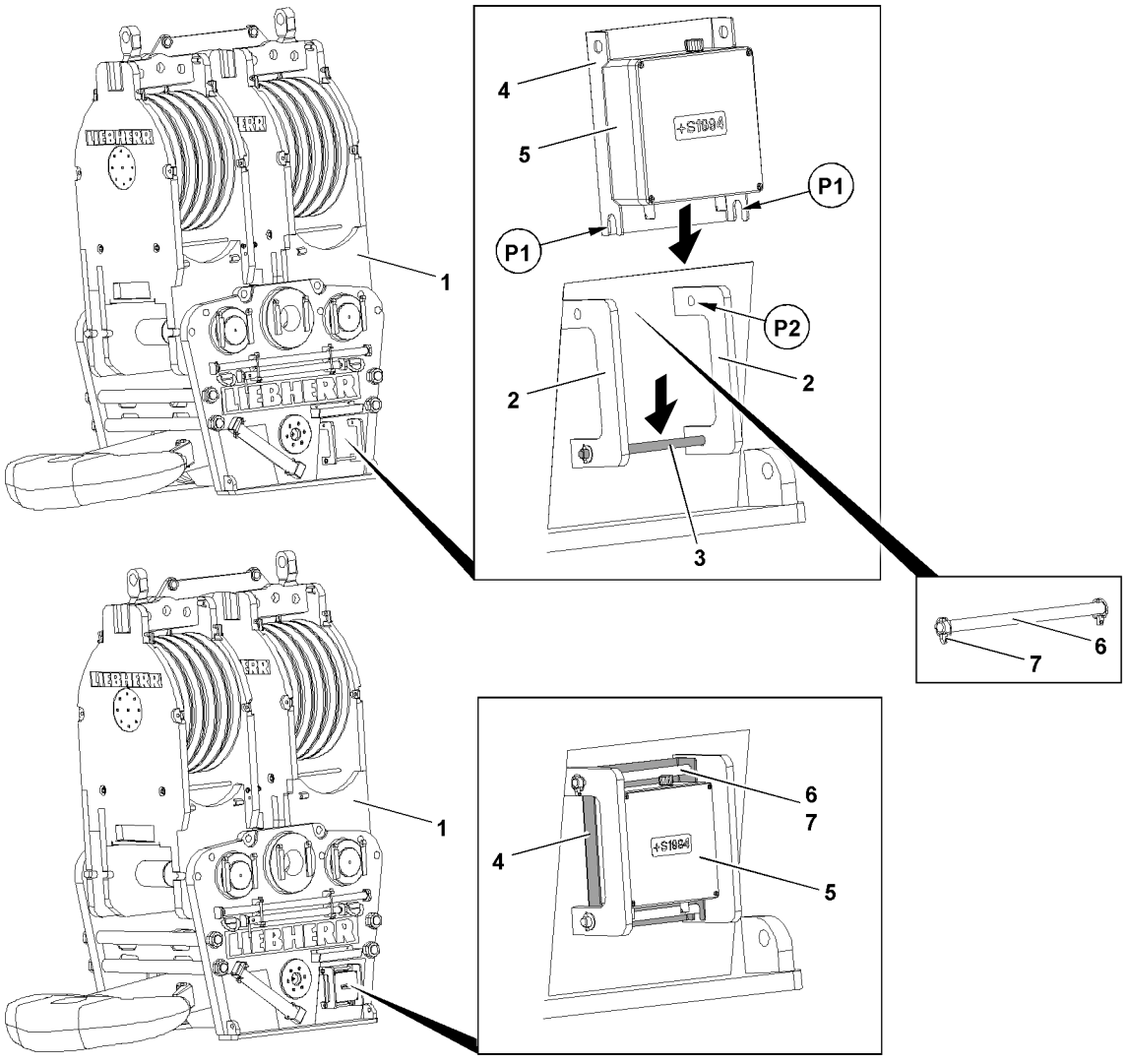

*Fig.120141: Assembly of the radio sending unit **5** on the hook block*

The installation of the radio sending unit **5** on the respective hook block is required to be able to ensure in parallel operation of winch 1 and winch 2 (1II2) via the incline display in the respective winch icons that the hook block does not get into an impermissible incline position.

Make sure that the following prerequisites are met:
- The hook block is standing on the ground.
- The hook block has the required retainer **2** for the assembly of the radio sending unit.
- The radio sending unit batteries are sufficiently charged.

Note
▶ An impermissible incline position of the hook block in parallel operation of winch 1 and winch 2 (1II2) does **not** result in a **shut-off** of winch movements by the LICCON computer system.

WARNING
Load ripping off!
If the hook block gets into an impermissible incline position in parallel operation of winch 1 and winch 2 (1II2), then the hook block can be overloaded.
The load can rip off and fall down.
Death, severe bodily injuries, property damage.
▶ Make sure that the radio sending unit **5** is properly installed on the hook block.
▶ Make sure that the incline display in the LICCON computer system is constantly monitored in crane operation, see Crane operating instructions, chapter 4.02.

Note
▶ The assembly of the radio sending unit **5** on the respective hook block is described as an example.
▶ The example assembly of the radio sending unit **5** is identical to the assembly of the radio sending unit **5** on additional hook blocks approved for parallel operation.

The radio sending unit **5** is screwed on the assembly plate **4**.

▶ Move the assembly plate **4** of the radio sending unit **5** with the fork connections at point **P1** on the axle **3** of the retainer **2**.

When the assembly plate **4** of the radio sending unit **5** is properly in the retainer **2**:
▶ Insert the pin **6** at point **P2** and secure properly with the locking pin **7**.

NOTICE
Damage of the radio sending unit **5**!
▶ Make sure that the radio sending unit **5** is not damaged when handling with the hook block.

▶ Protect the radio sending unit **5** from damage.

2.2 Disassembling the radio sending unit on the hook block

Make sure that the following prerequisite is met:
- The hook block is standing on the ground.

▶ Release the radio sending unit **5**: Remove the locking pin **7** and unpin the pin **6** at point **P2**.
▶ Lift the radio sending unit **5** and store it properly.
▶ Insert the pin **6** again at point **P2** and secure properly with locking pin **7**.

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5.30 Pin pulling device

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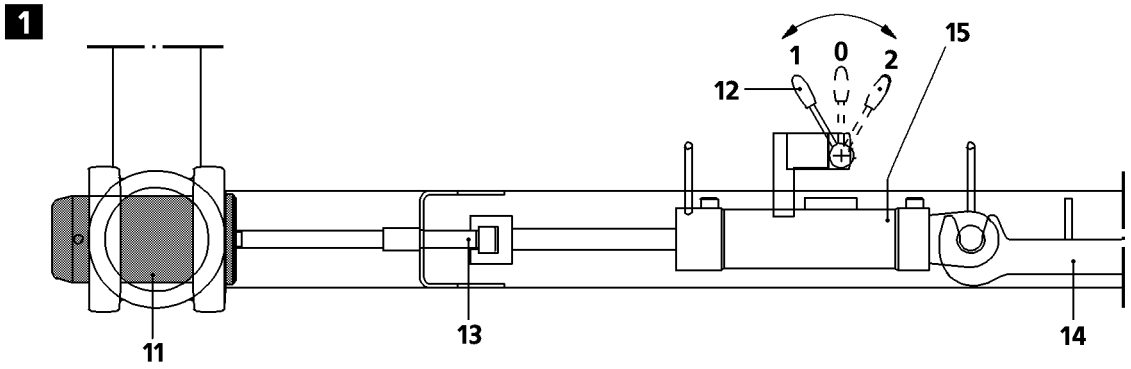

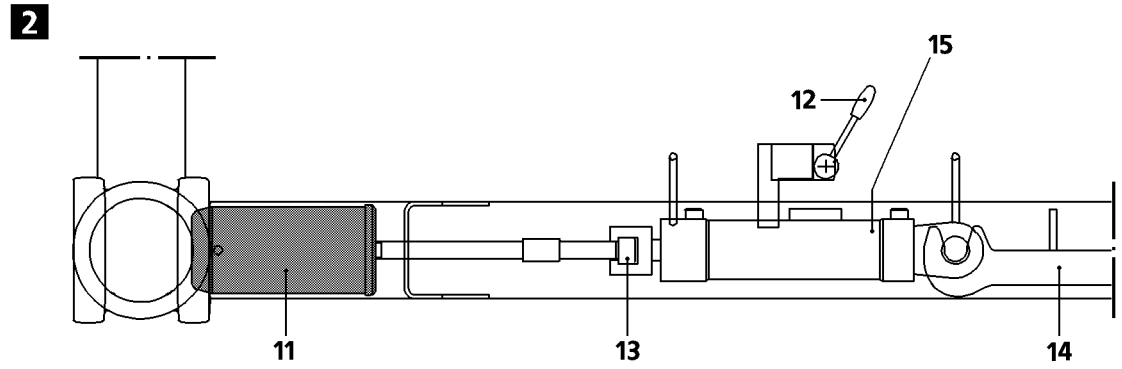

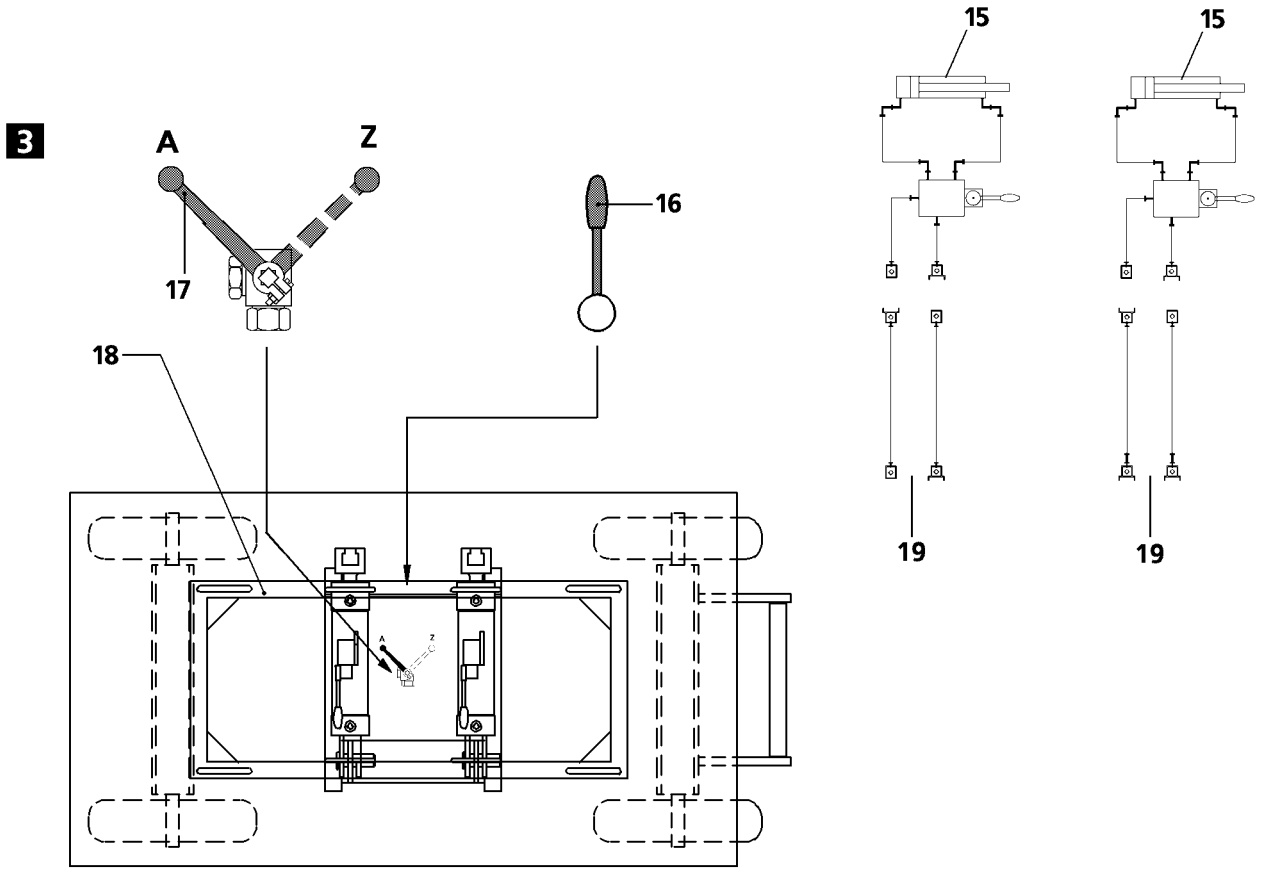

Fig.108585

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1 Pin pulling device

The pin pulling device consists of:
- Pin pulling cylinder **15**, see illustration **1**.
- Hydraulic component **18**, see illustration **3**.

DANGER
Danger of accident!
When you disassemble unsecured or unsupported crane parts, they can fall down!
Personnel can be severely injured or killed!
- ▶ Never stand **under** unsecured or unsupported crane parts and unpin the pins!
- ▶ Never unpin the connecting pins on unsecured or unsupported booms!
- ▶ Do not stand under the crane parts or within the complete danger zone during the pinning and unpinning procedure!
- ▶ Do not lean the ladder against the crane part being disassembled!

WARNING
Pressure in the hydraulic lines!
If the pressure supply is not interrupted before connecting / releasing the hydraulic lines, the hydraulic oil can escape with high pressure!
Personnel can be severely injured or killed!
- ▶ Release the pressure in the hydraulic system before connecting / disconnecting: Interrupt the pressure supply and wait for a short time!

WARNING
Loss of pressure or leakage!
Incorrectly coupled or self-loosening quick-release couplings (particularly return lines) can result in serious accidents due to component failure!
- ▶ Check that the quick couplings have been properly connected before using the crane!
- ▶ Assemble coupling components (sleeve and connector) and screw together with the hand-tightened nut!
- ▶ Tighten the hydraulic coupling by hand. Rotate hand-tightened nut until it reaches a tangible, fixed stop position!

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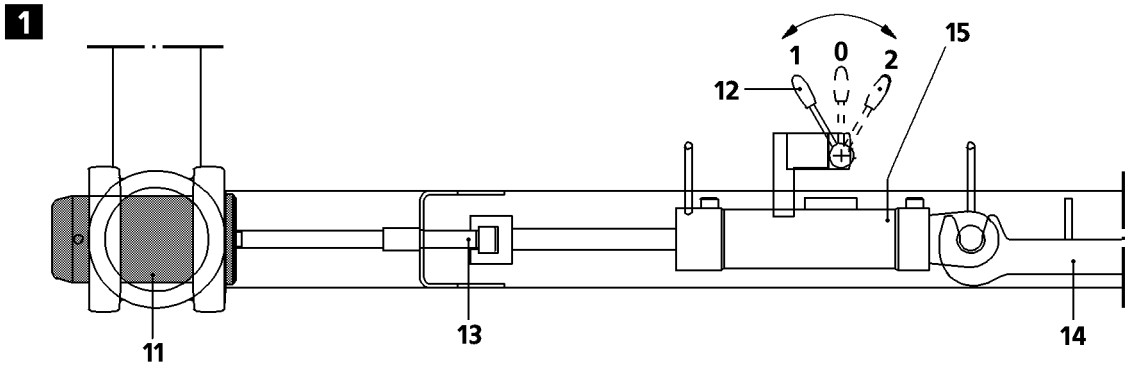

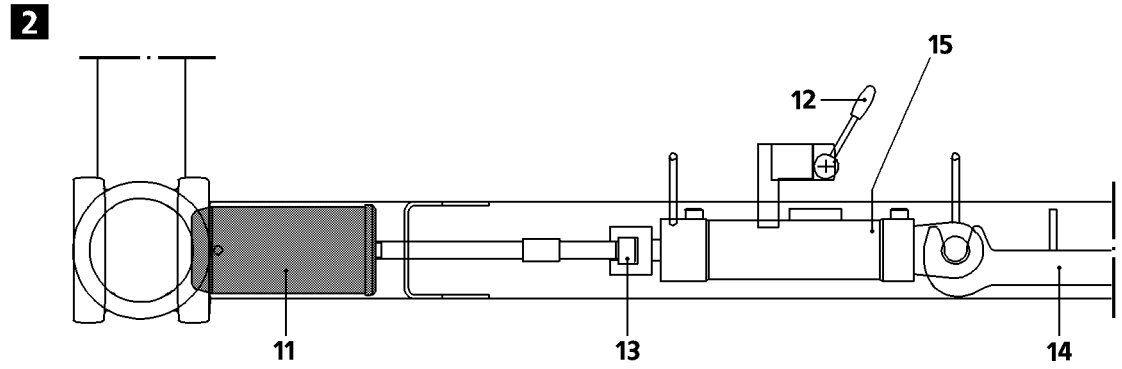

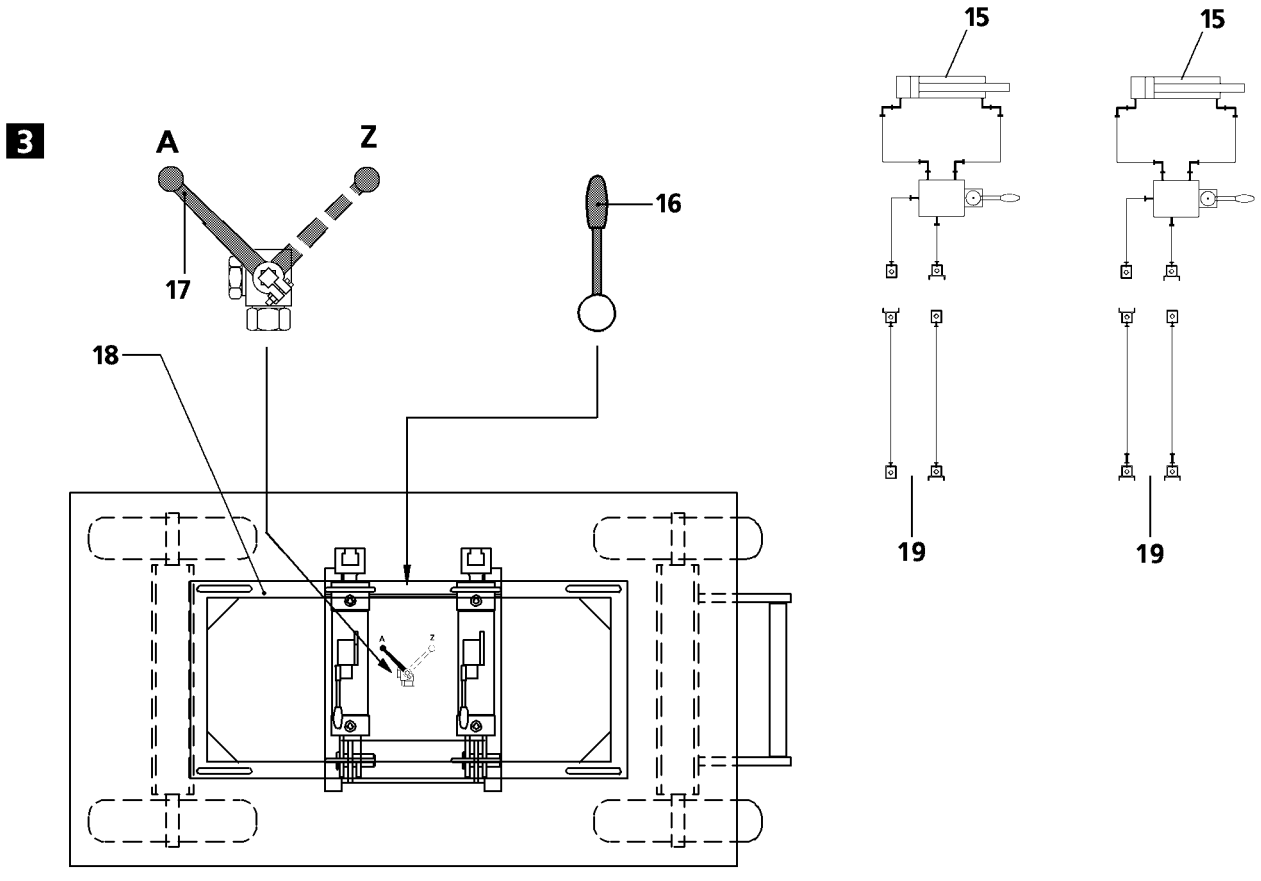

Fig.108585

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1.1 Hydraulic oil level

Note

- ▶ The hydraulic oil tank is filled when starting the hydraulic aggregate.
- ▶ Check the hydraulic oil level, see Operating and maintenance instructions for the Hydraulic aggregate.

NOTICE

Emerging hydraulic oil!

When the hydraulic aggregate is changed and / or the operational crane hydraulic is connected, then there is a danger that the hydraulic oil is supplied during the working process into the hydraulic tank circuit and thus forwarded into the hydraulic tank of the hydraulic aggregate.

The forwarded hydraulic oil quantity exceeds the tank volume of the hydraulic aggregate. Hydraulic oil runs over and contaminates the environment.

- ▶ Make sure that the hydraulic aggregate is separated from the hydraulic circuit of the crane before hydraulic components are actuated via the crane hydraulic.
- ▶ Make sure, before the hydraulic aggregate is separated from the crane, that the working process is ended with the same hydraulic aggregate.
- ▶ Make sure that the identical amount of hydraulic oil is in the hydraulic oil tank of the hydraulic aggregate after application than before.

1.2 Pinning and unpinning with pin pulling device

Note

- ▶ Observe the information in the Operating and Maintenance manual of the hydraulic aggregate **18**!
- ▶ The engine rpm can be adjusted using a separate speed regulator on the hydraulic aggregate **18**.

1.2.1 Pinning and unpinning the pins on the boom sections

Make sure that the following prerequisites are met:

- – The hydraulic connections **19** from the hydraulic aggregate **18** to the pin pulling cylinders **15** are established, see illustration **3**.
- – The levers **12** on the pin pulling cylinders **15** are set on **position 0**, see illustration **1**.

- ▶ Fasten pin pulling cylinder **15** between retainer **14** and pull screw **13**, see illustration **1**.
- ▶ Start the engine from the hydraulic aggregate **18**, see illustration **3**.
- ▶ Switch the ball valve **17** to position **Z**, see illustration **3**.

WARNING

Falling components!

When pinning / unpinning the pins on the lattice sections, components can fall down. Personnel can be killed or seriously injured.

- ▶ During the pinning / unpinning procedure of the lattice sections, do not step into the danger zone!
- ▶ Actuate pin pulling cylinder **15** exclusively for pinning and unpinning on the hydraulic aggregate **18** with lever **16**, see illustration **3**.

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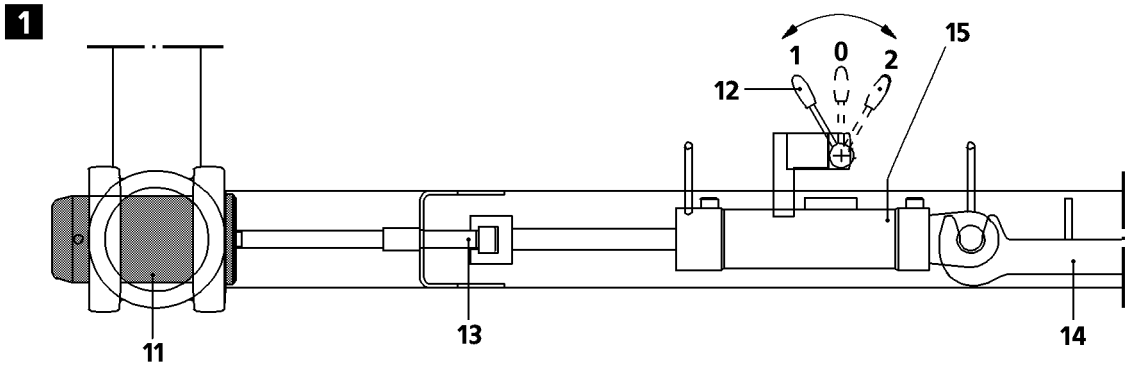

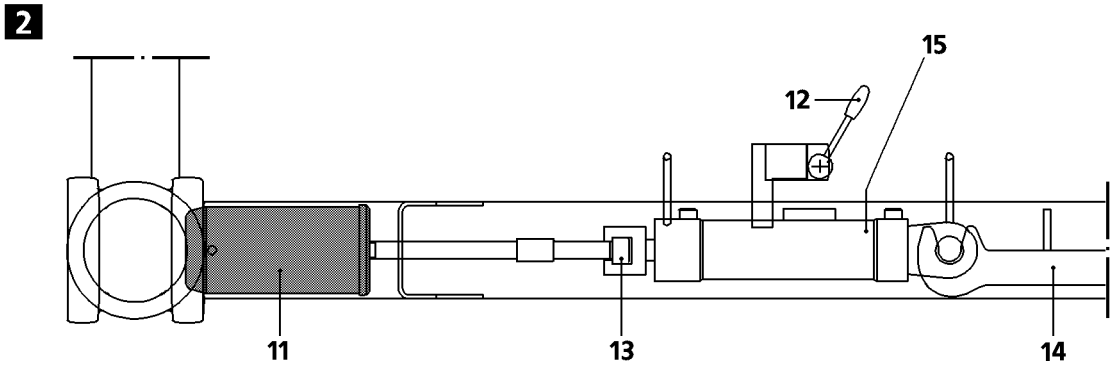

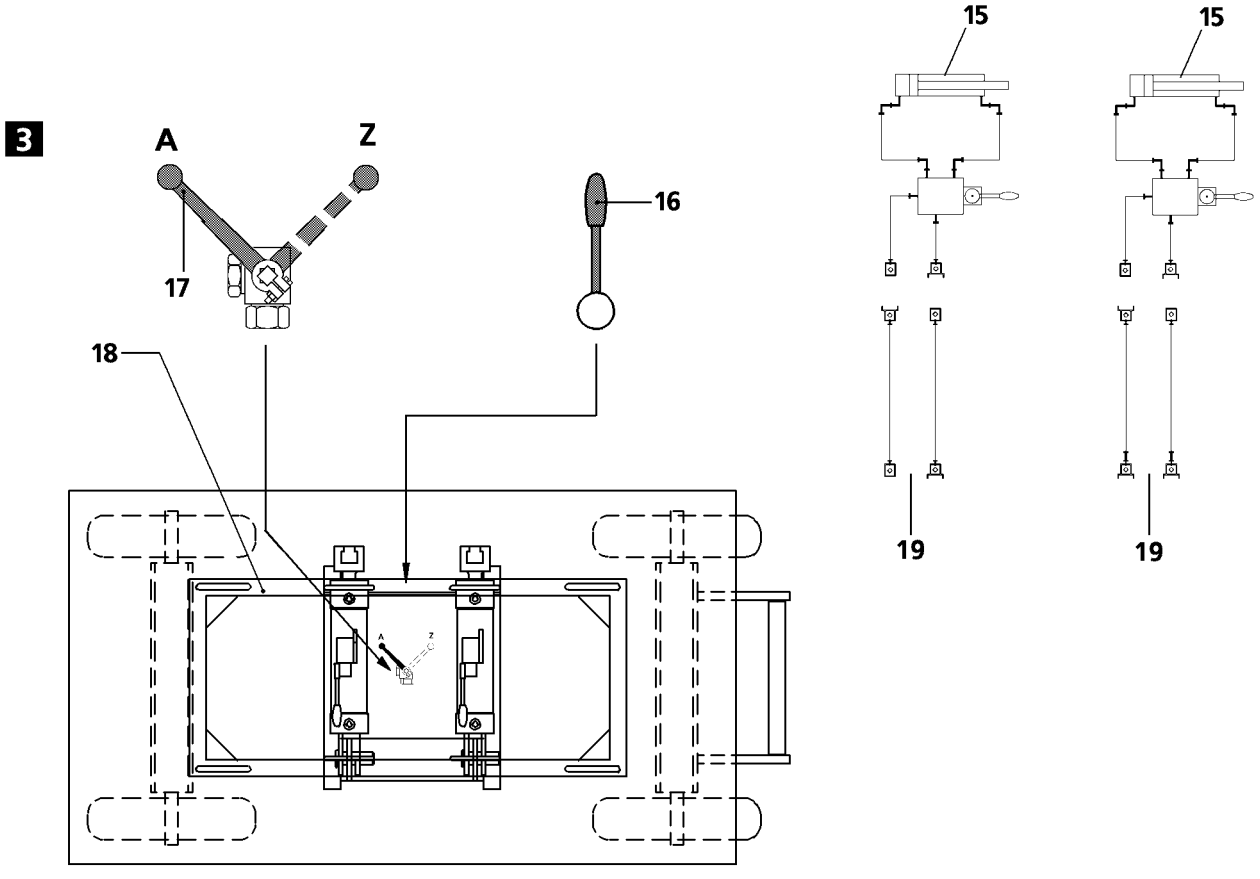

Fig.108585

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When it should be pinned (illustration **1**):
▶ Set the lever **12** on the pin pulling cylinders **15** to **position 1**.

When it should be unpinned (illustration **2**):
▶ Set the lever **12** on the pin pulling cylinders **15** to **position 2**.

Result:

– Pin pulling cylinders **15** are ready for use

Note
▶ Make sure that the levers **12** are set to the correct position.

Pin / unpin pin **11** with hydraulic aggregate **18**:
▶ Actuate lever **16** on the hydraulic aggregate **18** with the right operating mode.

1.3 Ending operation with pin pulling device

▶ The levers **12** on the pin pulling cylinders **15** are set to **position 0**, see illustration **1**.
▶ Turn the engine off from hydraulic aggregate **18**.
▶ Close ball valve **17** on position **A**, see illustration **3**.
▶ Remove hydraulic connections **19** and protect connections from contamination.
▶ Remove pin pulling cylinder **15** between retainer **14** and pull screw **13**, see illustration **1**.

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5.36 Derrick ballast - suspended ballast

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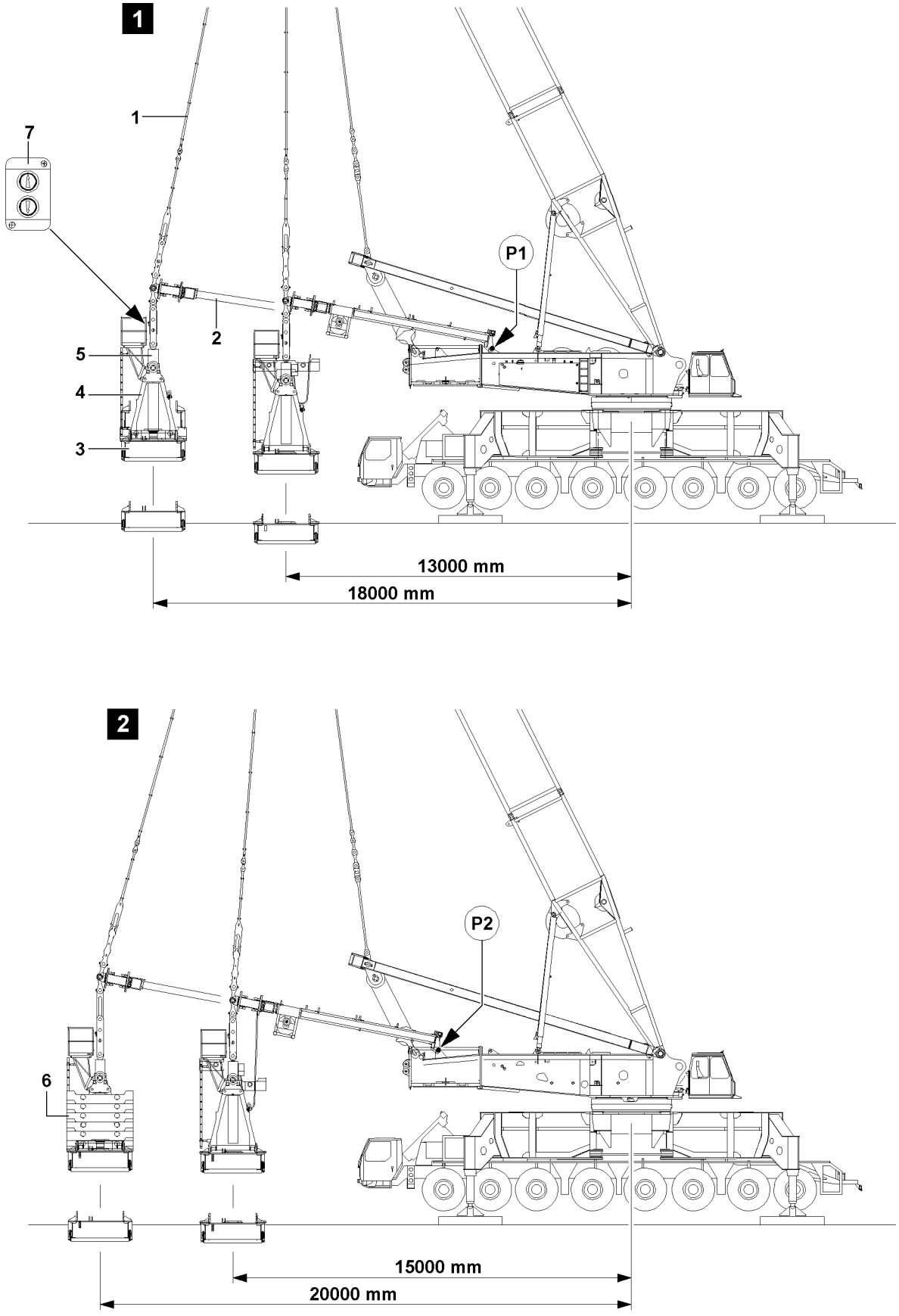

Fig.111374

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1 Description and component overview

The hydraulically telescopeable suspended ballast guide **2** can be steplessly telescoped out to 5000 mm.

Depending on the pivot point of the guide frame on the turntable, derrick ballast radii between 13.0 m and 18.0 m (pivot point **P1**), and 15.0 m and 20.0 m (pivot point **P2**), are possible.

WARNING
Danger of accident!
▶ For the 42 m derrick, only derrick ballast radii of 18 m and 20 m are permissible.

Note
▶ The suspended ballast is described in general as derrick ballast.
▶ The fixed compensation weight which is installed on the turntable is generally referred to as the counterweight.

The derrick boom angle, the derrick ballast radius, the derrick ballast weight and the derrick ballast utilization are displayed on LICCON monitor 1.

The derrick ballast is raised for crane operation after assembly on the ground with the pull cylinders **5**, which are installed on the ballast pallet **3**.

For crane operation with derrick ballast, see Crane operating instructions, chapter 4.02.

1.1 Component overview derrick ballast and ballast pallet

See illustration **1** and illustration **2**.

Position	Components
1	Derrick ballast guying
2	Guide
3	Ballast pallet
4	Erection rack
5	Pull cylinder
6	Ballast plates
7	Control panel

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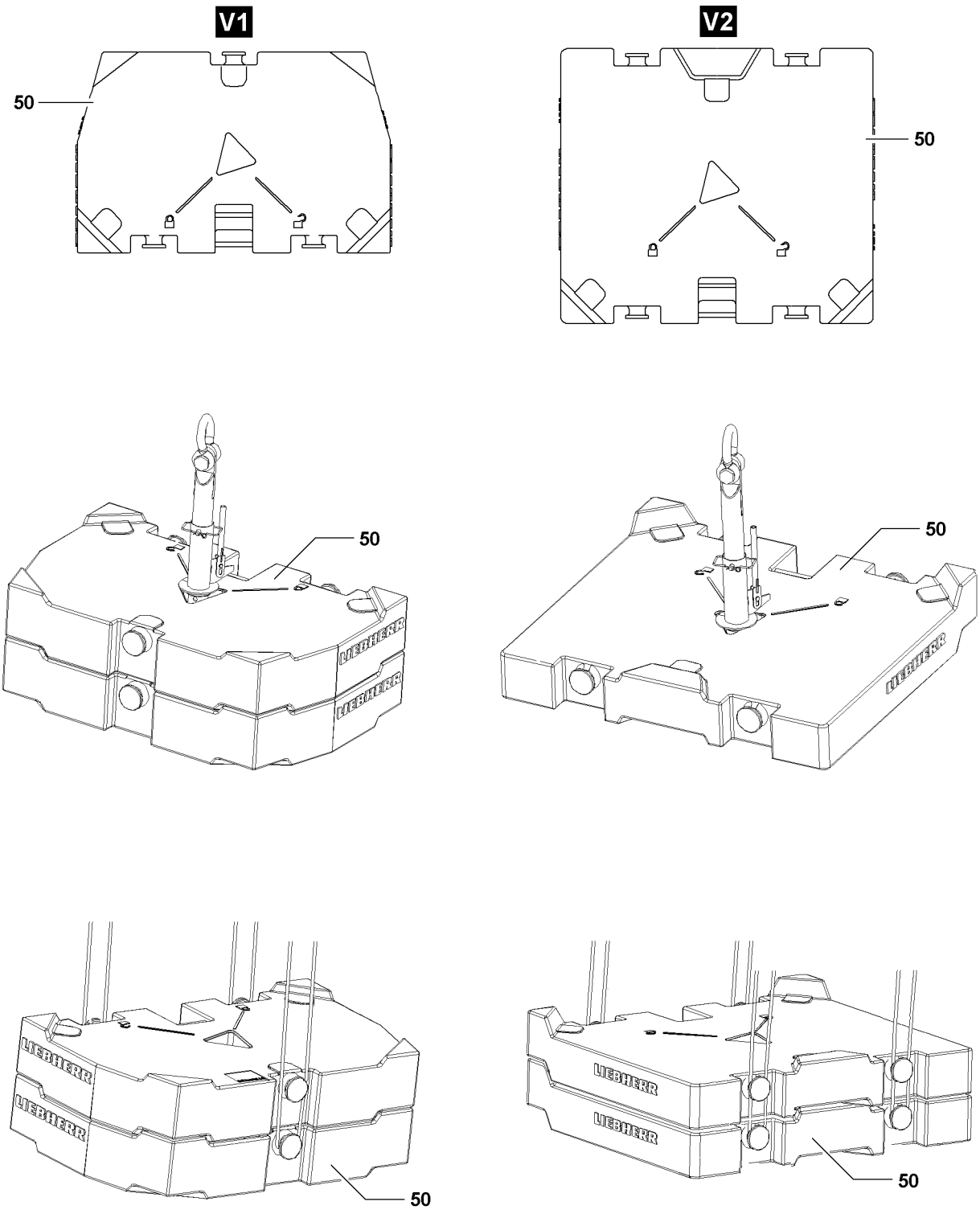

Fig.109419

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1.2 Ballast plates

Note
▶ The ballast plates are marked with their own weights.

The ballast plates are placed as a ballast stack on the suspended ballast pallet.

Ballast plates are available in variation **V1** and variation **V2**:

Ballast plate	Weight
Variation **V1**	10 t
Variation **V2**	12.5 t

2 Permissible ballast assemblies

WARNING
Overload fastening points ballast plates!
If more than the permissible number of ballast plates are lifted together, then the fastening points can be overloaded.
The ballast plates and components can fall down.
Personnel can be severely injured or killed.
▶ Attach only the maximum permissible number of ballast plates per lift.

Individual weight Ballast plate	Maximum number of same ballast plates per lift over	
	Twistlock	Bitt
10.0 t	2	2
12.5 t	1	2

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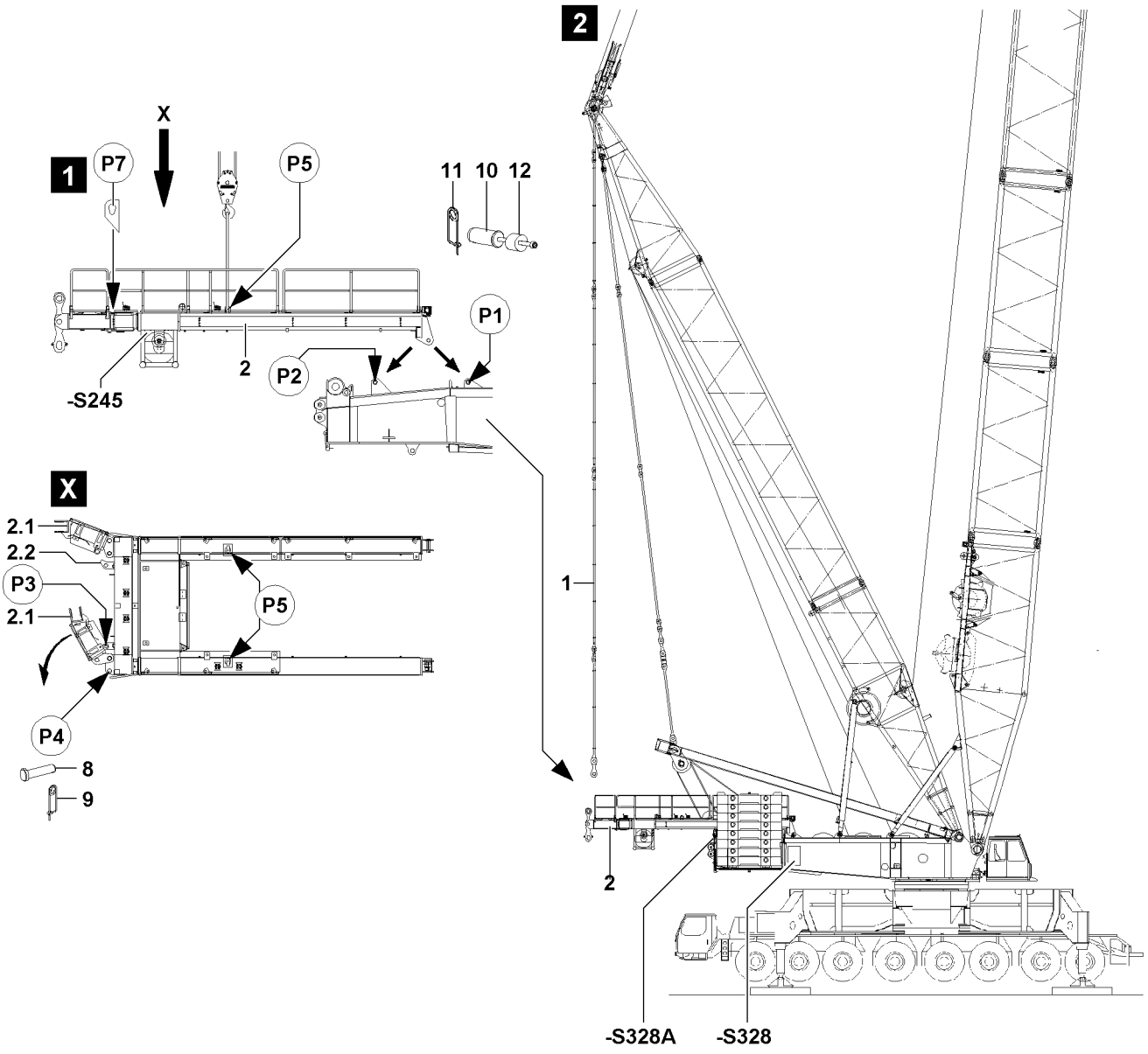

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Fig.111375

3 Assembly

WARNING
Danger of falling!
During assembly / disassembly, inspection and maintenance work, assembly personnel must be secured with appropriate aids to prevent them from falling. If this is not observed, assembly personnel could fall and suffer life-threatening or fatal injuries.

- All work aloft, where there is a danger of falling must be carried out with suitable aids.
- If fall arrest equipment is available, then it must be used, see Crane operating instructions, chapter 2.06.
- If aids are not available and work cannot be carried out from the ground, then the assembly personnel must secure themselves with the specified fall arrest system to prevent falling, see Crane operating instructions, chapter 2.04.
- The fall arrest system must be fastened on the fastening and hook points as well as on the safety ropes. For safety points, see Crane operating instructions, chapter 2.06.
- Only step on the aids, ladders and catwalks with clean shoes.
- Keep aids, ladders and catwalks free of heavy dirt, snow and ice.
- Remaining on as well as under a suspended load is prohibited.
- Remaining on or within crane components (for example: At assembly of boom sections, lattice sections) which are moved during lifting, lowering, turning or closing procedures is strictly prohibited.
- During all assembly and disassembly work, maintenance work and inspections, travel or crane operation is prohibited.
- It is prohibited to step on the boom system or an auxiliary boom without suitable protective devices.
- Stepping and walking on crane components and lattice sections, which have an incline of more than 20° is prohibited.

WARNING
Danger of impact / crushing!
When installing / removing crane components with the auxiliary crane, crane components can start to swing back and forth.
When lifting / lowering and positioning crane components, there is an increased danger of impacts / crushing.
Personnel can be caught and severely injured or killed.

- Make sure that personnel cannot be caught by components.
- Make sure that the crane is aligned in horizontal direction to avoid the support beams from swinging by themselves (only on connection with crane support or for the LG-crane).
- When working in danger zones: Use aids to protect limbs.
- Guide components with suitable aids to minimize oscillation.

WARNING
The lattice sections can fall down!
If the lattice sections are not pinned and secured correctly, then they can fall down and fatally injure personnel.

- Pin or unpin both pins at the same horizontal level, i.e. **left and right**.
- Do not stand under the lattice sections or within the entire danger zone during the pinning and unpinning procedure of the boom.
- Secure the pins in the bearing points and the receptacles.
- It is prohibited to lean the ladder against the component being disassembled.
- Do not remove the fastening equipment and the auxiliary crane until each component is pinned on and secured.

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Make sure that the following prerequisites are met:
- The crane is supported and aligned in horizontal direction according to the data in the load chart.
- The boom and the derrick boom are assembled on the turntable.
- The derrick boom is erected.
- The counterweight has been installed on the turntable according to the load chart.
- The LICCON overload protection has been set according to the data in the load chart.
- An auxiliary crane is available.

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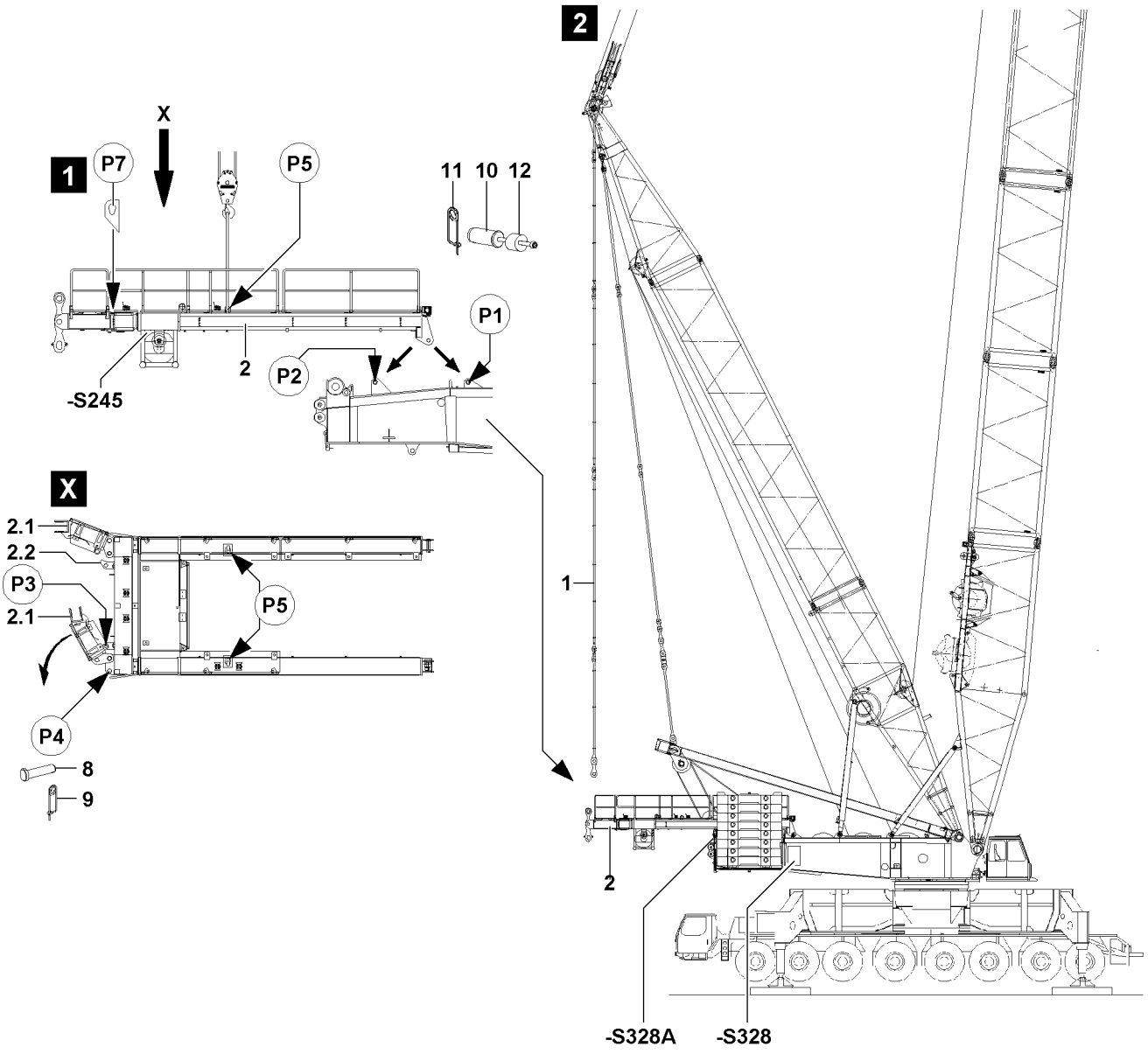

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Fig.111375

3.1 Pre-assembling guide frame

To retain the transport width of the guide frame **2**, the swing arms **2.1** are folded in transport position and secured, see illustration **X**.

Bring the swing arms **2.1** into operating position for crane operation and secure.

▶ Release and unpin locking pins **8** on the left and right at point **P3**.
▶ Fold the swing arms **2.1** into operating position (direction of the arrow) to the outside.

When the swing arms **2.1** are in operating position:
▶ Insert the locking pin **8** on point **P4** and secure with spring retainer **9**.

NOTICE
Risk of damage to railings!
If the railings are not brought into operating position and secured before installation of the guide frame on the turntable, they can be severely damaged.
▶ Bring the railings into operating position and secure them before assembly of the guide frame on the turntable.

▶ Remove the spring retainers on the railings.
▶ Swing the railing upward into operating position.
▶ Secure the railings in operating position with spring retainers.

3.2 Installing the guide frame on the turntable

Pin point	Possible derrick ballast radii
P1	13 m to 18 m
P2	15 m to 20 m

Make sure that the following prerequisites are met:
– The swing arms **2.1** are pinned in operating position and secured.
– All guard rails are pinned and secured in operating position.

▶ Attach guide frame **2** on the suspension lugs, point **P5**, at auxiliary crane, illustration **1**, illustration **X**.

NOTICE
Danger of property damage!
By swinging in the guide frame to the bolting points on the turntable, the crane components can be substantially damaged.
▶ Swinging the guide frame with the auxiliary crane is to be carried out with the greatest possible caution and at the slowest speed.

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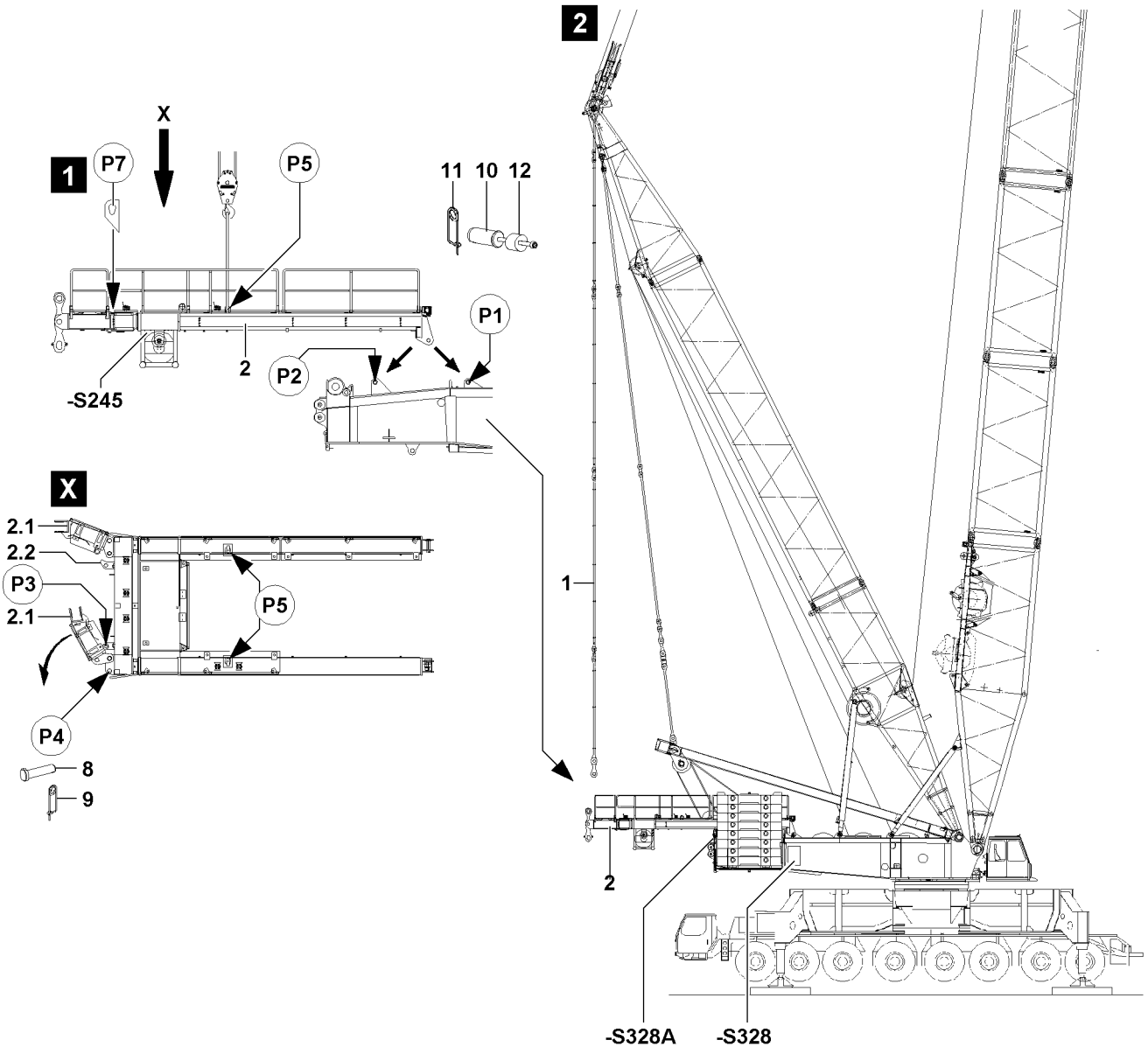

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Fig.111375

▶ Slew in guide frame **2** with auxiliary crane for pinning point **P1** on the turntable, illustration **2**.
or
Slew in guide frame **2** with auxiliary crane for pinning point **P2** on the turntable, illustration **2**.

When the guide frame **2** is found in the desired pinning point:
▶ Pin in the pins **10** at the corresponding pinning point with the striker **12** from the inside to the outside.
▶ Secure the pin **10** with spring retainer **11**.

When the guide frame is pinned and secured on both sides on the turntable:
▶ Lower guide frame **2** onto the support on the turntable, illustration **2**.
▶ Remove the auxiliary crane.
▶ Fold down lashing lugs, point **P5**, onto the guide frame **2**.
▶ Remove hydraulic hose lines from the guide frame **2**.

3.3 Establishing the hydraulic connection from the guide frame to the turntable

When connecting and releasing hydraulic lines with quick couplings, make sure that the coupling procedure is carried out correctly.

DANGER
Danger of accident due to loss of pressure or leakage!
Incorrectly coupled or self-loosening quick couplings (particularly return lines) can result in serious accidents due to component failure.
▶ Check that the quick couplings have been properly connected before using the crane.

▶ Release the pressure in the hydraulic system before connecting or disconnecting. Turn the engine off and wait several minutes.
▶ Combine the coupling components (sleeve and connector) and screw them together with the knurled nut.
▶ Tighten the hydraulic coupling by hand.
▶ Rotate the hand-tightened nut until it reaches a tangible, fixed stop position.

3.4 Establishing the electrical connection from the guide frame to the turntable

Make sure that the following prerequisite is met:
– The guide frame is assembled completely to the turntable, pinned and secured.

Note
▶ To establish the electrical connections, use the separate electrical wiring diagram.
▶ Observe the installation locations for the terminal boxes for the various derrick ballast radii.
▶ If the guide frame is pinned on the pin points **P1**, use the terminal box **-S328** on the turntable.
▶ If the guide frame is pinned on the pin points **P2**, use the terminal box **-S328A** on the turntable.

▶ Plug in the length sensor on the terminal box **-S328** on the turntable.
or
Plug in the length sensor on the terminal box **-S328A** on the turntable.
▶ Establish the connection from the terminal box **-S245** on the guide frame to the turntable.

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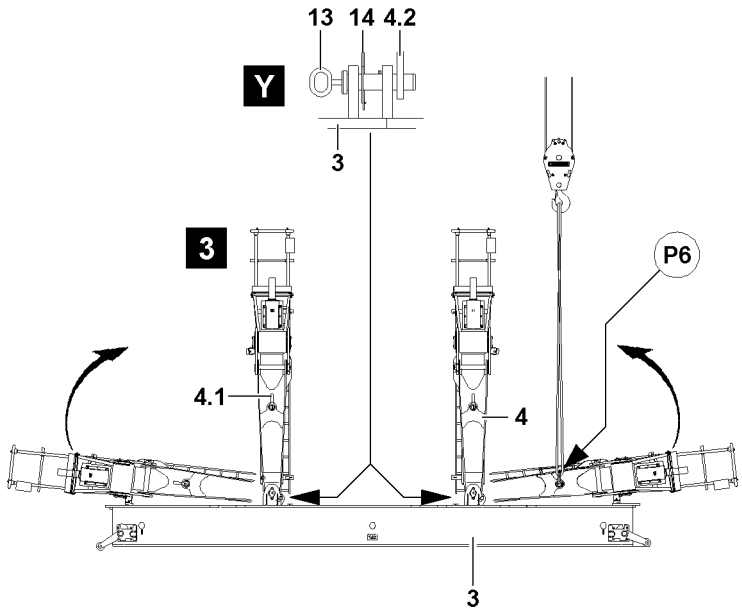

Fig.111376

3.5 Preassembling the ballast pallet

Align the ballast pallet with the auxiliary crane to the crane longitudinal axis and place it down within the turning range of the ballast trailer.

Then erect and secure the erection racks.

3.5.1 Aligning the ballast pallet in assembly position and placing it down

Note
▶ The attachment hooks for transport of the ballast pallet are inside the steel structure.

▶ Attach the ballast pallet on the four attachment hooks on the auxiliary crane.
▶ Align the ballast pallet with the auxiliary crane to the longitudinal axis of the crane or to the turntable.
▶ Place the ballast pallet down within the crane slewing range.
▶ Remove the auxiliary crane.

3.5.2 Setting up the erection racks

Note
▶ Erection of the erection racks **4** is identical for both erection racks and is described using the example of an erection rack.

WARNING
Mortal danger when assembling / disassembling the erection racks!
Improper assembly / disassembly of erection racks can cause them to tip over.
Personnel can be severely injured or killed.
▶ Never unpin the retaining pins **13** on unsecured or unsupported erection racks.
▶ Standing under the erection racks **4** as well as within the entire danger zone is prohibited during pinning or unpinning.

Make sure that the following prerequisite is met:
– The retaining pins **13** are in „Unpinned“ position.

▶ Attach the erection rack on the eye hooks **4.1**, point **P6** an the auxiliary crane.
▶ Erect the erection rack **4** with the auxiliary crane to the vertical position.

When the erection rack **4** is in the desired vertical position:
▶ Insert the retaining pins **13** on the bracket **4.2** and secure with spring retainer **14**, see illustration **Y**.

WARNING
Tipping erection racks!
Through improper securing of the erection racks, they can tip over upon removal of the auxiliary crane.
Personnel can be severely injured or killed.
▶ Ensure that the erection racks with the retaining pins **13** are properly pinned and secured.

When the erection rack **4** is pinned and secured properly:
▶ Remove the auxiliary crane.

Note
▶ Proceed with the erection of the second erection rack, as described above.

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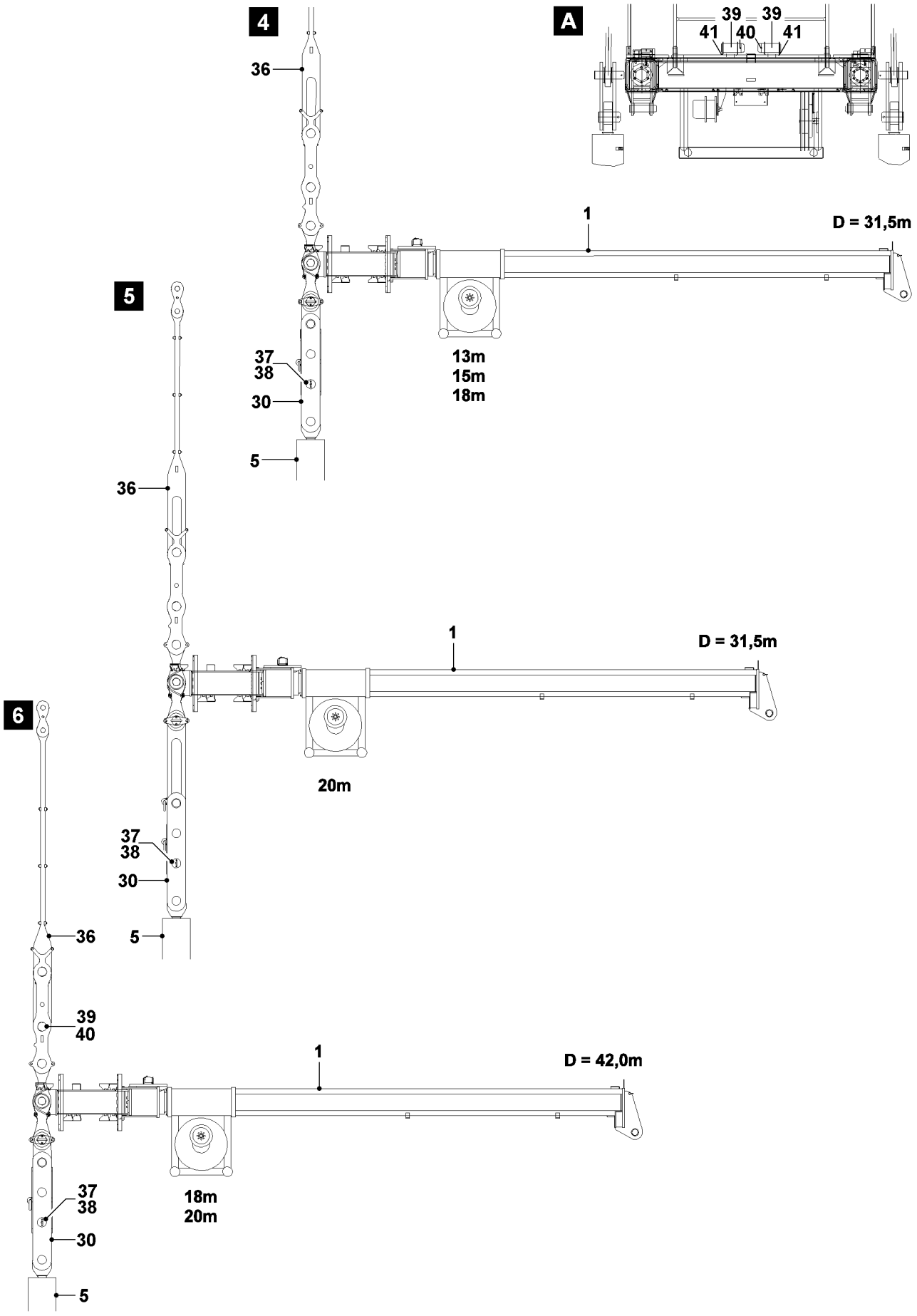

Fig.109443

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3.5.3 Adjusting length of lugs and rods

Note

- ▶ During assembly of the ballast pallet lugs **30** and the rods **36** are assembled according to the crane configuration. Decisive is the length of the derrick boom and the required derrick ballast radius for the crane operation.
- ▶ The length setting of the lugs **30** and the rods **36** is to be carried out corresponding to the following overview.
- ▶ The pins **37** are to be pinned according to the required length of the lugs **30** and to be secured with the spring retainers **38**.
- ▶ The pins **39** are to be pinned according to the required length of the rods **36** and to be secured with the spring retainers **40**.
- ▶ Before operation with the 31.5 m derrick, park the pins **39** in the retainers **41** on the ballast guide and secure with spring retainers **40** see illustration **A**.

Derrick 31.5 m , see illustration 4

Derrick ballast radius	Rod **36**	Bracket **30**
13 m	Extended	Retracted
15 m	Extended	Retracted
18 m	Extended	Retracted

Derrick 31.5 m , see illustration 5

Derrick ballast radius	Rod **36**	Bracket **30**
20 m	Extended	Extended

Derrick 42.0 m , see illustration 6

Derrick ballast radius	Rod **36**	Bracket **30**
18 m	Retracted	Retracted
20 m	Retracted	Retracted

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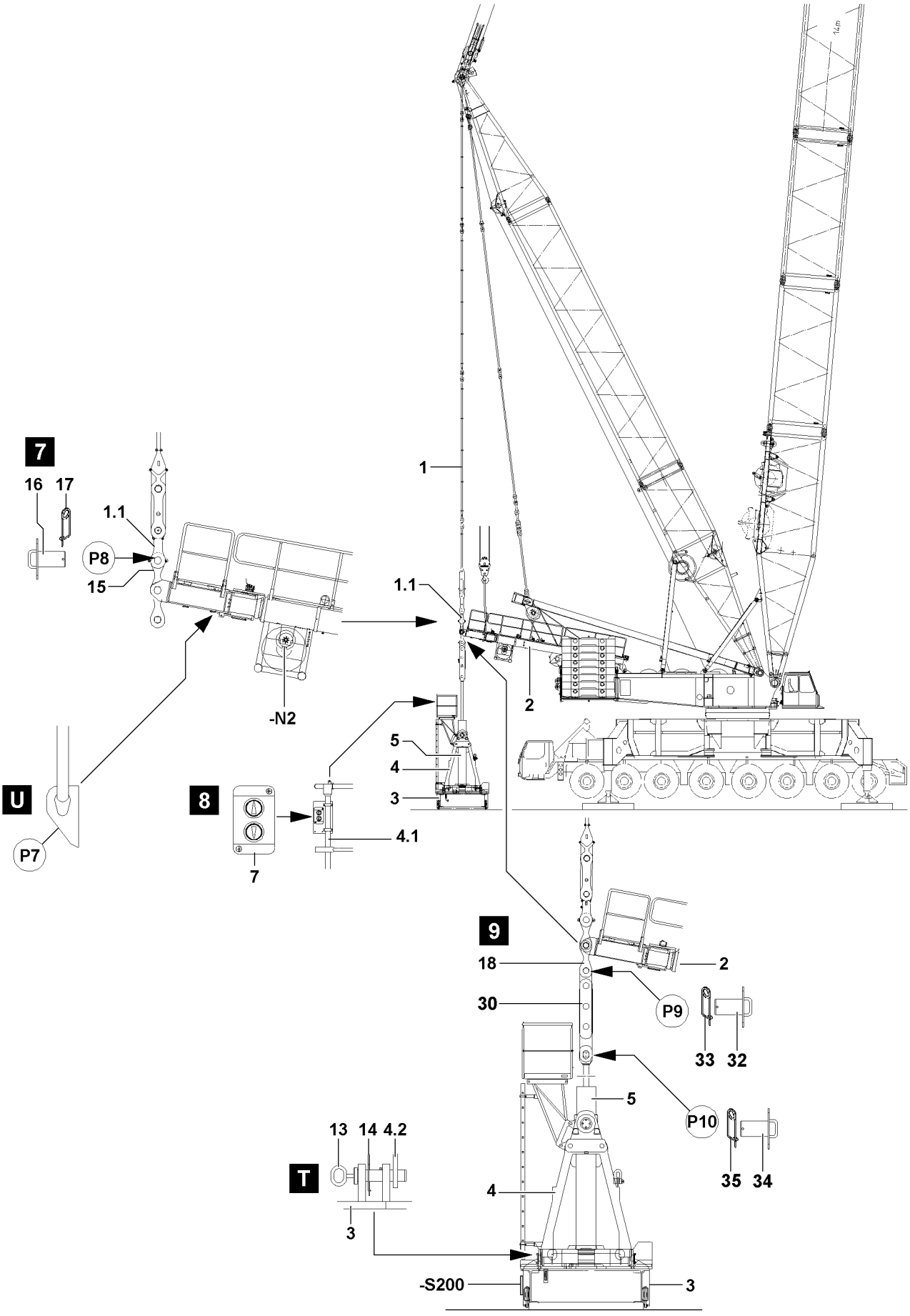

Fig.111377

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3.6 Installing the ballast pallet

WARNING
Toppling ballast pallet!
Unlevel ground can cause the ballast pallet to sink into the ground during assembly!
This can lead to toppling of the ballast stack during ballasting of the ballast pallet and can lead to life-threatening injuries or death to personnel.
▶ Make sure that the ground is level and of sufficient load bearing capacity to securely accept the ballast pallet including the ballast plates.

3.6.1 Installing guide frame to derrick ballast guying

▶ Lower derrick boom backward into operating position.
▶ Attach the auxiliary crane on the attachment points **P7** on the guide frame, see illustration **U**.
▶ Lift the guide frame **2** with the auxiliary crane.
or
Guide frame **2** telescope out with reduced speed.

When the pin bore for the lugs **1.1** and the lugs **15** align:
▶ Insert the pins **16** at point **P8** on both sides and secure with spring retainer **17**, see illustration **7**.

If the lugs **1.1** for the derrick ballast guying are securely pinned and secured with the lugs **15**:
▶ Remove the auxiliary crane.

3.6.2 Establishing hydraulic connections from the guide frame to the pull cylinders in the ballast pallet

When connecting and releasing hydraulic lines with quick couplings, make sure that the coupling procedure is carried out correctly.

DANGER
Danger of accident due to loss of pressure or leakage!
Incorrectly coupled or self-loosening quick couplings (particularly return lines) can result in serious accidents due to component failure.
▶ Check that the quick couplings have been properly connected before using the crane.

▶ Release the pressure in the hydraulic system before connecting or disconnecting. Turn the engine off and wait several minutes.
▶ Combine the coupling components (sleeve and connector) and screw them together with the knurled nut.
▶ Tighten the hydraulic coupling by hand.
▶ Rotate the hand-tightened nut until it reaches a tangible, fixed stop position.

3.6.3 Establishing the electrical connection from the guide frame to the ballast pallet

Note
▶ To establish the electrical connections, use the separate electric wiring diagram.

▶ Establish a connection from the terminal box **-S200** on the ballast pallet to the cable drum **-N2** on the guide frame.

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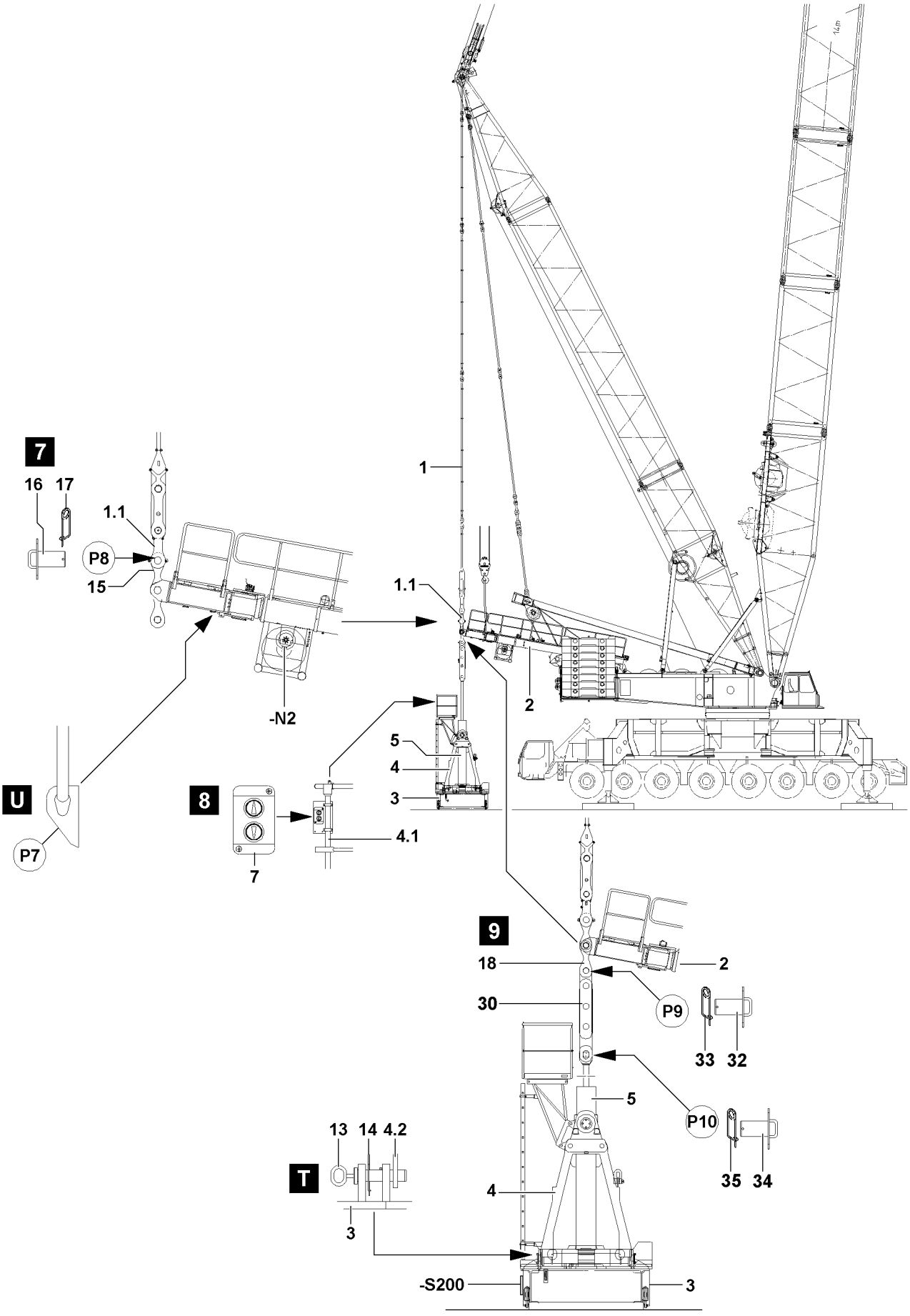

Fig.111377

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3.6.4 Installing the ballast pallet on the guide frame

Make sure that the following prerequisites are met:
- The guide frame is pinned and secured with the derrick ballast guying.
- The ballast pallet is in assembly position.
- The erection racks are erected, properly pinned and secured.
- The hydraulic connections to the ballast pallet are established.
- The electrical connections to the ballast pallet are established.

▶ Start the crane engine.

Pin lugs **18** at point **P9** with the lugs **30**:
▶ Insert the pins **32** at point **P9** on both sides and secure with spring retainer **33**, see illustration **9**.

Extend the piston rods of the pull cylinder **5** and pin with the lugs **30** on the guide frame.

Note
▶ The piston rods for the pull cylinders **5** can be operated from the crane operator's cab as well as directly on the corresponding control panels **7** of the ballast pallet, see illustration **8**.
▶ The control panels **7** are located on the pedestals **4.1** of the erection racks **4**.
▶ The respectively associated pull cylinder can be operated on the control panels **7**.

▶ Extend the piston rods for the pull cylinders **5**, see illustration **9**.

When the pin bores of the piston rods align with the pin bores of the lugs **30**:
▶ Insert the pins **34** at point **P10** on both sides and secure with spring retainer **35**, see illustration **9**.

NOTICE
Damage to the ballast pallet!
If the retaining pins **13** are not unpinned before starting to work with the crane, it can cause property damage in the area of the ballast pallet **3** and the erection racks **4**.
▶ Only unpin the retaining pins **13** when it is ensured that the piston rods of the pull cylinders **5** are securely pinned and secured with the lugs **30** on the guide frame **2**, see illustration **9**.

▶ Release retaining pins **13** and unpin up to the stop.
▶ Secure retaining pins **13** in position „Unpinned" with spring retainer **14**.

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Fig.195219

3.7 Functional control before lifting the derrick ballast

Make sure that the following prerequisites are met:
- The hydraulic connections from the derrick ballast and the turntable are established.
- The electrical connections from the derrick ballast to the turntable are established.
- The ground contact rollers must move easily.

WARNING
Risk of fatal injury if the derrick ballast touches the ground!
If the crane movement „turn the turntable“ is not switched off when the derrick ballast makes contact with the ground, then the ballast stacks or individual ballast plates can fall down.
Personnel can be severely injured or killed.
- ▶ Make sure that at least one ground contact switch is actuated when the derrick ballast touches the ground and the crane movement „turn the turntable“ switches off, check visually.
- ▶ There may be no persons, objects or obstacles within the turning range of the derrick ballast.

3.7.1 Limit switch „Derrick ballast on ground“

▶ Manually actuate the ground contact switch individually.

Result:

- „Turn the turntable“ turns off.
- The warning light lights up.

Fig.104666: Warning light „Derrick ballast on ground“

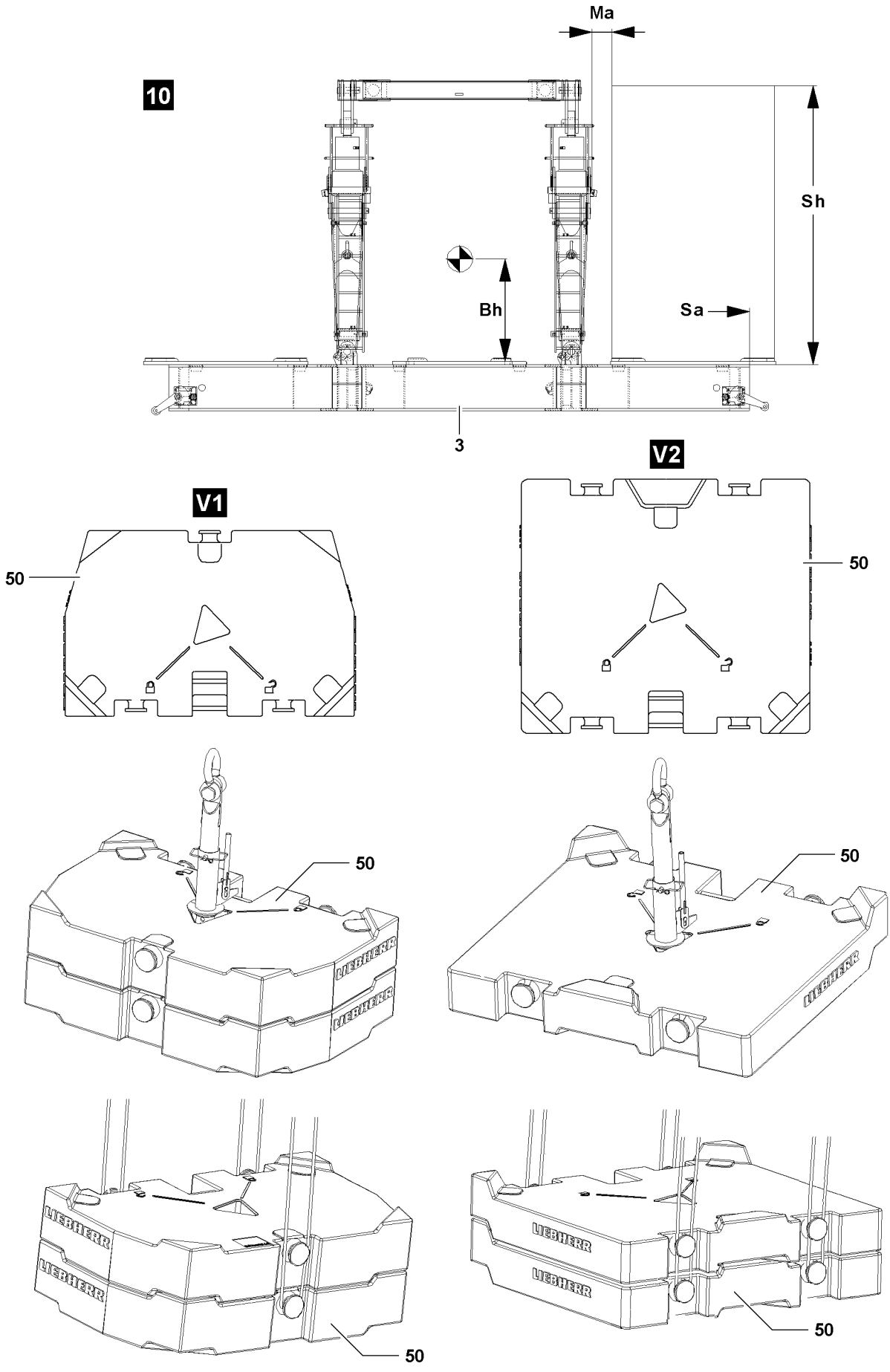

Fig.109416

3.8 Ballasting the ballast pallet

WARNING
The crane can topple over!
If the following danger notes are not observed, the ballast plates or the ballast stack can slip on the ballast pallet and fall down.
The crane can topple over and personnel can be severely injured or killed.

- ▶ The ground on which the ballast pallet is ballasted must be level and have adequate load-bearing capacity.
- ▶ Place the ballast plates always symmetrically, in reference to the longitudinal axis.
- ▶ Always ballast the center ballast stacks in suspended condition first and remove these ballast stacks last.
- ▶ The outer ballast stacks must always weigh the same and always be the same height after ballasting.
- ▶ The permissible weight difference between right and left ballast stack may not more then a maximum 20.0 t when ballasting up and down in suspended status.
- ▶ The maximum permissible ballast center of gravity height **Bh** of 2000 mm may not be exceeded.
- ▶ The maximum permissible stack height **Sh** of 4500 mm , measured from the upper edge of the ballast pallet, may not be exceeded.
- ▶ The maximum permissible total weight of the ballast plates of 390 t may not be exceeded.
- ▶ The ballast plates must be secured to prevent them from moving or falling down.
- ▶ The distances of the center of gravity of the outer ballast stacks must be maintained and must be identical between left and right stack.
- ▶ Replace damaged ballast plates immediately with new ballast plates.

NOTICE
Damage to the pull cylinders!
If the minimum clearance of the ballast stacks to the pull cylinders is exceeded, the pull cylinders can be significantly damaged.

- ▶ The minimum distance **Ma** of the ballast stacks to the pull cylinders must be at least 300 mm.

	Maximum permissible ballast weight per stack (left / right)		
Distance of center of gravity **Sa**	152 t	160 t	170 t
800 mm	**X**		
865 mm		**X**	
1000 mm			**X**

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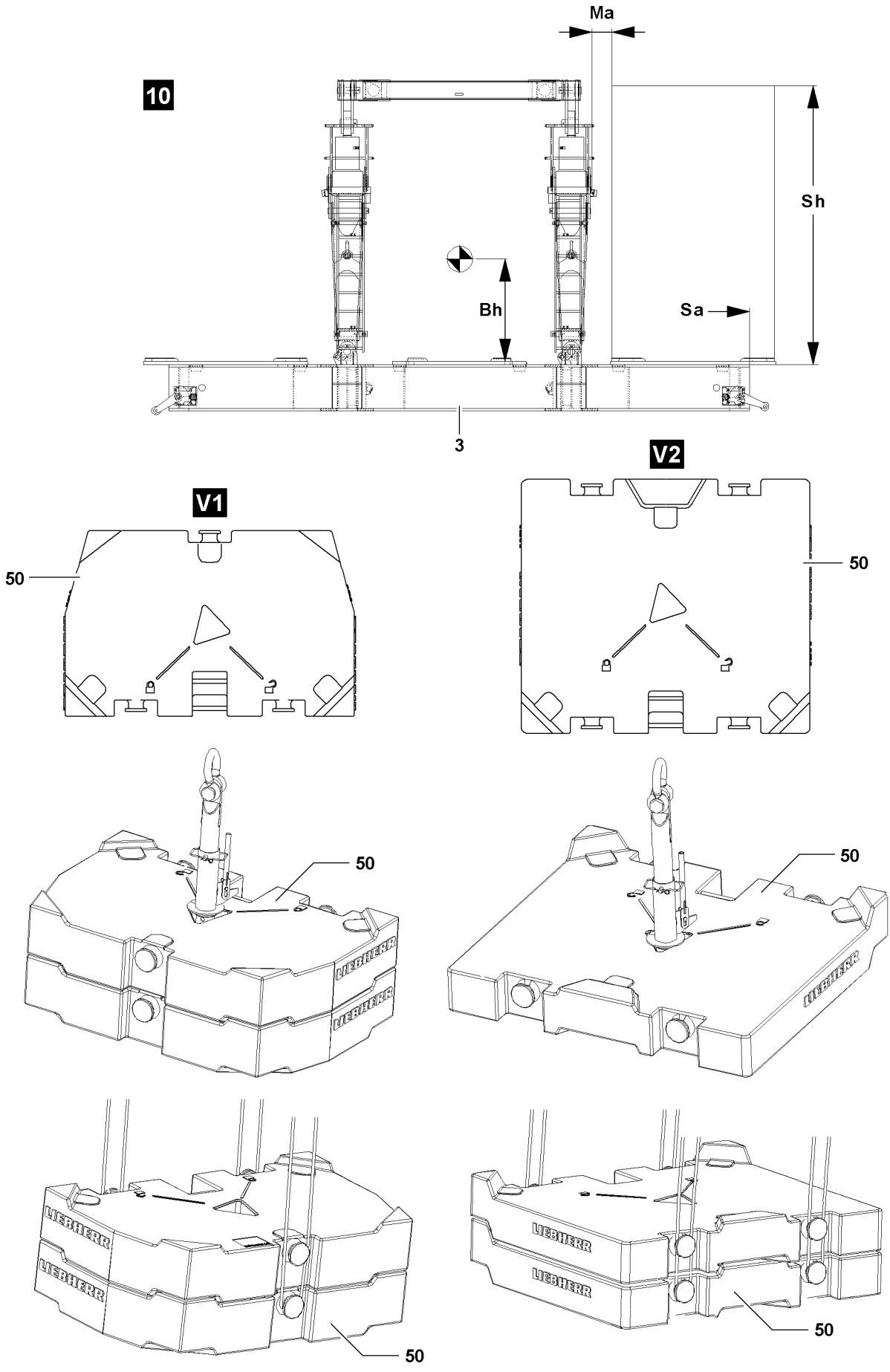

Fig.109416

WARNING
Damaged ballast plates!
Damage on the ballast plates can cause the fastening equipment to release.
The ballast plates and components can fall down.
Personnel can be severely injured or killed.
▶ Do not use damaged ballast plates and replace them immediately.

WARNING
Suspended ballast too low / too high!
If the placed suspended ballast deviates from the specified data in the load charts or the assembly conditions, then the crane can be damaged or topple over.
Personnel can be severely injured or killed.
▶ Make sure that the suspended ballast is placed according to the load chart.

WARNING
Asymmetrical ballast distribution!
If the suspended ballast is not distributed evenly on the ballast pallet, then this can lead to overload.
The crane can be damaged and components can fall down.
Personnel can be severely injured or killed.
▶ Make sure that the suspended ballast is distributed evenly on the ballast pallet.

WARNING
Toppling ballast stack!
Lopsided stacked ballast plates create instability in the ballast stack.
The ballast plates can tip from the ballast pallet and cause the crane to topple over.
Personnel can be severely injured or killed.
▶ Make sure that the ballast plates are placed correctly in the centerings.

WARNING
Impermissible combination of ballast plates!
Combining ballast plates of variation **V1** and variation **V2** creates instability in the ballast stack.
The ballast plates can tip from the ballast pallet and cause the crane to topple over.
Personnel can be severely injured or killed.
▶ Only ballast plates of the same variation may be stacked on each other.

Make sure that the following prerequisites are met:
– The ballast pallet is assembled on the guide frame and is lowered onto the ground.
– An auxiliary crane is available.

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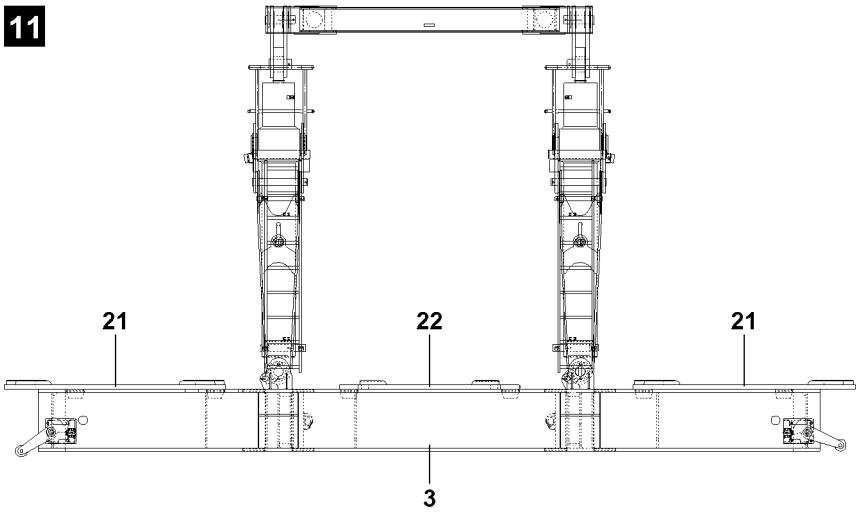

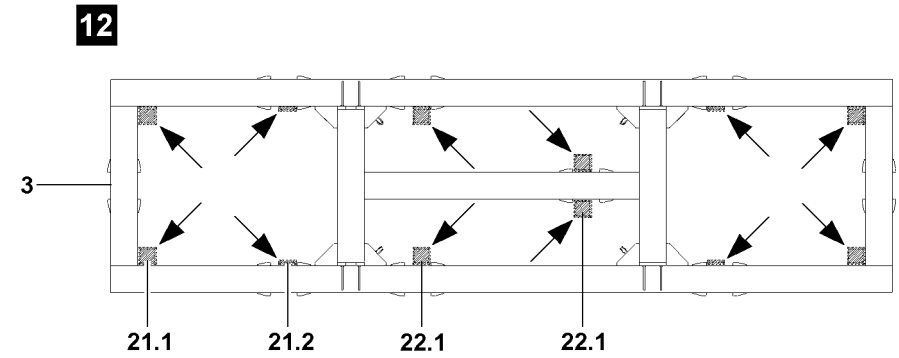

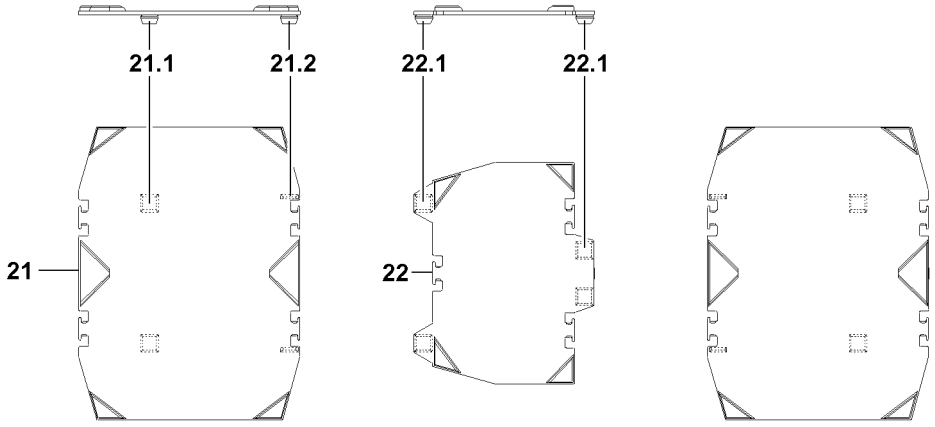

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Fig.107530

3.8.1 Ballasting the 10.0 t ballast plates

Note

▶ The ballast plates are marked with their own weights.

WARNING

Danger of toppling the ballast stack!

Personnel can be severely injured or killed by toppling ballast stacks.

▶ Before ballasting the ballast pallet, it must be properly placed on the ground.
▶ During ballasting pay attention to even distribution of the ballast plates.
▶ Pay attention to correct centering of the ballast plates.
▶ First establish the ballast stack in the center of the ballast pallet, then place the ballast stacks evenly on the left and right.

Note

▶ For determining the correct ballast weight, use the LICCON job planner.

Note

▶ The ballast plates may only be placed in layers on the ballast stacks on the left and right.
▶ The ballast stacks must have the identical stack heights on the left and right after ballasting and must have the identical ballast weight.

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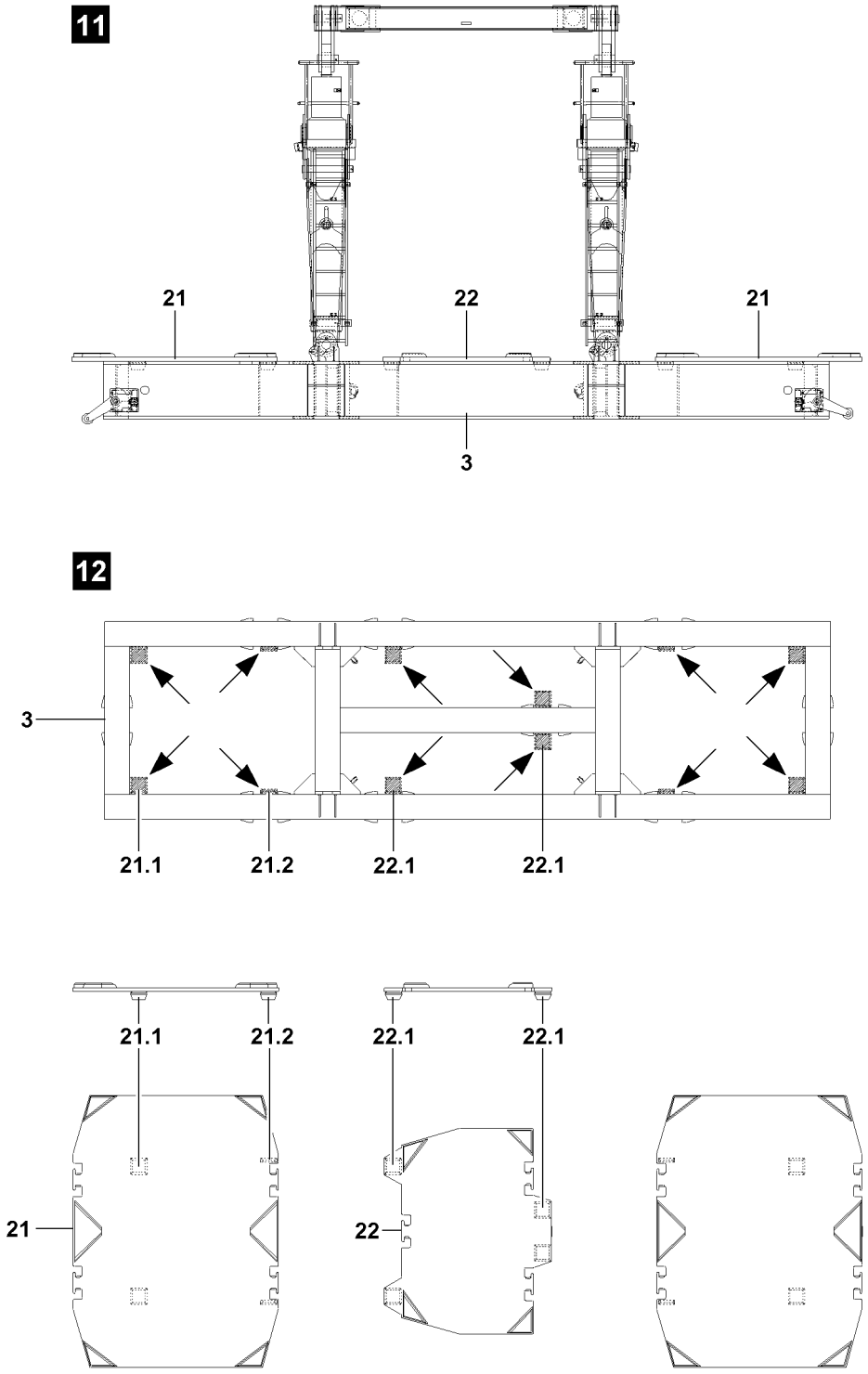

LWE/LG 1750-006/15409-07-02/en

Fig.107530

Placing the centering plates* on the ballast pallet

When using the 10.0 t ballast plates, the centering plates **21** and the centering plate **22** must be used.

The centering plates are used to take up the 10.0 t ballast plates securely in order to prevent slipping during crane operation.

WARNING
The crane can topple over!
Due to improperly placed centering plates, individual ballast plates or the ballast stacks can slip or fall down and cause the crane to topple over.
Personnel can be severely injured or killed.
- ▶ Place the centering plates properly on the ballast pallet, check visually.
- ▶ Crane operation with improperly placed centering plates is prohibited.

Placing the center centering plate

- ▶ Fasten the centering plate **22** on the auxiliary crane.

Note
- ▶ Observe the correct installation position of the centering plate, see illustration **11**.
- ▶ The centerings **22.1** must be positioned according to illustration **12** on the frame of the ballast pallet **3**, check visually.

- ▶ Position the centering plate **22** and lift it into the frame of the ballast pallet **3**.
- ▶ Lower the centering plate **22** on the frame of the ballast pallet **3**.

When the centering plate is placed flat on the frame of the ballast pallet:
- ▶ Remove the auxiliary crane.

Placing the outer centering plates

Note
- ▶ Placing of the two outer centering plates **21** on the ballast pallet **3** is identical and is only described on the basis of one centering plate.

- ▶ Fasten the centering plate **21** on the auxiliary crane.

Note
- ▶ Pay attention to the correct installation position of the centering plates, see illustration **11**.
- ▶ The centerings **21.1** and the centerings **21.2** must be positioned according to illustration **12** in the frame of the ballast pallet **3**, check visually.

- ▶ Position the centering plate **21** and lift it into the frame of the ballast pallet **3**.
- ▶ Lower the centering plate **21** onto the frame of the ballast pallet **3**.

When the centering plate is placed flat on the frame of the ballast pallet:
- ▶ Remove the auxiliary crane.

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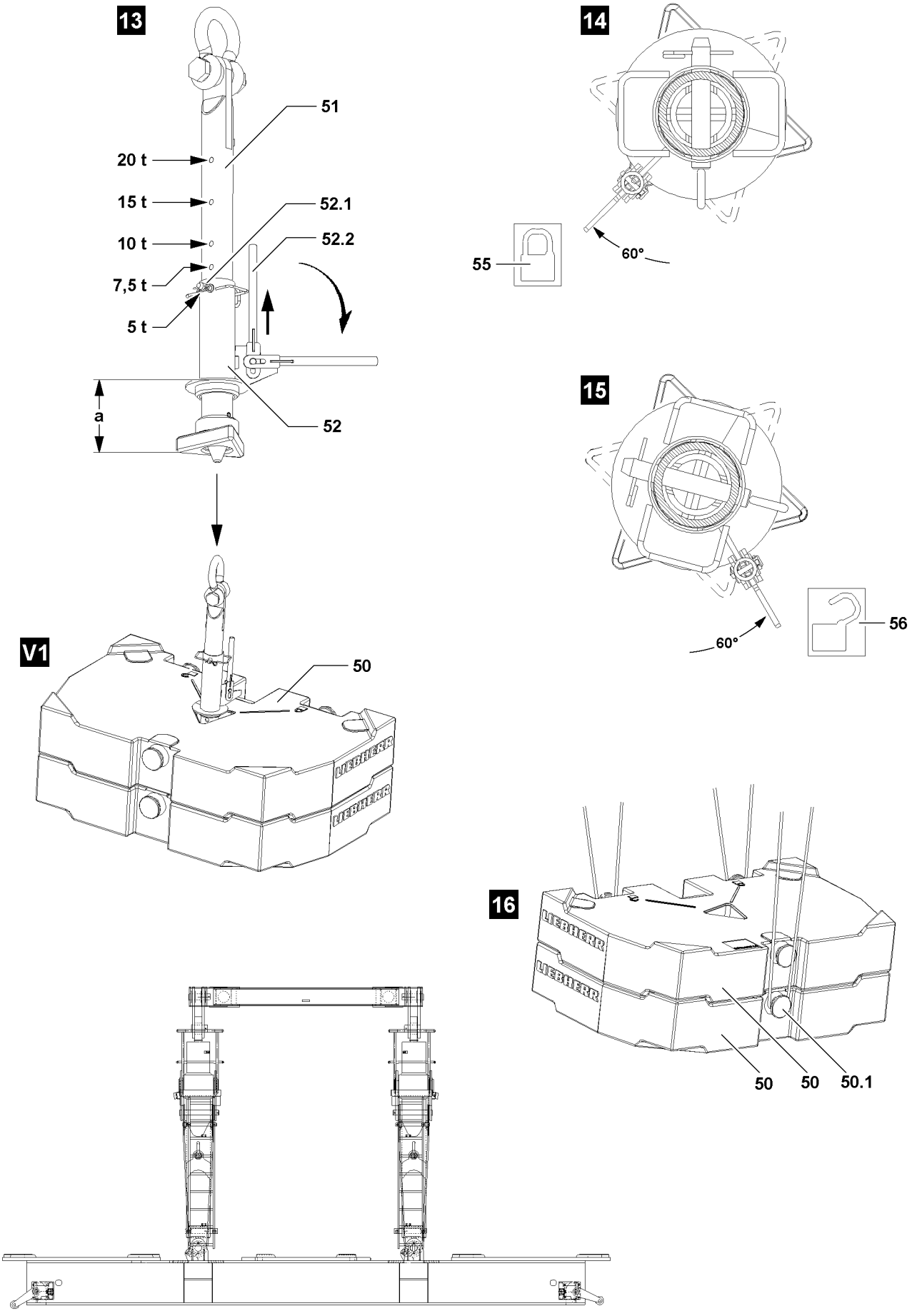

Fig.109417

Placing 10.0 t ballast plates, attachment system: „Twistlock“

WARNING
Overload of receptacle stud and ballast plates!
If more than the permissible number of ballast plates are lifted with the receptacle stud **51**, the receptacle stud **51** and the ballast plates can be overloaded and damaged.
The ballast plates can fall down.
Personnel can be severely injured or killed.
▶ Observe the section „Permissible ballast assemblies“ in this chapter.

WARNING
Damage of receptacle stud and ballast plates!
If two ballast plates are lifted which do not lay correctly in their centerings, the receptacle stud **51** and the ballast plates can be damaged.
Damage can cause the ballast plates to fall down.
Personnel can be severely injured or killed.
▶ Make sure that the ballast plates to be lifted are placed correctly in the centerings.

WARNING
The Twistlock system opens by itself!
If the receptacle stud **51** is not correctly locked, the Twistlock system can open by itself.
The ballast plates can fall down.
Personnel can be severely injured or killed.
▶ Make sure, when initiating a lift, that the lever **52.2** points directly on the „Locked“ icon **55** of the ballast plates **2**.

Note
▶ During a lift, the locked Twistlock system cannot release by itself due to its gravitational retention.
▶ During a lift, the locked Twistlock system cannot be released by hand due to its gravitational retention.

Note
▶ For ballast plates variation **V1**, use the adjustable receptacle stud **51** in illustration **13**.

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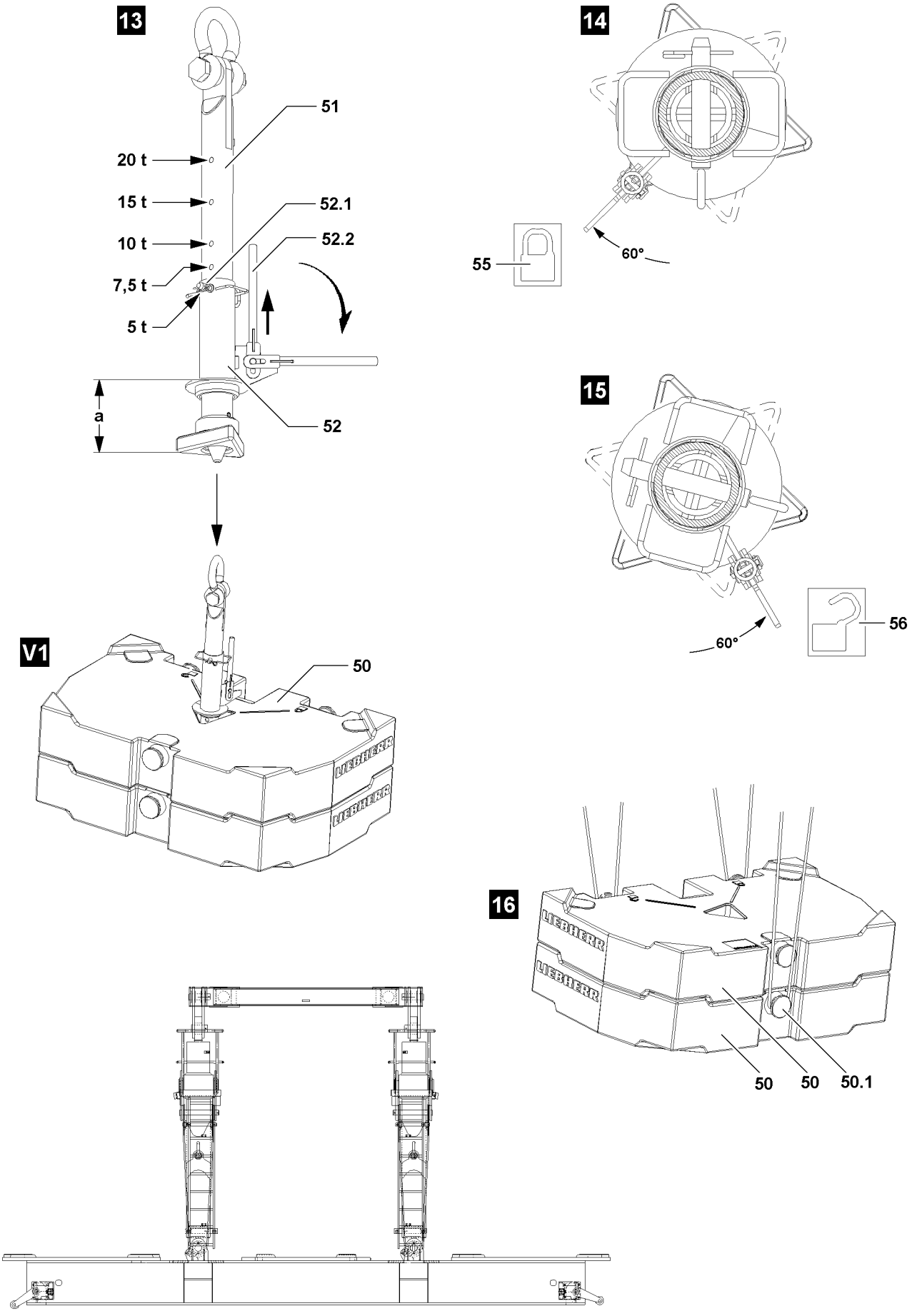

Fig.109417

Before the receptacle stud **51** is guided in the ballast plate variation **V1**, it must be ensured that the insertion length **a** of the receptacle stud **51** is set correctly.

The insertion length **a** of the receptacle stud **51** for ballast plate variation **V1** can be adjusted by hand.

If the insertion length **a** of the receptacle stud **51** is to be adjusted:

- ▶ Release and unpin the pin **52.1**.
- ▶ Adjust the insertion length **a** by moving the guide sleeve **52** to the desired insertion length **a**, observe the stages in illustration **13**.
- ▶ Insert and secure pin **52.1**.

Result:

– The receptacle stud **51** is adjusted.

Note

▶ The receptacle stud **51** in illustration **13** is set to 5 t.

- ▶ Attach the receptacle stud **51** on the auxiliary crane and guide it into the ballast plate(s).
- ▶ Pull the lever **52.2** up and fold it down.
- ▶ Turn the receptacle stud **51** with the lever **52.2** by 60° until it points to the „Locked“ icon **55** of the ballast plate, see illustration **14**.
- ▶ Lift the ballast plate(s) or the ballast assembly with the receptacle stud **51** and place it carefully on the centerings on the ballast pallet or on another ballast plate in the ballast stack.

When the ballast plates are placed down:

- ▶ Turn the receptacle stud **51** with the lever **52.2** by 60° to the stop in direction of the „Unlocked“ icon **56** of the ballast plate, see illustration **15**.

Result:

– The receptacle stud **51** is unlocked.

- ▶ Carefully pull out the receptacle stud **51**.

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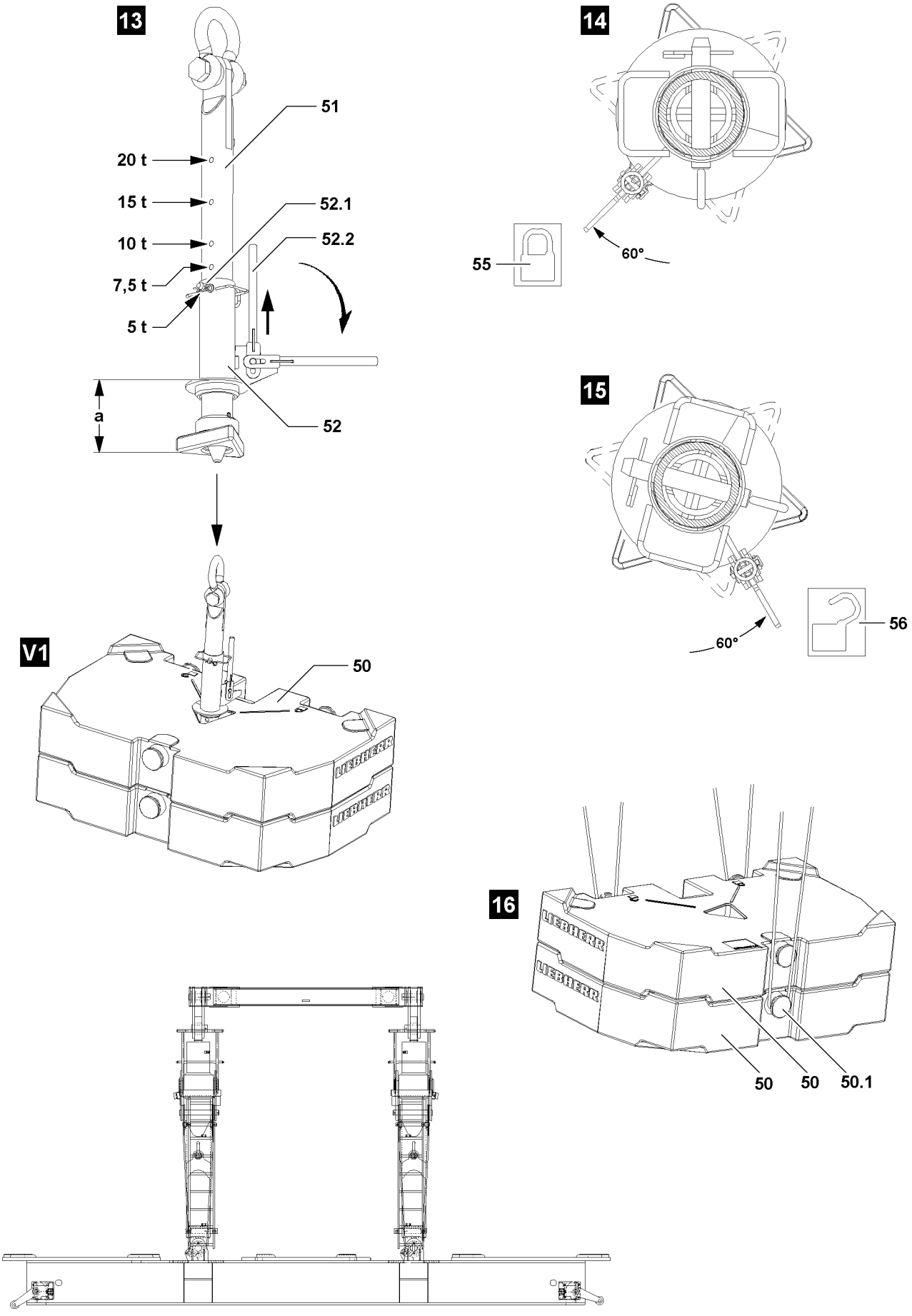

Fig.109417

Placing the ballast plates, fastening points: Bitt

WARNING
Overloaded ballast plates!
If more than the permissible loads are lifted, the bitts **50.1** are overloaded.
The ballast plates can be damaged and fall down.
Personnel can be severely injured or killed.
▶ Observe the section „Permissible ballast assemblies“ in this chapter.

WARNING
Incorrect handling of the fastening equipment!
If the fastening equipment is not attached correctly and / or if it is not secured sufficiently to prevent it from loosening up, the ballast plates can fall down.
Personnel can be severely injured or killed.
▶ Make sure that the fastening equipment is correctly attached on the bitts **50.1** and that it is secured sufficiently to prevent it from loosening up.

▶ Attach the ballast plates or ballast assembly, illustration **16** on the auxiliary crane.
▶ Lift the ballast plates or the ballast assembly and place it carefully on the centerings on the ballast pallet or on another ballast plate in the ballast stack.

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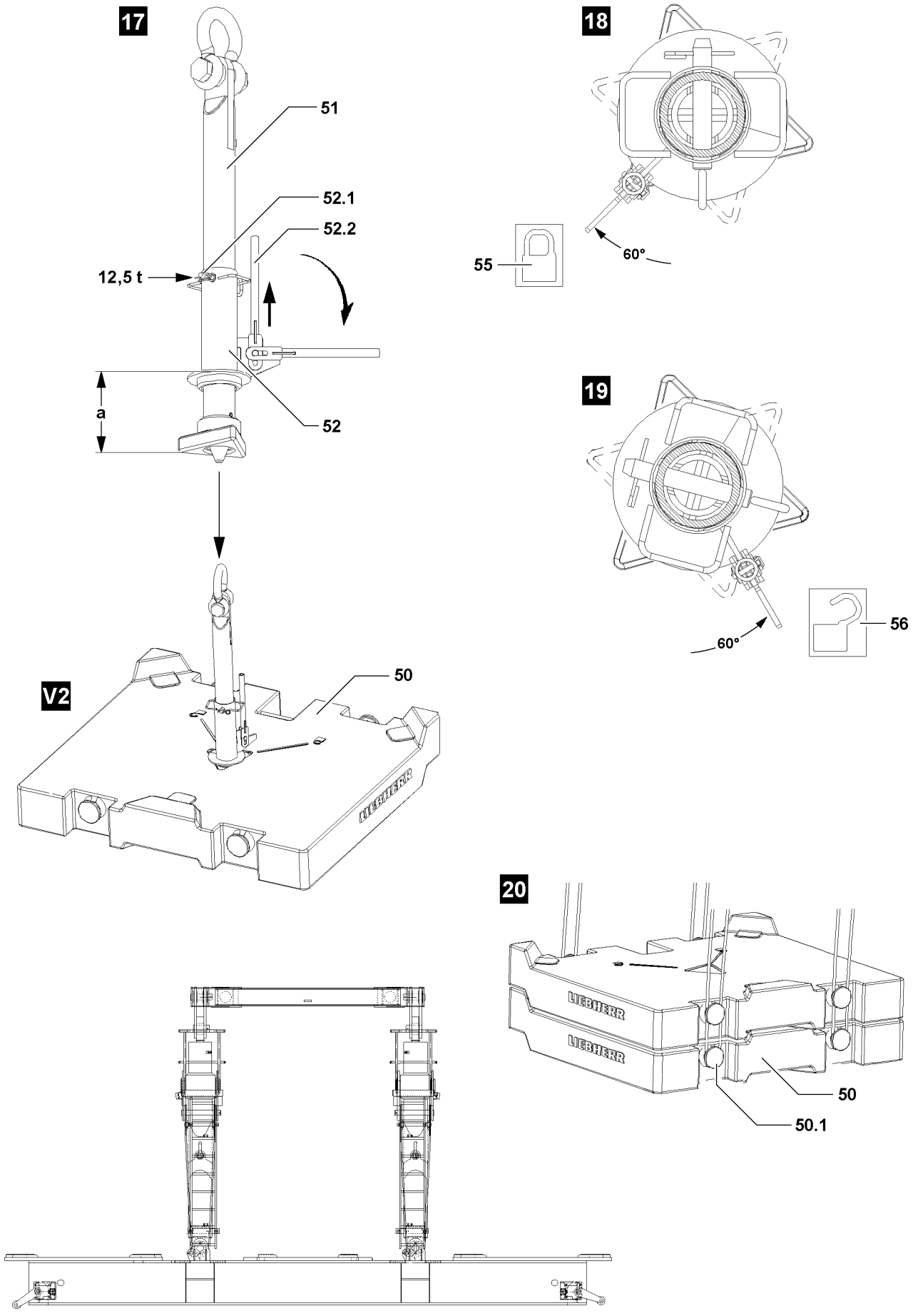

Fig.109418

LWE/LG 1750-006/15409-07-02/en

3.8.2 Ballasting the 12.5 t ballast plates

Note
- ▶ The ballast plates are marked with their own weights.
- ▶ The ballast plates are placed directly on the centerings on the ballast pallet frame.

Placing 12.5 t ballast plates, attachment system: „Twistlock“

WARNING
Overload of receptacle stud and ballast plates!
If more than one 12.5 t ballast plate are lifted with the receptacle stud **51**, the receptacle stud **51** and the ballast plates can be overloaded and damaged.
The ballast plates can fall down.
Personnel can be severely injured or killed.
- ▶ Observe the section „Permissible ballast assemblies“ in this chapter.

WARNING
The Twistlock system opens by itself!
If the receptacle stud **51** is not correctly locked, the Twistlock system can open by itself.
The ballast plates can fall down.
Personnel can be severely injured or killed.
- ▶ Make sure, when initiating a lift, that the lever **52.2** points directly on the „Locked“ icon **55** of the ballast plates.

Note
- ▶ During a lift, the locked Twistlock system cannot release by itself due to its gravitational retention.
- ▶ During a lift, the locked Twistlock system cannot be released by hand due to its gravitational retention.

Note
- ▶ For ballast plate variation **V2**, use the receptacle stud **51** in illustration **17**.

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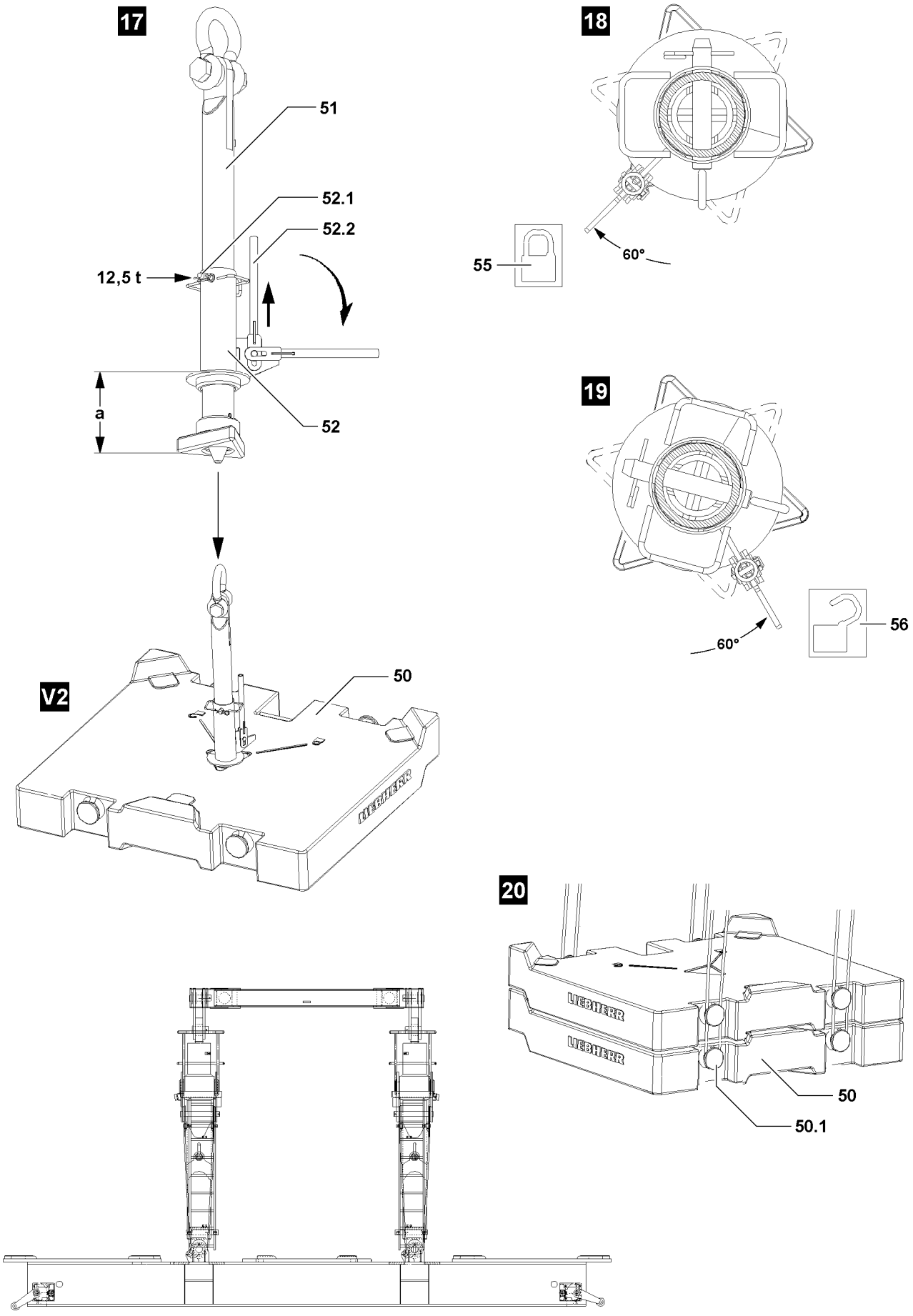

Fig.109418

LWE/LG 1750-006/15409-07-02/en

Before the receptacle stud **51** is guided in the ballast plate variation **V2**, it must be ensured that the insertion length **a** of the receptacle stud **51** is set correctly.

The insertion length **a** of the receptacle stud **51** for ballast plate variation **V2** can be adjusted by hand.

If the insertion length **a** of the receptacle stud **51** is to be adjusted:

- ▶ Release and unpin the pin **52.1**.
- ▶ Adjust the insertion length **a** by moving the guide sleeve **52** to the desired insertion length **a**, observe the stages in illustration **17**.
- ▶ Insert and secure pin **52.1**.

Result:

– The receptacle stud **51** is adjusted.

Note

▶ The receptacle stud **51** in illustration **17** is set to 12.5 t.

- ▶ Attach the receptacle stud **51** on the auxiliary crane and guide it into the ballast plate.
- ▶ Pull the lever **52.2** up and fold it down.
- ▶ Turn the receptacle stud **51** with the lever **52.2** by 60° until it points to the „Locked“ icon **55** of the ballast plate, see illustration **18**.
- ▶ Lift always the ballast plate with the receptacle stud **51** and place it carefully on the centerings on the ballast pallet or on another ballast plate in the ballast stack.

When the ballast plates are placed down:

- ▶ Turn the receptacle stud **51** with the lever **52.2** by 60° to the stop in direction of the „Unlocked“ icon **56** of the ballast plate, see illustration **19**.

Result:

– The receptacle stud **51** is unlocked.

- ▶ Carefully pull out the receptacle stud **51**.

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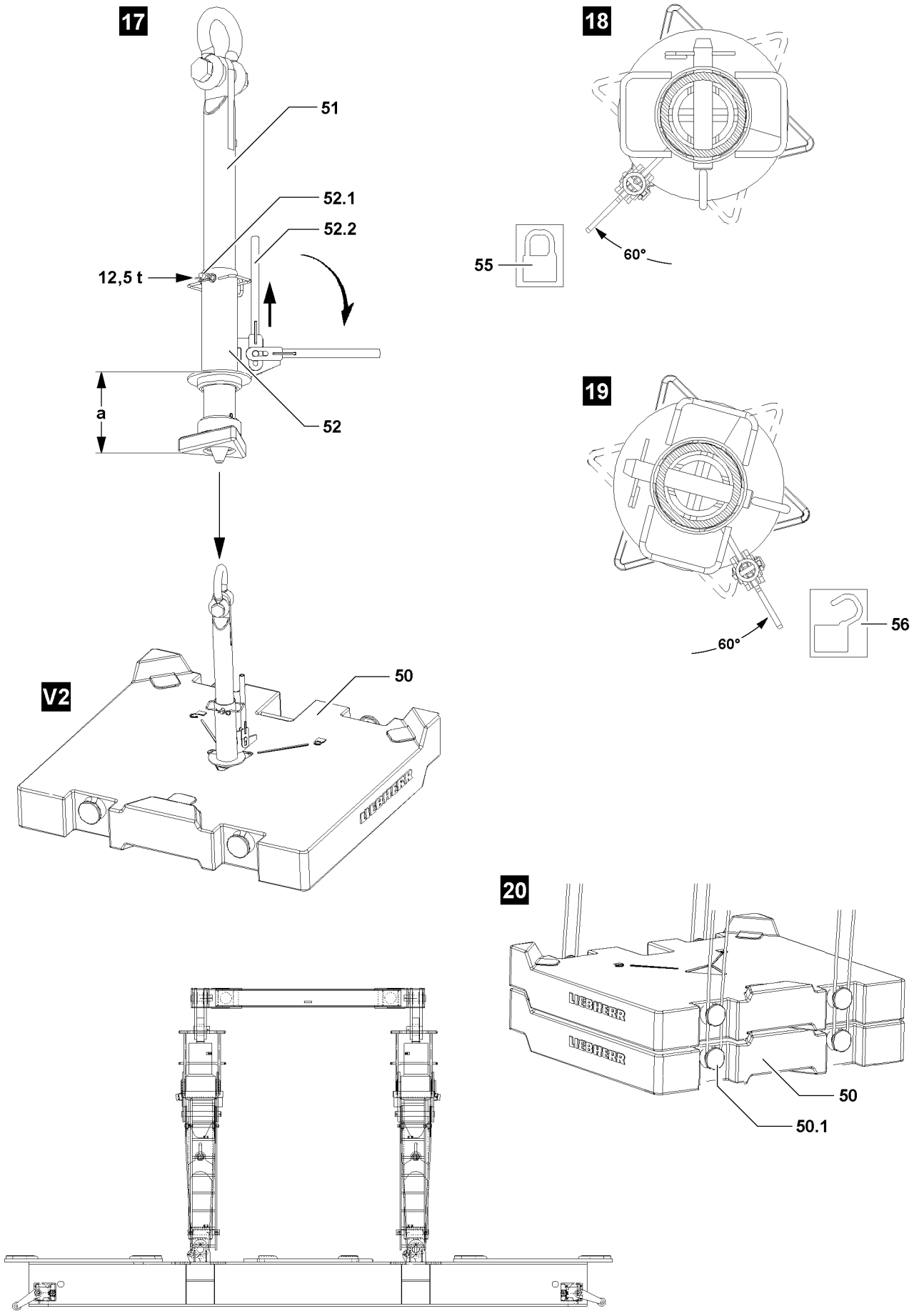

Fig.109418

LWE/LG 1750-006/15409-07-02/en

Placing 12.5 t ballast plates, fastening points: Bitt

WARNING
Overloaded ballast plates!
If more than the permissible loads are lifted, the bitts **50.1** are overloaded.
The ballast plates can be damaged and fall down.
Personnel can be severely injured or killed.
▶ Observe the section „Permissible ballast assemblies“ in this chapter.

WARNING
Incorrect handling of the fastening equipment!
If fastening equipment cannot be attached correctly and / or if it is not secured sufficiently to prevent it from loosening up, the ballast plate can fall down.
Personnel can be severely injured or killed.
▶ Make sure that the fastening equipment is correctly attached on the bitts **50.1** and that it is secured sufficiently to prevent it from loosening up.

▶ Attach the ballast plate, see illustration **20** on the auxiliary crane.
▶ Lift the ballast plate and place it carefully on the centerings on the ballast pallet or on another ballast plate in the ballast stack.

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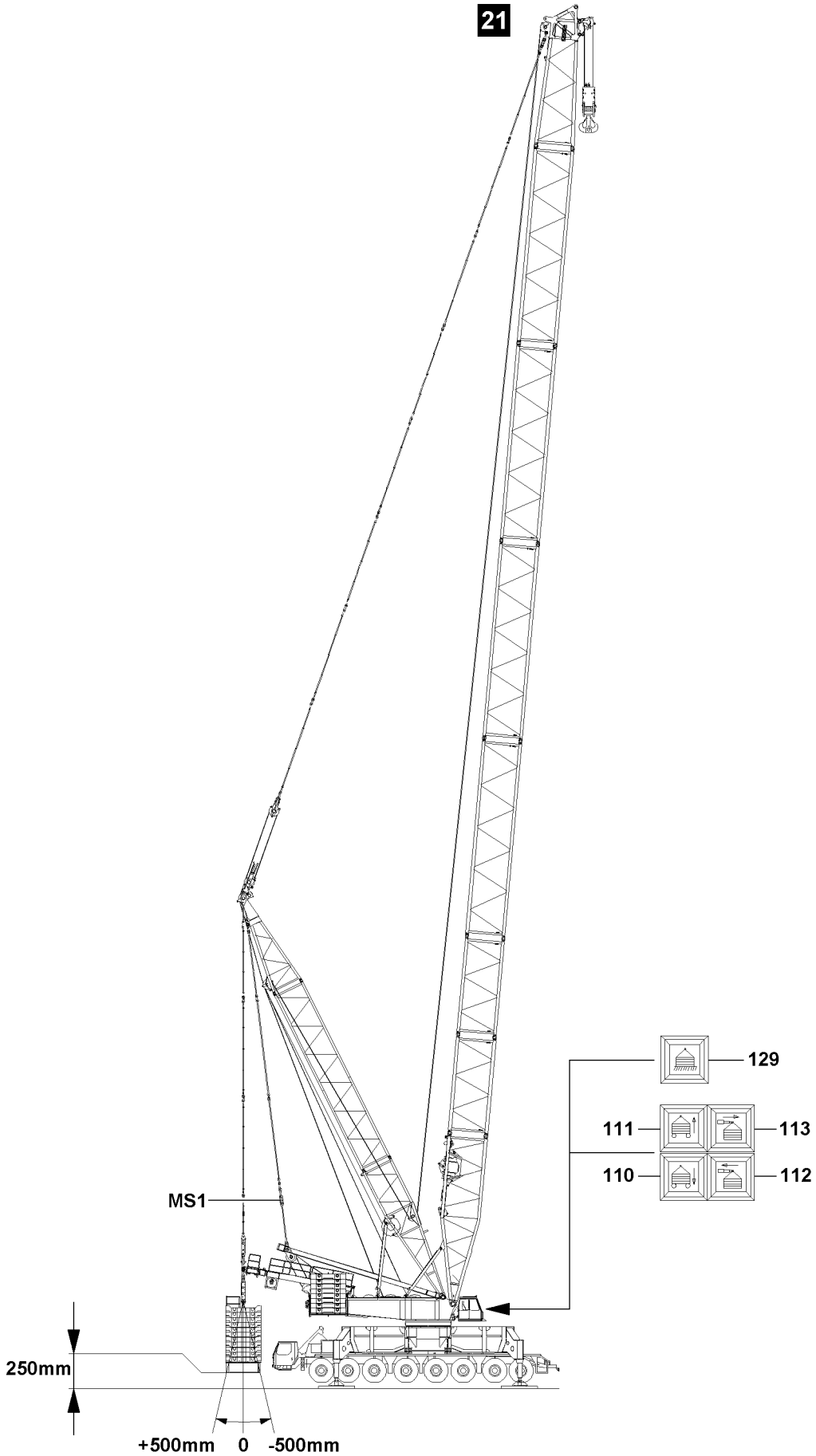

Fig.109445

LWE/LG 1750-006/15409-07-02/en

3.9 Lifting the derrick ballast off the ground

WARNING
The crane can topple over!
If the derrick ballast is lifted up off the ground beyond the **maximum permissible** 250 mm , the crane can topple over to the rear if the load rips off.
If the following notes are not observed, personnel can be severely injured or killed.

- ▶ There may be no personnel, objects or obstacles within the entire slewing range of the crane, derrick ballast and the load.
- ▶ Do not lift the derrick ballast by more than 250 mm off the ground.
- ▶ The ground in the entire working area of the crane - including the derrick ballast and the load - must be even and of sufficient load bearing capacity, in order to be able to securely accept the encountered ground pressures and weight loads.

Note

- ▶ Lifting of the derrick ballast must be observed by a guide.

WARNING
The crane can topple over!
If the minimum force F1-min, with derrick ballast placed on the ground and slack derrick guying, is fallen below, the boom system can abruptly move forward with increasing load moment and suddenly lift the derrick ballast off the ground.
This will result in the load swinging violently, whereby the crane can topple or be severely damaged. Personnel can be severely injured or killed.

- ▶ The guying between the SA-frame and the derrick end section, test point 1 **MS1**, may never be without power.
- ▶ The minimum force F1-min may not be fallen below.
- ▶ When taking up the load, the guying of the derrick ballast to the derrick end section must be no more than slightly tensioned, so that the minimum force F1-min on test point 1 **MS1**, is exceeded.

- ▶ Press the button **111** in the crane operator's cab.

Result:

- – The derrick ballast is lifted off the ground.
- – The warning light **129** „Suspended ballast on the ground“ turns off.

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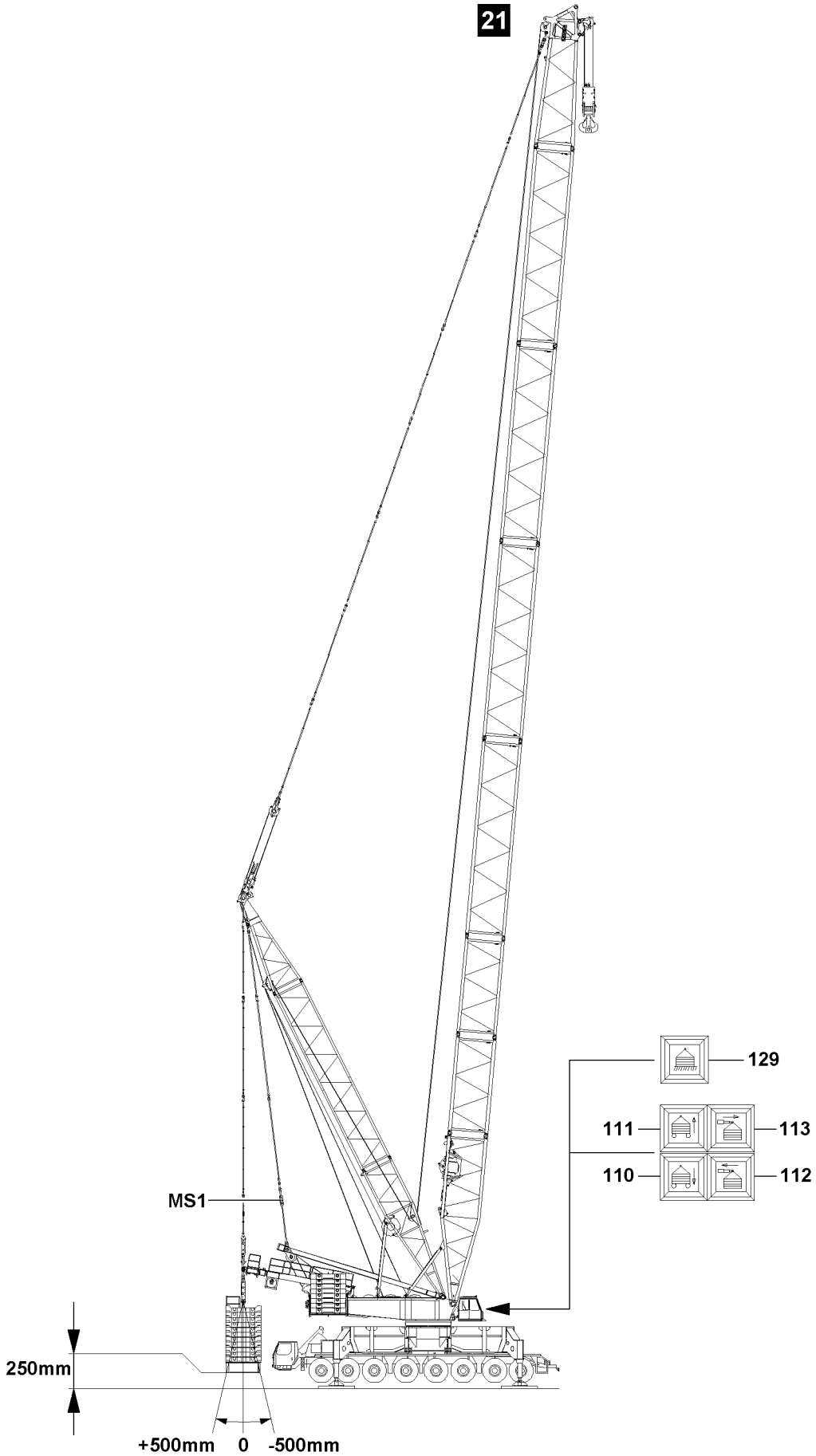

Fig.109445

LWE/LG 1750-006/15409-07-02/en

3.10 Telescoping the derrick ballast to the required derrick ballast radius

WARNING
Danger of fatal injury!
By remaining in the danger zone of the derrick ballast, personnel can be severely injured or killed.
- ▶ Remaining in the crane danger zone of the crane, especially within the danger zone of the derrick ballast danger is prohibited.
- ▶ Make sure that there are no people, objects or obstacles within the danger zone of the crane.
- ▶ The derrick ballast must be lifted off the ground before telescoping and the warning light **111** „Suspended ballast on the ground“ must be turned off.

WARNING
The crane can topple over!
An incorrect length path measurement of the derrick ballast radius can cause the crane to topple over.
Personnel can be severely injured or killed.
- ▶ The derrick ballast radius display on LICCON monitor 1 must be constantly monitored during telescoping.
- ▶ The crane operator may not simply rely on the derrick ballast radius measurement, instead he should also be pro-active and check whether the measurement is still working correctly, see section „Checking the length sensor value on the derrick ballast“.

Note
- ▶ The derrick ballast radius display on LICCON monitor 1 and the telescoping cylinders must be constantly monitored during telescoping.

3.10.1 Hydraulically telescoping out the guide frame

Make sure that the following prerequisite is met:
– The derrick ballast has been lifted off the ground.

▶ Press the button **113** in the crane operator’s cab.

Result:

– The telescoping cylinder on the guide frame extends.

When the required derrick ballast radius is reached:
▶ Release the button **113** in the crane operator’s cab.

3.10.2 Hydraulically telescoping in the guide frame

Make sure that the following prerequisite is met:
– The derrick ballast has been lifted off the ground.

▶ Press the button **112** in the crane operator’s cab.

Result:

– The telescoping cylinder on the guide frame retracts.

When the required derrick ballast radius is reached:
▶ Release the button **112** in the crane operator’s cab.

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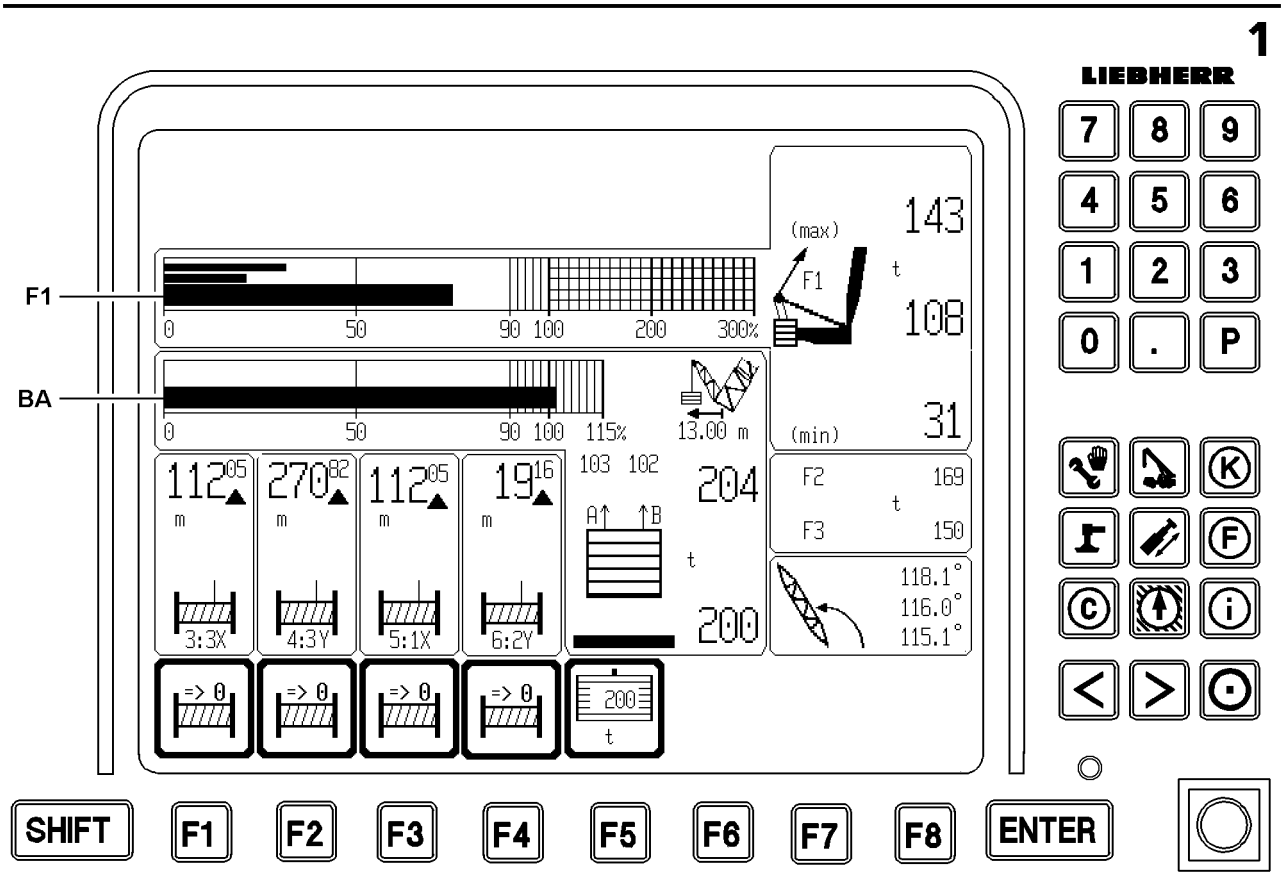

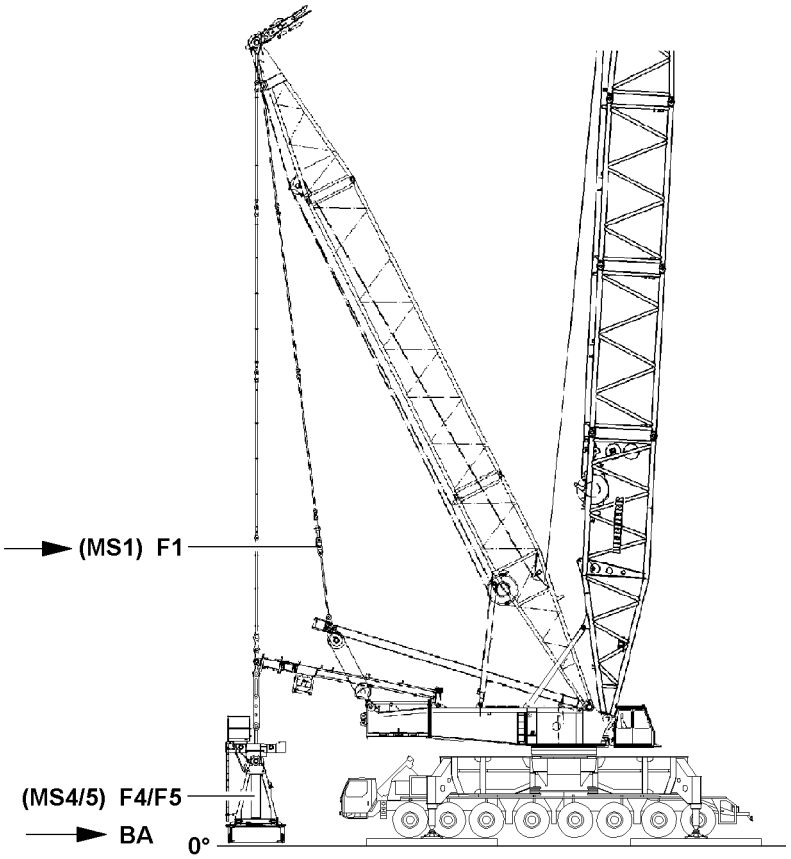

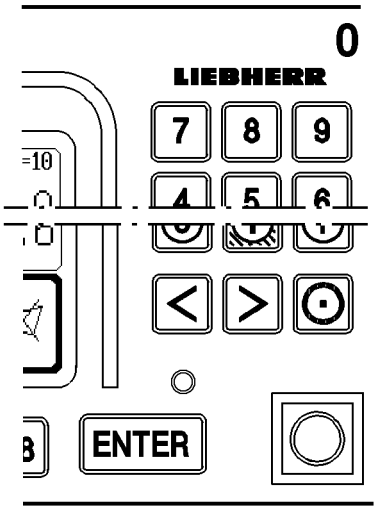

Fig.121122

LWE/LG 1750-006/15409-07-02/en

4 Crane operation with derrick ballast

Make sure that the following prerequisites are met:
- The test points are checked for function.
- The crane is supported and aligned in horizontal direction according to the data in the load charts.
- The weight of the load to be lifted is known.
- The required derrick ballast is placed according to the load chart.
- The derrick boom is in operating position.

4.1 Settings

▶ Set and confirm the load chart for the upcoming crane operation on the LICCON monitor.
▶ Set and confirm the weight of the actually placed derrick ballast on the LICCON monitor.

Note
▶ To set the derrick ballast, see Crane operating instructions, chapter 4.03.
▶ The required derrick ballast must be determined according to the data in the load chart or through the job planner.

WARNING
The crane can topple over!
Incorrect ballast weight entry can lead to dangerous operating situations.
▶ The set derrick ballast must match the actual installed derrick ballast.

▶ Check the set derrick ballast against the actual derrick ballast.

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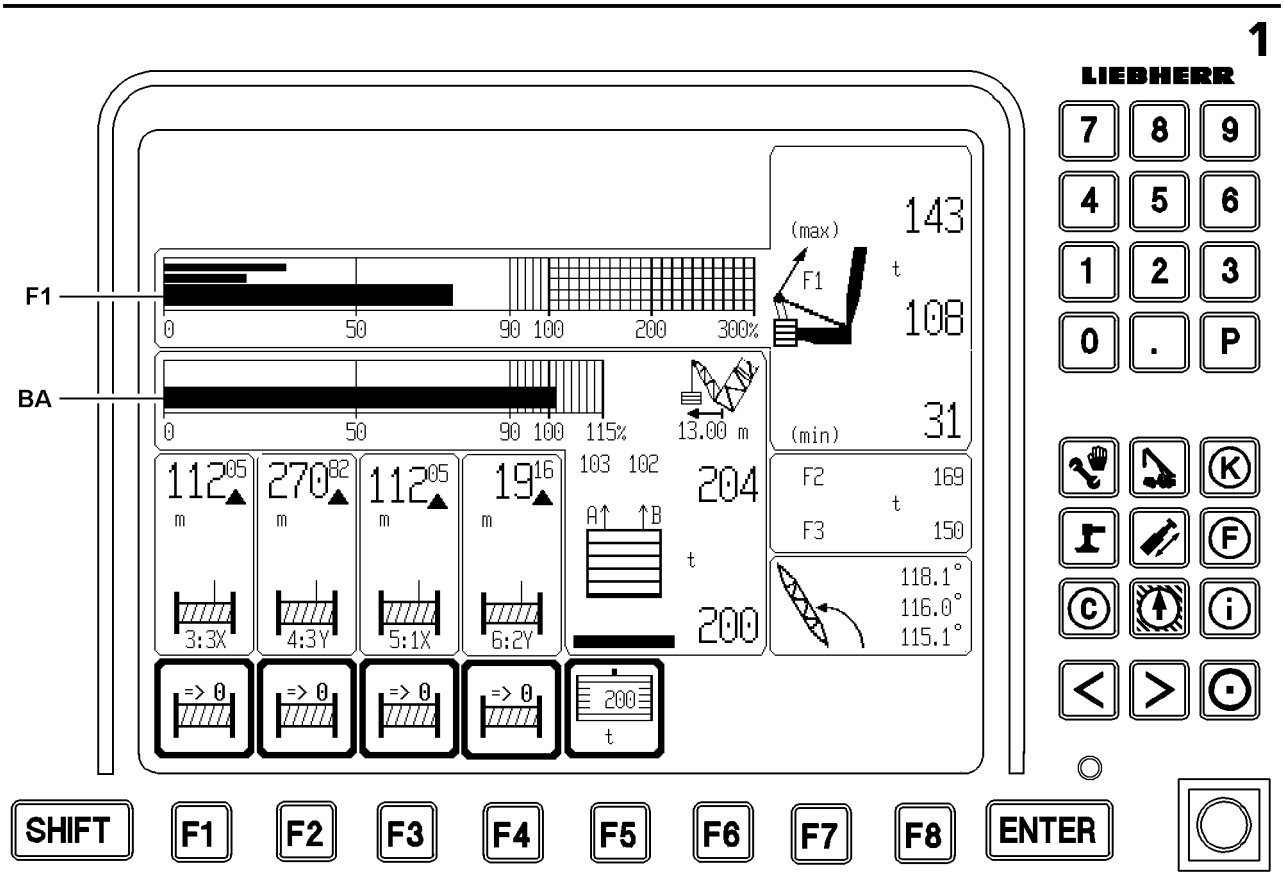

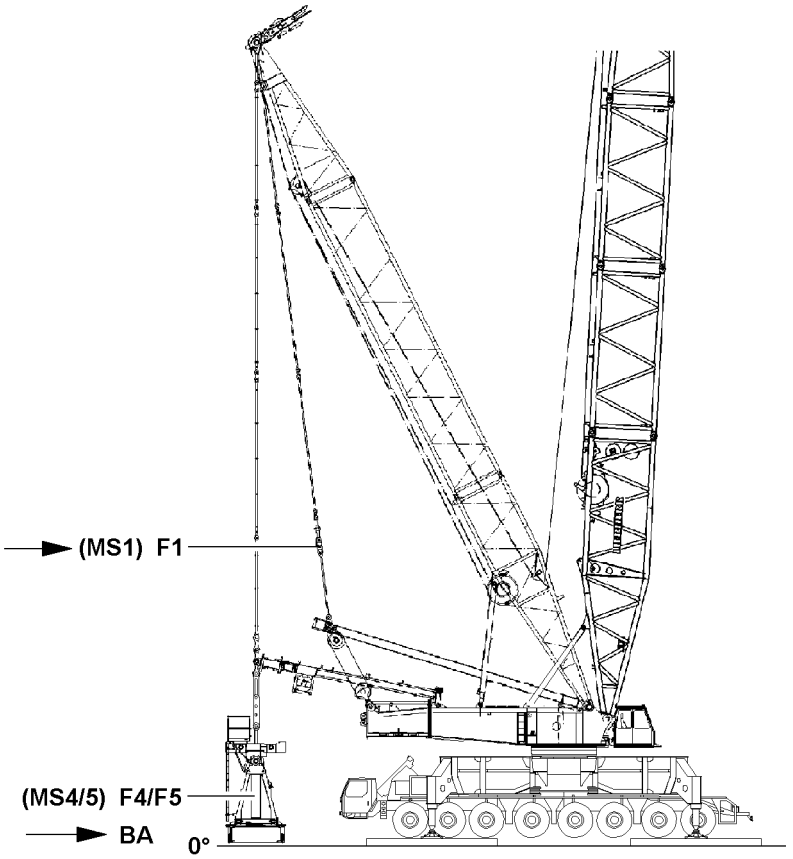

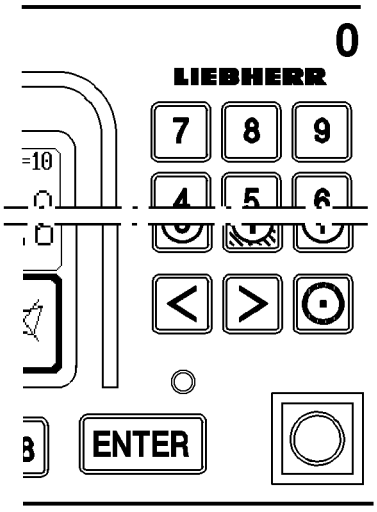

Fig.121122

4.2 Crane operation

Note

▶ For crane operation with derrick ballast, the data in the Crane operating instructions, chapter 4.02 must be observed and adhered to.

WARNING

The crane can topple over!
The jerky execution / braking of turning maneuvers can cause the load or suspended derrick ballast to swing.
This can lead to severe property damage or cause the crane to topple over.
Personnel can be severely injured or killed.

▶ There may be no persons, objects or obstacles within the turning range of the derrick ballast.
▶ During the turn, a guide must monitor the boom, derrick boom and derrick ballast for any danger of collision.
▶ The turning movement or braking must be initiated extremely carefully when turning with a load and suspended derrick ballast.
▶ Do not lift the derrick ballast by more than 250 mm off the ground.

Note

▶ If the suspended derrick ballast must be swung over any obstructions or be set down on a different level to the crane, it is possible to raise or lower the suspended derrick ballast using the pull cylinders.
▶ The pull cylinders are operated from the crane operator's cab.

WARNING

The crane can topple over!
If the derrick ballast in crane operation is operated via the control panels on the ballast pallet, important crane data cannot be viewed on the LICCON monitor.
The crane can topple over and personnel can be severely injured or killed.

▶ It is prohibited to operate the derrick ballast in crane operation from the control panels.
▶ The derrick ballast must always be aligned horizontally when it is raised or lowered with the pull cylinders.

▶ The crane operator must ensure that the pull cylinders extend / retract evenly.

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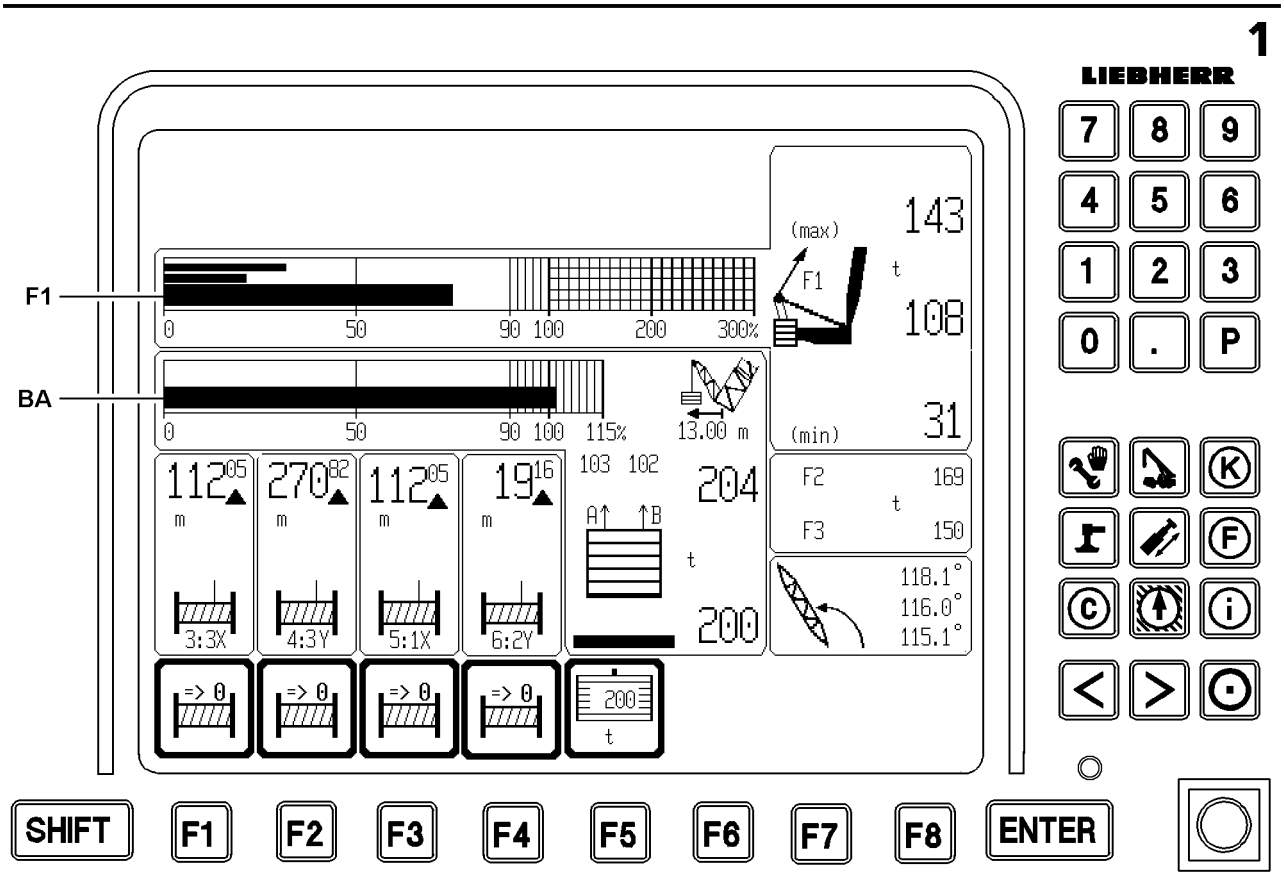

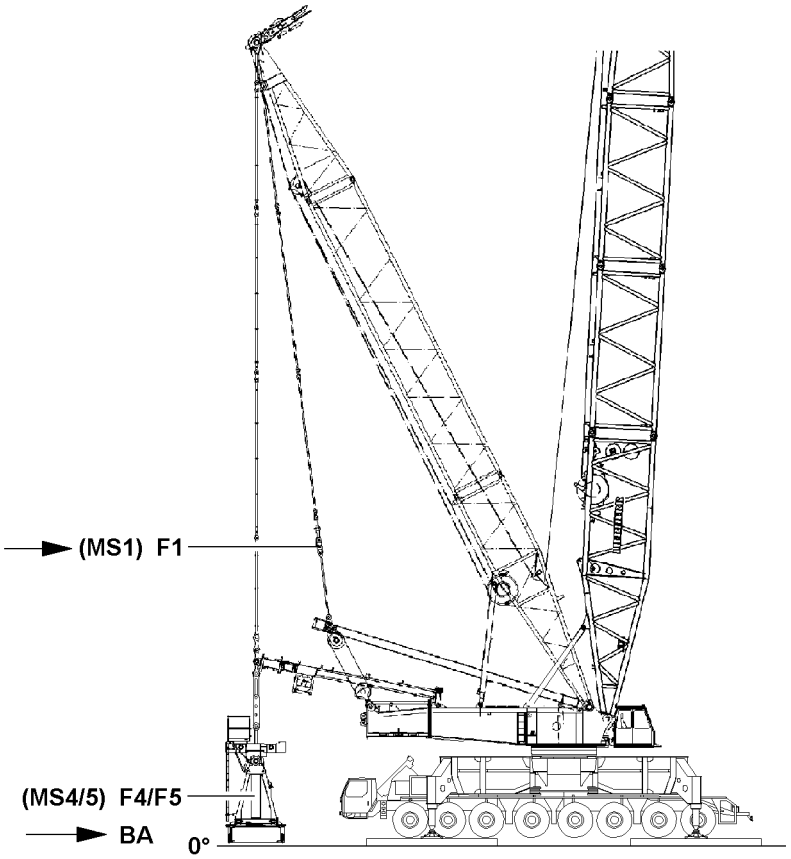

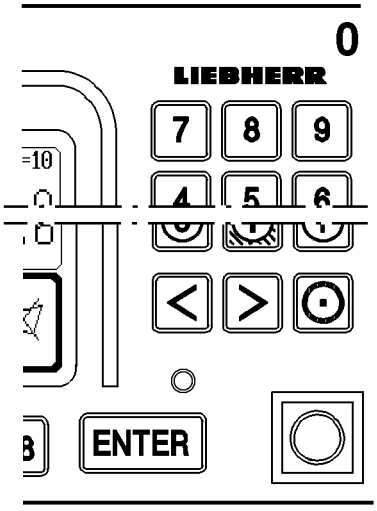

Fig.121122

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4.3 Crane operation with derrick ballast

In all operating modes with derrick ballast, the load is divided between the guy rods from the derrick end section to the SA-frame – test point 1 **MS1** (F1) – and to the derrick ballast **MS4/MS5**.

The load of the crane is monitored by test point 1 **MS1** (F1), in the guying from the SA-frame to the derrick head. If the force becomes too high, then all movements, which increase the load momentum are turned off.

The force distribution can change due to the following procedures:
- Taking on the load: Due to flexing of the turntable.
- Due to raising or lowering the derrick ballast with the pull cylinders.
- Due to ballasting the derrick ballast plates on or off.

WARNING
Danger of accident!
▶ Before setting down the load and suspended derrick ballast, the crane operator must make sure that it can be safely set down.

- Make sure that there are no persons, objects or obstacles within the slewing range of the crane, ballast trailer, suspended derrick ballast and load.
- When picking up the load, **make sure** to avoid diagonal pull, i.e. the derrick ballast, the center of rotation of the turntable and the load must be in one line. To ensure this, operate the cylinder to lift and set down the derrick ballast (ballast pallet) before adding any ballast plates.

4.4 Monitoring of minimum force F1

If more than fifty percent of the set derrick ballast is drawn (ballast utilization bar shows a ballast utilization of greater than fifty percent) and if the minimum force F1-min **MS1** (F1) is too low, if all load moment increasing crane movements are switched off.

DANGER
The crane can topple over!
▶ It is prohibited to let the minimum force F1-min **MS1** (F1) fall below if more than 50 % of the derrick ballast is pulled. If this is not observed, in case of slack guying of test point 1 **MS1** (F1) and „Derrick ballast on the ground“ by increasing the load torque, the derrick ballast can suddenly lift off the ground.
▶ Simultaneously, the boom system can move suddenly forward.
▶ This causes the load to swing strongly.
▶ The crane can topple over and personnel can be severely injured or killed.

If more than ninety percent of the set derrick ballast are pulled (ballast utilization bar shows a ballast utilization of more than ninety percent) and if the minimum force F1-min **MS1** (F1) is fallen below, if all load torque increasing and all load torque decreasing crane movements are turned off. The hoist gear „down“ movement is also turned off.

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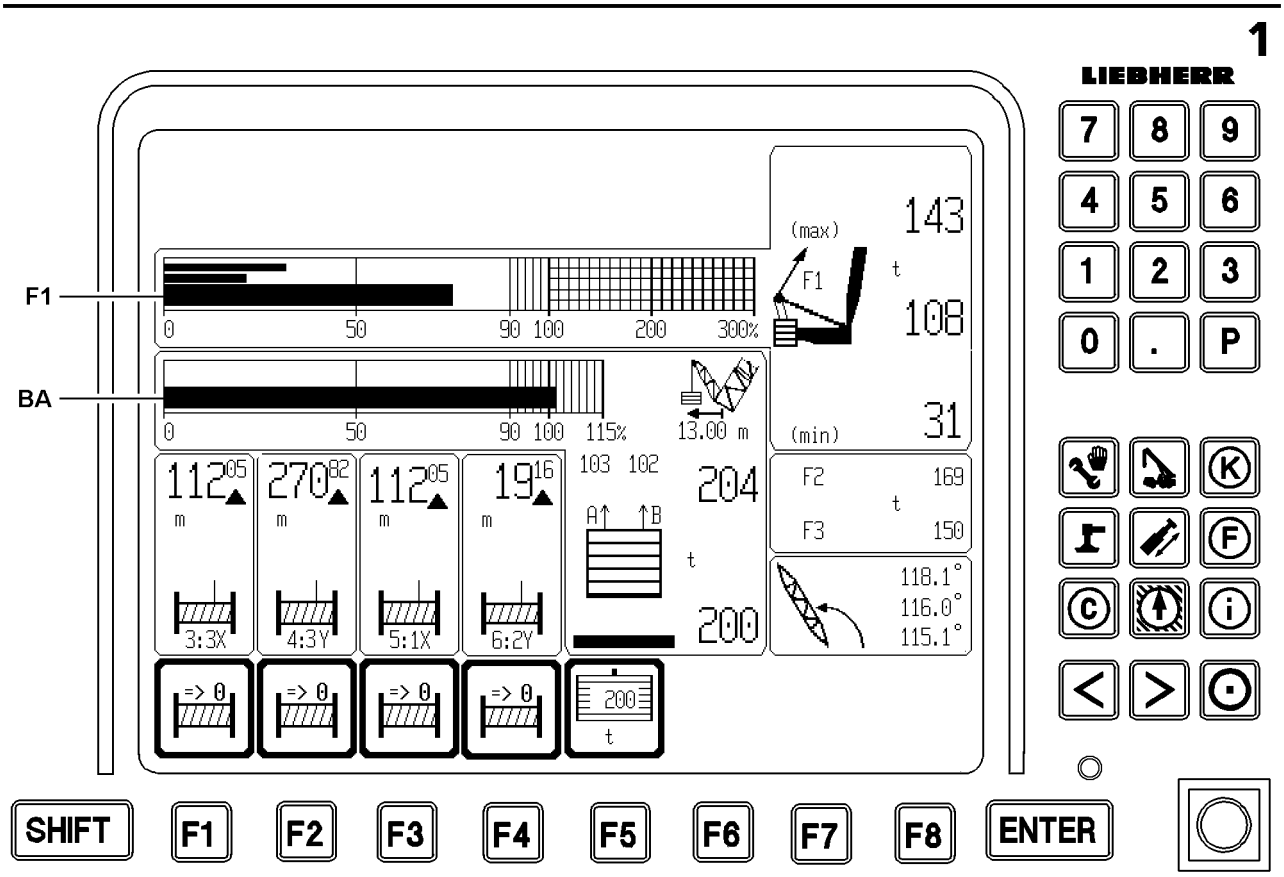

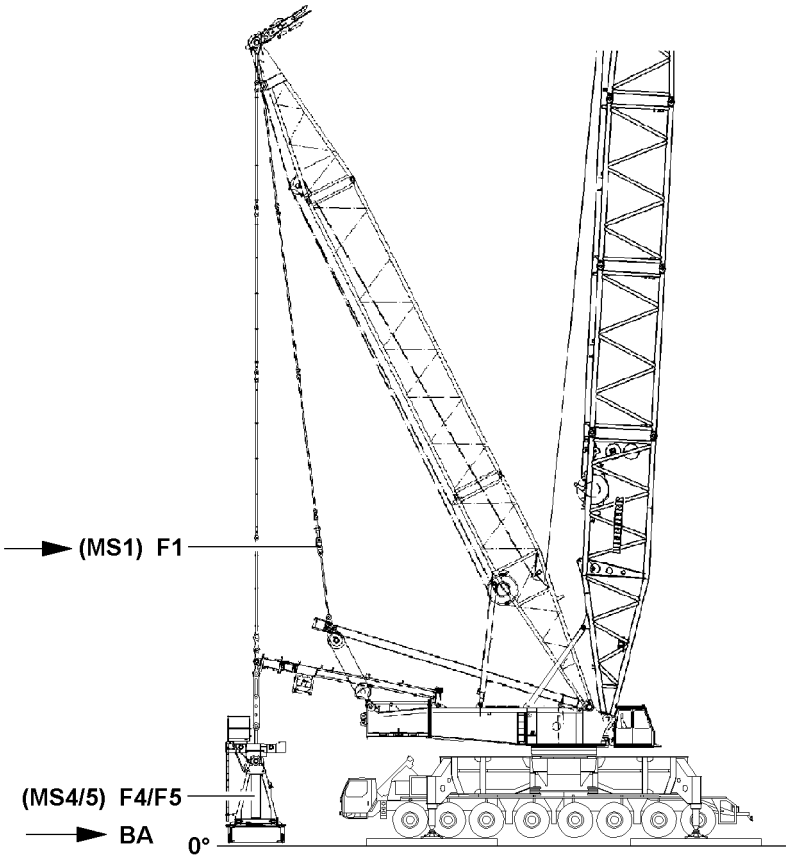

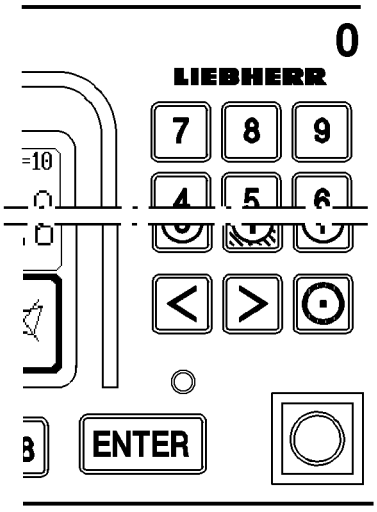

Fig.121122

LWE/LG 1750-006/15409-07-02/en

DANGER
The crane can topple over!
- ▶ It is prohibited to fall below the minimum force F1 min **MS1** (F1) if more than 90 % of the derrick ballast is pulled. If this is not observed, in case of the slack guying of test point **MS1** (F1) and the „Suspended derrick ballast“ can set down suddenly on the ground due to reduction of load torque of the derrick ballast and the boom system suddenly moves backward suddenly.
- ▶ As a result, the relapse cylinders can be pressed on block and be overloaded.
- ▶ There is a danger that the relapse cylinders on the boom and derrick may become damaged.
- ▶ This causes the load to swing strongly.
- ▶ The crane can topple over and personnel can be severely injured or killed.

This danger condition can only be overcome:
- – By lowering the suspended derrick ballast to the ground via the pull cylinders.

or:
- – The ballast plates are unloaded in order to reduce the derrick ballast utilization and to increase the load at test point 1 **MS1** (F1).

DANGER
The crane can topple over!
As a result of intentional misuse of the function „Exceeding the shut off limits of the LICCON overload protection“ the crane can collapse, the boom can break off or the crane can topple over.
Personnel can be severely injured or killed.
- ▶ The crane operator must have understood the function and effects of actuating the function „Exceeding the shut off limits of the LICCON overload protection“, see Crane operating instructions, chapter 4.20.

4.5 Force F1 (Test point 1) between guying SA-frame - Derrick end section

The force F1 **MS1** is determined in the guy rods from the SA-frame to the derrick head via 2 force test boxes and is shown on the LICCON monitor as total force of the guying.

The F1 - utilization is determined from the F1 operating force and the F1-maximum operating force.

This is shown on the LICCON monitor in the utilization bar **F1** (in %).

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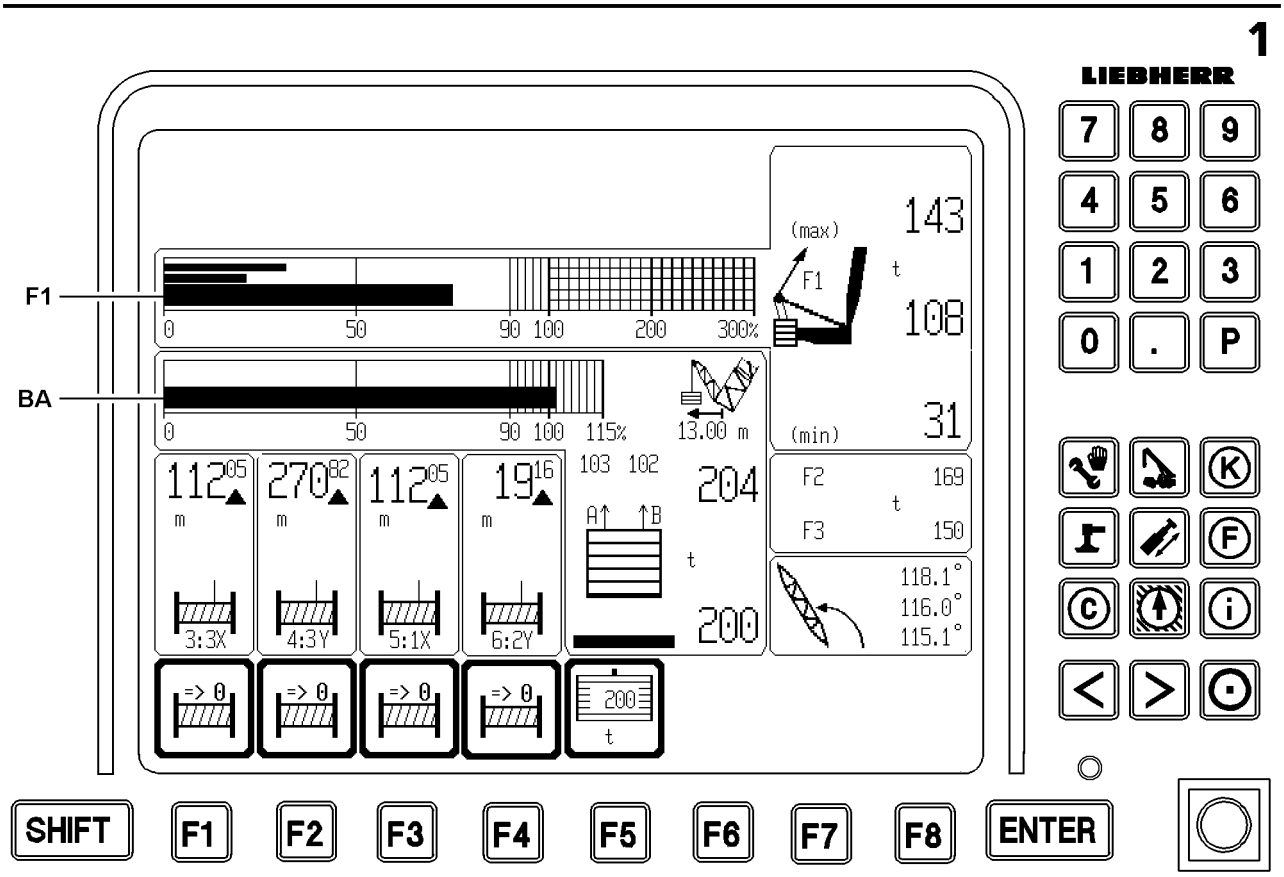

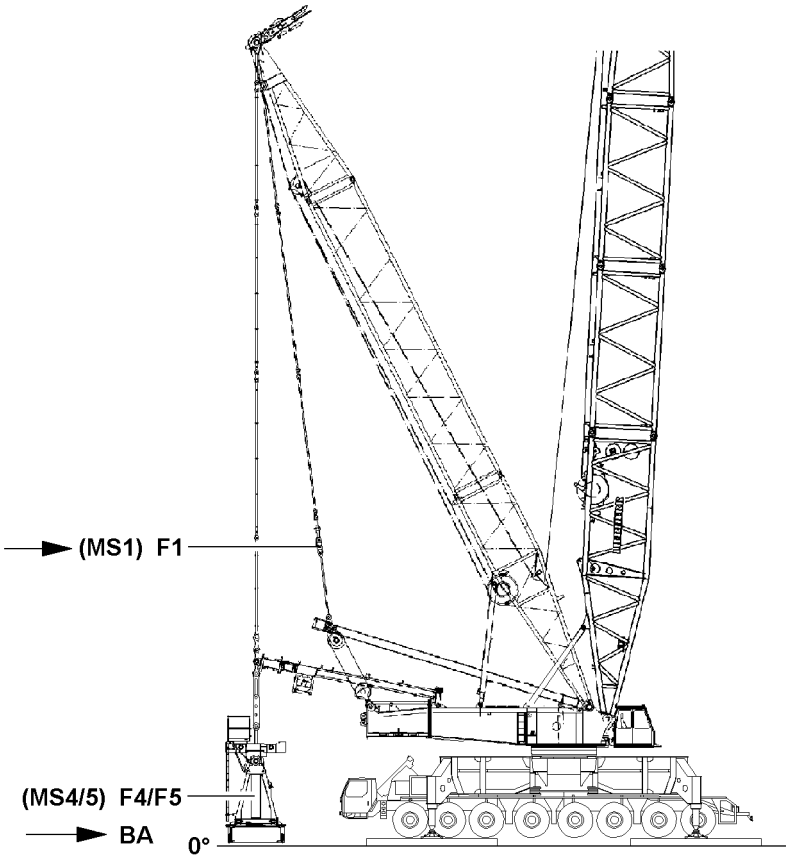

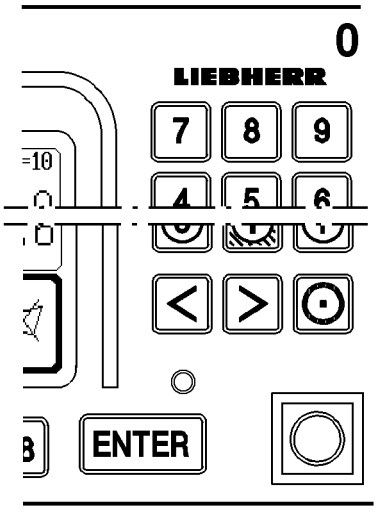

Fig.121122

4.6 Force F4 / F5 (MS4 / MS5) guying derrick ballast - Derrick end section

The forces F4 **MS4** and F5 **MS5** exert in the guy rods from the derrick ballast to the derrick head.

The existing forces in the guy rods (**A** = left and **B** = right) are calculated from the three pressure sensors, which are installed on the pull cylinders and shown in the LICCON monitor as individual forces.

The pulled derrick ballast is calculated from the forces of the individual guyings, which means the part of the derrick ballast which is pulled upward by the guying. The remaining part is laying on the ground. The derrick ballast utilization results from the pulled ballast and the placed ballast.

This is shown on the LICCON monitor in the utilization bar **BA** (in %).

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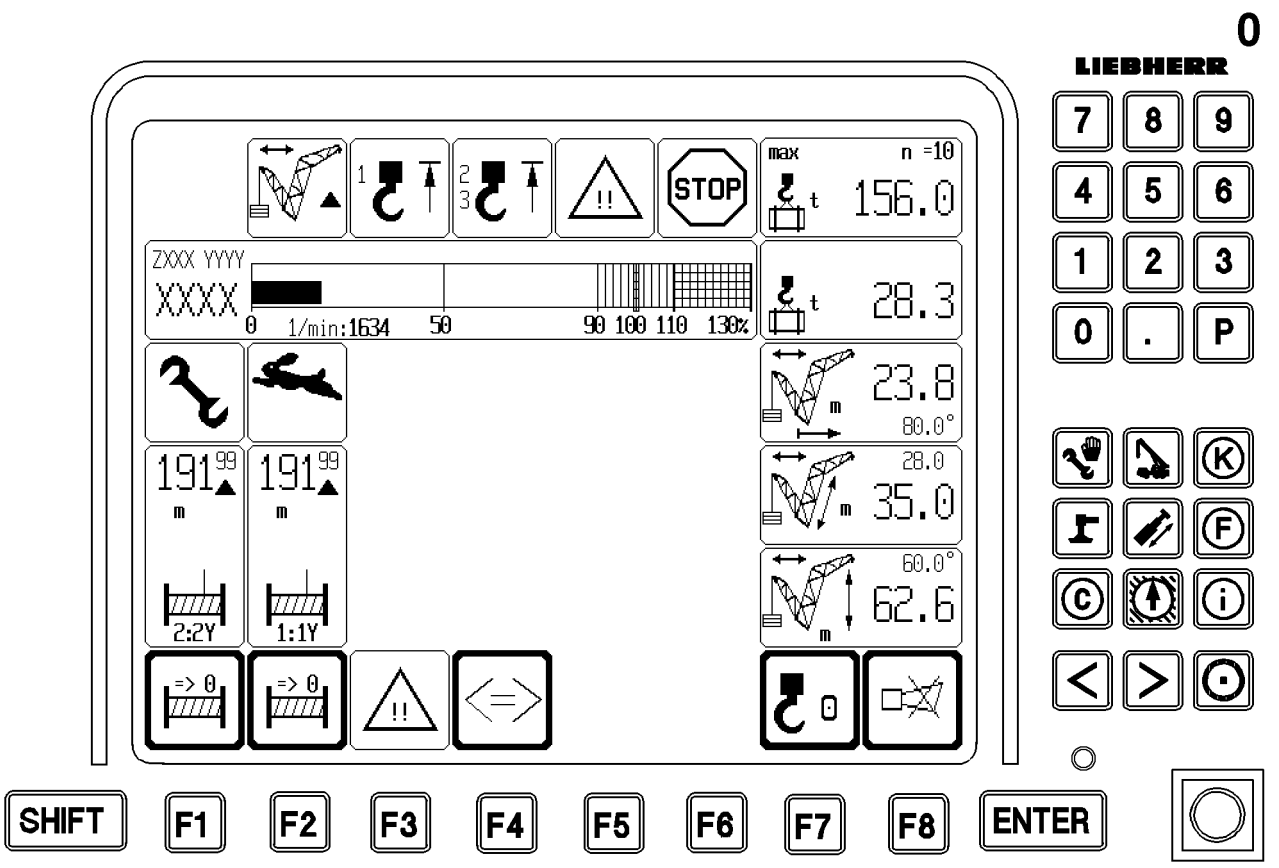

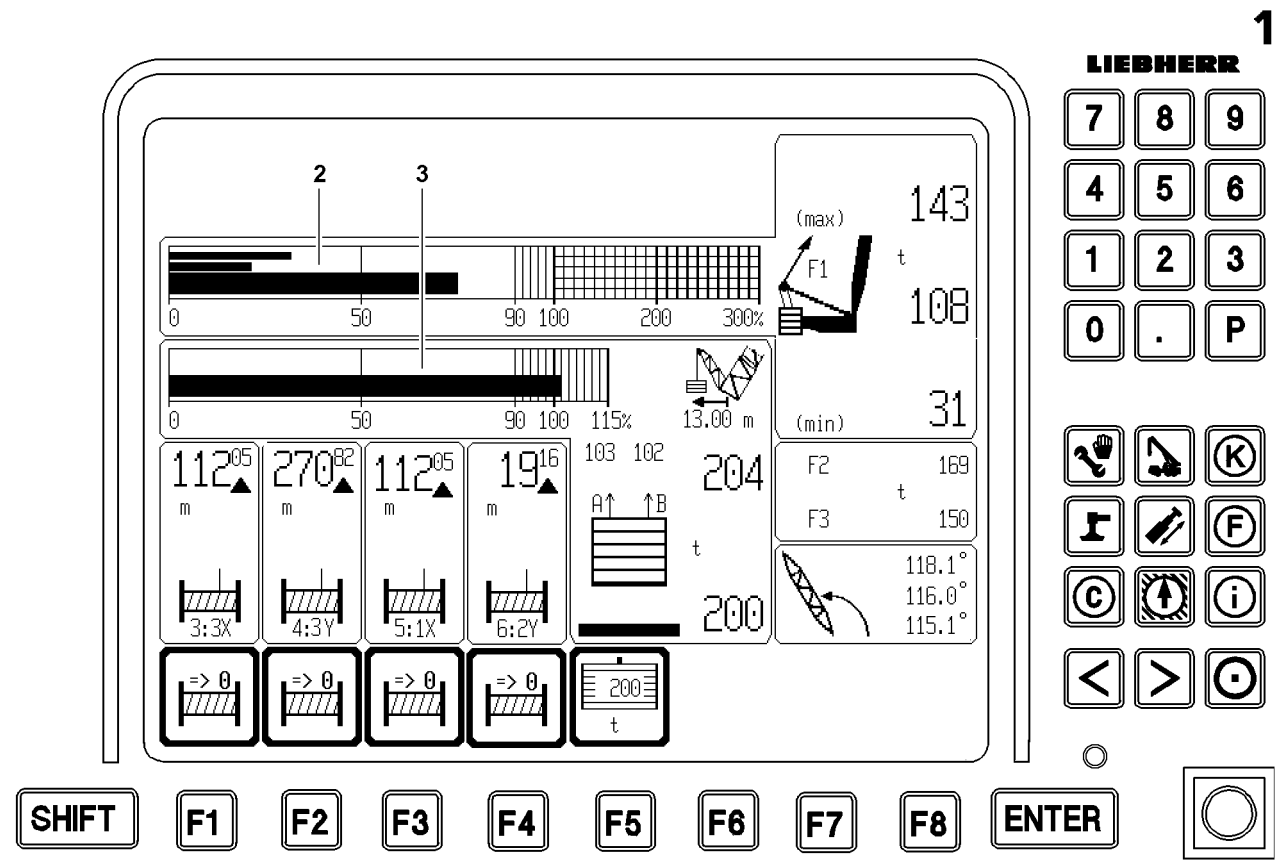

Fig.121123

4.7 Overload monitoring in operating mode with derrick ballast

In operating modes with derrick ballast, the „maximum load for the current crane condition“ is monitored two ways:

1. Monitoring of maximum load on the LICCON monitor 0
2. Monitoring of test point 1-operational maximum force LICCON monitor 1

4.7.1 Monitoring of maximum load on the LICCON monitor 0

It monitors the „maximum load according to load chart and reeving“.

In operating modes with derrick ballast, this is the maximum load of the current crane condition. It is shown on LICCON monitor 0. The current utilization of the crane results from the load utilization bar **1** on LICCON monitor 0.

If the load utilization bar reaches 90 %, an advance warning is given in the form of a „caution icon“ and a „SHORT HORN“ on monitor 0.

At 100 % on the load utilization bar, the shut off of all load moment increasing movements with the „stop icon“ and the acoustic warning „HORN“ occurs on LICCON monitor 0.

Note

▶ The „Maximum load of the current crane condition“ can possibly be increased further, refer to section Utilization conditions.

4.7.2 Monitoring of test point 1-operational maximum force (= F1 max)

It is displayed on monitor 1.

At ninety percent $F1_{max}$-utilization **2** an advance warning is given in the form of a caution icon and a „SHORT HORN“ on LICCON-Monitor 1.

At hundred percent $F1_{max}$-shut off of all load moment increasing movements take place with the „Stop-icon“ and the acoustic warning „HORN“ on LICCON-Monitor 1.

If the „Maximum load according to the load chart and the reeving“ is not reached (utilization bar **1**), then the „Maximum load of the current crane condition“ can still be increased by:

- Pulling up the derrick ballast, if the derrick ballast is not already suspended and the currently pulled derrick ballast is still smaller than the optimum derrick ballast.
- Telescoping out the derrick ballast if the placed derrick ballast is still smaller than the optimum derrick ballast.
- Increasing the derrick ballast by adding additional ballast plates if the placed ballast is still smaller than the optimum ballast.

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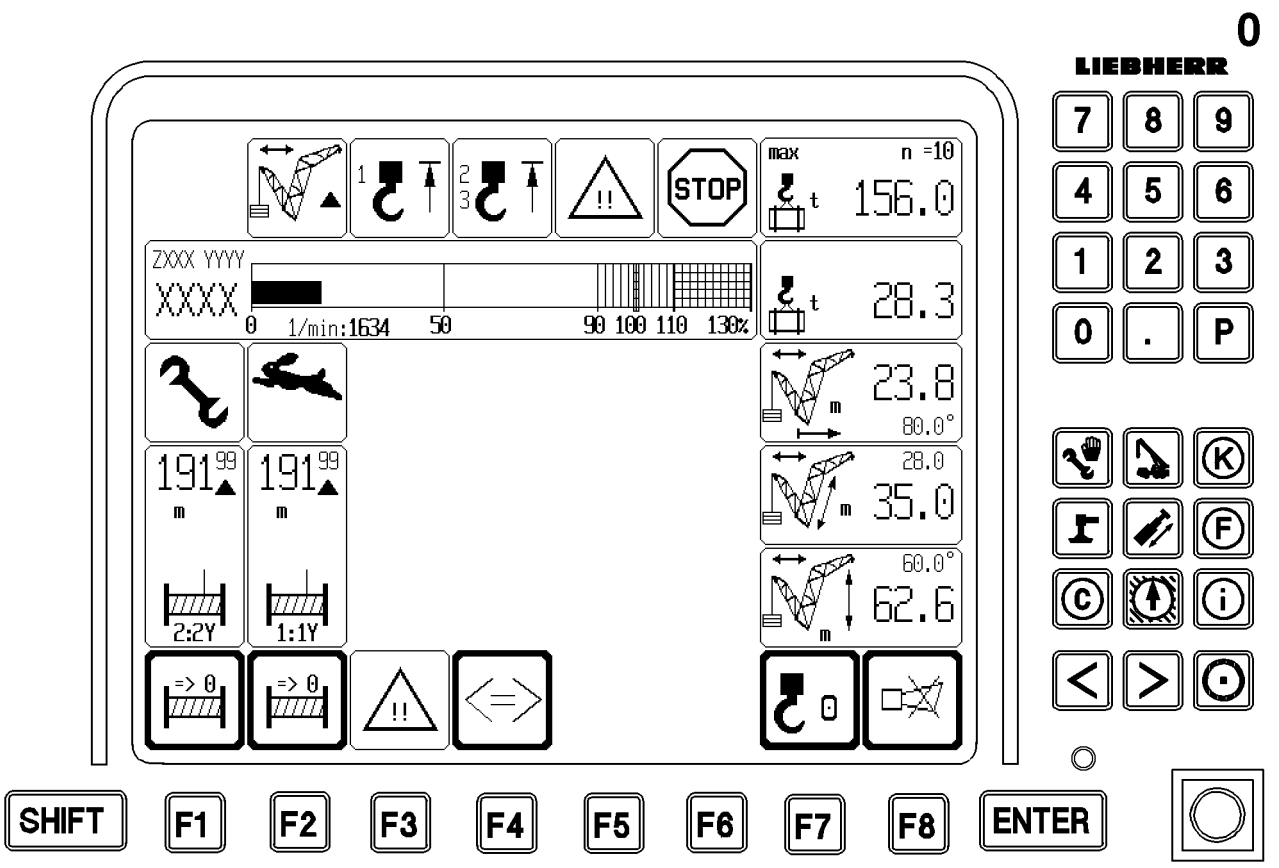

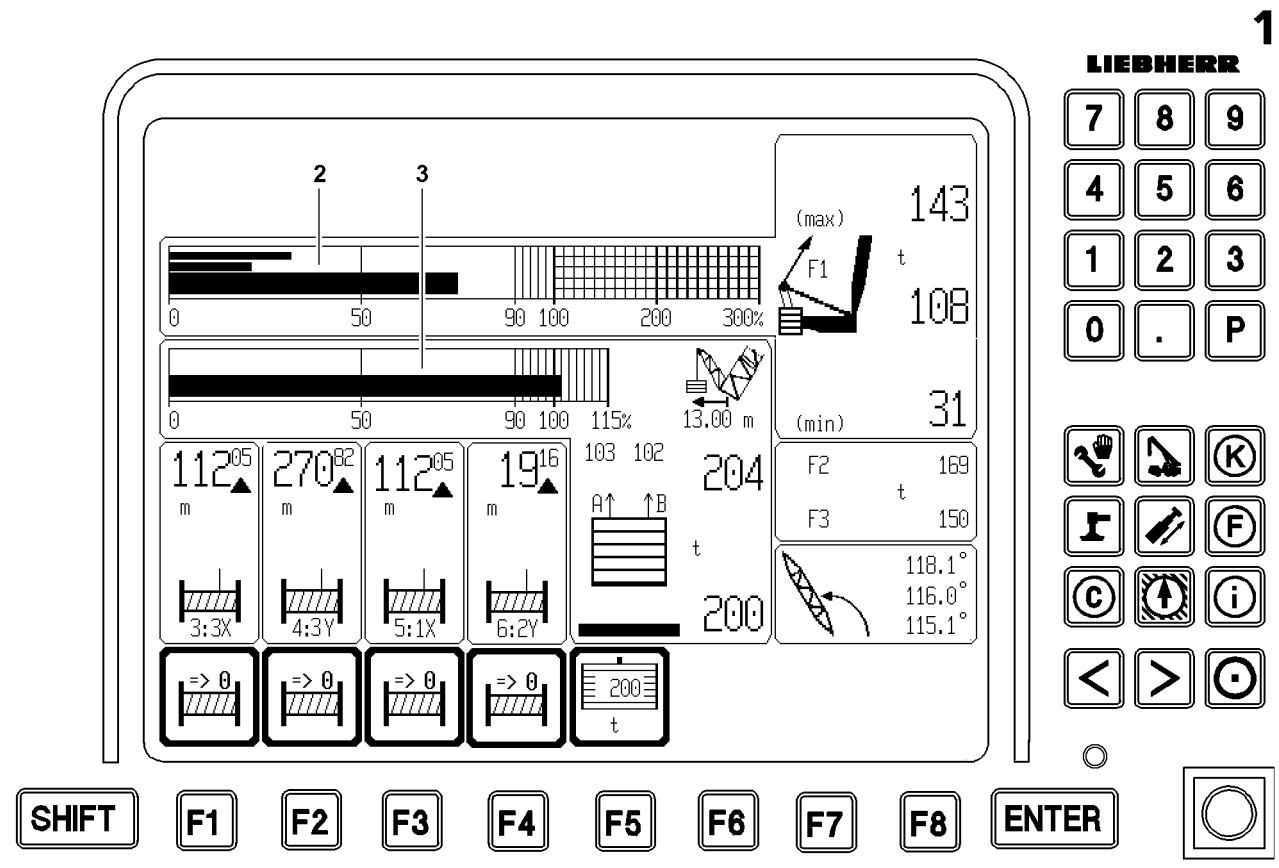

Fig.121123

4.8 Utilization conditions

The current utilization of the crane results from the load utilization bar **1** on LICCON monitor 0 and the F1-utilization bar **2** on LICCON monitor 1.

The „Maximum load of the current **crane condition**“ is reached when the load utilization bar **1** has reached 100 % or when the F1- utilization bar **2** has reached 100 %.

The „Maximum load of the current **crane equipment**“ is reached when the load utilization bar **1** has reached 100 % or when the F1- utilization bar **2** has reached 100 % and the derrick ballast is suspended (ballast utilization bar **3** at 100 %, if the ballast input value and the ballast weighing are correct).

The „maximum load according to the load chart and the reeving“ (100 % limit of load utilization bar) and the maximum load according to F1 $_{max}$ operation (100 % limit of the F1 utilization bar) can be bypassed by the following measure:

– Activate the function „Exceeding the shut off limits of the LICCON overload protection“:
  For function and effects of function „Exceeding the shut off limits of the LICCON overload protection“, see Crane operating instructions, chapter 4.20.

DANGER
The crane can topple over!
As a result of intentional misuse of the function „Exceeding the shut off limits of the LICCON overload protection“ the crane can collapse, the boom can break off or the crane can topple over.
Personnel can be severely injured or killed.

▶ The crane operator must have understood the function and effects of actuating the function „Exceeding the shut off limits of the LICCON overload protection“, see Crane operating instructions, chapter 4.20.

Note

▶ The movement „Raise ballast“ or „Lower ballast“ requires utmost attention by the crane operator.

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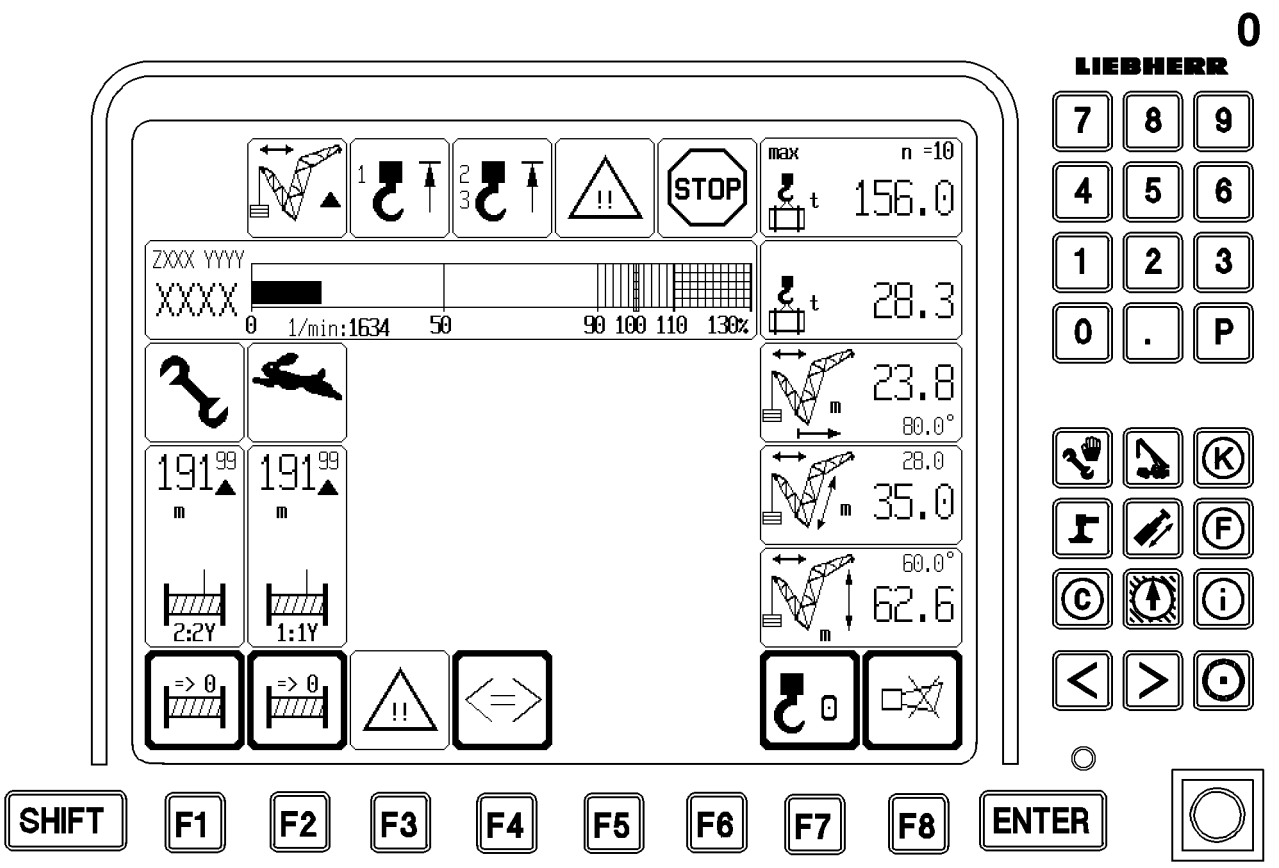

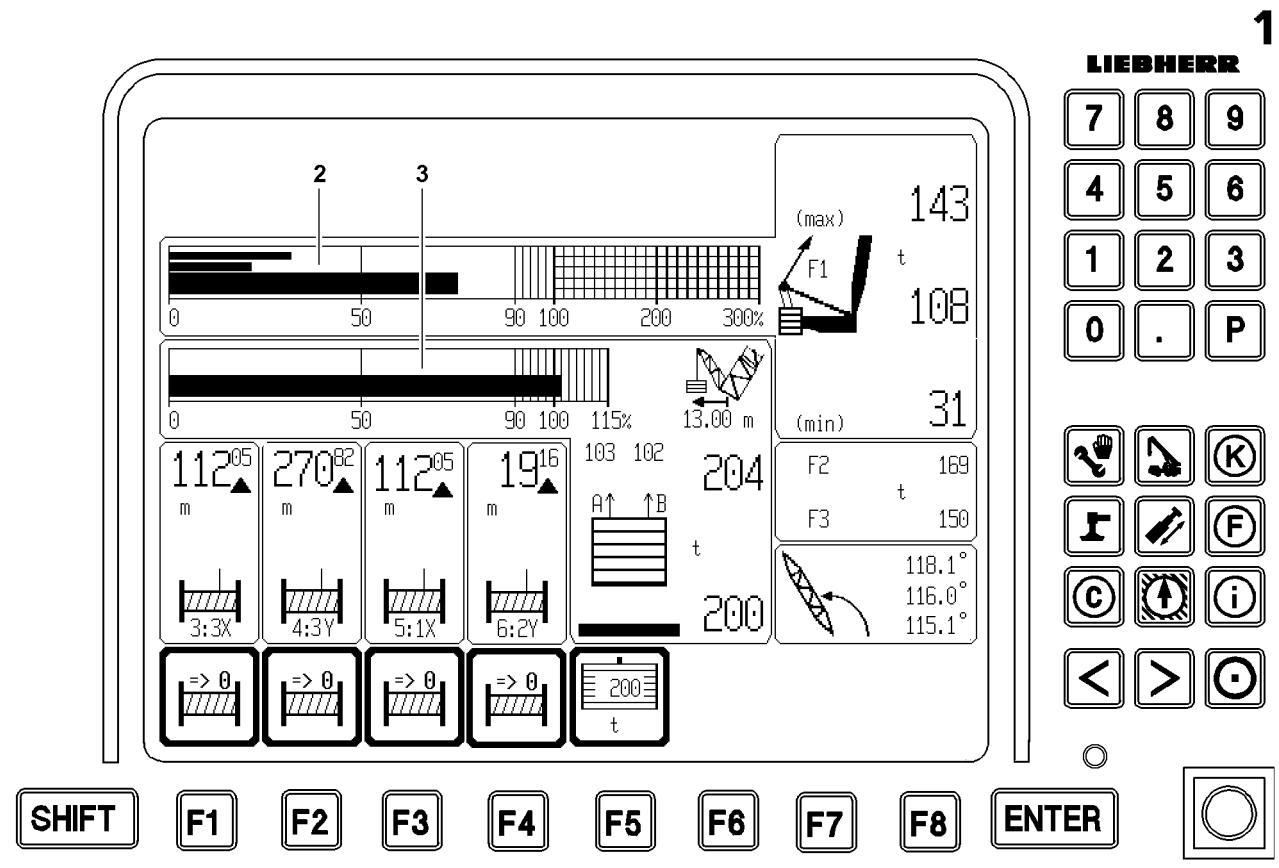

Fig.121123

4.9 Checking the length sensor value on the derrick ballast

CAUTION
Danger of accident!
If the derrick ballast radius is measured incorrectly, the false radius value will result in the calculated maximum lifted load and F1-Operation-max-force being too high.
The crane will be overloaded unnoticed and can topple over.
Personnel can be severely injured or killed.

- ▶ The crane operator may not rely blindly on the derrick ballast radius measurement, but he must think for himself and check, if the measurement is still working correctly.
- ▶ With completely telescoped in / out derrick ballast, the display „Derrick ballast radius“ must approximately show the corresponding end position.

Note

- ▶ When telescoping the suspended ballast guide, the display „Derrick ballast radius“ on the LICCON monitor must change according to the movement of the derrick ballast. If this is not the case, the crane operator can immediately recognize that if the length sensor rope drum jams when spooling in or out.

- ▶ When telescoping the derrick ballast in and out, the „Derrick ballast radius“ display must be observed carefully on the LICCON monitor.

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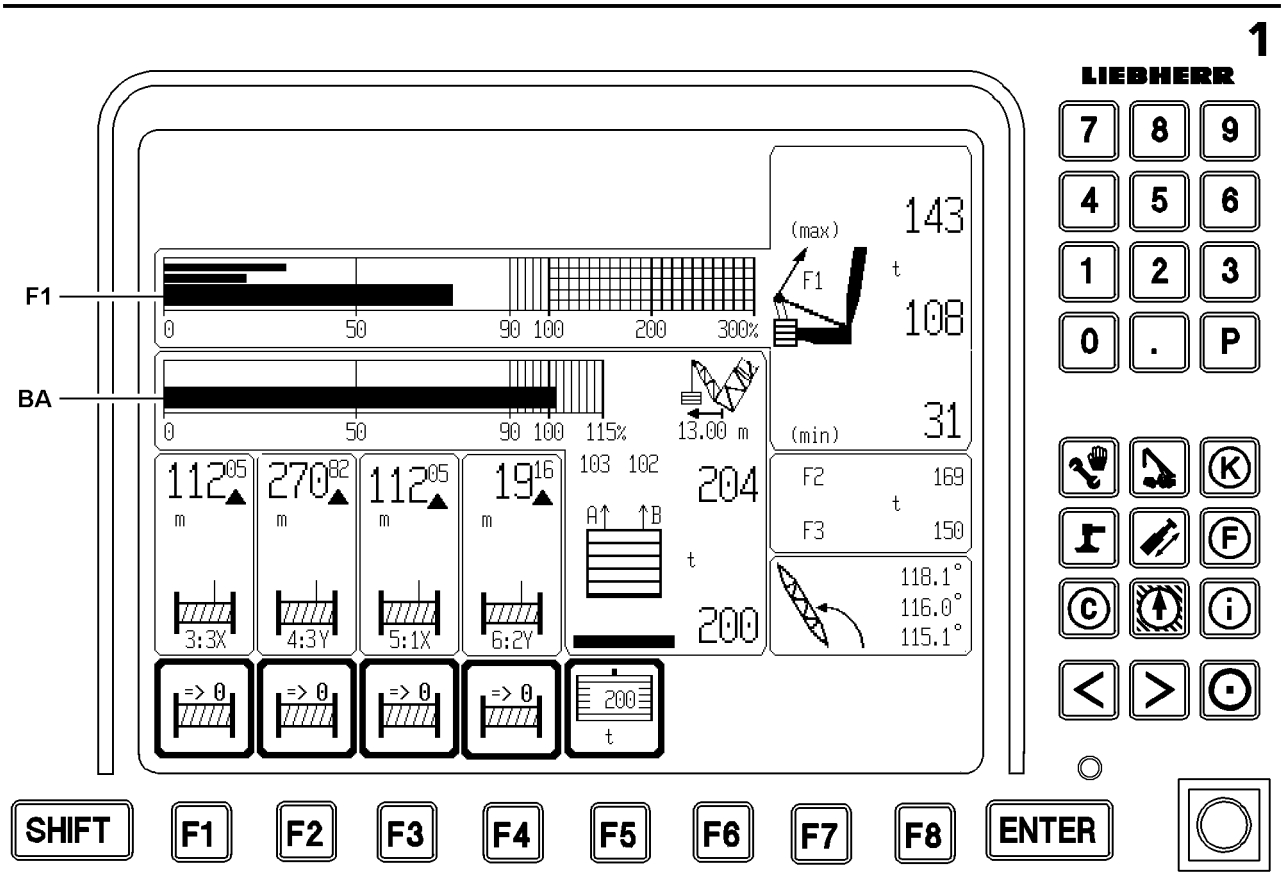

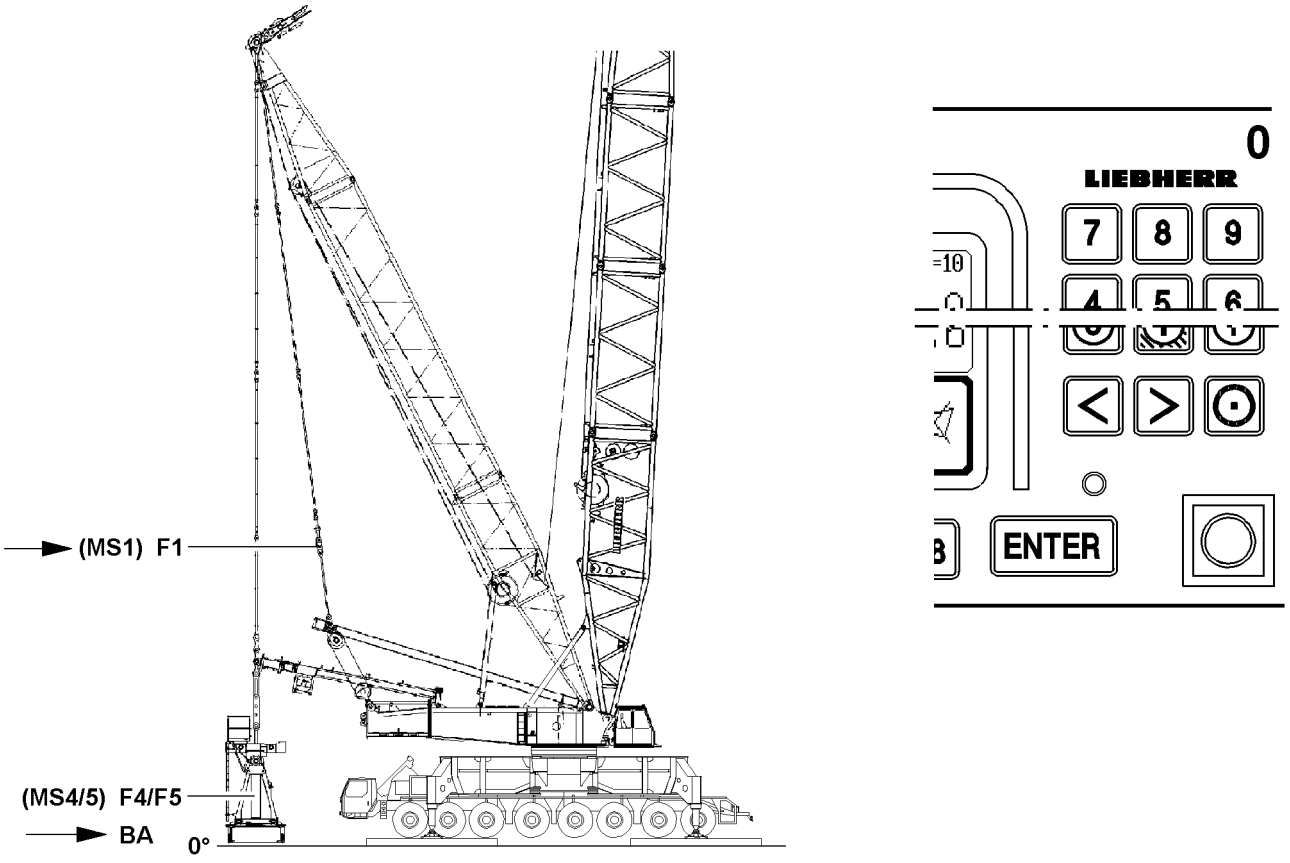

Fig.121122

4.10 Differential force monitoring for derrick ballast guying

In operating modes with derrick ballast, the difference between the forces on derrick guying A and B is monitored on LICCON monitor 1. If the difference exceeds a permissible value, an acoustic warning is issued and the two force values blink.

WARNING
Danger of accident due to damaged crane components!
Too high a difference in the derrick ballast guying A and B can have the result that the derrick ballast moves in an impermissible inclined position, and thereby the derrick end section, the ballast guide or other crane components may be damaged.
Personnel can be severely injured or killed.

- ▶ The forces in the derrick ballast guying A and B must be carefully monitored on the LICCON monitor.
- ▶ If the specified limit value is exceeded, there occurs **no shut off** of crane movements.
- ▶ The maximum permissible length difference on the derrick ballast guying A and B, in relation to the extension conditions on the pull cylinders, may not exceed 40 mm.

Exceeding the limit value can have the following causes:

- Flexing on the turntable.
- The ground under the derrick ballast is uneven.
- The crane is leaning to one side.
- The derrick ballast has been loaded one-sided.
- The force measurement in one derrick ballast guying is incorrect.

The crane driver must recognize the correct cause and take countermeasures:

- Error message appears.
- The error, which caused the one-sided force, must be remedied.
- The following measure is permitted only if the ground is only slightly uneven:
  Block one pull cylinder and with the other pull cylinder activate lift the derrick ballast or „lower the derrick ballast“ until the difference between the forces A and B becomes smaller.
- If sensor values are implausible: Check whether the ballast weighing pressure sensors or inputs for the ballast weighing are faulty. If necessary, pull out the sensor or replace the CPU.

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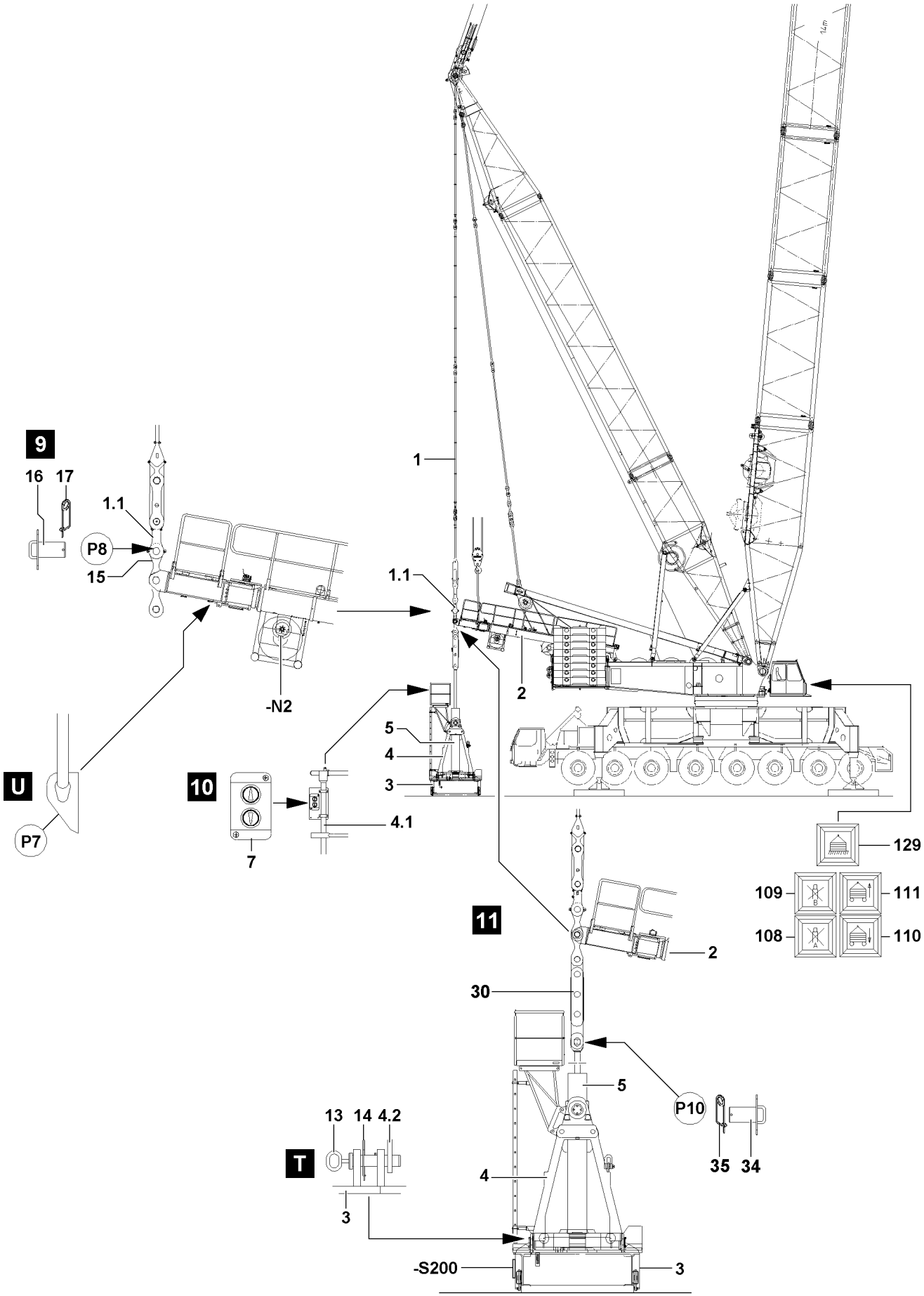

Fig.111378

LWE/LG 1750-006/15409-07-02/en

5 Disassembly

WARNING
Danger of falling!
During assembly / disassembly, inspection and maintenance work, assembly personnel must be secured with appropriate aids to prevent them from falling. If this is not observed, assembly personnel could fall and suffer life-threatening or fatal injuries.

- All work aloft, where there is a danger of falling must be carried out with suitable aids.
- If fall arrest equipment is available, then it must be used, see Crane operating instructions, chapter 2.06.
- If aids are not available and work cannot be carried out from the ground, then the assembly personnel must secure themselves with the specified fall arrest system to prevent falling, see Crane operating instructions, chapter 2.04.
- The fall arrest system must be fastened on the fastening and hook points as well as on the safety ropes. For safety points, see Crane operating instructions, chapter 2.06.
- Only step on the aids, ladders and catwalks with clean shoes.
- Keep aids, ladders and catwalks free of heavy dirt, snow and ice.
- Remaining on as well as under a suspended load is prohibited.
- Remaining on or within crane components (for example: At assembly of boom sections, lattice sections) which are moved during lifting, lowering, turning or closing procedures is strictly prohibited.
- During all assembly and disassembly work, maintenance work and inspections, travel or crane operation is prohibited.
- It is prohibited to step on the boom system or an auxiliary boom without suitable protective devices.
- Stepping and walking on crane components and lattice sections, which have an incline of more than 20° is prohibited.

WARNING
The lattice sections can fall down!
If the lattice sections are not pinned and secured correctly, then they can fall down and fatally injure personnel.

- Pin or unpin both pins at the same horizontal level, i.e. **left and right**.
- Do not stand under the lattice sections or within the entire danger zone during the pinning and unpinning procedure of the boom.
- Secure the pins in the bearing points and the receptacles.
- It is prohibited to lean the ladder against the component being disassembled.
- Do not remove the fastening equipment and the auxiliary crane until each component is pinned on and secured.

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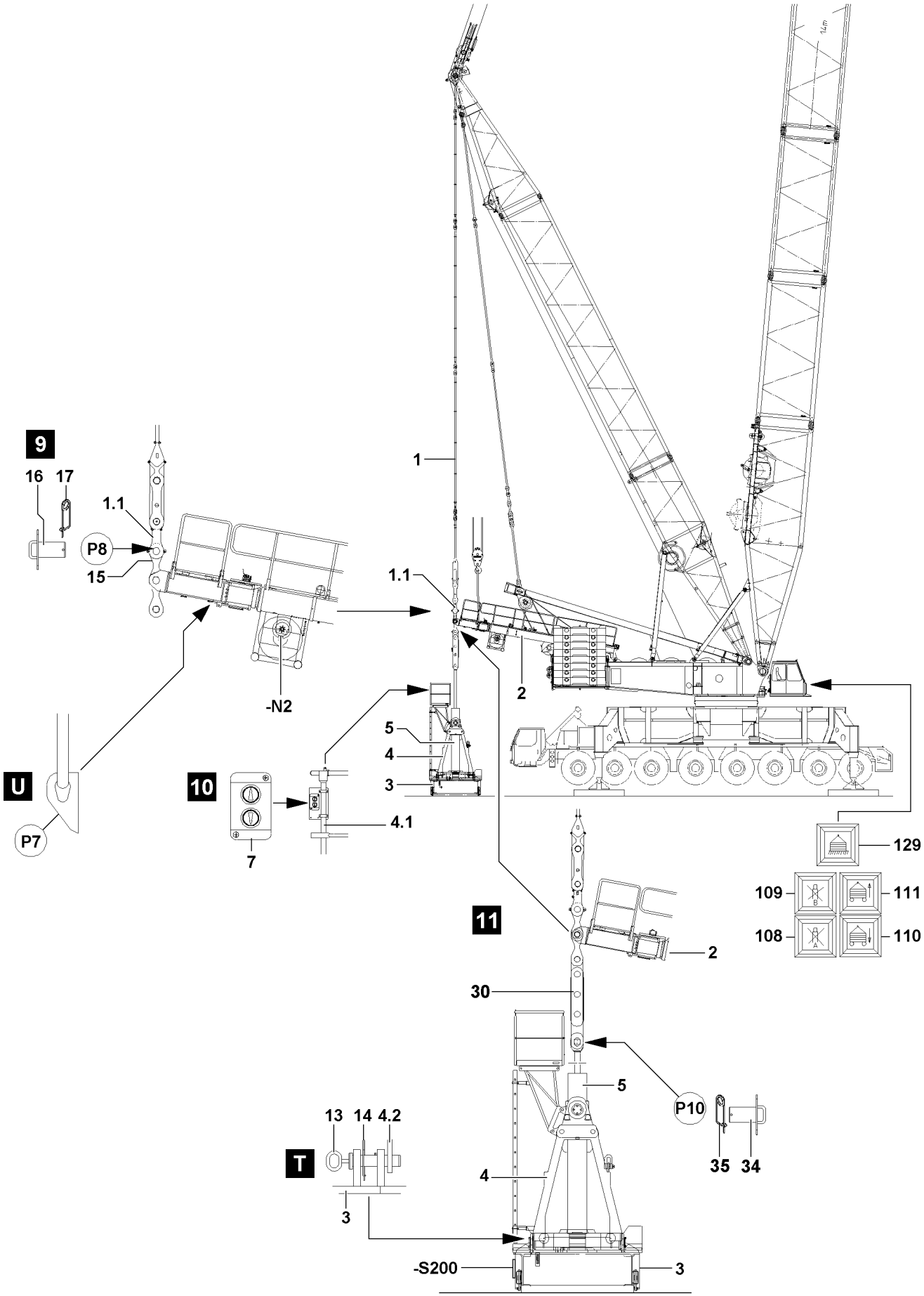

Fig.111378

LWE/LG 1750-006/15409-07-02/en

WARNING
Danger of impact / crushing!
When installing / removing crane components with the auxiliary crane, crane components can start to swing back and forth.
When lifting / lowering and positioning crane components, there is an increased danger of impacts / crushing.
Personnel can be caught and severely injured or killed.
- ▶ Make sure that personnel cannot be caught by components.
- ▶ Make sure that the crane is aligned in horizontal direction to avoid the support beams from swinging by themselves (only on connection with crane support or for the LG-crane).
- ▶ When working in danger zones: Use aids to protect limbs.
- ▶ Guide components with suitable aids to minimize oscillation.

Make sure that the following prerequisite is met:
- – The placement surface for the derrick ballast must be level, horizontal and of sufficient load carrying capacity.

DANGER
The crane can topple over!
The placement surface for the derrick ballast must be level, horizontal and of sufficient load bearing capacity, otherwise the ballast stacks can tip over.
Personnel can be severely injured or killed.
- ▶ Check the horizontal position of the crane during the set down procedure.
- ▶ Check the horizontal position of the derrick ballast during the set down procedure.
- ▶ Constantly check the difference forces in the guying on the LICCON monitor.
- ▶ It is strictly prohibited for anyone to stand under the derrick ballast or in any part of the danger zone during the set down procedure.

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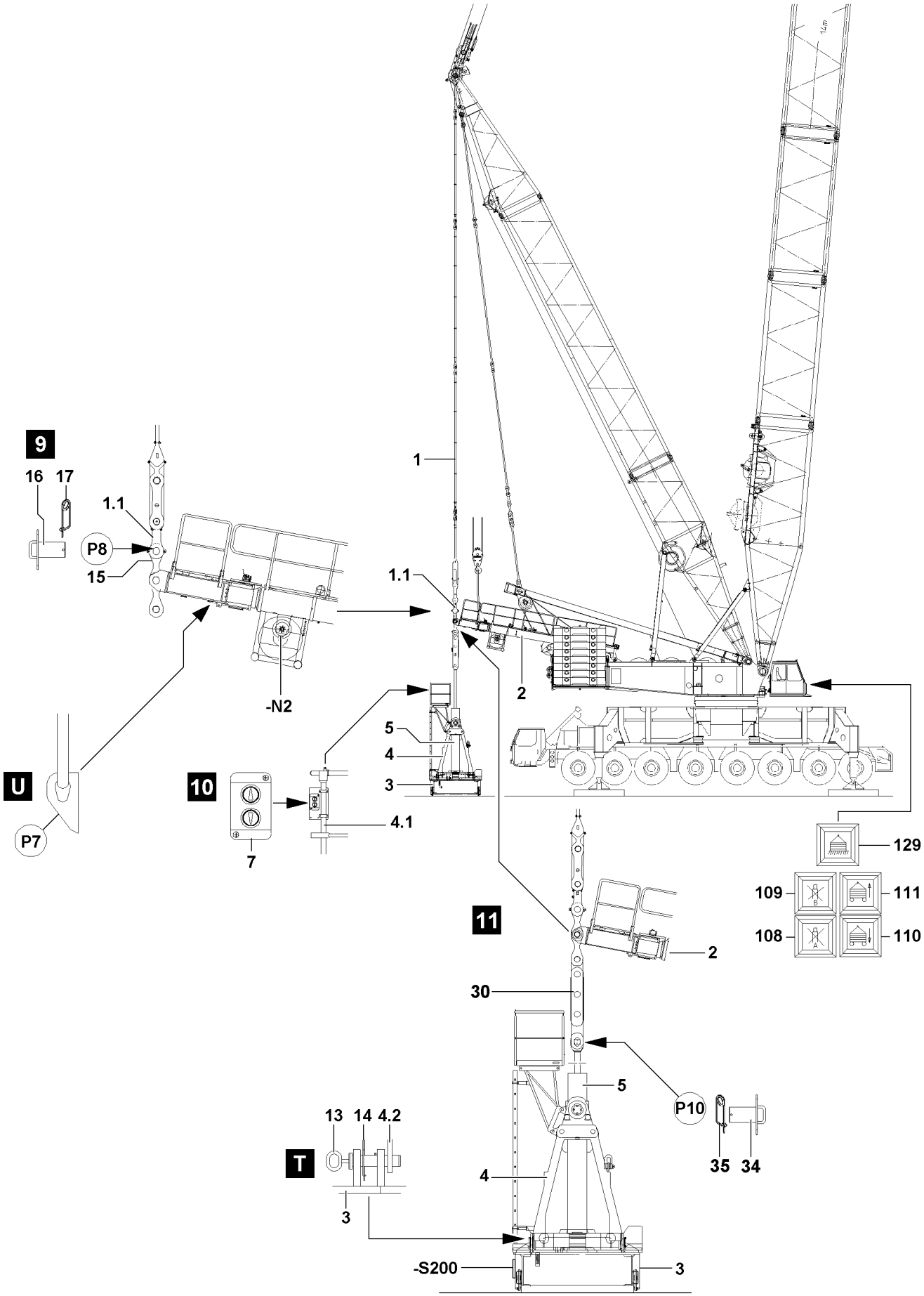

Fig.111378

LWE/LG 1750-006/15409-07-02/en

5.1 Setting the ballast pallet down

Note

▶ The guide frame must be completely telescoped in before setting down the ballast pallet onto the ground. Depending on the pin point on the turntable, the derrick ballast radius stands at 13 m or at 15 m.

▶ The derrick boom radius and the derrick ballast radius must be identical.

Make sure that the following prerequisites are met:
- The guide frame is fully telescoped in.
- The derrick boom radius and the derrick ballast radius are identical.
- The placement of the derrick ballast and the load is observed by a guide.

▶ Press the button **110**.

Result:

– The piston rods of the pull cylinders move out.
– The derrick ballast is lowered.

Note

▶ If the ballast pallet leans at an angle and if there is a difference in the forces in the derrick ballast guying, realign the ballast pallet until it is horizontal.

▶ Press the button **108**.
or
Press the button **109**.

Result:

– The corresponding pull cylinder is blocked.

▶ Extend or retract unblocked pull cylinder by pressing button **110** or button **111** until the ballast pallet is aligned horizontally.

When the ballast pallet is horizontally aligned:

▶ Press button **110** and lower ballast pallet with the pull cylinders onto the ground, until the warning light **129** lights up.

Result:

– The crane movement **„turntable turn“** turns off.
– The crane movement „**Derrick ballast down**“ turns off.

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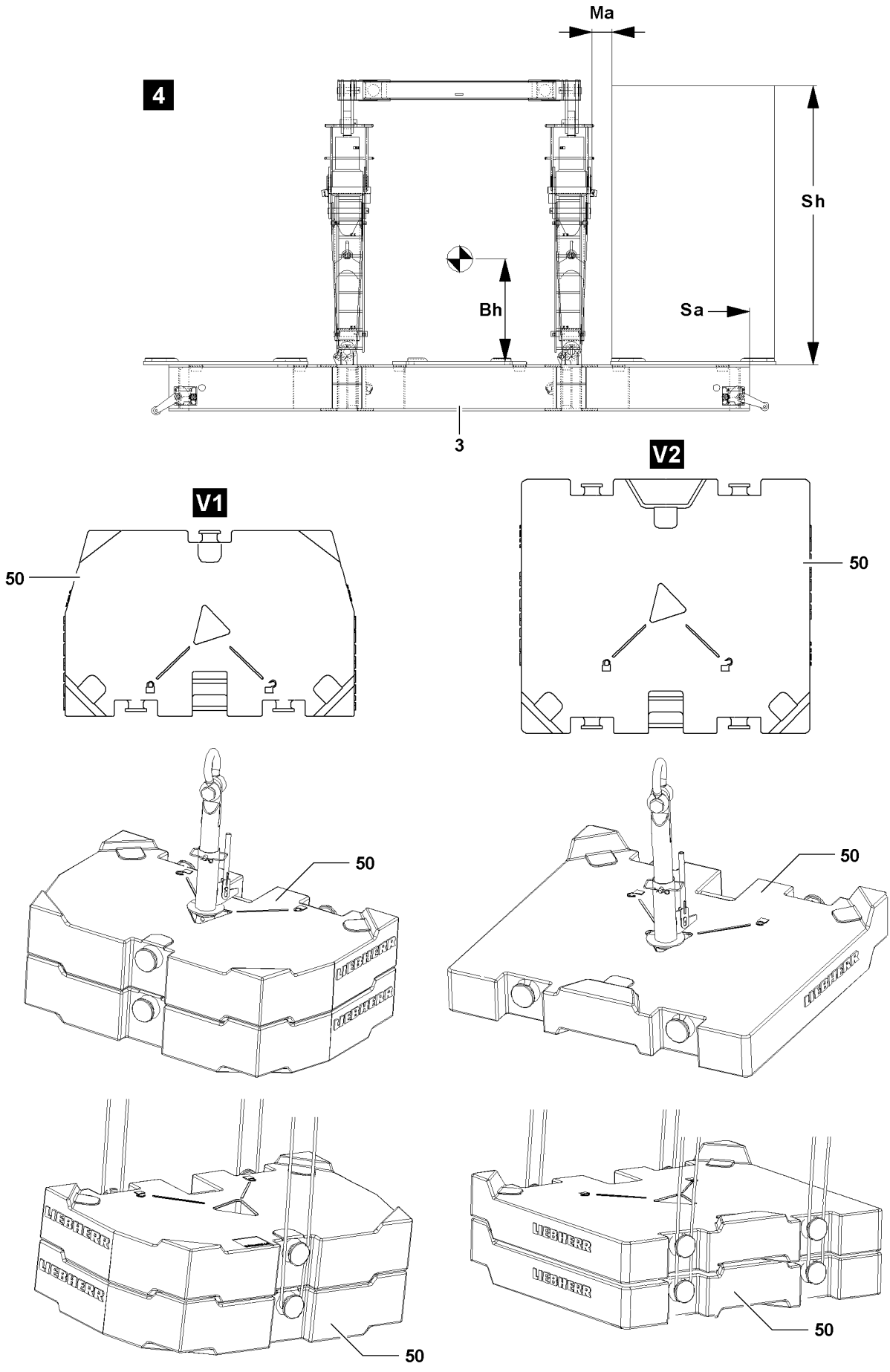

Fig.109453

5.2 Ballasting the ballast pallet off

WARNING
Damaged ballast plates!
Damage on the ballast plates can cause the fastening equipment to release.
The ballast plates and components can fall down.
Personnel can be severely injured or killed.
▶ Do not use damaged ballast plates and replace them immediately.

WARNING
Toppling ballast stack!
Lopsided stacked ballast plates create instability in the ballast stack.
The ballast plates can tip from the ballast pallet and cause the crane to topple over.
Personnel can be severely injured or killed.
▶ Make sure that the ballast plates are placed correctly in the centerings.

Make sure that the following prerequisites are met:
– The ballast pallet is placed on the ground.
– An auxiliary crane is available.

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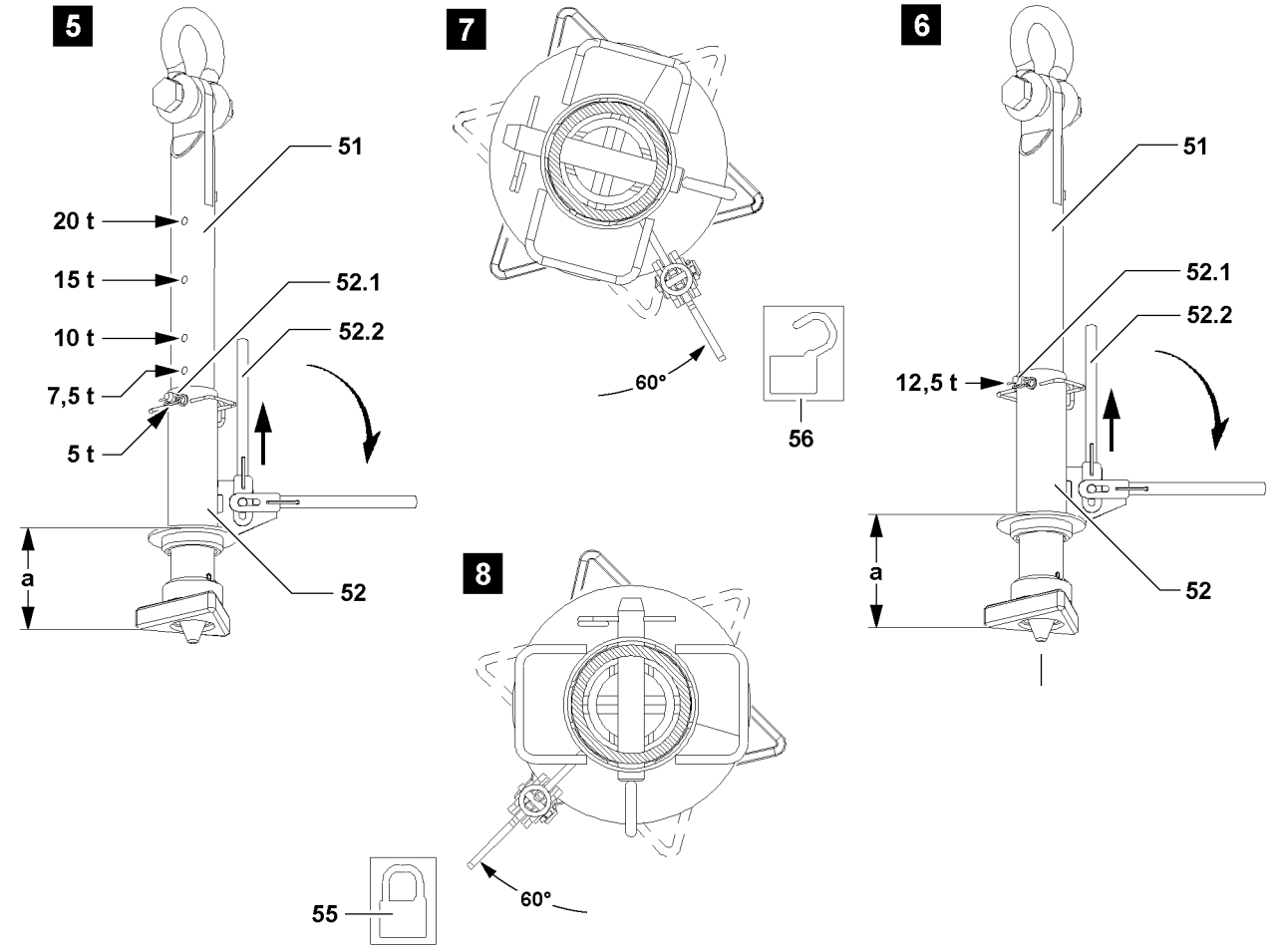

Fig.109420

5.2.1 Removing the ballast plates

Note
▶ The ballast plates are marked with their own weights.

WARNING
Danger of toppling the ballast stack!
Personnel can be severely injured or killed by toppling ballast stacks.
▶ Before ballasting the ballast pallet off, it must be properly placed on the ground.
▶ Remove ballast plates evenly from the ballast pallet.
▶ First take the left and right ballast stack off evenly, then remove the ballast stack in the center of the ballast pallet.

Removing the ballast plates, fastening system: „Twistlock“

WARNING
Overload of receptacle stud and ballast plates!
If more than the permissible number of ballast plates are lifted with the receptacle stud **51**, the receptacle stud **51** and the ballast plates can be overloaded and damaged.
The ballast plates can fall down.
Personnel can be severely injured or killed.
▶ Observe the section „Permissible ballast assemblies“ in this chapter.

WARNING
Damage of receptacle stud and ballast plates!
If two ballast plates are lifted which do not lay correctly in their centerings, the receptacle stud **51** and the ballast plates can be damaged.
Damage can cause the ballast plates to fall down.
Personnel can be severely injured or killed.
▶ Make sure that the ballast plates to be lifted are placed correctly in the centerings.

WARNING
The Twistlock system opens by itself!
If the receptacle stud **51** is not correctly locked, the Twistlock system can open by itself.
The ballast plates can fall down.
Personnel can be severely injured or killed.
▶ Make sure, when initiating a lift, that the lever **52.2** points directly on the „Locked“ icon **55** of the ballast plates **50**.

Note
▶ During a lift, the locked Twistlock system cannot release by itself due to its gravitational retention.
▶ During a lift, the locked Twistlock system cannot be released by hand due to its gravitational retention.

Note
▶ For ballast plate variation **V1**, use the adjustable receptacle stud **51** in illustration **5**.
▶ For ballast plate variation **V2**, use the receptacle stud **51** in illustration **6**.

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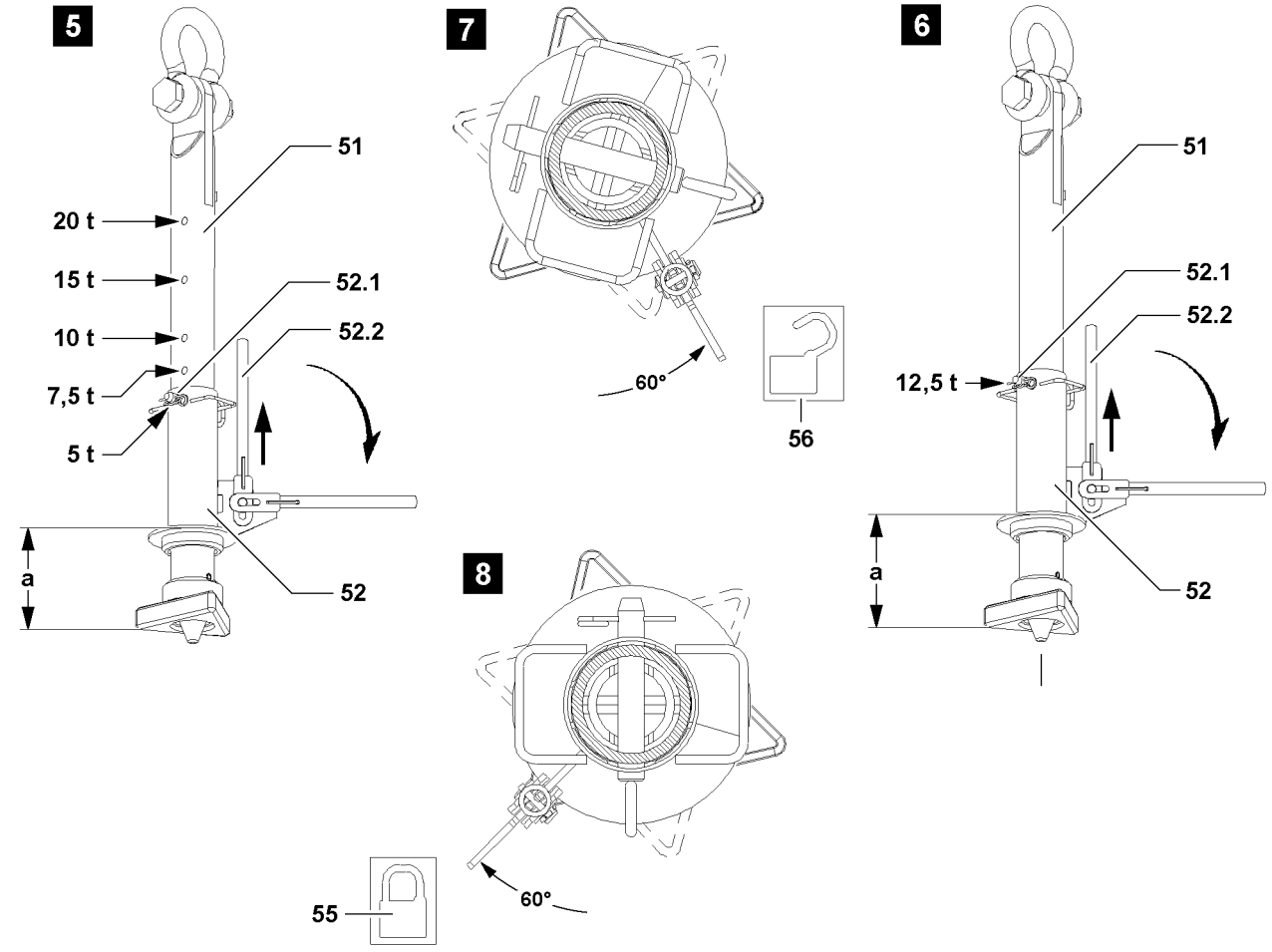

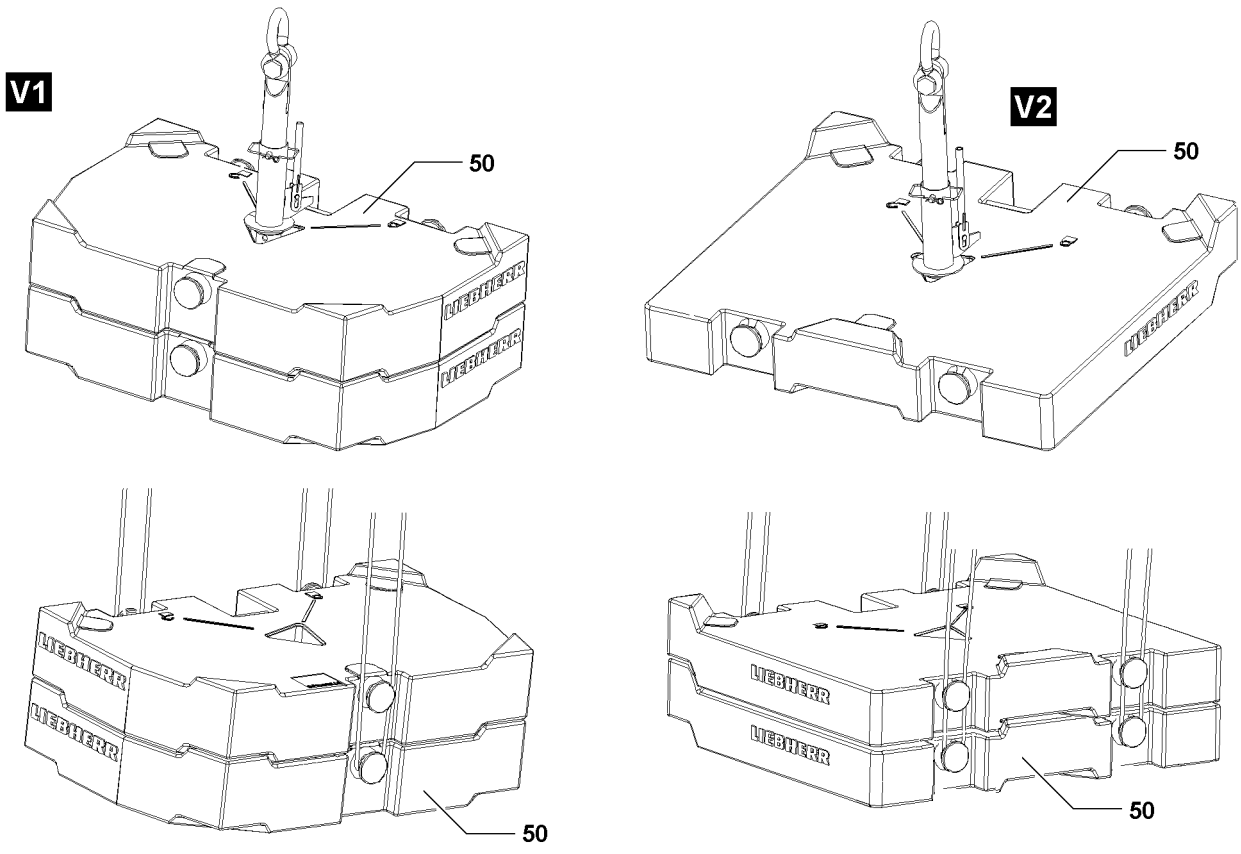

Fig.109420

Before the receptacle stud **51** is guided in the ballast plate variation **V1**, it must be ensured that the insertion length **a** of the receptacle stud **51** is set correctly.

The insertion length **a** of the receptacle stud **51** for ballast plate variation **V1** can be adjusted by hand.

If the insertion length **a** of the receptacle stud **51** is to be adjusted:
- ▶ Release and unpin the pin **52.1**.
- ▶ Adjust the insertion length **a** by moving the guide sleeve **52** to the desired insertion length **a**, observe the stages.
- ▶ Insert and secure pin **52.1**.

Result:

– The receptacle stud **51** is adjusted.

- ▶ Attach the receptacle stud **51** on the auxiliary crane and guide it into the ballast plate(s).
- ▶ Pull the lever **52.2** up and fold it down.
- ▶ Turn the receptacle stud **51** with the lever **52.2** by 60° until it points to the „Locked“ icon **55** of the ballast plate, see illustration **8**.
- ▶ Lift the ballast plate(s) or ballast assembly with the receptacle stud **51** from the ballast stack or from the ballast pallet and place on a suitable storage location.

When the ballast plates are placed down:
- ▶ Turn the receptacle stud **51** with the lever **52.2** by 60° to the stop in direction of the symbol „Unlocked“ **56**, see illustration **7**.

Result:

– The receptacle stud **51** is unlocked.

- ▶ Carefully pull the receptacle stud **51** from the ballast plate.

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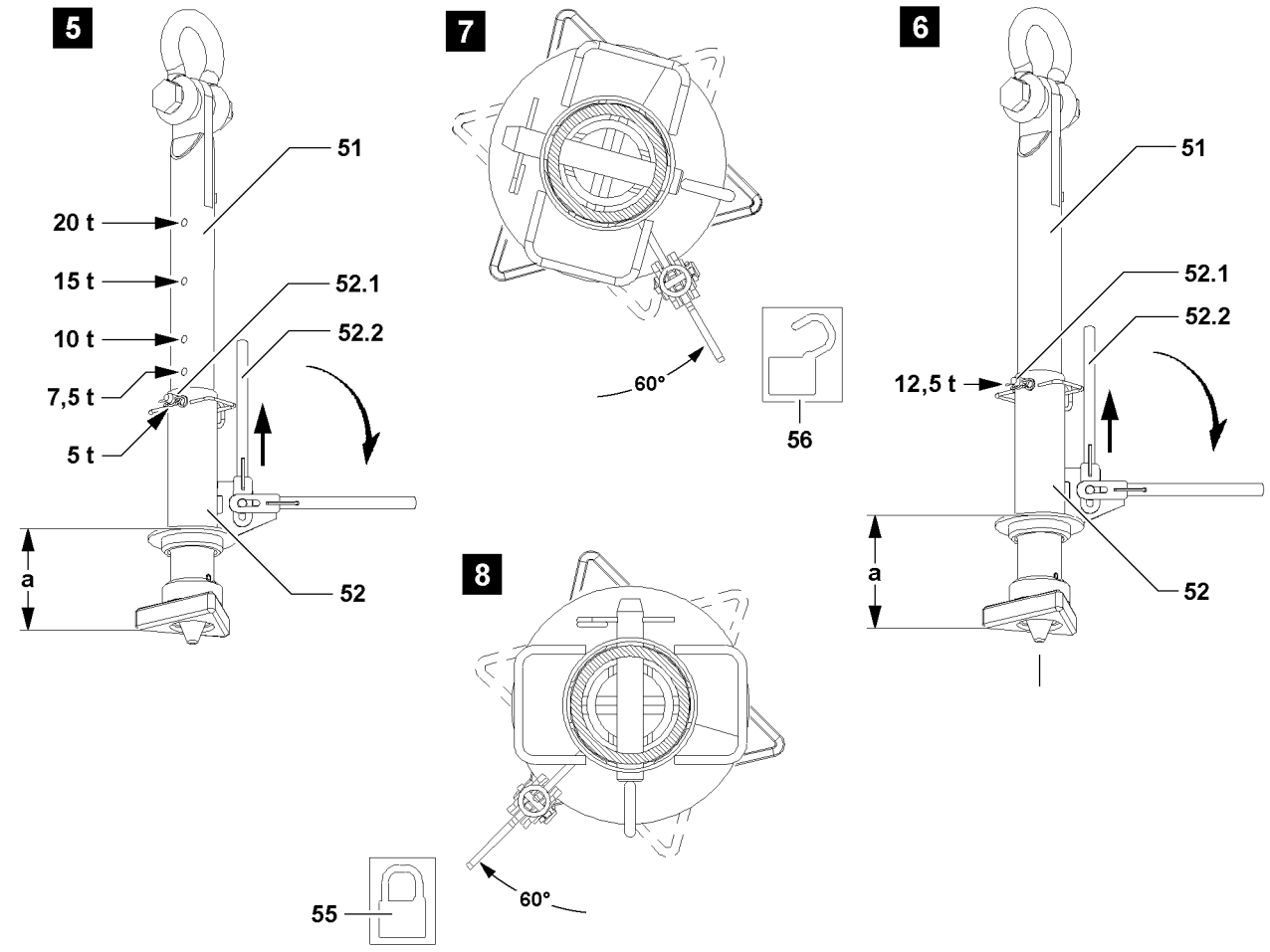

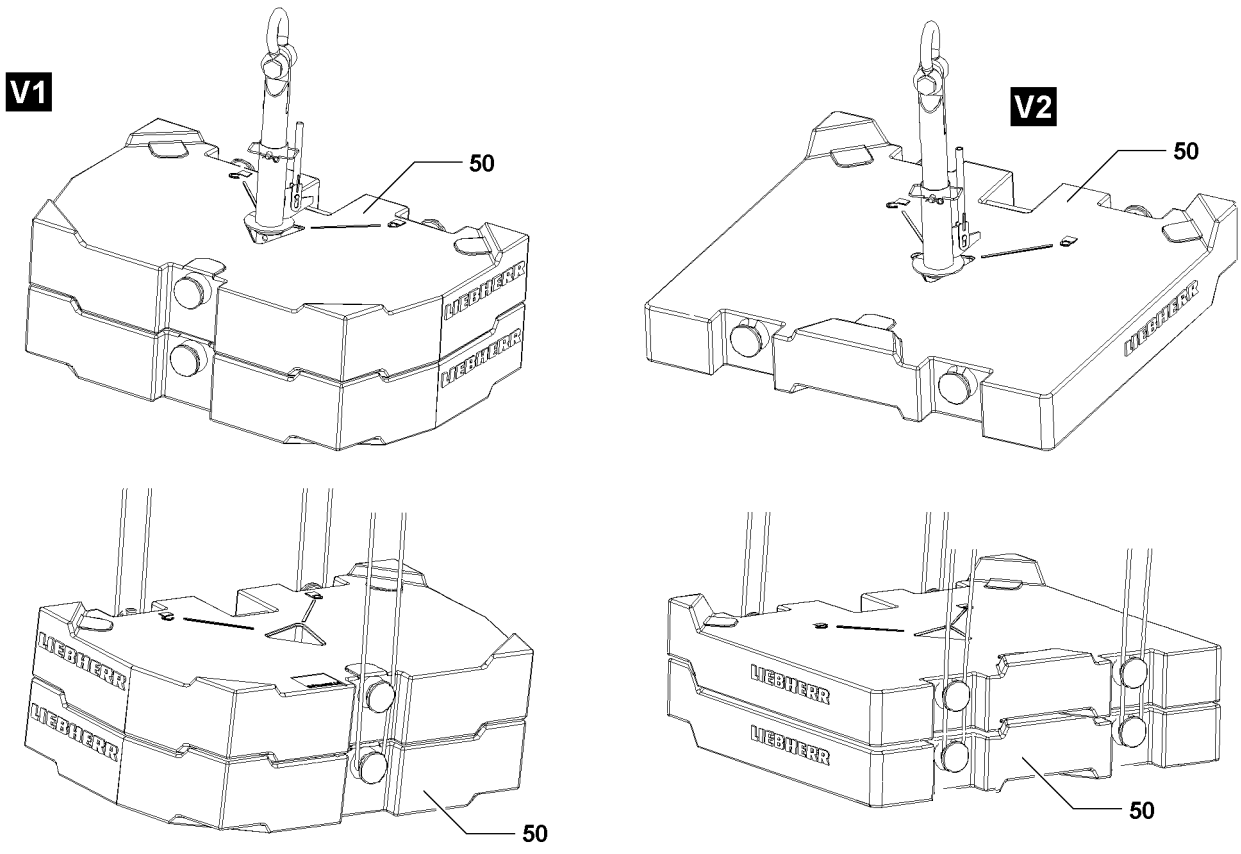

Fig.109420

Removing the ballast plates, fastening points: Bitt

WARNING
Overloaded ballast plates!
If more than the permissible loads are lifted, the bitts **50.1** are overloaded.
The ballast plates can be damaged and fall down.
Personnel can be severely injured or killed.
▶ Observe the section „Permissible ballast assemblies“ in this chapter.

WARNING
Incorrect handling of the fastening equipment!
If the fastening equipment is not attached correctly and / or if it is not secured sufficiently to prevent it from loosening up, the ballast plates can fall down.
Personnel can be severely injured or killed.
▶ Make sure that the fastening equipment is correctly attached on the bitts **50.1** and that it is secured sufficiently to prevent it from loosening up.

▶ Attach the ballast plates or ballast assembly on the auxiliary crane.
▶ Lift the ballast plate(s) or ballast assembly from the ballast stack or from the ballast pallet and place on a suitable storage location.

Removing the centering plates* from the ballast pallet

When all ballast plates have been removed from the ballast pallet:
▶ Attach the centering plates on auxiliary crane and lift the ballast pallet off the ground.

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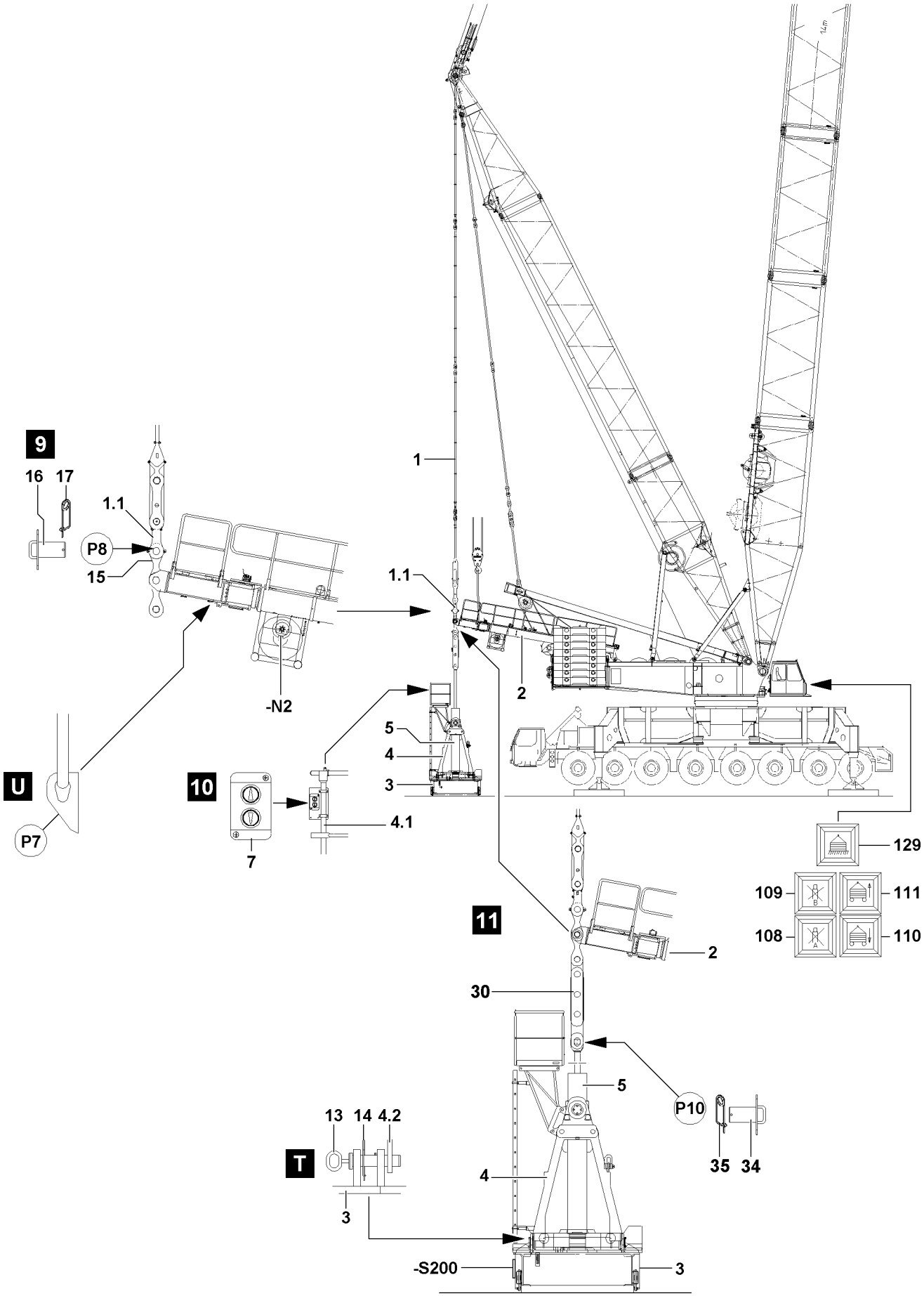

Fig.111378

LWE/LG 1750-006/15409-07-02/en

5.3 Disassembling the ballast pallet on the guide frame

Make sure that the following prerequisites are met:
- The ballast pallet is ballasted off.
- The ballast pallet is placed on the ground.
- An auxiliary crane is available.

DANGER
Danger of fatal injury due to toppling erection racks!
If the erection racks are **not** secured with the retaining pins **13** before disassembly of the ballast pallet on the guide frame, then the erection racks tip over.
Personnel can be severely injured or killed.
- ▶ Pin the erection racks before disassembly on the guide frame with retaining pins **13** and secure with spring retainer **14**.
- ▶ Before unpinning the piston rods on the guide frame, perform a visual inspection.

- ▶ Release the spring retainer **35** on the pin **34**, see illustration **11**.
- ▶ Unpin pin **34** at point **P10**.

When the pins **34** at point **P10** are unpinned on both sides:
- ▶ Retract the piston rods for the pull cylinders **5** completely.

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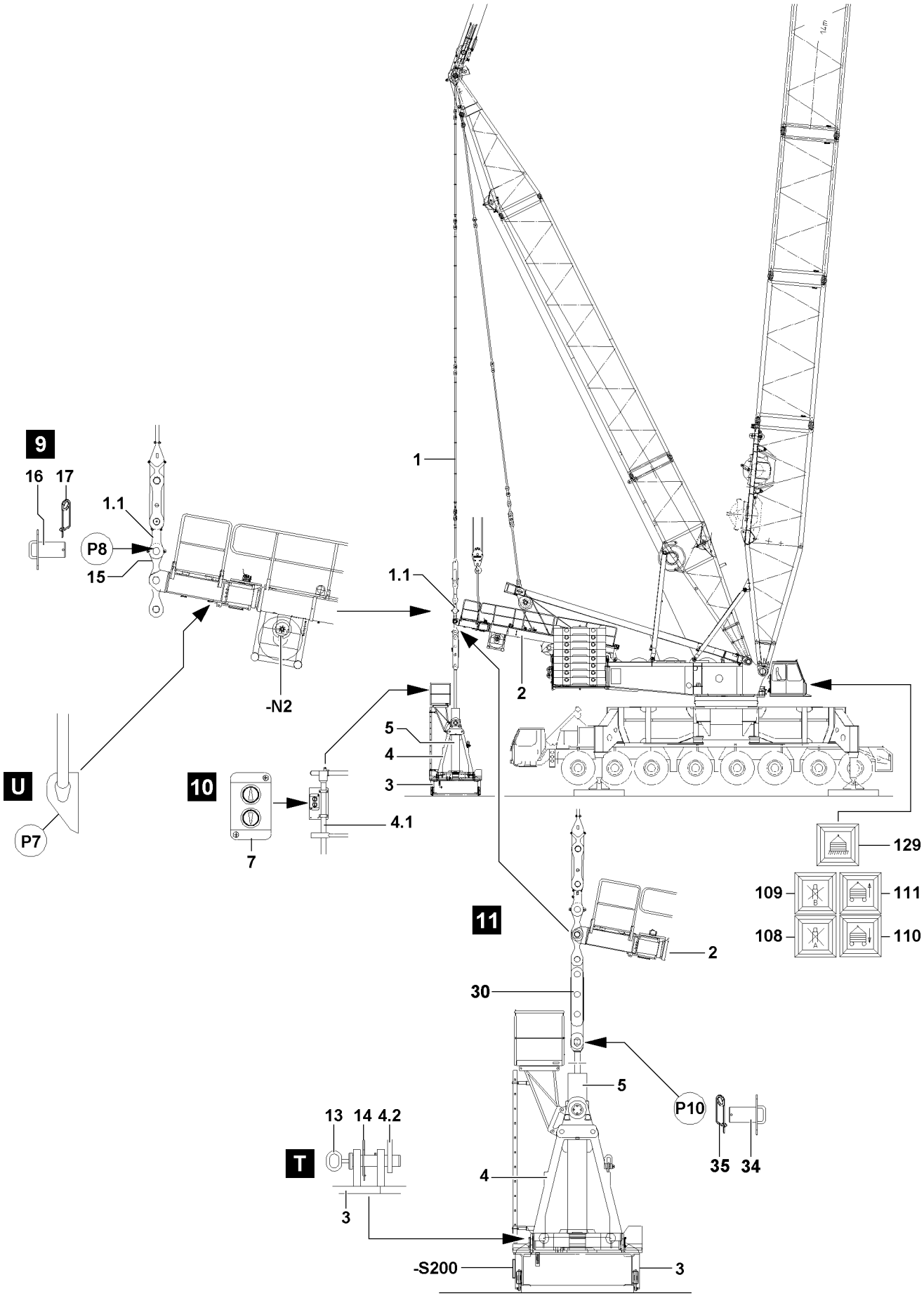

Fig.111378

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5.4 Disconnecting electrical connection from the ballast pallet to the guide frame

Note

▶ Release the electrical connections only when the ballast pallet is completely unpinned on the guide frame, which means both pins **34** must be unpinned!

Make sure that the following prerequisite is met:

– The ballast pallet is completely unpinned on the guide frame.

▶ Disconnect the electrical connections and store the cable properly.

5.5 Disconnecting the hydraulic connections from the ballast pallet to the guide frame

When connecting and releasing hydraulic lines with quick couplings, make sure that the coupling procedure is carried out correctly.

DANGER

Danger of accident due to loss of pressure or leakage!
Incorrectly coupled or self-loosening quick couplings (particularly return lines) can result in serious accidents due to component failure.

▶ Check that the quick couplings have been properly connected before using the crane.

▶ Release the pressure in the hydraulic system before connecting or disconnecting. Turn the engine off and wait several minutes.
▶ Unscrew coupling components (sleeve and connector) by using hand-tightened nut.
▶ Disconnect the coupling sections.
▶ Store hydraulic hoses on the guide frame correctly.
▶ Install protective caps on the coupling components to protect them from contamination and damage.

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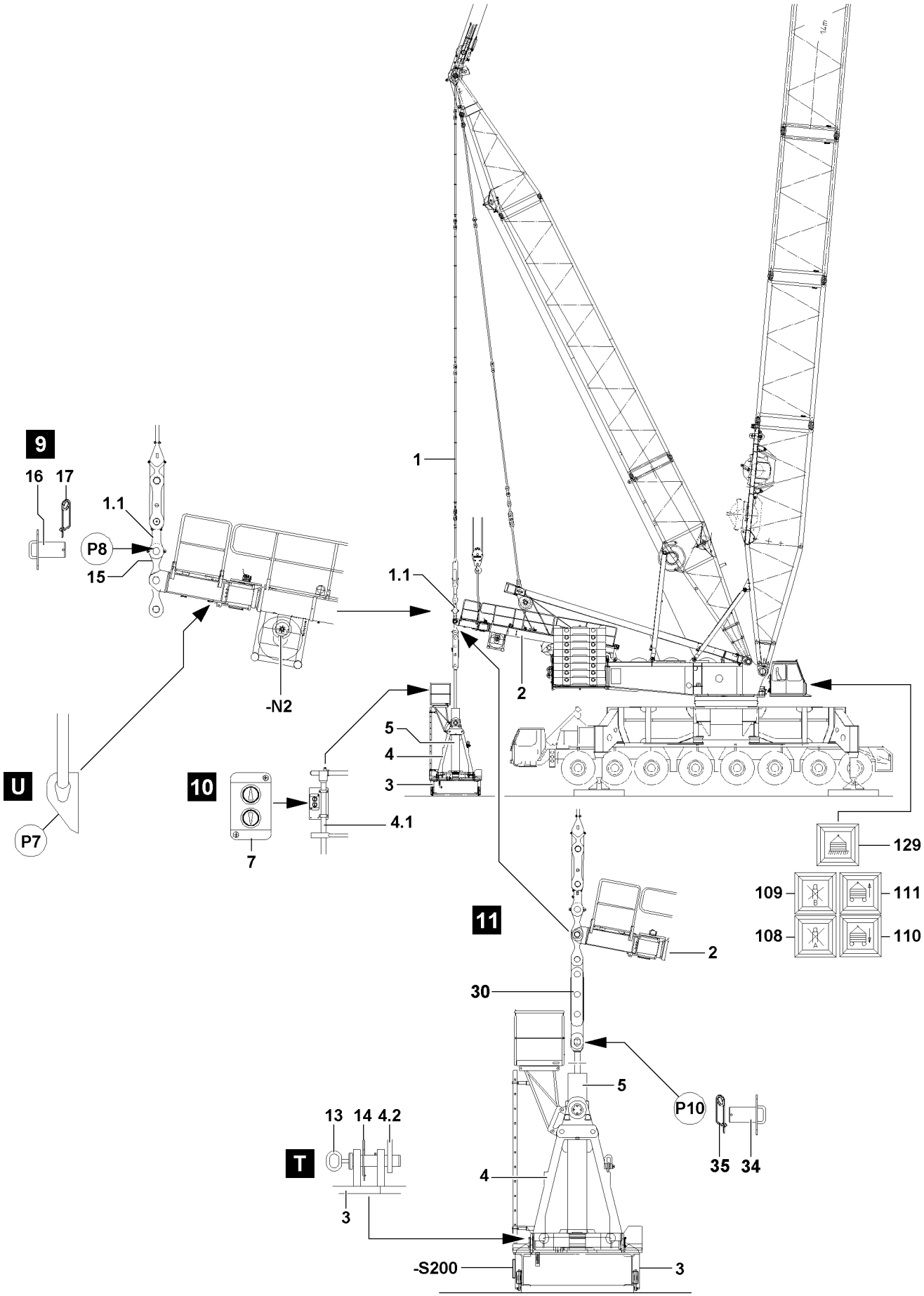

Fig.111378

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5.6 Disassembling the derrick ballast guying on the guide frame

For disassembly of the derrick ballast guying on the guide frame, it is required to raise the guide frame with the auxiliary crane until the derrick ballast guying is relieved and the connection pins can be unpinned.

- ▶ Attach the guide frame **2** onto the lashing lugs **2.3** on the auxiliary crane, see illustration **U**.
- ▶ Lift the guide frame **2** with the auxiliary crane.

When the derrick ballast guying **1** is relieved:

- ▶ Remove the spring retainer **17** on both sides and unpin the pin **16** at point **P8**.

When the pins **16** are completely unpinned:

- ▶ Carefully lay down guide frame **2** with auxiliary crane onto the receptacle on the turntable.

When the guide frame **2** is laying on the turntable:

- ▶ Remove the auxiliary crane.

5.7 Releasing the electrical connection from the guide frame to the turntable

Note

- ▶ Disconnect the electrical connections first after the derrick ballast guying is disassembled and the guide frame is completely placed on the turntable.

- ▶ Disconnect the electrical connections and store on the guide frame properly.

5.8 Loosening the hydraulic connections from the guide frame to the turntable

When connecting and releasing hydraulic lines with quick couplings, make sure that the coupling procedure is carried out correctly.

DANGER

Danger of accident due to loss of pressure or leakage!
Incorrectly coupled or self-loosening quick couplings (particularly return lines) can result in serious accidents due to component failure.

- ▶ Check that the quick couplings have been properly connected before using the crane.

- ▶ Release the pressure in the hydraulic system before connecting or disconnecting. Turn the engine off and wait several minutes.
- ▶ Unscrew coupling components (sleeve and connector) by using hand-tightened nut.
- ▶ Disconnect the coupling sections.
- ▶ Store hydraulic hoses on the guide frame correctly.
- ▶ Install protective caps on the coupling components to protect them from contamination and damage.

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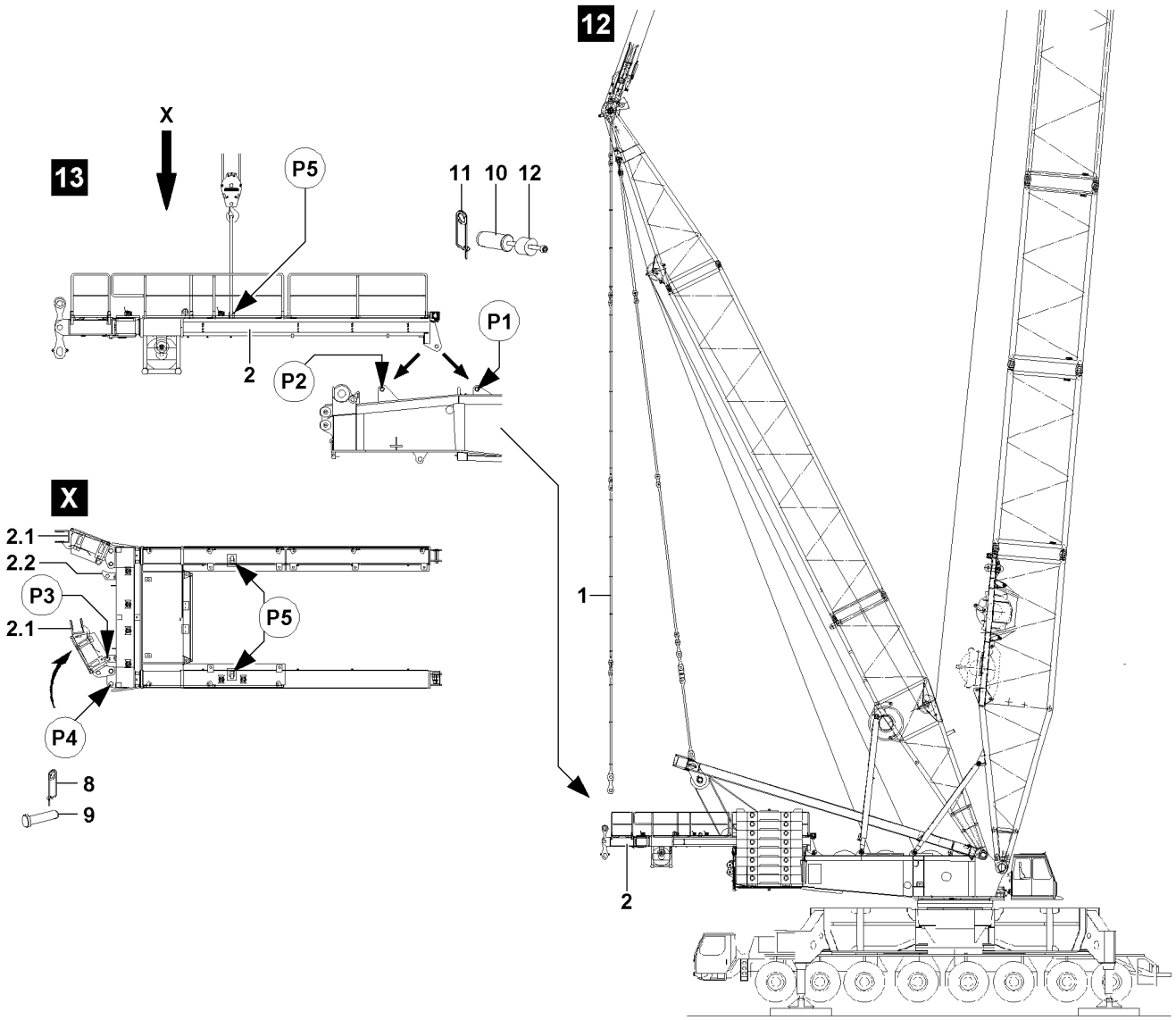

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Fig.111379

5.9 Disassembling the guide frame on the turntable

▶ Attach guide frame **2** onto the lashing lugs point **P5** on auxiliary crane.
▶ Tension the fastening equipment carefully.

When the fastening equipment is tensioned:
▶ Remove spring retainer **11** on both sides and unpin pins **10**.

NOTICE
Damage to crane!
By swinging out the guide frame **2**, severe property damage can occur in the area of the turntable or the guide frame.
▶ Swing out guide frame carefully and with the least possible speed.

▶ Lift guide frame **2** and swing out on the turntable.
▶ Lay down guide frame **2** against toppling.
▶ Remove the auxiliary crane.

5.10 Folding the swing arms in on the guide frame

In order to reestablish the transport width after disassembly of the guide frame, bring the swing arms **2.1** - after crane operation - back into transport position and secure.

Bring the swing arms **2.1** into transport position and secure.

▶ Release and unpin locking pins **8** on both sides at point **P4**.
▶ Fold the swing arms **2.1** in into operating position (direction of the arrow).

When the swing arms **2.1** are in transport position:
▶ Insert the locking pins **8** on the left and right at point **P3** and secure with spring retainers **9**.

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5.36.40 Derrick ballast - suspended ballast - special design VarioTray

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Fig.195219

1 Suspended ballast

The divisible ballast pallet is referred to as the „VarioTray“.

The divisible ballast pallet „VarioTray“ provides a system for erection with a high derrick ballast and crane operation with a small derrick ballast.

If the main boom is erected, the ballast that is not needed for the crane operation can simply be decoupled. Crane operation is then carried out only with the derrick ballast that is actually needed for the respective lift.

The derrick-boom angle, derrick ballast radius, derrick ballast and ballast utilization are displayed on the LICCON monitor.

The required derrick ballast radius is set by extending / retracting the hydraulically telescopeable suspended ballast guide. Stepless adjustment range 5000 mm.

For crane operation with derrick ballast, see chapter 4.02 and chapter 4.05.

After assembly on the ground, the derrick ballast can be raised for crane operation with the hydraulic cylinders in the D-guying.

The D-guying contains two pull cylinders (pull cylinder A and pull cylinder B). These pull cylinders are used to pull, lift or lower the derrick ballast.

Depending on the pivot point of the suspended ballast guide on the turntable, derrick ballast radii between 13.0 m and 18.0 m (pivot point **P1**), 15.0 m and 20.0 m (pivot point **P2**) and 17.0 m and 22.0 m (pivot point **P3**) are possible.

Note
Designation of the ballast types!
- ▶ The suspended ballast is described in general as the derrick ballast.
- ▶ The ballast installed on the turntable is generally referred to as the counterweight.

Note
- ▶ The standing levels of the derrick ballast refer to the standing level of the crawler / crane.
- ▶ The standing levels of the derrick ballast depend on the derrick ballast radii.

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1.1 Component overview derrick ballast

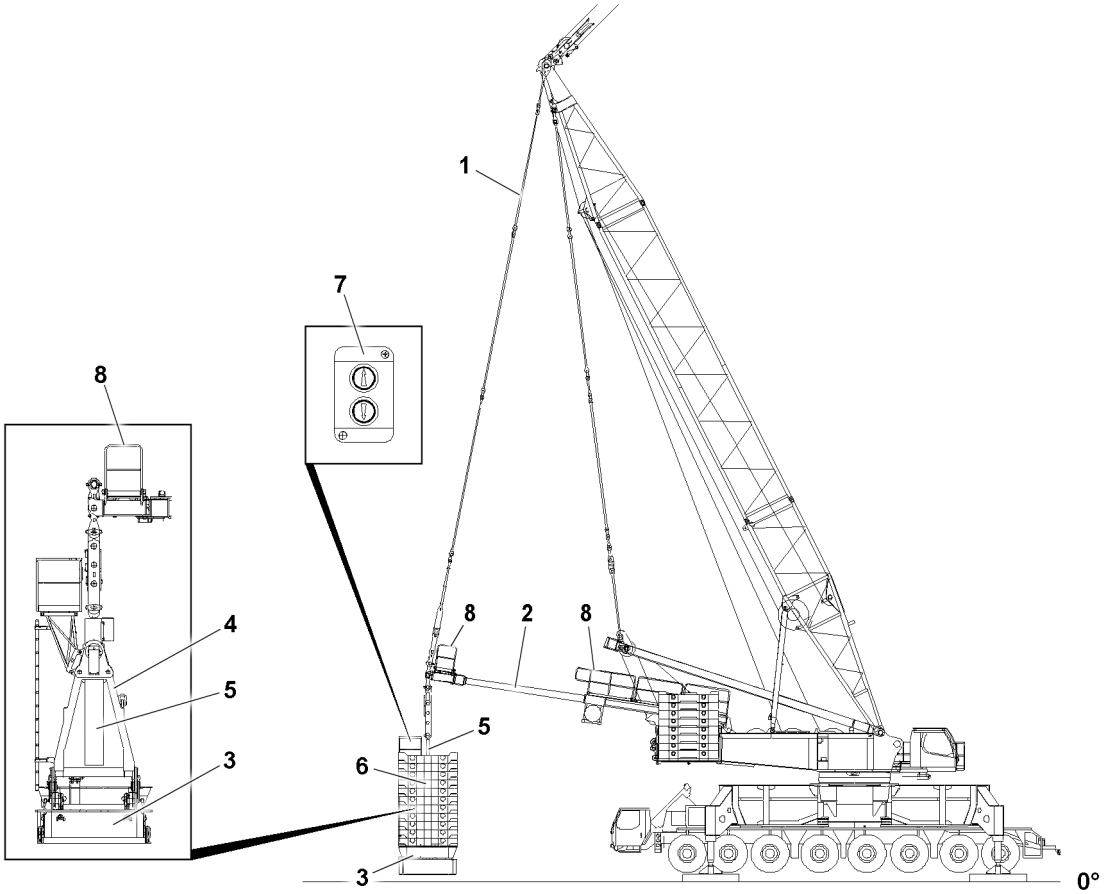

Fig.147633: Component overview derrick ballast

1 D-guying
2 Suspended ballast guide
3 Divisible ballast pallet „VarioTray“
4 Erection rack
5 Pull cylinder
6 Ballast plates
7 Control panel
8 Fall protection equipment / railing

1.2 Component overview for divisible ballast pallet „VarioTray“

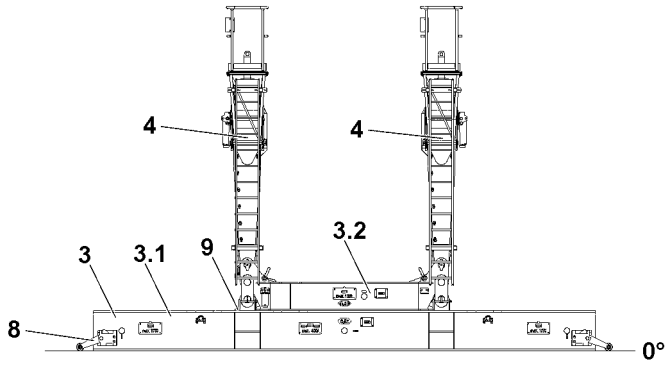

Fig.128923: Component overview for divisible ballast pallet „VarioTray“

3 Divisible ballast pallet „VarioTray“
3.1 Large ballast pallet
3.2 Small ballast pallet
4 Erection rack
8 Ground contact roller
9 Ground contact roller

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2 Ballast plate

2.1 Weight

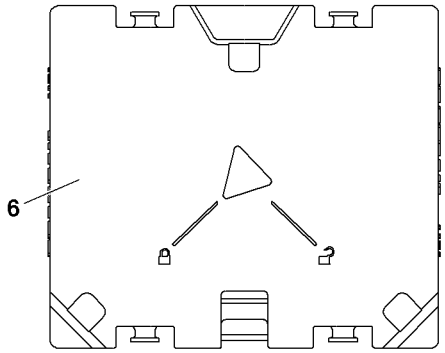

*Fig.128914: 12.5 t ballast plate **6***

Note
▶ The ballast plates are marked with their own weights.

The ballast plates are taken down as a ballast stack on the divisible ballast pallet „VarioTray“.

2.2 Permissible ballast assemblies

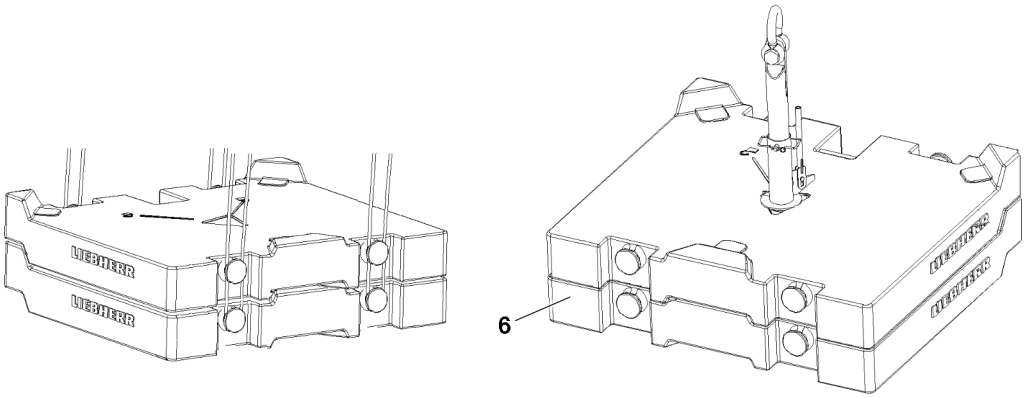

Fig.147655: Ballast assemblies

WARNING
Overload fastening points ballast plates!
If more than the permissible number of ballast plates **6** are lifted together, then the fastening points can be overloaded.
The ballast plates and components can fall down.
Death, severe bodily injuries, property damage.
▶ Fasten only the maximum permissible number of ballast plates per lift.

Individual weight	Maximum number of same ballast plates per lift over	
Ballast plate	Twistlock	Bitt
12.5 t	2	2

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3 Derrick ballast radii and standing levels

WARNING
The crane can topple over.
If the derrick ballast is lifted past the maximum permissible 250 mm from the respective standing level of the derrick ballast, then the crane can be topple over to the rear if the load rips off.
Death, severe bodily injuries, property damage.

- ▶ There may be no personnel, objects or obstacles within the entire slewing range of the crane, derrick ballast and the load.
- ▶ In crane operation, lift the derrick ballast no more than maximum 250 mm from the respective standing level of the derrick ballast.
- ▶ The position of the standing level depends on the set up configuration of the crane, see the following charts.
- ▶ The ground in the entire working area of the crane - including the derrick ballast and the load - must be even and of sufficient load bearing capacity, in order to be able to securely absorb the encountered ground pressures and weight loads.

Note

- ▶ Lifting of the derrick ballast must be observed by a guide.

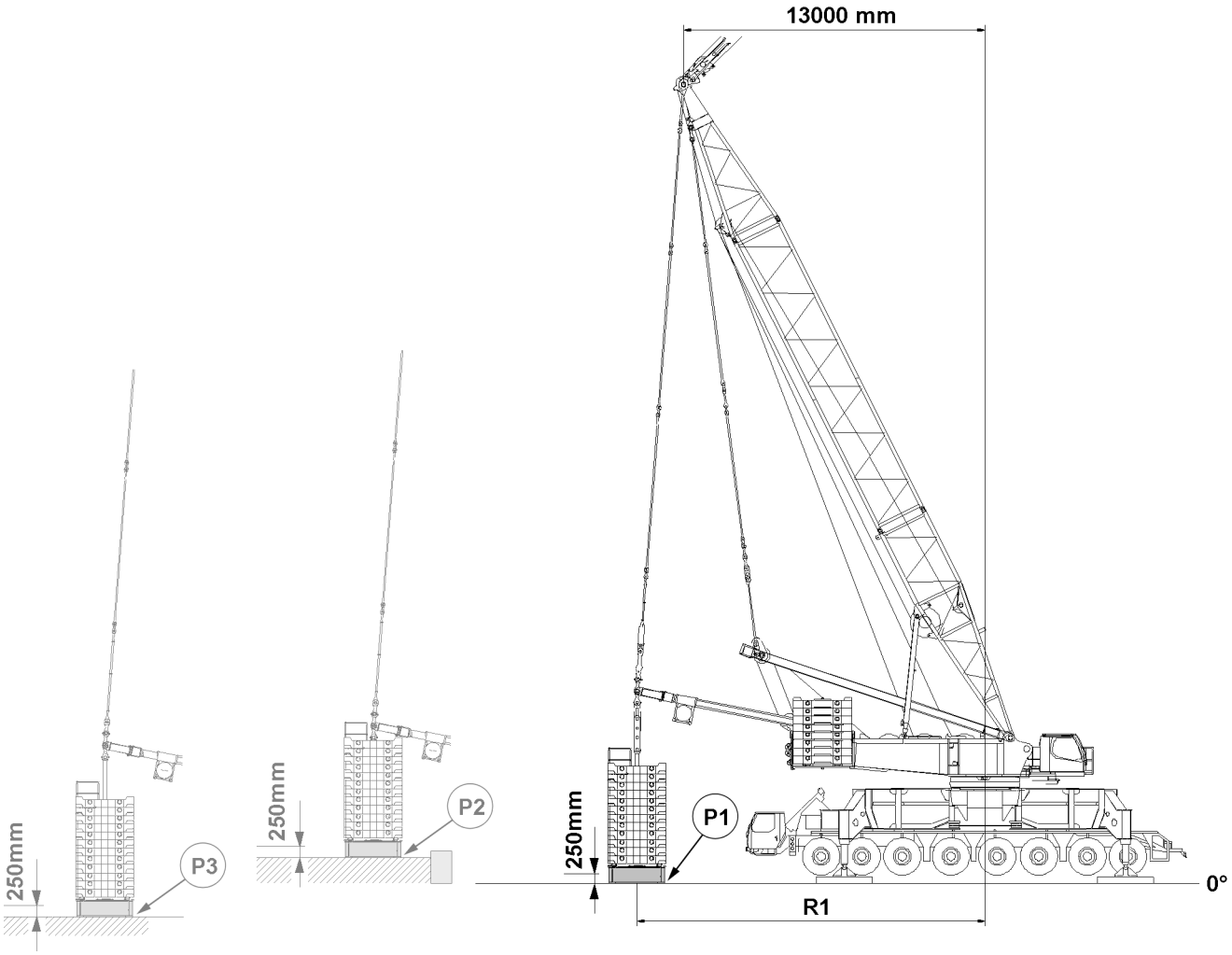

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Fig.147634: In crane operation, lift the suspended ballast no more than maximum 250 mm from the standing level of the derrick ballast.

P1 Derrick ballast standing level at the level of the crane standing level
P2 Derrick ballast standing level above the crane standing level (above ground level)

P3 Derrick ballast standing level below the crane standing level (below ground level)

4 Derrick ballast radii and standing levels at D 31.5 m

4.1 Crane operation with large ballast pallet

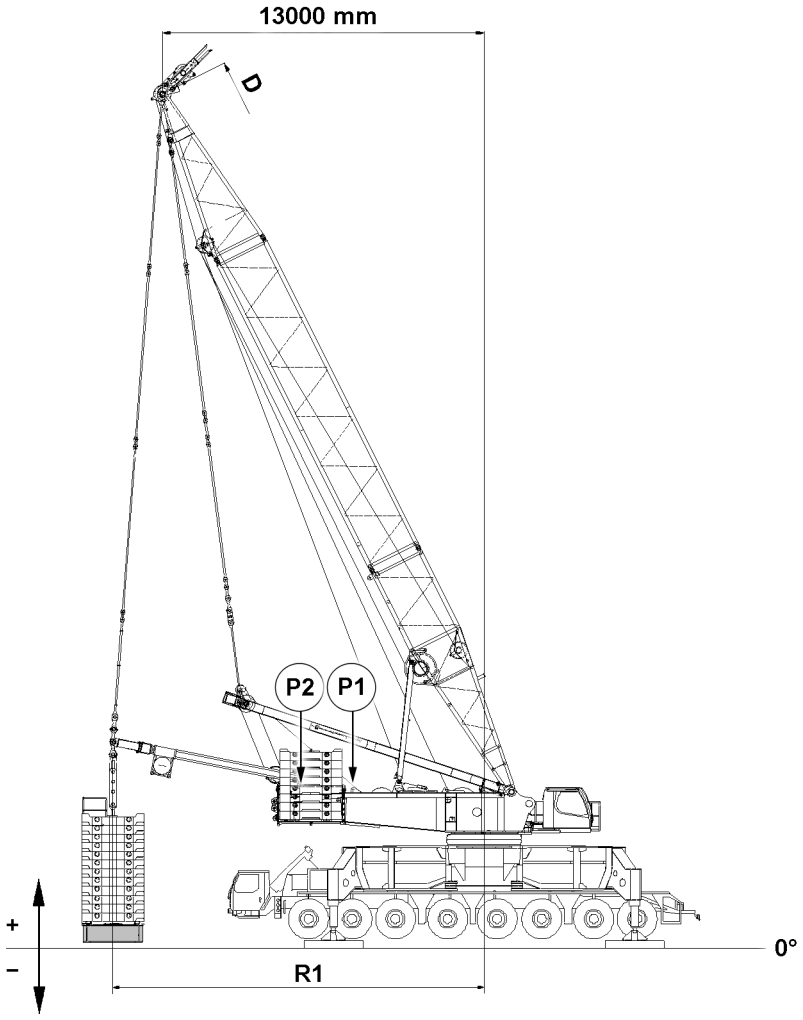

Fig.147635: Derrick ballast standing levels with suspended ballast guide

Derrick ballast radius R1 Pin point P1	Derrick ballast standing level	
	Above the crane standing level	Below the crane standing level
13 m	+731 mm	-1904 mm
18 m	+1215 mm	-1420 mm

31.5 m derrick, pin point P1 with large ballast pallet: Derrick ballast radius depending on the standing level

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Derrick ballast radius R1 Pin point P2	Derrick ballast standing level	
	Above the crane standing level	Below the crane standing level
15 m	+806 mm	-1829 mm
20 m	+1661 mm	-974 mm

31.5 m derrick, pin point P2 with large ballast pallet: Derrick ballast radius depending on the standing level

4.2 Crane operation with small ballast pallet

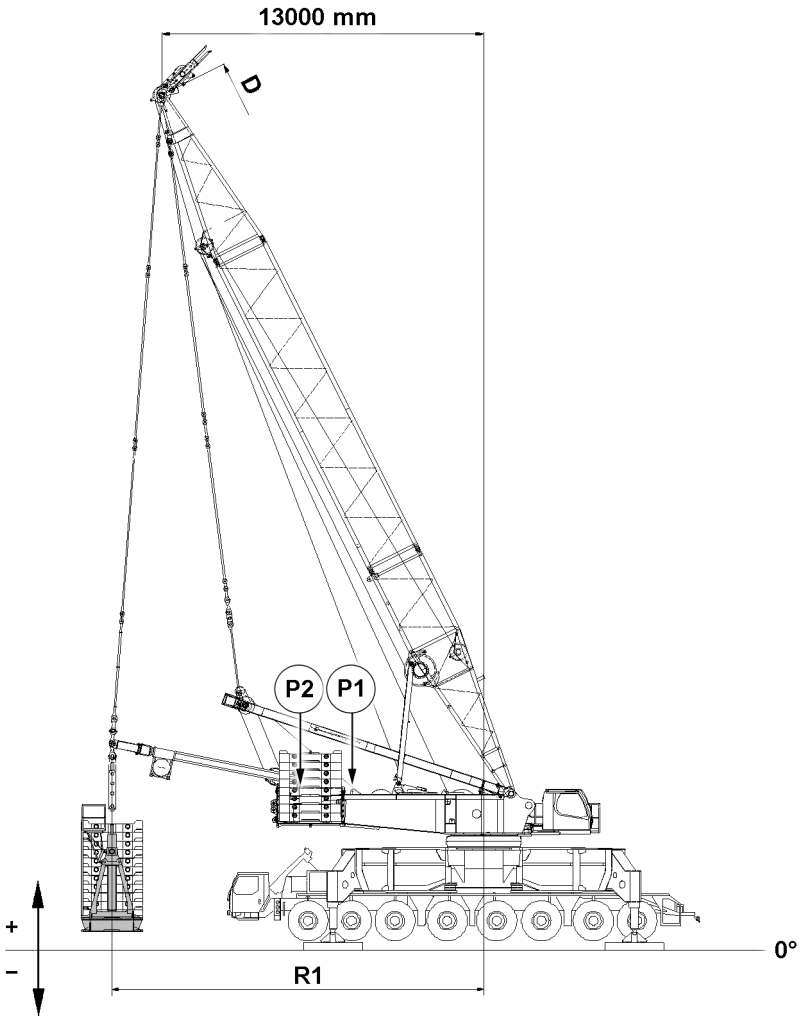

Fig.147636: Derrick ballast standing levels with suspended ballast guide

Derrick ballast radius R1 Pin point P1	Derrick ballast standing level	
	Above the crane standing level	Below the crane standing level
13 m	+1431 mm	-1204 mm
18 m	+1915 mm	-720 mm

31.5 m derrick, pin point P1 with small ballast pallet: Derrick ballast radius depending on the standing level

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Derrick ballast radius R1 Pin point P2	Derrick ballast standing level	
	Above the crane standing level	Below the crane standing level
15 m	+1506 mm	-1129 mm
20 m	+2361 mm	-274 mm

31.5 m derrick, pin point P2 with small ballast pallet: Derrick ballast radius depending on the standing level

5 Derrick ballast radii and standing levels at D2 42 m

5.1 Crane operation with large ballast pallet

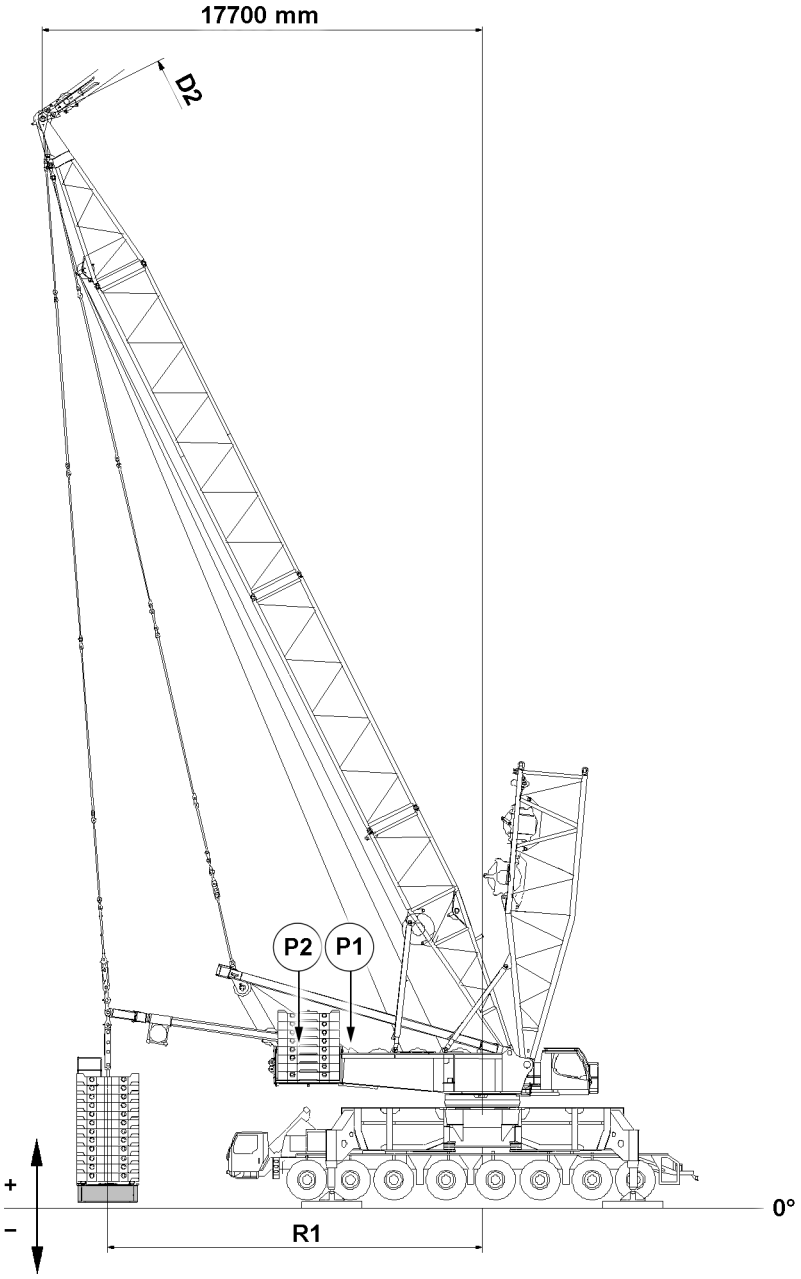

Fig.147657: Derrick ballast standing levels with suspended ballast guide

Derrick ballast radius R1 Pin point P2	Derrick ballast standing level	
	Above the crane standing level	Below the crane standing level
15 m	+815 mm	-1820 mm
20 m	+802 mm	-1833 mm

42 m derrick, pin point P2 with large ballast pallet: Derrick ballast radius depending on the standing level

5.2 Crane operation with small ballast pallet

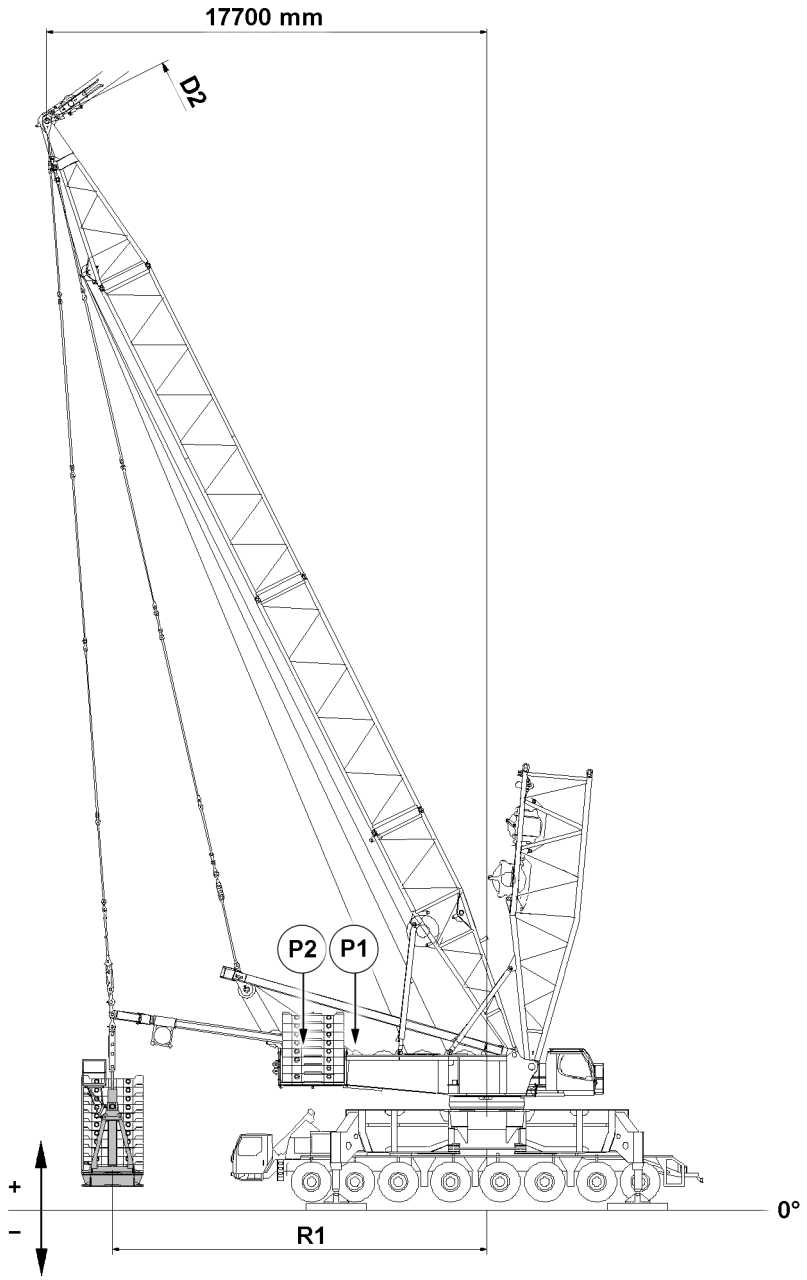

Fig.147658: Derrick ballast standing levels with suspended ballast guide

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Derrick ballast radius R1 Pin point P2	Derrick ballast standing level	
	Above the crane standing level	Below the crane standing level
15 m	+1515 mm	-1120 mm
20 m	+1502 mm	-1133 mm

42 m derrick, pin point P2 with small ballast pallet: Derrick ballast radius depending on the standing level

6 Derrick ballast radii and standing levels at D4 42 m with auxiliary guying

6.1 Crane operation with large ballast pallet

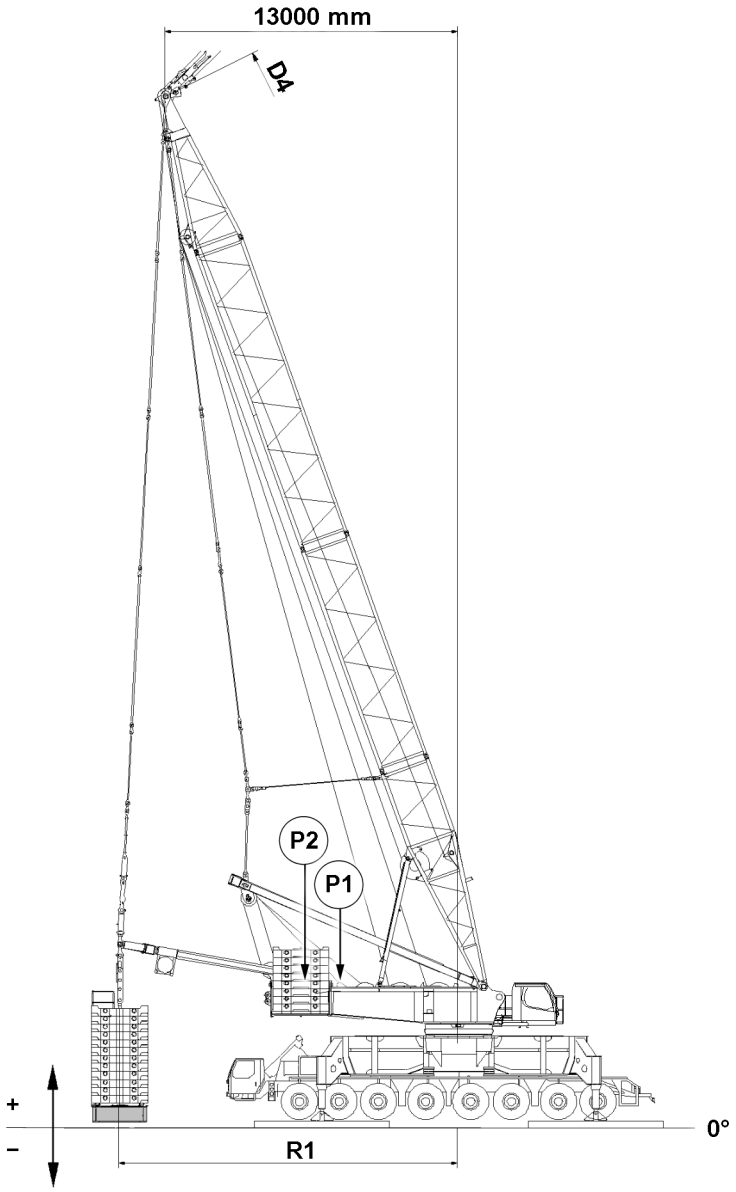

Fig.147639: Derrick ballast standing levels with suspended ballast guide

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Derrick ballast radius R1 Pin point P2	Derrick ballast standing level	
	Above the crane standing level	Below the crane standing level
15 m	+679 mm	-1956 mm
20 m	+1285 mm	-1350 mm

42 m derrick, pin point P2 with large ballast pallet: Derrick ballast radius depending on the standing level

6.2 Crane operation with small ballast pallet

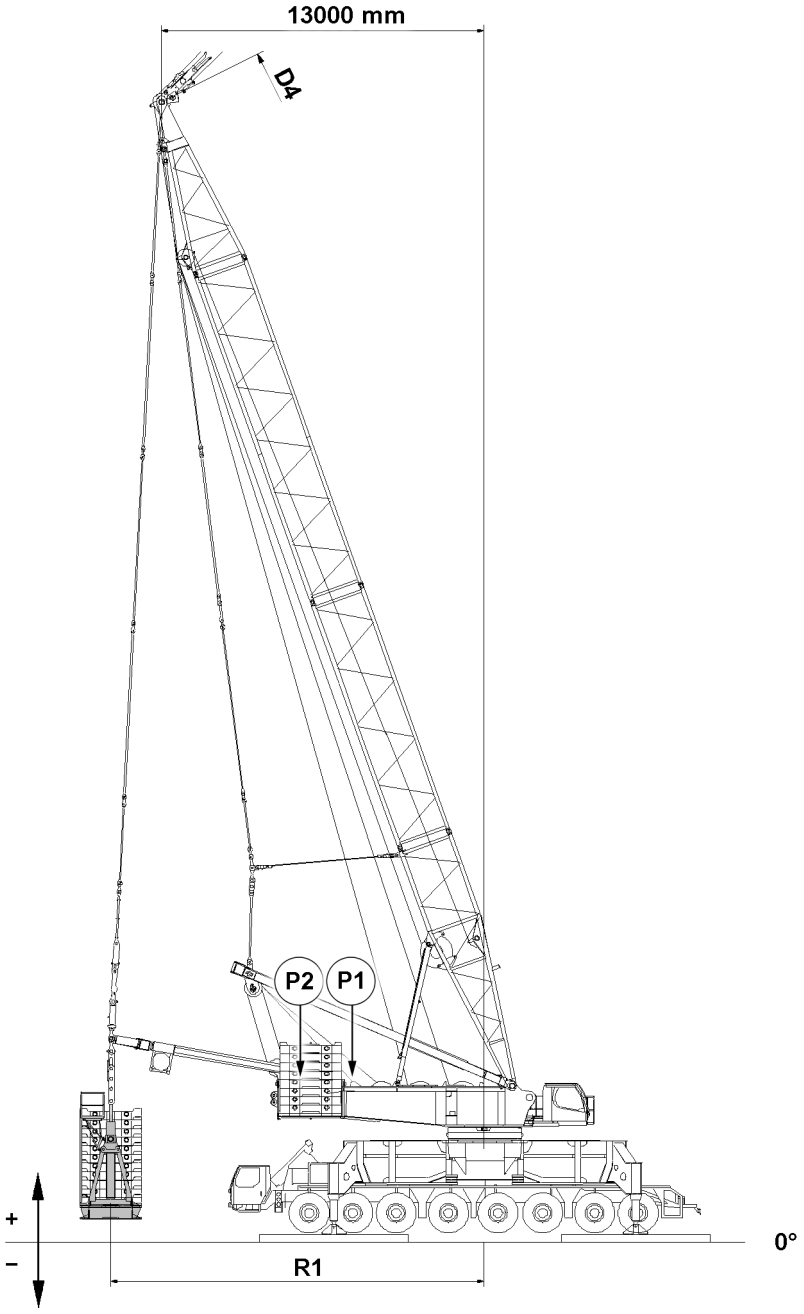

Fig.147640: Derrick ballast standing levels with suspended ballast guide

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Derrick ballast radius R1 Pin point P2	Derrick ballast standing level	
	Above the crane standing level	Below the crane standing level
15 m	+1383 mm	-1252 mm
20 m	+1985 mm	-650 mm

42 m derrick, pin point P2 with small ballast pallet: Derrick ballast radius depending on the standing level

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7 Derrick ballast radii and standing levels at D4 42 m with auxiliary guying and counterweight on the turntable extension

7.1 Crane operation with large ballast pallet

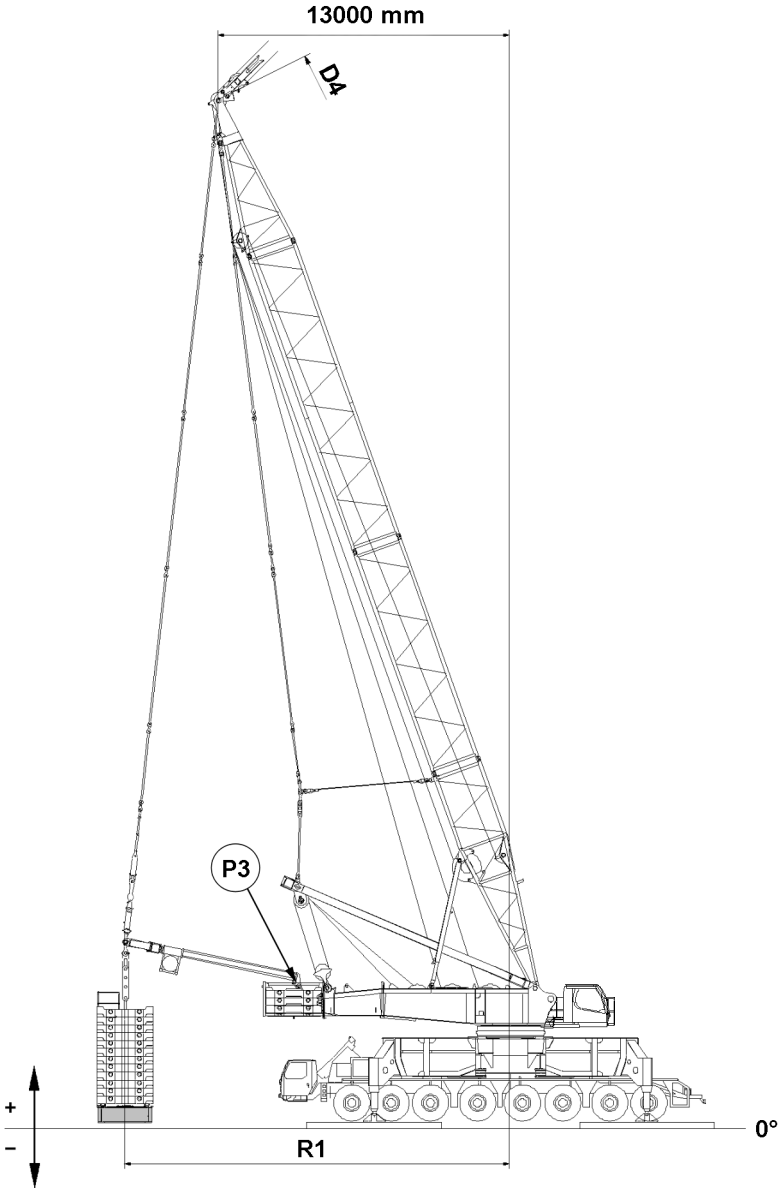

Fig.147641: Derrick ballast standing levels with suspended ballast guide

Derrick ballast radius R1 Pin point P3	Derrick ballast standing level	
	Above the crane standing level	Below the crane standing level
17 m	+852 mm	-1783 mm
22 m	+1733 mm	-902 mm

42 m derrick, pin point P3 with large ballast pallet: Derrick ballast radius depending on the standing level

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7.2 Crane operation with small ballast pallet

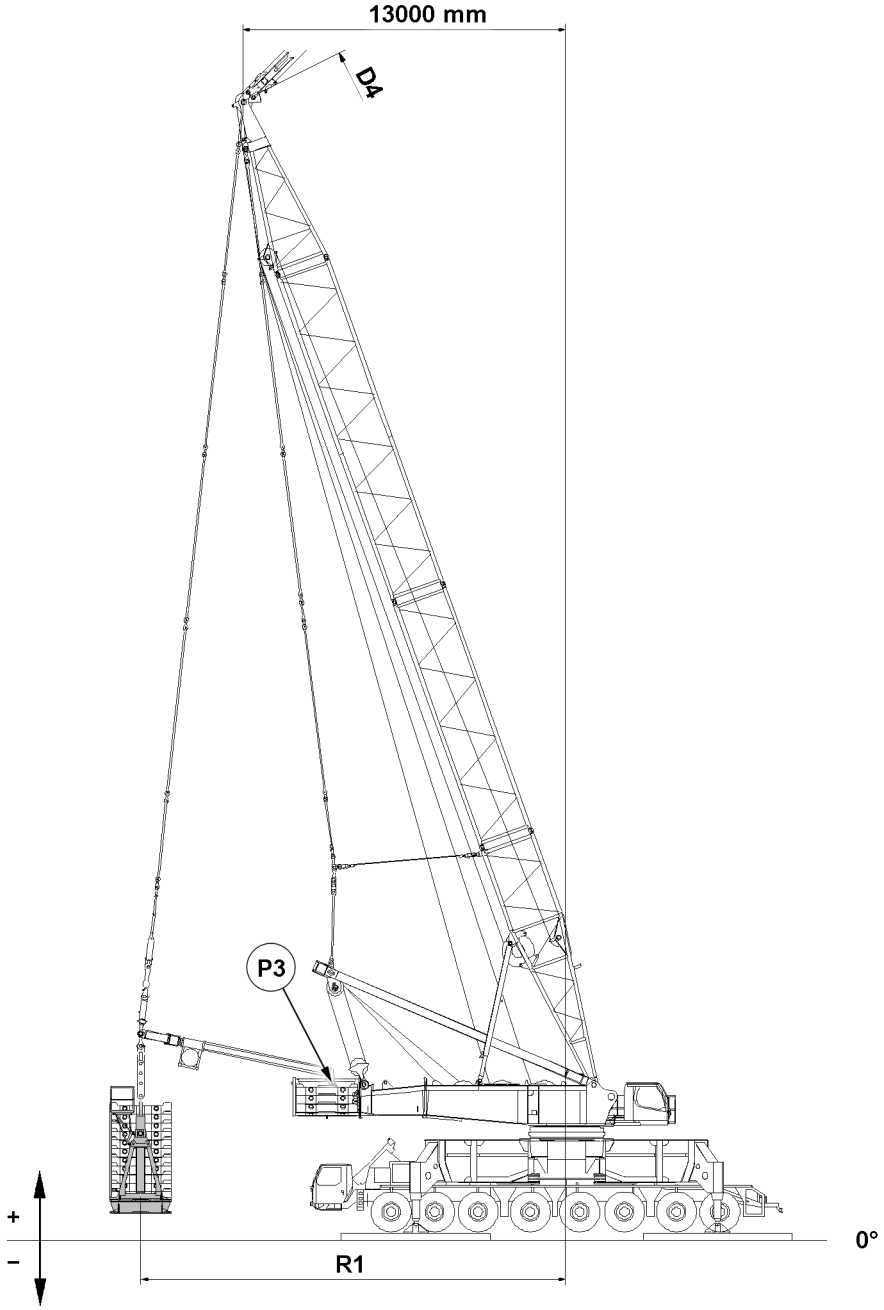

Fig.147642: Derrick ballast standing levels with suspended ballast guide

Derrick ballast radius R1 Pin point P3	Derrick ballast standing level	
	Above the crane standing level	Below the crane standing level
17 m	+1556 mm	-1079 mm
22 m	+2433 mm	-202 mm

42 m derrick, pin point P3 with small ballast pallet: Derrick ballast radius depending on the standing level

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8 Assembling

WARNING
Danger of falling!
During assembly / disassembly, inspection and maintenance work, assembly personnel must be secured with appropriate aids to prevent them from falling.
Death, severe bodily injuries, property damage.
- ▶ All work at a height, when there is a danger of falling, must be carried out with suitable aids.
- ▶ If aids are not available and work cannot be carried out from the ground, then assembly personnel must secure themselves with the supplied fall arrest system to prevent falling, see chapter 2.04.
- ▶ If fall protection equipment is available, then it must be used, see chapter 2.06.
- ▶ When lifting, lowering, swinging crane parts in and out, no persons may remain in the danger zone.
- ▶ When closing or opening boom systems during boom assembly or boom disassembly, no persons may remain on the boom system or in the danger zone.
- ▶ If railings are present on the components, then they must be brought into the corresponding position and secured for assembly / disassembly work.
- ▶ Only step on the aids, ladders and catwalks with clean shoes.
- ▶ Keep aids, ladders and catwalks free of heavy dirt, snow and ice.
- ▶ During all assembly and disassembly work, maintenance work and inspections, travel or crane operation is prohibited.
- ▶ Remaining on a suspended load is prohibited.
- ▶ Stepping or walking on crane components and lattice sections, which have an incline of more than 20° is prohibited.
- ▶ For all assembly work, the crane operator of the main crane must be in voice contact with the crane operator / crane operators of the auxiliary crane / auxiliary cranes.
- ▶ For assembly tasks, the crane operator may only initiate crane movements when the responsible guide has explicitly released the movement.

WARNING
Danger of impact / crushing!
When installing / removing crane components with the auxiliary crane, crane components can start to swing back and forth.
When lifting / lowering and positioning crane components, there is an increased danger of impacts / crushing.
Death, severe bodily injuries, property damage.
- ▶ Make sure that personnel cannot be caught by components.
- ▶ Make sure that the crane is horizontally aligned.
- ▶ When working in danger zones: Use aids to protect limbs.
- ▶ Guide components with suitable aids to minimize oscillation.

DANGER
The components can fall down!
If the corresponding component is disengaged from the auxiliary crane before the corresponding component is pinned, then the corresponding component can fall down.
Death, severe bodily injuries, property damage.
- ▶ Do not disengage the auxiliary crane until the respective component is pinned and secured.

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Make sure that the following prerequisites are met:
- The crane is properly supported.
- The crane is horizontally aligned.
- The derrick boom and main boom are installed on the turntable.
- The derrick boom is erected.
- The counterweight has been installed according to the load chart on the turntable or on the turntable extension.
- Counterweight for crane operation with D4 42 m and assembled turntable extension, is at least 100 t.
- The LICCON overload protection has been set according to the data in the load chart.
- An auxiliary crane is available.

8.1 Preassembling the suspended ballast guide

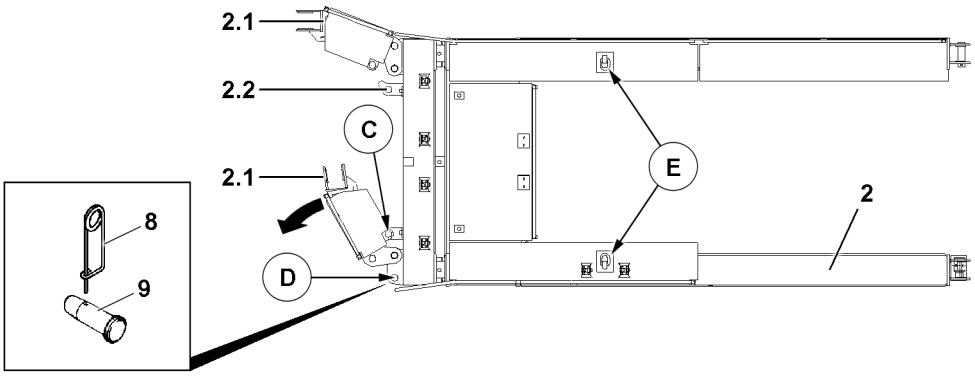

Fig.147529: Preassembling the suspended ballast guide

To retain the transport width of the suspended ballast guide **2**, the swing arms **2.1** are folded in transport position and secured.

Bring the swing arms **2.1** into the operating position for crane operation and secure.

▶ Release and unpin the locking pins **8** on the left and right at point **C**.
▶ Fold the swing arms **2.1** into the operating position (direction of the arrow) to the outside.

When the swing arms **2.1** are in the operating position:
▶ Insert the locking pin **8** at point **D** and secure with the retaining element **9**.

NOTICE
Damage to the railings!
If the railings are not brought into the operating position and secured before assembly of the suspended ballast guide on the turntable, they can be severely damaged.
▶ Bring the railings into operating position and secure them before assembly of the suspended ballast guide on the turntable.

▶ Remove the retaining element on the railings.
▶ Swing the railing upward into the operating position.
▶ Secure the railings in the operating position with the retaining element.

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8.2 Installing the suspended ballast guide on the turntable

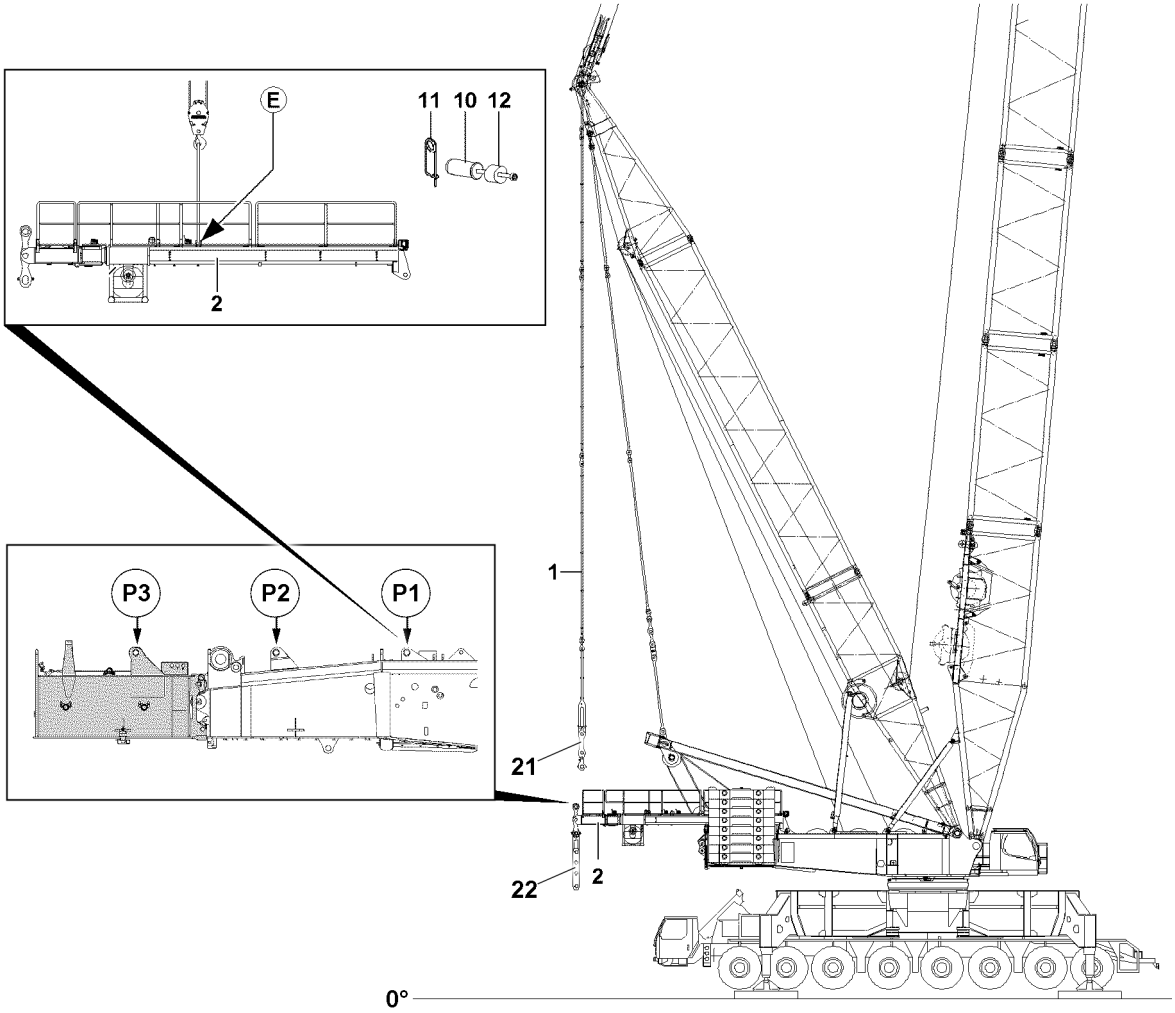

Fig.147643: Installing the suspended ballast guide

Pin point	Installation position	Possible derrick ballast radii
Point **P1**	Turntable	13 m to 18 m
Point **P2**	Turntable	15 m to 20 m
Point **P3**	Turntable extension	17 m to 22 m

Make sure that the following prerequisites are met:
- The rods **21** are properly pinned and secured to the derrick ballast guying **1**.
- The swing arms **2.1** are pinned and secured in the operating position.
- All railings are pinned and secured in the operating position.

▶ Fasten the suspended ballast guide **2** to the lashing lugs point **E** to the auxiliary crane.

NOTICE
Danger of property damage!
By swinging in the suspended ballast guide to the bolting points on the turntable, the crane components can be substantially damaged.
▶ Swinging the suspended ballast guide with the auxiliary crane is to be carried out with the greatest possible caution and at the slowest speed.

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▶ Swing in the suspended ballast guide **2** with the auxiliary crane for pinning point **P1** on the turntable.
or
Swing in the suspended ballast guide **2** with the auxiliary crane for pinning point **P2** on the turntable.
or
Swing in the suspended ballast guide **2** with the auxiliary crane for pinning point **P3** on the turntable.

When the suspended ballast guide **2** is found in the desired pin point:
▶ Insert the pins **10** at the corresponding pin point with the striker **12** from the inside to the outside.
▶ Secure the pin **10** with the retaining element **11**.

When the suspended ballast guide is pinned on both sides on the turntable and secured:
▶ Lower the suspended ballast guide **2** onto the support on the turntable.
▶ Remove the auxiliary crane.
▶ Fold down lashing lugs, point **E**, onto the suspended ballast guide **2**.
▶ Remove hydraulic hose lines from the suspended ballast guide **2**.

8.3 Establishing the hydraulic connections from the suspended ballast guide to the turntable

The hydraulic connections are made with quick couplings.

When connecting hydraulic lines with quick couplings, make sure that the coupling procedure is carried out correctly.

WARNING
Pressure in the hydraulic lines!
If the pressure supply is not interrupted before connecting / releasing the hydraulic lines, the hydraulic oil can escape with high pressure.
Death, severe bodily injuries, property damage.
▶ Release the pressure in the hydraulic system before connecting / disconnecting: Interrupt the pressure supply and wait for a short time.

WARNING
Loss of pressure or leakage!
Incorrectly coupled or self-loosening quick couplings (particularly return lines) can result in serious accidents due to component failure.
▶ Check that the quick couplings have been properly connected before using the crane.

▶ Connect the coupling components (sleeve and connector) and screw together with the knurled nut.
▶ Tighten the hydraulic coupling by hand. Turn the knurled nut until it reaches a tangible, fixed stop position.
▶ Establish the hydraulic connections, see the Hydraulic diagram.

8.4 Establishing the electrical connections from the suspended ballast guide to the turntable

Make sure that the following prerequisite is met:
– The suspended ballast guide is assembled completely to the turntable, pinned and secured.

Note
▶ To establish the electrical connections, use the separate electrical wiring diagram.
▶ Observe the installation locations for the terminal boxes for the various derrick ballast radii.

▶ Establish the electrical connections, see Electric wiring diagram.

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WARNING
Malfunction if dummy plugs are not installed!
If the dummy plugs on the non-required electrical connections are not installed, then malfunctions or functional limitations can occur on the crane.
- ▶ Make sure that all non-required electrical connections, which have a dummy plug are closed off with dummy plugs.
- ▶ Pay attention to the Electrical wiring diagram.

- ▶ As a rule, close off on-required electrical connections (for example for accessories which cannot be installed) with the respective dummy plugs.

NOTICE
Property damage due to dirt and / or corrosion!
If non-required electrical connections are not closed off with the respective protective caps, then dirt and / or corrosion can damage the electrical connections.
This could result in malfunctions.
- ▶ Make sure that all non-required electrical connections are always closed off properly.
- ▶ Pay attention to the Electrical wiring diagram.

- ▶ Close electrical connections, which have no dummy plugs, properly off with the corresponding protective caps.

8.5 Preassembling the divisible ballast pallet „VarioTray“

Align the divisible ballast pallet „VarioTray“ using the auxiliary crane with the crane longitudinal axis and stop it within the slewing range of the crane.

Then erect and secure the erection racks.

8.5.1 Aligning the divisible ballast pallet „VarioTray“ in the assembly position and stopping it

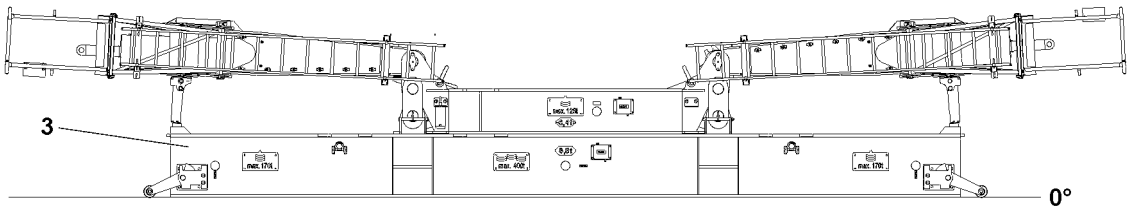

Fig.128921: Positioning the divisible ballast pallet „VarioTray“

Note
- ▶ The attachment hooks for transport of the divisible ballast pallet „VarioTray“ are inside the steel structure.

- ▶ Fasten the divisible ballast pallet „VarioTray“ to the four attachment hooks on the auxiliary crane.
- ▶ Align the divisible ballast pallet „VarioTray“ with the auxiliary crane with the longitudinal axis of the crane or to the turntable.
- ▶ Stop the divisible ballast pallet „VarioTray“ down within the crane slewing range.
- ▶ Align the divisible ballast pallet „VarioTray“ horizontally.
- ▶ Remove the auxiliary crane.

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8.5.2 Erecting the erection racks

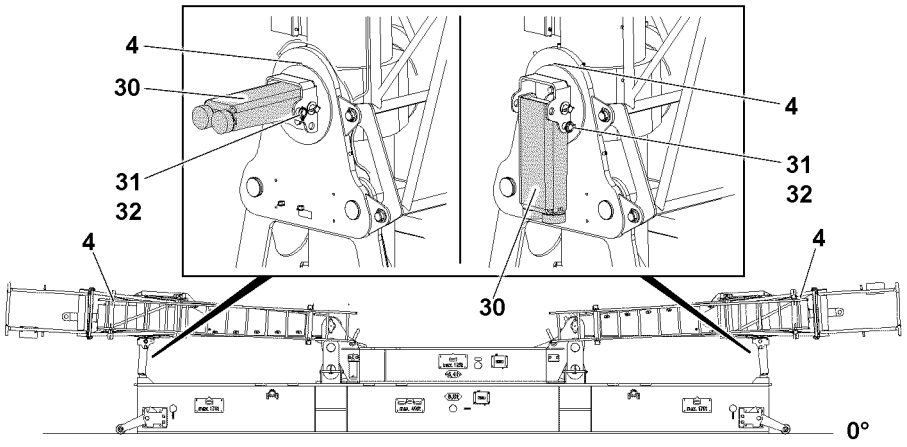

Fig.144302: Erecting the erection racks

Note

▶ Erection of the erection racks **4** is identical for both erection racks and is described using the example of one erection rack.

DANGER

Danger of accident during assembly / disassembly of the erection racks!
The small ballast pallet **3.2** must be safely pinned and secured on the large ballast pallet **3.1**, otherwise the small ballast pallet **3.2** can tip over when erecting the erection racks **4**.
Death, severe bodily injuries, property damage.

▶ Make sure when erecting the erection racks **4** that the small ballast pallet **3.2** is pinned and secured with the large ballast plate **3.1**.

DANGER

Danger of accident during assembly / disassembly of the erection racks!
The erection racks **4** must hang securely on the auxiliary crane, otherwise the erection racks **4** can tip over.
Death, severe bodily injuries, property damage.

▶ The two erection racks **4** must be locked and secured in a vertical position with four retaining pins. Only then may the auxiliary crane be removed.
▶ Never unpin the retaining pins of unsecured or unsupported erection racks.
▶ It is prohibited for anyone to remain under the erection racks **4** or within the complete danger zone during the pinning and unpinning procedure.

Make sure that the following prerequisites are met:
– The retaining pins **13** are in the „unpinned“ position.
– The small ballast pallet **3.2** is pinned and secured with the large ballast pallet **3.1**.

▶ Fasten the erection rack **4** to the auxiliary crane.
▶ Lift the erection rack **4** slightly with the auxiliary crane so that the foot **30** can be swung.
▶ Remove the retaining element **32** and unpin the pin **31** from the transport position.
▶ Swing the foot **30** to the park position.
▶ Insert the pin **31** and secure it with the retaining element **32**.

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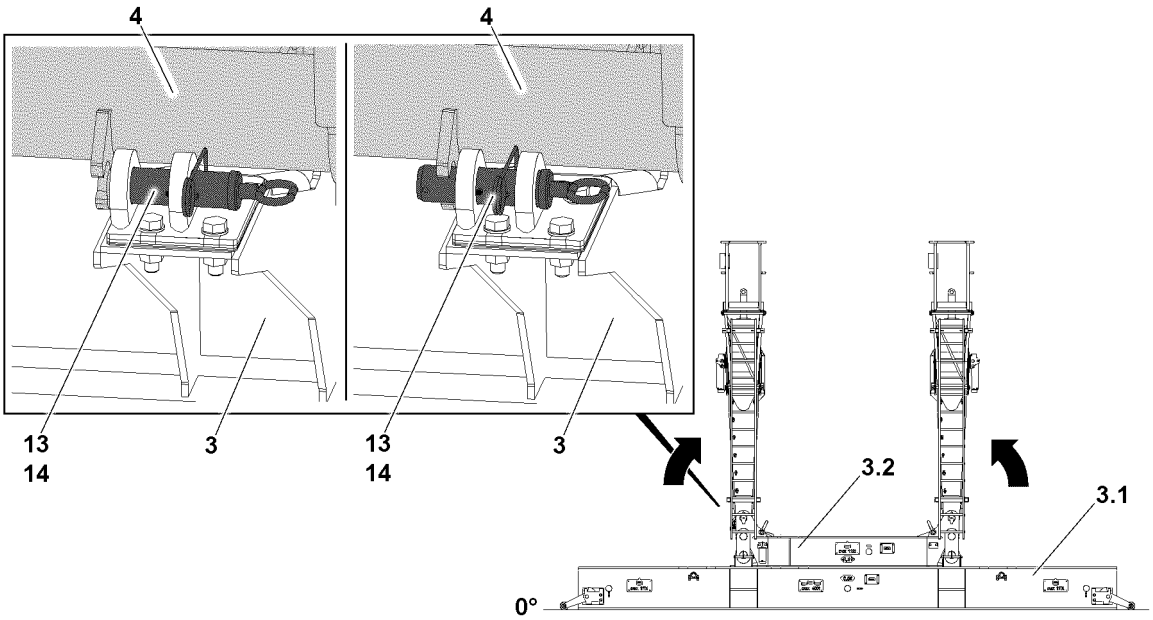

Fig.128922: Erecting the erection racks

▶ Erect the erection rack **4** with the auxiliary crane to the vertical position.

When the erection rack **4** is in the vertical position:

▶ Insert the retaining pins **13** and secure with the retaining elements **14**.

WARNING
Tipping erection racks!
Through the improper retaining of the erection racks, they can tip over upon removal of the auxiliary crane.
Death, severe bodily injuries, property damage.

▶ Make sure that the erection racks are properly pinned and secured with the retaining pins **13**.

When the erection rack **4** is pinned and secured properly:

▶ Remove the auxiliary crane.

▶ Erect, pin and secure the second erection rack according to the assembly of the first erection rack.

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8.6 Installing the divisible ballast pallet „VarioTray“

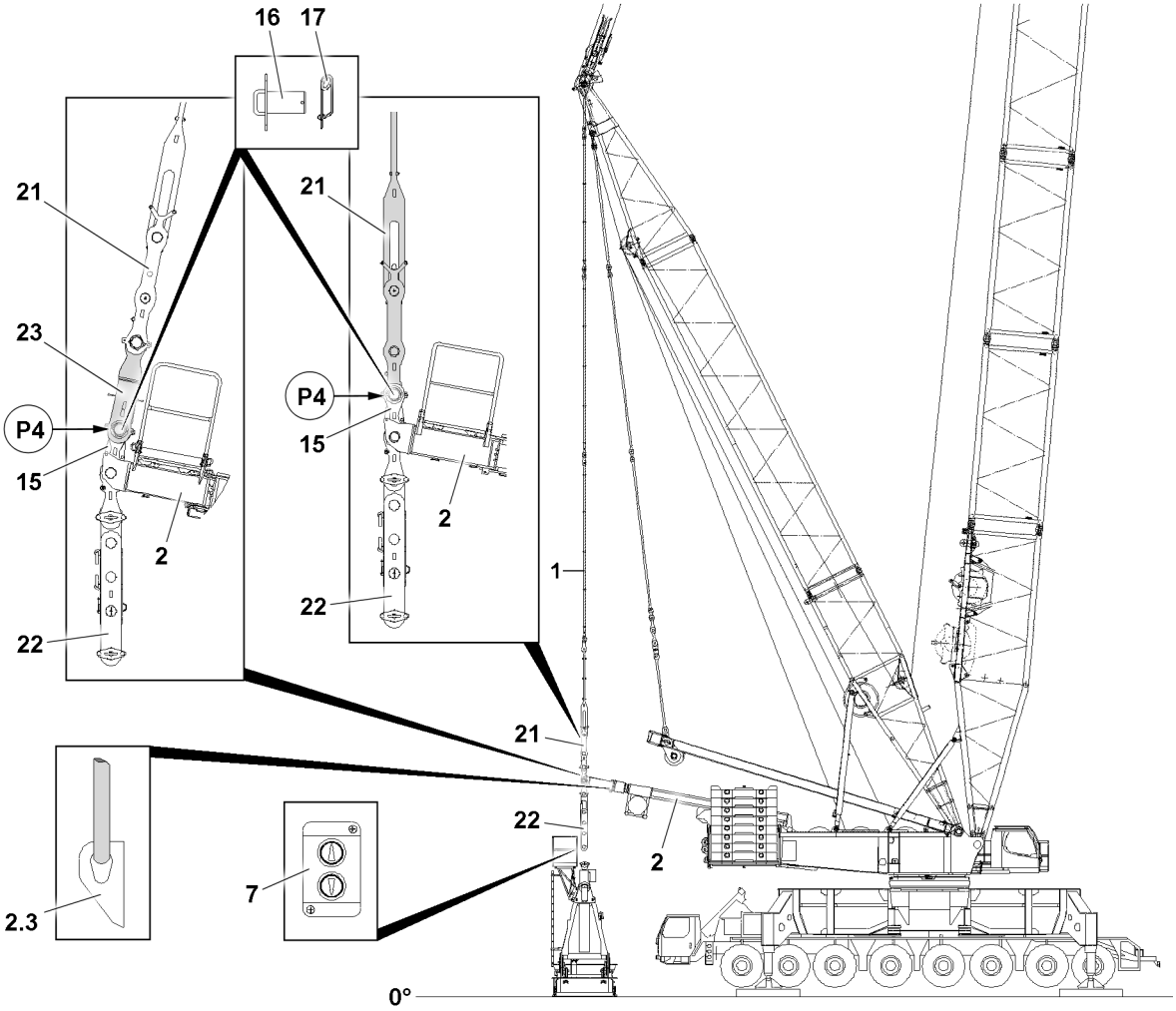

*Fig.147644: Installing the suspended ballast guide **2** on the derrick ballast guying*

23 Auxiliary lug with 1000 mm length for D4 42 m

WARNING
Toppling divisible ballast pallet „VarioTray“!
Ground with insufficient load bearing capacity can cause the divisible ballast pallet „VarioTray“ to sink into the ground during assembly.
This can lead to toppling of the ballast stack during ballasting of the divisible ballast pallet „VarioTray“.
Death, severe bodily injuries, property damage.
▶ Make sure that the ground is level and of sufficient load bearing capacity to securely accept the divisible ballast pallet „VarioTray“ including the ballast plates.

8.6.1 Installing the suspended ballast guide on the derrick ballast guying

Make sure that the following prerequisite is met:
– The rods **21** are properly pinned and secured to the derrick ballast guying **1**, see the rod plan.
– **For D4 42 m , the following applies:**
In addition, for D4 42 m make sure that the auxiliary lugs **23** are properly pinned and secured to the derrick ballast guying, see the rod plan.

▶ Lower the derrick boom to the rear into the operating position.
▶ Fasten the auxiliary crane on the fastening points **2.3** on the suspended ballast guide.

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▶ Lift the suspended ballast guide **2** with the auxiliary crane.
or
Telescope the suspended ballast guide **2** out with reduced speed.

When the pin bores for the lugs **21** and the lugs **15** align:
▶ Insert the pin **16** in point **P4** on both sides and secure with the retaining element **17**.

If the rods **21** for the derrick ballast guying are securely pinned and secured with the lugs **15**:
▶ Remove the auxiliary crane.

For D4 42 m , the following applies:

When the pin bores for the lugs **23** and the lugs **15** align:
▶ Insert the pin **16** in point **P4** on both sides and secure with the retaining element **17**.

If the rods **23** for the derrick ballast guying are securely pinned and secured with the lugs **15**:
▶ Remove the auxiliary crane.

8.6.2 Establishing the hydraulic connections from the suspended ballast guide to the pull cylinders in the divisible ballast pallet „VarioTray“

The hydraulic connections are made with quick couplings.

When connecting hydraulic lines with quick couplings, make sure that the coupling procedure is carried out correctly.

WARNING
Pressure in the hydraulic lines!
If the pressure supply is not interrupted before connecting / releasing the hydraulic lines, the hydraulic oil can escape with high pressure.
Death, severe bodily injuries, property damage.
▶ Release the pressure in the hydraulic system before connecting / disconnecting: Interrupt the pressure supply and wait for a short time.

WARNING
Loss of pressure or leakage!
Incorrectly coupled or self-loosening quick couplings (particularly return lines) can result in serious accidents due to component failure.
▶ Check that the quick couplings have been properly connected before using the crane.

▶ Connect the coupling components (sleeve and connector) and screw together with the knurled nut.
▶ Tighten the hydraulic coupling by hand. Turn the knurled nut until it reaches a tangible, fixed stop position.
▶ Establish the hydraulic connections, see the Hydraulic diagram.

8.6.3 Establishing the electrical connections from the suspended ballast guide to the divisible ballast pallet „VarioTray“

Note
▶ To establish the electrical connections, use the separate electrical wiring diagram.

▶ Establish the electrical connections, see Electric wiring diagram.

WARNING
Malfunction if dummy plugs are not installed!
If the dummy plugs on the non-required electrical connections are not installed, then malfunctions or functional limitations can occur on the crane.
▶ Make sure that all non-required electrical connections, which have a dummy plug are closed off with dummy plugs.
▶ Pay attention to the Electrical wiring diagram.

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▶ As a rule, close off on-required electrical connections (for example for accessories which cannot be installed) with the respective dummy plugs.

NOTICE
Property damage due to dirt and / or corrosion!
If non-required electrical connections are not closed off with the respective protective caps, then dirt and / or corrosion can damage the electrical connections.
This could result in malfunctions.
▶ Make sure that all non-required electrical connections are always closed off properly.
▶ Pay attention to the Electrical wiring diagram.

▶ Close electrical connections, which have no dummy plugs, properly off with the corresponding protective caps.

8.6.4 Installing the divisible ballast pallet „VarioTray“ on the suspended ballast guide

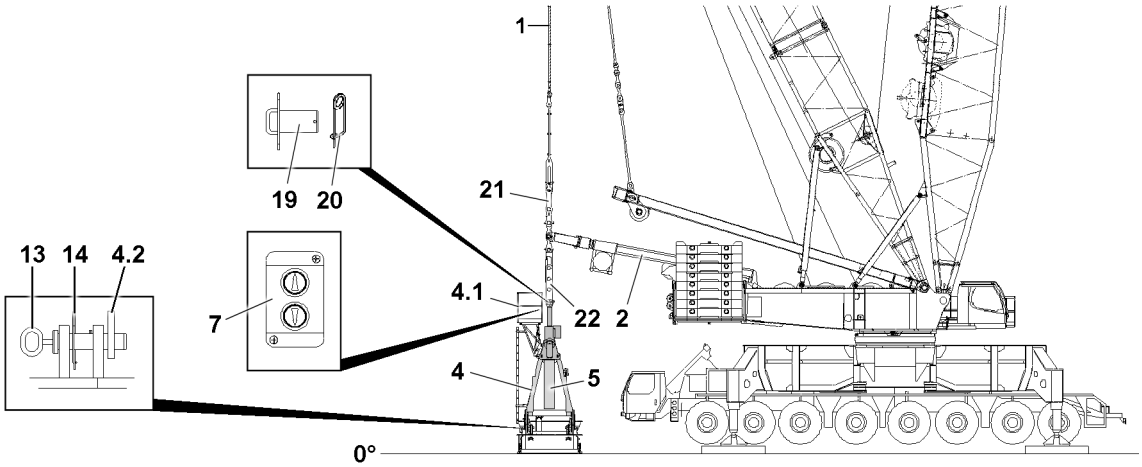

Fig.147645: Installing the divisible ballast pallet „VarioTray“ on the suspended ballast guide

Make sure that the following prerequisites are met:
– The suspended ballast guide is pinned and secured with the derrick ballast guying.
– The erection racks are erected, properly pinned and secured.
– The divisible ballast pallet „VarioTray“ is in the assembly position.
– The hydraulic connections to the divisible ballast pallet „VarioTray“ are established.
– The electrical connections to the divisible ballast pallet „VarioTray“ are established.

▶ Start the crane engine.

Extend the piston rods of the pull cylinder **5** and pin with the lugs **22** on the suspended ballast guide.

Note
▶ The piston rods for the pull cylinders **5** can be operated from the crane cab as well as directly on the corresponding control panels **7** of the divisible ballast pallet „VarioTray“.
▶ The control panels **7** are located on the platforms **4.1** of the erection racks **4**.
▶ The respectively associated pull cylinder can be operated on the control panels **7**.

▶ Extend the piston rods of the pull cylinders **5**.

When the pin bores of the piston rods align with the pin bores of the lugs **22**:
▶ Insert the pins **19** on both sides and secure with the retaining element **20**.

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NOTICE
Damage to the divisible ballast pallet „VarioTray“!
If the retaining pins **13** are not unpinned before starting to work with the crane, it can cause property damage in the area of the divisible ballast pallet „VarioTray“ **3** and the erection racks **4**.
▶ Only unpin the retaining pins **13** when it is ensured that the piston rods of the pull cylinders **5** are securely pinned and secured with the lugs **22** on the suspended ballast guide **2**.

▶ Release the retaining pin **13** and unpin up to the stop.
▶ Secure the retaining pin **13** in the „unpinned“ position with the retaining element **14**.

8.7 Function check before lifting the derrick ballast

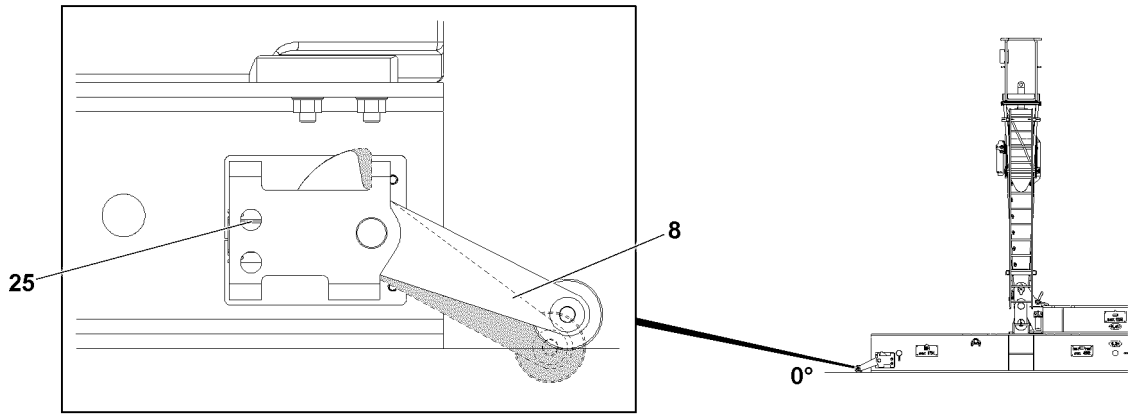

Fig.128924: Ground contact roller

Make sure that the following prerequisites are met:
– The electrical connection from the derrick ballast to the turntable has been established.
– The cable drum cable is plugged in on the turntable.
– The ground contact rollers must move easily.

DANGER
Danger of accident if the derrick ballast touches the ground!
▶ If the large divisible ballast pallet „VarioTray“ touches the ground, **at least one** ground contact switch **25** must be actuated via the ground contact roller **8**.
▶ The **turning the turntable** and **driving the crawler** crane movements turn off.

▶ Manually lift the ground contact roller **8**.

Result:

– The ground contact switch **25** is actuated.
– The **turning the turntable** and **driving the crawler** crane movements turn off.

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8.8 Ballasting the divisible ballast pallet „VarioTray“

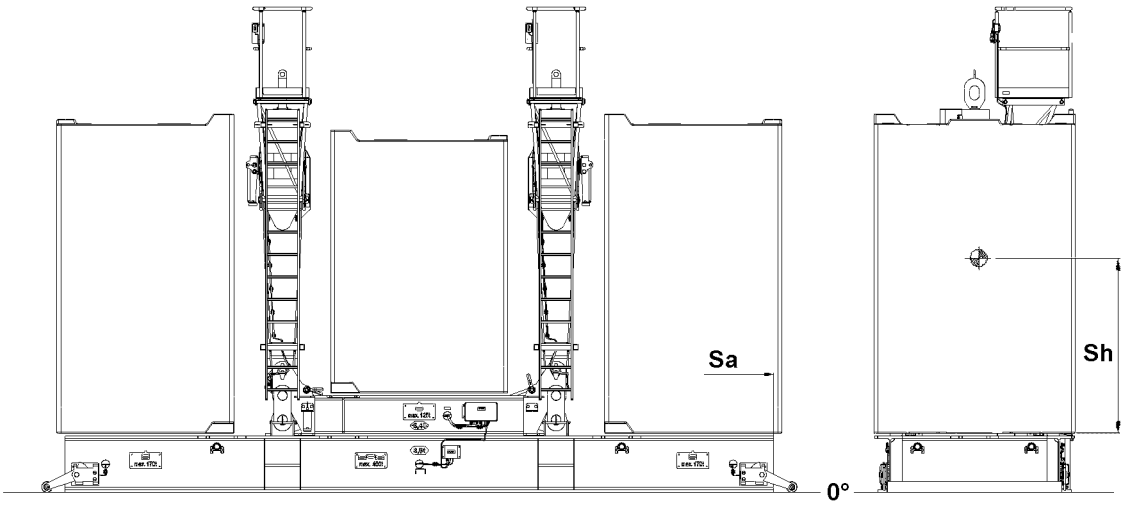

Fig.128925: Derrick ballast

WARNING
The crane can topple over!
If the following danger notes are not observed, the ballast plates or the ballast stack can slip on the divisible ballast pallet „VarioTray“ and fall down.
The crane can topple over.
Death, severe bodily injuries, property damage.

- ▶ The ground on which the divisible ballast pallet „VarioTray“ is ballasted must be level and have adequate load bearing capacity.
- ▶ Always place the ballast plates symmetrically, in reference to the longitudinal axis.
- ▶ Always ballast the center ballast stacks in suspended condition first and remove these ballast stacks last.
- ▶ The outer ballast stacks must always weigh the same and be the same height after ballasting.
- ▶ When adding and removing ballast in suspended condition, the weight difference between the left and right ballast stack may be no more than maximum 12.5 t.
- ▶ The maximum permissible ballast center of gravity height **Sh** of 2500 mm may not be exceeded.
- ▶ The maximum permissible total weight of the ballast plates of 400 t may not be exceeded.
- ▶ The ballast plates must be secured to prevent them from moving or falling down.
- ▶ The distances of the center of gravity of the outer ballast stacks must be maintained and must be identical between left and right stack.
- ▶ Replace damaged ballast plates immediately with new ballast plates.

	Maximum permissible ballast weight per stack (left / right)	
Center of gravity distance **Sa**	152 t	170 t
800 mm	**X**	
1000 mm		**X**

*Ballast weight depending on the center of gravity distance **Sa***

NOTICE
Damage to the pull cylinders!
If the minimum clearance of the ballast stacks to the pull cylinders is exceeded, the pull cylinders can be significantly damaged.
▶ The minimum distance of the ballast stacks to the pull cylinders must be at least 151 mm.

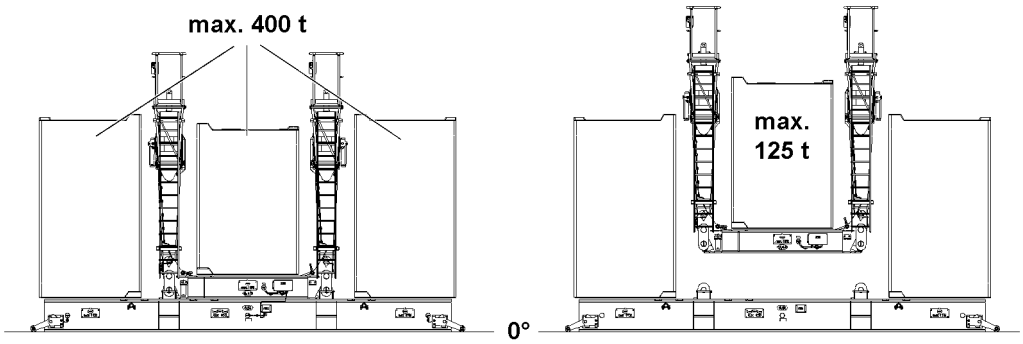

Fig.128926: Derrick ballast

WARNING
The crane can topple over!
If the following danger notes are not observed, the crane can topple over.
Death, severe bodily injuries, property damage.
▶ The maximum permissible total weight of the entire derrick ballast may not exceed 400 t.
▶ The maximum permissible total weight of the entire derrick ballast may not exceed 125 t during crane operation with ballast pallet.
▶ Observe the weight signs on the ballast pallets.

WARNING
Derrick ballast too low / too high!
If the placed derrick ballast deviates from the specified data in the load charts or the assembly conditions, then the crane can be damaged or topple over.
Death, severe bodily injuries, property damage.
▶ Make sure that the derrick ballast is placed according to the load chart.

WARNING
Toppling ballast stack!
Lopsided stacked ballast plates create instability in the ballast stack.
The ballast plates can tip from the divisible ballast pallet „VarioTray“ and cause the crane to topple over.
Death, severe bodily injuries, property damage.
▶ Make sure that the ballast plates are placed correctly in the centerings.

Make sure that the following prerequisites are met:
– The divisible ballast pallet „VarioTray“ is assembled on the suspended ballast guide and is lowered onto the ground.
– An auxiliary crane is available.

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8.8.1 Placing the ballast plates, fastening system: „Twistlock“

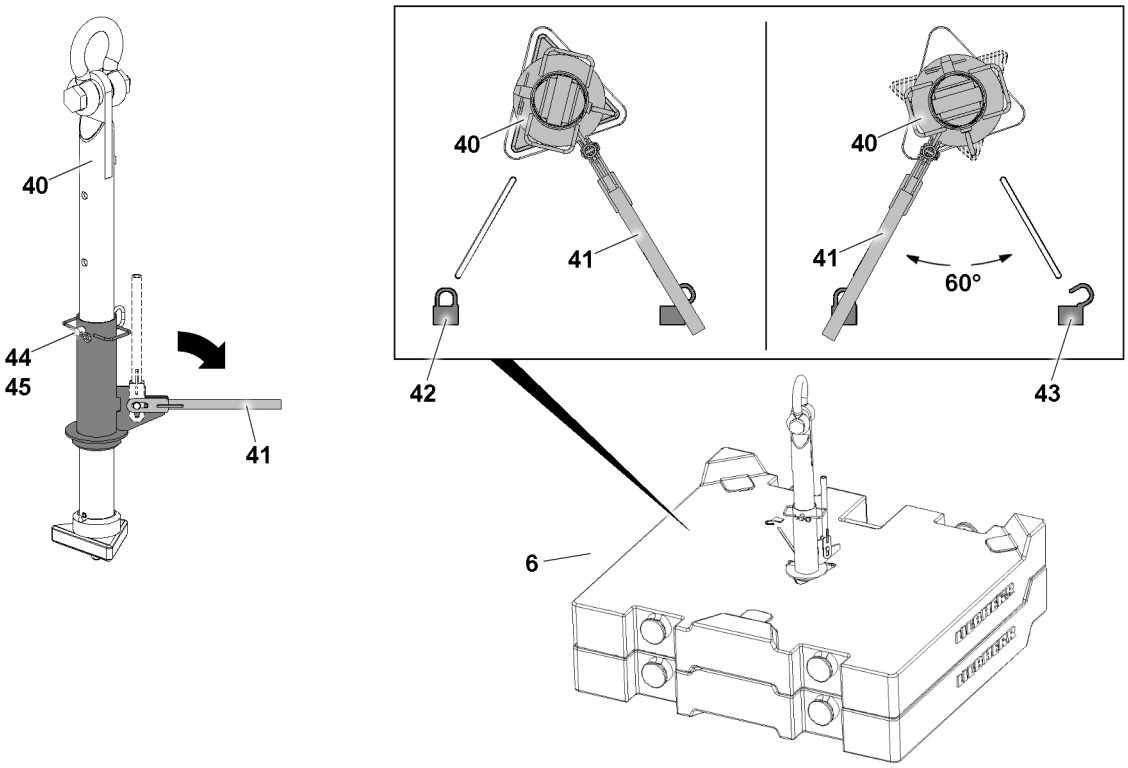

Fig.147646: Ballast plates, fastening system: „Twistlock“

WARNING
Danger of accident!
If more than the permissible two ballast plates are lifted with the receptacle stud, the receptacle stud will be overloaded and can be damaged.
Death, severe bodily injuries, property damage.
- ▶ Make sure that the ballast plates are placed correctly in the centerings.
- ▶ Observe the section „Permissible ballast assemblies“ in this chapter.
- ▶ Replace damaged ballast plates.

To stack the ballast plate(s), use the receptacle stud **40**.

Before the receptacle stud **40** is guided into the ballast plates, it must be ensured that the length of the receptacle stud is set correctly. The length of the receptacle stud **40** can be adjusted with the pin **44**.

If the length of the receptacle stud **40** is to be adjusted:
- ▶ Release and unpin the pin **44**.
- ▶ Adjust the length of the receptacle stud by moving the receptacle stud **40**.
- ▶ Insert the pin **44** and secure it with the retaining element **45**.
- ▶ Fasten the receptacle stud **40** to the auxiliary crane and guide it into the ballast plate(s) **6**.
- ▶ Pull the lever **41** up and fold it down.
- ▶ Turn the lever **41** 60° until the lever **41** points to the icon **42**.

Result:

– The receptacle stud **40** is locked with the ballast plate / ballast plates.

- ▶ Lift the ballast plate(s) with the receptacle stud **40** and take it down carefully on the outer centerings of the large ballast pallet.

When the ballast plate(s) has / have been taken down on the outer centerings of the large ballast pallet:
- ▶ Turn the lever **41** 60° until the lever **41** points to the icon **43**.

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Result:

– The receptacle stud **40** is unlocked.

▶ Carefully pull the receptacle stud **40** from the ballast plate / ballast plates.
▶ Stack the ballast plates according to the load chart, observe the danger notes.

8.8.2 Placing the ballast plates, fastening points: Bitt

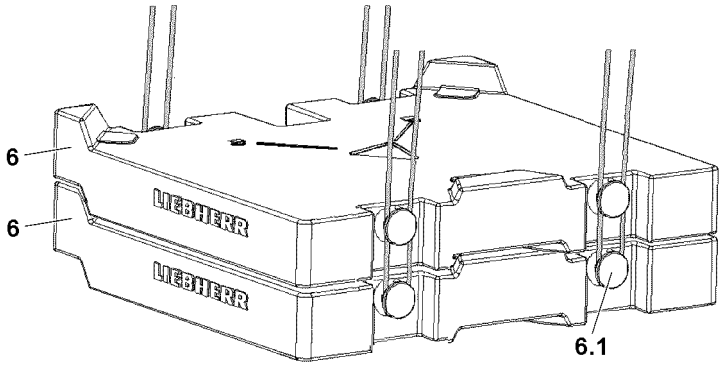

Fig.128927: Ballast plates, fastening system: „Bitt“

WARNING
Falling ballast plates!
If more than the permissible loads are lifted, then the bitts **6.1** are overloaded and the ballast plates can fall down.
Death, severe bodily injuries, property damage.
▶ Place the ballast plates individually or as a package, maximum 25 t , 4 fastening points.
▶ Observe the section „Permissible ballast assemblies“ in this chapter.
▶ Replace damaged ballast plates immediately.

WARNING
Incorrect handling of the fastening equipment!
If fastening equipment cannot be attached correctly and if it is not secured sufficiently to prevent it from loosening up, loads can fall down.
Death, severe bodily injuries, property damage.
▶ Make sure that the fastening equipment is correctly attached on the bitts **6.1** and that it is secured sufficiently to prevent it from loosening up.

▶ Always place only one ballast plate on the outer centerings on the large ballast pallet.

When a ballast plate has been placed on each of the outer centerings of the large ballast pallet:
▶ Place the ballast plates individually or as an assembly of a maximum of two plates alternately on the left and right with the auxiliary crane.
▶ Stack the ballast plates according to the load chart.

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8.9 Lifting the derrick ballast off the ground

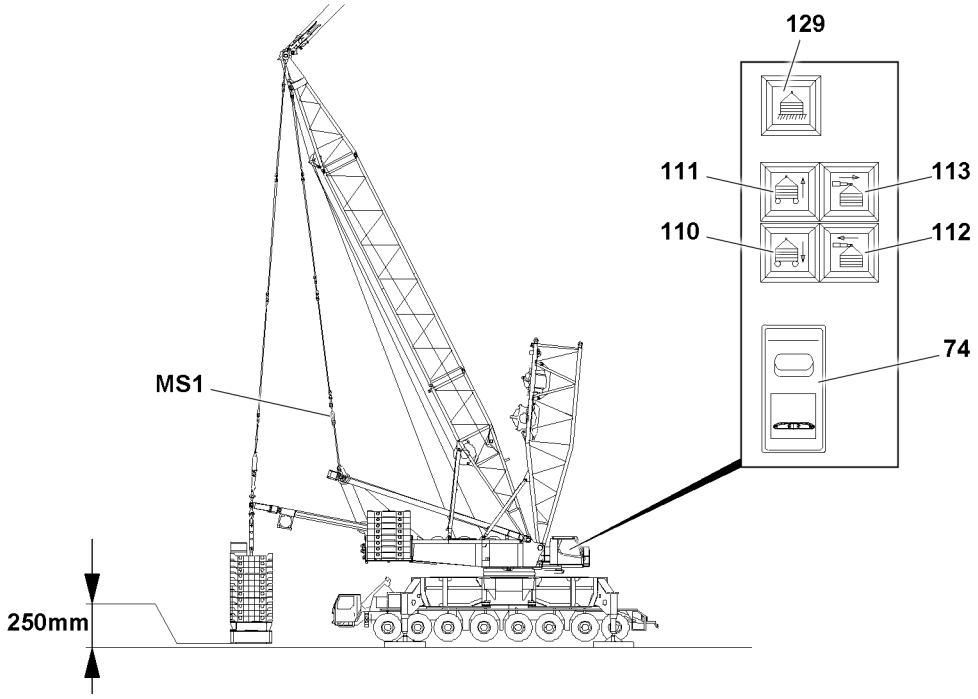

Fig.148005: Lifting the derrick ballast off the ground

WARNING
The crane can topple over!
If the derrick ballast is lifted up off the ground beyond the **maximum permissible** 250 mm , the crane can topple over to the rear if the load rips off.
Death, severe bodily injuries, property damage.

- ▶ There may be no personnel, objects or obstacles within the entire slewing range of the crane, derrick ballast and the load.
- ▶ Do not lift the derrick ballast more than 250 mm off the ground.
- ▶ The ground in the entire working area of the crane - including the derrick ballast and the load - must be even and of sufficient load bearing capacity, in order to be able to securely absorb the encountered ground pressures and weight loads.

Note

- ▶ Lifting of the derrick ballast must be observed by a guide.

WARNING
The crane can topple over!
If the minimum force F1-min, with derrick ballast placed on the ground and slack derrick guying, is fallen below, the boom system can abruptly move forward with increasing load moment and suddenly lift the derrick ballast off the ground.
This will result in the load swinging violently, whereby the crane can topple or be severely damaged.
Death, severe bodily injuries, property damage.

- ▶ The guying between the SA-frame and the derrick end section (test point 1 **MS1**) may never be without power.
- ▶ The minimum force F1-min may not be fallen below.
- ▶ When picking up the load, the guying of the derrick ballast to the derrick end section must be no more than slightly tensioned, so that the minimum force F1-min on test point 1 **MS1**, is exceeded.

- ▶ Press the button **111** in the crane cab.

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Result:

– The derrick ballast is lifted off the ground.
– The Warning light **129** „Derrick ballast on the ground“ turns off.

8.10 Telescoping the derrick ballast to the required derrick ballast radius

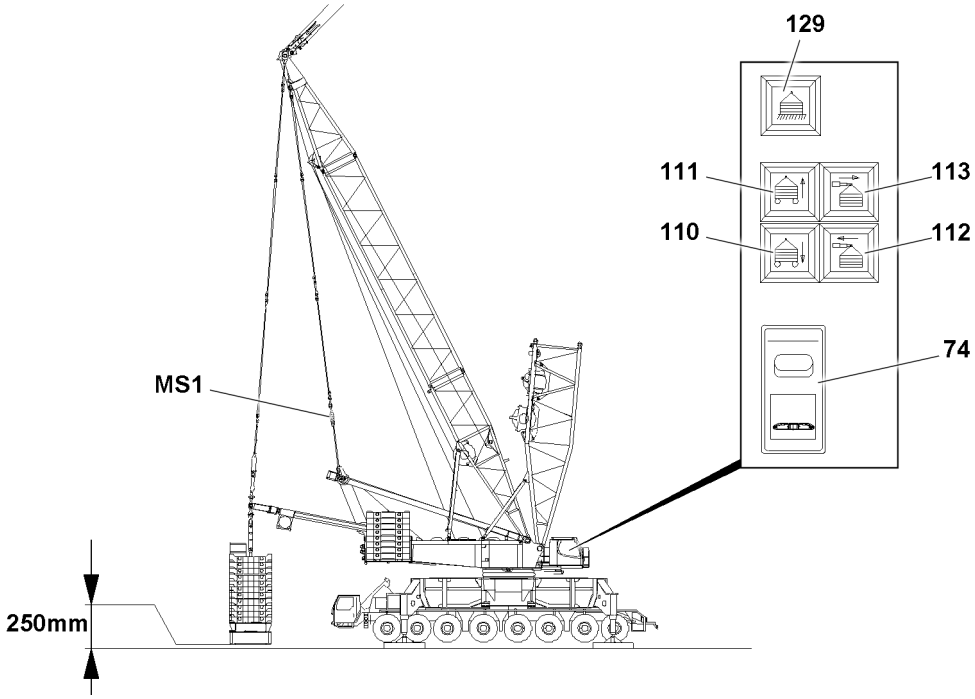

Fig.148005: Telescoping the derrick ballast to the required derrick ballast radius

WARNING
Danger of fatal injury!
Death, severe bodily injuries, property damage.
▶ Remaining in the crane danger zone of the crane, especially within the danger zone of the derrick ballast danger is prohibited.
▶ Make sure that there are no people, objects or obstacles within the danger zone of the crane.
▶ The derrick ballast must be lifted off the ground before telescoping and the warning light **111** „Derrick ballast on the ground“ must be turned off.

WARNING
The crane can topple over!
An incorrect length path measurement of the derrick ballast radius can cause the crane to topple over.
Death, severe bodily injuries, property damage.
▶ The derrick ballast radius display on LICCON monitor 1 must be constantly monitored during telescoping.
▶ The crane operator may not simply rely on the derrick ballast radius measurement, instead he should also be pro-active and check whether the measurement is still working correctly, see section „Checking the length sensor value on the derrick ballast“.

Note
▶ The derrick ballast radius display on LICCON monitor 1 and the telescoping cylinders must be constantly monitored during telescoping.

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8.10.1 Hydraulically telescoping out the suspended ballast guide

Make sure that the following prerequisite is met:
– The derrick ballast is lifted off the ground.

▶ Press the button **113** in the crane cab.

Result:

– The telescoping cylinder on the suspended ballast guide extends.

When the required derrick ballast radius is reached:
▶ Release the button **113** in the crane cab.

8.10.2 Hydraulically telescoping in the suspended ballast guide

Make sure that the following prerequisite is met:
– The derrick ballast is lifted off the ground.

▶ Press the button **112** in the crane cab.

Result:

– The telescoping cylinder on the suspended ballast guide retracts.

When the required derrick ballast radius is reached:
▶ Release the button **112** in the crane cab.

9 Crane operation with small ballast pallet

WARNING
The crane can topple over!
If the derrick ballast is lifted up off the ground beyond the maximum permissible 250 mm , the crane can topple over to the rear if the load rips off.
Death, severe bodily injuries, property damage.
▶ Make sure that the derrick ballast is not lifted more than 250 mm off the ground.

WARNING
The crane can topple over!
During the attaching / setting down procedure, the small ballast pallet swings out past the maximum permissible 250 mm , up to 1000 mm over the ground.
If the small ballast pallet is lifted past the maximum permissible 250 mm off the ground, then the crane can be topple over to the rear if the load rips off.
Death, severe bodily injuries, property damage.
▶ Make sure that the small ballast pallet is lifted or attached from the ballast pallet **without** a load on the hook.
▶ Make sure that the small ballast pallet, after being lifted out of the large ballast pallet, is immediately lowered again to 250 mm.
▶ Make sure that the small ballast pallet, before being lifted into the large ballast pallet, is only lifted briefly above the maximum permissible 250 mm.

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9.1 Setting up crane operation with the small ballast pallet

9.1.1 Disconnecting the divisible ballast pallet „VarioTray“

Make sure that the following prerequisites are met:
- The divisible ballast pallet „VarioTray“ is properly installed and secured on the suspended ballast guide.
- The electrical connection from the derrick ballast to the turntable has been established.
- The hydraulic connection from the derrick ballast to the turntable has been established.
- The cable drum cable is plugged in on the turntable.
- The ground contact rollers must move easily.
- Ballast plates are installed on the large ballast pallet according to the load chart or the erection and take-down charts.
- Ballast plates are installed on the small ballast pallet according to the load chart or the erection and take-down charts.

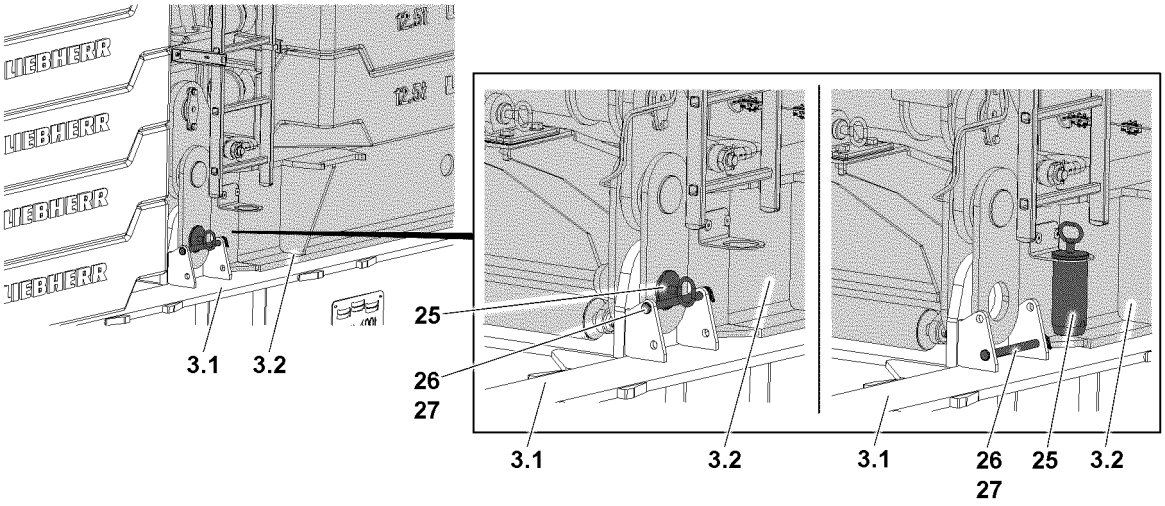

Fig.128929: Disconnecting the divisible ballast pallet „VarioTray“

▶ Disconnect electrical connections from the large ballast pallet **3.1** to the small ballast pallet **3.2**, see electric wiring diagram.
▶ Close the electrical connections off properly with dummy plugs or protective caps.

The small ballast pallet **3.2** is pinned at four points. The unpinning procedure is described for one pin as an example.

▶ Remove the retaining element **27** and unpin the retaining pin **26**.
▶ Insert the retaining pin **26** in park position and secure with retaining element **27**.
▶ Unpin the connector pin **25** and pin in the park position.

Result:

– The small ballast pallet **3.2** is disconnected from the large ballast pallet **3.1**.

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9.1.2 Function check before lifting the derrick ballast

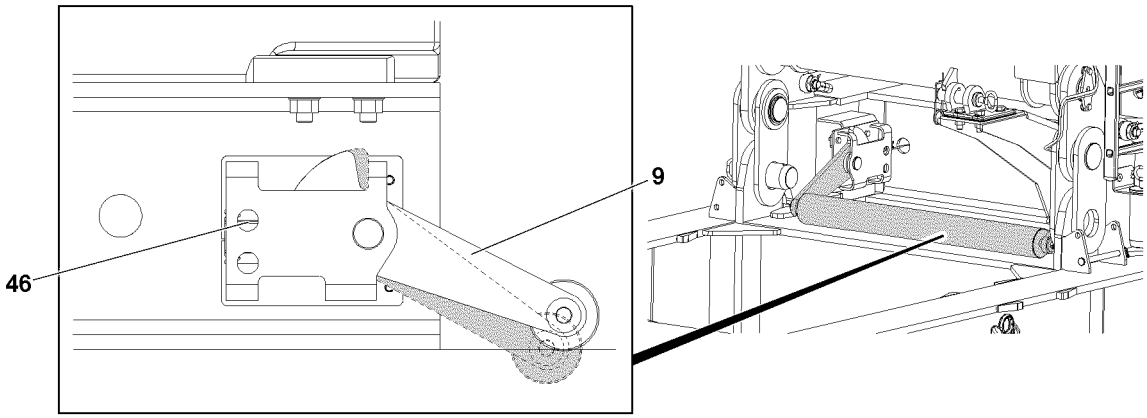

Fig.128930: Ground contact roller

Make sure that the following prerequisite is met:
– The ground contact rollers must move easily.

DANGER
Danger of accident if the derrick ballast touches the ground!
▶ If the small ballast pallet touches the ground, **at least one** ground contact switch **46** must be actuated via the ground contact roller **9**.
▶ The **turning the turntable** and **driving the crawler** crane movements turn off.

▶ Manually lift the ground contact roller **9**.

Result:

– The ground contact switch **46** is actuated.
– The **turning the turntable** and **driving the crawler** crane movements turn off.

9.1.3 Lifting the small ballast pallet

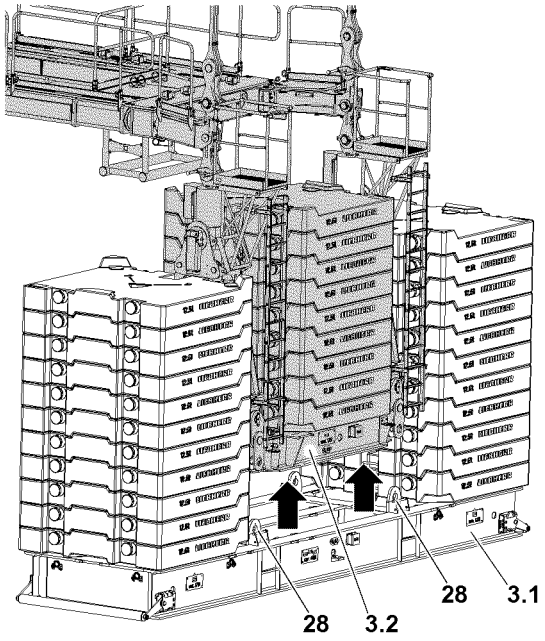

Fig.128931: Small ballast pallet

Make sure that the following prerequisite is met:
– The small ballast pallet **3.2** is disconnected from the large ballast pallet **3.1**.

WARNING
Danger of fatal injury due to tipping ballast plates!
If the crane is turned after the small ballast pallet **3.2** is lifted, the small ballast pallet **3.2** will tip over the ballast plates of the large ballast pallet **3.1**.
Death, severe bodily injuries, property damage.
- ▶ Make sure that the crane is never turned directly after lifting the small ballast pallet **3.2**.
- ▶ The large ballast pallet **3.1** must always be put down outside of the slewing range of the crane.

▶ Lift the small ballast pallet **3.2** until it is hovering over the plates **28** of the large ballast pallet **3.1**: Actuate the pull cylinder, see the section „Lifting and lowering the derrick ballast using the pull cylinder“.

9.2 Removing the crane operation with small ballast pallet

9.2.1 Setting down the small ballast pallet

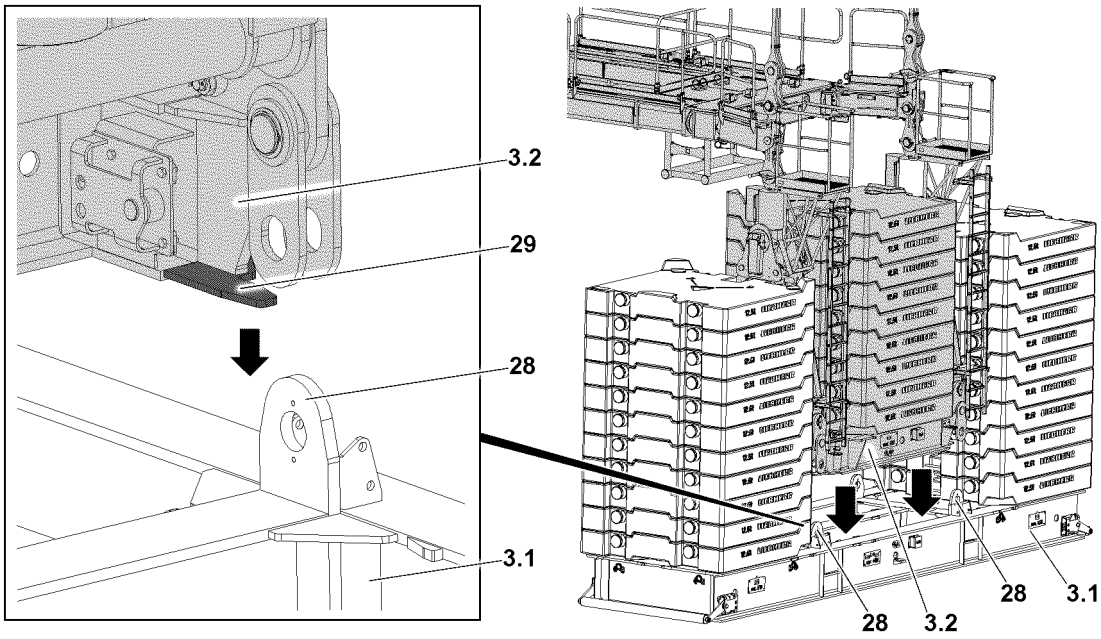

Fig.128932: Setting down the small ballast pallet

Make sure that the following prerequisites are met:
- The small ballast pallet **3.2** is located over the pin locations of the large ballast pallet **3.1**.
- The ground contact rollers must move easily.
- Ballast plates are installed on the large ballast pallet **3.1** according to the load chart or the erection and take-down charts.

WARNING
Danger of fatal injury due to tipping ballast plates!
If the crane is turned when the small ballast pallet **3.2** is being set down, the small ballast pallet **3.2** will tip over the ballast plates of the large ballast pallet **3.1**.
Death, severe bodily injuries, property damage.
- ▶ Make sure that the crane is never turned while the small ballast pallet **3.2** is being set down.

Note
- ▶ When setting down the small ballast pallet **3.2**, use the centerings **29** on the small ballast pallet **3.2** as a guide.

▶ Set down the small ballast pallet **3.2** on the large ballast pallet **3.1**: Actuate the pull cylinder, see the section „Lifting and lowering the derrick ballast using the pull cylinder“.

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9.2.2 Connecting the divisible ballast pallet „VarioTray“

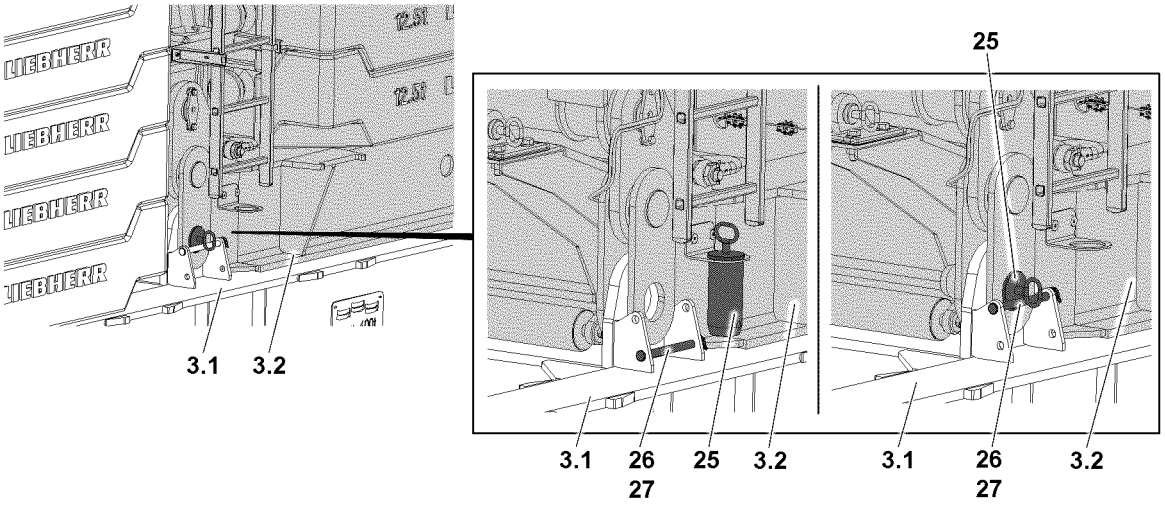

Fig.128933: Connecting the divisible ballast pallet „VarioTray“

Make sure that the following prerequisites are met:
- The small ballast pallet **3.2** is resting completely on the large ballast pallet **3.1**.
- The pin bores on the small ballast pallet **3.2** and on the large ballast pallet **3.1** align.

The small ballast pallet **3.2** is pinned at four points. The pin procedure is described for one pin as an example.

▶ Remove the connector pin **25** from the parking position and pin in the operating position.

Result:

– The small ballast pallet **3.2** is pinned to the large ballast pallet **3.1**.

▶ Remove the retaining element **27** from the parking position and unpin the retaining pin **26**.
▶ Insert the retaining pin **26** in the operating position and secure with the retaining element **27**.
▶ Establish electrical connections from the large ballast pallet **3.1** to the small ballast pallet **3.2**, see electric wiring diagram.

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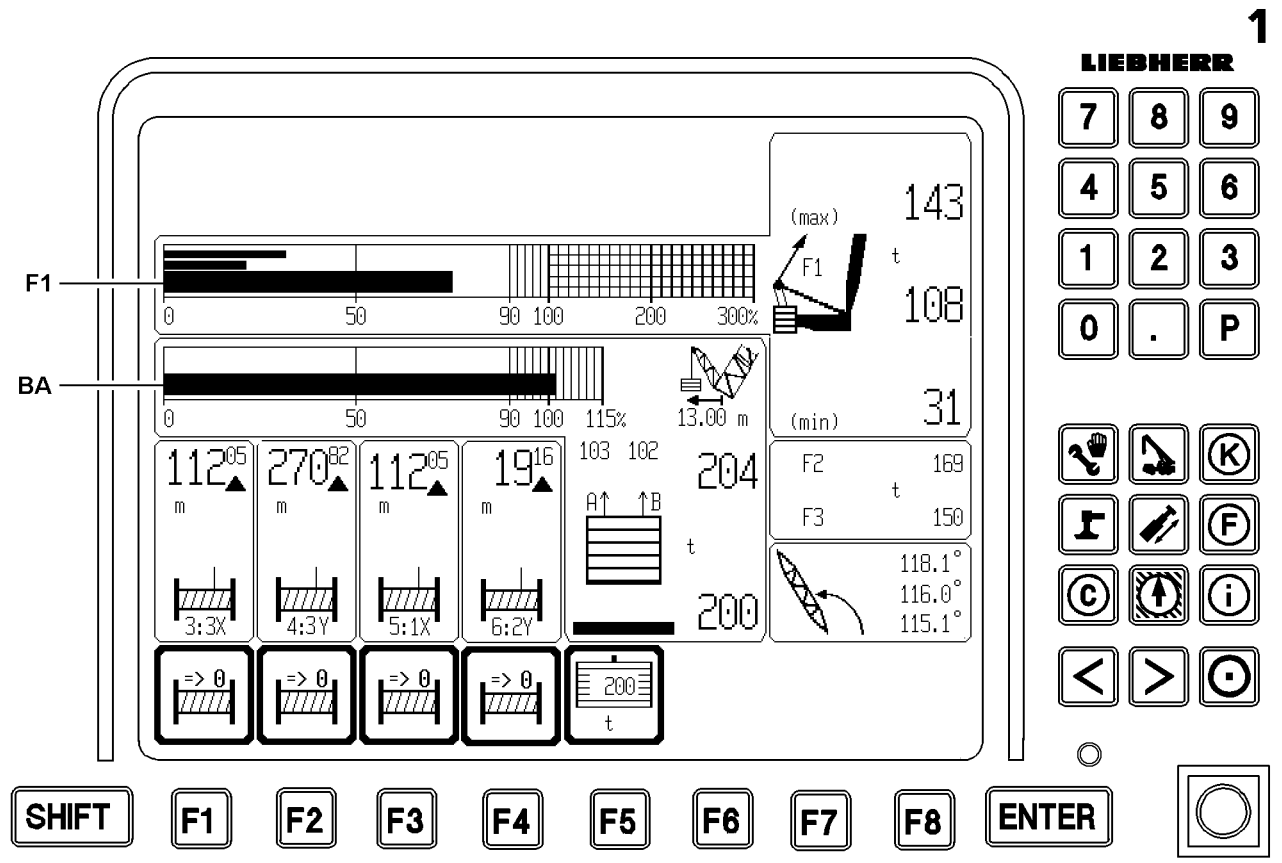
10 Crane operation with the derrick ballast



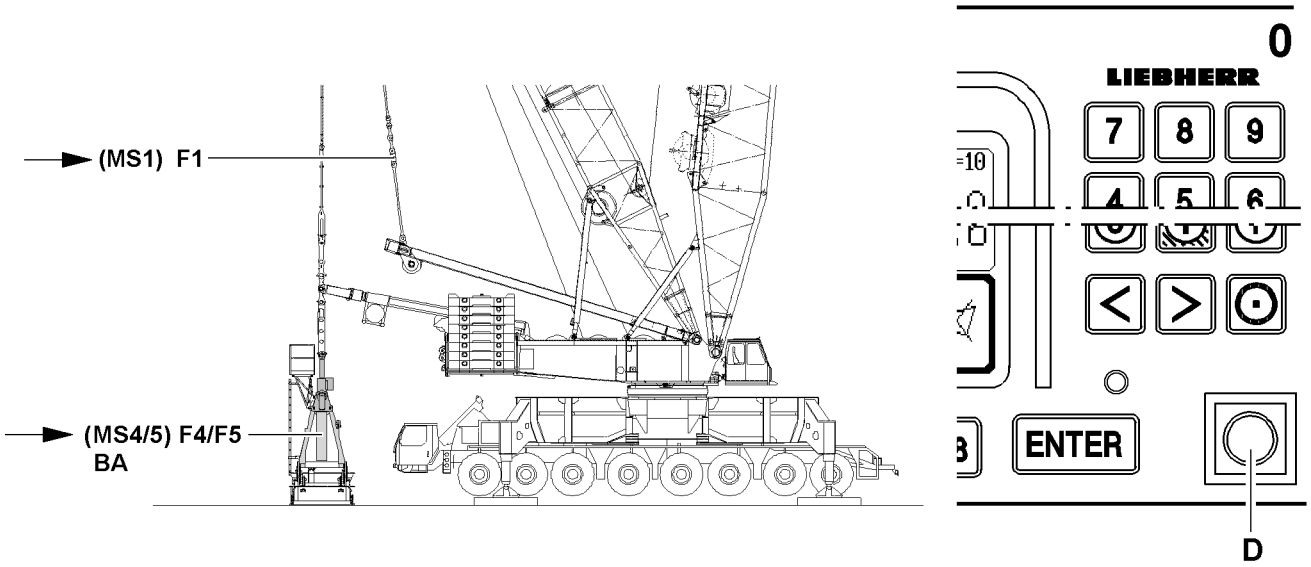


Fig.147649

Make sure that the following prerequisites are met:
- The test points are checked for function.
- The crane is properly supported and horizontally aligned.
- The weight of the load to be lifted is known.
- The required derrick ballast is placed according to the load chart.

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– The derrick boom is in the operating position.

10.1 Settings

▶ Set and confirm the load chart for the upcoming crane operation on the LICCON monitor.
▶ Set and confirm the weight of the actually placed derrick ballast on the LICCON monitor.

Note
▶ Adjusting the derrick ballast, see chapter 4.02.
▶ The required derrick ballast must be determined according to the data in the load chart or through the crane job planner.

WARNING
The crane can topple over!
Incorrect ballast weight entry can lead to dangerous operating situations.
▶ The set derrick ballast must correspond to the actually installed derrick ballast.

▶ Compare the set derrick ballast with the actual derrick ballast.

10.2 Crane operation

Note
▶ For crane operation with derrick ballast, the data, see chapter 4.02, must be observed and adhered to.

WARNING
The crane can topple over!
The jerky execution / braking of turning maneuvers can cause the load or suspended derrick ballast to swing.
This can lead to severe property damage or cause the crane to topple over.
Death, severe bodily injuries, property damage.
▶ There may be no persons, objects or obstacles within the turning range of the derrick ballast.
▶ When turning, a guide must monitor the boom, derrick boom and derrick ballast for any danger of collision.
▶ The turning movement or braking must be initiated extremely carefully when turning with a load and suspended derrick ballast.
▶ Do not lift the derrick ballast more than 250 mm off the ground.

Note
▶ If the suspended derrick ballast must be swung over any obstructions or be set down on a different level with respect to the crane, it is possible to raise or lower the suspended derrick ballast using the pull cylinders.
▶ The pull cylinders are operated from the crane cab.

WARNING
The crane can topple over!
If the derrick ballast in crane operation is operated via the control panels on the divisible ballast pallet „VarioTray“, important crane data cannot be viewed on the LICCON monitor.
The crane can topple over.
Death, severe bodily injuries, property damage.
▶ It is prohibited to operate the derrick ballast in crane operation from the control panels.
▶ The derrick ballast must always be aligned horizontally when it is raised or lowered with the pull cylinders.

▶ The crane operator must ensure that the pull cylinders extend / retract evenly.

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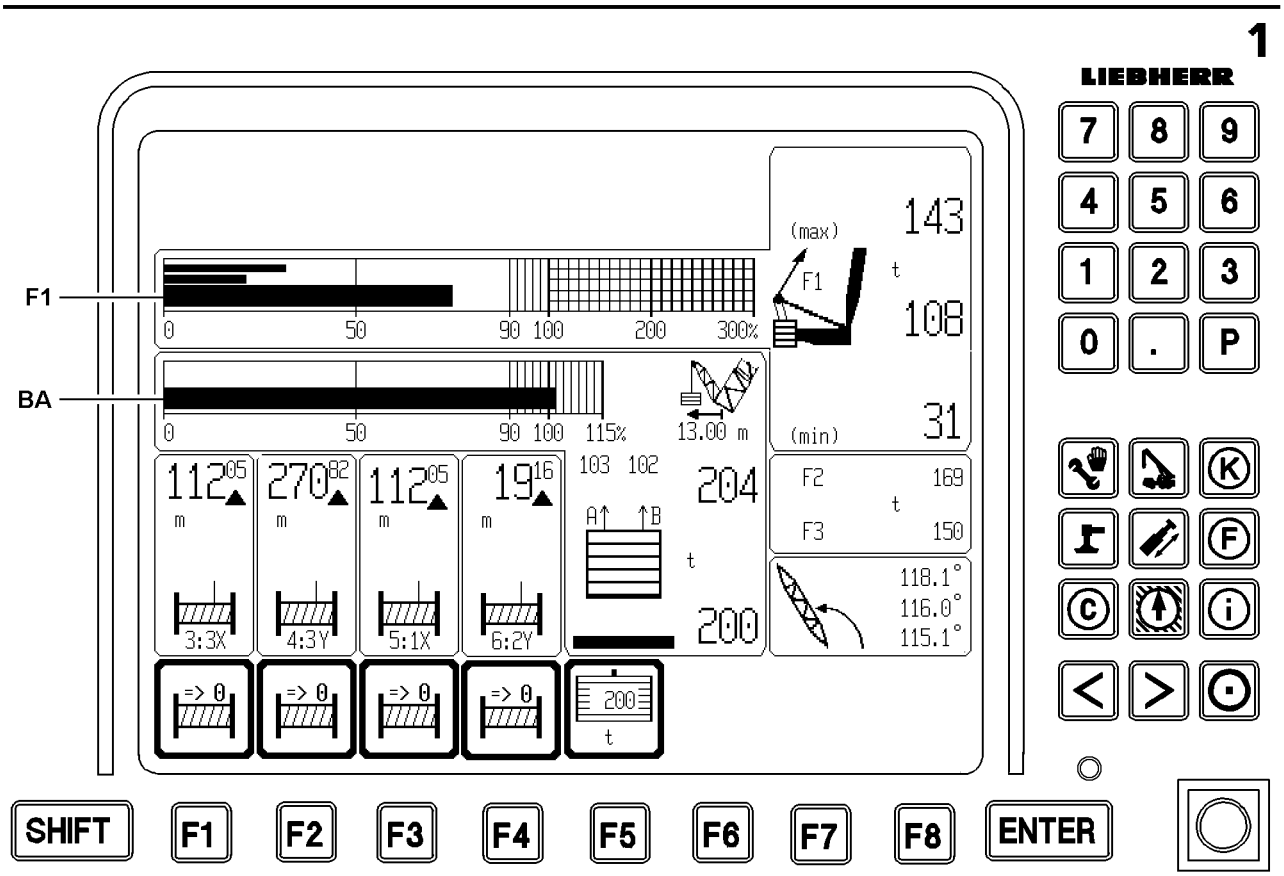
10.3 Crane operation with the derrick ballast



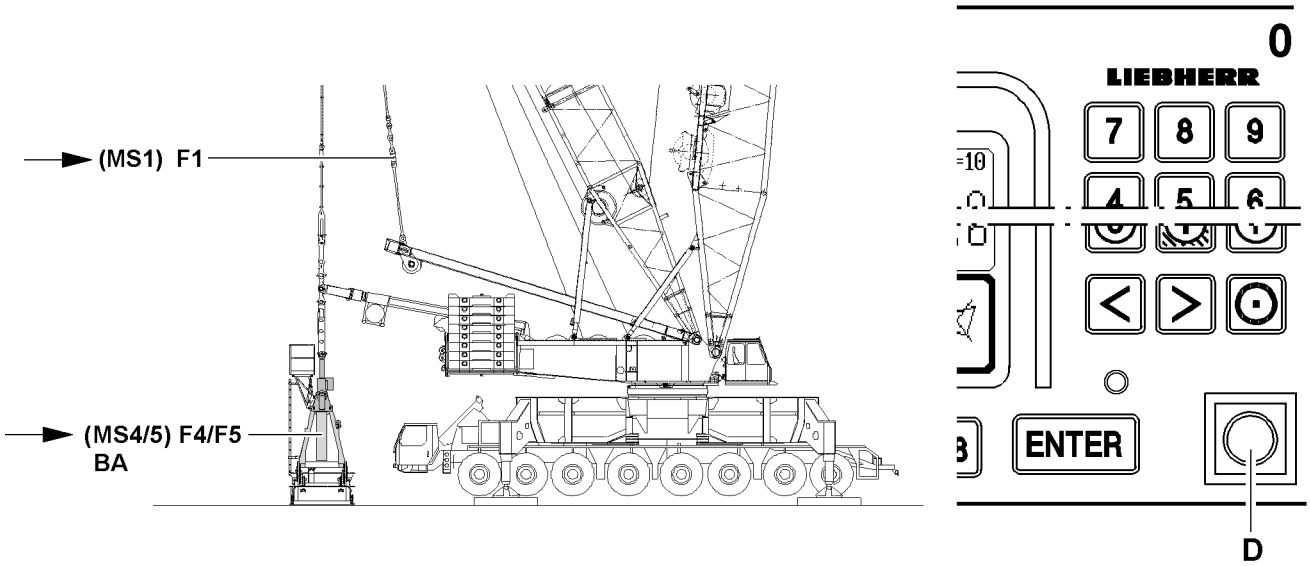


Fig.147649

In all operating modes with derrick ballast, the load is divided between the guy rods from the derrick end section to the SA-frame – test point 1 **MS1** (F1) – and to the derrick ballast **MS4/MS5**.

The load of the crane is monitored by test point 1 **MS1** (F1), in the guying from the SA-frame to the derrick head. If the force becomes too high, then all movements, which increase the load momentum are turned off.

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The force distribution can change due to the following procedures:
- Picking up the load: By flexing of the turntable.
- By raising or lowering the derrick ballast using the pull cylinders.
- By ballasting derrick ballast plates on or off.

WARNING
Danger of accident!
▶ Before setting down the load and suspended derrick ballast, the crane operator must make sure that it can be taken down safely.

- There may be no personnel, objects or obstacles within the slewing range of the crane, derrick ballast and the load.
- When picking up the load, **make sure** to avoid angular pull, i.e. the derrick ballast, the center of rotation of the turntable and the load must be aligned! To ensure this, operate the cylinder to lift and set down the divisible ballast pallet „VarioTray“ before adding any ballast plates.

10.4 Monitoring of minimum force F1

If more than fifty percent of the set derrick ballast is drawn (ballast utilization bar shows a ballast utilization of greater than fifty percent) and if the minimum force F1-min **MS1** (F1) is too low, all load moment increasing crane movements are switched off.

DANGER
The crane can topple over!
Death, severe bodily injuries, property damage.
▶ It is prohibited to fall below the minimum force F1-min **MS1** (F1) if more than 50 % of the derrick ballast is pulled. If this is not observed and the load torque is increased when the guying is slack at test point 1 **MS1** (F1) and the „derrick ballast on the ground“, the derrick ballast can suddenly lift up off the ground.
▶ Simultaneously, the boom system can move suddenly forward.
▶ This causes the load to swing strongly.
▶ The crane can topple over.

If more than ninety percent of the set derrick ballast is pulled (ballast utilization bar shows a ballast utilization of more than ninety percent) and if the minimum force F1-min **MS1** (F1) is fallen below, all load torque increasing and all load torque decreasing crane movements are turned off. The hoist gear „down“ movement is also turned off.

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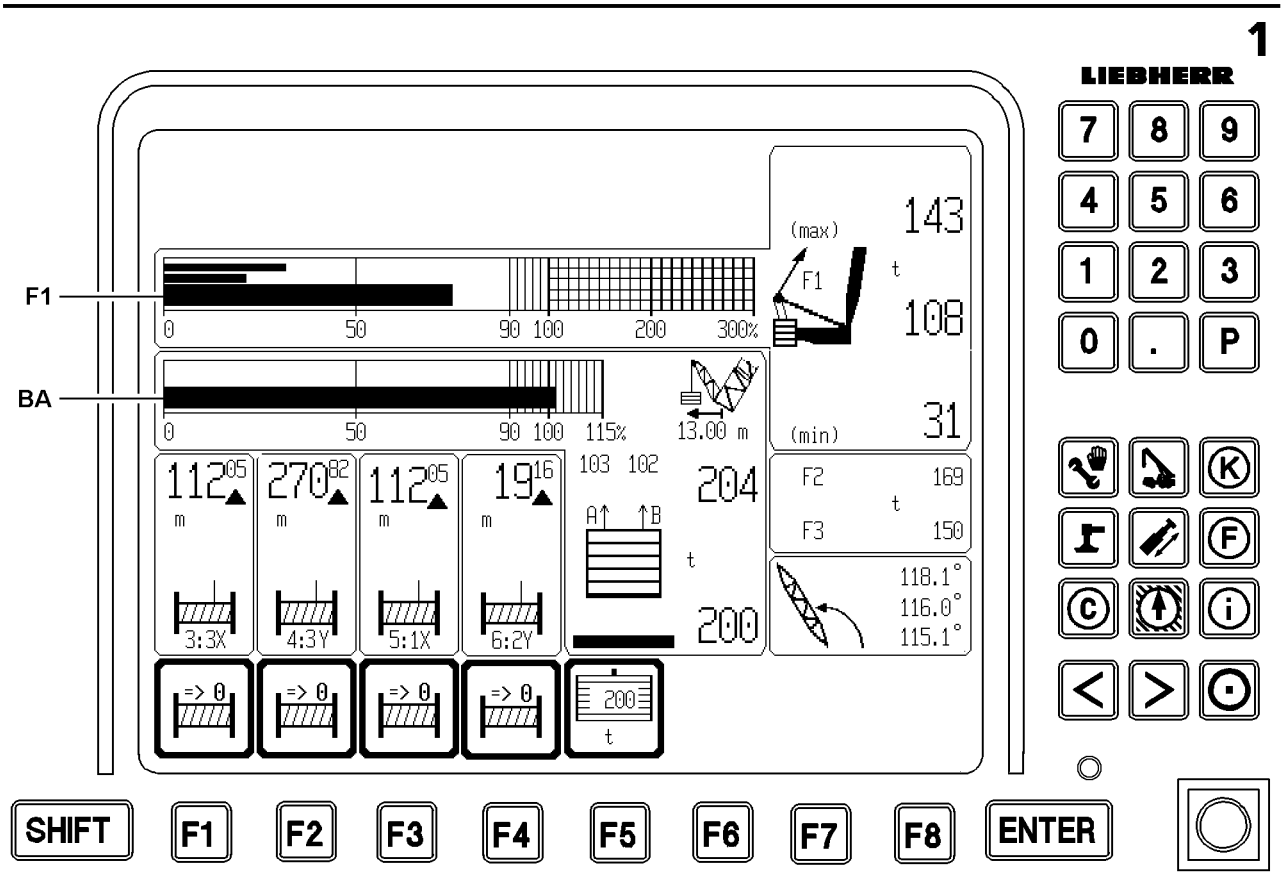

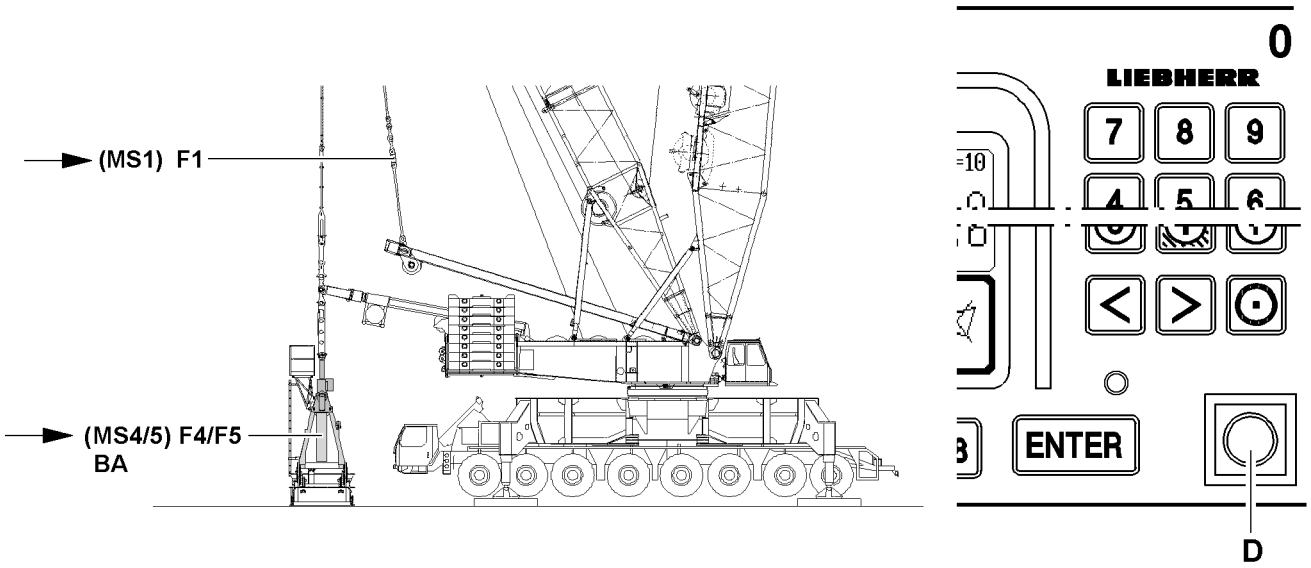

Fig.147649

DANGER
The crane can topple over!
Death, severe bodily injuries, property damage.
- ▶ It is prohibited to fall below the minimum force F1 min **MS1** (F1) if more than 90 % of the derrick ballast is pulled. If this is not observed and the load torque is decreased when the guying is slack at test point **MS1** (F1) and the „derrick ballast is suspended“, the derrick ballast can suddenly drop to the ground, causing the boom system to suddenly move backwards.
- ▶ As a result, the relapse cylinders can be pressed on the block and be overloaded.
- ▶ There is a danger that the relapse cylinders on the boom and derrick may be damaged.
- ▶ This causes the load to swing strongly.
- ▶ The crane can topple over.

This danger condition can only be overcome:
- – By lowering the suspended derrick ballast to the ground via the pull cylinders.
  or:
- – The ballast plates are unloaded in order to reduce the derrick ballast utilization and to increase the load at test point 1 **MS1** (F1).

DANGER
The crane can topple over!
Due to deliberate improper use of the set up key **D**, the crane can collapse, the boom can break off or the crane can topple over.
Death, severe bodily injuries, property damage.
- ▶ The crane operator must have understood the function and effects of an actuation before actuating the set up key **D**, see chapter 4.20.

10.5 Force F1 (Test point 1) between guying SA-frame - Derrick end section

The force F1 **MS1** is determined in the guy rods from the SA-frame to the derrick head via 2 force test boxes and is shown on the LICCON monitor as total force of the guying.

The F1-utilization is determined from the F1 operating force and the F1-maximum operating force.

This is shown on the LICCON monitor in the utilization bar **F1** (in %).

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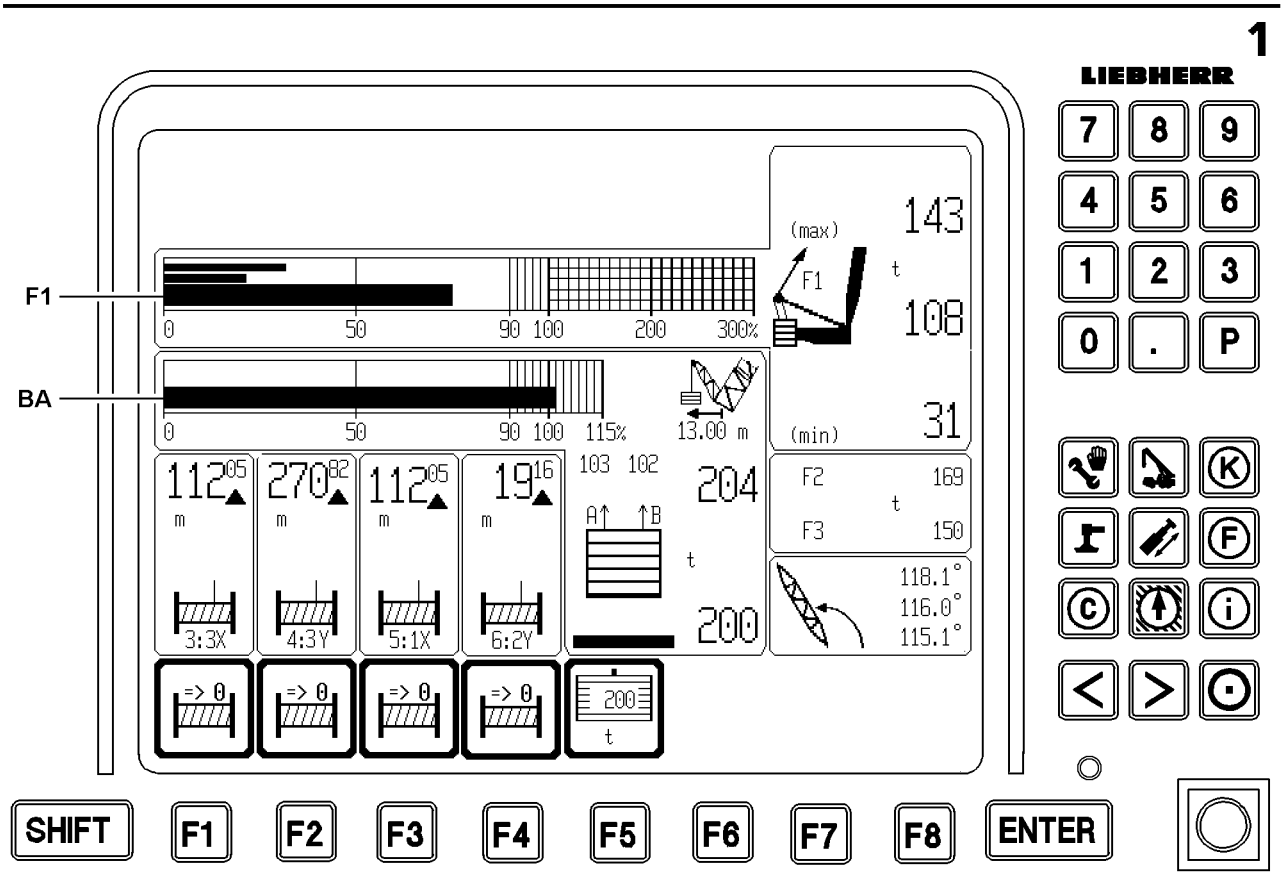

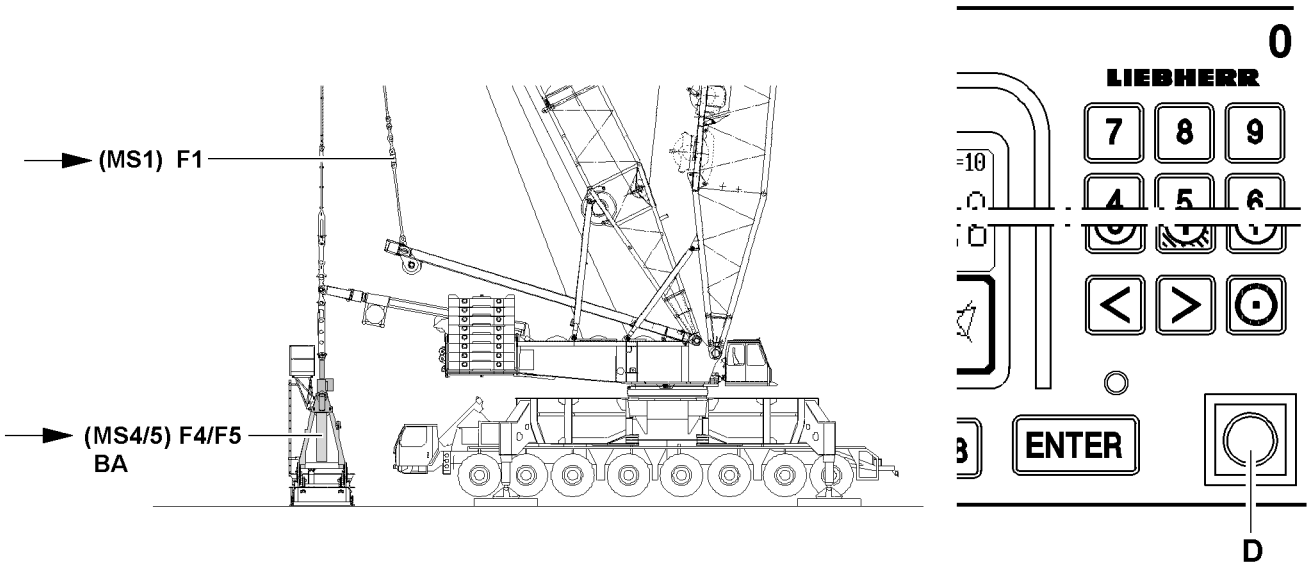

Fig.147649

10.6 Force F4/F5 (MS4/MS5) guying derrick ballast - Derrick end section

The forces F4 **MS4** and F5 **MS5** are exerted in the guy rods from the derrick ballast to the derrick head.

The existing forces in the guy rods (**A** = left and **B** = right) are calculated from the three pressure sensors, which are installed on the pull cylinders and shown in the LICCON monitor as individual forces.

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The pulled derrick ballast is calculated from the forces of the individual guyings, which means the part of the derrick ballast which is pulled upward by the guying. The remaining part is laying on the ground. The derrick ballast utilization results from the pulled ballast and the placed ballast.

This is shown on the LICCON monitor in the utilization bar **BA** (in %).

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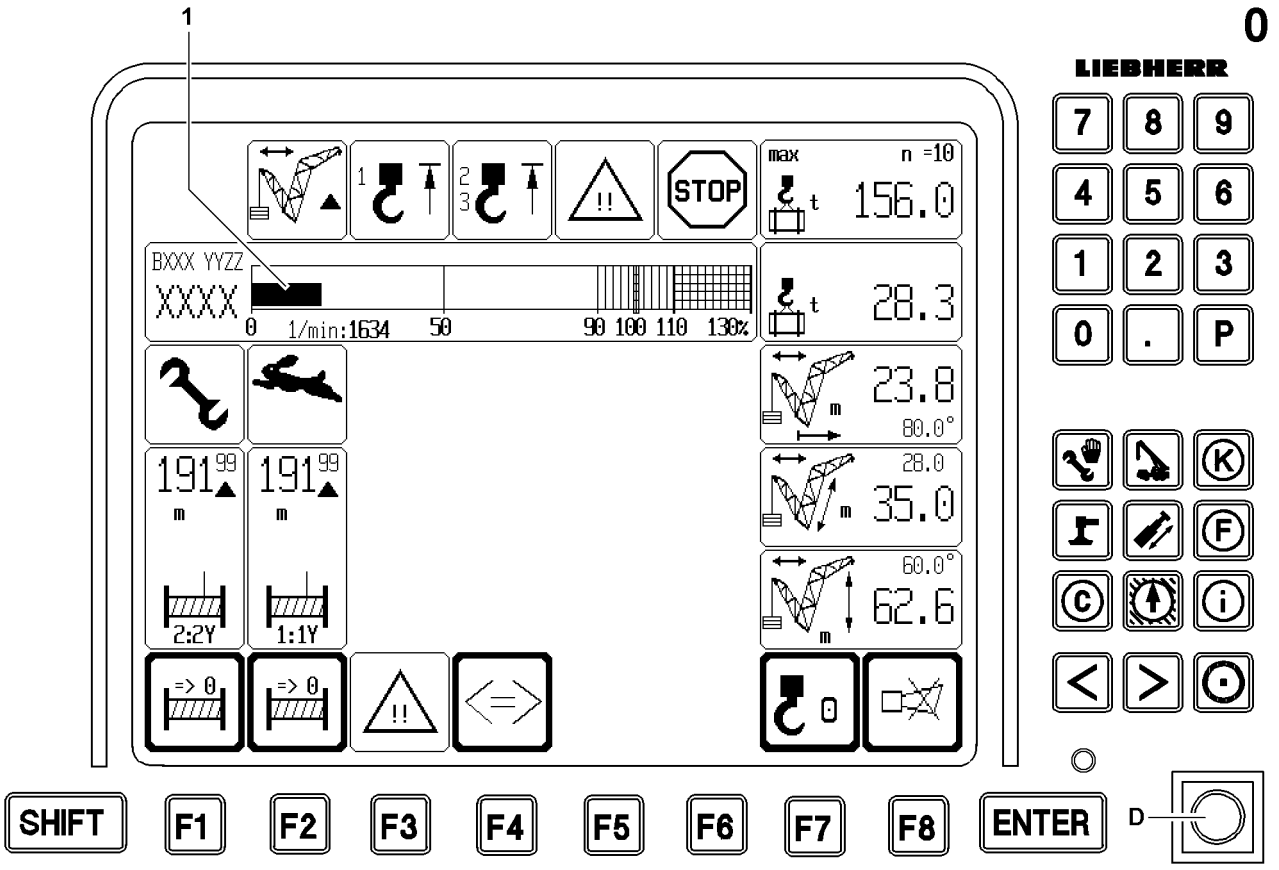

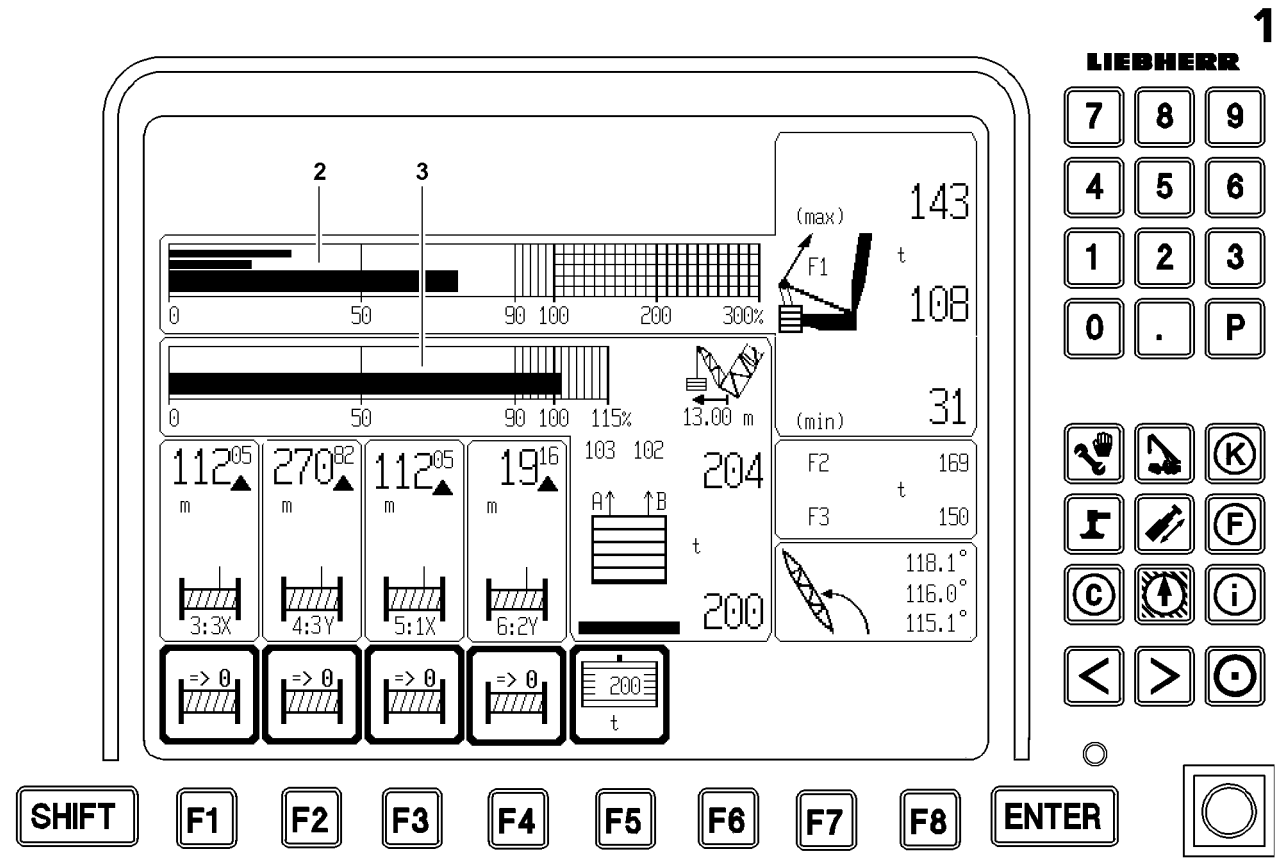

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Fig.111809

10.7 Overload monitoring in operating mode with derrick ballast

In operating modes with derrick ballast, the „maximum load for the current crane condition“ is monitored two ways:

1. Monitoring of maximum load on the LICCON monitor 0
2. Monitoring of test point 1-operational maximum force on the LICCON monitor 1

10.7.1 Monitoring of maximum load on the LICCON monitor 0

It monitors the „maximum load according to load chart and reeving“.

In operating modes with derrick ballast, this is the maximum load of the current crane condition. It is shown on LICCON monitor 0. The current utilization of the crane results from the load utilization bar **1** on LICCON monitor 0.

If the load utilization bar reaches 90 %, an advance warning is given in the form of a „notice icon“ and a „SHORT HORN“ on monitor 0.

At 100 % on the load utilization bar, the shut-off of all load moment increasing movements with the „stop icon“ and the acoustic warning „HORN“ occurs on LICCON monitor 0.

Note

▶ The „maximum load of the current crane condition“ can possibly be increased further, refer to section Utilization conditions.

10.7.2 Monitoring of test point 1-operational maximum force (= F1 max)

It is displayed on monitor 1.

At ninety percent $F1_{max}$-utilization **2** an advance warning is given in the form of a notice icon and a „SHORT HORN“ on the LICCON-Monitor 1.

At hundred percent $F1_{max}$-shut-off of all load moment increasing movements take place with the „Stop-icon“ and the acoustic warning „HORN“ on the LICCON-Monitor 1.

If the „Maximum load according to the load chart and the reeving“ is not reached (utilization bar **1**), then the „Maximum load of the current crane condition“ can still be increased by:

- Pulling up the derrick ballast, if the derrick ballast is not already suspended and the currently pulled derrick ballast is still smaller than the optimum derrick ballast.
- Telescoping out the derrick ballast if the placed derrick ballast is still smaller than the optimum derrick ballast.
- Increasing the derrick ballast by adding additional ballast plates if the placed ballast is still smaller than the optimum ballast.

10.8 Utilization conditions

The current utilization of the crane results from the load utilization bar **1** on the LICCON monitor 0 and the F1-utilization bar **2** on the LICCON monitor 1.

The „Maximum load of the current **crane condition**“ is reached when the load utilization bar **1** has reached 100 % or when the F1- utilization bar **2** has reached 100 %.

The „Maximum load of the current **crane equipment**“ is reached when the load utilization bar **1** has reached 100 % or when the F1- utilization bar **2** has reached 100 % and the derrick ballast is suspended (ballast utilization bar **3** at 100 %, if the ballast input value and the ballast weighing are correct).

The „Maximum load according to the load chart and the reeving“ (100 % limit of load utilization bar) and the maximum load according to $F1_{max}$ operation (100 % limit of the F1 utilization bar) can be bypassed by the following measure:

- Set up key **D** on LICCON monitor 0:
  For function and effects of the set up key **D**, see chapter 4.20.

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DANGER
The crane can topple over!
Due to deliberate improper use of the set up key **D**, the crane can collapse, the boom can break off or the crane can topple over.
Death, severe bodily injuries, property damage.
▶ The crane operator must have understood the function and effects of an actuation before actuating the set up key **D**, see chapter 4.20.

Note
▶ The „Lift ballast“ or „Lower ballast“ movement requires utmost attention by the crane operator.

10.9 Checking the length sensor value on the derrick ballast

CAUTION
Danger of accident!
If the derrick ballast radius is measured incorrectly, the false radius value will result in the calculated maximum lifted load and F1-Operation-max-force being too high.
The crane will be overloaded unnoticed and can topple over.
Death, severe bodily injuries, property damage.
▶ The crane operator may not rely blindly on the derrick ballast radius measurement, but he must think for himself and check if the measurement is still working correctly.
▶ With completely telescoped in / out derrick ballast, the „Derrick ballast radius“ display must approximately show the corresponding end position.

Note
▶ When telescoping the suspended ballast guide, the display „Derrick ballast radius“ on the LICCON monitor must change according to the movement of the derrick ballast. If this is not the case, the crane operator can immediately recognize that if the length sensor rope drum jams when spooling in or out.

▶ When telescoping the derrick ballast in and out, the „Derrick ballast radius“ display must be observed carefully on the LICCON monitor.

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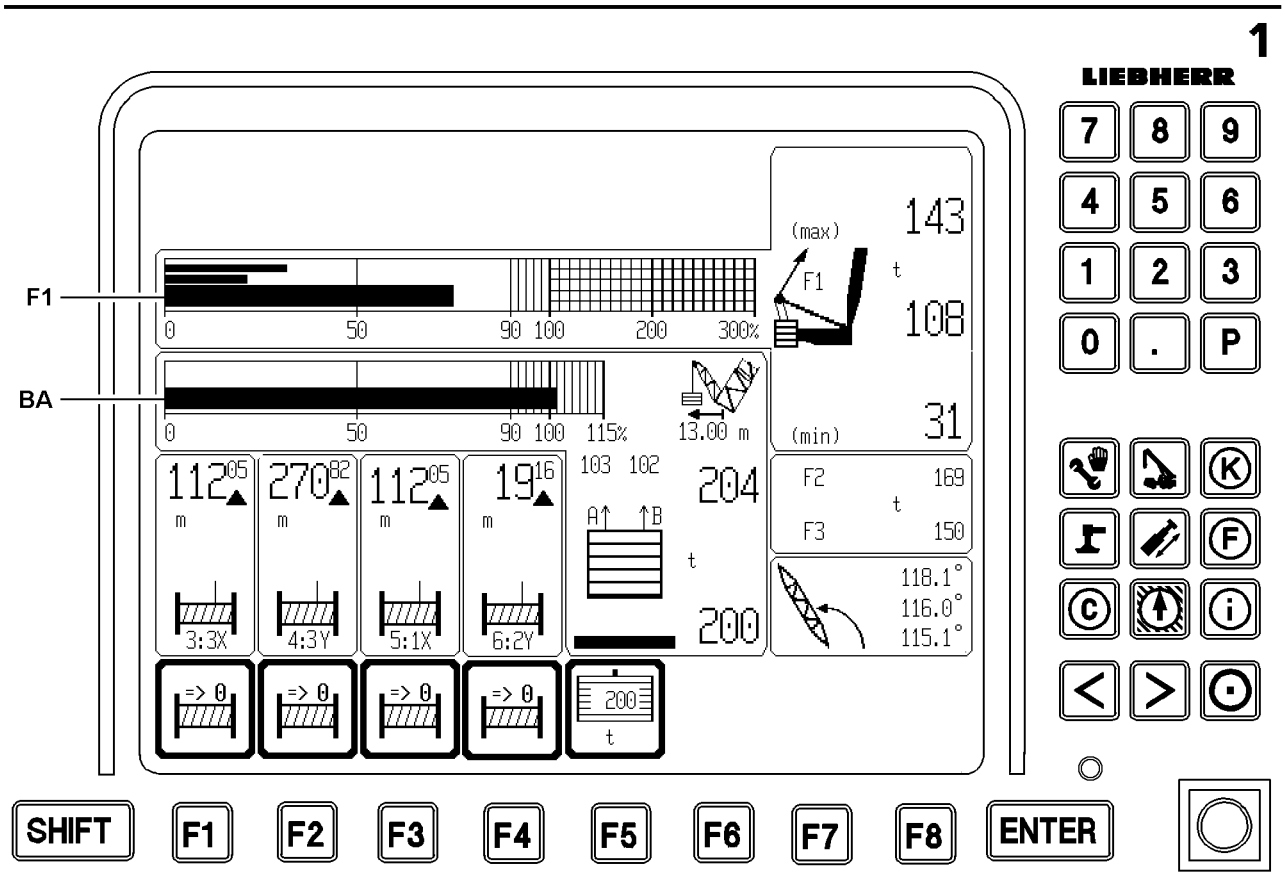
10.10 Differential force monitoring for derrick ballast-guying



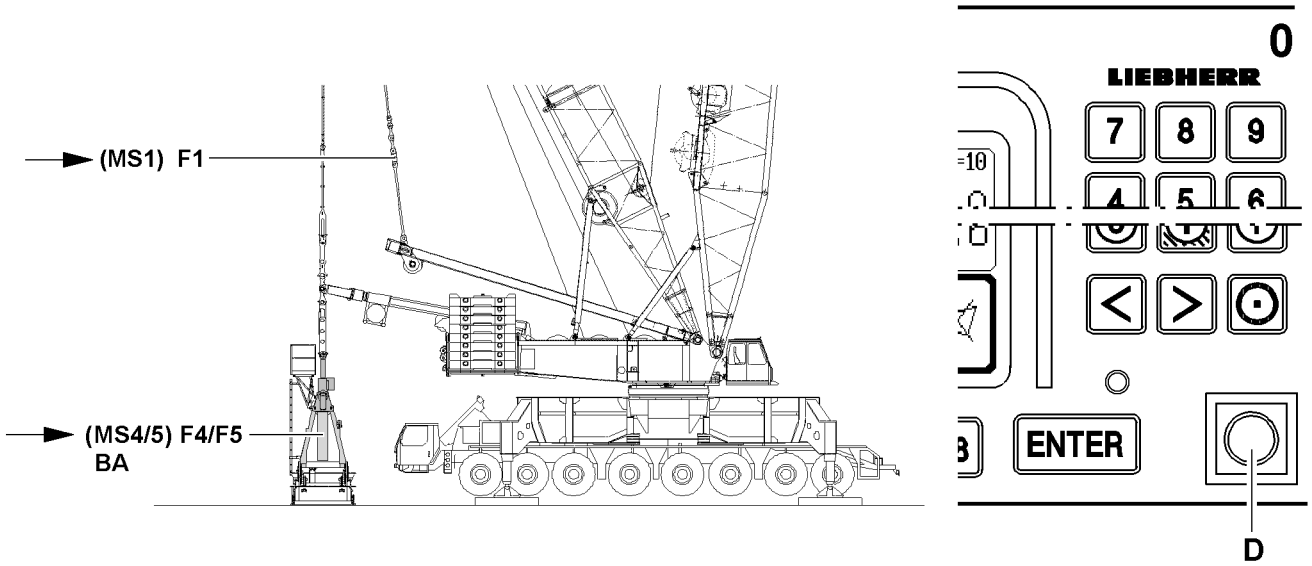


Fig.147649

In operating modes with derrick ballast, the difference of the forces between derrick ballast guyings A and B is monitored on LICCON monitor 1. If the difference exceeds a permissible value, an acoustic warning is issued and the two force values blink.

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WARNING
Danger of accident due to damaged crane components!
Too high a difference in the derrick ballast guying A and B can have the result that the derrick ballast moves in an impermissible inclined position, and thereby the derrick end section, the ballast guide or other crane components may be damaged.
Death, severe bodily injuries, property damage.
- ▶ The forces in the derrick ballast guyings A and B must be carefully monitored on the LICCON monitor.
- ▶ If the specified limit value is exceeded, **no shut-off** of crane movement occurs.
- ▶ The maximum permissible length difference on the derrick ballast guying A and B, in relation to the extension conditions on the pull cylinders, may not exceed 40 mm.

Exceeding the limit value can have the following causes:
- Deflection on the turntable.
- The ground under the derrick ballast is uneven.
- The crane is leaning to one side.
- The derrick ballast has been loaded on one side.
- The force measurement in one derrick ballast guying is incorrect.

The crane operator must recognize the correct cause and take countermeasures:
- Error message appears.
- The error, which caused the one-sided force, must be remedied.
- The following measures are permitted providing the ground is only slightly uneven:
  Lock one pull cylinder and with the other pull cylinder lift the derrick ballast or „Derrick ballast lower“ activate until the difference between the forces A and B is smaller.
- If the sensor values are implausible: Check whether the ballast weighing pressure sensors or inputs for the ballast weighing are faulty. If necessary, pull out the sensor or replace the CPU.

11 Disassembling

WARNING
Danger of falling!
During assembly / disassembly, inspection and maintenance work, personnel must be secured with appropriate aids to prevent them from falling.
If this is not observed, assembly personnel could fall and be killed or seriously injured.
- ▶ All work at a height, when there is a danger of falling, must be carried out with suitable aids.
- ▶ If aids are not available and work cannot be carried out from the ground, then assembly personnel must secure themselves with the supplied fall arrest system to prevent falling, see chapter 2.04.
- ▶ If fall protection equipment is available, then it must be used, see chapter 2.06.
- ▶ When lifting, lowering, swinging crane parts in and out, no persons may remain in the danger zone.
- ▶ If railings are present on the components, then they must be brought into the corresponding position and secured for assembly / disassembly work.
- ▶ Only step on the aids, ladders and catwalks with clean shoes.
- ▶ Keep aids, ladders and catwalks free of heavy dirt, snow and ice.
- ▶ During all assembly and disassembly work, maintenance work and inspections, travel or crane operation is prohibited.
- ▶ Remaining on a suspended load is prohibited.
- ▶ Stepping or walking on crane components and lattice sections, which have an incline of more than 20° is prohibited.
- ▶ For all assembly work, the crane operator of the main crane must be in voice contact with the crane operator / crane operators of the auxiliary crane / auxiliary cranes.
- ▶ For assembly / disassembly tasks, the crane operator may only initiate crane movements when the responsible guide has explicitly released the movement.

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WARNING
Danger of impact / crushing!
When installing / removing crane components with the auxiliary crane, crane components can start to swing back and forth.
When lifting / lowering and positioning crane components, there is an increased danger of impacts / crushing.
Death, severe bodily injuries, property damage.
- ▶ Make sure that personnel cannot be caught by components.
- ▶ When working in danger zones: Use aids to protect limbs.
- ▶ Guide components with suitable aids to minimize oscillation.

DANGER
The components can fall down!
If the corresponding component is disengaged from the auxiliary crane before the corresponding component is pinned, then the corresponding component can fall down.
Death, severe bodily injuries, property damage.
- ▶ Do not disengage the auxiliary crane until the respective component is pinned and secured.

DANGER
The crane can topple over!
The placement surface for the derrick ballast must be level, horizontal and of sufficient load bearing capacity, otherwise the ballast stacks can tip over.
Death, severe bodily injuries, property damage.
- ▶ Check the horizontal position of the crane during the set down procedure.
- ▶ Check the horizontal position of the derrick ballast during the set down procedure.
- ▶ Constantly check the difference forces in the guying on the LICCON monitor.

Make sure that the following prerequisites are met:
- The placement surface for the derrick ballast must be level, horizontal and of sufficient load bearing capacity.
- The crane is properly supported and horizontally aligned.
- An auxiliary crane is available.
- The counterweight has been installed on the turntable according to the load chart.
- The maximum ground unevenness for the placement surface of the derrick ballast is plus / minus 1°.
- The LICCON overload protection has been set according to the data in the load chart.
- The LICCON overload protection settings have been compared with the actual set up configuration.

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11.1 Setting down the divisible ballast pallet „VarioTray“

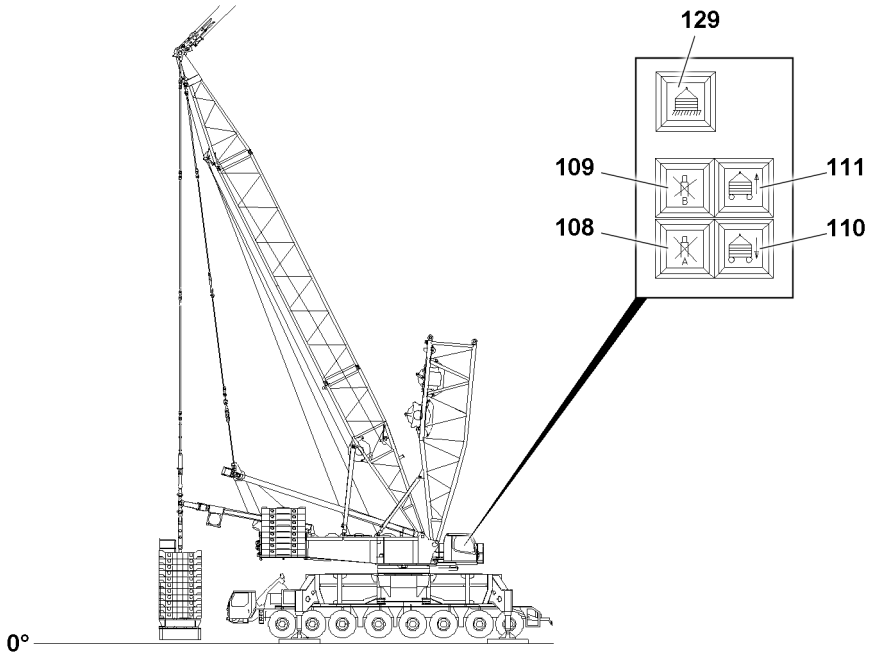

Fig.147651: Setting down the divisible ballast pallet „VarioTray“

Note

- ▶ The suspended ballast guide must be telescoped in all the way before setting the divisible ballast pallet „VarioTray“ down on the ground.
- ▶ The derrick boom radius and the derrick ballast radius must be identical.

Make sure that the following prerequisites are met:

- The suspended ballast guide is telescoped in all the way.
- The derrick boom radius and the derrick ballast radius are identical.
- The placement of the derrick ballast and the load is observed by a guide.

▶ Press the button **110**.

Result:

- The piston rods of the pull cylinders extend.
- The derrick ballast is lowered.

Note

- ▶ If the divisible ballast pallet „VarioTray“ leans at an angle and if there is a difference in the forces in the derrick ballast guying, realign the divisible ballast pallet „VarioTray“ until it is horizontal.

▶ Press the button **108**.
or
Press the button **109**.

Result:

- The corresponding pull cylinder is blocked.

▶ Extend or retract the unblocked pull cylinder by pressing button **110** or button **111** until the divisible ballast pallet „VarioTray“ is aligned horizontally.

When the divisible ballast pallet „VarioTray“ is horizontally aligned:

▶ Press the button **110** and lower the divisible ballast pallet „VarioTray“ with the pull cylinders onto the ground, until the warning light **129** lights up.

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Result:

– The **„turning the turntable“** and **„driving the crawler“** crane movements turn off.
– The crane movement „**Derrick ballast down**“ turns off.

11.2 Removing the ballast plates

Note
▶ The ballast plates are marked with their own weights.

WARNING
The crane can topple over!
If more than 25 t are removed with one lift from a ballast stack or if the ballast is removed asymmetrically, then the crane can topple over.
Death, severe bodily injuries, property damage.
▶ A weight difference between the right and left ballast stack of more than 25 t is prohibited.
▶ Alternately remove no more than maximum 25 t ballast assemblies from the ballast stack, symmetrically on the left and right.

WARNING
Damaged ballast plates!
Damage on the ballast plates can cause the fastening equipment to release.
The ballast plates and components can fall down.
Death, severe bodily injuries, property damage.
▶ Do not use damaged ballast plates and replace them immediately.

WARNING
Toppling ballast stack!
Lopsided stacked ballast plates create instability in the ballast stack.
The ballast plates can tip from the divisible ballast pallet „VarioTray“ and cause the crane to topple over.
Death, severe bodily injuries, property damage.
▶ Make sure that the ballast plates are placed correctly in the centerings.

Make sure that the following prerequisite is met:
– The ballast plates are released.
– The divisible ballast pallet „VarioTray“ is placed on the ground.
– An auxiliary crane is available.

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11.2.1 Removing the ballast plates, fastening system: „Twistlock“

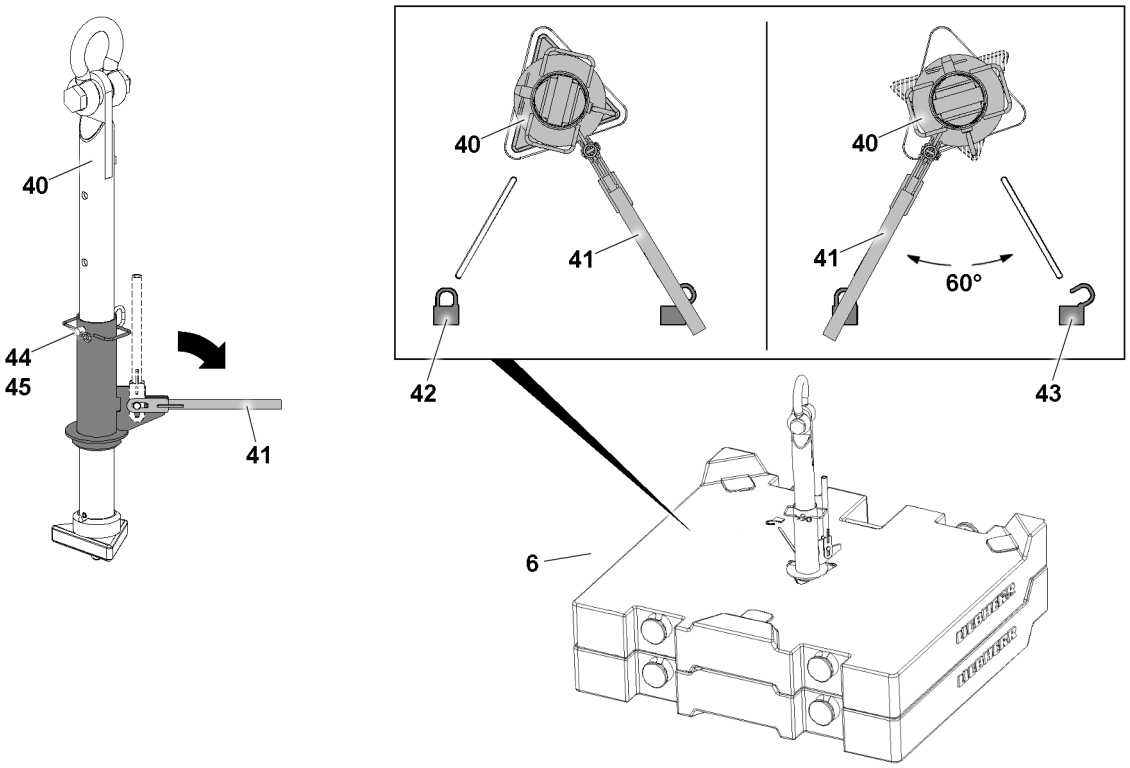

Fig.147646: Ballast plates, fastening system: „Twistlock“

WARNING
Danger of accident!
If more than the permissible two ballast plates are lifted with the receptacle stud, the receptacle stud will be overloaded and can be damaged.
Death, severe bodily injuries, property damage.
▶ Make sure that the ballast plates are placed correctly in the centerings.
▶ Replace damaged ballast plates.

To remove the ballast plate(s), use the receptacle stud **40**.

Before the receptacle stud **40** is guided into the ballast plates, it must be ensured that the length of the receptacle stud is set correctly. The length of the receptacle stud **40** can be adjusted with the pin **44**.

If the length of the receptacle stud **40** is to be adjusted:
▶ Release and unpin the pin **44**.
▶ Adjust the length of the receptacle stud by moving the receptacle stud **40**.
▶ Insert the pin **44** and secure it with the retaining element **45**.
▶ Fasten the receptacle stud **40** to the auxiliary crane and guide it into the ballast plate(s).
▶ Pull the lever **41** up and fold it down.
▶ Turn the lever **41** 60° until the lever **41** points to the icon **42**.

Result:

– The receptacle stud **40** is locked with the ballast plate / ballast plates.

▶ Lift the ballast plate(s) with the receptacle stud **40** and remove it from the ballast stack or the small ballast pallet.

When the ballast plate(s) are taken down:
▶ Turn the lever **41** 60° until the lever **41** points to the icon **43**.

Result:

– The receptacle stud **40** is unlocked.

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- ▶ Carefully pull the receptacle stud **40** from the ballast plate / ballast plates.
- ▶ Alternately remove the ballast plates **3** on both sides.

11.2.2 Removing the ballast plates, fastening points: Bitt

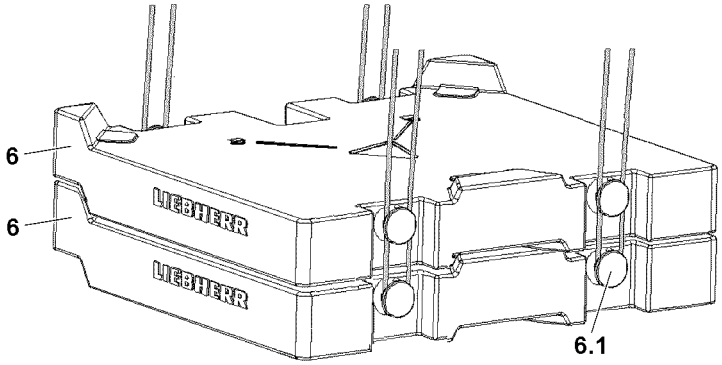

Fig.128927: Ballast plates, fastening system: „Bitt“

WARNING
Falling ballast plates!
If more than the permissible loads are lifted, then the bitts **6.1** are overloaded and the ballast plates can fall down.
Death, severe bodily injuries, property damage.
- ▶ Lift the ballast plates individually or as a package, maximum 25 t , 4 fastening points.
- ▶ Observe the section „Permissible ballast assemblies“ in this chapter.
- ▶ Replace damaged ballast plates immediately.

WARNING
Incorrect handling of the fastening equipment!
If fastening equipment cannot be attached correctly and if it is not secured sufficiently to prevent it from loosening up, loads can fall down.
Death, severe bodily injuries, property damage.
- ▶ Make sure that the fastening equipment is correctly attached on the bitts **6.1** and that it is secured sufficiently to prevent it from loosening up.

- ▶ Lift the ballast plate or ballast package and remove it from the ballast stack or the small ballast pallet.
- ▶ Alternately remove the ballast plates on both sides.

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11.3 Disassembling the divisible ballast pallet „VarioTray“ on the suspended ballast guide

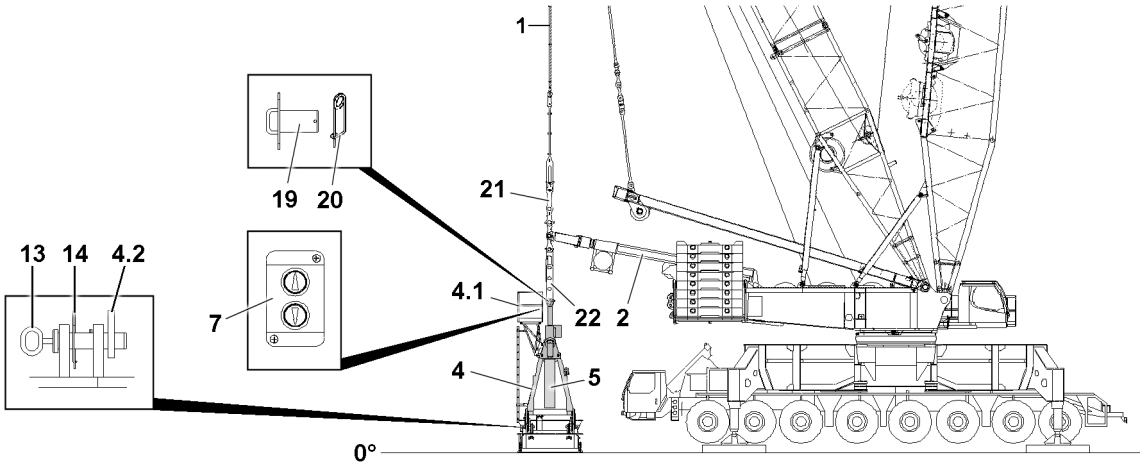

Fig.147645: Disassembling the divisible ballast pallet „VarioTray“

Make sure that the following prerequisites are met:
- The divisible ballast pallet „VarioTray“ is unballasted.
- The divisible ballast pallet „VarioTray“ is set on the ground.
- An auxiliary crane is available.

DANGER
Danger of fatal injury due to toppling erection racks!
If the erection racks are **not** secured with the retaining pins **13** before disassembly of the divisible ballast pallet „VarioTray“ on the suspended ballast guide, then the erection racks tip over.
Death, severe bodily injuries, property damage.
- ▶ Pin the erection racks before disassembly on the suspended ballast guide with the retaining pins **13** and secure with the retaining element **14**.
- ▶ Before unpinning the piston rods on the suspended ballast guide, perform a visual inspection.

- ▶ Remove the retaining element **20** on the pin **19**.
- ▶ Unpin the pin **19**.

When the pins **19** are unpinned on both sides:
- ▶ Retract the piston rods for the pull cylinders **5** completely.

11.4 Disconnecting the electrical Connections from the divisible ballast pallet „VarioTray“ to the suspended ballast guide

Note
- ▶ Release the electrical connections only when the divisible ballast pallet „VarioTray“ is completely unpinned on the suspended ballast guide, which means both pins **19** must be unpinned.

Make sure that the following prerequisite is met:
- The divisible ballast pallet „VarioTray“ is completely unpinned on the suspended ballast guide.

- ▶ Disconnect the electrical connections and store the cable properly.
- ▶ Close the electrical connections off properly with dummy plugs or protective caps.

11.5 Disconnecting the hydraulic connections from the divisible ballast pallet „VarioTray“ to the suspended ballast guide

The hydraulic connections are made with quick couplings.

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When disconnecting hydraulic lines with quick couplings, make sure that the coupling procedure is carried out correctly.

WARNING
Pressure in the hydraulic lines!
If the pressure supply is not interrupted before connecting / releasing the hydraulic lines, the hydraulic oil can escape with high pressure.
Death, severe bodily injuries, property damage.
▶ Release the pressure in the hydraulic system before connecting / disconnecting: Interrupt the pressure supply and wait for a short time.

▶ Release the hydraulic coupling by hand.
▶ Disconnect the hydraulic connections, see Hydraulic diagram.
▶ Protect the hydraulic connections from contamination with caps.
▶ Store the hydraulic lines on the suspended ballast guide.

11.6 Disassembling the derrick ballast guying on the suspended ballast guide

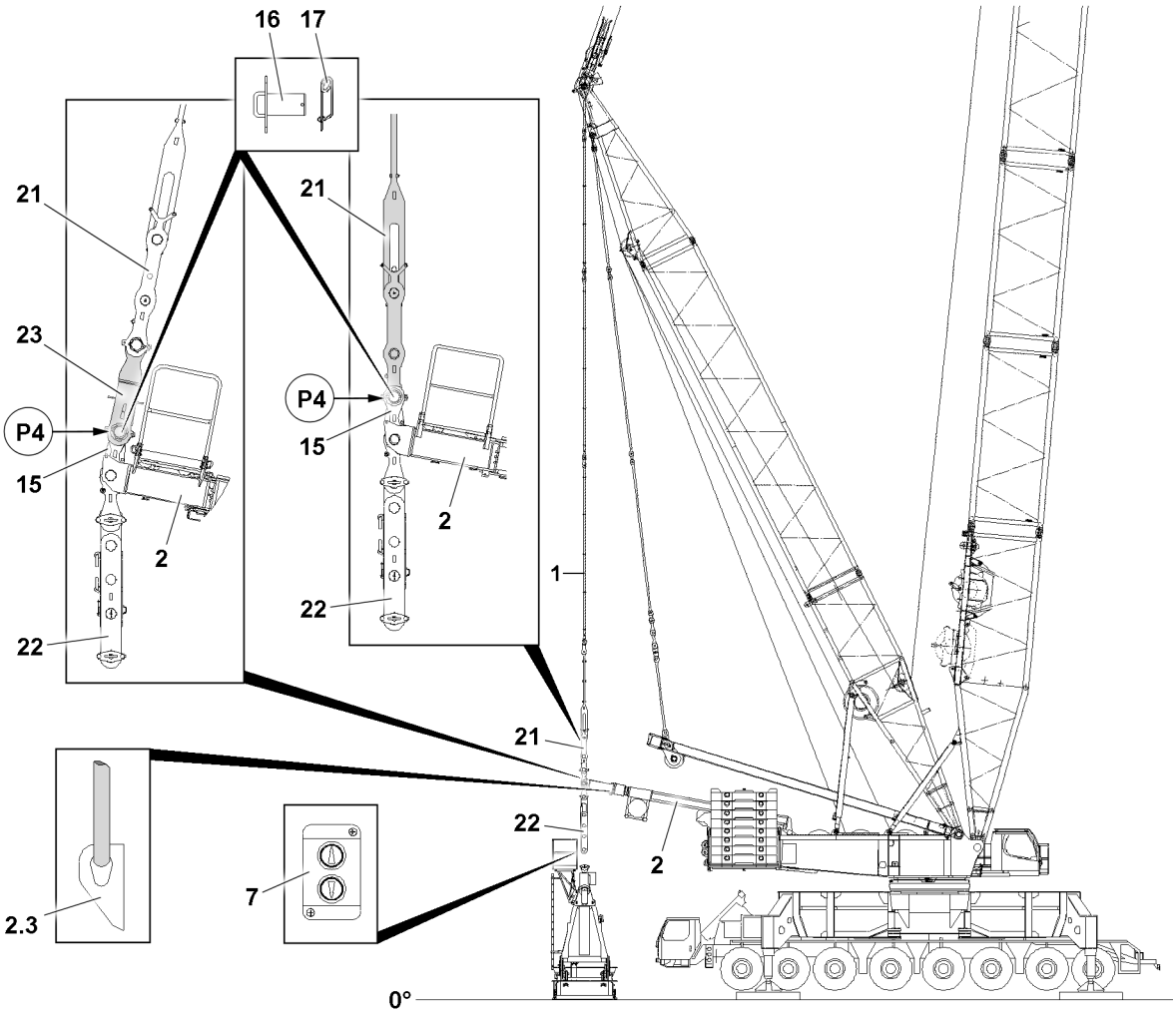

Fig.147644: Disassembling the derrick ballast guying

For disassembly of the derrick ballast guying on the suspended ballast guide, it is required to raise the suspended ballast guide with the auxiliary crane until the derrick ballast guying is relieved and the connector pins can be unpinned.

▶ Fasten the suspended ballast guide **2** on the lashing lugs **2.3** to the auxiliary crane.

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▶ Lift the suspended ballast guide **2** with the auxiliary crane.

When the derrick ballast guying **1** is relieved:
▶ Remove the retaining element **17** on both sides and unpin the pin **16** at point **P4**.

When the pins **16** are completely unpinned:
▶ Carefully take down the suspended ballast guide **2** with the auxiliary crane onto the receptacle on the turntable.

When the suspended ballast guide **2** is lying on the turntable:
▶ Remove the auxiliary crane.

11.7 Disconnecting the electrical connections from the suspended ballast guide to the turntable

Note
▶ Disconnect the electrical connections first after the derrick ballast guying is disassembled and the suspended ballast guide is completely taken down on the turntable.

▶ Disconnect the electrical connections and store on the suspended ballast guide properly.
▶ Close the electrical connections off properly with dummy plugs or protective caps.

11.8 Disconnecting the hydraulic connections from the suspended ballast guide to the turntable

The hydraulic connections are made with quick couplings.

When disconnecting hydraulic lines with quick couplings, make sure that the coupling procedure is carried out correctly.

WARNING
Pressure in the hydraulic lines!
If the pressure supply is not interrupted before connecting / releasing the hydraulic lines, the hydraulic oil can escape with high pressure.
Death, severe bodily injuries, property damage.
▶ Release the pressure in the hydraulic system before connecting / disconnecting: Interrupt the pressure supply and wait for a short time.

▶ Release the hydraulic coupling by hand.
▶ Disconnect the hydraulic connections, see Hydraulic diagram.
▶ Protect the hydraulic connections from contamination with caps.
▶ Store the hydraulic lines on the suspended ballast guide.

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11.9 Disassembling the suspended ballast guide on the turntable

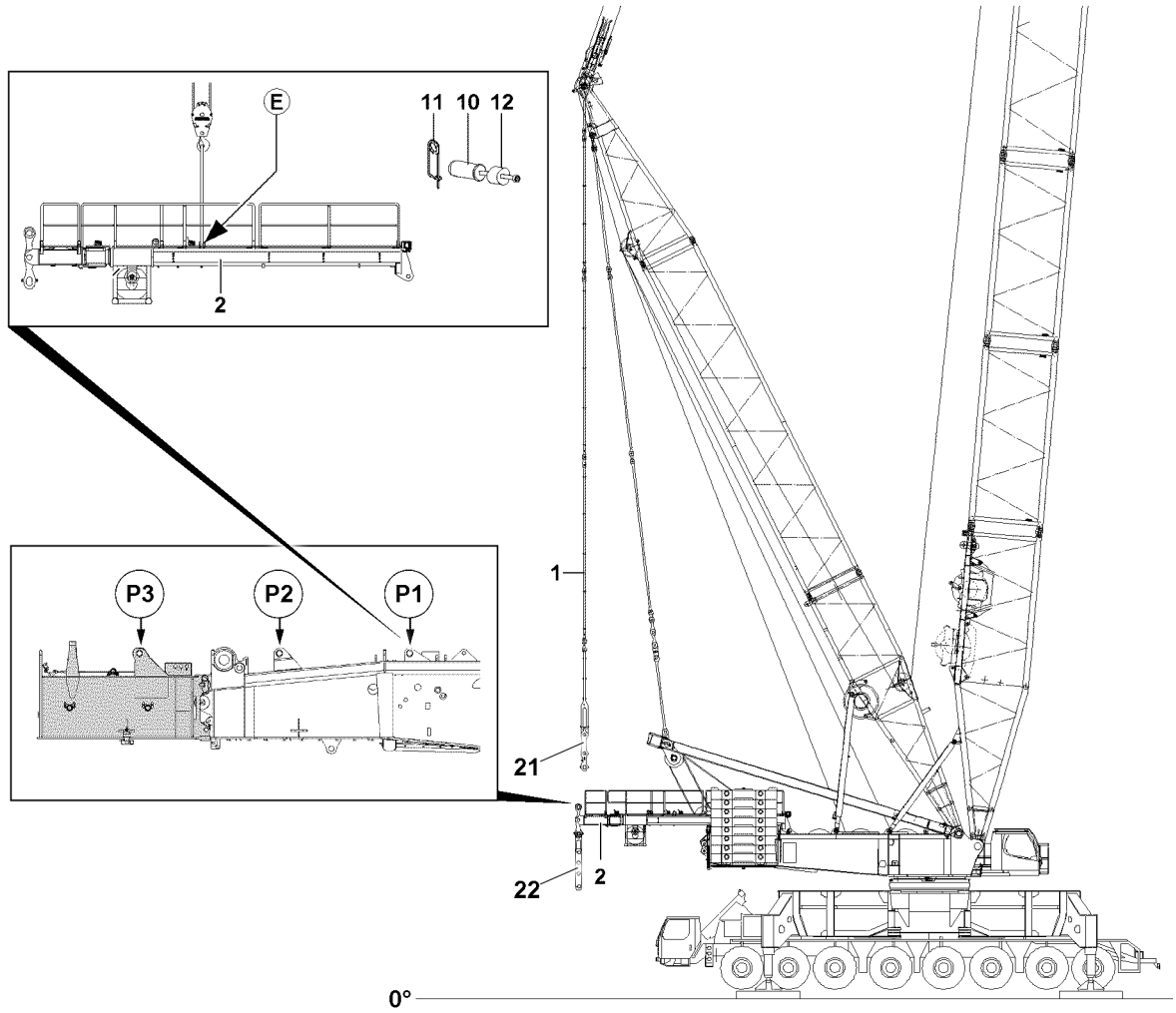

Fig.147643: Removing the suspended ballast guide

- ▶ Fasten the suspended ballast guide **2** to the lashing lugs point **E** to the auxiliary crane.
- ▶ Tension the fastening equipment with caution.

When the fastening equipment is tensioned:

- ▶ Remove the retaining element **11** on both sides and unpin the pin **10** at point **P1**.
  or
  Remove the retaining element **11** on both sides and unpin the pin **10** at point **P2**.
  or
  Remove the retaining element **11** on both sides and unpin the pin **10** at point **P3**.

NOTICE
Damage to the crane!
By swinging out the suspended ballast guide **2**, severe property damage can occur in the area of the turntable or the suspended ballast guide.

- ▶ Swing out suspended ballast guide carefully and with the least possible speed.

- ▶ Lift the suspended ballast guide **2** and swing out on the turntable.
- ▶ Take down the suspended ballast guide **2** so it will not topple over.
- ▶ Remove the auxiliary crane.

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11.10 Folding in the swing arms on the suspended ballast guide

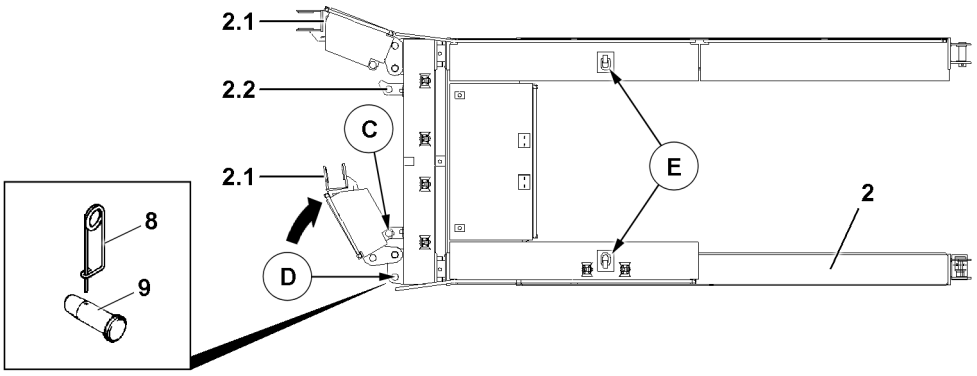

Fig.147538: Folding in the swing arms

In order to reestablish the transport width after disassembly of the suspended ballast guide, bring the swing arms **2.1** - after crane operation - back into transport position and secure.

Bring the swing arms **2.1** into the transport position and secure.

- ▶ Release and unpin the locking pins **8** on both sides at point **D**.
- ▶ Fold the swing arms **2.1** in into the transport position (direction of the arrow).

When the swing arms **2.1** are in the transport position:

- ▶ Insert the locking pins **8** on the left and right at point **C** and secure with the retaining element **9**.

11.11 Disassembling the divisible ballast pallet „VarioTray“

11.11.1 Taking down the erection racks

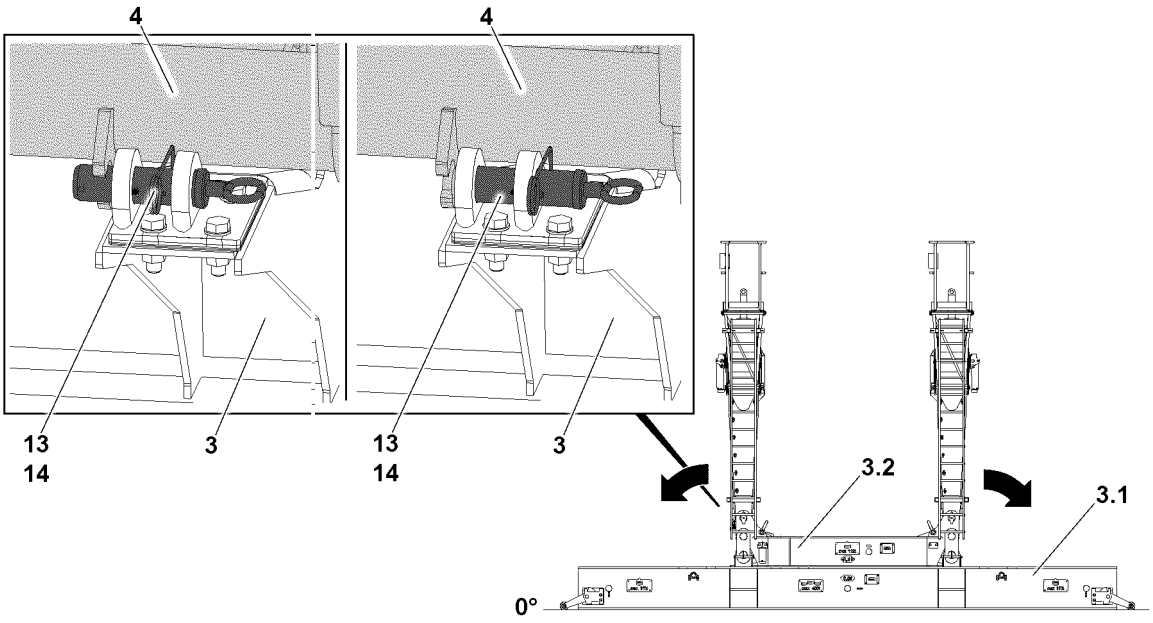

Fig.144304: Taking down the erection racks

Note

- ▶ Taking down the erection racks **4** is identical for both erection racks and is described using the example of one erection rack.

DANGER
Danger of accident during assembly / disassembly of the erection racks!
The small ballast pallet **3.2** must be safely pinned and secured on the large ballast pallet **3.1**, otherwise the small ballast pallet **3.2** can tip over when taking down the erection racks **4**.
Death, severe bodily injuries, property damage.
▶ Make sure that when taking down the erection racks **4** that the small ballast pallet **3.2** is pinned and secured with the large ballast plate **3.1**.

DANGER
Danger of accident during assembly / disassembly of the erection racks!
The erection racks **4** must hang securely on the auxiliary crane, otherwise the erection racks **4** can tip over.
Death, severe bodily injuries, property damage.
▶ Never unpin the retaining pins of unsecured or unsupported erection racks.
▶ It is prohibited for anyone to remain under the erection racks **4** or within the complete danger zone during the pinning and unpinning procedure.

Make sure that the following prerequisites are met:
– The erection racks **4** are in the operating position.
– The small ballast pallet **3.2** is pinned and secured with the large ballast pallet **3.1**.

▶ Fasten the erection rack **4** to the auxiliary crane.

When the erection rack **4** is safely held by the auxiliary crane:
▶ Remove the retaining element **14** and unpin the retaining pin **13**.
▶ Secure the retaining pin **13** in the transport position with the retaining element **14**.
▶ Lower the erection rack **4** with the auxiliary crane until the foot **30** can be swung.

11.11.2 Swinging the foot

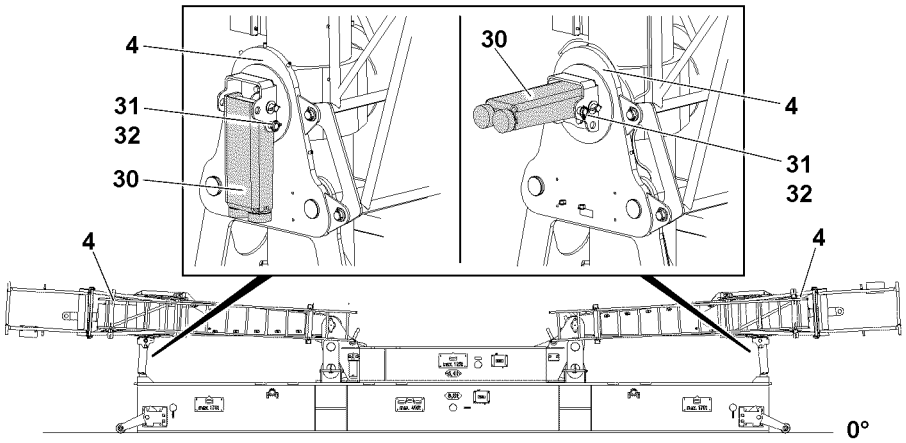

Fig.144303: Taking down the erection racks

WARNING
Foot swinging down!
The foot **30** can swing down uncontrolled due to its own weight when it is unpinned.
Death, severe bodily injuries.
Fingers and hands can be crushed.
▶ When unpinning the pin connection, hold the foot **30**.
▶ Do not reach with your hands into the danger zone.

▶ Unpin the foot **30** from the park position: Remove the retaining element **32** and unpin the pin **31**.
▶ Swing the foot **30** into the transport position.
▶ Insert the pin **31** and secure it with the retaining element **32**.
▶ Lower the erection rack **4** with the auxiliary crane until the foot **30** is lying on the frame.

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When the erection rack **4** is attached to the frame:

- ▶ Remove the auxiliary crane.
- ▶ Take down the second erection rack according to the assembly of the first erection rack.

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5.38 S/SL-boom

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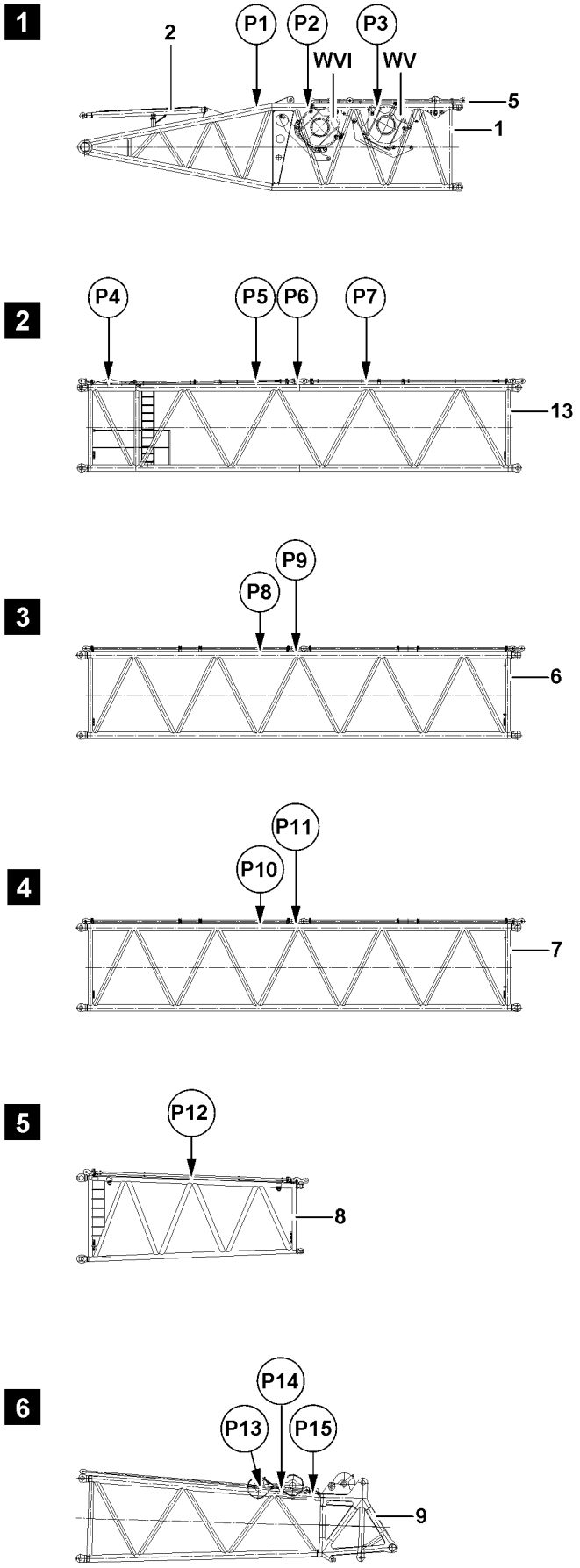

Fig.112549

1 Component overview S-/SL-boom

Examples for components of S-/SL-boom:

1 S-pivot section
- Pivot section with winch 5 **WV**, winch 6 **WVI** and W-guy rods **5**, see illustration **1**

2 S-relapse retainer
- See illustration **1**

13 S-intermediate section 2826.20
- Intermediate section 14 m with guy bracket on point **P4** for flying assembly, see illustration **2**

6 S-intermediate section 2826.30
- Intermediate section 14 m , reinforced intermediate section for S-system, see illustration **3**

7 S-intermediate section 2826.20
- Intermediate section 14 m , standard intermediate section for S-system, see illustration **4**

8 SL-reducer section
- See illustration **5**

9 S-end section
- See illustration **6**

2 Fastening points S-/SL-components

WARNING
Component incorrectly fastened!
Life-threatening situations can arise due to improper or incorrect attachment of the corresponding components.
Personnel can be severely injured or killed.
▶ Fasten the components only on the intended fastening points on both sides.
▶ Fastening of components and description of fastening points, see Crane operating instructions, chapter 5.01.

Component	Fastening point	Illustration
S-pivot section, without winches	P1 and P2	1
S-pivot section, with winches	P1 and P3	1
S-intermediate section 2826.20 for flying assembly	P5 and P6	2
S-intermediate section, without usage	P7	2
S-intermediate section 2826.30, reinforced	P8 and P9	3
S-intermediate section 2826.20	P10 and P11	4
SL-reducer section	P12	5
S-end section, without pulley set	P13 and P14	6
S-end section, with pulley set	P13 and P15	6

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3 Assembling the S/SL boom

Note

▶ The assembly is described on the example of the S-boom.

WARNING

Danger of falling!

During assembly / disassembly, inspection and maintenance work, assembly personnel must be secured with appropriate aids to prevent them from falling. If this is not observed, assembly personnel could fall and suffer life-threatening or fatal injuries.

- ▶ All work aloft, where there is a danger of falling must be carried out with suitable aids.
- ▶ If fall arrest equipment is available, then it must be used, see Crane operating instructions, chapter 2.06.
- ▶ If aids are not available and work cannot be carried out from the ground, then the assembly personnel must secure themselves with the specified fall arrest system to prevent falling, see Crane operating instructions, chapter 2.04.
- ▶ The fall arrest system must be fastened on the fastening and hook points as well as on the safety ropes. For safety points, see Crane operating instructions, chapter 2.06.
- ▶ Only step on the aids, ladders and catwalks with clean shoes.
- ▶ Keep aids, ladders and catwalks free of heavy dirt, snow and ice.
- ▶ Remaining on as well as under a suspended load is prohibited.
- ▶ Remaining on or within crane components (for example: At assembly of boom sections, lattice sections) which are moved during lifting, lowering, turning or closing procedures is strictly prohibited.
- ▶ During all assembly and disassembly work, maintenance work and inspections, travel or crane operation is prohibited.
- ▶ It is prohibited to step on the boom system or an auxiliary boom without suitable protective devices.
- ▶ Stepping and walking on crane components and lattice sections, which have an incline of more than 20° is prohibited.

WARNING

The lattice sections can fall down!

If the lattice sections are not pinned and secured correctly, then they can fall down and fatally injure personnel.

- ▶ Pin or unpin both pins at the same horizontal level, i.e. **left and right**.
- ▶ Do not stand under the lattice sections or within the entire danger zone during the pinning and unpinning procedure of the boom.
- ▶ Secure the pins in the bearing points and the receptacles.
- ▶ It is prohibited to lean the ladder against the component being disassembled.
- ▶ Do not remove the fastening equipment and the auxiliary crane until each component is pinned on and secured.

WARNING

Danger of impact / crushing!

When installing / removing crane components with the auxiliary crane, crane components can start to swing back and forth.

When lifting / lowering and positioning crane components, there is an increased danger of impacts / crushing.

Personnel can be caught and severely injured or killed.

- ▶ Make sure that personnel cannot be caught by components.
- ▶ Make sure that the crane is aligned in horizontal position to avoid the support beams from swinging by themselves.
- ▶ When working in danger zones: Use aids to protect limbs.
- ▶ Guide components with suitable aids to minimize oscillation.

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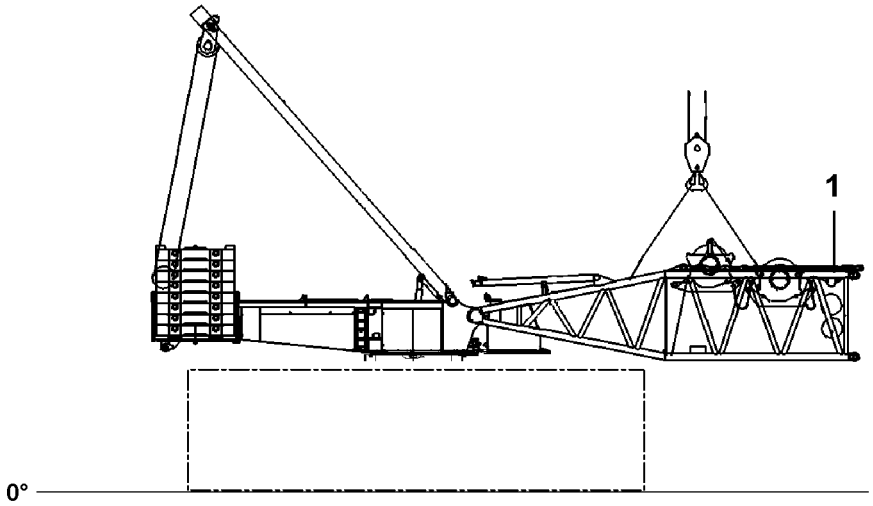

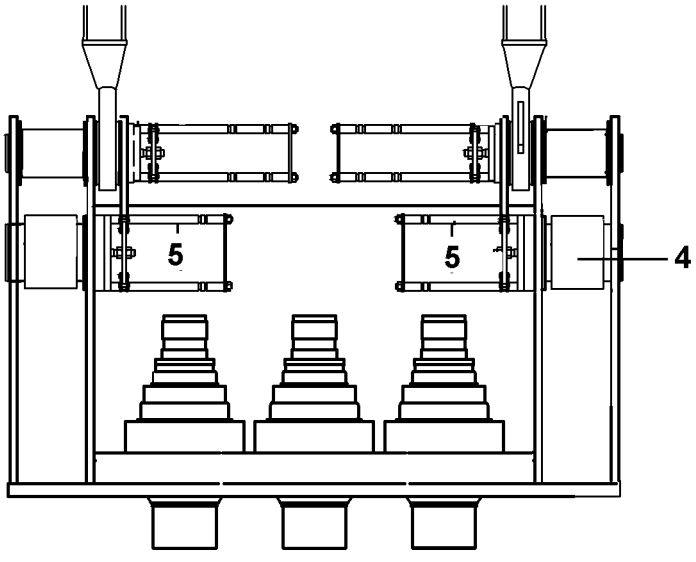

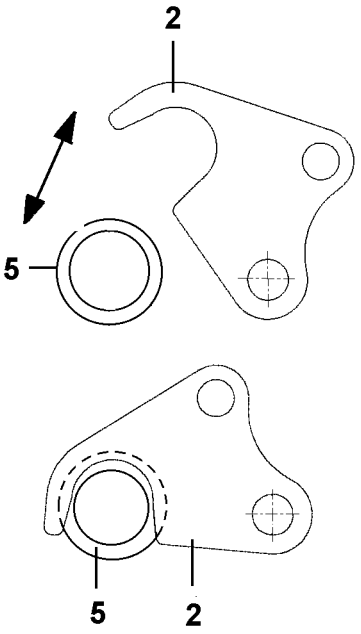

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Fig.120948

WARNING
The crane can topple over!
- ▶ The turntable may not be turned during the assembly of the boom.
- ▶ Observe the assembly conditions, see Crane operating instructions, chapter 3.06.

WARNING
Danger of accident!
If the following instructions are not observed, personnel can be severely injured or killed.
- ▶ For assembly of the boom combinations, the rod plan must be observed and adhered to.
- ▶ Depending on the condition of the ground, the boom and the lattice sections must be supported from below for the assembly of the boom.
- ▶ Observe the technical safety notes, see Crane operating instructions, chapter 5.01.

Make sure that the following prerequisites are met:
- – The crane is aligned in horizontal direction.
- – An auxiliary crane is available.
- – An assembly scaffolding / work platform is available.
- – The central ballast has been attached according to the load chart.
- – The counterweight has been installed on the turntable according to the load chart.
- – The LICCON overload protection has been set according to the data in the load chart.

3.1 Turning the turntable into assembly position

- ▶ Turn the turntable in longitudinal direction of the crawler travel gear or to the side, see Erection and take down charts.

3.2 Exceeding the LICCON overload protection for assembly

WARNING
Danger of accident due to function „Exceeding the shut off limits of the LICCON overload protection“!
If the shut off limits of the LICCON overload protection are exceeded, there is no additional protection against crane overload.
Due to erroneous operation or deliberate misuse, the crane could collapse, the boom can break off or the crane can topple over.
Personnel can be severely injured or killed.
- ▶ The function „Exceeding the shut off limits of the LICCON overload protection“ is only permissible in emergencies and for assembly purposes.
- ▶ The function „Exceeding the shut off limits of the LICCON overload protection“ may only be actuated by persons who know the effects of their actions regarding the function „Exceeding the shut off limits of the LICCON overload protection“.
- ▶ The function „Exceeding the shut off limits of the LICCON overload protection“ requires the presence of an authorized person and must be performed with utmost caution.
- ▶ Crane operation with activated function „Exceeding the shut off limits of the LICCON overload protection“ is prohibited.

- ▶ Exceeding the shut off limits of the LICCON overload protection: Engage assembly operation.

Result:

- – The shut off limits of the LICCON overload protection are exceeded.
- – The assembly icon appears on the LICCON monitor.

Note
- ▶ See Crane operating instructions, chapter 4.02.

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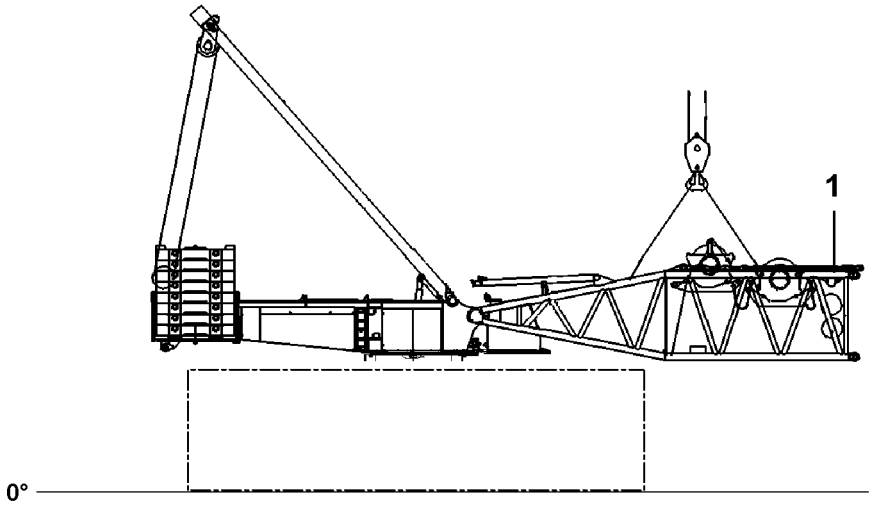

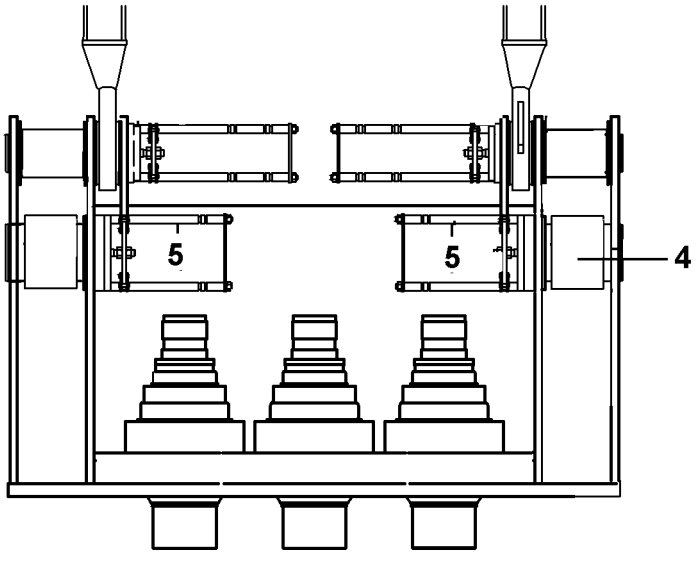

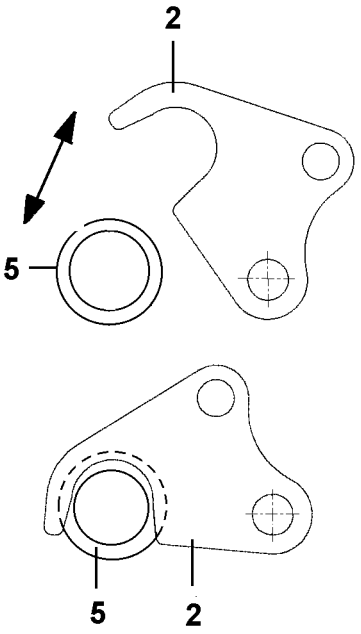

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Fig.120948

3.3 Pinning the S-pivot section on the turntable

WARNING
General danger notes!
- ▶ Support the S-boom during assembly with suitable materials.
- ▶ All pins are to be secured after assembly with the intended safety elements.
- ▶ The guy rods must be inspected regularly, see Crane operating instructions, chapter 8.15.

Make sure that the following prerequisite is met:
- – The pins **4** are unpinned.

▶ Hang the S-pivot section **1** onto the auxiliary crane and swing in to the pin points on the turntable.

The pin pulling cylinders on the turntable are actuated with the radio remote control (only available for LR-cranes).

Note
▶ For operation of the radio remote control, see Crane operating instructions, chapter 6.08.

WARNING
The S-pivot section can fold downward!
Due to non-secured or insufficiently secured connector pins, the S-pivot section can fold down.
Personnel can be severely injured or killed.
▶ Secure the pins **4** between the S-pivot section **1** and the turntable after the pinning procedure with the retaining hook **2**.

▶ Fold the retaining hook **2** out on the guides **5**.
▶ Insert the pins **4** on both sides.

When the pins **4** are completely pinned on the left and right on the S-pivot section **1**:
▶ Secure the pin **4**: Fold the retaining hook **2** in on the left and right on the guides **5**.

NOTICE
Damage to the S-pivot section!
When the installed S-pivot section is placed on the ground, the S-pivot section can be damaged.
▶ Slowly place the S-pivot section **1** with the auxiliary crane and at low speed on the ground.
▶ Before placing it on the ground, support the S-pivot section **1**.

▶ Carefully place the S-pivot section **1** on the support.
▶ Remove the auxiliary crane.

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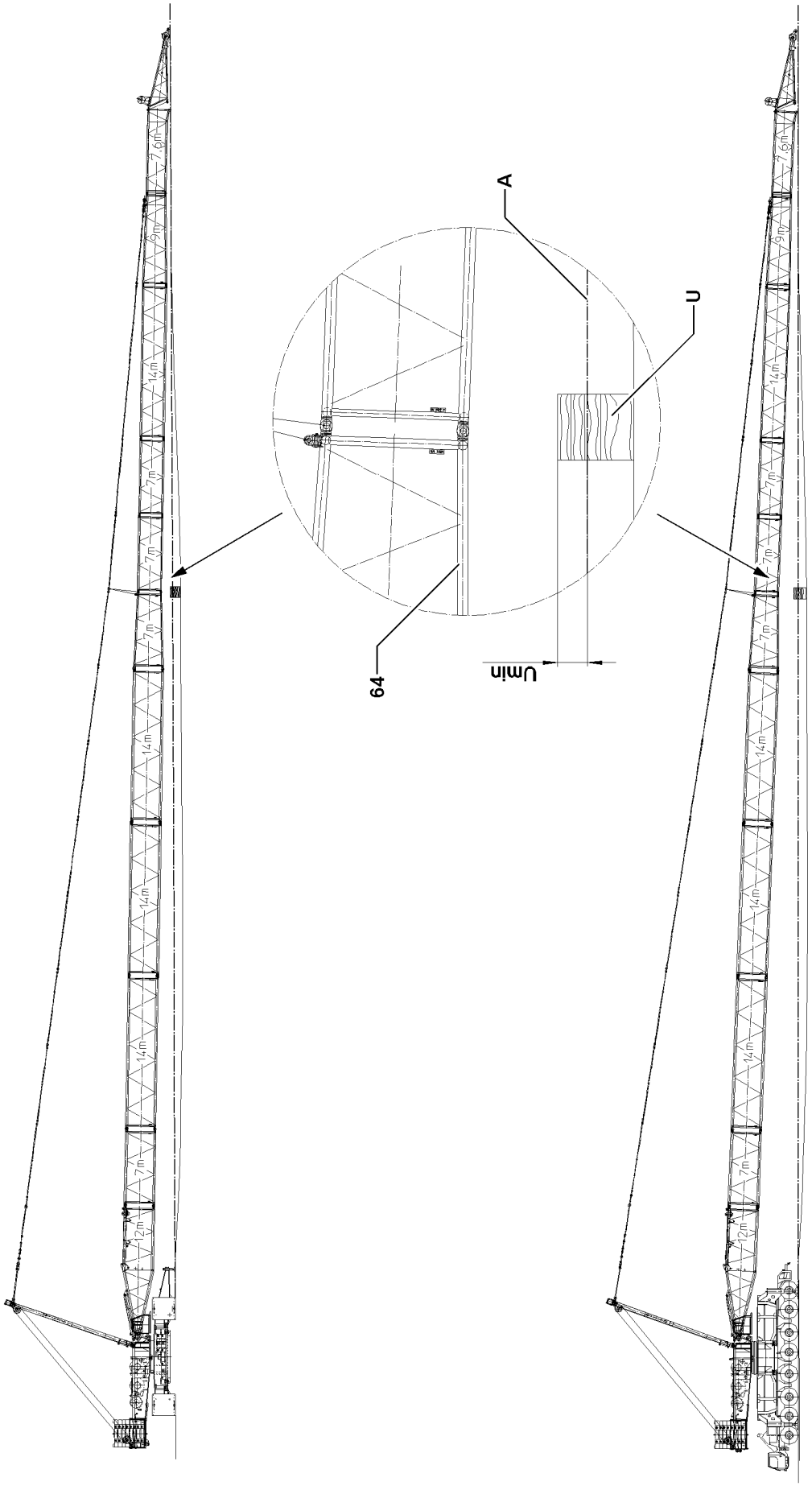

Fig.111626

3.4 Supporting the S/SL-boom combination for erection

NOTICE
Overload of boom!
If the SL-boom is not supported before the erection procedure, then the boom will be overloaded. The crane will be damaged during erection.
- ▶ For boom lengths SL/SL2, larger than 104 m , a support base must be used.
- ▶ Support the boom with suitable material of sufficient load bearing capacity.

Note
- ▶ The alignment level **A** is the placement level of the crane.

Note
- ▶ The boom combination must be supported on the reducer section **64** with the lug for the auxiliary guying until the dimension U_{min} above the alignment level **A**, see illustration and the following charts.

LR-crane	Boom system	U_{min}	Equipment
	SL-105m	0.0 m to 0.3 m	- Adapter 7.6 m - Boom nose 100 t

LG-crane	Boom system	U_{min}	Equipment
	SL-105m	Larger than 1.10 m	- Adapter 7.6 m - Boom nose 100 t
	SL-112m	Larger than 0.90 m	
	SL-115.5m	Larger than 0.90 m	

- ▶ Make sure that the upper edge of the base support **U** is dimension U_{min} above the alignment level **A**.
- ▶ Place the SL/SL2-boom combination on the supporting base **U**.

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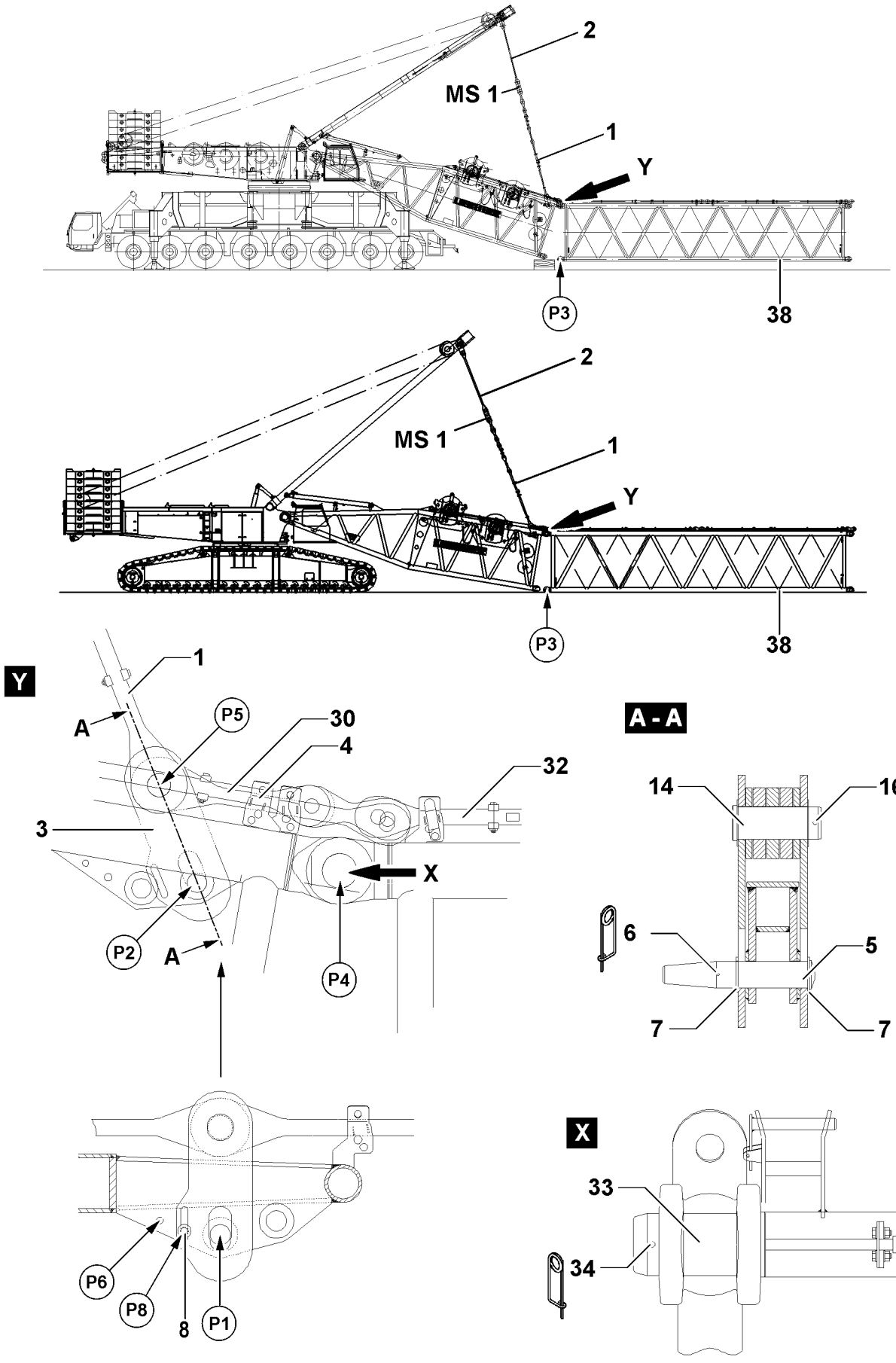

Fig.112553

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3.5 Assembling the S-lattice sections

The assembly of the lattice sections is carried out in various ways:
- „Closing“ the boom.
- Assembling the lattice sections in „Flying mode“.

WARNING
General danger notes!
- ▶ Support the S-boom during assembly / disassembly with suitable materials.
- ▶ All pins are to be secured after assembly with the intended safety elements.
- ▶ The guy rods must be inspected regularly, see Crane operating instructions, chapter 8.15.
- ▶ Secure the boom with support or auxiliary crane, see Crane operating instructions, chapter 5.01.
- ▶ It is prohibited for anyone to remain under the booms or within the complete danger zone during the pinning and unpinning procedure of the lattice section.

Note
- ▶ For weights of intermediate sections with placed guy rods, see Crane operating instructions, chapter 1.03.
- ▶ The intermediate sections are pinned with the aid of the pin pulling device, see Crane operating instructions, chapter 5.30.

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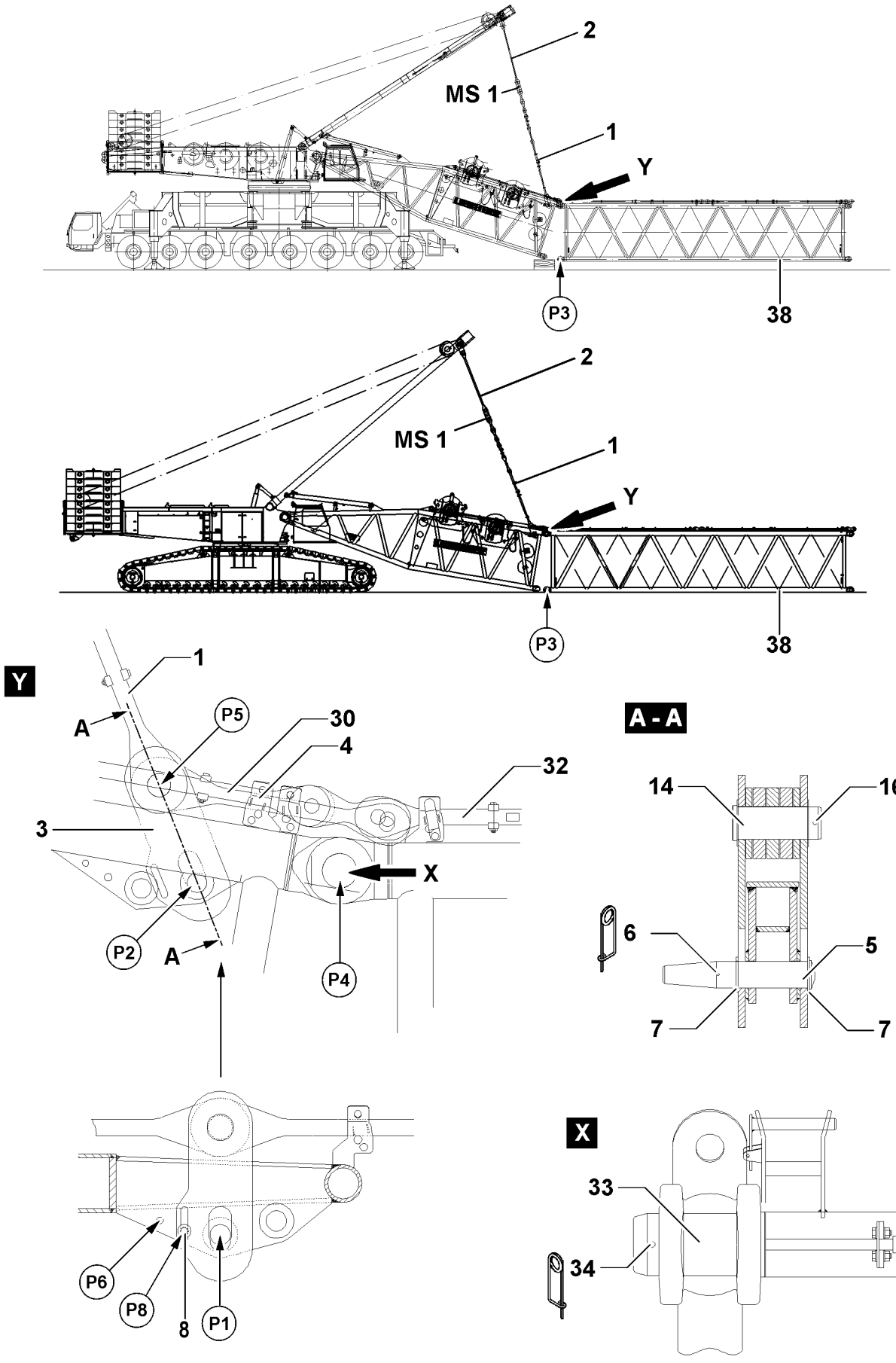

Fig.112553

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3.5.1 Assembling the S-lattice sections („close“ boom)

Make sure that the following prerequisites are met:
- The S-pivot section is pinned and secured on the turntable.
- The S-pivot section is placed on the ground.
- The auxiliary crane is removed.

Connecting the guy rods SA-frame with the guy rods S-pivot section

NOTICE
Assembly bracket secured in transport position!
When the assembly bracket **3** is secured in transport position at assembly or operation, components will be damaged.
▶ Assemble the transport retainer **8** before assembly and before operation in transport position on point **P6**, see detail **Y**.

Note
▶ Flying assembly with derrick: The assembly bracket **3** is pinned on point **P1**.

▶ Release the assembly bracket **3**: Disassemble the transport retainer **8** on both sides on point **P8** and assemble on point **P6**.
▶ Unpin the assembly bracket **3** on the S-pivot section: Remove the spring retainer **6** and unpin the pin **5** on both sides on point **P1**.

When pinning the pin **5**, you have to use the washers **7**, see sectional **A-A**.

▶ Pin the assembly bracket **3** on the S-pivot section: Insert the pins **5** on both sides on point **P2** and secure.
▶ Unpin the transport retainers **4** for the guy rods.
▶ Lower the SA-frame to the front until the guy rods **2** hang freely over the guy rods **1** of the S-intermediate section.
▶ Pin the guy rods **2** of the SA-frame with the guy rods **1** of the S-pivot section and secure.
▶ Make sure that the guy rod **1**, guy rod **4** and assembly bracket **3** are pinned with each other, point **P5** see detail **D**.
▶ Make sure that the assembly bracket **3** is secured with spring retainer **16**.
▶ Erect the SA-frame to the point where the guy rods are completely tensioned, see illustration.

Pinning the S-intermediate section on the S-pivot section on top

▶ Attach the S-intermediate section on the auxiliary crane and align on the S-pivot section until the pin bores align.

When the pin bores on the S-pivot section and on the S-intermediate section align:
▶ Pin the S-intermediate section on the S-pivot section „on top“: Insert the pin **33** on both sides at point **P4** and secure with spring retainer **34**, see detail **X**.

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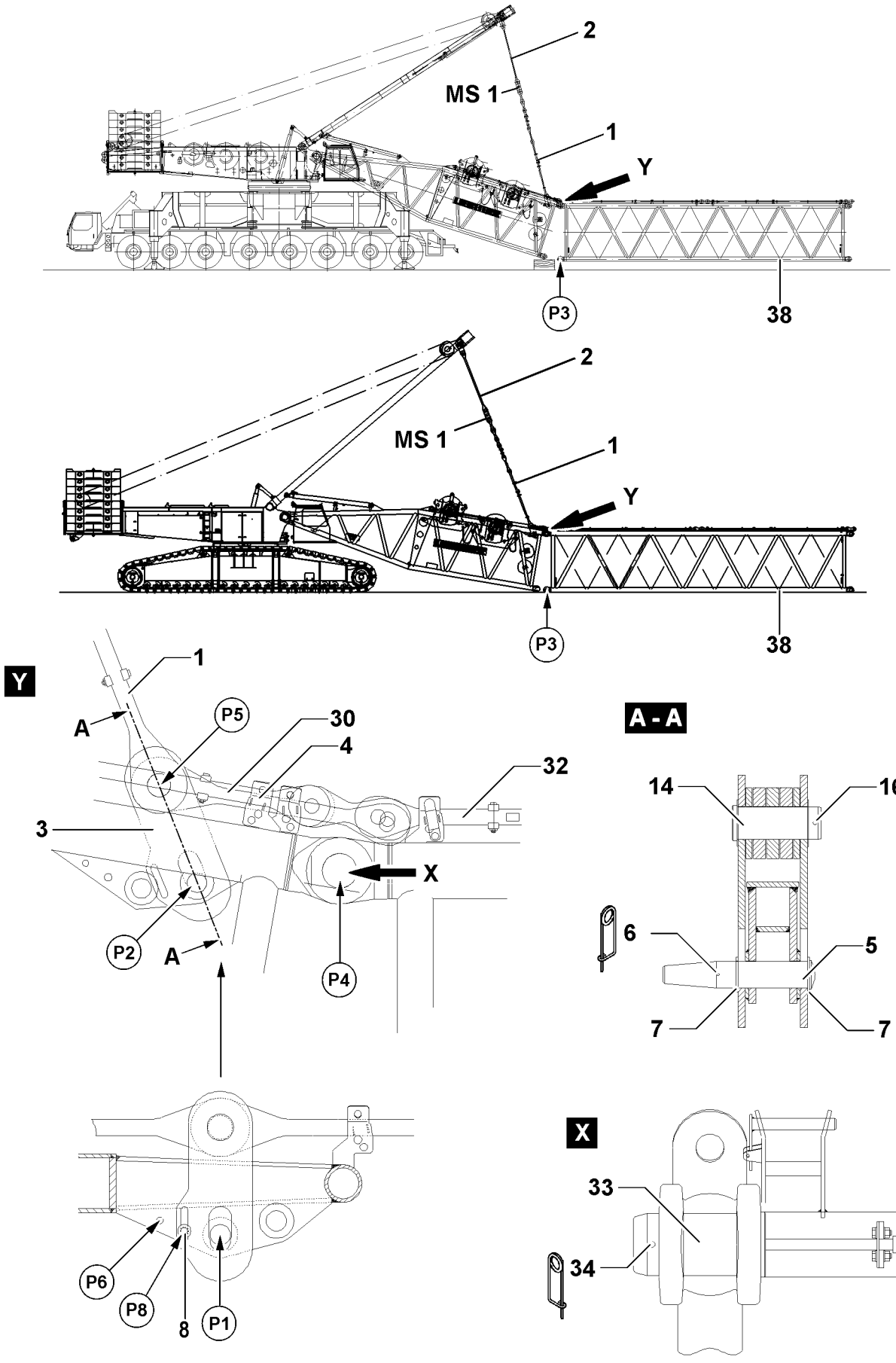

Fig.112553

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Closing the boom

WARNING
The crane can topple over!
If the following conditions are not met, the crane can topple over or be significantly damaged.
Personnel can be severely injured or killed.

- ▶ The end section of the corresponding S/SL-boom combination may **not** lift off the ground during the „Closing procedure“.
- ▶ Boom combinations only to a certain system length may be closed with the SA-frame, see the following chart.

Crane	Boom system	Maximum system length	Equipment
LR	S	84 m	- with S- and WA-frame II guy rods - base support on S-pivot section and on S-end section
	SL	98 m	- with S-guy rods - base support on S-pivot section and on L-end section
LG	S	91 m	- with S- and WA-frame II guy rods - base support on S-pivot section and on S-end section
	SL	98 m	- with S-guy rods
			- base support on S-pivot section and on L-end section
	SL	105 m	- with S-guy rods - base support on S-pivot section, on L-end section and on the end of the reducer section

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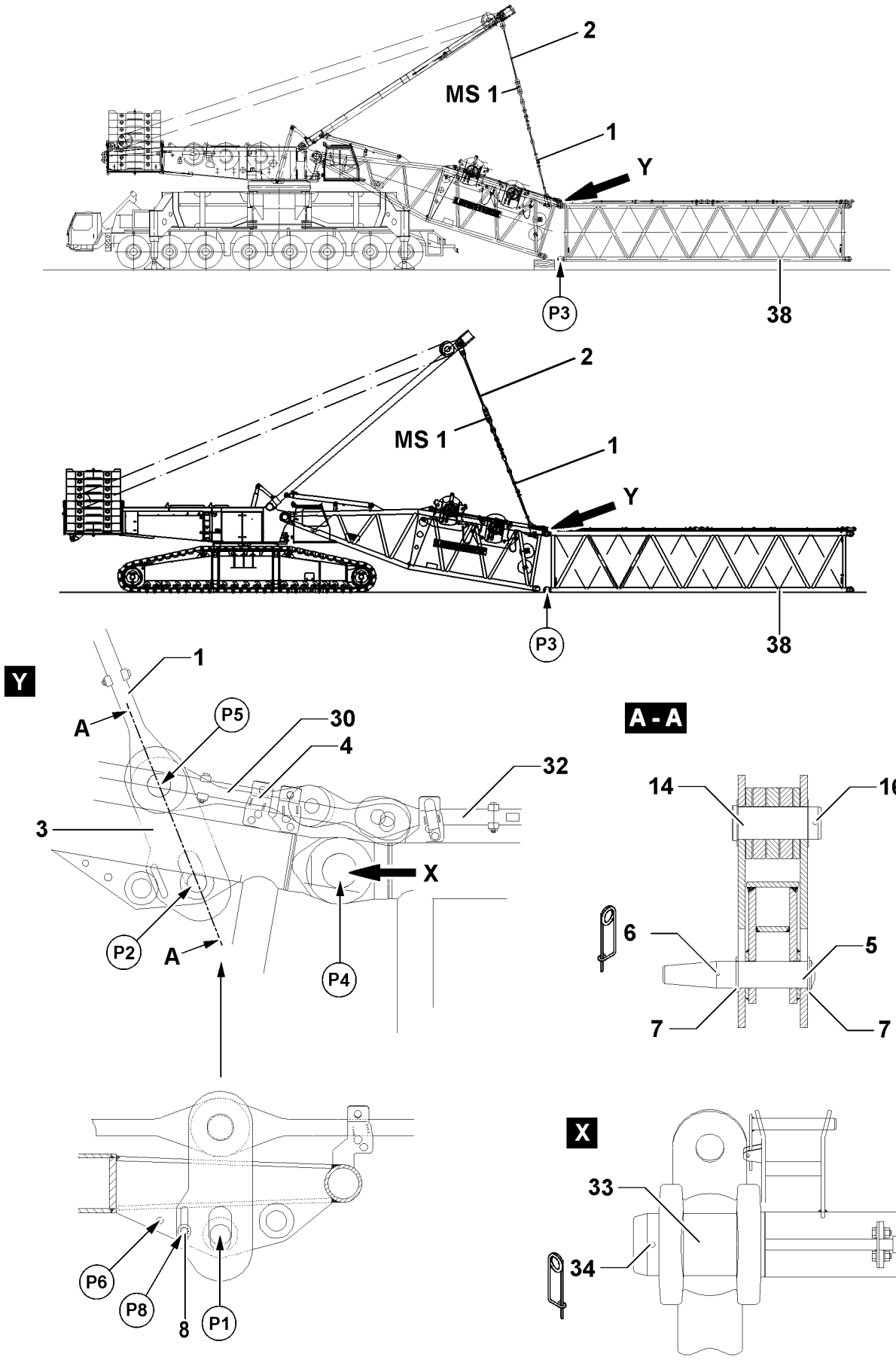

Fig.112553

Note

- ▶ The actual force on the test point **MS1** - which is exerted during the closing procedure of the boom system - is shown on the LICCON monitor 1.
- ▶ The actual force is noted and kept ready for the disassembly of the boom system.
- ▶ During the boom disassembly, the guying is tensioned with the noted actual force (assembly) so that the connector pins of the intermediate sections can be unpinned.

Note

- ▶ The guy rods of the intermediate sections are only assembled after the closing procedure.
- ▶ The brackets **30** and guy rods **32** are not pinned for the closing procedure.

The S-boom must be assembled to the required length before the S-boom can be closed. The assembly is described on the example of an intermediate section.

- ▶ Position the S-intermediate section with the auxiliary crane on the S-pivot section until the pin points align.
- ▶ Pin the S-lattice sections with each other: Insert the pin **33** on both sides on „top“ and secure with spring retainer **34**, see detail **X**.
- ▶ Pin the S-lattice sections with each other: Insert the pin **33** on both sides on the „bottom“ and secure with spring retainer **34**, see detail **X**.

When the S/SL-boom combination is assembled to the desired length:

- ▶ Lift the S-pivot section **1** with the SA-frame until the pin bores on the „bottom“ align at point **P3**.
- ▶ Read the actual force of the test point **MS1** on the LICCON monitor and note.
- ▶ Pin the S-lattice section on the S-pivot section „on the bottom“: Insert the pin **33** on both sides at point **P3** and secure with spring retainer **34**, see detail **X**.

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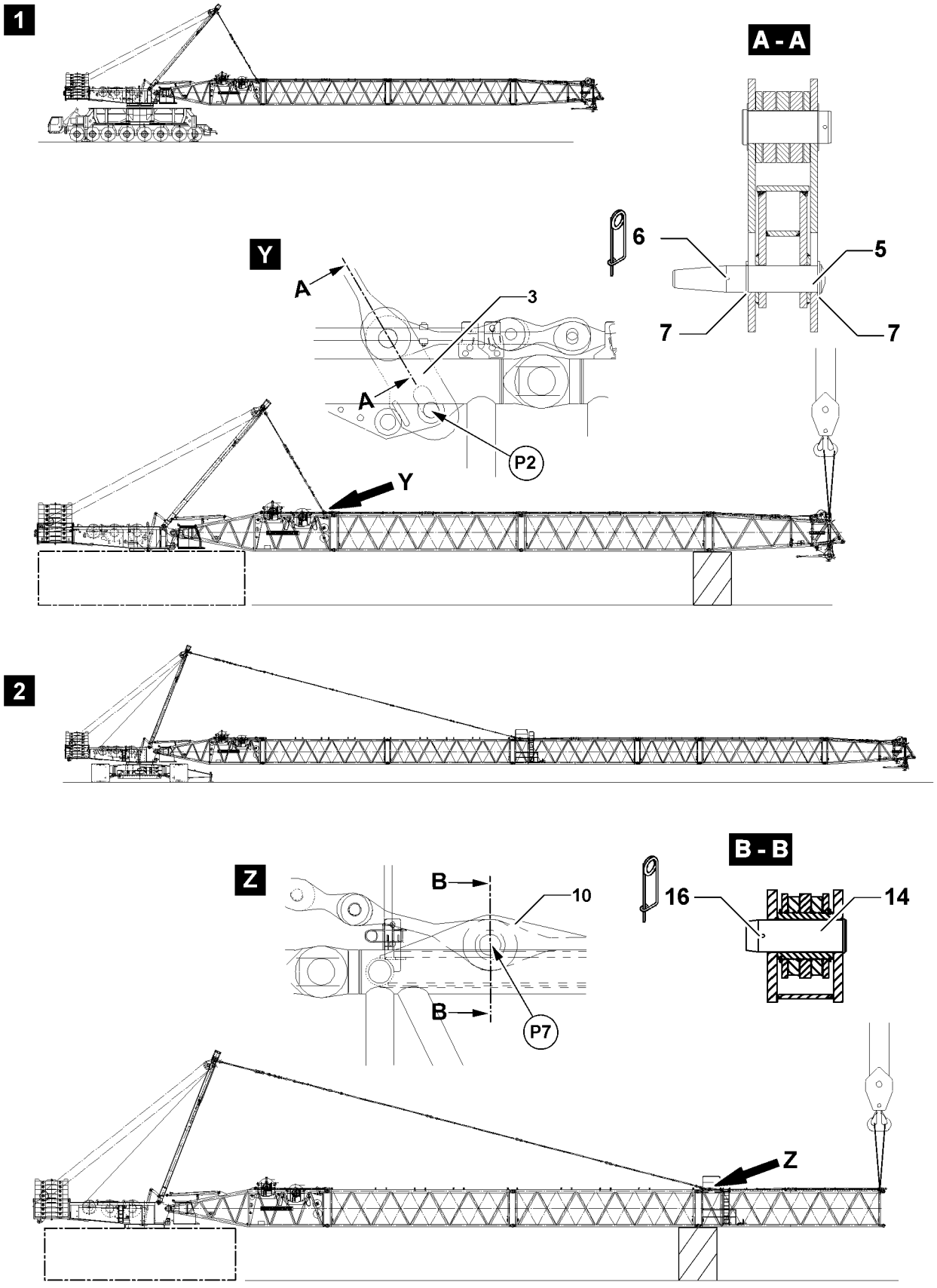

Fig.112554

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3.5.2 Assembling the S-lattice sections in „Flying mode“

If spatial prerequisites on the job site are limited for the assembly of the S-boom, or if they are limited by buildings or similar, then the S-boom can be installed in flying mode.

For the flying assembly, a differentiation is made between the guy points on the boom:
- Guying on S-pivot section, see illustrations **1**.
- Guying on the S-intermediate section 14 m 2620.20 for flying assembly, see illustrations **2**.

WARNING
General danger notes!
- ▶ Support the S-boom during assembly / disassembly with suitable materials.
- ▶ All pins are to be secured after assembly with the intended safety elements.
- ▶ The guy rods must be inspected regularly, see Crane operating instructions, chapter 8.15.
- ▶ Secure the boom with support or auxiliary crane, see Crane operating instructions, chapter 5.01.
- ▶ It is prohibited for anyone to remain under the booms or within the complete danger zone during the pinning and unpinning procedure of the lattice section.

WARNING
Impermissible boom lengths guyed!
If impermissible boom lengths are guyed on the assembly brackets, then significant property damage can occur on the crane.
Personnel can be severely injured or killed.
- ▶ The maximum permissible boom lengths for the „flying assembly“ may not be exceeded.
- ▶ Pin the guy rods either on the assembly brackets **3**, point **P2**, illustration **1** or the assembly brackets **10**, point **P7**, illustration **2**.
- ▶ The specifications in the erection and take down charts as well as the load charts must be observed.

Note
- ▶ For weights of intermediate sections with placed guy rods, see Crane operating instructions, chapter 1.03.

Note
- ▶ When guying on the S-pivot section, you have to use the washers **7** when inserting the pins **5**, see illustration **1**, sectional **A-A**.
- ▶ For guying on the S-pivot section, the pin **5** is inserted on both sides on the assembly brackets **3** on point **P2** and secured with the spring retainer **6**.
- ▶ For guying on the S-intermediate section 14 m 2620.20 for flying assembly, the pin **14** is inserted on both sides on the assembly brackets **10** on point **P7** and secured with the spring retainer **16**.

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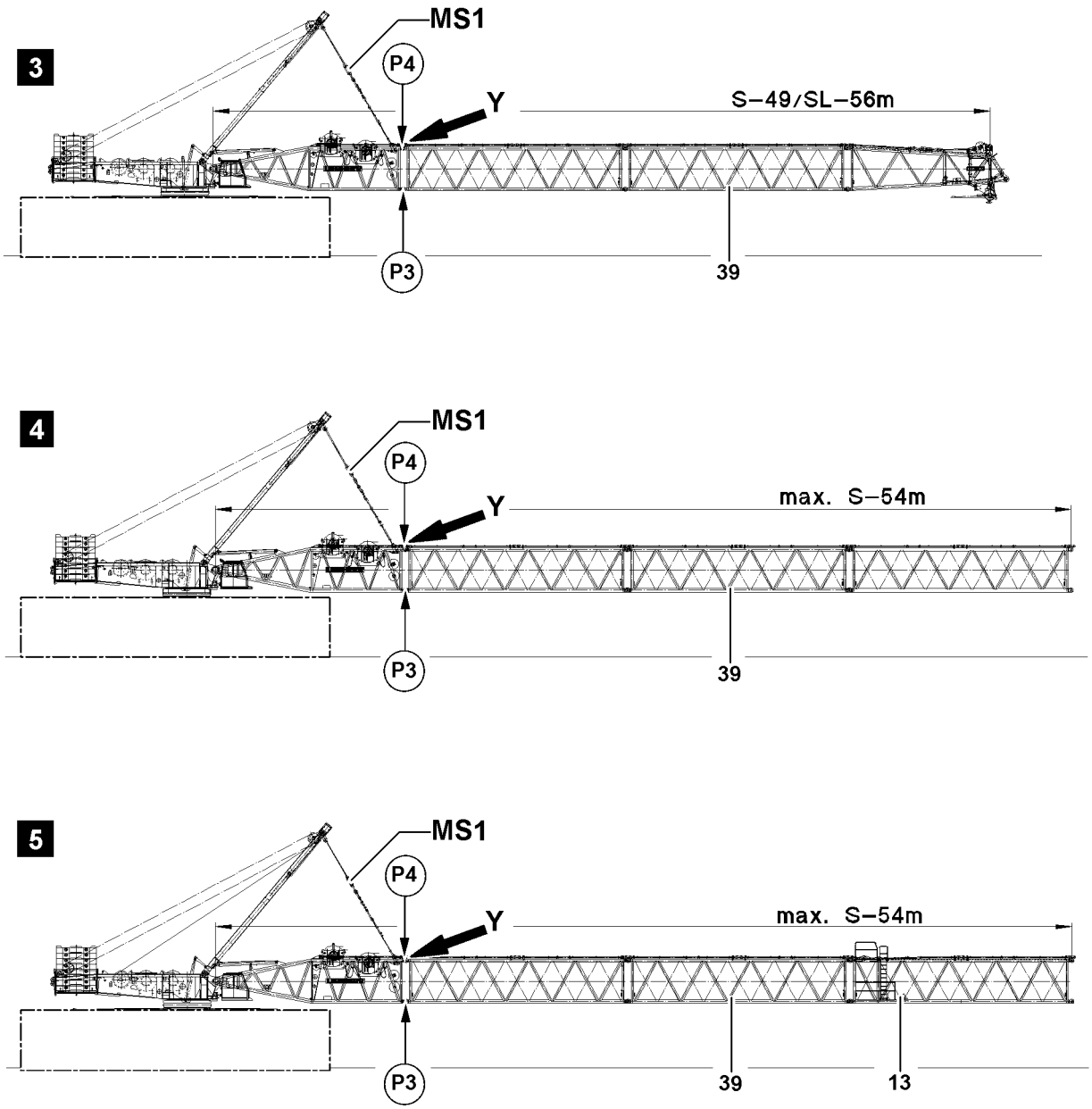

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Fig.112555

Assembling the S-intermediate sections in „Flying mode“ on the S-pivot section

WARNING
The crane can topple over!
If the following conditions are not met, the crane can topple over or be significantly damaged. Personnel can be severely injured or killed.

- ▶ For the „flying“ boom assembly, the maximum permissible total force on the test point **MS1** may **not** be exceeded. The „actual force“ is shown on LICCON monitor 1.
- ▶ The „flying“ boom assembly is only permissible up to a certain system length, observe the following charts.
- ▶ The specifications in the erection and take down charts as well as the load charts must be observed.

LR-crane	**Turntable in travel direction, ZB_{min} 2) 45 t**			
Boom system	**Maximum system length**	**Equipment (without hook block)**	**Maximum force MS1**	**Minimum DB_{min} 1)**
S	49 m	- with S- and WA-frame II guy rods - with end section	160 t	120 t
S	54 m	- with S- and WA-frame II guy rods - **with intermediate section 2826.20 with guy brackets** - without end section	160 t	120 t
SL	56 m	- with S-guy rods - with L-end section	160 t	120 t

1) This counterweight must be at least installed on the turntable for „flying assembly“.
2) This central ballast must be at least installed on the crawler center section for „flying assembly“.

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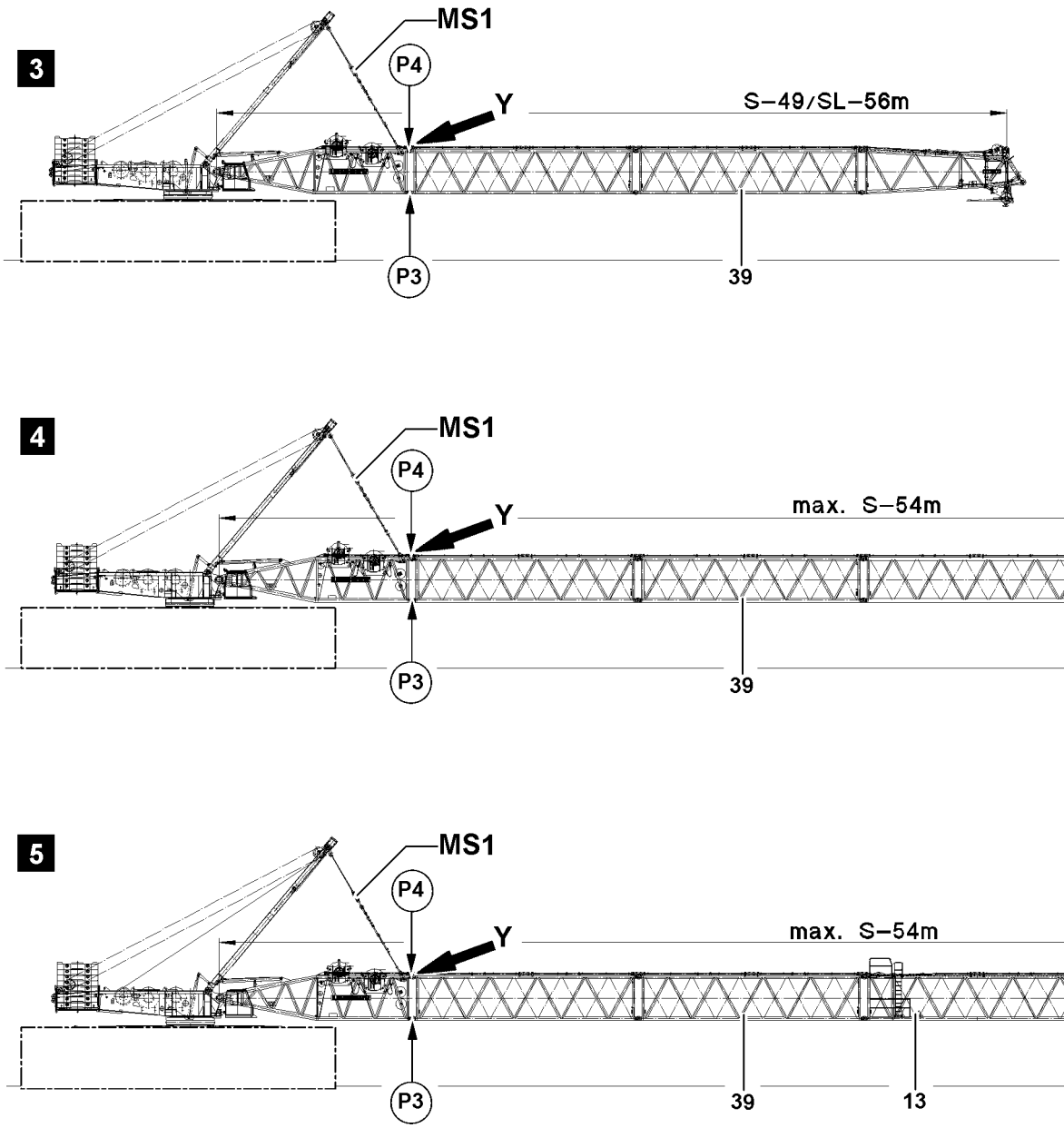

LWE/LG 1750-006/15409-07-02/en

Fig.112555

LG-crane	Turntable in travel direction				
Boom system	**Maximum system length**	**Equipment (without hook block)**	**Maximum force MS1**	**DB_{min} 1)**	**Support base**
S	49 m	- with S- and WA-frame II guy rods	160 t	70 t	12 m x 12 m
		- with end section		45 t	16 m x 16 m
S	54 m	- **with intermediate section 2826.20 with guy brackets** - with S- and WA-frame II guy rods - without end section	160 t	120 t	12 m x 12 m or 16 m x 16 m
SL	56 m	- with S-guy rods	160 t	70 t	12 m x 12 m
		- with L-end section		45 t	16 m x 16 m

1) This counterweight must be at least installed on the turntable for „flying assembly“.

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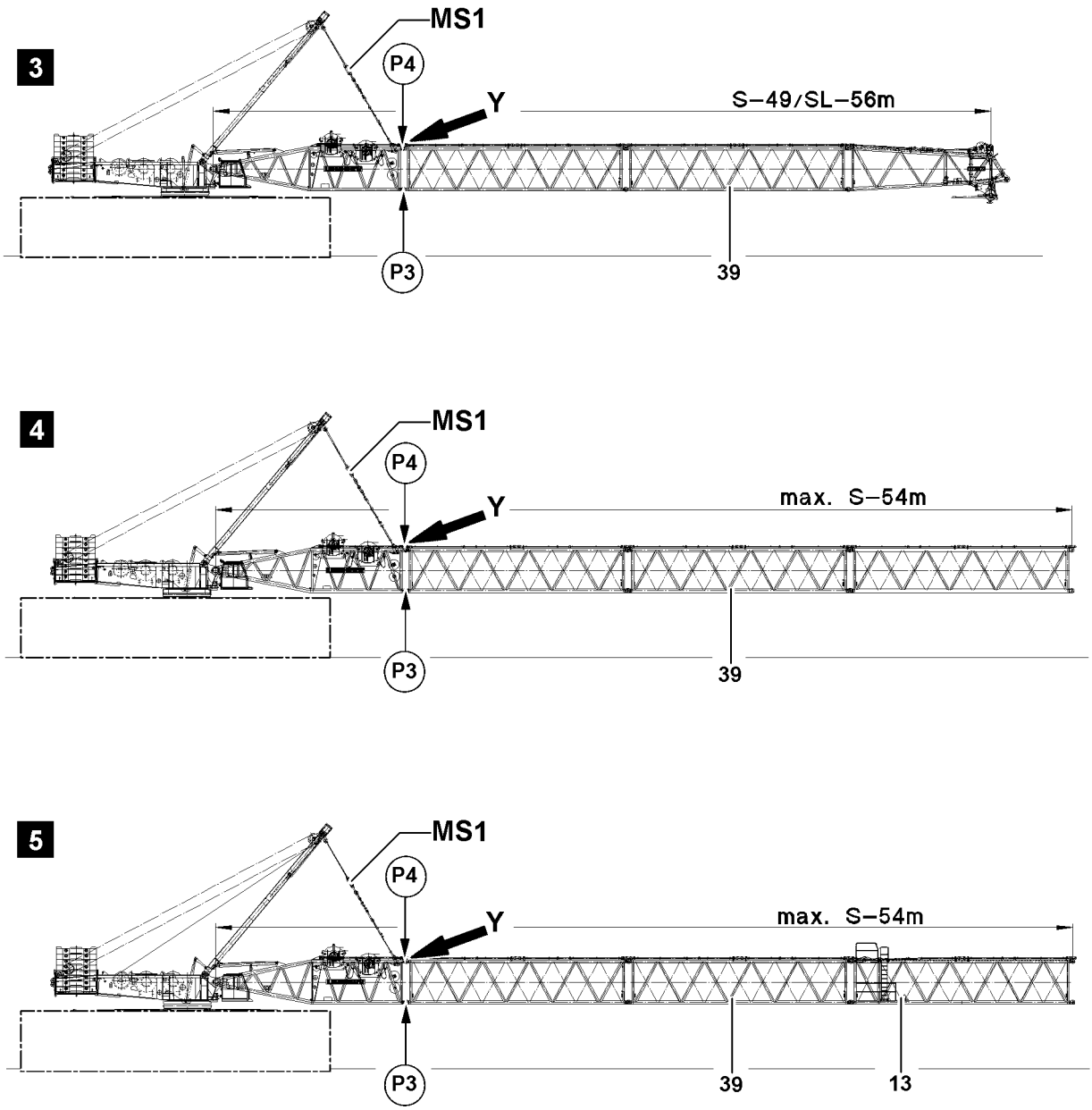

LWE/LG 1750-006/15409-07-02/en

Fig.112555

Make sure that the following prerequisites are met:
- The S-pivot section is pinned and secured on the turntable.
- The S-pivot section is pinned on the assembly brackets **3** on point **P2** with the guy rods and is in horizontal position, see illustration **3**, detail **Y**.
- An auxiliary crane is available.

WARNING
Falling components!
If unsecured or non-supported components are assembled or disassembled, they can fall down. Personnel can be severely injured or killed.
- ▶ During pinning and unpinning of the intermediate sections, it is prohibited for anyone to remain **under** or **on** the components as well as within the entire danger zone.
- ▶ Before unpinning: Support the components and boom.
- ▶ Secure the pins in the storage locations and in the receptacles.
- ▶ It is prohibited to lean a ladder against the crane section which is being disassembled.

Note
- ▶ The „Actual force“ is shown on LICCON monitor.
- ▶ The flying assembly of the intermediate sections is made without hook block.

For „flying“ assembly of the intermediate sections, they can be installed individually or as preassembled boom unit on the S-pivot section.

- ▶ Attach intermediate sections **39** or preassembled boom unit **39** on the auxiliary crane.
- ▶ Lift the intermediate sections **39** or preassembled boom unit **39** with the auxiliary crane and position on the S-pivot section until the pin points align.

When the pin points between the S-pivot section and the intermediate section or the preassembled boom unit align „on top“ and „bottom“:
- ▶ Pin the intermediate sections „on top“: Insert the pin **33** on both sides at point **P4** and secure with spring retainer **34**, see detail **X**.
- ▶ Pin the intermediate sections „on the bottom“: Insert the pin **33** on both sides at point **P3** and secure with spring retainer **34**, see detail **X**.

When the pins are properly pinned and secured on „top“ and „bottom“ between the S-pivot section and the S-intermediate section or the preassembled boom unit:
- ▶ Remove the auxiliary crane.

If additional lattice sections are assembled:
- ▶ Assemble additional lattice sections the same way as described in this section.

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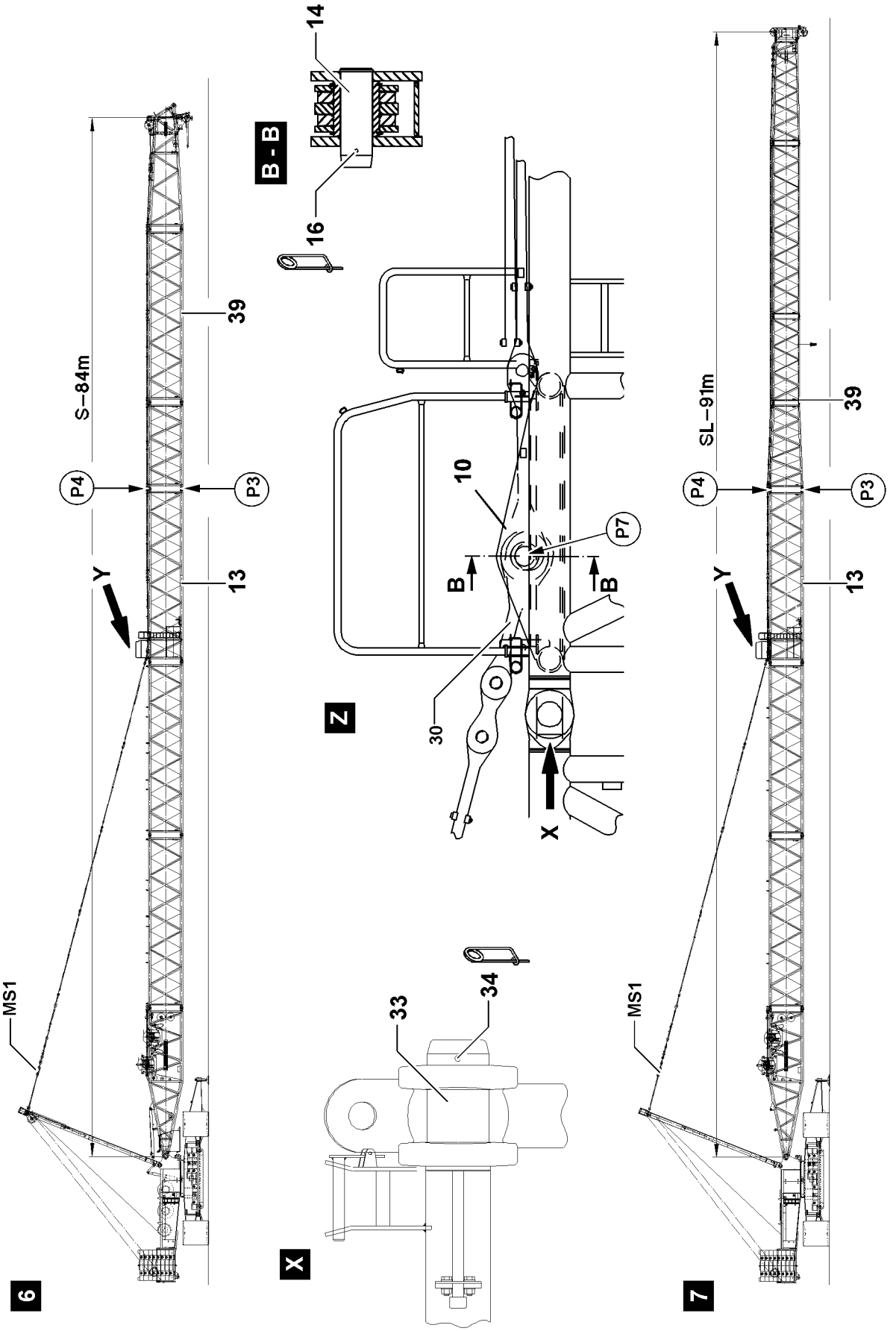

Fig.112552

LWE/LG 1750-006/15409-07-02/en

Assembling the S-intermediate sections in „flying“ mode on the intermediate section 14 m 2826.20

WARNING
The crane can topple over!
If the following conditions are not met, the crane can topple over or be significantly damaged. Personnel can be severely injured or killed.

- ▶ For the „flying“ boom assembly, the maximum permissible total force on the test point **MS1** may **not** be exceeded. The „actual force“ is shown on LICCON monitor 1.
- ▶ The „flying“ boom assembly is only permissible up to a certain system length, observe the following charts.
- ▶ The specifications in the erection and take down charts as well as the load charts must be observed.

Note

- ▶ The guy rods of the SA-frame are pinned on the intermediate section 2826.20 **13** with the guy brackets **30**.

LR-crane	**Turntable vertical to the travel direction, ZB_{min} 2) 45 t**			
Boom system	**Maximum system length**	**Equipment (without hook block)**	**Maximum force MS1**	**DB_{min} 1)**
S	77 m	- with S- and WA-frame II guy rods	325 t	170 t
S	84 m	- with S-guy rods	325 t	170 t
SL	91 m		290 t	120 t

1) This counterweight must be at least installed on the turntable for „flying assembly“.
2) This central ballast must be at least installed on the crawler center section for „flying assembly“.

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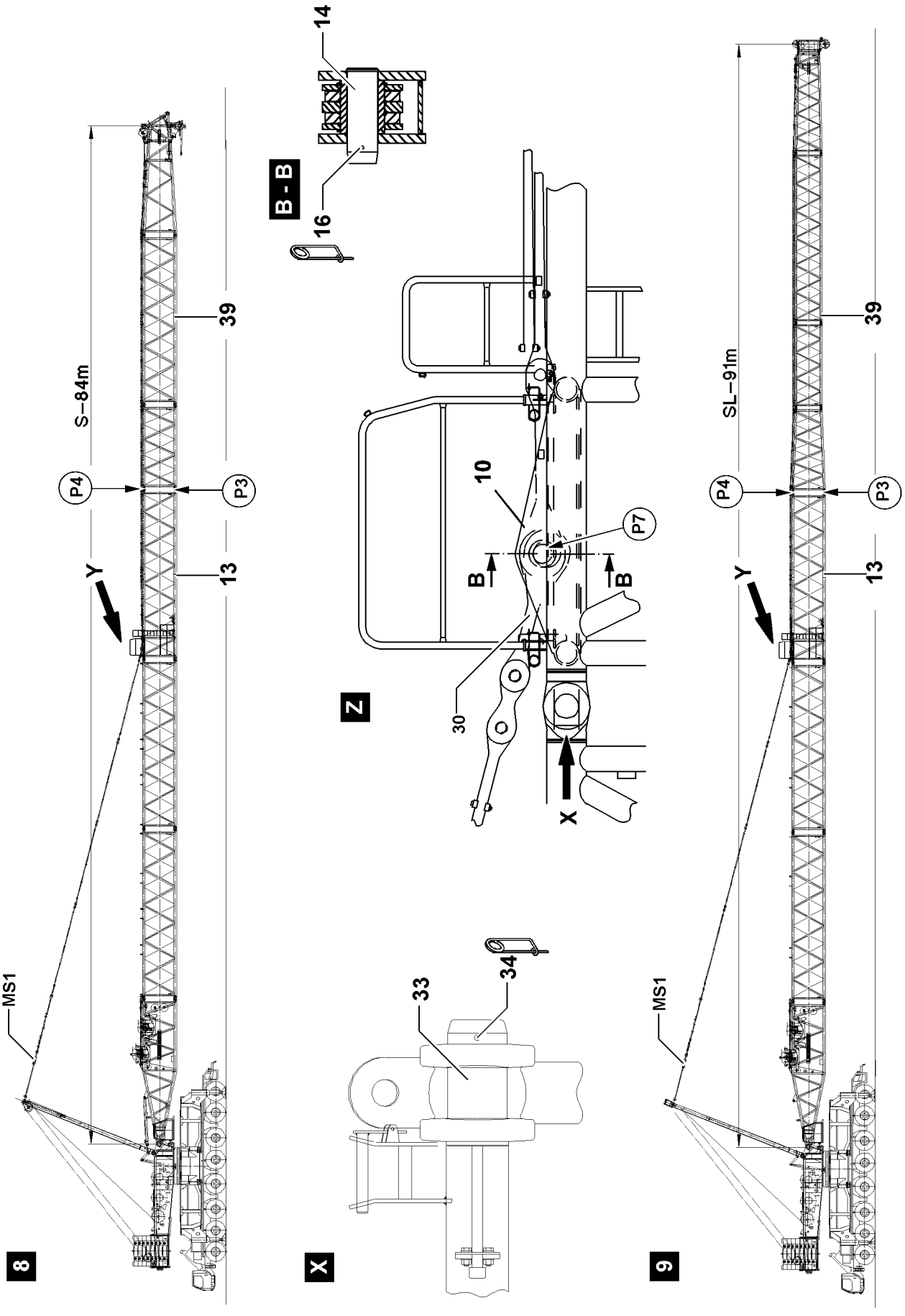

Fig.112558

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LG-crane	Turntable in travel direction				
Boom system	**Maximum system length**	**Equipment (without hook block)**	**Maximum force MS1**	**DB_{min} 1)**	**Support base**
S	77 m	- with S- and WA-frame II guy rods	325 t	195 t	16 m x 16 m
				245 t	12 m x 12 m
S	84 m	- with S-guy rods	325 t	195 t	16 m x 16 m
				245 t	12 m x 12 m
SL	91 m		290 t	170 t	16 m x 16 m
				220 t	12 m x 12 m

1) This counterweight must be at least installed on the turntable for „flying assembly“.

Make sure that the following prerequisites are met:
- The S-pivot section is pinned and secured on the turntable.
- The intermediate section 14 m 2826.20 with the assembly brackets **10** is pinned on point **P7** with the guy rods **30** on the SA-frame and is in horizontal position, see illustration **8**, detail **Z**.
- An auxiliary crane is available.

WARNING
Falling components!
If unsecured or non-supported components are assembled or disassembled, they can fall down.
Personnel can be severely injured or killed.
- ▶ During pinning and unpinning of the intermediate sections, it is prohibited for anyone to remain **under** or **on** the components as well as within the entire danger zone.
- ▶ Before unpinning: Support the components and boom.
- ▶ Secure the pins in the storage locations and in the receptacles.
- ▶ It is prohibited to lean a ladder against the crane section which is being disassembled.

Note
- ▶ The „Actual force“ is shown on LICCON monitor.
- ▶ The flying assembly of the intermediate sections is made without hook block.

For „flying“ assembly of the intermediate sections, they can be installed individually or as preassembled boom unit on the intermediate section **13**.

- ▶ Attach intermediate sections **39** or preassembled boom unit **39** on the auxiliary crane.
- ▶ Lift the intermediate sections **39** or preassembled boom unit **39** with the auxiliary crane and position on the S-pivot section until the pin points align.

When the pin points between the S-intermediate section **13** and the intermediate sections **39** or the preassembled boom unit **39** align „on top “ and „bottom“:
- ▶ Pin the intermediate sections „on top“: Insert the pin **33** on both sides at point **P4** and secure with spring retainer **34**, see detail **X**.
- ▶ Pin the intermediate sections „on the bottom“: Insert the pin **33** on both sides at point **P3** and secure with spring retainer **34**, see detail **X**.

When the pins are properly pinned and secured on „top“ and „bottom“ between the S-intermediate section **13** and the intermediate sections **39** or the preassembled boom unit **39**:
- ▶ Remove the auxiliary crane.

If additional lattice sections are assembled:
- ▶ Assemble additional lattice sections the same way as described in this section.

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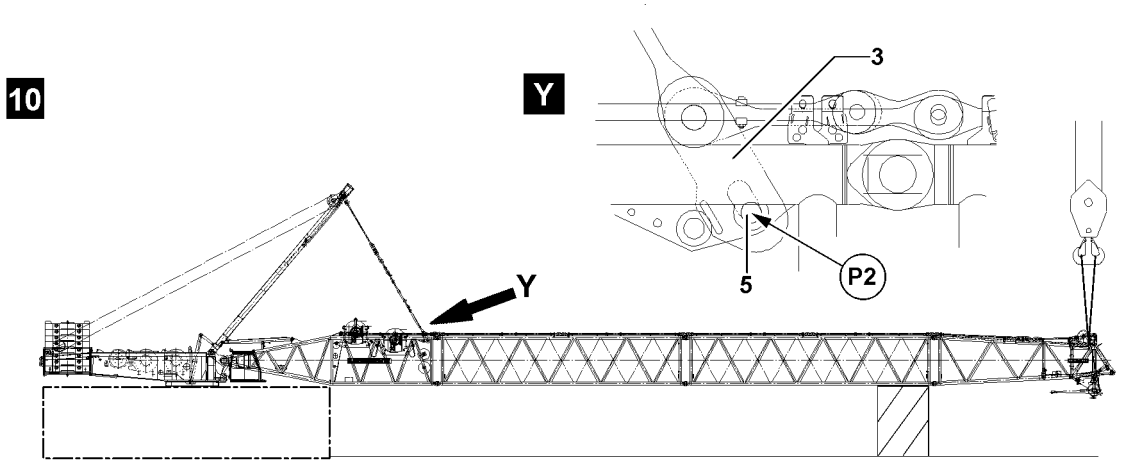

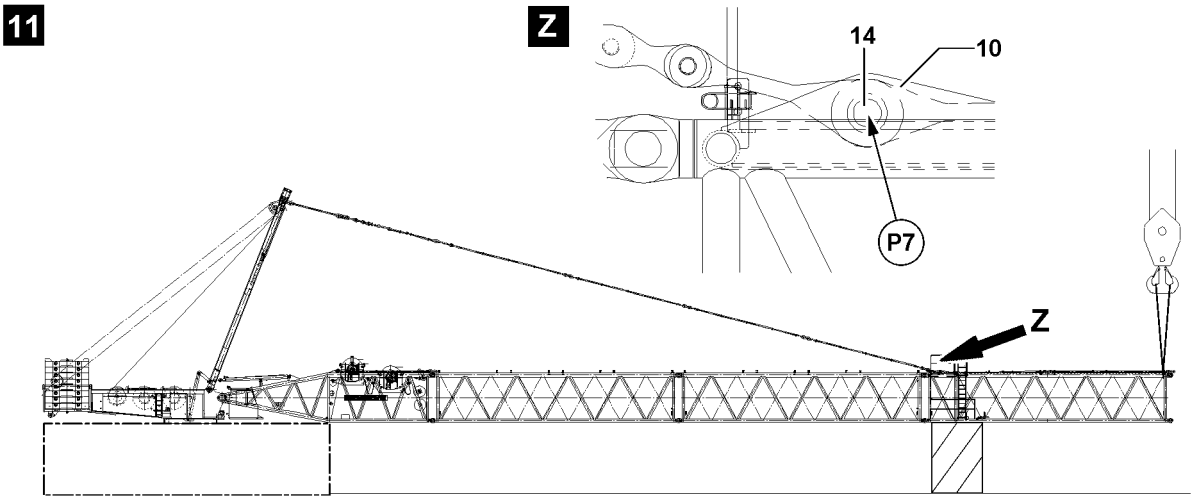

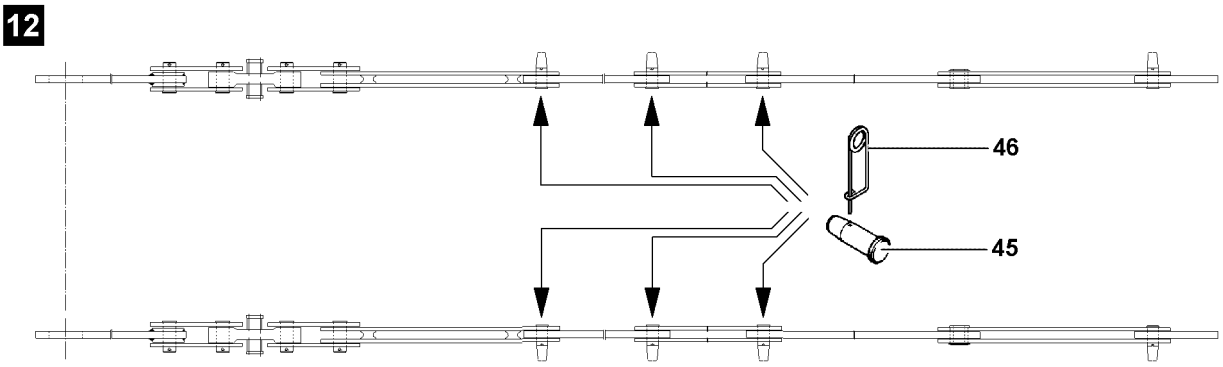

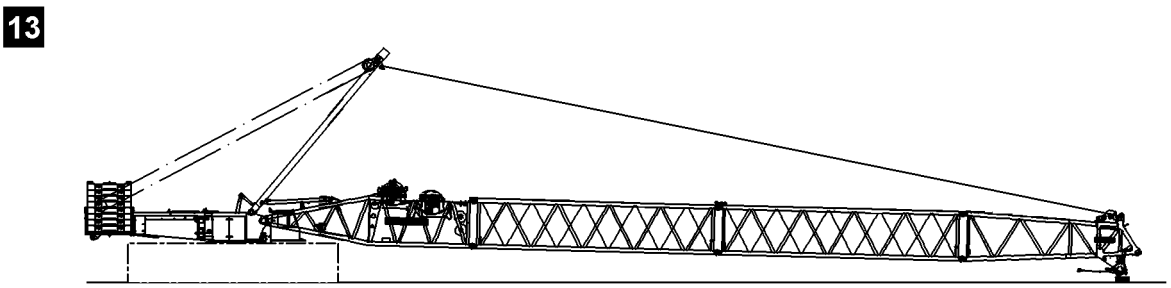

Fig.112556

3.6 Assembling the S-guy rods

WARNING
Neglected inspection and maintenance on guy rods!
If the regular inspection and maintenance of the guy rods is not carried out or is carried out only in irregular intervals, then severe accidents can occur due to existing and unrecognized damage to the guy rods.
Personnel can be severely injured or killed.
- ▶ Check the guy rods before every assembly, see Crane operating instructions, chapter 8.15.
- ▶ The S-guy rods must be assembled and secured, see Rod plan. The numbering in the rod plan must be identical to the numbering on the guy rods.

Make sure that the following prerequisites are met:
- – The boom is guyed on point **P5** on the S-pivot section, see illustration **10**, detail **Y**.
- – **Or** the boom is guyed on point **P7** on the S-intermediate section 14 m 2620.20 for flying assembly, see illustration **11**, detail **Z**.
- – **Or** the boom is laying on the ground with tensioned guy rods, see illustration **13**.

WARNING
Falling components!
If the intermediate sections are incompletely pinned or secured, then components can fall down.
Personnel can be severely injured or killed.
- ▶ Make sure that the intermediate sections or preassembled boom unit are pinned and secured on the S-pivot section.
- ▶ Make sure that the intermediate sections or preassembled boom unit is supported with suitable materials, secured with the auxiliary crane or the boom is placed on the ground.

When the boom is **not** laying on the ground:
- ▶ Support the boom or secure it with the auxiliary crane.
- ▶ Relieve the guy rods: Lower the SA-frame somewhat to the front.

Result:

- – The guy rods between the SA-frame and the S-pivot section or the S-intermediate section for flying assembly are relieved.

The guy rods are placed and secured for transport on the S-intermediate sections. Before assembly of the guy rods, you must remove the transport retainers.

- ▶ Release and unpin transport retainers for the guy rods.

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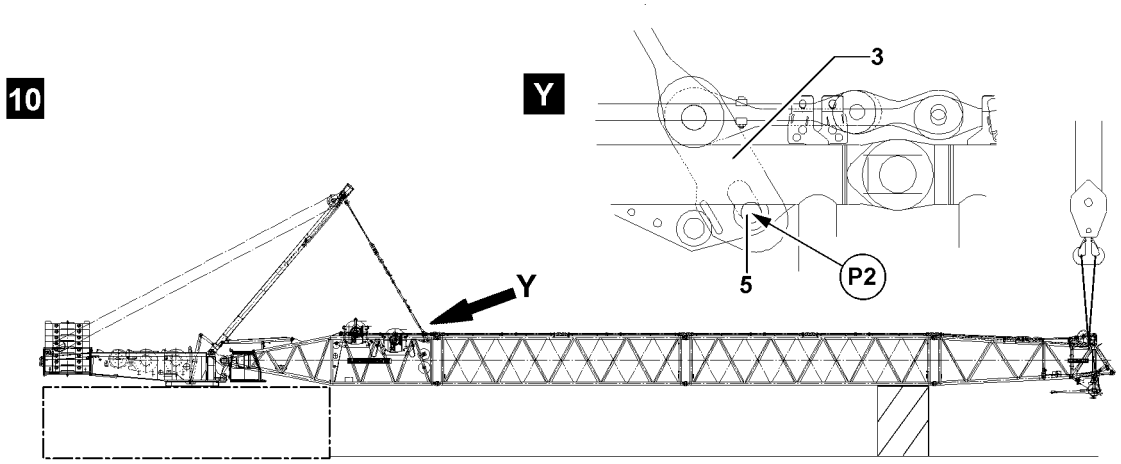

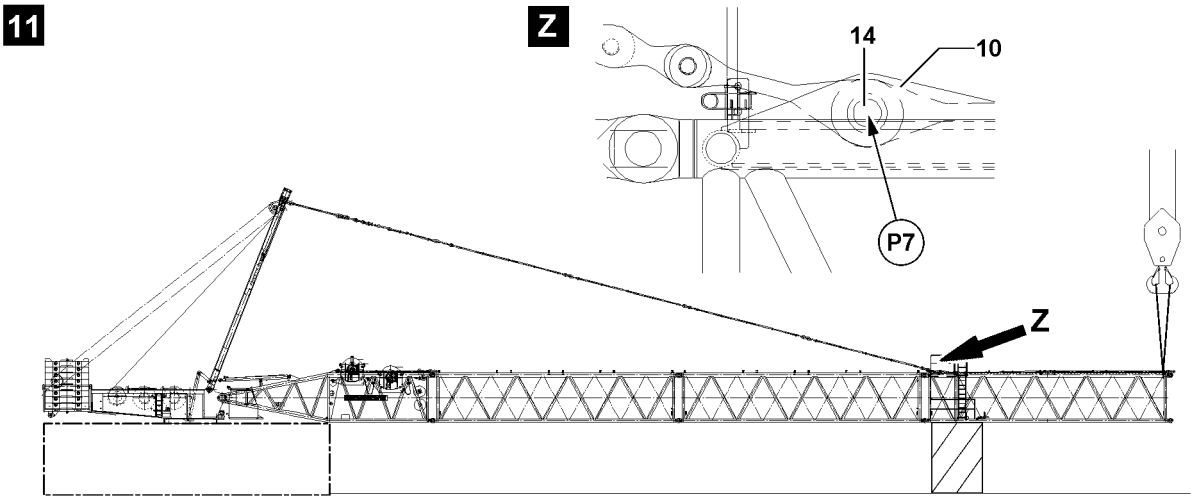

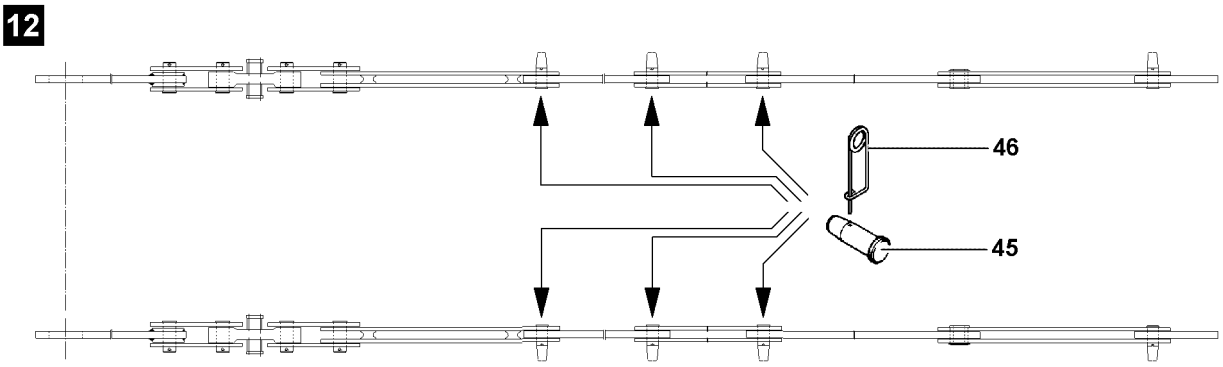

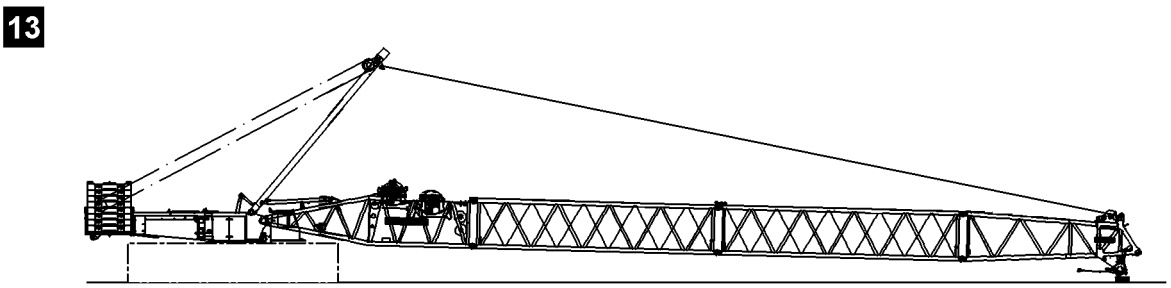

Fig.112556

NOTICE
Property damage!
If the pins of the guy rods are not pinned from the „inside“ to the „outside“, the hoist rope can scrape on the pins and be damaged.
▶ Always insert the pins of the guy rods from the „inside“ to the „outside“, see Rod plan and illustration **12**.

Note
▶ The guy rods of the S-intermediate sections are pinned to each other starting from the fixed point on the end section of the boom.

▶ Pin the guy rods of all intermediate sections: Insert the pin **45** from the „inside“ to the „outside“ and secure with spring retainer **46**.

WARNING
The boom can fold downward!
By unpinning the guy rods on the assembly brackets **3** or the assembly brackets **10**, the boom can fold down.
Personnel can be severely injured or killed.
▶ Unpin the guy rods on the assembly brackets **3**, point **P5** or the assembly brackets **7**, point **P7** when it is ensured that the intermediate sections are supported with suitable materials or are held by the auxiliary crane or the boom is placed on the ground.

▶ Make sure that all guy rods of the boom system are pinned and secured.

When the boom is guyed on the S-pivot section:
▶ Release and unpin the pins **5** on the assembly brackets **3**.
or

When the boom is guyed on the S-intermediate section:
Release and unpin the pins **14** on the assembly brackets **10**.
▶ Erect the SA-frame until the guy rods between the SA-frame and the S-end section tension, see illustration **13**.
▶ Remove the auxiliary crane.

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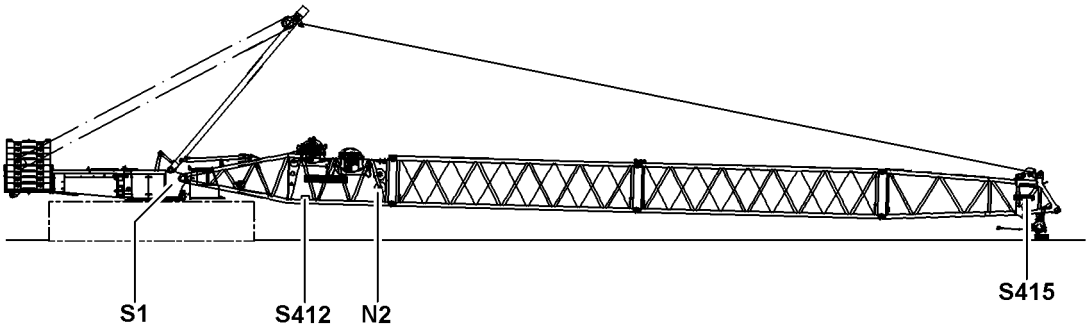

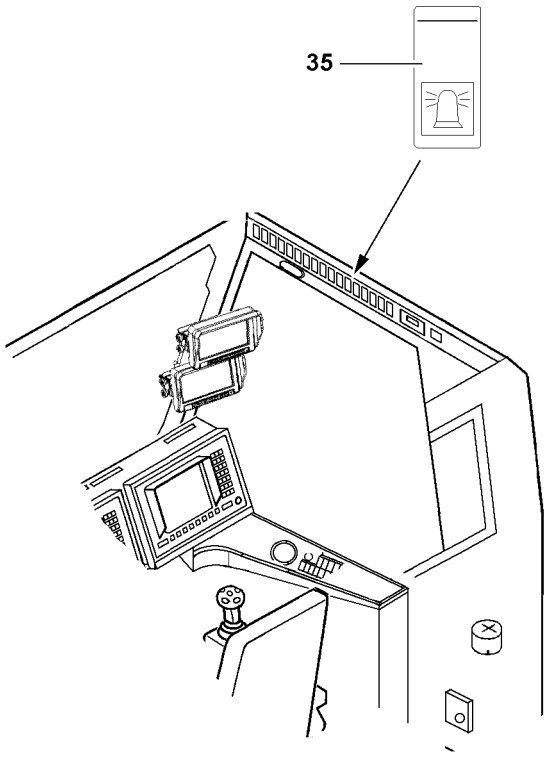

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Fig.111624

3.7 Establishing the electrical connections

NOTICE
Damage to the electrical connection on the cable drum!
If the electrical connection from the cable drum to the terminal box on the S-pivot section is established first before the connection to the terminal box on the S-end section, the electrical connection can be damaged when spooling out the cable drum.
▶ Establish first the electrical connection from the cable drum in the S-pivot section to the terminal box on the S-end section and then the electrical connection from the terminal box in the S-pivot section to the cable drum.

Note
▶ To establish the electrical connections on the S-boom, see Electric wiring diagram.

Make sure that the following prerequisites are met:
– The S-boom is completely assembled.
– The airplane warning light and the wind speed sensor are assembled.

▶ Establish the electrical connections.
▶ Make sure that all electrical connections on the boom are established.

3.8 Establishing the hydraulic connections to the boom

When connecting hydraulic lines with quick couplings, make sure that the coupling procedure is carried out correctly.

WARNING
Pressure in the hydraulic lines!
If the pressure supply is not interrupted before connecting / releasing the hydraulic lines, the hydraulic oil can escape with high pressure.
Personnel can be severely injured or killed.
▶ Release the pressure in the hydraulic system before connecting / disconnecting: Interrupt the pressure supply and wait for a short time.

WARNING
Loss of pressure or leakage!
Incorrectly coupled or self-loosening quick couplings (particularly return lines) can result in serious accidents due to component failure.
▶ Check that the quick couplings have been properly connected before using the crane.

▶ Connect the coupling components (sleeve and connector) and screw together with the hand-tightened nut.
▶ Tighten the hydraulic coupling by hand. Rotate the hand-tightened nut until it reaches a tangible, fixed stop position.
▶ Establish the hydraulic connections.

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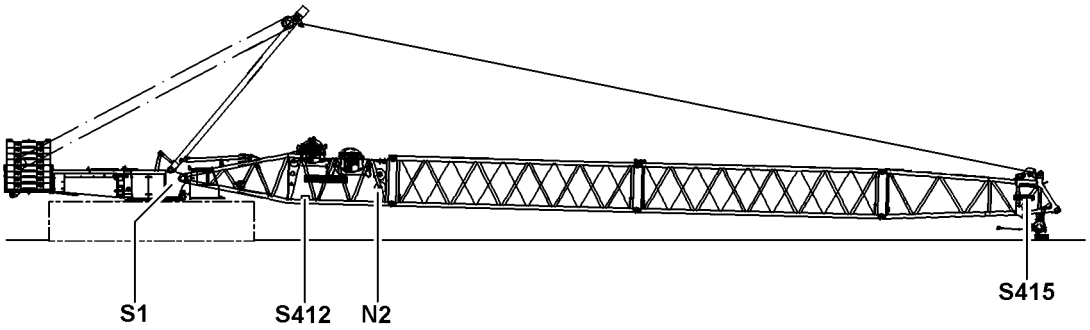

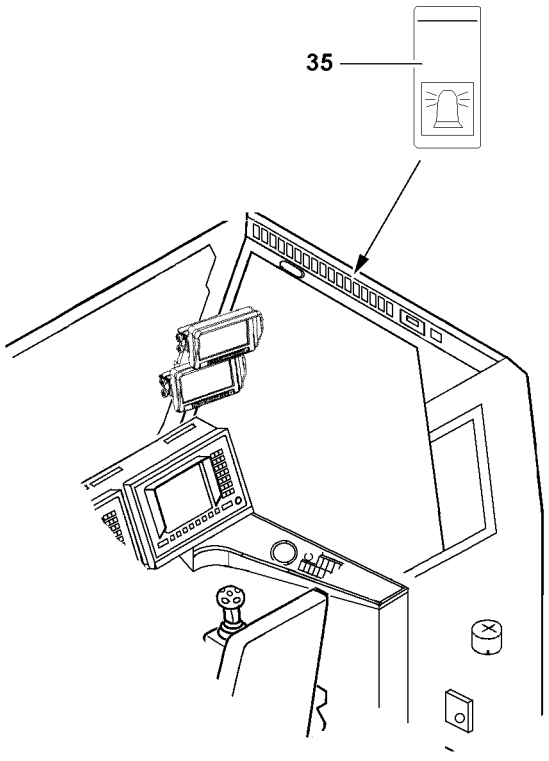

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Fig.111624

3.9 Checking the function of the safety devices

WARNING
Non-functioning safety devices!
If the function of the safety devices is defective, personnel can be severely injured or killed.
▶ Crane operation with non-functioning safety devices is **prohibited**.

Note
▶ The function of the individual limit switches must be checked before erection.
▶ The function of the limit switch initiators must be checked in the test system, see Diagnostics manual.

Note
▶ If a function check on the limit switches or on the safety devices does not lead to the desired shut offs, then the plug connections on the connector boxes or the components itself must be checked. If no visible connection errors or component defects can be found, contact Liebherr Service.

Make sure that the following prerequisites are met:
– All electrical connections have been made.
– The crane engine is running.
– The corresponding operating mode is set on the LICCON monitor.

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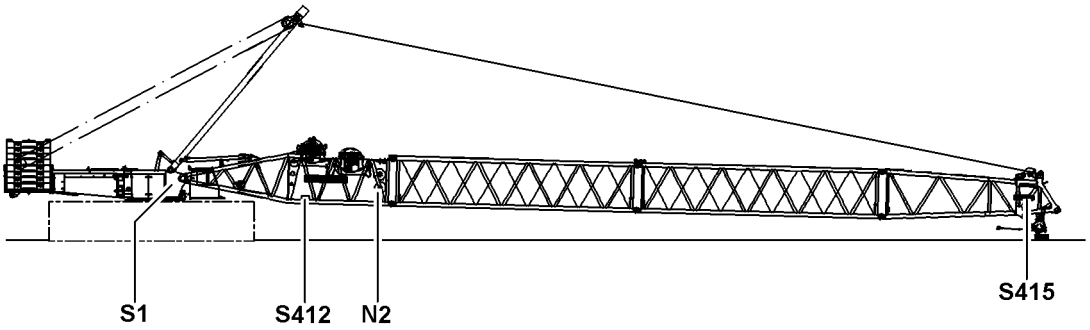

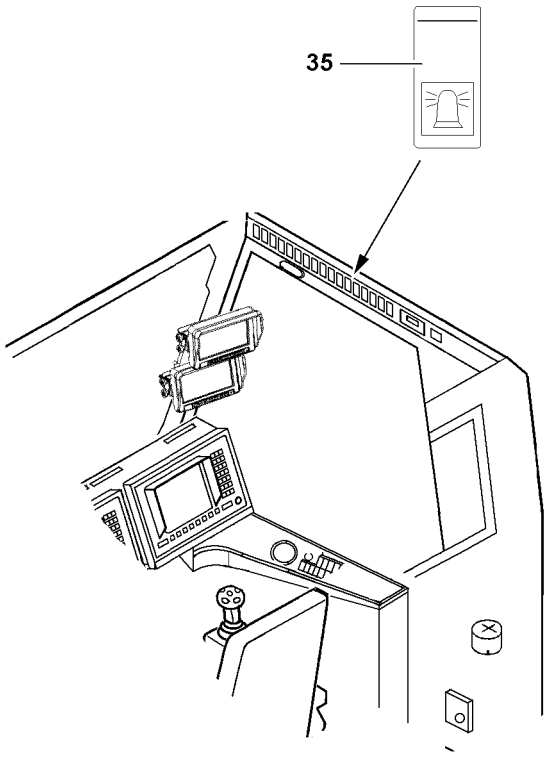

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Fig.111624

3.9.1 Checking the wind speed sensor

▶ Check the movement and the function of the wind speed sensor.

3.9.2 Checking the airplane warning light

▶ Turn on the airplane warning light on with the button **382**.
▶ Check the function visually.

3.9.3 Checking the hoist limit switch on the pulley head

Note
▶ When replacing or changing a hoist limit switch (HES), the corresponding hoist limit switch must have the correct bus address and the correct software version in order to be detected again by the bus system (LSB).

▶ Actuate the hoist limit switch manually on the pulley head.

Result:

– The spool up function of the hoist winch turns off.
– The icon „Hoist top“ appears on the LICCON monitor 0.
– The limit switch is functioning.

3.9.4 Checking the limit switch S-boom „Steepest position“

Note
▶ The limit switch functions have to be checked individually before erection.

▶ Cover the limit switch initiators on the S-relapse cylinders individually with a metal plate.

Result:

– The limit switch is actuated manually.
– The spool up function of winch IV (control winch) turns off.
– The icon „Boom limitation“ appears on the LICCON monitor 0.
– The limit switch is functioning.

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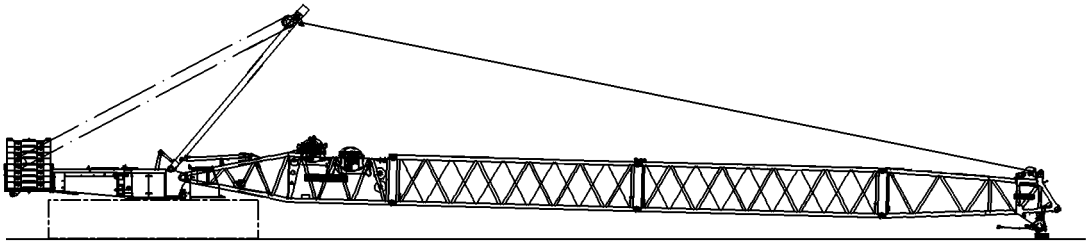

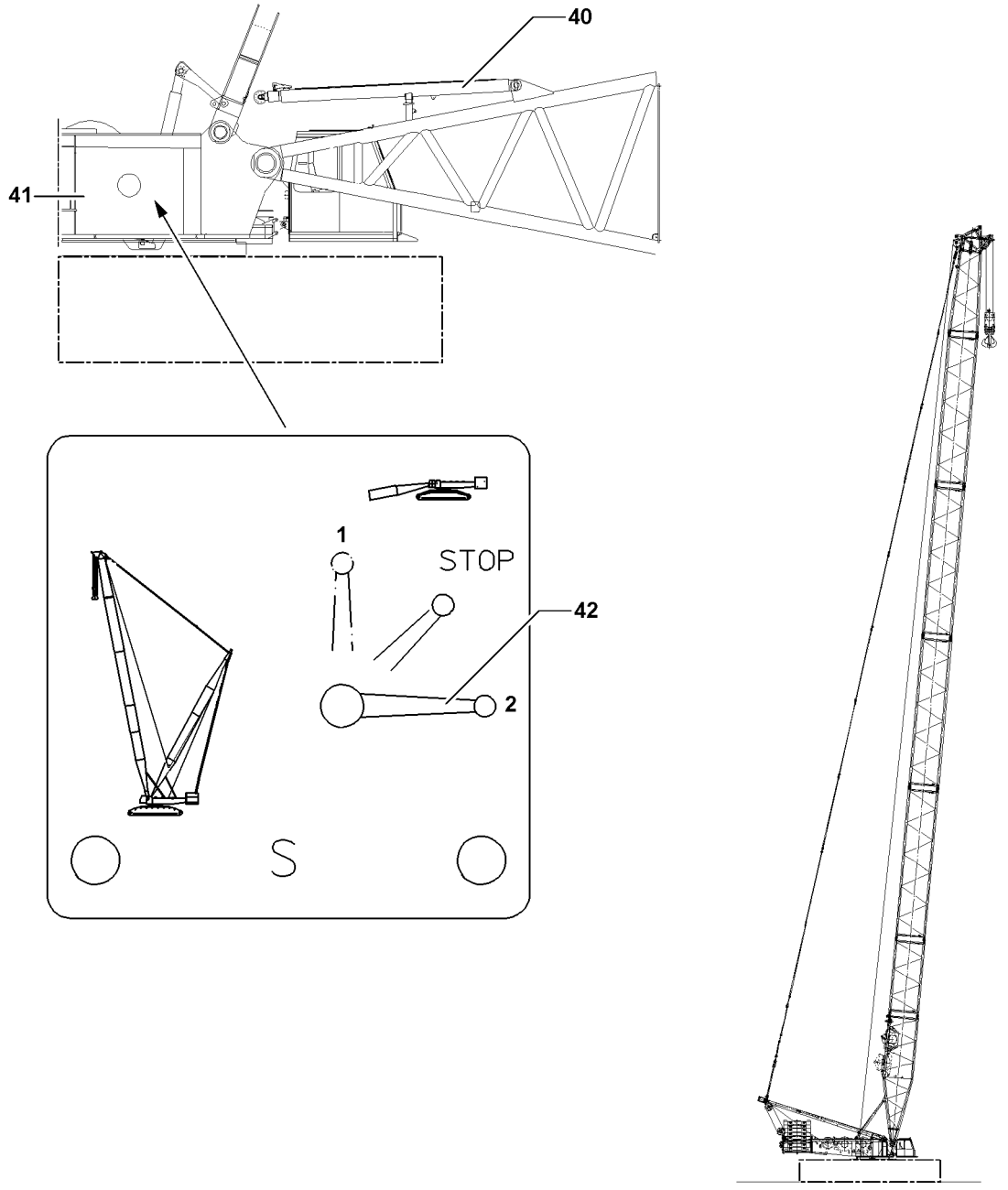

Fig.121121

3.10 Erecting the S-boom

WARNING
The crane can topple over!
If the following conditions are not met before erecting the boom, the crane can topple over.
Personnel can be severely injured or killed.
- ▶ It is not permitted to turn the crane during the erection procedure.
- ▶ Observe the data in the erection and take down charts!
- ▶ Observe the technical safety notes, see Crane operating instructions, chapter 5.01.
- ▶ Extend the S-relapse cylinder before erection.
- ▶ Do not allow slack rope formation on the control winch.

WARNING
Unutilized guy rods on boom!
If guy rods are on the lattice sections which are not used for operation, then there is a danger of accidents.
Personnel can be severely injured or killed.
Guy rods can loosen up and fall down.
The load chart is invalid.
The load display of the LICCON computer system shows the incorrect value.
The weight of the boom is too large for erection.
- ▶ Disassemble and remove unutilized guy rods on the transport retainers before erecting the boom.

NOTICE
Overload of boom!
If the SL-boom is not supported before the erection procedure, then the boom will be overloaded. The crane will be damaged during erection.
- ▶ For boom lengths SL/SL2, larger than 104 m , a support base must be used.
- ▶ Support the boom with suitable material of sufficient load bearing capacity.
- ▶ Observe the support height U_{min}, see section „Supporting the S/SL-boom combination for erection“.

Make sure that the following prerequisites are met:
- The crane is aligned in horizontal direction.
- All electrical connections have been established.
- All limit switches are functioning.
- The central ballast has been attached according to the data in the load chart.
- The counterweight has been installed to the turntable according to the load chart.
- All pin connections have been secured.
- The hoist rope has been correctly placed in the rope pulleys and is prevented from jumping out with the rope retaining pins.
- There are no loose parts on the boom.
- The LICCON overload protection has been adjusted according to the data in the load chart.
- The LICCON overload protection settings have been compared with the actual set up configuration.
- The LICCON overload protection is exceeded.
- The assembly icon is visible on the LICCON monitor.
- No personnel is within the danger zone.

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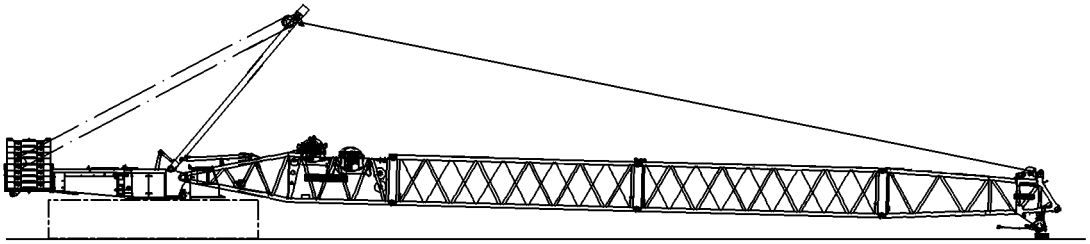

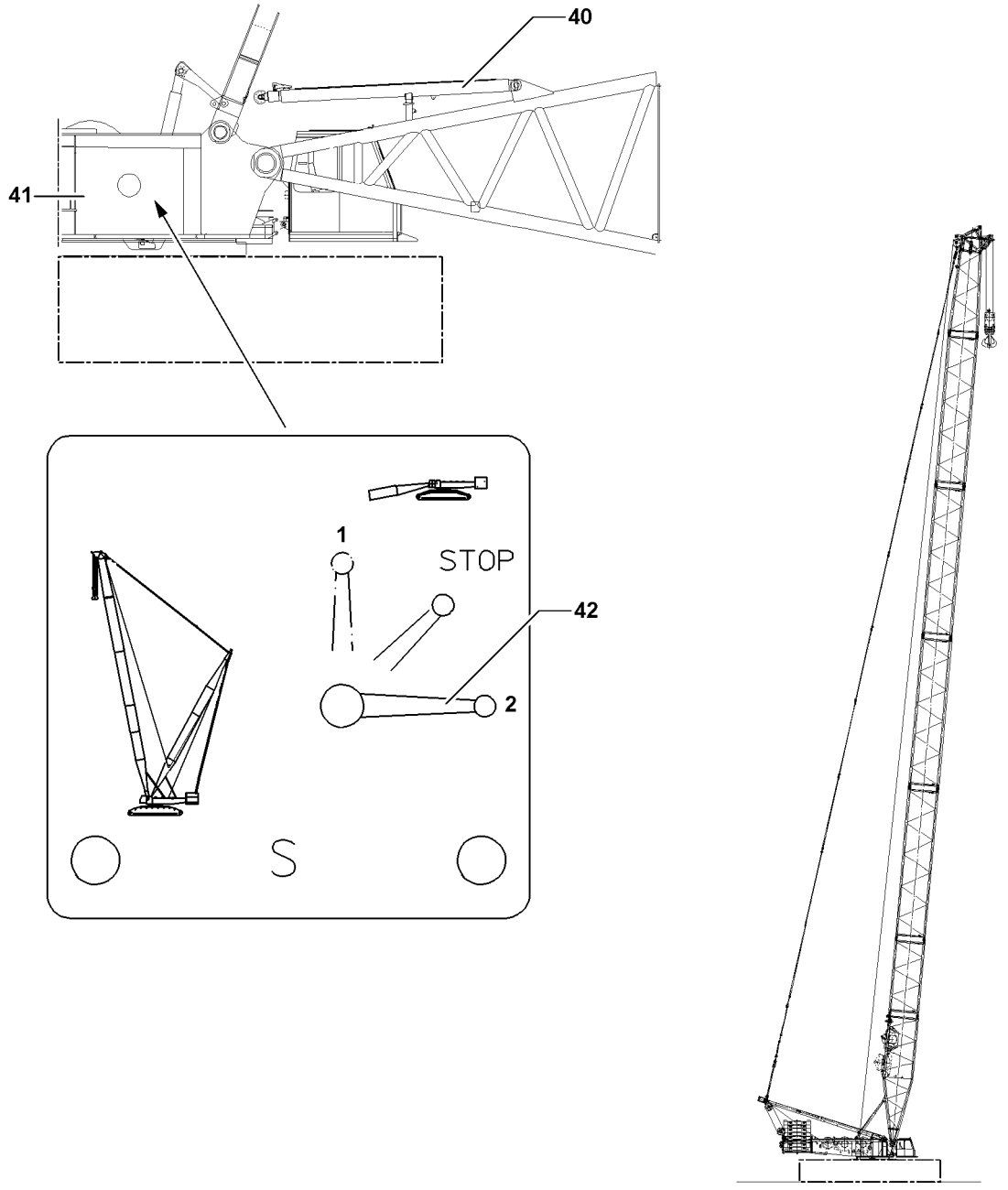

Fig.121121

LWE/LG 1750-006/15409-07-02/en

3.10.1 Moving the S-relapse cylinders out

WARNING
The crane can topple over!
If the S-relapse cylinders are not extended before erecting the S-boom, then the S-boom can fall off to the rear in crane operation and the crane can topple over.
Personnel can be severely injured or killed.
- ▶ Extend the S-relapse cylinders **40** before erecting the S-boom.
- ▶ Secure the ball valve **42** during crane operation to prevent inadvertent actuation.

Ball valve positions	
2	Crane operation, extend the piston rod
1	Assembly, retract the piston rod
STOP	The piston rod cannot be retracted / extended.

The piston rods on the S-relapse cylinders **40** can be moved out with the ball valve **42**.

- ▶ Set the ball valve **42** to **Position 2**.

Result:

– The piston rods of the S-relapse cylinders **40** move out.

Note
- ▶ The ball valve **42** is secured by closing the cabinet door **41** and removing the key.

- ▶ Close the cabinet door **41** and pull the key.
- ▶ Hand the key to an authorized person.

3.10.2 Reeving in the hook block

- ▶ Erect the boom until the end section lifts off the ground.
- ▶ Check the actual load on the LICCON monitor.

Problem remedy
Actual load on the LICCON monitor is larger than 0.0 t.
- ▶ Observe the notes for input of hook block weight, see Crane operating instructions, chapter 4.02.

Note
- ▶ Hoist rope reevings, see Crane operating instructions, chapter 4.06 and Reeving plan.

- ▶ Reeve in the hook block properly and secure the hoist rope on the rope fixed point, for reeving, see reeving plan.
- ▶ Attach the hoist limit switch weight.
- ▶ Enter the weight of the hook block into the LICCON computer system.

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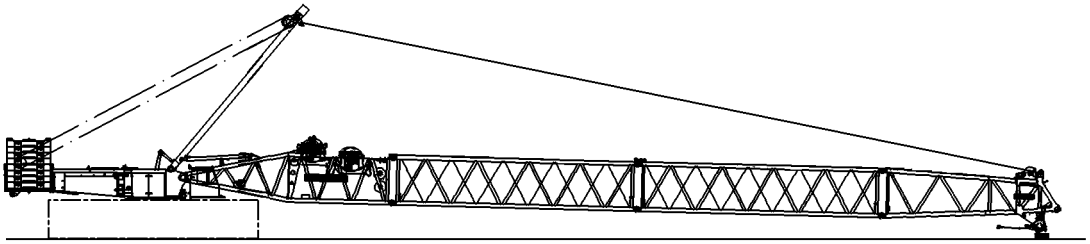

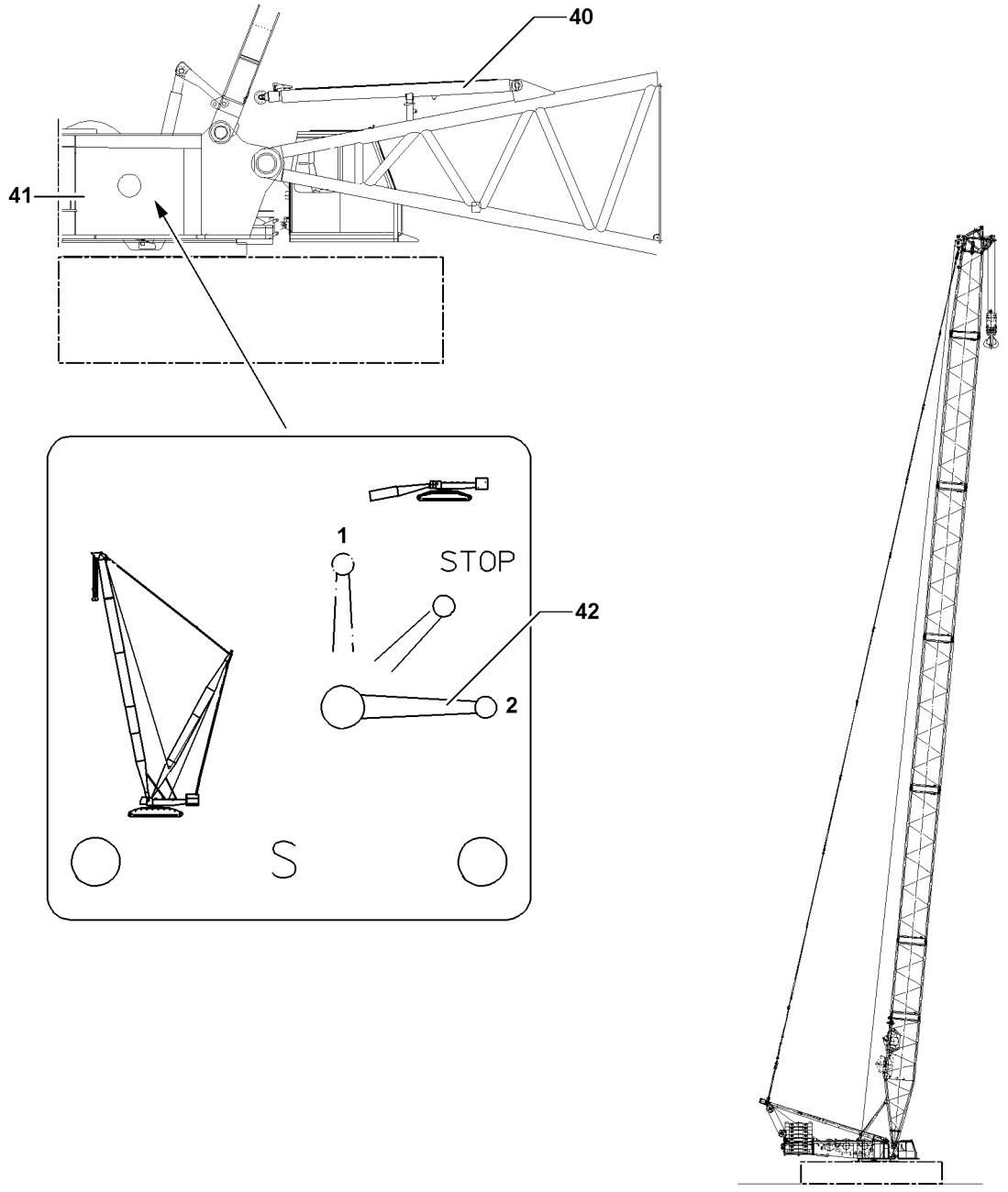

Fig.121121

3.10.3 Erecting the S-boom

WARNING
The crane can topple over!
In crane operation with exceeded LICCON overload protection, the crane can topple over.
Personnel can be severely injured or killed.
▶ The radii listed in the load chart may not be exceeded or fallen below, even if there is no load on the hook.

If required in the erection and take down chart:
▶ Carry the hook block along with the auxiliary crane.

Note
▶ When the lowest operating position of the boom is reached, the LICCON overload protection is activated.
▶ The displays on the LICCON monitor turn off!
▶ In the maximum load icon appears a load number in „t“ instead of the display ???.

▶ Luff the boom up to the lowest operating position.

When the boom has reached the lowest operating position:
▶ Make sure that the assembly icon on the LICCON monitor turns off.

Result:

– The LICCON overload protection is active.

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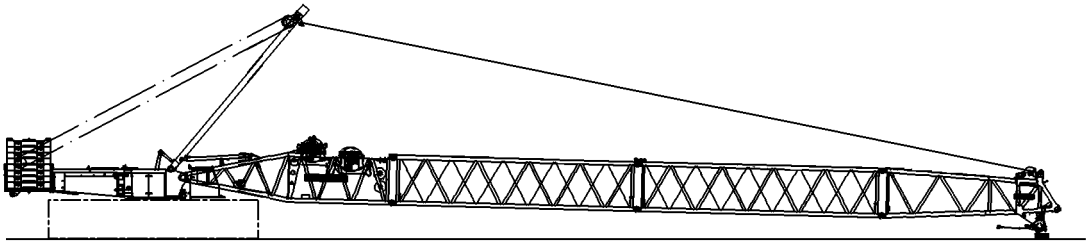

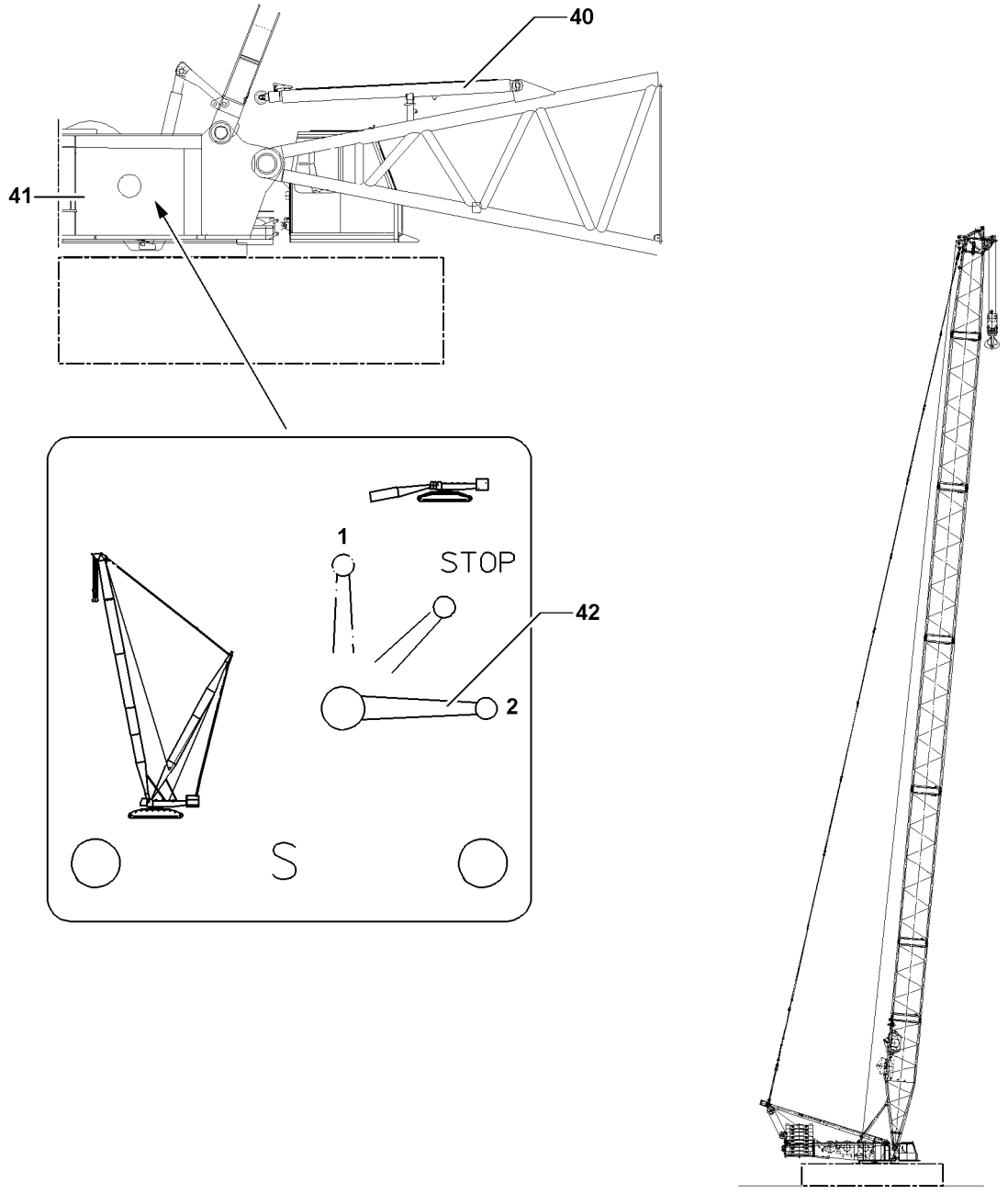

Fig.121121

4 Operating the crane

4.1 Preparing for crane operation

Note

▶ Observe the notes in the chapters, see Crane operating instructions, chapter 4.05, chapter 4.08 and chapter 5.01.

Make sure that the following prerequisites are met:
- The LICCON overload protection is active.
- The LICCON overload protection has been set according to the data in the load chart.

WARNING

The crane can topple over!

▶ Check the horizontal position of the crane before and during operation.

▶ If the crane operator leaves the cab, even for a short time, the operating mode setting must be checked and reset if necessary before resuming crane operation.

4.2 Checking the settings

▶ Check the function of the overload protection by running against the operating positions „on top“ and „bottom“.

▶ Check the hoist limit switch by running against the hoist limit switch weight.

▶ Check the function of the limit switches on the relapse cylinders.

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Fig.195219

5 Disassembling the S/SL boom

Note

▶ The disassembly is described on the example of the S-boom.

WARNING

Danger of falling!

During assembly / disassembly, inspection and maintenance work, assembly personnel must be secured with appropriate aids to prevent them from falling. If this is not observed, assembly personnel could fall and suffer life-threatening or fatal injuries.

- ▶ All work aloft, where there is a danger of falling must be carried out with suitable aids.
- ▶ If fall arrest equipment is available, then it must be used, see Crane operating instructions, chapter 2.06.
- ▶ If aids are not available and work cannot be carried out from the ground, then the assembly personnel must secure themselves with the specified fall arrest system to prevent falling, see Crane operating instructions, chapter 2.04.
- ▶ The fall arrest system must be fastened on the fastening and hook points as well as on the safety ropes. For safety points, see Crane operating instructions, chapter 2.06.
- ▶ Only step on the aids, ladders and catwalks with clean shoes.
- ▶ Keep aids, ladders and catwalks free of heavy dirt, snow and ice.
- ▶ Remaining on as well as under a suspended load is prohibited.
- ▶ Remaining on or within crane components (for example: At assembly of boom sections, lattice sections) which are moved during lifting, lowering, turning or closing procedures is strictly prohibited.
- ▶ During all assembly and disassembly work, maintenance work and inspections, travel or crane operation is prohibited.
- ▶ It is prohibited to step on the boom system or an auxiliary boom without suitable protective devices.
- ▶ Stepping and walking on crane components and lattice sections, which have an incline of more than 20° is prohibited.

WARNING

The lattice sections can fall down!

If the lattice sections are not pinned and secured correctly, then they can fall down and fatally injure personnel.

- ▶ Pin or unpin both pins at the same horizontal level, i.e. **left and right**.
- ▶ Do not stand under the lattice sections or within the entire danger zone during the pinning and unpinning procedure of the boom.
- ▶ Secure the pins in the bearing points and the receptacles.
- ▶ It is prohibited to lean the ladder against the component being disassembled.
- ▶ Do not remove the fastening equipment and the auxiliary crane until each component is pinned on and secured.

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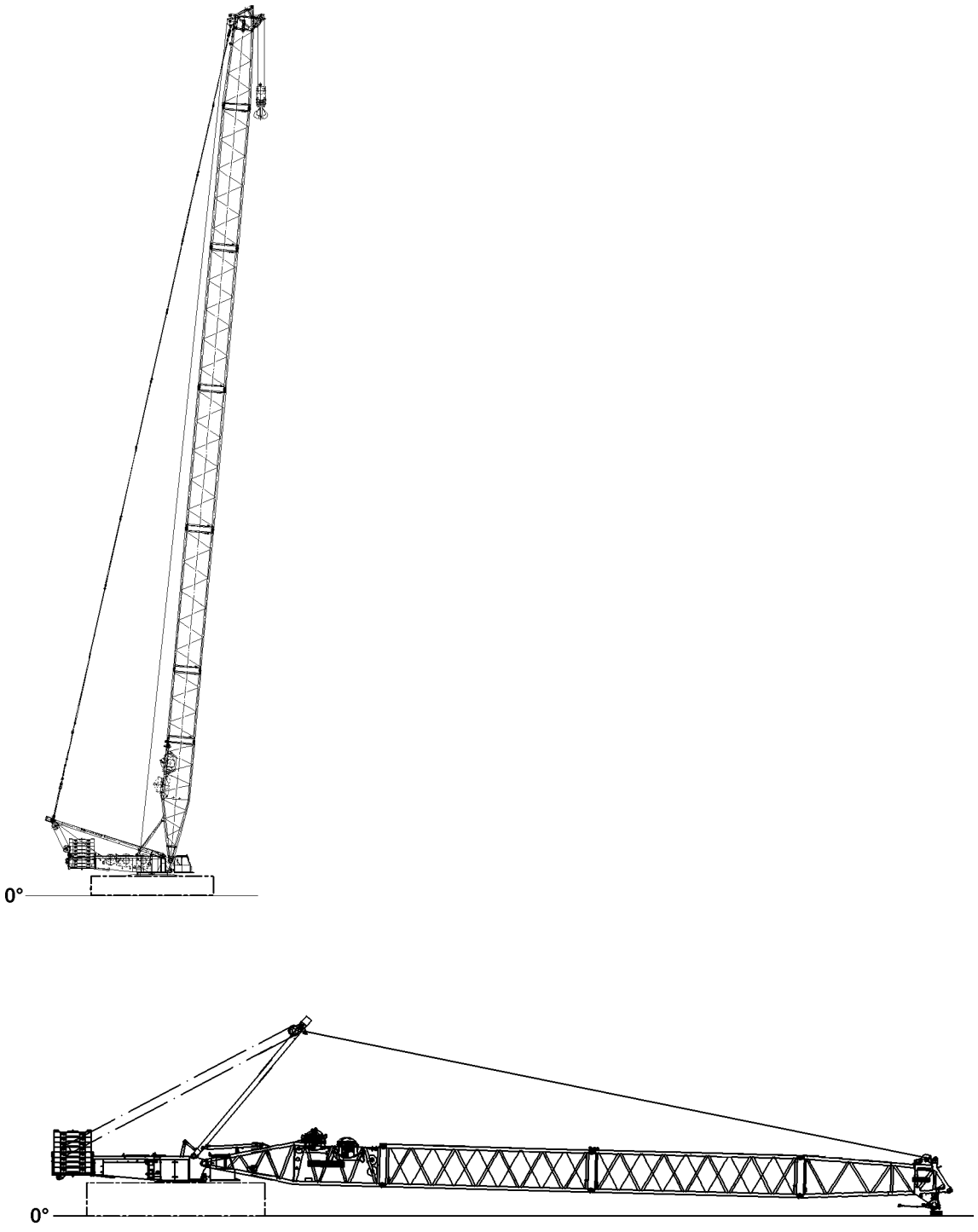

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Fig.120949

WARNING
Danger of impact / crushing!
When installing / removing crane components with the auxiliary crane, crane components can start to swing back and forth.
When lifting / lowering and positioning crane components, there is an increased danger of impacts / crushing.
Personnel can be caught and severely injured or killed.
- ▶ Make sure that personnel cannot be caught by components.
- ▶ Make sure that the crane is aligned in horizontal position to avoid the support beams from swinging by themselves.
- ▶ When working in danger zones: Use aids to protect limbs.
- ▶ Guide components with suitable aids to minimize oscillation.

5.1 Turning the turntable into disassembly position

- ▶ Turn the turntable in longitudinal axle of the crawler travel gear against the travel direction or vertically to the crawler travel gear, see Erection and take down chart.

5.2 Taking the S-boom down

WARNING
The crane can topple over!
If the following conditions are not met before taking down the boom, the crane can topple over and fatally injure personnel.
- ▶ The turntable may not be turned during the disassembly of the boom
- ▶ Observe the technical safety notes, see Crane operating instructions, chapter 5.01.
- ▶ Observe the data in the erection and take down charts.

If required in the erection and take down chart:
- ▶ Carry the hook block along with the auxiliary crane.

NOTICE
Damage of boom components!
Taking down the boom system can lead to a collision between the hook block and the pulley head.
Boom components can be severely damaged.
- ▶ Luff the boom system down at the same time and spool the hoist winch out.

Note
- ▶ Depending on the condition of the ground, the boom and the lattice sections must be supported from below for the disassembly of the boom.

Make sure that the following prerequisites are met:
- The crane is aligned in horizontal direction.
- An auxiliary crane is available.
- An assembly scaffolding / work platform is available.
- The central ballast is installed according to the erection and take down charts.
- The counterweight has been installed on the turntable according to the erection and take down chart.
- The LICCON overload protection has been set according to the data in the load chart.

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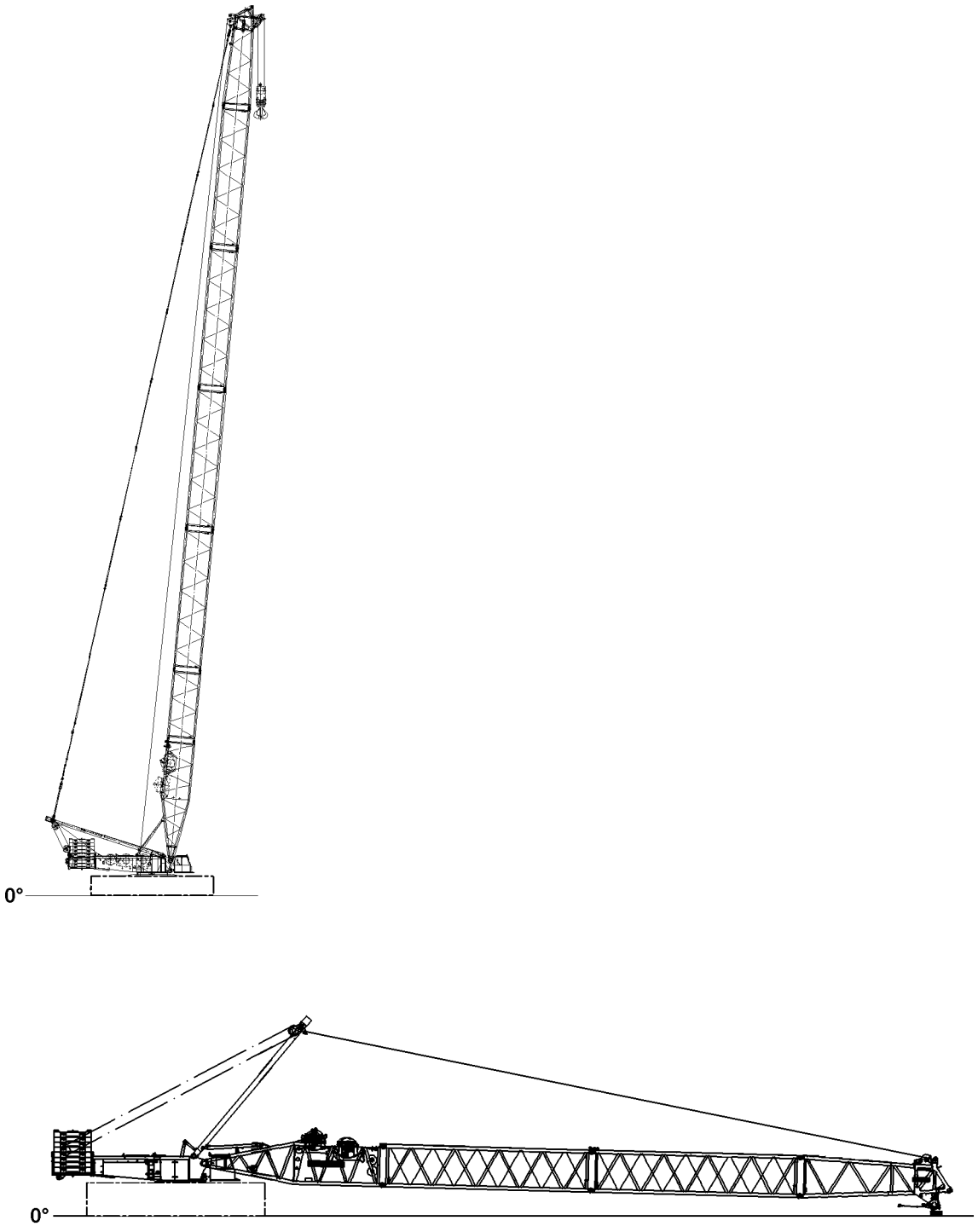

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Fig.120949

5.2.1 Luffing the S-boom down

Note

- ▶ The luff down movement is turned off as soon as the lowest operating position is reached.
- ▶ When the lowest operating position of the S-boom is reached, the load display in the maximum load icon turns off and instead of the load display appears the display „???“.
- ▶ In the crane operating screen appear alarm functions.

▶ Luff the S-boom down to the „lowest“ operating position.

Result:

– The luff down movement is turned off.
– The „STOP“ icon appears on the LICCON monitor.
– The horn icon appears on the LICCON monitor.

WARNING

Danger of accident due to function „Exceeding the shut off limits of the LICCON overload protection“!
If the shut off limits of the LICCON overload protection are exceeded, there is no additional protection against crane overload.
Due to erroneous operation or deliberate misuse, the crane could collapse, the boom can break off or the crane can topple over.
Personnel can be severely injured or killed.

- ▶ The function „Exceeding the shut off limits of the LICCON overload protection“ is only permissible in emergencies and for assembly purposes.
- ▶ The function „Exceeding the shut off limits of the LICCON overload protection“ may only be actuated by persons who know the effects of their actions regarding the function „Exceeding the shut off limits of the LICCON overload protection“.
- ▶ The function „Exceeding the shut off limits of the LICCON overload protection“ requires the presence of an authorized person and must be performed with utmost caution.
- ▶ Crane operation with activated function „Exceeding the shut off limits of the LICCON overload protection“ is prohibited.

▶ Exceeding the shut off limits of the LICCON overload protection: Engage assembly operation.

Result:

– The shut off limits of the LICCON overload protection are exceeded.
– The assembly icon appears on the LICCON monitor.

▶ At the same time, spool the hoist winch out and luff the S-boom down until the hook block touches the ground.

5.2.2 Unreeving the hook block

▶ Remove the hoist limit switch weight and unreeve the hook block.

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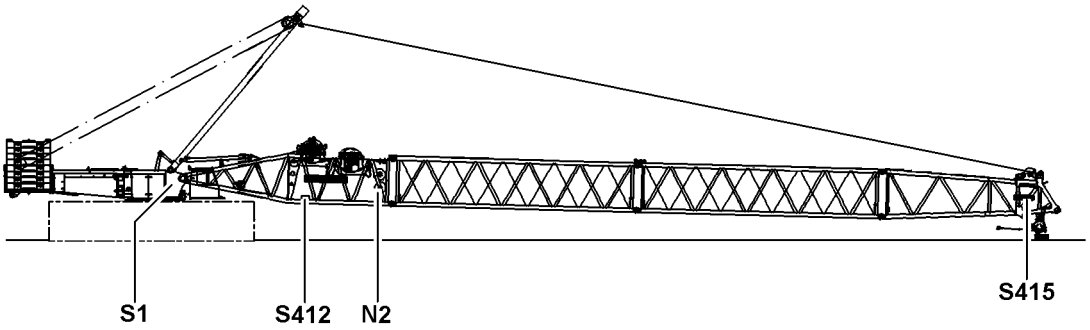

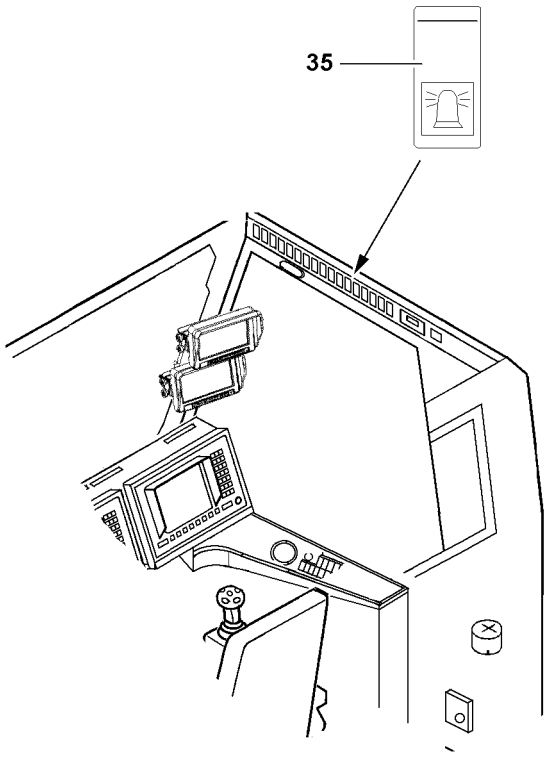

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Fig.111624

5.2.3 Spooling the hoist rope up

NOTICE
Overspooled winch!
If the rope is pulled under the winch when spooling up, the settings of the cam limit switch are not longer correct and there is an increased danger of accidents.
As a result, extensive adjustment work on the cam limit switch is required.
- ▶ All rope retaining pins / pipes on the S-boom are removed.
- ▶ Slowly spool up the hoist rope over the rope pulleys back to the winch.
- ▶ Stop the winch in time, with sufficient rope reserve.
- ▶ Do not overspool the winch.

▶ Spool the hoist rope up.

5.3 Disconnecting the electrical connections on the boom

Make sure that the following prerequisite is met:
– The S-boom has been placed down.

NOTICE
Damage to cable drum or cable!
If the cable of the cable drum is not properly spooled up on the cable drum after unplugging the S-end section, then the cable drum or the cable can be significantly damaged.
- ▶ Spool the cable drum up after unplugging.

- ▶ Spool the cable drum up and secure it to prevent inadvertent spooling out.
- ▶ Make sure that all electrical connections on the S-boom have been disconnected.

5.4 Disconnecting the hydraulic connection on the boom

When releasing hydraulic lines with quick couplings, make sure that the coupling procedure is carried out correctly.

WARNING
Pressure in the hydraulic lines!
If the pressure supply is not interrupted before connecting / releasing the hydraulic lines, the hydraulic oil can escape with high pressure.
Personnel can be severely injured or killed.
- ▶ Release the pressure in the hydraulic system before connecting / disconnecting: Interrupt the pressure supply and wait for a short time.

- ▶ Install the coupling components (sleeve and connector) with the hand-tightened nut.
- ▶ Disconnect the hydraulic connections.
- ▶ Install dust caps on the quick couplings.

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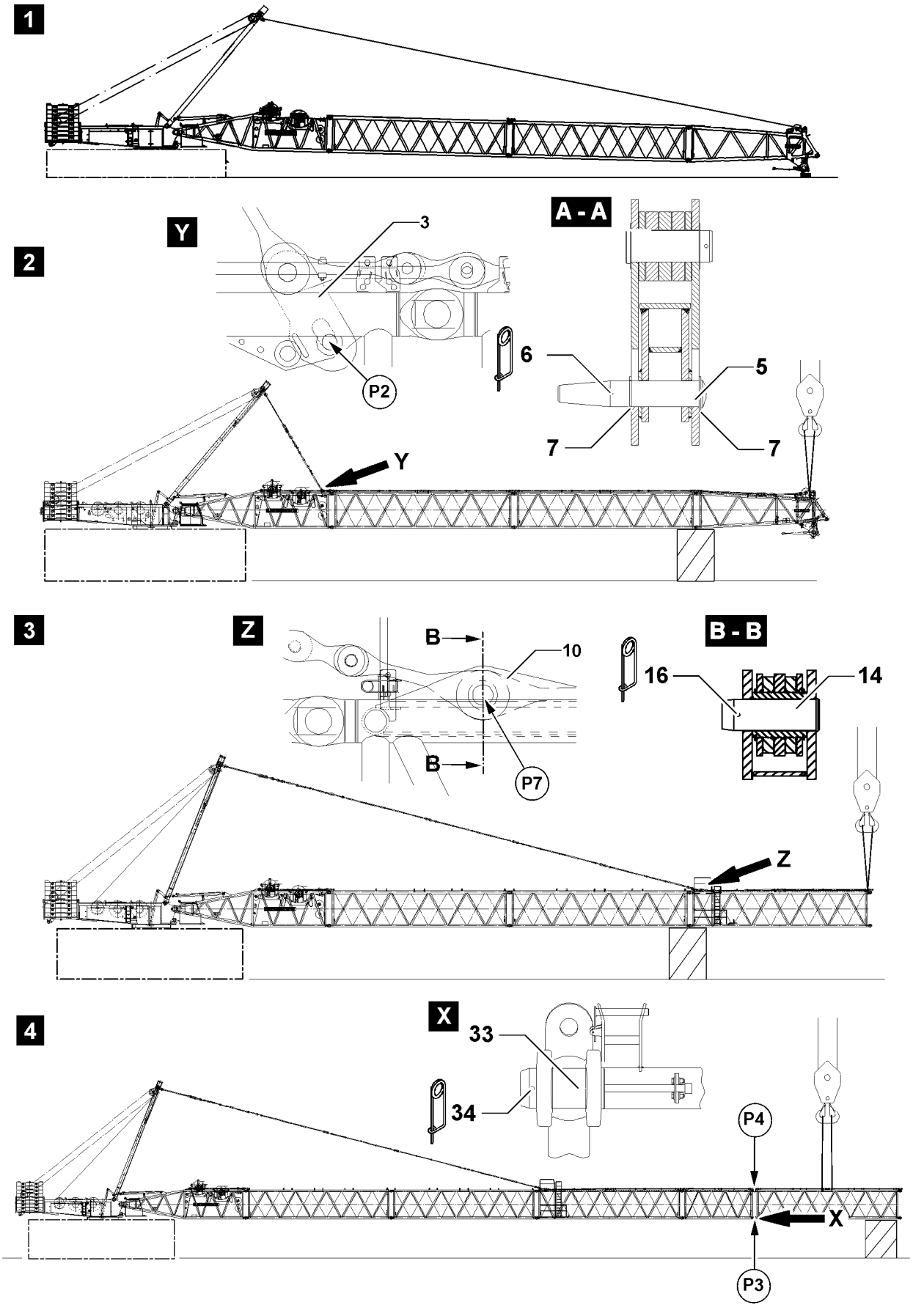

Fig.112557

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5.5 Disassembling the S-lattice sections

The disassembly of the lattice sections is carried out in various ways:
- Disassembling the lattice sections in „Flying mode“.
- „Opening“ the boom.

WARNING
General danger notes!
- ▶ Support the S-boom during assembly / disassembly with suitable materials.
- ▶ All pins are to be secured after assembly with the intended safety elements.
- ▶ The guy rods must be inspected regularly, see Crane operating instructions, chapter 8.15.
- ▶ Secure the boom with support or auxiliary crane, see Crane operating instructions, chapter 5.01.
- ▶ It is prohibited for anyone to remain under the booms or within the complete danger zone during the pinning and unpinning procedure of the lattice section.

Note
- ▶ For weights of intermediate sections with placed guy rods, see Crane operating instructions, chapter 1.03.
- ▶ The intermediate sections are unpinned with the aid of the pin pulling device, see Crane operating instructions, chapter 5.30.

Make sure that the following prerequisite is met:
- All electrical and hydraulic connections are separated on the boom.

5.5.1 Disassembling the S-intermediate sections in flying mode

If spatial prerequisites on the job site are limited for the disassembly of the S-boom, or if they are limited by buildings or similar, then the S-boom can be removed in flying mode.

For the flying disassembly, a differentiation is made between the guy points on the boom:
- Guying on S-pivot section, see illustration **3**.
- Guying on S-intermediate section for flying assembly, see illustration **4**.

WARNING
Impermissible boom lengths guyed in flying mode!
If impermissible boom lengths are guyed on the assembly brackets, then severe property damage can occur on the crane.
Personnel can be severely injured or killed.
- ▶ The maximum permissible boom lengths for the „Flying assembly“ may not be exceeded, see section „Assembling the S-lattice sections“.
- ▶ For the „flying“ boom assembly, the maximum permissible total force on the test point **MS1** may **not** be exceeded, see section „Assembling the S-lattice sections in flying mode“.
- ▶ Pin the guy rods either on the assembly brackets **3**, point **P2**, or the assembly brackets **10**, point **P7**.
- ▶ The specifications in the erection and take down charts as well as the load charts must be observed.

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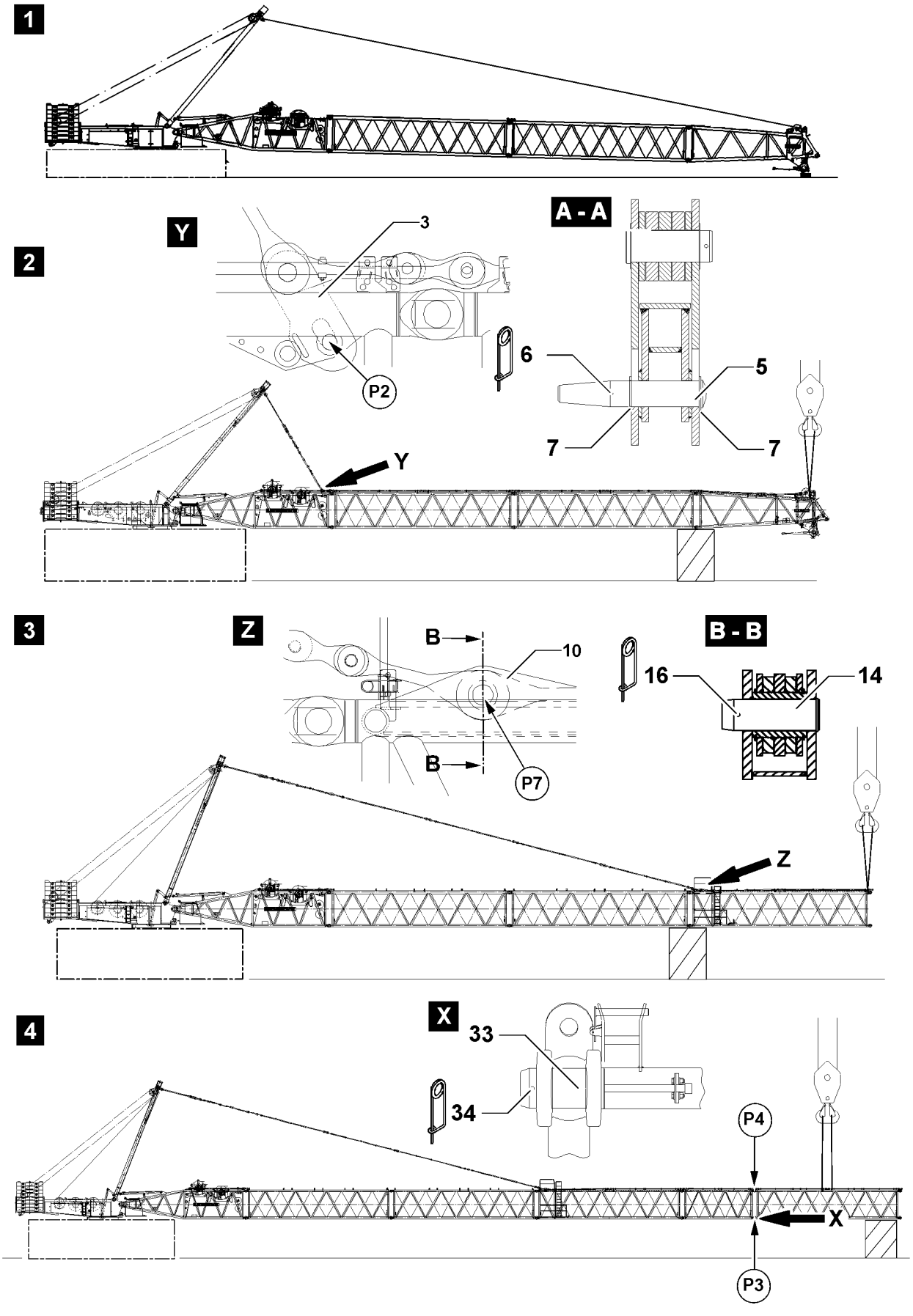

Fig.112557

LWE/LG 1750-006/15409-07-02/en

WARNING
The boom can fold downward!
By unpinning the guy rods on the assembly brackets **3** or the assembly brackets **23**, the boom can fold down.
Personnel can be severely injured or killed.
▶ Unpin the guy rods on the assembly brackets **3**, point **P2** or the assembly brackets **10**, point **P7** when it is ensured that the intermediate sections are supported with suitable materials or are secured with the auxiliary crane or the boom is placed on the ground.

Make sure that the following prerequisites are met:
– The boom is in horizontal position.
– The guy rods are tensioned.
– Suitable materials to support the boom are available.
– An auxiliary crane is available.

Guying the S-boom in „Flying mode“

▶ Support the boom or secure it with the auxiliary crane.

Note
▶ The guy rods must be placed down to the point where the boom can be guyed on the assembly brackets **3** on point **P2** or the assembly brackets **10** on point **P7**.

▶ Make sure that the transport retainers for the guy rods on the intermediate sections are unpinned.
▶ Luff the SA-frame down and place the guy rods on the S-intermediate sections in the transport retainers.

Guying on the S-pivot section: When pinning the pin **5**, you have to use the washers **7**, see illustration **2**, sectional **A-A**.

When the boom is guyed on the S-pivot section:
▶ Pin the guy rods on the assembly brackets **3**: Insert the pin **5** on point **P2** and secure with spring retainer **6**.

When the boom is guyed on the S-intermediate section:
▶ Pin the guy rods on the assembly brackets **10**: Insert the pin **14** on point **P7** and secure with spring retainer **16**.
▶ Disassemble the guy rods, which are laying on the boom and secure them in the transport retainers.

Result:

– The S-intermediate sections can be disassembled.

Disassembling the S-intermediate section

The „flying“ disassembly is described on the example of one intermediate section, see illustration **4**.

▶ Secure the S-intermediate section with the auxiliary crane.
▶ Unpin the S-intermediate section on both sides „on the bottom“ at point **P3**: Remove the spring retainer **34** and unpin the pin **33**.
▶ Unpin the S-intermediate section on both sides „on top“ at point **P4**: Remove the spring retainer **34** and unpin the pin **33**.
▶ Remove the S-intermediate section.

If additional lattice sections are disassembled:
▶ Disassemble additional lattice sections the same way as described in this section.

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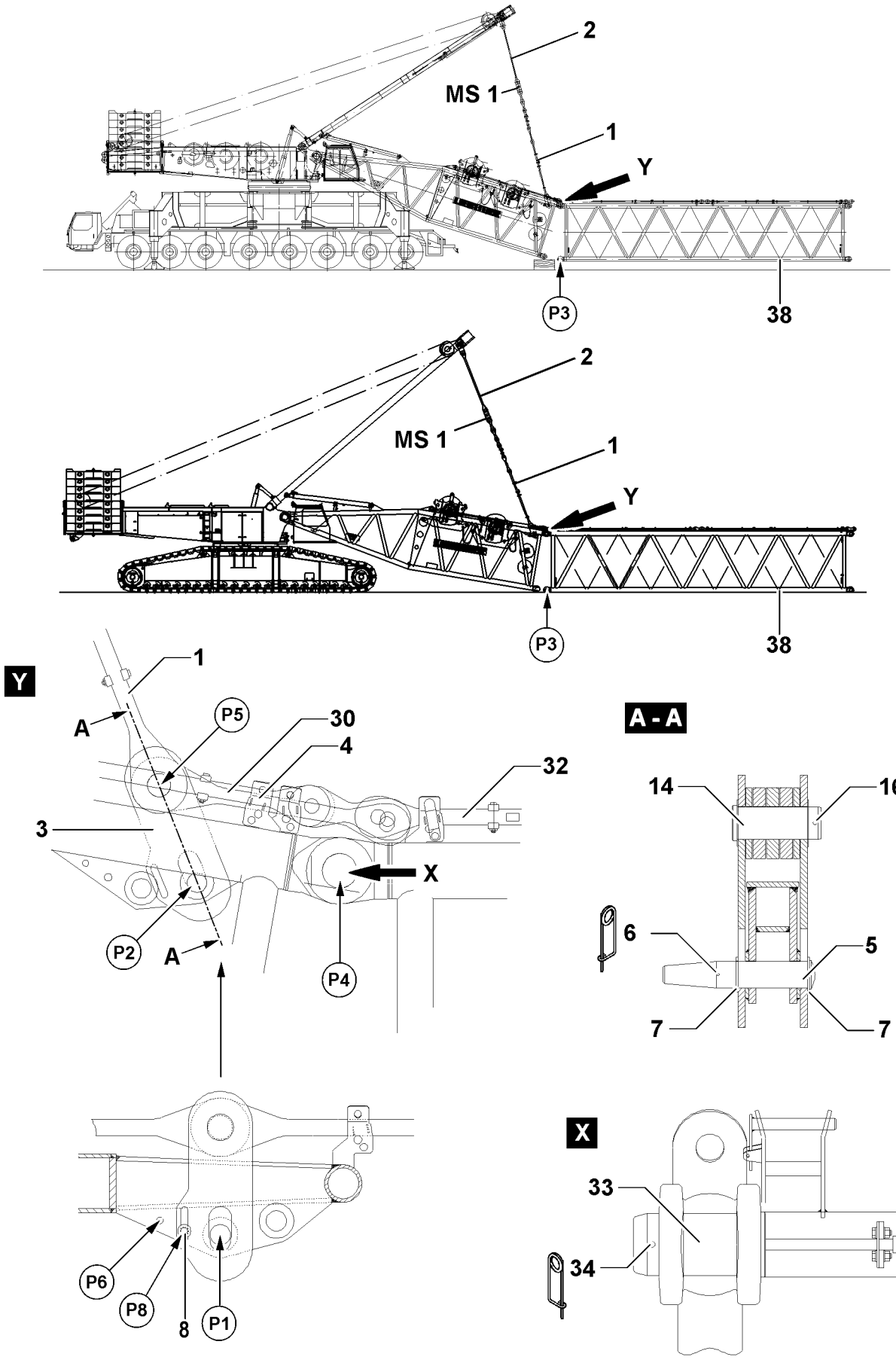

Fig.112553

5.5.2 Disassembling the S-lattice sections („open“ boom)

WARNING
The crane can topple over!
If the following conditions are not met, the crane can topple over or be significantly damaged.
Personnel can be severely injured or killed.
- ▶ The end section of the corresponding S/SL-boom combination may **not** lift off the ground during the „Closing procedure“.
- ▶ With the SA-frame, boom combinations only to certain system lengths may be lifted / opened, see section „Assembling S-lattice sections (close boom)“.

Make sure that the following prerequisites are met:
- The guy rods are tensioned.
- Suitable materials to support the boom are available.
- An auxiliary crane is available.

Pinning the guy rods on the S-pivot section

Note
- ▶ The guy rods must be placed down to the point where the guy rods can be pinned on the assembly brackets **3** on point **P2**.

- ▶ Luff the SA-frame down and place the boom on the support on the ground.
- ▶ Make sure that the transport retainers for the guy rods on the intermediate sections are unpinned.
- ▶ Luff the SA-frame down and place the guy rods on the S-intermediate sections in the transport retainers.

When pinning the pin **5**, you have to use the washers **7**, see illustration.

- ▶ Pin the guy rods **1** on the assembly brackets **3** on the S-pivot section: Insert the pin **5** and secure with spring retainer **6**, see detail **Y**.
- ▶ Unpin the guy rods, which are laying on the boom and secure them individually with the transport retainers.

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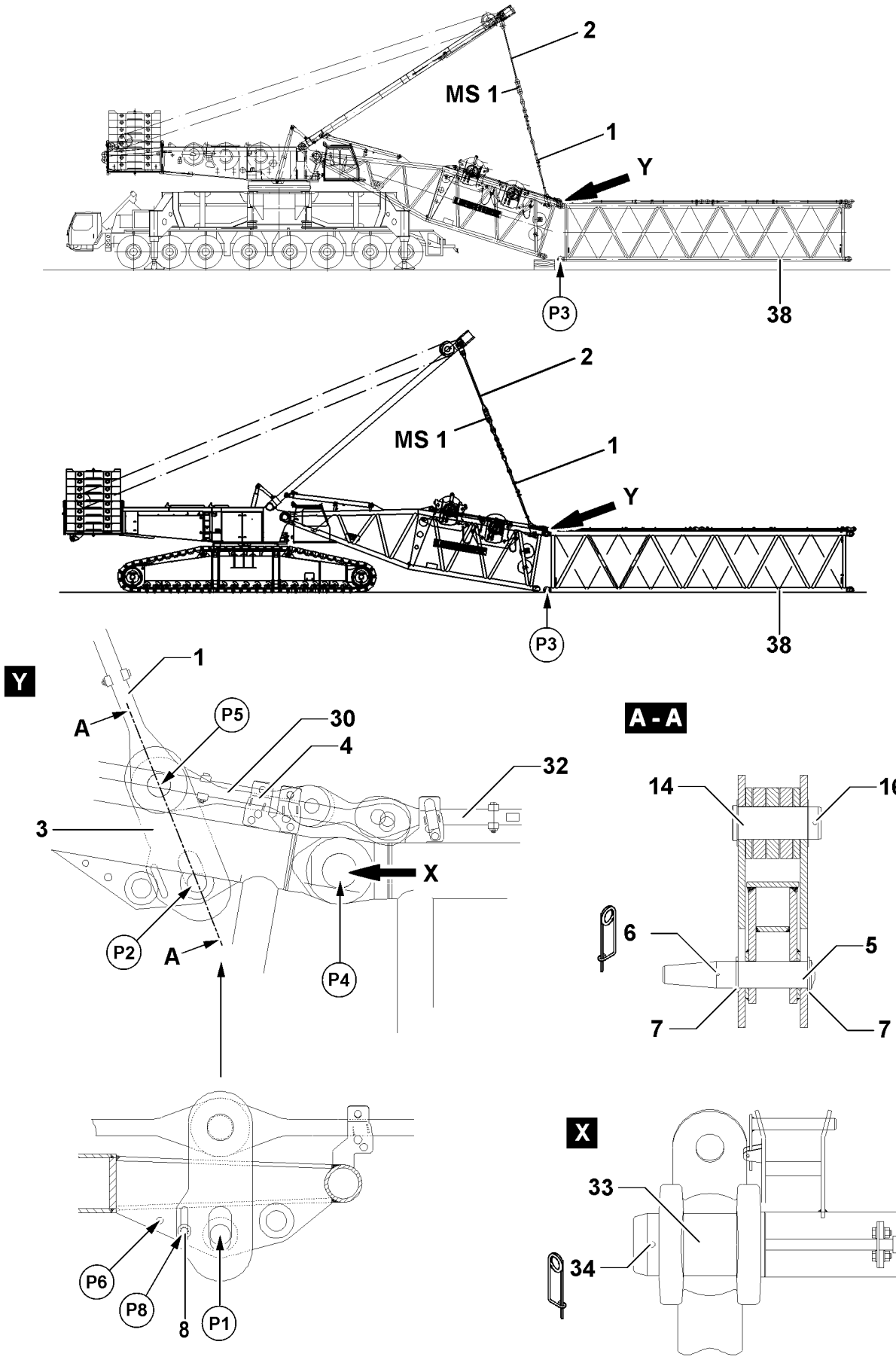

Fig.112553

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„Opening“ the S-boom

Note
- ▶ The ACTUAL force on test point **MS1** is shown on LICCON monitor 1.
- ▶ Tension the guying on the SA-frame with the same force as for assembly, see the actual force which was measured and noted at assembly on test point **MS1**.
- ▶ The pins can be pulled easier and the pins and lugs are therefore not damaged.

- ▶ Lift the SA-frame and tension the guy rods until the force on test point **MS1** corresponds to the force at assembly.
- ▶ Unpin the S-pivot section on both sides „on the bottom“ at point **P3**: Remove the spring retainer **34** and unpin the pin **33**, see detail **X**.
- ▶ Lower the S-boom until the intermediate sections and the S-pivot section are laying on the support on the ground.
- ▶ Unpin the S-pivot section on both sides „on top“ at point **P4**: Remove the spring retainer **34** and unpin the pin **33**, see detail **Y**.
- ▶ Lower the SA-frame and place the guy rods **1** in the transport retainers on the S-pivot section.
- ▶ Unpin the guy rods **1** on the guy rods **2** of the SA-frame.
- ▶ Secure guy rods **1** in the transport retainers.

NOTICE
Assembly bracket in operating position!
If the assembly bracket **3** is in operating position during transport, components can be damaged.
- ▶ Secure the assembly bracket **3** before transport with the transport retainer **8** on point **P8**, see detail **Y**.

- ▶ Unpin the assembly bracket **3** on the S-pivot section: Remove the spring retainer **6** and unpin the pin **5** on point **P2**, see detail **Y**.

When pinning the pin **5**, you have to use the washers **7**, see sectional **A-A**.

- ▶ Pin the assembly bracket **3** on the S-pivot section: Insert the pin **5** on point **P1** and secure with spring retainer.
- ▶ Secure the assembly bracket **3**: Disassemble the transport retainer **8** on point **P6** and assemble on point **P8**.

Result:

– The S-lattice sections can be disassembled.

Disassembling the S-lattice sections

The disassembly is described on the example of one intermediate section, see detail **X**.

- ▶ Unpin the S-intermediate section on both sides „on the bottom“: Remove the spring retainer **34** and unpin the pin **33**.
- ▶ Unpin the S-intermediate section on both sides „on top“: Remove the spring retainer **34** and unpin the pin **33**.
- ▶ Remove the S-intermediate section.

If additional lattice sections are disassembled:
- ▶ Disassemble additional lattice sections the same way as described in this section.

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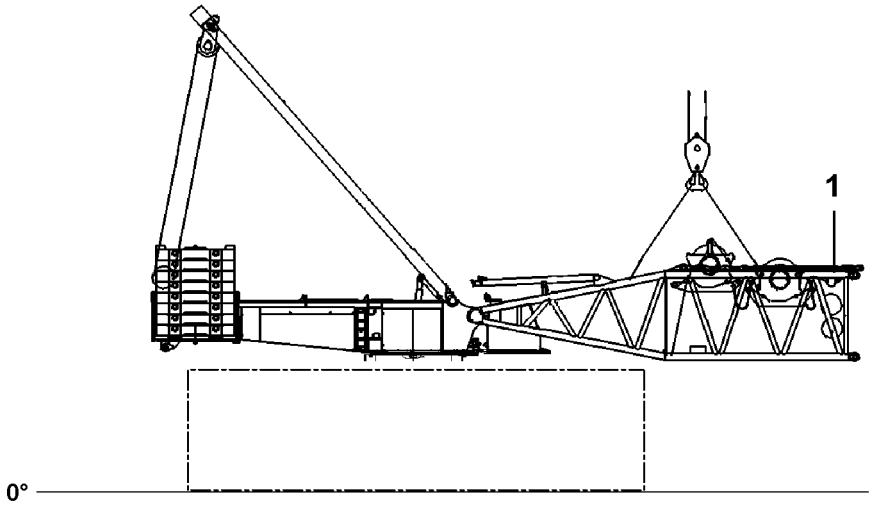

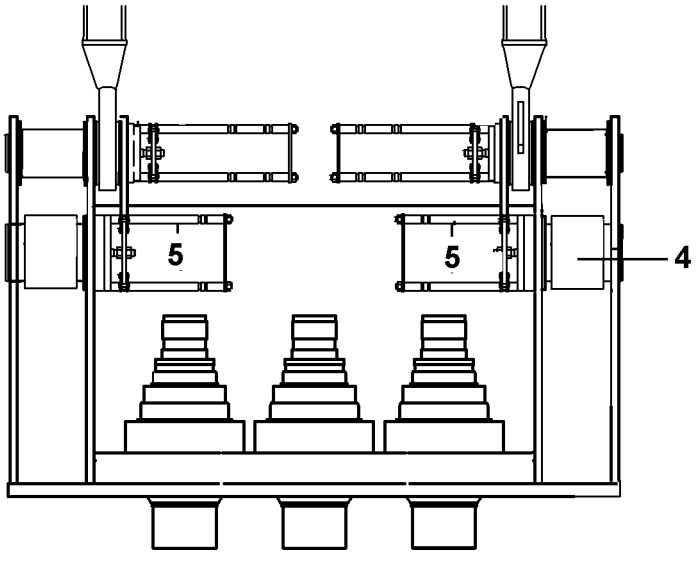

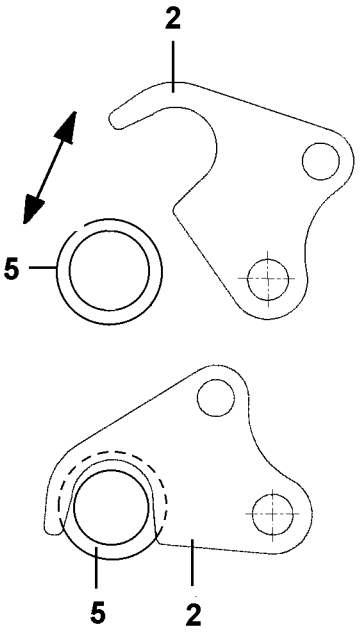

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Fig.120948

5.6 Disassembling the S-pivot section

WARNING
General danger notes!
- ▶ Support the S-pivot section during disassembly with suitable materials.
- ▶ Insert and secure all pins after disassembly in the intended transport receptacles.
- ▶ The guy rods must be inspected regularly, see Crane operating instructions, chapter 8.15.

Make sure that the following prerequisite is met:
- – The SA-frame is erected to the point where the S-pivot section can be disassembled without obstructions.

- ▶ Attach the S-pivot section **1** on the auxiliary crane.
- ▶ Lift the S-pivot section **1** with the auxiliary crane to the horizontal.

The pin pulling cylinders on the turntable are actuated with the radio remote control (only available for LR-cranes).

Note
- ▶ For operation of the radio remote control, see Crane operating instructions, chapter 6.08.

WARNING
The S-pivot section can fold downward!
If the S-pivot section is not secured before unpinning the pins, then it will fold down.
Personnel can be severely injured or killed.
- ▶ Make sure that the S-pivot section is secured with the auxiliary crane before unpinning the pin **4**.

- ▶ Release the pin **4**: Fold the retaining hook **2** out on the guides **5**.
- ▶ Unpin the pins **4** on both sides.

When the pins **4** are completely unpinned on the left and right on the S-pivot section **1**:
- ▶ Secure the pin **4**: Fold the retaining hook **2** in on the left and right on the guides **5**.

NOTICE
Property damage on the turntable and on the S-pivot section!
- ▶ Slowly swing the S-pivot section out with the auxiliary crane and at low speed on the turntable.

- ▶ Carefully place the S-pivot section **1** down.
- ▶ Remove the auxiliary crane.

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5.39.20 SD/SLD/SXD/SXZD/SXLD/SXZLD/HSD/HSLD-boom combination

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Fig.195219

1 Component overview

Note
- ▶ The boom components as well as the dimensions and weights are described in chapter 1.03.
- ▶ For the combination of the various boom systems, refer to the Rod plan and chapter 5.03.

2 Fastening points

WARNING
Falling lattice sections!
Death, severe bodily injuries, property damage.
- ▶ Make sure that the lattice sections are properly fastened on the respective fastening points.
- ▶ Make sure that the fastening equipment has the appropriate length and a sufficient load bearing capacity.
- ▶ Pay attention and adhere to the labels on the fastening points on the lattice sections and crane components.

2.1 Fastening points S-pivot section

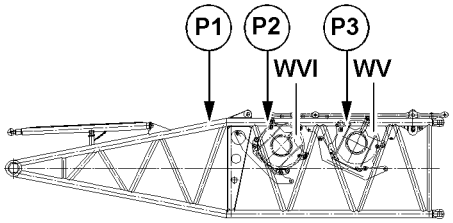

Fig.124846: Fastening points S-pivot section

Fastening points	
P1 + P2	S-pivot section without winch 5, without winch 6
P1 + P3	S-pivot section with winch 5, without winch 6
P1 + P3	S-pivot section with winch 6, without winch 5
P1 + P3	S-pivot section with winch 5, with winch 6

2.2 Fastening points SX-reducer, bottom

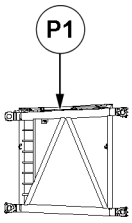

Fig.145064: Fastening points SX-reducer, bottom

Note
- ▶ The lattice section must be fastened on both sides to the fastening points.

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Fastening points	
P1	SX-reducer, bottom

2.3 Fastening points S-intermediate section 3326.40 RU

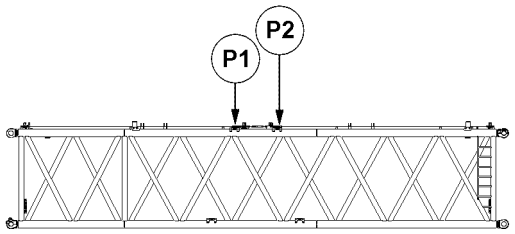

*Fig.145261: Fastening points S-intermediate section **3326.40 RU***

Note
▶ The lattice section must be fastened on both sides to the fastening points.

Fastening points	
P1 + P2	S-intermediate section **3326.40 RU**

2.4 Fastening points S-intermediate sections 3326.40

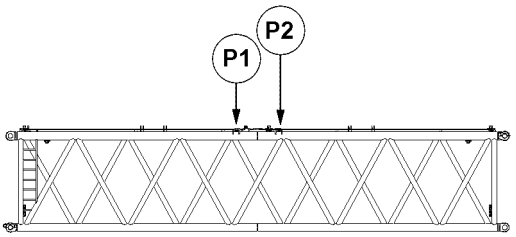

*Fig.145255: Fastening points S-intermediate sections **3326.40***

Note
▶ The lattice section must be fastened on both sides to the fastening points.

Fastening points	
P1 + P2	S-Intermediate sections **3326.40**

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2.5 Fastening points S-intermediate section 3326.40 RO

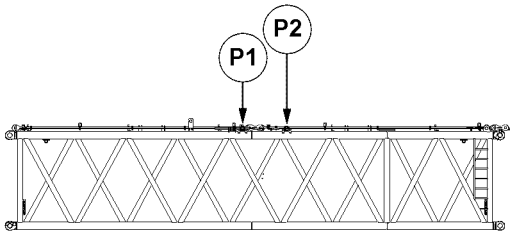

*Fig.145254: Fastening points S-intermediate section **3326.40 RO***

Note
▶ The lattice section must be fastened on both sides to the fastening points.

Fastening points	
P1 + P2	S-intermediate section **3326.40 RO**

2.6 Auxiliary guying frame fastening point

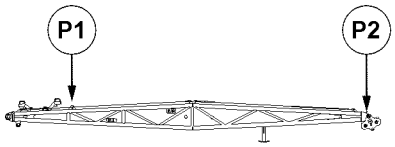

Fig.145253: Auxiliary guying frame fastening point

Note
▶ The auxiliary guying frame must be fastened on both sides on the fastening points.

Fastening points	
P1 + P2	Auxiliary guying frame

2.7 Fastening points S-intermediate sections 7 m

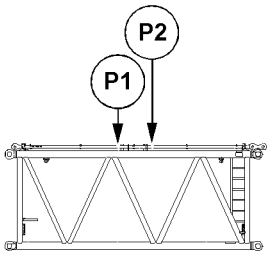

Fig.124851: Fastening points S-intermediate section 7 m

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Note
- ▶ The S-intermediate sections are available in various system dimensions.
- ▶ The distance between the fastening pints can vary, depending on the respective S-intermediate section.
- ▶ The lattice section must be fastened on both sides to the fastening points.

Fastening points	
P1 + P2	S-intermediate section 7 m

2.8 Fastening points S-intermediate sections 14 m

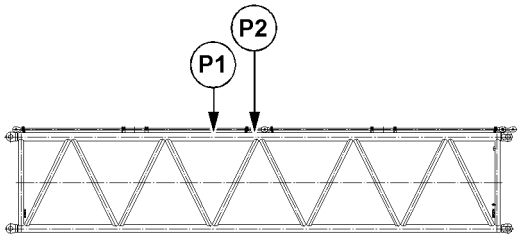

Fig.124848: Fastening points S-intermediate section 14 m

Note
- ▶ The S-intermediate sections are available in various system dimensions.
- ▶ The distance between the fastening pints can vary, depending on the respective S-intermediate section.
- ▶ The lattice section must be fastened on both sides to the fastening points.

Fastening points	
P1 + P2	S-intermediate section 14 m

2.9 Fastening points S-intermediate sections 14 m , for flying assembly

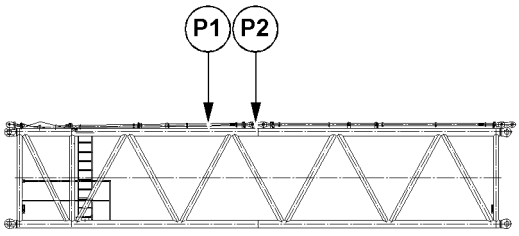

Fig.124847: Fastening points S-intermediate sections 14 m , for flying assembly

Note
- ▶ The S-intermediate sections are available in various system dimensions.
- ▶ The distance between the fastening pints can vary, depending on the respective S-intermediate section.
- ▶ The lattice section must be fastened on both sides to the fastening points.

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Fastening points	
P1 + P2	S-intermediate section 14 m , for flying assembly

2.10 Fastening points LA-intermediate sections 7 m

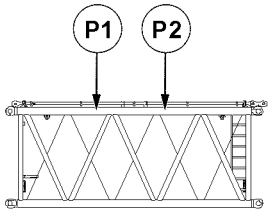

Fig.124852: Fastening points LA-intermediate section 7 m

Note
▶ The lattice section must be fastened on both sides to the fastening points.

Fastening points	
P1 + P2	LA-intermediate section 7 m

2.11 Fastening points LA-intermediate sections 14 m

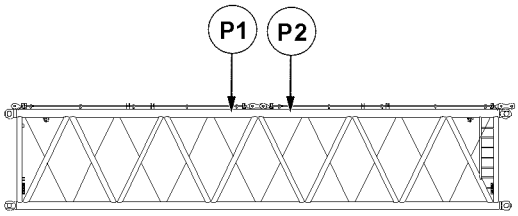

Fig.124853: Fastening points LA-intermediate section 14 m

Note
▶ The lattice section must be fastened on both sides to the fastening points.

Fastening points	
P1 + P2	LA-intermediate section 14 m

2.12 Fastening points LI-intermediate sections 7 m

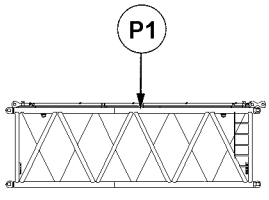

Fig.124854: Fastening points LI-intermediate section 7 m

Note
▶ The lattice section must be fastened on both sides to the fastening points.

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Fastening points	
P1	LI-intermediate section 7 m

2.13 Fastening points LI-intermediate sections 14 m

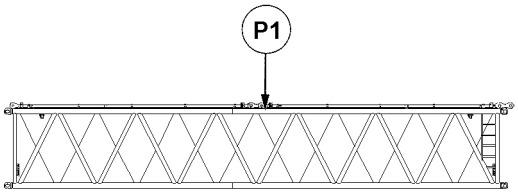

Fig.124855: Fastening points LI-intermediate section 14 m

Note
▶ The lattice section must be fastened on both sides to the fastening points.

Fastening points	
P1	LI-intermediate section 14 m

2.14 Fastening points L-adapter

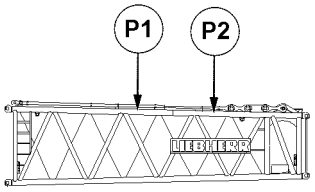

Fig.124858: Fastening points L-adapter

Note
▶ The lattice section must be fastened on both sides to the fastening points.

Fastening points	
P1 + P2	L-adapter

2.15 Fastening points Adapter for boom nose

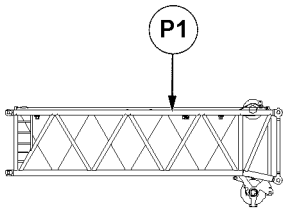

Fig.124859: Fastening points Adapter for boom nose

Note
▶ The lattice section must be fastened on both sides to the fastening points.

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Fastening points	
P1	Adapter for boom nose

2.16 Fastening points SL-reducer 7 m

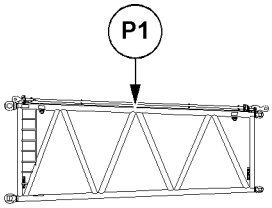

Fig.124849: Fastening points SL-reducer 7 m

Note
▶ The lattice section must be fastened on both sides to the fastening points.

Fastening points	
P1	SL-reducer 7 m

2.17 Fastening points S-end section

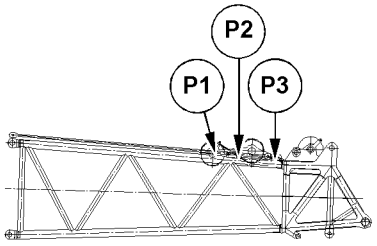

Fig.124850: Fastening points S-end section

Fastening points	
P1 + P2	S-end section, without roller set
P1 + P3	S-end section, with roller set

2.18 Fastening points L-end section

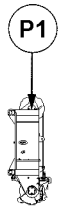

Fig.124860: Fastening points L-end section

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Fastening points	
P1	L-end section

3 Assembling the SLD / SD-boom

Note

▶ The assembly is described on the example of the S-boom.

WARNING

Danger of falling!

During assembly / disassembly, inspection and maintenance work, assembly personnel must be secured with appropriate aids to prevent them from falling. If this is not observed, assembly personnel could fall and be killed or seriously injured.

- ▶ All work at a height, when there is a danger of falling, must be carried out with suitable aids.
- ▶ If fall protection equipment is available, then it must be used, see the Crane operating instructions, chapter 2.06.
- ▶ If aids are not available and work cannot be carried out from the ground, then assembly personnel must secure themselves with the specified fall arrest system to prevent falling, see the Crane operating instructions, chapter 2.04.
- ▶ The fall arrest system must be fastened on the fastening and hook points as well as on the safety ropes. For the safety points, see the Crane operating instructions, chapter 2.06.
- ▶ Only step on the aids, ladders and catwalks with clean shoes.
- ▶ Keep aids, ladders and catwalks free of heavy dirt, snow and ice.
- ▶ Remaining on as well as under a suspended load is prohibited.
- ▶ Remaining on or within crane components (for example: At assembly of boom sections, lattice sections) which are moved during lifting, lowering, turning or closing procedures is strictly prohibited.
- ▶ During all assembly and disassembly work, maintenance work and inspections, travel or crane operation is prohibited.
- ▶ It is prohibited to step on the boom system or an auxiliary boom without suitable protective devices.
- ▶ Stepping and walking on crane components and lattice sections, which have an incline of more than 20° is prohibited.

WARNING

The lattice sections can fall down!

If the lattice sections are not pinned and secured correctly, then they can fall down and fatally injure personnel.

- ▶ Pin or unpin both pins at the same horizontal level, i.e. **left and right**.
- ▶ Do not stand under the lattice sections or within the entire danger zone during the pinning and unpinning procedure of the boom.
- ▶ Secure the pins in the bearing points and the receptacles.
- ▶ It is prohibited to lean the ladder against the component being disassembled.
- ▶ Do not remove the fastening equipment and the auxiliary crane until each component is pinned on and secured.

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WARNING
Danger of impact / crushing!
When installing / removing crane components with the auxiliary crane, crane components can start to swing back and forth.
When lifting / lowering and positioning crane components, there is an increased danger of impacts / crushing.
Personnel can be caught and severely injured or killed.
- ▶ Make sure that personnel cannot be caught by components.
- ▶ Make sure that the crane is aligned in the horizontal direction to avoid the support beams from swinging by themselves (only on connection with crane support or for the LG-crane).
- ▶ When working in danger zones: Use aids to protect limbs.
- ▶ Guide components with suitable aids to minimize oscillation.

WARNING
The crane can topple over!
If the turntable is turned during the assembly of the boom, then the crane can topple over and be severely damaged.
Personnel can be severely injured or killed.
- ▶ The turntable may not be turned during the assembly of the boom.

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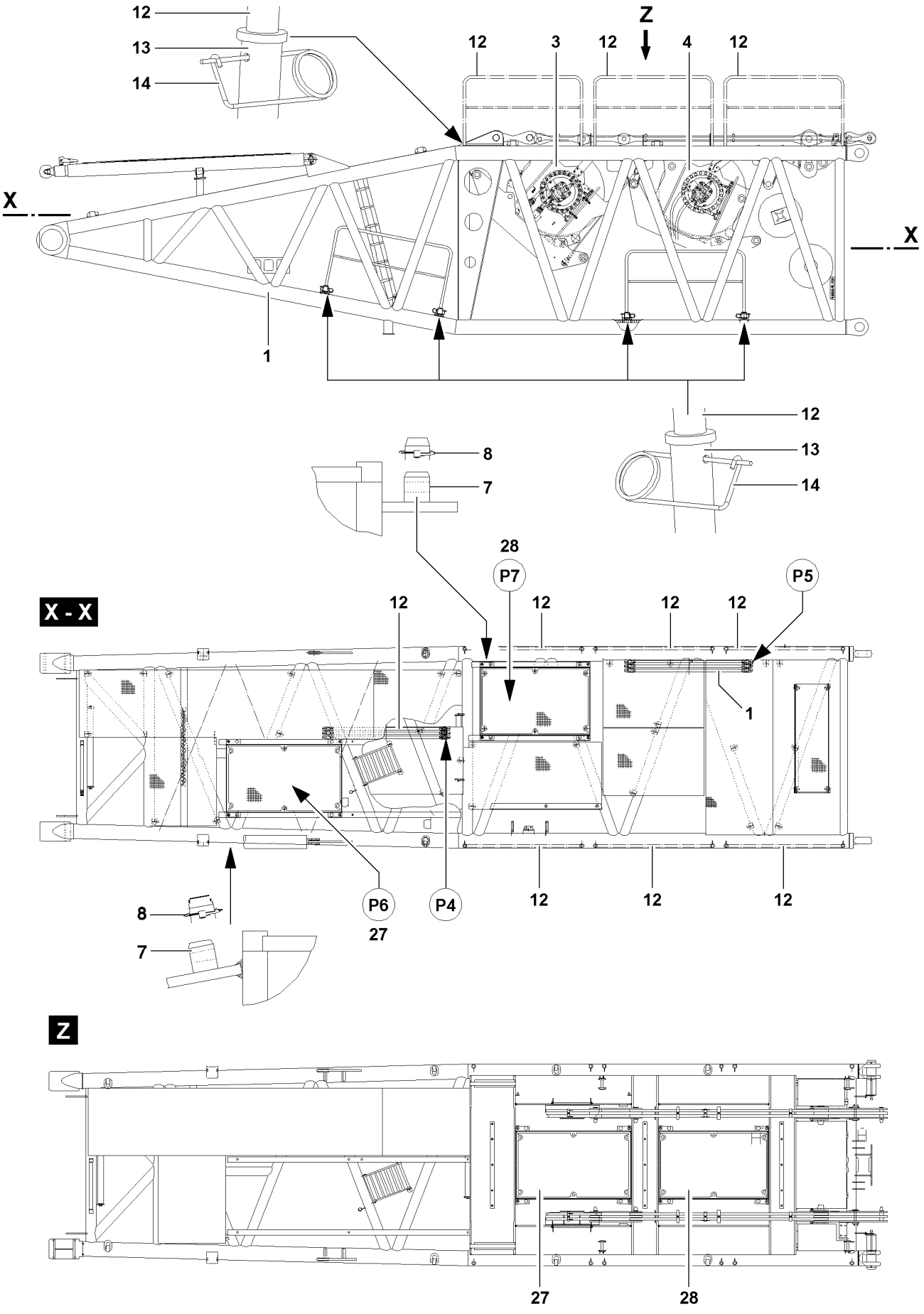

Fig.112057

3.1 Assembling the railing on the S-pivot section

WARNING
Danger of falling!
During assembly and disassembly of the railings **12**, assembly personnel must be secured with appropriate aids (for example: personal protective equipment) to prevent them from falling.
Even during the assembly of protective equipment there is a danger of falling.
Assembly personnel can fall and be severely injured or killed.
- ▶ For assembly and disassembly work, maintenance and inspection work on the S-pivot section, all railings **12** must be assembled and secured.
- ▶ Step on the S-pivot section **1** only with „clean shoes“.

Note
- ▶ See the Crane operating instructions, chapter 2.06.

- ▶ Remove the railing **12** on the S-pivot section **1** from the transport position **P4** and transport position **P5** and bring into the operating position: Insert the railing **12** in the mounting pipes **13** and secure with the spring retainer **14**.

3.2 Assembling the catwalks

WARNING
Disassembled or incompletely assembled catwalks!
If the catwalks are not assembled if the winches are missing or not completely assembled then personnel can fall and be severely injured or killed.
- ▶ For each non-assembled winch on the S-pivot section: Assemble the catwalk.
- ▶ The catwalks may only be accessed when they are pinned and secured in the operating position, check visually.

Catwalks are assigned to the openings for the winches:
- **27** Winch 6 – catwalk
- **28** Winch 5 – catwalk

Note
- ▶ If one or both winches are installed in the operating position on the S-pivot section, then the disassembled catwalks must be taken down in the respective receptacles and secured.

Make sure that the following prerequisites are met:
- The railings are pinned and secured in the operating position.
- Assembly personnel is secured to prevent them from falling.

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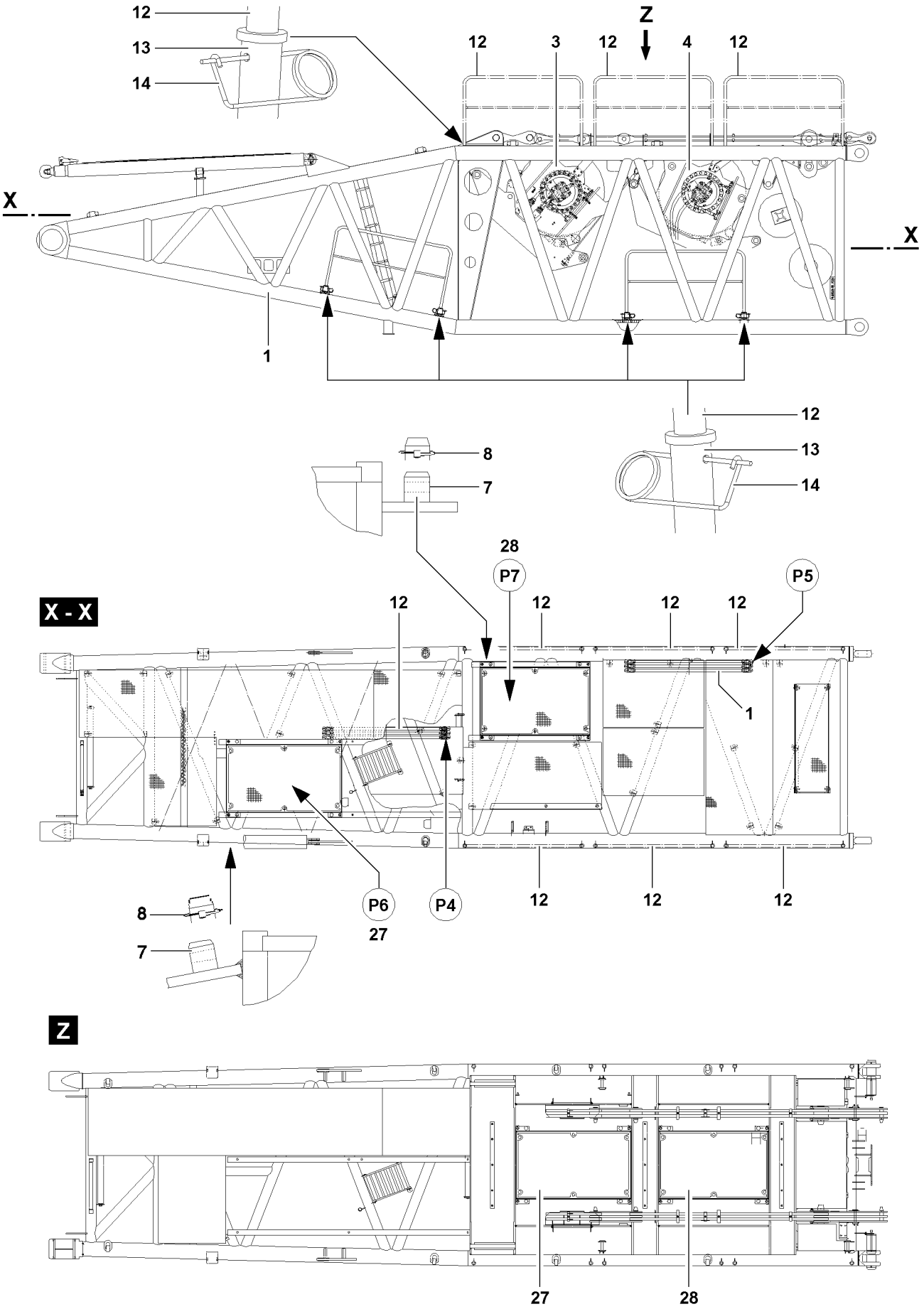

Fig.112057

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3.2.1 S-pivot section without winches

Make sure that the following prerequisite is met:
- The catwalks are in the transport receptacles.

Remove the catwalks with the auxiliary crane from the transport receptacles and install them individually in the operating position.

▶ Remove the catwalk **27** and catwalk **28** with the auxiliary crane from the transport receptacle.
▶ Install and secure the catwalks in the operating position - over the installation opening of the respective winch.

3.2.2 S-pivot section before installation of winches

Make sure that the following prerequisites are met:
- Winch 5 is in the transport position.
- Winch 6 is in the transport position.
- The catwalk **27** and catwalk **28** are pinned and secured in the operating position.

▶ Fasten the respective catwalk to the auxiliary crane.
▶ Release the catwalk on the centering pins: Remove the locking pin **8**.
▶ Lift the catwalk with the auxiliary crane from the operating position.
▶ Take down the catwalk with the auxiliary crane in the transport position **P6** or in the transport position **P7** and secure with the locking pin **8**.

Result:

– The respective winch can be installed.

3.3 Installing the winch(es) on the S-pivot section

Make sure that the following prerequisite is met:
- The catwalks are in the transport receptacles.

▶ Fasten the required winch to the auxiliary crane.
▶ Bring the winch into the operating position with the auxiliary crane, pin and secure.

When the winch is pinned and secured:
▶ Remove the auxiliary crane.
▶ Establish the electrical connections from the terminal box in the S-pivot section to the winches.
▶ Establish the hydraulic connections to the winches.

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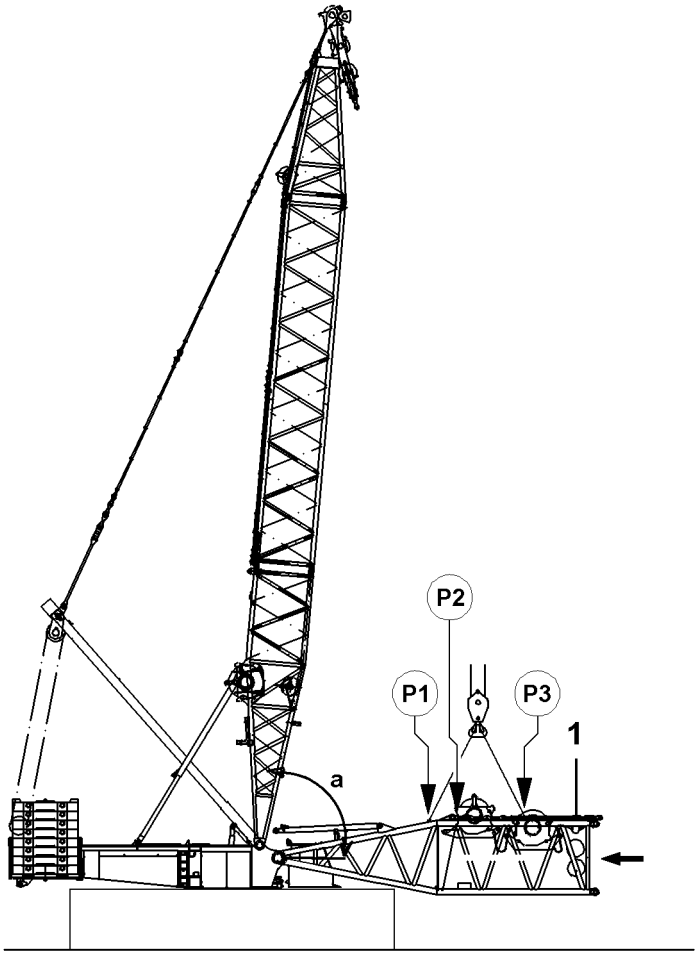

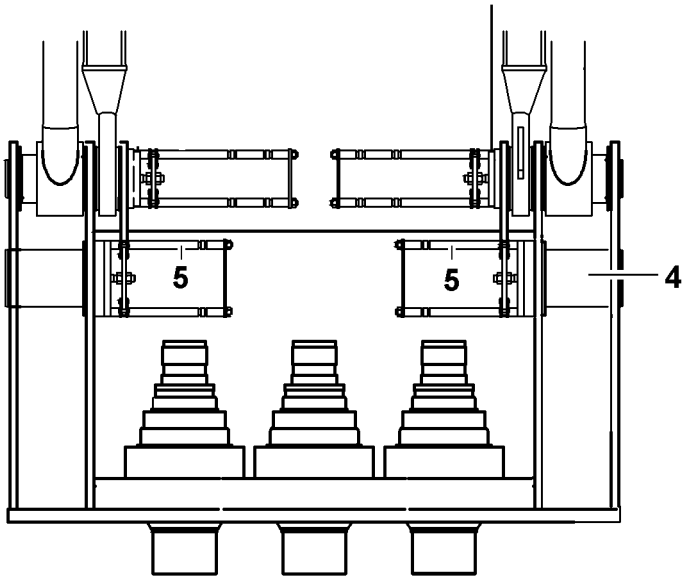

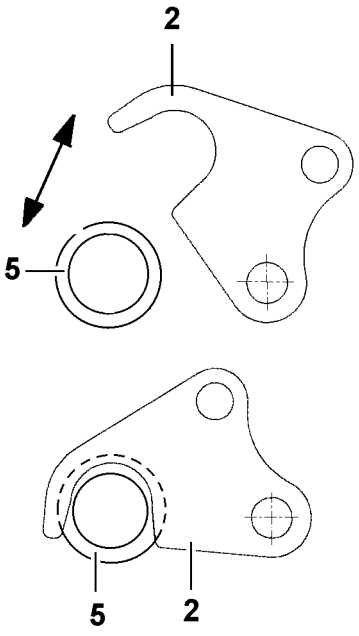

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Fig.120031

3.4 Assembling the SLD / SD-boom

Make sure that the following prerequisites are met:
- The crane is supported.
  (only in connection with crane support or for LG-cranes)
- The crane is horizontally aligned.
- An auxiliary crane is available.
- An assembly scaffolding / work platform is available.
- The counterweight has been installed on the turntable according to the load chart.
- The D-boom is completely assembled and erected on the turntable, see the Crane operating instructions, chapter 5.05.
- The LICCON overload protection has been set according to the data in the load chart.

3.4.1 Turning the turntable into the assembly position

WARNING
The crane can tip over!
If the specifications in the erection and take-down charts as well as in the assembly conditions are not observed, the crane can topple over.
Personnel can be severely injured or killed.
- ▶ Observe the assembly conditions, see the Crane operating instructions, chapter 3.06.
- ▶ Turn the turntable in the longitudinal direction of the crawler travel gear or to the side before assembly.
- ▶ Make sure that the specifications in the erection and take-down charts are observed.

Note
- ▶ If the turntable is turned to the side for the assembly of the boom, then boom and lattice sections must be supported, depending on the ground condition.

- ▶ Turn the turntable in the longitudinal direction of the crawler travel gear or to the side.

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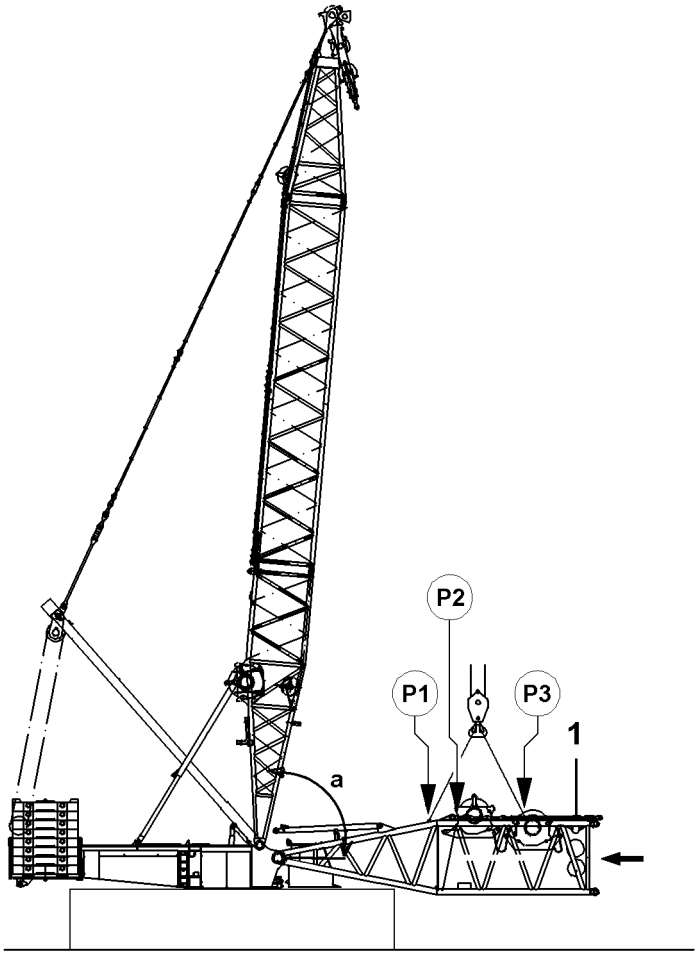

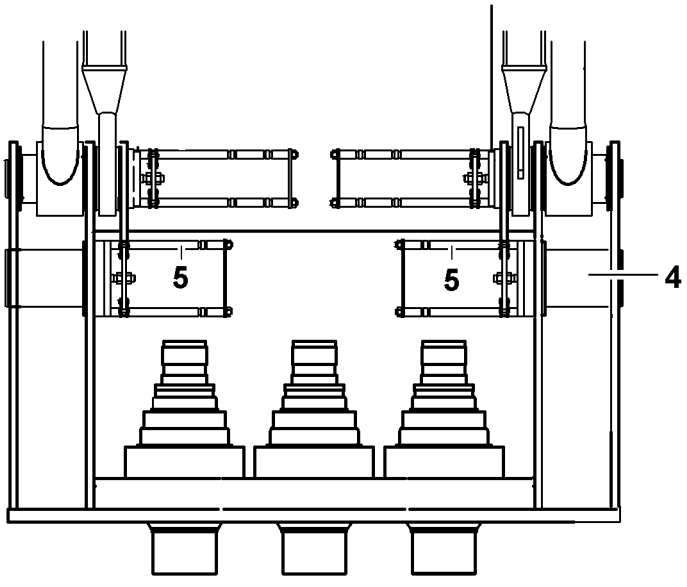

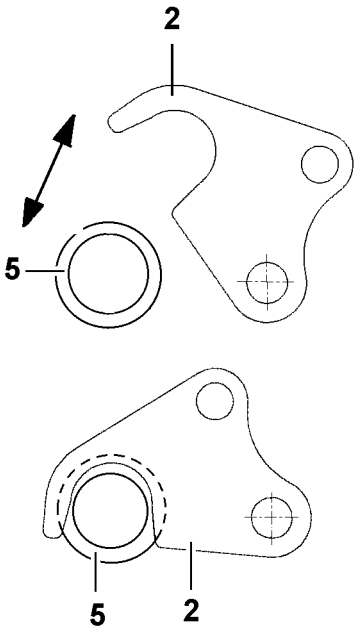

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Fig.120031

3.4.2 Exceeding the shut off limits of the LICCON overload protection for assembly operation

WARNING
Danger of accident due to the „Exceedance of shut-off limits of the LICCON overload protection“ function!
If the shut off limits of the LICCON overload protection are exceeded, there is no additional protection against crane overload.
Due to erroneous operation or deliberate misuse, the crane could collapse, the boom can break off or the crane can topple over.
Personnel can be severely injured or killed.

- ▶ The function „Exceedance of shut off limits of the LICCON overload protection“ is only permissible in emergencies and for assembly purposes.
- ▶ The function „Exceeding the shut off limits of the LICCON overload protection“ may only be actuated by persons who know the effects of their actions regarding the function „Exceeding the shut off limits of the LICCON overload protection“.
- ▶ The „Exceedance of shut off limits of the LICCON overload protection“ function requires the presence of an authorized person and must be performed with utmost caution.
- ▶ Crane operation with activated function „Exceedance of shut off limits of the LICCON overload protection“ is prohibited.

▶ Exceeding the shut off limits of the LICCON overload protection: Engage assembly operation.

Result:

– The shut off limits of the LICCON overload protection are exceeded.
– The assembly icon appears on the LICCON monitor.

Note
▶ See the Crane operating instructions, chapter 4.02.

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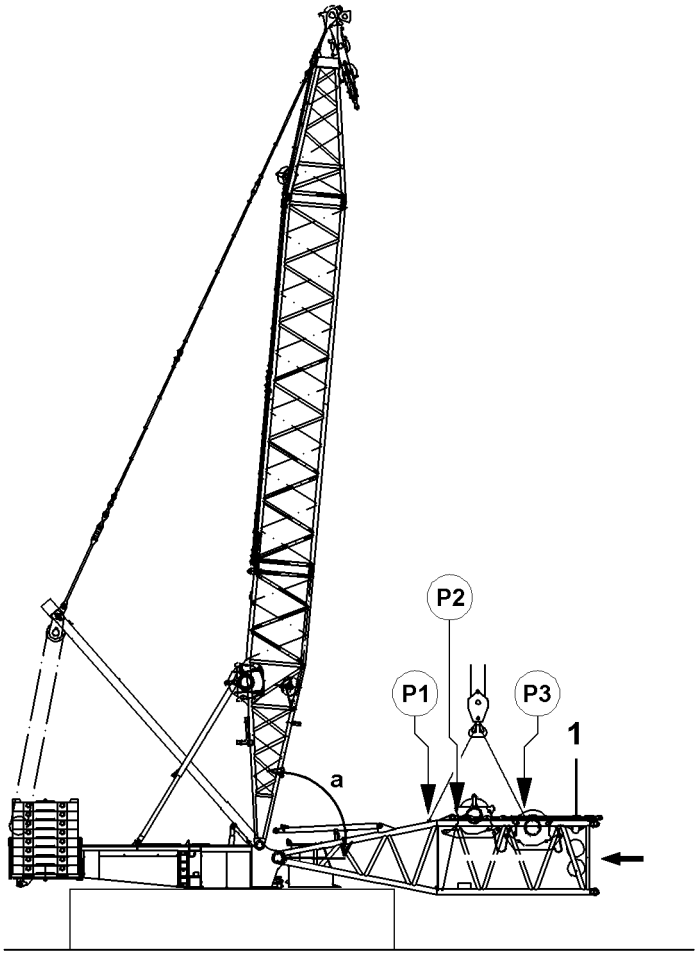

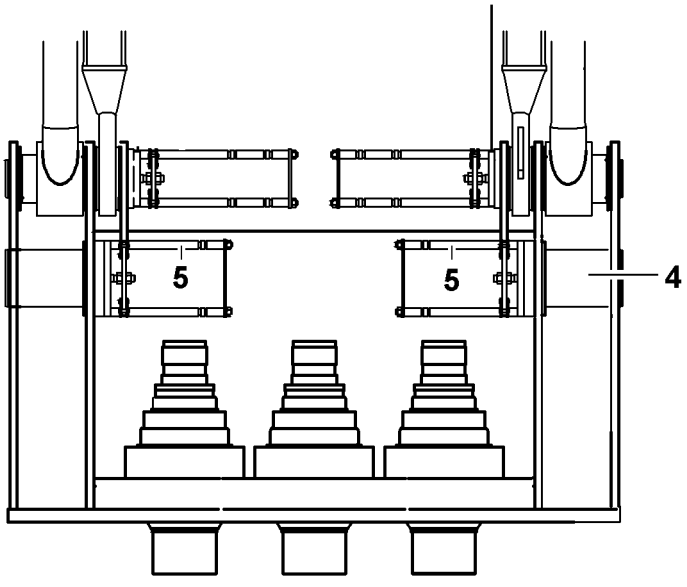

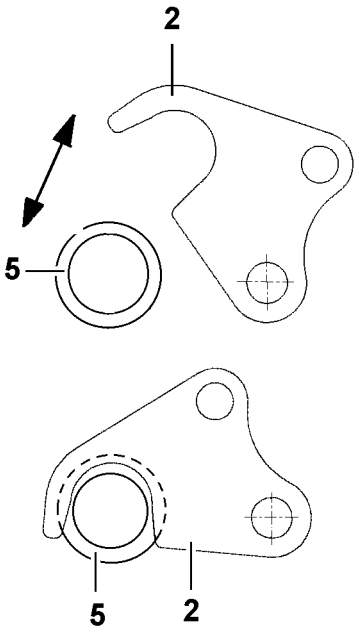

LWE/LG 1750-006/15409-07-02/en

Fig.120031

3.4.3 Pinning the S-pivot section on the turntable

WARNING
General danger notes!
- ▶ Support the S-boom during assembly with suitable materials.
- ▶ All pins are to be secured after assembly with the intended retaining elements.
- ▶ The guy rods must be inspected regularly, see the Crane operating instructions, chapter 8.15.

Make sure that the following prerequisite is met:
- – The connector pins **4** on the turntable are unpinned.

Note
- ▶ Select the fastening points on the S-pivot section in such a way that the S-pivot section hangs horizontally on the auxiliary crane at assembly, see section „Fastening points“.

- ▶ Fasten the S-pivot section **1** to the fastening points **P1** and the fastening points **P2** to the auxiliary crane and swing in to the pin points on the turntable.
  or
  Fasten the S-pivot section **1** to the fastening points **P1** and the fastening points **P3** to the auxiliary crane and swing in to the pin points on the turntable.

The pin pulling cylinders are actuated with the radio remote control (only available for LR-crane).

Note
- ▶ For operation of the radio remote control, see the Crane operating instructions, chapter 6.08.

WARNING
Falling S-pivot section!
Due to non-secured or insufficiently secured connector pins, the S-pivot section can fall down.
Personnel can be severely injured or killed.
- ▶ Secure the connector pins **4** between the S-pivot section **1** and the turntable after the pinning procedure with the retaining hook **2**.

- ▶ Fold the retaining hook **2** out on the guides **5**.
- ▶ Insert the connector pins **4** on both sides: Actuate the radio remote control.

When the connector pins **4** are completely pinned on the left and right on the S-pivot section **1**:
- ▶ Secure the connector pin **4**: Fold the retaining hook **2** in on the left and right on the guides **5**.

NOTICE
Damage to the S-pivot section!
When the installed S-pivot section is taken down on the ground, the S-pivot section can be damaged.
- ▶ Before taking the S-pivot section down on the ground, make sure that the S-pivot section cannot collide with the crane components during the take down procedure.
- ▶ Slowly take the S-pivot section **1** down with the auxiliary crane and at low speed on the ground.
- ▶ Before taking it down on the ground, support the S-pivot section **1**.

- ▶ Carefully take the S-pivot section **1** down onto the substructure.
- ▶ Remove the auxiliary crane.

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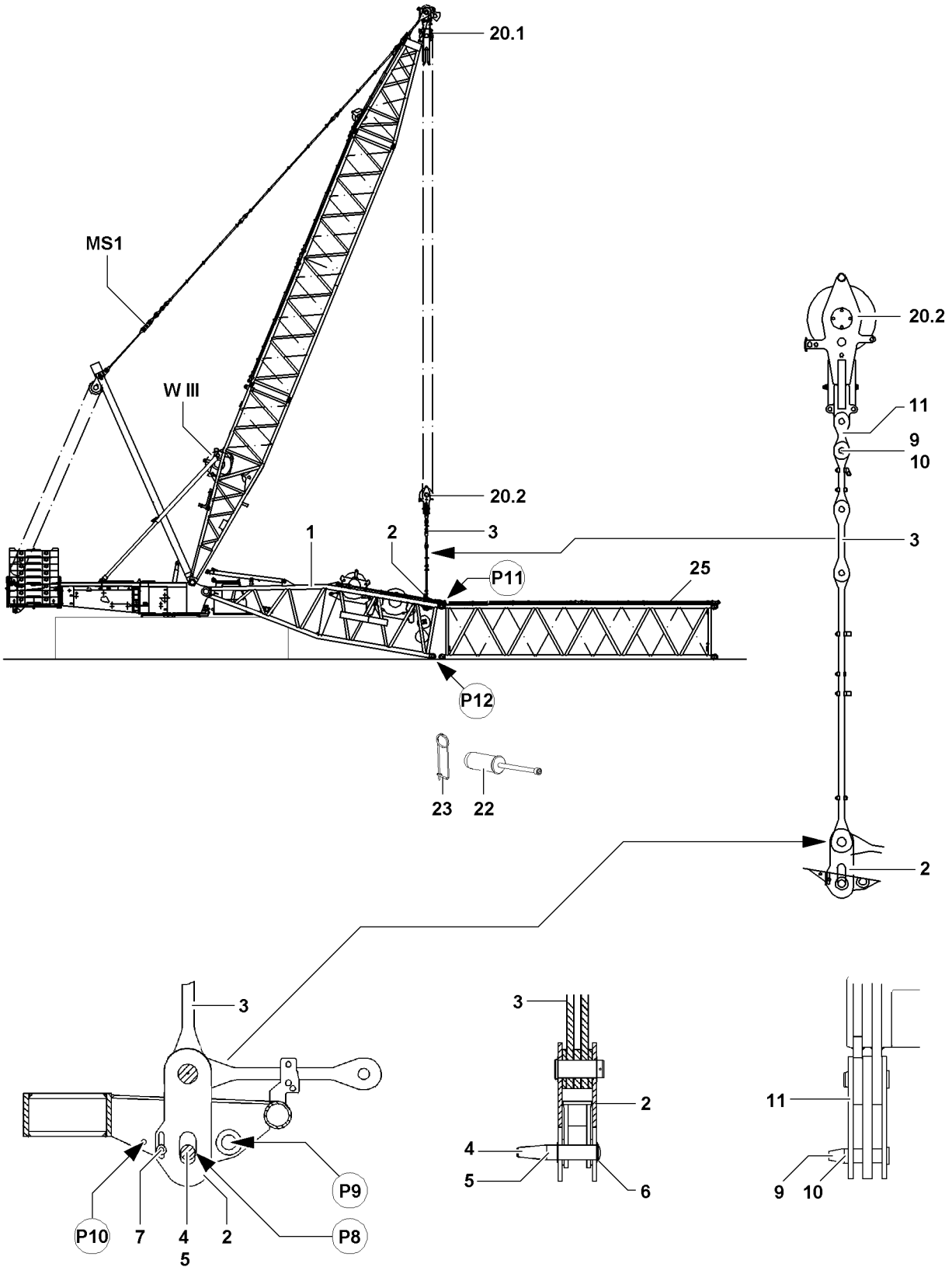

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Fig.120032

3.4.4 Pinning the upper pulley block on the S-pivot section

To be able to „close“ the S-boom combination after assembly, it is necessary to luff the D-boom down to the front and to lower the upper pulley block via control winch 3 **W III** to the S-pivot section **1** and to pin with the guy rods.

Make sure that the following prerequisites are met:
- The S-pivot section **1** is pinned and secured on the turntable.
- The S-pivot section **1** is taken down onto the substructure on the ground.
- The auxiliary crane is removed.

NOTICE
Damage to the crane components!
During the assembly and crane operation, the transport retaining pin **7** must be unpinned, otherwise crane components can be damaged.
▶ Insert the transport retaining pin **7** in the park position, point **P10**, and secure.

Note
▶ Pin point **P8** for flying assembly of the S-boom with derrick.
▶ Pin point **P9** for flying assembly of the S-boom with SA-frame.

▶ Luff the D-boom down to the front until the upper pulley block **20.2** hangs freely over the assembly bracket **2** of the S-pivot section **1**.
▶ Pin and secure the upper pulley block **20.2** with the guy rods **3**: Pin and secure the assembly bracket **2**. Use the pin **4**, washer **6** and spring retainer **5**.
▶ Carefully spool up winch 3 **WIII** until the guy rods **3** are slightly tensioned.

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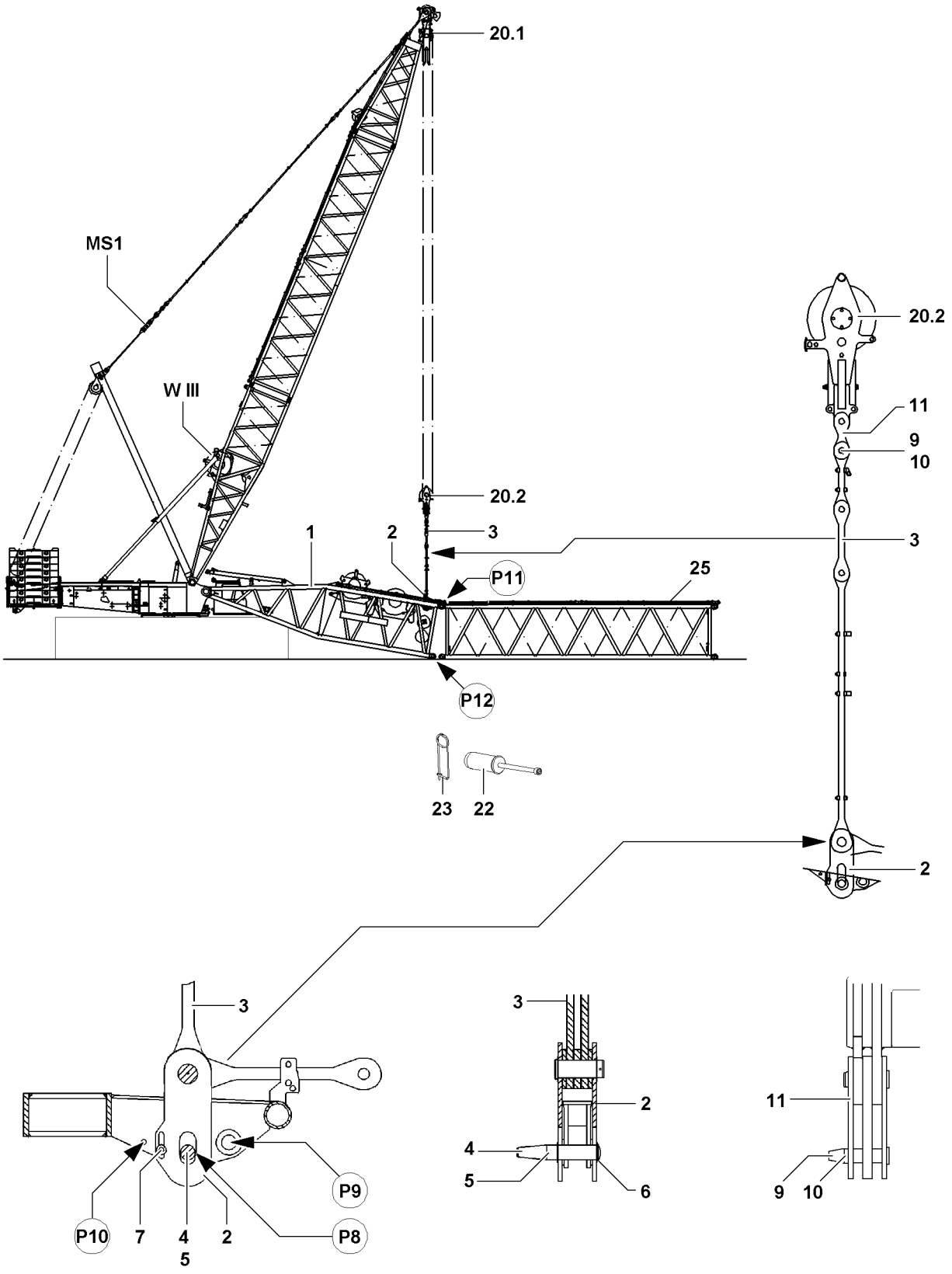

LWE/LG 1750-006/15409-07-02/en

Fig.120032

3.4.5 Assembling the S-intermediate sections on the S-pivot section

Make sure that the following prerequisites are met:
- The S-pivot section **1** is pinned and secured on the turntable.
- The S-pivot section **1** is taken down onto the substructure on the ground.
- The upper pulley block **20.2** is pinned and secured with the guy rods **3**.
- The auxiliary crane is removed.

Note
- ▶ The S-intermediate sections are pinned with the pin pulling device, see the Crane operating instructions, chapter 5.30.
- ▶ Support the S-intermediate sections from below for easier assembly / disassembly.

WARNING
General danger notes!
- ▶ All pins are to be secured after assembly of the S-intermediate sections with the intended retaining elements.

Pin the S-intermediate section **25** on the S-pivot section **1** „on top“.

▶ Fasten the S-intermediate section **25** to the auxiliary crane and align it with the S-pivot section **1**.

When the pin bores on the S-pivot section **1** and on the S-intermediate section **25** „on top“ (point **P11**) align:

▶ Insert the pin **22** from the inside to the outside and secure with the spring retainer **23**.

Assemble the S-boom to the required length and pin and secure the intermediate section „on top“ and „bottom“.

▶ Insert the pin **22** from the inside to the outside and secure with the spring retainer **23**.

WARNING
The crane can topple over!
If the following conditions are not met, the crane can topple over or be significantly damaged.
Personnel can be severely injured or killed.
- ▶ With the upper pulley block, with placed S-guy rods, boom lengths up to maximum S 140 m or SL 98 m may be closed.
- ▶ With the upper pulley block, in connection with placed WA-frame 2 and S-guy rods, a maximum boom length of S 91 m may be closed.
- ▶ Non-required guy rods must be removed from the lattice sections, see the Crane operating instructions, chapter 5.01.
- ▶ The end section of the corresponding SL / S-boom combination may **not** lift off the ground during the „closing procedure“.

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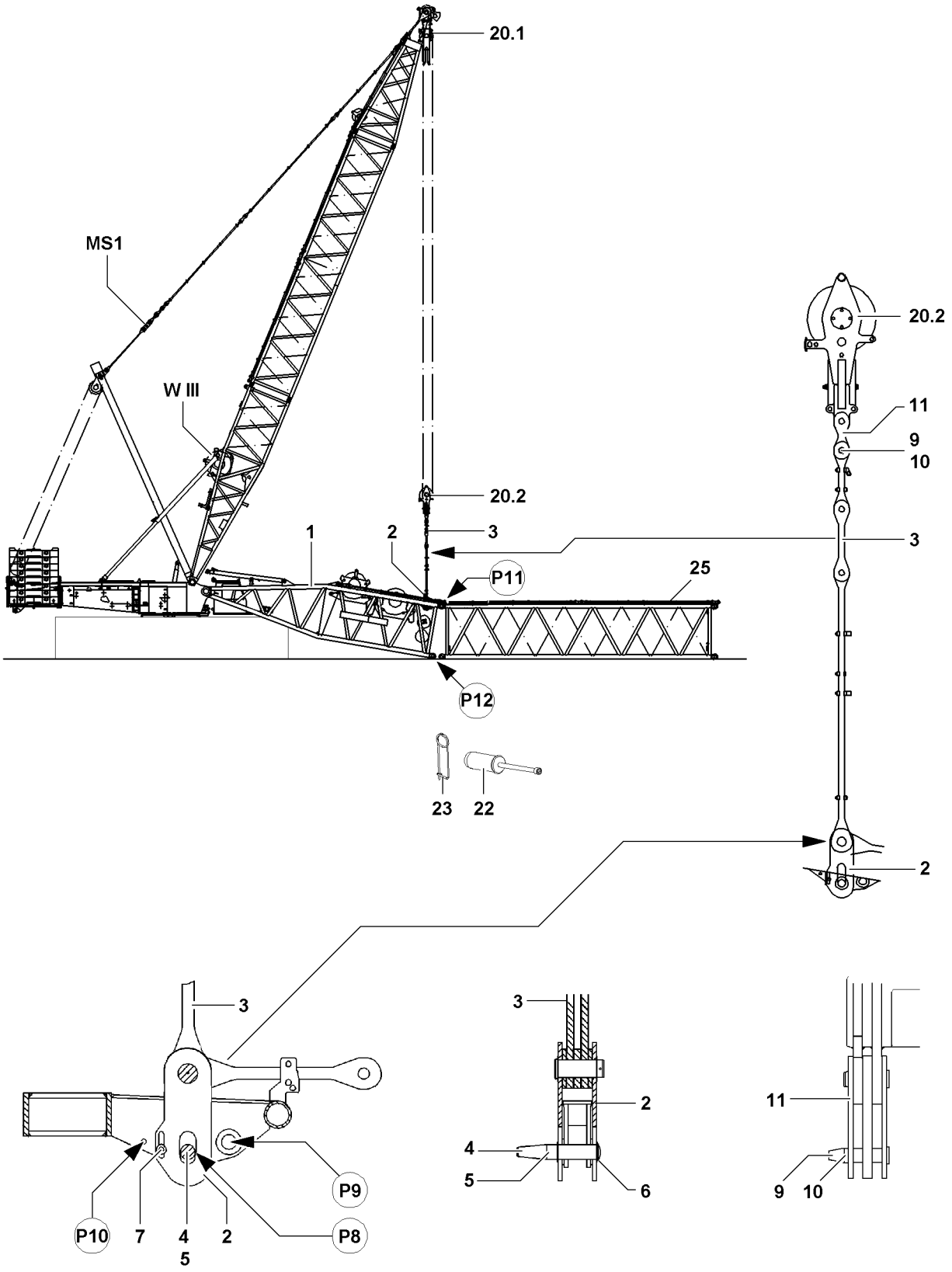

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Fig.120032

When the SL / S-boom combination is assembled to the desired length:

- ▶ Lift the S-pivot section **1** with the upper pulley block **20.2** until the pin bores on the „bottom“ align at point **P12**.
- ▶ Insert the pin **22** from the inside to the outside and secure with the spring retainer **23**.

WARNING

Danger of fatal injury due to folding down of boom!

By unpinning the upper pulley block **20.2** on the guy rods **3**, the boom can suddenly fold down if the boom is not pinned at point **P12** „on the bottom“.

Personnel can be severely injured or killed.

- ▶ It is prohibited for anyone to remain under the raised boom combination during the pinning / unpinning procedure.
- ▶ Unpin the upper pulley block **20.2** only when it is ensured that the S-pivot section **1** is pinned and secured „on top“ and „bottom“ with the S-intermediate section **25**.

When the S-boom system is „closed“:

- ▶ Slowly lower the upper pulley block **20.2** until the guy rods **3** are relieved.
- ▶ Release and unpin the guy rods **3** on the upper pulley block **20.2**.
- ▶ Take down and secure the guy rods **3** in the transport retainers on the S-pivot section.

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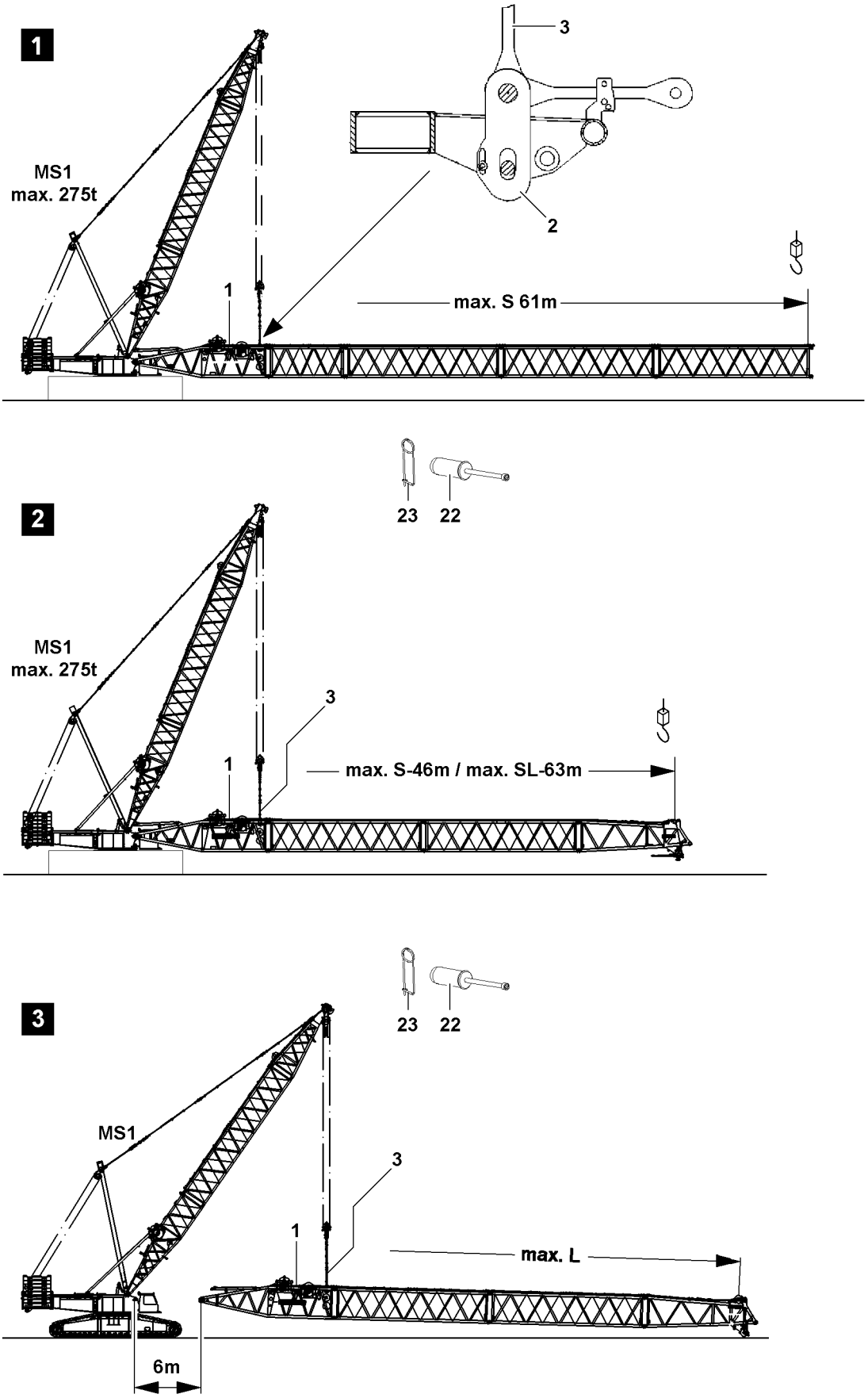

Fig.112572

3.5 Assembling the SL / S-boom in Flying mode (guying on S-pivot section)

If spatial prerequisites on the job site are limited for the assembly of the S-boom, or if they are limited by buildings or similar, then the S-boom can be installed in flying mode.

WARNING
General danger notes!
- ▶ Support the S-boom during assembly with suitable materials.
- ▶ All pins are to be secured after assembly with the intended retaining elements.
- ▶ The guy rods must be inspected regularly, see the Crane operating instructions, chapter 8.15.

WARNING
The crane can topple over!
If the following conditions are not met, the crane can topple over or be significantly damaged.
Personnel can be severely injured or killed.
- ▶ For the „flying“ boom assembly, the maximum permissible total forces on the test point **MS1** may **not** be exceeded. The „actual forces“ are shown on LICCON monitor 1.
- ▶ The „flying mode“ boom assembly is only permissible up to certain system lengths.
- ▶ The maximum permissible system lengths may **not** be exceeded, observe the following charts.

Note
- ▶ Weights of the individual lattice sections, see the Crane operating instructions, chapter 1.03.

Make sure that the following prerequisites are met:
- – The crane is supported.
  (only in connection with crane support or for LG-cranes)
- – The crane is horizontally aligned.
- – An auxiliary crane is available.
- – An assembly scaffolding / work platform is available.
- – The counterweight has been installed on the turntable according to the load chart.
- – The D-boom is completely assembled and erected on the turntable, see the Crane operating instructions, chapter 5.05.
- – The LICCON overload protection has been set according to the data in the load chart.

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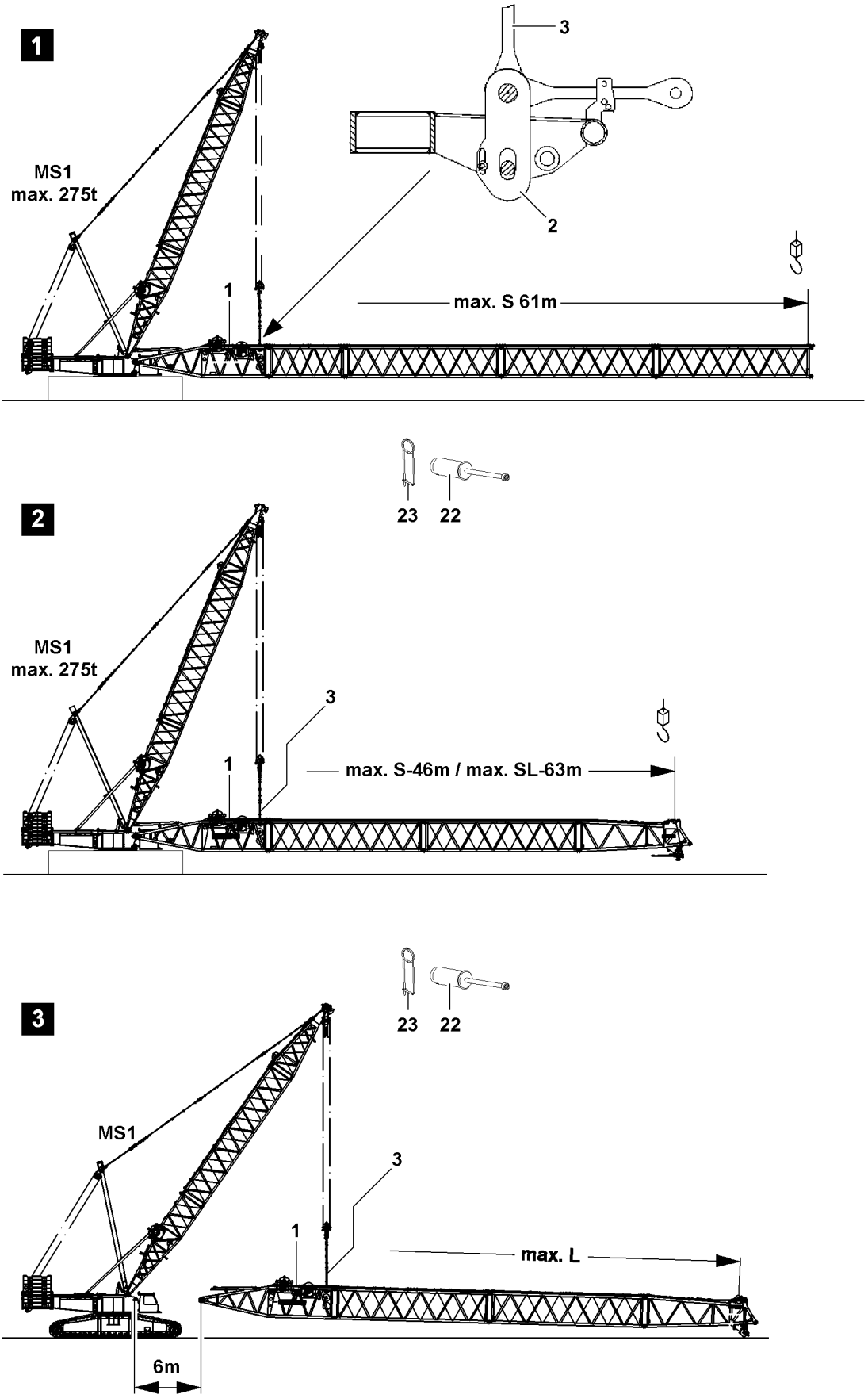

Fig.112572

Maximum permissible system lengths for a maximum total force MS1 of 275 t / 285 t [6]					
Support base 12 m x 12 m or 16 m x 16 m [4]					
Boom system	**Maximum system length**	**Equipment**	**DB_{min} [1]**	**ZB_{min} [2], [3]**	**Illustration**
S(D)	49.0 m	- with end section - without hook block - with S- and WA-frame 2 guy rods	120 t 70 t [4]	45 t	**2**
	61 m	- without end section - without hook block - with S- and WA-frame 2 guy rods	120 t 145 t [6]	45 t	**1**
SL(D)	63.0 m	- with S-guy rods	120 t 70 t [4]	45 t	**2**

1) This counterweight must be installed at least on the turntable for „flying assembly“.
2) This central ballast must be installed at least on the crawler center section for „flying assembly“.
3) For the LG-crane no ZB is possible.
4) Only valid for LG-crane with 31.5 m derrick boom.
6) Only valid for LG-crane with 42 m derrick boom.

Note
▶ The following chart overview is valid only for the LR-crane.

Maximum permissible system lengths for a maximum total force MS1 of 175 t / (245 t)					
Boom system	**Maximum system length**	**Equipment**	**DB_{min} [1]**	**ZB_{min} [2]**	**Illustration**
S(D)	91.0 m	- with end section - without hook block - with S- and WA-frame 2 guy rods	70 t / (120 t)	20 t / (45 t)	**3**
	140 m	- with S-guy rods	70 t / (120 t)	20 t / (45 t)	**3**
SL(D)	98.0 m	- with S-guy rods	70 t / (120 t)	20 t / (45 t)	**3**

1) This counterweight must be installed at least on the turntable for „flying assembly“.
2) This central ballast must be installed at least on the crawler center section for „flying assembly“.

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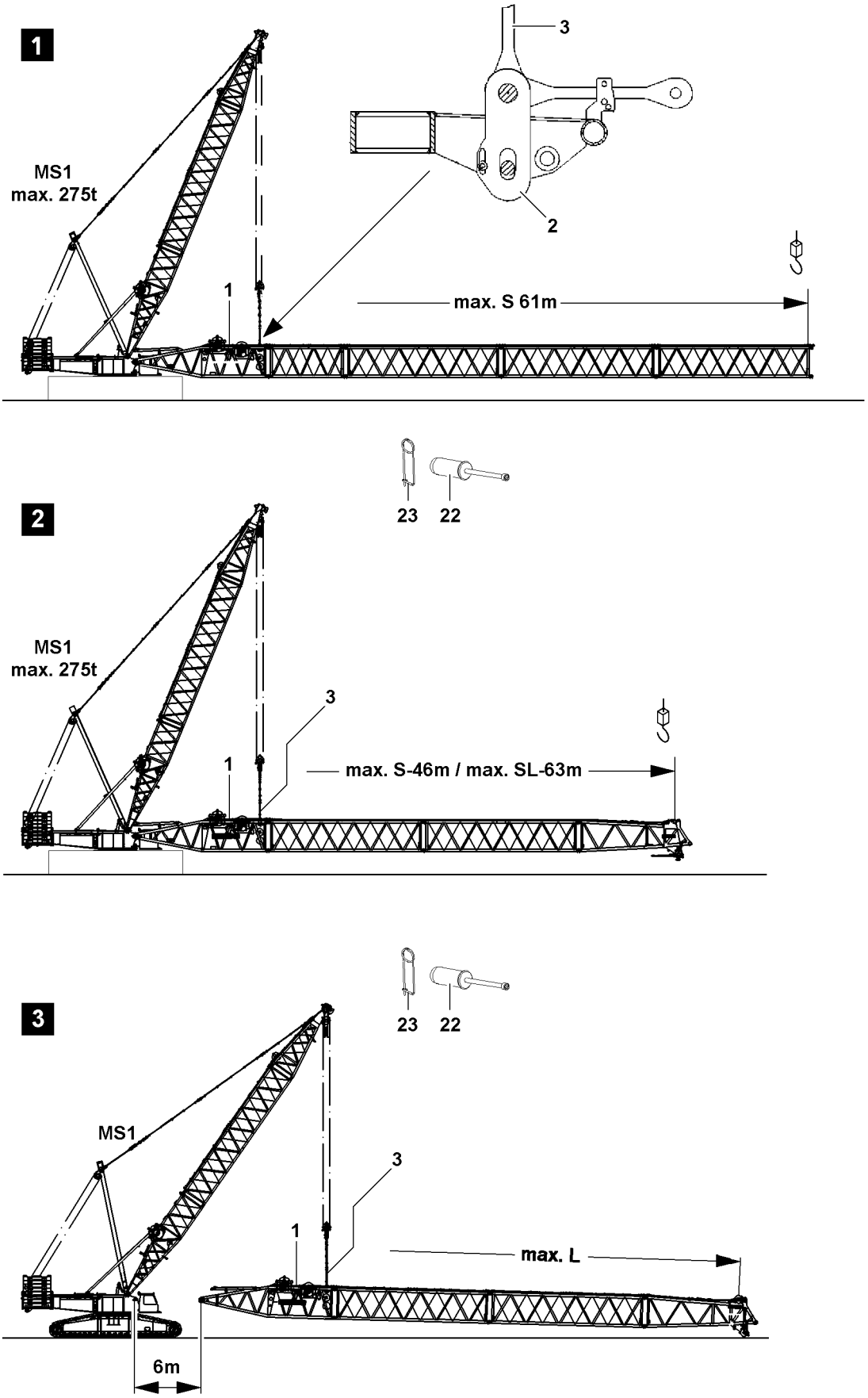

Fig.112572

LWE/LG 1750-006/15409-07-02/en

3.5.1 Assembling the S-intermediate sections in flying mode on the S-pivot section

In „flying mode“ assembly, the intermediate sections can be pinned and secured with the auxiliary crane individually or as a preassembled unit on the S-pivot section.

WARNING
Impermissible boom lengths!
If impermissible boom lengths are installed on the crane, significant property damage can occur on the crane.
Personnel can be severely injured or killed.
- ▶ The maximum permissible boom lengths for the „flying assembly“ may not be exceeded.
- ▶ The data in the erection and take-down charts as well as the load charts must be observed.

Make sure that the following prerequisites are met:
- The S-pivot section is pinned and secured on the turntable.
- The S-pivot section is horizontally tensioned.
- The counterweight is placed according to the specifications.
- The central ballast is placed according to the specifications.
- An auxiliary crane is available.

WARNING
Falling components!
If unsecured or non-supported components are assembled or disassembled, they can fall down.
Personnel can be severely injured or killed.
- ▶ During pinning and unpinning of the intermediate sections it is prohibited for anyone to remain **under** or **on** the components as well as within the entire danger zone.
- ▶ Before unpinning: Support the components and boom.
- ▶ Secure the pins in the storage locations and in the receptacles.
- ▶ It is prohibited to lean a ladder against the crane section that is being disassembled.

- ▶ Fasten the S-intermediate sections or preassembled boom unit to the auxiliary crane.
- ▶ Lift the S-intermediate sections or the preassembled boom unit with the auxiliary crane and position on the S-pivot section **1**.

When the pin points between the S-pivot section **1** and the S-intermediate section **or** the S-pivot section **1** and pre-assembled boom unit align on „top“ and „bottom“:
- ▶ Insert the pins **22** „on top“ and „bottom“ and secure with spring retainer **23**.

When the pins between the S-pivot section **1** and the S-intermediate section **or** the S-pivot section **1** and pre-assembled boom unit are properly pinned and secured on „top“ and „bottom“:
- ▶ Take the boom down on the substructure.
- ▶ Remove the auxiliary crane.

When the boom is safely taken down on the substructure or held by an auxiliary crane:
- ▶ Slowly lower the upper pulley block **20.2** until the guy rods **3** are relieved.
- ▶ Release and unpin the guy rods **3** on the upper pulley block **20.2**.
- ▶ Take down, pin and secure the guy rods **3** in the transport retainers on the S-pivot section.

Note
- ▶ Assembly of guy rods, see section „Assembling the guy rods“.

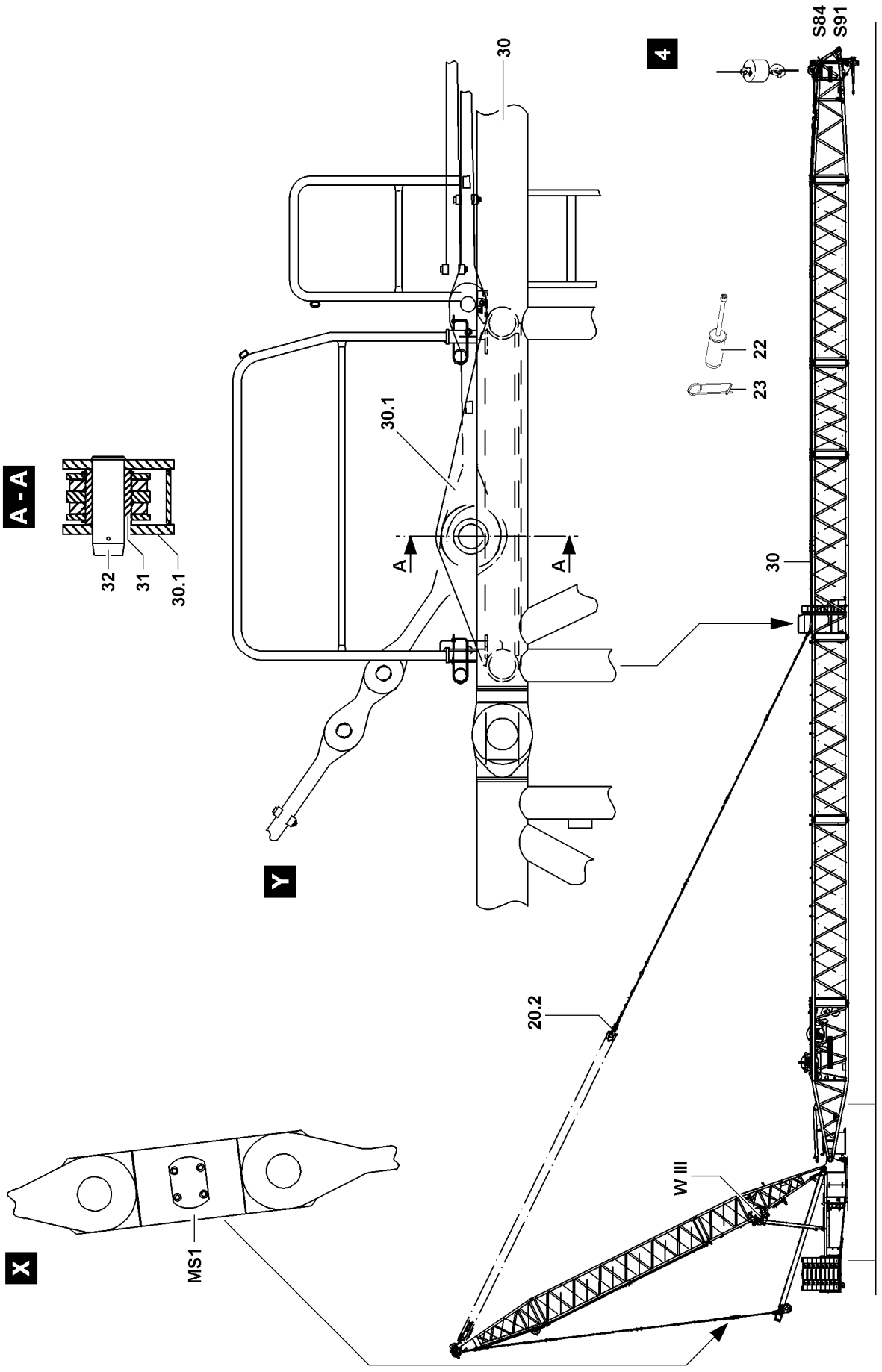

Fig.112050

LWE/LG 1750-006/15409-07-02/en

3.6 Assembling the SL / S-boom 84 m and 91 m in flying mode (guying on flying assembly intermediate section)

If spatial prerequisites on the job site are limited for the assembly of the S-boom, or if they are limited by buildings or similar, then the S-boom can be installed in flying mode.

WARNING
General danger notes!
- ▶ Support the S-boom during assembly with suitable materials.
- ▶ All pins are to be secured after assembly with the intended retaining elements.
- ▶ The guy rods must be inspected regularly, see the Crane operating instructions, chapter 8.15.

Note
- ▶ Weights of the individual lattice sections, see the Crane operating instructions, chapter 1.03.

WARNING
The crane can topple over!
If the following conditions are not met, the crane can topple over or be significantly damaged.
Personnel can be severely injured or killed.
- ▶ For the flying boom assembly, the maximum permissible total force on the test point **MS1** (F1) may **not** be exceeded. The „actual force“ is shown on the LICCON monitor 1.
- ▶ The flying boom assembly is only permissible up to a certain system length, observe the following charts.
- ▶ The data in the erection and take-down charts as well as the load charts must be observed.

Make sure that the following prerequisites are met:
- – The crane is supported.
  (only in connection with crane support or for LG-cranes).
- – The crane is horizontally aligned.
- – The S-pivot section is pinned and secured on the turntable.
- – The counterweight is placed according to the specifications.
- – The central ballast is placed according to the specifications.
- – The S-intermediate sections are installed up to the flying assembly intermediate section.
- – The boom system is tensioned horizontally on the flying assembly intermediate section.
- – An auxiliary crane is available.

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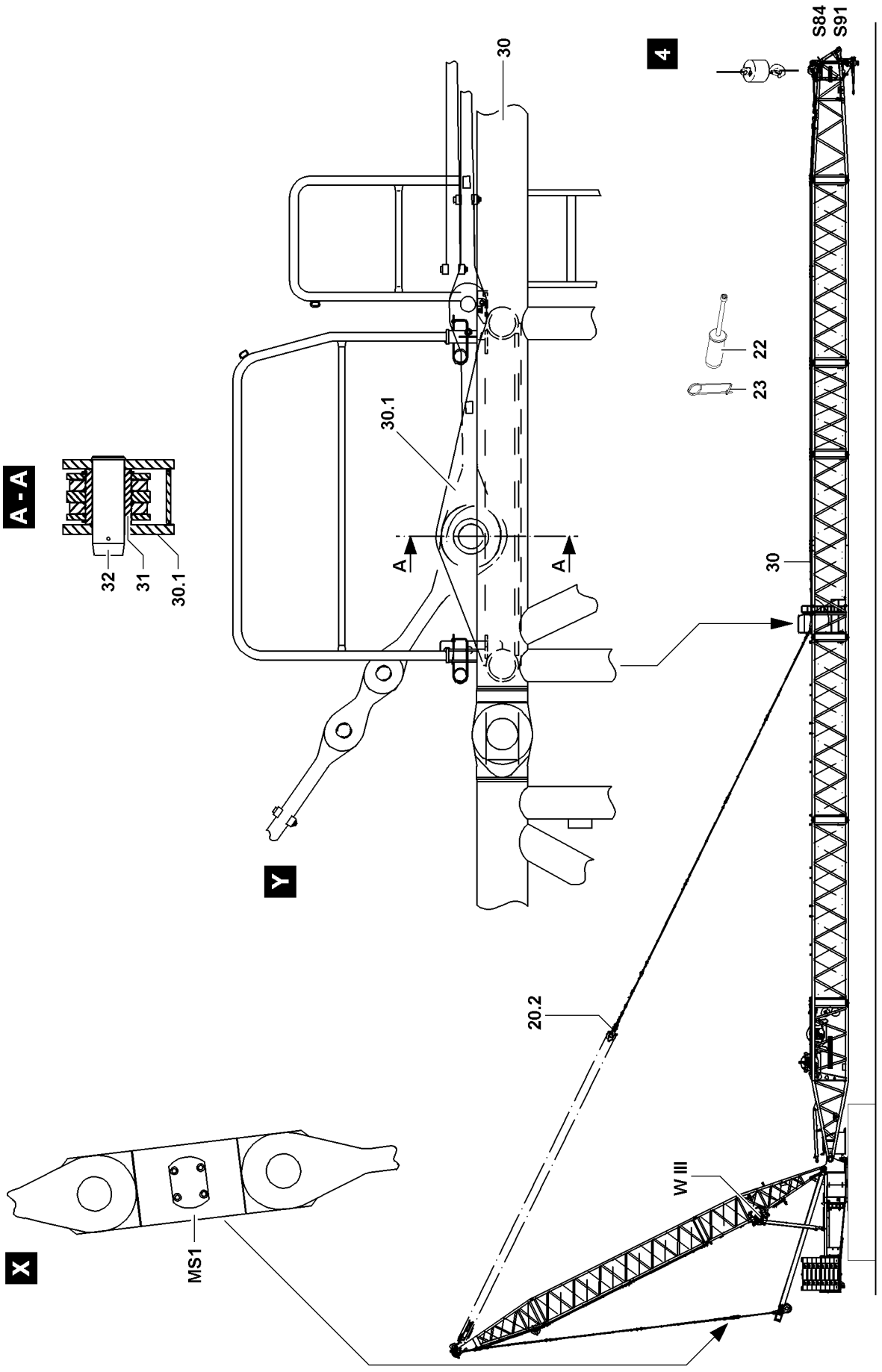

Fig.112050

LWE/LG 1750-006/15409-07-02/en

3.6.1 Assembling the S-intermediate sections in flying mode on the flying assembly intermediate section

Maximum permissible system lengths for a maximum total force MS1 of 410 t					
Boom system	**Maximum system length**	**Equipment**	**DB_{min} 1)**	**ZB_{min} 2), 3)**	**Illustration**
S(D)	84.0 m	- support base 12.0 m x 12.0 m 4) - without hook block - with S- and WA-frame 2 guy rods - with end section	245 t	95 t	4
	91 m	- support base 16.0 m x 16.0 m 4) - without hook block - with S- and WA-frame 2 guy rods - with end section	220 t	95 t	4
		5) **Note:** A derrick ballast of at least 100 t , with a derrick ballast radius of 13 m is required.			

1) This counterweight must be installed at least on the turntable for „flying assembly“.
2) This central ballast must be installed at least on the crawler center section for „flying assembly“.
3) For the LG-crane no ZB is possible.
4) Only valid for LG-crane.
5) Only valid for LR-crane.

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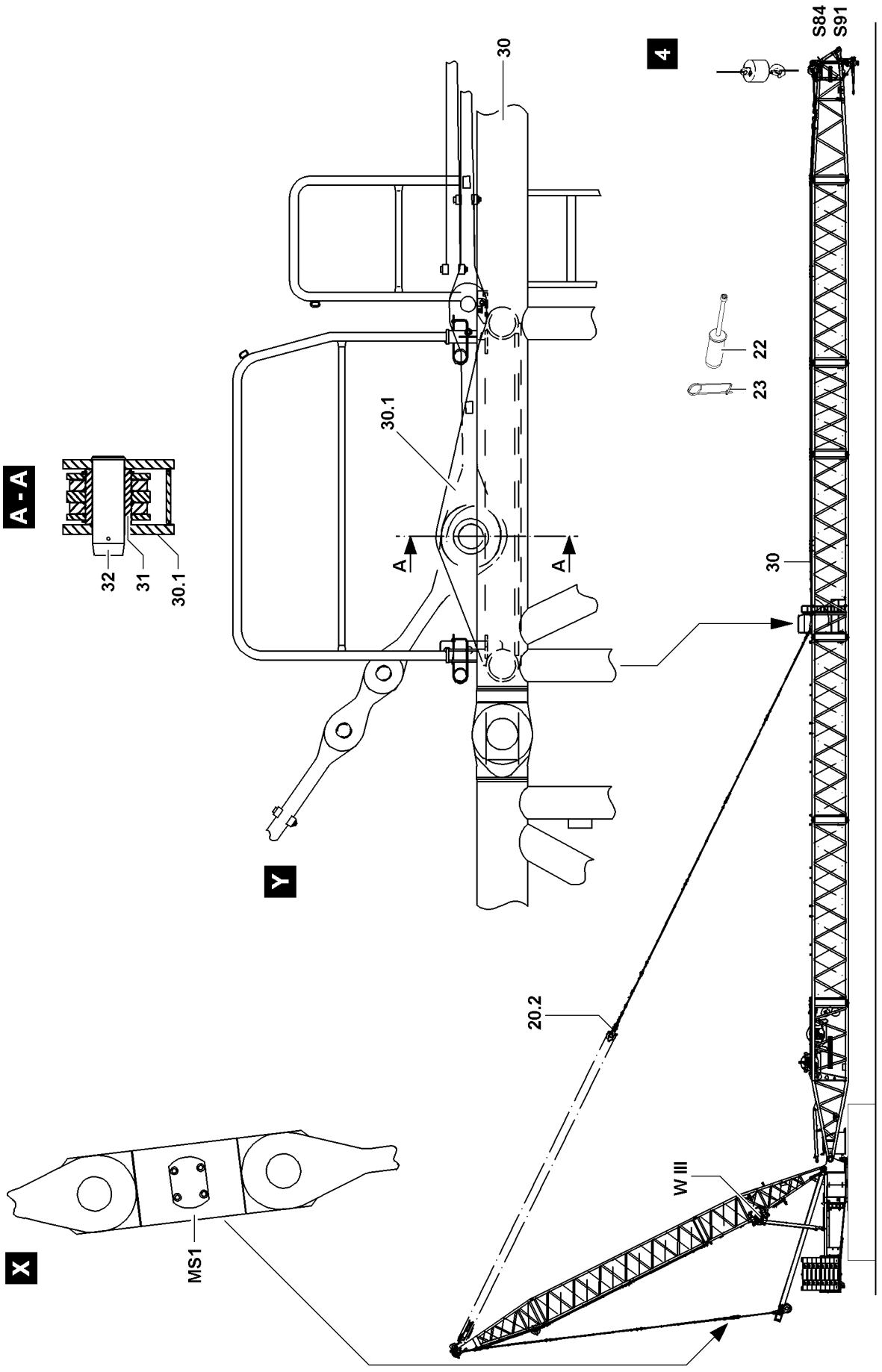

Fig.112050

LWE/LG 1750-006/15409-07-02/en

WARNING
Falling components!
If unsecured or non-supported components are assembled or disassembled, they can fall down.
Personnel can be severely injured or killed.
- ▶ During pinning and unpinning of the intermediate sections it is prohibited for anyone to remain **under** or **on** the components as well as within the entire danger zone.
- ▶ Before unpinning: Support the components and boom.
- ▶ Secure the pins in the storage locations and in the receptacles.
- ▶ It is prohibited to lean a ladder against the crane section that is being disassembled.

Note
- ▶ The „actual force“ is shown on the LICCON monitor.
- ▶ The flying assembly of the intermediate sections is carried out without a hook block.

WARNING
The crane can topple over!
If the derrick boom is luffed up to more than 85° to the horizontal, then the crane can topple over.
Personnel can be severely injured or killed.
- ▶ Make sure that the derrick boom at S-boom assembly is not luffed up more than maximum 85° to the horizontal.

Note
- ▶ To improve accessibility at S-boom assembly, the derrick boom must be luffed up to 75° to maximum 85° to the horizontal.

- ▶ Fasten the S-intermediate sections or preassembled boom unit to the auxiliary crane.
- ▶ Lift the S-intermediate sections or the preassembled boom unit with the auxiliary crane and position on the S-pivot section **1**.

When the pin points between the S-pivot section **1** and the S-intermediate section **or** the S-pivot section **1** and pre-assembled boom unit align on „top“ and „bottom“:
- ▶ Insert the pins **22** „on top“ and „bottom“ and secure with spring retainer **23**.

When the pins between the S-pivot section **1** and the S-intermediate section **or** the S-pivot section **1** and pre-assembled boom unit are properly pinned and secured on „top“ and „bottom“:
- ▶ Take the boom down on the substructure.

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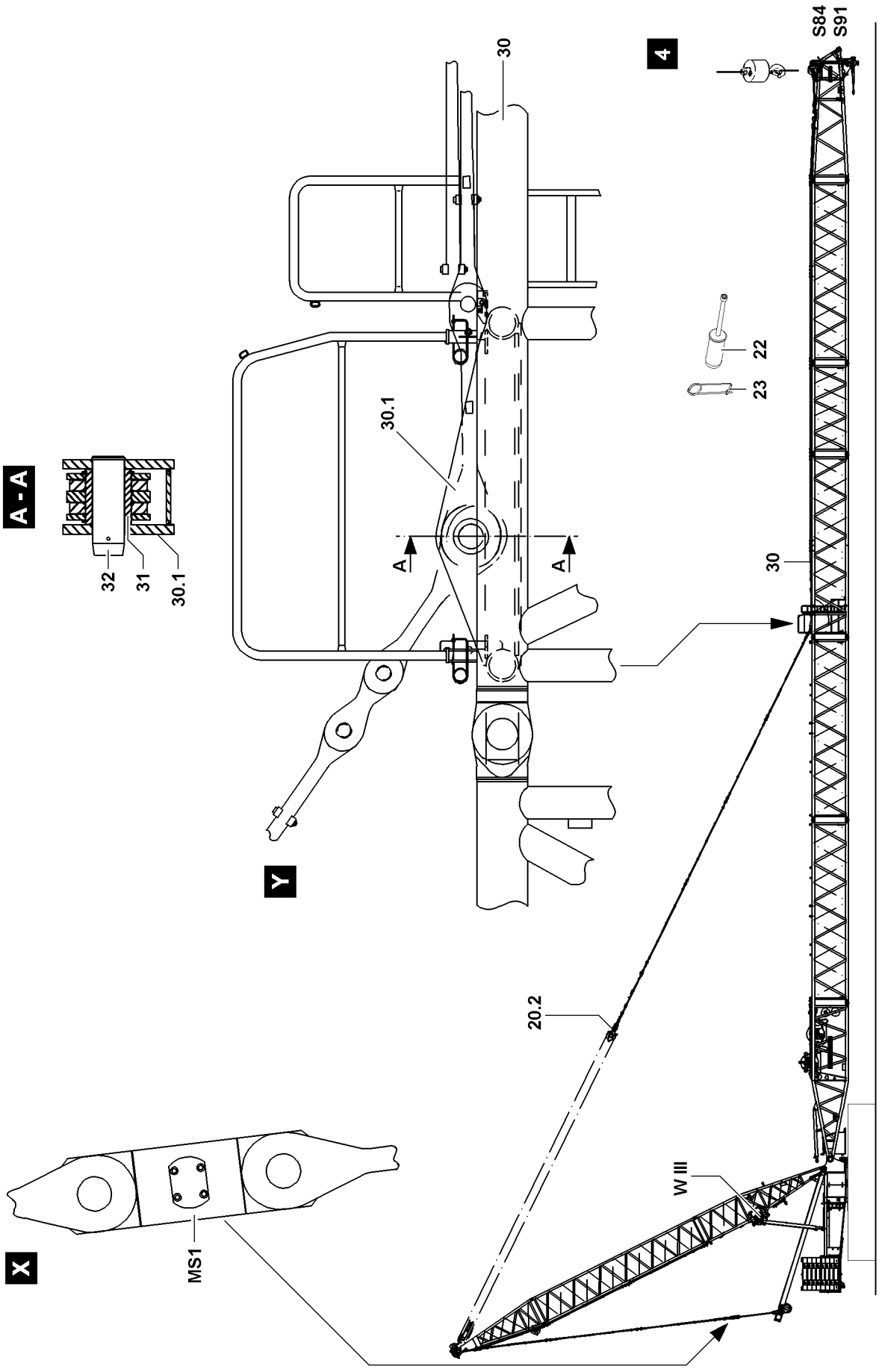

Fig.112050

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▶ Remove the auxiliary crane.

When the boom is safely taken down on the substructure or held by an auxiliary crane:
▶ Slowly lower the upper pulley block **20.2** to the S-pivot section or to the boom.
▶ Pin the guy rods of the intermediate sections with each other.
▶ Pin and secure the guy rods on the upper pulley block **20.2** and on the consoles **30.1** through the hollow axle **31**.
▶ Insert and secure the pin **32**.

WARNING
Overload of crane!
If the guy rods and the rope of winch 3 **W III** are tensioned when luffing up the derrick boom into the operating position, then the crane can be overloaded.
▶ Make sure, when luffing up the derrick boom into the operating position, that the guy rods and the rope of winch 3 **W III** always sag slightly.
▶ Make sure that no slack rope forms.

▶ Luff the derrick into the operating position, 115° to 118°.

Note
▶ The S-intermediate section for flying assembly **30** as compared to standard intermediate sections weighs approximately 1.4 t more.
▶ The additional weight of the S-intermediate sections for flying assembly **30** is not taken into account in the load charts and must therefore be added to the load to be lifted, as applicable.

▶ Spool up winch 3 **W III** until the guying between the upper pulley block **20.2** and the S-intermediate section for flying assembly **30** is tensioned and the auxiliary crane is relieved.
▶ Pay attention to the horizontal alignment of the boom.

When the boom is tensioned horizontally:
▶ Remove the auxiliary crane.

Install the additional S- / L-intermediate sections and the respective end section, depending on the permissible boom length, individually or fully preassembled on the S-intermediate section for flying assembly **30**.

Note
▶ Note and observe the maximum permissible boom lengths for flying assembly.

▶ Assemble the S-intermediate sections or L-intermediate sections on the S-intermediate section for flying assembly **30**: Use the pin **22** and spring retainer **23**.

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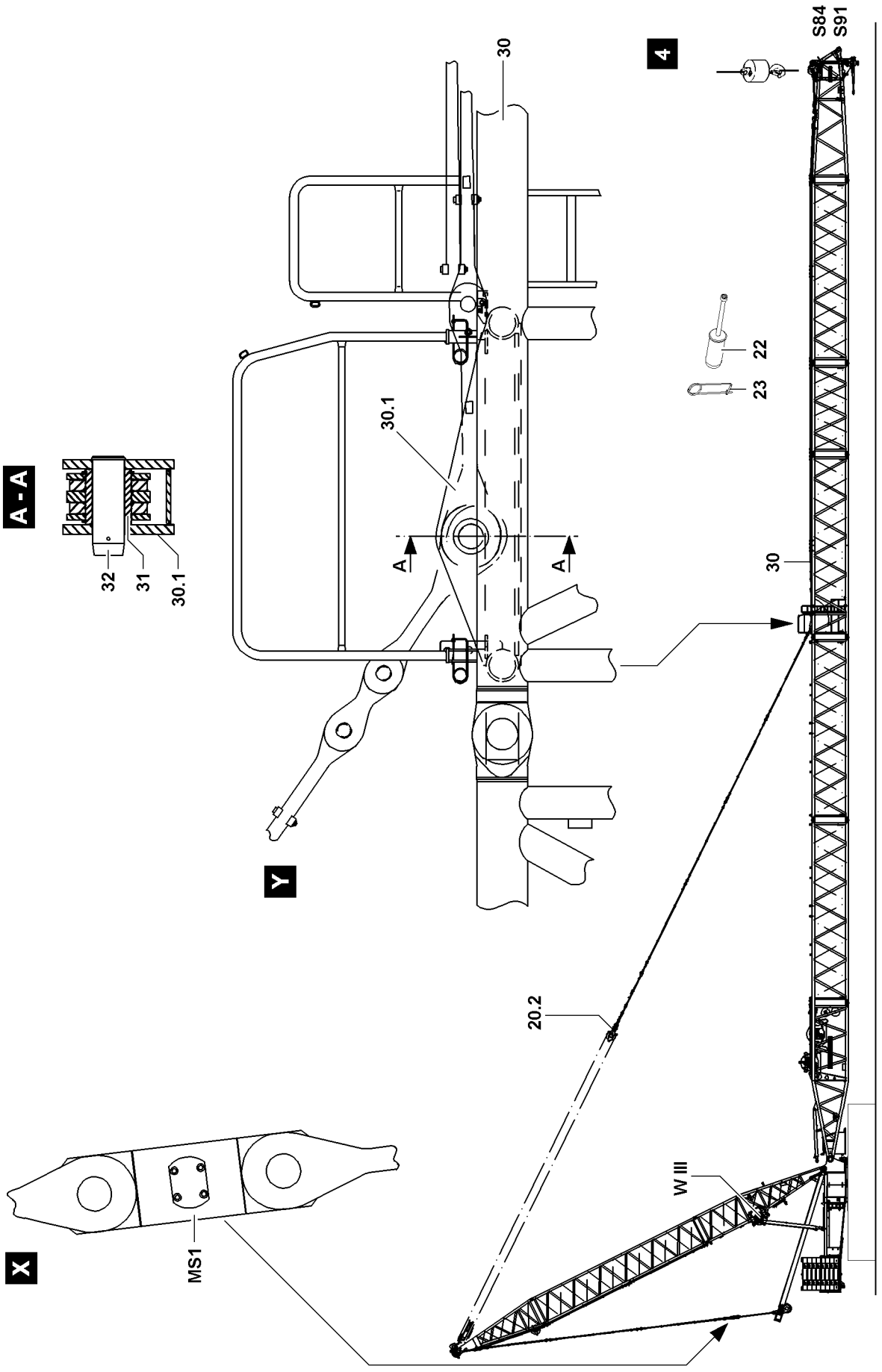

Fig.112050

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WARNING
Unutilized guy rods on boom!
If the guy rods, which are not needed for crane operation, are on the lattice sections, then they can release and fall down during crane operation.
Personnel can be severely injured or killed.
The load display of the LICCON computer system shows a value which is too high.
The weight of the boom is too heavy for erection.

▶ Disassemble and remove unutilized guy rods on the transport retainers before erecting the boom.

▶ Pin and secure the guy rods with each other.
▶ Hang the assembled boom on the auxiliary crane.
or
Support the assembled boom from below with materials of adequate load bearing capacity.
▶ Spool out winch 3 **W III** until the guying between the upper pulley block **20.2** and the S-intermediate section for flying assembly **30** is relieved.

DANGER
The boom can fold down!
If the pins **32** on the brackets **30.1** are unpinned, then the boom can fold down by itself.
Personnel can be severely injured or killed.

▶ Make sure that the boom is safely held with the auxiliary crane or that it is supported with stable materials before the pins **32** are unpinned.

▶ Unpin the pins **32** from the consoles **30.1**.

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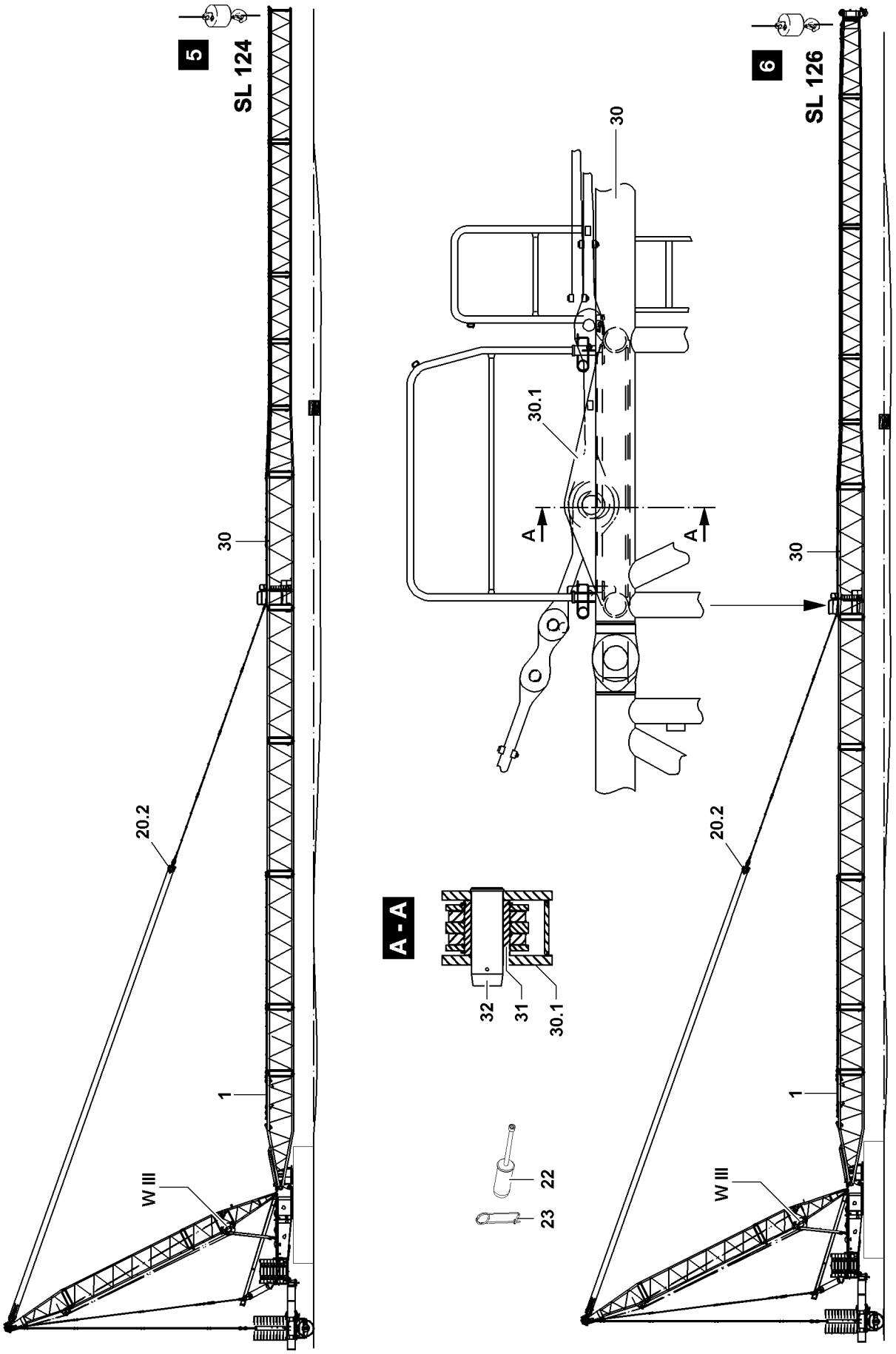

Fig.112051

LWE/LG 1750-006/15409-07-02/en

3.7 Assembling the SLD-boom 98 m to 133 m in flying mode (guying on flying assembly intermediate section)

If spatial prerequisites on the job site are limited for the assembly of the S-boom, or if they are limited by buildings or similar, then the S-boom can be installed in flying mode.

WARNING
General danger notes!
- ▶ Support the S-boom during assembly with suitable materials.
- ▶ All pins are to be secured after assembly with the intended retaining elements.
- ▶ The guy rods must be inspected regularly, see the Crane operating instructions, chapter 8.15.

Note
- ▶ Weights of the individual lattice sections, see the Crane operating instructions, chapter 1.03.

WARNING
Impermissible boom lengths guyed!
If impermissible boom lengths are guyed on the assembly brackets, then significant property damage can occur on the crane.
Personnel can be severely injured or killed.
- ▶ The maximum permissible boom lengths for the „flying assembly“ may not be exceeded.
- ▶ The data in the erection and take-down charts as well as the load charts must be observed.

Make sure that the following prerequisites are met:
- The crane is supported.
  (only in connection with crane support or for LG-cranes).
- The crane is horizontally aligned.
- The S-pivot section is pinned and secured on the turntable.
- The S-pivot section is horizontally tensioned.
- The counterweight is placed according to the specifications.
- The central ballast is placed according to the specifications.
- An auxiliary crane is available.

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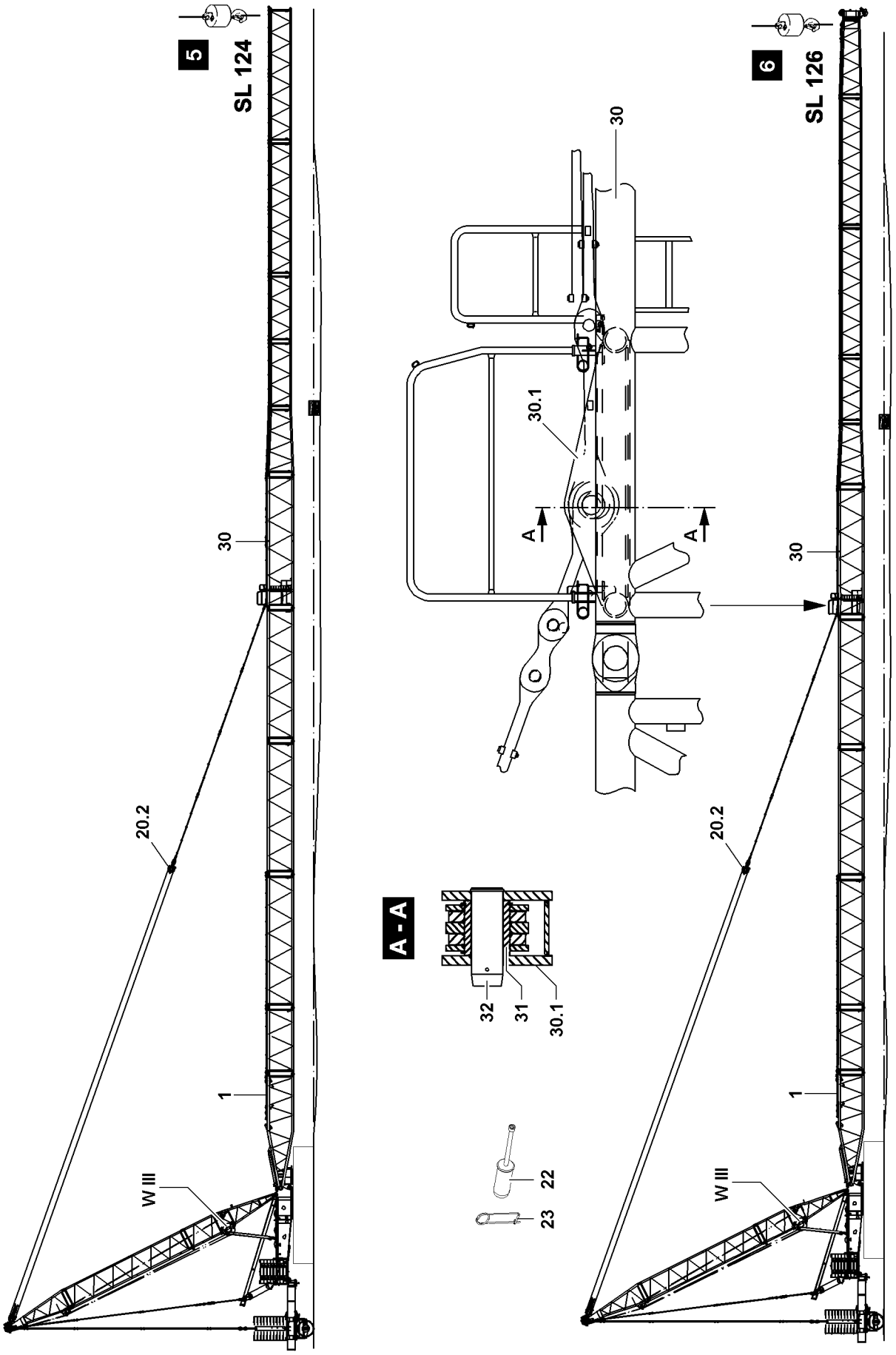

Fig.112051

LWE/LG 1750-006/15409-07-02/en

3.7.1 Flying boom assembly without and with end section

Flying assembly without end section

WARNING
The crane can topple over!
If the required minimum derrick ballast is not installed on the crane in the respective derrick ballast radius, then the crane can topple over.
Personnel can be severely injured or killed.
▶ A derrick ballast of at least 200 t , with a derrick ballast radius of 13 m is required.

Maximum permissible system lengths					
Boom system	**Maximum system length**	**Equipment**	**DB_{min} 1)**	**ZB_{min} 2), 3)**	**Illustration**
SL(D)	124.0 m	- without end section - without hook block - with S-guy rods	170 t	45 t	5

1) This counterweight must be installed at least on the turntable for „flying assembly“.
2) This central ballast must be installed at least on the crawler center section for „flying assembly“.
3) For the LG-crane no ZB is possible.

	Substructure U_{min} depending on boom length				
	SL-boom length				
	103 m	110 m	117 m	124 m	—
LG-crane	U_{min} = 1.10 m	U_{min} = 0.90 m	U_{min} = 0.80 m	U_{min} = 0.60 m	—
LR-crane	Substructure U_{min} 0.3 m to 0.7 m over alignment level **Note:** Up to including SL- 98 m , the boom does not have to be supported.				

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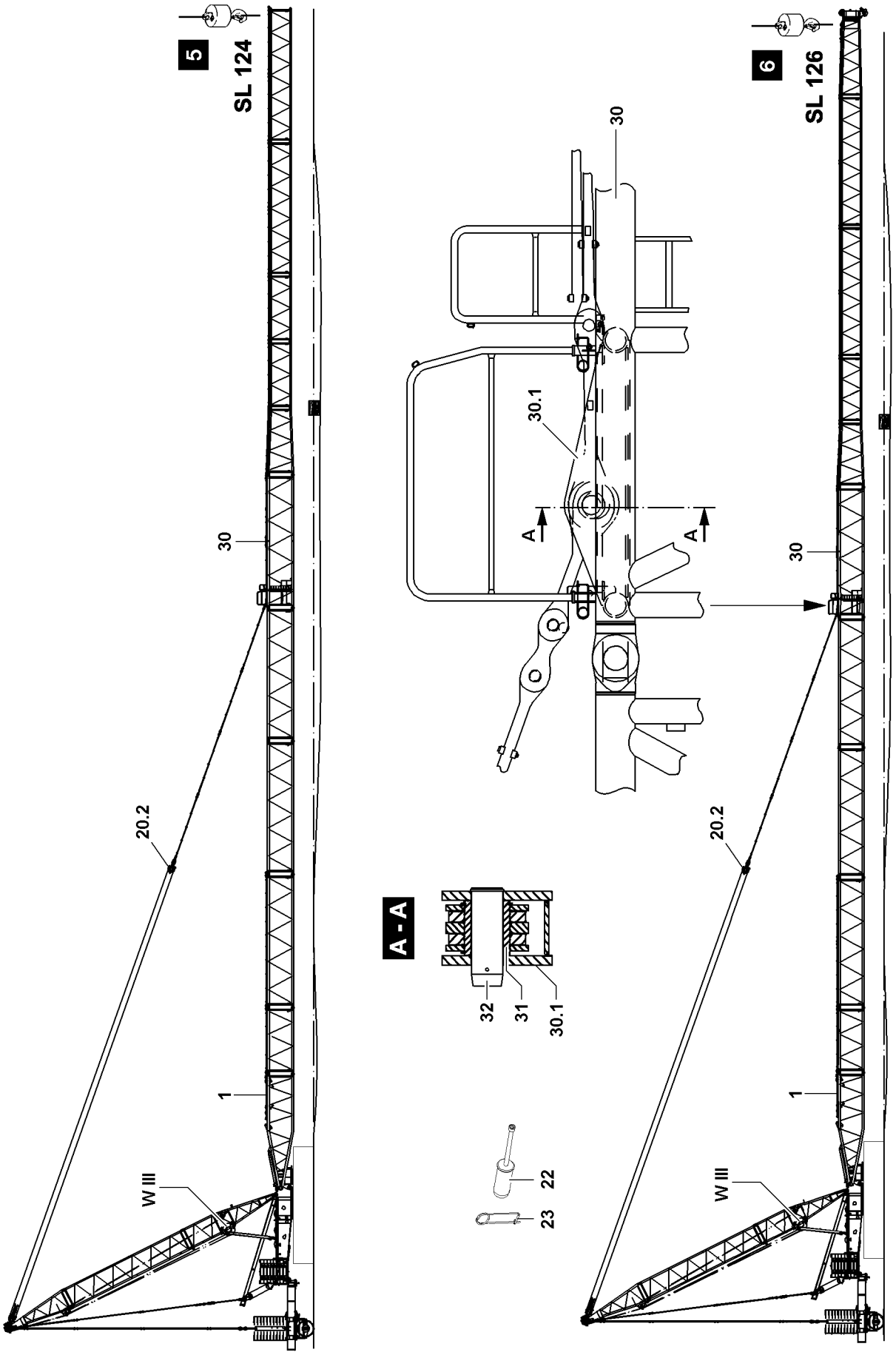

Fig.112051

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Flying assembly with end section

WARNING
The crane can topple over!
If the required minimum derrick ballast is not installed on the crane in the respective derrick ballast radius, then the crane can topple over.
Personnel can be severely injured or killed.
▶ A derrick ballast of at least 200 t , with a derrick ballast radius of 13 m is required.

Maximum permissible system lengths					
Boom system	**Maximum system length**	**Equipment**	**DB_{min} 1)**	**ZB_{min} 2), 3)**	**Illustration**
	126.0 m	- with end section - without hook block - with S-guy rods	170 t	45 t	6

1) This counterweight must be installed at least on the turntable for „flying assembly“.
2) This central ballast must be installed at least on the crawler center section for „flying assembly“.
3) For the LG-crane no ZB is possible.

	Substructure U_{min} depending on boom length				
	SL-boom length				
	105 m	112 m	119 m	126 m	133 m
LG-crane	U_{min} = 1.10 m	U_{min} = 0.90 m	U_{min} = 0.80 m	U_{min} = 0.60 m	U_{min} = 0.50 m
	Note: Up to including SL- 98 m , the boom does not have to be supported.				
LR-crane	Substructure U_{min} 0.3 m to 0.7 m over alignment level **Note:** Up to including SL- 98 m , the boom does not have to be supported.				

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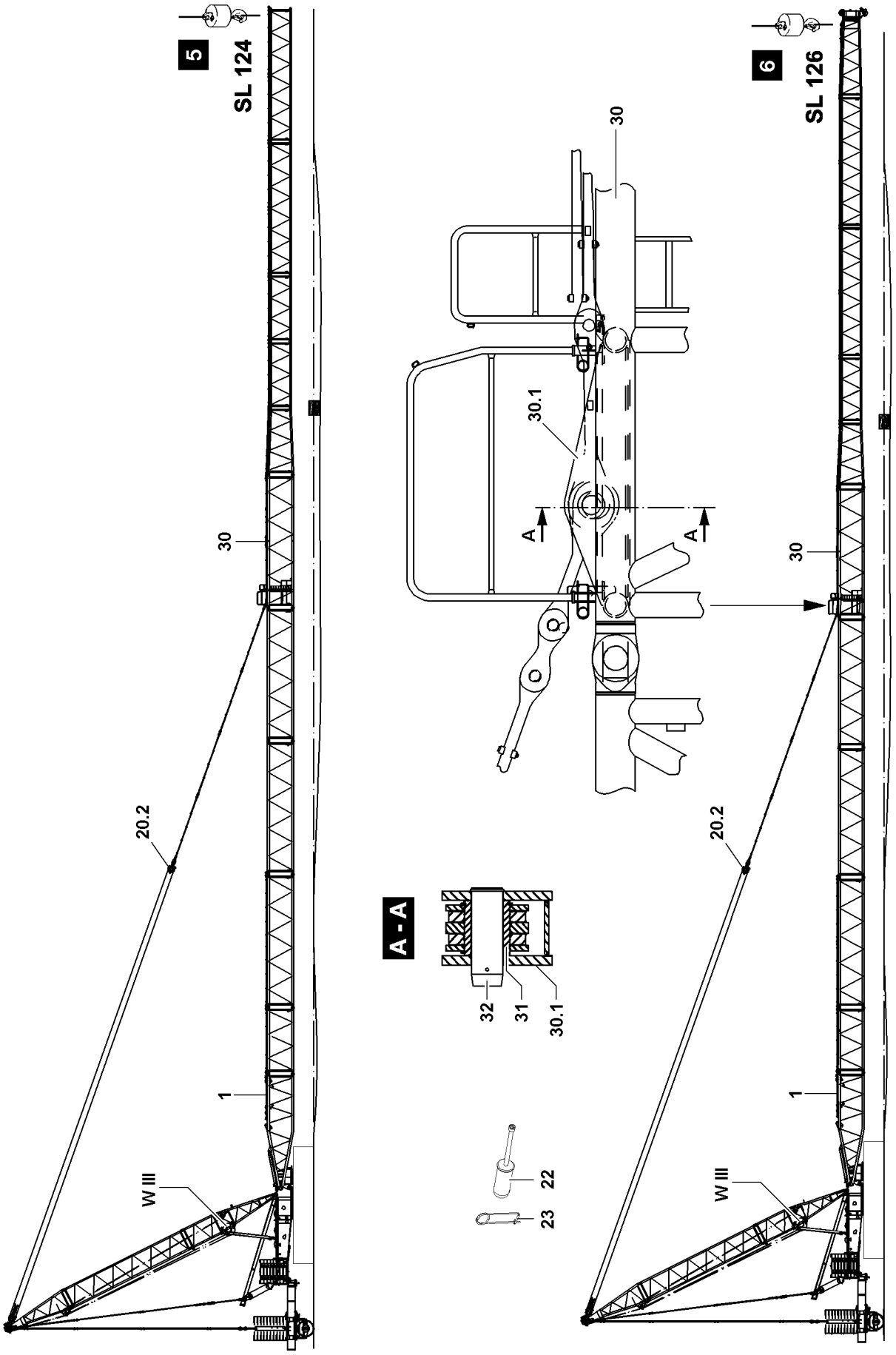

Fig.112051

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3.7.2 Assembling the boom

WARNING
Falling components!
If unsecured or non-supported components are assembled or disassembled, they can fall down.
Personnel can be severely injured or killed.
- ▶ During pinning and unpinning of the intermediate sections it is prohibited for anyone to remain **under** or **on** the components as well as within the entire danger zone.
- ▶ Before unpinning: Support the components and boom.
- ▶ Secure the pins in the storage locations and in the receptacles.
- ▶ It is prohibited to lean a ladder against the crane section that is being disassembled.

Note
- ▶ The „actual force“ is shown on the LICCON monitor.
- ▶ The flying assembly of the intermediate sections is carried out without a hook block.

WARNING
The crane can topple over!
If the derrick boom is luffed up to more than 85° to the horizontal, then the crane can topple over.
Personnel can be severely injured or killed.
- ▶ Make sure that the derrick boom at S-boom assembly is not luffed up more than maximum 85° to the horizontal.

Note
- ▶ To improve accessibility at S-boom assembly, the derrick boom must be luffed up to 75° to maximum 85° to the horizontal.

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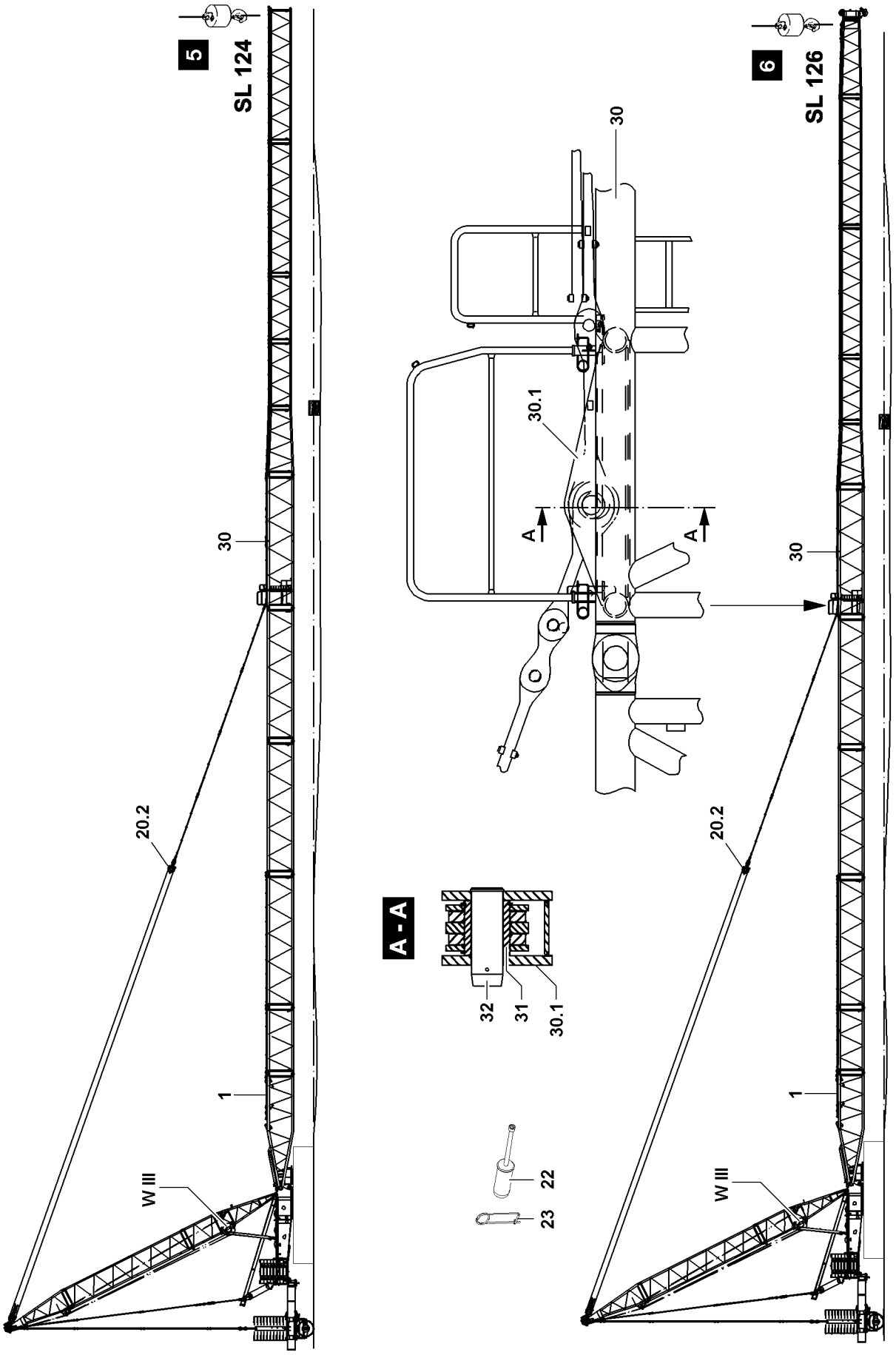

Fig.112051

LWE/LG 1750-006/15409-07-02/en

- ▶ Fasten the S-intermediate sections or preassembled boom unit to the auxiliary crane.
- ▶ Lift the S-intermediate sections or the preassembled boom unit with the auxiliary crane and position on the S-pivot section **1**.

When the pin points between the S-pivot section **1** and the S-intermediate section **or** the S-pivot section **1** and pre-assembled boom unit align on „top“ and „bottom“:

- ▶ Insert the pins **22** „on top“ and „bottom“ and secure with spring retainer **23**.

When the pins between the S-pivot section **1** and the S-intermediate section **or** the S-pivot section **1** and pre-assembled boom unit are properly pinned and secured on „top“ and „bottom“:

- ▶ Take the boom down on the substructure.
- ▶ Remove the auxiliary crane.

When the boom is safely taken down on the substructure or held by an auxiliary crane:

- ▶ Slowly lower the upper pulley block **20.2** to the S-pivot section or to the boom.
- ▶ Pin the guy rods of the intermediate sections with each other.
- ▶ Pin and secure the guy rods on the upper pulley block **20.2** and on the consoles **30.1** through the hollow axle **31**.
- ▶ Insert and secure the pin **32**.

DANGER
The boom can fold down!
If the pins **32** on the brackets **30.1** are unpinned, then the boom can fold down by itself.
Personnel can be severely injured or killed.

- ▶ Make sure that the boom is safely held with the auxiliary crane or that it is supported with stable materials before the pins **32** are unpinned.

- ▶ Unpin the pins **32** from the consoles **30.1**.

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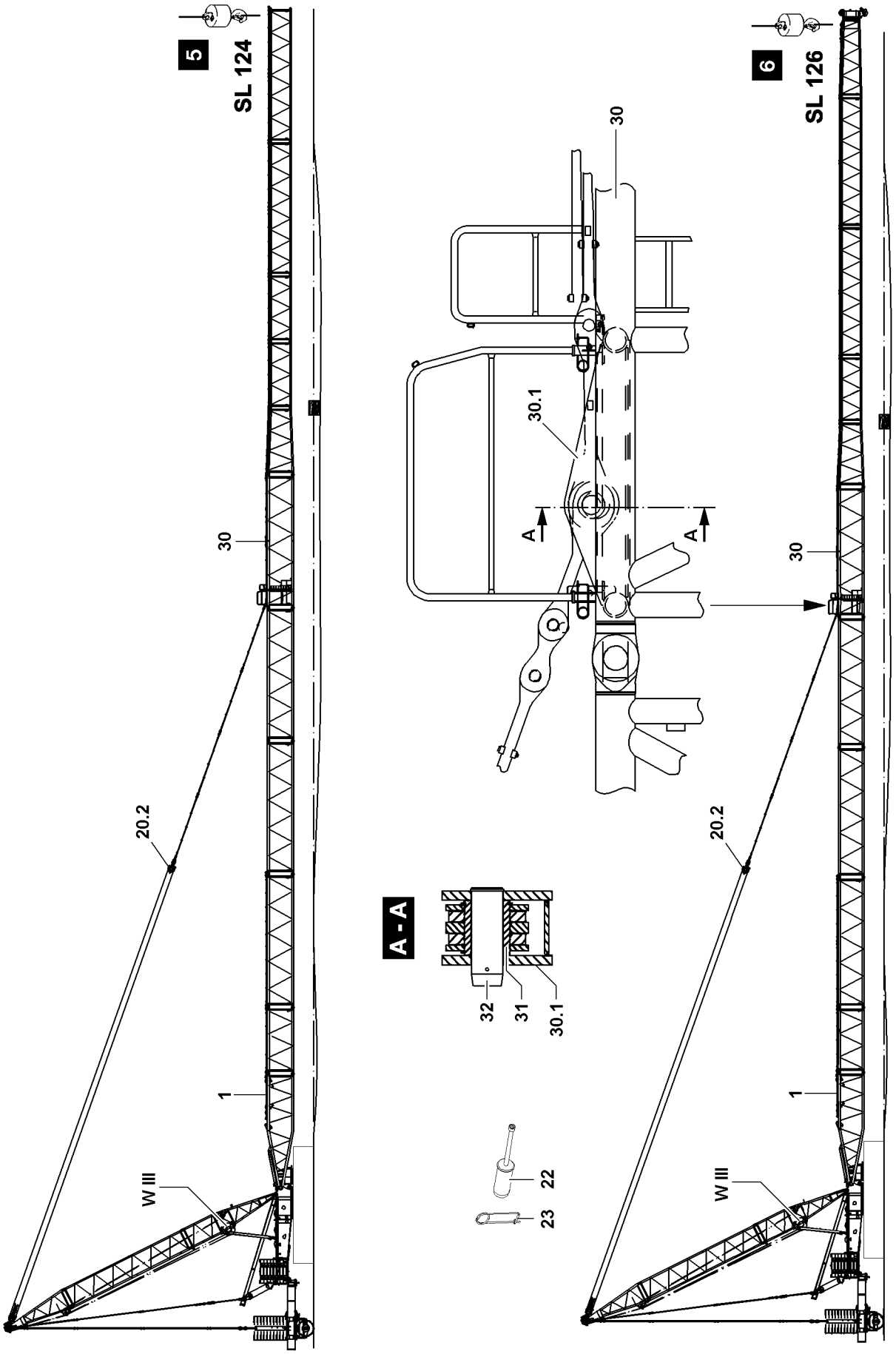

Fig.112051

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WARNING
Overload of crane!
If the guy rods and the rope of winch 3 **W III** are tensioned when luffing up the derrick boom into the operating position, then the crane can be overloaded.
- ▶ Make sure, when luffing up the derrick boom into the operating position, that the guy rods and the rope of winch 3 **W III** always sag slightly.
- ▶ Make sure that no slack rope forms.

▶ Luff the derrick into the operating position, 115° to 118°.

Note
- ▶ The S-intermediate section for flying assembly **30** as compared to standard intermediate sections weighs approximately 1.4 t more.
- ▶ The additional weight of the S-intermediate sections for flying assembly **30** is not taken into account in the load charts and must therefore be added to the load to be lifted, as applicable.

- ▶ Spool up winch 3 **W III** until the guying between the upper pulley block **20.2** and the S-intermediate section for flying assembly **30** is tensioned and the auxiliary crane is relieved.
- ▶ Pay attention to the horizontal alignment of the boom.

When the boom is tensioned horizontally:
- ▶ Remove the auxiliary crane.

Install the additional S- / L-intermediate sections and the respective end section, depending on the permissible boom length, individually or fully preassembled on the S-intermediate section for flying assembly **30**.

Note
- ▶ Note and observe the maximum permissible boom lengths for flying assembly.
- ▶ The required substructure (U_{min}) for erection of the boom systems must be adhered to.

- ▶ Assemble the S-intermediate sections or L-intermediate sections on the S-intermediate section for flying assembly **30**: Use the pin **22** and spring retainer **23**.

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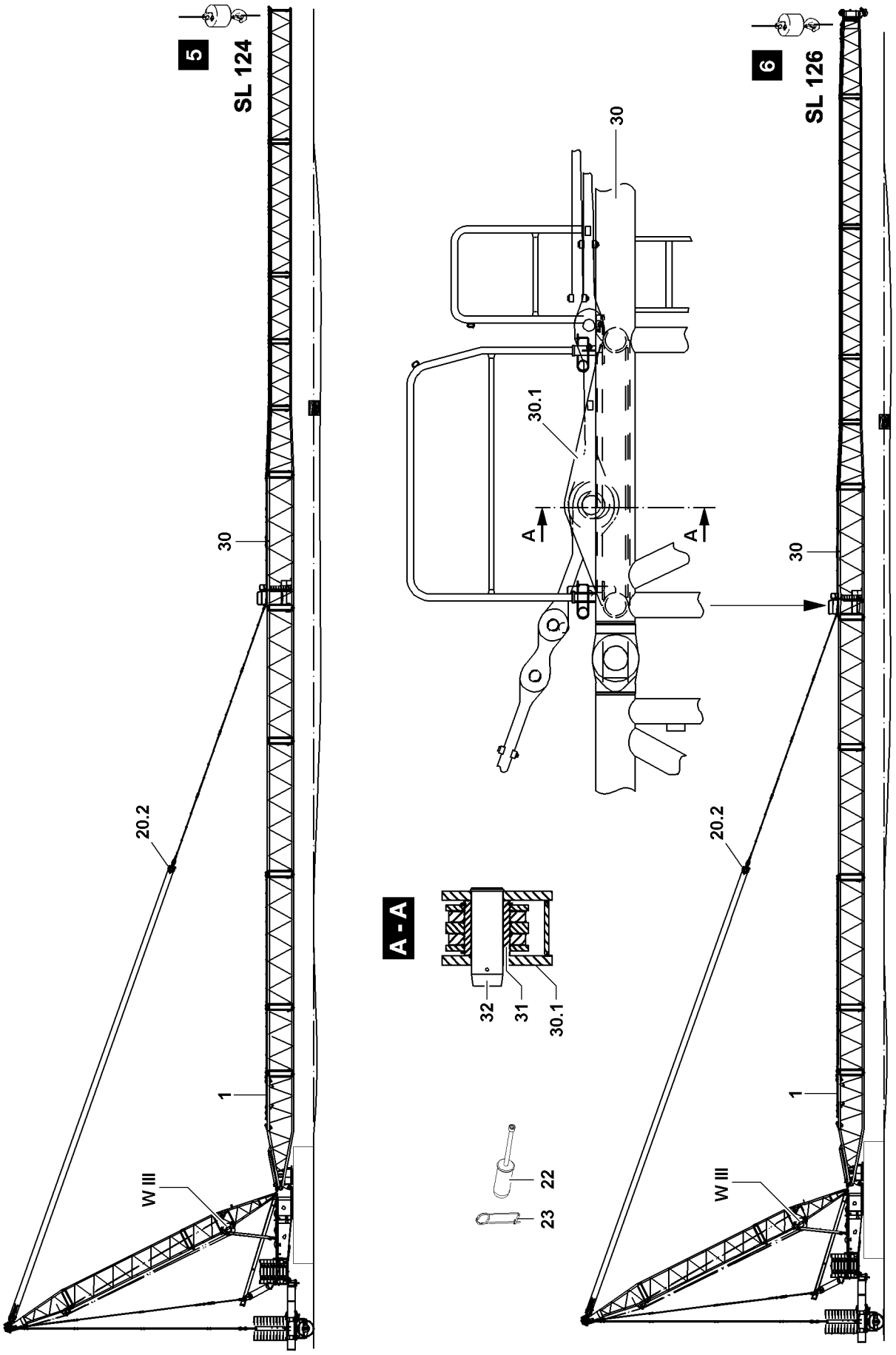

Fig.112051

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WARNING
Unutilized guy rods on boom!
If guy rods are on the lattice sections which are not used for operation, then there is a danger of accidents.
Personnel can be severely injured or killed.
Guy rods can loosen up and fall down.
The load display of the LICCON computer system shows the incorrect value.
The weight of the boom is too heavy for erection.
▶ Disassemble and remove unutilized guy rods on the transport retainers before erecting the boom.

▶ Pin and secure the guy rods with each other.
▶ Hang the assembled boom on the auxiliary crane.
or
Support the assembled boom from below with materials of adequate load bearing capacity.
▶ Spool out winch 3 **W III** until the guying between the upper pulley block **20.2** and the S-intermediate section for flying assembly **30** is relieved.

DANGER
The boom can fold down!
If the pins **32** on the brackets **30.1** are unpinned, then the boom can fold down by itself.
Personnel can be severely injured or killed.
▶ Make sure that the boom is safely held with the auxiliary crane or that it is supported with stable materials before the pins **32** are unpinned.

▶ Unpin the pins **32** from the consoles **30.1**.

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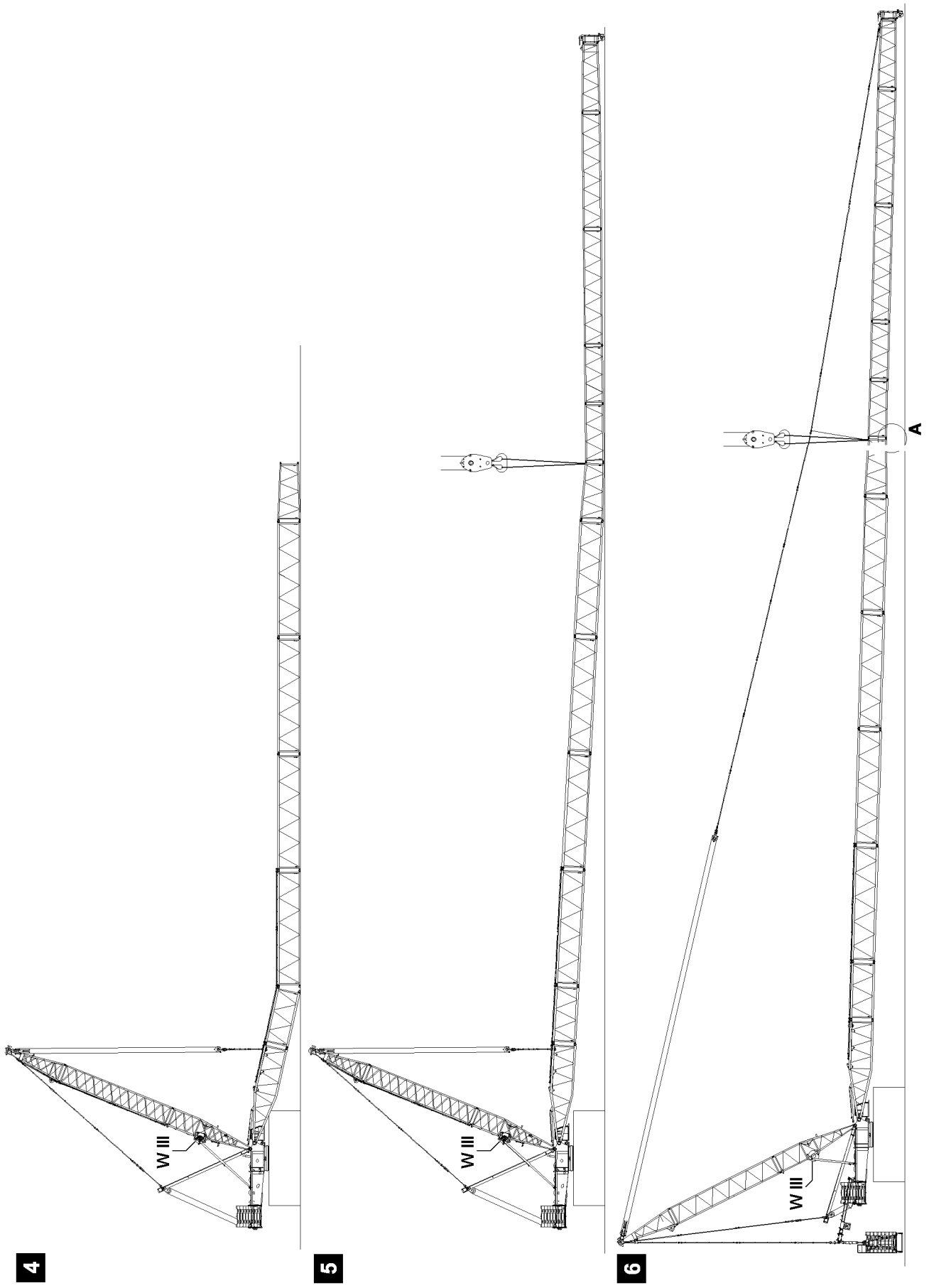

Fig.112059

LWE/LG 1750-006/15409-07-02/en

3.8 Closing boom systems

WARNING
The crane can topple over!
If the crane is not supported and ballasted according to the load chart when closing the respective boom systems, then the crane can topple over.
Personnel can be severely injured or killed.
▶ The following prerequisites must be adhered to.

Make sure that the following prerequisites are met:
- The crane is supported.
  (only in connection with crane support or for LG-cranes).
- The crane is horizontally aligned.
- The counterweight is placed according to the specifications.
- The central ballast is placed according to the specifications.
- If required:
  The derrick ballast is placed according to the specifications.
  The derrick ballast is on the required derrick ballast radius.
- An auxiliary crane is available.

3.8.1 Closing the SLD-boom 105 m to SLD 133 m

Note
▶ Booms up to a boom length of SLD- 98 m can be closed without a substructure from below.
▶ Up to a boom length SLD- 126 m , the L-end section may lift off the ground when closing the boom.

WARNING
The crane can topple over!
When closing the boom length SLD- 133 m and the L-end section lifts off the ground, then the crane can topple over.
Personnel can be severely injured or killed.
▶ Make sure that the L-end section remains on the ground when closing the SLD- 133 m boom.

	Substructure U_{min} depending on boom length				
	SL-boom length				
	105 m	112 m	119 m	126 m	133 m
LG / LR-crane	U_{min} = 1.10 m	U_{min} = 0.90 m	U_{min} = 0.80 m	U_{min} = 0.60 m	U = 0.50 m
	Note: Up to including SL- 98 m , the boom does not have to be supported.				

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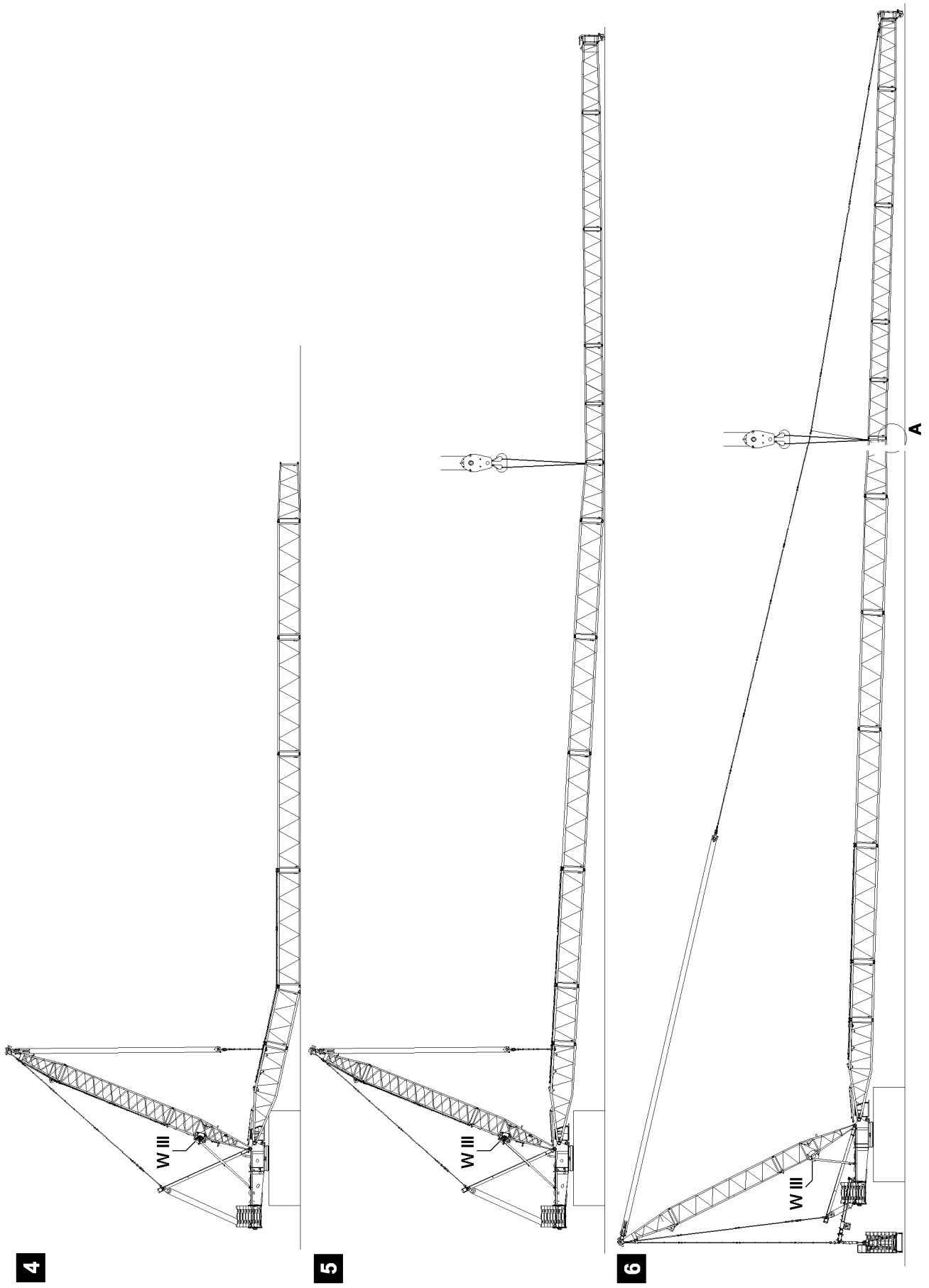

Fig.112059

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Illustration **4:**

- ▶ Assemble the SL-boom up to the reducer.
- ▶ Close the partial boom by spooling up winch 3 **W III**.

Illustration **5:**

- ▶ Install the remaining boom system completely (to maximum SL- 133 m).

Note

- ▶ The required auxiliary crane for closing and holding the boom system must have a minimum load carrying capacity of 60 t.

- ▶ Fasten the auxiliary crane to the reducer.
- ▶ Close the boom system with the auxiliary crane.
- ▶ Hold the boom with the auxiliary crane.
- ▶ Install the guying.
- ▶ Luff the derrick boom up until the SL-boom is safely held by the guying.

When the SL-boom is safely held by the guying:

- ▶ Remove the auxiliary crane.
- ▶ Erect the boom completely (see section Erection procedure).

Illustration **6:**

- ▶ Take the boom down: Before taking the boom down completely, fasten the auxiliary crane to the boom.

NOTICE

Damage to the crane!

If the boom is not held by an auxiliary crane when taking it down, then the crane can be overloaded. Crane components can be damaged.

- ▶ Make sure that the SL-boom is safely held by the auxiliary crane before the L-end section reaches the ground **or** the boom has reached a distance of 0.5 m to 1.1 m to the alignment level **A**.

- ▶ Fasten the auxiliary crane to the SL-boom.

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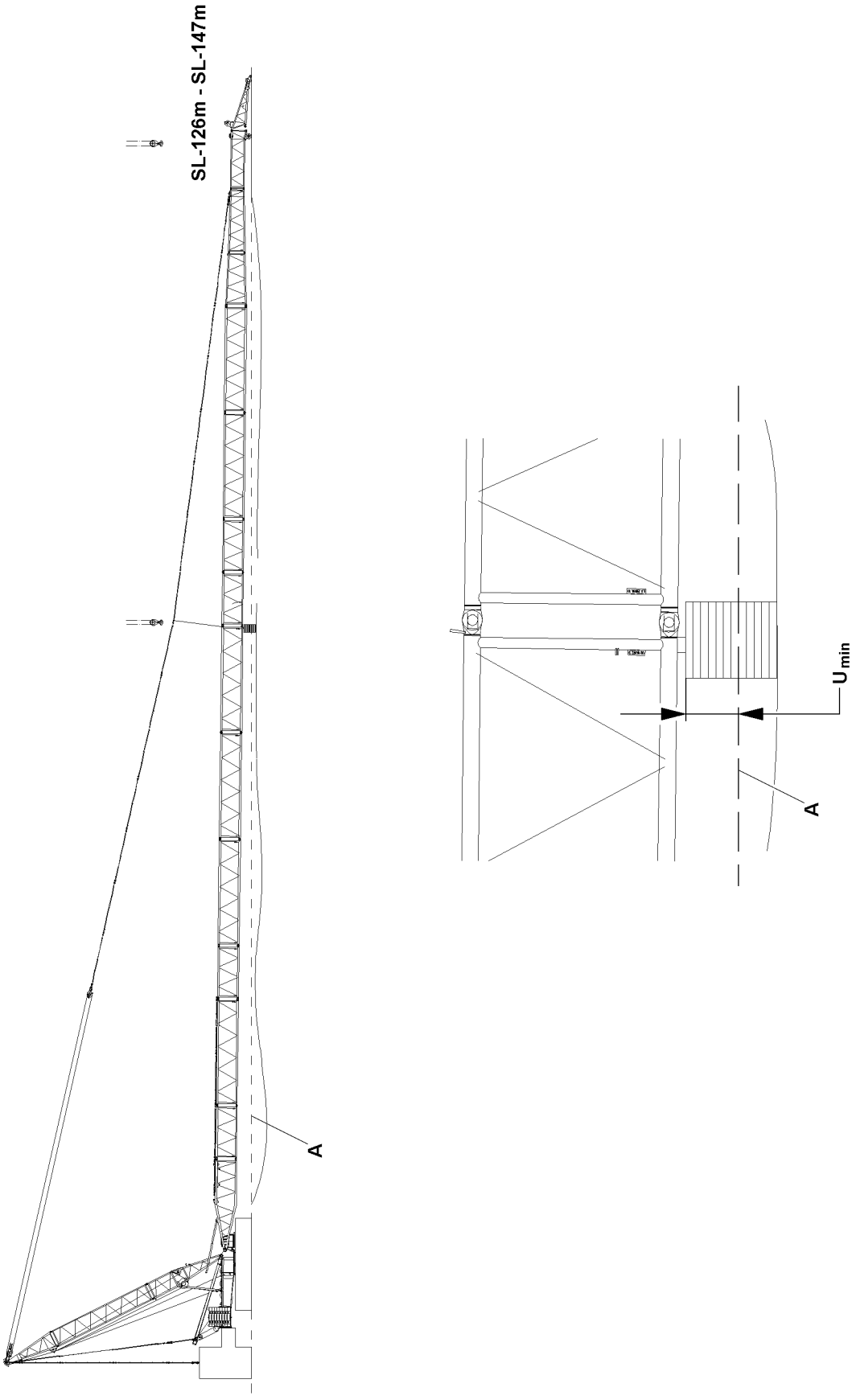

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Fig.112061

3.8.2 Closing the SL7DHS 126 m to 147 m

The boom combinations must be erected or taken down according to the erection and take-down charts. The boom combinations, depending on the boom length, must be supported from below to a certain height, substructure **Umin**.

	Substructure U_{min}
LG-crane	1.0 m
	Note: Up to a boom length of SL- 119 m erection is possible without a substructure.
LR-crane	0 m to 0.4 m

WARNING
The crane can topple over!
If the following conditions are not met before erecting the boom, the crane can topple over.
Personnel can be severely injured or killed.
- ▶ Observe the technical safety instructions, see the Crane operating instructions, chapter 5.01.
- ▶ Observe the specifications in the erection and take-down charts.
- ▶ It is not permitted to turn the crane during the erection procedure.
- ▶ Extend the S-relapse cylinders before erecting the boom combination.

▶ Close the boom system with the auxiliary crane.

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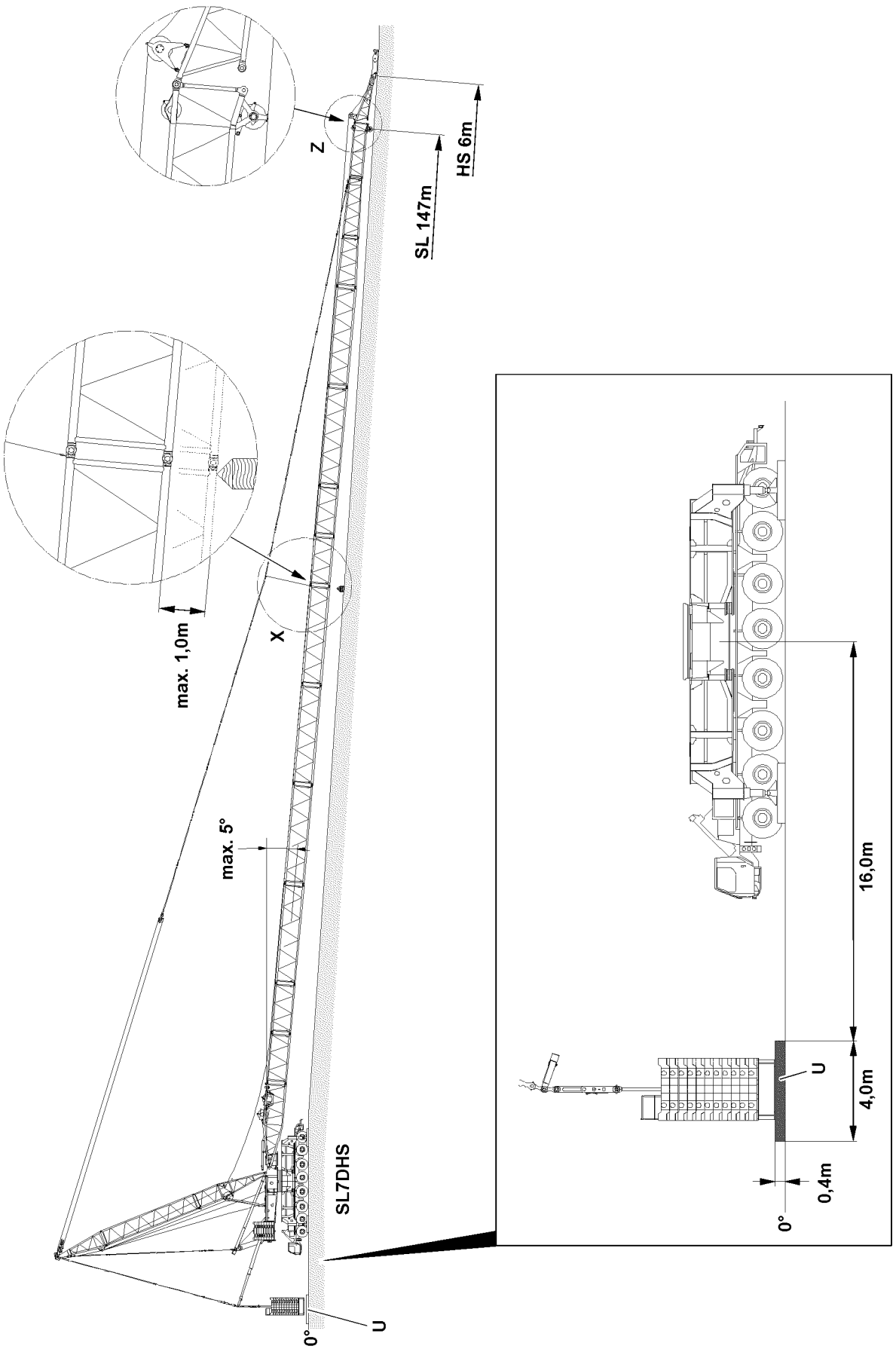

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Fig.120891

3.8.3 Assembling the SL7DHS-boom system in an incline

WARNING
The crane can topple over!
If the crane is not horizontal, then it can be overloaded when erecting / taking down the boom system and topple over.
Personnel can be severely injured or killed.

- ▶ Make sure that the placement level of the crane is level and horizontal.
- ▶ Make sure that the crane is completely supported and horizontally aligned.
- ▶ Make sure that the suspended ballast pallet is supported with stable and load bearing materials to 0.4 m above the placement level of the crane, substructure **U**.
- ▶ Make sure that the substructure **U** of the suspended ballast pallet has a minimum width of 4.0 m.
- ▶ Make sure that the distance of 16.0 m is retained between the suspended ballast substructure **U** to the center of rotation of the crane.
- ▶ Make sure that the maximum permissible incline of the main boom angle of -5° is not exceeded at boom assembly / disassembly.
- ▶ Make sure that the maximum permissible deflection of the respective boom system of 1.0 m is not being exceeded, see the following chart and detail **X**.
- ▶ Make sure that all movements of the crane are actuated slowly and anticipatorily.
- ▶ Support the boom systems with suitable material of sufficient load bearing capacity.

Maximum permissible deflection of boom system		
Boom system	**Length**	**Maximum permissible deflection at X**
SL7DHS	126.0 m to 147.0 m	1.0 m

NOTICE
Damage to the crane!
If the substructure of the boom system at **X** is not carried out properly and in the required height, then the boom system can be damaged due to excessive deflection.

- ▶ Make sure that the substructure at **X** is carried out in such a way that the deflection does **not** exceed the maximum permissible value.

Note

- ▶ Assemble the SL7DHS-boom according to the Crane operating instructions, chapter 5.39.

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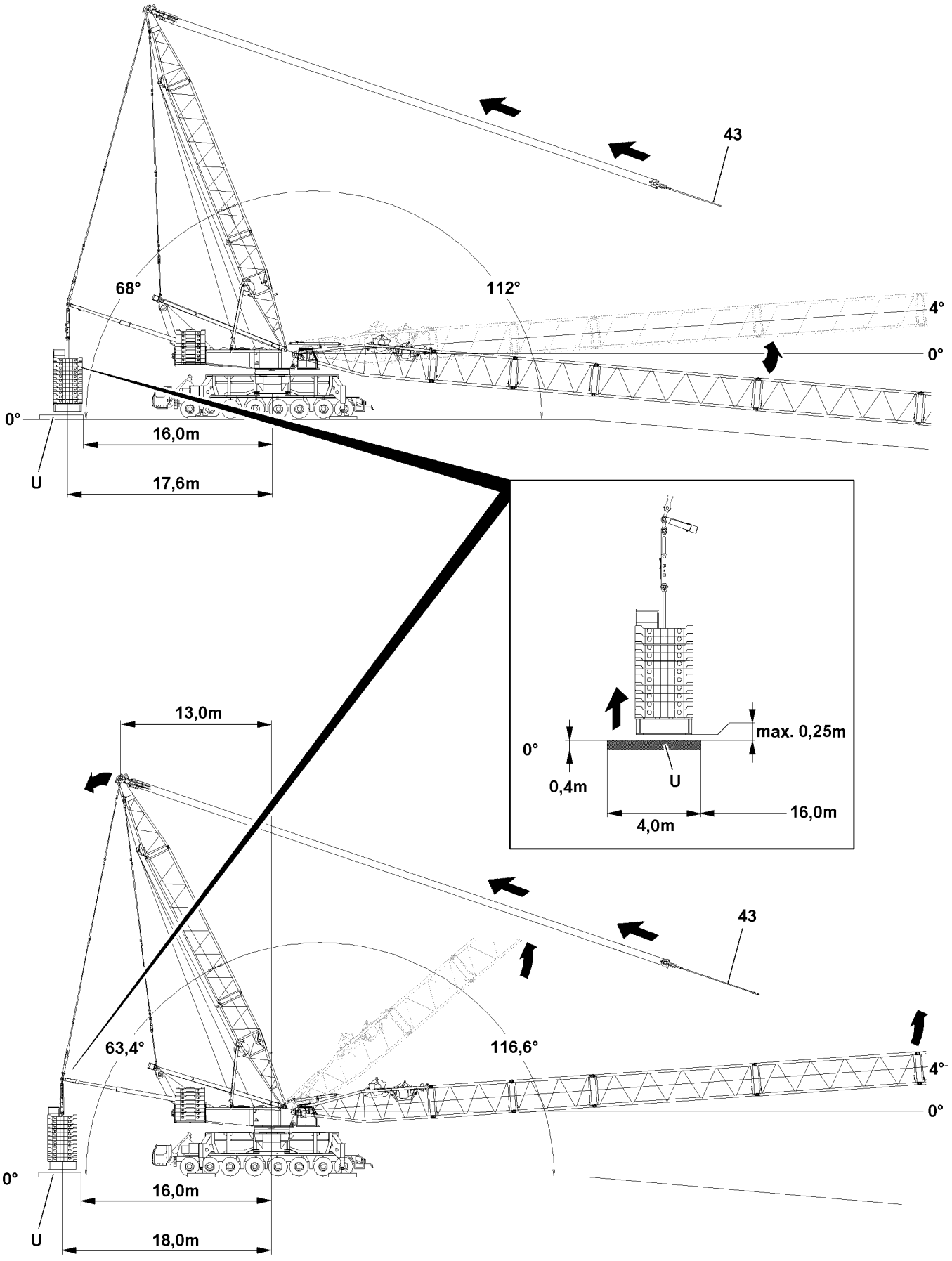

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Fig.120892

Erecting the SL7DHS-boom to the horizontal

Make sure that the following prerequisites are met:
- The boom system is properly supported.
- The substructure on the main boom is properly set up, pay attention to the maximum permissible deflection.

DANGER
The crane can topple over!
In crane operation with exceeded LICCON overload protection, the crane can topple over.
Personnel can be severely injured or killed.
▶ The radii listed in the load chart may not be exceeded or fallen below, even if there is no load on the hook.

WARNING
The crane can topple over!
If the specifications in the erection and take down charts are disregarded, the crane can topple over.
Personnel can be severely injured or killed.
▶ Observe the Erection and take down charts.

▶ Assemble the guy rods properly, see the Crane operating instructions, chapter 5.39.

When the guy rods on the SL7D-boom are properly installed and secured:
▶ Set the derrick boom to 68°.

WARNING
The crane can topple over!
If the suspended ballast is lifted by the more than the maximum permissible 0.25 m off the substructure **U**, then the crane can be topple to the rear if the load rips off.
▶ Do not lift the suspended ballast by more than 0.25 m off the substructure **U**.

▶ Assemble and lift the suspended ballast properly, see the Crane operating instructions, chapter 5.36.
▶ Assemble the auxiliary jib HS properly on the main boom.

When the auxiliary jib HS is properly installed and secured:
▶ Erect the boom system to **minimum** 0° to **maximum** 4° to the horizontal.

WARNING
Danger of accident due to the boom!
During the derrick boom adjustment, if the main boom is luffed up at the same time, then dangerous situations can arise.
Personnel can be severely injured or killed.
▶ Make sure during the adjustment of the derrick boom to 63.4°, that the main boom is held **between** 0° and 4°.

When the boom system is between 0° and 4° to the horizontal:
▶ Set the derrick boom to 63.4° to the rear.

Result:

– The derrick boom is on a derrick radius of 13.0 m.

When the derrick boom is on a derrick radius of 13.0 m:
▶ Erect the boom system, see the Erection and take down charts and section „Erecting the boom system“.

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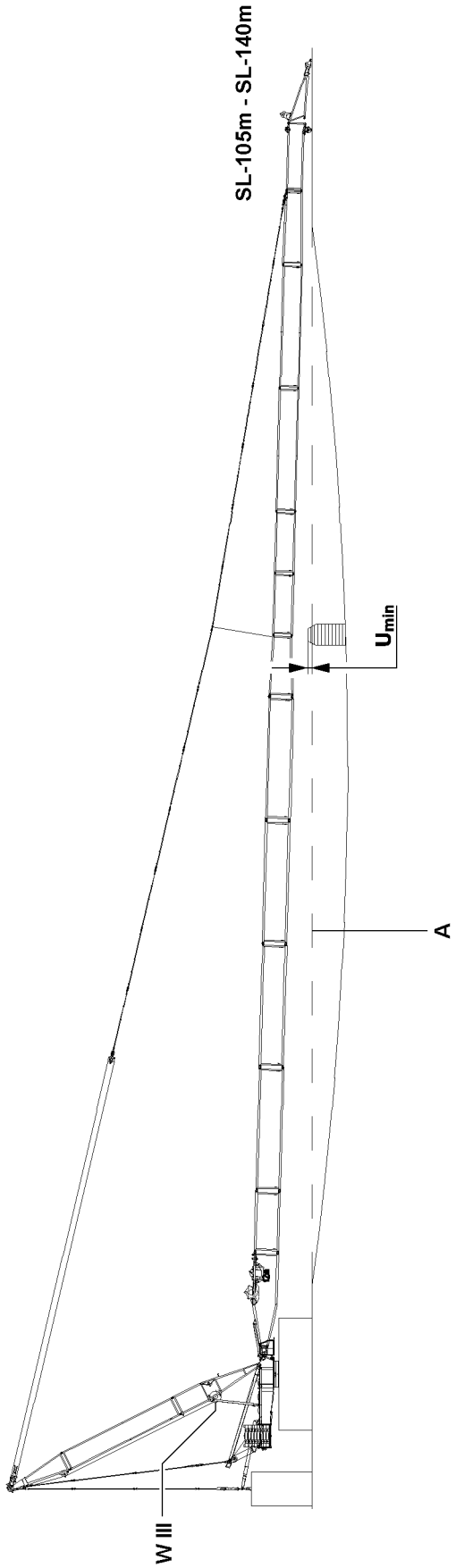

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Fig.112060

3.8.4 Closing the SL8DHS 105 m to 140 m

The boom combinations must be erected or taken down according to the erection and take-down charts. The boom combinations, depending on the boom length, must be supported from below to a certain height, substructure **Umin**.

Note

▶ Up to a boom length SL8- 119 m , the L-end section may lift off the ground when closing the boom.

	Substructure U_{min}
LG-crane	0.6 m to 1.0 m
LR-crane	0 m to 0.4 m

WARNING

The crane can topple over!

If the following conditions are not met before erecting the boom, the crane can topple over.

Personnel can be severely injured or killed.

▶ Observe the technical safety instructions, see the Crane operating instructions, chapter 5.01.

▶ Observe the specifications in the erection and take-down charts.

▶ Make sure that the L-end section of the SL8D-boom 126 m does **not** lift off the ground when closing.

▶ It is not permitted to turn the crane during the erection procedure.

▶ Extend the S-relapse cylinders before erecting the boom combination.

▶ Close the boom system with the auxiliary crane.

3.9 Establishing the electrical connections

NOTICE

Damage to the electrical connection on the cable drum!

If the electrical connection from the cable drum to the terminal box on the S-pivot section is established first before the connection to the terminal box on the S-end section, the electrical connection can be damaged when spooling out the cable drum.

▶ Establish first the electrical connection from the cable drum in the S-pivot section to the terminal box on the S-end section and then the electrical connection from the terminal box in the S-pivot section to the cable drum.

Note

▶ To establish the electrical connections on the S-boom, use the Electric wiring diagram.

Make sure that the following prerequisites are met:

– The S-boom is completely assembled.

– The airplane warning light and the wind speed sensor are assembled.

▶ Establish the electrical connections.

▶ Make sure that all electrical connections on the boom are established.

3.10 Establishing the hydraulic connections

When connecting and releasing hydraulic lines with quick couplings, make sure that the coupling procedure is carried out correctly.

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DANGER
Danger of accident due to loss of pressure or leakage!
Incorrectly coupled or self-loosening quick couplings (particularly return lines) can result in serious accidents due to component failure.
▶ Check that the quick couplings have been properly connected before using the crane.

Note
▶ To connect or release the hydraulic lines with quick couplings, see Crane operating instructions, chapter 5.01.

▶ Release the pressure in the hydraulic system before connecting or disconnecting. Turn the engine off and wait for short time.
▶ Assembling coupling components (sleeve and connector) by using knurled nut.
▶ Connect coupling components.

3.11 Function check

WARNING
Non-functioning safety equipment!
If the function of the safety equipment is defective, personnel can be severely injured or killed.
▶ Crane operation with non-functioning safety equipment is **prohibited**.

Note
▶ The function of the individual limit switches must be checked before erection of the boom system.
▶ The function of the limit switch initiators must be checked in the test system, see the Diagnostics manual.

Note
▶ If a function check on the limit switches or on the safety equipment does not lead to the desired shut offs, then the plug connections on the connector boxes or the components itself must be checked. If no visible connection errors or component defects can be found, contact Liebherr Service.

Make sure that the following prerequisites are met:
– All electrical connections have been made.
– The crane engine is running.
– The corresponding operating mode is set on the LICCON monitor.
– The actuator levers of the limit switches have been checked for easy movement and are lubricated.

3.11.1 Wind speed sensor

▶ Check the movement and the function of the wind speed sensor.

3.11.2 Airplane warning light

▶ Turn the airplane warning light on, see Crane operating instructions, chapter 4.01.
▶ Check the function visually.

3.11.3 Hoist limit switch

▶ Actuate the hoist limit switch manually on the pulley head.

Result:

– The hoist winch turns off in upward movement.
– The hoist top icon on the LICCON monitor 0 blinks.

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3.11.4 Checking the limit switch D-boom „Steepest position“

Note
▶ The limit switch functions have to be checked individually before erection.

▶ Cover the limit switch initiators on the D-relapse cylinders individually with a metal plate.

Result:

– The limit switch is actuated manually.
– The spool up function of winch 4 (control winch) turns off.
– The icon „Boom limitation“ appears on the LICCON monitor 0.

3.11.5 Checking the limit switch S-boom „steepest position“

Note
▶ The limit switch functions have to be checked individually before erection.

▶ Cover the limit switch initiators on the S-relapse cylinders individually with a metal plate.

Result:

– The limit switch is actuated manually.
– The spool up function of winch 3 turns off.
– The icon „Boom limitation“ appears on the LICCON monitor 0.

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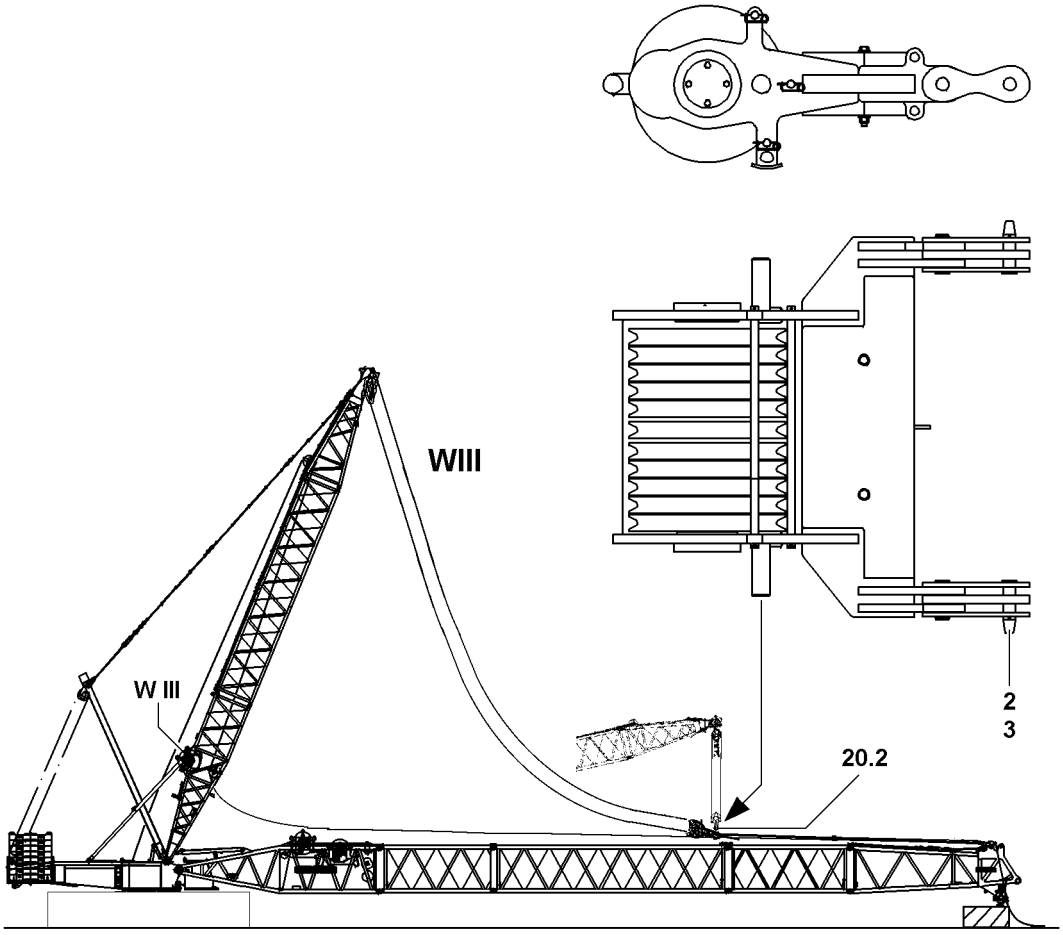

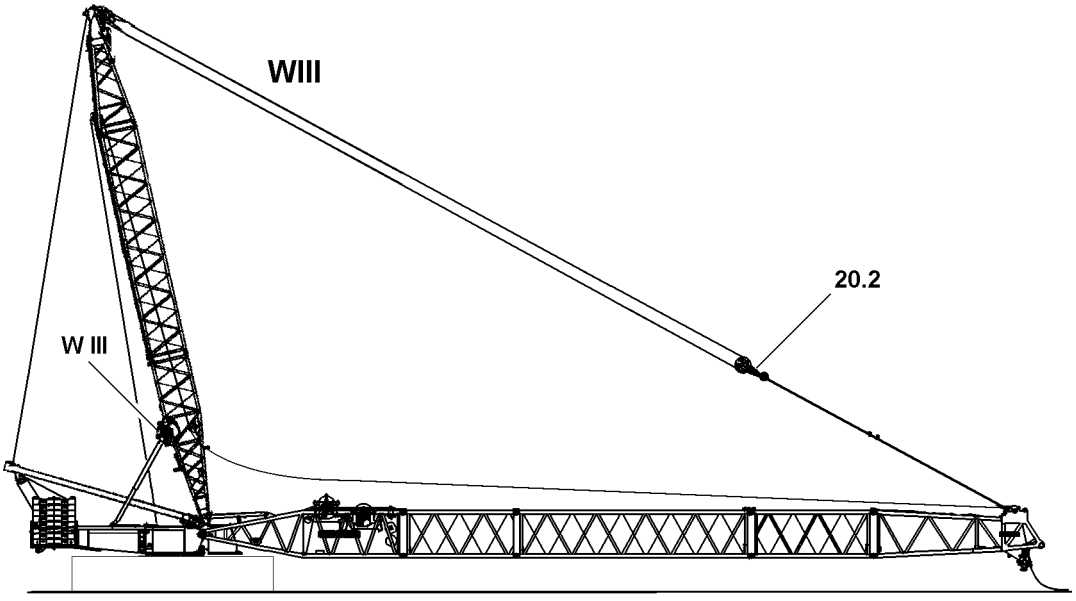

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Fig.112062

3.12 Assembling the guy rods

WARNING
Neglected inspection and maintenance on guy rods!
If the regular inspection and maintenance of the guy rods is not carried out or only at irregular intervals, then severe accidents can occur due to existing and not recognized damage on the guy rods. Personnel can be severely injured or killed.
▶ The guy rods must be checked before every assembly, see Crane operating instructions, chapter 8.15.

Note
▶ The guy rods must be installed and secured according to the separately supplied rod plans. The numbering on the rod plans must be identical to the numbering on the guy rods.

Make sure that the following prerequisites are met:
– The S-boom is completely assembled.
– All lattice sections are properly pinned with each other.
– All pin connections are secured.
– The upper pulley block **20.2** is unpinned on the S-pivot section.

3.12.1 Pinning the guy rods

▶ Luff the D-boom down to the front.
▶ Lower the upper pulley block **20.2** to the boom: Spool out winch 3 **W III**.

The guy rods are taken down and secured for transport on the corresponding intermediate sections. Before assembly, the transport retainers must be released.

▶ Release the transport retainers on the guy rods.

NOTICE
Danger of property damage!
If the pins of the guy rods are not pinned from the „inside“ to the „outside“, the hoist rope can scrape on the pins and be damaged.
▶ Always insert the pins of the guy rods from the „inside“ to the „outside“.
▶ Pay attention to the special rod plan.

Note
▶ The guy rods of the S- / L-intermediate sections are pinned with each other and secured starting from the lugs on the fixed point of the respective end section or starting from the lugs on the L-adapter.

▶ Pin and secure the guy rods for the intermediate sections according to the Rod plan.
▶ Pin and secure the guy rods with the upper pulley block **20.2**.

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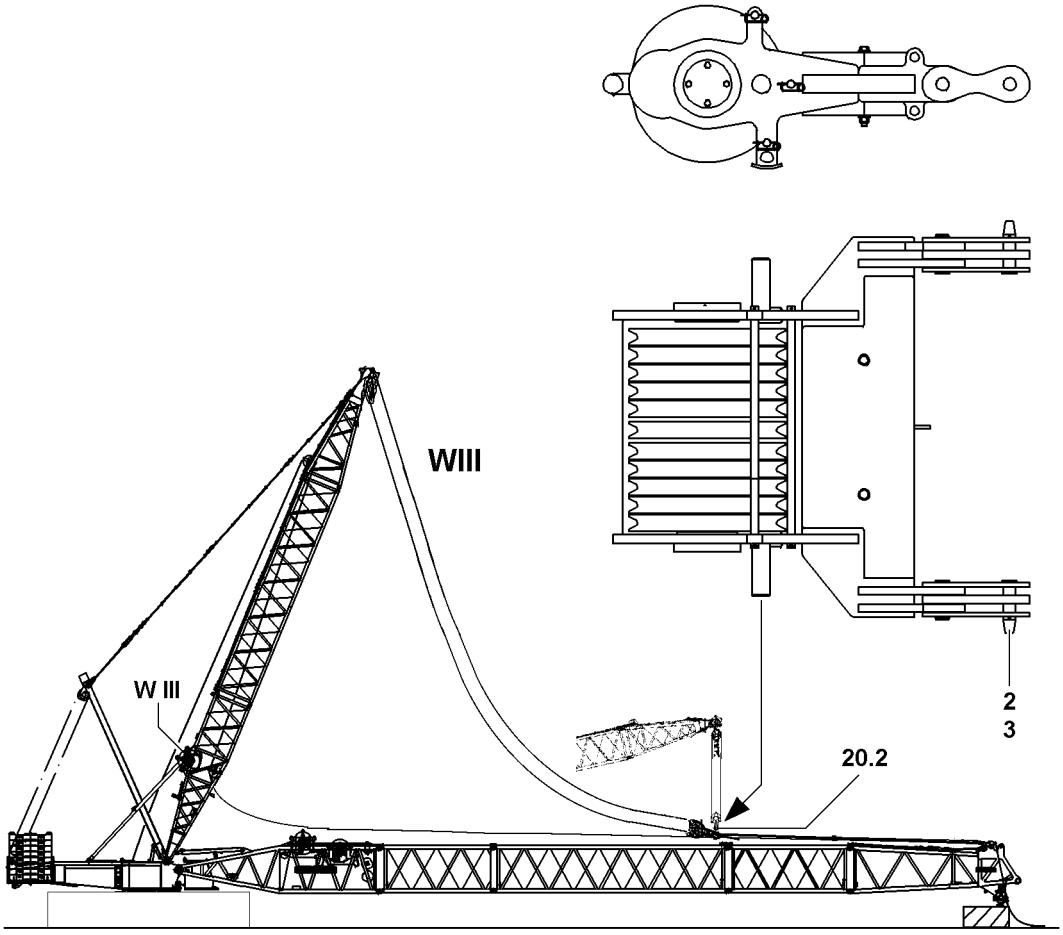

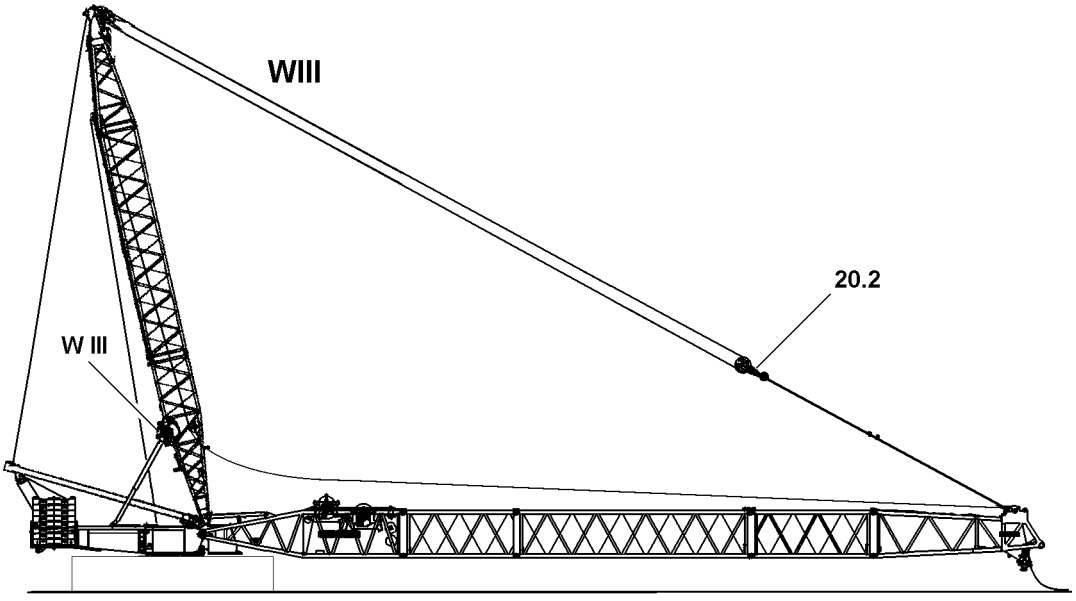

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Fig.112062

WARNING
Falling boom!
If the auxiliary guying is not assembled on the boom or not according to the specifications, then the boom can buckle downward, break off and fall down during erection.
Personnel can be severely injured or killed.
▶ Make sure that the auxiliary guying is assembled correctly, see the Rod plan.

▶ Assemble the auxiliary guying.

Note
▶ The S-boom must remain on the ground when erecting the derrick boom and may **not** be pulled up along.

When the guy rods are pinned and secured with the upper pulley block **20.2**:
▶ Erect the D-boom to operating position and at the same time, spool out winch 3 **W III**.

When the D-boom has reached the operating position:
▶ Tension the guying between the D-boom and the boom head or the L-adapter.

WARNING
The boom can suddenly fold down!
If the following notes are not observed, the boom can suddenly fold down when the auxiliary boom or the substructure is removed.
Personnel can be severely injured or killed.
▶ Remove the auxiliary crane or the substructure only if it is ensured that the D-boom is in operating position and the S-boom is safely being held by the guying.

When the boom is safely held by the guying:
▶ Remove the auxiliary crane on the boom head or on the L-adapter.
or
Remove the substructure.
▶ Guide the hoist rope over the rope pulley(s) on the boom head, see the Reeving plans.

3.12.2 Assembling the auxiliary guying frame

Depending on the boom system, an additional auxiliary guying frame and an additional auxiliary guying is required for crane guying. Refer to rod plan for the respectively necessary auxiliary guying frame or the auxiliary guying.

Note
▶ Auxiliary guying assembly, see chapter 5.03.
▶ Observe and adhere to the Rod plan.

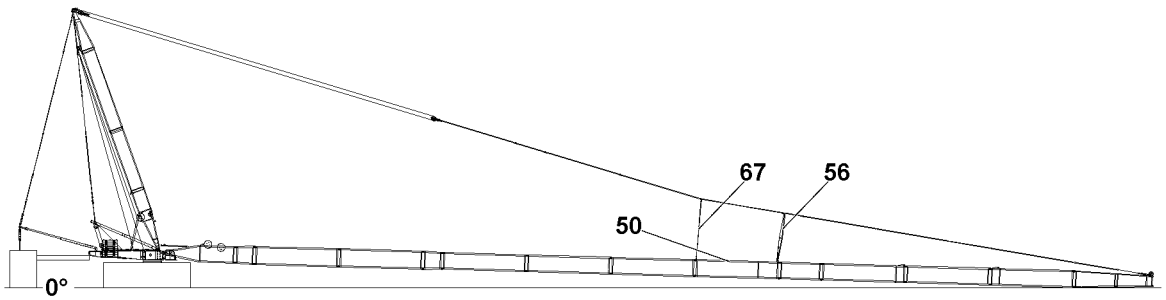

Fig.145252: The boom system with the auxiliary guying frame and auxiliary guying

50 S-intermediate section 3326.40 RO
56 Auxiliary guying frame
67 Auxiliary guying

Make sure that the following prerequisites are met:
- The boom system is properly assembled and secured.
- The required guy rods are installed and secured according to the rod plan.

Assembling the tension straps

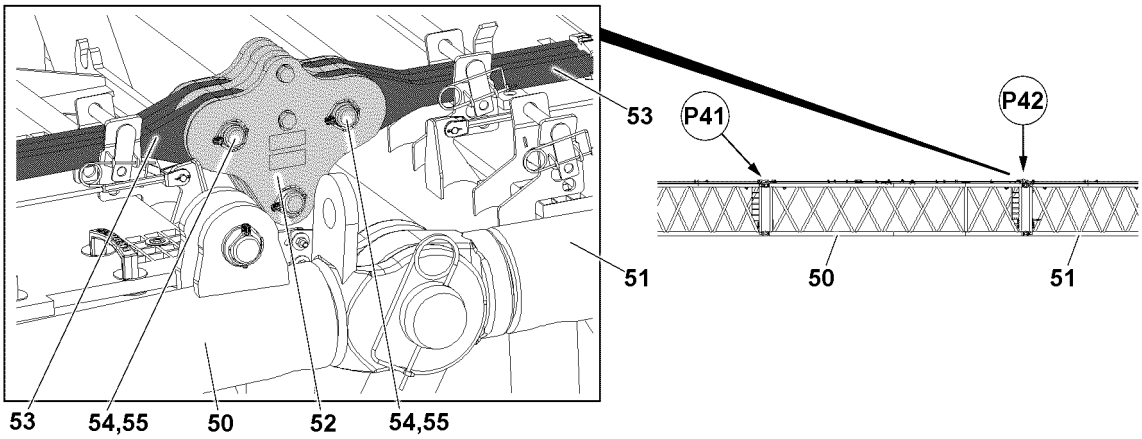

Fig.145244: Tension strap

Install the tension straps **52** of the auxiliary guying frame in the rod strand at points **P42**.

▶ Disconnect the rods at points **P42**: Unpin the pins.

Note
▶ The weight of the tension strap **52** is 60 kg.

▶ Fasten the tension straps **52** to the auxiliary crane.
▶ Unpin the tension straps **52** from the auxiliary guying frame: Remove the retaining element and unpin the pin.
▶ Swing the tension straps **52** with the auxiliary crane to the pin location.

When the pin bores align:
▶ Insert the pin **54** at points **P42** and secure with the retaining elements **55**.

Note
▶ Not every boom system requires auxiliary guying. Refer to the rod plan if auxiliary guying is required.
▶ Auxiliary guying assembly, see chapter 5.03.
▶ Observe and adhere to the Rod plan.

If necessary:
▶ Install the tension straps for the auxiliary guying at points **P41** in the rod strand.

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Pinning the auxiliary guying frame on the lugs of the S-intermediate section 3326.40 RO

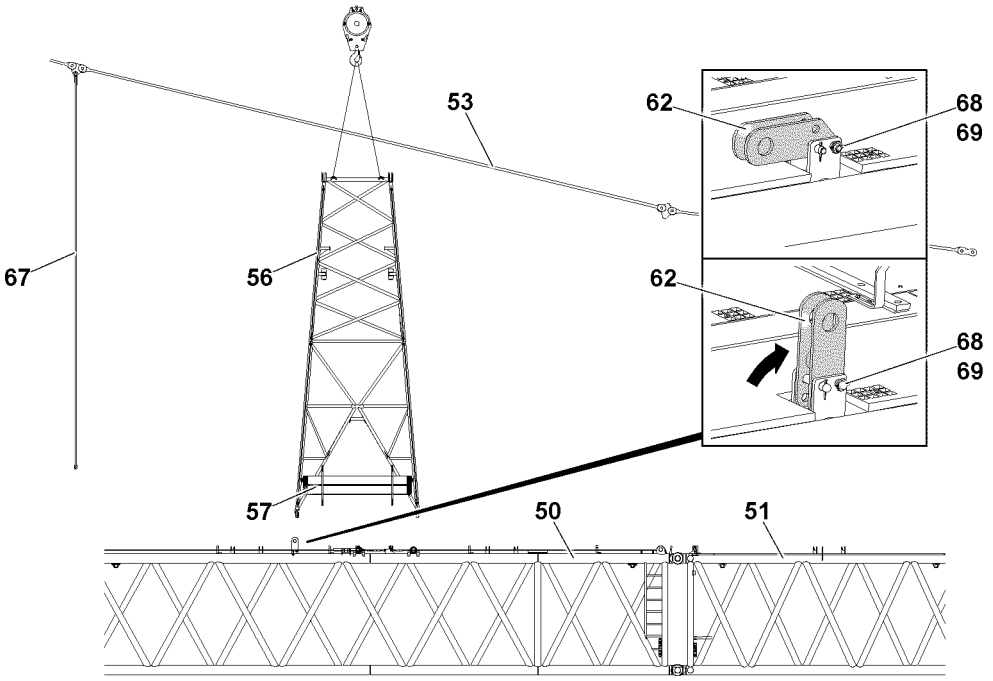

Fig.145245: Swinging the auxiliary guying frame

Make sure that the following prerequisite is met:
- The tension straps are pinned and secured with the guy rods of the rod strand.

Note
- ▶ Not every boom system requires auxiliary guying. Refer to the rod plan if auxiliary guying is required.
- ▶ Auxiliary guying assembly, see chapter 5.03.
- ▶ Observe and adhere to the Rod plan.

If necessary:
- ▶ Pin the auxiliary guying **67** with the guy rods **53** and secure.
- ▶ Tension the crane guying.
- ▶ Release the lugs **62** out of the transport position, remove the retaining element **69** and unpin the pin **68**.
- ▶ Swing the lugs **62** into the operating position.
- ▶ Secure the lugs **62** in the operating position: Insert the pin **68** and secure it with the retaining element **69**.
- ▶ Fasten the auxiliary guying frame **56** to the auxiliary crane.
- ▶ Insert the auxiliary guying frame **56** with the auxiliary crane between the guy rods **53** of the crane guying.

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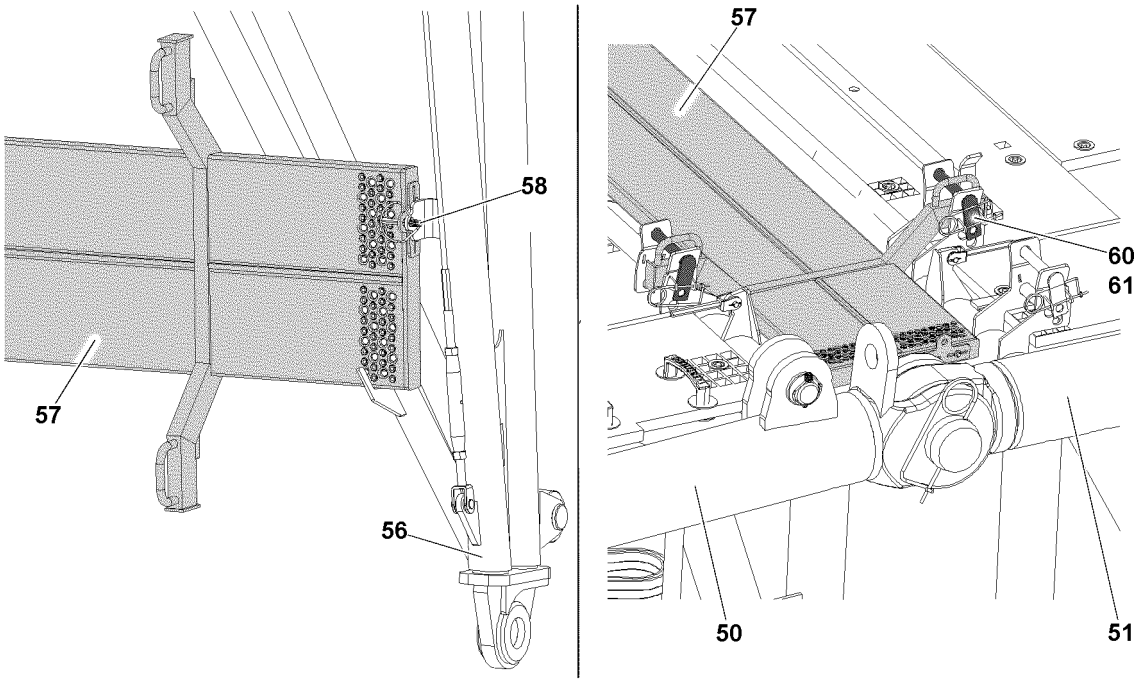

Fig.145243: Catwalk

Note

▶ The weight of the catwalk **57** is 22 kg.

WARNING

Falling catwalk!

The catwalk **57** can fall down by itself due to its own weight when it is unpinned.

Death, severe bodily injuries.

Fingers and hands can be crushed!

▶ For safety reasons, disassemble the catwalk **57** always with **two** persons!

▶ Hold the catwalk **57** during the unpinning procedure!

▶ Do not reach with your hands into the danger zone!

▶ Use personal protective equipment!

▶ Remove the retaining element **58**.

▶ Remove the catwalk **57** from the transport position.

▶ Insert the catwalk **57** between the S-intermediate section 3326.40 RO **50** and the S-intermediate section **51**.

▶ Pin the catwalk **57**: Insert the pin **60** and secure it with the retaining element **61**.

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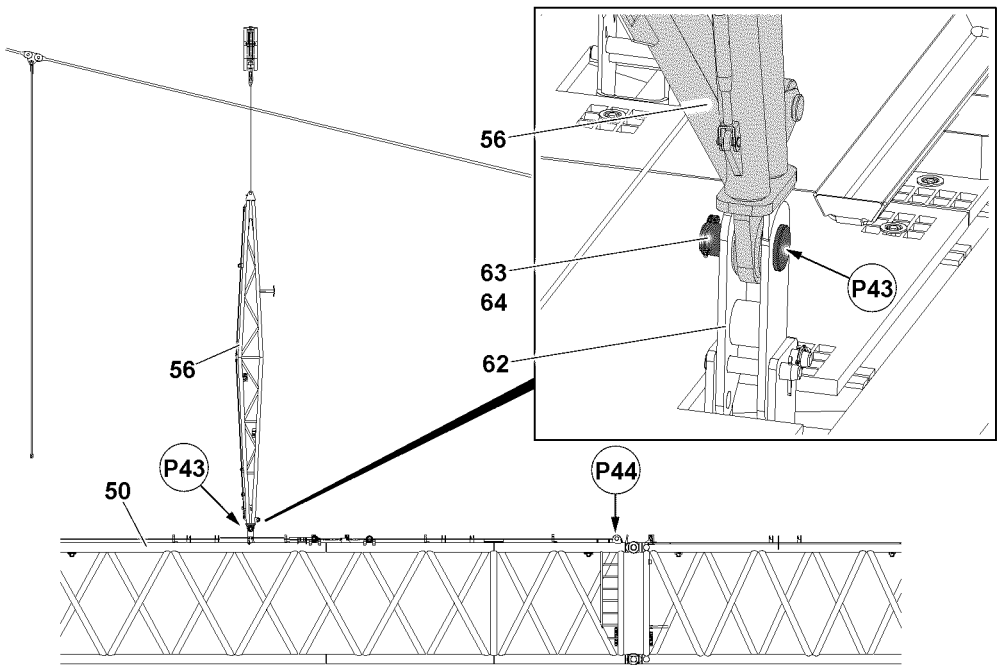

Fig.145246: Pinning the auxiliary guying frame

▶ Swing the auxiliary guying frame **56** with the auxiliary crane to the pin location in point **P43**.

Note

▶ Remove the pin **63** and retaining element **64** from the pin location in point **P44**.

When the pin bores align:

▶ Insert the pin **63** on the lugs **62** at points **P43** and secure with the retaining element **64**.

Pinning the auxiliary guying frame to the auxiliary lugs of the rod strand

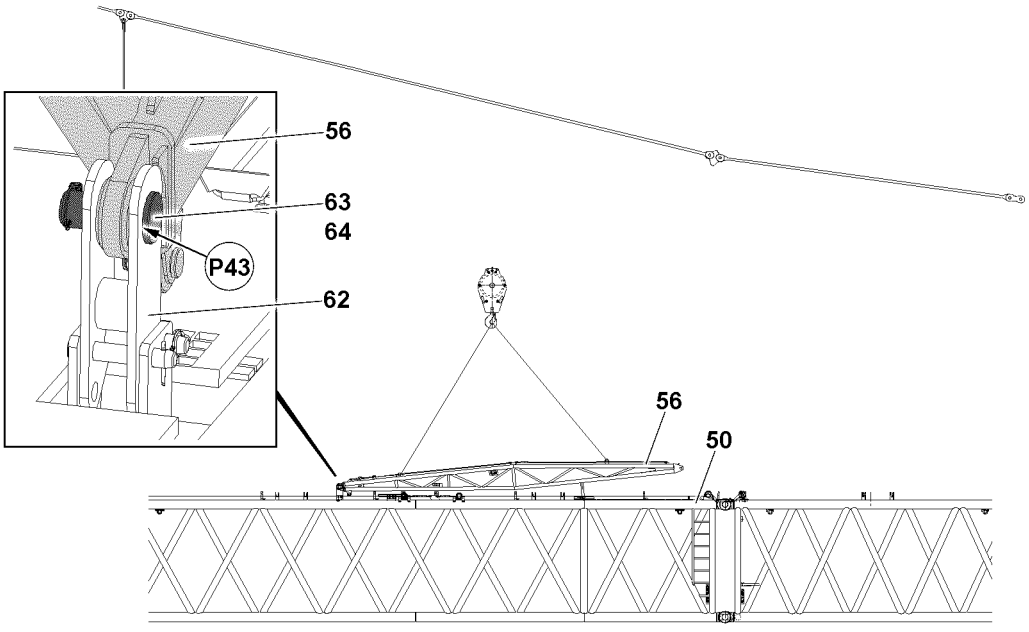

Fig.145247: Unpinning the auxiliary guying frame

▶ Take the auxiliary guying frame **56** down with the auxiliary crane.

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- ▶ Rehang auxiliary crane.
- ▶ Unpin the auxiliary guying frame **56** on the lugs **62**: Remove the retaining element **64** at points **P43** and unpin the pins **63**.

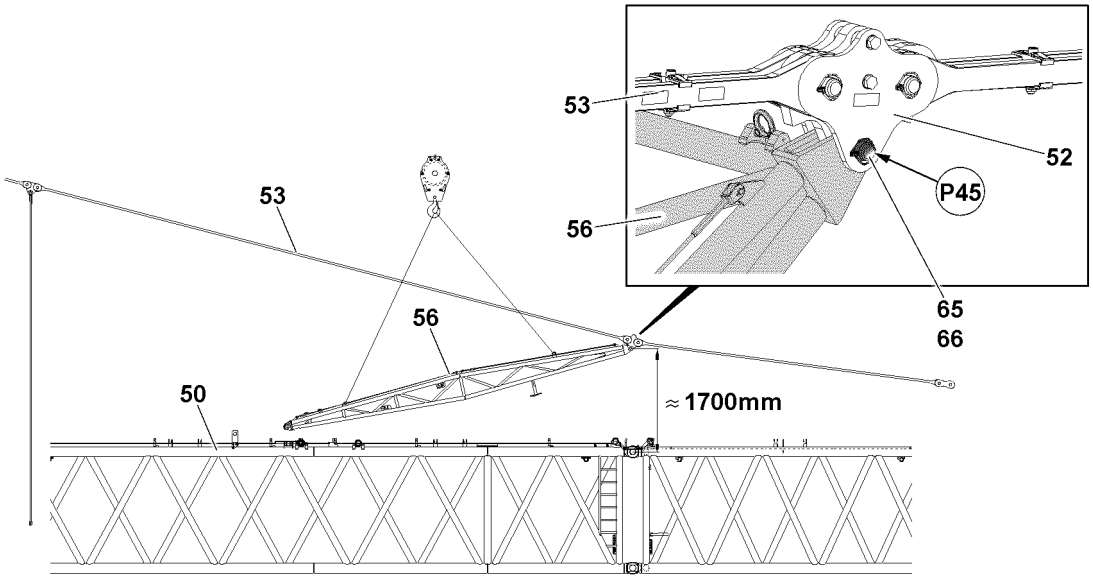

Fig.145248: Pinning the auxiliary guying frame

- ▶ Lower the crane guying.
- ▶ Pin the auxiliary guying frame **56** suspended with the tension straps **52**: Insert the pin **65** at points **P45** and secure with the retaining element **66**.

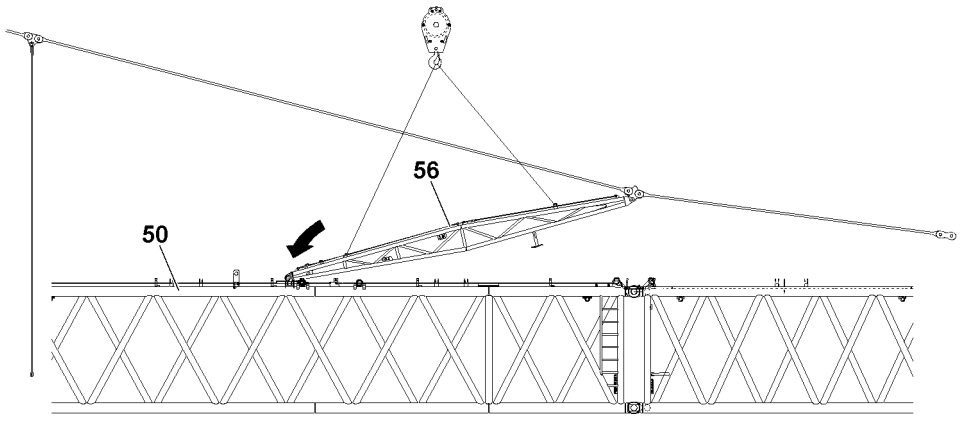

Fig.145249: Setting down the auxiliary guying frame

- ▶ Set the auxiliary guying frame **56** down with the auxiliary crane.

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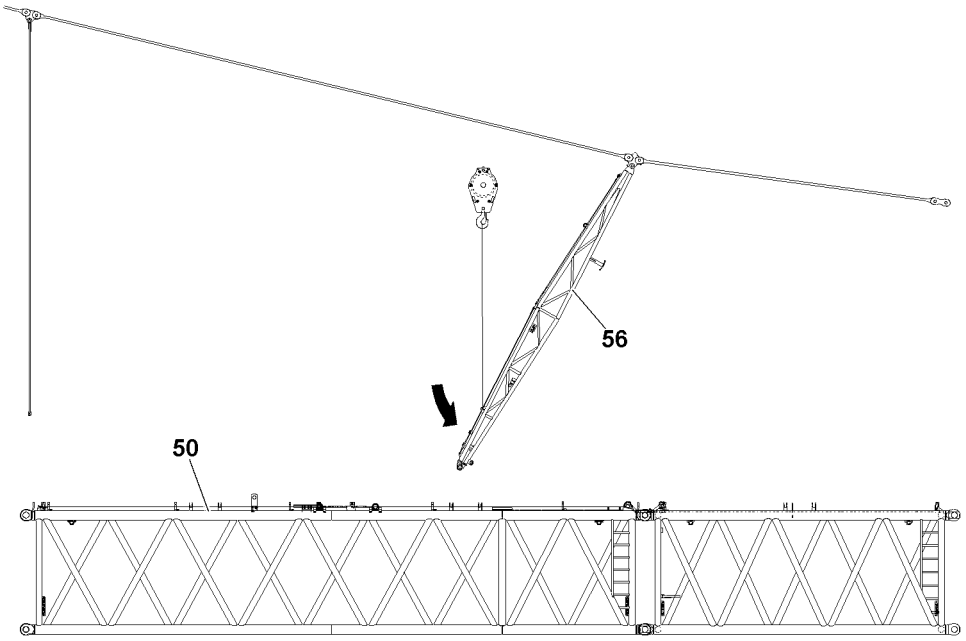

Fig.145250: Carrying the auxiliary guying frame along

- ▶ Rehang auxiliary crane.
- ▶ Tension the crane guying.
- ▶ Carry the auxiliary guying frame **56** along with the auxiliary crane to the pin location.

Pinning the auxiliary guying frame on the S-intermediate section 3326.40 RO

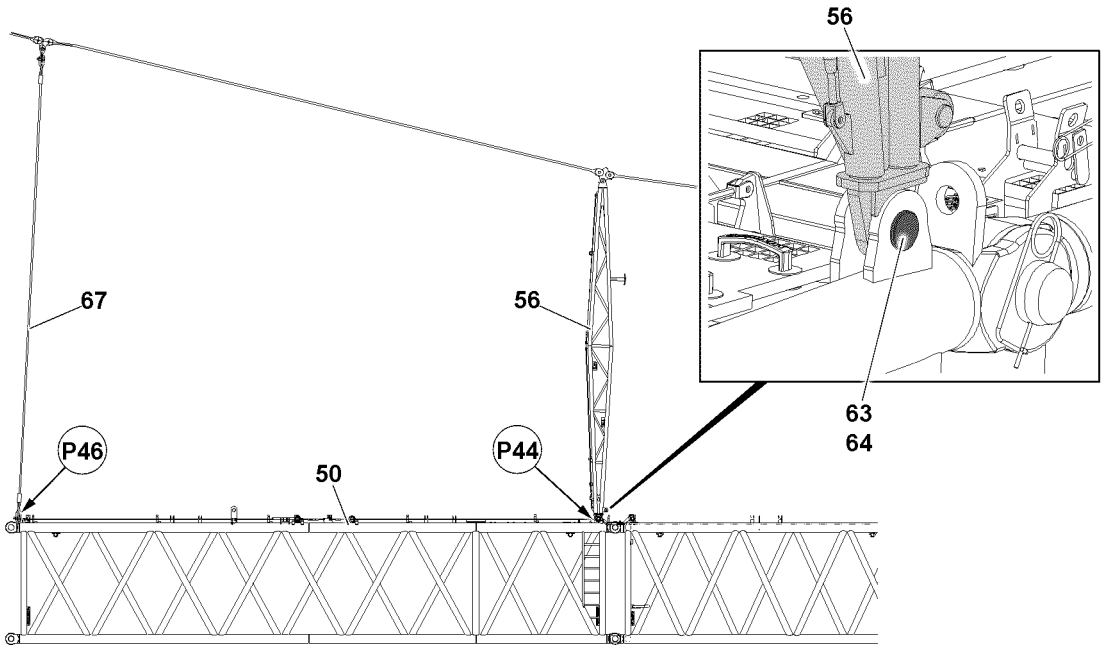

Fig.145251: Pinning the auxiliary guying frame

When the pin bores align:

- ▶ Insert the pin **63** at points **P44** and secure with the retaining element **64**.

Result:

– The auxiliary guying frame **56** is pinned and secured with the S-intermediate section 3326.40 RO **50**.

Note

- ▶ Not every boom system requires auxiliary guying. Refer to the rod plan if auxiliary guying is required.
- ▶ Auxiliary guying assembly, see chapter 5.03.
- ▶ Observe and adhere to the Rod plan.

If necessary:

- ▶ Pin the auxiliary guying **67** at points **P46**.

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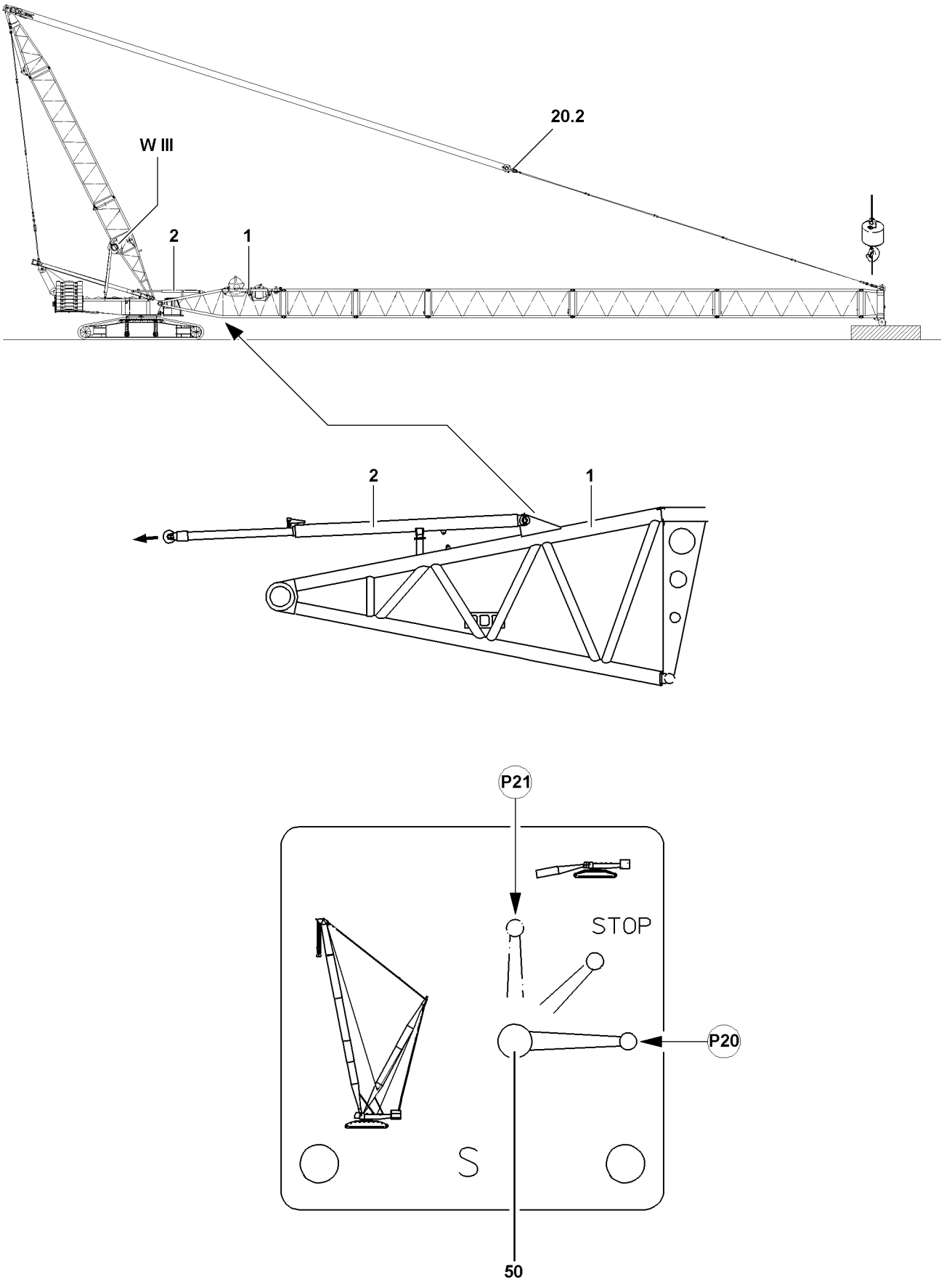

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Fig.112054

4 Erecting the boom system

4.1 Erecting the boom

WARNING
The crane can topple over!
In crane operation with exceeded LICCON overload protection, the crane can topple over. Personnel can be severely injured or killed.
▶ The radii listed in the load chart may not be exceeded or fallen below, even if there is no load on the hook.

If required in the erection and take down chart:
▶ Carry the hook block along with the auxiliary crane.

WARNING
The crane can topple over!
If the following conditions are not met before erecting the boom, the crane can topple over.
Personnel can be severely injured or killed.
▶ Observe the technical safety instructions, see the Crane operating instructions, chapter 5.01.
▶ Extend the S-relapse cylinders before erecting the boom combination.
▶ Do not allow slack rope formation on the control winch.

WARNING
Falling hoist rope!
If the hoist rope is not reeved with the respective length over the S-boom before the erection procedure, then it can fall backward due to its own weight.
Personnel can be severely injured or killed.
▶ Reeve in the hoist rope with sufficient length on the S-boom before the erection process.
▶ The hoist rope must be constantly monitored during erection.
▶ Do not step into the danger zone.

NOTICE
Overload of boom!
If the SL-boom is not supported before the erection procedure, then the boom will be overloaded.
The crane will be damaged during erection.
▶ The substructure for the various boom lengths shall always be executed according to the specifications.
▶ Support the boom with suitable material of sufficient load bearing capacity.

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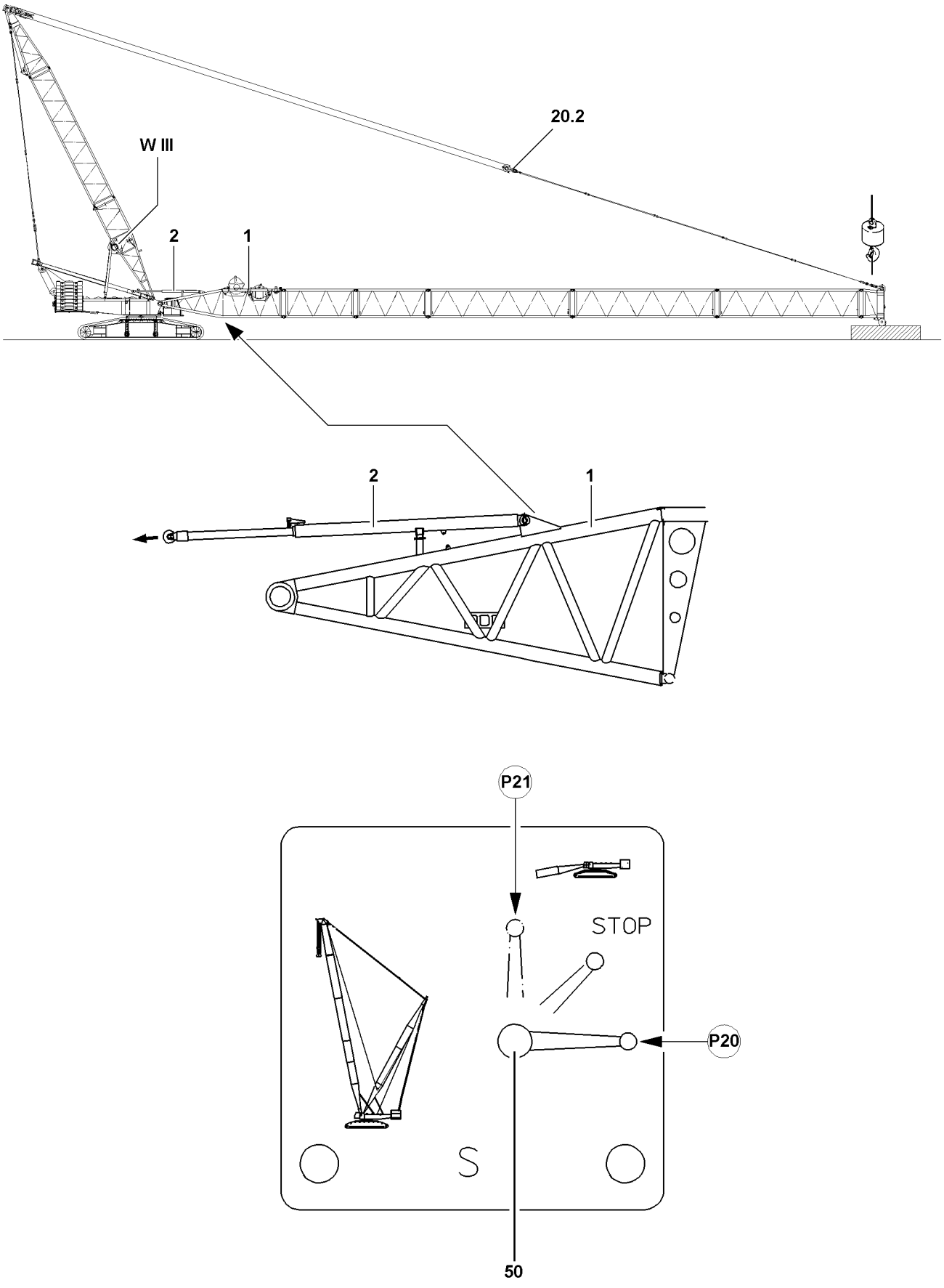

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Fig.112054

Make sure that the following prerequisites are met:
- The crane is supported.
  (only in connection with crane support or for LG-cranes).
- The crane is horizontally aligned.
- All electrical connections have been made.
- All limit switches are functioning.
- The central ballast is installed according to the erection and take-down charts.
  (not possible for LG-crane).
- The counterweight has been installed on the turntable according to the erection and take-down charts.
- All pin connections are secured.
- The hoist rope has been correctly placed in the rope pulleys and is prevented from jumping out with the rope retaining pins.
- Non-required guy rods are disassembled.
- There are no loose parts on the boom.
- The boom is free of snow and ice.
- The LICCON overload protection has been set according to the data in the load chart.
- The load weighing was carried out on the boom and the hook block weight has been entered on the LICCON monitor, see the Crane operating instructions, chapter 4.02.
- The LICCON overload protection settings have been compared with the actual set up configuration.
- The LICCON overload protection is exceeded.
- The assembly icon is visible on the LICCON monitor.
- No persons are present in the danger zone.

4.1.1 Extending the S-relapse cylinders

NOTICE
Damage to the relapse cylinders!
By extending the S-relapse cylinders, a collision with the D-relapse cylinders can occur.
This can result in severe damage to the relapse cylinders.
▶ Extend the S-relapse cylinders only when the D-boom is in the operating position.

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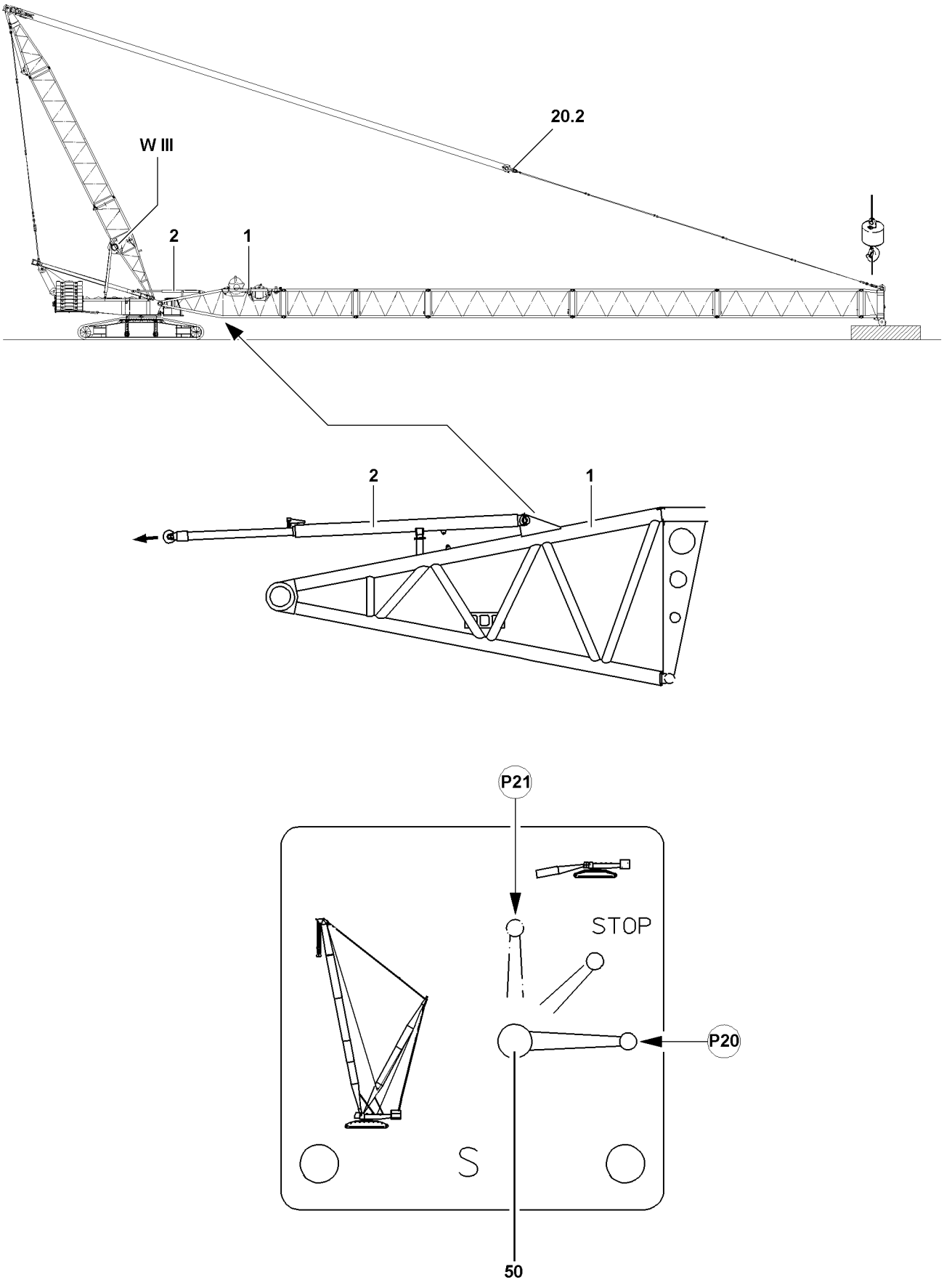

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Fig.112054

WARNING
The crane can topple over!
If the S-relapse cylinders are not extended before erecting the boom, then the boom can fall to the rear during crane operation and the crane can topple over.
Personnel can be severely injured or killed.
▶ Extend the S-relapse cylinders before erecting the S-boom.
▶ Secure the ball valve **50** during crane operation to prevent inadvertent actuation.

Ball valve positions	
Position (P)	Function
20	Crane operation, extend the piston rod
21	Assembly, retract the piston rod
STOP	The piston rod cannot be retracted / extended

Make sure that the following prerequisite is met:
– All hydraulic connections have been made.

▶ Set the ball valve **50** to position **P20**.

Result:

– The piston rods of the S-relapse cylinders **2** extend.

Note
▶ The ball valve **50** is secured by closing the cabinet door and removing the key.

When the piston rods of the S-relapse cylinders **2** are fully extended:
▶ Close the cabinet door and pull out the key.
▶ Hand the key to an authorized person.

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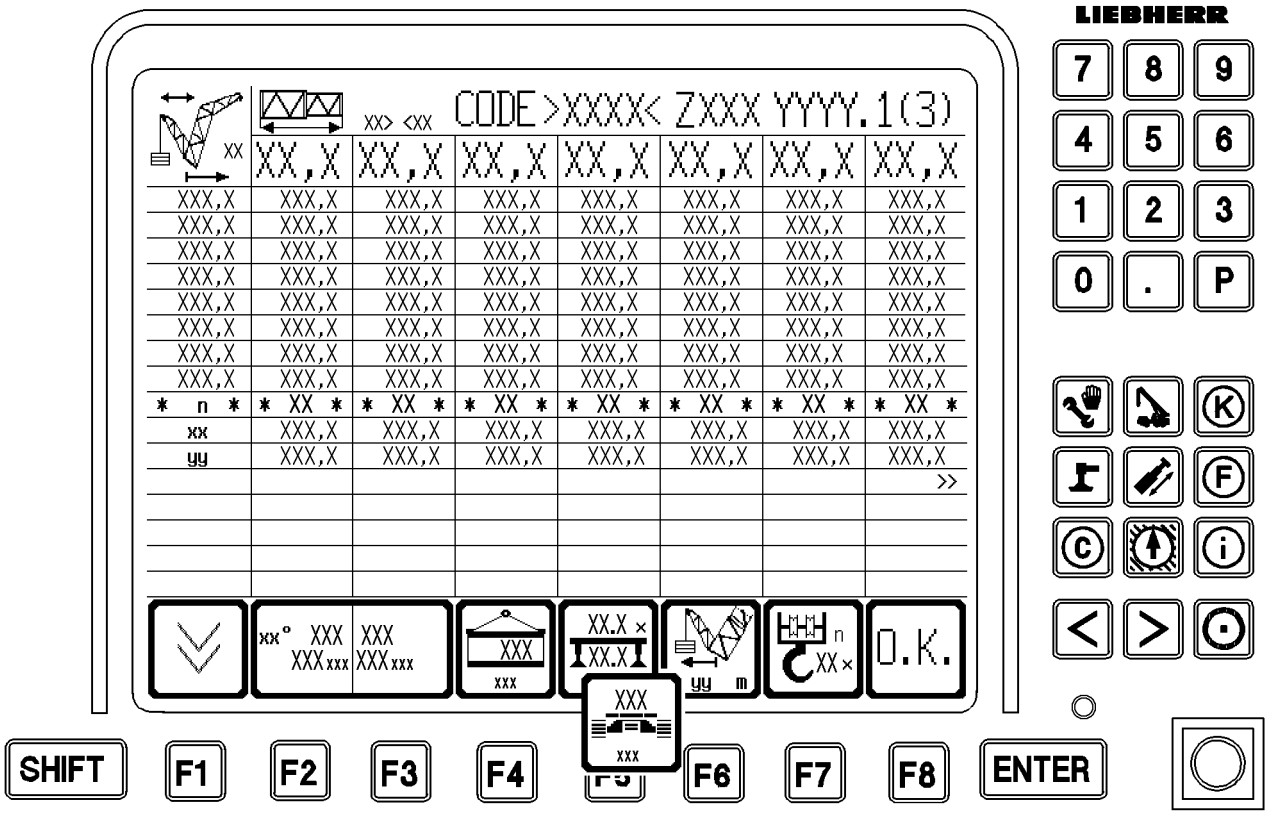

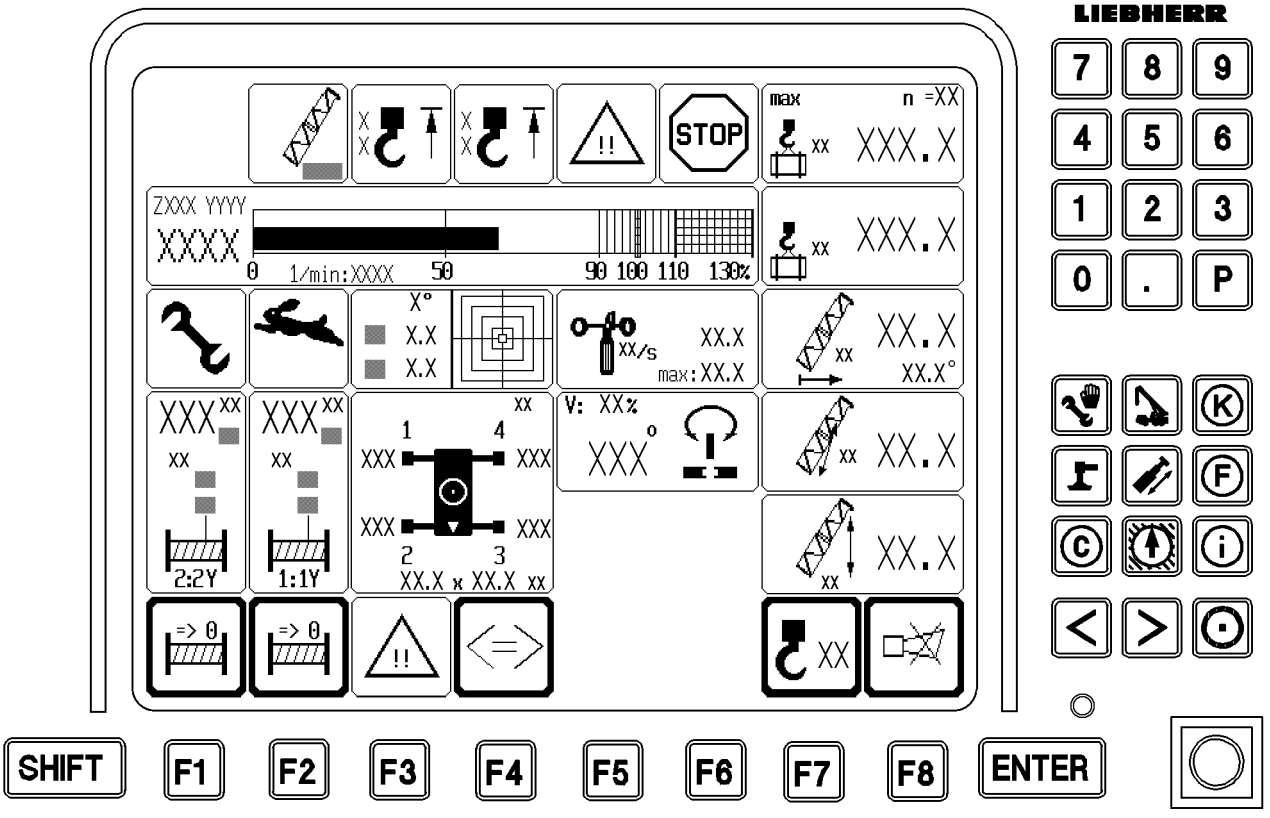

Fig.112055

4.1.2 Erection procedure

DANGER
The crane can topple over!
- ▶ It is prohibited to turn the crane superstructure while erecting the boom.
- ▶ Adhere to the specifications in the erection and take down charts.

Make sure that the following prerequisite is met:
- – The load weighing was carried out on the boom and the hook block weight has been entered on the LICCON monitor, see the Crane operating instructions, chapter 4.02.

Reeving in the hook block

- ▶ Erect the boom until the end section lifts off the ground.

WARNING
Falling hoist rope!
If the hoist rope is not reeved with the respective length over the S-boom before the erection procedure, then it can fall backward due to its own weight.
Personnel can be severely injured or killed.
- ▶ Reeve the hoist rope before the erection procedure with sufficient length on the D-boom.
- ▶ The hoist rope must be constantly monitored during erection.
- ▶ Do not step into the danger zone.

- ▶ Reeve in the hoist rope properly and secure on the rope fixed point, for reeving, see the Reeving plan.
- ▶ Pin and secure the rope retainers on the rope pulleys.
- ▶ Attach the hoist limit switch weight.

Erecting the boom

WARNING
The crane can topple over!
In crane operation with exceeded LICCON overload protection, the crane can topple over.
There is then no additional protection against crane overload.
Personnel can be severely injured or killed.
- ▶ The radii listed in the load chart may not be exceeded or fallen below, even if there is no load on the hook.
- ▶ Crane operation with deactivated LICCON overload protection is prohibited.

Note
- ▶ When the lowest operating position of the boom is reached, the LICCON overload protection is activated.
- ▶ In the maximum load icon, a load number appears in „t“ instead of the display „???“.

- ▶ Luff the boom up to the lowest operating position.

When the boom has reached the lowest operating position:
- ▶ Make sure that the assembly icon on the LICCON monitor turns off.

Result:

- – The LICCON overload protection is active.

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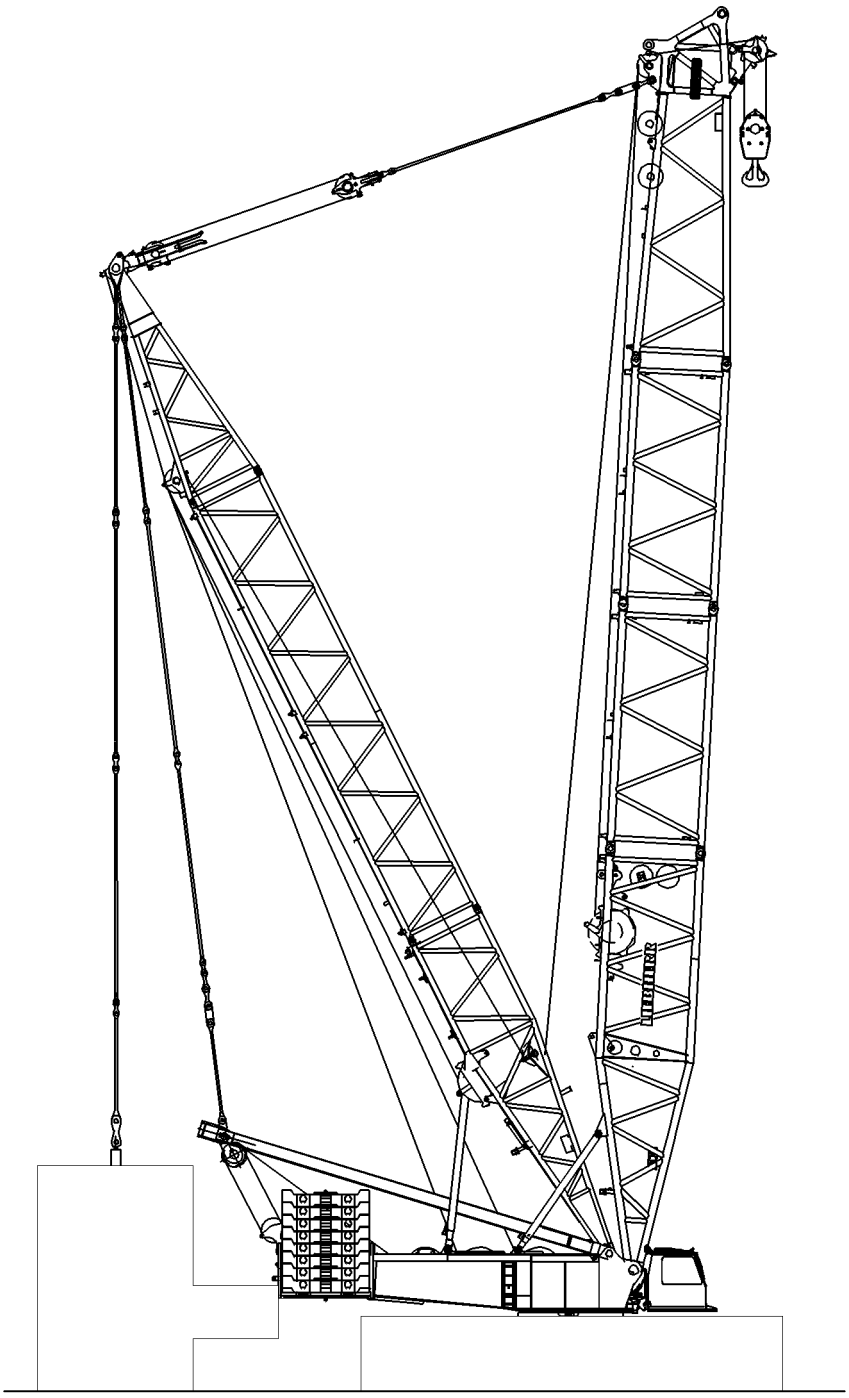

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Fig.112063

5 Operating the crane

5.1 Preparing for crane operation

Note

▶ Observe the notes, see the Crane operating instructions, chapter 4.02, chapter 4.05, chapter 4.08 and chapter 5.01.

Make sure that the following prerequisites are met:

– The LICCON overload protection is active.
– The LICCON overload protection has been set according to the data in the load chart.

WARNING

The crane can topple over!

▶ Check the horizontal position of the crane before and during operation.
▶ If the crane operator leaves the cab, even for a short time, the operating mode setting must be checked and reset if necessary before resuming crane operation.

5.1.1 Checking the settings

▶ Check the function of the overload protection by running against the operating positions „on top“ and „bottom“.
▶ Check the hoist limit switch by running against the hoist limit switch weight.
▶ Check the function of the limit switches „Boom steep“ on the relapse cylinders.

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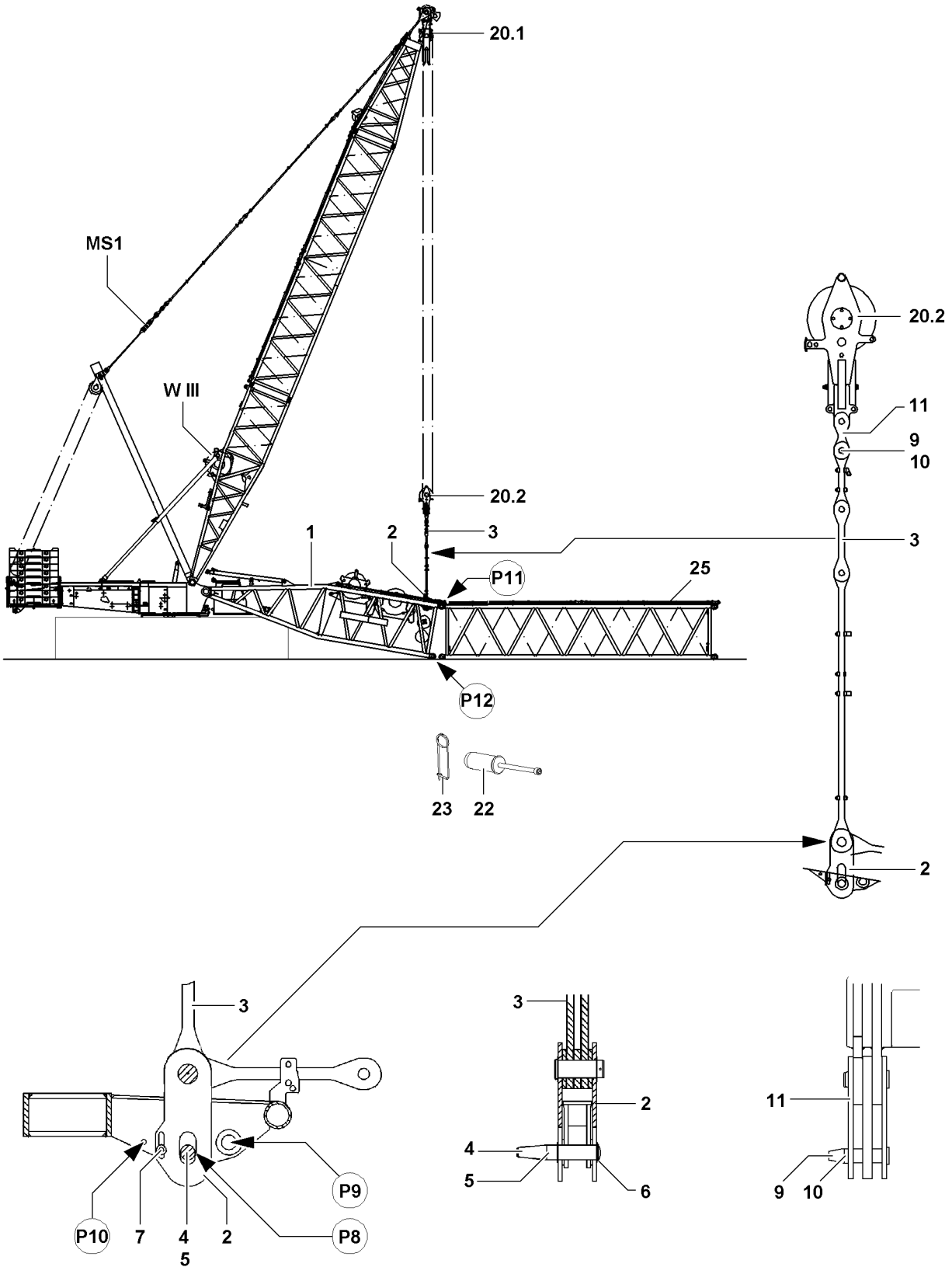

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Fig.120032

6 Disassembling the SLD / SD-boom

Note

▶ The disassembly is described on the example of the S-boom.

WARNING

Danger of falling!

During assembly / disassembly, inspection and maintenance work, assembly personnel must be secured with appropriate aids to prevent them from falling. If this is not observed, assembly personnel could fall and be killed or seriously injured.

- ▶ All work at a height, when there is a danger of falling, must be carried out with suitable aids.
- ▶ If fall protection equipment is available, then it must be used, see the Crane operating instructions, chapter 2.06.
- ▶ If aids are not available and work cannot be carried out from the ground, then assembly personnel must secure themselves with the specified fall arrest system to prevent falling, see the Crane operating instructions, chapter 2.04.
- ▶ The fall arrest system must be fastened on the fastening and hook points as well as on the safety ropes. For the safety points, see the Crane operating instructions, chapter 2.06.
- ▶ Only step on the aids, ladders and catwalks with clean shoes.
- ▶ Keep aids, ladders and catwalks free of heavy dirt, snow and ice.
- ▶ Remaining on as well as under a suspended load is prohibited.
- ▶ Remaining on or within crane components (for example: At assembly of boom sections, lattice sections) which are moved during lifting, lowering, turning or closing procedures is strictly prohibited.
- ▶ During all assembly and disassembly work, maintenance work and inspections, travel or crane operation is prohibited.
- ▶ It is prohibited to step on the boom system or an auxiliary boom without suitable protective devices.
- ▶ Stepping and walking on crane components and lattice sections, which have an incline of more than 20° is prohibited.

WARNING

The lattice sections can fall down!

If the lattice sections are not pinned and secured correctly, then they can fall down and fatally injure personnel.

- ▶ Pin or unpin both pins at the same horizontal level, i.e. **left and right**.
- ▶ Do not stand under the lattice sections or within the entire danger zone during the pinning and unpinning procedure of the boom.
- ▶ Safely secure the pins in the storage locations as well as in the receptacles.
- ▶ It is prohibited to lean the ladder against the component being disassembled.

WARNING

Danger of crushing!

When disassembling crane components, limbs can be crushed or even severed due to oscillation of components.

- ▶ Make sure that the components do not swing back and forth during disassembly.

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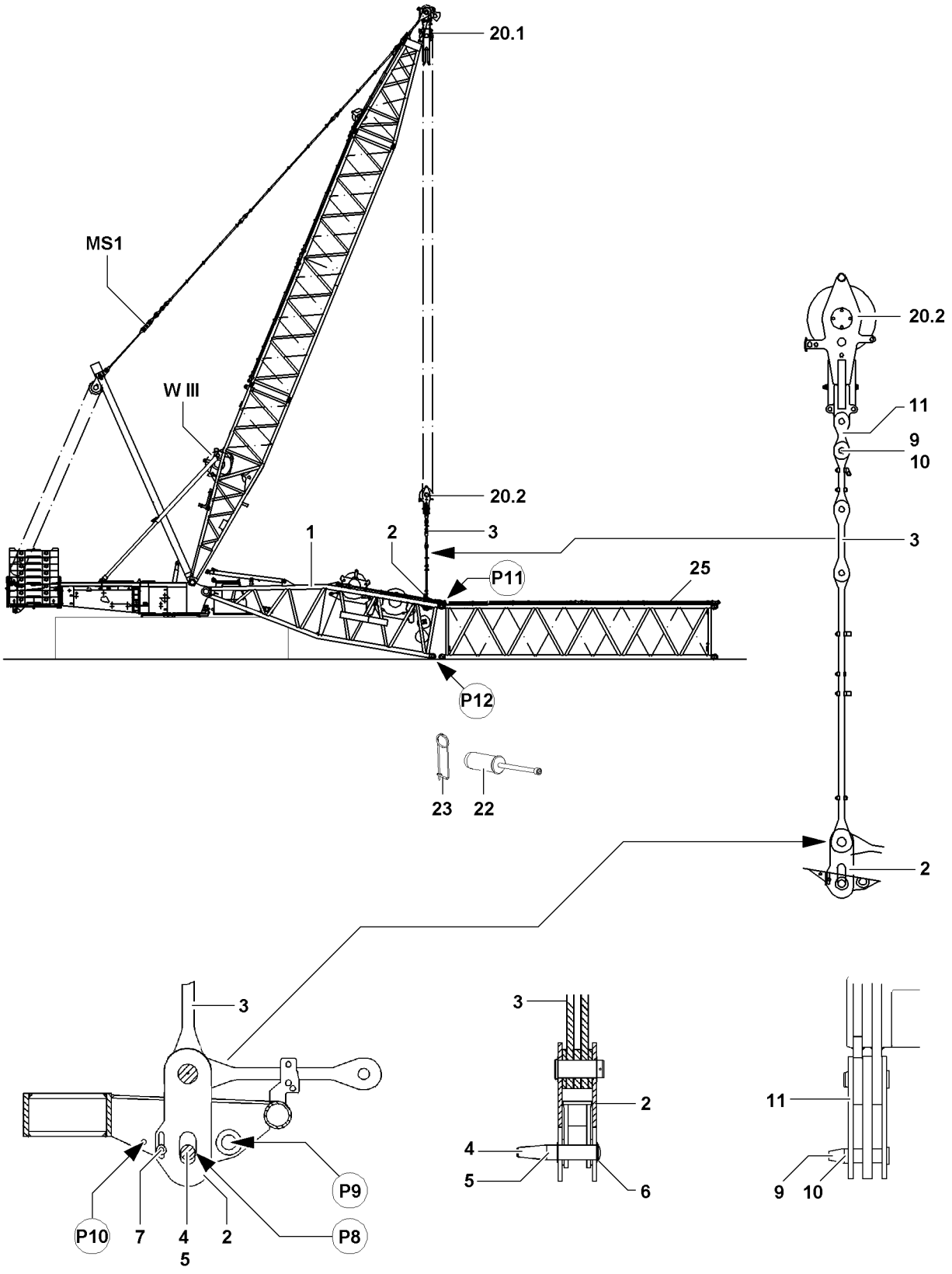

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Fig.120032

6.1 Taking the S-boom down

WARNING
The crane can topple over!
If the following conditions are not met before taking down the S-boom, the crane can topple over.
Personnel can be severely injured or killed.
- ▶ Observe the technical safety instructions, see the Crane operating instructions, chapter 5.01.
- ▶ Observe the specifications in the erection and take-down charts.

NOTICE
Damage of boom components!
Taking down the boom system can lead to a collision between the hook block and the pulley head.
Boom components can be severely damaged.
- ▶ Luff the boom system down at the same time and spool the hoist winch out.
- ▶ When luffing the boom system down, the D-boom must remain in the operating position until the S-end section is laying on the ground or on a substructure or it is safely held by an auxiliary crane.

Note
- ▶ The luff down movement is turned off as soon as the lowest operating position of the S-boom is reached.
- ▶ When the lowest operating position of the S-boom is reached, the load display in the maximum load icon turns off and instead of the load display appears the display „???“.
- ▶ Alarm functions appear on the crane operation screen.

▶ Luff the boom down to the **lowest** operating position.

Result:

– The luff down movement is turned off.
– The „STOP“ icon appears on the LICCON monitor.
– The horn icon appears on the LICCON monitor.

WARNING
Danger of accident due to the „Exceedance of shut-off limits of the LICCON overload protection“ function!
If the shut off limits of the LICCON overload protection are exceeded, there is no additional protection against crane overload.
Due to erroneous operation or deliberate misuse, the crane could collapse, the boom can break off or the crane can topple over.
Personnel can be severely injured or killed.
- ▶ The function „Exceedance of shut off limits of the LICCON overload protection“ is only permissible in emergencies and for assembly purposes.
- ▶ The function „Exceeding the shut off limits of the LICCON overload protection“ may only be actuated by persons who know the effects of their actions regarding the function „Exceeding the shut off limits of the LICCON overload protection“.
- ▶ The „Exceedance of shut off limits of the LICCON overload protection“ function requires the presence of an authorized person and must be performed with utmost caution.
- ▶ Crane operation with activated function „Exceedance of shut off limits of the LICCON overload protection“ is prohibited.

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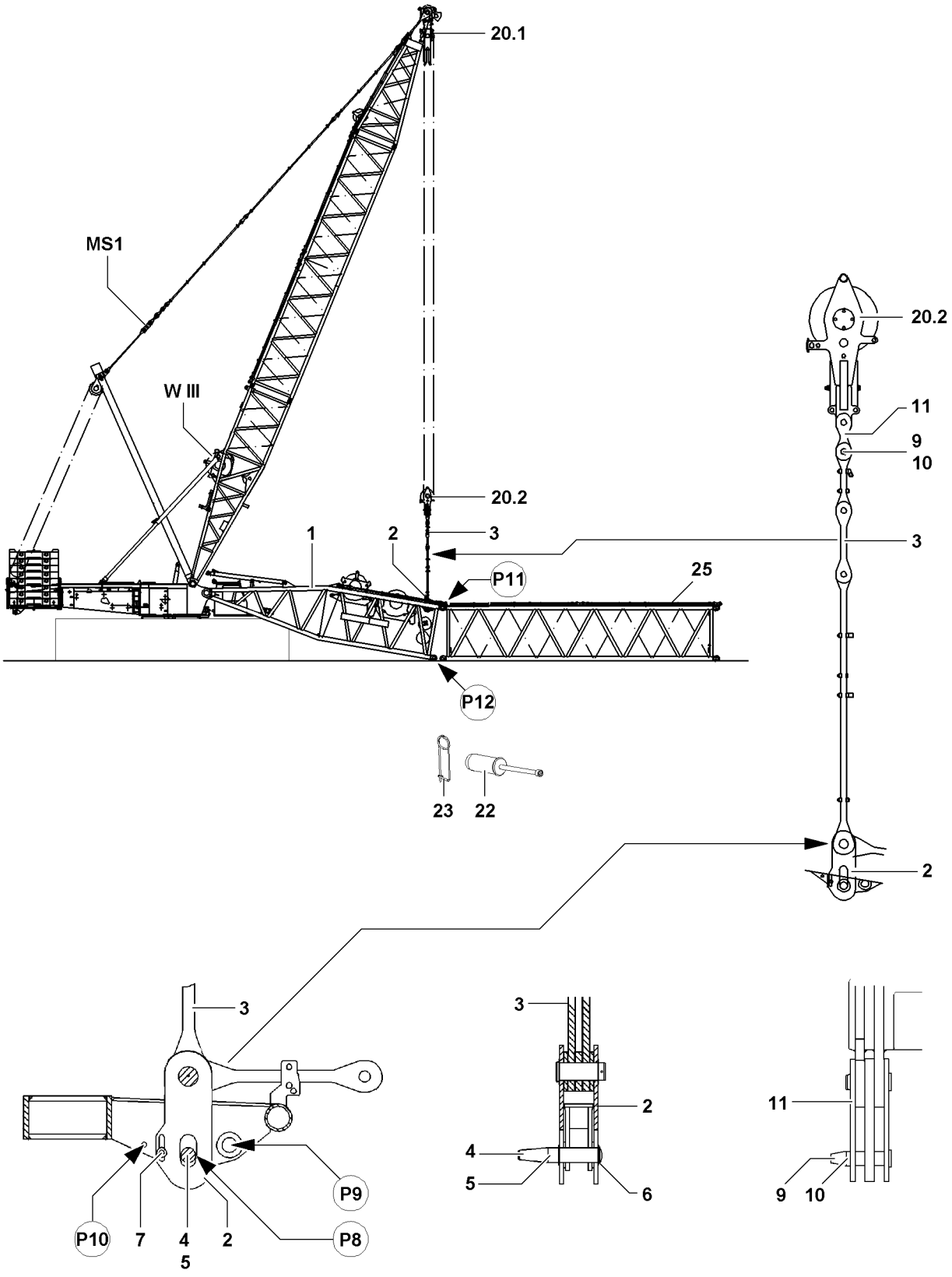

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Fig.120032

▶ Exceeding the shut off limits of the LICCON overload protection: Engage assembly operation.

Result:

– The shut off limits of the LICCON overload protection are exceeded.
– The assembly icon appears on the LICCON monitor.

▶ At the same time, spool the hoist winch out and luff the S-boom down until the hook block touches the ground.
▶ Remove the hoist limit switch weight and reeve the hook block out.

Note
▶ See the Crane operating instructions, chapter 4.02.

WARNING
Overload of boom!
If the boom is not supported in the area of the auxiliary guying according to specification when taking it down, then the crane can be overloaded, the boom can break off and fall down.
Personnel can be severely injured or killed.
▶ Make sure that the boom system is supported according to specification, observe dimension U_{min} for the respective boom system.
▶ The derrick boom must remain in the operating position when taking down the S / SL-boom until the S / SL-boom is taken down on the substructure.

▶ Luff the S / SL-boom down until the boom or the boom head is laying on the substructure.

WARNING
Spooling up of hoist rope!
By spooling the hoist rope up, personnel can be severely injured or killed.
▶ All rope retaining pins / pipes on the S-boom are removed.
▶ Slowly spool up the hoist rope over the rope pulleys back to the winch.
▶ No one may be present in the danger zone.

NOTICE
Overspooled winch!
If the hoist rope is pulled under the winch when spooling up, then the adjustment of the cam limit switch can change.
A new adjustment by **Liebherr Service** is required.
▶ Stop the winch in time, with sufficient rope reserve.
▶ Do not overspool the winch.

▶ Spool the hoist rope up.

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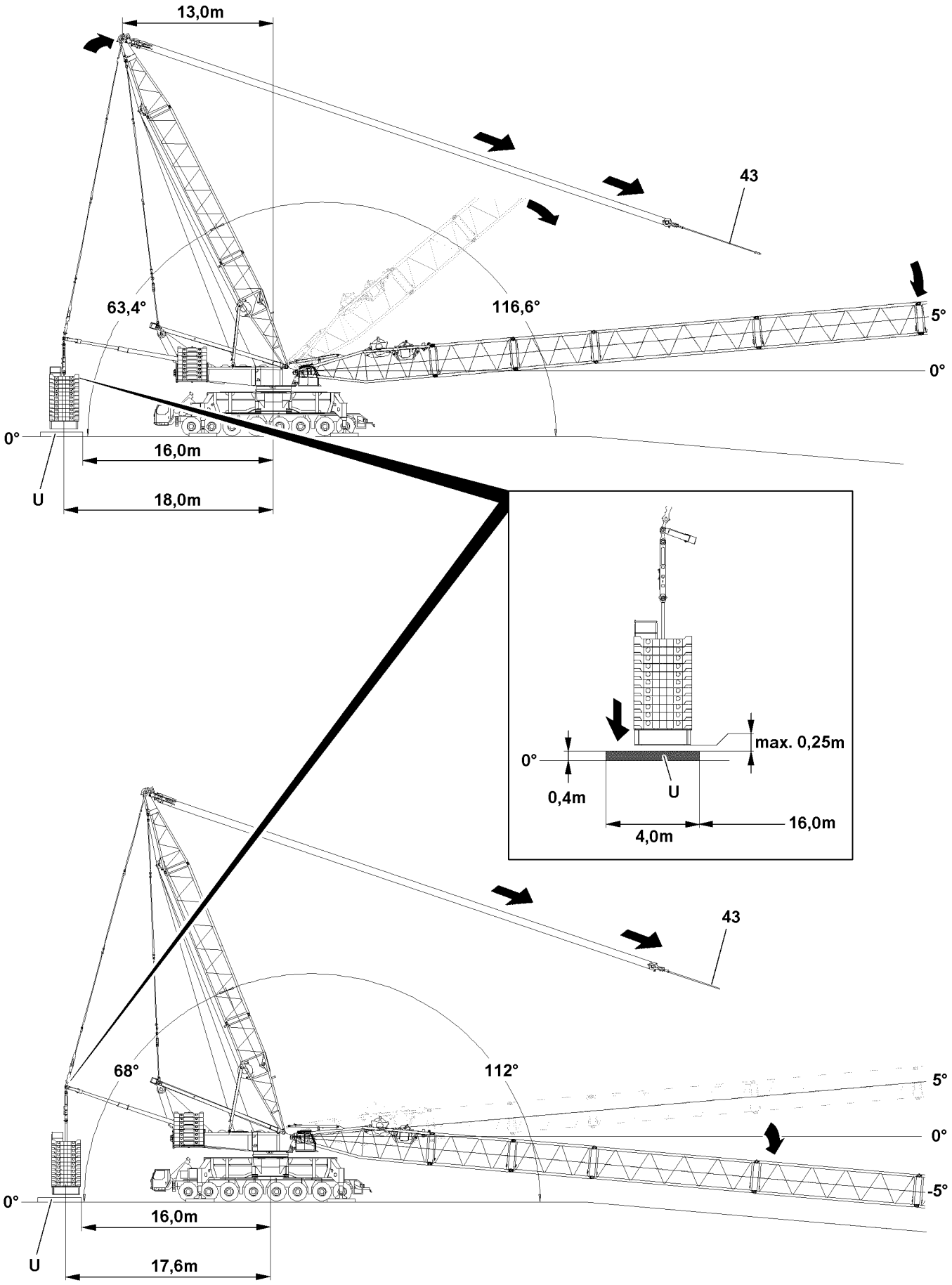

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Fig.120893

6.2 Taking the SL7DHS-boom system down in an incline

WARNING
The crane can topple over!
If the crane is not horizontal, then it can be overloaded when erecting / taking down the boom system and topple over.
Personnel can be severely injured or killed.
- ▶ Make sure that the placement level of the crane is level and horizontal.
- ▶ Make sure that the crane is completely supported and horizontally aligned.
- ▶ Make sure that the suspended ballast pallet is supported with stable and load bearing materials to 0.4 m above the placement level of the crane, substructure **U**.
- ▶ Make sure that the substructure **U** of the suspended ballast pallet has a minimum width of 4.0 m.
- ▶ Make sure that the distance of 16.0 m is retained between the suspended ballast substructure **U** to the center of rotation of the crane.
- ▶ Make sure that the maximum permissible incline of the main boom angle of -5° is not exceeded at boom assembly / disassembly.
- ▶ Make sure that the maximum permissible deflection of the respective boom system of 1.0 m is not being exceeded, see the following chart and detail **X**.
- ▶ Make sure that all movements of the crane are actuated slowly and anticipatorily.
- ▶ Support the boom systems with suitable material of sufficient load bearing capacity.

Maximum permissible deflection of boom system		
Boom system	**Length**	**Maximum permissible deflection at X**
SL7DHS	126.0 m to 147.0 m	1.0 m

NOTICE
Damage to the crane!
If the substructure of the boom system at **X** is not carried out properly and in the required height, then the boom system can be damaged due to excessive deflection.
- ▶ Make sure that the substructure at **X** is carried out in such a way that the deflection does **not** exceed the maximum permissible value.

Note
- ▶ Disassemble the SL7DHS-boom according to the Crane operating instructions, chapter 5.39.

WARNING
The crane can topple over!
If the suspended ballast is lifted by the more than the maximum permissible 0.25 m off the substructure **U**, then the crane can be topple to the rear if the load rips off.
- ▶ Do not lift the suspended ballast by more than 0.25 m off the substructure **U**.

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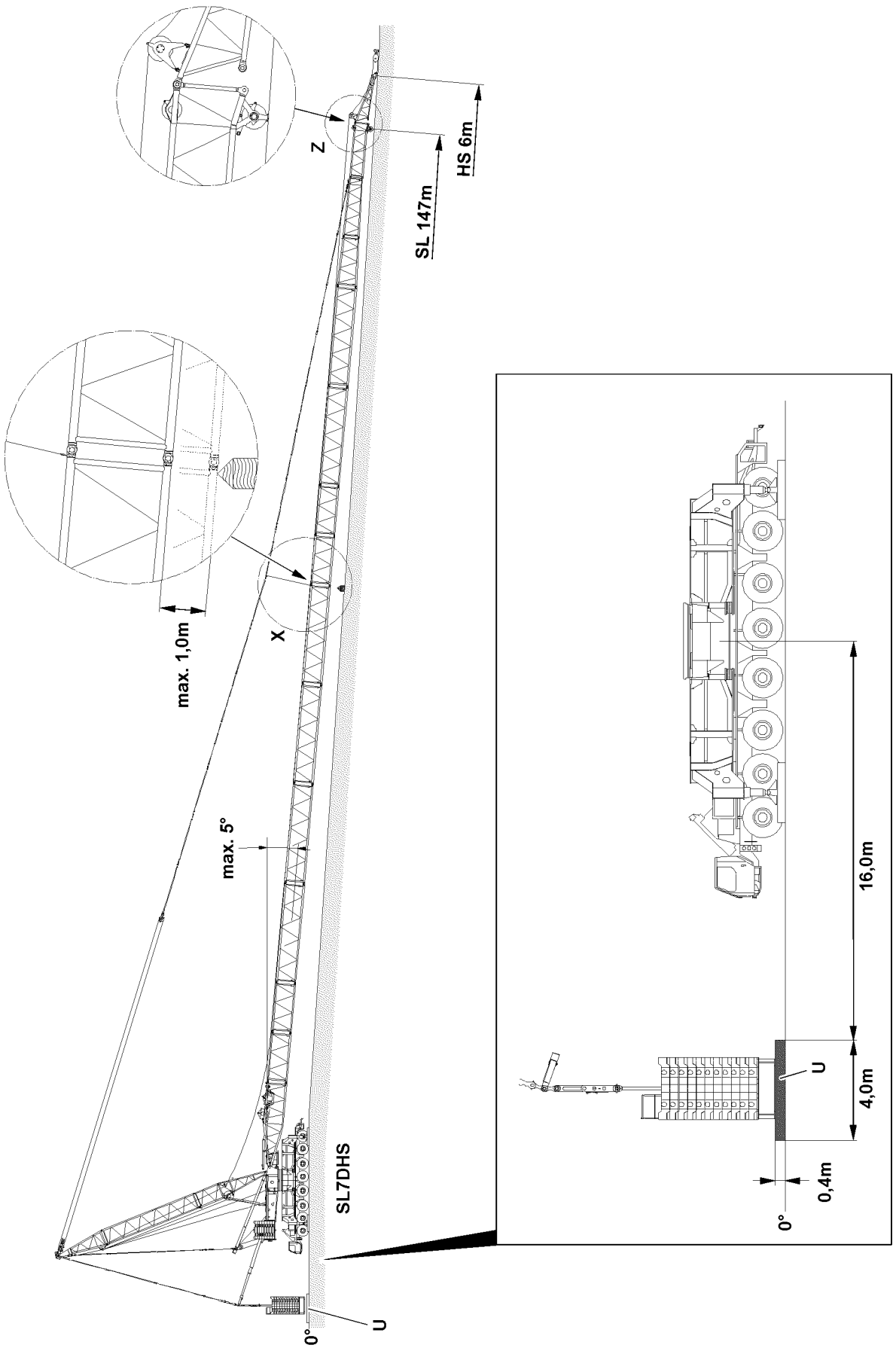

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Fig.120891

Make sure that the following prerequisites are met:
- The suspended ballast is lifted off from the substructure **U**.
- The derrick boom is on 63.4° (derrick radius of 13.0 m).
- The substructure on the main boom is properly set up, pay attention to the maximum permissible deflection.

DANGER
The crane can topple over!
In crane operation with exceeded LICCON overload protection, the crane can topple over.
Personnel can be severely injured or killed.
▶ The radii listed in the load chart may not be exceeded or fallen below, even if there is no load on the hook.

WARNING
The crane can topple over!
If the specifications in the erection and take down charts are disregarded, the crane can topple over.
Personnel can be severely injured or killed.
▶ Observe the Erection and take down charts.

▶ Luff the main boom down to the „lowest operating position“.

Result:

- The luff down movement is turned off.
- The „STOP“ icon appears on the LICCON monitor.
- The „horn“ icon appears on the LICCON monitor.

WARNING
Overload of crane!
If the main boom is luffed down too far at a derrick boom angle of 63.4°, then the crane can be overloaded.
Personnel can be severely injured or killed.
▶ Luff the main boom down to maximum 5°.

▶ Luff the main boom down to 5°.

WARNING
Danger of accident due to the boom!
During the derrick boom adjustment, if the main boom is luffed down at the same time, then dangerous situations can arise.
Personnel can be severely injured or killed.
▶ Make sure during the adjustment of the derrick boom to 68°, that the main boom is held at 5°.
▶ Make sure that the substructures of the main boom are properly made, pay attention to the chart with the maximum permissible deflection of the boom system.

When the main boom is at 5°.
▶ Set the derrick boom to 68°.

When the derrick boom is at 68°:
▶ Take the main boom down to maximum -5° to the horizontal.

When the main boom is properly taken down:
▶ Set the suspended ballast pallet down on the ground.
▶ Disassemble the boom system, see section „Disassembling the SLD / SD-boom“.
▶ Disassemble the suspended ballast, see the Crane operating instructions, chapter 5.36.

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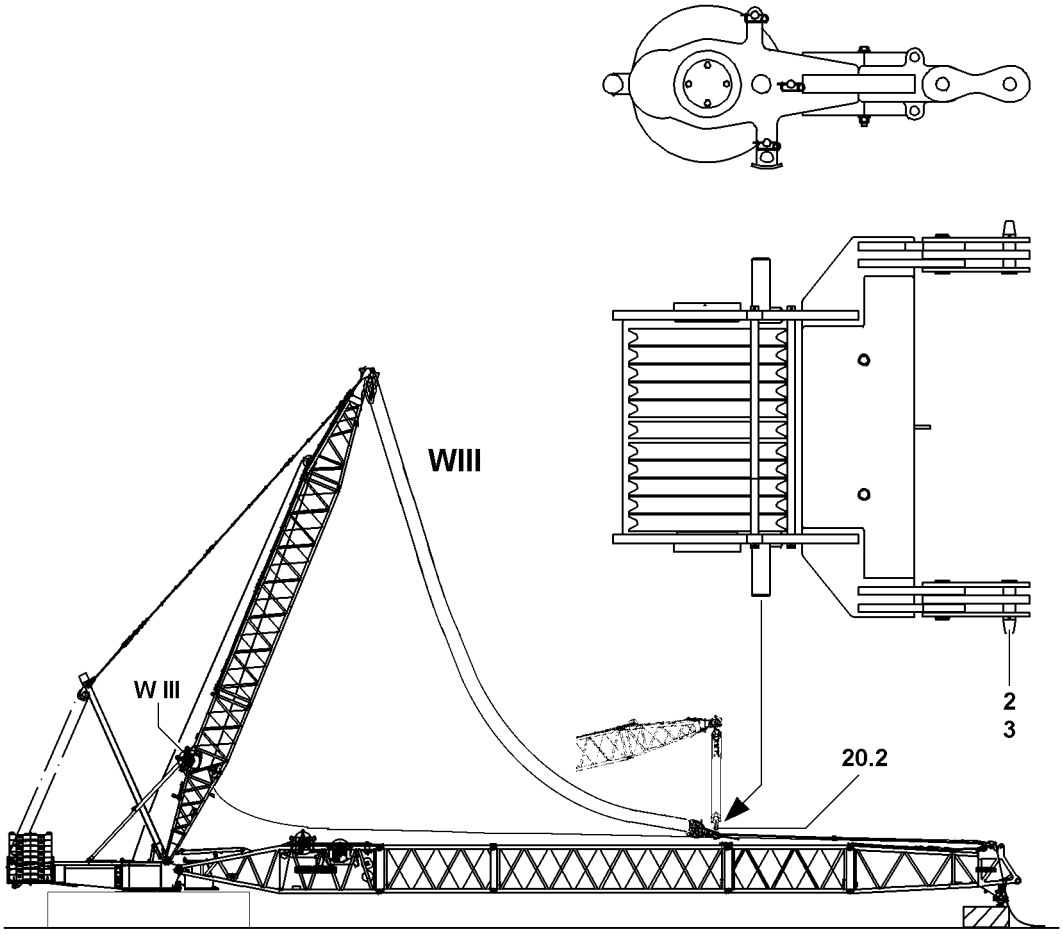

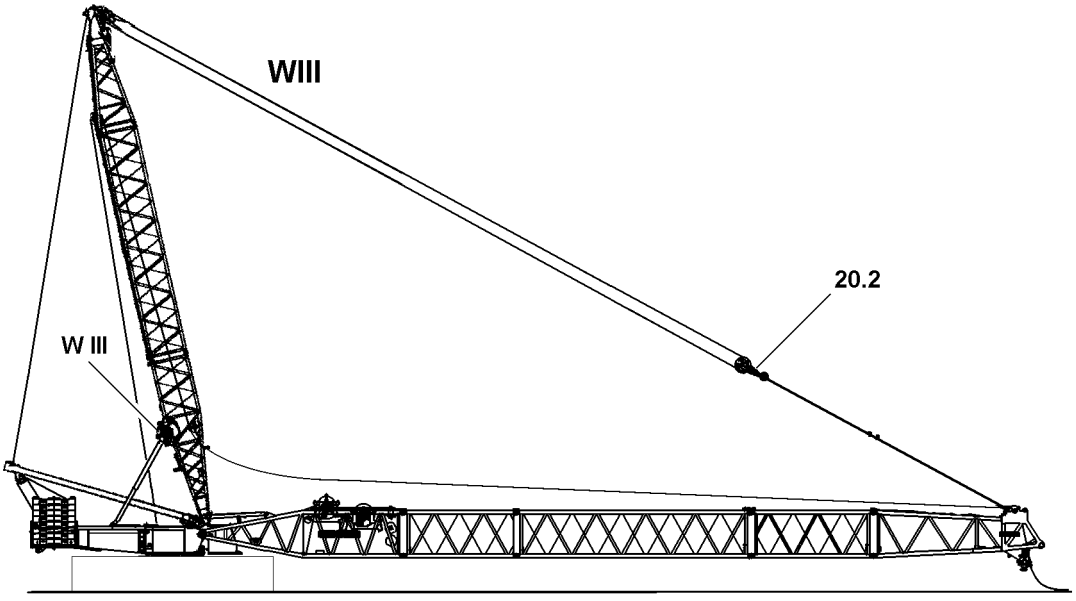

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Fig.112062

6.3 Disconnecting the electrical connections

Make sure that the following prerequisite is met:
– The S-boom is taken down on the substructure / substructures.

NOTICE
Damage to the cable drum or cable!
If the cable of the cable drum is not properly spooled up on the cable drum after unplugging the S-end section, then the cable drum or the cable can be significantly damaged.
▶ Spool the cable drum up after unplugging.

▶ Spool the cable drum up and secure it to prevent inadvertent spooling out.
▶ Disconnect the electrical connections and store the plugs and cables properly.

6.4 Disassembling the guy rods

6.4.1 Disassembling the auxiliary guying frame

Depending on the boom system, an additional auxiliary guying frame and an additional auxiliary guying is required for crane guying. Refer to rod plan for the respectively necessary auxiliary guying frame or the auxiliary guying.

Note
▶ Auxiliary guying disassembly, see chapter 5.03.
▶ Observe and adhere to the Rod plan.

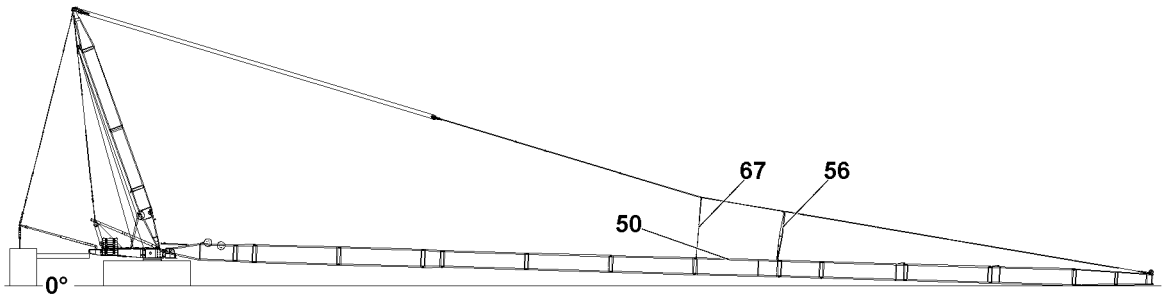

Fig.145252: The boom system with the auxiliary guying frame and auxiliary guying

50 S-intermediate section 3326.40 RO
56 Auxiliary guying frame
67 Auxiliary guying

Make sure that the following prerequisite is met:
– The boom is taken down on the substructure or on the ground.

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Unpinning the auxiliary guying frame on the S-intermediate section 3326.40 RO

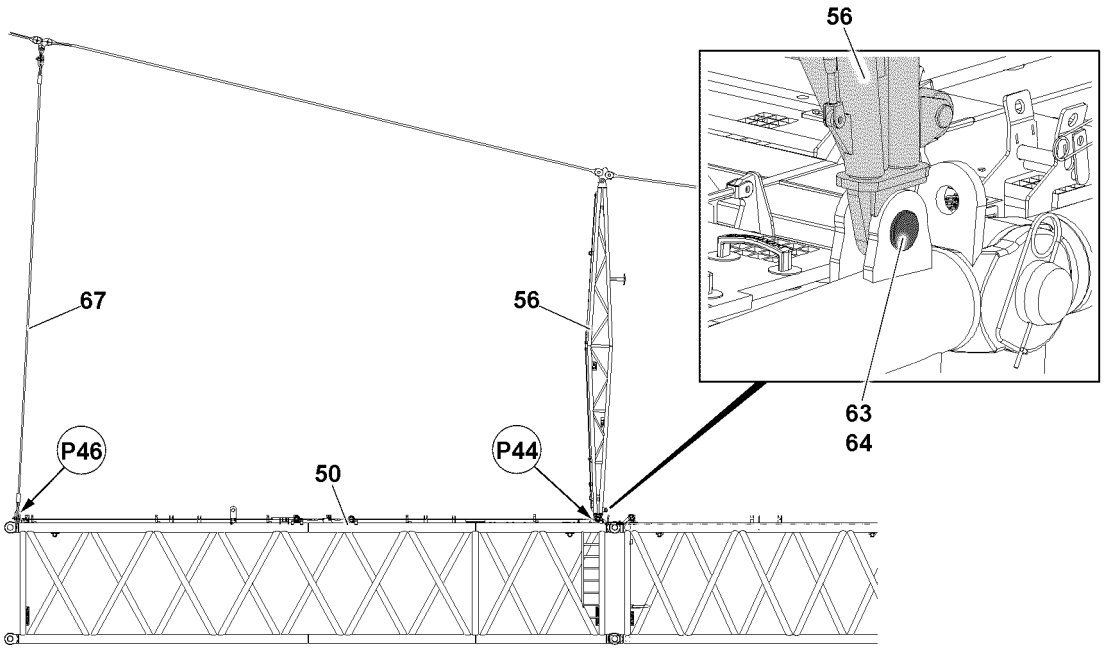

Fig.145251: Unpinning the auxiliary guying frame

▶ Remove the retaining element **64** at points **P44** and unpin the pins **63**.

Result:

– The auxiliary guying frame **56** is unpinned on the S-intermediate section 3326.40 RO **50**.

Note

▶ Not every boom system requires auxiliary guying. Refer to the rod plan if auxiliary guying is required.
▶ Auxiliary guying disassembly, see chapter 5.03.
▶ Observe and adhere to the Rod plan.

If necessary:

▶ Unpin the auxiliary guying **67** at the points **P46**.

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Unpinning the auxiliary guying frame on the auxiliary lugs of the rod strand

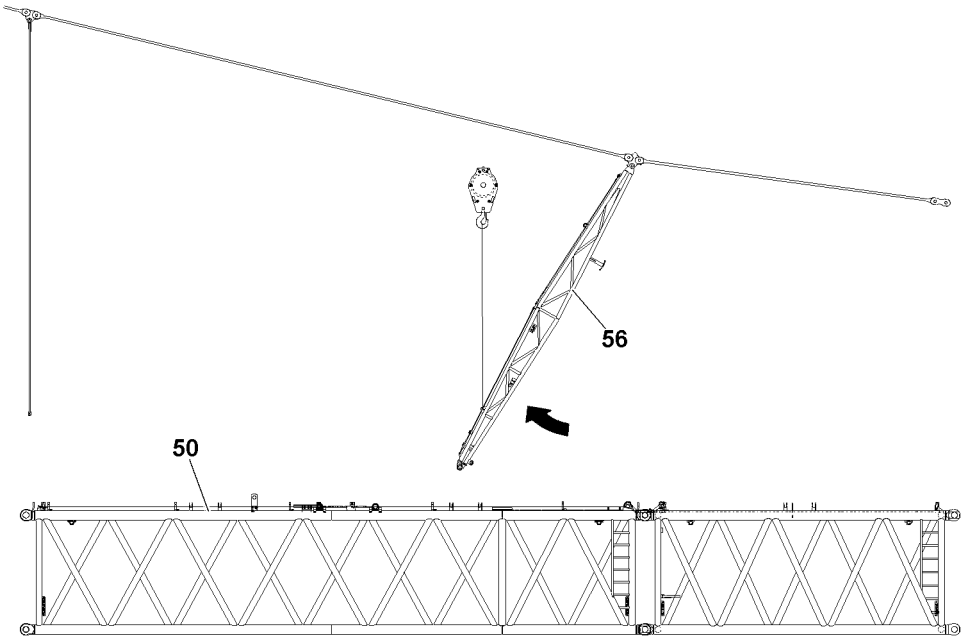

Fig.145256: Swinging the auxiliary guying frame

- ▶ Fasten the auxiliary guying frame **56** to the auxiliary crane.
- ▶ Relieve the crane guying.
- ▶ Swing the auxiliary guying frame **56** with the auxiliary crane.

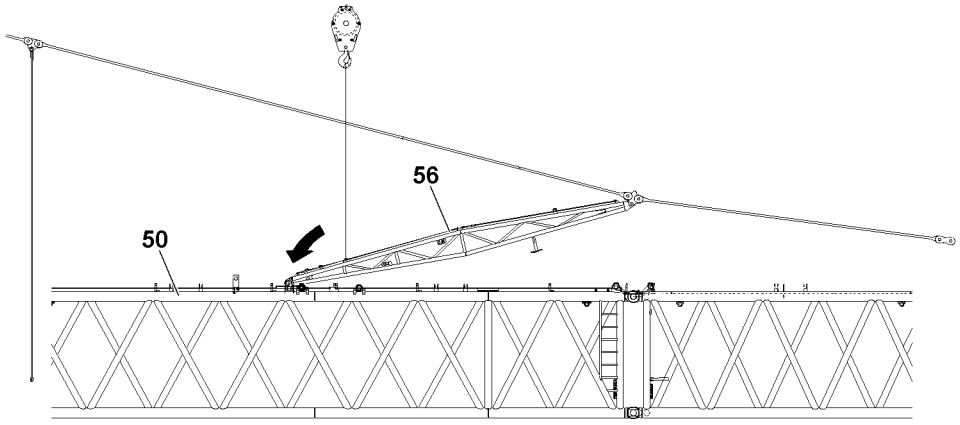

Fig.145257: Setting down the auxiliary guying frame

- ▶ Set the auxiliary guying frame **56** down with the auxiliary crane.

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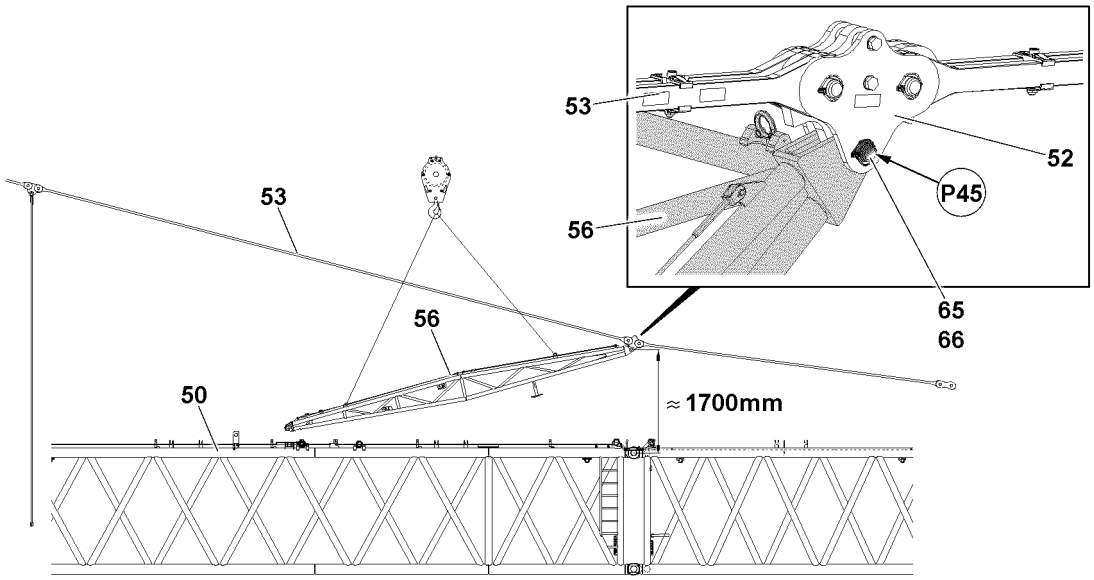

Fig.145248: Pinning the auxiliary guying frame

- ▶ Rehang auxiliary crane.
- ▶ Lift the auxiliary guying frame **56** with the auxiliary crane.

WARNING
Swinging auxiliary guying frame!
The auxiliary guying frame **56** can swing to the rear uncontrolled due to its own weight when it is unpinned.
Death, severe bodily injuries.

- ▶ Make sure that there are no persons within the danger zone during the entire unpinning procedure.

- ▶ Unpin the auxiliary guying frame **56** from with the tension straps **52**: Remove the retaining element **66** at points **P45** and unpin the pins **65**.

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Pinning the auxiliary guying frame on the lugs of the S-intermediate section 3326.40 RO

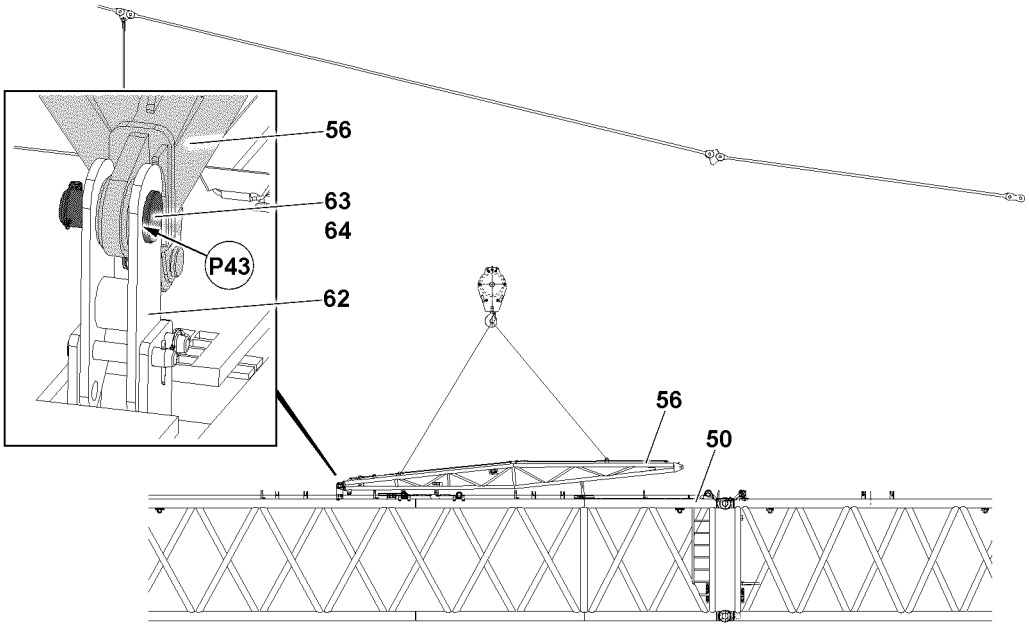

Fig.145247: Pinning the auxiliary guying frame

- ▶ Swing the auxiliary guying frame **56** with the auxiliary crane to the pin location in the points **P43**.
- ▶ Insert the pin **63** on the lugs **62** at points **P43** and secure with the retaining element **64**.
- ▶ Take the auxiliary guying frame **56** down with the auxiliary crane.

Unpinning the auxiliary guying frame on the lugs of the S-intermediate section 3326.40 RO

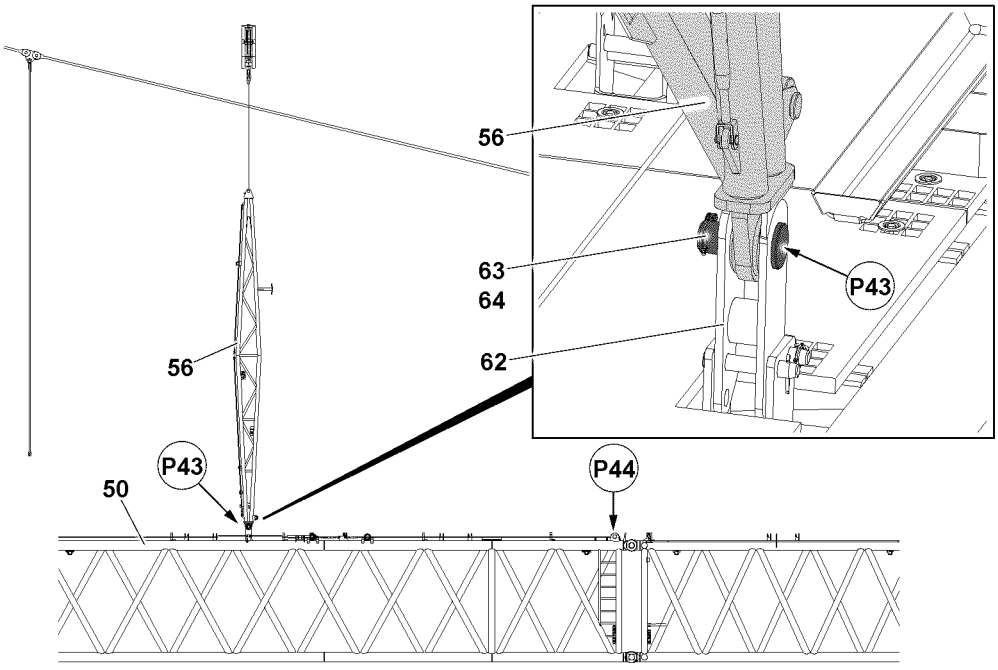

Fig.145246: Unpinning the auxiliary guying frame

- ▶ Rehang auxiliary crane.
- ▶ Raise the auxiliary guying frame **56** with the auxiliary crane.
- ▶ Remove the retaining element **64** on the lugs **62** at points **P43** and unpin the pin **63**.

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▶ Insert the pin **63** in the transport position at points **P44** and secure with the retaining element **64**.

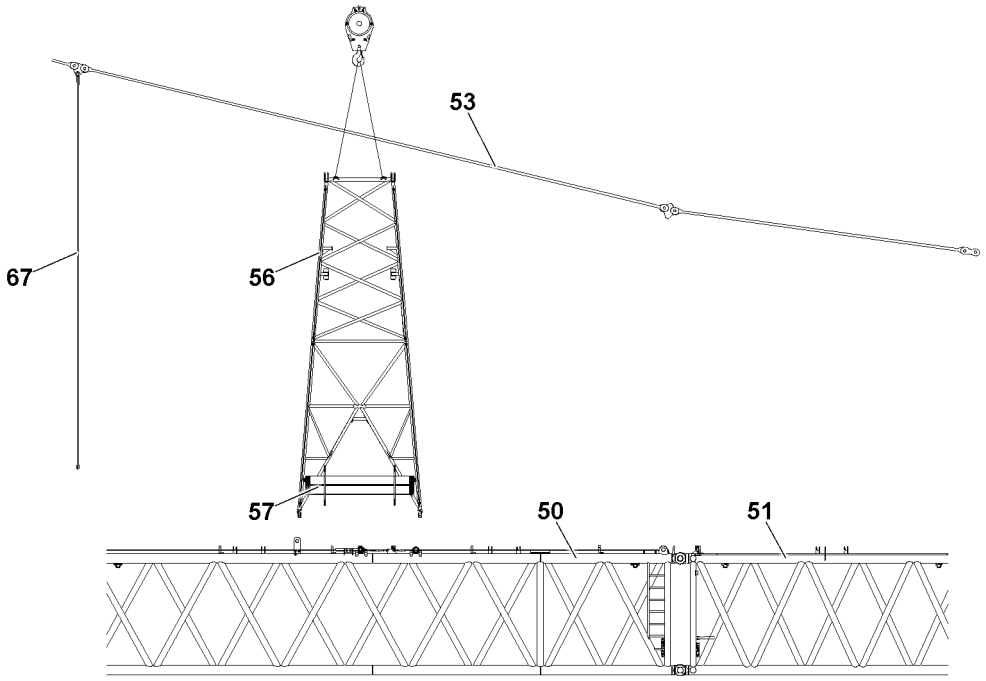

Fig.145258: Auxiliary guying frame

▶ Turn the auxiliary guying frame **56** with the auxiliary crane.

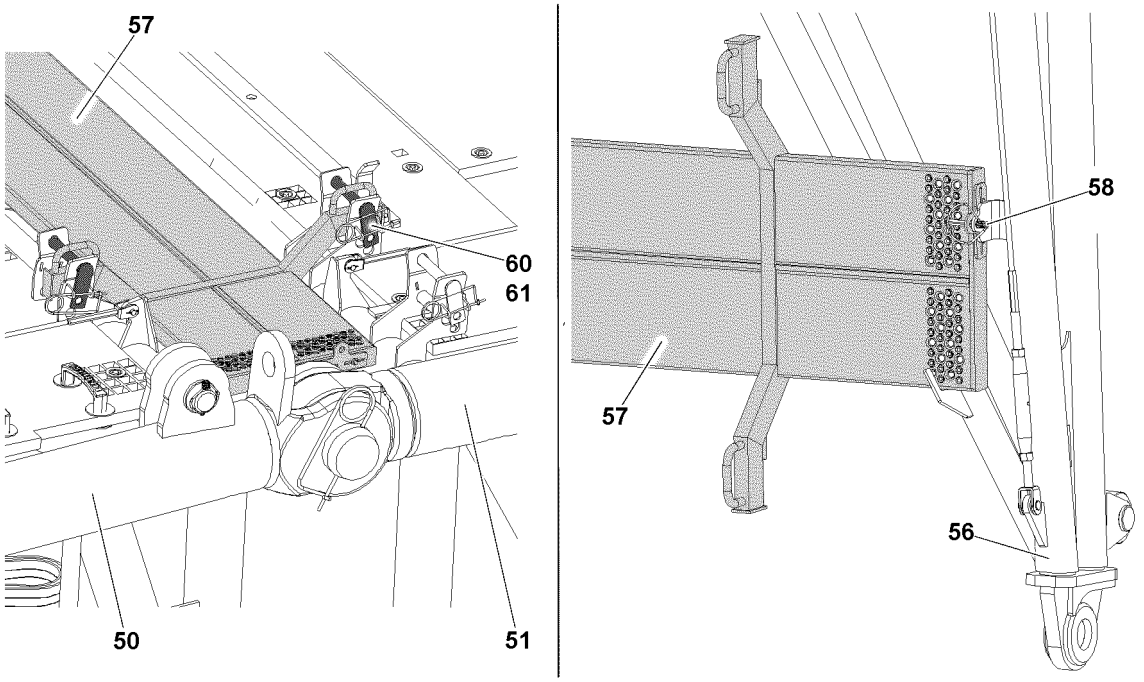

Fig.145259: Catwalk

Note

▶ The weight of the catwalk **57** is 22 kg.

▶ Unpin the catwalk **57** between the S-intermediate section 3326.40 RO **50** and the S-intermediate section **51**: Remove the retaining elements **61** and unpin the pins **60**.

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WARNING
Falling catwalk!
The catwalk **57** can fall down by itself due to its own weight when pinning.
Death, severe bodily injuries.
Fingers and hands can be crushed!
- ▶ For safety reasons, assemble the catwalk **57** always with **two** persons!
- ▶ Hold the catwalk **57** during the pinning procedure!
- ▶ Do not reach with your hands into the danger zone!
- ▶ Use personal protective equipment!

- ▶ Insert the catwalk **57** in the transport position.
- ▶ Secure the catwalk **57** with the retaining elements **58**.

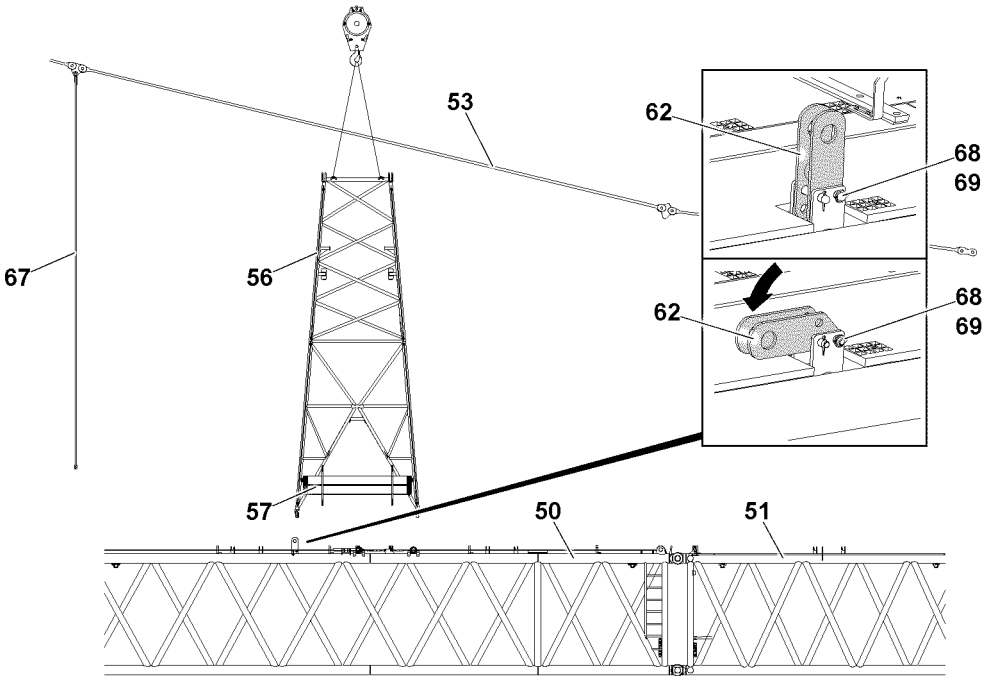

Fig.145260: Swinging the lugs

- ▶ Release the lugs **62** out of the operating position, remove the retaining element **69** and unpin the pin **68**.
- ▶ Swing the lugs **62** into the transport position.
- ▶ Secure the lugs **62** in the transport position: Insert the pin **68** and secure it with the retaining element **69**.
- ▶ Remove the auxiliary guying frame **56** with the auxiliary crane.
- ▶ Relieve the crane guying.

Note
- ▶ Not every boom system requires auxiliary guying. Refer to the rod plan if auxiliary guying is required.
- ▶ Auxiliary guying disassembly, see chapter 5.03.
- ▶ Observe and adhere to the Rod plan.

If necessary:
- ▶ Unpin the auxiliary guying **67**.

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Disassembling the tension straps

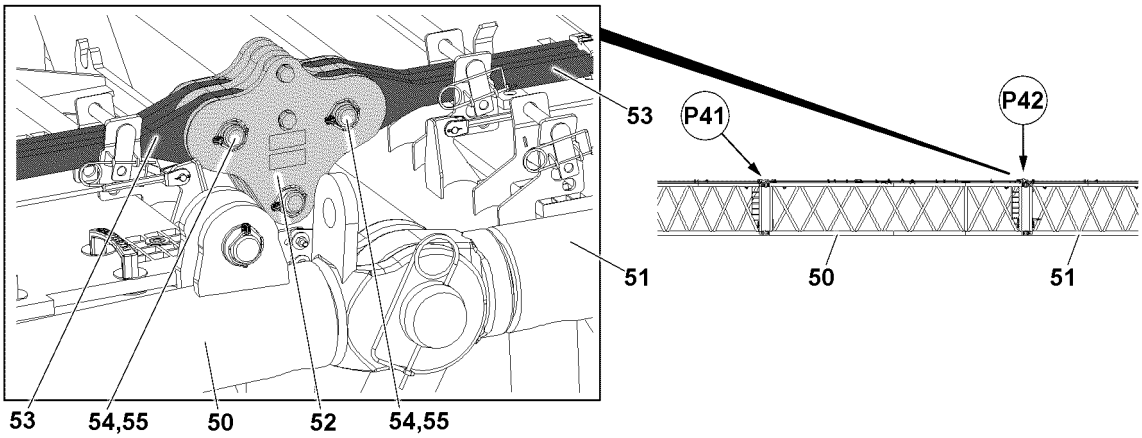

Fig.145244: Tension strap

▶ Take down the crane guying.

Remove the tension straps **52** of the auxiliary guying frame out of the rod strand at points **P42**.

Note
▶ The weight of the tension strap **52** is 60 kg.

▶ Fasten the tension straps **52** to the auxiliary crane.
▶ Unpin the tension straps **52**: Remove the retaining elements **55** and unpin the pins **54**.
▶ Remove the tension straps **52** with the auxiliary crane and pin on the auxiliary guying frame.

Note
▶ Not every boom system requires auxiliary guying. Refer to the rod plan if auxiliary guying is required.
▶ Auxiliary guying disassembly, see chapter 5.03.
▶ Observe and adhere to the Rod plan.

If necessary:
▶ Unpin the tension straps for the auxiliary guying at points **P41**.

6.4.2 Unpinning the guy rods

▶ Relieve the guying: Luff the D-boom down to the front and at the same time spool out winch 3.

When the guying is relieved:
▶ Disassemble the auxiliary guying (if present on the boom).
▶ Unpin the upper pulley block **20.2** on the guy rods.
▶ Take the guy rods down on the intermediate sections and secure with transport retainers.
▶ Disconnect the guy rods according to their association to the intermediate sections.

NOTICE
Damage to the intermediate sections!
▶ Do not pull the upper pulley block **20.2** over the intermediate sections, rather carry them along with the auxiliary crane.

When the guy rods are taken down in the transport retainers and secured:
▶ Erect the D-boom and spool the hoist rope up at the same time.

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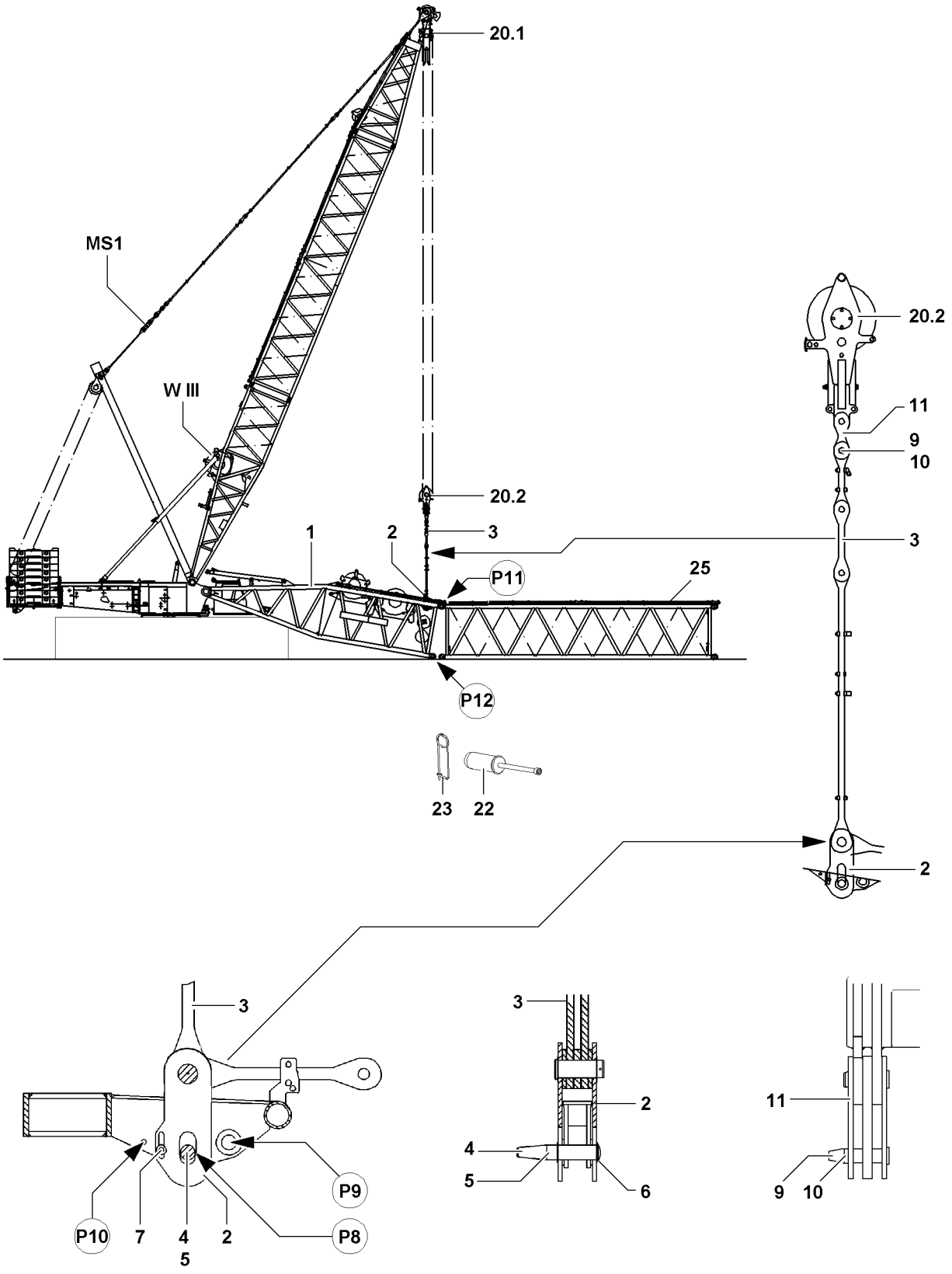

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Fig.120032

6.5 Disassembling the S-boom

WARNING
The boom can suddenly fold down!
If the following conditions are not met before disassembling the boom, the boom can fold down.
Personnel can be severely injured or killed.
- ▶ Support the S-boom during disassembly with suitable materials.
- ▶ During pinning and unpinning of the lattice sections, it is prohibited for anyone to remain **under** or **on** the components as well as within the entire danger zone.

Make sure that the following prerequisites are met:
- – All electrical and hydraulic connections have been disconnected.
- – The auxiliary guying is disassembled.
- – The guy rods have been disassembled and taken down in the transport retainers.

- ▶ Lower the upper pulley block **20.2** until it is located over the assembly brackets **2** on the S-pivot section **1**.
- ▶ Pin and secure the upper pulley block **20.2** with the guy rods **3**: Pin and secure the assembly bracket **2**. Use the pin **4**, washer **6** and spring retainer **5**.

WARNING
The crane can topple over!
If the following conditions are not met, the crane can topple over or be significantly damaged.
Personnel can be severely injured or killed.
- ▶ The maximum permissible total force on test point **MS1** may **not** be exceeded.
- ▶ Lifting the following boom length is permissible if the maximum permissible total forces on test point 1 (MS1) are observed, observe the following chart.

Note
- ▶ The ACTUAL force on test point **MS1** is shown on LICCON monitor 1.
- ▶ Tension the guying on the SA-frame with the same force as during assembly.
- ▶ For this, refer the ACTUAL force at the test point (MS1) measured and recorded during the assembly.
- ▶ The pins can be pulled easier and the pins and lugs are therefore not damaged.

Note
- ▶ Unpin the intermediate sections with the pin pulling device, see Crane operating instructions, chapter 5.30.

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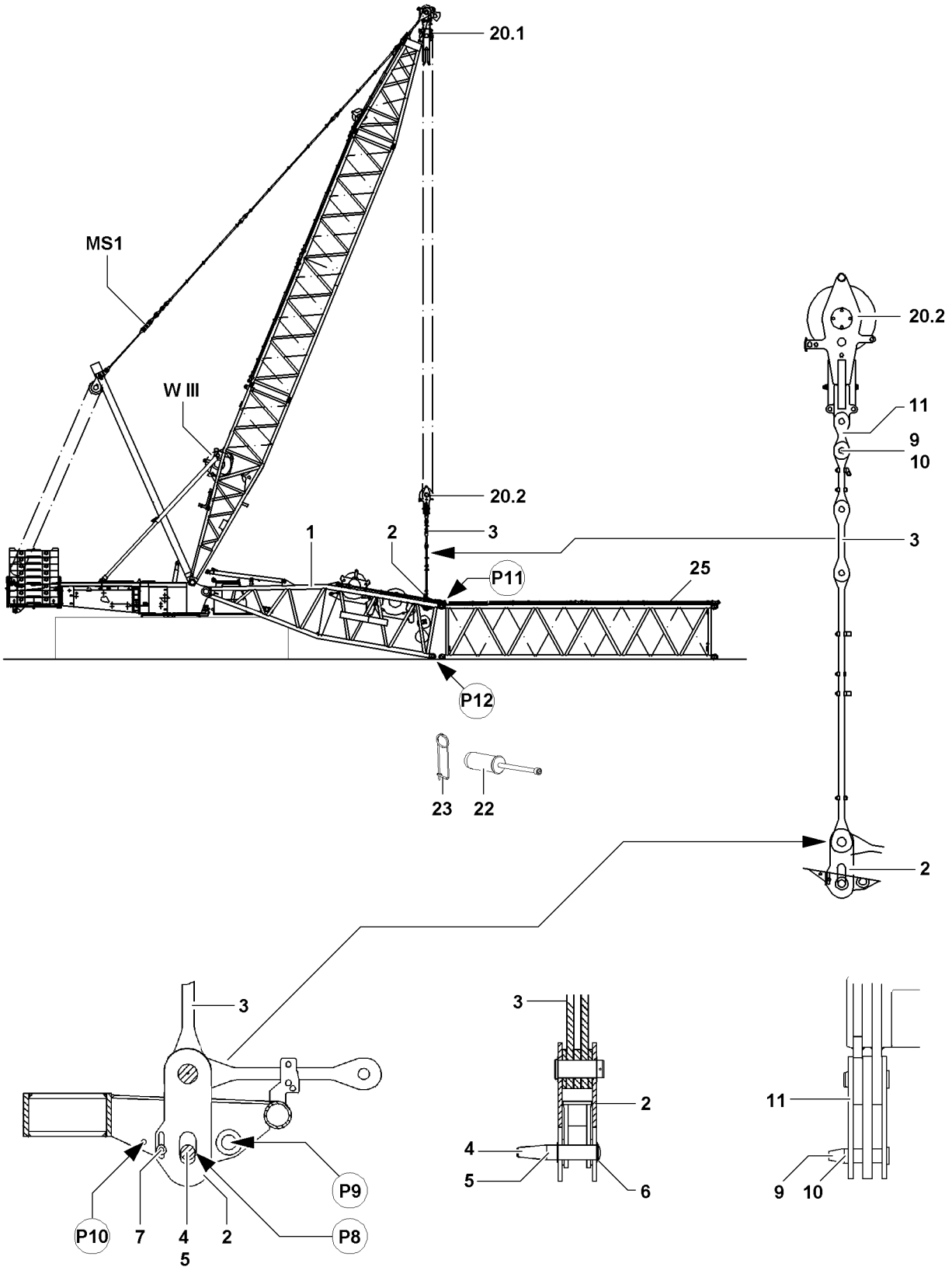

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Fig.120032

NOTICE
Danger of property damage!
If the maximum permissible total forces is not observed when lifting the boom system for disassembly, then crane components can be severely damaged.
- ▶ Reassemble long booms to the required length for flying disassembly on the ground.
- ▶ Do not exceed the maximum permissible total forces.

▶ Lift the S-boom from the substructure or off the ground by spooling up winch 3.

When the S-boom has been lifted off the ground and is safely held by winch 3:
▶ Unpin the S-pivot section **1** and S-intermediate section **25** at point **P12** on both sides: Remove the locking pin **23** and unpin the pin **22**.

When the pins **22** are unpinned at point **P12**:
▶ Carefully take the S-boom down on the ground.

When the S-boom is laying on the ground:
▶ Unpin the S-pivot section **1** and S-intermediate section **25** at point **P11** on both sides: Remove the locking pin **23** and unpin the pin **22**.
▶ Remove the S-intermediate section **25** with the auxiliary crane.
▶ Unpin the upper pulley block **20.2** on the guy rods **3**: Remove the spring retainer **10** and unpin the pin **9**.
▶ Take down and secure the guy rods **3** in the transport receptacles on the S-pivot section.

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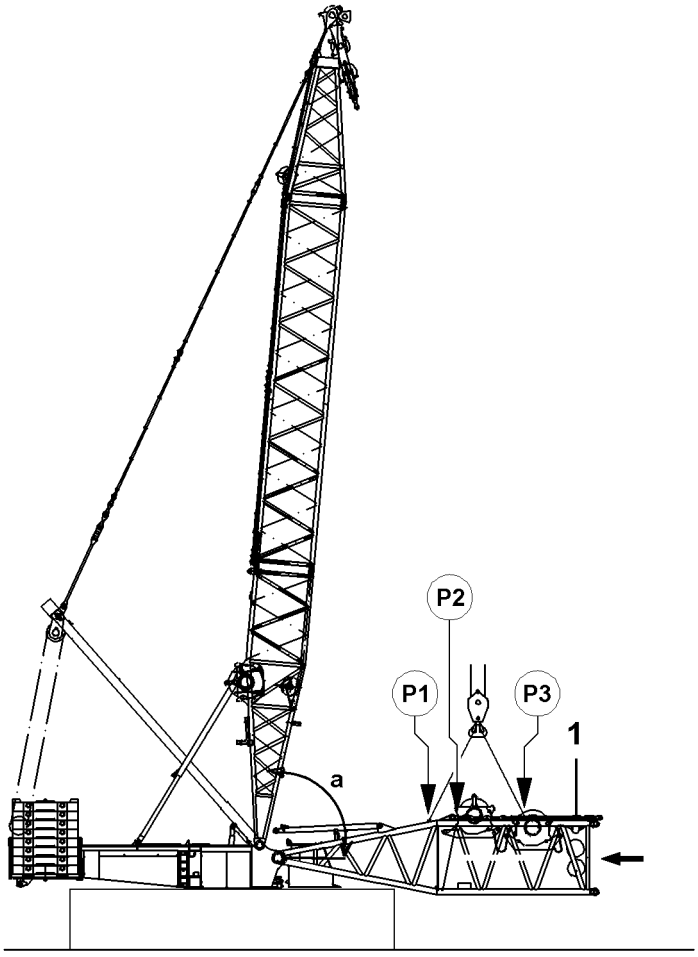

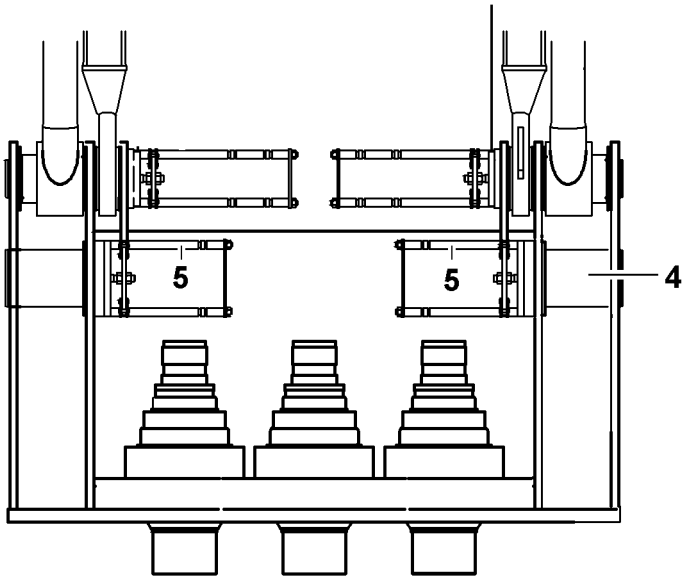

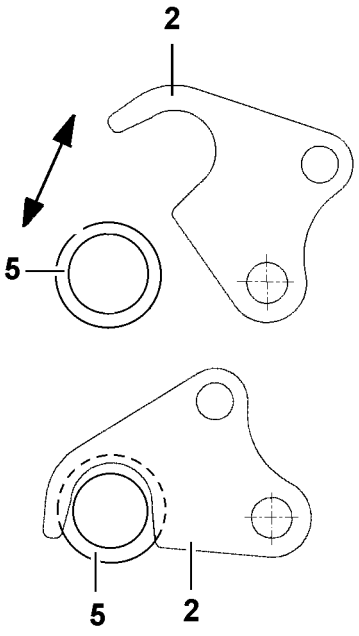

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Fig.120031

6.6 Unpinning the S-pivot section on the turntable

WARNING
General danger notes!
▶ Insert and secure all pins after disassembly in the intended transport receptacles.

Make sure that the following prerequisites are met:
– The D-boom is erected to the point where the S-pivot section can be disassembled without obstructions.
– The guy rods are separated from the S-pivot section to the upper pulley block and taken down in the transport receptacles and secured.

Note
▶ Select the fastening points on the S-pivot section in such a way that the S-pivot section hangs horizontally on the auxiliary crane at assembly. See section „Fastening points“.

▶ Fasten the S-pivot section **1** on the fastening points **P1** and fastening points **P3** to the auxiliary crane.
or
Fasten the S-pivot section **1** on the fastening points **P1** and fastening points **P2** to the auxiliary crane.
▶ Lift the S-pivot section **1** with the auxiliary crane to the horizontal.
▶ Establish the hydraulic connection to the pin pulling device.

WARNING
Falling pivot section!
▶ Make sure that the S-pivot section is safely held by the auxiliary crane before unpinning the pins **4**.

When the S-pivot section is safely held by the auxiliary crane:
▶ Release the pin **4**: Fold the retaining hook **2** out.
▶ Hook the pin pulling cylinder **6** in the receptacles.

Note
▶ The pin pulling cylinders are actuated with the radio remote control.

▶ Unpin the connector pins **4** on both sides with the hydraulic pin pulling cylinder **6**.

When the connector pins **4** are fully unpinned on both sides:
▶ Secure the connector pin **4**: Fold the retaining hook **2** in on the left and right on the guides.
▶ Disconnect the hydraulic connections to the pin pulling device.

NOTICE
Damage to the turntable and the S-pivot section!
▶ Slowly swing the S-pivot section out with the auxiliary crane and at low speed on the turntable.
▶ Before taking it down on the ground, support the S-pivot section.

▶ Take the S-pivot section down with the auxiliary crane on the substructure on the ground.
▶ Remove the auxiliary crane.

Note
▶ Disassemble the D-boom, see Crane operating instructions, chapter 5.05.

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5.39.30 SX2LD4/SX2ZLD4/SX3LD4/SX3ZLD4/SX3D4-boom combination

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Fig.195219

1 Component overview

Note
- ▶ The boom components as well as the dimensions and weights are described in chapter 1.03.
- ▶ For the combination of the various boom systems, refer to the Rod plan and chapter 5.03.

2 Fastening points

WARNING
Falling lattice sections!
Death, severe bodily injuries, property damage.
- ▶ Make sure that the lattice sections are properly fastened on the respective fastening points.
- ▶ Make sure that the fastening equipment has the appropriate length and a sufficient load bearing capacity.
- ▶ Pay attention and adhere to the labels on the fastening points on the lattice sections and crane components.

2.1 Fastening points S-pivot section

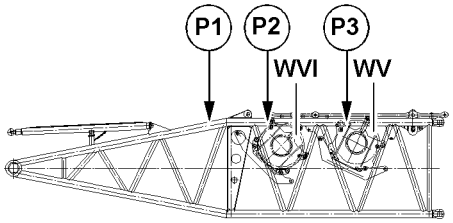

Fig.124846: Fastening points S-pivot section

Fastening points	
P1 + P2	S-pivot section without winch 5, without winch 6
P1 + P3	S-pivot section with winch 5, without winch 6
P1 + P3	S-pivot section with winch 6, without winch 5
P1 + P3	S-pivot section with winch 5, with winch 6

2.2 Fastening points SX-reducer RU, bottom

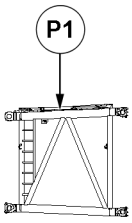

Fig.145064: Fastening points SX-reducer, bottom

Note
- ▶ The lattice section must be fastened on both sides to the fastening points.

Fastening points	
P1	SX-reducer, bottom

2.3 Fastening points SX-intermediate section 14 m in the transport position

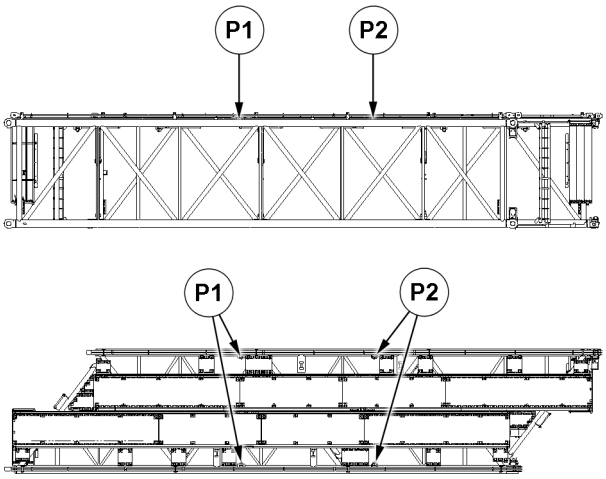

Fig.145066

Note
- ▶ The SX-intermediate sections are available in various system dimensions.
- ▶ The distance between the fastening pints can vary, depending on the respective SX-intermediate section.
- ▶ The lattice section must be fastened on both sides to the fastening points.

Fastening points	
P1 + P2	SX-intermediate section 14 m

2.4 Fastening points SX-intermediate section 14 m

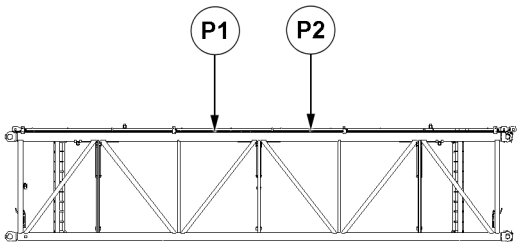

Fig.145065: Fastening points SX-intermediate section 14 m

Note
- ▶ The SX-intermediate sections are available in various system dimensions.
- ▶ The distance between the fastening pints can vary, depending on the respective SX-intermediate section.
- ▶ The lattice section must be fastened on both sides to the fastening points.

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Fastening points	
P1 + P2	SX-intermediate section 14 m

2.5 Fastening points SX-reducer RO, top

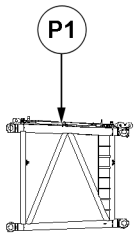

Fig.145067: Fastening points SX-reducer RO, top

Note
▶ The lattice section must be fastened on both sides to the fastening points.

Fastening points	
P1	SX-reducer RO, top

2.6 Fastening points S-intermediate section 3326.40 RU

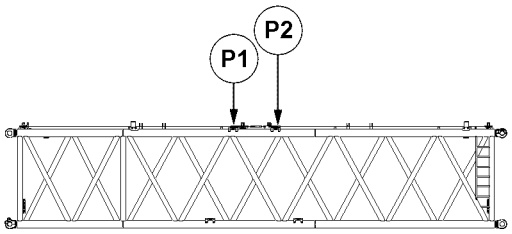

*Fig.145261: Fastening points S-intermediate section **3326.40 RU***

Note
▶ The lattice section must be fastened on both sides to the fastening points.

Fastening points	
P1 + P2	S-intermediate section **3326.40 RU**

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2.7 Fastening points S-intermediate sections 3326.xx

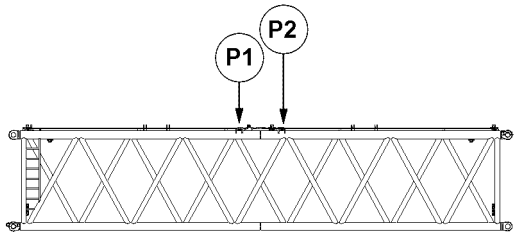

*Fig.145255: Fastening points S-intermediate sections **3326.xx***

Note
▶ The lattice section must be fastened on both sides to the fastening points.

Fastening points	
P1 + P2	S-Intermediate sections **3326.xx**

2.8 Fastening points S-intermediate section 3326.30 RO

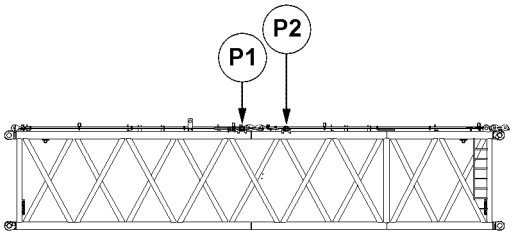

*Fig.145254: Fastening points S-intermediate section **3326.30 RO***

Note
▶ The lattice section must be fastened on both sides to the fastening points.

Fastening points	
P1 + P2	S-intermediate section **3326.30 RO**

2.9 Auxiliary guying frame fastening point

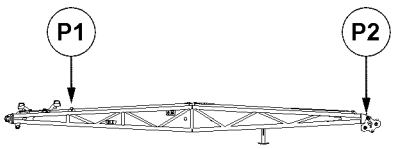

Fig.145253: Auxiliary guying frame fastening point

Note
▶ The auxiliary guying frame must be fastened on both sides on the fastening points.

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Fastening points	
P1 + P2	Auxiliary guying frame

2.10 Fastening points S-intermediate sections 7 m

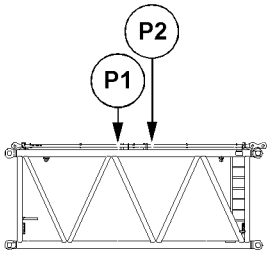

Fig.124851: Fastening points S-intermediate section 7 m

Note
- ▶ The S-intermediate sections are available in various system dimensions.
- ▶ The distance between the fastening pints can vary, depending on the respective S-intermediate section.
- ▶ The lattice section must be fastened on both sides to the fastening points.

Fastening points	
P1 + P2	S-intermediate section 7 m

2.11 Fastening points S-intermediate sections 14 m

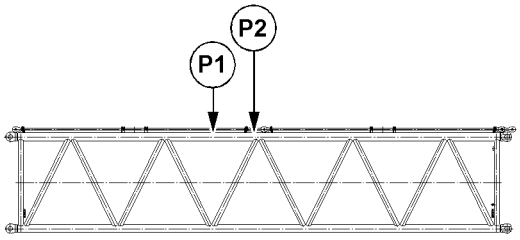

Fig.124848: Fastening points S-intermediate section 14 m

Note
- ▶ The S-intermediate sections are available in various system dimensions.
- ▶ The distance between the fastening pints can vary, depending on the respective S-intermediate section.
- ▶ The lattice section must be fastened on both sides to the fastening points.

Fastening points	
P1 + P2	S-intermediate section 14 m

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2.12 Fastening points S-intermediate sections 14 m , for flying assembly

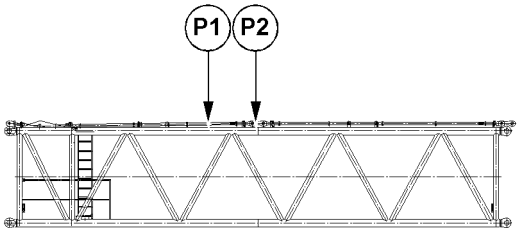

Fig.124847: Fastening points S-intermediate sections 14 m , for flying assembly

Note
- ▶ The S-intermediate sections are available in various system dimensions.
- ▶ The distance between the fastening pints can vary, depending on the respective S-intermediate section.
- ▶ The lattice section must be fastened on both sides to the fastening points.

Fastening points	
P1 + P2	S-intermediate section 14 m , for flying assembly

2.13 Fastening points LA-intermediate sections 7 m

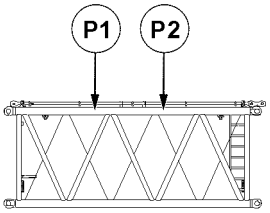

Fig.124852: Fastening points LA-intermediate section 7 m

Note
- ▶ The lattice section must be fastened on both sides to the fastening points.

Fastening points	
P1 + P2	LA-intermediate section 7 m

2.14 Fastening points LA-intermediate sections 14 m

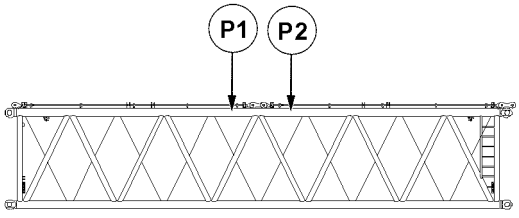

Fig.124853: Fastening points LA-intermediate section 14 m

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Note
▶ The lattice section must be fastened on both sides to the fastening points.

Fastening points	
P1 + P2	LA-intermediate section 14 m

2.15 Fastening points LI-intermediate sections 7 m

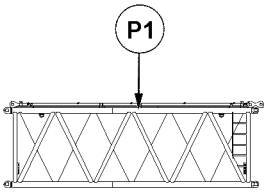

Fig.124854: Fastening points LI-intermediate section 7 m

Note
▶ The lattice section must be fastened on both sides to the fastening points.

Fastening points	
P1	LI-intermediate section 7 m

2.16 Fastening points LI-intermediate sections 14 m

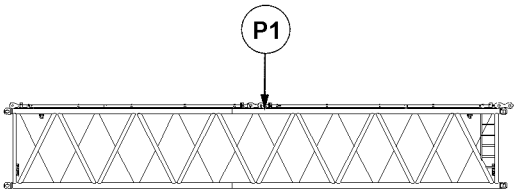

Fig.124855: Fastening points LI-intermediate section 14 m

Note
▶ The lattice section must be fastened on both sides to the fastening points.

Fastening points	
P1	LI-intermediate section 14 m

2.17 Fastening points L-adapter

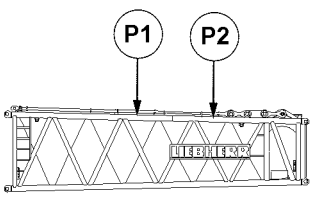

Fig.124858: Fastening points L-adapter

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Note
▶ The lattice section must be fastened on both sides to the fastening points.

Fastening points	
P1 + P2	L-adapter

2.18 Fastening points Adapter for boom nose

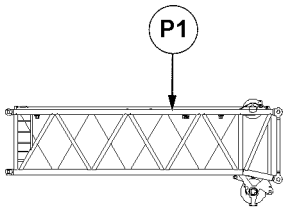

Fig.124859: Fastening points Adapter for boom nose

Note
▶ The lattice section must be fastened on both sides to the fastening points.

Fastening points	
P1	Adapter for boom nose

2.19 Fastening points SL-reducer 7 m

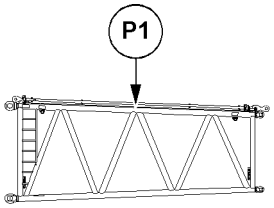

Fig.124849: Fastening points SL-reducer 7 m

Note
▶ The lattice section must be fastened on both sides to the fastening points.

Fastening points	
P1	SL-reducer 7 m

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2.20 Fastening points S-end section

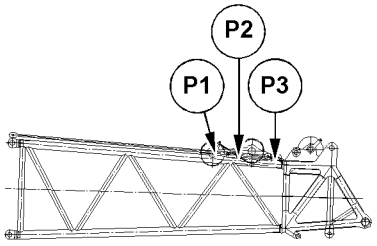

Fig.124850: Fastening points S-end section

Fastening points	
P1 + P2	S-end section, without roller set
P1 + P3	S-end section, with roller set

2.21 Fastening points L-end section

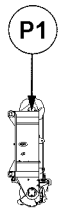

Fig.124860: Fastening points L-end section

Fastening points	
P1	L-end section

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3 Assembling the SX-intermediate section in the operating condition

WARNING
Danger of falling!
During assembly / disassembly, inspection and maintenance work, assembly personnel must be secured with appropriate aids to prevent them from falling.
Death, severe bodily injuries, property damage.
- ▶ All work at a height, when there is a danger of falling, must be carried out with suitable aids.
- ▶ If aids are not available and work cannot be carried out from the ground, then assembly personnel must secure themselves with the supplied fall arrest system to prevent falling, see chapter 2.04.
- ▶ If fall protection equipment is available, then it must be used, see chapter 2.06.
- ▶ When lifting, lowering, swinging crane parts in and out, no persons may remain in the danger zone.
- ▶ When closing or opening boom systems during boom assembly or boom disassembly, no persons may remain on the boom system or in the danger zone.
- ▶ If railings are present on the components, then they must be brought into the corresponding position and secured for assembly / disassembly work.
- ▶ Only step on the aids, ladders and catwalks with clean shoes.
- ▶ Keep aids, ladders and catwalks free of heavy dirt, snow and ice.
- ▶ During all assembly and disassembly work, maintenance work and inspections, travel or crane operation is prohibited.
- ▶ Remaining on a suspended load is prohibited.
- ▶ Stepping or walking on crane components and lattice sections, which have an incline of more than 20° is prohibited.
- ▶ For all assembly work, the crane driver of the main crane must be in voice contact with the crane driver / crane drivers of the auxiliary crane / auxiliary cranes.
- ▶ For assembly tasks, the crane driver may only initiate crane movements when the responsible guide has explicitly released the movement.

WARNING
Danger of impact / crushing!
When installing / removing crane components with the auxiliary crane, crane components can start to swing back and forth.
When lifting / lowering and positioning crane components, there is an increased danger of impacts / crushing.
Death, severe bodily injuries, property damage.
- ▶ Make sure that personnel cannot be caught by components.
- ▶ Make sure that the crane is horizontally aligned.
- ▶ When working in danger zones: Use aids to protect limbs.
- ▶ Guide components with suitable aids to minimize oscillation.

DANGER
Danger of falling!
If the corresponding component is disengaged from the auxiliary crane before the corresponding component is pinned, then the corresponding component can fall down.
Death, severe bodily injuries, property damage.
- ▶ Do not disengage the auxiliary crane until the respective component is pinned and secured.

WARNING
Danger of accident!
Death, severe bodily injuries, property damage.
- ▶ For assembly of the boom combinations, the rod plan must be observed and adhered to.
- ▶ Depending on the condition of the ground, the boom and the lattice sections must be supported from below for the assembly of the boom.
- ▶ Observe the technical safety instructions, see chapter 5.01.

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3.1 Taking the SX-intermediate section out of the transport position

Make sure that the following prerequisites are met:
- An auxiliary crane is available.
- An assembly scaffolding / work platform is available.

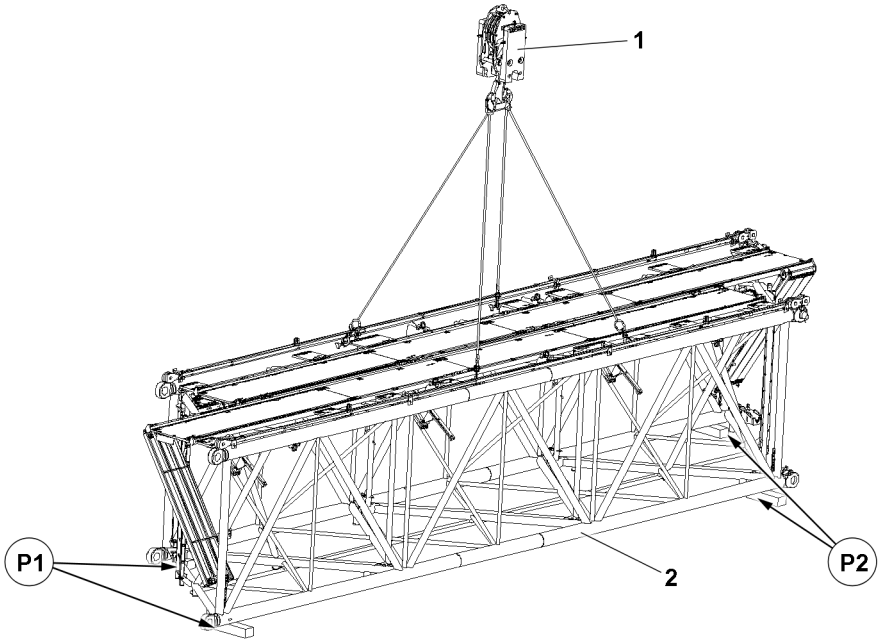

Fig.145068: SX-intermediate section in the transport position

▶ Fasten the auxiliary crane **1** to the fastening points for the transport position.
▶ Support the SX-intermediate section **2** on position **P1** and position **P2**.

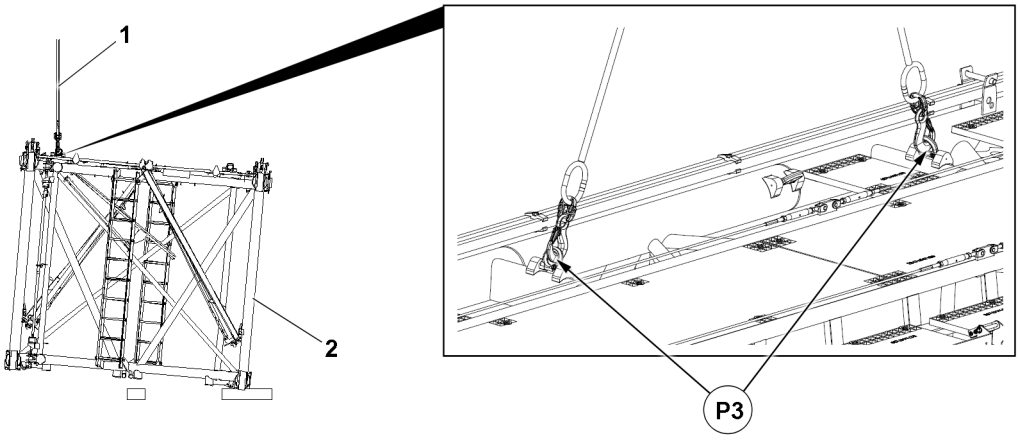

Fig.145069: Preparing the assembly position

▶ Hang the SX-intermediate section **2** on position **P3**.
▶ Lift the SX-intermediate section **2** on one side.
▶ Place the substructure from outside to inside.

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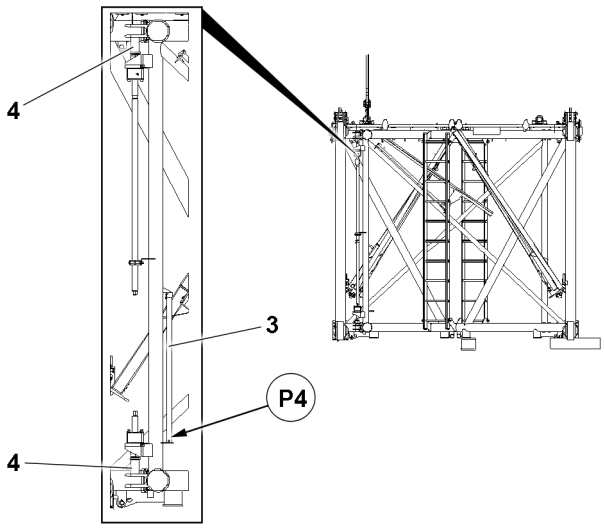

Fig.145070: Bringing the connector pins into the assembly position

- ▶ Bring the safety rod **3** in position **P4** into the park position.
- ▶ Bring the connector pins **4** into the assembly position

3.2 Assembling the SX-intermediate section

Make sure that the following prerequisites are met:
- An auxiliary crane is available.
- An assembly scaffolding / work platform is available.
- The SX-intermediate section is no longer in the transport position.

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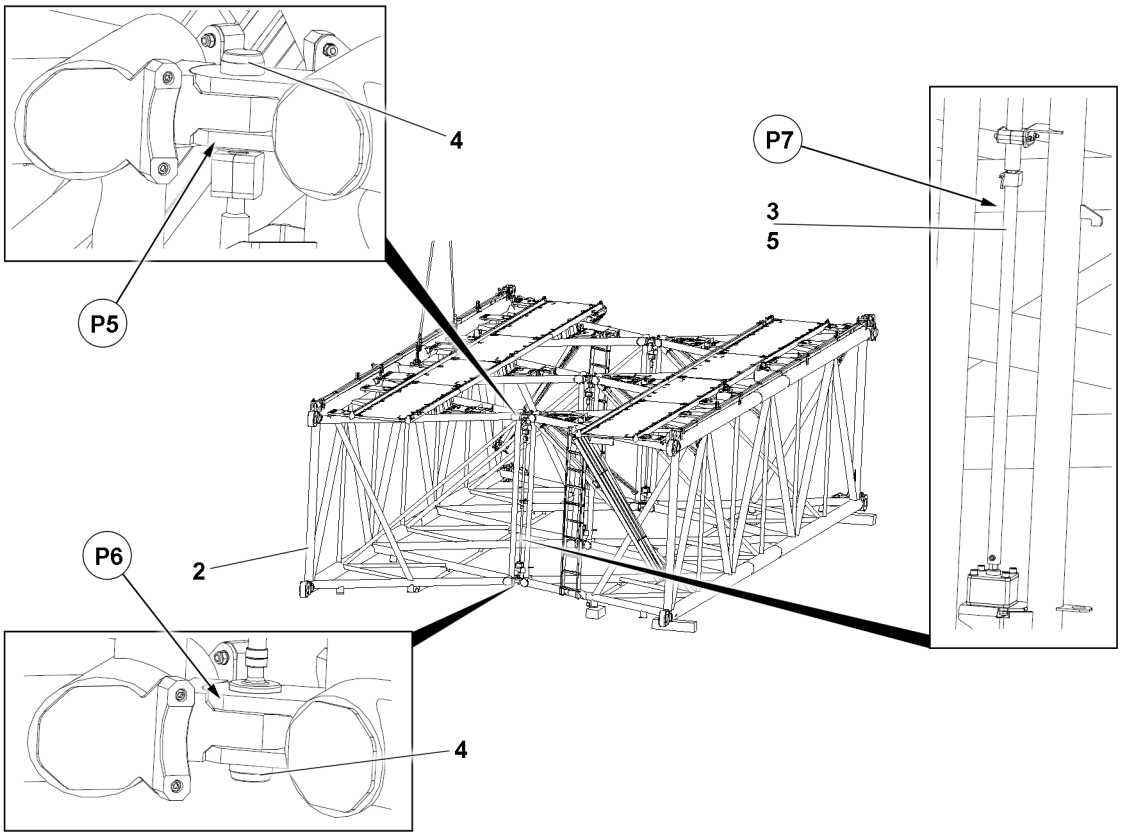

Fig.145071: Assembling the SX-intermediate section

WARNING
Danger of impact / crushing!
When installing / removing crane components with the auxiliary crane, crane components can start to swing back and forth.
When lifting / lowering and positioning crane components, there is an increased danger of impacts / crushing.
Death, severe bodily injuries, property damage.
- ▶ Make sure that personnel cannot be caught by components.
- ▶ Make sure that the crane is horizontally aligned.
- ▶ When working in danger zones: Use aids to protect limbs.
- ▶ Guide components with suitable aids to minimize oscillation.

- ▶ Swing the attached SX-intermediate section **2** away.
- ▶ Position the SX-intermediate section **2** in the pin position.
- ▶ Insert the connector pin **4** in position **P5** and position **P6**.
- ▶ Secure the connector pin **4** in position **P7** with the safety rod **3** and the retaining element **5**.
- ▶ Lift the SX-intermediate section **2** on one side. and shift the substructure from the center to the outside.
- ▶ Unhook the auxiliary crane.

3.3 Assembling the catwalks in the operating position

Make sure that the following prerequisites are met:
- An auxiliary crane is available.
- An assembly scaffolding / work platform is available.
- The SX-intermediate section is assembled.
- The connector pins are secured.

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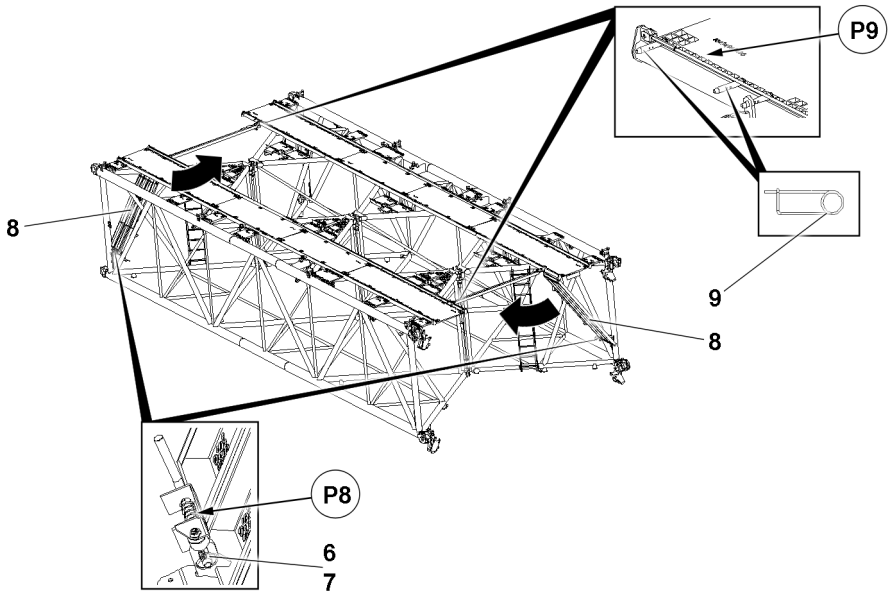

Fig.145072: Assembling the catwalks in the operating position

WARNING
Danger of falling!
If the catwalks are not installed or not completely installed, then personnel can fall down.
Death, severe bodily injuries, property damage.
▶ The catwalks may only be accessed when they are pinned and secured in the operating position, check visually.

▶ Remove the retaining element **6** in position **P8** and release the walkways.
▶ Fold the walkways **8** up and secure with the retaining element **9** in position **P9**.
▶ Bring the retaining element **6** on the retaining element **7** in position **P8** into the park position.

3.4 Assembling the rope guard in the operating position

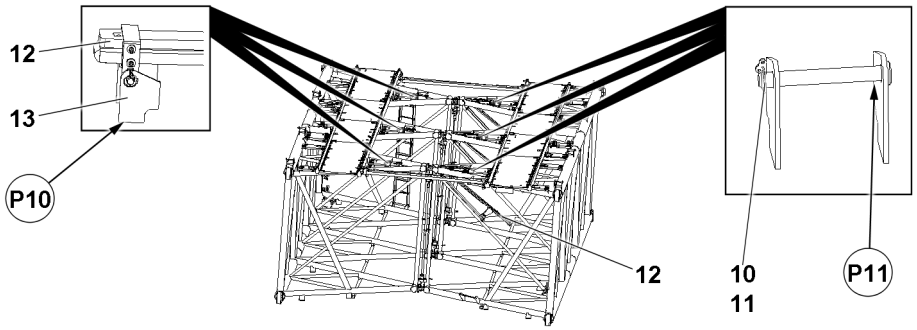

Fig.145073: Assembling the rope guard in the operating position

▶ Remove the retaining element **10** and pin **11** in position **P11**.
▶ Push the rope guard **12** up and push it in position **P10** in the retainer **13**.
▶ Pin the retaining element **10** and pin **11** again in position **P11**.

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3.5 Assembling the rod receptacle in the operating position

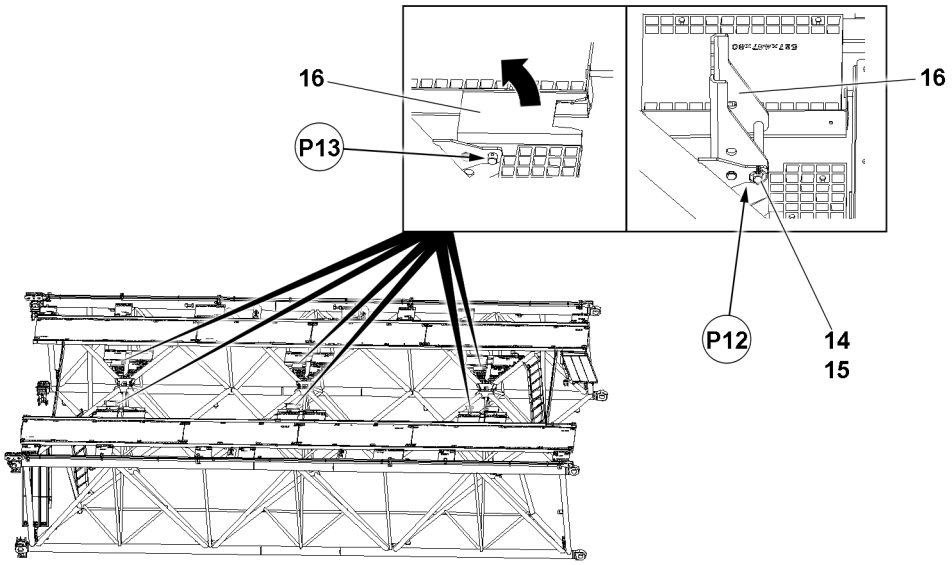

Fig.145074: Assembling the rod receptacle in the operating position

- ▶ Release the rod receptacle **16** in position **P13**.
- ▶ Fold the rod receptacle **16** up.
- ▶ Secure the rod receptacle **16** in position **P12** with the retaining pin **14** and the retaining element **15**.

3.6 Assembling the rods in the operating position

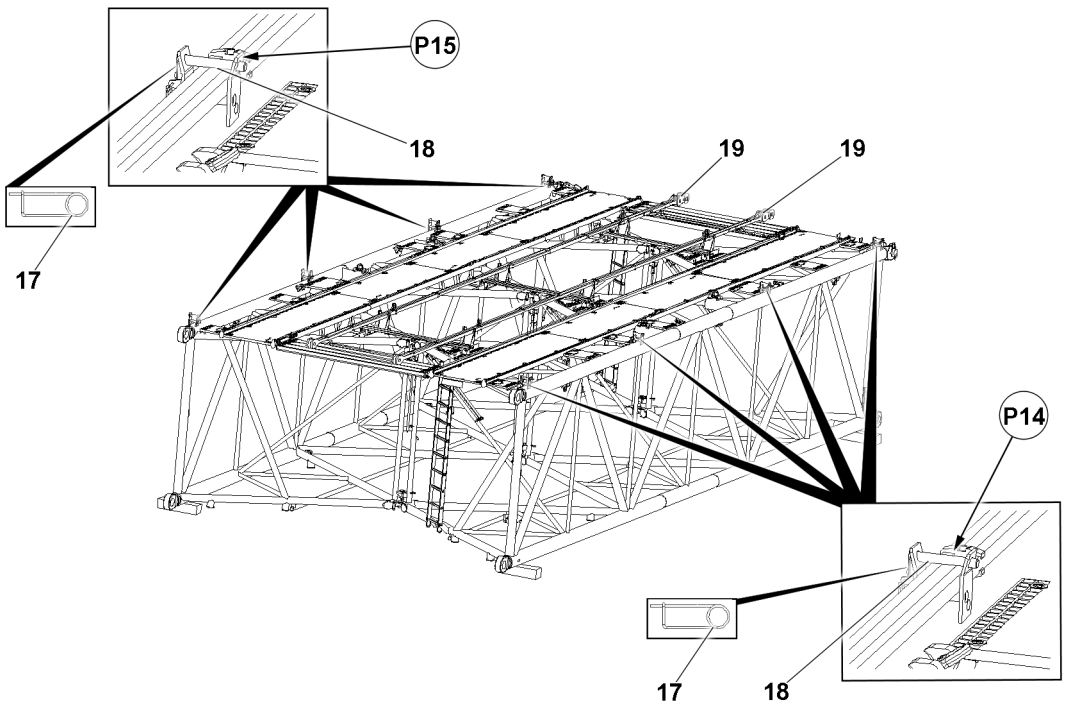

Fig.145075: Assembling the rods in the operating position

- ▶ Release the rods **19** in position **P14** and position **P15**.
- ▶ Lay the rods **19** inward using the auxiliary crane.
- ▶ Bring the retaining pin **18** and retaining element **17** in position **P14** and position **P15** into the park position.

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4 Assembling the boom

Note

- For the combination of the boom lattice sections, observe and adhere to the Rod plan and chapter 5.03.

WARNING

Danger of falling!

During assembly / disassembly, inspection and maintenance work, assembly personnel must be secured with appropriate aids to prevent them from falling.

Death, severe bodily injuries, property damage.

- All work at a height, when there is a danger of falling, must be carried out with suitable aids.
- If aids are not available and work cannot be carried out from the ground, then assembly personnel must secure themselves with the supplied fall arrest system to prevent falling, see chapter 2.04.
- If fall protection equipment is available, then it must be used, see chapter 2.06.
- When lifting, lowering, swinging crane parts in and out, no persons may remain in the danger zone.
- When closing or opening boom systems during boom assembly or boom disassembly, no persons may remain on the boom system or in the danger zone.
- If railings are present on the components, then they must be brought into the corresponding position and secured for assembly / disassembly work.
- Only step on the aids, ladders and catwalks with clean shoes.
- Keep aids, ladders and catwalks free of heavy dirt, snow and ice.
- During all assembly and disassembly work, maintenance work and inspections, travel or crane operation is prohibited.
- Remaining on a suspended load is prohibited.
- Stepping or walking on crane components and lattice sections, which have an incline of more than 20° is prohibited.
- For all assembly work, the crane driver of the main crane must be in voice contact with the crane driver / crane drivers of the auxiliary crane / auxiliary cranes.
- For assembly tasks, the crane driver may only initiate crane movements when the responsible guide has explicitly released the movement.

WARNING

Danger of falling!

If the lattice sections are not pinned and secured correctly, then they can fall down.

Death, severe bodily injuries, property damage.

- Pin or unpin both pins at the same horizontal level, i.e. **left and right**.
- Do not stand under the lattice sections or within the entire danger zone during the pinning and unpinning procedure of the boom.
- Safely secure the pins in the storage locations as well as in the receptacles.
- It is prohibited to lean the ladder against the component being disassembled.

WARNING

Danger of impact / crushing!

When installing / removing crane components with the auxiliary crane, crane components can start to swing back and forth.

When lifting / lowering and positioning crane components, there is an increased danger of impacts / crushing.

Death, severe bodily injuries, property damage.

- Make sure that personnel cannot be caught by components.
- Make sure that the crane is horizontally aligned.
- When working in danger zones: Use aids to protect limbs.
- Guide components with suitable aids to minimize oscillation.

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DANGER
Danger of falling!
If the corresponding component is disengaged from the auxiliary crane before the corresponding component is pinned, then the corresponding component can fall down.
Death, severe bodily injuries, property damage.
▶ Do not disengage the auxiliary crane until the respective component is pinned and secured.

WARNING
Danger of accident due to unintended actuation of the master switch!
During assembly and disassembly of the boom system with the radio remote control, the unintended actuation of the master switch, (the turning function in particular), can lead to the uncontrolled movement of the boom system and therefore dangerous situations for personnel.
Death, severe bodily injuries, property damage.
▶ The turntable may not be turned during the assembly of the boom.
▶ During assembly and disassembly of the boom system with the radio remote control, observe the assembly conditions, see chapter 3.06.

WARNING
Danger of accident!
Death, severe bodily injuries, property damage.
▶ For assembly of the boom combinations, the rod plan must be observed and adhered to.
▶ Depending on the condition of the ground, the boom and the lattice sections must be supported from below for the assembly of the boom.
▶ Observe the technical safety instructions, see chapter 5.01.

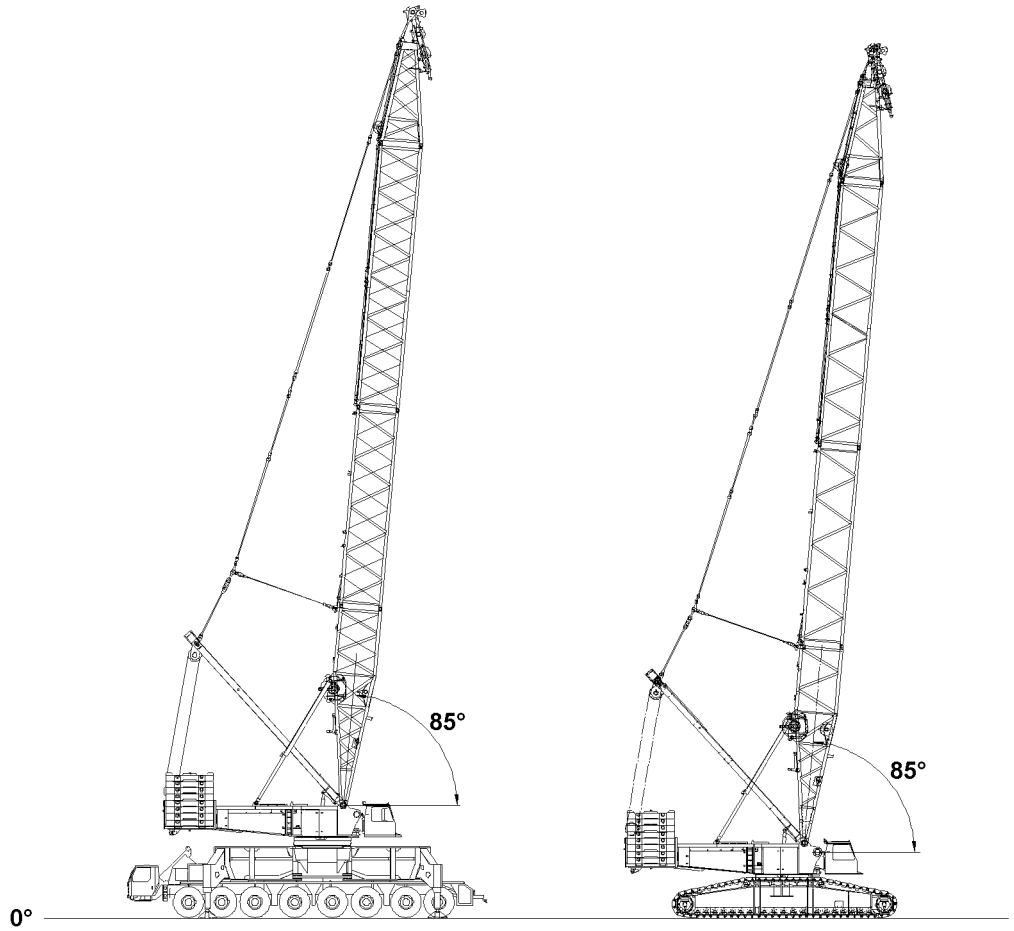

Fig.146607: Derrick erected to 85°

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Make sure that the following prerequisites are met:
- The ground is able to safely take on the entire operating weight of the crane including the load to be lifted.
- The crane is properly supported (only LG-crane or LR-crane with the crane support).
- The crane is horizontally aligned.
- An auxiliary crane with sufficient load carrying capacity is available.
- An assembly scaffolding / work platform is available.
- The central ballast is installed according to the load chart.
- The counterweight has been installed on the turntable according to the load chart.
- The D-boom is completely assembled and erected on the turntable, see chapter 5.05.
- The LICCON overload protection has been set according to the data in the load chart.

4.1 Assembling the railing on the S-pivot section

WARNING
Danger of falling!
During assembly and disassembly of the railings **12**, assembly personnel must be secured with appropriate aids (for example: (with personal protective equipment) to prevent them from falling.
Even during the assembly of protective equipment there is a danger of falling.
Death, severe bodily injuries, property damage.
- ▶ For assembly and disassembly work, maintenance and inspection work on the S-pivot section, all railings **12** must be assembled and secured.
- ▶ Only step on the S-pivot section **1** with „clean shoes“.

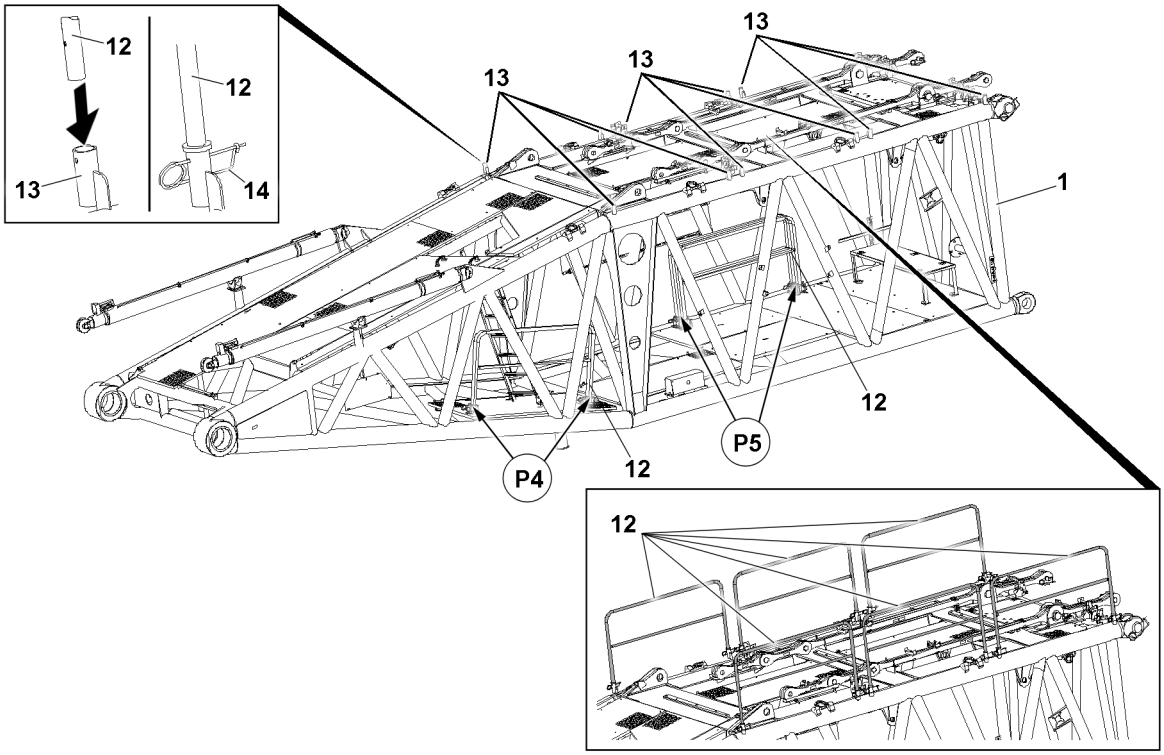

Fig.124905: Assembling the railing on the S-pivot section

Note
- ▶ See chapter 2.06.

- ▶ Remove the railing **12** on the S-pivot section **1** from the transport position **P4** and transport position **P5** and bring into the operating position: Insert the railing **12** in the mounting pipes **13** and secure with the spring retainer **14**.

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4.2 Assembling the catwalks on the S-pivot section

WARNING
Danger of falling!
If the catwalks are not installed or not completely installed when the winches are missing, then personnel can fall down.
Death, severe bodily injuries, property damage.
- ▶ For each non-assembled winch on the S-pivot section: Assemble the catwalk.
- ▶ The catwalks may only be accessed when they are pinned and secured in the operating position, check visually.

Catwalks are assigned to the openings for the winches:
- **27** Winch 6 – catwalk
- **28** Winch 5 – catwalk

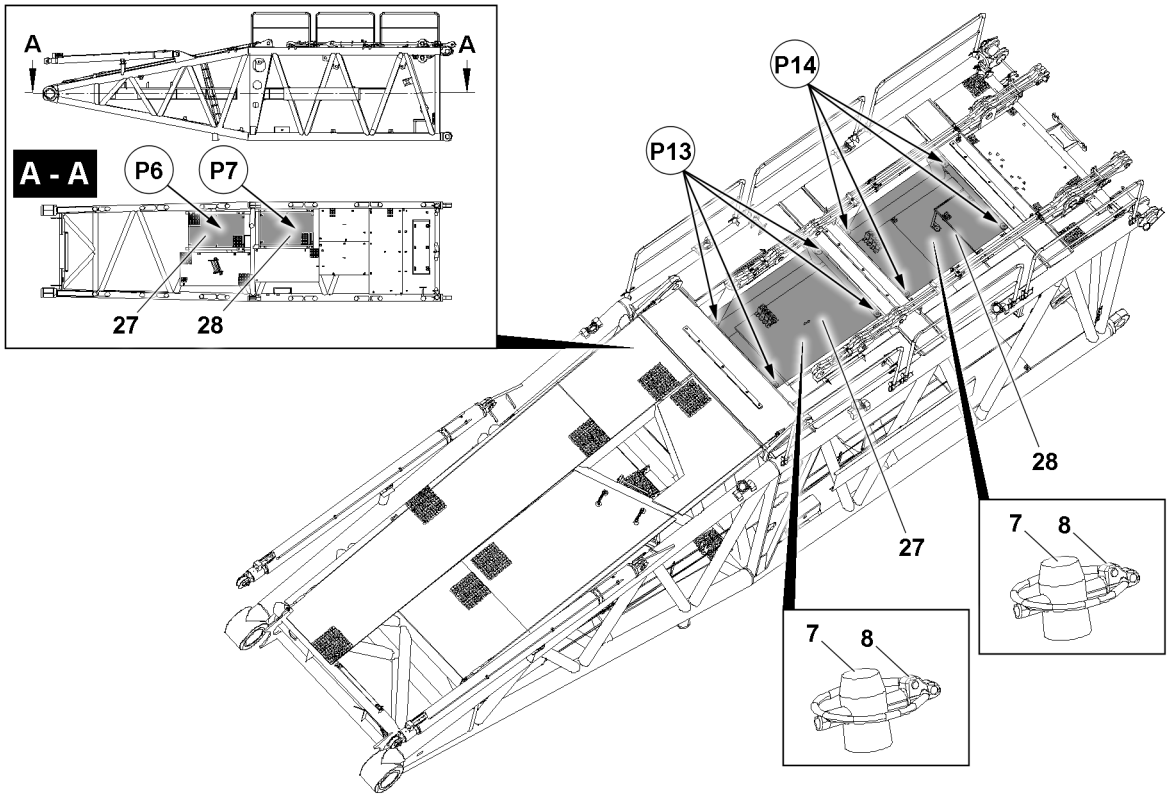

Fig.124906: Assembling the catwalks on the S-pivot section instead of the winches (winch 5 and winch 6)

Note
- ▶ If one or both winches are installed in the operating position on the S-pivot section, then the disassembled catwalks must be taken down in the respective transport receptacles and secured, see section **A-A**.
- ▶ The transport receptacle for the catwalk **27** is in point **P6**.
- ▶ The transport receptacle for the catwalk **28** is in point **P7**.

Make sure that the following prerequisites are met:
- The railings **12** (6x) are properly installed in the operating position and secured.
- Assembly personnel is secured to prevent them from falling.

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4.2.1 S-pivot section without winches

Make sure that the following prerequisites are met:
- The catwalks are in the transport receptacles.
- Winch 6 is disassembled on the S-pivot section.
- Winch 5 is disassembled on the S-pivot section.

Installing the catwalk instead of winch 6

Remove the catwalks with the auxiliary crane from the transport receptacles and install them individually in the operating position.

▶ Release the catwalk **27** in the transport receptacle: Remove the locking pin **8**.

Install the catwalk **27** in the operating position:
▶ Lift the catwalk **27** with the auxiliary crane from the transport receptacle in point **P6**.
▶ Set the catwalk **27** properly on the receptacle studs **7** on points **P13**.
▶ Secure the catwalk **27** properly on the receptacle studs **7** with the locking pins **8**.

Installing the catwalk instead of winch 5

▶ Release the catwalk **28** in the transport receptacle: Remove the locking pin **8**.

Install the catwalk **28** in the operating position:
▶ Lift the catwalk **28** with the auxiliary crane from the transport receptacle in point **P7**.
▶ Set the catwalk **28** properly on the receptacle studs **7** on points **P14**.
▶ Secure the catwalk **28** properly on the receptacle studs **7** with the locking pins **8**.

4.2.2 Bringing the winches from the transport position into the operating position

Winch 5 and / or winch 6 are installed on the S-pivot section and are in transport position. The catwalks are installed over the winches on the S-pivot section.

Make sure that the following prerequisites are met:
- Winch 5 is in the transport position.
- The catwalk **28** is pinned and secured in the operating position.
- Winch 6 is in the transport position.
- The catwalk **27** is pinned and secured in the operating position.

Disassembling the catwalks and installing them in the park position

▶ Fasten the catwalk **27** to the auxiliary crane.
▶ Release the catwalk **27** on the centering pins **7**: Remove the locking pin **8**.
▶ Lift the catwalk with the auxiliary crane from the operating position.
▶ Take the catwalk down with the auxiliary crane into the transport position at point **P6** and secure with the locking pin **8**.

Result:

– Winch 6 can be installed on the S-pivot section in the operating position, see section „Installing the winch(es) on the S-pivot section“.

Note
▶ The disassembly of catwalk **28** is identical to the disassembly of catwalk **27**.
▶ The transport receptacle of the catwalk **28** is in point **P7**.

When the catwalk **28** is installed in the transport position:
▶ Install Winch 5 on the S-pivot section in the operating position, see section „Installing the winch(es) on the S-pivot section“.

Installing the winch(es) on the S-pivot section

Make sure that the following prerequisite is met:
- The catwalks are in the transport receptacles.

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▶ Fasten the required winch to the auxiliary crane.
▶ Bring the winch into the operating position with the auxiliary crane, pin and secure.

When the winch is pinned and secured:
▶ Remove the auxiliary crane.
▶ Establish the electrical connections from the terminal box in the S-pivot section to the winches, see the electric wiring diagram.
▶ Establish the hydraulic connections to the winches.

4.3 Turning the turntable into the assembly position

WARNING
Danger of toppling the crane
If the specifications in the erection and take-down charts as well as in the assembly conditions are not observed, the crane can topple over.
Death, severe bodily injuries, property damage.
▶ Observe the assembly conditions, see chapter 3.06.
▶ Turn the turntable in the longitudinal direction of the crawler travel gear or to the side before assembly.
▶ Observe the specifications in the erection and take-down charts.
▶ Observe the specifications in the load charts.

Note
▶ If the turntable is turned to the side for the assembly of the boom, then boom and lattice sections must be supported, depending on the ground condition.

▶ Turn the turntable in the longitudinal direction of the crawler travel gear or to the side.

4.4 Exceeding the LICCON overload protection for assembly

WARNING
Danger of accident due to the „Exceedance of shut-off limits of the LICCON overload protection“ function!
If the shut off limits of the LICCON overload protection are exceeded, there is no longer any protection against crane overload.
Due to erroneous operation or deliberate misuse, the crane could collapse, the boom can break off or the crane can topple over.
Death, severe bodily injuries, property damage.
▶ The function „Exceedance of shut off limits of the LICCON overload protection“ is only permissible in emergencies and for assembly purposes.
▶ The function „Exceeding the shut off limits of the LICCON overload protection“ may only be actuated by persons who know the effects of their actions regarding the function „Exceeding the shut off limits of the LICCON overload protection“.
▶ The „Exceedance of shut off limits of the LICCON overload protection“ function requires the presence of an authorized person and must be performed with utmost caution.
▶ Crane operation with activated function „Exceedance of shut off limits of the LICCON overload protection“ is prohibited.

▶ Exceeding the shut off limits of the LICCON overload protection: Engage assembly operation.

Result:

– The shut off limits of the LICCON overload protection are exceeded.
– The assembly icon appears on the LICCON monitor.

Note
▶ See chapter 4.02.

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4.5 Assembling the S-pivot section on the turntable

NOTICE
Swinging in of the S-pivot section!
The S-pivot section can collide with the pin points on the turntable. The S-connector pin or the S-pivot section can be damaged.
▶ Make sure that the S-connector pins are completely unpinned before assembly of the S-pivot section.

Note
▶ Assemble the boom combinations according to the supplied Rod plans.

WARNING
Danger of toppling the crane!
If the specifications listed below are not observed, the crane can collapse, the boom can break off or the crane can topple over.
Death, severe bodily injuries, property damage.
▶ The instructions in chapter 5.01 and chapter 5.03 must be observed and adhered to.
▶ All pins are to be secured after assembly with the intended retaining elements.
▶ The guy rods must be inspected regularly, see chapter 8.15.

NOTICE
Damage to the S-pivot section!
If the maximum permissible negative angle is exceeded due to uneven ground, then the S-pivot section can be damaged.
Property damage.
▶ The permissible negative angle range of the S-pivot section may not be exceeded, see section „Assembling the S / SL boom at an incline“.

Make sure that the following prerequisites are met:
– The S-connector pins **4** are unpinned.
– The crane engine is running.

The fastening points on the S-pivot section **1** must be selected in such a way that the S-pivot section **1** hangs horizontally during assembly. See section „Fastening points“.

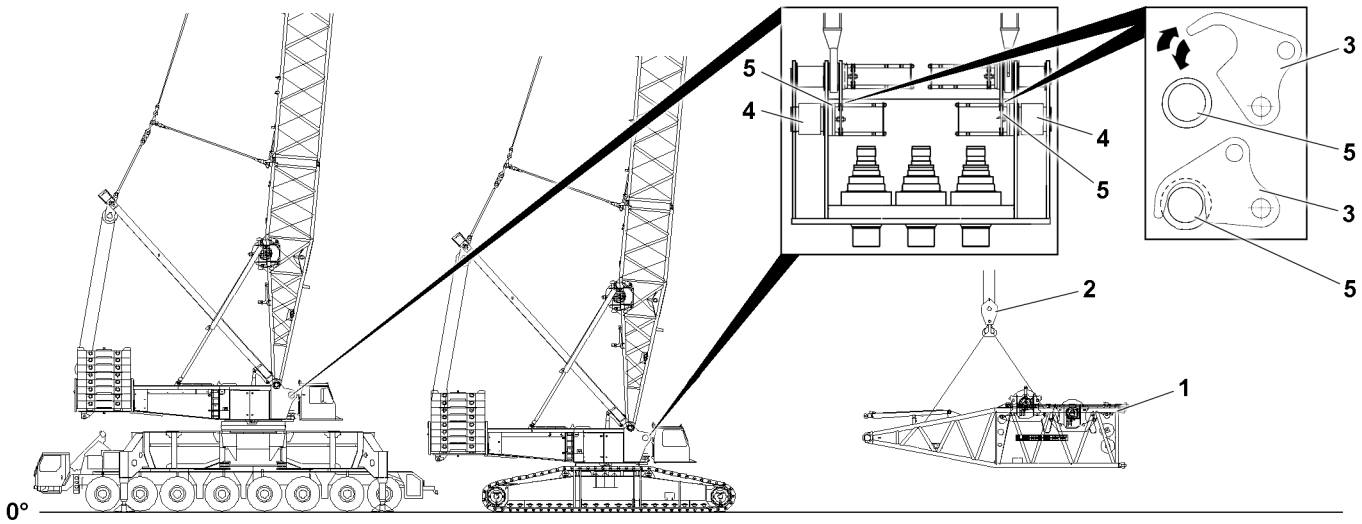

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Fig.146608: Assembling the S-pivot section on the turntable

▶ Fold the retaining hook **3** out on the guides **5**.
▶ Unpin the pin **4** with the pin pulling cylinder.

The pin pulling cylinders on the turntable are actuated with the radio remote control.

Note

▶ For operation of the radio remote control, see chapter 6.08!

▶ Hang the S-pivot section **1** on the auxiliary crane **2** and swing it in to the pin points on the turntable.

WARNING

Danger of falling!

Due to non-secured or insufficiently secured connector pins, the S-pivot section can fold down.

Death, severe bodily injuries, property damage.

▶ Secure the pins **4** between the S-pivot section **1** and the turntable after the pinning procedure with the retaining hook **3**.

▶ Insert the pins **4** on both sides.

When the pins **4** are completely pinned on the left and right on the S-pivot section **1**:

▶ Secure the pins **4**: Fold the retaining hook **3** in on the left and right on the guides **5**.

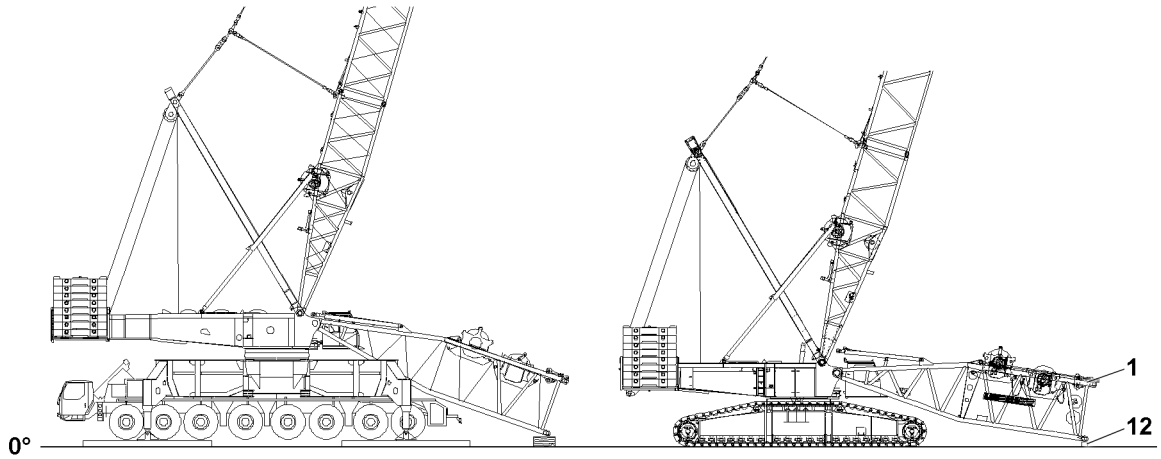

Fig.146609: Taking the S-pivot section down on the substructure on the ground

NOTICE

Danger of accident!

When taking the assembled S-pivot section down, the S-pivot section or the turntable can be damaged.

▶ Lower the S-pivot section **1** after assembly on the turntable carefully onto the substructure **12** on the ground.

▶ Observe the specifications in the chart „Assembly conditions on crawlers“, see chapter 3.06.

▶ Observe the specifications in the section „Ground unevenness“. See section „Ground uneveness“.

▶ Lower the S-pivot section **1** carefully and at a slow speed onto the substructure **12** on the ground.

When the S-pivot section **1** is placed on the substructure **12** on the ground:

▶ Remove the auxiliary crane.

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4.6 Establishing the electric and hydraulic connections on the S-pivot section

4.6.1 Establishing the electrical connections

NOTICE
Danger of damage to the electrical connections!
If the electrical connection between the terminal box and the S-pivot section and the cable drum in the S-pivot section is established before the boom end section is installed and electrically connected, then the electric connection can be damaged.
▶ Make sure that the electric connection between the terminal box in the S-pivot section and the cable drum in the S-pivot section is only established **after** assembly and the connection of the electric wiring for the boom end section.

Note
▶ To establish the electrical connections on the S-pivot section: Use the Electrical wiring diagram.

Make sure that the following prerequisite is met:
– The S-pivot section is completely assembled and taken down on the substructure.

▶ Establish the electrical connections.
▶ Make sure that all electrical connections to the S-pivot section have been established.

WARNING
Malfunction if dummy plugs are not installed!
If the dummy plugs on the non-required electrical connections are not installed, then malfunctions or functional limitations can occur on the crane.
▶ Make sure that all non-required electrical connections, which have a dummy plug are closed off with dummy plugs.
▶ Pay attention to the Electrical wiring diagram.

▶ As a rule, close off on-required electrical connections (for example for accessories which cannot be installed) with the respective dummy plugs.

NOTICE
Property damage due to dirt and / or corrosion!
If non-required electrical connections are not closed off with the respective protective caps, then dirt and / or corrosion can damage the electrical connections.
This could result in malfunctions.
▶ Make sure that all non-required electrical connections are always closed off properly.
▶ Pay attention to the Electrical wiring diagram.

▶ Close electrical connections, which have no dummy plugs, properly off with the corresponding protective caps.

4.6.2 Establishing the hydraulic connections

When connecting and releasing hydraulic lines with quick couplings, make sure that the coupling procedure is carried out correctly.

DANGER
Danger of accident due to loss of pressure or leakage!
Incorrectly coupled or self-loosening quick couplings (particularly return lines) can result in serious accidents due to component failure.
▶ Check that the quick couplings have been properly connected before using the crane.

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Note
▶ To connect or release the hydraulic lines with quick couplings, see chapter 5.01.

▶ Release the pressure in the hydraulic system before connecting or disconnecting. Turn the engine off and wait for short time.
▶ Assembling coupling components (sleeve and connector) by using knurled nut.
▶ Connect coupling components.

4.7 Assembling the SX-boom

4.7.1 Assembling the SX-reducer „bottom“ on the S-pivot section

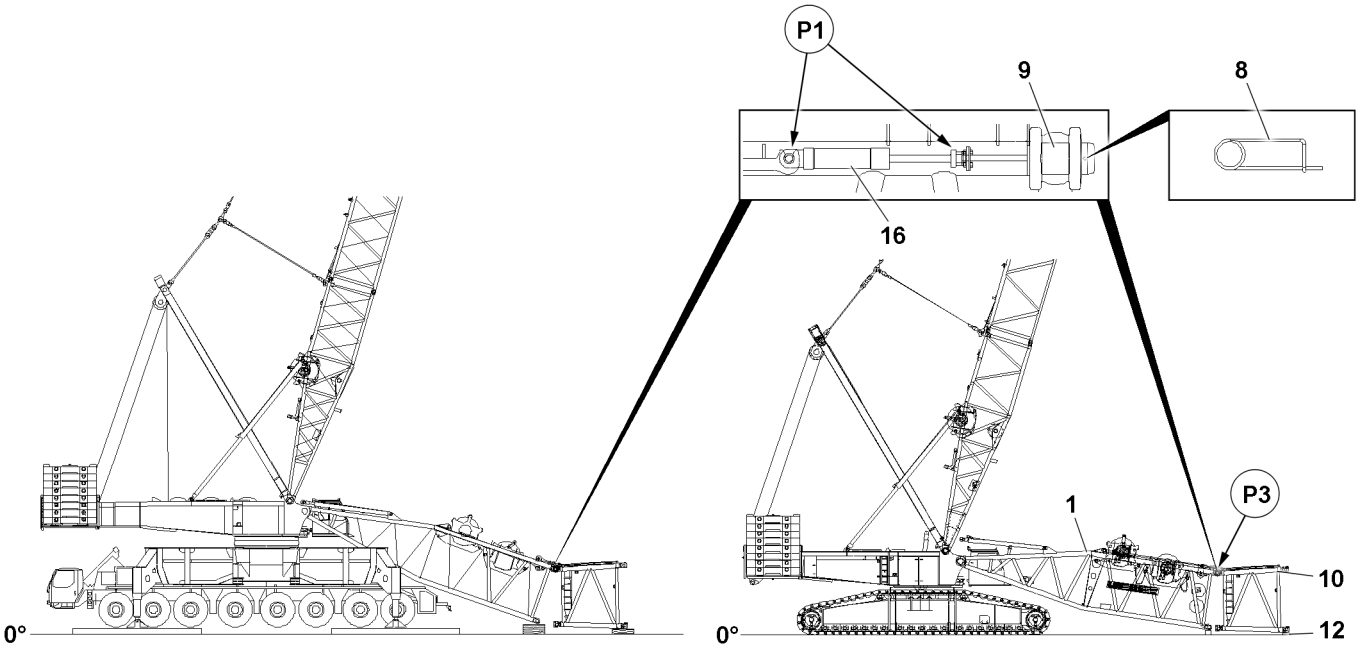

Fig.146610: Assembling the SX-reducer RU „bottom“ on the S-pivot section

Make sure that the following prerequisites are met:
– The S-pivot section **1** is pinned and secured on the turntable.
– The S-pivot section **1** is taken down onto the substructure on the ground.
– The auxiliary crane is removed.

Note
▶ The SX-reducer, **10** „bottom“ is pinned with the pin pulling device, see chapter 5.30.
▶ For easier assembly / disassembly of the SX-reducer **10** „bottom“, it shall be supported.

WARNING
General danger notes!
Death, severe bodily injuries, property damage.
▶ All connector pins **9** are to be secured after assembly of the SX-reducer with the intended retaining elements **8**.

Note
▶ For the fastening of boom components, observe and adhere to section „Fastening points“.

▶ Place the pin pulling cylinder **16** in position **P1**.
▶ Release the connector pin **9** and unpin the pin pulling cylinder **16**.
▶ Fasten the SX-reducer **10** „bottom“ to the auxiliary crane and align it with the S-pivot section **1**.

When the pin bores align in position **P3** „at the top“:

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▶ Insert the connector pins **9** on both sides to the stop: Actuate the pin pulling cylinder **16**.
▶ Secure the connector pins **9** with retaining element **8**.

When the SX-reducer **10** „bottom“ is pinned and secured on the S-pivot section **1** „top“:

▶ Lower the SX-reducer **10** „bottom“ on the substructure on the ground.
▶ Remove the auxiliary crane.

4.7.2 Assembling the SX-intermediate section

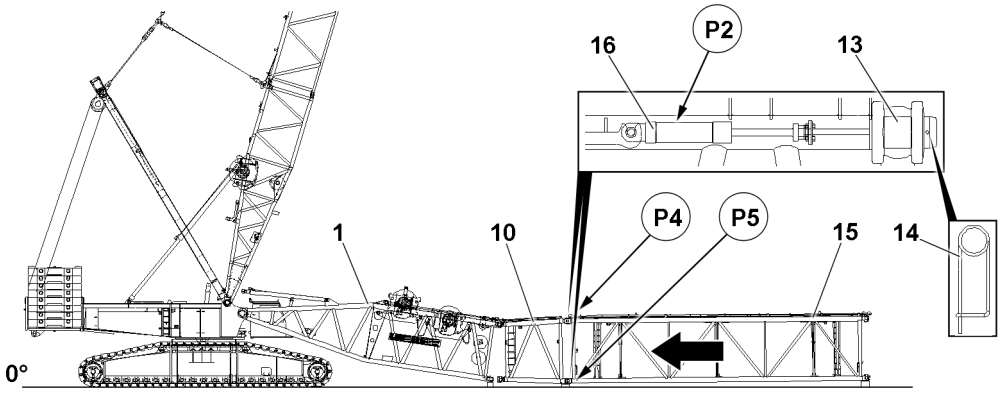

Fig.145080: Assembling the SX-intermediate section on the LR-crane

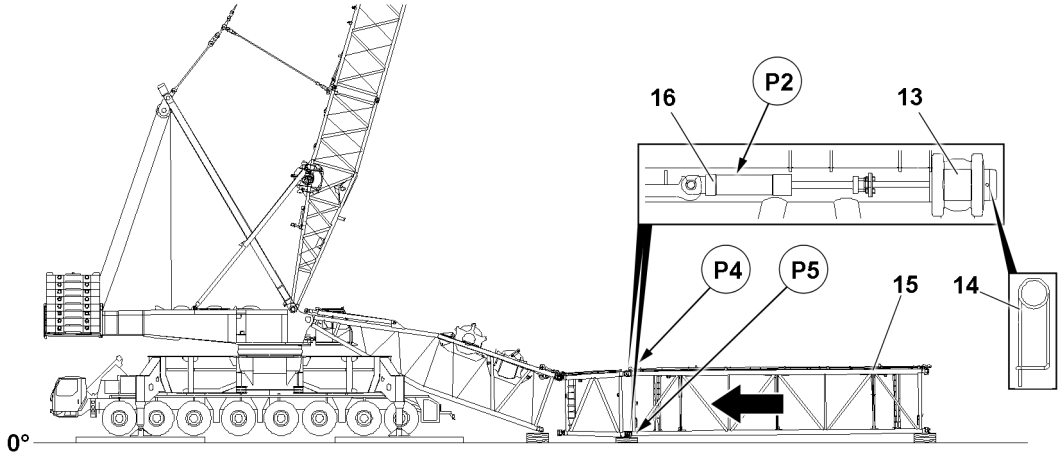

Fig.146611: Assembling the SX-intermediate section on the LG-crane

Make sure that the following prerequisites are met:
- The SX-reducer **10** „bottom“ is pinned and secured on the S-pivot section **1**.
- The S-pivot section and the SX-reducer **10** „bottom“ are taken down on substructures on the ground.
- The connector pins on the SX-reducer **10** „bottom“ – in direction of the SX-intermediate section **15** – are fully unpinned.
- The auxiliary crane is removed.

Note
▶ The SX-intermediate sections **15** are pinned with the pin pulling cylinders **16**, see chapter 5.30.
▶ For easier assembly / disassembly, the SX-intermediate sections **15** are supported.

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WARNING
General danger notes!
Death, severe bodily injuries, property damage.
- ▶ All connector pins **13** are to be secured after assembly of the SX-intermediate section **15**with the intended retaining elements **14**.

Note
- ▶ For the fastening of boom components, observe and adhere to section „Fastening points“.

- ▶ Place the pin pulling cylinders **16** in position **P2**.
- ▶ Fasten the SX-intermediate sections **15** to the auxiliary crane and align it „at the bottom“ with the SX-reducer **10**.

When the pin bores align in position **P4** „at the top“:

- ▶ Insert the connector pins **13** on both sides to the stop: Actuate the pin pulling cylinders **16**.
- ▶ Secure the connector pins **13** with retaining elements **14**.

When the connector pins **13** „on top“ are fully pinned to the stop and secured on both sides:

- ▶ Insert the connector pins **13** „on the bottom“ in position **P5** with the pin pulling cylinders **16** on both sides to the stop: Actuate the pin pulling cylinders **16**.
- ▶ Secure the connector pins **13** with retaining elements **14**.
- ▶ Lower the SX-intermediate section **15** on the substructure on the ground.
- ▶ Remove the auxiliary crane.

4.7.3 Continuing boom assembly

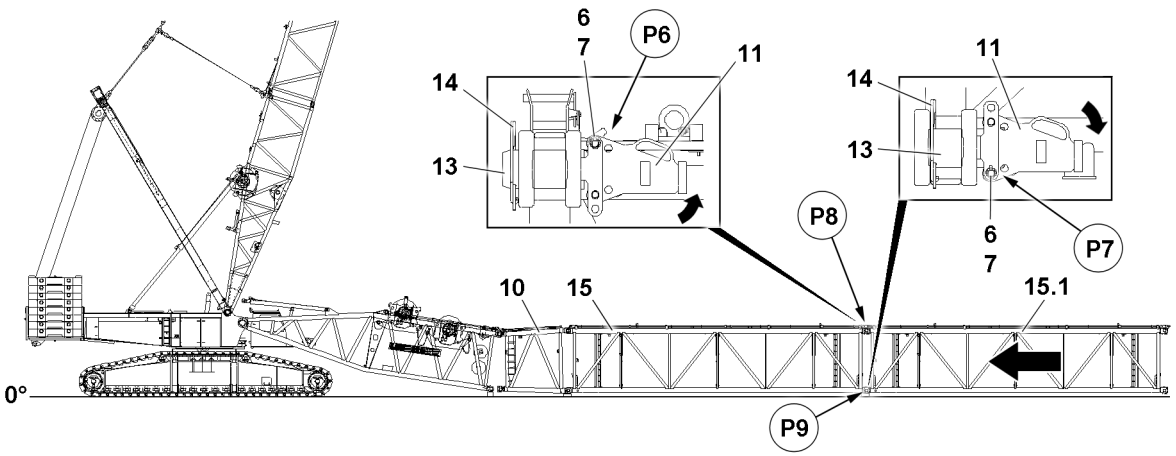

Fig.145476: Continuing boom assembly

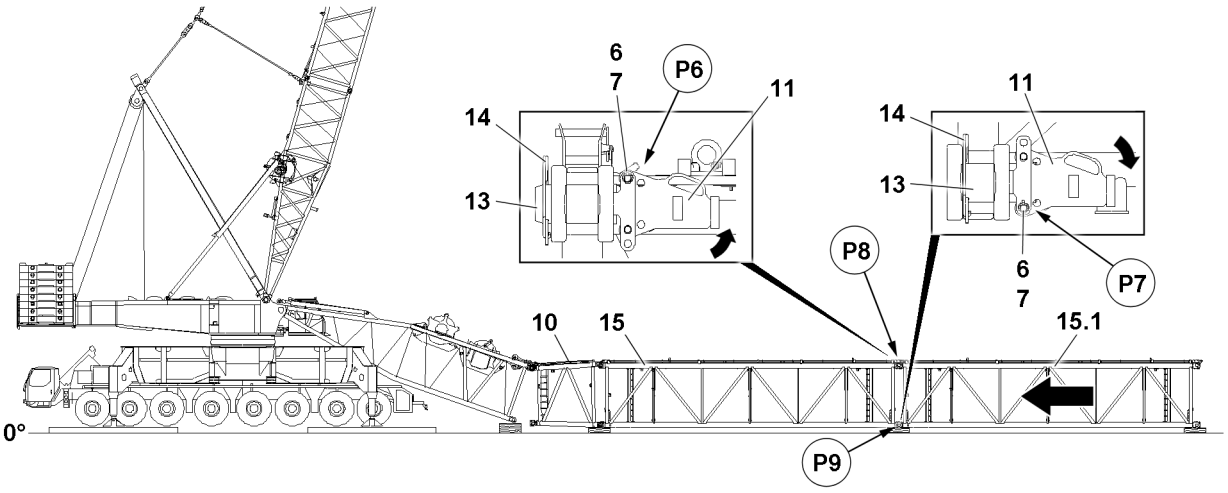

Fig.146612: Continuing boom assembly

Make sure that the following prerequisites are met:
- The connector pins on the SX-intermediate section **15** - in direction of the expansion of the boom system - are completely unpinned.
- The SX-intermediate section **15** is laying properly on the ground or on the substructure.
- The auxiliary crane is removed.

NOTICE
Danger of toppling the crane!
The crane can topple over due to the improper assembly of the boom.
Death, severe bodily injuries, property damage.
- ▶ The combination of the various boom systems must be taken from the Rod plan and it must be adhered to.
- ▶ The specifications in chapter 5.01 and chapter 5.03 must be observed.
- ▶ Make sure that all pin connections are secured after assembly.
- ▶ Support the boom system during assembly and disassembly with assembly shoes.

Bring the pin pulling device **11** into the operating position:

- ▶ Fold the pin pulling device **11** up into position **P6** and secure with the retaining pin **6** and the retaining element **7**.
- ▶ Fold the pin pulling device **11** down into position **P7** and secure with the retaining pin **6** and the retaining element **7**.

When the connector pins **13** on the first SX-intermediate section **15** are fully unpinned:

- ▶ Fasten the second SX-intermediate section **15.1** to the auxiliary crane and align with the first SX-intermediate section **15**.

When the pin bores between the first SX-intermediate section **15** and the second SX-intermediate section **15.1** align in position **P8** „on top“:

- ▶ Insert the connector pins **13** „on the top“ with the pin pulling cylinders on both sides to the stop: Actuate the pin pulling cylinder.
- ▶ Secure the connector pins **13** with retaining element **14**.

When the connector pins **13** „on top“ are fully pinned to the stop and secured on both sides:

- ▶ Insert the connector pins **13** „on the bottom“ in position **P9** with the pin pulling cylinders on both sides to the stop: Actuate the pin pulling cylinder.
- ▶ Secure the connector pins **13** with retaining element **14**.
- ▶ Lower the SX-intermediate section **15.1** on the substructure on the ground.
- ▶ Remove the auxiliary crane.
- ▶ Continue boom assembly to the required system length.

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4.7.4 Assembling the SX-reducer RO „top“ on the SX-intermediate section

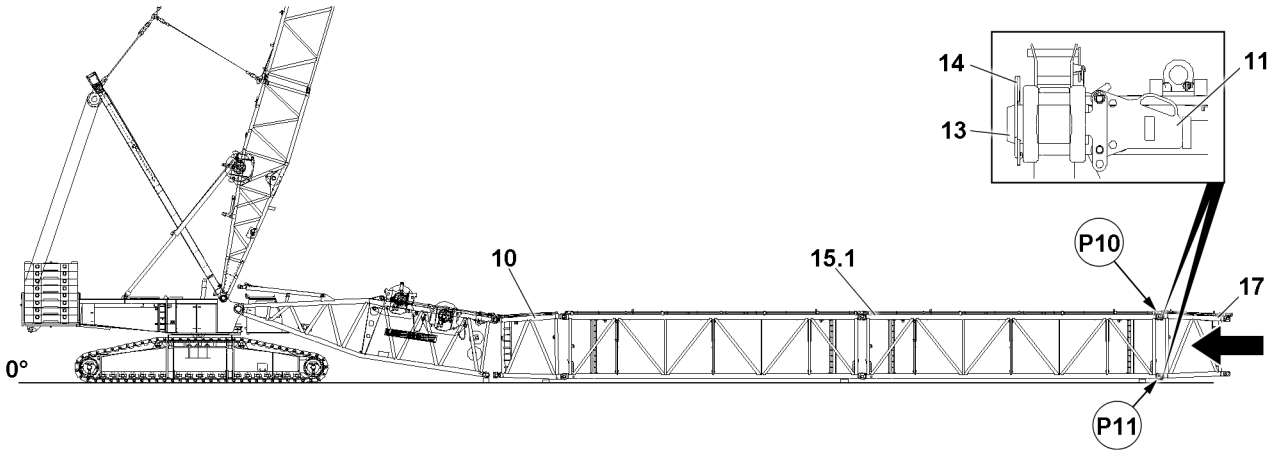

Fig.145477: Assembling the SX-reducer RO „top“

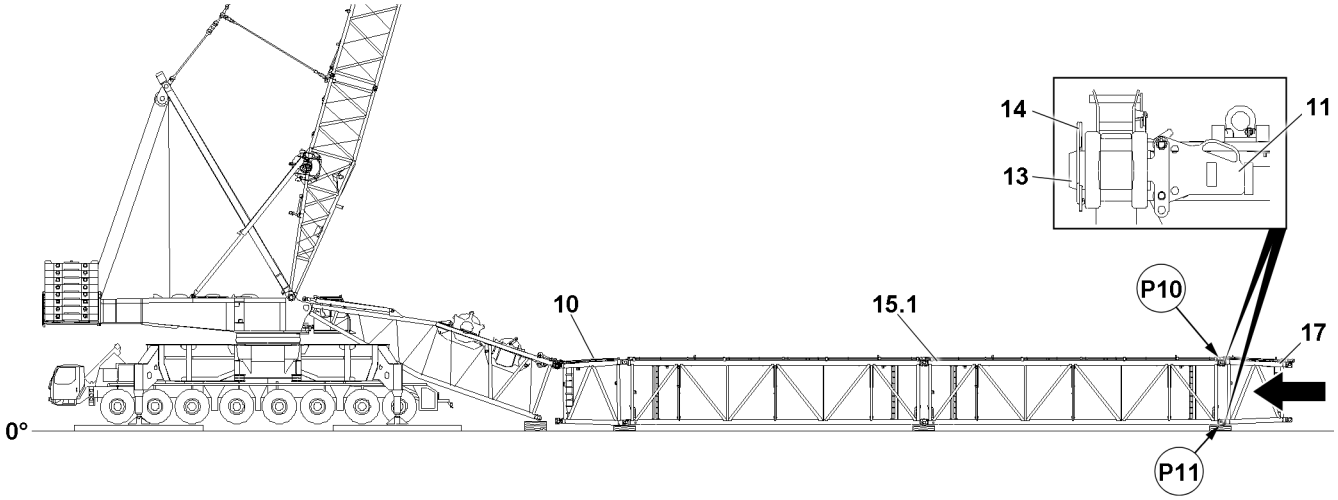

Fig.146613: Assembling the SX-reducer RO „top“

Make sure that the following prerequisites are met:
- The connector pins **13** on the SX-intermediate section **15.1** – in the direction of the SX-reducer **17** „top“ – are fully unpinned.
- The SX-intermediate sections are laying properly on the ground or on the substructure.
- The pin pulling device **11** is in the operating position.
- The auxiliary crane is removed.

Note
- ▶ The SX-reducer, **17** „top“ is pinned with the pin pulling device, see chapter 5.30.
- ▶ For easier assembly / disassembly of the SX-reducer **17** „top“, it shall be supported.

WARNING
General danger notes!
Death, severe bodily injuries, property damage.
- ▶ All connector pins **13** are to be secured after assembly of the SX-reducer **15** „top“ with the intended retaining elements **14**.

Note
- ▶ For the fastening of boom components, observe and adhere to section „Fastening points“.

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▶ Fasten the SX-reducer **17** „bottom“ to the auxiliary crane and align it with the SX-intermediate section **15.1**.

When the pin bores align in position **P10** „at the top“:

▶ Insert the connector pins **13** on both sides to the stop: Actuate the pin pulling cylinder.
▶ Secure the connector pins **13** with retaining element **14**.

When the SX-reducer **17** „top“ is pinned and secured on the SX-intermediate section **15.1** „top“:

▶ Insert the connector pins **13** „on the bottom“ in position **P11** with the pin pulling cylinders on both sides to the stop: Actuate the pin pulling cylinder.
▶ Secure the connector pins **13** with retaining element **14**.
▶ Taking the SX-boom down on the substructure
▶ Remove the auxiliary crane.

4.8 Closing the boom with S-control

4.8.1 Pinning the upper pulley block on the S-pivot section

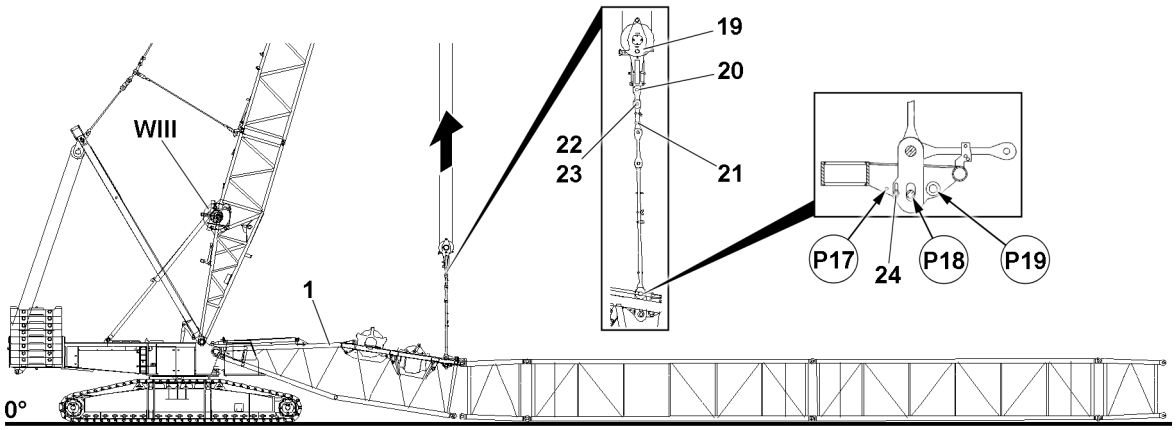

Fig.145479: Pinning the upper pulley block on the S-pivot section

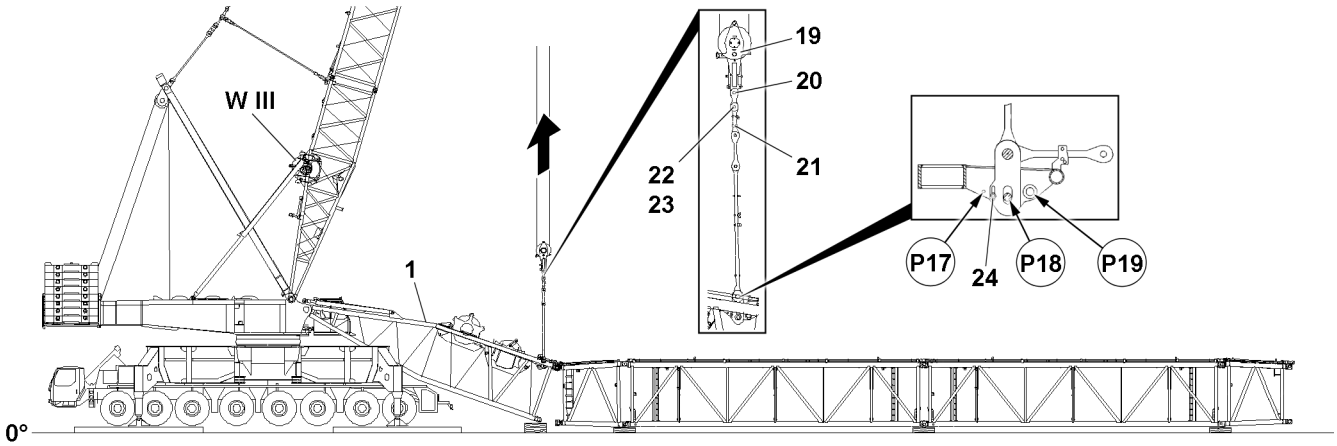

Fig.146614: Pinning the upper pulley block on the S-pivot section

To be able to „close“ the SX-boom system after assembly, it is necessary to luff the D-boom down to the front and to lower the upper pulley block via control winch 3 **WIII** to the S-pivot section **1** and to pin with the guy rods.

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Make sure that the following prerequisites are met:
- The S-pivot section **1** is pinned and secured on the turntable.
- The S-pivot section **1** is taken down onto the substructure on the ground.
- The boom system is properly assembled and secured.
- The auxiliary crane is removed.

NOTICE
Damage to the crane components!
During the assembly and crane operation, the transport retaining pin **24** must be unpinned, otherwise crane components can be damaged.
▶ Insert the transport retaining pin **24** in park position, in position **P17** and secure.

Note
▶ Pin point **P18** for flying assembly of boom with derrick.
▶ Pin point **P19** for flying assembly of boom with SA-frame.

▶ Luff the D-boom down to the front until the upper pulley block **19** hangs vertically over the guy rods **21** of the S-pivot section **1**.
▶ Remove the retaining element **23** from the lugs **20** and unpin the pin **22**.

When the pins **22** are fully removed on both sides:

▶ Lower the upper pulley block **19** until the pin bores of the lugs **20** align with the pin points of the guy rods **21**.

When the pin bores align:

▶ Insert the pin **22** on both sides completely and secure with retaining elements **23**.

4.8.2 Closing the boom system

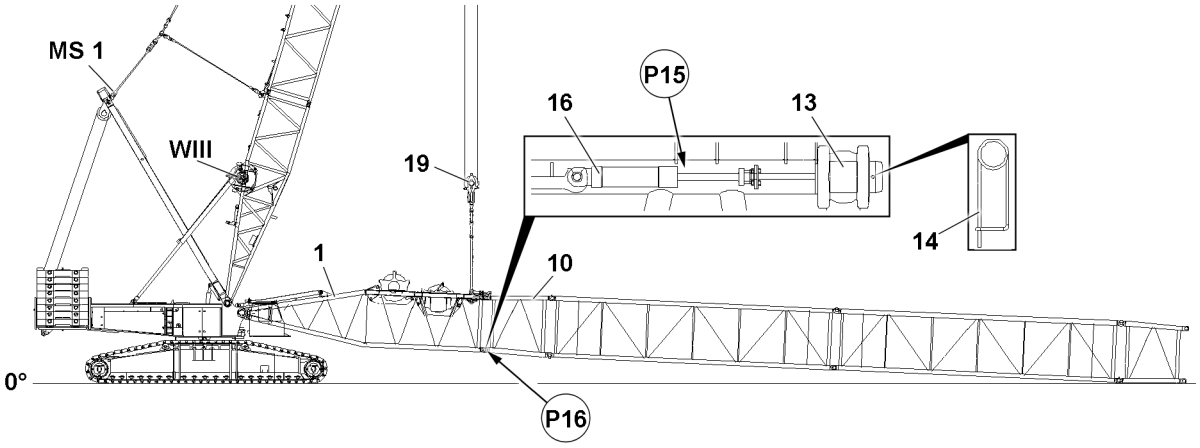

Fig.145480: Closing the boom system

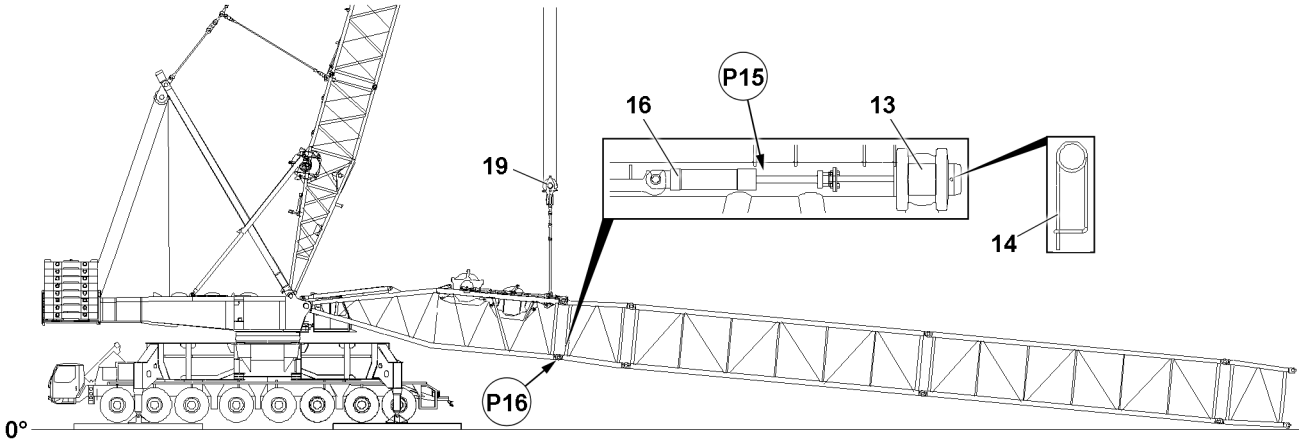

Fig.146615: Closing the boom system

Make sure that the following prerequisites are met:
- The boom system is properly assembled and secured.
- All lattice sections are properly pinned with each other.
- All pin connections are properly pinned and secured.
- The upper pulley block **19** is properly pinned and secured with the guy rods on the S-pivot section **1**.

WARNING
Overload of crane!
Death, severe bodily injuries, property damage.
- ▶ During the „closing procedure“ of the boom system, the maximum permissible F1-total force of 65 t on the test point **MS 1** may not be exceeded.
- ▶ The reducer of the corresponding SX-boom system may not lift off the ground during the „closing procedure“.
- ▶ Make sure that there are no persons on the boom system as well as in the danger zone during the closing procedure.
- ▶ Remove non-required guy rods from the lattice sections, see chapter 5.01.

Note
- ▶ The actual force on the test point **MS 1** that is exerted during the closing procedure of the boom system is shown on the LICCON monitor 1.
- ▶ Before unpinning the S-pivot section **1**: Pretension the boom system with the identical actual force on the test point **MS 1**.

Close the boom system with the upper pulley block **19**.
- ▶ Lift the SX-boom section with the upper pulley block **19** until the pin bores „on the bottom“ align in position **P16**.
- ▶ Insert the connector pin „on the bottom“ **13** with the pin pulling cylinder **16** and secure with the retaining element **14**.

WARNING
Danger of falling!
Danger of fatal injury: By unpinning the upper pulley block **19** on the S-pivot section **1**, the boom can suddenly fold down if the boom is not properly pinned and secured „on the bottom“.
Death, severe bodily injuries, property damage.
- ▶ It is prohibited for anyone to remain under the raised boom system during the pinning / unpinning procedure.
- ▶ Unpin the upper pulley block **19** on the S-pivot section **1** only when it is ensured that the S-pivot section **1** is properly pinned and secured „on top“ and „bottom“ with the SX-reducer **10**.

When the S-pivot section **1** is „closed“ with the SX-reducer **10**:
- ▶ Remove the upper pulley block **19** from the guy rods.

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▶ Continue the boom system to the required system length.

4.9 Closing the boom on the SX-reducer RO

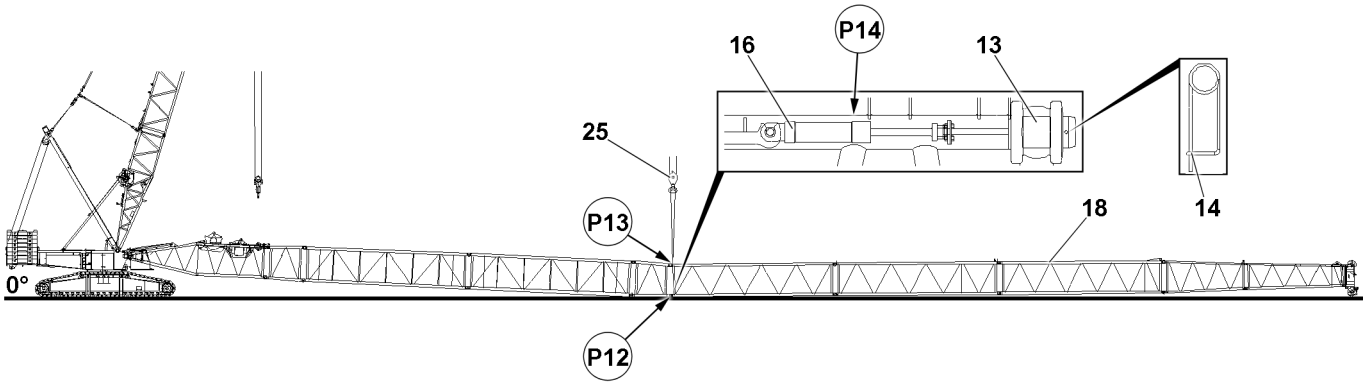

Fig.145478: Closing the boom on the SX-reducer RO

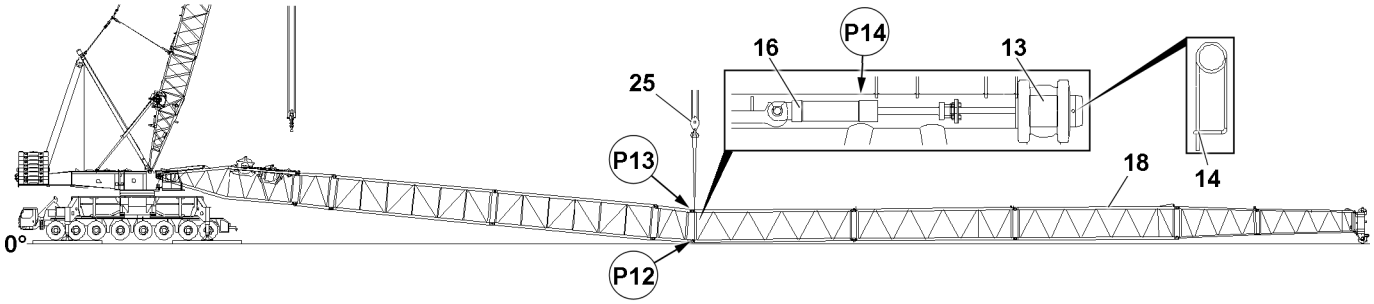

Fig.146616: Closing the boom on the SX-reducer RO

Make sure that the following prerequisites are met:
- The boom system is properly assembled and secured.
- The S-pivot section and the SX-boom system are closed.
- An auxiliary crane with sufficient load carrying capacity is available.
- The upper pulley block is removed from the guy rods.

WARNING
General danger notes!
Death, severe bodily injuries, property damage.
▶ All connector pins **13** are to be secured after assembly of the boom system **18** with the intended retaining elements **14**.

▶ Fasten the auxiliary crane **25** to the S-intermediate section in position **P13**.
▶ Place the pin pulling cylinders **16** in position **P14**.

Close the boom system with the auxiliary crane **25**:
▶ Lift the boom section with the auxiliary crane **25** until the pin bores „on the bottom“ align in position **P12**.
▶ Insert the connector pin „on the bottom“ **13** with the pin pulling cylinder **16** and secure with the retaining element **14**.

When the boom system is closed:

▶ Remove the auxiliary crane **25**.

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5 Assembling the guy rods

WARNING
Impermissible guying!
Death, severe bodily injuries, property damage.

Special guy rods are used when assembling an SX-boom system:
- ▶ Make sure that all guy rods are marked for an SX-boom system with **X**.
- ▶ Any other arrangement of the guy rods than specified in the operating instructions or the rod plans is prohibited.
- ▶ The numbering on the guy rods must be identical to the numbering in the rod plan.
- ▶ Remove the S- or SL-guy rods for the lattice sections from the transport receptacles and replace them with SX-guy rods.

WARNING
Neglected inspection and maintenance on the guy rods!
If the regular inspection and maintenance of the guy rods is not carried out or only in irregular intervals, then severe accidents can occur due to existing and not recognized damage on the guy rods.
Death, severe bodily injuries, property damage.
- ▶ The guy rods must be checked before every assembly, see chapter 8.15.

Note
- ▶ Always assemble and secure the guy rods according to the separately supplied rod plans.

5.1 Assembling the lugs

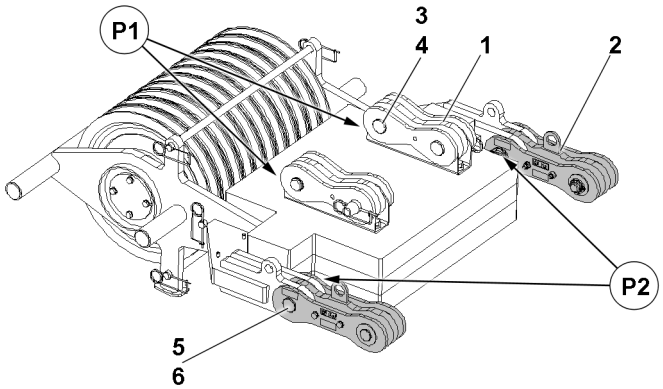

Fig.145488: Assembling the lugs on the upper pulley block

- ▶ Lower the upper pulley block until the lugs **2** can be assembled.
- ▶ Remove the lugs **1**: Remove the retaining element **4** and unpin the pin **3**.
- ▶ Pin the lugs **1** in position **P1** in the park position and secure with the retaining element **4**.
- ▶ Remove the pin **5** and retaining element **6** from the lug **2**.
- ▶ Pin the lug **2** in position **P2** with the pin **5** and secure with the retaining element **6**.

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5.2 Assembling the upper pulley block on the guy rods

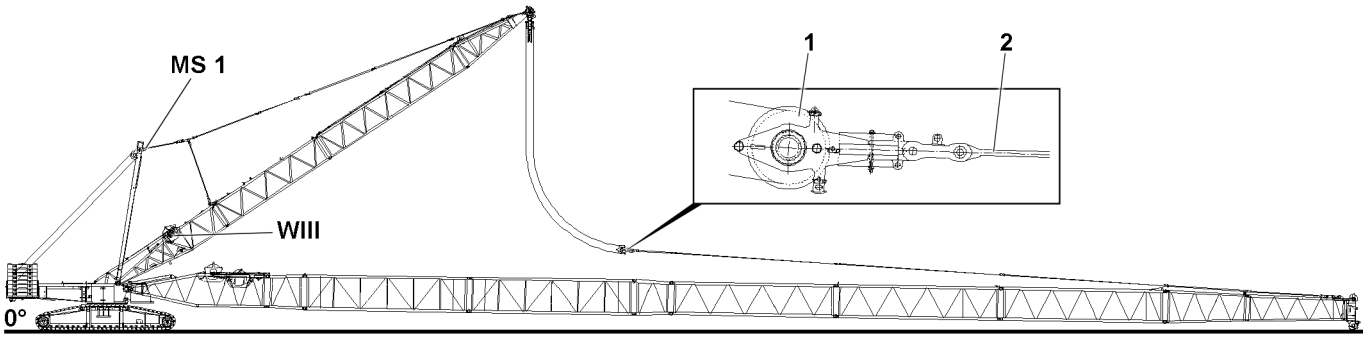

Fig.145487: Assembling the upper pulley block on the guy rods

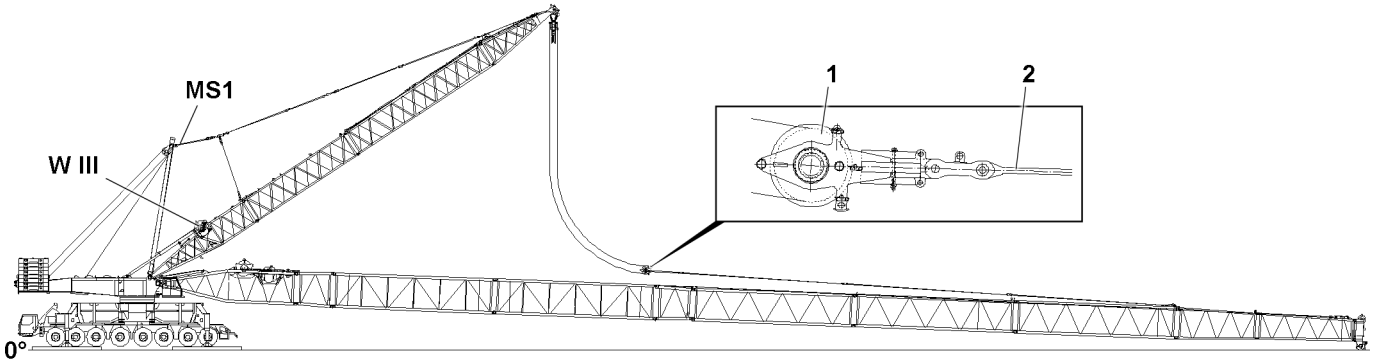

Fig.146617: Assembling the upper pulley block on the guy rods

Make sure that the following prerequisites are met:
- The boom is completely assembled.
- All lattice sections are properly pinned with each other.
- The pin connections are secured.
- The upper pulley block **1** is unpinned on the S-pivot section.
- The lugs are assembled.

Depending on the use configuration of the boom system:
- The SX-guy rods are taken down in the transport retainers of the main boom-lattice sections.
  or:
  The S-guy rods are taken down in the transport retainers of the main boom-lattice sections.

The guy rods **2** are taken down and secured for transport on the corresponding intermediate sections. Before assembly, the transport retainers must be released.

▶ Release the transport retainers of the guy rods **2**.
▶ Luff the D-boom down to the front.
▶ Lower the upper pulley block **1** to the boom: Spool out winch 3 **WIII**.

NOTICE
Danger of property damage!
If the pins of the guy rods **2** are not pinned from the „inside“ to the „outside“, the hoist rope can scrape on the pins and be damaged.
▶ Always insert the pins of the guy rods from the „inside“ to the „outside“.
▶ Pay attention to the separate rod plan.

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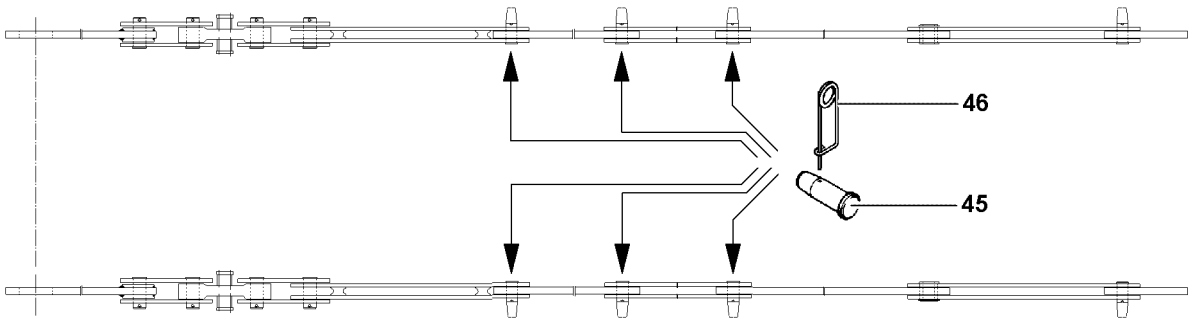

Fig.124900: Pinning the guy rods from the „inside“ to the „outside“

Note

- The guy rods **2** of the S- / L-intermediate sections are pinned with each other and secured starting from the brackets on the fixed point of the respective end section or starting from the brackets on the L-adapter.

- Pin the guy rods **2** of all intermediate sections: Insert the pin **45** from the „inside“ to the „outside“ and secure with the spring retainer **46**.
- Pin and secure the guy rods **2** with the upper pulley block **1**.

WARNING

Danger of falling!
If the auxiliary guying is not assembled on the boom or not according to the specifications, then the boom can buckle downward, break off and fall down during erection.
Death, severe bodily injuries, property damage.

- Make sure that the auxiliary guying is assembled correctly, see the Rod plan.

Note

- Depending on the boom system, an additional auxiliary guying frame and an additional auxiliary guying is required for boom guying. Refer to rod plan for the respectively necessary auxiliary guying frame or the auxiliary guying.

- Assemble the auxiliary guying.

WARNING

The crane can topple over!
During erection of the D-boom in the operating position, the crane can topple over to the rear.
Death, severe bodily injuries, property damage.

- Make sure that the main boom does **not** lift off the ground when erecting the D-boom.
- Make sure that the guying between the D-boom and the main boom are always tensioned during erection.

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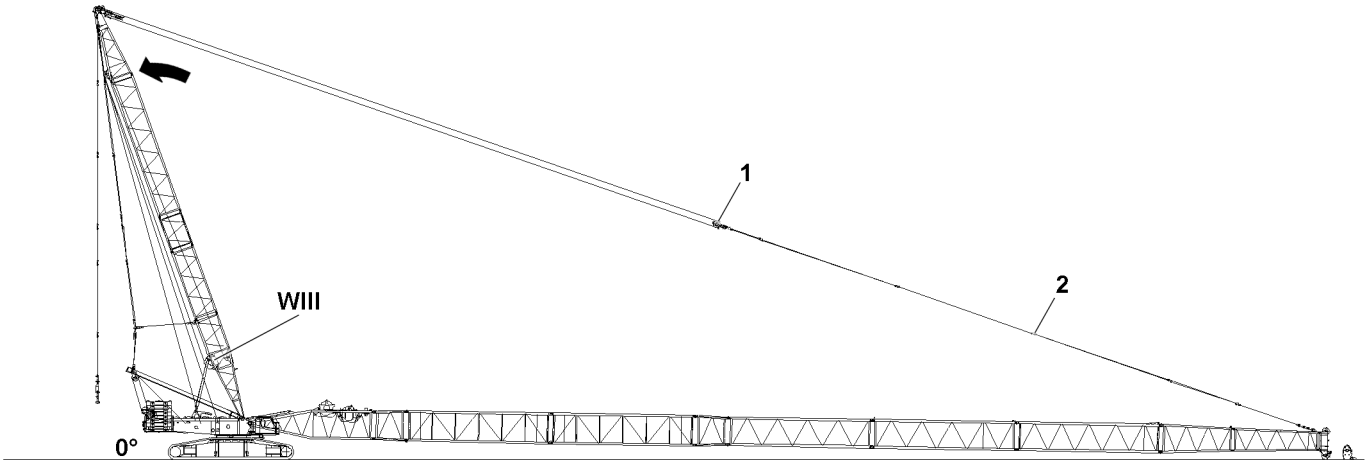

Fig.146622: D-boom in the operating position - tensioning the main boom guying

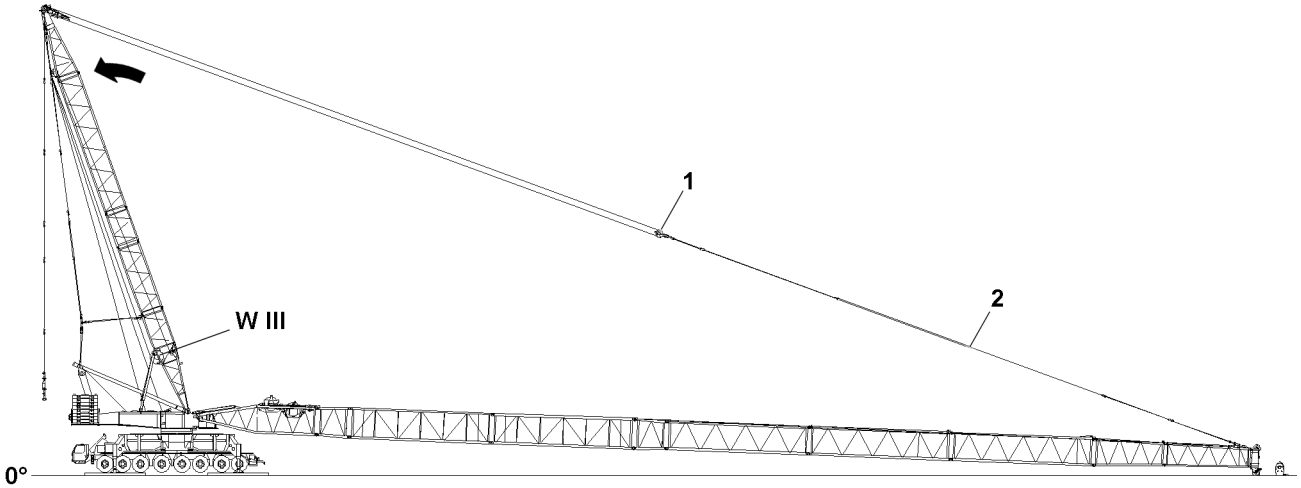

Fig.146623: D-boom in the operating position - tensioning the main boom guying

When the guy rods **2** are pinned and secured with the upper pulley block **1**:

▶ Erect the D-boom to operating position and at the same time, spool out winch 3 **WIII**.

5.3 Assembling the derrick ballast

Make sure that the following prerequisites are met:

– The crane is properly supported (only LG-crane or LR-crane with the crane support).
– The crane is horizontally aligned.

WARNING
Improper assembly of the derrick ballast!
Death, severe bodily injuries, property damage.

▶ Pay attention to the derrick assembly chapter.
▶ Observe the erection / take-down charts.

When the D-boom is in the operating position and the main boom guying is tensioned:

▶ Assemble the derrick ballast on the crane, see chapter 5.35.xx or 5.36.xx.

WARNING
Danger of falling!
If the following notes are not observed, the boom can suddenly fold down when the auxiliary crane or the substructure is removed.
Death, severe bodily injuries, property damage.
▶ Remove the auxiliary crane or the substructure only if it is ensured that the D-boom is in operating position and the main boom is safely being held by the guying.

When the main boom is safely held by the guying:
▶ Remove the auxiliary crane on the boom head or on the L-adapter.
or
Remove the substructure.
▶ Guide the hoist rope over the rope pulley(s) on the boom head, see the Reeving plan.

5.4 Assembling the auxiliary guying frame

Depending on the boom system, an additional auxiliary guying frame and an additional auxiliary guying is required for boom guying. Refer to rod plan for the respectively necessary auxiliary guying frame or the auxiliary guying.

Note
▶ Auxiliary guying assembly, see chapter 5.03.
▶ Observe and adhere to the Rod plan.

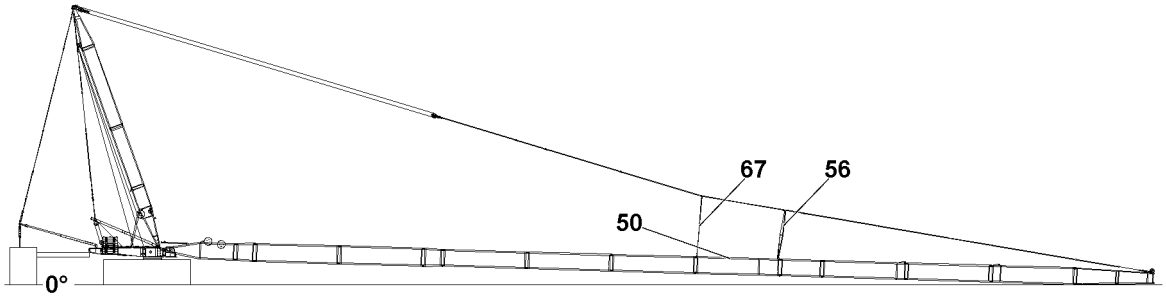

Fig.145252: The boom system with the auxiliary guying frame and auxiliary guying

50 S-intermediate section 3326.30 RO
56 Auxiliary guying frame
67 Auxiliary guying

Make sure that the following prerequisites are met:
– The boom system is properly assembled and secured.
– The required guy rods are installed and secured according to the rod plan.

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5.4.1 Assembling the tension straps

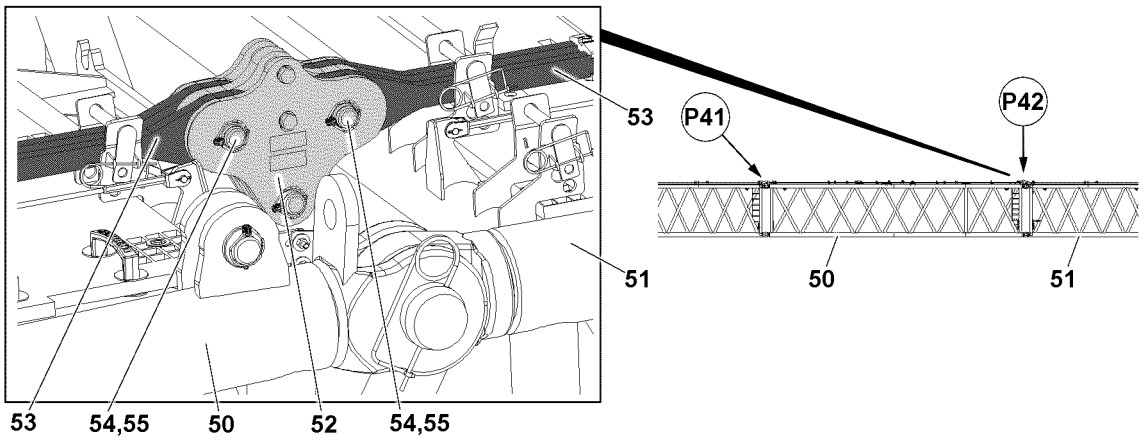

Fig.145244: Tension strap

Install the tension straps **52** of the auxiliary guying frame in the rod strand at points **P42**.

▶ Disconnect the rods at points **P42**: Unpin the pin.

Note

▶ The weight of the tension strap **52** is 60 kg.

▶ Fasten the tension straps **52** to the auxiliary crane.
▶ Unpin the tension straps **52** from the auxiliary guying frame: Remove the retaining element and unpin the pin.
▶ Swing the tension straps **52** with the auxiliary crane to the pin location.

When the pin bores align:

▶ Insert the pin **54** at points **P42** and secure with the retaining elements **55**.

Note

▶ Not every boom system requires auxiliary guying. Refer to the rod plan if auxiliary guying is required.
▶ Auxiliary guying assembly, see chapter 5.03.
▶ Observe and adhere to the Rod plan.

If necessary:

▶ Install the tension straps for the auxiliary guying at points **P41** in the rod strand.

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5.4.2 Pinning the auxiliary guying frame on the lugs of the S-intermediate section 3326.30 RO

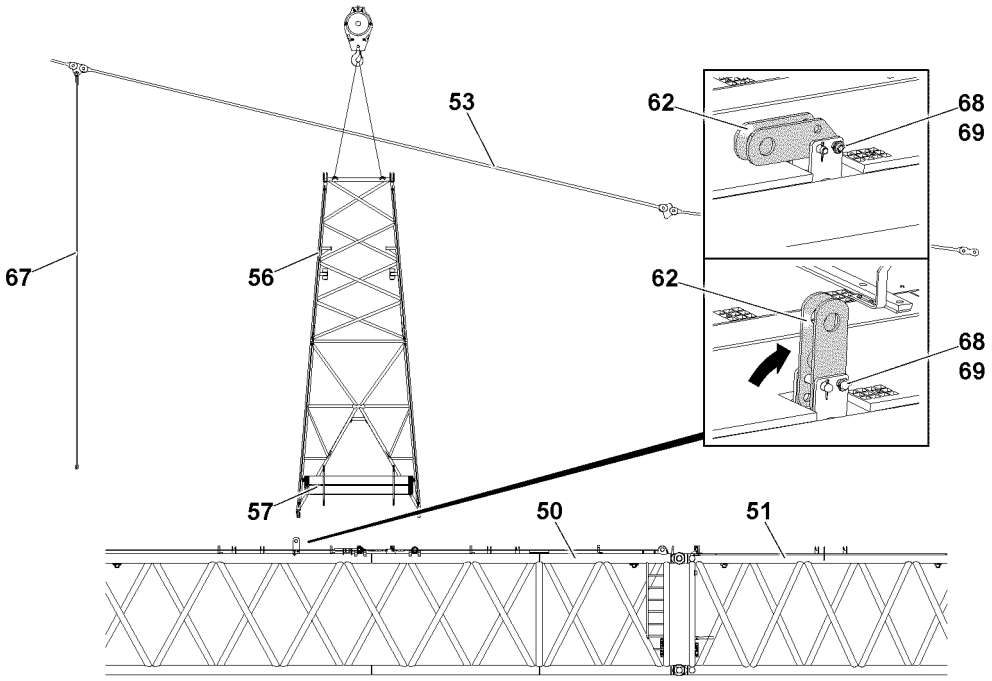

Fig.145245: Swinging the auxiliary guying frame

Make sure that the following prerequisite is met:
– The tension straps are pinned and secured with the guy rods of the rod strand.

Note
- ▶ Not every boom system requires auxiliary guying. Refer to the rod plan if auxiliary guying is required.
- ▶ Auxiliary guying assembly, see chapter 5.03.
- ▶ Observe and adhere to the Rod plan.

If necessary:
- ▶ Pin the auxiliary guying **67** with the guy rods **53** and secure.
- ▶ Tension the boom guying.
- ▶ Release the lugs **62** out of the transport position, remove the retaining element **69** and unpin the pin **68**.
- ▶ Swing the lugs **62** into the operating position.
- ▶ Secure the lugs **62** in the operating position: Insert the pin **68** and secure it with the retaining element **69**.
- ▶ Fasten the auxiliary guying frame **56** to the auxiliary crane.
- ▶ Insert the auxiliary guying frame **56** with the auxiliary crane between the guy rods **53** of the boom guying.

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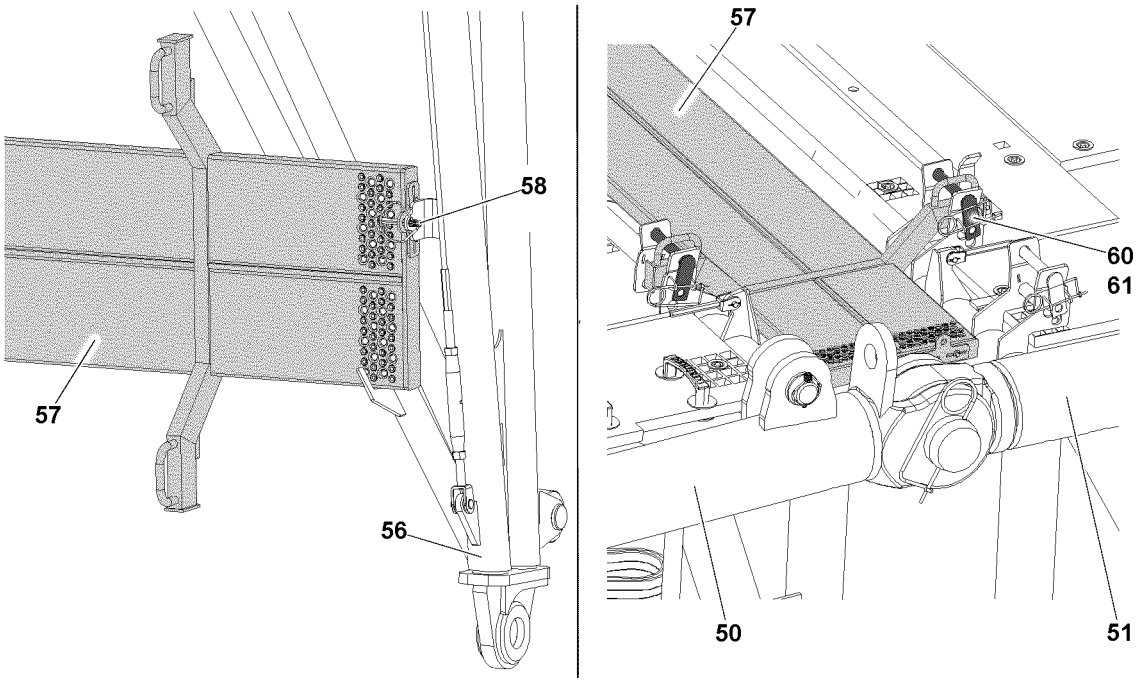

Fig.145243: Catwalk

Note

▶ The weight of the catwalk **57** is 22 kg.

WARNING

Falling catwalk!

The catwalk **57** can fall down by itself due to its own weight when it is unpinned.

Death, severe bodily injuries.

Fingers and hands can be crushed.

▶ For safety reasons, disassemble the catwalk **57** always with **two** persons.

▶ Hold the catwalk **57** during the unpinning procedure.

▶ Do not reach with your hands into the danger zone.

▶ Use personal protective equipment.

▶ Remove the retaining element **58**.

▶ Remove the catwalk **57** from the transport position.

▶ Insert the catwalk **57** between the S-intermediate section 3326.30 RO **50** and the S-intermediate section **51**.

▶ Pin the catwalk **57**: Insert the pin **60** and secure it with the retaining element **61**.

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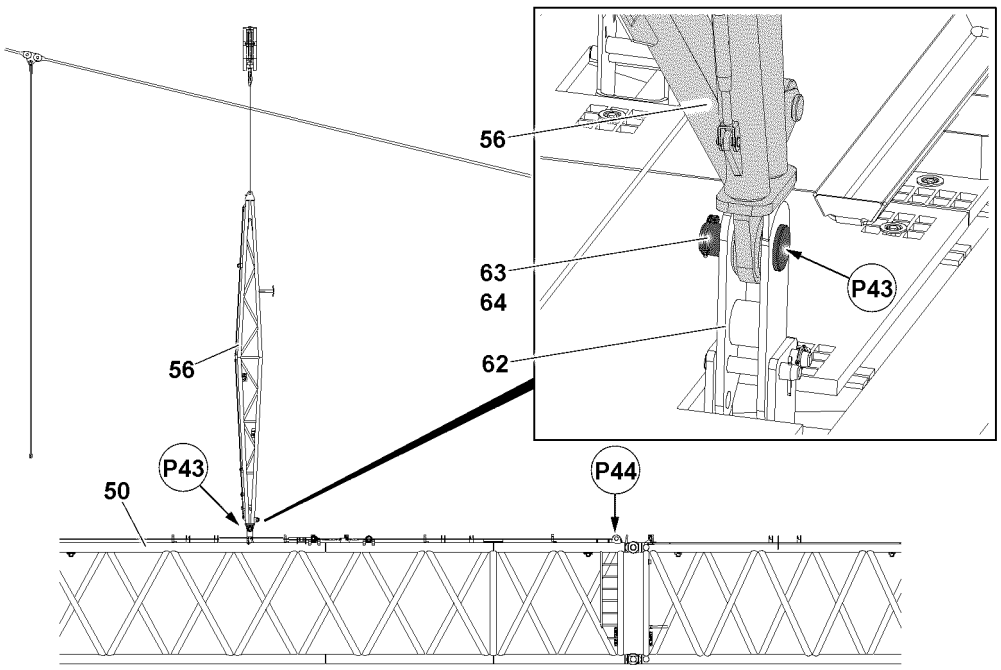

Fig.145246: Pinning the auxiliary guying frame

▶ Swing the auxiliary guying frame **56** with the auxiliary crane to the pin location in point **P43**.

Note

▶ Remove the pin **63** and retaining element **64** from the pin location in point **P44**.

When the pin bores align:

▶ Insert the pin **63** on the lugs **62** at points **P43** and secure with the retaining element **64**.

5.4.3 Pinning the auxiliary guying frame to the auxiliary lugs of the rod strand

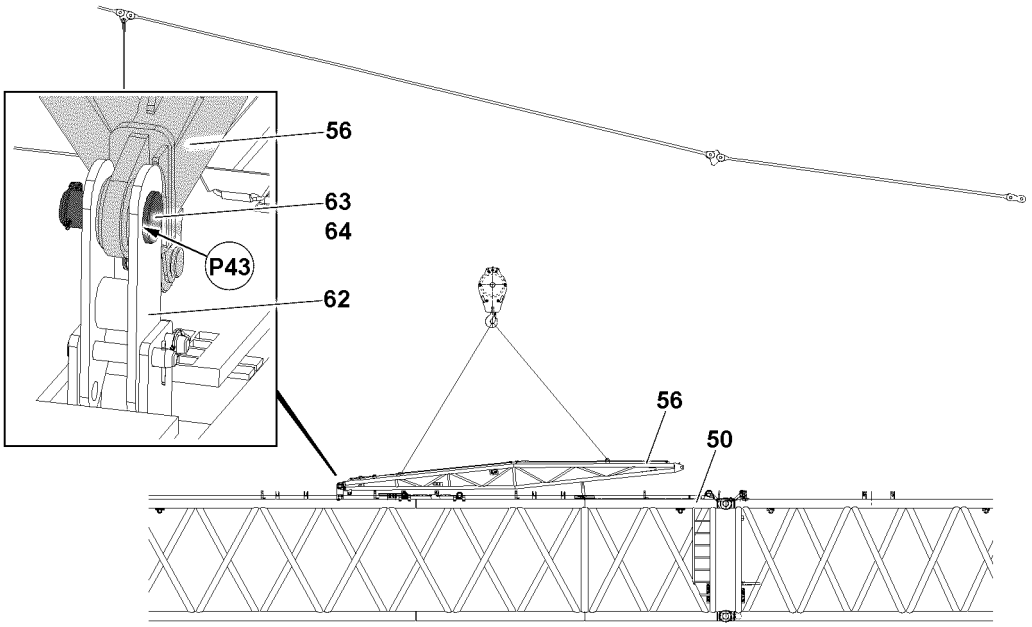

Fig.145247: Unpinning the auxiliary guying frame

▶ Take the auxiliary guying frame **56** down with the auxiliary crane.

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- ▶ Rehang auxiliary crane.
- ▶ Unpin the auxiliary guying frame **56** on the lugs **62**: Remove the retaining element **64** at points **P43** and unpin the pins **63**.

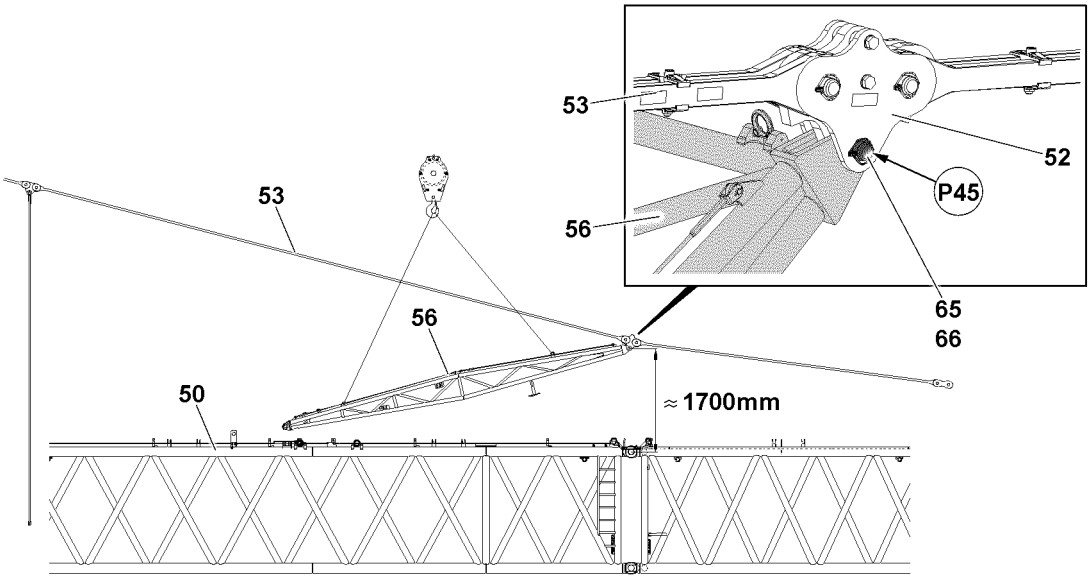

Fig.145248: Pinning the auxiliary guying frame

- ▶ Lower the boom guying.
- ▶ Pin the auxiliary guying frame **56** suspended with the tension straps **52**: Insert the pin **65** at points **P45** and secure with the retaining element **66**.

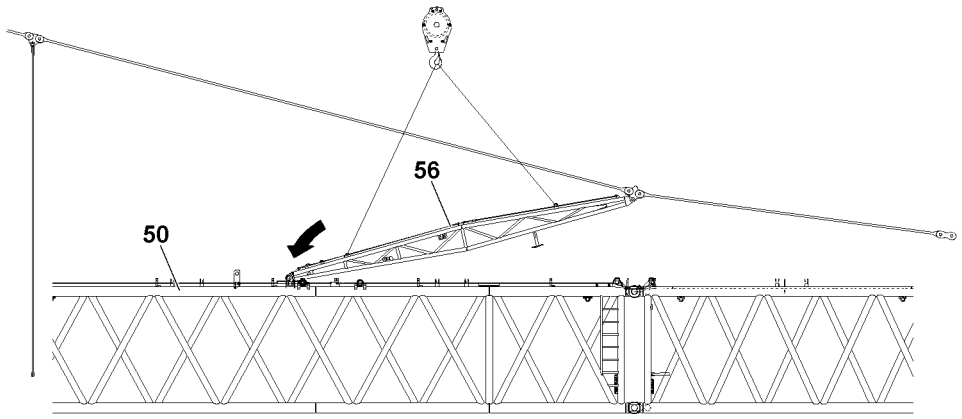

Fig.145249: Setting down the auxiliary guying frame

- ▶ Set the auxiliary guying frame **56** down with the auxiliary crane.

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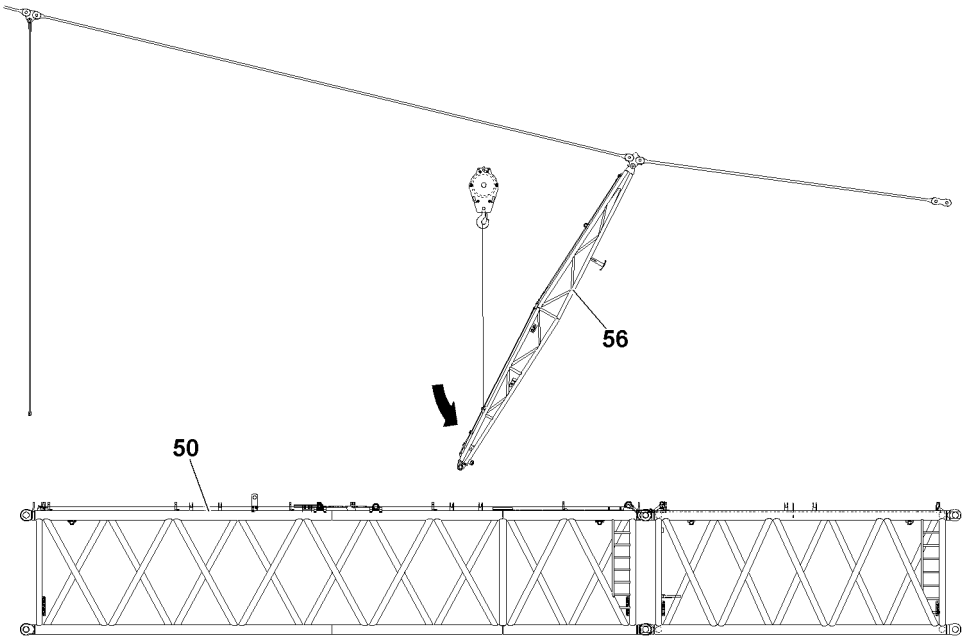

Fig.145250: Carrying the auxiliary guying frame along

- ▶ Rehang auxiliary crane.
- ▶ Tension the boom guying.
- ▶ Carry the auxiliary guying frame **56** along with the auxiliary crane to the pin location.

5.4.4 Pinning the auxiliary guying frame on the S-intermediate section 3326.30 RO

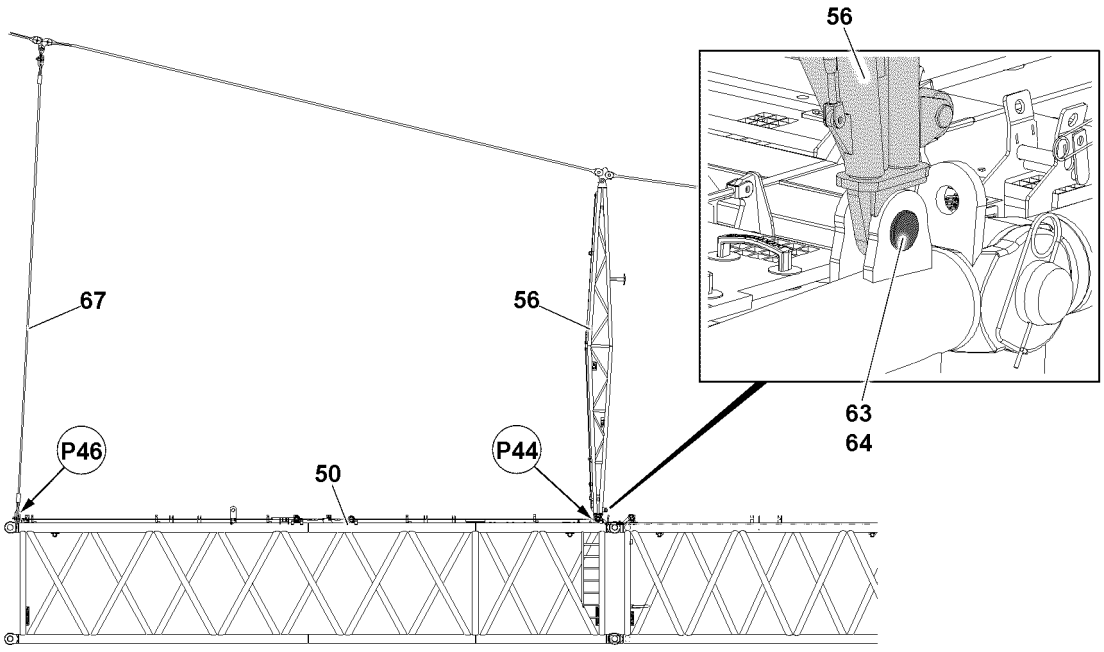

Fig.145251: Pinning the auxiliary guying frame

When the pin bores align:

- ▶ Insert the pin **63** at points **P44** and secure with the retaining element **64**.

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Result:

– The auxiliary guying frame **56** is pinned and secured with the S-intermediate section 3326.30 RO **50**.

Note

▶ Not every boom system requires auxiliary guying. Refer to the rod plan if auxiliary guying is required.
▶ Auxiliary guying assembly, see chapter 5.03.
▶ Observe and adhere to the Rod plan.

If necessary:

▶ Pin the auxiliary guying **67** at points **P46**.

6 Establishing the electrical connections to the boom end section

Make sure that the following prerequisites are met:

– The boom system is properly assembled and secured.
– The boom end section is properly assembled and secured.

NOTICE

Danger of damage to the electrical connections!
If the electrical connection from the cable drum in the S-pivot section to the terminal box on the S-pivot section is established first before the connection to the terminal box on the boom end section, then the electrical connection will be damaged when spooling out the cable drum.

▶ Establish first the electrical connection from the cable drum in the S-pivot section to the terminal box on the boom end section and then the electrical connection from the terminal box in the S-pivot section to the cable drum in the S-pivot section.

Note

▶ To establish the electrical connections on the S-boom: Use the Electrical wiring diagram.

▶ Establish the electrical connections.
▶ Make sure that all electrical connections on the boom are established.

WARNING

Malfunction if dummy plugs are not installed!
If the dummy plugs on the non-required electrical connections are not installed, then malfunctions or functional limitations can occur on the crane.

▶ Make sure that all non-required electrical connections, which have a dummy plug are closed off with dummy plugs.
▶ Pay attention to the Electrical wiring diagram.

▶ As a rule, close off on-required electrical connections (for example for accessories which cannot be installed) with the respective dummy plugs.

NOTICE

Property damage due to dirt and / or corrosion!
If non-required electrical connections are not closed off with the respective protective caps, then dirt and / or corrosion can damage the electrical connections.
This could result in malfunctions.

▶ Make sure that all non-required electrical connections are always closed off properly.
▶ Pay attention to the Electrical wiring diagram.

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▶ Close electrical connections, which have no dummy plugs, properly off with the corresponding protective caps.

7 Function check

WARNING
Non-functioning safety equipment!
Death, severe bodily injuries, property damage.
▶ Crane operation with non-functioning safety equipment is **prohibited**.

Note
▶ The function of the individual limit switches must be checked before erection of the boom system.
▶ The function of the limit switch initiators must be checked in the test system, see the Diagnostics manual.

Note
▶ If a function check on the limit switches or on the safety equipment does not lead to the desired shut offs, then the plug connections on the connector boxes or the components itself must be checked. If no visible connection errors or component defects can be found, contact the Liebherr-Werk Ehingen GmbH Customer Service.

Make sure that the following prerequisites are met:
– All electrical connections have been made.
– The crane engine is running.
– The corresponding operating mode is set on the LICCON monitor.
– The actuator levers of the limit switches have been checked for easy movement and are lubricated.

7.1 Wind speed sensor

▶ Check the movement and the function of the wind speed sensor.

7.2 Airplane warning light

▶ Turn the airplane warning light on, see chapter 4.01.
▶ Check the function visually.

7.3 Hoist limit switch

▶ Actuate the hoist limit switch manually on the pulley head.

Result:

– The hoist winch turns off in upward movement.
– The hoist top icon on the LICCON monitor 0 blinks.

7.4 Checking the limit switch D-boom „Steepest position“

Note
▶ The limit switch functions have to be checked individually before erection.

▶ Cover the limit switch initiators on the D-relapse cylinders individually with a metal plate.

Result:

– The limit switch is actuated manually.
– The spool up function of winch 4 (control winch) turns off.
– The icon „Boom limitation“ appears on the LICCON monitor 0.

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7.5 Checking the limit switch S / HS-boom „steepest position“

Note
▶ The limit switch functions have to be checked individually before erection.

▶ Cover the limit switch initiators on the S-relapse cylinders individually with a metal plate.

Result:

– The limit switch is actuated manually.
– The spool up function of winch 3 turns off.
– The icon „Boom limitation“ appears on the LICCON monitor 0.

8 Erecting the boom

WARNING
Danger of toppling the crane!
In crane operation with exceeded LICCON overload protection, the crane can topple over.
Death, severe bodily injuries, property damage.
▶ The radii listed in the load chart may not be exceeded or fallen below, even if there is no load on the hook.

If required in the erection and take down chart:
▶ Carry the hook block along with the auxiliary crane.

WARNING
Danger of toppling the crane!
If the following conditions are not met before erecting the boom, the crane can topple over.
Death, severe bodily injuries, property damage.
▶ It is not permitted to turn the crane during the erection procedure.
▶ Observe the specifications in the erection and take-down charts.
▶ Observe the technical safety instructions, see chapter 5.01.
▶ Extend the S-relapse cylinders before erecting the boom combination.
▶ Do not allow slack rope formation on the control winch.

WARNING
Danger of falling!
If the hoist rope is not reeved with the respective length on the boom before the erection procedure, then it can fall backward due to its own weight.
Death, severe bodily injuries, property damage.
▶ Reeve in the hoist rope with sufficient length on the boom before the erection procedure.
▶ The hoist rope must be constantly monitored during erection.
▶ Do not step into the danger zone.

WARNING
Unutilized guy rods on boom!
If guy rods are on the lattice sections which are not used for operation, then there is a danger of accidents.
Death, severe bodily injuries, property damage.
Guy rods can loosen up and fall down.
The load chart is invalid.
The load display of the LICCON computer system shows an incorrect value.
The weight of the boom is too heavy for erection.
▶ Disassemble and remove unutilized guy rods on the transport retainers before erecting the boom.

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Make sure that the following prerequisites are met:
- The crane is horizontally aligned.
- The electrical connections have been made.
- The limit switches are functioning.
- The central ballast is installed according to the erection and take-down charts.
- The counterweight has been installed on the turntable according to the erection and take-down charts.
- The pin connections are secured.
- The hoist rope has been correctly placed in the rope pulleys and is prevented from jumping out with the rope retaining pins.
- Non-required guy rods are disassembled.
- There are no loose parts on the boom.
- The boom is free of snow, frost and ice.
- The LICCON overload protection has been set according to the data in the load chart.
- The load weighing was carried out on the boom and the hook block weight has been entered on the LICCON monitor, see chapter 4.02.
- The LICCON overload protection settings have been compared with the actual set up configuration.
- The LICCON overload protection is exceeded.
- The assembly icon is visible on the LICCON monitor.
- No persons are present in the danger zone.
- No obstacles or objects are within the danger zone.

8.1 Extending the S-relapse cylinders

WARNING
Danger of toppling the crane!
If the S-relapse cylinders are not extended before erecting the boom, then the boom can fall down towards the rear during crane operation and the crane can topple over.
Death, severe bodily injuries, property damage.
- ▶ Make sure that the S-relapse cylinders **2** do not collide with the D-relapse cylinders when extending them.
- ▶ Extend the S-relapse cylinders **2** only when the D-boom is in the operating position.
- ▶ Extend the S-relapse cylinders **2** before erecting the boom.
- ▶ Secure the ball valve **1** during crane operation to prevent inadvertent actuation.

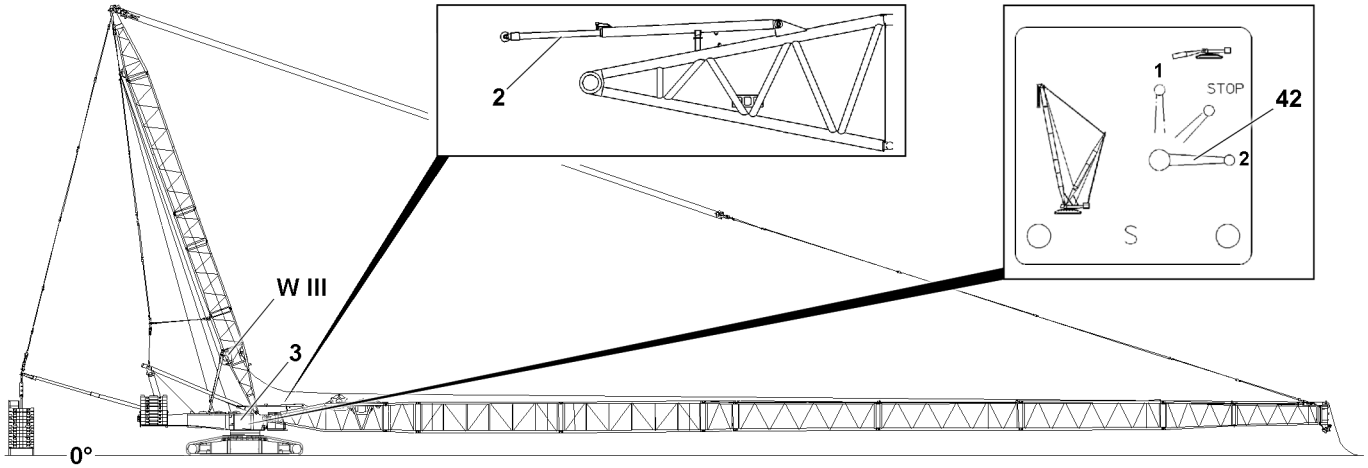

Fig.145490: Extending the S-relapse cylinders

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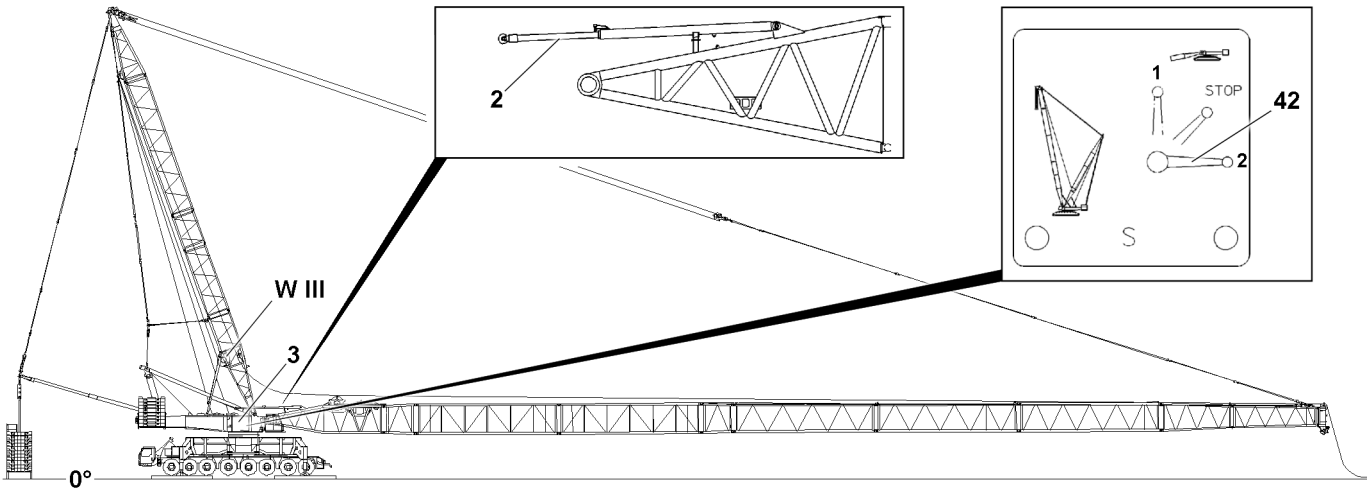

Fig.146619: Extending the S-relapse cylinders

Ball valve positions	
2	Crane operation, extend the piston rod
1	Assembly, retract the piston rod
STOP	The piston rod cannot be retracted / extended

The piston rods on the S-relapse cylinders **2** can be moved out with the ball valve **1**.

▶ Set the ball valve **1** to **Position 2**.

Result:

– The piston rods of the S-relapse cylinders **2** move out.

Note

▶ The ball valve **1** is secured by closing the cabinet door **3** and removing the key.

▶ Close the cabinet door **3** and pull out the key.

▶ Hand the key to an authorized person.

8.2 Reeving in the hook block

▶ Check the actual load on the LICCON monitor.

Problem remedy

The actual load on the LICCON monitor is greater than 0.0 t.

▶ Observe the notes for input of hook block weight, see chapter 4.02.

WARNING

Danger of falling!

If the hoist rope is not reeved with the respective length on the boom before the erection procedure, then it can fall backward due to its own weight.

Death, severe bodily injuries, property damage.

▶ Reeve in the hoist rope with sufficient length before the erection procedure.

▶ The hoist rope must be constantly monitored during erection.

▶ Do not step into the danger zone.

Note

▶ Hoist rope reevings, see chapter 4.06 and Reeving plan.

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- ▶ Reeve in the hook block properly and secure the hoist rope on the rope fixed point, for reeving, see the reeving plan.
- ▶ Attach the hoist limit switch weight.
- ▶ Enter the weight of the hook block in the LICCON computer system.

8.3 Erecting the boom

WARNING
Danger of toppling the crane!
In crane operation with exceeded LICCON overload protection, the crane can topple over.
There is no additional protection against crane overload.
Death, severe bodily injuries, property damage.
- ▶ The radii listed in the load chart may not be exceeded or fallen below, even if there is no load on the hook.
- ▶ Crane operation with deactivated LICCON overload protection is prohibited.

If required in the erection and take down chart:
- ▶ Carry the hook block along with the auxiliary crane.

Note
- ▶ When the lowest operating position of the boom is reached, the LICCON overload protection is activated.
- ▶ The displays on the LICCON monitor turn off.
- ▶ In the maximum load icon, instead of the display „???“ a load number appears in „t“.

- ▶ Luff the boom up to the lowest operating position.

When the boom has reached the lowest operating position:
- ▶ Make sure that the assembly icon on the LICCON monitor turns off.

Result:

– The LICCON overload protection is active.

9 Operating the crane

9.1 Preparing for crane operation

Note
- ▶ Observe the notes, see chapter 4.02, chapter 4.05, chapter 4.08 and chapter 5.01.

Make sure that the following prerequisites are met:
– The LICCON overload protection is active.
– The LICCON overload protection has been set according to the data in the load chart.

WARNING
Danger of toppling the crane!
- ▶ Check the horizontal position of the crane before and during crane operation.
- ▶ If the crane operator leaves the cab, even for a short time, the operating mode setting must be checked and reset if necessary before resuming crane operation.

9.2 Checking the settings

- ▶ Check the function of the overload protection by running against the operating positions „on top“ and „bottom“.
- ▶ Check the hoist limit switch by running against the hoist limit switch weight.
- ▶ Check the function of the limit switches „Boom steep“ on the relapse cylinders.

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10 Disassembling the boom

WARNING
Danger of falling!
During assembly / disassembly, inspection and maintenance work, assembly personnel must be secured with appropriate aids to prevent them from falling.
Death, severe bodily injuries, property damage.
- ▶ All work at a height, when there is a danger of falling, must be carried out with suitable aids.
- ▶ If aids are not available and work cannot be carried out from the ground, then assembly personnel must secure themselves with the supplied fall arrest system to prevent falling, see chapter 2.04.
- ▶ If fall protection equipment is available, then it must be used, see chapter 2.06.
- ▶ When lifting, lowering, swinging crane parts in and out, no persons may remain in the danger zone.
- ▶ When closing or opening boom systems during boom assembly or boom disassembly, no persons may remain on the boom system or in the danger zone.
- ▶ If railings are present on the components, then they must be brought into the corresponding position and secured for assembly / disassembly work.
- ▶ Only step on the aids, ladders and catwalks with clean shoes.
- ▶ Keep aids, ladders and catwalks free of heavy dirt, snow and ice.
- ▶ During all assembly and disassembly work, maintenance work and inspections, travel or crane operation is prohibited.
- ▶ Remaining on a suspended load is prohibited.
- ▶ Stepping or walking on crane components and lattice sections, which have an incline of more than 20° is prohibited.
- ▶ For all assembly work, the crane driver of the main crane must be in voice contact with the crane driver / crane drivers of the auxiliary crane / auxiliary cranes.
- ▶ For assembly tasks, the crane driver may only initiate crane movements when the responsible guide has explicitly released the movement.

WARNING
Danger of falling!
If the lattice sections are not pinned and secured correctly, then they can fall down.
Death, severe bodily injuries, property damage.
- ▶ Pin or unpin both pins at the same horizontal level, i.e. **left and right**.
- ▶ Do not stand under the lattice sections or within the entire danger zone during the pinning and unpinning procedure of the boom.
- ▶ Safely secure the pins in the storage locations as well as in the receptacles.
- ▶ It is prohibited to lean the ladder against the component being disassembled.

WARNING
Danger of impact / crushing!
When installing / removing crane components with the auxiliary crane, crane components can start to swing back and forth.
When lifting / lowering and positioning crane components, there is an increased danger of impacts / crushing.
Death, severe bodily injuries, property damage.
- ▶ Make sure that personnel cannot be caught by components.
- ▶ Make sure that the crane is horizontally aligned.
- ▶ When working in danger zones: Use aids to protect limbs.
- ▶ Guide components with suitable aids to minimize oscillation.

DANGER
Danger of falling!
If the corresponding component is disengaged from the auxiliary crane before the corresponding component is unpinned, then the corresponding component can fall down.
Death, severe bodily injuries, property damage.
- ▶ Do not disengage the auxiliary crane until the respective component is unpinned.

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10.1 Turning the turntable into the disassembly position

▶ Turn the turntable along the longitudinal axis of the crawler travel gear against the travel direction or vertically to the crawler travel gear, see the Erection and take down chart.

10.2 Taking down the boom

WARNING
Danger of toppling the crane!
If the following conditions are not met before taking down the boom, the crane can topple over.
Death, severe bodily injuries, property damage.
▶ The turntable may not be turned during the disassembly of the boom
▶ Observe the technical safety instructions, see chapter 5.01.
▶ Observe the specifications in the erection and take-down charts.

If required in the erection and take down chart:
▶ Carry the hook block along with the auxiliary crane.

NOTICE
Damage of boom components!
Taking down the boom system can lead to a collision between the hook block and the pulley head.
Boom components can be severely damaged.
▶ Luff the boom system down at the same time and spool the hoist winch out.

Note
▶ Depending on the condition of the ground, the boom and the lattice sections must be supported for the disassembly of the boom.

Make sure that the following prerequisites are met:
– The crane is properly supported (only LG-crane or LR-crane with the crane support).
– The crane is horizontally aligned.
– An auxiliary crane is available.
– An assembly scaffolding / work platform is available.
– The central ballast is installed according to the erection and take-down charts.
– The counterweight has been installed on the turntable according to the erection and take-down charts.
– The LICCON overload protection has been set according to the data in the load chart.

10.2.1 Luffing the boom down

WARNING
Overload of boom!
If the boom is not supported in the area of the auxiliary guying according to specification when taking down, then the crane can be overloaded.
The boom can break and fall down.
Death, severe bodily injuries, property damage.
▶ Make sure that the respective boom system is supported according to specifications.
▶ The D-boom must remain in the operating position when taking down the main boom until the main boom is taken down on the substructure.

Note
▶ The luff down movement is turned off as soon as the lowest operating position is reached.
▶ When the lowest operating position of the SX-boom is reached, the load display in the maximum load icon turns off and instead of the load display appears the display „???“.
▶ Alarm functions appear on the crane operation screen.

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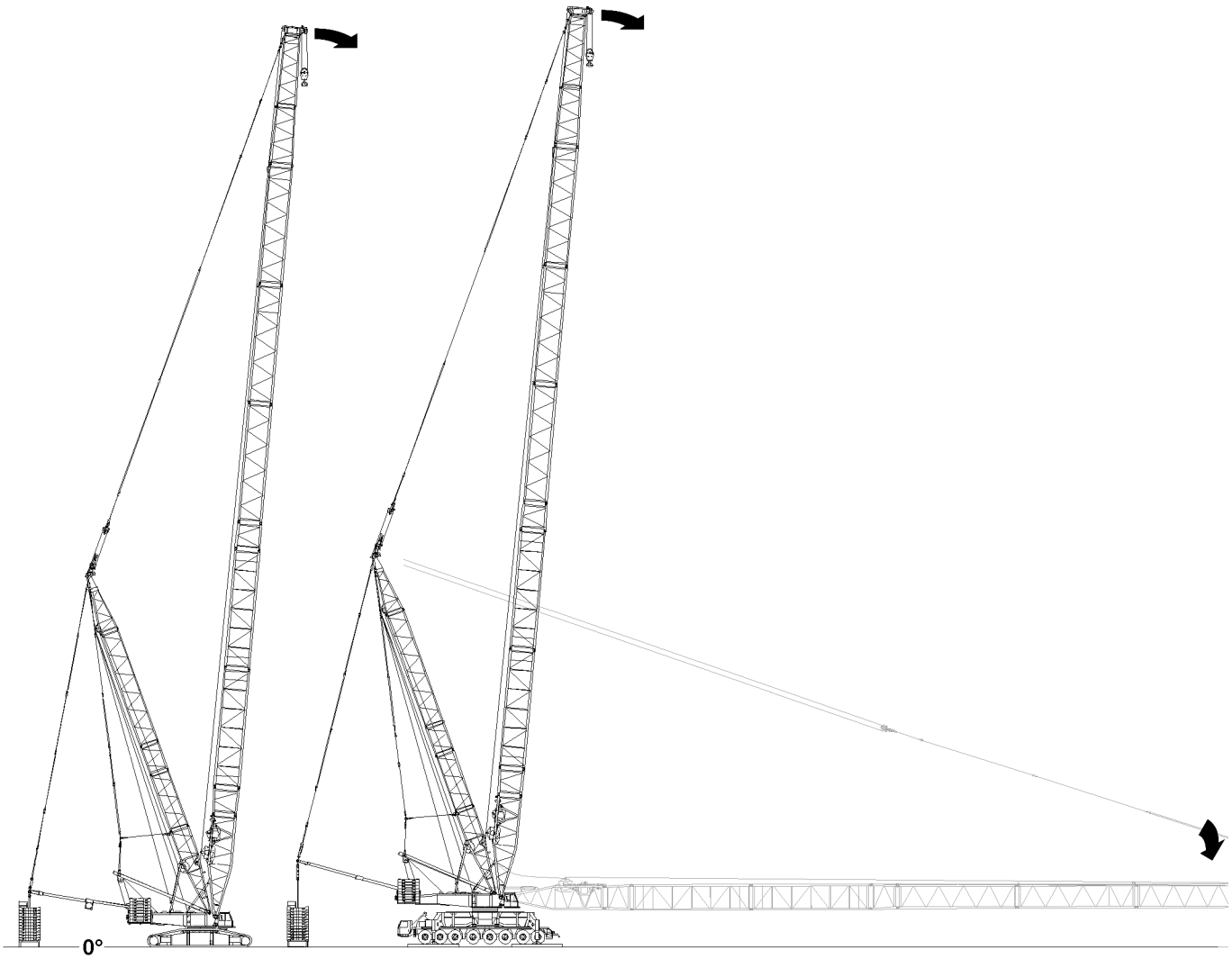

Fig.146620: Taking down the boom

▶ Luff the SX-boom down to the **lowest** operating position.

Result:

– The luff down movement is turned off.
– The „STOP“ icon appears on the LICCON monitor.
– The horn icon appears on the LICCON monitor.

WARNING
Danger of accident!
If the shut off limits of the LICCON overload protection are exceeded, there is no longer any protection against crane overload.
Due to erroneous operation or deliberate misuse, the crane could collapse, the boom can break off or the crane can topple over.
Death, severe bodily injuries, property damage.

▶ The function „Exceedance of shut off limits of the LICCON overload protection“ is only permissible in emergencies and for assembly purposes.
▶ The function „Exceeding the shut off limits of the LICCON overload protection“ may only be actuated by persons who know the effects of their actions regarding the function „Exceeding the shut off limits of the LICCON overload protection“.
▶ The „Exceedance of shut off limits of the LICCON overload protection“ function requires the presence of an authorized person and must be performed with utmost caution.
▶ Crane operation with activated function „Exceedance of shut off limits of the LICCON overload protection“ is prohibited.

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▶ Exceeding the shut off limits of the LICCON overload protection: Engage assembly operation.

Result:

– The shut off limits of the LICCON overload protection are exceeded.
– The assembly icon appears on the LICCON monitor.

▶ At the same time, spool the hoist winch out and luff the SX-boom down until the hook block touches the ground.

10.2.2 Reeving out the hook block

▶ Remove the hoist limit switch weight and reeve the hook block out.

10.2.3 Spooling the hoist rope up

NOTICE
Overspooled winch!
If the hoist rope is pulled under the winch when spooling up, then the adjustment of the cam limit switch can change.
A new adjustment by the customer service of Liebherr-Werk Ehingen GmbH is required.
▶ All rope retaining pins / pipes on the SX-boom are removed.
▶ Slowly spool up the hoist rope over the rope pulleys back to the winch.
▶ Stop the winch in time, with sufficient rope reserve.
▶ Do not overspool the winch.

▶ Spool the hoist rope up.
▶ Luff the D-boom down to the front and spool out winch 3 simultaneously until the boom head lies on the ground or on the substructure.

10.3 Retracting the S-relapse cylinder

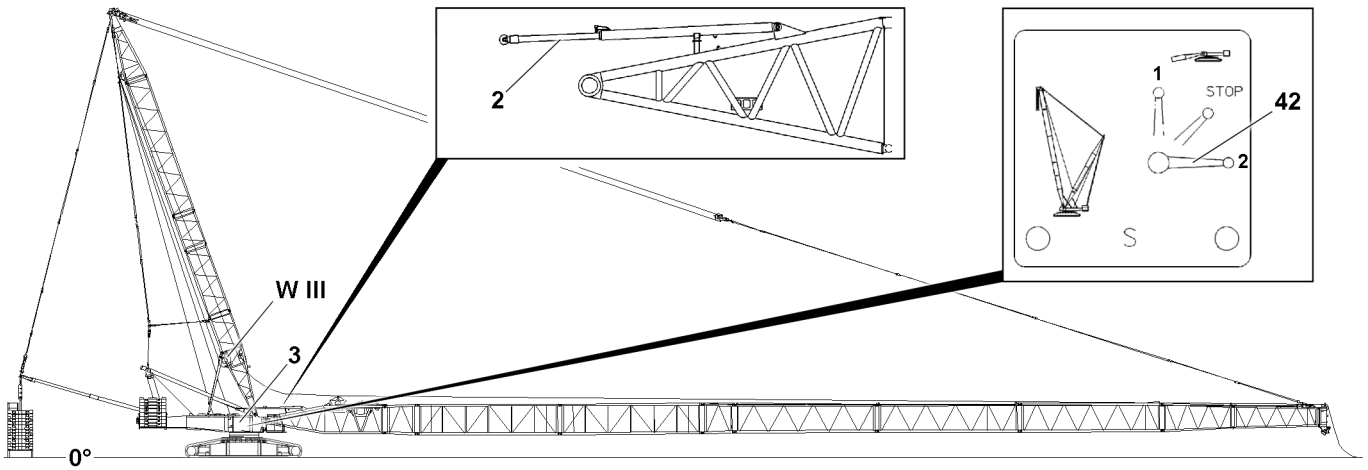

Fig.145490: Retracting the S-relapse cylinder

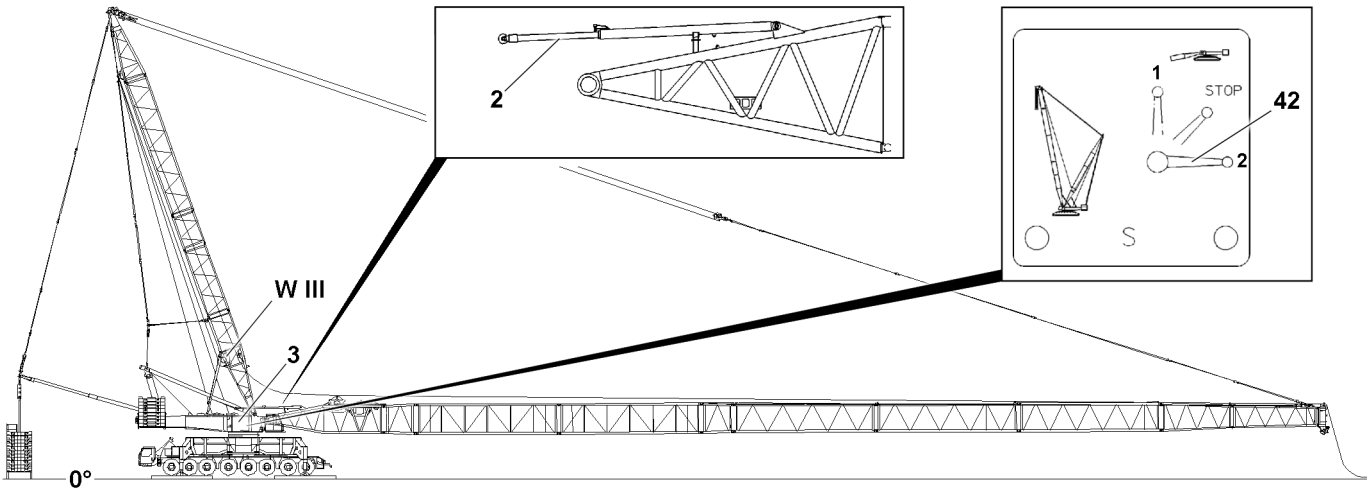

Fig.146619: Retracting the S-relapse cylinder

Ball valve positions	
2	Crane operation, extend the piston rod
1	Assembly, retract the piston rod
STOP	The piston rod cannot be retracted / extended

Note

▶ The ball valve **1** is secured by closing the cabinet door **3** and removing the key.

▶ Take the key from an authorized person.

▶ Open the cabinet door **3**.

The piston rods on the S-relapse cylinders **2** can be retracted with the ball valve **1**.

▶ Set the ball valve **1** to **Position 1**.

Result:

– The piston rods of the S-relapse cylinders **2** retract.

10.4 Disconnecting the electrical connections on the boom

Make sure that the following prerequisite is met:

– The boom is taken down on the substructure or on the ground.

NOTICE

Damage to the cable drum or the cable!

If the cable of the cable drum is not properly spooled up on the cable drum after unplugging the S-end section, then the cable drum or the cable can be significantly damaged.

▶ Spool the cable drum up after unplugging.

▶ Spool the cable drum up and secure it to prevent inadvertent spooling out.

▶ Disconnect the electrical connections and store the plugs and cables properly.

NOTICE

Property damage due to dirt and / or corrosion!

If electrical connections are not closed off with the respective protective caps, then dirt and / or corrosion can damage the electrical connections.

This could result in malfunctions.

▶ Make sure that all electrical connections are always closed off properly.

▶ Pay attention to the Electrical wiring diagram.

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If dummy plugs are present on the electrical connections:
▶ Attach the dummy plug according to the Electric wiring diagram.

If no dummy plugs are present:
▶ Close the electrical connections off with protective caps.

10.5 Disconnecting the hydraulic connection on the boom

When releasing hydraulic lines with quick couplings, make sure that the coupling procedure is carried out correctly.

WARNING
Pressure in the hydraulic lines!
If the pressure supply is not interrupted before connecting / releasing the hydraulic lines, the hydraulic oil can escape with high pressure.
Death, severe bodily injuries, property damage.
▶ Release the pressure in the hydraulic system before connecting / disconnecting: Interrupt the pressure supply and wait for a short time.

▶ Install the coupling components (sleeve and connector) with the knurled nut.
▶ Disconnect the hydraulic connections.
▶ Install dust caps on the quick couplings.

10.6 Disassembling the guy rods

10.6.1 Disassembling the auxiliary guying frame

Depending on the boom system, an additional auxiliary guying frame and an additional auxiliary guying is required for boom guying. Refer to rod plan for the respectively necessary auxiliary guying frame or the auxiliary guying.

Note
▶ Auxiliary guying disassembly, see chapter 5.03.
▶ Observe and adhere to the Rod plan.

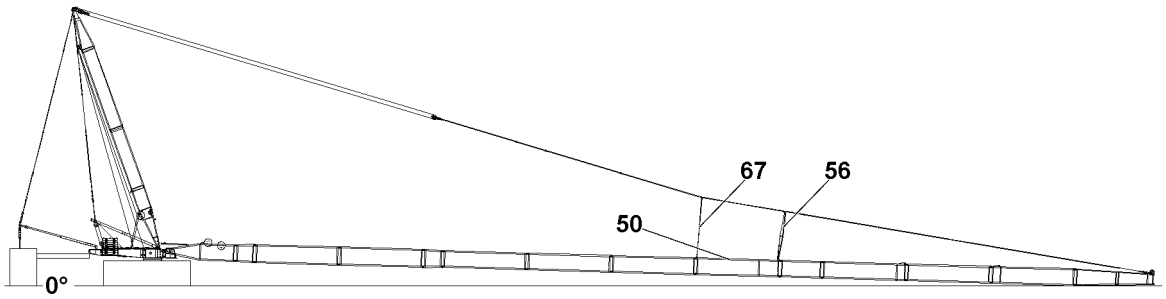

Fig.145252: The boom system with the auxiliary guying frame and auxiliary guying

50 S-intermediate section 3326.30 RO
56 Auxiliary guying frame
67 Auxiliary guying

Make sure that the following prerequisite is met:
– The boom is taken down on the substructure or on the ground.

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Unpinning the auxiliary guying frame on the S-intermediate section 3326.30 RO

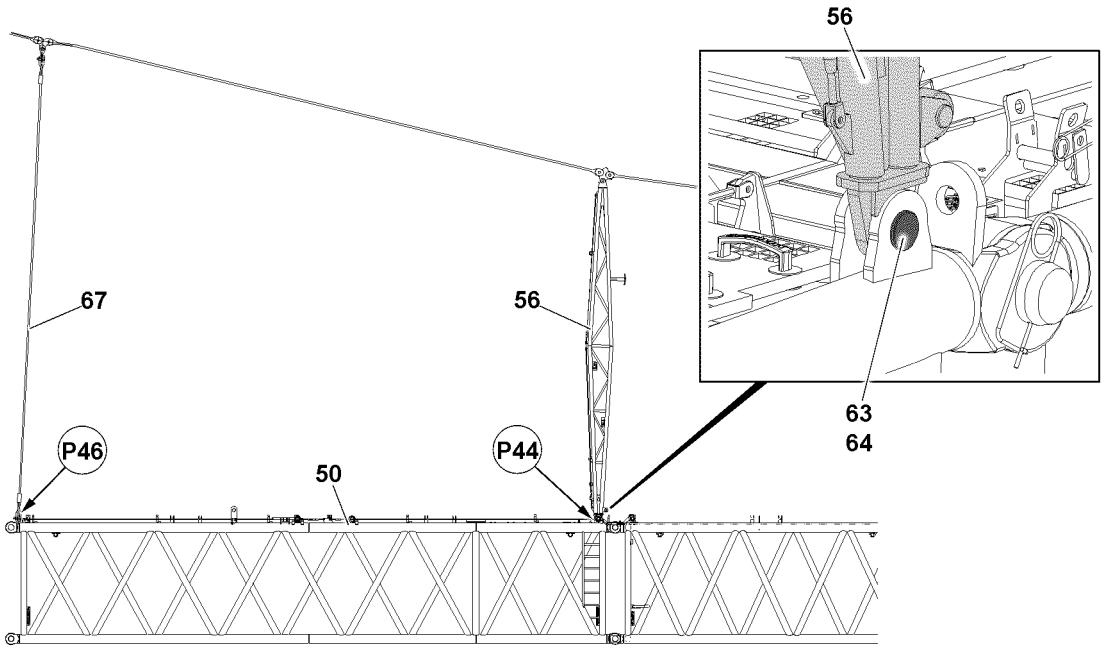

Fig.145251: Unpinning the auxiliary guying frame

▶ Remove the retaining element **64** at points **P44** and unpin the pins **63**.

Result:

– The auxiliary guying frame **56** is unpinned on the S-intermediate section 3326.30 RO **50**.

Note

▶ Not every boom system requires auxiliary guying. Refer to the rod plan if auxiliary guying is required.
▶ Auxiliary guying disassembly, see chapter 5.03.
▶ Observe and adhere to the Rod plan.

If necessary:

▶ Unpin the auxiliary guying **67** at the points **P46**.

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Unpinning the auxiliary guying frame on the auxiliary lugs of the rod strand

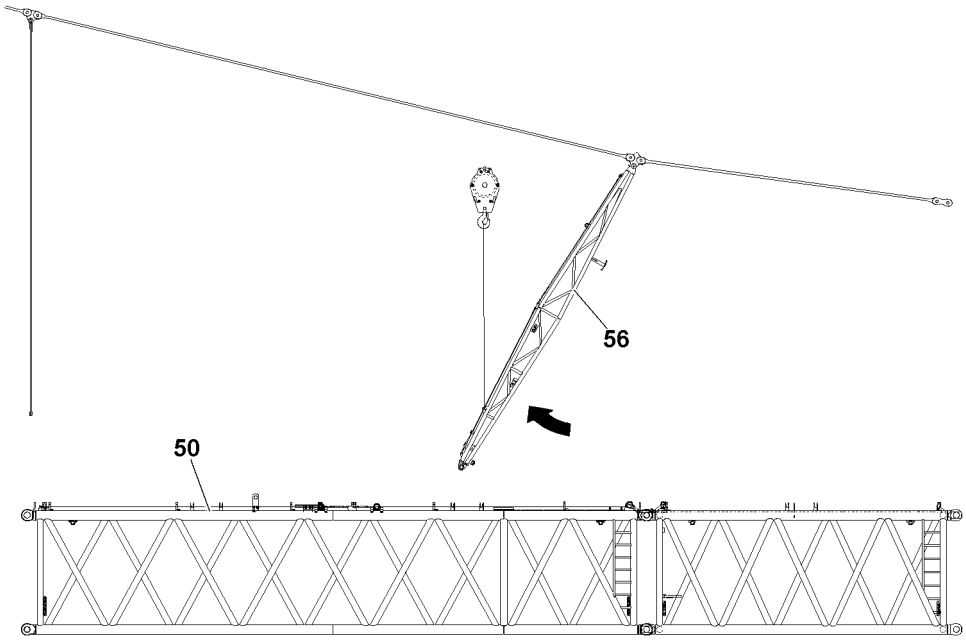

Fig.145256: Swinging the auxiliary guying frame

- ▶ Fasten the auxiliary guying frame **56** to the auxiliary crane.
- ▶ Relieve the boom guying.
- ▶ Swing the auxiliary guying frame **56** with the auxiliary crane.

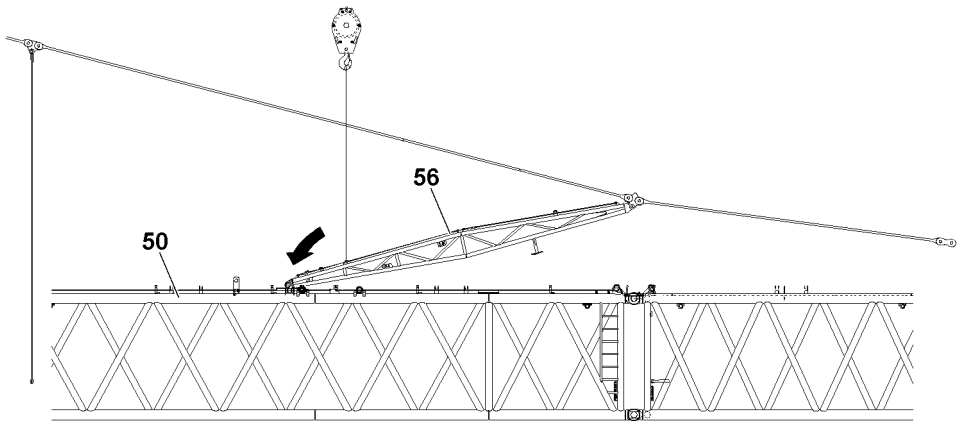

Fig.145257: Setting down the auxiliary guying frame

- ▶ Set the auxiliary guying frame **56** down with the auxiliary crane.

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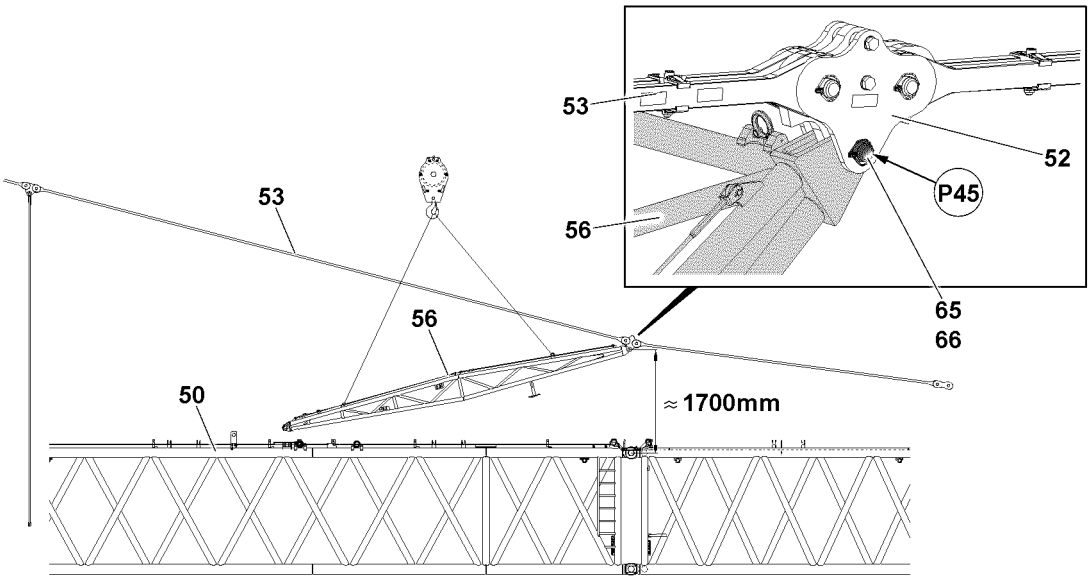

Fig.145248: Pinning the auxiliary guying frame

- ▶ Rehang auxiliary crane.
- ▶ Lift the auxiliary guying frame **56** with the auxiliary crane.

WARNING
Swinging auxiliary guying frame!
The auxiliary guying frame **56** can swing to the rear uncontrolled due to its own weight when it is unpinned.
Death, severe bodily injuries.
- ▶ Make sure that there are no persons within the danger zone during the entire unpinning procedure.

- ▶ Unpin the auxiliary guying frame **56** from with the tension straps **52**: Remove the retaining element **66** at points **P45** and unpin the pins **65**.

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Pinning the auxiliary guying frame on the lugs of the S-intermediate section 3326.30 RO

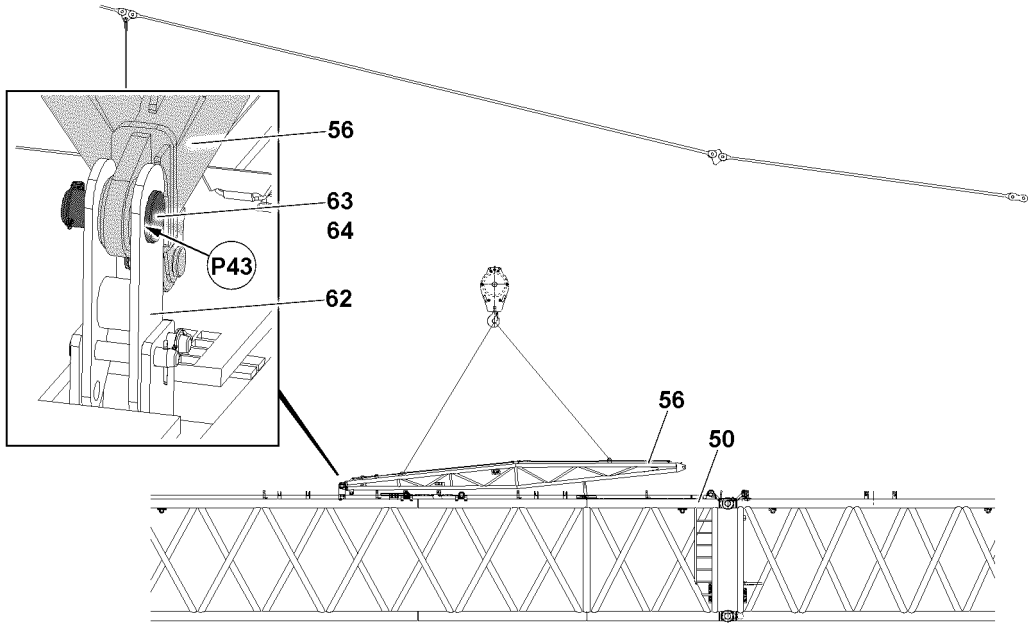

Fig.145247: Pinning the auxiliary guying frame

- ▶ Swing the auxiliary guying frame **56** with the auxiliary crane to the pin location in the points **P43**.
- ▶ Insert the pin **63** on the lugs **62** at points **P43** and secure with the retaining element **64**.
- ▶ Take the auxiliary guying frame **56** down with the auxiliary crane.

Unpinning the auxiliary guying frame on the lugs of the S-intermediate section 3326.30 RO

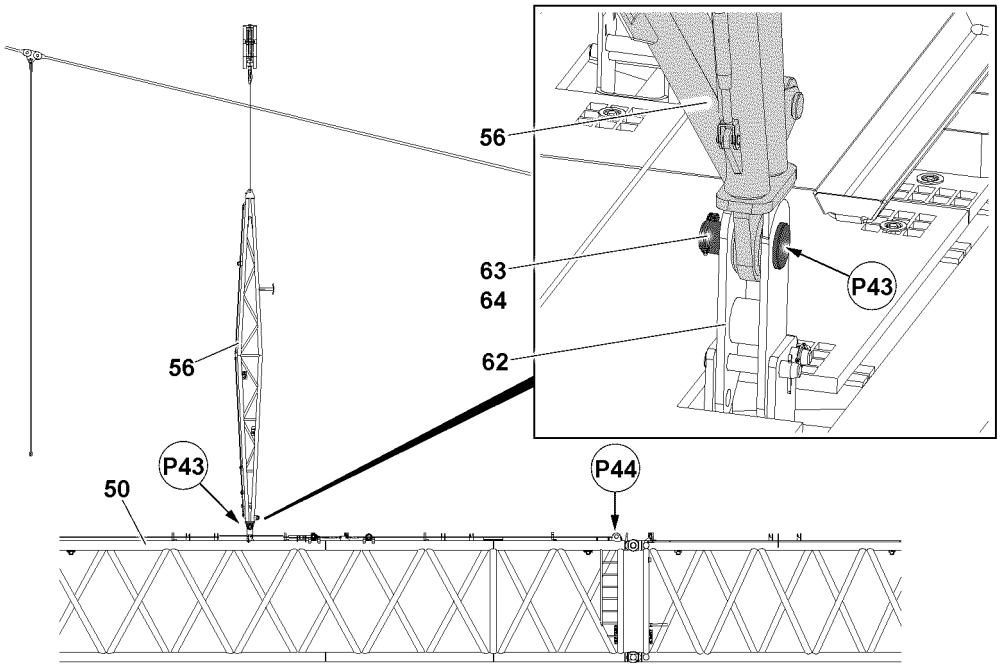

Fig.145246: Unpinning the auxiliary guying frame

- ▶ Rehang auxiliary crane.
- ▶ Raise the auxiliary guying frame **56** with the auxiliary crane.
- ▶ Remove the retaining element **64** on the lugs **62** at points **P43** and unpin the pin **63**.

▶ Insert the pin **63** in the transport position at points **P44** and secure with the retaining element **64**.

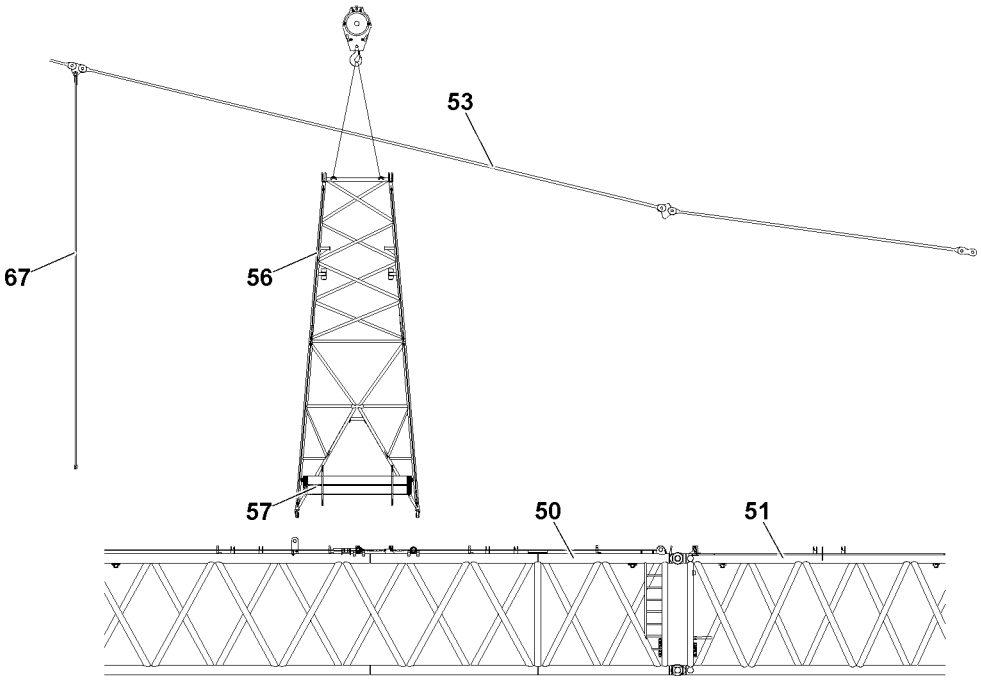

Fig.145258: Auxiliary guying frame

▶ Turn the auxiliary guying frame **56** with the auxiliary crane.

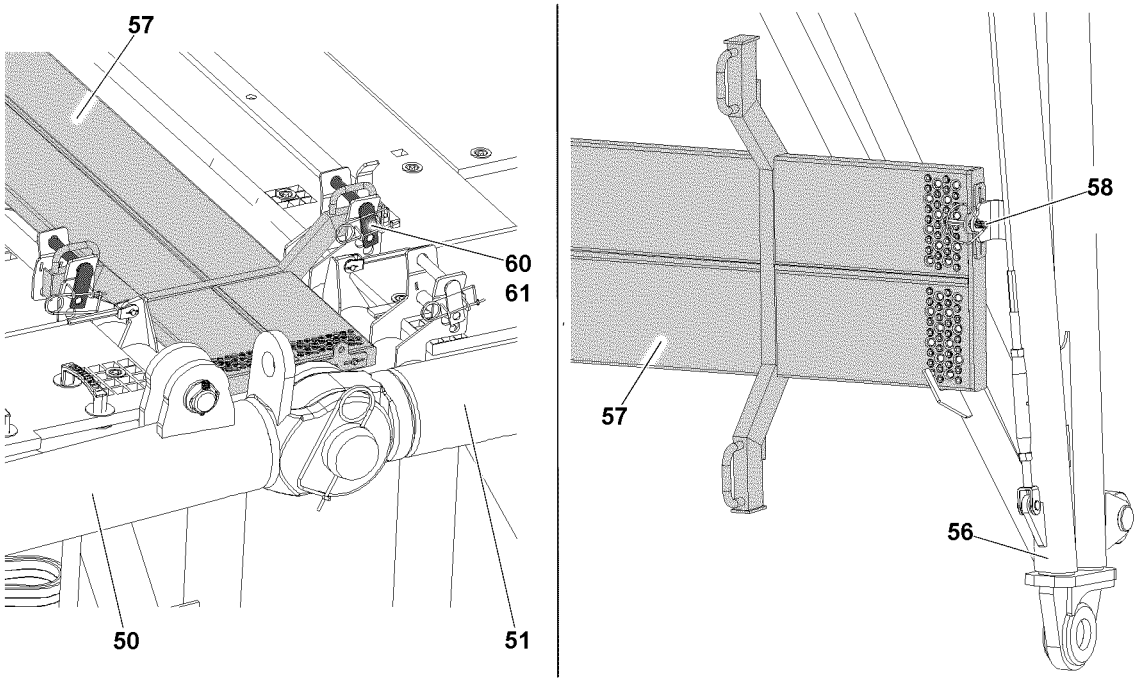

Fig.145259: Catwalk

Note

▶ The weight of the catwalk **57** is 22 kg.

▶ Unpin the catwalk **57** between the S-intermediate section 3326.30 RO **50** and the S-intermediate section **51**: Remove the retaining elements **61** and unpin the pins **60**.

WARNING
Falling catwalk!
The catwalk **57** can fall down by itself due to its own weight when pinning.
Death, severe bodily injuries.
Fingers and hands can be crushed.
- ▶ For safety reasons, assemble the catwalk **57** always with **two** persons.
- ▶ Hold the catwalk **57** during the pinning procedure.
- ▶ Do not reach with your hands into the danger zone.
- ▶ Use personal protective equipment.

- ▶ Insert the catwalk **57** in the transport position.
- ▶ Secure the catwalk **57** with the retaining elements **58**.

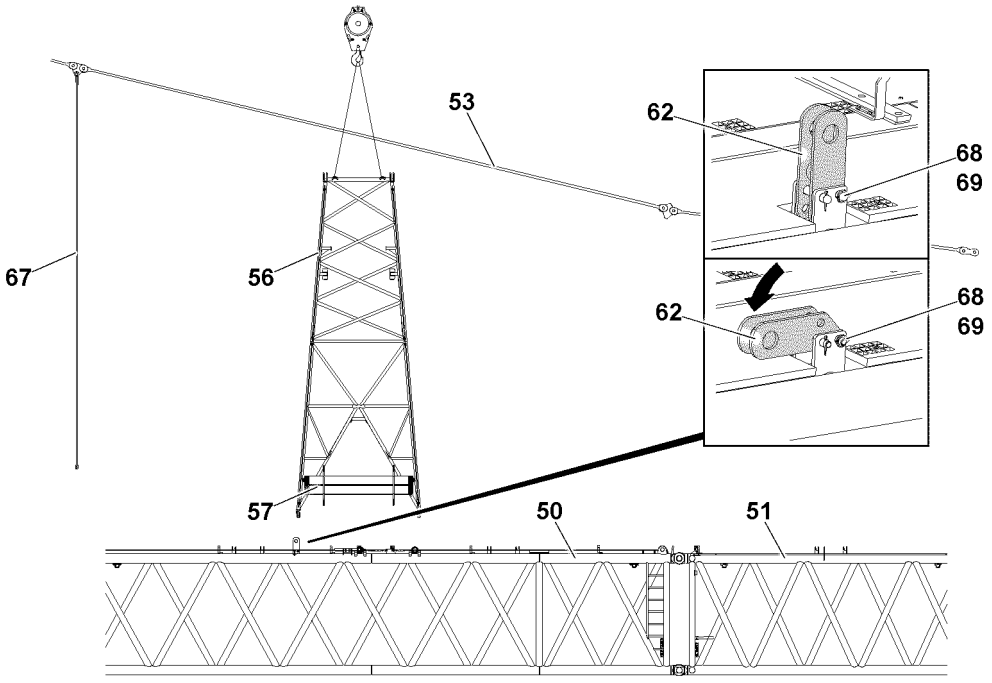

Fig.145260: Swinging the lugs

- ▶ Release the lugs **62** out of the operating position, remove the retaining element **69** and unpin the pin **68**.
- ▶ Swing the lugs **62** into the transport position.
- ▶ Secure the lugs **62** in the transport position: Insert the pin **68** and secure it with the retaining element **69**.
- ▶ Remove the auxiliary guying frame **56** with the auxiliary crane.
- ▶ Relieve the boom guying.

Note
- ▶ Not every boom system requires auxiliary guying. Refer to the rod plan if auxiliary guying is required.
- ▶ Auxiliary guying disassembly, see chapter 5.03.
- ▶ Observe and adhere to the Rod plan.

If necessary:
- ▶ Unpin the auxiliary guying **67**.

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Disassembling the tension straps

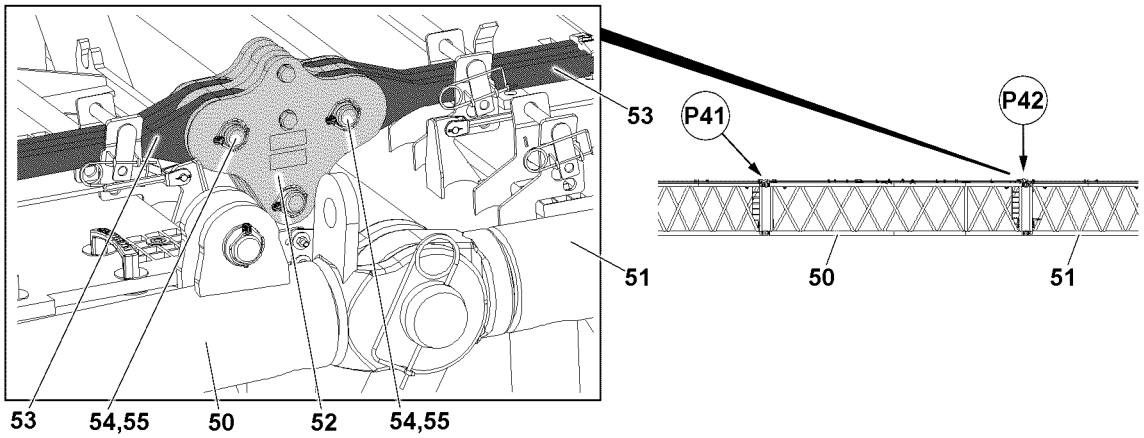

Fig.145244: Tension strap

▶ Take the boom guying down.

Remove the tension straps **52** of the auxiliary guying frame out of the rod strand in points **P42**.

Note
▶ The weight of the tension strap **52** is 60 kg.

▶ Fasten the tension straps **52** to the auxiliary crane.
▶ Unpin the tension straps **52**: Remove the retaining elements **55** and unpin the pins **54**.
▶ Remove the tension straps **52** with the auxiliary crane and pin on the auxiliary guying frame.

Note
▶ Not every boom system requires auxiliary guying. Refer to the rod plan if auxiliary guying is required.
▶ Auxiliary guying disassembly, see chapter 5.03.
▶ Observe and adhere to the Rod plan.

If necessary:
▶ Unpin the tension straps for the auxiliary guying at points **P41**.

10.6.2 Disassembling the derrick ballast

WARNING
Improper disassembly of the derrick ballast!
Death, severe bodily injuries, property damage.
▶ Observe the erection / take-down charts.
▶ Pay attention to the derrick assembly chapter.

Make sure that the following prerequisites are met:
– The crane is properly supported (only LG-crane or LR-crane with the crane support).
– The crane is horizontally aligned.
– The main boom is taken down on the ground or on a load bearing substructure.
– Disassemble the derrick ballast on the crane, see chapter 5.35.xx or 5.36.xx.

▶ Disassembling the derrick ballast

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10.6.3 Disassembling the guy rods

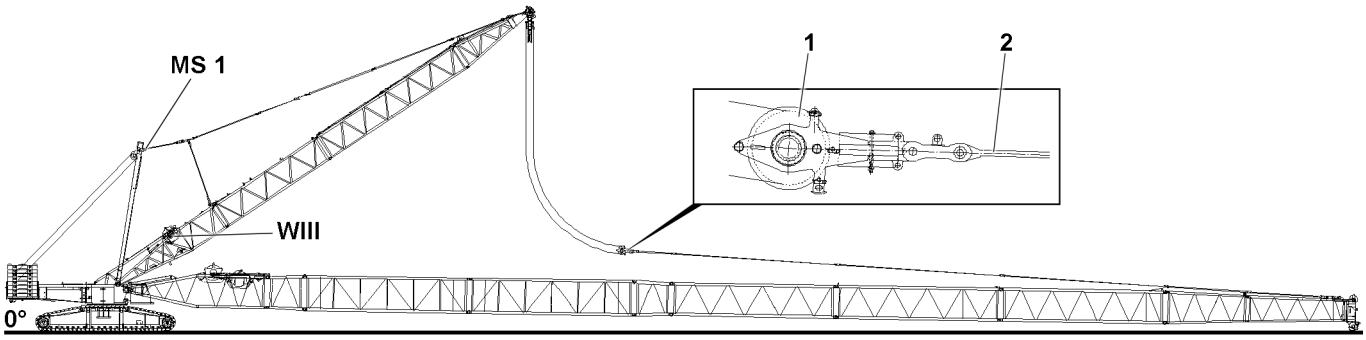

Fig.145487: Disassembling the guy rods

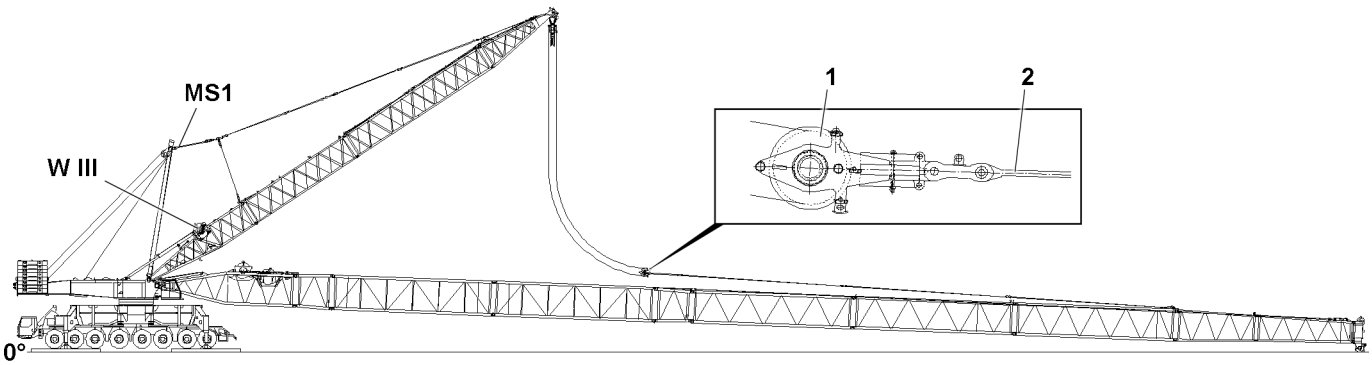

Fig.146617: Disassembling the guy rods

- ▶ Take the guy rods **2** down on the intermediate sections and secure with transport retainers.
- ▶ Unpin the upper pulley block **1** on the guy rods.
- ▶ Disconnect the guy rods **2** according to their association to the intermediate sections.

NOTICE
Damage to the intermediate sections!
- ▶ Do not pull the upper pulley block **1** over the intermediate sections, rather carry them along with the auxiliary crane.

When the guy rods **2** are taken down in the transport retainers and secured:
- ▶ Erect the D-boom and spool the hoist rope up at the same time.

10.7 Opening the boom system

WARNING
Danger of accident!
If the following conditions are not met before disassembling the boom, the boom can fold down.
Death, severe bodily injuries, property damage.
- ▶ Support the boom during disassembly with suitable materials.
- ▶ During the pinning and unpinning of the lattice sections, it is prohibited for anyone to remain **under** or **on** the components as well as within the entire danger zone.

WARNING
Danger of toppling the crane!
If the following conditions are not met, the crane can topple over or be significantly damaged.
Death, severe bodily injuries, property damage.
- ▶ The maximum permissible total force on test point **MS1** may **not** be exceeded.

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10.7.1 Assembling the lugs

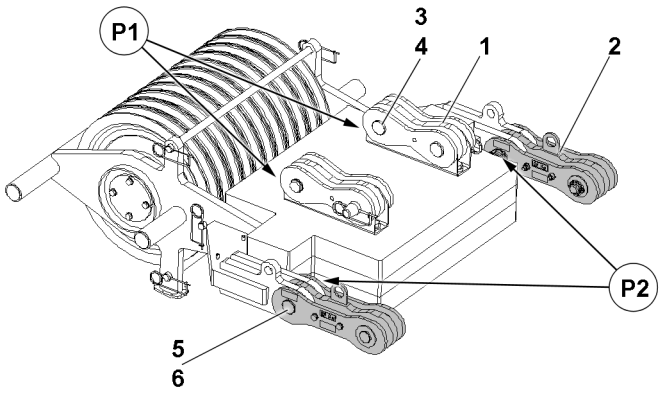

Fig.145488: Assembling the lugs on the upper pulley block

- ▶ Lower the upper pulley block until the lugs **1** can be assembled.
- ▶ Remove the lugs **2**: Remove the retaining element **6** and unpin the pin **5**.
- ▶ Remove the lugs **1** in position **P1** out of the park position.
- ▶ Pin the lug **1** in position **P2** with the pin **3** and secure with the retaining element **4**.

10.7.2 Opening and disassembling the boom system

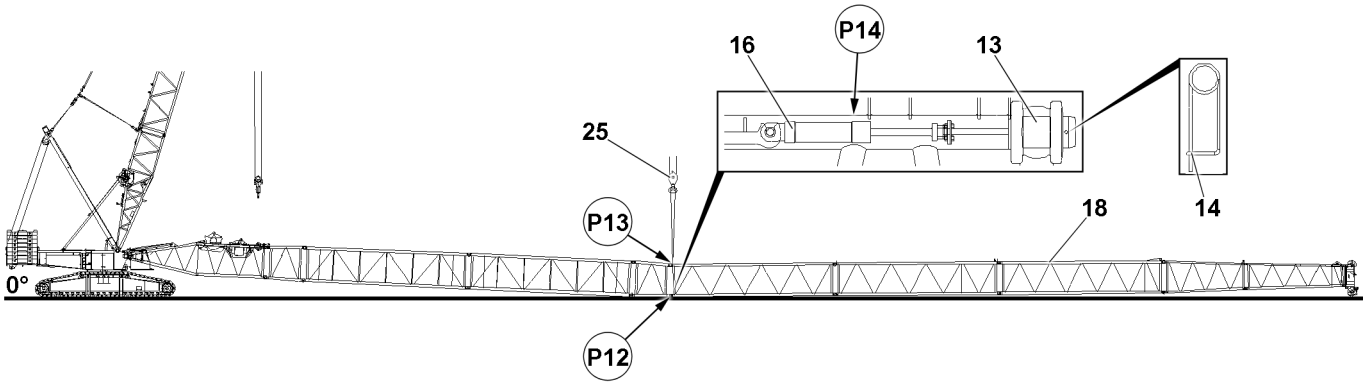

Fig.145478: Opening and disassembling the boom system

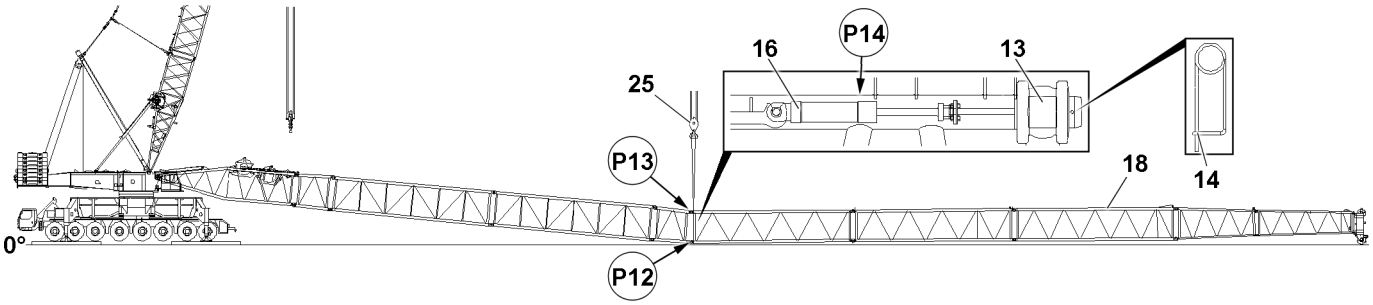

Fig.146616: Opening and disassembling the boom system

Make sure that the following prerequisites are met:
- The boom system is properly taken down.
- The S-pivot section and the SX-boom system are closed.
- An auxiliary crane with sufficient load carrying capacity is available.

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WARNING
Danger of falling!
Danger of fatal injury: By unpinning the connector pins **13** in position **P12**, the boom can fold down suddenly.
Death, severe bodily injuries, property damage.
- ▶ It is prohibited for anyone to remain under the raised boom system during the pinning / unpinning procedure.
- ▶ Unpin the connector pins **13** only after ensuring that the auxiliary crane is securely holding the boom.

- ▶ Fasten the auxiliary crane **25** to the S-intermediate section in position **P13**.
- ▶ Place the pin pulling cylinders **16** in position **P14**.

Relieve the boom system with the auxiliary crane **25**:
- ▶ Release the connector pin.
- ▶ Completely insert the connector pin „on the bottom“ **13** with the pin pulling cylinder **16**.
- ▶ Lower the boom system with the auxiliary crane.

When the boom system is open:

- ▶ Remove the auxiliary crane **25**.
- ▶ Disassemble the boom properly.

10.7.3 Opening the SX-boom system

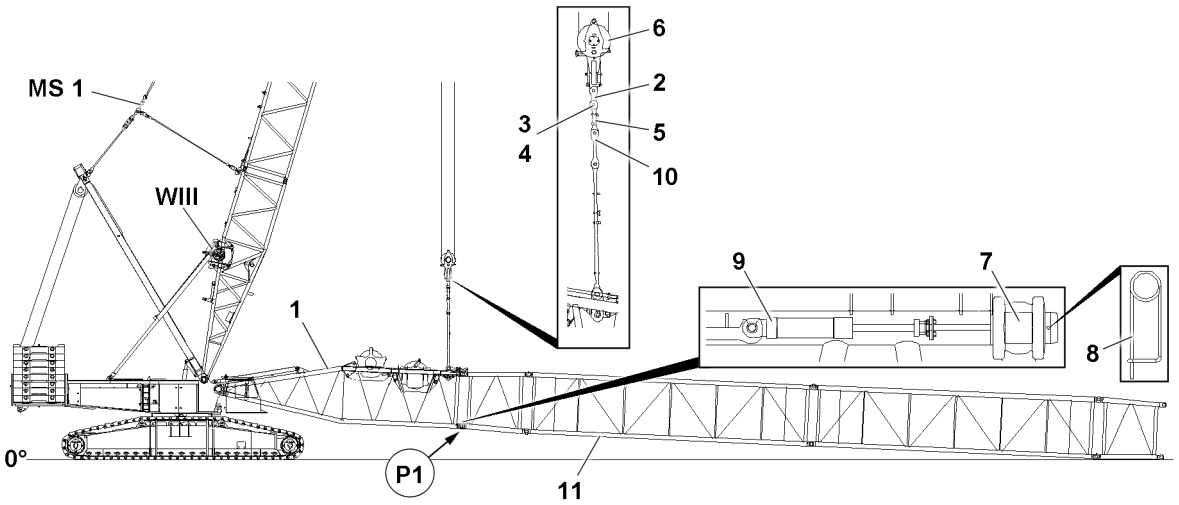

Fig.145492: Opening and disassembling the SX-boom system

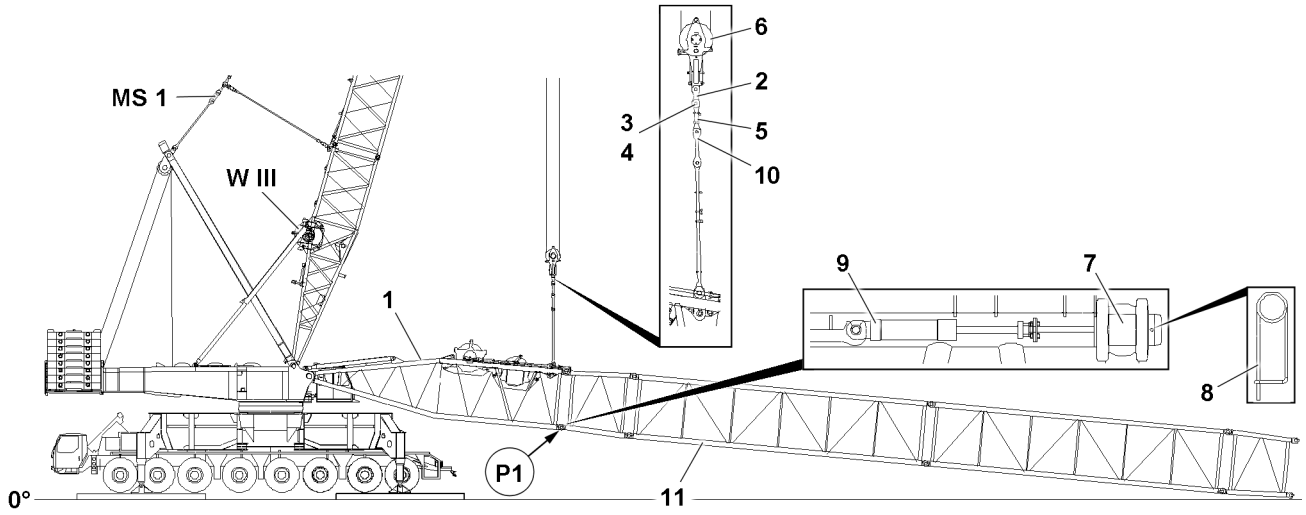

Fig.146621: Opening and disassembling the SX-boom system

To be able to open the SX-boom system after take-down, it is necessary to luff the D-boom down to the front and to lower the upper pulley block **6** via control winch 3 **WIII** to the S-pivot section **1** and to pin with the assembly brackets **5**.

Make sure that the following prerequisites are met:
- The electrical and hydraulic connections have been disconnected.
- The auxiliary guying is disassembled.
- The guy rods have been disassembled and taken down in the transport retainers.

WARNING
Danger of falling!
Danger of fatal injury: By unpinning the upper pulley block **6** on the S-pivot section **1**, the boom can suddenly fold down if the boom is not properly pinned and secured „on the bottom“.
Death, severe bodily injuries, property damage.
- ▶ It is prohibited for anyone to remain under the raised boom system during the pinning / unpinning procedure.
- ▶ Unpin the upper pulley block **6** on the S-pivot section **1** only when it is ensured that the S-pivot section **1** and the SX-boom **10** are lying properly on the ground.

- ▶ Lower the upper pulley block **6** until it is located over the assembly brackets **5** on the S-pivot section **1**.
- ▶ Pin and secure the upper pulley block **6** with the guy rods **10**: Pin and secure the assembly bracket **5**. Use the pin **3** and retaining element **4**.

Note
- ▶ The ACTUAL force on test point **MS1** is shown on LICCON monitor 1.
- ▶ Tension the guying on the SA-frame with the same force as during assembly.
- ▶ For this, refer the ACTUAL force at the test point (MS1) measured and recorded during the assembly.
- ▶ The pins can be pulled easier and the pins and lugs are therefore not damaged.

Note
- ▶ Unpin the connector pin with the pin pulling device, see chapter 5.30.

- ▶ Relieve the boom by spooling up winch 3 **WIII**.

When the boom is relieved and safely held by winch 3 **WIII**:
- ▶ Unpin the S-pivot section **1** and SX-reducer **11** in position **P1** on both sides: Remove the retaining element **8** and unpin the pin **7** with the pin pulling cylinder **9**.

When the pins **7** are unpinned in position **P1**:
- ▶ Take the boom down carefully on the ground or on a substructure.

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When the boom is lying on the ground:
- ▶ Disassemble the SX-boom **11** properly.
- ▶ Unpin the upper pulley block **6** on the guy rods **10**: Remove the retaining element **4** and unpin the pin **3**.
- ▶ Take down and secure the guy rods **10** in the transport receptacles on the S-pivot section **1**.

10.7.4 Disassembling the S-pivot section on the turntable

WARNING
General danger notes!
- ▶ Support the S-pivot section **1** during disassembly with suitable materials.
- ▶ Insert and secure all pins after disassembly in the intended transport receptacles.
- ▶ The guy rods must be inspected regularly, see chapter 8.15.

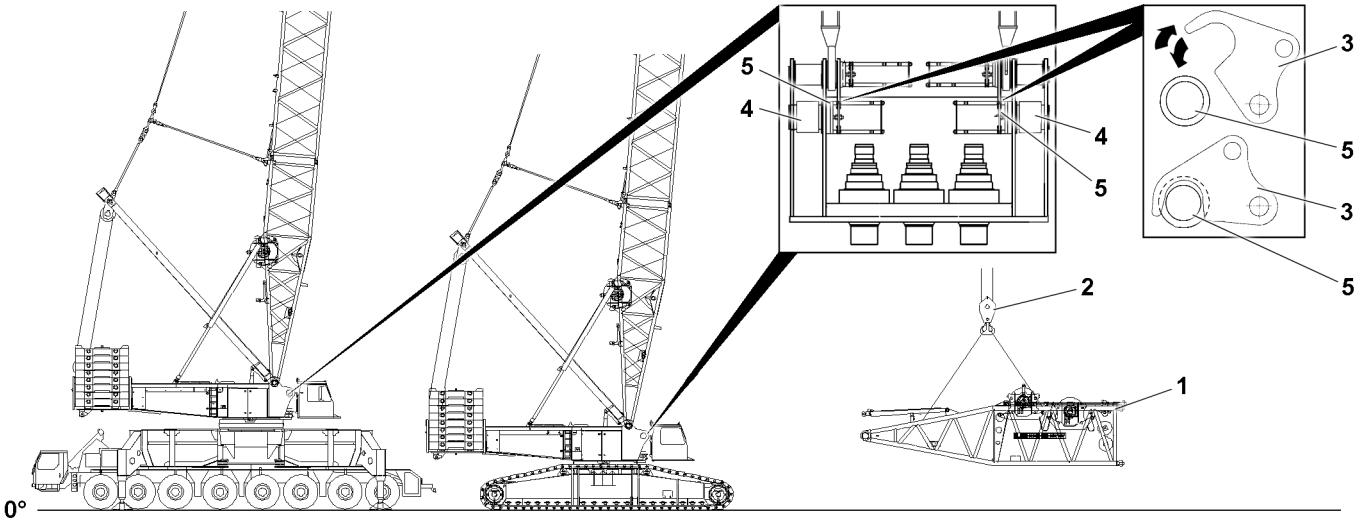

Fig.146608: Disassembling the S-pivot section on the turntable

Make sure that the following prerequisites are met:
- – The D-boom is erected to the point where the S-pivot section **1** can be disassembled without obstructions.
- – The guy rods are separated from the S-pivot section **1** to the upper pulley block and taken down in the transport receptacles and secured.

Note
- ▶ Select the fastening points on the S-pivot section **1** in such a way that the S-pivot section **1** hangs horizontally on the auxiliary crane **2** at assembly. See section „Fastening points“.

- ▶ Fasten the S-pivot section **1** to the auxiliary crane **2**.
- ▶ Lift the S-pivot section **1** with the auxiliary crane **2** to the horizontal.

The pin pulling cylinders on the turntable are actuated with the radio remote control (only available for LR-cranes).

Note
- ▶ For operation of the radio remote control, see chapter 6.08!

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WARNING
Danger of falling!
Falling S-pivot section **1** due to improper fastening of the auxiliary crane.
Death, severe bodily injuries, property damage.
▶ Make sure that the S-pivot section **1** is safely held by the auxiliary crane **2** before unpinning the connector pins **4**.

When the S-pivot section **1** is safely held by the auxiliary crane **2**:
▶ Release the connector pin **4**: Fold the retaining hook **3** out on the guides **5**.
▶ Hook the pin pulling cylinder in the receptacles.

Note
▶ The pin pulling cylinders are actuated with the radio remote control.

▶ Unpin the connector pins **4** on both sides with the hydraulic pin pulling cylinder.

When the connector pins **4** are fully unpinned on both sides:
▶ Secure the connector pin **4**: Fold the retaining hook **3** in on the left and right on the guides **5**.
▶ Disconnect the hydraulic connections to the pin pulling device.

NOTICE
Danger of accident!
Damage of the turntable and the S-pivot section **1**, property damage.
▶ Slowly swing the S-pivot section **1** out with the auxiliary crane **2** and at low speed on the turntable.
▶ Before taking it down on the ground, support the S-pivot section **1**.

▶ Take the S-pivot section **1** down with the auxiliary crane **2** on the substructure on the ground.
▶ Remove the auxiliary crane **2**.

Note
▶ Disassemble the D-boom, see chapter 5.05.

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11 Assembling the SX-intermediate section in the transport position

WARNING
Danger of falling!
During assembly / disassembly, inspection and maintenance work, assembly personnel must be secured with appropriate aids to prevent them from falling.
Death, severe bodily injuries, property damage.
- ▶ All work at a height, when there is a danger of falling, must be carried out with suitable aids.
- ▶ If aids are not available and work cannot be carried out from the ground, then assembly personnel must secure themselves with the supplied fall arrest system to prevent falling, see chapter 2.04.
- ▶ If fall protection equipment is available, then it must be used, see chapter 2.06.
- ▶ When lifting, lowering, swinging crane parts in and out, no persons may remain in the danger zone.
- ▶ When closing or opening boom systems during boom assembly or boom disassembly, no persons may remain on the boom system or in the danger zone.
- ▶ If railings are present on the components, then they must be brought into the corresponding position and secured for assembly / disassembly work.
- ▶ Only step on the aids, ladders and catwalks with clean shoes.
- ▶ Keep aids, ladders and catwalks free of heavy dirt, snow and ice.
- ▶ During all assembly and disassembly work, maintenance work and inspections, travel or crane operation is prohibited.
- ▶ Remaining on a suspended load is prohibited.
- ▶ Stepping or walking on crane components and lattice sections, which have an incline of more than 20° is prohibited.
- ▶ For all assembly work, the crane driver of the main crane must be in voice contact with the crane driver / crane drivers of the auxiliary crane / auxiliary cranes.
- ▶ For assembly tasks, the crane driver may only initiate crane movements when the responsible guide has explicitly released the movement.

WARNING
Danger of impact / crushing!
When installing / removing crane components with the auxiliary crane, crane components can start to swing back and forth.
When lifting / lowering and positioning crane components, there is an increased danger of impacts / crushing.
Death, severe bodily injuries, property damage.
- ▶ Make sure that personnel cannot be caught by components.
- ▶ Make sure that the crane is horizontally aligned.
- ▶ When working in danger zones: Use aids to protect limbs.
- ▶ Guide components with suitable aids to minimize oscillation.

DANGER
Danger of falling!
If the corresponding component is unpinned before the corresponding component is attached by the auxiliary crane, the corresponding component can fall down.
Death, severe bodily injuries, property damage.
- ▶ Do not disengage the auxiliary crane until the respective component is pinned and secured.

WARNING
Danger of accident!
Death, severe bodily injuries, property damage.
- ▶ Depending on the condition of the ground, the boom and the lattice sections must be supported for the disassembly of the boom.
- ▶ Observe the technical safety instructions, see chapter 5.01.

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11.1 Assembling the rods in the transport position

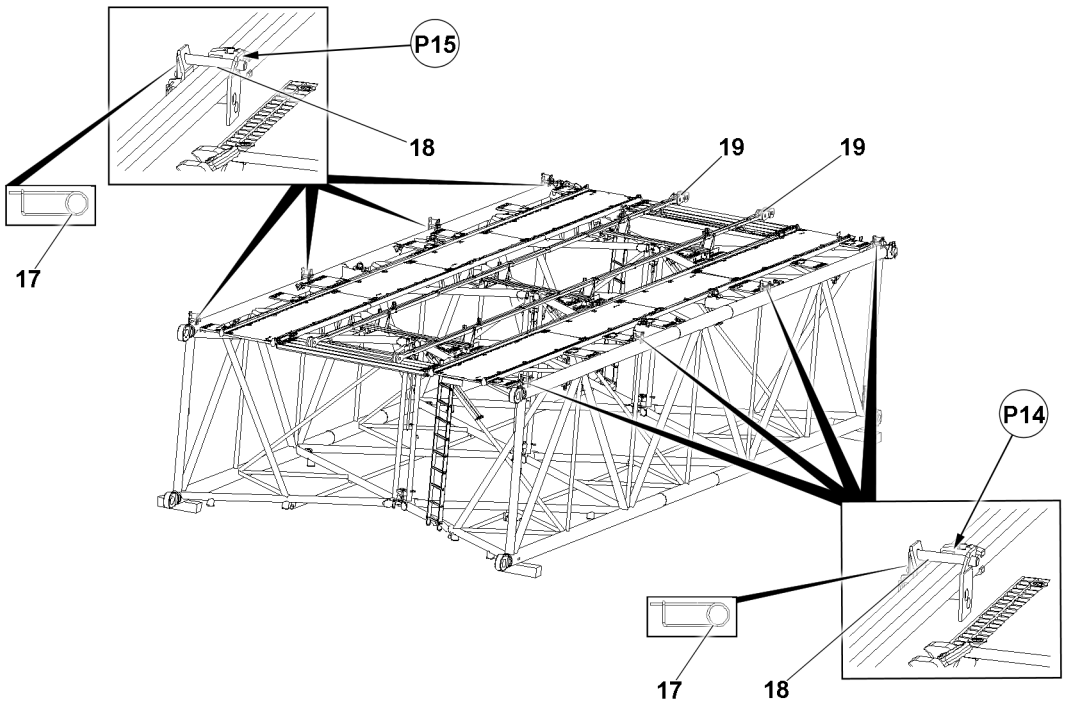

Fig.145075: Assembling the rods in the transport position

Make sure that the following prerequisites are met:
- The SX-intermediate section is disassembled and taken down on the substructure.
- An auxiliary crane with sufficient load carrying capacity is available.
- An assembly scaffolding / work platform is available.

▶ Remove the retaining pin **18** in the transport retainerPosition **P14** and Position **P15**: Remove the retaining element **17** and unpin the retaining pin **18**.
▶ Lay the rods **19** from the inside to the outside in the transport retainer, using the auxiliary crane.
▶ Secure the rods **19** with the retaining pin **18** and the retaining element **17**.

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11.2 Assembling the rod receptacle in the transport position

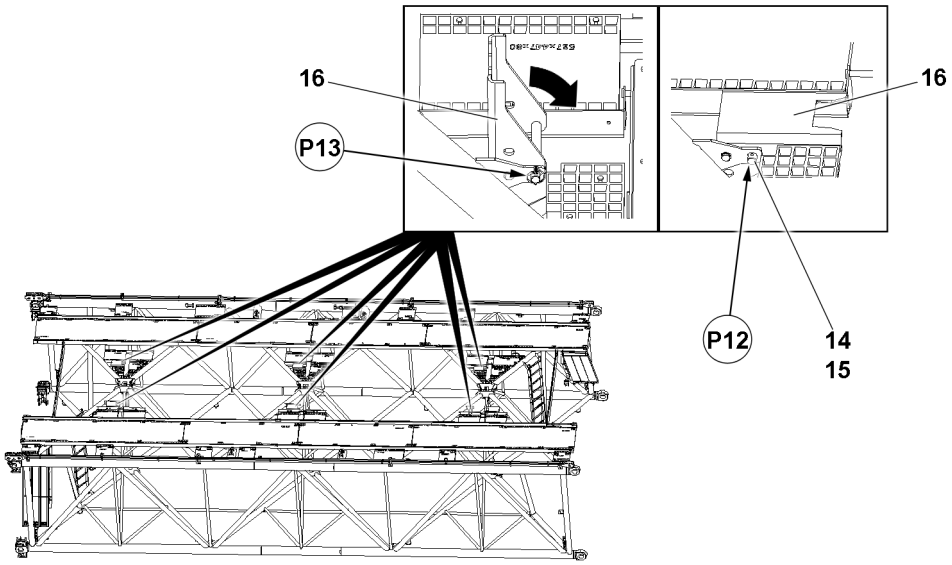

Fig.145493: Assembling the rod receptacle in the transport position

Make sure that the following prerequisite is met:
- All rods are assembled and secured in the transport position.

▶ Release the rod receptacle **16** in position **P13**: Remove the retaining element **14** and unpin the retaining pin **15**.
▶ Fold the rod receptacle **16** down.
▶ Secure the rod receptacle **16** in position **12** with the retaining element **14** and the retaining pin **15**.

11.3 Assembling the rope guard in the transport position

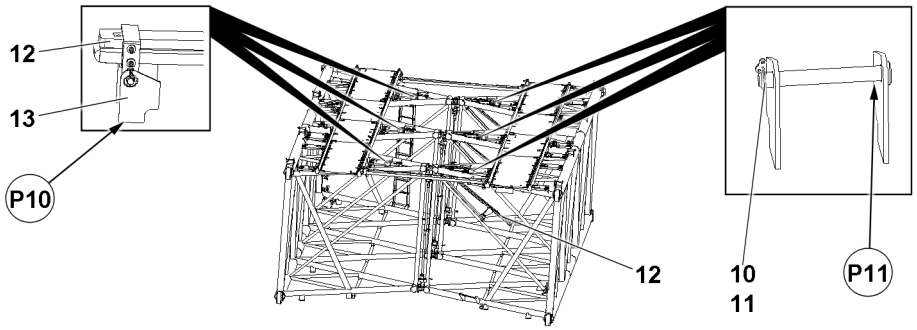

Fig.145073: Assembling the rope guard in the transport position

▶ Remove the retaining element **10** and pin **11** in position **P11**.
▶ Push the rope guard **12** down and fold down the retainer **13** in position **P10**.
▶ Pin the retaining element **10** and pin **11** again in position **P11**.

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11.4 Assembling the catwalks in the transport position

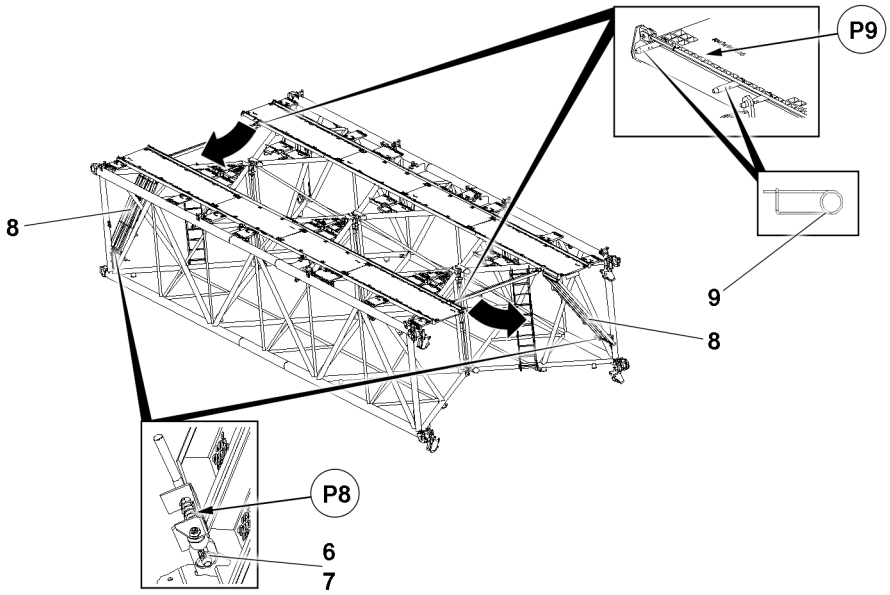

Fig.145494: Assembling the catwalks in the transport position

Make sure that the following prerequisite is met:
– An assembly scaffolding / work platform is available.

WARNING
Danger of falling!
If the catwalks are not installed or not completely installed, then personnel can fall down.
Death, severe bodily injuries, property damage.
▶ The catwalks may only be accessed when they are pinned and secured in the operating position, check visually.

▶ Release the catwalks **8** in position **P9** and fold them upward.
▶ Bring the catwalks **8** in position **P8** into the transport position and secure with the pin **6** and retaining element **7**.

11.5 Disassembling the SX-intermediate section

WARNING
Danger of impact / crushing!
When installing / removing crane components with the auxiliary crane, crane components can start to swing back and forth.
When lifting / lowering and positioning crane components, there is an increased danger of impacts / crushing.
Death, severe bodily injuries, property damage.
▶ Make sure that personnel cannot be caught by components.
▶ Make sure that the crane is horizontally aligned.
▶ When working in danger zones: Use aids to protect limbs.
▶ Guide components with suitable aids to minimize oscillation.

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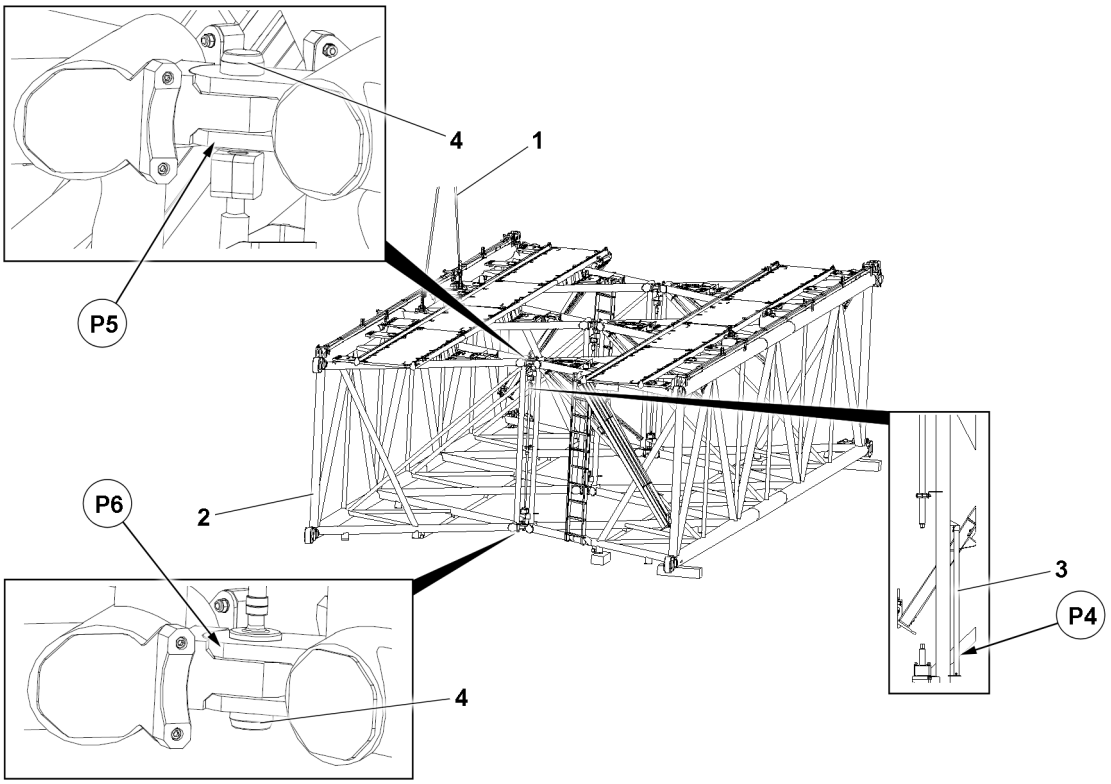

Fig.145495: Unpinning the SX-intermediate sections

Make sure that the following prerequisites are met:
- The rods are in the transport position and secured.
- The rod retainers are in the transport position and secured.
- The rope guard is in transport position.
- The catwalks are in the transport position and secured.

▶ Fasten the auxiliary crane **1** to the SX-intermediate section **2** on one side and lift.
▶ Shift the substructure from outside to inside.
▶ Release the safety rod **3** and in position **P4** bring into the park position.
▶ Unpin the connector pin in position **P5** and position **P6**.
▶ Swing the SX-intermediate section **2** away.

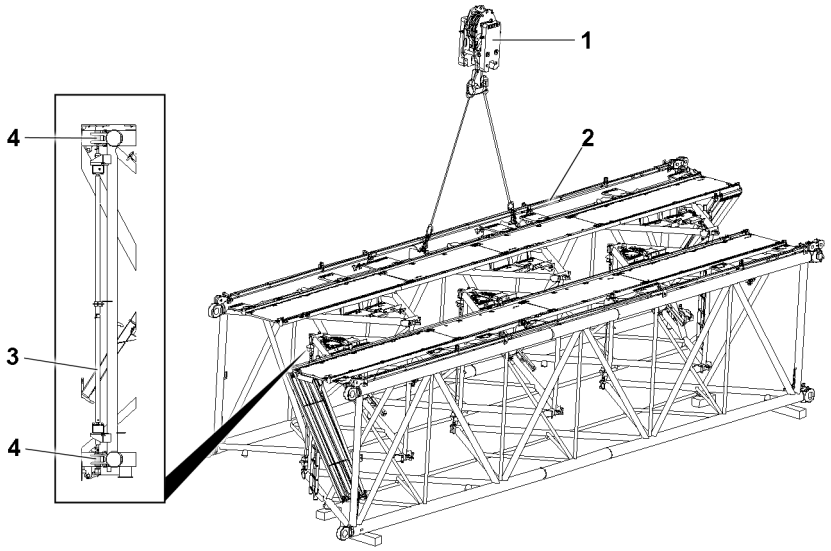

Fig.145496: Pushing the SX-intermediate sections into each other

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When the SX-intermediate section **2** is swung away:

- ▶ Bring the connector pin **4** into the operating / transport position: Insert the connector pin **4** and secure with a safety rod **3**.
- ▶ Push the SX-intermediate sections **2** into each other with the auxiliary crane **1**.
- ▶ Shift the substructure from the center to the outside in position **P1** and position **P2**.

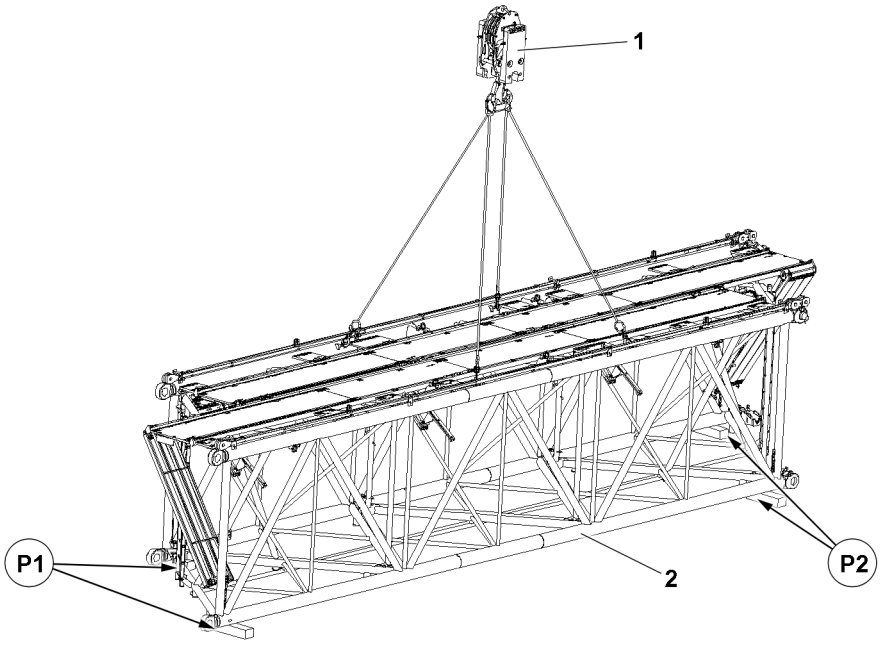

Fig.145068: Fasten the auxiliary crane to the fastening points for the transport position.

- ▶ Fasten the auxiliary crane **1** to the fastening points for the transport position.
- ▶ Unload the SX-intermediate section **2** with the auxiliary crane **1**.
- ▶ Remove the auxiliary crane **1**.

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5.42 HS-auxiliary jib

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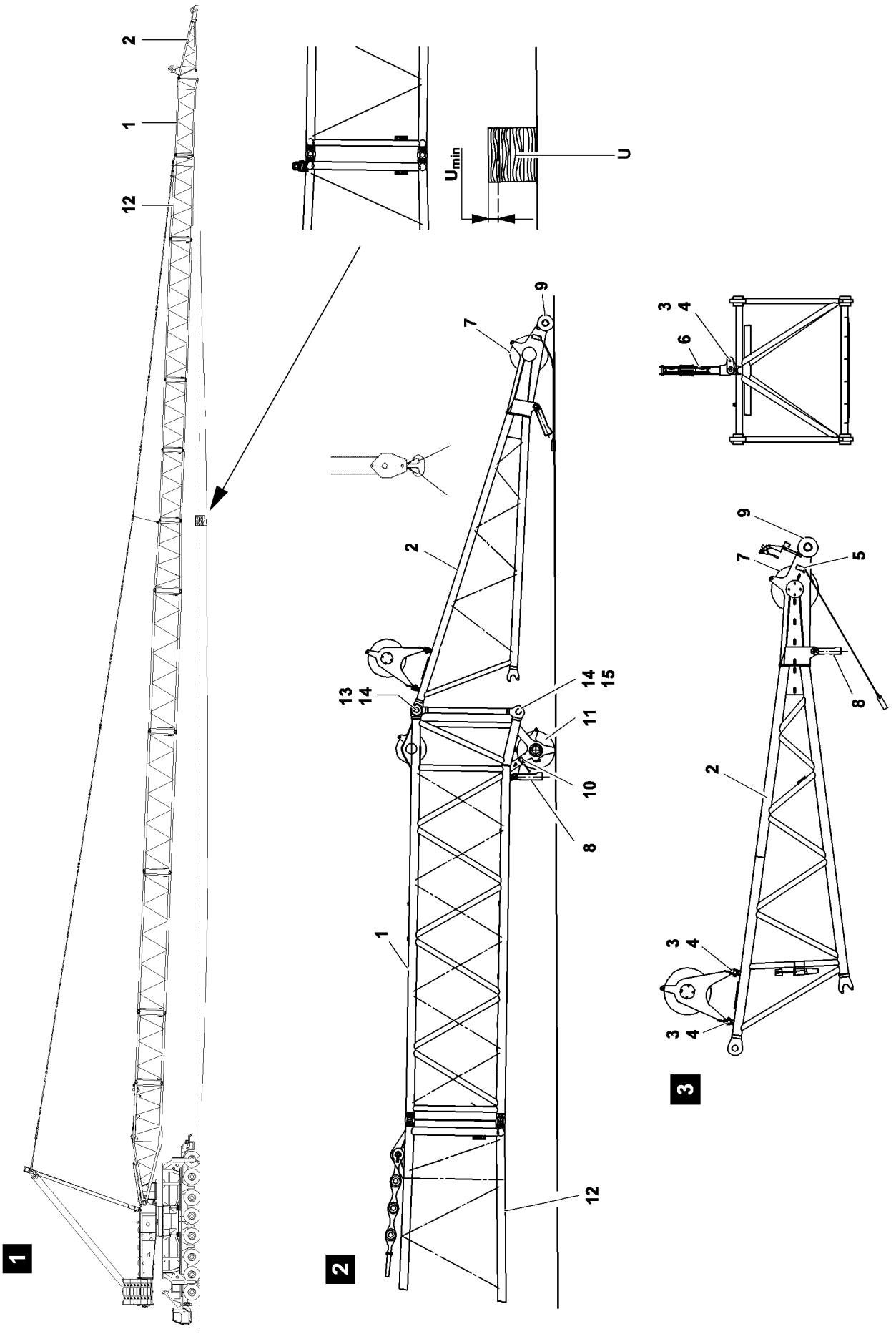

Fig.111675

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1 Auxiliary jib „HS“

Note
▶ The auxiliary jib „HS“ is installed on the boom system SL8HS on the adapter for the auxiliary jib **1**!

1.1 Component overview of auxiliary jib „HS“

Position	Component	Weight
1	Adapter for auxiliary jib	3.6 t
2	Auxiliary jib „HS“	2.5 t
3	Pin	
4	Spring retainer	
5	Hoist limit switch	
6	Pulley retainer	
7	Pulley set Auxiliary jib HS	
8	Rope fixed point „Rope lock“	
9	Roller	
10	Hoist limit switch	
11	Pulley set adapter	
12	L-adapter	5.3 t
13	Pin	
14	Spring retainer	
15	Pin	

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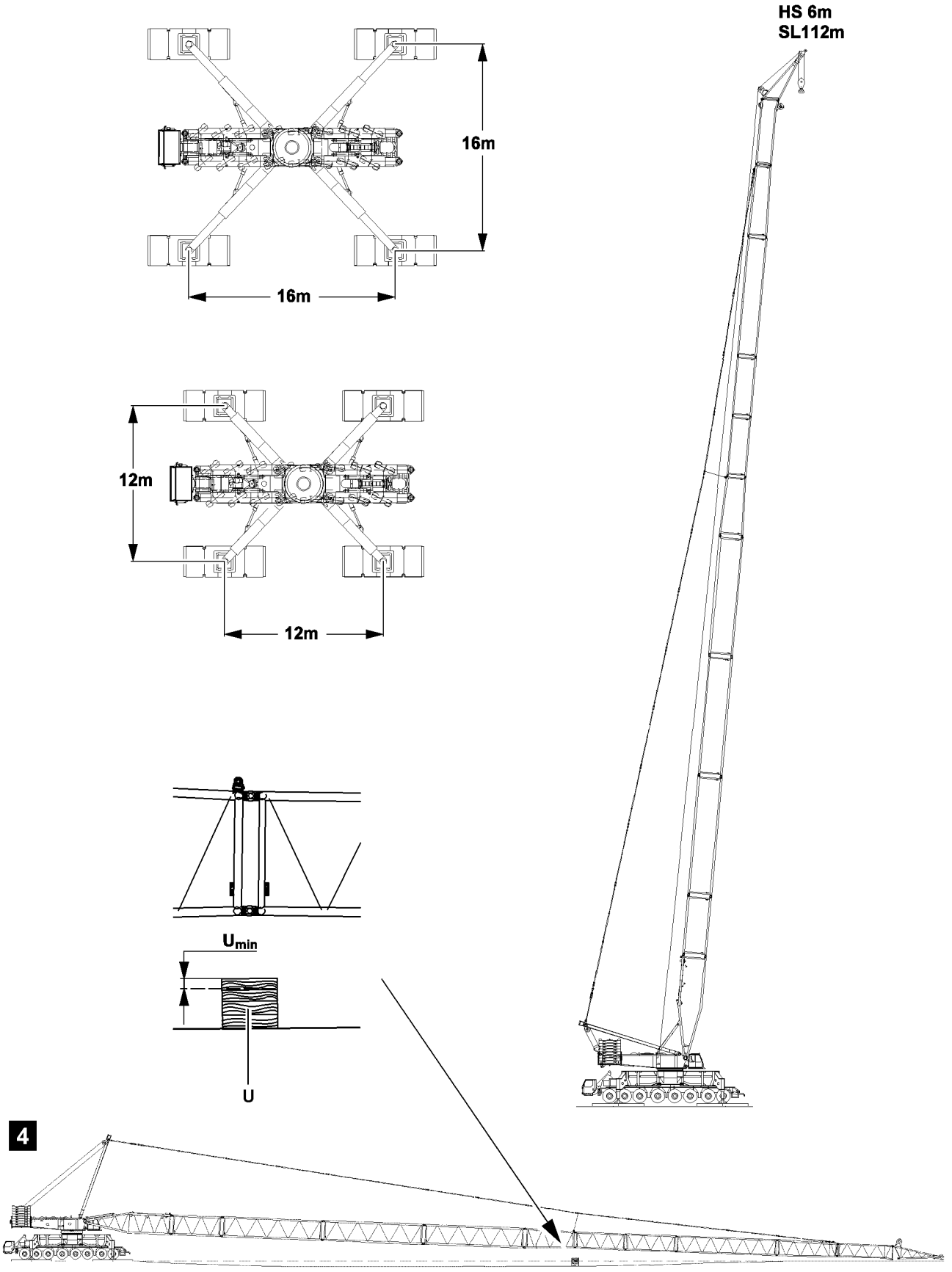

Fig.111674

1.2 Operating mode overview

	Equipment	
Operating modes	Adapter for auxiliary jib with pulley set 120 t	Auxiliary jib „HS“ with pulley set 120 t
SL8HS Support base 12 m x 12 m	X	X
SL8HS Support base 16 m x 16 m	X	X

1.3 Support

Note

▶ The different boom lengths must be supported at assembly with suitable material to prevent excessive bending of the boom, see illustration **4**!

Boom	Support U_{min}
SL - 105 m	> 1.1 m
SL - 112 m	> 0.9 m
SL - 115 m	> 0.9 m

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Fig.195219

2 Assembly

WARNING
Risk of falling!
During assembly / disassembly work, personnel must be secured with appropriate aids to prevent them from falling. If this is not observed, assembly personnel can fall and suffer life-threatening or fatal injuries!

- ▶ Any work, where there is a danger of falling must be carried out with suitable aids (for example lifting platform, scaffolding, ladder, auxiliary crane)!
- ▶ If the work cannot be carried out with such aids nor from the ground, then the assembly personnel must secure themselves with approved fall arrest systems to avoid falling, see Crane operating instructions, Chapter 2.04!
- ▶ Approved fall arrest systems must be hung into the respective fastening points on the crane, see Crane operating instructions, chapter 2.06!
- ▶ If railings are present on the components, then they must be brought into the corresponding position and secured for assembly / disassembly work!
- ▶ Step on aids and fall protection equipment only with clean shoes!
- ▶ Keep aids and fall protection equipment clean and free from snow and ice!
- ▶ During all assembly and disassembly work, maintenance work and inspections, travel and crane operation is prohibited!

WARNING
Falling components!
If unsecured or non-supported components are assembled or disassembled, they can fall down. Personnel can be killed or seriously injured!

- ▶ During pinning and unpinning of the lattice sections, it is prohibited for anyone to remain **under** or **on** the components as well as within the entire danger zone!
- ▶ Support the boom and components before pinning / unpinning!
- ▶ Pin or unpin both pins that lie in one horizontal level, i.e. **left** and **right**!
- ▶ Secure the pins in the bearing points and in the receptacles!
- ▶ Do not disengage the auxiliary crane until each component is pinned on and secured!
- ▶ It is prohibited to lean a ladder against the component being disassembled!

WARNING
Danger of impact / crushing!
When installing / removing counterweight components with the auxiliary crane, crane components can start to swing back and forth!
When lifting / lowering and positioning crane components, there is an increased danger of impacts / crushing!
Personnel can be caught and severely injured or killed as a result!

- ▶ Make sure that personnel cannot be caught by components!
- ▶ When working in danger zones: Use aids to protect limbs!
- ▶ Guide components with suitable aids to minimize oscillation!

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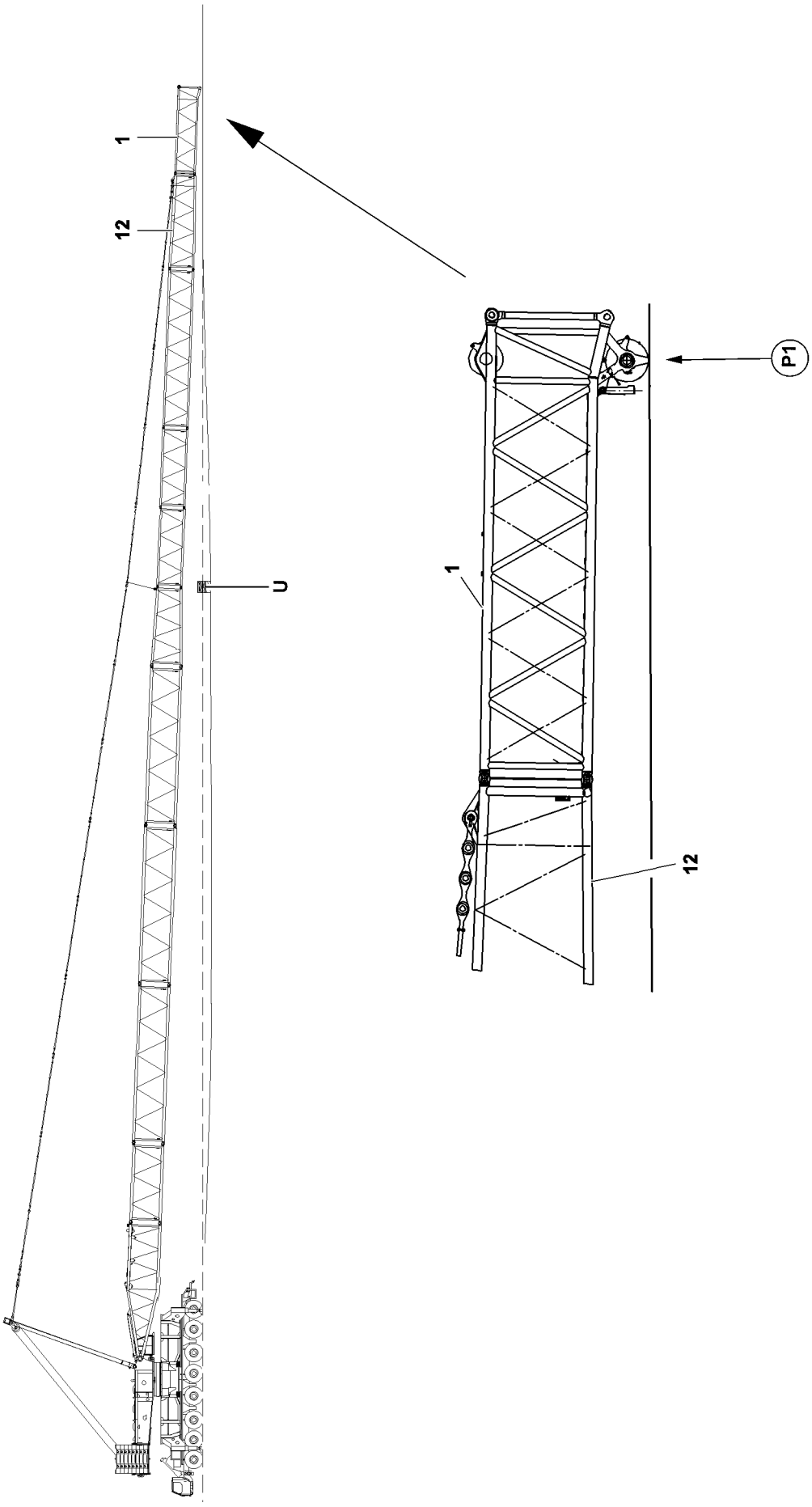

Fig.111676

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WARNING
Danger of accidents due to incorrectly assembled intermediate sections!
- ▶ Any other arrangement of the intermediate sections and guy rods than specified in the operating instructions or the rod plans is prohibited!
- ▶ When assembling the boom, it must be ensured that the intermediate sections are installed according to their description, see Crane operating instructions, chapter 5.03!

Note
- ▶ The SL-boom combination in connection with the auxiliary jib „HS“ must be installed according to the separately supplied rod and assembly plans!
- ▶ For installation of the SL-boom combination, see Crane operating instructions, chapter 5.38!

Make sure that the following prerequisites are met:
- The crane is supported and aligned in horizontal direction.
- The boom including the adapter **1** are installed.
- The boom is laying on the support legs of the adapter for the auxiliary jib, point **P1**.
- An assembly scaffolding / work platform is available.
- The counterweight has been installed to the turntable according to the load chart.
- The LICCON overload protection has been set according to the data in the load chart.
- The LICCON overload protection settings have been compared with the actual crane configuration.
- The assembly icon is visible on the LICCON monitor.
- An auxiliary crane is available.

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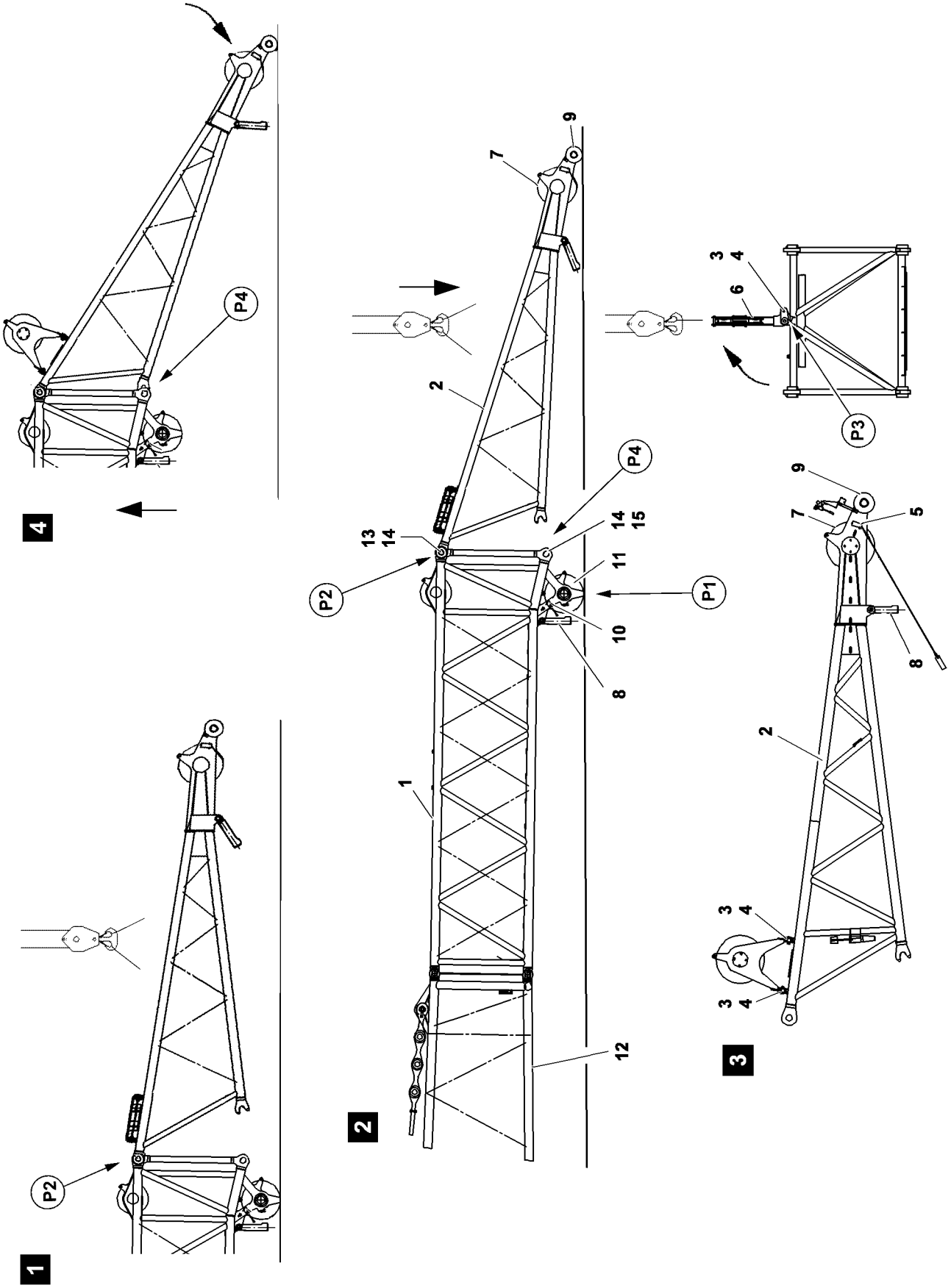

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Fig.111677

2.1 Installing the auxiliary jib „HS“

WARNING
Falling components!
If the components are incompletely pinned or secured, then components can fall down!
Personnel can be severely injured or killed!
▶ Make sure that all components are completely pinned and secured!

▶ Swing the auxiliary jib „HS“ **2** with the auxiliary crane in to the pin points, point **P2** on the adapter for the auxiliary jib **1**, see illustration **1**.

Pin the auxiliary jib „HS“ on the adapter for the auxiliary jib on both sides at point **P2**, see illustration **2**:
▶ Insert the pins **13** on both sides with the pin pulling device and secure with spring retainer **14**.
▶ Place the auxiliary jib „HS“ with the auxiliary crane on the ground, see illustration **2**.
▶ Remove the auxiliary crane.
▶ Insert the pin **15** on both sides at point **P4** on the adapter for the auxiliary jib and secure with spring retainer **14**.
▶ Erect the pulley retainer **6** with the auxiliary crane, see illustration **3**.
▶ Pin the pin **3** on point **P3** and secure with spring retainer **4**.
▶ Remove the auxiliary crane.
▶ Pull the hoist rope over the rope pulleys of the auxiliary jib „HS“, see reeving plan.

2.2 Lifting the boom off the ground

WARNING
The crane can topple over!
During erection of the boom, the crane can be overloaded and topple over!
Personnel can be severely injured or killed!
▶ Observe the data in the erection and take down charts!
▶ It is prohibited to turn the crane superstructure while erecting the boom!

NOTICE
Damage of auxiliary jib „HS“!
▶ After the auxiliary jib „HS“ **2** is lifted off the ground, the boom combination may be luffed up or placed down only very carefully! The auxiliary jib „HS“ folds out automatically when it is placed down and runs on the rollers **9** toward the „outside“!

▶ Luff the boom up carefully.

Result:

– Due to its own weight, the auxiliary jib„HS“ **2** runs on the rollers **9** slowly toward the „inside“, see illustration **4**.

▶ Luff up the boom until the auxiliary jib „HS“ lifts off the ground.

Result:

– The auxiliary jib„HS“ **2** supports itself at point **P4** on the pin **15**.

2.3 Establishing the electrical connections

Make sure that the following prerequisite is met:
– The boom combination is completely assembled.

Note
▶ To establish the electrical connections, see Electric wiring diagram!

▶ Establish the electrical connections.
▶ Make sure that all electrical connections on the boom are established.

2.4 Establishing the hydraulic connections

The hydraulic connections are made with quick couplings.

When connecting hydraulic lines with quick couplings, make sure that the coupling procedure is carried out correctly.

WARNING
Pressure in the hydraulic lines!
If the pressure supply is not interrupted before connecting / releasing the hydraulic lines, the hydraulic oil can escape with high pressure!
Personnel can be severely injured or killed!
▶ Release the pressure in the hydraulic system before connecting / disconnecting: Interrupt the pressure supply and wait for a short time!

WARNING
Loss of pressure or leakage!
Incorrectly coupled or self-loosening quick-release couplings (particularly return lines) can result in serious accidents due to component failure!
▶ Check that the quick-release couplings have been properly connected before using the crane!

▶ Connect the coupling components (sleeve and connector) and screw together with the hand-tightened nut.
▶ Tighten the hydraulic coupling by hand. Rotate the hand-tightened nut until it reaches a tangible, fixed stop position.
▶ Establish the hydraulic connection to the D-relapse cylinders.

2.5 Checking the function of the safety devices

WARNING
Non-functioning safety devices!
If the function of the safety devices is defective, personnel can be severely injured or killed!
▶ Crane operation with non-functioning safety devices is **prohibited**!

Note
▶ The function of the individual limit switches must be checked before erection!
▶ The function of the limit switch initiators must be checked in the test system, see Diagnostics manual!

Note
▶ If a function check on the limit switches or on the safety devices does not lead to the desired shut offs, then the plug connections on the connector boxes or the components itself must be checked!
▶ If no visible connection errors or component defects can be found, contact **LIEBHERR** Service!

Make sure that the following prerequisites are met:
– All electrical connections have been made.
– The crane engine is running.
– The corresponding operating mode is set on the LICCON monitor.

2.5.1 Checking the wind speed sensor

▶ Test the movement and the function of the wind speed sensor.

2.5.2 Checking the airplane warning light

▶ Turn the airplane warning light on.
▶ Visually check functionality.

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2.5.3 Checking the hoist limit switch on the pulley head

Note

▶ When replacing or changing a hoist limit switch, the corresponding hoist limit switch must have the correct bus address and the correct software version in order to be detected by the bus system!

▶ Actuate the hoist limit switch manually on the pulley head.

Result:

– The spool up function of the hoist winch turns off.
– The icon „Hoist top“ appears on the LICCON monitor 0.
– The limit switch is functioning.

2.5.4 Checking the limit switch SL-boom „steepest position“

Note

▶ The limit switch functions have to be checked individually before erection!

▶ Cover the limit switch initiators on the S-relapse cylinder individually with a metal plate.

Result:

– The hoist limit switch is actuated manually.
– The control winch movement „spool up“ turns off.
– The icon „boom limitation“ appears on the LICCON monitor 0.
– The limit switch is functioning.

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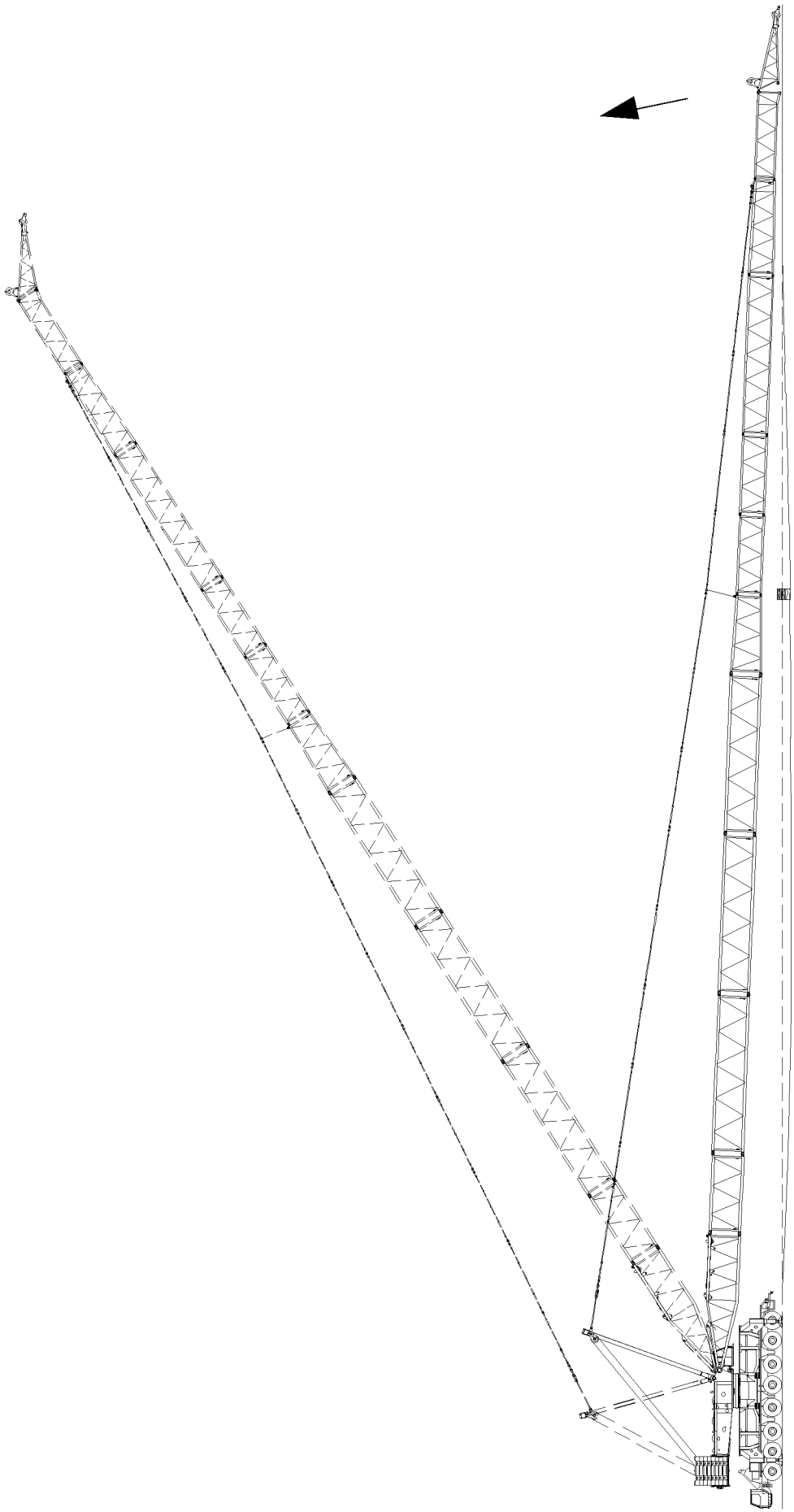

Fig.111678

3 Erecting the boom

DANGER
The crane can topple over!
- ▶ It is prohibited to turn the crane superstructure while erecting the boom!
- ▶ Observe the data in the erection and take down charts!

WARNING
The crane can topple over!
If the following conditions are not met before erecting the boom, the crane can topple over!
Personnel can be severely injured or killed!
- ▶ Observe the Safety technical notes, see Crane operating instructions, chapter 5.01!
- ▶ Extend the S-relapse cylinders before erecting the boom combinations!
- ▶ Do not allow slack cable to build up on the control winch!

WARNING
Falling hoist rope!
If the hoist rope is not reeved before the erection procedure with the corresponding length on the auxiliary jib „HS“, then it can fall down backward due to its own weight!
Personnel can be severely injured or killed!
- ▶ Reeve the hoist rope with sufficient length on the auxiliary jib „HS“ before the erection procedure!
- ▶ The hoist rope must be constantly monitored during the erection procedure!
- ▶ Do not step into the danger zone!

3.1 Erection procedure

Erect the boom combination, see Crane operating instructions, chapter 5.38.

Note
- ▶ Observe the data in the erection and take down charts!

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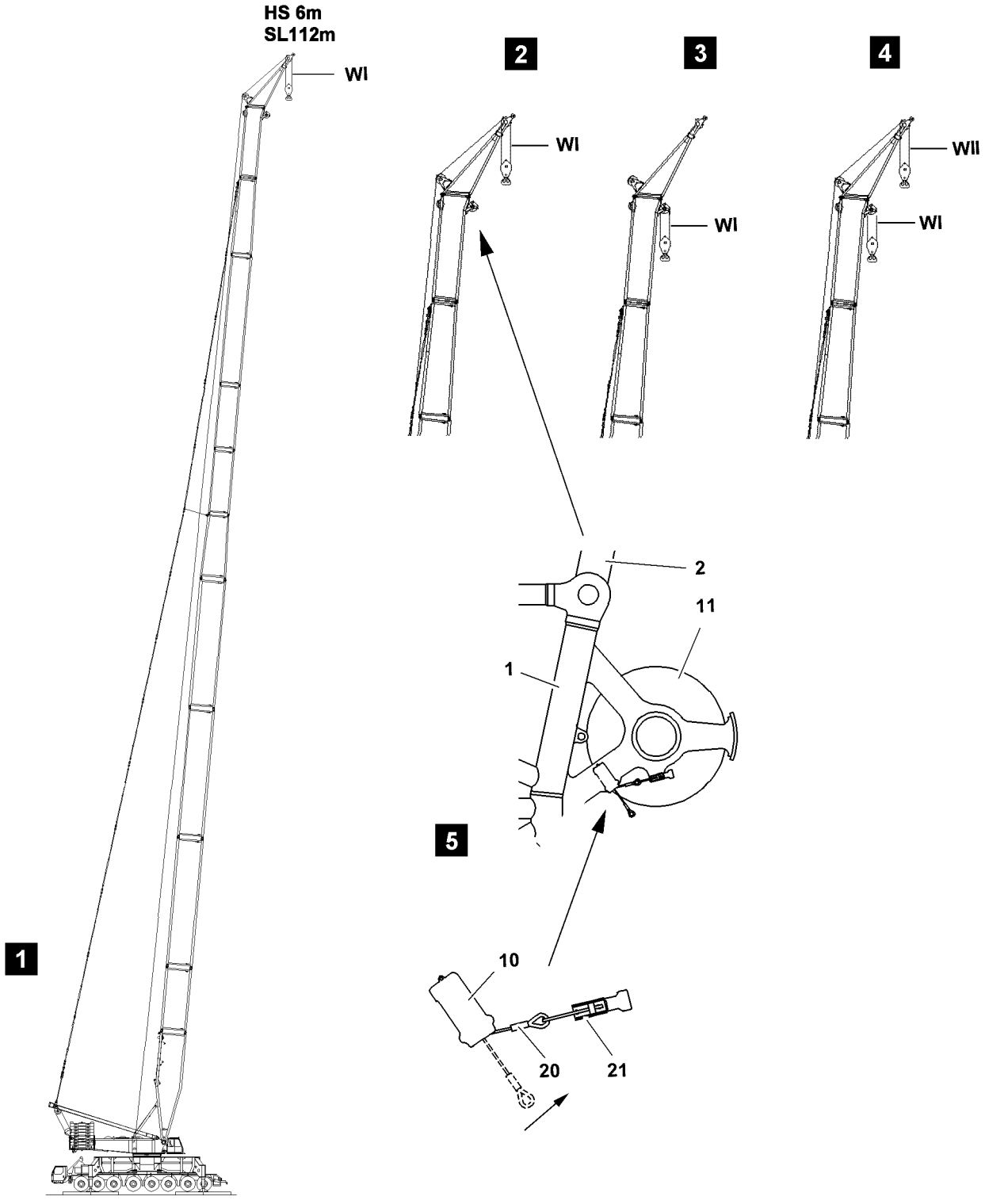

Fig.111679

4 Operating the crane

4.1 Preparing for crane operation

Note

▶ Observe the notes, see Crane operating instructions, chapter 4.05, chapter 4.08 and chapter 5.01!

Make sure that the following prerequisites are met:
- The LICCON overload protection is active.
- The LICCON overload protection has been set according to the data in the load chart.

WARNING

The crane can topple over!

▶ Check the horizontal position of the crane before and during operation!

▶ If the crane operator leaves the cab, even for a short time, the operating mode setting must be checked and reset if necessary before resuming crane operation!

4.2 Checking the settings

▶ Check the function of the overload protection by running against the operating positions „on top“ and „bottom“.

▶ Check the hoist limit switch by running against the hoist limit switch weight.

▶ Check the function of the limit switches on the relapse cylinders.

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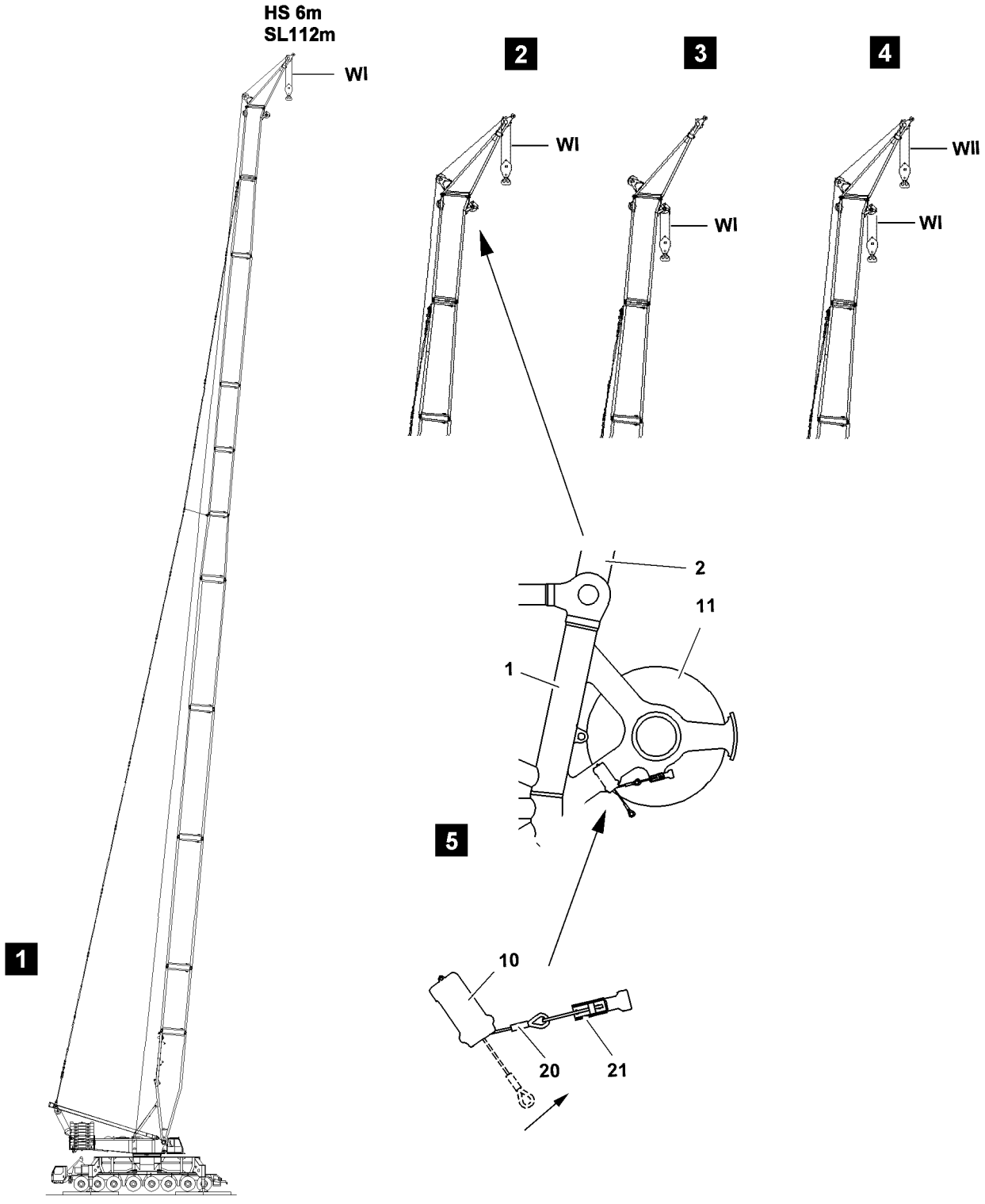

Fig.111679

4.3 Operating mode

Hoist rope reevings, see Crane operating instructions, chapter 4.06 and Reeving plans.

WARNING
Overload of crane!
With reeved winch 2, the load display is smaller than the actual load on the load hook!
The crane can be overloaded and topple over in case of:
- small reevings
- steep boom positions or small radii

▶ Carry out crane movements with special caution!

4.3.1 Crane operation with reeved auxiliary jib „HS“

Note
▶ For crane operation with reeved auxiliary jib „HS“ **2**, winch 1 must be reeved!

Reeving of hoist rope, see illustration **2**.

Note
The hoist limit switch **10** on the adapter for the auxiliary jib **1** must always be connected on the LIC-CON system bus!
For crane operation with reeved auxiliary jib HS **2** no hoist rope is reeved on the adapter for the auxiliary jib **1**!
▶ Make sure that the hoist limit switch **10** is released on the adapter for the auxiliary jib **1**!

▶ Remove the hoist limit switch weight.
▶ Attach the hoist limit switch rope **20** with hook lock **21** under „tension“, see illustration **5**.

Result:

– The hoist limit switch **10** is released.

4.3.2 Crane operation with reeved adapter for the auxiliary jib

Note
▶ For crane operation with reeved adapter for the auxiliary jib **1**, winch 1 must be reeved!

Reeving of hoist rope, see illustration **3**.

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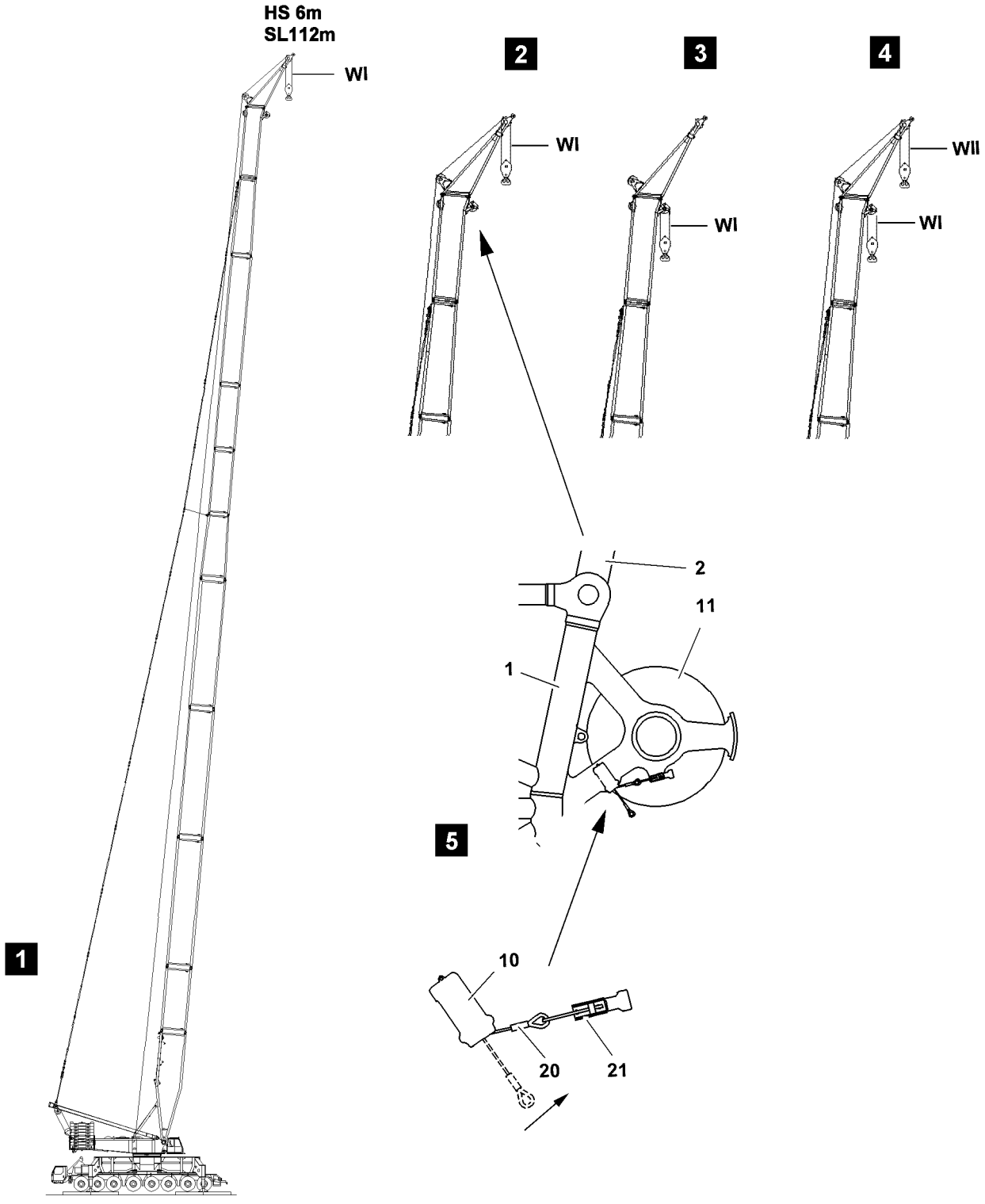

Fig.111679

4.3.3 Two hook crane operation

For two hook operation, there is the possibility to operate the load hook on the auxiliary jib „HS“ and the load hook on the adapter for the auxiliary jib simultaneously. This possibility is provided for turning loads.

Note

▶ For two hook operation, winch 1 on the adapter for the auxiliary jib **1** and winch 2 on the auxiliary jib „HS“ **2** must be reeved!

Reeving of hoist rope, see illustration **4**.

Make sure that the following prerequisites are met:
- The LICCON overload protection has been set according to the data in the load chart.
- The corresponding operating mode is set on the LICCON monitor.
- The rope reeving is entered on the LICCON monitor according to the actual reeving number.

Note

▶ The load must always be lifted first by 100% with the weakest components, auxiliary jib „HS“!

WARNING

Overload of crane

The reeving on the adapter for the auxiliary jib **1** must be the same or greater than the reeving on the auxiliary jib „HS“ **2**!

If this is not observed, the crane can be overloaded!

▶ Make sure that the hoist ropes are correctly reeved!

The maximum total load for two hook operation corresponds to the maximum load permitted in the load chart on the auxiliary jib „HS“.

NOTICE

Load capacity reduction!

The load capacity is reduced by the weights of the load hook and the weights of the fastening equipment!

▶ To the weight of the load to be lifted, the weights of the load hook and the fastening equipment must be added!

Note

Radius display

▶ The radius display is according to the entered auxiliary jib „HS“!

▶ In individual load capacity per hook in two hook operation corresponds to the permissible load in the respective load chart for operation with auxiliary jib „HS“!

▶ In total load capacity in two hook operation corresponds to the permissible load in the respective load chart for operation with auxiliary jib „HS“!

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Fig.195219

5 Disassembly

WARNING
Risk of falling!
During assembly / disassembly work, personnel must be secured with appropriate aids to prevent them from falling. If this is not observed, assembly personnel can fall and suffer life-threatening or fatal injuries!

- ▶ Any work, where there is a danger of falling must be carried out with suitable aids (for example lifting platform, scaffolding, ladder, auxiliary crane)!
- ▶ If the work cannot be carried out with such aids nor from the ground, then the assembly personnel must secure themselves with approved fall arrest systems to avoid falling, see Crane operating instructions, Chapter 2.04!
- ▶ Approved fall arrest systems must be hung into the respective fastening points on the crane, see Crane operating instructions, chapter 2.06!
- ▶ If railings are present on the components, then they must be brought into the corresponding position and secured for assembly / disassembly work!
- ▶ Step on aids and fall protection equipment only with clean shoes!
- ▶ Keep aids and fall protection equipment clean and free from snow and ice!
- ▶ During all assembly and disassembly work, maintenance work and inspections, travel and crane operation is prohibited!

WARNING
Falling components!
If unsecured or non-supported components are assembled or disassembled, they can fall down. Personnel can be killed or seriously injured!

- ▶ During pinning and unpinning of the lattice sections, it is prohibited for anyone to remain **under** or **on** the components as well as within the entire danger zone!
- ▶ Support the boom and components before pinning / unpinning!
- ▶ Pin or unpin both pins that lie in one horizontal level, i.e. **left** and **right**!
- ▶ Secure the pins in the bearing points and in the receptacles!
- ▶ Do not disengage the auxiliary crane until each component is pinned on and secured!
- ▶ It is prohibited to lean a ladder against the component being disassembled!

WARNING
Danger of impact / crushing!
When installing / removing counterweight components with the auxiliary crane, crane components can start to swing back and forth!
When lifting / lowering and positioning crane components, there is an increased danger of impacts / crushing!
Personnel can be caught and severely injured or killed as a result!

- ▶ Make sure that personnel cannot be caught by components!
- ▶ When working in danger zones: Use aids to protect limbs!
- ▶ Guide components with suitable aids to minimize oscillation!

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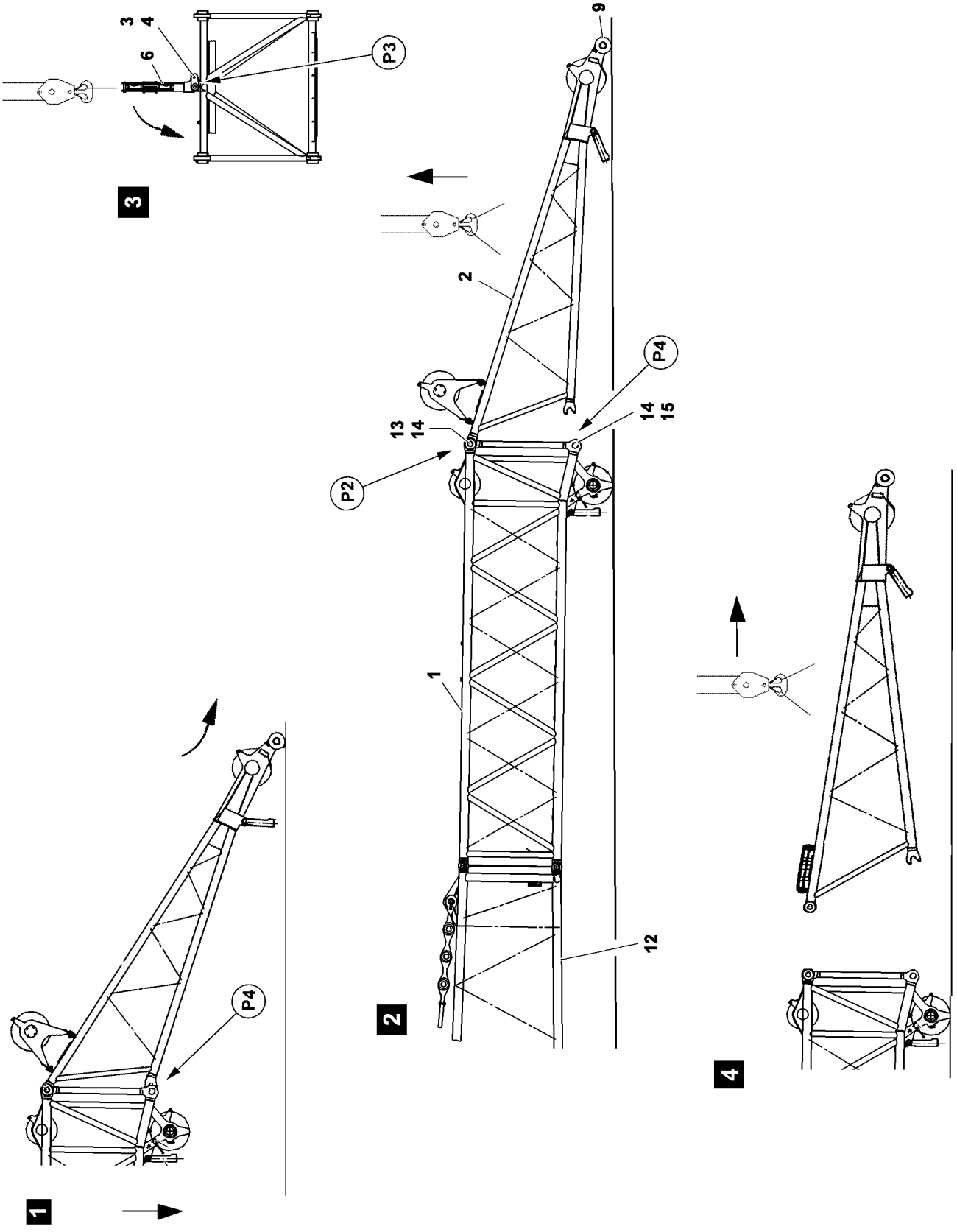

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Fig.111680

5.1 Luff the boom down

WARNING
The crane can topple over!
If the following conditions are not met before luffing down the boom, the crane can topple over!
Personnel can be caught and severely injured or killed as a result!
- ▶ Observe the Safety technical notes, see Crane operating instructions, chapter 5.01!
- ▶ Observe the data in the erection and take down charts!

NOTICE
Damage of auxiliary jib „HS“!
When luffing down, place the boom combination very carefully on the ground so that the auxiliary jib „HS“ **2** can automatically fold up on the fork connection, see point **P4** and run on the rollers **9** toward the „outside“, see illustration **1**!
If this is not observed, the auxiliary jib „HS“ can be damaged!
- ▶ Make sure that the auxiliary jib „HS“ **2** can move „out“ without any restriction!

- ▶ Luff the boom down, see Crane operating instructions, chapter 5.38!

5.2 Disconnecting the electrical connections

Make sure that the following prerequisite is met:
- – The boom has been placed down.

- ▶ Disconnect the electrical connections.
- ▶ Make sure that all electrical connections on the auxiliary jib „HS“ have been disconnected.

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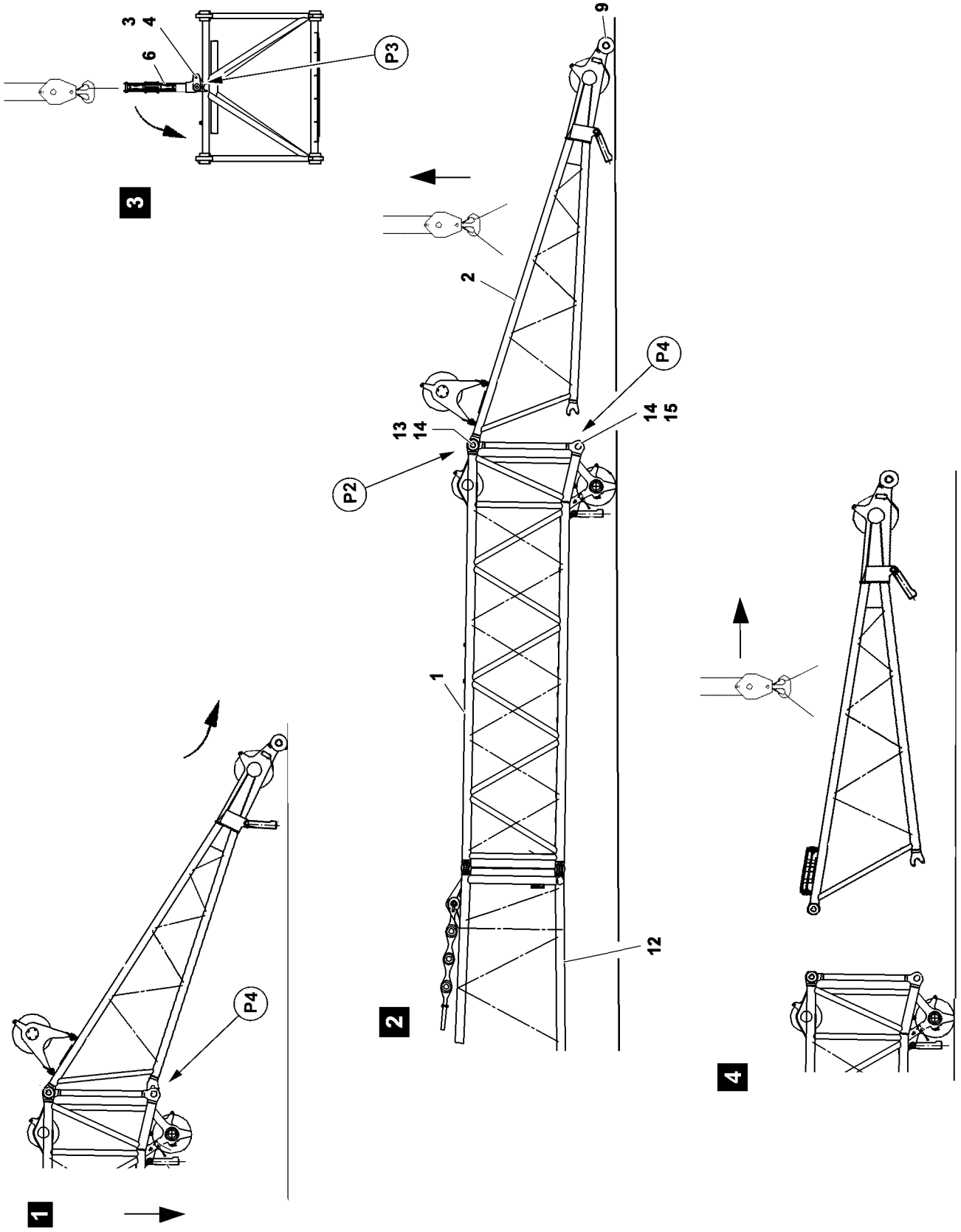

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Fig.111680

5.3 Disconnecting the hydraulic connections

When releasing hydraulic lines with quick-release couplings, make sure that the uncoupling procedure is carried out correctly.

WARNING
Pressure in the hydraulic lines!
If the pressure supply is not interrupted before connecting / releasing the hydraulic lines, the hydraulic oil can escape with high pressure!
Personnel can be severely injured or killed!
▶ Release the pressure in the hydraulic system before connecting / disconnecting: Interrupt the pressure supply and wait for a short time!

▶ Release the hydraulic coupling by hand.
▶ Disconnect the hydraulic connection.

5.4 Removing the auxiliary jib „HS“

Make sure that the following prerequisites are met:
– The SL-boom is placed on a load-bearing support.
– The auxiliary jib „HS“ **2** is laying on the ground.
– All electrical connections are disconnected.
– All hydraulic connections are disconnected.
– The hoist rope on the auxiliary jib „HS“ is unreeved.

DANGER
Risk of injury due to crushing!
The pulley retainer **6** can fold out during the unpinning procedure due to its own weight!
Crushing injuries can occur!
Personnel can be severely injured!
▶ Before unpinning, attach the pulley retainer on the auxiliary crane!

Fold the pulley retainer **6** down with the auxiliary crane, see illustration **3**:
▶ Release and unpin the pin **3**, point **P3**.
▶ Remove the auxiliary crane.
▶ Attach the auxiliary jib „HS“ **2** on the auxiliary crane.
▶ Lift the auxiliary jib „HS“ with the auxiliary crane until the auxiliary jib „HS“ hangs horizontally.
▶ Release the pins **13** on the auxiliary jib „HS“ at point **P2** and unpin.

When the pins **13** are unpinned, see illustration **4**:
▶ Remove the auxiliary jib „HS“ with the auxiliary crane.

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5.61 Roller cart

LWE/LG 1750-006/15409-07-02/en

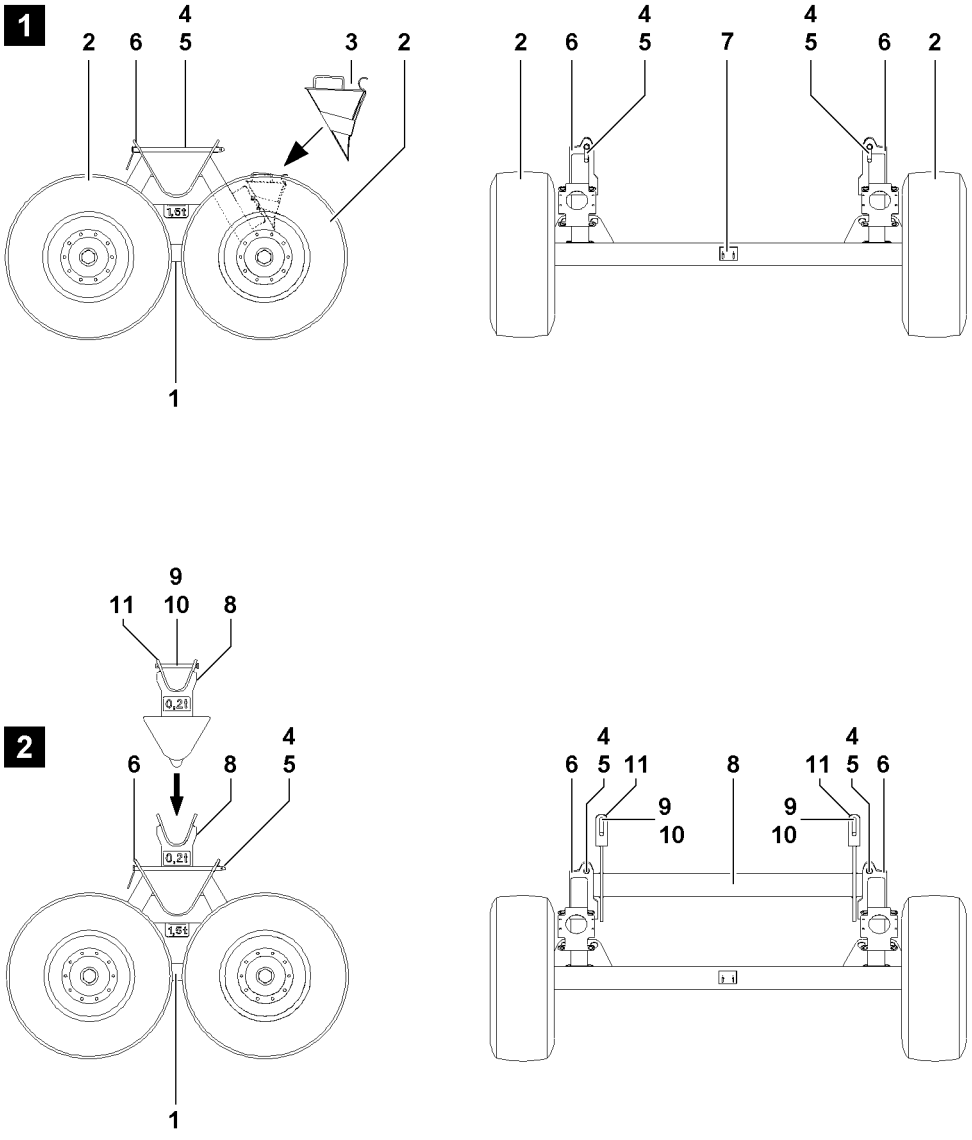

Fig.108265

1 Components of pulley cart

Position	Description	Use
1	Pulley cart	Erection of boom system with W-lattice jib
2	Tires	
3	Wedge	
4	Retaining pin	
5	Locking pin	
6	Receptacle	
7	Axle	
8 [1)]	Adapter for pulley cart*	Assembly of auxiliary jib Erecting the boom system with the auxiliary jib
9 [1)]	Retaining pin	
10 [1)]	Locking pin	
11 [1)]	Receptacle	
17	Adapter for F-jib*	Erecting the boom system with F-jib

1) Required for SLK-operation

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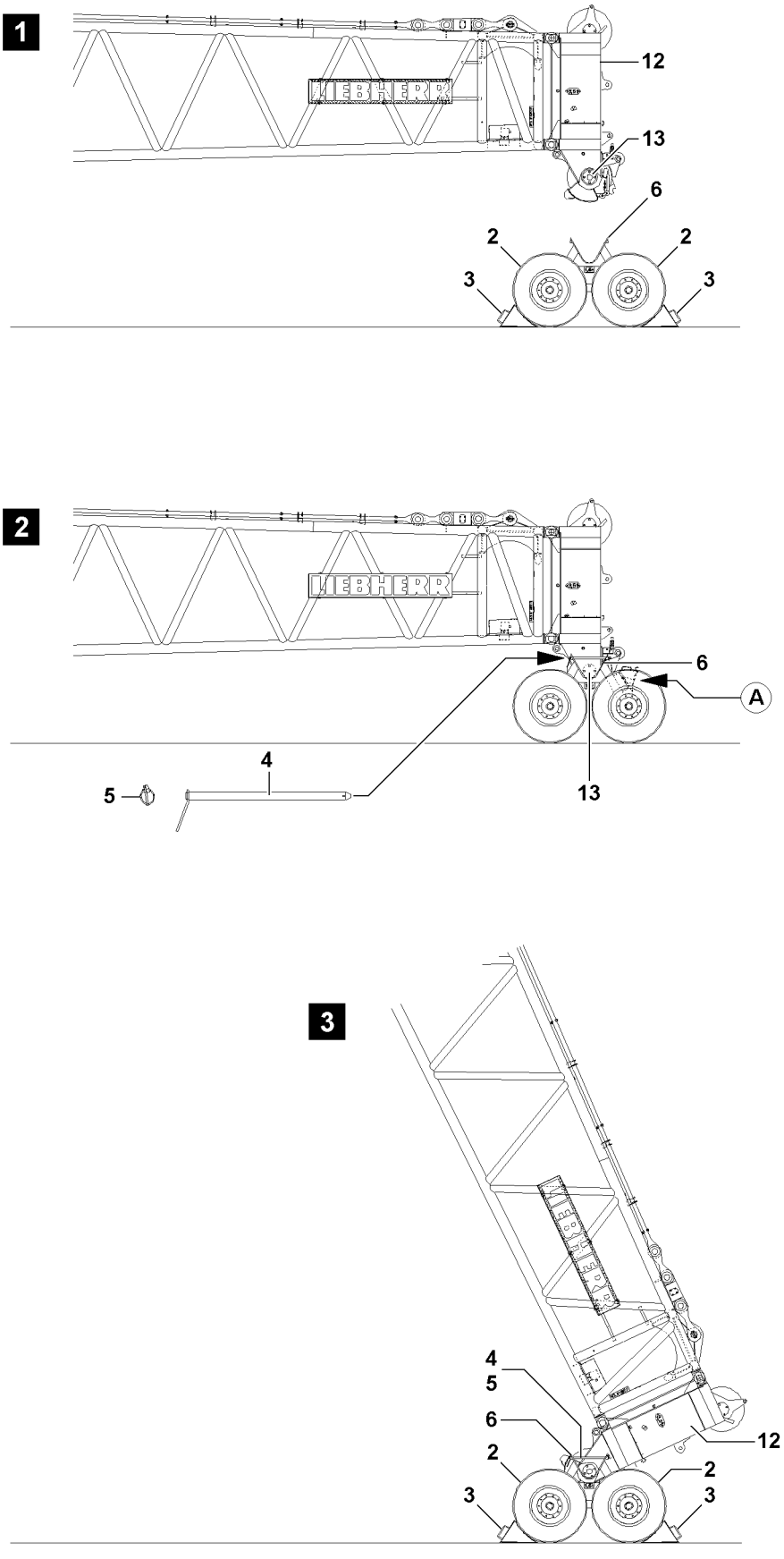

Fig.108264

2 Installing / removing the roller cart from W-boom head

2.1 Installing the pulley cart

Place the pulley cart **1** under the W-end section **12** and affix with wedges **3**.

- ▶ Remove the wedges **3** from the transport retainer (point **A**) on the pulley cart.
- ▶ Secure the pulley cart **1** with wedges **3** to prevent it from rolling off: Push the wedges **3** on the left and right hand side tightly under the wheels **2**, illustration **1**.
- ▶ Release the retaining pins **4** on the receptacles **6** and unpin.
- ▶ Slowly lower the W-boom until the studs **13** of the W-end section **12** are placed in the receptacles **6** of the pulley cart, illustration **2**.

Secure the studs **13** in the receptacles **6** of the pulley cart.

- ▶ Insert the pin **4** at receptacles **6** and secure with locking pin **5**, illustration **2**.
- ▶ Remove the wedges **3** on the wheels.
- ▶ Remove the wedges **3** on the transport receptacle (point **A**) on the pulley cart.

2.2 Removing the pulley cart

When the boom system has reached a certain angle between the S-boom and the W-lattice jib, then the pulley cart is no longer required. Before luffing the boom system all the way up, remove the pulley cart on the W-end section.

WARNING
Overload of crane!
If the pulley cart is not removed before erecting the boom system all the way, the crane can be overloaded and topple over!
Personnel can be severely injured or killed!
- ▶ Remove the pulley cart before lifting the boom system from the ground!

- ▶ Remove the wedges **3** from the transport retainer (point **A**) on the pulley cart.
- ▶ Secure the pulley cart with wedges **3** to prevent it from rolling off: Push the wedges **3** on the left and right hand side tightly under the wheels **2**, illustration **3**.
- ▶ Release the retaining pin **4**: Remove the locking pin **5**.
- ▶ Unpin the retaining pin **4** on the receptacle **6**.
- ▶ Luff the boom system up.

When the boom system is luffed up:
- ▶ Remove the wedges **3** on the wheels.
- ▶ Remove the wedges **3** on the transport receptacle (point **A**) on the pulley cart.
- ▶ Insert the retaining pin **4** in the receptacle **6** and secure with locking pins **5**.
- ▶ Remove the pulley cart.

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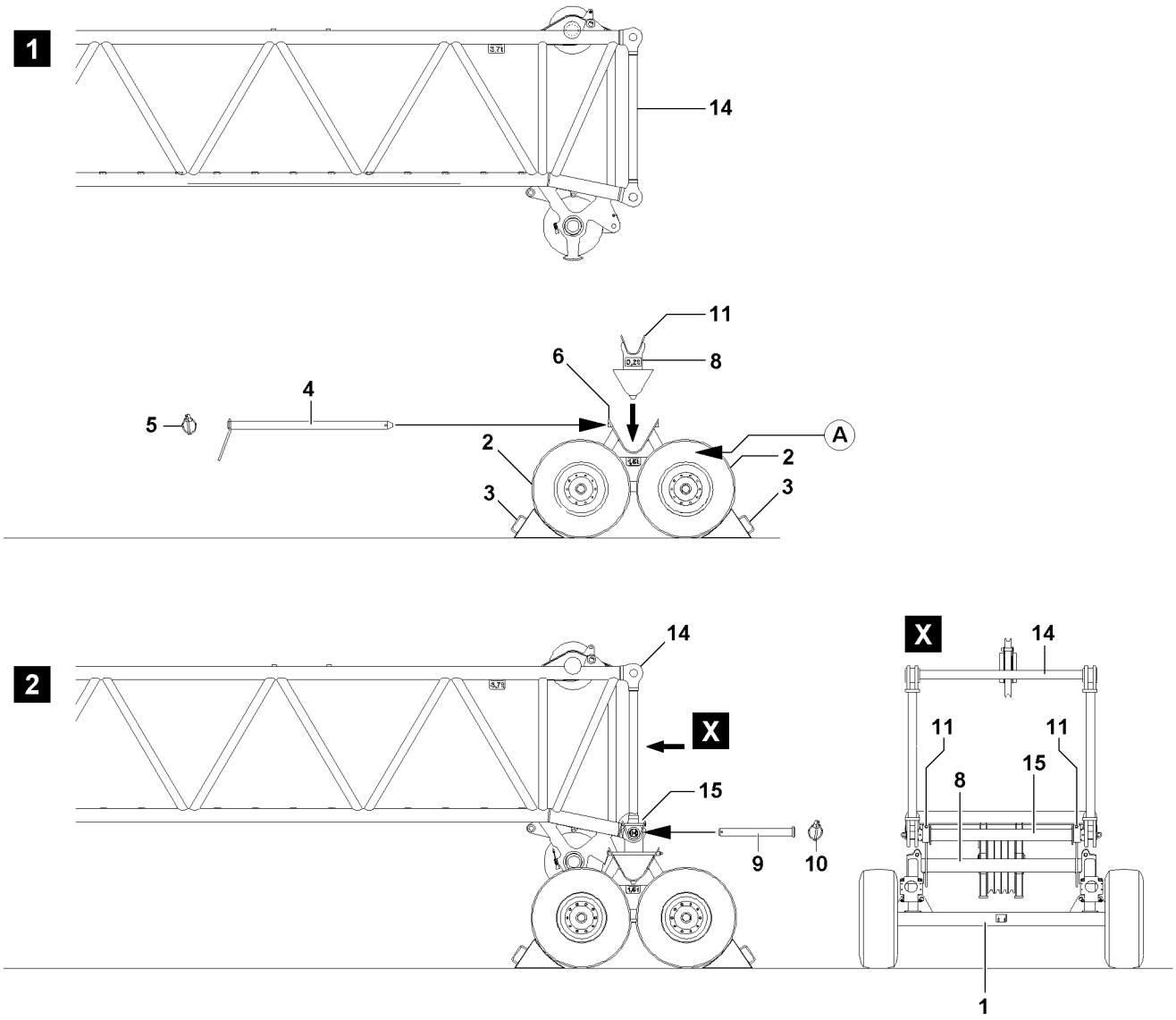

Fig.108275

3 Installing / removing the pulley cart on the adapter for the auxiliary jib

3.1 Installing the „adapter for the pulley cart*“ on the pulley cart

The adapter for the pulley cart **8** is required to erect the SLK-boom combinations. To prevent the pulley set of the adapter for the auxiliary jib **14** from laying on the steel construction of the pulley cart, the receptacle **6** on the pulley cart must be raised. This elevation can be obtained by installing the adapter for the pulley cart **8**.

- ▶ Attach the adapter for the pulley cart **8** on the auxiliary crane.
- ▶ Release the retaining pins **4** on the pulley cart on both sides and unpin.
- ▶ Align the adapter for the pulley cart **8** on the receptacles **6** on the pulley cart.
- ▶ Lower the adapter for the pulley cart **8** in the receptacles **6** on the pulley cart.

When the adapter for the pulley cart **8** is completely lowered in the receptacles **6** on the pulley cart:

- ▶ Insert the retaining pin **4** and secure with locking pin **5**.
- ▶ Remove the auxiliary crane.

3.2 Installing the pulley cart on the „adapter for the auxiliary jib“

Make sure that the following prerequisite is met:

- The adapter for the pulley cart **8** is properly installed and secured on the pulley cart.

Place the pulley cart under the adapter for the auxiliary jib **14** and affix with wedges **3**.

- ▶ Remove the wedges **3** from the transport retainer (point **A**) on the pulley cart.
- ▶ Secure the pulley cart with wedges **3** to prevent it from rolling off: Push the wedges **3** on the left and right hand side tightly under the wheels **2**, illustration **1**.
- ▶ Lower the adapter for the auxiliary jib **14** slowly until the pipe **15** is laying in the receptacles **11** on the adapter for the pulley cart **8**, illustration **2**, illustration **X**.

Secure the pipe **15** in the receptacles **11** on the adapter for the pulley cart **8**.

- ▶ Insert the pin **9** at receptacles **11** and secure with locking pin **10**, illustration **2**.
- ▶ Remove the wedges **3** on the wheels.
- ▶ Remove the wedges **3** on the transport receptacle (point **A**) on the pulley cart.

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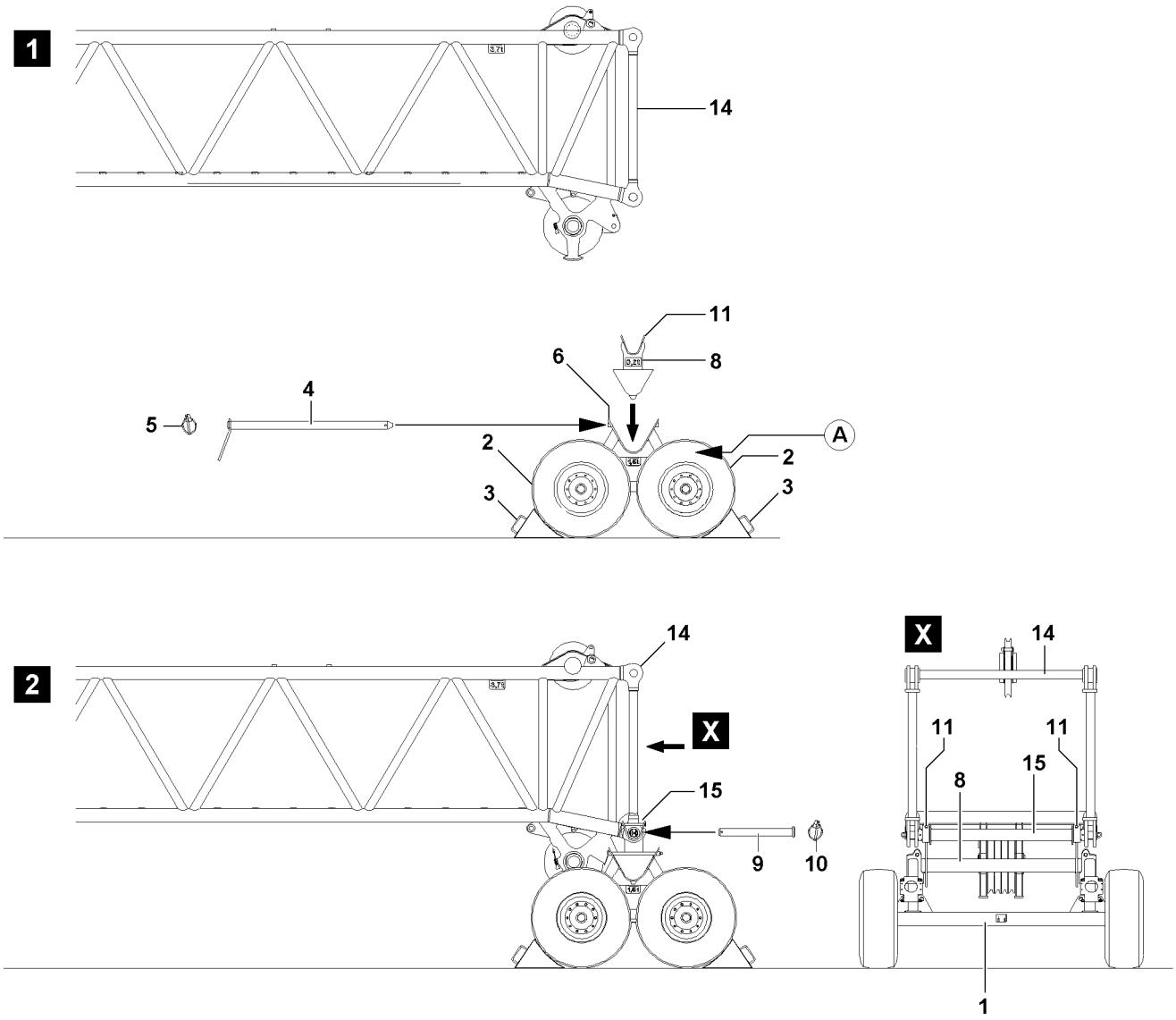

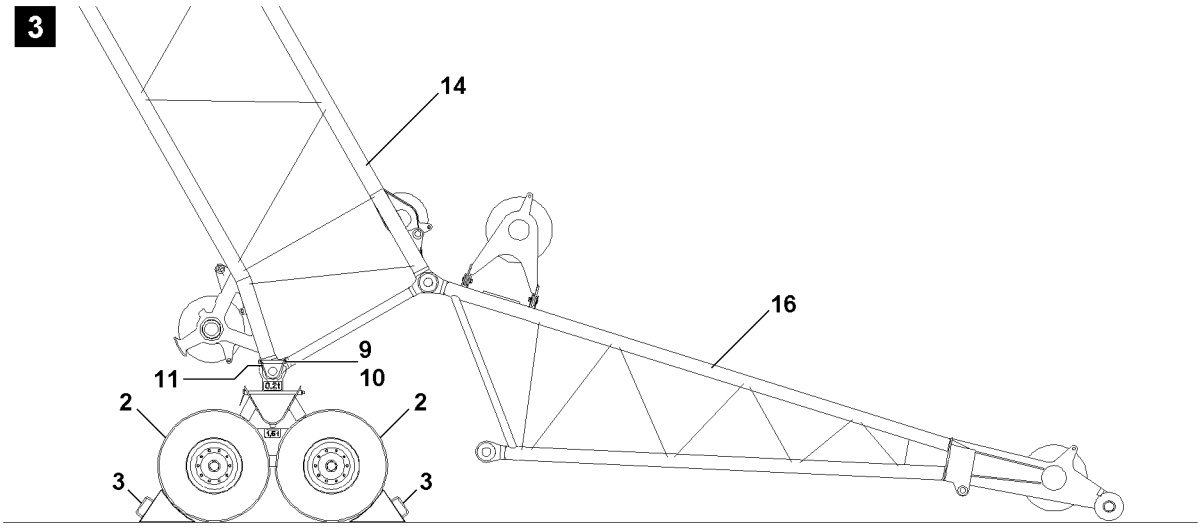

Fig.108275

3.3 Removing the pulley cart on the „adapter for the auxiliary jib“

When the boom system has reached a certain angle between the SL-boom and the K-lattice jib, then the pulley cart is no longer required. Before lifting the boom system off, the pulley cart must be removed on the adapter for the auxiliary jib **14**.

WARNING
Overload of crane!
If the pulley cart is not removed before erecting the boom system all the way, the crane can be overloaded and topple over!
Personnel can be severely injured or killed!
▶ Remove the pulley cart before lifting the boom system from the ground!

▶ Remove the wedges **3** from the transport retainer (point **A**) on the pulley cart.
▶ Secure the pulley cart with wedges **3** to prevent it from rolling off: Push the wedges **3** on the left and right hand side tightly under the wheels **2**, illustration **4**.
▶ Release the retaining pin **9**: Remove the locking pin **10**.
▶ Release the retaining pin **9** on the receptacle **11** and unpin.
▶ Luff the boom system up.

When the boom system is luffed up:
▶ Remove the wedges **3** on the wheels.
▶ Remove the wedges **3** on the transport receptacle (point **A**) on the pulley cart.
▶ Insert the retaining pin **9** in the receptacle **11** and secure with locking pins **10**.
▶ Remove the pulley cart.

3.4 Removing the „adapter for the pulley cart“* on the pulley cart

▶ Attach the adapter for the pulley cart **8** on the auxiliary crane.
▶ Release the retaining pins **4** on the pulley cart on both sides and unpin.
▶ Lift the adapter for the pulley cart **8** and place it on a pallet or a suitable support.
▶ Remove the auxiliary crane.
▶ Insert the retaining pin **4** in the receptacles **6** and secure with locking pins **5**.

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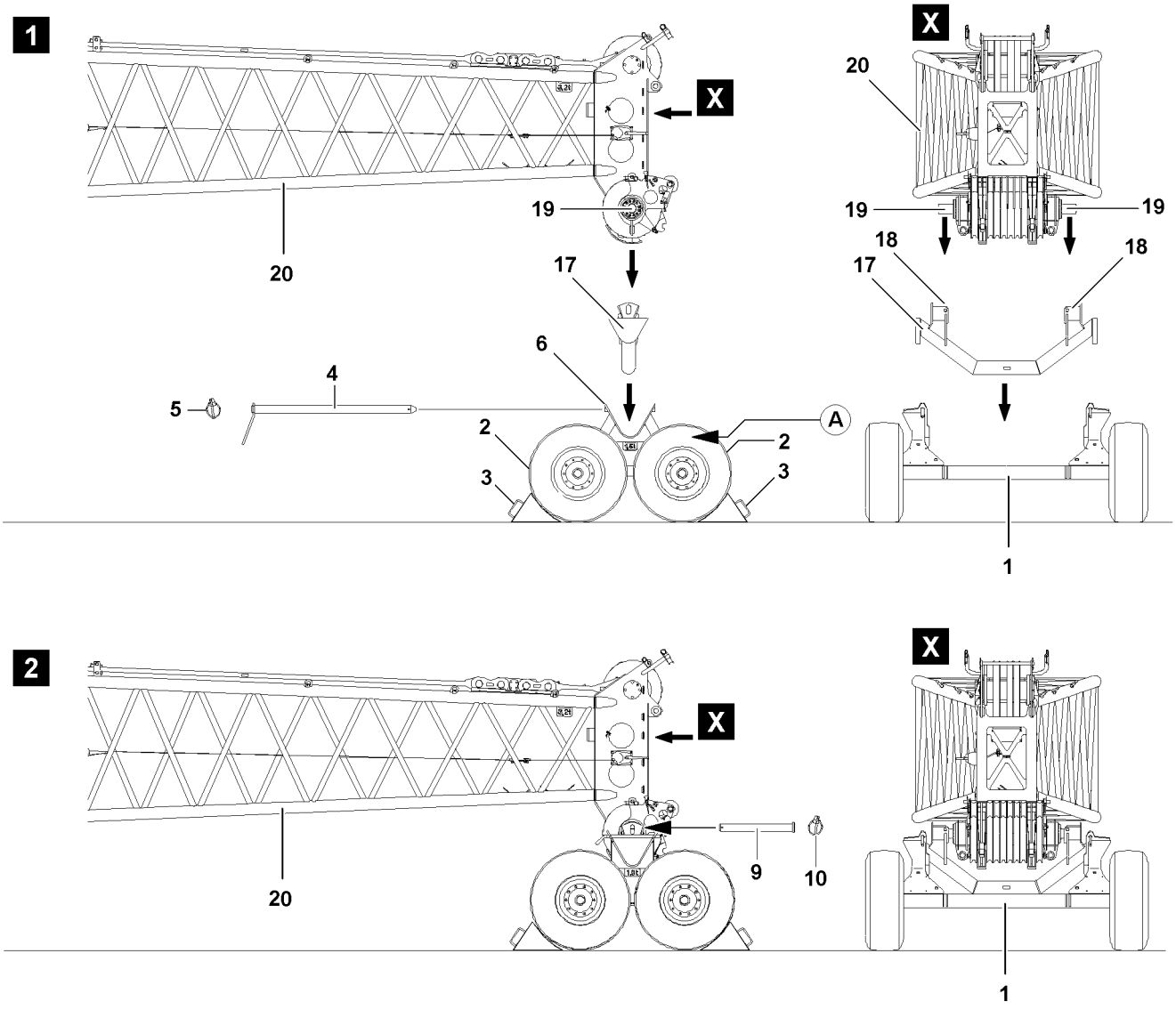

Fig.120169

4 Installing / removing the pulley cart on the F-end section.

4.1 Assembling the „adapter for F-jib*“ on the pulley cart

The F-jib **20** can be erecting by using the pulley cart. Place first the adapter for the F-jib into the pulley cart and secure.

- ▶ Fasten the adapter for F-jib **17** on the auxiliary crane.
- ▶ Release the retaining pins **4** on the pulley cart on both sides and unpin.
- ▶ Align the adapter for F-jib **17** on the receptacles **6** on the pulley cart.
- ▶ Lower the adapter for F-jib **17** in the receptacles **6** on the pulley cart.

When the adapter for F-jib **17** is completely lowered in the receptacles **6** on the pulley cart:

- ▶ Insert the retaining pin **4** and secure with locking pin **5**.
- ▶ Remove the auxiliary crane.

4.2 Installing the pulley cart

Place the pulley cart **1** under the F-jib **20** and affix with wedges **3**.

- ▶ Remove the wedges **3** from the transport retainer (point **A**) on the pulley cart.
- ▶ Secure the pulley cart **1** with wedges **3** to prevent it from rolling off: Push the wedges **3** on the left and right hand side tightly under the wheels **2**, illustration **1**.
- ▶ Release and unpin the pins **9** on the receptacles **18**.
- ▶ Slowly lower the F-jib **20** until the studs **19** of the F-jib **20** are laying in the receptacles **18** of the adapters for F-jib, illustration **2**.

Secure the studs **19** in the receptacles **18** of the adapter for the F-jib.

- ▶ Insert the pin **4** at receptacles **18** and secure with locking pin **5**, illustration **2**.
- ▶ Remove the wedges **3** on the wheels.
- ▶ Remove the wedges **3** on the transport receptacle (point **A**) on the pulley cart.

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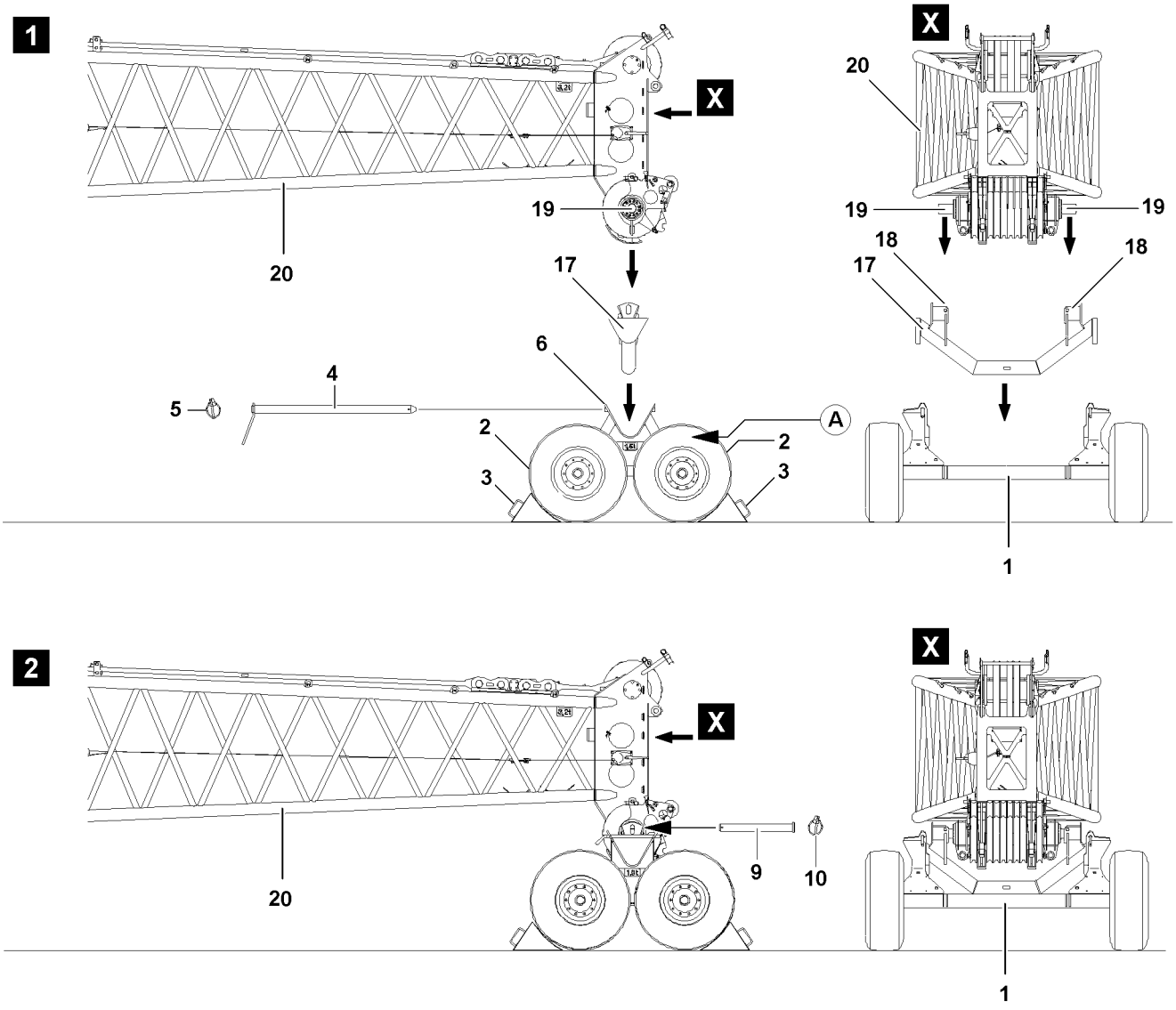

Fig.120169

4.3 Removing the pulley cart

When the boom system has reached a certain angle between the main boom and the F-jib, then the pulley cart is no longer required. Before luffing the boom system all the way up, remove the pulley cart on the F-jib.

WARNING
Overload of crane!
If the pulley cart is not removed before erecting the boom system all the way, the crane can be overloaded and topple over.
Personnel can be severely injured or killed.
▶ Remove the pulley cart before lifting the boom system off the ground.

▶ Remove the wedges **3** from the transport retainer (point **A**) on the pulley cart.
▶ Secure the pulley cart with wedges **3** to prevent it from rolling off: Push the wedges **3** on the left and right hand side tightly under the wheels **2**, illustration **3**.
▶ Release the pin **9**: Remove the locking pin **10**.
▶ Unpin the pin **9** on the receptacle **18**.
▶ Luff the boom system up.

When the boom system is luffed up:
▶ Remove the wedges **3** on the wheels.
▶ Remove the wedges **3** on the transport receptacle (point **A**) on the pulley cart.
▶ Insert the pin **9** in the receptacle **18** and secure with locking pin **10**.
▶ Remove the pulley cart.

4.4 Disassembling the „adapter for F-jib“* on the pulley cart

▶ Fasten the adapter for F-jib **17** on the auxiliary crane.
▶ Release the retaining pins **4** on the pulley cart on both sides and unpin.
▶ Lift the adapter for the F-jib **17** and place it on a pallet or a suitable support.
▶ Remove the auxiliary crane.
▶ Insert the retaining pin **4** in the receptacles **6** and secure with locking pins **5**.

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6 Auxiliary equipment

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6.01 Heater / engine preheating

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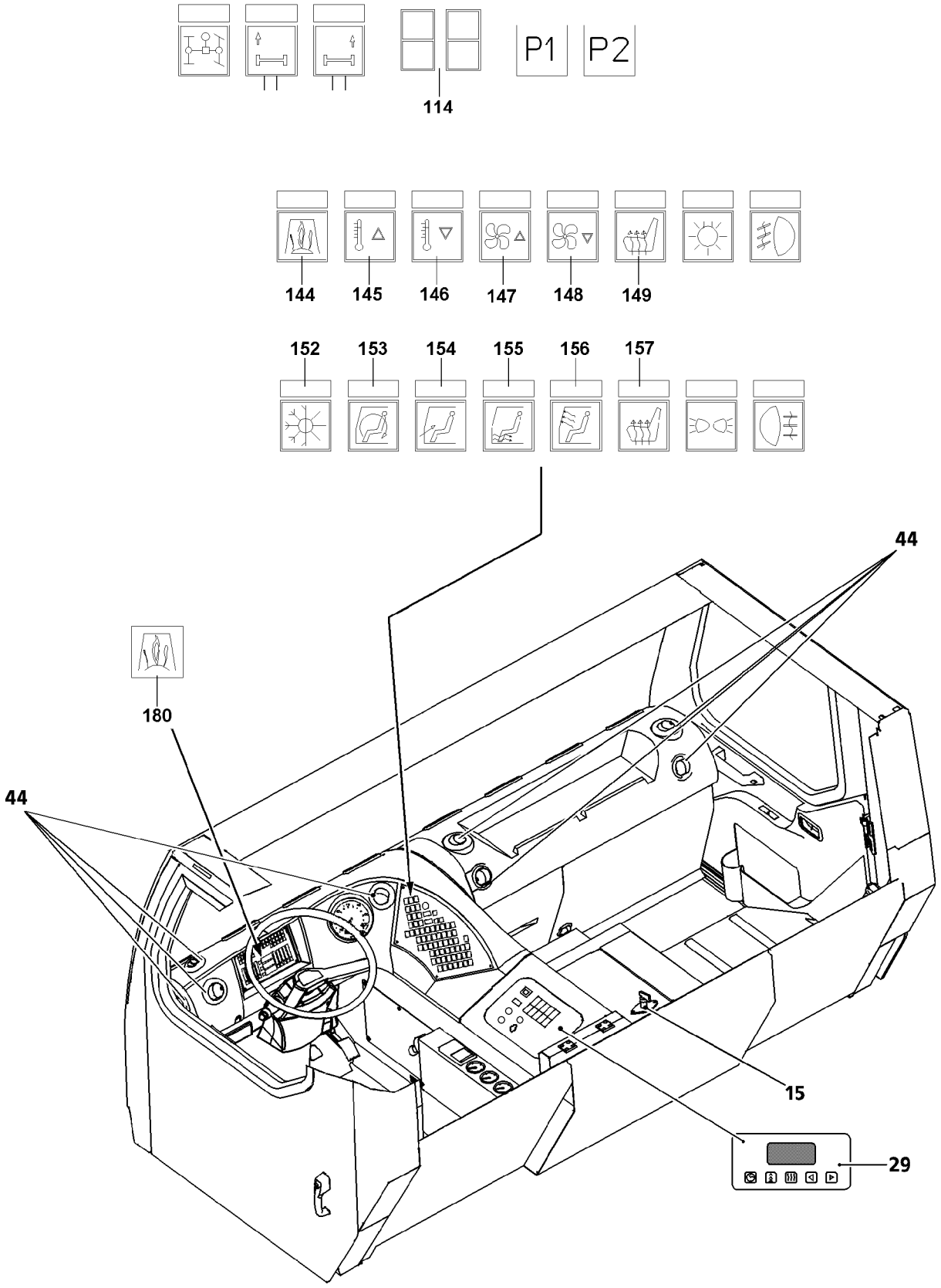

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Fig.198440

1 Heating the driver's cab

The driver's cab can be heated using three different types of heaters which are independent of each other:

- Engine-dependent heater.
- Engine-independent auxiliary heater with engine preheating, at ambient temperatures of up to -40 °C, WEBASTO; Thermo 90 S.*
- Engine-independent auxiliary heater with engine preheating, at ambient temperatures of less than -40 °C, WEBASTO; DBW 2020*, Air Top 5000*.

The individual adjustment of the heater (for both engine-dependent and engine-independent auxiliary heaters*) is carried out with the control elements under the crane operator's seat as well as via switches and indicator lights on the instrument panel.

CAUTION
Risk of damage to the heater control units* when carrying out electrical welding work on the crane!
▶ Disconnect the negative and positive cables from the batteries and lay the positive cable to the vehicle ground.

1.1 Heater operation

1.1.1 Adjusting the temperature

The driver's cab is heated using the engine coolant. The temperature may be set in 7 different temperature stages (0=„cold“ to 6=„warm“).

Note
▶ The selected settings are maintained after the ignition is turned off.

If you want to increase the temperature:
▶ Press button **145**.

Result:

- The function control on button **145** lights up.
- The display unit **114** briefly displays the temperature level set.

If you want to decrease the temperature:
▶ Press button **146**.

Result:

- The function control on button **146** lights up.
- The display unit **114** briefly displays the temperature level set.

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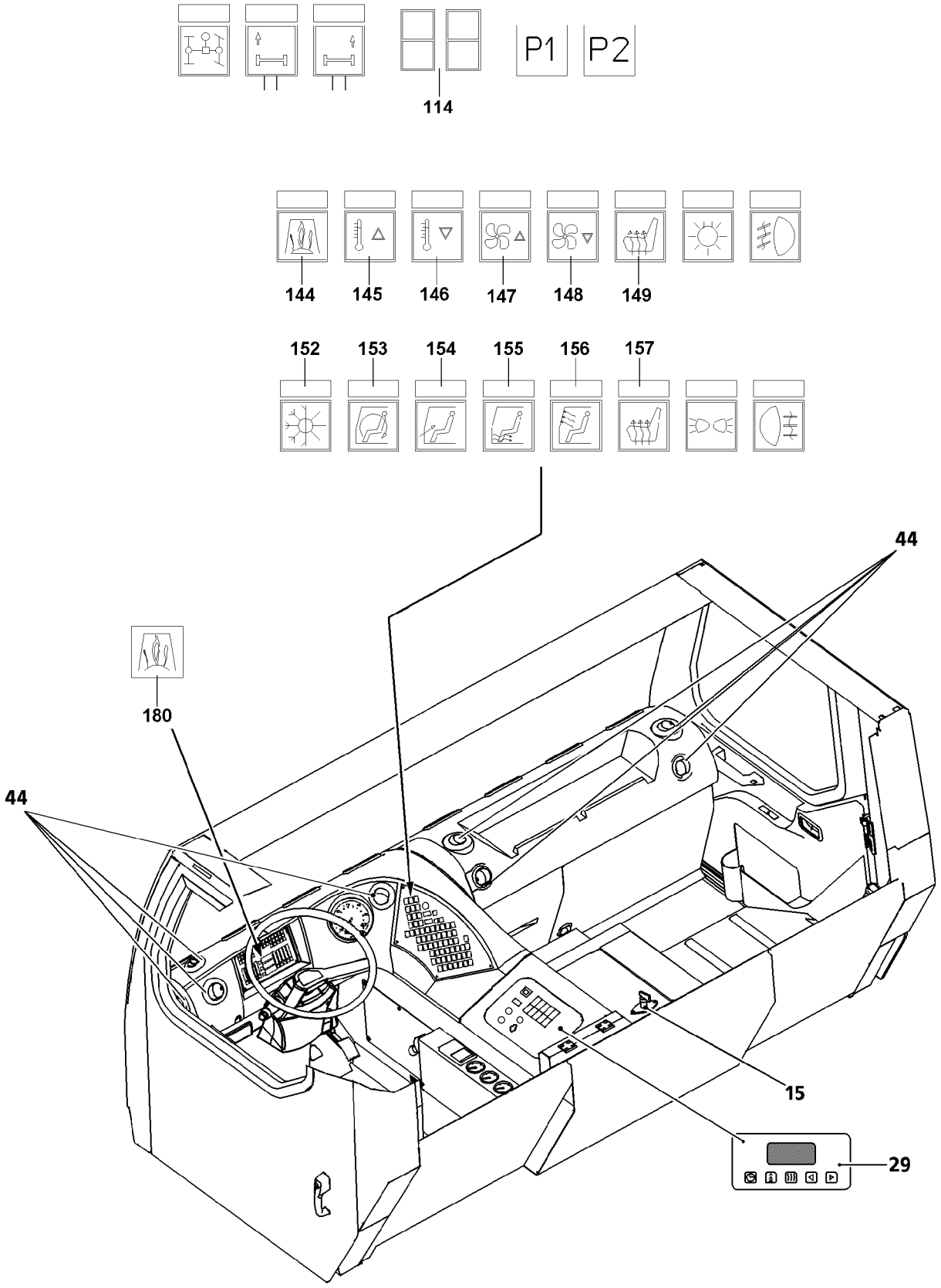

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Fig.198440

1.1.2 Adjusting the ventilation

The fan speed can be set in four different stages (0=„off“ to 3=„maximum fan speed“).

If you want to increase the fan speed:
▶ Press button **147**.

Result:

– The function control on button **147** lights up.
– The display unit **114** briefly displays the set fan speed.

If you want to decrease the fan speed:
▶ Press button **148**.

Result:

– The function control on button **148** lights up.
– The display unit **114** briefly displays the set fan speed.

1.1.3 Adjusting the recirculated air / fresh air

The supply of fresh air into the cab can be controlled using button **153** and button **154**.

Recirculated air button **153**	**Fresh air** button **154**	**Air distribution**
On	Off	Recirculated air only
Off	On	Fresh air only
On	On	Approx. 70% recirculated air and 30% fresh air
Off	Off	Approx. 30% recirculated air and 70% fresh air

▶ Press button **153**.

Result:

– The function control on button **153** lights up.
– The button **153** has been turned on.

▶ Press button **154**.

Result:

– The function control on button **154** lights up.
– The button **154** has been turned on.

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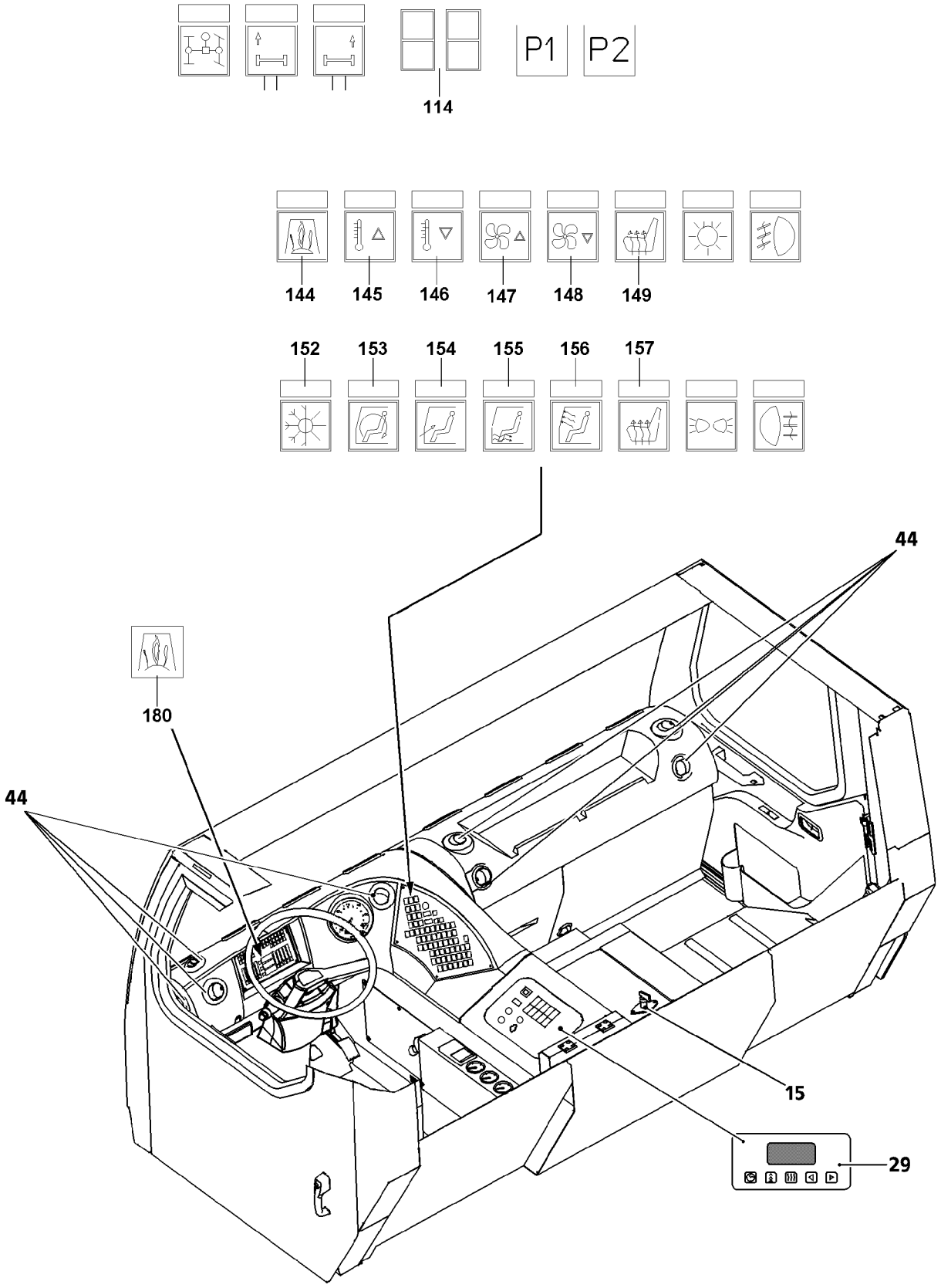

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Fig.198440

1.1.4 Ventilating the floorboard area / front windshield

The supply of fresh air into the cab can be controlled using button **155** and button **156**.

Floorboard area button **155**	**Front windshield** button **156**	**Air distribution**
On	Off	Floorboard area only
Off	On	Front windshield only
On	On	Approx. 70% floorboard area and 30% front windshield
Off	Off	Approx. 30% floorboard area and 70% front windshield

▶ Press button **155**.

Result:

– The function control on button **155** lights up.
– The button **155** has been turned on.

▶ Press button **156**.

Result:

– The function control on button **156** lights up.
– The button **156** has been turned on.

1.1.5 Adjusting the air distribution

▶ Open air vent **44**.

Result:

– Air distribution takes place.

▶ Close the air vent **44**.

Result:

– The air distribution is completed.

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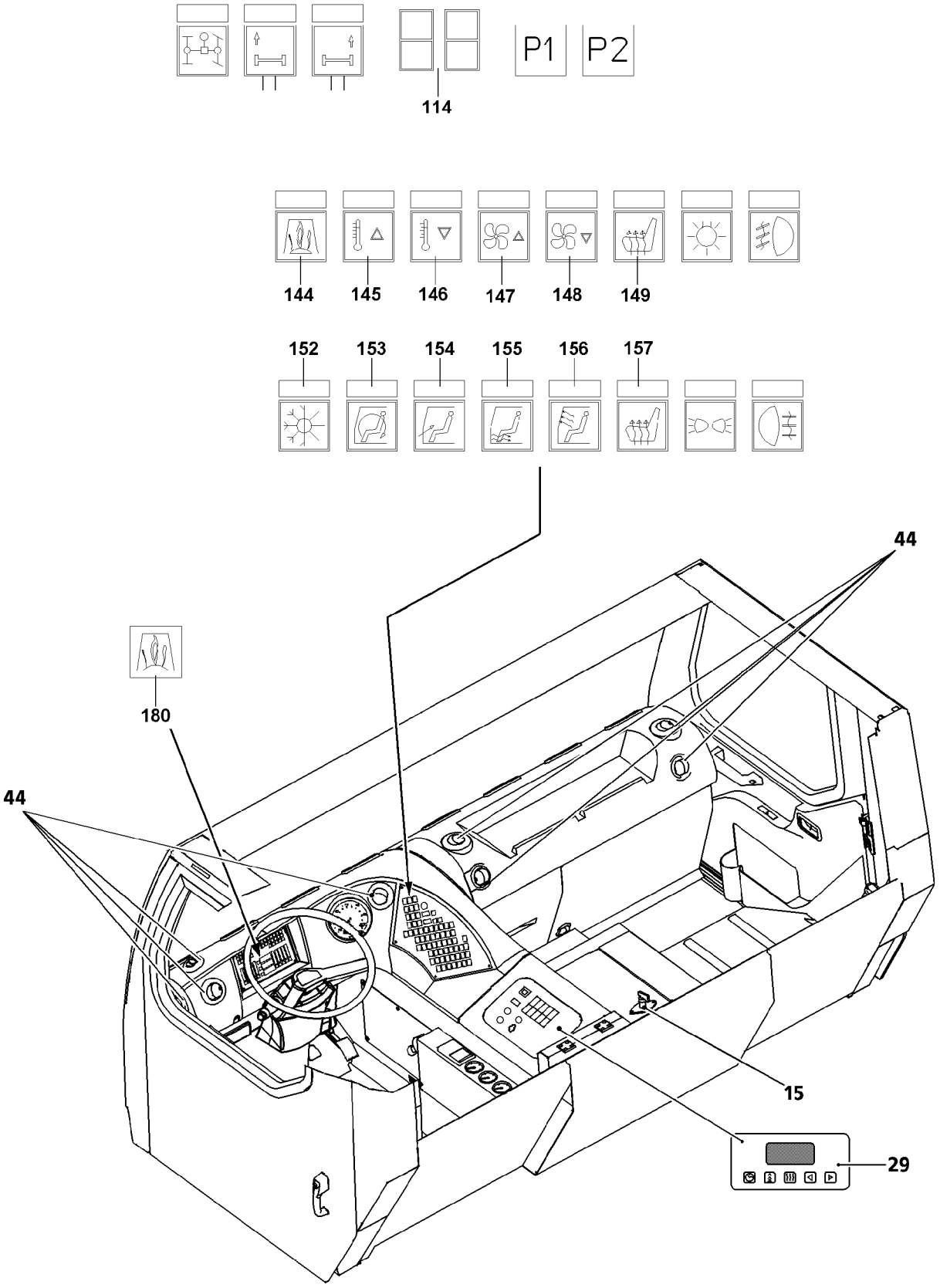

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Fig.198440

1.2 Operating the engine-independent auxiliary heater*

The engine-independent auxiliary heater is used to heat the driver cab when the engine is turned off and as auxiliary heat* at low ambient temperatures if the engine-dependent heater is insufficient.

For detailed description of the auxiliary heater* refer to the enclosed manufacturer's operating instructions.

In summer run the auxiliary heater* once a month for approx. 15 to 20 minutes.

Carry out maintenance work on the auxiliary heater* as outlined in the enclosed manufacturer's operating instructions.

1.2.1 Start up

CAUTION
Risk of damage to auxiliary heater!
▶ Fill all units with sufficient service fluids for winter operation, as specified in the lubricant chart.

DANGER
Risk of poisoning and suffocation in enclosed areas!
▶ Operate the heater, even with a timer, only in closed areas such as garages or workshops if an exhaust suction system is present.

DANGER
Risk of explosion!
In areas where combustible fumes or dust could form, such as in the vicinity of storage areas for fuel, coal, wood dust or grain storage or similar and in the vicinity of filling stations or tank depots, there is a risk of explosion.
▶ Turn off the heater.

▶ Press button **144**.

Result:

– The function control on the button **144** lights up.
– The indicator light **180** lights up.
– The fan comes on automatically at level 1 in order to prevent the auxiliary heater from overheating.

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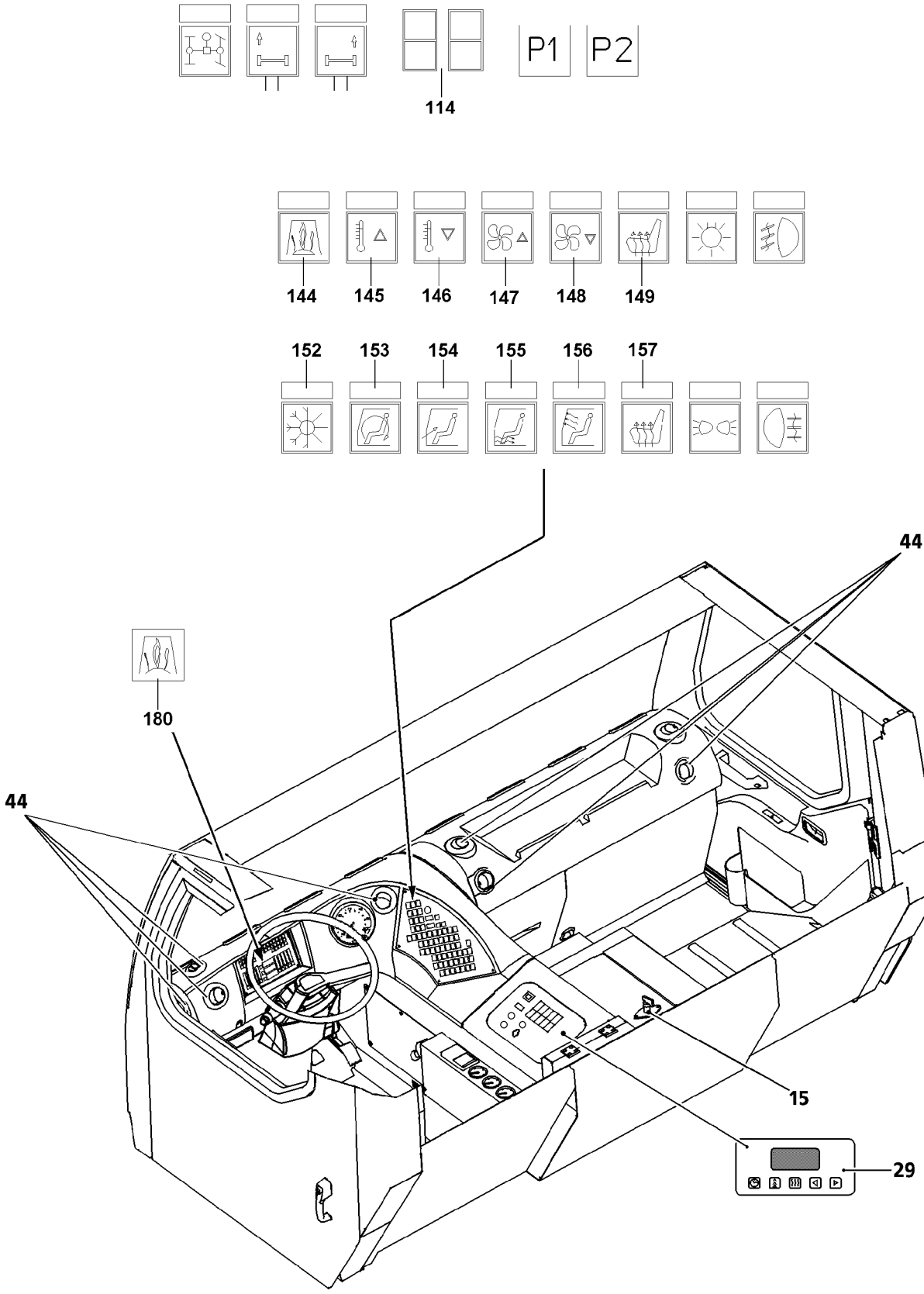


LWE/LG 1750-006/15409-07-02/en

Fig.198440

1.2.2 Turning off

▶ Press button **144**.

Result:

– The function control on the button **144** turns off.
– An afterrun is carried out each time the auxiliary heater is turned off.
The keypad unit remains on even if the ignition key has been removed.

CAUTION
Danger of property damage!
▶ Turn the battery master switch off only when the heater after run is over.

When the after run is over:
– The indicator light **180** turns off.
– The keypad unit turns off automatically.

1.2.3 Operation with timer*

For a detailed description of the timer **29** refer to the enclosed manufacturer's operating instructions.

▶ Set the required turn-on time, temperature and duration of heater operation on the timer **29**.

1.2.4 Venting the system

When draining the engine coolant, the contents of the heating system will also be drained because the engine and heater operate as one circuit. When refilling the system, it should be carefully vented.

▶ Fill the coolant via the expansion tank of the engine cooling circuit as specified in the lubricant chart.
▶ Start the engine as described in chapter 3.04.
▶ Set the button **145** to level 3.
▶ Check the expansion tank for air bubbles.

Result:

– The engine is bled as soon as no more air bubbles rise up.

When no more air bubbles appear in the expansion tank:
▶ Set the button **146** for the driver's cab temperature to level 0.

Result:

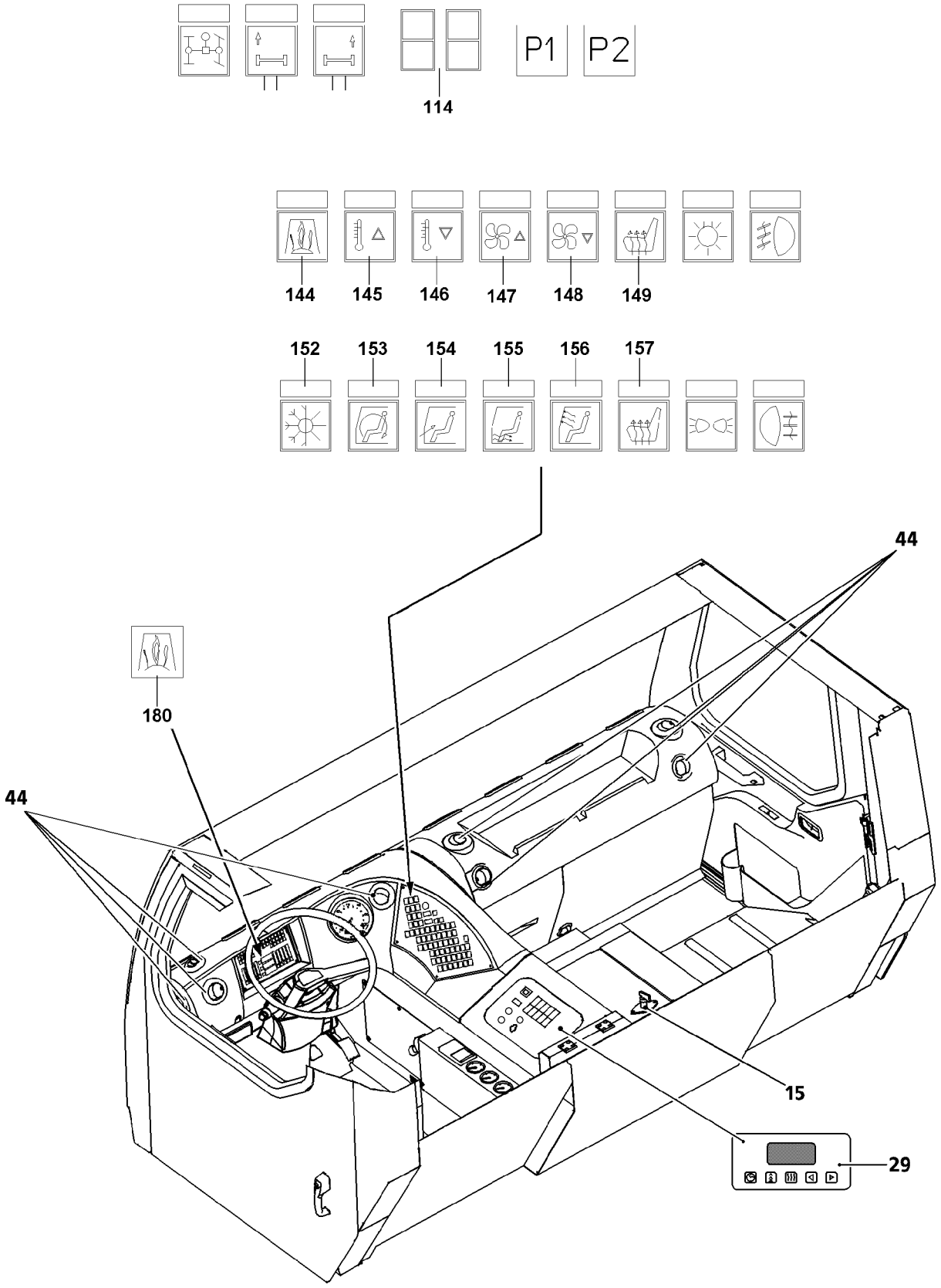
– The heating circuit will be bled.

▶ Check the expansion tank for air bubbles.

Result:

– The heater circuit is bled as soon as no more air bubbles rise up.

LWE/LG 1750-006/15409-07-02/en



LWE/LG 1750-006/15409-07-02/en

Fig.198440

1.3 Operating the engine-independent auxiliary heater for engine pre-heating*

At ambient temperatures of less than -20 °C, the engine must be pre-heated by the engine pre-heating system.

At ambient temperatures below -40 °C, the engine, the injection pump and the transmission must be preheated with the engine preheating system, which is operated with diesel fuel.

For a detailed description of the engine preheating system, refer to the enclosed manufacturer's operating instructions.

1.3.1 Start up

CAUTION
Risk of damage to auxiliary heater!
▶ Fill all units with sufficient service fluids for winter operation, as specified in the lubricant chart.

DANGER
Risk of poisoning and suffocation in enclosed areas!
▶ Operate the heater, even with a timer, only in closed areas such as garages or workshops if an exhaust suction system is present.

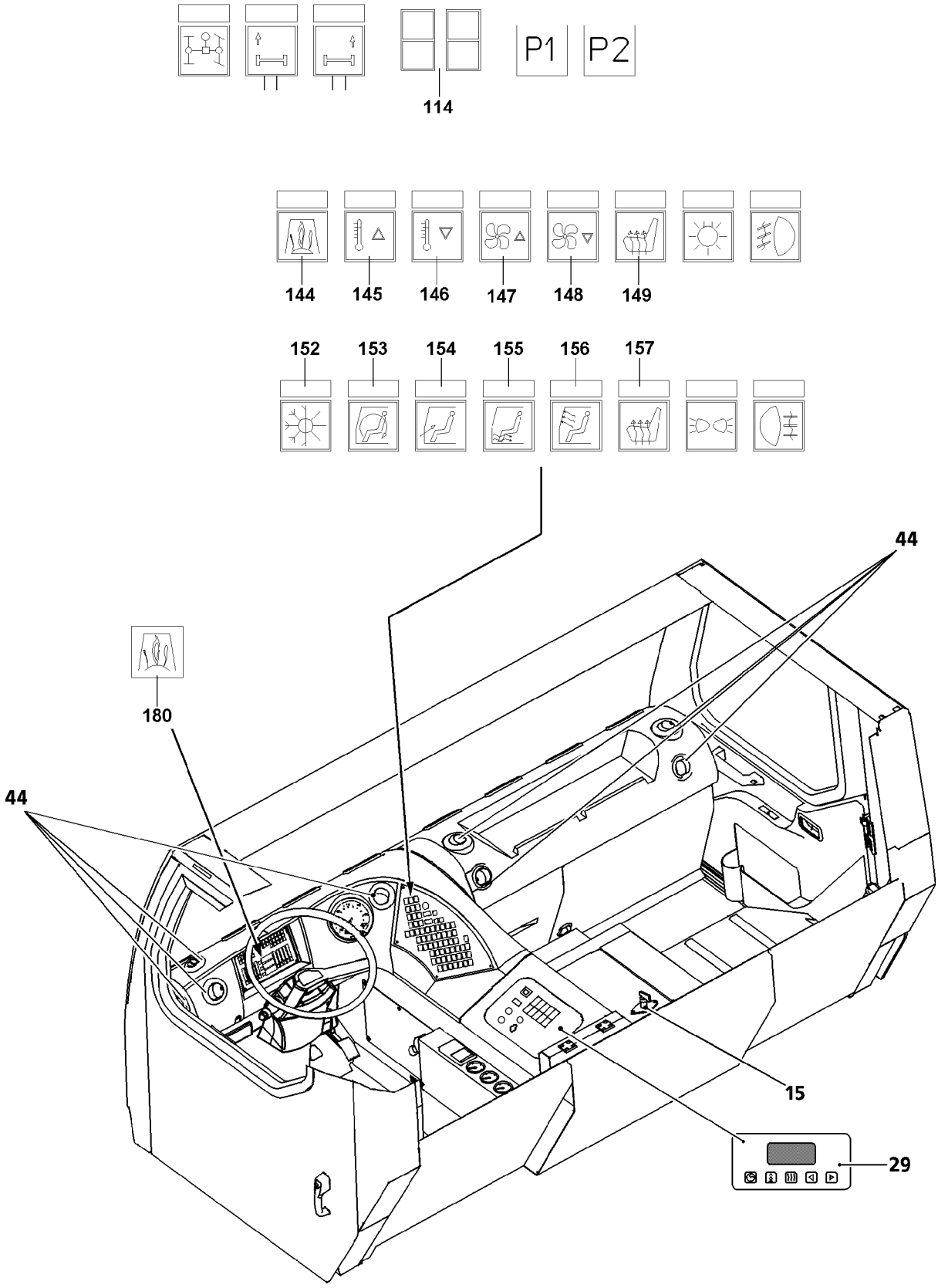
DANGER
Risk of explosion!
In areas where combustible fumes or dust could form, such as in the vicinity of storage areas for fuel, coal, wood dust or grain storage or similar and in the vicinity of filling stations or tank depots, there is a risk of explosion.
▶ Turn off the heater.

▶ Turn the battery master switch **15** on.
▶ Set the temperature selection to stage 0=„cold".
▶ Press button **144**.

Result:

– The function control on the button **144** lights up.
– The prerun of the engine preheating system turns on and runs for approx. 10 to 25 seconds.
– The engine preheating starts after 10 to 25 seconds.
– The engine preheating runs in automatic regulating mode.

LWE/LG 1750-006/15409-07-02/en



LWE/LG 1750-006/15409-07-02/en

Fig.198440

1.3.2 Turning off

When the preheating period is over:

▶ Press button **144**.

Result:

– The function control on the button **144** turns off.
– Engine preheating is completed.
– An afterrun of the engine preheating will run up to 150 seconds.

1.3.3 Starting up with preselect clock*

For a detailed description of the timer***** **29** refer to the enclosed manufacturer's operating instructions.

▶ Turn the battery master switch **15** on.
▶ Before turning off the engine, set the temperature selection to level 0=„cold".
▶ Use the preselect clock***** **29** to switch on the engine preheating.

Result:

– The prerun of the engine preheating system turns on and runs for approx. 10 to 25 seconds.
– The engine preheating starts after 10 to 25 seconds.
– The engine preheating runs in automatic regulating mode.

1.3.4 Turning off with preselect clock*

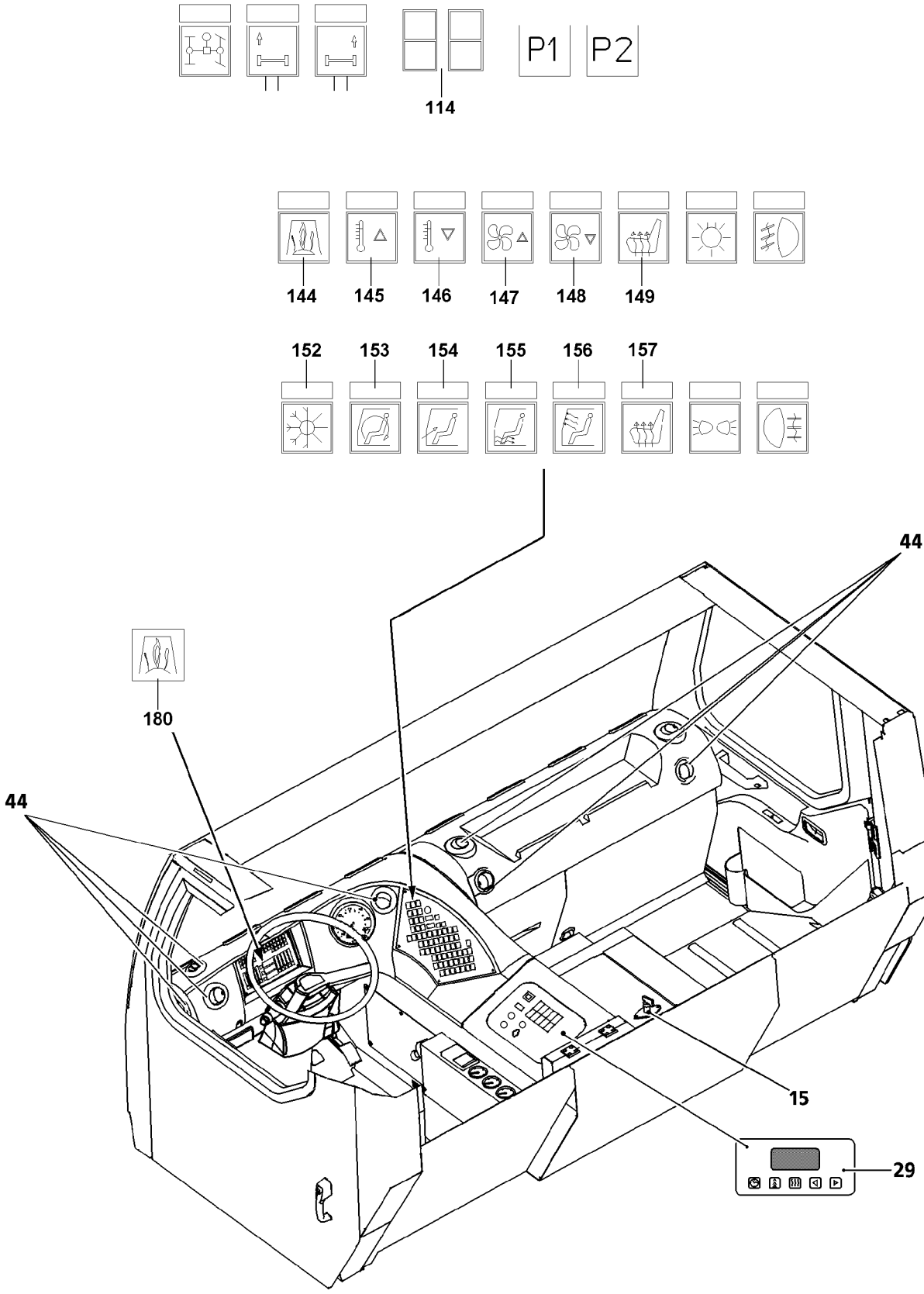
When the preheating period is over:

▶ Turn off the preselect clock***** **29**.

Result:

– An afterrun of the engine preheating will run up to 150 seconds.

LWE/LG 1750-006/15409-07-02/en



LWE/LG 1750-006/15409-07-02/en

Fig.198440

1.4 Air conditioning system* operation

The cab can be air conditioned.

For a detailed description of the air conditioning system, refer to the enclosed manufacturer's operating instructions.

The air conditioning system* can be operated independent of the auxiliary heater*.

Maintenance work on the air conditioning system* is to be carried out according to the enclosed manufacturer's operating instructions.

1.4.1 Start up

Make sure that the following prerequisites are met:
- the battery master switch is turned on,
- the engine is running.

▶ Close the doors and windows in the driver's cab.

If the temperature of the emitted air is too low, then it can be regulated by turning the heater on.

▶ Set the temperature with the button **146** to stage 0=„cold".

Result:

– The display **114** shows the selected temperature stage.

▶ Adjust the fan speed using the button **147** or set the button **148** to at least level 1.

Result:

– The display **114** shows the selected fan speed.

▶ Turn on the air conditioning system with the button **152**.

Result:

– The function control on the button **152** lights up.

If you wish to change the air conditioning system's cooling capacity:

▶ Press the button **153** air circulation, button **147** „increase fan speed" or button **148** „decrease fan speed".

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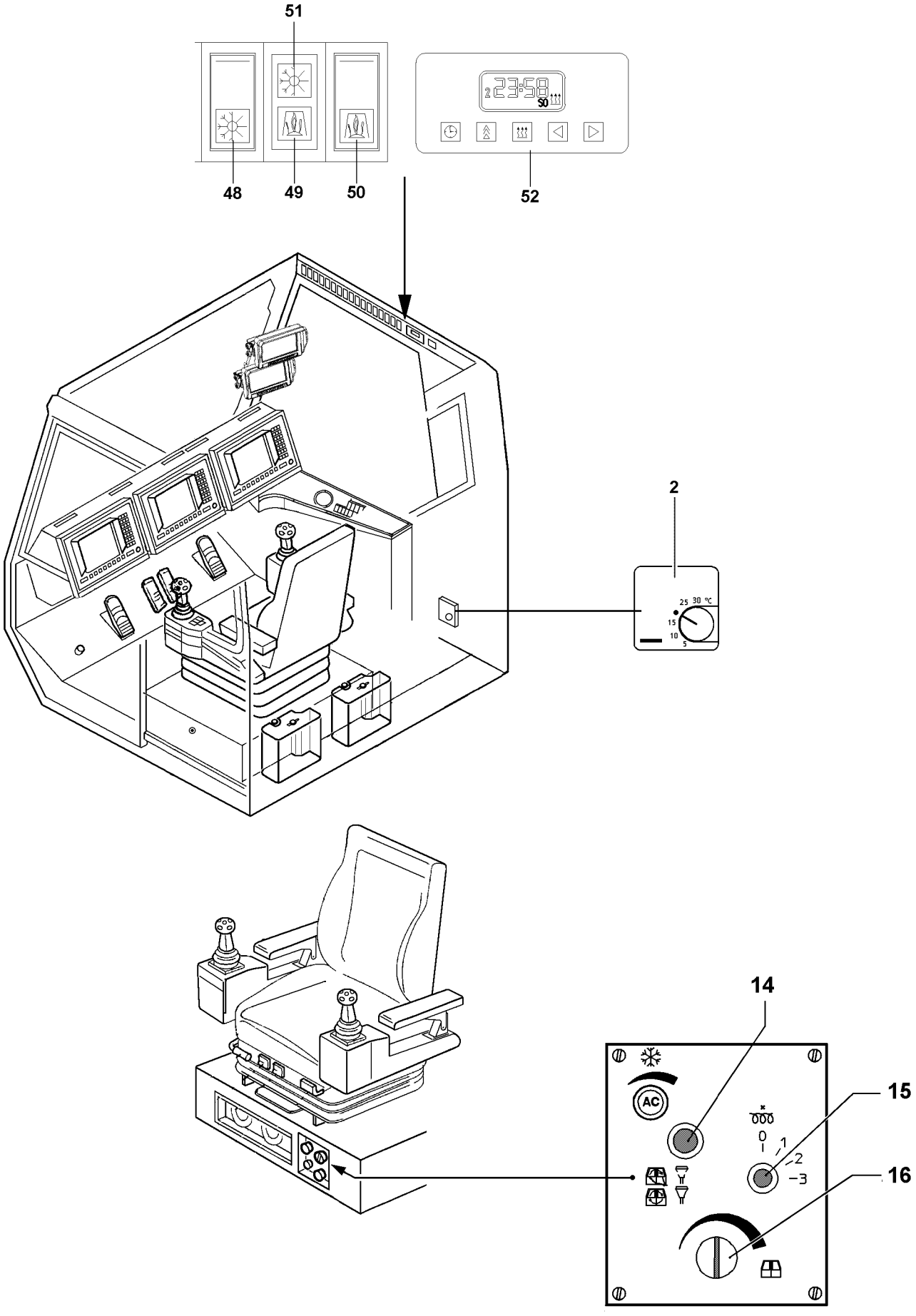

Fig.108314

LWE/LG 1750-006/15409-07-02/en

2 Heating the crane operator’s cab

The cab can be heated with two heaters, which are independent of each other:
- Engine-dependent heater.
- Engine-independent auxiliary heater, for outside temperatures of up to -40 °C, WEBASTO; Thermo 90 S.*

The individual adjustment of the heater (for both engine-dependent and engine-independent auxiliary heaters*) is carried out with the control elements under the crane operator’s seat as well as via switches and indicator lights on the instrument panel.

NOTICE
Risk of damage to the heater control units* when carrying out electrical welding work on the crane!
▶ Disconnect the negative and positive cables from the batteries and connect the positive cables to the vehicle ground.

2.1 Heater operation

2.1.1 Adjusting the temperature

The cab is heated with the engine coolant.

▶ Set the knob **16**.

2.1.2 Adjusting the ventilation

▶ Set the blower with the 3-stage rotary switch **15**.

Result:

– The air volume will be regulated.

2.1.3 Adjusting the recirculated air / fresh air

▶ Actuate the changeover switch **14**.

LWE/LG 1750-006/15409-07-02/en

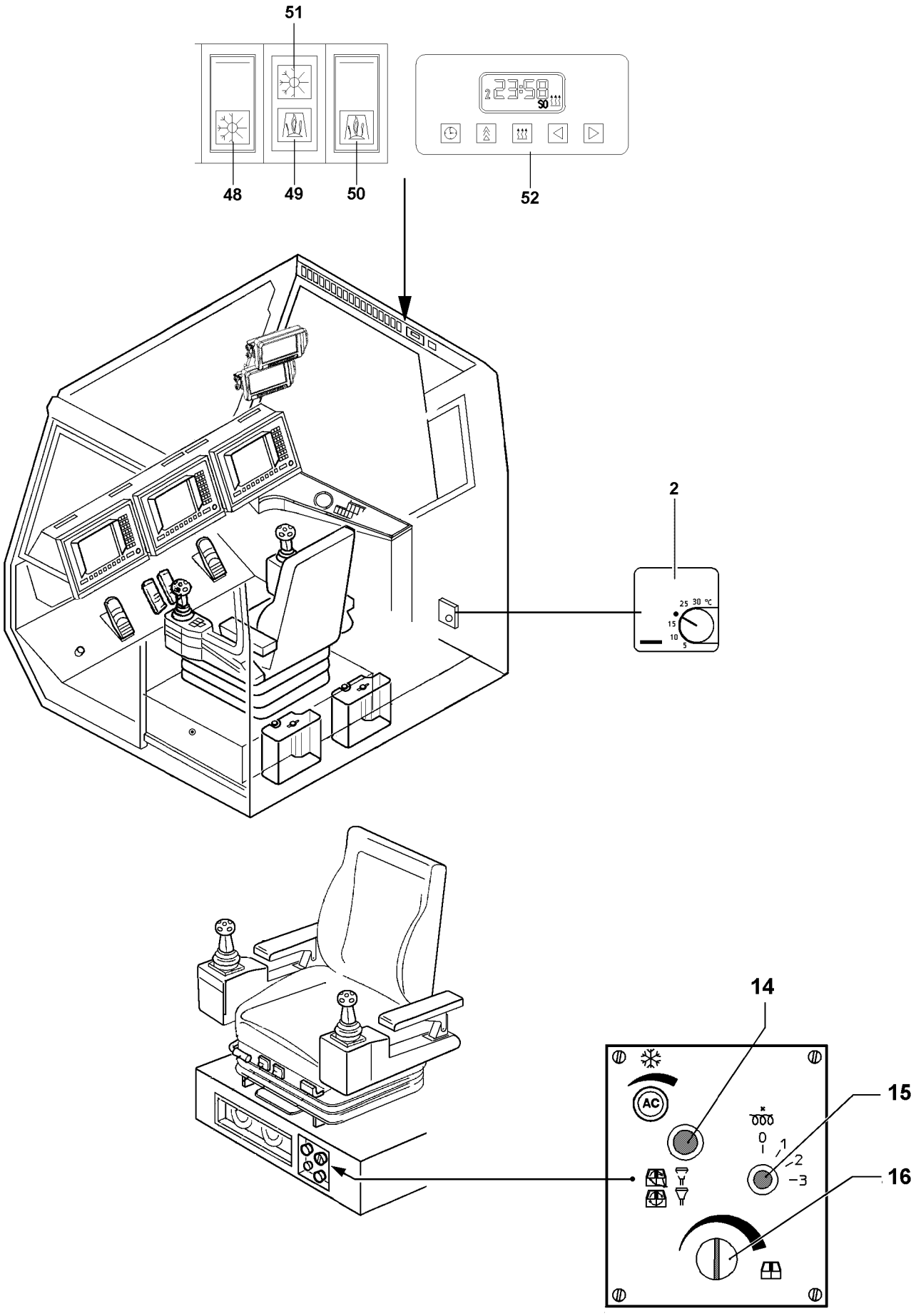

Fig.108314

LWE/LG 1750-006/15409-07-02/en

2.2 Operating the engine-independent auxiliary heater*

The engine-independent auxiliary heater is used to heat the cab when the engine is turned off and as auxiliary heater* at low ambient temperatures, if the engine-dependent heating is insufficient.

For detailed description of the auxiliary heater* refer to the enclosed manufacturer's operating instructions.

In summer run the auxiliary heater* once a month for approx. 15 to 20 minutes.

Carry out maintenance work on the auxiliary heater* as outlined in the enclosed manufacturer's operating instructions.

2.2.1 Start up

NOTICE
Risk of damage to auxiliary heater!
▶ Fill all units with sufficient service fluids for winter operation, as specified in the lubricant chart.

DANGER
Risk of poisoning and suffocation in enclosed areas!
▶ Operate the heater, even with a timer, only in closed areas such as garages or workshops if an exhaust suction system is present.

DANGER
Risk of explosion!
In areas where combustible fumes or dust could form, such as in the vicinity of storage areas for fuel, coal, wood dust or grain storage or similar and in the vicinity of filling stations or tank depots, there is a risk of explosion.
▶ Turn off the heater.

▶ Set the knob **16** to „warm".
▶ Actuate the switch **50**.

Result:

– The function control on the switch **50** lights up.
– The indicator light **49** lights up.

2.2.2 Turning off

▶ Actuate the switch **50**.

Result:

– The function control on the switch **50** turns off.
– Each time the auxiliary heater is turned off, it continues to run up to 150 seconds longer.

NOTICE
Danger of property damage!
▶ Turn the battery master switch off only when the heater after run is over.

– When the after run is over:
The indicator light **49** turns off.

LWE/LG 1750-006/15409-07-02/en

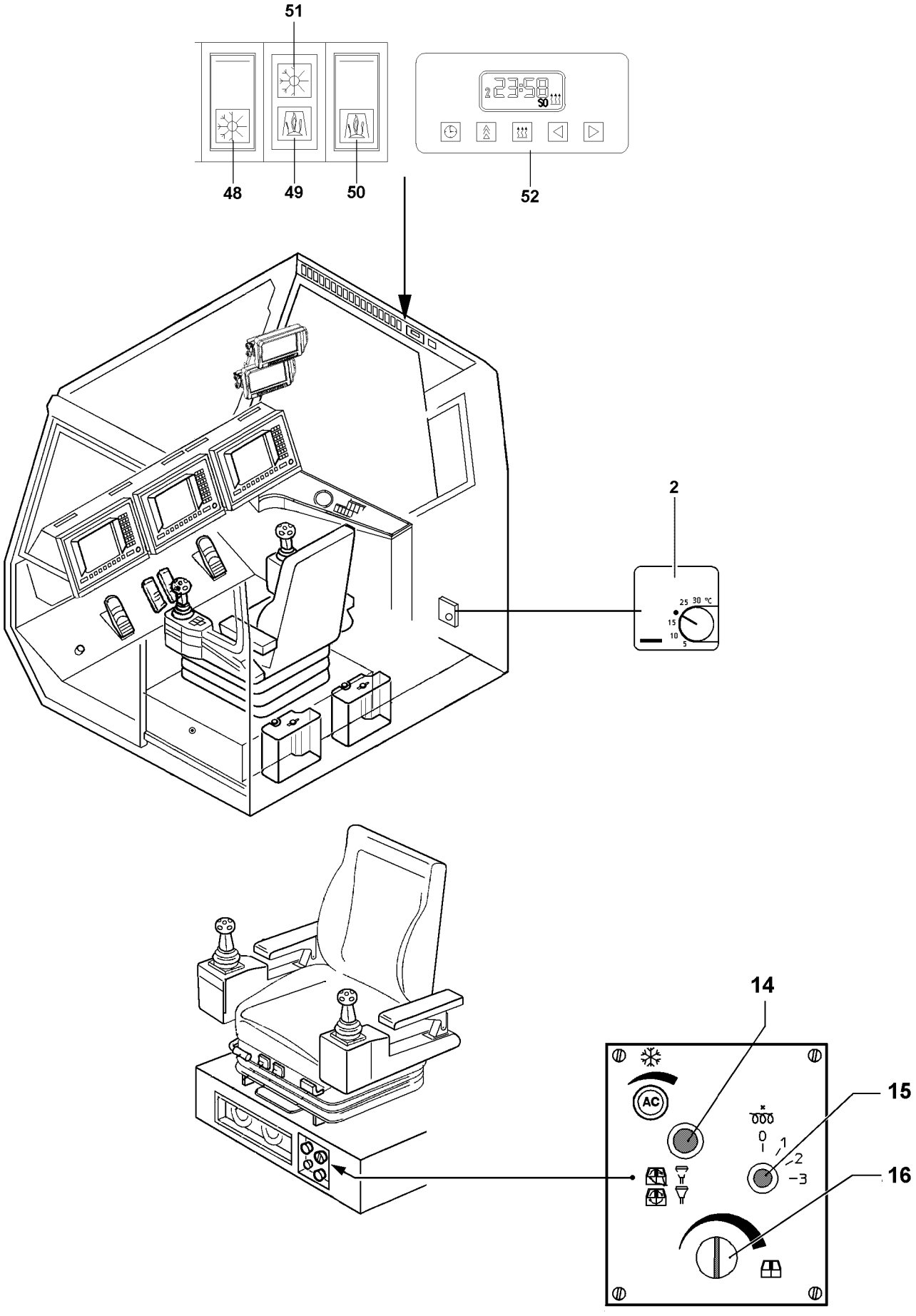

Fig.108314

LWE/LG 1750-006/15409-07-02/en

2.2.3 Operation with timer*

For a detailed description of the timer **52** refer to the enclosed manufacturer's operating instructions.

▶ Set the required turn-on time, temperature and duration of heater operation on the timer **52**.
▶ Open or close the air vents, as desired.

Result:

– Upwards or downwards air distribution will be selected.

▶ Set the knob **16** to „warm".

2.2.4 Operating the thermostat*

Ensure that the following prerequisite is met:
– the knob **16** is set to „warm".

▶ Turn the thermostat **2** to the desired temperature.

2.2.5 Venting the system

When refilling the system, it should be carefully vented.

▶ Add coolant into the expansion tank for the heater system according to the lubricant chart.
▶ Start the engine.
▶ Set the knob **16** to „warm".
▶ Check the expansion tank for air bubbles.

Result:

– The heating system is vented as soon as no more air bubbles rise up.

▶ Set the knob **16** to „cold".
▶ Check the expansion tank for air bubbles.

Result:

– The circuit is vented as soon as no more air bubbles rise up.

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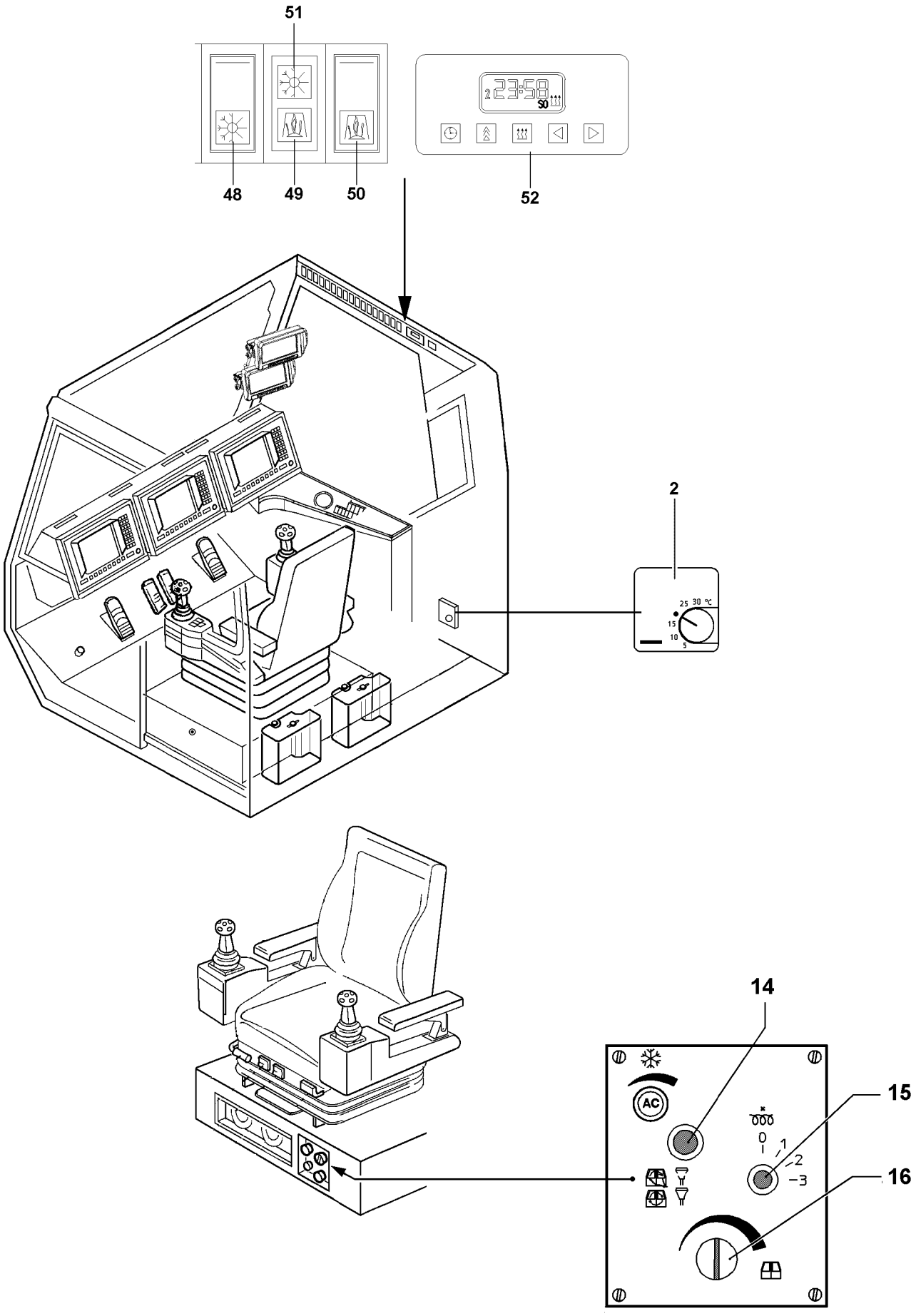

Fig.108314

2.3 Air conditioning system* operation

For a detailed description of the air conditioning system*****, refer to the enclosed manufacturer's operating instructions.

Carry out maintenance work on the air conditioning system***** according to the enclosed manufacturer's operating instructions.

2.3.1 Start up

Make sure that the following prerequisites are met:
- the battery master switch is turned on,
- the engine is running,
- the air intake opening for recirculated air operation is clear.

▶ Open or close the air vents, as desired.

Result:

– Upwards or downwards air distribution will be selected.

▶ Close both windows and the cab door.
▶ Set the changeover switch **14** for fresh air / recirculated air to recirculated air operation.
▶ Actuate the switch **48**.

Result:

– The indicator light **51** lights up.
– The air conditioning system***** is turned on and ready to operate.

▶ Open the appropriate air vent for upward air distribution.
▶ Turn on the fan with the rotary switch **15**.
▶ Regulate the temperature with the knob **16**.

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6.02 Crane operator's cab heater / engine preheating / air conditioning system

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LWE/LG 1750-006/15409-07-02/en

Fig.195219

1 Heating the crane cab

The cab can be heated with three independent heaters:
- Engine-dependent heater
- Engine-independent auxiliary heater with engine pre-heating, at ambient temperatures down to -40 °C , WEBASTO; Thermo 90 ST*
- Engine-independent auxiliary heater for cab preheating, at ambient temperatures less than -40 °C , WEBASTO; DBW 2020*

The individual heat adjustment (both for engine-dependent as well as the engine-independent auxiliary heater*) are made solely via the „Climate control settings“ menu on the touch display.

NOTICE
Damage in the electrical / electronic component area when carrying out electric welding work on the crane.
▶ Disconnect the negative and positive cables from the batteries and connect the positive cables to the vehicle ground.

2 Menu „Climate control settings“

2.1 General

The „Climate control settings“ menu is accessed - with the ignition turned on - by pressing the function key **F1** on the touch display.

Note
▶ The „Climate control settings“ menu is removed automatically after 30 sec. if no settings are changed during this time.

If the crane ignition is turned off, the LICCON computer system and the touch display also turn themselves off. The settings made in the „Climate control settings“ menu are retained.

Note
▶ If the auxiliary heater has been programmed, the settings are saved when the ignition is turned „OFF“.

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2.2 Operating the touch display

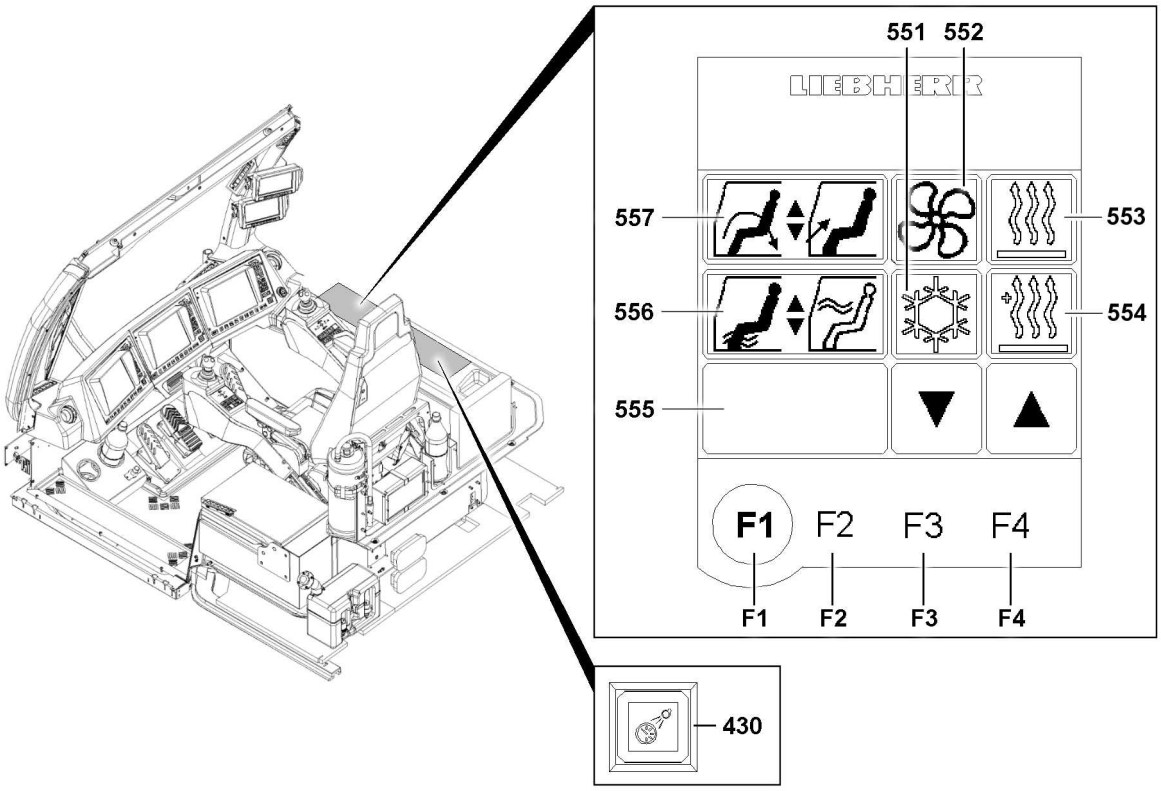

Fig.127301: Touch display in the right instrument panel

On the touch display, all functions are available for making and operating all heating, ventilation and air conditioning settings and for programming the auxiliary heater on the crane:

- **557** Recirculating air / fresh air
  - Function selection
- **556** Air distribution „up“ / „down“
  - Function selection
- **555** Status display
  - Display function

  The status display **555** shows the following, depending on the selected function:
  - The adjustment ratios between the overhead area and the floorboard area for recirculating air / fresh air.
  - The adjustment ratios for air distribution.
  - The temperature setting in manual heating mode.
  - The temperature setting in AUTO heating mode.
  - Climate control system „ON“.
  - Climate control system „OFF“.
  - The programming display for auxiliary heater.
- **551** Air conditioning system
  - Function selection
- **552** Fan / blower
  - Function selection
- **553** Heater
  - Function selection
- **554** Auxiliary heater
  - Function selection

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The background illumination for the touch display can be turned on or off with the button **430**.

▶ Press the button **430**.

Result:

– The background illumination for the touch display is turned on.

▶ Press the button **430** again.

Result:

– The background illumination for the touch display is turned off.

2.3 Adjusting the recirculating air / fresh air

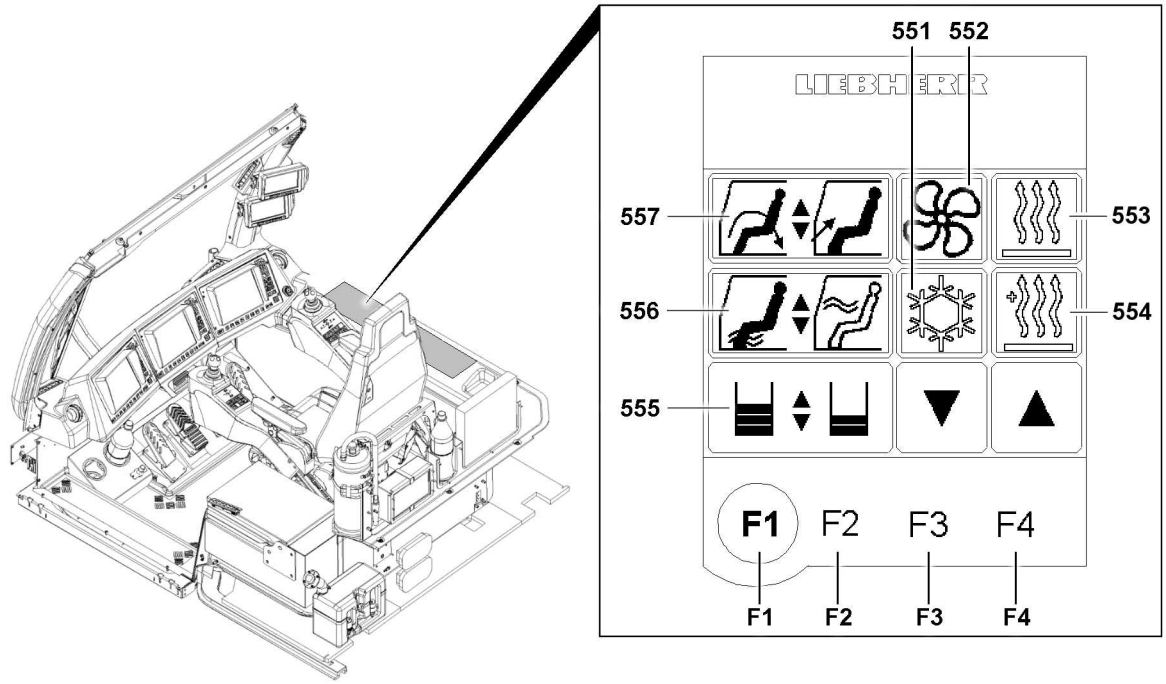
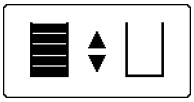
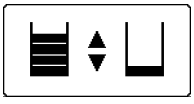


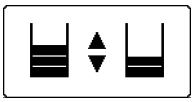
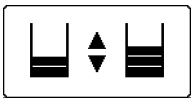
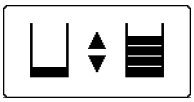
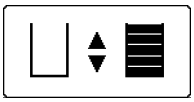
Fig.127302: Adjusting the recirculating air / fresh air

The „recirculating air / fresh air“ function is selected by „touching“ the icon **557** on the left touch display.

The adjustment rate is displayed in the status display **555** as a double bar display for „recirculating air“ and „fresh air“.

The adjustment rate between „recirculating air / fresh air“ is changed with the function key **F3** and the function key **F4**.

Adjustment rates for recirculating air / fresh air			
Status display	Recirculating air	Fresh air	Icon display
	**5**	**0**	 *Fresh air „OFF“*
	**4**	**1**	

Adjustment rates for recirculating air / fresh air			
	**3**	**2**	
	**2**	**3**	
	**1**	**4**	
	**0**	**5**	 *Recirculating air „OFF“*

▶ Select „Recirculating air / fresh air“ **557** function by „touching“.

Result:

– The „Recirculating air / fresh air“ icon is surrounded with a black border.
– The current adjustment rate is displayed in the status display **555** as a double bar display for „recirculating air“ and „fresh air“.

▶ Press the function key **F3**.

Result:

– The „proportion of circulating air“ is reduced, the „proportion of fresh air“ increases at the same time.

▶ Press the function key **F4**.

Result:

– The „proportion of fresh air“ is reduced, the „proportion of circulating air“ increases at the same time.

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2.4 Adjusting the „lower“ / „upper“ air distribution

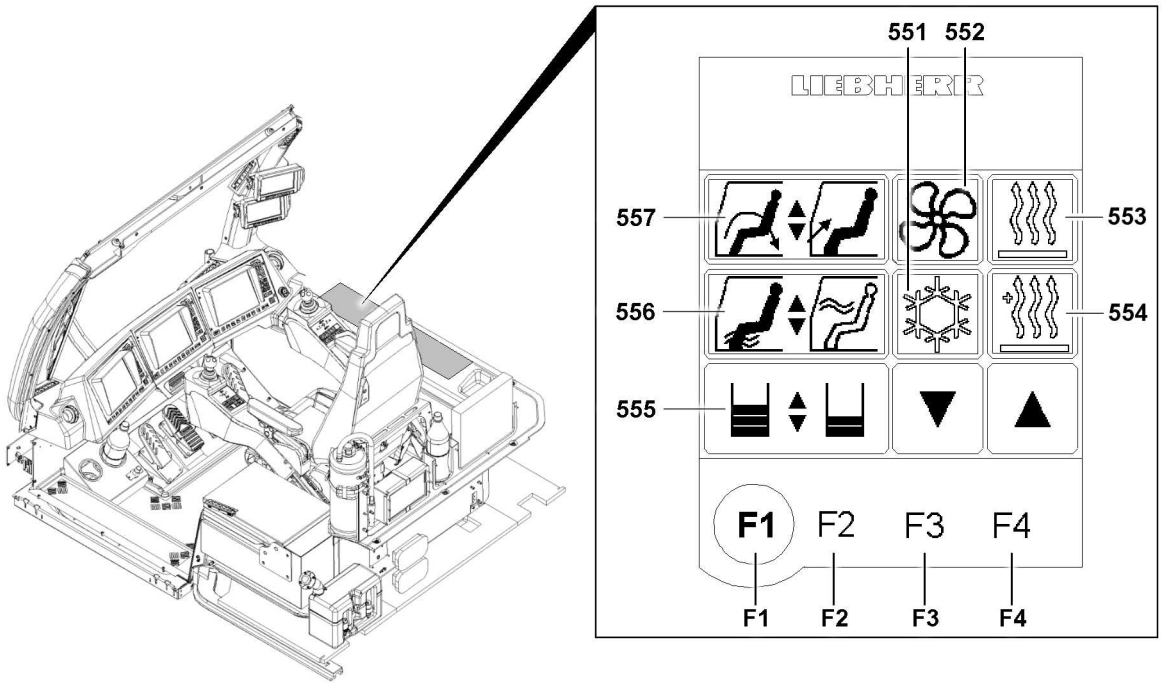
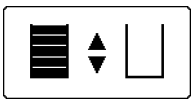
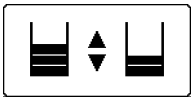


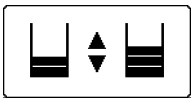
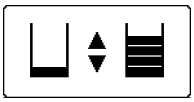
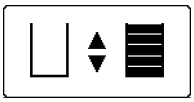
Fig.127302: Adjusting the lower / upper air distribution

The „lower“ / „upper“ air distribution function is selected by „touching“ the icon **556** on the left touch display.

The adjustment ratio is displayed in the Status display **555** - as a double bar display - for the „lower“ and „upper“ air distribution.

The „lower“ and „upper“ adjustment rate is changed with the function key **F3** and the function key **F4**.

Air distribution adjustment rates			
Status display	„Down“	„Up“	Icon display
	**5**	**0**	 *Up „OFF“*
	**4**	**1**	
	**3**	**2**	

Air distribution adjustment rates			
	**2**	**3**	
	**1**	**4**	
	**0**	**5**	 *Down „OFF“*

▶ Select Air distribution „upper / lower“ **556** function by „touching“.

Result:

– The „lower / upper“ air distribution icon is surrounded with a black border.
– The current adjustment rate is displayed in the status display **555** - as a double bar display - for „lower“ and „upper“.

▶ Press the function key **F3**.

Result:

– The proportion of air on the „bottom“ is reduced, the proportion of air on the „top“ increases at the same time.

▶ Press the function key **F4**.

Result:

– The proportion of air „on the top“ is reduced, the proportion of air „on the bottom“ increases at the same time.

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2.5 Fan / blower adjustment

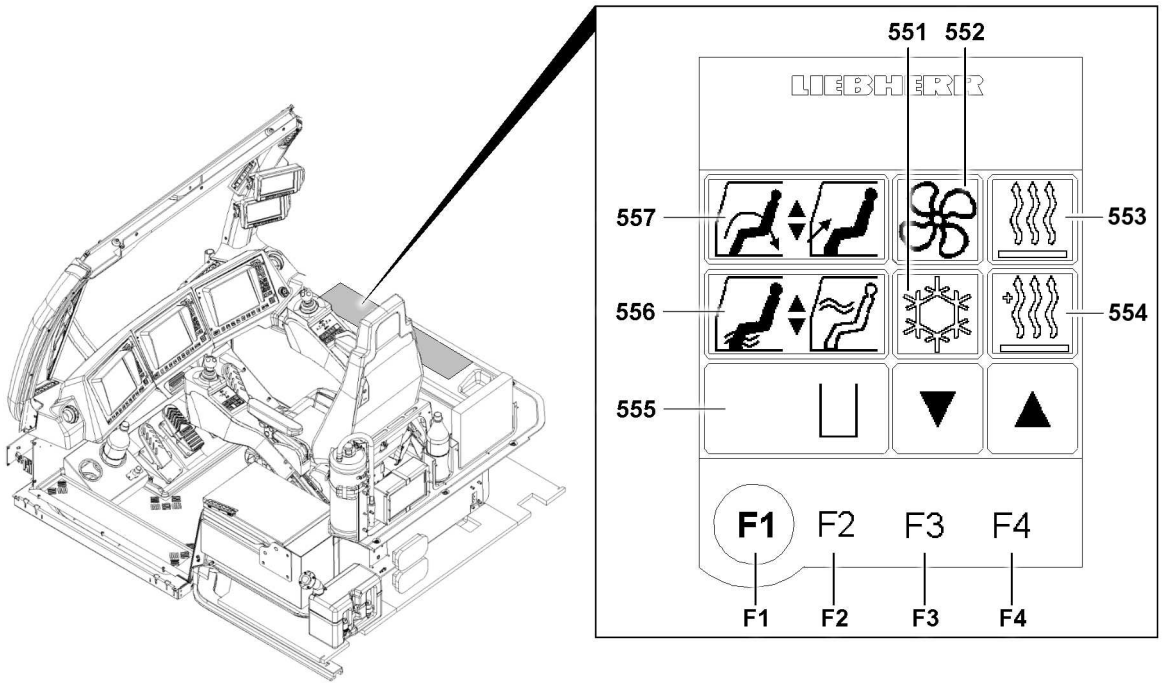
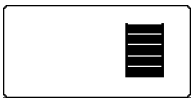
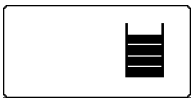
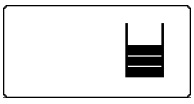
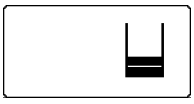
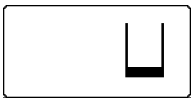
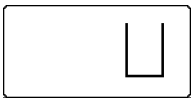


Fig.127303: Fan / blower adjustment

The „fan / blower“ function is selected by „touching“ the icon **552** on the left touch display.

The current „fan“ / „blower setting“ is shown as a bar display in the status display **555**.

The „fan“ / „blower setting“ is reduced with the function key **F3** and increased with the function key **F4**.

„Fan“ / „blower stage“		
Status display	Stage	Icon display
	**5**	
	**4**	
	**3**	
	**2**	
	**1**	
	**0**	 *Fan „OFF“*

▶ Select „fan / blower **552**“ by „touch“.

Result:

– The „fan / blower“ icon is then surrounded with a black border.
– In the current status display **555**, the „fan“ / „blower stage“ is shown as a bar display.

▶ Press the function key **F3**.

Result:

– The „fan“ / „blower stage“ is reduced.

▶ Press the function key **F4**.

Result:

– The „fan“ / „blower stage“ is increased.

2.6 Climate control system operation

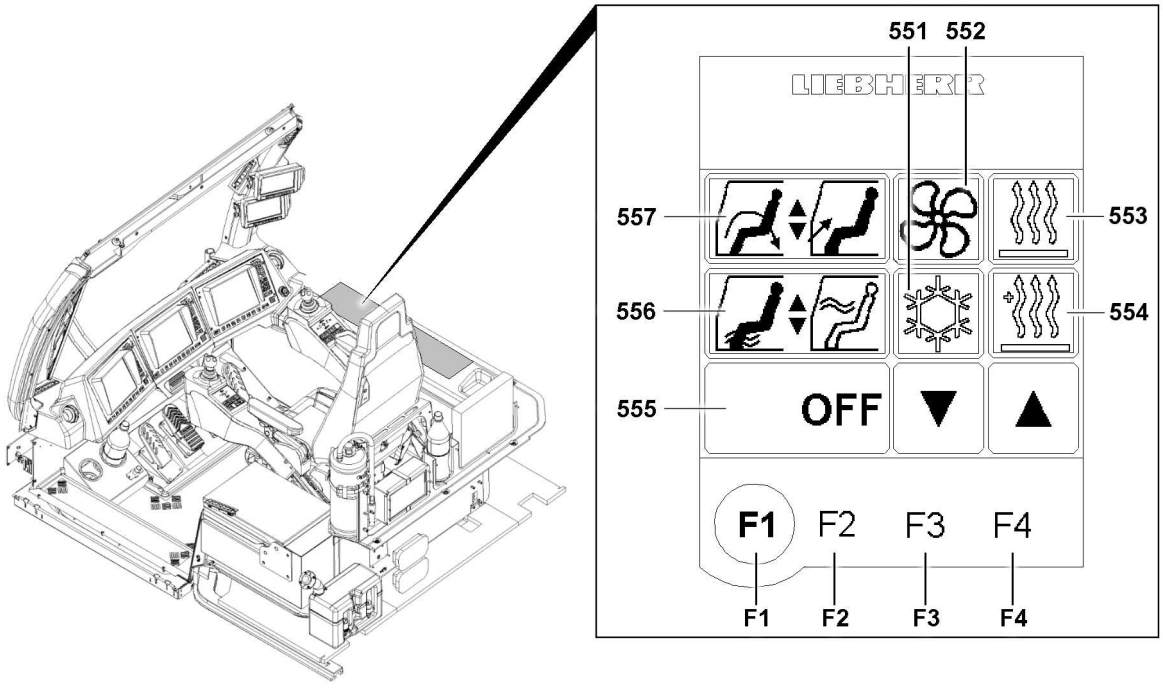


Fig.127304: Climate control system operation

The „Climate control system“ function is selected by „touching“ the icon **551** in the left touch display.

The status of the climate control system is displayed in the status display **555**.

The „Air conditioning system“ is turned off with the function key **F3** („OFF“) and turned with the function key **F4** („ON“).

Note

▶ The climate control system turns itself on automatically if the „AUTO“ heating mode is activated.

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Air conditioning system		
Status display	Status	Icon display
OFF	„OFF“	
ON	„ON“	

Make sure that the following prerequisites are met before operating the climate control system:

- The air intake opening for recirculated air operation is clear.
- All windows and the cab door are closed.
- The recirculating air / fresh air adjustment ratio is 5:0.

▶ Select „Climate control system **551**“ function by „touching“.

Result:

– The „Climate control system“ icon is surrounded with a black border.
– The switching status of the climate control system appears in the status display **555**.

▶ Press the function key **F3**.

Result:

– The climate control system is turned off.

▶ Press the function key **F4**.

Result:

– The climate control system is turned on.

▶ Open or close the air vents, as desired.
▶ Open the appropriate air vent for upward air distribution.
▶ Turn the fan / blower on.
▶ Select the heater and change into „MANUAL“ heating mode.
▶ Set the temperature stage.
or
Select heater and change into „AUTO“ heating mode.
▶ Set the temperature in [°C] or [°F].

2.7 Turning the heater on

2.7.1 General

The „heater“ function is selected by „touching“ the icon **553** on the left touch display.

The status of the heater is displayed in the status display **555**.

The temperature is regulated in „MANUAL“ heating mode via the function key **F3** („reduce“ temperature) and function key **F4** („increase“ temperature).

Function key **F2** is used to switch from „MANUAL“ heating mode to „AUTO“ heating mode and vice versa.

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2.7.2 Manual heating mode

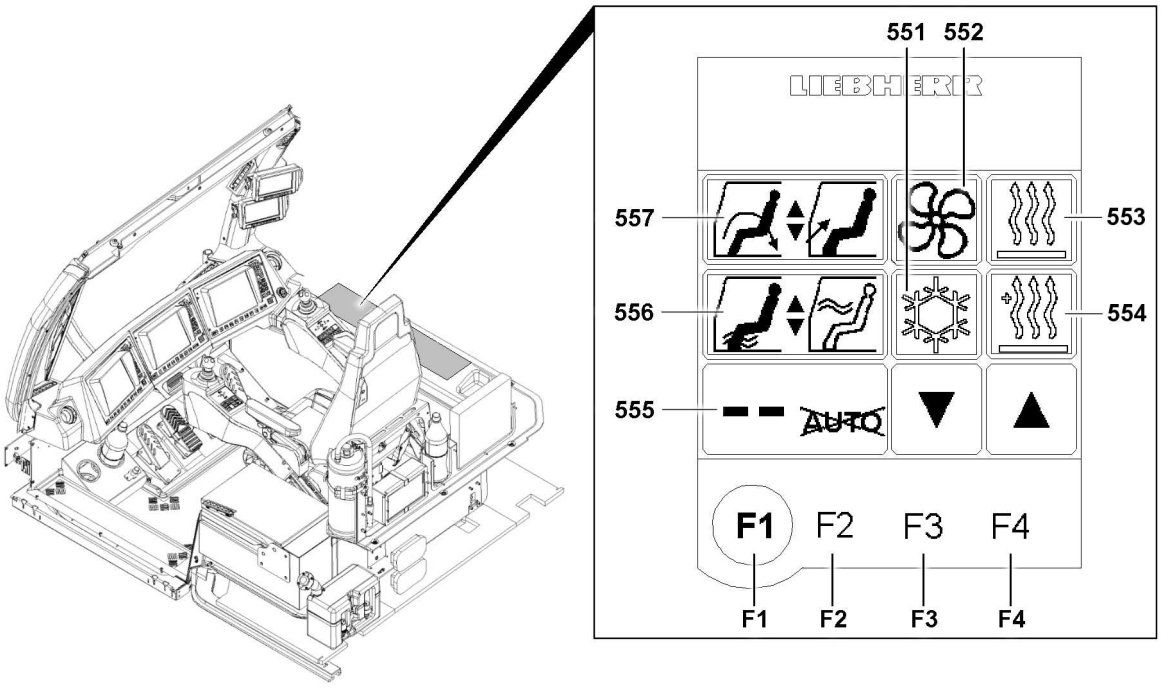

Fig.127305: Turning the heater on

In „MANUAL“ heating mode, the temperature stages - from stage 1 to stage 16 - are available to the crane driver for temperature adjustment.

With the function key **F3**, the temperature stages can be reduced from stage 16 in increments until „Heater OFF“.

Note
- ▶ If the status „Heater OFF“ is reached, the heater does not operate.
- ▶ The crane cab is **not** heated.

Press the function key **F4** to leave the „OFF“ status and to increase the temperature stages incrementally from stage 1 to maximum stage 16.

Heating mode „MANUAL“			
Status display	Status	Stage	Icon display
-- AUTO	**„OFF“**	**— —**	*Heater „OFF“*
1 AUTO	**„ON“**	**1**	
16 AUTO	**„ON“**	**16**	

- ▶ Select the „heater **553**“ function by „touching“.

Result:

– The „heater“ icon is then surrounded with a black border.
– The status display **555** contains the current status of the „heater“.

▶ Press the function key **F2**.

Result:

– Heating mode „AUTO“ is switched to heating mode „MANUAL“.

▶ Press the function key **F3**.

Result:

– The „temperature stages“ are reduced incrementally by one stage.
– The amount of warm air supply into the crane cab is reduced accordingly.

▶ Press the function key **F4**.

Result:

– The „temperature stages“ are increased incrementally by one stage.
– The amount of warm air supply into the crane cab is increased.

2.7.3 AUTO heating mode

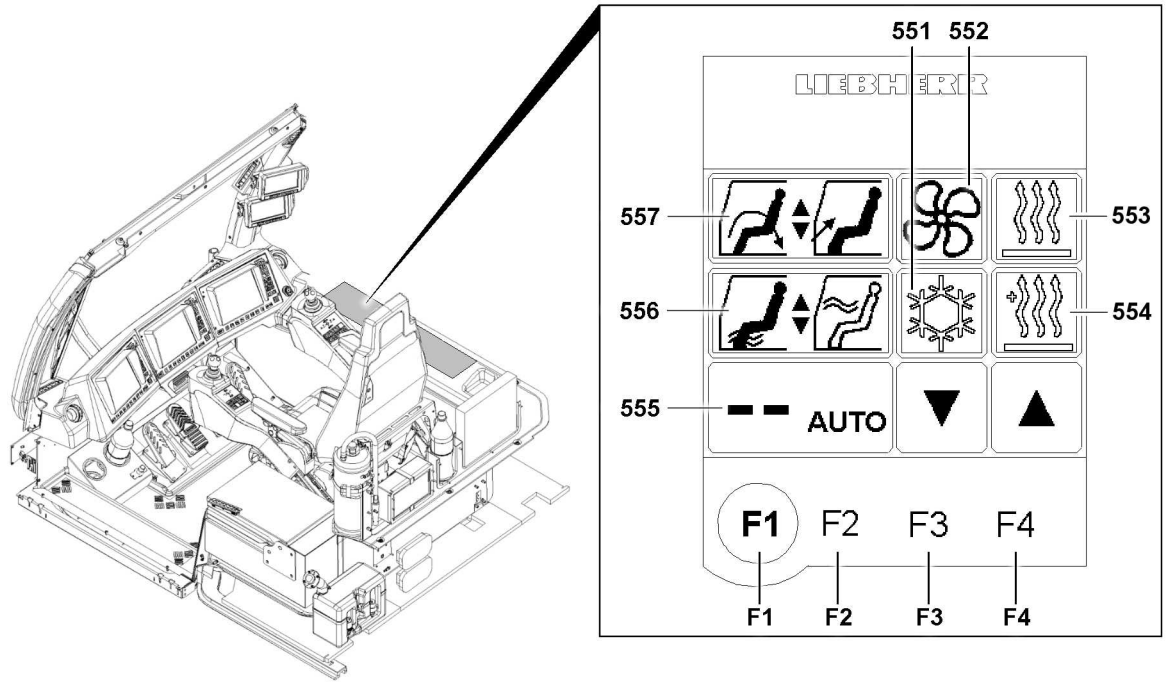

Fig.127306: AUTO heating mode

If heating mode „AUTO“ is selected, the climate control system is automatically enabled.

Note

▶ The blower / fan stage is automatically regulated in the „AUTO“ heating mode, whereby the maximum blower / fan stage is available, which was set before manually.

In „AUTO“ heating mode, the crane driver can adjust the temperature infinitely variable.

By pressing the function key **F3**, the temperature is reduced steplessly from maximum value to minimum value and if the function key **F3** is pressed again, the heater is turned off.

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Note

- ▶ If a status „Heater OFF“ has been reached, the heater does **not** operate but the cab can continue to be cooled.
- ▶ The crane cab is **not** heated.

Leave the „OFF“ state by pressing the function key **F4** and the temperature can be increased infinitely variable from minimum value to maximum value.

Heating mode „AUTO“			
Status display	Status	Temperature in [**°C**] or [°F]	Icon display
-- AUTO	**„OFF“**	**—**	 *Heater „OFF“*
15 °X AUTO *Minimum value*	**„ON“**	**15**	
30 °X AUTO *Maximum value*	**„ON“**	**30**	

▶ Select the „heater **553**“ function by „touching“.

Result:

– The „heater“ icon is then surrounded with a black border.
– The status display **555** contains the current status of the „heater“.

▶ Press the function key **F2**.

Result:

– Heating mode „MANUAL“ is switched to heating mode „AUTO“.

▶ Press the function key **F3**.

Result:

– The „temperature setting“ is reduced in stages in 1 °C increments.
– The amount of warm air supply into the crane cab is regulated according to the current temperature setting.

▶ Press the function key **F4**.

Result:

– The „temperature setting“ is increased in stages in steps of 1 °C.
– The amount of warm air supply into the crane cab is regulated according to the current temperature setting.

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2.8 Procedure for fogged windows

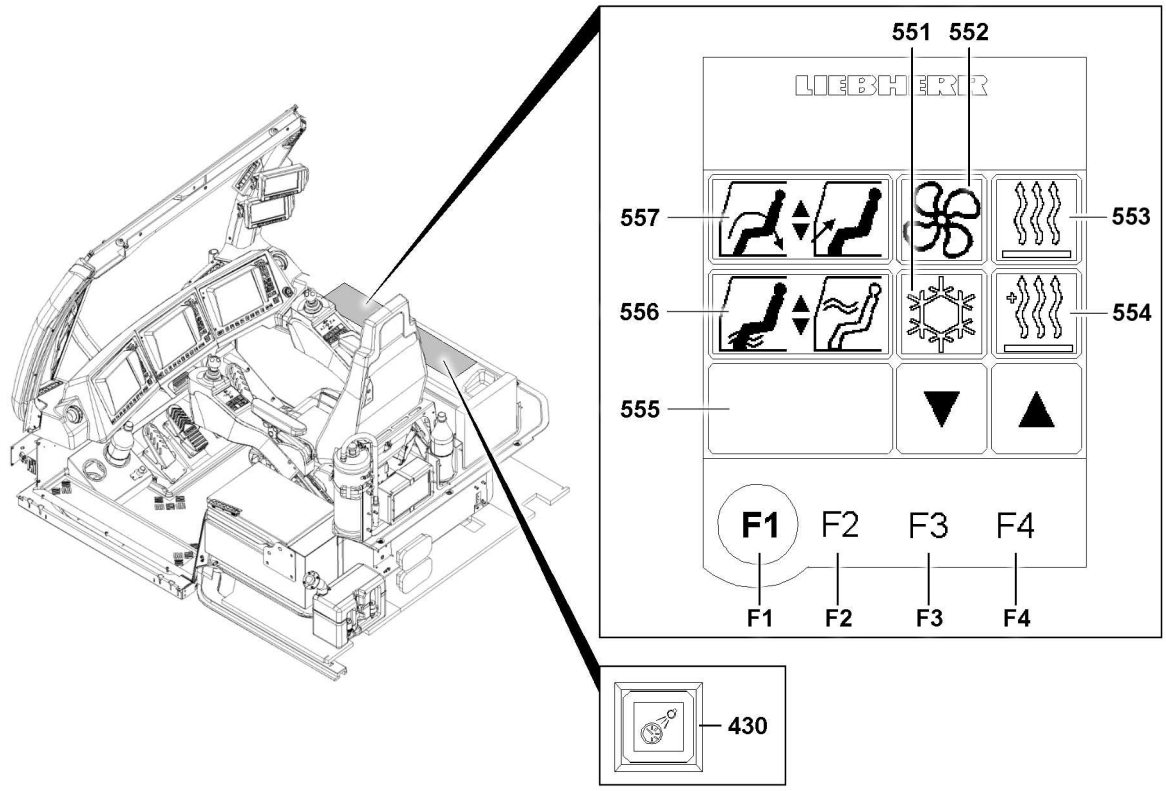

Fig.127301

2.8.1 General

A certain order must be followed to clear the windows quickly for subsequent crane operation.

The settings can be made manually or semi-automatically.

2.8.2 Adjusting the settings manually in the „Climate control settings“ menu

- ▶ Set the air distribution **556** to maximum level „up“ - stage 5.
- ▶ Open the air vents.
- ▶ Set recirculating air **557** to maximum level - stage 5.
- ▶ Set the fan / blower **552** to maximum level - stage 5.
- ▶ Set the climate control system **551** to „ON“.
- ▶ Set the heater **553** to maximum possible level in „**manual**“ heating mode.
- ▶ If the crane engine is cold, add the auxiliary heater **554**, if required.

2.8.3 Making adjustments semi-automatically in the „Climate control settings“ menu

- ▶ Set the heater **553** to „**AUTO**“ heating mode.
- ▶ Set the air distribution **556** to maximum level „up“ - stage 5.
- ▶ Open the air vents.
- ▶ If the crane engine is cold, add the auxiliary heater **554**, if required.

Note

- ▶ The other functions are automatically added by the system.

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2.9 Operating the engine-independent auxiliary heater

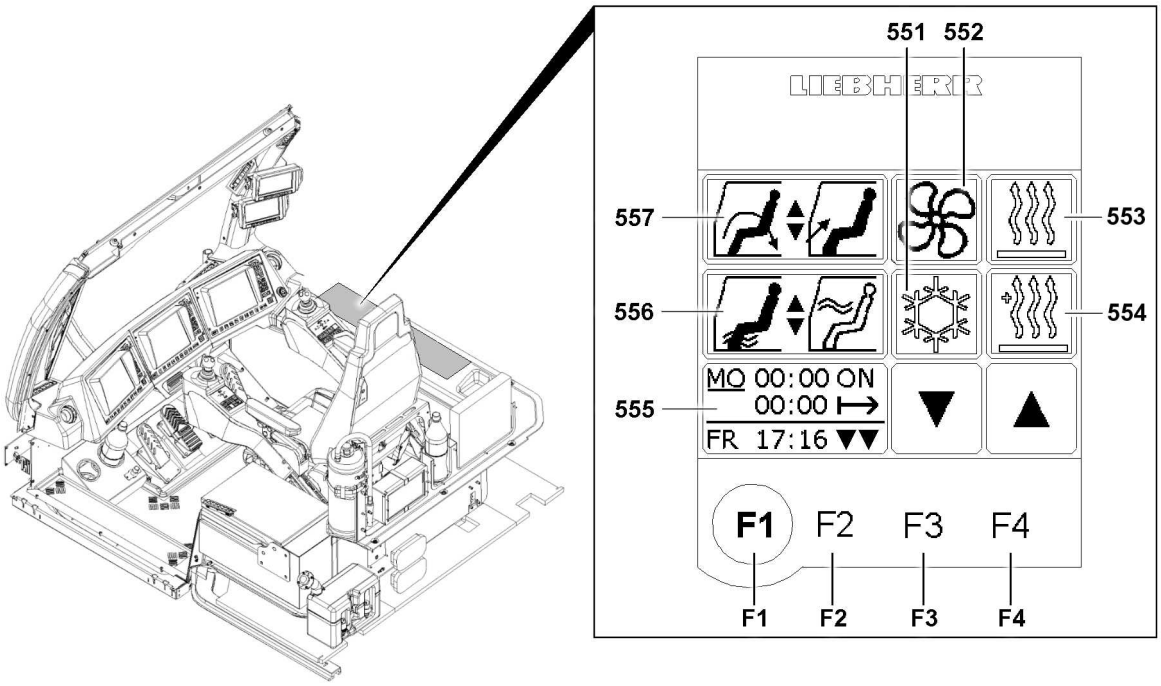

Fig.127307

The engine-independent auxiliary heater is used to heat the crane cab when the engine is turned off and as auxiliary heater at low ambient temperatures, if the engine-dependent heater is insufficient.

At ambient temperatures of below -20 °C , the crane engine must be pre-heated by the engine-independent auxiliary heater. In this case, the crane cab does not have to be heated too.

Note

▶ In summer, run the auxiliary heater once a month for approx. 15 to 20 minutes.

Carry out maintenance work on the auxiliary heater according to the supplied manufacturer's operating instructions.

2.9.1 General

NOTICE

Damage of auxiliary heater!

▶ Fill all units with sufficient service fluids for winter operation according to the lubrication chart.

DANGER

Danger of poisoning and suffocation in enclosed areas!

▶ Only operate the engine-independent auxiliary heater in enclosed areas such as garages or workshops only if an exhaust system is used, even in „Programming mode“.

DANGER

Danger of explosion!

In areas where combustible fumes or dust could form, e.g. in the vicinity of storage areas for fuel, coal, wood dust or grain or similar and in the vicinity of filling stations or tank farms, there is a danger of explosion.

▶ Turn the auxiliary heater off.

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2.9.2 Adding the engine-independent auxiliary heater manually

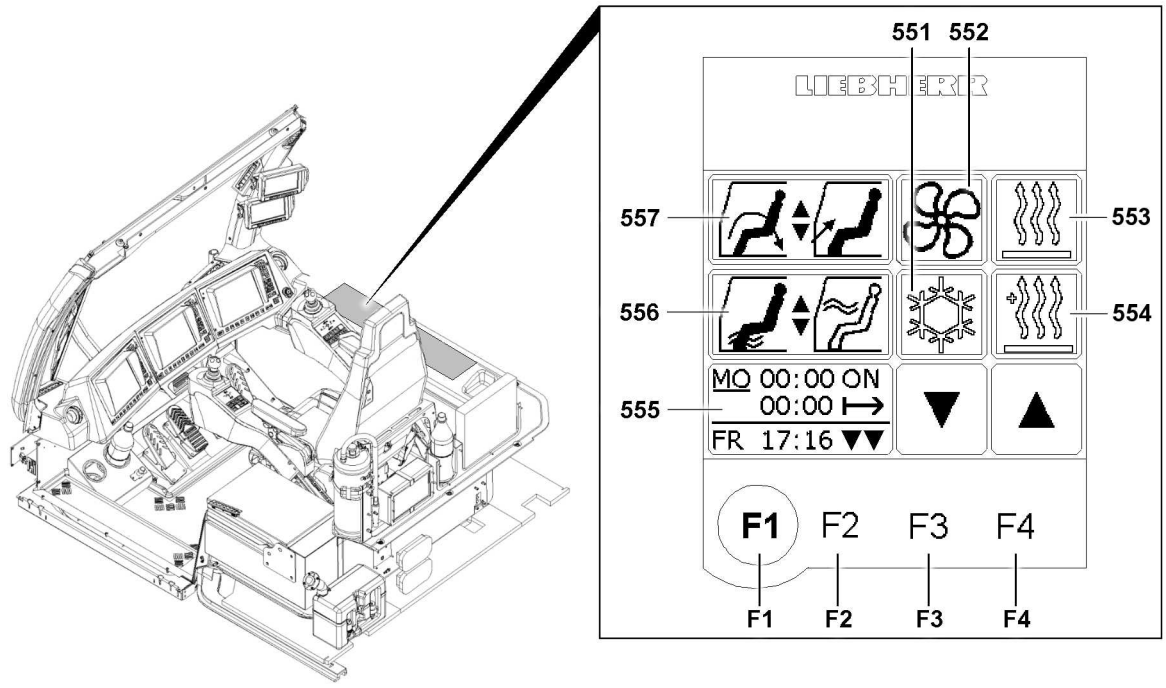

Fig.127307

The engine-independent auxiliary heater can be added manually in driving or crane operation mode. The auxiliary heater, icon **554**, must be selected and turned on.

If the auxiliary heater is in the „OFF“ state, pressing function key **F4** once adds the cab auxiliary heater.

Pressing the function key **F4** again turns engine preheating auxiliary heater on.

Note

▶ If the auxiliary heater it added for engine pre-heating, then the crane cab is **not** heated.

Manual auxiliary heater			
Status display	Function key **F4**	Function key **F3**	Icon display
MO 06:45 ON 00:30 FR 17:16 **OFF**	▲ F4	— —	*Auxiliary heater „OFF“*
MO 06:45 ON 00:30 FR 17:16 **ON**	▲ F4	▼ F3	*Auxiliary heater - cab „ON“*
MO 06:45 ON 00:30 FR 17:16 **ON**	▲ F4	▼ F3	*Auxiliary heater - engine pre-heating „ON“*

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Engaging the auxiliary heater

▶ Select heat **553** and set the required temperature via function key **F3** or function key **F4** (see section entitled „Turning the heater on“).

Note

▶ The temperature adjustment via function key **F3** or function key **F4** is only needed to heat the crane cab.

▶ Select auxiliary heater **554** and press function key **F3** or function key **F4** until the required setting is displayed in the status display **555** (see chart).

Result:

– The auxiliary heater is switched on.
– Depending on the setting, the crane cab or the engine is heated.

Note

▶ When the crane cab is „warm“ and the engine is at the operating temperature, turn the auxiliary heater off.
▶ This increases the service life of the auxiliary heater.

Turning the auxiliary heater off

▶ Select auxiliary heater **554** and press the function key **F3** until the status display **555** shows the setting auxiliary heater „OFF“ (**OFF**).

Result:

– The auxiliary heater is turned off.
– An shut off delay is carried out each time the auxiliary heater is turned off.

▶ Turn the battery master switch off if the crane is temporarily not being used.

2.9.3 Adding the engine-independent auxiliary heater in programming mode

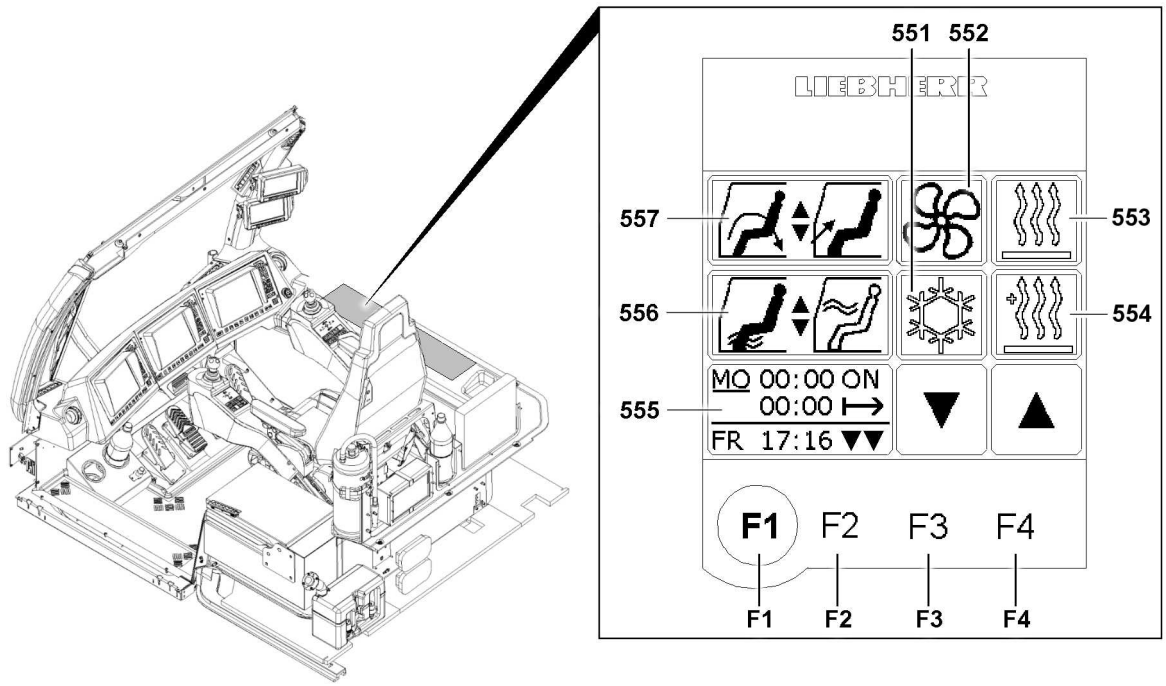

Fig.127307

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The engine-independent auxiliary heater to heat the cab or for engine preheating can be programmed a **maximum** of one week in advance.

Note

▶ It is advisable to restrict auxiliary heater programming to two days, since there is a risk of the battery discharging extremely quickly at minus temperatures.

NOTICE

Clogging of auxiliary heater

In the transitional period, the auxiliary heater can clog up and be damaged as a result of the short time in operation.

▶ By selecting the program „Summer operation“, the clogging and damage of the auxiliary heater can be prevented.

Auxiliary heater programmed			
Status display	Function key **F4**	Function key **F3**	Icon display
MO 06:45 ON 00:30 ⟼ FR 17:16 **OFF**	▲ F4	— —	*Auxiliary heater „OFF“*
MO 06:45 ON 00:30 ⟼ FR 17:16 ☼	▲ F4	▼ F3	*Auxiliary heater „Summer operation“*
MO 06:45 ON 00:30 ⟼ FR 17:16 **ON**	▲ F4	▼ F3	*Auxiliary heater „On“*
MO 06:45 ON 00:30 ⟼ FR 17:16 ◴	▲ F4	▼ F3	*Auxiliary heater „programmed“*
MO 06:45 ON 00:30 ⟼ FR 17:16**ON**≒	▲ F4	▼ F3	*Auxiliary heater with engine preheating „On“*
MO 06:45 ON 00:30 ⟼ FR 17:16 ◴≒	— —	▼ F3	*Auxiliary heater with engine preheating „programmed“*

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Programming the auxiliary heater

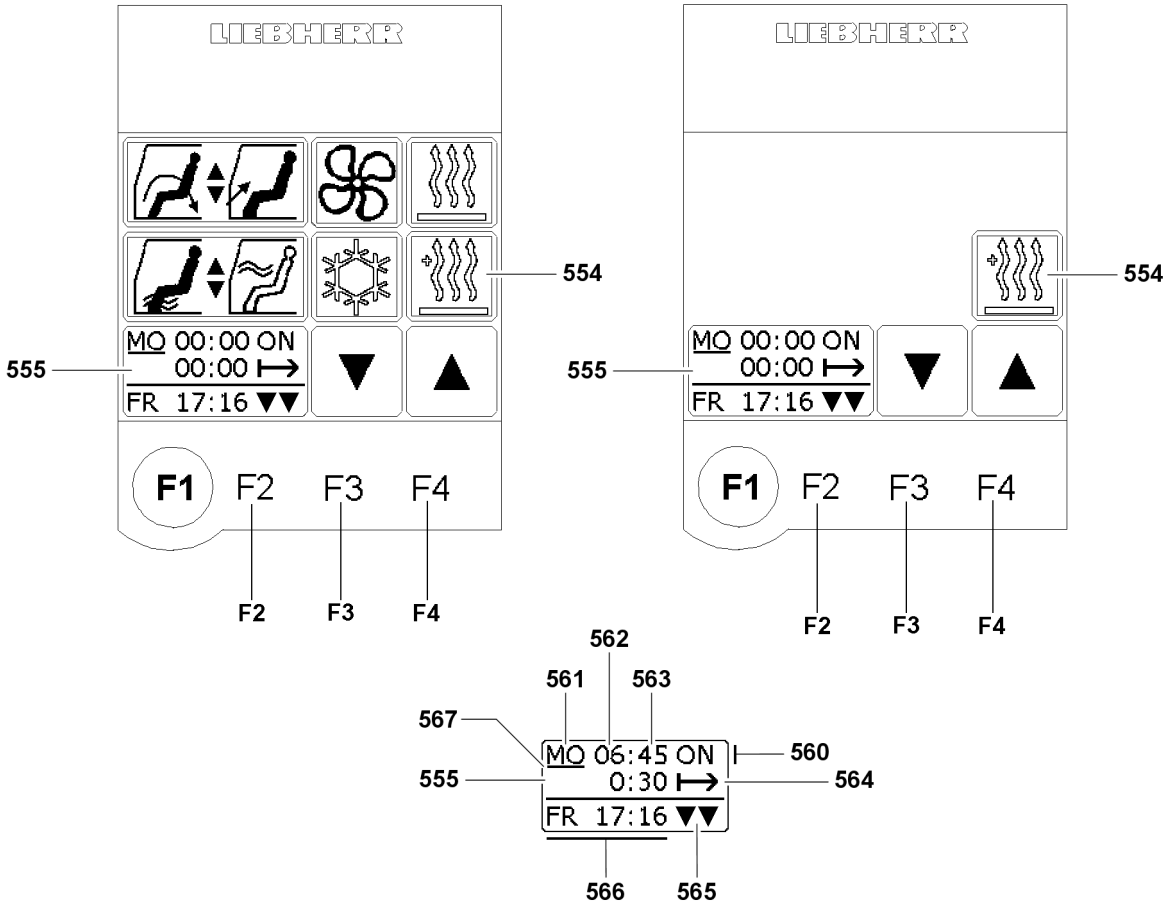

Fig.127308

In order to access auxiliary heater programming mode, press the function key **F4** until the status display shows the „clock“ (programming mode for cab heater), or the „clock with wave“ (programming mode for engine preheating), illustration **1**.

The status display **555** contains the current day of the week with the time **566**. The time in the status display **555** is coupled to the „real-time clock“ in the test system.

Note

▶ The procedure for programming the auxiliary heater (to heat the crane cab or for engine preheating) is identical in both cases.

Make sure that the following prerequisites are met **before** the auxiliary heater is programmed:

– The desired temperature for the heater has been set.
– The fan / blower is set to stage 0 („OFF“).
– The desired programming mode, cab heater („clock“) or engine preheating („clock with wave“) has been set.

▶ Press the function key **F2**.

Result:

– The auxiliary heater programming interface is displayed, illustration **2**.
– The status display **555** shows the cursor **567** below the editable input value.

Note

▶ The cursor **567** is positioned on day programming **560** by default.

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▶ Press the function key **F4** and select the required day of the week **561** (**ascending** order).
or
Press the function key **F3** and select the required day of the week **561** (**descending** order).

Result:

– The selected day of the week is „set“.

▶ Press the function key **F2**.

Result:

– The cursor **567** changes from day programming **561** to hour programming **560**.

▶ Press the function key **F4** and select the desired hour **562** (**ascending** order).
or
Press the function key **F3** and select the desired hour **562** (**descending** order).

Result:

– The selected hour is „set“.

▶ Press the function key **F2**.

Result:

– The cursor **567** changes from hour programming **562** to minute programming **563**.

▶ Press the function key **F4** and select the desired minute **563** (**ascending** order).
or
Press the function key **F3** and select the desired minute **563** (**descending** order).

Result:

– The selected minute is „set“.

▶ Press the function key **F2**.

Result:

– The cursor **567** changes from minute programming **563** to turn on duration **564**.

▶ Press the function key **F4** and select the desired turn on duration **564** (ascending).
or
Press the function key **F3** and select the desired turn on duration **564** (descending).

Result:

– The selected turn on duration **564** is „set“.

Note
▶ The turn on duration **564** for the auxiliary heater is restricted to a maximum of **0:55 minutes**.
▶ The cursor **567** automatically changes to the minutes setting for the turn on duration **564**.
▶ The turn on duration **564** can only be changed in 5 minute increments.

▶ Press the function key **F2**.

Result:

– The cursor **567** changes from turn on duration **564** to day programming **560**.
– The programming for the auxiliary heater is complete.

▶ Select the auxiliary heater **554** icon by „touching“.

Result:

– The programmed settings are taken over.
– The „Climate control settings“ menu is displayed.
– The auxiliary heater starts to operate when the programmed turn on time for the heater operation is reached and turns the heater operation off again when the selected turn on duration has expired.

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– The auxiliary heater runs in automatic regulating operation, depending on the heater setting in „manual“ or „AUTO“.

Note

▶ The auxiliary heater programming must be manually reset to „zero“ after the programmed heating period. Otherwise, the auxiliary heater is turned on automatically according to the programming.

Resetting the auxiliary heater programming

To reset the auxiliary heater programming, proceed as described in „Auxiliary heater programming“.

▶ Reset the values in the status display **555** to „zero“.

Result:

– The programming is turned off.

Note

▶ The programming can be manually changed at any time or it can be turned off altogether.

2.10 Bleeding the heating system

When draining the engine coolant, the contents of the heating system will also be drained because the engine and heater operate as one circuit. When refilling the system, it must be carefully bled.

▶ Fill the coolant via the expansion tank of the engine cooling circuit as specified in the lubrication chart.
▶ Start the engine as described in the Crane operating instructions, chapter 4.03.
▶ Set the heater to „warm“.
▶ Check the expansion tank for air bubbles.

Result:

– The engine is bled as soon as no more air bubbles rise up.

When no more air bubbles appear in the expansion tank:
▶ Set the heater to „cold“.

Result:

– The heater circuit will be bled.

▶ Check the expansion tank for air bubbles.

Result:

– The heater circuit is bled as soon as no more air bubbles rise up.

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6.05 Emergency take down

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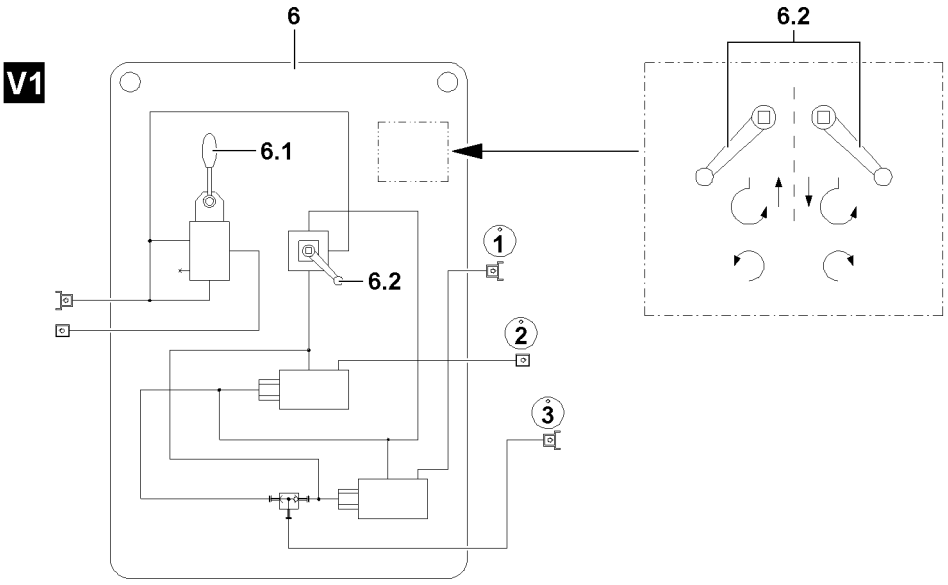

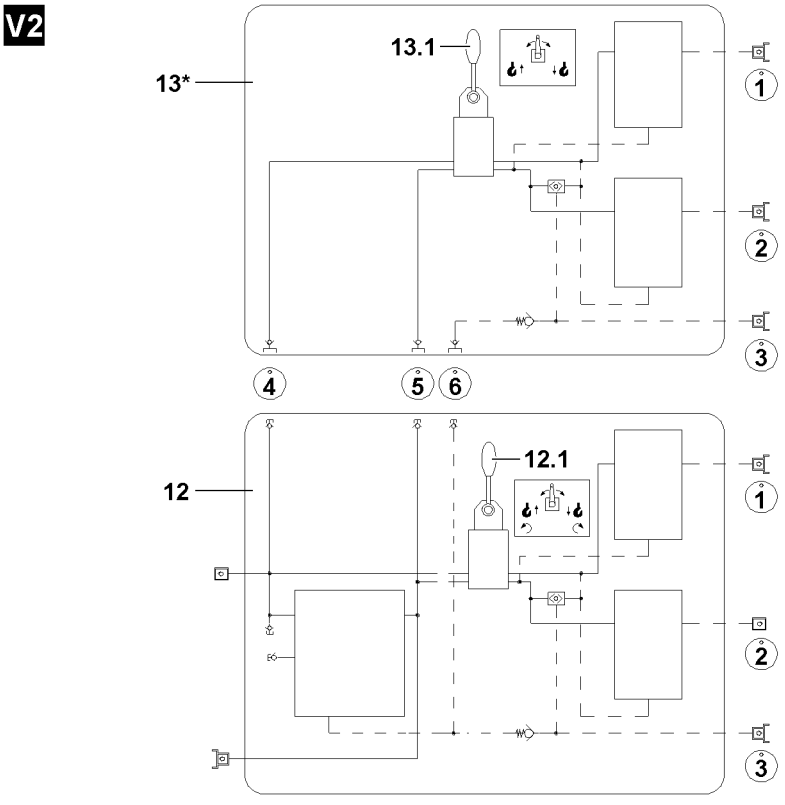

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Fig.109407

1 Emergency operation

Note
▶ The illustrations in this chapter are examples and may not apply exactly to your crane!

Note
▶ Before you start with preparations for emergency operation, check which of the following assembly plates you have available to carry out the emergency operation!

There are two **different** variations of assembly plates.

With variation 1 **V1**, all winches, which are equipped with the respective auxiliary hydraulic for emergency operation and the slewing gear can be actuated, each individually.

With variation 2 **V2**, which consists of two assembly plates, all winches, which are equipped with the respective auxiliary hydraulic for emergency operation can be actuated, each individually, **or** winch 1 **WI** and winch 2 **WII** can be actuated in parallel operation or the slewing gear can be actuated individually.

Note
▶ Observe the following charts!

	Variation 1 (V1)	**Variation 2(V2)**
	each in individual operation	each in individual operation
Winch 1	X	X
Winch 2	X	X
Winch 1II2[1)]	—	X
Winch 3	X	X
Winch 4	X	X
Winch 5	X	X
Winch 6	X	X
Slewing gear	X	X

1) Parallel operation Winch 1 and winch 2 (1II2)

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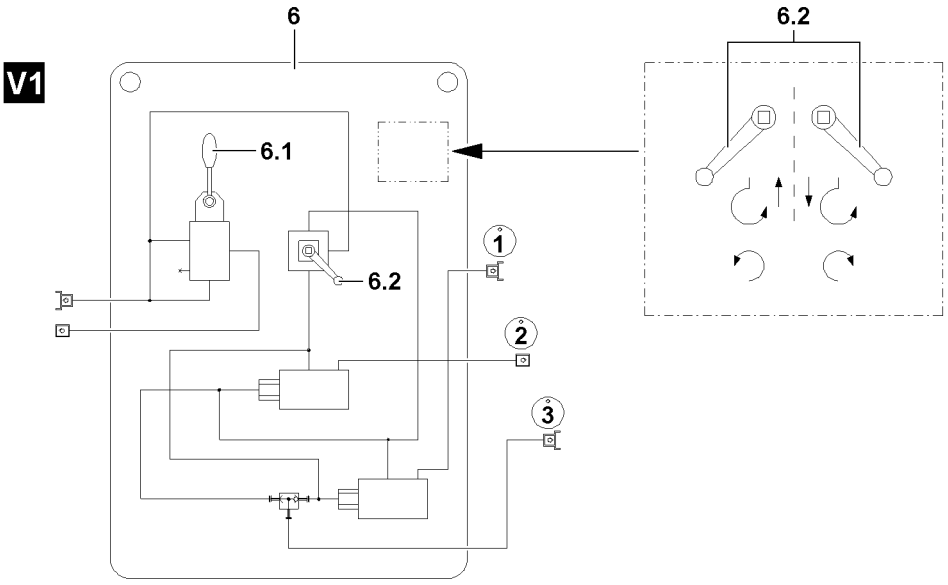

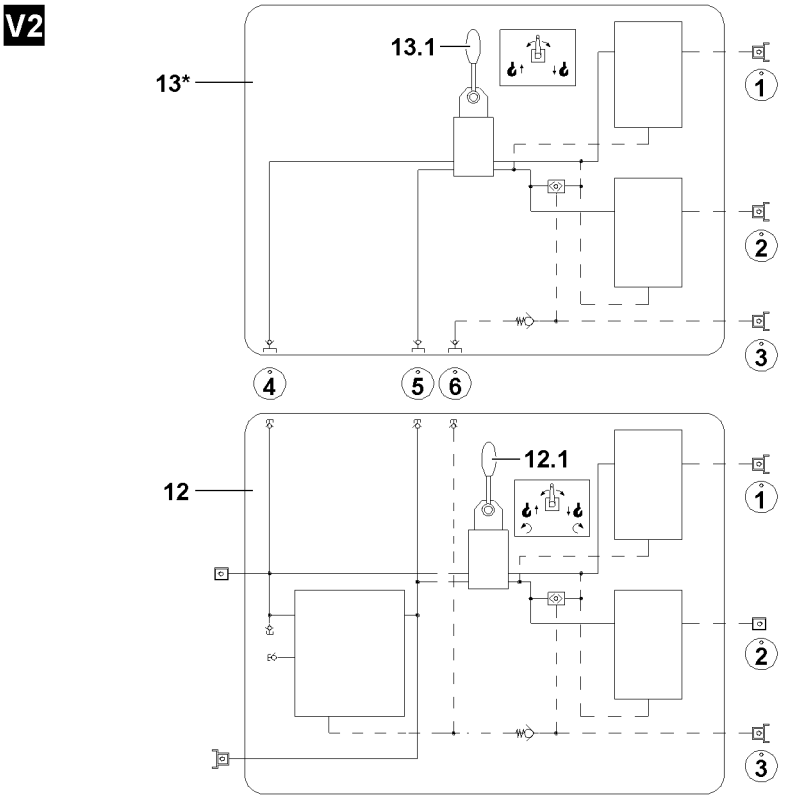

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Fig.109407

1.1 General danger notes

DANGER
Significant accident risk during emergency operation!
During an emergency operation, crane movements are no longer monitored by the LICCON computer system!
In the event of improper operation or deliberate misuse, the crane can topple over!
There is an increased risk of accident if the following danger notes are not observed!
Personnel can be severely injured or killed!
This could result in high property damage!
▶ All hazard warnings are to be observed and maintained!

General danger notes!

1. **Emergency operation of the crane superstructure may only be carried out:**
   - **To remove a dangerous situation.**
   - **After consultation with customer service at LIEBHERR-Werk Ehingen GmbH.**
   - **By authorized personnel who are knowledgeable of the hydraulic circuit diagram, the connection diagram and carrying out emergency operation.**
   - **By authorized personnel who are aware of the risks of emergency operation.**
   - **To carry out load reducing movements.**
2. **The danger zone must be blocked off!**
3. **No persons or objects may remain in the danger zone!**
4. **If a load is on the hook, then it must first be set down to relieve the boom!**
5. **During emergency operation, all safety devices, with the exception of „winch spooled out“ are automatically bypassed**!
6. **In the event of a defect or failure of the LICCON computer system, each step must be carried out and monitored with extreme caution and care, since a visual check on the LICCON monitor is no longer possible. Visual check!**
7. **All crane movements must be travelled with extreme caution and at the lowest speed!**
8. **The crane operator must be in visual contact with auxiliary personnel or guides person!**

Note
Please note!
▶ The hydraulic supply for the crane can, to the extent that the crane has been equipped, take place through an emergency unit*. If this is not the case, the crane must be taken down by using additional auxiliary cranes!

WARNING
The crane can topple over!
▶ The boom may only be luffed down if the stability of the crane permits this action, observe information in the load tables and maintain them!
▶ When taking down the boom, the information in the erection and take down charts are to be observed and followed!

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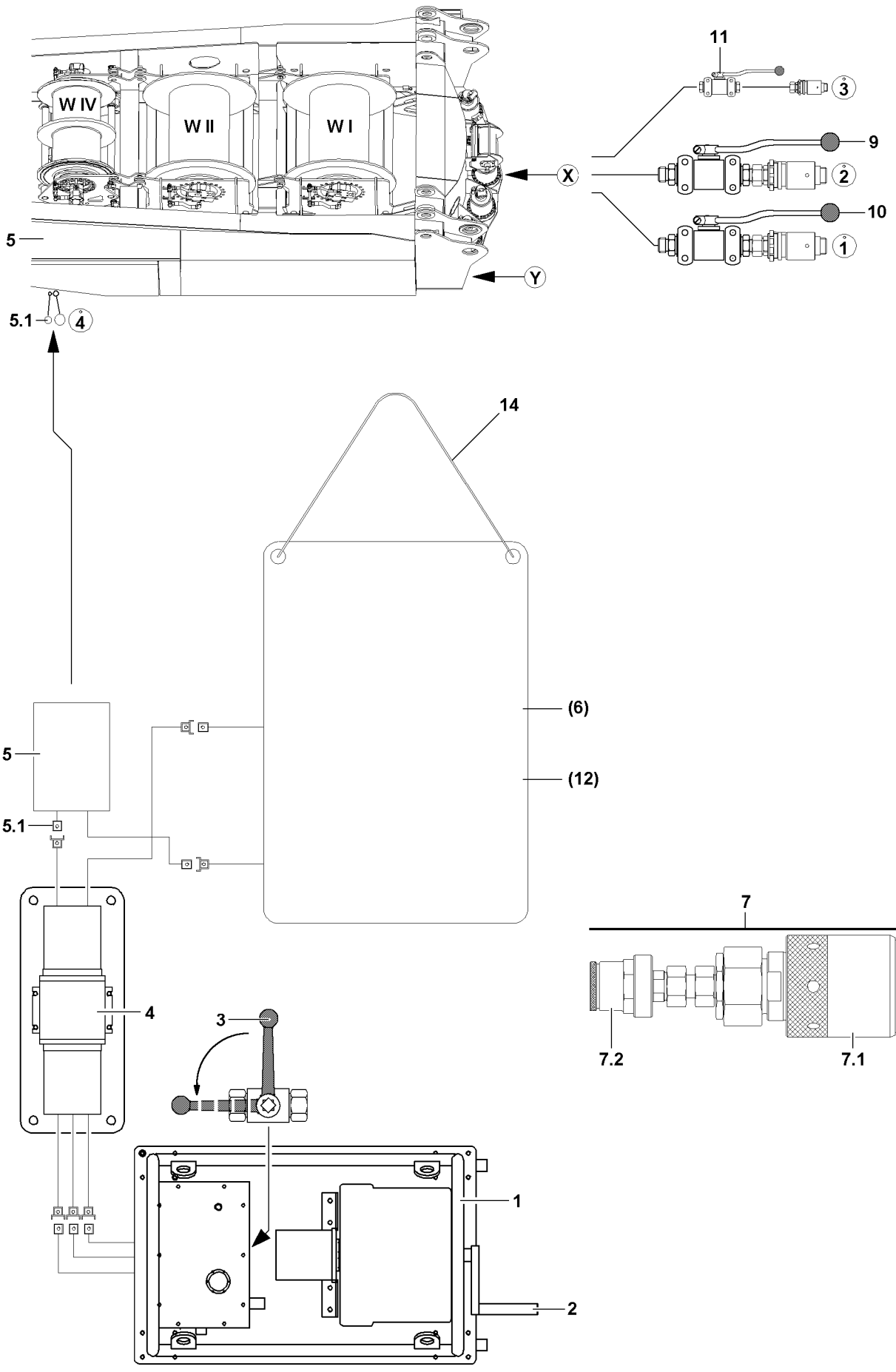

Fig.109408

LWE/LG 1750-006/15409-07-02/en

1.2 Handling of assembly plates

WARNING
Falling assembly plates!
Non-secured assembly plates can fall down when carrying out the emergency operation!
Personnel can be severely injured or killed!
- ▶ For emergency operation, secure the assembly plates with the chains **14** to prevent them from falling down!
- ▶ Do not secure the assembly plates near movable crane components!

1.3 Prerequisites for emergency operation

Note
- ▶ On the basis of different line diameters on the hydraulic lines, false couplings are prevented, additionally the hydraulic connections are identified with numbers!

Make sure that the following prerequisites are met:
- The hydraulic circuit diagram is available.
- The hydraulic system is functioning.
- An emergency operation aggregate **1** is available.
- A „Hydraulic transformer **4**“ is available.
- The assembly plate(s) are available.
- Reducer sections **7** (adapter) are available.
- The dust plugs for the hydraulic connections are removed.

1.4 Establishing the hydraulic connections

WARNING
Danger due to hydraulic pressure!
If the hydraulic lines are pressurized when releasing the connections, it can lead to severe injuries to assembly personnel!
- ▶ Relieve the pressure in the hydraulic lines before releasing!

- ▶ Establish the hydraulic connections from the emergency operation aggregate* **1** to the transformer **4**.
- ▶ Establish the hydraulic connection from the transformer **4** to the (suction line) on theturntable **5** of the crane, connection **5.1**.
- ▶ Hydraulic connection (return line, number **4**) from the turntable of the crane to the assembly plate **6** or to the assembly plate **12**.
- ▶ Establish the hydraulic connection (pressure line) from the transformer **4** to the assembly plate **6** or to the assembly plate **12**.

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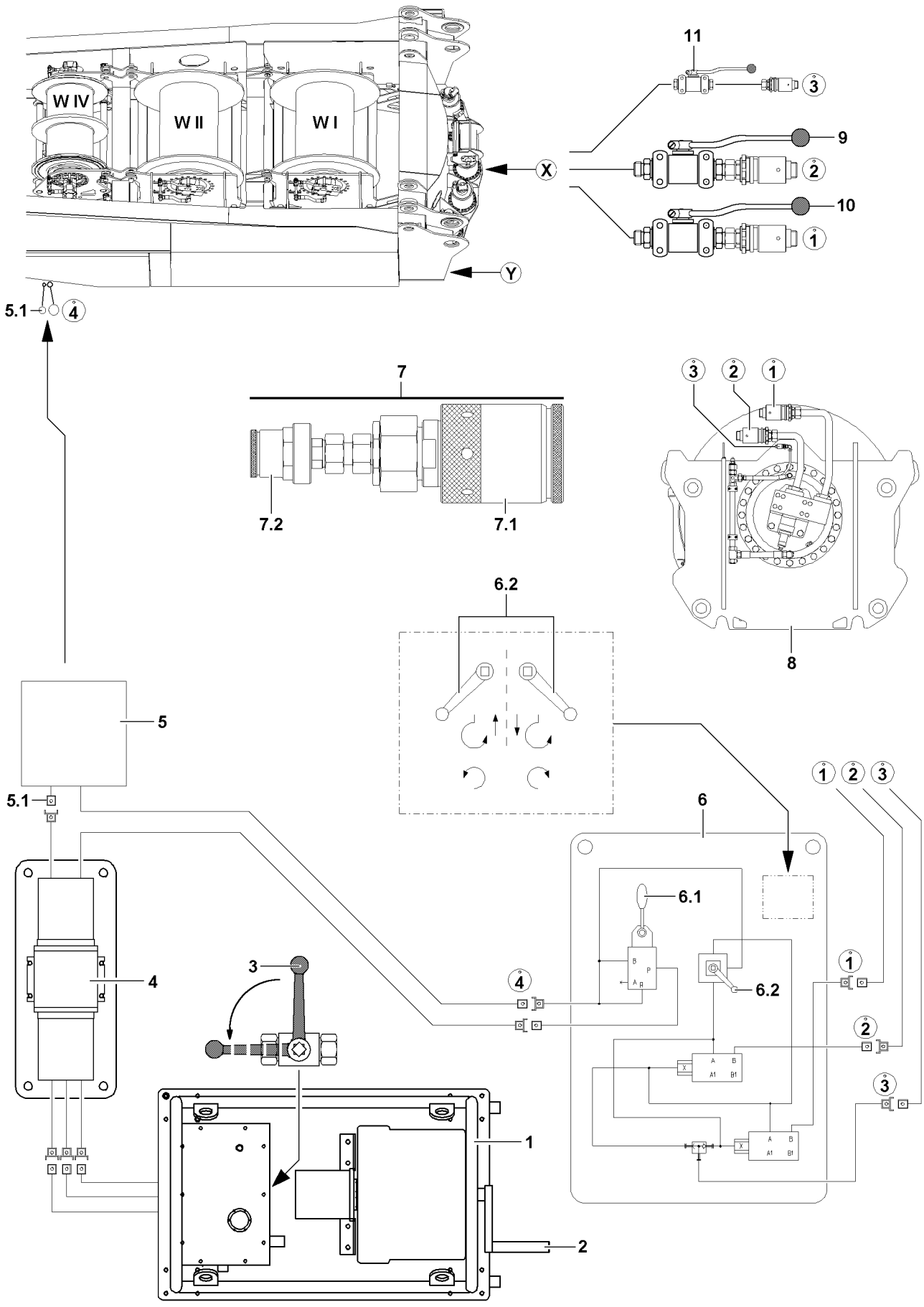

Fig.108301

2 Emergency operation with assembly plate Variation 1 (V1)

Note

▶ The procedure of the emergency operation - except winch 4 on the LR1600/2 and LR1600/2-W - is identical for all winches and is described on the example of one winch!

Exception LR1600/2 and LR1600/2-W:

▶ Before emergency operation of winch 4 **W IV** on the LR1600/2 and LR1600/2-W, in addition to the hydraulic connections to lift, lower and for the control pressure of the brake, a control line must be connected, see section: „Emergency operation of winch 4 **W IV** on the LR1600/2 and LR1600/2-W!“

To carry out the emergency operation, use an emergency operation aggregate **1**, a hydraulic transformer **4** and the assembly plate **6**.

2.1 Functional selection on the assembly plate

With the ball valve **6.2** on the assembly plate **6** the following movements are preselected:
– Lift or lower
– Turn left or right

▶ Preselect crane movement: Activate ball valve **6.2** in the corresponding direction.

Moving the hand lever **6.1** determines the speed of the each crane movement.

▶ Operate the hand lever **6.1** and carry out the respective crane movement carefully.

2.2 Start the emergency operation aggregate

▶ Turn the crank **2** on the emergency operation aggregate*** 1**.
▶ Switch the ball valve **3** to „horizontal“ position.

Note

▶ The engine rpm on the emergency operation aggregate can be set via a separate speed regulator!

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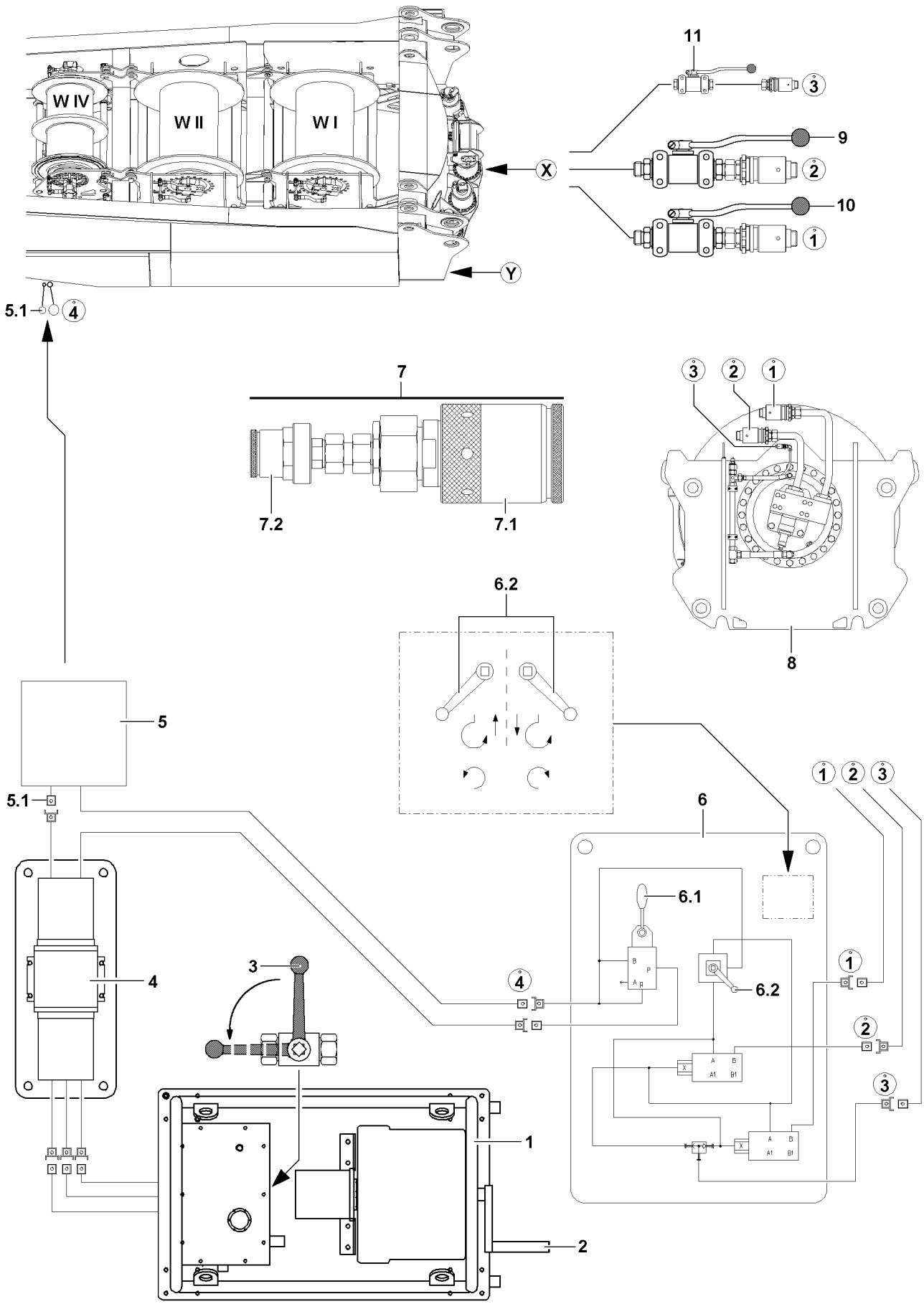

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Fig.108301

2.3 Emergency operation of winch 4 on the LR1600/2 and LR1600/2-W

WARNING
Emergency operation winch 4 **W IV**!
▶ Observe the section „Emergency operation of winch 4 (W IV) on the LR1600/2 and LR1600/2-W“!

2.4 Emergency operation winches

2.4.1 Establishing the hydraulic connections to the winch

Make sure that the following prerequisite is met:
– The pressure in the hydraulic system has been relieved.

▶ Release the hydraulic connections on the corresponding winch.
▶ Install the reducer sections **7** (adapter) with coupling sleeve **7.1** on the connection **1** and on the connection **2** of the winch **8**.

Note
▶ Observe the numbering of the hydraulic lines!

▶ Establish the hydraulic connections for the assembly plate **6** (connection **1**, connection **2** and brake **3**) to the winch **8**.

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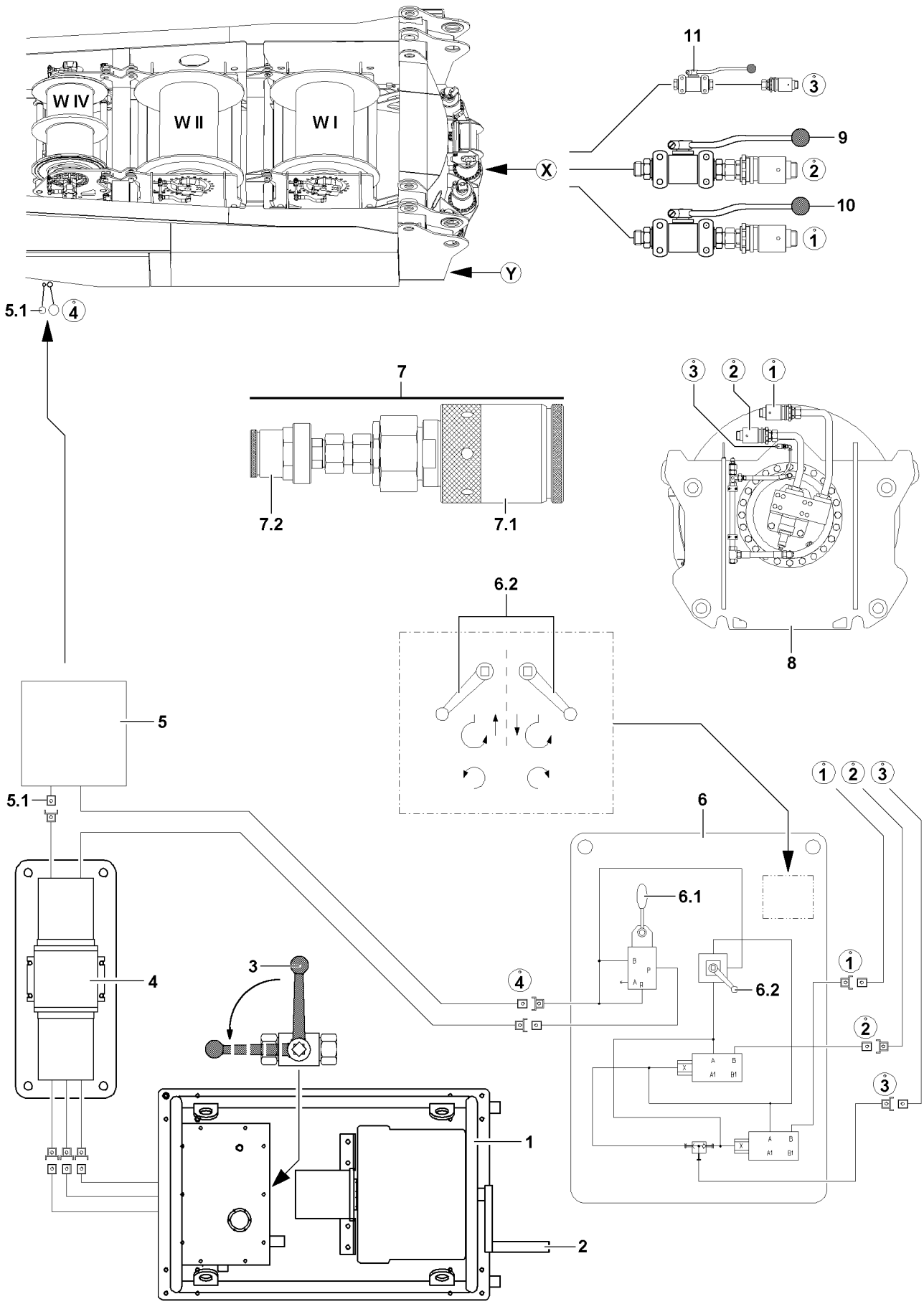

Fig.108301

2.4.2 Spooling the winch out

▶ Set the ball valve **6.2** for the assembly plate **6** on „lower“.
▶ Move the manual lever **6.1** carefully.

Result:

– The winch spools out.

2.4.3 Spooling the winch up

▶ Set the ball valve **6.2** for the assembly plate **6** on „lift“.
▶ Move the manual lever **6.1** carefully.

Result:

– The winch spools up.

2.5 Disconnecting the hydraulic connections

Make sure that the following prerequisites are met:
– The emergency operation is completed.
– The pressure in the hydraulic system has been relieved.

▶ Disconnect the hydraulic connections from the winch **8** to the assembly plate **6**.
▶ Remove the reducer sections **7** (adapter).
▶ Close off the hydraulic connections of the winch **8** with dust caps.
or
Reconnect the winch **8** onto the hydraulic system of the crane.

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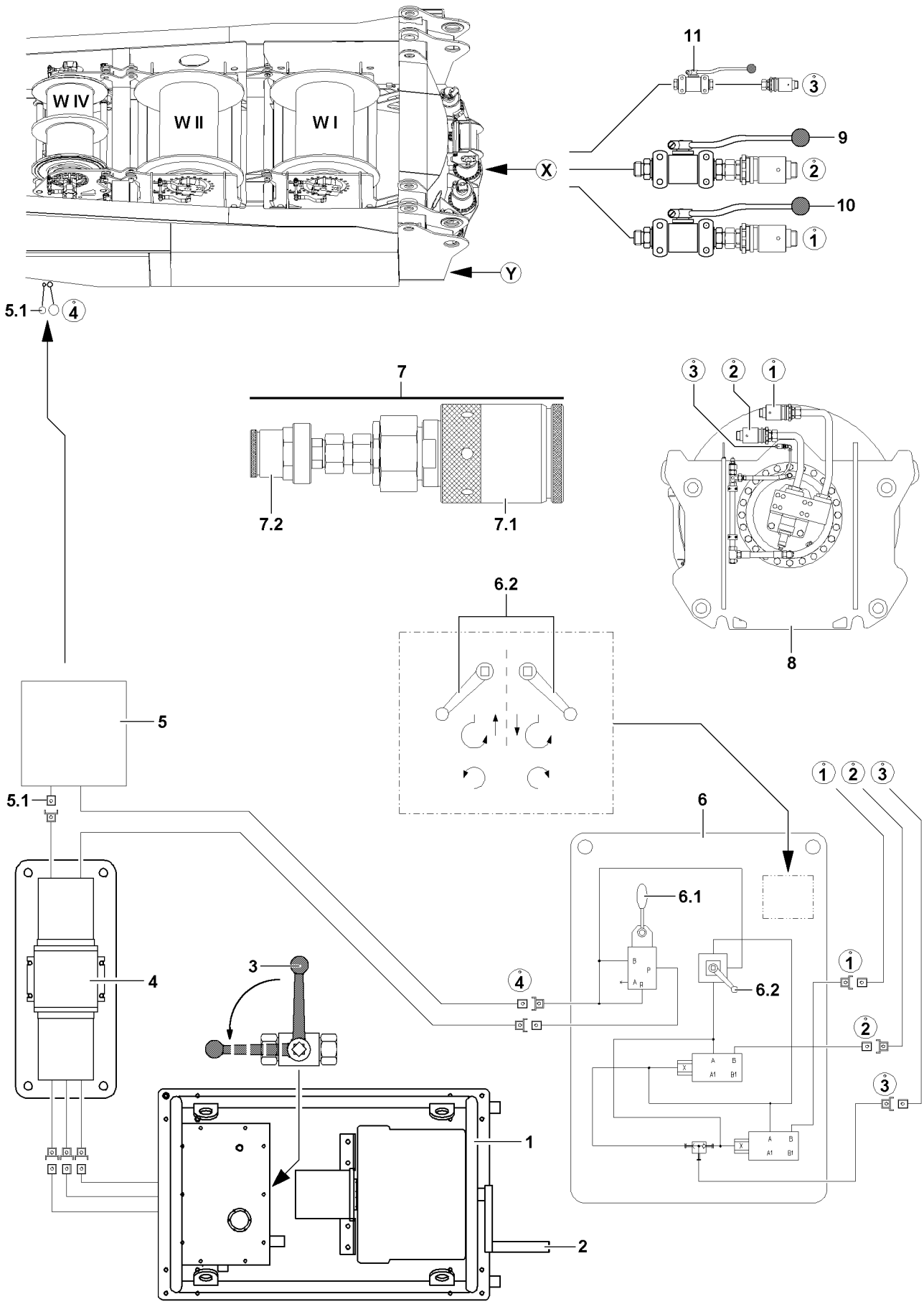

Fig.108301

LWE/LG 1750-006/15409-07-02/en

3 Emergency operation of slewing gear(s) with assembly plate Variation 1 (V1)

WARNING
Danger due to hydraulic pressure!
If the hydraulic lines are pressurized when releasing the connections, it can lead to severe injuries to assembly personnel!
▶ Relieve the pressure in the hydraulic lines before releasing!

Note
▶ For each crane type, the installation position of the ball valves for emergency operation of the slewing gear on the turntable varies!
▶ Possible installation positions of the ball valve: Point **X** or point **Y**!

3.1 Establishing the hydraulic connection to the slewing gears

Make sure that the following prerequisite is met:
– The pressure in the hydraulic system has been relieved.

Note
▶ Observe the numbering of the hydraulic lines!

▶ Establish the hydraulic connections of the assembly plate **6** (connection **1**, connection **2** and brake **3**) to the „Ball valves“ on the turntable.

3.2 Turning the turntable to the left

▶ Set the ball valve **9** into emergency operation position.
▶ Set the ball valve **10** into emergency operation position.
▶ Set the ball valve **11** into emergency operation position.
▶ Set the ball valve **6.2** for the assembly plate **6** on „turn left“.
▶ Move the manual lever **6.1** carefully.

Result:

– The turntable turns to the left.

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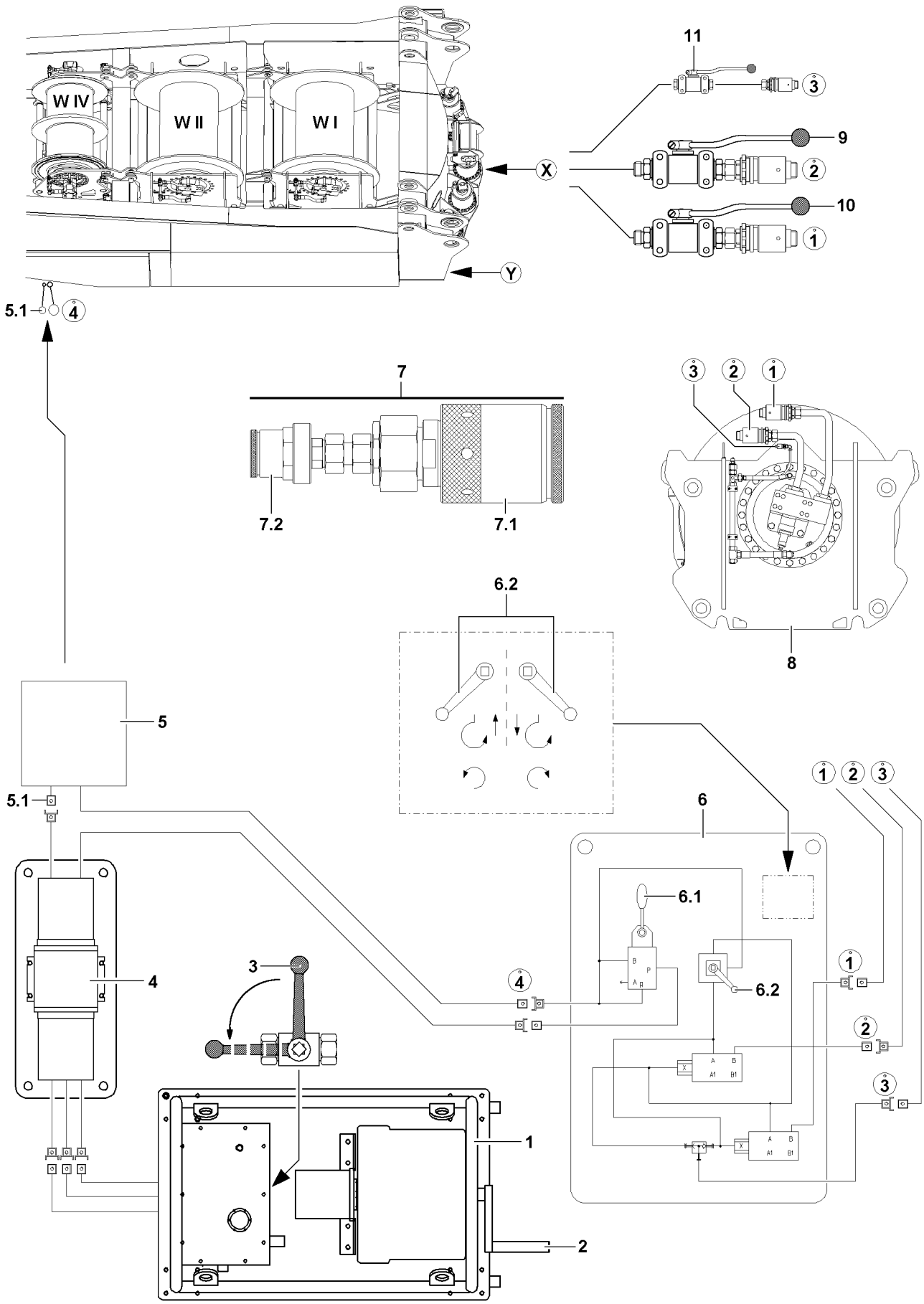

Fig.108301

LWE/LG 1750-006/15409-07-02/en

3.3 Turning the turntable to the right

▶ Set the ball valve **9** into emergency operation position.
▶ Set the ball valve **10** into emergency operation position.
▶ Set the ball valve **11** into emergency operation position.
▶ Set the ball valve **6.2** for the assembly plate **6** on „turn right“.
▶ Move the manual lever **6.1** carefully.

Result:

– The turntable turns to the right.

3.4 Disconnecting the hydraulic connections

Make sure that the following prerequisites are met:
– The emergency operation is completed.
– The pressure in the hydraulic system has been relieved.

Disconnect the hydraulic connections to the assembly plate **6**.

▶ Reposition the ball valve **9** in position for crane operation.
▶ Reposition the ball valve **10** in position for crane operation.
▶ Reposition the ball valve **11** in position for crane operation.

When the ball valve **9**, ball valve **10** and ball valve **11** are repositioned into crane operation position:
▶ Disconnect the hydraulic connections to the assembly plate **6**.
▶ Close off the hydraulic connections with dust plugs.

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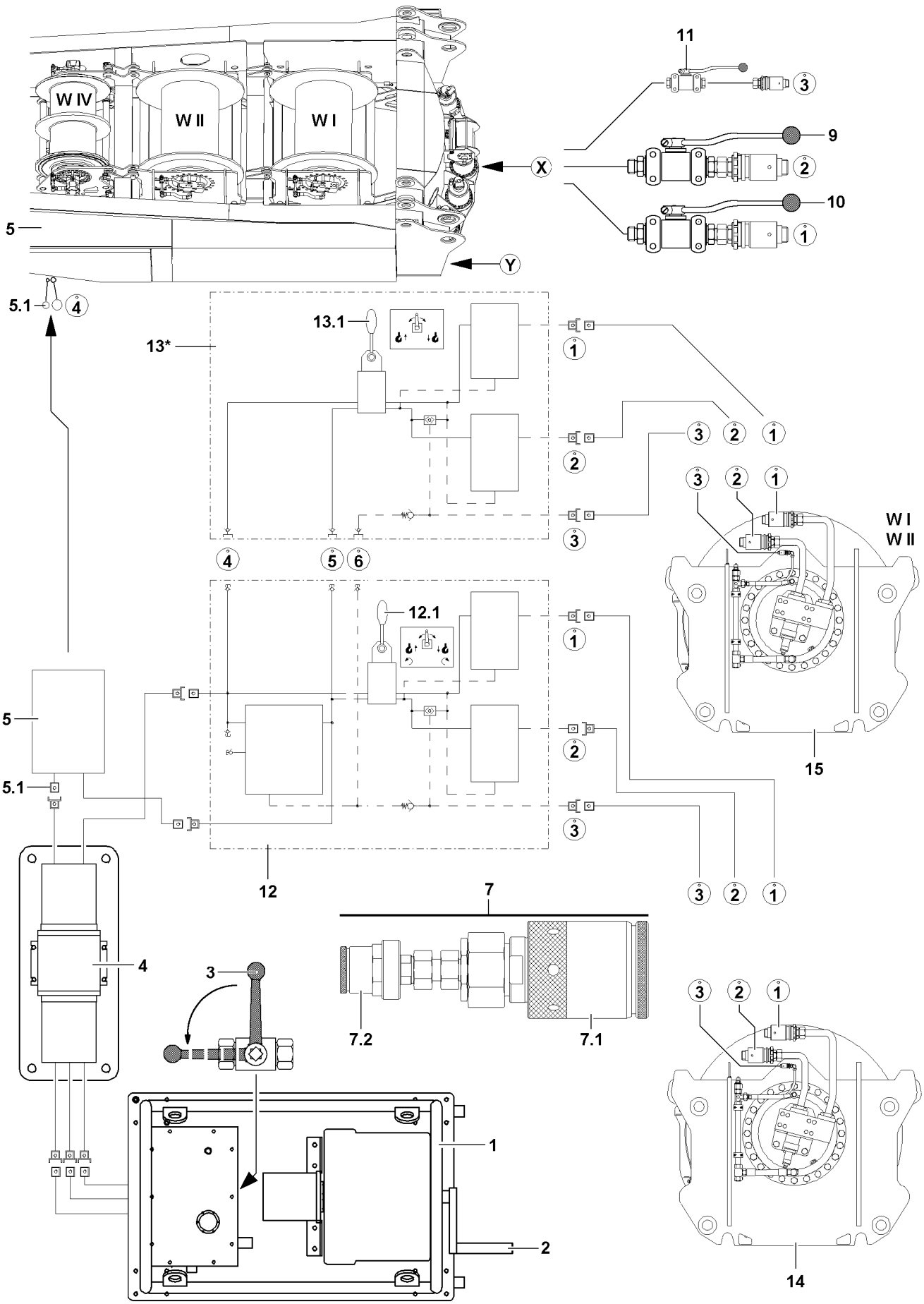

Fig.109393

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4 Emergency operation with assembly plate(s) Variation 2 (V2)

Note

▶ The procedure of the emergency operation - except winch 4 on the LR1600/2 and LR1600/2-W - is identical for all winches and is described on the example of one winch!

Exception LR1600/2 and LR1600/2-W:

▶ Before emergency operation of winch 4 **W IV** on the LR1600/2 and LR1600/2-W, in addition to the hydraulic connections to lift, lower and for the control pressure of the brake, a control line must be connected, see section: „Emergency operation of winch 4 **W IV** on the LR1600/2 and LR1600/2-W!“

To carry out the emergency operation, use an emergency operation aggregate **1**, a hydraulic transformer **4** and the assembly plate **12**. To carry out the emergency operation from winch 1 **W I** and winch 2 **W II** in parallel operation (1II2), in addition to the assembly plate **12**, the assembly plate **13** is needed. Connect the assembly plate **12** with the assembly plate **13** hydraulically on hydraulic connections 4, 5 and 6.

4.1 Start the emergency operation aggregate

▶ Turn the crank **2** on the emergency operation aggregate*** 1**.
▶ Switch the ball valve **3** to „horizontal“ position.

Note

▶ The engine rpm on the emergency operation aggregate can be set via a separate speed regulator!

4.2 Emergency operation of winch 4 on the LR1600/2 and LR1600/2-W

WARNING

Emergency operation winch 4 **W IV**!

▶ Observe the section „Emergency operation of winch 4 (W IV) on the LR1600/2 and LR1600/2-W“!

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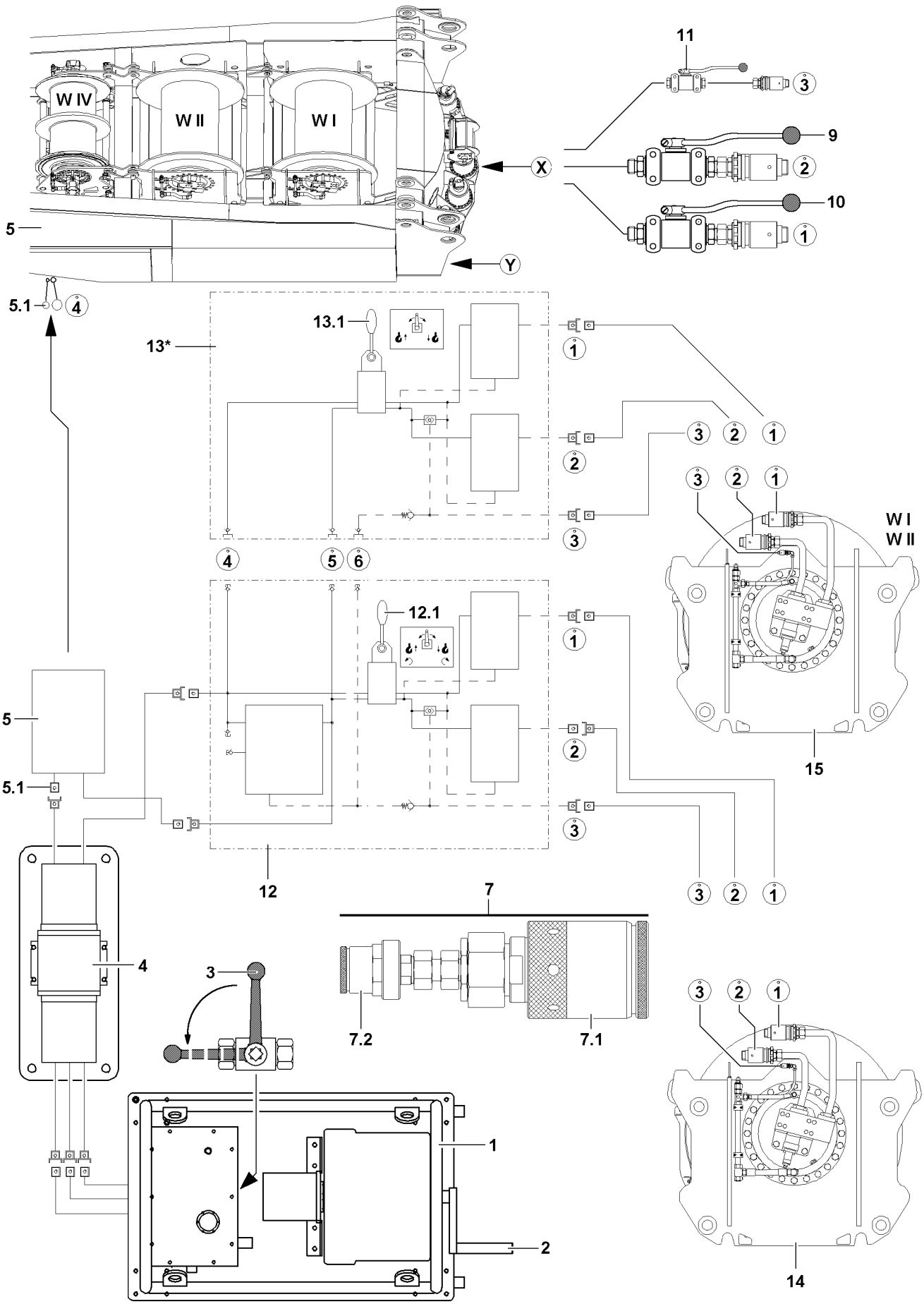

Fig.109393

4.3 Emergency operation of winches, individual operation

Note

▶ The crane movements are actuated and the speed of the respective crane movement is determined via the ball valve **12.1** and ball valve **13.1**!

4.3.1 Establishing the hydraulic connections to the winch

Make sure that the following prerequisite is met:

– The pressure in the hydraulic system has been relieved.

▶ Release the hydraulic connections on the corresponding winch.

▶ Install the reducer sections **7** (adapter) with coupling sleeve **7.1** on the connection **1** and on the connection **2** of the respective winch.

Note

▶ Observe the numbering of the hydraulic lines!

▶ Establish the hydraulic connection of the assembly plate **12** (connection **1**, connection **2** and brake **3**) to the respective winch.

4.3.2 Spooling the winch out

▶ Set the ball valve **12.1** for the assembly plate **12** on „lower“.

Result:

– The winch spools out.

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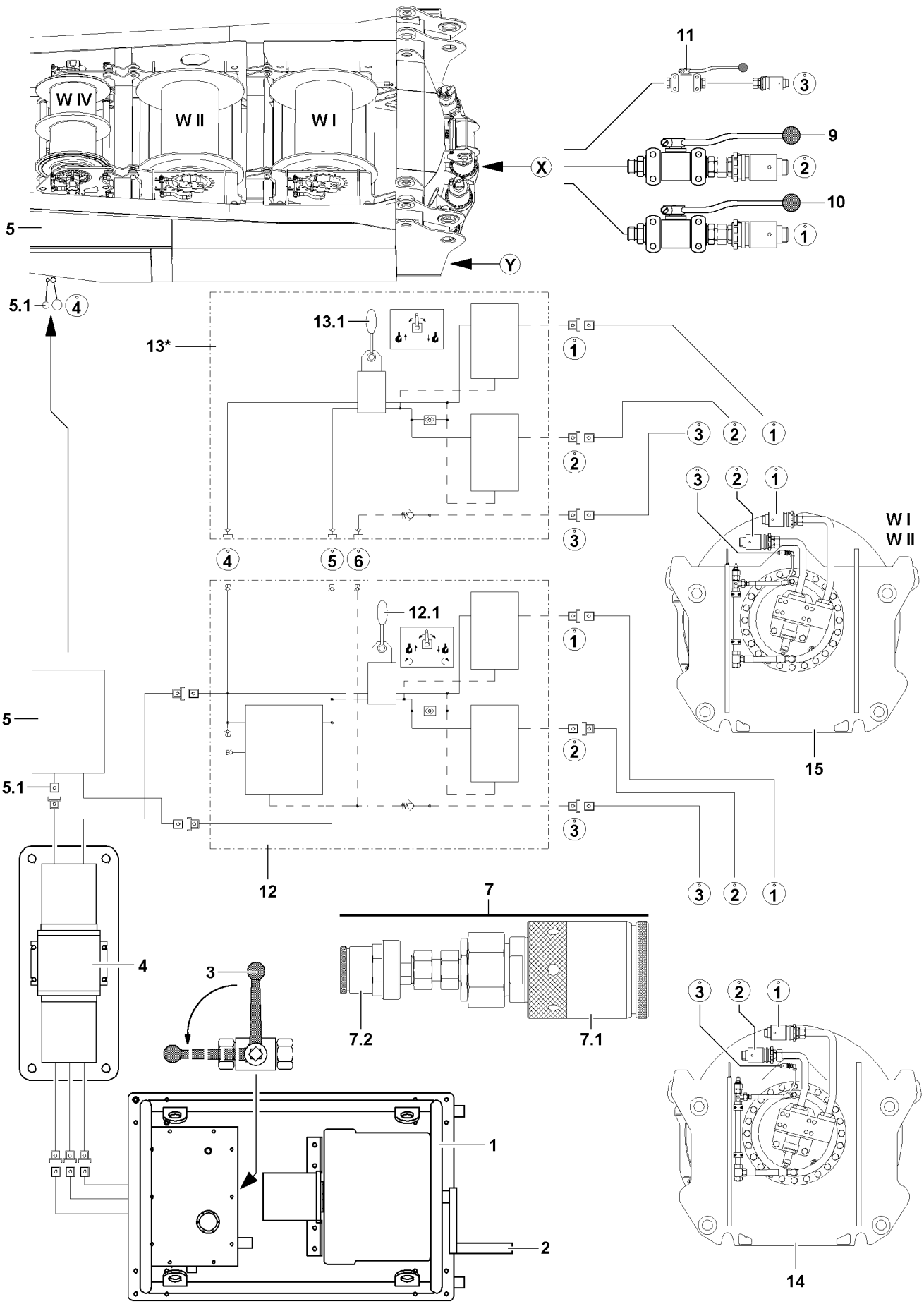

Fig.109393

4.3.3 Spooling the winch up

▶ Set the ball valve **12.1** for the assembly plate **12** on „lift“.

Result:

– The winch spools up.

4.3.4 Disconnecting the hydraulic connections

Make sure that the following prerequisites are met:
– The emergency operation is completed.
– The pressure in the hydraulic system has been relieved.

▶ Separate the hydraulic connections from the respective winch to the assembly plate **12**.
▶ Remove the reducer sections **7** (adapter).
▶ Close off the hydraulic connections of the winch with dust plugs.
or
Reconnect the winch to the hydraulic system of the crane.

4.4 Emergency operation of winches, parallel operation winch 1II2

Note
▶ The crane movements are actuated and the speed of the respective crane movement is determined via the ball valve **12.1** and ball valve **13.1**!

WARNING
Risk of accident!
If the following notes are not observed, dangerous situations can arise!
Personnel can be severely injured or killed!
▶ If winch 1 and winch 2 are actuated in emergency operation in parallel operation, then it must be ensured that the hook blocks are horizontally aligned!
▶ Always actuate winch 1 and winch 2 simultaneously!

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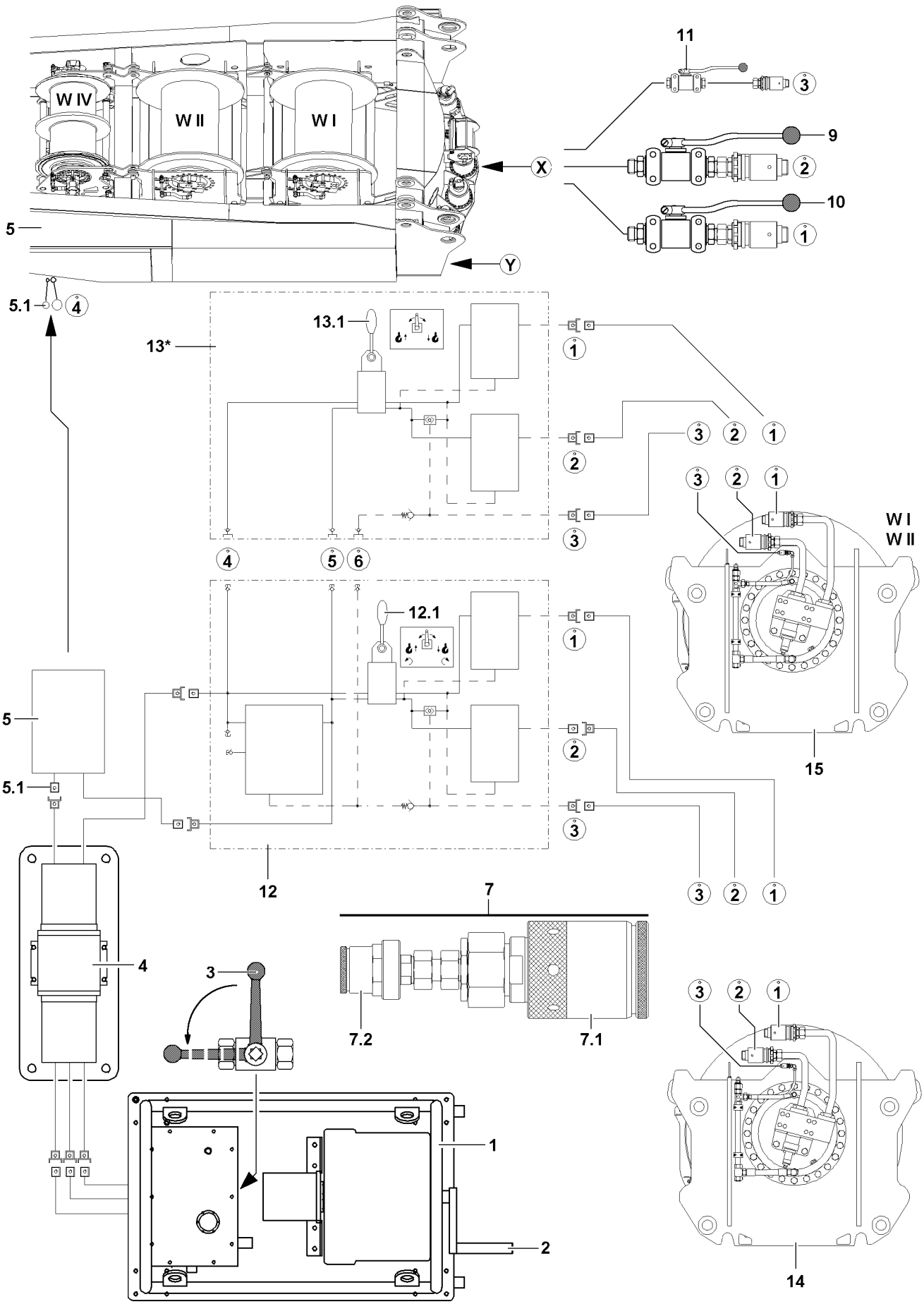

Fig.109393

4.4.1 Establishing the hydraulic connections to the winches

Make sure that the following prerequisite is met:
– The pressure in the hydraulic system has been relieved.

▶ Release the hydraulic connections on winch 1 and winch 2.
▶ Install the reducer sections **7** (adapter) with coupling sleeve **7.1** on the connection **1** and on the connection **2** of the respective winch.

Note
▶ Observe the numbering of the hydraulic lines!

▶ Establish the hydraulic connections for the assembly plate **12** (connection **1**, connection **2** and brake **3**) to winch 1.
or
Establish the hydraulic connections for the assembly plate **12** (connection **1**, connection **2** and brake **3**) to winch 2.
▶ Establish the hydraulic connections for the assembly plate **13** (connection **1**, connection **2** and brake **3**) to winch 1.
or
Establish the hydraulic connections for the assembly plate **13** (connection **1**, connection **2** and brake **3**) to winch 2.

4.4.2 Spooling the winches out

Note
▶ Check which winch you have connected to which assembly plate!

▶ Set the ball valve **12.1** for the assembly plate **12** on „lower“.

Result:

– Winch 1 **or** winch 2 spools out.

▶ Set the ball valve **13.1** for the assembly plate **13** on „lower“.

Result:

– Winch 2 **or** winch 1 spools out.

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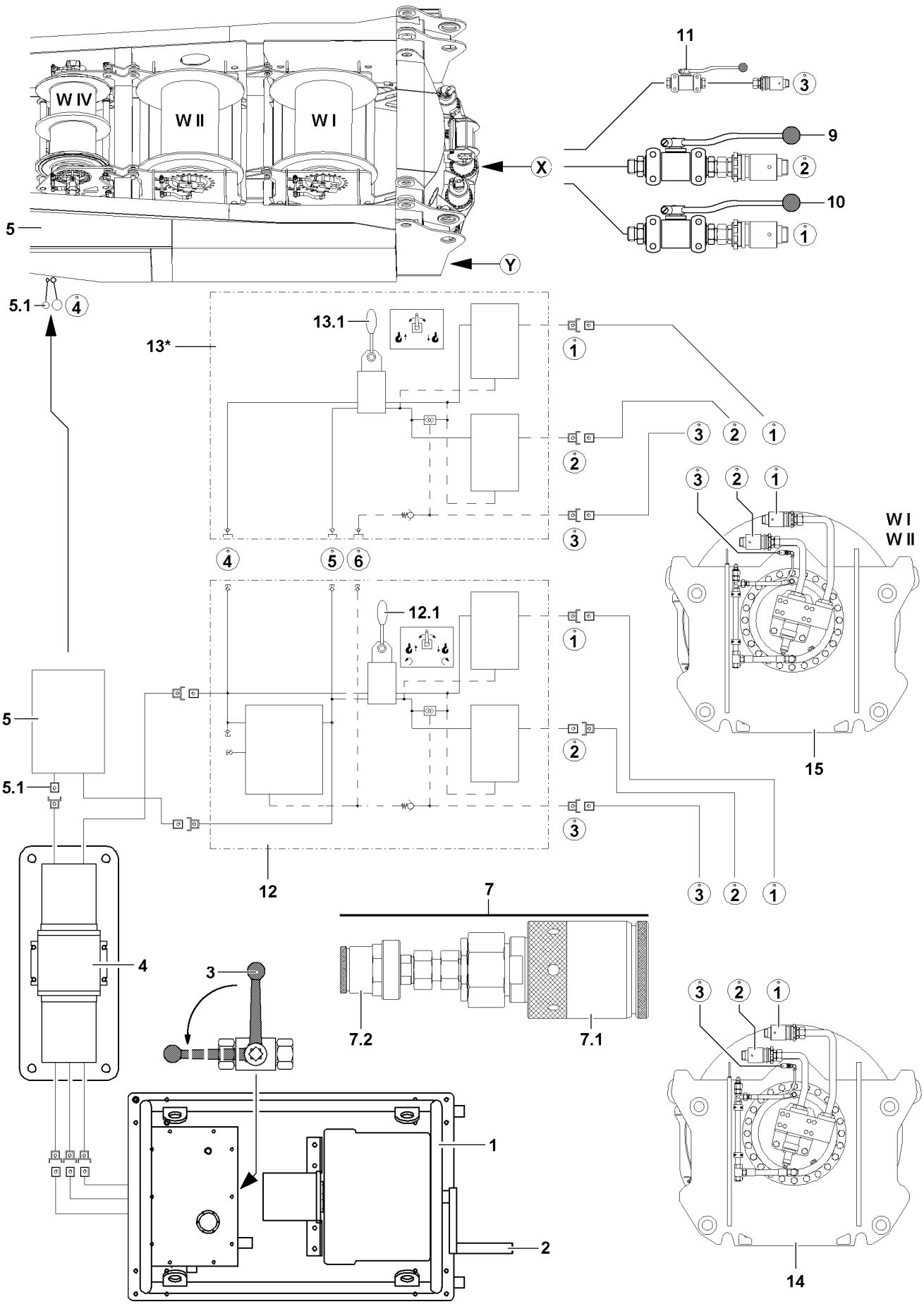

Fig.109393

4.4.3 Spooling the winches up

▶ Set the ball valve **12.1** for the assembly plate **12** on „lift“.

Result:

– Winch 1 **or** winch 2 spools up.

▶ Set the ball valve **13.1** for the assembly plate **13** on „lift“.

Result:

– Winch 2 **or** winch 1 spools up.

4.4.4 Disconnecting the hydraulic connections

Make sure that the following prerequisites are met:
- The emergency operation is completed.
- The pressure in the hydraulic system has been relieved.

▶ Disconnect the hydraulic connections of winch 1 and winch 2 to the respective assembly plates.
▶ Remove the reducer sections **7** (adapter).
▶ Close off the hydraulic connections of the winches with dust plugs.
or
Reconnect the winches to the hydraulic system of the crane.

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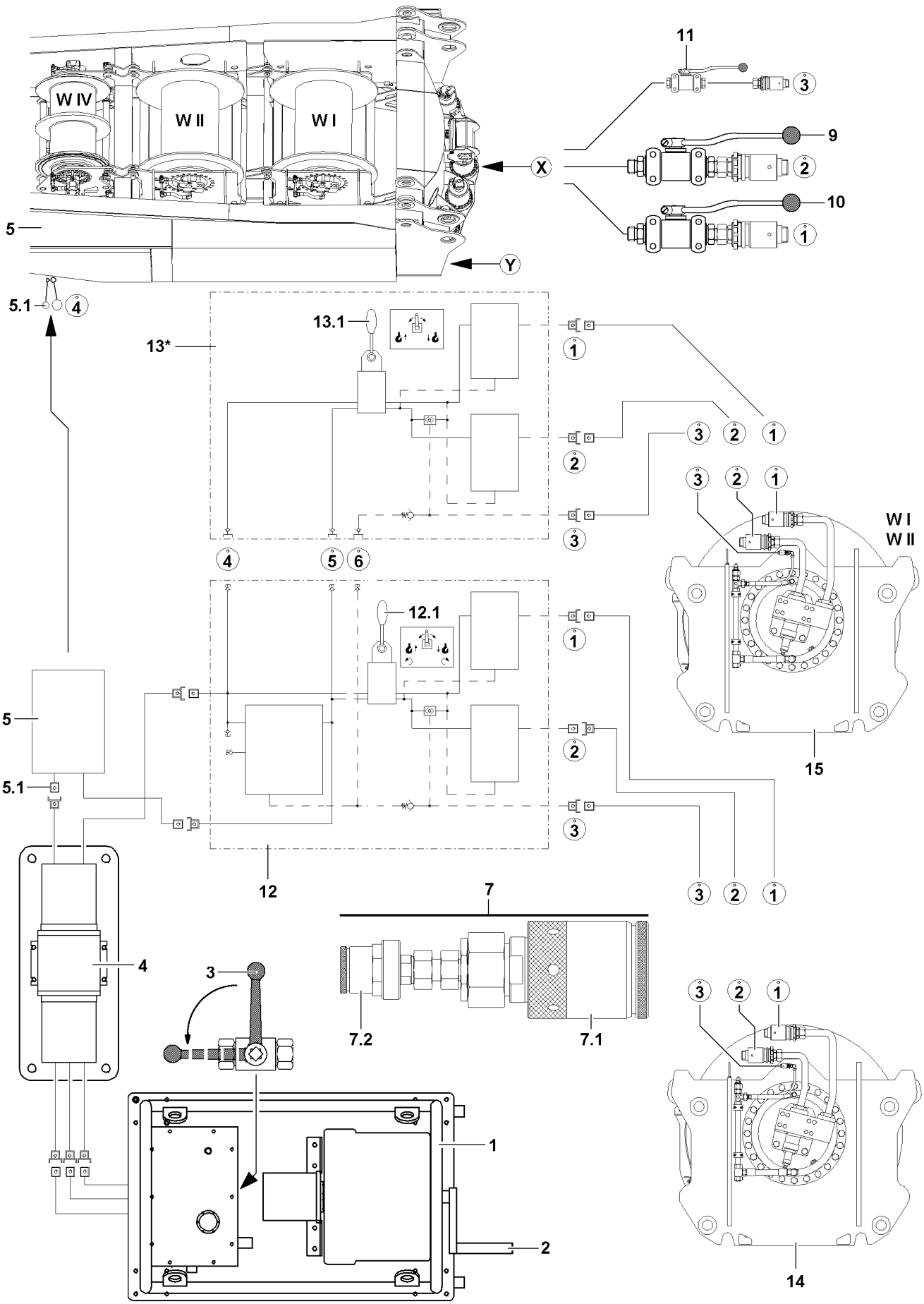

Fig.109393

5 Emergency operation slewing gear(s) with assembly plate(s) Variation 2 (V2)

WARNING
Danger due to hydraulic pressure!
If the hydraulic lines are pressurized when releasing the connections, it can lead to severe injuries to assembly personnel!
▶ Relieve the pressure in the hydraulic lines before releasing!

Note
▶ For each crane type, the installation position of the ball valves for emergency operation of the slewing gear on the turntable varies!
▶ Possible installation positions of the ball valve: Point **X** or point **Y**!

Note
▶ The slewing movement is actuated and the speed of the slewing movement is determined via the ball valve **12.1**!

5.1 Establishing the hydraulic connection to the slewing gears

Make sure that the following prerequisite is met:
– The pressure in the hydraulic system has been relieved.

Note
▶ Observe the numbering of the hydraulic lines!

▶ Establish the hydraulic connections of the assembly plate **12** (connection **1**, connection **2** and brake **3**) to the „Ball valves“ on the turntable.

5.2 Turning the turntable to the left

▶ Set the ball valve **9** into emergency operation position.
▶ Set the ball valve **10** into emergency operation position.
▶ Set the ball valve **11** into emergency operation position.
▶ Set the ball valve **12.1** for the assembly plate **12** on „turn left“.

Result:

– The turntable turns to the left.

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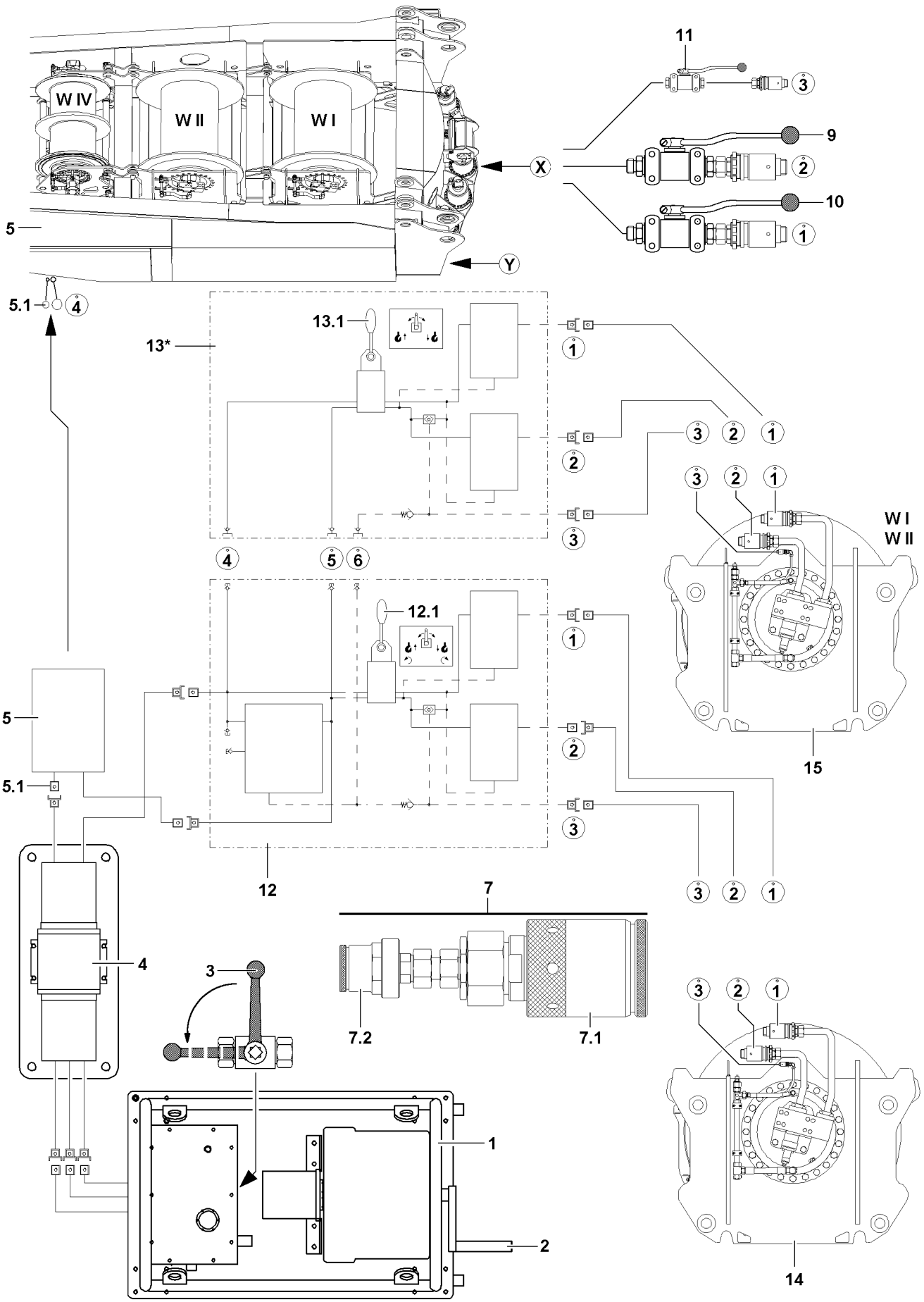

Fig.109393

5.3 Turning the turntable to the right

▶ Set the ball valve **9** into emergency operation position.
▶ Set the ball valve **10** into emergency operation position.
▶ Set the ball valve **11** into emergency operation position.
▶ Set the ball valve **12.1** for the assembly plate **12** on „turn right“.

Result:

– The turntable turns to the right.

5.4 Disconnecting the hydraulic connections

Make sure that the following prerequisites are met:
– The emergency operation is completed.
– The pressure in the hydraulic system has been relieved.

Disconnect the hydraulic connections to the assembly plate **12**.

▶ Reposition the ball valve **9** in position for crane operation.
▶ Reposition the ball valve **10** in position for crane operation.
▶ Reposition the ball valve **11** in position for crane operation.

When the ball valve **9**, ball valve **10** and ball valve **11** are repositioned into crane operation position:
▶ Disconnect the hydraulic connections to the assembly plate **12**.
▶ Close off the hydraulic connections with dust plugs.

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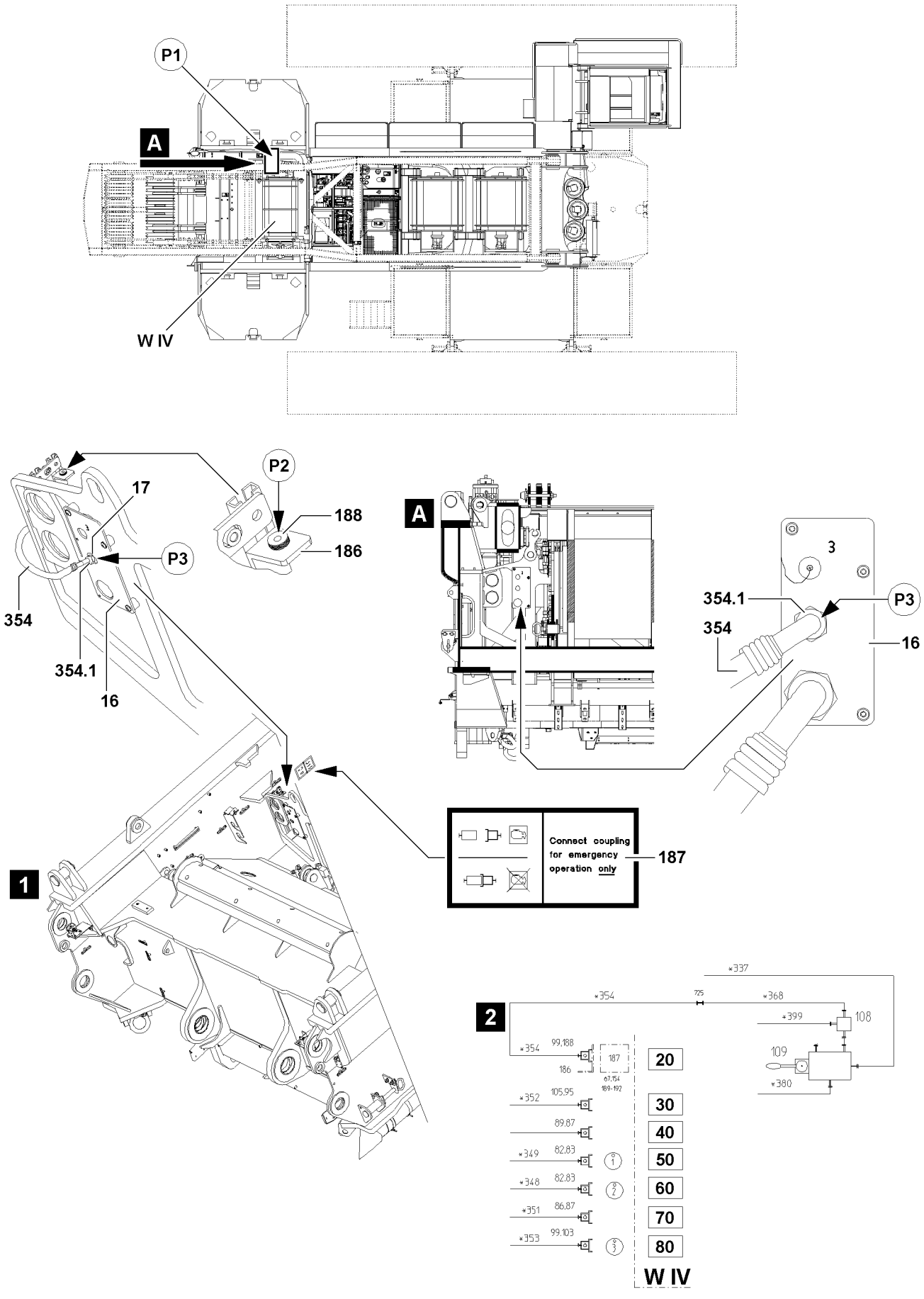

Fig.112453

LWE/LG 1750-006/15409-07-02/en

6 Emergency operation of winch 4 (W IV) on the LR1600/2 and LR1600/2-W

NOTICE
Damage of crane components!
If the hydraulic hose (control line) **354** for the emergency operation is not connected properly, then hydraulic parts or crane components can be damaged!
▶ Make sure, before starting the emergency operation, that the hydraulic hose **354** is properly connected!

6.1 Emergency operation winch 4 (WIV)

6.1.1 Establishing the hydraulic connections to winch 4 (WIV)

Note
▶ The hydraulic connections to winch 4 - connection 1, connection 2 and brake - have been established, see section „Emergency operation of winches“!
▶ Pay attention to the different variations of the assembly plates!

Before emergency operation of winch 4 **W IV**, in addition to the hydraulic connections for the emergency operation of the winch, the hydraulic hose **354** must be connected.

Make sure that the following prerequisites are met:
– The hydraulic connections to winch 4 are established.
– The hydraulic hose **354** is in park position, point **P2**.

▶ Release the hydraulic hose **354** with the fitting **354.1** on the plug **188** (park position), point **P2**.
▶ Guide the hydraulic hose **354** to the front to the connector plate **16**.
▶ Connect the hydraulic hose **354** with the fitting **354.1** on the supply line **17**, point **P3**, of the connector plate **16**.

Note
▶ Observe the notes in the sections „Emergency operation of winches“!

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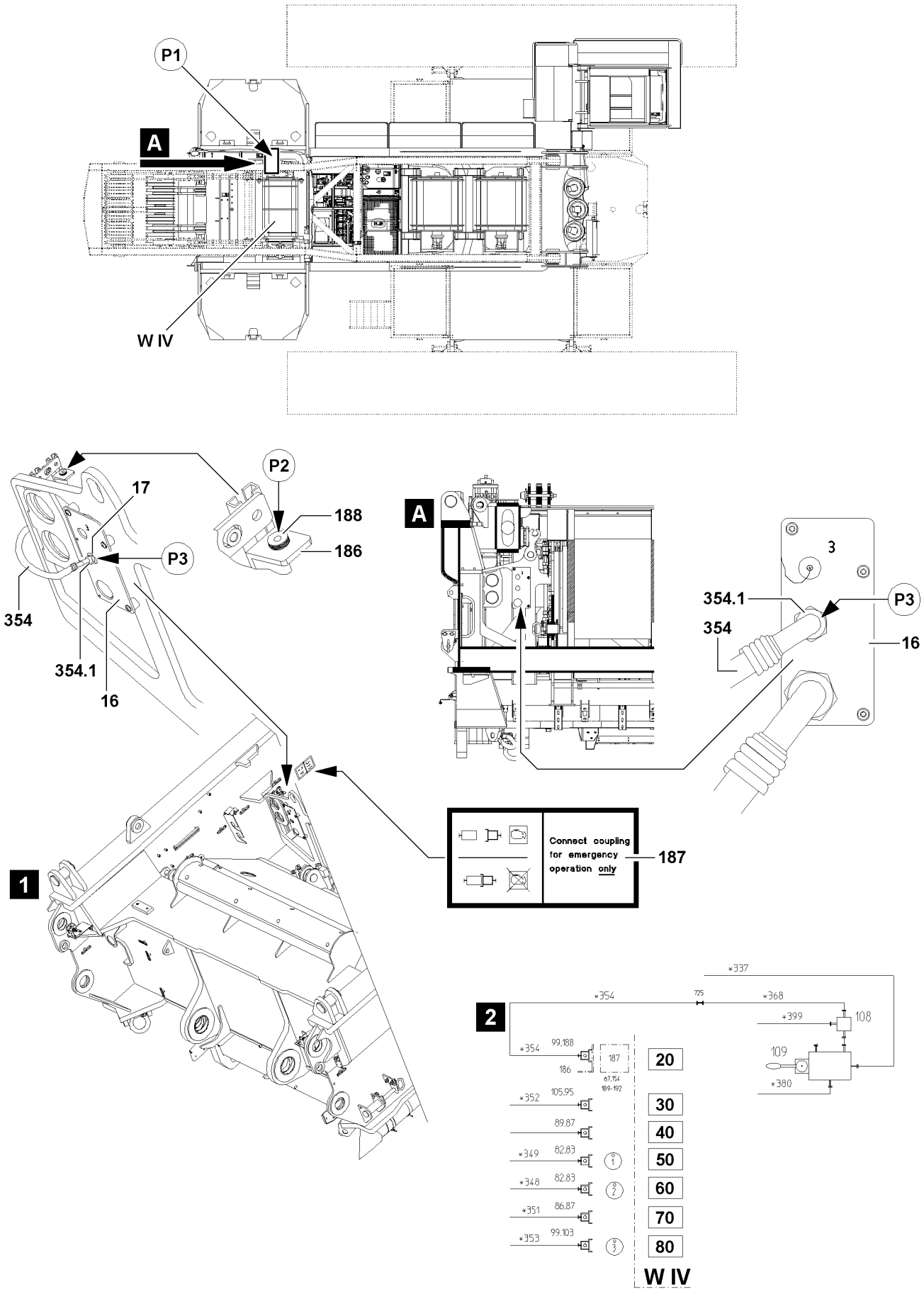

Fig.112453

LWE/LG 1750-006/15409-07-02/en

6.1.2 Spooling the winch out

▶ See section: „Emergency operation with assembly plate Variation 1 (V1)“
or
See section: „Emergency operation with assembly plate Variation 2 (V2)“

6.1.3 Spooling the winch up

▶ See section: „Emergency operation with assembly plate Variation 1 (V1)“
or
See section: „Emergency operation with assembly plate Variation 2 (V2)“

6.2 Disconnecting the hydraulic connections

Make sure that the following prerequisites are met:
– The emergency operation is completed.
– The pressure in the hydraulic system has been relieved.

▶ Disconnect the hydraulic connections from the winch 4 to the assembly plate.
▶ Remove the reducer sections (adapter).
▶ Close off the hydraulic connections of the winch 4 **W IV** with dust caps.
or
Reconnect the winch 4 **W IV** onto the hydraulic system of the crane.
▶ Disconnect the hydraulic hose **354** at point **P3**.
▶ Bring the hydraulic hose **354** in parking position: Install the fitting **354.1** onto the plug **188**.

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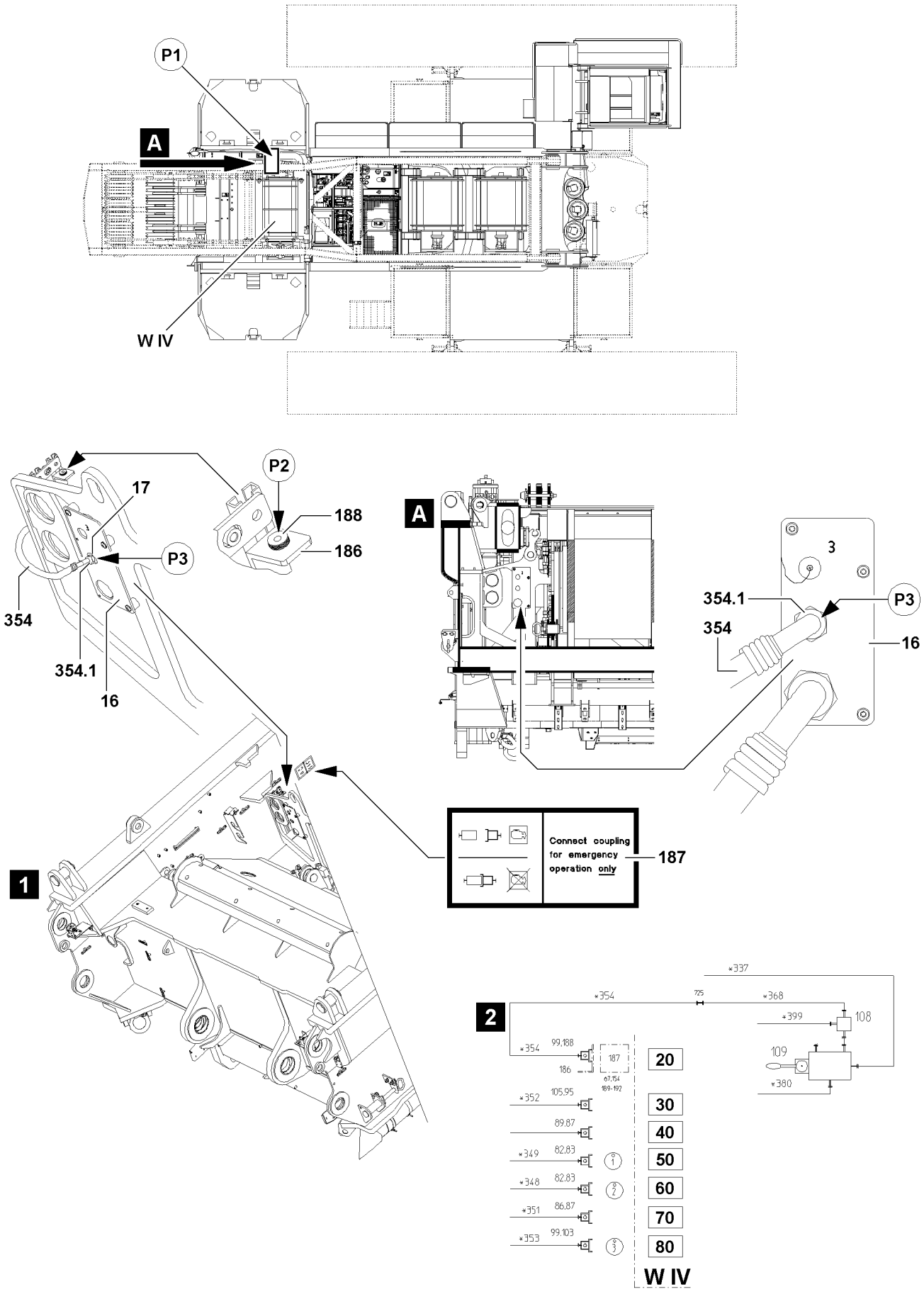

Fig.112453

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6.3 Connection schematic for emergency operation, illustration 2

Note
▶ See also Hydraulic schematic!

Position	Connection / description
20	Control pressure SA-frame
50	Lifting
60	Lowering
80	Replenishing pressure brake

7 Ending emergency operation

7.1 Procedure

▶ Turn the emergency operation aggregate***** **1** off.
▶ Close the ball valve **3**.
▶ Disconnect the hydraulic connections and close them off with dust plugs.

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6.50 Customer-specific special equipment

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Fig.195219

1 Description

SLGS-**S**ingle **L**ine **G**uiding **S**ystem.

The term **S**ingle **L**ine **G**uiding **S**ystem stands for a system with an additional guide rope that is tensioned in parallel to the boom longitudinal axis. The guide rope runs from the boom foot to the boom head.

The **S**ingle **L**ine **G**uiding **S**ystem offers an improved guiding method for the control elements of a receptacle for the rotor blade or a frame for the load. This prohibits, or minimises, the load from swaying or the hook from swinging during lifting work and also provides the possibility to precisely align the load or the hook.

NOTICE
Maximum permissible boom system!
- ▶ Maximum permissible SL7; SL8 boom system for SLGS-operation: SL= 147 m.
- ▶ Maximum permissible SL9 boom system for SLGS-operation: SL= 136.5 m , F= 18 m.
- ▶ Maximum permissible SL12 boom system for SLGS-operation: SL= 140 m , F= 21 m.
- ▶ Maximum permissible SX boom system for SLGS-operation: SX= 162 m , F= 12 m.

2 Component overview

Note
- ▶ The assembly sections are marked with their own weight.
- ▶ Dimensions and weights, see chapter 1.03.

2.1 Guide pulley I

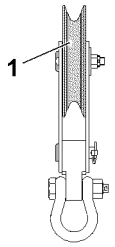

Fig.145201: Guide pulley I

Position	Component
1	Guide pulley I

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2.2 Guide pulley II

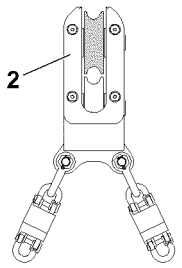

Fig.145200: Guide pulley II

Position	Component
2	Guide pulley II

2.3 Fixed point HS-auxiliary jib

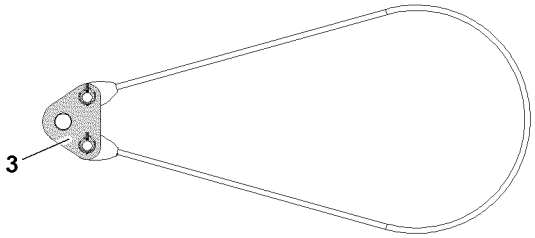

Fig.145204: Fixed point HS-auxiliary jib

Position	Component
3	Fixed point HS-auxiliary jib

2.4 Fixed point SL-boom system

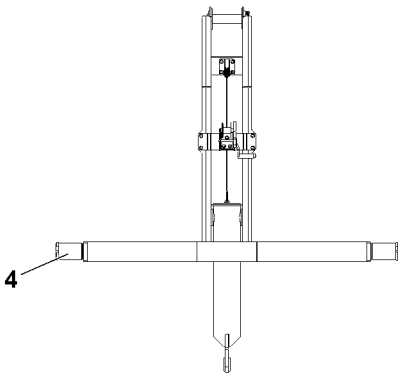

Fig.145205: Fixed point SL-boom system

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Position	Component
4	Fixed point SL-boom system

2.5 Fixed point SX-boom system

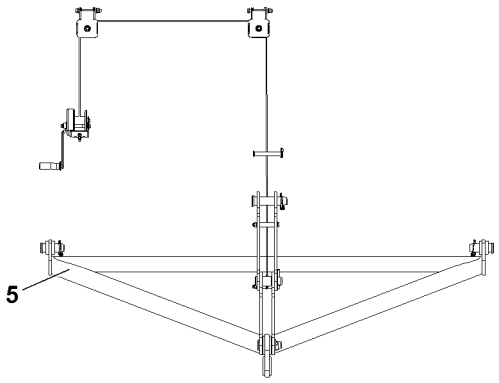

Fig.145206: Fixed point SX-boom system

Position	Component
5	Fixed point SX-boom system

2.6 S-pivot section

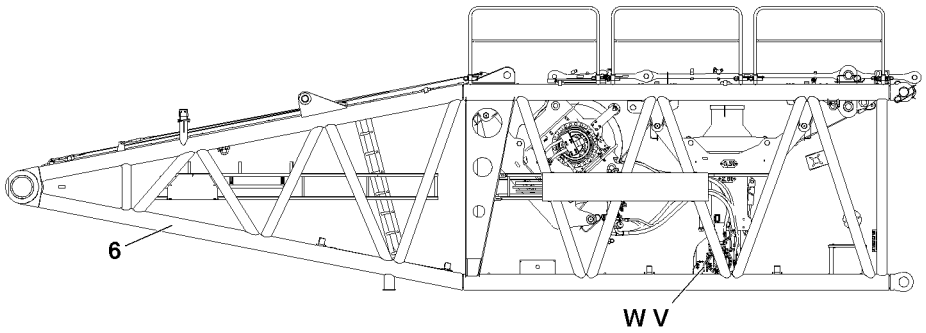

Fig.145202: S-pivot section

Position	Component
6	S-pivot section

2.7 Components

Note

- ▶ S-intermediate sections, L-intermediate sections, SL-reducer, see chapter 5.38.
- ▶ SX-intermediate sections, see chapter 5.39.
- ▶ HS-auxiliary jib, see chapter 5.42.
- ▶ F-assembly unit, F-intermediate sections, F-end section, see chapter 5.13.10 or chapter 5.13.20.

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3 Fastening points

WARNING
Falling lattice sections!
Death, severe bodily injuries, property damage.
- ▶ Make sure that the lattice sections are properly fastened on the respective fastening points.
- ▶ Make sure that the fastening equipment has the appropriate length and a sufficient load bearing capacity.
- ▶ Pay attention and adhere to the labels on the fastening points on the lattice sections and crane components.

3.1 Fastening points S-pivot section

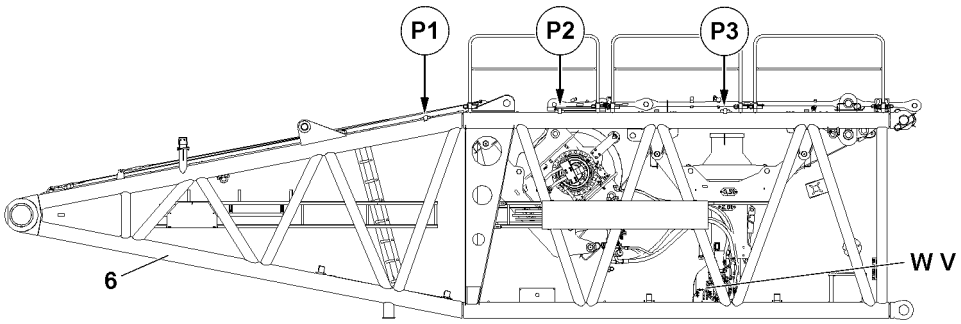

Fig.145203: Fastening points S-pivot section

Fastening points	
P1 + P2	S-pivot section without winch 5, without winch 6
P1 + P3	S-pivot section with winch 5, without winch 6
P1 + P3	S-pivot section without winch 5, with winch 6
P1 + P3	S-pivot section with winch 5, with winch 6

3.2 Fastening points components

Note
- ▶ S-intermediate sections, L-intermediate sections, SL-reducer, see chapter 5.38.
- ▶ SX-intermediate sections, see chapter 5.39.
- ▶ HS-auxiliary jib, see chapter 5.42.
- ▶ F-assembly unit, F-intermediate sections, F-end section, see chapter 5.13.10 or chapter 5.13.20.

4 Assembling the boom system

Note
- ▶ For the combination of the boom lattice sections, observe and adhere to the rod plan and operating instructions, chapter 5.03.

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WARNING
Danger of falling!
During assembly / disassembly, inspection and maintenance work, assembly personnel must be secured with appropriate aids to prevent them from falling.
Death, severe bodily injuries, property damage.
- ▶ All work at a height, when there is a danger of falling, must be carried out with suitable aids.
- ▶ If aids are not available and work cannot be carried out from the ground, then assembly personnel must secure themselves with the supplied fall arrest system to prevent falling, see chapter 2.04.
- ▶ If fall protection equipment is available, then it must be used, see chapter 2.06.
- ▶ When lifting, lowering, swinging crane parts in and out, no persons may remain in the danger zone.
- ▶ When closing or opening boom systems during boom assembly or boom disassembly, no persons may remain on the boom system or in the danger zone.
- ▶ If railings are present on the components, then they must be brought into the corresponding position and secured for assembly / disassembly work.
- ▶ Only step on the aids, ladders and catwalks with clean shoes.
- ▶ Keep aids, ladders and catwalks free of heavy dirt, snow and ice.
- ▶ During all assembly and disassembly work, maintenance work and inspections, travel or crane operation is prohibited.
- ▶ Remaining on a suspended load is prohibited.
- ▶ Stepping or walking on crane components and lattice sections, which have an incline of more than 20° is prohibited.
- ▶ For all assembly work, the crane driver of the main crane must be in voice contact with the crane driver / crane drivers of the auxiliary crane / auxiliary cranes.
- ▶ For assembly tasks, the crane driver may only initiate crane movements when the responsible guide has explicitly released the movement.

WARNING
The lattice sections can fall down!
If the lattice sections are not pinned and secured correctly, then they can fall down.
Death, severe bodily injuries, property damage.
- ▶ Insert or unpin both pins at the same horizontal level, i.e. **left and right**.
- ▶ Standing under the lattice sections or within the entire danger zone during the pinning and unpinning procedure of the boom system is prohibited.
- ▶ Safely secure the pins in the storage locations as well as in the receptacles.
- ▶ It is prohibited to lean the ladder against the component being disassembled.

WARNING
Danger of impact / crushing!
When installing / removing crane components with the auxiliary crane, crane components can start to swing back and forth.
When lifting / lowering and positioning crane components, there is an increased danger of impacts / crushing.
Death, severe bodily injuries, property damage.
- ▶ Make sure that personnel cannot be caught by components.
- ▶ Make sure that the crane is horizontally aligned.
- ▶ When working in danger zones: Use aids to protect limbs.
- ▶ Guide components with suitable aids to minimize oscillation.

NOTICE
The components can fall down!
If the corresponding component is disengaged from the auxiliary crane before the corresponding component is pinned, then the corresponding component can fall down.
Death, severe bodily injuries, property damage.
- ▶ Do not disengage the auxiliary crane until the respective component is pinned and secured.

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WARNING
The crane can topple over!
- ▶ The turntable may not be turned during the assembly of the boom system.
- ▶ Observe the assembly conditions, see chapter 3.06.

WARNING
Danger of accident!
Death, severe bodily injuries, property damage.
- ▶ For assembly of the boom system, the rod plan must be observed and adhered to.
- ▶ Depending on the condition of the ground, the boom and the lattice sections must be supported from below for the assembly of the boom system.
- ▶ Observe the technical safety instructions, see chapter 5.01.

Make sure that the following prerequisites are met:
- The crane is horizontally aligned.
- An auxiliary crane is available.
- An assembly scaffolding / work platform is available.
- The central ballast is installed according to the load chart.
- The counterweight has been installed on the turntable according to the load chart.
- The LICCON overload protection has been set according to the data in the load chart.

4.1 Preparing the S-pivot section

4.1.1 Positioning the railings on the S-pivot section in the operating position

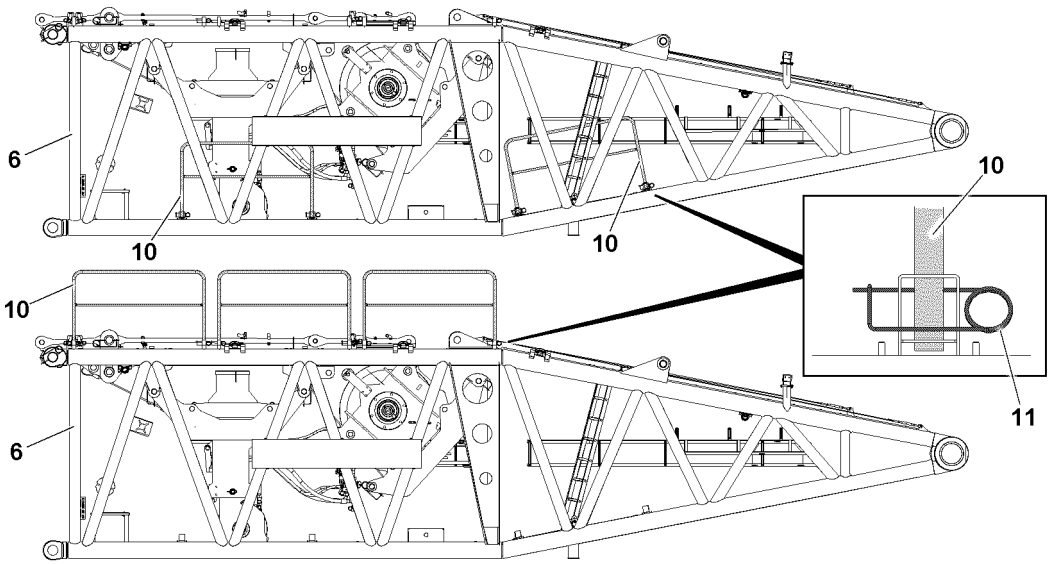

Fig.145209: Railings on the S-pivot section

WARNING
Danger of falling!
During assembly and disassembly of the railings, assembly personnel must be secured with appropriate aids to prevent them from falling.
Even during the assembly of protective equipment there is a danger of falling.
Death, severe bodily injuries, property damage.
- ▶ For assembly and disassembly work, maintenance and inspection work on the S-pivot section, all railings must be assembled and secured.
- ▶ Only step on the S-pivot section with „clean shoes“.

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▶ Remove the railings **10** on the S-pivot section **6** from the transport position and bring them into the operating position: Insert the railing **10** into the mounting pipes and secure with the retaining element **11**.

4.1.2 Assembling the guy rods

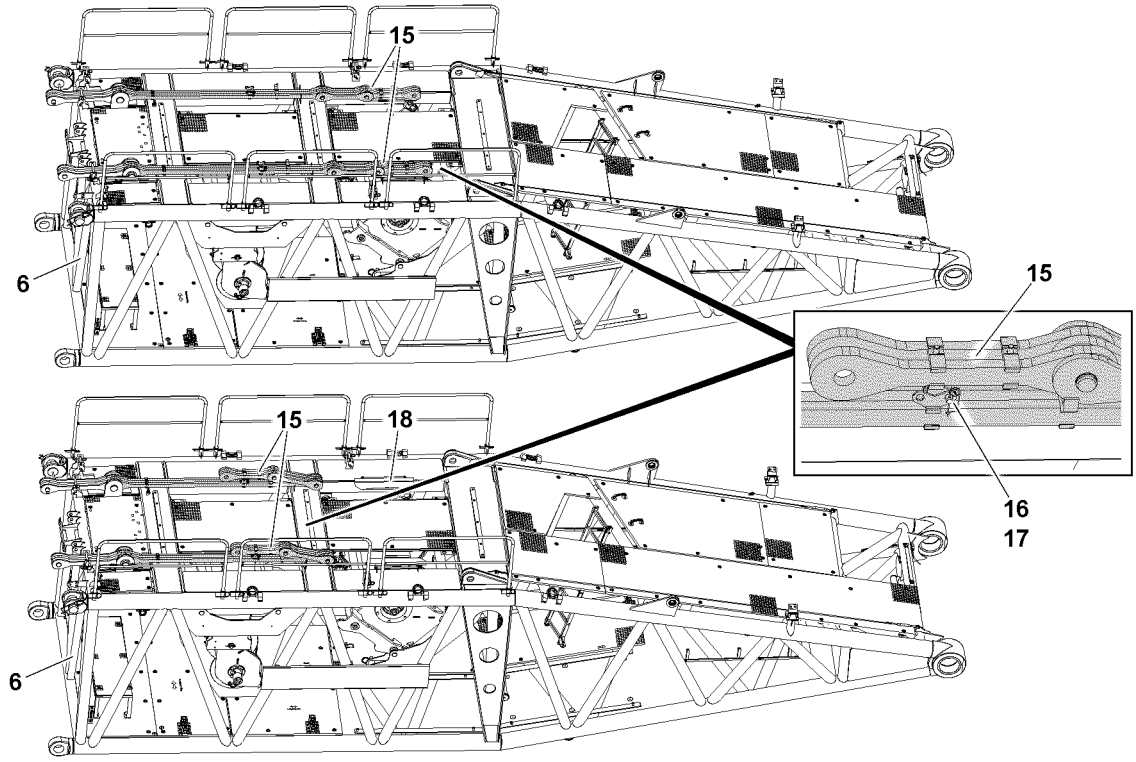

Fig.145211: Guy rods

Make sure that the following prerequisites are met:
- All railings are pinned and secured in the transport position.
- The catwalk **12** is secured in the transport position.
- The catwalk **14** is secured in the operating position.

▶ Hang the guy rods **15** on the auxiliary crane.
▶ Swing the guy rods **15** inward using the auxiliary crane.
▶ Secure the guy rods **15**: Insert the pin **16** and secure it with the retaining element **17**.

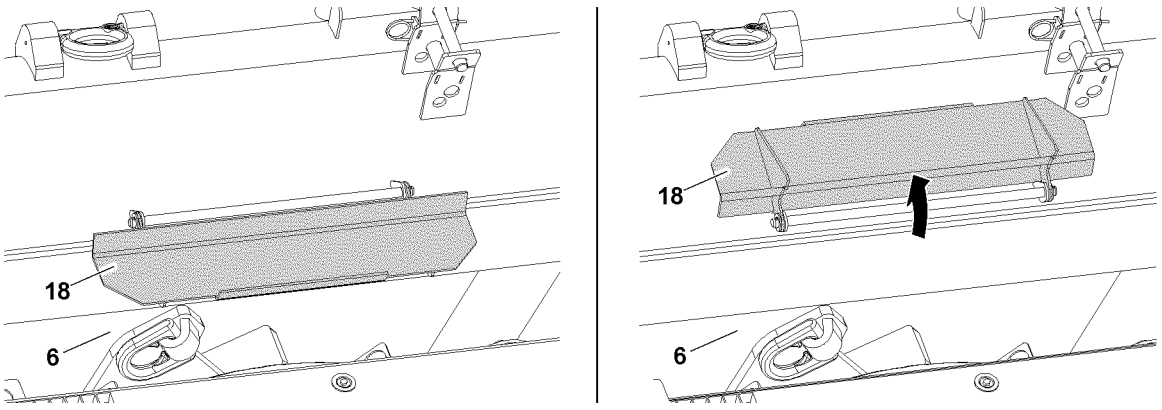

Fig.145212: Guy rod receptacles

▶ Swing the guy rod receptacles **18** out on both sides.

4.1.3 Assembling the catwalks

WARNING
Disassembled or incompletely assembled catwalks!
If the catwalks are not installed when the winches are missing or if the catwalks are not completely installed, then personnel can fall down.
Death, severe bodily injuries, property damage.
- ▶ For each non-assembled winch on the S-pivot section: Assemble the catwalk.
- ▶ The catwalks may only be accessed when they are pinned and secured in the operating position, check visually.

WARNING
Falling catwalk!
Catwalks that fall down by themselves can cause severe face or head injuries for assembly personnel.
Death, severe bodily injuries, property damage.
- ▶ For safety reasons, assemble the catwalks always with two persons.

S-pivot section with winches

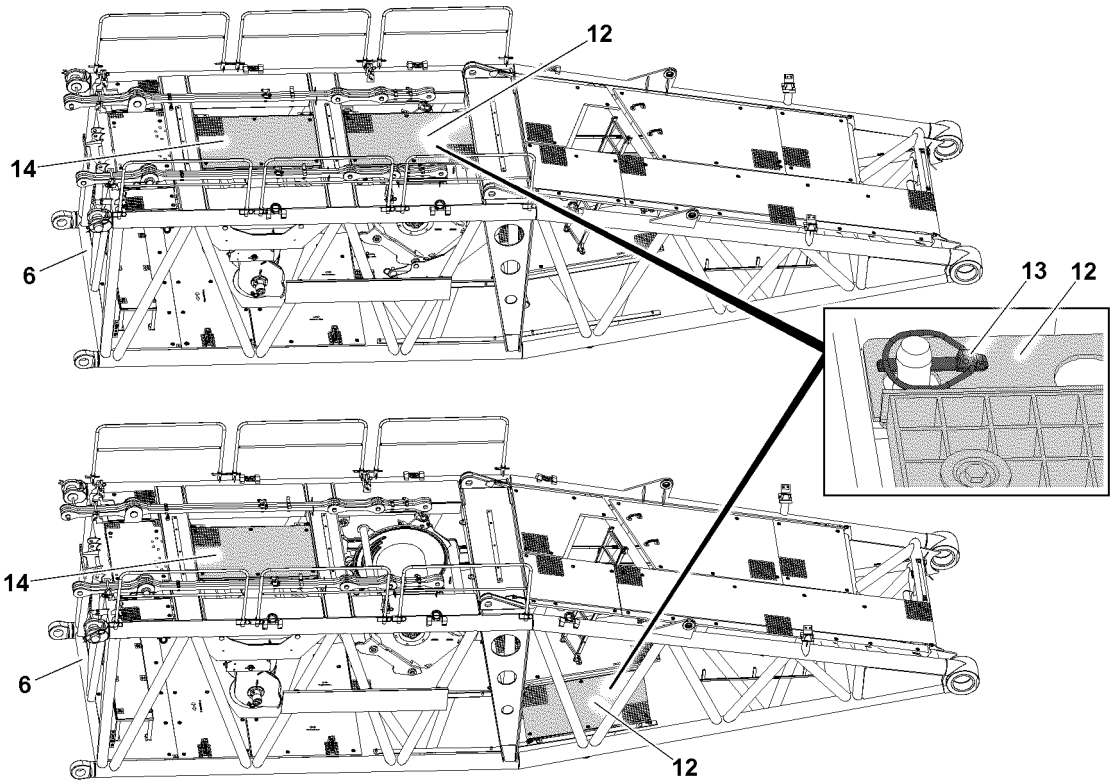

Fig.145210: Catwalks

Make sure that the following prerequisites are met:
- – All railings are pinned and secured in the transport position.
- – The catwalk **12** is secured in the transport position.
- – The catwalk **14** is secured in the operating position.

Note
- ▶ The catwalk **14** is already secured in the operating position.

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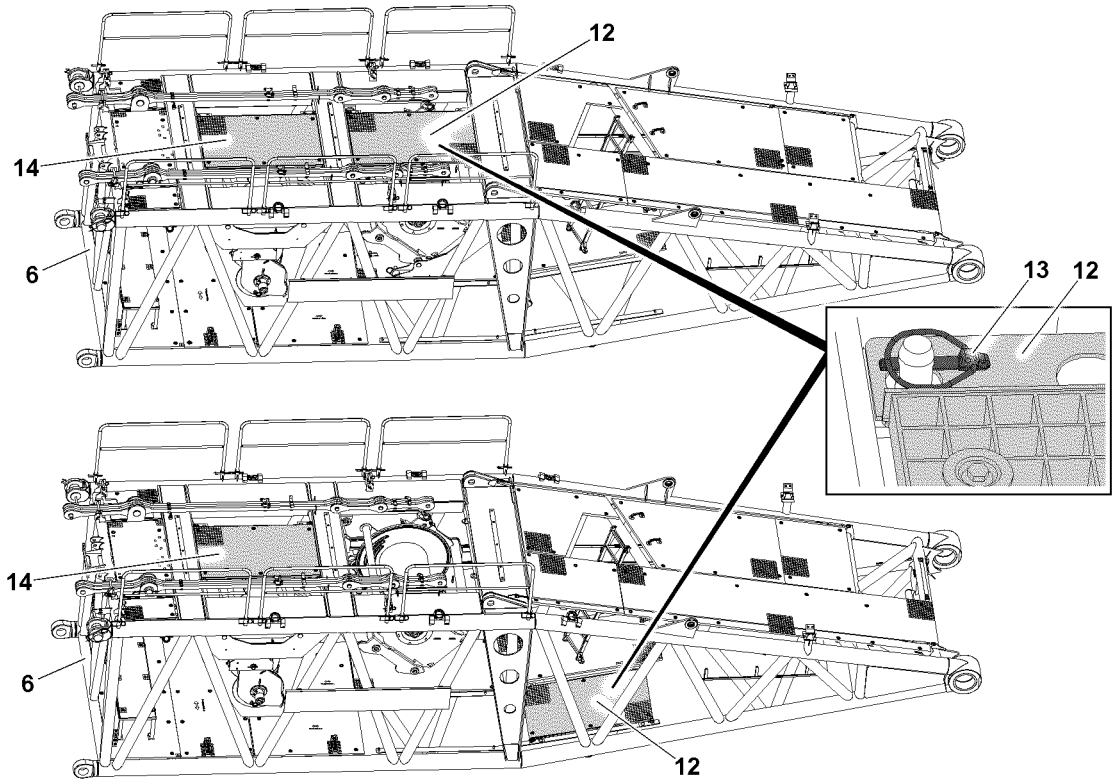

Fig.145210: Catwalks

- ▶ Hang the catwalk **12** on the auxiliary crane.
- ▶ Release the catwalk **12**: Remove the retaining element **13**.
- ▶ Lower the catwalk **12** downward and remove the auxiliary crane.
- ▶ Position the catwalk **12** in the operating position.
- ▶ Secure the catwalk **12** in the operating position with the retaining element **13**.
- ▶ Swing winch 6 out of the transport position into the operating position, see section „Swinging winch 6 out of the transport position into the operating position.“

S-pivot section before installation of winch 5

Make sure that the following prerequisites are met:
- All railings are pinned and secured in the transport position.
- The catwalk **12** is secured in the transport position.
- The catwalk **14** is secured in the operating position.
- Winch 5 is not installed.
- Winch 6 is installed.

- ▶ Hang the catwalk **14** on the auxiliary crane.
- ▶ Release the catwalk **14**: Remove the retaining element **13**.
- ▶ Lower the catwalk **14** downward and remove the auxiliary crane.
- ▶ Install winch 5, see chapter 3.09.50.
- ▶ Reposition the catwalk **14** with the auxiliary crane in the operating position.
- ▶ Secure the catwalk **14** in the operating position with the retaining element **13**.
- ▶ Position the catwalk **12** in the operating position, see section „S-pivot section with winches.“

S-pivot section before installation of winch 6

Make sure that the following prerequisites are met:
- All railings are pinned and secured in the transport position.
- The catwalk **12** is secured in the transport position.
- The catwalk **14** is secured in the operating position.
- Winch 5 is installed.
- Winch 6 is not installed.

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Note
▶ The catwalk **14** is already secured in the operating position.

▶ Position the catwalk **12** in the operating position, see section „S-pivot section with winches."
▶ Install winch 6, see chapter 3.09.60.
▶ Swing winch 6 out of the transport position into the operating position, see section „Swinging winch 6 out of the transport position into the operating position."

S-pivot section before installation of winches

Make sure that the following prerequisites are met:
– All railings are pinned and secured in the transport position.
– The catwalk **12** is secured in the transport position.
– The catwalk **14** is secured in the operating position.
– Winch 5 is not installed.
– Winch 6 is not installed.

▶ Position the catwalk **12** in the operating position, see section „S-pivot section with winches."
▶ Install winch 6, see chapter 3.09.6.
▶ Swing winch 6 out of the transport position into the operating position, see section „Swinging winch 6 out of the transport position into the operating position."
▶ Remove the catwalk **14**, see section „S-pivot section before installation of winch 5."
▶ Install winch 5, see chapter 3.09.50.
▶ Reposition the catwalk **14** in the operating position and secure, „S-pivot section before installation of winch 5."

4.1.4 Swinging winch 6 into the operating position

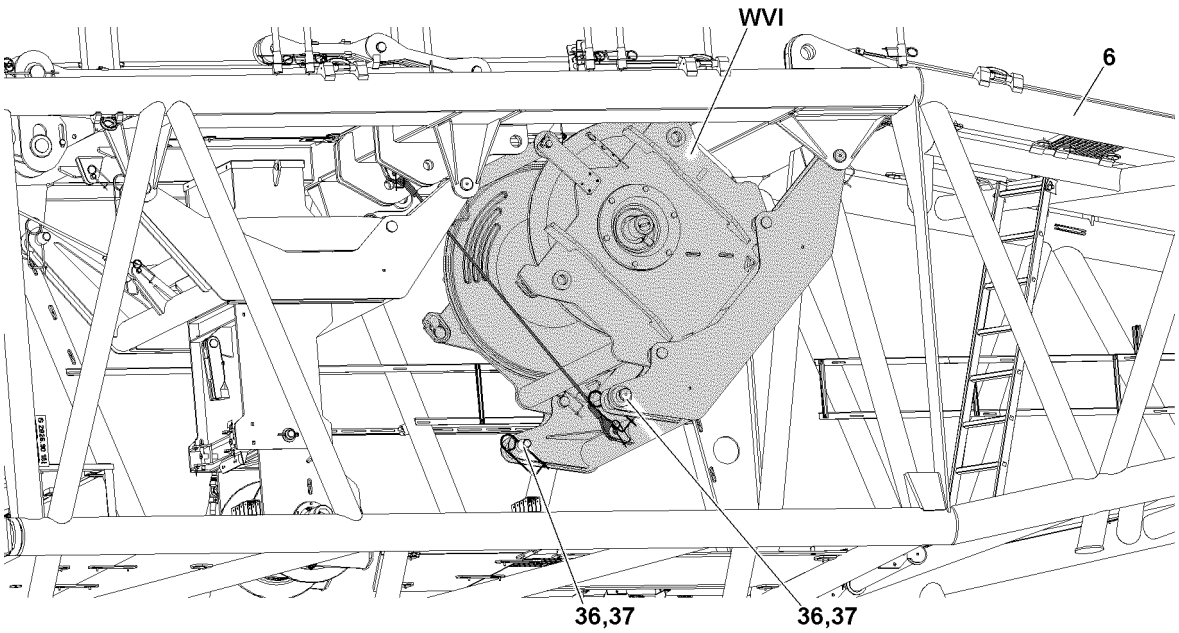

Fig.145217: Winch 6 in the transport position

Make sure that the following prerequisites are met:
– The catwalk **12** is secured in the transport position.
– The guy rods **15** are not swung in.
– The guy rod receptacles **18** are swung out on both sides.

▶ Fasten winch 6 to the auxiliary crane.
▶ Remove the retaining element **37** on winch 6 and unpin the pin **36**.

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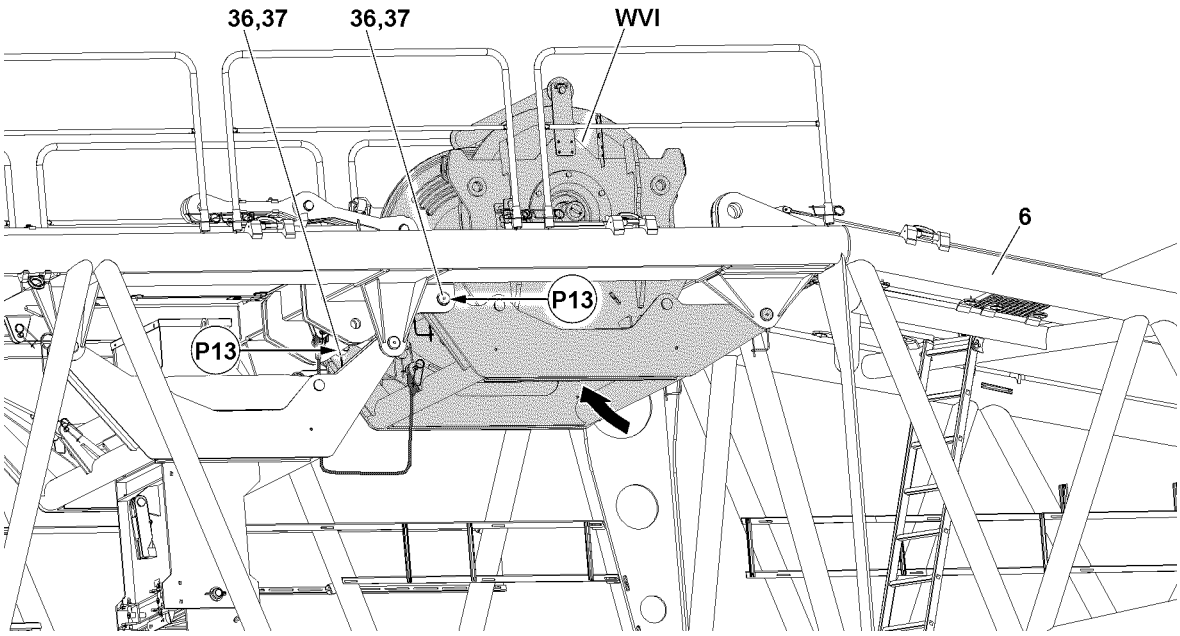

Fig.145218: Winch 6 in the operating position

▶ Swing winch 6 with the auxiliary crane until it can be pinned in the pin locations (points **P13**).

Secure winch 6 in the operating position:

▶ Insert the pin **36** and secure it with the retaining element **37**.

4.1.5 Swinging the protective roller

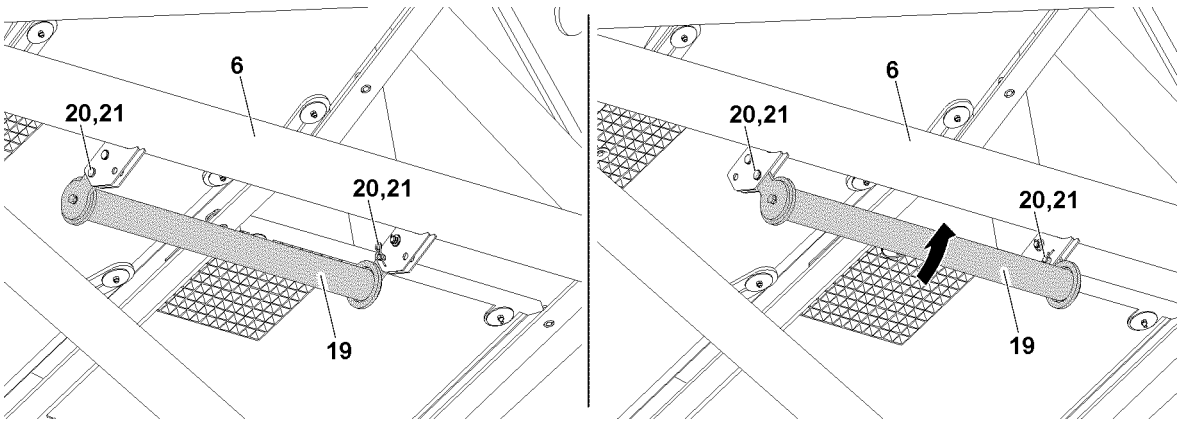

Fig.145213: Protective roller

WARNING
Swinging protective roller!
The protective roller **19** can fall down due to its own weight when unpinning it.
Death, severe bodily injuries.
▶ Make sure that the protective roller **19** is held during unpinning.
▶ Assembly personnel must be at the side of the assembly unit.

▶ Release the protective roller **19**: Remove the retaining elements **21** and unpin the pins **20**.
▶ Swing the protective roller **19** into the operating position.
▶ Secure the protective roller **19** in the operating position: Insert the pins **20** and secure with the retaining elements **21**.

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4.2 Assembling the main boom

WARNING
The crane can topple over!
- ▶ The turntable may not be turned during the assembly of the boom system.
- ▶ Observe the assembly conditions, see chapter 3.06.

WARNING
Danger of accident!
Death, severe bodily injuries, property damage.
- ▶ For assembly of the boom system, the rod plan must be observed and adhered to.
- ▶ Depending on the condition of the ground, the boom and the lattice sections must be supported from below for the assembly of the boom system.
- ▶ Observe the technical safety instructions, see chapter 5.01.

Make sure that the following prerequisites are met:
- The crane is horizontally aligned.
- An auxiliary crane is available.
- An assembly scaffolding / work platform is available.
- The central ballast is installed according to the load chart.
- The counterweight has been installed on the turntable according to the load chart.
- The LICCON overload protection has been set according to the data in the load chart.

4.2.1 Turning the turntable into the assembly position

WARNING
The crane can topple over!
If the following conditions are not met before turning the turntable - **without** assembled S-boom, the crane can topple over.
Death, severe bodily injuries, property damage.
- ▶ Observe the specifications in the erection and take-down charts.
- ▶ Observe the maximum permissible ballast combinations depending on the assembly status, see chapter 3.06.

- ▶ Turn the turntable into the assembly position, see „Erection and take down charts“.

4.2.2 Exceeding the LICCON overload protection for assembly

WARNING
Danger of accident due to the „Exceedance of shut-off limits of the LICCON overload protection“ function!
If the shut off limits of the LICCON overload protection are exceeded, there is no additional protection against crane overload.
Due to erroneous operation or deliberate misuse, the crane could collapse, the boom system can break off or the crane can topple over.
Death, severe bodily injuries, property damage.
- ▶ The function „Exceedance of shut off limits of the LICCON overload protection“ is only permissible in emergencies and for assembly purposes.
- ▶ The function „Exceeding the shut off limits of the LICCON overload protection“ may only be actuated by persons who know the effects of their actions regarding the function „Exceeding the shut off limits of the LICCON overload protection“.
- ▶ The „Exceedance of shut off limits of the LICCON overload protection“ function requires the presence of an authorized person and must be performed with utmost caution.
- ▶ Crane operation with activated function „Exceedance of shut off limits of the LICCON overload protection“ is prohibited.

- ▶ Exceeding the shut off limits of the LICCON overload protection: Engage assembly operation.

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Result:

– The shut off limits of the LICCON overload protection are exceeded.
– The assembly icon appears on the LICCON monitor.

Note
▶ See chapter 4.02.

4.2.3 Assembling the main boom

Note
▶ Assembling the SL boom system or SX boom system, see chapter 5.38 or chapter 5.39.

4.3 Placing winch 5 in the operating position

Make sure that the following prerequisites are met:
– The SL-boom system or the SX-boom system of the required length is installed on the crane.
– The SL-boom system or the SX-boom system is placed on the ground or on the substructure.
– The lock is fastened on winch 5.
– The rope of winch 5 is connected with the lock.

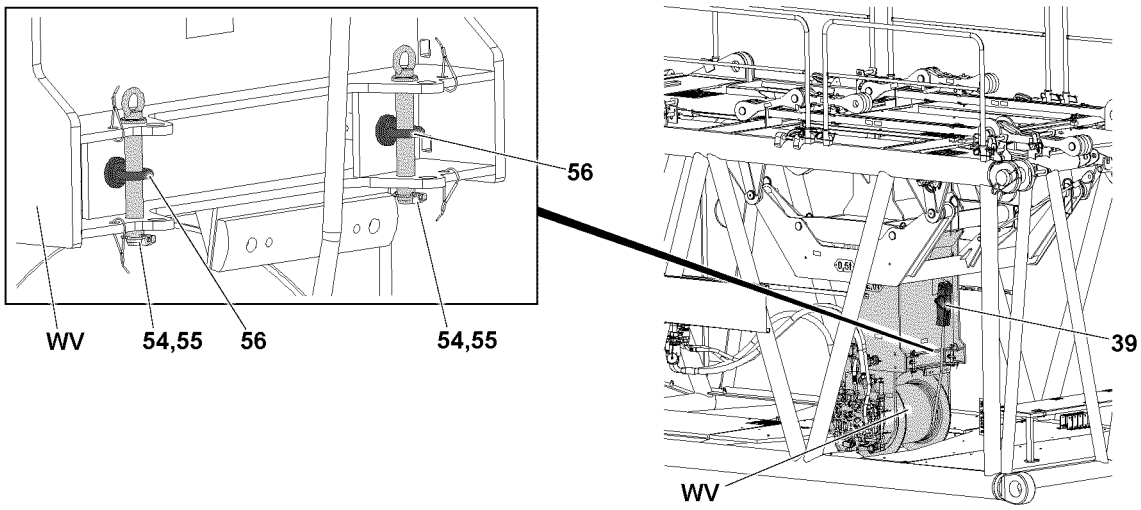

Fig.145224: Winch 5 in the transport position

▶ Remove the retaining element **55** and unpin the retaining pin **54**.
▶ Unpin the pin **56**.

Result:

– Winch 5 is released and can be extended.

NOTICE
Danger of slack rope formation!
▶ When spooling winch 5 out, make sure that no slack rope forms.

In order to operate winch 5, the „Bypass of the seat contact“ button **71** on the master switch MS2 must be pressed, see chapter 4.01.
▶ Extend winch 5: Spool out the rope from winch 5.

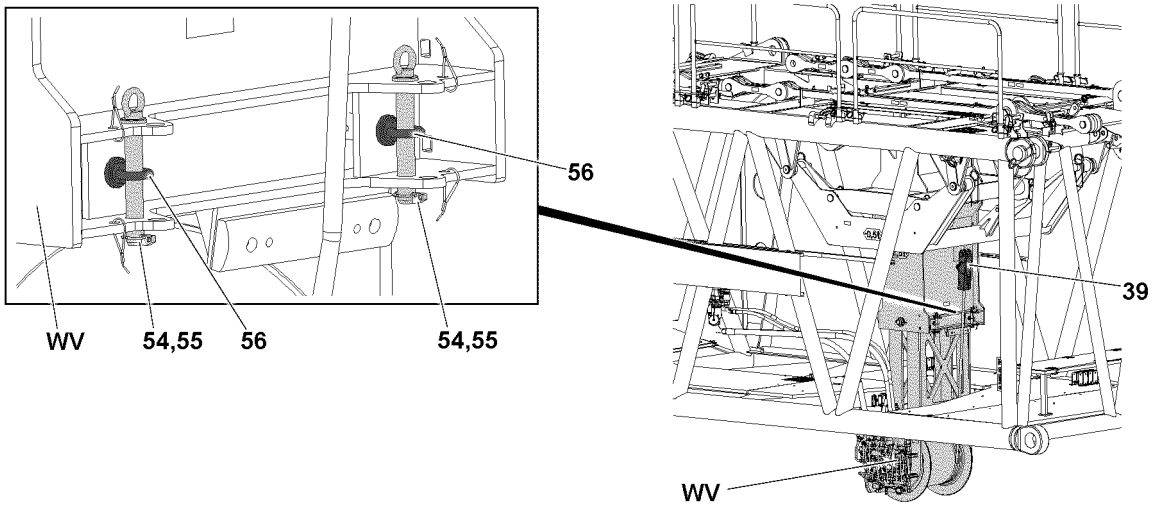

Fig.145225: Winch 5 in the operating position

- ▶ Extend winch 5 to the stop.
- ▶ Insert the pin **56**.

Result:

– Winch 5 is secured in the operating position.

- ▶ Secure the pin **56**: Insert the retaining pins **54** and secure it with the retaining elements **55**.
- ▶ Spool out winch 5 until the rope of winch 5 is relieved.
- ▶ Separate the rope of winch 5 from the lock **39**.
- ▶ Unpin the lock **39** from winch 5.

4.4 Preparing the fixed point

4.4.1 Fixed point SL7DHS, SL8DHS, SL8HS

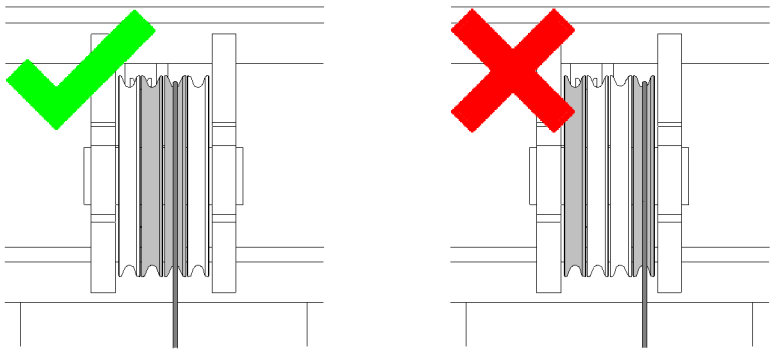

Fig.145220: Fixed point on the pulley

NOTICE
Fixed point on the pulley!
The fixed point may only be attached around outer pulleys.
- ▶ Connect the fixed point on one of the two **inner** pulleys.

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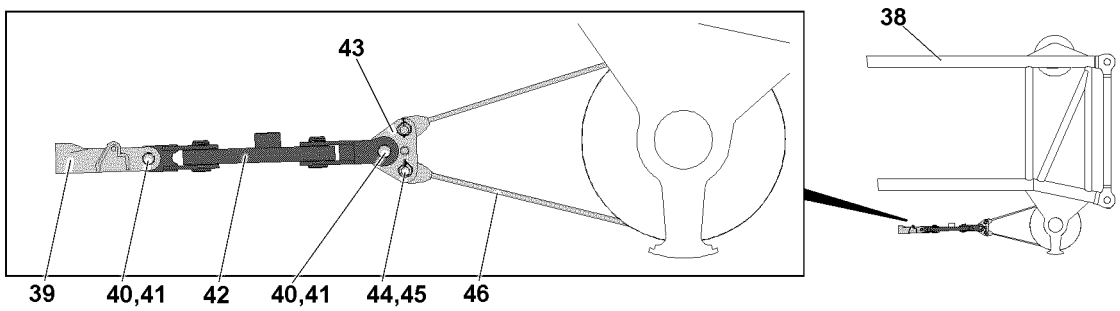

Fig.145219: Fixed point

- ▶ Connect the rope **46** of the fixed point **43** to the inner pulley of the F-connector head **38**.
- ▶ Fasten the rope **46** on the fixed point **42**: Insert the pin **44** and secure it with the retaining element **45**.
- ▶ Connect the fixed point **43** with the pull test bracket **42**: Insert the pin **40** and secure it with the retaining element **41**.
- ▶ Connect the pull test bracket **42** with the lock **39**: Insert the pin **40** and secure it with the retaining element **41**.

4.4.2 Fixed point SL9D2FB, SL12D2FB

NOTICE
With an installed fixed point, there is a danger of collision between the frame of the fixed point and the upper cross tube of the F-pivot section when attaching or removing of the F-jib on SL9 and SL12 booms!
- ▶ See section „Assembling the F-jib“.

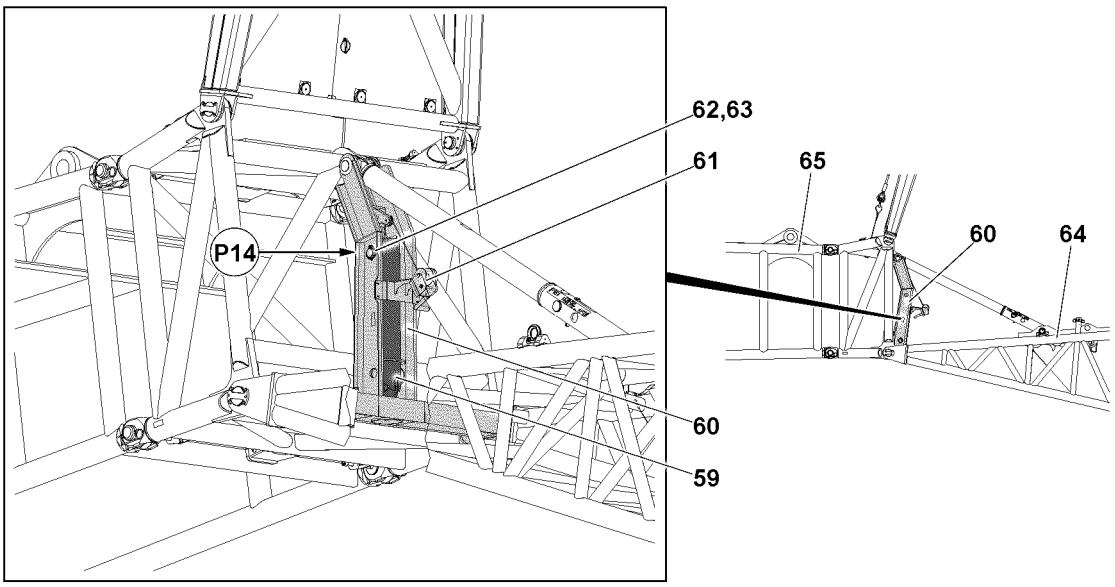

Fig.145231: Fixed point

- ▶ Release the fixed point receptacle **59** of the fixed point **60** from the transport position: Remove the retaining element **63** at point **P14** and unpin the pin **62**.
- ▶ Set the fixed point receptacle **59** in the operating position: Actuate the manual rope winch **61**.

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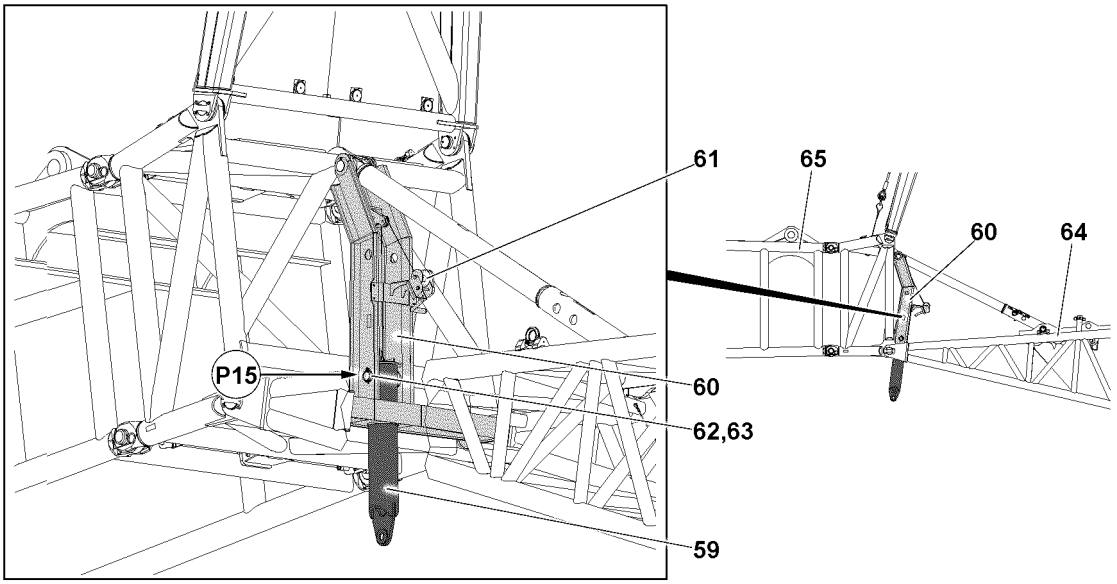

Fig.145232: Fixed point

▶ Secure the fixed point receptacle **59** in the operating position: Pin the pin **62** in point **P15** and secure with the retaining element **63**.

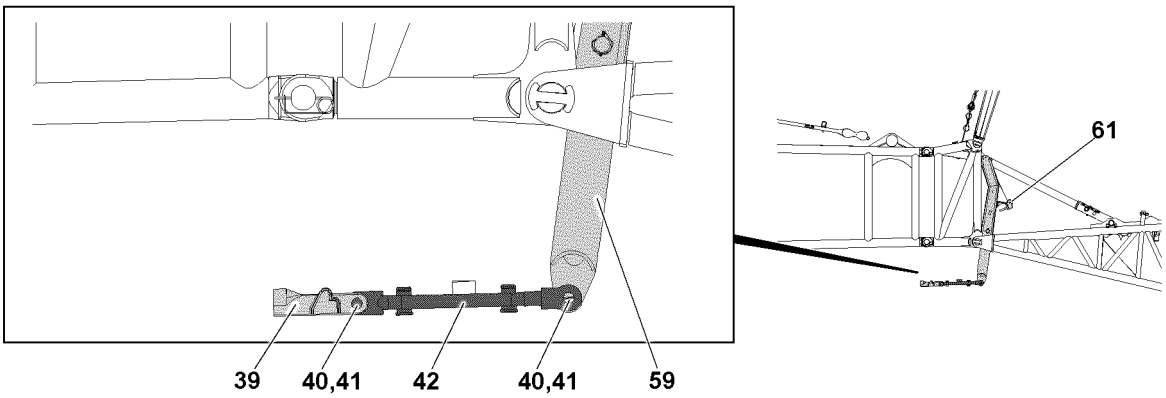

Fig.145233: Fixed point

▶ Connect the fixed point receptacle **59** with the pull test bracket **42**: Insert the pin **40** and secure it with the retaining element **41**.

▶ Connect the pull test bracket **42** with the lock **39**: Insert the pin **40** and secure it with the retaining element **41**.

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4.4.3 Fixed point SX3D4F2B/BW

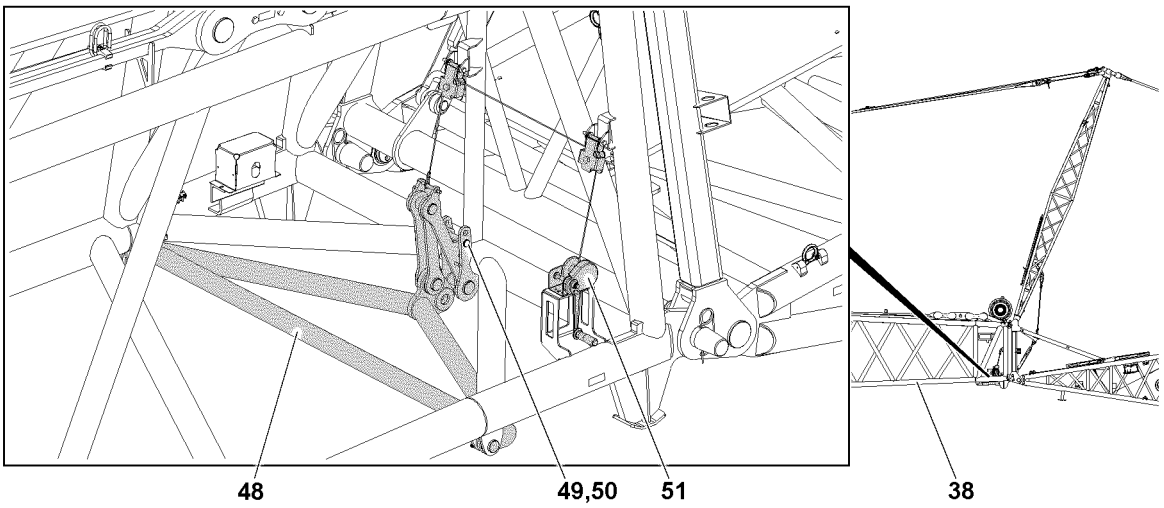

Fig.145222: Fixed point

▶ Release the fixed point **48** from the transport position: Remove the retaining element **49** and unpin the pin **50**.

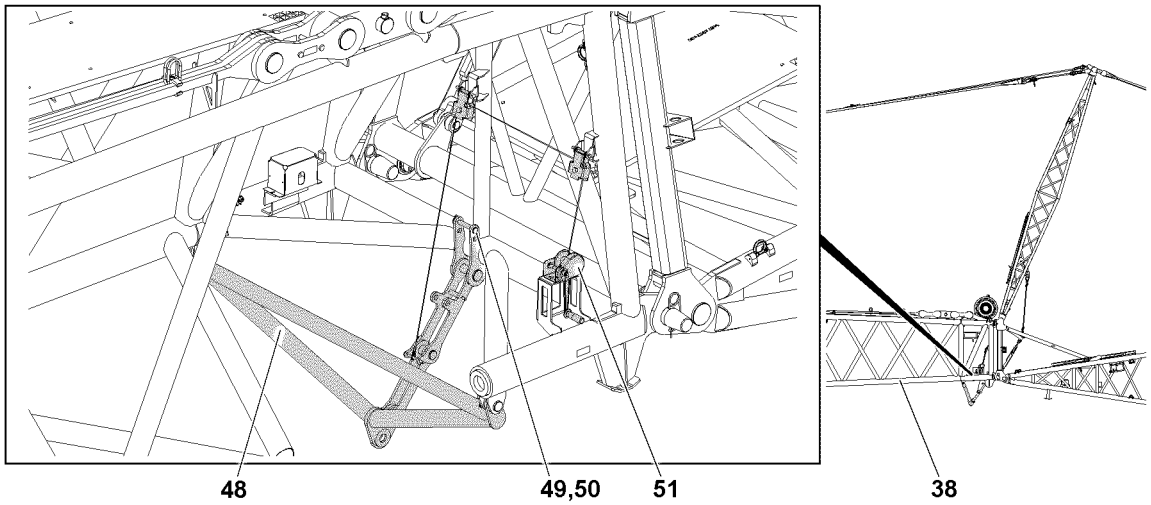

Fig.145223: Fixed point

▶ Insert the pin **50** in the park position and secure with the retaining element **49**.
▶ Swing the fixed point **48** into the operating position: Actuate the manual rope winch **51**.

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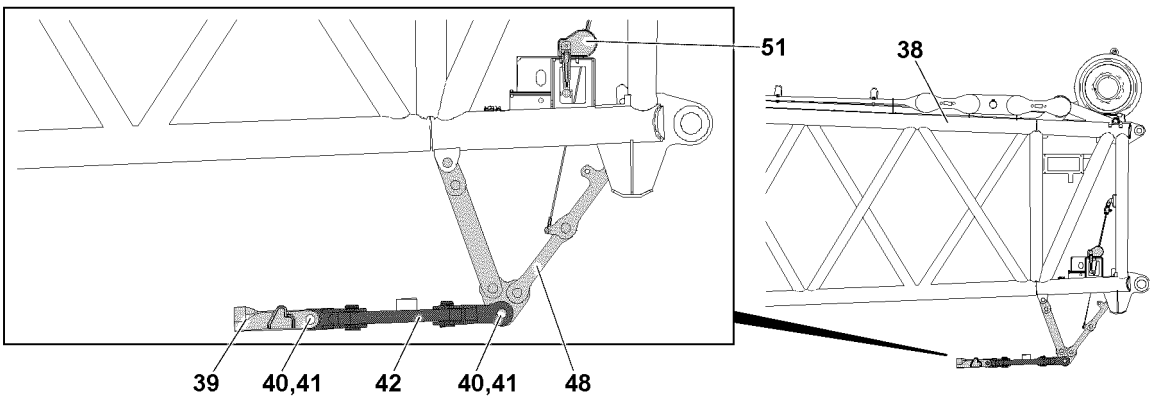

Fig.145221: Fixed point

- ▶ Connect the fixed point **48** with the pull test bracket **42**: Insert the pin **40** and secure it with the retaining element **41**.
- ▶ Connect the pull test bracket **42** with the lock **39**: Insert the pin **40** and secure it with the retaining element **41**.

4.5 Assembling the F-jib

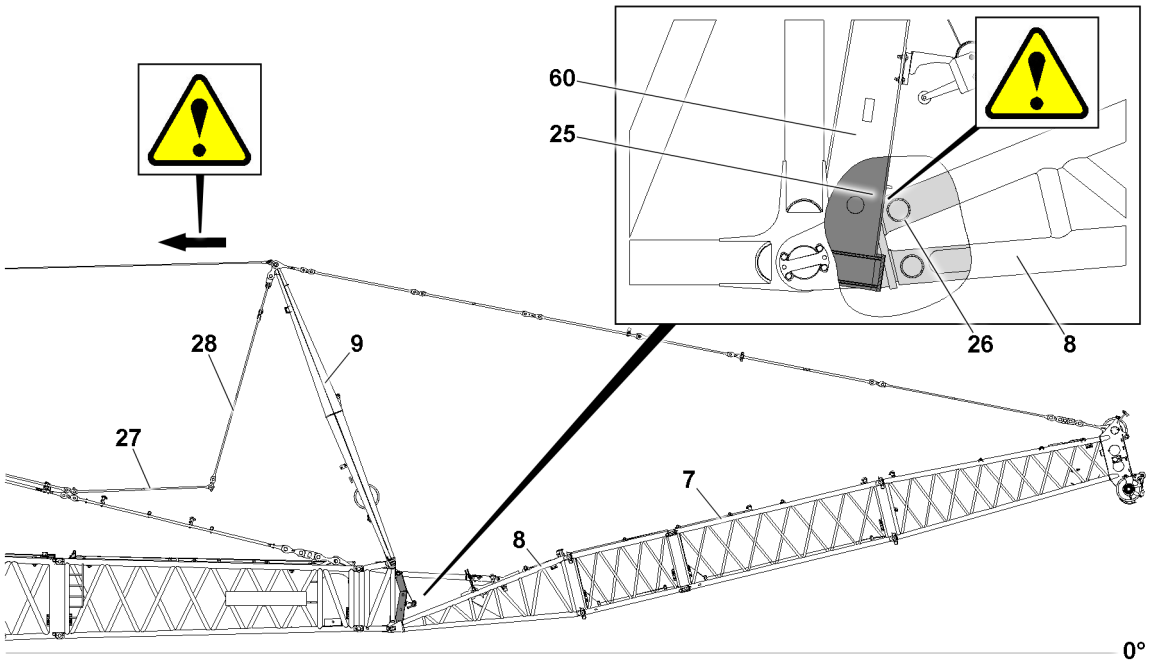

Fig.147778: Danger of collision

NOTICE
Danger of collision during assembly and disassembly of the F-jib **7**!
Danger of collision between the frame **25** of the fixed point **60** and the upper cross tube **26** of the F-pivot section **8**.
With an installed fixed point **60**, there is a danger of collision between the frame **25** of the fixed point **60** and the upper cross tube **26** of the F-pivot section **8** when attaching or removing of the F-jib **7** on SL9 and SL12 booms.
The danger of collision exists when the FA-frame **9** is pulled with the hoist rope in the direction of the crane (and thereby the F-jib **7** upward) in order to pin or unpin the rods of the FAB-guying.
▶ Make sure that a guide supervises the swinging process.
▶ Make sure that the guide is constantly in visual and acoustic contact with the crane operator.
▶ Make sure that the pulling of the FA-frame **9** in the direction of the crane is ended on time.

WARNING
Falling and swinging rods of the FAB-guying!
The rod **27** can fall down due to its own weight during assembly or disassembly.
The rod **28** can swing to the FA-frame **9** due to its own weight during assembly or disassembly.
Death, severe bodily injuries, property damage.
▶ Make sure when pinning and unpinning the FAB-guying that the rod is safely held.
▶ Assembly personnel must be at the side of the assembly unit.

▶ Install and pin the rods of the FAB-guying, use lifting platform.
▶ Assembling the F-jib, see chapter 5.13.10 or chapter 5.13.20.

4.6 Connecting the rope from winch 5 with the lock

Make sure that the following prerequisites are met:
– Winch 5 is secured in the operating position.
– The fixed point is assembled and secured.
– The pull test bracket is assembled and secured.

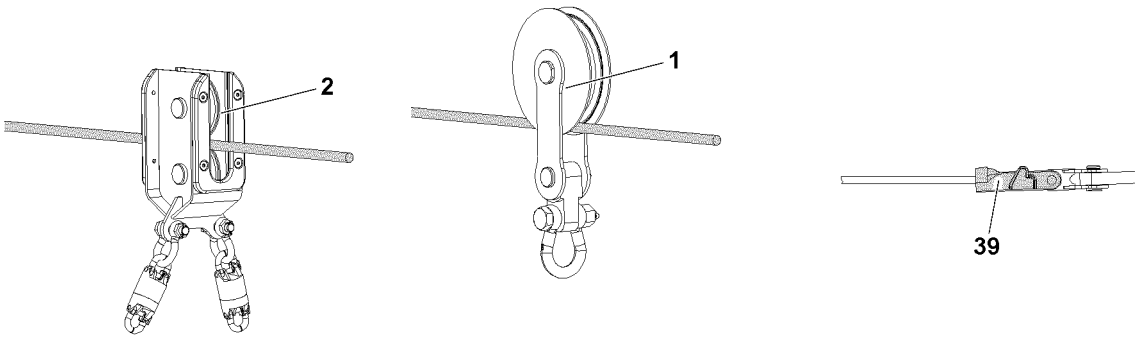

Fig.145226: Guide pulley

▶ Assemble guide pulley I **1** or guide pulley II **2** on the rope of winch 5.

NOTICE
Danger of slack rope formation!
▶ When spooling winch 5 out, make sure that no slack rope forms.

In order to operate winch 5, the „Bypass of the seat contact“ button **71** on the master switch MS2 must be pressed, see chapter 4.01.
▶ Pull the rope of winch 5 forward to the fixed point: Spool out winch 5.
▶ Insert the rope of winch 5 in the lock **39** and secure.

NOTICE
Rope of winch 5!
The rope of winch 5 may **not** be pretensioned before lifting the boom system.
▶ Lift the rope of winch 5 from the ground.

▶ Spool up winch 5 until the rope of winch 5 is lifted off the ground. Do not pretension.

4.7 Establishing the electrical and hydraulic connections

Note
▶ Establishing the electrical and hydraulic connections, see chapter 5.38 or chapter 5.39.

4.8 Function check

WARNING
Non-functioning safety equipment!
If the function of the safety equipment is defective, set crane operation.
Death, severe bodily injuries, property damage.
▶ Crane operation with non-functioning safety equipment is **prohibited**.

Note
▶ The function of the individual limit switches must be checked before erection of the boom system.
▶ The function of the limit switch initiators must be checked in the test system, see the Diagnostics manual.

Note
▶ If a function check on the limit switches or on the safety equipment does not lead to the desired shut offs, then the plug connections on the connector boxes or the components itself must be checked. If no visible connection errors or component defects can be found, contact Liebherr Service.

Note
▶ Function check, see chapter 5.38 or chapter 5.39.

4.9 Assembling the guy rods

WARNING
Neglected inspection and maintenance on the guy rods!
If the regular inspection and maintenance of the guy rods is not carried out or only carried out at irregular intervals, then severe accidents can occur due to existing and not recognized damage on the guy rods.
Death, severe bodily injuries, property damage.
▶ The guy rods must be checked before every assembly, see chapter 8.15.

Note
▶ The guy rods must be installed and secured according to the separately supplied rod plans. The numbering on the rod plans must be identical to the numbering on the guy rods.

Note
▶ Assembling the guy rods, see chapter 5.38 or chapter 5.39.

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5 Erecting the boom system

5.1 Erecting the boom system

WARNING
The crane can topple over!
In crane operation with exceeded LICCON overload protection, the crane can topple over.
Death, severe bodily injuries, property damage.
▶ The boom radii listed in the load chart may not be exceeded or fallen below, even if there is no load on the hook.

If required in the erection and take down chart:
▶ Carry the hook block along with the auxiliary crane.

WARNING
The crane can topple over!
If the following conditions are not met before erecting the boom system, the crane can topple over.
Death, severe bodily injuries, property damage.
▶ Observe the technical safety instructions, see chapter 5.01.
▶ Extend the S-relapse cylinder out before erecting the boom system.
▶ Do not allow slack rope formation on the control winch.

WARNING
Falling hoist rope!
If the hoist rope is not reeved with the respective length on the boom system before the erection procedure, then it can fall down backward due to its own weight.
Death, severe bodily injuries, property damage.
▶ Reeve in the hoist rope before the erection procedure with sufficient length on the boom system.
▶ The hoist rope must be constantly monitored during erection.
▶ Do not step into the danger zone.

NOTICE
Overload of boom system!
If the boom system is not supported before the erection procedure, then the boom system will be overloaded.
The crane will be damaged during erection.
▶ Implement the substructure for the different boom lengths always according to the specifications.
▶ Support the boom system with suitable material of sufficient load bearing capacity.

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Make sure that the following prerequisites are met:
- The crane is supported.
  (only in connection with crane support or for LG-cranes)
- The crane is horizontally aligned.
- All electrical connections have been made.
- All limit switches are functioning.
- The central ballast is installed according to the erection and take-down charts.
  (not possible for LG-crane)
- The counterweight has been installed on the turntable according to the erection and take-down charts.
- All pin connections are secured.
- The hoist rope has been correctly placed in the rope pulleys and is prevented from jumping out with the rope retaining pins.
- Non-required guy rods are disassembled.
- There are no loose parts on the boom system.
- The boom system is free of snow and ice.
- The LICCON overload protection has been set according to the data in the load chart.
- The load weighing was carried out on the boom system and the hook block weight has been entered on the LICCON monitor, see the chapter 4.02.
- The LICCON overload protection settings have been compared with the actual set up configuration.
- The LICCON overload protection is exceeded.
- The assembly icon is visible on the LICCON monitor.
- No persons are present in the danger zone.

5.1.1 Extending the S-relapse cylinders

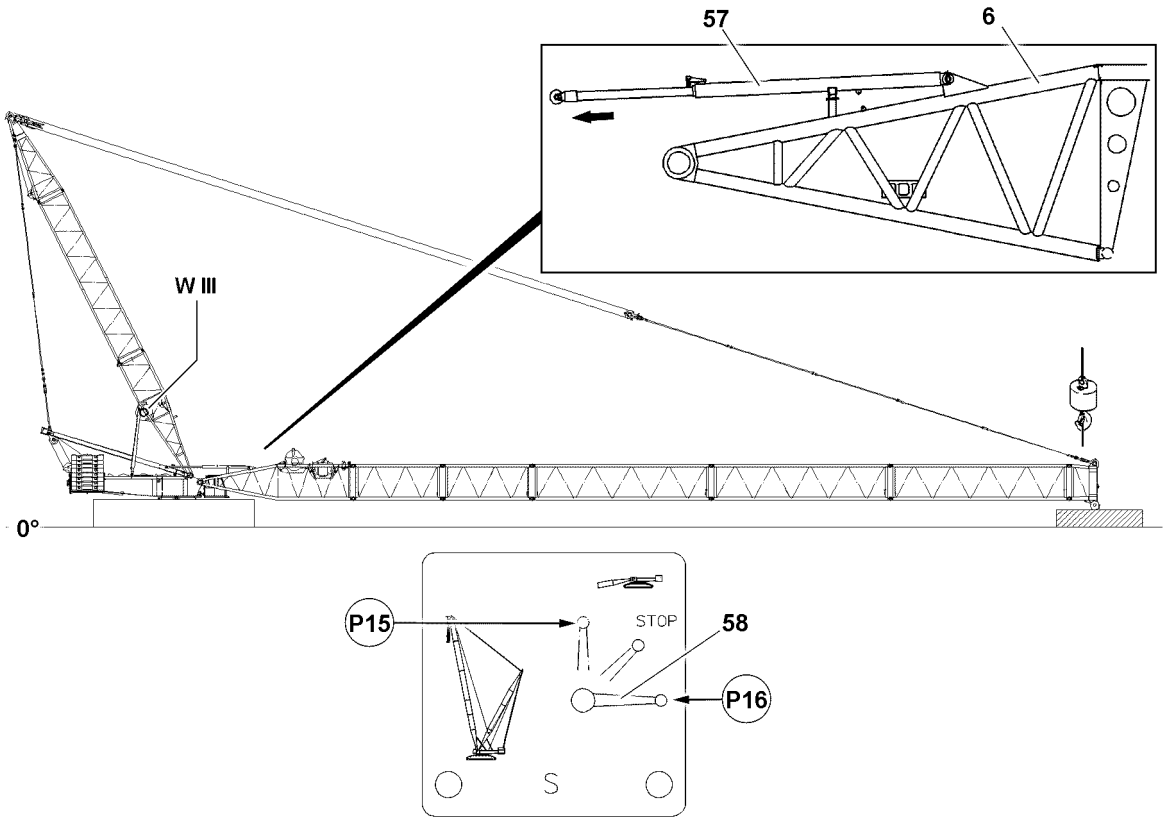

Fig.145229: S-relapse cylinder

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NOTICE
Damage to the relapse cylinders!
By extending the S-relapse cylinders, a collision with the D-relapse cylinders can occur.
This can result in severe damage to the relapse cylinders.
▶ Extend the S-relapse cylinders only when the D-boom is in the operating position.

WARNING
The crane can topple over!
If the S-relapse cylinders are not extended before erecting the boom system, then the boom system can fall to the rear in crane operation and the crane can topple over.
Death, severe bodily injuries, property damage.
▶ Extend the S-relapse cylinder out before erecting the boom system.
▶ Secure the ball valve **58** during crane operation to prevent inadvertent actuation.

Ball valve positions	
Position (P)	Function
16	Crane operation, extend the piston rod
15	Assembly, retract the piston rod
STOP	The piston rod cannot be retracted / extended

Make sure that the following prerequisite is met:
– All hydraulic connections have been made.

▶ Set the ball valve **58** to position **P16**.

Result:

– The piston rods of the S-relapse cylinders **57** extend.

Note
▶ The ball valve **58** is secured by closing the cabinet door and removing the key.

When the piston rods of the S-relapse cylinders **57** are fully extended:
▶ Close the cabinet doors and pull out the key.
▶ Hand the key to an authorized person.

5.1.2 Erection procedure

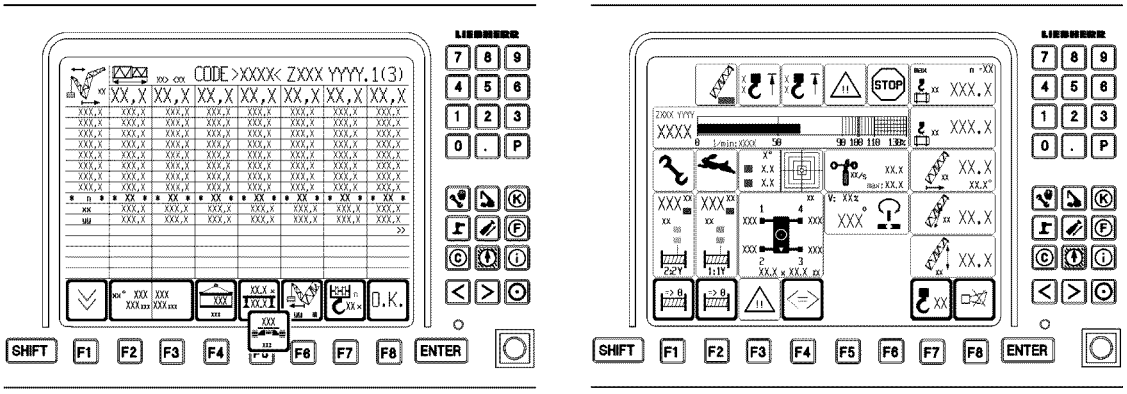

Fig.145230: LICCON monitor

WARNING
The crane can topple over!
If the specifications in the erection and take down charts are disregarded, the crane can topple over.
Death, severe bodily injuries, property damage.
▶ It is prohibited to turn the crane superstructure while erecting the boom system.
▶ Adhere to the specifications in the erection and take down charts.

Make sure that the following prerequisite is met:
– The load weighing was carried out on the boom system and the hook block weight has been entered on the LICCON monitor, see the chapter 4.02.

Reeving in the hook block

▶ Erect the boom system until the end section lifts off the ground.

WARNING
Falling hoist rope!
If the hoist rope is not reeved with the respective length on the boom system before the erection procedure, then it can fall down backward due to its own weight.
Death, severe bodily injuries, property damage.
▶ Reeve the hoist rope before the erection procedure with sufficient length on the D-boom.
▶ The hoist rope must be constantly monitored during erection.
▶ Do not step into the danger zone.

▶ Reeve in the hoist rope properly and secure on the rope fixed point, for reeving, see the Reeving plan.
▶ Pin and secure the rope retainers on the rope pulleys.
▶ Attach the hoist limit switch weight.

Erecting the boom system

WARNING
The crane can topple over!
In crane operation with exceeded LICCON overload protection, the crane can topple over.
There is then no additional protection against crane overload.
Death, severe bodily injuries, property damage.
▶ The boom radii listed in the load chart may not be exceeded or fallen below, even if there is no load on the hook.
▶ Crane operation with deactivated LICCON overload protection is prohibited.

Note
▶ When the lowest operating position of the boom system is reached, the LICCON overload protection is activated.
▶ In the maximum load icon, a load number appears in „t“ instead of the display „???“.

▶ Luff the boom system up to the lowest operating position.

When the boom system has reached the lowest operating position:
▶ Make sure that the assembly icon on the LICCON monitor turns off.

Result:

– The LICCON overload protection is active.

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5.2 Pretensioning the rope of winch 5

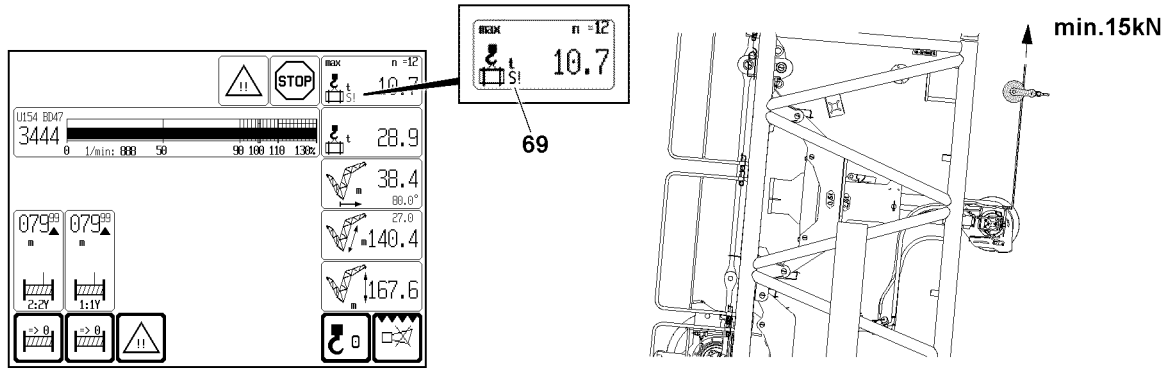

Fig.145228: Pretension force

WARNING
Overload of boom system!
After erecting the boom system and before starting crane operation with SLGS, the rope of winch 5 must be pretensioned with 15 kN.
▶ Make sure that the rope of winch 5 is pretensioned with at least 15 kN.

WARNING
Reduction of load!
Due to the additional load of the boom system due to pretensioning the rope of winch 5, the load is reduced in crane operation with SLGS by 20 t.
▶ Take the reduction of the load into account.

In order to operate winch 5, the „Bypass of the seat contact“ button **71** on the master switch MS2 must be pressed, see chapter 4.01.
▶ Spool up winch 5 until the rope of winch 5 is pretensioned with 15 kN.

Result:

– The icon **69** appears on the LICCON monitor.
– The load is reduced by 20 t.

6 Operating the crane

6.1 Preparing for crane operation

Note
▶ Observe the notes, see chapter 4.02, chapter 4.05, chapter 4.08 and chapter 5.01.

Make sure that the following prerequisites are met:
– The LICCON overload protection is active.
– The LICCON overload protection has been set according to the data in the load chart.

WARNING
The crane can topple over!
▶ Check the horizontal position of the crane before and during crane operation.
▶ If the crane operator leaves the cab, even for a short time, the operating mode setting must be checked and reset if necessary before resuming crane operation.

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6.1.1 Checking the settings

- ▶ Check the function of the overload protection by running against the operating positions „on top“ and „bottom“.
- ▶ Check the hoist limit switch by running against the hoist limit switch weight.
- ▶ Check the function of the limit switches on the jib stop cylinders.

6.2 Crane operation with SLGS, permissible forces

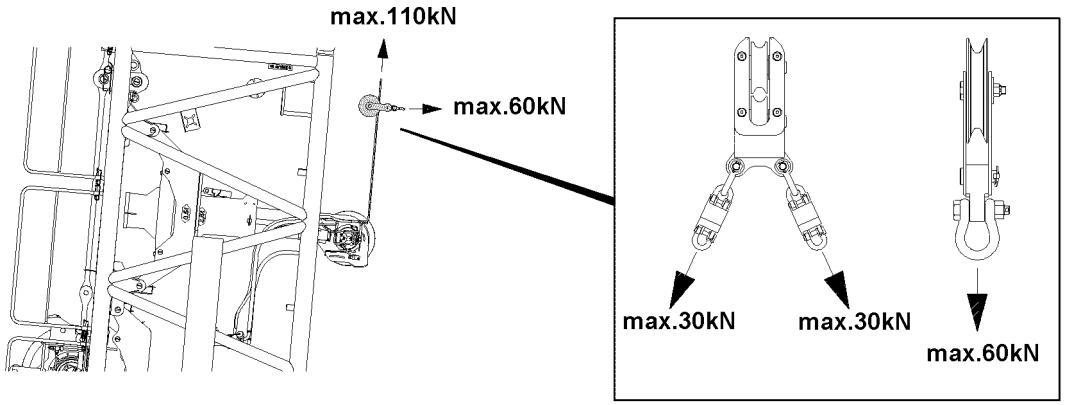

Fig.145227: Maximum permissible force

WARNING
Overload of boom system!
Death, severe bodily injuries, property damage.
- ▶ Make sure that a force of **no** more than 110 kN is applied on the rope of winch 5 in crane operation with SLGS.
- ▶ Maximum permissible force 110 kN.

WARNING
Overload of boom system!
Death, severe bodily injuries, property damage.
- ▶ Make sure that a force of **no** more than 60 kN is applied on the guide pulley in crane operation with SLGS.
- ▶ Maximum permissible force 60 kN.

- ▶ Observe the permissible forces.

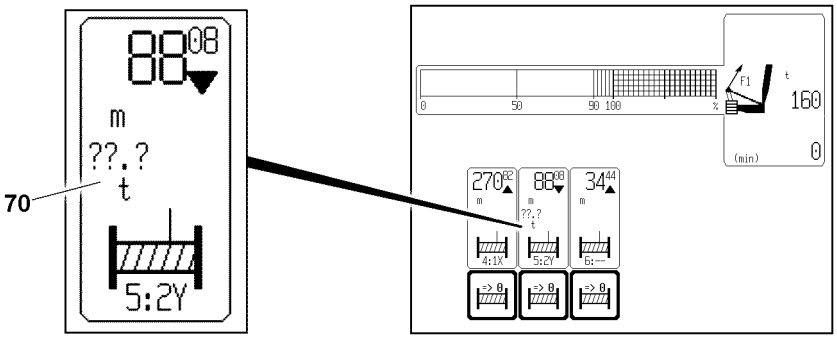

Fig.145390: LICCON display

Note

▶ The force that is applied on the rope of winch 5 in crane operation with SLGS is shown on the display **70** in tons.

▶ Pay attention to the values on the display **70**.

7 Taking down the boom system

7.1 Take down procedure

WARNING

The crane can topple over!

If the following conditions are not met before taking down the boom system, the crane can topple over.

Death, severe bodily injuries, property damage.

▶ The turntable may not be turned during the disassembly of the boom system.

▶ Observe the technical safety instructions, see chapter 5.01.

▶ Observe the specifications in the erection and take-down charts.

If required in the erection and take down chart:

▶ Carry the hook block along with the auxiliary crane.

NOTICE

Damage of boom components!

Taking down the boom system can lead to a collision between the hook block and the pulley head.

Boom components can be severely damaged.

▶ Luff the boom system down at the same time and spool the hoist winch out.

▶ When luffing the boom system down, the D-boom must remain in the operating position until the S-end section is laying on the ground or on a substructure.

Note

▶ Depending on the condition of the ground, the boom and the lattice sections must be supported from below for the disassembly of the boom system.

Make sure that the following prerequisites are met:

– The crane is horizontally aligned.
– An auxiliary crane is available.
– An assembly scaffolding / work platform is available.
– The central ballast is installed according to the erection and take-down charts.
– The counterweight has been installed on the turntable according to the erection and take-down charts.
– The LICCON overload protection has been set according to the data in the load chart.

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7.1.1 Relieving the rope of winch 5

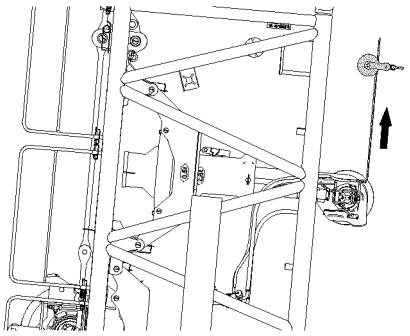

Fig.145234: Relieving the rope of winch 5

NOTICE
Overload of boom system!
▶ Before taking down the boom system, make sure that the pretension in the rope of winch 5 is released.

In order to operate winch 5, the „Bypass of the seat contact“ button **71** on the master switch MS2 must be pressed, see chapter 4.01.
▶ Spool out winch 5 until the rope of winch 5 is relieved.

7.1.2 Luffing the boom system down

Note
▶ The luff down movement is turned off as soon as the lowest operating position is reached.
▶ When the lowest operating position of the S-boom system is reached, the load display in the maximum load icon turns off and instead of the load display appears the display „???“.
▶ Alarm functions appear on the crane operation screen.

▶ Luff the boom system down to the „lowest“ operating position.

Result:

– The luff down movement is turned off.
– The „STOP“ icon appears on the LICCON monitor.
– The horn icon appears on the LICCON monitor.

WARNING
Danger of accident due to the „Exceedance of shut-off limits of the LICCON overload protection“ function!
If the shut off limits of the LICCON overload protection are exceeded, there is no additional protection against crane overload.
Due to erroneous operation or deliberate misuse, the crane could collapse, the boom system can break off or the crane can topple over.
Death, severe bodily injuries, property damage.
▶ The function „Exceedance of shut off limits of the LICCON overload protection“ is only permissible in emergencies and for assembly purposes.
▶ The function „Exceeding the shut off limits of the LICCON overload protection“ may only be actuated by persons who know the effects of their actions regarding the function „Exceeding the shut off limits of the LICCON overload protection“.
▶ The „Exceedance of shut off limits of the LICCON overload protection“ function requires the presence of an authorized person and must be performed with utmost caution.
▶ Crane operation with activated function „Exceedance of shut off limits of the LICCON overload protection“ is prohibited.

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▶ Exceeding the shut off limits of the LICCON overload protection: Engage assembly operation.

Result:

– The shut off limits of the LICCON overload protection are exceeded.
– The assembly icon appears on the LICCON monitor.

Note
▶ See chapter 4.02.

▶ At the same time, spool the hoist winch out and luff the boom system down until the hook block touches the ground.

7.1.3 Reeving out the hook block

▶ Remove the hoist limit switch weight and reeve the hook block out.

7.1.4 Spooling the hoist rope up

WARNING
Spooling up of hoist rope!
Death, severe bodily injuries, property damage.
▶ All rope retaining pins / pipes on the boom system are removed.
▶ Slowly spool up the hoist rope over the rope pulleys back to the winch.
▶ No one may be present in the danger zone.

NOTICE
Overspooled winch!
If the rope is pulled under the winch when spooling up, the settings of the cam limit switch are no longer correct and there is an increased danger of accident.
As a result, extensive adjustment work on the cam limit switch is required.
▶ All rope retaining pins / pipes on the boom system are removed.
▶ Slowly spool up the hoist rope over the rope pulleys back to the winch.
▶ Stop the winch in time, with sufficient rope reserve.
▶ Do not overspool the winch.

▶ Spool the hoist rope up.
▶ Take the boom system down on the substructure.

7.2 Spooling up the rope of winch 5

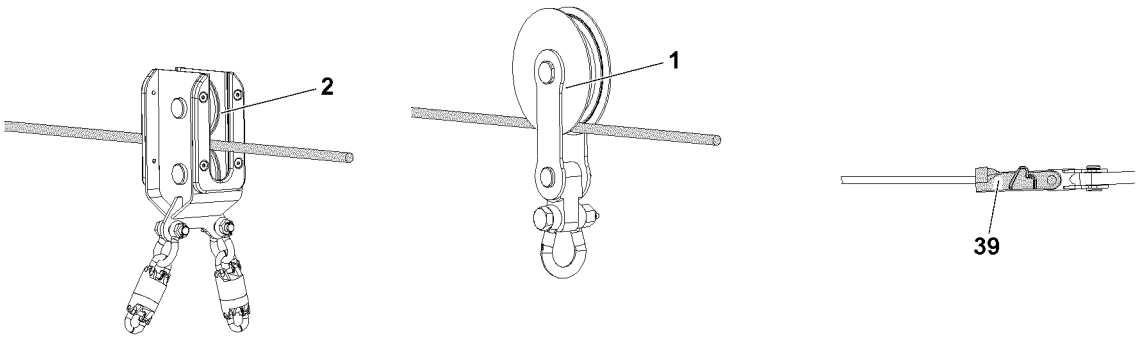

Fig.145226: Guide pulley, lock

NOTICE
Danger of slack rope formation!
▶ When spooling winch 5 out, make sure that no slack rope forms.

In order to operate winch 5, the „Bypass of the seat contact“ button **71** on the master switch MS2 must be pressed, see chapter 4.01.

- ▶ Spool out winch 5 until the rope of winch 5 lies on the ground.
- ▶ Separate the rope of winch 5 from the lock **39**.
- ▶ Remove guide pulley I **1** or guide pulley II **2** from the rope of winch 5.
- ▶ Spool up the rope from winch 5: Actuate winch 5.

8 Disassembling the boom system

WARNING
Danger of falling!
During assembly / disassembly, inspection and maintenance work, assembly personnel must be secured with appropriate aids to prevent them from falling.
Death, severe bodily injuries, property damage.

- ▶ All work at a height, when there is a danger of falling, must be carried out with suitable aids.
- ▶ If aids are not available and work cannot be carried out from the ground, then assembly personnel must secure themselves with the supplied fall arrest system to prevent falling, see chapter 2.04.
- ▶ If fall protection equipment is available, then it must be used, see chapter 2.06.
- ▶ When lifting, lowering, swinging crane parts in and out, no persons may remain in the danger zone.
- ▶ When closing or opening boom systems during boom assembly or boom disassembly, no persons may remain on the boom system or in the danger zone.
- ▶ If railings are present on the components, then they must be brought into the corresponding position and secured for assembly / disassembly work.
- ▶ Only step on the aids, ladders and catwalks with clean shoes.
- ▶ Keep aids, ladders and catwalks free of heavy dirt, snow and ice.
- ▶ During all assembly and disassembly work, maintenance work and inspections, travel or crane operation is prohibited.
- ▶ Remaining on a suspended load is prohibited.
- ▶ Stepping or walking on crane components and lattice sections, which have an incline of more than 20° is prohibited.
- ▶ For all assembly work, the crane driver of the main crane must be in voice contact with the crane driver / crane drivers of the auxiliary crane / auxiliary cranes.
- ▶ For assembly tasks, the crane driver may only initiate crane movements when the responsible guide has explicitly released the movement.

WARNING
The lattice sections can fall down!
If the lattice sections are not pinned and secured correctly, then they can fall down.
Death, severe bodily injuries, property damage.

- ▶ Insert or unpin both pins at the same horizontal level, i.e. **left and right**.
- ▶ Standing under the lattice sections or within the entire danger zone during the pinning and unpinning procedure of the boom system is prohibited.
- ▶ Safely secure the pins in the storage locations as well as in the receptacles.
- ▶ It is prohibited to lean the ladder against the component being disassembled.

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WARNING
Danger of impact / crushing!
When installing / removing crane components with the auxiliary crane, crane components can start to swing back and forth.
When lifting / lowering and positioning crane components, there is an increased danger of impacts / crushing.
Death, severe bodily injuries, property damage.
- ▶ Make sure that personnel cannot be caught by components.
- ▶ Make sure that the crane is horizontally aligned.
- ▶ When working in danger zones: Use aids to protect limbs.
- ▶ Guide components with suitable aids to minimize oscillation.

DANGER
The components can fall down!
If the corresponding component is disengaged from the auxiliary crane before the corresponding component is pinned, then the corresponding component can fall down.
Death, severe bodily injuries, property damage.
- ▶ Do not disengage the auxiliary crane until the respective component is pinned and secured.

WARNING
The crane can topple over!
- ▶ The turntable may not be turned during the assembly of the boom system.
- ▶ Observe the assembly conditions, see chapter 3.06.

WARNING
Danger of accident!
Death, severe bodily injuries, property damage.
- ▶ For assembly of the boom system, the rod plan must be observed and adhered to.
- ▶ Depending on the condition of the ground, the boom and the lattice sections must be supported from below for the assembly of the boom system.
- ▶ Observe the technical safety instructions, see chapter 5.01.

8.1 Disconnecting the electrical and hydraulic connections

Note
- ▶ Disconnecting the electrical and hydraulic connections, see chapter 5.38 or chapter 5.39.

8.2 Disassembling the guy rods

NOTICE
Damage to the intermediate sections!
- ▶ Do not pull the upper pulley block over the intermediate sections, rather guide them with the auxiliary crane.

Note
- ▶ Disassembling the guy rods, see chapter 5.38 or chapter 5.39.

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8.3 Disassembling the F-jib

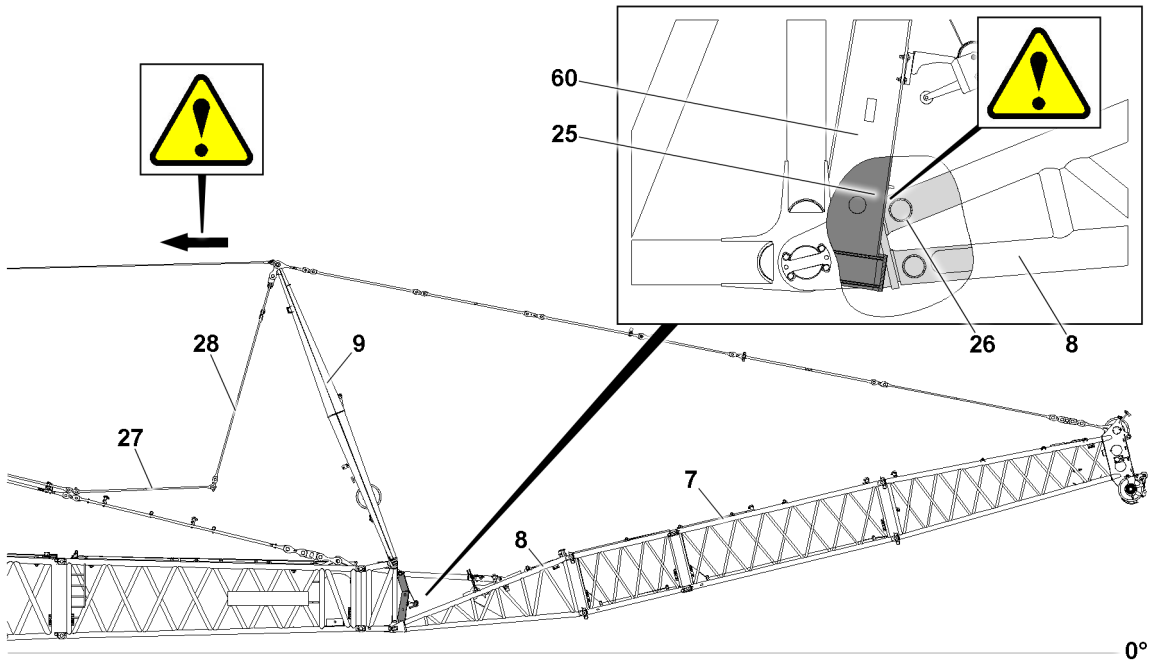

Fig.147778: Danger of collision

NOTICE
Danger of collision during assembly and disassembly of the F-jib **7**!
Danger of collision between the frame **25** of the fixed point **60** and the upper cross tube **26** of the F-pivot section **8**.
With an installed fixed point **60**, there is a danger of collision between the frame **25** of the fixed point **60** and the upper cross tube **26** of the F-pivot section **8** when attaching or removing of the F-jib **7** on SL9 and SL12 booms.
The danger of collision exists when the FA-frame **9** is pulled with the hoist rope in the direction of the crane (and thereby the F-jib **7** upward) in order to pin or unpin the rods of the FAB-guying.
▶ Make sure that a guide supervises the swinging process.
▶ Make sure that the guide is constantly in visual and acoustic contact with the crane operator.
▶ Make sure that the pulling of the FA-frame **9** in the direction of the crane is ended on time.

WARNING
Falling and swinging rods of the FAB-guying!
The rod **27** can fall down due to its own weight during assembly or disassembly.
The rod **28** can swing to the FA-frame **9** due to its own weight during assembly or disassembly.
Death, severe bodily injuries, property damage.
▶ Make sure when pinning and unpinning the FAB-guying that the rod is safely held.
▶ Assembly personnel must be at the side of the assembly unit.

▶ Disassemble the rods of the FAB-guying, use lifting platform.
▶ Disassembling the F-jib, see chapter 5.13.10 or chapter 5.13.20.

8.4 Disassembling the fixed point

Make sure that the following prerequisite is met:
– The boom system is placed on the ground or on the substructure.
– The rope of winch 5 is spooled out.

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8.4.1 Fixed point SL7DHS, SL8DHS, SL8HS

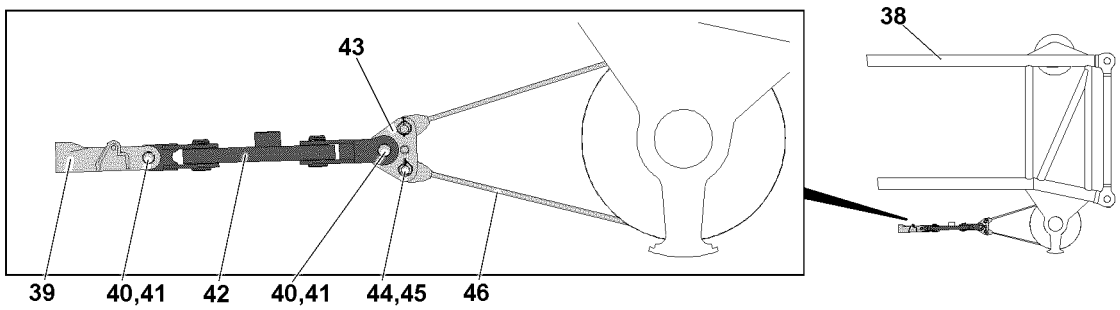

Fig.145219: Fixed point

- ▶ Disconnect the lock **39** from the pull test bracket **42**: Unpin the retaining element **41** and the pin **40**.
- ▶ Disconnect the pull test bracket **42** from the fixed point **43**: Remove the retaining element **41** and unpin the pin **40**.
- ▶ Remove the rope **46** from the fixed point **42**: Remove the retaining element **45** and unpin the pin **44**.
- ▶ Disengage the rope **46** of the fixed point **43** from the pulley of the F-connector head **38**.

8.4.2 Fixed point SL9D2FB, SL12D2FB

NOTICE
With an installed fixed point, there is a danger of collision between the frame of the fixed point and the upper cross tube of the F-pivot section when attaching or removing of the F-jib on SL9 and SL12 booms!

- ▶ See section „Disassembling the F-jib“.

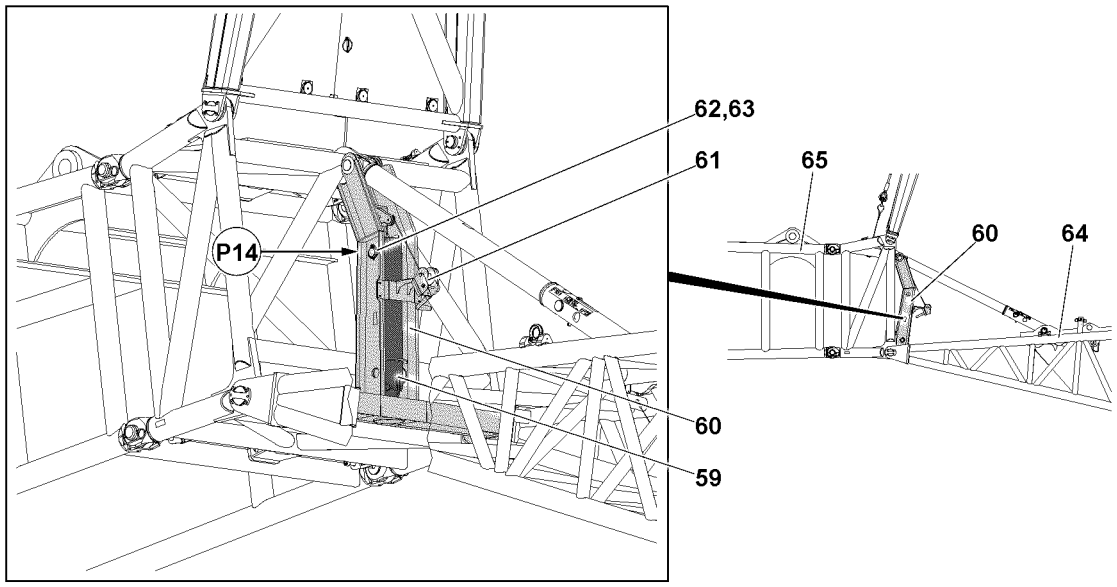

Fig.145231: Fixed point

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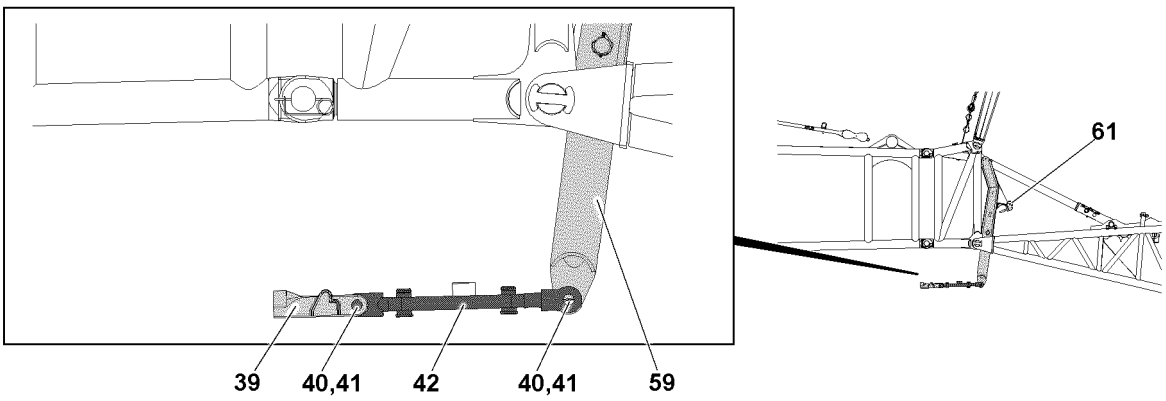

Fig.145233: Fixed point

- ▶ Disconnect the lock **39** from the pull test bracket **42**: Unpin the retaining element **41** and the pin **40**.
- ▶ Disconnect the pull test bracket **42** from the fixed point **43**: Remove the retaining element **41** and unpin the pin **40**.

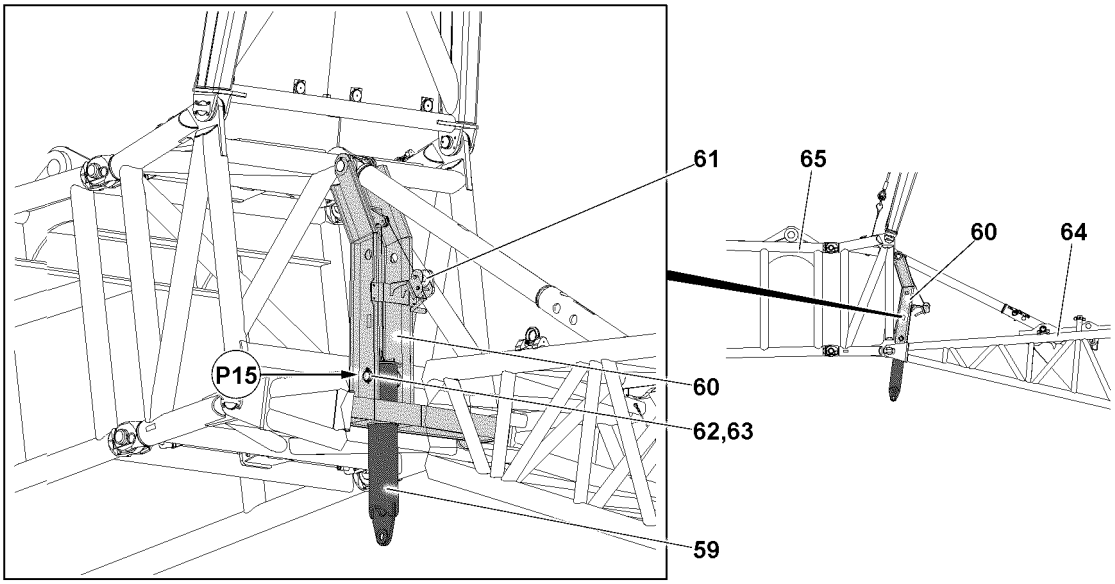

Fig.145232: Fixed point

- ▶ Release the fixed point receptacle **59** of the fixed point **60** from the operating position: Remove the retaining element **63** at point **P15** and unpin the pin **62**.
- ▶ Set the fixed point receptacle **59** in the transport position: Actuate the manual rope winch **61**.

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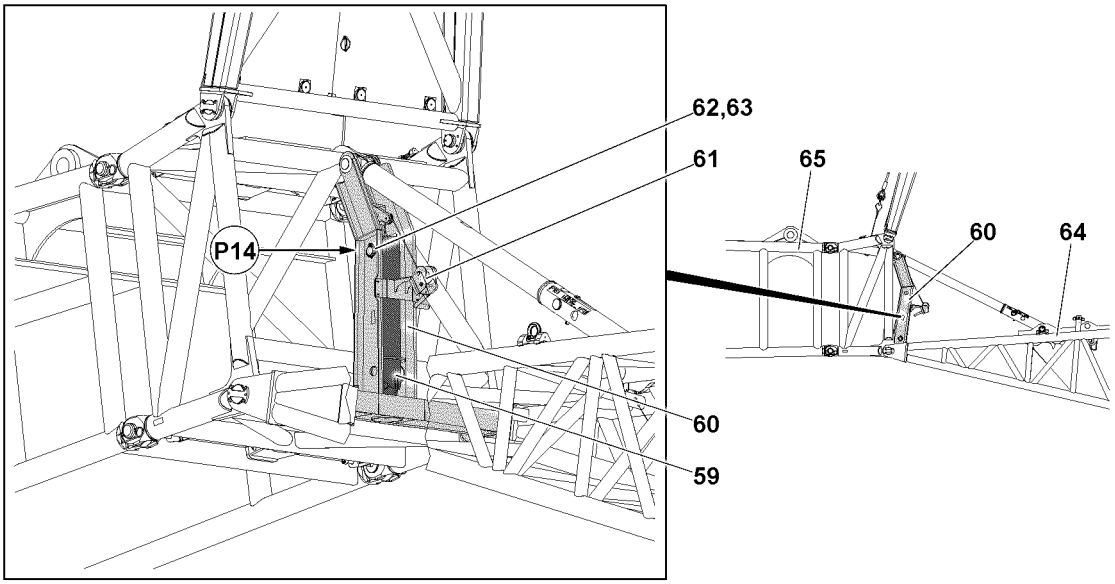

Fig.145231: Fixed point

▶ Secure the fixed point receptacle **59** in the transport position: Pin the pin **62** in point **P14** and secure with the retaining element **63**.

8.4.3 Fixed point SX3D4F2B/BW

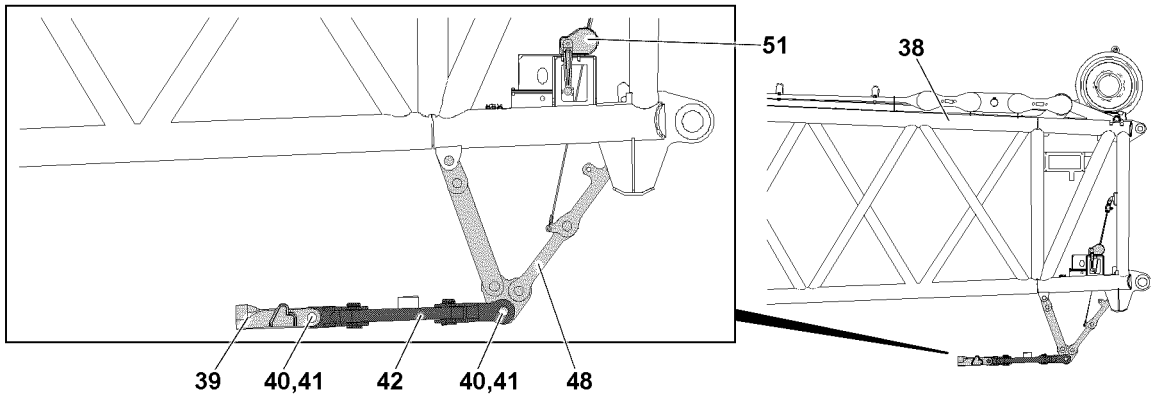

Fig.145221: Fixed point

▶ Disconnect the lock **39** from the pull test bracket **42**: Unpin the retaining element **41** and the pin **40**.
▶ Disconnect the pull test bracket **42** from the fixed point **43**: Remove the retaining element **41** and unpin the pin **40**.

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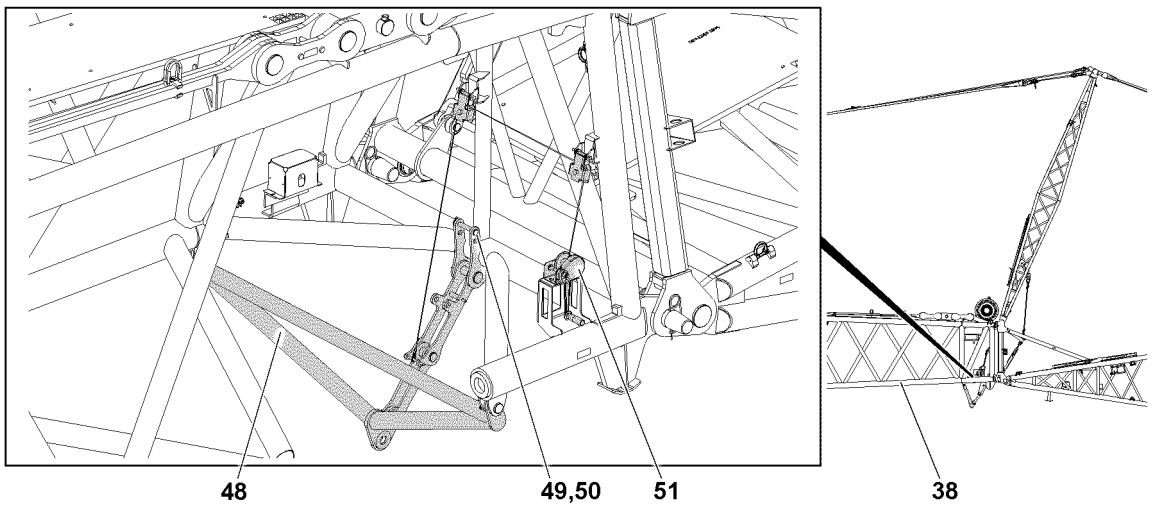

Fig.145223: Fixed point

- ▶ Unpin the pin **50** from the park position.
- ▶ Swing the fixed point **48** into the transport position: Actuate the manual rope winch **51**.

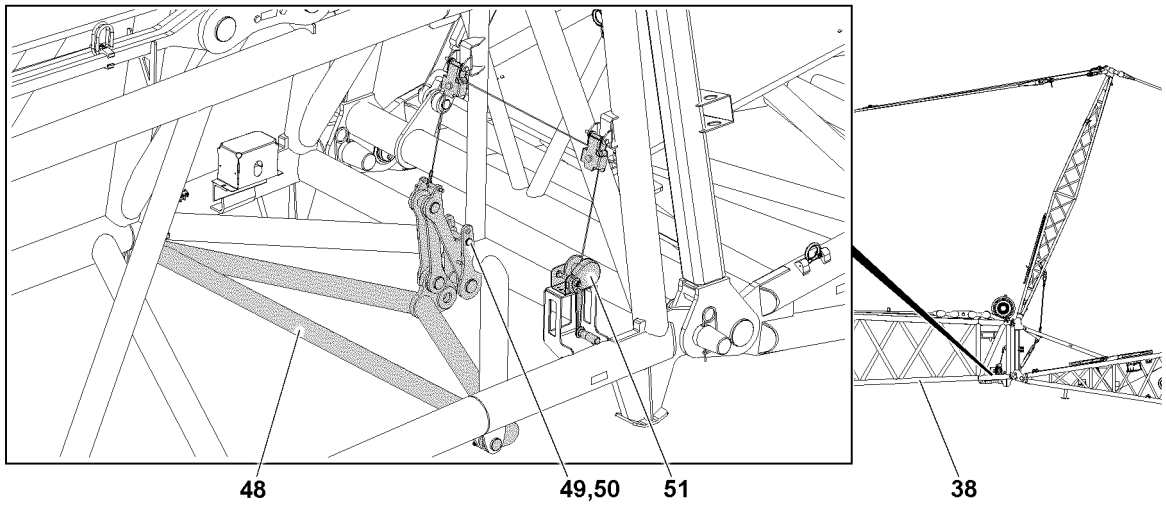

Fig.145222: Fixed point

- ▶ Secure the fixed point **48** in the transport position: Insert the pin **50** and secure it with the retaining element **49**.

8.5 Disassembling the main boom

WARNING
The boom system can suddenly fold down!
If the following conditions are not met before disassembling the boom system, the boom system can fold down.
Death, severe bodily injuries, property damage.
- ▶ Support the boom system during disassembly with suitable materials.
- ▶ During pinning and unpinning of the lattice sections, it is prohibited for anyone to remain **under** or **on** the components as well as within the entire danger zone.

Make sure that the following prerequisites are met:
- – All electrical and hydraulic connections have been disconnected.
- – The guy rods have been disassembled and taken down in the transport retainers.
- – The folding brackets are pinned and secured in the transport position.

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8.5.1 Placing winch 5 in the transport position

Make sure that the following prerequisite is met:
– The rope of winch 5 is spooled out.

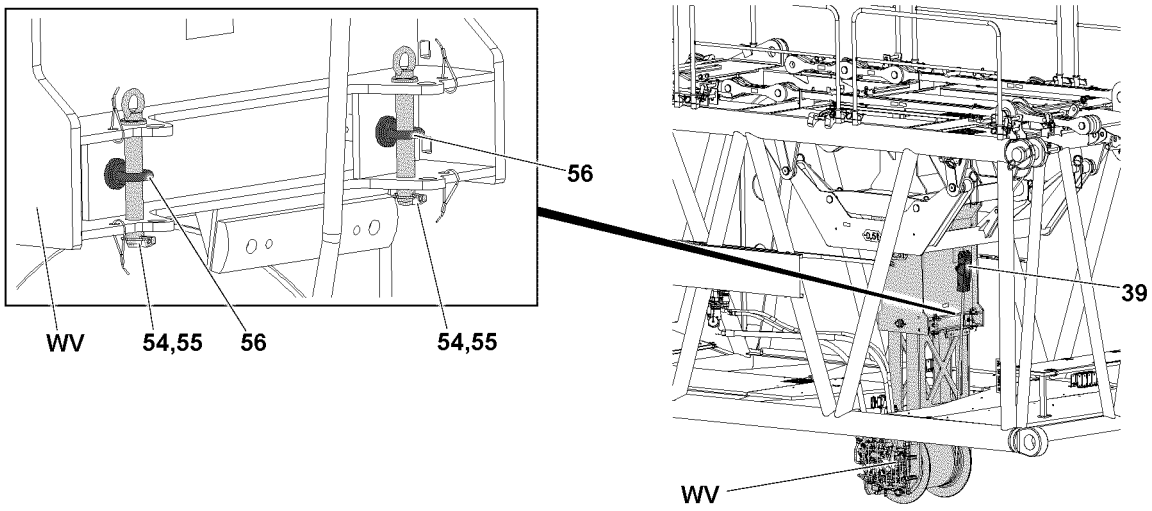

Fig.145225: Winch 5 in the transport position

▶ Pin the lock **39** in winch 5.
▶ Insert the rope of winch 5 in the lock **39** and secure.

In order to operate winch 5, the „Bypass of the seat contact“ button **71** on the master switch MS2 must be pressed, see chapter 4.01.
▶ Tension the rope of winch 5: Spool winch 5 up.
▶ Remove the retaining element **55** and unpin the retaining pin **54**.
▶ Unpin the pin **56**.

Result:

– Winch 5 is released and can be retracted.

▶ Retract winch 5: Spool up the rope from winch 5.

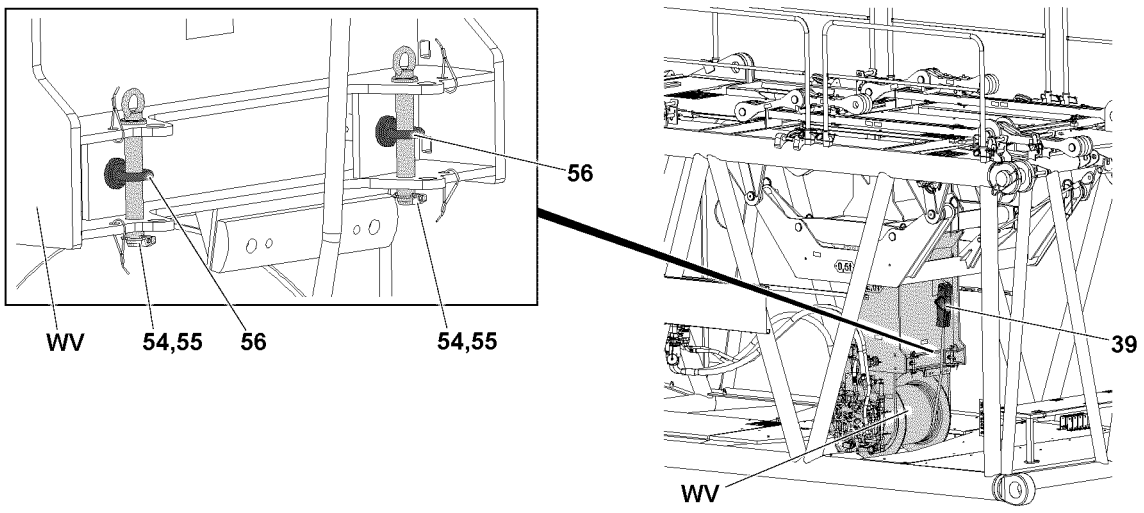

Fig.145224: Winch 5 in the operating position

▶ Retract winch 5 to the stop.
▶ Insert the pin **56**.

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Result:

– Winch 5 is secured in the transport position.

▶ Secure the pin **56**: Insert the retaining pins **54** and secure it with the retaining elements **55**.

8.5.2 Removing the main boom

WARNING
The crane can topple over!
If the following conditions are not met, the crane can topple over or be significantly damaged.
Death, severe bodily injuries, property damage.
▶ The maximum permissible total force on test point 1 (MS1) (**200 t**) may **not** be exceeded.
▶ The maximum permissible total force on test point 2 (MS3) (**138 t**) may **not** be exceeded.
▶ Lifting the following boom lengths is permissible if the maximum permissible total force on test point 1 (MS1) and test point 3 (MS3) is noted, observe the following charts.

Note
▶ The actual forces on test point 1 (MS1) and on test point 3 (MS3) are shown on the LICCON monitor 1.
▶ Tension the guying on the SA-frame with the same force as during assembly.
▶ For this, refer to the ACTUAL force at test point 1 (MS1) measured and recorded during assembly.
▶ The pins can be pulled easier and the pins and lugs are therefore not damaged.

NOTICE
Danger of property damage!
If the maximum permissible total forces are not observed when lifting the boom system for disassembly, then crane components can be severely damaged.
▶ Do not exceed the maximum permissible total forces.

Note
▶ Disassembling the boom system, see chapter 5.38 or chapter 5.39.

8.5.3 Preparing the S-pivot section for transport

Swinging the protective roller

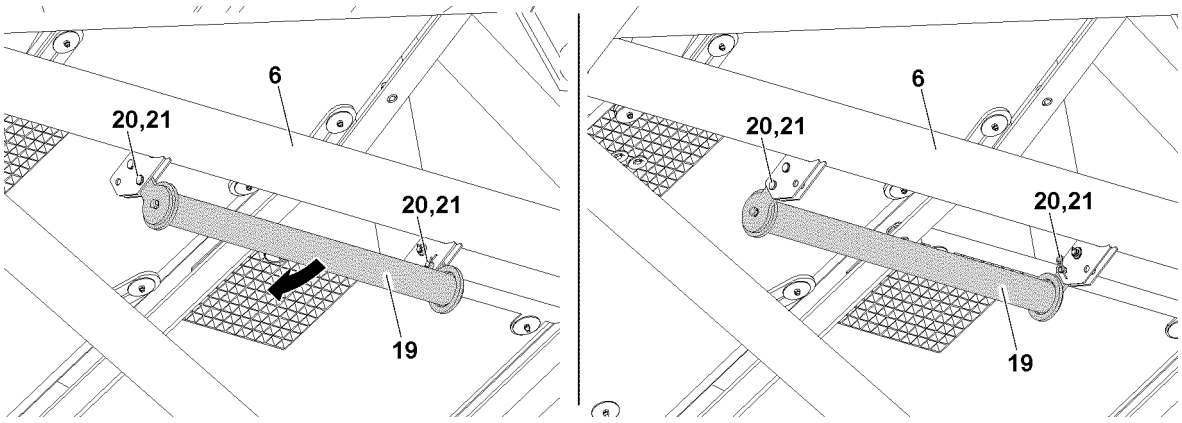

Fig.145235: Protective roller

▶ Release the protective roller **19**: Remove the retaining elements **21** and unpin the pins **20**.
▶ Swing the protective roller **19** into the transport position.
▶ Secure the protective roller **19** in the transport position: Insert the pins **20** and secure with the retaining elements **21**.

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Swinging winch 6 into the transport position

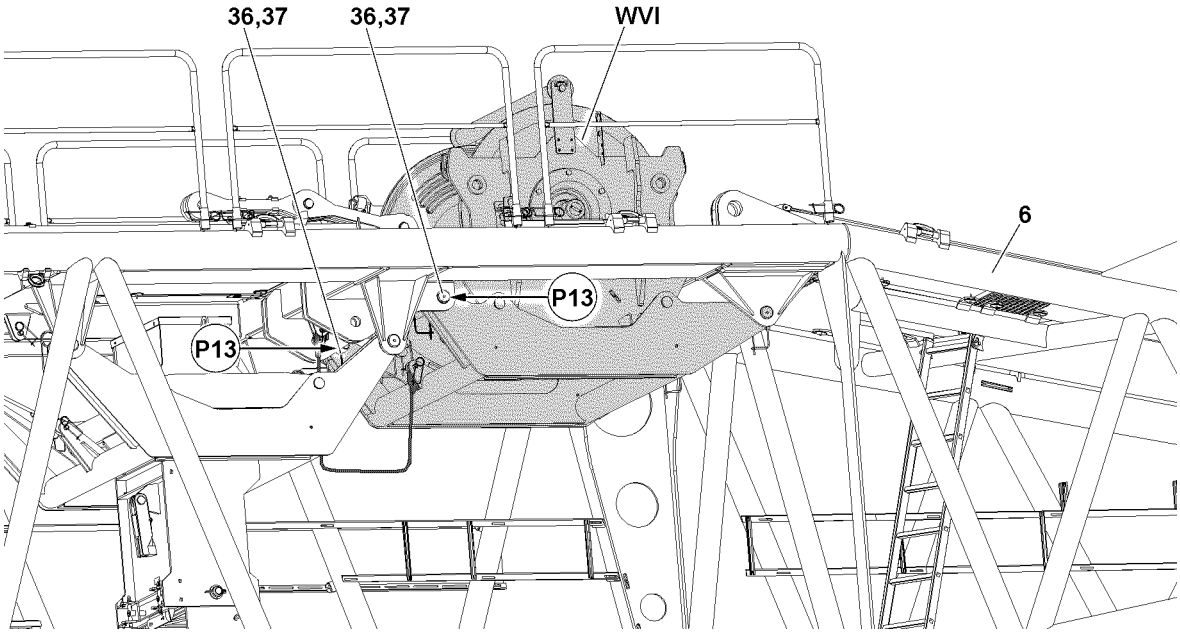

Fig.145236: Winch 6 in the operating position

WARNING
Swinging winch 6!
Winch 6 can fall down due to its own weight when unpinning it.
Death, severe bodily injuries.
- ▶ Make sure that winch 6 is held by the auxiliary crane during unpinning.
- ▶ Assembly personnel must be at the side of the assembly unit.

- ▶ Fasten winch 6 to the auxiliary crane.
- ▶ Remove the retaining element **37** at points **P13** and unpin the pins **36**.

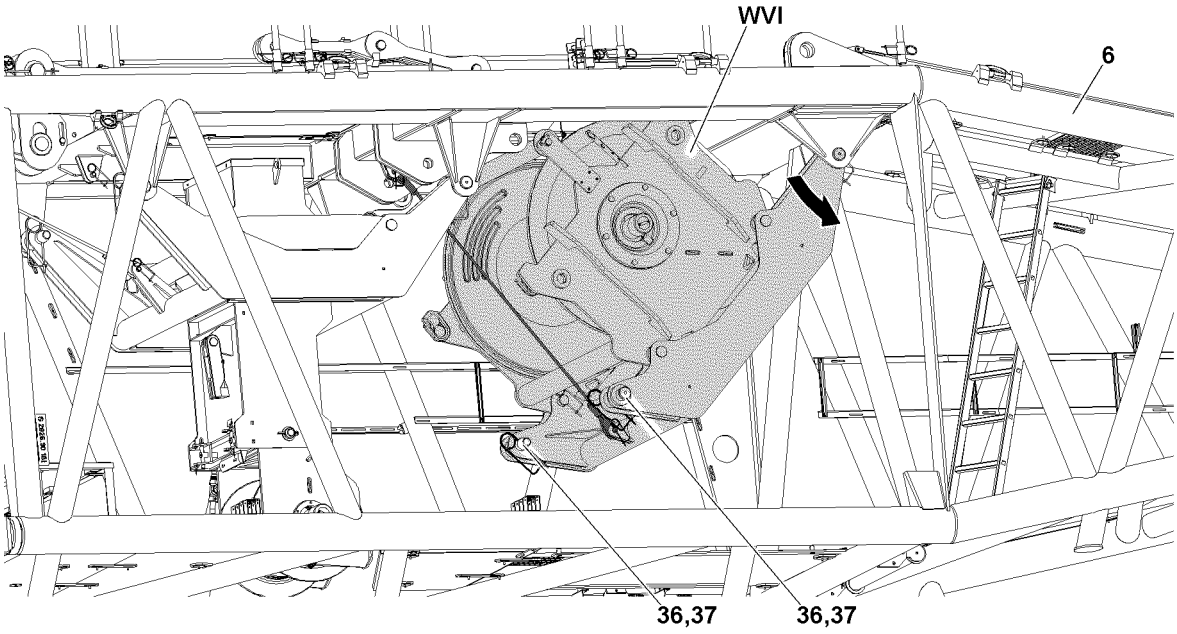

Fig.145237: Winch 6 in the transport position

- ▶ Swing winch 6 into the transport position.

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- ▶ Insert the pins **36** again on winch 6 and secure with the retaining elements **37**.
- ▶ Remove the auxiliary crane.

Assembling the catwalks

WARNING
Disassembled or incompletely assembled catwalks!
If the catwalks are not installed when the winches are missing or if the catwalks are not completely installed, then personnel can fall down.
Death, severe bodily injuries, property damage.
- ▶ For each non-assembled winch on the S-pivot section: Assemble the catwalk.
- ▶ The catwalks may only be accessed when they are pinned and secured in the operating position, check visually.

WARNING
Falling catwalk!
Catwalks that fall down by themselves can cause severe face or head injuries for assembly personnel.
Death, severe bodily injuries, property damage.
- ▶ For safety reasons, assemble the catwalks always with two persons.

S-pivot section with winches

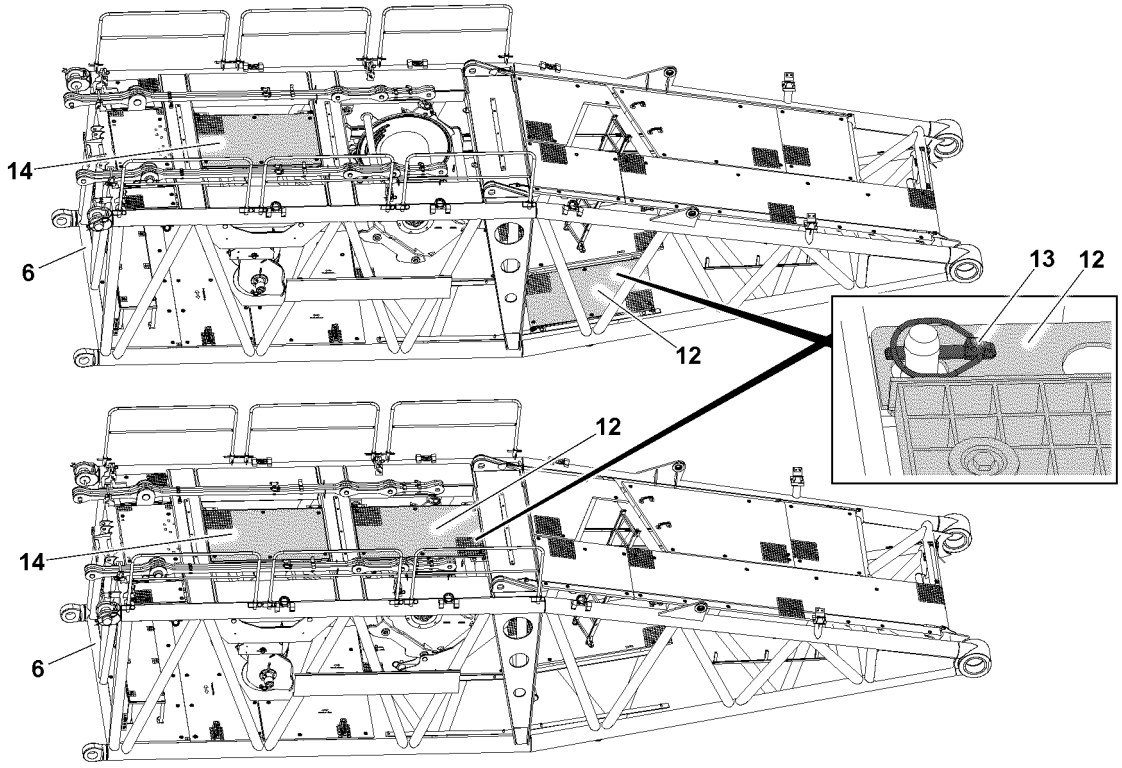

Fig.145238: Catwalks

Make sure that the following prerequisites are met:
- All railings are pinned and secured in the transport position.
- The catwalk **12** is secured in the operating position.
- The catwalk **14** is secured in the operating position.
- Winch 6 is positioned in the transport position.

- ▶ Release the catwalk **12**: Remove the retaining element **13**.
- ▶ Remove the catwalk **12** and hang it on the auxiliary crane.
- ▶ Position the catwalk **12** in the transport position.

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▶ Secure the catwalk **12** in the transport position with the retaining elements **13** and remove the auxiliary crane.

S-pivot section without winches

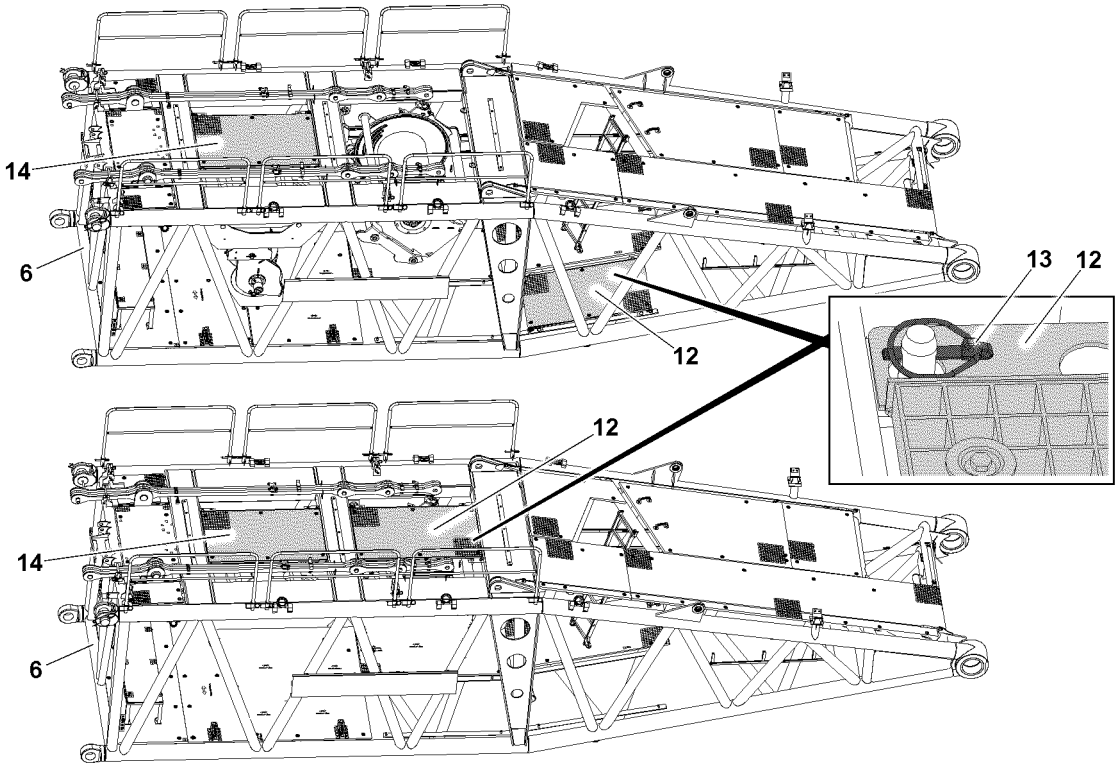

Fig.145242: Catwalks

Make sure that the following prerequisites are met:
- All railings are pinned and secured in the transport position.
- The catwalk **12** is secured in the operating position.
- The catwalk **14** is secured in the operating position.

Note

▶ The catwalk **14** is already secured in the operating position.

▶ Release the catwalk **14**: Remove the retaining element **13**.
▶ Hang the catwalk **14** on the auxiliary crane and remove.
▶ Remove winch 5, see chapter 3.09.50.
▶ Reposition the catwalk **14** in the operating position.
▶ Secure the catwalk **14** in the operating position with the retaining element **13**.
▶ Remove the auxiliary crane.
▶ Remove winch 6, see chapter 3.09.60.
▶ Release the catwalk **12** in the operating position: Remove the retaining element **13**.
▶ Remove the catwalk **12** and hang it on the auxiliary crane.
▶ Position the catwalk **12** in the transport position.
▶ Secure the catwalk **12** in the transport position with the retaining elements **13** and remove the auxiliary crane.

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Assembling the guy rods

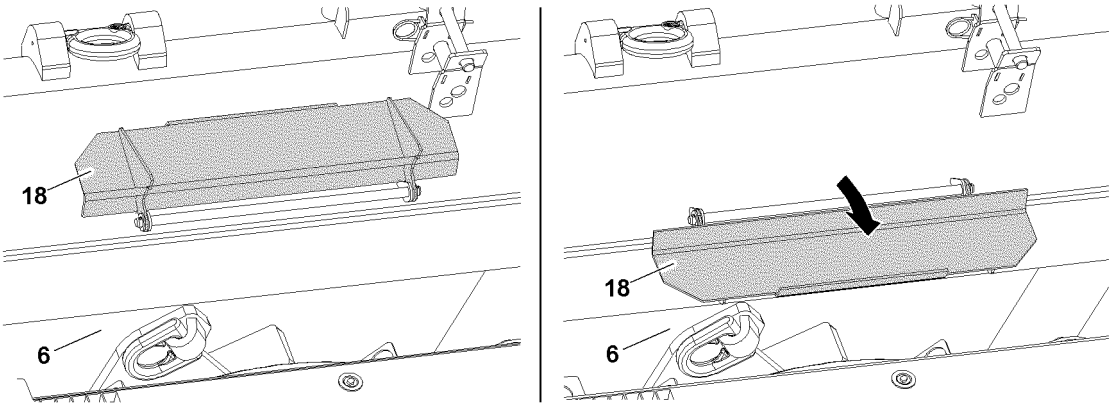

Fig.145239: Guy rod receptacles

Make sure that the following prerequisite is met:
– The catwalks are secured in the transport position.

▶ Swing the guy rod receptacles **18** in on both sides.

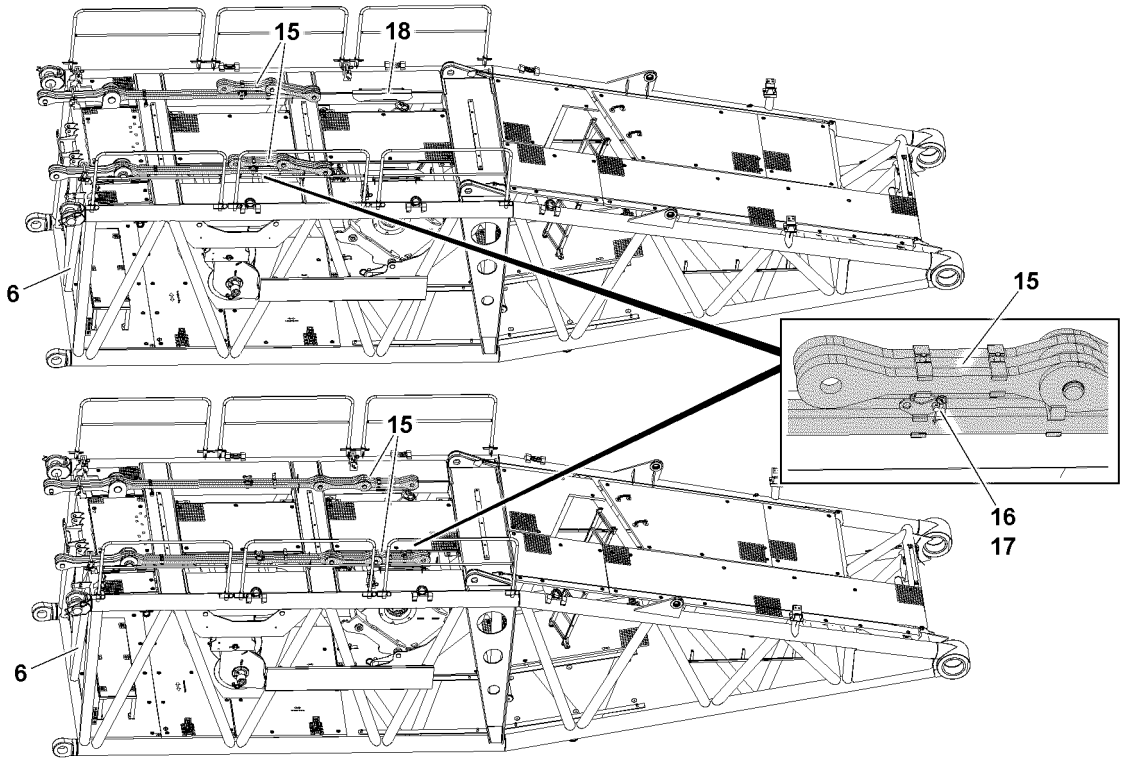

Fig.145240: Guy rods

▶ Hang the guy rods **15** on the auxiliary crane.
▶ Release the guy rods **15**: Remove the retaining element **17** and unpin the pin **16**.
▶ Swing the guy rods **15** out with the auxiliary crane and take them down on the guy rod receptacles.

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Positioning the railings on the S-pivot section in the transport position

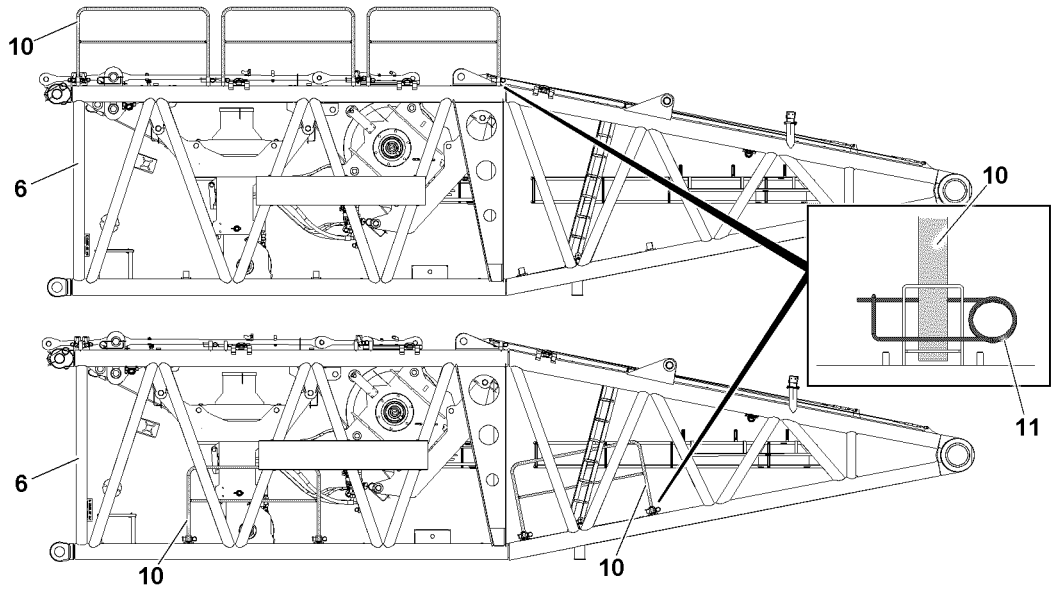

Fig.145241: Railings

WARNING
Danger of falling!
During assembly and disassembly of the railings, assembly personnel must be secured with appropriate aids to prevent them from falling.
Even during the assembly of protective equipment there is a danger of falling.
Death, severe bodily injuries, property damage.

- ▶ For assembly and disassembly work, maintenance and inspection work on the S-pivot section, all railings must be assembled and secured.
- ▶ Only step on the S-pivot section with „clean shoes“.

- ▶ Remove the railings **10** on the S-pivot section **6** from the operating position and bring them into the transport position: Insert the railing **10** into the mounting pipes and secure with the retaining element **11**.

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7 Maintenance and service

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7.01 Maintenance and service - General

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Fig.195219

1 Technical safety instructions

WARNING
Maintenance instructions **not** adhered to!
Death, severe injury, increased wear and failure of components.
- ▶ Observe the following listed safety notes and the generally applicable safety rules!
- ▶ Adhere to the maintenance intervals.
- ▶ Carry out only applicable maintenance tasks.
- ▶ Repair and maintenance tasks are to be carried out carefully.
- ▶ For aggregates and components: Follow the operating instructions of the manufacturer.

1.1 Description of intervals and tasks

Note
- ▶ Fill quantities and descriptions of service items and lubricants are specified in the Service fill.

The maintenance intervals and scope of maintenance are described in several chapters.

For crane maintenance, observe the following chapters:
- Crane operating instructions, chapter 7.02: Maintenance intervals - Crane chassis [1)]
- Crane operating instructions, chapter 7.02.50: Maintenance intervals Ballast trailer*[1)]
- Crane operating instructions, chapter 7.03: Maintenance intervals - Crane superstructure [1)]
- Crane operating instructions, chapter 7.03.50: Maintenance intervals - Crane boom [1)]
- Crane operating instructions, chapter 7.04: Maintenance instructions - Crane chassis [2)]
- Crane operating instructions, chapter 7.04.50: Ballast trailer maintenance instructions [2)]
- Crane operating instructions, chapter 7.05: Maintenance instructions - Crane superstructure [2)]
- Crane operating instructions, chapter 7.05.50: Crane boom maintenance instructions [2)]
- Crane operating instructions, chapter 7.06: Fill quantities, lubrication chart
- Crane operating instructions, chapter 7.07: Operating fluids and lubricants

[1)] These chapters contain a list of maintenance intervals for all maintenance tasks.
[2)] For aggregates, observe and adhere to additionally to the instructions of the manufacturer.

1.2 Definition of „Checking“

The action of „Checking“ includes all required task in connection with the maintenance, for example:
- Determining a specified value
- Cleaning
- Adjusting
- Refilling
- Replacing

1.3 Maintenance intervals

Use the following rules for interval determination:
- Carry out maintenance and inspection tasks on the crane chassis after reaching the specified driven mileage, operating hours or calendar intervals. The interval which occurs first is the deciding factor.
- Carry out maintenance and inspection tasks on the crane superstructure after reaching the specified operating hours or calendar intervals. The interval which occurs first is the deciding factor.
- The maintenance intervals complement each other. If a higher interval is coming up, then carry out the tasks according to the lower interval also.

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1.4 Securing against operation

WARNING
Impermissible travel or crane operation during maintenance or repair tasks!
Death, severe injury, severe property damage.
- ▶ Make sure that travel and crane operation is not possible during maintenance and repair tasks.
- ▶ Show clearly with signs that maintenance or repair tasks are being carried out on the mobile crane.
- ▶ Use signs which show without a doubt that it is prohibited to drive and operate the crane.
- ▶ Adhere to the national regulations regarding tagging on mobile crane and signs.
- ▶ Turn the engine on the crane superstructure and the crane chassis off!
- ▶ Apply the „parking brake crane chassis“.

If possible:
- ▶ Lock the driver's cab and the crane cab.
- ▶ Hand the ignition key from the crane superstructure and the crane chassis to an authorized person.

1.5 Personnel

WARNING
Unauthorized and **untrained** expert personnel!
Improper maintenance, personal injury, property damage.
- ▶ Observe and follow the personnel requirements for the respective maintenance task.

If there are no personnel requirements:
- ▶ The crane operator can perform the maintenance task.
- ▶ Have the repair tasks performed exclusively by authorized and trained expert personnel.
- ▶ Make sure that only authorized persons are within the danger zone.

Maintenance tasks may only be carried out by expert, authorized and trained employees.

An expert is someone who possesses the required expert knowledge for performing a certain task. Requirements regarding the technical qualification depends on the type of task.

Requirements regarding the technical qualification of a person:
- – Corresponding professional training.
- – Professional experience or a currently performed corresponding professional activity.
- – Participation in training to keep the expert knowledge up to date.

1.6 Securing against falls

WARNING
Personnel is **not** secured against falls!
During maintenance tasks on the crane superstructure or boom, personnel must be secured with appropriate safety measures to prevent them from falling. If this is **not** observed, working personnel can fall and be killed or severely injured.
- ▶ For all tasks on the crane where there is a danger of falling, take suitable safety measures.
- ▶ The crane superstructure or the boom may **not** be accessed without suitable aids.
- ▶ Suitable aids are, for example: Lifting platforms, scaffoldings, ladders, assembly platforms, auxiliary crane.
- ▶ If railings are present on the crane superstructure, then they must be swung into operating position and secured for all tasks. See the Crane operating instructions, chapter 2.06.
- ▶ Only step on such aids with clean shoes.
- ▶ Keep aids clean, free of snow and ice.
- ▶ If tasks cannot be carried out using these aids or from the ground, then the maintenance personnel must be protected from falling using approved fall arrest systems. See the Crane operating instructions, chapter 2.04.
- ▶ It is prohibited to step on the driver's cab or cab roof and specially marked surfaces. See the Crane operating instructions, chapter 2.05.

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WARNING
Dirty slip-resistant mats!
Fall
- ▶ Keep slip-resistant mats clean and free of snow and ice!
- ▶ Only step on slip-resistant mats with clean shoes!
- ▶ Replace or renew missing or damaged slip-resistant mats!

1.7 Preventing fires

WARNING
Excess fuel, excess oil in engine compartment during operation!
Death, severe injury, fire damage.
- ▶ Check the diesel engine after repairs and Service tasks but also in regular intervals for leaking oil and fuel.
- ▶ Make sure that the V-area of the Diesel engine is free of oil and fuel.
- ▶ Do **not** spill any service fluids over the hot components.

WARNING
Disregard of general safety regulations during tasks on the fuel system or on the electrical system!
Severe burns, fire damage.
- ▶ Disconnect the battery from the power supply.
- ▶ Do **not** smoke.
- ▶ Do **not** work near open flames.
- ▶ Keep a functioning fire extinguisher ready.

WARNING
Sound insulation mats are contaminated with fuel, engine oil, gear oil, hydraulic oil or solvents!
The sound insulation mats can ignite. Severe burns, fire damage.
- ▶ Remove any polluted sound insulation mats **immediately** and **replace immediately** with **Original Liebherr spare parts**.

If there are sound insulation mats around the starter on the chassis:
- ▶ **Immediately** remove the part of the insulation mats in an area of 0,5 m around the starter. Do **not** replace the sound insulation mats.

If there are sound insulation mats in the engine compartment cover on the superstructure:
- ▶ Remove sound insulation mats **immediately** and do **not** replace them.
- ▶ In addition, observe the section „Sound insulation mats“.

1.8 Protecting from burns

WARNING
Hot surfaces!
Severe burns.
- ▶ Let any components to be maintained or inspected cool off.
- ▶ Let hot components cool off.
- ▶ Avoid contact with hands and skin.
- ▶ Wear personal protective equipment and suitable protective gloves.

WARNING
Hot Service fluids!
Severe burns.
- ▶ Let hot service fluids cool off.
- ▶ Avoid contact with hands, skin and eyes.
- ▶ Wear safety glasses.
- ▶ Wear personal protective equipment and suitable protective gloves.

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WARNING
Electric short circuit!
Severe burns.
- ▶ Prevent short circuits in the electrical system, especially on the battery.
- ▶ Replace or change missing or defective protective insulation.

1.9 Protecting from scalding

WARNING
Cooling system is pressurized!
When the coolant reservoir is opened, hot coolant can escape explosively.
Severe scalding.

When the engine is warm:
- ▶ Do **not** open the cover of the coolant reservoir.
- ▶ To protect face, hands and arms from hot steam of hot coolant, cover the cap with a large rag when opening.

1.10 Rotating parts

WARNING
Rotating parts, ignition system on running engine!
The cooler fan can turn on suddenly.
Death, severe injury.
- ▶ Proceed especially careful.
- ▶ Do **not** reach into rotating parts.
- ▶ Never reach into the cooler fan when the engine is warm.

1.11 Protecting from aggressive environmental conditions

NOTICE
Aggressive environmental conditions!
When using cranes under aggressive environmental conditions, for example at places with maritime climates and particularly salty air, hydraulic cylinders can corrode and thereby be destroyed or severely damaged.
Elaborate and expensive repairs.

If the crane is taken out of operation for an extended period of time:
- ▶ Take down the crane.
- ▶ Fully retract all crane hydraulic cylinders.

When hydraulic cylinders can **not** be retracted completely:
- ▶ Protect exposed areas of the piston rod from corrosion, for example with grease.
- ▶ Grease any exposed areas on the piston rods, for example on luffing cylinders and ballasting cylinders, especially carefully.

1.12 Use of suitable operating fluids

WARNING
Operating fluids **not** suitable for ambient temperature!
Death, severe injuries, property damage.
- ▶ Adjust the operating fluids in time to the ambient temperatures.

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1.13 Replacing damaged crane components

WARNING
Damaged crane components **not** replaced!
Death, severe injury, failure of components.
- ▶ Maintain crane components according to the data in the maintenance intervals, the maintenance guidelines and the chart for service items and lubricants.
- ▶ Replace damaged crane components immediately.

1.14 After replacement of components

Type of oil, see data tag and supplied „Service fill“.

The following instructions must be observed when replacing components such as engine, gear or axle:

WARNING
Maintenance of a replaced component **not** carried out!
- ▶ Before start up, be sure to refill with the correct type of oil to the center of the minimum / maximum mark.
- ▶ Carry out first maintenance. See chapter „Maintenance intervals“.
- ▶ Adhere to regular maintenance intervals.
- ▶ Follow the break-in instructions. See the Crane operating instructions, chapter 2.02.

1.15 Tire size

When changing certain tire sizes, the mobile crane must be modified.

Contact Liebherr customer service to change the following tire sizes:
- From 385/95 R 25 to 445/95 R 25
- From 385/95 R 25 to 525/80 R 25
- From 445/95 R 25 to 385/95 R 25
- From 525/80 R 25 to 385/95 R 25

2 Warranty and coverage

NOTICE
Maintenance intervals and maintenance guidelines **not** adhered to, impermissible lubricants used!
Damage, failure of crane components.
The warranty for the respective crane component is voided.
- ▶ Maintain crane components according to the data in the maintenance intervals, the maintenance guidelines and the chart for service items and lubricants.

NOTICE
Not using Original Liebherr spare parts and **not** using Original Liebherr Service items!
In the event that replacement parts are used that are **not** Original Liebherr replacement parts and **not** Original Liebherr service items and lubricants, Liebherr-Werk Ehingen GmbH disclaims all liability for system functionality as well as for the parts.
- ▶ Use exclusively Original Liebherr spare parts.

Note
- ▶ Original Liebherr replacement parts have been tested for crane operation and may be used without risking safety.

The buyer in entitled to warranty or coverage only:
- when exclusively Original Liebherr spare parts are used.

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– when Liebherr Service items and Liebherr lubricants are used for the Liebherr crane.

3 Liebherr Service

Liebherr mobile cranes, whether truck-mounted, mobile or crawler cranes - are technically advanced products, which prove their worth daily even under tough conditions.

The high technical standards of these cranes provide functional security, resistance to failure and ease of maintenance.

Liebherr is continuously developing the drive and control components. The combination of well proven units and modern manufacturing methods produces cranes that are safe to operate and easy to maintain.

Several hundred cranes are built every year for the international market, supported by international service.

Liebherr's „After Sales Service“ plays an important role at Liebherr in ensuring operational readiness and high crane availability.

With Liebherr, Service begins when the crane is handed over. Your crane operators will be professionally trained in line with their level of knowledge and we devote much time to this.

We also train your workshop staff in all crane-specific matters, because we know that they can deal with more than just minor repairs themselves. Often there are specialists who can quickly and reliably carry out crane repairs.

We have special service advisers available who will solve any problems you may have. This phone contact saves time and money. You should take advantage of it as soon as possible.

Our service technicians are specialists with years of experience, who can be deployed from local support points. Naturally these experts have specialized knowledge and special tools.

But before you call these specialists, it is worth making use of the facilities for getting advice mentioned above.

4 Taking an oil sample

Note

- ▶ Liebherr recommends taking oil samples for the gears, engines and hydraulic system in regular intervals.
- ▶ Based on the trend analysis of the oil analysis results, changes can be determined in the lubricity of the oil and increased component wear.

WARNING

Tasks on components and operating fluids at operating temperature!
Burns.

- ▶ Carry out all tasks with utmost caution.
- ▶ Wear protective clothing.

Make sure that the following prerequisites are met:

– Oil has a normal operating temperature

- ▶ Always take oil in the same location.
- ▶ Take oil always according to the same method.
- ▶ Do **not** take oil right after an oil change.
- ▶ Do **not** take oil immediately after larger amounts of oil have been added.

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Note
Recommendation:
▶ Fill oil into original laboratory sample containers.

▶ Fill oil exclusively in a clean and dry sample container.

5 Cleaning

5.1 Exhaust system

NOTICE
Ingress of water, steam or cleaning substances into the SCR-module!
Sensors for exhaust aftertreatment can be destroyed, the coating of the SCR catalytic converter can be washed off.
▶ Before cleaning, let the SCR system cool off (surface temperature 50 °C).
▶ Before cleaning, cover all openings.
▶ Make sure that **no** fluids and **no** dirt gets into the tailpipe opening of the SCR module.
▶ During cleaning, keep sufficient distance to the tailpipe opening.

5.2 Sound insulation mats

NOTICE
Improper cleaning (tools or cleaning methods)!
Sound insulation mats can be destroyed or damaged.
▶ Remove severe contamination with suitable tools, for example with soft plastic scrapers.
▶ Do **not** use tools with sharp edges.
▶ Use steam cleaners **exclusively** with extreme caution and with a sufficient distance to the sound insulation mats and with low water pressure.
▶ Do **not** use solvents for cleaning.

If sound insulation mats are contaminated with fuel, engine oil, gear oil, hydraulic oil or solvents:
▶ Observe section „Preventing fires“.

5.3 Slip-resistant mats

▶ Before every access: Check the slip-resistant mats for slip resistance and cleanliness.
▶ If dirty: Clean the slip-resistant mats with a brush with hard plastic bristles.
▶ For cleaning the surfaces, use commercially available cleaners.
▶ Flush with water.

5.4 Driver's cab and crane cab

Note
▶ The steering wheel, center console, instrument panel cover, floor covering and dirty upholstery in the driver's cab and the crane cab should only be cleaned with warm water mixed with dishwashing detergent!
▶ Do not use any scouring agents!

5.5 Ladders

▶ Remove any dirt on the ladders.
▶ Make sure that the grooves on the rungs are free of dirt.

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6 Disposal

6.1 Operating fluids and lubricants

WARNING
Operating items and lubricants are dangerous waste products!
- ▶ Dispose of operating fluids and lubricants separately.
- ▶ Service items and lubricants may **not** be disposed of in the ground, bodies of waters, wastewater systems, sewers or in the groundwater.
- ▶ Dispose of operating items and lubricants in an environmentally safe manner.
- ▶ When disposing operating items and lubricants observe and follow the valid regulations of the relevant authorities.

Service items and lubricants are:
- – Fuels
- – Coolant
- – Urea
- – Engine oils, gear oils
- – Hydraulic fluids
- – Brake fluids
- – Window washer concentrate
- – Greases

6.2 Batteries

WARNING
Batteries contain harmful substances!
- ▶ Do **not** dispose of batteries in regular household trash.
- ▶ Collect batteries separately and send them for environmentally safe disposal.
- ▶ Leave batteries at a qualified workshop or at a collection points for used batteries.

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7.02 Maintenance intervals - Crane chassis

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1 Maintenance and inspection schedule

Note

- ▶ Carry out maintenance work after reaching the specified driven mileage, operating hours or calendar intervals. The interval which occurs first is the deciding factor!
- ▶ The maintenance intervals complement each other. If a higher interval is coming up, then carry out the work according to the lower interval also!

First maintenance after	Operating hour intervals or driven mileage			Calendar intervals			Work to be carried out	O.K.
	250 h 5000 km	500 h 10000 km	1000 h 20000 km	Daily	Weekly	Annually		
Safety systems								□
						X	Personal protective equipment Follow the instructions of the manufacturer	
						X	Height rescue system Follow the instructions of the manufacturer	
Fall protection equipment								□
						X	Check protection points	
						X	Check safety ropes	
						X	Check the ladders for technically immaculate condition	
						X	Check railings, steps and pedestals for safe function	
						X	Check catwalks and open mesh flooring for safe function	
Crane surface								□
					X		Check accessible surfaces for cleanliness	
						X	Check accessible surfaces for completeness and slip resistance	
						X	Check labels for completeness and legibility	
Rigging and fastening points								□
				X [2)]			Check condition and mounting	
						X	Check for continued suitability by an authorized inspector, inspection expert	

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First maintenance after	Operating hour intervals or driven mileage			Calendar intervals			Work to be carried out	O.K.
	250 h 5000 km	500 h 10000 km	1000 h 20000 km	Daily	Weekly	Annually		
Diesel engine								□
				X			Check the oil level For all other maintenance tasks, observe the instructions of the engine manufacturer	
Cooling system								□
				X			Check the coolant level in the expansion tank	
			6000 h			Every 4 years	Replace the coolant if filled with **Liebherr Antifreeze OS Mix**	
			3000 h			Every 2 years	Replacing the coolant	
SCR Exhaust aftertreatment								□
			4500 h			Every 2 years	Replace foam and filter element of urea pump	
Engine independent heater (auxiliary heater)								□
				X			Check the fluid level in the expansion tank	
					Every 4 weeks [7]		Operate and check the function for 10 minutes with the engine cold and the highest fan stage	
					X [8]		Operate and burn-free for 15 minutes with the engine cold and the highest fan stage	
						X	Carry out maintenance work before and after every heating period	
						Every 2 years	Replace the fluid for the heating system	
Air filter								□
				X			Check monitoring device	
						X	Clean, change the filter insert Observe the instructions of the engine manufacturer	
Receptacle frame telescopic boom								□
	X						Grease	

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First maintenance after	Operating hour intervals or driven mileage			Calendar intervals			Work to be carried out	O.K.
	250 h 5000 km	500 h 10000 km	1000 h 20000 km	Daily	Weekly	Annually		
Hydraulic system								□
					X		Check hydraulic system for leaks	
					X		Hydraulic tank check the oil level	
500 h			X			X	Check hydraulic oil, required degree of purity: 20/18/15 Take oil sample and have it tested by oil supplier	
100 h		X					Replace bleeder filter of hydraulic tank	
100 h		X					Replace the return filter	
100 h		X					Replace oil filter insert	
			X				Check hydraulic pressure, readjust, if necessary	
Hydraulic hose lines								□
				X			Check for leaks and damage	
						X	Check for a safe condition by an authorized inspector, inspection expert	
Steering								□
	X						Check that steering gear and tie rods are firmly attached, check cotter pin	
				X			Check hydraulic steering system for leaks	
				X			Check hydraulic hoses for leaks and damage	
	X [1)]						Check track alignment, readjust, if necessary	
100 h		X					Replace pressure filter insert	
			X				Check hydraulic steering stop, adjust if necessary	
				X [6)]	X		Support the crane. Deflect the steering wheel in steering program 2 and 3 with maximum steering deflection to the right and left.	
					Every 2 weeks		Spray steering uncoupling LTC 1045-3.1, LTC 1050-3.1	
Hydraulic fan								□
100 h		X					Replace pressure filter insert of hydraulic fan	

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First maintenance after	Operating hour intervals or driven mileage			Calendar intervals			Work to be carried out	O.K.
	250 h 5000 km	500 h 10000 km	1000 h 20000 km	Daily	Weekly	Annually		
Hydraulic supports								□
	X						Check sliding beam for ease of movement, grease	
	X						Check sliding beam cables	
					X		Grease sliding beam cylinder mounting pins	
						Every 3 months	Lubricate bearing points of the swingable sliding beams (folding beams)	
					X		Check sight gauge, adjust if necessary	
	X					X	Check sensor and reflector of the optical sliding beam monitoring for dirt, clean if necessary	
						X	Have the extension conditions of the sliding beams 0 % and 100 % checked by an authorized inspector, inspection expert	
Axle suspension								□
	X						Function test as blocking cylinder	
			X [4)]			X [4)]	Check pressure accumulator pretension pressure (nitrogen)	
Automatic transmission								□
				X			Check the oil level	
				X			Check oil pressure	
				X			Check operating temperature	
					X		Check for leaks	
	X						Check mounting screws, retighten if necessary	
100 h			X			X	Oil change	
100 h			X			X	Replace oil filter	
Powershift transmission								□
					X		Check the oil level	
					X		Check for leaks	
100 h		X				X	Oil change	
100 h		X				X	Replace oil filter	

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First maintenance after	Operating hour intervals or driven mileage			Calendar intervals			Work to be carried out	O.K.
	250 h 5000 km	500 h 10000 km	1000 h 20000 km	Daily	Weekly	Annually		
Automated shift transmission AS-Tronic, Traxon								□
					X		Check the oil level	
					X		Check for leaks	
						Every 3 years [5)]	Oil change	
						Every 3 years [5)]	Replace oil filter	
Torque converter coupling TC 2								□
					X		Check the oil level	
					X		Check for leaks	
						X	Oil change	
						X	Replace oil filter	
Torque converter coupling TC HD								□
					X		Check the oil level	
					X		Check for leaks	
						Every 3 years [5)]	Oil change	
						Every 3 years [5)]	Replace suction filter	
						Every 3 years [5)]	Replace the pressure filter	
Displacement gear								□
					X		Check for leaks	
	X						Check mounting	
1000 km			X			X	Oil change	

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First maintenance after	Operating hour intervals or driven mileage 250 h 5000 km	500 h 10000 km	1000 h 20000 km	Calendar intervals Daily	Weekly	Annually	Work to be carried out	O.K.
Distributor gear								□
1000 km			X			X	Oil change	
					X		Check the oil level	
				X			Check for leaks	
	X						Check mounting screws, retighten if necessary	
					X		Check the transfer function of road gear / off-road gear	
					X		Check all-wheel drive enabling function	
				Every 2 years			Have the tachograph checked	
			X			X	Clean breather nipple	
Hydrostatic travel drive								□
				X			Check hydraulic hoses for leaks and damage	
100 h		X					Clean filter insert	
			X				Replacing the filter insert	
Pump distributor gear								□
					X		Check for leaks	
	X						Check mounting	
200 h			X			X	Oil change	
Miter gear crane drive								□
					X		Check for leaks	
	X						Check mounting	
100 h			1500 h			X	Oil change	

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First maintenance after	Operating hour intervals or driven mileage			Calendar intervals			Work to be carried out	O.K.
	250 h 5000 km	500 h 10000 km	1000 h 20000 km	Daily	Weekly	Annually		
Gear shafts and bearing block								□
100 km			25000 km			Every 6 months	Check flange screws, retighten if necessary	
			25000 km			Every 6 months	Visual inspection of gear shafts	
			25000 km			Every 6 months	Visually check the intermediate shaft bearing and bearing block	
			100000 km			Every 2 years	Lubricate gear bearings, if they can be lubricated	
			100000 km			Every 2 years	Lubricate length compensation, if it can be lubricated	
Drive shafts between the engine and transmission or transmission and distributor gear **Notice:** These checks should only be carried out by authorized and trained expert personnel!								
			100000 km			Every 2 years	Check resistance or play in joint by manually bending it after removal	
			100000 km			Every 2 years	Check length compensation for impermissible bending play after removal. Replace the gear shaft if the bending play exceeds 0.17 mm.	
Axle, driven								□
				X			Check for leaks	
	X						Oil level checks at axle housing, differential housing and wheel hubs	
			10000 km			X	Grease king pin bearings	
	X						Check mounting	
1000 km			X			Every 2 years	Oil change	
						Every 2 years	Replace wheel bearing grease filling, if lubricated with grease	
			X			X	Clean breather nipple on axle housing	
Axles, non-driven								□
			10000 km			X	Grease king pin bearings	
	X						Check mounting	
			X			X	Replace wheel hub grease filling	
			X			X	Adjust wheel bearings	

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First maintenance after	Operating hour intervals or driven mileage			Calendar intervals			Work to be carried out	O.K.
	250 h 5000 km	500 h 10000 km	1000 h 20000 km	Daily	Weekly	Annually		
Electrical system								□
				X			Check vehicle lighting for function	
						X	Cable connections	
					Every 6 months [3)]		Service the batteries	
					Every 6 months [3)]		Empty the acid container	
Fuel system								□
				X			Check for leaks	
		X				X	Check condition and mounting	
		X				X	Drain off water and sediments	
		X				X	Clean preliminary filter for auxiliary fuel pump	
	Every 50 h						Check fuel preliminary filter, drain off water if necessary	
			X				Replace preliminary fuel filter	
Tires								□
					X		Check for external damage	
					X		Check the tire pressure	
				X			Check profile wear and depth Observe the regulations as stipulated by law	
100 km	X						Check lug nuts for tight seating, retighten if necessary	
Brake system								□
						X	Check brake system	
	X						Check brake lining thickness	
	X						Brakes, readjust if necessary	
	X						Brake pads, replace if necessary	
	X						Check the brake discs	
	X						Check the brake drums	
				X			Check function of parking brake and service brake	

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First maintenance after	Operating hour intervals or driven mileage			Calendar intervals			Work to be carried out	O.K.
	250 h 5000 km	500 h 10000 km	1000 h 20000 km	Daily	Weekly	Annually		
Eddy current retarder								□
5000 km		X				X	Check mechanical and electrical parts Follow the instructions of the manufacturer	
Compressed air system								□
					X		Check for leaks	
				X			Check operating pressure of brake system	
				X			Check shut off pressure	
						X	Drain air pressure tank	
						X	Replace air dryer granular cartridges	
						X	Clean air dryer preliminary filter	
Driver's cab								□
				X			Check instruments for function	
				X			Check indicator lights for function	
				X			Check engine brake actuation	
				X			Check retarder actuation	
					Every 2 weeks		Grease glide shoes of cab guide on vehicle frame LTC 1045-3.1, LTC 1050-3.1	
Window washing bays, camera washing bays								□
				X			Check the fluid level in the reservoir for the washing bays	
Emergency control								□
						X	Check for correct function	
Support plates with equalization								□
						X	Replace the grease filling, if not self-lubricating	
						X	Perform function test	

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First maintenance after	Operating hour intervals or driven mileage			Calendar intervals			Work to be carried out	O.K.
	250 h 5000 km	500 h 10000 km	1000 h 20000 km	Daily	Weekly	Annually		
Pin connections								□
						Every 2 months [9]	Check the retainer of the pin connections	
						Every 2 months [9]	Check the pins and / or connector elements for damage, visual inspection	
						Every 2 months [9]	Check the retaining elements for damage, visual inspection	

[1] every 500 km to 2000 km for frequent off-road driving.
[2] at least 1x a year for frequent off-road driving
[3] in hot climate zones: every 3 months
[4] observe and comply with the maintenance instructions - Crane chassis in chapter 7.04
[5] only when using ZF-Ecofluid M, otherwise observe and comply with the list of lubricants TE-ML 02
[6] in winter: when salt is used or near the ocean
[7] outside of the heating period
[8] during the heating period
[9] for cranes used for a long period of time

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7.03 Maintenance intervals - Crane superstructure

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Fig.195219

1 Maintenance and inspection schedule

Note

- ▶ Carry out maintenance work after reaching the specified operating hours or calendar intervals. The interval which occurs first is the deciding factor!
- ▶ The maintenance intervals complement each other. If a higher interval is coming up, then carry out the work according to the lower interval also!

First maintenance after	Operating hour intervals 250 h	500 h	1000 h	Calendar intervals Daily	Weekly	Annually	Work to be carried out	O.K.
Safety systems								□
						X	Personal protective equipment Follow the instructions of the manufacturer	
						X	Height rescue system Follow the instructions of the manufacturer	
Fall protection equipment								□
						X	Check protection points	
						X	Check safety ropes	
						X	Check the ladders for technically immaculate condition	
						X	Check railings, steps and pedestals for safe function	
						X	Check catwalks and open mesh flooring for safe function	
Crane surface								□
					X		Check accessible surfaces for cleanliness	
						X	Check accessible surfaces for completeness and slip resistance	
						X	Check labels for completeness and legibility	
Rigging and fastening points								□
				X [2)]			Check condition and mounting	
						X	Check for continued suitability by an authorized inspector, inspection expert	
Load handling equipment and assembly aids								□
				X [2)]			Check for cracks, damage, wear and distortion	
						X	Check for continued suitability by an authorized inspector, inspection expert	

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First maintenance	Operating hour intervals			Calendar intervals			Work to be carried out	O.K.
after	250 h	500 h	1000 h	Daily	Weekly	Annually		
Fastening equipment and load securing devices								□
				X [2]			Observe and adhere to the manufacturer's instructions	
Fire extinguishing system								□
						X	Carry out a visual inspection of the system For all other maintenance tasks, observe the instructions of the fire extinguisher manufacturer.	
						Every 5 years	Replace trigger elements and extinguisher tank.	
Diesel engine								□
				X			Check the oil level For all other maintenance tasks, observe the instructions of the engine manufacturer	
Cooling system								□
				X			Check the coolant level in the expansion tank	
			6000 h			Every 4 years	Replace the coolant if filled with **Liebherr Antifreeze OS Mix**	
			3000 h			Every 2 years	Replacing the coolant	
SCR Exhaust aftertreatment								□
			4500 h			Every 2 years	Replace foam and filter element of urea pump	
Engine independent heater (auxiliary heater)								□
				X			Check the fluid level in the expansion tank	
					Every 4 weeks [8]		Operate and check the function for 10 minutes with the engine cold and the highest fan stage	
					X [9]		Operate and burn-free for 15 minutes with the engine cold and the highest fan stage	
						X	Carry out maintenance work before and after every heating period	
						Every 2 years	Replace the fluid for the heating system	
				X			Check the fill level of the fuel container	

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First maintenance after	Operating hour intervals 250 h	500 h	1000 h	Calendar intervals Daily	Weekly	Annually	Work to be carried out	O.K.
Air filter								□
					X		Check monitoring device	
						X	Clean, change the filter insert Observe the instructions of the engine manufacturer	
Slewing ring connection								□
	X						Lubricate the gears	
						X [1]	Lubricating the slewing ring connection	
					Every 6 months [1]		Drain water on the water drain bores of the slewing ring connection (only LTM 11200-9.1, LTR 11200)	
250 h			1500 h			X	Check the mounting screws for tight seating	
						X	Checking the tilt play	
Winches								□
250 h			X			X	Check the mounting screws for tight seating	
				X			Check for leaks	
					X [6]		Check the oil level	
250 h			3000 h			Every 4 years	Change the gear oil	
			1500 h [4]			X [4]	Lubricate the space between V-ring / winch bearing (only for winches with a winch bearing that is lubricated with a grease fitting)	
			200 h			X	Check the condition of the tooth flanks; determining factor are the operating hours of the winch (only for winches with gear ring drive)	
						X	Check the remaining theoretical service life by an authorized inspector	
						Every 4 years	Check the remaining theoretical utilization life by an inspection expert	
Winch brakes								□
				X			Check for leaks	
						X	Check for correct function	

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First maintenance after	Operating hour intervals 250 h	500 h	1000 h	Calendar intervals Daily	Weekly	Annually	Work to be carried out	O.K.
Relapse supports								□
					Every 3 months [5), 6)]		Lubricating the bearings	
X [2), 6)]							Check the oscillation guard for easy movement	
Relapse cylinder								□
X [2), 6)]					X		Check for leaks	
					Every 3 months [5), 6)]		Lubricating the bearings	
X [2), 6)]		X				X	Check pretension pressure (nitrogen)	
X [2), 6)]		X				X	Check the oil quantity	
Pneumatic springs								□
X [2), 5), 6)]		X				X	Check for correct function	
A-frame								□
		X					Lubricate the bearing	
X [2), 6)]						X	Check the lever for the limit switch on the A-frame 3 for easy movement and reset of spring	
X [2), 6)]						X	Check the rods with guide rail on the A-frame 2 and A-frame 3 for easy movement and distortion	
Counterweight frame								□
						X	Check the cylinder stroke of the locking pin on the swinging arms (only LTM 1450-8.1)	
Counterweight								□
1000 km		or 10,000 km				X	Check tightening torque of mounting screws	
Concrete ballast plates (ballast container) (only LR 13000)								□
				X			Check for damage	
						Every 5 years	Check by licensing agency	
Ballasting								□
	X					X	Lubricating the bearings	
						X	Check the swing play (only LTM 11200-9.1)	
						X	Check the braid ropes (only LTM 11200-9.1)	

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First maintenance after	Operating hour intervals 250 h	500 h	1000 h	Calendar intervals Daily	Weekly	Annually	Work to be carried out	O.K.
Press on pulleys of rope winches								□
	X					X	Grease guides	
Rope pulleys								□
					X [5), 6)]		Check groove base for cleanliness	
			X			X	Check for wear, damage, cracks and easy movement	
			3000 h			Every 3 years	Lubricate the bearings	
Carrier rollers								□
				X [2)]			Check for damage and distortion	
			X			X	Check for wear, damage and easy movement	
			X			X	Check the mounting screws for tight seating	
Crane cab								□
				X			Check instruments for function	
				X			Check indicator lights for function	
						X	Replace the filter insert for switch cabinet ventilation	
						X	Replace filter insert in water heater	
				X			Check fluid level in expansion tank of engine regulation	
		X				X	Check the sliding or incline device for function	
		X				X	Lubricate the bearings of the sliding or incline device	
		X				X [7)]	Check the lift device (telescope arm) for function	
		X				X [7)]	Lubricate the bearings of the lift device and telescope arm	
Window washing bays, camera washing bays								□
				X			Check the fluid level in the reservoir for the washing bays	
Overload protection								□
				X			Check for correct function	
		X				X	Check length sensor for function	
		X				X	Check length sensor rope for damage	

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First maintenance after	Operating hour intervals 250 h	500 h	1000 h	Calendar intervals Daily	Weekly	Annually	Work to be carried out	O.K.
Remote diagnostics device								□
						X	Check for correct function	
						X	Check the validity of the SIM card	
Electrical system								□
						X	Cable connections	
					Every 6 months [3]		Service the batteries	
					Every 6 months [3]		Empty the acid container	
						X [5]	Replace the interior compartment filter of the switch cabinet ventilation	
Fuel system								□
				X			Check for leaks	
						X	Check condition and mounting	
						X	Drain off water and sediments	
						X	Clean preliminary filter for auxiliary fuel pump	
	Every 50 h						Check fuel preliminary filter, drain off water if necessary	
		Every 1000 h					Replace preliminary fuel filter	
Slewing gear								□
250 h			X			X	Check the mounting screws for tight seating	
				X			Check for leaks	
					X		Check the oil level	
250 h			3000 h			Every 4 years	Change the gear oil	
Slewing gear brakes								□
				X			Check for leaks	
						X	Check for correct function	
Turntable lock								□
		X				X	Grease	
		X				X	Check for correct function	
Bearings								□
						X	Checking the retaining elements	

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First maintenance after	Operating hour intervals 250 h	500 h	1000 h	Calendar intervals Daily	Weekly	Annually	Work to be carried out	O.K.
Pin connections								□
					Every 2 months 10)		Check the retainer of the pin connections	
					Every 2 months 10)		Check the pins and / or connector elements for damage, visual inspection	
					Every 2 months 10)		Check the retaining elements for damage, visual inspection	
Pump distributor gear								□
				X			Check for leaks	
					X		Check the oil level	
500 h			1500 h			X	Change the gear oil	
Hydraulic hose lines								□
				X			Check for leaks and damage	
						X	Check for a safe condition by an authorized inspector, inspection expert	
Hydraulic system								□
				X			Check the oil level	
					X		Check for leaks	
250 h		X				X	Replace the servo pressure and replenishing pressure filter inserts	
250 h		X				X	Replace return filter inserts (only for cranes with open hydraulic circuit)	
250 h		X				X	Replace bleeder filter of hydraulic tank	
500 h			X			X	Check hydraulic oil, required degree of purity: 20/18/15 Take oil sample and have it tested by oil supplier	
Hydraulic cylinder								□
					X		Check for leaks	
					Every 3 months 5), 6)		Lubricating the bearings	
Hydraulic pressure accumulator (nitrogen)								□
		X 4)				X 4)	Check pretension pressures	
Hydraulic coupling system LIKUFIX								□
				X 2) 6)			Check for leaks, dirt and lubricate the guides	

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First maintenance after	Operating hour intervals 250 h	500 h	1000 h	Calendar intervals Daily	Weekly	Annually	Work to be carried out	O.K.
Compressed air system								□
					X		Check for leaks	
					X		Check operating pressure	
					X		Check shut off pressure	
					X		Check operation of automatic drain valve	
						X	Replace air dryer granular cartridges	
						X	Clean air dryer preliminary filter	
Central lubrication system								□
					Every 6 months [1]		Carrying out an intermediate lubrication	
		X					Check for correct function	
					X		Check the grease container fill level	
Emergency control								□
						X	Check for correct function	
Suspended ballast								□
						X	Check the fall protection equipment	
						X	Check frame, suspension and guide section for distortion and cracks	

[1] if the crane is not moved: every 3 months
[2] before every start up: checking visually
[3] in hot climate zones: every 3 months
[4] observe maintenance instructions - crane superstructure, chapter 7.05
[5] and as necessary
[6] and during assembly
[7] in Great Britain: every 6 months
[8] outside of the heating period
[9] during the heating period
[10] also for cranes used for a long period of time

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7.03.50 Maintenance intervals - Crane boom

LWE/LG 1750-006/15409-07-02/en

Fig.195219

1 Maintenance and inspection schedule

Note

- Carry out maintenance work after reaching the specified operating hours or calendar intervals. The interval which occurs first is the deciding factor!
- The maintenance intervals complement each other. If a higher interval is coming up, then carry out the work according to the lower interval also!

First maintenance after	Operating hour intervals 250 h	500 h	1000 h	Calendar intervals Daily	Weekly	Annually	Work to be carried out	O.K.
Safety systems								□
						X	Personal protective equipment Follow the instructions of the manufacturer	
						X	Height rescue system Follow the instructions of the manufacturer	
Fall protection equipment								□
						X	Check protection points	
						X	Check safety ropes	
						X	Check the ladders for technically immaculate condition	
						X	Check railings, steps and pedestals for safe function	
						X	Check catwalks and open mesh flooring for safe function	
Surface of crane boom								□
					X		Check accessible surfaces for cleanliness	
						X	Check accessible surfaces for completeness and slip resistance	
						X	Check labels for completeness and legibility	
Rigging and fastening points								□
				X [2)]			Check condition and mounting	
						X	Check for continued suitability by an authorized inspector, inspection expert	
Load handling equipment and assembly aids								□
				X [2)]			Check for cracks, damage, wear and distortion	
						X	Check for continued suitability by an authorized inspector, inspection expert	

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First maintenance after	Operating hour intervals 250 h	500 h	1000 h	Calendar intervals Daily	Weekly	Annually	Work to be carried out	O.K.
Fastening equipment and load securing devices								□
				X [2]			Observe and adhere to the manufacturer's instructions	
Lattice sections								□
						X	Check cracks, damage and distortion	
						X	Check protection points	
						X	Check safety ropes	
						X	Check railings and pedestals for safe function	
						X	Check catwalks and open mesh flooring for safe function	
X [6]						X	Grease the lube points of lattice sections	
Guy rods								□
						X	Check for cracks, damage and distortion by an authorized person	
						Every 4 years	Check cracks, damage and distortion by an authorized inspector	
						X	Checking the retaining elements	
						X	Check labels for completeness and legibility	
X [6]						X	Lubricate the lube points of guy rods	
Fiber guy ropes								□
					Every 3 months [7]		Check braid and intermediate layers for damage and distortion	
					Every 3 months [7]		Check rope end connections for cracks, damage and distortion	
					Every 3 months [7]		Check rope grommet transitions for damage and distortion	
Relapse supports								□
					Every 3 months [5], [6]		Lubricating the bearings	
X [2], [6]							Check the oscillation guard for easy movement	

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First maintenance after	Operating hour intervals 250 h	500 h	1000 h	Calendar intervals Daily	Weekly	Annually	Work to be carried out	O.K.
Relapse cylinder								□
X [2), 6)]					X		Check for leaks	
					Every 3 months [5), 6)]		Lubricating the bearings	
X [2), 6)]		X				X	Check pretension pressure (nitrogen)	
X [2), 6)]		X				X	Check the oil quantity	
Hydraulic hose lines								□
				X			Check for leaks and damage	
						X	Check for a safe condition by an authorized inspector, inspection expert	
Hydraulic cylinder								□
					X		Check for leaks	
					Every 3 months [5), 6)]		Lubricating the bearings	
Hydraulic pressure accumulator (nitrogen)								□
		X [4)]				X [4)]	Check pretension pressures	
Rope pulleys								□
					X [5), 6)]		Check groove base for cleanliness	
			X			X	Check for wear, damage, cracks and easy movement	
			3000 h			Every 3 years	Lubricate the bearings	
Carrier rollers								□
				X [2)]			Check for damage and distortion	
			X			X	Check for wear, damage and easy movement	
			X			X	Check the mounting screws for tight seating	
Auxiliary guying								□
						X [6)]	Check the rope connection between the guy point and the lattice section	
						X [6)]	Check cracks, damage and distortion	

First maintenance after	Operating hour intervals 250 h	500 h	1000 h	Calendar intervals Daily	Weekly	Annually	Work to be carried out	O.K.
Pin connections								□
					Every 2 months 8)		Check the retainer of the pin connections	
					Every 2 months 8)		Check the pins and / or connector elements for damage, visual inspection	
					Every 2 months 8)		Check the retaining elements for damage, visual inspection	
Crane ropes								□
				X			Check for damage and distortion	
					Monthly 5)		Check, grease by expert personnel	
						X	Check by an authorized inspector	
						Every 4 years	Check by an inspection expert	

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First maintenance after	Operating hour intervals 250 h	500 h	1000 h	Calendar intervals Daily	Weekly	Annually	Work to be carried out	O.K.
Hook blocks								□
				X [3]			Check of the load hook for distortion, wear, damage and cracks by the crane operator	
			X			X	Check rope pulleys for distortion, wear, damage and cracks	
			3000 h			Every 3 years	Lubricate rope pulley bearings	
	100 h				Every 3 months [5]		Lubricate pressure bearings	
	100 h				Every 3 months [5]		Lubricate radial bushing	
	100 h				Every 3 months [5]		Lubricate suspension of hook beam	
					Every 6 months [5]		Replace batteries on incline sensor	
						X	Load hook: Check distance dimension (y)	
						X	Check of the load hook for distortion, wear, damage and cracks by an authorized person	
						Every 4 years	Check of the load hook for distortion, wear, damage and cracks by an inspection expert	

[2] before every start up: checking visually
[3] before starting crane operation: checking visually
[4] observe maintenance instructions - crane superstructure, chapter 7.05
[5] and as necessary
[6] and during assembly
[7] by authorized and trained expert personnel with boom taken down and before every erection procedure
[8] also for cranes used for a long period of time

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7.04 Maintenance instructions - Crane chassis

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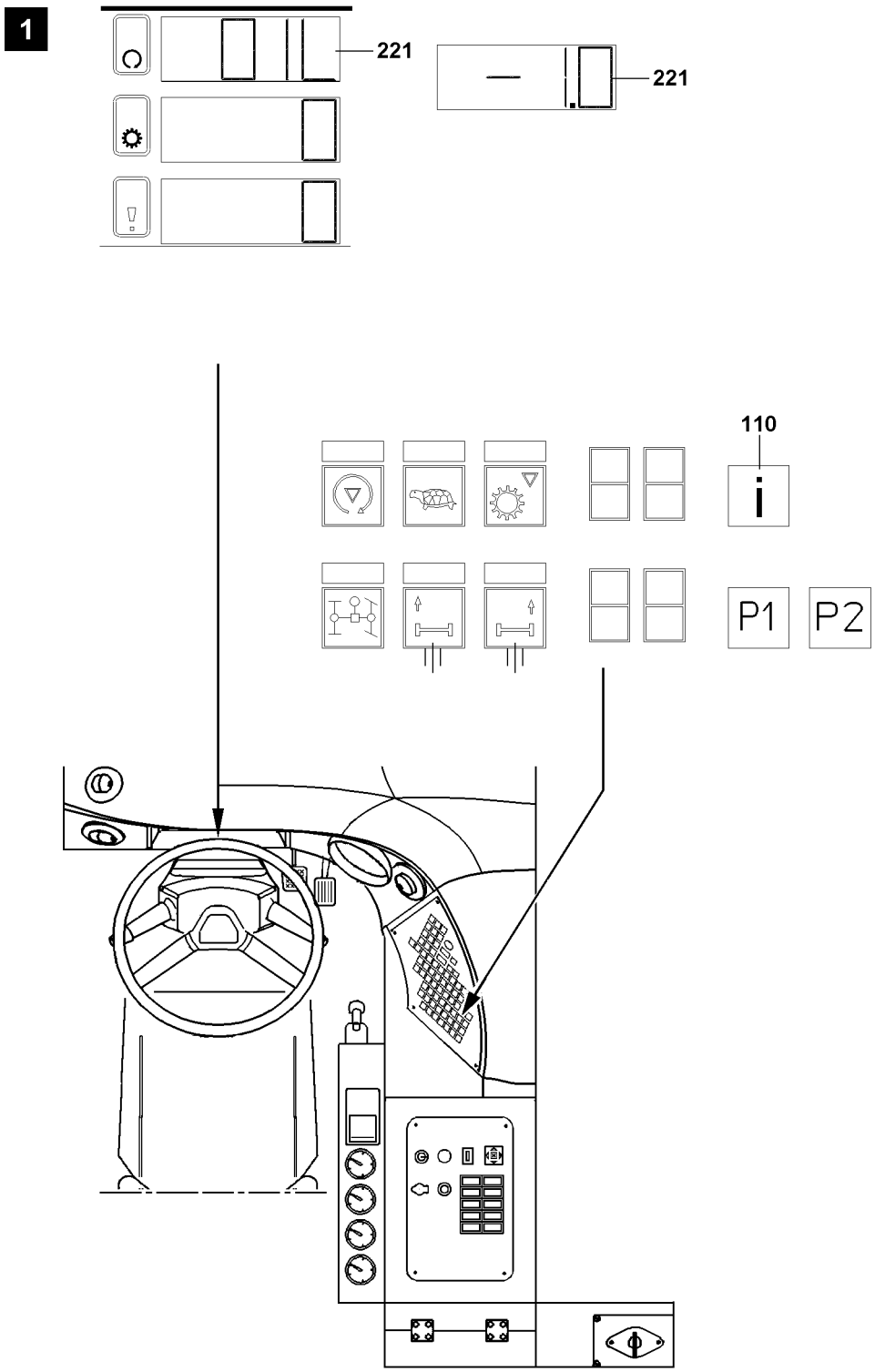

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Fig.115446

1 Diesel engine

Under no circumstances may fuel lines be stepped on during maintenance or repair work!

DANGER
Danger of fire!
- ▶ Make sure that the engine area is kept free of diesel fuel.
- ▶ Extreme cleanliness is vital, particularly during filter changes and bleeding. Wipe up any spilled fuel.
- ▶ When changing the filter it is advisable to place some cotton rags underneath to absorb the fuel before removing the filter.

1.1 Engine oil

1.1.1 Checking the oil level on the display in the driver's cab

Make sure that the following prerequisites are met:
- – The crane is in horizontal position.
- – The diesel engine is turned off and the ignition is turned on.
- – The oil has collected in the oil pan.

Note
- ▶ The display***** **225** of the engine oil level shows how much engine oil is to be added or drained.
- ▶ Example,illustration **1**: If „-1.0“ is shown, then 1 liter of engine oil must be drained. If „+1.5“ is shown, then 1.5 liter of engine oil must be added.
- ▶ The measurement is made when the engine is at a standstill. When filling or draining the engine oil, wait for a few minutes until the engine oil has collected in the oil pan.

- ▶ Press the button***** **110** until display***** **225** engine oil level shows „OIL“, see illustration **1**.

NOTICE
Danger of damaging the engine!
If the diesel engine is operated with too much or not enough engine oil, the diesel engine can be severely damaged.
- ▶ If too much engine oil is shown on the display***** **225**, then drain engine oil according to the display***** **225**.
- ▶ If not enough engine oil is shown on the display***** **225**, add engine oil according to the display***** **225** and the lubrication chart.

- ▶ Check the engine oil level on the display***** **225**.

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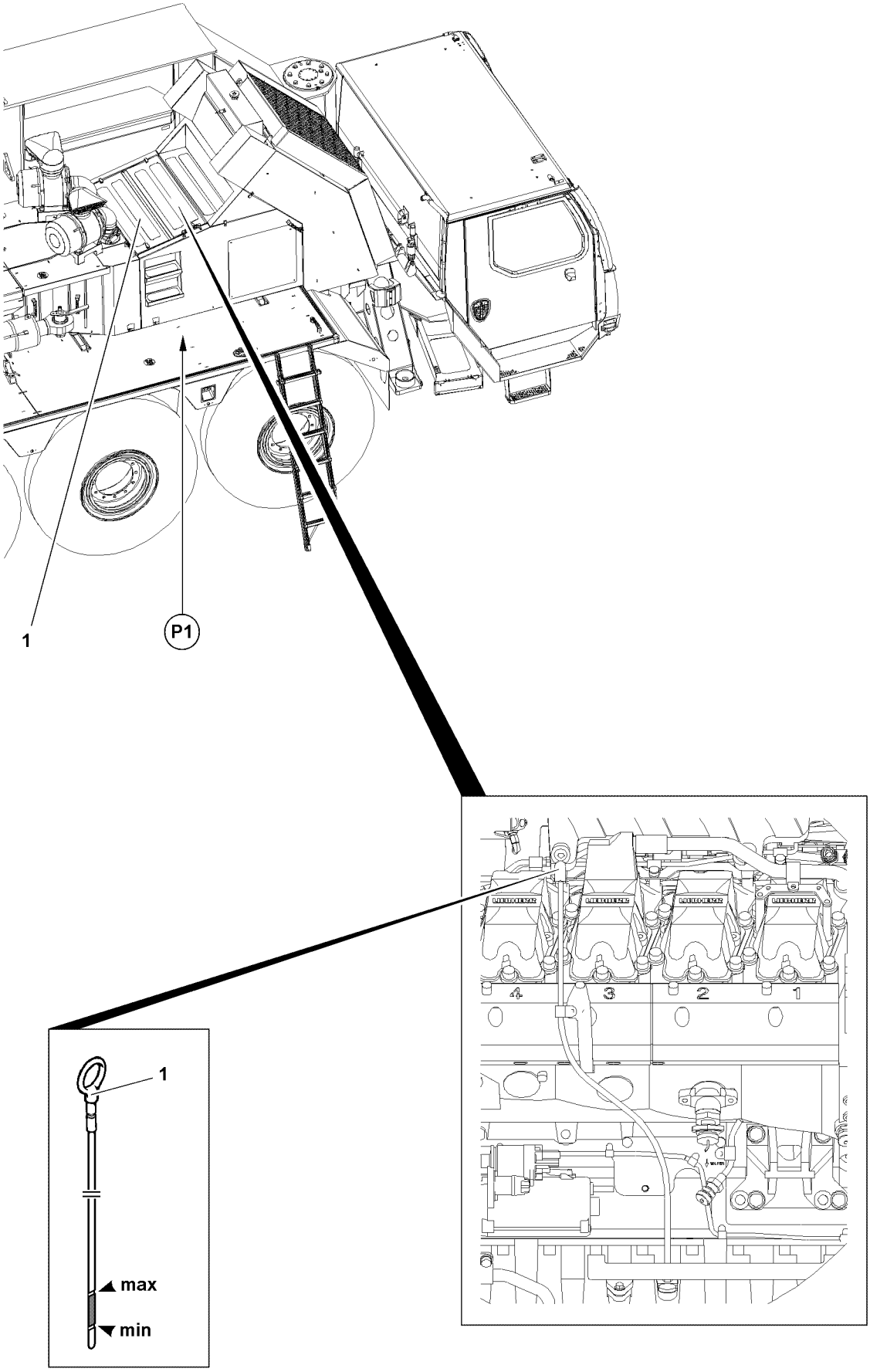

Fig.116780

1.1.2 Checking the oil level with the dipstick

Make sure that the following prerequisites are met:
- The crane is in horizontal position.
- The diesel engine is turned off and the oil has collected in the oil pan.
- The cover **1** of the engine covering is open.
- The maintenance person is at position **P1**.

▶ Remove the dipstick **1** and wipe it off.
▶ Reinsert the dipstick **1** and pull it out again.

The oil level must be between the min. and max. marks on the dipstick **1**.

▶ Check the oil level.

NOTICE
Danger of damaging the engine!
If the oil level has dropped below the minimum mark, add engine oil as specified in the lubrication chart until the oil level is between the minimum and maximum marks.
▶ Add engine oil and check again.

▶ Reinsert the dipstick **1**.

1.1.3 Changing the oil

See separate engine manufacturer’s operating instructions.

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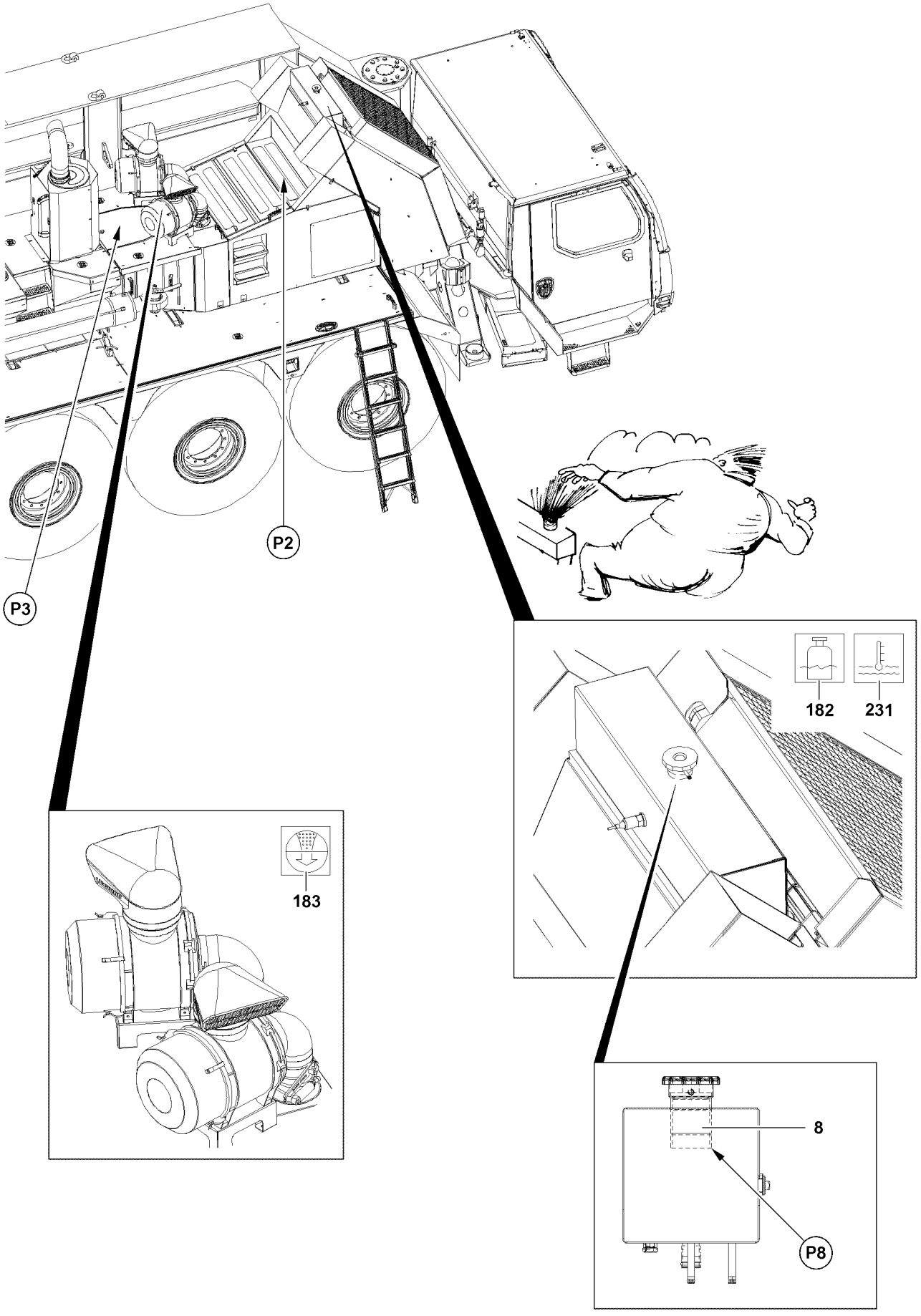

Fig.116782

2 Coolant system

2.1 Coolant Engine cooling

The coolant level on the expansion tank is monitored with a water level probe. If the coolant level is too low, the warning light **182** „Diesel engine coolant level too low“ lights up on the display unit.

The coolant temperature of the diesel engine can be read on the display unit on the bargraph via the warning light **231**.

Make sure that the following prerequisites are met:
- The crane is in horizontal position.
- The maintenance person is at position **P2**.

WARNING
Danger of burns due to hot coolant!
If the coolant reservoir is opened when the engine is at operating temperature, explosive hot steam or hot coolant can emerge and cause severe skin burns.
Personnel can be severely injured.
- ▶ The cooling system is under pressure.
- ▶ Never open the cap on the coolant reservoir as long as the engine is warm.
- ▶ To protect from skin burns caused by hot steam or hot coolant, place a large rag over the cover of the coolant reservoir when opening it.

- ▶ Turn the cap on the filler neck of the water cooler expansion tank to the 1st notch.
- ▶ Release excess pressure.
- ▶ Remove the cap.
- ▶ Check the coolant level.

Add coolant as specified in the lubrication chart only on the filler neck of the water cooler expansion tank.

- ▶ If necessary, add coolant to the starting point **P8** on the riser tube **8**.

3 Air filter system

3.1 Replacing the air filter

The air filter is monitored electronically. If the vacuum in the intake pipe has increased because of dirty air filter inserts, the warning light **183** in the driver’s cab display unit lights up.

Make sure that the following prerequisite is met:
- The maintenance person is at position **P3**.

If the warning light **183** lights up:
- ▶ Clean or replace the filter insert.

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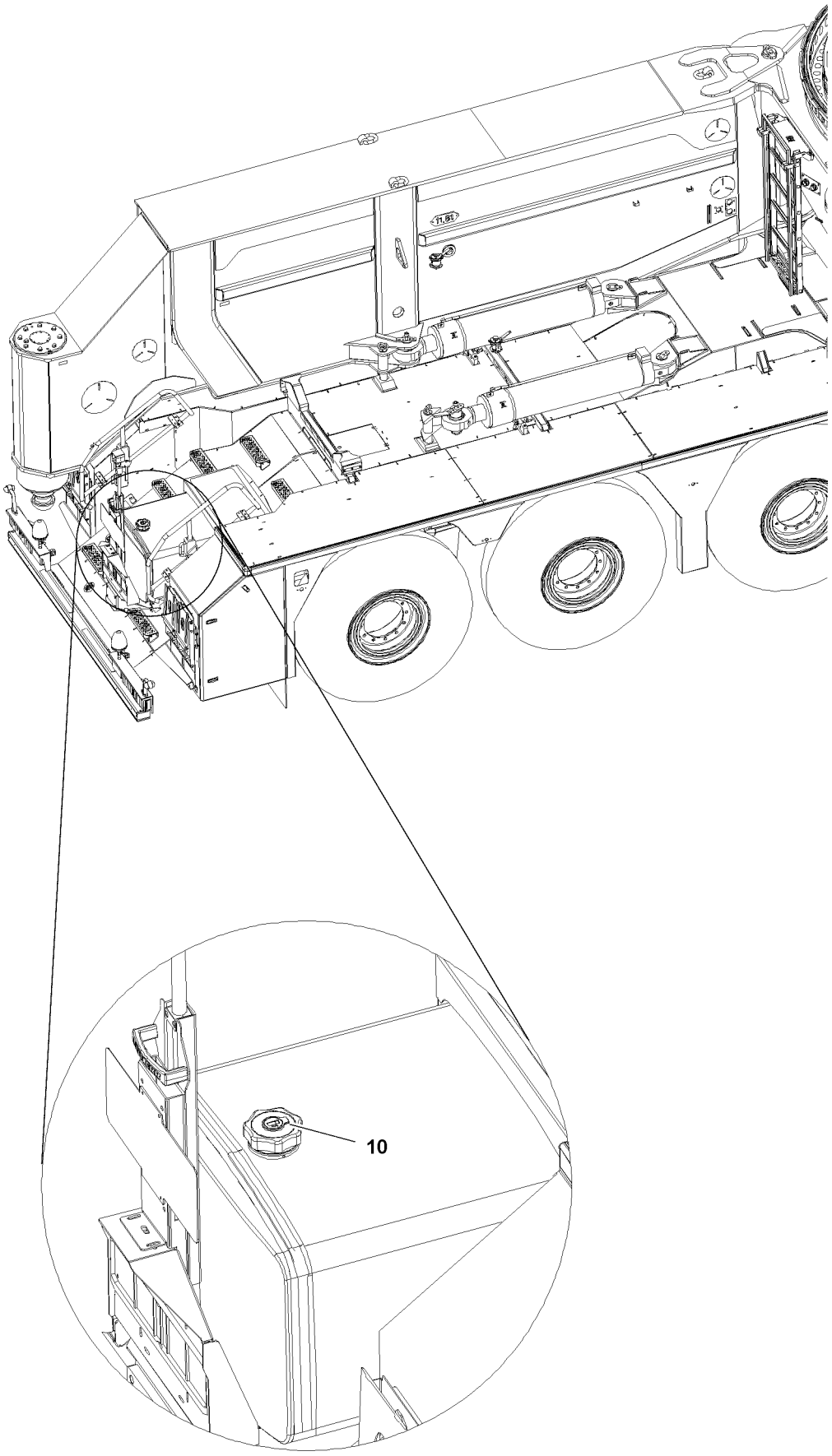

Fig.116781

4 Fuel system

4.1 Refueling

Make sure that the following prerequisites are met:
- The crane vehicle is at the level for on road driving.
- The auxiliary heater is turned off.
- The parking brake is applied.
- The diesel engine and the ignition are turned off.

Note
▶ Also observe the danger notes in the Crane operating instructions, chapter 7.01.

The refueling procedure is carried out by the maintenance personnel either from the ground or from a permanently integrated side rear access.

▶ Open the tank cover **10**.
▶ Insert the fuel nozzle **11** in the filler neck.
▶ Refuel the vehicle.
▶ Close the tank cover **10**.

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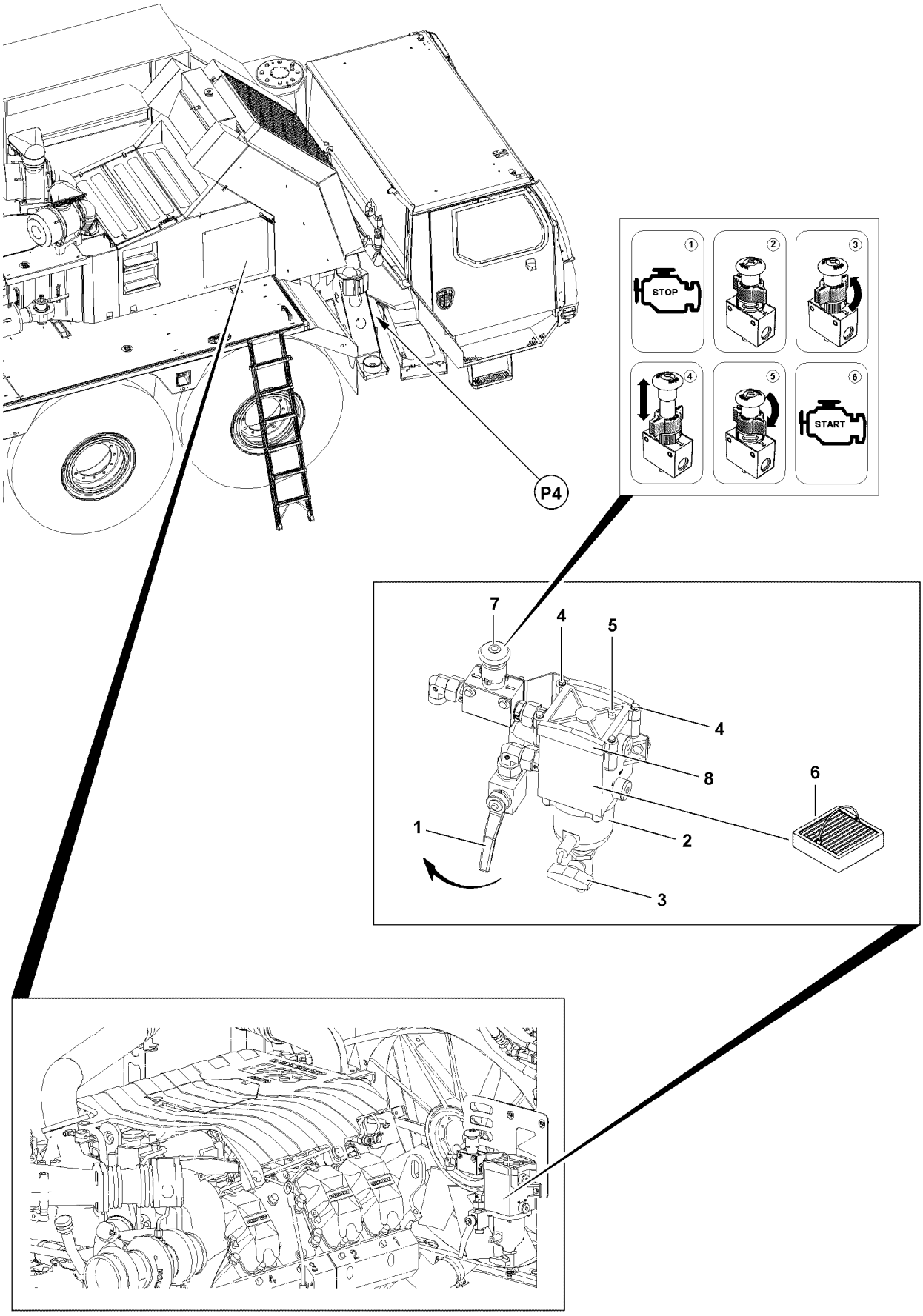

Fig.116783

4.2 Fuel preliminary filter*

4.2.1 Draining the fuel preliminary filter

Note

- ▶ Fuel preliminary filter only for diesel engines with exhaust aftertreatment system SCR (Selective Catalytic Reduction).
- ▶ The water separator **2** on the fuel preliminary filter must be drained according to the maintenance intervals or when an error message is shown.

Make sure that the following prerequisites are met:

- The telescopic boom is luffed up.
- The maintenance person is at position **P4**.

- ▶ Turn the diesel engine off.
- ▶ Place a catch basin under the water separator.
- ▶ Close the ball valve **1**.
- ▶ Open the drain valve **3** and drain water until fuel emerges.
- ▶ Close the drain valve **3**.
- ▶ Open the ball valve **1**.
- ▶ Remove the catch basin and dispose of the fluid.

4.2.2 Cleaning the filter strainer

Note

- ▶ The filter strainer **6** on the fuel preliminary filter must be cleaned according to the maintenance intervals or when an error message is shown.

DANGER

Danger of fire and explosion!

- ▶ Do not smoke.
- ▶ Avoid naked flame.
- ▶ Work only when the diesel engine is turned off.
- ▶ Maintain extreme cleanliness during all work.

- ▶ Turn the diesel engine off.
- ▶ Place a catch basin under the fuel preliminary filter.
- ▶ Close the ball valve **1**.
- ▶ Open the drain valve **3** until no more fuel emerges.
- ▶ Remove the catch basin and dispose of the fluid.
- ▶ Remove the screws **4** and remove the cover **8**.
- ▶ Remove the filter strainer **6** and clean it properly.
- ▶ Insert the cleaned filter strainer **6** properly.
- ▶ Install the cover **8** with seals properly.
- ▶ Properly tighten the screws **4**.
- ▶ Open the ball valve **1**.
- ▶ Open the breather screw **5**.
- ▶ Operate the hand pump **7** and properly bleed the fuel filter.
- ▶ Properly tighten the breather screw **5**.
- ▶ Start the diesel engine and check the fuel preliminary filter for leaks.

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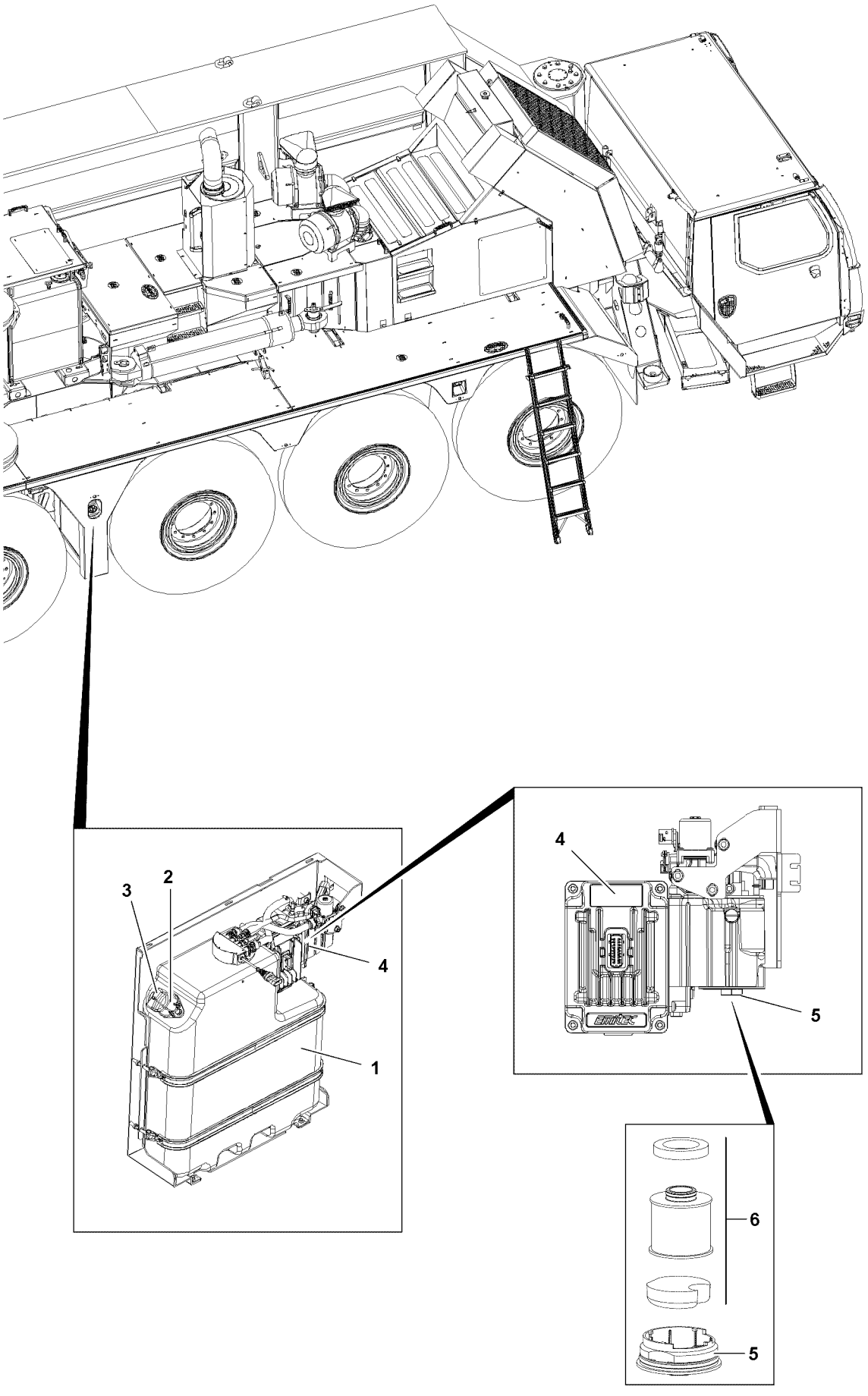

Fig.116784

5 Urea system*

Note
▶ Urea system only for diesel engines with exhaust aftertreatment system SCR (Selective Catalytic Reduction).

5.1 Adding Urea solution

Make sure that the following prerequisites are met:
– The auxiliary heater is turned off.
– The parking brake is applied.
– The diesel engine and the ignition are turned off.

Note
▶ Also observe the danger notes in the Crane operating instructions, chapter 7.01.

▶ Open the tank cover **3** on the Urea tank **1**.
▶ Insert the fuel nozzle in the filler neck **2** of the Urea tank **1**.
▶ Refuel the vehicle.

After the refueling procedure:
▶ Remove the fuel nozzle and close the tank cover **3**.

5.2 Changing the urea filter

NOTICE
Danger of corrosion!
If urea is spilled, the affected surfaces can corrode.
▶ Absorb the spilled urea and flush the affected areas immediately with a large amount of water.
▶ When handling urea, observe the general cautionary and sanitary protective measures.

Note
▶ Change the filter insert **6** for the urea pump **4** according to the data in the maintenance intervals, see Crane operating instructions, chapter 7.02!
▶ Also observe separate engine manufacturer's operating instructions.
▶ Change the filter insert **6** only when the pressure is relieved.

▶ Turn the diesel engine off.
▶ Remove the cover.
▶ Open the housing cover **5** and replace the filter insert **6**.
▶ Close the filter housing with the housing cover and tighten with a tightening torque of 15 Nm.
▶ If applicable, remove spilled urea and clean affected areas with plenty of water.

6 Exhaust system

6.1 Diesel particle filter*

DANGER
Danger of igniting the diesel particle filter*!
▶ The Diesel particle filter* may only be regenerated under the supervision of operating personnel.

Carry out the operation and maintenance of the diesel particle filter* according to the separate operating instructions of the diesel particle filter* manufacturer.

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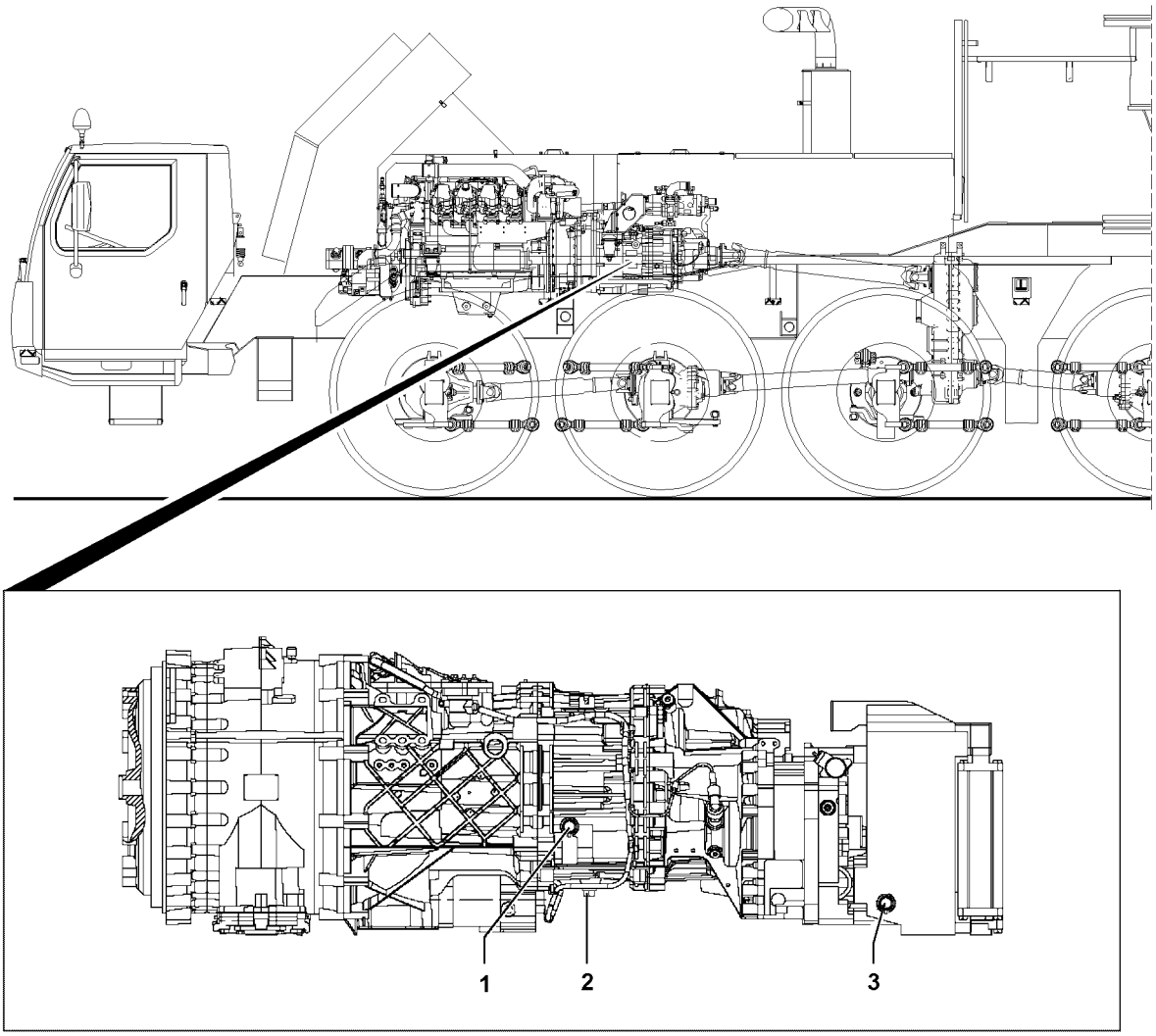

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Fig.117117

7 Automatic transmission with torque converter coupling

NOTICE
Danger of damaging the transmission!
- ▶ Maintain utmost cleanliness during all work to prevent any dirt from entering the inside of the gear.
- ▶ Check the transmission for leaks at regular intervals.
- ▶ Have leaking transmission sealed immediately and professionally.

7.1 Checking for leaks

- ▶ Check visually if there are any leaks on the automatic transmission and the torque converter coupling.

7.2 Checking the oil level on the automatic transmission

Make sure that the following prerequisites are met:
- The crane vehicle is in horizontal position.
- The parking brake is applied.
- The gear oil has cooled down (less than 40 °C).
- The covers for the automatic transmission are removed.

- ▶ Remove the oil filler plug **1**.

The oil level must reach the edge of the bore.

- ▶ Perform a visual inspection.

NOTICE
Danger of gear damage!
Too little oil causes lubricating problems and reduces the service life of the gear.
Too much oil causes more displacement work and overheats the gear.
- ▶ Add oil as specified in the lubrication chart up to the overflow on the oil filler plug **1** and re-check the level.
- ▶ The deciding factor for exact oil quantity is always the correct procedure for adding oil and checking the oil level after a trial run.

- ▶ Install the oil filler plug **1** with new seal and tighten.

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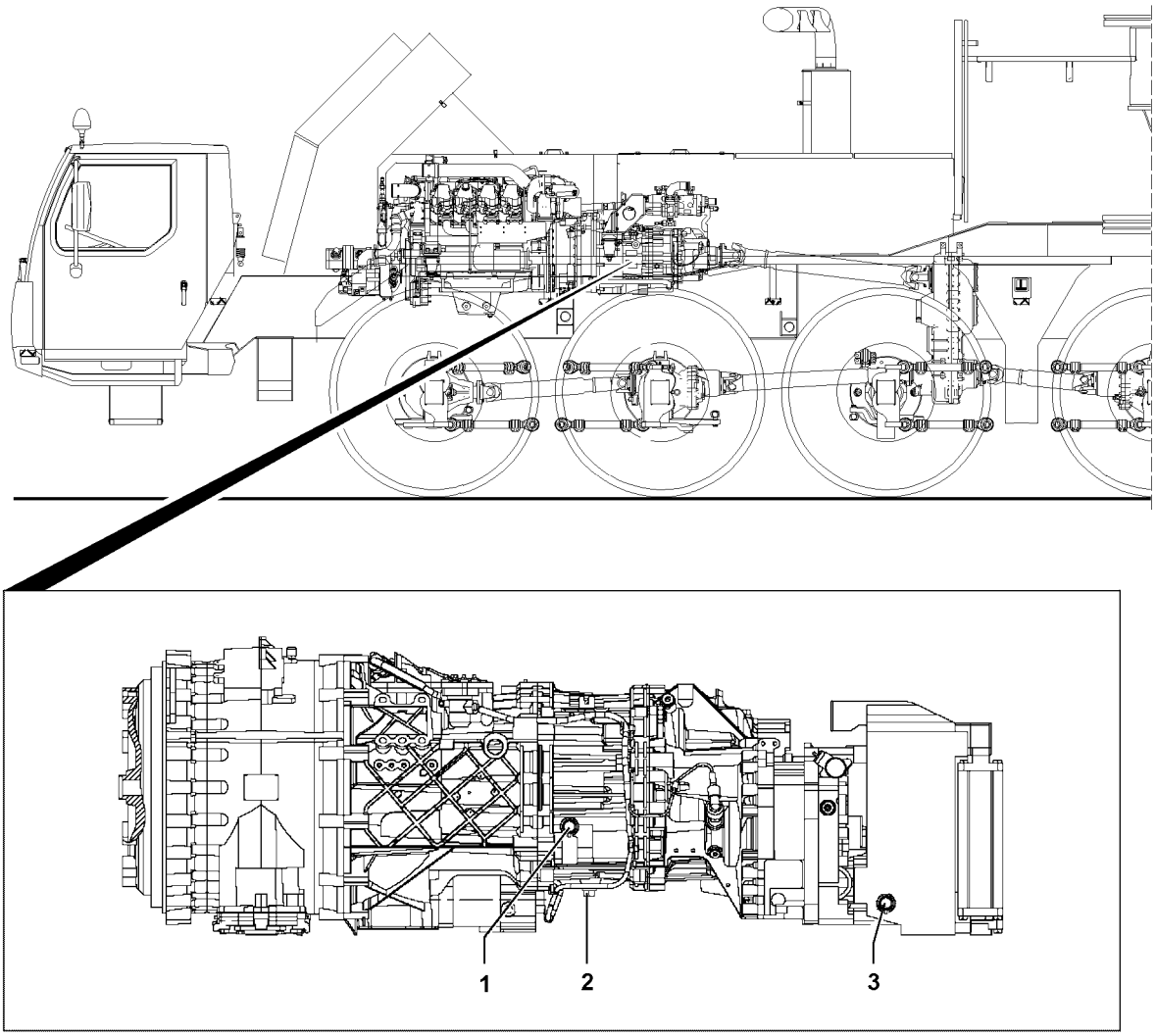

LWE/LG 1750-006/15409-07-02/en

Fig.117117

7.3 Replacing the oil in the automatic transmission

Make sure that the following prerequisites are met:
- The crane vehicle is in horizontal position.
- The parking brake is applied.
- The transmission is warmed up and ready for operation.
- The covers for the automatic transmission are removed.

Note
- ▶ When selecting the container to catch the used oil, make sure that the container is sufficiently sized to be able to catch all the used oil.
- ▶ For fill quantity of automatic transmission, see Crane operating instructions, chapter 7.06.

- ▶ Remove the oil filler plug **1**.
- ▶ Remove the oil drain plug **2** and the oil drain plug **3** and drain the gear oil.
- ▶ Clean the magnet on the oil drain plugs.
- ▶ Reinstall the oil drain plug **2** and the oil drain plug **3** with a new seal and tighten.
- ▶ Add oil according to the lubrication chart on the bore of the oil filler plug **1** until it starts to run over.
- ▶ After adding the oil, install the oil filler plug **1** with a new seal and tighten.
- ▶ Test drive the vehicle.
- ▶ Check the oil level and add oil, if necessary.

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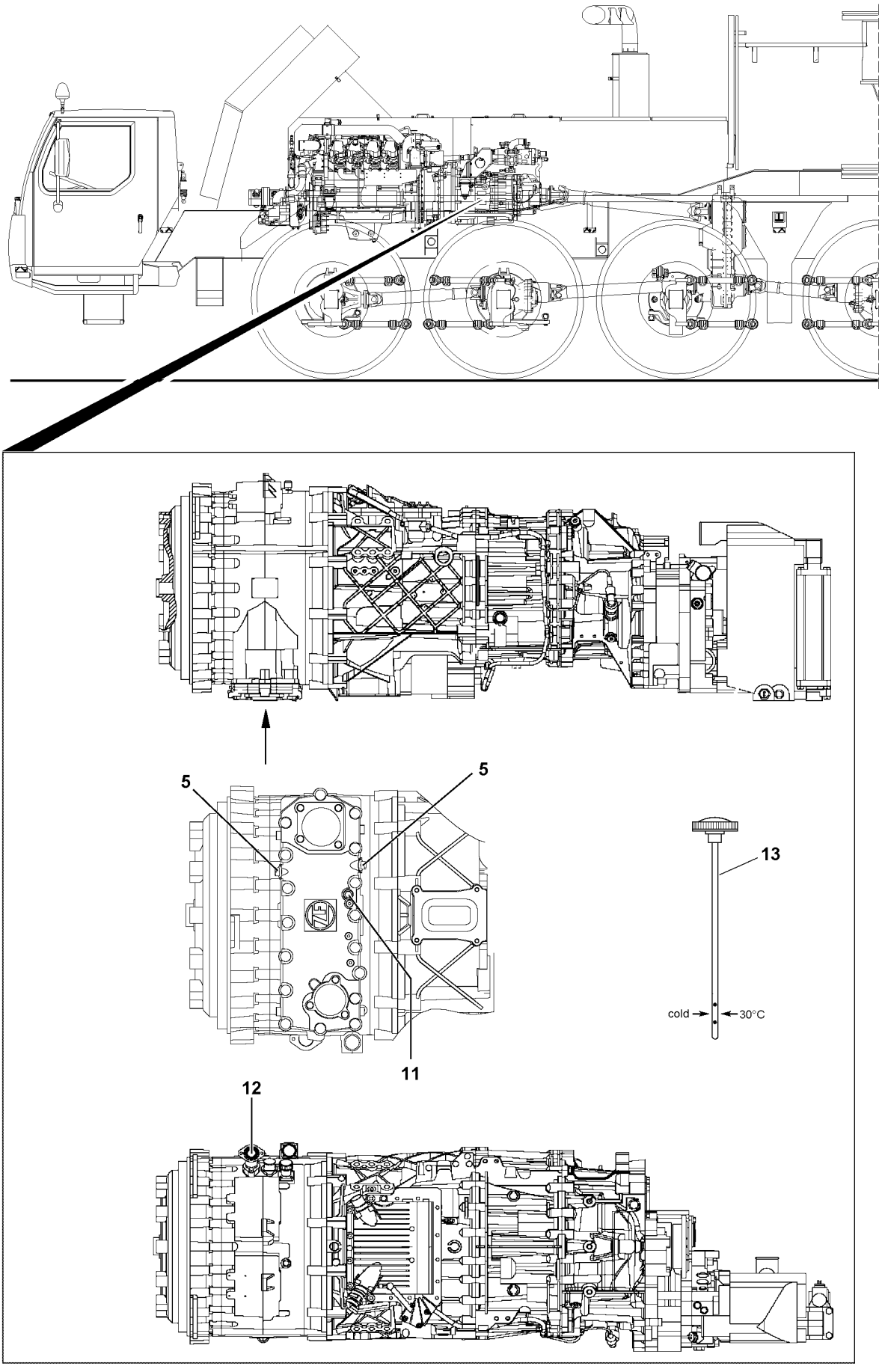

Fig.117116

LWE/LG 1750-006/15409-07-02/en

7.4 Checking the oil level of torque converter coupling

Make sure that the following prerequisites are met:
- The crane vehicle is in horizontal position.
- The oil temperature is 30 °C.
- The engine is running at idling speed.
- The transmission is in neutral position.

The retarder may not be operated while checking the oil level.

▶ Remove the dipstick **13** and check the oil level.

If the oil level has dropped below the permissible minimum mark „cold“, then oil must be added.

If there is too much oil in the system, it must be drained via the oil drain plug.

Note
Important checking note!
The oil on the dipstick **13** must be transparent. Milky oil means that foam is forming in the system.
▶ Let the engine run at idling speed until the oil on the entire dipstick is clear. This procedure can take several minutes.

▶ Perform a visual inspection.

NOTICE
Danger of gear damage!
Too little oil causes lubricating problems and reduces the service life of the gear. Too much oil causes more displacement work and overheats the gear. If too much oil is added, oil can escape during retarder operation and / or during longer downtime.
▶ Add oil as shown in lubrication chart and recheck.

▶ Insert the dipstick **13**.

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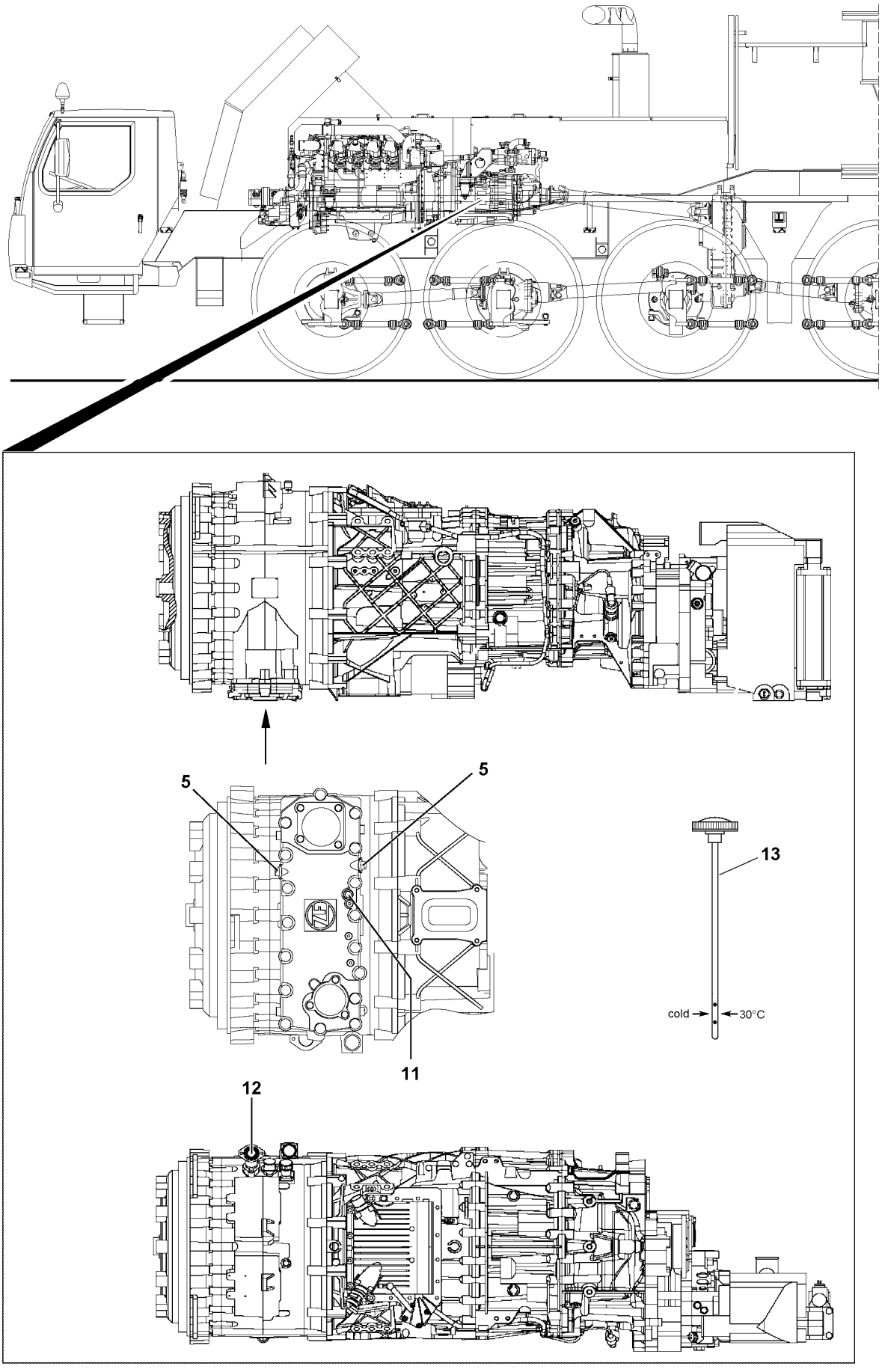

Fig.117116

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7.5 Changing the oil on the torque converter coupling

Make sure that the following prerequisites are met:
- The parking brake is applied.
- The transmission is in neutral position.
- The oil is hot and is thin.

Note
Important safety instructions!
- ▶ Do not drive against converter at a standstill.
- ▶ Do not actuate the retarder at a standstill. The retarder must be turned off.

Note
- ▶ When selecting the container to catch the used oil, make sure that the container is sufficiently sized to be able to catch all the used oil.
- ▶ For fill quantities of torque converter coupling, see Crane operating instructions, chapter 7.06.

- ▶ Remove the dipstick **13**.
- ▶ Remove the oil drain plugs **5** and the torque converter discharge plug **11** and drain the oil.

Note
- ▶ The oil in the torque converter cannot be drained completely. The oil remaining in the torque converter is approx. 9 l. Depending on the version and location, a certain amount of oil, which cannot be drained, also remains in the connector lines.

- ▶ Clean the magnet on the oil drain plugs **5**.
- ▶ Reinstall the oil drain plugs **5** and torque converter discharge plug **11** with new seal ring and tighten.
- ▶ Add oil as specified on the lubrication chart on the oil filler tube **12** (approx. 20 l).
- ▶ Start the diesel engine.
- ▶ With the engine running at idling speed, check the oil level constantly and add oil until the oil level on the oil dipstick **13** remains steadily in the range of the 30 °C cold mark.

NOTICE
Danger of damage!
- ▶ If too much oil has been added, then it must be drained.

The oil should be at approx. 30 °C , allow oil to cool down if necessary.

- ▶ Check oil level at 30 °C cold mark with the engine at idling speed.
- ▶ Add oil if necessary.

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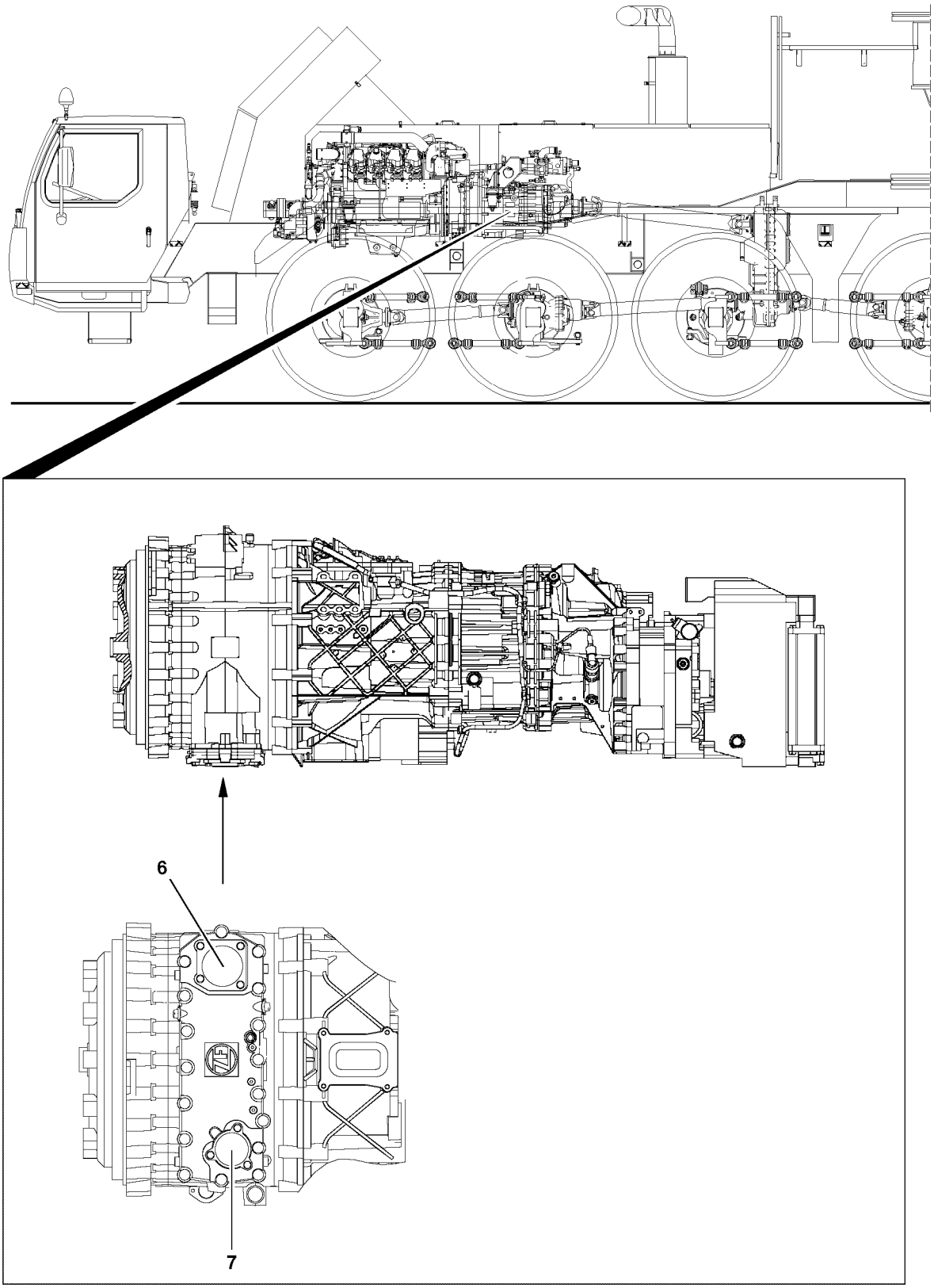

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Fig.117118

7.6 Replacing the suction filter

The suction filter **6** must be replaced at every oil change.

- ▶ Remove the old suction filter **6**.
- ▶ Install the new suction filter **6** properly.

7.7 Changing the pressure filter

The pressure filter **7** must be replaced at every oil change.

- ▶ Remove the old pressure filter **7**.
- ▶ Install the new pressure filter **7** properly.

7.8 Bleeding the gear

The gear oil heats up while the vehicle is being driven. This creates overpressure which is continuously released via a breather valve.

Make sure that the function of the breather valve is ensured at all times. The vent must be clean and the plastic cover must be removed.

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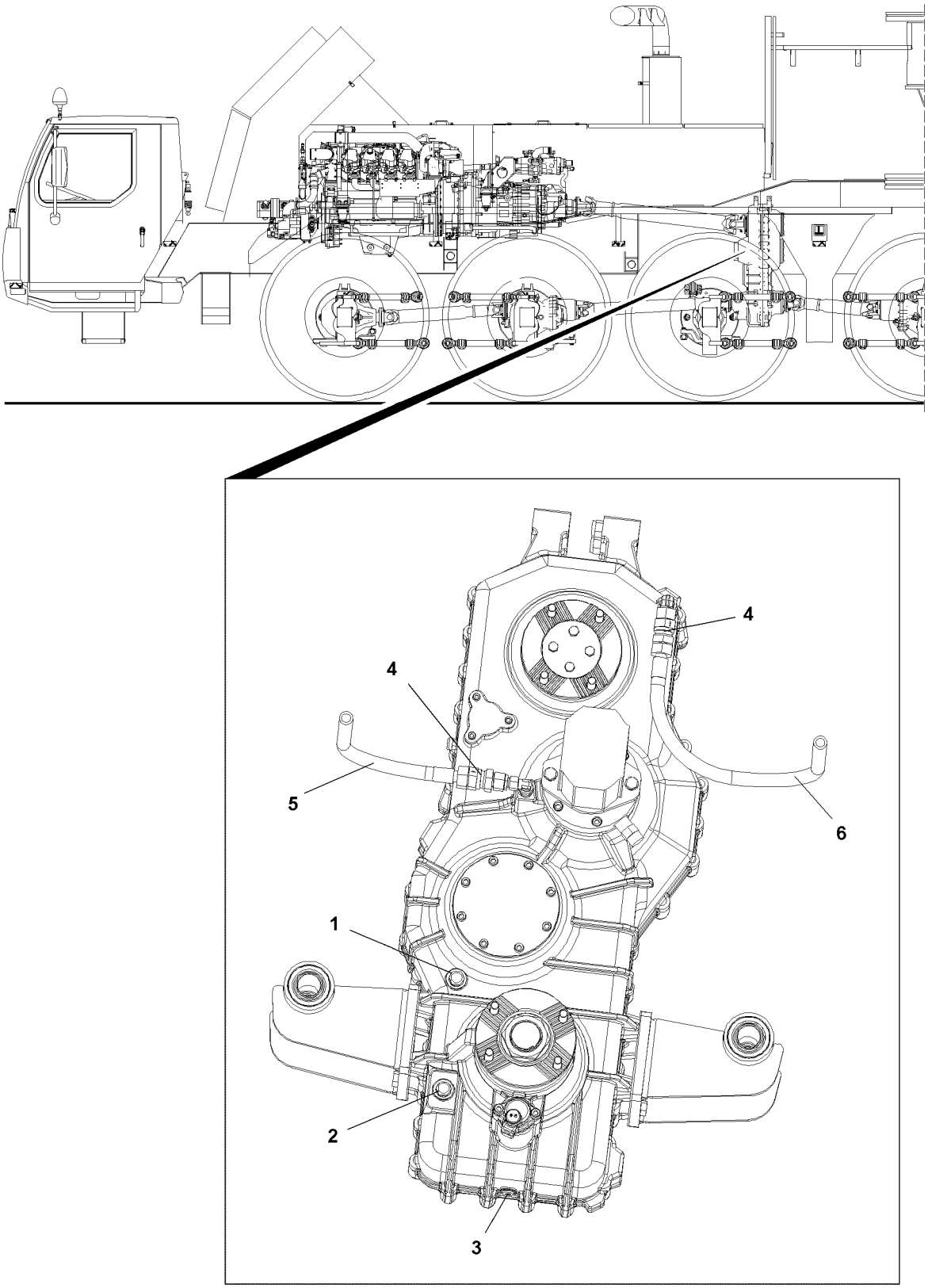

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Fig.117119

8 Distributor gear

Maintain utmost cleanliness during all work to prevent any dirt from entering the inside of the gear.

8.1 Checking for leaks

▶ Check visually if there are any leaks on the distributor gear.

8.2 Checking the oil level

Make sure that the following prerequisite is met:
– The crane vehicle is in horizontal position.

▶ Remove the level control plug **2**.

The oil level must be up to the edge of the bore for the level control plug **2**.

▶ Perform a visual inspection.

NOTICE
Danger of gear damage!
If more than 0.5 l runs out on the bore edge of the level plug **2**, then this is a sign of a defect in the oil circuit.
▶ Contact Customer Service at Liebherr-Werk Ehingen.

NOTICE
Danger of gear damage!
Too little oil causes lubricating problems and reduces the service life of the gear. Too much oil causes more displacement work and overheats the gear.
▶ Add oil up to the overflow level of the level control plug **2**, as specified in the lubrication chart and re-check the level.

▶ Reinstall the level control plug **2** with new seal and tighten.

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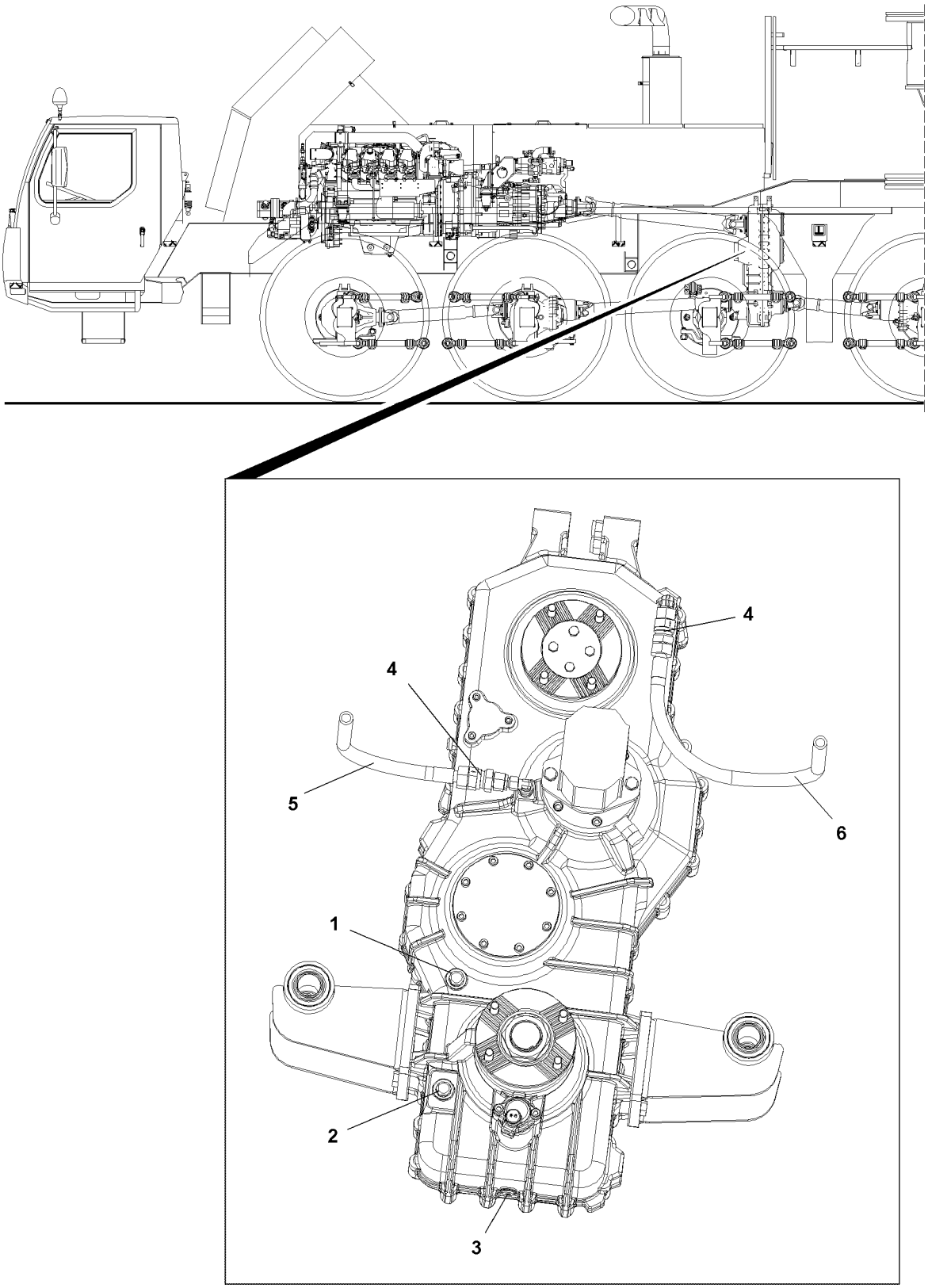

LWE/LG 1750-006/15409-07-02/en

Fig.117119

8.3 Changing the oil

WARNING
Danger of burning due to hot oil!
If the oil drain plug is opened when the distributor gear is too hot, hot oil can cause severe burns on hand, skin or eyes.
- ▶ Let the distributor gear cool down until hand warm.
- ▶ Wear suitable protective gloves.

Make sure that the following prerequisites are met:
- – The crane vehicle is in horizontal position.
- – The distributor gear has cooled down until it is hand warm.

Note
- ▶ When selecting the container to catch the used oil, make sure that the container is sufficiently sized to be able to catch all the used oil.
- ▶ For fill quantity of distributor gear, see Crane operating instructions, chapter 7.06.

- ▶ Remove the oil filler plug **1** and the level control plug **2**.
- ▶ Remove the oil drain plug **3**, drain the oil and determine the oil quantity.

Note
- ▶ During removal, the check valves **4** must remain on the supply line **5** and the return line **6** on the distributor gear.

- ▶ Remove the supply line **5** and the return line **6** on the distributor gear, drain the oil and determine the oil quantity.

If necessary:
- ▶ Carefully blow out the oil lines with maximum 4 bar to drain all the oil.

Note
- ▶ If the determined oil quantity is significantly less that the oil quantity specified in chapter 7.06, then this is a sign that there is a leak in the oil circuit. Find the reason for the leaky oil circuit and fix it.

- ▶ Check the supply line **5** and the return line **6** for damage.
- ▶ Install the supply line **5** and the return line **6** properly.
- ▶ Install the oil drain plug **3** and the level plug **2** with a new seal and tighten.
- ▶ Add the complete oil quantity for the distributor gear with oil cooler and lines as specified in the lubrication chart on the oil filler plug **1**. See chapter 7.06 and 7.07.
- ▶ Install the oil filler plug **1** with new seal and tighten.
- ▶ Drive the mobile crane about 10 km.

Note
- ▶ After about 10 km, the oil cooler is filled with oil.

- ▶ Check the oil level as described in paragraph „Checking the oil level“ and add more oil or drain oil, as necessary.

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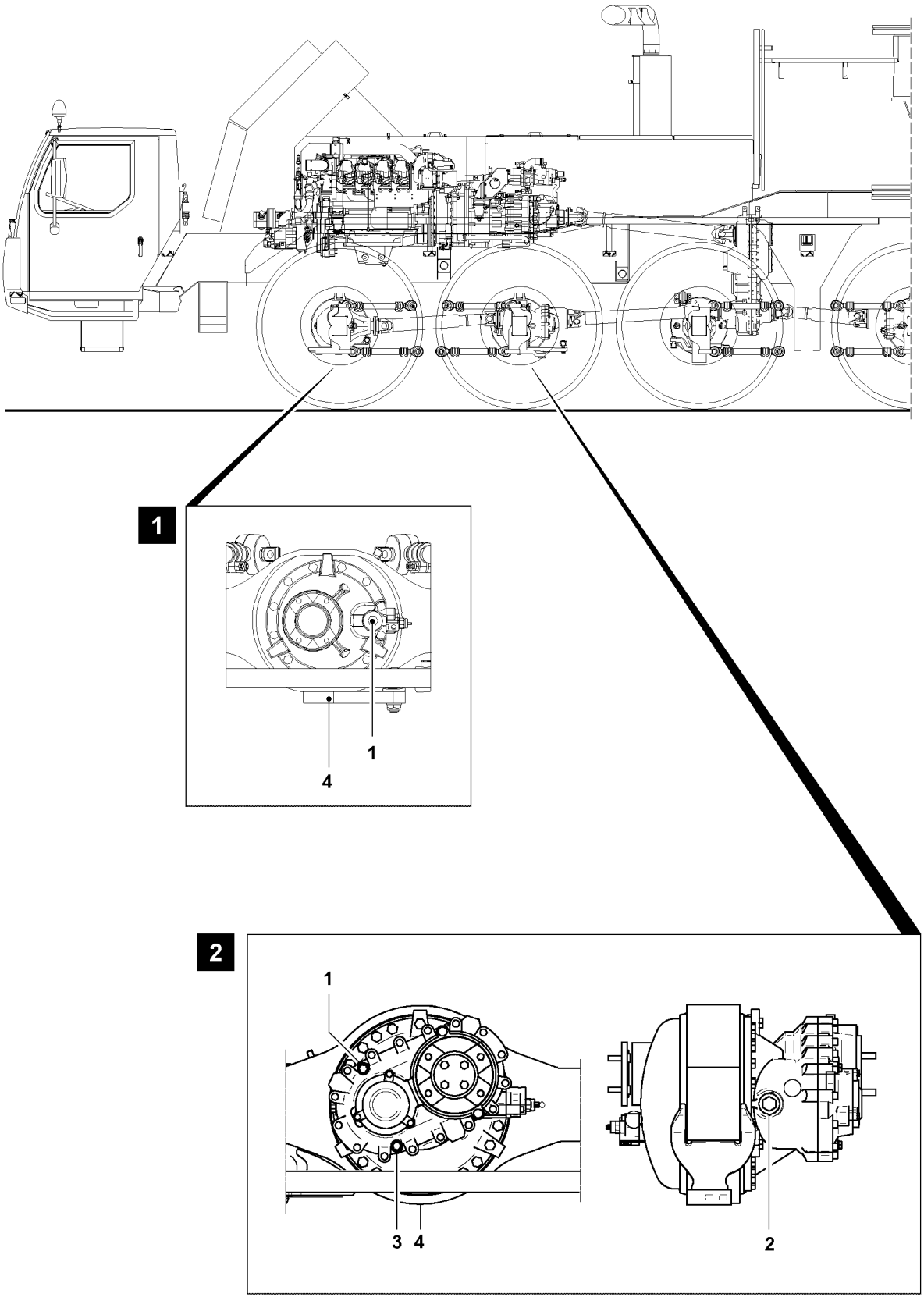

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Fig.117122

9 Axles

Maintain extreme cleanliness during all work to prevent dirt from entering the interior of the axle casings.

9.1 Axle casings

The position of oil filler plug **1**, oil filler plug **2** as well as the position of oil drain plug **3** and oil drain plug **4** depends on the type of axle.

Make sure that the following prerequisite is met:
– The crane vehicle is in horizontal position.

9.1.1 Checking the oil level

▶ Remove the oil filler / control plug **1**, see illustration **1**.
▶ Remove the oil filler plug **2**, see illustration **2**.

The oil level must reach the edge of the bore.

▶ Perform a visual inspection.

NOTICE
Damage to the axles!
If the oil level has dropped, add oil according to the lubrication chart until it runs over on the oil filler / control plug **1** (illustration **1**) or oil filler plug **2** (illustration **2**).
▶ Add oil and check again.

▶ Install the oil filler / control plug **1** with new seal ring and tighten, see illustration **1**.
▶ Install the oil filler plug **2** with new seal ring and tighten, see illustration **2**.

9.1.2 Changing the oil (illustration 1)

▶ Remove the oil filler / control plug **1**.
▶ Remove the oil drain plug **4** and drain the oil.
▶ Install the oil drain plug **4** with new seal ring and tighten.
▶ Add oil as specified in the lubrication chart on the oil filler / control plug **1** until it starts to overflow at the edge of the bore for the oil filler / control plug **1**.
▶ Install the oil filler / control plug **1** with new seal ring and tighten.

9.1.3 Changing the oil (illustration 2)

▶ Remove the oil filler plug **1** and the oil filler plug **2**.
▶ Remove the oil drain plug **4** and drain the oil.
▶ Reinstall the oil drain plug **4** with new seal ring and tighten.
▶ Add oil as specified in the lubrication chart on the oil filler plug **1** or the oil filler plug **2** until it starts to overflow on the bore edge of the oil filler plug **2**.
▶ Reinstall the oil filler plug **2** with new seal ring and tighten.
▶ Reinstall the oil filler plug **1** with new seal ring and tighten.

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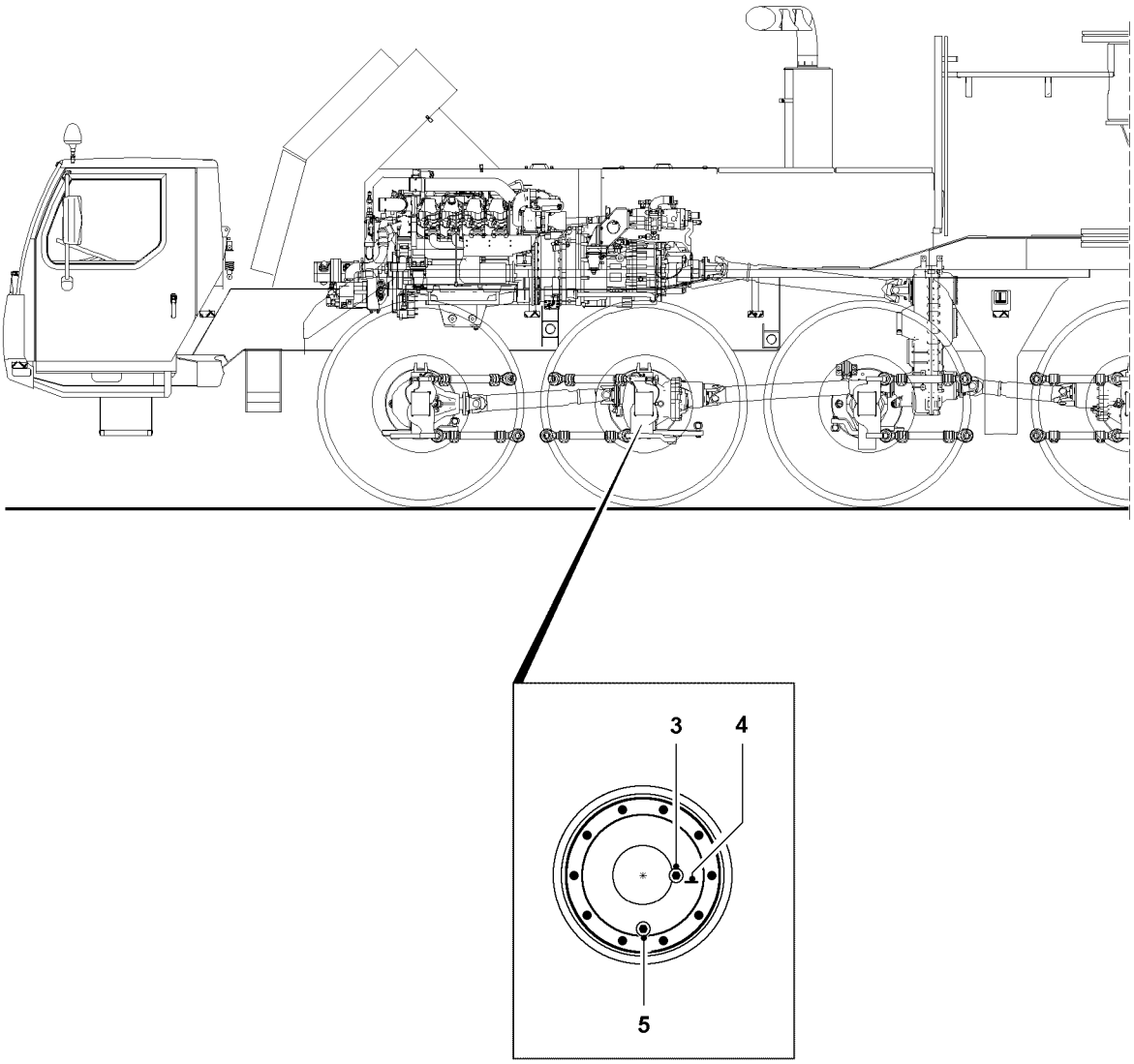

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Fig.117123

9.2 Wheel hubs

Make sure that the following prerequisites are met:
- The crane vehicle is in horizontal position.
- The crane vehicle is supported.

9.2.1 Checking the oil level

▶ Turn each driven wheel until the oil drain plug **5** reaches its lowest point and the line **4** is exactly horizontal.
▶ Remove the oil filler plug **3**.

The oil level must reach the edge of the bore.

▶ Perform a visual inspection.

NOTICE
Danger of damage!
If the oil level has dropped, always add oil as specified in the lubrication chart up to the overflow of the oil filler plug **3**.
▶ Add oil and check again.

▶ Reinstall the oil filler plug **3** with new seal ring and tighten.

9.2.2 Changing the oil

▶ Turn each driven wheel until the oil drain plug **5** reaches its lowest point and the line **4** is exactly horizontal.
▶ Remove the oil filler plug **3**.
▶ Remove the oil drain plug **5** and drain the oil.
▶ Install the oil drain plug **5** with new seal ring and tighten.
▶ Add oil as specified in the lubrication chart on the oil filler plug **3** until it starts to overflow at the edge of the bore.
▶ Reinstall the oil filler plug **3** with new seal ring and tighten.

10 Steering

10.1 Active rear axle steering

WARNING
Damaged and leaky hydraulic hose lines!
Fire. Loss of steering ability. Death, severe injury, property damage.

If leaky areas are found during the visual inspection:
▶ Have these leaky areas inspected immediately by authorized and trained expert personnel and remedied.

If damage is found during the visual inspection:
▶ Have hydraulic hose lines checked by an **expert person for hydraulic hose lines**.

Note
▶ For annual inspection of hydraulic hose lines and for definition of **expert person for hydraulic hose lines**, see Crane operating instructions, chapter 8.06.

Hydraulic hose lines must be inspected **once a year** by an **expert person for hydraulic hose lines**.

The hydraulic hose lines must be visually inspected **daily**.

The hydraulic hose lines must be visually inspected **before starting to work**.

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10.1.1 Inspecting the hydraulic hose lines for damage

Hydraulic hose lines must be inspected by an **expert person for hydraulic hose lines** when one of the following defects is found:
- Damage on outer surface, such as chafe marks, cuts and cracks
- Brittleness due to aging of outer layer (cracks)
- Distortion, such as splitting of hose layers, bubbles, crushed areas, kinks, twists
- Damage or distortion of hose fixtures or hose fitting (seal is endangered)

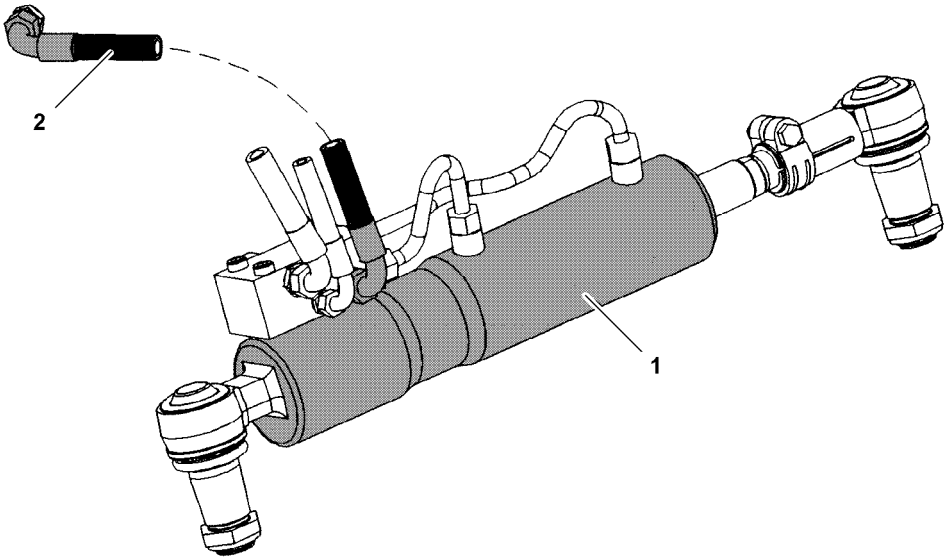

Fig.119290: Steering cylinder

▶ Check the hydraulic hose lines **2** of the steering centering cylinder **1** to the control valve on the rear axle steering for damage.

If one of the listed defects is found:
▶ Have the hydraulic hose lines **2** checked by an **expert person for hydraulic hose lines**.
▶ Document conspicuous findings, decisions and replacements comprehensibly, see Crane operating instructions, chapter 8.06.

10.1.2 Inspecting the hydraulic hose lines for leaks

▶ Check the crane for escaped hydraulic oil.
▶ Check the ground under the crane for emerged leak oil.

When the hydraulic system leaks:
▶ Have these leaky areas inspected by authorized and trained expert personnel and remedied.

If one of the listed defects is found:
▶ Have hydraulic hose lines checked by an **expert person for hydraulic hose lines**.
or
Contact Liebherr Service.
▶ Document conspicuous findings, decisions and replacements comprehensibly, see Crane operating instructions, chapter 8.06.

10.1.3 Checking the wheel alignment

The wheel alignment must be checked at regular intervals. Failure to perform this check can result in increased tire wear. If extremely high stress has occurred such as driving against curbs, it is extremely important to check the wheel alignment.

▶ Always have the wheel alignment checked by a trained and authorized expert.

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11 Tires

WARNING
Minimum profile depth fallen below!
Death, severe injury, property damage.

When the legal minimum profile depth is reached:
▶ Replace the tire.

For EM-tires (Earthmover tires) there is no legal specification for tire replacement due to tire aging either from the tire manufacturer or by law.

To reach a long service life for the tires on the crane vehicle, adhere to the following recommendations:
– Observe the axle loads specified by law.
– Observe the valid travel conditions specified by **Liebherr-Werk Ehingen GmbH**.
– Check in regular intervals:
  • Tire profile depth
  • Tire surface for cracks, damage or foreign particles
  • Tire outer wall for cracks or damage
  • Tire pressure
  • Track adjustment for all axles
– Remove foreign particles (for example: rocks) which are stuck or wedged in the tire profile.
– Rotate the wheels as described in Section "Rotating the wheels".

11.1 Checking the tires

This section contains information for the external inspection of the tires.

If the external properties of the tires are without recognizable defects, damage can be present in the interior of the tires.

To be able to determine damage in the interior of the tires, you can only observe the changes of the dynamic behavior, for example:
– Increasing noises
– Vibrations

When the properties of the tires get worse during travel, then the tires can be defective.

WARNING
Damage in the interior of the tires!
Worsening of dynamic behavior during travel.
Death, severe injury, property damage.
▶ Look for any change of dynamic behavior, such as increasing noises or vibrations.

If the dynamic behavior worsens:
▶ Have tires inspected by authorized and trained expert personnel of the tire manufacturer.
▶ **After eight to ten years**: Have tires inspected by authorized and trained expert personnel of the tire manufacturer.
▶ Pay attention to the result of the inspection and follow the specifications regarding further use of the tire.
▶ Replace defective tires.

WARNING
Use of **non-approved** wheels (tires and disk wheels)!
Death, severe injury, property damage.
Damage of mobile crane and surrounding area.
▶ Use exclusively spare wheels approved in writing by **Liebherr-Werk Ehingen GmbH**.
▶ Use of **non-approved** spare wheels is prohibited.
▶ Only use tires which were approved for the respective disk wheel type (1-part or 3-part disk wheel).

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Note

▶ Tires and disk wheels approved by **Liebherr-Werk Ehingen GmbH**. See Crane operating instructions, chapter 1.03.

11.1.1 Inspecting the tires

WARNING

Impermissible tire properties!
Death, severe injury, property damage.

If the minimum legal profile depth is reached or if the tires are damaged:

▶ Replace the tire.
▶ Adhere to the specified tire pressure. See Crane operating instructions, chapter 1.03.

When the tire pressure has dropped below 3 bar:

▶ Have the tires inflated exclusively by qualified and trained expert personnel.

The depth of tire tread may **not** drop below the legally specified minimum.

▶ Check the tread depth of the tires.
▶ Check tires for damage.

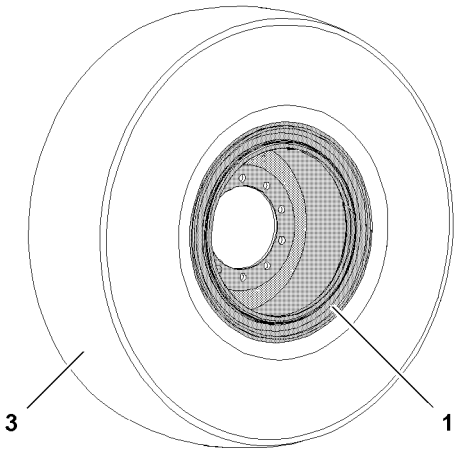

Fig.120146: Disk wheel with tire

The tire bead must touch the inside and outside of the disk wheel evenly.

▶ Make sure that the tire **3** is correctly seated on the disk wheel **1**.
▶ Check the tire pressure.

11.2 Disk wheels

11.2.1 Inspecting the disk wheels

Types of disk wheels **1**:

– 1-part
– 3-part

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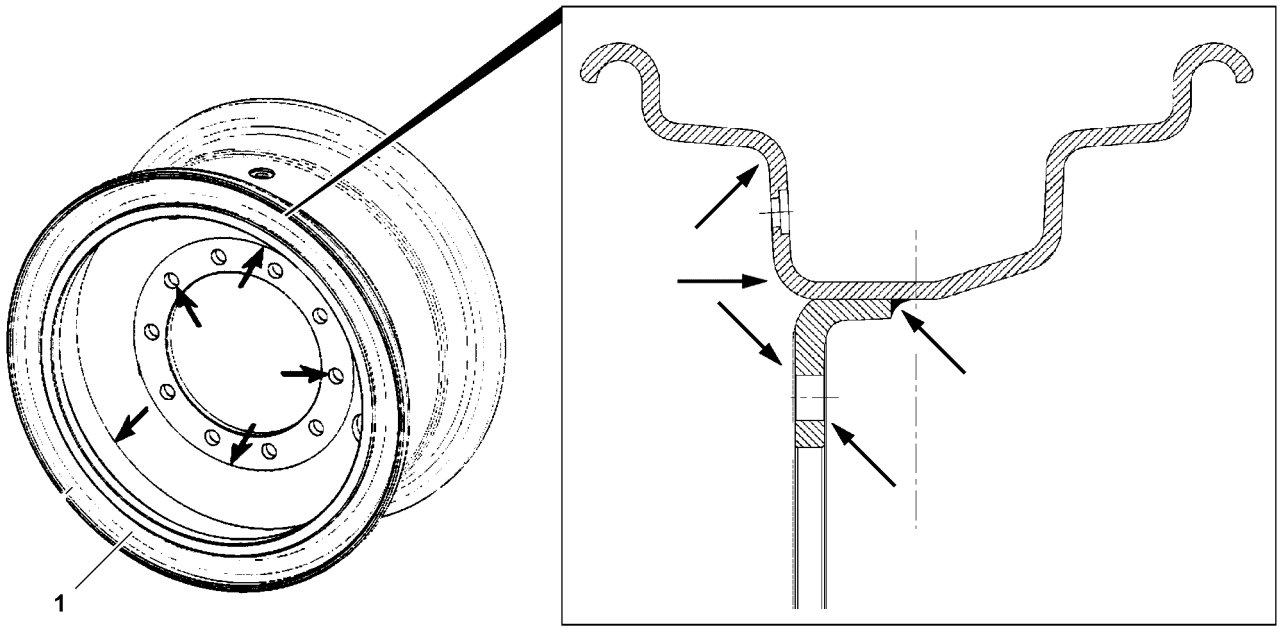

Fig.120144: 1-part disk wheel

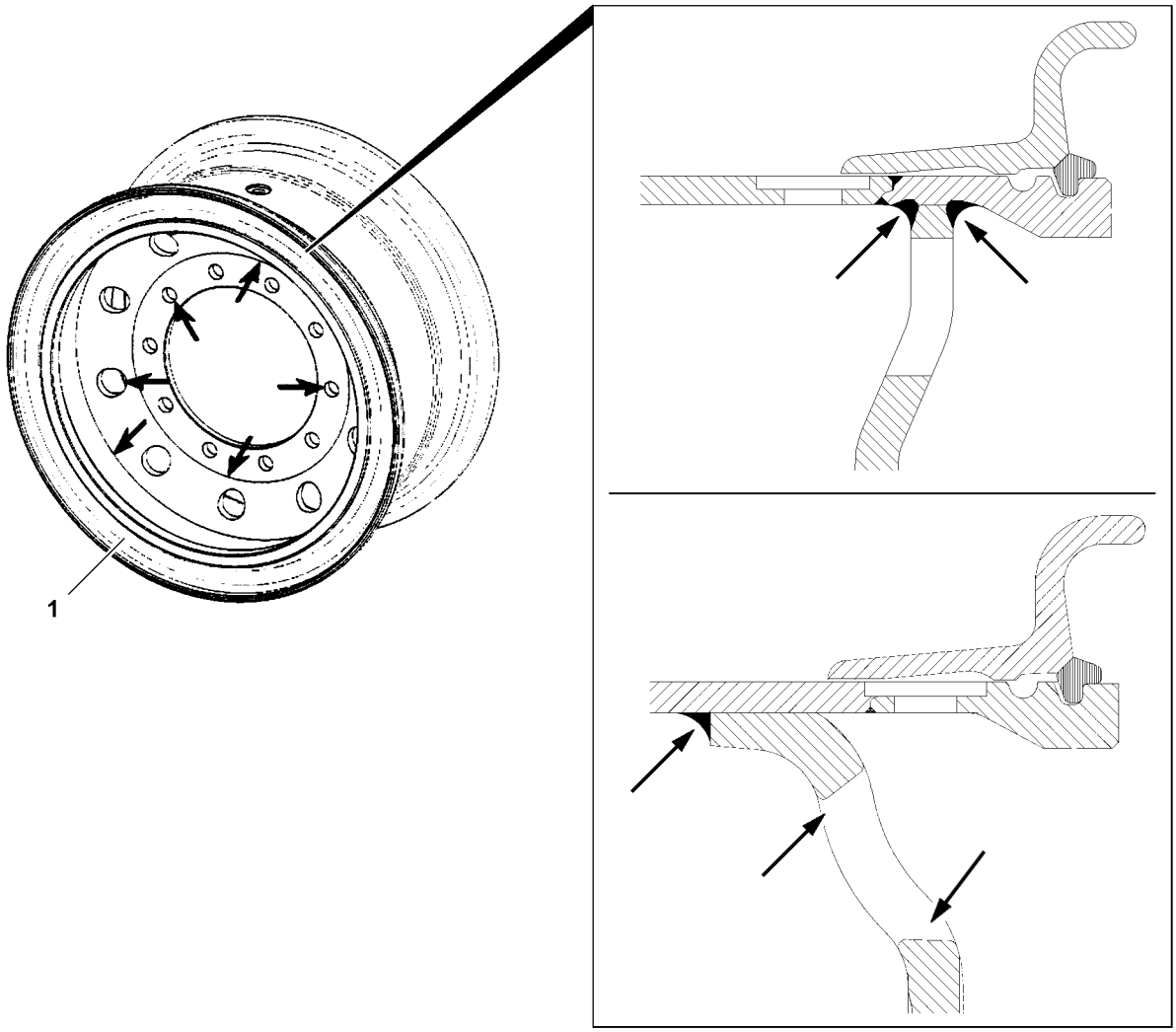

Fig.120143: 3-part disk wheel

WARNING
Damaged disk wheels!
Death, severe injury, property damage.

When the disk wheels are damaged:
▶ Replace the disk wheels **1**.

▶ Check wheel disks **1** for damage.
▶ Check wheel disks **1** for corrosion.
▶ Check welding seams and bore edges for cracks, see illustrations.

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11.2.2 Checking the side ring and locking ring

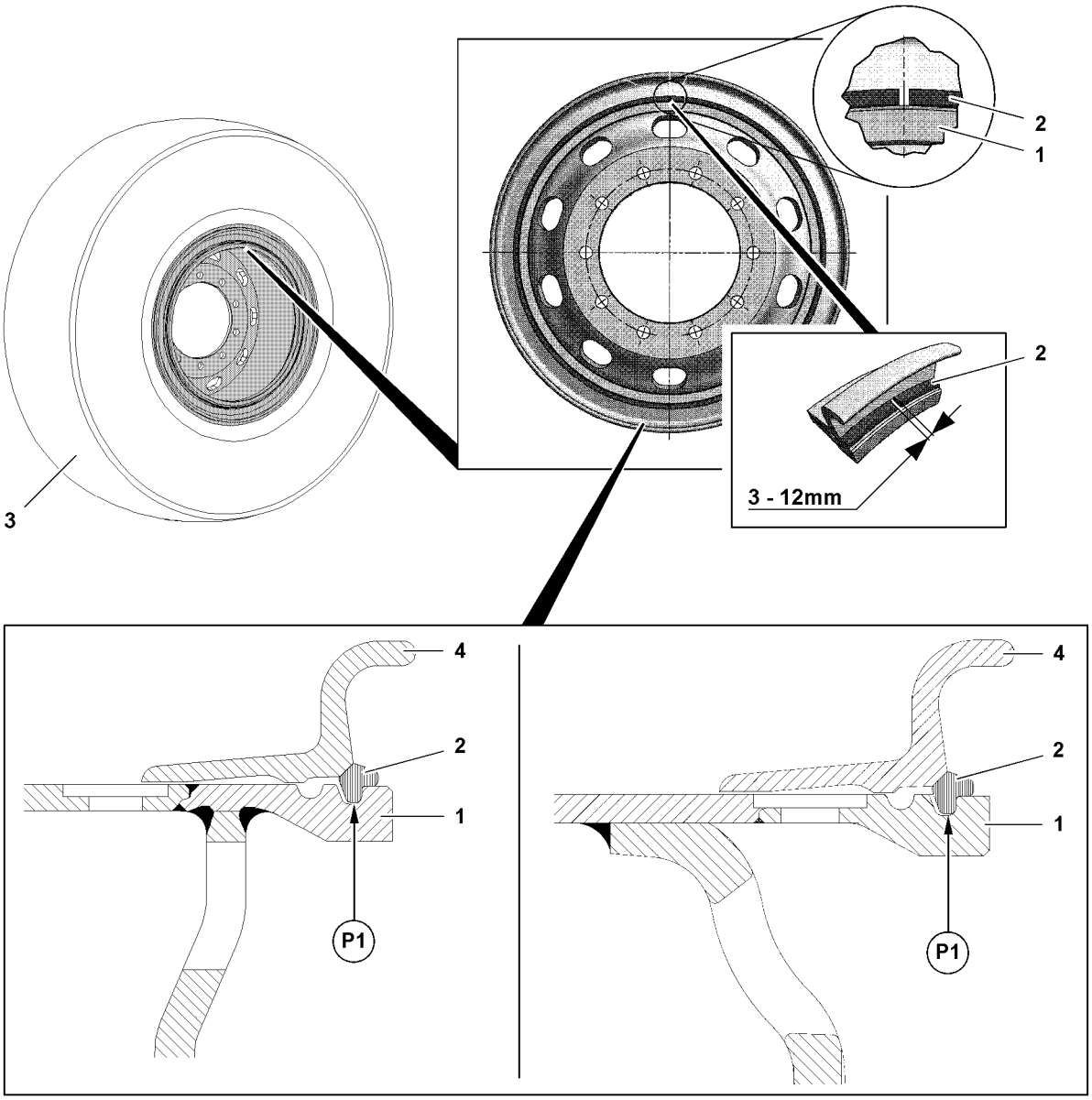

Fig.120142: 3-part disk wheel

On **3-part disk wheels** the side ring and the locking ring must be checked.

WARNING
Danger of fatal injury if the lock ring **2** is not properly seated!
If the locking ring **2** is **not** correctly seated in the groove, then the locking ring **2** can jump off explosively when pumping the tire up.
▶ Check to ensure that the lock ring is correctly seated.

If there is any doubt about the correct seating of the locking ring **2**:
▶ Consult authorized and trained expert personnel for inspection.

When the locking ring **2** is **not** seated correctly in the grove:
▶ Consult authorized and trained expert personnel.
▶ Do **not** change the tire pressure.

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Indications of an incorrectly installed lock ring are present if:
– The locking ring **2** is not completely seated with its entire circumference in the groove (point **P1**) of the disk wheel.
– The gap of the installed locking ring **2** is outside the permissible tolerance range of 3 mm to 12 mm.

▶ Check the gap on the locking ring **2**.
▶ Visually check the side ring **4** and locking ring **2** for correct seating.

11.3 Check the tire pressure

WARNING
Impermissible tire pressure!
Damage on tire body, failure of tire.
▶ Ensure permissible tire pressure.
▶ Do **not** exceed or fall below the permissible tire pressure.
▶ Check the tire pressure exclusively when the tire is cold.

Note
▶ The specified tire pressure must be within the tolerance range of ± 0.2 bar.

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11.3.1 1-part disk wheel

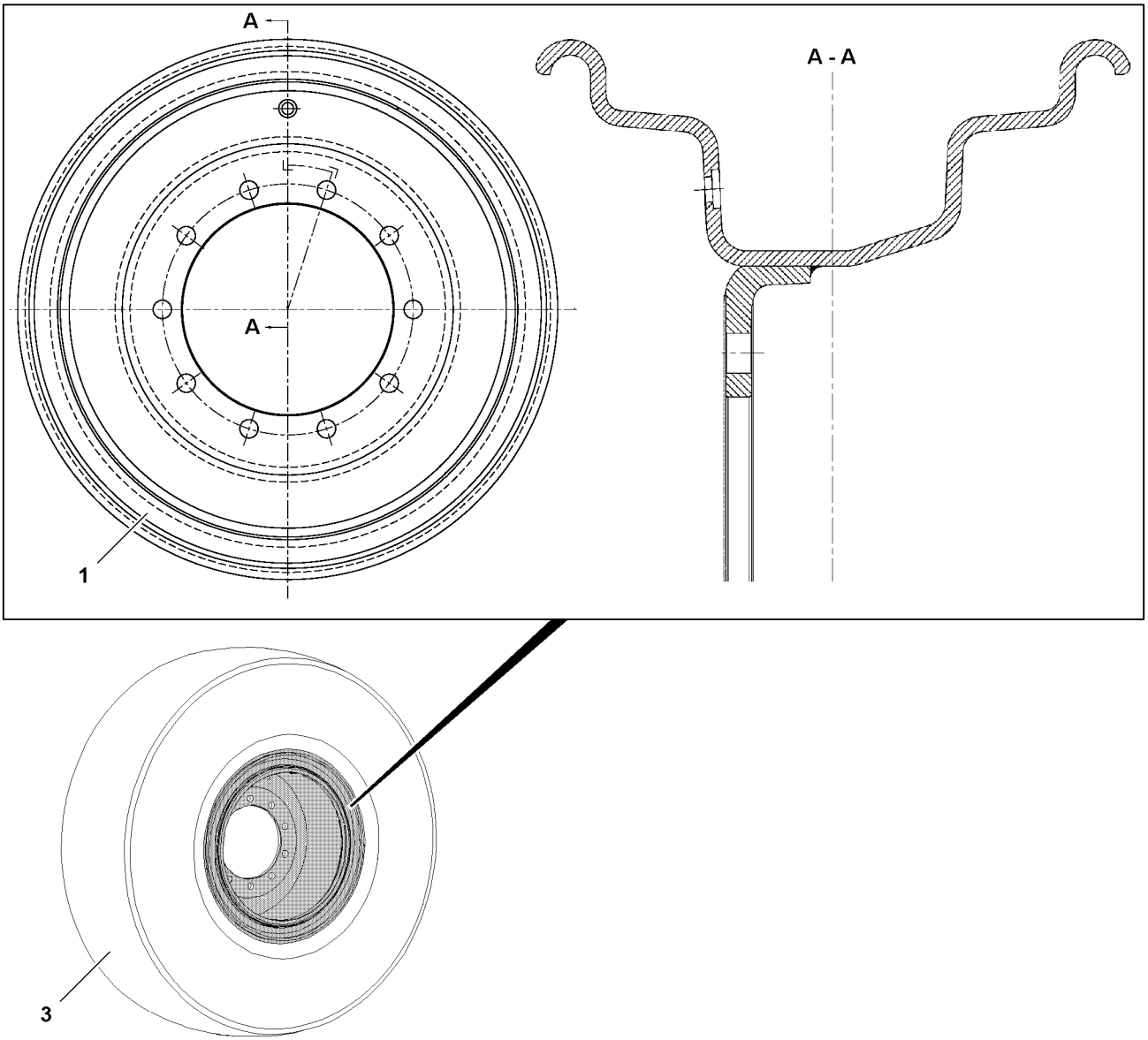

Fig.120145: 1-part disk wheel

Make sure that the following prerequisite is met:
- The tire **3** is correctly seated on the disk wheel **1**.

▶ Check the tire pressure.
▶ Inflate the tire to the pressure which is specified for installed tires. See Crane operating instructions, chapter 1.03.

11.3.2 3-part disk wheel

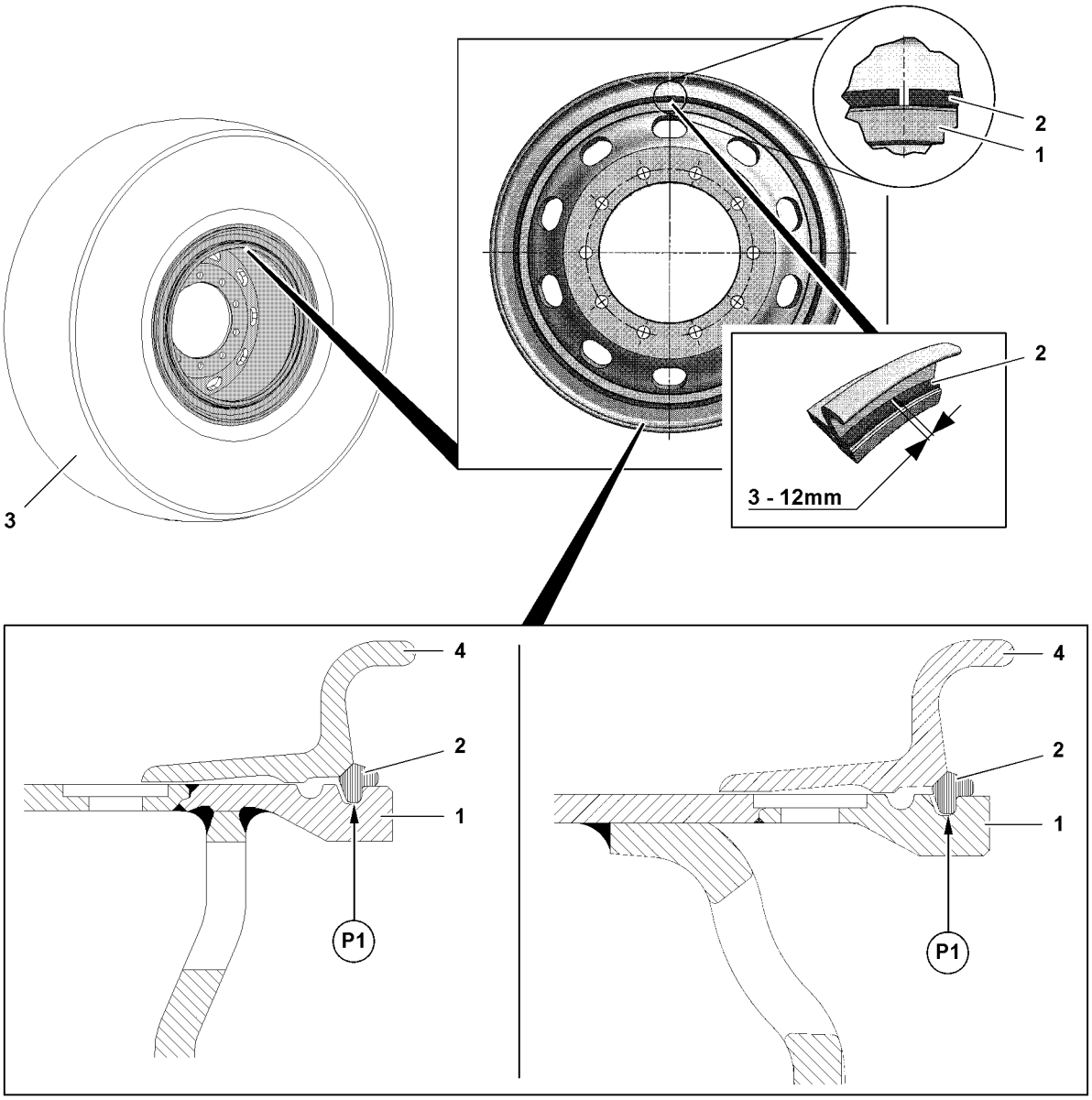

Fig.120142: 3-part disk wheel

Make sure that the following prerequisites are met:
- The tire **3** is correctly seated on the disk wheel **1**.
- The locking ring **2** is seated correctly in the groove (point **P1**) on the disk wheel **1**.

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WARNING
Danger of fatal injury if the lock ring **2** is not properly seated!
If the tire pressure has dropped to less than 3 bar , the locking ring **2** can jump off explosively if the tires are improperly inflated.
▶ When checking the tire pressure on the vehicle or after tire installation, make sure that the locking ring **2** is correctly installed on the disk wheel.

When the tire pressure is less than 3 bar:
▶ Have the tires inflated exclusively by authorized and trained expert personnel.

When the locking ring **2** is **not** correctly seated on the disk wheel:
▶ Consult exclusively authorized and trained expert personnel.
▶ Do **not** make any tire pressure changes on your own.

The gap on the locking ring **2** must be between 3 mm and 12 mm.

▶ Check the gap on the locking ring **2**.
▶ Check the tire pressure.
▶ Inflate the tire to the pressure which is specified for installed tires. See Crane operating instructions, chapter 1.03.

11.4 Changing the tires

WARNING
Use of **non-approved** wheels (tires and disk wheels)!
Death, severe injury, property damage.
▶ Use exclusively spare wheels approved in writing by **Liebherr-Werk Ehingen GmbH**.
▶ Use of **non-approved** spare wheels is prohibited.
▶ Only use tires which were approved for the respective disk wheel type (1-part or 3-part disk wheel).

WARNING
Use of **non-approved** tires!
Death, severe injury, property damage.
▶ Use exclusively replacement tires approved in writing by **Liebherr-Werk Ehingen GmbH**.
▶ Use of **non-approved** replacement tires is prohibited.

11.4.1 1-part disk wheel

WARNING
Death or severe injury due to improper assembly or disassembly!
▶ Install or remove tires on the disk wheel exclusively according to **Specification 98011958** of **Liebherr-Werk Ehingen GmbH**.
▶ Have tires installed and removed exclusively by authorized and trained expert personnel.

11.4.2 3-part disk wheel

WARNING
Death or severe injury due to improper assembly or disassembly!
▶ Have tires installed and removed exclusively by authorized and trained expert personnel.

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11.5 Changing the wheels in case of a flat tire

WARNING
Accident due to a flat tire!
Shaky steering wheel, obstruction of traffic, endangerment of crane personnel.

When the steering wheel shakes:
- ▶ Hold the steering wheel with both hands.
- ▶ Do **not** endanger road traffic when stopping.
- ▶ Select the location for changing the wheel in such a way that the crane is horizontally aligned.
- ▶ Select the location for changing the wheel in such a way that the traffic is obstructed as little as possible.
- ▶ Select the location for changing the wheel in such a way that crane personnel is **not** endangered when changing the wheel.
- ▶ Secure the vehicle and the changing location.
- ▶ Carry out crane operation only when supported.

WARNING
Toppling wheel!
The wheel can fall over when changing the wheel and seriously injure personnel.
- ▶ Secure the wheel to prevent it from falling over.
- ▶ Actuate the support solely when no wheel is leaned against a sliding beam or a support cylinder.
- ▶ When the wheel starts to tip, move away quickly, do **not** try to hold the wheel.
- ▶ Change the wheel solely with an aid and with the proper assembly tools.

- ▶ Apply the parking brake. See Crane operating instructions, chapter 3.04.
- ▶ Block the axle suspension. See Crane operating instructions, chapter 3.03.
- ▶ Loosen the lug nuts on the defective wheel.

DANGER
Death due to impermissible support base!
Toppling crane.
- ▶ Select the support base in such a way that the mobile crane will **not** topple over.

- ▶ Support the mobile crane insofar until the wheels can be changed. See Crane operating instructions, chapter 3.05.

Wheels that are on their side are extremely difficult to lift up. Do **not** lay the wheels down when changing a wheel.

- ▶ Lift the spare wheel using the crane, set it down next to defective wheel and prevent it from rolling away or toppling over.
- ▶ Unscrew lug nuts and dismount defective wheel.

WARNING
Mortal danger due to defective spare wheel!

When a 3-part disk wheel is installed:
- ▶ Before installation, check the disk wheel, side ring, locking ring and tires visually.
- ▶ Make sure that a defective spare wheel is **not** installed.
- ▶ Replace a defective spare wheel.
- ▶ Install only wheels which are approved for the vehicle.

- ▶ Mount the spare wheel.

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WARNING
Accidents due to damaged or loosening lug nuts!
- ▶ Replace damaged lug nuts.
- ▶ Keep the lug nut threads and wheel bolt threads free of oil and grease.
- ▶ Adhere to the tightening torque of 600 Nm.
- ▶ Do **not** overtighten the lug nuts.
- ▶ Use lug nuts exclusively approved by **Liebherr-Werk Ehingen GmbH**.

▶ Install the lug nuts and tighten them crosswise with 600 Nm.

After driving 50 km:
▶ Check the lug nuts for tight seating and retighten if necessary.

11.6 Rotating the tires

Crane vehicle tires are subjected to differing loads during operation.

Note
Recommendation!
- ▶ To obtain an even wear pattern of all tires on a vehicle, rotate the wheels.
- ▶ As soon as an irregular wear pattern is recognizable, rotate the wheels.
- ▶ Proven intervals are between 5000 km and 10000 km.

▶ Rotate the wheels crosswise (see following illustrations).

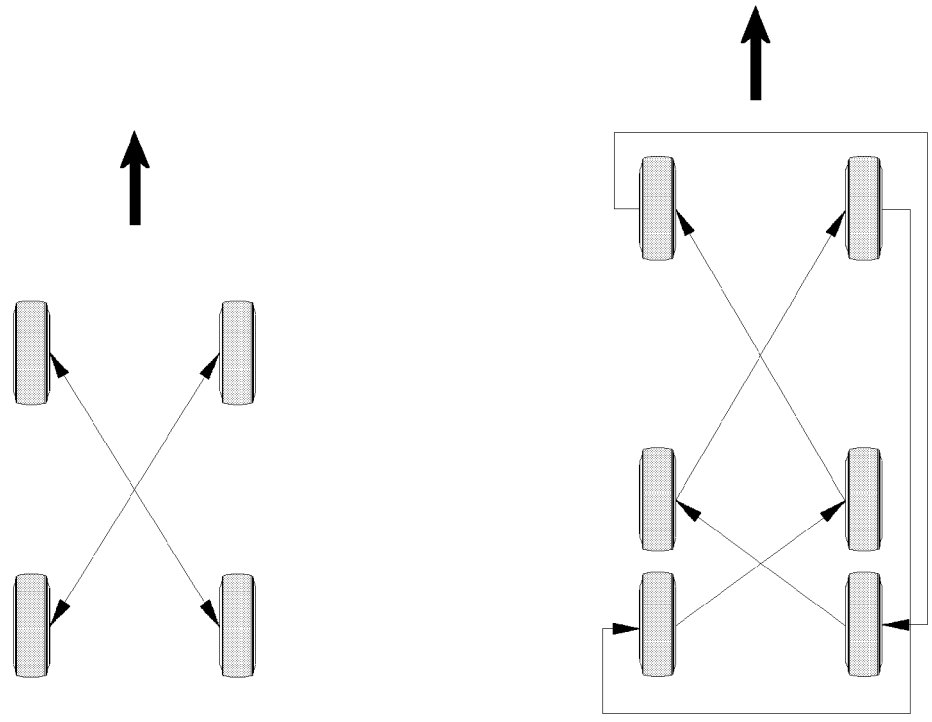

Fig.119259: Example of tire rotation

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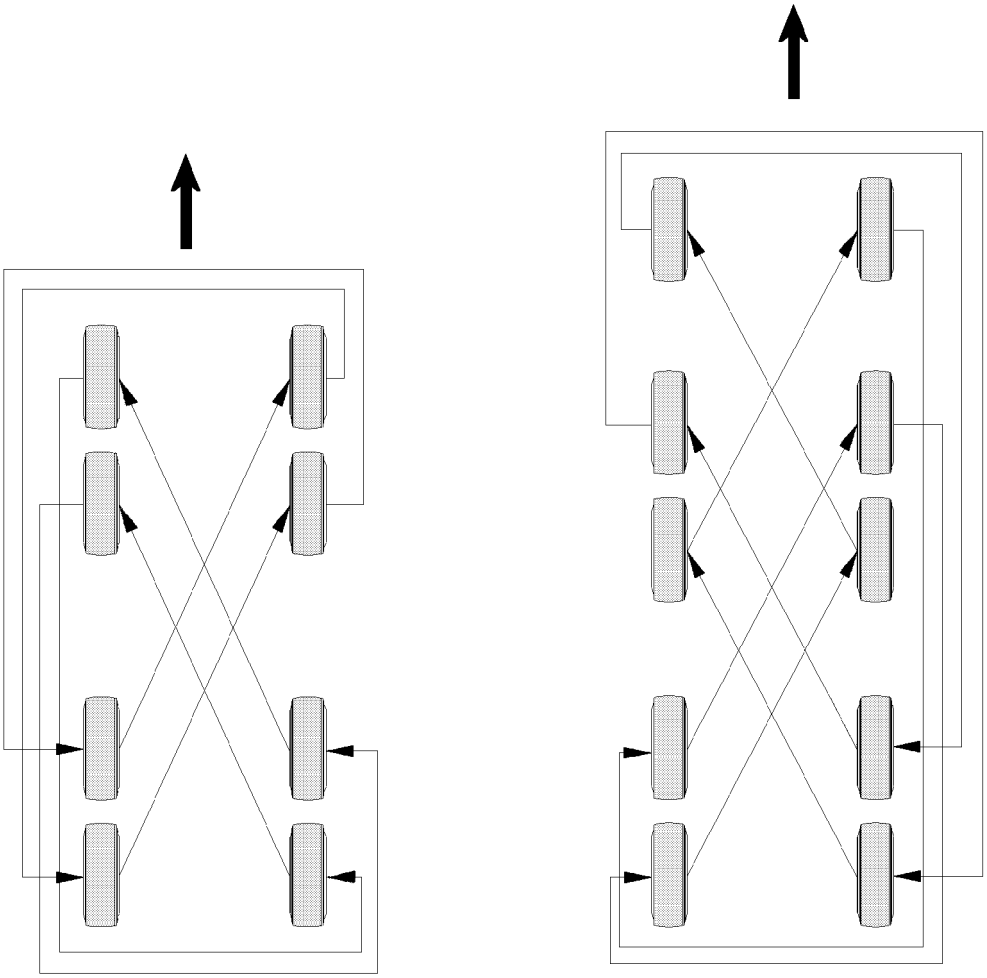

Fig.119260: Example of tire rotation

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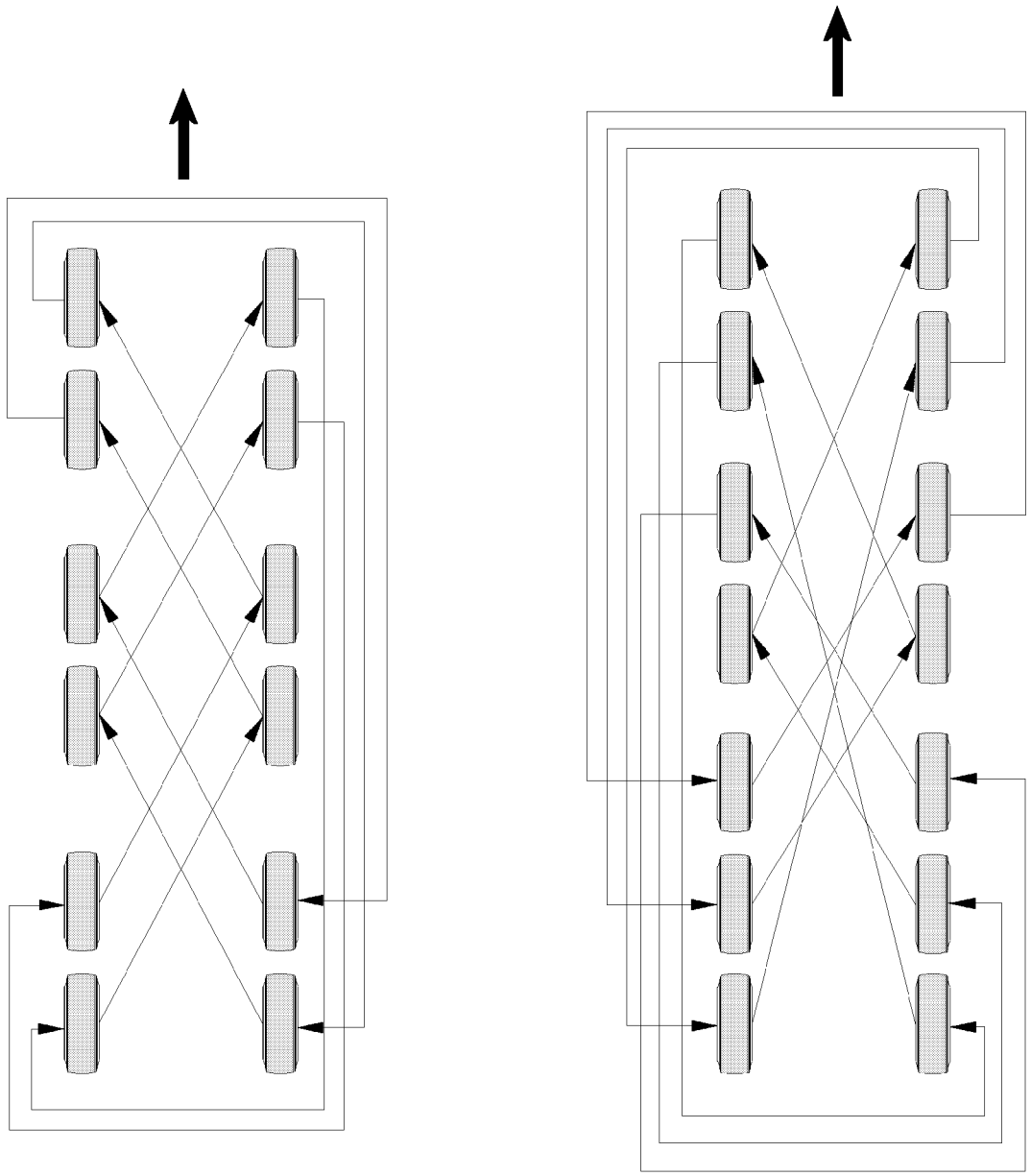

Fig.119261: Example of tire rotation

LWE/LG 1750-006/15409-07-02/en

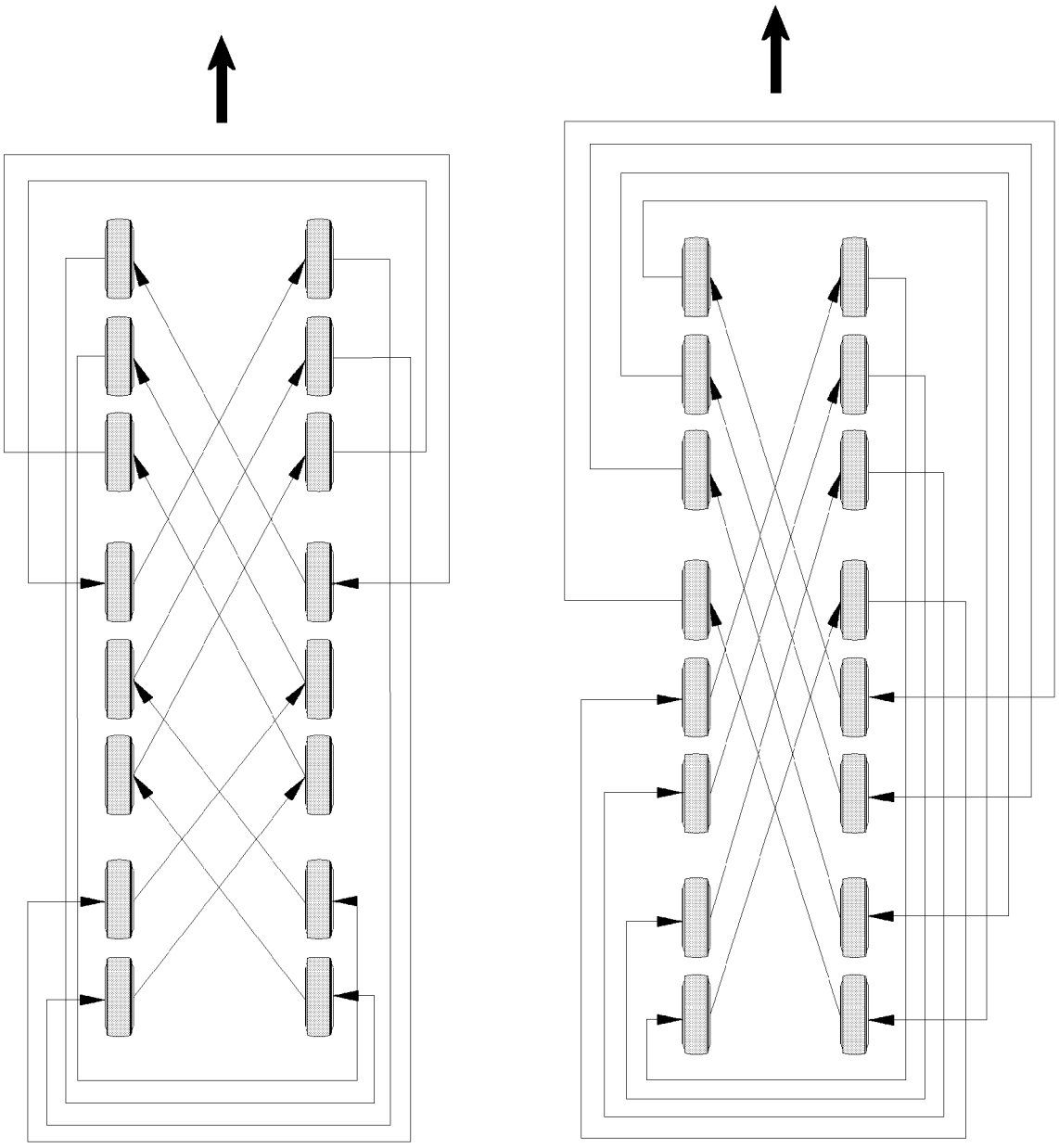

Fig.119263: Example of tire rotation

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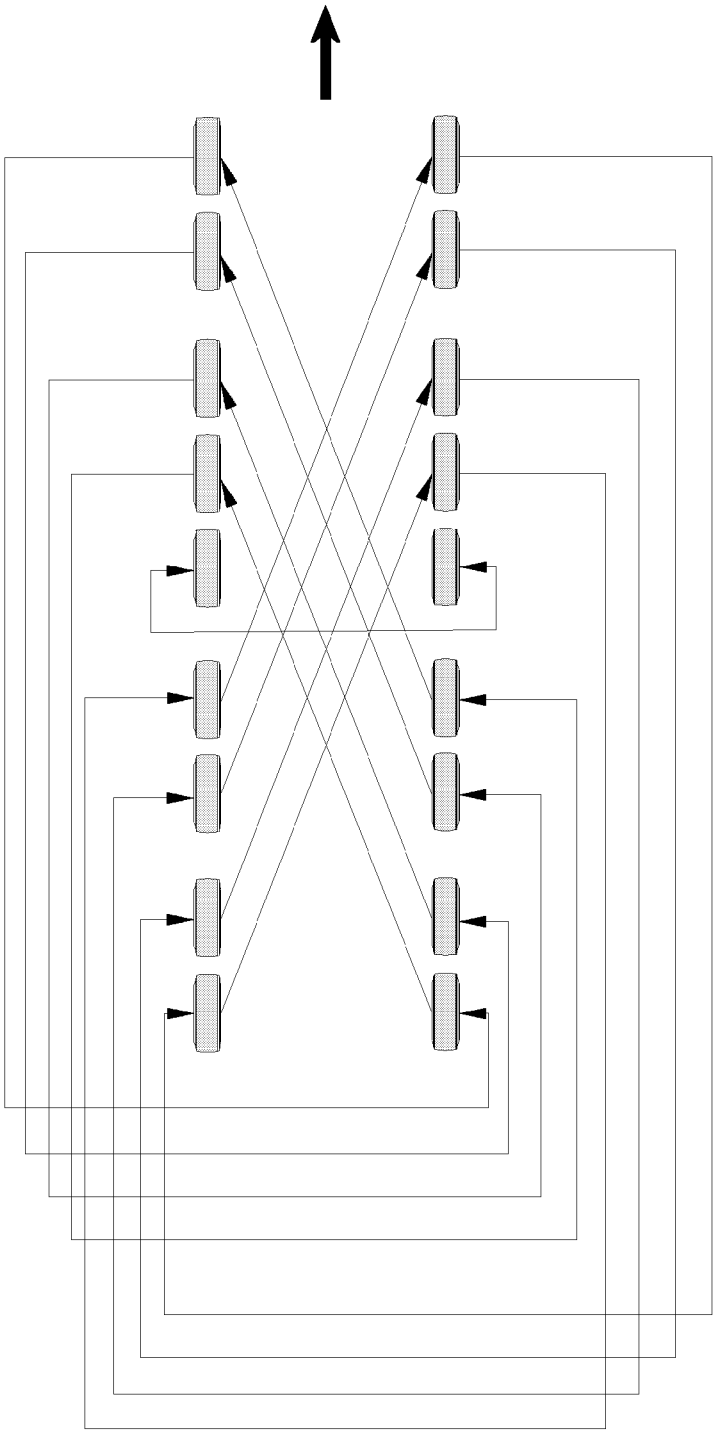

Fig.119262: Example of tire rotation

When a wheel has an even wear pattern:

▶ Remove the wheel and change it with a wheel with irregular wear pattern.

When a wheel has an uneven wear pattern:

▶ Remove the wheel and change it with a wheel with regular wear pattern.

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11.7 Checking the wheel alignment

NOTICE
Increased tire wear due to incorrect alignment!
▶ Check the wheel alignment in regular intervals.

When the tire is subjected to especially high strain:
▶ Have the wheel alignment carried out immediately.

When the tires hit on a curb, for example, then an especially high strain is present.

▶ Have the wheels aligned exclusively by trained and authorized expert personnel.

12 Driver’s cab

The driver’s cab can be tilted forward.

Make sure that the following prerequisites are met:

- The crane is at a standstill.
- The parking brake is applied.
- The transmission is in neutral.
- The engine is off.
- The heater is turned off.
- The climate control system is turned off.
- Loose objects have been removed from the driver’s cab (for example: containers, bags, bottles, cans, tools).
- The storage compartments are closed.
- The doors are closed.
- The mobile crane is secured to prevent it from rolling off.

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12.1 Tilting the driver's cab forward

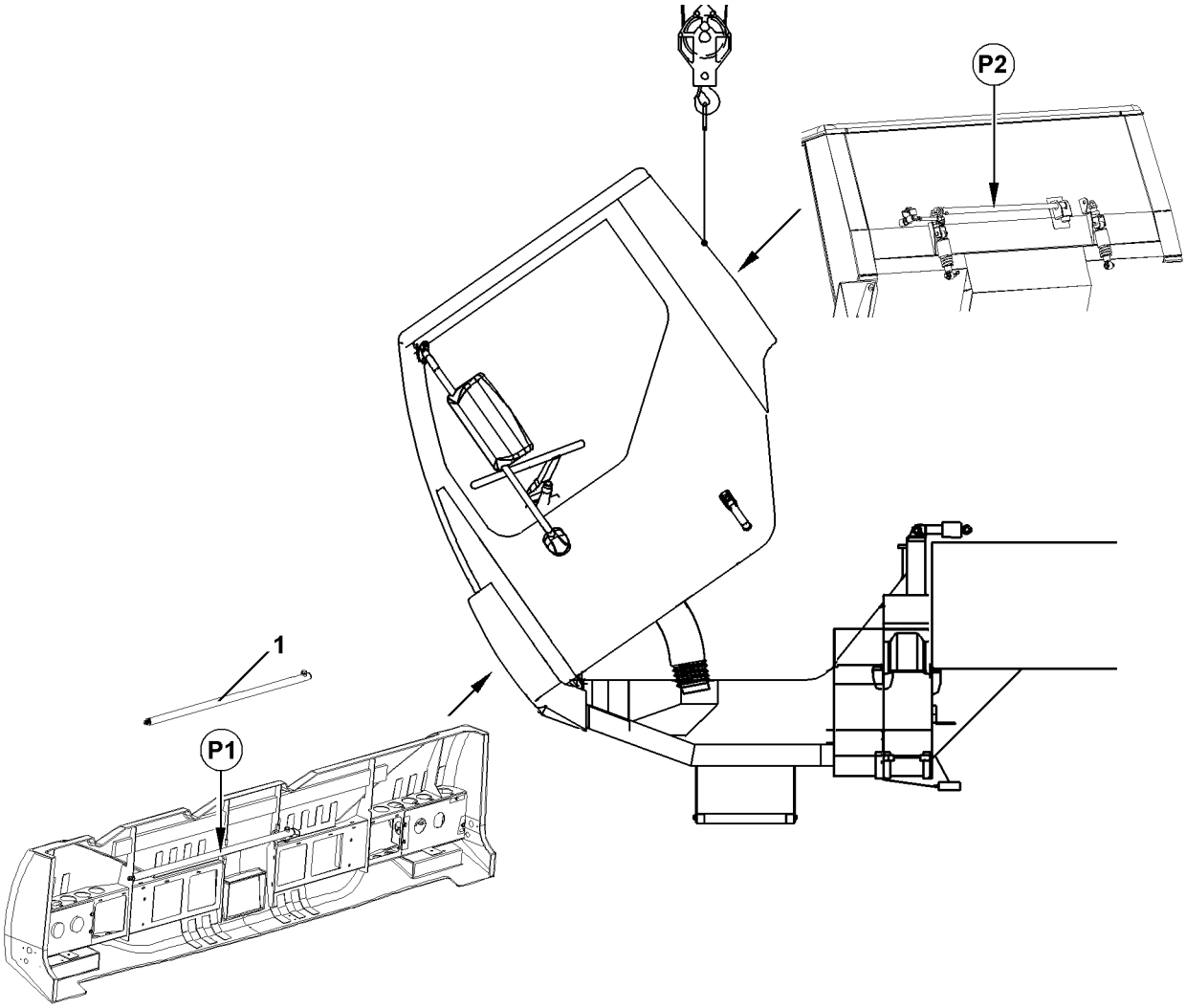

Fig.119291

Note

- Depending on the version, the support rod **1** is carried along on front on the bumper, see point **P1** or behind the driver's cab, see point **P2**.

Before the driver's cab may be tilted forward over the front bearing, the following measures must be taken, depending on the version.

- Mark the position of drive shaft in relation to the miter gear.
- Unscrew the drive shaft from the miter gear to the steering gear on the flange.
- Remove the shock absorbers and stabilizers (if necessary) from rear wall of driver's cab.
- Loosen any mountings, if necessary.

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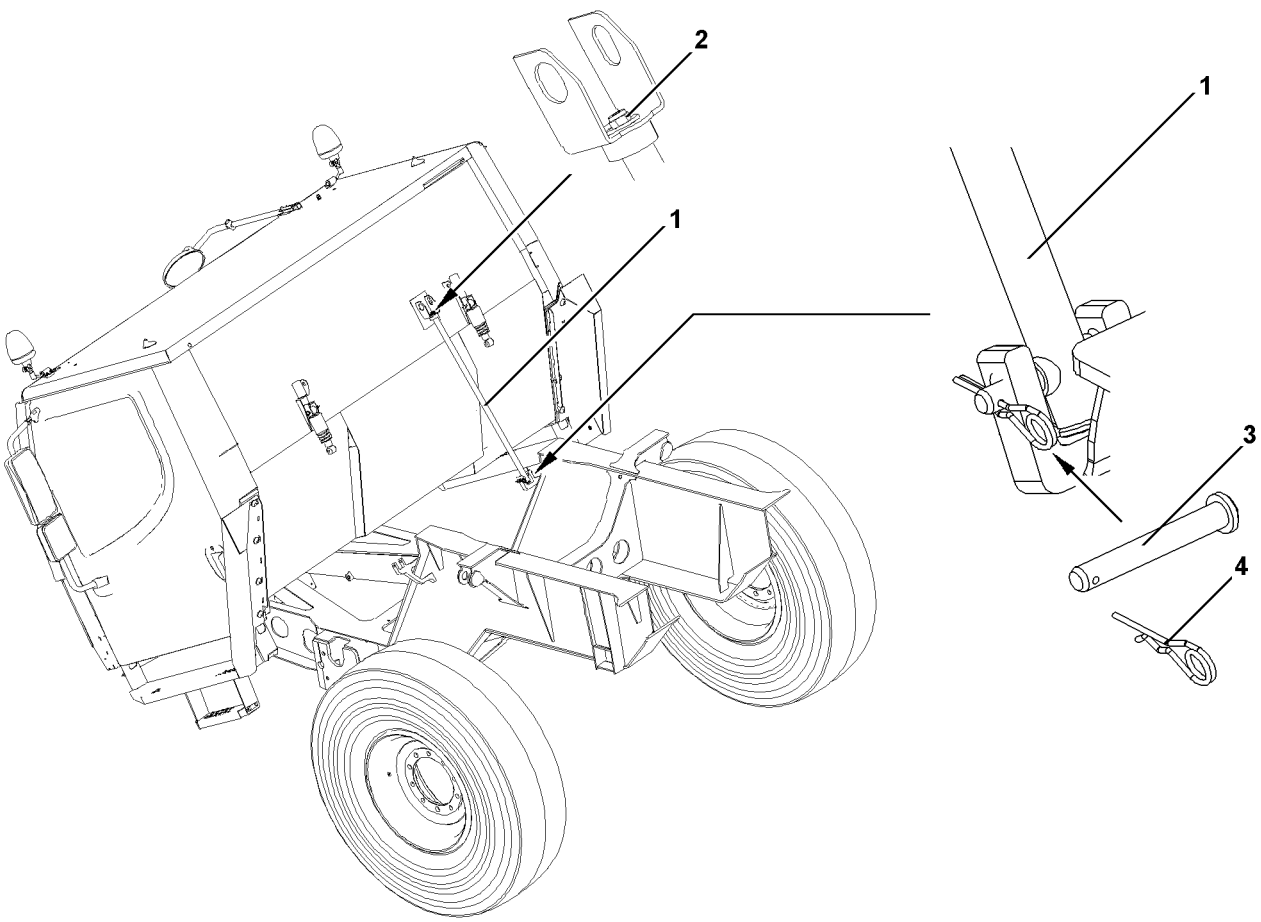

Fig.119292

WARNING
Cab tilts forward in an uncontrolled manner!
- ▶ Do not damage any cables and hoses on underside of driver's cab.
- ▶ Properly support the driver's cab when tilted and secure it with the support rod **1**.

- ▶ Screw and secure the support rod **1** with a nut M10 **2** and washer on top on the driver's cab.
- ▶ Pin the support rod **1** on the bottom with pins **3** on the vehicle frame and secure with cotter pin **4**.
- ▶ Remove front bumper completely (depending on model) or loosen it, pull it out and tilt it downward.

12.2 Reinstalling the drive shaft after tilting the cab

- ▶ Check the drive shaft for ease of movement and operation of joints and slider.
- ▶ If the drive shaft is damaged, replace it with a new drive shaft.
- ▶ Install the drive shaft according to the marks that were made.

12.3 Tilting the driver's cab into travel position

WARNING
Danger of accident and injury due to **unfastened** driver's cab!
The driver's cab can tilt forward.
You can loose control over the vehicle.
Persons in the driver's cab can be flung forward.
Persons or objects within the swing range can be hit.
- ▶ Make sure that the driver's cab is properly fastened in travel position.

- ▶ Tilt the driver's cab back into travel position.

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▶ Fasten the driver’s cab on the vehicle frame.

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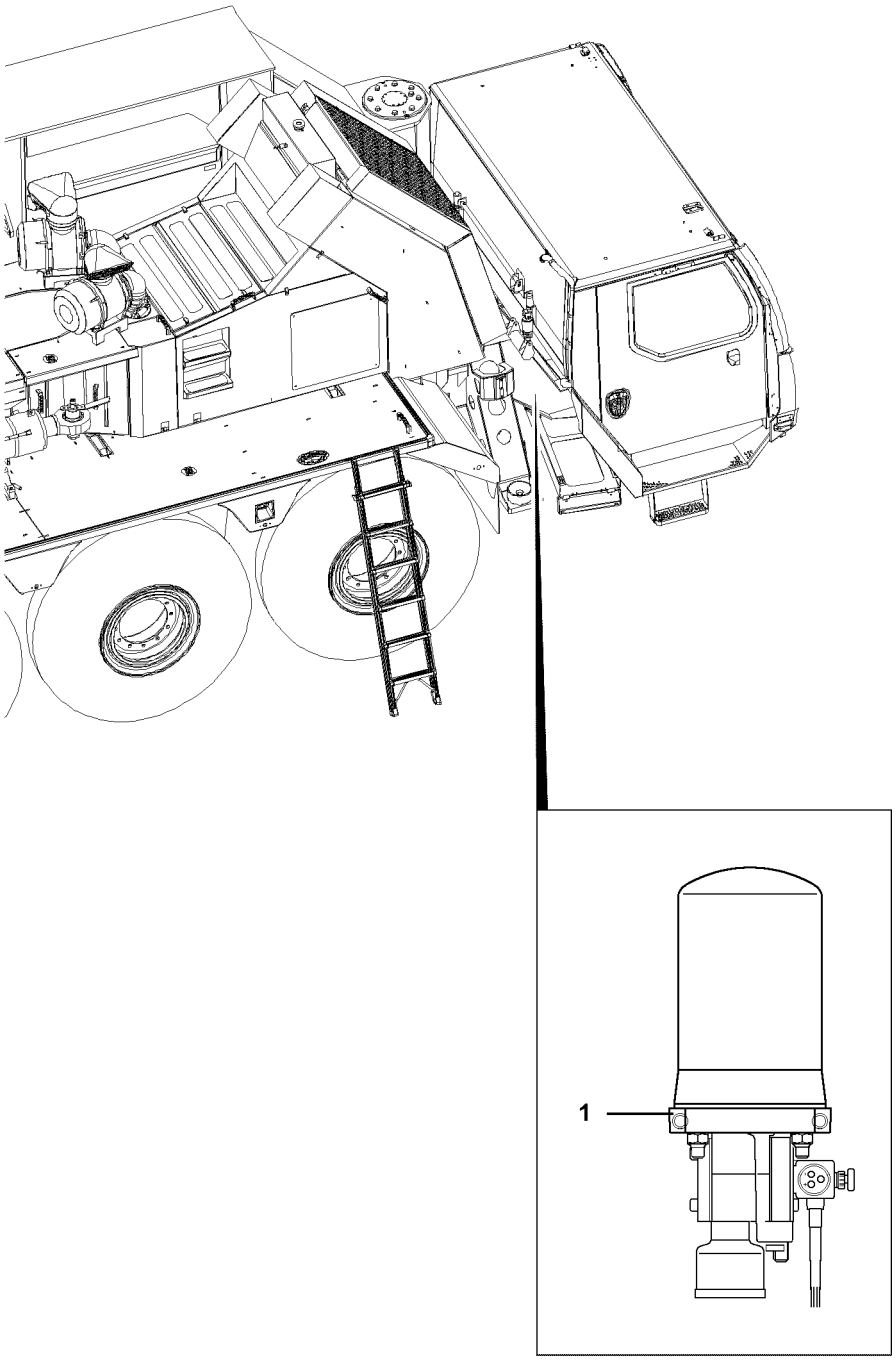

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Fig.117121

13 Compressed air and brake system

13.1 Replacing the granular cartridge

WARNING
Danger of accident due to pretensioned granular cartridge!
The granular cartridge of the air dryer **1** is under spring tension.
Personnel can be severely injured.
▶ Caution when replacing the granular cartridge.

▶ Replace the granular cartridge once a year.

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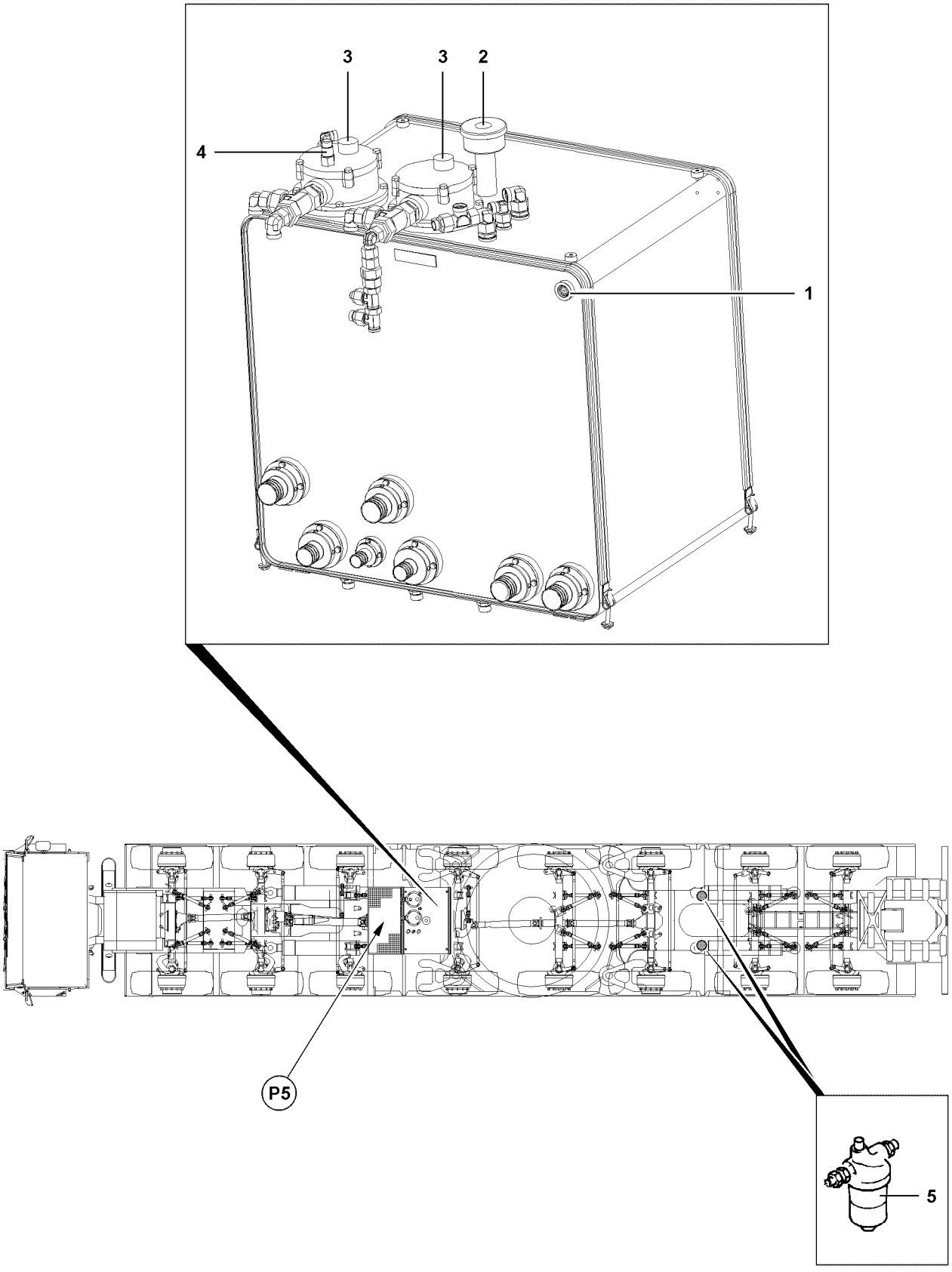

LWE/LG 1750-006/15409-07-02/en

Fig.117120

14 Hydraulic system

Extreme cleanliness must be maintained when adding oil.

14.1 Hydraulic tank

14.1.1 Checking the oil level

Make sure that the following prerequisites are met:
- The crane vehicle is in horizontal position.
- The support cylinders and sliding beams have been fully retracted.
- The vehicle has been lowered to the lowest axle suspension level.
- The maintenance personnel is at position **P5**.

NOTICE
Danger of accident due to defective hydraulic pump!
If the oil level is too low, the hydraulic pump may be damaged, which will increase the danger of accident because of incapacity to steer the crane.
The cylinders cannot be fully extended and the vehicle cannot be levelled.
▶ Check oil level and add oil, if necessary.

The oil level must be in the center of the oil level sight gauge **1**.

▶ Check the oil level on the oil level sight gauge **1** of the hydraulic oil tank.

Problem remedy
No oil is visible in the oil level sight gauge **1**?
▶ Add oil as specified in the lubrication chart with a fine-mesh strainer until the oil level is visible in the center of the oil level sight gauge **1**.

14.1.2 Checking the vent / breather filter

▶ Open the cover with the turn lock.
▶ Check the filter **2** for impurities (visual inspection).

In the event of heavy contamination:
▶ Replace the filter **2**.
▶ Close the cover with the turn lock again.
▶ Start the diesel engine.
▶ Slowly run through all crane movements.
▶ Check the oil level again and add oil if necessary.

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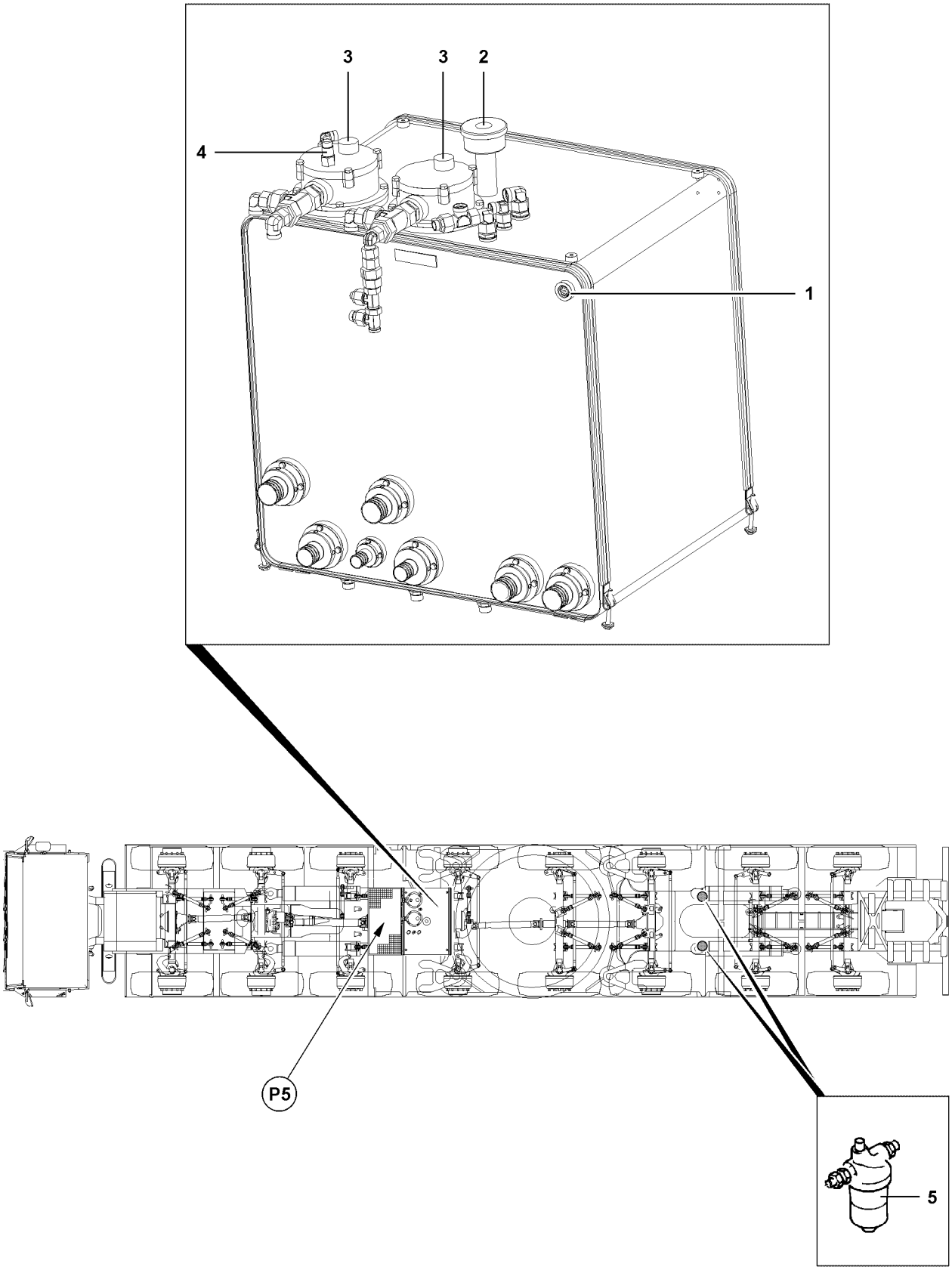

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Fig.117120

14.1.3 Checking and replacing the return filter

The return filter **3** is equipped with a maintenance indicator **4**. If the red bar indicator is visible when the oil is at operating temperature, the filter cartridges in both return filters **3** must be replaced.

- ▶ Unscrew and remove both filter covers on the return filter **3**.
- ▶ Remove the filter units.
- ▶ Rinse out the filter housing.
- ▶ Clean the sealing surfaces on the covers and filter housings.
- ▶ Insert new filter units.
- ▶ Lubricate the rubber seal rings in the covers with oil.
- ▶ Place both filter covers and tighten.
- ▶ Start the diesel engine and check the filters for leaks.
- ▶ Check the oil level again and add oil, if necessary.

14.1.4 Pressure filter

The pressure filters **5** are equipped with a maintenance indicator. If the red bar indicator is visible when the oil is at operating temperature, then the filter cartridge must be replaced.

- ▶ Turn the diesel engine off.
- ▶ Release the filter cartridge and collect any escaping oil in a suitable container.
- ▶ Remove and dispose of the filter cartridge.
- ▶ Clean the sealing surface on the filter bracket.
- ▶ Lubricate the rubber seal ring on the new filter cartridge with oil.
- ▶ Install a new filter cartridge and tighten.
- ▶ Start the diesel engine and check the filters for leaks.

Result:

– This bleeds the hydraulic system.

- ▶ Check the oil level again and add oil, if necessary.

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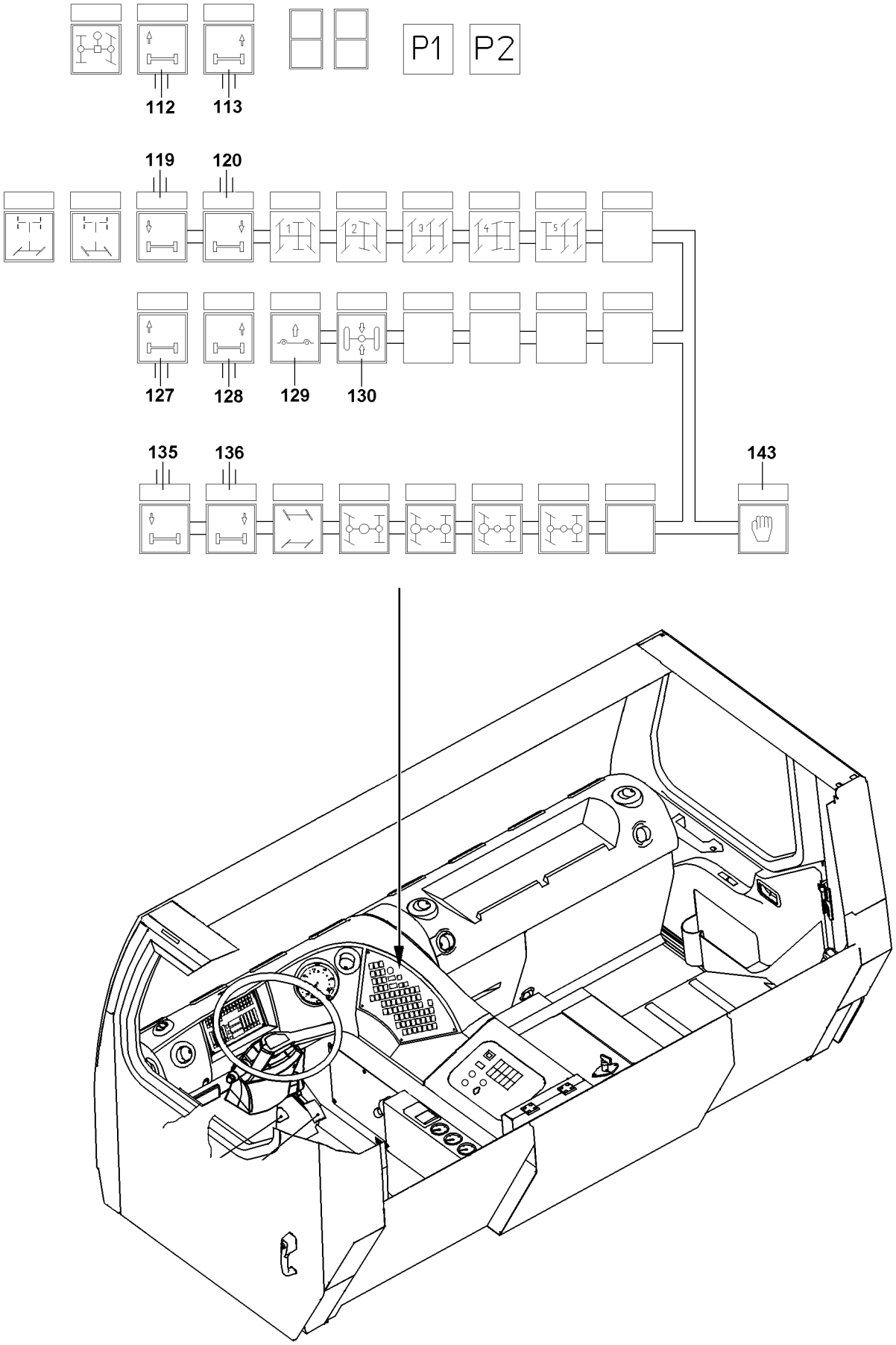

Fig.108134

14.2 Diaphragm reservoirs of axle suspension / axle blocking system

Diaphragm reservoirs have been installed in the hydraulic system. The pretension pressures are specified in the hydraulic circuit diagram as well as on the individual diaphragm reservoirs. The pretension pressure must be measured separately in each diaphragm reservoir.

NOTICE
Risk of travel gear damage!
If the outside temperature fluctuates considerably, e.g. after transport to extremely hot or cold countries or in countries with considerable differences between the summer and winter temperatures, the gas accumulator pressures may change. Inadequate gas pretension may cause the reservoir diaphragms to be overstressed. If the pretension is too high, the spring action in the axle suspension if no longer guaranteed.
▶ Check the gas accumulator pressures and correct if necessary.

Make sure that the following prerequisites are met:
– The axle suspension / axle blocking system is in the suspended position.
– The function control on button **130** does not light up.

▶ Lower the vehicle down as far as possible using button **119**, button **120**, button **135**, button **136** and enter **143** until the oil has drained from the diaphragm reservoirs.

WARNING
Danger of explosion!
The pressure in the nitrogen cylinder must be less than the maximum permissible operating pressure of the accumulator or the pressure gauge. Otherwise install a pressure reducer between the cylinder and the filling device.
▶ Do not use air or oxygen to fill the diaphragm reservoir!

The pretension pressure in the hydraulic reservoirs may only be checked by an expert with appropriate training and equipment. In addition, the national regulations for pressurized container inspections must also be observed.

▶ Check the pretension pressure with a testing and filling device and correct it, if necessary.
▶ Press level button **129** and ENTER **143** until the function control on the level button **129** blinks.

Result:

– The vehicle is at the level setting (level for on road driving).

15 Hydraulic hose lines

15.1 Checking the hydraulic hose lines

WARNING
Damaged and leaky hydraulic hose lines!
Fire, accidents, death, severe injury, property damage.

If leaky areas are found during the visual inspection:
▶ Have these leaky areas inspected immediately by authorized and trained expert personnel and remedied.

If damage is found during the visual inspection:
▶ Have hydraulic hose lines checked by an **expert person for hydraulic hose lines**.

Note
▶ For annual inspection of hydraulic hose lines and for definition of **expert person for hydraulic hose lines**, see Crane operating instructions, chapter 8.06.

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Hydraulic hose lines must be inspected **once a year** by an **expert person for hydraulic hose lines**.

The system must be visually inspected **daily**.

The system must be visually inspected **before starting to work**.

15.1.1 Inspecting the hydraulic hose lines for damage

Hydraulic hose lines must be inspected by an **expert person for hydraulic hose lines** when one of the following defects is found:
- Damage on outer surface, such as chafe marks, cuts and cracks
- Brittleness due to aging of outer layer (cracks)
- Distortion, such as splitting of hose layers, bubbles, crushed areas, kinks, twists
- Damage or distortion of hose fixtures or hose fitting (seal is endangered)

▶ Inspect the hydraulic hose lines for damage.

If one of the listed defects is found:
▶ Have hydraulic hose lines checked by an **expert person for hydraulic hose lines**.
▶ Document conspicuous findings, decisions and replacements comprehensibly, see Crane operating instructions, chapter 8.06.

15.1.2 Inspecting the hydraulic hose lines for leaks

▶ Check the crane for escaped hydraulic oil.
▶ Check the ground under the crane for emerged leak oil.

When the hydraulic system leaks:
▶ Have these leaky areas inspected by authorized and trained expert personnel and remedied.

If one of the listed defects is found:
▶ Have hydraulic hose lines checked by an **expert person for hydraulic hose lines**.
or
Contact Liebherr Service.
▶ Document conspicuous findings, decisions and replacements comprehensibly, see Crane operating instructions, chapter 8.06.

16 Electrical system

16.1 Bulbs and fuses

NOTICE
Property damage on the electrical system!
▶ Defective fuses may **not** be bypassed with wire or the like.
▶ Always replace defective fuses with fuses for the same current strength.
▶ Always replace defective bulbs with bulbs for the same output.
▶ If the same fuse or bulb repeatedly becomes defective: Check the electrical system.

16.2 Lines

▶ Make sure that all electrical lines are properly routed and fastened in their retainers.
▶ Fix any chafes or brittle areas in the insulation and coverings immediately.
▶ Any installation lines that are **not** in perfect condition must be immediately and professionally replaced.

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16.3 Batteries

16.3.1 Safety guidelines

WARNING
Danger of accidents due to discharged batteries!
- ▶ Plug in the cable of the external power supply on the Liebherr charger.
- ▶ Make sure that the batteries are charged while the crane is not in operation.

WARNING
Chemical burns due to battery acid!
Eye damage and skin irritation on contact.
- ▶ Make sure that eyes and skin do **not** come in contact with battery acid.
- ▶ Wear eye protection.
- ▶ Wear protective gloves.

When eyes came in contact with battery acid:
- ▶ Flush the eyes out immediately with clear water and consult a physician.

When skin came in contact with battery acid:
- ▶ Flush the skin immediately with water and consult a physician.

Note
- ▶ All safety signs on the batteries must be complete and always legible.
- ▶ Observe and adhere to the manufacturer's operating instructions.

Sign	Explanation
	Follow the guidelines on the battery, in the instruction manual and in the Crane operating instructions.
	Wear eye protection.
	Keep children away from acid and batteries.
	**Danger of explosion!** A highly explosive acoustic mixture is created when charging batteries.
	**Warning!** Fire, sparks, open light and smoking is prohibited. Avoid spark formation when handling cables and electrical devices. Avoid short circuits.

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Sign	Explanation
	**Danger of chemical burns!** Battery acid is very caustic, for that reason: Wear protective gloves and eye protection. Do **not** tilt the battery, acid can emerge from the vent openings.
	**First aid:** Flush splashed acid in the eye immediately for several minutes with clear water and consult a physician immediately. Neutralize splashed acid on skin or clothing immediately with an antacid or soap and flush with lots of water. When acid was ingested, contact a physician immediately.
	**Warning!** Do **not** expose batteries unprotected to direct daylight. Discharged batteries can freeze. Store batteries frost free.
	**Disposal!** Dispose old batteries at a collection point. During transport, observe the guidelines of the manufacturer. Never dispose of old batteries in general trash.
	**Back to the manufacturer!** Used batteries with this sign are reusable assets. Send batteries for recycling. Old batteries, which are **not** recycled must be disposed of as hazardous waste under observation of all regulations.

16.3.2 Checking the batteries

DANGER
Mortal danger due to electric shock!
- ▶ When working on the electrical system of the crane, disconnect batteries from the electric circuits.
- ▶ Avoid spark formation caused by electrostatic charge.

When working on batteries:
- ▶ Wear a ground strap.
- ▶ Do not bring oil, grease, fuel or solvents into contact with the battery casting compound.

- ▶ Keep batteries dry and clean.
- ▶ Release dirty terminals, clean and grease them with an acid-free and acid-resistant grease.

NOTICE
Property damage due to excessively high or low acid level!
- ▶ Check the acid level in the battery only with a wooden stick or cardboard strip.
- ▶ Never check the acid level in the battery with metallic material.
- ▶ Adhere to the „minimum“ or „maximum“ acid level over the lead plates in the batteries according to the specifications of the battery manufacturer.

- ▶ Check the acid level in the batteries **every 6 months**. In summer and in hot climates, check it at least **every 3 months**.
- ▶ If necessary, add distilled water to the specified „max mark“.

An acid container is located in the battery box.

- ▶ Check the acid container.
- ▶ Fill the acid in the acid container into the battery.

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The charge condition of a battery is determined by measuring the acid density.

Measure the acid density: The acid temperature should be + 20 °C if possible.

When distilled water was added:
▶ Measure the acid density after 30 minutes.

Proceed as follows when checking the battery charge:

Acid density	Charge condition	Measure
in kg/l at +25 °C		
1.28/1.23*	charged	—
1.20/1.16*	semi-charged	charge
1.12/1.08*	discharged	charge immediately

* in tropical countries

Reduced battery performance requires greater power requirements.

▶ Charge batteries in time.
▶ Make sure that batteries are charged in the cold season.

16.3.3 Charging batteries with the Liebherr charger*

The Liebherr charger is integrated in the crane electric.

Make sure that the following prerequisite is met:
– The ignition is turned off.

▶ Turn the battery master switch off.

A socket for external power supply for the Liebherr charger is located on the crane.

▶ Plug in the cable of the external power supply on the socket.

16.3.4 Charging the battery with an external charger

WARNING
Danger of injuries!
▶ Do **not** place tools on batteries and keep out of sunlight.
▶ Eliminate spark formation caused by electrostatic charge. Before working on batteries, wear a ground strap.
▶ Work only in well ventilated rooms.
▶ Do **not** tilt or shake the batteries.

NOTICE
Property damage if charge voltage is more than 33 V !
▶ Make sure that the external charger delivers a charge voltage of maximum 33 V.

NOTICE
Loss of data due to disconnected battery!

When the battery is disconnected:
▶ Make sure that the temporary data memory is **not** needed.

Make sure that the following prerequisite is met:
– The ignition is turned off.

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Charging the battery while installed

- ▶ Turn the battery master switch off.
- ▶ Use an external charger with a charge voltage of maximum 33 V.
- ▶ Charge the battery professionally with an external charger.

Charging the battery while removed

NOTICE
Damage to alternator!
- ▶ Disconnect batteries solely if the diesel engine has been turned off.

Removing the batteries

- ▶ Turn the battery master switch off.
- ▶ Use an external charger with a charge voltage of maximum 33 V.
- ▶ Disconnect the negative terminal first (ground cable), then the positive terminal.
- ▶ Disconnect the vent hose from the vent channels of the batteries.
- ▶ Remove the batteries.

Charging the batteries externally

NOTICE
Damage to batteries!
- ▶ Charge only with direct current. Maximum current: 1/10 of the battery capacity.

Example for charging: To charge a battery with 170 Ah , the charge current may **not** be more than 17.0 A.

- ▶ Frozen batteries must be thawed out before charging.
- ▶ Remove all plugs, if present, before charging.
- ▶ Check the acid level in the battery, see section „Maintaining the batteries“.
- ▶ Make sure that ventilation is adequate during the charging procedure (danger of oxyhydrogen explosion).
- ▶ Connect the battery to a battery charger (positive to positive and negative to negative).
- ▶ Turn on the battery charger after connecting the battery.

Stop charging immediately if:
- – The acid temperature exceeds 55 °C (casing more than warm to the touch).
- – The battery starts to give off gas.
- – The electrolyte concentration or the charging voltage has **not** changed for 2 hours.

- ▶ Turn the battery charger off after charging, then remove the connector cables individually from battery and battery charger.

Installing the batteries

- ▶ Check the acid level in the battery, see section „Checking the batteries“.
- ▶ Reinstall the batteries tightly in the vehicle.
- ▶ Connect the vent hose on the vent channels of the batteries.
- ▶ Connect the positive terminal to the battery first, then the negative terminal (ground cable).
- ▶ Check that the terminals are tightly seated (low transfer resistance).
- ▶ Grease the terminals and terminal posts with acid-free and acid-resistant grease (use corrosion protection even for modern maintenance-free batteries).

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17 Ladders

WARNING
Danger of falling!
If the following safety guidelines are **not** observed, personnel can fall down and be killed or severely injured.

- ▶ Observe and adhere to the installation and safety guidelines for ladders.
- ▶ Observe and adhere to the safety signs on the ladders.
- ▶ Install and secure the ladders properly.
- ▶ Do **not** use damaged ladders and replace them immediately.
- ▶ Repair the ladder exclusively through authorized service facilities.

17.1 Lubricating ladders

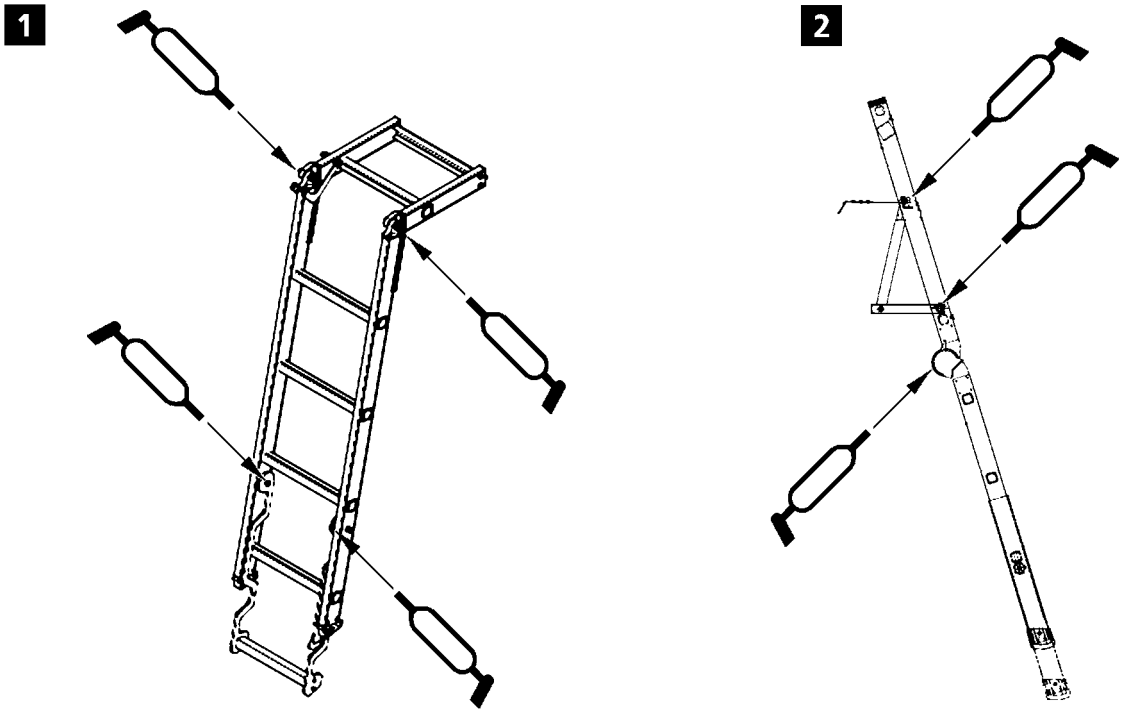

Fig.109766

- ▶ Grease joints and pivot points on the ladders regularly and check them for easy movement, see illustration **1** and illustration **2**!
- ▶ Repairs and maintenance work on the ladder must be made by expert personnel.

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7.05 Maintenance instructions - Crane superstructure

LWE/LG 1750-006/15409-07-02/en

Fig.195219

1 Carrying out maintenance work

WARNING
Danger of falling!
During assembly / disassembly, inspection and maintenance work, personnel must be secured with appropriate aids to prevent them from falling!
If this is not observed, assembly personnel could fall and suffer life-threatening or fatal injuries!

- ▶ The assembly personnel must always move carefully and anticipatory on the crane, the crane components or lattice sections!
- ▶ Any work, where there is a danger of falling, must be carried out with suitable aids (for example: lifting platforms, scaffoldings, ladders, auxiliary crane)!
- ▶ If fall protection equipment is available, then it must be used!
- ▶ If the work cannot be carried out with such aids nor from the ground, then the assembly personnel must secure themselves with approved fall arrest systems to avoid falling, see Crane operating instructions chapter 2.04!
- ▶ Before any assembly / disassembly work, maintenance and inspection work it must be ensured that all obstacles below the work place have been removed and that there is sufficient clearance in case of a fall!
- ▶ During all assembly / disassembly work, maintenance work and inspections, travel or crane operation is prohibited!
- ▶ Only step on the aids, ladders and catwalks with clean shoes!
- ▶ Keep aids, ladders and catwalks free of heavy dirt, snow and ice!

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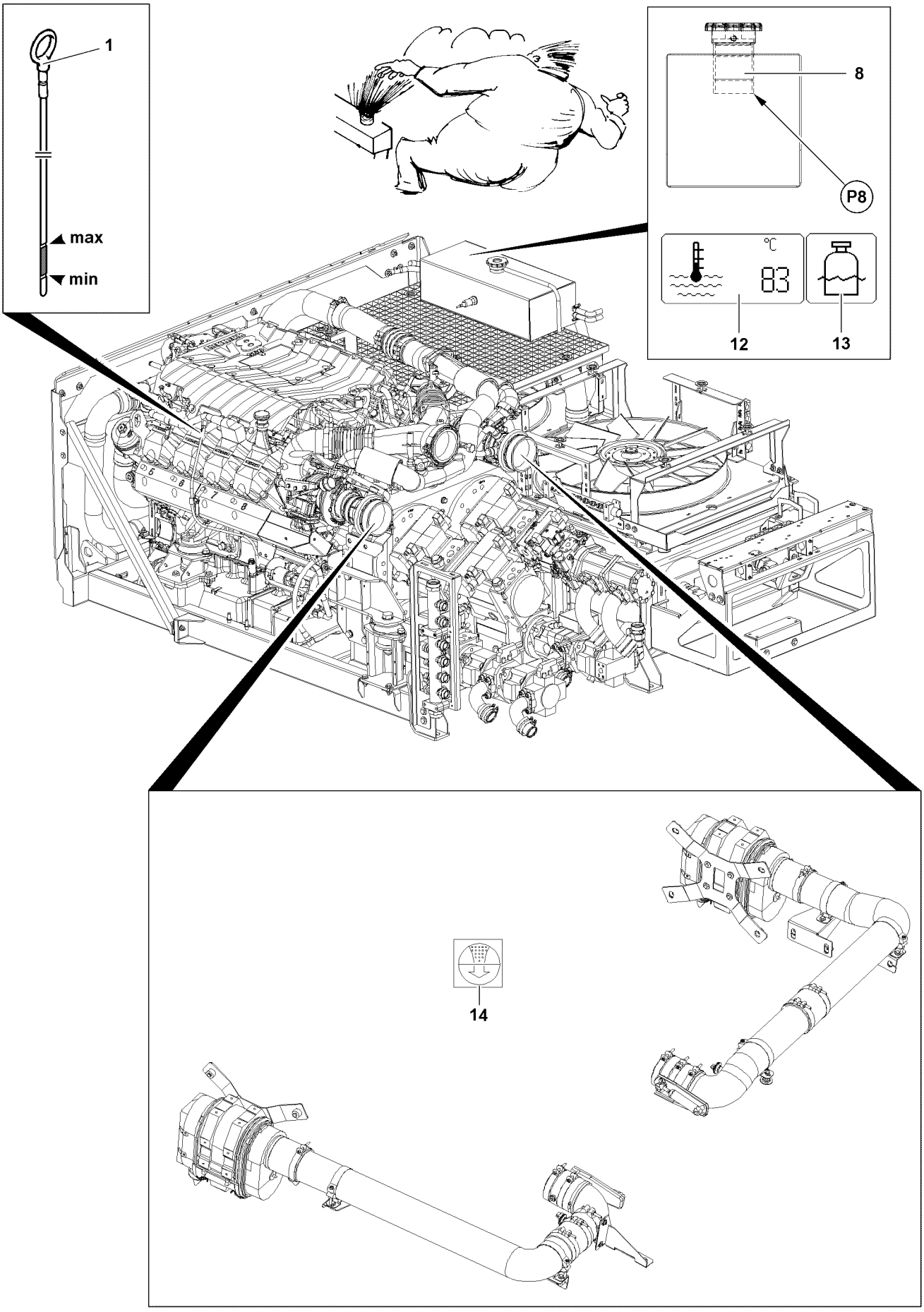

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Fig.117124

2 Diesel engine

Never step on fuel lines during maintenance or repair work in the engine area!

DANGER
Danger of fire!
- ▶ Make sure that the engine area is kept free of diesel fuel!
- ▶ Extreme cleanliness is vital, particularly during filter changes and bleeding. Wipe up any spilled fuel!
- ▶ When replacing the filter, it is recommended to put down cleaning rags before removing the filter in order to absorb fuel!

2.1 Engine oil

2.1.1 Checking the oil level

Make sure that the following prerequisites are met:
- The crane is in horizontal position.
- The diesel engine is turned off.
- The oil has collected in the oil pan.

▶ Remove the dipstick **1** and wipe it off.
▶ Reinsert the dipstick **1** and pull it out again.

The oil level must be between the min. and max. marks on the dipstick **1**.

▶ Check the oil level.

NOTICE
Danger of damaging the engine!
If the oil level has dropped below the minimum mark, add engine oil according to the lubrication chart until the oil level is between the minimum and maximum marks!
▶ Add engine oil and check again!

▶ Reinsert the dipstick **1**.

2.1.2 Changing the oil

Refer to separate operating instructions for „Liebherr Diesel engines“.

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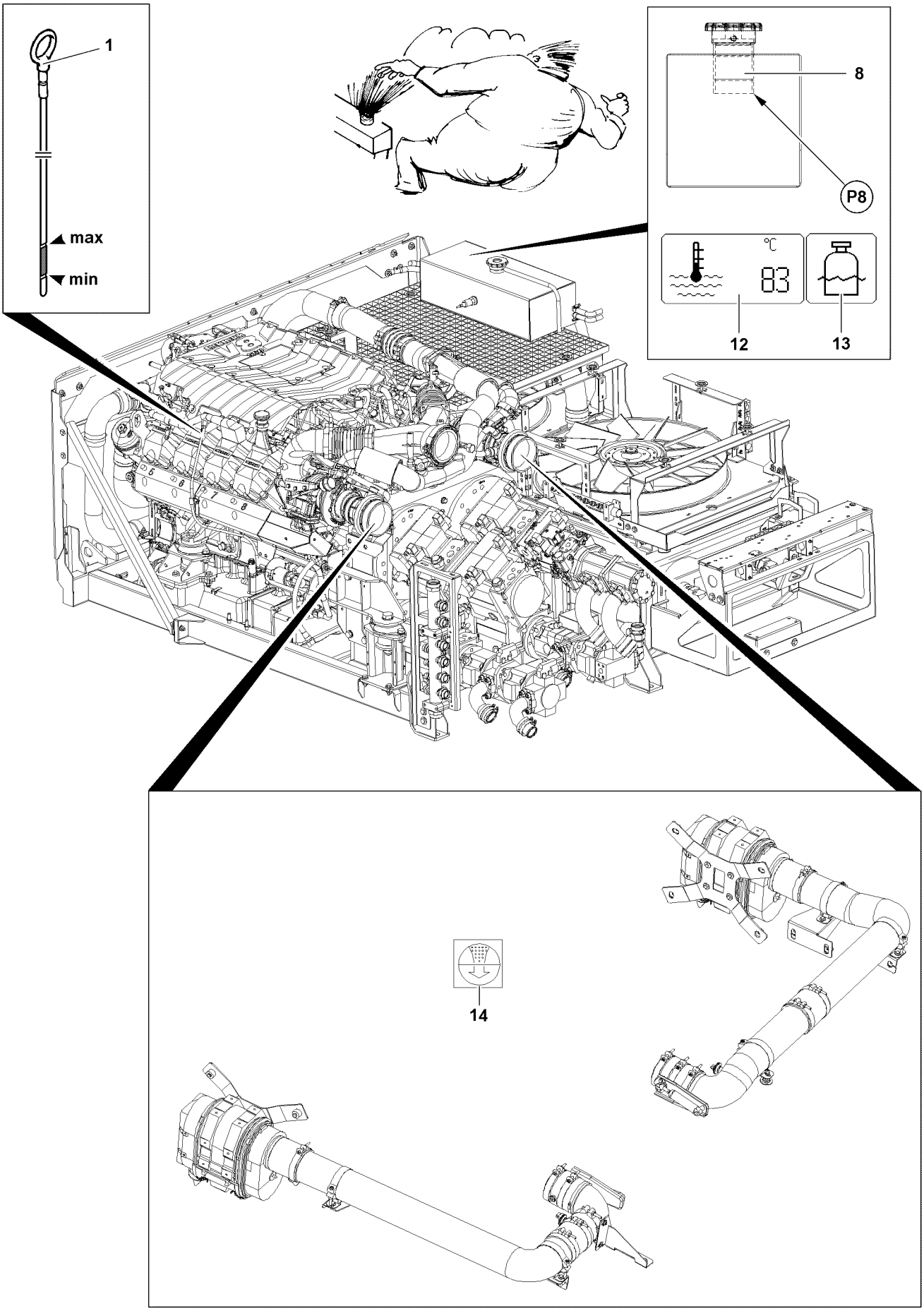

Fig.117124

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2.2 Coolant Engine cooling

The coolant level is monitored by the LICCON computer system. If the coolant level is too low the „Low coolant level“ **13** icon appears on the LICCON monitor.

The crane’s engine coolant temperature can be read on the LICCON monitor in [°] on the „Engine coolant temperature“ icon.

WARNING
Danger of skin burns!
▶ Check the coolant only when the engine is cold!

▶ Turn the cap **2** on the filler neck of the water cooler expansion tank to the 1st notch.
▶ Release excess pressure.
▶ Remove the cap **2**.
▶ Check the coolant level.

Add coolant as specified in the lubrication chart only on the filler neck of the water cooler expansion tank.

▶ Add coolant to overflow level if necessary.

2.3 Air filter

The air filter **1** is monitored by the LICCON computer system. If the vacuum increases in the intake line due to dirty filter units, the „Air filter contaminated“ **14** icon is displayed on the LICCON monitor.

If the „Air filter contaminated“ **14** icon appears:
▶ Clean or replace the filter insert.

2.4 Diesel particle filter*

DANGER
Danger of igniting the diesel particle filter*!
▶ The diesel particle filter* may only be regenerated under the supervision of operating personnel!

Carry out the operation and maintenance of the diesel particle filter* according to the separate operating instructions of the diesel particle filter* manufacturer.

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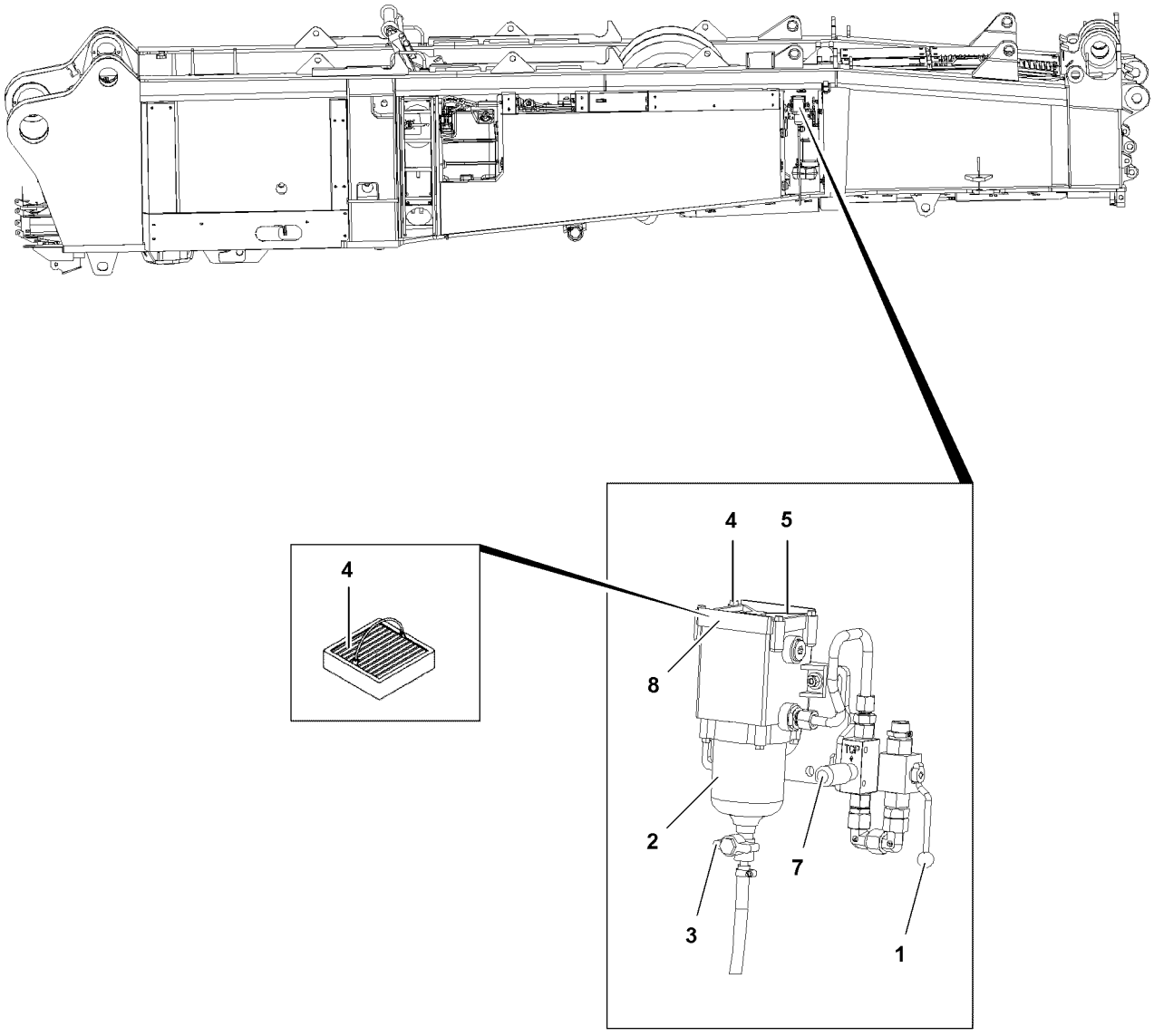

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Fig.117125

2.5 Fuel preliminary filter

2.5.1 Draining the fuel preliminary filter

Note

▶ The water separator **2** on the fuel pre-filter must be drained at regular intervals!

▶ Turn the engine off.
▶ Place a catch basin under the water separator.
▶ Close the ball valve **1**.
▶ Open the drain valve **3** and drain water until fuel emerges.
▶ Close the drain valve **3**.
▶ Open the ball valve **1**.
▶ Remove the catch basin and dispose of the fluid.

2.5.2 Cleaning the filter strainer

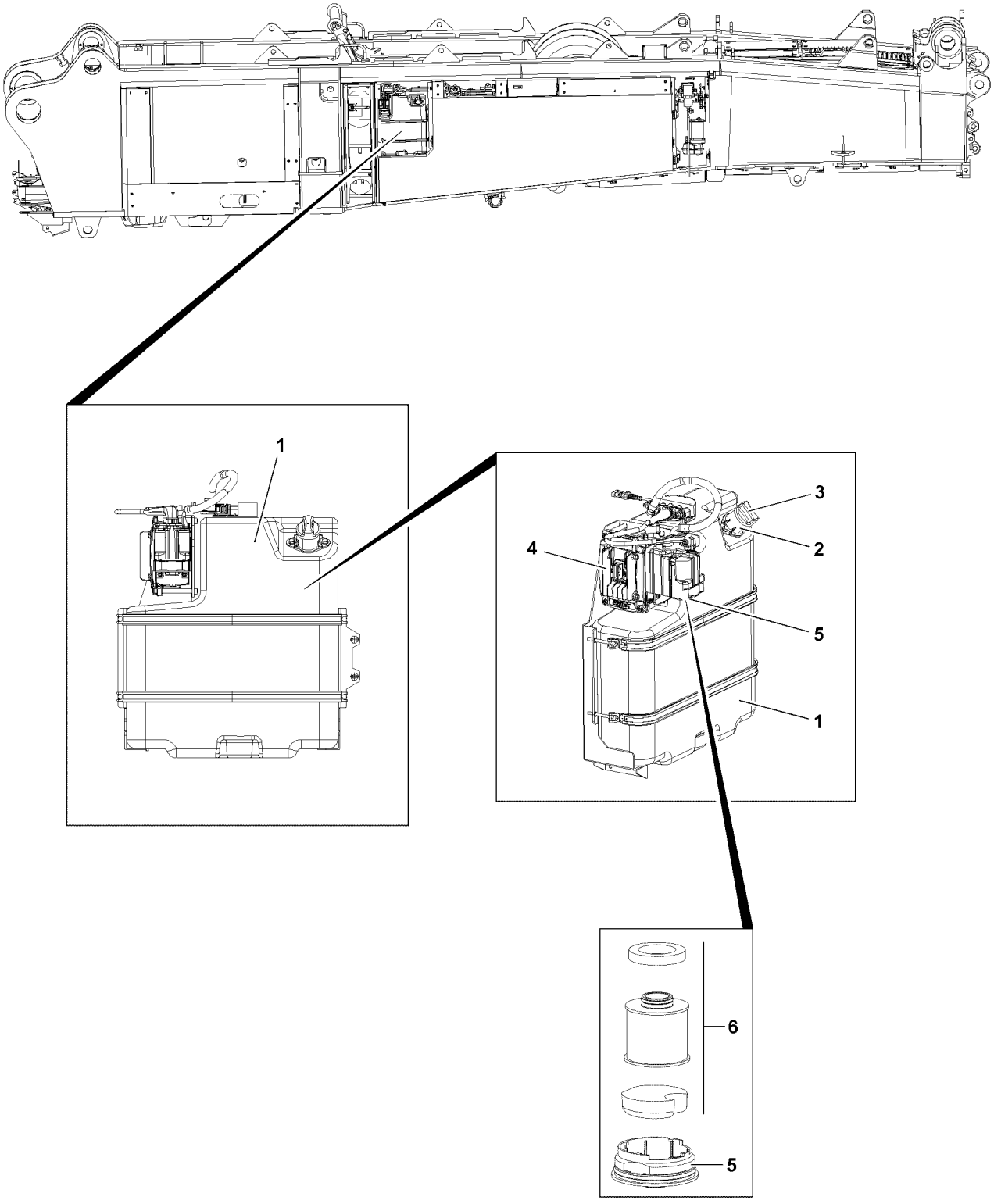
DANGER

Danger of fire and explosion.

▶ Do not smoke!
▶ Avoid open flames!
▶ Work only when the diesel engine is turned off!
▶ Maintain extreme cleanliness during all work!

▶ Turn the engine off.
▶ Place a catch basin under the fuel preliminary filter.
▶ Close the ball valve **1**.
▶ Open the drain valve **3** until no more fuel emerges.
▶ Remove the catch basin and dispose of the fluid.
▶ Remove the screws **4** and remove the cover **8**.
▶ Remove the filter strainer **6** and clean it properly.
▶ Insert the cleaned filter strainer **6** properly.
▶ Install the cover **8** with seals properly.
▶ Properly tighten the screws **4**.
▶ Open the ball valve **1**.
▶ Open the breather screw **5**.
▶ Operate the hand pump **7** and properly bleed the fuel filter.
▶ Properly tighten the breather screw **5**.
▶ Start the engine and check the fuel preliminary filter for leaks.

LWE/LG 1750-006/15409-07-02/en



LWE/LG 1750-006/15409-07-02/en

Fig.117136

3 Urea system*

Note
▶ Urea system only for Diesel engines with exhaust aftertreatment system SCR (Selective Catalytic Reduction).

3.1 Adding Urea solution

Make sure that the following prerequisites are met:
– The auxiliary heater is turned off.
– The Diesel engine and the ignition are turned off.

Note
▶ Also observe the danger notes in the Crane operating instructions, chapter 7.01.

▶ Open the tank cover **3** on the Urea tank.
▶ Insert the fuel nozzle in the filler neck **2** of the Urea tank.
▶ Refuel the vehicle.

After the refueling procedure:
▶ Remove the fuel nozzle and close the tank cover **3**.

3.2 Changing the urea filter

NOTICE
Danger of corrosion!
If urea is spilled, affected surfaces can corrode!
▶ Absorb the spilled urea and flush the affected areas immediately with a large amount of water!
▶ When handling urea, observe the general cautionary and sanitary protective measures!

Note
▶ Change the filter insert **6** for the urea pump **4** according to the data in the maintenance intervals, see Crane operating instructions, chapter 7.03.
▶ Also observe separate engine manufacturer's operating instructions.
▶ Change the filter insert **6** only when the pressure is relieved!

▶ Turn the diesel engine off.
▶ Remove the cover.
▶ Open the housing cover **5** and replace the filter insert **6**.
▶ Close the filter housing with the housing cover and tighten with a tightening torque of 15 Nm.
▶ If applicable, remove spilled urea and clean affected areas with plenty of water.

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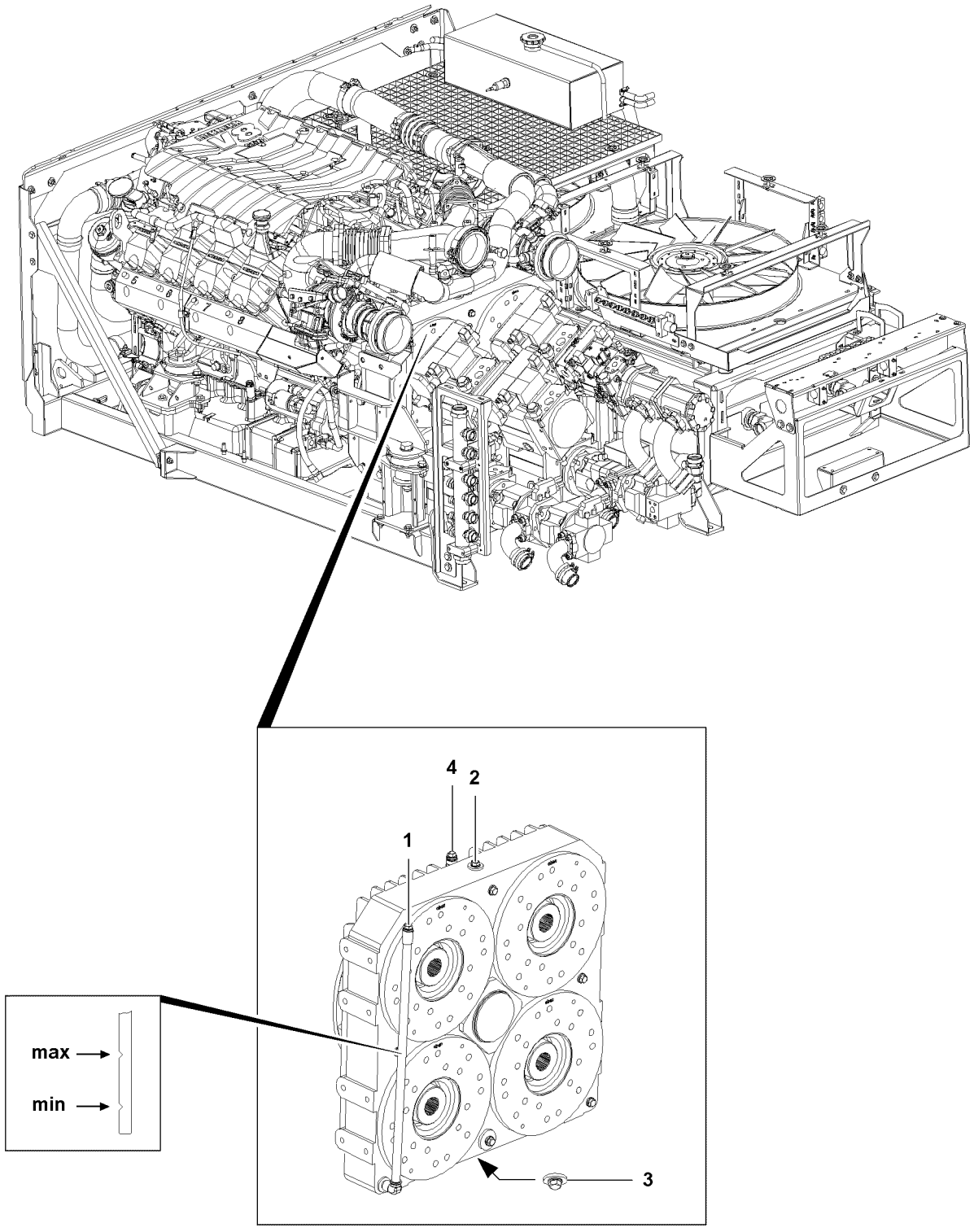

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Fig.117126

4 Pump distributor gear

Maintain utmost cleanliness during all work to prevent any dirt from entering the inside of the gear.

4.1 Checking the oil level

Note
▶ Make sure that the crane is in horizontal position!

▶ Remove the dipstick **1** and wipe it off.
▶ Reinsert the dipstick **1** and pull it out again.

The oil level must be between the min. and max. marks on the dipstick **1**.

▶ Check the oil level.

NOTICE
Danger of gear damage!
If the oil level has dropped below the minimum mark, add engine oil as specified in the lubrication chart until the oil level is between the minimum and maximum marks!
▶ Add oil and check again!

▶ Reinsert the dipstick **1**.

4.2 Changing the oil

Make sure that the following prerequisites are met:
– The crane is in horizontal position.
– The gear is warm.

▶ Remove the oil filler plug **2** and the breather screw **4**.
▶ Remove the oil drain plug **3** and drain the oil.
▶ Install the oil drain plug **3** with new seal and tighten.
▶ Add oil as specified in the lubrication chart on the oil filler plug **2** until the oil level is between the min. and max. marks on the dipstick **1**.
▶ Install the oil filler plug **2** and the breather screw **4** with new seal.
▶ Check the oil level.

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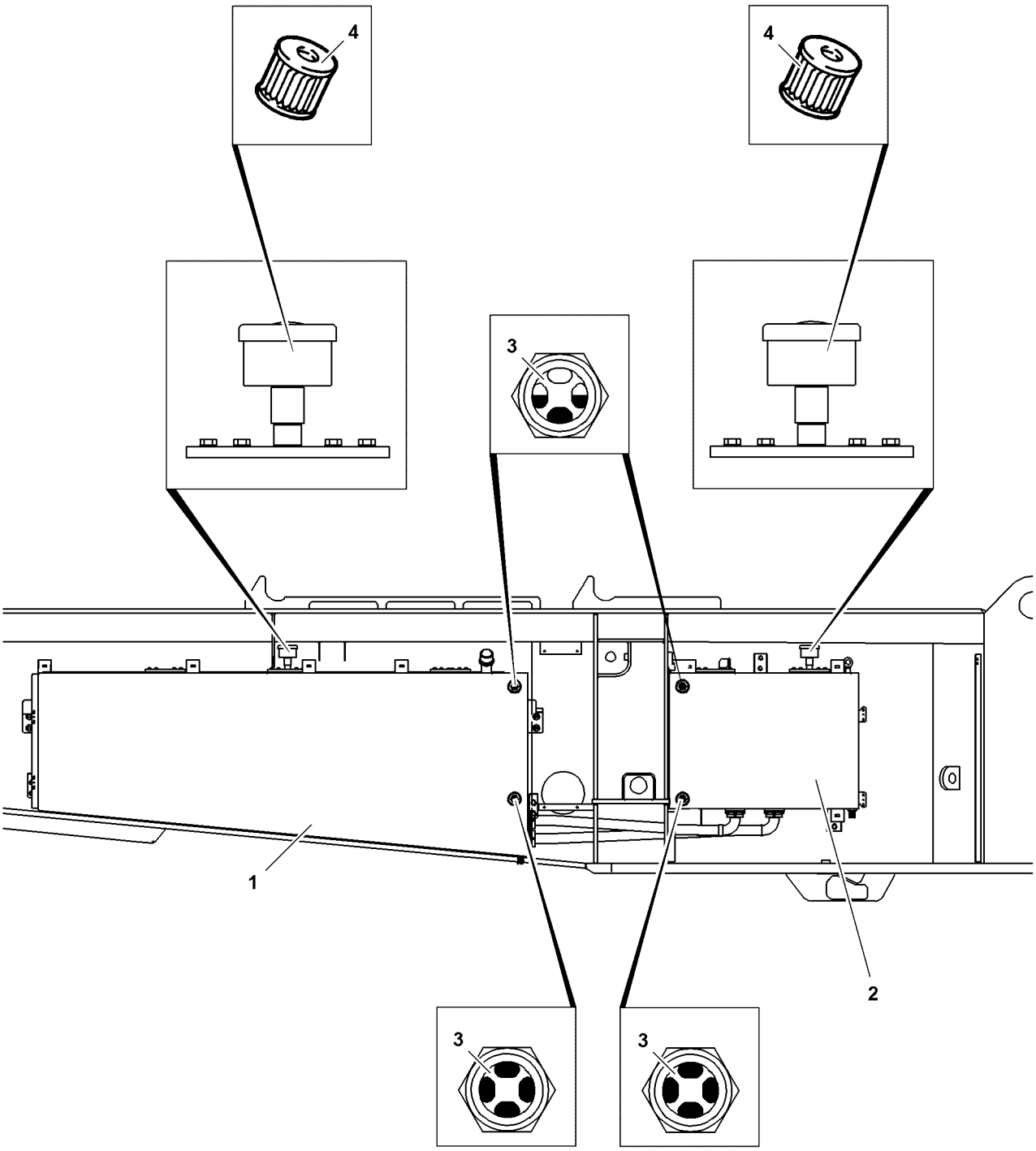

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Fig.117127

5 Hydraulic system

When adding oil, observe utmost cleanliness.

5.1 Hydraulic oil tank / auxiliary oil tank*

5.1.1 Checking the oil level

NOTICE
Damage to the hydraulic oil tank!
If the hydraulic cylinders are not completely retracted when checking the oil level, there is a danger of overfilling!
When retracting the hydraulic cylinders, excess oil is discharged via the tank breather!
If the hydraulic cylinders are retracted too quickly, the hydraulic oil tank can be destroyed!
▶ Make sure that all hydraulic cylinders are completely retracted before checking the oil!

Make sure that the following prerequisites are met:
– The crane is in horizontal position.
– All hydraulic cylinders are fully retracted.

The oil level must be in the center of the oil level sight gauge **3**.

▶ Check the oil level on the oil level sight gauge **3** of hydraulic oil tanks.

Problem remedy
No oil is visible in the oil level sight gauge **3**?
▶ Add oil as specified in the lubrication chart with a fine mesh filter until the oil level on the hydraulic oil tank **1** is visible in the center of the oil level sight gauges **3**.

Note
▶ After adding oil, wait for approx. two minutes until the oil is distributed evenly in the hydraulic oil tank **1** and in the auxiliary oil tank **2**!
▶ If necessary, check oil level again!

5.1.2 Checking the vent / breather filter

▶ Open the cover on the hydraulic oil tank **1** and on the auxiliary oil tank **2** with the turn lock.
▶ Check the filter **4** for impurities (visual inspection).

In the event of heavy contamination:
▶ Replace the filter **4**.
▶ Close the cover with the turn lock again.

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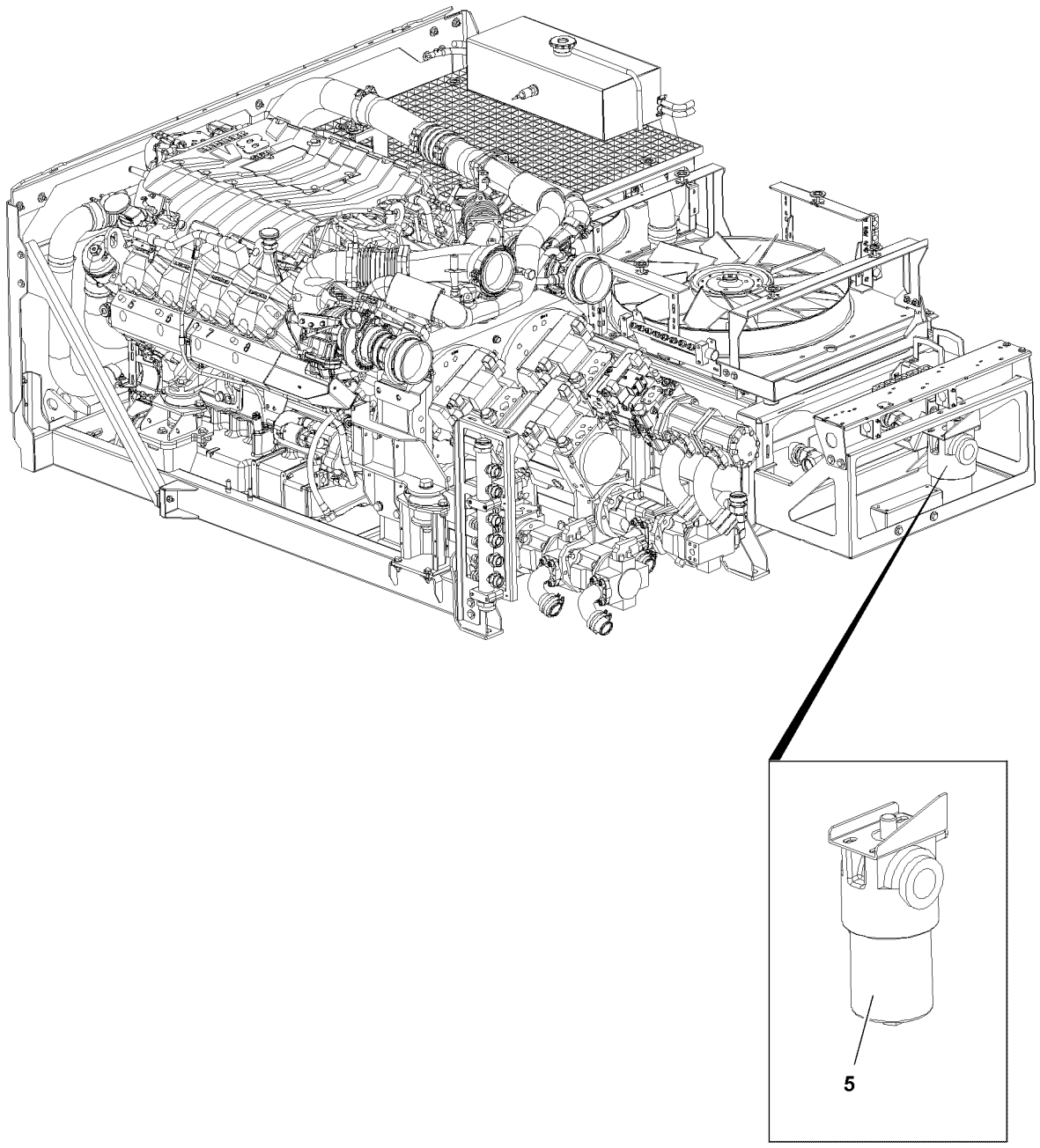

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Fig.117128

5.2 Pressure filters in the crane hydraulic

The pressure filter **5** is equipped with a maintenance indicator. If the red bar indicator is visible when the oil is at operating temperature, then the filter cartridge must be replaced.

- ▶ Turn the engine off.
- ▶ Release the filter cartridge and collect any escaping oil in a suitable container.
- ▶ Remove and dispose of the filter cartridge.
- ▶ Clean the sealing surface on the filter bracket.
- ▶ Lubricate the rubber seal ring on the new oil filter cartridge with oil.
- ▶ Install a new filter cartridge and tighten.
- ▶ Start the engine and check for leaks.
- ▶ Slowly run through all crane movements.

Result:

– This bleeds the hydraulic system.

▶ Check the oil level again and add oil if necessary.

5.3 Diaphragm reservoirs

Various diaphragm reservoirs are installed in the hydraulic system. The pretension pressures are specified in the hydraulic circuit diagram as well as on the individual diaphragm reservoirs. The pretension pressure must be measured separately in each diaphragm reservoir.

NOTICE
Risk of damaging the hydraulic system!
If the outside temperature fluctuates considerably, e.g. after transport to extremely hot or cold countries or in countries with considerable differences between the summer and winter temperatures, the accumulator pressures may change!
▶ Check the accumulator pressures and correct if necessary!

Make sure that the following prerequisite is met:
– The crane engine is turned off.
This relieves the diaphragm reservoir at the fluid side.

DANGER
Danger of explosion!
The pressure in the nitrogen cylinder must be less than the maximum permissible operating pressure of the accumulator or the pressure gauge. Otherwise install a pressure reducer between the cylinder and the filling device!
▶ Do not use air or oxygen to fill the diaphragm reservoir!

The pretension pressure in the hydraulic reservoirs may only be checked by an expert with appropriate training and equipment. In addition, the national regulations for pressurized container inspections must also be observed.

▶ Check the pretension pressure with a testing and filling device and correct, if necessary.

5.4 Hydraulic hose lines

The hydraulic hose lines must be checked according to ISO 9927-1 by an **experienced technician** or **expert mechanic**, as required, depending on the duration of use and the operating conditions, but at least once a year.

Experienced technicians are persons who:
– possess sufficient knowledge about cranes due to their professional background and experience.
– are familiar with the relevant settings to detect any abnormal deviations from the nominal condition.
– have undergone special training.

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Expert mechanics are mechanics, who:
- are experienced in the design, construction or maintenance of cranes.
- possess sufficient knowledge about the relevant settings and standards.
- are fully equipped to perform inspections.
- are able to assess the safety status of the crane.
- can decide which action needs to be taken to ensure the crane can continue to be operated safely.

Note
▶ The applicable national regulations must also be complied with!

5.4.1 Checking the hydraulic hoses within area of responsibility of the German employer's liability insurance associations

At least once a year, an **expert** must inspect the hydraulic hoses to ensure they are in operationally safe condition. The crane must be inspected by an **authorized inspector** every four years from the day it was first licensed. After the 12th year of operation, the crane must be inspected by the authorized inspector annually.

The **expert** or **authorized inspector** must document the fact that the hydraulic hoses can continue to be used in the crane!

An expert is someone:
- whose technical training and experience means that he has adequate knowledge in the field of hydraulic hoses and hose systems.
- who is familiar with the relevant occupational health and safety regulations.
- who is familiar with the relevant accident prevention guidelines.
- who is familiar with the directives and generally accepted technical regulations (e.g. DIN standards, VDE regulations, technical regulations of other EU member states or other countries that have signed the European Economic Community agreement).
- who can properly assess whether hydraulic hoses and hose systems are deemed safe in accordance with the guidelines and regulations stated above.

Authorized inspector(s) is / are:
- an authorized expert employed by the technical supervisory authorities.
- in Hamburg this is the Amt für Arbeitsschutz (office for occupational health and safety).
- in Hessen these are the technical supervisory offices.
- an authorized expert appointed by the professional associations.

5.4.2 Examples of possible defects in hose lines

DANGER
Risk of fire or accident!
If problems are discovered during inspections, then they must be remedied immediately or suitable measures are to be taken. Failure to do this can result in serious injury to persons, death or damage to property!
▶ Remedy problems or take suitable measures!

- Damage to the outer layer as far as the intermediate later (e.g. chafing, cuts and cracks).
- Outer layer brittleness (crack formation of the hose material).
- Deformation that differs from the natural shape of the hose or hose line, in depressurized as well as in pressurized condition or in bends, for example layer separation, bubbling, crushing or kinking.
- Leaks.
- Failure to follow installation instructions.
- Damage or deformation of hose fittings that inhibit the function and strength of the fitting or the hose / fitting connection.
- Hose slipping out of fitting.
- Fitting corrosion that inhibits function and strength.
- Storage time or usage period exceeded.

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5.4.3 Maintenance of hose lines

- We recommend to check all hoses, hose lines and screw fittings daily, but at least every two weeks for leaks and externally recognizable signs of damage.
- Damaged parts must be replaced immediately! Oil spray can lead to injuries and fires!
- Hydraulic lines and hoses may not be repaired!
- Hoses that have already been used as a part of a hose line may not be reinstalled in hose lines.
- Always use Original Liebherr spare parts when replacing hoses and hose lines.
- Always ensure that the hoses are routed free of torsion. If high pressure hoses are being used, attach the screws of the half clamps or full flange at both ends of hose and then tighten.
- When using high pressure hoses with a bent fitting, tighten the end with the bent fitting first when tightening the flanges, then the end with the straight fitting.
- Any mounting clamps in the hose center may be attached and tightened only thereafter.
- Route the hoses in such a way that chafing with other hoses or other structures is prevented. Maintain a minimum clearance of approximately ½ the outer diameter of the hose to other parts. The clearance should never be less than 10 mm to 15 mm.

5.4.4 Replacing the hose lines

DANGER
Risk of fire or accident!
Failure to replace the hose lines at appropriate intervals can cause serious injury to persons, death or damage to property!
▶ Replace hose lines according to appropriate intervals!

This must be documented in the crane's log book by the **expert** or the **authorized inspector**.

The service life of a hose line may not exceed six years, including a storage period of a maximum of two years (pay attention to the manufacturing date on the hoses). The duration of use can also be defined by the **expert** or **authorized inspector** in accordance with existing test and empirical data in the individual application areas, taking the usage conditions into consideration.

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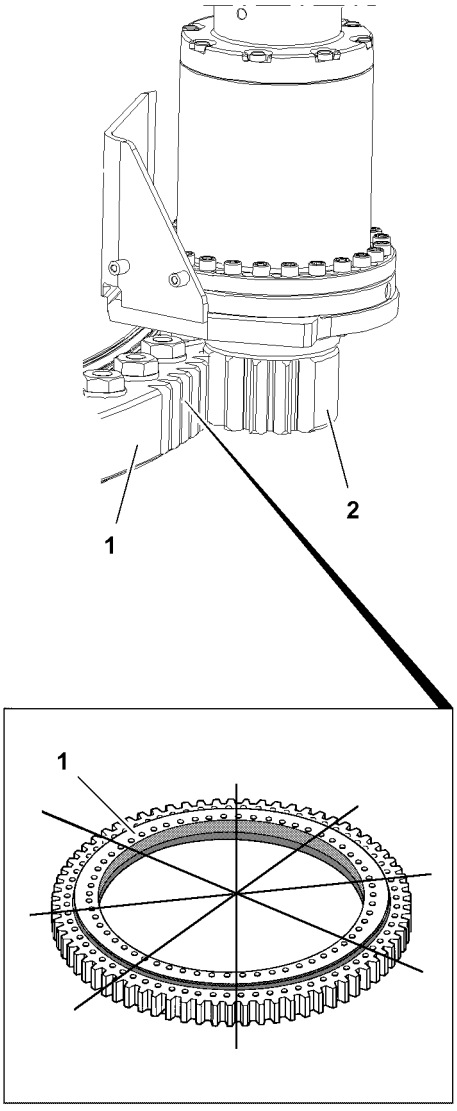

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Fig.117129

6 Slewing ring connection

6.1 Lubricating the slewing ring connection

Perform lubrication with extreme care before and after long operating intervals, particularly before and after any winter break, in order to provide the best possible corrosion protection.

If the crane has not been moved for more than 3 months, then it must be lubricated every 3 months with an external grease pump until grease emerges on all sealing lips, see also section of „Central lubrication system“. Then the relevant crane movement must be repeated several times and the lubrication procedure must be carried out again.

▶ Lubricate the slewing ring connection.

6.2 Lubricating the gear ring and the slewing gear pinion

Before and after extended breaks in service, grease the gear ring **1** and the slewing gear pinion **2** to ensure the best possible protection from corrosion.

▶ Grease the gear ring **1** and the slewing gear pinion **2** externally.

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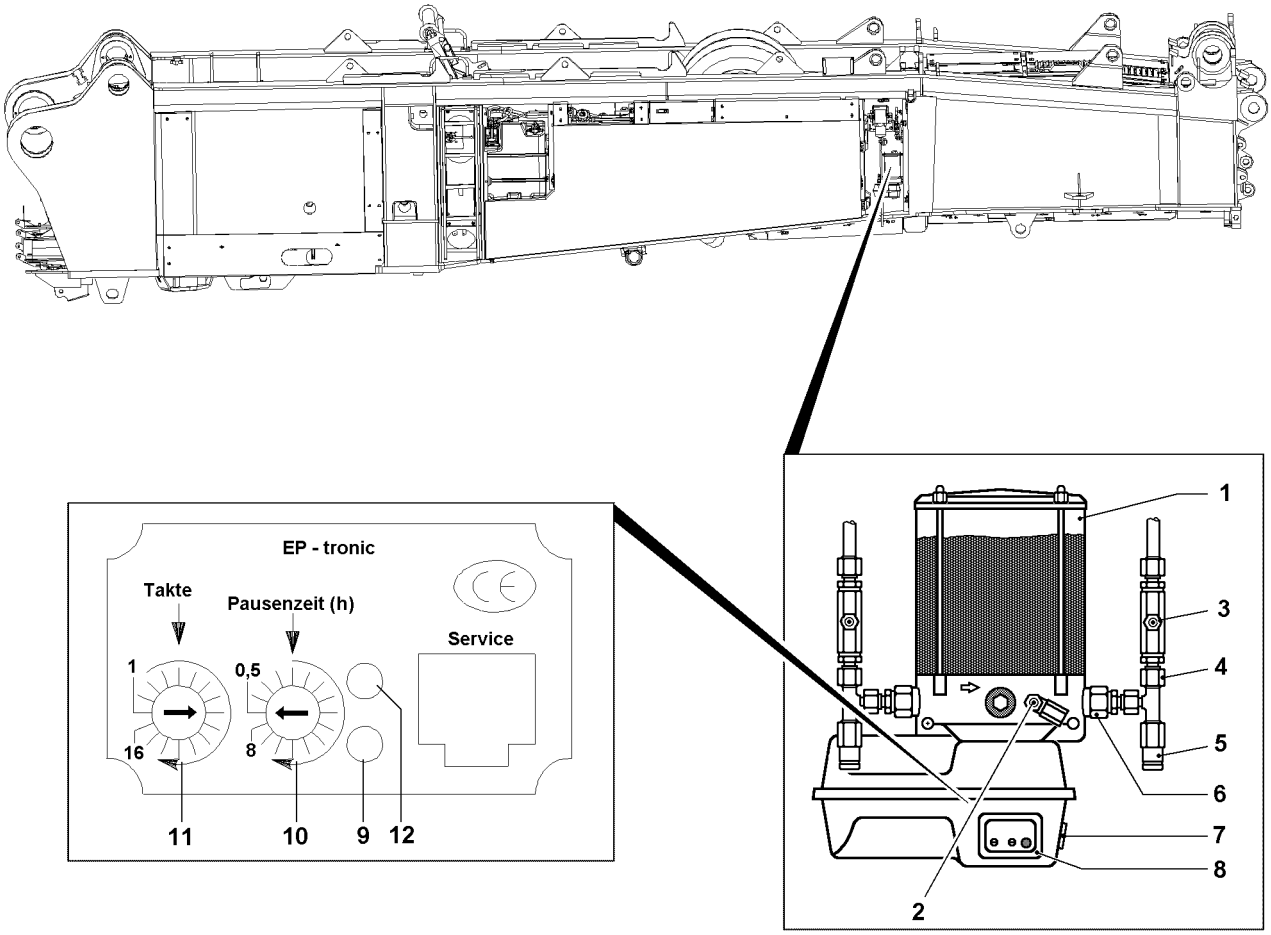

Fig.117130

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7 Central lubrication system

The crane superstructure is equipped with a central lubrication system. All grease points (refer to the overview on the left), the bearing of the pivot section, the bearings of the luffing cylinders and the winches are automatically supplied with the correct amount of grease.

If the crane has not been moved for more than 3 months, then it must be lubricated every 3 months with an external grease pump on the grease fitting **3** until grease emerges from all grease points. Then the relevant crane movement must be repeated several times and the lubrication procedure must be carried out again.

Note

▶ Cleaning is permitted in washing bays or with steam cleaners!

7.1 Pump operating period of central lubrication system - Crane superstructure

- Pump operation period: 9 cycles
- Break period: 0.5 h

7.2 Components of the system

- **1** Grease container
- Grease fitting **2**: Fill the central lubrication pump
- Grease fitting **3**: Fill the lube lines
- **4** Pump outlet
- **5** Pressure relief valve
- **6** Pump element
- **7** Push button
- **8** Control
- Green LED **9**: Function display
- Latched switch **10**: Pause time (h)
- Latched switch **11**: Cycles
- Red LED **12**: Fault display

7.3 Setting the lubrication and break periods

The LED **9** on the engine protection housing blinks in a 0.5 second cycle during the lubrication process. The lubrication and pause time is set at the factory. The times can possibly be changed by using the latched switch **10** and latched switch **11**.

▶ Turn on the engine ignition.

Result:

– When turning the ignition on, the green LED **9** lights up for approximately 2 seconds and shows the operation readiness of the control **8**.

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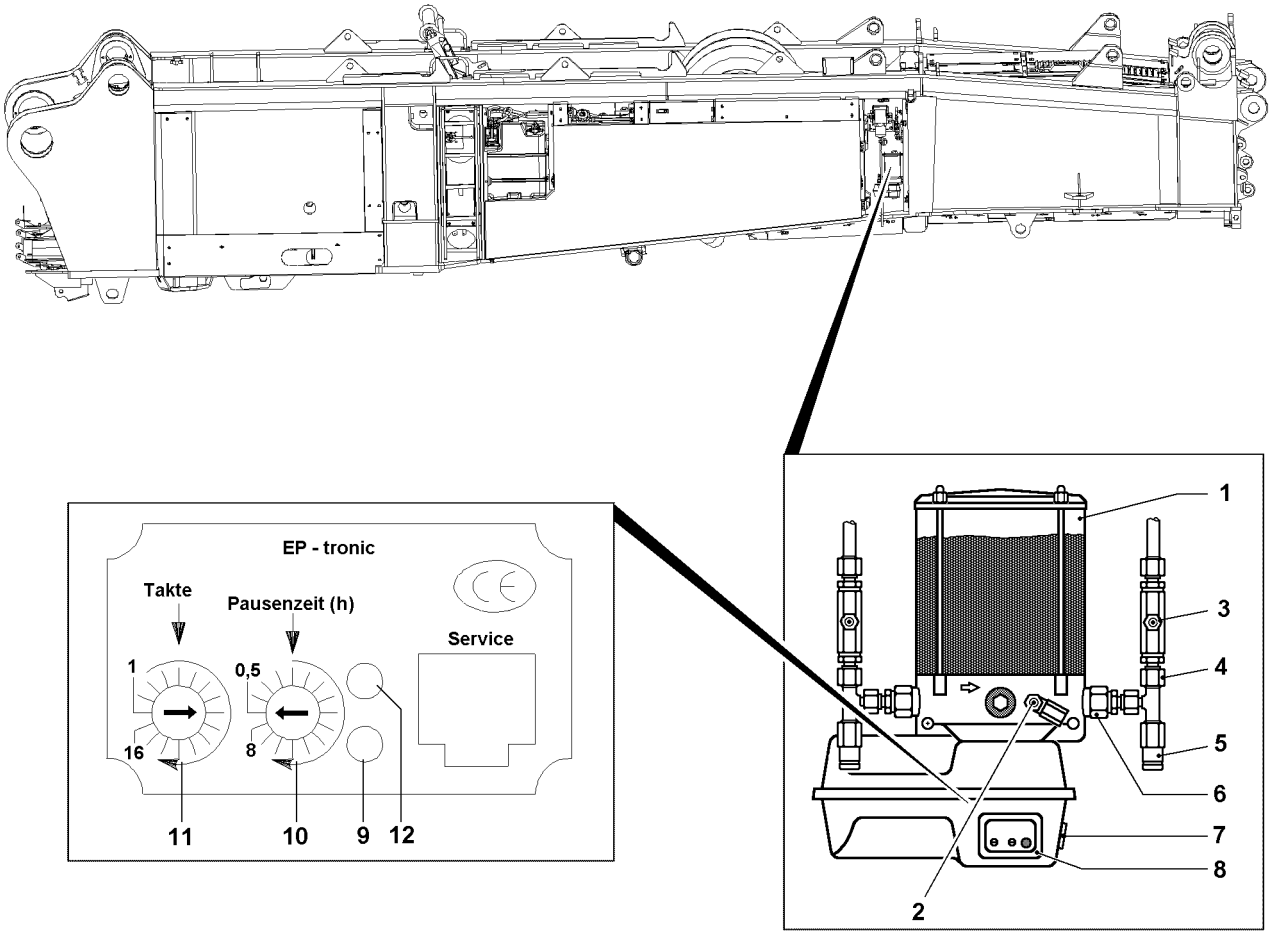

Fig.117130

7.4 Function check

▶ Start the engine.
▶ Trigger 2 or 3 grease pulses using the push button **7**.

Result:

– Grease emerges on the lube points.
– If the system is blocked but the electric pump is properly functioning, the grease emerges through the pressure relief valve **5**.

7.5 Cycle control

The central lubrication system is progressively monitored. This means that a proximity switch converts the piston strokes of the central lubrication system distributor into electric control signals and relays them to the control unit. If the control signals are not present or incomplete, the indicator light **363** displays a malfunction or a problem by blinking.

7.5.1 Blinker code - cycle control

During operation

– Ignition on, ready for operation:
  The indicator light **363** lights up orange for 1.5 s and turns off.
  The green LED **9** and the red LED **12** light up for 1.5 s and turn off.
– Lubrication active:
  The indicator light **363** lights up yellow during the lubrication period.
  The green LED **9** lights up during the lubrication period.

In case of a problem

– Error of monitoring period of cycle input, lubrication time larger monitoring period cycle input.
  The indicator light **363** lights up orange for 2 s and is off for 2 s etc.
  The green LED **9** and the red LED **12** light up for 1 s and are off for 1 s etc.
– Error CPU, Error memory
  The indicator light **363** lights up red for 1 s and is off for 1 s etc.
  The red LED **12** lights up for 0.5 s and is off for 0.5 s etc.

7.6 Access to the automatic lubrication (intermediate lubrication)

After washing the crane, carry out intermediate lubrication processes or fill the grease lines with grease again after a repair.

▶ With the ignition turned on, press the red button **7** on the engine protection housing of the pump.

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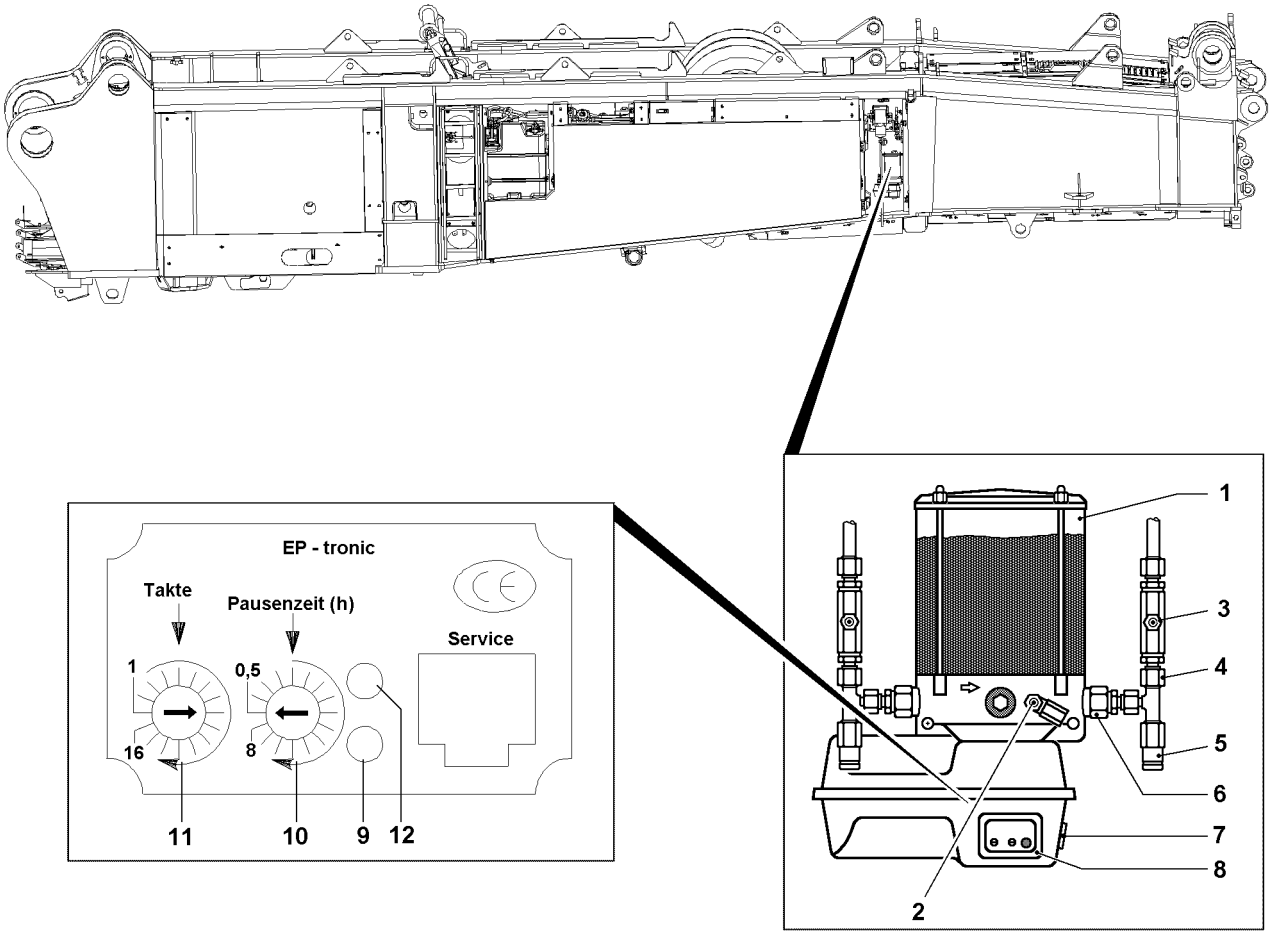

Fig.117130

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7.7 Filling the grease container

NOTICE
Risk of damage due to insufficient lubrication!
- ▶ There must always be sufficient grease in the grease container **1**!
- ▶ Observe utmost cleanliness when filling the grease container **1**!

- ▶ Fill the grease container **1** with a grease pump via the grease fitting **2** on the central lubrication pump.

7.8 Bleeding the central lubrication system

If the grease container **1** has been emptied, then it may be necessary to bleed the central lubrication system.

- ▶ Fill the grease container **1**.
- ▶ Unscrew the main line from the pump outlet **4**.
- ▶ Trigger additional lubricating pulses until there are no more air bubbles in the emerging grease at the pump outlet **4**.
- ▶ Reconnect the main line.
- ▶ Trigger an additional lubricating process.

7.9 Filling the lubrication lines

NOTICE
Risk of damage due to insufficient lubrication!
The lubrication lines must be refilled after any repair on components, which are lubricated with grease. If this is not observed, the component may run dry!
- ▶ Sufficient grease must be available in the grease lines after every repair on greased components!
- ▶ Observe utmost cleanliness when filling the grease lines!

- ▶ Add grease with an external grease pump via the grease fitting **3**.
  or
  With the ignition turned on, press the red button **7** on the engine protection housing of the pump.

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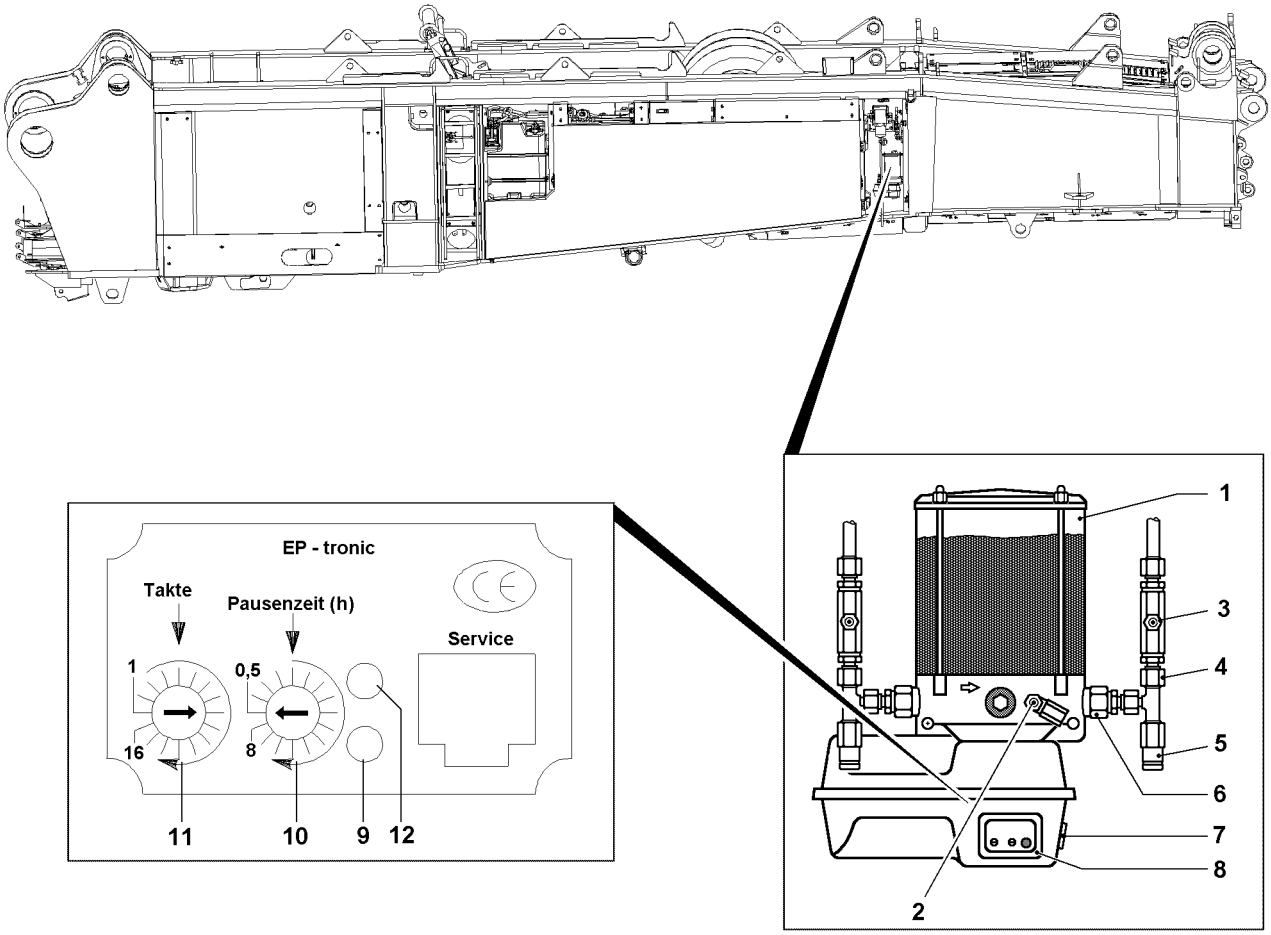

Fig.117130

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7.10 Troubleshooting on the central lubrication system

Problem	Cause	Remedy
The grease pump does not work	Integrated electronic control defective, electrical line interrupted, grease pump defective	Replace lower part of motor protection housing, replace electrical line, replace grease pump
Grease pump operates, but does not deliver	Air cushion in delivery piston, minimum fill level fallen below, grease pump element defective	Bleed grease pump, fill reservoir, replace grease pump element
No grease collar on all lube points	Grease pump not operating, interval time too high or cycle time too short, system blocked	See „Grease pump not operating“, reduce interval time or increase number of cycles, refer to „Grease emerges on pressure relief valve“
No grease collar on several lube points	Supply lines to secondary distributors broken or leaking, screw connections leaking	Replace lines, tighten or replace screw connections
No grease collar on one lube point	Associated lube line broken or leaking, screw connection leaking	Replace line, tighten or replace screw fitting
Grease pump speed reduced	High system pressure, low ambient temperature	Check system / bearing points, no damage: Grease intermediately once or twice, if necessary
Grease escapes at the pressure relief valve	System pressure too high, progressive distributor blocked, system blocked, defective valve spring	Check system, replace distributor, repair blocked / seized bearing point, replace pressure relief valve
The red LED blinks very fast	Error CPU / memory	Consult Liebherr Service
The red LED and the indicator light blink fast	Error in the monitoring period from cycle start	The proximity switch is defective, consult Liebherr Service

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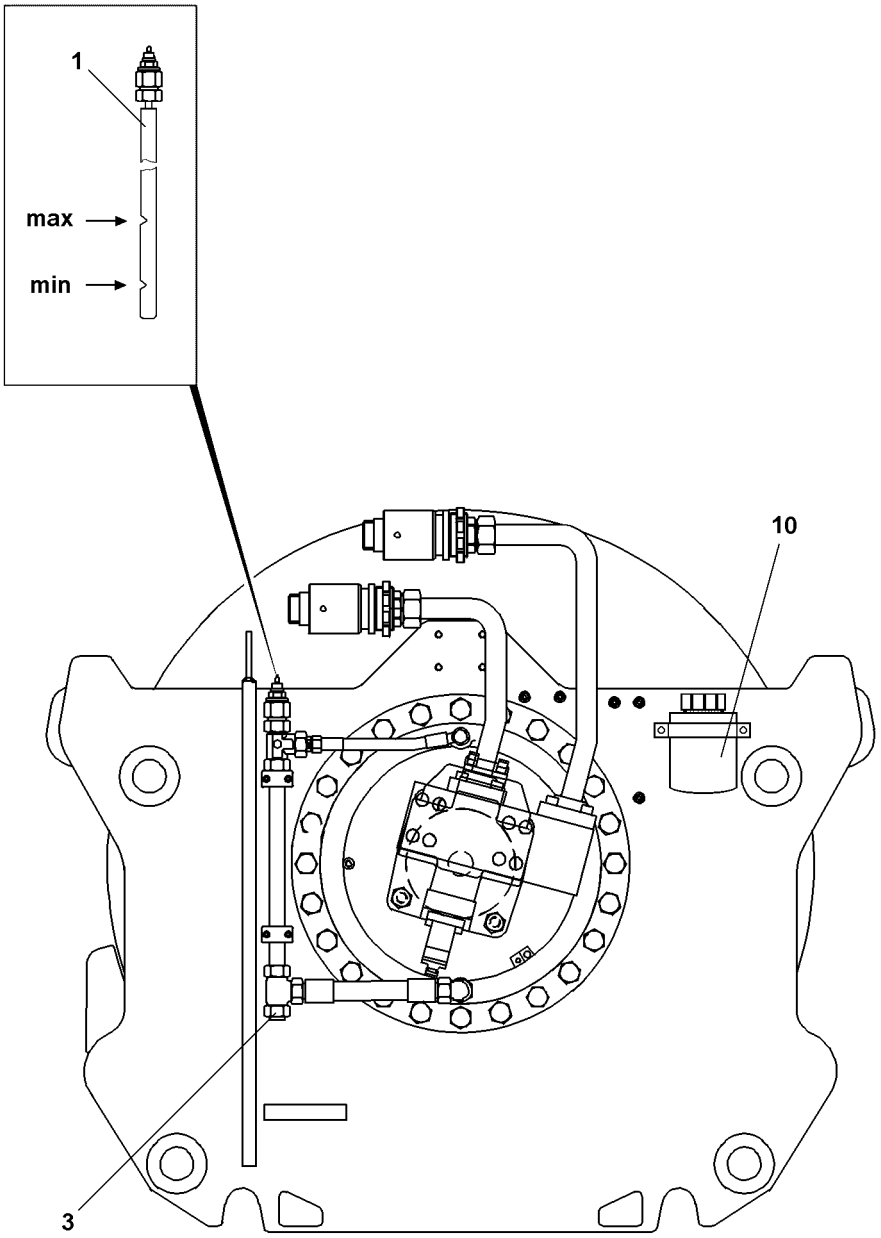

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Fig.117131

8 Hoist gear 1 to 6

Maintain utmost cleanliness during all work to prevent any dirt from entering the inside of the gear.

8.1 Overflow container

When the oil heats up in the hydraulic motor for the winches, the oil can enter the overflow container **4** via a check valve, but cannot flow back into the hydraulic system after cooling off. For this reason the oil that has collected in the overflow container **4** must be disposed of at regular intervals.

8.2 Winch

Make sure that the following prerequisites are met:
- The winch is inactive.
- The crane is in horizontal position.

8.2.1 Checking the oil level

▶ Unscrew, remove and wipe off the dipstick **1**.

Note
▶ Do not insert the dipstick **1** to measure!

▶ Reinsert the dipstick **1** and pull it out again.

The oil level must be between the min. and max. mark on the dipstick **1**.

▶ Check the oil level.

NOTICE
Danger of gear damage!
If the oil level has dropped below the minimum mark, add oil as specified in the lubrication chart until the oil level is between the minimum and maximum mark!
▶ Add oil and check again!

▶ Reinsert the oil dipstick **1**.

8.2.2 Oil change

▶ Turn the dipstick **1** and pull it out.
▶ Remove the oil drain plug **3** and drain the oil into a suitable container.
▶ Install the oil drain plug **3** with new seal and tighten.
▶ Add oil as specified in the lubrication chart at the oil filler port until the oil level is between the minimum and maximum mark on the dipstick **1**.
▶ Install the dipstick **1** and tighten.
▶ Check the oil level as described above.

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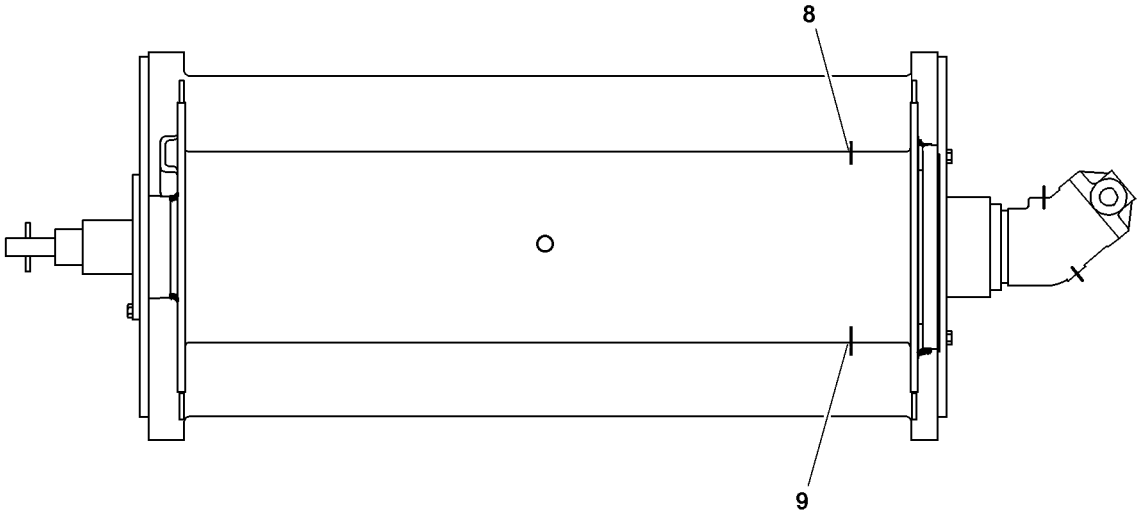

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Fig.117132

9 Assembly winch

9.1 Oil change

Note
▶ Make sure that the assembly winch has been spooled out!

▶ Remove the oil filler plug **8**.
▶ Remove the oil drain plug **9** and drain the oil into a suitable container.
▶ Install the oil drain plug **9** with new seal and tighten.
▶ Add oil as specified on the lubrication chart on the oil filler plug **8**.
▶ Install the oil filler plug **8** with new seal and tighten.

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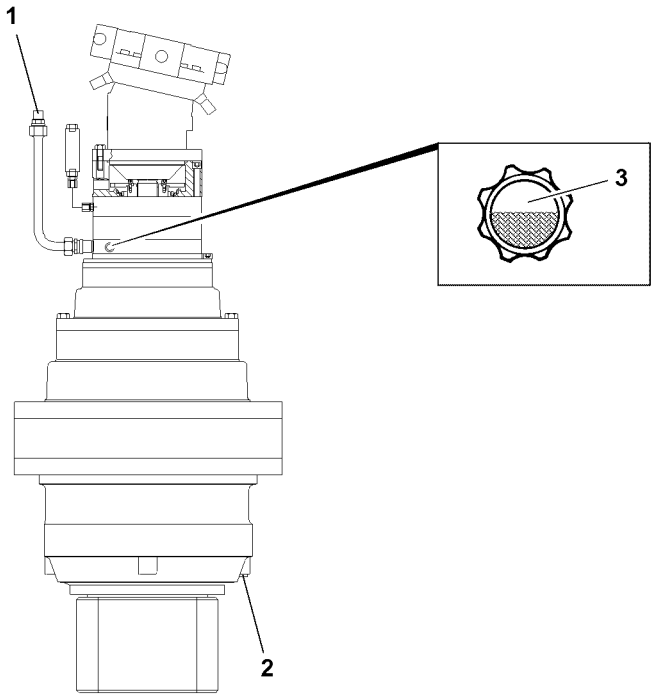

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Fig.117133

10 Slewing gear

Maintain utmost cleanliness during all work to prevent any dirt from entering the inside of the gear.

10.1 Checking the oil level

Make sure that the following prerequisites are met:
- The crane is in horizontal position.
- The slewing gear is inactive.
- The slewing gear is warm.

Note
▶ The oil level must be in the center of the oil level sight gauge **3**!

▶ Check the oil level on the oil level sight gauge **3**.

NOTICE
Danger of gear damage!
If the oil level on the oil level sight has dropped to the point that it is no longer recognizable, then oil as specified on the lubrication chart must be added until the oil level is again in the center of the oil level sight gauge!
▶ Add oil and check again!

▶ Check the oil level on the oil level sight gauge **3**.

10.2 Changing the oil

Make sure that the following prerequisites are met:
- The crane is in horizontal position.
- The slewing gear is inactive.
- The gear is warm.

▶ Remove the oil filler plug / breather screw **1**.
▶ Remove the oil drain plug **2** with the seal ring and drain the oil.
▶ Clean the oil drain plug **2** and sealing surface on the housing.
▶ Install the oil drain plug **2** with new seal ring and tighten.
▶ Add oil as specified on the lubrication chart on the oil filler port **1** until the oil is in the center of the oil level sight gauge **3**.
▶ Install the oil filler plug / breather screw **1**.
▶ Check the oil level as described above.

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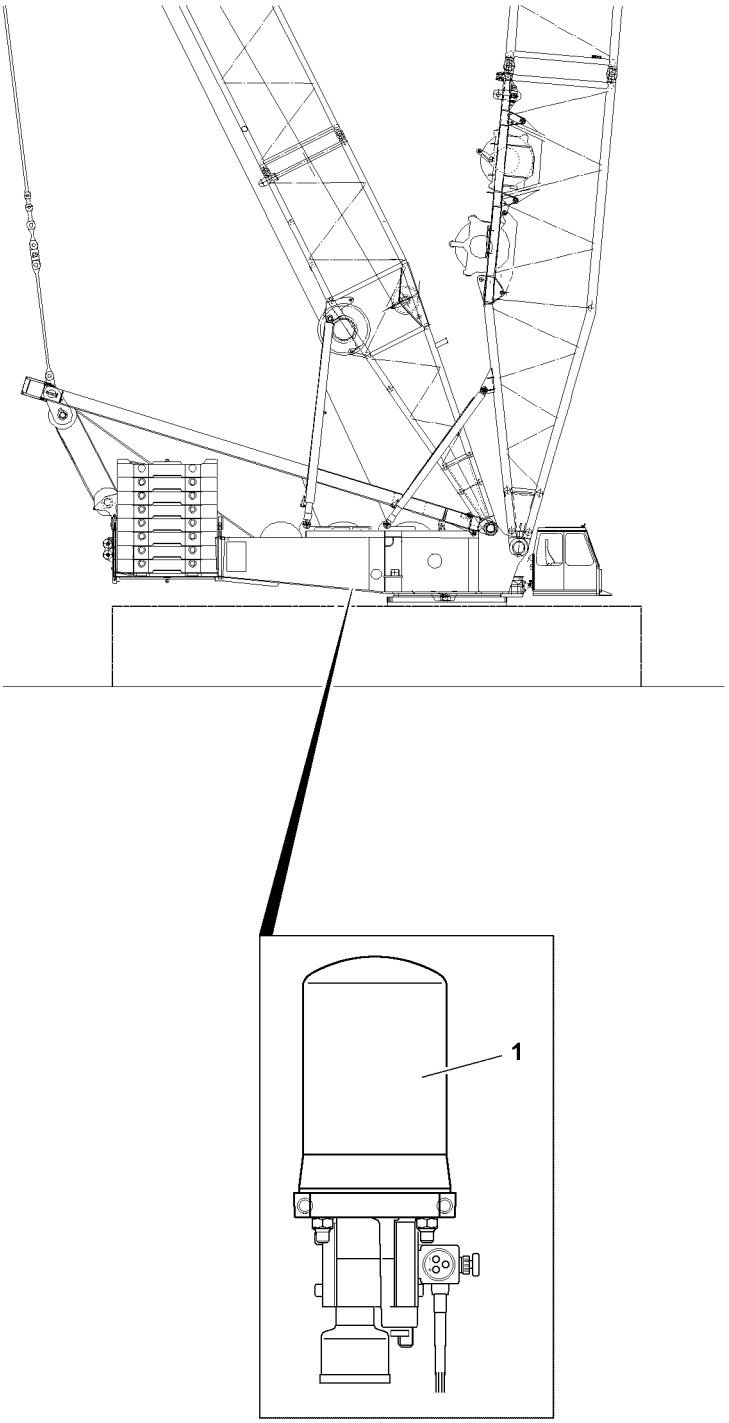

Fig.117135

11 Air dryer of the compressed air system of the crane superstructure

11.1 Replacing the granular cartridge

CAUTION
Danger of accident due to pretensioned granular cartridge!
The granular cartridge **1** is under spring tension!
▶ Caution when replacing the granular cartridge!

▶ Replace the granular cartridge **1** once per year.

12 Electrical system - Lighting

The maintenance of the electrical system is essentially limited to replacing defective fuses and bulbs and maintaining the batteries.

NOTICE
Damage to electrical system!
Never short circuit defective fuses with wire or similar items!
▶ Always replace defective fuses with fuses of the same amperage!
▶ If there is a repeat problem with the same fuse, check the electrical system!

12.1 Battery maintenance

DANGER
Danger of fatal injury!
▶ Always disconnect the batteries from the power circuits when working on the electrical system of the crane and during all welding work!

▶ Keep batteries dry and clean.
▶ Do not bring oil, grease, fuel or solvents into contact with the battery casting compound.
▶ Release dirty terminals, clean and grease them with an acid-free and acid-resistant grease.
▶ Check the acid levels in batteries at least once a year. In summer and in hot climate zones, check it at least twice a year.
▶ On conventional batteries, check electrolyte level at regular intervals and add distilled water to the specified „max mark“, if necessary.

When adding distilled water:
▶ Measure the acid concentration only after 30 minutes. The acid temperature for measuring should be + 20 °C if possible.

Proceed as follows when checking the battery charge:

Specific weight	Charge condition
1,28/1,23*	Well charged
1,20/1,16*	Semi-charged, recharge
1,12/1,08*	Discharged, recharge immedi-ately

* in tropical countries

Reduced battery performance requires greater power requirements.

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▶ Ensure that batteries are well charged, particularly during the colder months.

12.2 Mixing battery acid

▶ Ensure that work area is well ventilated.

DANGER
Danger of explosion!
▶ When mixing battery acid, always pour distilled water into the container first, then the concentrated sulphuric acid!
▶ Observe this order, otherwise explosions and spattering can occur!

▶ Stir the mixture with an acid-proof stick (glass or plastic).

Desired acid concentration kg/l	1,23	1,24	1,25	1,26	1,27	1,28
Volume ratio of concentrated sulphuric acid (96 %) to distilled water	1:3,8	1:3,6	1:3,4	1:3,2	1:3,0	1:2,8

When adding the battery acid, the acid level should be 15 mm above the top edge of the battery plates and the temperature of the acid should be approximately 15 °C.

▶ Add battery acid to battery.

Wait approximately 20 minutes before connecting the battery. By that time, it will be balanced out.

▶ Connect the battery after approximately 20 minutes.

12.3 Removing and recharging the battery

WARNING
Danger of injuries!
▶ Do not place tools on batteries and keep open flames away!

12.3.1 Removing the battery

Make sure that the following prerequisites are met:
– The engine is turned off.
– All electrical users are turned off.

NOTICE
Damage to alternator!
▶ Do not disconnect batteries unless the engine has been turned off!

▶ Carry out work in well ventilated rooms and avoid sparks.
▶ Disconnect the negative terminal first (ground cable), then the positive terminal.
▶ Remove the battery.
▶ Avoid spark formation caused by electrostatic charge. To avoid this, touch the ground support point in the driver's cab.
▶ Do not tilt or shake the battery.

12.3.2 Recharging the battery

NOTICE
Damage to battery!
▶ Recharge only with direct current, the strength of which does not exceed 1/10 of the battery capacity!

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Recharging example: A battery with 170 Ah should be charged with a maximum charging current of 17.0 A.

- ▶ Frozen batteries must be thawed out before charging.
- ▶ Remove all plugs before charging.
- ▶ Provide ventilation during charging (risk of oxyhydrogen gas explosion!).
- ▶ Connect the battery to a battery charger (positive to positive and negative to negative).
- ▶ Turn on the battery charger after connecting the battery.

Stop charging immediately if:
- – The acid temperature exceeds 55 °C (casing more than warm to the touch).
- – The battery starts to give off gas.
- – The acid concentration or the charging voltage has not changed for 2 hours.

- ▶ Turn the battery charger off after charging, then remove the connector cables individually from battery and battery charger.

12.3.3 Installing the battery

- ▶ Reinstall the battery tightly in the vehicle.
- ▶ Avoid spark formation caused by electrostatic charge. To avoid this, touch the ground support point in the driver's cab.
- ▶ Connect the positive terminal to the battery first, then the negative terminal (ground cable).
- ▶ Check that the terminals are tightly seated (low transfer resistance).
- ▶ Grease the terminals and terminal posts with acid-free and acid-resistant grease (use corrosion protection even for modern maintenance-free batteries).

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7.05.50 Maintenance instructions - Crane boom

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Fig.195219

1 Lattice mast boom

WARNING
Danger of falling!
Death, severe injuries.
▶ For all work on the crane where there is a danger of falling, suitable safety measures must be taken, see Crane operating instructions, chapter 2.06.

Note
▶ The following illustration is an example and may not exactly match to your crane.

1.1 Lubricating the pin bores on the lattice sections and guy rods

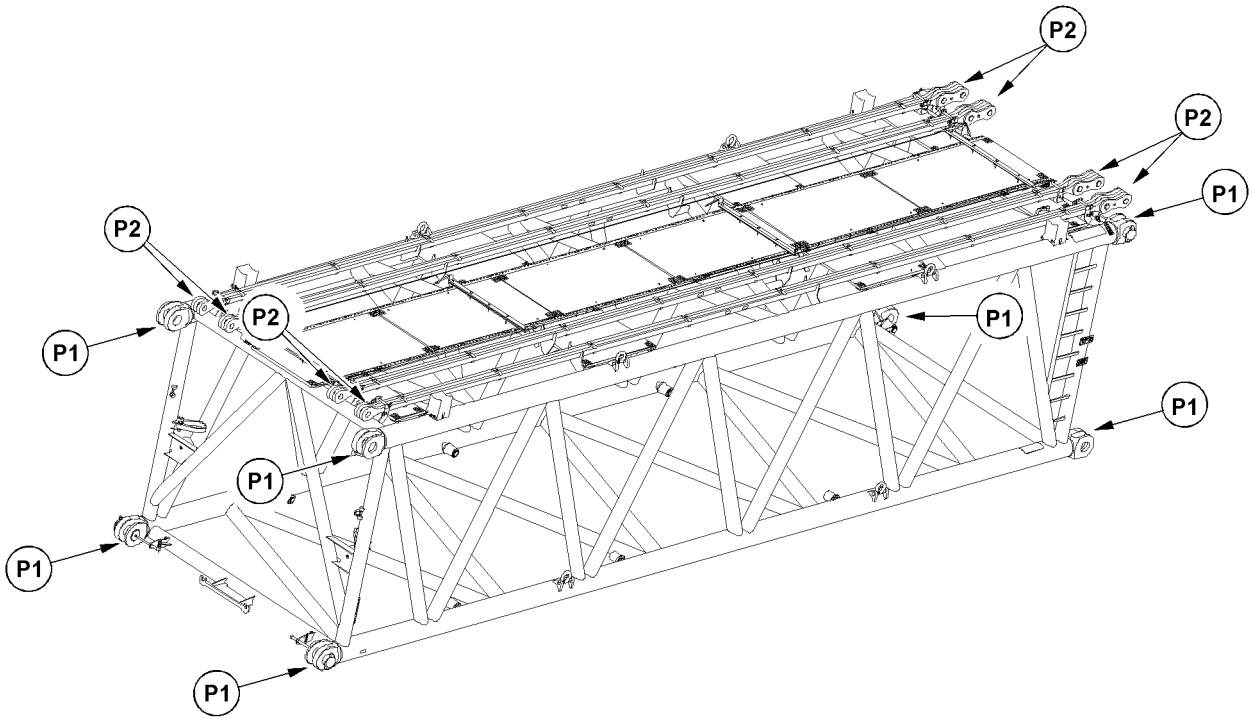

Fig.123861: Lube points on boom lattice sections and guy rods

Note
▶ For the pin bores on the lattice sections (points **P1**) and the guy rods (points **P2**), use special grease as lubricant. See Service fill and Crane operating instructions, chapter 7.07.
▶ Apply the grease on the pin bores over the entire circumference.
▶ The lubrication of the pin bores on the boom lattice sections and the guy rods is made before assembly or after disassembly.

Make sure that the following prerequisites are met:
– The lattice sections are not installed on the crane.
– The lattice sections are playing on a load bearing support on the ground.

▶ Grease the pin bores on the boom lattice sections and the guy rods.

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2 Rope pulleys and guide pulleys

2.1 Check bearings for easy movement

Stiff or blocked rope pulleys or compensation pulleys wear rapidly and unevenly and cause serious rope abrasion.

Ineffective compensation pulleys can lead to irregular rope tension.

▶ Check the rope pulleys for proper movement in their bearings.

When rope pulleys are **not** easily moveable in their bearings:
▶ Fix the bearings.

2.2 Checking for mechanical damage

Ropes can cause mechanical damage, such as stress marks.

▶ Check guide pulleys and rope pulleys for mechanical damage.

3 Crane ropes

3.1 Personal protective equipment

WARNING
Injury due to wires and skin irritation due to lubricant!
▶ When working with ropes, always wear work gloves.

WARNING
Injuries if protective equipment is **not** worn!
▶ Wear hard hat, safety shoes and safety glasses.

3.2 Safe and problem-free operation

WARNING
Wear, overload, incorrect use, damage, improper maintenance!
Failure of ropes. Death, severe injuries, property damage.
▶ Prevent failure of ropes: Observe and adhere to the following notes.

Carry out the following measures to ensure safe and problem-free rope operation.
- Service ropes and rope end connections regularly according to the maintenance intervals.
- Check ropes and rope end connections regularly according to the inspection intervals.
- When it is determined that the ropes should be withdrawn from service, do **not** continue to use them further.
- Exclude contact of rope with components except rope drive elements.
- Exclude contact of rope with structural parts, power lines or other objects within the surrounding area.
- Avoid corrosive and chemical surroundings.
- Avoid excessive soiling.
- Avoid excessive heat influence.
- Ensure proper condition of all elements of rope drive.
- Ensure proper spooling formation on the rope drum.
- Use the entire rope length of hoist ropes.
- Avoid slack rope formation on the drum.
- Do **not** bring outer twists into the rope.
- Avoid shock relief of the rope, such as sudden set down of the load.

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– Avoid **non-permissible** angular pull, for example by pulling the load at an angle.

3.3 Temperature operating limits

Adhere the temperature operating limits for steel ropes. The determining factors are wire material, lubricant, rope end connections. See Manufacturer's specifications.

3.4 Qualification Maintenance personnel

Make sure that the following prerequisites are met:
– The maintenance personnel is trained and instructed in maintenance tasks.
– The maintenance personnel is assigned (authorized) for the maintenance by the crane operator.

3.5 Damage on rope

Rope removal criteria: If severe damage reduces the operational safety, then the rope can reached the removal criteria.

This section provides an overview for possible damage on the rope. For clearer illustration, the distortions on the illustrations are exaggerated.

The displayed ropes show a condition, which is far above the removal criteria.

Damage on the rope causes uneven load distribution in the affected areas.

Damage on the rope is most often localized.

Typical examples for damage, which can be recognized during maintenance work:
– Broken strands
– Wire breaks
– Reduction of rope diameter
– Localized increase of rope diameter
– Corrosion
– Flattenings
– Corkscrew-like distortion
– Basket formation
– Protruding, distorted inlay or braiding
– Loop formation
– Kinking, rope loops (grommets) pulled closed
– Buckles
– Influence of heat or electrical voltage, such as arcing

3.5.1 Broken strands

A strand consists of several individual wires.

When a complete braid is broken, then the rope must be taken down.

3.5.2 Broken wire

Externally visible broken wires are the result of wear caused by operation.

Additional types of broken wires:
– Broken wire in the inside of the rope
– Broken wire in the strand valleys
– Broken wire on a rope connection

A broken wire does not endanger the safety of the rope.

3.5.3 Reduction of rope diameter

The rope diameter changes due to abrasion, settling and external influences.

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Abrasion of cover wires of outer strands of rope due to frictional contact. Especially in those areas where ropes are in contact with the rope pulleys during start up or slow down of the load.

Wear is increased by lack of or incorrect lubrication and the effect of dust.

Abrasion reduces the tensile strength of steel ropes because the cross section of the steel is reduced.

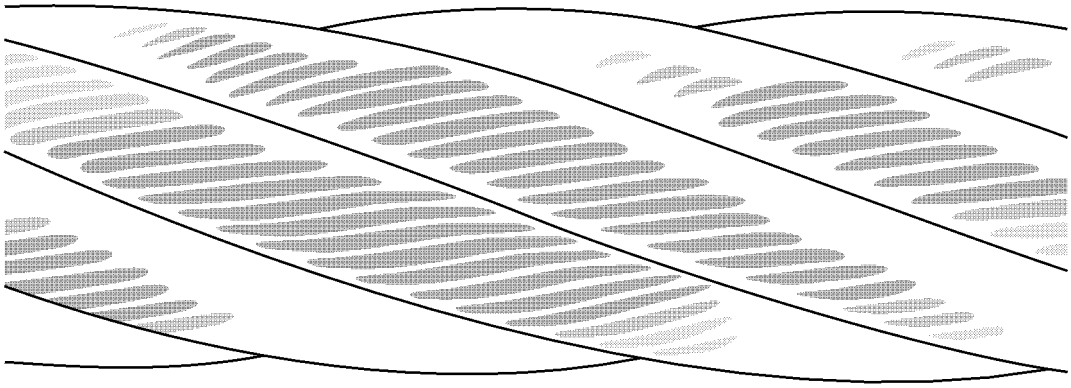

Fig.121001: External abrasion on the rope

When the rope diameter is reduced, the rope must be checked by **expert personnel for crane rope inspection**.

3.5.4 Localized increase of rope diameter

An increase, which occurs over a longer area of the rope can be caused by absorption of moisture in the fiber insert or due to corrosion in the inside of the rope.

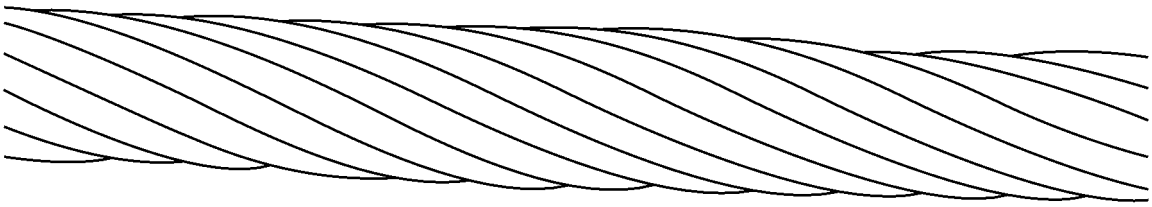

Fig.120992: Increase of rope diameter

When a localized increase of the rope diameter is present, then the rope must be checked by **expert personnel for crane rope inspection**.

3.5.5 Corrosion

Corrosion occurs due to insufficient lubrication, in maritime climates and in an atmosphere polluted by industrial fumes.

External corrosion is indicated by a rough wire surface. A superficial rust film can be wiped off.

Significant corrosion reduces the strength and elasticity of the rope due to the reduction of the rope diameter.

Inner corrosion is hard to detect.

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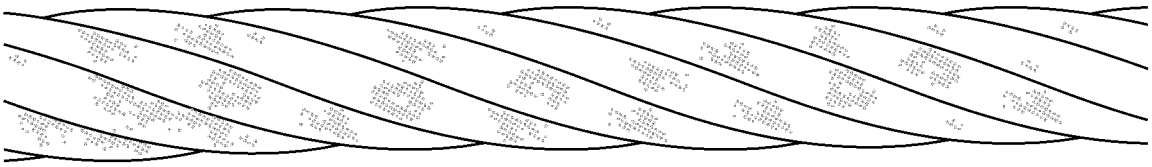

Fig.120994: External corrosion

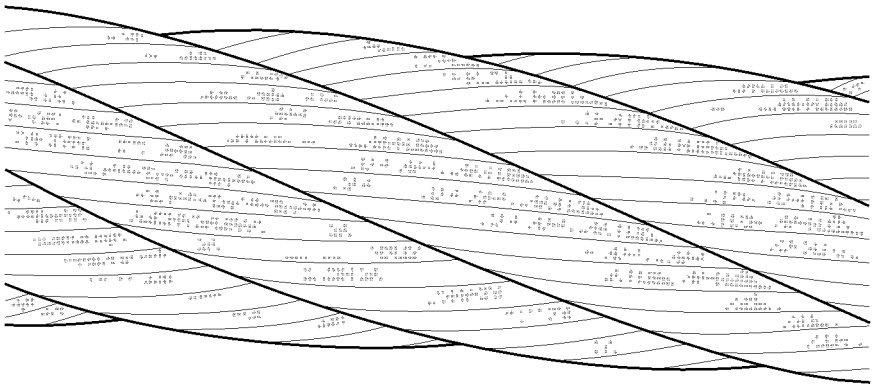

Fig.120995: Magnification of external corrosion for better depiction

When significant corrosion is present, the rope must be checked by **expert personnel for crane rope inspection**.

3.5.6 Flattening

Flattening occurs when the rope runs through the rope pulleys. In this area the rope wears quicker.

Corrosion occurs faster on retaining ropes and guy ropes.

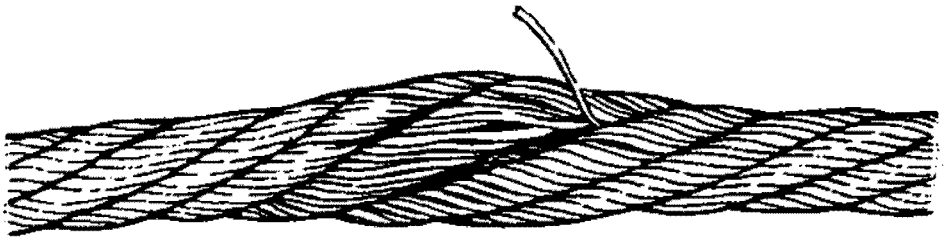

Fig.120997: Localized limited flattening, which leads to broken wires (single layer rope)

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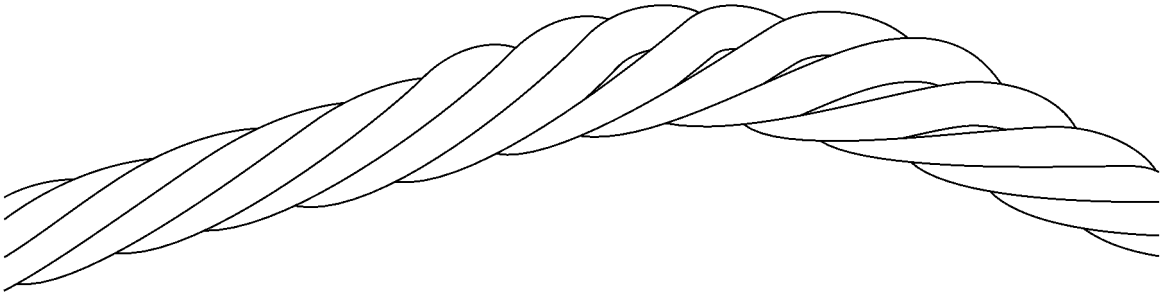

Fig.120996: Flattenings on multi layer spoolings

When flattening is present, the rope must be checked by **expert personnel for crane rope inspection**.

3.5.7 Corkscrew-like distortion

Distortion where the rope is in the form of a corkscrew along its longitudinal axis.

Corkscrew-like distortion causes rope wear, broken wires and bearing damage on rope pulleys.

Fig.120988: Corkscrew-like distortion

When corkscrew-like distortion is present, the rope must be checked by **expert personnel for crane rope inspection**.

3.5.8 Basket formation

This distortion occurs due to different layers between the outer strand layers and the inside of the rope.

Causes for basket formation are high angular pull angles during the run over the rope pulleys and run-in rope pulleys. Even load distribution over the entire cross section is not possible.

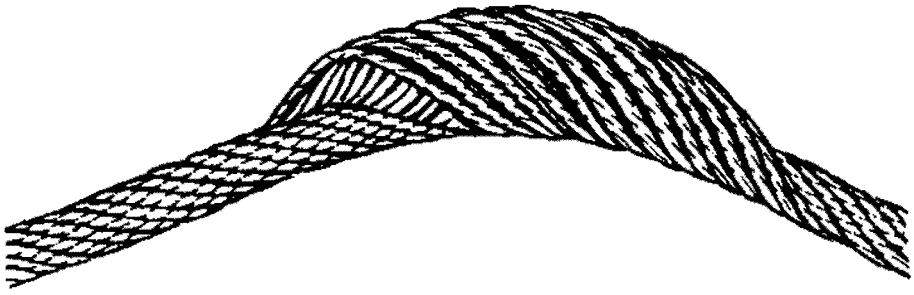

Fig.120989: Basket formation

When basket formation is present, then the rope must be taken down.

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3.5.9 Protruding, distorted inlay, braiding

This distortion is a special form of basket formation: The insert or the core of the rope protrudes between the external braids or an external braid protrudes from the rope banding.

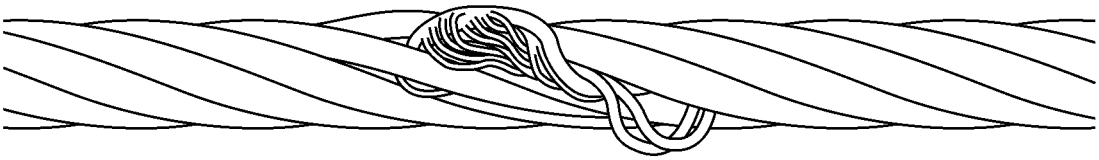

Fig.120990: Protrusion of an insert (rope single layer)

Fig.120991: Distorted or protruding strand

When the insert or a strand protrudes or is distorted, place the rope down. Have **expert personnel for crane rope inspection** check if the rope area with the distortion can be removed.

3.5.10 Loop formation

At loop formation individual wires protrude from the rope banding, when no broken wire ends can be seen.

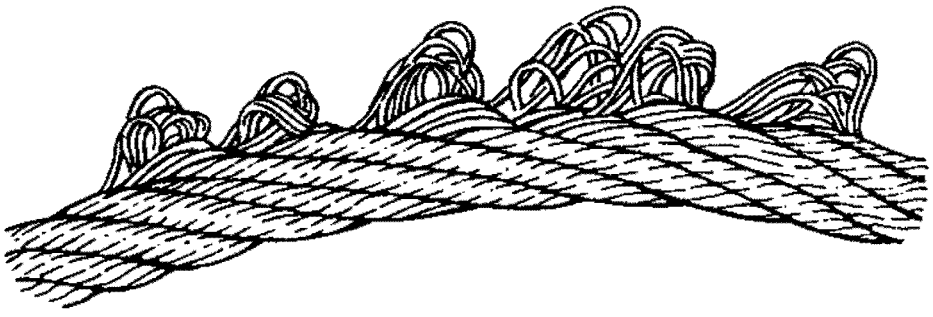

Fig.120993: Emergence of individual wires

When loop formation is present, take the rope down.

3.5.11 Kinking, rope loops (grommets) pulled closed

Deformation, where a loop has formed in the rope, without the possibility to rotate around its own axis during a load. The rope is subjected to more wear.

The rope is deformed. The strength remains only in part.

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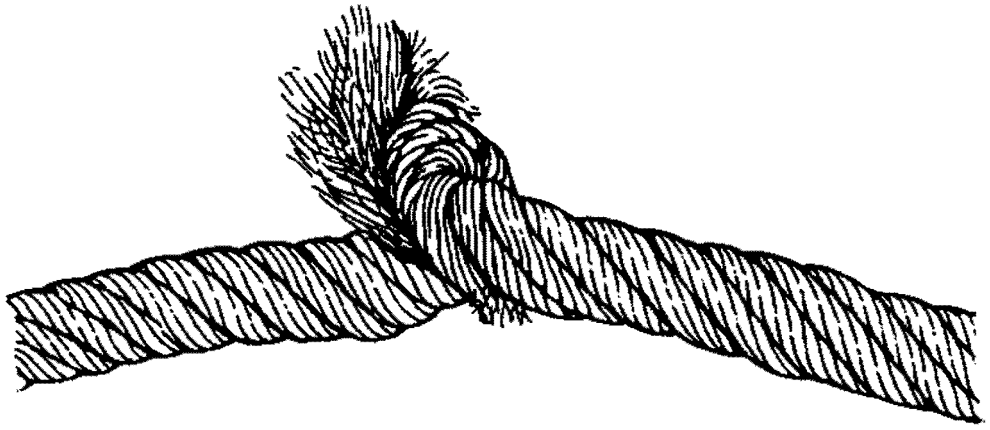

Fig.120998: Severe kinking or knots

When kinking or rope loops are present, place the rope down.

3.5.12 Buckles

Buckles are angular deformations. The rope was damaged due to external influences. Strong deformations of the rope cause stronger wear.

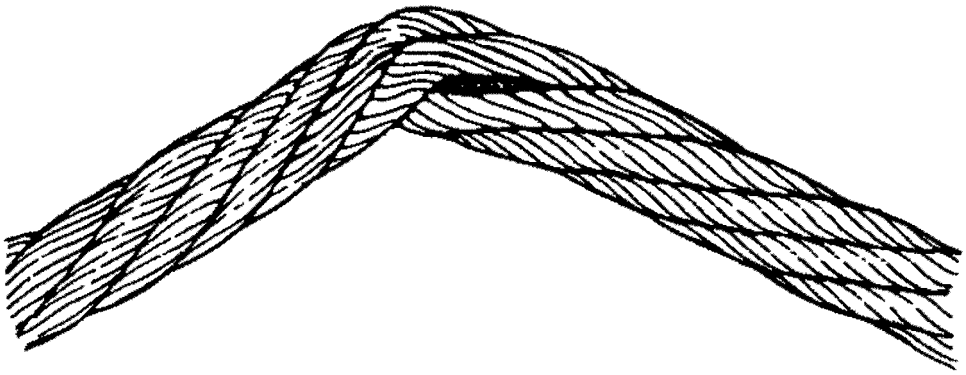

Fig.120999: Severe buckle

When buckles are present, take the rope down.

3.5.13 Effects of heat, arcs

Damage caused to the rope by welding work, for example.

Unusual heat impact is visible by tempering colors and loss of lubricant.

When heat impact has occurred on the rope, then the rope must be taken down.

3.6 Checking the ropes

WARNING
Operation with damaged rope!
Failure of rope. Death, severe injury, property damage.

When damage, wear and deformations are present:
▶ Have **expert personnel for crane rope inspection** determine if the rope has to be taken down.

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The following sections describe the tasks for **daily visual inspection**.

The crane operator can carry out a daily visual inspection if he is sufficiently trained in the tasks and considered to be able to do so.

3.6.1 Intervals

Intervals and situations where the daily visual inspection must be made:
- Daily, before starting to work
- In case of change of the reeving of the crane rope due to
  - Transport
  - New reeving
  - Removal and installation

3.6.2 Areas

The rope must be checked over the entire length.

The following areas must be checked with special diligence:
- Rope end connections
- Safety coils and fixed point on the winch
- Areas of the rope which run through the hook block
- Areas of the rope which run over the rope pulleys or laying on the rope pulleys
- Areas of the rope which are spooled on the winch, especially cross over areas
- Areas of the rope which are laying above the compensation pulleys
- Areas of the rope which are subjected to abrasion due to external components
- All areas of the rope which are subjected to temperatures above 60°C

3.6.3 Documentation of rope condition

Every visible change of the wire rope must be documented in the crane records.

3.6.4 Checking the lubrication

WARNING
Missing lubrication!
Functional problems. Inner and outer corrosion.
- ▶ Lubricate the rope regularly.
- ▶ Make sure that the rope is lubricated all around.
- ▶ Select manual or automatic lubrication procedures.

The lubrication must be checked at least once a **month**.

When the rope shows signs of drying out:
- ▶ Lubricate the rope, see section „Lubricating the rope“.

3.6.5 Check for wear and distortion

- ▶ Check all visible parts of the rope for wear and distortion.
- ▶ Check the rope end connections and fixed points especially carefully for wear, damage, cracks and distortion.
- ▶ Check pressed together rope end connection for slipping and traces on the rope.

Note
- ▶ The maximum permissible number for broken wires over a certain rope length may not be exceeded.
- ▶ Determine the maximum permissible number of broken wires, see Crane operating instructions, chapter 8.04.

- ▶ Check the rope end connection and rope area near the rope end connection for broken wires.

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When broken wires are present on the rope:
▶ Remove the broken wire, see section „Removing broken wires“.

When broken wires or damage is present on the rope end connection:
▶ Document visible changes of the rope condition.
▶ Have the rope checked by **expert personnel for crane rope inspection**.

When the rope can be shortened without reducing the operational safety:
▶ Shorten the rope, see section „Shortening the rope“.

3.6.6 Checking the rope drive for spooling problems

Lacking pretension of the rope on the winch can cause spooling problems in multi layer spooling.

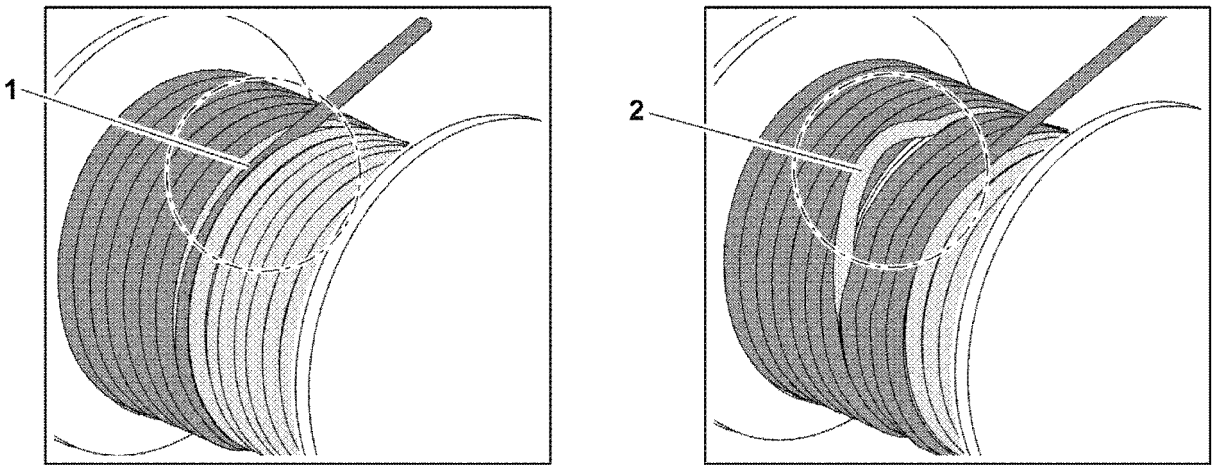

Fig.120967: Possible spooling problems on the rope winch

1 Cutting into the lower rope layers **2** Loop formation in the lower rope layers

▶ Check the spooling behavior of rope on the rope winch for cutting into the lower rope layers **1**.
▶ Check the spooling behavior of rope on the rope winch for loop formation in the lower rope layers **2**.

When spooling defects are found:
▶ Renew the pretension, see section „Renewing the pretension of hoist ropes“.
▶ Document visible changes of the rope condition.
▶ Have the rope checked by **expert personnel for crane rope inspection**.

3.6.7 Checking the position

▶ Check the correct position of the rope on the rope pulleys.

When the rope is **not** correctly laying on the rope pulley:
▶ Have the rope and rope pulley checked by **expert personnel for crane rope inspection**.

3.6.8 Checking for corrosion

A superficial „rust film“ can be wiped off.

▶ Do **not** clean the rope with solvents or cleaners.
▶ Clean the rope solely with a wire hand brush.
▶ Check rope for corrosion.

When the rope shows a rough surface:
▶ Document visible changes of the rope condition and have the rope checked by **expert personnel for crane rope inspection**.

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If there is any uncertainly regarding the condition of the rope:
▶ Place the rope down or contact Liebherr Service.

3.6.9 Checking for flattenings

In the cross over area of the spooled up rope layers on the winch the rope is stressed more. The rope can be flattened as a result.

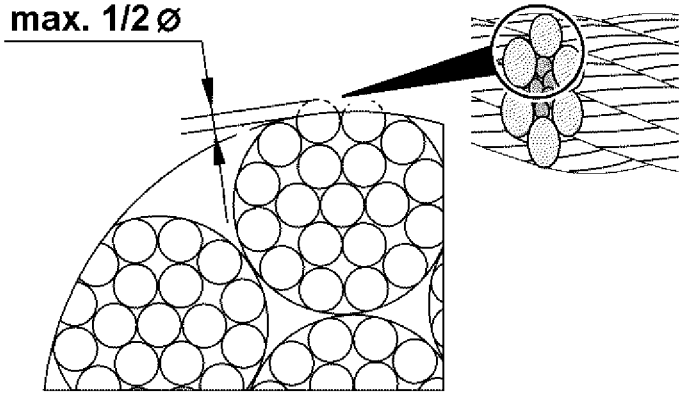

Fig.120966: Maximum flattening of wires on the outer strands

▶ Check the rope in the ascent zones of the rope spooling on the winch for flattenings.

When the outer braids are flattened more than half of the wire diameter:
▶ Document visible changes of the rope condition.
▶ Have the rope inspected by **expert personnel for crane rope inspection** or place the rope down.

When the rope can be shortened without reducing the operational safety:
▶ Shorten the rope on the rope drum fixed point, see section „Shortening the rope“.

3.7 Checking the control rope for distortions

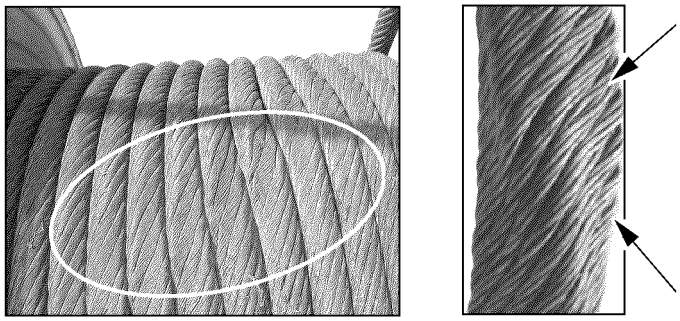

Fig.114002: Distortion on control ropes

▶ Check the first rope layer of the control rope for crushed areas and distortions.

When distortions are present:
▶ Have the rope checked by **expert personnel for crane rope inspection**.

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3.8 Lubricating the rope

WARNING
Missing lubrication!
Functional problems. Inner and outer corrosion.
▶ Lubricate the rope regularly.
▶ Make sure that the rope is lubricated all around.
▶ Select manual or automatic lubrication procedures.

NOTICE
Too much or incorrect lubricant!
Excessive soiling. Wear on rope, on rope pulley and on winch. Recognition of take down criteria is impeded.
▶ Use lubricant, which is compatible with the rope and the original lubricant.

▶ Do **not** clean the rope with solvents or cleaners.
▶ Clean the rope solely with a wire hand brush.

Areas, which must be lubricated especially well are bending zones on winch and rope pulleys.

▶ Lubricate the rope.

3.9 Removing broken wires

NOTICE
Broken wires!
Damage of other components in crane operation, for example rope pulleys and compensation pulleys.
▶ Remove broken wires.

Make sure that the following prerequisite is met:
– Suitable pliers are on hand.

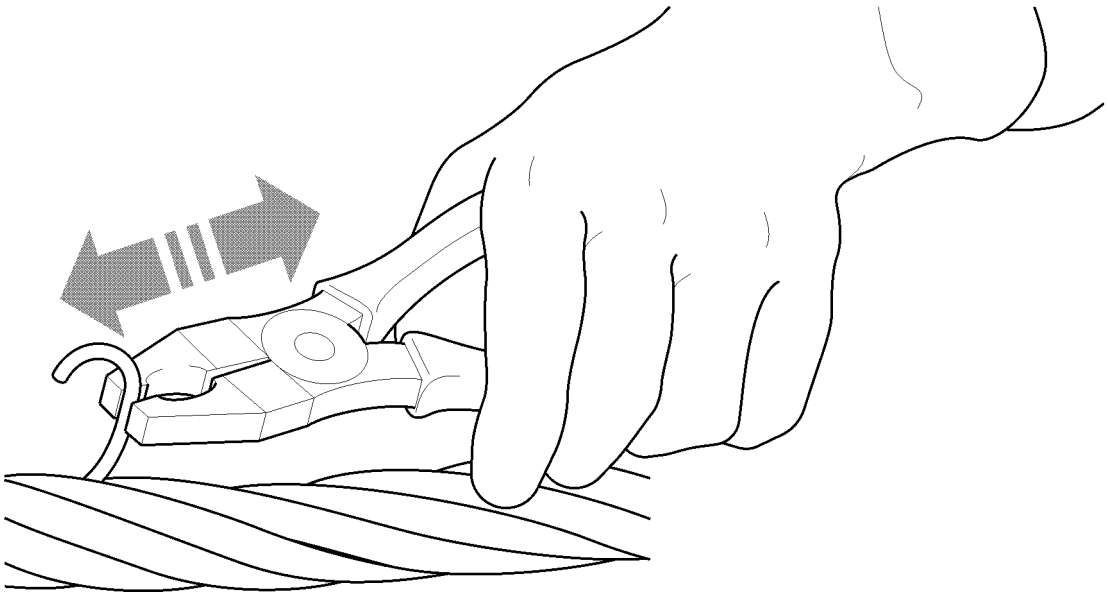

Fig.120979: Remove broken wire

▶ Grasp the wire on the upper end with pliers. Bend the wire back and forth until the wire breaks off in the braid valley.

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The position of a broken wire is important for subsequent inspection. Individual broken wires are counted and are recorded later in the evaluation for withdrawal from service.

▶ Document the position of the broken wires in the crane record. Inspection checklist, see chapter 8.04.

3.10 Turning an extremely rotation-resistant hoist rope out

WARNING
Damage of rope due to incorrect procedure!
▶ Use extreme caution for the following procedures.
▶ Observe the following instructions exactly.

The cause for the turn-in of the hook block can have various reasons.

Check the crane for the following peculiarities:
– Scrub marks: Are hoist rope scrub marks present on the crane components? If scrub marks are present, check the hoist rope run and correct it.
– Rope pulleys: Did the groove diameter become too small?
  • Groove diameter dimensional stability must be present.
  • If this is not the case, the rope pulley must be replaced.
– Rope lubrication: Has the hoist rope been sufficiently lubricated? If the rope surface is dry, the hoist rope must be re-lubricated.

If the crane does not display other peculiarities, the hoist rope must be spun out.

The following sections describe two methods of how to spin out the hoist rope. The methods must be applied in the described sequence.

3.10.1 Spinning out with single strand reeving

▶ Reeve in the single strand hoist rope.
▶ Extend the boom to the maximal boom length and hook height.
▶ Lower hooks to approximately 1 m above the ground and allow the hoist rope to spin out.
▶ With an empty hook block, carry out one complete hoist cycle.
▶ Lower the hook again to approximately 1 m above the ground and allow the hoist rope to spin out again.
▶ Reeve the number of strands of hoist rope carefully and spin free where the twisting of the hook block is largest.
▶ Distribute the spin out to the entire rope length: Run at least two entire hoist cycles at maximum boom length and hook height.

Note

When the hook block continues to turn in:
▶ Spin the rope out, see section „Spinning out by turning the hook block out“.

3.10.2 Spinning out by turning out the hook block

Make sure that the following prerequisite is met:
– The hook block is reeved with the number of strands where the twisting is the largest.

▶ Extend the boom completely and lower the hook block.
▶ Attach a load of approximately 10 % of the nominal rope pull on the hook block.

Before lifting the load, a helper must rotate the twisted hook block to a straight position by hand until the rope strands no longer touch each other.

▶ Continue to turn the hook block by one entire turn.

Result:

– The rope strands touch again.

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NOTICE
The hook block turns back under load in a straight position!

When the hook block turns back in a straight position:
▶ Release the hook block.

▶ Hold the hook block in the prescribed position until the load lifts off the ground.
▶ Move the load until approximately 15 m before the uppermost hook position of the completely extended boom.
▶ Lower load and set it down.

3.11 Renewing the pretension of hoist ropes

WARNING
Lacking pretension of the rope on the winch!
Excessive rope wear in the lower spooling layers, gap formation, rope cutting in.

When the lower rope layers on the winch are hardly used or **not**:
▶ Renew the pretension in the entire rope regularly.

Make sure that the following prerequisites are met:
– A reeving is selected where the entire rope length can be spooled.
– Clean spooling pattern on the drum at spooling.

Note
Recommendation!
▶ The rope application is the most economical when the entire rope length is utilized.

When only a part of the rope length is used for a longer period of time:
▶ Use a proportionally shorter rope.

▶ Spool the rope out until three safety coils.
▶ Spool the rope up with a rope tensile force of 10 % of the maximum rope tensile force.

3.12 Shortening the rope

WARNING
Distortions and mechanical damage!
Operational safety significantly disturbed, uneven load distribution within the rope.
▶ Have the manufacturer check if the distorted and damaged area can be severed.

Visible form changes often occur localized or in short rope sections.

When a safe operation of the rope is ensured, a distorted and damaged area can be severed.

To shorten the rope there are different prerequisites:
– Rope shows flattenings
– Broken wires occur solely within the area of the rope end connection, the remaining rope is undamaged

DANGER
Minimum number of remaining coils on the winch fallen below!
Rope releases or rips off, falling load. Death, severe injury, property damage.
▶ Make sure, after shortening the rope that **at least three remaining coils** remain on the winch in all working positions of the crane.

Make sure that the following prerequisite is met:
– The rope was shortened by authorized and trained expert personnel.

Multi layer spooling: When the rope on the fixed point on the winch is shortened by half the winch diameter, then the service life of the rope increases significantly.

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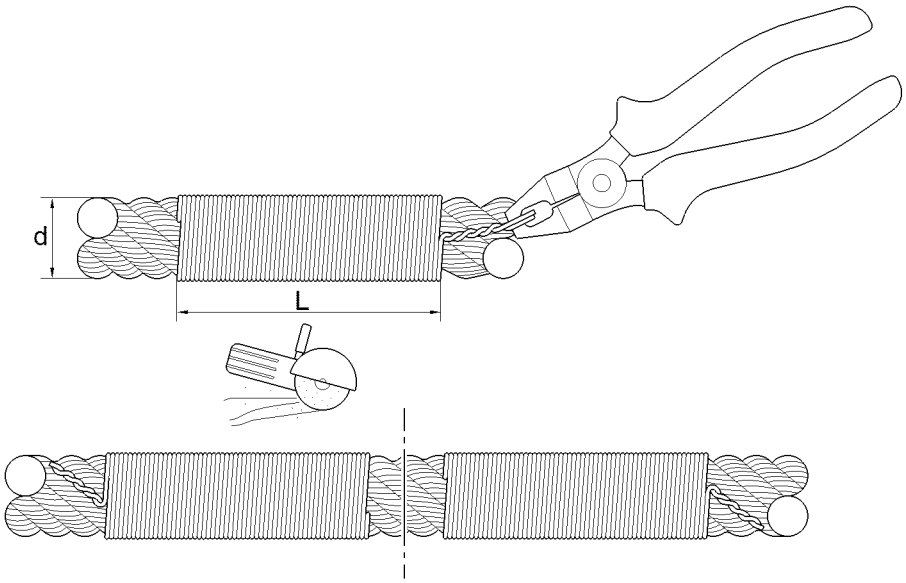

Fig.120972: Tie the rope before shortening it

d Rope nominal diameter **L** Length of tie, at least 2d

The length of the tie **L** must be at least 2 times the rope nominal diameter (2d).

The shortening of the rope in this section applies to a single layer rope. On rotation-resistance, parallel roped ropes it may be necessary to tie several times to prevent the rope from jumping open when it is cut.

- ▶ Tie the rope on both sides with wire.
- ▶ Twist the end of the wire with the pliers to prevent them from releasing.

WARNING
Danger of injury due to flying sparks!
- ▶ Wear safety glasses and safety gloves.

- ▶ Separate the rope vertically to the rope axis.
- ▶ Fasten the end connections on the rope according to the manufacturer's instructions.
- ▶ Remove the tie on both ends of the separation from the rope.

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Empty page!

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7.06 Fill quantities, lubrication chart

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Fig.195219

1 Fill quantities

WARNING
Handling poisonous operating fluids and lubricants!
Poisoning, severe health damage.

When operating fluids are to be used, stored and disposed of:
- ▶ Observe and follow the printed instructions on the original containers.
- ▶ Store operating fluids exclusively in the closed original container.
- ▶ Keep children away from operating fluids. Keep operating fluids away from children.
- ▶ Dispose of operating items and lubricants in an environmentally safe manner.

NOTICE
Damage on aggregates due to impermissible additives!
- ▶ Make sure that **no** impermissible additives are added to the operating fluids.

Note
- ▶ Fill quantities and descriptions of service items and lubricants are specified in the Service fill.
- ▶ Fill the crane chassis, crane superstructure and equipment with the respective operating fluids.
- ▶ The specified fill quantities (change quantities) are orientation values. The marks on the dipsticks, inspection ports and sight gauges are decisive for filling.
- ▶ The equipment depends on the purchased scope of delivery.

On mobile cranes with truck chassis:
- ▶ Observe the maintenance intervals and maintenance notes of the truck chassis manufacturer.

NOTICE
Danger of property damage!
- ▶ Do **not** mix different oil products!
- ▶ Do **not** mix synthetic oils with mineral oils!
- ▶ Adhere to the data in the Service fill!

1.1 Diesel engine

- ▶ Check the engine oil. See Maintenance intervals and maintenance instructions.
- ▶ Adhere to the operating instructions of the engine manufacturer.

1.2 Coolant system

NOTICE
Property damage due to impermissible coolant!
- ▶ Do **not** mix different coolant products.
- ▶ Do **not** thin Liebherr-Fertig-Mix (Liebherr Ready Made Mix).

When adding coolant:
- ▶ Use exclusively the same coolant.

Coolants contain corrosion inhibitor - antifreeze fluid.

Add coolant only on the filler neck. See Service fill.

Note
If the coolant is changed:
- ▶ Contact the Service Dept. at Liebherr-Werk Ehingen GmbH for procedure.
- ▶ Empty the cooling system completely and flush.

In exceptional cases, the coolant can be supplemented with different coolants.

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Note
Supplementing the coolant with different coolants:
▶ Contact the Service Dept. at Liebherr-Werk Ehingen GmbH for procedure.

▶ Check the coolant level. See Maintenance intervals and maintenance instructions.

1.3 Transmission

▶ Check the gear oil. See Maintenance intervals and maintenance instructions.

1.4 Hydraulic system

Note
▶ The oil level must be in the center of the hydraulic oil level sight gauge at 20 °C oil temperature.

At lower hydraulic oil temperature:
▶ Warm up the hydraulic oil.

At higher hydraulic oil temperature:
▶ Cool off the hydraulic oil.
▶ Retract all hydraulic cylinders completely, for example luffing cylinder, telescoping cylinder.

On vehicles with level regulation:
▶ Lower the vehicle completely with the level regulation.

▶ Check the hydraulic oil. See Maintenance intervals and maintenance instructions.

2 Lubrication schedule

Note
▶ Grease the crane chassis, crane superstructure and equipment with the respective lubricants. See Service fill.
▶ The equipment depends on the purchased scope of delivery.

On mobile cranes with truck chassis:
▶ Observe the maintenance intervals and maintenance notes of the truck chassis manufacturer.

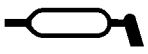

Fig.107729

Note
▶ Lube points are marked with a symbol.

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7.07 Operating fluids and lubricants

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Fig.195219

1 Specified service fluids and lubricants for Liebherr cranes

No.	Crane components	Ambient temperature for driving and crane operation	
		-20 °C to +50 °C	-40 °C to +30 °C
1.1	Diesel engine **with** Exhaust aftertreatment US Tier 4, EU-Stage IV LMB D936 A7-04, D944 A7-04, D946 A7-04, D9508 A7-04 MTU 6R 1000 Euro V ECE R.49, K LMB D936 A7-50, D946 A7-50, D9508 A7-50	**LWE Id. No.: 10871536** **Liebherr Motoroil 5W-30** SAE 5W-30 and ACEA E6 **or:** SAE 10W-40 and ACEA E6 Observe the instructions of the engine manufacturer	**LWE Id. No.: 10871536** **Liebherr Motoroil 5W-30** SAE 5W-30 and ACEA E6 **or:** SAE 10W-40 and ACEA E6 Observe the instructions of the engine manufacturer **Below -20 °C** with pre-heating
	Note: To improve the cold start ability of the diesel engine at an ambient temperature below -10 °C , we recommend the use of Liebherr Motoroil 5W-30, **LWE-Id no.: 10871536**		
1.2	Diesel engine **with** Exhaust aftertreatment US Tier 4 interim, EU-Stage III B LMB D936 A7 SCR, D934 A7 SCR, D856 A7 SCR, D9508 A7 SCR MTU/Mercedes Benz OM 906, OM 926	**LWE Id. No.: 10663796** **Liebherr Motoroil 10W-40 low ash** SAE 10W-40 low ash and ACEA E6 Observe the instructions of the engine manufacturer	**LWE Id. No.: 11100934** **Liebherr Motoroil 5W-30 low ash** SAE 5W-30 low ash and ACEA E6 Observe the instructions of the engine manufacturer **Below -20 °C** with pre-heating
	Note: To improve the cold start ability of the diesel engine at an ambient temperature below -10 °C , we recommend the use of Liebherr Motoroil 5W-30 low ash, **LWE-Id no.: 11100934**		
1.3	Diesel engine **without** Exhaust aftertreatment US Tier 3, EU-Stage IIIA such as 1.2 or optionally also LMB D936 A6, D934 A6, D846 A7, D9508 A7 MTU/Mercedes Benz OM 906	**LWE Id. No.: 861005308** **Liebherr Motoroil 10W-40** SAE 10W-40 and ACEA E4 Observe the instructions of the engine manufacturer	**LWE Id. No.: 10871536** **Liebherr Motoroil 5W-30** SAE 5W-30 and ACEA E4 Observe the instructions of the engine manufacturer **Below -20 °C** with pre-heating
	Note: To improve the cold start ability of the diesel engine at an ambient temperature below -10 °C , we recommend the use of Liebherr Motoroil 5W-30, **LWE-Id no.: 10871536**		

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No.	Crane components	Ambient temperature for driving and crane operation	
		-20 °C to +50 °C	-40 °C to +30 °C
1.4	Diesel engine **without**	**LWE ld. No.: 10871536**	**LWE ld. No.: 10871536**
	Exhaust aftertreatment	**Liebherr Motoroil 5W-30**	**Liebherr Motoroil 5W-30**
	Power band H and I ECE R.96	SAE 5W-30 and ACEA E4	SAE 5W-30 and ACEA E4
		or: SAE 10W-40 and ACEA E4	**or:** SAE 10W-40 and ACEA E4
	LMB D936 A7-03, D944 A7-03, D946 A7-03, D9508 A7-03	Observe the instructions of the engine manufacturer	Observe the instructions of the engine manufacturer
			Below -20 °C with pre-heating
	Note: To improve the cold start ability of the diesel engine at an ambient temperature below -10 °C , we recommend the use of Liebherr Motoroil 5W-30, **LWE-ld no.: 10871536**		
1.5	Diesel engine **without**	**LWE ld. No.: 861005308**	**LWE ld. No.: 10871536**
	Exhaust aftertreatment	**Liebherr Motoroil 10W-40**	**Liebherr Motoroil 5W-30**
	US Tier 2, EU-Stage II	SAE 10W-40 and Cummins Engineering Standard CES 20078, 20077, 20076, 20075, 20071	SAE 5W-30 and Cummins Engineering Standard CES 20078, 20077, 20076, 20075, 20071
	Cummins QSK 23	SAE 10W-40 and API CI-4, CH-4, CF-4	SAE 5W-30 and API CI-4, CH-4, CF-4
		SAE 10W-40 and ACEA E7, E5, E3, E2	SAE 5W-30 and ACEA E7, E5, E3, E2
		Observe the instructions of the engine manufacturer	Observe the instructions of the engine manufacturer
			Below -20 °C with pre-heating
	Note: To improve the cold start ability of the diesel engine at an ambient temperature below -10 °C , we recommend the use of Liebherr Motoroil 5W-30, **LWE-ld no.: 10871536**		
2	Drive axle	**LWE ld. No.: 861901008**	**LWE ld. No.: 10425142**
	with differentials,	**Liebherr Gear Hypoid 90 EP**	**Liebherr Syntogear Plus 75W-90**
	planetary gear and	SAE 90 and API GL 5	SAE 75W-90 and API GL 5
	installed distributor gear		
3	Axle drive ZF DK-7	**LWE ld. No.: 861901008**	**LWE ld. No.: 10425142**
		Liebherr Gear Hypoid 90 EP	**Liebherr Syntogear Plus 75W-90**
		ZF TE-ML 05	ZF TE-ML 05
4.1	Vehicle distributor gear	**LWE ld. No.: 861901008**	**LWE ld. No.: 10425142**
	KESSLER	**Liebherr Gear Hypoid 90 EP**	**Liebherr Syntogear Plus 75W-90**
	VG 1800, VG 2400, VG 2550, VG 2600, VG 2700, VG 3750, VG 3751	SAE 90 and API GL 5	SAE 75W-90 and API GL 5
	W 3750, W 3751		

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No.	Crane components	Ambient temperature for driving and crane operation	
		-20 °C to +50 °C	-40 °C to +30 °C
4.2	Vehicle distributor gear with PTO for crane drive KESSLER VG 2700 with PTO VG 3751 with PTO	**LWE Id. No.: 10425142** **Liebherr Syntogear Plus 75W-90** SAE 75W-90 and API GL 5	**LWE Id. No.: 10425142** **Liebherr Syntogear Plus 75W-90** SAE 75W-90 and API GL 5
4.3	Vehicle distributor gear ZF Passau, STEYR PUCH VG 1200, VG 1600, VG 2000, VG 3800	**LWE Id. No.: 861901008** **Liebherr Gear Hypoid 90 EP** ZF TE-ML 19	**LWE Id. No.: 10425142** **Liebherr Syntogear Plus 75W-90** ZF TE-ML 19
5	Miter gear for crane drive	**LWE Id. No.: 10425142** **Liebherr Syntogear Plus 75W-90** SAE 75W-90 and API GL 5	**LWE Id. No.: 10425142** **Liebherr Syntogear Plus 75W-90** SAE 75W-90 and API GL 5
6	Offset gear (drop box) ZF Passau, STEYR PUCH	**LWE Id. No.: 861901008** **Liebherr Gear Hypoid 90 EP** ZF TE-ML 19	**LWE Id. No.: 10425142** **Liebherr Syntogear Plus 75W-90** ZF TE-ML 19
7.1	Pump distributor gear filled with **mineral** gear oil	**LWE Id. No.: 861901008** **Liebherr Gear Hypoid 90 EP** SAE 90 and API GL 5	**LWE Id. No.: 10425142** **Liebherr Syntogear Plus 75W-90** SAE 75W-90 and API GL 5
7.2	Pump distributor gear filled with **synthetic** gear oil	**LWE Id. No.: 861901208** **Liebherr Gear PG 220** CLP PG 220, DIN 51517-3 **WARNING: May not be mixed with other oils!**	**LWE Id. No.: 10664125** **Liebherr Gear PG 150** CLP PG 150, DIN 51517-3 **WARNING: May not be mixed with other oils!**
7.3	Pump distributor gear LTC 1055-3.1	**LWE Id. No.: 10425142** **Liebherr Syntogear Plus 75W-90** SAE 75W-90 and API GL 5	**LWE Id. No.: 10425142** **Liebherr Syntogear Plus 75W-90** SAE 75W-90 and API GL 5
8.1	Powershift transmission ZF torque converter WG 120, WG 150, WG 180, WG 181, WG 200, WG 201	**LWE Id. No.: 861005308** **Liebherr Motoroil 10W-40** ZF TE-ML 03	**LWE Id. No.: 861900608** **Liebherr Hydraulic-Gear ATF** ZF TE-ML 03 **Below -20 °C** run until warm according to the operating instructions

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No.	Crane components	Ambient temperature for driving and crane operation	
		-20 °C to +50 °C	-40 °C to +30 °C
8.2	Powershift transmission ZF torque converter WG 251* ZF ERGOPOWER WG 210, WG 260, WG 310 * also for ambient temperatures above -10 °C	**LWE Id. No.: 861900608** **Liebherr Hydraulic-Gear ATF** ZF TE-ML 03	**LWE Id. No.: 861900608** **Liebherr Hydraulic-Gear ATF** ZF TE-ML 03 **Below -20 °C** run until warm according to the operating instructions
9	Powershift transmission CLARK	**LWE Id. No.: 861005308** **Liebherr Motoroil 10W-40** SAE 10W-40 and ACEA E4	**LWE Id. No.: 861900608** **Liebherr Hydraulic-Gear ATF** ATF Dexron II D and ALLISON C4 **Below -20 °C** run until warm according to the operating instructions
10	Offset gear (drop box) ALLISON	**LWE Id. No.: 861005308** **Liebherr Motoroil 10W-40** SAE 10W-40 and API CF, ACEA E4	**LWE Id. No.: 861900608** **Liebherr Hydraulic-Gear ATF** ALLISON C4 **Below -20 °C** run until warm according to the operating instructions
11.1	Automatic transmission ALLISON CLBT 740, CLBT 750, CLBT 754, CLBT 755 HT 755, HD 4560	**LWE Id. No.: 861900608** **Liebherr Hydraulic-Gear ATF** ALLISON C4	**LWE Id. No.: 861903708** **CASTROL Transynd** ALLISON C4 **Below -20 °C** run until warm according to the operating instructions
11.2	Automatic transmission ZF	**LWE Id. No.: 861900608** **Liebherr Hydraulic-Gear ATF** ZF TE-ML 14	**LWE Id. No.: 861900608** **Liebherr Hydraulic-Gear ATF** ZF TE-ML 14 **Below -20 °C** run until warm according to the operating instructions
12.1	Automatic transmission ZF AS-Tronic ZF TC-Tronic (basic gear) ZF TC-Tronic HD (basic gear)	**LWE Id. No.: 10218305** **ZF-Ecofluid M** ZF TE-ML 02	**LWE Id. No.: 10218305** **ZF-Ecofluid M** ZF TE-ML 02 **below -20 °C** preheat gear according to operating instructions

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No.	Crane components	Ambient temperature for driving and crane operation	
		-20 °C to +50 °C	-40 °C to +30 °C
12.2	Automatic transmission ZF TraXon ZF TraXon Torque (basic gear)	**LWE Id. No.: 10218305** **ZF-Ecofluid M** ZF TE-ML 02	**LWE Id. No.: 10218305** **ZF-Ecofluid M** ZF TE-ML 02 **below -20 °C** preheat gear according to operating instructions
13.1	Torque converter coupling ZF TC HD	**LWE Id. No.: 10218305** **ZF-Ecofluid M** ZF TE-ML 02	**LWE Id. No.: 10218305** **ZF-Ecofluid M** ZF TE-ML 02 **below -20 °C** preheat gear according to operating instructions
13.2	Torque converter coupling ZF TC 2	**LWE Id. No.: 861900608** **Liebherr Hydraulic-Gear ATF** ZF TE-ML 14	**LWE Id. No.: 861900608** **Liebherr Hydraulic-Gear ATF** ZF TE-ML 14
14	Transmission ZF ECO-Split	**LWE Id. No.: 10218305** **ZF-Ecofluid M** ZF TE-ML 02	**LWE Id. No.: 10218305** **ZF-Ecofluid M** ZF TE-ML 02
15	Slewing gear	**LWE Id. No.: 861901208** **Liebherr Gear PG 220** CLP PG 220, DIN 51517-3 **WARNING: May not be mixed with other oils!**	**LWE Id. No.: 861901208** **Liebherr Gear PG 220** CLP PG 220, DIN 51517-3 **WARNING: May not be mixed with other oils!**
16.1	Rope winch	**LWE Id. No.: 861901208** **Liebherr Gear PG 220** CLP PG 220, DIN 51517-3 **WARNING: May not be mixed with other oils!**	**LWE Id. No.: 861901208** **Liebherr Gear PG 220** CLP PG 220, DIN 51517-3 **WARNING: May not be mixed with other oils!**
16.2	Rope winch LR 13000	**LWE Id. No.: 11000948** **Liebherr Universal grease 9900** KPF2N-25, DIN 51502	**LWE Id. No.: 11000948** **Liebherr Universal grease 9900** KPF2N-25, DIN 51502
17	Winch of Telescopic boom guying	**LWE Id. No.: 861901208** **Liebherr Gear PG 220** CLP PG 220, DIN 51517-3 **WARNING: May not be mixed with other oils!**	**LWE Id. No.: 861901208** **Liebherr Gear PG 220** CLP PG 220, DIN 51517-3 **WARNING: May not be mixed with other oils!**
18.1	Crane hydraulics Crane chassis and crane superstructure Observe exceptions, see 18.2	**LWE Id. No.: 861903508** **Liebherr Hydraulic 37**	**LWE Id. No.: 10293807** **Liebherr Hydraulic Plus Arctic**

No.	Crane components	Ambient temperature for driving and crane operation	
		-20 °C to +50 °C	-40 °C to +30 °C
18.2	Crane hydraulics Crane chassis and crane superstructure LTM 11200-9.1 LTR 11200 LR 13000, LR 11000, LR 1600/2, LR 1600/2-W LTC 1055-3.1	**LWE Id. No.: 10293807** **Liebherr Hydraulic Plus Arctic**	**LWE Id. No.: 10293807** **Liebherr Hydraulic Plus Arctic**
19	Brake system if hydraulically actuated	**LWE Id. No.: 861000108** **DOT 4** SAE J 1703e	**LWE Id. No.: 861000108** **DOT 4** SAE J 1703e
20	Clutch actuator	**LWE Id. No.: 861000108** **DOT 4** SAE J 1703e	**LWE Id. No.: 861000108** **DOT 4** SAE J 1703e
21	King pin bearing Gear shaft if **not** maintenance-free	**LWE Id. No.: 861301308** **Liebherr Special grease 9610 Plus** KP2K-20, DIN 51502	**LWE Id. No.: 10296825** **Liebherr Universal grease Arctic** KPFHC1N-60, DIN 51502
22.1	Glide and roller bearing roller bearing joint	**LWE Id. No.: 861301308** **Liebherr Special grease 9610 Plus** KP2K-20, DIN 51502	**LWE Id. No.: 10296825** **Liebherr Universal grease Arctic** KPFHC1N-60, DIN 51502
22.2	Rope pulley bearing	**LWE Id. No.: 10296825** **Liebherr Universal grease Arctic** KPFHC1N-60, DIN 51502	**LWE Id. No.: 10296825** **Liebherr Universal grease Arctic** KPFHC1N-60, DIN 51502
23	Central lubrication system	**LWE Id. No.: 861301308** **Liebherr Special grease 9610 Plus** KP2K-20, DIN 51502	**LWE Id. No.: 10296825** **Liebherr Universal grease Arctic** KPFHC1N-60, DIN 51502
24.1	Slewing ring connection Roller bearing	**LWE Id. No.: 861301308** **Liebherr Special grease 9610 Plus** KP2K-20, DIN 51502	**LWE Id. No.: 10296825** **Liebherr Universal grease Arctic** KPFHC1N-60, DIN 51502
24.2	Slewing ring connection LR 13000	**LWE Id. No.: 11000948** **Liebherr Universal grease 9900** KPF2N-25, DIN 51502	**LWE Id. No.: 10296825** **Liebherr Universal grease Arctic** KPFHC1N-60, DIN 51502

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No.	Crane components	Ambient temperature for driving and crane operation	
		-20 °C to +50 °C	-40 °C to +30 °C
25.1	Support plate with equalization	**LWE Id. No.: 10877698** **Loctite LB 8104** Silicone oil base **WARNING: Do not use oils with another base!**	**LWE Id. No.: 10877698** **Loctite LB 8104** Silicone oil base **WARNING: Do not use oils with another base!**
25.2	Glide shoes for cab guidance on vehicle frame LTC 1045-3.1 LTC 1050-3.1	**LWE Id. No.: 861303608** **Liebherr Telescope grease 9613 Plus** KP2K-30, DIN 51502	**LWE Id. No.: 861303608** **Liebherr Telescope grease 9613 Plus** KP2K-30, DIN 51502
26	Sliding beam Plastic glide bearing Beam for track adjustment	**LWE Id. No.: 861303608** **Liebherr Telescope grease 9613 Plus** KP2K-30, DIN 51502	**LWE Id. No.: 861303608** **Liebherr Telescope grease 9613 Plus** KP2K-30, DIN 51502
27.1	Telescopic boom Plastic glide bearing Corner guide top	**LWE Id. No.: 861303608** **Liebherr Telescope grease 9613 Plus** KP2K-30, DIN 51502	**LWE Id. No.: 861303608** **Liebherr Telescope grease 9613 Plus** KP2K-30, DIN 51502
27.2	Telescopic boom Outer glide bearing Lower shell Inner glide bearing (only during assembly)	**LWE Id. No.: 861303308** **Liebherr Special grease 1336** KP2K-30, DIN 51502 Spray grease	**LWE Id. No.: 861303308** **Liebherr Special grease 1336** KP2K-30, DIN 51502 Spray grease
27.3	Telescopic boom LTC 1045-3.1 LTM 1050-3.1	**LWE Id. No.: 11651459** **Bechem Berulub TCG 1 V**	**LWE Id. No.: 11651459** **Bechem Berulub TCG 1 V**
28	Boom lock	**LWE Id. No.: 861301308** **Liebherr Special grease 9610 Plus** KP2K-20, DIN 51502	**LWE Id. No.: 10296825** **Liebherr Universal grease Arctic** KPFHC1N-60, DIN 51502
29	Guide rail on Telescoping cylinder	**LWE Id. No.: 861303308** **Liebherr Special grease 1336** KP2K-30, DIN 51502 Spray grease	**LWE Id. No.: 861303308** **Liebherr Special grease 1336** KP2K-30, DIN 51502 Spray grease
30	Gear ring rotary connection Slewing gear drive pinion	**LWE Id. No.: 861007708** **RHS-Fluid** OGPFOS-20, DIN 51502	**LWE Id. No.: 861007708** **RHS-Fluid** OGPFOS-20, DIN 51502
31	Running rope	**LWE Id. No.: 10173371** **Liebherr WR-Lube SC** Adhesive grease	**LWE Id. No.: 10173371** **Liebherr WR-Lube SC** Adhesive grease

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No.	Crane components	Ambient temperature for driving and crane operation	
		-20 °C to +50 °C	-40 °C to +30 °C
32	Radiator fluid Diesel engine and heating system	**LWE Id. No.: 10871121** **Liebherr Antifreeze OS Mix** Pre-mixed corrosion inhibitor / antifreeze **WARNING: May not be diluted and / or mixed with other corrosion inhibitors / antifreeze!**	**LWE Id. No.: 10871121** **Liebherr Antifreeze OS Mix** Pre-mixed corrosion inhibitor / antifreeze **WARNING: May not be diluted and / or mixed with other corrosion inhibitors / antifreeze!**
33.1	Travel gears Crawler crane	see data tag	see data tag
33.2	Travel gears telescope crawler crane	see data tag	see data tag
34	Recovery winch	See the data tag and manufacturer's specifications	See the data tag and manufacturer's specifications
35	Recovery winch rope	See the manufacturer's specifications	See the manufacturer's specifications
36	Steering uncoupling LTC 1045-3.1 LTC 1050-3.1	**LWE Id. No.: 10800345** **Teflon Spray**	**LWE Id. No.: 10800345** **Teflon Spray**
37	Pin connections	**LWE Id. No.: 11000948** **Liebherr Universal grease 9900** KPF2N-25, DIN 51502	**LWE Id. No.: 11000948** **Liebherr Universal grease 9900** KPF2N-25, DIN 51502

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7.15 Procedure in case of problems

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Fig.197077

1 Procedure to follow in case of a problem

This chapter answers the following questions:
- What to do in case of a problem?
- Which data is important for communication with Liebherr Service?
- Which displays and component groups are relevant for error diagnostics?
- Which measures are to be taken in clear problem cases?
- How to proceed in case of error messages of the LICCON computer system?
- How can an error diagnostics be carried out?
- Which measures are to be taken for defective components?

WARNING
Incorrect operation!
Incorrect operation of the crane can result in death or serious injuries!
▶ The crane may only be operated by authorized expert personnel trained on mobile cranes by Liebherrwerk Ehingen!

WARNING
Measures without the help of Liebherr Service!
Measures in case of a problem, which are carried out without consulting Liebherr Service can cause damage to the crane. Personnel can be severely injured or killed!
▶ If problems remain or in case of error messages, consult Liebherr Service to determine the cause of the problem and further procedure.

Note
Error diagnostics without the help of Liebherr Service!
▶ For information regarding error diagnostics and error remedy, see „Diagnostics manual“.

Note
▶ The monitor illustrations in this section are only examples. The error codes shown in the monitor illustrations and the corresponding error descriptions might not exactly match the crane.

1.1 Procedure to follow in case of a problem

▶ Observe and adhere to the notes and instructions in this chapter.
▶ Before contacting Liebherr Service: Determine relevant data about the problem.
▶ Carry out the error diagnostics with the aid of Liebherr Service or the „Diagnostics manual“.
▶ Follow the instructions given by Liebherr Service.
▶ After error diagnostics: Replace defective components, which are supplied as spare parts.

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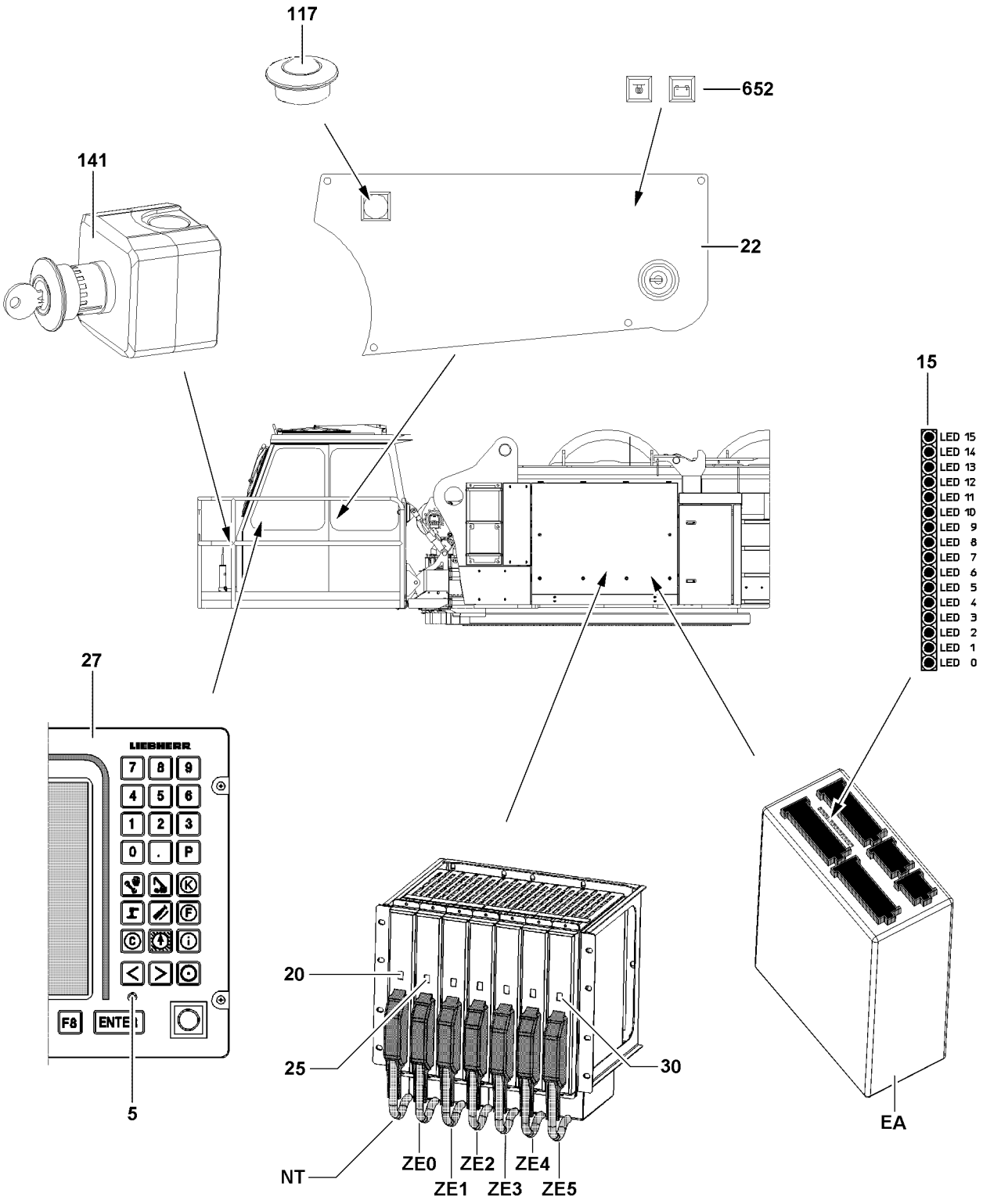

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Fig.108791

1.2 Overview of displays and component groups for error diagnostics

Various displays and component groups allow the crane driver:

- To localize error messages
- To communicate quicker and more precise with Liebherr Service
- With the aid of the „Diagnostics manual“: Diagnostics and remedy errors

Note
Error diagnostics without the help of Liebherr Service!
▶ For information regarding error diagnostics and error remedy, see „Diagnostics manual“.

5 LED
15 LED display I / O module
20 LED display power supply
22 Instrument panel
27 LICCON monitor
117 EMERGENCY OFF switch in the crane operator's cab
141 EMERGENCY OFF switch on the crane operator's cab
EA I / O module
NT Power supply
ZE CPUs
- CPU 0 **ZE0** to CPU 5 **ZE5**

LED displays CPU
- LED display CPU0 **25** to LED display CPU5 **30**

1.3 Which data is required by Liebherr Service?

If the assistance of Liebherr Service is required, always provide the following information:
- Crane type
- Crane number
- Complete error number and any error message displayed on the LICCON monitor **27**
- For certain errors: LED displays of power supply **NT** and CPUs **ZE**
- Application conditions of the crane
- Action during which the error occurs
- Frequency of error

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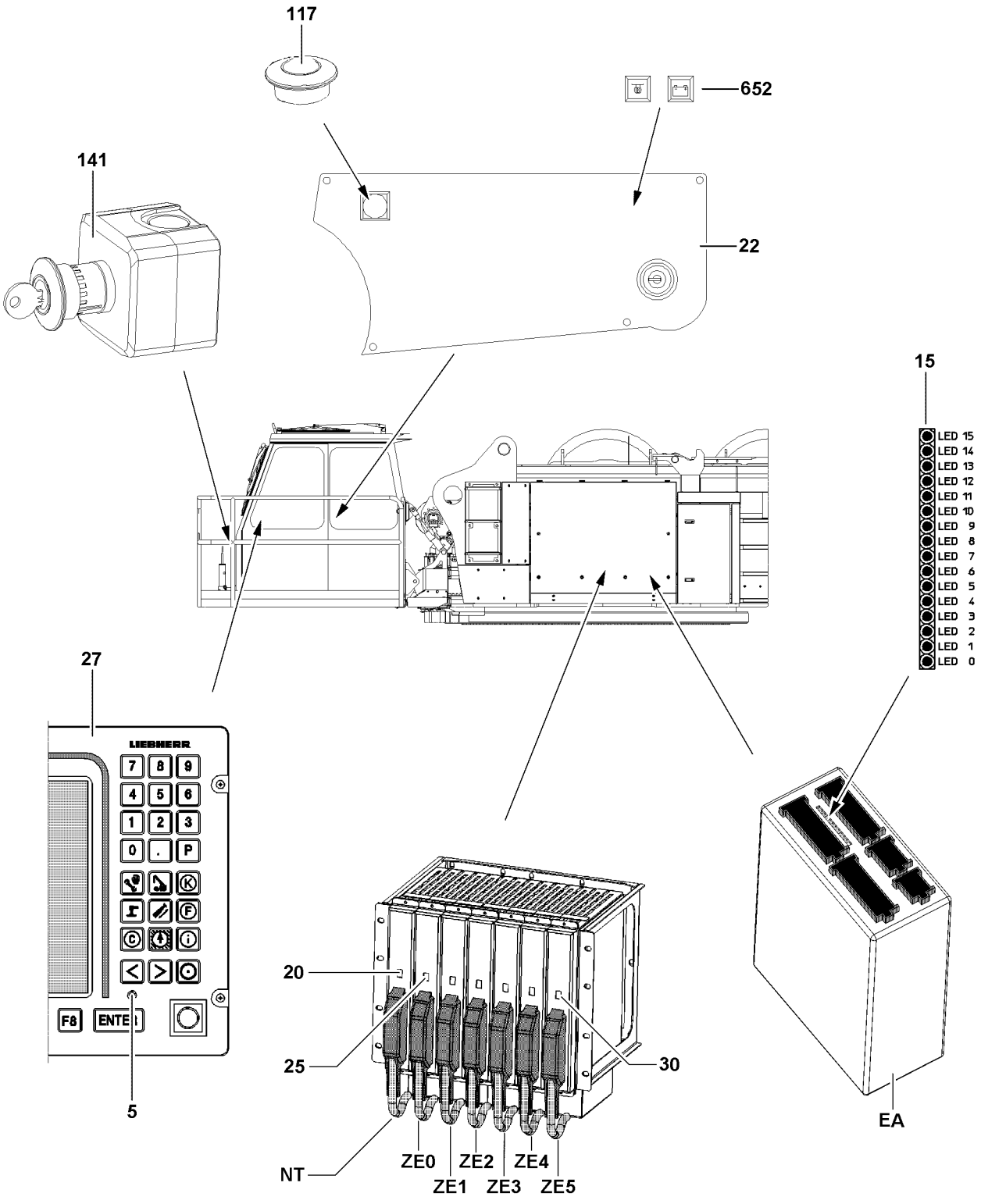

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Fig.108791

2 Measures in clear problem cases

Measures, which are taken in clear problem cases, are described in this section.

Note
- ▶ If a problem occurs, which is not described in this chapter:
- ▶ Contact Liebherr Service to determine the cause of the problem and further procedure.

Clear problem cases are:
- Engine does not start.
- Hydraulic, electric or engine failed.
- An alarm function occurs.
- LICCON computer system shows an error message.

2.1 The engine does not start?

- ▶ Make sure that the EMERGENCY OFF switch **117** and the EMERGENCY OFF switch **141** are not actuated.
- ▶ Make sure that the crane driver is seated on the crane driver's seat.
- ▶ Turn the ignition off.
- ▶ Start the engine again.

If the engine still cannot be started:
- ▶ Monitor the indicator lights **652** on the instrument panel **22**.

Note
- ▶ For Problem remedy, see chapter 4.03, section „Starting the engine and turning it off“.

If the error cannot be remedied:
- ▶ Contact Liebherr Service to determine the cause of the problem and further procedure.

2.2 Have the hydraulic, electric or engine failed?

Note
- ▶ Is the equipment for hydraulic emergency control part of the scope of delivery, the crane can be taken down when the crane hydraulic, crane electric and crane engine failed.
- ▶ For emergency control, see chapter 6.05.

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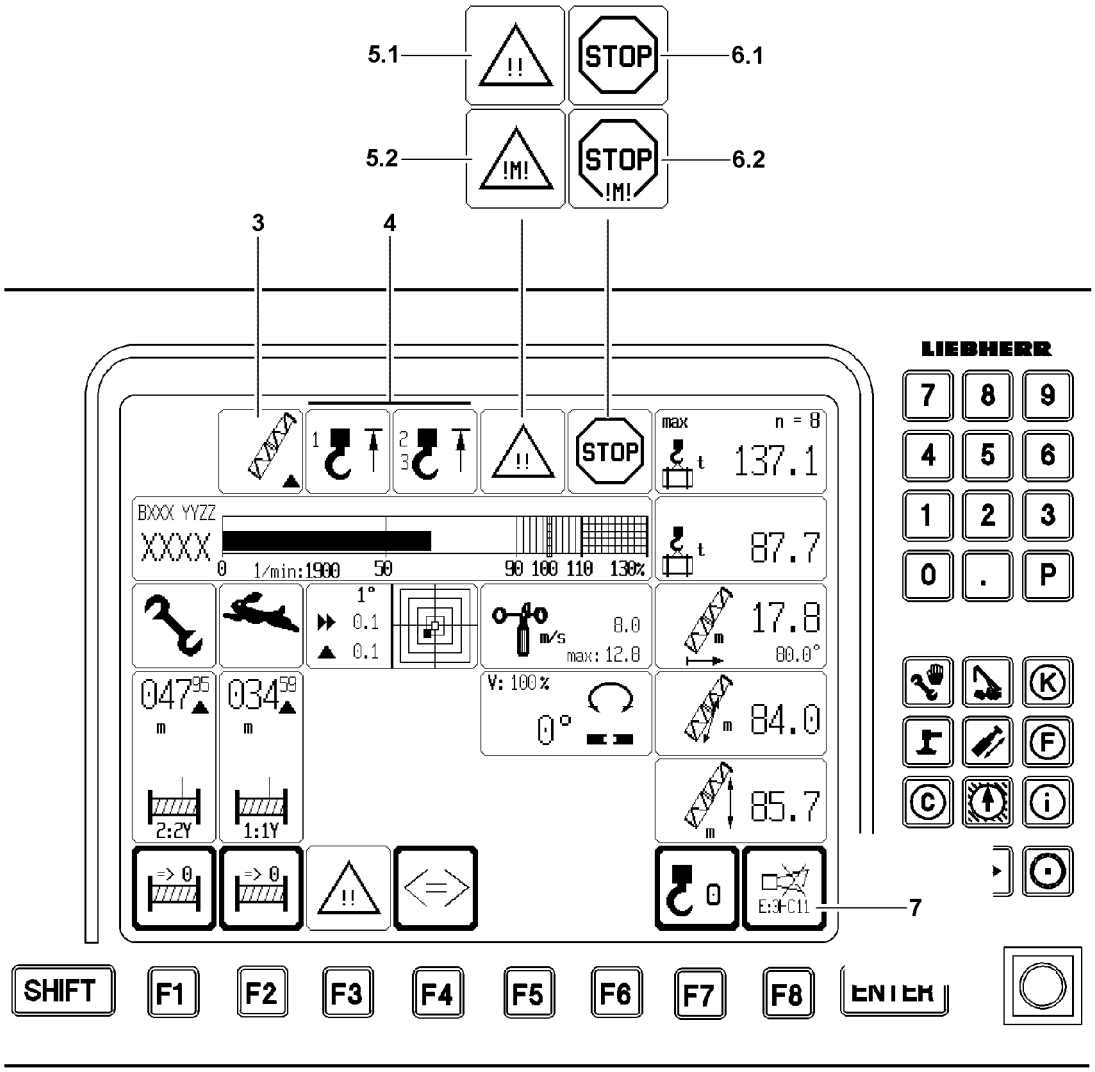

Fig.109972

2.3 Did an alarm function occur?

Note
- ▶ For a detailed description of alarm functions, see chapter 4.02.
- ▶ In case of an alarm function, an error message **7** with LICCON error code appears at the same time.

The following alarm functions are indicated by blinking icons on the LICCON monitor 0:
- **3** Boom limitation
- **4** Hoist top limit switch
- Advance warning load **5.1** / Advance warning engine **5.2**
- Stop load **6.1** / Stop engine **6.2**

The limit ranges of the crane movements are monitored by:
- Hoist limit switch
- Angle sensors
- Pressure sensors
- Pull test brackets (force measuring boxes)
- Wind sensor
- Inductive sensors

If the limit ranges for these sensors are exceeded, the crane movements are turned off (LMB-STOP).

The load moment limiter (LMB) is a program of the LICCON computer system to monitor the permissible load moment. If the permissible load moments of the load chart are exceeded, the LMB-STOP turns the crane movements off.

Note
- ▶ In case of certain shut offs, you can only continue to work by bypassing the safety devices.

WARNING
Risk of accident!
Personnel can be severely injured or killed!
- ▶ All instructions and data in chapter 4.04 must be observed and adhered to!

DANGER
Bypassing the overload protection!
If the overload protection is bypassed, there is no further protection against crane overload!
In the event of deliberate improper use, the crane could collapse, the boom can break off or the crane can topple over!
Personnel can be severely injured or killed!
This could result in high property damage!
- ▶ It is only permitted to bypass the overload safety device during assembly or in emergencies!
- ▶ The bypass may only be carried out by persons who are aware of the effects of their acts regarding the bypass of the overload protection!
- ▶ Bypassing the overload protection requires the presence of the crane supervisor and must be performed with utmost caution!
- ▶ Crane operation with bypassed overload safety device is prohibited!
- ▶ Contact Liebherr Service to determine the cause of the problem and further procedure.

If a LMB-STOP occurs due to boom limitation:
- ▶ Carry out load moment reducing crane movements.

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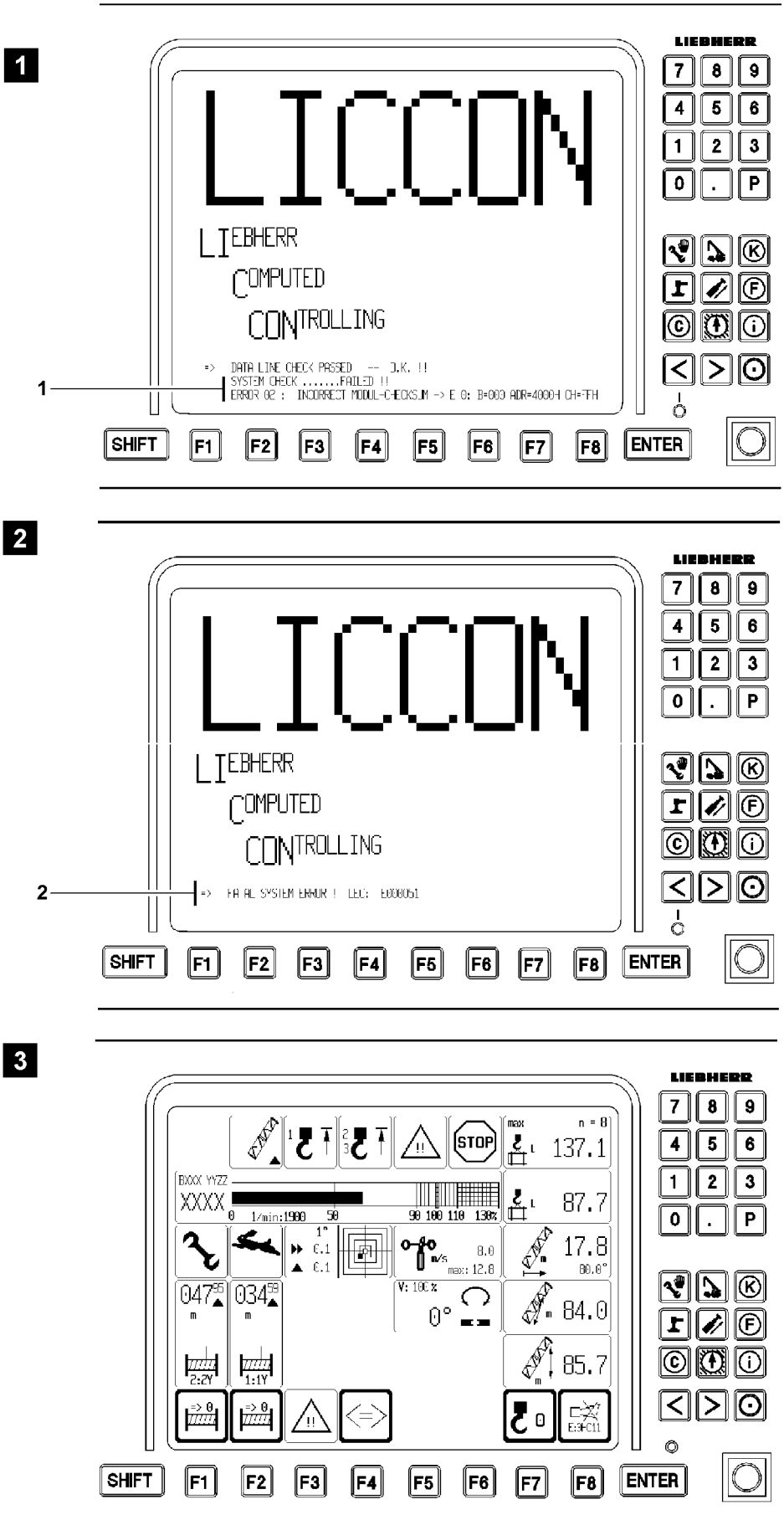

Fig.109973

2.4 LICCON computer system shows an error message?

WARNING
Risk of accident!
Personnel can be severely injured or killed!
The crane can be severely damaged or destroyed!
▶ All instructions and data in chapter 4.04 must be observed and adhered to!

Examples of error messages:
– While the LICCON computer system starts up, see error display illustration **1**, example **1**.
– During operation, see error display illustration **2**, example **2**.
– During operation, see operating screen illustration **3**, example **3**.

Differentiation of error messages on the LICCON monitor:
– Error without LICCON Error Code (LEC), see example **1**.
– Error with LICCON Error Code (LEC), see example **2** and example **3**.

Differentiation of errors in crane operation:
– Errors which lead to shut down: The shut down icon is shown.
– Errors which do not lead to shut down: The crane operator is warned.

2.4.1 Remedying temporary errors during system start

Note
▶ While the LICCON computer system starts, temporary errors can occur, see illustration **1**.

Errors, which occur temporarily, can have the following causes:
– Loosen contact
– Fluctuations in the power supply
– Error message can be a subsequent error

▶ Turn the LICCON computer system off and restart it after waiting for at least 5 s.
▶ Repeat this procedure up to three times (wait 2 min after 3 start attempts).

If the same error view appears several times:
▶ Turn the LICCON computer system off.
▶ Call up the test system, see section „Calling up the test system program“.
▶ Contact Liebherr Service to determine the cause of the problem and further procedure.

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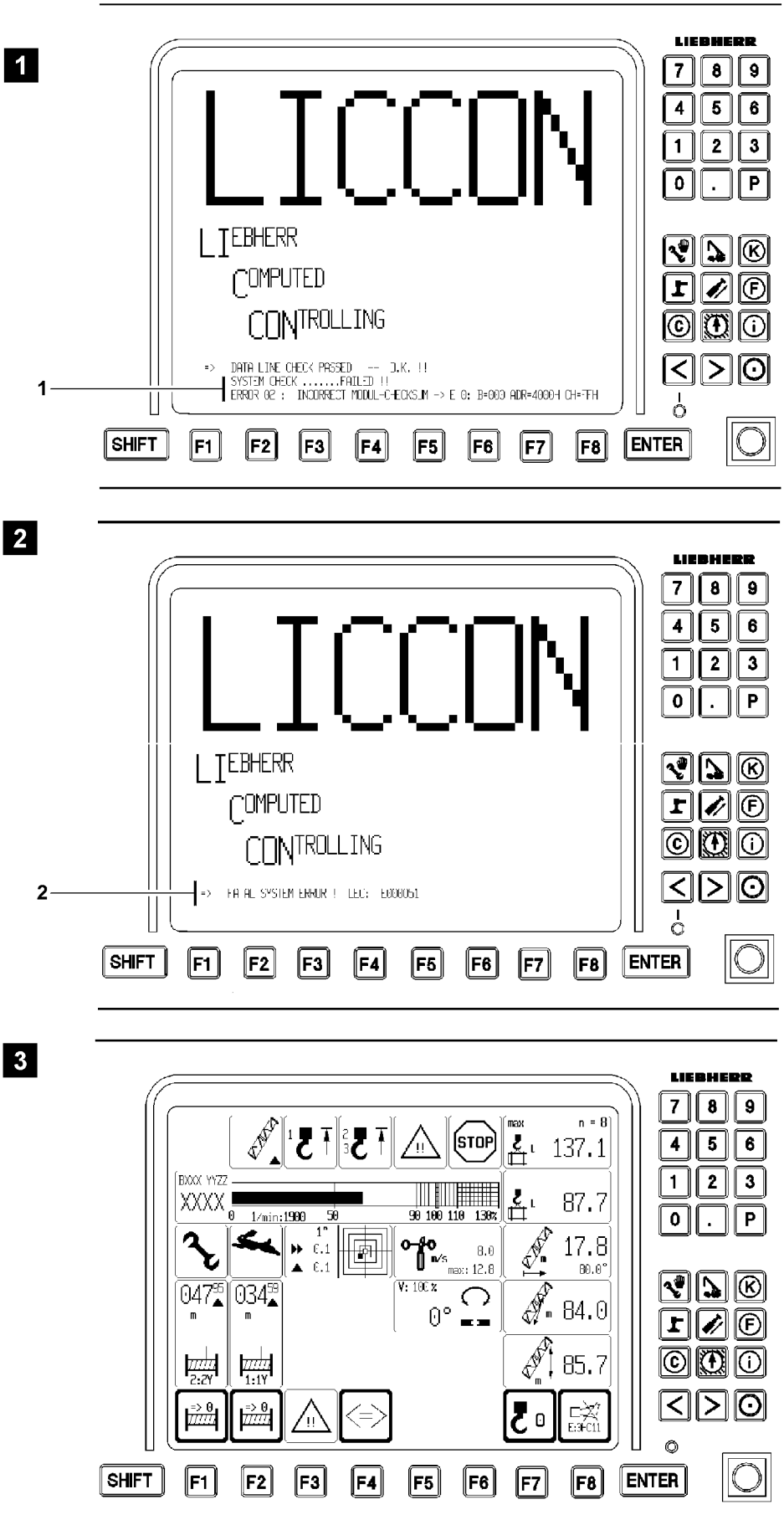

Fig.109973

2.4.2 Procedure in case of error messages with LEC

Two different types of errors are differentiated with the LEC:
- Operating errors - Error code starts with a „B“.
- System errors / application errors - Error code starts with an „E“.

A LEC is always 6-digit.

Example of an error code: E:OHC11	
Element	**Description**
E:	Error class
0	CPU
HC11	I / O module and number, or processor of CPU

If an error code starts with a „B“:
▶ Correct the operating error.

If an error code starts with an „E“:
▶ Call up the test system, see section „Calling up the test system program“.
▶ Contact Liebherr Service to determine the cause of the problem and further procedure.

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4

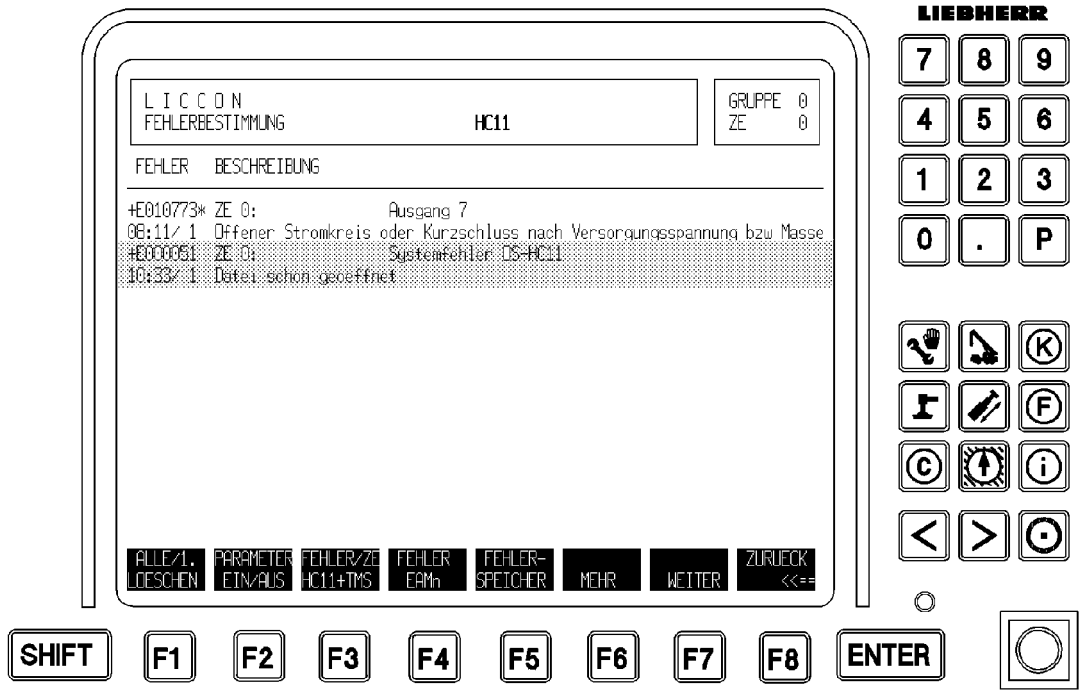

Fig.106381

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2.4.3 Calling up the „Test system“ program

Error messages of the LICCON computer systems with LEC are described in the error determination screen, illustration **4**. To do so, change into the test system program.

Listed errors in the error determination screen are differentiated by:
- Active errors - Error code starts with a „+“ .
- Inactive errors - Error code starts with a „-“ .

Note
▶ Active errors have higher priority than inactive errors and must be taken care of.

Calling up the „Test system“ from the operating screen

Make sure that the following prerequisites are met:
- Error message visible in the icon element „Horn“, see illustration **3**.
- Warning signal „Horn“ is audible.

▶ Press function key **F8** once.

Result:

– Horn is turned off.

▶ Press function key **F8** twice.

Result:

– Change into the error determination screen.
– Listing of errors with LEC and error text.

Calling up the „Test system“ after an error screen

Make sure that the following prerequisites are met:
- The operating screen changes into the error screen (system error), see illustration **2**.
- Crane functions are interrupted.

or:
- Error screen, while the LICCON computer system starts up, see illustration **3**.

▶ Turn the LICCON computer system off.
▶ Turn the LICCON computer system back on after approx. 5 s.

Result:

– Change into the error determination screen.
– Listing of errors with LEC and error text.

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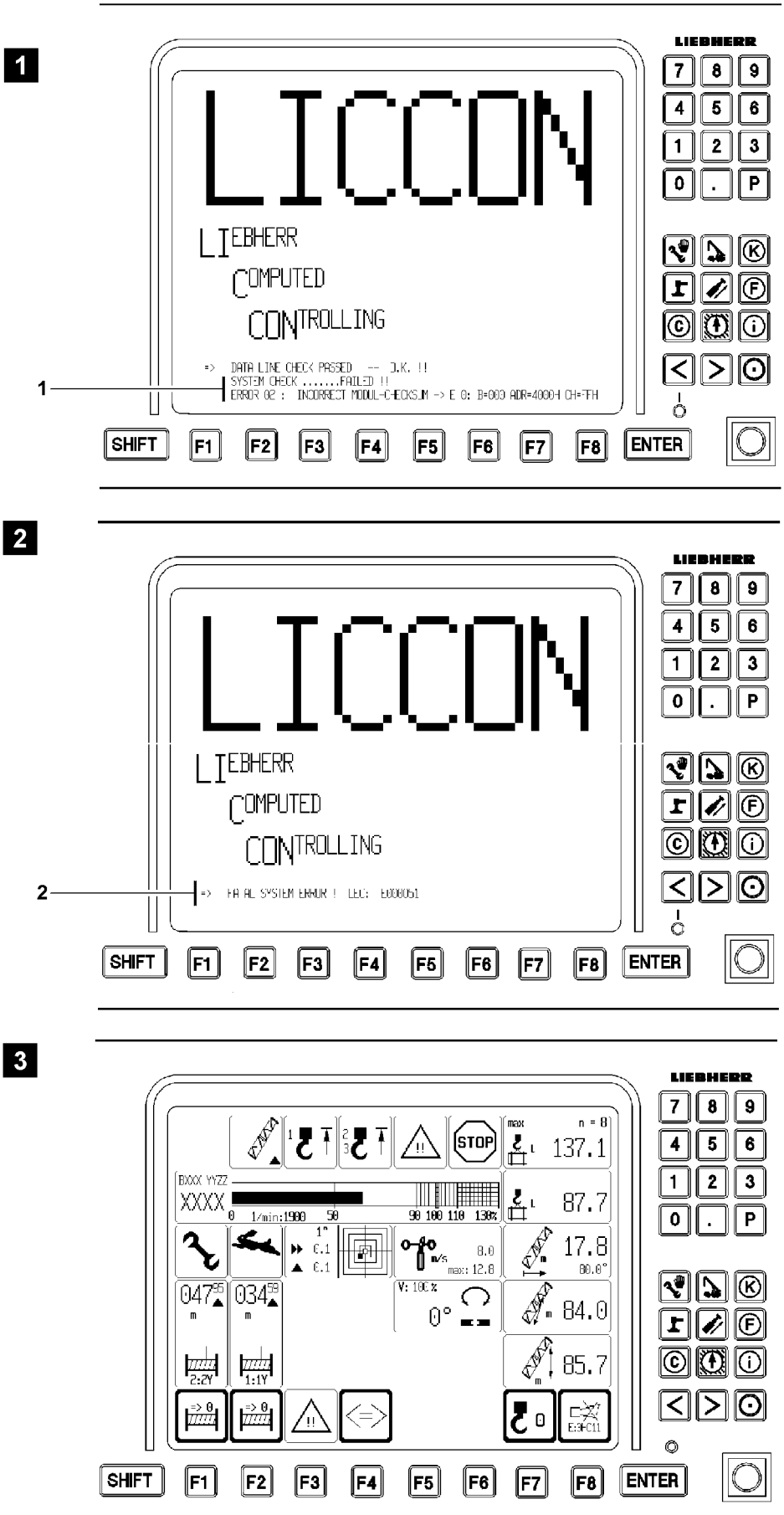

Fig.109973

3 Carrying out an error diagnostics

Several possibilities exist for an error diagnostics:
- With the help of Liebherr Service.
- With the help of Liebherr Service via remote diagnostics.
- Without the help of Liebherr Service.

3.1 Error diagnostics with the help of Liebherr Service

3.1.1 Error diagnostics by phone

▶ Contact Liebherr Service to determine the cause of the problem and further procedure.
▶ Follow the instructions given by Liebherr Service.

3.1.2 Remote diagnostics

The remote diagnostics makes it possible for Liebherr Service to check Liebherr cranes from a remote location in case of problems.

Activation of the remote diagnostics device is first carried out by Liebherr Service.

Make sure that the following prerequisites are met:
- The crane operator has a valid SIM-card (telephone card for mobile telephones) from a current mobile network operator.
- The telephone number of the data service is known.
- The PIN code request of the SIM-card is deactivated.
- The SIM-card is installed in the GSM module.
- For information for remote diagnostics, see „Diagnostics manual“.
- Follow the instructions given by Liebherr Service.

Note
▶ For information for remote diagnostics, see „Diagnostics manual“.

▶ Follow the instructions given by Liebherr Service.

3.2 Error diagnostics without the help of Liebherr Service

WARNING
Measures without the help of Liebherr Service!
Measures in case of a problem, which are carried out without consulting Liebherr Service can cause damage to the crane. Personnel can be severely injured or killed!
▶ If problems remain or in case of error messages, consult Liebherr Service to determine the cause of the problem and further procedure.

Note
Error diagnostics without the help of Liebherr Service!
▶ For information regarding error diagnostics and error remedy, see „Diagnostics manual“.

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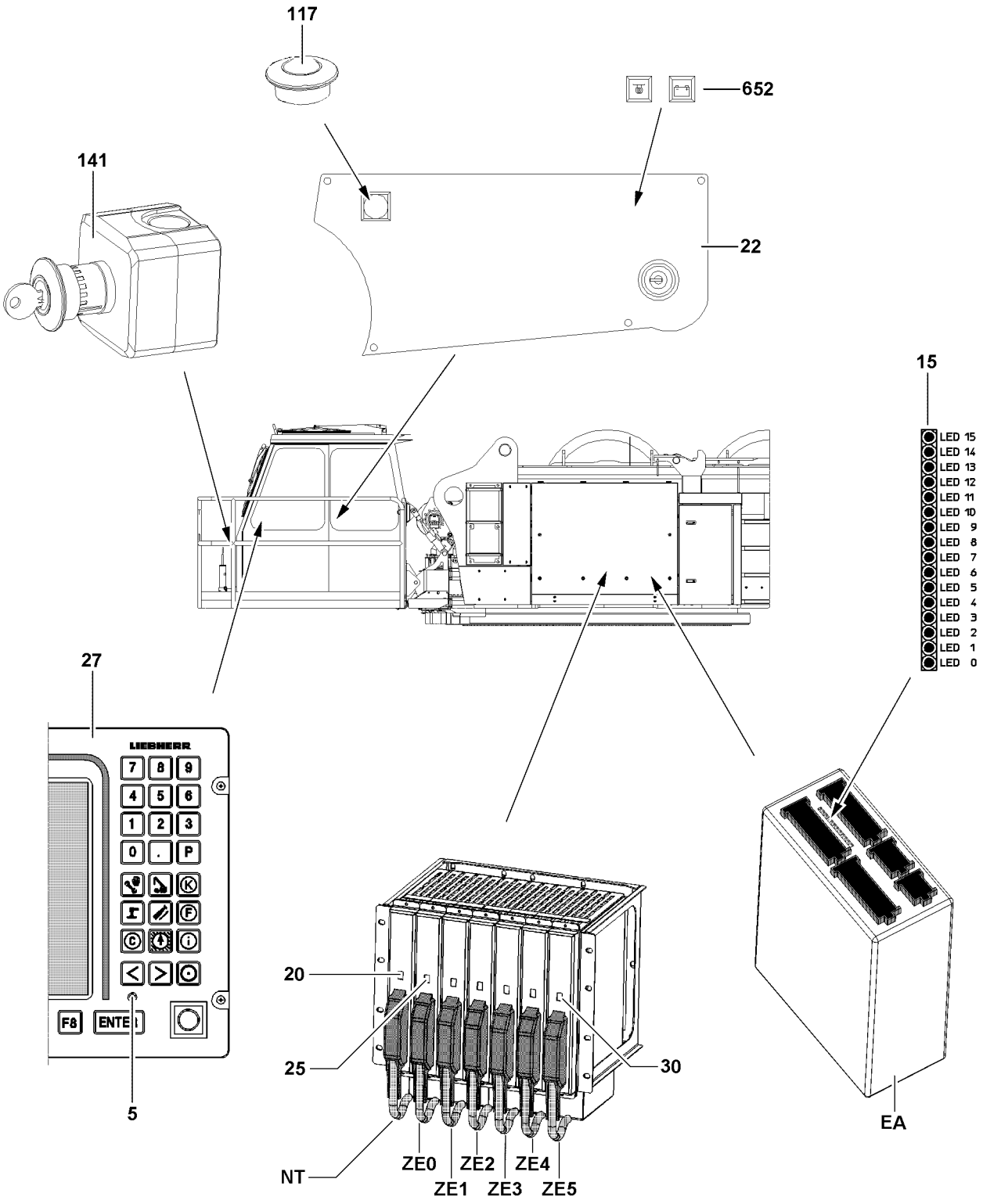

LWE/LG 1750-006/15409-07-02/en

Fig.108791

4 Measures for defective components

The following components are part of the scope of delivery as spare parts:
- **27** LICCON monitor
- **NT** Power supply
- **ZE** CPU

WARNING
Danger to life if original attachment parts are **not** used!
If the crane is operated with attachment parts, which are **not** original, then the crane can fail and cause fatal accidents!
Crane components can be damaged!
- ▶ Operate the crane only with original attachment parts!
- ▶ Crane operation with attachment parts, which do **not** belong to the crane is prohibited!

DANGER
The crane permit and the manufacturer's warranty will become void!
If any original installed parts are modified, manipulated or replaced (e.g. removal of parts, installation of non-original Liebherr parts), both the crane permit and the manufacturer's warranty will become void.
- ▶ Leave installed original parts unchanged!
- ▶ Do not remove installed original parts!
- ▶ Use only Original Liebherr spare parts!

Note
- ▶ For instructions describing the replacement of a defective LICCON monitor, a defective power supply **NT** or a defective CPU **ZE**, see „Diagnostics“ manual.

Make sure that the following prerequisites are met:
- Error diagnostics has been carried out.
- Defective component has been determined.

4.1 Is the LICCON monitor defective?

- ▶ Replace LICCON monitor with a functioning substitute monitor.

4.2 Is the power supply defective?

Note
- ▶ When replacing the power supply unit **NT**, transfer the Common memory of the removed power supply **NT**.
- ▶ A spare power supply unit is located in the switch cabinet crane control.
- ▶ The power must be turned off when replacing the power supply **NT**. When pulling out the power supply unit plug from the socket, the stand-by power supply of the module will be interrupted. In other words, a cold start results. The stored set-up state data and the adjusting events will be lost.

- ▶ Replace the power supply **NT** with a functioning power supply.

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4.3 Is the CPU defective?

Note

- ▶ When replacing the central processing unit **ZE**, transfer the program memory of the removed central processing unit **ZE**.
- ▶ A spare central processing unit is located in the switch cabinet crane control.
- ▶ The power must be turned off when replacing the central processing unit **ZE**. When pulling out the central processing unit **ZE**from the module carrier, the stand-by power supply of the module will be interrupted. In other words, a cold start results. The stored set-up state data and the adjusting events will be lost.

▶ Replace the CPU **ZE** with a functioning spare CPU.

4.4 Is the electrical connection of a cable drum interrupted?

WARNING
Interrupted electrical connection!
If the electrical connection of a cable drum is interrupted, then this causes a shut off (LMB STOP). No further crane movements are possible.

▶ Contact Liebherr Service to determine further procedure.

4.5 Is a sensor or limit switch defective?

Certain crane functions are monitored with two sets of sensors and limit switches.

Note

- ▶ For double version: If only one of the two limit switches or sensor defective, then work can continue with the crane.

▶ Replace the defective limit switch or sensor.

Note

- ▶ For single version: If a limit switch or sensor is defective, then this causes a shut off (LMB STOP).
- ▶ For double version: If both limit switches or sensors are defective, then this causes a shut off (LMB STOP).

WARNING
Bypassing the overload protection!
If the overload protection is bypassed, there is no further protection against crane overload!
In the event of deliberate improper use, the crane could collapse, the boom can break off or the crane can topple over!
Personnel can be severely injured or killed!
This could result in high property damage!

- ▶ It is only permitted to bypass the overload protection for assembly or in emergencies!
- ▶ The bypass may only be carried out by persons who are aware of the effects of their acts regarding the bypass of the overload protection!
- ▶ Bypassing the overload protection requires the presence of the crane supervisor and must be performed with utmost caution!
- ▶ Missing values must be monitored manually and must match the load chart.
- ▶ Crane operation with bypassed overload safety device is prohibited!
- ▶ Contact Liebherr Service to determine the cause of the problem and further procedure.
- ▶ All instructions and data in chapter 4.04 must be observed and adhered to!

▶ Contact Liebherr Service to determine further procedure.

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8 Inspections of cranes

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8.01 Periodic crane inspections

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Fig.195219

1 General information

This crane was tested at the manufacturer's facilities prior to shipment in accordance with the valid ISO, FEM and DIN Standards and DGUV 52 (DGUV 309-001).

The safety level achieved during initial start up may not be attainable during operation.

Examples of the root cause of such deviations include; e.g., wear and tear, corrosion, effects of external forces, changes in the environment and changes to the mode of operation.

The operator is responsible for taking the necessary steps to ensure that the level of safety is maintained.

Periodic inspections are regulated nationally in the BetrSichV.

The crane operator is therefore obligated to have the crane inspected by an **authorized inspector**, at intervals depending on the operational conditions but at least once per year, from the first day of vehicle registration.

Every 4 operating years, in the 13th operating year and thereafter at least annually, from the first day of vehicle registration, the crane must be inspected by an **inspection expert**.

Periodic inspection are principally a visual inspection, where the inspector (either type) appraises the condition of the crane and its components.

WARNING
There is a risk of weakening the supporting components when major changes or repairs are made to the crane!
▶ In this case, the operator must have the crane reinspected by an inspection expert before placing it back into service!

In addition, all respective local and national regulations also apply.

Authorized inspector
Authorized inspectors are those persons who through their professional training, their professional experience and their recent professional activity have the necessary knowledge for the inspection of work equipment.

Authorized inspector for pressure tanks
Authorized inspector for pressure tanks are authorized inspectors who additionally:
- Have relevant technical professional training.
- Have at least one year of experience with the manufacture, assembly, operation or maintenance of the equipment or components to be inspected in accordance with BetrSichV.
- Keep their knowledge about pressure-related hazards up to date by participating in training or instruction, in particular with regard to the following topics:
  - Design and manufacturing processes
  - Equipment and safeguarding concepts
  - Assembly, installation and operation / use
  - Destined use
  - Risk assessment
  - Inspections, inspection periods, inspection procedures including assessment of the results
  - Relevant influences and damage symptoms found in practice

Inspection expert
Inspection experts are authorized inspectors who also:
- Have completed training as an engineer or have equivalent knowledge and experience in the subject area with which their activities are involved.
- Have at least three years of experience in the design, construction, maintenance or inspection of cranes, of which at least half a year were involved in the inspection activities of an inspection expert.
- Possess sufficient knowledge of the relevant regulations and rules.
- Have the necessary facilities for inspection and documentation.
- Keep their professional knowledge up to date.

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To ensure the high safety standard of the crane, it is recommended, no later than the 12th year, in the 20th year, in the 26th year and then every 4 years, to have the crane undergo a **general inspection** by an **inspection expert**. At that time, in addition to the usual scope of inspection, all load carrying parts of the crane - the complete steel structure with all welding seams as well as all components and connecting devices - are to be subjected to a complete visual inspection. The following procedural notes for repeat inspections are to be observed for that.

The purpose of the inspections is to avoid accidents by detecting deficiencies early on. Any deficiencies found by the inspector must be documented, corrected and subsequently reinspected.

A number of important examples of items that are particularly important during the periodic crane inspections are listed in the following. We wish to advise that the **authorized inspectors** or **inspection experts** take sole responsibility for the crane inspections that they carry out.

Note

▶ The inspection may not be solely limited to the following positions shown in the sample construction illustrations. Rather the **entire** crane structure must be subjected to a careful inspection!

In the Crane operating instructions, chapter 8.90 is a checklist to assist the inspector during the periodic inspections of Liebherr mobile and crawler cranes.

If the inspector has any questions they should be directed through the Service Department of Liebherr-Werk Ehingen GmbH to the technical departments.

WARNING

Danger of accident!

▶ Adhere to the following inspection guidelines and intervals.

2 Inspection of carrying crane structures, especially steel structures

2.1 Basic principles and procedure

DANGER

Danger of fatal injury!

The crane structures, particularly steel constructions, have to be checked by an **authorized inspector** or **inspection expert** at least once a year. If this is not the case, they could fail and cause fatal injury or seriously damage the crane!

▶ Crane structures, particularly steel constructions must be checked by an **authorized inspector** or an **inspection expert** at least once a year!

▶ Shorten the inspection intervals when the crane is subjected to above-average load spectrums, for example when handling large material quantities or frequently erecting long boom systems.

▶ When the crane was subjected to excessive operating loads; e.g., due to an unusual impact, the crane structure, especially the steel structures must be inspected immediately!

Crane structures, especially steel structures, such as booms, turntables, chassis, support equipment (e.g., sliding beams or folding outriggers) must be carefully inspected, at the very least during the annual recommended crane inspections. Inspect welding seams especially through an intensive visual inspection.

If paint damage with corrosion (rust) is found on load carrying parts of the crane structure, especially on telescopic booms, lattice booms, lattice jibs, pull rods etc., then the rust must be removed, primed and painted.

During an electrolyte process, such as corrosion in combination with water, an atomic hydrogen is created, which causes to hydrogen induced corrosion with resulting cracks on high tensile fine grain construction steel.

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If disassembly and assembly work on the crane is required to carry out the inspections, then they must be carried out by taking the manufacturer's data into account or in coordination with the crane manufacturer.

We would like to point out that the framework of mobile cranes is designed for a limited number of stress work cycles. This also determines the utilization or service life of the framework. The service life is not determined solely by the number of stress cycles. It also depends on the loads (load spectrum) applied during the time in operation.

Liebherr mobile and crawler cranes are designed for specific characteristics and movements, such as constant deployment of drive forces, only occasional operation and load conditions according to EN 13000.

Liebherr mobile and crawler cranes are designed for assembly operation and, according to grouping in class A1 according to ISO 4301-1, they can only take on a limited number of work cycles (N = 63000) with a collective class Q1 = light (kp = 0.125).

Example of a load collective according to grouping in collective class Q_1 = light (k_p = 0.125).

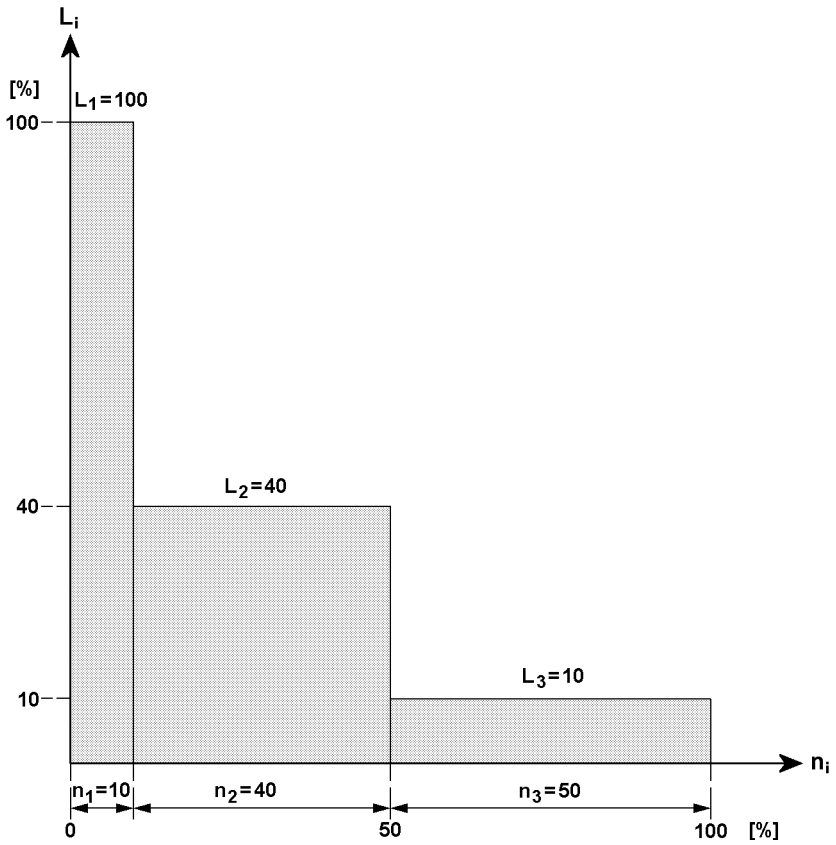

Fig.104716

L_i: Load proportion in relation to maximum load [%]

n_i: Load cycles in relation to maximum number [%]

Note

- The service life of Liebherr mobile and crawler cranes can be drastically reduced, for example when used in magnet, grapple or material handling applications!
- Repeated inspection of crane structure, especially the steel structure and the welding seams must then be carried out in shorter intervals than specified.

For that reason, the steel structures and the welding joints must be subjected to a visual intensive inspection by the **authorized inspector** or **inspection expert** during the specified periodic inspections.

If any damage (such as cracks or suspicion of cracks) are apparent on any part of the steel structure, the total extent of the damage must be determined by qualified specialists using appropriate material

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testing methods, such as magnetic crack detection, ultrasound or x-rays. Thereafter, the qualified personnel must determine whether or not the damaged area can be repaired by welding or by other means.

The following diagrams are samples of the load-bearing welding structures. The welding joints or seams or steel structural zones that require inspection may be present more than once and in various forms. The joints or zones must be inspected all around at the locations identified by arrows.

Note

- ▶ The scope and extent of all inspections remain the sole responsibility of the inspectors!
- ▶ The scope and results of tests should be documented to permit reproducibility. This documentation forms part of the crane records and should be safely stored during the entire service life of the crane!
- ▶ The following diagrams are provided to assist the inspector. The illustrations are only examples and are not necessarily 100 % complete!

2.2 Repair welding

Defects such as cracks or permanent deformation on load-bearing steel components must be immediately reported to the Service Department at **Liebherr-Werk Ehingen GmbH**.

The defect must immediately be appraised by an inspection expert according to standard welding technology rules. The inspection expert must immediately ascertain if the crane can continue to be safely operated due to danger of accident until a repair welding is performed.

Repair welding may solely be made in consultation and under the instructions of the Customer Service at **Liebherr-Werk Ehingen GmbH** by authorized and trained expert personnel.

WARNING

Repair welding **not** according to regulations!
Death, severe bodily injuries, property damage.

- ▶ Contact Customer Service at **Liebherr-Werk Ehingen GmbH**.
- ▶ Coordinate the procedure for repair welding with **Liebherr-Werk Ehingen GmbH**.

Note

Exclusion of liability!
For repair welding, which were not carried out by personnel from **Liebherr-Werk Ehingen GmbH** or by authorized personnel from **Liebherr-Werk Ehingen GmbH**, **Liebherr-Werk Ehingen GmbH** excludes any liability, for system functionality as well as for the parts.

- ▶ Have repair welding made solely by personnel of **Liebherr-Werk Ehingen GmbH** or by personnel authorized by **Liebherr-Werk Ehingen GmbH**.

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2.3 Example for test points

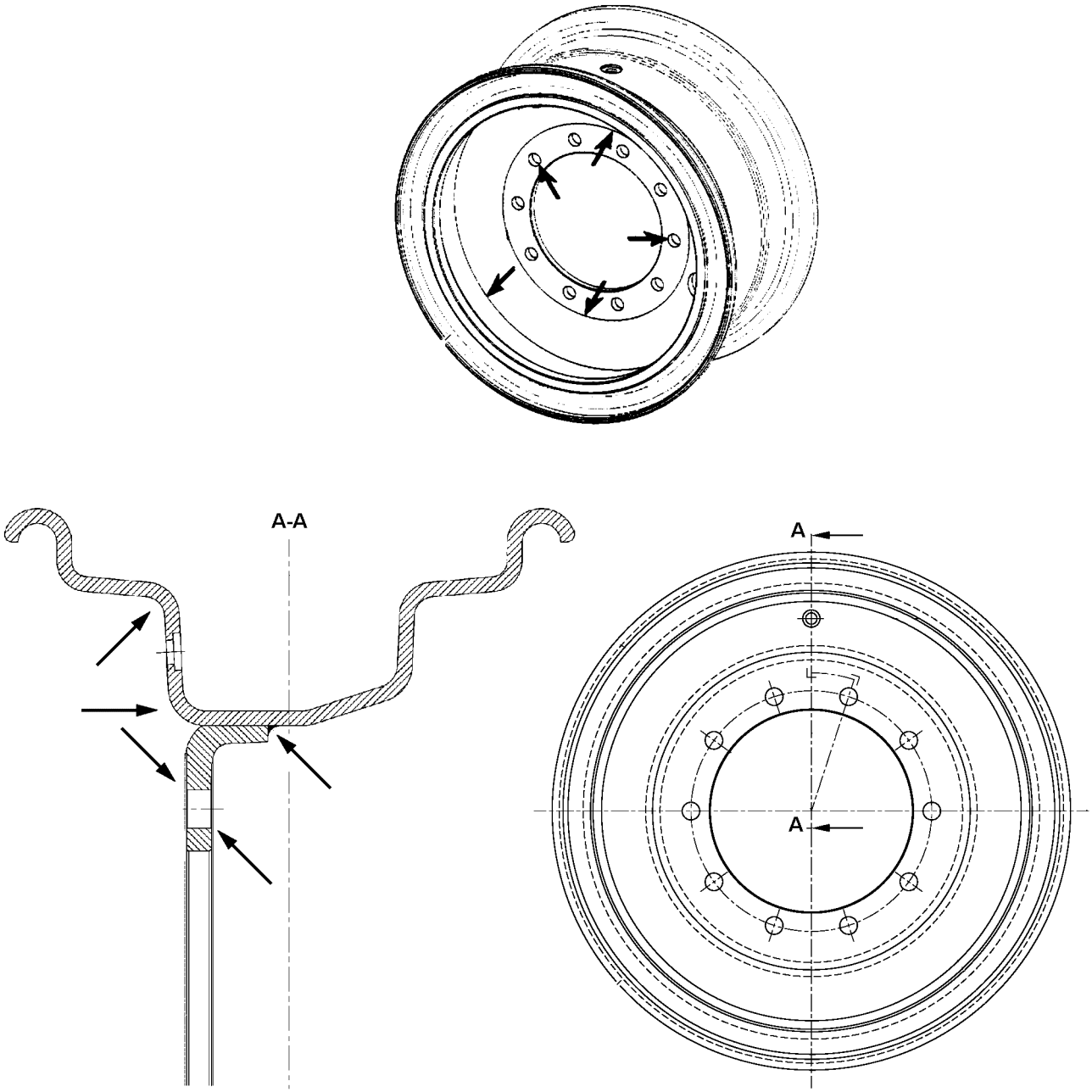

Fig.118052: Example for 1-part disk wheel

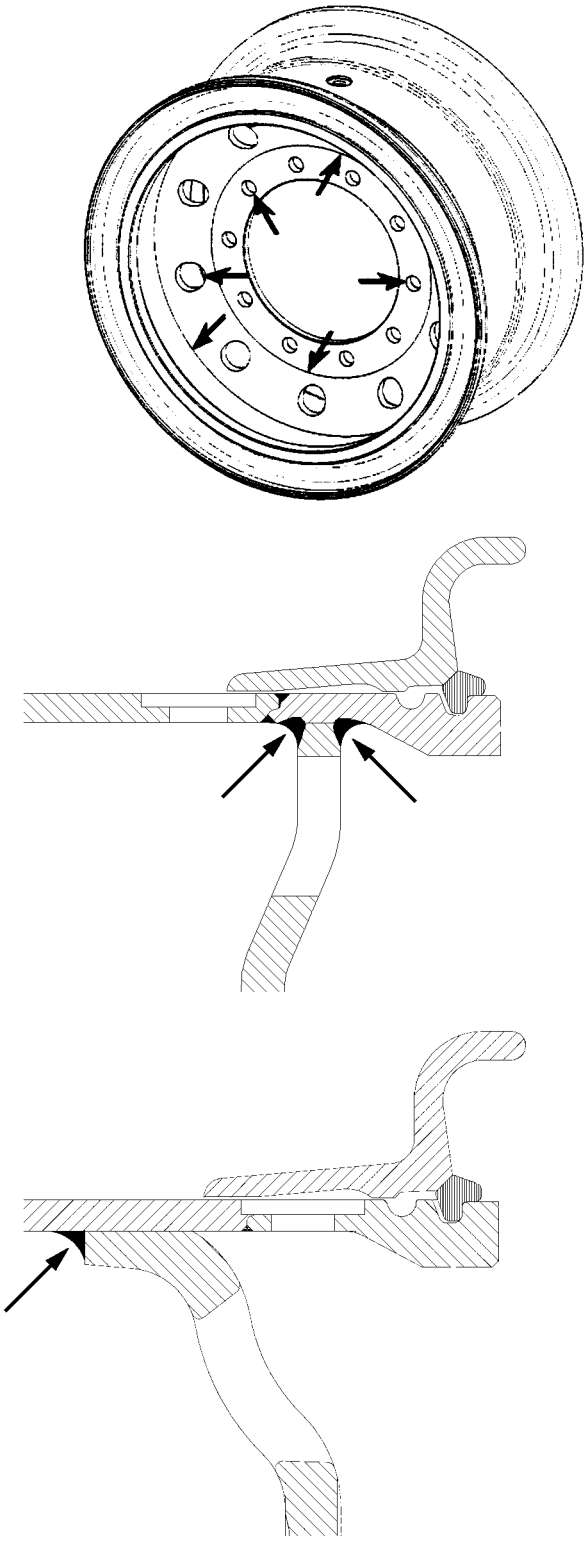

Fig.118053: Example for 3-part disk wheel

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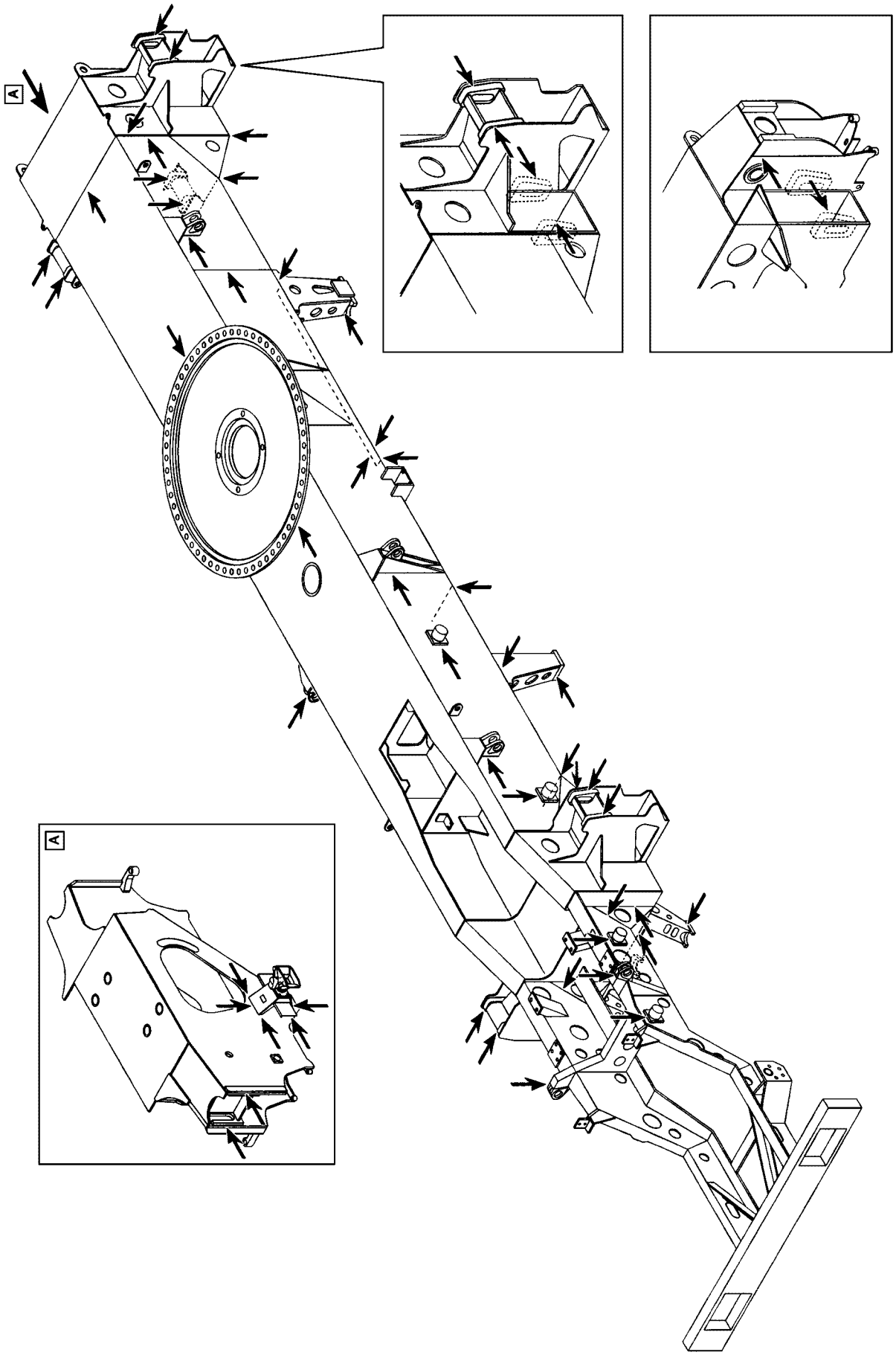

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Fig.185046: Example for vehicle frames

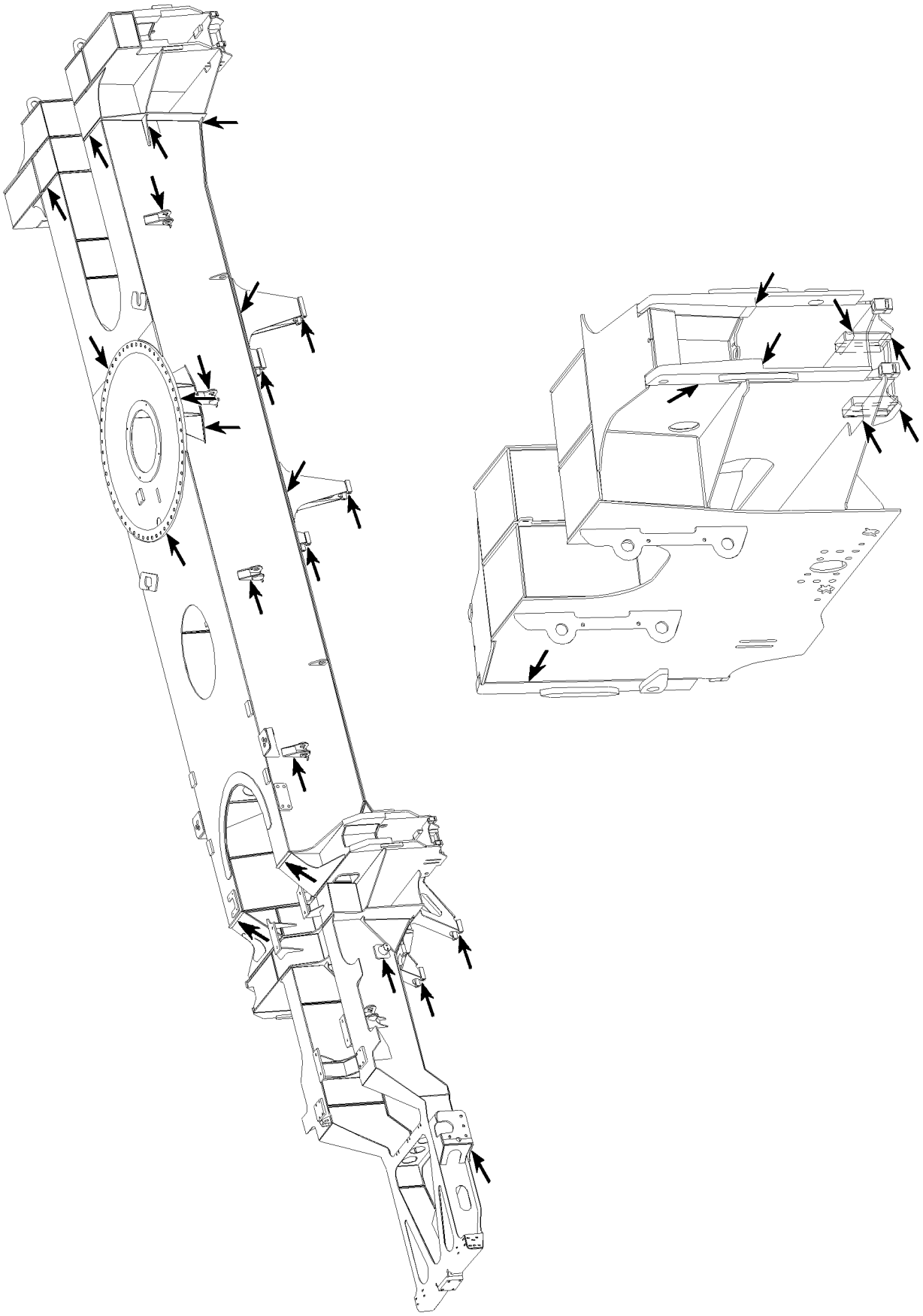

Fig.105702: Example for vehicle frames

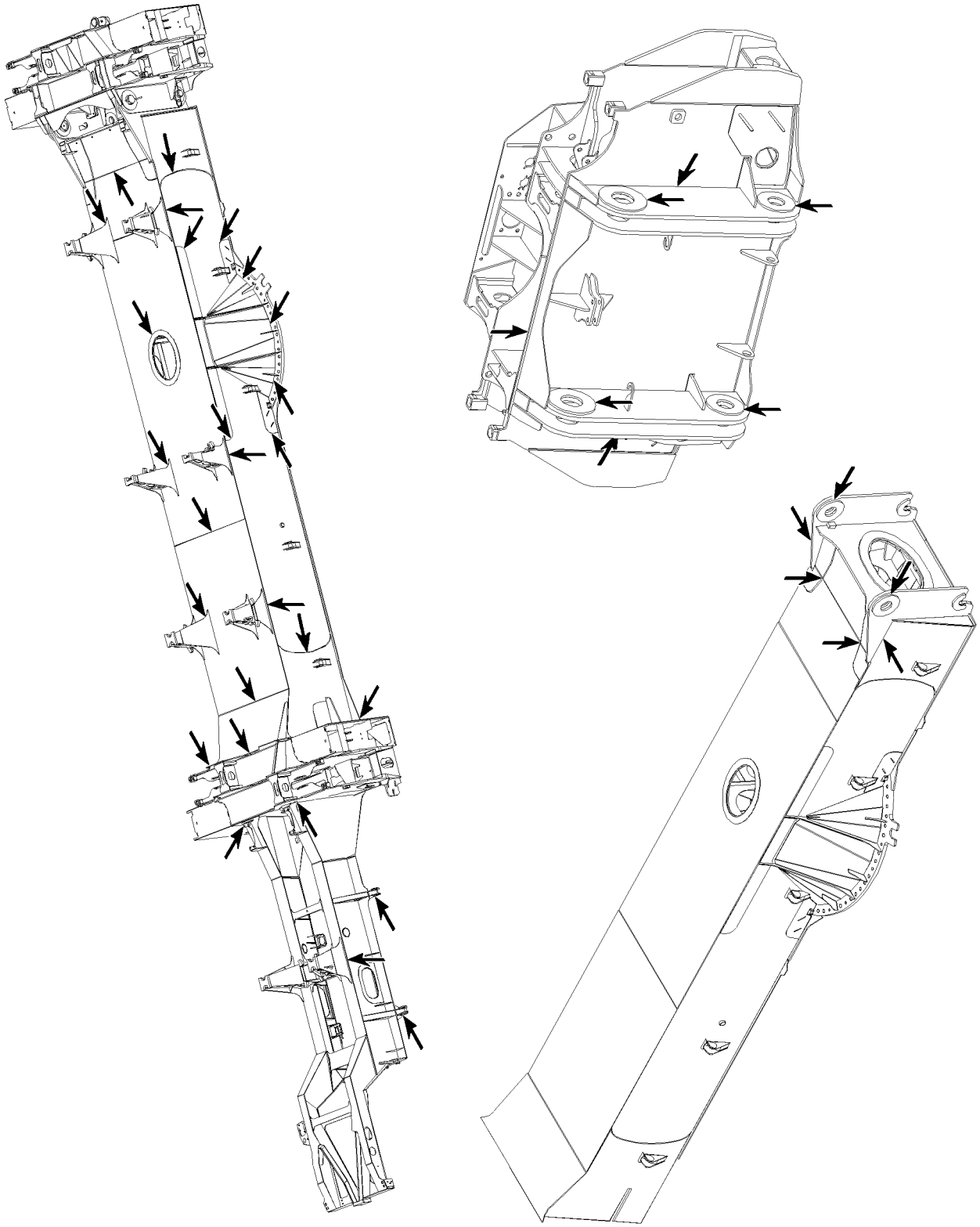

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Fig.105719: Example for vehicle frames

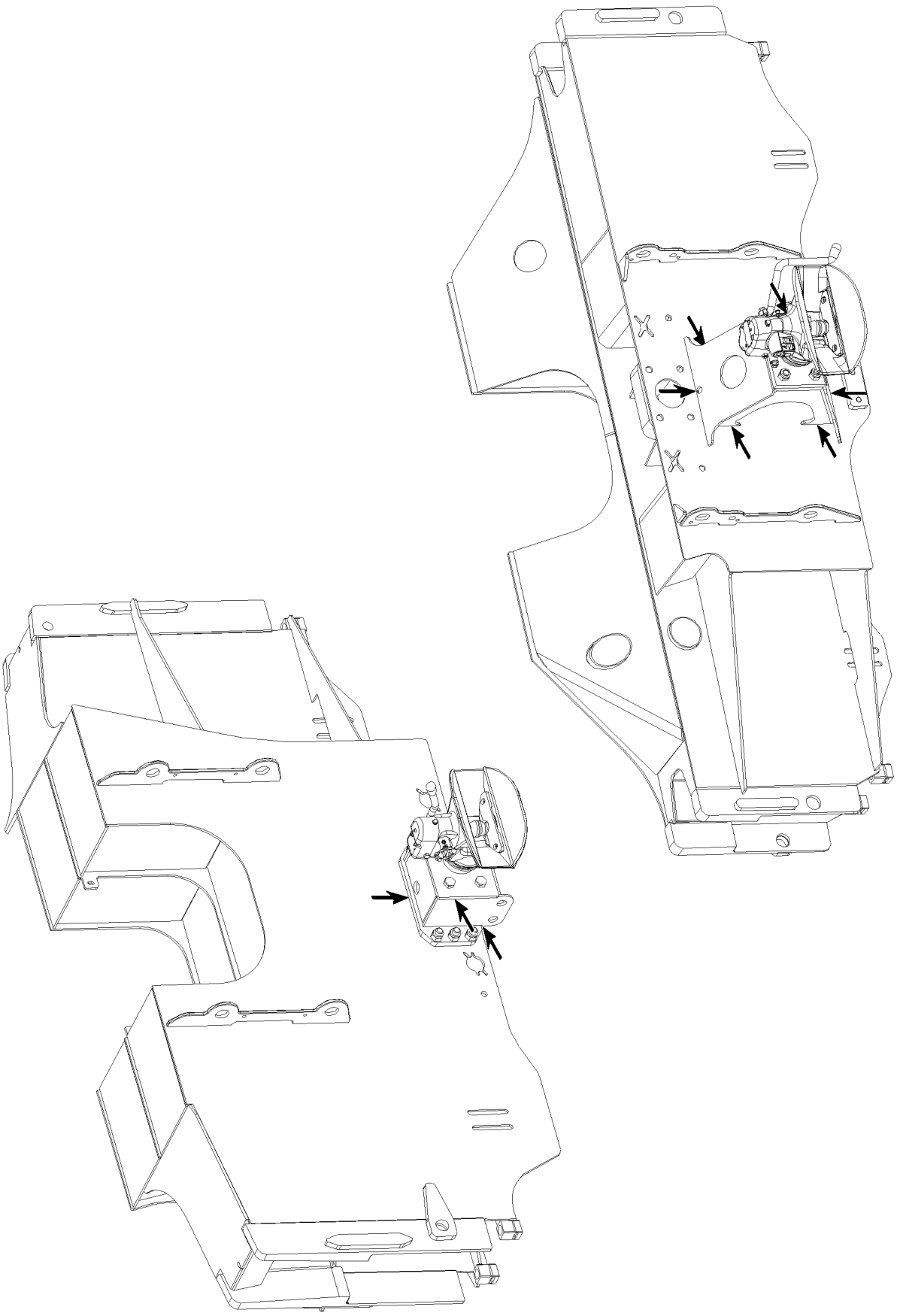

Fig.105687: Example for tow coupling

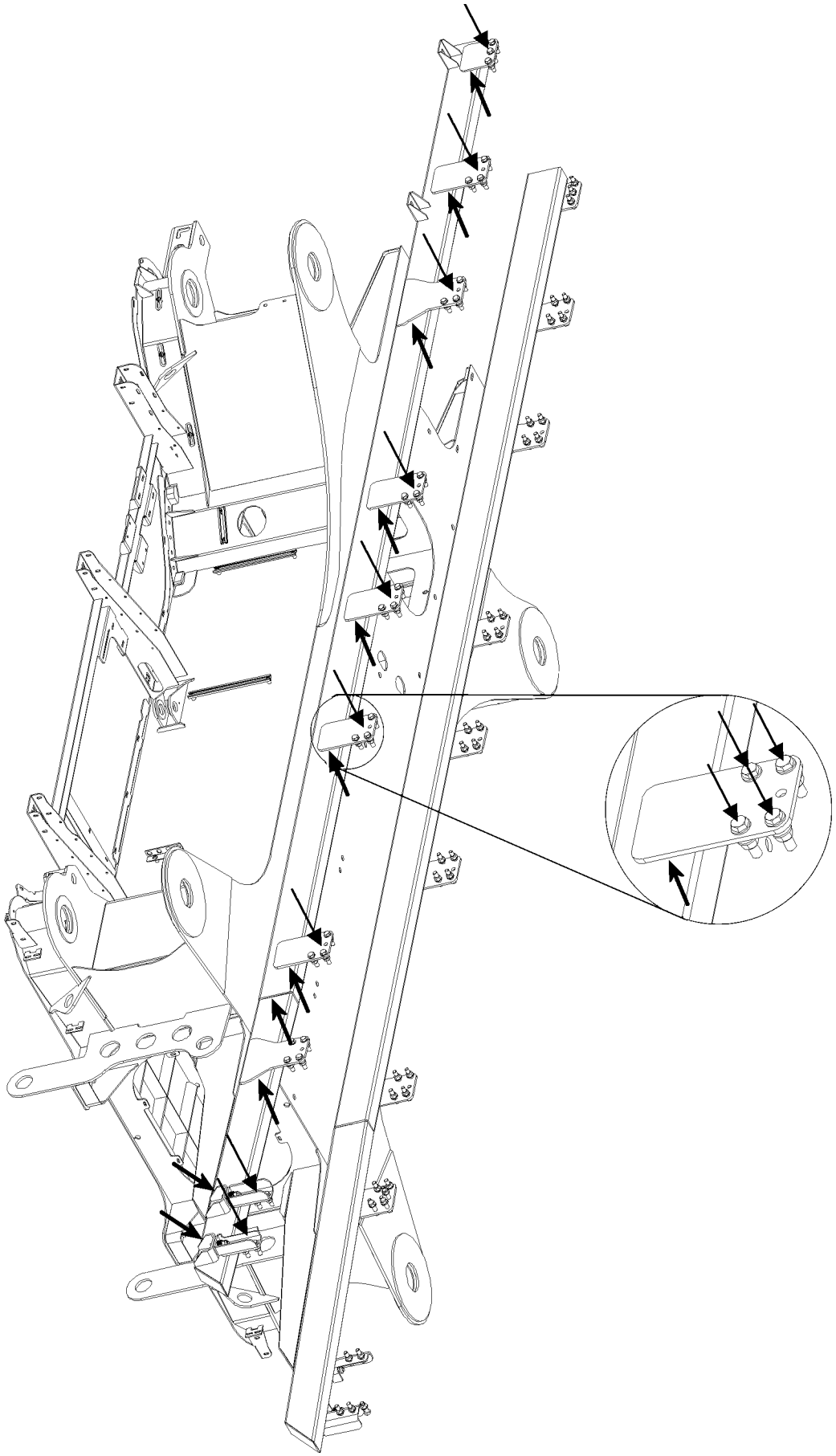

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Fig.113940: Example for intermediate frame

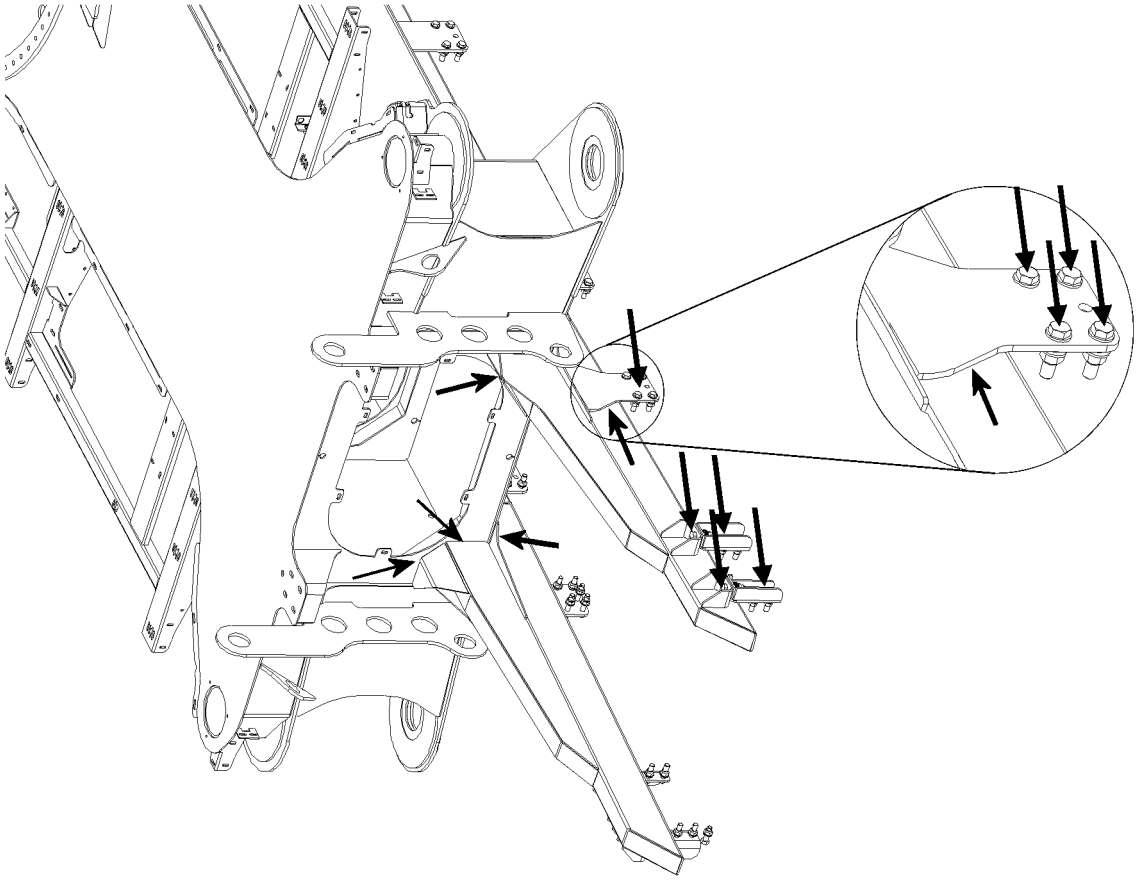

Fig.114000: Example for intermediate frame

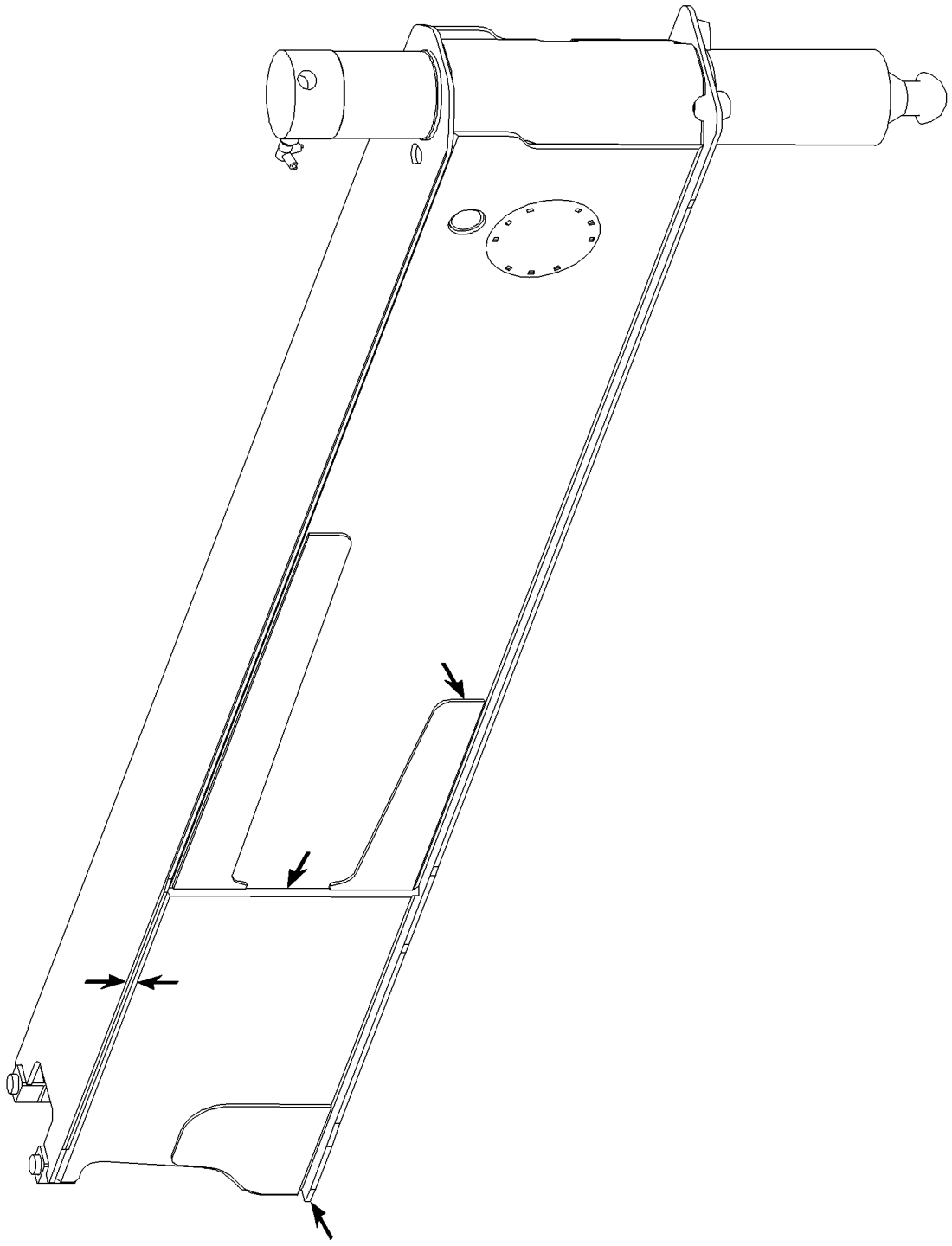

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Fig.105698: Example for sliding beam

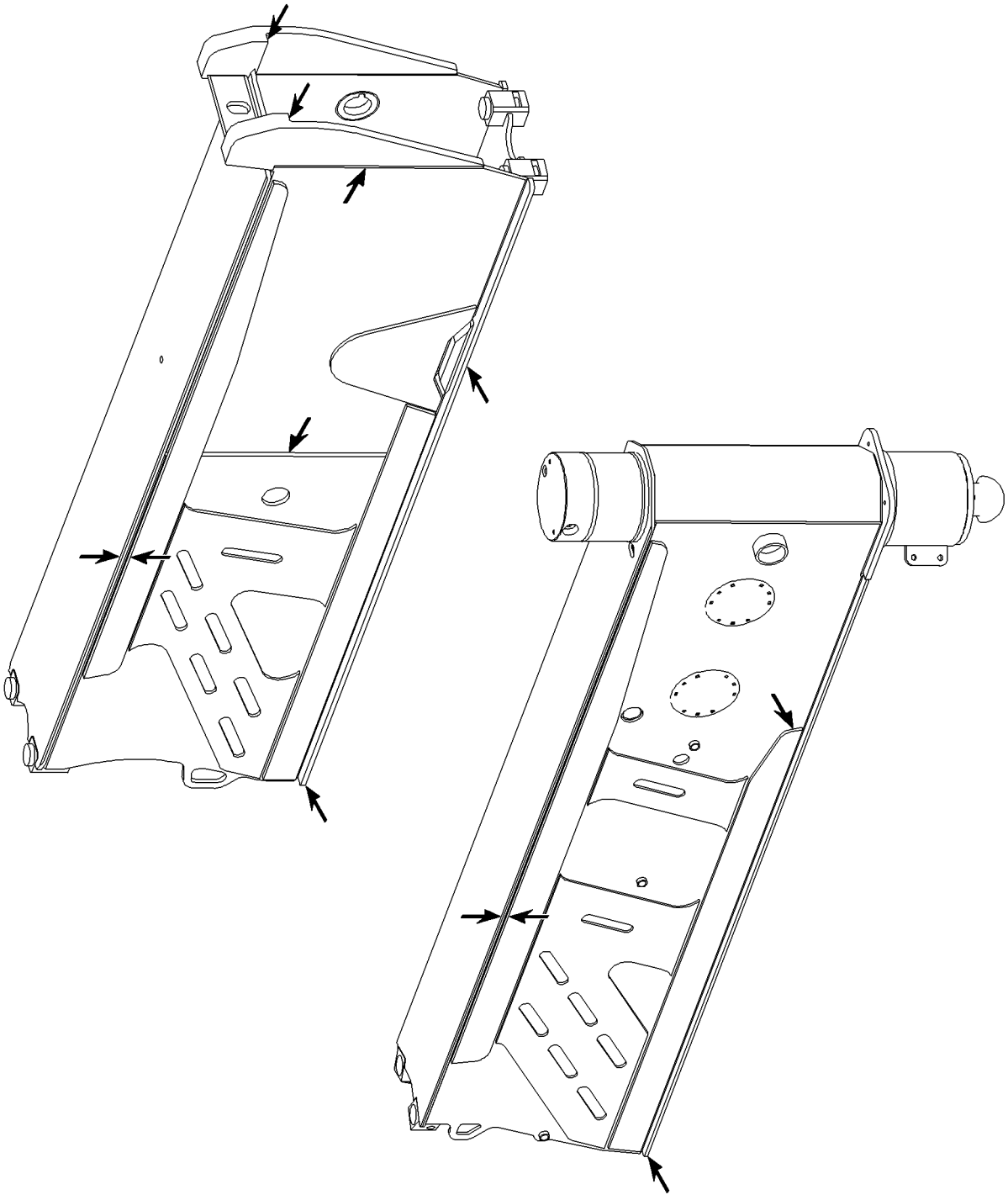

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Fig.105717: Example for sliding beam

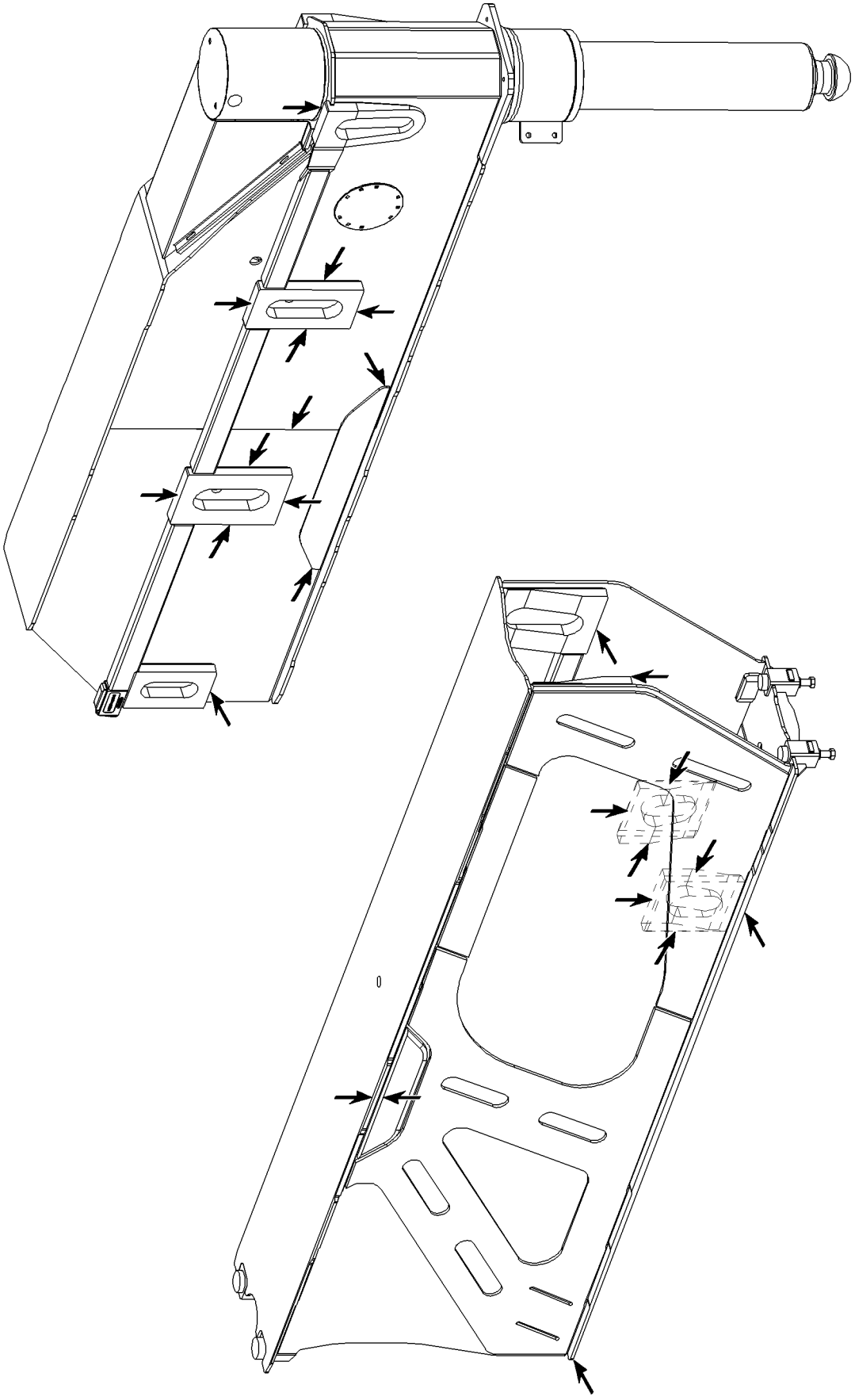

Fig.105718: Example for sliding beam

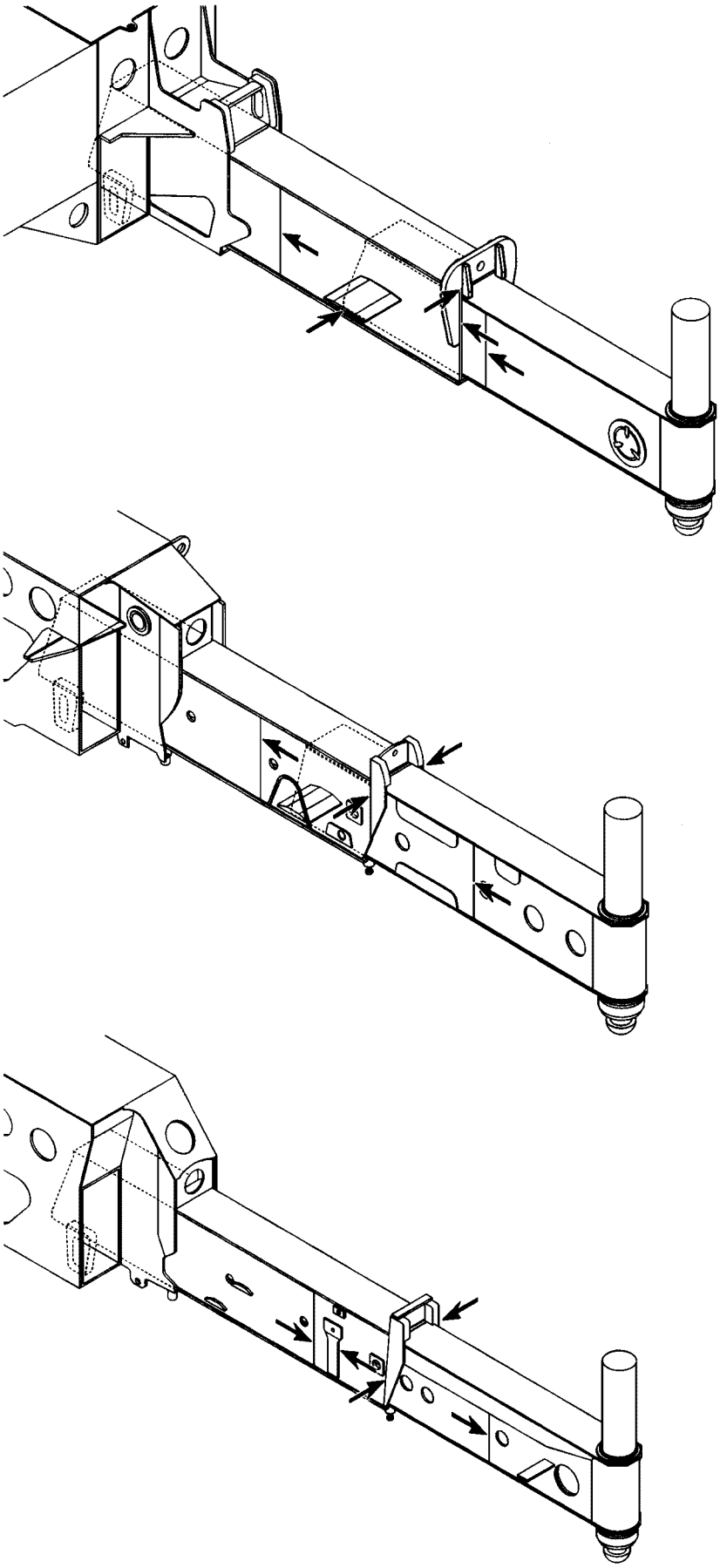

Fig.185047: Example for sliding beam

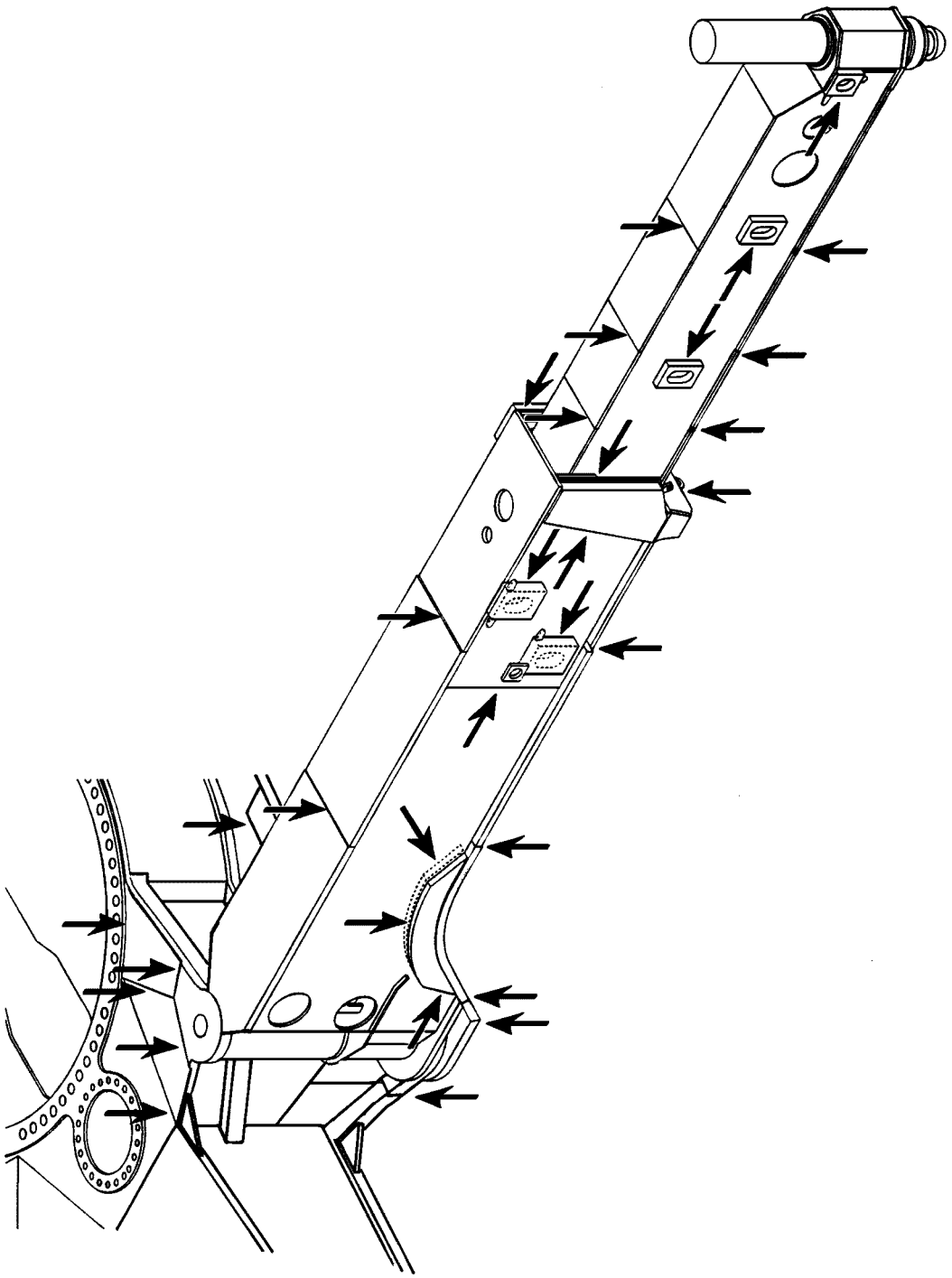

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Fig.185060: Example for swingable sliding beam

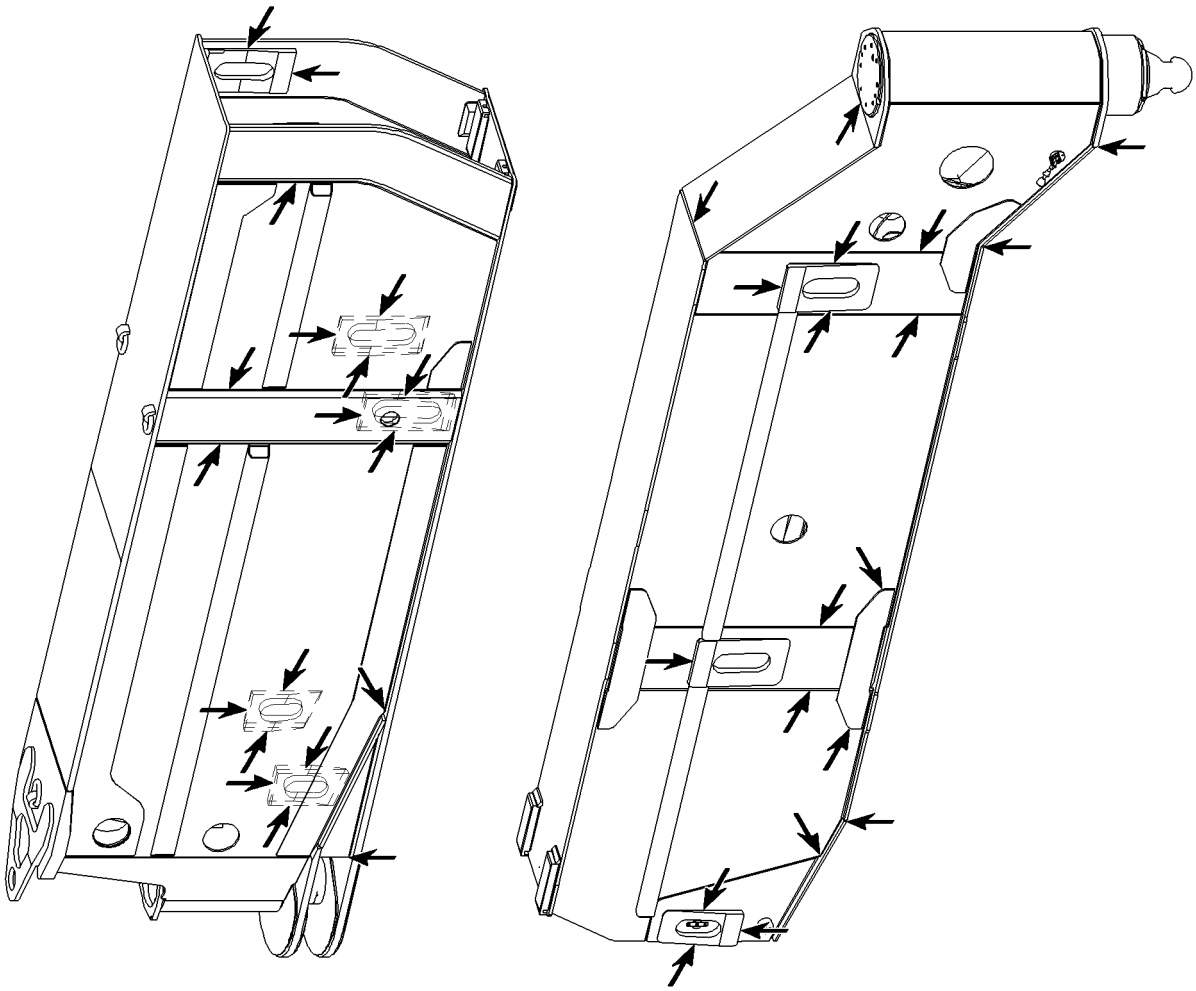

Fig.105690: Example for swingable sliding beam

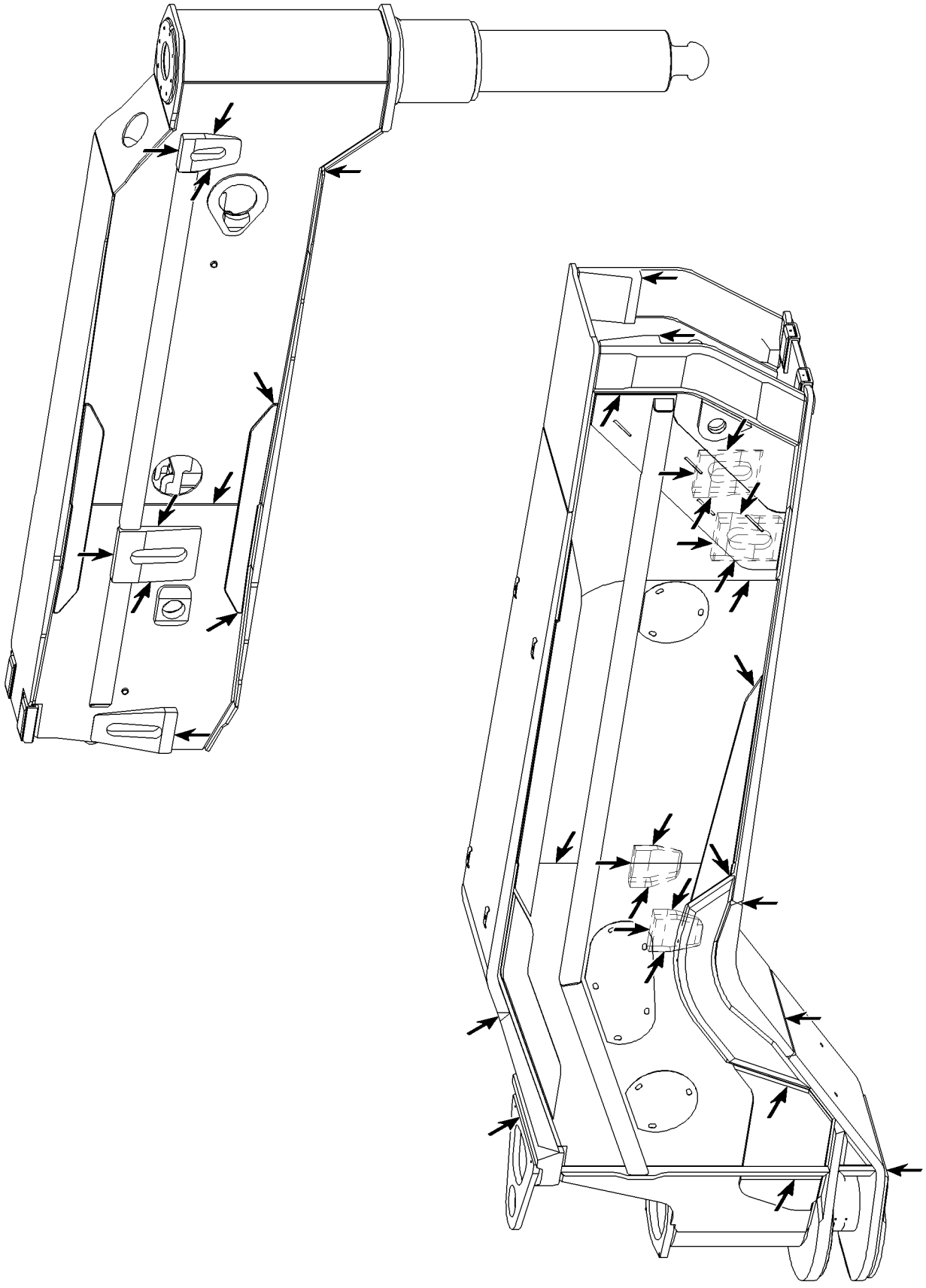

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Fig.105704: Example for swingable sliding beam

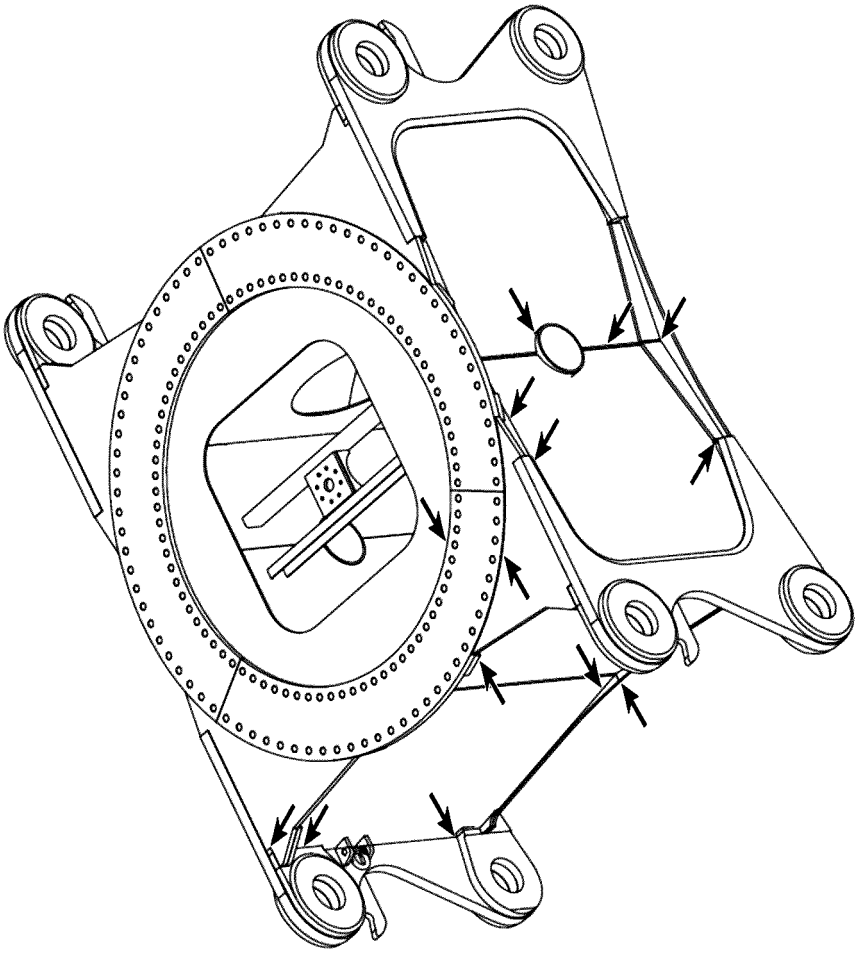

Fig.105725: Example for crawler center section

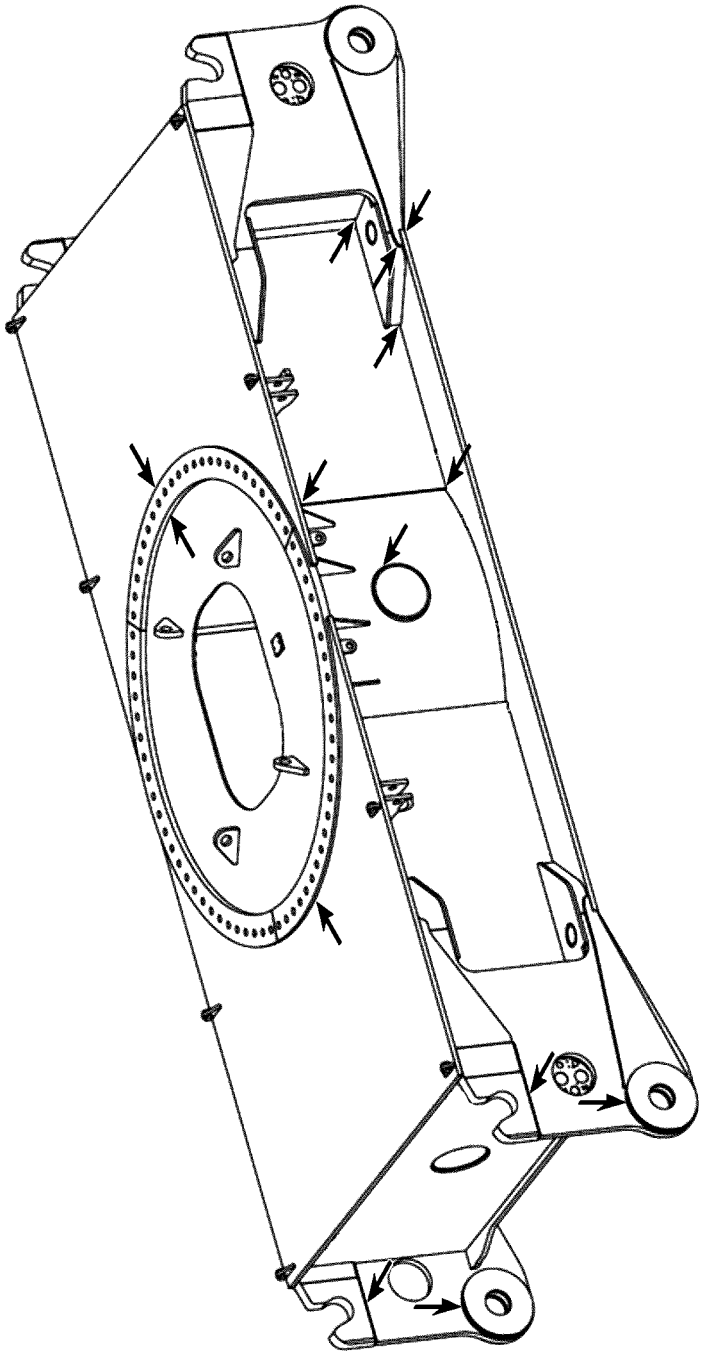

Fig.105726: Example for crawler center section

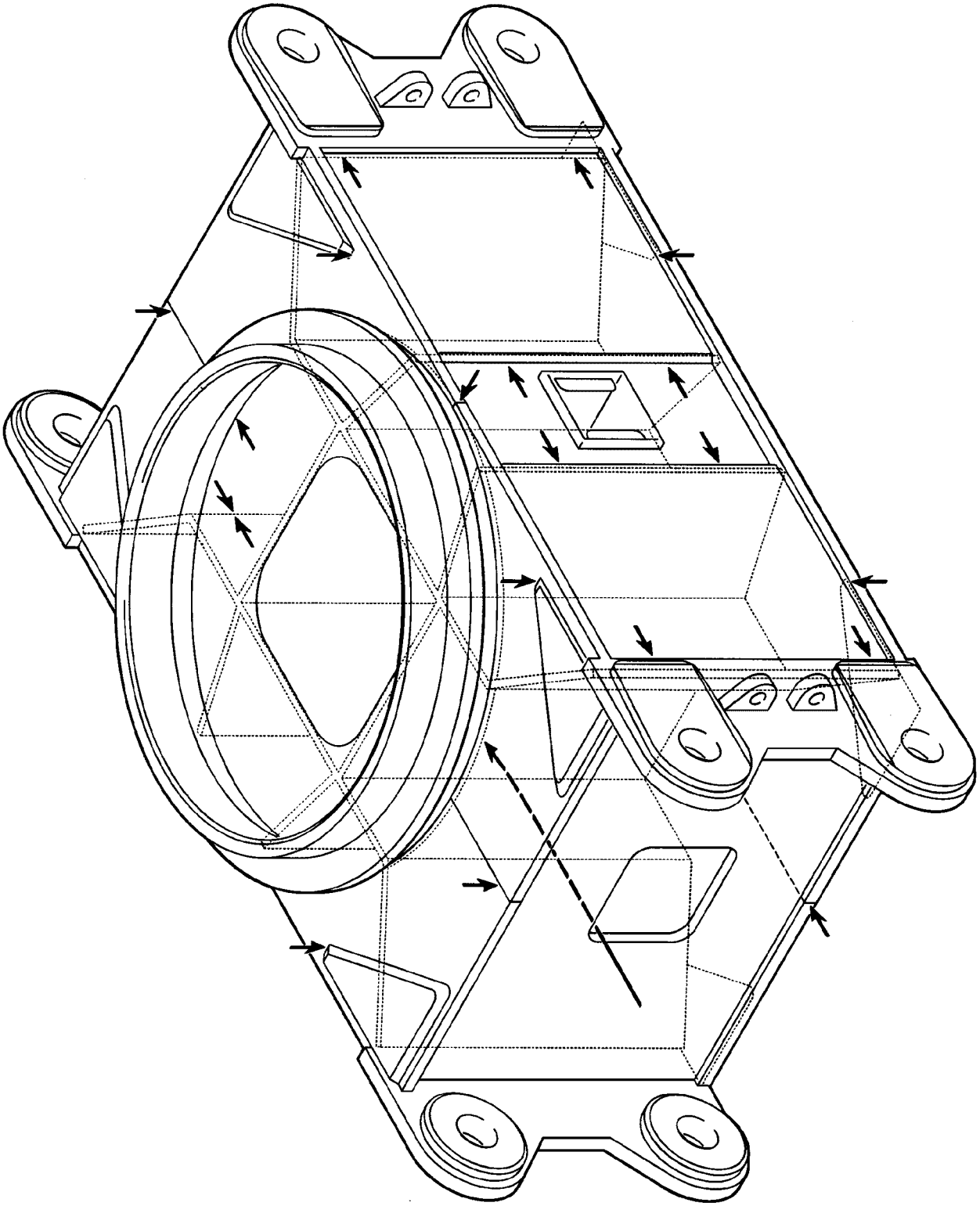

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Fig.187347: Example for crawler center section

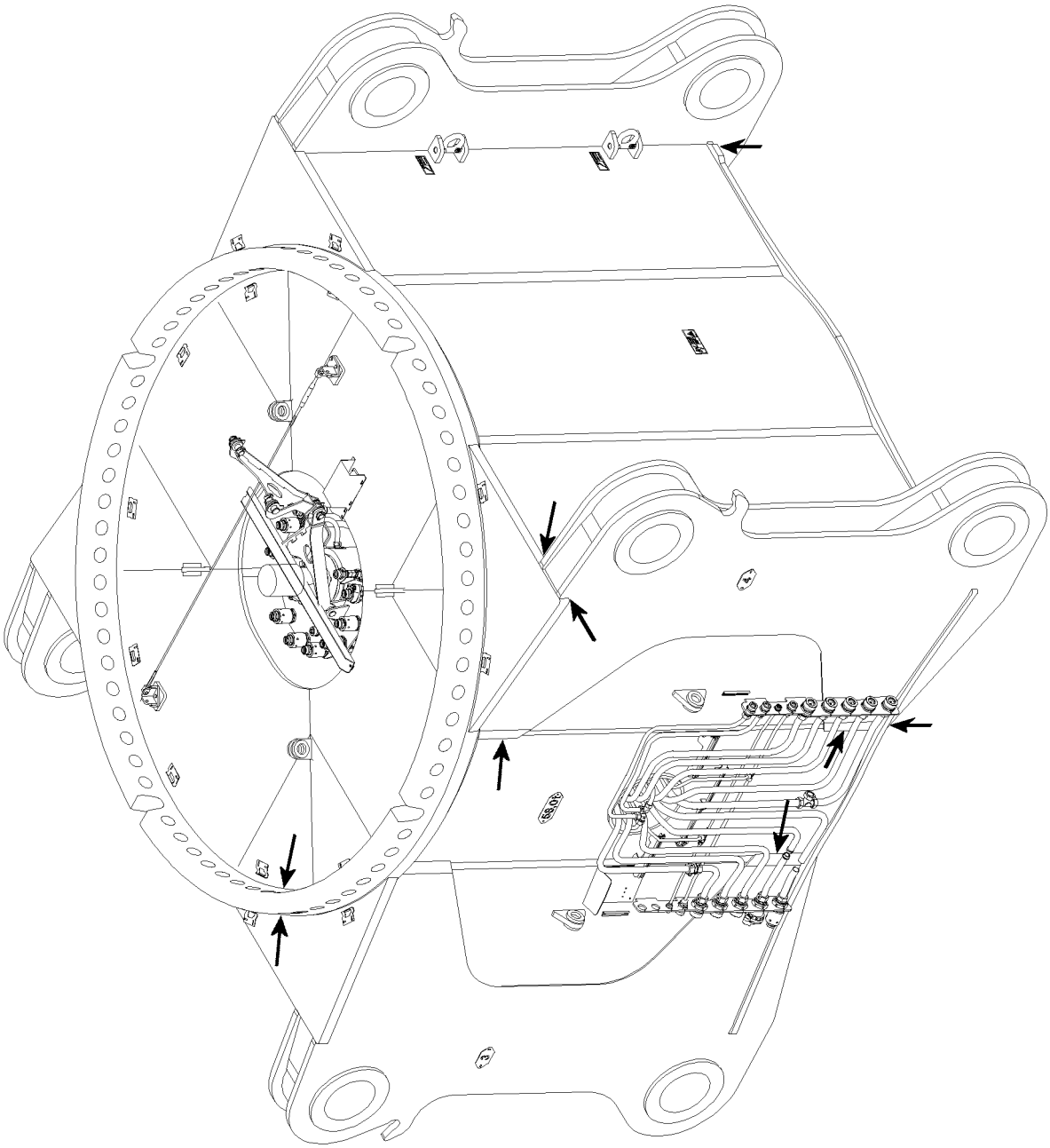

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Fig.115920: Example for crawler center section

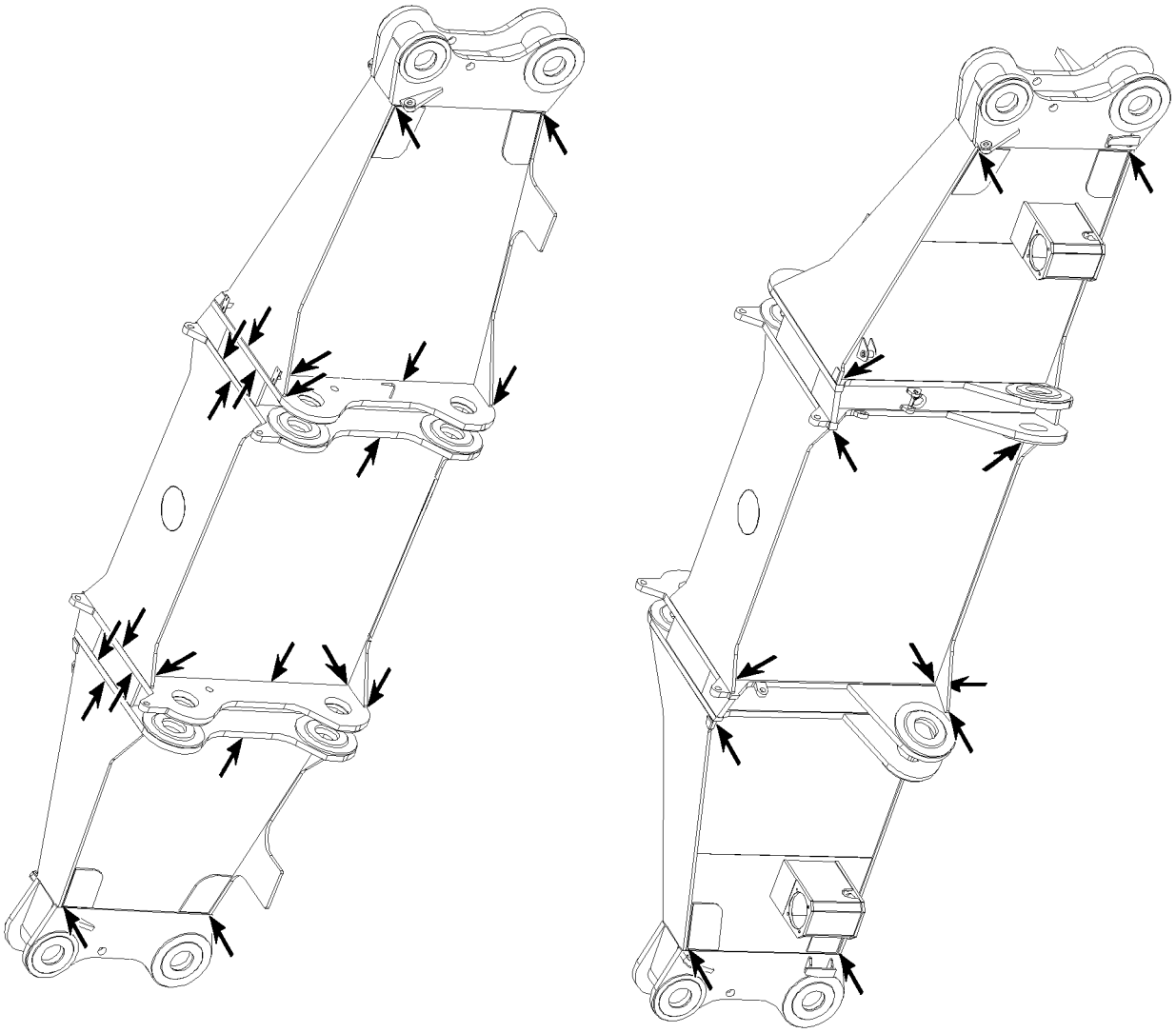

Fig.105727: Example for cross carrier

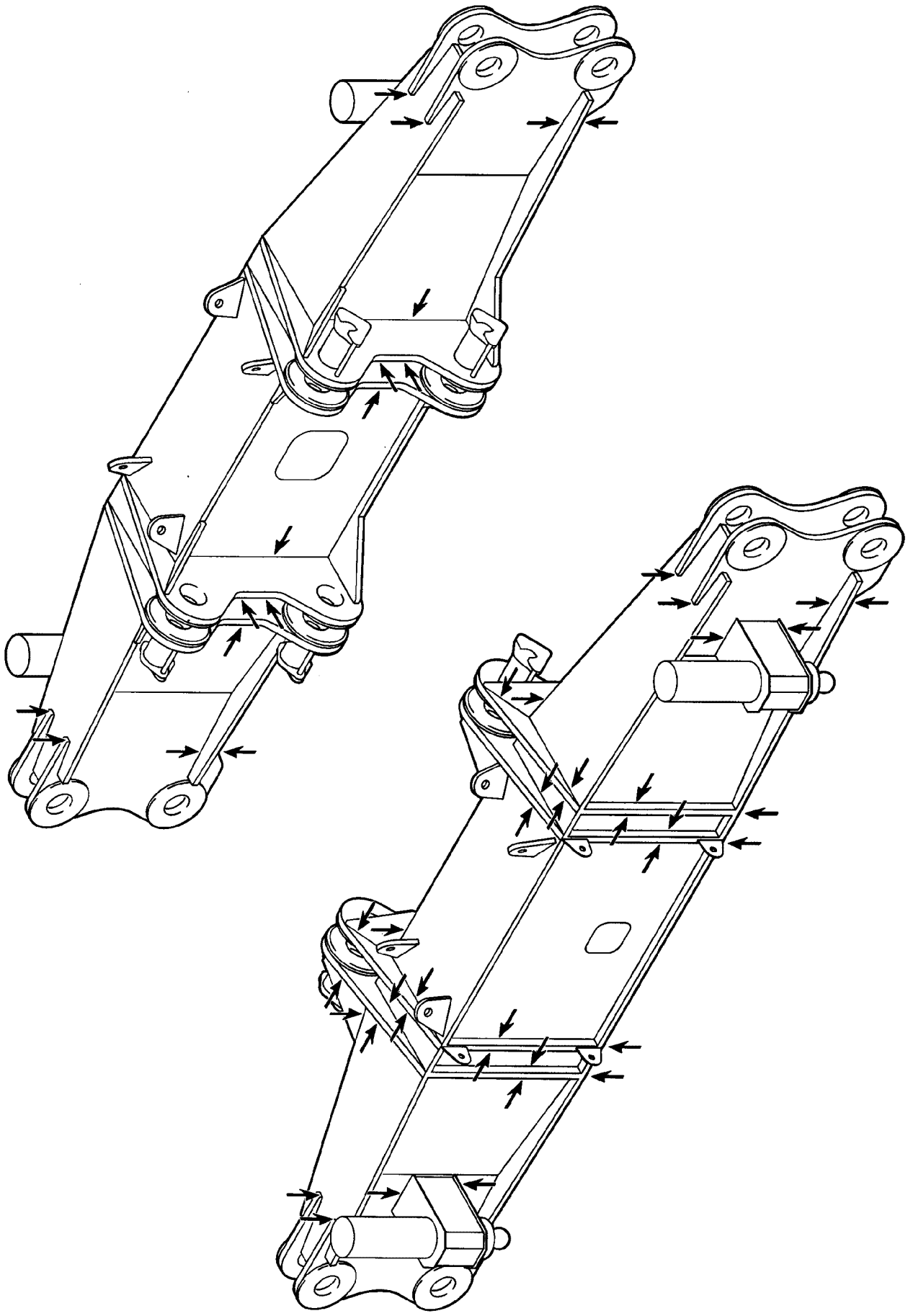

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Fig.187348: Example for cross carrier

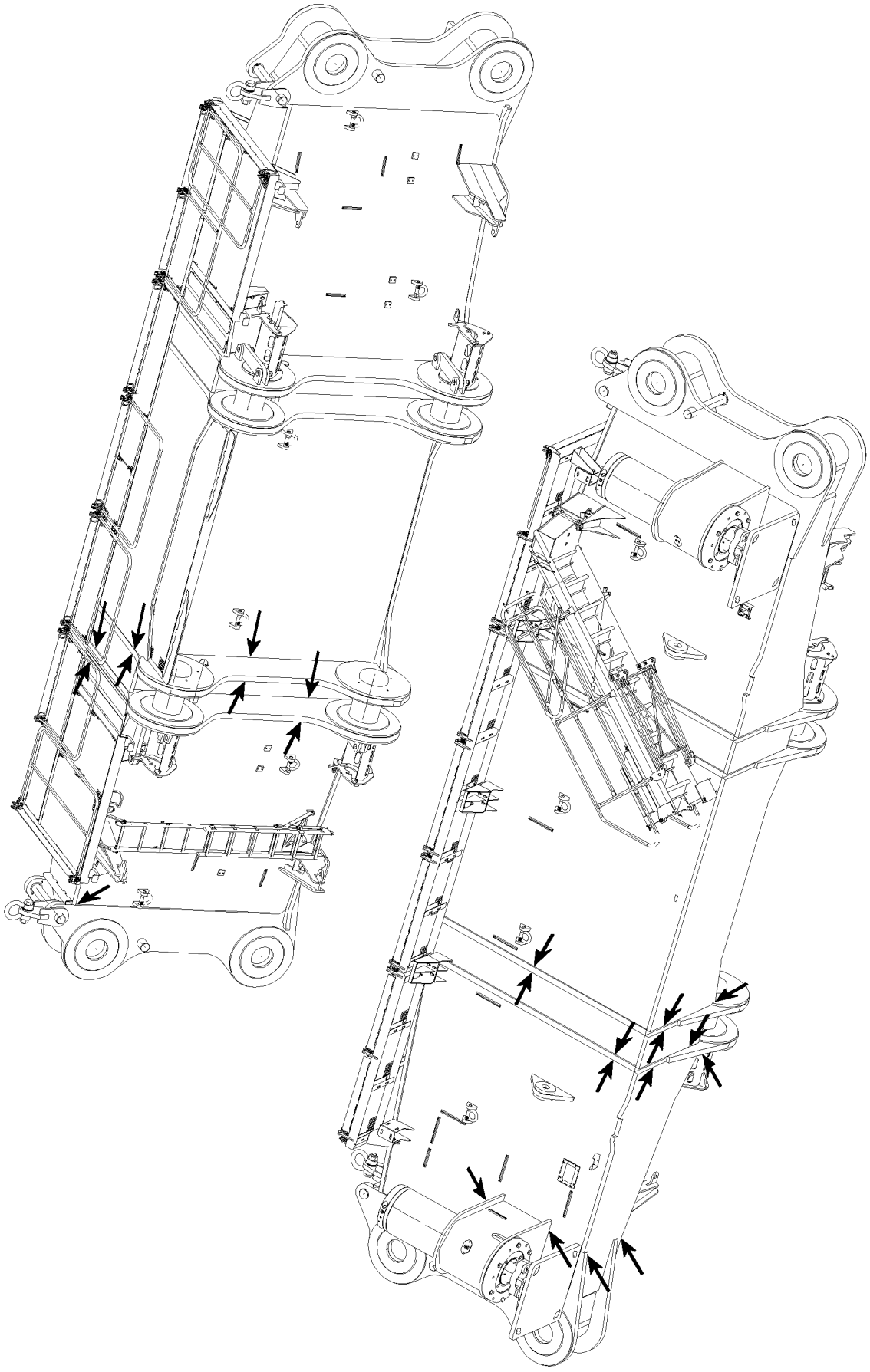

Fig.115921: Example for cross carrier

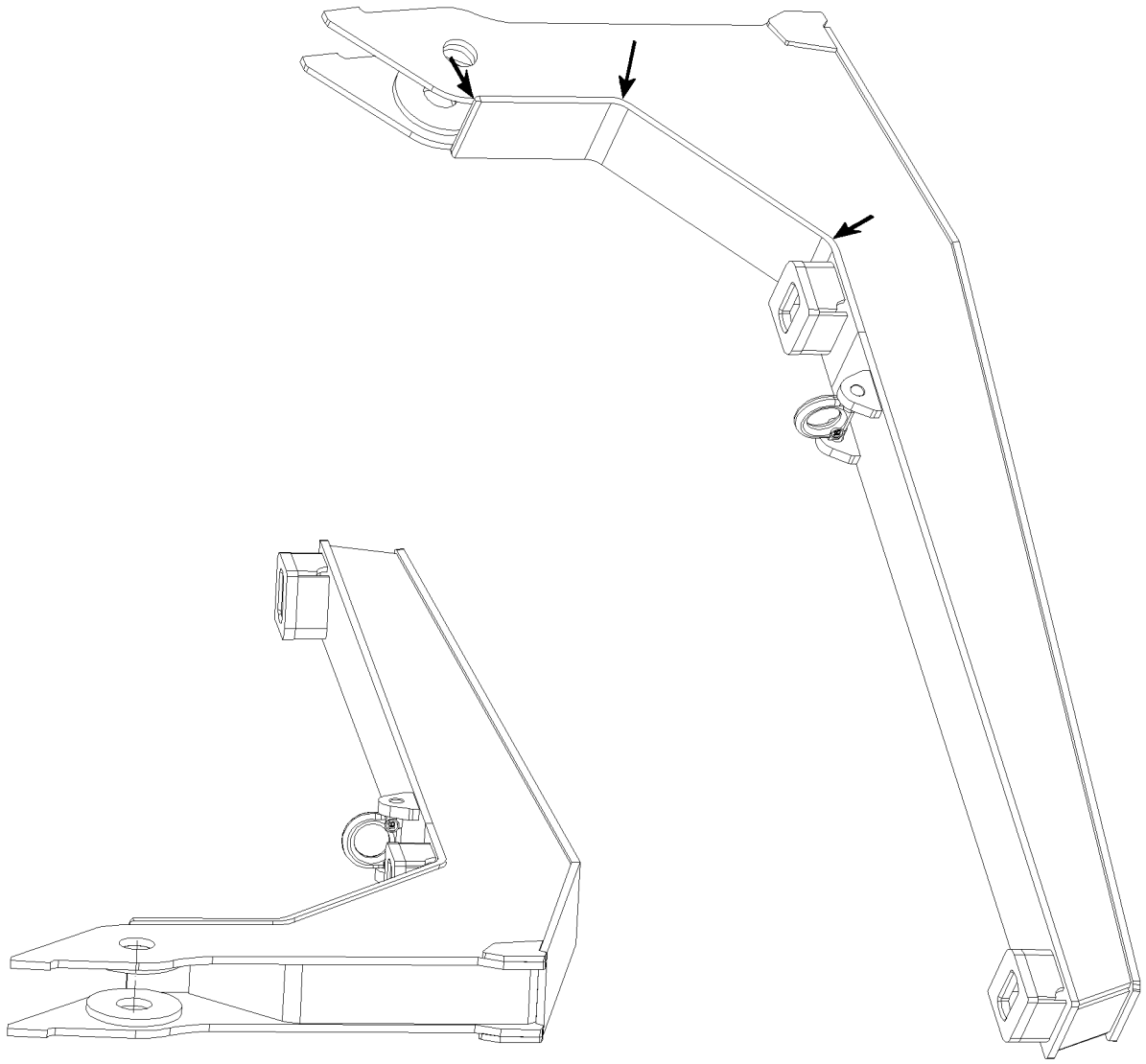

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Fig.115919: Example for carrier for central ballast

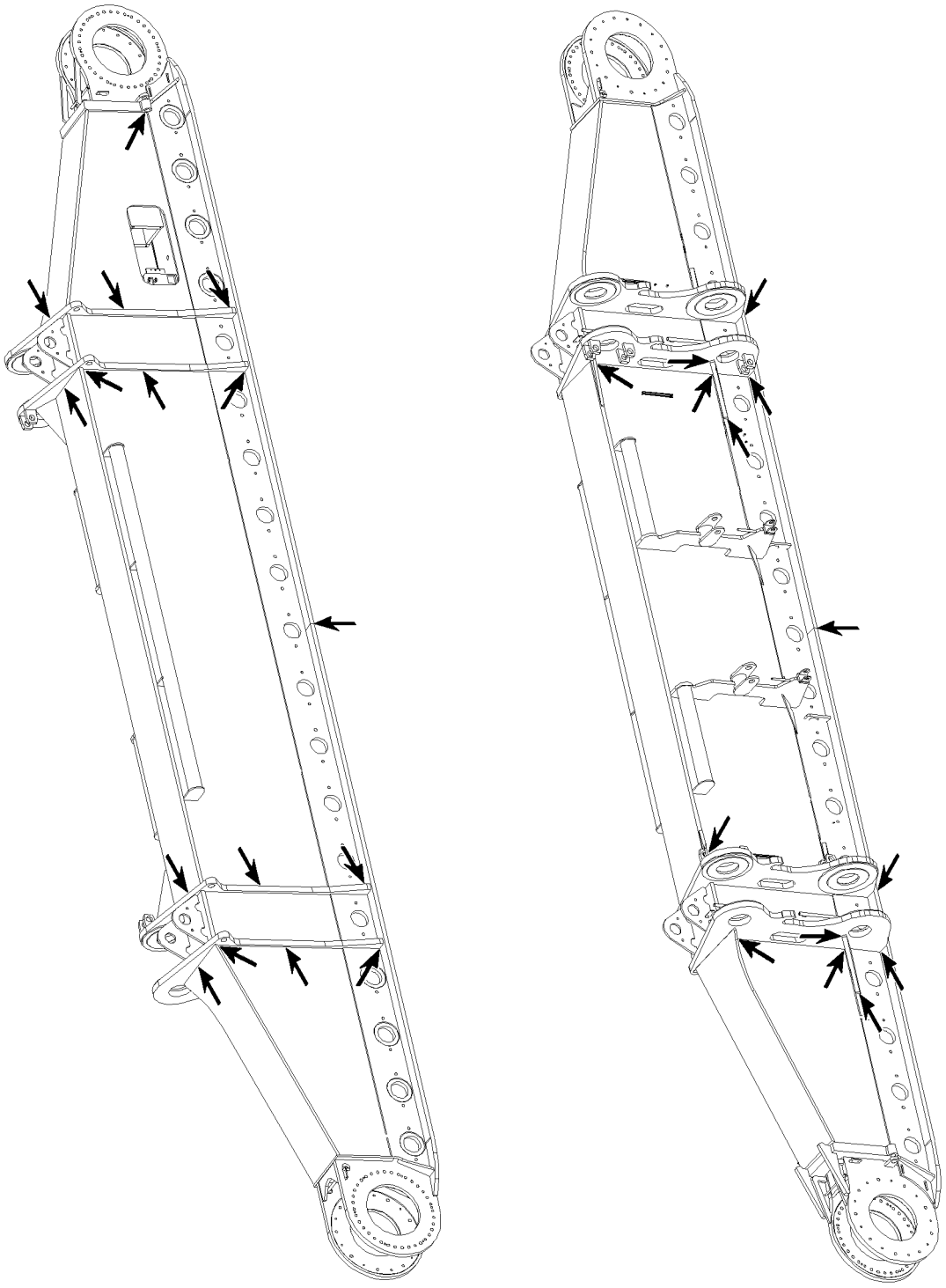

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Fig.105728: Example for crawler carrier

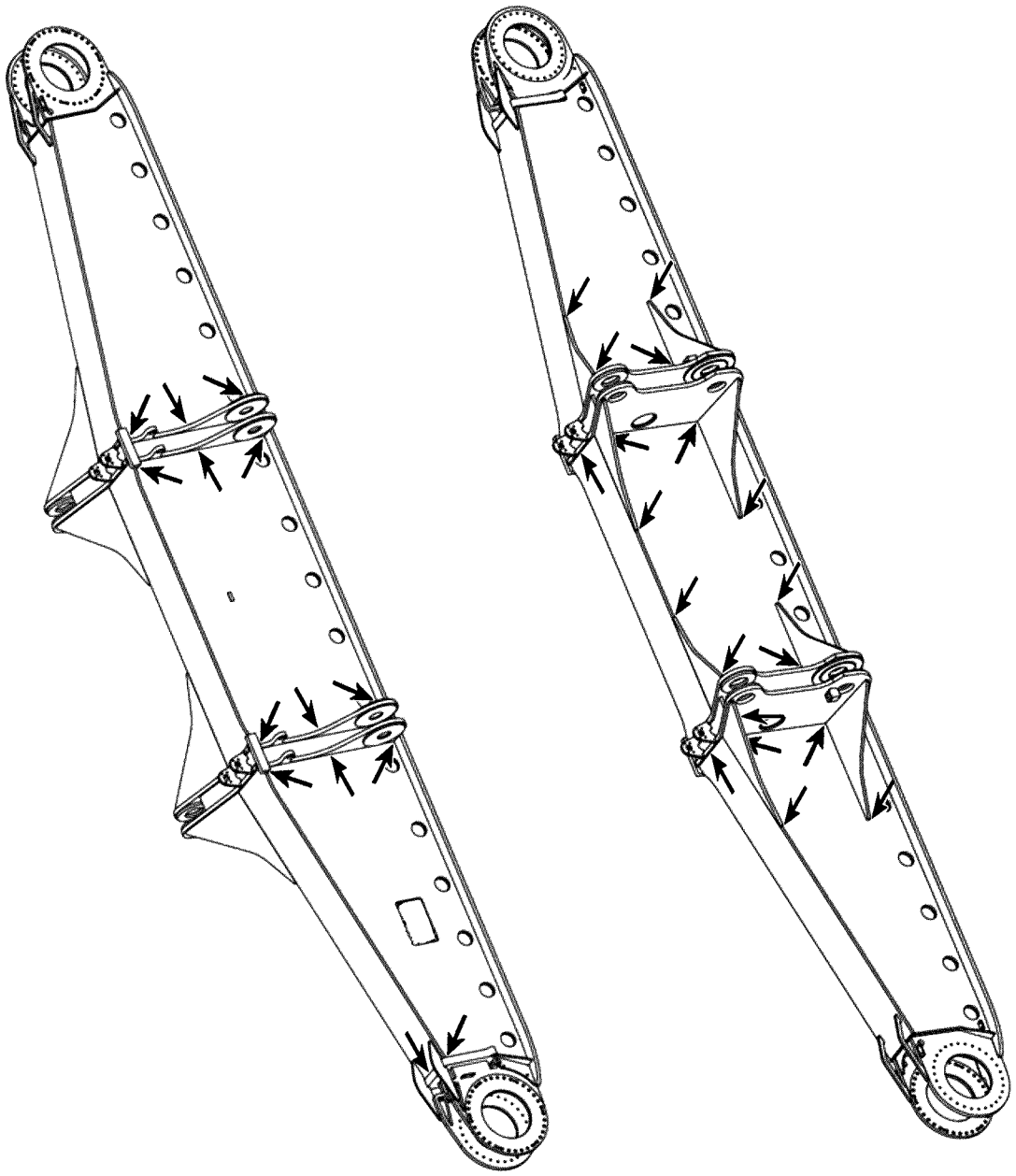

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Fig.105729: Example for crawler carrier

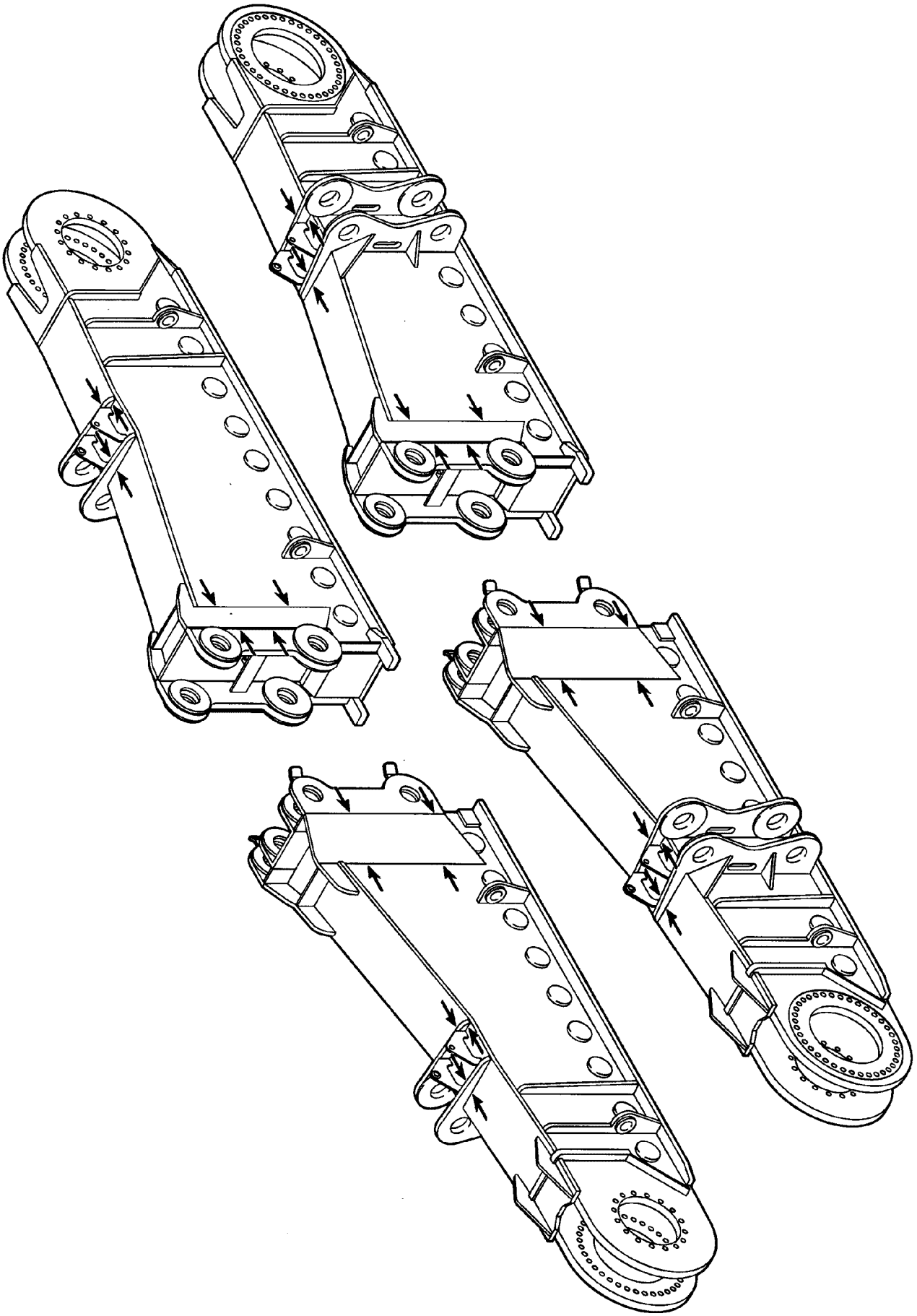

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Fig.187349: Example for crawler carrier

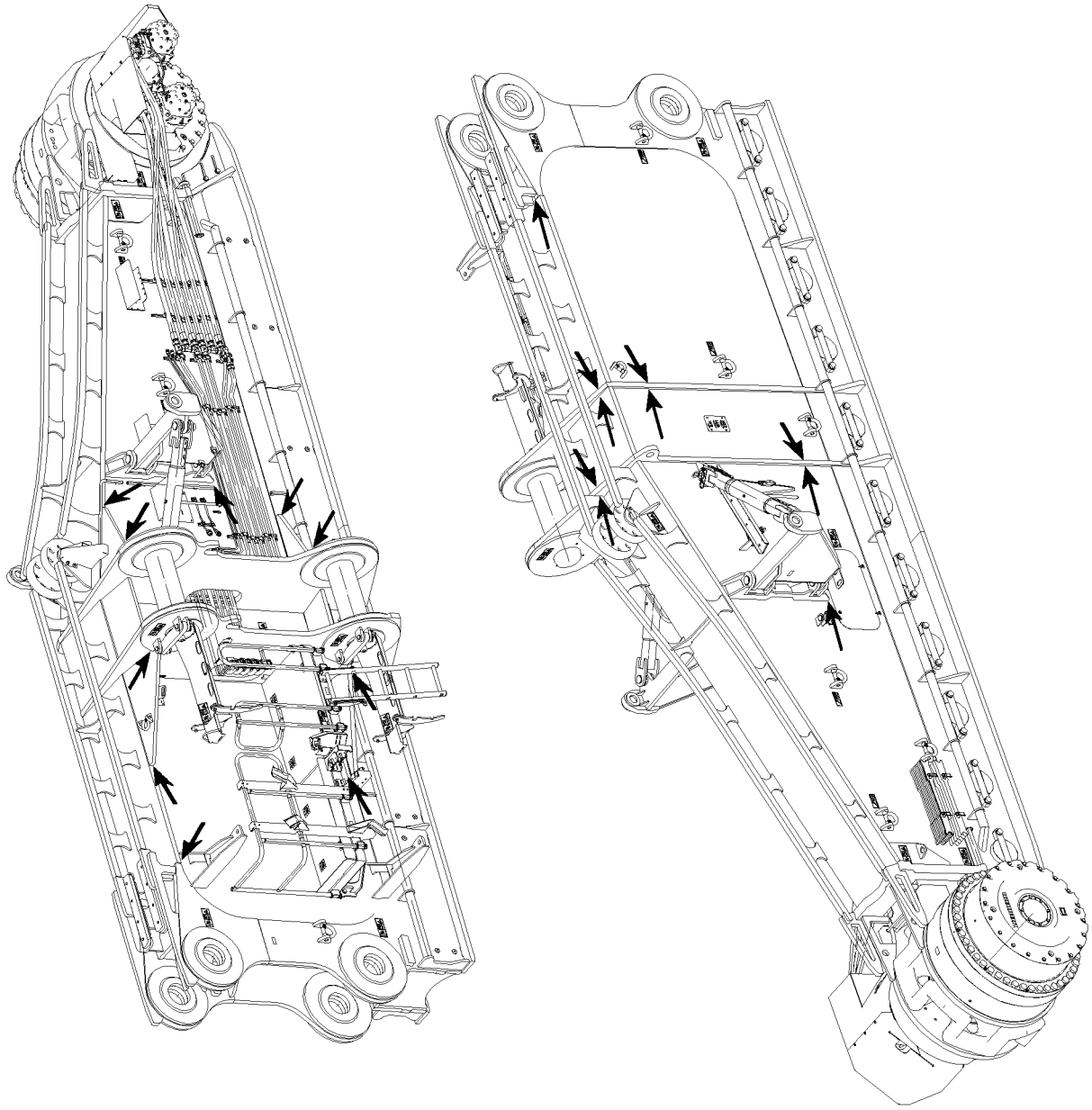

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Fig.115917: Example for crawler carrier

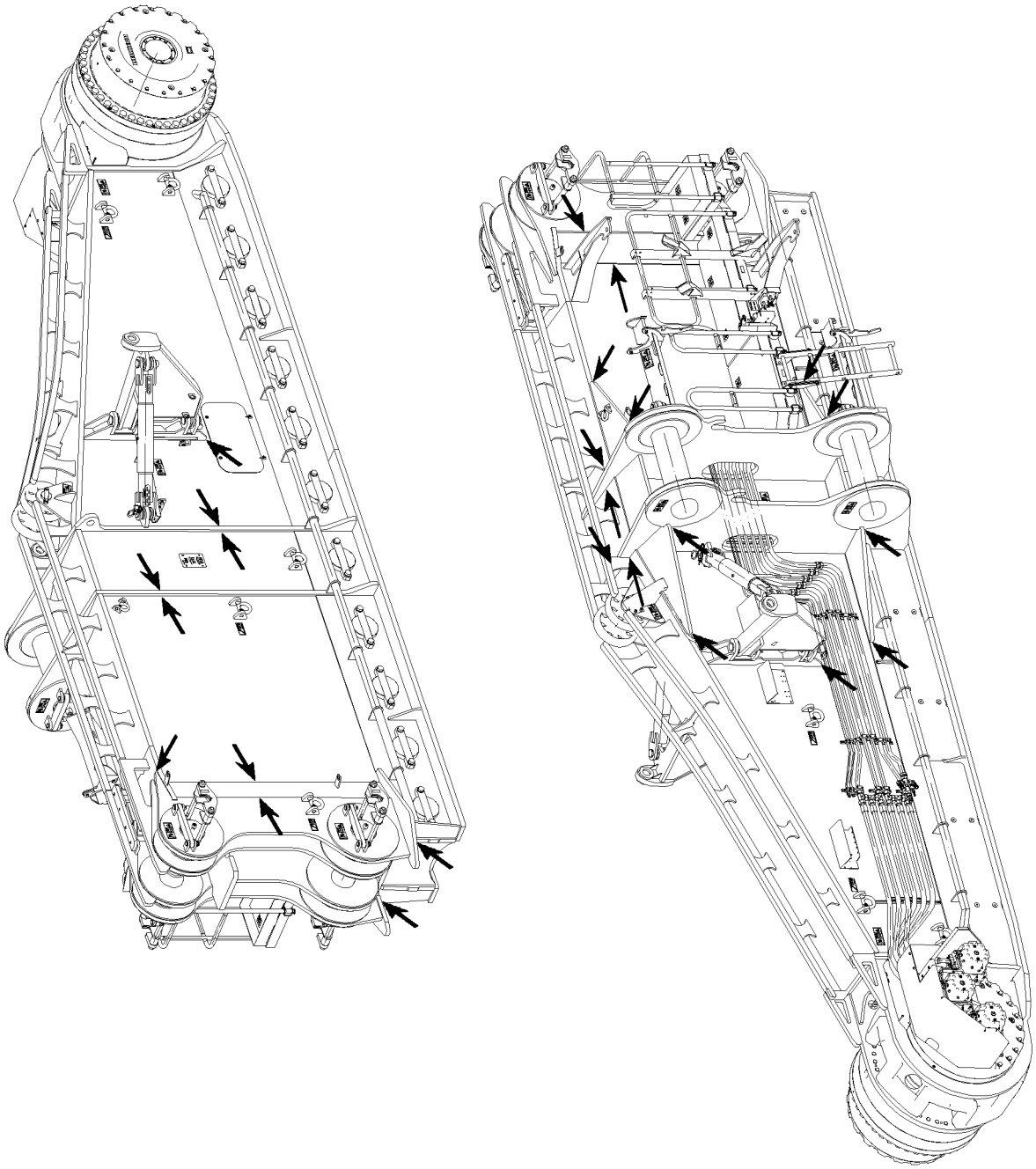

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Fig.115918: Example for crawler carrier

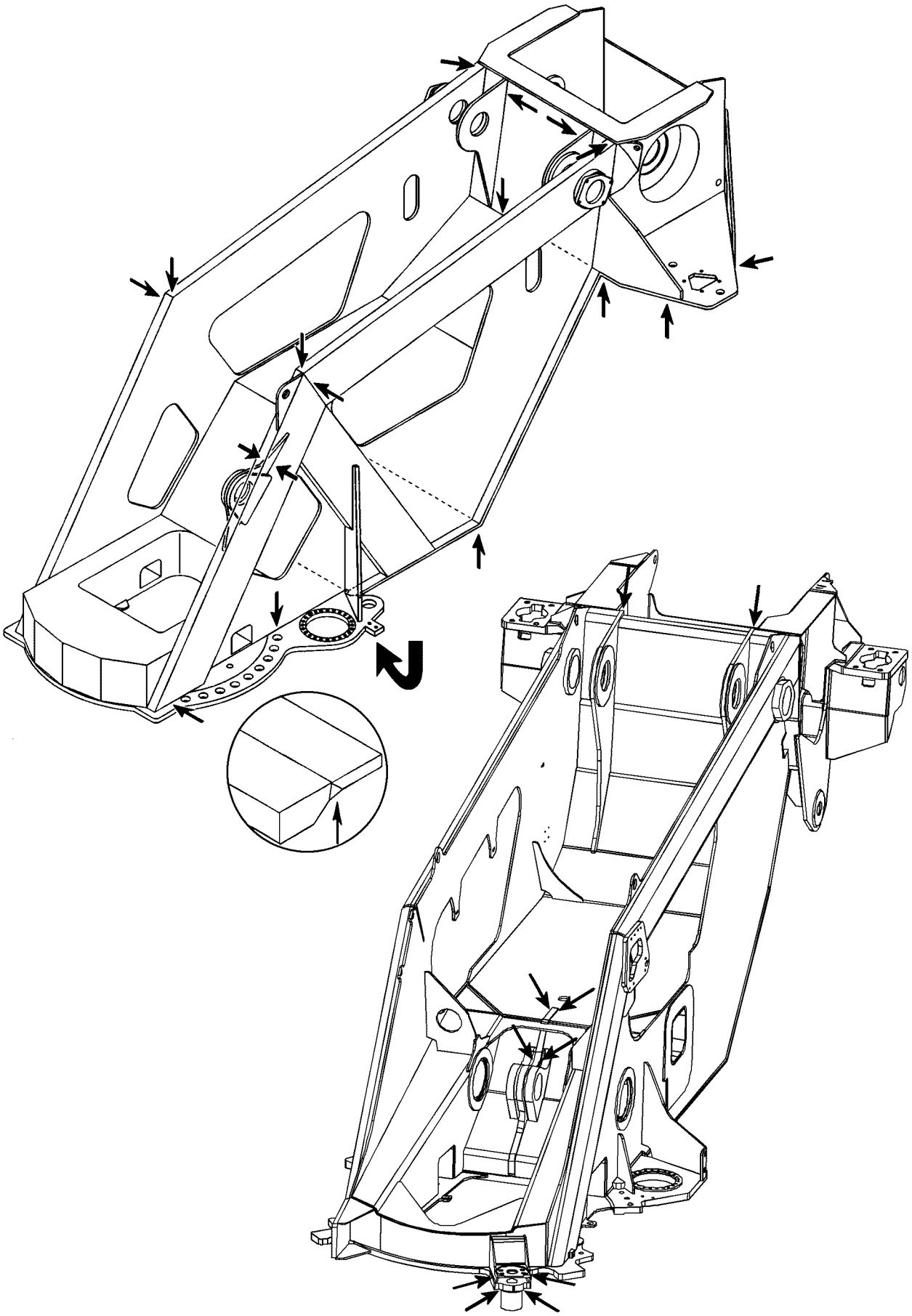

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Fig.185048: Example for turntable frame

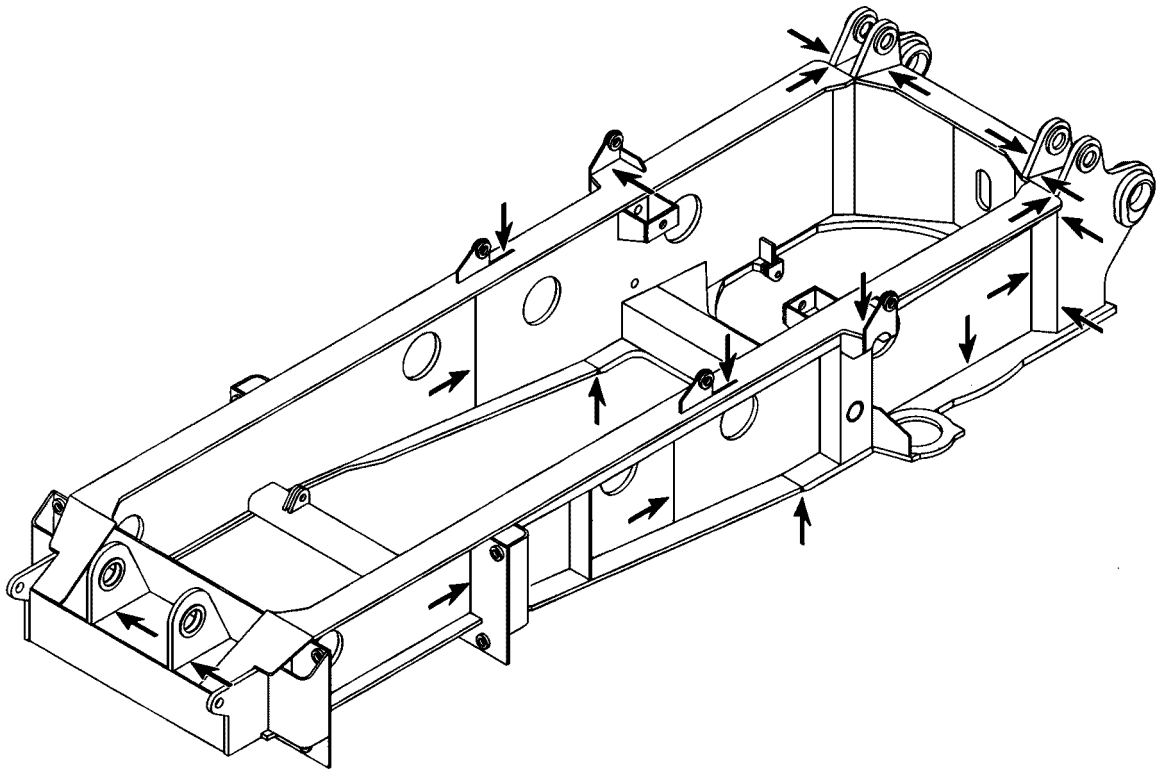

Fig.185049: Example for turntable frame

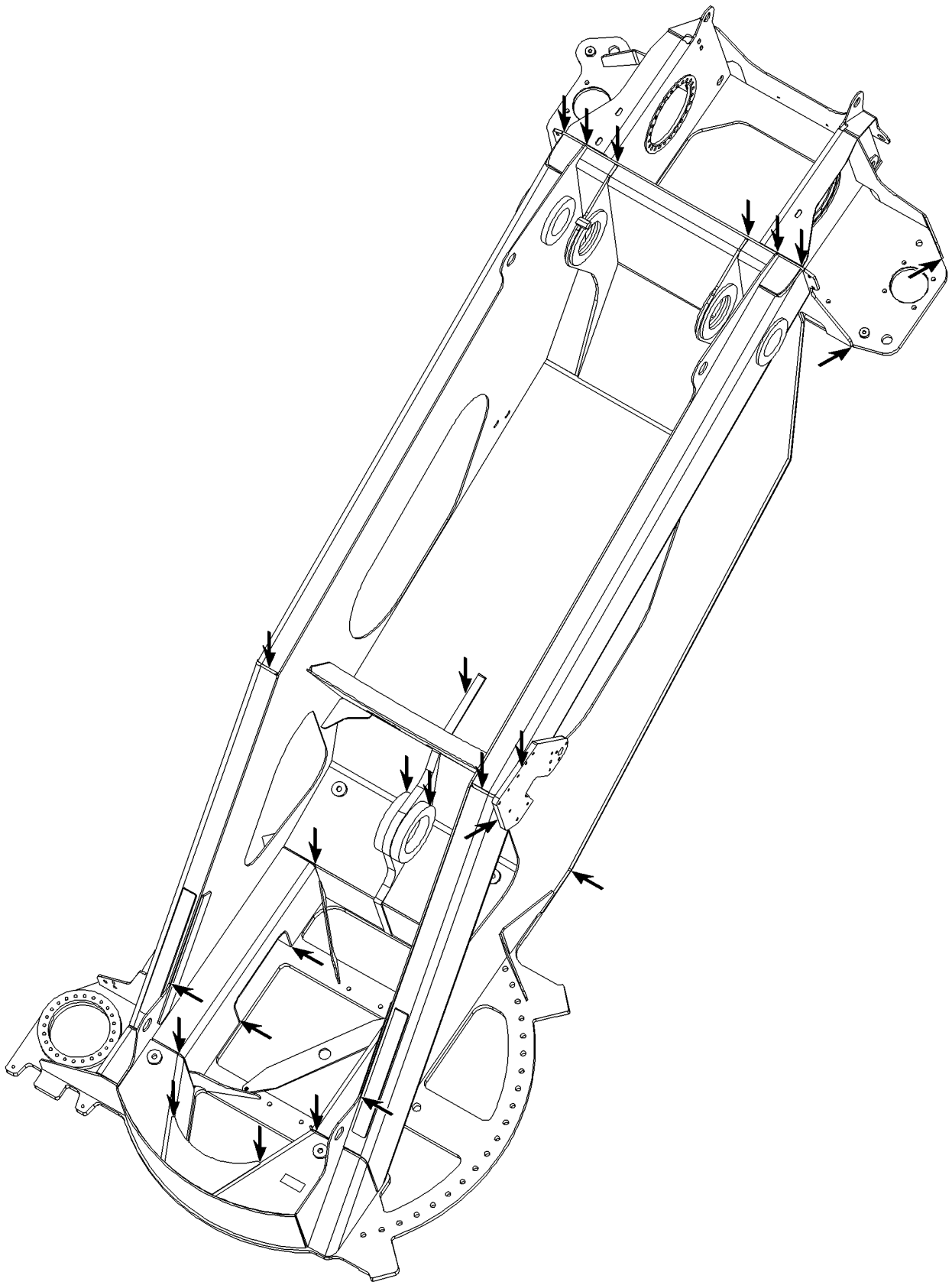

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Fig.105700: Example for turntable frame

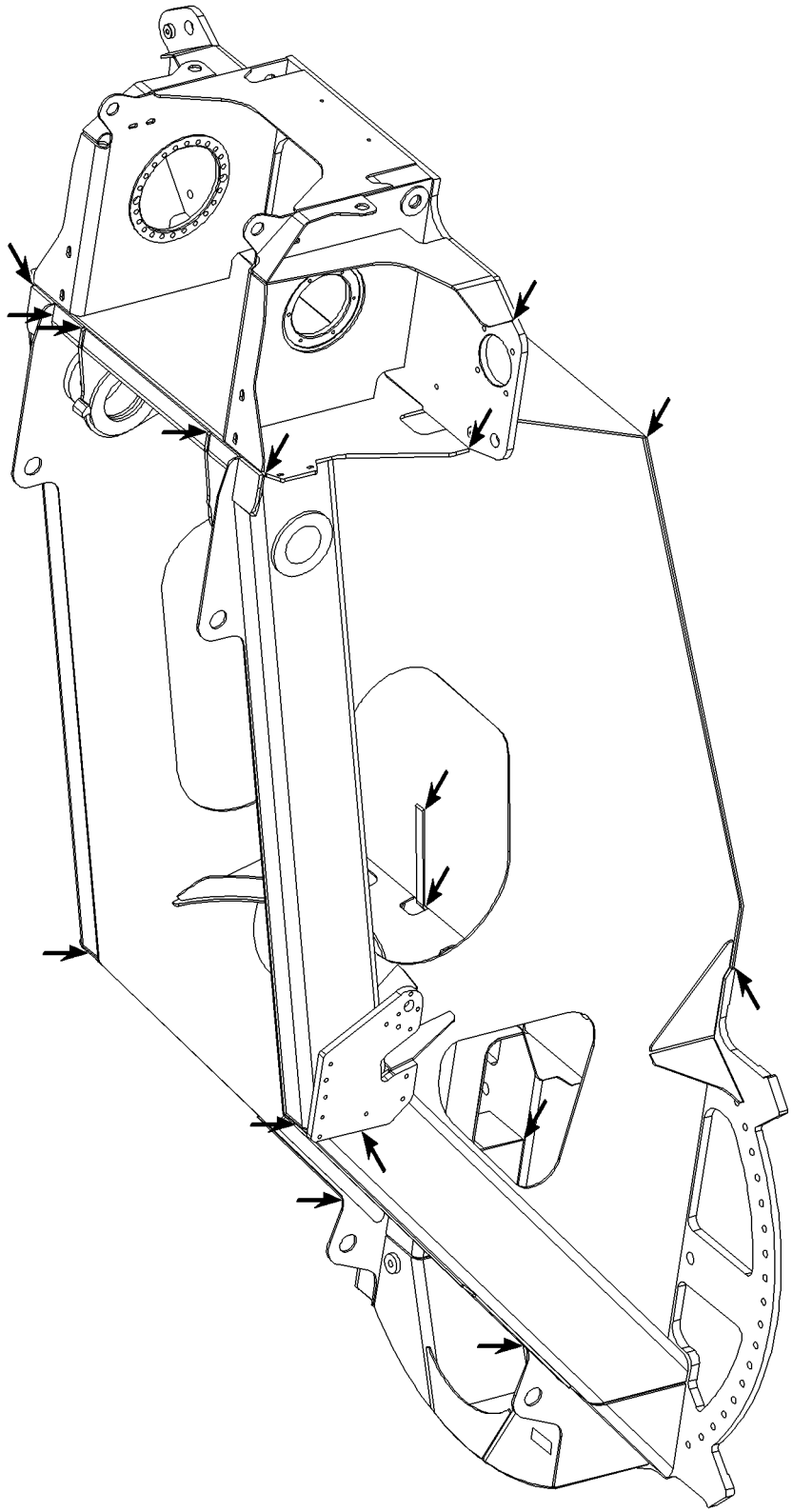

Fig.105701: Example for turntable frame

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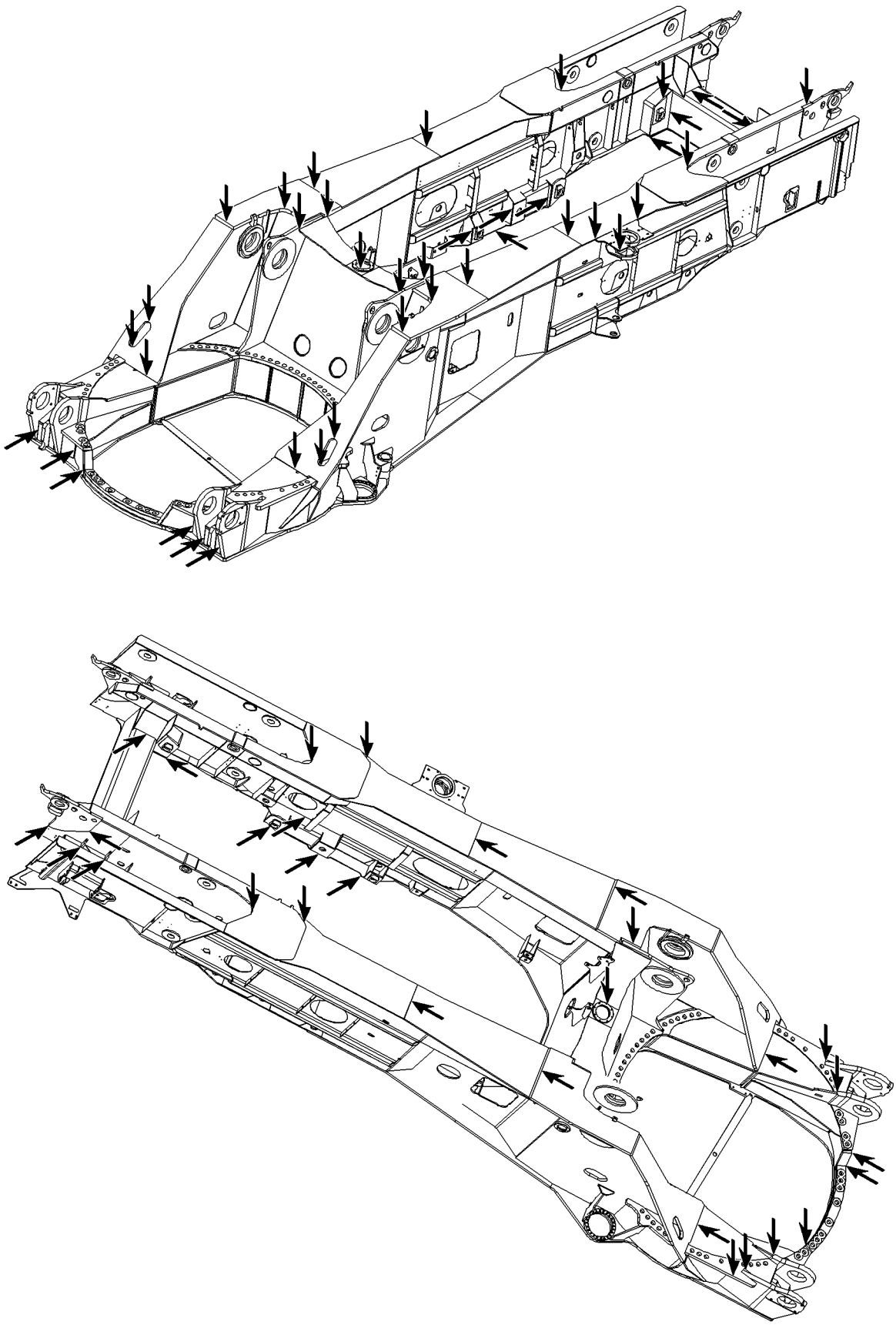

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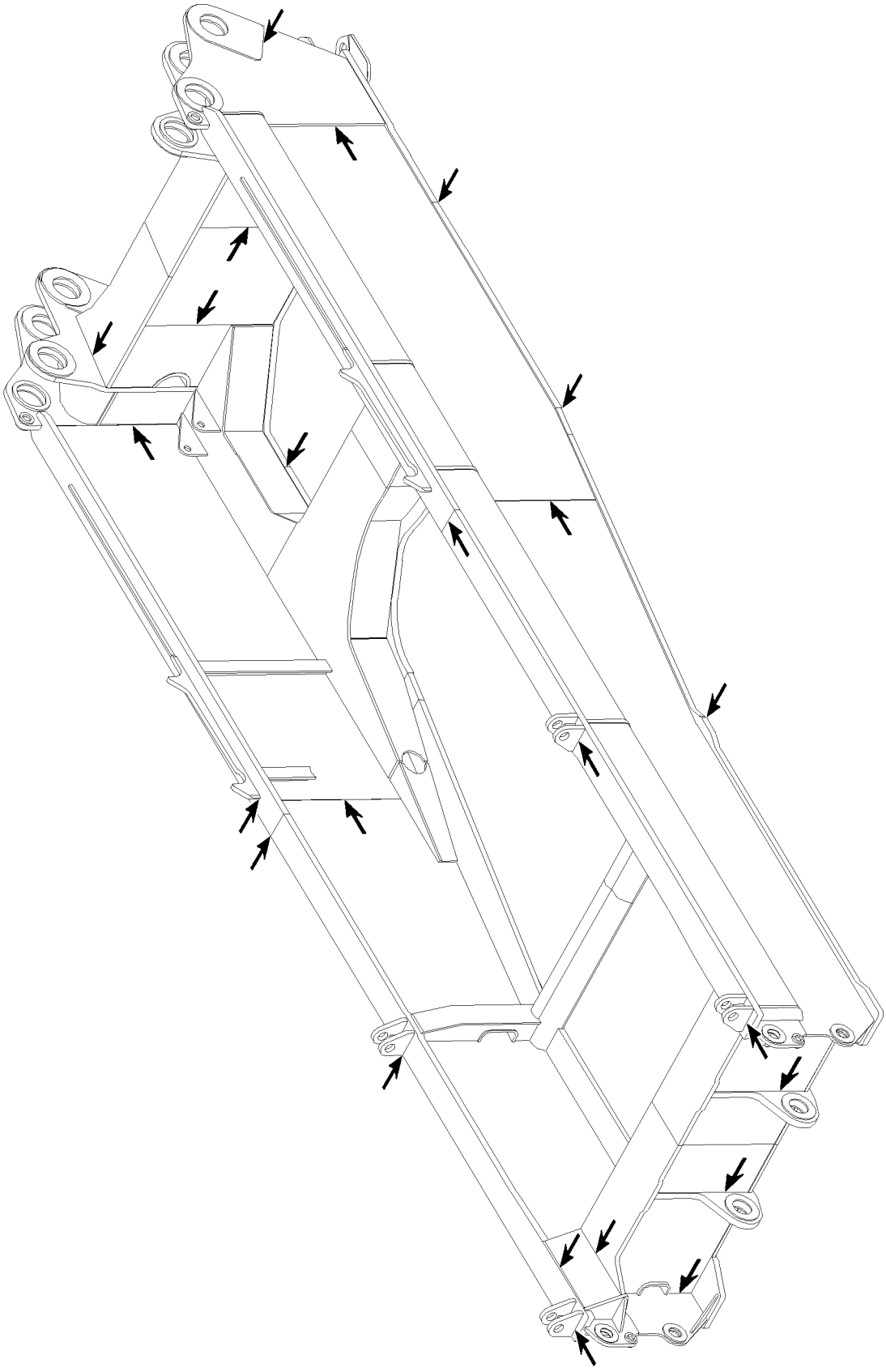
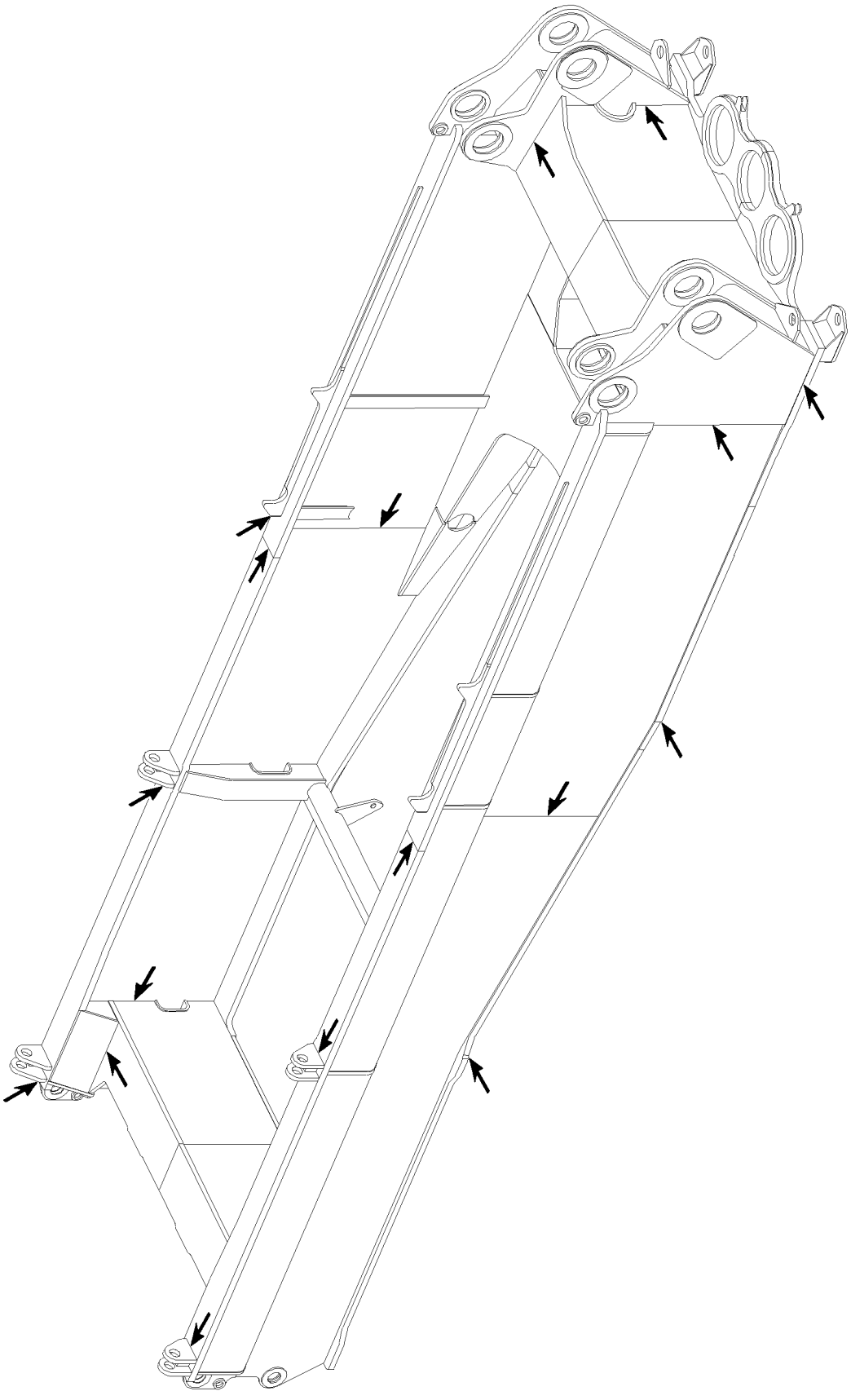
Fig.105706: Example for turntable frame



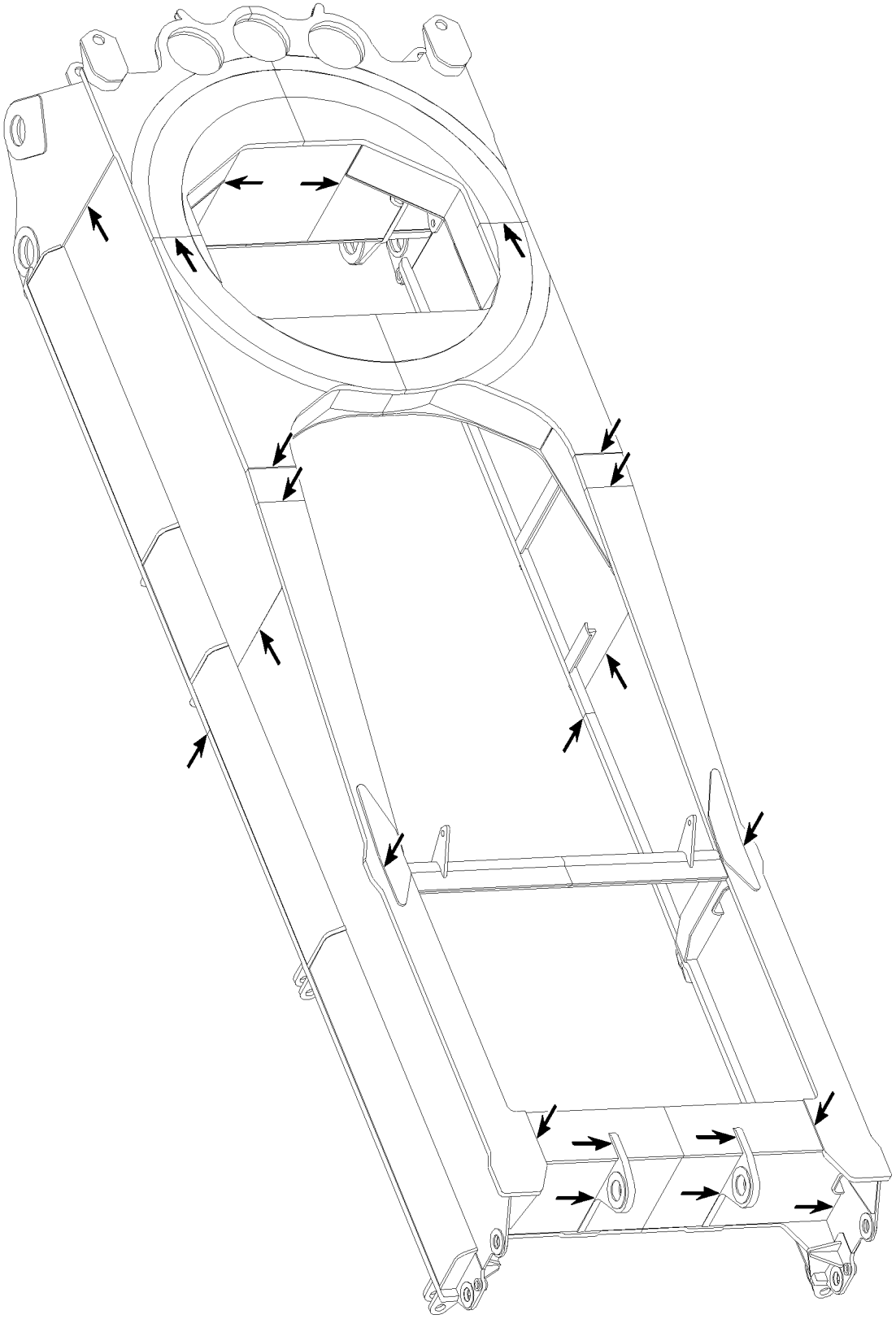
LWE/LG 1750-006/15409-07-02/en

Fig.105694: Example for turntable frame



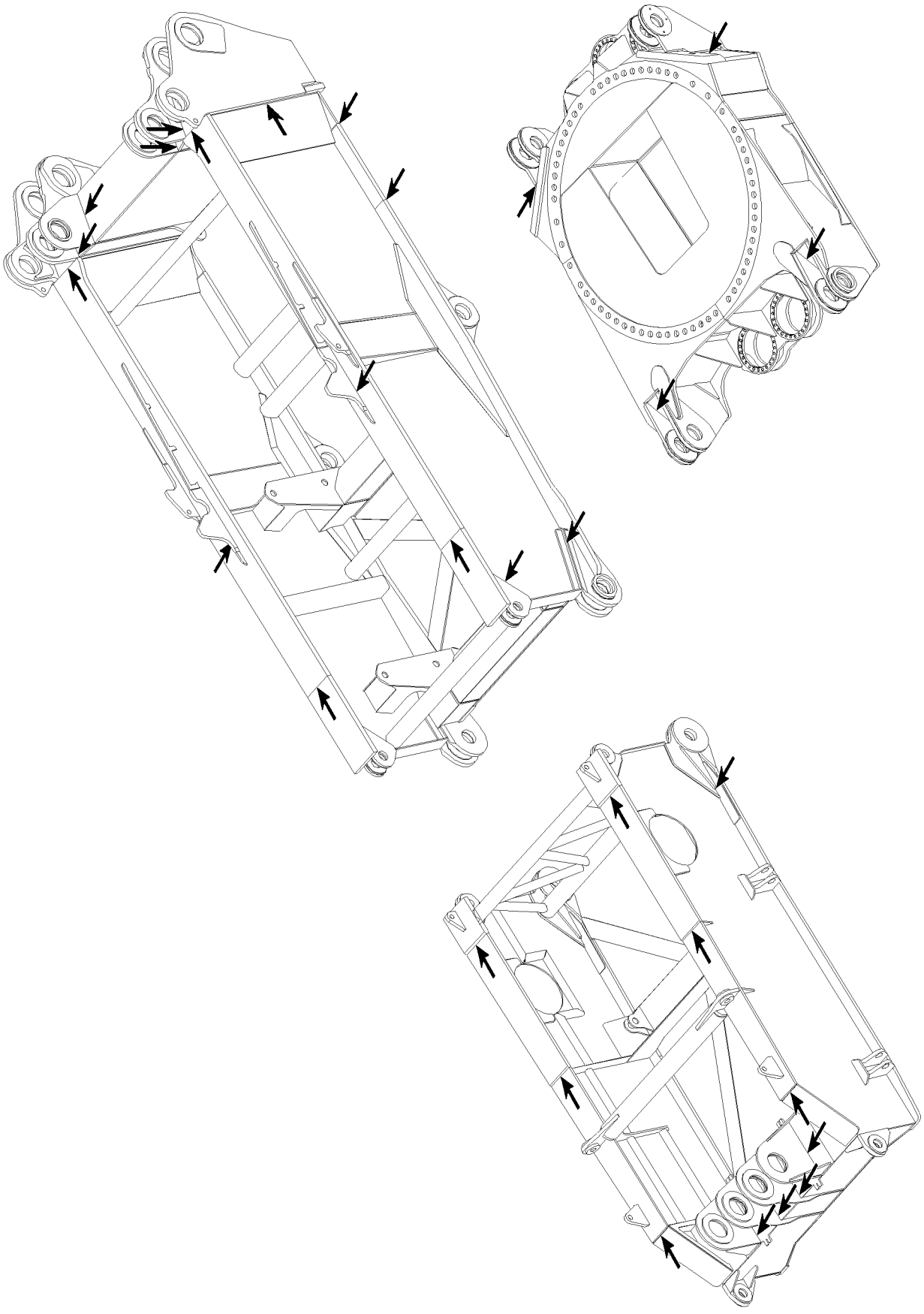
LWE/LG 1750-006/15409-07-02/en

Fig.105695: Example for turntable frame



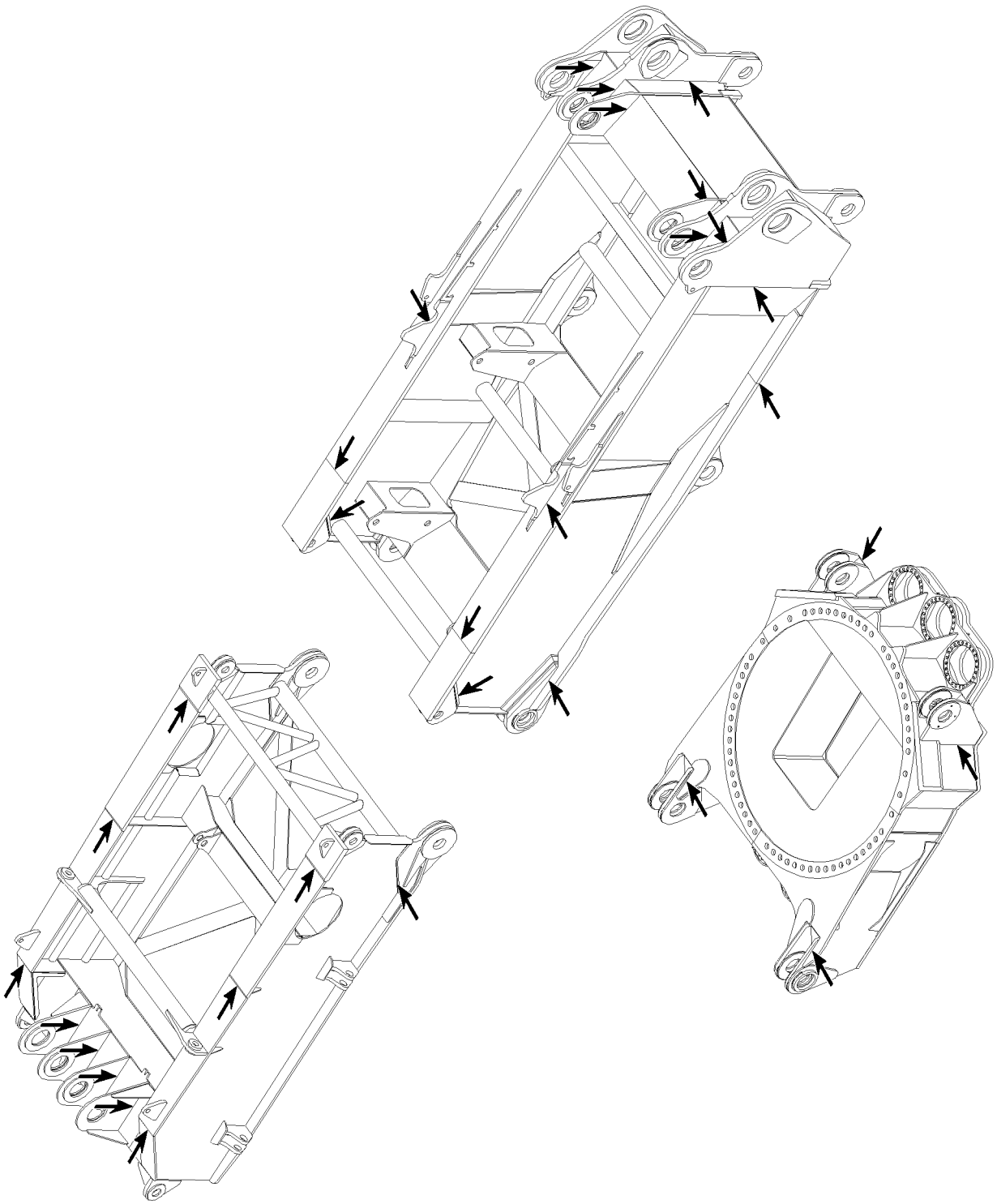
LWE/LG 1750-006/15409-07-02/en

Fig.105696: Example for turntable frame



LWE/LG 1750-006/15409-07-02/en

Fig.105691: Example for turntable frame



LWE/LG 1750-006/15409-07-02/en

Fig.105692: Example for turntable frame

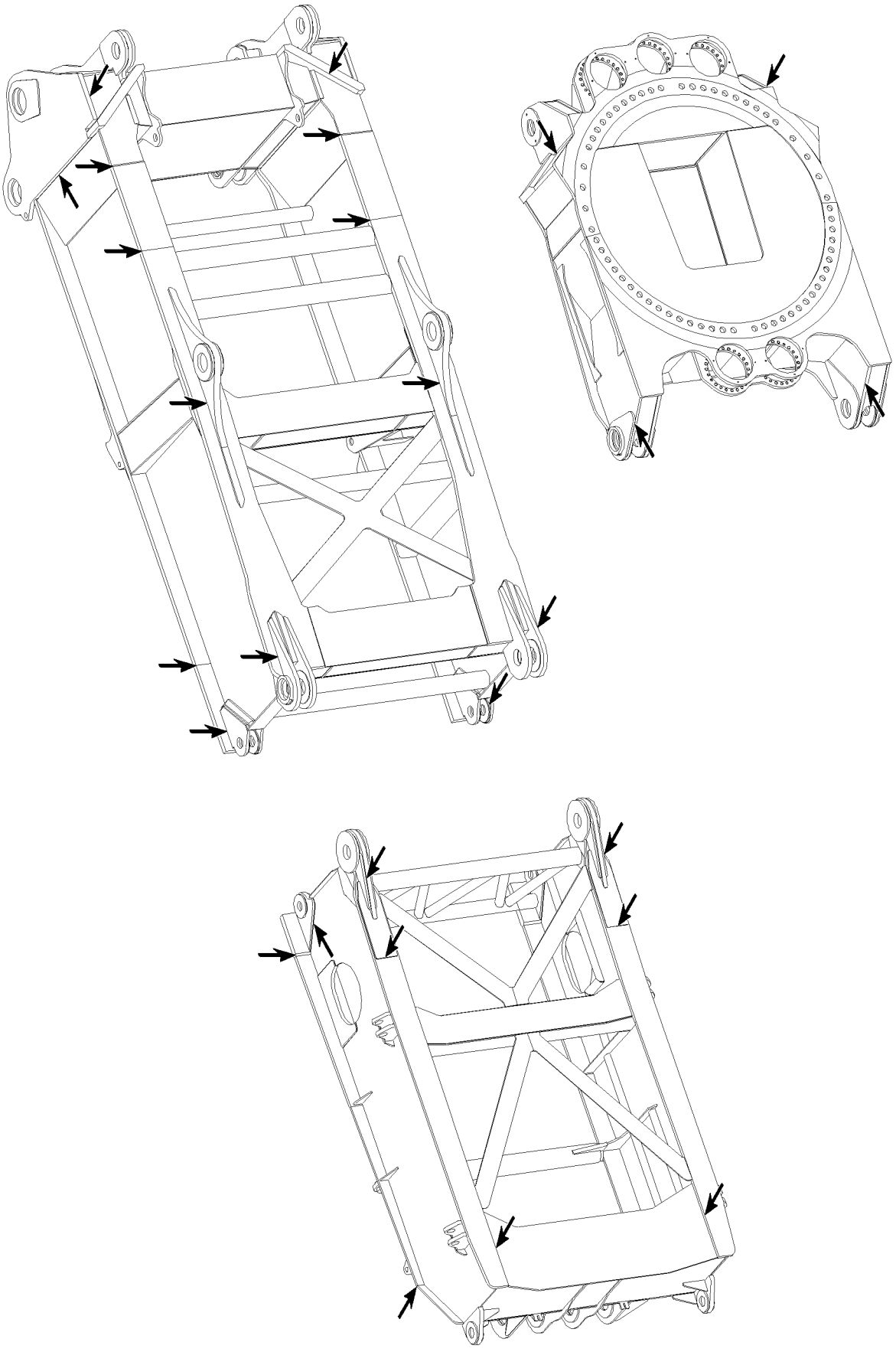


Fig.105693: Example for turntable frame

LWE/LG 1750-006/15409-07-02/en

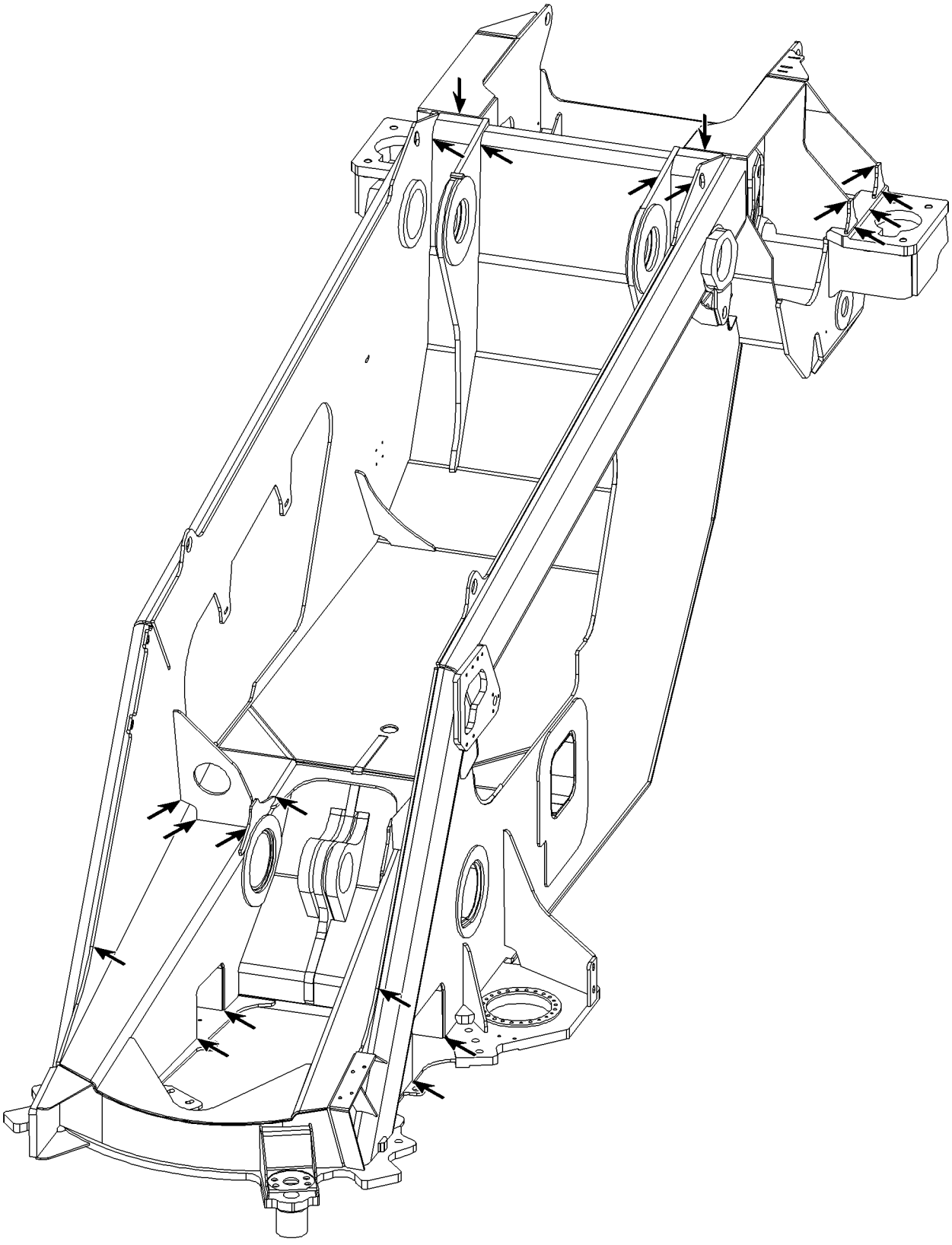
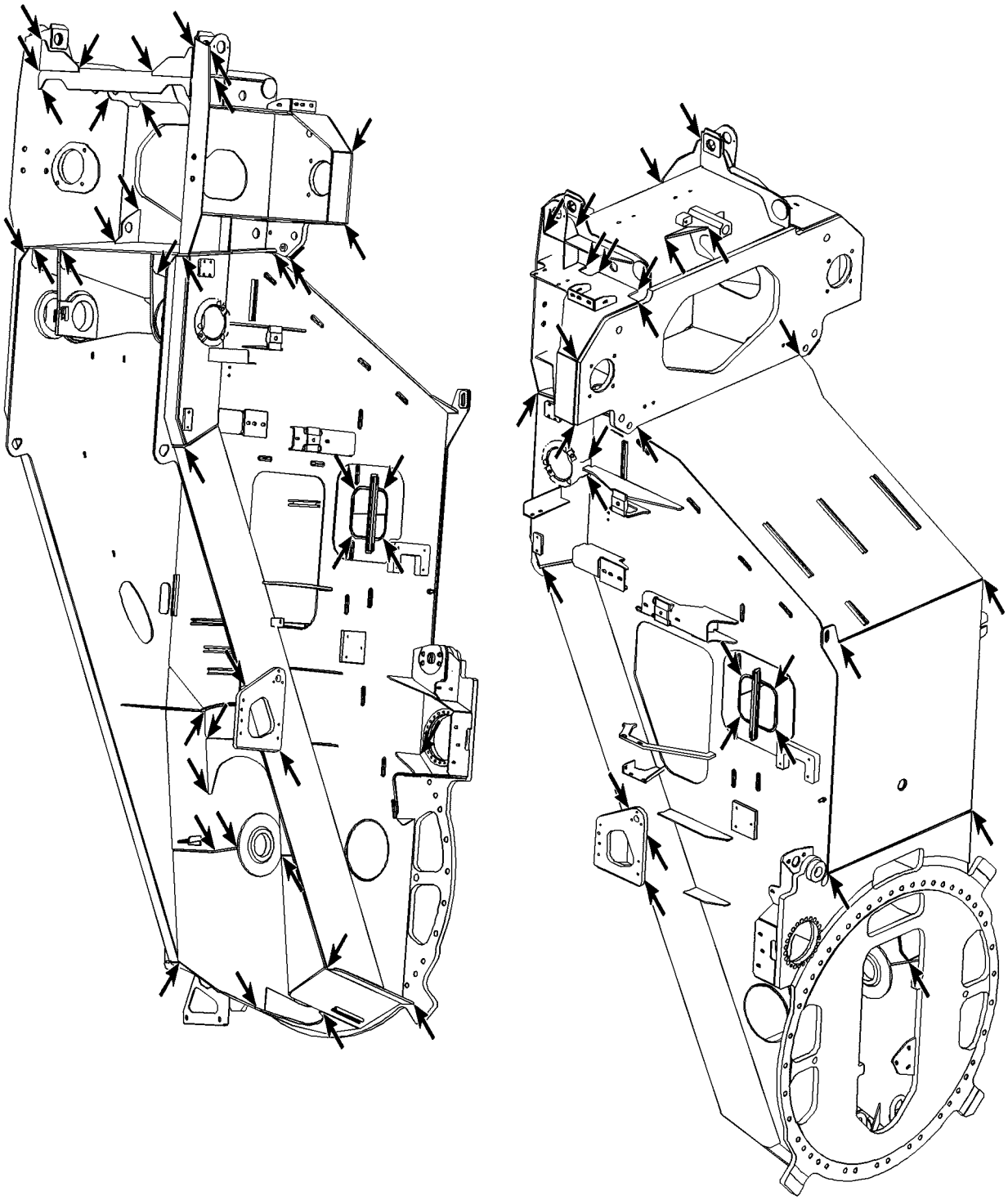


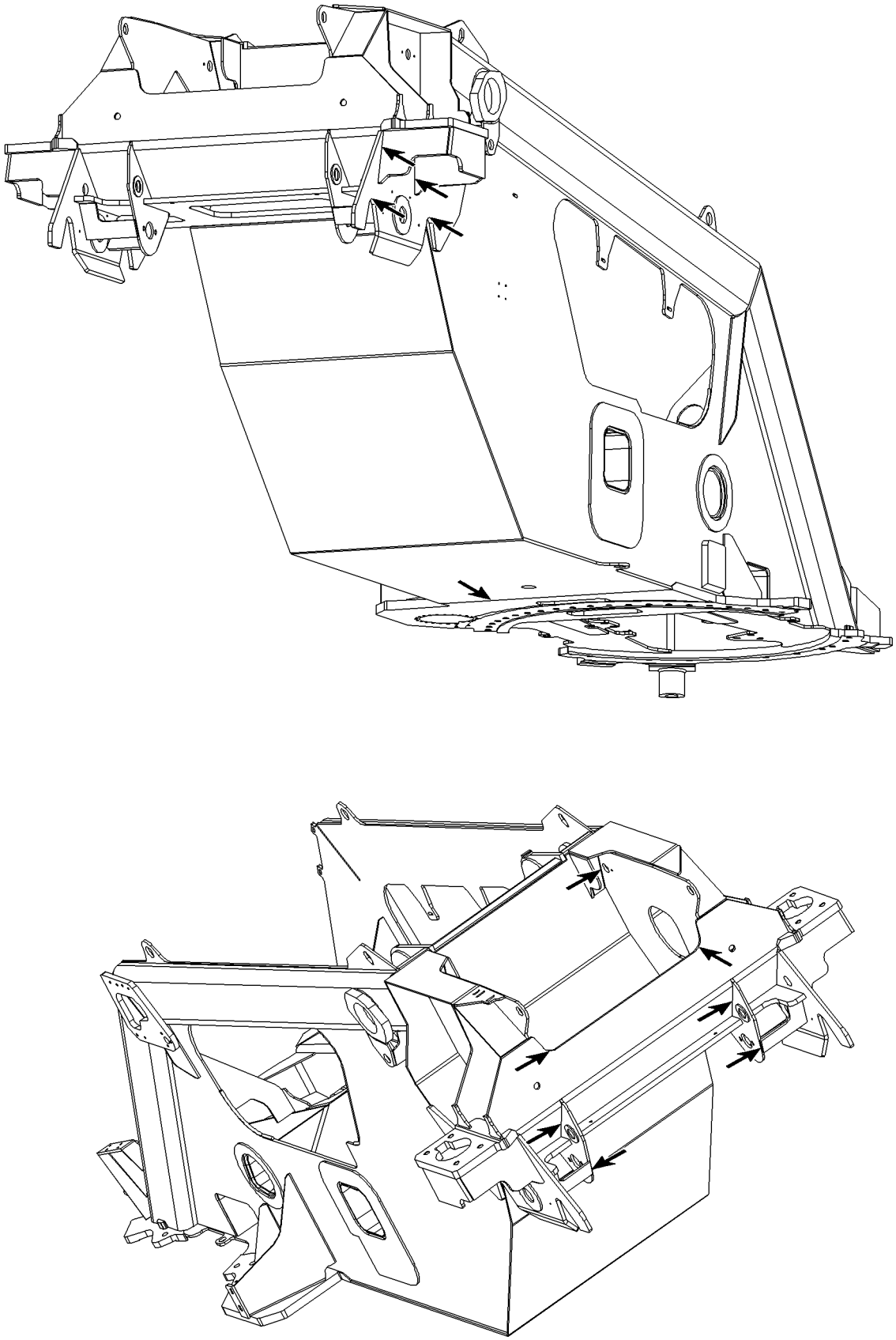
Fig.105722: Example for turntable frame

LWE/LG 1750-006/15409-07-02/en



LWE/LG 1750-006/15409-07-02/en

Fig.105932: Example for turntable frame



LWE/LG 1750-006/15409-07-02/en

Fig.105723: Example for turntable frame

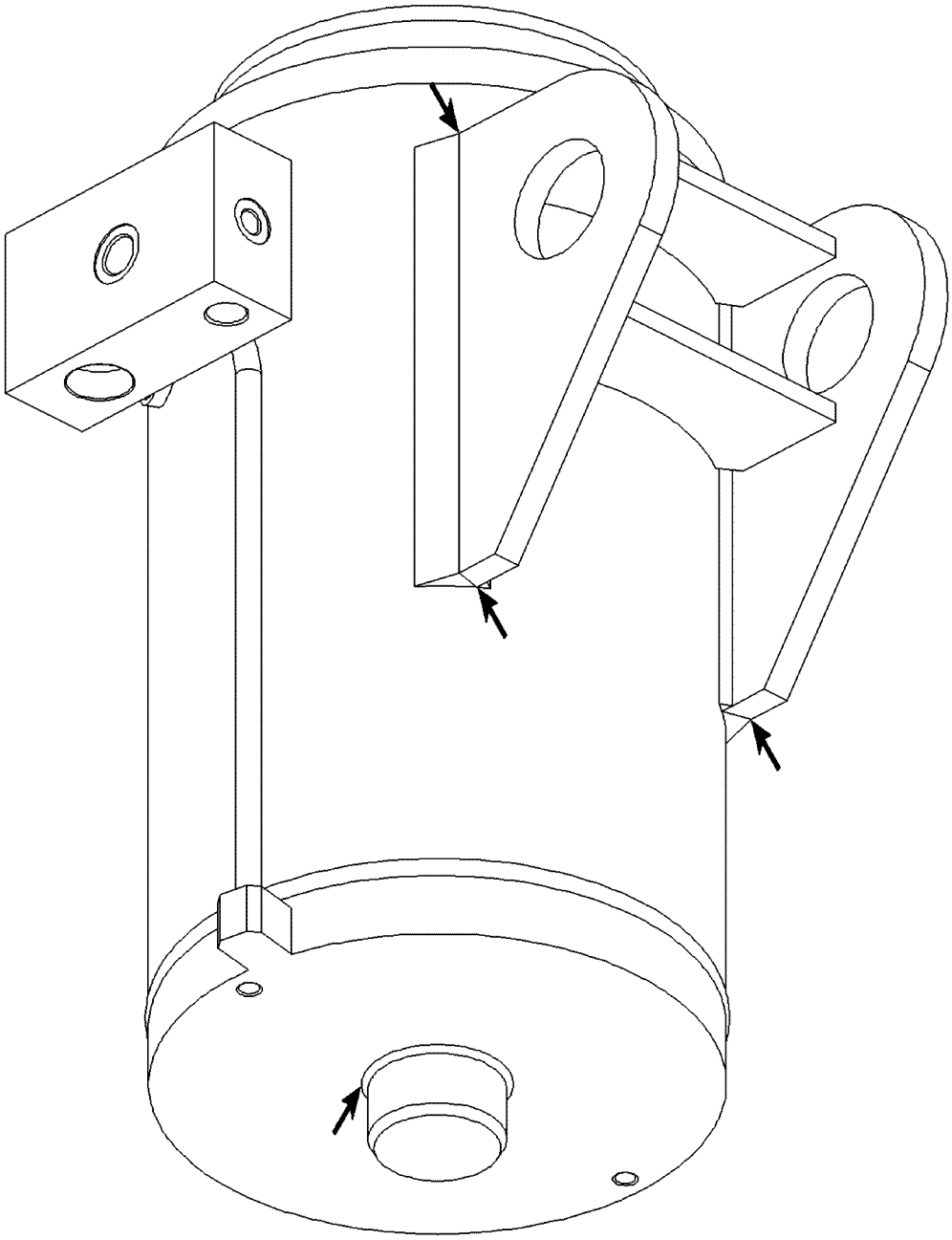


Fig.105801: Example for ballast cylinder

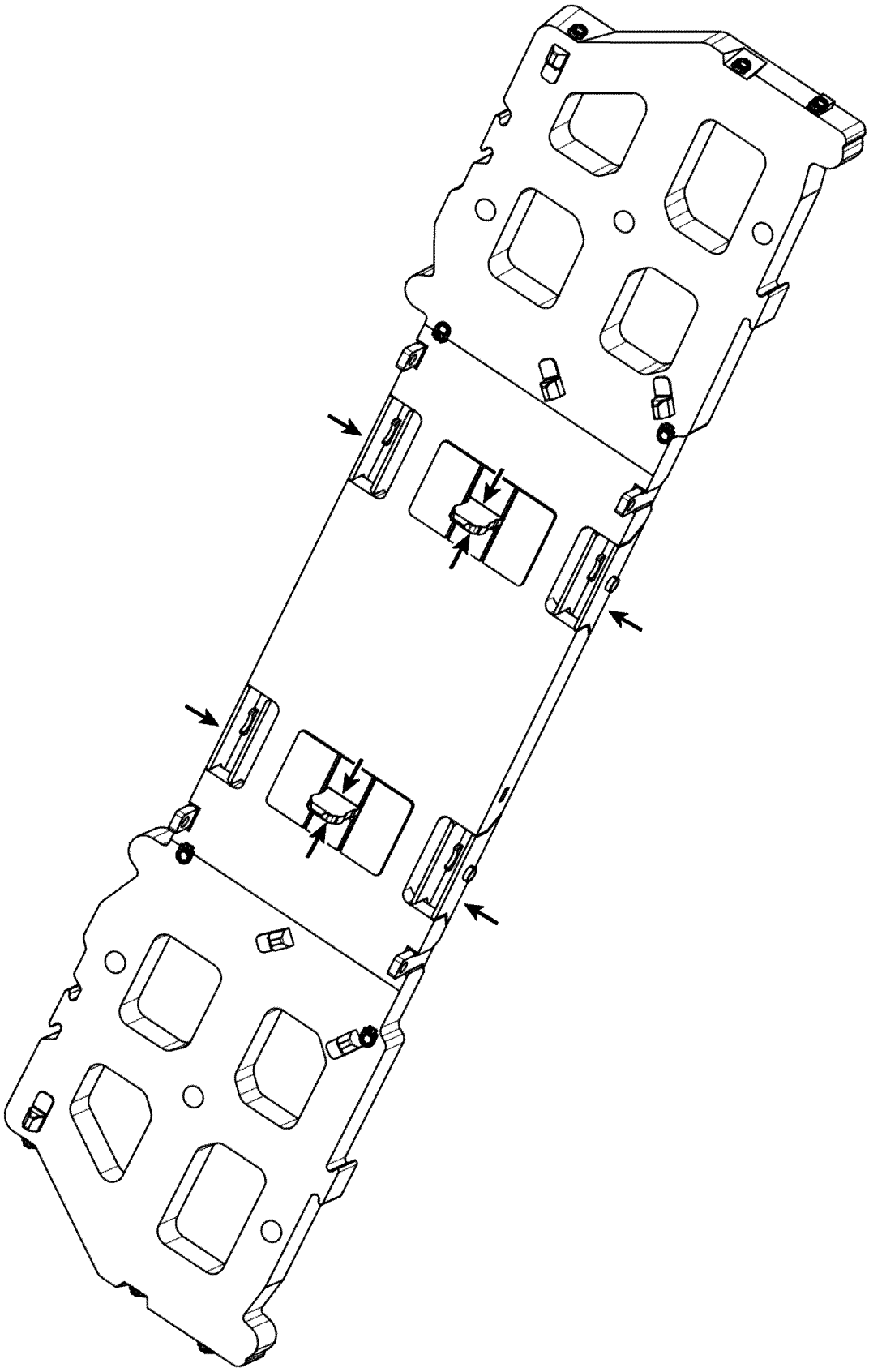
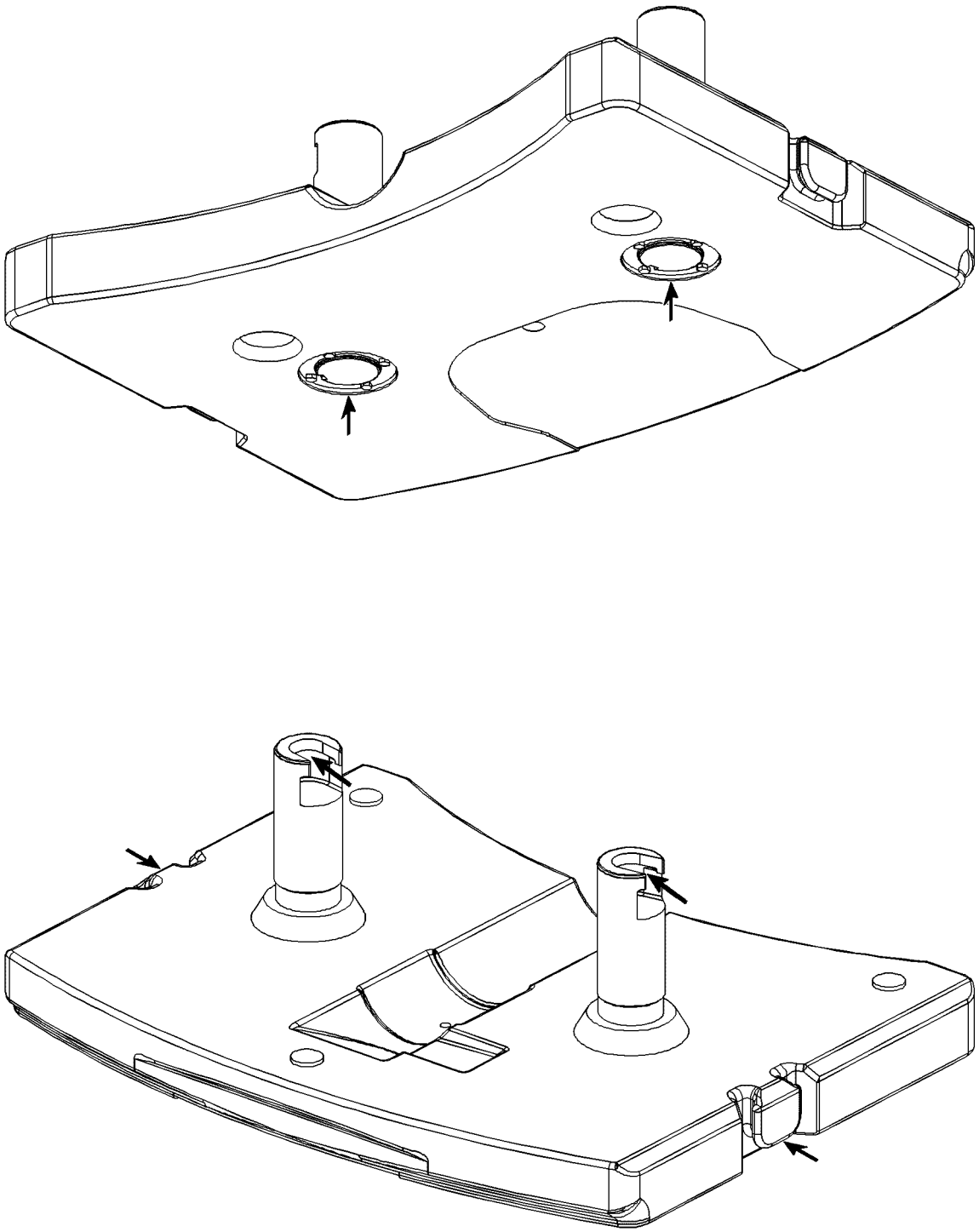


Fig.105705: Example for mounting plate



LWE/LG 1750-006/15409-07-02/en

Fig.105807: Example for base plate

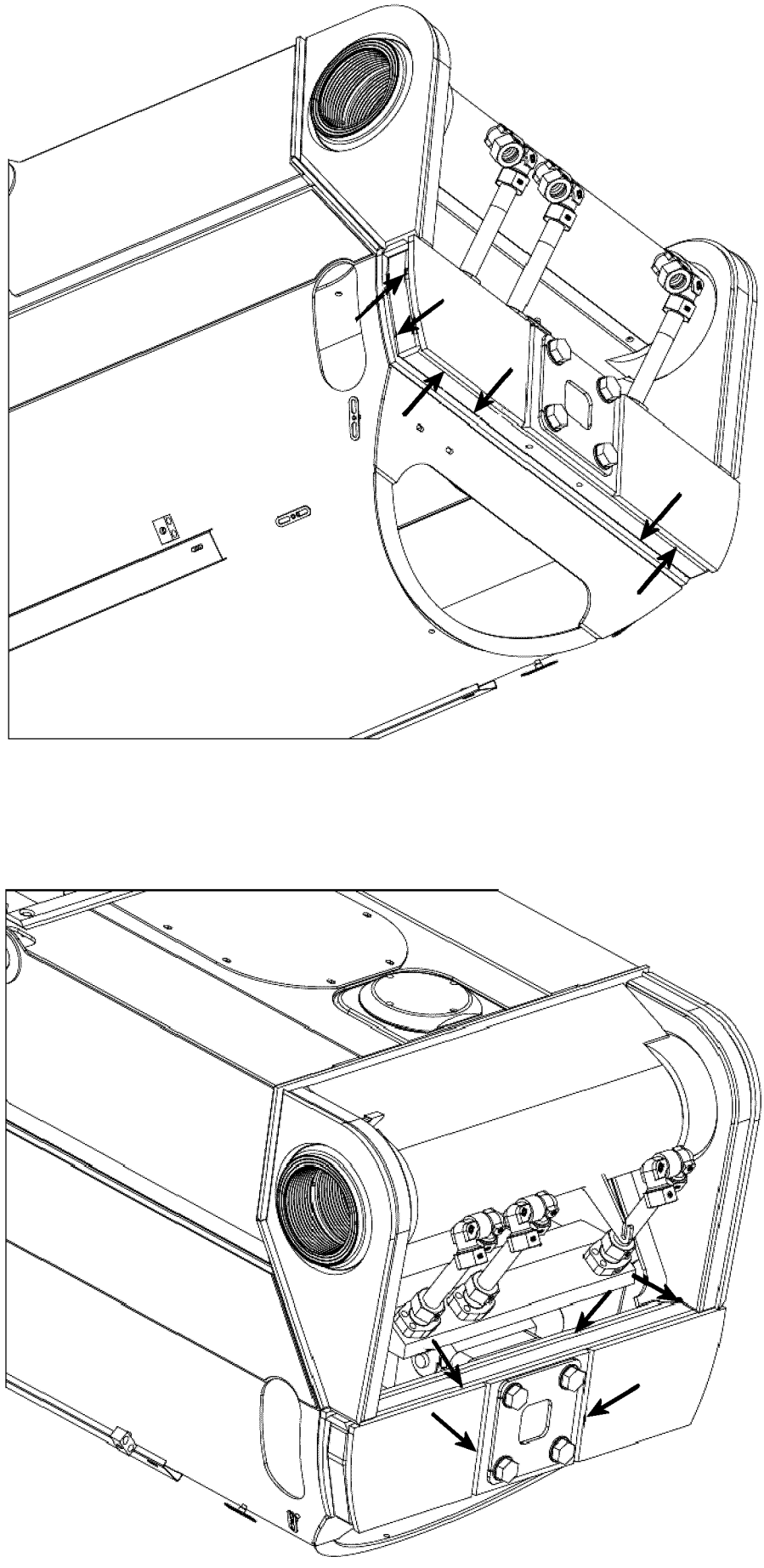
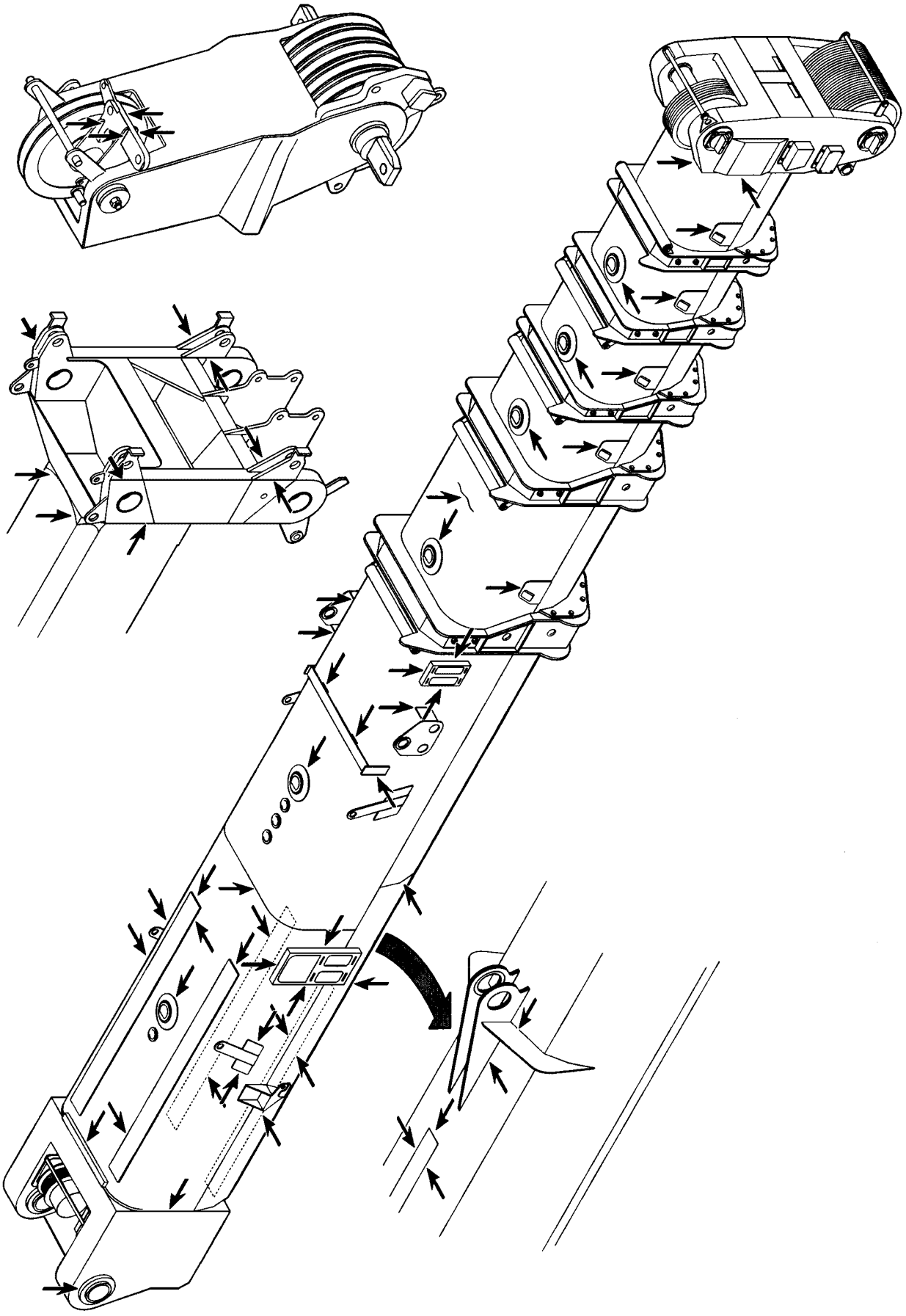


Fig.120273: Example for pivot section



LWE/LG 1750-006/15409-07-02/en

Fig.185050: Example for telescopic boom

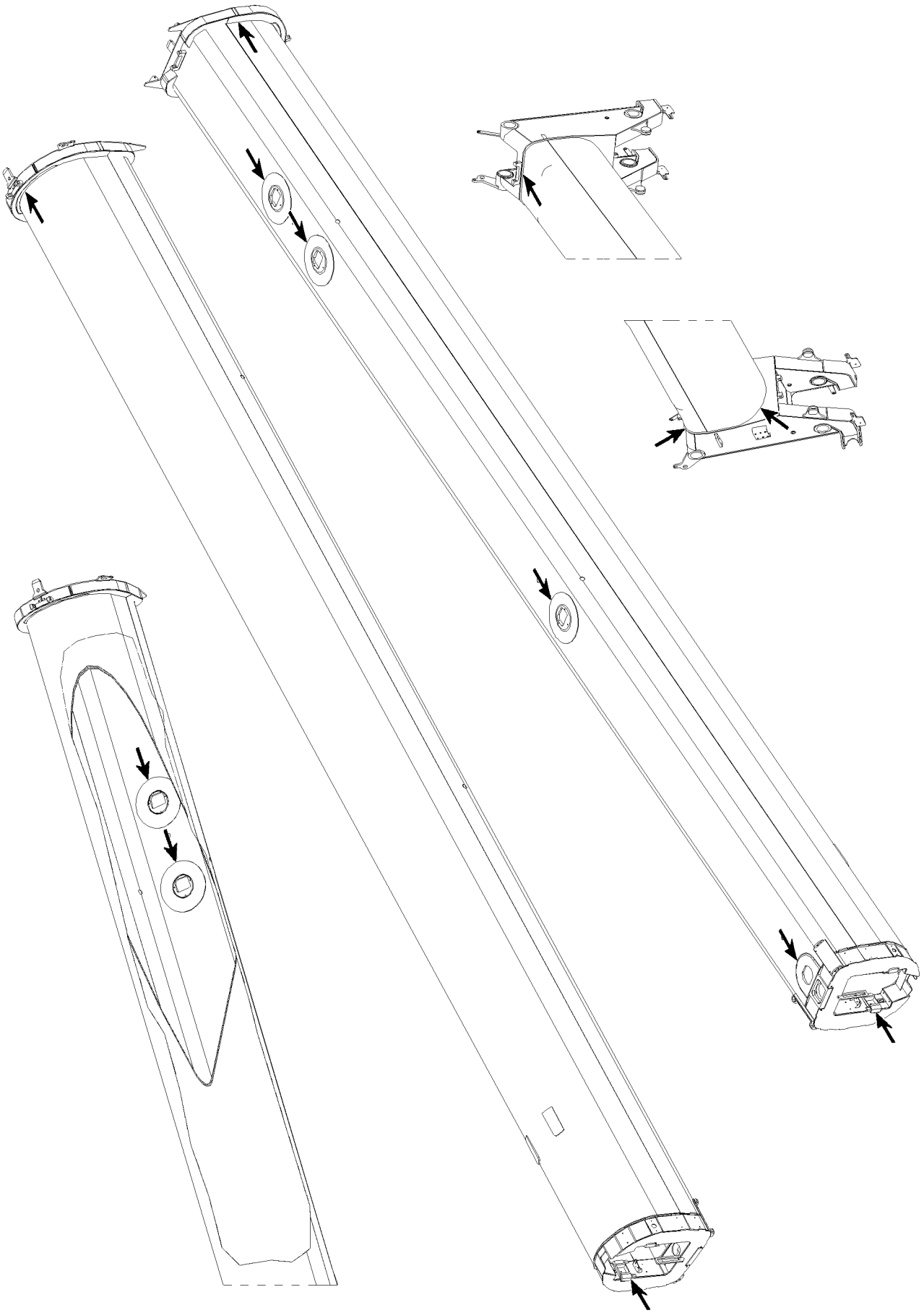
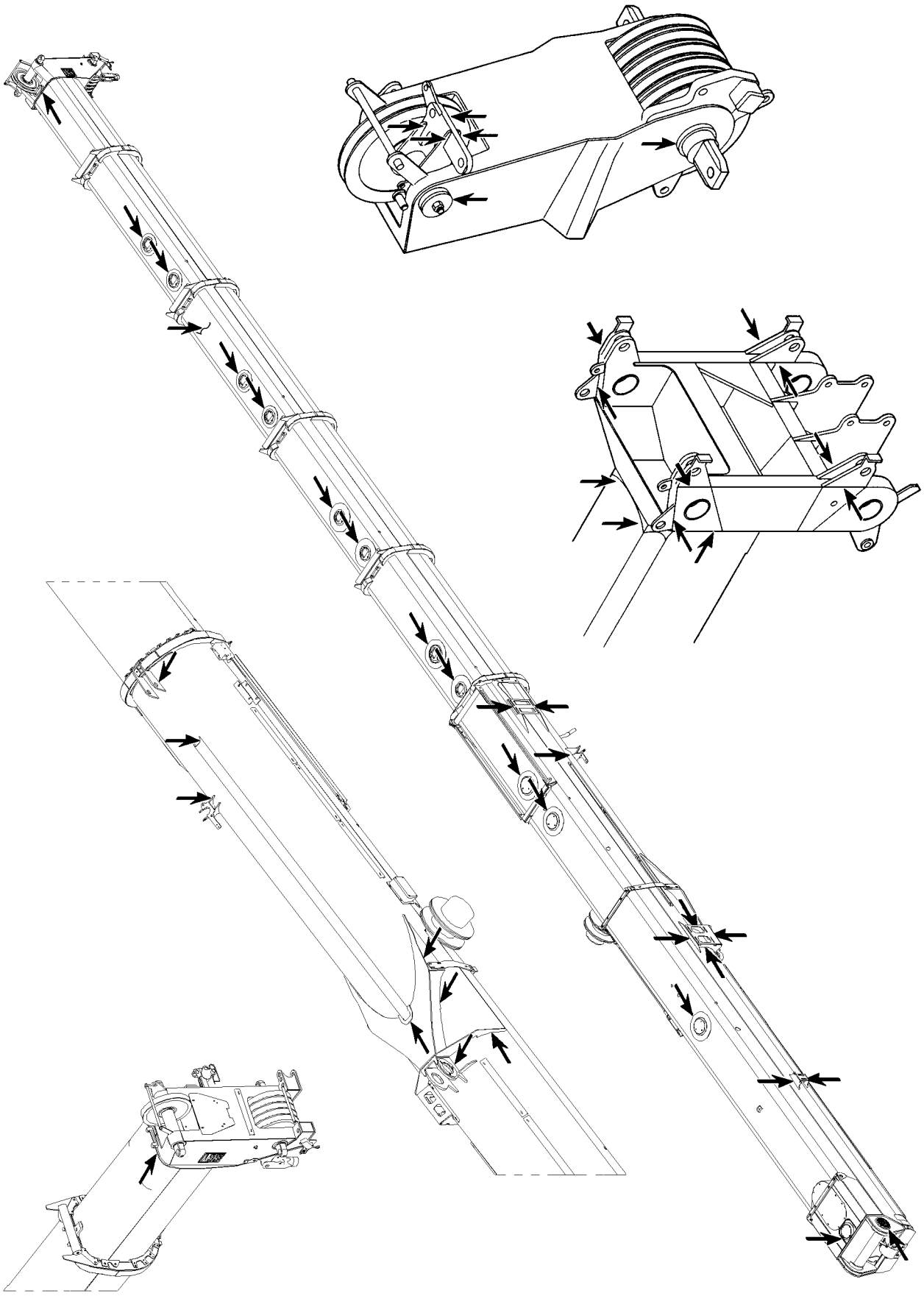


Fig.105710: Example for telescopic boom



LWE/LG 1750-006/15409-07-02/en

Fig.105711: Example for telescopic boom

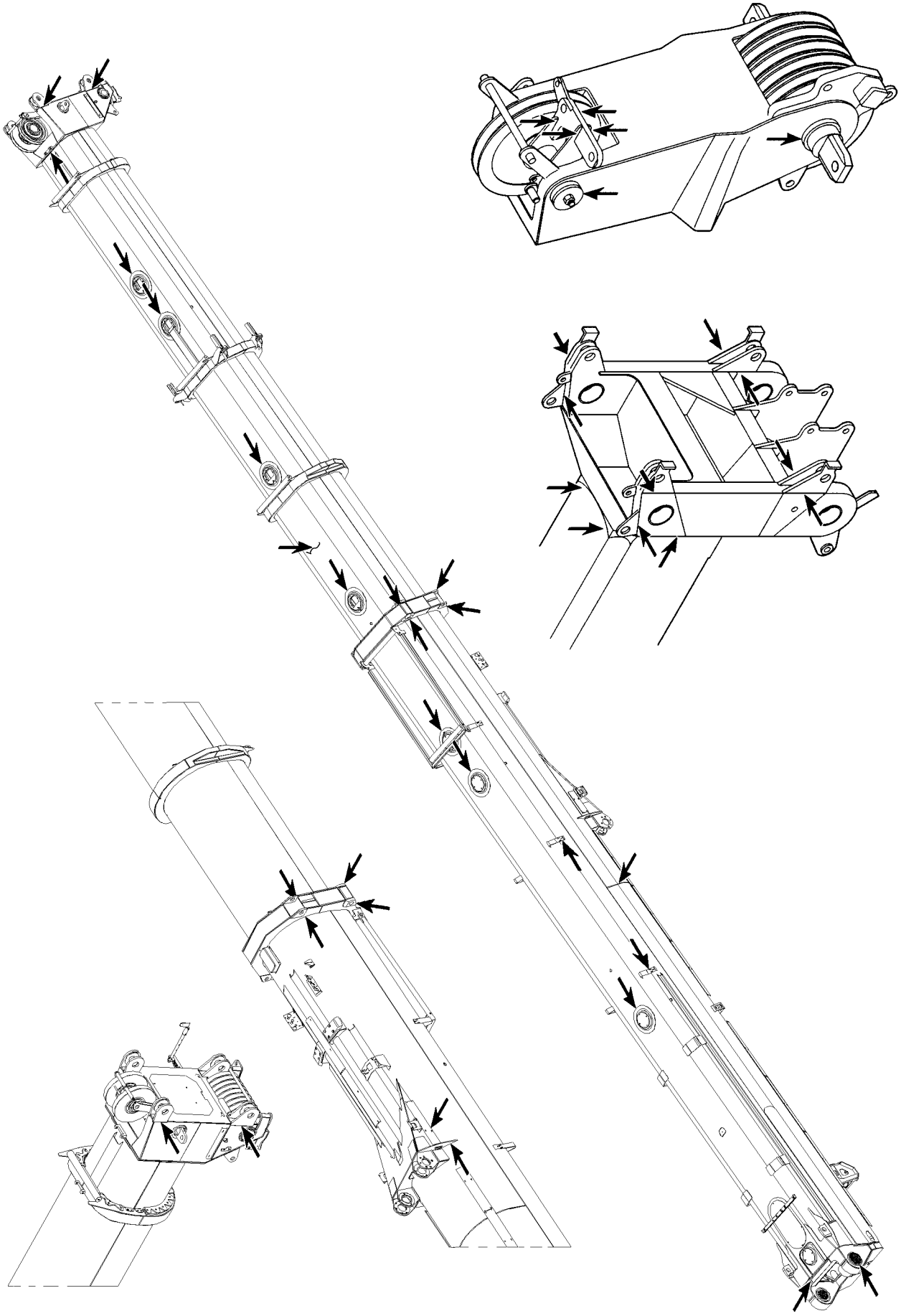


Fig.105720: Example for telescopic boom

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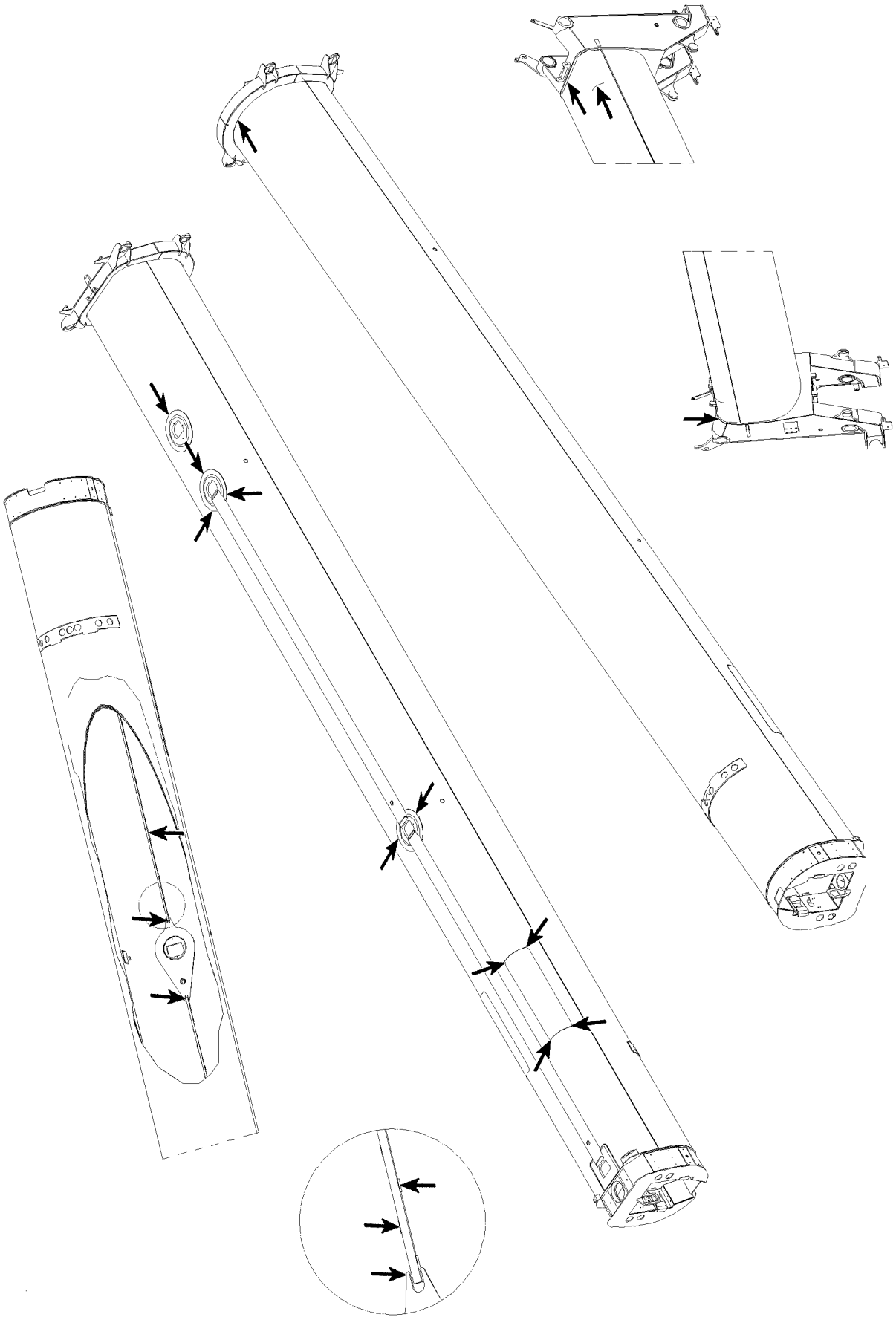

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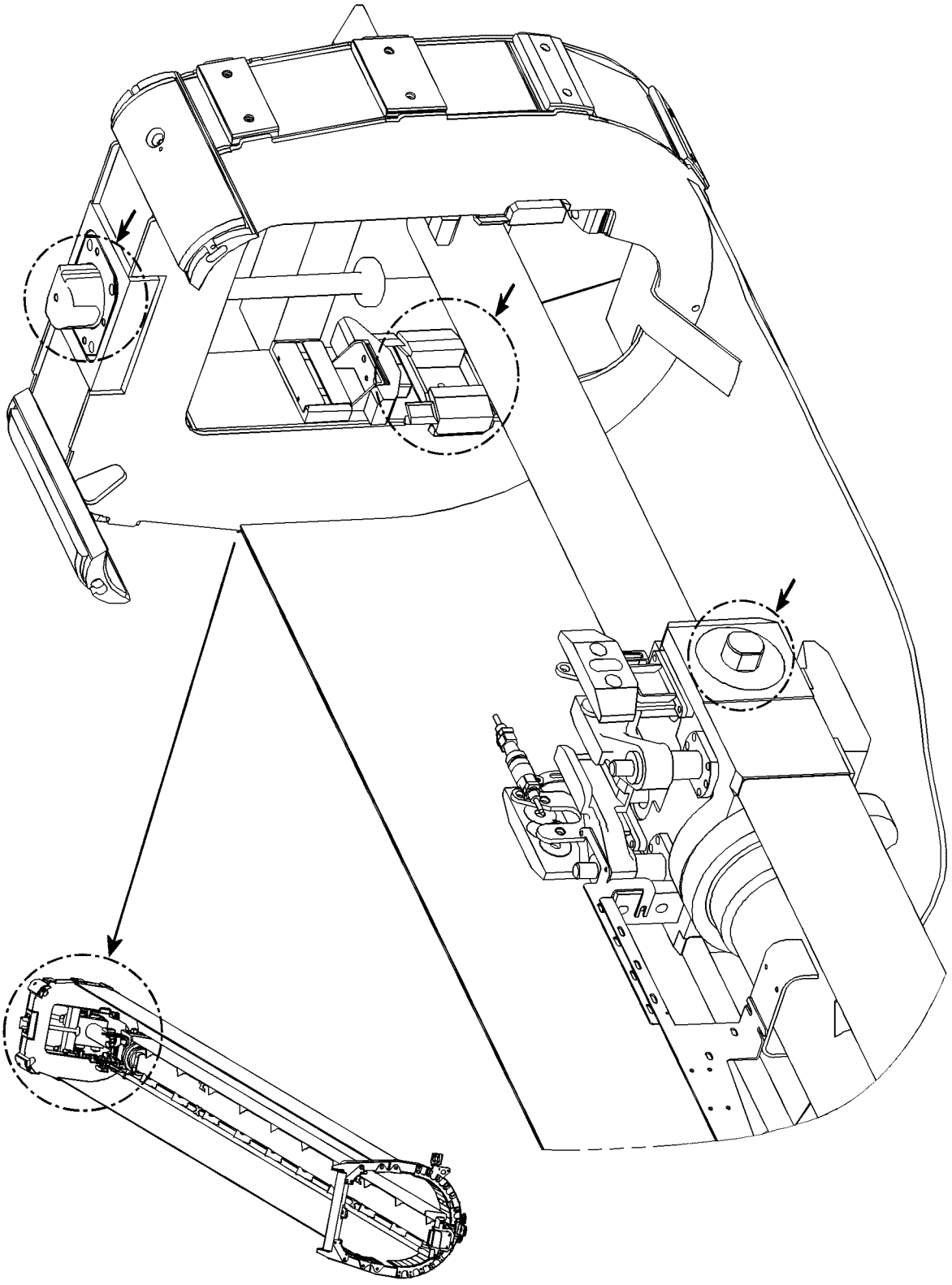
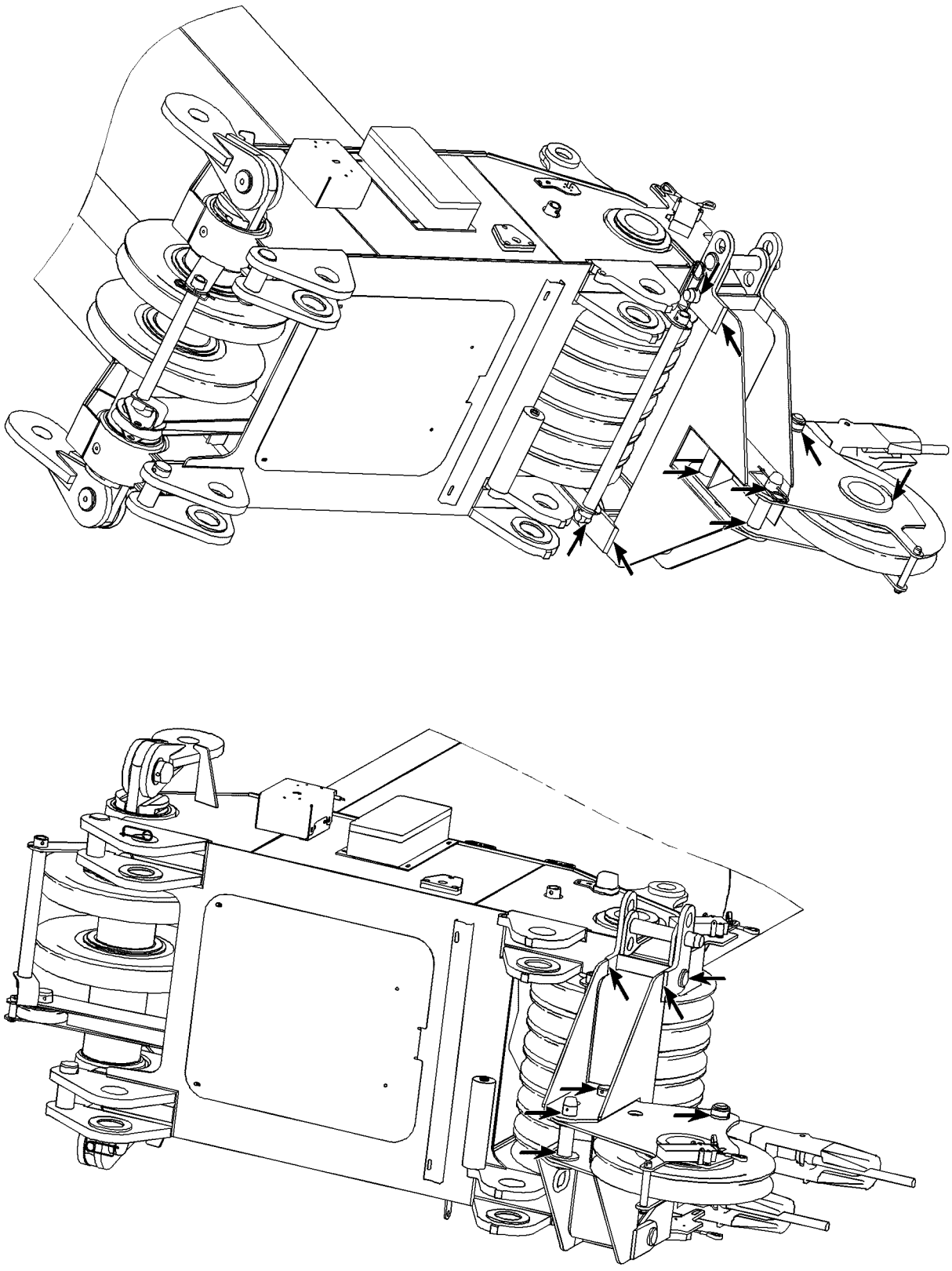
Fig.105721: Example for telescopic boom



LWE/LG 1750-006/15409-07-02/en

Fig.105891: Example for push out mechanics telescopic boom



LWE/LG 1750-006/15409-07-02/en

Fig.105892: Example for boom nose

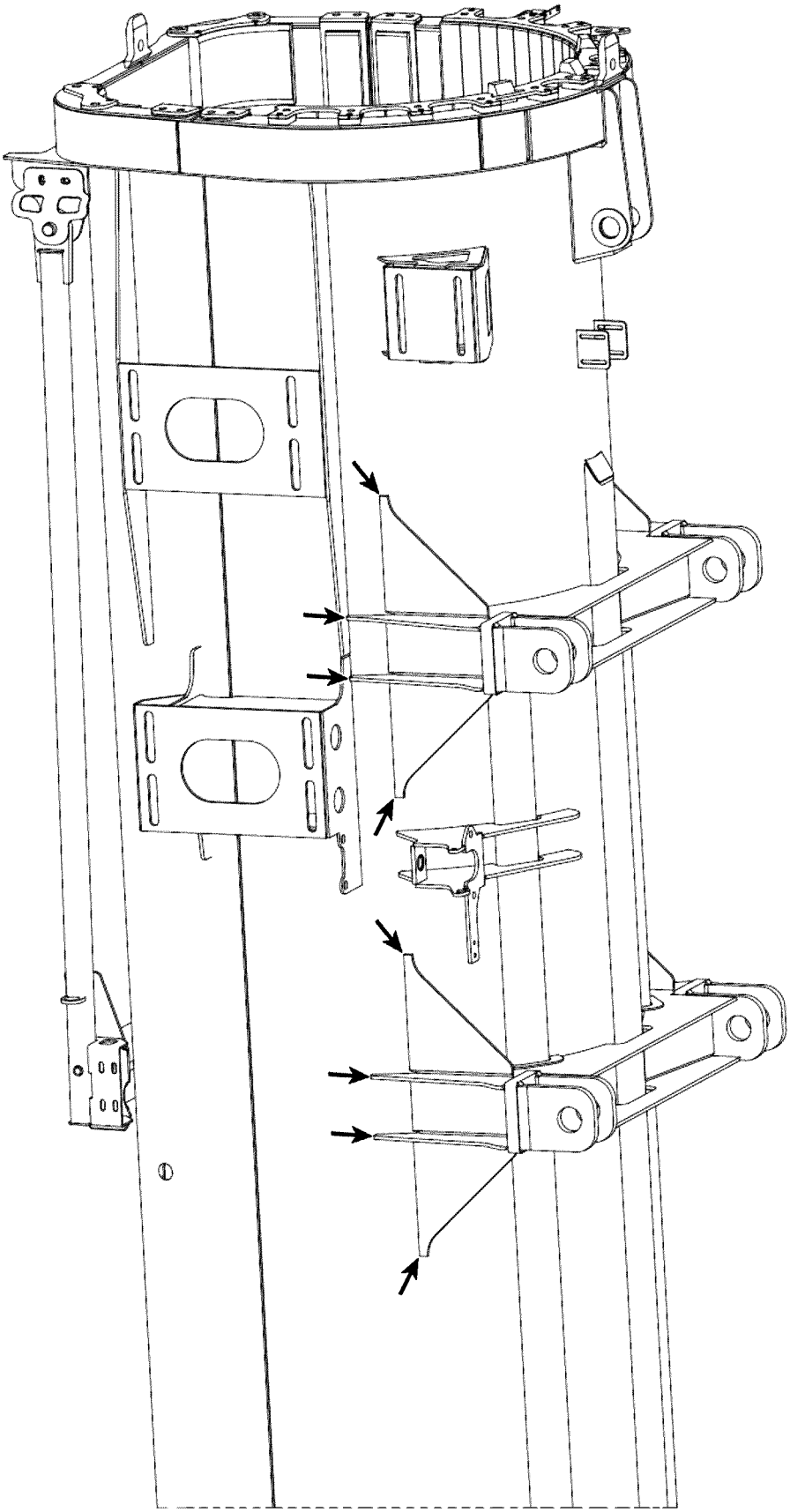
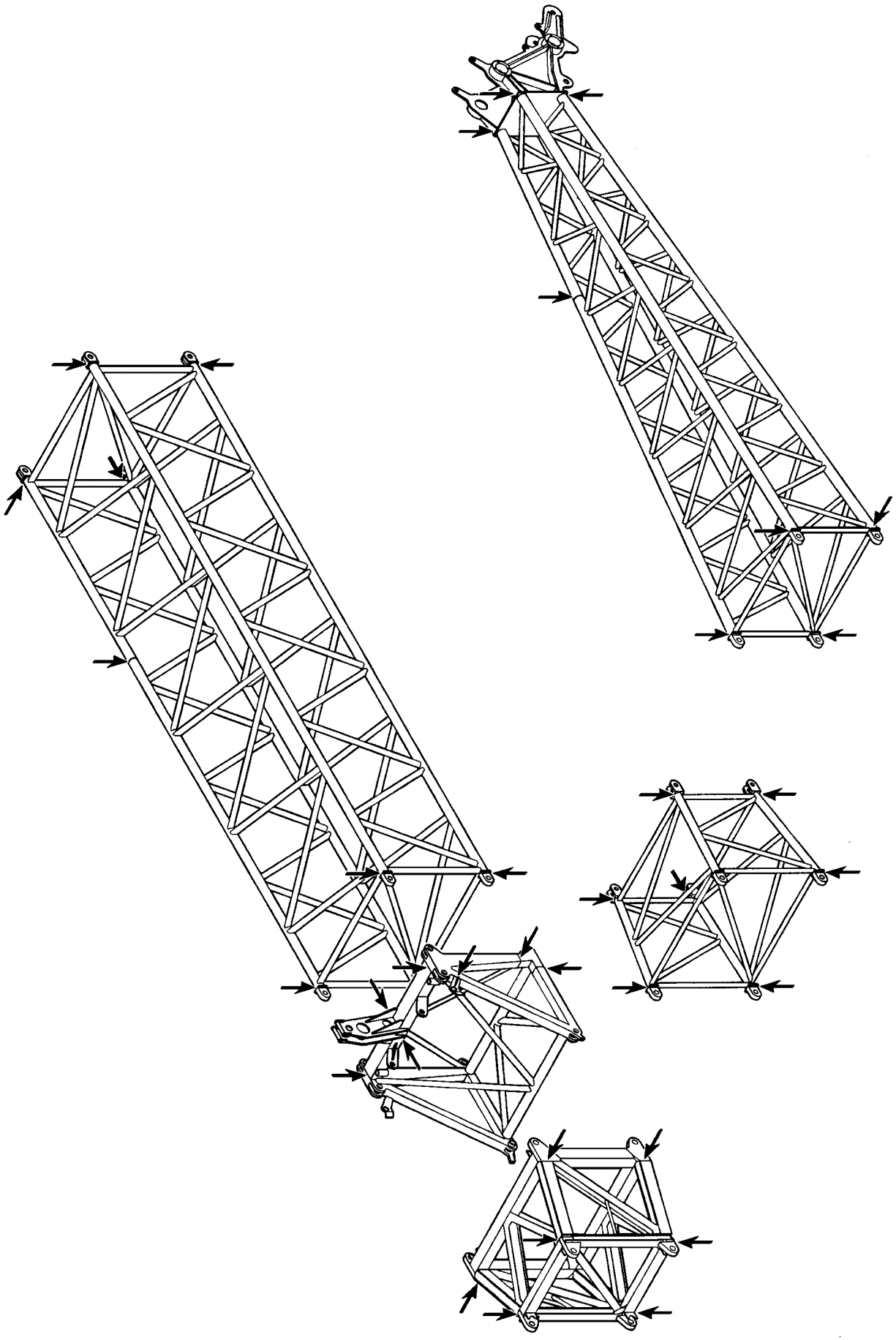


Fig.105689: Example for dolly console



LWE/LG 1750-006/15409-07-02/en

Fig.185051: Example for lattice jib

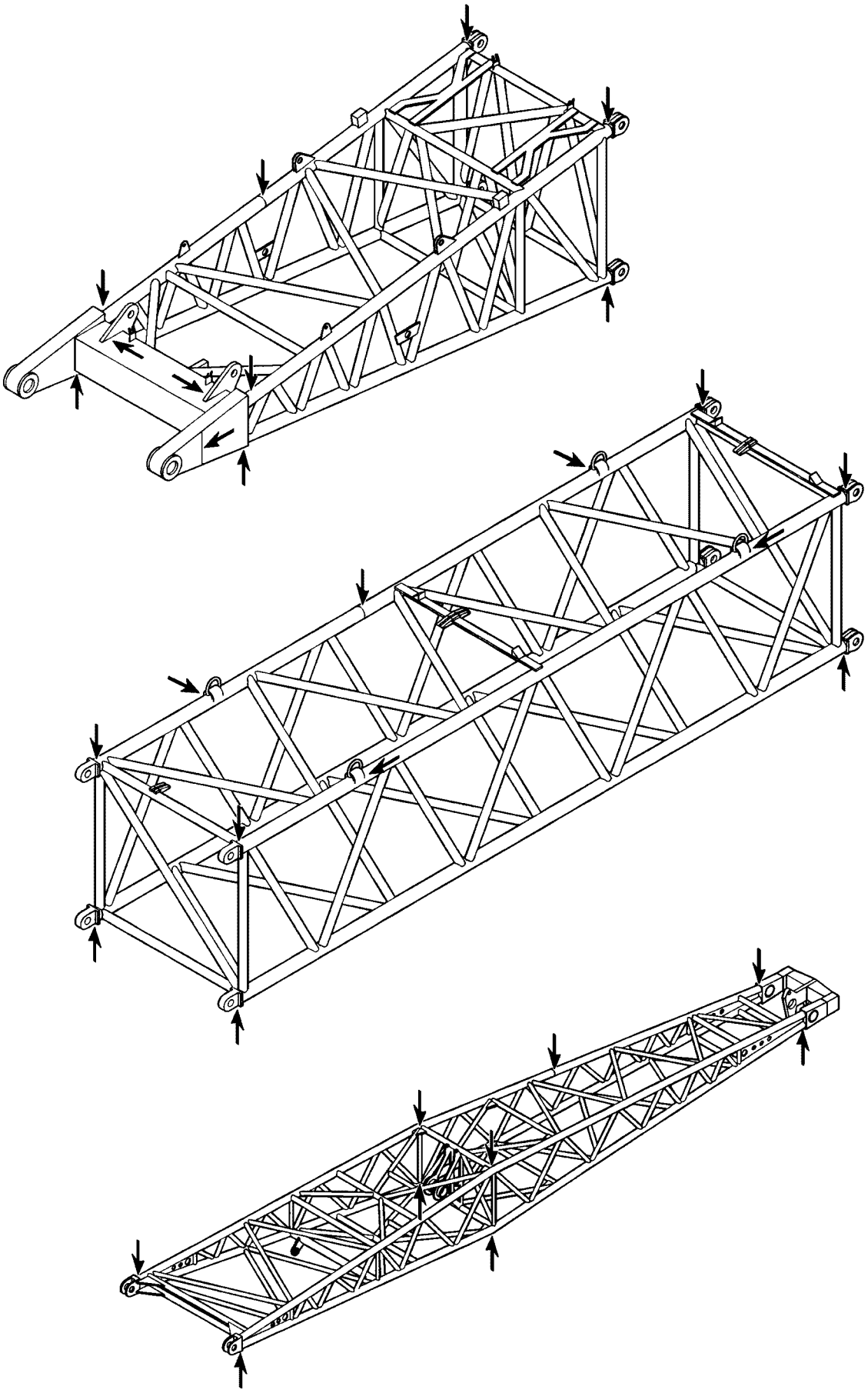
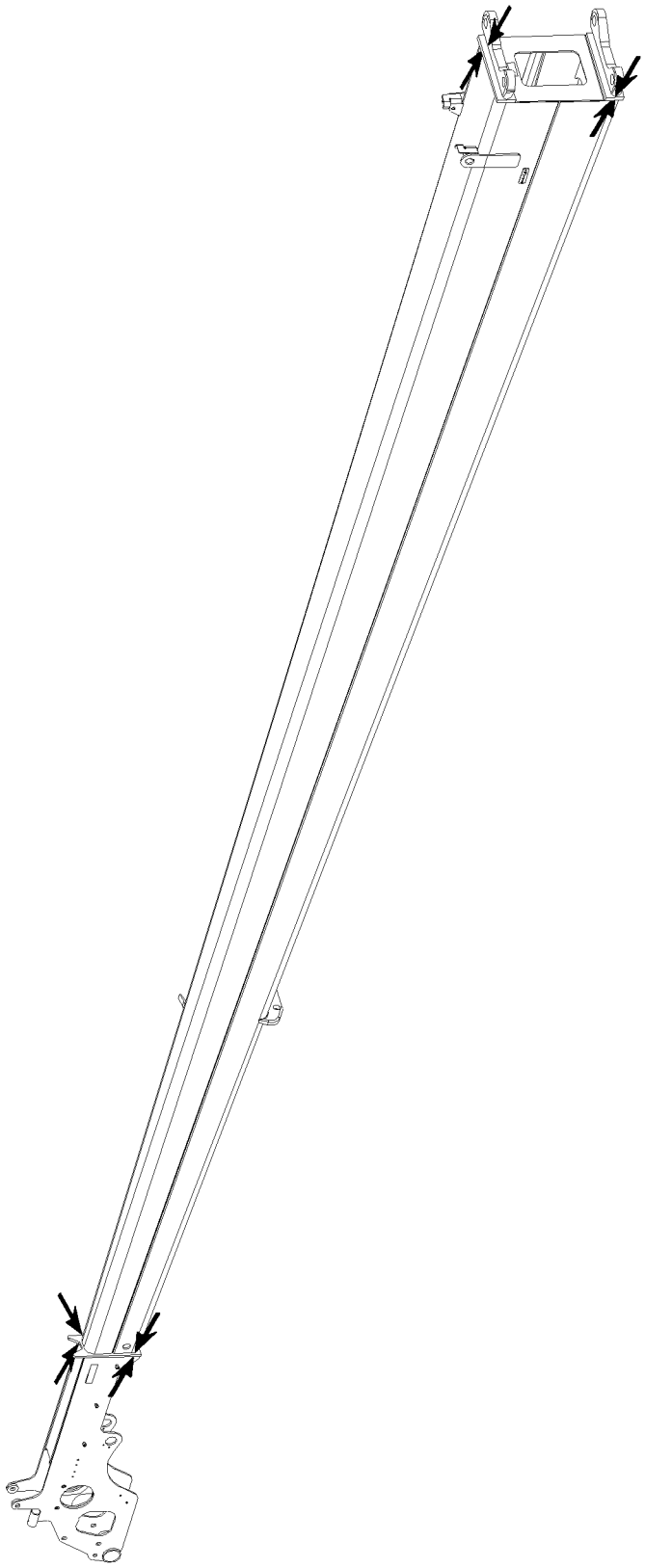


Fig.185052: Example for NA / WA-frame



LWE/LG 1750-006/15409-07-02/en

Fig.105713: Example for end section

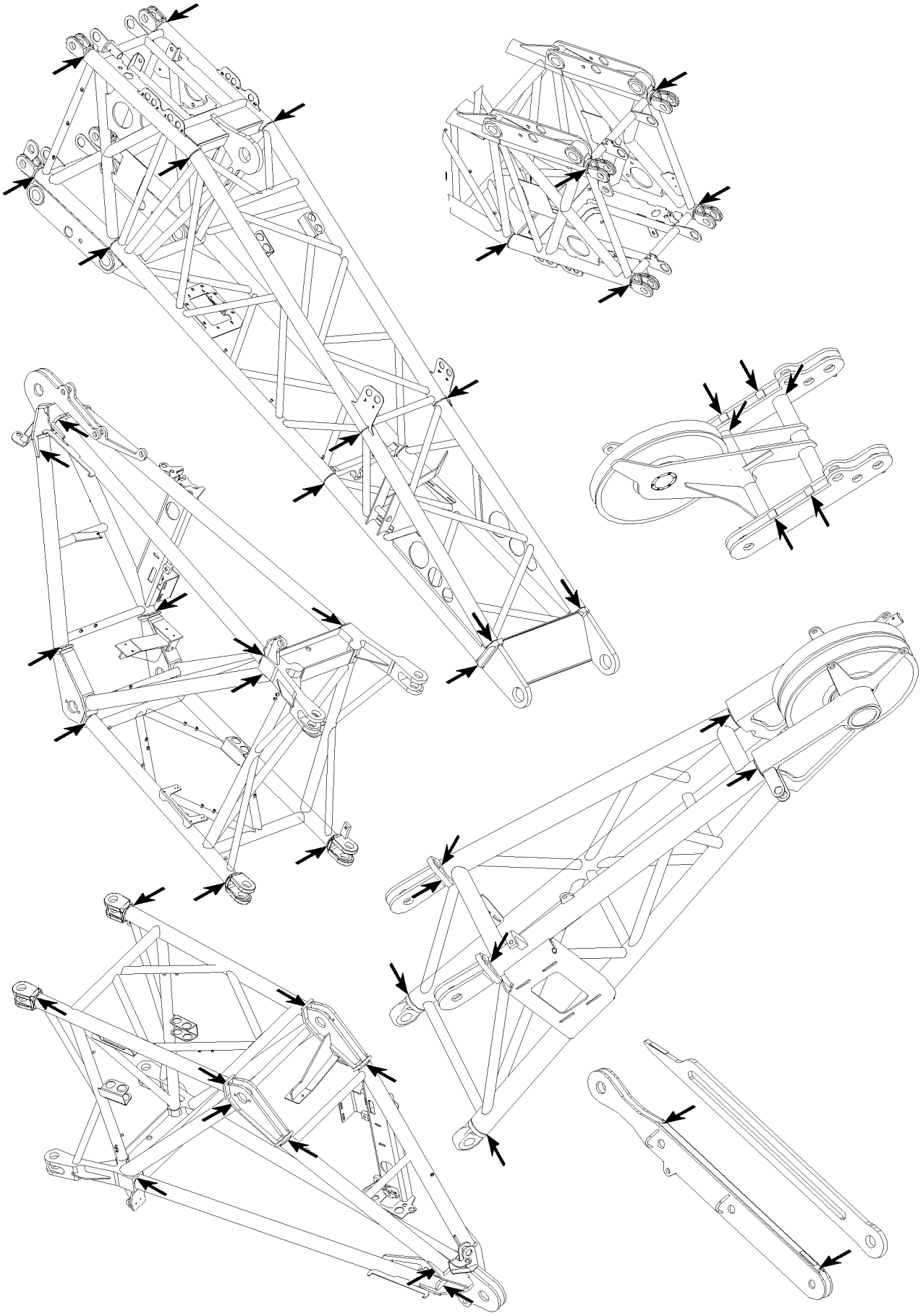


Fig.105836: Example for pivot section, adapter and boom nose

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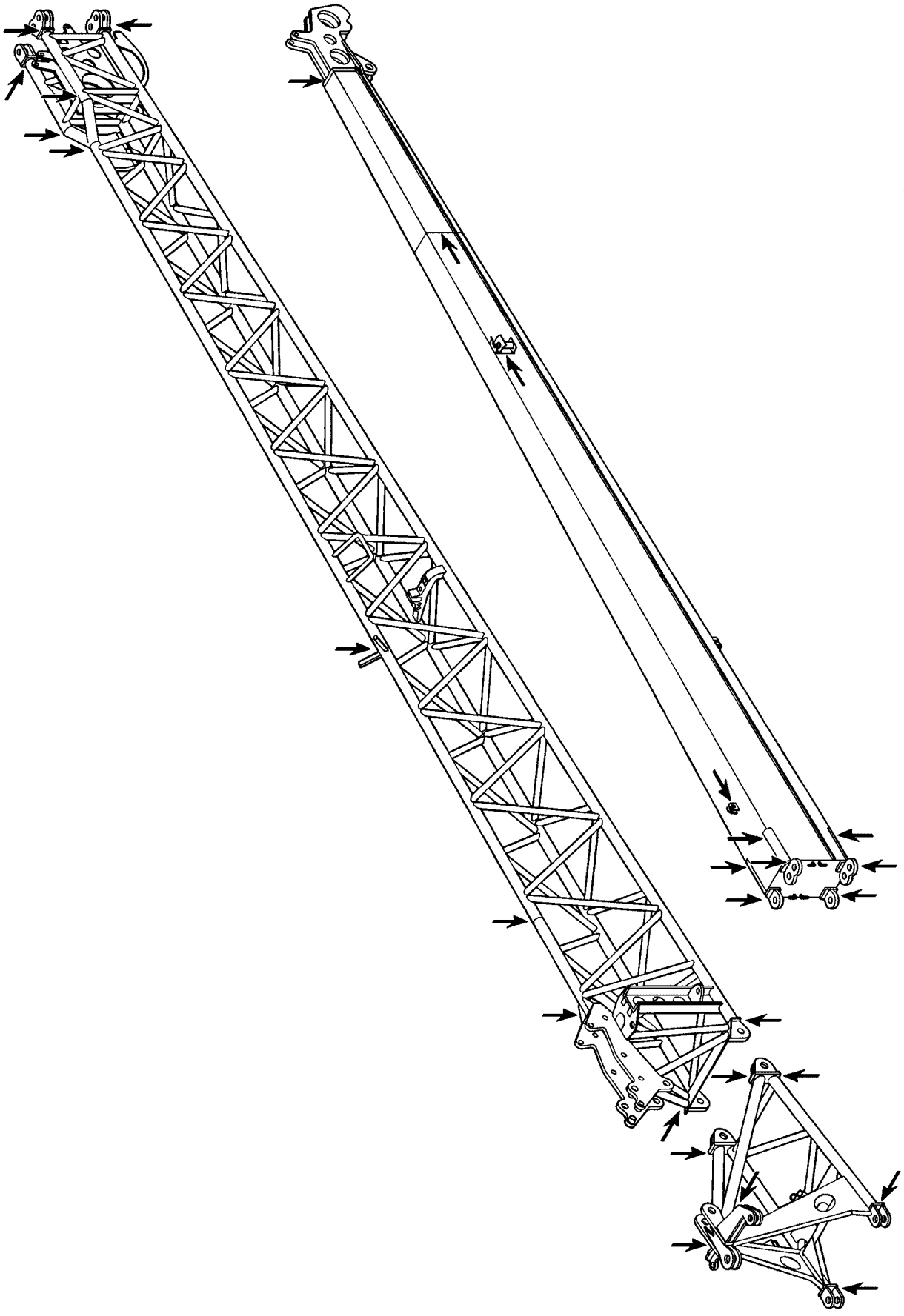
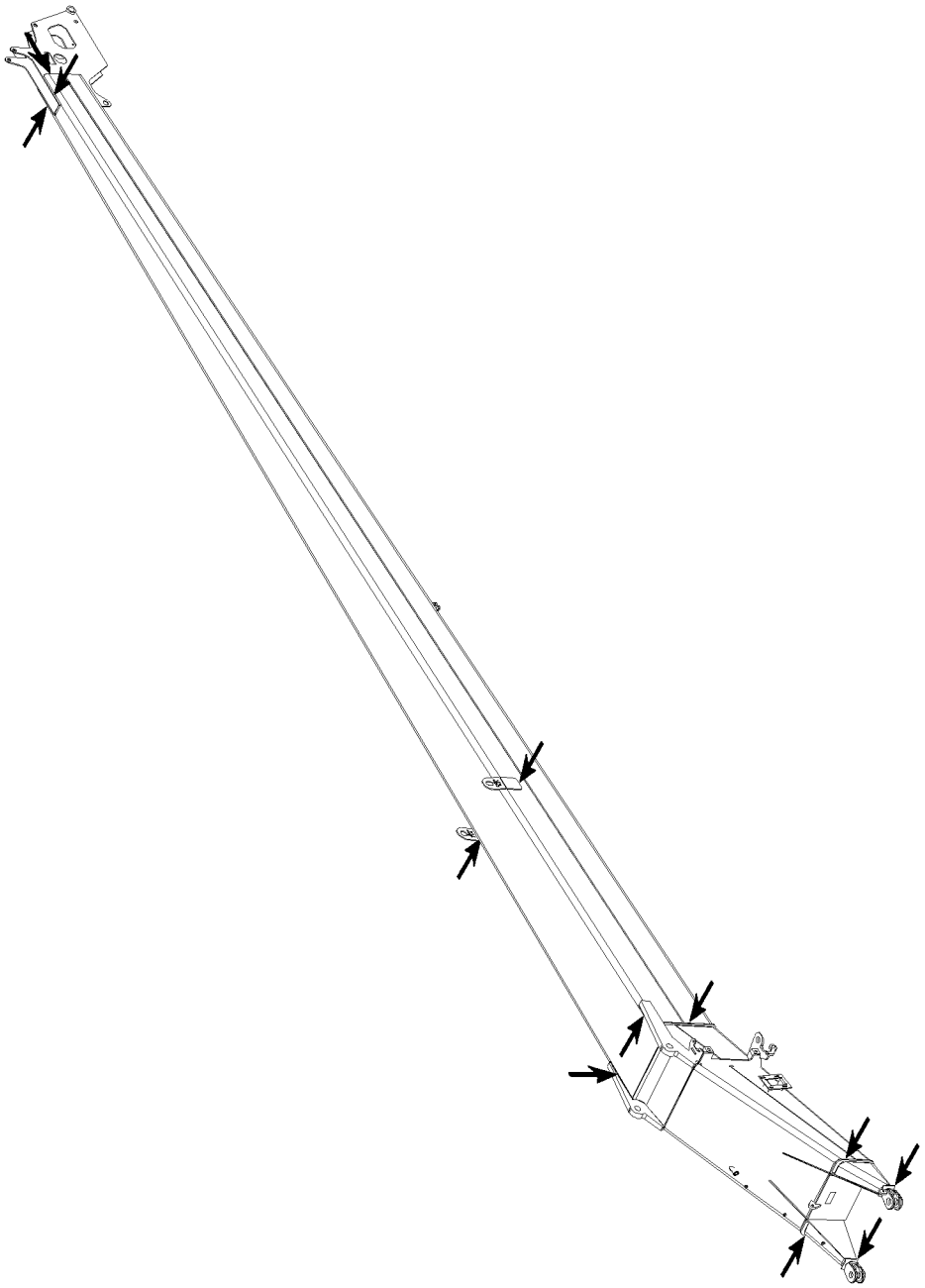


LWE/LG 1750-006/15409-07-02/en

Fig.185058: Example for folding jib



LWE/LG 1750-006/15409-07-02/en

Fig.105697: Example for folding jib

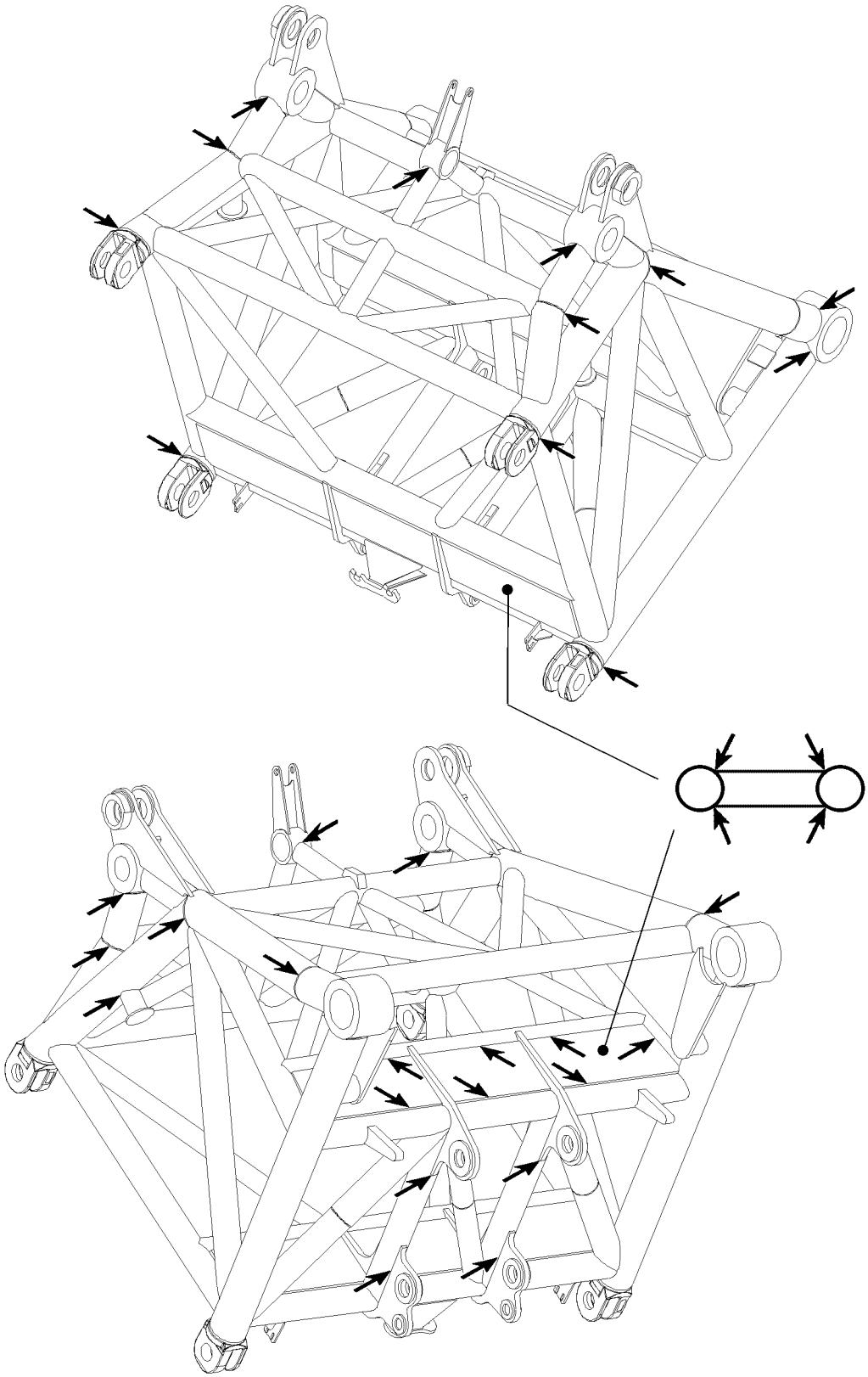


Fig.105732: Example for W-connector head

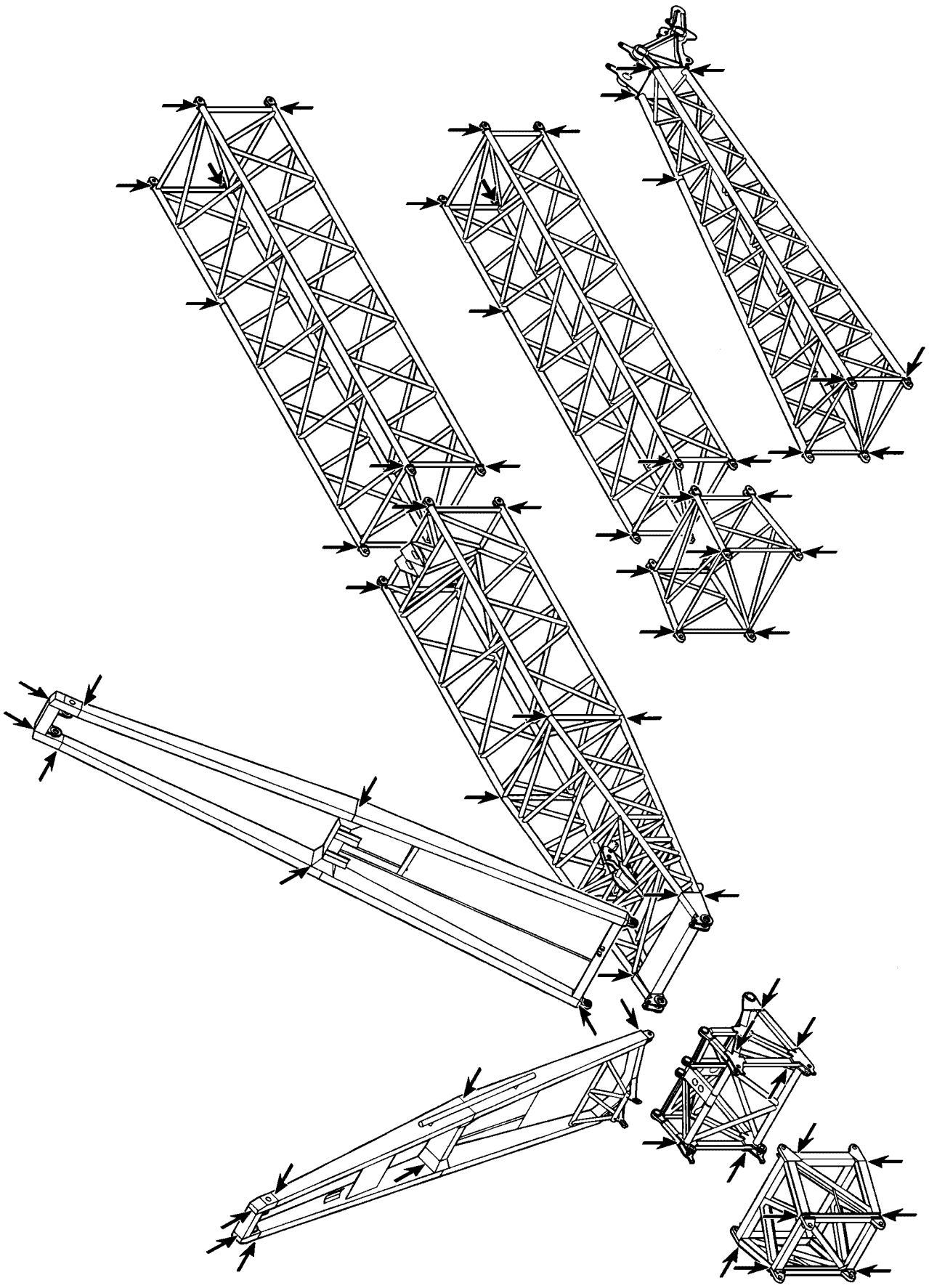


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Fig.185053: Example for assembly unit with lattice jib

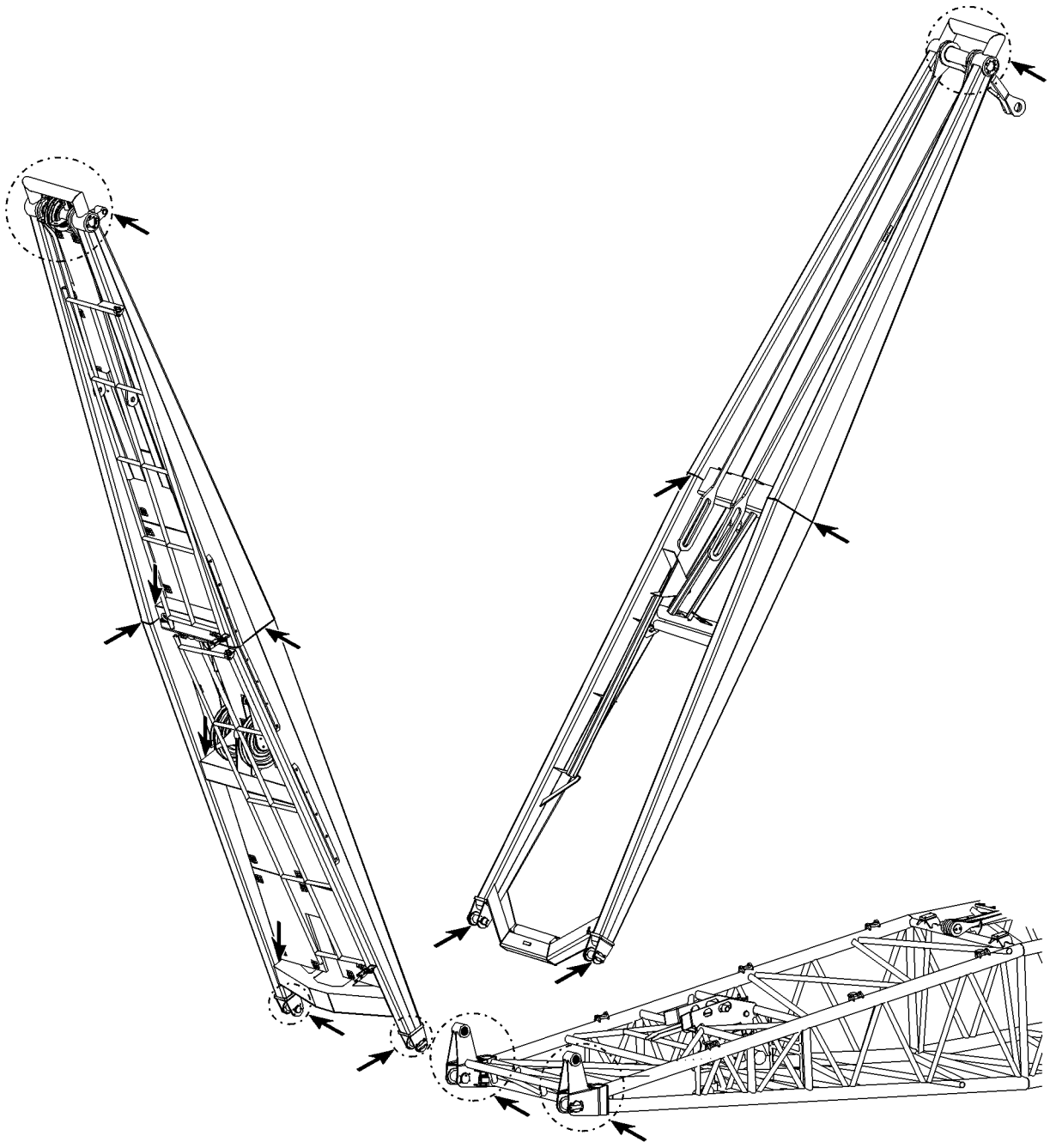

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Fig.105838: Example for NA frames

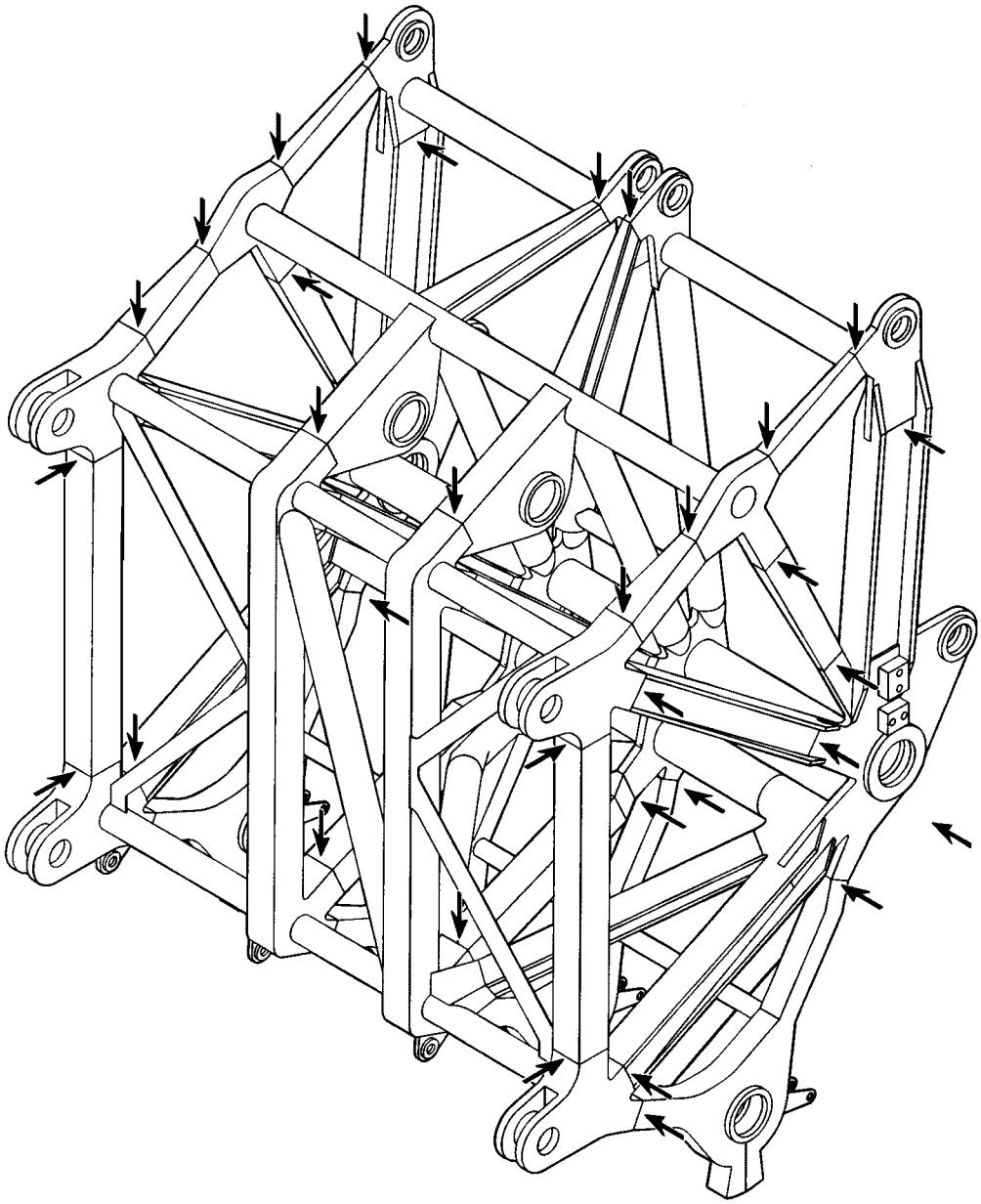

Fig.185054: Example for pulley head

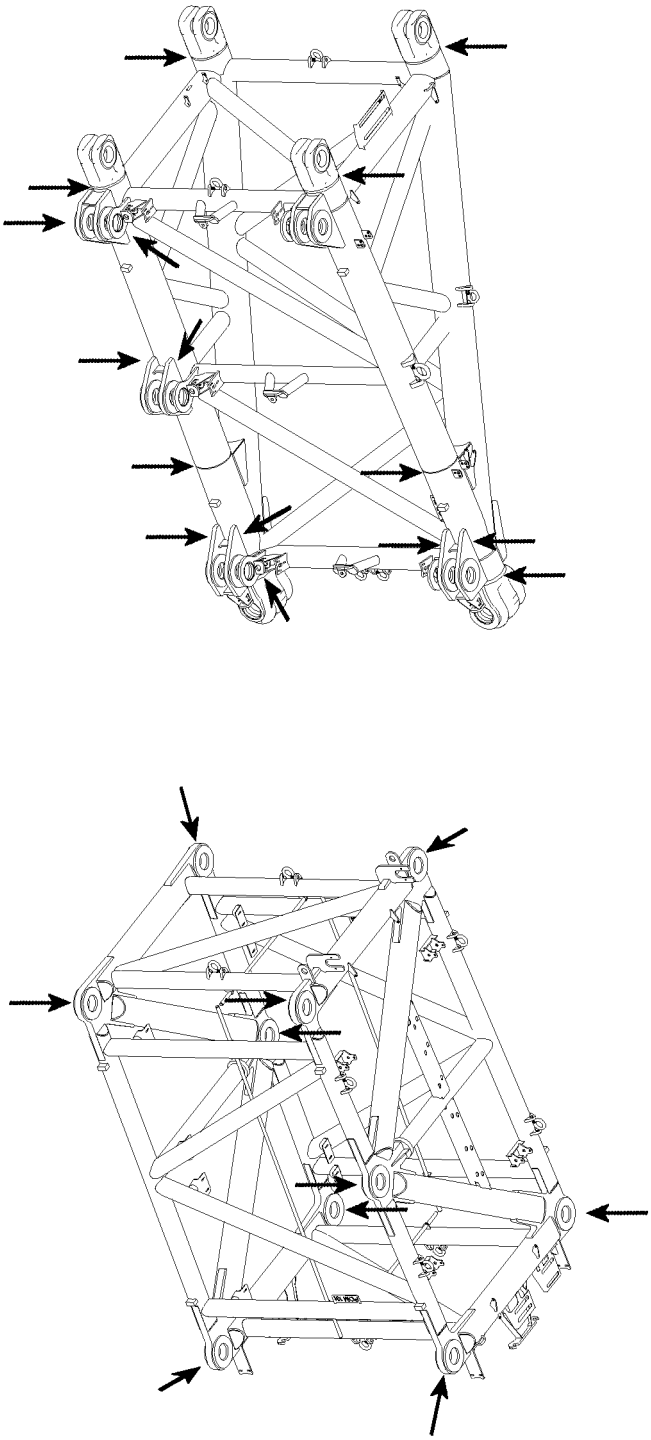

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Fig.116609: Example for P-adapter

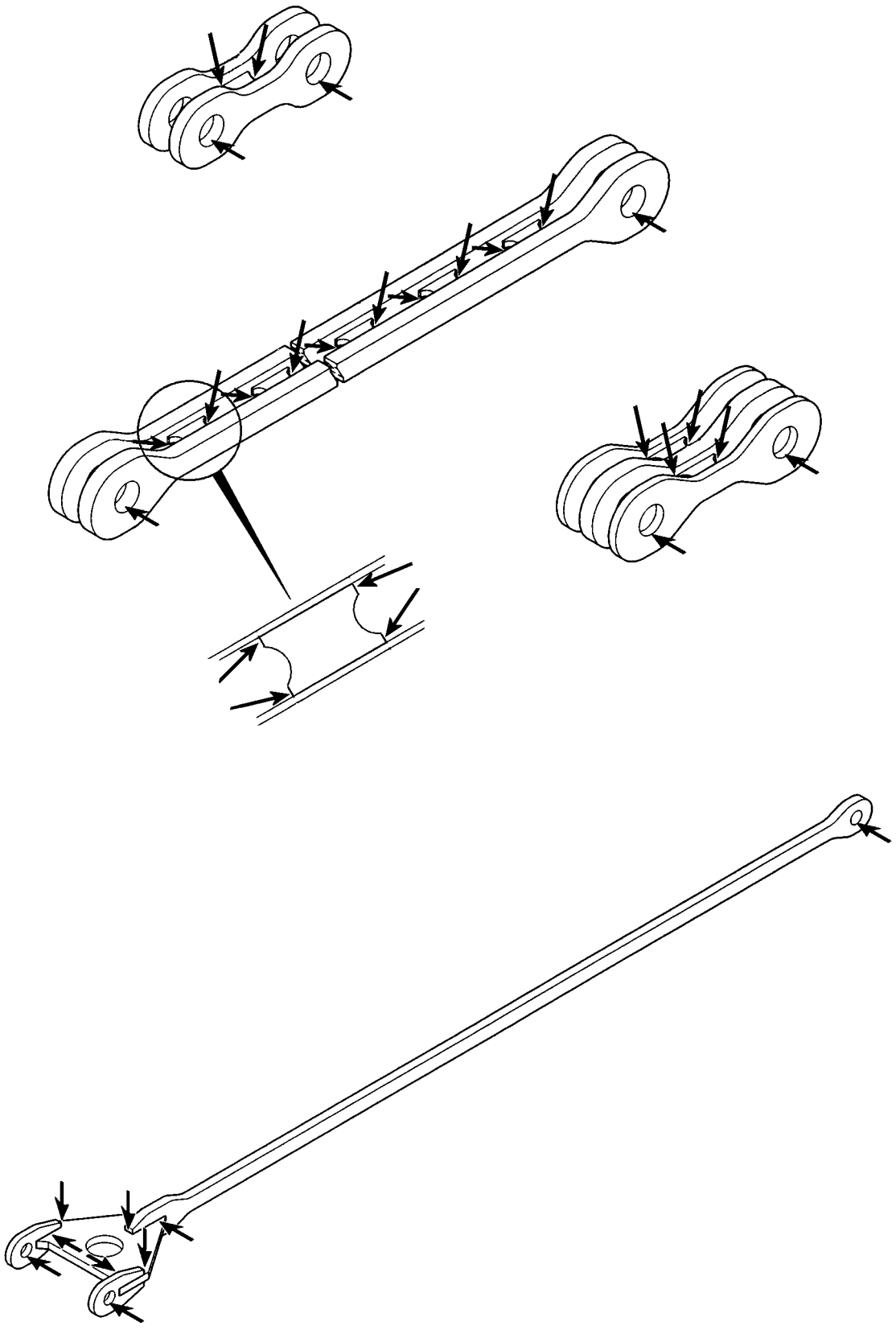
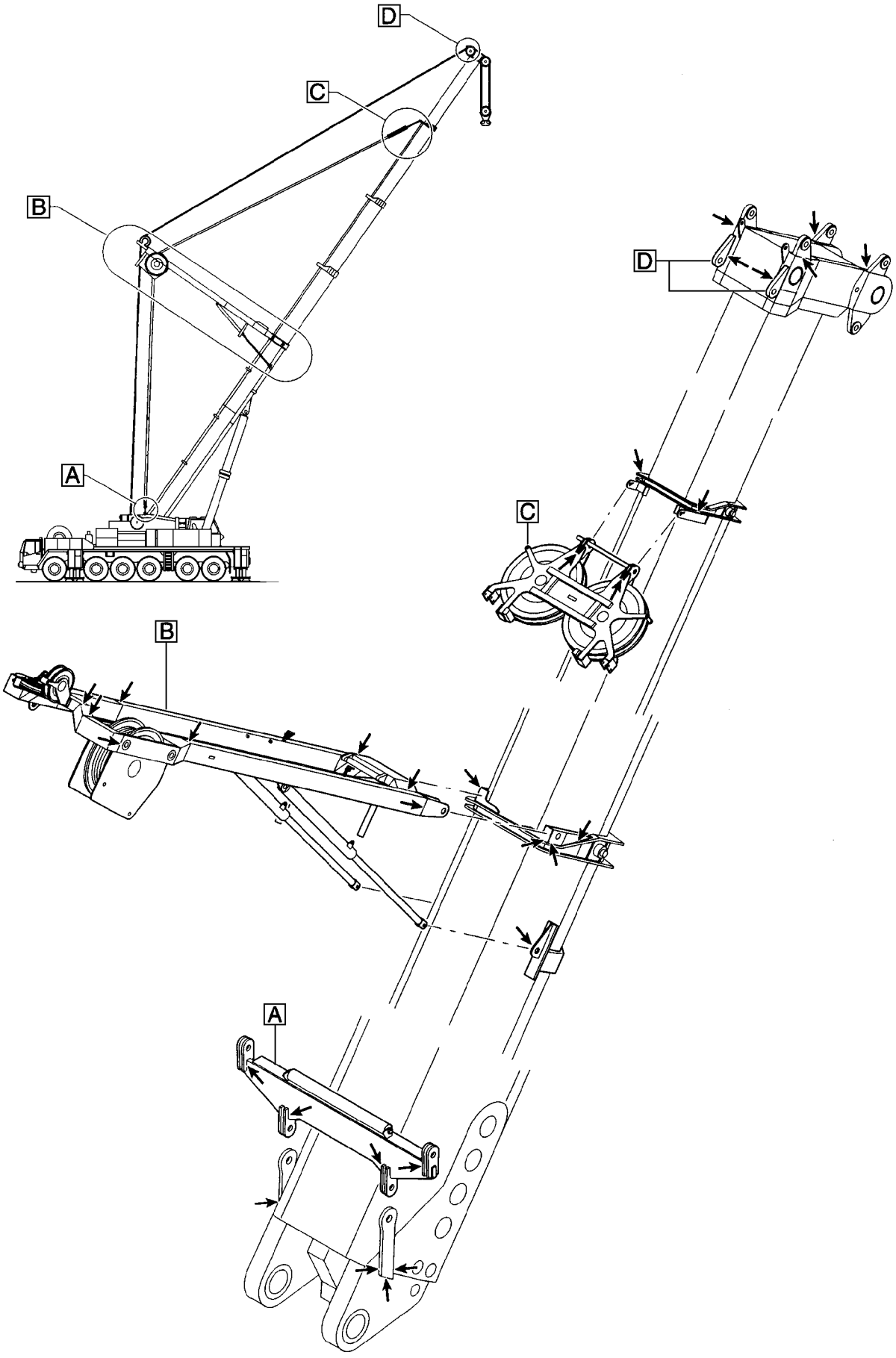


Fig.185055: Example for guy rod



LWE/LG 1750-006/15409-07-02/en

Fig.185059: Example for TA-guying

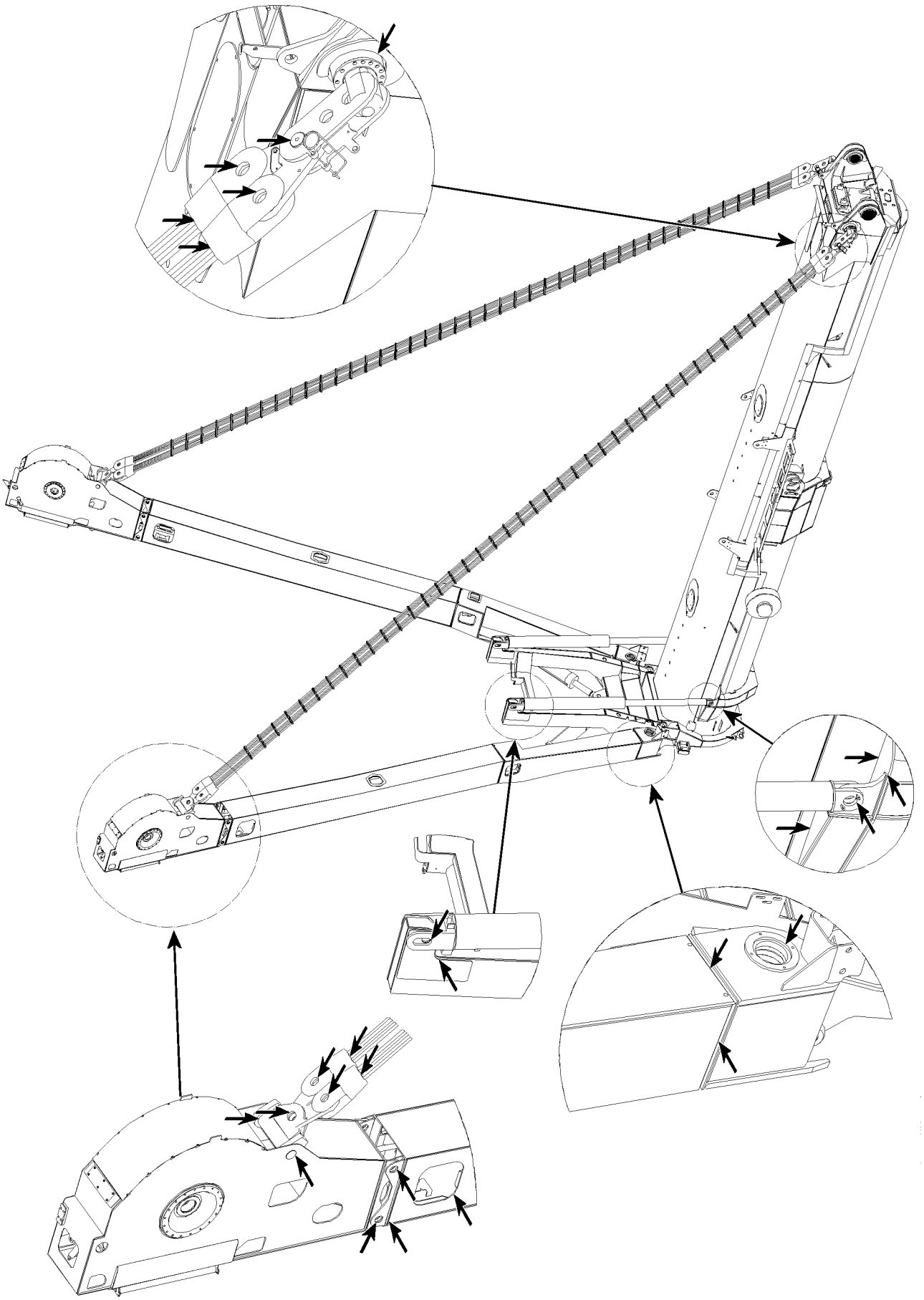


Fig.105707: Example for TY-guying

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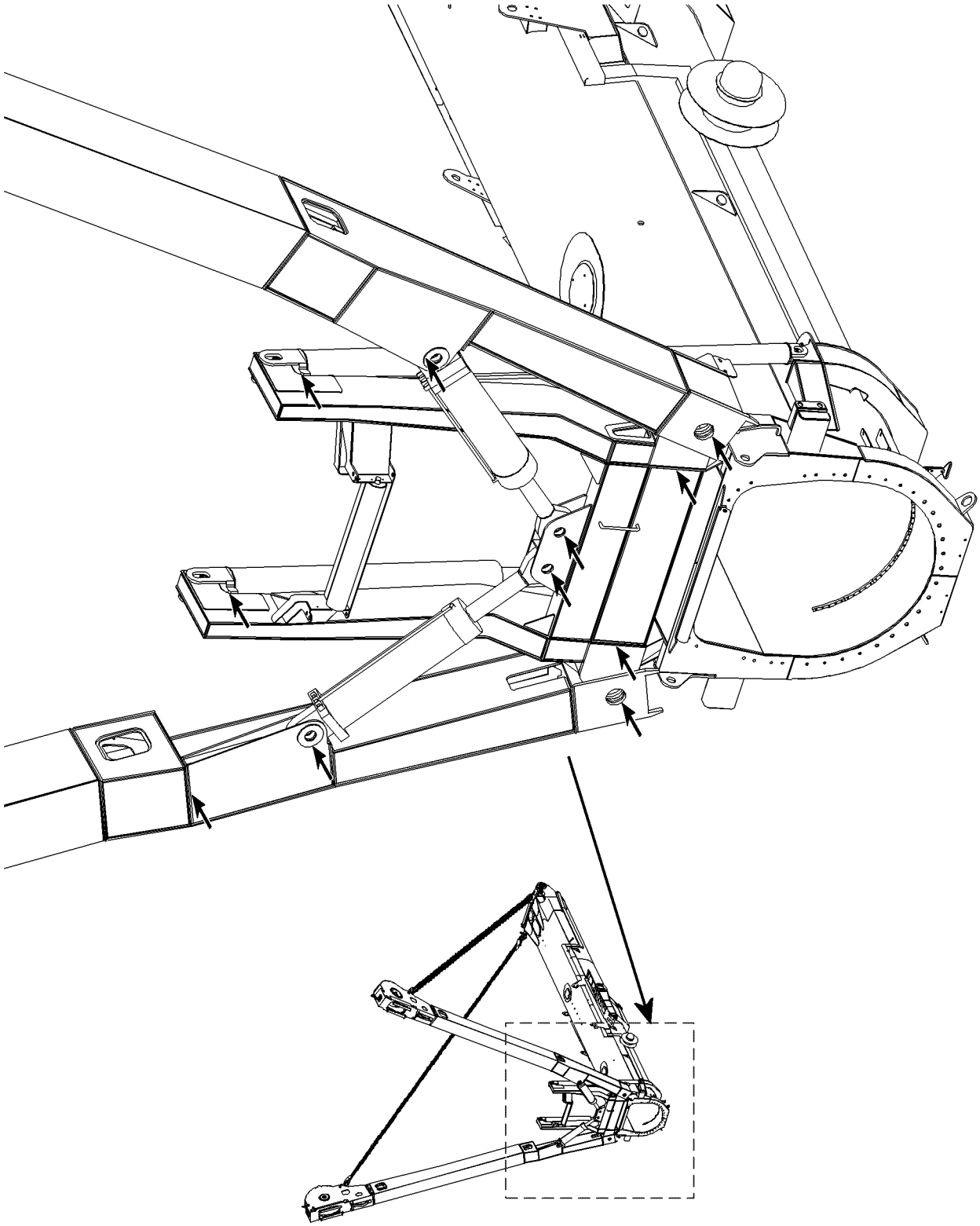

LWE/LG 1750-006/15409-07-02/en

Fig.105708: Example for TY-guying

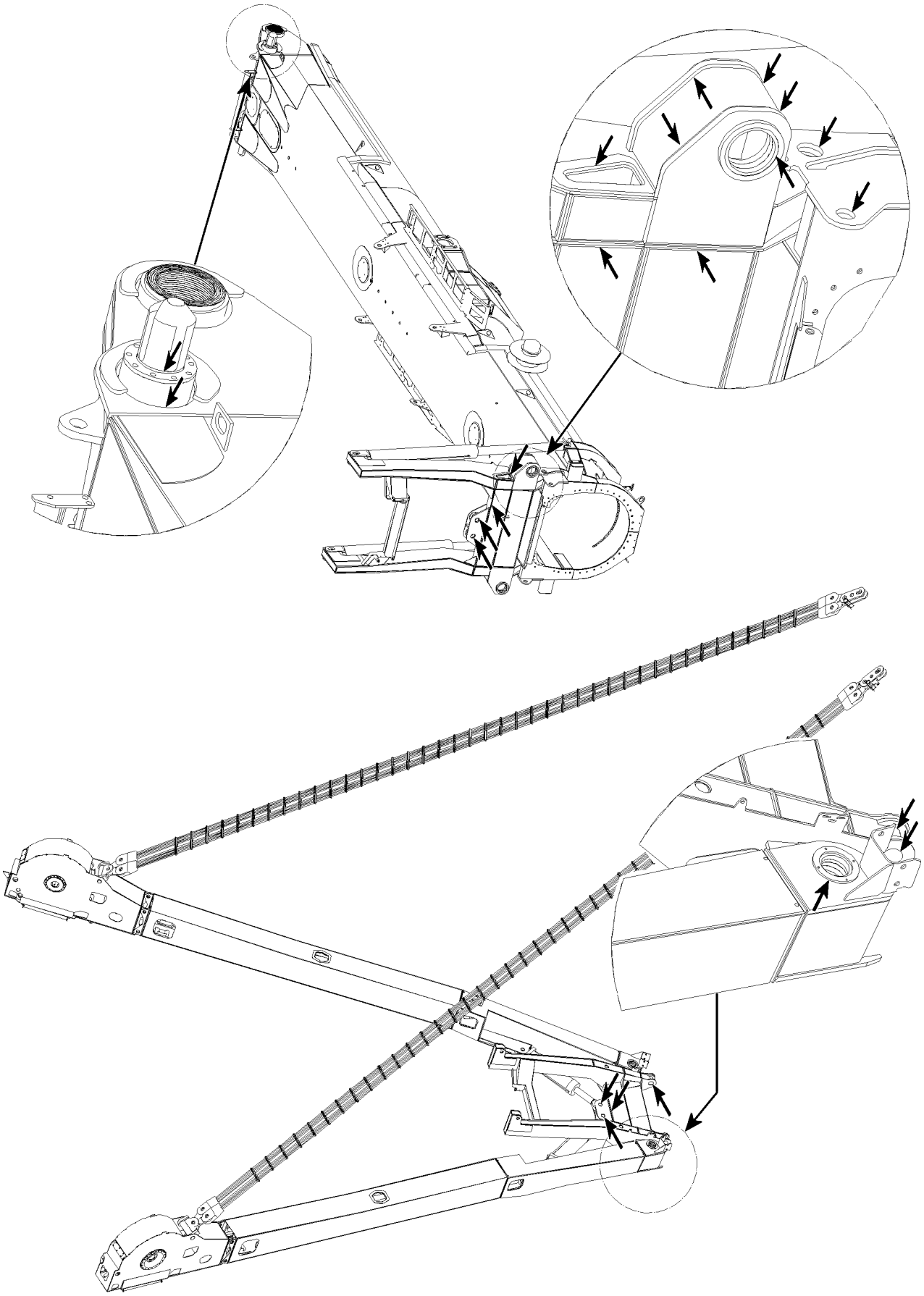

Fig.105709: Example for TY-guying

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2.4 Rigging and fastening points

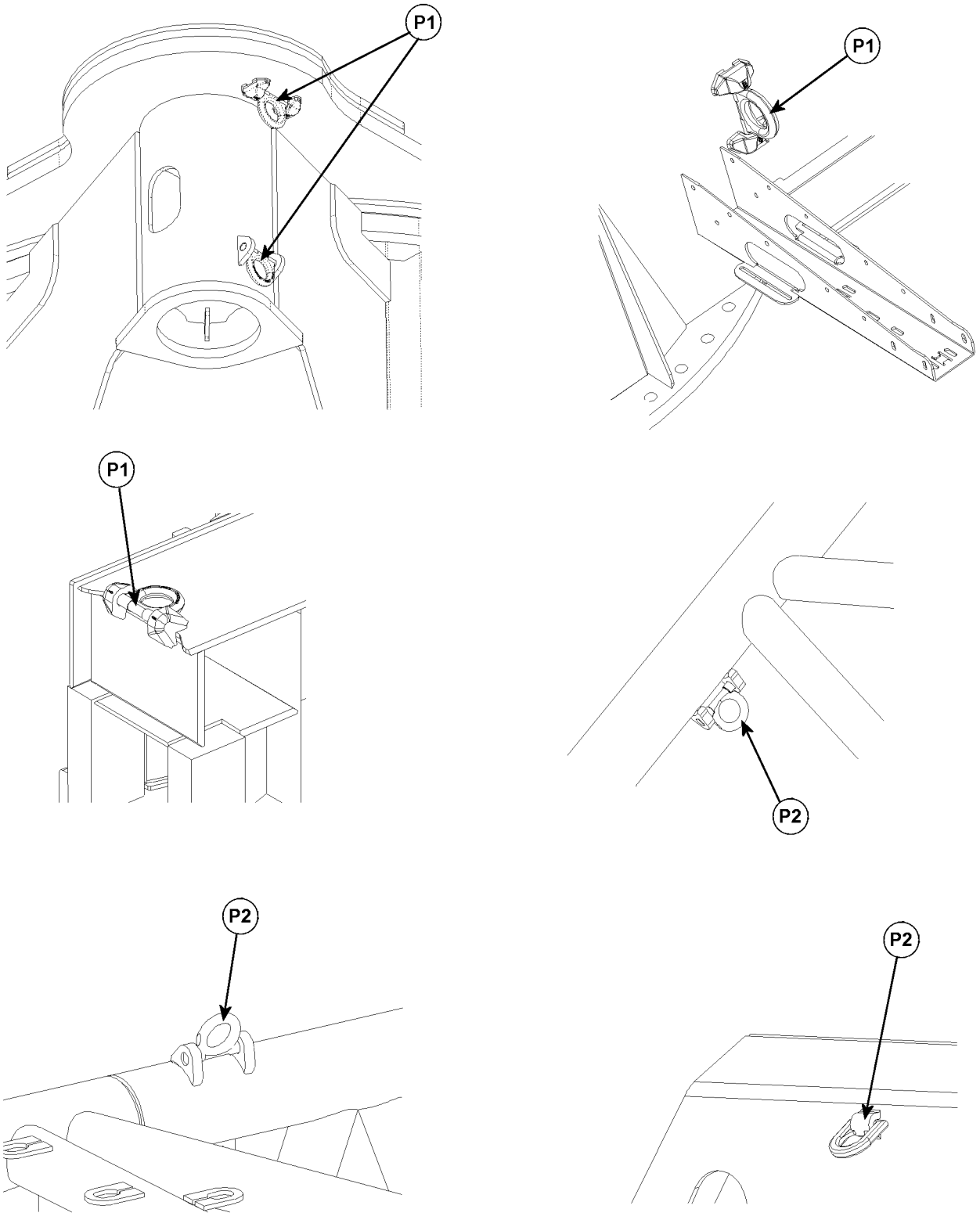

Fig.121160: Examples for rigging and fastening points

P1 Rigging points **P2** Fastening points

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WARNING
Unsafe rigging point or fastening point!
The mobile crane or component can rip free and fall down!

When a rigging point or fastening point is not safe for operation:
▶ Have the rigging point or fastening point replaced by authorized and trained expert personnel.
▶ Avoid damage on the rigging device due to sharp-edged exposure.

Make sure that the following damage does **not** occur:
– Crushing points
– Shearing points
– Catch points
– Impact points

Inspection criteria:
– Completeness of rigging point.
– Distortion of carrying parts.
– Mechanical damage such as severe nicks.
– Changes in diameter due to wear.
– Significant corrosion (pitting)
– Cracks on carrying parts.
– Cracks or other damage on the welding seam.

Check the rigging points **P1** and fastening points **P2** before every start up and at regular intervals.

2.5 Inspecting the lattice sections

Note
▶ The illustration is only an example and is valid for all lattice sections!
▶ Check all diagonal and frame pipe connections!
▶ Check all bores of the fork - finger connections!

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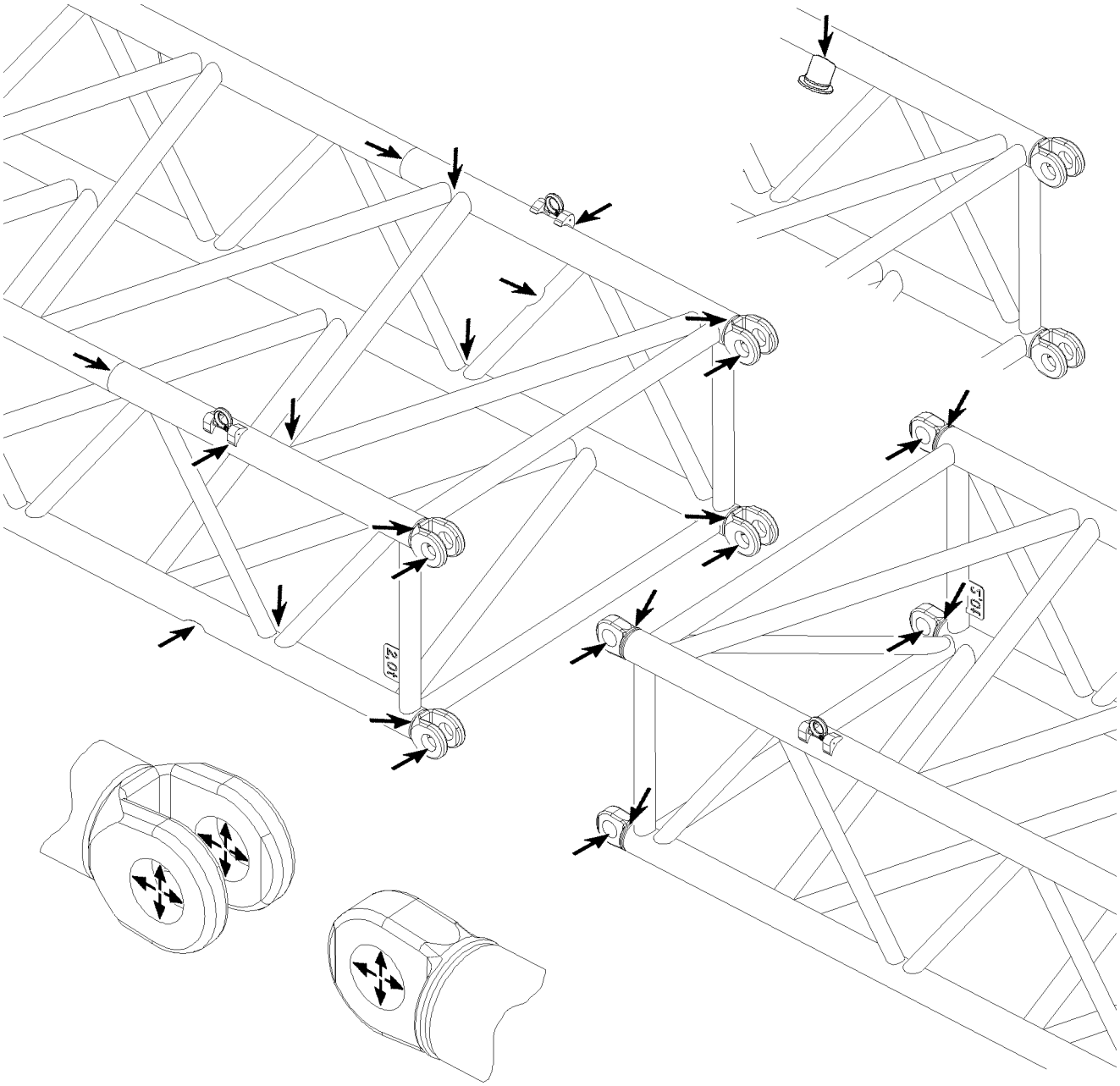

Fig.121023: Example for lattice sections

3 Inspection of locking system of telescopic boom

3.1 For cranes with pneumatic boom locking system

- For inspection of function, see chapter 8.11.
- For inspection of pin wear pattern, see chapter 8.11.
- For inspection of wear, see chapter 8.11.
- For inspection of safety control, see chapter 8.11.

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3.2 For cranes with telescopic boom system Telematik

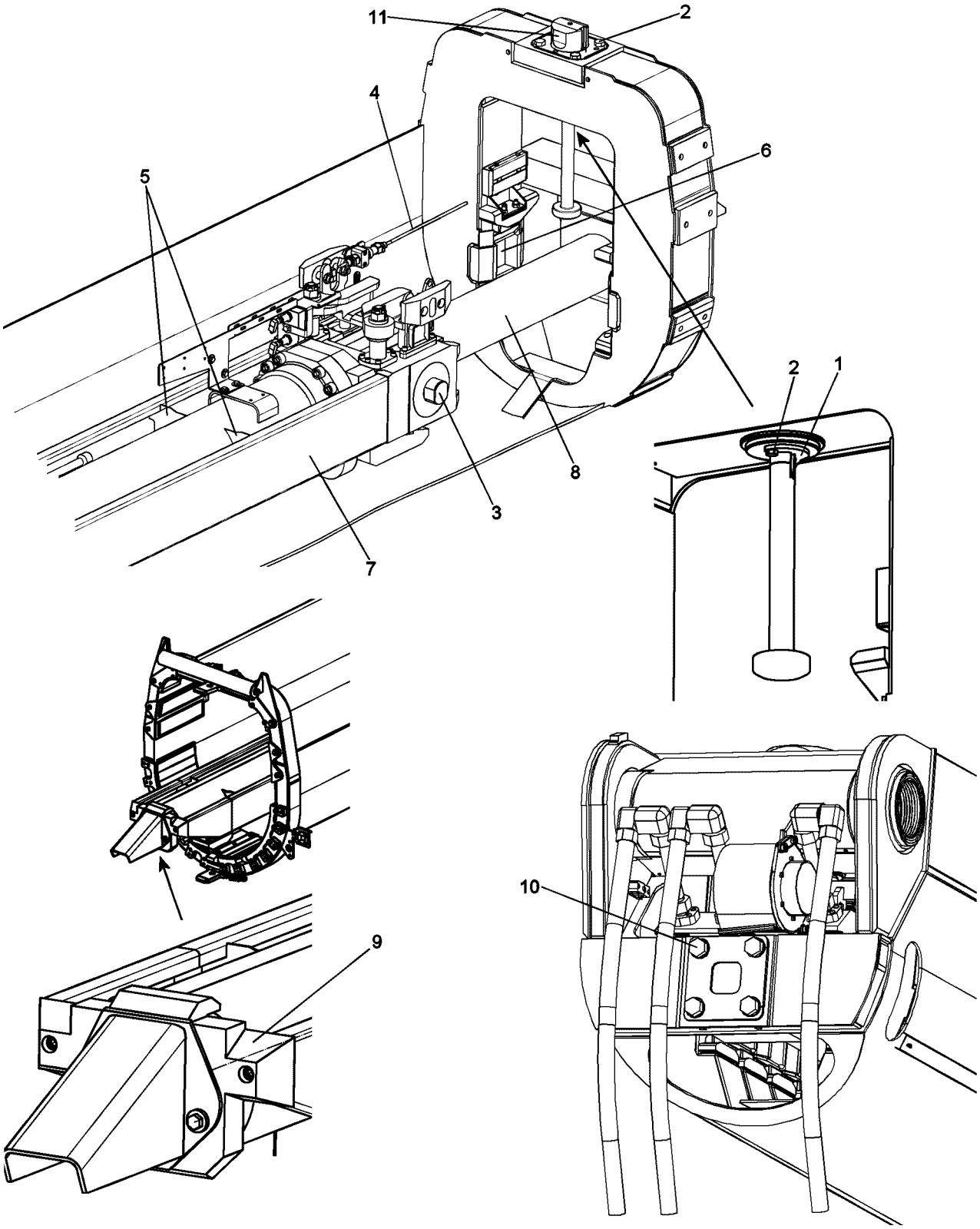

Fig.109286

- Inspection of the pull knob safety **1** and all mounting screws **2** for tight seating
- Inspection of twist guards of cylinder pinning **3** and the telescopic boom pinning **11**
- Inspection of the length sensor rope **4** for damage
- Inspection of the cylinder barrel in the area of all welding seams **5** for crack formation
- Inspection of the locking pockets **6** for damage

- Grease the guide rail **7**
- In case of leakage: Inspection of the piston rod **8** for grooves
- Inspection of the wear pattern on the cylinder pinning **3** and the telescopic boom pinning **11**
- Inspection of guide rail **7** for distortion of contour
- Inspection of plastic guide **9** on cylinder bottom for damage
- Inspection of all mounting screws **10** on the push out cylinder for tight seating

4 Inspection of safety ropes and anchor points

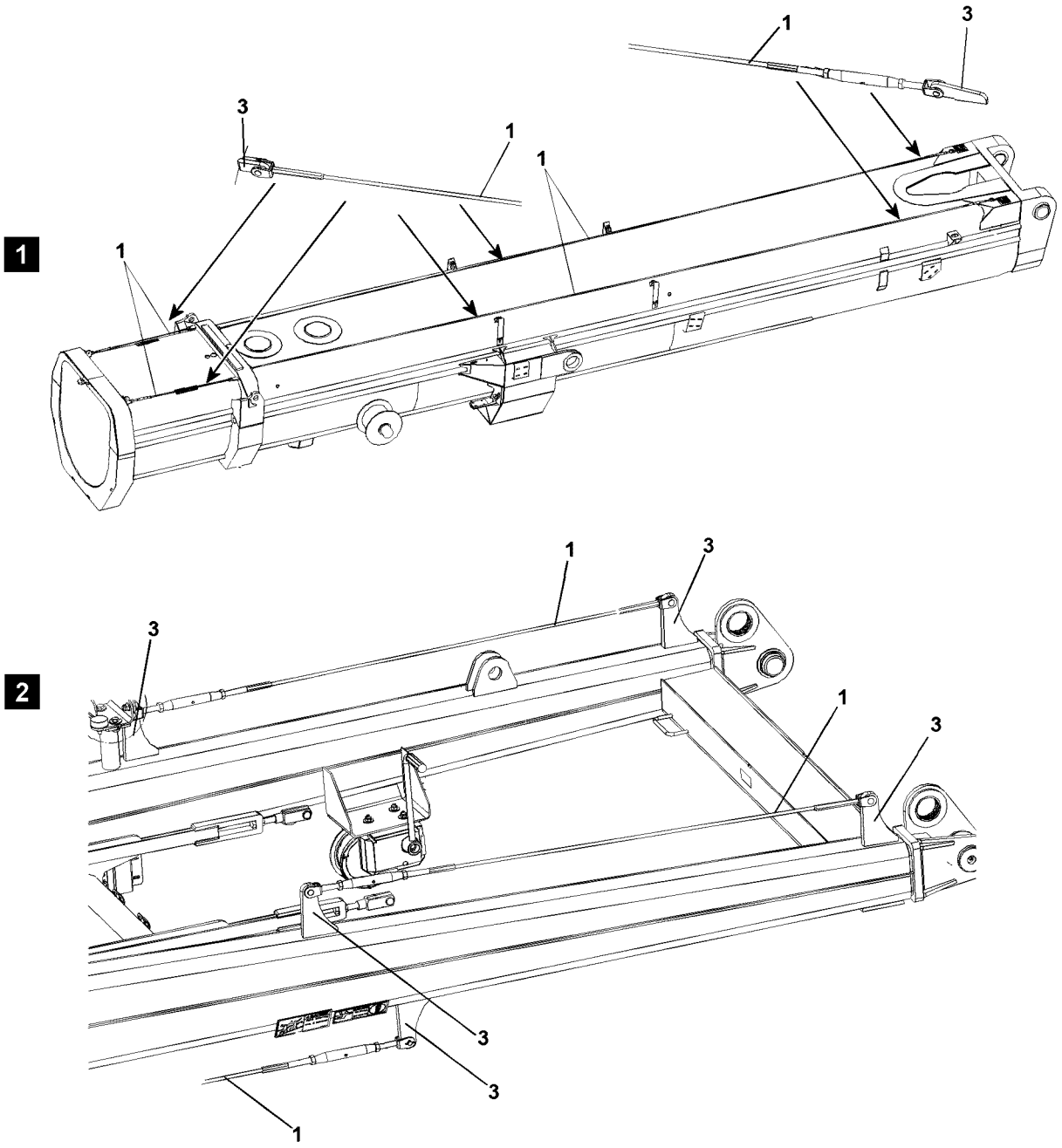

Fig.127130

WARNING
Danger of falls due to damaged safety ropes or anchor points!
The safety ropes **1** and anchor points **3** must be checked **at least once a year** by **authorized inspectors** for safety and damage!
If any defects are found on the safety ropes **1** or anchor points **3** during the inspections, then the safety ropes **1** or anchor points **3** must be replaced immediately by authorized and trained specialists! If this is not observed, assembly personnel could be killed or fatally injured in a fall!
- ▶ The rope pretension on the safety ropes must be 800 N !
- ▶ Have damaged safety ropes **1** or anchor points **3** replaced immediately by trained expert personnel!

Note
Document the inspections in writing!
- ▶ The scope and results of tests should be documented to permit reproducibility. This documentation forms part of the crane records and should be safely stored during the entire service life of the crane.

4.1 Checking of rope pretension on telescopic booms, illustration 1

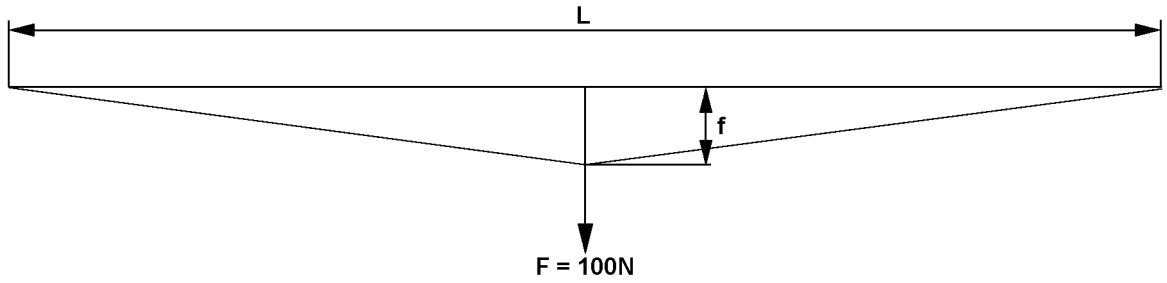

Fig.112738

The rope pretension must be 800 N. This can be checked with the aid of a spring balance, which is pulled centered on the safety rope. If the specified deflection (f) depending on the rope length (L) according to the following charts results for the raised load F = 100 N then the rope pretension of 800 N is set correctly.

Rope pretension is 800 N if:					
Rope length (L)	1.0 m	1.5 m	2.0 m	2.5 m	3.5 m
Deflection (f)	15 mm	25 mm	30 mm	40 mm	55 mm

Rope pretension is 800 N if:					
Rope length (L)	5.5 m	7.5 m	9.5 m	11.5 m	13.5 m
Deflection (f)	85 mm	115 mm	145 mm	180 mm	215 mm

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4.2 Inspection of rope pretension on lattice sections, illustration 2

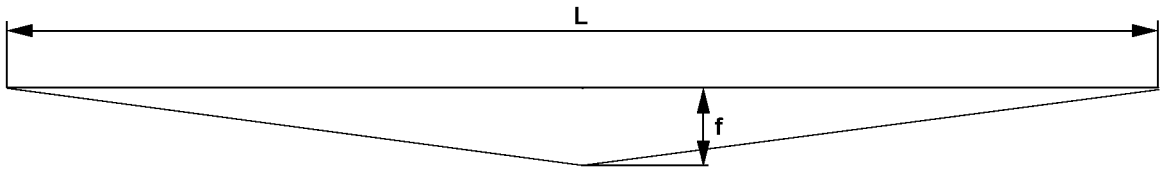

Fig.117747

The rope pretension is 800 N , if a sag (f) according to the chart is present on the safety rope according to the rope length (L).

Rope pretension is 800 N if:					
Rope length (L)	1.0 m	1.5 m	2.0 m	2.5 m	3.5 m
Deflection (f)	0	1 mm	2 mm	3 mm	6 mm

Rope pretension is 800 N if:					
Rope length (L)	5.5 m	7.5 m	9.5 m	11.5 m	13.5 m
Deflection (f)	15 mm	28 mm	45 mm	66 mm	90 mm

5 Inspection of load handling equipment and assembly aids

WARNING
Load handling equipment and / or assembly aids **not** inspected!
Death, severe bodily injuries, property damage.
▶ Inspect load handling equipment and / or assembly aids at least once a year.

The recurring inspection of the load handling equipment and / or assembly aids must be carried out once a year.

The inspections of load handling equipment and / or assembly aids must be recorded.

The welding seams must be subjected to a visual inspection.

Inspect load handling equipment and assembly aids for:
- Damage
- Wear
- Cracks

Replace damaged, worn or ripped load handling equipment and assembly aids immediately.

Repairs on load handling equipment and assembly aids may solely be made in consultation and under the instructions of the Customer Service at **Liebherr-Werk Ehingen GmbH** by authorized and trained expert personnel.

Note
▶ Document the scope of the inspection and the results in writing and comprehensibly.
▶ Save the documentation as a part of the crane records for the entire service life of the crane.

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6 Inspection of fastening equipment

WARNING
Fastening equipment **not** inspected!
Death, severe bodily injuries, property damage.
▶ Inspect the fastening equipment at least once a year.

The recurring inspection of the fastening equipment must be carried out once a year.

The inspections of the fastening equipment must be recorded.

The welding seams must be subjected to a visual inspection.

Inspect the fastening equipment according to the specifications of the corresponding regulations and standards.

Replace damaged, worn or ripped fastening equipment immediately.

Note
▶ Document the scope of the inspection and the results in writing and comprehensibly.
▶ Save the documentation as a part of the crane records for the entire service life of the crane.

7 Inspection of diaphragm reservoir

Note
▶ The national regulations for pressurized container inspection must be observed!

The inspection of the diaphragm reservoir for specified gas pressure must be carried out by an **authorized inspector**, see chapter 7.04 and chapter 7.05.

8 Inspection of relapse cylinders

WARNING
Fatal accidents due to defective relapse cylinders!
Loss of oil or corrosion can damage the relapse cylinders!
Safe crane operation is no longer ensured!
▶ Crane operation with defective relapse cylinders is prohibited!

8.1 Pressure test of relapse cylinders

The relapse cylinders must be inspected annually by an **authorized inspector**. The purpose of the inspections is to avoid accidents by detecting deficiencies early on.

8.2 Checking the gas pressure and oil fill before operation

WARNING
Fatal accidents due to defective relapse cylinders!
Loss of oil or corrosion can damage the relapse cylinders!
Safe crane operation is no longer ensured!
▶ Before every start-up: Carry out a visual inspection for leaks, damage and corrosion on the relapse cylinders.
▶ If any defects are found, the relapse cylinders must be inspected by the cylinder manufacturer!

The gas pressure and the oil fill must be checked by an **authorized inspector** for pressure tanks.

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8.3 Inspection of the safety controls on the relapse cylinders

Inspecting the interlocking system or limit switches on the relapse cylinders and the boom A-frames, see Chapter 8.12.

9 Inspection of rope pulleys

9.1 Checking for damage and cracks

DANGER
Danger of accident in case of damage or cracks!
▶ Replace rope pulley immediately!

Check the entire rope pulley assemblies for damage and cracks once a year.

If rope pulleys are subjected to any impacts (e.g., with buildings) or are otherwise overloaded, they must be visually inspected for damage or cracks immediately.

9.2 Checking the groove diameter

NOTICE
Worn rope pulleys!
The functionality and service life of the rope is reduced. Damage on rope.
▶ Before placing the rope, check the groove diameter of rope pulleys.

Visible wear on rope pulleys:
– Reduced groove diameter
– Negative impressions of the rope profile in the groove

Make sure that the following tools are available:
– Groove caliber

Make sure that the following prerequisites are met:
– All components to be inspected are cleaned.
– The rope does **not** obstruct the inspection of the components

Note
▶ The actual groove diameter **must** be larger than the actual diameter of the rope!

The groove diameter of rope pulleys and winches must be at least 6 % larger than the nominal rope diameter.

Check the rope pulleys with a groove caliber for wear. When wear exists on the rope grooves: Fix the rope pulleys or replace.

10 Inspection of carrier rollers

10.1 Checking visually

DANGER
Damaged carrier rollers!
Breakage and falling components. Death, severe bodily injuries, property damage.
▶ Carry out a visual inspection according to the maintenance intervals.
▶ Replace the carrier roller immediately.

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The visual inspection must be carried out according to the following criteria:
- Wear
- Damage
- Cracks

Visible wear on carrier rollers:
- Negative imprints of the rope profile on the circumference of the carrier rollers
- Lead-in tracks

10.2 Checking the depth of the lead-in tracks

DANGER
Worn carrier rollers!
Breakage and falling components. Damage to ropes. Death, severe bodily injuries, property damage.
▶ Check the depth of the lead-in tracks.
▶ Replace worn carrier rollers immediately.

Make sure that the following prerequisites are met:
- All components to be inspected are cleaned.
- The rope does **not** obstruct the inspection of the components.

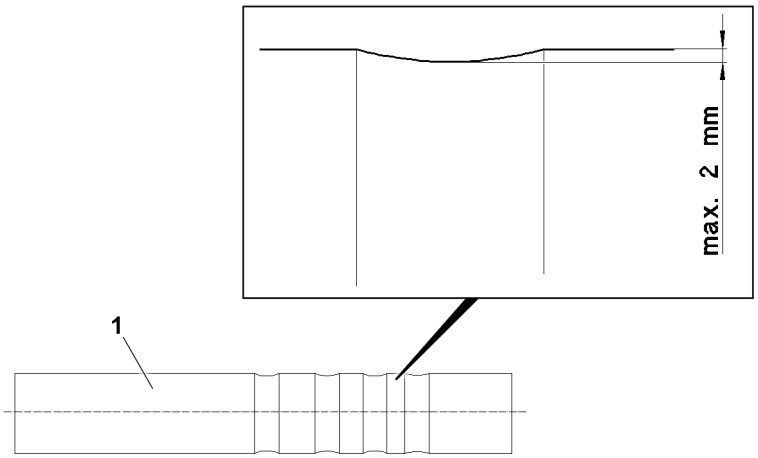

Fig.124864: Permissible depth of the lead-in tracks

1 Carrier roller

The depth of the lead-in tracks may be maximum 2 mm.

10.3 Checking bearings for easy movement

Stiff or blocked carrier rollers wear unevenly and cause serious rope abrasion.

Ineffective carrier rollers can lead to irregular rope tension.

Tasks to check the carrier rollers:
- Check the carrier rollers for proper movement in their bearings.
- When carrier rollers are **not** easily moveable in their bearings: Fix the bearings.

10.4 Checking the tightening torque

The tightening torque of screws must be checked according to maintenance interval.

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11 Inspection of extension conditions of sliding beams

The extension conditions of the sliding beams must be inspected annually by an **authorized inspector**.

Check the extension conditions on every sliding beam:
- Check if the position 0 % of the LICCON display matches the actual condition of the sliding beam.
- Check if the position 100 % of the LICCON display matches the actual condition of the sliding beam.

12 Inspection of the function of the overload protection

Position the longest boom at minimum and maximum radius: Check the load indicator, using the hook block as a test load.

The display reading may not deviate by more than 10 % off the true load value at these two extreme positions.

Measure the indicated radius for the longest boom at its minimum radius and at a boom angle of 45°.

The indicator readings may not deviate more than 10 % off the measured boom radius.

13 Inspecting the pin connections

WARNING
Pin connections **not** inspected!
Death, severe bodily injuries, property damage.
▶ Inspect the pin connections at least once a year.

The recurring inspection of all pin connections must be carried out once a year.

The inspections of the pin connection must be recorded.

Check the pin connections for:
- Properly secured pin connections
- Damage to the pins and / or connector elements
- Damage to the retaining elements

Replace damaged pins immediately.

Immediately replace damaged, bent or broken retaining elements.

Only replace damaged pins with identical pins.

Only replace damaged retaining elements with identical retaining elements.

Note
▶ Document the scope of the inspection and the results in writing and comprehensibly.
▶ Save the documentation as a part of the crane records for the entire service life of the crane.

14 Inspection of slewing ring connection

14.1 Checking the tilt play

The wear of the slewing ring connection is determined by measuring the tilt play with the ring installed.

The permissible tilt play depends on the type of slewing ring connection.

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WARNING
The tilt play of the slewing ring connection is too large!
If the permissible tilt play is exceeded, then safe crane operation is **no** longer possible.
Death, severe bodily injuries, property damage.

When the permissible tilt play is exceeded:
▶ Replace the slewing ring connection.

The determination of the tilt play must be carried out according to the **test instructions** of **Liebherr-Werk Ehingen GmbH**.

Request the test instructions and permissible tilt play: Contact Liebherr Service.

15 Inspection of the mounting of the load bearing equipment

15.1 Check the mounting screws for tight seating

The mounting screws must be checked for a tight fit during the annual crane inspection.

The mounting screws are pre-stressed at the factory, so that no loosening of the screw connections will occur during normal crane operation.

The screw connection may become overloaded and the mounting screws may be permanently stretched if the crane is overloaded or if the load is pulled free. The mounting screws must be checked immediately for a tight fit after an overload.

Check the tightening torque of the mounting screws of load bearing equipment for a tight fit:
- Slewing ring connection
- Winches
- Slewing gears
- Transmission
- Trailer coupling

If a mounting screw can be tightened, then the mounting screw is loose. Follow the instructions in section „Checking the mounting screws for damage“.

15.2 Checking the mounting screws for damage

Completely unscrew the loose mounting screws and check in detail for damage.

Completely unscrew the adjacent mounting screws and check in detail for damage.

Replace the mounting screw if any of the following damage is present:
- The mounting screw is stretched by more than 2 % (in relation to its original length).
- Cracks, permanent deformation or other damage is visible on the mounting screw.
- The mounting screw is uneven.
- There is pitting.
- The thread is hard to move.

If there is **no** damage, reuse the checked mounting screws (expansion screws) a maximum of two times.

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16 Inspection of the tele extension with eccentric, illustration 1

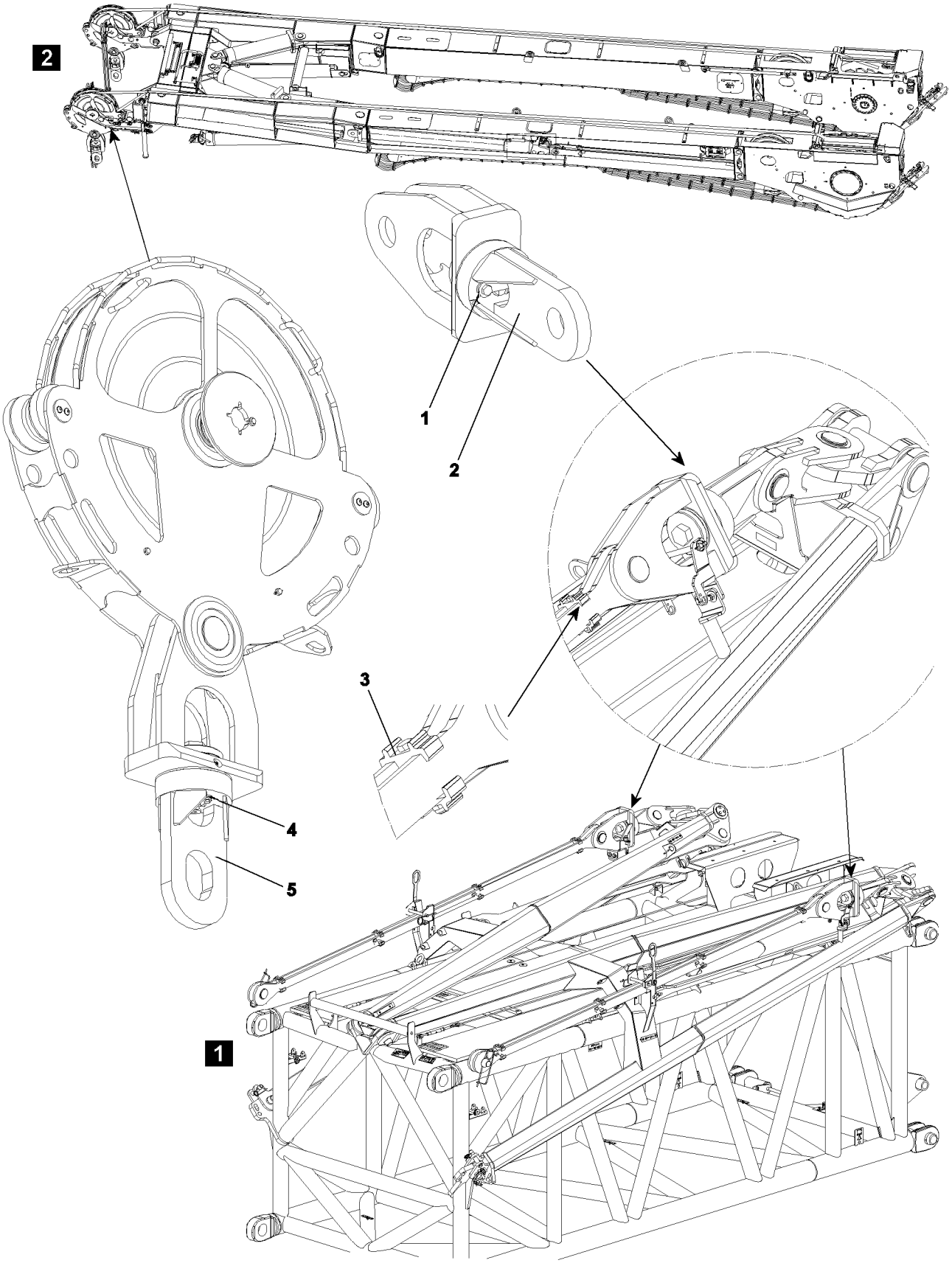

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Fig.109096

- Inspection of twist guard **1** for damage and loose screw connection.
- Inspection of swivel **2** for easy turnability.
- Inspection of all clamps **3** for damage and function.

17 Inspection of change over pulleys, illustration 2

- Inspection of twist guard **4** for damage and loose screw connection.
- Inspection of swivel **5** for easy turnability.

18 Inspection of the oil and fuel tanks

Visually check the oil and fuel tanks at least once a year for leaks and safe mounting.

Repairs may only be carried out by authorized and trained specialists.

Improper repairs; e.g., welding, hard or soft soldering is not permitted, particularly if the Service department at Liebherr-Werk Ehingen GmbH has not been consulted!

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8.03 Inspecting of winches

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Fig.195219

1 Inspecting the hoist and retracting winches

The hoist and retracting winches are designed in sealed planetary gear version. These gears are sized for long service life and the drive shafts and gears are rated for endurance.

Even though the hoist and retracting winches are designed for long life, an external visual inspection is not adequate, since their life can be significantly affected by bad maintenance (insufficient oil), using oil that does not meet specification requirements, defective seals, improper operation or overloading.

The annual inspection must therefore be carried out by an **expert** in accordance with the following specification.

The winches must be inspected by an **authorized inspector** every four years after the initial license.

Within the territorial validity of the BGV D6, after the 10th year in operation, counted from the first day of initial license, when the theoretical utilization time is not over, the winches must be checked annually by an **authorized inspector**.

1.1 Checking the groove diameter

WARNING
Worn winches!
Damage of flanged disks, high rope wear, operational problems. Broken rope, falling load.
▶ Before placing the rope, check the groove diameter of winches.

Visible wear on winches:
- Reduced groove diameter
- Mechanical damage, for example scrub marks or scouring on flanged disks

Make sure that the following tools are available:
- Groove caliber

Make sure that the following prerequisites are met:
- All components to be inspected are cleaned
- The rope does **not** obstruct the inspection of the components

Note
▶ The groove radius may **not** be smaller than the actual diameter of the rope.

The groove diameter of rope pulleys and winches must be at least 6 % larger than the nominal rope diameter.

Check winches with a groove caliber for wear. When wear is present: Fix the winch or replace.

1.2 Inspection intervals

At least once a year, see Crane operating instructions, chapter 7.03.

1.3 Checking the oil level

Check the oil level with the dipstick.

For hoist and retracting winches **without** a dipstick, we recommend that the oil is drained and the amount compared to the specified oil quantity.

1.4 Evaluating oil color

Assume that the oil has been overheated if it is black and / or a burnt oil smell is detected. Change the oil.

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1.5 Checking for solid foreign substances

In general, the oil must be analyzed by a qualified laboratory.

For simple testing, the following procedure can be used:
- Drip the used oil on a specified filter fleece.
- Visual inspection with a magnifying glass may reveal coarse particles.
- If coarse particles are found: Have the components of the oil analyzed by a qualified laboratory.

NOTICE
Danger of property damage!
- ▶ Repairs may only be carried out by authorized and especially trained personnel.
- ▶ Replace damaged parts and change the gear oil.

1.6 Visual inspection for leaks

The gears must be checked for leaks, since oil losses - in addition to polluting the environment - can lead to gear failure.

1.7 Inspecting the gear brakes

Check the brakes each time the gears are inspected.

In order to do so, proceed as follows:
- Attach a load, which creates the maximum rope pull in the uppermost layer of the coil and raise it just off the ground.
- Remove the plug on the brake lifting magnet.
  This means the brake remains applied when activated.
- Activate the winch in the lowering direction.

Note
- ▶ The brake may not slip, in other words, the winch may not turn. If the brake slips, contact the Service department at Liebherr-Werk Ehingen GmbH!
- ▶ Only operate the crane after it has been checked and approved for use by the Service department at Liebherr Werk Ehingen GmbH!

NOTICE
Danger of property damage!
- ▶ Only qualified personnel with specialized knowledge may be used to evaluate gears and brakes!

1.8 Documenting the completed inspection

The results of the annual inspections and maintenance work, including the steps taken, must be documented by the competent or authorized inspector, including attachments from the inspection labs and qualified service companies if applicable.

This documentation must be filed in the crane inspection log under the heading "Periodic inspections".

2 Inspection of the auxiliary reeving winch, recovery winch and spare wheel winch

The inspection of the auxiliary reeving winch, recovery winch and spare wheel winch regarding scope and content is made according to the manufacturer's instructions.
- Inspect the auxiliary reeving winch, recovery winch and spare wheel winch according to the manufacturer's instructions.

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– Request data about the service life of the auxiliary reeving winch, recovery winch and spare wheel winch from the respective manufacturer.

3 Monitoring the winches

3.1 Theoretical service life

The designer of your crane used a theoretical total operating time when designing and sizing the winches. This resulted in the theoretical service life of the equipment.

The winches of your crane are classified according to ISO 4301/1 as follows:

Winches	Classification
Power train group:	M3
Load spectrum:	L1
Load spectrum factor Km:	0.125
Theoretical service life D:	3200 h

Note

▶ The „theoretic service life“ is not equal to the real (true) service life of a winch!

The actual life of the winch is affected by many additional outside factors; for example:

– Overloads caused by unapproved use of the crane.
– Inadequate maintenance: Oil is not changed in a timely manner
– Improper operation:
  • Extreme acceleration or deceleration of the load
  • Load falling into the ropes
– Maintenance errors:
  • Using the wrong type of oil
  • Too much or too little oil
  • Contamination during oil change
– Assembly errors during repair and maintenance
– Undetected leaks
– Incorrectly set safety equipment
– Hidden damage from accidents
– Extreme environmental conditions:
  • Extreme low or high temperatures
  • Corrosive atmosphere
  • Dust and dirt

3.2 Used proportion of the theoretical service life

The crane operator is obligated to carry out an inspection of the crane at least once a year.

At this time, the actually used part of the theoretical service life must also be calculated. If necessary, the crane operator must contract an authorized inspector.

For the determination of the used part of the theoretical service life, the actual operating conditions (load spectrum) and the hoist gear operating hours for each inspection interval are to be determined. The operator is responsible for the documentation in the crane inspection log.

3.2.1 Determining the operating conditions (load spectrum)

The load spectrum of the crane is divided into groups, please refer to ISO 4301/1.

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Select one of the following load spectrums and record it in the crane inspection log for the respective inspection interval based on the actual operating conditions. A more precise determination of the load spectrum is permissible.

Load spectrum class: Light L1

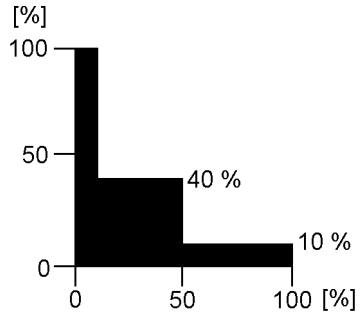

Fig.195234: Graphic illustration Load spectrum L1

Definition:

Power train or parts thereof are subjected to maximum stress only in exceptional cases, but normally only operate at very light loads.

Operating time rates:

10 % of the time at maximum load (dead load and 1/1 working load)
40 % of the time with dead load and 1/3 working load
50 % of the time only with dead load

Factor of load spectrum:

Km = 0.125

Note

▶ Load spectrum L1 with load spectrum factor Km = 0.125 is normally applied to cranes used for assembly operations!

Load spectrum class: Medium L2

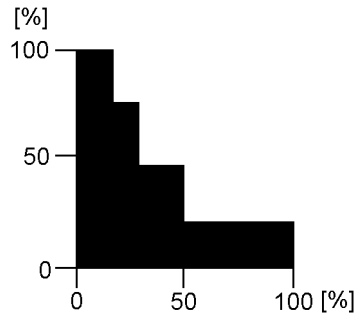

Fig.195235: Graphic illustration Load spectrum L2

Definition:

Power train or parts thereof are subjected to maximum load relatively often, but normally only operate at light load.

Operating time rates:

1/6 of the time at maximum load (dead load and 1/1 working load)
1/6 of the time with dead load and 2/3 working load

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1/6 of the time with dead load and 1/3 working load
50 % of the time only with dead load

Factor of load spectrum:
Km = 0.25

Load spectrum class: Heavy L3

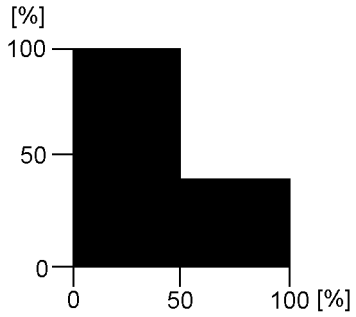

Fig.195236: Graphic illustration Load spectrum L3

Definition:
Power train or parts thereof are frequently subjected to maximum load and normally operate at medium load.

Operating time rates:
50 % of the time at maximum load (dead load and 1/1 working load)
50 % of the time only with dead load

Factor of load spectrum:
Km = 0.5

Load spectrum class: Very heavy L4

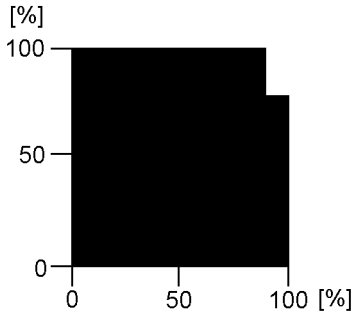

Fig.195237: Graphic illustration Load spectrum L4

Definition:
Power train or parts thereof are regularly subjected to near maximum loads.

Operating time rates:
90 % of the time at maximum load (dead load and 1/1 working load)
10 % of the time only with dead load

Factor of load spectrum:
Km = 1

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3.2.2 Determining the effective operating hours T_i

The effective operating hours calculated as follows must be entered into the crane inspection log for the respective inspection interval.

There are four different scenarios:

1. Operating hour meter installed on every winch.
   If an operating hour meter is installed on every winch in your crane, the effective operating hours T_i can be read directly during each inspection.
2. Operating hour meter installed for the overall crane drive.
   The winch proportion of the total superstructure operating hours must be estimated.
   For cranes used in assembly operations, the operating time for the hoist winches can be estimated generally at 20 % of the total operating hours of the superstructure.
3. One operating hour meter is used for both the crane engine and the crane drive
   The winch proportion of the total crane operating hours must be estimated.
   For cranes used in assembly operations, the operating time for the superstructure can be estimated at 60 % of the total operating hours of the crane. If the hoist winch proportion is estimated at 20 % of the superstructure operating hours (see previous item), then the result in relation to the **total** operating hours of the crane is: 12 %.
4. No operating hour meter is available.
   In this case, the operator must estimate and document the actual operating hours of the winch.
   The approximate percentages stated above normally apply to main hoist winches. For auxiliary hoist winches or boom control winches, the proportion of the total operating hours can be significantly less and should therefore be estimated by the operator.

3.2.3 Determining the used proportion of the theoretical service life

For an inspection interval i (max. 1 year), the actually used proportion S_i of the theoretical Service life is derived from the formula:

$$S_i = \frac{Km_i}{Km} \times T_i$$

Fig.195230

Abbreviation	Explanation
S_i	Used proportion of the theoretical service life.
Km	Load spectrum factor that was used to calculate the winch rates. This factor is provided in the Operating instructions.
Km_i	Load spectrum factor for inspection interval i according to section „Determining the operating conditions“.
T_i	Effective operating hours for inspection interval i according to section „Determining the effective operating hours T_i“.

The actually used proportion is subtracted from the remaining theoretical service life D_i after each inspection interval (see example).

If the remaining theoretical service life is not long enough to cover the next projected operating period, a general overhaul of the winch is required.

If the theoretical service life D has been reached (see chapter on „Theoretical service life“), then the winch may only be operated after conducting a general overhaul.

A general overhaul of the winch is required not later than 10 years after start up.

The general overhaul must be arranged by the operator and carried out by the manufacturer or the manufacturer's authorized representatives and must be documented in the inspection log. After the

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general overhaul, the manufacturer or the manufacturer's authorized representative will define a new theoretical service life D.

When the design life has not been reached after 10 years, continued operation of the winch without a general overhaul is acceptable, when the crane's authorized inspector has confirmed the accuracy of the actual usage calculation by signing the crane inspection log at each authorized inspection interval.

In such a case, the authorized crane inspector must thoroughly inspect the winch. This comprises at least:
- External visual inspection (leaks damage, deformation, etc.).
- Oil check, especially for metal residues.
- Load test at minimum and maximum rope tension and at maximum possible speed in both cases. At least one layer must be spooled up. Pay particular attention to any unusual noises during this load test.

The authorized crane inspector must confirm this inspection in the crane inspection log and must make a statement regarding suitability of the winch for continued operation. The next inspection must take place at the end of the 12th operating year and annually thereafter.

3.3 Example

According to the manufacturer's operating instructions, a crane with a separate operating hour meter for the travel drive and the crane drive is classified as follows:
- Power train group: M3
- Load spectrum: Light L1
- Factor of load spectrum: Km = 0.125
- Theoretical service life: D = 3200 h

Actual usage proportion S of the theoretical service life is calculated using the individual inspection intervals as follows:

3.3.1 First inspection (first year)

The crane was used for assembly work during the past year:

Load spectrum L1, in other words $Km_1 = 0.125$.

The superstructure operating hour meter indicates 800 h. The winch was operated about 20 % of the time; i.e. $T_1 = 160$ h.

The actual usage proportion S of the theoretical service life at the time of the first inspection is therefore:

$$S_1 = \frac{0{,}125}{0{,}125} \text{ x } 160 \text{ h} = 160 \text{ h}$$

Fig.195231

Remaining theoretical service life:

$D_1 = 3200 \text{ h} - 160 \text{ h} = 3040 \text{ h}$

The above values are recorded in the crane inspection log.

3.3.2 Second inspection (second year)

The crane was used at a harbor for unloading work:

Load spectrum L3, in other words $Km_2 = 0.5$.

The superstructure operating hour meter indicates 2000 h ; i.e., during this period:

2000 h – 800 h = 1200 h (800 h were used during the first year of operation)

The winch was operated about 40 % of the time; i.e. $T_2 = 480$ h.

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The actual usage proportion S_2 of the theoretical service life at the time of the second inspection is therefore:

$$S_2 = \frac{0,5}{0,125} \times 480\ h = 1920\ h$$

Fig.195232

Remaining theoretical service life:

D_2 = 3040 h – 1920 h = 1120 h

3.3.3 Third inspection (third year)

The crane was used for assembly work and occasionally at a harbor for unloading work:

Load spectrum L2, in other words Km_3 = 0.25.

The superstructure operating hour meter indicates 3000 h ; i.e., during this period:

3000 h – 2000 h = 1000 h (2000 h were used during the first two years of operation)

The winch was operated about 30 % of the time; i.e. T_3 = 300 h.

The actual usage proportion S_3 of the theoretical service life at the time of the third inspection is therefore:

$$S_3 = \frac{0,25}{0,125} \times 300\ h = 600\ h$$

Fig.195233

Remaining theoretical service life:

D_3 = 1120 h – 600 h = 520 h

3.4 Chart for determining the theoretically remaining service life

Chart 1 includes an example.

The remaining theoretical service life is to be documented in chart 2.

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Fig.121551-en: Chart 1

Chart to determine the remaining theoretical service life of winch No. 1 (Main hoist winch)

Crane type: LTM 1050
Fabrication No.: 0010 540 08
Put in service : 12345
Serial number of winch according to data tag: 0815
Last general overhaul performed on: .....
Configuration data of winch (see Operating Manual):
Drive gear group: M 3
Load collective: L 1
Factor of load collective Km: 0.125
Theoretical service life D: 3200 hrs.

S_i = Used part of theoretical service life since last inspection
D_i = Remaining theoretical service life
D_{i-1} = Remaining theoretical service life after previous inspection
Km = Factor of load collective, which was taken for calculation of winch. This factor is to be taken from the Operating Manual
Km_i = Factor of load collective in inspection interval i
T_i = Effective operating hours in inspection interval i

(*) In the following pages, carry over the last line from the previous page.

Inspection interval No. (max. annually) i	Date of initial service / data of inspection	Operating conditions since last inspection (load collective)	Factor of load connective Km_i	Total crane operating hours [h]	Operating hours of super-structure [h]	Operating hours of super-structure since last inspection [h]	Operating hours of winch [h]	Operating hours of winch since last inspection T_i [h]	Used part of theoretical service life D: $S_i = \frac{Km_i}{Km} \times T_i$ [h]	Remaining theoretical service life $D_i = D_{i-1} - S_i$ [h]	Name of inspector	Signature	Remarks	Name of expert	Signature
(*) 0	10.06.90	-	-	-	0				0	3200					
1	05.06.91	L1	0,125	-	800	800	-	160 (20 % of 800)	160	3040	Müller				
2	20.05.92	L3	0,5	-	2000	1200	-	480 (40 % of 1200)	1920	1120	Huber				
3	18.05.93	L2	0,25	-	3000	1000	-	300 (30 % of 1000)	600	520	Maier				
4															

C A U T I O N : Perform general overhaul at least once every 10 years! In case of deviation, see guidelines in this chapter.

General overhaul last performed on : .....

Chart to determine the remaining theoretical service life of winch No. ....

Crane type: .....
Fabrication No.: .....
Put in service: .....
Serial number of winch according to data tag: .....
Last general overhaul performed on: .....
Configuration data of winch (see Operating Manual): .....
Drive gear group: M.....
Load collective: L.....
Factor of load collective Km: .....
Theoretical service life D: .....

S_i = Used part of theoretical service life since last inspection
D_i = Remaining theoretical service life
D_{i-1} = Remaining theoretical service life after previous inspection
Km = Factor of load collective, which was taken for calculation of winch. This factor is to be taken from the Operating Manual
Km_i = Factor of load collective in inspection interval i
T_i = Effective operating hours in inspection interval i

*) In the following pages, carry over the last line from the previous page.

Inspection interval No. (max. annually) i	Date of initial service / data of inspection	Operating conditions since last inspection (load collective)	Factor of load connective Km_i	Total crane operating hours [h]	Operating hours of super-structure [h]	Operating hours of super-structure since last inspection [h]	Operating hours of winch [h]	Operating hours of winch since last inspection T_i [h]	Used part of theoretical service life D: $S_i = \frac{Km_i}{Km} \times T_i$ [h]	Remaining theoretical service life $D_i = D_{i-1} - S_i$ [h]	Name of inspector	Signature	Remarks	Name of expert	Signature
(*)															

C A U T I O N : **Perform general overhaul at least once every 10 years!** In case of deviation, see guidelines in this chapter.

General overhaul last performed on : .....

Fig. 121552-en: Chart 2

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8.04 Inspection of crane wire ropes

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Fig.195219

1 Crane ropes

This chapter applies, for example, for the following crane ropes:
- Hoist ropes
- Control ropes for the boom system
- Control ropes of the telescopic boom with rope mechanism: Pull-out ropes and return ropes
- Guy ropes for boom system

2 Importance of inspection

Rope removal criteria: If severe damage reduces the operational safety, then the rope has reached the removal criteria.

The importance of regular inspections is demonstrated by:
- Evaluation of operational safety of ropes
- Determination of rope removal criteria
- Determination of next inspection

3 Personal protective equipment

WARNING
Wires and lubricant!
Severe injury and skin irritation.
▶ When working with ropes, always wear work gloves.

WARNING
Protective equipment **not** worn!
Severe injuries.
▶ Wear hard hat, safety shoes and safety glasses.

4 Qualification Inspection personnel

Make sure that the following prerequisites are met:
- Inspection personnel are **expert personnel for crane rope inspection**.
- **Expert personnel for crane rope inspection:**
  - Are trained in the inspection of crane ropes according to **DIN ISO 4309** and have practical experience in the evaluation of rope removal criteria.
  - Have practical experience in the evaluation of rope removal criteria according to **DIN ISO 4309**.
- The inspection personnel is assigned (authorized) for the maintenance by the crane operator.

5 Unscheduled inspection

In the following situations the rope must be inspected:
- After unusual strain
- If non-visible damage is suspected
- when a rope or the rope end connection is damaged
- when the rope has been placed again after removal
- when the rope has been out of service for longer than three months

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6 Intervals

Intervals for crane inspection:
- according to determination by **expert personnel for crane rope inspection**
- or **at least once a year**

Note
▶ Shortening the inspection interval: The older a rope is the more frequently will wire breaks occur.

Determining factors for determination of inspection intervals are:
- Legal regulations in the country where the crane is operated
- Climate conditions under which the rope drive is utilized
- Power train group
- Results of previous inspections on current or comparable machine and under comparable operating conditions
- Frequency and type of use of a rope
- Service life of rope

7 Areas

WARNING
Broken wires and distortions on ropes in cross over areas!
Rope performance can be greatly reduced. Rope breakage. Death, severe injuries, property damage.
▶ Inspection rope cross over areas especially diligently.

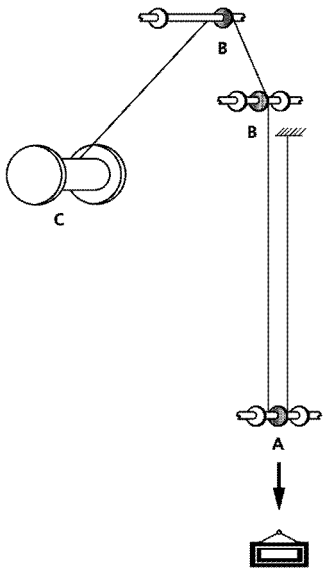

Fig.120969: Important inspection areas for multi layer spooled up ropes

A Rope sections, which run in the area of the load rise into the lower rope pulleys (the load is raised here).

B Rope intake on the first rope pulley in the area of the load rise.

C Rope sections, which are subjected in the cross over areas to the strongest effects (maximum deflection angle).

The rope must be checked over the entire length.

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The following areas must be checked with special diligence:
- Rope end connections
- Safety coils and fixed point on the winch
- Areas of the rope which run through the hook block.
- Areas of the rope that run over the rope pulleys or lay on the rope pulleys.
- Areas of the rope that are spooled on the winch, especially cross over areas.
- Areas of the rope which are laying above the compensation pulleys.
- Areas of the rope which are subjected to abrasion due to external components.
- All areas of the rope that are subjected to temperatures above 60 °C.

8 Documenting inspection results

Note
- ▶ Document the results of the inspections in an inspection checklist.
- ▶ Form for an inspection checklist, see section „Current checklist“.

9 Wire ropes and rope end connections

WARNING
Wire rope with impermissible rope end connection!
The wire rope can fail. The load call fall down.
Death, severe bodily injuries, property damage.
- ▶ Select the permissible rope type for the respective application.
- ▶ Select the permissible rope end connection for the respective rope type.
- ▶ Observe and adhere to the warning display on the lock.

Wire rope application	Rope type
Hoist rope	Rotation-resistant rope
Guy rope or control rope	Non-rotation resistant rope
Auxiliary rope or assembly rope	Non-rotation resistant rope

Rope type depending on the application

The type of rope that is selected determines the corresponding rope end connections.

9.1 Rotation-resistant ropes with rope end connections

Use rotation-resistant ropes as **hoist ropes**.

Rotation-resistant ropes are special ropes that produce extremely little torque and twisting at the rope end connection when they are under strain.

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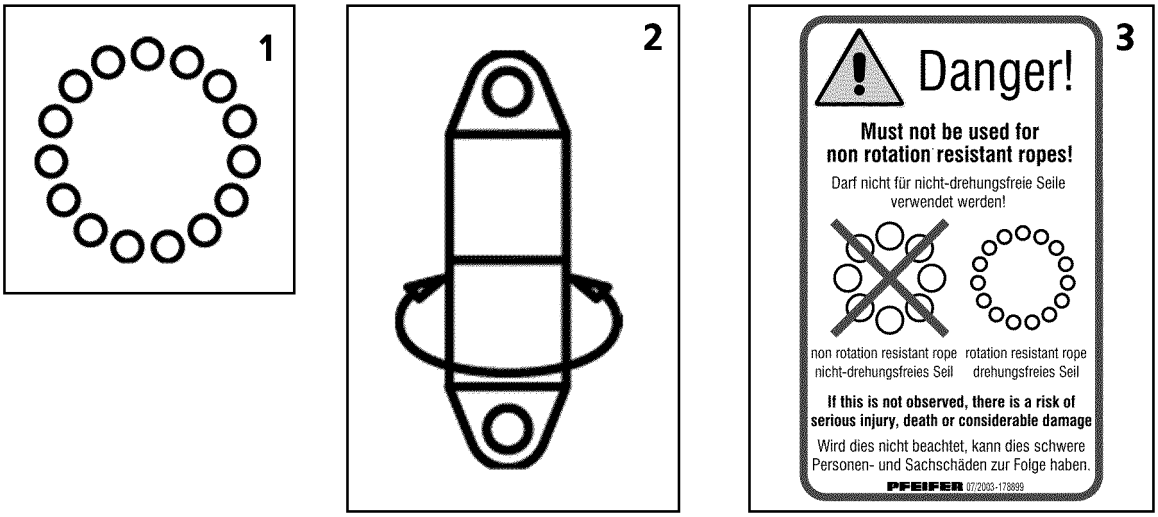

Fig.195653: Symbols for rotation-resistant ropes with rope end connections

1 Rotation-resistant rope symbol
2 Rotating rope end connection symbol
3 Warning display on the PFEIFER lock

Typical rotation-resistant rope structures are wire ropes with 15 to 18 outer strands. Rotation-resistant ropes are symbolically depicted with 15 outer strands (circles), see illustration **1**.

9.1.1 Non-rotating rope end connection

Note
▶ In the case of a rotation-resistant ropes, Liebherr recommends the use of a lock **without** a swivel or a wedge lock. This can reduce the stress on the hoist ropes.

9.1.2 Rotating rope end connection

Note
▶ In the case of rotation-resistant ropes, Liebherr recommends **not** using a lock **with** a swivel and **not** to use a twist compensator / swivel.

To reduce a problematic turning behavior, the following rope end connections can be used in an individual case and after consultation with Liebherr customer service:
– Lock **with** swivel
– Twist compensator / swivel

9.2 Non-twisting ropes with rope end connections

WARNING
Wire rope with impermissible rope end connection!
The wire rope can fail. The load call fall down.
Death, severe bodily injuries, property damage.
▶ Use a lock **without** a swivel or a wedge lock.
▶ **Never** use a lock **with** a swivel with non-twisting rope.
▶ **Never** use a twist compensator / swivel with a non-twisting rope.

Use non-twisting ropes as **guy ropes** or **control ropes**, **auxiliary ropes** or **assembly ropes**.

Non-twisting ropes generate high torque levels on the rope end connection under strain. For this reason, the rope ends must be protected from twisting using an appropriate rope end connection to prevent the wire rope from unscrewing under strain.

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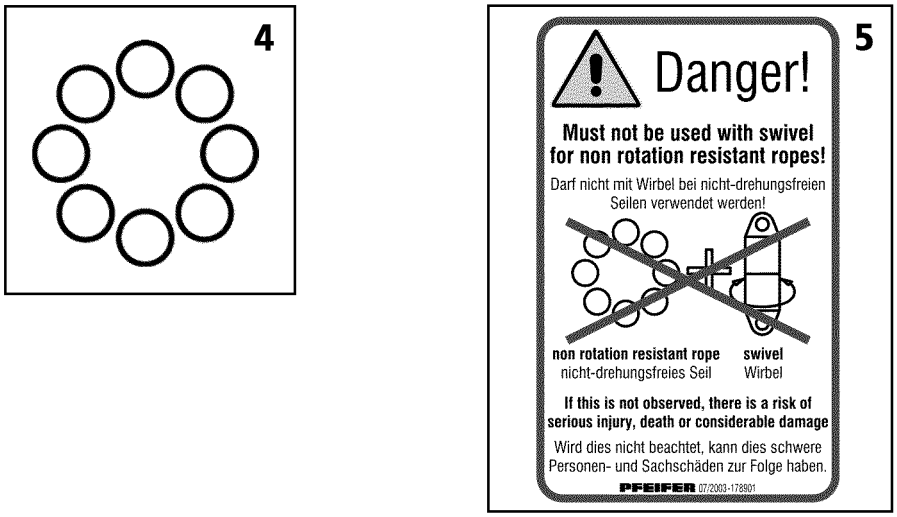

Fig.195654: Symbols for non-twisting ropes with rope end connections

4 Non-twisting rope symbol

5 Warning display on the PFEIFER lock / wedge lock

Typical non-twisting rope structures are wire ropes with eight or ten outer strands. Non-twisting ropes are symbolically depicted with eight outer strands (circles), see illustration **4**.

Only use non-twisting ropes with the following **non-twisting** rope end connections:
- Lock **without** swivel
- Wedge lock

A non-rotating rope end connection is also the mounting of the rope on the fixed point of the winch drum.

10 Degree of severity

The deciding factor for the removal criteria is which removal criteria are resent and to which degree they occur.

When various removal criteria are **not** present to a full degree, then the removal criteria must be evaluated as a total entity. For every individual removal criteria a degree of severity must be determined (percentage value).

For a certain rope section the sum of individual degrees of severity results in a **combined degree of severity**, see section „Combined degree of severity“.

When the combined degree of severity is more than 100 %, then the rope must be taken down.

11 Abbreviations Rope diameter

Abbreviations	Description
Rope nominal diameter **d**	Rope diameter, identification of rope
Reference diameter $\mathbf{d}_{ref}$	Measured rope diameter of a straight rope section, directly after placing the rope
6d	Length of 6-fold rope nominal diameter
30d	Length of 30-fold rope nominal diameter

Abbreviations Rope diameter

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12 Distortions and mechanical damage

WARNING
Distortions and mechanical damage!
Operational safety significantly disturbed, uneven load distribution within the rope.
▶ Have the manufacturer check if the distorted and damaged area can be severed.

Visible form changes often occur localized or in short rope sections.

When a safe operation of the rope is ensured, a distorted and damaged area can be severed.

13 Removal criteria Overview

The following chart provides an overview between removal criteria and the respective method for inspection. The degree is described, when the removal criteria is reached.

The removal criteria is described in detail in the subsequent sections.

Note

When the rope for parallel operation has reached the removal criteria:
▶ Often, both ropes must be replaced. The new rope has a larger diameter and other elongation characteristics.

Removal criteria	Degree for removal criteria	Inspection method
Broken strands	One strand is broken	Visual check
Broken wires on ropes, which run over rope pulleys and are spooled in multiple layers	Maximum number of broken wires reached, see Section Determining the number of broken wires	Count
Broken wire in the strand valleys	Two or more broken wires in strand valleys, on the contact points of two neighboring strands within an angular length (corresponds approx. to 6d)	Count
Broken wires in the area of the rope end connection	Two or more broken wires, according to decision of **expert personnel for crane rope inspection**	Visual inspection, test with marlin spike
Broken wire nests	On occurrence	Visual check
Reduction rope diameter at even diameter reduction	Maximum reduction of rope diameter reached	Measurement, calculation
Localized increase of rope diameter	Maximum increase of rope diameter reached	Measurement
Significant corrosion	Surface of rope is significantly affected or rust film emerges, according to decision of **expert personnel for crane rope inspection**	Visual check
Corkscrew-like distortion	Maximum permissible distortion reached	Measurement, calculation
Basket formation	On occurrence	Visual check
Wires or bunches of wires protruding from the rope	On occurrence, if more than one wire protrudes from the rope	Visual check

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Removal criteria	Degree for removal criteria	Inspection method
Flattenings	Larger than half of the diameter of the outer strand, according to decision of **expert personnel for crane rope inspection**	Visual check
Loop formation	Loops on several wires	Visual check
Kinking or remaining distortion	On occurrence	Visual check
Buckles or contusions	On occurrence, according to decision of **expert personnel for crane rope inspection**	Visual check
Heat influence, electric voltage	Bluish discoloration, broken or melted wires	Visual check
Damage on rope end connections: Material cracks, deformation, wear, corrosion, traces of slipping between the locking clamp and rope	According to decision of **expert personnel for crane rope inspection**	Visual inspection
Combined degree of severity	Degree of severity 100 % or above, according to decision of **expert personnel for crane rope inspection**	Calculation of individual degrees of severity

Removal criteria Overview

14 Checking for broken strands

A strand consists of several individual wires.

If a complete strand is broken:
▶ Take the rope down.

15 Determining the number of broken wires

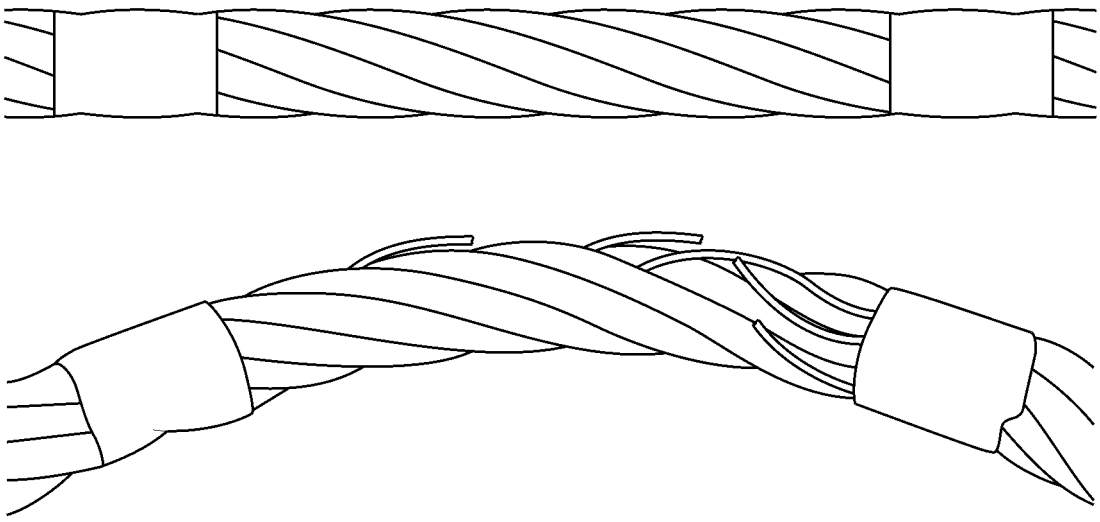

Fig.120980: Determine broken wires by bending

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By bending the rope, broken wires can be recognized better.

Make sure that the following prerequisites are met:

- The rope is clean.
- Inspection checklist is on hand.

15.1 Scattered occurring broken wires

The following different rope types each have their own chart for the permissible number of broken wires:
- Single layer and parallel roped ropes
- Rotation resistant ropes

The charts in this section are valid exclusively for **scattered occurring broken wires**.

15.1.1 Wire break increase rate

The wire break increase rate is an increase of broken wires, which can skyrocket with increasing use of the rope.

▶ Include the inspection checklists for the previous inspection and use it to draw a conclusion for the wire break rate increase.

15.1.2 Single layer and parallel roped ropes

Rope category number RCN	Total number of load carrying wires in the outer strand layer of rope[1] n	Number of visible outer wire breaks[2]					
		Rope sections, which run over steel pulleys and / or spool up on a single layer spooling drum (coincidental distribution of broken wires)				Rope sections, which spool up on a multi layer drum[3]	
		Class M1 to M4, or class unknown[4]				All classes	
		Lang lay		Even lay		Lang lay and even lay	
		Over a length of 6d[5]	Over a length of 30d[5]	Over a length of 6d[5]	Over a length of 30d[5]	Over a length of 6d[5]	Over a length of 30d[5]
01	n ≤ 50	2	4	1	2	4	8
02	51 ≤ n ≤ 75	3	6	2	3	6	12
03	76 ≤ n ≤ 100	4	8	2	4	8	16
04	101 ≤ n ≤ 120	5	10	2	5	10	20
05	121 ≤ n ≤ 140	6	11	3	6	12	22
06	141 ≤ n ≤ 160	6	13	3	6	12	26
07	161 ≤ n ≤ 180	7	14	4	7	14	28
08	181 ≤ n ≤ 200	8	16	4	8	16	32
09	201 ≤ n ≤ 220	9	18	4	9	18	36
10	221 ≤ n ≤ 240	10	19	5	10	20	38
11	241 ≤ n ≤ 260	10	21	5	10	20	42
12	261 ≤ n ≤ 280	11	22	6	11	22	44

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Rope category number RCN	Total number of load carrying wires in the outer strand layer of rope[1] n	Number of visible outer wire breaks[2]					
		Rope sections, which run over steel pulleys and / or spool up on a single layer spooling drum (coincidental distribution of broken wires)				Rope sections, which spool up on a multi layer drum[3]	
		Class M1 to M4, or class unknown[4]				All classes	
		Lang lay		Even lay		Lang lay and even lay	
		Over a length of 6d[5]	Over a length of 30d[5]	Over a length of 6d[5]	Over a length of 30d[5]	Over a length of 6d[5]	Over a length of 30d[5]
13	281 ≤ n ≤ 300	12	24	6	12	24	48
	n > 300	0.04 x n	0.08 x n	0.02 x n	0.04 x n	0.08 x n	0.16 x n
Note: Ropes with outer strands in the Seale type, number of wires per strand 19 or less (for example 6 × 19 Seale), are classified in this chart as two lines over the line, which would be defined due to the number of load carrying wires in the outer strands.							

*Number of visible broken wires (reached or exceeded) for removal criteria is reached, for **single-layer** and **parallel** roped ropes according to **DIN ISO 4309***

1) For the purpose of this international standard, fill wires are not considered to be load carrying wires and are not included in the value for n.
2) A broken wire has two ends (counted as one wire).
3) The values apply for damage in the cross over areas and the layers of coils due to deflection angles (not for rope sections, which run only over rope pulleys and do not spool up on the winch).
4) For ropes on drive gears of groups M5 to M8 twice the number of broken wires listed can be used.
5) d = Rope nominal diameter

▶ Check the rope over the entire length for visible broken wires.

When visible broken wires are scattered present:
▶ On the point of a broken wire, mark the rope sections on a length of 30d in both directions.
▶ Count visible broken wires in the marked rope sections and record them.
▶ Take the RCN (Rope category number) from the manufacturer's documentation of the rope.

When the make for single layer and parallel roped ropes is **not** listed in the chart:
▶ Determine the total number of load carrying wires in the rope: Add all wires in the strands of the outer layer, do **not** count fill wires.
▶ Compare the number of broken wires of each marked rope section 30d with the number of broken wires in the chart.

When the number of visible broken wires is smaller than listed in the chart:
▶ Within the rope section with the most broken wires: Mark the rope section with the most broken wires on a length of 6d.
▶ Count visible broken wires in the marked rope sections 6d and record them.
▶ Compare the number of broken wires of the marked rope section with the number of broken wires in the chart.

When the number of visible broken wires is equal to or larger than that listed in the chart:
▶ Take the rope down.
▶ Enter the results in the inspection checklist.

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15.1.3 Rotation resistant ropes

Rope category number RCN	Total number of load carrying wires in the outer strands of rope[1] n	Number of visible outer wire breaks[2]			
		Rope sections, which run over steel pulleys and / or spool up on a single layer spooling drum (coincidental distribution of broken wires)		Rope sections, which spool up on a multi layer drum[3]	
		Over a length of 6d[4]	Over a length of 30d[4]	Over a length of 6d[4]	Over a length of 30d[4]
21	4 strands n ≤ 100	2	4	2	4
22	3 or 4 strands n ≥ 100	2	4	4	8
	At least 11 strands in the outer layer				
23-1	71 ≤ n ≤ 100	2	4	4	8
23-2	101 ≤ n ≤ 120	3	5	5	10
23-3	121 ≤ n ≤ 140	3	5	6	11
24	141 ≤ n ≤ 160	3	6	6	13
25	161 ≤ n ≤ 180	4	7	7	14
26	181 ≤ n ≤ 200	4	8	8	16
27	201 ≤ n ≤ 220	4	9	9	18
28	221 ≤ n ≤ 240	5	10	10	19
29	241 ≤ n ≤ 260	5	10	10	21
30	261 ≤ n ≤ 280	6	11	11	22
31	281 ≤ n ≤ 300	6	12	12	24
	n > 300	6	12	12	24
Note: Ropes with outer strands in Seale type, number of wires in each strand 19 or less (for example 18 × 19 Seale - WSC), are classified in this chart as two lines over the line, which would be defined due to the number of load carrying wires in the outer strands.					

*Number of visible broken wires (reached or exceeded) is achieved in the rope removal criteria, for **rotation-resistant** ropes according to **DIN ISO 4309***

1) For the purpose of this international standard, fill wires are not considered to be load carrying wires and are not included in the value for n.
2) A broken wire has two ends (counted as one wire).
3) The values apply for damage in the cross over areas and the layers of coils due to deflection angles (not for rope sections, which run only over rope pulleys and do not spool up on the drum).
4) d = Rope nominal diameter

▶ Check the rope over the entire length for visible broken wires.

When visible broken wires are scattered present:
▶ On the point of a broken wire, mark the rope sections on a length of 30d in both directions.
▶ Count visible broken wires in the marked rope sections and record them.
▶ Take the RCN (Rope category number) from the manufacturer's documentation of the rope.

When the make for rotation-resistant ropes is **not** listed in the chart:
▶ Determine the total number of load carrying wires in the rope: Add all wires in the strands of the outer layer, do **not** count fill wires.

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▶ Compare the number of broken wires of each marked rope section 30d with the number of broken wires in the chart.

When the number of visible broken wires is smaller than listed in the chart:
▶ Within the rope section with the most broken wires: Mark the rope section with the most broken wires on a length of 6d.
▶ Count visible broken wires in the marked rope sections 6d and record them.
▶ Compare the number of broken wires of the marked rope section with the number of broken wires in the chart.

When the number of visible broken wires is equal to or larger than that listed in the chart:
▶ Take the rope down.
▶ Enter the results in the inspection checklist.

15.2 Broken wire in the strand valleys

The broken wires in these areas point to the fact that the condition in the inside of the rope is deteriorating.

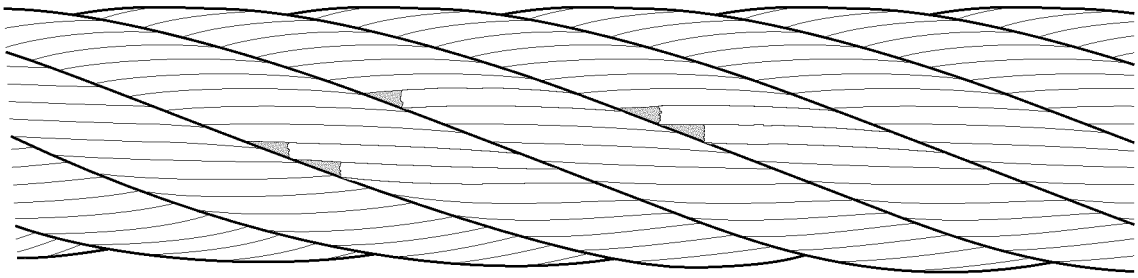

Fig.121005: Broken wire in the strand valleys

When two or more broken wires occur within a 6d long rope section:
▶ Take the rope down.

15.3 Broken wires on rope end connections

▶ Check the area near the rope end connections and carefully check for broken wires.

Loose wires are a sign of broken wires in the rope end connection.

▶ Use a marlin spike to check for loose wires.

When broken wires are near a rope end connection and two or more wires are affected:
▶ Take the rope down.
or

When the remaining rope lengths fulfil the minimum number of remaining coils in all operating positions:
Shorten the rope, see chapter 7.05.50.
▶ Attach the rope end connection.

15.4 Broken wires in rope sections, which are not spooled up on the winch

When the broken wires are concentrated on one or two strands, the removal criteria can be present at fewer broken wires as noted in the chart (rope section in the length of 6d).

▶ Have the rope removal criteria determined by **expert personnel for crane rope inspection**.

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15.5 Broken wire nests

When broken wires are very close to each other or when the broken wires are concentrated on one strand, then the rope must be taken down, even at fewer broken wires than noted in the chart (rope section 6d).

▶ Have the rope removal criteria determined by **expert personnel for crane rope inspection**.

16 Checking the rope end connection

The removal criteria are evaluated by the **expert personnel for crane rope inspection**.

Check for broken wires, see section „Broken wires on rope end connections“.

16.1 Pressed rope end connection

Example of a pressed rope end connection: Locking clamp.

▶ Check the rope end connections for signs of possible slipping between the locking clamp and the wire rope.
▶ Check the rope end connections for material cracks.
▶ Check rope end connections for corrosion, deformation and wear.

16.2 Enlarged rope end connection

Example of an enlarged rope end connection: Locking cast sleeve.

▶ If present: Remove the beam.
▶ Check rope end connections for corrosion, deformation and wear.

If the rope connection is on a flat rope:
▶ Check the cone setting, see chapter 8.04.10.

16.3 Detachable rope end connection

Example of a detachable rope end connection: Wedge lock.

▶ Check that the rope end connections are fit tightly and correctly installed.
▶ Check the wire rope inside and at the outlet of the rope end connection. Check the rope according to the removal criteria in this chapter.

17 Checking of rope diameter

17.1 Even reduction of rope diameter

WARNING
Spooling problems due to reduced rope diameter!
▶ Take the rope down even when the removal criteria according to **DIN ISO 4309** has not yet been reached.

The values in this section do **not** apply for rope sections, which were damaged in cross over areas due to multi layer spooling on a winch.

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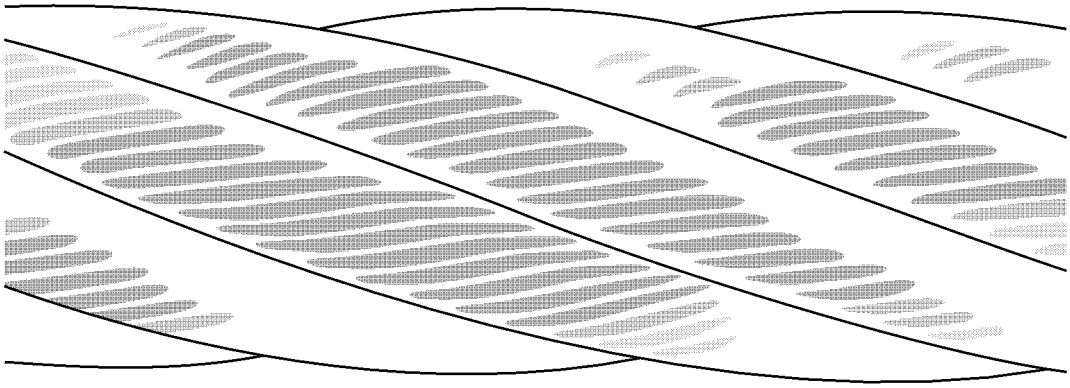

Fig.121001: External abrasion on the rope

The rope diameter changes due to abrasion, settling and external influences.

Abrasion of cover wires of outer strands of rope due to frictional contact. Especially in those areas where ropes are in contact with the rope pulleys during start up or slow down of the load.

Wear is increased by lack of or incorrect lubrication and the effect of dust.

Abrasion reduces the tensile strength of steel ropes because the cross section of the steel is reduced.

Additional possible causes for reduction of rope diameter:
- Wear in the inside of the rope
- Wear of fiber insert
- Breakage of a steel insert
- Broken inner strands

This section is valid solely for the following ropes:
- Ropes, which spool up on single layer winches
- Ropes, which run through a steel rope pulley

$$d_V = \frac{d_{ref} - d_m}{d} \times 100\ \%$$

Fig.121372: Formula Reduction of rope diameter

d_V = even reduction of rope diameter
d_{ref} = rope diameter, which was determined before placement
d_m = measured rope diameter
d = rope nominal diameter: Take value from inspection checklist

The following chart applies exclusively for ropes, which spool up on single layer winches and / or run through a steel rope pulley.

Rope type	Even reduction of diameter d_V (in percentages of rope nominal diameter d)	Classification of degree of severity	
		Description	%
	Less than 6 %	—	0
Single layer rope with fiber insert	6 % and above, but less than 7 %	Light	20
	7 % and above, but less than 8 %	Medium	40
	8 % and above, but less than 9 %	High	60
	9 % and above, but less than 10 %	Very high	80
	10 % and above	**Rope removal criteria**	**100**

Rope type	Even reduction of diameter d_v (in percentages of rope nominal diameter d)	Classification of degree of severity	
		Description	%
Single layer rope with steel insert or parallel roped rope	Less than 3.5 %	—	0
	3.5 % and above, but less than 4.5 %	Light	20
	4.5 % and above, but less than 5.5 %	Medium	40
	5.5 % and above, but less than 6.5 %	High	60
	6.5 % and above, but less than 7.5 %	Very high	80
	7.5 % and above	**Rope removal criteria**	**100**
Rotation-resistant rope	Less than 1 %	—	0
	1 % and above, but less than 2 %	Light	20
	2 % and above, but less than 3 %	Medium	40
	3 % and above, but less than 4 %	High	60
	4 % and above, but less than 5 %	Very high	80
	5 % and above	**Rope removal criteria**	**100**

Degree of severity and removal criteria depending on rope type and even diameter reduction according to ***DIN ISO 4309***

The medium value from the smallest and the largest measured diameter results in the value for $\mathbf{d}_m$.

- ▶ Measure rope diameter on several locations and calculate measured diameter $\mathbf{d}_m$.
- ▶ Calculate even reduction $\mathbf{d}_v$ of rope diameter with formula.
- ▶ Read the degree of severity in the chart, depending on the rope type.
- ▶ Document the degree of severity in the inspection checklist.

When the degree of severity has reached 100 %:

- ▶ Take the rope down.

17.2 Localized reduction of rope diameter

Localized reductions of rope diameter point to the fact that a rope insert may have failed, for example.

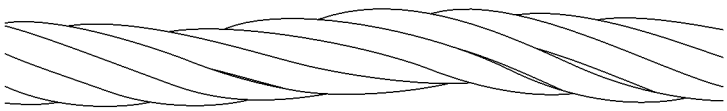

Fig.120983: Localized reduction of rope diameter

- ▶ Check the rope for localized reduction of rope diameter.

When a localized reduction of the rope diameter is found:

- ▶ Take the rope down.

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17.3 Localized increases of rope diameter

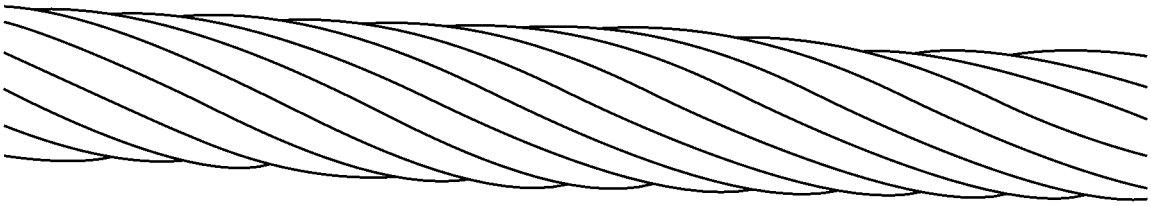

Fig.120992: Localized increase of rope diameter

An increase over a longer area of the rope can be caused by absorption of moisture in the fiber insert or due to corrosion in the inside of the rope.

Rope insert	Maximum increase of rope diameter during operation
Steel	5 %
Fiber	10 %

▶ Check the rope for increases in rope diameter.

When the increases exceed the maximum values:
▶ Take the rope down.

18 Corrosion

Corrosion occurs due to insufficient lubrication, in maritime climates and in an atmosphere polluted by industrial fumes.

External corrosion is indicated by a rough wire surface. A superficial rust film can be wiped off.

Significant corrosion reduces the strength and elasticity of the rope due to the reduction of the rope diameter.

Inner corrosion is hard to detect.

Do **not** use solvents to clean the rope.

Make sure that the following prerequisite is met:
– Rope is cleaned (wiped and brushed).

18.1 External corrosion

The various types of corrosion are classified and noted with the classification for removal criteria in percentages:

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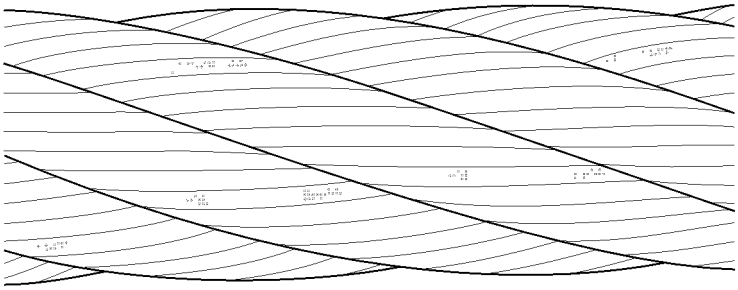

Fig.120984: Surface light corrosion: Classification 0 % of removal criteria

Superficial light corrosion (rust film) can be wiped off.

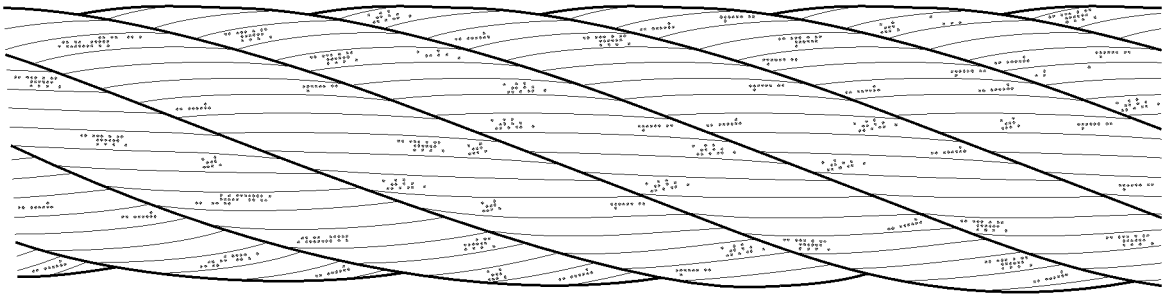

Fig.120985: Surface feels rough: Classification 20 % of removal criteria

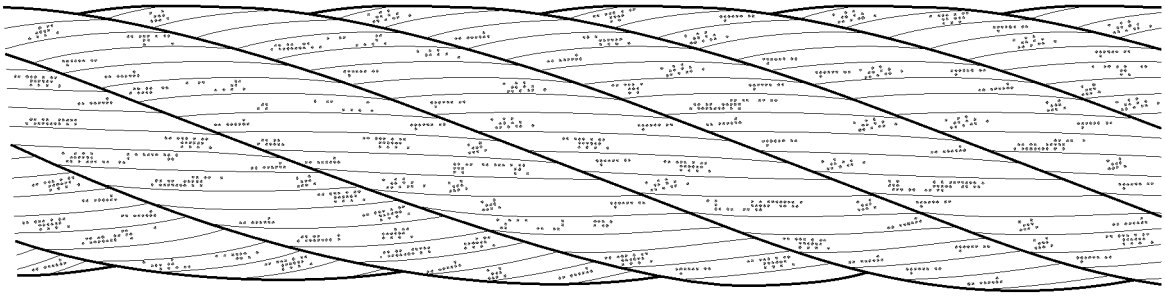

Fig.120986: Surface feels very rough: Classification 60 % of removal criteria

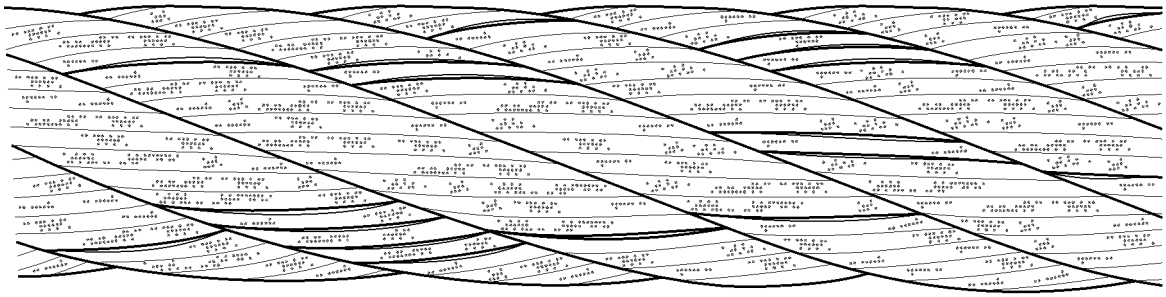

Fig.120987: Surface very decayed, spaces between individual wires can be easily recognized: Classification 100 % of removal criteria

When 100 % of removal criteria is reached:
▶ Take the rope down.

18.2 Internal corrosion

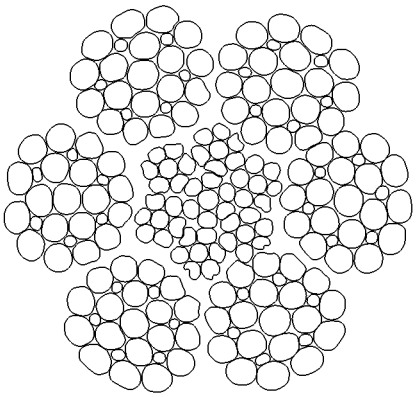

Fig.120982: Corrosion in the inside of the rope

Internal corrosion is present when clearly visible corrosion particles migrate between the valleys of the outer strands: Classification 100 % removal criteria.

When internal corrosion is found:
▶ Have the rope removal criteria evaluated by **expert personnel for crane rope inspection** or place the rope down.

18.3 Friction corrosion

Friction corrosion occurs as a type of brown powder, which migrates from the inside of the rope to the outside: Classification 100 % of removal criteria.

▶ Check the rope diligently for friction corrosion.

If friction corrosion is found:
▶ Have the rope removal criteria evaluated by **expert personnel for crane rope inspection** or place the rope down.

19 Corkscrew-like distortion

Fig.120988: Corkscrew-like distortion

Distortion where the rope is in the form of a corkscrew along its longitudinal axis.

Effects of corkscrew-like distortion:
- Irregular rope drive
- Rope wear
- Broken wire
- Bearing damage on rope pulleys

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If the distortion is very pronounced, then other components can be affected in their function when the affected rope section runs through in crane operation.

▶ Check the entire rope for corkscrew-like distortion.

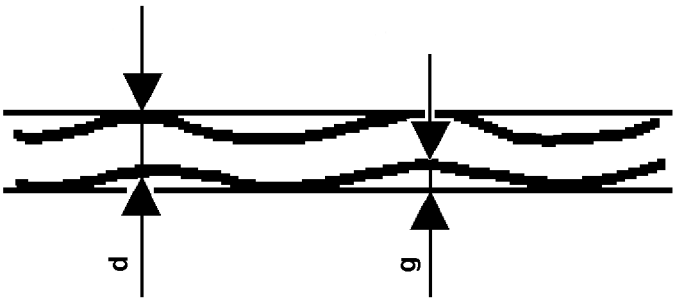

Fig.123988: Example for corkscrew-type distortion

d Rope nominal diameter **g** Distance

Rope section	Conditions for removal criteria, formula
Straight rope section, which does **not** run through or around a rope pulley or spool up on a winch	$g \geq \frac{1}{3} \times d$
Straight rope section, which runs through or around a rope pulley or spools up on a winch	$g \geq \frac{1}{10} \times d$

When corkscrew-like distortion is present:
▶ Determine the rope nominal diameter **d** and distance **g** on the rope.
▶ Check the removal criteria with the formula.

When the removal criteria is reached:
▶ Take the rope down.

20 Basket formation

This distortion occurs due to different layers between the outer strand layers and the inside of the rope.

Causes for basket formation are high angular pull angles during the run over the rope pulleys and run-in rope pulleys. Even load distribution over the entire cross section is not possible.

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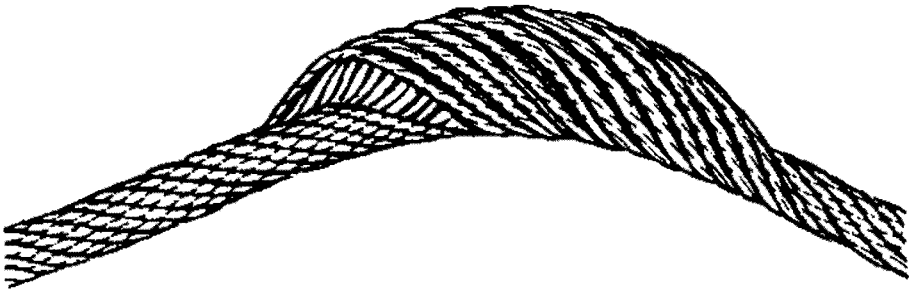

Fig.120989: Basket formation

▶ Check the entire rope for basket formation.

When basket formation is present:
▶ Take the rope down.

21 Protruding, distorted insert or strand

This distortion is a special form of basket formation. The insert or the core of the rope protrudes between the outer strands or an outer strand protrudes from the rope banding.

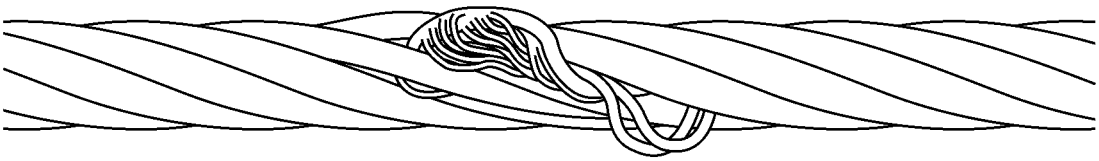

Fig.120990: Protrusion of an insert (rope single layer)

Fig.120991: Distorted or protruding strand

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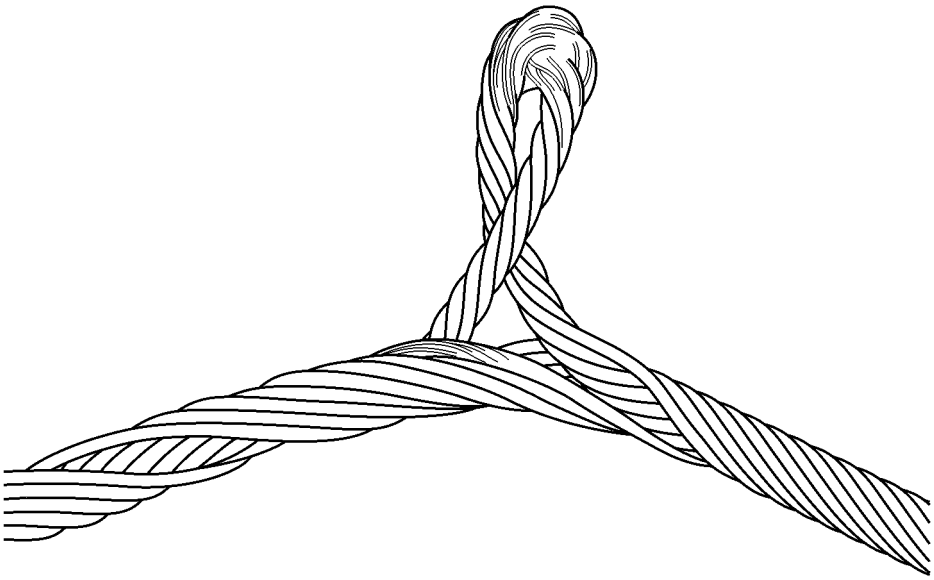

Fig.121373: Protrusion of rope insert on rotation-resistant rope

When the insert or a strand protrudes or is distorted, place the rope down. Have authorized inspector for crane rope inspection check if the rope area with the distortion can be removed.

▶ Check the entire rope for protruding, distorted insert or strand.

When protruding, distorted insert or braid is present:
▶ Take the rope down.
▶ Have **expert personnel for crane rope inspection** check if the rope area with the distortion can be removed.

22 Loop formation

At loop formation individual or several wires protrude from the rope and bulge upward (bird-caging).

These areas are most often on the opposite side of the rope pulley groove.

Make sure that the following prerequisite is met:
– There are **no** broken wire ends present.

If only a core wire of the rope insert protrudes through the outer strands, then the rope does not have to be taken down when:
– The wire can be removed.
– The wire does not disturb other elements of the rope drive.

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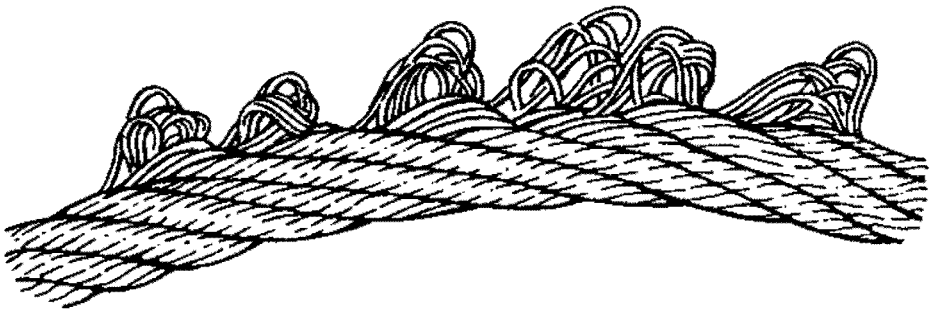

Fig.120993: Emergence of individual wires

▶ Check rope for loop formation.

When solely a core wire protrudes:
▶ Remove the core wire.

When several wires are affected from the loop formation:
▶ Take the rope down.

23 Kinking or rope loops pulled closed

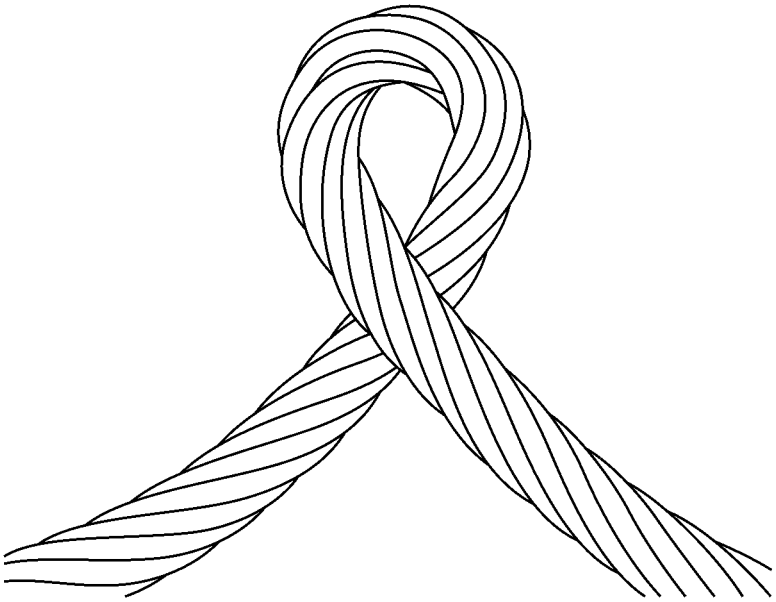

Fig.121007: Kinking or rope loop pulled closed

At this deformation a loop has formed in the rope, without the possibility to rotate around its own axis during a load. The rope is subjected to more wear.

The rope is significantly distorted. The strength remains only in part.

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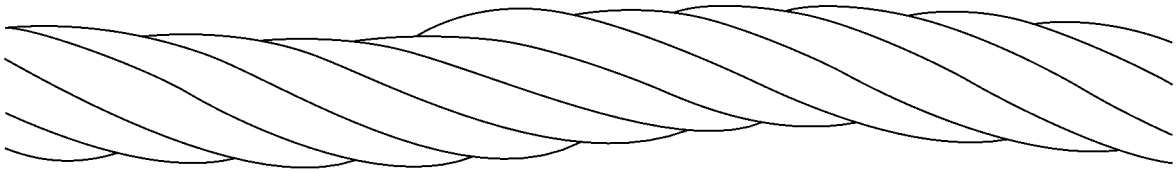

Fig.121002: Positive Kinking

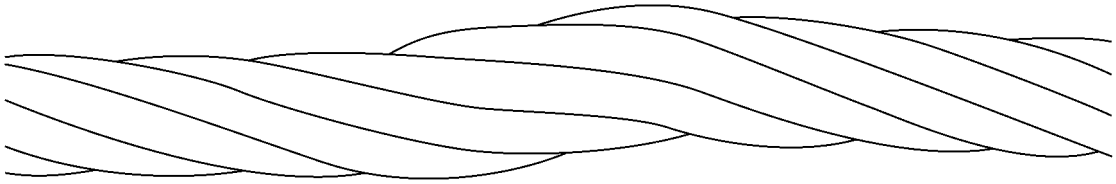

Fig.121003: Negative Kinking

▶ Check the rope for kinking or rope loops pulled closed.

When kinking or rope loops pulled closed occur:
▶ Take the rope down.

24 Buckles

Buckles are angular deformations. The rope was damaged due to external influences. Strong deformations of the rope cause stronger wear.

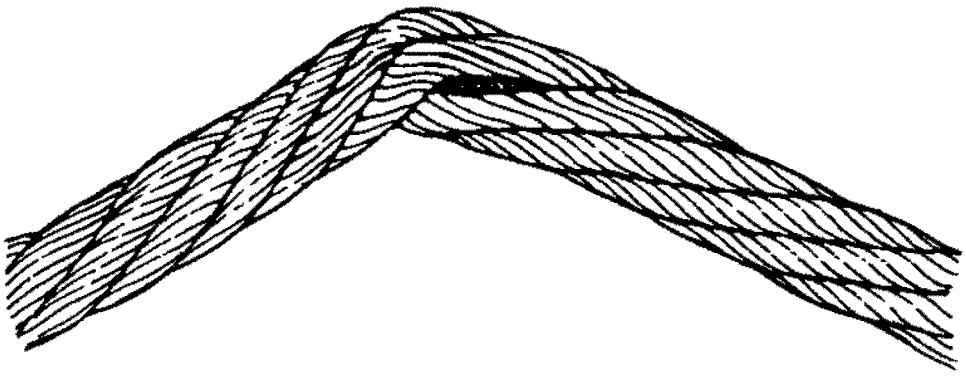

Fig.120999: Severe buckle

A buckle is a serious matter if a fold is visible on the underside of the rope.

When buckles are present:
▶ Have the rope inspected by **expert personnel for crane rope inspection**.

When a distortion and degree of severity permits further operation:
▶ Shorten the inspection interval.

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When the removal criteria is reached:
▶ Take the rope down.

25 Effects of heat, arcs

Damage caused to the rope by welding work, for example.

Exceptional thermal effect is visible through tempering colors, the loss of lubricant and by localized melting of wires.

When thermal effect has occurred on the rope:
▶ Take the rope down.

26 Combined degree of severity

Note
▶ For a method to determine the effect of a combined degree of severity and damage on the rope, see **DIN ISO 4309**.

When the condition of the rope deteriorates, then often a combination of various causes occurs.

To determine the degree of severity, the **expert personnel for crane rope inspection** must:
- take different damage within a rope section into account
- evaluate the entire effect of the damage and the distortions
- decide about the operational safety of the rope
- evaluate if inspection intervals must be adjusted
- decide if the rope must be taken down

When the combined degree of severity is more than 100 %, then the rope must be taken down.

27 Flattenings

Effects of flattenings on the rope:
- Rope sections with flattenings, which move **over the rope pulleys** tend to higher wear and a higher number of broken wires.
- Rope pulleys can be damaged.
- Flattenings on **stationary ropes** (guy ropes boom) promote quicker corrosion, especially in the areas where the outer strands have opened.

Flattened rope sections must be checked in shorter intervals for broken wires and corrosion.

27.1 Shorting the intervals

▶ Check the entire rope for flattenings.

When flattenings are present on stationary ropes:
▶ Shorten the intervals for rope inspection.

When it is **not** possible to shorten the intervals for the rope inspection:
▶ Take the rope down.

27.2 Improper mechanical damage

An improper mechanical damage occurs, for example, when the rope is trapped.

▶ Take the rope down immediately or shorten it, see chapter 7.05.50.

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27.3 Operational transverse pressure

Operational transverse pressure causes flattenings, for example in the incline range of multi layer spooling.

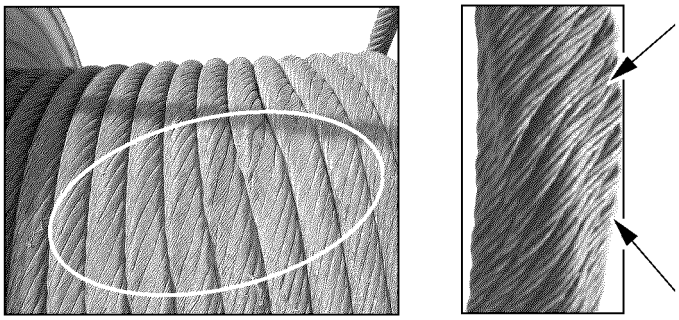

Fig.114002: Flattenings

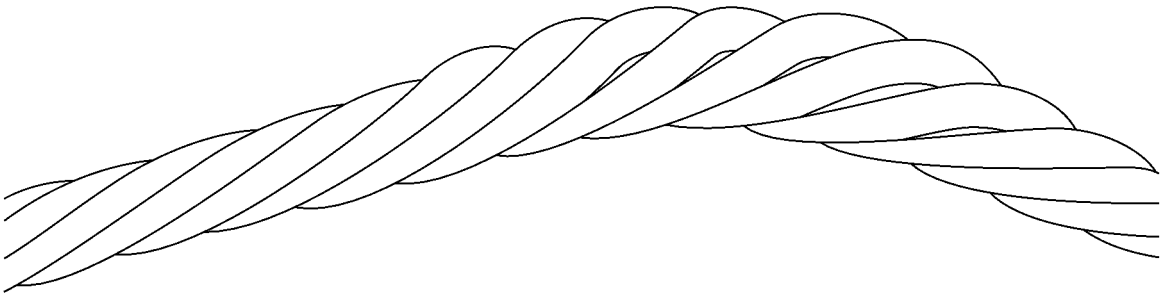

Fig.120996: Flattenings on multi layer spoolings

▶ Check the first rope layer of the winches for crushed areas and distortions.

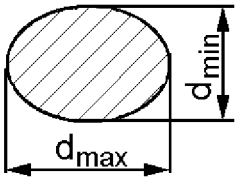

Fig.121006: Largest and smallest diameter on the distortion area

$$V = \frac{d_{max} - d_{min}}{d} \times 100\ \%$$

Fig.121374: Formula to calculate the distortion

V	Rope distortion in percentages	**dmax**	Largest diameter of distortion area
d	Rope nominal diameter	**dmin**	Smallest diameter of distortion area

When distortions are present:
▶ Determine the number of broken wires See section „Determining the number of broken wires“.

When the number of permissible broken wires is exceeded:
- ▶ Take the rope down.
- ▶ Calculate the distortion **V** with the formula and document it in the inspection checklist.

When distortion **V** is larger than 5 %:
- ▶ Check the rope before every assembly and erection procedure.

When distortion **V** is larger than 10 %:
- ▶ Document the degree of severity of 50 % in the inspection checklist.

When distortion **V** is larger than 20 %:
- ▶ The degree of severity of 100 % is reached: Take the rope down.

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28 Current checklist

Crane and use:

Rope application:		RCN[3]:	Installation date:
Brand name:		Nominal diameter:	Take-down date:
Make[1]:	○ Right hand	○ Left hand	Minimum tensile strength
Direction of lay[1]:	○ Lang's lay	○ Ordinary lay	Permissible number of visible external broken wires
Intermediate layer[1]:	○ IWRC	○ FC ○ WSC	Datum diameter
Wire surface[1]:	○ Bare	○ Galvanized	Permissible diameter reduction: 6d: 30d:
Rope end connections:			

Date	Visible external broken wires						Diameter			Corrosion		Damage, deformation		Combined severity level[2]	Name of expert for the wire rope inspection	Signature
	Number in length of		Position in the rope		Severity level[2]		Measured	Actual reduction to datum diameter	Position in the rope	Severity level[2]	Position in the rope	Severity level[2]	Position in the rope			
JJ/MM/TT	6d	30d	6d	30d	6d	30d										

[1] Check where applicable.
[2] State extent of damage; slight or 20%; medium or 40%; high or 60%; very high or 80%; take-down or 100%
[3] RCN = Rope Category Number

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Fig.121370-en: Form for current checklist

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8.05 Inspection of load hooks

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Fig.195219

1 Safety guidelines

DANGER
Death, severe injury, property damage due to welding on load hooks!
- ▶ Do **not** weld load hooks to repair wear.
- ▶ Replace the load hook in case of impermissible wear.
- ▶ Contact Liebherr Service.

Make sure that the following regulation is followed:
- – Do **not** carry out any welding work on load hooks, for example to repair wear.

2 Inspection intervals

By recognizing defects in time, accidents are prevented.

An inspection must be made before operation.

Load hooks must be inspected as needed, but at least once a year by an expert.

The load hook must be inspected very 4 years by an expert.

3 Inspecting and monitoring the load hook

Any defects found must be remedied and documented.

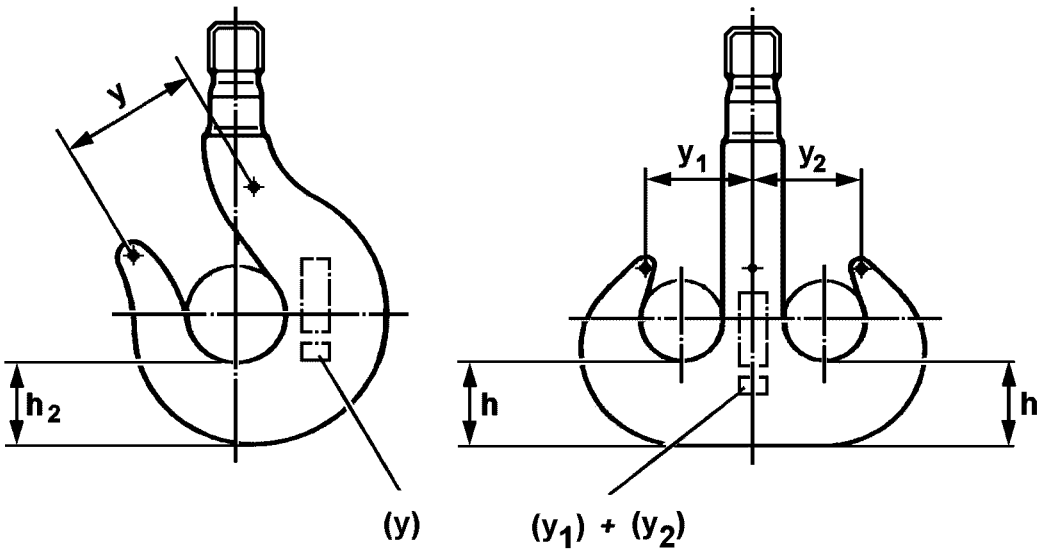

Fig.121531: Description of measured distances of load hooks

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3.1 Checking the load hook for distortion

DANGER
Death, severe injury, property damage due to expansion of hook jaw!
- ▶ Replace the load hook in case of impermissible expansion.
- ▶ Contact Liebherr Service.

The initial dimension **(y)** for the single hook is marked on the load hook.

The initial dimension **(y_1)** and the initial dimension **(y_2)** for the double hook is marked on the load hook.

The expansion of the hook jaw may not exceed more than 10 % in reference to the initial dimension **(y)** or the initial dimension **(y_1)** and the initial dimension **(y_2)**.

- ▶ Measure dimension **y** or dimension **y_1** and dimension **y_2** from center punch to center punch.
- ▶ Check for dimensional accuracy within the permissible tolerance.

3.2 Checking the load hook for surface cracks

DANGER
Death, severe injury, property damage due to surface cracks and damage on the load hook!
- ▶ Replace the load hook in case of surface cracks and damage.
- ▶ Contact Liebherr Service.

When distortions are found on the hook jaw:
- ▶ Check the load hook for surface cracks with a suitable procedure.
- ▶ Check the load hook for damage

3.3 Checking the load hook for wear

DANGER
Death, severe injury, property damage due to wear on the hook base!
- ▶ Replace the load hook in case of impermissible wear.
- ▶ Contact Liebherr Service.

The wear on the hook base may be no more than 5 % of the initial nominal dimension **h_2** for single hooks or initial nominal dimension **h** for double hooks.

The initial nominal dimensions **h_2** for single hooks and **h** for double hooks are listed in the chart.

Hook Number	Single hook h_2 [mm]	Double hook h [mm]
4	67	—
5	75	—
6	85	75
8	95	85
10	106	95
12	118	106
16	132	118
20	150	132
25	170	150
32	—	170

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Hook Number	Single hook h_2 [mm]	Double hook h [mm]
40	—	190
50	—	212
63	—	236
80	—	265
100	—	300
125	—	335
160	—	375
200	—	425
250	—	475
320	—	545

Initial nominal dimensions $\mathbf{h_2}$ for single hooks and **h** for double hooks

- ▶ Measure dimension $\mathbf{h_2}$ for single hooks or dimension **h** for double hooks.
- ▶ Check for dimensional accuracy within the permissible tolerance.

3.4 Checking load hooks for corrosion and wear

DANGER
Death, severe injury, property damage due to corrosion and wear on the thread!
- ▶ Replace load hooks which are **not** dimensionally accurate.

When wear or impermissible axial play on the hook nut is present:
- ▶ Replace the hook nut.
- ▶ Contact Liebherr Service.

To check the threads regarding corrosion and wear, the hook nut must be unscrewed from the hook shaft.

- ▶ Check the load hook thread and hook nut for corrosion and wear.

When reconditioning work is required to remove corrosion notches:
- ▶ Carry out a test for dimensional accuracy.

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8.06 Inspection of hydraulic hose lines

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Fig.195219

1 Safety guidelines

WARNING
Damaged and leaky hydraulic hose lines!
Fire, accidents, death, severe injury, property damage.

If leaky areas are found:
▶ Have these leaky areas inspected immediately by authorized and trained expert personnel and remedied.

If damage is found:
▶ Have the hydraulic hose lines replaced exclusively by authorized and trained expert personnel.

If it is determined that the service life is over:
▶ Have the hydraulic hose lines replaced exclusively by authorized and trained expert personnel.

Make sure that the following prerequisite is met:
– A **competent person for hydraulic hose lines** inspects the hydraulic hose lines.

A **competent person for hydraulic hose lines** has the following knowledge:
– Knowledge and experience in hydraulic and mechanics
– Knowledge of all requirements regarding valid standards:
  • ISO 8331
  • ISO 2230
  • ISO 1402
  • ISO/TR
  • EN 853 to EN 857
  • National regulations
– **or:** Knowledge of all requirements regarding the valid German standards, for example:
  • DIN 20066:202-10
  • BGR 237 Feb 2008, BG-Regulation

2 Inspection intervals

The inspection of hydraulic hose lines must be carried out in the following intervals:
– when the crane is **up to 10 years** old, at least one inspection every twelve months
– when the crane is **older than 10 years**, at least one inspection every six months

3 Checking the end of the service life

Hydraulic hose lines have a limited service life.

When hydraulic hose lines are properly stored, installed and used, then the manufacturer guarantees a service life of at least 10 years.

The life expectancy of hydraulic hose lines can deviate significantly from the noted service life of hydraulic hose lines.

Note
Special case: Active rear axle steering!
▶ The life expectancy of hydraulic hose lines is six years, including a storage period of maximum two years.

The life expectancy of a hydraulic hose line depends on various factors:
– Environmental influences, for example: Temperature, humidity, corrosive air
– Use

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- Working cycles
- Number of bending cycles
- Friction
- Fluid

The following factors reduce the life expectancy significantly:
- Heat
- Repeated bending under pressure

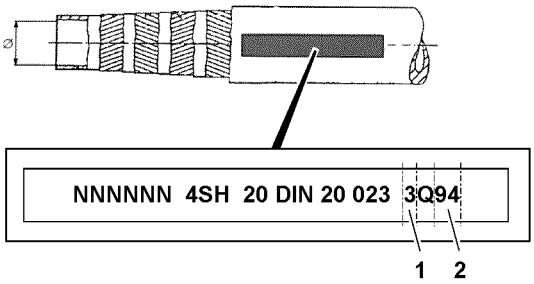

Fig.120159: Example for identification of hydraulic hose lines

The manufacturing date is marked on the fixtures or fittings.

▶ Read the quarter **1** of manufacture.
▶ Read the year **2** of manufacture.

When the life expectancy of a hydraulic hose line has been exceeded, then a **competent person** can decide **not** to replace the hydraulic hose line. Document the decisions, see section „Documenting the inspection“.

When the end of the service life is determined:
▶ Have the hydraulic hose lines replaced exclusively by authorized and trained expert personnel.

4 Inspecting the hydraulic hose lines for damage

Hydraulic hose lines must be replaced when one of the following damage is present:
– Damage on outer surface, such as chafe marks, cuts and cracks
– Brittleness due to aging of outer layer (cracks)
– Distortion, such as splitting of hose layers, bubbles, crushed areas, kinks, rotational stress
– Leakages
– Damage or distortion of hose fixtures or hose fitting (seal is endangered)
– Movement between hose and hose line, hose working itself loose from the fixture or the fitting
– Requirements for installation **not** observed
– Corrosion of fixture or fitting (solidness or function of fitting is endangered)

When the hydraulic hose line is **not** completely accessible:
▶ Remove the hydraulic hose line.

When the hydraulic hose line is protected with a protective hose:
▶ Check the hose protection for abrasion Abrasion on a hose protective hose can indicate abrasion on the hydraulic hose line.
▶ Check hydraulic hose lines for distortion in pressureless and pressurized status and during bending.

When the hydraulic hose line is slightly damaged, then a **competent person** can decide **not** to replace the hydraulic hose line. Document the decisions, see section „Documenting the inspection“.

If damage is found:
▶ Have the hydraulic hose lines replaced exclusively by authorized and trained expert personnel.

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5 Inspecting the hydraulic hose lines for leaks

▶ Check the crane for escaped hydraulic oil.
▶ Check the crane for leaks by visually checking the ground under the crane.

When the hydraulic system leaks:
▶ Have these leaks inspected immediately by authorized and trained expert personnel and remedied.
or
Contact Liebherr Service.

6 Documenting the inspection

Make sure that the following prerequisite is met:
– A **competent person for hydraulic hose lines** documents noticeable observations.

The following data about hydraulic hose lines is documented:
– Installation location
– Condition
– Date
– Time

▶ Document noticeable observations comprehensibly.

When the life expectancy of a hydraulic hose line has been exceeded of if the hydraulic hose line is slightly damaged, then a **competent person** can decide **not** to replace the hydraulic hose line.

When the hydraulic hose line is **not** replaced:
▶ Document decisions and replacements comprehensibly.
▶ Document the date for the next inspection comprehensibly.

7 Replacing hydraulic hose lines

To ensure maximum safety, sealing and service life, the following guidelines apply for replacement of hydraulic hose lines.

WARNING
Impermissible spare parts!
Death, severe injury, property damage.
▶ Do **not** use repaired or used hydraulic hose lines.
▶ Use exclusively Original Liebherr spare parts.
▶ Use exclusively hydraulic hose lines according to manufacturer's specification (including fixtures, rubber piece goods and manufacturing process).

NOTICE
Routing of hydraulic hose lines changed!
Abrasion. Incorrect bending radius. Stress. Shortened service life.
▶ Keep the routing of hydraulic hose lines.
▶ Inspect the hydraulic hose lines according to intervals.

▶ Adhere to the hose bending radii according to the manufacturer's specifications.
▶ Ensure the routing of hydraulic hose lines according to manufacturer's specifications (pressureless and pressurized condition).
▶ Ensure the distance between lines and structures.

If necessary:
▶ Check moving parts in the area of hydraulic hose lines.

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When the hydraulic hose line is installed in straight direction:

- ▶ Ensure a sag of the hose.
- ▶ Avoid mechanical tension and twisting of the hose during installation.
- ▶ Fasten the hydraulic hose line according to manufacturer's specification.
- ▶ Do not cross hydraulic hose lines for high pressure and low pressure.
- ▶ Keep hydraulic hose lines away from hot components.

When hydraulic hose lines are in a surrounding with high temperatures:

- ▶ Install protective insulation according to manufacturer's specifications.

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8.07 Inspection of pneumatic brake system for drum brakes

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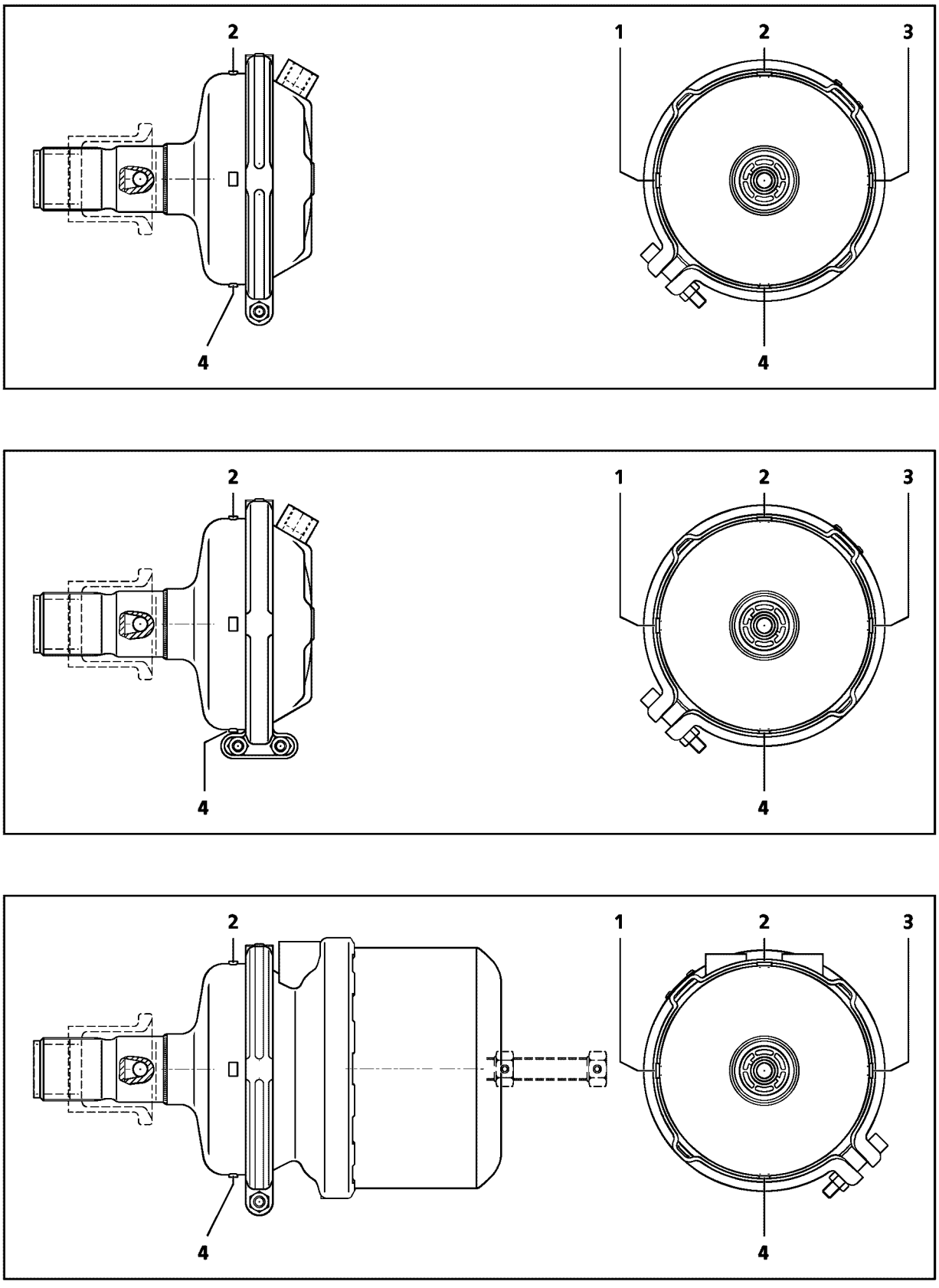

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Fig.190108

1 General

Air braking systems on mobile cranes must be inspected annually.

In Germany, the main inspection and safety tests must be conducted in accordance with section 29 of STVZO.

Local national laws apply in other countries.

2 Visual inspection

Check that the following requirements are met:
- Piping and hoses are not damaged, not corroded and are properly installed
- Devices are properly installed and fastened
  Ensure that the breathing holes **4** on the diaphragm cylinders are not blocked (plugs removed). If this is not done, the membrane bellows may twist. The spring loaded-brake will then not be completely released and the brake will run hot.
  The breathing holes **1** breathing holes **2** and breathing holes **3** must nevertheless be closed by plugs.
- The air pressure tank is not damaged and no corrosion is visible on the outside.
  The tank is labeled as specified.
  No welding may be done nor heat be applied to the tank walls.
- Pressure tank is drained
- Dust seals are not damaged
- Joints are properly secured, operate freely and are properly seated
- Rods have not been repaired by welding, are not bent, move freely and are not otherwise damaged
- The wheel brakes are properly adjusted (brake lining clearance, brake cylinders stroke, lining thickness, slack adjuster)

3 Operation and performance test

3.1 Operation test

- **Pressure regulator**, **Air compressor**: Test low and high pressure settings and delivery rate
- **Pressurized air system**: Check for sealing and supply pressure
- **Multi-circuit safety valve**, **spill valve** and **warning system**: Check operation

3.2 Performance test

Note
▶ The following values are valid for an axle load of 12 t.

Brake action can be checked using the observation ports located in the metal covers:
- Press on the brake pedal: Both brake shoes contact the drum
- Release the brake pedal: Brake shoes immediately return to their starting position

Check brake performance:
- Measure the retarding force
- Measure stopping distance
- Determine braking performance using brake stands

Determine retarding force using a retarding force measuring instrument

When applying a pressure of 6.5 bar , the measured average retarding force d_m should be greater than 4.5 m/s^2.

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Measure stopping distance

When applying a pressure of 6.5 bar , the stopping distance, s, should be less than the value given in the charts.

Test speed v [km/h]	Stopping distance s [m]
20	6.5
30	12.5
40	19.8
50	29.0

Measure the braking performance using a brake stand

When braking forces are measured at the vehicle axles, braking performance shall be determined as follows:

$$z = \frac{F_1 \times i_1 + F_2 \times i_2 \ldots F_n \times i_n}{G_z} \times 100\,\%$$

Fig.195327

$$i_1 = \frac{p_{N1} - 0{,}4}{p_1 - 0{,}4}$$

Fig.195328

$$i_n = \frac{p_{Nn} - 0{,}4}{p_n - 0{,}4}$$

Fig.195329

Gz = allowable total vehicle weight [N]
z = braking performance [%]
F_1 = braking force at the first axle, which was determined at pressure p_1 [N]
F_2 = braking force at the second axle, which was determined at pressure p_2 [N]
F_n = braking force at the last axle, which was determined at pressure p_n [N]
$p_{N1...n}$ = max. braking pressure at the respective axle [bar]
$p_{1...n}$ = braking pressure actually transmitted to the wheel cylinder at the respective axle [bar]

4 Internal inspection of the wheel brakes

DANGER
Risk of accident!
▶ All brake maintenance and repair work shall be carried out only by authorized and trained personnel.

Check the brake lining condition every three months using the inspection ports in the metal covers.

Perform an internal inspection of the individual brake components by removing the brake drum every 12 months.

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WARNING
Risk of damaging the brakes!
▶ Do **not** activate the brakes while the brake drum is removed!

When brake linings measure 5.5 mm (new brake lining thickness 18 mm), not including metal shoes, replace the linings. Burned, shiny or oil-covered linings must also be replaced.

DANGER
Risk of accident!
▶ Always replace brake linings on both wheels of each axle.

Only the following brake linings may be used for replacement purposes **Jurid 546**, **Bremskerl 6275** and **Beral 1549** .

Thoroughly turn down the brake drums. When turning down the brake drums, do not exceed the permissible turn-down measurement of 0.75% of nominal diameter.

Example:

Nominal diameter: 500.00 mm

Permissible turn-down measurement: 3.75 mm

Permissible inner diameter: 503.75 mm

DANGER
Risk of accident!
▶ Replace the brake drum when the inner diameter is larger than 503.75 mm.

The brake is equipped with an automatic adjustment device, that corrects for brake lining wear and centers the brake.

The automatic adjustment mechanism is maintenance-free.

DANGER
Risk of accident!
▶ If any individual components are damaged, replace the complete adjustment assembly.
▶ Use the „Adjustment“ repair kit.

Replace the pressure and tension springs, as well as sealing rings, protection covers and bellows at least every two years.

Repeat the visual, functional and performance tests after reassembly.

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8.12 Inspection of safety controls on the relapse supports

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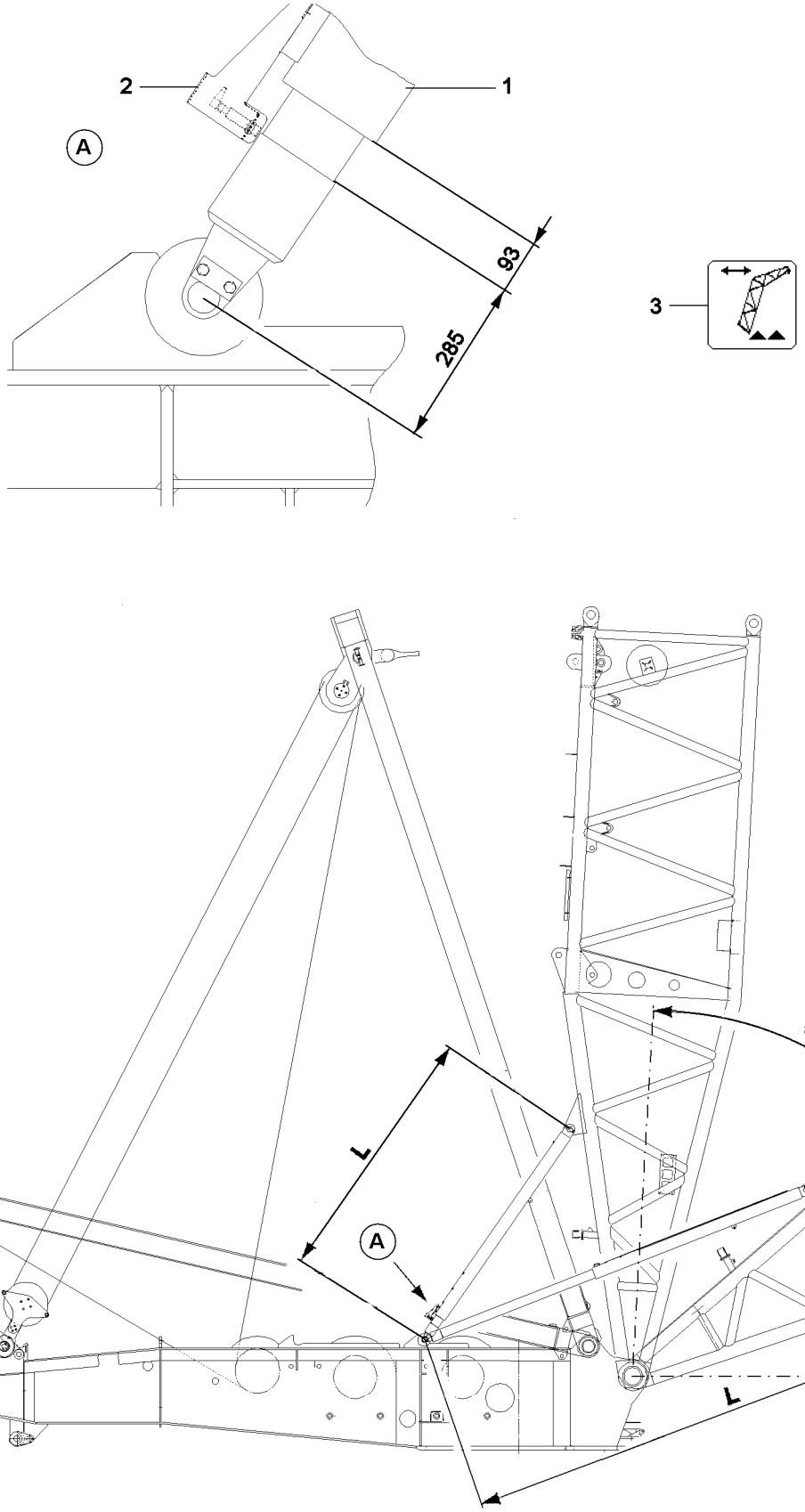

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Fig.107959

1 S-boom relapse retainer

Two hydraulic cylinders prevent the boom from falling backward.

They are controlled on high or low pressure, depending on the operating mode or boom length.

Note

▶ In the steepest boom position, the luffing up movement is turned off by activating the limit switches on the cylinders **1**.

1.1 Checking limit switch initiators for function

Limit switch initiators are individually covered with a metal plate **2** on the S-relapse cylinder **1**.

– The S-boom movement „luff up“ must switch off.
– The icon **3** must appear on the LICCON monitor.

	Angle a	Cylinder length L
Steepest position	87°	4051 mm
Electric switch position	88°	3998 mm
Block position	89°	3940 mm
Cylinder extended	29.7°	6490 mm

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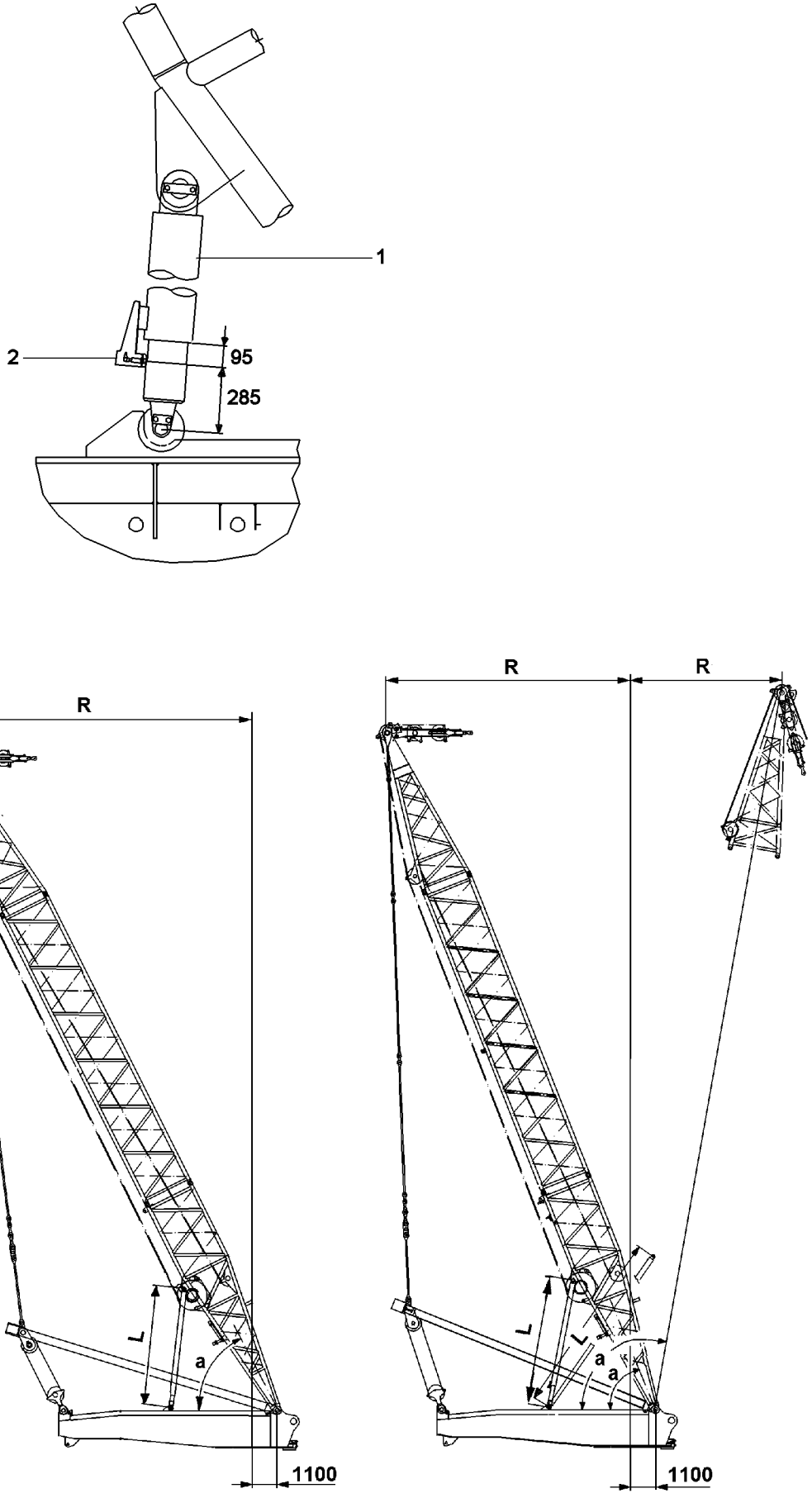

Fig.190844

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2 Derrick relapse retainer

Two hydraulic cylinders prevent the derrick from falling backward.

Note
▶ Upon activating the limit switches on the cylinders **1**, winch 4 „spool up“ is turned off.

2.1 Checking limit switch initiators for function

Individually cover limit-switch initiators **2** on the D-relapse cylinder **1** with a metal plate.

Note
▶ Derrick movement„ luff up,“ spool out winch 4, must switch off.

	Slewing radius R	Angle a	Cylinder length L
Cylinder extended	6.6 m	100°	7920 mm
R min. only LD,SLD,SD	10.5 m	68.4°	5582 mm
Nominal position	13.0 m	63.4°	5185 mm
Electric switch position	14.0 m	61.4°	5020 mm
Block position	14.4 m	60.5°	4950 mm

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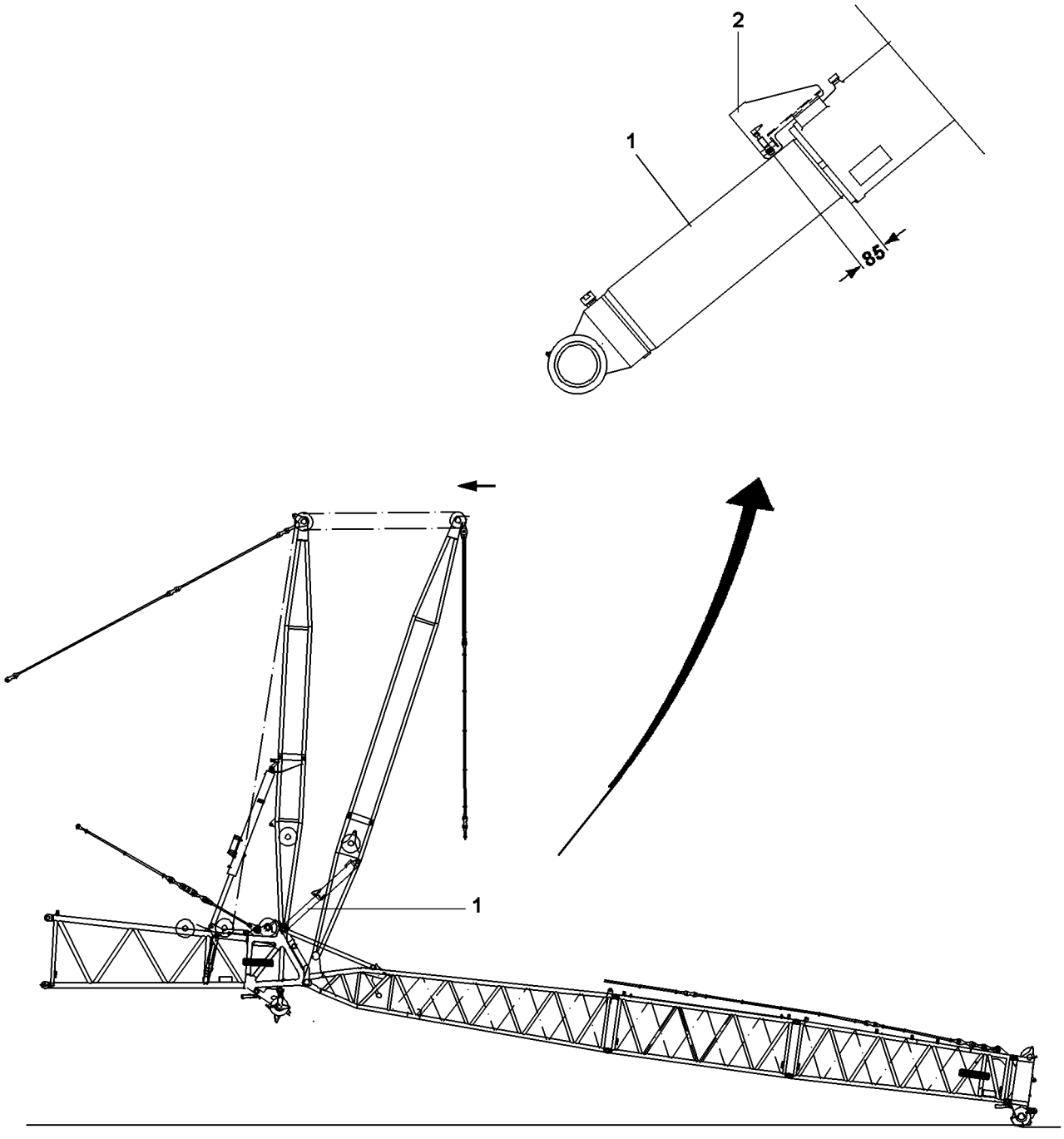

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Fig.192157

3 W-lattice jib

3.1 Checking limit switch initiators for function

Individually cover Limit switch initiators **2** on the W-relapse cylinder **1** with a metal plate.

Note

▶ The movement, W-adjusting winch „spool out," must switch off.

3.2 Checking limit switch initiators on switch point „steepest position"

Before erecting the boom, check the function of the limit switch initiators **2** in installed condition. Pull up both WA-frames to the specified dimension until the switch contact opens, see illustration.

- The W-control winch „spool up" movement must turn off.
- The icon must appear on the LICCON monitor.

After successful test, reset the WA-frames to set up condition.

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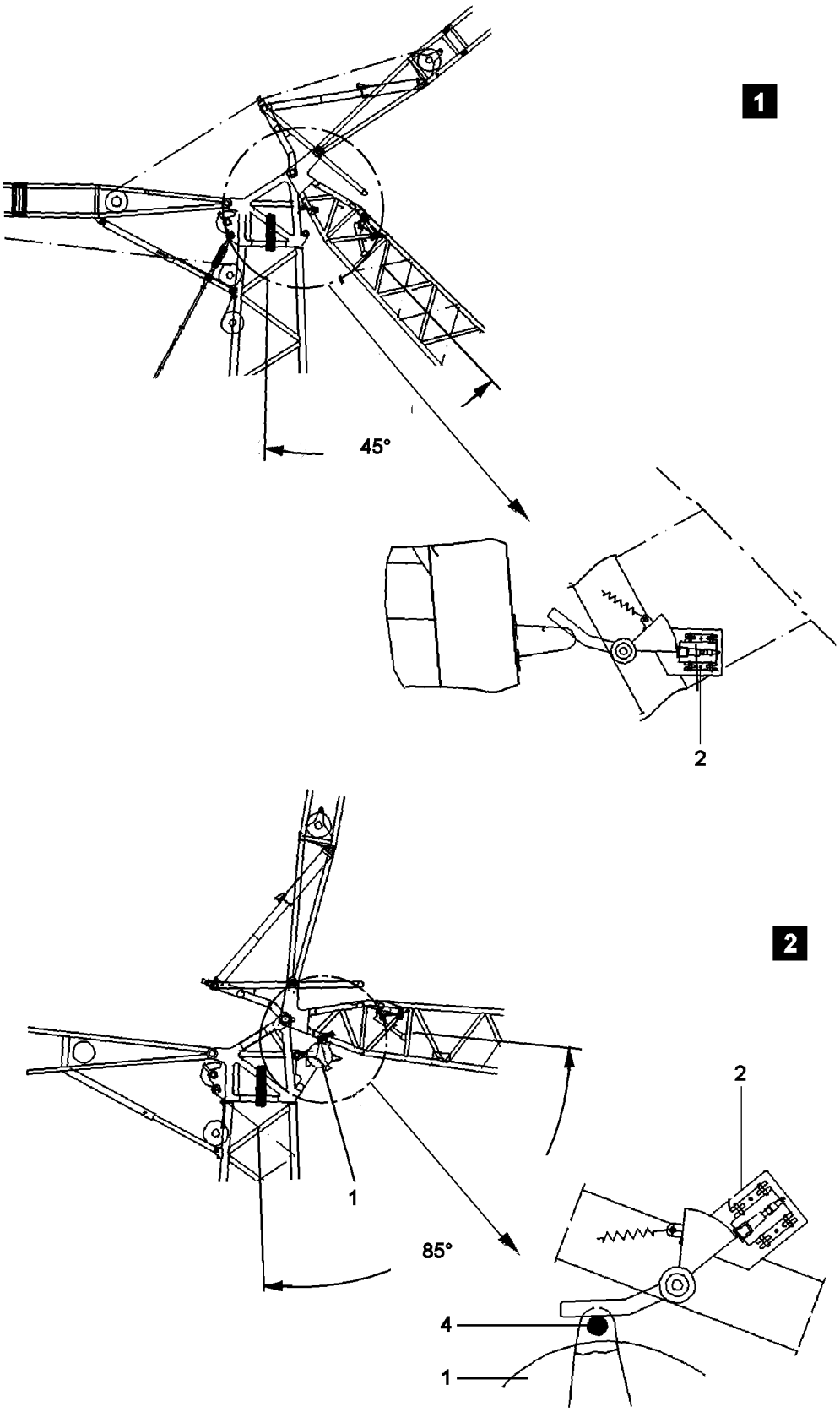

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Fig.192739

3.3 W-lattice jib „downward, without pulley set, illustration 1“

Note

- ▶ Switch setting, W-lattice jib „downward“, approximately 45°!
- ▶ The movement, W-adjusting winch „spool out“ must switch off!

3.4 W-lattice jib „downward, with pulley set, illustration 2“

Note

- ▶ Switch setting, W-lattice jib „downward“, approximately 85°!
- ▶ The movement, W-adjusting winch „spool out“ must switch off!

WARNING

Collision danger while the rope guard **4** is not assembled on the pulley set **4**!
While the rope guard **4** is not assembled, no turning off of movement takes place, W-adjusting winch „spool out“!

- ▶ Crane operation without rope guard **4** on the pulley set **4** is prohibited!
- ▶ Before erection, the rope guard **4** must be assembled and inspected!

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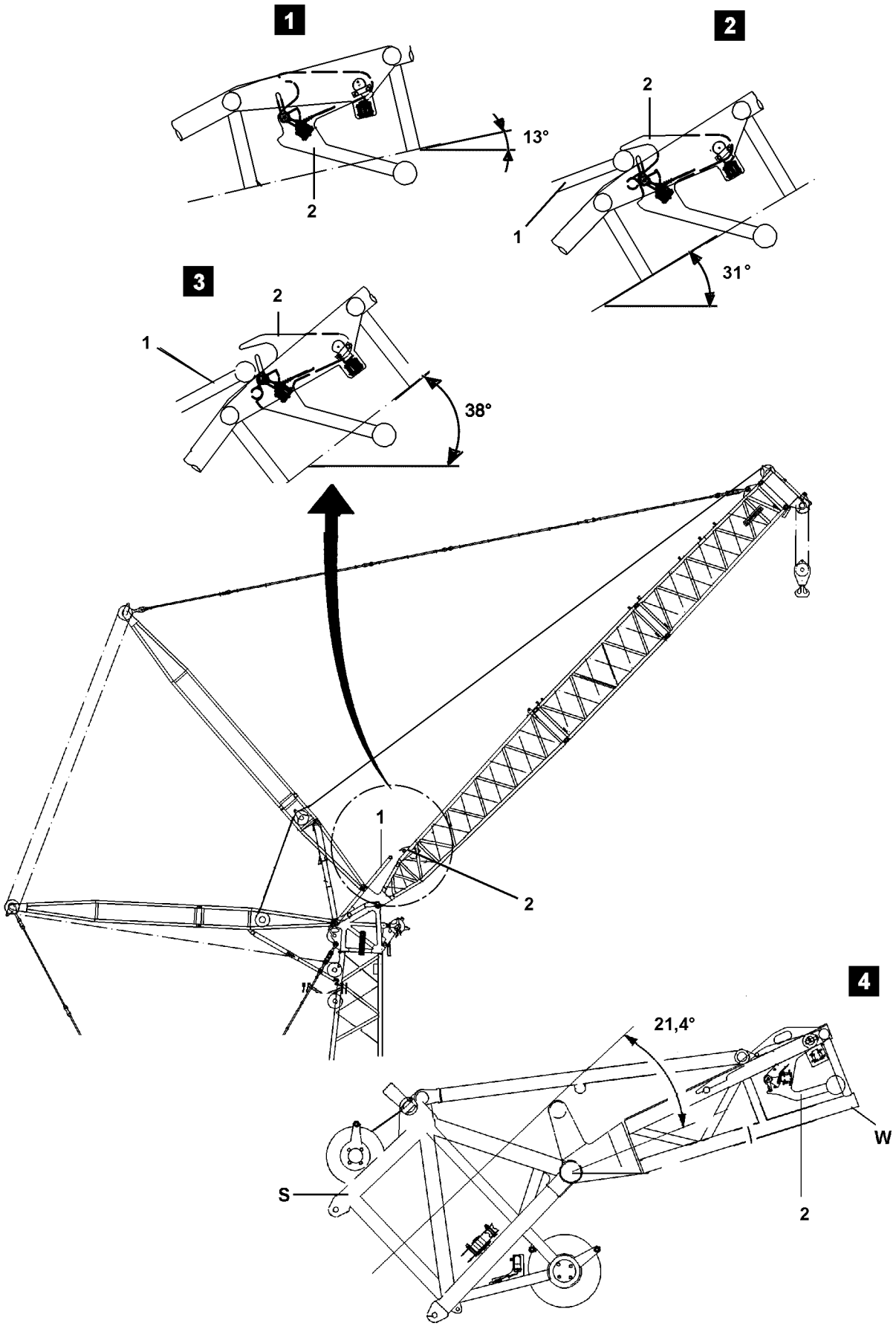

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Fig.198383

3.5 Function check of limit switch initiators on the mechanical relapse retainer

Mechanical relapse support **1**.
Oscillating safety **2** for mechanical relapse support.

In addition to the relapse cylinders, the lattice jib is also secured by a mechanical relapse support **1**, which engages in steepest lattice jib position into the flap of the oscillating safety **2**. The luffing up movement is turned off by the actuated limit switches on the oscillation guard.

WARNING
Danger of tipping over if the oscillation guard is hard to move!
If the oscillation guard **2** is hard to move, the mechanical relapse retainer will no longer function. The W-lattice jib can tip backwards uncontrolled and cause the crane to topple over!
- ▶ Crane operation with hard to move oscillation safety **2** is prohibited!
- ▶ Before erection, the pendulum of the mechanical relapse retainer must be checked for easy movement over the complete swing range of the pendulum.

Depending on the lattice jib position (boom position = 87°), the flap on the oscillation safety is swung out by the weight of the pendulum:
- 13° the flap is swung in, see illustration **1**.
- 31° the flap can be pushed open, see illustration **2**.
- 38° the flap is swung out, see illustration **3**.
- 21.4° the flat is at collision, see illustration **4**.

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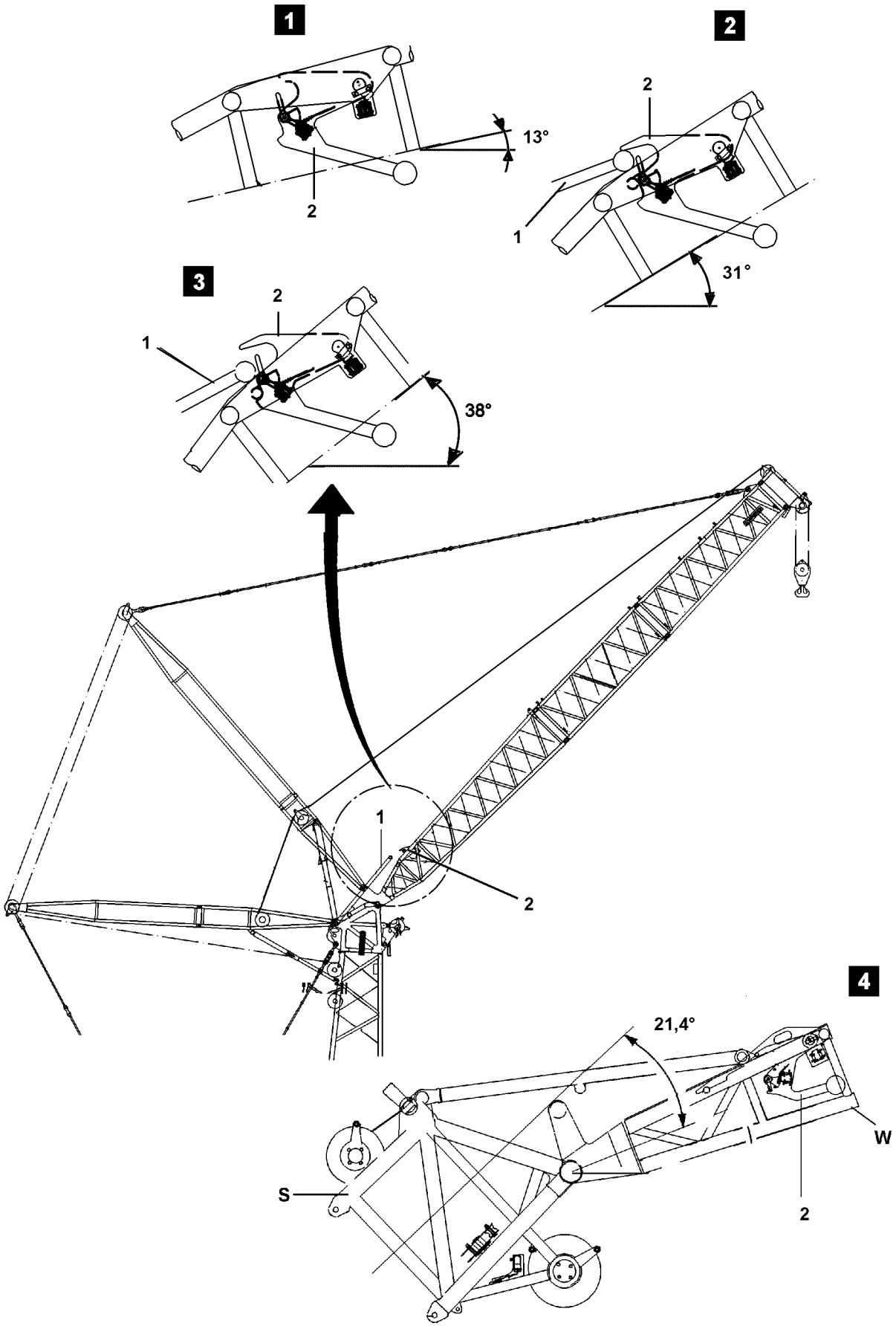

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Fig.198383

3.6 Flap of oscillating safety 2 on collision with mechanical relapse support 1

WARNING
Risk of collision!
If the angle between boom and lattice jib is smaller than or equal to 21.4°, the mechanical relapse support collides **1** with the flap on the oscillation guard **2**. The lattice jib can tip backward uncontrolled and cause the crane to topple over!
Personnel can be killed!
- ▶ Never exceed the angle 21.4° when luffing up!
- ▶ Carry out visual inspection!

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8.14 Inspection of accumulator pressure in relapse cylinder

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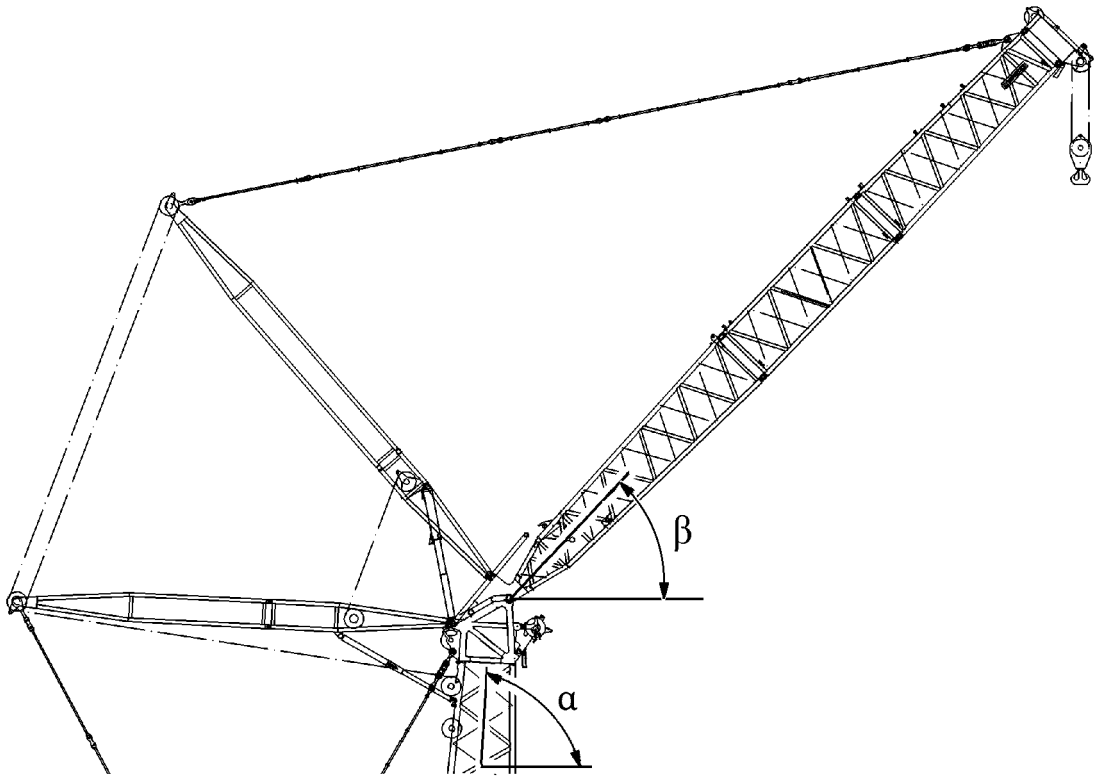

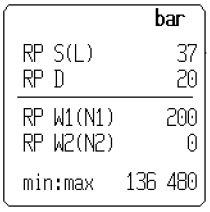

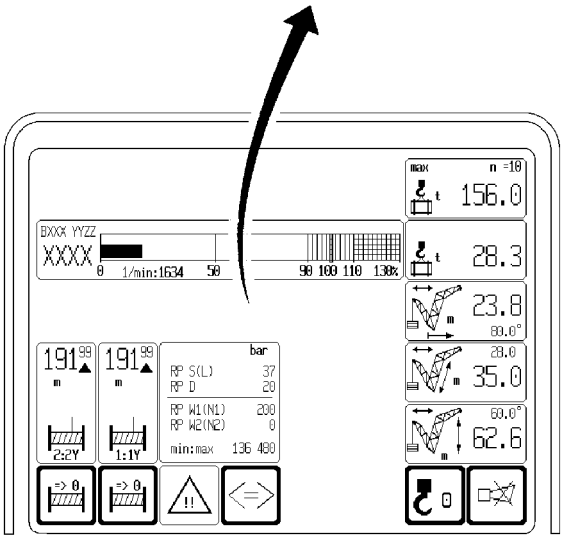

Fig.190804

1 Checking jib stop cylinder pressure

The jib stop cylinder pressure must be checked using the LICCON operation display before and after crane operation, „see diagnosis“.

The actual pressure displayed on the LICCON operation display must correspond with the target pressure in the table.

Note

- ▶ The specified target pressure depends on the outside temperature.
- ▶ The maximum permitted difference between the target pressure and the actual pressure is +/- 10 bar.

The jib stop cylinder pressure is checked as follows:

- Checking cylinder pressure with „jib stop extended to maximum limit“
- Checking cylinder pressure with „jib stop in test position“

1.1 Checking cylinder pressure with „jib stop extended to maximum limit“

- Set main boom and lattice jib to angles specified in table.
- Compare target pressure in table with actual pressure in LICCON operation display.

„Extend jib stop to maximum limit“								
Boom angle α	Lattice jib angle β	Cylinder length	Stroke	Target pressure				
				-40° C	-20° C	0° C	20° C	40° C
87°	44,6°	5050 mm	0 mm	107,3 bar	116,5 bar	125,7 bar	134,9 bar	144,1 bar

1.2 Testing cylinder pressure with „jib stop in test position“

- Set main boom and lattice jib to angles specified in table.
- Compare target pressure in table with actual pressure in LICCON operation display.

„Jib stop in test position“								
Boom angle (α)	Lattice jib angle (β)	Cylinder length	Stroke	Target pressure				
		mm	mm	-40° C	-20° C	0° C	20° C	40° C
87°	46°+2°	4997 mm	53 mm	110,0 bar	119,5 bar	129,0 bar	138,4 bar	147,9 bar

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8.15 Inspection of guy rods

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Fig.195219

1 Safety guidelines

WARNING
Damaged guy rods!
Accident. Death, severe injury, property damage.
▶ Crane operation with damaged guy rods **1** is prohibited.
▶ Replace damaged guy rods **1**.

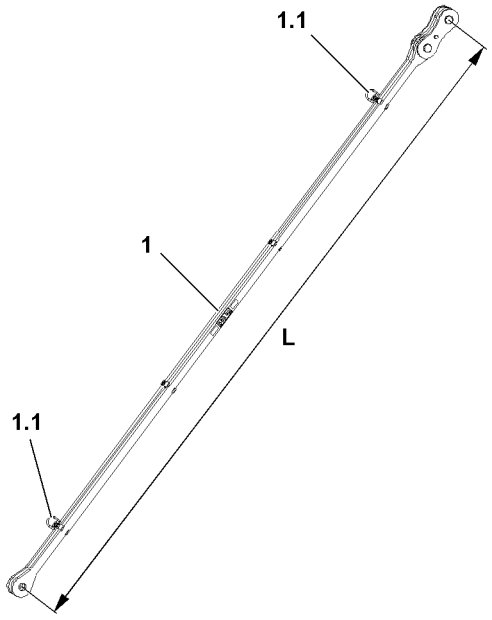

Fig.123845: Guy rod

Make sure that the following prerequisites are met:
– **Authorized and trained expert personnel** checks the guy rods **1**.
– A checklist for documentation of the inspection is on hand

2 Inspection intervals

The inspection of the guy rods **1** must be carried out in the following intervals:
– One inspection of the guy rods every 12 months by an expert.
– One inspection of the guy rods every four years by an authorized inspector.

After a load rip-off or overload of the crane:
– immediate inspection of guy rods by an expert

3 Checking the guy rods

3.1 Inspection

Note
▶ All inspections of the guy rods **1** must be documented.

The guy rods must be inspected in removed condition.

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WARNING
The guy rods **1** can be ripped off!
If a damaged guy rod **1** is used further, it can rip off in crane operation.
Death, severe injury, property damage.
- ▶ Crane operation with damaged guy rods is prohibited.
- ▶ Repairs on guy rods **1** (for example: through welding) are prohibited.
- ▶ Replace damaged guy rods immediately.
- ▶ If one of the following stated damage is found, then the guy rods **1** may no longer be used.

3.2 Cracks and dents

- ▶ Check the guy rods **1** thoroughly through a visual inspection for cracks and dents.

Problem remedy
Damage to guy rods is not clearly evidenced through a visual inspection?
- ▶ Check the respective areas of the guy rods thoroughly, for example with a magnetic particle test.

- ▶ If damage is found: Replace the guy rods **1** immediately.

3.3 Elongation

Note
- ▶ The initial dimension **L** of the guy rods **1** refers to the bore spacing of the pin bores.
- ▶ The initial dimension **L** of the guy rods **1** is listed in the separate rod plan.

- ▶ Check the elongation of the guy rods **1** by measuring the guy rods.

WARNING
The guy rods can be ripped off!
The permissible elongation of the guy rods **1** may be a maximum of 0.2 %, for example 14 mm , at an initial dimension **L** of 7000 mm.
Death, severe injury, property damage.
- ▶ If the maximum permissible elongation is reached or exceeded: Replace the guy rods **1** immediately.

- ▶ If an elongation of the guy rods of more / equal to 0.2 % of the initial dimension **L** is proven: Replace the guy rods **1** immediately.

3.4 Wear

- ▶ Check the bores, pins and pin retainers for signs of wear.
- ▶ If respective wear is present in the stated areas: Replace the guy rods **1** immediately.

3.5 Ductile deformation

- ▶ If a guy rod **1** shows any ductile deformation: Replace the guy rod **1** immediately.

3.6 Paint / coating

- ▶ The guy rods **1** must be checked for paint damage or corrosion.
- ▶ If damage is present on the paint finish / coating: Repair the paint / coating of the guy rods **1** expertly.

NOTICE
Danger of property damage!
- ▶ Never store guy rods **1** in or near aggressive media, for example: Seawater.

- ▶ Always store the guy rods **1** properly and outside of aggressive media.

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3.7 Fastening points

- ▶ Check the fastening points **1.1** of the guy rods **1** for damage.
- ▶ Replace damaged fastening points **1.1**.

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8.16 Inspection of fiber guy ropes

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LWE/LG 1750-006/15409-07-02/en

Fig.195219

1 Safety guidelines

WARNING
Damaged fiber guy rope!
Accident. Death, severe injury, property damage.

If damage is found:
▶ Have fiber guy rope **1** inspected by authorized and trained expert personnel.

When no final evaluation of the damage can be made:
▶ Send the fiber guy rope **1** to the rope manufacturer for inspection and damage evaluation.

If it is found that a fiber guy rope **1** cannot be used any longer or cannot be repaired:
▶ Replace the fiber guy rope **1**.

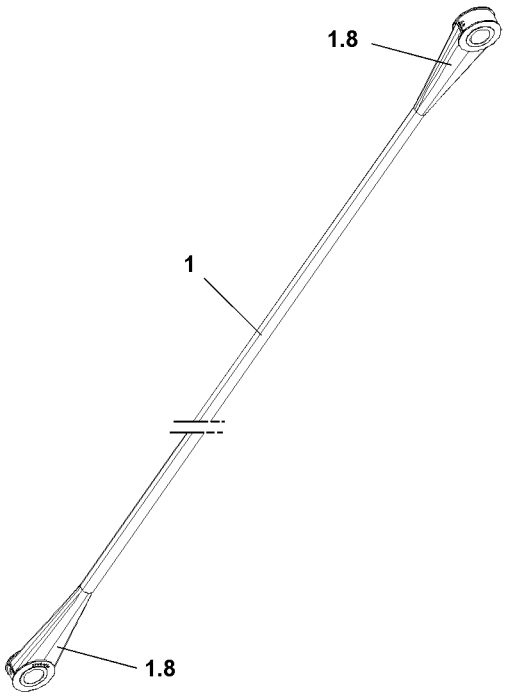

Fig.123614: Fiber guy rope

Make sure that the following prerequisites are met:
– **Authorized and trained expert personnel** inspects the fiber guy rope **1**.
– **In case of doubt:** Rope manufacturer inspects the fiber guy rope **1**

The authorized and trained expert personnel has the following expertise:
– Knowledge about technical design and the condition of fiber guy ropes **1**
– Knowledge about relevant inspection criteria for fiber guy ropes **1**
– Knowledge and experience in the use of various test procedures to determine the scope of the damage
– Knowledge and experience in the evaluation of rope damage on fiber guy ropes **1**
– Has the knowledge about inspection intervals for the required inspections, as specified by the manufacturer
– Knowledge and experience in the evaluation of further use of the fiber guy ropes **1** is permissible
– Knowledge about the required prerequisites for the inspection of fiber guy ropes **1**, as specified by the manufacturer

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2 Inspection intervals

Inspection intervals for fiber guy ropes, see Crane operating instructions, chapter 7.03.50.

After a load rip-off or overload of the crane:
- Immediate inspection of fiber guy ropes by an expert

3 Inspecting the fiber guy ropes

3.1 Composition

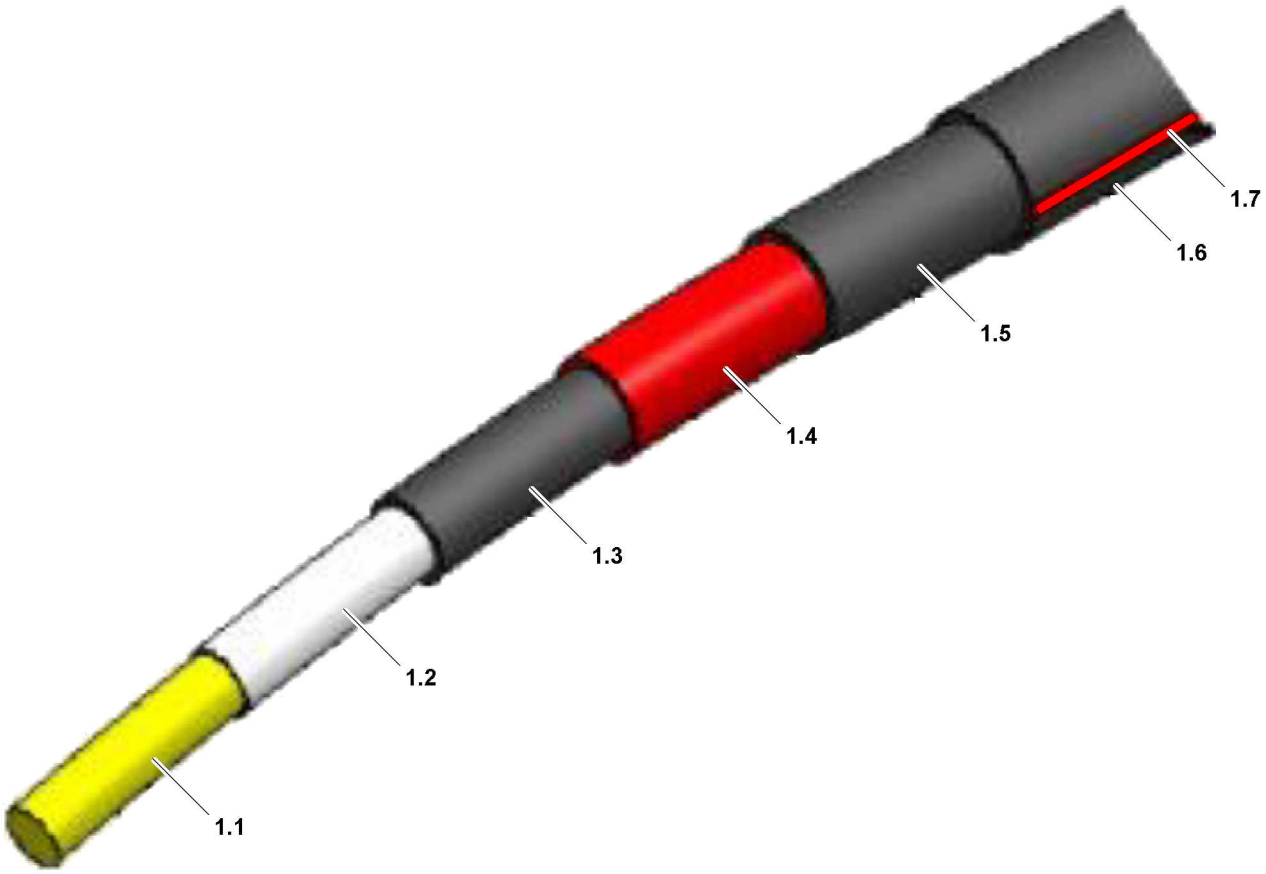

Fig.123619: Composition of a fiber guy rope

1.1 Aramid suspension rope (yellow)
1.2 Compression band
1.3 Sealing band
1.4 Inner braiding (red)
1.5 Intermediate layer
1.6 Outer braiding
1.7 Twist display

3.2 Inspection

Note
▶ All inspections of the fiber guy ropes **1** must be documented.

The inspection of the fiber guy ropes can be made via a visual inspection.

The fiber guy ropes must be inspected in removed condition.

The degree of severity of possible damage and further use of the fiber guy ropes depends mainly on which layers of the rope structure were damaged where and how.

In case of obvious severe rope damage, a safe crane operation should always be the priority and the respective fiber guy rope should be replaced.

If there is any doubt regarding the rope damage, only a detailed inspection of the fiber guy rope by the rope manufacturer can provide information if further use is possible or permissible.

WARNING
The fiber guy ropes can rip off!
Depending on the degree of severity, a damaged fiber guy rope can rip off in crane operation.
▶ To ensure a safe crane operation: Continue to use damaged fiber guy ropes only after and extensive inspection and release by the rope manufacturer.

Note
▶ If one or several fiber guy rope(s) must be replaced, inform Liebherr Service.

To determine the degree of severity of a damaged fiber guy rope, have the fiber guy rope inspected by the rope manufacturer.

The rope manufacturer decides after intensive inspection of the damage:
– if a repair of the fiber guy rope is possible
– if further use of the fiber guy rope is possible or useful

Only use the fiber guy rope again if the rope manufacturer declares that the damage is harmless and releases the fiber guy rope for further use.

Note
▶ The following listed fiber guy rope damage is an example.

3.3 Grommets and rope end connections

The grommets **1.8** and the rope end connections must be thoroughly inspected visually for cracks and dents.

Note
▶ If there is any doubt, have the respective areas of the grommet **1.8** thoroughly tested, for example with a magnetic particle test.

Check the pin bores for expansion, elongation and diameter changes.

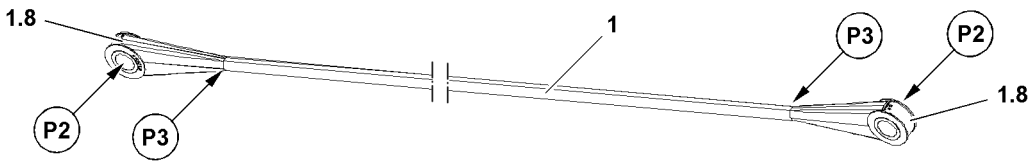

Fig.123700: Grommets and rope end connections on fiber guy rope

▶ Remove the fiber guy rope **1**.
▶ Inspect the fiber guy rope.

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DANGER
Damaged fiber guy ropes can rip off!
If a fiber guy rope **1** is damaged in the area of the grommet **1.8** or the rope end connection, then the load capacity is significantly reduced.
The grommet **1.8** or the rope end connection can rip off if used further under load in crane operation.
Death, severe injury, property damage.
- ▶ Crane operation with damaged rope end connection is prohibited.
- ▶ Replace fiber guy ropes **1** with damaged grommet **1.8** or rope end connection.

- ▶ Check grommets **1.8** on the pin bores **P2** and the rope - grommet transitions **P3**.

When cracks or other severe damage are present:
- ▶ Replace the fiber guy rope **1**.

3.4 Damage symptoms of fiber guy rope

3.4.1 Damaged outer braiding

The fiber guy rope is damaged on the outer braiding **1.6**.

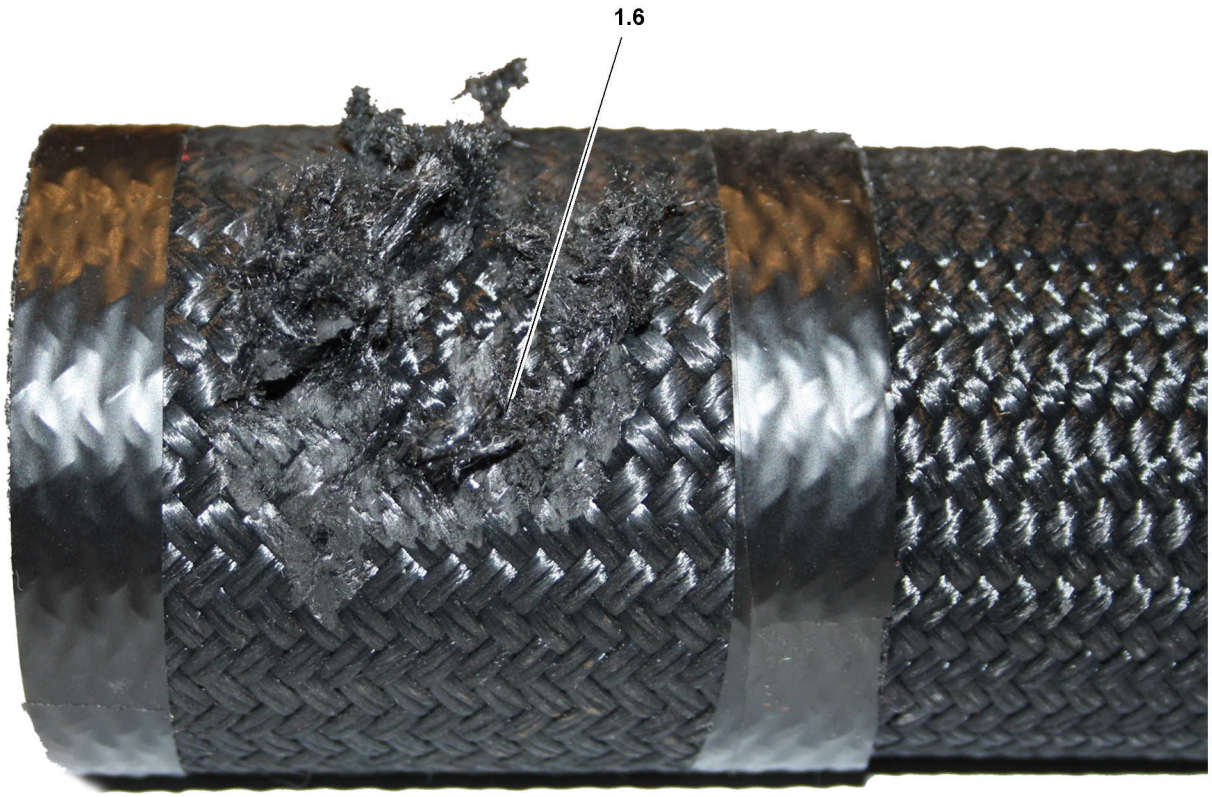

*Fig.123615: Damage on outer braiding **1.6***

- ▶ Remove the fiber guy rope.
- ▶ Inspect the fiber guy rope.

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WARNING
Fiber guy rope ripping off!
If the outer braiding **1.6** is not properly repaired, then the outer braiding **1.6** can unravel widely if further used and the braiding underneath can be damaged.
Death, severe injury, property damage.
▶ Seal fibers of the outer braiding **1.6** with approved repair agents to prevent further unraveling of the outer braiding **1.6**.

If solely the outer braiding **1.6** is damaged:
▶ Carefully remove protruding fibers with a sharp knife or scissors.
▶ Repair the outer braiding **1.6** properly with approved repair agents to prevent it from unraveling further.

Result:

– The fiber guy rope can be further used for crane operation.

3.4.2 Damaged rope braiding

The fiber guy rope is damaged on the outer braiding **1.6** and the intermediate layer **1.5**.

The inner braiding (red) **1.4** is visible.

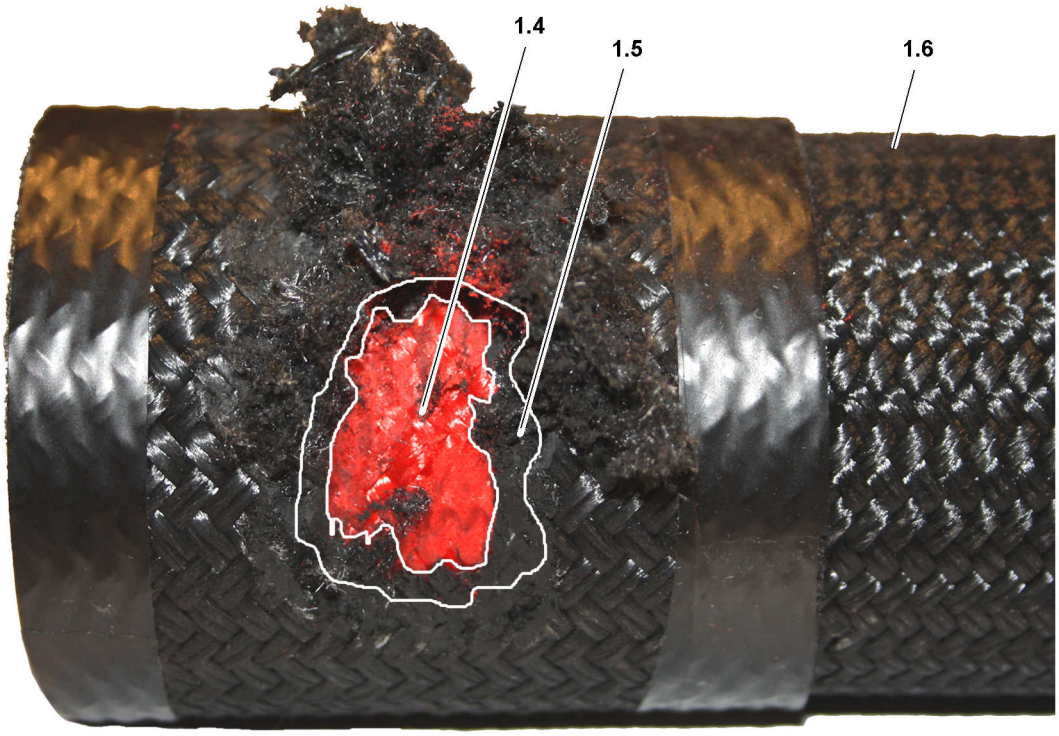

Fig.123616: Damage of outer two rope braidings, inner braiding (red) is undamaged

▶ Remove the fiber guy rope.
▶ Inspect the fiber guy rope.

WARNING
Damaged fiber guy ropes can rip off!
If a fiber guy rope is damaged, then it can rip off if used further under load in crane operation.
Death, severe injury, property damage.
▶ Crane operation with damaged fiber guy rope is prohibited.
▶ Replace the damaged fiber guy rope.

When the outer braiding **1.6** and the intermediate layer **1.5** are damaged:
▶ Replace the fiber guy rope.

3.4.3 Damaged intermediate layers

The fiber guy rope shows grave damage.

The Aramid suspension rope **1.1** is visible and / or damaged.

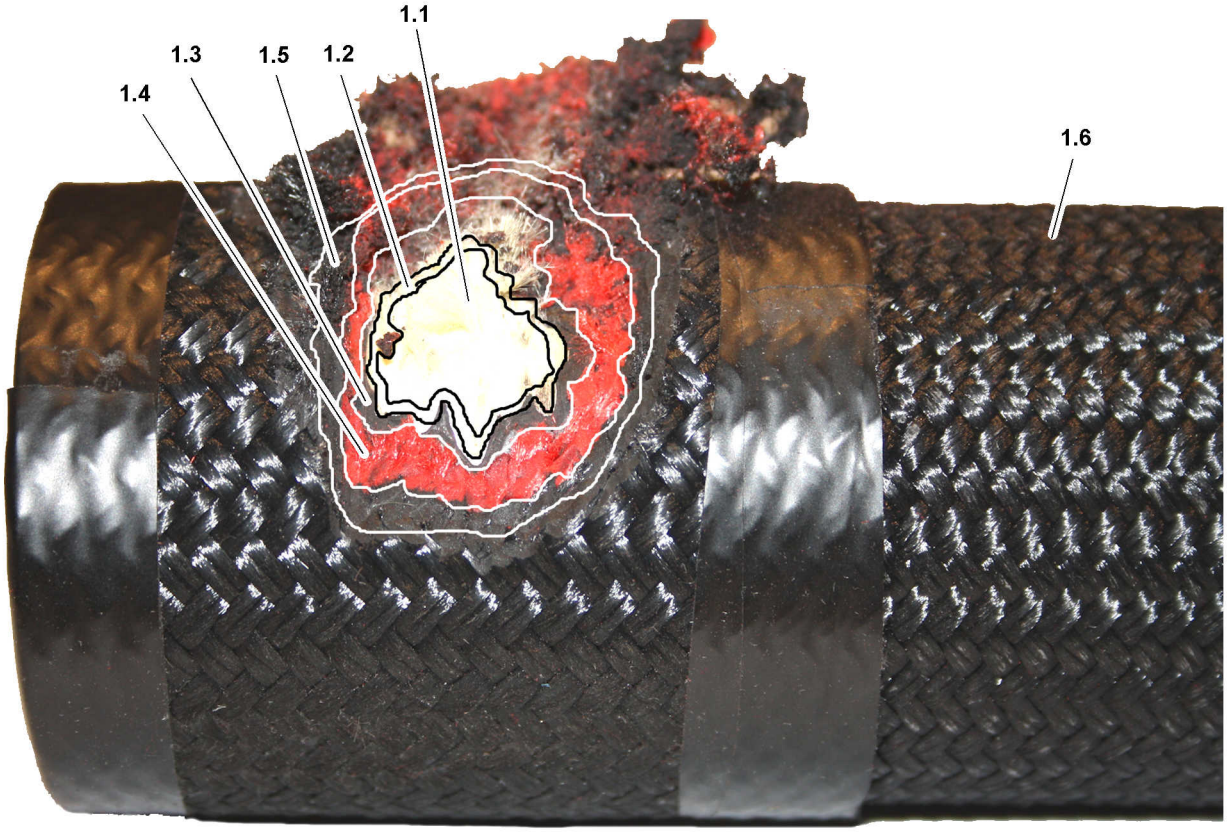

Fig.123617: Damage of outer braiding and all intermediate layers

▶ Remove the fiber guy rope.
▶ Inspect the fiber guy rope.

DANGER
Damaged fiber guy ropes can rip off!
If a fiber guy rope is damaged into the carrying structure of the Aramid suspension rope (yellow) **1.1** then the fiber guy rope will rip off if used further under load in crane operation.
Death, severe injury, property damage.
▶ Crane operation with damaged fiber guy rope is prohibited.
▶ Replace the damaged fiber guy rope.

When the outer braiding **1.6** and all intermediate layers are damaged up to the Aramid suspension rope (yellow) **1.1**:
▶ Replace the fiber guy rope.

3.4.4 Buckles

Buckles are angular deformations.

The rope was damaged due to external influences.

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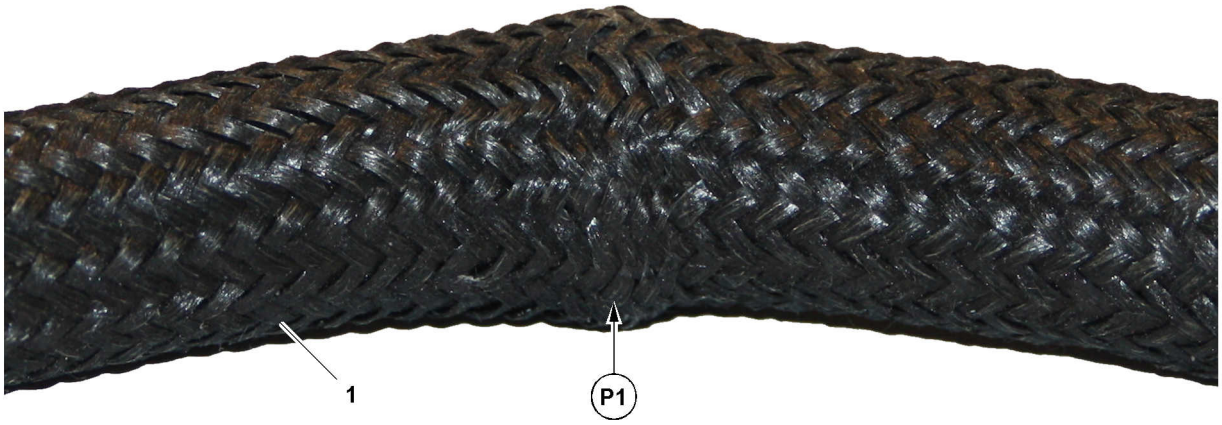

*Fig.123618: Fiber guy rope buckled at point **P1***

- ▶ Remove the fiber guy rope.
- ▶ Inspect the fiber guy rope.

DANGER
Damaged fiber guy ropes can rip off!
If a fiber guy rope is buckled, then the load capacity is significantly reduced.
The fiber guy rope can rip off if further used under load in crane operation.
Death, severe injury, property damage.
- ▶ Crane operation with buckled fiber guy rope is prohibited.
- ▶ Replace the damaged fiber guy rope.

A buckle is severe if a fold / compression well as a clear buckle is visible on one side of the fiber guy rope (for example at point **P1**).

When a buckle is present:
- ▶ Replace the fiber guy rope.
- ▶ Have the fiber guy rope inspected by the rope manufacturer.

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8.17 Inspection of ladders

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Fig.195219

1 Safety guidelines

WARNING
Damaged ladders!
Accident. Death, severe injury, property damage.

If damage is found:
▶ Have ladders repaired by authorized and trained expert personnel.

If it is determined that the ladder cannot be repaired:
▶ Scrap the ladder immediately.

Make sure that the following prerequisite is met:
– **Authorized and trained expert personnel** checks the ladders.

The authorized and trained expert personnel has the following expertise:
– Knowledge, experience and abilities in repairing ladders
– Is familiar with the necessary prerequisites as determined by the contractor for the inspection of ladders
– Has the knowledge about the type, scope and intervals for the required inspections as determined by the contractor

2 Inspection intervals

The inspection of ladders must be carried out in the following intervals:
– The contractor determines the **required** intervals
– But there must be at least one inspection every **12 months**

Intervals depend on:
– Operating conditions
– Frequency of use
– Operational demands during use
– Frequency and severity of defects found during previous inspections

3 Inspecting ladders

Make sure that the following prerequisites are met:
– Ladder inspection sheets are on hand. For blank form, see section „Inspection form for the inspection of ladders and steps“
– Check lists are on hand. For blank form, see section „Check list for the inspection of ladders and steps“

▶ For every ladder and every step: Enter the data in the ladder inspection form.
or
Get the ladder inspection form for ladders or steps.
▶ Check the ladders and steps according to the check list and document the results.
▶ Collect the ladder inspection forms and check lists in the crane documentation.

4 Inspection sheet and check list

The following is shown, as an example: Inspection form and check list for the inspection of ladders and steps.

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4.1 Inspection form for the inspection of ladders and steps

Ladder control sheet		
Stock no. of the ladder/steps		
Location/installation location		
Ladder type		Stepladder
		Leaning ladder
		Leaning ladder with overshoot
		Vertical ladder
		Vertical ladder with overshoot aid
		Platform ladder
		Steps
		Other
Material of the ladder		Aluminium
		Plastic
		Steel
		Stainless steel
Number of rungs/stairs		
Ladder length/ladder shortened to		
Manufacturer/dealer		
Article/type number		
Date of purchase		
Date of discard		
Name of representative		
Next inspection		

Control sheet for inspecting ladders and steps

Fig.121361-en

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4.2 Check list for the inspection of ladders and steps

Inspection criteria	1st Inspection	2nd Inspection	3rd Inspection	4th Inspection	5th Inspection
1. Beams					
Deformation					
Damage (for example cracks)					
Sharp edges, splinters, burrs					
Wear					
Protective treatment					
2. Rungs/stairs/platform					
Deformation					
Damage					
Sharp edges, splinters, burrs					
Connection to the beam (for example, flanging, screw/rivet connections, welding seam)					
Wear (for example, stepping surfaces, platform overlay)					
3. Spreader safety					
Completeness/fastening					
Functionality					
Damage					
4. Fitting parts					
Damage/corrosion					
Completeness/fastening					
Functionality					
Wear					
Lubrication (mechanical parts)					

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Fig.121362-en

Inspection criteria	1st Inspection	2nd Inspection	3rd Inspection	4th Inspection	5th Inspection
5. Ladder/stands/pulleys					
Completeness/fastening					
Wear/damage					
Functionality					
6. Accessories (for example, beam extension, base expansion, wall support)					
Completeness/fastening					
7. Identification					
Operating instructions (for example, pictogram)					
8. Inspection result					
Ladder OK and usable					
Repair necessary					
Discard ladder immediately					
Comments					
Next inspection (month/year)					
Ladder inspected					
Date					
Signature					

Check list for inspecting ladders and steps

Fig.121363-en

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8.80 Weighing procedure for mobile cranes

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Fig.195219

1 Weighing error

Every weighing can be afflicted with weighing errors.

Observe the following when weighing:
- Weigh the mobile crane on a calibrated weigh-bridge
- Carefully drive the mobile crane on the weigh-bridge
- Bring the mobile crane to a standstill on the weigh-bridge **without** braking suddenly
- Secure the mobile crane with wedges to prevent it from rolling away

NOTICE
The static weighing per axle with plate scales results in incorrect weighing results!
The above noted and additional error influences cause incorrect measuring results for the total weight and axle loads in this weighing procedure.
▶ Weigh the mobile crane exclusively with two-part or one-part weigh-bridges.
▶ Calculate the total weight and axle load as follows.

2 Symbol

Definition of symbols		
Sign	**Unit**	**Description**
Gk	[kg]	Total weight mobile crane
Gk1	[kg]	Weighing result Section 1
Gk2	[kg]	Weighing result Section 2
Wa1 (2, 3, ...)	[kg]	Axle load Axle 1 (2, 3, ...)
n	Each	Number of axles
ng1	Each	Number of axles Axle group 1
ng2	Each	Number of axles Axle group 2

Symbol

3 Weighing the mobile crane

Make sure that the following prerequisites are met:
- The mobile crane is in the On-road driving program (axle suspension *suspended*)
- Mobile crane is in level position for on-road driving
- The travel switch is in the neutral position „N“

Note
Weigh-bridge **not** calibrated!
The measurements are not exact.
▶ Weigh the mobile crane exclusively with regularly checked and calibrated weigh-bridges.
▶ Drive the mobile crane centred along the axle group on the weigh-bridge

3.1 Determining the axle groups

The axle groups for mobile cranes are shown in the following illustrations.

The distribution of the axle groups depends on the mobile crane type and the number of axles.

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3.1.1 Crane with two axles

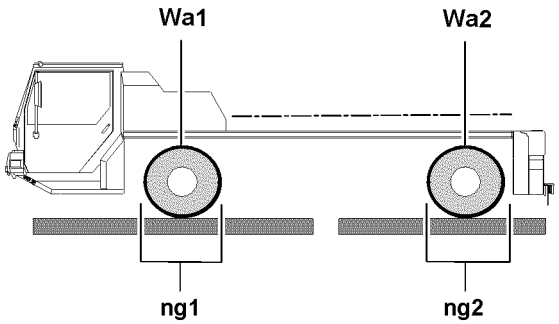

Fig.120006: Example Axle groups: Crane with two axles, ng1 = 1, ng2 = 1

3.1.2 Crane with three axles

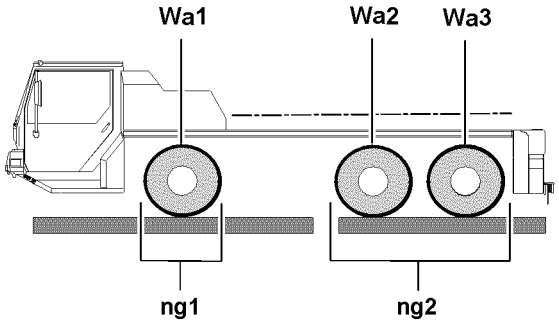

Fig.120007: Example Axle groups: Crane with three axles, ng1 = 1, ng2 = 2

3.1.3 Crane with four axles

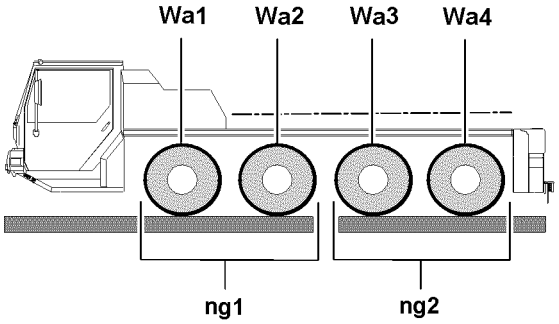

Fig.120008: Example Axle groups: Crane with four axles, ng1 = 2, ng2 = 2

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3.1.4 Crane with five axles

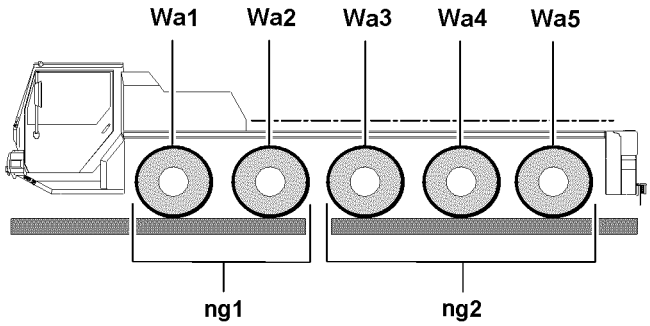

Fig.120009: Example Axle groups: Crane with five axles, ng1 = 2, ng2 = 3

3.1.5 Crane with six axles

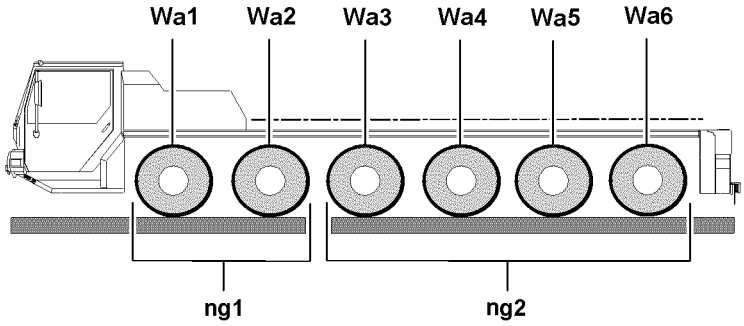

Fig.120010: Example Axle groups: Crane with six axles, ng1 = 2, ng2 = 4

3.1.6 Crane with seven axles

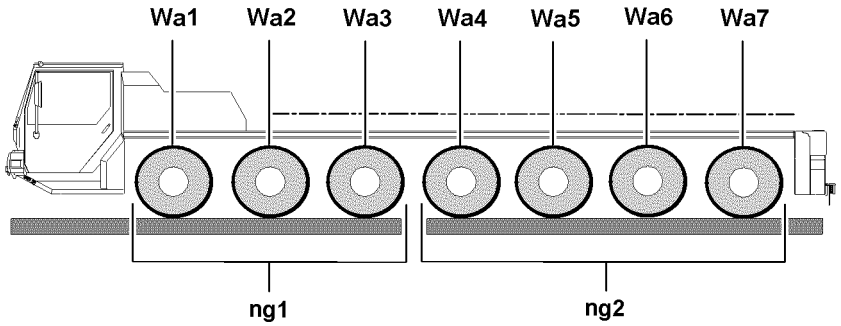

Fig.120011: Example Axle groups: Crane with seven axles, ng1 = 3, ng2 = 4

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3.1.7 Crane with eight axles

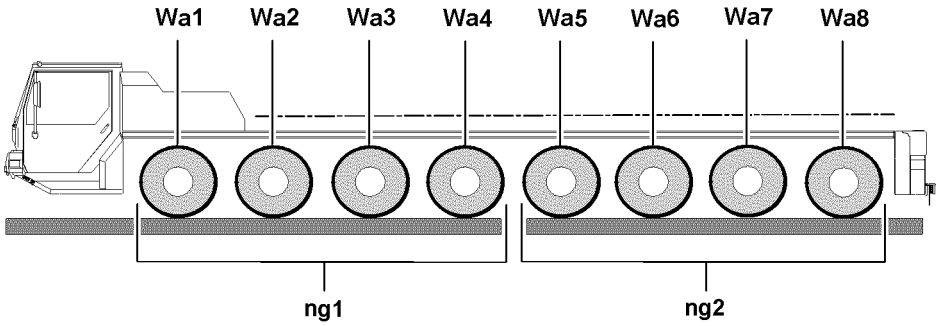

Fig.120012: Example Axle groups: Crane with eight axles, ng1 = 4, ng2 = 4

3.1.8 LTM 1750-9.1

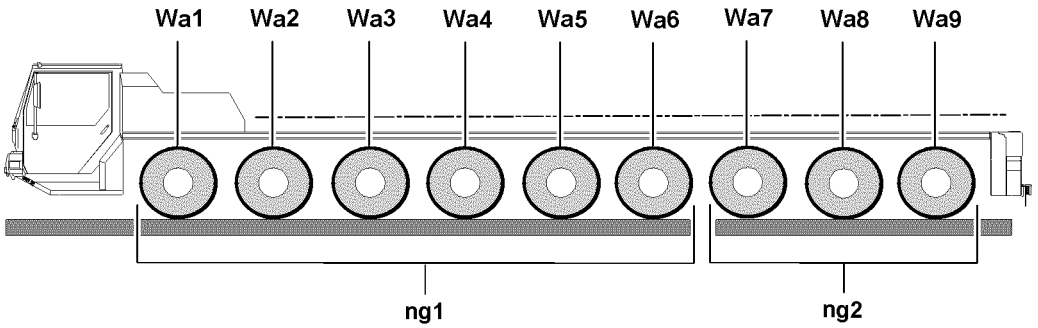

Fig.120013: Example Axle groups: LTM 1750-9.1, ng1 = 6, ng2 = 3

3.1.9 LTM 11200-9.1

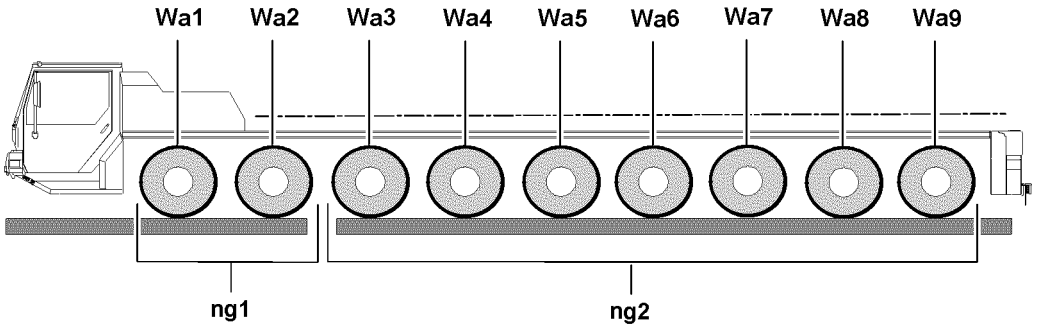

Fig.120014: Example Axle groups: LTM 11200-9.1, ng1 = 2, ng2 = 7

▶ Determine the respective axle groups for the weighing according to the illustrations.

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3.2 Weighing the mobile crane with a two-part weigh-bridge

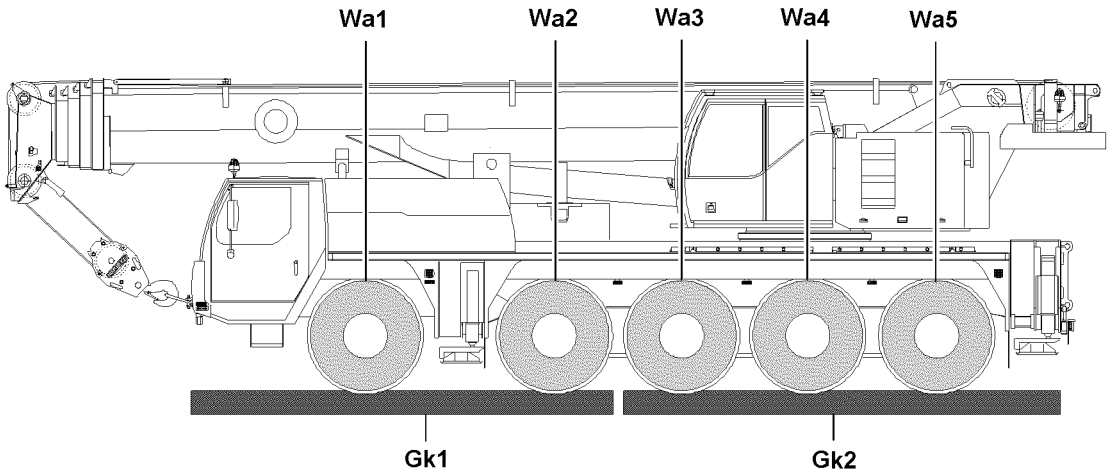

Fig.120004: Example of a two-part weigh-bridge: ng1 = 2, ng2 = 3

Gk1 Section 1
Gk2 Section 2
Wa1 Axle load Axle 1
Wa2 Axle load Axle 2
Wa3 Axle load Axle 3
Wa4 Axle load Axle 4
Wa5 Axle load Axle 5

The calculations are shown as an example for a mobile crane with five axles.

▶ Drive the mobile crane on a two-part weigh-bridge.

Every axle group must be positioned on a section of the weigh-bridge.

▶ Weight axle groups simultaneously.
▶ Take the measuring uncertainty of the weigh-bridges into account.
▶ Calculate the total weight and axle load per axle: Replace the values for the example in the chart with measured values.

Result:

Description	Value
Weighing result of weigh-bridge Section 1	Gk1 = **23900 kg**
Weighing result of weigh-bridge Section 2	Gk2 = **36000 kg**
Total weight mobile crane	Gk = Gk1 + Gk2 = 23900 kg + 36000 kg = 59000 kg
Number of axles Axle group 1	ng1 = **2**
Number of axles Axle group 2	ng2 = **3**
Axle load Axle 1 and Axle 2	Wa1 + Wa2 = Gk1 = 23900 kg
Axle load Axle 1	Wa1 = Gk1 : ng1 = 23900 kg : 2 = 11950 kg
Axle load Axle 2	Wa2 = Gk1 : ng1 = 23900 kg : 2 = 11950 kg
Axle load Axle 3 to Axle 5	Wa3 + Wa4 + Wa5 = Gk2 = 36000 kg
Axle load Axle 3	Wa3 = Gk2 : ng2 = 36000 kg : 3 = 12000 kg
Axle load Axle 4	Wa4 = Gk2 : ng2 = 36000 kg : 3 = 12000 kg
Axle load Axle 5	Wa5 = Gk2 : ng2 = 36000 kg : 3 = 12000 kg

Calculation example

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3.3 Weighing the mobile crane with a one-part weigh-bridge

The calculations are shown as an example for a mobile crane with five axles.

If the mobile crane is weighed using a one-part weigh-bridge, two weighings are necessary:
- First weighing: Section 1 **Gk1**, axle group 1
- Second weighing: Section 2 **Gk2**, axle group 2

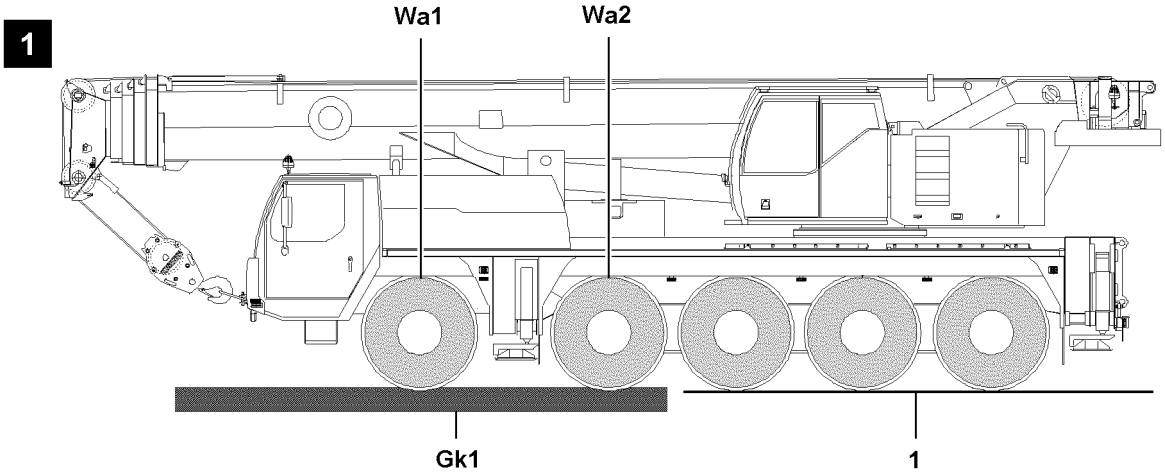

Fig.128198: Example of a one-part weigh-bridge, first weighing: ng1 = 2

Gk1 Section 1
Wa1 Axle load Axle 1
Wa2 Axle load Axle 2
1 Road

- ▶ Drive the axle group 1 on the weigh-bridge.
- ▶ Section 1 **Gk1**: Weight axle group 1.
- ▶ Take the measuring uncertainty of the weigh-bridge into account.
- ▶ Record the measured value.

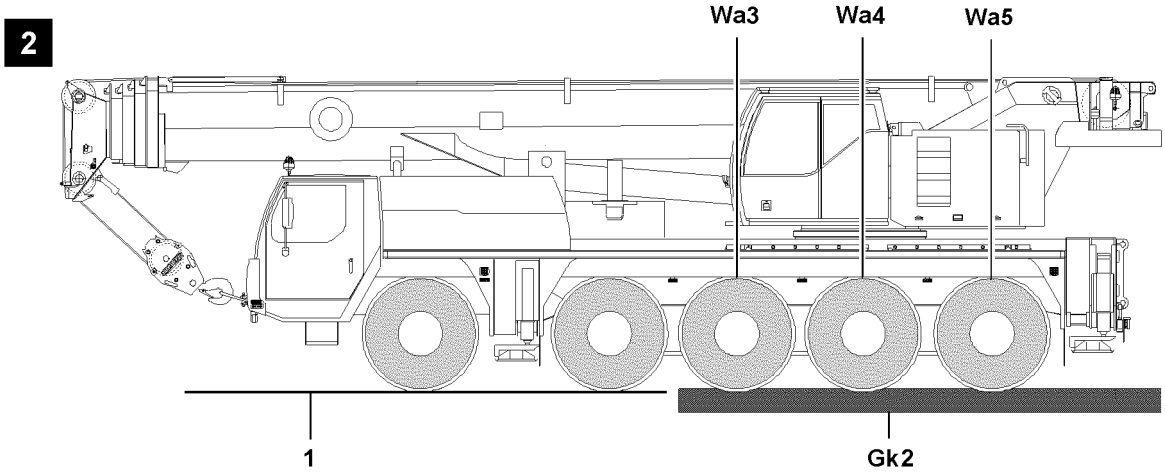

Fig.128199: Example of a one-part weigh-bridge, second weighing: ng2 = 3

Gk2 Section 2
Wa3 Axle load Axle 3
Wa4 Axle load Axle 4
Wa5 Axle load Axle 5
1 Road

- ▶ Drive the axle group 2 on the weigh-bridge.
- ▶ Section 2 **Gk2**: Weight axle group 2.
- ▶ Take the measuring uncertainty of the weigh-bridge into account.
- ▶ Record the measured value.

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▶ Calculate the total weight and axle load per axle: Replace the values for the example in the chart with measured values.

Result:

Description	Value
Weighing result of weigh-bridge Section 1, first weighing	Gk1 = **23900 kg**
Weighing result of weigh-bridge Section 2, second weighing	Gk2 = **36000 kg**
Total weight mobile crane	Gk = Gk1 + Gk2 = 23900 kg + 36000 kg = 59000 kg
Number of axles Axle group 1	ng1 = **2**
Number of axles Axle group 2	ng2 = **3**
Axle load Axle 1 and Axle 2	Wa1 + Wa2 = Gk1 = 23900 kg
Axle load Axle 1	Wa1 = Gk1 : ng1 = 23900 kg : 2 = 11950 kg
Axle load Axle 2	Wa2 = Gk1 : ng1 = 23900 kg : 2 = 11950 kg
Axle load Axle 3 to Axle 5	Wa3 + Wa4 + Wa5 = Gk2 = 36000 kg
Axle load Axle 3	Wa3 = Gk2 : ng2 = 36000 kg : 3 = 12000 kg
Axle load Axle 4	Wa4 = Gk2 : ng2 = 36000 kg : 3 = 12000 kg
Axle load Axle 5	Wa5 = Gk2 : ng2 = 36000 kg : 3 = 12000 kg

Calculation example

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8.90 Inspection chart for cranes

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Fig.195219

1 Inspection chart for recurring inspections of Liebherr cranes

The following is a checklist to assist the inspector during the periodic inspections of Liebherr mobile and crawler cranes.

Company:	**Inspector:**
Crane manufacturer: Liebherr	**Crane type:**
Serial number:	**Stock number:**
Year of construction:	**Date:**
Inspector's signature for No. 1 to 22:	

1. inspection category: Crane document						
Component to be inspected	**A**	**B**	**C**	**D**	**E**	**Comments**
Crane inspection log						
Operating and installation instructions						
Crane control log						
Load chart manual						
Job planner						

2. inspection category: Signs / identification						
Component to be inspected	**A**	**B**	**C**	**D**	**E**	**Comments**
Factory tag						
Load data						
Operating instruction label						
Prohibition and command signs						
Other safety signs						

3. inspection category: Travel gear[1]						
Component to be inspected	**A**	**B**	**C**	**D**	**E**	**Comments**
Frame[2]						
Supports[3]						
Axles						
Wheels						
Tires						
Bearings						
Transmission						
Universal drive shaft						
Leaf springs / springs						
Shock absorbers						

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3. inspection category: Travel gear[1]						
Component to be inspected	**A**	**B**	**C**	**D**	**E**	**Comments**
Steering						
Brakes						
Hydraulic axle suspension						

4. inspection category: Chassis[1]						
Component to be inspected	**A**	**B**	**C**	**D**	**E**	**Comments**
Coverings						
Accessible surfaces						
Counterweight holders[2]						
Towing devices						
Accesses, ladders						
Holding devices, handles						
Platforms, railings						
Retainer for hook block[2]						
Boom support[2]						

5. inspection category: Chassis - driver's cab[1]						
Component to be inspected	**A**	**B**	**C**	**D**	**E**	**Comments**
Doors						
Windows / windshields						
Window wipers						
Mirrors						
Seat						
Heater						
Ventilation						
Sound absorber						
Trip recorder						
First aid kit						
Spare bulbs						
Hazard warning triangle						
Safety vest						

6. inspection category: Chassis - drive[1]						
Component to be inspected	**A**	**B**	**C**	**D**	**E**	**Comments**
Combustion engine						
Exhaust system						
Fuel tank						

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6. inspection category: Chassis - drive[1]						
Component to be inspected	**A**	**B**	**C**	**D**	**E**	**Comments**
Urea container						
Fuel container						
Filters						
Sound absorber						
Engine mount						
Oil levels						
Fuel lines						
Urea lines						
Fuel lines						

7. inspection category: Chassis - hydraulics[1]						
Component to be inspected	**A**	**B**	**C**	**D**	**E**	**Comments**
Oil container						
Filter with maintenance indicator						
Pumps						
Motors						
Valves						
Lines						
Hoses						
Cylinder						
Pressure limiting valves						

8. inspection category: Chassis - compressed air system[1]						
Component to be inspected	**A**	**B**	**C**	**D**	**E**	**Comments**
Compressor						
Filters						
Air tanks						
Valves						
Lines						
Hoses						
Cylinder						

9th inspection category: Chassis - electrical system[1]						
Component to be inspected	**A**	**B**	**C**	**D**	**E**	**Comments**
Motors						
Generators						
Battery						

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9th inspection category: Chassis - electrical system[1]						
Component to be inspected	**A**	**B**	**C**	**D**	**E**	**Comments**
Switches / buttons						
Lines						
Fuses						
Resistors						
Lighting						
Brake lights						
Blinkers						
Tail lights						
Working lights						
Signaling systems						
Indicator lights						
Battery switch						
Limit switches: Transmission, steering, drive train						
Support pressure indicator[2]						

10th inspection category: Chassis - control systems[1]						
Component to be inspected	**A**	**B**	**C**	**D**	**E**	**Comments**
Engine regulation						
Transmission						
Couplings						
Circuits						
Brakes						
Steering						
Control displays						
Engine shut off line						
Control of supports[2]						
Axle suspension						
Crane leveling						
Rear axle steering						

11th inspection category: Superstructure						
Component to be inspected	**A**	**B**	**C**	**D**	**E**	**Comments**
Frame						
Coverings						
Treads						
Bearings						

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11th inspection category: Superstructure						
Component to be inspected	**A**	**B**	**C**	**D**	**E**	**Comments**
Counterweights						
Relapse retainer						
Slewing ring connection: Tilt play						
Slewing ring connection: Mounting screws						
Slewing ring connection: Gears						
Slewing gear: Mounting screws						
Slewing gear: Gears						

12th inspection category: Superstructure - crane operator's cab						
Component to be inspected	**A**	**B**	**C**	**D**	**E**	**Comments**
Doors						
Windows / windshields						
Window wipers						
Mirrors						
Seat						
Heater						
Ventilation						
Muffler						
Joystick for working functions						
Gear shifts						
Safety: Crushing / shear locations						

13th inspection category: Superstructure - Retaining and protection devices						
Component to be inspected	**A**	**B**	**C**	**D**	**E**	**Comments**
Accesses, ladders						
Handles						
Coverings						
Covers						
Hatches						
Treads						

14th inspection category: Superstructure - drive train						
Component to be inspected	**A**	**B**	**C**	**D**	**E**	**Comments**
Combustion engine						
Exhaust system						
Fuel tank						
Urea container						

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14th inspection category: Superstructure - drive train						
Component to be inspected	**A**	**B**	**C**	**D**	**E**	**Comments**
Fuel container						
Filters						
Sound absorber						
Engine mount						
Fuel lines						
Urea lines						
Fuel lines						

15. inspection category: Superstructure - hydraulic system						
Component to be inspected	**A**	**B**	**C**	**D**	**E**	**Comments**
Oil container						
Filters						
Pumps						
Motors						
Valves						
Lines						
Hoses						
Cylinder						
Pressure limiting valves						
Lowering brake valves						
Brake control: Hoist gear						
Brake control: Slewing gear						

16th inspection category: Superstructure - electrical system						
Component to be inspected	**A**	**B**	**C**	**D**	**E**	**Comments**
Motors						
Generators						
Batteries						
Switches / buttons						
Lines						
Fuses						
Resistors						
Lighting						
Signal lights						

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17. inspection category: Superstructure - control systems						
Component to be inspected	**A**	**B**	**C**	**D**	**E**	**Comments**
Engine regulation						
Transmission						
Flexible couplings						
Circuits						
Engine shut off line						
Control displays						

18. inspection category: Superstructure - rope drives						
Component to be inspected	**A**	**B**	**C**	**D**	**E**	**Comments**
Winch 1[3]						
Winch 2[3]						
Winch 3[3]						
Winch 4[3]						
Winch 5[3]						
Winch 6[3]						
Assembly winches [3]						
Rope pulleys						
Rope end connection						
Rope for winch 1						
Rope for winch 2						
Rope for winch 3						
Rope for winch 4						
Rope for winch 5						
Rope for winch 6						
Rope for assembly winches						
Guy ropes						

19th inspection category: Superstructure - hook						
Component to be inspected	**A**	**B**	**C**	**D**	**E**	**Comments**
Pulleys						
Rope guards on pulleys						
Axle support						
Load hook						
Load hook mounting						
Hook retention						

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20th inspection category: Superstructure - safety and switch systems						
Component to be inspected	**A**	**B**	**C**	**D**	**E**	**Comments**
Hoist emergency limit switch I						
Hoist emergency limit switch II						
Lowering emergency limit switch I						
Lowering emergency limit switch II						
Boom emergency limit switch I						
Boom emergency limit switch II						
Luffing jib: Boom limit switch I						
Luffing jib: Boom limit switch II						
Load torque limiter						
Angle display: Boom						
Angle display: Luffing jib						
Angle display: Slewing gear						
Safety devices: Control						
Working range limitation						
Pressure sensors						
Speed sensor						
Wind sensor						
Sliding beam monitoring						
Support pressure indicator						
Incline display						
Length indicator: Radius, boom length						
Emergency off system						
Engine stop						

21th inspection category: Boom						
Component to be inspected	**A**	**B**	**C**	**D**	**E**	**Comments**
Weld structure						
Rope pulleys						
Change over pulleys feed mechanism						
Luffing cylinder						
Telescoping cylinder						
Boom extension ropes						
Boom retraction ropes						
Boom bearings						
Boom pinning						
Guy rods						
Guy ropes						

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21th inspection category: Boom						
Component to be inspected	**A**	**B**	**C**	**D**	**E**	**Comments**
Control ropes						
Guide ropes						
Safety ropes						
Relapse cylinders						
Pin connections						

22. inspection category: Equipment						
Component to be inspected	**A**	**B**	**C**	**D**	**E**	**Comments**
Weld structure						
Rope pulleys						
Relapse cylinder						
Relapse support						
Oscillation guard						
A-frame bearings						
Pinning of components						
Guy rods with pinning						
Rods with guide rail on A-frame 2 and A-frame 3						
All limit switches with switch mechanism						
Pin connections						

Inspection chart for periodic inspections of Liebherr mobile and crawler cranes

Inspection criteria:

A = Present / complete
B = Condition / maintenance
C = Function
D = Repair / replace
E = Re-inspection required

Evaluation:

Satisfactory = x
Unsatisfactory = -
Not required = 0

Comments:

[1] Inspection of the crane carrier vehicle road worthiness is also fulfilled if it has already been certified by the road traffic department certification authority. For cranes that are not certified for use on public roads, an expert or authorized inspector must conduct the required tests to validate the vehicle's road worthiness.

[2] These inspections must be carried out by an authorized inspector even if it has passed the road traffic department test and is certified.

[3] Inspection of the winches with respect to the actually used proportion of their design life.

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90 Appendix

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90.01 Preface to the appendix

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Fig.195219

1 Foreword

This crane may only be used in a flawless technical condition and according to its mission as well as with constant awareness of safety and dangers. Any problems, which could affect safety, must be fixed immediately.

Note

▶ Modifications on the crane may only be made with written approval by Liebherr-Werk Ehingen GmbH.

1.1 Change to the operating instructions

Changes to the operating instructions are received in the form of chapters. The chapter to be replaced must be removed from the operating instructions and replaced with the new chapter in the same location.

When you receive a change to the operating instructions:

▶ Remove the chapter to be replaced from the operating instructions.
▶ File the new chapter in the same location in the operating instructions.
▶ Destroy the replaced chapter.
▶ Fill out the change confirmation form in chapter 90.05 of the operating instructions.

1.2 Update to the operating instructions

Updates to the operating instructions, which you receive in the circular as Customer information, must be filed in the operating instructions in chapter 90.05.

Fig.113870: Customer information decal

When you receive an update to the operating instructions:

▶ Attach the decals **1**, which are enclosed in the customer information to the footer of the respective chapter. See the following example.

Note

Example: Update to the operating instructions!

If there is an update that concerns the operating instructions, chapter 2.04:

▶ Attach the decal **1** in the footer of chapter 2.04.

▶ File the update in chapter 90.05 of the operating instructions.
▶ Fill out the update confirmation form in chapter 90.05 of the operating instructions.

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90.05 Update confirmation

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Fig.195219

1 Change confirmation form

Chapter	Change	Completed	
		on	by

2 Update confirmation

Chapter	Update	Completed	
		on	by

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3 Customer information

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