LIEBHERR

Mobile crane with telescopic boom

LTM 1130-5.1

LTM 1130-5-1-004

Operating instructions

BAL No.: 20502-04-02

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Serial No.	
Date	

ORIGINAL OPERATING MANUAL

The operating manual is part of the crane!

It must always be available within reach!

The traffic regulations and those for crane operation must be observed!

Liebherr-Werk Ehingen GmbH
Postfach 1361
D-89582 Ehingen / Donau
+49 (0) 7391 502–0
+49 (0) 7391 502–3399
info.lwe@liebherr.com
www.liebherr.com

Preface

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 recording device

This crane is equipped with a data recording device. Among others, the following data is recorded:
- Date and time of day
- Entered configuration of the crane
- Actual load
- Percentage of utilization of the crane
- 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 notes

Safety and warning notes are 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.

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.

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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.

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.

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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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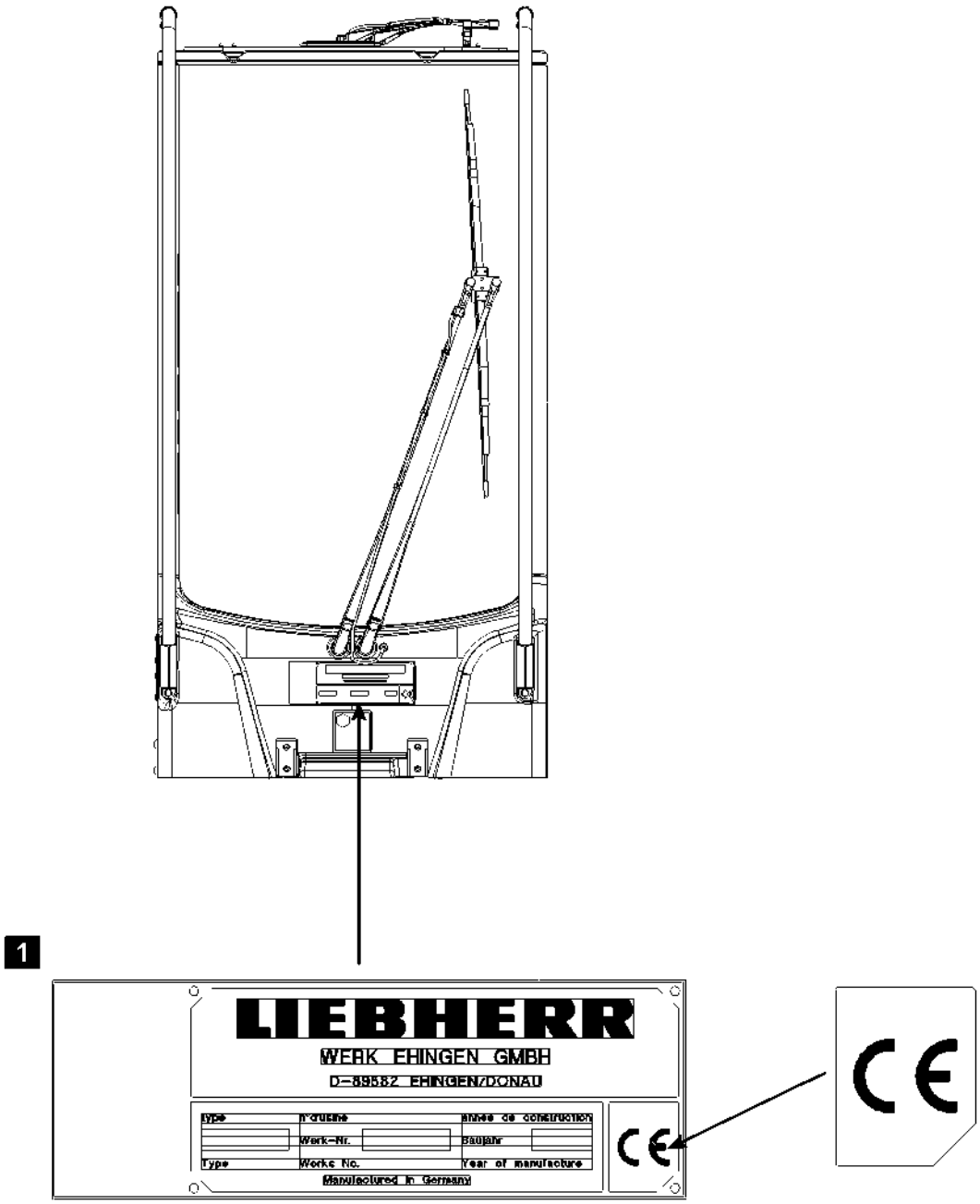

Fig.110001

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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 which are operated outside the respective area of application 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 % which are programmed according to ASME B30.5 within the European Union or in countries which permit a lower stationary stability utilization (for example ISO 4305)! 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 devices, for example bypassed load moment limitation or with bypassed hoist limit switch.
- Increasing the radius of the lifted load after a LMB shut off, for example by diagonally pulling the load.
- Using the support pressure display as a safety function against tipping over.
- Use of equipment parts which are not approved for the crane.
- Using the crane at sports and recreational events, especially for "Bungee" jumps and / or "Dinner in the sky".
- Driving on a public road in non-permissible driving condition (axle load, dimension).
- Driving with the equipment in place in a non-permissible driving condition.
- Pushing, pulling or lifting loads with the leveling regulation, 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).

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– 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:
– • The load moment 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 lifting 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 on the chassis.
– 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.

Safety systems

Special attention must be paid to the safety systems built into the crane. The safety systems must constantly be checked for functionality. The crane may not be operated if the safety systems 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 crane operation and driving regulations and has been approved by the relevant authorities.

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!

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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 operator's cab** refer to the superstructure. Front is always in direction of the placed down boom.

Definition of directional data for crawler cranes

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

Driving in 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).

Conversion chart

Note

▶ If the crane is used in countries where US-units are customary, you can use the conversion factors in this chart for conversion of metric measuring units into US-units!

	Unit of Measure	Multiply by	To optain
Length	millimeter (mm)	0.03937	inch (in)
	millimeter (mm)	0.00328084	foot (ft)
	meter (m)	39.37	inch (in)
	meter (m)	3.28084	foot (ft)
	meter (m)	1.09361	yard (yd)
	kilometer (km)	0.62137	mile (mi)
Area	square centimeter (cm^2)	0.155	square inch (in^2)
	square meter (m^2)	10.7639	square foot (ft^2)
	square meter (m^2)	1.196	square yard (yd^2)
	square kilometer (km^2)	0.3861	square mile (mi^2)
Volume	cubic centimeter (cm^3)	0.06102	cubic inch (in^3)
	cubic meter (m^3)	35.3147	cubic foot (ft^3)
	cubic meter (m^3)	1.308	cubic yard (yd^3)
	liter (L)	61.024	cubic inch (in^3)

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	Unit of Measure	Multiply by	To optain
	liter (L)	0.035	cubic foot (ft^3)
	liter (L)	0.264	gallon (U.S.) (gal)
Weight	gram (g)	0.03527	ounce (oz)
	kilogram (kg)	2.20462	pound (lb)
	metric ton (t)	2204.62262	pound (lb)
	metric ton (t)	1.102	short tons (U.S.)
Mass divided	kilogram per meter (kg/m)	0.055998	pound per inch (lb/in)
by length	kilogram per meter (kg/m)	0.67197	pound per foot (lb/ft)
Force	newton (N)	0.2248	pound-force (lbf)
	kilonewton (kN)	224.809	pound-force (lbf)
	kilonewton (kN)	0.2248	kip (1 kip = 1000 lbf)
Torque	newton meter (N·m)	8.85075	pound-force inch (lbf·in)
	newton meter (N·m)	0.73756	pound-force foot (lbf·in)
Power	horsepower (metric)	0.73549	kilowatt (kW)
	horsepower (metric)	0.98632	horsepower (U.K.)
	kilowatt (kW)	1.34102	horsepower (U.K.)
Pressure	kilopascal (kPa)	0.01	bar (bar)
	kilopascal (kPa)	0.1450377	pound-force per square inch (psi)
	bar (bar)	14.50377	pound-force per square inch (psi)
	newton per square centimeter (N/cm^2)	1.450377	pound-force per square inch (psi)
	newton per square meter (N/m^2)	0.0001450377	pound-force per square inch (psi)
Speed	meter per second (m/s)	39.37	inch per second (in/s)
	meter per second (m/s)	3.28084	foot per second (ft/s)
	kilometer per hour (km/h)	0.62137	mile per hour (mi/h)
	liter per minute (l/min)	0.26417	gallon per minute (gal/min)
Temperature	degree Celsius (°C)	([°C] · 1.8) + 32	degree Fahrenheit (°F)
	kelvin (K)	([K] · 1.8) - 459.67	degree Fahrenheit (°F)

Conversion chart version 1

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1 Description of crane

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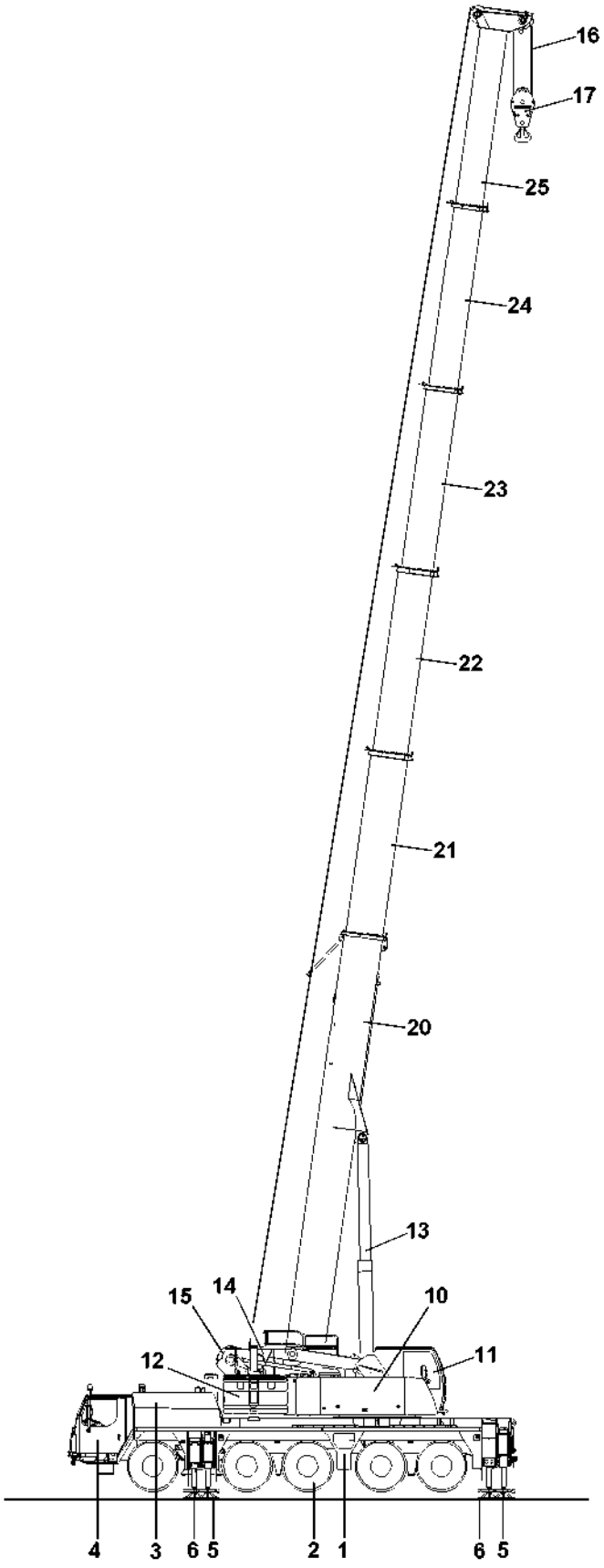

Fig.112595

1 Crane components

1.1 Crane chassis

1 5-axle chassis
2 Tires
3 Engine / Travel motor
4 Driver's cab
5 Sliding beams
- With support cylinders

6 Support plates

1.2 Crane superstructure

10 Crane engine
11 Crane operator's cab
12 Counterweight
13 Luffing cylinder
- With telescopic boom adjustment

14 Winch 1
15 Winch 2*****
16 Hoist rope
17 Hook block

1.3 Telescopic boom (T)

20 Pivot section
21 Telescopic section 1
22 Telescopic section 2
23 Telescopic section 3
24 Telescopic section 4
25 Telescopic section 5

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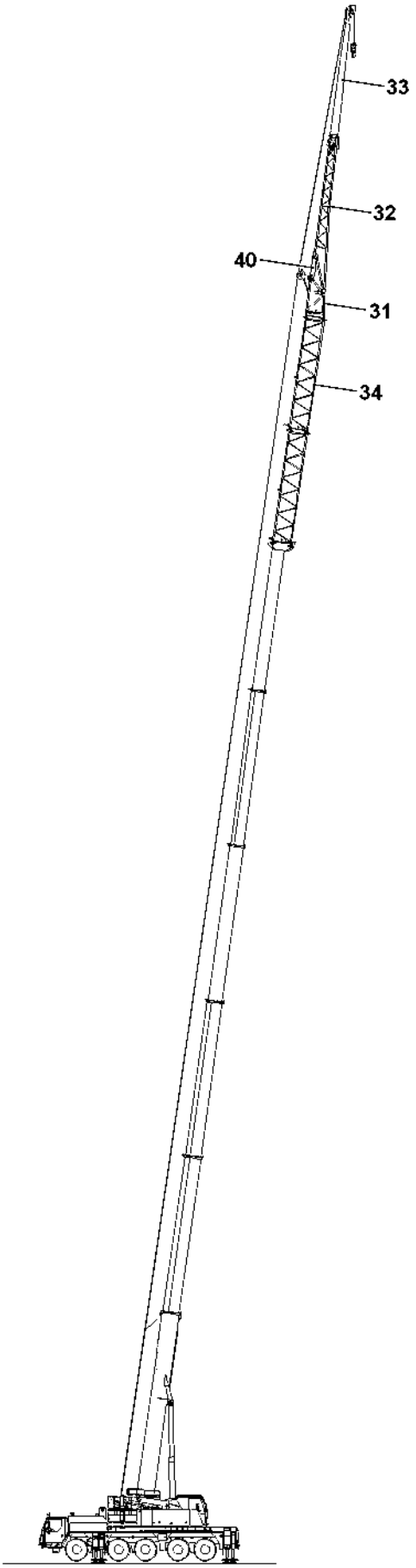

Fig.112596

2 Auxiliary boom

2.1 Folding jib (TK)*

31 Adapter
32 Pivot section
33 End section

2.2 Folding jib with extension (TVK)*

31 Adapter
32 Pivot section
33 End section
34 Telescopic boom extension

2.3 Hydraulically adjustable folding jib (TNZK)*

31 Adapter
32 Pivot section
33 End section
40 Control cylinder

2.4 Hydraulically adjustable folding jib with extension (TVNZK)*

31 Adapter
32 Pivot section
33 End section
34 Telescopic boom extension
40 Control cylinder

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Fig.195219

1 Crane chassis

1.1 Frame

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

1.2 Supports

4-point support, fully hydraulically extendable horizontally and vertically.

Automatic support levelling.

Electronic incline indicator.

Support field illumination.

1.3 Engine / Travel motor

6-cylinder diesel, manufactured by Liebherr, model D 856 A7 SCR, water-cooled

Performance: 390 KW at 1900 rpm.
Maximum torque: 2503 Nm at 1100 -1350 rpm.
Exhaust emissions: According to guidelines per 97/68/EC Stage 3b and EPA/CARB Tier 4i.
Fuel tank: 480 l.

1.4 Gearbox

ZF 12-speed transmission system with automatic switching system AS-TRONIC.

ZF intarder attached directly to the transmission.

Two-stage transfer gearbox, with lockable distributor differential.

1.5 Axles, for drive 10x6

All 5 axles are welded and made from high-strength, close-grained structural steel.

All axles can be steered.

Axles 2, 4 and 5 are planetary axles with differential locks.

1.6 Suspension

All axles with hydro-pneumatic suspension and hydraulically lockable.

1.7 Tires

10 tires

Tire size: 385/95 R 25

1.8 Steering

ZF Servocom power steering gear, dual circuit system with hydraulic servo mechanism and auxiliary stand-by pump, powered from the axle.

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The axles 3, 4 and 5 are steered electro-hydraulically, depending on the speed, and from 30 km/hr., the third and fourth axle are affixed to straight forward travel

From 60 km/hr., the fifth axle is affixed for straight forward travel

Steering according to EC Directive 70/311/EEC.

1.9 Brakes

Service brake: All-wheel power-assisted compressed air brake, dual-circuit system, all axles are equipped with disk brakes.
Hand brake: Spring-loaded brake acting on the wheels of the second to fifth axle.
Retarder: Engine brake as exhaust flap brake with Liebherr auxiliary braking system ZBS.
Intarder integrated in transmission. Brakes conform to EC Directive 71/320/EEC or 70/311/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, comfort features.

1.11 Electrical system

Modern data bus technology, 24 Volt 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 ring connection is used as the connecting element to the crane chassis, providing unlimited rotation.

2.2 Crane engine

4-cylinder diesel, manufactured by Liebherr, model D 934 A7 SCR, water-cooled

Performance: 129 KW at 1800 rpm.
Maximum torque: 815 Nm at 1500 rpm.
Exhaust emissions: According to guidelines per 97/68/EC Stage 3b and EPA/CARB Tier 4i.
Fuel tank: 250 l.

2.3 Crane drive

Diesel hydraulic with 2 axial piston adjustment pumps with servo control and power control, 1 dual gear pump.

Hydraulic drive in a compact design is flanged directly onto the Diesel engine, complete drive assembly encased for noise reduction.

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2.4 Control

Electronic control system from LICCON-system (PLC control). Two 4–way manual control levers, self-centering. Infinitely variable control of all crane movements by adjusting the hydraulic pumps, additional speed control when adjusting the diesel engine rpm.

2.5 Hoist gear

Axial piston fixed displacement motor.

Liebherr rope winch with built-in planetary gear and spring-loaded stop brake.

The hoist gear is driven in open oil circuit.

2.6 Luffing gear

1 differential cylinder with servo controlled brake valve.

2.7 Slewing gear

Axial piston fixed displacement motor, planetary gear, spring-loaded stop brake.

The slewing gear is driven in open as well as in tensioned oil circuit.

2.8 Crane operator's cab

Galvanized steel construction, with safety glass, operating and control instruments, comfort features, cab can be tilted backwards.

Crane cab can be tilted backwards.

2.9 Safety equipment

LICCON overload system, test system, hoist limit switch, safety valves to prevent pipe and hose breakage.

2.10 Telescopic boom

Dent and distortion-resistant design made from high-strength, close-grained structural steel with oval boom profile, 1 pivot section and 5 telescopic sections. All telescopic sections are hydraulically extendable, independent of each other. Rapid-cycle telescoping system „Telematik“.

Boom length: 12.7 m to 60 m.

2.11 Counterweight

29.3 t

2.12 Electrical system

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

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3 Auxiliary equipment

3.1 Folding jib

10.8 m to 19 m long, can be installed below 0°, 20° or 40° to the telescopic boom.

Hydraulic cylinder***** for adjusting the folding jib from 0° to 40°.

3.2 Telescopic boom extension

2x 7 m long lattice section, resulting in a 14 m higher pivot point for the folding jib.

3.3 Winch 2

For two hook operation or during operation with folding jib if main hoist rope is to remain reeved.

3.4 Tires

10 tires

Tire size: 445/95 R 25 and 525/80 R 25

3.5 10x8 drive

The first axle can also be added.

Axle 1 planetary axle with differential lock.

3.6 Auxiliary ballast

12.7 t for a total ballast of 42 t.

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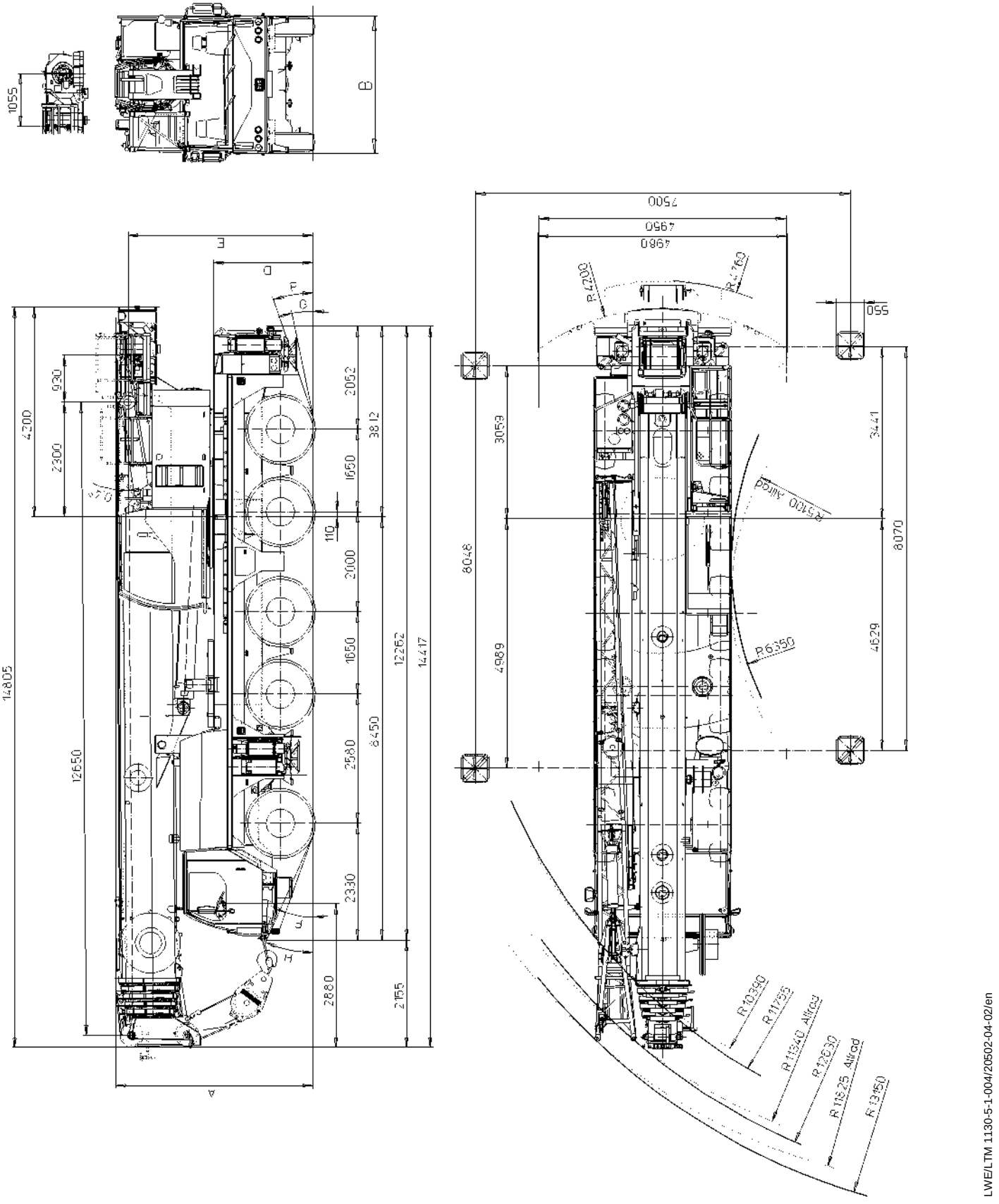

Fig.112191

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1 Dimensions

Tire size	385/95 R 25	445/95 R 25*	525/80 R 25
A	3950 mm	4000 mm	4000 mm
B	2750 mm	2750 mm	2850 mm
C	2313 mm	2301 mm	2323 mm
D	2000 mm	2050 mm	2050 mm
E	3702 mm	3752 mm	3752 mm
F	20°	22°	22°
G	12°	14°	14°
H	24°	26°	26°

2 Suspension path and incline

Suspension path crane vehicle	Side incline
+ 150 mm /- 100 mm	+9.0°/-9.0°

3 Support

3.1 Dimensions support base

Support base	Length	Width
Retracted	8.10 m	2.40 m
Reduced	8.10 m	5.00 m
Wide	8.10 m	7.50 m

3.2 Dimensions support pad

Length	Width
550 mm	550 mm

3.3 Support forces

Max. support force per support	Front	Rear
With nominal load	650 kN	820 kN

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4 Tires

4.1 Tires with „speed symbol E“

Tire size	Wheel weight	Tire pressure for driving on public roads	Tire pressure for driving with the equipment in place
385/95 R 25	260 kg	10 bar	10 bar
445/95 R 25*****	320 kg	9 bar	10 bar
525/80 R 25*****	375 kg	7 bar	8 bar

4.2 Tires with „speed symbol F“

Tire size	Wheel weight	Tire pressure for driving on public roads	Tire pressure for driving with the equipment in place
385/95 R 25	260 kg	9 bar	9 bar
445/95 R 25*****	320 kg	9 bar	9 bar
525/80 R 25*****	372 kg	7 bar	7 bar

5 Weights

5.1 Axle loads

Travel condition
See Crane operating instructions, chapter 3.04.

5.2 Load handling equipment

Load	Pulleys	Strands	Installed auxiliary weights	Net weight
112.3 t	7	14	-	1.24 t
90.2 t	5	11	-	0.9 t
			2	1.3 t
			4	1.7 t
			6	2.1 t
			8	2.5 t
59.1 t	3	7	-	0.7 t
26.1 t	1	3	-	0.45 t
8.8 t	-	1	-	0.25 t

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6 Workplace-related emission value

Sound pressure level at nominal engine rpm	Stationary noise L_{pA}	
	Left ear	Right ear
Driver’s cab, driver’s side	74 dB(A)	73 dB(A)
Driver’s cab, passenger side	73 dB(A)	
Crane operator’s cab	77 dB(A)	

7 Vibrations

Vibrations transferred to the operator	Value
Total vibration value to which the upper body limbs are exposed	Not more than 2,5 m/s^2
Effective value of weighted acceleration to which the entire body is exposed to.	Not more than 0.5 m/s^2

8 Speeds

8.1 Driving speeds with 385/95 R 25 tires

Speed	Gear							
	1	2	3	4	5	6	7	8
On road gear	5.50 km/h	7.10 km/h	9.20 km/h	11.80 km/h	14.90 km/h	19.20 km/h	25.20 km/h	32.40 km/h
Off-road gear	1.30 km/h	1.70 km/h	2.20 km/h	2.90 km/h	—	—	—	—

Speed	Gear						Maximum gradient
	9	10	11	12	R1	R2	
On road gear	41.80 km/h	53.60 km/h	68.10 km/h	80.00 km/h	5.90 km/h	7.7 km/h	48 %
Off-road gear	—	—	—	—	1.40 km/h	1.90 km/h	> 60 %

8.2 Driving speeds with 445/95 R 25 and 525/80 R 25 tires

Speed	Gear							
	1	2	3	4	5	6	7	8
On road gear	6.00 km/h	7.70 km/h	10.00 km/h	12.80 km/h	16.20 km/h	20.90 km/h	27.40 km/h	35.30 km/h

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Speed	Gear							
	1	2	3	4	5	6	7	8
Off-road gear	1.50 km /h	1.90 km /h	2.40 km /h	3.10 km /h	—	—	—	—

Speed	Gear						Maximum gradient
	9	10	11	12	R1	R2	
On road gear	45.40 km/h	58.30 km/h	74.10 km/h	80.00 km/h	6.50 km /h	8.30 km /h	43 %
Off-road gear	—	—	—	—	1.60 km /h	2.00 km /h	56 %

8.3 Crane speeds

Drives	Infinitely variable
Hoist gear 1	0 m/min to 110 m/min for single strand
Hoist gear 2	0 m/min to 110 m/min for single strand
Slewing gear	0 rpm to 1.45 rpm
Luffing gear	Approx. 65 s from 1.2° to 82° boom position
Telescoping	Approx. 390 sec. for boom length 12.7 m to 60 m

9 Rope diameter

Type of rope	Rope diameter	Rope category number RCN
Hoist rope 1	21 mm	See Rope certificate
Hoist rope 2*****	21 mm	See Rope certificate

10 Lifting heights

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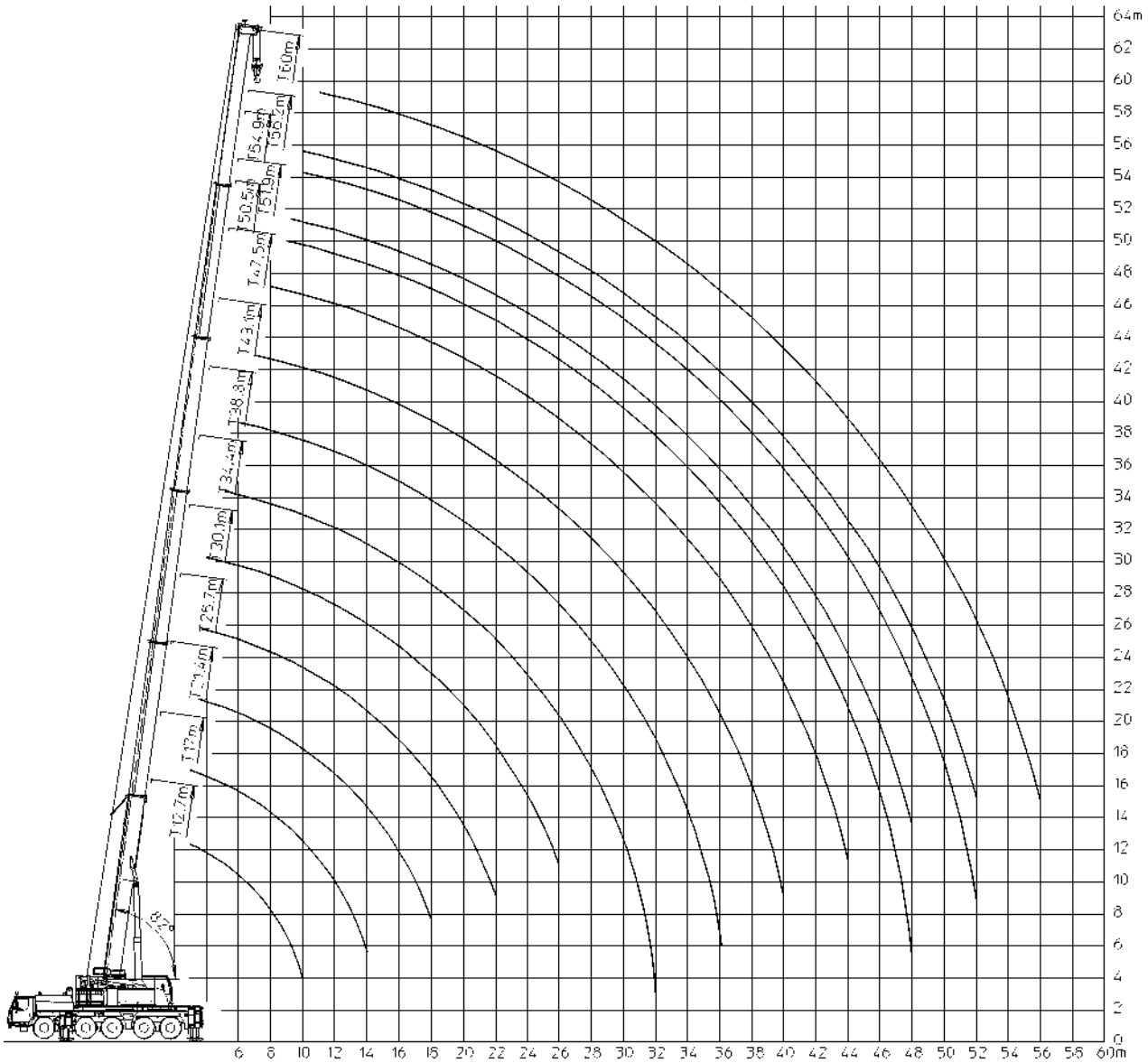

Fig.103072: Telescopic boom

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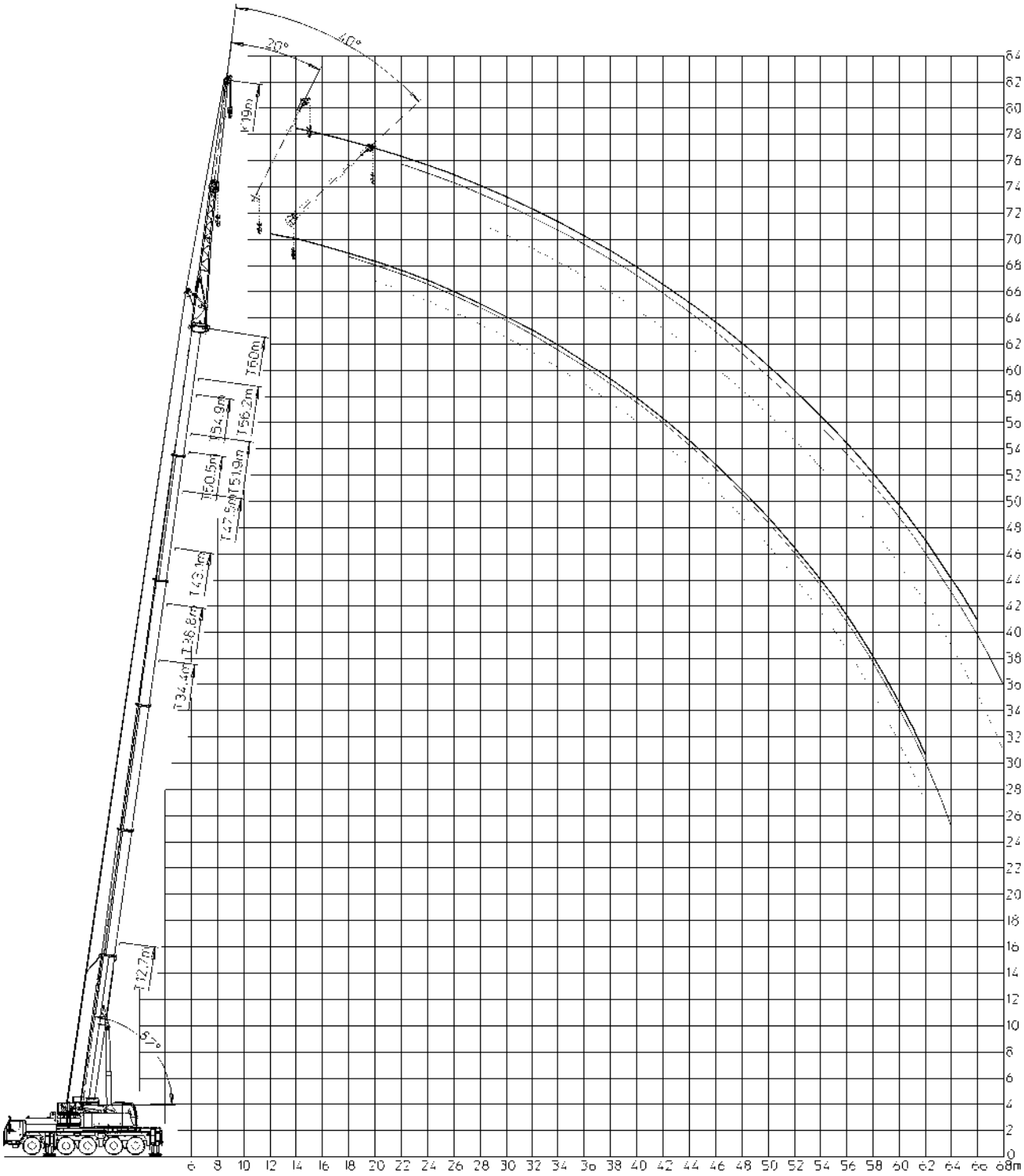

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Fig.103073: Telescopic boom with folding jib

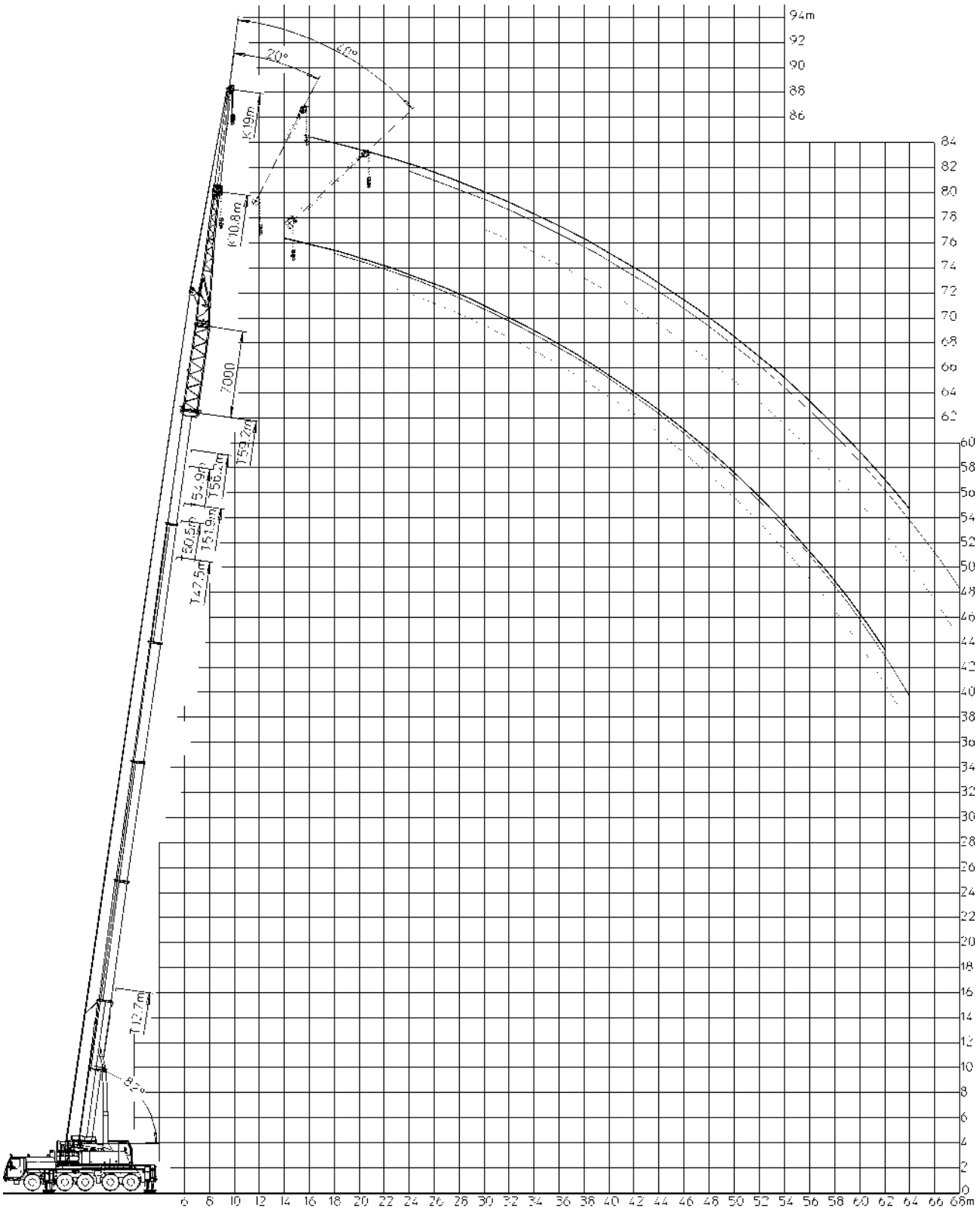

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Fig.103074: Telescopic boom with folding jib and extensions

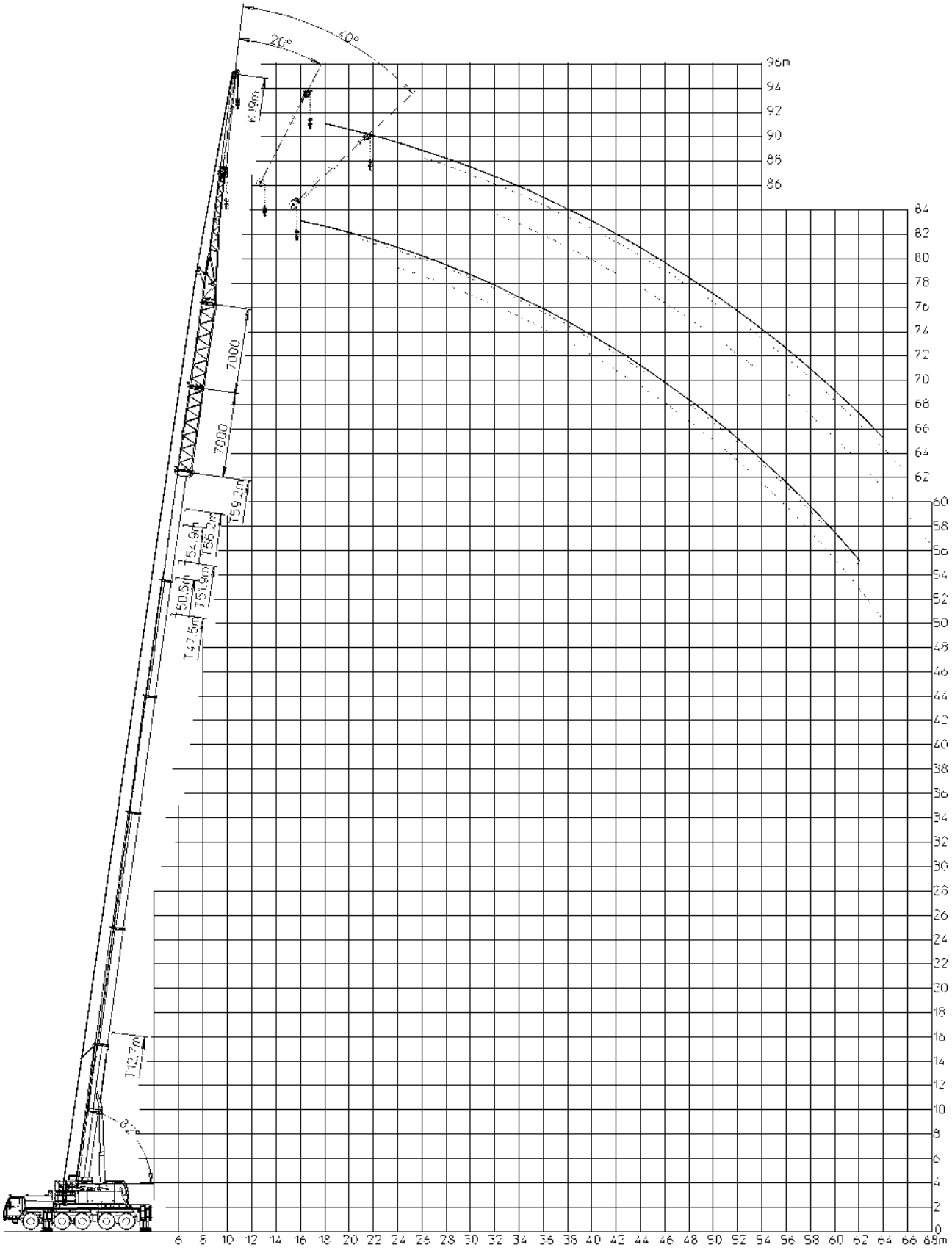

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Fig.103075: Telescopic boom with folding jib and extensions

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2 Safety

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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 Crane operating instructions, chapter 2.01.10.
– The **National traffic regulations** are determined by the laws of the respective country, where the crane is used, see Crane operating instructions, chapter 2.01.20.

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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!
- ▶ 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 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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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 addition, the following regulations must be observed when driving on public roads:
- Any working floodlights that are present must be turned off.
- The telescopic boom must be moved into the telescope position defined during vehicle acceptance, where it must be mechanically secured to prevent movement or twisting.
- Any auxiliary equipment that is present (such as a folding jib, a hook block, additional ballast, a rope winch or the like) must be properly secured on 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.
- 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.
- The moveable crane parts (for example: load hook, rope guides, ropes, brackets) must be secured to prevent them from swinging back and forth and loosing them.
- For driving on public roads, the „driving status 1“ (suspended) for the axle suspension must be actuated 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.
- The „road driving“ steering program must be selected.
- The differential locks must be turned off.
- The turntable must be set into the position determined at vehicle acceptance and mechanically secured to prevent turning.
- The vehicle must be set to chassis operation.
- The crane cab is set in transport position, see Crane operating instructions, chapter 3.02.

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.

1.2 Driving configurations of the crane

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

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Fig.195219

1 Break-in instructions

NOTICE
Risk of damaging while driving the crane.
▶ It is absolutely essential to break-in the crane!

Please observe the following specifications:
1. Continuously monitor temperature and oil pressure indicators while driving!
   Stop immediately if there are any fault indications!
2. Carry out the following maintenance work after the first 50 km and 100 km:
   - Do not over-tighten the wheel nuts (maximum permissible torque= 600 Nm).
     Make sure that wheel nuts are tight.
   - Check engine water and oil levels.
   - Check automatic or manual transmission and load transmission oil levels.
   - Visually inspect engine, gearbox and axles for any leakage or loose components.
   - Check that drive shaft is properly seated.
   - Check that there are no other loose chassis components.
   - Visually inspect tire condition and inflation.

1.1 Breaking in the brake linings

To achieve optimum braking performance, all new brake pads must be broken in by activating the brakes.

WARNING
Risk of accident due to overloaded braking system!
The risk of accident increases when new brake pads are subjected to one or more braking operations over extended periods of time or if the vehicle is forced to a stop by hard braking from maximum speed several times.
▶ Hard braking and continuous braking are not permitted!

For drum brakes, the following applies in addition:

Activate the brakes by pumping them at low to medium speed. Hard braking is not permitted. The break-in distance generally depends on the vehicle capabilities, but a break-in distance of at least 500 km is advisable. The brake drum temperature must not exceed 200 °C during this phase. The temperature rise resulting from each individual braking action should not exceed 15% of the maximum value.

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Fig.195219

1 Planning crane operation

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

DANGER
Missing information increases the risk of accidents!
Crane operation may not be possible or improvisation can result if a crane operator does not have all the required data.
▶ A crane operator must have exact data before starting any work!

The crane operator must obtain or receive the necessary information in a timely fashion before driving to the work site. In particular:
– type of crane operation
– work site (travel distance)
– route
– height and width clearance measurements
– electrical transmission lines (including voltages)
– space restrictions at the work site
– movement restrictions caused by buildings
– weight and dimensions of the load(s) to be hoisted
– required hoisting height and boom projection
– ground bearing capacity at the work site

Based on the above information, the crane operator must assemble the equipment required to operate the crane:
– hook block / load hook
– auxiliary boom
– separate lifting accessories
– counterweight
– underlay materials for support pads

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Fig.195219

1 General

Note

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

1.1 Danger zone of crane

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.

WARNING

Do not stay in danger zone!
Personnel within the danger zone cane 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!

1.2 Danger of crushing when closing the windows

WARNING

Danger of crushing!
Never close the windows carelessly or uncontrolled. Significant crushing injuries can occur!

▶ During closing, watch the windows as it moves up!
▶ Make sure that no personnel or objects are wedged in!

1.3 Exhaust systems and other crane components with high temperatures

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 off before touching them!
▶ Proceed with special caution near heated crane components!

1.4 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!
▶ Observed the signage!
▶ Replace damaged safety signs (warning signs) immediately!

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1.5 Traffic endangerment and environmental damage

WARNING
Danger of slipping and skidding!
If the roadway 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!

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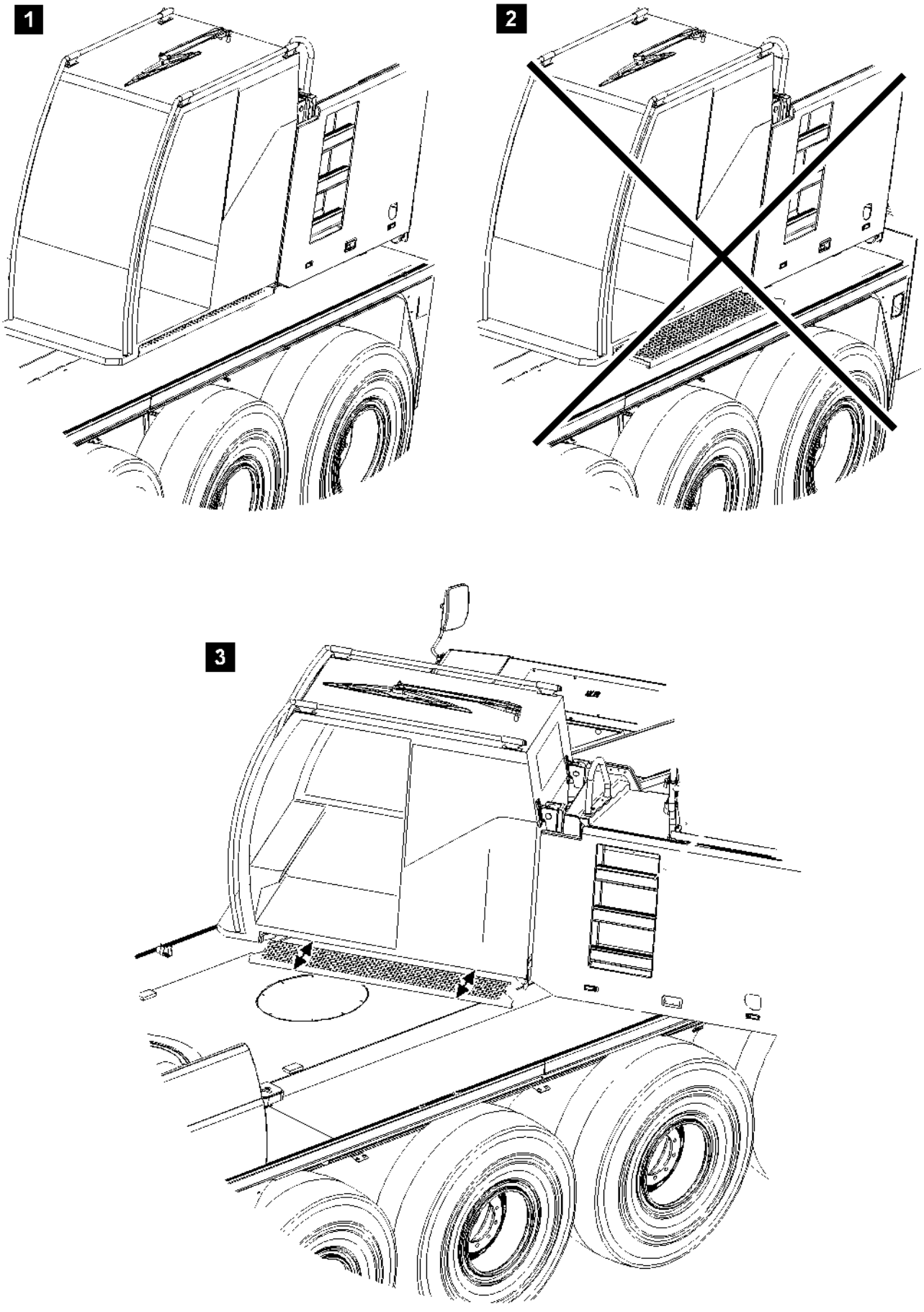

Fig.109287

1.6 Crane cab with retracted / extended step

1.6.1 Entering / exiting of crane superstructure alignment length axis crane chassis

See illustration **1**

Before entering the crane cab or existing from the crane cab, the following prerequisites must be met:
- The crane superstructure is aligned in length axis of the crane chassis.
- The step under the crane cab is retracted.
- The crane cab with incline adjustment is in 0° position.
- All 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 Crane operating instructions, chapter 2.07.

WARNING
Danger of falling!
If the crane superstructure is aligned in length axis of the crane chassis and the step can **not** be moved in, then there is a danger of falling when entering / exiting! See illustration **2**.
Personnel can be severely injured or killed!
▶ Set up a suitable access, such as a ladder or pedestal, to ensure safe entry into the crane cab!
▶ When exiting the crane cab in position crane superstructure in length axis crane chassis, always move the step in completely!

1.6.2 Entering / exiting a swung crane superstructure

See illustration **3**

Before entering the crane cab or existing from 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 is in 0° position.
- All folding ladders are folded into the ascent and descent position.

Note
▶ Use extendable step!
▶ The extended step allows comfortable entry into the crane cab as well as safe exit from the crane to the crane chassis!
▶ When all folding ladders are folded into the ascent and descent position, then a safe descent is possible from every position. See Crane operating instructions, chapter 2.07.

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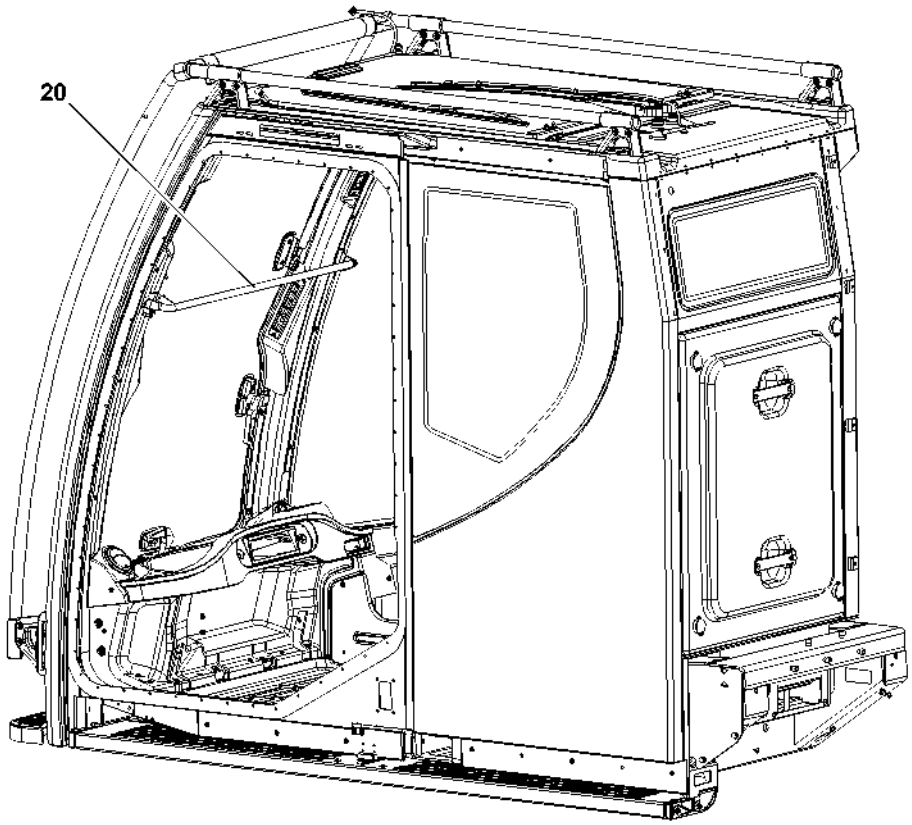

Fig.114885

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1.7 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 pedestals or other suitable entry aids set up to ensure safe exit from the crane cab!

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!

1.8 Safety bar

Note
- ▶ The safety bar **20** is installed to protect the crane operator from a danger of falling when the front windshield is open.
- ▶ Do not use the safety bar **20** as a handle.

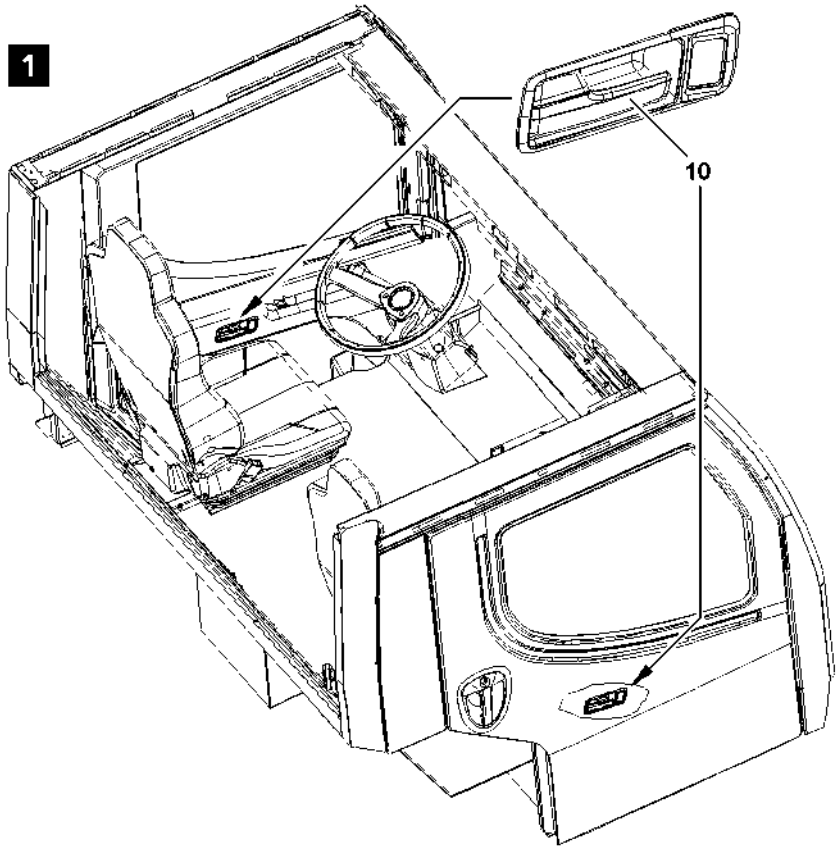

Fig.112864

2 Emergency exit

2.1 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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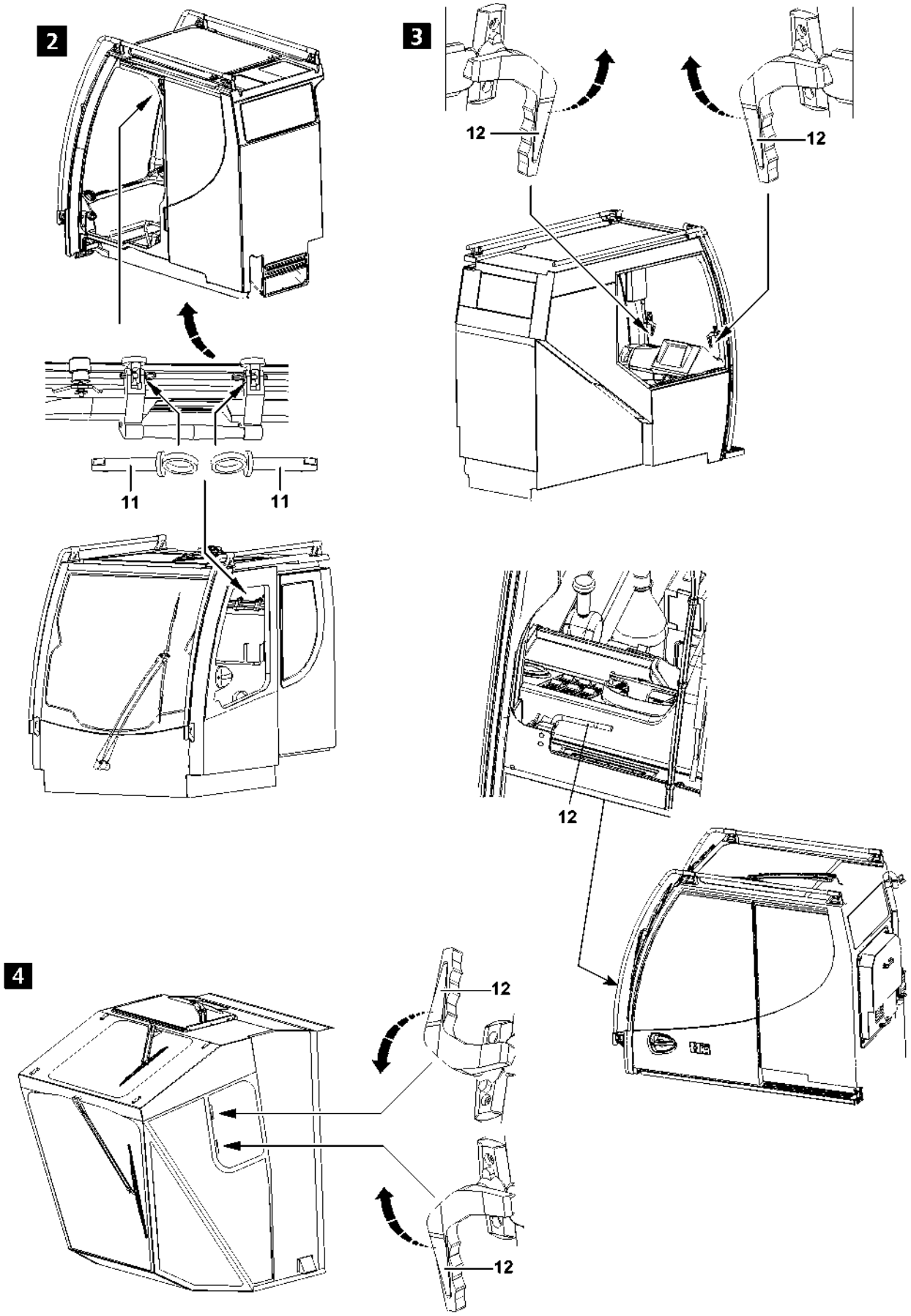

Fig.112865

2.2 Emergency exist crane cab

WARNING
Danger of falling!
If it is not possible to safely leave the crane cab through the door or to reset the crane cab from inclined position to horizontal position, then the crane operator can fall from the crane cab during the emergency exit and be severely injured!
▶ Be especially careful when exiting at emergency exit!
▶ If the crane cab cannot be exited safely, use outside aid!

In case of an emergency, if it is not possible to leave the crane cab through the door, the crane cab can be exited through one of the following openings, depending on the model:
– **Roof window**, see illustration **2**: Pull the pins **11** on the left and right and open the roof window upward.
– **Rear window**, see illustration **2**: Pull the pins **11** on the left and right and open the rear window upward.
– **Front window**, see illustration **3**: Unlock the left and right handles **12** and open the front window.
– **Side window**, see illustration **4**: Unlock the top and bottom handles **12** and open the side window.

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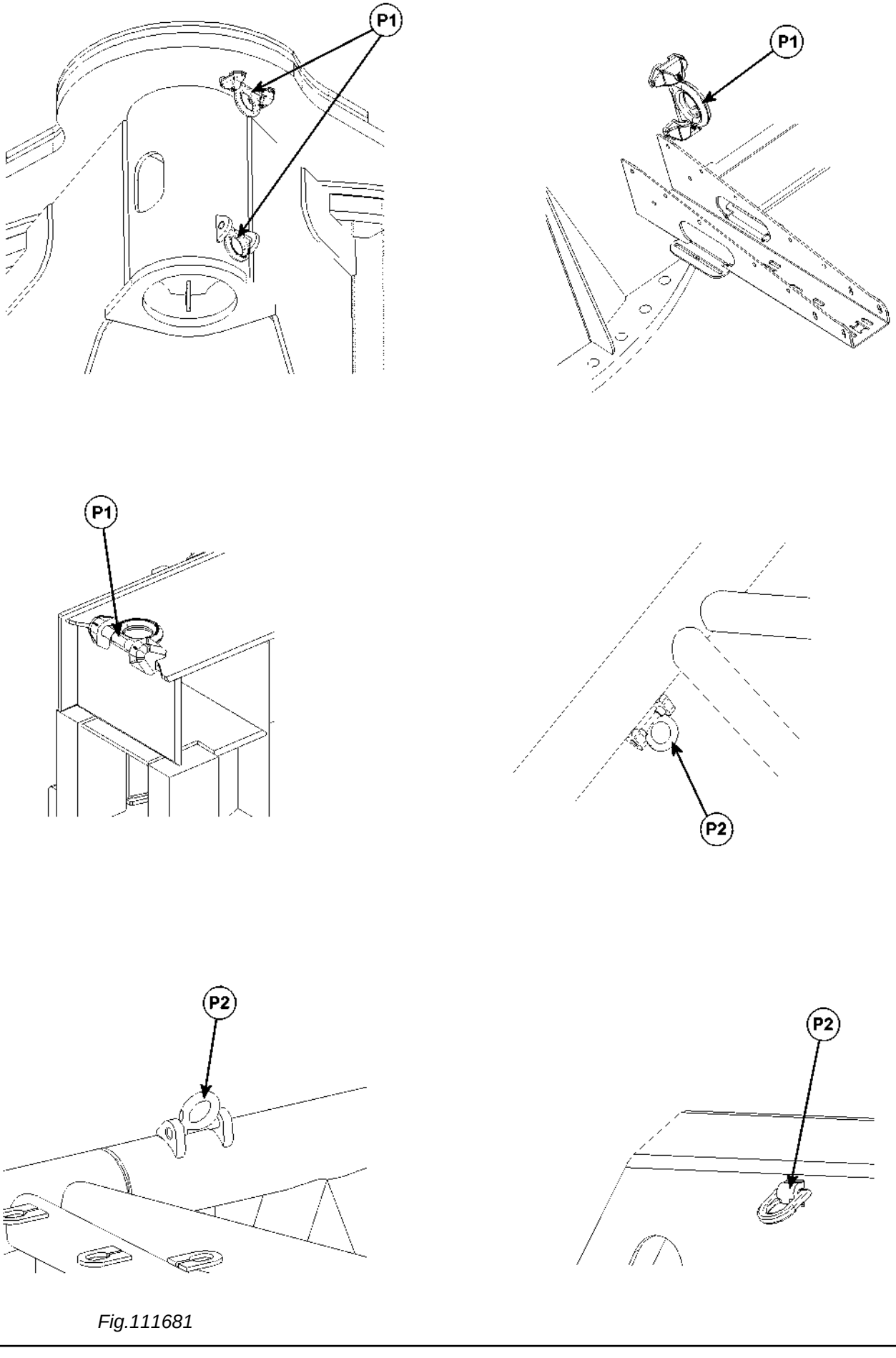

Fig.111681

3 Checking the rigging and fastening points

The rigging and fastening points are marked as follows:
P1: Rigging points
P2: Fastening points

Before every operation and at regular intervals, check the rigging points **P1** and the fastening points **P2** for cracks of the welding seam, significant corrosion, wear and distortion.

The inspection criteria are:
- Completeness of rigging points **P1** and fastening points **P2**.
- 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 and fastening points which are not operationally safe, severe personal and property damage can occur!
- ▶ Have rigging and fastening points, which are not operationally safe replaced with new rigging and fastening points by authorized and trained expert personnel!
- ▶ When hooking and unhooking the rigging and fastening equipment, handle carefully to avoid crushing, sheering, catch and impact points!
- ▶ Eliminate damage of rigging and fastening equipment due to sharp edged stress loads!

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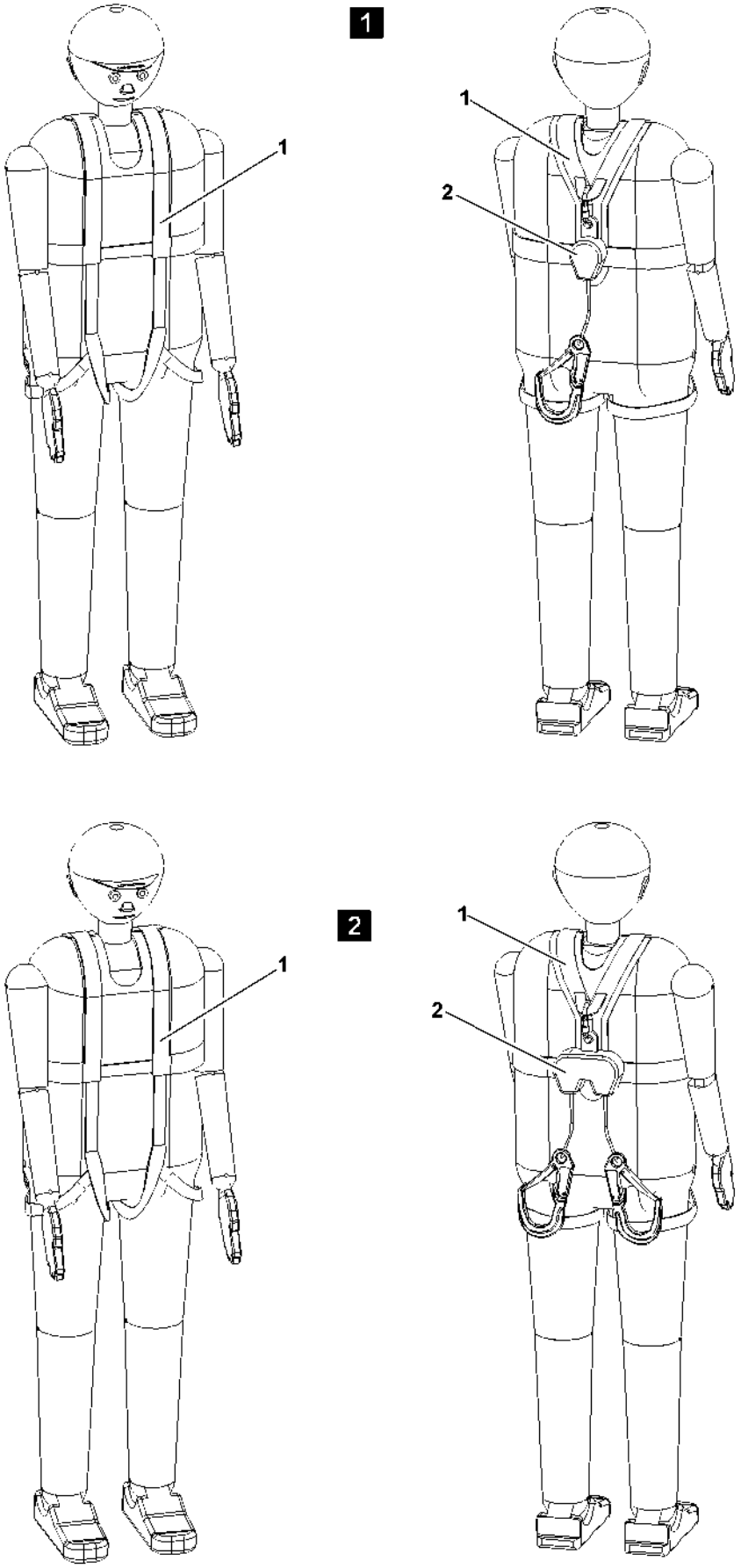

Fig.111691

4 Personal protective equipment

WARNING
Danger of falling!
If personal protective equipment is not worn during assembly or maintenance work, then the assembly personnel can be killed or severely injured!
- ▶ Observe and adhere the operating instructions and maintenance instructions of the manufacturer for the personal protective equipment!
- ▶ Ensure through regular inspections that the product identification is not damaged!
- ▶ The crane operator must make personal protective equipment available for the assembly personnel!
- ▶ The crane operator must ensure that the personal protective equipment is worn by the assembly personnel!
- ▶ The assembly personnel is obligated to carry the personal protective equipment and to wear it!
- ▶ Check personal protective equipment before use for damage and completeness!
- ▶ Replace defective or damaged personal protective equipment with functioning protective equipment!

WARNING
Impermissible fall arrest system!
If a fall arrest system is used, which was not obtained via Liebherr-Werk Ehingen GmbH, there is a danger of falling! Another fall arrest system is **NOT** designed for the crane structure!
Personnel can be severely injured or killed!
- ▶ Utilize exclusively fall arrest systems from Liebherr-Werk Ehingen GmbH!

The personal protective equipment includes the following equipment:
- – Supplied fall arrest systems (safety harness **1** and height safety equipment **2**).
- – Head protection with chin strap: Protection from falling parts at assembly and disassembly. Hitting the head at assembly and disassembly of lattice mast equipment.
- – Non-slid and slip resistance safety gloves.
  As a rule, when working with ropes, penetration safe safety gloves must be used.
- – Safety shoes: Protection from falling parts at assembly and disassembly.
- – Warning apparel.

WARNING
Danger of fatal injury!
Even personal protective equipment does not provide 100 % protection!
A helmet can protect against small falling objects, but not against falling loads!
Personnel can be killed or seriously injured!
- ▶ Always remain alert!
- ▶ Always be safety conscious!
- ▶ Standing under suspended loads is prohibited!

WARNING
Danger of accident!
If the following measures are not carried out, personnel can be killed or severely injured!
- ▶ A plan for rescue actions, taking all possible emergencies into account, must be on hand!
- ▶ The following points can endanger the safe function of the personal protective equipment: For example extreme temperatures, routing of connecting devices, routing over or around sharp edges, chemical influences, electrical effects, cuts, abrasion, climatic influences or swing movements during falls!
- ▶ For that reason, safety preparations must be made!

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WARNING
Important for the safety of the user!
- If the personal protective equipment is sold to another country, then the purchaser must make the manufacturer's operating instructions as well as the inspection and maintenance documents available in the language of the user country!

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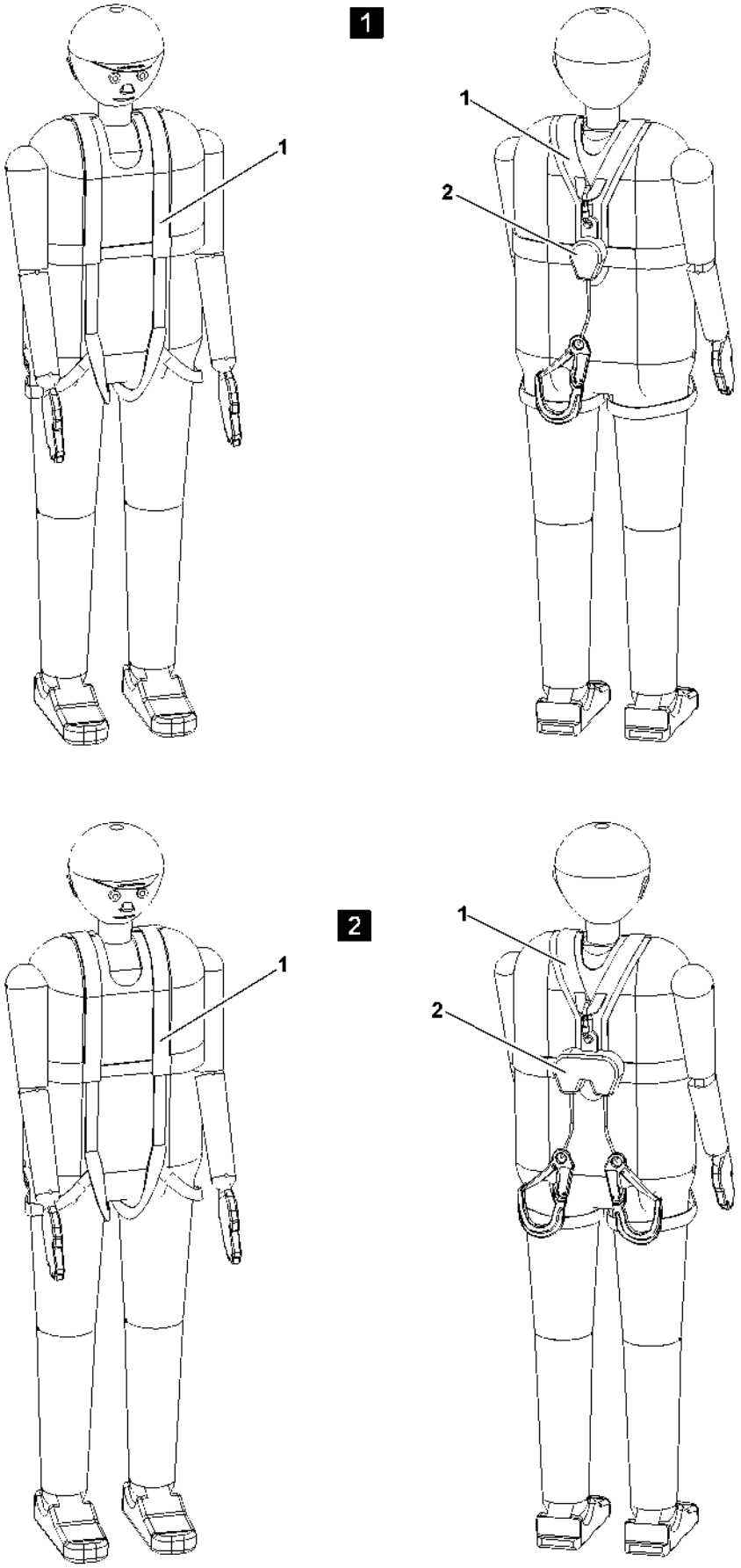

Fig.111691

4.1 Supplied fall arrest system (safety harness and height safety equipment)

The supplied fall arrest system, consisting of safety harness **1** and height safety equipment **2** must be worn where no other fall protection equipment, such as railings, can be installed for technical reasons. In these cases, marked fastening and hook points for the fall arrest systems are provided on the components.

Note

▶ For cranes, which do not include the fall arrest system and the height rescue system as part of the scope of delivery can purchase the fall arrest system, consisting of safety harness **1** and height safety equipment **2** as well as the height rescue system at the Liebherr-Werk Ehingen GmbH.

Part of the category „Aids for working aloft“ are, for example:
- Lifting platforms
- Scaffolding
- Auxiliary cranes

WARNING

Danger of falling!
If the fall arrest system is not worn during assembly or maintenance work, then the assembly personnel can fall down and be killed or severely injured!

▶ All work aloft, where there is a danger of falling must be carried out with suitable aids!
▶ If fall protection equipment is available, then the fall protection equipment 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 supplied fall arrest system to prevent falling!
▶ The supplied 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!
▶ The assembly personnel must be instructed in practice on how to wear the supplied fall arrest system (safety harness **1** and height safety equipment **2**)! Annual practice instructions and drills must be carried out!
▶ The supplied fall arrest system must be used!
▶ The fall arrest system consists of a safety harness **1**, approved according to **EN 361** and a height safety equipment **2**, approved according to **EN 360** (for horizontal application and sharp edges)!
▶ The supplied fall arrest system may not be changed in its configuration! Extending or shortening the fall arrest rope is prohibited!
▶ The fall absorber is integrated in the height safety device **2**. The utilization of an additional fall absorber is prohibited!
▶ The supplied fall arrest system is effective from a height of 2.5 m !
▶ The fall space must be free of obstacles!
▶ The intended safety points designed for this purpose on the crane must be used!
▶ The operating instructions of the manufacturer for the supplied fall arrest systems (safety harnesses **1** and height safety equipment **2**) must be observed and adhered to!
▶ Only step on the aids, ladders and catwalks with clean shoes!
▶ Keep aids, ladders and catwalks free of heavy dirt, snow and ice!
▶ The safety harness **1** and the height safety equipment **2** must be inspected annually by authorized and trained expert personnel and the results must be documented in the inspection log book!
▶ After every fall, the safety harness **1** and the height safety equipment **2** must be removed and inspected by an authorized and trained expert and the results must be documented in the inspection log book!
▶ The results must be documented in the inspection log book!
▶ Only after written release by expert personnel may be fall arrest system be reused!

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5 Use of single-stranded height safety equipment, illustration 1

Height safety equipment with a belt strap is intended for all cranes which have no catwalks with safety ropes. Use the supplied height safety equipment with extendable belt strap and snap hook (**EN 362 Class A**) with link.

6 Use of double-stranded height safety equipment, illustration 2

Height safety equipment with two belt straps are intended for cranes with catwalks, which are equipped with two ropes as fastening device on the left and right hand side of the catwalk. 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 (**EN 362 Class A**) with links.

WARNING
Danger of falling!
▶ If two safety ropes are installed on the booms, lattice sections and other components, then the height safety equipment with two belt straps must always be used and one belt strap per safety rope must be hooked!

7 Securing the assembly personnel against falling

Make sure that the assembly personnel is wearing the supplied fall arrest systems (safety harnesses and height safety equipment) correctly.

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.

WARNING
Danger of falling in case of missing 3-point support!
▶ When accessing a ladder, do not hold any objects in your hands!

7.1 Working on the telescopic boom head

Reeve the hoist rope in or out on the pulley head:
– When working on a ladder, always use the supplied ladder with hook device. For fastening and hook points, see Crane operating instructions, chapter 2.06.
– When ascending, the assembly personnel must ensure a 3-point support.
– When working on the ladder, the assembly personnel must hook themselves with the snap hooks of the fall arrest system on the fastening points and secure themselves against falling.

7.2 Working on the auxiliary boom

Assembling or disassembling the auxiliary boom:
– When working on a ladder, always use the supplied ladder with hook device. For fastening and hook points, see Crane operating instructions, chapter 2.06.
– When ascending, the assembly personnel must ensure a 3-point support.
– When working on the ladder, 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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7.3 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 the 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.

7.4 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:
- Before changing over, the assembly personnel must hook at least one snap hook of the fall arrest system on a safety rope and secure themselves against falling.

7.5 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.

7.6 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.

Attaching the lattice sections:
- When attaching 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.

7.7 Descending from lattice sections or booms

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

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

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8 Rescuing the assembly personnel

The height rescue system, consisting of the rappelling rescue device, is an evacuation and rescue device. With the height rescue system, one or more persons can rappel down in an oscillating procedure from a higher to a lower location with limited speed. In addition, one person can be pulled up by a helper from a lower to a higher location.

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!

8.1 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!

9 Documentation

Note
- ▶ The documentation of the fall arrest systems (safety harnesses and height safety equipment) and the height rescue system must be carried out according to the operating instructions of the respective manufacturer.
- ▶ The crane operator, who employs the user, is responsible for the creation of documentation and entry of the required data.

10 Identification

Every personal protective equipment or other equipment must be marked clearly and permanently in the language of the user country.

If the identification is no longer legible, then the personal protective equipment must be handed to an expert for inspection.

11 Crane operator responsibilities

11.1 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.

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Many crane accidents are caused by incorrect crane operation.

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.

The main **operating errors**, which are made again and again while operating or driving a crane, are as follows:
– Not paying careful attention while working, for example:
  • Slewing too quickly
  • Stopping the load too quickly
  • Angular pulling
  • Slack rope formation
– Overloading
– Driving too fast with a load and / or equipment on an uneven roadway
– Attaching the load incorrectly
– Unsuitable operation; especially angular pulling, breaking away stuck loads
– Wind action on suspended loads
– Mistakes 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, support under the support plates
– Mistakes during assembly or disassembly of booms

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

11.2 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!
▶ Only step on such aids with clean shoes!
▶ Keep aids clean and free of 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!

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11.3 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.
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 devices are set to neutral or idle position before release of the energy supply to the drive components.
   - The control devices 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 at all crane movements or the load tackle devices 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 devices 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 moment limiter was triggered, the crane operator may not take on 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.

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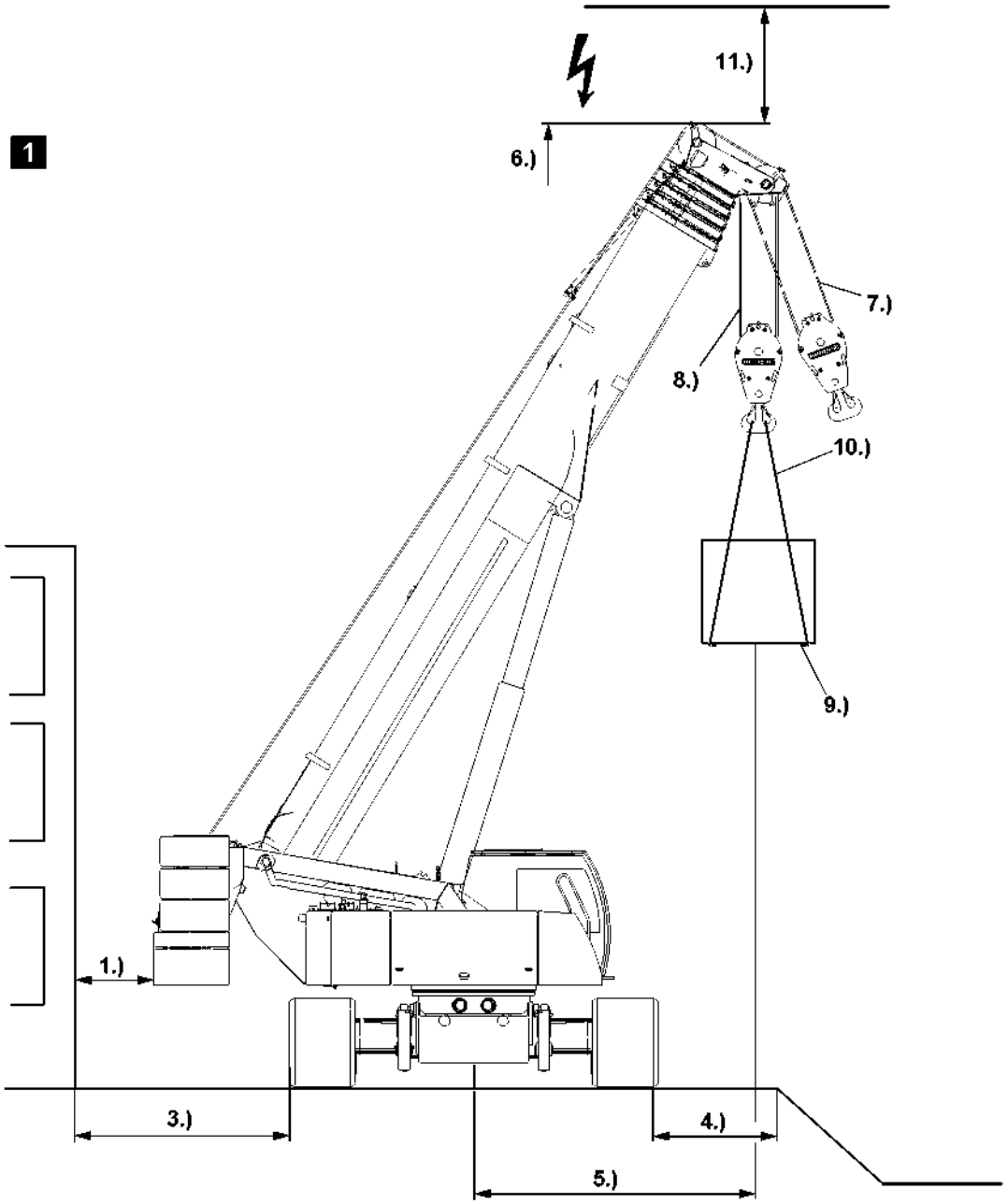

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Fig.104101: Example for crawler crane with telescopic boom

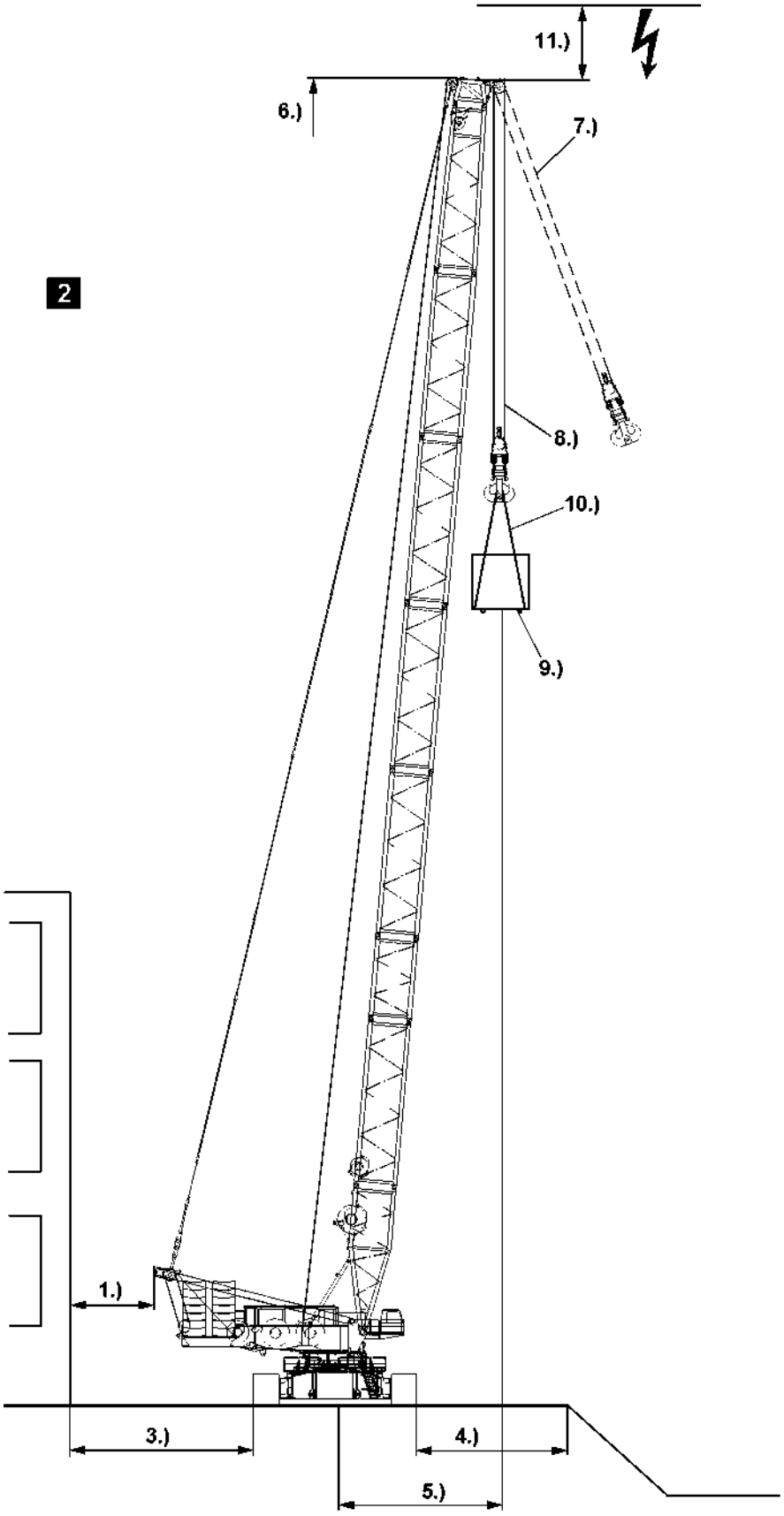

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Fig.104102: Example for crawler crane with lattice mast boom

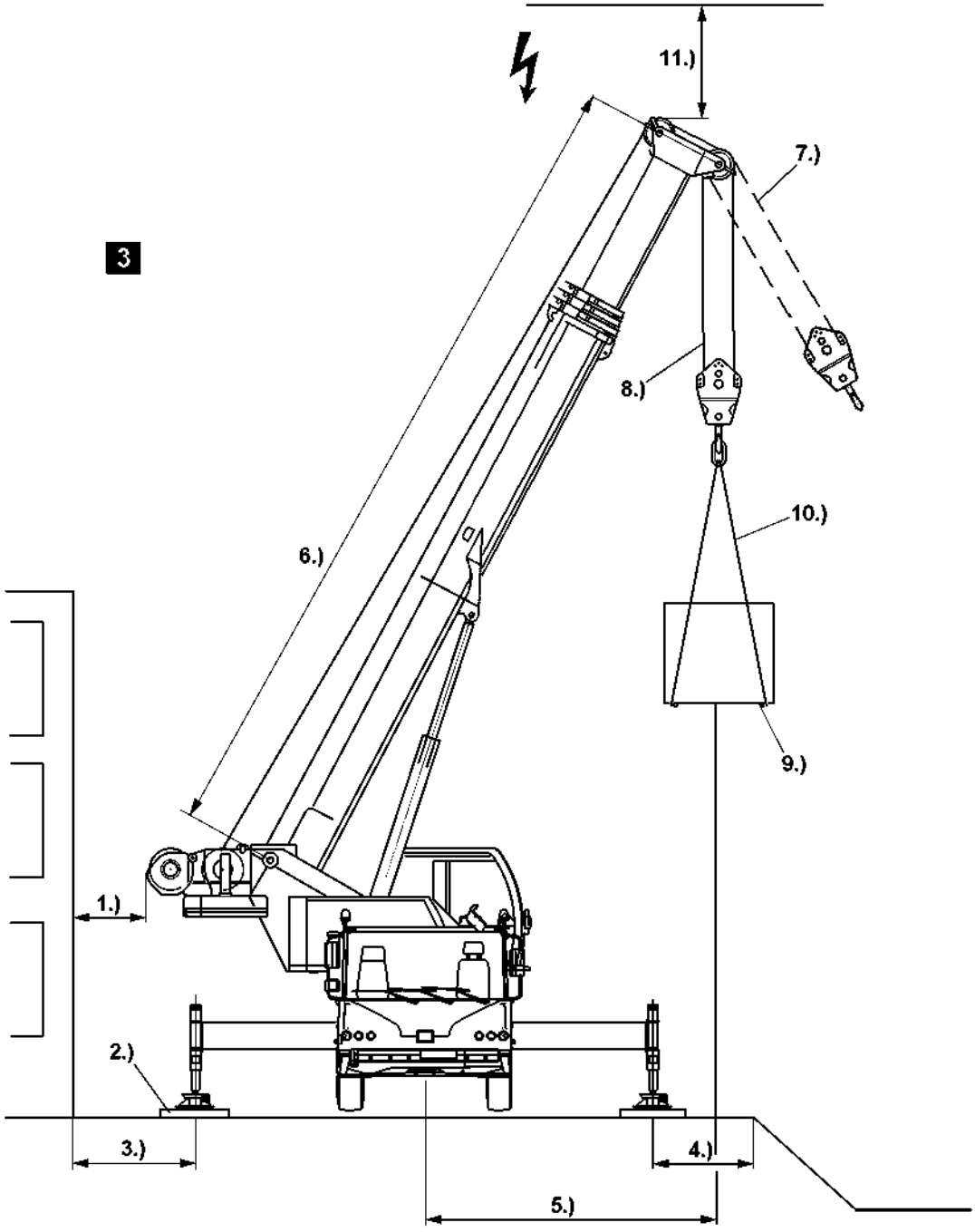

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Fig.104103: Example for mobile cranes

12 Selecting the location, illustrations 1 to 3

It is very important to choose an appropriate location for crane operation in order to minimize accident risks.

DANGER
Risk 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 the required load-bearing capacity!
- ▶ Act responsibly when planning and selecting the crane location and route.
- ▶ Note the following points!

When selecting the location for the crane, observe the following:
1. 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.
2. On mobile cranes:
   Support the crane correctly and support the support plates according to the load bearing capacity of the ground on the placement location.
3. Keep a safety distance to basements or similar.
4. Keep a safety distance to slopes or similar.
5. Keep the radius to as low as possible.
6. Select the correct boom length to the load case.
7. Angular pull is prohibited!
8. Select the correct reeving of the hoist rope to the load case.
9. Bear in mind the weight and the wind exposure surface of the load.
10. Select tackle according to the weight of the load, the type of attachment and the incline angle.
11. Keep sufficient distance to electrical overhead wiring.

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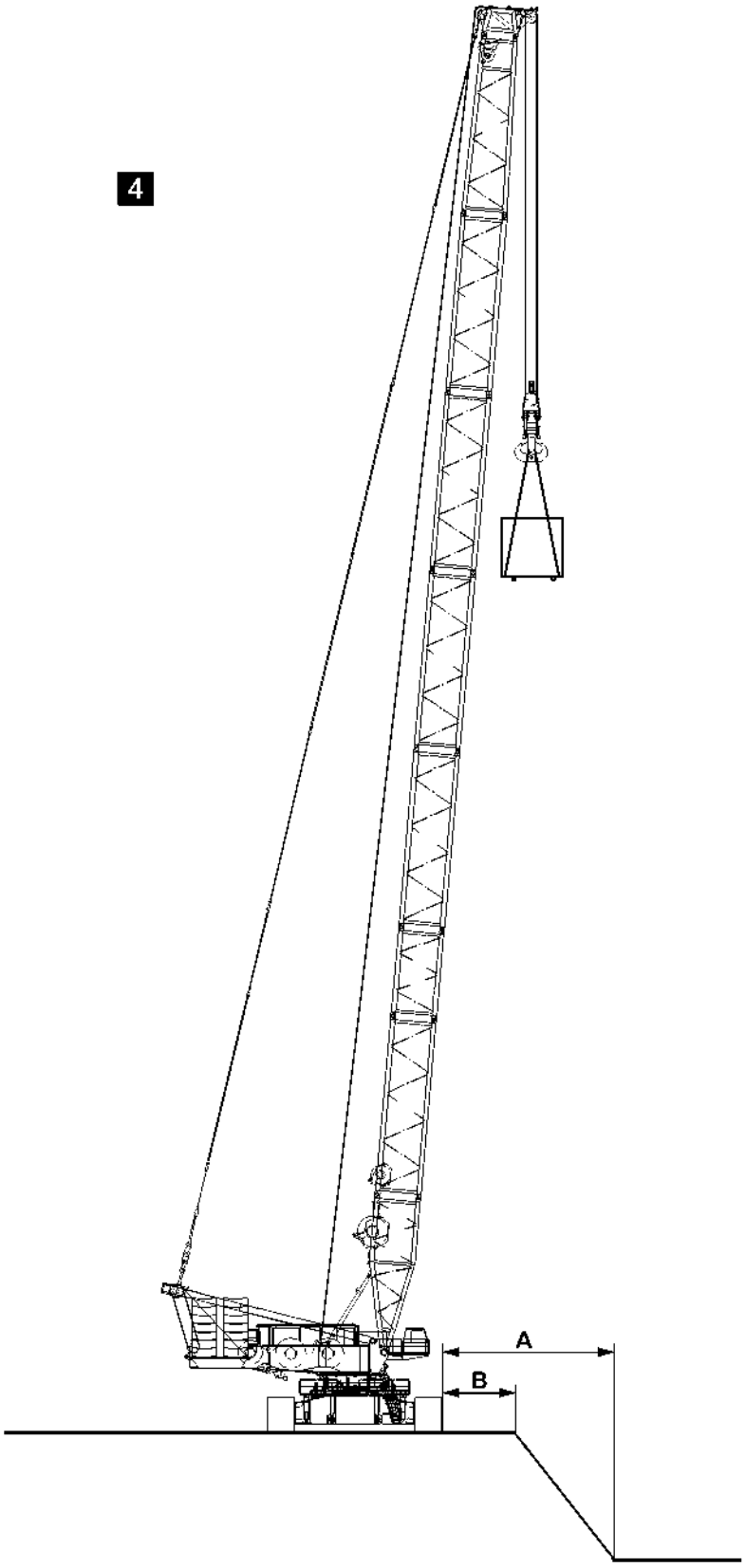

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Fig.108387: Example for crawler cranes

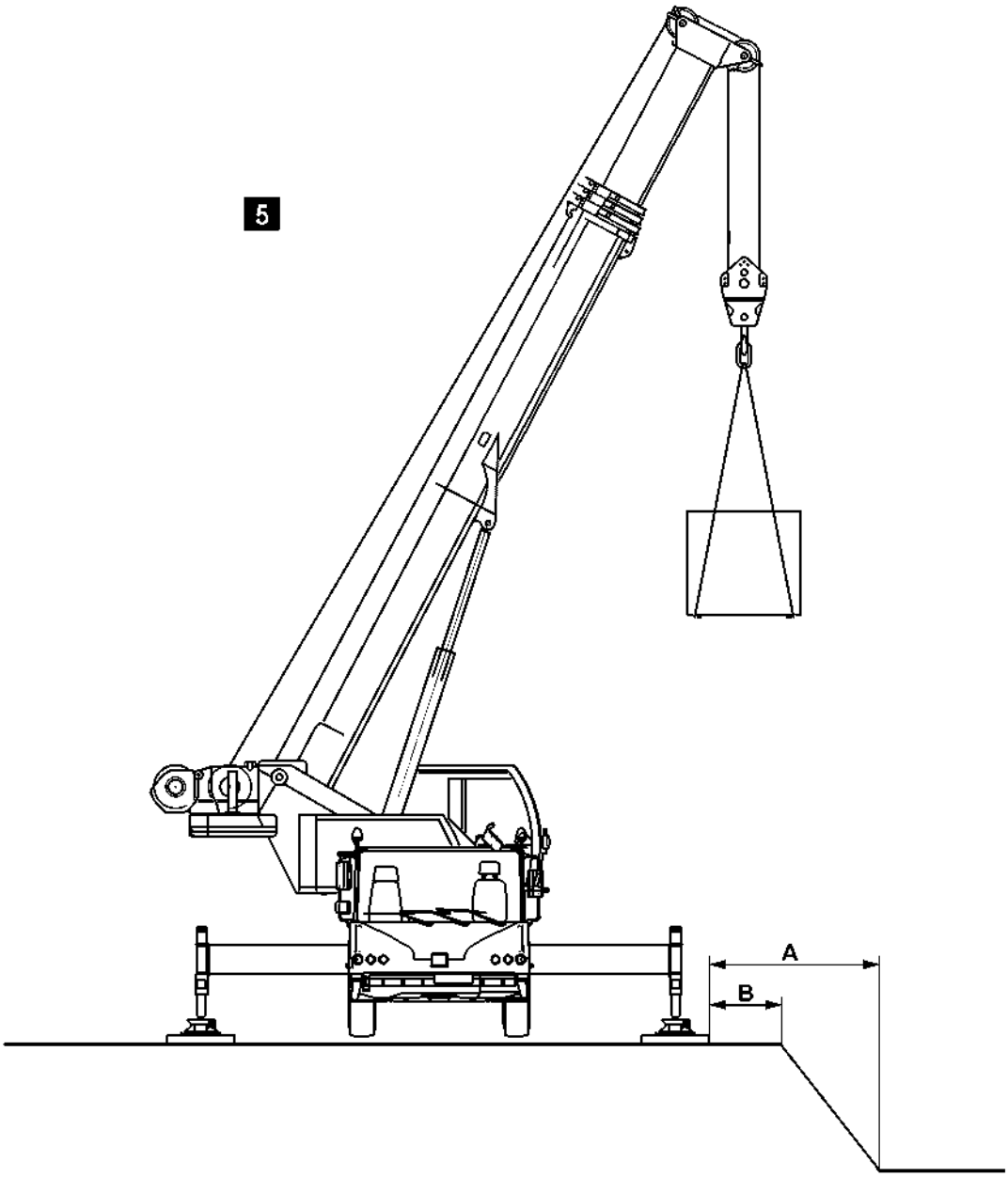

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Fig.108388: Example for mobile cranes

13 Slopes and excavations, illustrations 4 and 5

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.

WARNING
The crane can topple over!
The edge of the slope or excavation can break in if safety distance **A** or safety distance **B** is too small.
If the edge of the slope or excavation breaks in, the crane can topple over and kill personnel!
▶ Always maintain the required safety distance **A** and safety distance **B**!

Abbreviation	Term
A	Distance to bottom of excavation
B	Distance to excavation

14 Permissible ground pressures

Permissible ground pressures		
Soil type		[N/cm²]
1.	Organic ground:	
	Peat, sludge, muck	0
2.	Uncompacted fill:	
	Construction debris	0 to 10
3.	Non-cohesive ground:	
	Sand, gravel, rocks and mix	20
4.	Cohesive soil:	
	a) Clayed silt, mixed with topsoil	12
	b) Silt, consisting of poor clay and coarse clay	13
	c) Plastic clay, consisting of potter's clay and fill	
	Stiff	9
	Semi-solid	14
	Solid	20
	d) Mixed granular ground, clay to sand, gravel and rocky areas	
	Stiff	15
	Semi-solid	22
	Solid	33
5.	Rock in evenly solid condition:	
	a) Brittle, with traces of decomposition	150
	b) Not brittle	400

If there is any doubt about the load bearing capability of the ground at the site, soil tests should be carried out by specialists using, for example, a penetrometer.

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14.1 Permitted ground pressure for crawler cranes

In crane operation, significant forces are transferred to the ground. The ground must be able to safely withstand the pressure. If the crawler area is inadequate, then the crawlers must be supported from below according to the load bearing capacity of the ground.

WARNING
The crane can topple over!
If the crane is not properly supported, the crane can topple over and fatally injure personnel!
▶ The foundation support must be large enough for the ground conditions and constructed from solid materials, such as wood or steel plates!

14.2 Permitted ground pressure for mobile cranes

When the crane is supported, the support cylinders transmit significant forces to the ground.

In any case, the ground must be able to safely withstand this pressure. If the support pad area is inadequate, the support pads must be supported from below according to the load bearing capacity of the ground.

The required support area can be calculated from the load bearing capability of the ground and the crane support force.

Note
▶ Consider that the support force, due to the counterweight, can be higher without a load than with a load.

WARNING
The crane can topple over!
If the crane is not properly supported, the crane can topple over and fatally injure personnel!
▶ Only strong materials may be used for the support pad bases; for example properly dimensioned wooden timbers!
▶ In order to ensure that pressure is evenly distributed over the base surface, the support plates must be positioned in the center of the support base!

Note
▶ 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 specific support pressure	
Maximum support force according to crane operating instructions, chapter 1.03 for example: 720 kN	720000 N
Surface of square support plate with 550 mm side length according to chapter 1.03, for example: 302500 mm^2	3025 cm^2
80 % as carrying surface of support plate: 302500 mm^2 x 0.8 = 242000 mm^2	2420 cm^2
Specific support pressure = Support force / surface support plate	720000 N / 2420 cm^2 = 297.52 N/cm^2
Specific support pressure:	**298 N/cm^2**

The value of the specific support pressure is far higher than the permissible ground pressure for all types of granular soil. If this crane is utilized on bedrock, type of ground gravel, permissible ground pressure 20 N/cm^2 , then the support surface must be increased.

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Example: Calculation of required support surface	
Maximum support force according to crane operating instructions, chapter 1.03 for example: 720 kN	720000 N
Permissible ground pressure, for example: 20 N/cm²	20 N/cm²
Required support surface = Support force / permissible ground pressure	720000 N / 20 N/cm² = 36000 cm²
Required support surface:	36000 cm² = **3.6 m²**

The surface of the support for each support plate must be at least **3.6 m²**.

Note
▶ The corresponding support forces can be determined with the crane job planer.

14.3 LICCON job planer

The calculation of support forces and ground pressures of tracks with the LICCON job planner are based on idealized assumptions.

Side deformations of the boom system due to wind, inclined position and elastic compliancy of the steel structure are not taken into account in the LICCON job planner.

These influences can lead to an increase of support forces or increase of ground pressures of the tracks.

15 Support

15.1 Supporting the crane

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 system!
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 exactly in accordance with the load charts 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
Danger of tipping over!
If only the load side sliding beams are extended, the crane can tip over when turning or setting down the load!
▶ Move all 4 sliding beams and support cylinders out according to the data in the load chart!
▶ In intermediate positions between the support bases supporting is prohibited!
▶ Pin the sliding beams to support base according to the load chart!
▶ Fully insert and secure the pins!

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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 slewing from the longitudinal vehicle direction.
▶ Move all 4 sliding beams and support cylinders out according to the data in the load chart!

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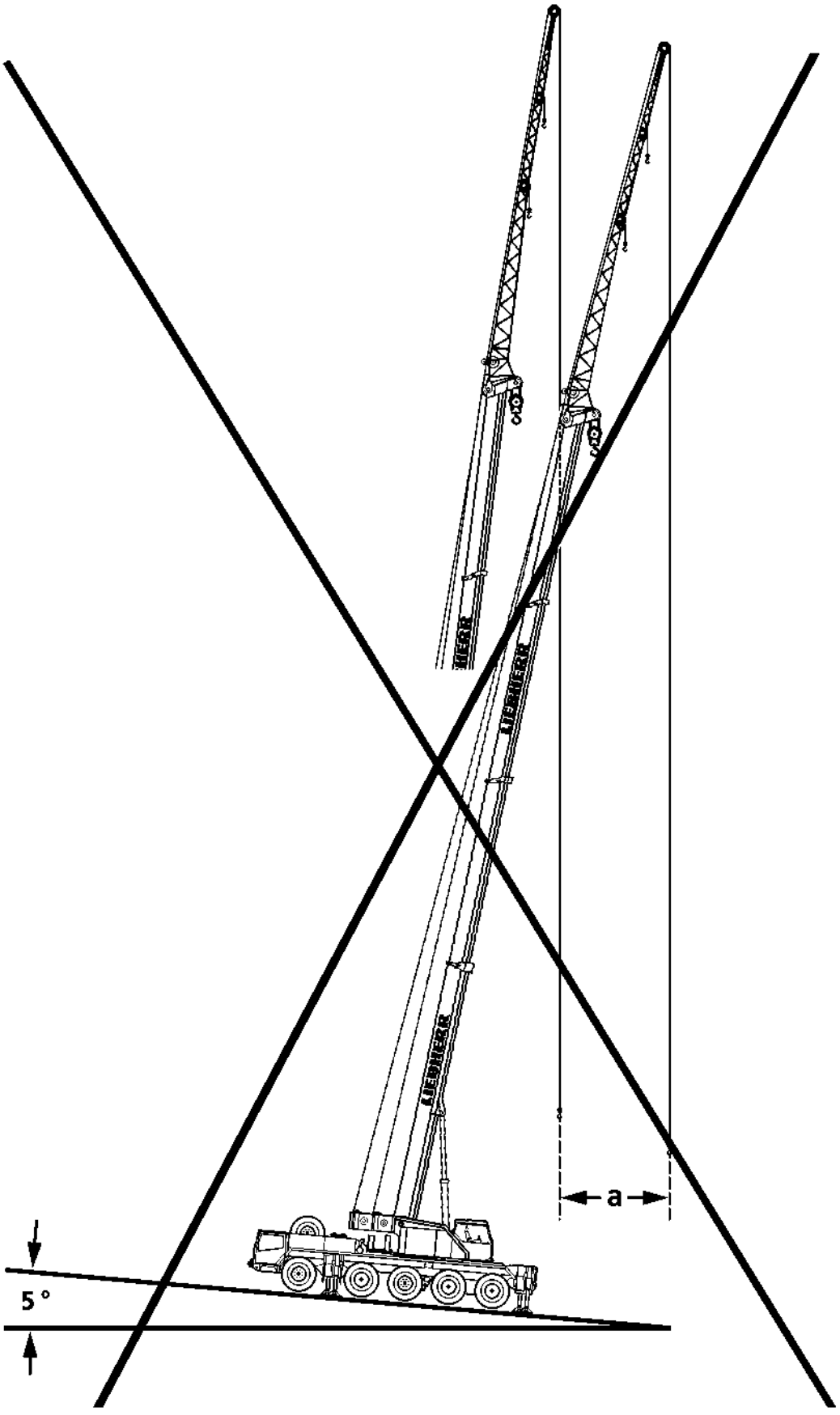

Fig.180001: General example

15.2 Aligning the crane

In addition to the proper foundation 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!

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

16 Checking the safety measures

- The placement location has been selected in such a way that the crane can be operated with the least possible boom radius.
- The load bearing capacity of the ground is adequate.
- There is sufficient distance 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.
- On mobile cranes:
- • The axle suspension is blocked.
  • 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 the operating position.
  • The axles are relieved, which means the tires do not touch the ground.

17 Endangering air traffic

When working with cranes, 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!
▶ Assemble 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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18 Grounding

18.1 Grounding the crane

WARNING
Danger of fatal injury due to electrical shock!
There is a risk 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 operation:
– 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 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).

18.2 Grounding the load

WARNING
Danger of fatal injury due to electrical shock!
There is a risk 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 operation:
– 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.

19 Consideration of wind conditions

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
Crane operation	Load chart manual

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Assembly / crane conditions	Reference for permissible wind speed
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

WARNING
Increase of support force and exceedance of permissible ground pressure!
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 forces and the ground 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!
The ground pressure is increased!
▶ Do not exceed the permissible ground pressure!

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!

19.1 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.

19.2 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.

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.

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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“ please contact the Customer Service at Liebherr-Werk Ehingen GmbH!

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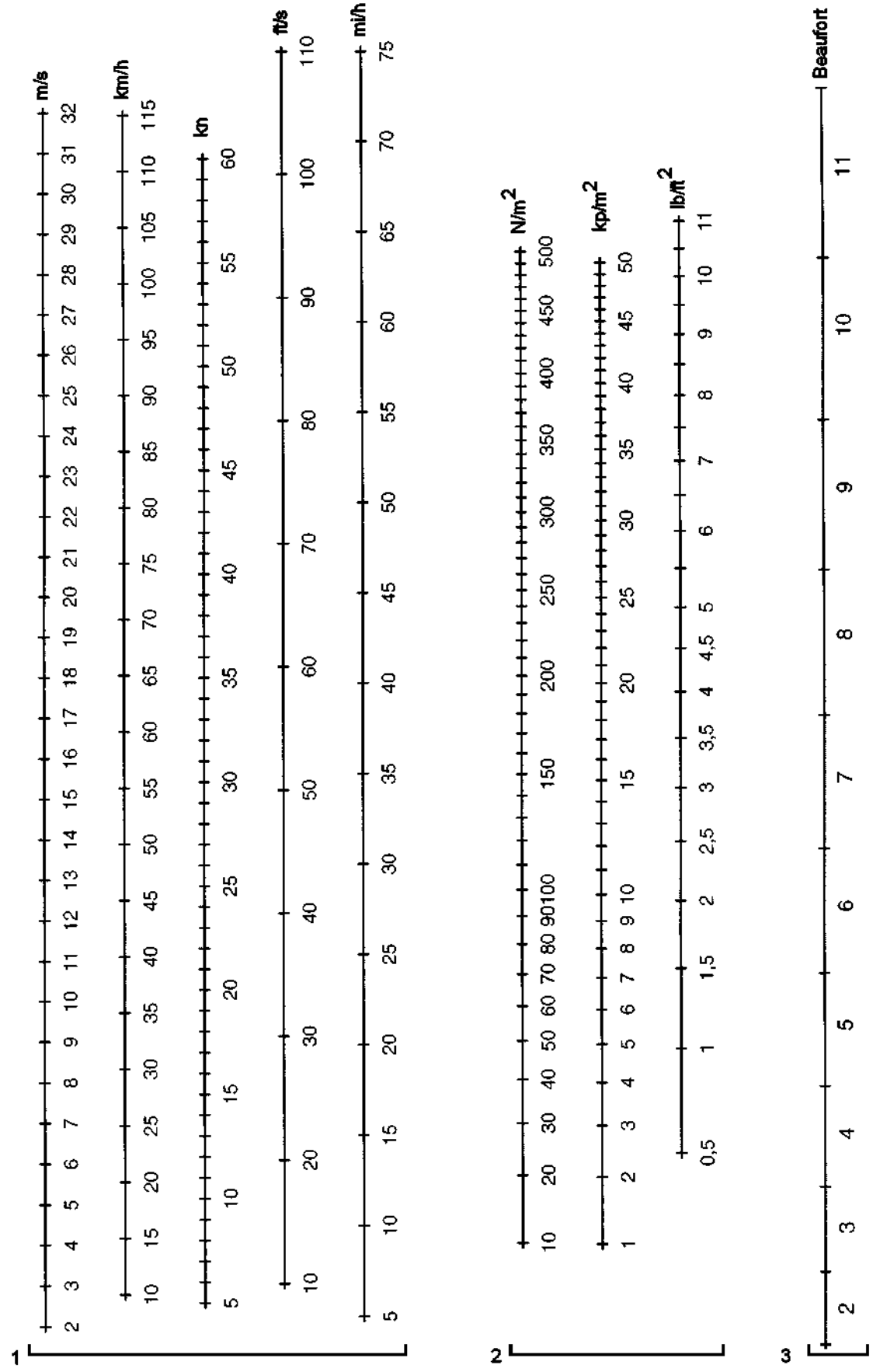

Fig.106876

1 Wind speeds 2 Dynamic pressure 3 Wind velocity

19.3 Conversion chart for wind speed and dynamic pressure

Note
▶ The wind scales for the following conversion charts are in the adjacent graphic!

Wind speed					Dynamic pressure		
[m/s]	[km/h]	[kn]	[ft/s]	[mi/h]	[N/m²]	[kp/m²]	[lb/ft²]
2	7.2	3.9	6.6	4.5	2.5	0.25	0.05
4	14.4	7.8	13.1	8.9	9.8	1.00	0.20
6	21.6	11.7	19.7	13.4	22.1	2.25	0.46
8	28.8	15.6	26.2	17.9	39.2	4.00	0.82
10	36.0	19.4	32.8	22.4	61.3	6.25	1.28
12	43.2	23.3	39.4	26.8	88.3	9.00	1.84
14	50.4	27.2	45.9	31.3	120.2	12.25	2.51
16	57.6	31.1	52.5	35.8	157.0	16.00	3.28
18	64.8	35.0	59.1	40.3	198.7	20.25	4.15
20	72.0	38.9	65.6	44.7	245.3	25.00	5.12
22	79.2	42.8	72.2	49.2	296.8	30.25	6.20
24	86.4	46.7	78.7	53.7	353.2	36.00	7.37
26	93.6	50.5	85.3	58.2	414.5	42.25	8.65
28	100.8	54.4	91.9	62.6	480.7	49.00	10.04
30	108.0	58.3	98.4	67.1	551.8	56.25	11.52
32	115.2	62.2	105.0	71.6	627.8	64.00	13.11

19.4 Conversion chart for wind force

Note
▶ The influence of the wind onto the surrounding is described clearly in the Beaufort wind chart below to provide an orientation for the crane operator!

Wind force		Wind speed		Effect of the wind
Beaufort	Description	[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
5	Fresh breeze	8.0 to 10.7	29 to 38	Small deciduous trees begin to sway, whitecaps form at sea

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Wind force		Wind speed		Effect of the wind
Beaufort	Description	[m/s]	[km/h]	Inland
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

19.5 Height dependent wind speeds according to EN 13000:2010

Note

- The maximum permissible wind speed (v_{max}) and the maximum permissible wind speed according to the load chart (v_{max_TAB}) always refers to the 3 second wind gust speed, which is present in the maximum hoist height.
- 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 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!
- The following chart shows the 3 second wind gust speed depending on the medium wind speed according to the Beaufort Scale and the height!

3 second wind gust speed depending on the medium wind speed according to the Beaufort Scale and the height

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
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

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Beaufort number	3	4	5[a]	5	6	7[a]	7	8	9	10
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

Sign [Unit]	Definition
v_m [m/s]	Wind speed determined over 10 minutes at a height of 10 m (Upper limit of Beaufort Scale)
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)

19.6 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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19.7 Wind influences in crane operation

WARNING
The crane can topple over!
Unforeseeable factors, such as sudden gusts of wind onto the crane and the load cannot be considered exactly in advance!
- ▶ Carry out a professional job planning with authorized and trained expert personnel!
- ▶ 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 attachments 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!

19.8 Wind influences when the „Crane is not in service“

WARNING
The crane can topple over!
If the crane is taken out of service in configured condition and the expected wind speeds are larger 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 larger than the maximum permissible wind speeds for „Taking the crane out of service“, then the attachments and the boom must be taken down!
- ▶ Always take the boom down for safety reasons if weather conditions are unclear, see Erection and take down charts!

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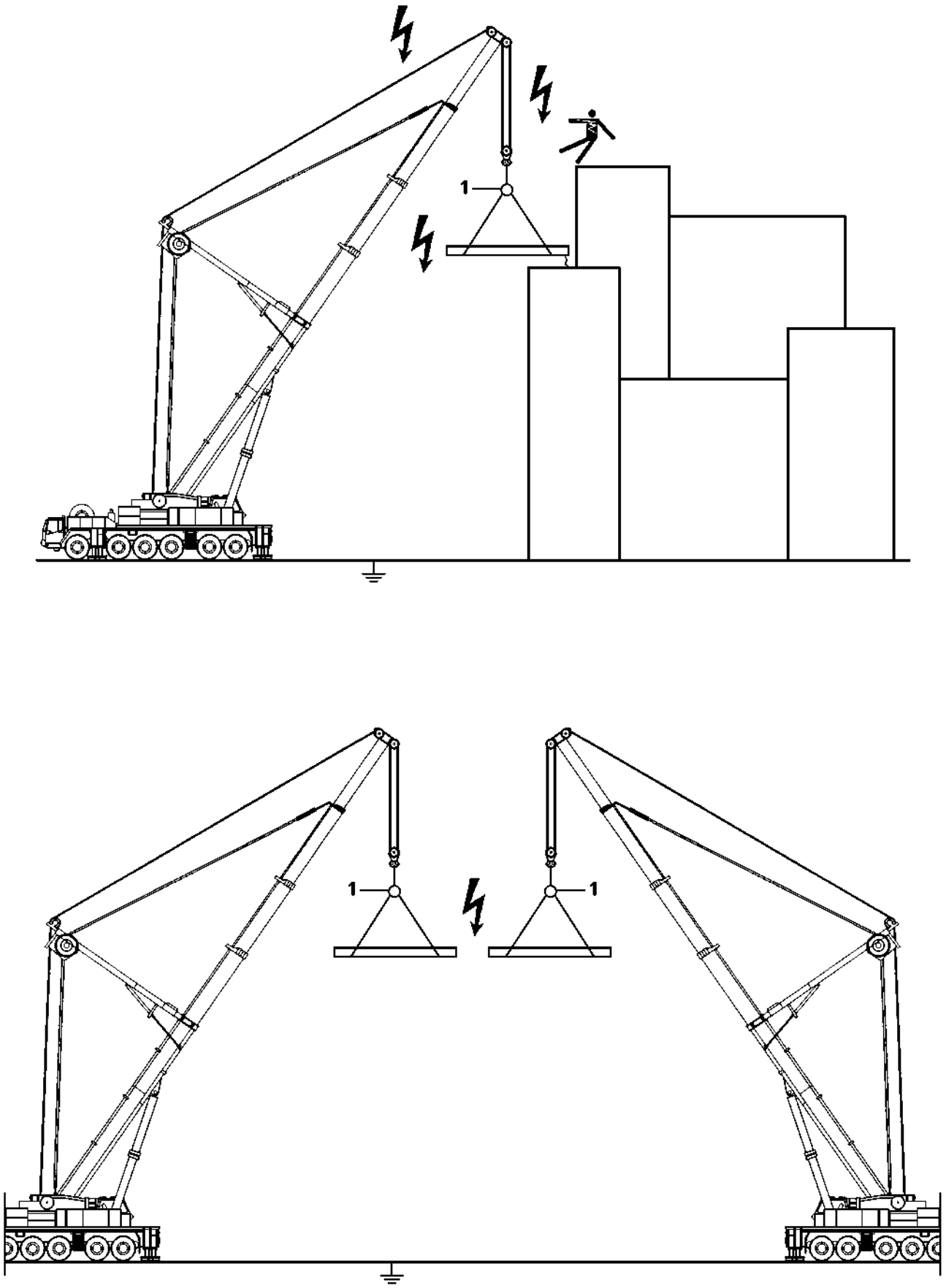

Fig.189640: General example

20 Working in the vicinity of transmitters

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.
- Combustion and ignition caused by temperature increases.
- Sparks or arcing.

DANGER
Risk 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 carrying capacity, any such occurrences must be reported immediately to the foreman 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.

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21 Joint lifting of a load with two cranes

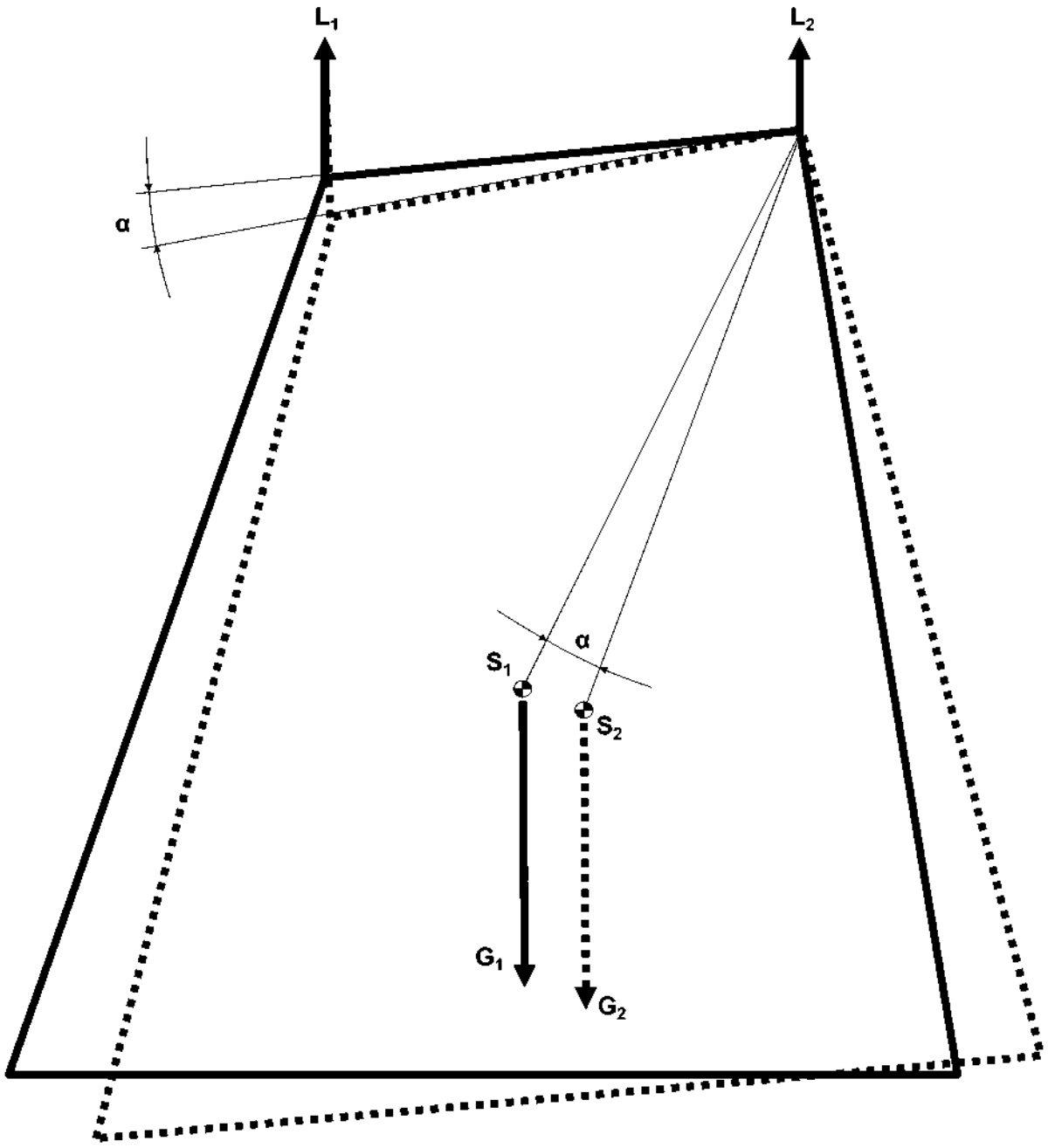

Fig.111731

L$_1$= Load on crane 1

α = Angle of incline position

S$_2$ = Center of gravity of load at incline position

L$_2$= Load on crane 2

S$_1$ = Center of gravity of load

Before lifting a load jointly with two cranes, the operator of the cranes or a representative of the operator must determine the work sequence and assign a responsible supervisory person for the operation. The responsible supervisory person must monitor the operation.

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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!

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

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

WARNING

Danger of tipping and overload of load carrying components!
If the load is not lifted or lowered exactly evenly by both cranes, then the center of gravity changes.
One of the two 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!
- ▶ Utilize the load values given in the load chart manual for the used crane configuration to no more than the utilization degree of maximum 80 %!

In 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 1 **(L_1)** is lowered, the load on crane 2 **(L_2)** increases. As a result, crane 2 can be overloaded as a result of the load reduction of crane 1, without any action of its own!

22 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.

Note

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

23 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.

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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!

23.1 General hand signals

23.1.1 Start operation

(follow my instructions)

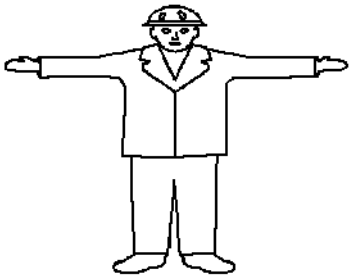

Fig.111700

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

23.1.2 Stop

(normal stop)

Fig.111701

Lift one arm overhead with open hand and palm directed to the front.

23.1.3 Emergency stop

(quick stop)

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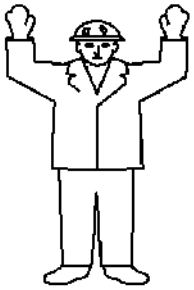

Fig.111702

Lift both arms overhead with open hands and palms directed to the front.

23.1.4 End operation

(no longer follow my instructions)

Fig.111703

Fold hands together at chest height in front of body.

23.1.5 Inching gear or very slow movement

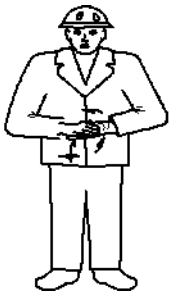

Fig.111704

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

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23.2 Vertical movements

23.2.1 Show the vertical distance

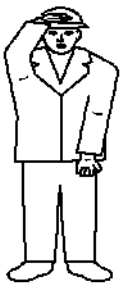

Fig.111705

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

23.2.2 Lift / lower a load with even speed

Fig.111706

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

23.2.3 Lift slowly

Fig.111707

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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23.2.4 Lower the load while stationary

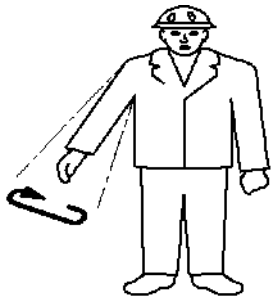

Fig.111708

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

23.2.5 Lower slowly

Fig.111709

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.

23.3 Horizontal movements

23.3.1 Move / swing in given direction

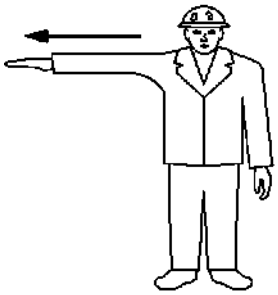

Fig.111710

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

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23.3.2 Move away from me

Fig.111711

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.

23.3.3 Move toward me

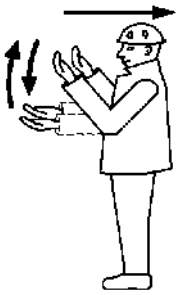

Fig.111712

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.

23.3.4 Move both track chains

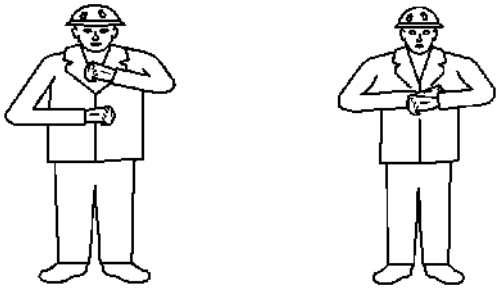

Fig.111713

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

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23.3.5 Move one track chain

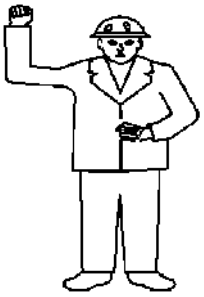

Fig.111714

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.

23.3.6 Show the horizontal distance

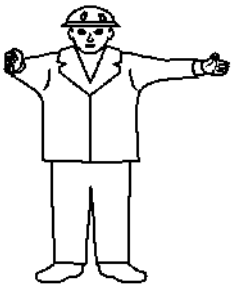

Fig.111715

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

23.3.7 Transfer (between two cranes or two hooks)

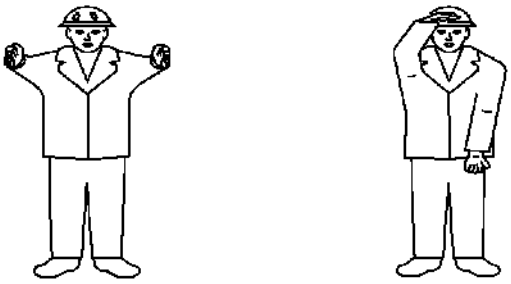

Fig.111717

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

WARNING
Danger of toppling the crane!
▶ Make sure that the load carrying capacity of the individual crane and hook is sufficient even if the transfer of the load is suddenly asymmetric!

23.4 Machine related movements

23.4.1 Lift with main winch

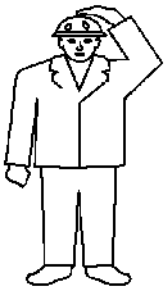

Fig.111719

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.

23.4.2 Lift with auxiliary winch

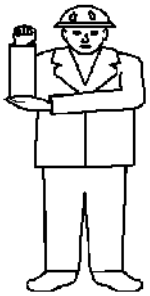

Fig.111720

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.

23.4.3 Lift the boom

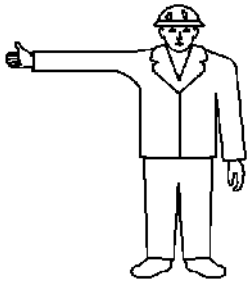

Fig.111721

Hold one arm horizontally with thumb directed upward.

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23.4.4 Lower the boom

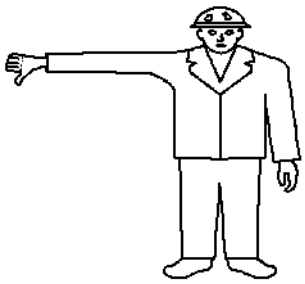

Fig.111722

Hold one arm horizontally with thumb directed downward.

23.4.5 Extend the boom

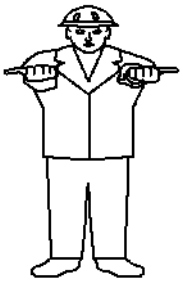

Fig.111723

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

23.4.6 Retract the boom

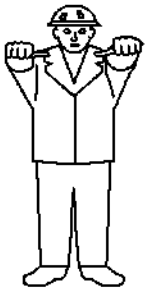

Fig.111724

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

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23.4.7 Lift the boom and lower the load at the same time

Fig.111725

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.

23.4.8 Lower the boom and lift the load at the same time

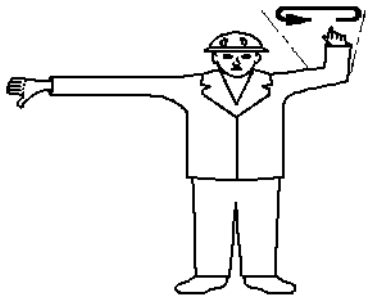

Fig.111726

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

24 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 devices, for example: Load moment limiter, hoist limit switch, brakes must be fully functioning, otherwise crane operation is prohibited!

Make sure that the following prerequisites are met:

- The load moment limiter must be set according to the current crane configuration.
- 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, lifting equipment and tackle must be in accordance with specified requirements.

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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.**

24.1 Counterweight and / or ballast

The type of counterweight and / or ballast required depends on the weight of the load to be lifted and the 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 as specified on the respective load chart!

24.2 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!

24.3 Crane operation

DANGER

Not-observation of the following guidelines increases the risk of accident!

▶ Observe the following points.

High accident risk exists if:

1. The load torque limiter is not set in accordance with the current crane configuration and is therefore not able to provide proper protection.
2. The load torque limiter is defective or taken out of operation.
3. The hoist limit switches are defective or not functioning.

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4. On crawler cranes:
   The angle sensor and the force test brackets are not functioning.
5. On mobile cranes:
   The sliding beams of the hydraulic supports are not extended to the dimensions specified in the load chart.
6. On crawler cranes:
   The crawlers are not supported with stable base material sufficiently large for the ground conditions.
7. On mobile cranes:
   The support plates are not supported with stable base materials sufficiently large for the ground conditions.
8. If the load is pulled at an angle.
   Angular pulling to the side is particularly dangerous, because the boom has only minimal lateral resistance momentum.
   Angular pull is prohibited.
9. Load attached during disassembly is too heavy and is freely suspended on the crane after release.
10. 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 jerk back violently.
11. When working when the wind is excessively strong.
    Comply with the load chart specifications.
12. The crane is not aligned horizontally and the load is swung toward the slope.
13. If improper crane movements cause the suspended load to swing like a pendulum.
14. The loads and radii specified in the load charts are exceeded.
15. When working in the vicinity of electricity transmission lines:
    - The electricity transmission lines were not turned off by expert electricians
    - **or** 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 due to current transfer!
▶ Adhere to the safety distance according to the following chart!

If a current transfer occurs, 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 out 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
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

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25 Lifting of personnel

25.1 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!

▶ 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 lift cages (cherry pickers)!

25.2 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!

25.2.1 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!
- 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!

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25.2.2 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!

25.2.3 Inspection before operation

Make sure that the following inspections are made before use of 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!

25.2.4 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 with 50 % of its maximum load capacity of the valid load chart!

26 Crane operation in case of thunderstorms

In weather conditions, which can include lightning:
- Stop work on the crane.
- If possible, place the load down.
- If possible, telescope the boom in or put it down 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.

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

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27 Safety notes for external power feed (100 V AC to 400 V AC)

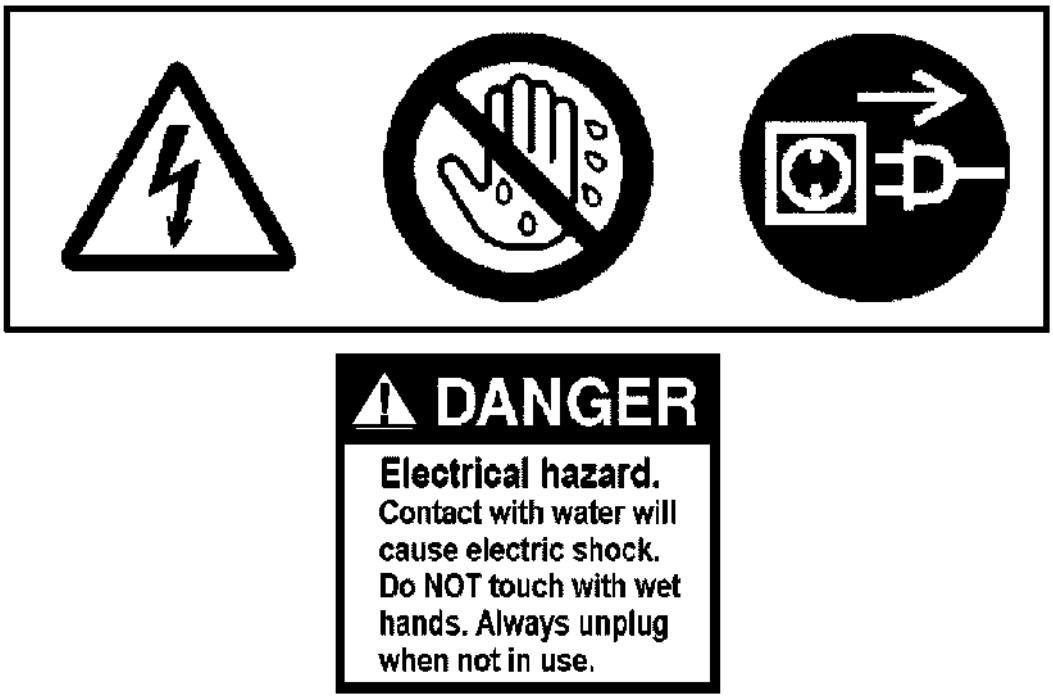

Fig.197720

A potential hazard 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 it 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.

28 Welding work on the load

Note
▶ The load must also be grounded.

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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29 Travel and crane operation

29.1 Before starting to work

Before driving the crane and before starting to work with the crane:

- ▶ Close all doors!
- ▶ Keep the doors closed during travel and crane operation!

29.2 Interrupting crane operation

WARNING
Crane is not supervised!
Situations during interruption of crane operation may occur which could cause the crane to become unsafe if left unsupervised!
The crane can topple over, personnel can be severely injured or killed!

- ▶ Always keep the crane under control!

If the crane can **not** be constantly kept under control:

- ▶ Take the equipment and the boom down!

If the crane is in equipped status:

- ▶ Do not leave the crane!

If wind conditions are present, which are above the permissible values of the wind speed chart:

- ▶ Do not leave the crane!

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!

If an erroneous function of a crane movement is recognized during crane operation (change of cylinder stroke):

- ▶ The boom must be placed down completely, check the cylinder for internal and external leaks!

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WARNING
Set up crane is not supervised!
If the set up crane is left during interruption of crane operation, situations may occur which could cause the crane to become unsafe!
The crane can topple over, personnel can be severely injured or killed!

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!
- ▶ Make sure that no danger can occur for the 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 predicted wind speeds are above the permissible values:
- ▶ Place the boom and the equipment completely down on the ground in time before the permissible wind speeds occur, telescope the telescopic boom in and luff down to 0°!
- ▶ To telescope the telescopic boom in / position the boom and the auxiliary boom, see Crane operating instructions and the wind speed chart!
- ▶ 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!
- ▶ Place the load completely on the ground and unhook from the crane hook!
- ▶ Lift the hook block into the highest position!
- ▶ Remove the fastening ropes from the hook!
- ▶ Make sure that all measures were taken to keep the crane in a safe condition if something happens!
- ▶ Make sure that access to the crane and operation for unauthorized personnel is excluded: Lock the driver's cab and the crane!

Incidents which could occur (for example):
- The ground giving way due to severe rain.
- Melting ice under the supports.
- Bad weather and thunderstorms, wind.
- Storm and wind.
- Lightning.
- Flooding.
- Landslides.
- Washouts.
- On mobile cranes:
  Slippage of support cylinders (leakage, temperature changes).
- On cranes with telescopic booms:
  Slippage of luffing cylinders (leakage, temperature changes).
- Vandalism.

Make sure that the following prerequisites are met:
- There is no load on the hook.
- The fastening ropes on the hook were removed.
- The hook block is in the highest position.
- The driver's cab and the crane cab are locked.
- The predicted wind speeds during the time frame of the interruption of crane operation are within the permissible range.
- The crane poses no traffic obstacle.

29.3 Resuming crane operation

When resuming crane operation, the crane operator is required to check the condition of the crane and the safety devices.

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WARNING
Danger of accident!
▶ 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.

▶ Check operating mode settings and reset, if necessary.

29.4 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 cranes with telescopic booms:
▶ Telescope the telescopic boom all the way in and place the boom down.

On cranes with lattice mast booms:
▶ Set down the lattice mast boom 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 the ignition key.
▶ Lock the crane cab.
▶ Secure the crane to prevent unauthorized use.

On mobile cranes:
▶ 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".

29.5 Turning / driving in reverse

WARNING
Danger of accidents when turning or driving in reverse!
When turning or driving in reverse, personnel can be overlooked or 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 drive only in reverse or move back when it is ensured that persons or equipment are not endangered! If this cannot 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!

29.6 Parking the vehicle

Note
▶ The „Parking the vehicle" section is only to be observed for mobile cranes!

WARNING
Danger of accidents if the vehicle rolls off!
If the following points are disregarded by the crane driver, then personnel can be fatally injured.
▶ It is prohibited to park the vehicle at a slope or an incline of more than 18 %.
▶ The parking brake must always be applied when parking the vehicle.
▶ The ground on which the vehicle is parked must be level and have adequate load-bearing capacity.

Make sure that the following prerequisites are met:
– The vehicle is standing on level ground with sufficient load bearing capacity.

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– The parking brake is applied.

WARNING
The vehicle can roll off uncontrollably!
Under the following conditions, the vehicle must be secured against rolling away by using the specified number of wheel chocks or wedges, in addition to the parking brake:

- ▶ The vehicle is parked on a slope or an incline!
- ▶ The vehicle is defective, particularly if the brake system is defective!
- ▶ If all the specified wheel chocks are not placed directly behind the corresponding wheel, the vehicle may roll off uncontrollably and personnel can be fatally injured.
- ▶ All specified wheel chocks must be placed in such a way that they act against the downdrift force!
- ▶ Place all specified wheel chocks tightly directly under the wheel!
- ▶ Place all specified wheel chocks tightly so that they have an immediate braking action and keep the vehicle in parking position!

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Fig.195219

1 Technical safety instructions

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 entry and exit 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 installation 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.
- ▶ Do not use damaged ladders and replace them immediately.
- ▶ Repair the ladder exclusively through authorized service facilities.

2 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
  - 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.

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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 for easy work of short duration.
- 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 and extension ladders: Do not step on the uppermost three steps / rungs.
- For stepladders with attached extension ladder: Do not step on the uppermost four rungs.
- For working on a ladder: Grip with one hand.
  If this is not possible: Make additional safety preparations.

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.

3 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°.
	The lift guard must be latched before use.

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Sign	Explanation
	Ladder overhang above the exit level.
	Secure the upper / lower end of the ladder.
	The spreaders on the stepladders must be tensioned.
	The locking pin joints and pull pin locks must always be engaged.
	To open / close the gas cap and to climb up / down, insert the gas pump nozzle into the retainer.
	Fold the platform open before setting up the ladder.
	Visual inspection of the ladder before use.
	Check the legs of the ladder.
	Maximum load.
	Do not use the three uppermost rungs of an extension ladders as rungs to stand on.

Sign	Explanation
	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, then the ladder legs must be spread 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.
	Only one person may climb up / down on any accessible leg of the ladder.

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Sign	Explanation
	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 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.
	Do not carry along bulky objects or objects over 10 kg.

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Sign	Explanation
	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.

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Empty page!

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Fig.195219

1 Signs

1.1 7725039 – Warning of high voltage

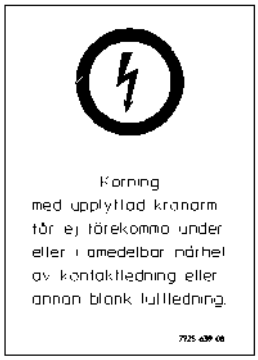

Fig.116269: Warning of high voltage

Note
▶ Only for certain countries.

1.2 772564008 – Swing range

Fig.116270: Swing range

Note
▶ Only for certain countries.

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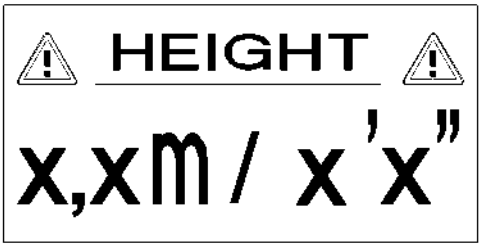
1.3 772580408 – Limitation of maximum travel speed

Fig.106035: Limitation of maximum travel speed

Note
▶ Only for certain countries.

1.4 Notice sign regarding vehicle height

	Notice sign regarding vehicle height
970610408	
970629508	
970596108	
970608708	
979459108	

Notice sign regarding vehicle height

Note
▶ Only for certain countries.
▶ Vehicle height x.x m (x.x ft)

1.5 9412158 – Read operating instructions

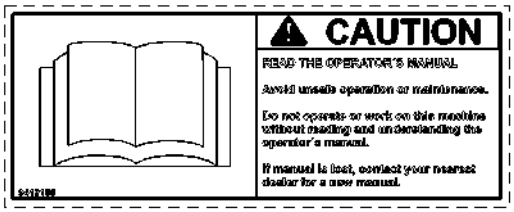


Fig.106048: Read the operating instructions

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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.

1.6 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.

1.7 97017585 – Falling telescopic boom during disassembly / assembly

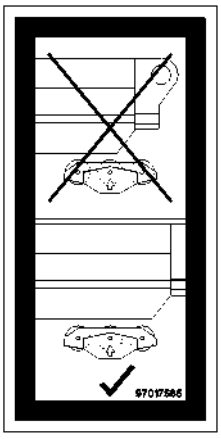

Fig.118467: Falling telescopic boom during disassembly / assembly

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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1.8 97018351 – Falling telescopic boom during transport!

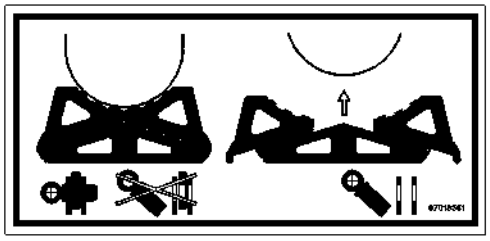

Fig.118466: Falling telescopic boom during transport

WARNING
Fatal accidents due to falling telescopic boom during transport!
▶ Make sure that the transport bracket on the left and right is pinned and secured.

1.9 97018564 – Falling telescopic boom during transport!

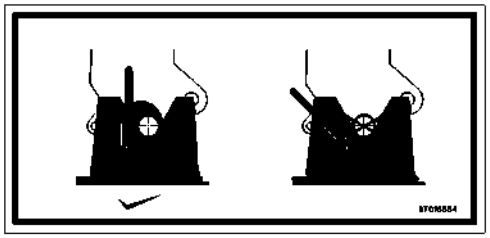

Fig.118533: Falling telescopic boom during transport

WARNING
Fatal accidents due to falling telescopic boom during transport!
▶ Make sure that the telescopic boom is locked in the head receptacle.

1.10 97027147 – Overloading of combi box is prohibited

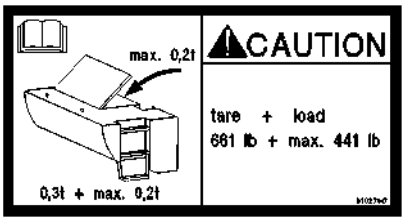

Fig.113829: Overloading of combi box is prohibited

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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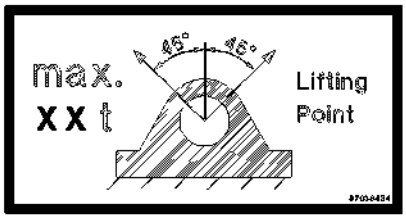
1.11 97036733 – Fastening point

Fig.116268: Fastening point

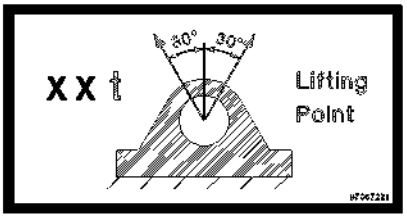
Note
▶ Notice sign for fastening points

1.12 Suspended load fastening point

	Suspended load fastening point
97038434	
97037482	
97039068	

Note
▶ Observe the maximum permissible suspended load.

1.13 Suspended load fastening point

	Suspended load fastening point
97037221	
97037219	
97037223	

Note
▶ Observe the maximum permissible suspended load.

1.14 97037625 – Suspended load Fastening points / rigging points

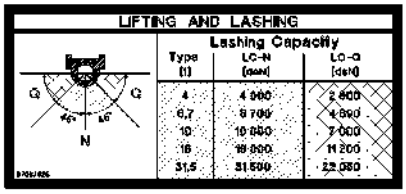


Fig.119988: Fastening points / rigging points

Note
▶ Notice sign for fastening points and rigging points.

1.15 97036735 – Fastening point for lattice section

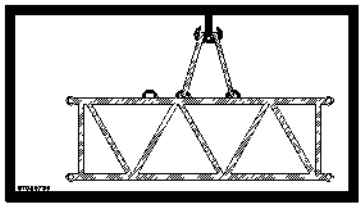


Fig.116266: Fastening point for lattice section

Note
▶ Notice sign for fastening points for lattice section.

1.16 97036736 – Fastening point for lattice sections

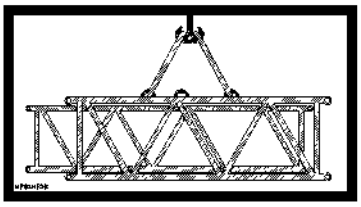


Fig.116267: Fastening point for lattice section

Note
▶ Notice sign for fastening points for lattice sections.

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1.17 97038442 – Fastening point for lattice section

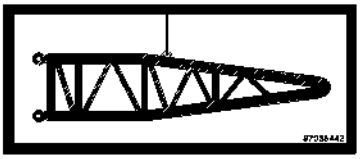

Fig.116288: Fastening point for lattice section

Note
▶ Notice sign for fastening point for lattice section.

1.18 97038452 – Fastening point for lattice sections

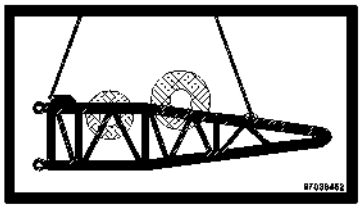

Fig.116289: Fastening point for lattice section

Note
▶ Notice sign for fastening points for lattice sections.

1.19 97038454 – Fastening point for lattice sections

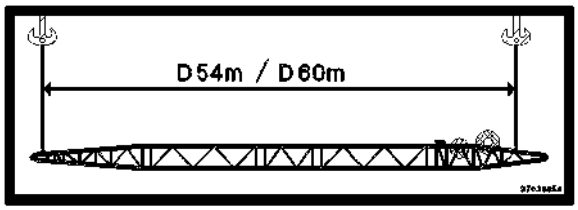

Fig.116290: Fastening point for lattice section

Note
▶ Notice sign for fastening points for lattice sections.

1.20 97037871 – Fastening points for lattice sections

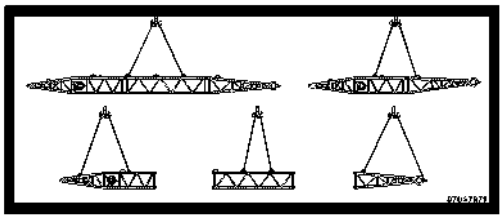

Fig.116292: Fastening point for lattice section

Note
▶ Notice sign for fastening points for lattice sections.

1.21 97057097 – Fastening point to turn the component

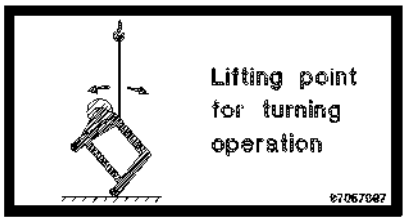

Fig.119987: Fastening point to turn the component

Note
▶ Notice sign for fastening point to turn the component.

1.22 97039035 – Suspended load Assembly unit

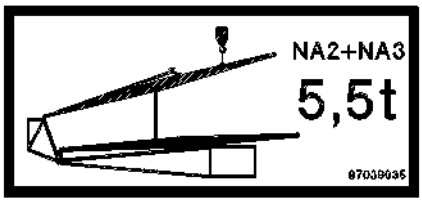

Fig.117348: Suspended load Assembly unit

Note
▶ Notice the suspended load.

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1.23 97003109 – Access of step ladder

Fig.109032: Access of step ladder

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 stepping on the step ladder, fold the lowest step out.

1.24 97003110 – Fold the step ladder in and out

Fig.109033: Fold 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.

1.25 97006167 – Identification of support base

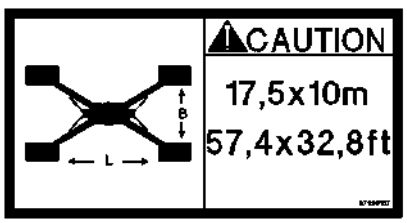

Fig.116285: Identification of support base

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).

1.26 97006167 – Identification of support base

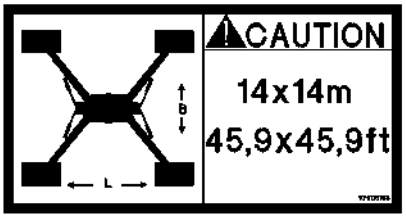

Fig.116286: Identification of support base

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).

1.27 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.

▶ Always remain aware of your surroundings and behave in a safe manner.

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1.28 97009799 – Data logger

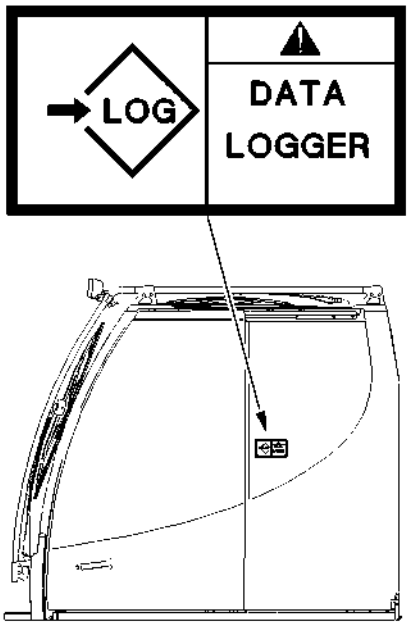

Fig.116261: Data logger

Note
▶ Notice sign for data logger.

1.29 97012949 – Maximum load

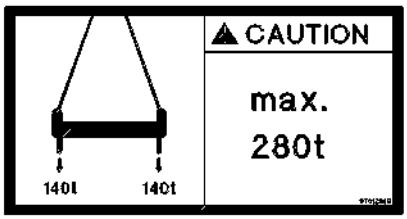

Fig.116263: Maximum load

CAUTION
Property damage due to overload!
If the cross bar is subjected to a higher load than permissible, damage can occur.
▶ Do not overload the cross bar.

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1.30 97012095 – Maximum load

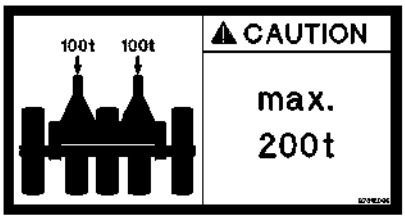

Fig.116265: Maximum load

CAUTION
Property damage due to overload!
If the pulley cart is subjected to a higher load than permissible, damage can occur.
▶ Do not overload the pulley cart.

1.31 97011689 – Warning of crushing danger

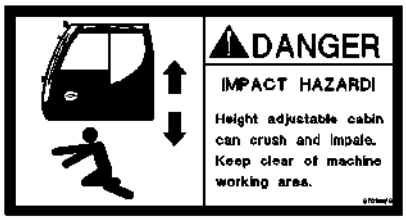

Fig.111047: Warning of crushing danger

DANGER
Danger of fatal injury!
▶ It is prohibited to remain within the danger zone of the cab.
▶ Keep away from the movement range of the cab.

1.32 97011690 – Overload of cab is prohibited

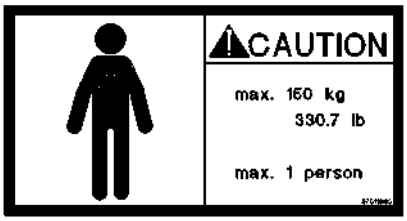

Fig.111048: Overload of cab is prohibited

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.

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1.33 97016304 – Notice sign for refueling

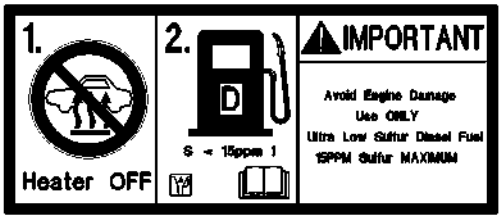

Fig.113766: Notice sign for refueling

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.

1.34 97016392 – Crushing danger for feet

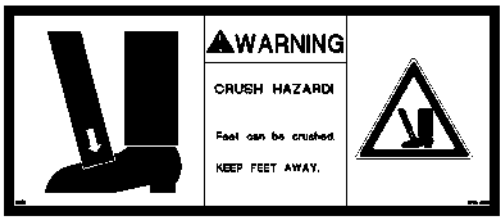

Fig.112474: Crushing danger for feet

WARNING
Crushing danger for feet!
Feet can be caught or crushed.
- ▶ Keep feet away.

1.35 97012737 – Danger of accident

Fig.111748: Danger of accident

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WARNING
Danger of accident!
▶ For driving, the windshield must be closed.

1.36 97023034 – Disassembly

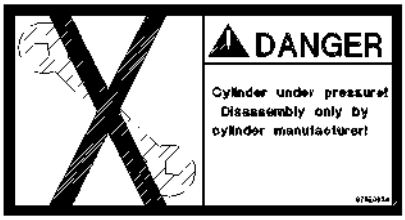

Fig.116264: Disassembly

DANGER
Mortal danger 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.

1.37 97036732 – Access via 3-point support

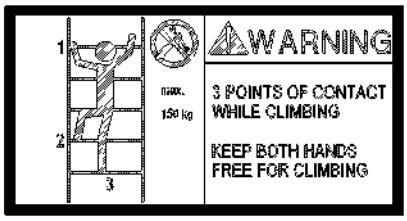

Fig.115172: Access via 3-point support

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.

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1.38 97003112 – Maximum suspended load

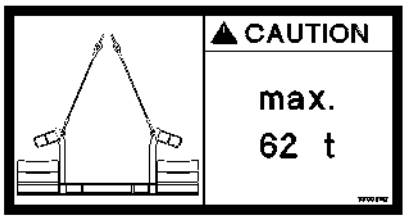

Fig.116282: Maximum suspended load

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.

1.39 97036917 – Maximum suspended load

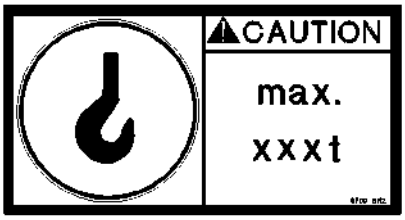

Fig.116262: Maximum suspended load

WARNING
Maximum suspended load!
If the maximum suspended load is exceeded, the load can fall down and kill personnel.
▶ Observe the maximum permissible suspended load.

1.40 97037383 – Notice sign for urea

Fig.115173: Notice sign for urea

CAUTION
Property damage due to incorrect service items!
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.

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1.41 97037952 – Warning of fatal electric shock

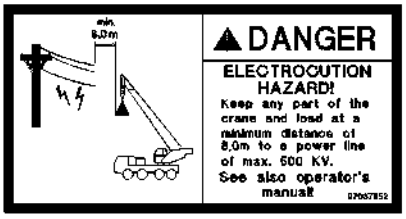

Fig.116280: Warning of fatal electric shock

DANGER
Danger of fatal injury due to electrical shock!
If the boom or the hoist rope is under electric current, 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 to current carrying parts.

1.42 97042730 – Falling luffing cylinder

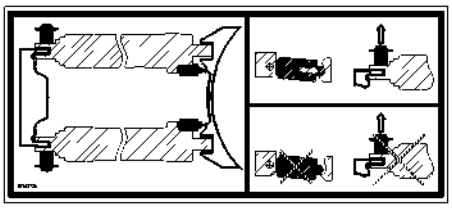

Fig.118465: Falling luffing cylinder

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.

1.43 97042797 – Warning of overload of components

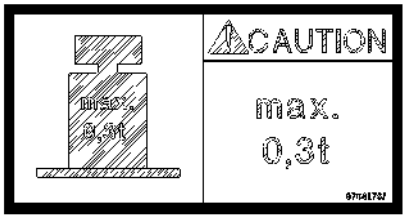

Fig.117347: Warning of overload of components

DANGER
Danger of falling due to overload!
If a component, such as a sliding beam platform, is subjected to a weight of more than 0.3 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.

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1.44 97041305 – Warning of overload of components

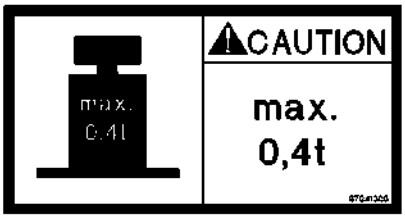
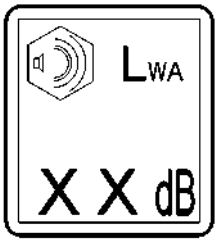


Fig.116792: Warning of overload of components

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.

1.45 Warranted maximum sound power level

	Notice sign for Warranted maximum sound power level
975809508	
971693308	
971693408	
971693508	
971693608	

1.46 977055908 – Fastening point for swingable sliding beam

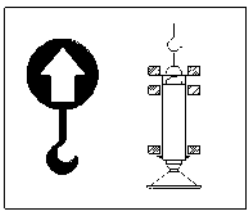


Fig.106894: Fastening point for swingable sliding beam

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1.47 971494208 – Limitation of maximum travel speed

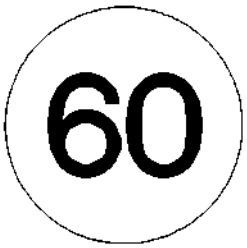

Fig.106034: Limitation of maximum travel speed

Note
▶ Only for certain countries.

1.48 971539808 – Warning notice for unpinning the auxiliary boom on the pulley head

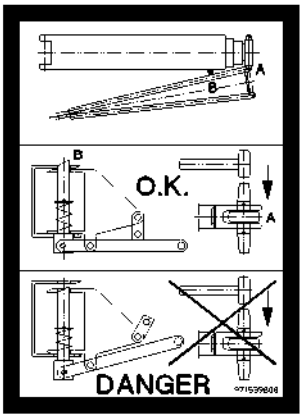

Fig.106040: Warning notice for unpinning the auxiliary boom on the pulley head

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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1.49 971539908 – Warning notice for unlocking the auxiliary boom

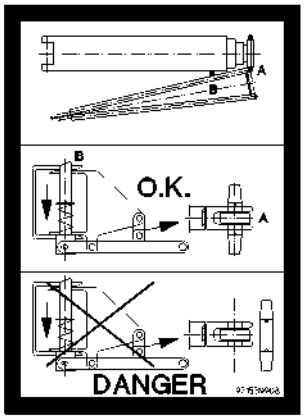

Fig.106041: Warning notice for unlocking the auxiliary boom

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.

1.50 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.
▶ Keep away from the working range of the machine.

1.51 978674008 – Access for unauthorized personnel prohibited

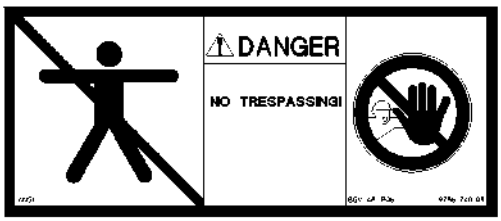

Fig.106037: Access for unauthorized personnel prohibited

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.

1.52 97039753 – Danger of stumbling

Fig.117346

WARNING
Danger of stumbling!
▶ Move carefully.

1.53 978674108 – Warning of crushing danger

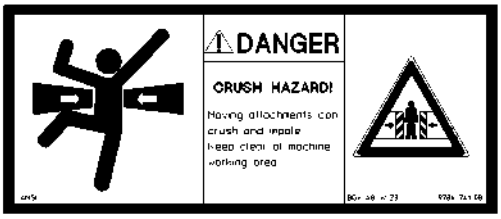

Fig.106027: Danger of crushing

DANGER
Mortal danger when remaining in areas with crushing danger!
▶ It is prohibited for anyone to remain in areas where there is a crushing danger.
▶ Keep away from the working range of the machine.

1.54 97016911 – Risk of collision

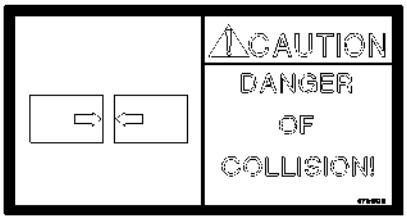

Fig.117344: Risk of collision

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NOTICE
Danger of collision!
▶ Avoid a collision.

1.55 978674308 – Radio remote control

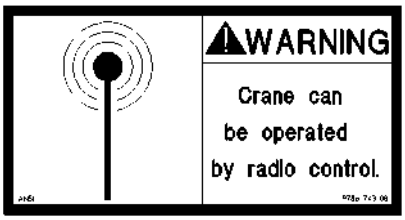

Fig.106047: Radio remote control

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!

1.56 978674408 – Danger of burning hands

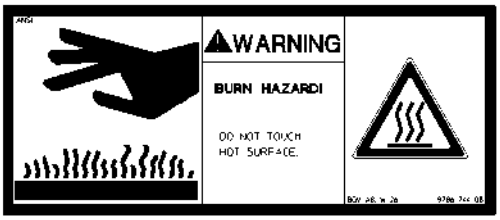

Fig.106028: Danger of burning hands

WARNING
Danger of burns when touching hot surfaces!
▶ Do not touch hot surfaces.

1.57 978674508 – Warning of rotating parts

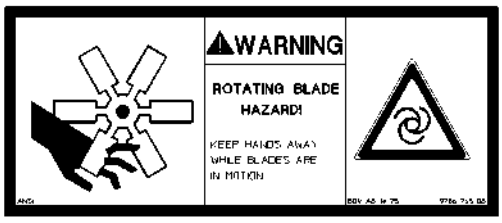

Fig.106029: Warning of rotating parts

WARNING
Rotating parts!
The rotating fan blade can cause finger and hand injuries.
▶ Keep your hands away from the rotating fan blade.

1.58 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!

1.59 978674808 – Personal protective equipment

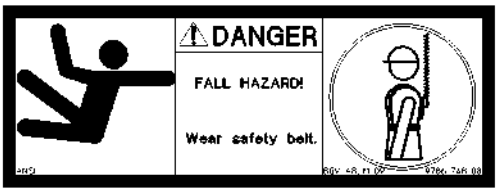

Fig.106036: Personal protective equipment

DANGER
Danger of falling!
▶ Use the personal protective equipment.

1.60 978674908 – Walking on the area is prohibited

Fig.106038: Walking on 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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1.61 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.

1.62 978687408 – Rigging point

Fig.112475: Lashing point

WARNING
Rigging point!
▶ Use the rigging point **only** for rigging.
▶ Lifting on the rigging point is prohibited.

1.63 97036734 – Rigging point

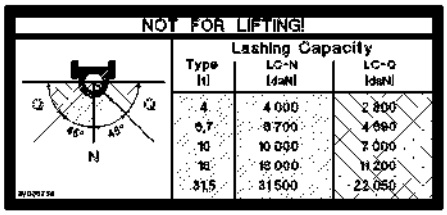

Fig.116287: Lashing point

WARNING
Rigging point!
▶ Use the rigging point **only** for rigging.
▶ Lifting on the rigging point is **prohibited**.

1.64 978867108 – Warning of fatal electric shock

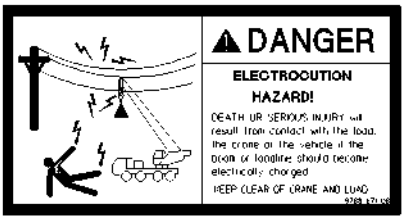

Fig.106814: Warning of fatal electric shock

DANGER
Danger of fatal injury due to electrical shock!
If the boom or the hoist rope is under electric current, then death or severe injuries can occur if anyone touches the crane, the vehicle or the load.
▶ Keep away from the crane and the load.

1.65 979383308 – Notice sign for oil change

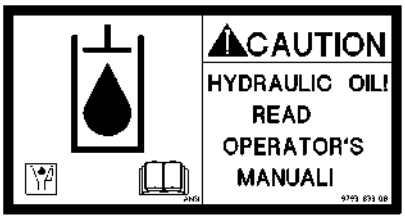

Fig.113827: Notice sign for oil change

CAUTION
Property damage through oil change!
If the oil specified in the operating instructions is not used during the oil change, it can lead to damage.
▶ See Crane operating instructions, chapter 7.07.

1.66 979561108 – Counterweight

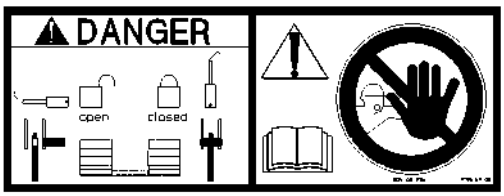

Fig.109026: Counterweight

WARNING
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 Crane operating instructions, chapter 4.07.

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1.67 97001802 – Falling platform

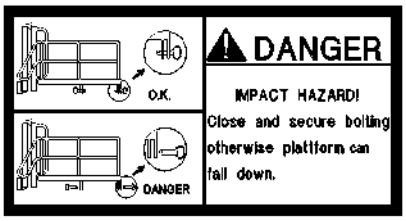


Fig.117345: Falling platform

WARNING
The platform can fall down!
▶ Pin and secure the platform in assembly / disassembly position.

1.68 973974408 - Transport weights of the components

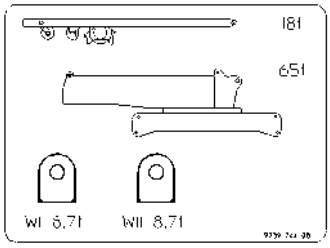


Fig.112440: Transport weights of components

1.69 973974608 - Transport weights of the components

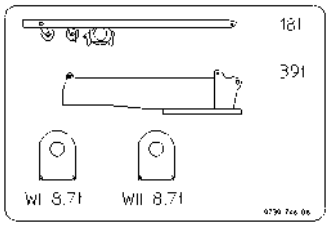


Fig.112441: Transport weights of components

1.70 97011336 - Transport weights of the components

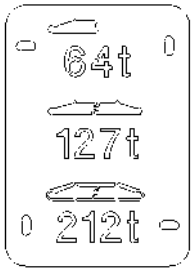
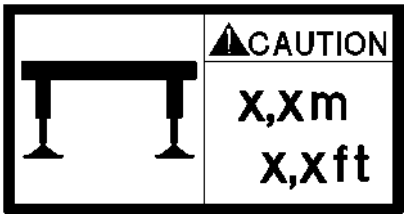


Fig.116271: Transport weights of components

1.71 Identification of sliding beam

	Identification of sliding beam
978675108	
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).

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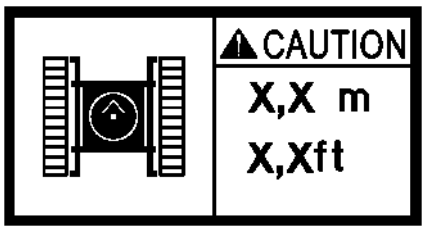
1.72 Identification Track width retracted

	Track width retracted
97009840	
97009841	
97017044	
97017045	
97017046	

Identification of track width

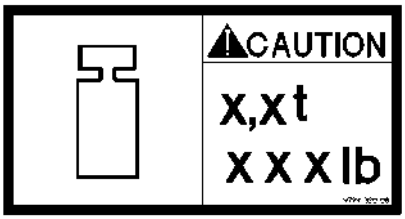
Note
▶ Track width retracted to x.xx m (x.x ft)

1.73 976624808 – Fasten the load

Fig.116283: Attaching 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.

1.74 Notice Weight sliding beams

	Weight of sliding beams
979932008	
979932108	
979932708	

	Weight of sliding beams
979932808	

Weight of sliding beams

Note
▶ Pay attention to the weight of the sliding beams.

1.75 97047566 – Center of gravity Counterweight

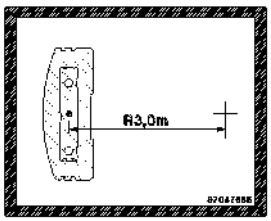


Fig.118491: Notice sign: Distance between center of gravity of counterweight and center of rotation

Note
▶ Noted on this notice sign is the distance between the center of rotation and the center of gravity of the counterweight.

1.76 97047566 – Center of gravity Counterweight

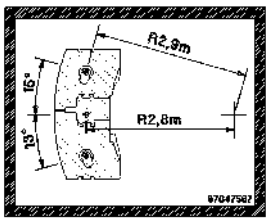


Fig.118492: Notice sign: Distance between center of gravity of counterweight and center of rotation

Note
▶ Noted on this notice sign is the distance between the center of rotation and the center of gravity of the counterweight.

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1.77 97047566 – Center of gravity Counterweight

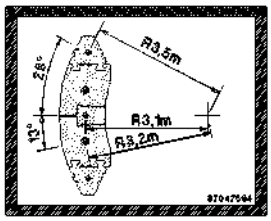

Fig.118493: Notice sign: Distance between center of gravity of counterweight and center of rotation

Note

▶ Noted on this notice sign is the distance between the center of rotation and the center of gravity of the counterweight.

1.78 97047566 – Center of gravity Counterweight

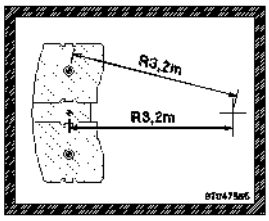

Fig.118494: Notice sign: Distance between center of gravity of counterweight and center of rotation

Note

▶ Noted on this notice sign is the distance between the center of rotation and the center of gravity of the counterweight.

1.79 97047566 – Center of gravity Counterweight

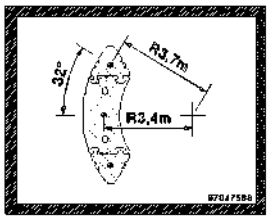

Fig.118495: Notice sign: Distance between center of gravity of counterweight and center of rotation

Note

▶ Noted on this notice sign is the distance between the center of rotation and the center of gravity of the counterweight.

1.80 97047566 – Center of gravity Counterweight

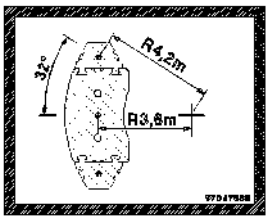

Fig.118496: Notice sign: Distance between center of gravity of counterweight and center of rotation

Note

▶ Noted on this notice sign is the distance between the center of rotation and the center of gravity of the counterweight.

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Fig.195219

1 Identifications on the hook block or load hooks

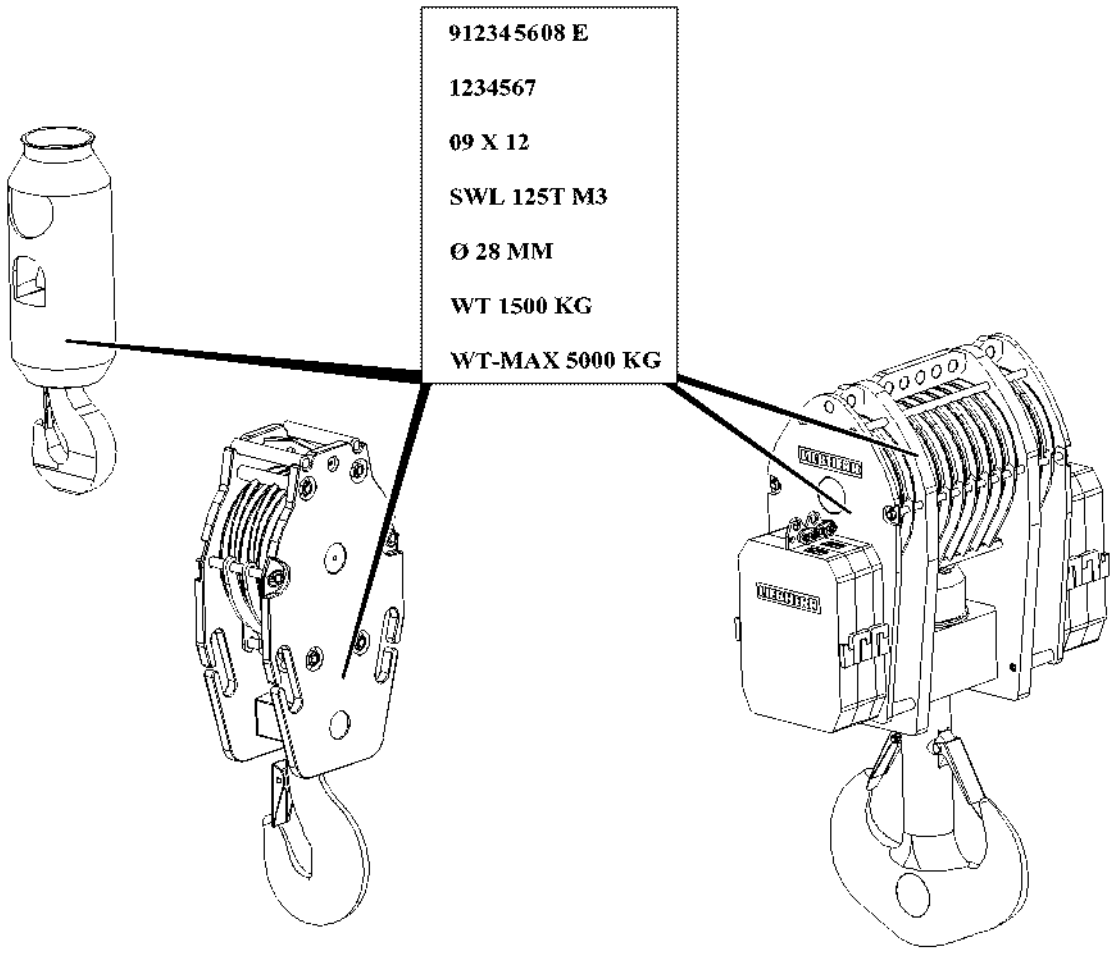

Fig.118509

Note

- ▶ For the load hooks and hook blocks approved for this crane type refer to 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 Tara) = Own weight (without auxiliary weights)
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

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Punch mark area	Explanation
	Determination via addition of assembled own weights (number of auxiliary weights + hook block)

Identifications on the hook block or load hooks

2 Identifications on single hook or double hook

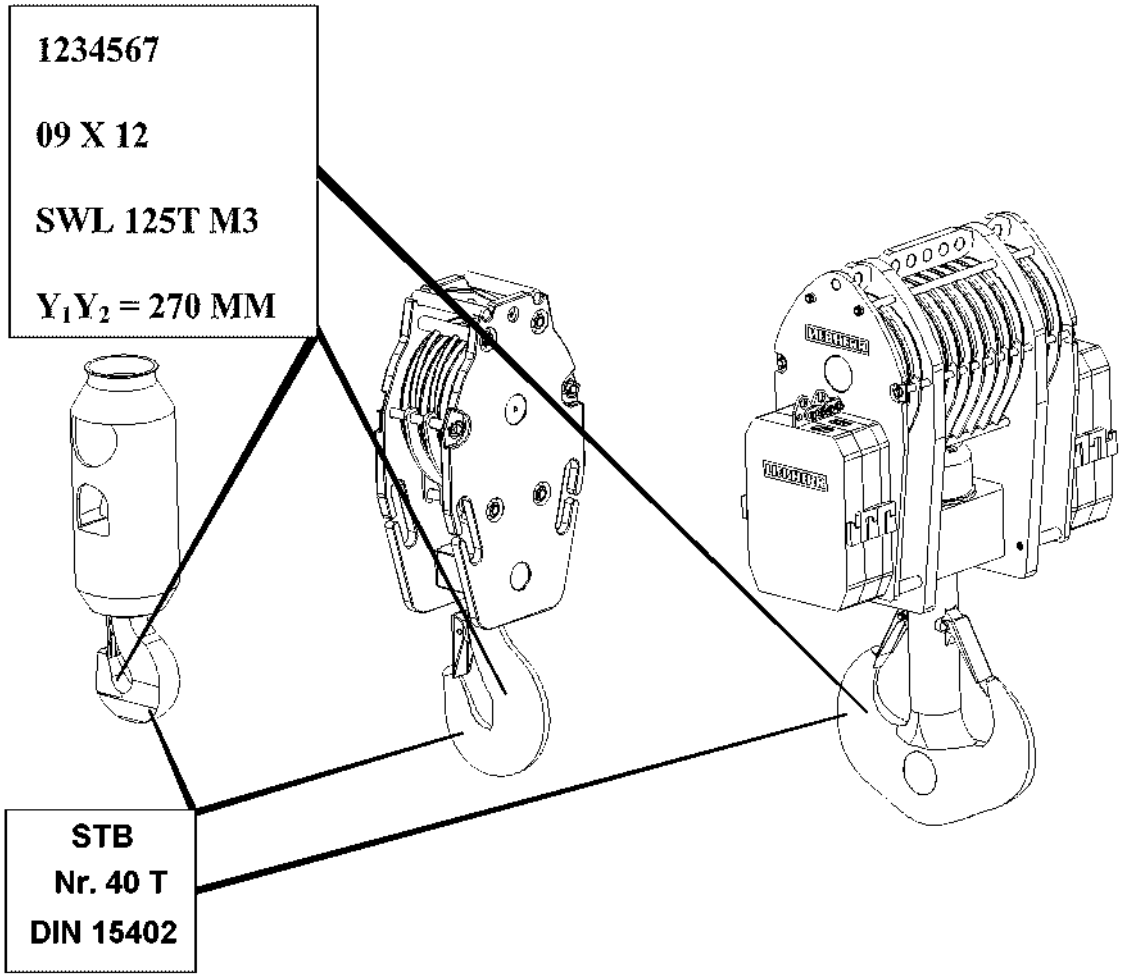

Fig.118510

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
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
Y1Y2 = 270 mm	Dimension Y or dimension Y1 and dimension Y2 according to DIN

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Punch mark area	Explanation
	(= Test dimensions for recurrent tests)

Identifications on single hook or double hook

3 Identifications on auxiliary weights

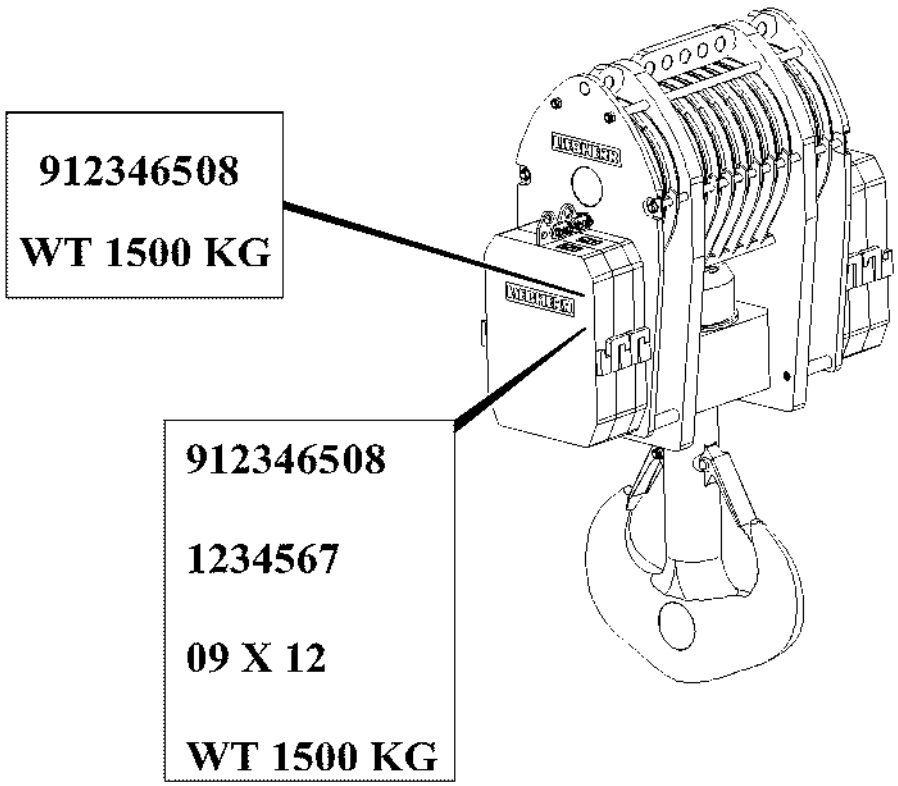

Fig.118511

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 Tara) = Own weight of individual auxiliary weight

Identifications of auxiliary weights at delivery

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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 Tara) = Own weight of individual auxiliary weight

Identifications of auxiliary weights at reorder

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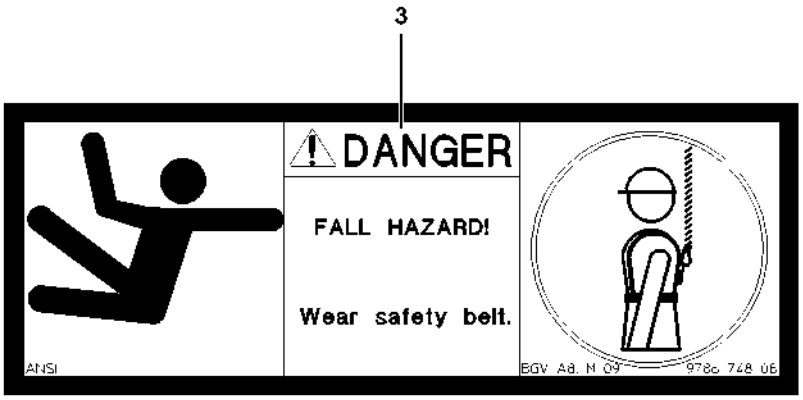

Fig.112104

1 Personal protective equipment

WARNING
Risk 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!
- ▶ 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!
- ▶ 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 retaining 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 with a fall arrest system to secure themselves against falling!

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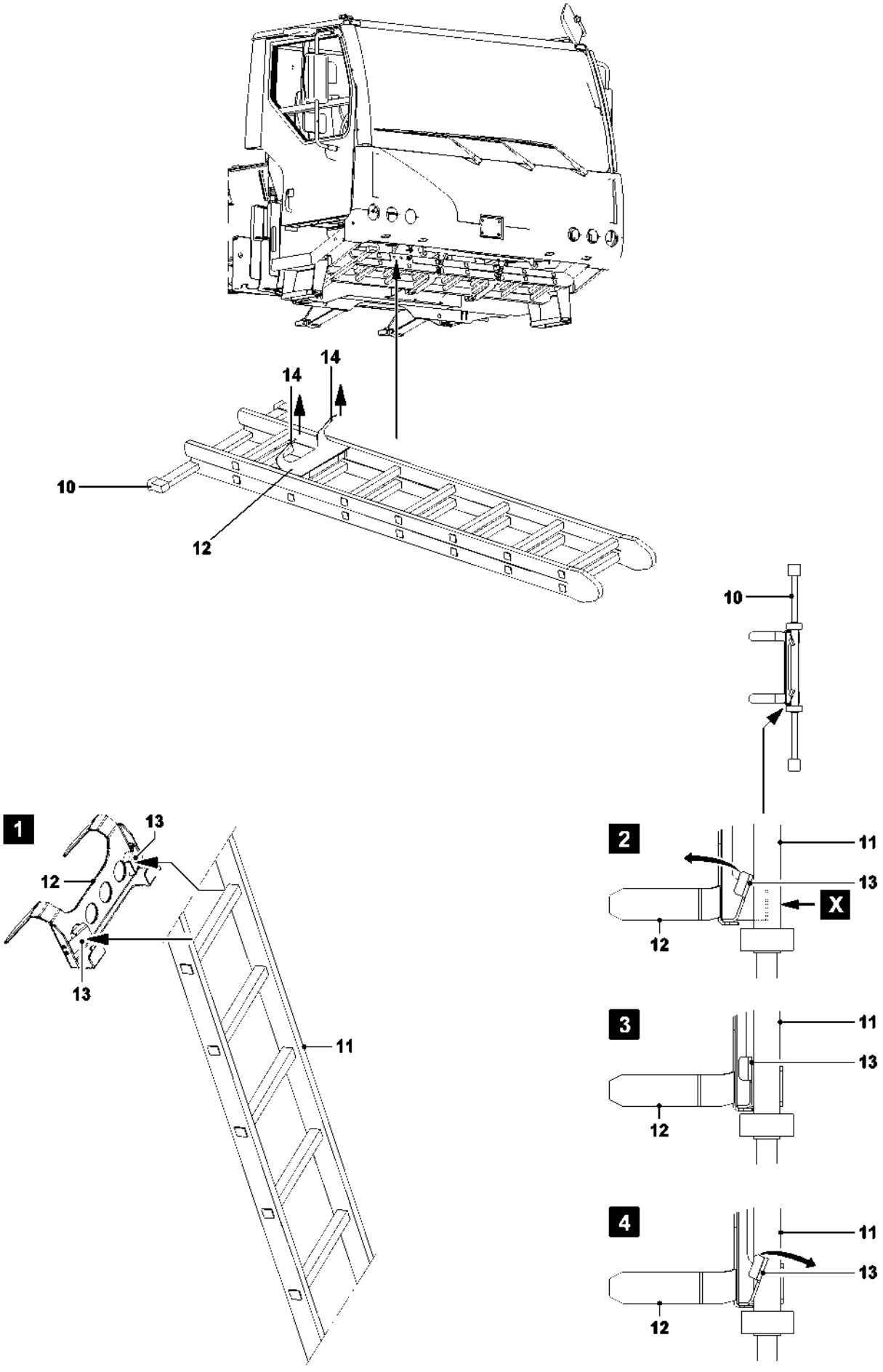

Fig.102241

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2 Preparing the ladder

Note

- ▶ For assembly / disassembly work on the telescopic boom, winch 2*****, the folding jib and folding jib extension, one must use the supplied ladder **11** with hook device **12**.
- ▶ The ladder **11** is carried along under the driver's cab.

WARNING

Risk of accident!

If the following notes are not observed, the ladder can tip and the assembly personnel can fall from the ladder and sustain life-threatening injuries!

- ▶ Replace damaged ladders immediately!
- ▶ Use only the supplied ladder with cross brace **10**!
- ▶ The hook device **12** on the ladder serves as protection from falling over. For all assembly / disassembly work on the folding jib, folding jib extension and telescopic boom, the ladder with hook device **12** must be used!
- ▶ The ladder must be set up stable and safely accessible!
- ▶ For safe handling of ladder, observe the safety notes on the ladder!

2.1 Transportation retainer for ladder

WARNING

Danger of accidents due to incorrectly installed hook device!

The two hooks **14** on the hook device **12** may **not** point downward to the roadway during transport!

The hook device **12** must be assembled on the ladder **11** in such a way that, during transport, the two hooks **14** are pointed „upward“ to the driver’s cab!

- ▶ After assembly / disassembly work, install and secure the ladder **11** with the hook device **12** properly under the driver's cab!
- ▶ Before starting to travel, check if the hooks **14** of the hook device **12** are pointing „upward“ to the driver’s cab!

2.2 Installing the hook device on the ladder

Before using the ladder, the hook device **12** must be installed on a rung.

- ▶ Push the ladder with the required rung against the locking plates **13** on the hook device **12** (point **X**), see illustration **1**, illustration **2**.

Result:

– The locking plates **13** spring in direction of the arrow and release the receptacle on the hook device **12** for the rung, see illustration **3**.

- ▶ Push the hook device **12** „upward“.

Result:

– The locking plates **13** spring (arrow) „back“ into their original position by themselves and secure the rung, see illustration **4**.

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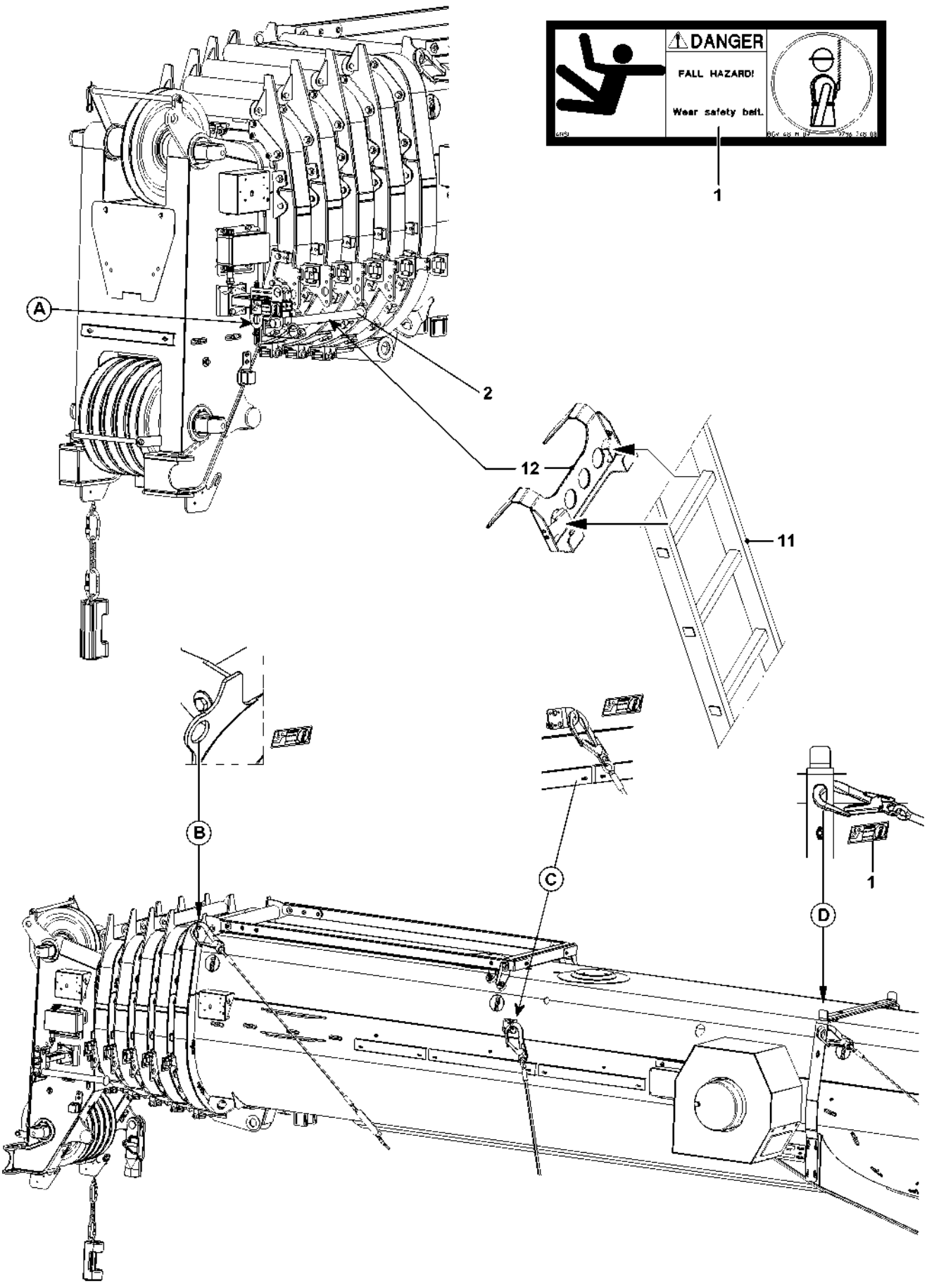

Fig.112599

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3 Attachment and fastening points

3.1 Fastening and hook points on the telescopic boom

Fastening point **A**, fastening point **B**, fastening point **C** and fastening point **D** are installed on the telescopic boom.

WARNING
When working aloft, there is a danger of falling!
If the following notes are not observed, the assembly personnel could fall and suffer life-threatening injuries!

- ▶ Before performing any assembly / disassembly work or maintenance work on the crane superstructure and telescopic boom, assembly personnel must wear an approved fall arrest system and protective equipment!
- ▶ For assembly / disassembly work, the ladder **11** with hook device **12** is hung on the pipe **2**, see also section „Installing the hook device on the ladder“.
- ▶ The assembly personnel must be secured with an approved fall arrest system on fastening point **A**, fastening point **B**, fastening point **C** or fastening point **D** to prevent them from falling.

NOTICE
Danger of damage!

- ▶ Never hang loads or objects on fastening point **A**, fastening point **B** or fastening point **C** or fastening point **D**!

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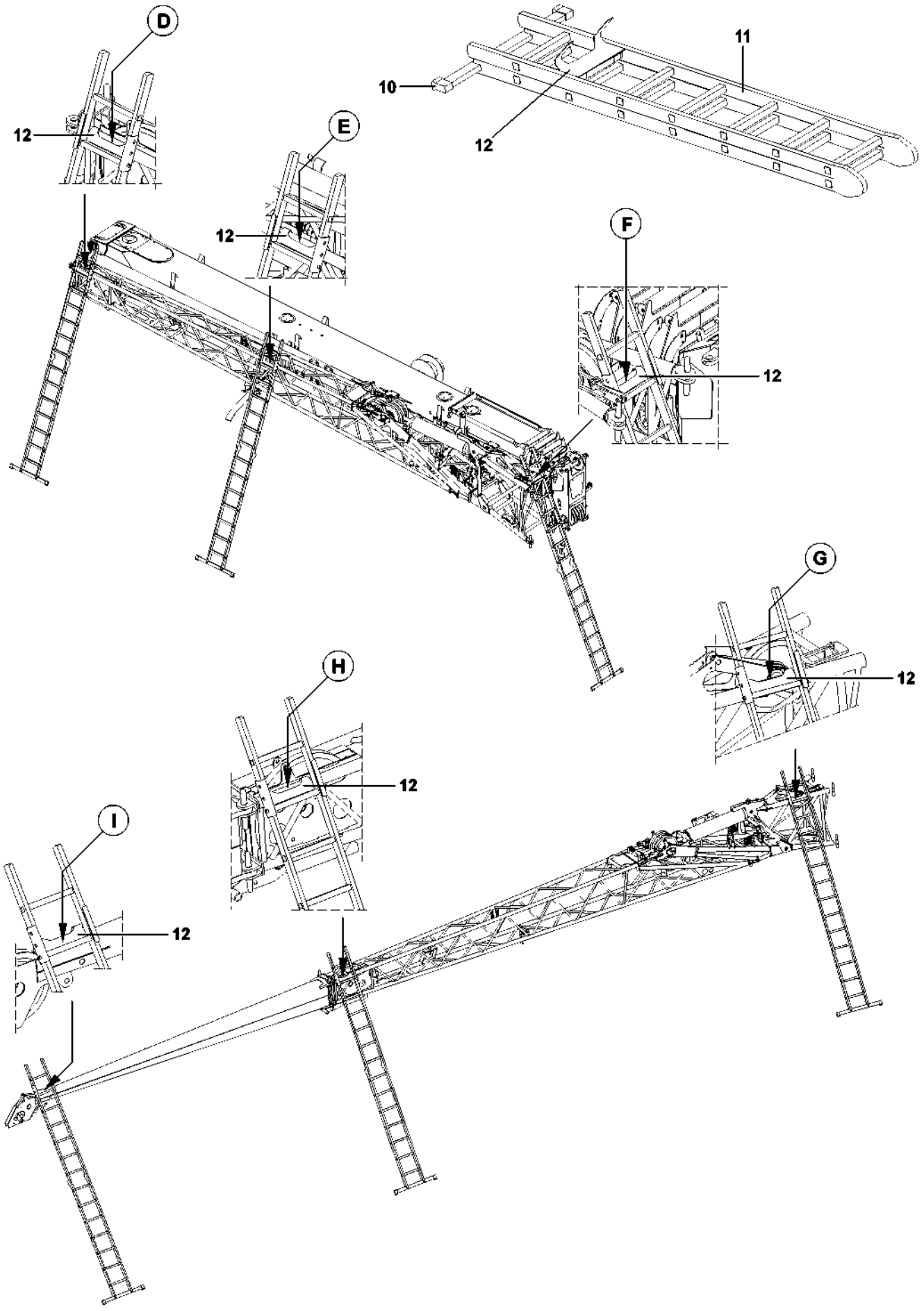

Fig.102242

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3.2 Fastening and hook points on folding jib / folding jib extension and telescope extension

WARNING
When working aloft, there is a danger of falling!
If the following notes are not observed, the ladder can tip and the assembly personnel can fall from the ladder and sustain life-threatening injuries!

- ▶ For all assembly / disassembly work on the folding jib, the telescope extension and the folding jib extension, use the ladder **11** with cross brace **10** and hook device **12**, see section „Assembling the hook device on the ladder“!
- ▶ Hang the ladder with hook device **12** on the corresponding hook point and set it up stable!
- ▶ Do not use the ladder as a hang ladder. The ladder must be resting on the ground.
- ▶ For safe handling of ladder, observe the safety notes on the ladder!
- ▶ Only step on the ladder with „clean shoes“!
- ▶ Assembly personnel must hook themselves onto the folding jib with approved an fall arrest system **3**, for example on the struts of the folding jib, the telescope extension and the folding jib extension and secure themselves to prevent them from falling!

For assembly / disassembly work on the folding jib and the folding jib extension, note the following hook points for the ladder:

- **D** Hook point
- **E** Hook point
- **F** Hook point
- **G** Hook point
- **H** Hook point
- **I** Hook point

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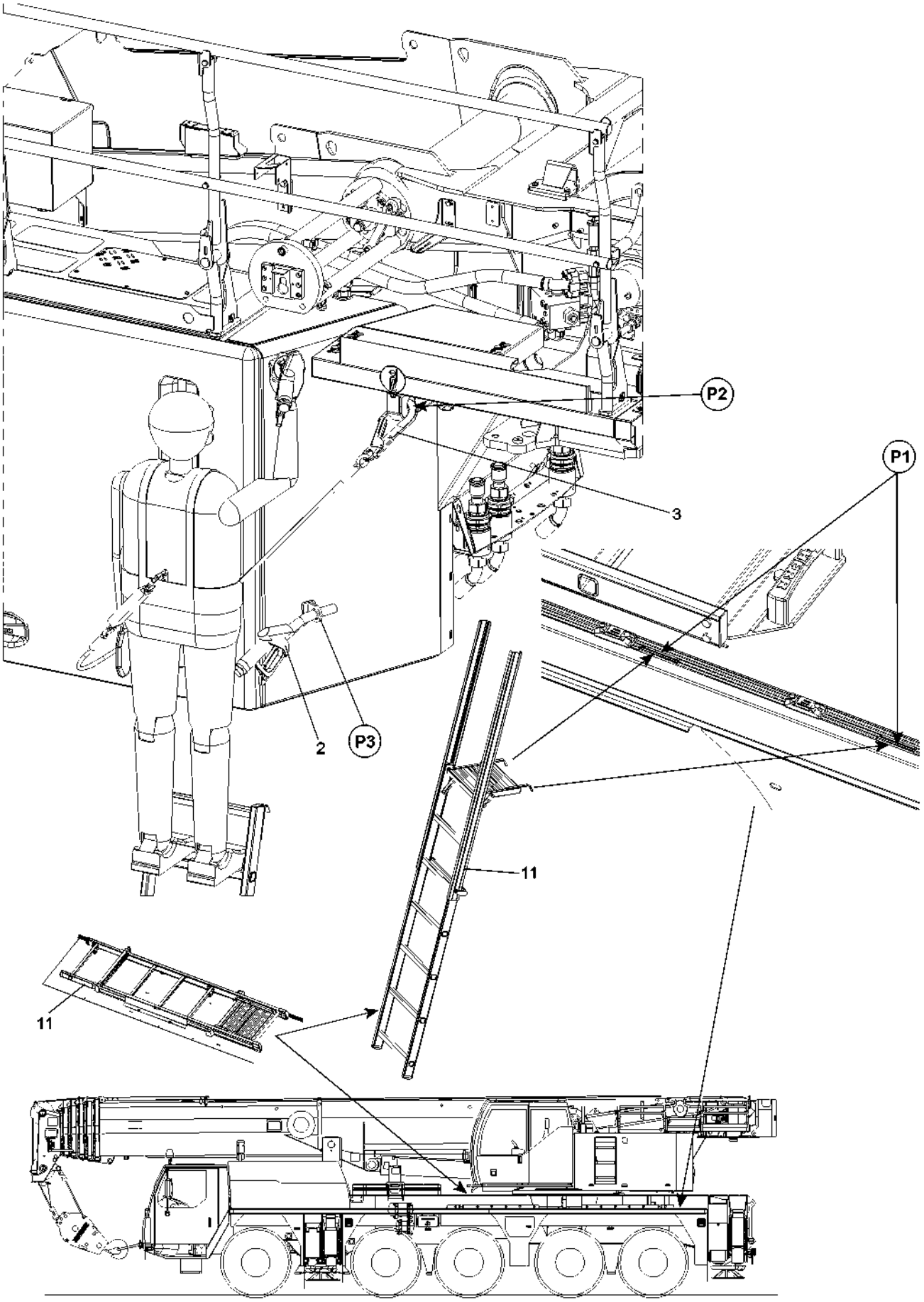

Fig.112598

3.3 Fastening and hook points on the turntable

WARNING
Risk of falling!
To refuel the fuel tank, the 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!

- ▶ Assembly personnel must hook themselves onto the fastening point **3** with approved fall arrest system **P2** to prevent them from falling!
- ▶ Use only the supplied ladder **11**!
- ▶ To refuel, hang the ladder **11** with the hook device in the tire cover on point **P1**!
- ▶ For safe handling of the ladder **11**, observe the safety guidelines in the Crane operating instructions, chapter 2.04!
- ▶ Step on the ladder **11** only with „clean shoes“!
- ▶ Keep ladder **11** clean and free of snow and ice!
- ▶ Clean dirty shoes!

- ▶ Hang the ladder **11** with the hook device **12** in the tire cover **1** and set it up safely.
- ▶ Bring the gas pump nozzle **2** in parking position **P3**.
- ▶ Access the ladder **11** and hook the fall arrest system **3** on the fastening point **P2**.
- ▶ Remove the gas pump nozzle **2** from the parking position **P3** and pump the fuel.
- ▶ Bring the gas pump nozzle **2** back into parking position **P3**.
- ▶ Unhook the fall arrest system **3** and climb down the ladder.
- ▶ Remove the gas pump nozzle **2**.

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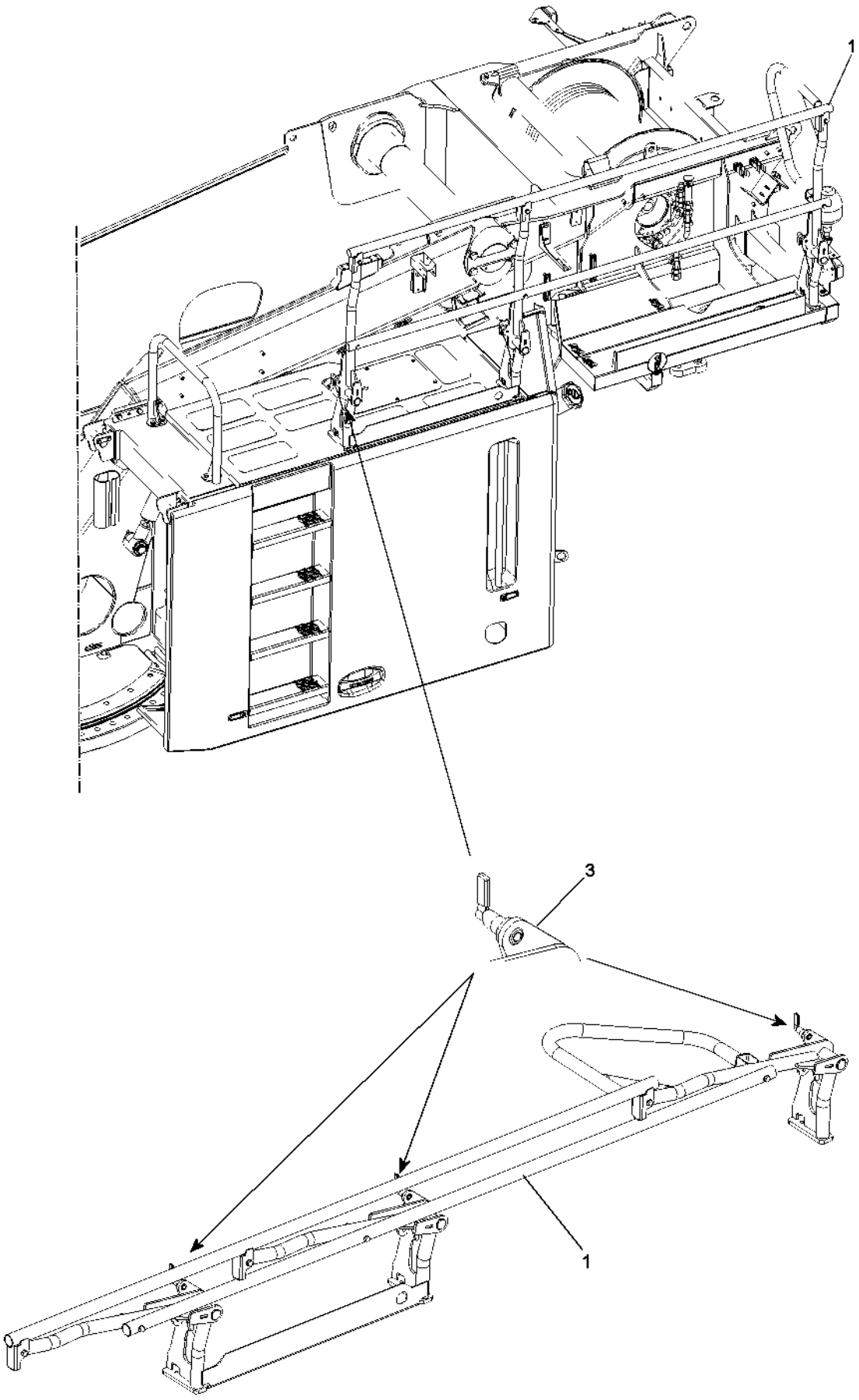

Fig.112597

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4 Railings on the crane superstructure

CAUTION
Risk of crushed limbs!
When moving the railing **1**, limbs can be crushed!
▶ Swing the railing especially carefully!

4.1 Swinging the railing in position for assembly / disassembly, illustration 2

▶ Swing the railing **1** in position for assembly / disassembly.
▶ Secure the railing **1** in position for assembly / disassembly: Lock the clamping lever **3**.

4.2 Swinging the railing into transport position, illustration 1

▶ Release the clamping lever **3**.
▶ Swing the railing **1** into transport position.

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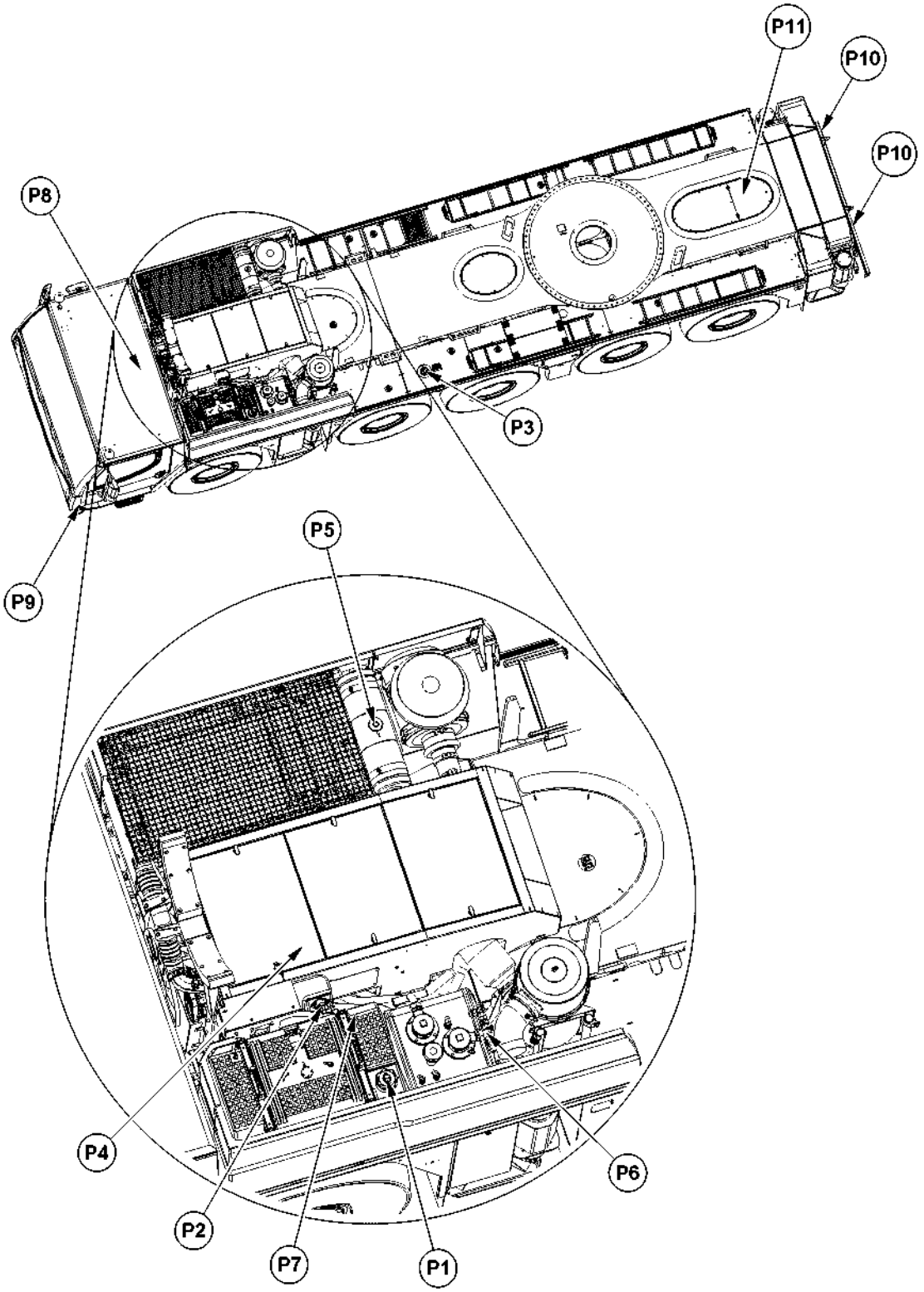

Fig.114894

1 Components on the crane

1.1 Adding service fluids

1.1.1 Refueling

The fuel tanks are installed on both sides on the crane chassis at position **P1**.

▶ Refueling, see Crane operating instructions, chapter 7.04.

1.1.2 Adding Urea solution

The urea tank is installed on the crane chassis at position **P2**.

▶ Adding urea solution, see Crane operating instructions, chapter 7.04.

1.1.3 Refueling fuel*

The fuel tank is installed on the crane chassis at position **P3**.

▶ Refueling fuel, see Crane operating instructions, chapter 7.04.

1.2 Checking components on the crane chassis

1.2.1 Checking the engine oil level

Note

▶ The oil level on the Diesel engine can be checked comfortably on the display unit in the driver's cab. See Crane operating instructions, chapter 7.04.

The dipstick for the diesel engine is at position **P4**.

▶ Check the oil level on the diesel engine, see Crane operator's instructions, chapter 7.04 and separate operating instructions of the engine manufacturer.

1.2.2 Checking the coolant level in the expansion tank

The expansion tank is installed on the crane chassis at position **P5**.

▶ Check the coolant level, see Crane operating instructions, chapter 7.04.

1.2.3 Checking the oil level and filter on the hydraulic oil tank

The hydraulic oil tank with the filters is installed on the crane chassis at position **P6**.

▶ Check the oil level and filter, see Crane operating instructions, chapter 7.04.

1.2.4 Checking the fuel preliminary filter

The fuel preliminary filter is installed on the crane chassis at position **P7**.

▶ Check the fuel preliminary filter, see Crane operating instructions, chapter 7.04.

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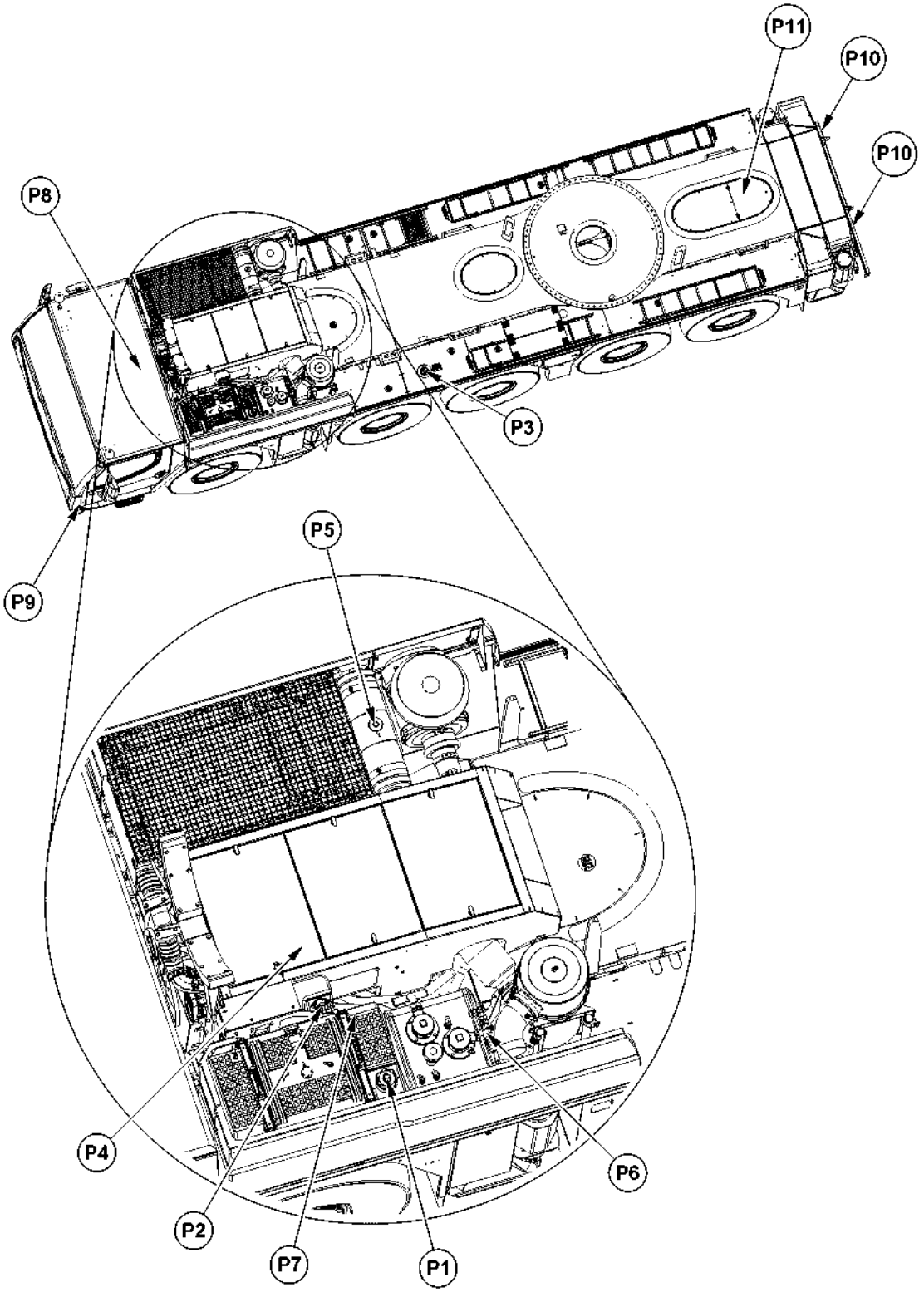

Fig.114894

1.3 Additional components

1.3.1 Tire inflation connection

The tire inflation connection is installed under the driver's cab at position **P8**.

1.3.2 Emergency stop switch

The emergency stop switch is installed on the driver's cab at position **P9**.

▶ For the description of the emergency stop switch, see Crane operating instructions, chapter 3.04.

1.3.3 Chocks

The chocks are installed on the crane chassis at position **P10**.

1.3.4 Load hook receptacle

The load hook receptacle is installed on the crane chassis at position **P11**.

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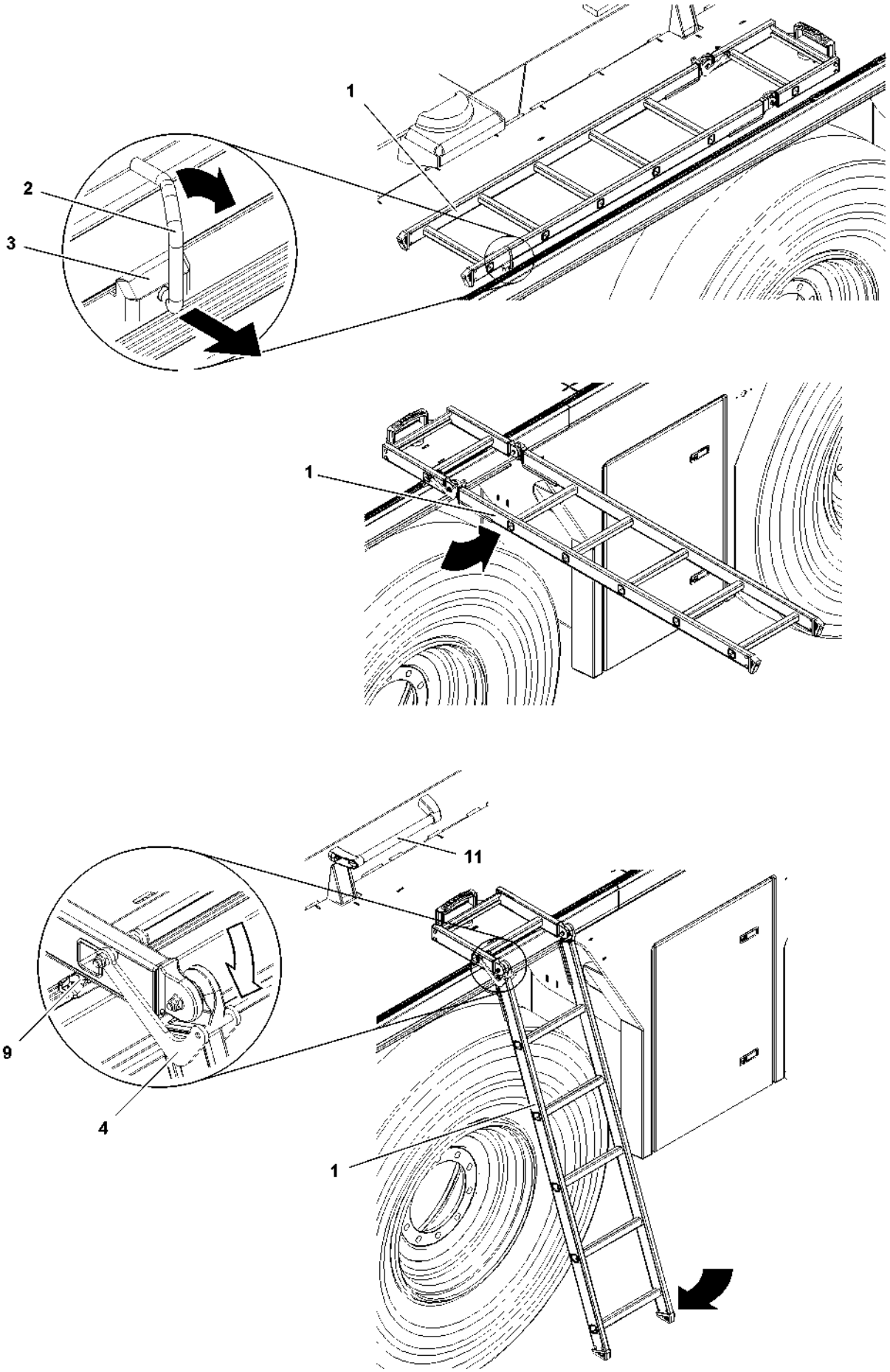

Fig.114558

2 Ascent and descent on the crane 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!
- ▶ The danger zone is free of personnel and objects during folding and swinging of the folding ladder!
- ▶ When accessing the ladder, do not hold any objects in your hands!
- ▶ Stepping on ladders by persons weighing more than 150 kg is prohibited!
- ▶ 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!

Make sure that the following prerequisites are met:
- – The assembly personnel is wearing the personal protective equipment.
- – The crane vehicle is supported on level ground and aligned in horizontal position.
  The distance between tires and the ground is 50 mm.

Note
- ▶ The access height from the ground to the first step may not be more than maximum 600 mm.
- ▶ When the access height is more than 600 mm , then the crane operator must ensure safe ascent and descent, for example by using a step.

2.1 Bringing the folding ladder to ascent and descent position

All folding ladders **1** must be set to operating position before ascent.

CAUTION
Danger of crushing!
During assembly and disassembly of the folding ladder **1** fingers and hands can be crushed!
- ▶ Do not reach into the retainer **3** or the hinge area!
- ▶ Fold the folding ladder **1** out only from the ground!

- ▶ Release the retainer **3**: Pull the bar **2**, swing it to the right by 90° and place the bar **2** down on the plate.
- ▶ Lift the folding ladder **1** and swing it outward by 90°.
- ▶ Fold the folding ladder **1** downward and place into the retainer **9**.

Result:

- – As soon as the folding ladder **1** is folded down, the relapse retainer **4** engages.

- ▶ Check if the relapse retainer **4** is correctly engaged.

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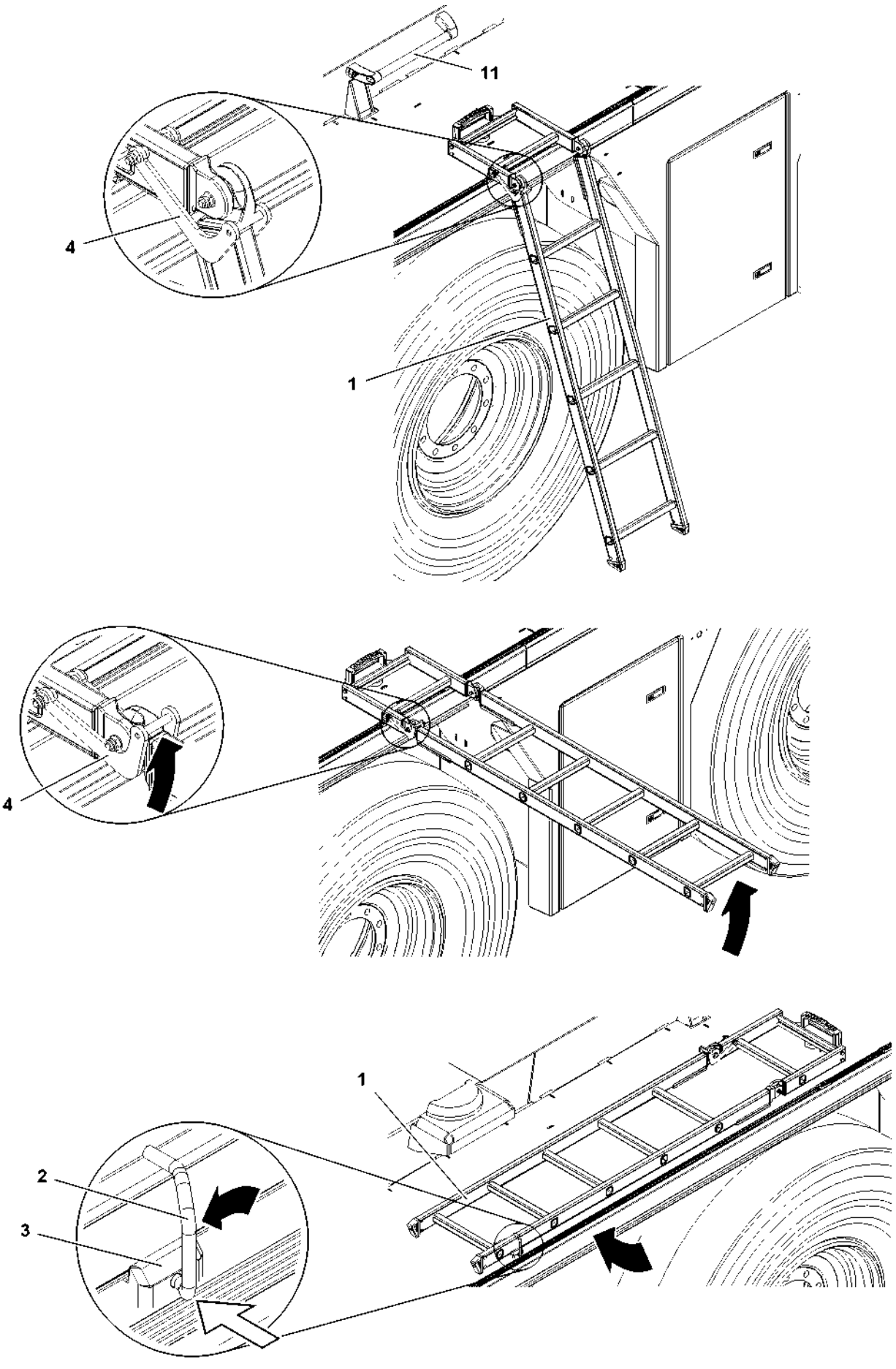

Fig.114559

2.2 Ascent and descent via the ladder

WARNING
Danger of falling!
While stepping 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 sufficiently deep!
- ▶ When changing from the ladder to the walking surface, the assembly personnel must secure themselves with the attached handle **11** to prevent falling!
- ▶ When changing from the ladder to the walking surface, the assembly personnel must secure themselves with the attached handle **11** 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.

▶ Climb up or down via the ladder.

2.3 Securing the folding ladder in transport position

All folding ladders **1** must be set to transport position before driving.

CAUTION
Danger of crushing!
During assembly and disassembly of the folding ladder **1** fingers and hands can be crushed!
- ▶ Do not reach into the retainer **3** or the hinge area!
- ▶ Fold the folding ladder **1** out only from the ground!

- ▶ Lift the relapse retainer **4** and then lift the folding ladder **1**.
- ▶ Swing the folding ladder **1** to the inside by 90°.
- ▶ Place the folding ladder **1** in the retainer **3**.
- ▶ Secure the folding ladder **1**: Pull the bar **2**, swing it to the left until the bar **2** engages again.
- ▶ Check if the bar **2** is correctly engaged.

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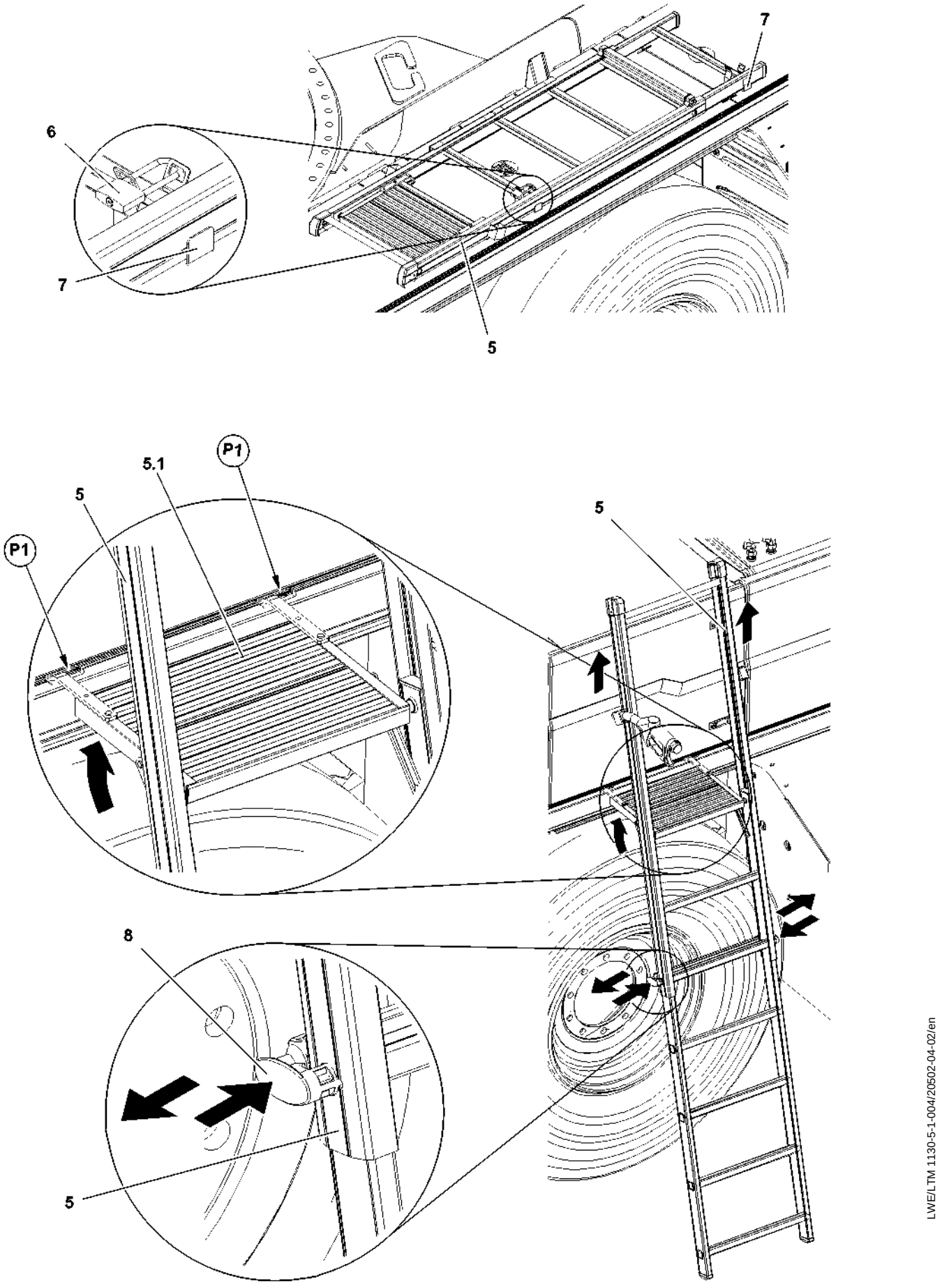

Fig.114560

2.4 Bringing the refueling ladder to ascent and descent position

Make sure that the following prerequisites are met:
– The mobile crane is leveled for on road driving.

CAUTION
Danger of crushing!
During assembly and disassembly of the refueling ladder **5** fingers and hands can be crushed!
▶ Do not reach into the retainers **7** or the hinge area!
▶ Install the refueling ladder **5** only from the ground!
▶ Step on the refueling ladder **5** only when the refueling ladder **5** and the platform **5.1** are secured in ascent and descent position!

▶ Remove the pad lock **6**.
▶ Take the refueling ladder **5** from the retainers **7**.
▶ Fold the platform **5.1** out with upright standing refueling ladder **5** and lock.
▶ Hook the refueling ladder **5** in the receptacles on the border strip at position **P1**.
▶ Pull the lock **8** on the left and right and extend the refueling ladder **5** completely upward.
▶ Check if all retainers are engaged.

WARNING
Danger of falling!
While stepping 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 sufficiently deep!

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.

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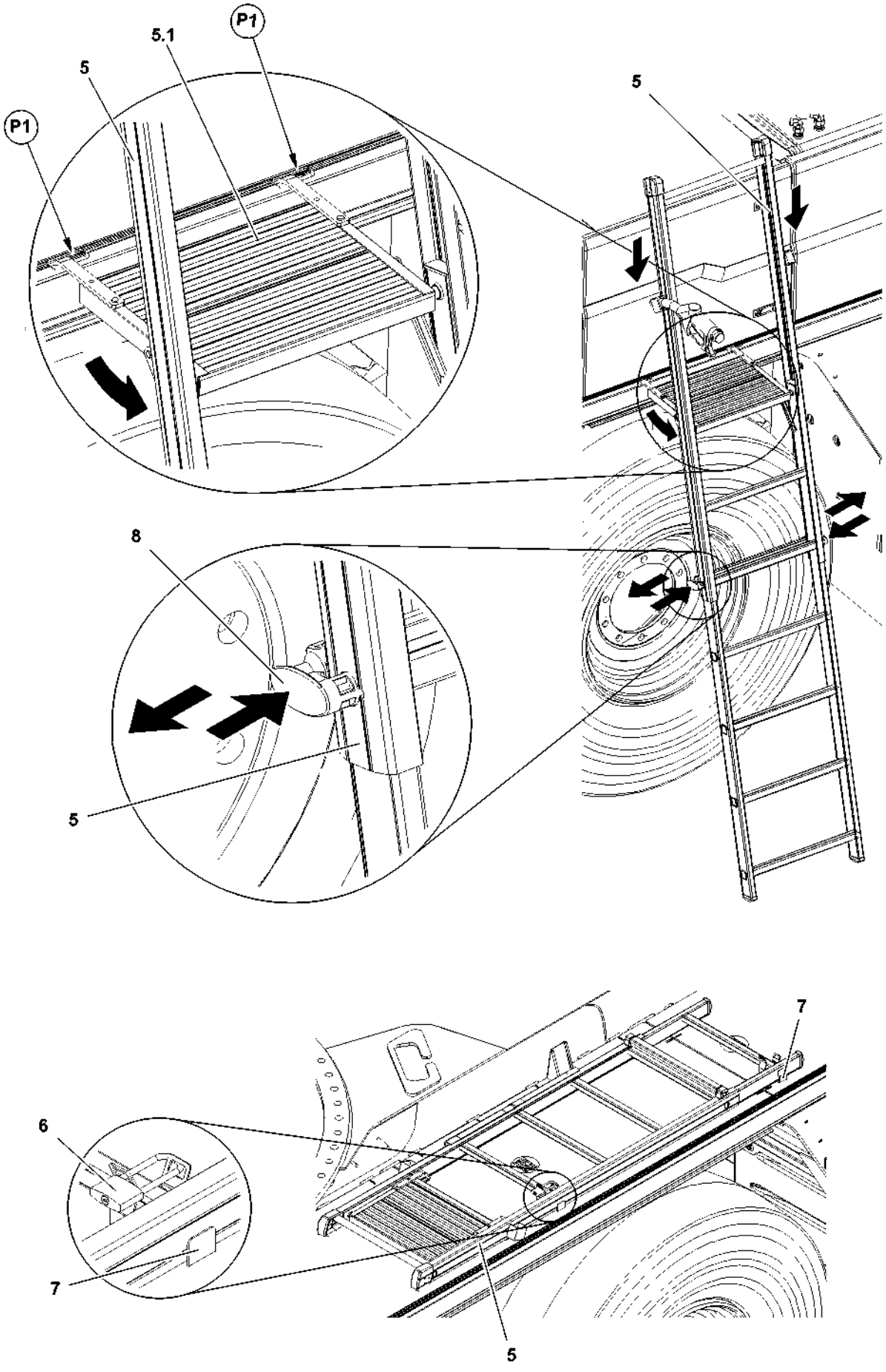

Fig.114561

2.5 Securing the refueling ladder in transport position

Make sure that the following prerequisites are met:
– The mobile crane is leveled for on road driving.

CAUTION
Danger of crushing!
During assembly and disassembly of the refueling ladder **5** fingers and hands can be crushed!
▶ Do not reach into the retainers **7** or the hinge area!
▶ Remove the refueling ladder **5** only from the ground!

▶ Pull the lock **8** on the left and right and retract the refueling ladder **5** completely.
▶ Lock the retracted refueling ladder **5**.
▶ Check if the lock **8** is correctly engaged on the left and right.
▶ Detach the refueling ladder **5**.
▶ Fold the platform **5.1** in completely with upright standing refueling ladder **5**.
▶ Fasten the refueling ladder **5** in the retainers **7**.
▶ Secure the refueling ladder **5** with a pad lock **6**.
▶ Check if the refueling ladder **5** is secured in the transport position.

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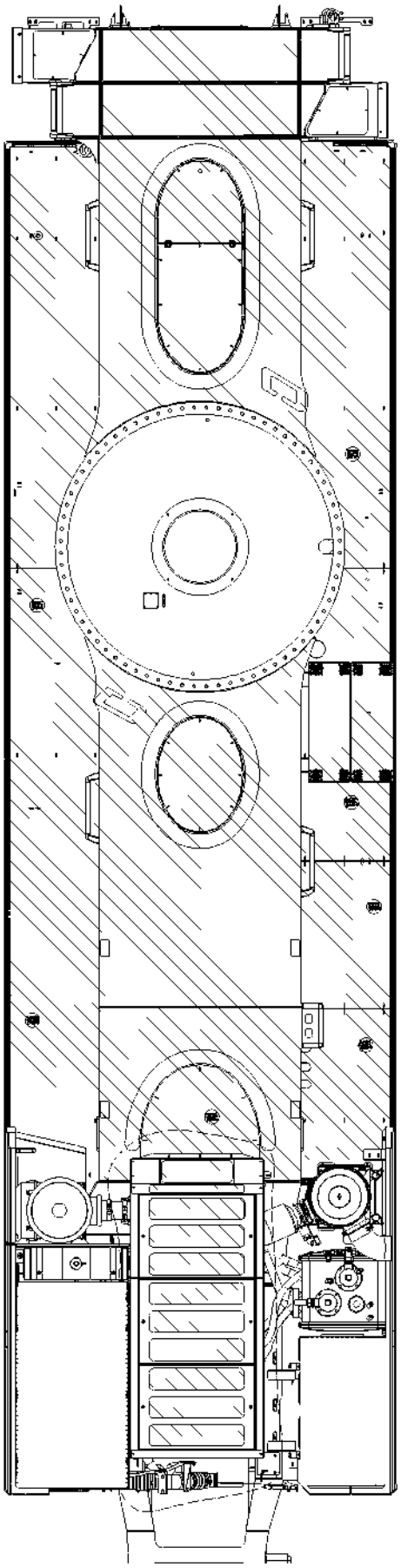

Fig.114893

3 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!

3.1 Accessible walking and stepping surfaces

Fig.114701

Note
- ▶ The accessible walking and stepping surfaces are marked with these cross hatches.

3.2 Non-accessible walking and stepping surfaces

WARNING
Danger of falling!
If the walking and stepping surfaces are accessed, which are **not** approved for access, personnel can slip and fall down! Personnel can be killed or injured!
When accessing the walking and stepping surfaces, which are **not** approved for access, crane components can be damaged!
- ▶ Only step on accessible walking and stepping surfaces!
- ▶ Access to walking and stepping surfaces, which are **not** approved for access is prohibited!
- ▶ Stepping on surfaces with an incline of more than 20° is prohibited!

Fig.114702

Note
- ▶ The walking and stepping surfaces which are **not** approved for access are marked with these cross hatches.

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Fig.195219

1 Working in low temperatures

1.1 Required auxiliary equipment*

Note

▶ For work in low temperatures, between -25 °C and -40 °C , or in temperatures below -40 °C , **Liebherr-Werk Ehingen GmbH** offers numerous auxiliary equipment*****.

WARNING

Danger of accident when working in low temperatures!

When working in low temperatures **without** auxiliary equipment, damage can occur to crane components.

Personnel can be severely injured or killed.

▶ Make sure that the crane is equipped for application and for work in low temperatures.

▶ When working in low temperatures, always act anticipatorily, slowly and with utmost caution.

▶ Make sure that the following danger notices are observed and adhered to.

2 Working in ambient temperatures up to -40 °C

This section contains important notices for application of Liebherr cranes in ambient temperatures to -40 °C.

Valid for:

– Liebherr Lattice mast cranes
– Liebherr Telescopic cranes

WARNING

The crane can topple over!

Disregard of crane documentation can cause the crane to topple over!

Personnel can be severely injured or killed!

▶ Observe and adhere to the crane documentation.

▶ Make sure that you have read and understood the safety technical notices for crane operation, see Crane operating instructions, chapter 2.04.

▶ Make sure that you have read and understood the safety technical notices for assembly / disassembly, see Crane operating instructions, chapter 5.01.

▶ Make sure that you have read and understood the notices for maintenance, see Crane operating instructions, chapter 7.01.

2.1 Measures before crane operation

NOTICE

Danger of property damage!

Low temperatures, such as snow, frost and ice can impair crane operation and cause problems on the crane.

▶ Carry out the following measures before crane operation.

– Make sure that all winches and rope pulleys are free of snow, frost and ice.
– Make sure that all cable and hose drums are easily moveable.
– Make sure that all rope pulleys are easily moveable.
– Make sure that counterweight / ballast plates are installed smoothly.
– Make sure that the support plates are supported exclusively with suitable and sufficiently load bearing materials.
– Make sure that support plates are supported on one side of the crane with greased polyamide plates.

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– Make sure that the support cylinders for crane operation are extended only to maximum 50 %.

2.1.1 Preheating hydraulic cylinders / hydraulic system on lattice mast cranes

NOTICE
Damage to hydraulic cylinders!
▶ Always preheat hydraulic cylinders at ambient temperatures below -25 °C - before crane operation.

WARNING
Death due to hydraulically actuated crane components!
When hydraulic cylinders are „warmed up“, personnel can be severely injured or killed.
▶ Make sure that no persons or objects are within the danger zone.

Preheat the pull cylinders in the derrick ballast guying before crane operation.

WARNING
The crane can topple over!
If the following points are not observed, the crane can topple over.
Personnel can be severely injured or killed.
▶ Make sure that a valid set up configuration has been entered and confirmed in the LICCON computer system.
▶ Make sure that there is no load on the hook of the boom system.
▶ Observe and adhere to the load charts.
▶ For ballast trailer: Make sure that the ballast trailer guide is fully retracted.
▶ Make sure that the derrick radius and the derrick ballast radius are identical.
▶ Make sure that the derrick ballast is laying completely on the ground.
▶ Make sure that the derrick guy rods hang vertically.
▶ Make sure that the derrick guying is relieved.
▶ Make sure that the F1-actual force (test point 1) is in the permissible range, see Crane operating instructions, chapter 4.02.

▶ Remove the guy rods from the pull cylinders to the derrick ballast properly, see Crane operating instructions, chapter 5.35 and chapter 5.36.

When the guy rods are properly removed:
▶ Retract and extend the pull cylinders several times.

Preheat additional hydraulic cylinders:
▶ Retract and extend hydraulic cylinders several times over the entire stroke length.

2.1.2 Preheating hydraulic cylinders / hydraulic system on telescopic cranes

NOTICE
Damage to hydraulic cylinders!
▶ Always preheat hydraulic cylinders at ambient temperatures below -25 °C - before crane operation.

WARNING
Death due to hydraulically actuated crane components!
When hydraulic cylinders are „warmed up“, personnel can be severely injured or killed.
▶ Make sure that no persons or objects are within the danger zone.

Preheat the luffing cylinder before crane operation.

NOTICE
Damage to hydraulic components!
▶ Make sure that the hydraulic oil - before starting crane operation with a load - has a temperature of at least 20 °C.

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Make sure that the following prerequisites are met:
– The crane is properly supported and horizontally aligned.
– The telescopic boom is fully telescoped in.
– There is no load on the hook.

▶ Luff the telescoped in telescopic boom up and down several times.

Preheat additional hydraulic cylinders:
▶ Retract and extend hydraulic cylinders several times over the entire stroke length.

2.1.3 Reducing hoist ropes - rope / strand pull

Note
▶ When using hoist ropes in temperature ranges between -25 °C and -40 °C , **Liebherr-Werk Ehingen GmbH** recommends to reduce the rope / strand pull of the hoist ropes for crane application.

NOTICE
Rope damage due to insufficient weight of the hook block!
▶ Observe and adhere to the „minimum required hook block weight“ in the load chart.

▶ Increase the rope reeving specified in the load chart.

Result:

– The rope / strand pull of the hoist rope is reduced.

2.1.4 Increasing the hook block - hook block weight

Note
▶ The calculation of the minimum required hook block weight is described in the load chart!
▶ Depending on the temperature range in which the crane is used, increase the minimum required hook block weight, see the following chart overview.
▶ Observe the permissible hook block weights for erection and take down of the boom systems in the erection and take down charts.

Crane application in ambient temperatures	Increase of minimum required hook block weight
To -30 °C	By 10 %
To -40 °C	By 15 %

2.2 Measures for crane operation

Crane structures and crane components are subjected to special stress in low temperature application. For that reason, crane operation in low temperatures require anticipatory working procedures, adapted to the weather conditions from the crane operator.

WARNING
Breakage of crane components!
Sudden jerky initiation or slow down of crane movements can lead to breakage of crane components. Personnel can be severely injured or killed.
▶ Initiate and slow down crane movements sensitively and with utmost caution.
▶ Initiate crane movements with utmost caution and at the lowest speed.

2.2.1 Interruption of crane operation.

In areas with ambient temperatures to -40 °C , **Liebherr-Werk Ehingen GmbH** recommends to leave the engine / the engines of crane running during the entire time of the interruption.

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Possible interruptions of crane work:
– Break times
– Shut down of crane over night

WARNING
An equipped crane with running engine / engines is unattended!
If an equipped crane with running engine / engines is turned off, the crane operator is obligated to carry out special measures.
If the following measures are not observed and adhered to by the crane operator, then the crane can topple over.
Personnel can be severely injured or killed.
▶ Make sure that the measures for interruption of crane work are adhered to, see Crane operating instructions, chapter 2.04.
▶ Make sure that the following measures are additionally observed.
▶ The crane operator bears the full responsibility for observance of all measures.

– If predicted wind speeds are higher than the maximum permissible wind speeds, see wind speed chart:
  • Place the boom down according to the erection and take down charts in time.
– Make sure that no movements can be carried out on the crane:
  • Respective electrical fuses in the control cabinet may only be removed after consultation with the **Service Department of Liebherr-Werk Ehingen GmbH**.
– Make sure that access to the crane and operation for unauthorized personnel is excluded:
  • Lock the driver's cab after leaving.
  • Pull the key of the driver's cab and store it safely.
  • Lock the crane operator's cab after leaving.
  • Pull the key of the crane operator's cab and store it safely.
– Make sure that the fill levels of Diesel fuel, engine oil and urea are regularly checked by an authorized person. Top off the fill levels if necessary.
– Make sure that the crane is checked in regular intervals by an authorized person for safe crane condition.

2.2.2 Driving two-engine cranes in low temperature application

If two engine cranes are driven in areas with ambient temperatures to -40 °C , **Liebherr-Werk Ehingen GmbH** recommends to let the engine in the crane superstructure idle while driving. This requires special measures on the crane to prevent engine damage on the superstructure engine when driving on uphill or downhill gradients up to maximum 25 %.

NOTICE
Engine damage!
If the oil level on the superstructure engine is insufficient, the engine can be damaged when driving on uphill / downhill gradients up to 25 %.
▶ Make sure that the fill levels of Diesel fuel, engine oil and urea on the crane superstructure are regularly checked by an authorized person. Top off the fill levels if necessary.
▶ Make sure that the oil level is adjusted before driving the crane, with the crane in horizontal position, according the following chart.
▶ Observe and adhere to the following chart.

Engine in crane superstructure	Fill level engine oil
Four cylinder engine	To the max mark
Six cylinder engine	To the max mark + 2.5 l

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2.2.3 Crane utilization lattice mast cranes

On lattice mast cranes with pull cylinders in the derrick ballast guying, the maximum derrick ballast must be reduced in low temperature application to -40 °C.

WARNING
The crane can topple over!
Personnel can be severely injured or killed.
▶ Make sure that the crane is not overloaded with reduced derrick ballast.

▶ Reduce the maximum derrick ballast between -30 °C and -40 °C by 15 %.

2.2.4 Crane utilization telescopic cranes

For telescopic cranes, the crane utilization must be reduced in low temperature application between -30 °C and -40 °C.

▶ Reduce the crane utilization between -30 °C and -40 °C by 15 %.

2.3 Measures and notices for maintenance

2.3.1 Load bearing crane structures

Note
▶ Check load bearing crane structures for damage according to the Crane operating instructions.

2.3.2 Lubrication and service items

Note
▶ Use lubrication and service items according to the lube chart / service fill.

2.3.3 Rope pulleys and hydraulic cylinders

Note
▶ Check rope pulleys and hydraulic cylinders for damage according to the Crane operating instructions.

2.3.4 Pretension pressures of pressure accumulators

Note
▶ Check the pretension pressures of pressure accumulators according to the crane operating instructions.
▶ In low temperature application to -40 °C , reduce the maintenance intervals.

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Fig.195219

3 Working in ambient temperatures below -40 °C

The regulations and notices for the ambient temperatures up to -40 °C apply.

WARNING
The crane can topple over!
Disregard of crane documentation can cause the crane to topple over!
Personnel can be severely injured or killed!
- ▶ Observe and adhere to the crane documentation.
- ▶ Make sure that you have read and understood the safety technical notices for crane operation, see Crane operating instructions, chapter 2.04.
- ▶ Make sure that you have read and understood the safety technical notices for assembly / disassembly, see Crane operating instructions, chapter 5.01.
- ▶ Make sure that you have read and understood the notices for maintenance, see Crane operating instructions, chapter 7.01.
- ▶ Make sure that the additional measures for crane application in ambient temperatures below -40 °C are observed and adhered to.

3.1 Measures before crane operation

- ▶ Cover exposed hose drums to protect them from ice, frost and snow.

Before operation:

- ▶ Remove snow from winches, boom, hose and cable drums, including inlet and outlet.

NOTICE
Discharging batteries!
During the preheating of the Diesel engine, the batteries can discharge and be damaged as a result.
- ▶ Make sure that the batteries are fully charged before using the preheating.
- ▶ Make sure that the batteries are not discharged.
- ▶ We recommend to ensure the engine preheating via an external power supply, see Crane operating instructions, chapter 2.04.

- ▶ Preheat the Diesel engine until it can be started.
- ▶ Turn the preheater(s) off as soon as the Diesel engine has reached operating temperature.
- ▶ Preheat the hydraulic system for the crane chassis and the hydraulic system for the crane superstructure for at least 30 minutes.
- ▶ Preheat the driver’s cab and the crane operator’s cab at the same time with the hydraulic systems for crane chassis and crane superstructure for at least 10 minutes.

3.2 Measures for crane operation

WARNING
The crane can topple over!
The following listed property damage can cause the crane to topple over as a result.
- ▶ Make sure that the following listed property damage is prevented by appropriate measures.

NOTICE
Damage to the hydraulic system / hydraulic cylinders!
If the cold hydraulic system is actuated with high pressures, damage can occur on hydraulic cylinders, pressure accumulators and the entire hydraulic system.

Before the hydraulic system is actuated with the pressures:
- ▶ Make sure that the preheating of the hydraulic system is completed.

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NOTICE
Damage of crane components!

After ending crane operation:
▶ Protect winches, hose and cable drums from moisture and freezing.

3.3 Measures and notices for maintenance

3.3.1 Lubrication and service items

Note
▶ Use lubrication and service items according to the lube chart / service fill.

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3 Crane chassis operation

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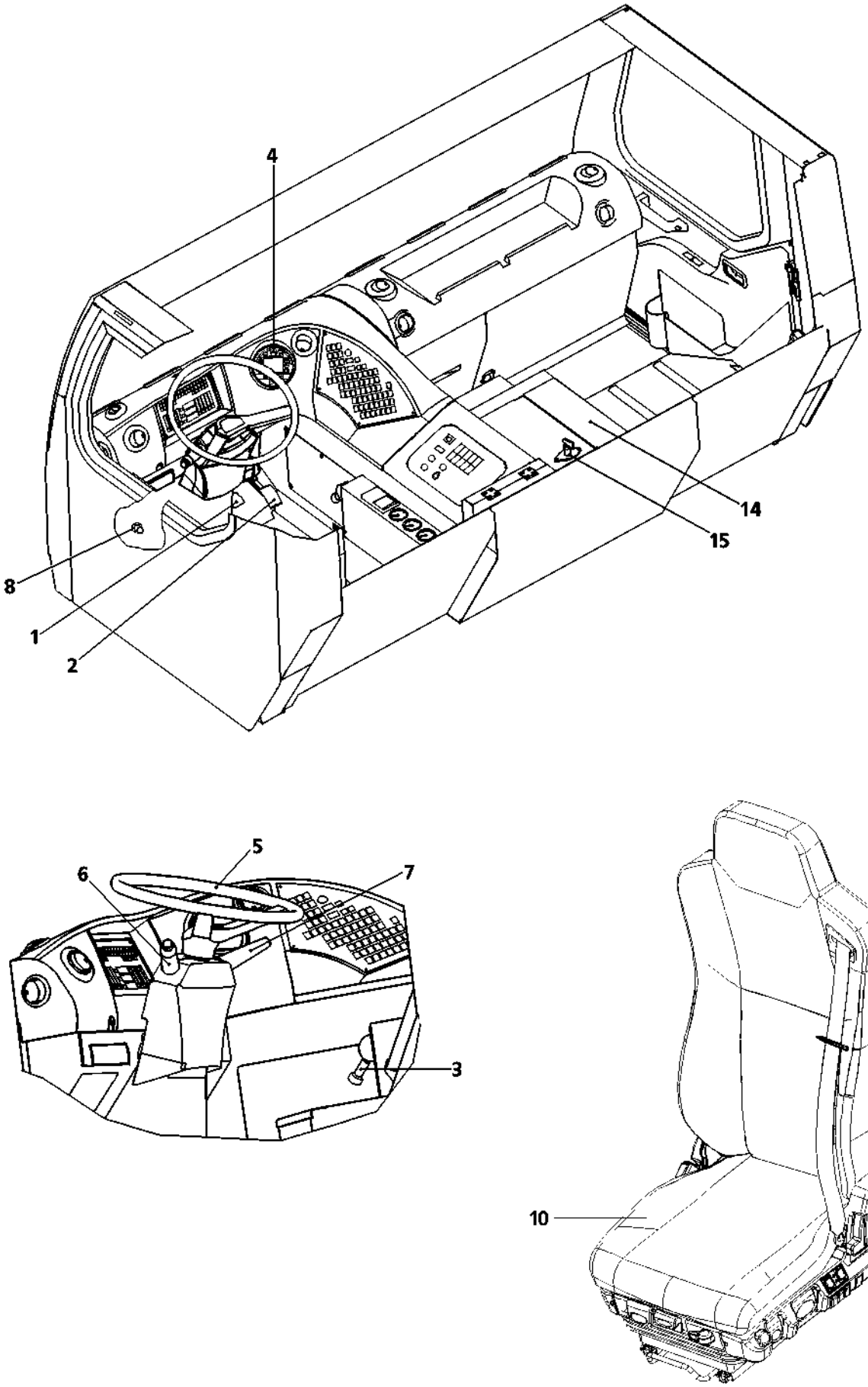

Fig.110281

1 General operating elements

1 Service brake

2 Engine regulation

3 Parking brake

4 BTT (Bluetooth™ Terminal)

Note:
For the description of BTT (Bluetooth™-Terminal) see Crane operating instructions, chapter 5.31.

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 -5
- Tempomat
- Temposet
- Manual throttle
- Shift 1 gear up or down with manual transmission

8 Foot button
- Pneumatic steering wheel angle 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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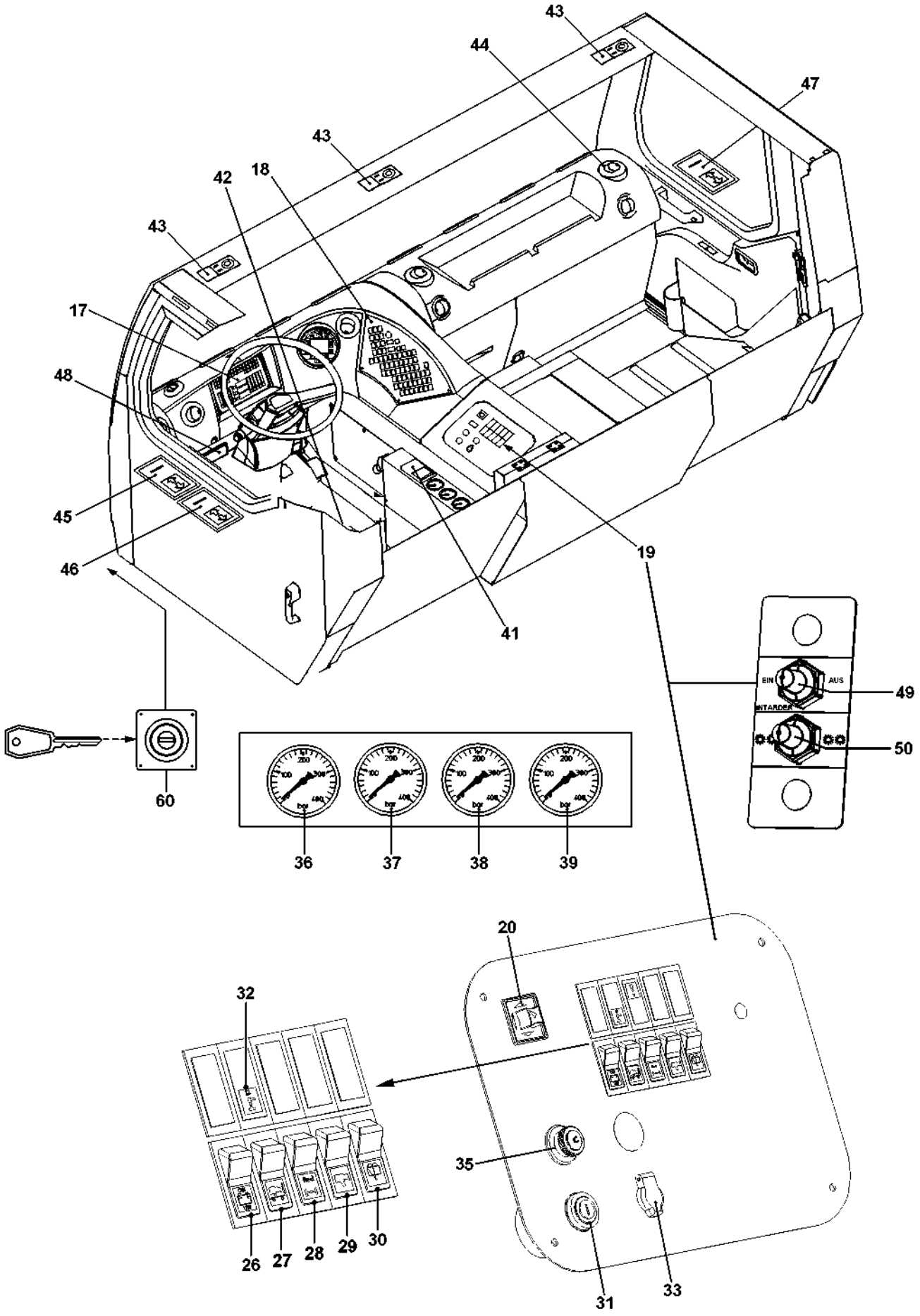

Fig.115003

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*****
- Battery charger, change between superstructure (OW) / chassis (UW)

27 Switch*****
- Dolly mode

28 Switch with indicator light*****
- Switch the diaphragm reservoirs

  The indicator light does not light up: The diaphragm reservoir is switched to 12 t axle load.

  The indicator light lights up: The diaphragm reservoir is switched to reduced axle load.

  Note:

  With the telescopic boom is removed, the diaphragm reservoir must be switched to reduced axle load.

29 Switch*****
- Turning the camera when driving forward

30 Switch*****
- Turning the camera cleaning on

31 Ignition switch

Position:
- P = Ignition key can be pulled out
- 0 = Ignition key can be pulled out
- I = Ignition on
- II = Start the engine

33 Integrated socket 24 V

35 Cigarette lighter

36 Axle pressure gauge
- Axles 1 and 2, left side

37 Axle pressure gauge
- Axles 1 and 2, right side

38 Axle pressure gauge
- Axles 3 to 5, left side.

39 Axle pressure gauge
- Axles 3 to 5, right side.

41 Ashtray

42 Reservoir
- Windshield washer fluid

43 Interior illumination

44 Outlet nozzles
- For heat / ventilation / Climate control system*****

45 Switch
- Left power window lift

46 Switch

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- 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.

50 Switch
- Switch distributor gear to freewheel

  Note:
  The switch **50** is under the center console.

60 EMERGENCY OFF switch*****

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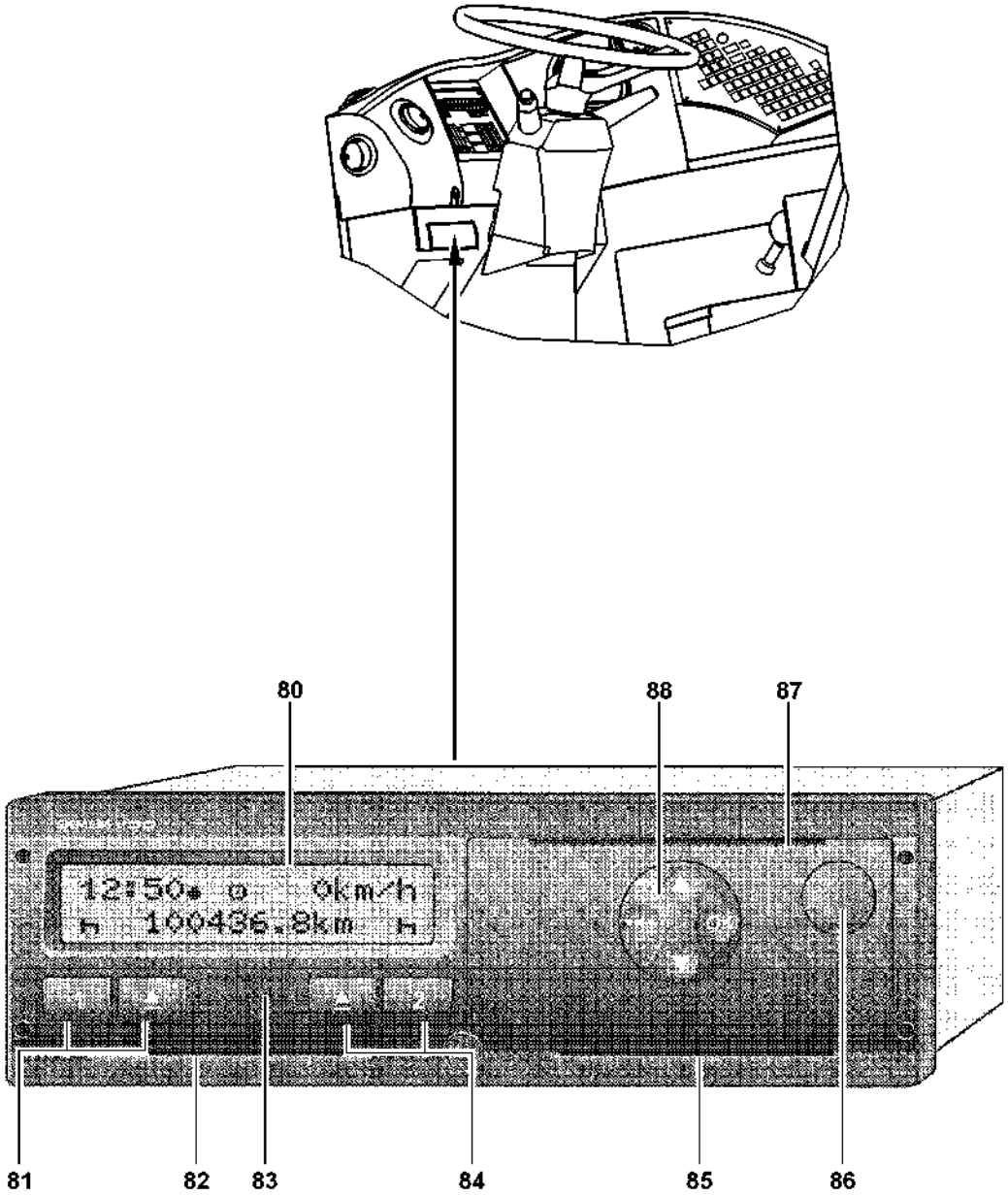

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Fig.104055

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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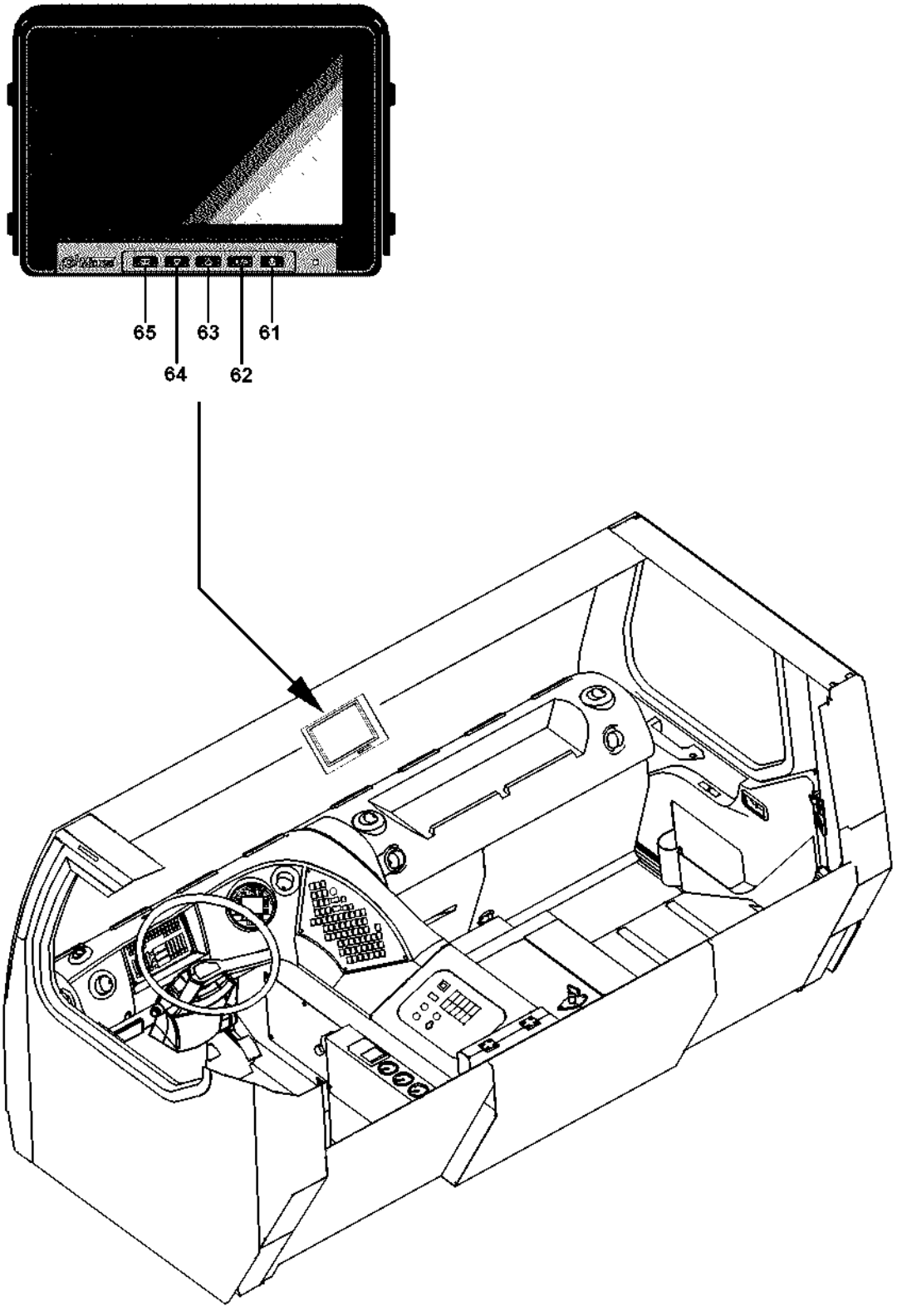

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Fig.107909

3 Operating elements on camera-monitor*

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 Button „Plus“
- By pressing the „Plus“ key, the value of a setting is increased.

64 Button „Minus“
- 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: Setting the language (English, French, German, Spanish, Italian, Portuguese).
  – Standard: Reset to default settings.

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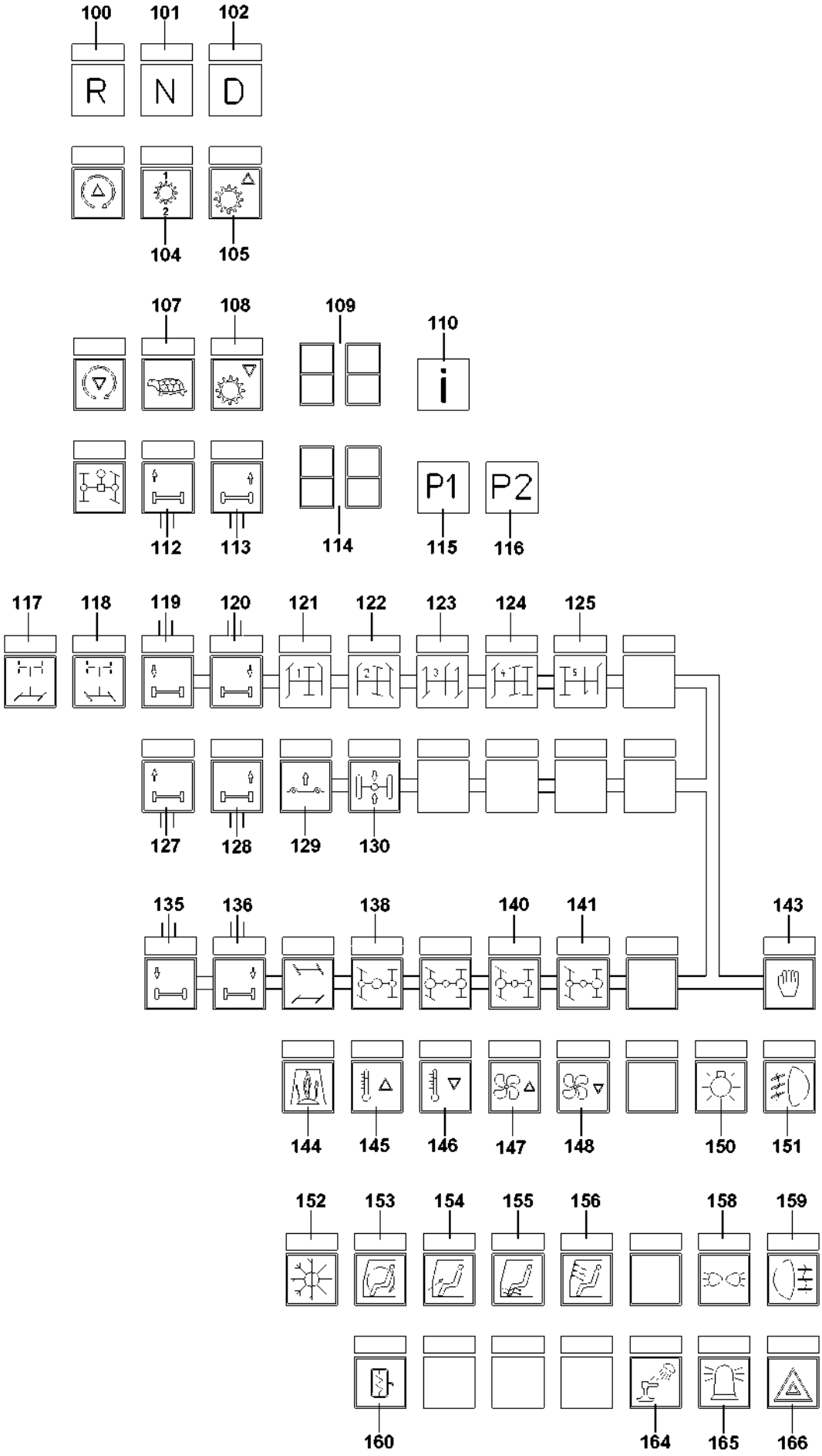

Fig.114310

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
- Activating 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 **225** shows how much engine oil must be added or drained.

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

122 2-hand button
- Add „All-wheel steering“ steering program

123 2-hand button
- Add „Crabwalk steering“ steering program

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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 mode, road driving

130 2-hand button
- Blocking 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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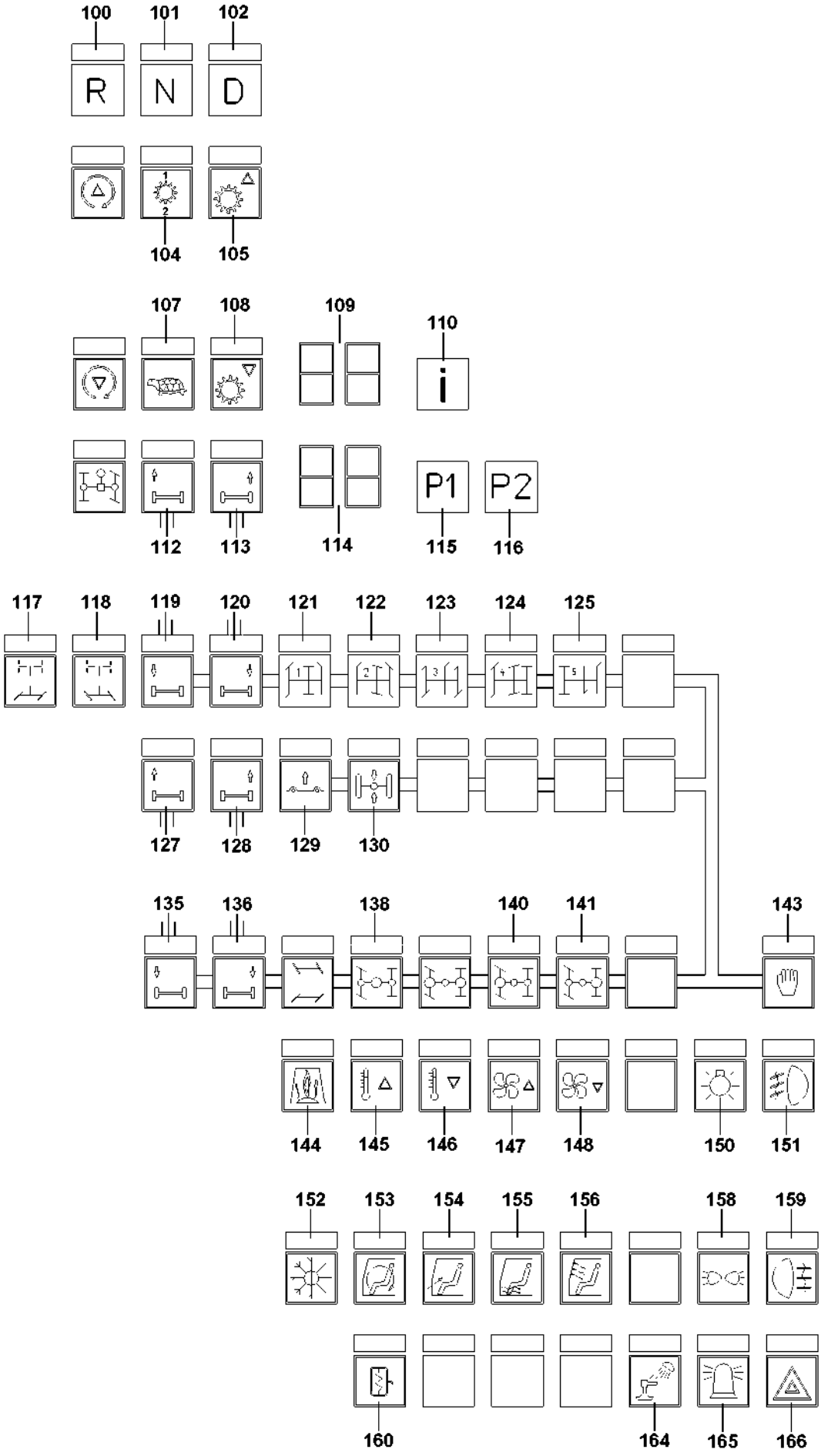

Fig.114310

138 2-hand button
- Addition of longitudinal differential locks in transfer gearbox and axle 4 + addition of axle 1 (with 10x8 drive*****)

140 2-hand button
- Addition of transversal differential lock axle 1 (with 10x8 drive*****) + axle 2

141 2-hand button
- Addition of transverse differential locks axle 4 + axle 5

143 2-hand button
- Confirmation for 2-hand operation
  Note:
  The „2-hand button“ must be operated for:
  Vehicle level regulation.
  Add steering programs.
  Add differential locks.
  Blocking 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 lights

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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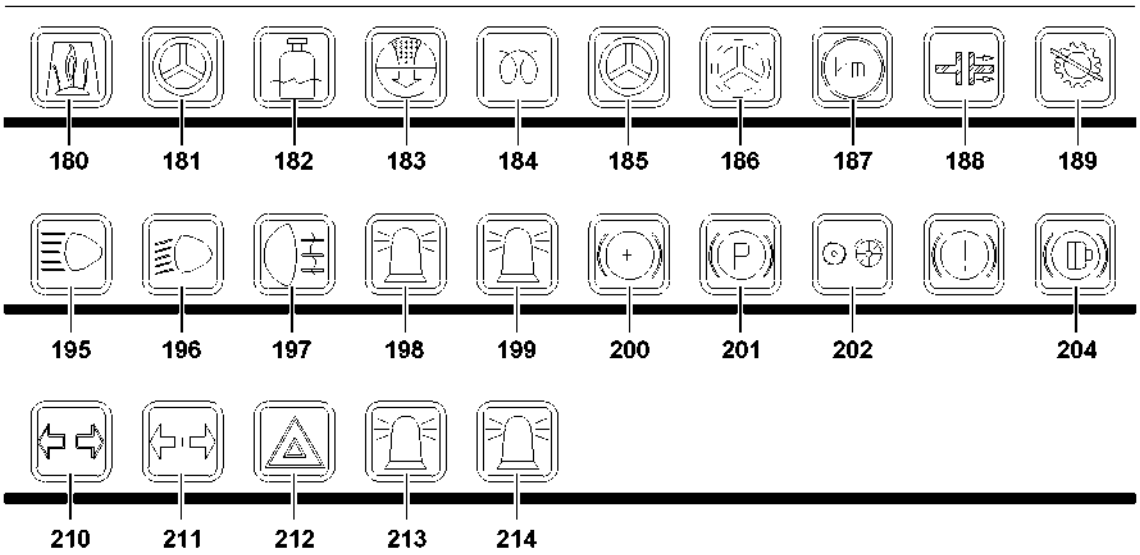

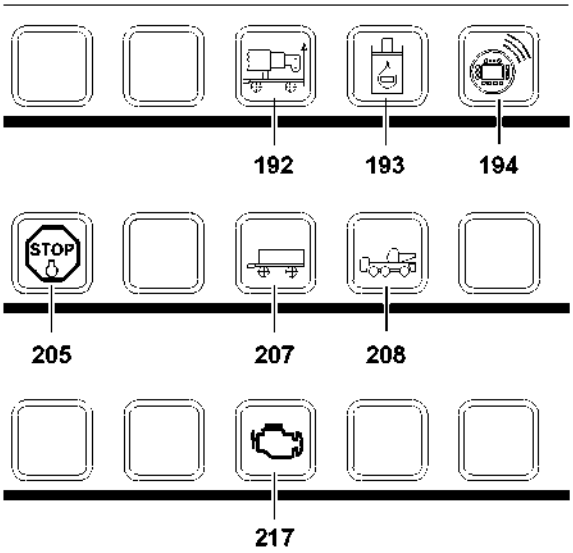

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Fig.113788

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 II (steering pump)

186 Warning light
- Steering circuit I (auxiliary steering pump)

187 Warning light
- Speed limiter

188 Indicator light
- Clutch released, control light illuminates during:
  - Start up procedure, service brake + „Drive range switch forwards D“ operated.
  - Shifting procedure

189 Warning light
- Transmission error

192 Indicator light*****
- Release for Dolly mode*****
  Blinks: When driving with the dolly***** and the hydraulic oil pressure for the release of the slewing gear brake / luffing cylinder lowering brake drops below a permissible range.

193 Indicator light*****
- Automatic brake force reduction

194 Indicator light
- Bluetooth™ Terminal
  Off: BTT turned on and in charging cradle.
  Lights up: BTT turned to radio operation and emergency-off function on BTT activated.
  Blinks fast: BTT not in charging cradle, faulty or turned off.
  Blinks slowly: Data transmission error.

195 Indicator light
- High beam

196 Indicator light
- Low beam

197 Indicator light
- Rear fog lights

198 Indicator light*****
- Rotating beacon

199 Indicator light*****
- Rotating beacon

200 Indicator light
- Engine brake active

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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 occurence is present, the warning light **205** lights up or blinks.
  If required: Turn the engine off!
  Pay attention to system errors and remedy the cause of errors immediately.

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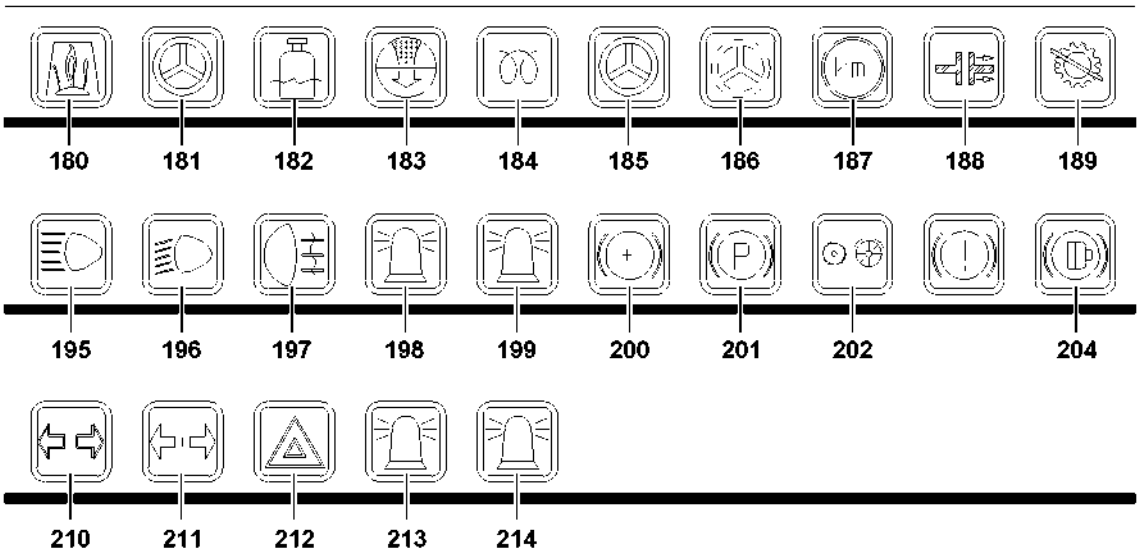

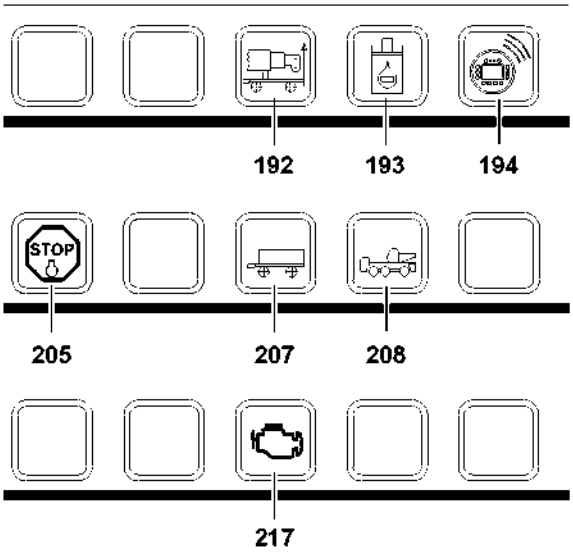

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Fig.113788

207 Indicator light*****
- ABS on trailer
  ABS Antilock Brake System.
  Lights up: ABS error.
  Blinks: Communication error between ABS vehicle electronics
  At a driving speed in trailer mode of more than approx. 10 km/h , this warning light must turn off.

208 Indicator light
- **Off**: ABS ok.
  Lights up: ABS error
  Blinks: Error Data transfer CAN.

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 after treatment.
  Note:
  If a warning occurrence is present, the indicator light **217** lights up or blinks and a signal sounds!
  Pay attention to system errors and remedy the cause of errors immediately!

Engine stage 3b:
- Indicator light off: Exhaust aftertreatment OK.
- The indicator light blinks: Urea is getting low or faulty function of the exhaust aftertreatment.
  Note:
  Add urea or remedy the faulty function of the exhaust aftertreatment!
- Indicator light on statically: Urea almost empty or faulty function of the exhaust aftertreatment.
  Note:
  Add urea immediately or remedy the faulty function of the exhaust aftertreatment!

Engine TIER 4i:
- Indicator light off: Exhaust aftertreatment OK.
- The indicator light blinks: Urea is getting low or faulty function of the exhaust aftertreatment.
  The maximum driving speed is reduced.
  Note:
  Add urea or remedy the faulty function of the exhaust aftertreatment!
- Indicator light on statically: Urea almost empty or faulty function of the exhaust aftertreatment.
  The maximum driving speed is significantly reduced.

Note

▶ The reduction of the maximum driving speed is made in stages.

WARNING

Significant limitation of driveability!
Due to the reduction of the maximum driving speed, dangerous situations can occur!
The mobile crane can obstruct traffic!

▶ Add urea in time or remedy faulty function of the exhaust aftertreatment!

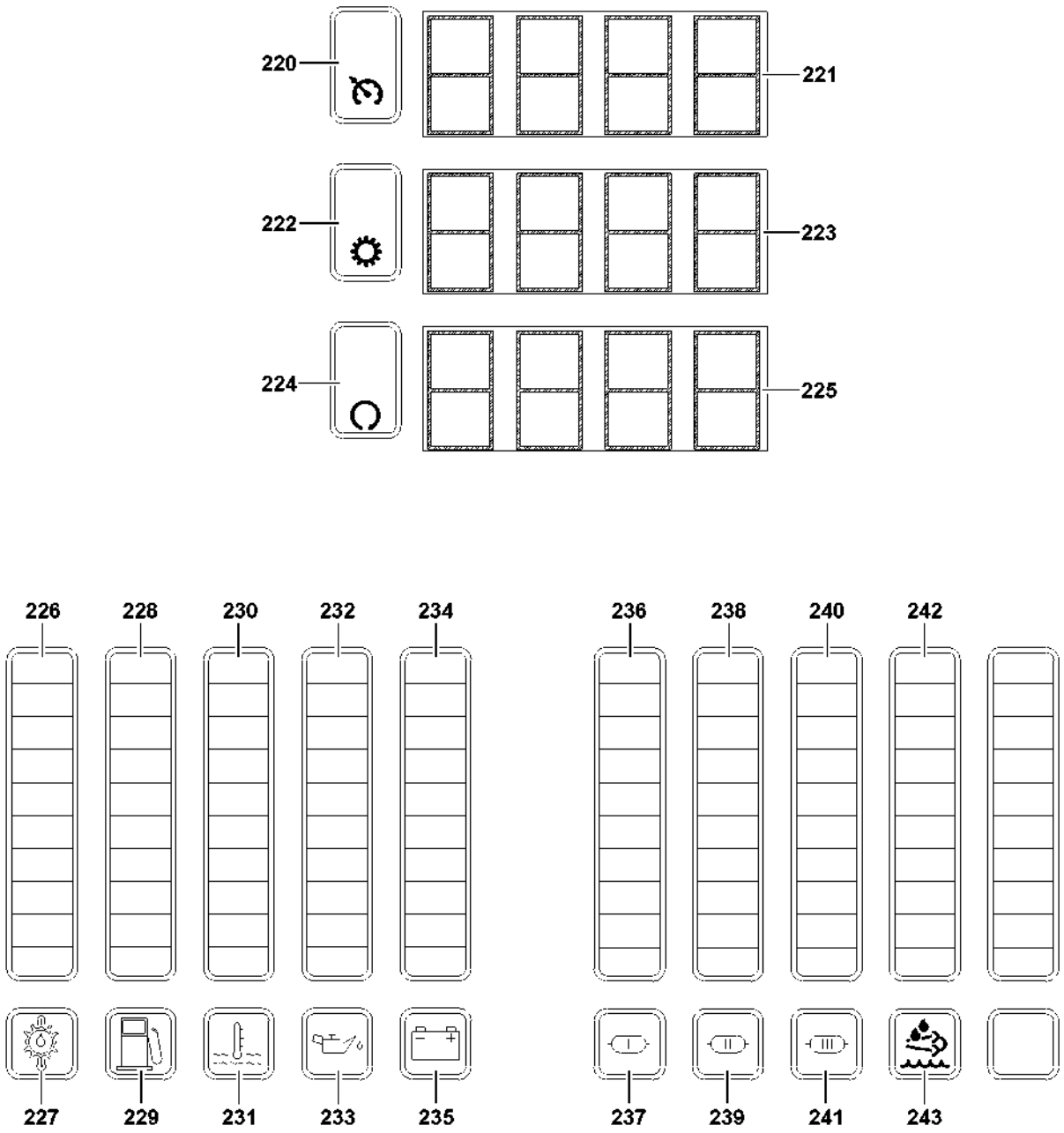

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Fig.113745

220 Indicator light
- Tempomat or Temposet active

221 Display
- Speed in [km/h]

222 Display
- Transmission in neutral „N“

223 Display
- Gear indicator

  Note:
  Brief display of Tempomat and Temposet speed settings.

224 Warning light
- Excessive engine rpm

225 Display
- Engine speed [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.

226 Bar graph
- Gear oil temperature [deg], 50 °C 140 °C

227 Warning light
- Gear oil temperature too high

228 Bar graph
- Fuel reserve [%], 0 to 100 %

229 Warning light
- Fuel reserve less than 10 %

230 Bar graph
- Engine coolant temperature [deg], 30 °C 120 °C

231 Warning light
- Engine coolant temperature or charge air temperature too high or engine error

232 Bar graph
- Engine oil pressure [bar], 0 bar 10 bar

233 Warning light
- Oil pressure too low / oil temperature too high

234 Bar graph
- Battery voltage [V], 21 V 30 V

235 Warning light
- Charge monitoring

236 Bar graph
- Compressed air supply I [bar], 0 bar 10 bar

237 Warning light
- Compressed air supply I less than 5.5 bar

238 Bar graph
- Compressed air supply II [bar], 0 bar 10 bar

239 Warning light
- Compressed air supply II less than 5.5 bar

240 Bar graph
- Compressed air supply III [bar], 0 bar 10 bar

241 Warning light
- Compressed air supply III less than 5.5 bar

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242 Bar graph
- Urea reserve [%], 0 to 100 %

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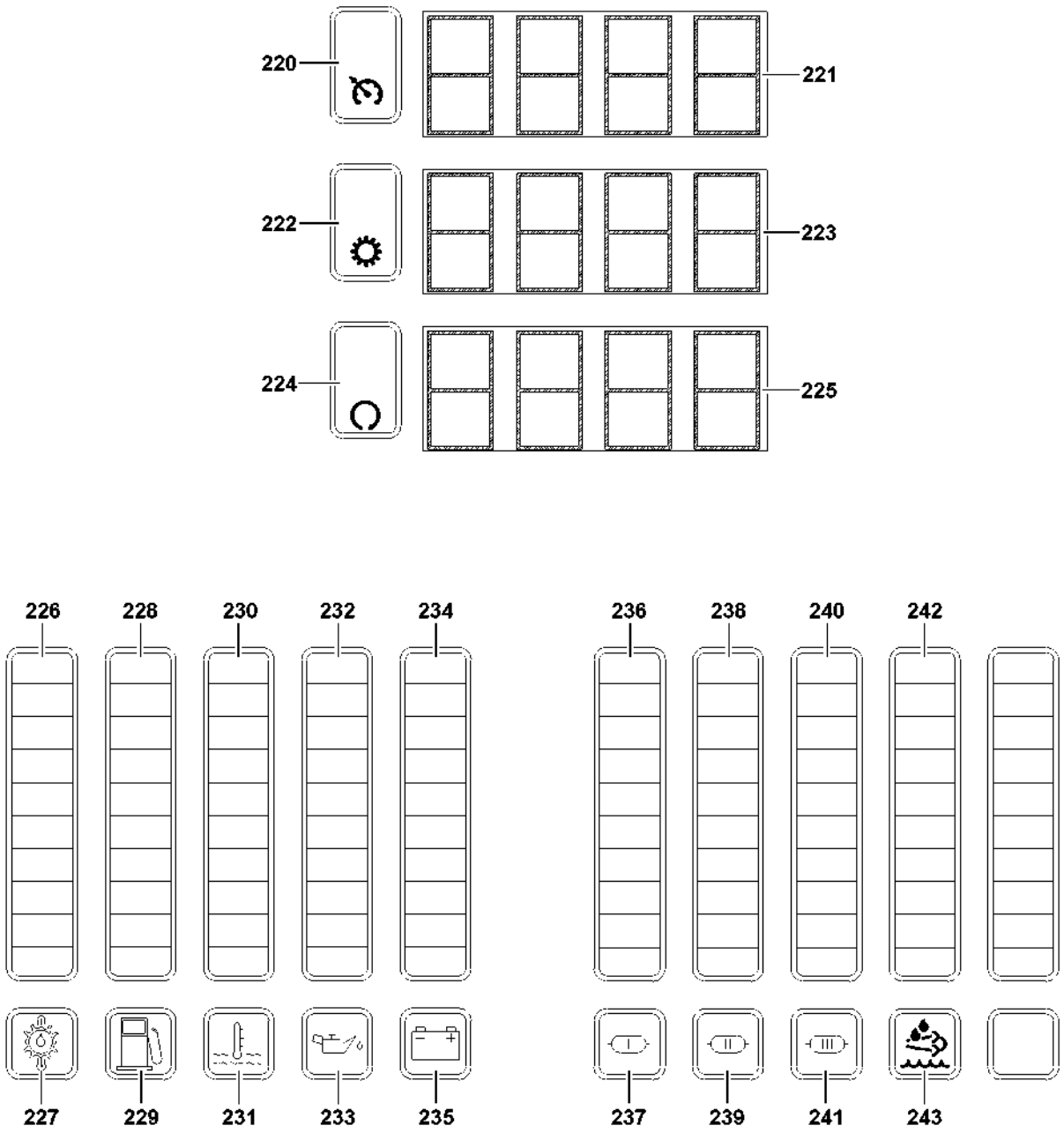

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Fig.113745

243 Indicator light

- Urea tank

  Note:

  If a warning occurrence is present, the indicator light **243** lights up or blinks and a signal sounds!

  Pay attention to system errors and remedy the cause of errors immediately!

Engine stage 3b:

- Indicator light off: Urea available.
- Indicator light on statically: Urea is getting low or faulty function of the exhaust aftertreatment.

  Note:

  Add urea or remedy the faulty function of the exhaust aftertreatment!
- The indicator light blinks: Urea almost empty or faulty function of the exhaust aftertreatment.

  Note:

  Add urea immediately or remedy the faulty function of the exhaust aftertreatment!

Engine TIER 4i:

- Indicator light off: Urea available.
- Indicator light on statically: Urea is getting low or faulty function of the exhaust aftertreatment.

  The maximum driving speed is reduced.

  Note:

  Add urea or remedy the faulty function of the exhaust aftertreatment!
- The indicator light blinks: Urea almost empty or faulty function of the exhaust aftertreatment.

  The maximum driving speed is significantly reduced.

Note

▶ The reduction of the maximum driving speed is made in stages.

WARNING

Significant limitation of driveability!

Due to the reduction of the maximum driving speed, dangerous situations can occur!

The mobile crane can obstruct traffic!

▶ Add urea in time or remedy faulty function of the exhaust aftertreatment!

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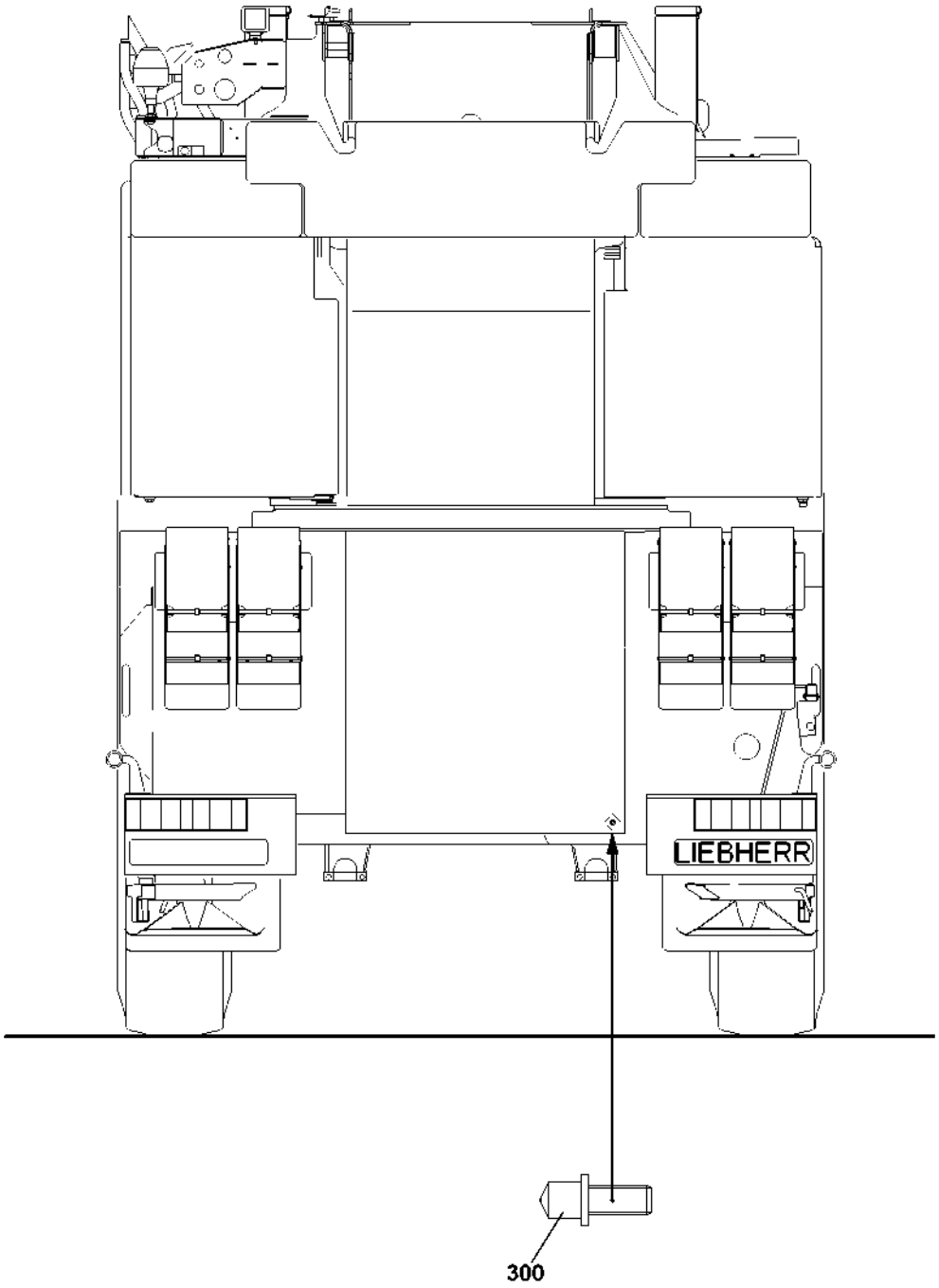

Fig.197504

6 Grounding the mobile crane

300 Pin

- Ground connection
  Note:
  In order for the mobile crane to be grounded, the pin **300** for the ground connection is installed. To ground the mobile crane, see Crane operating instructions chapter 2.04.

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Fig.195219

1 General checks before starting to travel

Various checks must be performed every time before operating 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 circuit 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 chapter 7.06 and chapter 7.07 in the Crane operating instructions and the separately supplied drawings!

1.1 Checking the coolant level

WARNING
Danger of injury due to scalding of the skin!
- ▶ Never open the cap on the coolant reservoir as long as the engine is warm! The cooling system is under pressure!
- ▶ To protect face, hands and arms from hot steam of hot coolant, cover the cap with a large rag when opening!

- ▶ Check the coolant level.

If the coolant level is too low:

- ▶ Add coolant, see Crane operating instructions, chapter 7.04.

1.2 Checking the tires

While doing this, also check the spare tire*****.

Note
- ▶ See Crane operating instructions, chapter 8.01.

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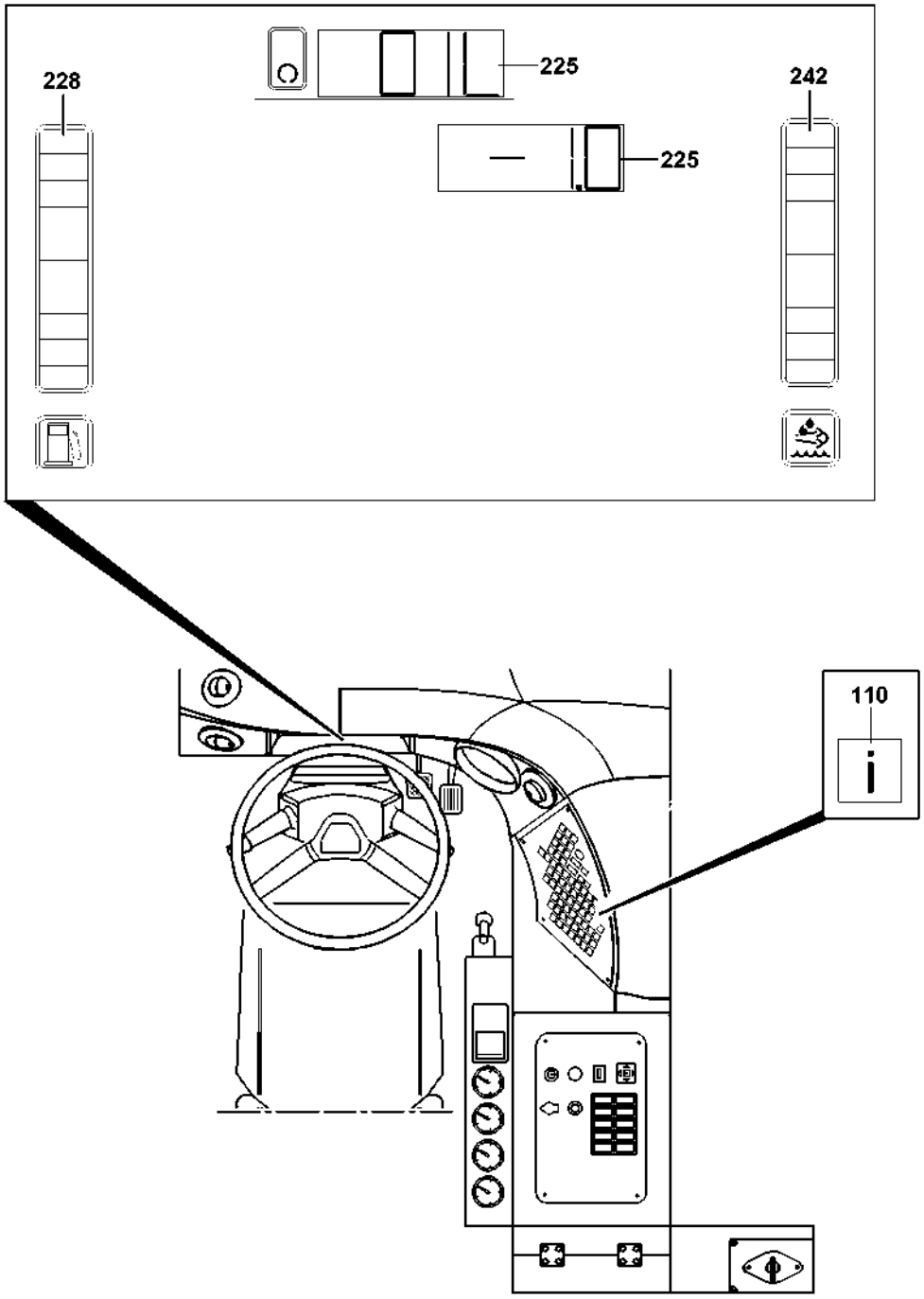

Fig.113349

1.3 Checking the oil levels and filters

- ▶ Turn the ignition on.
- ▶ Press the button **110** until display **225** engine oil level shows „OIL“.

Note

- ▶ The display **225** of the engine oil level shows how much engine oil is to be added or drained.
- ▶ Example: 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.

- ▶ Check the oil level in automatic transmission and distributor gear.
- ▶ Check the oil level in the hydraulic reservoir for steering, support and axle suspension.
- ▶ Check the filter on the hydraulic oil tank.

1.4 Checking the fuel level

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 reserve on the display **228**.

1.5 Checking the urea level.

- ▶ Check the ureal reserve on the display **242**.

1.6 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.

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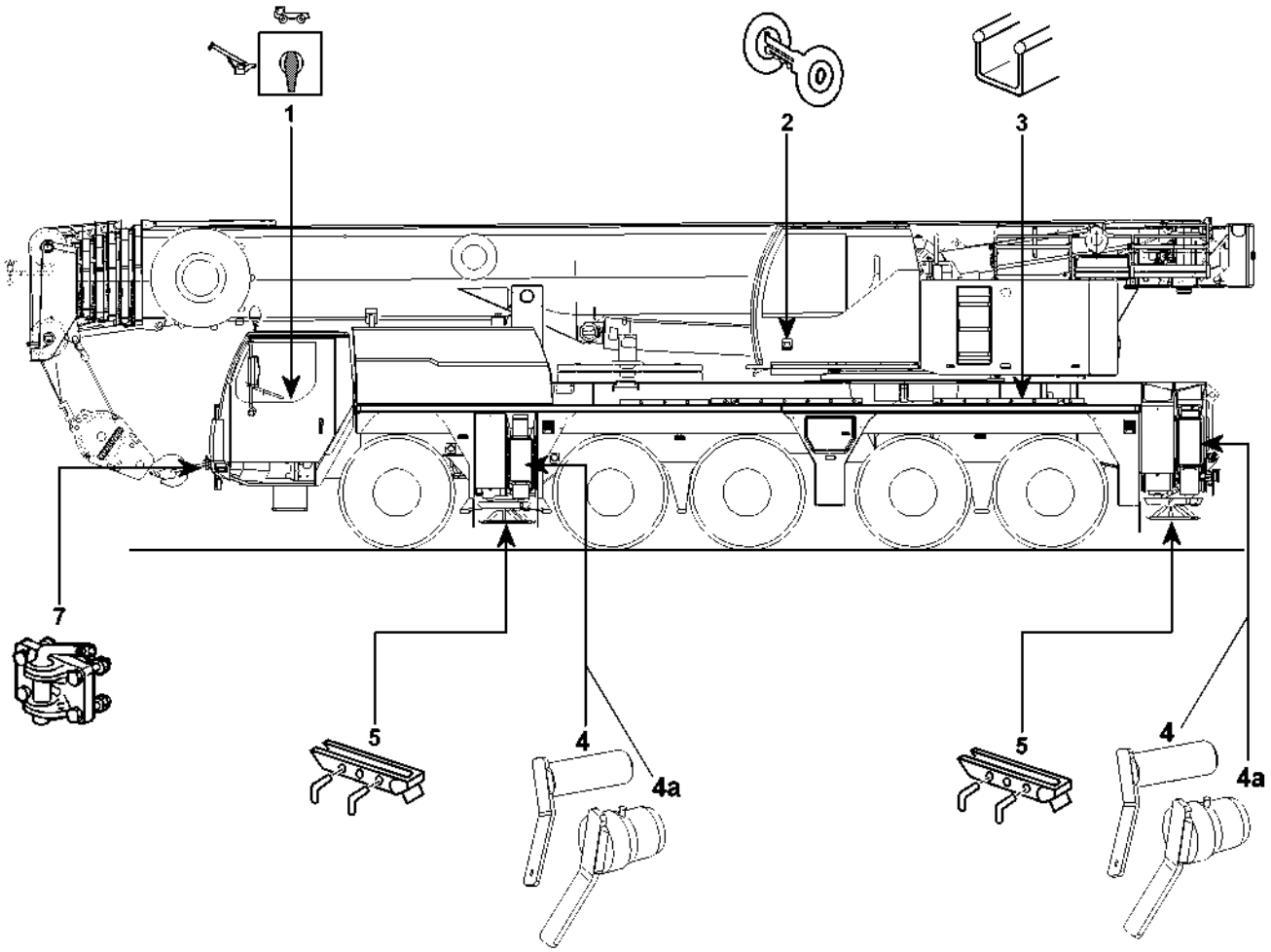

Fig.112197

1.7 Checking the general transport condition

Note
Transport on public highways:
- ▶ For transport on public highways the driving conditions of the crane as described in chapter 3.04 must be adhered to retain the maximum axle load of 12 t.

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 in paragraph „General transport condition“ must be performed!

To be in a suitable condition for transport, all loose parts on the mobile crane must be fastened and secured.

- ▶ While driving, the wind speed sensor may not be installed on the telescopic boom.
- ▶ Point crane superstructure in direction of travel and mechanically lock to prevent twisting.
- ▶ The telescopic boom must be fully telescoped in and placed down on the boom receptacle.
- ▶ Secure the telescopic boom to prevent it from extending by itself.
- ▶ Retract and secure the step next to the crane cab.
- ▶ Close the windows and doors **2** of the crane operator's cab.
- ▶ Secure the assembly ladder under the front bumper.
- ▶ Check that the counterweight is securely fastened to the turntable.
- ▶ Place and secure the folding ladders on vehicle frame **3**.
- ▶ Individually secure the four sliding beams of the hydraulic supports with pins **4** to prevent them from extending unintentionally.
- ▶ Secure the four pins **4a** in the respective transportation retainers.
- ▶ Move the four support plates to the transport position and secure them with pins **5** to prevent them from extending unintentionally.
- ▶ Take the four chocks and secure them in their holders.
- ▶ Secure all locks on tool boxes, cabinet doors and covering.
- ▶ Check that all locking pins used only for crane operation are present and secure them for transport.

A hook block may only be transported at the front if it is permitted in the crane's driving condition. For more information see chapter 3.04.

- ▶ The hook block may only be reeved a maximum of 4 ways and must be hooked and secured to the front tow coupling **7** with the specially provided eyehooks.
- ▶ Set the rotary switch **1** to „Travel mode“.
- ▶ Place the steering program „On-road travel“.
- ▶ Set the axle suspension / axle locking system to level for „suspended“ on-road travel, see chapter 3.03.

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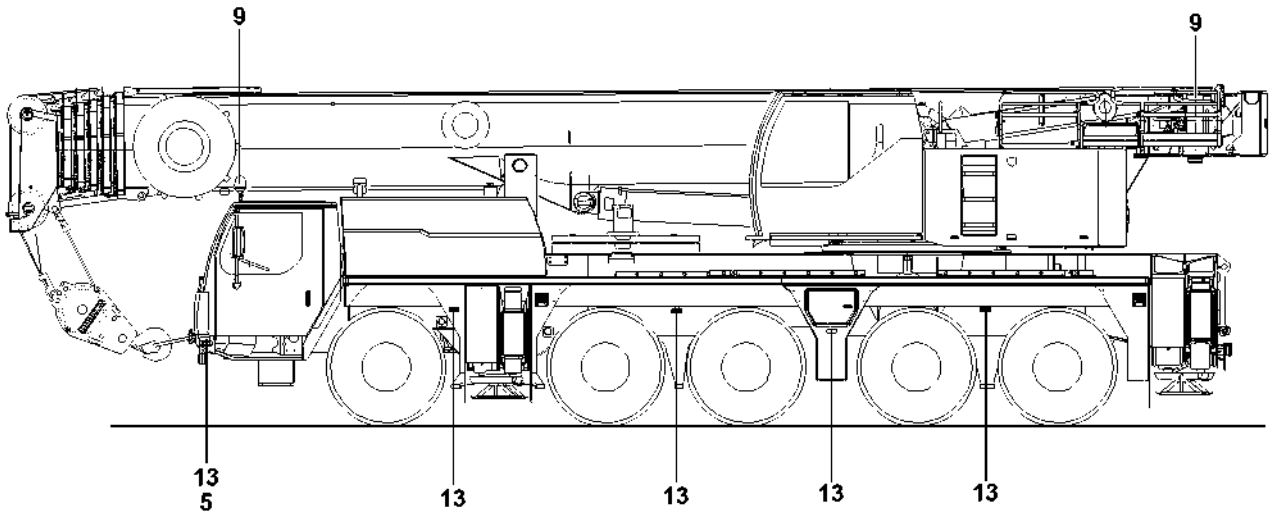

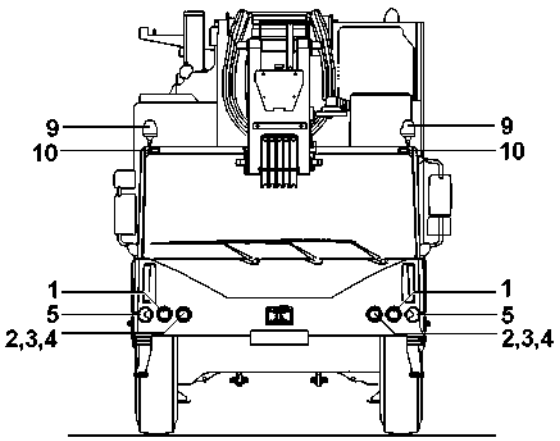

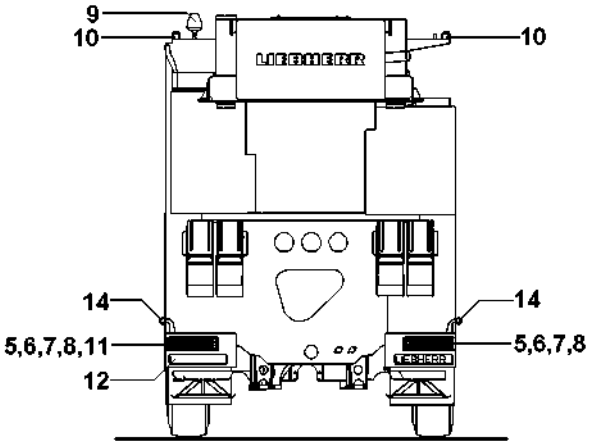

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Fig.112198

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!

Lights on 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
– **10** Outline lights
– **11** Rear fog lights
– **12** License plate illumination
– **13** Side marking lights
– **14** Course holding light

▶ Check all lights before starting to travel.

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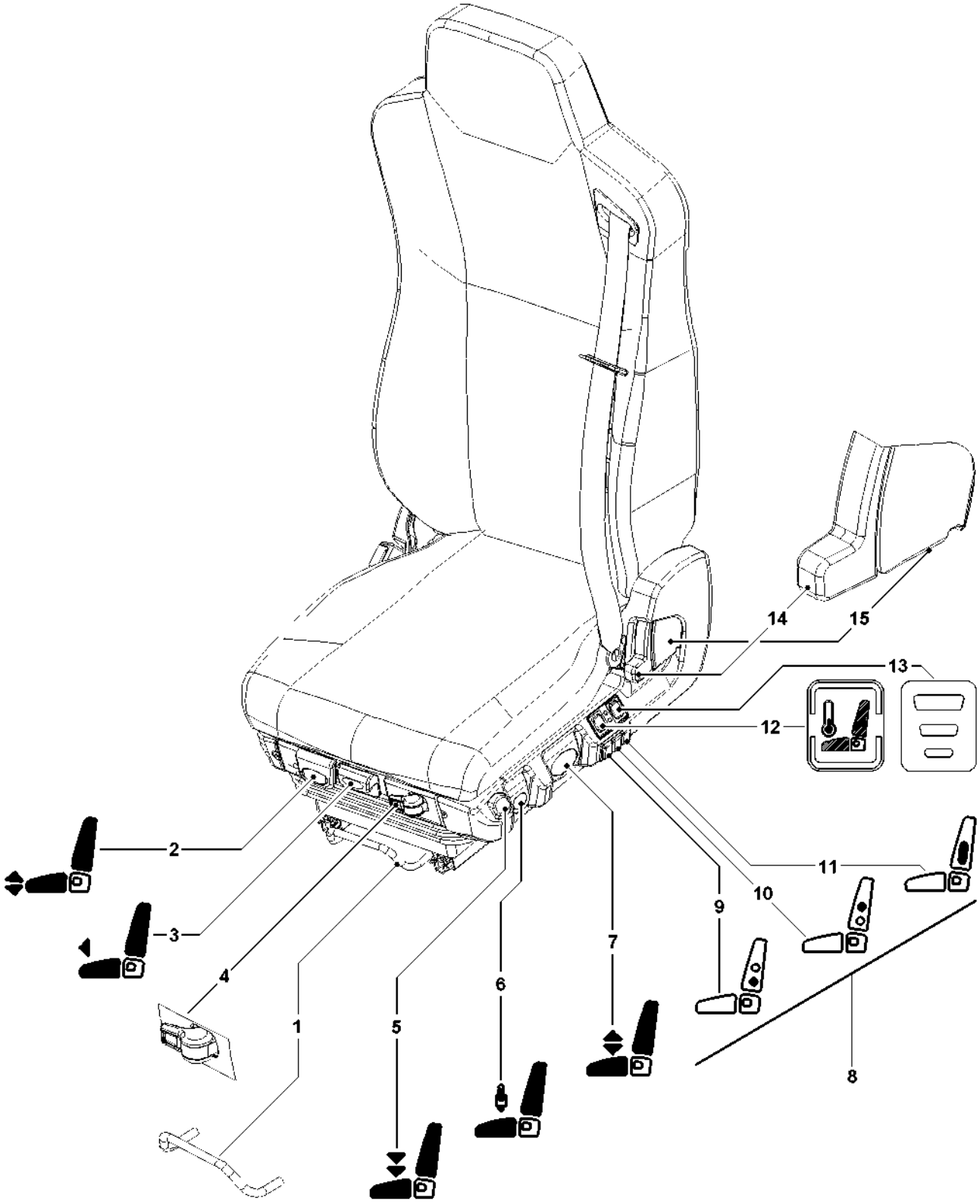

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Fig.103209

2 Work station - Driver's cab

DANGER
Danger of accident due to incorrect mirror and / or steering wheel adjustment!
▶ 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“.

12 Seat heater /seat climate control*****
- **Switch position up:**
  Seat cushion and arm rest heater is turned on.
  Thermostatically regulated seat cushion and arm rest heater.
- **Switch position neutral (center position):**
  No function, switch position „OFF“.
- **Switch position down:**
  Seat cushion and arm rest climate control turned on.

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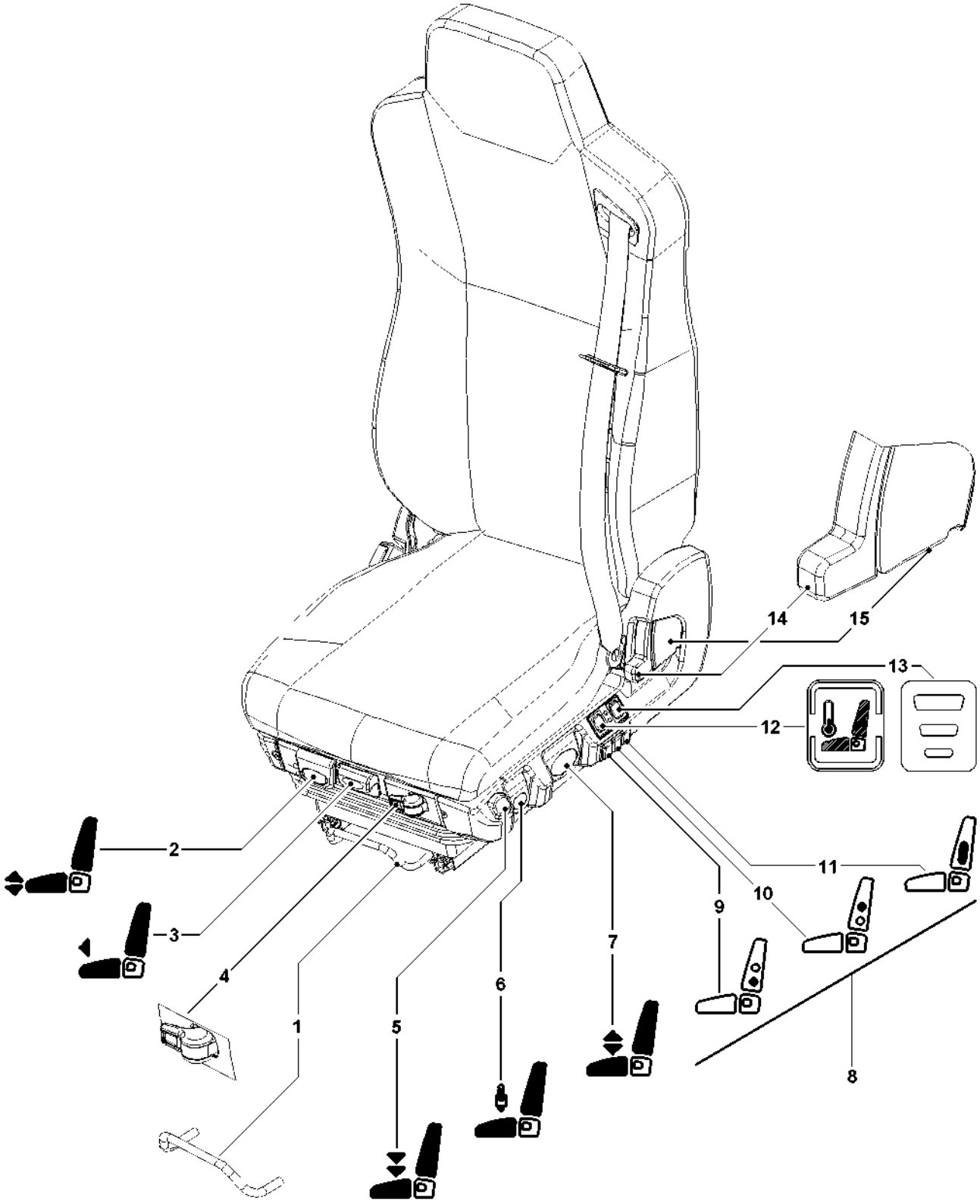

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Fig.103209

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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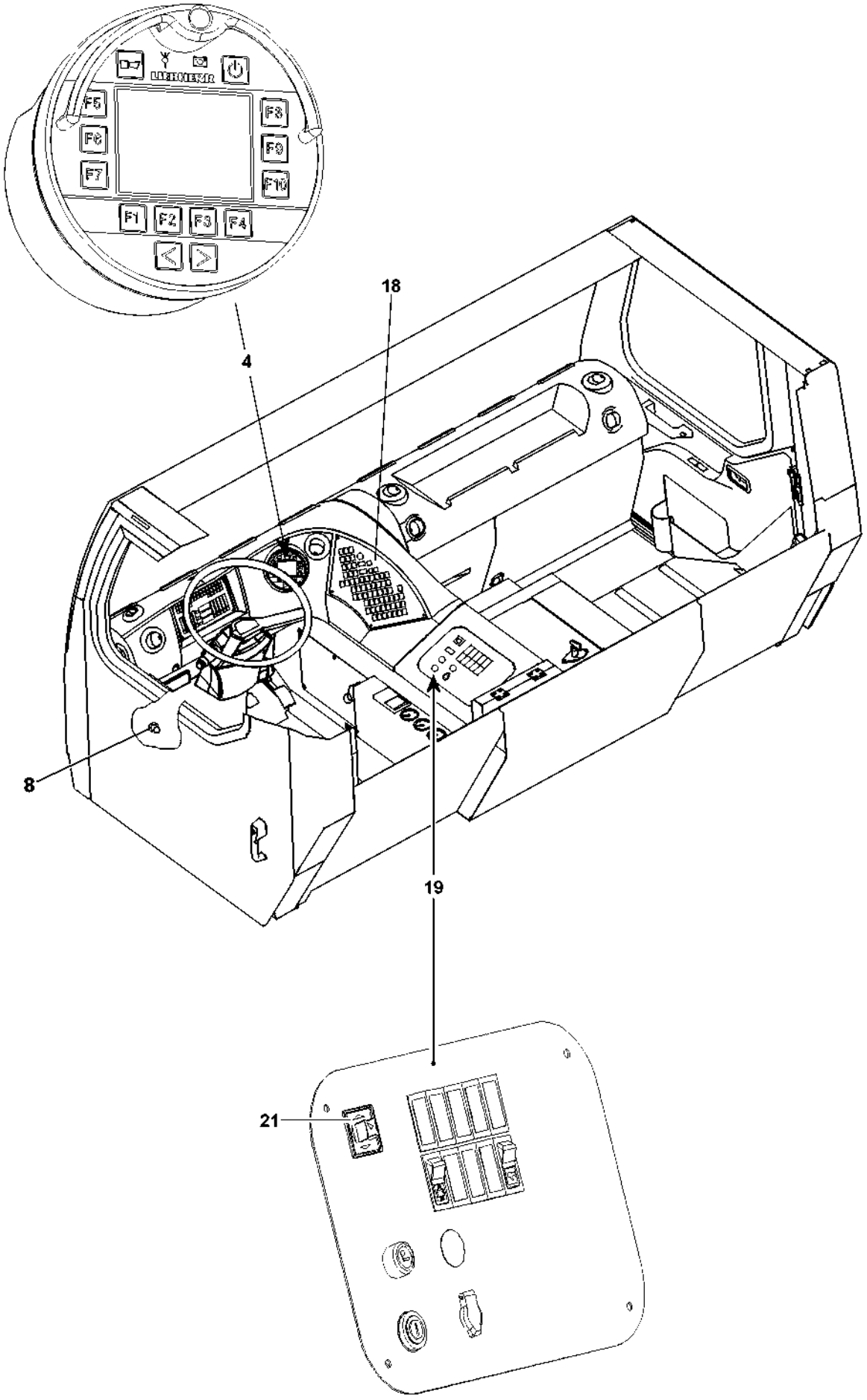

Fig.105661

2.2 BTT (Bluetooth™ Terminal)

Before driving, plug the BTT **4** into the instrument panel.

▶ Insert BTT **4** into the instrument panel.

Result:

– Speed and kilometer data is displayed when driving.
– The rechargeable battery for the BTT is charged.

2.3 Adjusting the mirrors

Clean outside mirrors before starting to travel and adjust to suit the driver's field of view.

▶ Actuate the switch **21** on the center console **19**.

Result:

– You can switch between the left and right outside mirrors.
– Mirror is adjusted.

2.4 Adjusting the steering wheel

The steering wheel is unlocked pneumatically.

▶ Press the button **8**.
▶ Adjust the angle and height of the steering wheel.

2.5 Turning the heater / ventilation on

The driver's cab can be heated or ventilated to the desired temperature.

For a detailed description, see chapter 6.01.

▶ To adjust the heater or ventilation, use the keypad **18**.

2.6 Fastening the seatbelt

DANGER
Danger of fatal injury if seatbelt is not worn!
If the seatbelt is not worn during travel operation, the driver or the passenger can be fatally injured or killed in case of an accident or full braking action.
▶ All occupants must be wearing the seatbelt before starting to drive the crane and during driving.

▶ Fasten the seatbelt.

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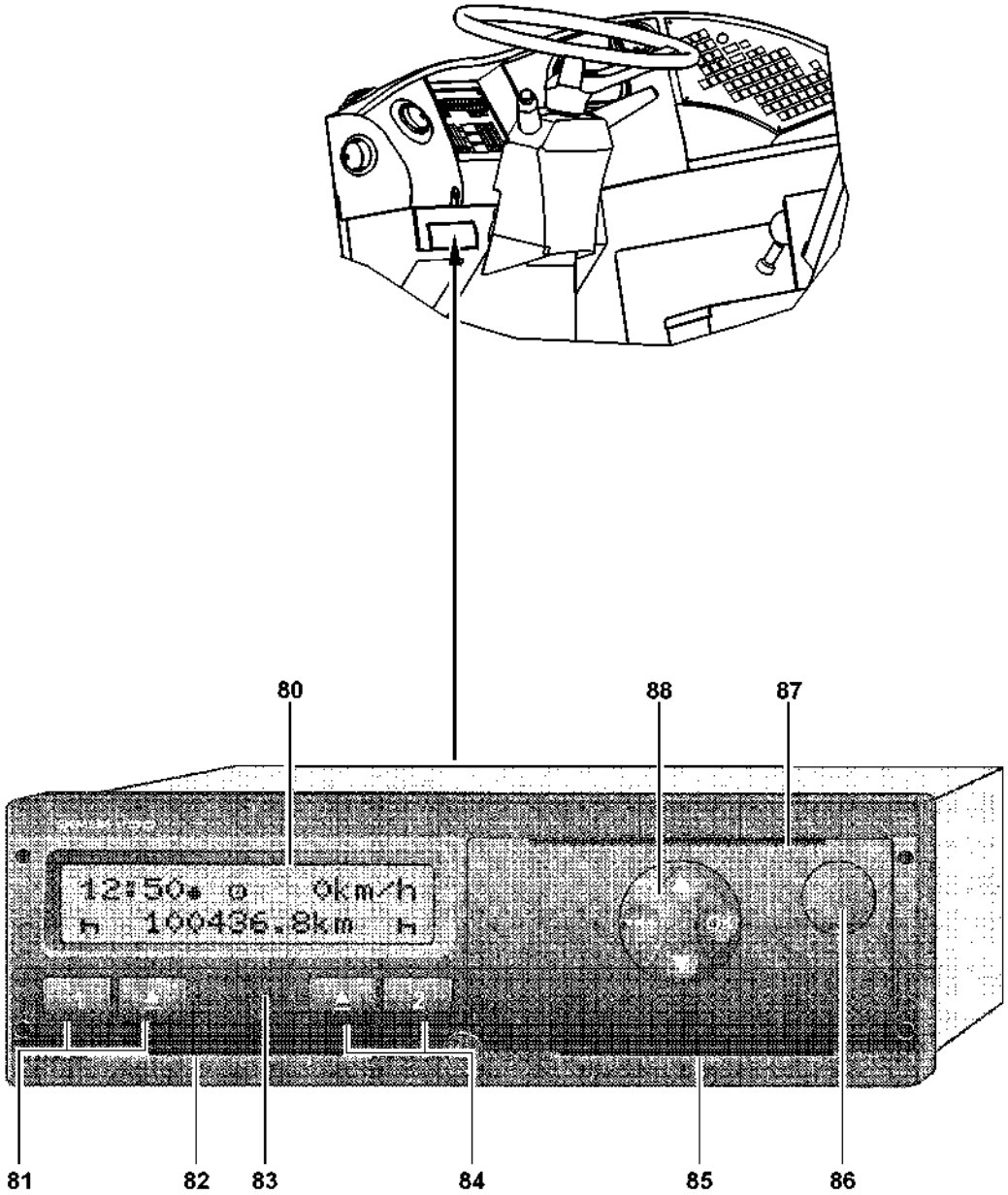

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Fig.104055

2.7 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 travel speed for cranes with active rear axle steering is limited to 40 km/h.
- ▶ 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.

2.7.1 Initial calibration

Note
- ▶ 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).

2.7.2 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.

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 saved every 28 days!

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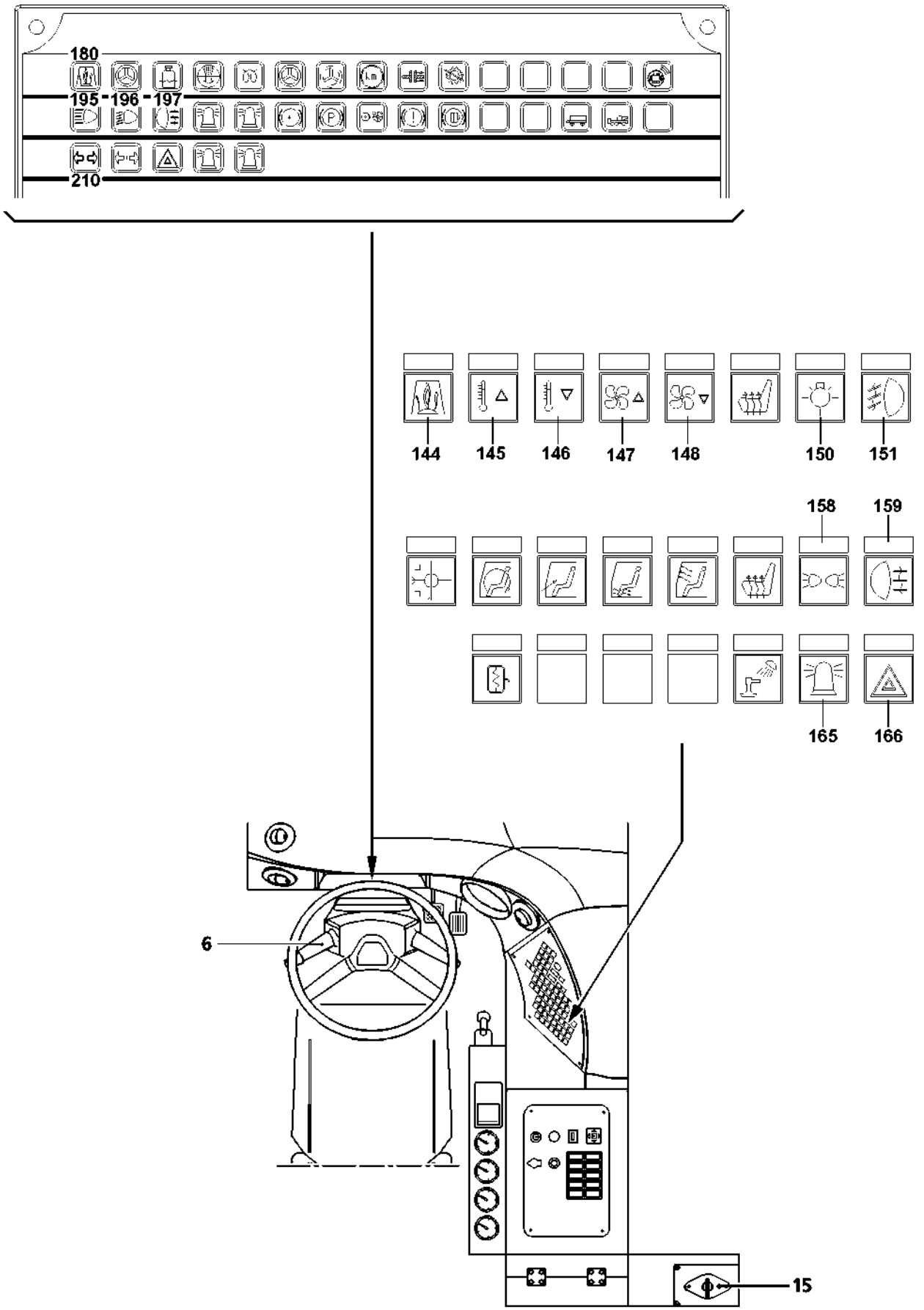

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Fig.105662

2.8 Checking the important operating instruments

DANGER
Risk 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.

2.8.1 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.

2.8.2 Checks with the ignition turned on

- ▶ Headlight: Press the button **150** with function control, check indicator light **195** and indicator light **196**.
- ▶ Fog lights***** (only with headlight or parking light turned on): Press button **151** with function control and check.
- ▶ Rear fog light***** (only with headlight 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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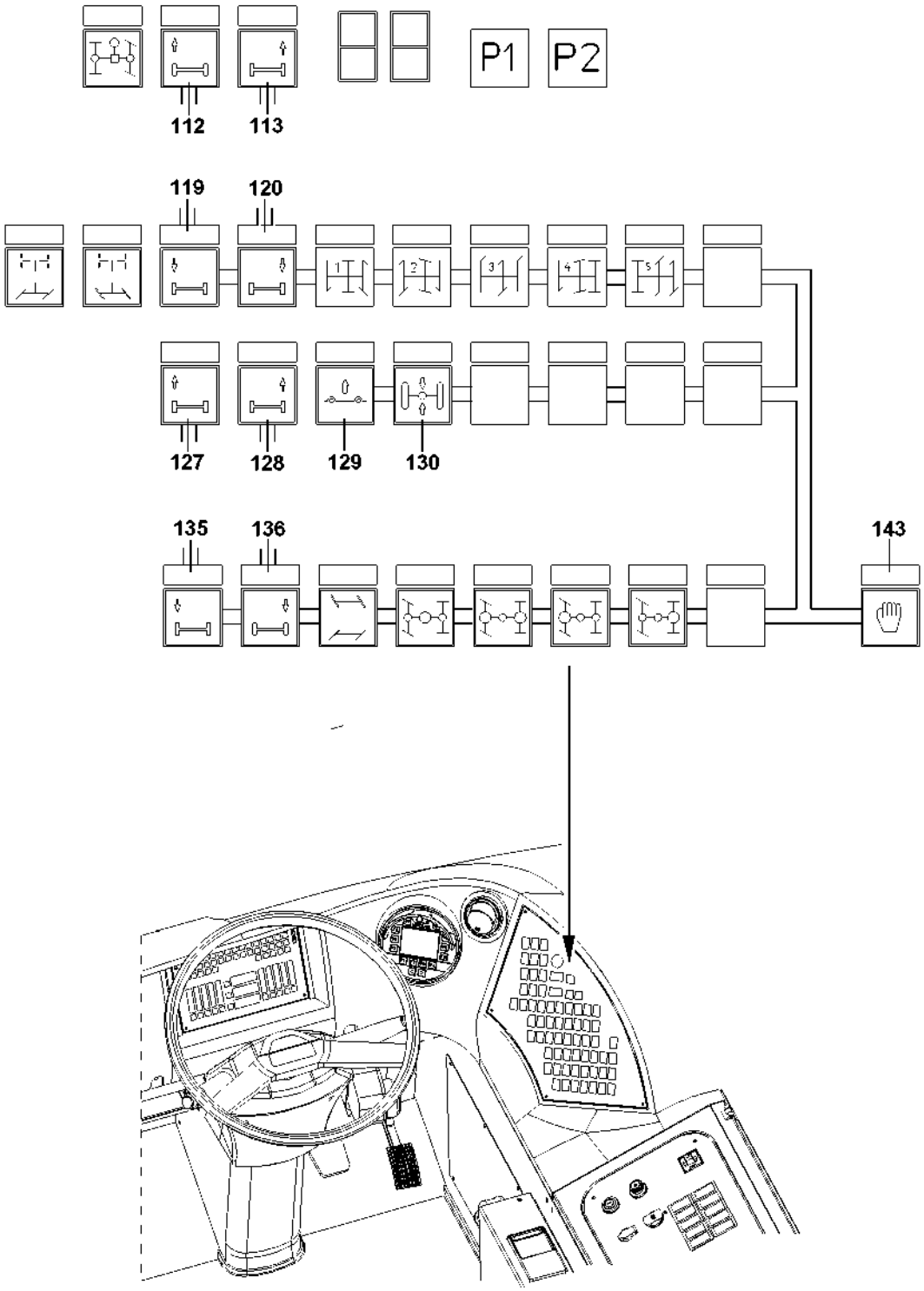

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Fig.109432

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 driving off road, see Crane operating instructions, chapter 3.04.

1.1 Turning the axle suspension on

1.1.1 Turning the axle suspension on from the driver's cab

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 on 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 of the crane!

▶ Press button **143** and button **130**.

Result:

– The function control on button **130** does not light up.
– All axles are suspended in this position.
– The level of the crane can be regulated.

Problem remedy
The function control on the button **130** blinks?
The air pressure reserves is not sufficient to turn the axle blocking system on.
▶ Start the engine and refill the air pressure reserves!

If the function control on the button **130** despite sufficient air pressure reserves:
▶ Contact Liebherr Service to determine the cause of the problem and further procedure!

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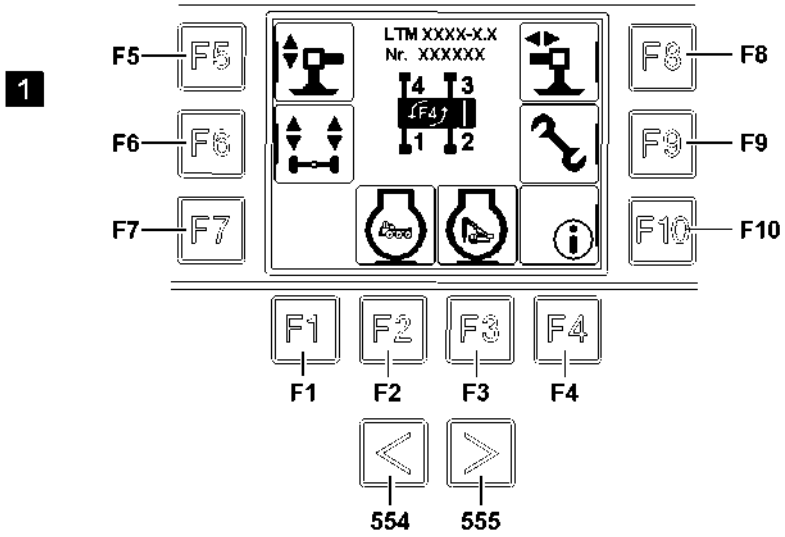

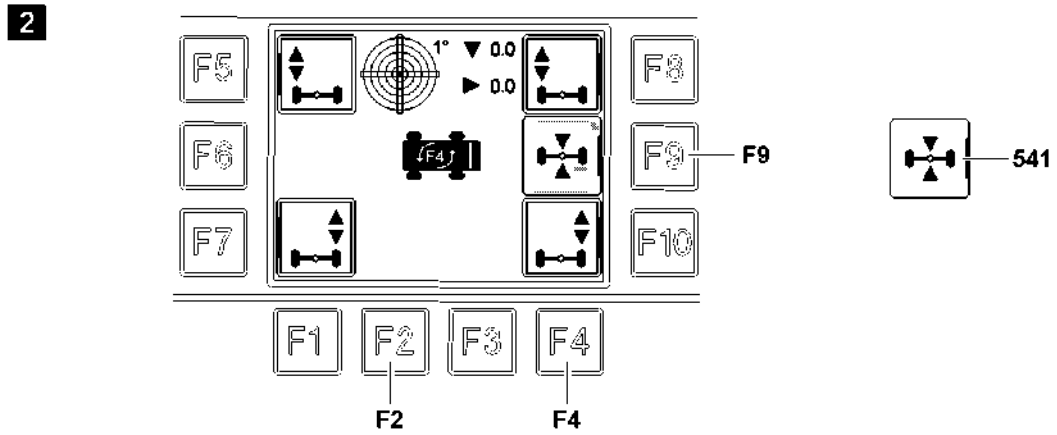

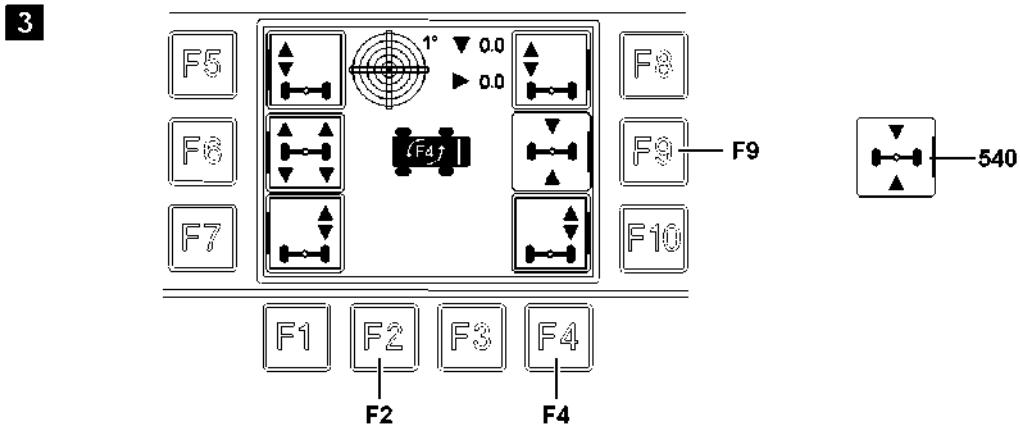

Fig.114545

1.1.2 Turning the axle suspension on on the BTT*

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 on 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 of the crane!

Make sure that the following prerequisites are met:
– The axle suspension is blocked.

▶ Press the function key **F6** and select the „axle suspension“ menu, illustration **1**.
▶ Press the function key **F9**, illustration **2**.

Result:

– The icon **540** is shown on the BTT.
– All axles are suspended in this position.
– The level of the crane can be regulated.

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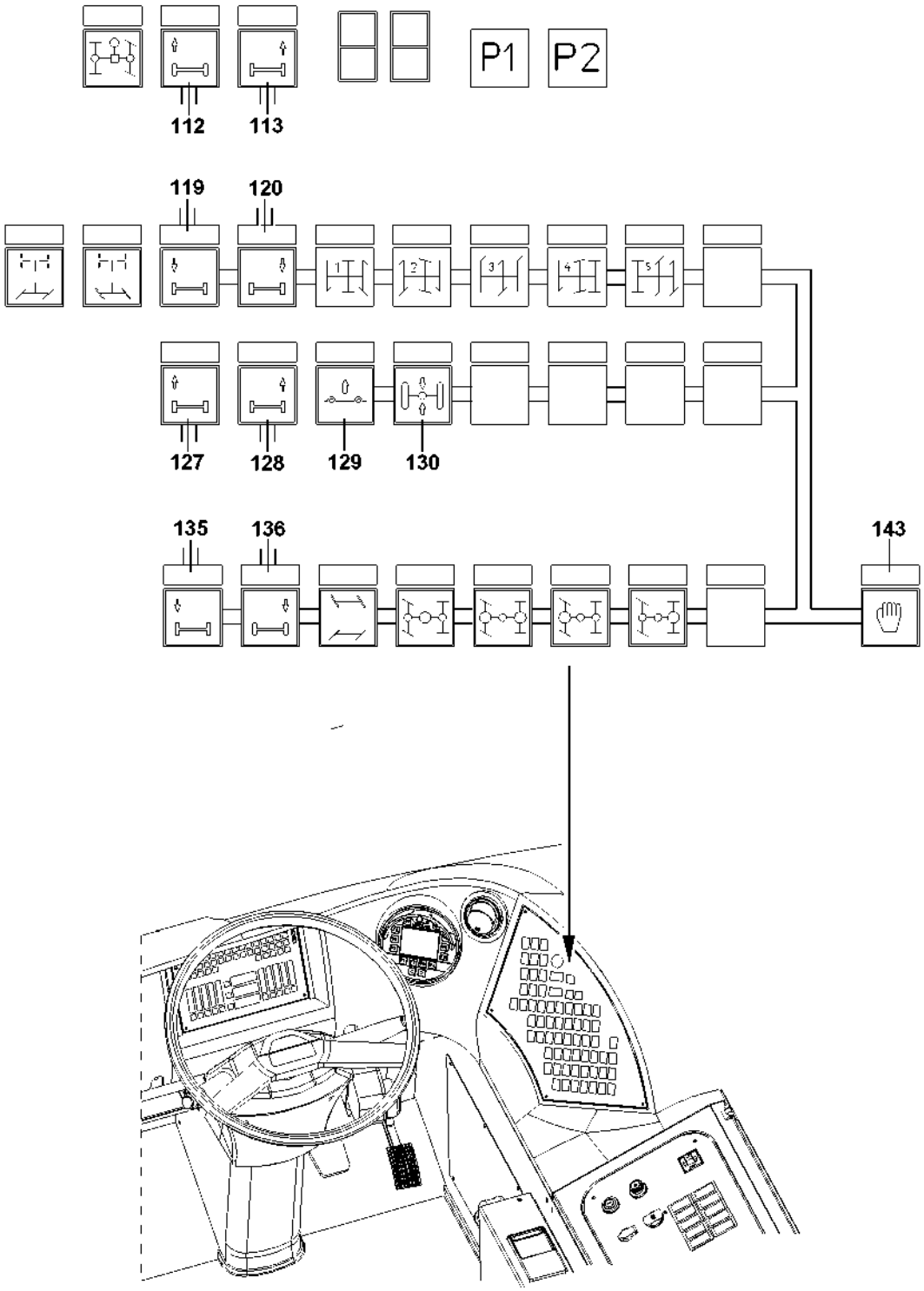

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Fig.109432

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.
– Support 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 of the crane!

2.1.1 Blocking the axle suspension from the driver's cab

Make sure that the following prerequisites are met:
– The axle suspension is suspended.

▶ Press button **143** and button **130**.

Result:

– The function control 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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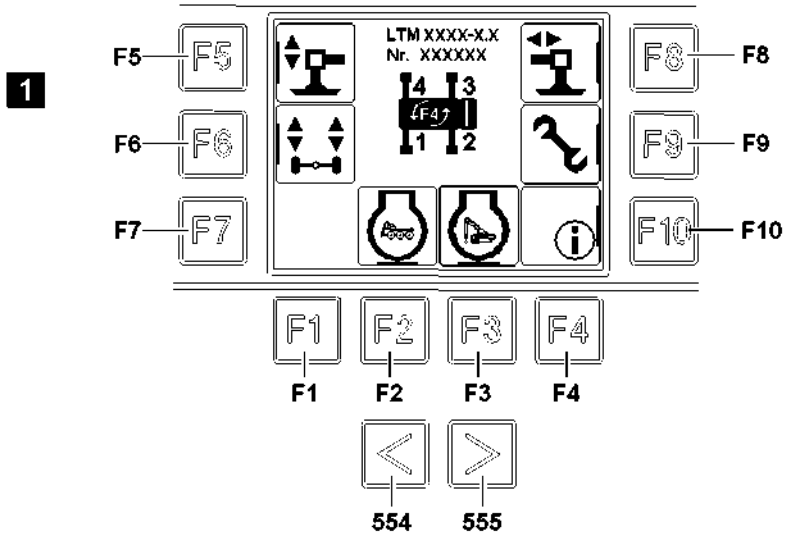

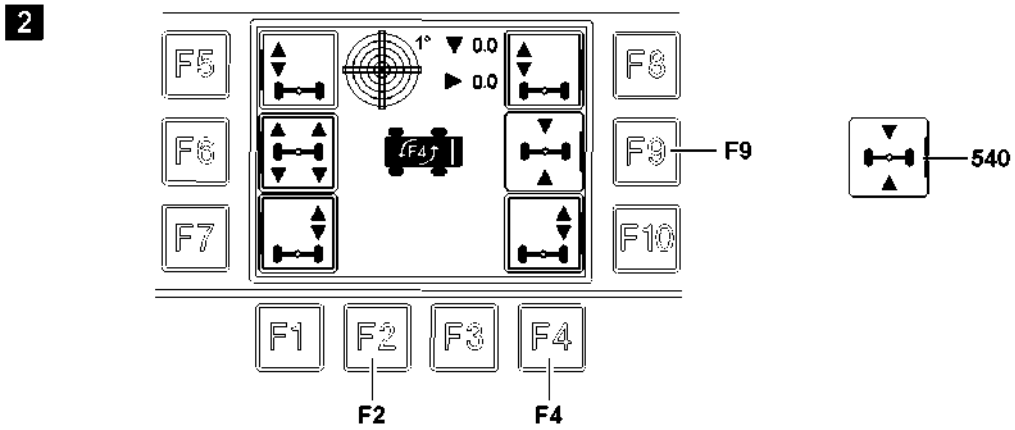

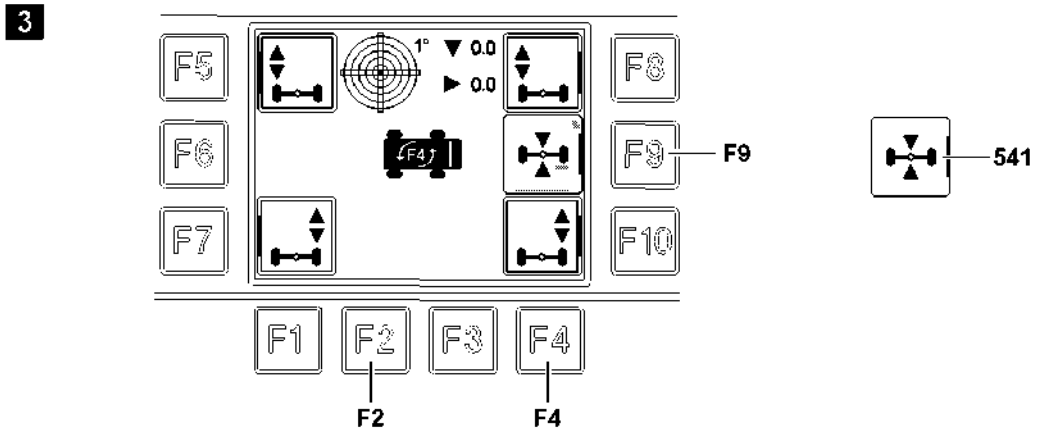

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Fig.114834

2.1.2 Blocking the axle suspension on the BTT*

Make sure that the following prerequisites are met:
– The axle suspension is suspended.

▶ Press the function key **F6** and select the „axle suspension“ menu, illustration **1**.
▶ Press the function key **F9**, illustration **2**.

Result:

– The icon **541** is shown on the BTT.
– All axles are blocked in the current position.
– The level of the crane can be regulated manually.

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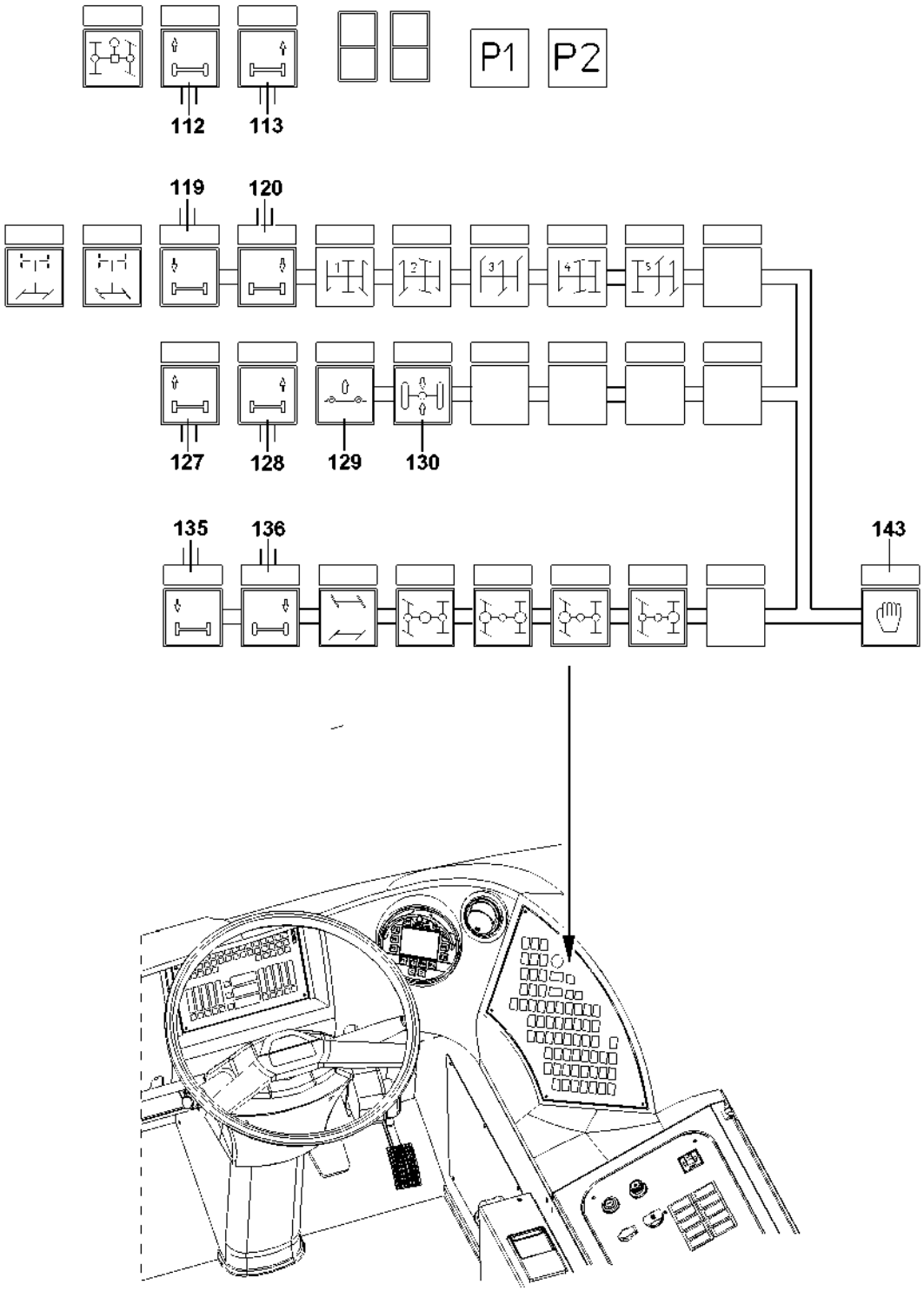

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Fig.109432

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 inclined. 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.

DANGER

Risk of injury when operating the axle suspension system!

▶ Ensure that no persons are present within the crane danger zone of the crane!

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.

Make sure that the following prerequisites are met:

– The vehicle **is standing** on a level surface.
– The engine is running.
– The transmission is in neutral position „N“.

3.1 Level regulation from the driver's cab

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.

After completed level regulation procedure:

– The function control on the button **129** turns off.

Note

▶ If the function control does not turn off when releasing the button **129**, have the problem remedied by an expert.

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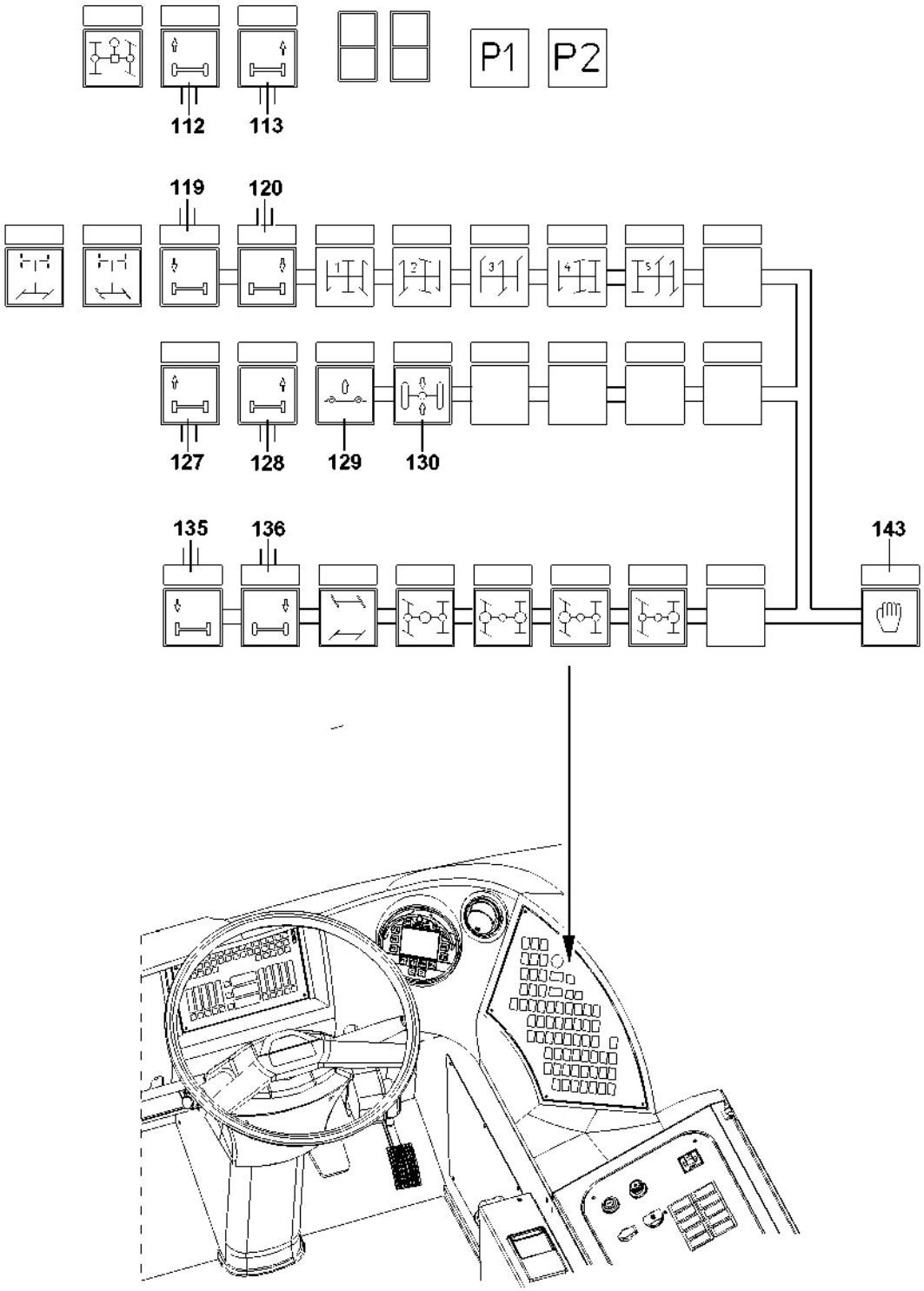

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Fig.109432

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.

Make sure 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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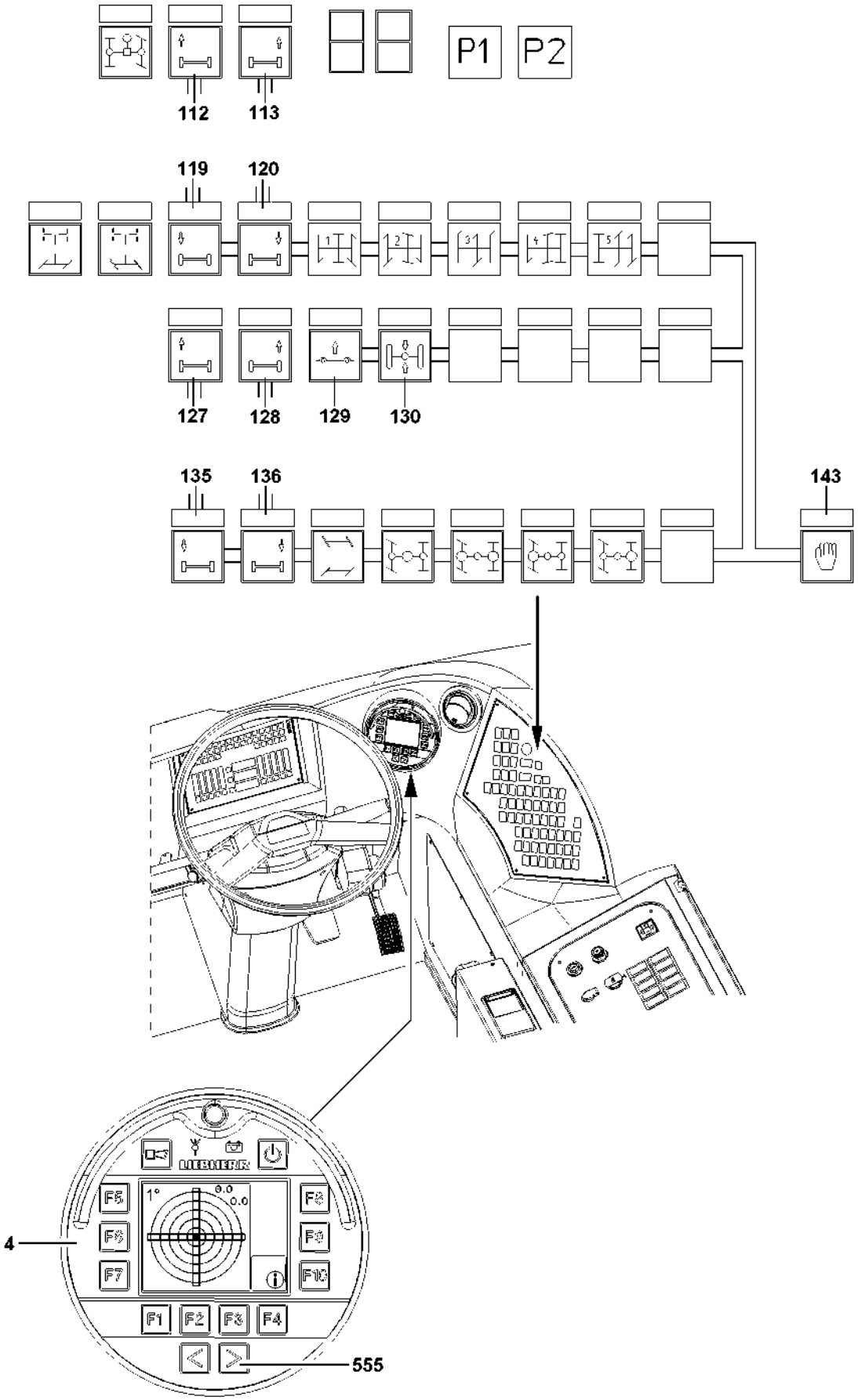

Fig.109433

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 then filled or emptied.

WARNING
Danger 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
▶ If the axle suspension is blocked, the level regulation can be adjusted manually.
▶ If the crane vehicle is not in level position, then it is shown by blinking on the function controls for manual level regulation (button **112**, button **113**, button **119**, button **120**, button **127**, button **128**, button **135** and button **136**) which axles must be raised or lowered so that the respective suspension cylinder gets to level position.
▶ To adjust the vehicle incline via the axle suspension, the function key **555** can be used to switch to the sight gauge on the BTT **4**, which must be in the charging cradle.

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 completely raised.

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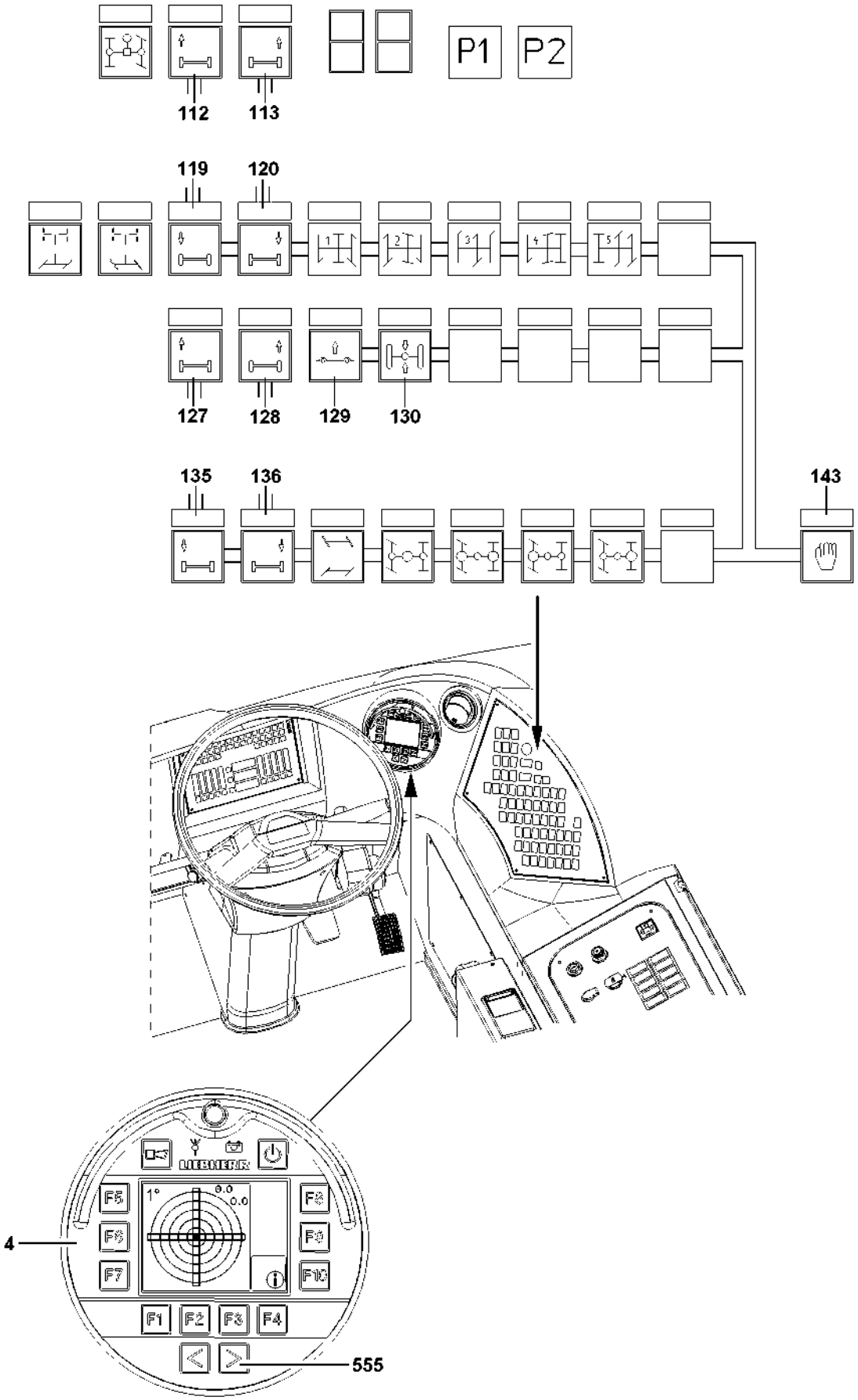

Fig.109433

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 completely lowered.

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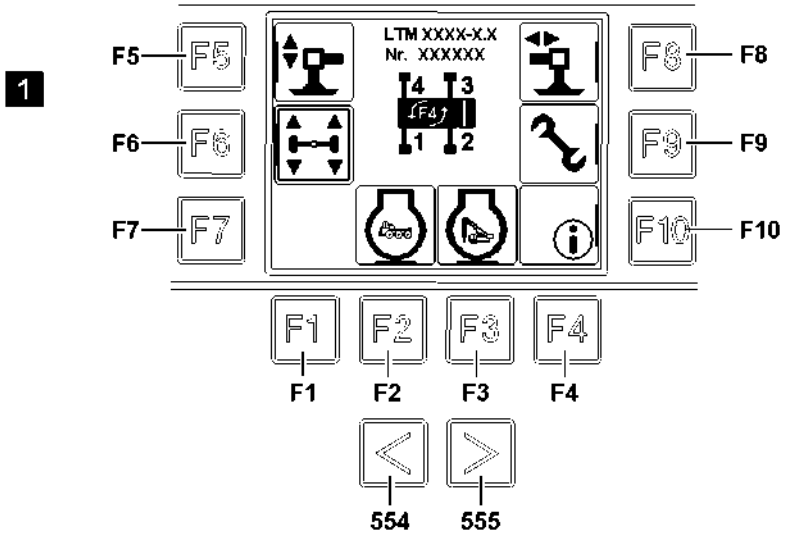

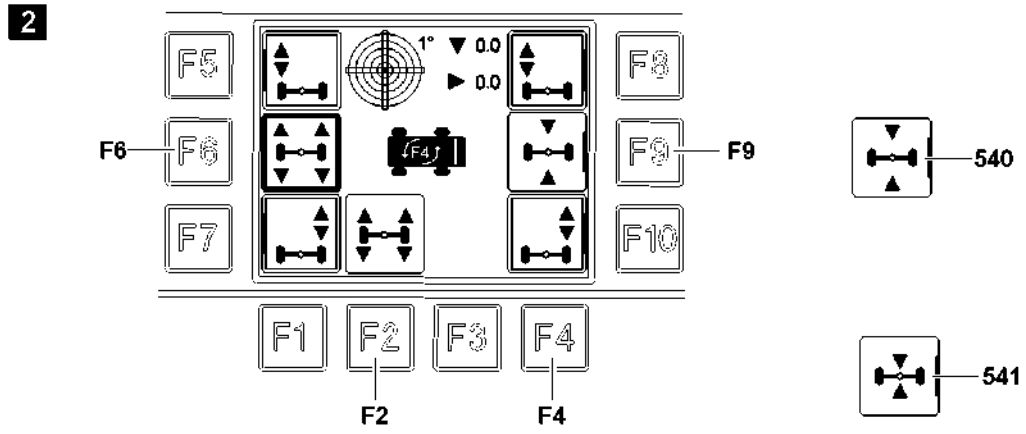

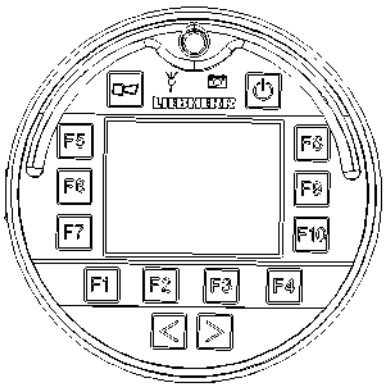

Fig.114835

3.2 Level regulation with the BTT*

3.2.1 Automatic level regulation

By actuating the automatic level regulation, the suspension cylinders are filled or lowered. The crane is automatically moved to a level position (driving height for road driving) by the level switches attached to the suspension cylinders.

▶ Press the function key **F6** and select the „axle suspension“ menu, illustration **1**.
▶ Press the function key **F4** and set it to the correct view on the crane vehicle.

The crane vehicle can only be leveled automatically in suspended status.

When the axle suspension is blocked, icon **541** is shown:
▶ Press the function key **F9**, illustration **2**.

Result:

– The icon **540** is shown on the BTT.
– All axles are suspended in this position.
– The level of the crane can be regulated.

▶ Press the function key **F6** and select level the axle suspension automatically.
▶ Press function key **F2** (hold it down).

Result:

– The vehicle is leveled.
– When the procedure is complete the level icon blinks and an acoustic signal is emitted.

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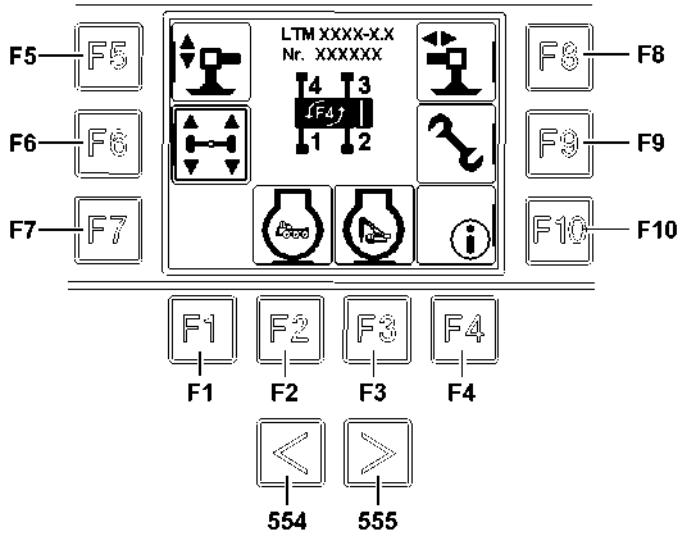
1



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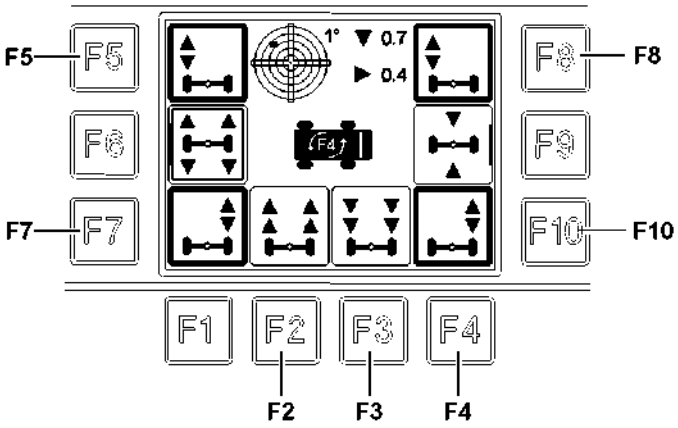

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Fig.114836

3.2.2 Manual level regulation

WARNING
Danger 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!

Raising the vehicle

▶ Press the function key **F6** and select the „axle suspension“ menu, illustration **1**.
▶ Press function key **F4** and set it to the correct view on the crane vehicle, illustration **2**.
▶ Press the function key **F5** or function key **F7** or function key **F8** or function key **F10** and select the respective suspension cylinders.
▶ Press the function key **F2** and lift the respective suspension cylinder.

Raising the entire vehicle

▶ Press the function key **F6** and select the „axle suspension“ menu, illustration **1**.
▶ Press function key **F4** and set it to the correct view on the crane vehicle, illustration **2**.
▶ Press the function key **F5**, function key **F7**, function key **F8** and function key **F10** and select all suspension cylinders.
▶ Press the function key **F2** and raise the vehicle level completely.

Lowering the vehicle

▶ Press the function key **F6** and select the „axle suspension“ menu, illustration **1**.
▶ Press function key **F4** and set it to the correct view on the crane vehicle, illustration **2**.
▶ Press the function key **F5** or function key **F7** or function key **F8** or function key **F10** and select the respective suspension cylinders.
▶ Press the function key **F3** and lower the respective suspension cylinder.

Lowering the entire vehicle

▶ Press the function key **F6** and select the „axle suspension“ menu, illustration **1**.
▶ Press function key **F4** and set it to the correct view on the crane vehicle, illustration **2**.
▶ Press the function key **F5**, function key **F7**, function key **F8** and function key **F10** and select all suspension cylinders.
▶ Press the function key **F3** and raise the vehicle level completely.

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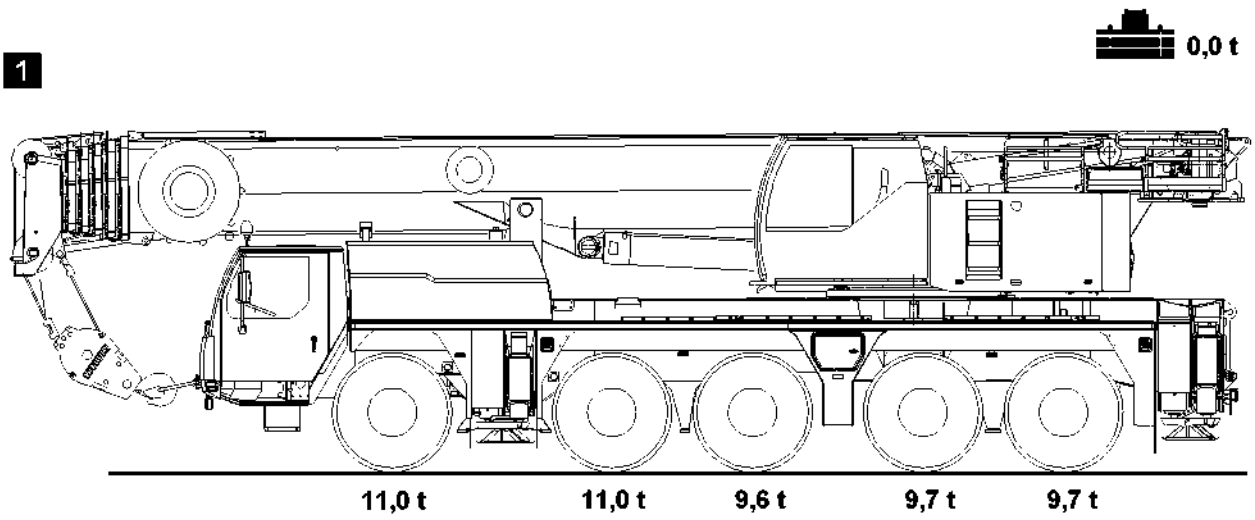

Fig.112779

1 Driving conditions of the crane

Before the crane can be driven on public roads, the telescopic boom must be fully telescoped in and placed on the receptacle frame.

Note
Traffic on public highways.
▶ Observe **national regulations** at all times!

1.1 Axle loads up to 11 t

Before the crane can be driven on public roads or highways, in order to comply with the axle load limit of 11 t per axle, no counterweight may be carried as shown in the illustration and the chart according to the StVZO (Federal Motor Vehicle Safety Standards).

Make sure that the following prerequisites are met:
– The telescopic boom is fully telescoped in and placed down.
– The hook block is attached as described in chapter 3.02.
– 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

DANGER
Danger of accidents due to insufficient brake force!
A limit switch for the brake force reduction is installed on the counterweight receptacle on the crane chassis. This means the brake force reduction becomes active as soon as no counterweight is laying on the counterweight receptacle. The vehicle is then slowed down with reduced brake force!
▶ If **no** counterweight is placed on the counterweight receptacle, then **no** counterweight may be installed on the turntable!
▶ In this driving condition, **no** counterweight may be carried along on the crane chassis and on the turntable.

Set up condition					
with:	Hook block, 1-pulley				
Without:	Counterweight on the crane chassis and the crane superstructure Replacement weight or hoist gear 2 Folding jib				
Overall weight	**Axle load**				
	1	2	3	4	5
51 t	11.0 t	11.0 t	9.6 t	9.7 t	9.7 t

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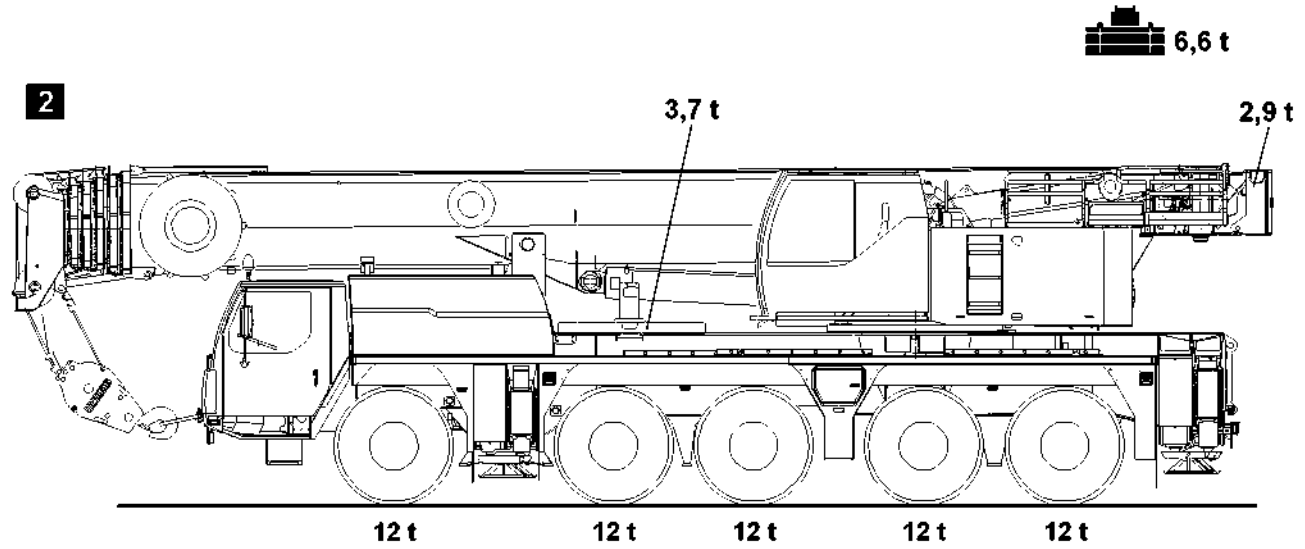

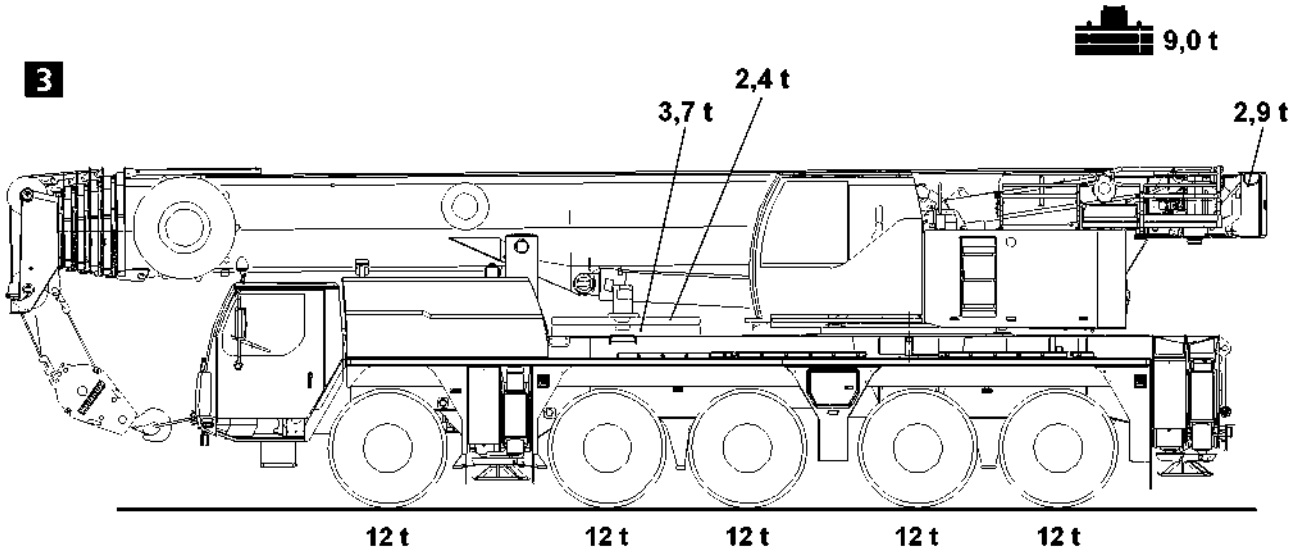

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Fig.112762

1.2 Axle loads up to 12 t

Before the crane can be driven on public roads or highways, in order to comply with the axle load limit of up to 12 t per axle a counterweight must be carried as shown in the illustration and the chart according to the StVZO (Federal Motor Vehicle Safety Standards).

Make sure that the following prerequisites are met:
- The telescopic boom is fully telescoped in and placed down.
- The hook block is attached as described in chapter 3.02.
- The axle suspension system has been set to „suspended“.
- The vehicle is at the level setting for on-road driving.

Note

▶ Instead of the 2.9 t replacement weight, hoist gear 2***** can be carried along.

1.2.1 Driving condition 2, illustration 2

DANGER

Danger of accidents due to insufficient brake force!

A limit switch for the brake force reduction is installed on the counterweight receptacle on the crane chassis.

If a counterweight is placed on the counterweight receptacle, the brake force reduction turns off. The vehicle is then slowed down with increased brake force!

▶ For driving condition 2, the counterweight plate 3.7 t must be carried along on the crane chassis!

Set up condition						
Counterweight on crane superstructure	2.9 t					
Counterweight on crane chassis	3.7 t					
with:	Folding jib Hook block, 1-pulley					
Overall weight	**Axle load**					
	1	2	3	4	5	
60 t	12 t	12 t	12 t	12 t	12 t	

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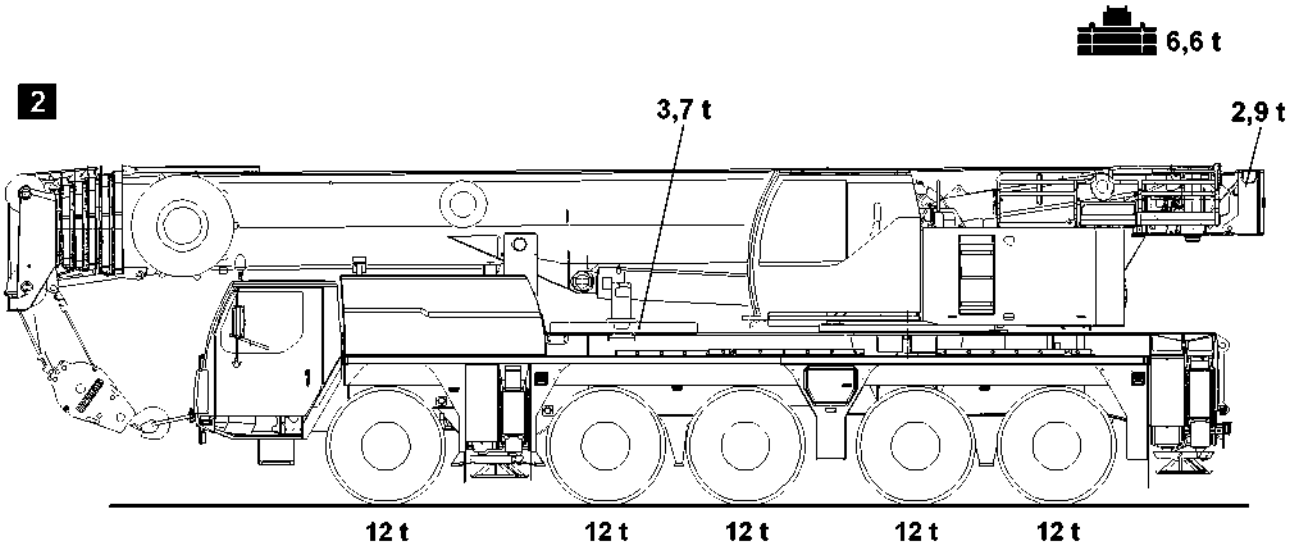

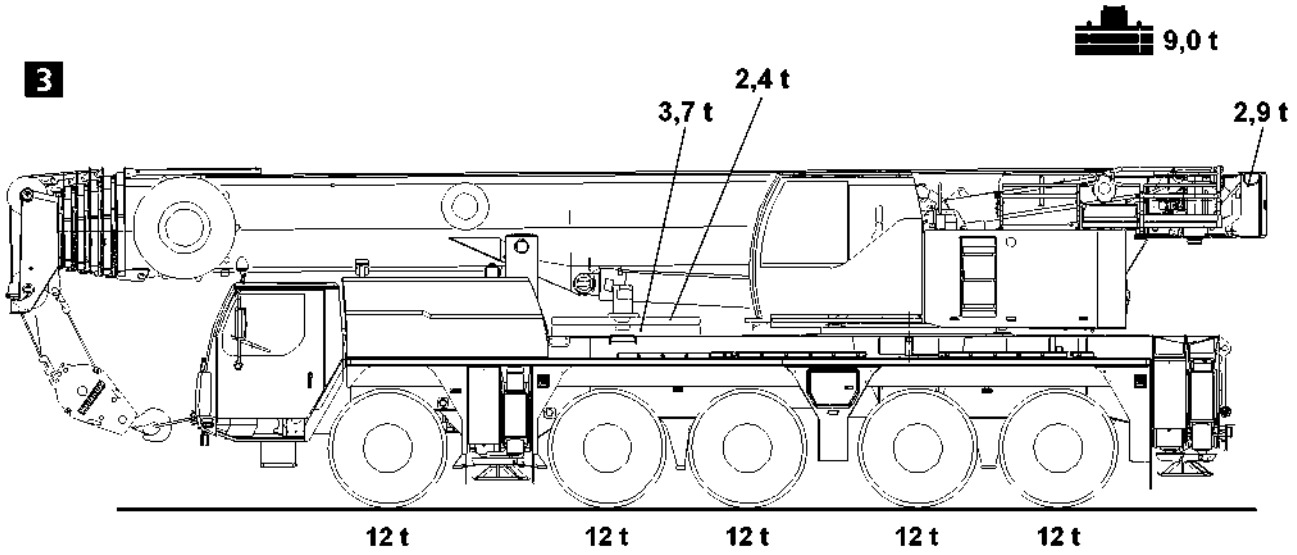

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Fig.112762

1.2.2 Driving condition 3, illustration 3

DANGER
Danger of accidents due to insufficient brake force!
A limit switch for the brake force reduction is installed on the counterweight receptacle on the crane chassis.
If a counterweight is placed on the counterweight receptacle, the brake force reduction turns off. The vehicle is then slowed down with increased brake force!
▶ For driving condition 3, the counterweight plate 3.7 t and the counterweight plate 2.4 t must be carried along on the crane chassis!

Set up condition					
Counterweight on crane superstructure	2.9 t				
Counterweight on crane chassis	3.7 t + 2.4 t				
with:	Hook block, 1-pulley				
Without:	Folding jib				
Overall weight	**Axle load**				
	1	2	3	4	5
60 t	12 t	12 t	12 t	12 t	12 t

1.3 Axle loads above 12 t

DANGER
Increased danger of accidents!
The braking distance is longer due to the higher overall weight!
The wear on brake linings is increased and there is an increased danger of overheating the brakes.
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 and all drive, suspension and steering components is reduced.
▶ Check the affected parts more frequently!
▶ One counterweight must always be placed on the counterweight receptacle on the crane chassis to obtain an increased brake force!

1.4 Driving with a total weight of 75 t

Note
▶ Observe the relevant **applicable national traffic regulations**!

NOTICE
Danger of clutch damage!
The clutch will overheat or be damaged if the following points are not observed!
▶ In manual shift operation and on level roads, drive off the crane „in gear 2 or lower“.
▶ On uphill inclines greater than 6 %, start to drive the crane only when the off road gear in the transfer gear box has been engaged and „only in gear 2“.
▶ The vehicle may only be maneuvered or positioned when the off road gear is engaged.
▶ Do not attempt to drive off if the vehicle rolls back and a forward gear has been selected.

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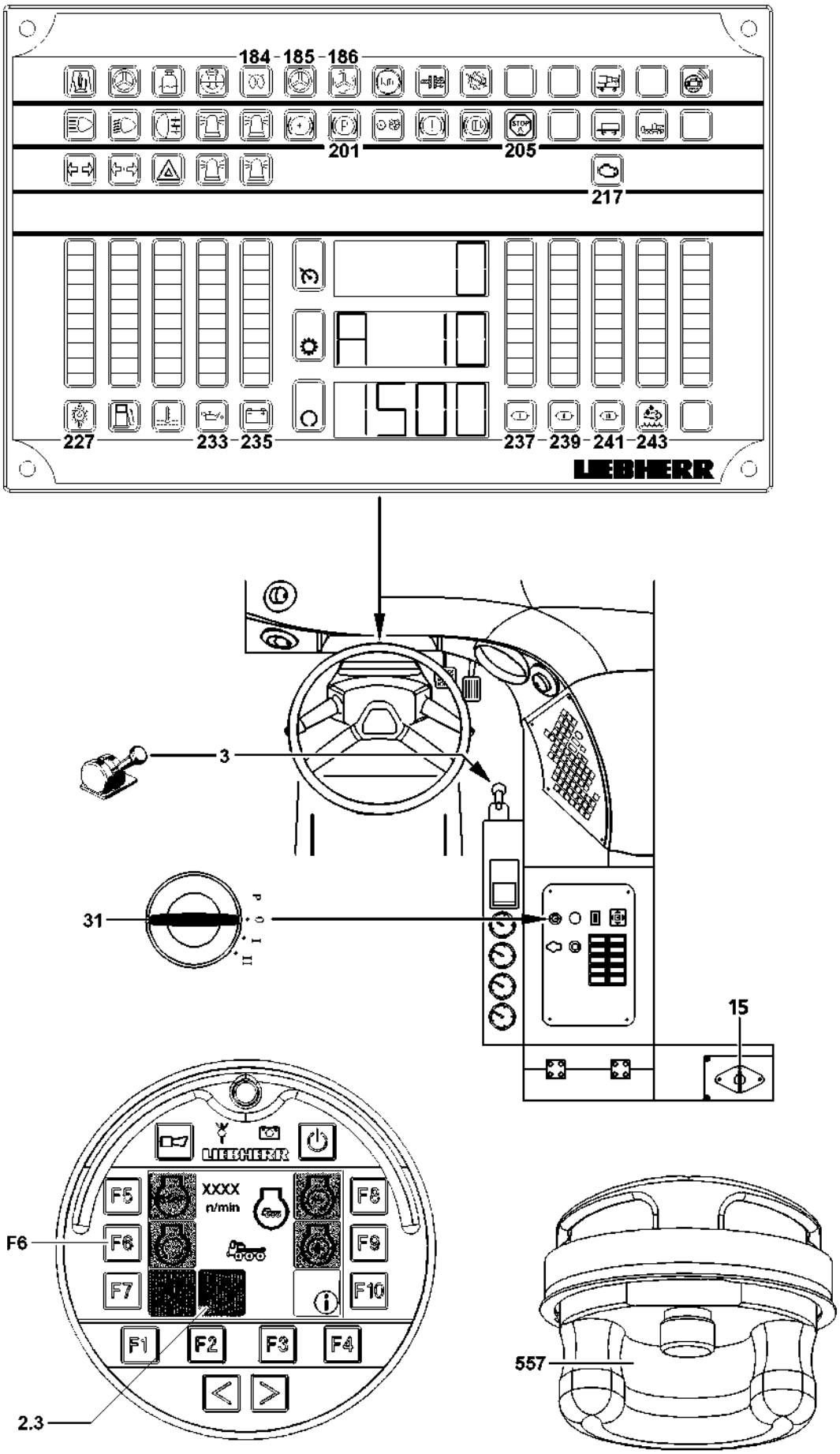

Fig.114104

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 from the driver's cab

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.

2.2 Starting the engine with the Bluetooth™ Terminal (BTT)

Make sure that the following prerequisites are met:
- The battery master switch **15** is turned on.
- Ignition switch **31** is in position „I“.
- The „Engine operation“ menu is selected in the BTT
- The indicator light **2.3** lights up „green“.

▶ Actuate the 2-Hand keypad **557** on the rear of the BTT.

Result:

- The icon at function key **F6** turns purple.

▶ Press the function key **F6** on the BTT.

Result:

- The engine starts.

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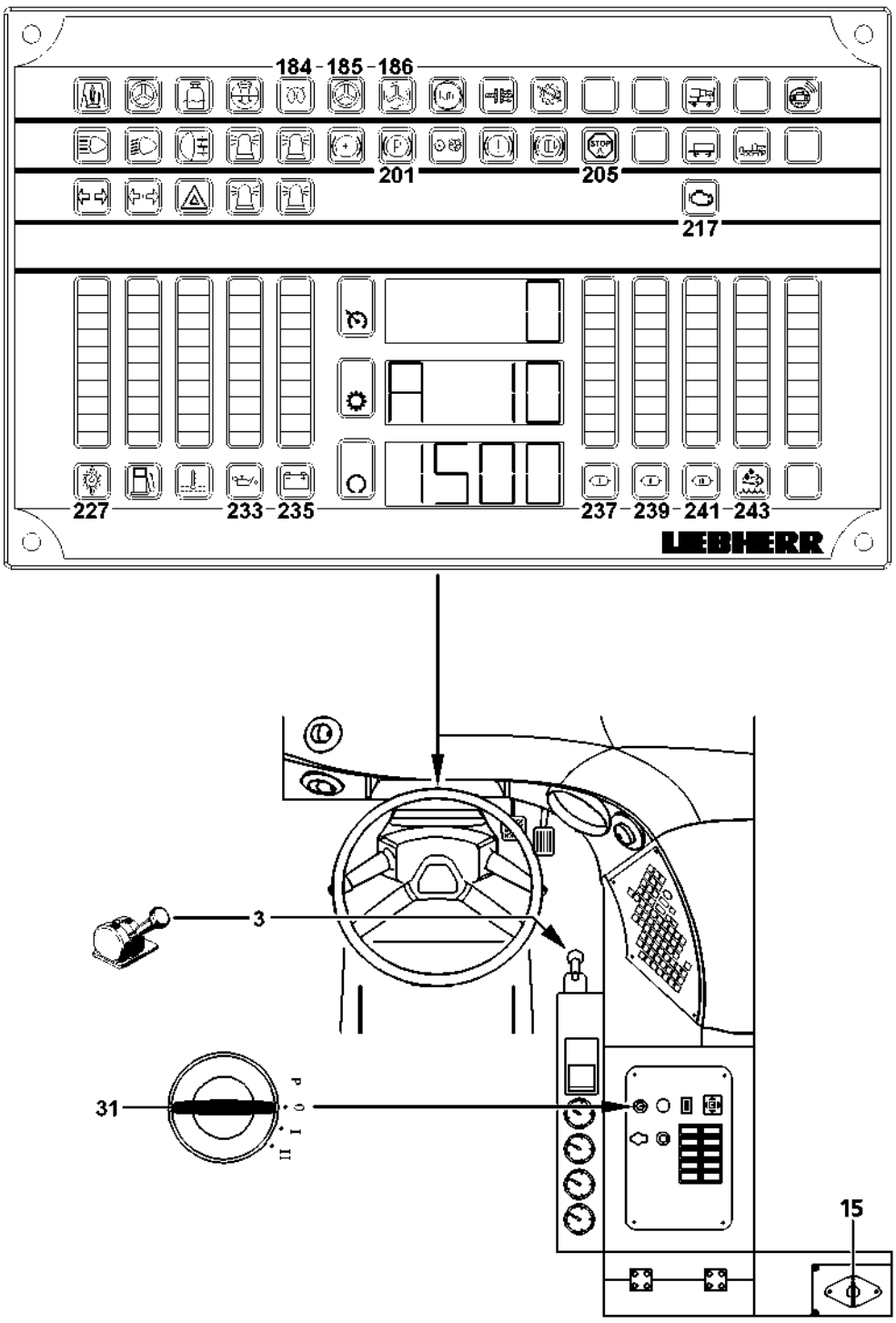

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Fig.114105

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 and remedy the problem!

▶ Check the preheat indicator light **184**.
▶ Check the charge indicator light **235**.
▶ Check the indicator light for the gear oil temperature **227**.
▶ Check the indicator light for steering circuit II **185**.

The indicator light for steering circuit I **186** turns off only after a certain speed.

▶ Check the indicator light for steering circuit I **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**.

Problem remedy
The indicator light severe engine problem **205** lights up?
▶ Turn the engine off immediately and remedy the problem!

▶ Check the indicator light urea (AdBlue®) **243**.

Problem remedy
The indicator light urea (AdBlue®) **243**lights up or blinks yellow?
The urea (AdBlue®) is getting low.
▶ Add urea (AdBlue®)!

▶ 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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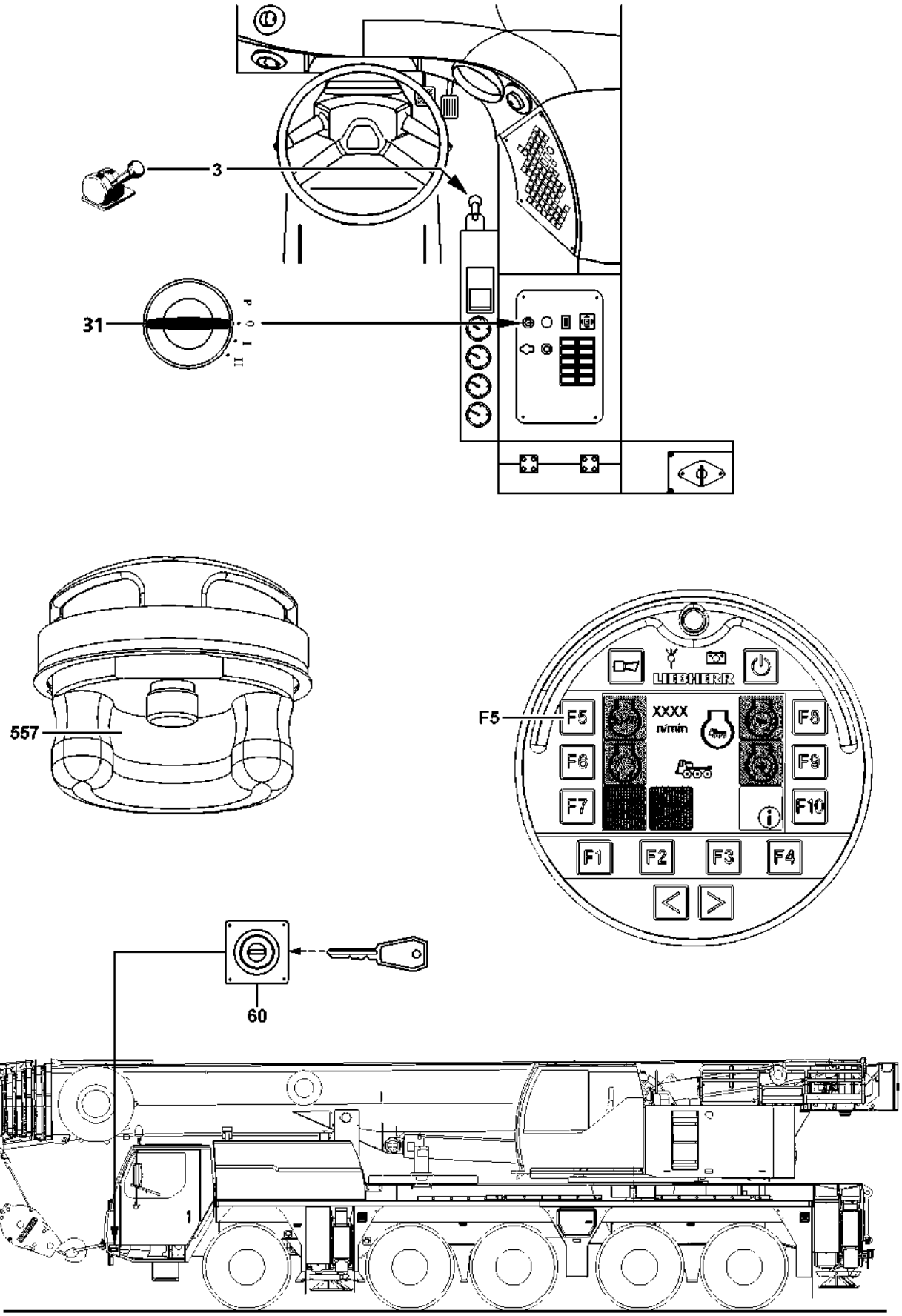

Fig.114957

2.4 Turning the engine off

NOTICE
Damage to engine!
▶ Turn off the engine immediately in the event of dropping or sharply fluctuating oil pressure, reduced performance and speed without a change in engine regulation, the appearance of large amounts of smoke, increasing coolant temperatures or suddenly occurring abnormal engine noises!

See also paragraph „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 in a safe place.

2.4.2 Turning the engine off with the Bluetooth™ Terminal (BTT)

– The „Engine operation“ menu is selected in the BTT

▶ Actuate the 2-Hand keypad **557** on the rear of the BTT.

Result:

– The icon at function key **F5** turns purple.

▶ Press the function key **F5** on the BTT.

2.4.3 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*** 60**.

Note
Operation of the emergency stop switch*** 60**
▶ Only use the emergency stop switch*** 60** in the event of a clear emergency. Use of the emergency stop switch*** 60** for normal operation is not permitted!

▶ Actuate the emergency stop switch*** 60**.

Result:

– The engine is turned off immediately.

To turn the emergency stop switch*** 60** off again after activation:
▶ Unlock with the ignition key.

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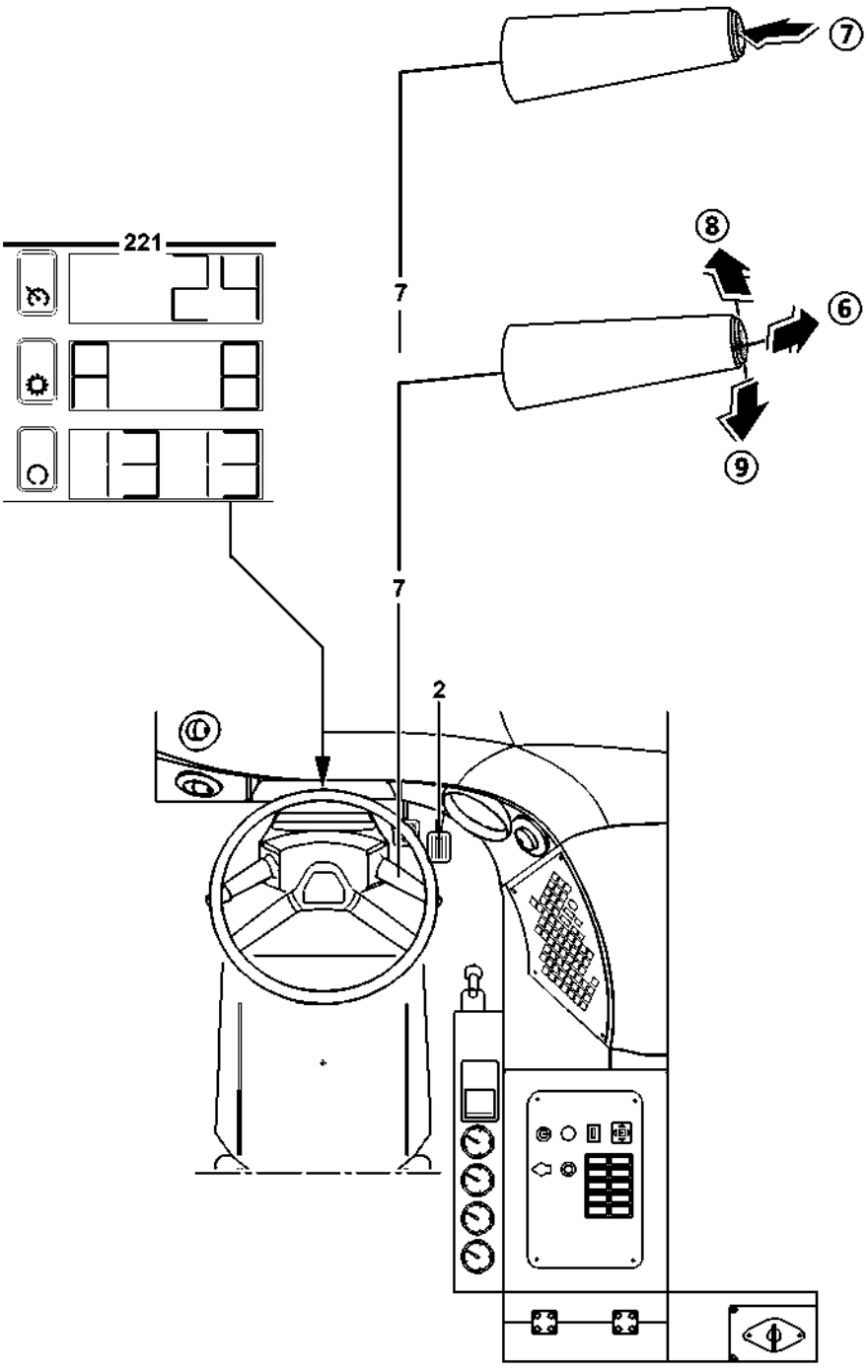

LWE/LTM 1130-5-1-004/20502-04-02/en

Fig.105636

3 Driving the crane vehicle

3.1 Driving speed

The current driving speed is shown on the display **221**.

3.1.1 Changing the driving speed display from kilometers (km) to miles (m)

In the menu „Kilometer display and operating hours“ the display on the BTT of the trip and total kilometers can be changed from kilometer (km) to miles (m).

Make sure that the following prerequisites are met:
- No function is active on the BTT.
- The ignition is turned on.

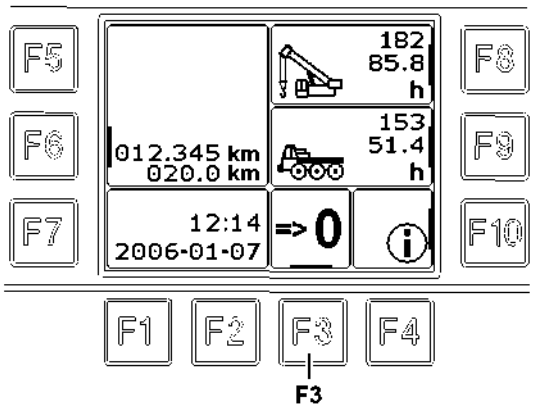

Fig.109435

▶ Press the function key **F3** on the BTT for approx. 12 s.

Result:

- An acoustical advance warning sounds after 7 s.
- After 12 s , the display is changed over, a siren sounds and a system error is displayed.

▶ Turn the ignition off.

Result:

- The siren stops.

▶ Turn the ignition on.

Result:

- The system error is deleted.

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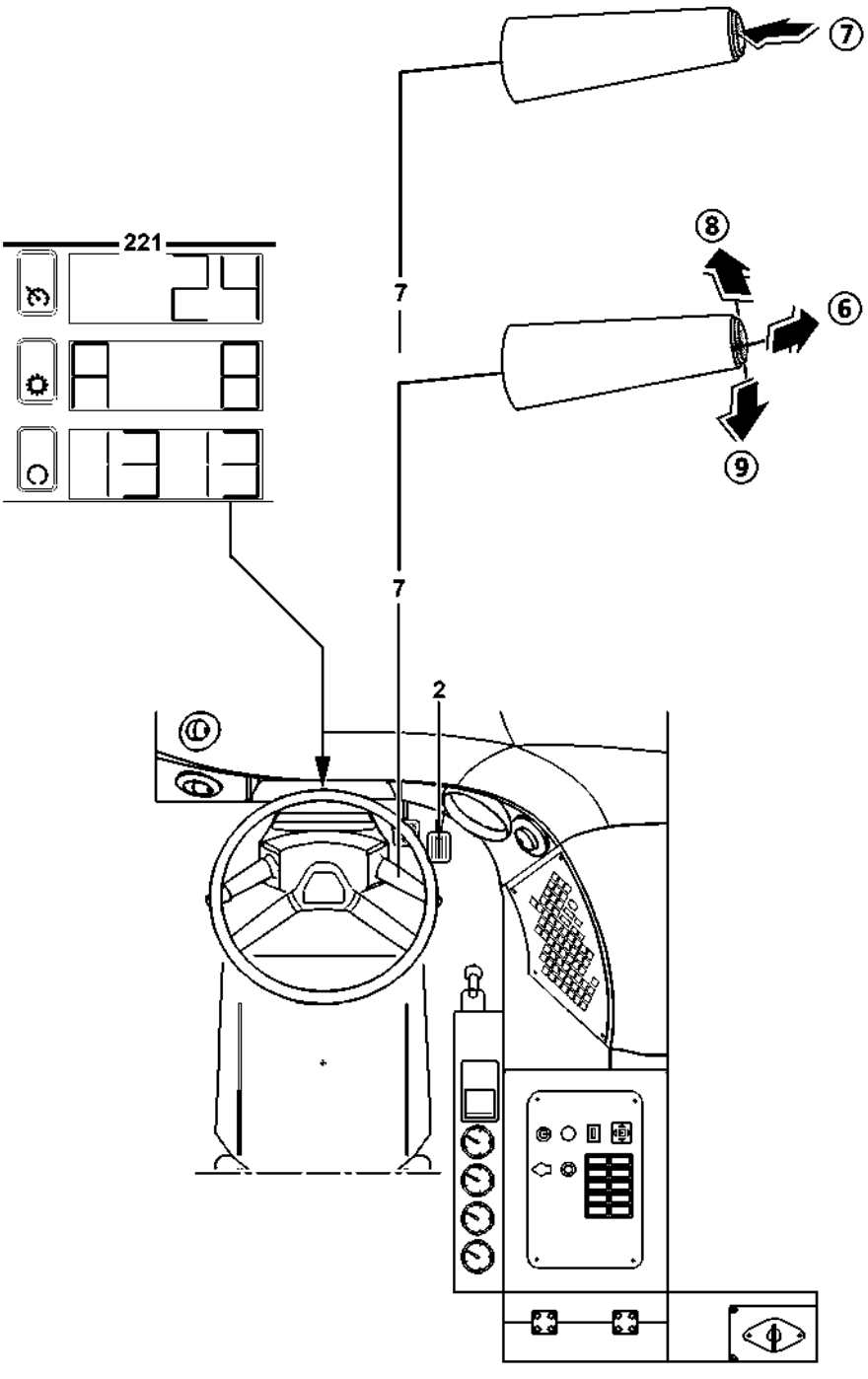

Fig.105636

3.2 Changing the idling speed

The idling speed increase will be automatically reduced after preselecting the drive range switch „D“ or „R“.

3.2.1 Changing the idling speed with the steering column switch

If required, the idling speed can be changed when the vehicle is not operational and the transmission is in neutral position „N“ using the steering column switch **7**.

After the engine is started, the idling speed will be automatically regulated according to 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.

3.2.2 Changing the idling speed with the engine regulation

▶ Set the idling speed with the engine regulation **2**.
▶ Press button **7**.

Result:

– The engine runs at set rpm.

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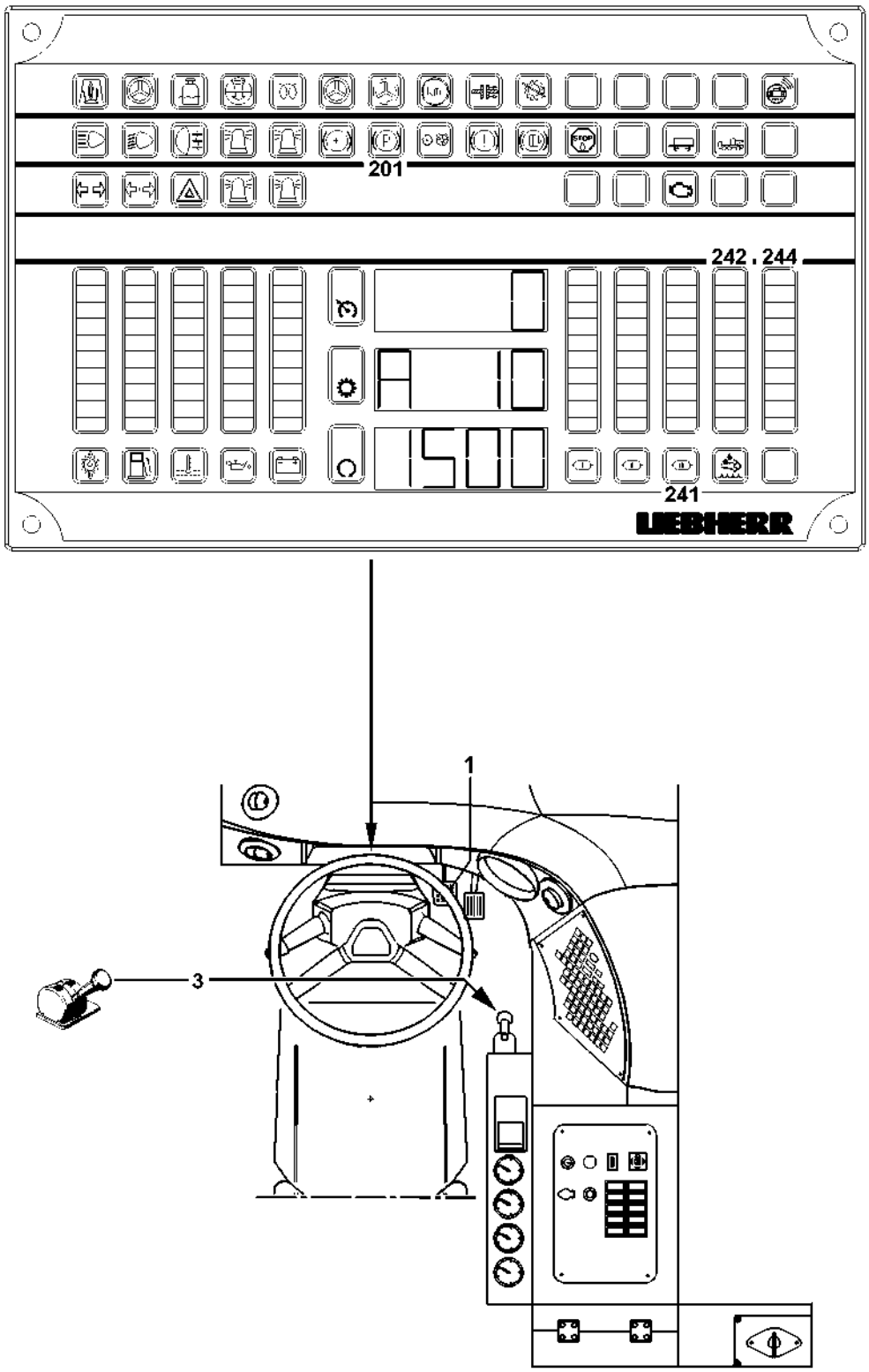

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Fig.113336

3.3 Parking brake

3.3.1 Applying

WARNING
The vehicle can roll off uncontrollably!
If the hand lever **3** is not correctly engaged when the parking brake is applied, then the vehicle can roll off uncontrollably and fatally injure personnel!
▶ It is imperative to ensure that the hand lever **3** is correctly locked into place. 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.

3.3.2 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 immediately start moving and cause fatal injuries!
▶ When releasing the parking brake, slow the mobile crane down with the service brake or accelerate using the engine control!

▶ 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.

3.4 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.

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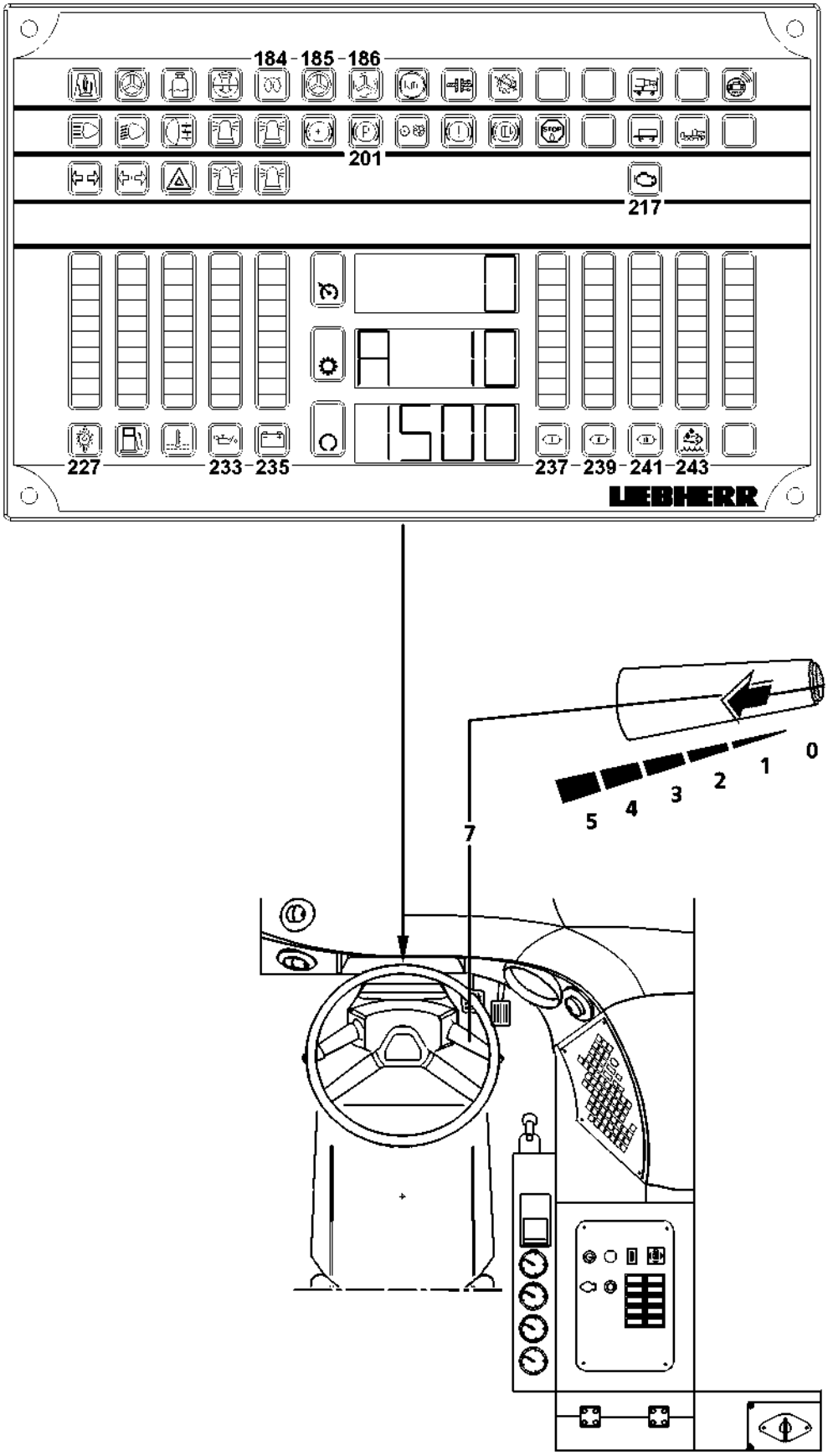

Fig.114107

3.5 Retarder

The retarder consists of the engine brake, the hydraulic intarder and the eddy current brake.

3.5.1 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 by anticipating travel modes reduces wear on the service brake and thereby reduces operating costs.

DANGER
Utmost care should be taken 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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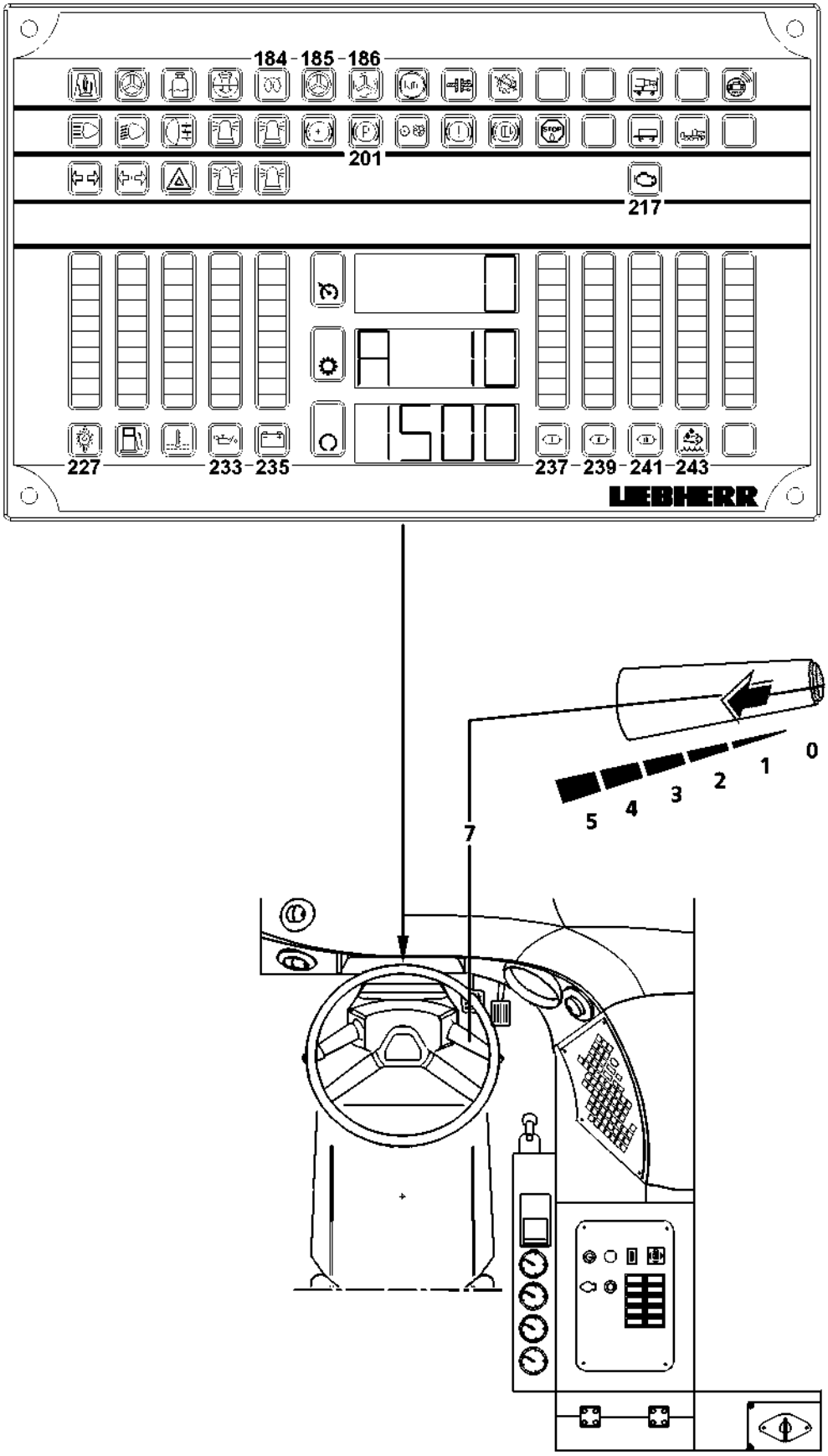

Fig.114107

3.5.2 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 driven speed is retained when driving downhill.
– In switch position 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.

NOTICE
Danger of overheating!
▶ As soon as the vehicle is at a standstill or no more deceleration is required, turn the retarder off.

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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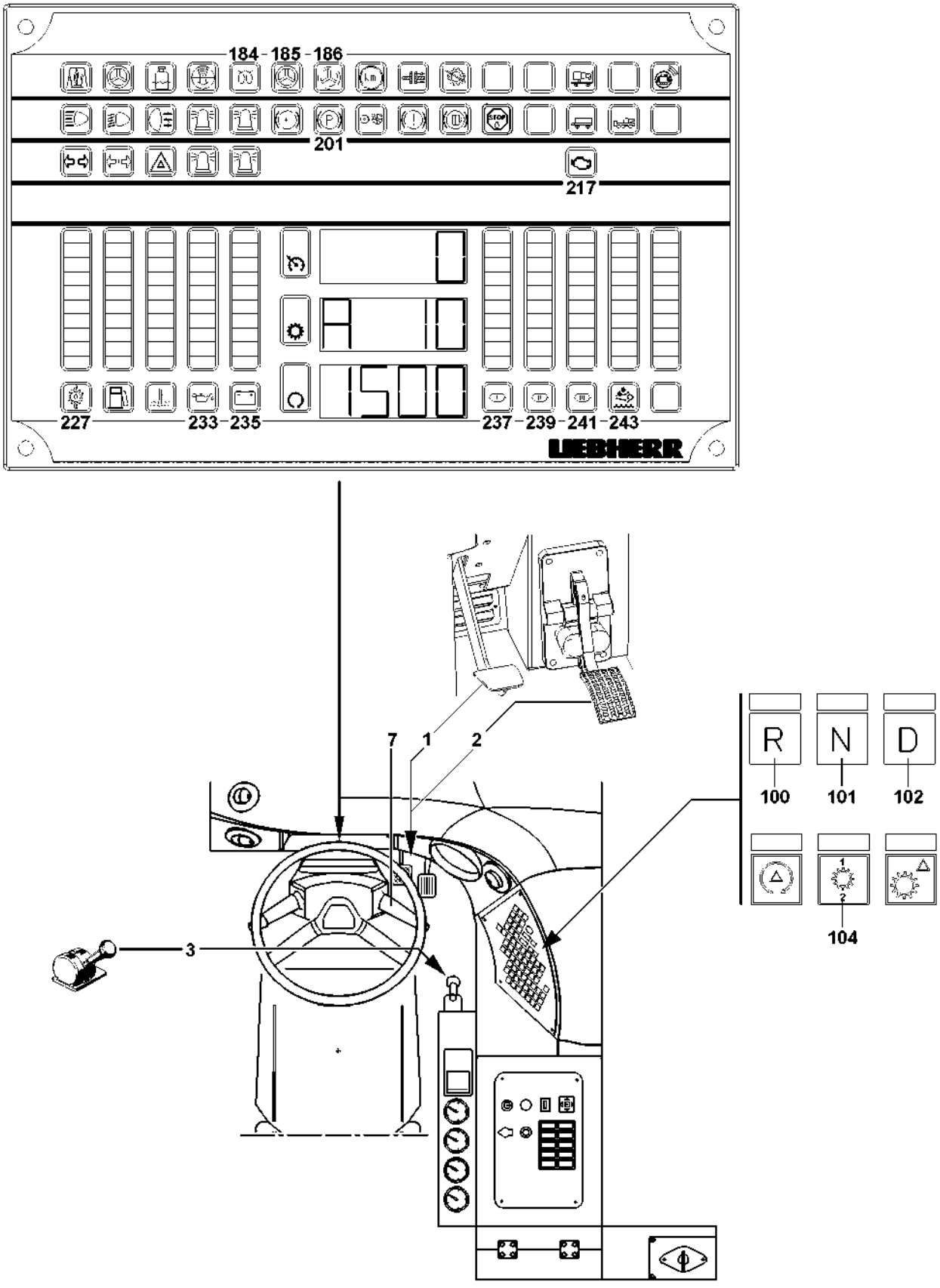

LWE/LTM 1130-5-1-004/20502-04-02/en

Fig.114112

3.6 Automatic transmission

3.6.1 General

The automatic transmission can be driven 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**.

3.6.2 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“ driving 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.

3.6.3 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 crane with service brake **1** or accelerate with engine control **2**.

The starting gear is automatically selected by the transmission according to the travel resistance which preceded it. It can be manually corrected upward as far as 4th gear or downward as far as 1st gear. To do so, change to manual shift mode. Thereafter it is possible to change immediately back to automatic mode.

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**.
▶ 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**.

Result:

– The dry clutch closes and a propelling force is created.

▶ Activate the engine regulation **2** gently.

Result:

– A greater propelling force is created.

▶ Release the parking brake **3** and activate engine regulation **2** as required.

Result:

– The vehicle accelerates up to an engine rpm of approx. 1400 rpm until the torque converter clutch closes.

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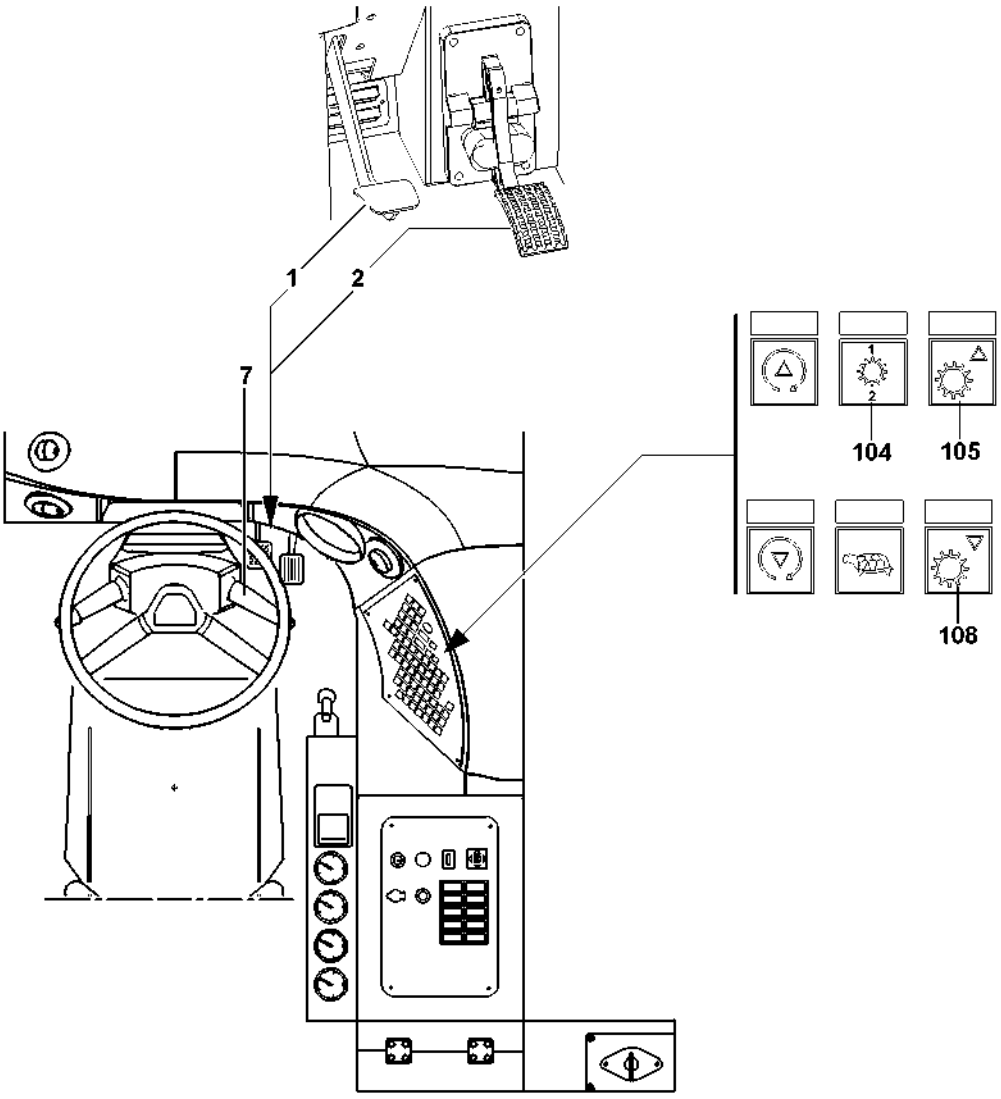

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Fig.105640

3.6.4 Uphill or downhill driving

If the engine regulation **2** is brought back to the 0 setting 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.

3.6.5 Driving downhill with an ascending gradient following on shortly afterwards

When driving downhill with an ascending gradient following 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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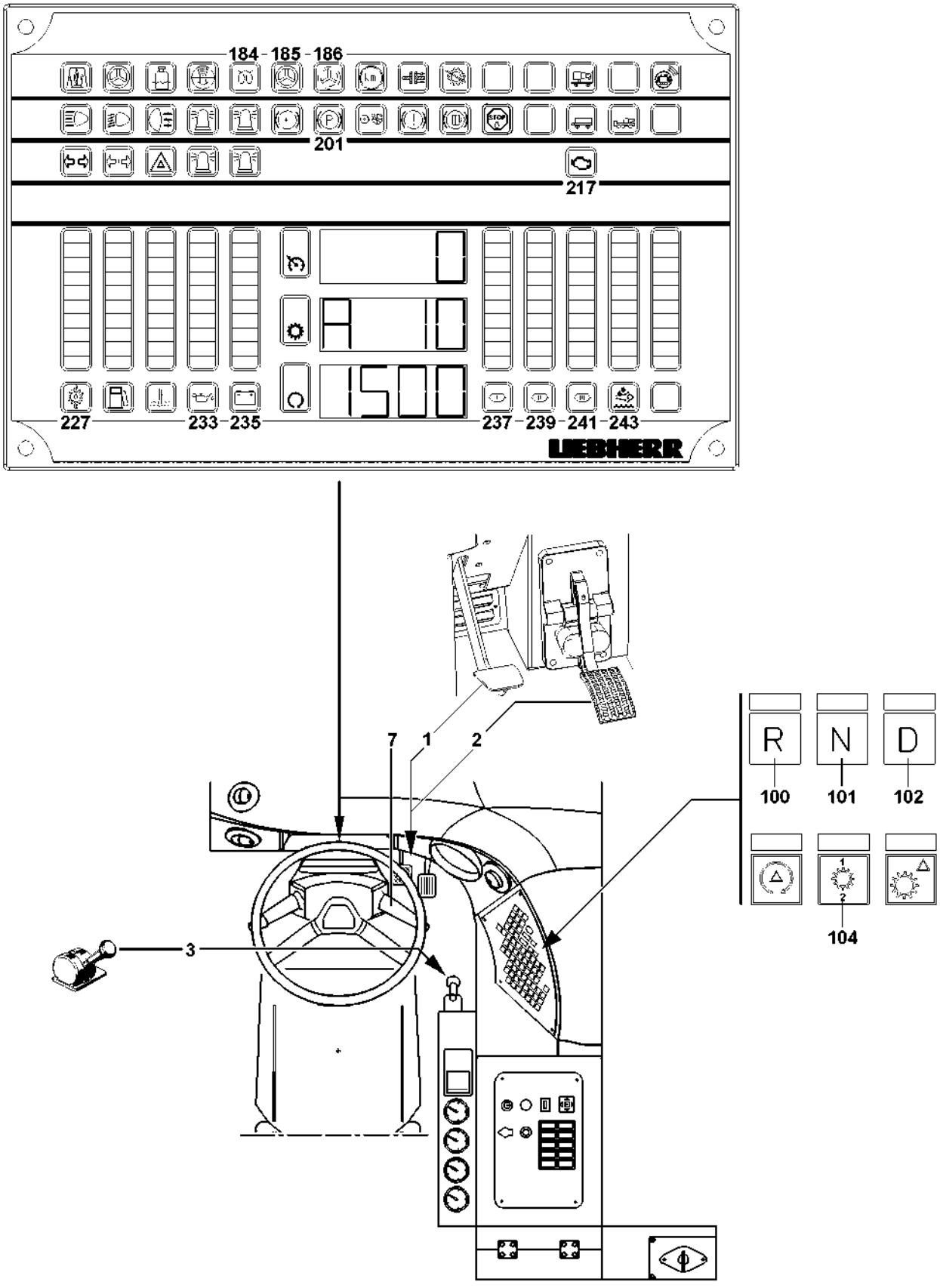

Fig.114112

3.6.6 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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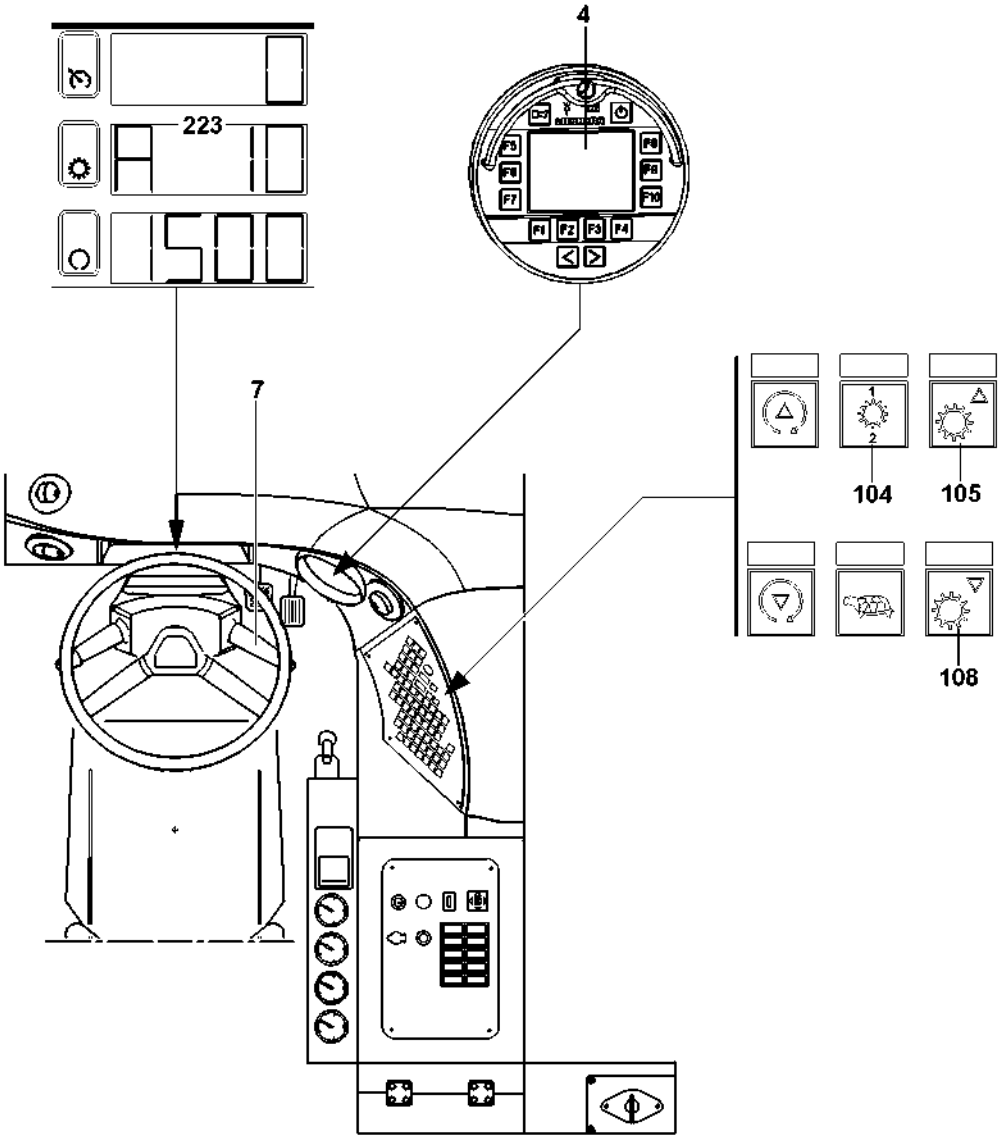

Fig.105641

3.6.7 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 drive range. If this is not done, an acoustic warning signal sounds and an operating instruction appears on the Bluetooth™ Terminal **4**.

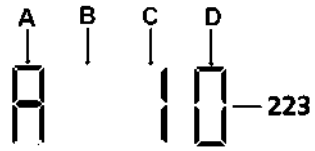

Fig.197532

The display **223** contains the following information:
- **A** Automatic mode:
- **B** Not assigned:
- **C** Gear engaged:
- **D** Gear engaged:

3.6.8 Manual shift mode

In manual mode the gears are selected by the driver using the steering column switch **7** or the key **105** and the key **108**.

Apply the service brake before switching from neutral „N“ to a drive range. If this is not done, an acoustic warning signal sounds and an operating instruction appears on the Bluetooth™ Terminal **4**.

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 in the Bluetooth™ Terminal **4**.

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 in the Bluetooth™ Terminal **4**.

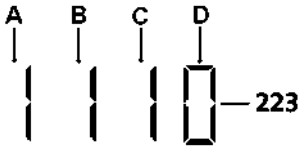

Fig.197533

The display **223** contains the following information:
- **A** Gear selected:
- **B** Gear selected:
- **C** Gear engaged:
- **D** Gear engaged:

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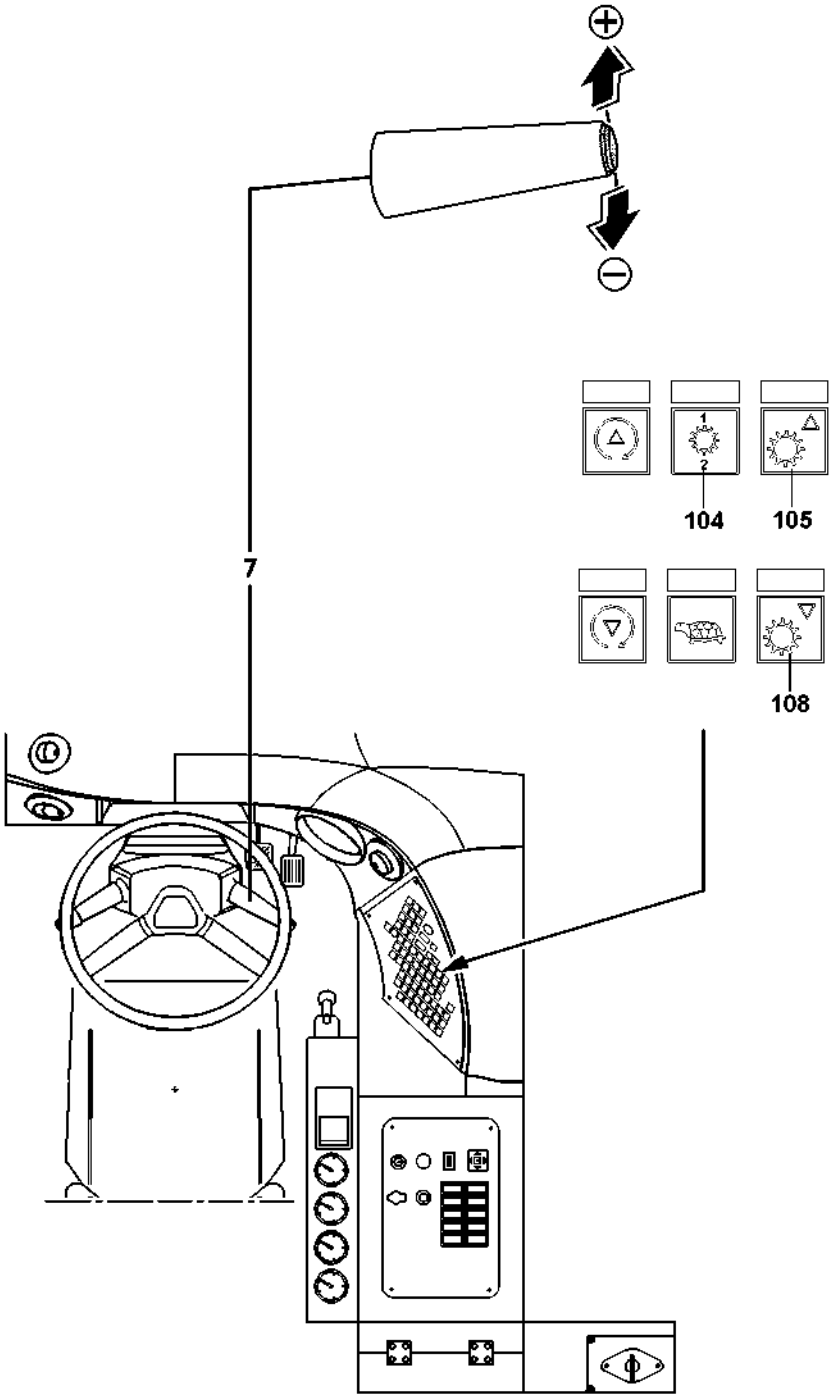

Fig.105642

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 steering column switch **7** briefly upward.

Result:

– To shift up by one gear.

▶ Push the steering column switch **7** up and hold.

Result:

– The gears are increased cyclically in 1/2 second intervals.

Shifting down

▶ Push the steering column switch **7** briefly downward.

Result:

– To shift down by one gear.

▶ Push the steering column switch **7** down and hold.

Result:

– The gears are reduced cyclically at 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:

– To shift up by one gear.

▶ Press and hold button **105**.

Result:

– The gears are increased cyclically in 1/2 second intervals.

Shifting down

▶ Press the button **108** briefly.

Result:

– To shift down by one gear.

▶ Press and hold button **108**.

Result:

– The gears are reduced cyclically at 1/2 second intervals.

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3.6.9 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.

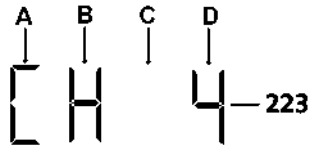

Fig.197535

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.

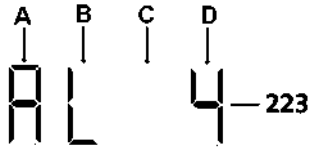

Fig.197536

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.

Clutch overloaded

The clutch could overheat in the event that a too high demand is placed on it.

This is shown via the display **223** „CL“.

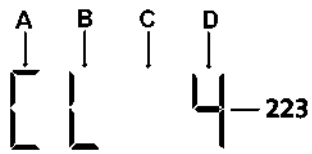

Fig.197537

CL =„clutch load“

The display **223** contains the following information:
– **A** Clutch overheating:
– **B** Clutch overheating:
– **C** Gear engaged:
– **D** Gear engaged:

DANGER
Danger of fatal injury due to rolling crane!
If the driver ignores the error message „CL“, the clutch closes of its own accord when the accelerator pedal is operated. This can result in the engine stalling and the crane rolling back.
▶ Stop the vehicle immediately and allow the clutch to cool off!

CAUTION
Danger of clutch damage!
If the ignition is turned off and then turned immediately back on while the error message „CL“ is showing, the error message „CL“ will no longer be displayed even though the clutch is overheated.
▶ It is imperative to let the clutch cool down!

▶ Stop the vehicle and allow the clutch to cool off until it is possible to shift gears again.

Clutch worn

NOTICE
Danger of clutch damage!
Disregarding the warnings - blinking indicator light **188** „wear limit of clutch reached“ - can cause severe and expensive damage to the clutch.
▶ Proceed to the nearest certified service center or one of the LIEBHERR service centers **as soon as the warning is issued for the first time**.
▶ Contact LIEBHERR Service if you have any questions.

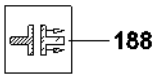

Fig.103360

If the crane engine is successfully started after ignition „OFF“, then the clutch wear display recognized that the wear limit of the clutch is reached as soon as **the gear is placed for the first time**. This condition is shown on the display unit by the blinking indicator light **188** on the display unit at a frequency of 2 Hz.

Note
▶ The indicator light **188** turns off by itself after 60 s and is not shown again until the crane engine is started again via ignition „OFF“ and a gear is placed for the first time after ignition „ON“ and crane engine „START“.

▶ Contact the nearest certified service center or one of the LIEBHERR service centers.

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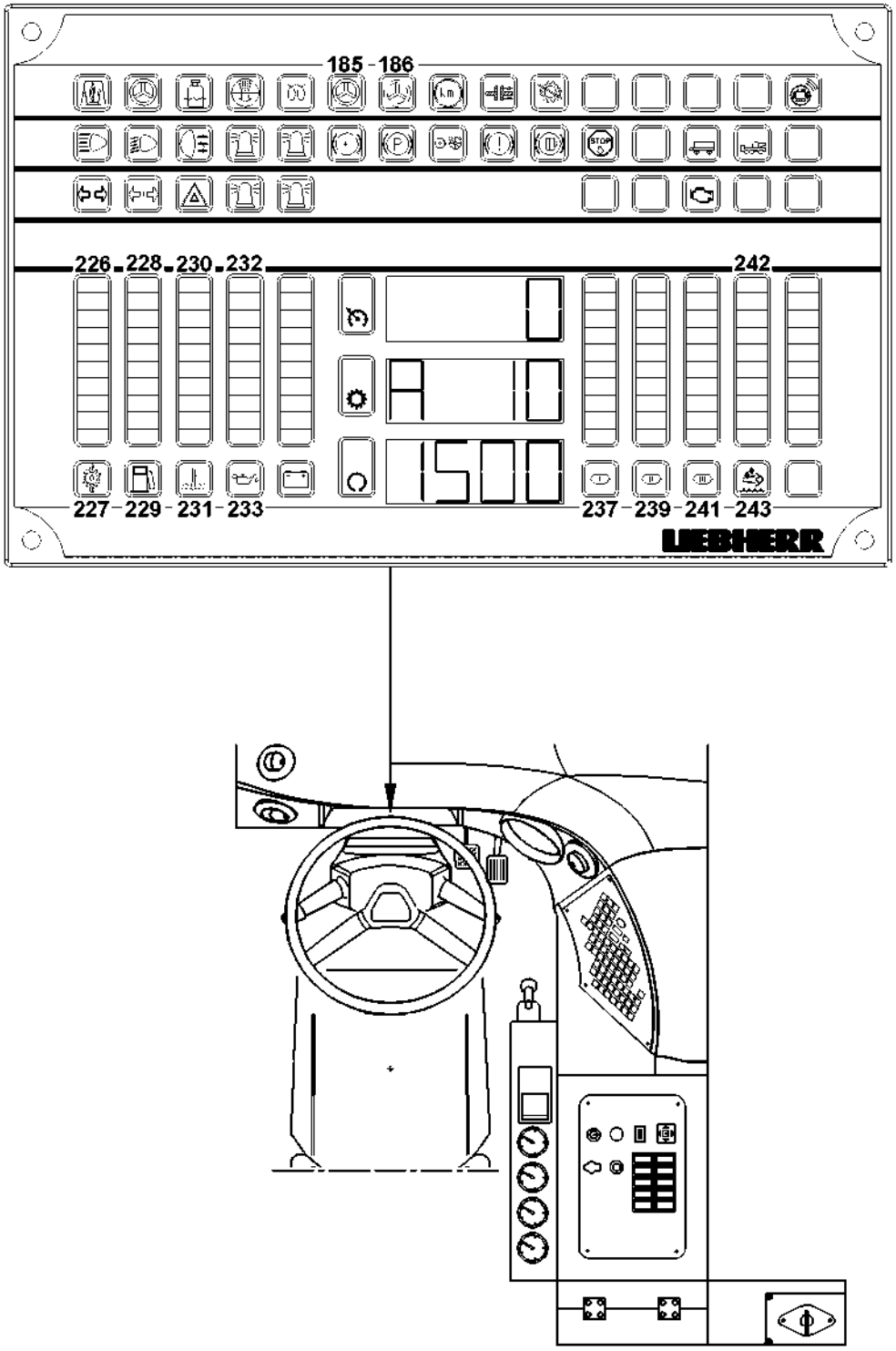

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Fig.114546

3.7 Important indicator instruments while driving

3.7.1 Checking steering circuit I

At a driving speed of approximately 10 km/h the warning light **186** for hydraulic steering circuit I 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?
Steering circuit I is not operational.
▶ 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** of 0 bar 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?
In case of low or missing oil pressure, there is no engine lubrication. 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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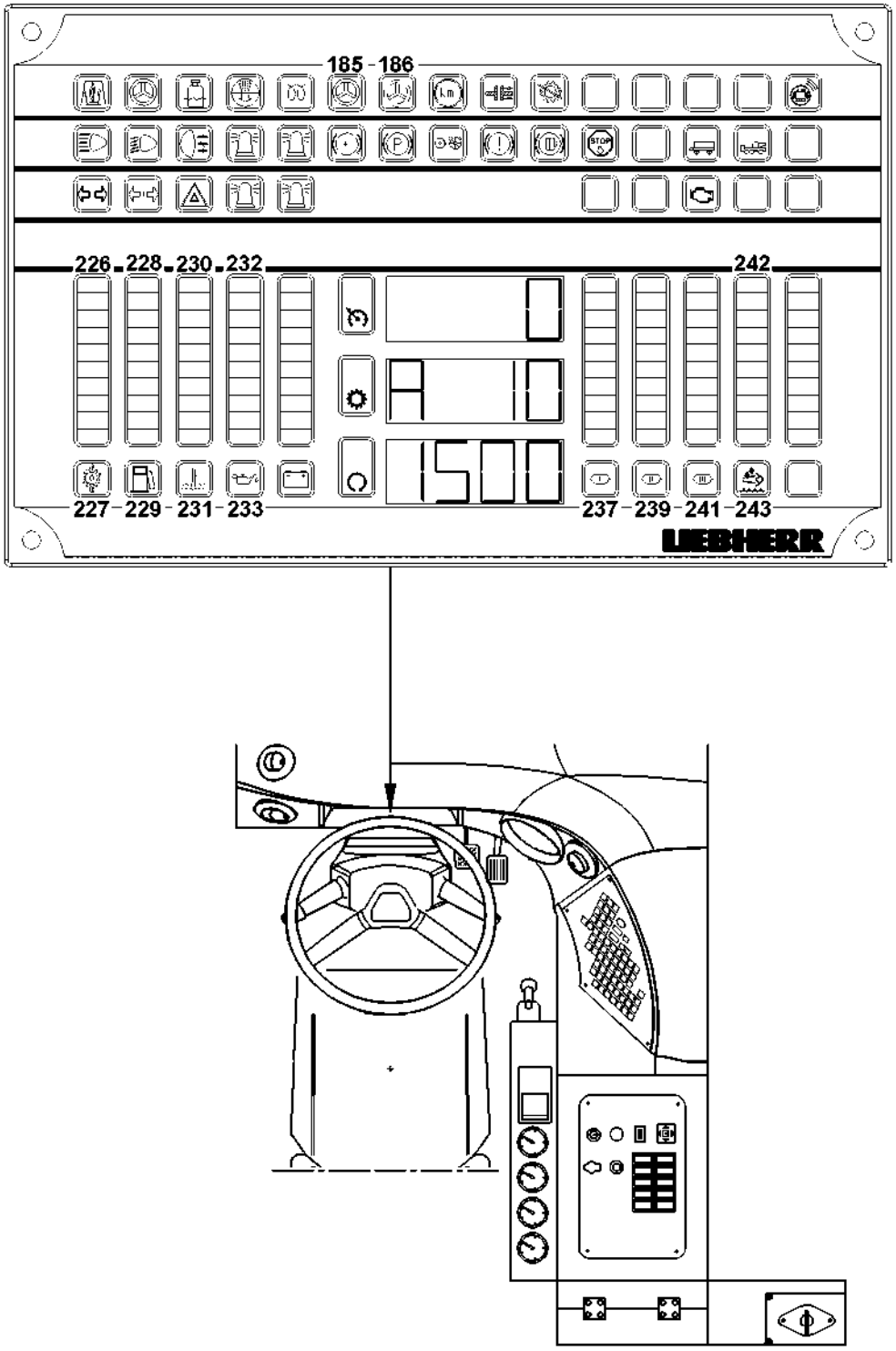

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Fig.114546

3.7.4 Checking the fuel reserve

Do not drive when the fuel tank is empty or 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 less than 10 % (approx. 48 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 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 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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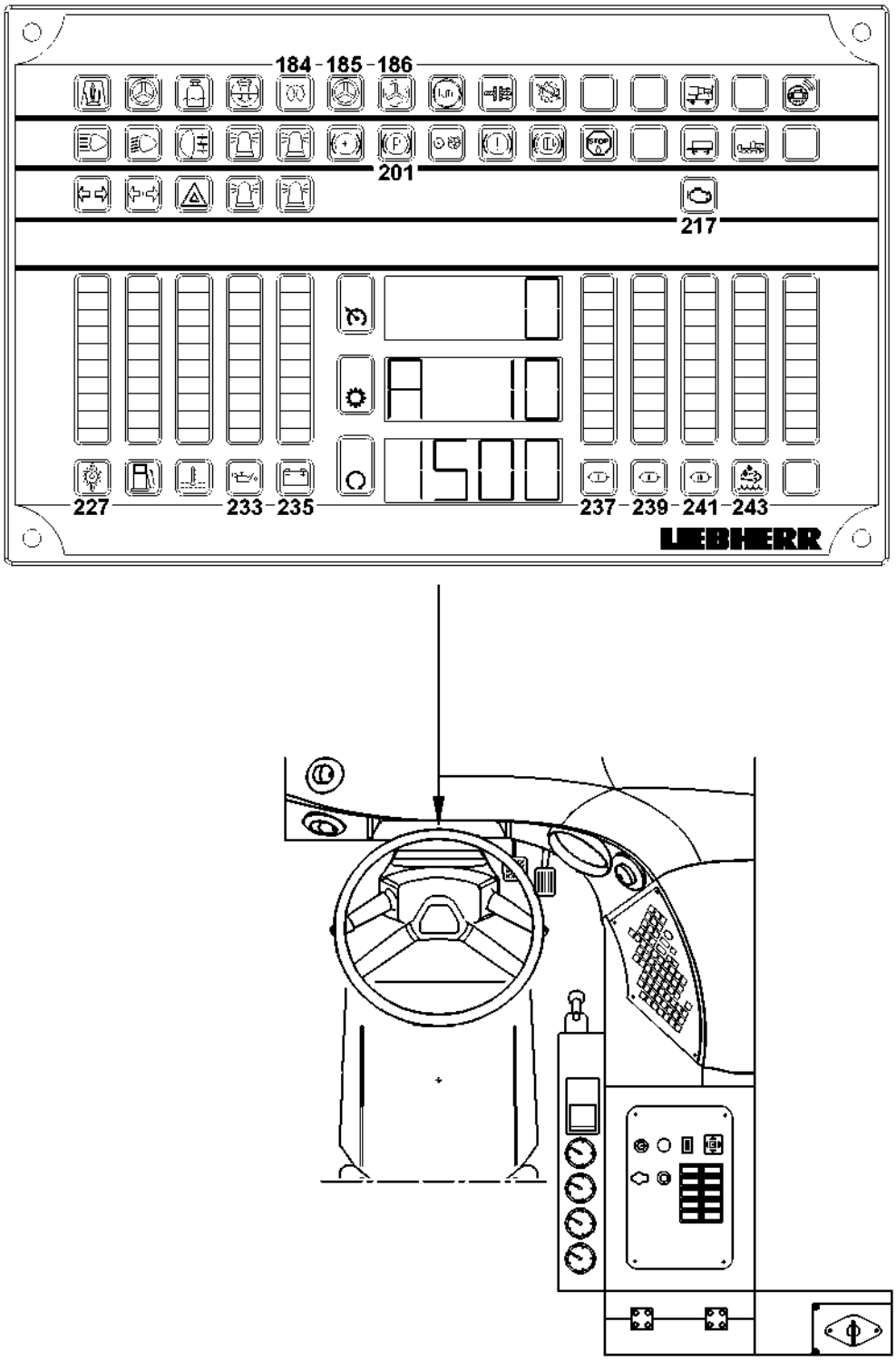

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Fig.114110

3.7.7 Checking the gear oil temperature

Display of gear oil temperature on bar graph **226** from 50 °C 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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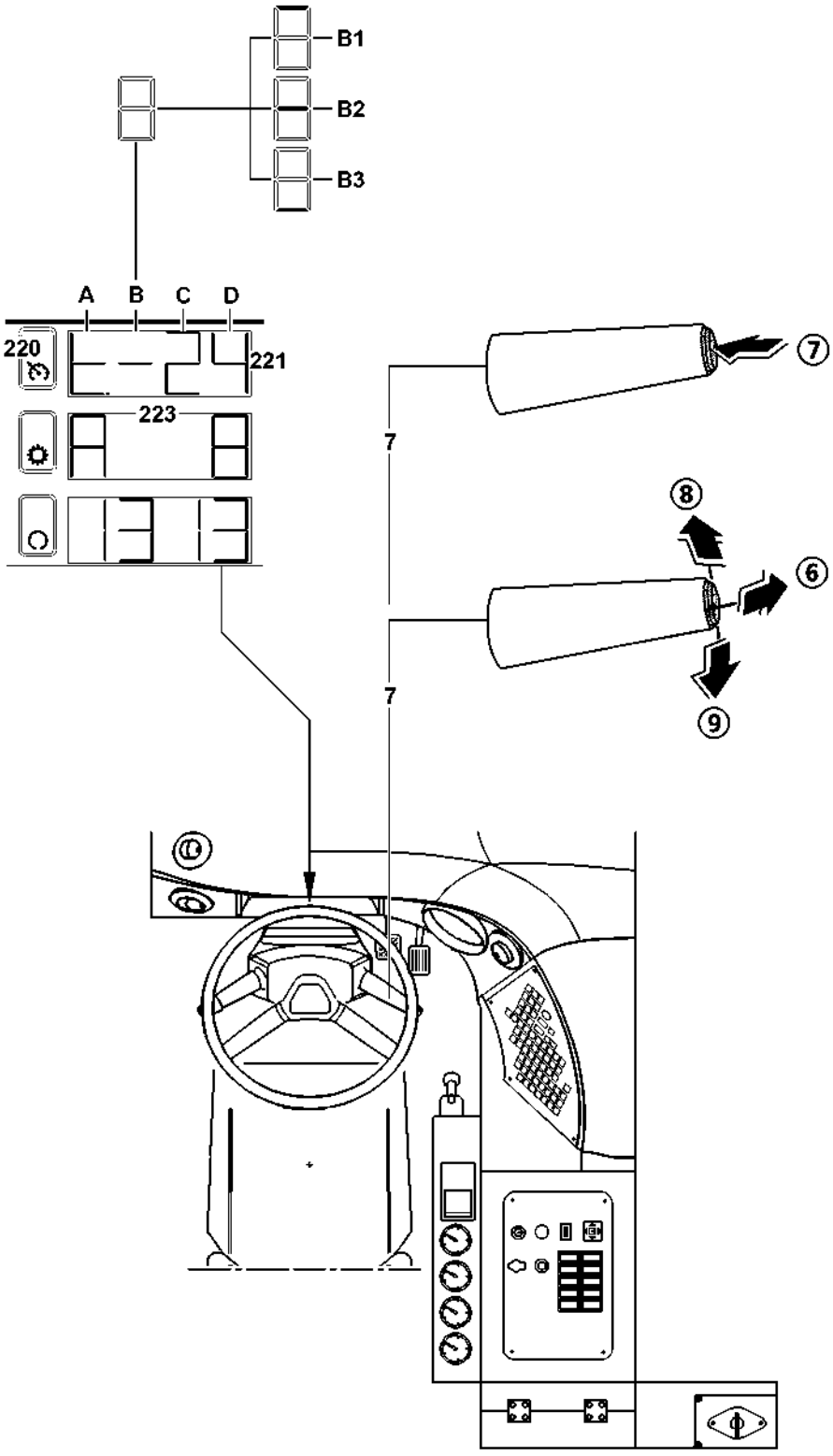

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Fig.105645

3.8 Tempomat

A driving speed of more than 15 km/h can be stored using the Tempomat. The Tempomat is operated with the steering column switch **7**. If the Tempomat is active, the indicator light **220** lights up and the display **221** shows a „t“ on position **A**. The set speed will be briefly shown 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.

If the engine regulation is used, the crane will brake back to the speed stored in the Tempomat when the engine regulation is released.

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 15 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 Status Tempomat speed

If the Tempomat is active, the display **221** will indicate the status of the stored Tempomat speed at position **B**:
– **B1** The stored speed exceeded:
– **B2** The stored speed is reached:
– **B3** The speed is below the stored speed:

The current speed is shown at position **C** and position **D**.

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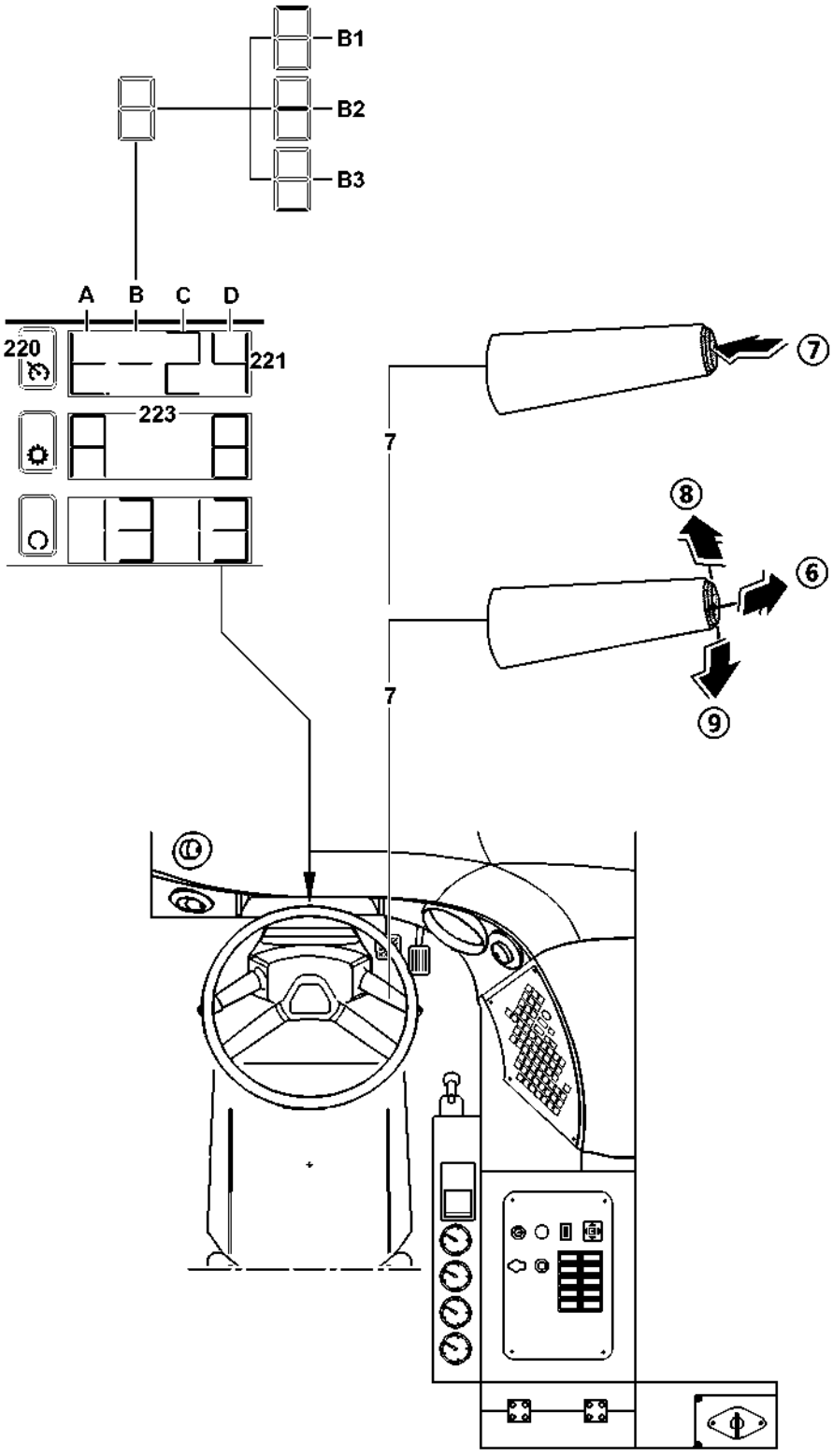

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Fig.105645

3.8.3 Changing the current Tempomat speed

▶ Operate the steering column switch **7** in direction **8 and** shortly thereafter again 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** shortly thereafter again 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

The stored speed is deleted when the ignition switch is turned back to position „0“.

▶ Move the steering column switch **7** in direction **6**.
or
Apply the service brake or retarder.

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 displayed driving speed will be resumed.

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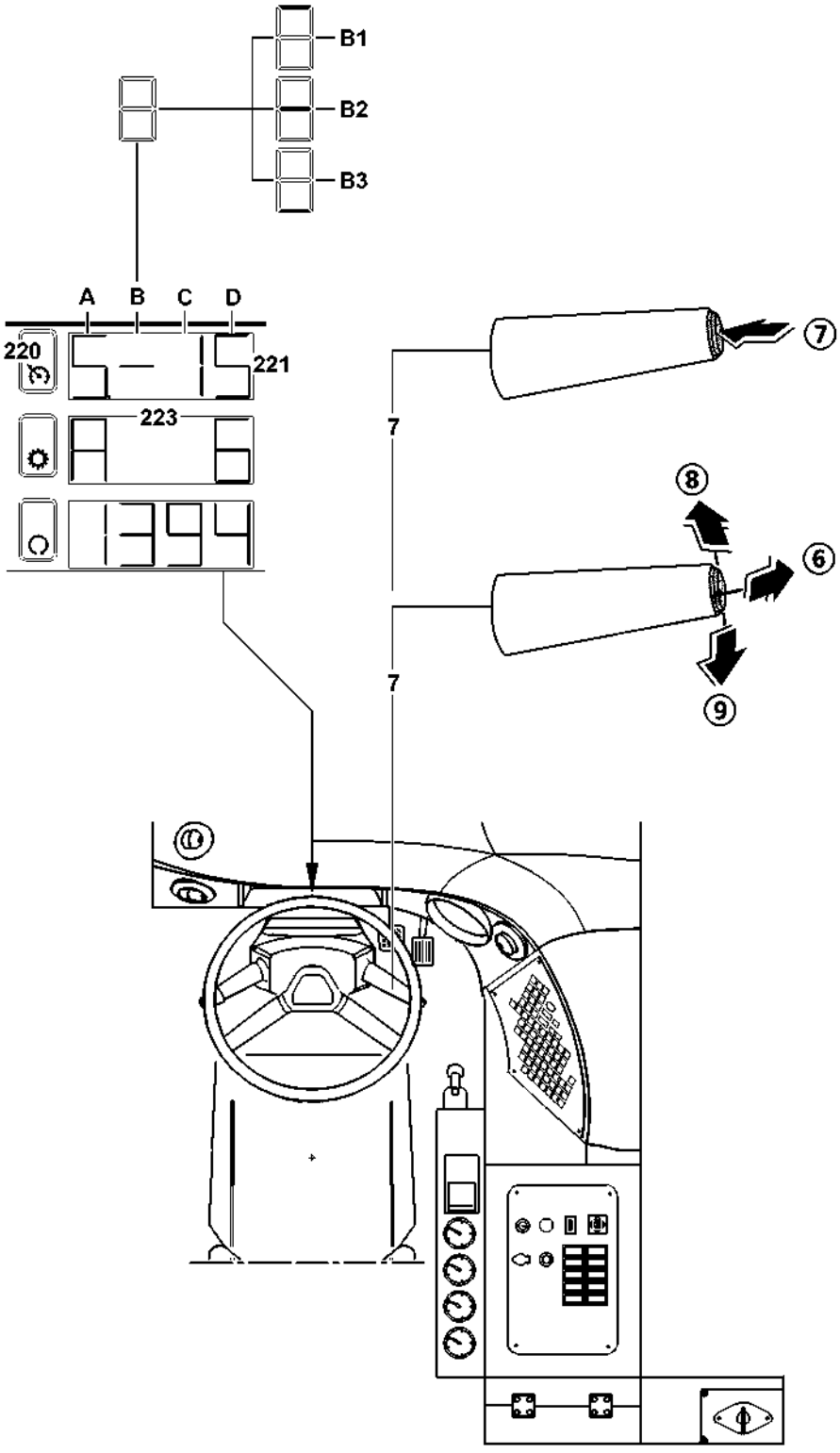

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Fig.105646

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**. If the Temposet is active, the indicator light **220** lights up and the display **221** shows an „S“ at position **A**. The set driving speed will be briefly shown 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 Status Temposet speed

If the Temposet is active, the display **221** will indicate the status of the stored Temposet speed at position **B**:
- **B1** The stored speed exceeded:
- **B2** The stored speed is reached:
- **B3** The speed is below the stored speed:

The current speed is shown at position **C** and position **D**.

3.9.3 Changing the current Temposet speed

▶ Press the button **7** and move the steering column switch **7** in direction **8**. Shortly thereafter, move it again in direction **8**.

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**. Shortly thereafter, move it again in direction **9**.

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 switch position „0“ and the vehicle-specific speed is activated.

▶ Move the steering column switch **7** in direction **6**.

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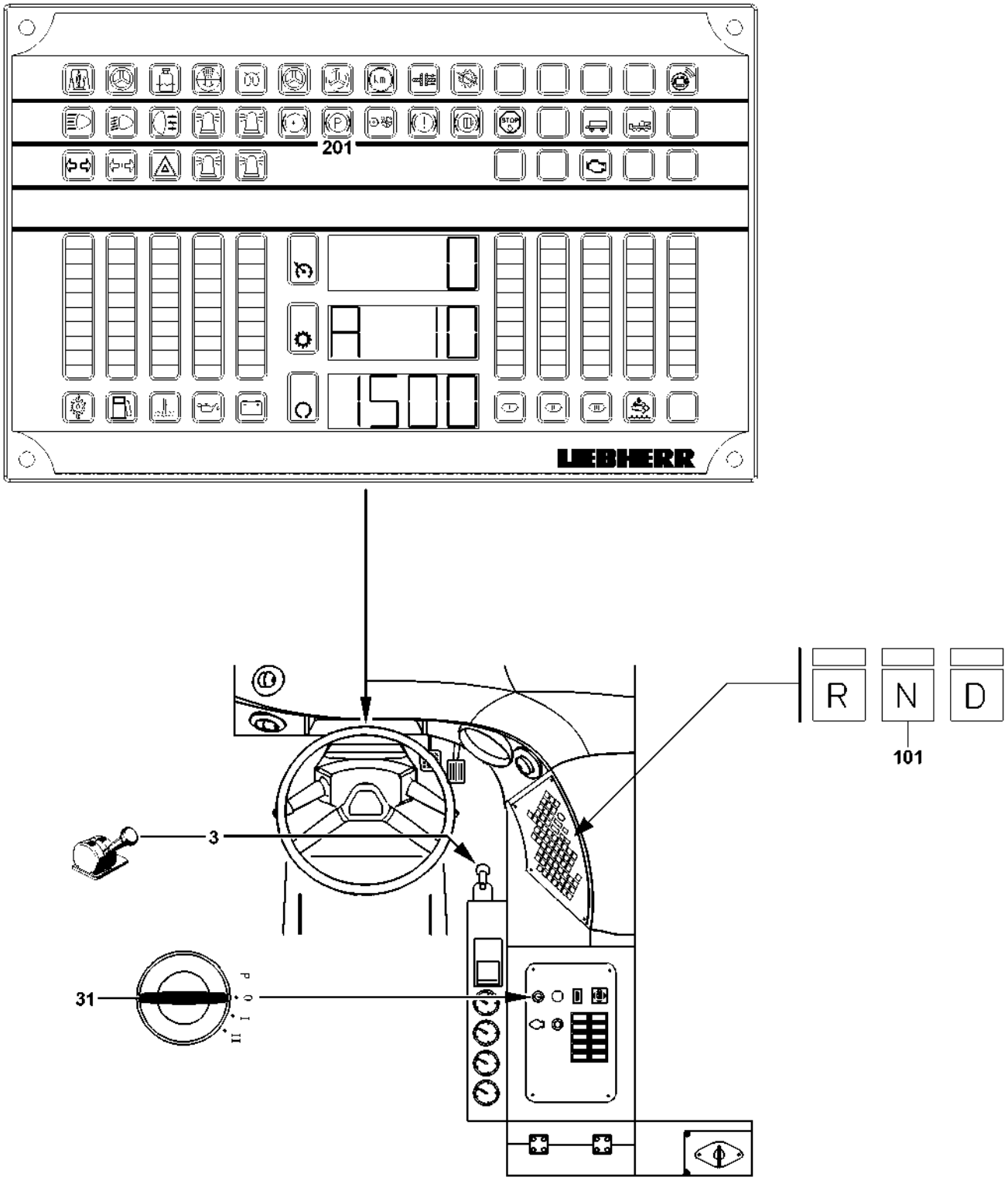

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Fig.114108

3.10 Ending driving

NOTICE
Inadequate lubrication will damage the automatic transmission!
Do not allow vehicle to coast in neutral gear. This cancels out the engine braking effect and the gear lubrication will be inadequate.
▶ 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 a load at idling speed for 1-2 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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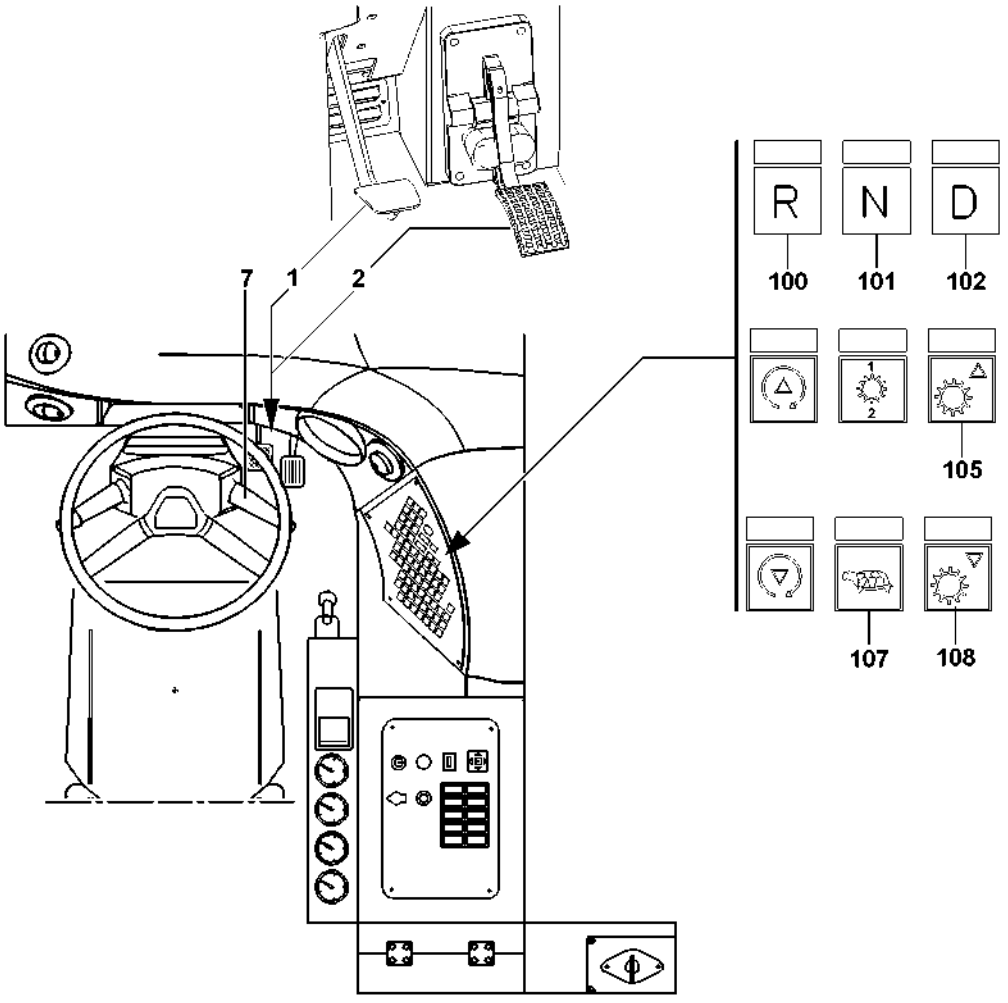

Fig.114830

4 Creeper gear (off road gear / maneuvering or taxiing mode)

The creeper gear consists of the following operating modes:
1. Off road gear (V2 – V4 / R2)
   The off road gear can be added separately.
2. Maneuvering operation (V1 / R1)
   The maneuvering mode assumes the off road gear.

4.1 Off-road gear

When switching into the off-road gear, the system automatically switches into manual shift operation, starting in 2nd gear. Switching (V1...V4 or R2) is only possible when the vehicle is stationary.

Make sure that the following prerequisites are met:
- The crane is at a standstill.
- The transmission is in neutral position „N“.

4.1.1 Addition of off-road gear

▶ Press the button **107**.

Result:

- The off-road gear is added.
- The function control on the button **107** lights up.

4.1.2 Turning the off-road gear off

▶ Press the button **107**.

Result:

- The off-road gear is turned off.
- The function control on the button **107** turns off.

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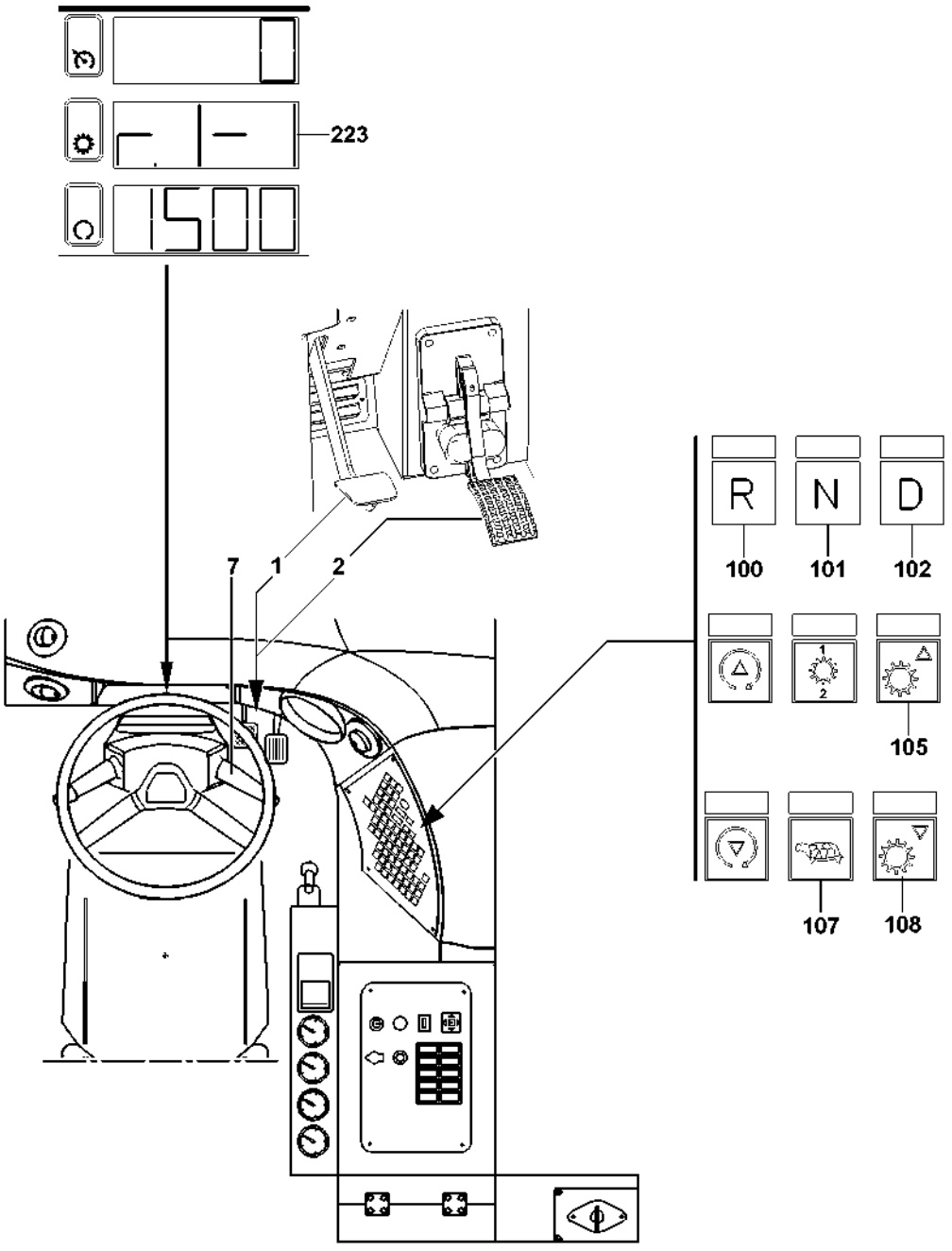

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Fig.114831

4.2 Maneuvering mode

The maneuvering mode is only designed to be used in the following driving situations:
- Slow driving (maneuvering) in restricted spaces.
- Slowly backing in and out of a parking space.
- For Driving with the equipment in place, see Crane operating instructions, chapter 15.01.

CAUTION
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 not permitted!
▶ Only select the maneuvering mode when absolutely necessary.

Make sure that the following prerequisites are met:
- **The off-road gear is enabled.**
- The crane is at a standstill.

4.2.1 General

The way that the engine and transmission work together in maneuvering operation is substantially different from the way that they work in normal operation.

In normal mode, the engine regulation **2** specifies only the maximum engine torque. The electronic (torque control) handles the closing and opening of the clutch as well as gear changes.

In maneuvering mode, the closing of the clutch depends directly on the position of the gas pedal. At a light touch of the engine regulation **2**, the clutch connects and transmits a small amount of torque, which is however not sufficient to move the vehicle. Further activation of the engine regulation **2** closes the clutch ever more forcefully until with full activation the clutch is 100 % closed. The engine rpm remains close to constant at idling speed up to a gas pedal position of 50 %. Only after that does engine rpm increase to a maximum of 1400 rpm. The engine torque is adjusted to the demands on it (engine speed regulation).

As long as the clutch is slipping, heat is generated and the clutch gets hot. If the clutch gets too hot, the „warning clutch overloaded“ „CL“ is issued. See warning information display **223**. The slipping of the clutch is related to wear and tear, and the higher the clutch temperature, the greater the wear and tear.

For that reason, the following situations must be avoided:
- Holding the vehicle on a hill with the engine regulation.
- Lengthy maneuvering at very low speed.
- Shaking the vehicle free when stuck.

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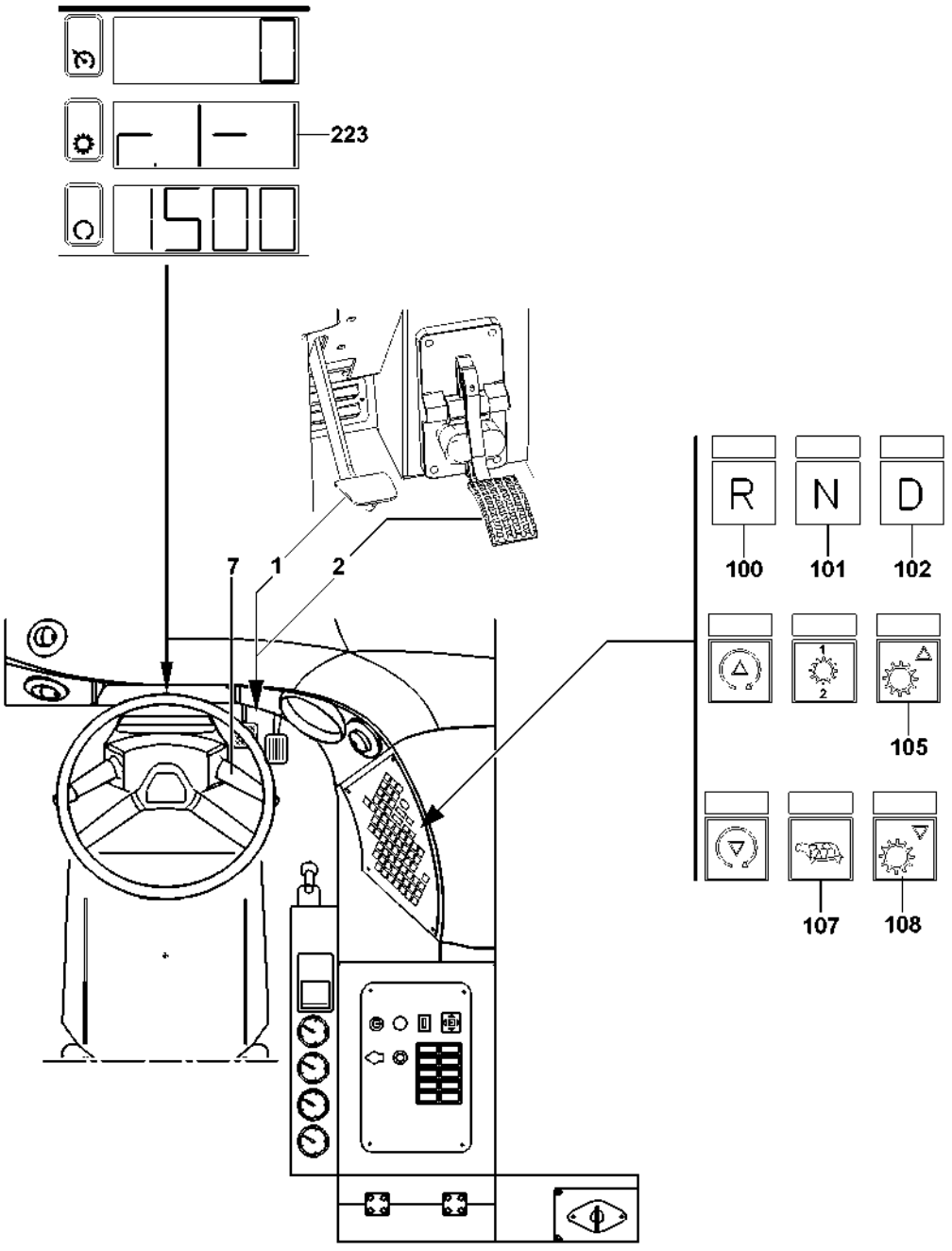

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Fig.114831

4.2.2 Activating the maneuvering mode

▶ Apply the service brake **1** gently and hold down.
▶ With the steering column switch **7**, engage gear 1.
or
Press button **108** to engage gear 1.

Result:

– The maneuvering mode is added.

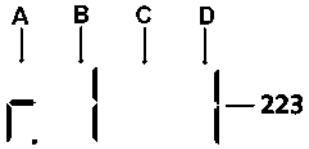

Fig.197539

The display **223** contains the following information:
– **A** Maneuvering mode:
– **B** Gear selected:
– **C** Not assigned:
– **D** Gear engaged:

▶ Release the parking brake **3**.
▶ Release the service brake **1**.

Result:

– The vehicle begins to move.

4.2.3 Turning the maneuvering mode off

▶ With the steering column switch **7**, shift up by 1 gear.
▶ With the button **105** shift up by 1 gear.

Result:

– The maneuvering mode is turned off.

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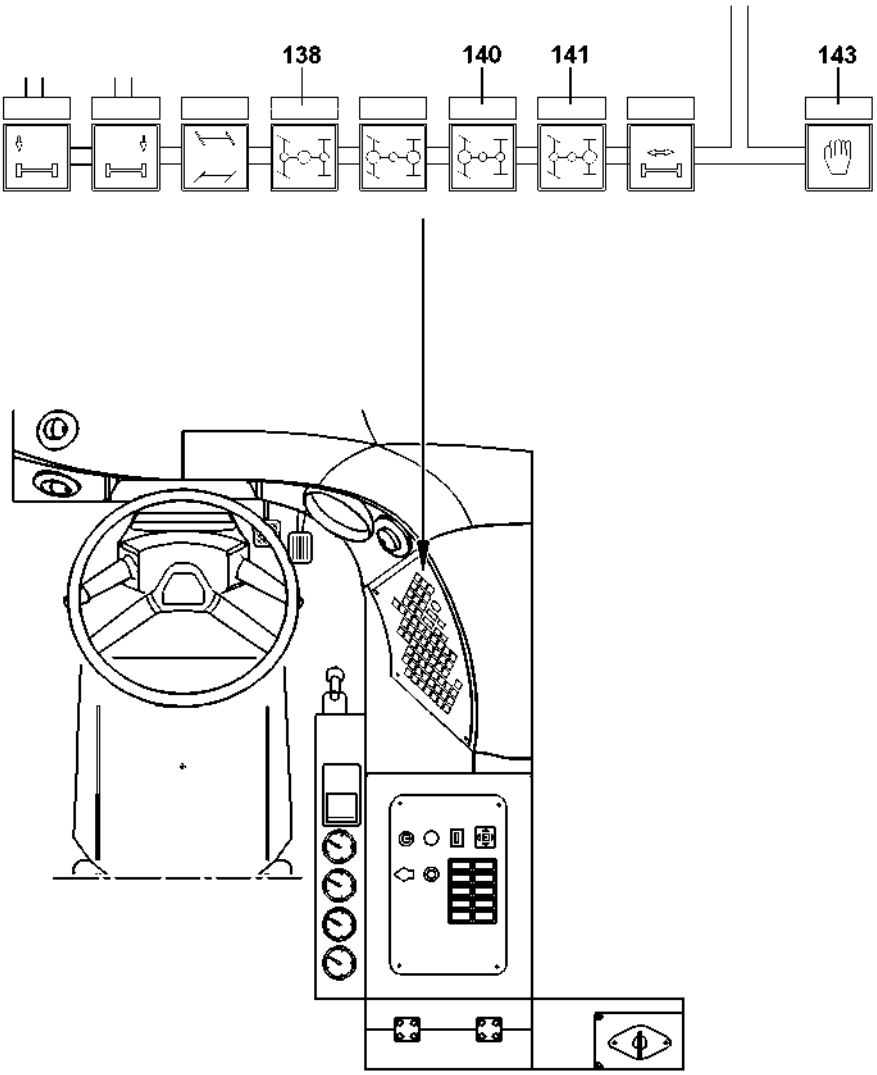

Fig.105648

5 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. Addition of longitudinal differential lock in transfer gearbox and axle 4 + addition of axle 1 (with 10x8 drive)*****.
2. Transverse differential lock axle 4 + axle 5.
3. Transverse differential lock axle 1 (with 10x8 drive)***** + axle 2.

CAUTION
Danger of damage to drive axles!
- ▶ Turn the differential locks on / 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 drive on difficult terrain (e.g. sand, slush, loose or slippery subsoil etc.) with differential locks.

5.1 Addition of longitudinal differential locks in transfer gearbox and axle 4 + addition of axle 1 (with 10x8 drive)*

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 locks in transfer gearbox and axle 4 + axle 1 (with 10x8 drive)***** are added.

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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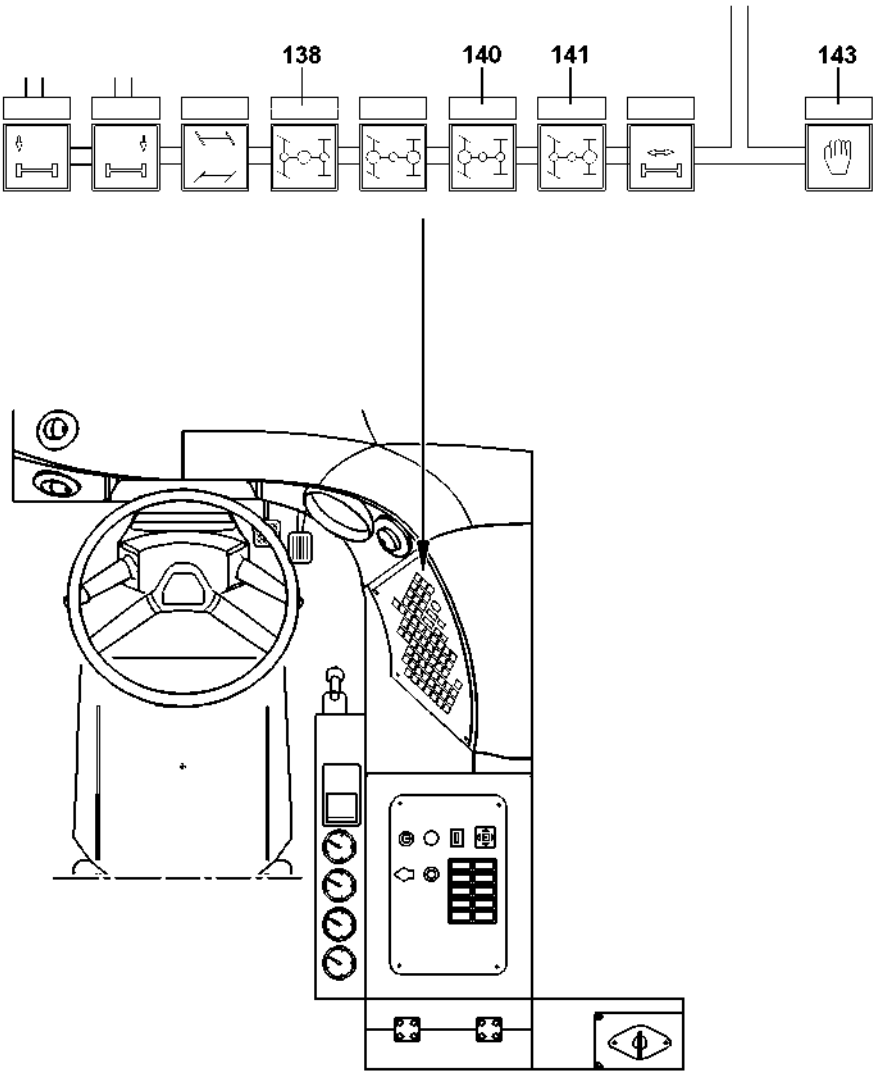

Fig.105648

5.2 Adding transverse differential locks axle 4 + axle 5

Make sure that the following prerequisites are met:
- The vehicle is at a standstill.
- The transmission is in neutral position „N“.
- The longitudinal differential locks in transfer gearbox and axle 4 + axle 1 (with 10x8 drive)***** are added.

▶ Press button **141** and button **143**.

Result:

- The function control on the button **141** lights up.
- The transverse differential locks axle 4 + axle 5 are added.

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.

5.3 Adding the transverse differential lock axle 1 (with 10x8 drive)* + axle 2

Make sure that the following prerequisites are met:
- The vehicle is at a standstill.
- The transmission is in neutral position „N“.
- The longitudinal differential locks in transfer gearbox and axle 4 + axle 1 (with 10x8 drive)***** are added.
- The transverse differential locks axle 4 + axle 5 are added.

▶ Press button **140** and button **143**.

Result:

- The function control on the button **140** lights up.
- Transverse differential lock axle 1 (with drive 10x8)***** + axle 2 is added.

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.

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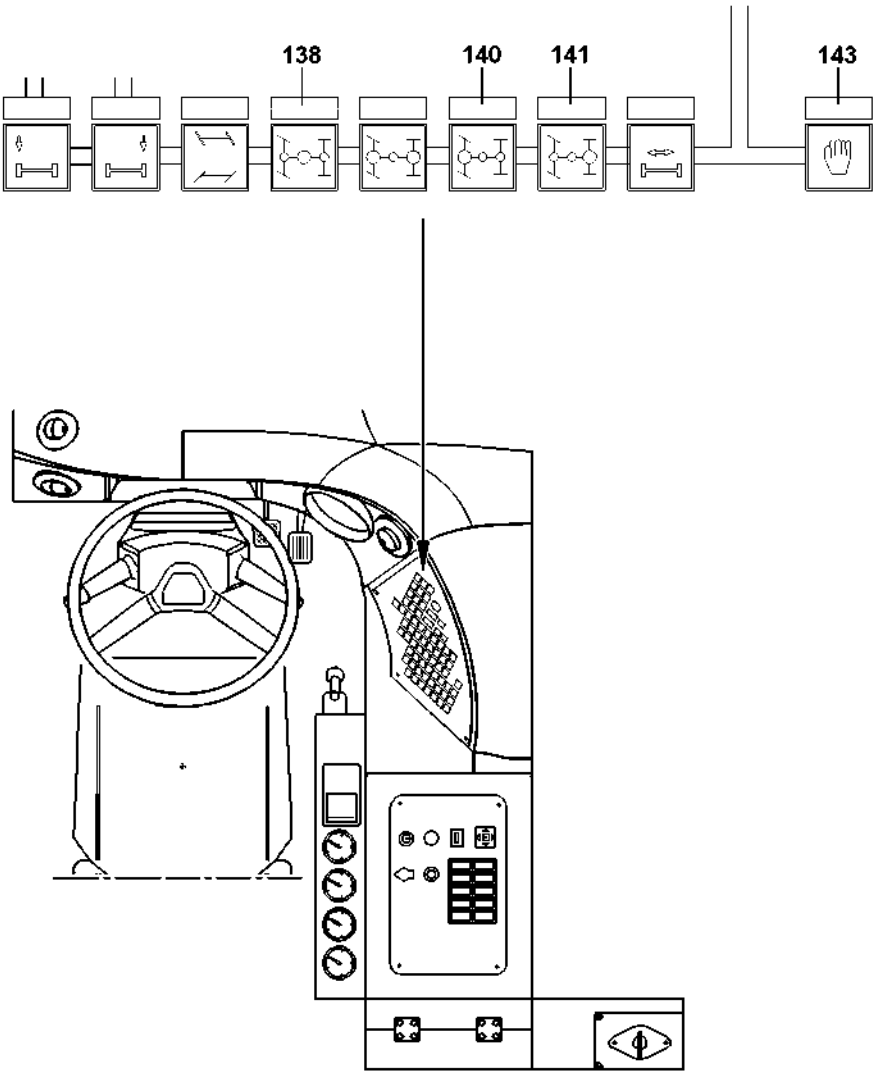

Fig.105648

5.4 Turning the differential locks off

CAUTION
Danger of damage to drive axles as well as the entire drive train!
Considerable damage can be caused by driving on solid, non-slippery ground with added differential lock.
▶ 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 **140** and button **143**.

Result:

– The function control on the button **140** turns off.
– Transverse differential lock axle 1 (with 10x8 drive)***** + axle 2 is turned off.

▶ Press button **141** and button **143**.

Result:

– The function control on the button **141** turns off.
– The transverse differential locks axle 4 + axle 5 are turned off.

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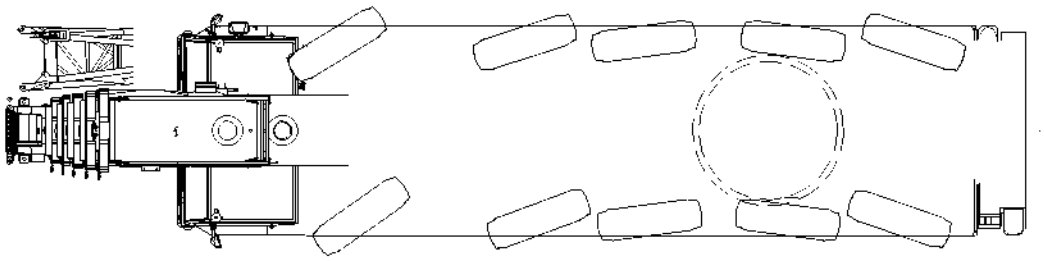
1



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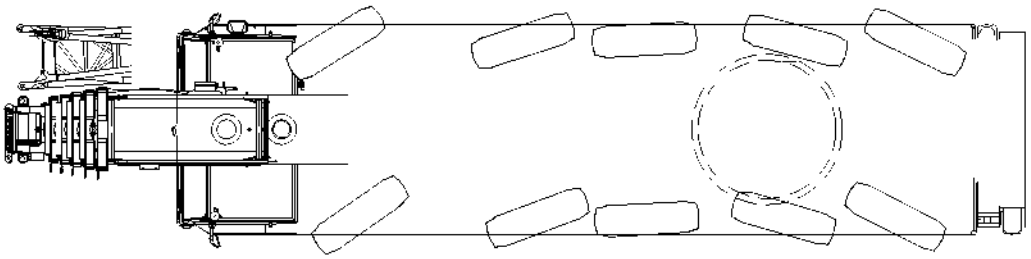

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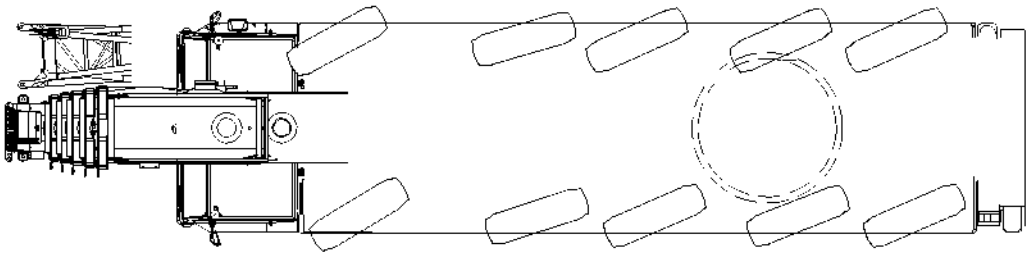

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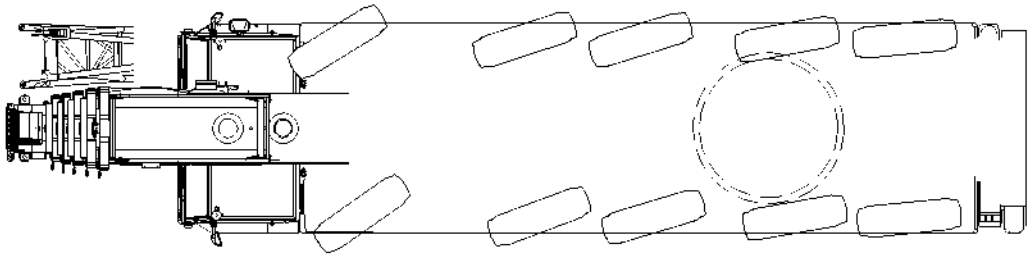

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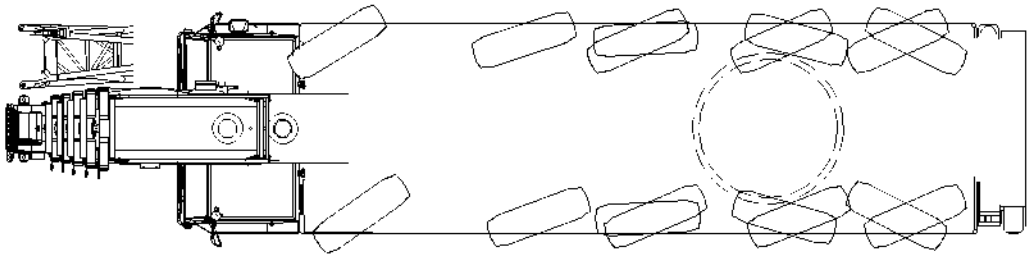

Fig.102011

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6 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.

6.1 General

WARNING
Danger of crushing!
▶ Ensure no one is between the wheels when the engine is started and a gear is placed.

Approval to shift change 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 Bluetooth™ Terminal **4**.

A shift change in operating mode is only possible up to a speed of 20 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 last selected operating mode 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 from the steering circuit II every time the engine is started and subsequently periodically after every steering request. This can cause a short term, slight increase of force on the steering wheel.
▶ This procedure has no influence on the safety of the steering system, the steering system continues to be fully functioning!

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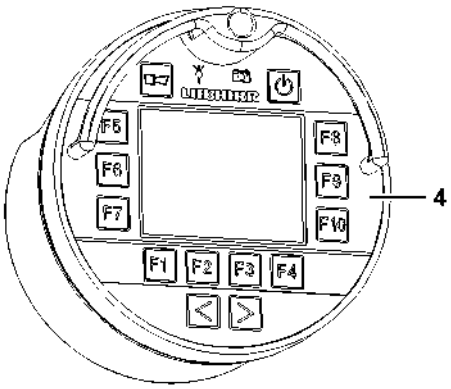

Fig.105390

6.1.1 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.

6.1.2 Function controls

▶ The function control on the button lights up.

Result:

– Operating mode is activated.

▶ Function control on button does not light up.

Result:

– Operating mode is not activated.

▶ 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 system has not (yet) approved the shift 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 an error in the steering system. The operation of the button will be suppressed; if necessary an acoustic signal is output on the display unit or an error message is indicated on the Bluetooth™ Terminal **4**.
▶ Remedy the error.

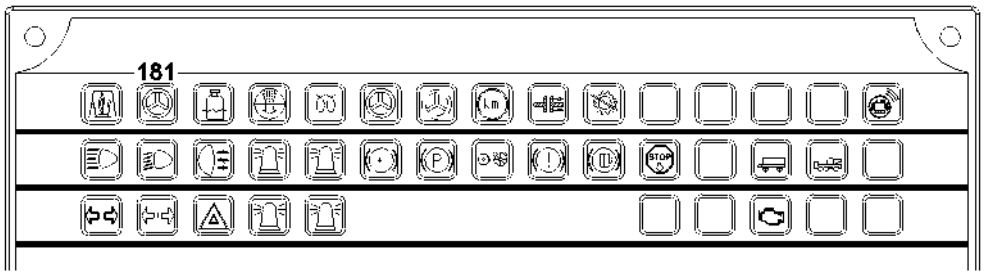

Fig.113347

6.1.3 Indicator lights

The indicator light **181** shows the condition of the steering:
- The indicator light **181** lights up: Steering operational.
- 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.

WARNING
Danger of accident!
An error in the steering will be indicated by the blinking indicator light **181** and fast blinking of all 5 buttons for the steering operating modes. An acoustic warning signal also sounds every 3 seconds. The rear steering axles are automatically reset in 0° position and aligned straight forward. 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.

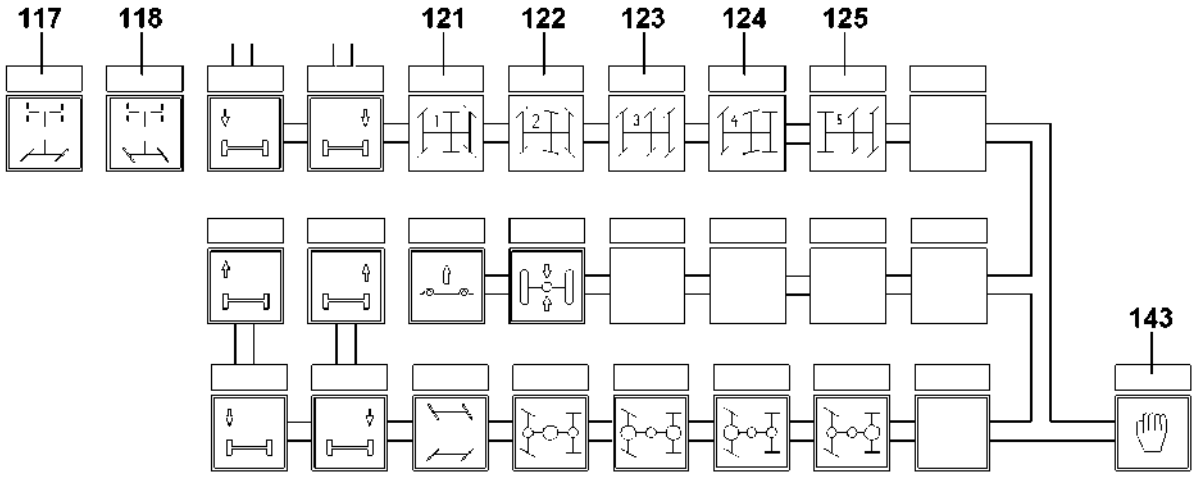

Fig.103243

6.2 Changing between operating modes

6.2.1 Direct selection

Select the desired operating mode using the button **143** and the operating mode button. Turn the steering wheel until the wheels on 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.

6.2.2 Indirect selection using the operating mode „Independent steering“

The operating mode can also be changed without changing the current steering position 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.

6.3 On road driving

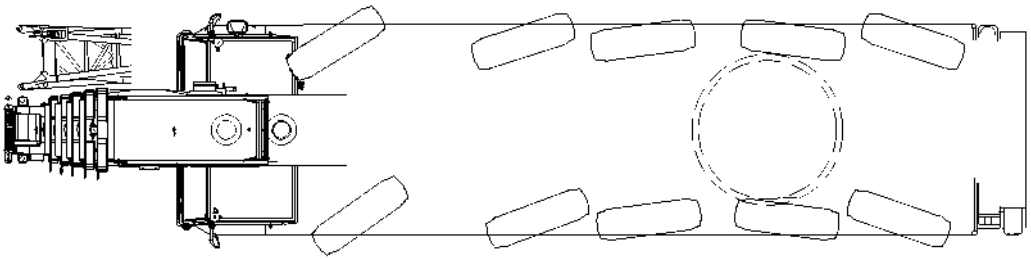

Fig.102012

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.

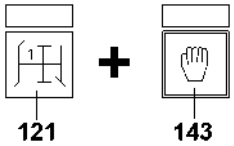

Fig.197512

▶ Press button **143** and button **121**.

6.4 All wheel steering

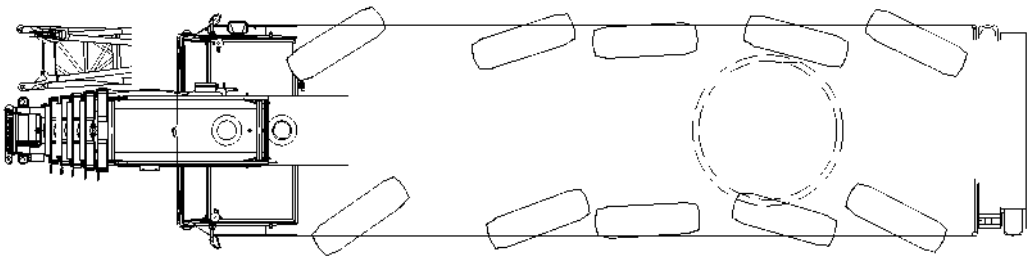

Fig.102013

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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.

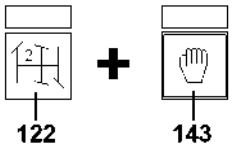

Fig.197514

▶ Press button **143** and button **122**.

6.5 Crab steering

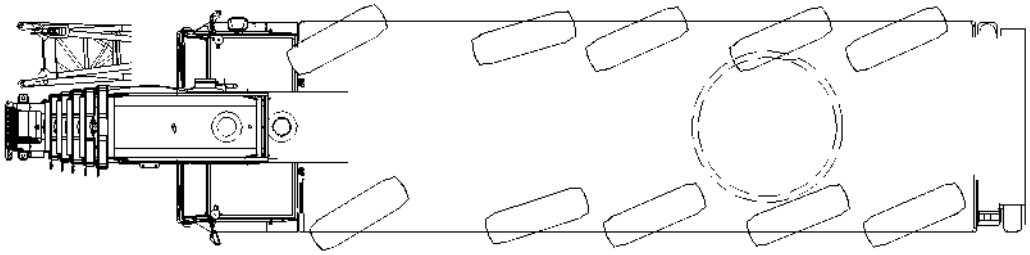

Fig.102014

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 the weight distribution of the crane.

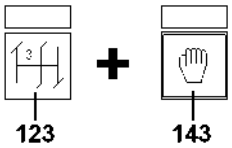

Fig.197516

▶ Press button **143** and button **123**.

6.6 Steering without sheer out

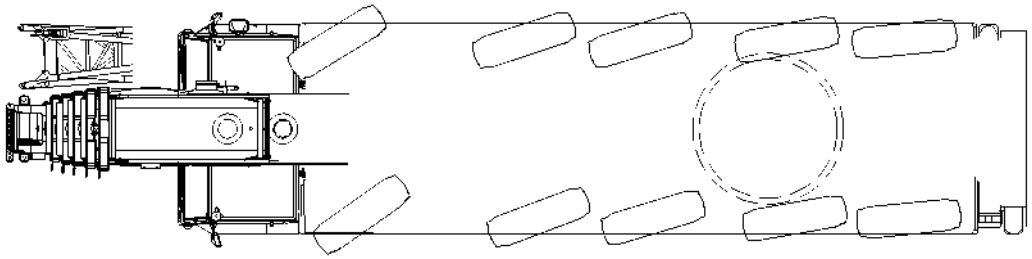

Fig.102015

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.

The maximum driving speed is limited to 20 km/h.

Only restricted turns are possible in this operating mode.

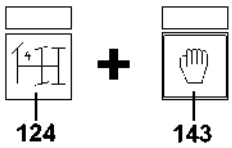

Fig.197518

▶ Press button **143** and button **124**.

6.7 Independent steering

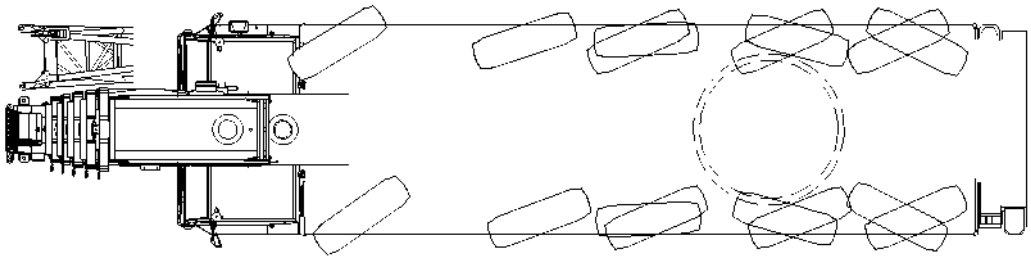

Fig.102016

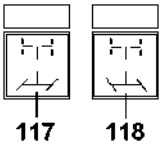

Fig.197523

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 added in all wheel positions.

The maximum driving speed is limited to 20 km/h.

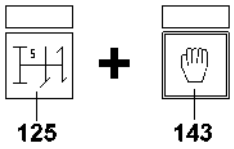

Fig.197520

▶ Press button **143** and button **125**.

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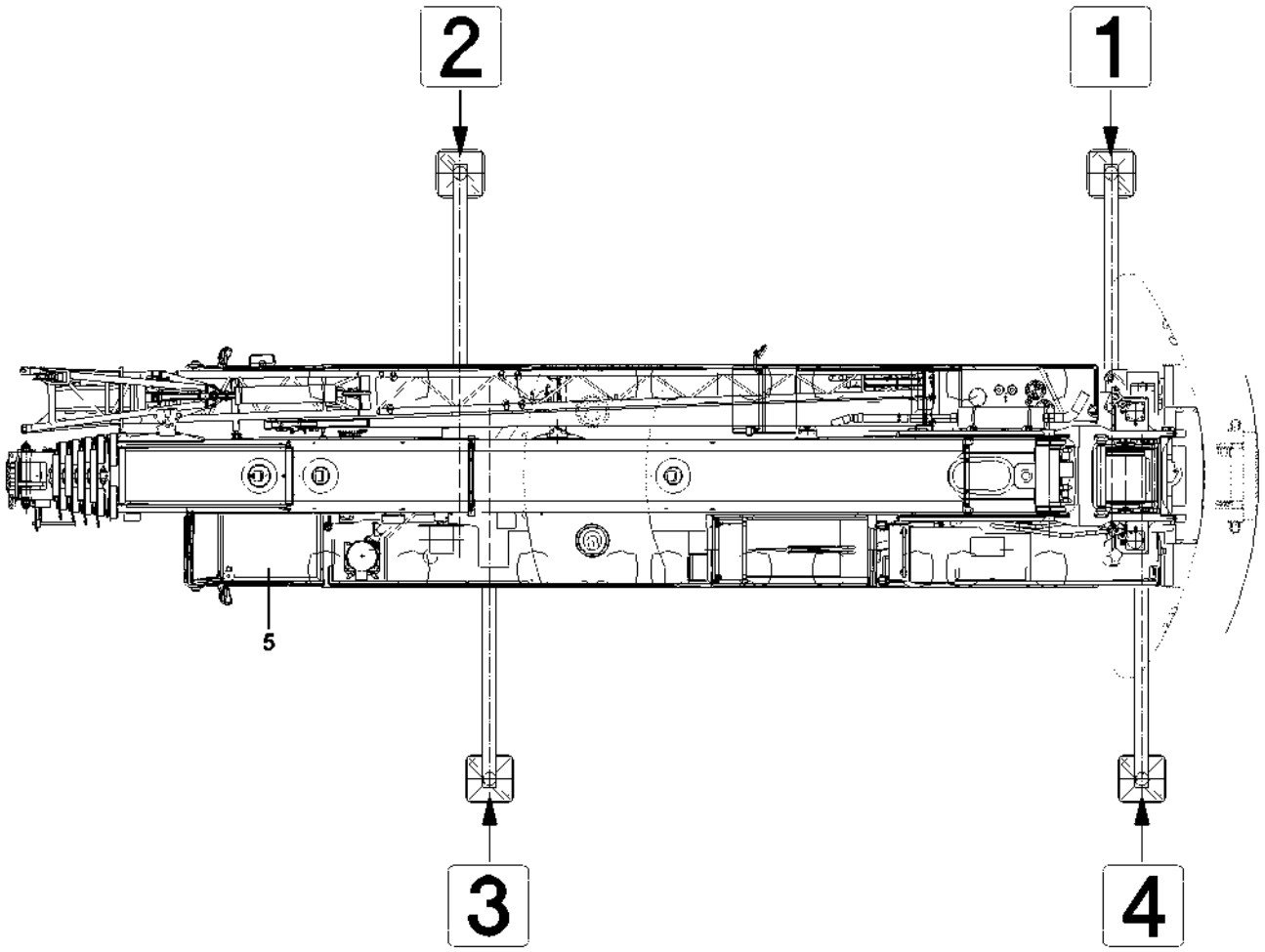

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Fig.112605

1 General

1.1 Selecting the operating location

Note

▶ Chapter 2.04 in the Crane operating 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 charts and the crane can be aligned horizontally.

1.2 Numbering of sliding beams with support cylinder

All four sliding beams on the crane are numbered to be able to match the number on the display with the number on the sliding beam when supporting via the BTT.

The illustration on the left side shows the crane from above as well as the numbered sliding beams with support cylinders and the driver's cab **5**.

- **1** Sliding beam „right rear“ with support cylinder
- **2** Sliding beam „right front“ with support cylinder
- **3** Sliding beam „left front“ with support cylinder
- **4** Sliding beam „left rear“ with support cylinder

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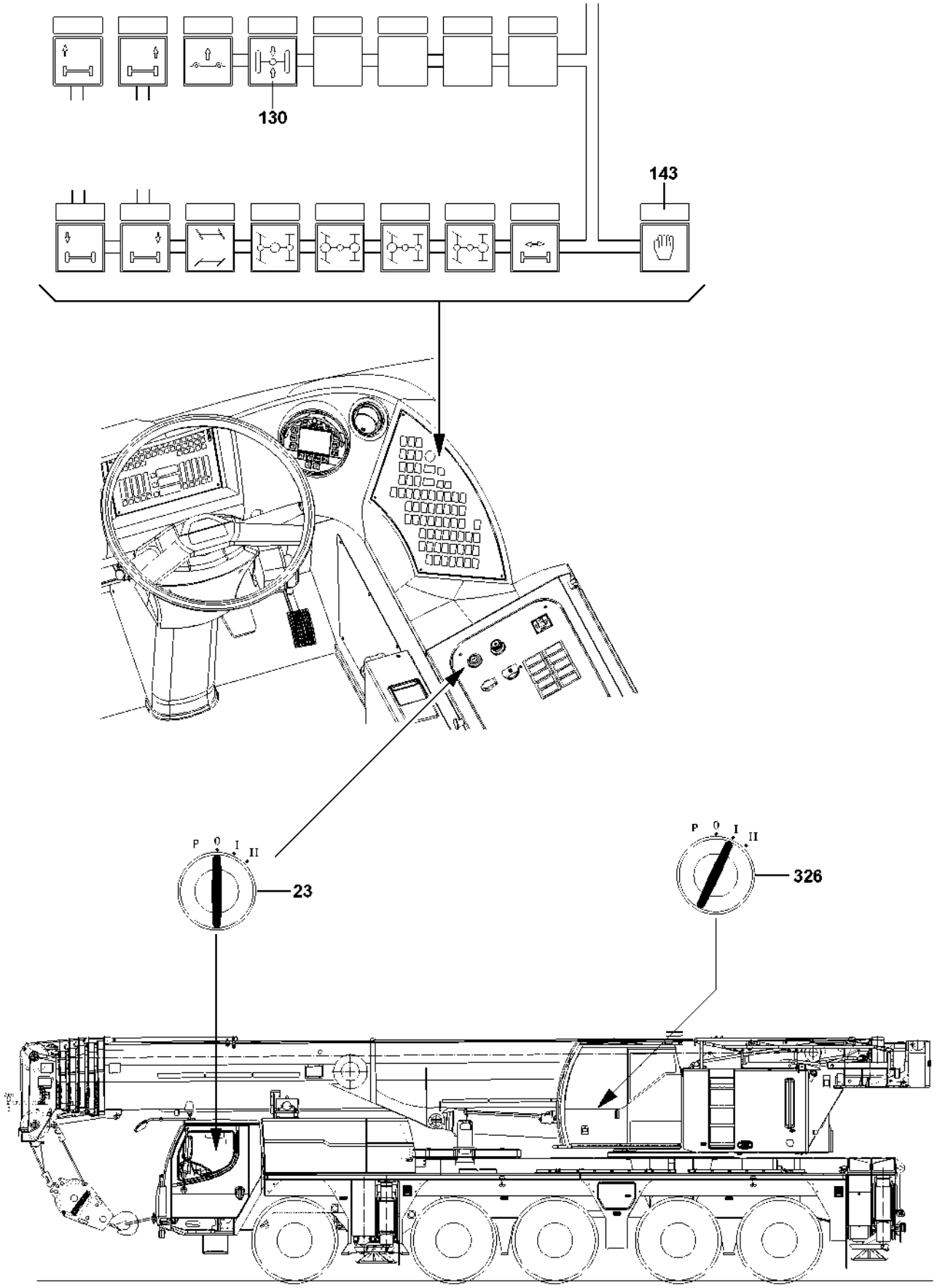

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Fig.112606

1.3 Changing from driving operation to crane operation

Make sure that the following prerequisites are met:
- The crane is on a level and load-bearing surface.
- The parking brake is applied.
- The transmission is in neutral position „N“.
- The engine is running.

1.3.1 Blocking the axle suspension

The axle suspension must be locked before the crane is supported.

▶ Press button **130** and button **143**.

Result:

- Function control on the button **130** lights up.
- The axle suspension is blocked.

▶ Extend the support cylinders and sliding beams.

1.3.2 Changing to crane operation

Make sure that the following prerequisites are met:
- The engine is turned off.
- The ignition in the chassis is turned off.
- The axle suspension is blocked.

▶ Turn the ignition switch **326** in the crane operator's cab to position „I“.

Result:

- The crane has been changed to superstructure operation.

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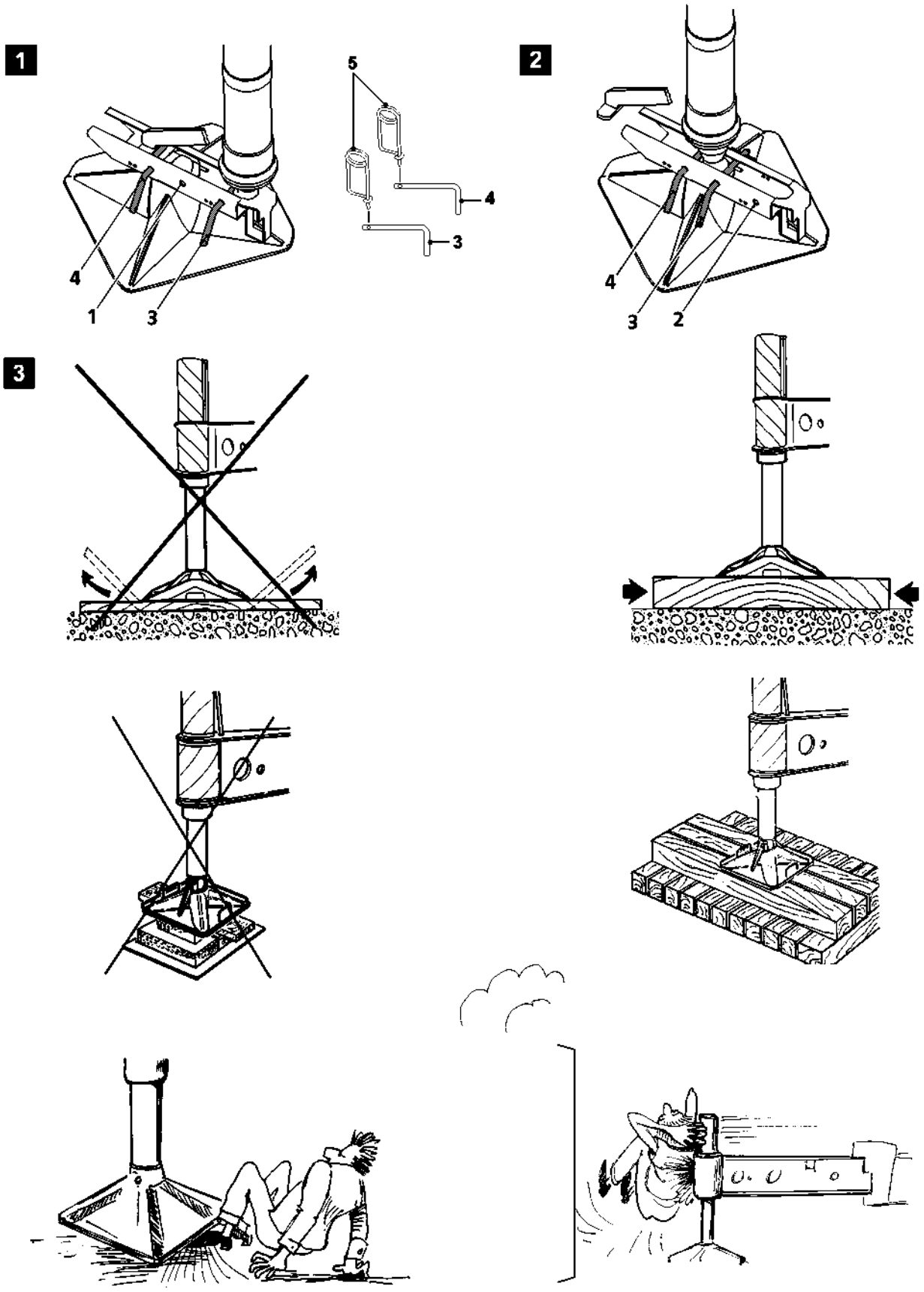

Fig.105531

1.4 Bringing the support plates from transport position (illustration 1) to operating position (illustration 2)

- ▶ Remove the cotter pin **5** of the locking pin **3**.
- ▶ Pull the locking pin **3** from the bore **2**.
- ▶ Pull the support plate outward by the handle until the locking pin **4** meets ball head of the support cylinder.
- ▶ Insert the locking pin **3** into the bore **1** and secure with the cotter pin **5**.

1.5 Bringing the support plates from operating position (illustration 2) to transport position (illustration 1)

- ▶ Remove the cotter pin **5** from the locking pin **3**.
- ▶ Pull the locking pin **3** from the bore **1**.
- ▶ Use handle to push the support plate in until it meets ball head of the support cylinder.
- ▶ Insert the locking pin **3** into the bore **2** and secure it with the cotter pin **5**.

1.6 Support plates, illustration 3

Observe the safety instructions and permissible ground pressures (see Crane operating instructions, chapter 2.04).

Support plate area = 2500 cm^2

DANGER
Risk of accident!
- ▶ Use only suitable materials for support.
- ▶ Place the support bases in the center under the support plates.

- ▶ Use stable materials such as wood, steel plates or concrete slabs of a suitable size under the supports plates, depending on the ground conditions.

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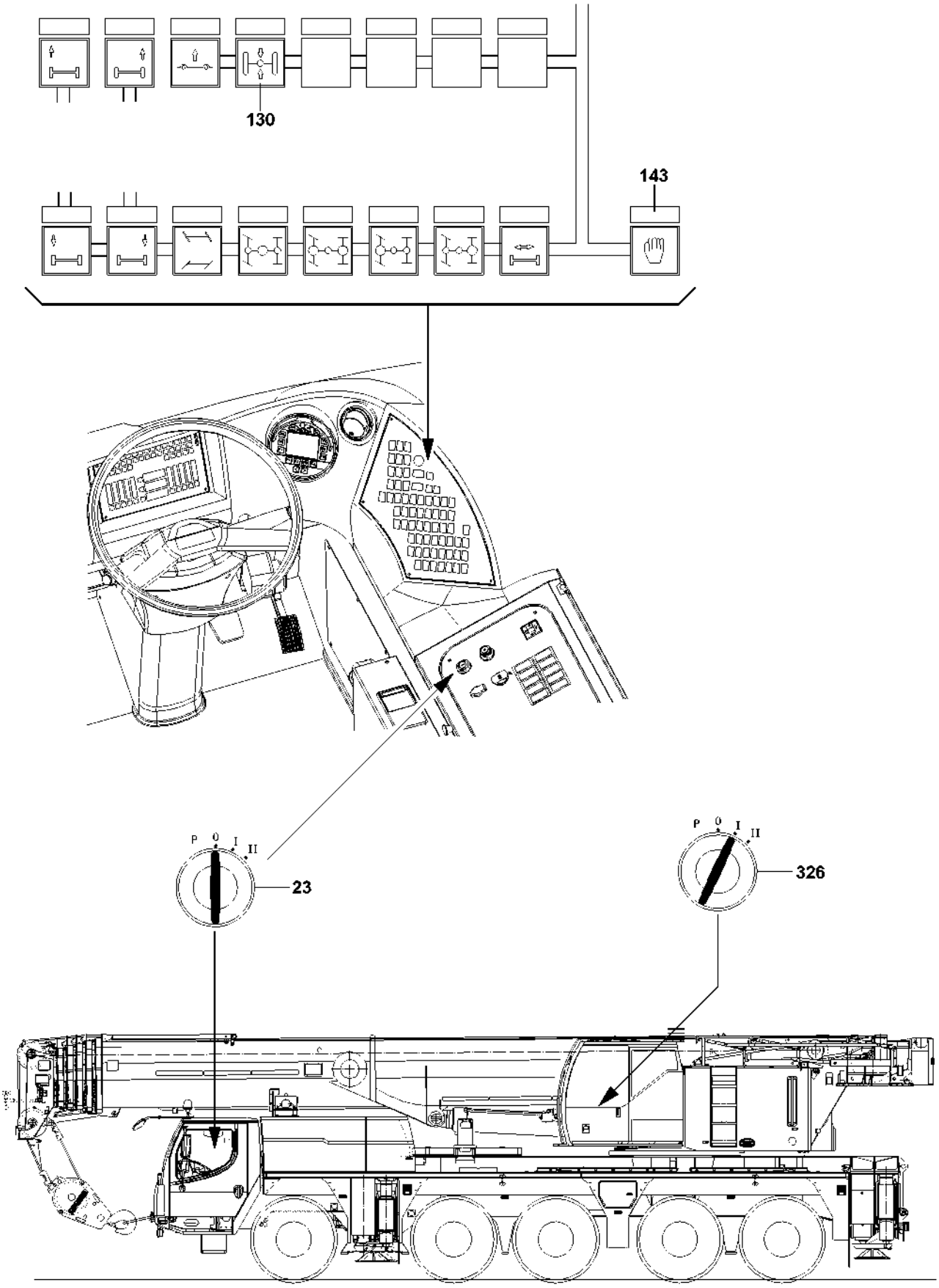

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Fig.112607

1.7 Changing from crane operation to driving 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 telescopic boom is fully telescoped in.
- The telescopic boom is placed down to the front into the boom receptacle.
- The transmission is in neutral position „N“.

1.7.1 Turning the axle block off

WARNING
Risk of damage to 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 drop down.
▶ Do not turn axle blocking off until all wheels are in contact with the ground.

▶ Retract the support cylinders until all wheels are in contact with the ground.
▶ Press button **130** and button **143**.

Result:

- The function control on the button **130** turns off.
- The axle suspension is active.

▶ Retract the support cylinders and the sliding beams all the way.

1.7.2 Changing to driving operation

Make sure that the following prerequisites are met:
- The engine is turned off.
- The ignition in the superstructure is turned off.

▶ Turn the ignition switch **23** in the driver's cab to position „I“.

Result:

- The crane is changed to driving operation.

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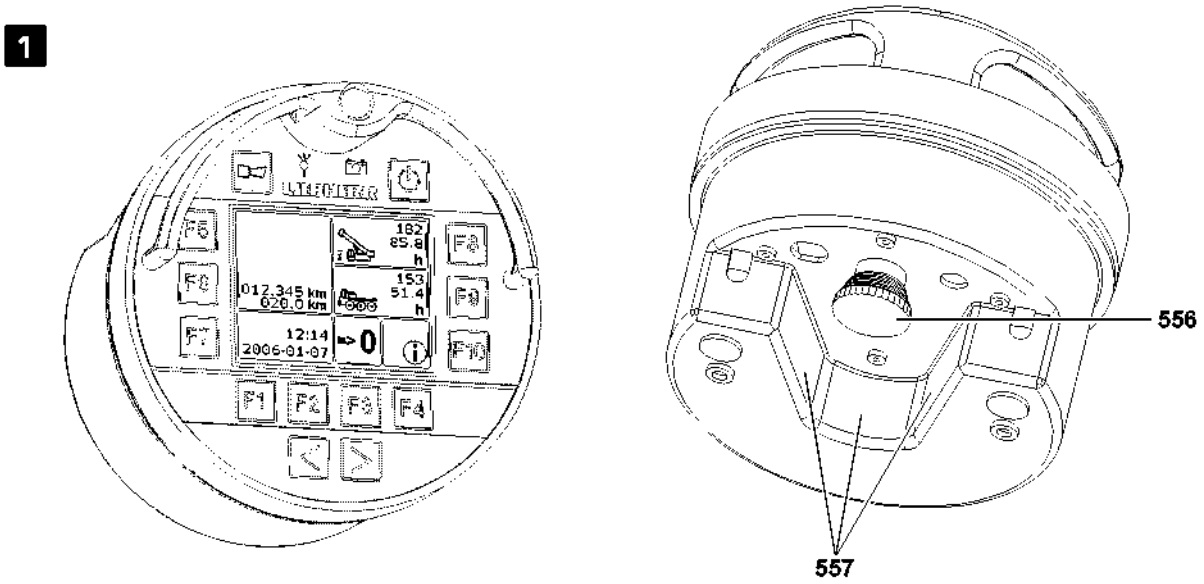

Fig.105969

LWE/LTM 1130-5-1-004/20502-04-02/en

2 The Bluetooth™ Terminal (BTT)

2.1 General

Before being able to work with the BTT, it must run through the pairing process, see Crane operating instructions, chapter 5.31. This is necessary to be able to establish the connection between the Bluetooth™ Basis (BTB) and the BTT.

The crane may be supported via the Bluetooth™ Terminal (BTT) as well as from the crane cab.

To operate the support with the Bluetooth™ Terminal, remove the terminal from its fitting in the driver's cab.

DANGER
Risk of fatal injury!
- ▶ The crane operator must set the LICCON overload protection according to the load chart for the respective support width.
- ▶ The support cylinders must be supported as specified.

▶ Turn on the ignition in the cab.

Result:

– The Bluetooth™ Terminal (BTT) turns itself on.

If the BTT display shows the „Kilometer display and operating hours“ menu, see illustration **1**:
▶ Remove the BTT from the charging cradle.

Result:

– The BTT display changes to the „Main menu“, see illustration **2**.

Note
▶ The icon on function key **F9** is only displayed during superstructure operation.

▶ Press the function key **F2**.

Result:

– The BTT display changes to the „Engine operation chassis“ menu, see illustration **3**.
– The rotating beacons turn on.
– The EMERGENCY OFF switch **556** on the BTT is active.

Note
▶ The rotating beacons turn off at engine stop.

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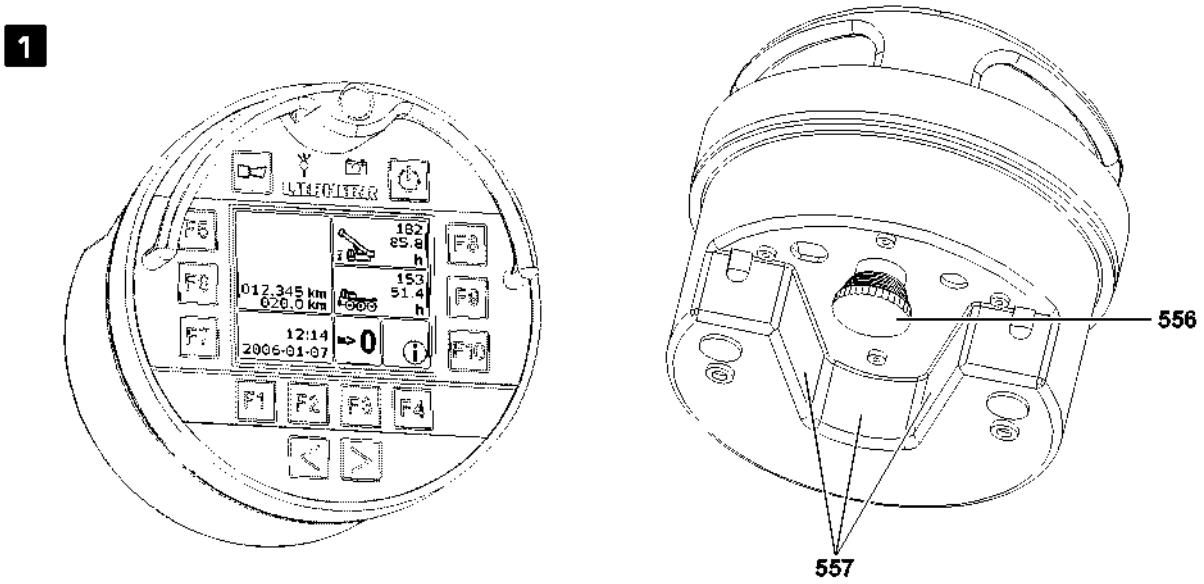

Fig.105969

LWE/LTM 1130-5-1-004/20502-04-02/en

If the icons on function key **F5** and / or the function key **F6** are highlighted in purple:
▶ Press the function key **F6**.

Result:

– The engine is started.

▶ Press the function key **F5**.

Result:

– The engine is stopped.

If the icons on function key **F8** and / or the function key **F9** are highlighted in purple:
▶ Press the function key **F9**.

Result:

– The engine speed increases.

▶ Press the function key **F8**.

Result:

– The engine speed decreases.

Problem remedy
If the icons are not highlighted in purple?
The 2-hand keypad **557** at the rear of the BTT was not actuated **or** the selection is invalid.
▶ Press the 2-hand keypad **557**.

Note
▶ The actuation of the 2-hand keypad **557** is stored for 30 seconds. If no movement is actuated within these 30 seconds or if the 2-hand keypad **557** is not actuated, then the stored actuation is deleted and a signal tone sounds.

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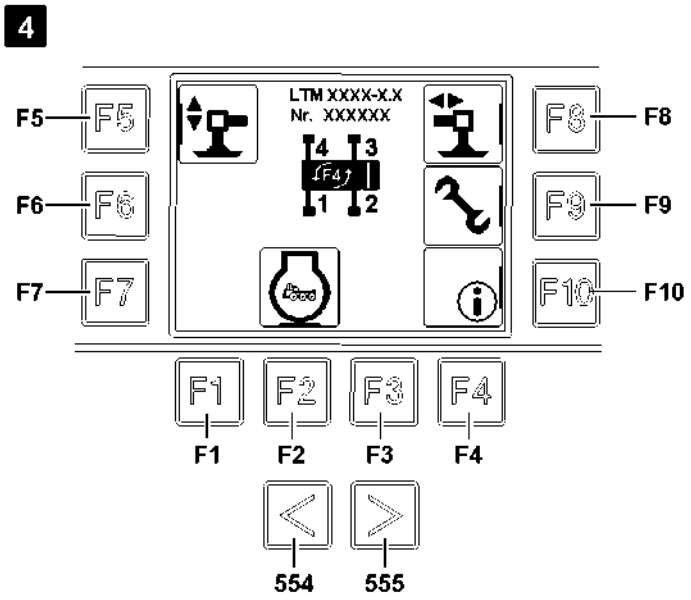

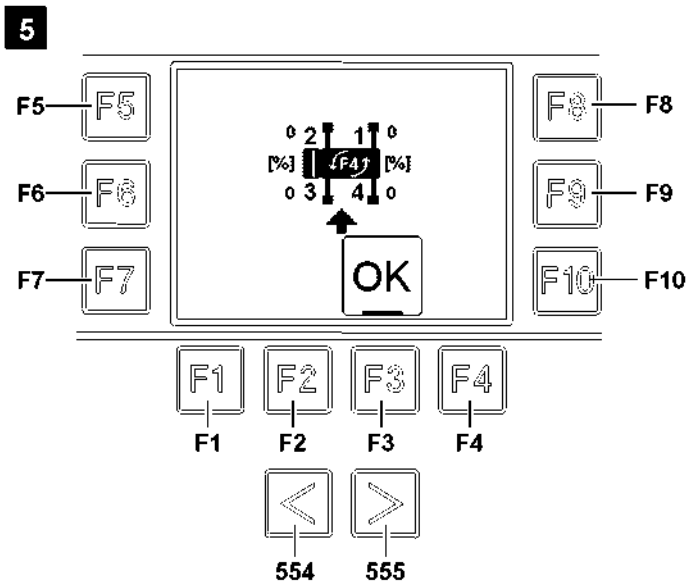

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Fig.105970

▶ Press the function key **F1**.

Result:

– The BTT display changes to the „Main menu“, see illustration **4**.

▶ Press the function key **F8**.

Result:

– The BTT display changes to the „Sliding beam movement“ menu, see illustration **5**.

Note

▶ Use function key **554** and function key **555** to „toggle“ between individual menus.

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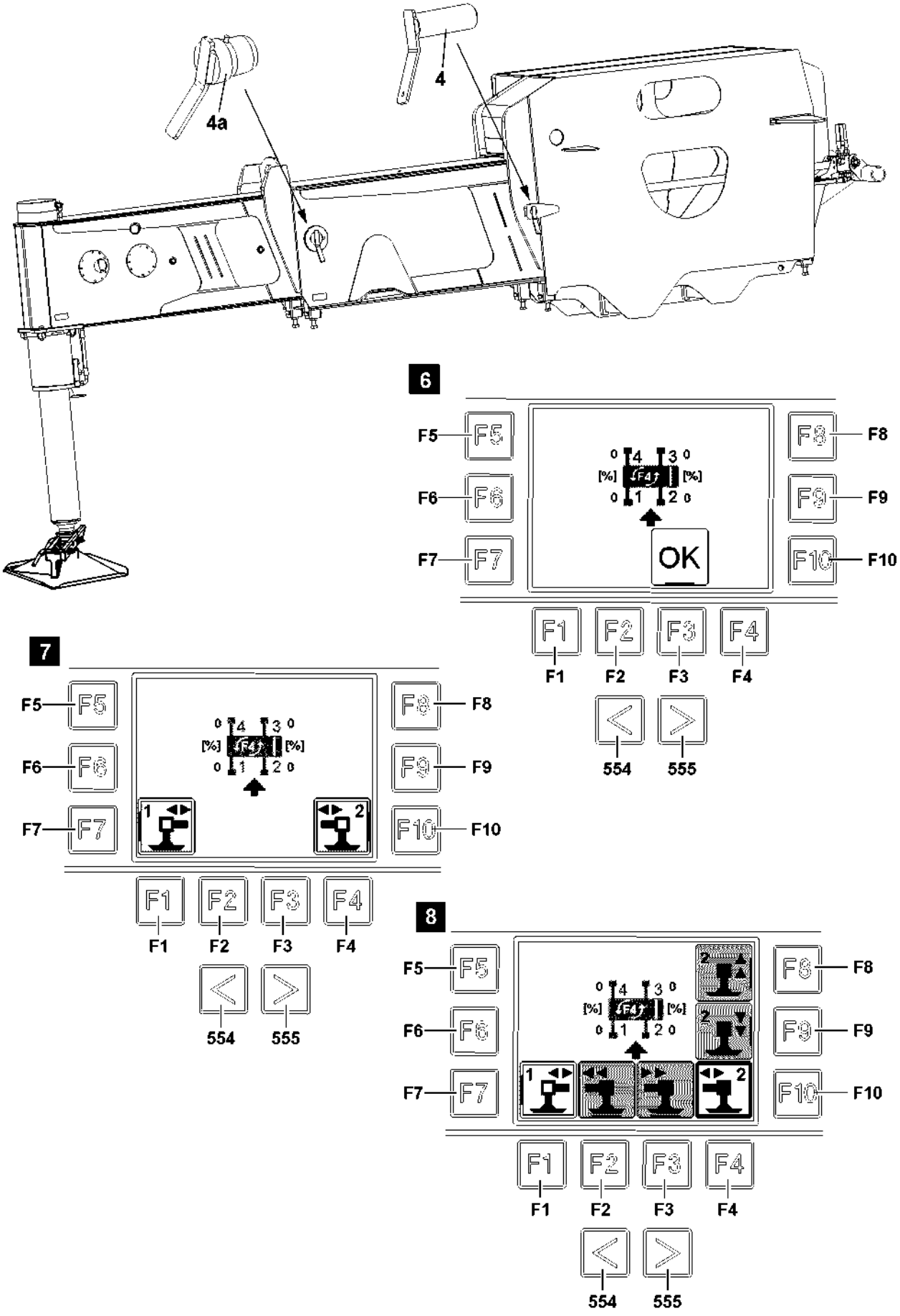

Fig.112608

LWE/LTM 1130-5-1-004/20502-04-02/en

2.2 Extending the sliding beam with the BTT

Make sure that the following prerequisites are met:
- The engine is running.
- The „Sliding beam movement“ menu is shown on the BTT display.

The sliding beams on the left / right side of the vehicle can be operated using the Bluetooth™ Terminal.

WARNING
Danger of fatal injury when extending the sliding beams!
- ▶ The operator is obliged to carefully monitor the extending movement of the controlled sliding beam.
- ▶ Ensure that no persons or objects are within the danger zone when the sliding beams are extended.

2.2.1 Extending the sliding beams on the right side of the vehicle

▶ Remove retaining pins **8** from both sliding beams on the right side of the vehicle.

WARNING
Risk of accident if operator is incorrectly positioned next to the crane.
If the following is not observed, there is a danger of the sliding beams being extended on the wrong side, resulting in severe or fatal personal injury.
- ▶ The crane icon on the BTT display must correspond to the actual position of the operator with respect to the crane. This ensures that the sliding beams on the selected vehicle side are extended.

If the actual position of the operator with respect to the crane does not correspond to the crane icon on the BTT display:

▶ Press the function key **F4**.

Result:

– The crane icon is turned by 180°, see illustration **6**.

▶ Press the function key **F3**.

Result:

– The sliding beams at the right side of the vehicle are displayed, see illustration **7**.

▶ Press function key **F7** and / or function key **F10**.

Result:

– The sliding beam adjustment icons are displayed, see illustration **8**.
– The blinkers on the right side of the vehicle turn on.

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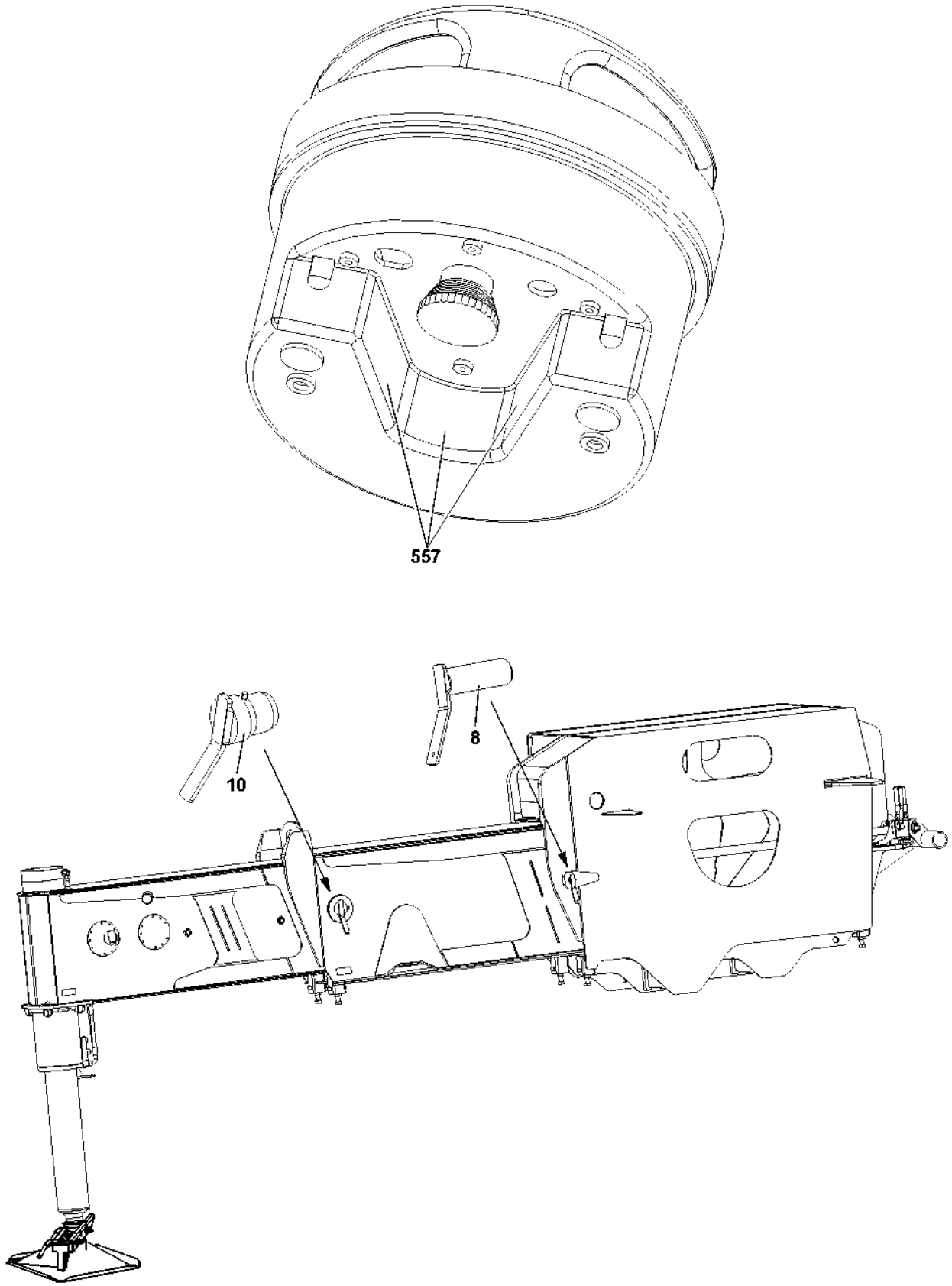

LWE/LTM 1130-5-1-004/20502-04-02/en

Fig.112609

If the icons on function key **F2** and function key **F3** are highlighted in purple:

▶ Extend sliding beams using function key **F3** to the support base specified in the load chart.

Problem remedy

If the icons are not highlighted in purple?

The 2-hand keypad **557** at the rear of the BTT was not actuated **or** the selection is invalid.

▶ Press the 2-hand keypad **557**.

Note

▶ The actuation of the 2-hand keypad **557** is stored for 30 seconds. If no movement is actuated within these 30 seconds or if the 2-hand keypad **557** is not actuated, then the stored actuation is deleted and a signal tone sounds.

WARNING

Risk of accident due to toppling crane!

The crane may topple over if the following conditions are not met.

▶ The sliding beams must be pinned to prevent movement of the bearing surfaces after positioning!

▶ Pin and lock the retaining pin **8** and retaining pin **10**.

▶ Do not support in intermediate positions!

▶ Secure and lock the retaining pins **8** and retaining pins **10** on both sliding beams on the right side of the vehicle.

Note

▶ After selection of the individual sliding beams via the function key **F7** or the function key **F10**, the icons for the support cylinders on the function key **F5** and function key **F6** or on the function key **F8** and function key **F9** are only used to extend them so that they touch the ground.

▶ To support the crane, select the „Support“ menu on the BTT.

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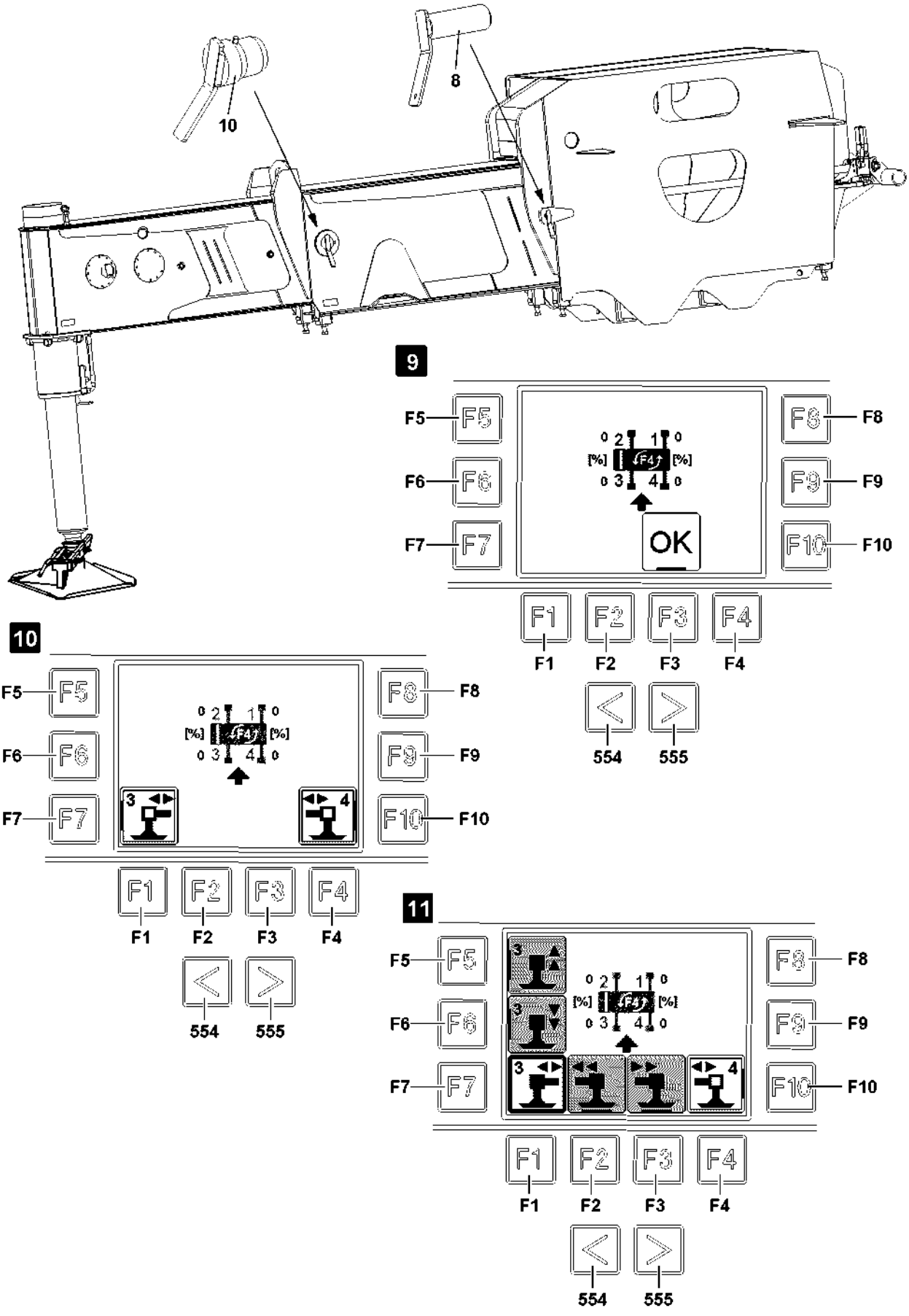

Fig.112610

2.2.2 Extending the sliding beams on the left side of the vehicle

▶ Remove retaining pins **8** from both sliding beams on the left side of the vehicle.

WARNING
Risk of accident if operator is incorrectly positioned next to the crane.
If the following is not observed, there is a danger of the sliding beams being extended on the wrong side, resulting in severe or fatal personal injury.
▶ The crane icon on the BTT display must correspond to the actual position of the operator with respect to the crane. This ensures that the sliding beams on the selected vehicle side are extended.

If the actual position of the operator with respect to the crane does not correspond to the crane icon on the BTT display:
▶ Press the function key **F4**.

Result:

– The crane icon is turned by 180°, see illustration **9**.

▶ Press the function key **F3**.

Result:

– The sliding beams at the left side of the vehicle are displayed, see illustration **10**.

▶ Press function key **F7** and / or function key **F10**.

Result:

– The sliding beam adjustment icons are displayed, see illustration **11**.
– The blinkers on the left side of the vehicle turn on.

If the icons on function key **F2** and function key **F3** are highlighted in purple:
▶ Extend sliding beams using function key **F3** to the support base specified in the load chart.

Problem remedy
If the icons are not highlighted in purple?
The 2-hand keypad **557** at the rear of the BTT was not actuated **or** the selection is invalid.
▶ Press the 2-hand keypad **557**.

Note
▶ The actuation of the 2-hand keypad **557** is stored for 30 seconds. If no movement is actuated within these 30 seconds or if the 2-hand keypad **557** is not actuated, then the stored actuation is deleted and a signal tone sounds.

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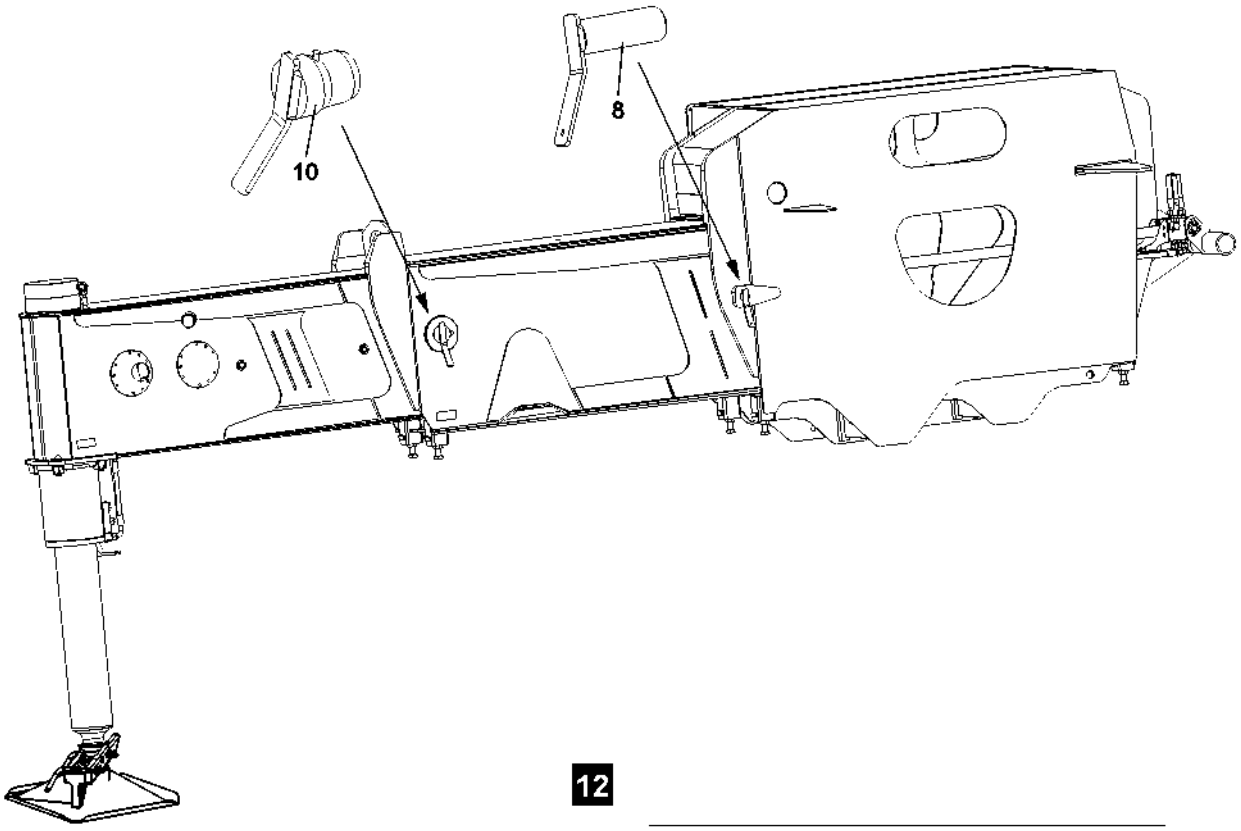

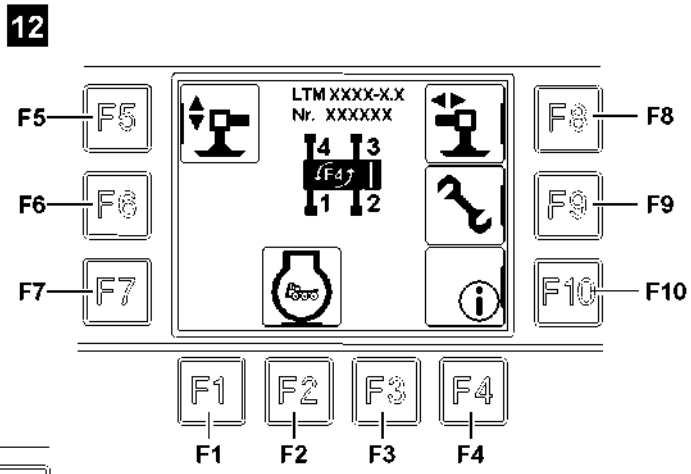

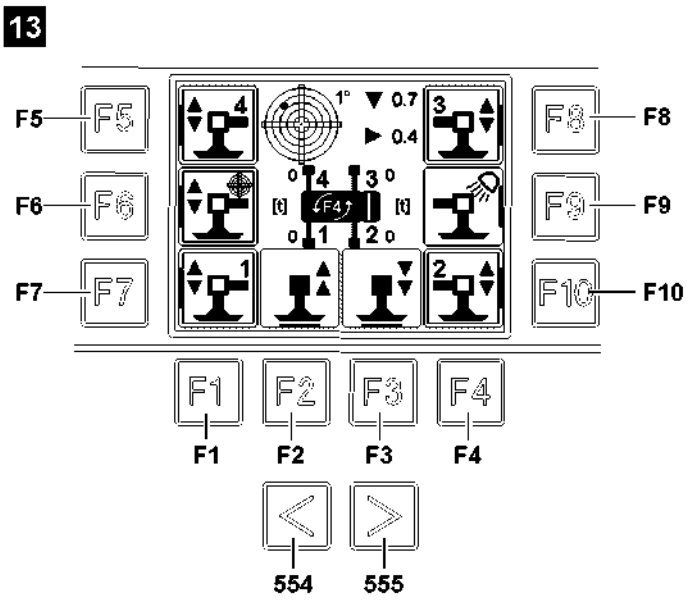

Fig.112611

WARNING
Risk of accident due to toppling crane!
The crane may topple over if the following conditions are not met.
- ▶ The sliding beams must be pinned to prevent movement of the bearing surfaces after positioning!
- ▶ Insert all retaining pins **8** and retaining pins **10** and lock.
- ▶ Do not support in intermediate positions!

▶ Secure and lock the retaining pins **8** and retaining pins **10** on both sliding beams on the left side of the vehicle.

Note
- ▶ After selection of the individual sliding beams via the function key **F7** or the function key **F10**, the icons for the support cylinders on the function key **F5** and function key **F6** or on the function key **F8** and function key **F9** are only used to extend them so that they touch the ground.
- ▶ To support the crane, select the „Support“ menu on the BTT.

▶ Press the function key **F1**.

Result:

– The BTT display changes to the „Main menu“, see illustration **12**.

▶ Press the function key **F5**.

Result:

– The BTT display changes to the „Support“ menu, see illustration **13**.

Note
- ▶ Use function key **554** and function key **555** to „toggle“ between individual menus.

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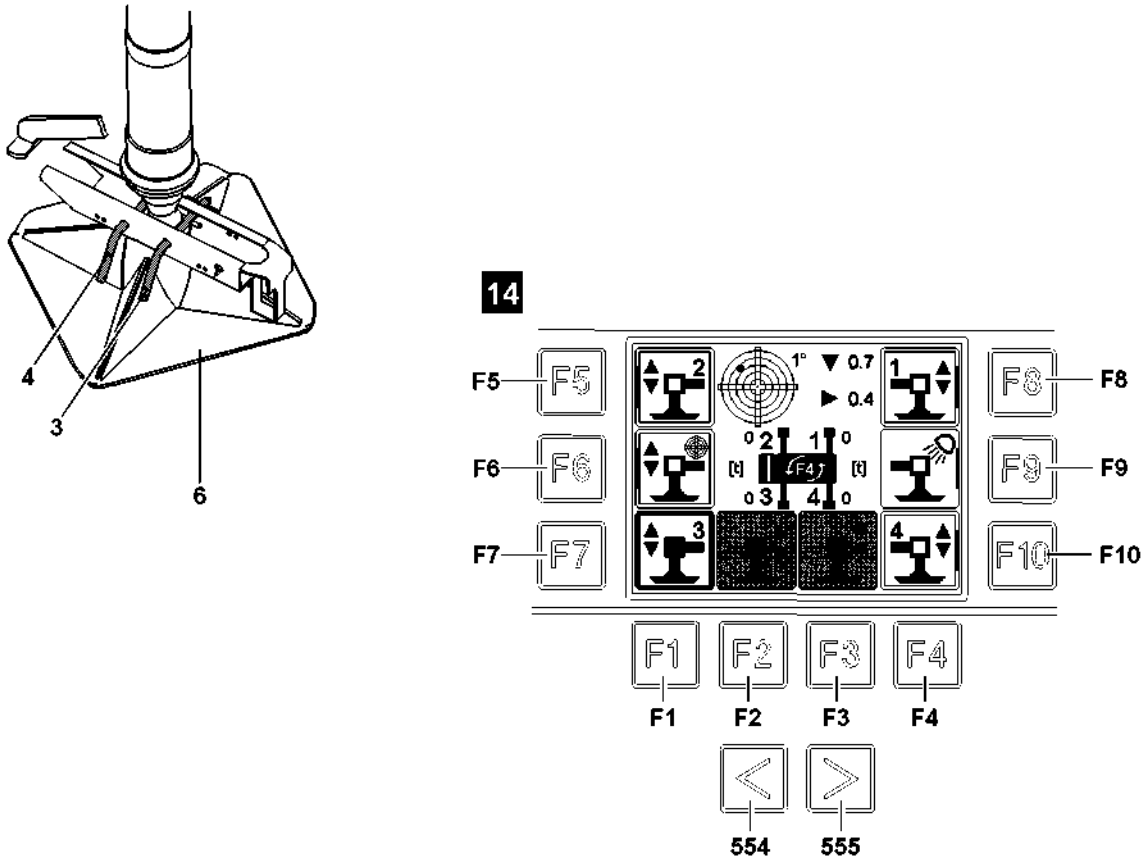

Fig.110270

2.3 Extending the support cylinder using the BTT

Make sure that the following prerequisites are met:
- The sliding beams are extended and pinned to the support base specified in the load chart.
- The four support plates **6** are set in „operating position“ and pinned and secured with the pins **3** and pins **4**, see also section „Bringing the support plates from transport position into operating position“.
- The „Support“ menu is shown on the BTT display, see illustration **14**.

DANGER
Danger of accident when supporting!
- ▶ Ensure that no persons or objects are within the danger zone when the support cylinders are extended.
- ▶ Raise the crane until the wheels are no longer touching the ground.
- ▶ Do not move the support cylinders out all the way during crane operation (up to stop position)! Move the fully extended support cylinders in again by at least 10 mm.

Ensure that the crane has been lifted so that the wheels are no longer touching the ground.

2.3.1 Supporting manually

Supporting the crane

WARNING
Risk of accident if operator is incorrectly positioned next to the crane.
If the following is not observed, there is a danger of the support cylinders being extended on the wrong side, resulting in severe personal injury.
- ▶ The crane icon on the BTT display must correspond to the actual position of the operator with respect to the crane. This ensures that the support cylinders on the selected vehicle side are extended.

If the actual position of the operator with respect to the crane does not correspond to the crane icon on the BTT display:
- ▶ Press the function key **F4**.

Result:
- The crane icon is turned by 180°.

Up to 4 support cylinders can be extended at the same time.
- ▶ In the „Support“ menu, select the relevant support cylinder(s) by pressing function key **F5**, function key **F7**, function key **F8** and function key **F10**.

Result:
- The selected support cylinder(s) are displayed in a black border on the BTT display.
- The blinkers turn on depending on the selected support cylinder(s) on the corresponding side of the vehicle.

Note
- ▶ If all 4 support cylinders are extended at the same time, then the blinkers on the right and left side of the vehicle turn on.

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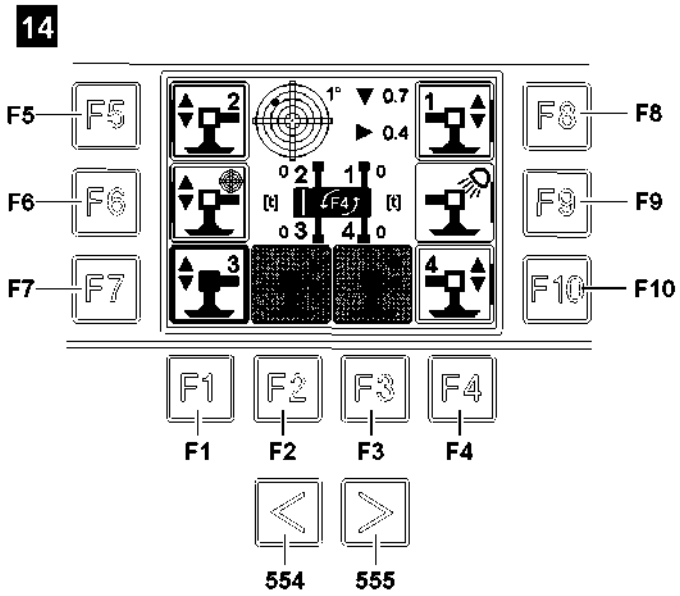

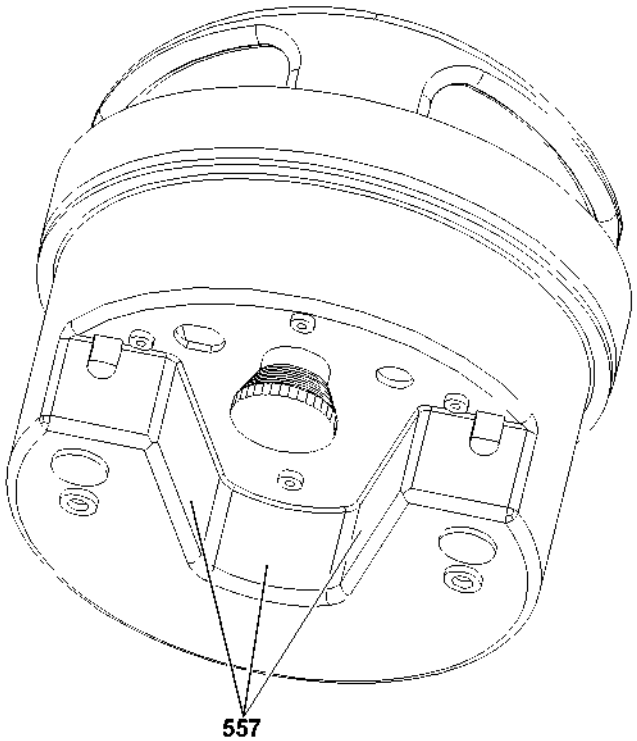

Fig.105336

If the icons on function key **F2** and function key **F3** are highlighted in purple:

▶ Press the function key **F3**.

Result:

– The selected support cylinder(s) are extended.

Problem remedy

If the icons are not highlighted in purple?

The 2-hand keypad **557** at the rear of the BTT was not actuated **or** the selection is invalid.

▶ Press the 2-hand keypad **557**.

Note

▶ The actuation of the 2-hand keypad **557** is stored for 30 seconds. If no movement is actuated within these 30 seconds or if the 2-hand keypad **557** is not actuated, then the stored actuation is deleted and a signal tone sounds.

▶ Use function key **554** and function key **555** to „toggle“ between individual menus.

Aligning the crane horizontally

WARNING

Danger of accident if crane topples over!

If the crane is not aligned horizontally, it may tip over.

▶ Ensure that crane is level.

The maximum permitted deviation from the horizontal position is ±0.5 % (±0.3 °).

▶ Extend and retract individual support cylinders until the point (small square) is in the center of the graphic spirit level, see BTT display. The crane incline in longitudinal and lateral direction is displayed as 0 °.

Result:

– The crane is horizontal.

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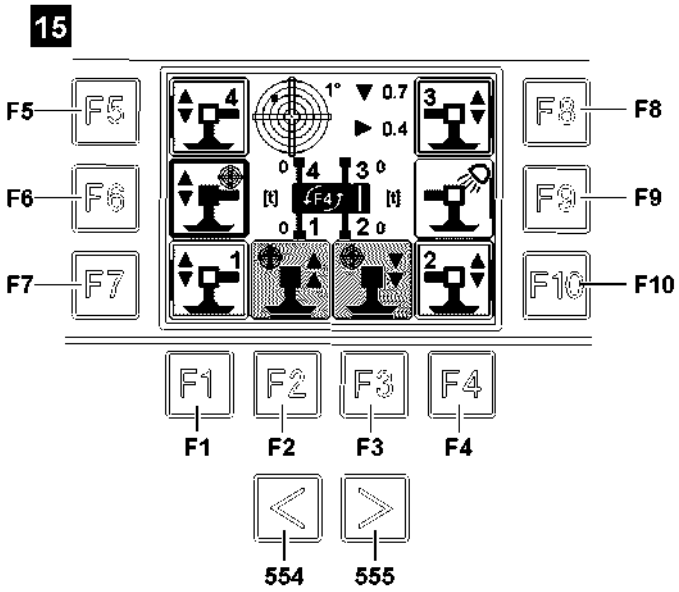

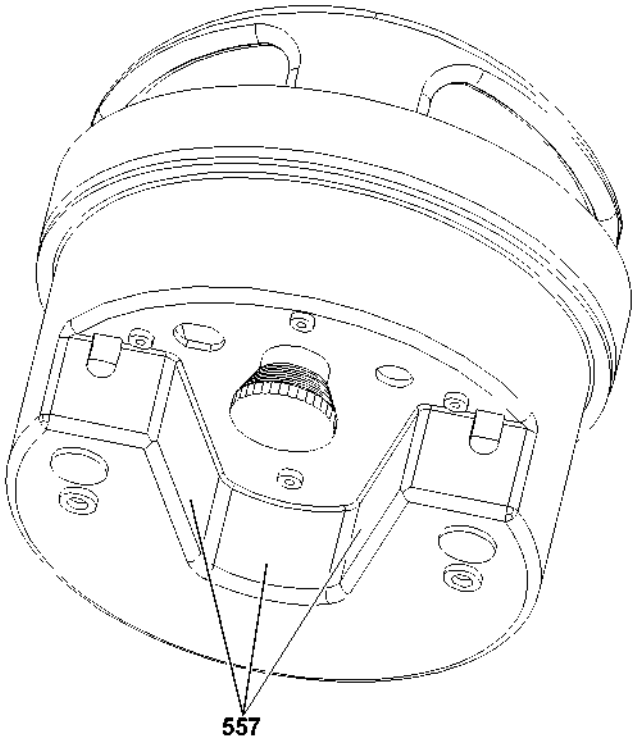

LWE/LTM 1130-5-1-004/20502-04-02/en

Fig.105337

2.3.2 Supporting automatically

WARNING
Risk of accident!
When the automatic support is operated the crane is levelled automatically.
▶ Make sure that the alignment is within the permissible tolerance and that all four support plates are touching the ground.

The automatic support is activated by pressing function key **F6** in the „Support“ menu, see illustration **15**. The selection of the automatic support function is cancelled.

▶ Press the function key **F6**.

Result:

– The blinkers on the right and left side of the vehicle turn on.

If the icons on function key **F2** and function key **F3** are highlighted in purple:
▶ Press the function key **F3**.

Result:

– All support cylinders are moved out.
– The crane is aligned horizontally.

Problem remedy
If the icons are not highlighted in purple?
The 2-hand keypad **557** at the rear of the BTT was not actuated **or** the selection is invalid.
▶ Press the 2-hand keypad **557**.

Note
▶ The actuation of the 2-hand keypad **557** is stored for 30 seconds. If no movement is actuated within these 30 seconds or if the 2-hand keypad **557** is not actuated, then the stored actuation is deleted and a signal tone sounds.
▶ Use function key **554** and function key **555** to „toggle“ between individual menus.

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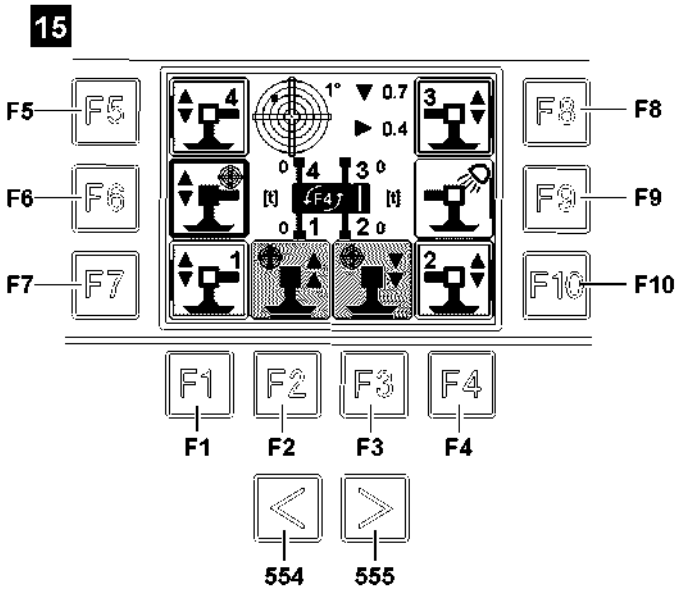

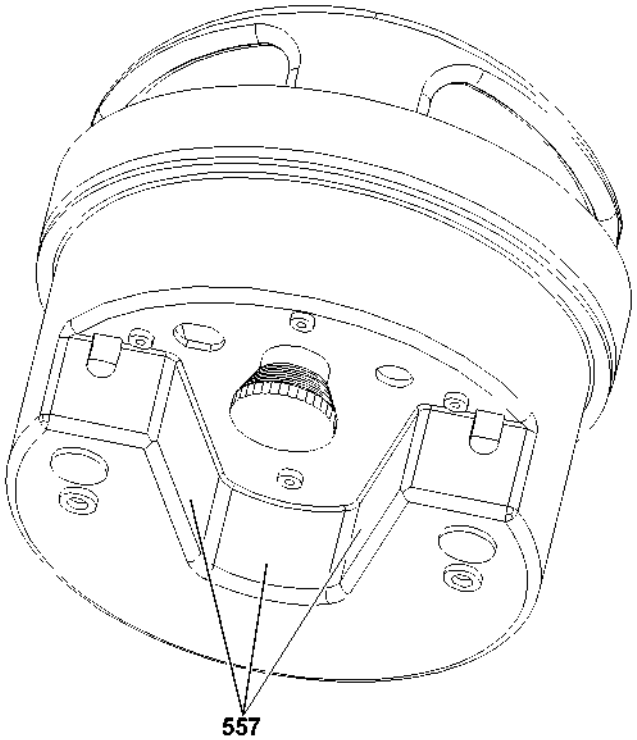

LWE/LTM 1130-5-1-004/20502-04-02/en

Fig.105337

2.3.3 Checking the supports

In order to minimize the accident risk, 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 telescopic boom (also applies to auxiliary 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.
Another situation may occur when it becomes necessary to slew the load to the opposite side. If only the sliding beams on the load side are moved out, the crane could topple over.
When rotating out of the longitudinal vehicle direction, the boom or counterweight momentum could tip over the crane unless all four sliding beams are moved out.
▶ Always extend all 4 sliding support beams, i.e. also on the side opposite the load.

▶ Check the extension conditions.
▶ Make sure that all four sliding support beams have been extended.

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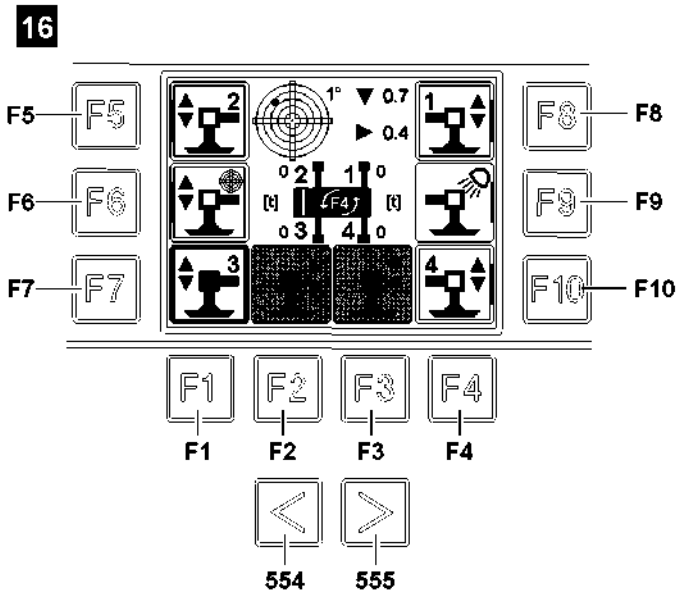

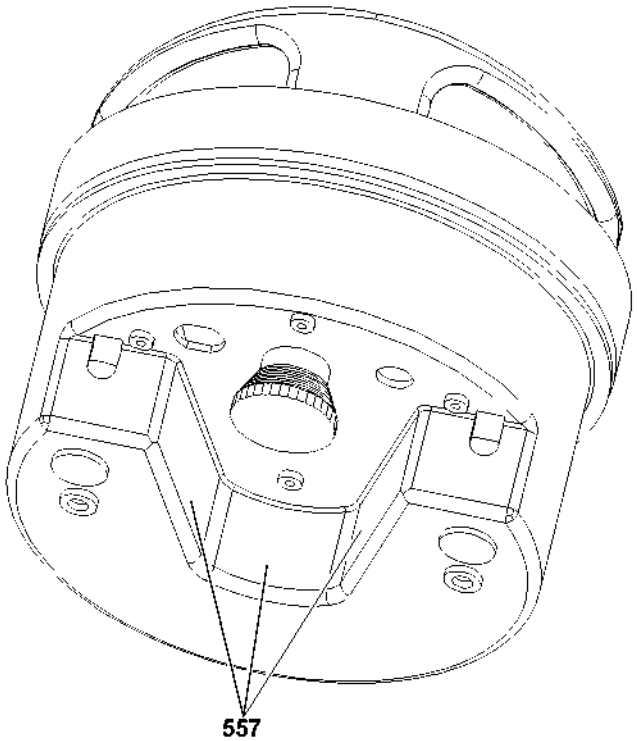

Fig.105338

2.4 Retracting the support cylinders with the BTT

Make sure that the following prerequisites are met:
- The BTT is turned on and the „Main menu“ is displayed.
- The engine is running.

WARNING
Danger of injury when retracting the support cylinders!
▶ Ensure that there are no persons or objects in the danger zone.

NOTICE
Risk of damage to 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 drop down.
▶ Do not turn axle blocking off until all wheels are in contact with the ground.

2.4.1 Manual retraction

▶ Press the function key **F5**.

Result:

- The BTT display changes to the „Support“ menu, see illustration **16**.

WARNING
Risk of accident if operator is incorrectly positioned next to the crane.
If the following is not observed, there is a danger of the support cylinders being retracted on the wrong side, resulting in severe personal injury.
▶ The crane icon on the BTT display must correspond to the actual position of the operator with respect to the crane. This ensures that the support cylinders on the selected vehicle side are retracted.

If the actual position of the operator with respect to the crane does not correspond to the crane icon on the BTT display:
▶ Press the function key **F4**.

Result:

- The crane icon is turned by 180°.

Up to 4 support cylinders may be retracted at the same time.

▶ In the „Support“ menu, select the relevant support cylinder(s) by pressing function key **F5**, function key **F7**, function key **F8** and function key **F10**.

Result:

- The selected support cylinder(s) are displayed in a black border on the BTT display.
- The blinkers turn on depending on the selected support cylinder(s) on the corresponding side of the vehicle.

Note
▶ If all 4 support cylinders are retracted at the same time, then the blinkers on the right and left side of the vehicle turn on.

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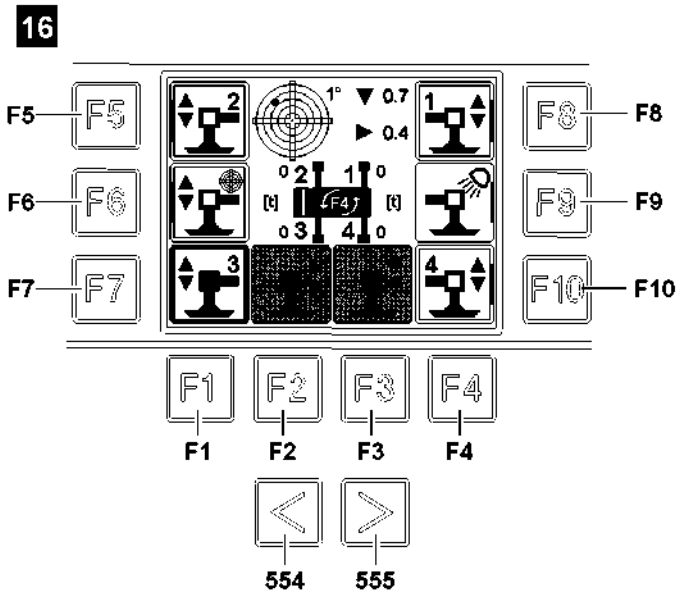

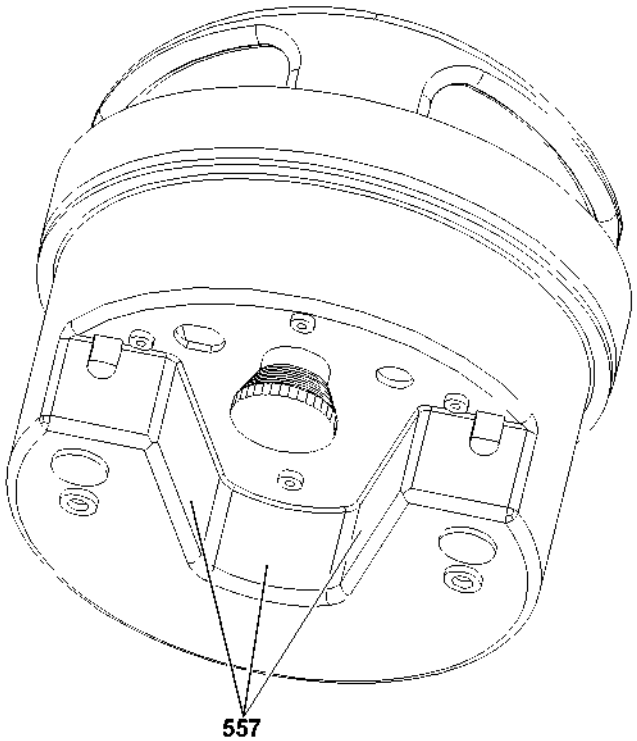

Fig.105338

If the icons on function key **F2** and function key **F3** are highlighted in purple:

▶ Press function key **F2** until all wheels are in contact with the ground.

Result:

– The selected support cylinder(s) are retracted.

Problem remedy

If the icons are not highlighted in purple?

The 2-hand keypad **557** at the rear of the BTT was not actuated **or** the selection is invalid.

▶ Press the 2-hand keypad **557**.

Note

▶ The actuation of the 2-hand keypad **557** is stored for 30 seconds. If no movement is actuated within these 30 seconds or if the 2-hand keypad **557** is not actuated, then the stored actuation is deleted and a signal tone sounds.

▶ Use function key **554** and function key **555** to „toggle“ between individual menus.

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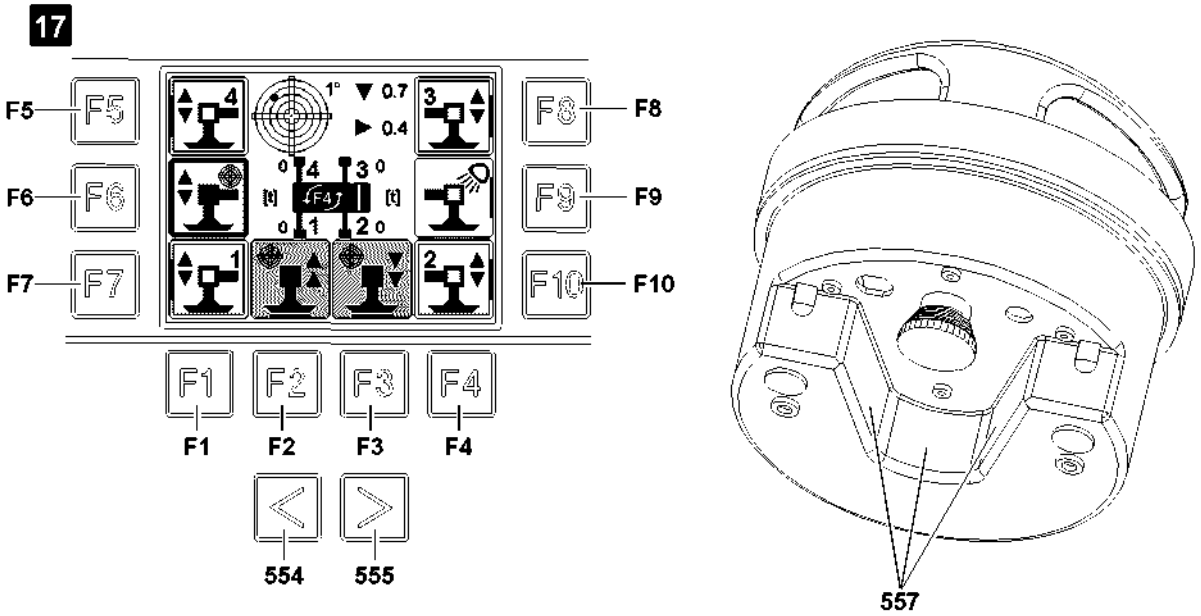

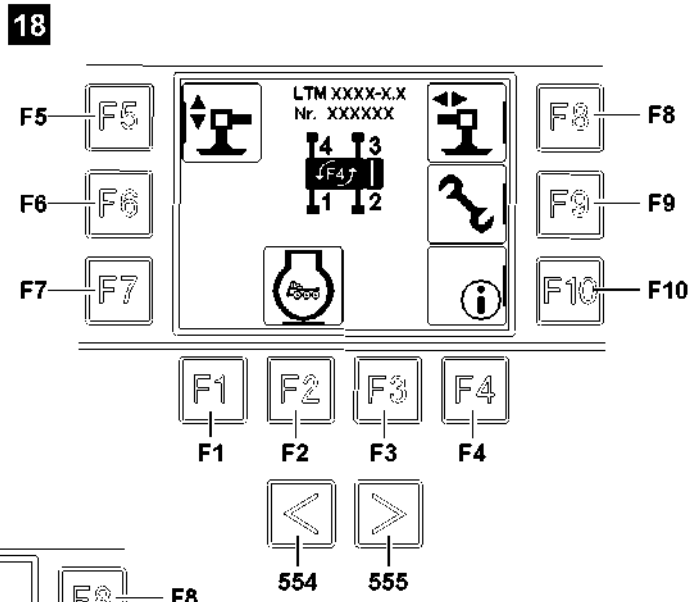

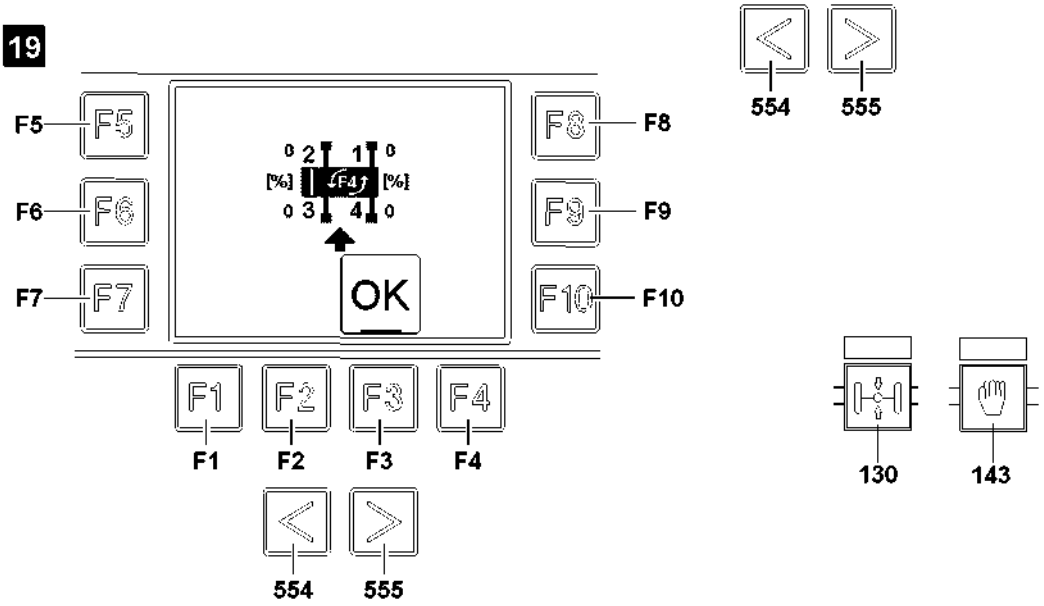

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Fig.106106

2.4.2 Automatic retraction

If the BTT display is showing the „Main menu“:

▶ Press the function key **F5**.

Result:

– The BTT display changes to the „Support“ menu, see illustration **17**.

WARNING
Risk of accident!
When the automatic support is operated the crane is levelled automatically.

▶ Make sure that the alignment is within the permissible tolerance and that all four support plates are touching the ground.

The automatic support is activated by pressing function key **F6** in the „Support“ menu. The selection of the automatic support function is cancelled.

▶ Press the function key **F6**.

Result:

– The blinkers on the right and left side of the vehicle turn on.

If the icons on function key **F2** and function key **F3** are highlighted in purple:

▶ Press the function key **F2**.

Result:

– All support cylinders are retracted.

Problem remedy
If the icons are not highlighted in purple?
The 2-hand keypad **557** at the rear of the BTT was not actuated **or** the selection is invalid.

▶ Press the 2-hand keypad **557**.

Note

▶ The actuation of the 2-hand keypad **557** is stored for 30 seconds. If no movement is actuated within these 30 seconds or if the 2-hand keypad **557** is not actuated, then the stored actuation is deleted and a signal tone sounds.

▶ Retract all four support cylinders all the way.

▶ Press the function key **F1**.

Result:

– The BTT display changes to the „Main menu“.

▶ Press the function key **F8**.

Result:

– The BTT display changes to the „Sliding beam movement“ menu.

Note

▶ Use function key **554** and function key **555** to „toggle“ between individual menus.

2.4.3 Turning the axle block off

▶ Press button **143** and button **130** to switch off axle locking.

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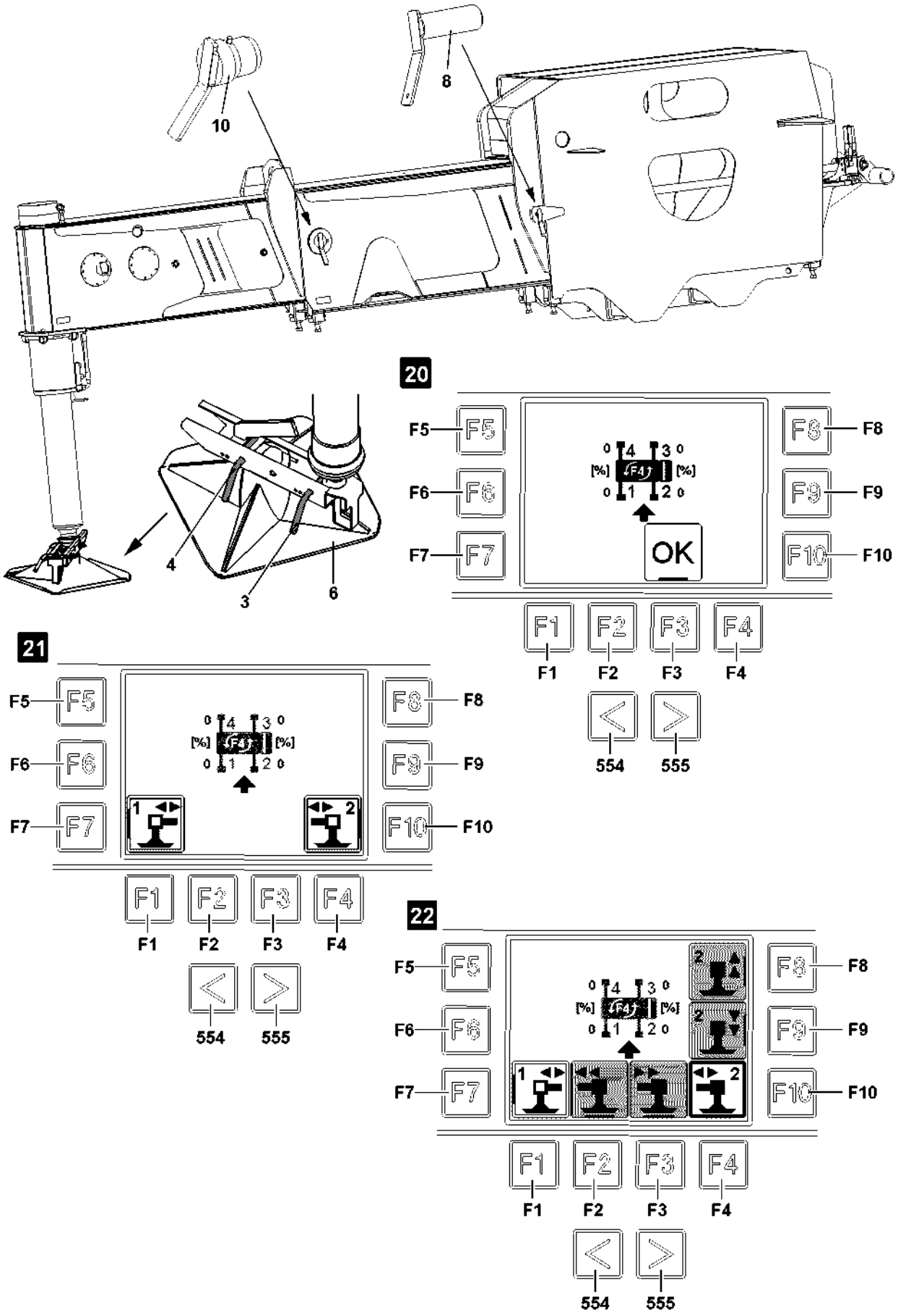

Fig.112612

2.5 Retracting the sliding beam using the BTT

Make sure that the following prerequisites are met:
- The engine is running.
- The four support plates **6** are set in „transport position“ and pinned and secured with the pins **3** and pins **4**, see also section „Bringing the support plates from operating position into transport position“.
- The „Sliding beam movement“ menu is shown on the BTT display.

The sliding beams on the left / right side of the vehicle can be operated using the Bluetooth™ Terminal.

WARNING
Danger of fatal injury when retracting the sliding beams!
- ▶ The operator is obliged to carefully monitor the retraction movement of the controlled sliding beam.
- ▶ Ensure that no persons or objects are within the danger zone when the sliding beams are retracted.

2.5.1 Retracting the sliding beams on the right side of the vehicle

▶ Remove retaining pins **8** and retaining pins **10** from both sliding beams on the right side of the vehicle.

WARNING
Risk of accident if operator is incorrectly positioned next to the crane.
If the following is not observed, there is a danger of the sliding beams being retracted on the wrong side, resulting in severe or fatal personal injury.
- ▶ The crane icon on the BTT display must correspond to the actual position of the operator with respect to the crane. This ensures that the sliding beams on the selected vehicle side are retracted.

If the actual position of the operator with respect to the crane does not correspond to the crane icon on the BTT display:

▶ Press the function key **F4**.

Result:

– The crane icon is turned by 180°, see illustration **20**.

▶ Press the function key **F3**.

Result:

– The sliding beams at the right side of the vehicle are displayed, see illustration **21**.

▶ Press function key **F7** and / or function key **F10**.

Result:

– The sliding beam adjustment icons are displayed, see illustration **22**.
– The blinkers on the right side of the vehicle turn on.

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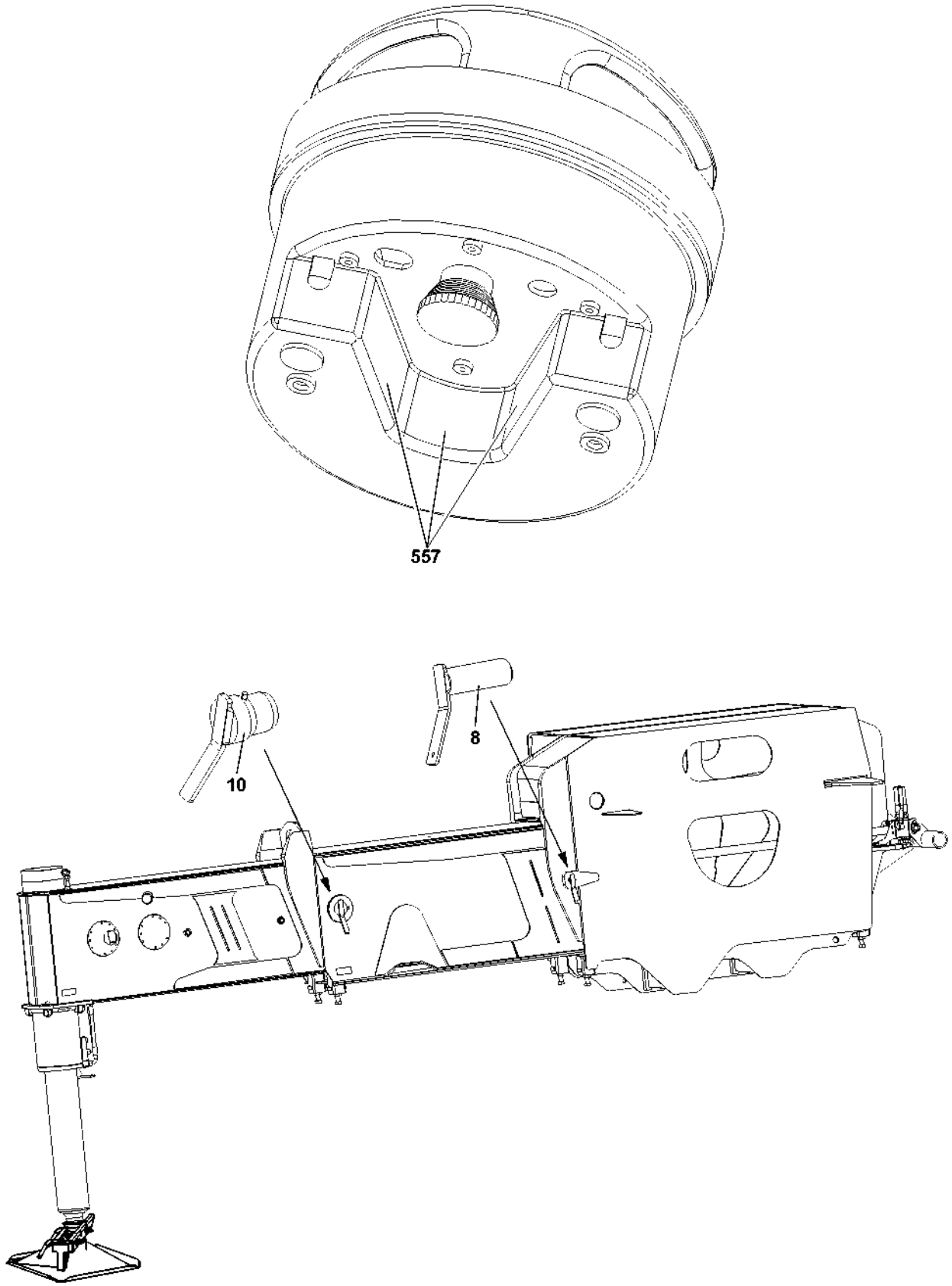

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Fig.112609

If the icons on function key **F2** and function key **F3** are highlighted in purple:

▶ Retract the sliding beam(s) using function key **F2**.

Problem remedy

If the icons are not highlighted in purple?

The 2-hand keypad **557** at the rear of the BTT was not actuated **or** the selection is invalid.

▶ Press the 2-hand keypad **557**.

Note

▶ The actuation of the 2-hand keypad **557** is stored for 30 seconds. If no movement is actuated within these 30 seconds or if the 2-hand keypad **557** is not actuated, then the stored actuation is deleted and a signal tone sounds.

▶ Secure and lock the retaining pins **8** for both sliding beams on the right side of the vehicle.

▶ Insert and secure the retaining pins **10** into the transport retainer.

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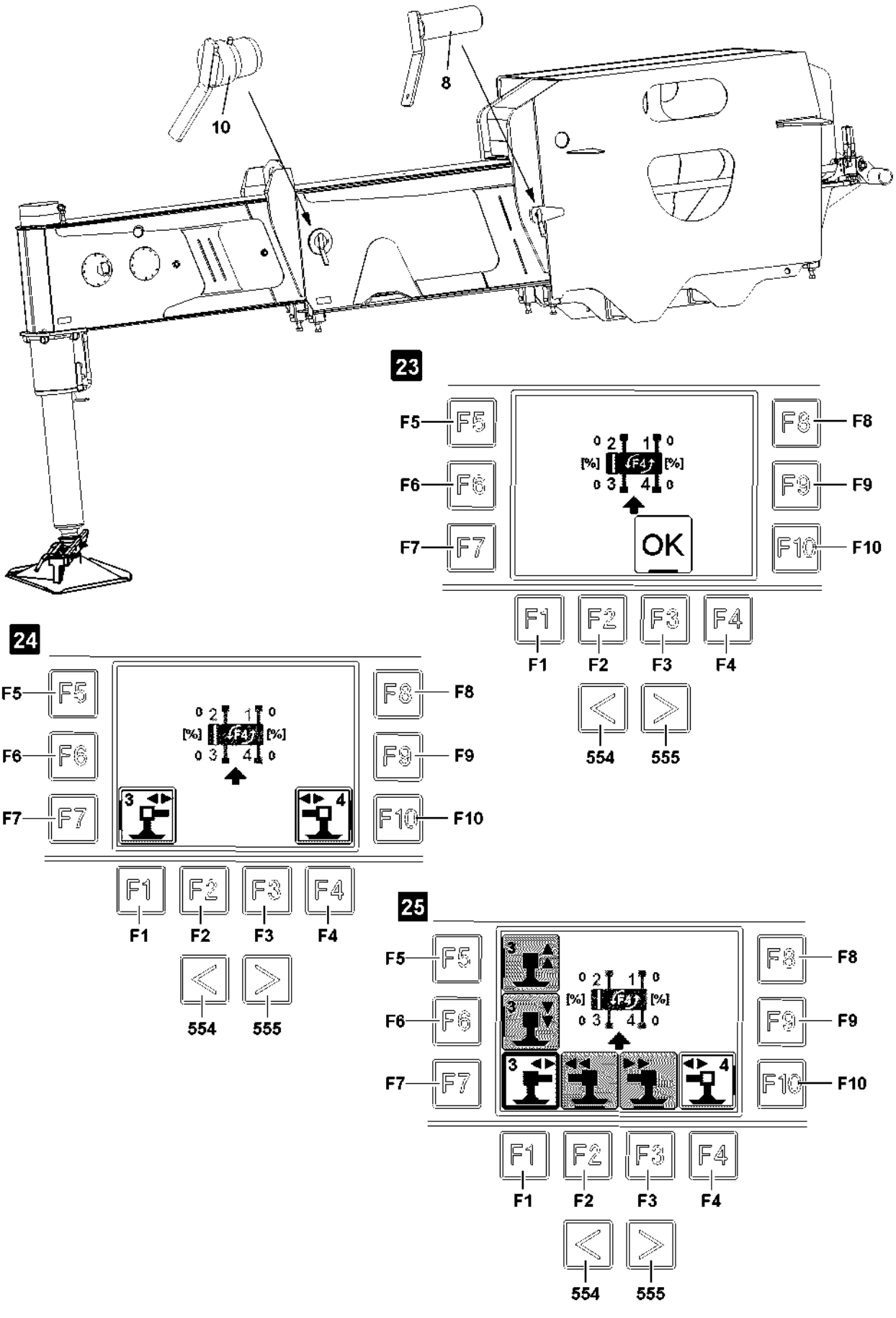

Fig.112613

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2.5.2 Retracting the sliding beams on the left side of the vehicle

▶ Remove retaining pins **8** and retaining pins **10** from both sliding beams on the left side of the vehicle.

WARNING
Risk of accident if operator is incorrectly positioned next to the crane.
If the following is not observed, there is a danger of the sliding beams being retracted on the wrong side, resulting in severe or fatal personal injury.
▶ The crane icon on the BTT display must correspond to the actual position of the operator with respect to the crane. This ensures that the sliding beams on the selected vehicle side are retracted.

If the actual position of the operator with respect to the crane does not correspond to the crane icon on the BTT display:
▶ Press the function key **F4**.

Result:

– The crane icon is turned by 180°, see illustration **23**.

▶ Press the function key **F3**.

Result:

– The sliding beams at the left side of the vehicle are displayed, see illustration **24**.

▶ Press function key **F7** and / or function key **F10**.

Result:

– The sliding beam adjustment icons are displayed, see illustration **25**.
– The blinkers on the left side of the vehicle turn on.

If the icons on function key **F2** and function key **F3** are highlighted in purple:
▶ Retract the sliding beam(s) using function key **F2**.

Problem remedy
If the icons are not highlighted in purple?
The 2-hand keypad **557** at the rear of the BTT was not actuated **or** the selection is invalid.
▶ Press the 2-hand keypad **557**.

Note
▶ The actuation of the 2-hand keypad **557** is stored for 30 seconds. If no movement is actuated within these 30 seconds or if the 2-hand keypad **557** is not actuated, then the stored actuation is deleted and a signal tone sounds.

▶ Secure and lock the retaining pins **8** for both sliding beams on the left side of the vehicle.
▶ Inset and secure the retaining pins **10** into the tranport retainer.
▶ Press the function key **F1**.

Result:

– The BTT display changes to the „Main menu“.

▶ Place the Bluetooth™ Terminal in the charging cradle.

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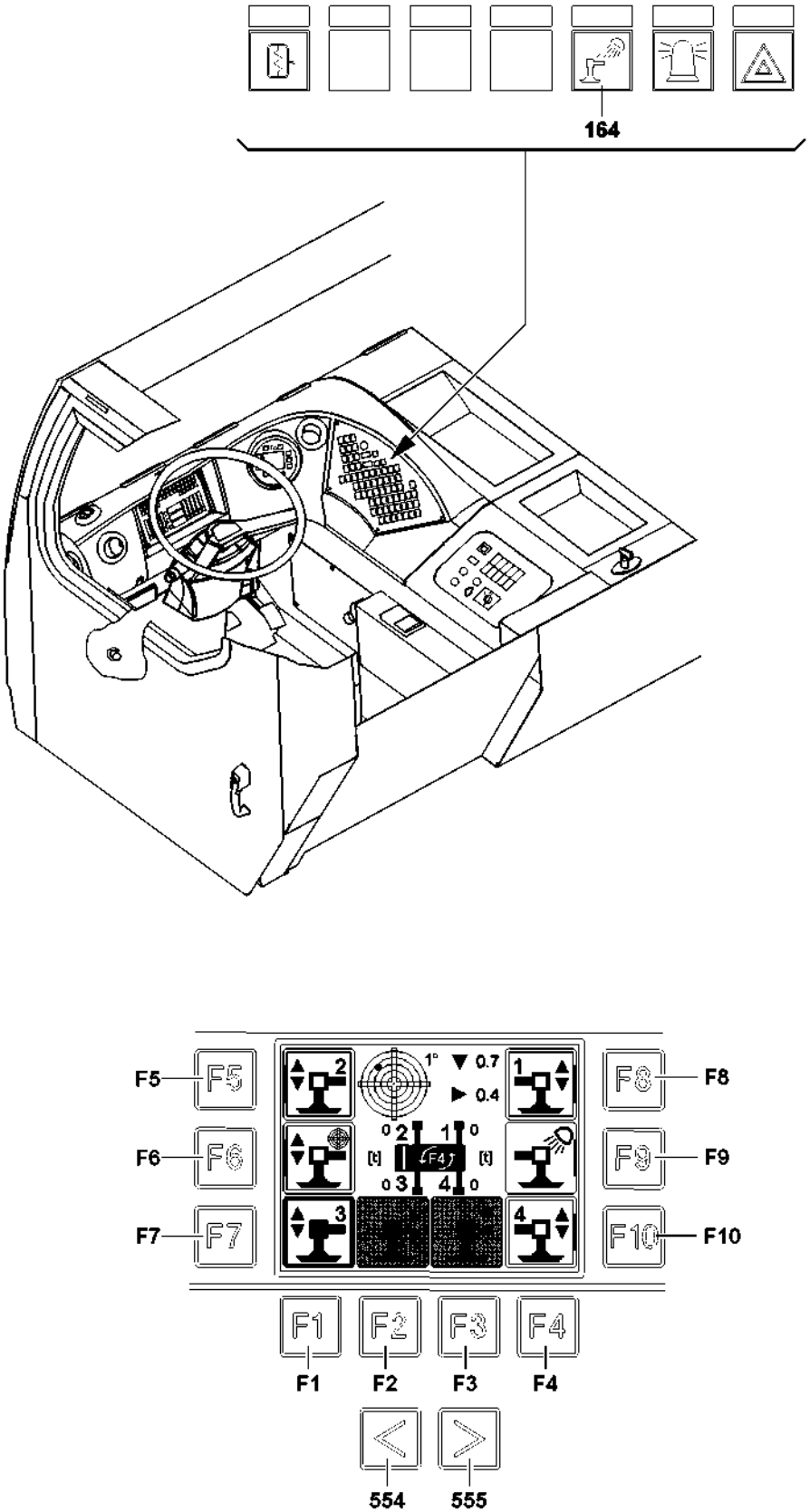

Fig.104067

2.6 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.

2.6.1 Manually

Make sure that the following prerequisites are met:
- The engine is running.
- The vehicle is at a standstill.

▶ Press key **164** on the keyboard.
or
Press function key **F9** in the „Support“ menu.

Result:

- The sliding beam illumination is turned off or on.

2.6.2 Automatic

Make sure that the following prerequisites are met:
- The vehicle is in support mode (transmission in neutral „N“ and BTT set to „Sliding beam movement“ or „Support“ menu).
- The engine is running.
- The vehicle is at a standstill.

▶ Perform any movement when the BTT is in the „Sliding beam movement“ or „Support“ menu.

Result:

- The sliding beam illumination is turned on.

Problem remedy
Can sliding beam illumination not be turned on automatically?
If sliding beam illumination has been automatically turned on and then turned off in the chassis using the key **164** on the keyboard, or if it is turned off using function key **F9** on the BTT, automatic sliding beam illumination has been deactivated.

▶ Turn the sliding beam illumination back on by pressing the key **164** on the keyboard or function key **F9** on the BTT. Automatic sliding beam illumination is active again.

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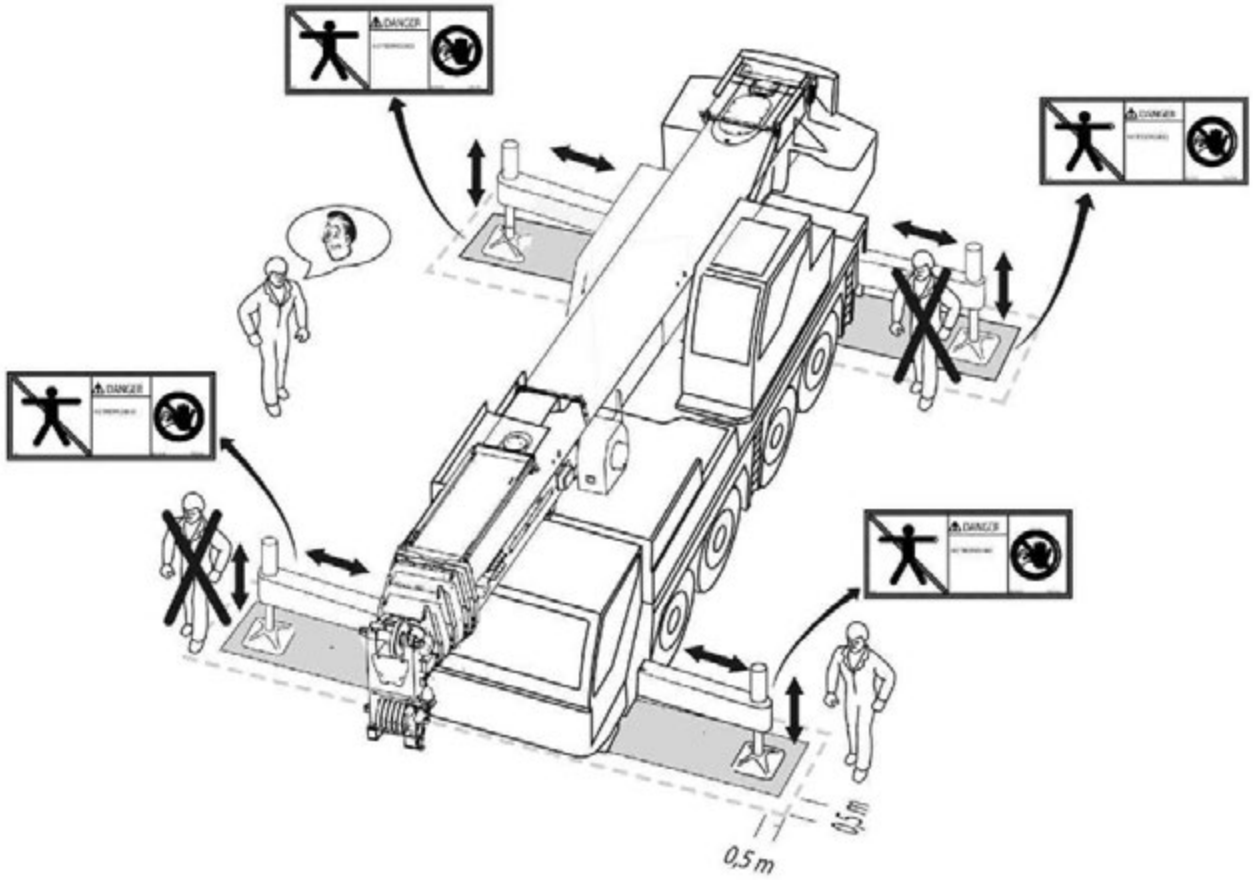

LWE/LTM 1130-5-1-004/20502-04-02/en

Fig.108891

3 Supporting from the crane operator's cab

3.1 General

The supports are operated from the crane cab using the right touch-display. See Crane operating instructions, chapter 4.01.

The „Support program“ may also be used to work and operate the crane. Support procedures, which must be repeated at short intervals do not require switching back to the „Operation program“.

WARNING
Danger of injury if hazard warnings are ignored!
An increased accident hazard exists, if the following hazard warnings are not observed!

- ▶ All regulations and hazard warnings listed in the „Bluetooth Terminal“ section must be observed!
- ▶ The operator must monitor the extending and retracting of the sliding beams.
- ▶ A guide is required to assist when extending and retracting the supports without any visual contact with the support cylinders or sliding beam. Make sure that there is a constant contact between the guide and the crane operator, for example through hand signs or radio contact!
- ▶ When extending and retracting the sliding beams, make sure that there are no persons or objects within the danger zone.
- ▶ The crane must be aligned horizontally.
- ▶ All 4 sliding beams and support cylinders must be extended, the ones on the side opposite the load as well.

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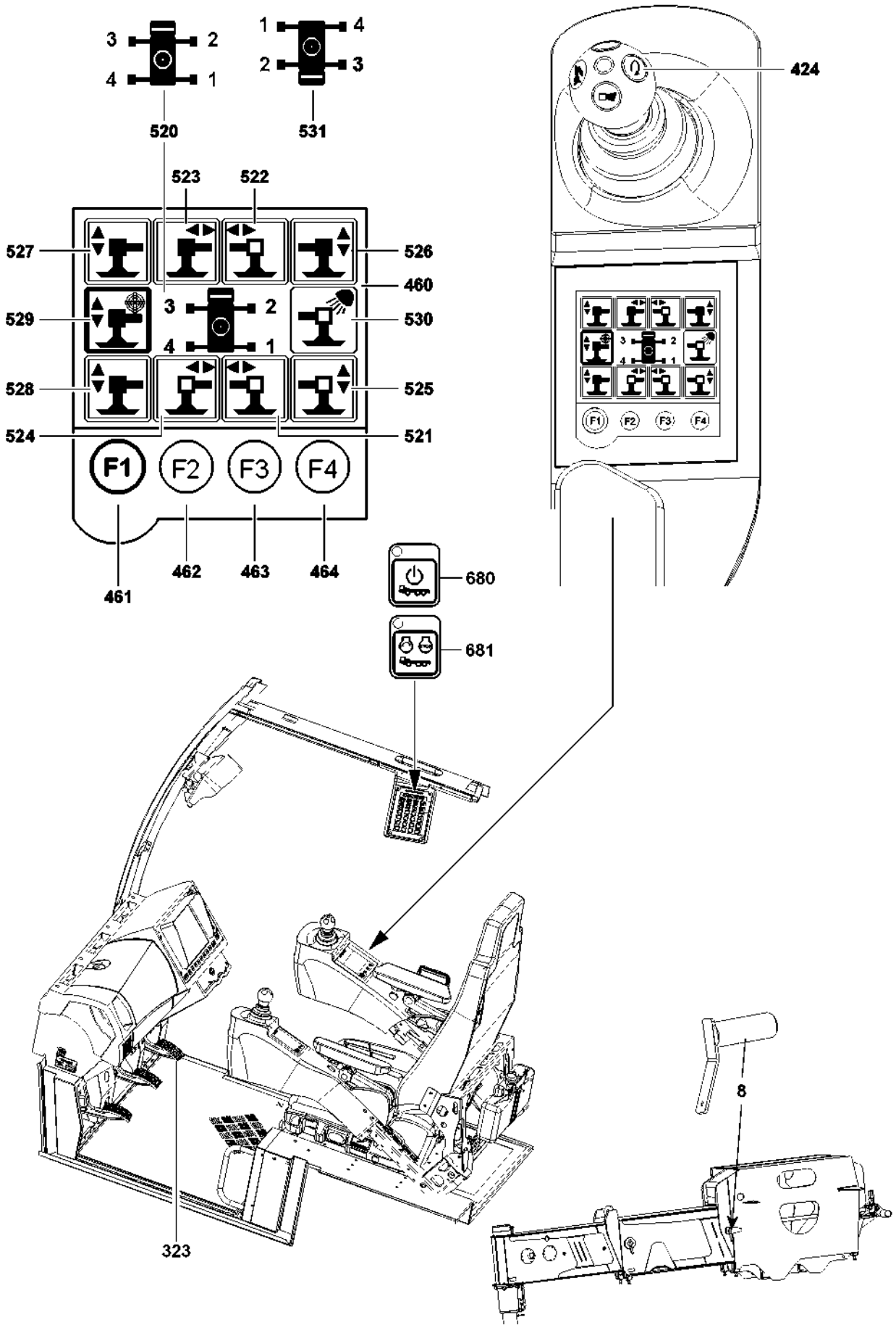

Fig.112615

3.2 Extending the sliding beams from the crane operator's cab

Make sure that the following prerequisites are met:
- Observe the engine regulation from the crane operator's cab in chapter 4.03.
- The crane is on a level and load-bearing surface.
- The telescopic boom is telescoped in all the way and placed into the boom receptacle.
- The parking brake in the driver's cab and the crane cab is applied.
- The support plates are in the operating position and secured.
- The retaining pins **8** of the four sliding beams are unpinned.
- The axle suspension is blocked.
- The engine rpm on the crane superstructure has been locked via the button **424** on the master switch.
- The ignition on the crane chassis is turned on via the function key **680**.
- The engine on the crane chassis is started on via the function key **681**.

Note

▶ If the engine in the crane chassis is started via the function key **681**, then only the engine rpm on the crane chassis can be changed via the pedal **323**. The engine rpm on the crane superstructure can only be changed after turning the engine in the crane chassis off or after selecting a crane superstructure menu.

DANGER

Risk of fatal injury due to toppling crane!

▶ Always extend all 4 sliding support beams, i.e. also on the side opposite the load.

Note

Pay attention to sliding beam assignments!

▶ The sliding beam assignment on the touch-display depends on the operating direction of the crane in the „Support / sliding beams“ menu. If the working direction of the crane is changed from „forward“ **520** to working direction „backward“ **531** - or vice versa - by turning the turntable, then the sliding beam assignment on the touch-display changes accordingly.

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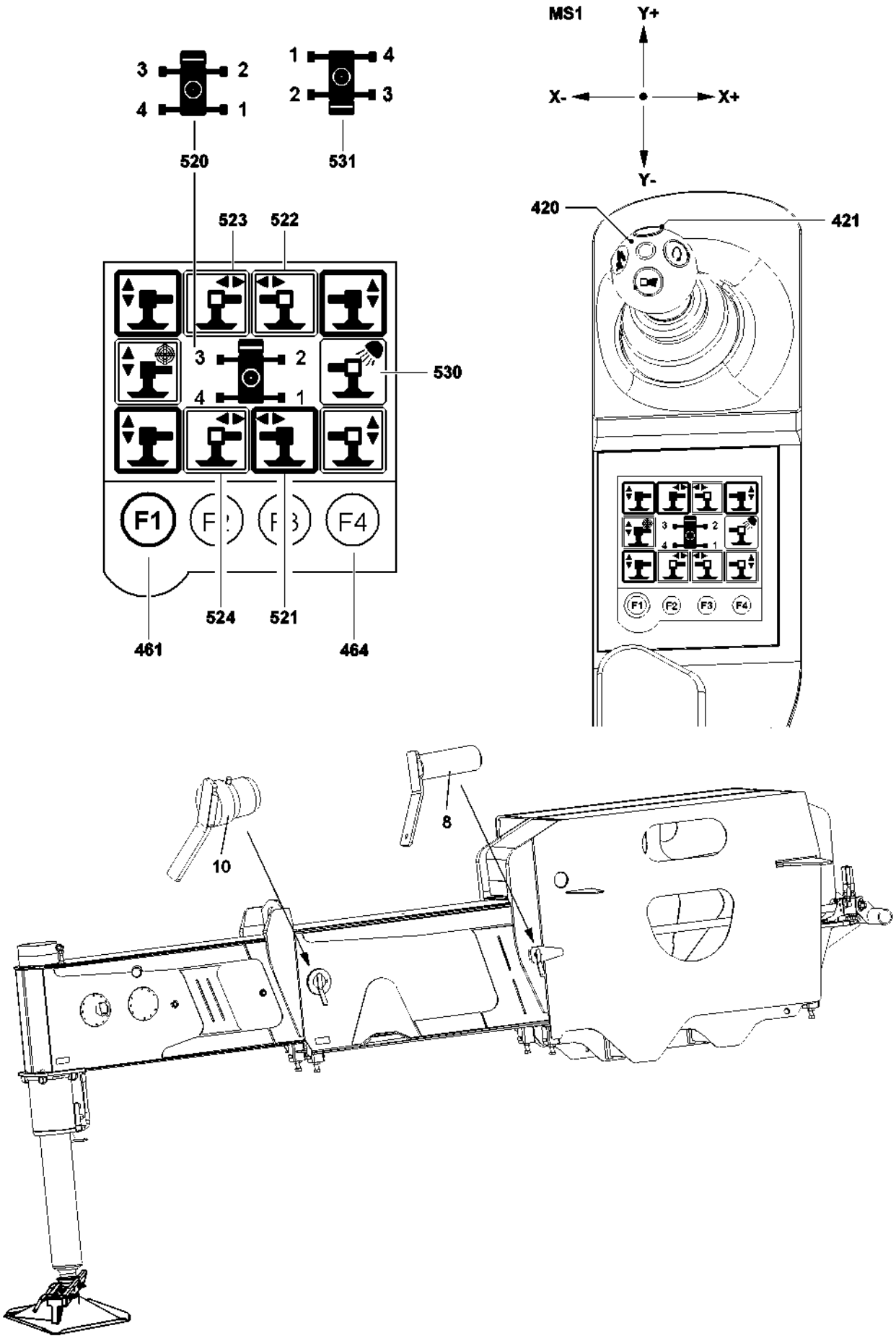

Fig.112614

For safety reasons, only **one** sliding beam can be selected on the touch display and extended / retracted.

Note

▶ The sliding beams are extended / retracted by pressing the button **421** (holding down) and by moving the master switch **420** in the X+ or X- direction.

▶ Press function key **461** until the „Support / sliding beams“ menu appears.

▶ Select required sliding beam by „touching“ icon **521** or icon **522** or icon **523** or icon **524**.

Result:

– The selected sliding beam is displayed on the touch-display with a black border.

CAUTION

Pay attention to sliding beam assignment and crane operating direction!

▶ Pay attention to „operating direction“ and „selected sliding beam“ on right touch-display.

▶ Press button **421** (hold down) and move master switch **420** in direction X+ or X-.

– The selected sliding beam extends or retracts.

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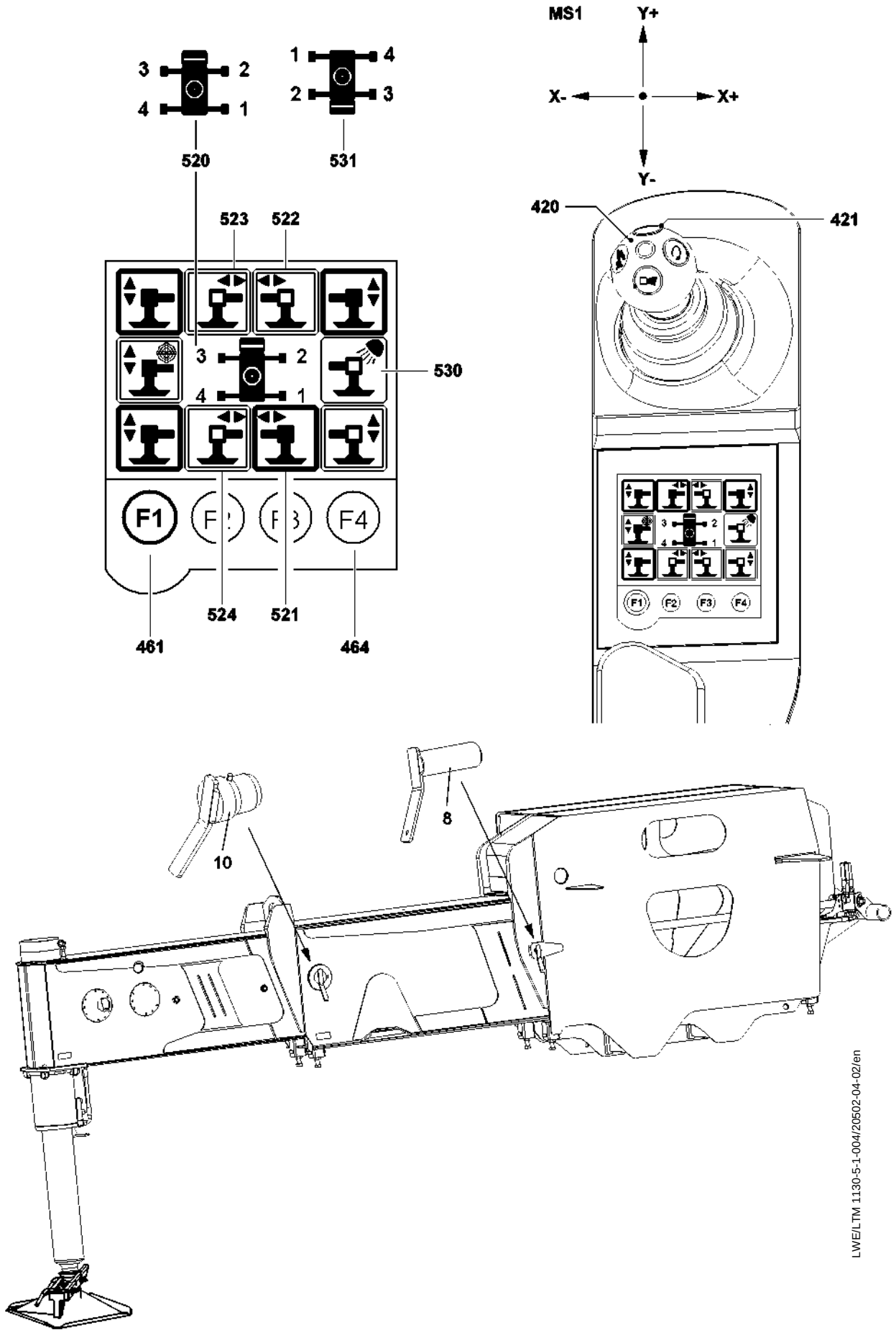

Fig.112614

Note
If the button **421** is released while retracting or extending a sliding beam or the master switch is moved from X+ or X- to Y+ or Y-, then the current sliding beam movement is shut off.

- ▶ Move the right master switch **420** to the neutral position.
- ▶ Extend / retract the sliding beam to the selected position by pressing button **421** and by moving master switch in the X+ or X- direction.

- ▶ Extend the sliding beam to the required support bases.
- ▶ Extend all 4 sliding beams to the required support bases.

WARNING
Danger of accidents due to toppling of the crane!
If the following conditions are not met, the crane can topple over.

- ▶ The sliding beams must be pinned to prevent movement of the bearing surfaces after positioning!
- ▶ Insert all retaining pins **8** and retaining pins **10** and lock.
- ▶ Do not support in intermediate positions!

- ▶ Secure and lock all 4 sliding beams with retaining pins **8** and retaining pins **10**.

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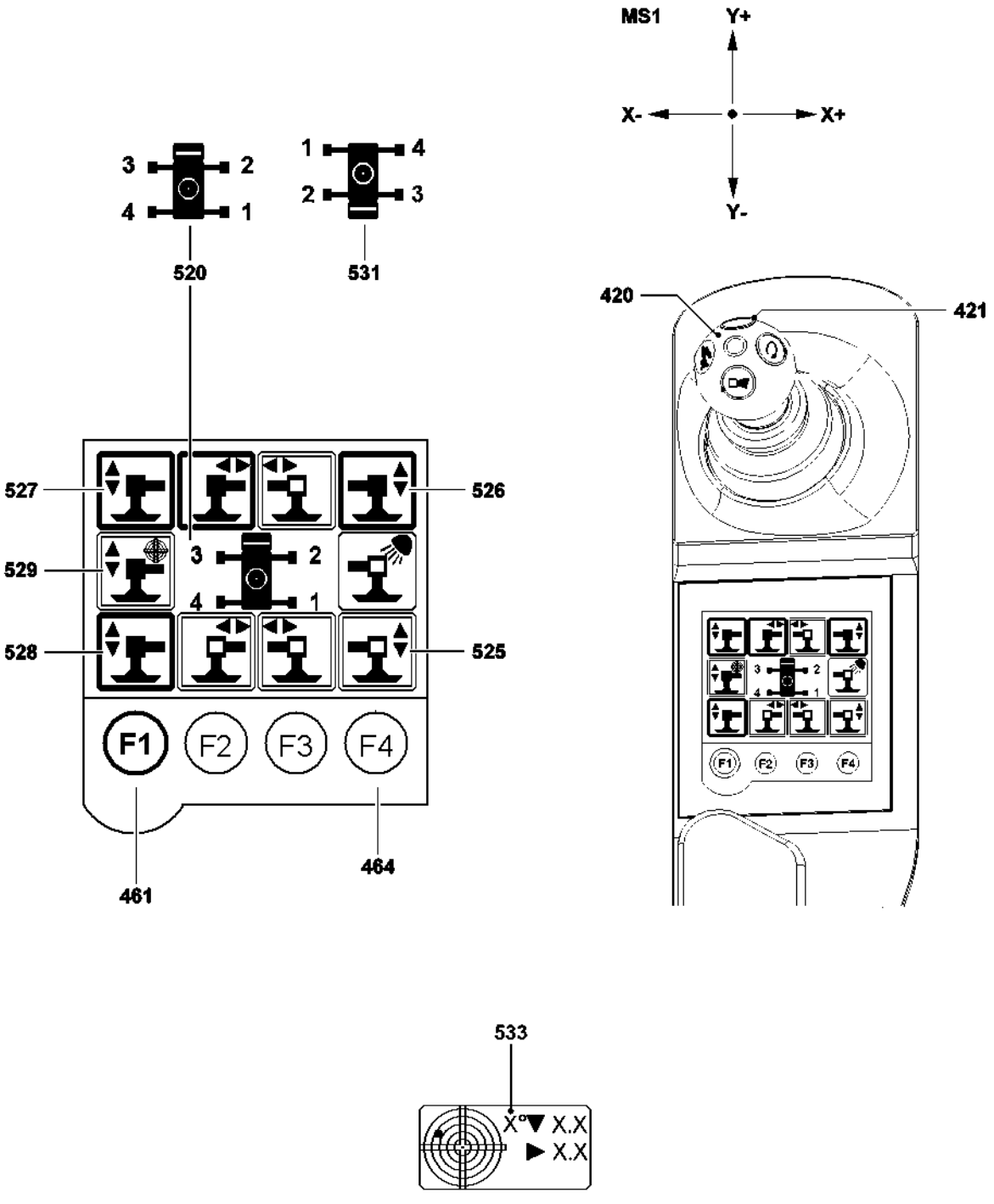

Fig.112616

3.3 Extending the support cylinders from the crane operator's cab

Make sure that the following prerequisites are met:

– The four support plates are set and secured in „operating position“, see also section „Bringing the support plates from transport position into operating position“.

WARNING

Danger of accident when supporting!

▶ Ensure that there are no persons or objects present in the danger zone when the support cylinders are being extended and retracted.

▶ Raise the crane until the wheels are no longer touching the ground.

▶ Do not move the support cylinders out all the way during crane operation (up to stop position)! Move the fully extended support cylinders in again by at least 10 mm.

Note

Pay attention to sliding beam assignments!

▶ The sliding beam assignment on the touch-display depends on the operating direction of the crane in the „Support / sliding beams“ menu. If the working direction of the crane is changed from „forward“ **520** to working direction „backward“ **531** - or vice versa - by turning the turntable, then the sliding beam assignment on the touch-display changes accordingly.

The extension / retraction speed of the support can be controlled via the master switch.

Two extension / retraction speeds are available:

Small deflection of the master switch = slow.

Large deflection of the master switch = rapid.

3.3.1 Supporting manually

Up to 4 support cylinders can be extended at the same time.

▶ Press the function key **461** on the right touch-display until the „Support / sliding beams“ menu appears.

▶ In the „Support / sliding beams“ menu, select / deselect the relevant support cylinder(s) by „touching“ icon **525**, icon **526**, icon **527** and icon **528**.

Result:

– The selected support cylinder(s) will be displayed with a black border on the touch display.

▶ Press button **421** (hold down) and move master switch **420** in direction Y+.

Result:

– The selected support cylinder(s) are extended.

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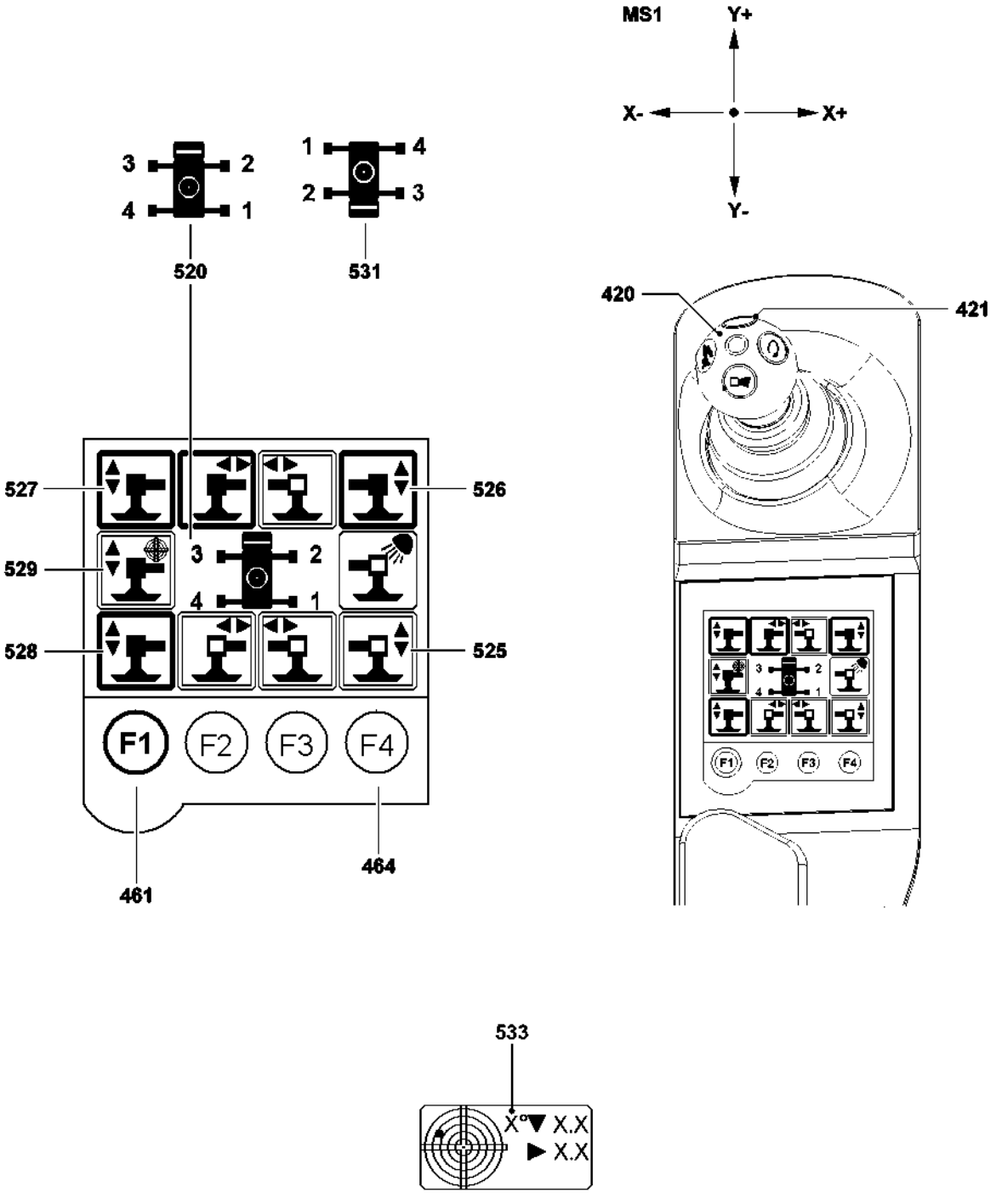

Fig.112616

3.3.2 Aligning the crane horizontally

WARNING
Danger of accident if crane topples over!
If the crane is not aligned horizontally, it may tip over.
▶ Ensure that crane is level.

The maximum permitted deviation from the horizontal position is ±0.5 % (±0.3 °).

▶ Extend and retract individual support cylinders until the point (small square) is in the centre of the graphic spirit level, see icon **533** on the LICCON monitor. The crane incline in longitudinal and lateral direction is displayed as 0 °.

Result:

– The crane is horizontal.

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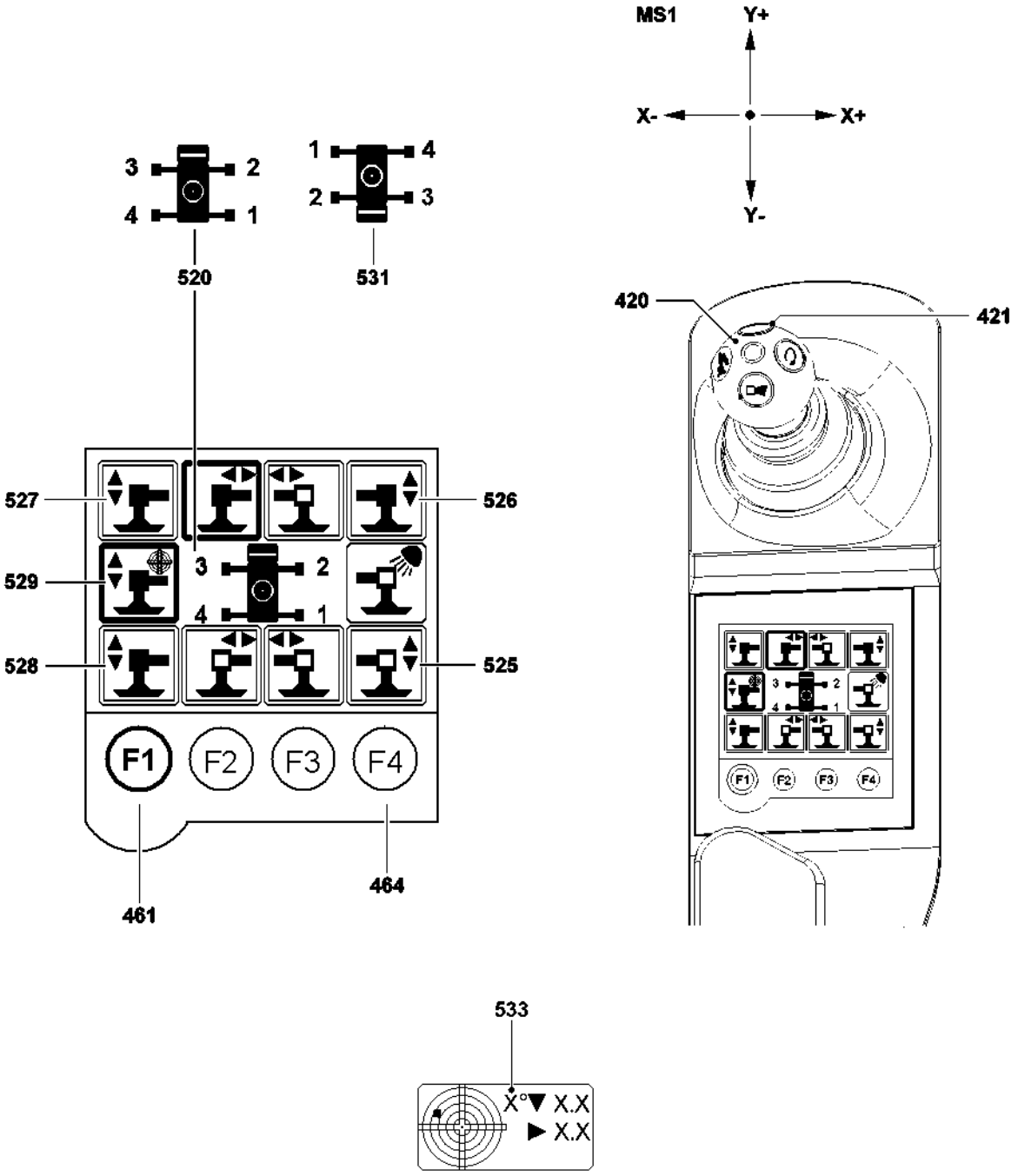

Fig.112617

3.3.3 Supporting automatically

WARNING
Risk of accident!
When the automatic support is operated the crane is levelled automatically.
▶ Make sure that the alignment is within the permissible tolerance and that all four support plates are touching the ground.

Automatic support is activated by „touching“ the icon **529** in the „Support / sliding beams“ menu. The selection of the automatic support function is cancelled.

▶ Press icon **529**.
▶ Press button **421** (hold down) and move master switch **420** in direction Y+.

Result:

– All support cylinders are moved out.
– The crane is aligned horizontally.

Note
▶ If the button **421** is released during the supporting procedure, the button **421** must be pressed again (held down) and the master switch **420** must be moved from the neutral position in direction Y+.

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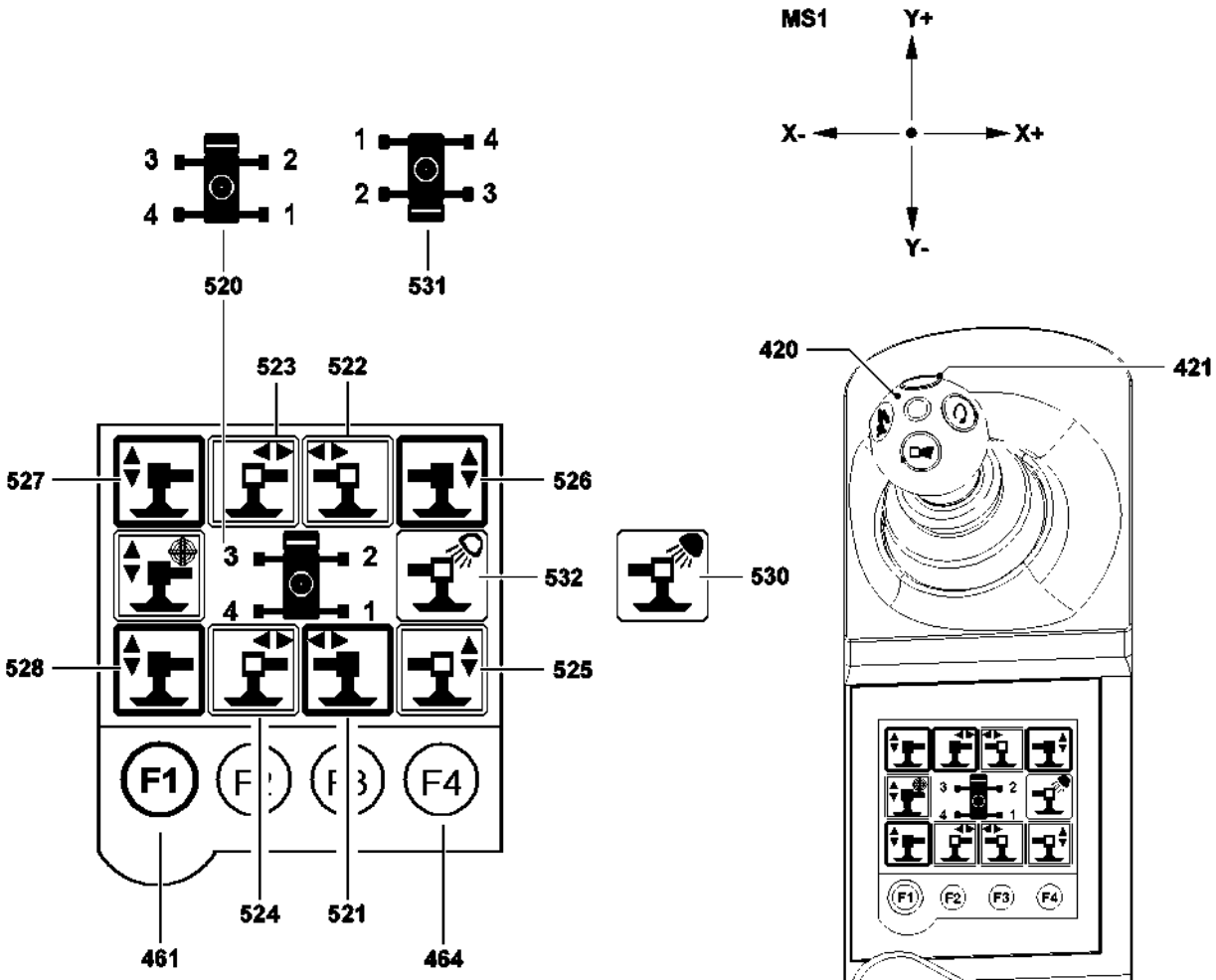

Fig.104135

3.4 Retracting support cylinders from crane operator's cab

WARNING
Danger of injury when retracting the support cylinders!
▶ Ensure that there are no persons or objects in the danger zone.

NOTICE
Risk of damage to 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 drop down.
▶ Do not turn axle blocking off until all wheels are in contact with the ground.

3.4.1 Manual retraction

Up to 4 support cylinders may be retracted at the same time.

▶ Press the function key **461** on the right touch-display until the „Support / sliding beams“ menu appears.
▶ In the Support / sliding beams menu, select / deselect the relevant support cylinder(s) by „touching“ icon **525**, icon **526**, icon **527** and icon **528**.

Result:
– The selected support cylinder(s) will be displayed with a black border on the touch display.
▶ Press button **421** (hold down) and move master switch **420** in direction Y-.

Result:

– The support cylinder(s) are retracted.

▶ Retract support cylinders until all crane wheels are in contact with the ground.

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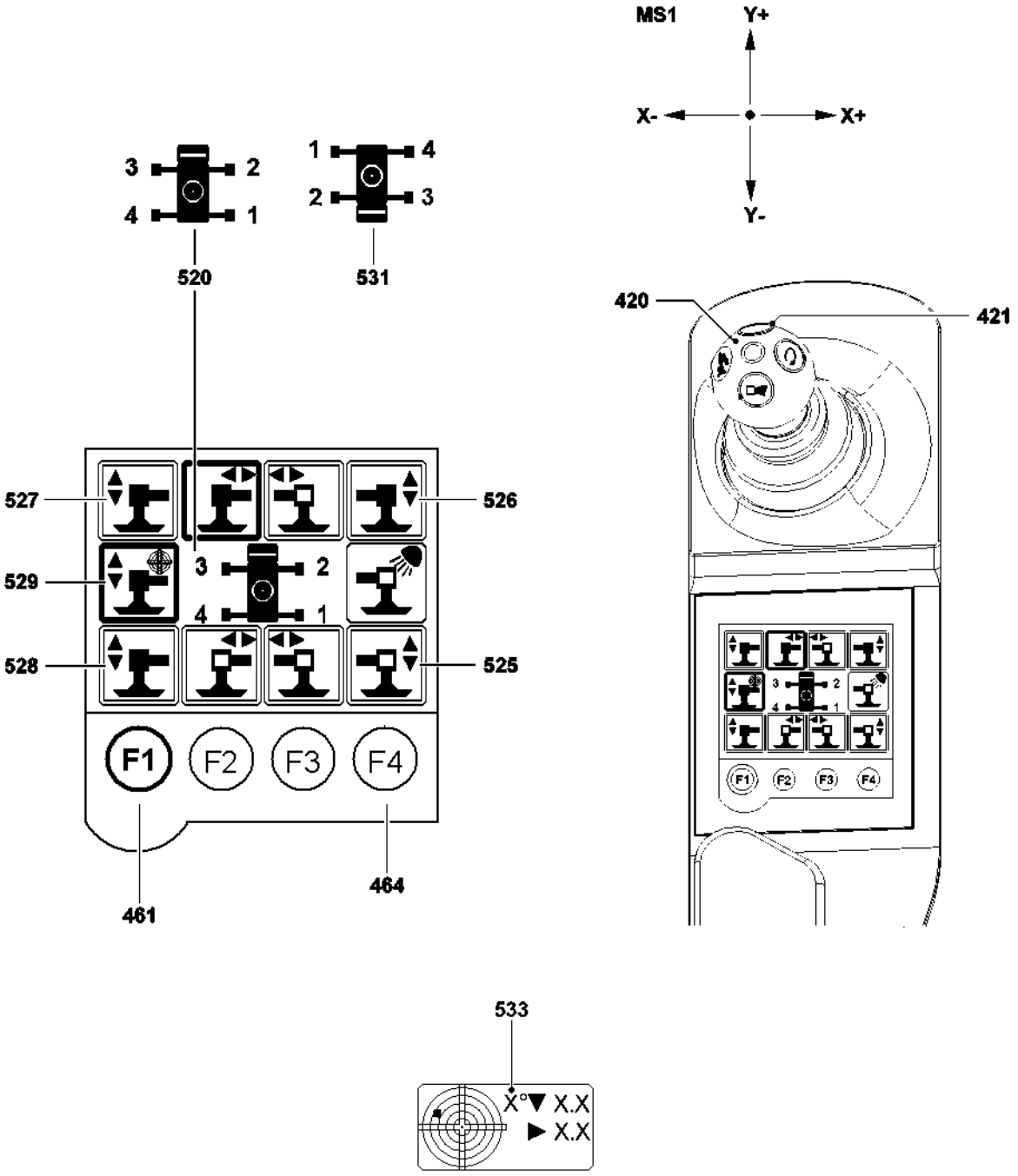

Fig.112617

3.4.2 Automatic retraction

WARNING
Risk of accident!
When the automatic support is operated the crane is levelled automatically.
▶ Make sure that the alignment is within the permissible tolerance and that all four support plates are touching the ground.

Automatic support is activated by „touching“ the icon **529** in the „Support / sliding beams“ menu. The selection of the automatic support function is cancelled.

▶ Press icon **529**.
▶ Press button **421** (hold down) and move master switch **420** in direction Y+.

Result:

– All support cylinders are retracted.

Note
▶ If the button **421** is released during the supporting procedure, the button **421** must be pressed again (held down) and the master switch **420** must be moved from the neutral position in direction Y+.

3.4.3 Turning the axle block off

▶ Turn the axle block off, see Crane operating instructions, chapter 3.03.
▶ Fully retract all four support cylinders.

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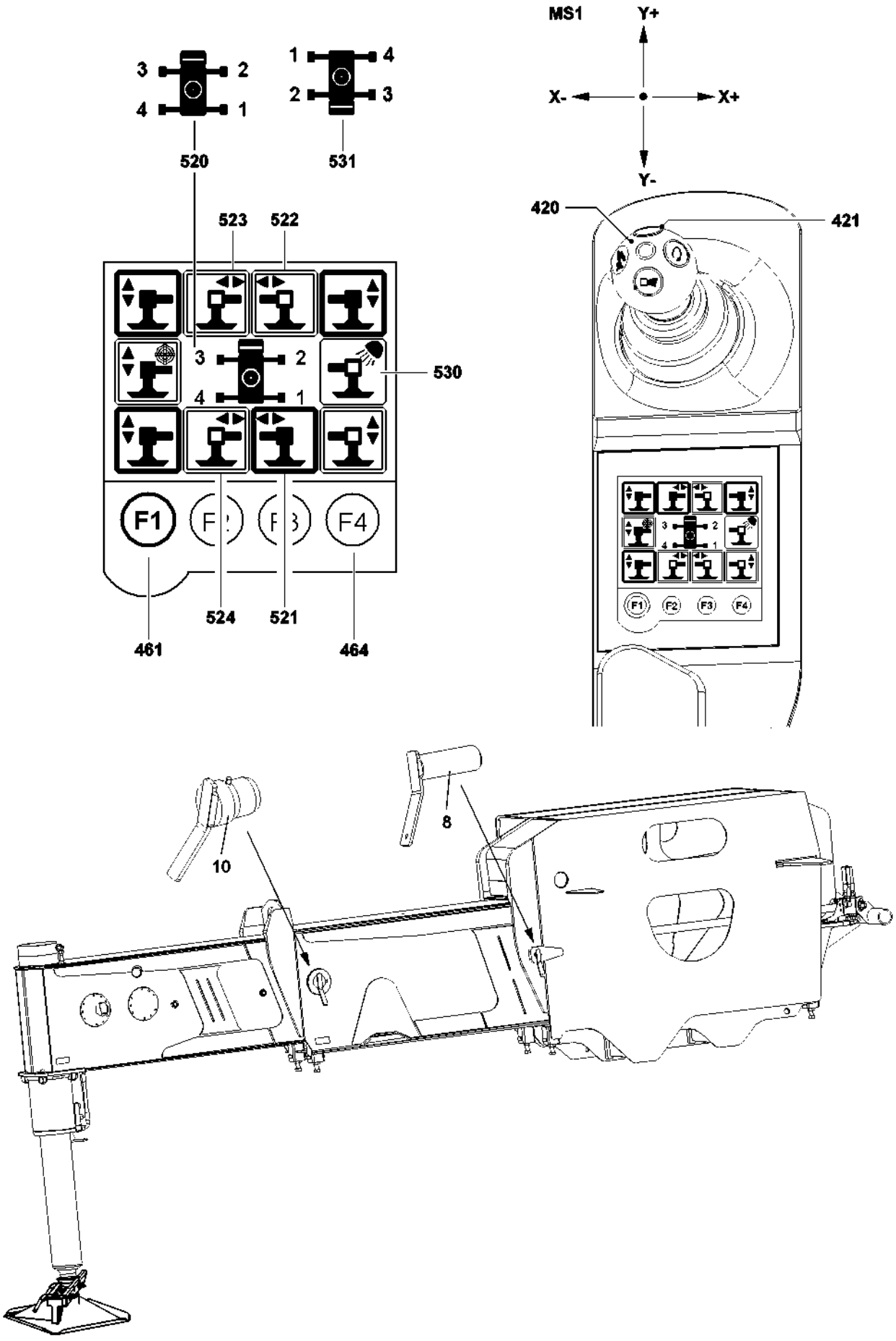

Fig.112614

3.5 Retracting the sliding beams from the crane operator's cab

Only one sliding beam may be retracted at a time.

- ▶ Unpin retaining pin **8** and retaining pin **10**.
- ▶ Press function key **461** until the „Support / sliding beams“ menu appears.
- ▶ Select required sliding beam by selecting icon **521**, icon **522**, icon **523** or icon **524**.

Result:

– The selected sliding beam is displayed with a black border.

CAUTION
Pay attention to sliding beam assignment and crane operating direction!
- ▶ Pay attention to „operating direction“ and „selected sliding beam“ on right touch-display.

- ▶ Press button **421** (hold down) and move master switch **420** in direction X- or X+.
- ▶ Retract sliding beam all the way.
- ▶ Completely retract the 4 sliding beams.
- ▶ Secure all sliding beams with the four retaining pins **8** and lock.
- ▶ Insert and secure the retaining pins **10** into the transport retainer.

3.6 Bringing the support plates to transport position and securing them

- ▶ Bring the support plates from operating position to transport position and secure them. See section „Bringing the support plates from operating position to transport position“.

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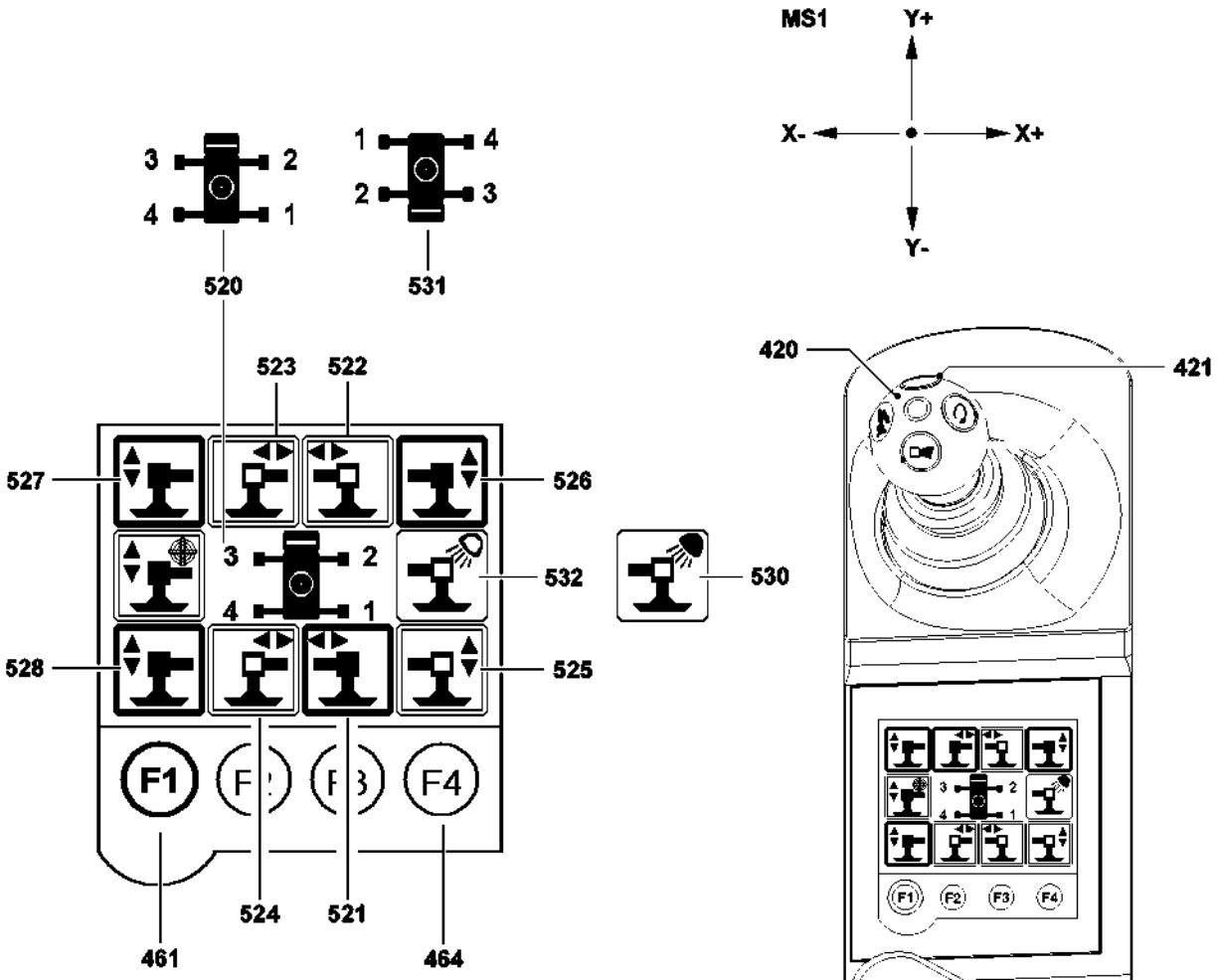

Fig.104135

3.7 Turning the sliding beam illumination on / off

The sliding beam illumination turns off at a driving speed of more than 3 km/h.

The sliding beam illumination is also turned off and blocked if the engine is turned off.

3.7.1 Manually

Make sure that the following prerequisites are met:
- The vehicle is in the support menu.
- The engine is running.
- The vehicle is at a standstill.

▶ Press the function key **461** on the right touch-display until the „Support / sliding beams“ menu appears.
▶ Press the function key **464**.

Result:

- Sliding beam illumination is turned off or on, see icon **530** and icon **532**.

3.7.2 Automatic

Make sure that the following prerequisites are met:
- The vehicle is in the support menu.
- The engine is running.
- The vehicle is at a standstill.

▶ Press icon **521** or icon **522** or icon **523** or icon **524** or icon **525** or icon **526** or icon **527** or icon **528**.
▶ Move master switch **420** in direction X+ or X-, or direction Y+ or Y-.

Result:

- The sliding beam illumination is turned on, see icon **532**.

Problem remedy
The sliding beam illumination does not turn on automatically?
If the sliding beam illumination has been automatically turned on and then turned off with the function key **464** in the „Support / sliding beams“ menu, the automatic turn on of the sliding beam illumination is **deactivated**. The automatic turn on function does not become active until the LICCON computer system is restarted with „Ignition ON“.
▶ Turn the ignition on.

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 drive.

WARNING
Risk of accident due to improper transport condition!
Improper transport conditions can result in property damage to the crane and endanger others on the road.
▶ Check that the crane is secured in the correct transport condition before driving off.

▶ Ensure proper transport condition.

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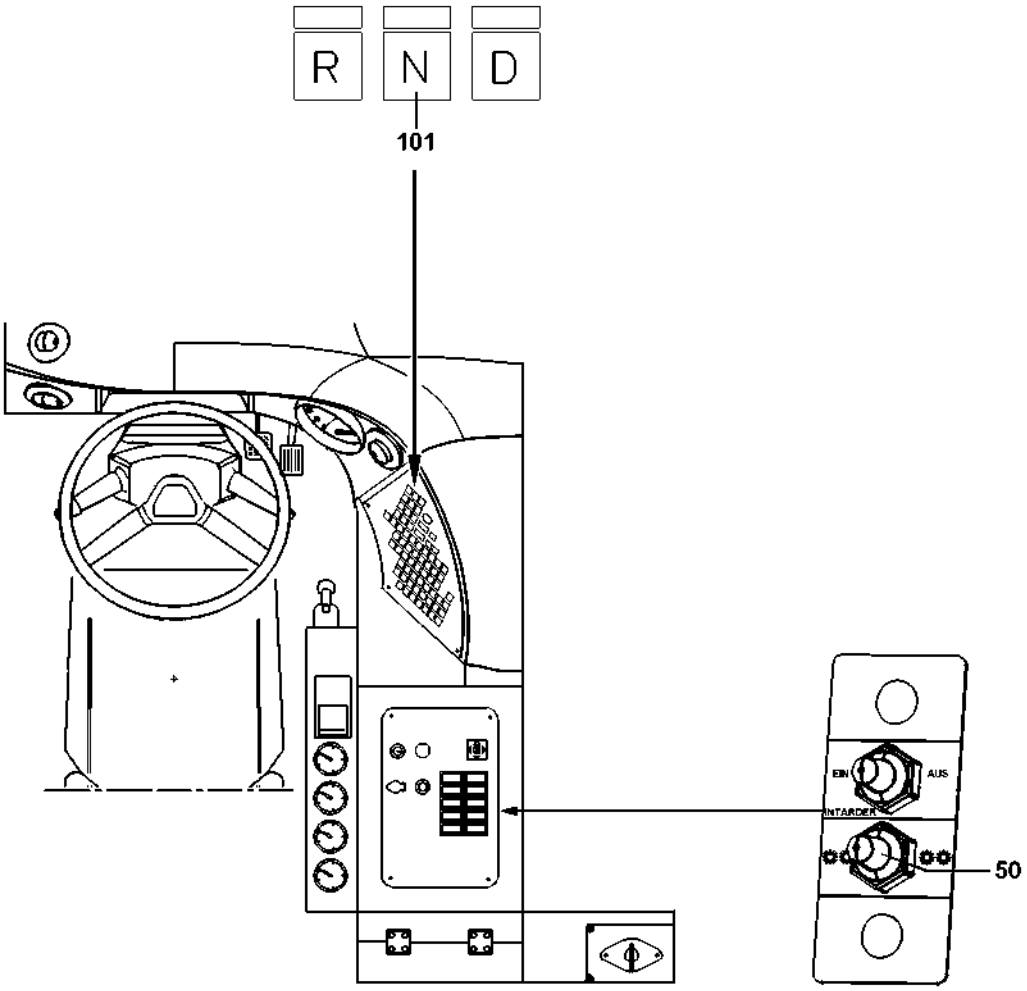

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Fig.108812

1 Towing

1.1 General towing regulations

The following towing regulations must be adhered to:
- For the towing procedure, release the parking brake or the brake system will be damaged.
- When towing, the speed must always remain below 20 km/h.
- Use the maneuvering coupling to tow the vehicle.
- Only tow with a tow bar.
- Turn on the hazard warning system and the headlight.
- When towing, always switch the transfer gearbox to freewheel.

1.2 Towing with a defective engine and / or transmission

If the engine cannot be started, a compressed air supply must be established from the towing vehicle to the mobile crane. A coupling is attached at the front under the bumper to supply compressed air to the mobile crane to be towed.

Connect this connection for the external supply via a hose line with the towing vehicle.

DANGER
Danger of accident!
- ▶ The supply pressure of the compressed air brake system of the mobile crane to be towed must be at least 6 bar.
- ▶ With the engine turned off the vehicle can only be steered from a speed of 5 km/h 10 km/h.

- ▶ Actuate the switch **50** and shift the transfer gearbox to freewheel.
- ▶ Shift the transmission with the driving range switch **101** to neutral position „N“.

1.3 Towing with an intact engine

1.3.1 Towing in case of damage on the distributor gear

- ▶ Disconnect the gear shafts from the distributor gear to the drive axles on the drive axles and tie them up.
- ▶ Shift the transmission with the driving range switch **101** to neutral position „N“.
- ▶ Allow the engine to run at idling speed.

1.3.2 Towing in case of damage to the drive axles

Only authorized and specially trained personnel can carry out towing arrangements in case of damage to the drive axles.

- ▶ Assign specially trained personnel to carry out this work.

1.4 Extended maneuvering coupling*

Note
- ▶ Only the hook block may be engaged on the extended maneuvering coupling***** to move the crane vehicle. If the crane vehicle is towed, the maneuvering coupling without extension must be assembled on the crane vehicle.
- ▶ The tightening torque for the mounting screws of the maneuvering coupling is 540 Nm.

- ▶ Remove the extended maneuvering coupling*****.
- ▶ Remove the extension on the maneuvering coupling.
- ▶ Install the maneuvering coupling without extension on the crane vehicle.

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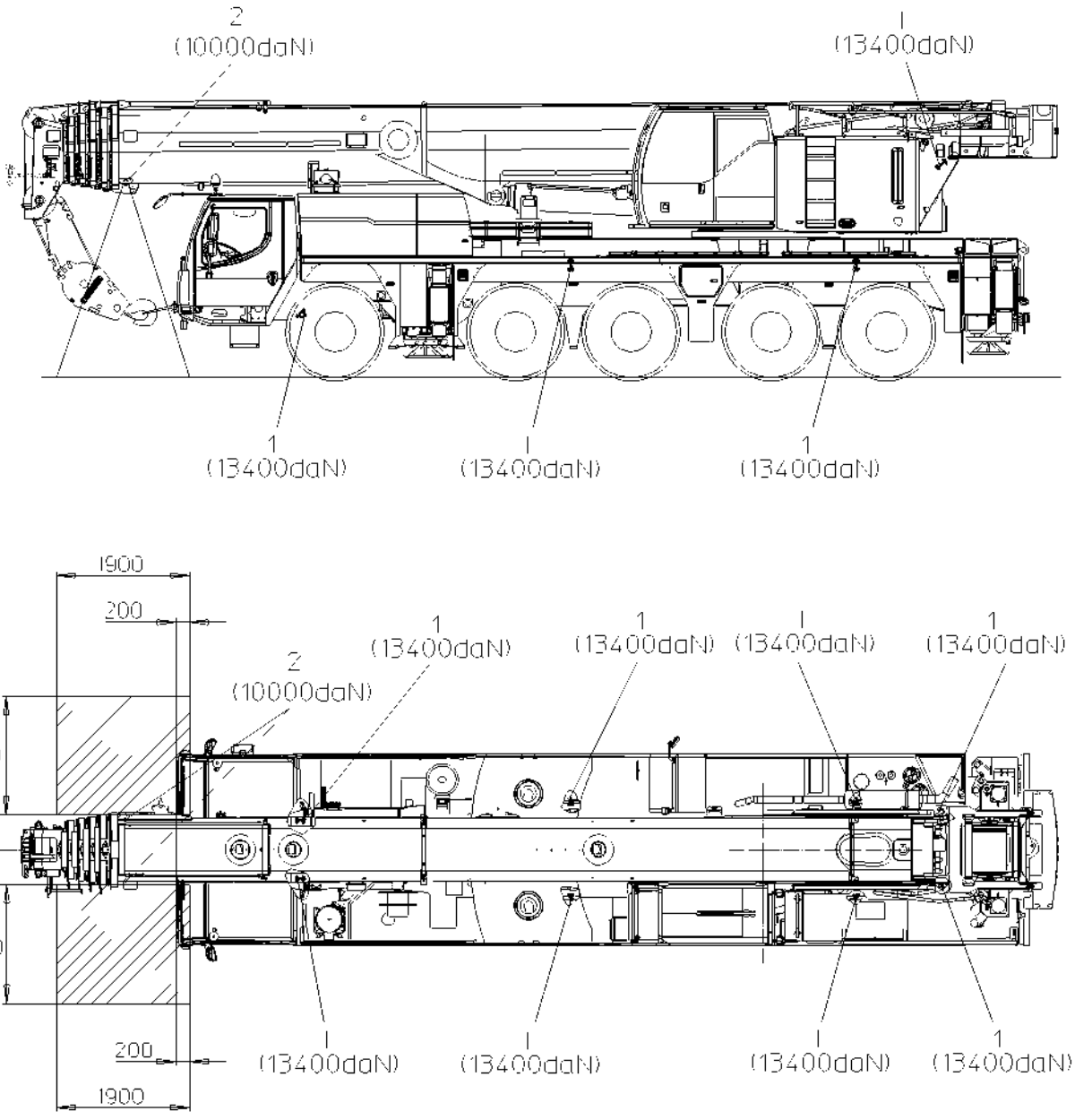

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Fig.112603

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
Risk 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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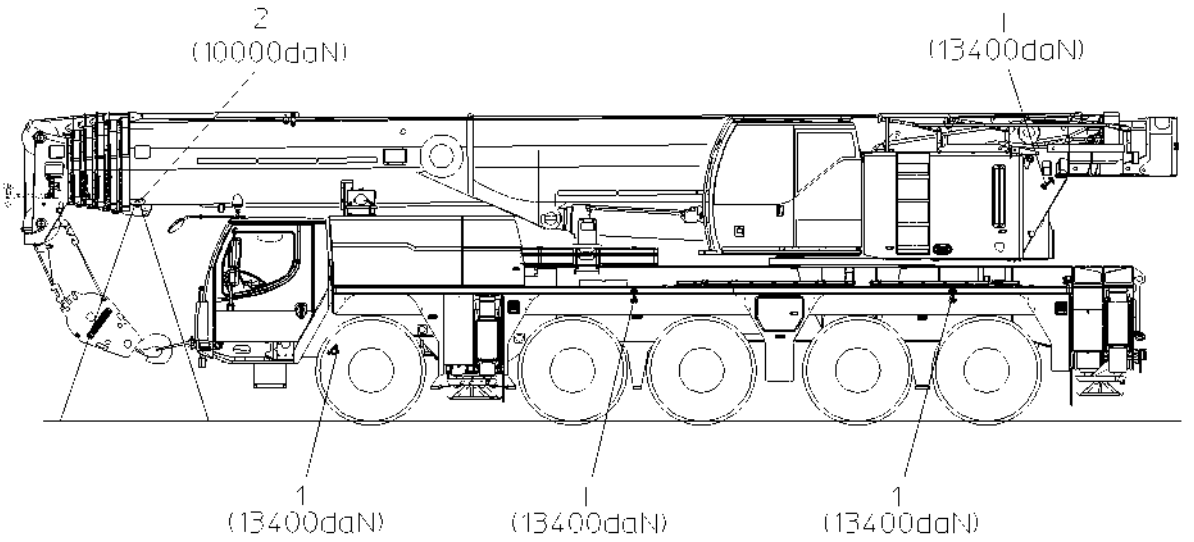

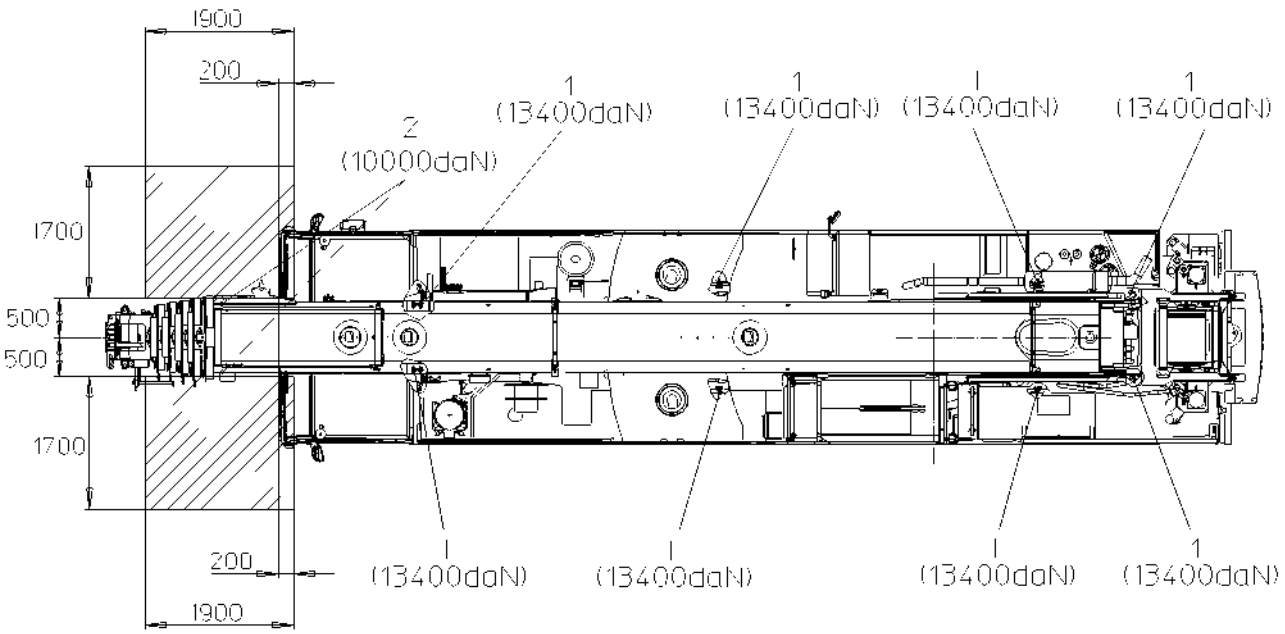

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Fig.112603

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 Operating instructions, chapter 3.04, section „Parking brake“.
- Lower the crane with the leveling regulation to obtain a center of gravity as low as possible. See Operating instructions, chapter 3.03, section „Axle suspension system“.
- Place wedges under the wheels. See Operating instructions, chapter 2.04, section „Parking the vehicle“.
- Close the driver's cab and the crane cab as well as all cover panels.

NOTICE
Damage to crane!
The rigging eyehooks **1** and the rigging points **2** may only be used to rig the crane. The rigging eyehooks **1** and the rigging points **2** may not be used to lift the crane and to lift loads.
▶ Use the rigging eyehooks **1** and rigging points **2** 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 material with sufficient capacity.
- Secure the telescope on the marked rigging points **2** (13400 daN maximum nominal load) by taking the specified rigging area according to the illustration, permissible load and valid regulations for loading and load retention into account.

Permissible tension surface on the ground for the rigging points **2** at lowered levelling regulation on the crane.

- Use suitable rigging material with sufficient capacity.

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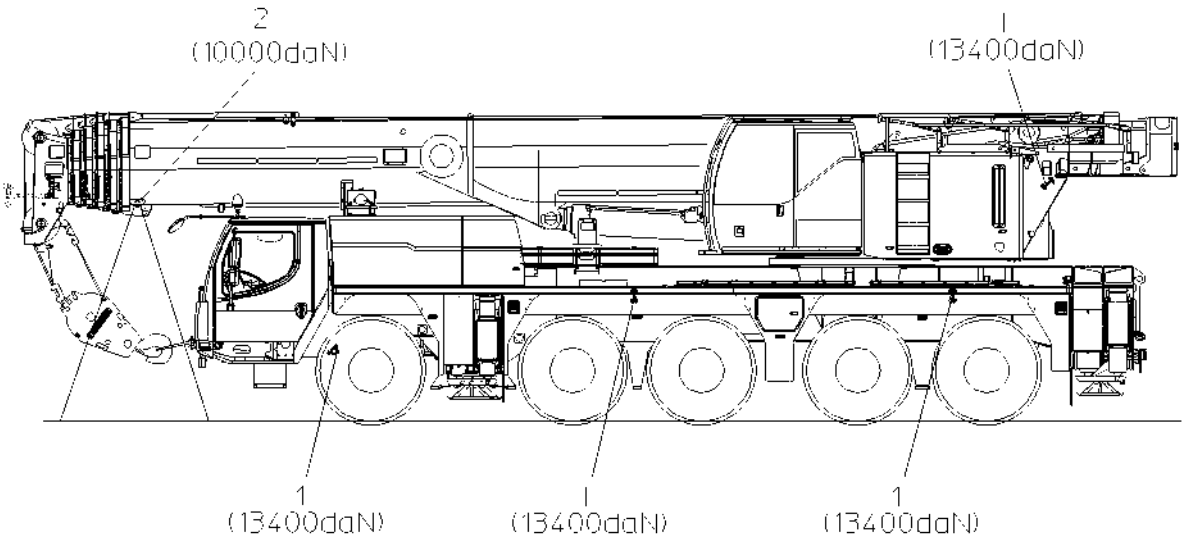

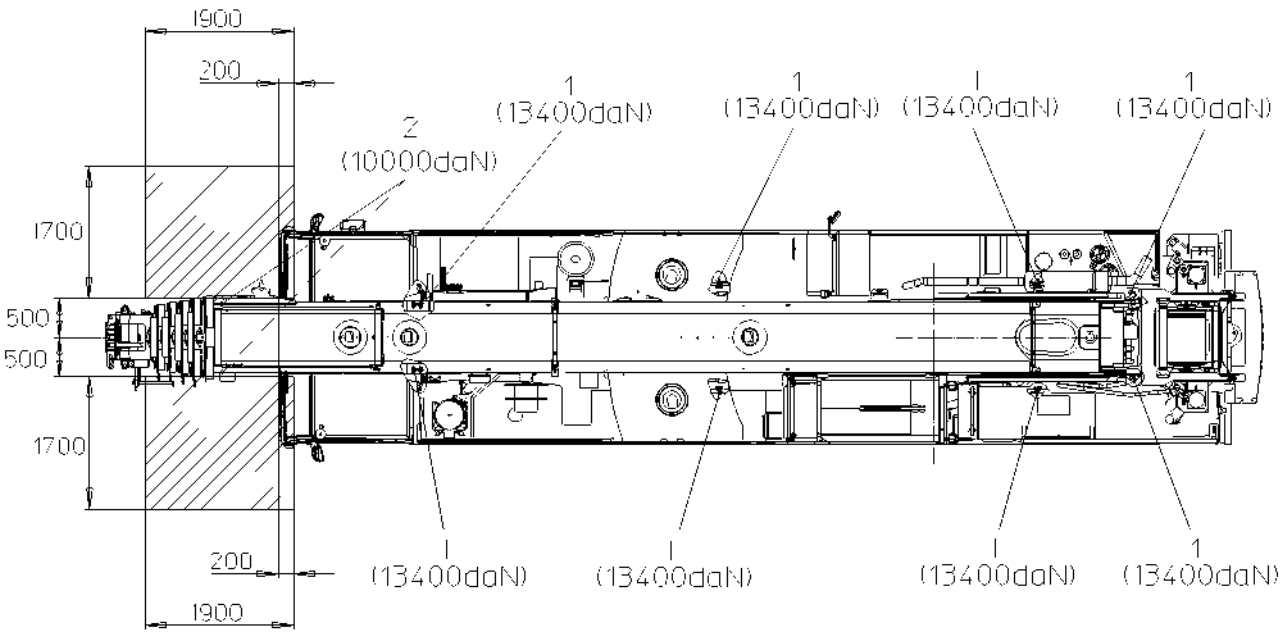

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Fig.112603

1.3 Driving the crane on the transport vehicle

Make sure that the following prerequisites are met:
- The crane superstructure is locked 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 Operating instructions, chapter 3.04, section „Parking brake“.
▶ Lower the vehicle. See Operating instructions, chapter 3.03, section „Axle suspension system“.

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 the vehicle, see Operating instructions, chapter 2.04, section „Parking the vehicle“.
▶ Close the driver's cab, crane cab and all cover panels 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** and rigging points **2** according to the illustration!
▶ Observe angles, radii and tension surfaces according to the illustration!

The rigging points **2** are marked with the sign **3**.

▶ Secure the crane with tension belts or tension chains on the rigging eyehooks **1**.
▶ Secure the telescope with tension belts or tension chains by observing the marked tension area on the rigging points **2**.
▶ Attach the tension belts or tension chains on the transport vehicle.

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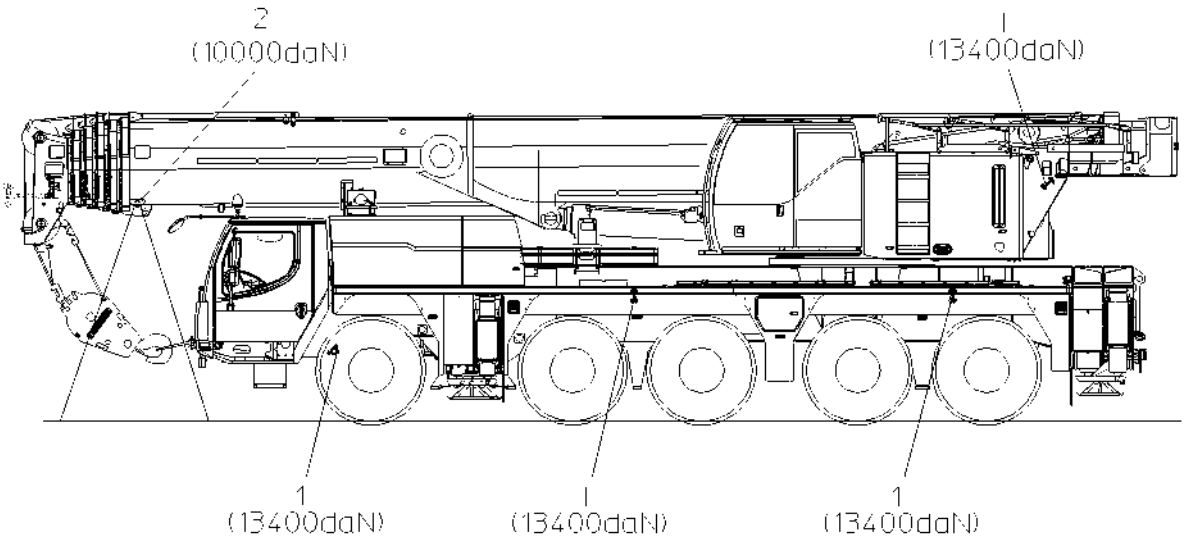

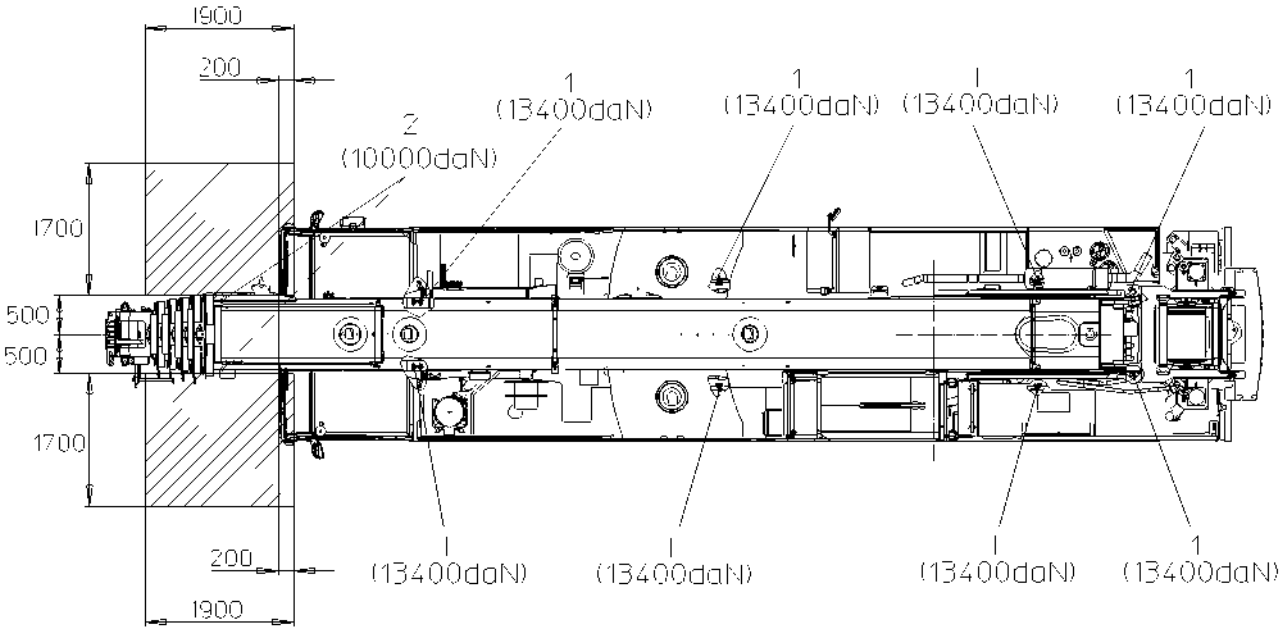

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Fig.112603

1.5 Unloading the crane safely

Make sure that the following prerequisites are met:
- The crane superstructure is locked with the crane chassis.
- A guide is available.

▶ Remove all transport retainers.
▶ Level the vehicle for on road driving. See Operating instructions, chapter 3.03, section „Axle suspension system“.
▶ Release the parking brake. See Operating instructions, chapter 3.04, section „Parking brake“.

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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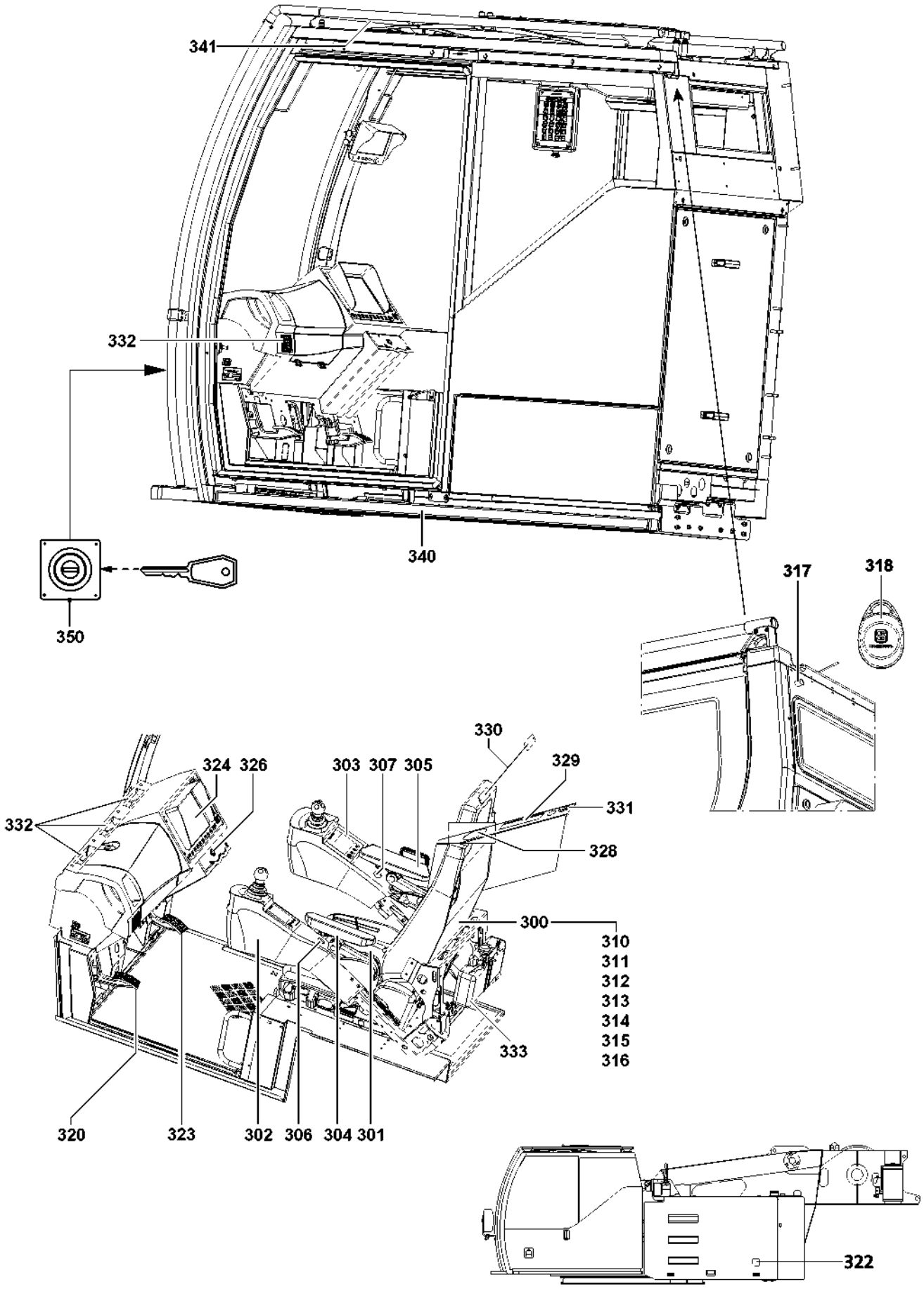

Fig.114097

1 Operating and control instruments

1.1 Operating elements on control platform

300 Crane operator's seat

301 Seat contact button

302 Left console
- Master switch 2 (MS2)
- Touch display

303 Right console
- Master switch 1 (MS1)
- Touch display

304 Left armrest

305 Right armrest

306 Left notch lever

307 Right notch lever

1.1.1 Operating elements for seat adjustment

Note

▶ For a detailed description of the control elements for the seat adjustment, see Crane operating instructions in chapter 4.03.

310 Horizontal adjustment

311 Incline adjustment

312 Seat cushion adjustment

313 Height adjustment

314 Seat heater / seat climate control*****

315 Fan*****

316 Backrest adjustment

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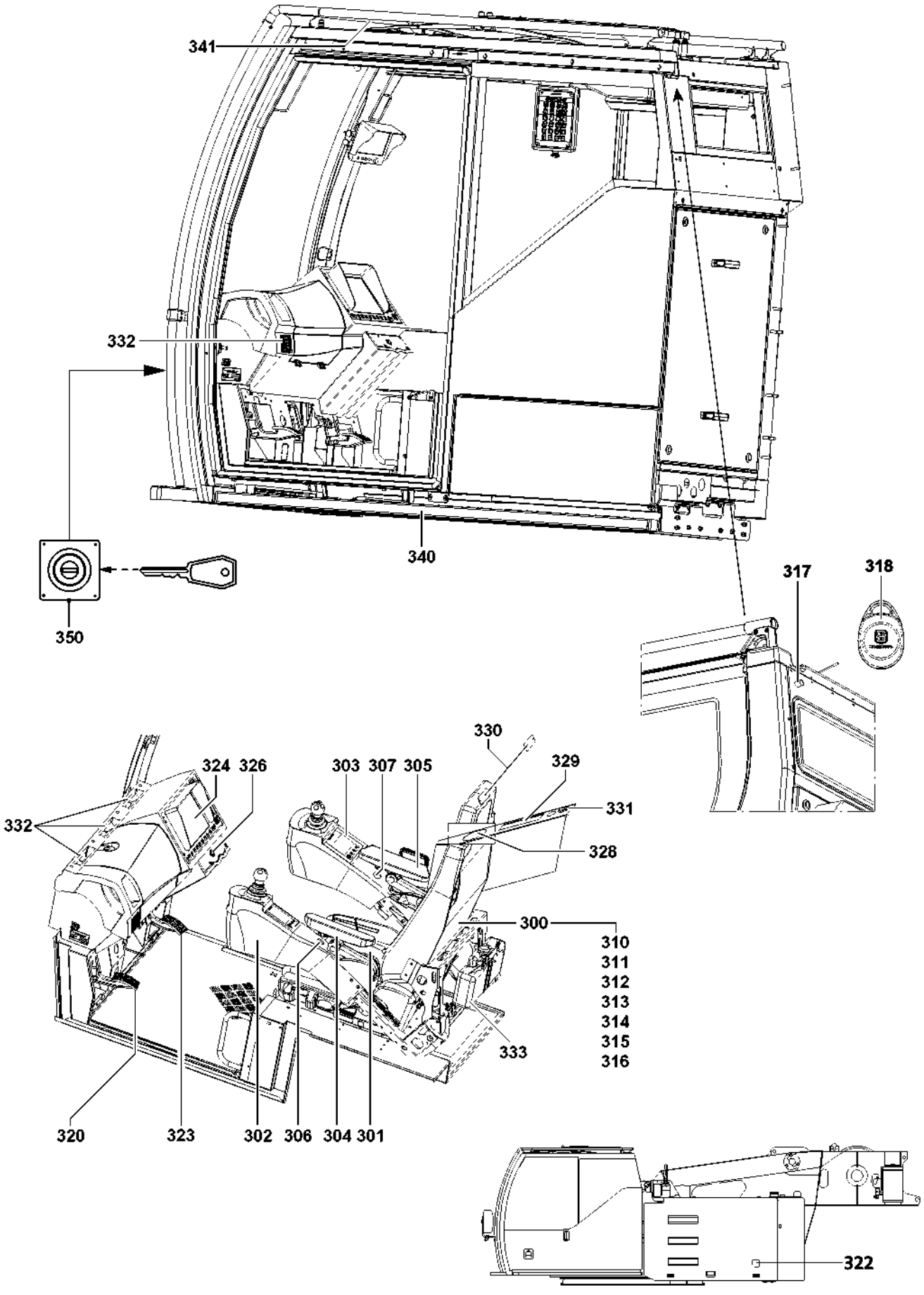

Fig.114097

1.2 Operating elements, General

317 Sensor
- LMB emergency operation
  Note:
  Only active if the crane has a CE-mark (EN13000 active).

318 Transponder
- LMB emergency operation
  Note:
  Only active if the crane has a CE-mark (EN13000 active).

320 Pedal
- Slewing gear brake

322 Main battery switch

323 Pedal
- Engine regulation, see Crane operating instructions, chapter 4.03

324 LICCON monitor
- Display of crane data required for **Crane operation**, see Crane operating instructions, chapter 4.02.

326 Ignition switch

Position:
- 0 = Ignition key can be pulled out
- 1 = Ignition on
- 2 = Start the engine

328 Drink holder

329 Radio

330 LED interior lights
- Located above the crane operator's seat
- Dimmable

331 Integrated socket 24 V

332 Outlet nozzles
- For heat / ventilation / Climate control system*****

333 Reservoir
- Windshield washer fluid

340 Footboard / step
- **Note:**
  Refer to section „Operating elements on the operating and control unit (BKE)“.

341 Warning light rod
- LICCON utilization display:
  - Green:
    „**Safe range**“
  - Yellow:
    Above a utilization of 90 %, the **„Safe range“** is exceeded.
  - Red:
    Above a utilization of 100 %, the **„DANGER ZONE“** is reached!
    Note:
    Once 100 % utilization is reached, the red warning light lights up and an **„LMB-Stop“** occurs.

350 EMERGENCY OFF switch
- Crane operator's cab (external)

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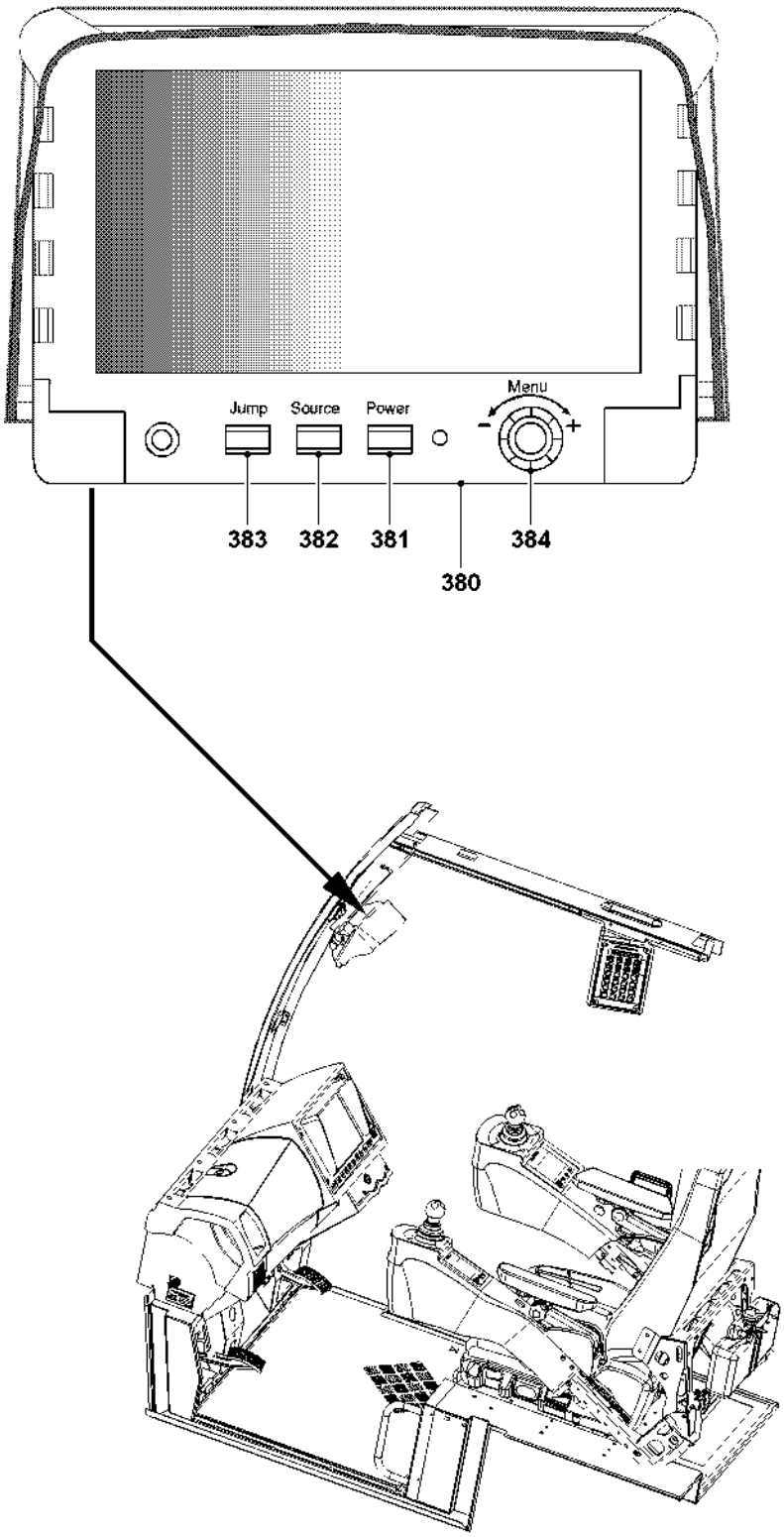

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Fig.112867

2 Operating elements on camera - monitor*

380 TFT monitor

381 Key „Power“
- Monitor On / Off

382 Button „Source“
- By pressing the „Source“ key in turned on condition, the view on the monitor is changed

383 Button „Jump“
- By pressing the „Jump“ key, the preset camera inputs can be selected

384 Selection knob / pressure switch
- The selection menu on the monitor is activated by pressing the selection knob / pressure switch
  Note:
  If no adjustments are made after activation of selection on the monitor, then the selection turns off by itself after several seconds.
- When the selection menu is activated, a menu point can be selected by turning the selection knob / pressure switch. The selected menu point is highlighted in „yellow“. Press the selection knob / pressure switch to change the color from „yellow“ to „red“. This selects the desired function.

Selection menu
- **Screen adjustments**
  Note:
  The following adjustments can be made in the menu „Screen adjustments“.
  - Brightness
  - Contrast
  - Color
  - Hue
  - Automatic brightness control
  - Direction display
  - Back
- **OSD settings**
  Note:
  The following adjustments can be made in the menu „OSD adjustments“.
  - Display
  - Distance display
  - Back
- **Camera adjustments**
  Note:
  The following adjustments can be made in the menu „Camera adjustments“.
  - Reflection
  - Changeover
  - Video outlet
  - Back
- **Reset**
  - The display is reset to default settings
- **Output**
  - OSD selection is ended

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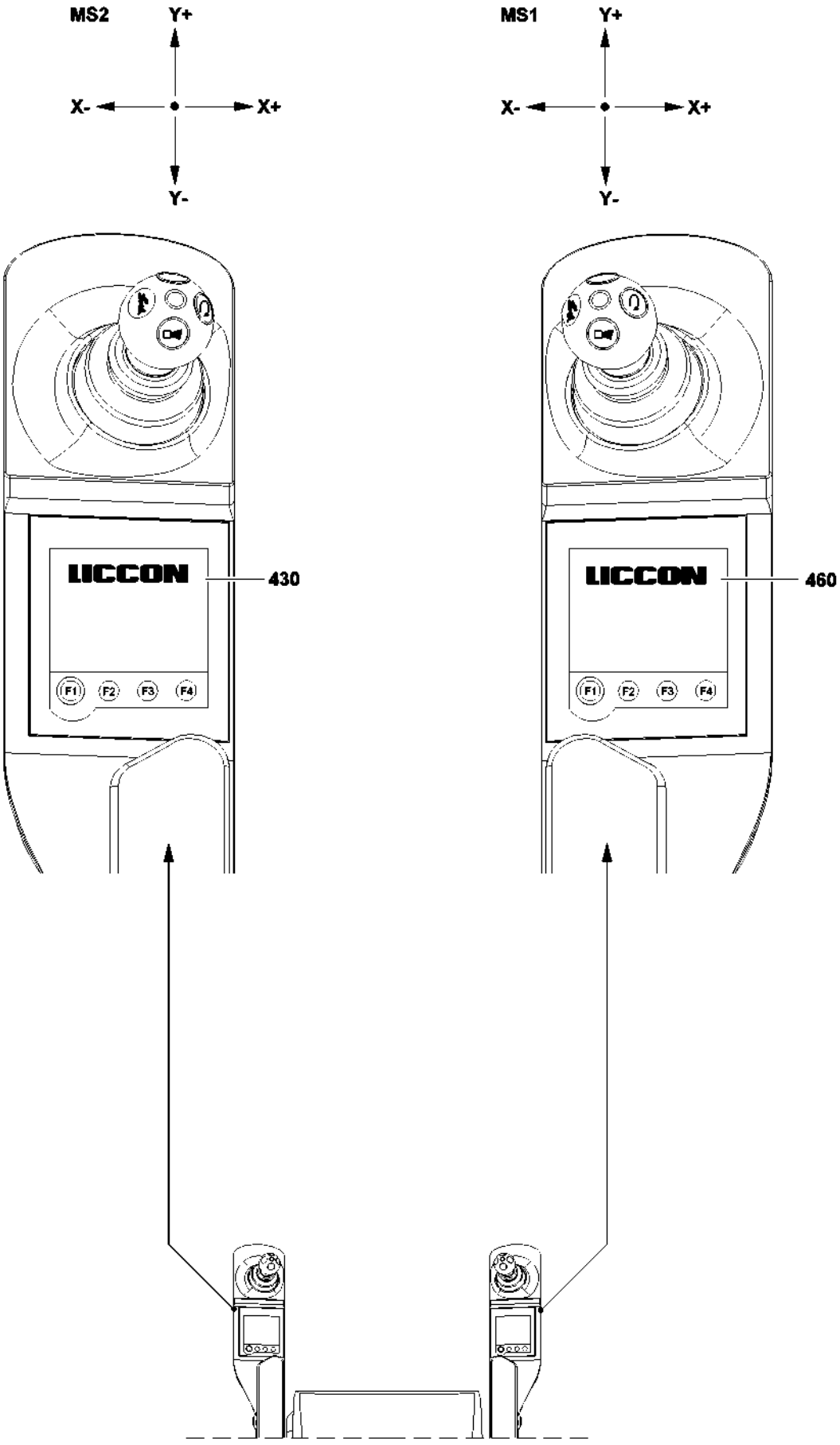

Fig.105575

3 Operating elements on control consoles

3.1 Touch displays

The touch displays are combined display and operating elements. The touch displays are operated using the row of function keys „F1“ to „F4“ and by direct „touch“ (fingertip) on the corresponding display icons.

Note
- ▶ The illustrations or icons in the touch displays are only examples.
- ▶ They may differ from the crane!

Via the left touch display **430** and the right touch display **460**, you can call up various menus. Various crane functions can be selected or preselected, turned on or off, or directly activated in these menus.

F Function keys
- The function of individual function keys depends on the menu and can vary, depending on the menu selected. Therefore the individual menus will now be described in more detail. The icons on the touch display above the row of function keys with a single border indicate the functions that will be triggered by activating the function keys below them.

460 Right touch display
- Menu „Master switch configuration“
- Menu „Support / sliding beams“

430 Left touch display
- Menu „Master switch configuration“
- Menu „Working floodlight“
- Menu „Climate control settings“

Touch functions

Note
- ▶ Touch functions are identified by the double border of the display icons. Selecting a function by „touching“ the relevant icon on the display does not actually trigger the function directly. Instead, it **selects** or **pre-selects** the function.
- ▶ The function **selection** or **pre-selection** can be cancelled by „touching“ the corresponding icon again.

Note
- ▶ Selected or pre-selected functions are shown on the touch display with a „**bold icon border**“.

3.1.1 Starting up the LICCON Computer system and the touch displays

After turn on and correct boot up of the LICCON computer system, a static crane screen appears briefly on the left touch display **430** and the right touch display **460**. From here the system automatically switches to the master switch assignment for the relevant master switch, MS1 (right) or MS2 (left).

The touch display always displays the master switch assignment that was set or „active“ before the LICCON computer system was turned off.

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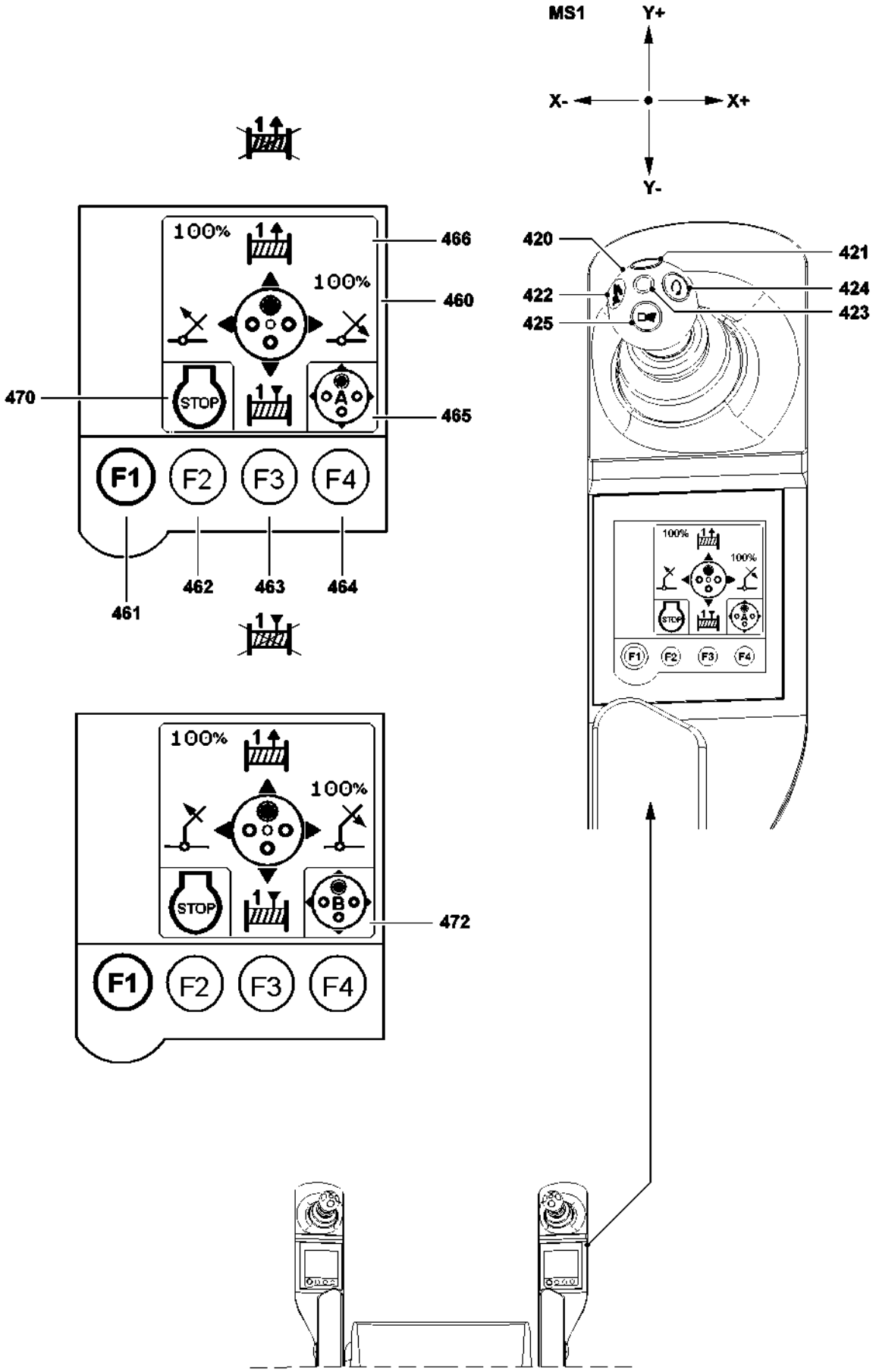

Fig.112193

3.2 Master switch assignment for machines with one winch

3.2.1 The „Master switch configuration“ menu (right touch display)

The function key line

461 Function key F1
- Change to next menu

462 Function key F2
- Engine STOP

463 Function key F3
- Winch changeover - Winch 1
  Activate / deactivate the winch
  Conditions:
  Neutral position master switch 1 **420** (MS1) right.
  Danger of accident!
  Never activate / deactivate winch 1 while a crane movement is being actuated.
  The winch status (winch activated / deactivated) can be seen on the touch display.

464 Function key F4
- Change master switch assignment from „A“ to „B“
  Conditions:
  Neutral position master switch 1 **420** (MS1) right.
  An operating mode or configuration with auxiliary boom must be selected and displayed on the LICCON computer system.
  Note
  If no configuration with auxiliary boom has been set and confirmed, the „luffing auxiliary boom“ master switch assignment is **not** available.

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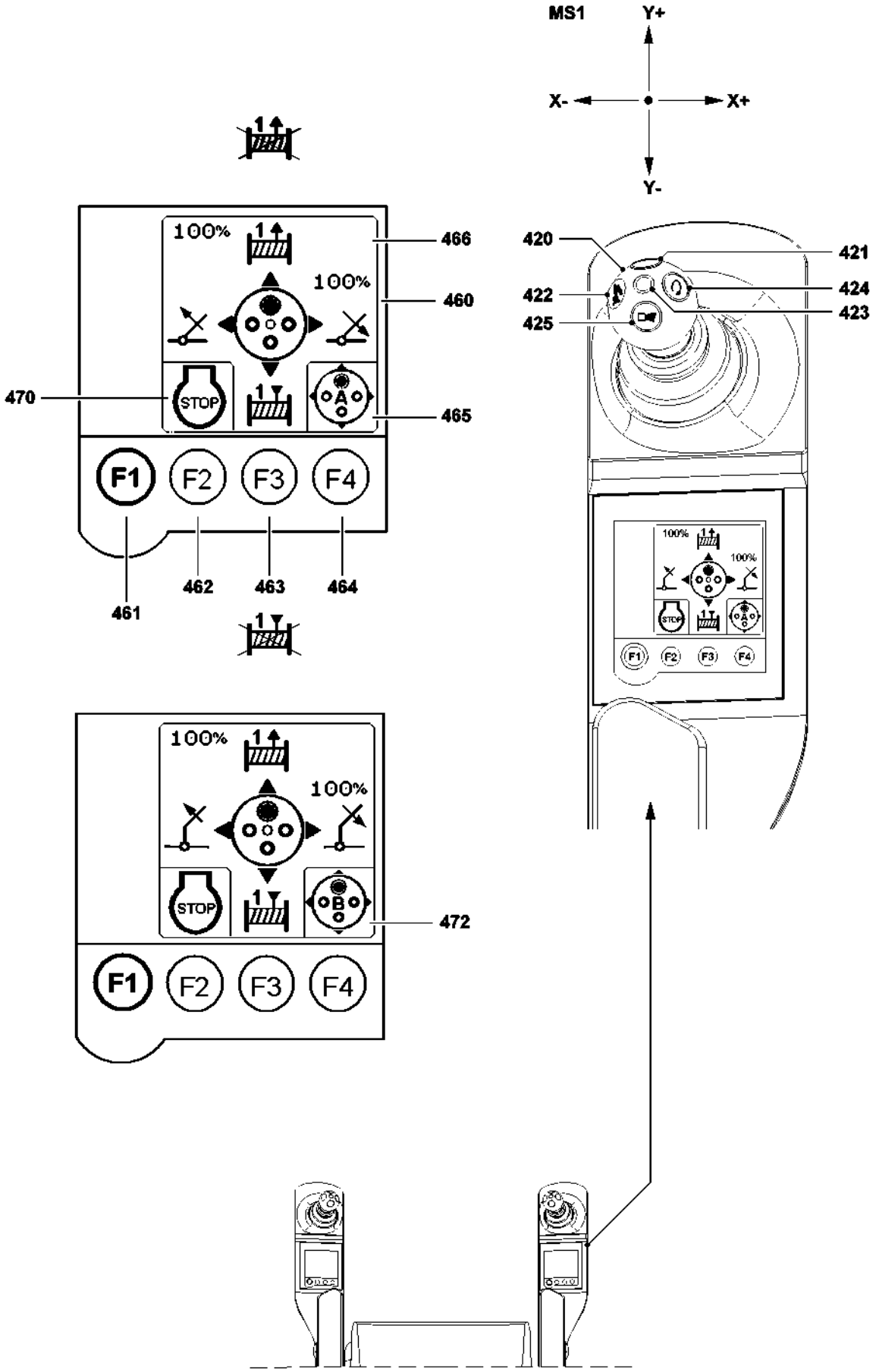

Fig.112193

Right master switch assignment

420 Master switch - right (MS 1)

Hoist gear 1:
- Move the master switch **420** in direction Y+ (forward): Winch 1 spools out and the load is lowered.
- Move the master switch **420** in direction Y- (backward): Winch 1 spools up and the load is raised.

Luffing gear - telescopic boom: Master switch assignment „A“ **465** is active:
- Move the master switch **420** in direction X+ (toward the right): Luff the telescopic boom down.
- Move the master switch **420** in direction X- (toward the left): Luff the telescopic boom up.

Luffing auxiliary boom*:Master switch assignment „B“ **472** is active:
- Move the master switch **420** in direction X+ (toward the right): Luff the auxiliary boom down.
- Move the master switch **420** in direction X- (toward the left): Luff the auxiliary boom up.

421 Button
- Bypass of seat contact button. **Or** if the seat contact button is actuated: Activation of vibration sensor **423**.

422 Button
- Adding rapid mode for the hoist gear(s) and luffing up

423 Vibration sensor
- Winch turn sensor, (vibrator) winch 1

424 Button
- Lock of engine regulation of superstructure engine
  Note:
  Pressing the button **424** will lock the engine regulation in the current position.

425 Button
- Horn

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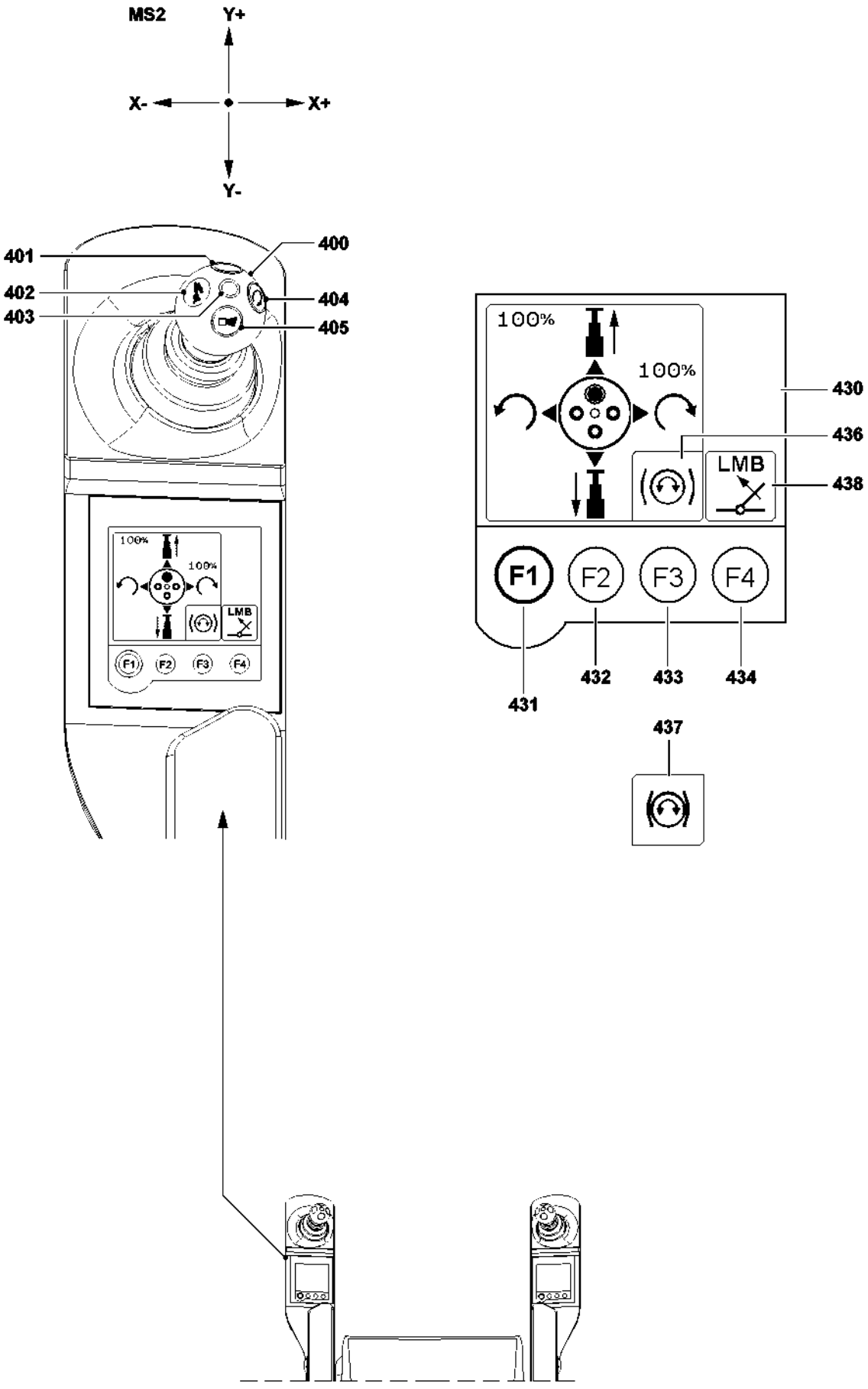

Fig.103961

3.2.2 The „Master switch configuration“ menu (left touch display)

The function key line

431 Function key F1
- Change to next menu

432 Function key F2
- **No** function

433 Function key F3
- Apply / release slewing gear brake
  - **436** Slewing gear brake released
  - **437** Slewing gear brake applied

434 Function key F4 (touching)
- Exceeding the overload protection (icon **438**), used to luff in with suspended load
  Danger:
  The exceedance may only be carried out if the overload was caused by luffing down at freely suspended load and the crane operator is absolutely certain that luffing up the load will take it out of the overload range.

Left master switch assignment:

400 Master switch left (MS 2)

Telescoping gear
- Move the master switch **400** in direction Y+ (forward): Telescope out.
- Move the master switch **400** in direction Y- (backward): Telescope in.

Slewing gear:
- Move the master switch **400** in direction X+ (toward the right): Superstructure turns to the right.
- Move the master switch **400** in direction X- (toward the left): Superstructure turns to the left.

401 Button
- Bypass of seat contact button. **Or** if the seat contact button is actuated: Activation of vibration sensor **403**.

402 Button
- Addition of the rapid gear for winch(es) and luffing up

403 Vibration sensor
- Winch turn sensor, (vibrator) winch 1 or winch 2 **or** turn sensor, (vibrator) slewing gear

404 Button
- Lock of engine regulation of superstructure engine
  Note:
  Pressing the button **404** will lock the engine regulation in the current position.
- The idling speed can be increased up to the maximum rpm.
  - Can be „overridden“ with the engine regulation (gas pedal)
  - At continued actuation of the engine regulation (gas pedal), the current rpm is taken over
  - By pressing the button **404** with the engine regulation (gas pedal) **not actuated**, the manual throttle is cancelled
  - At locked engine rpm, a **„+“** appears in the „dynamic utilization bar display“ (crane operation)

405 Button
- Horn

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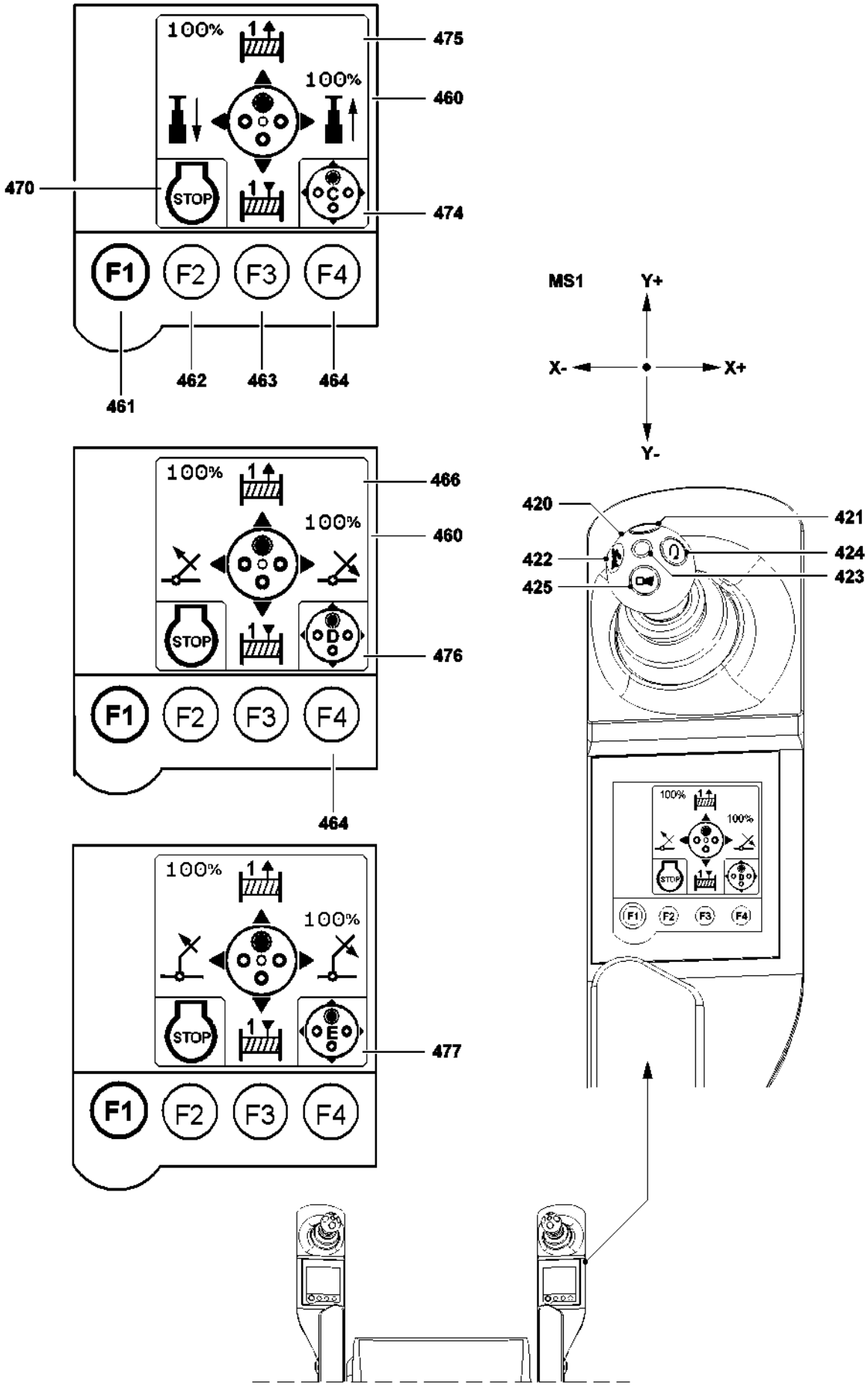

Fig.112194

3.3 Master switch assignment for machines with two winches

3.3.1 The „Master switch configuration“ menu (right touch display)

The function key line

461 Function key F1
- Change to next menu

462 Function key F2
- Engine STOP
  Note:
  After „Engine STOP“ the engine can be re-started by turning the ignition switch to „position 2“, also see Crane operating instructions, chapter 4.02.

463 Function key F3
- Winch changeover - Winch 1
  Activate / deactivate the winch
  Conditions:
  Neutral position master switch 1 **420** (MS1) right.
  Crane driving speed = 0 km/h
  Danger of accident!
  Never activate / deactivate winch 1 while a crane movement is being actuated.
  Note:
  The winch status (winch activated / deactivated) can be seen on the touch display.

464 Function key F4
- Change master switch assignment from „C“ to „D“ or „E“.
  Conditions:
  Neutral position master switch 1 **420** (MS1) right.
  For master switch assignment **E**, an operating mode or configuration with auxiliary boom must be selected and confirmed on the LICCON computer system.
  Note
  If no configuration with auxiliary boom has been set and confirmed, the „luffing auxiliary boom“ master switch assignment is **not** available.

Touch functions in the driving mode and Master switch configuration menu

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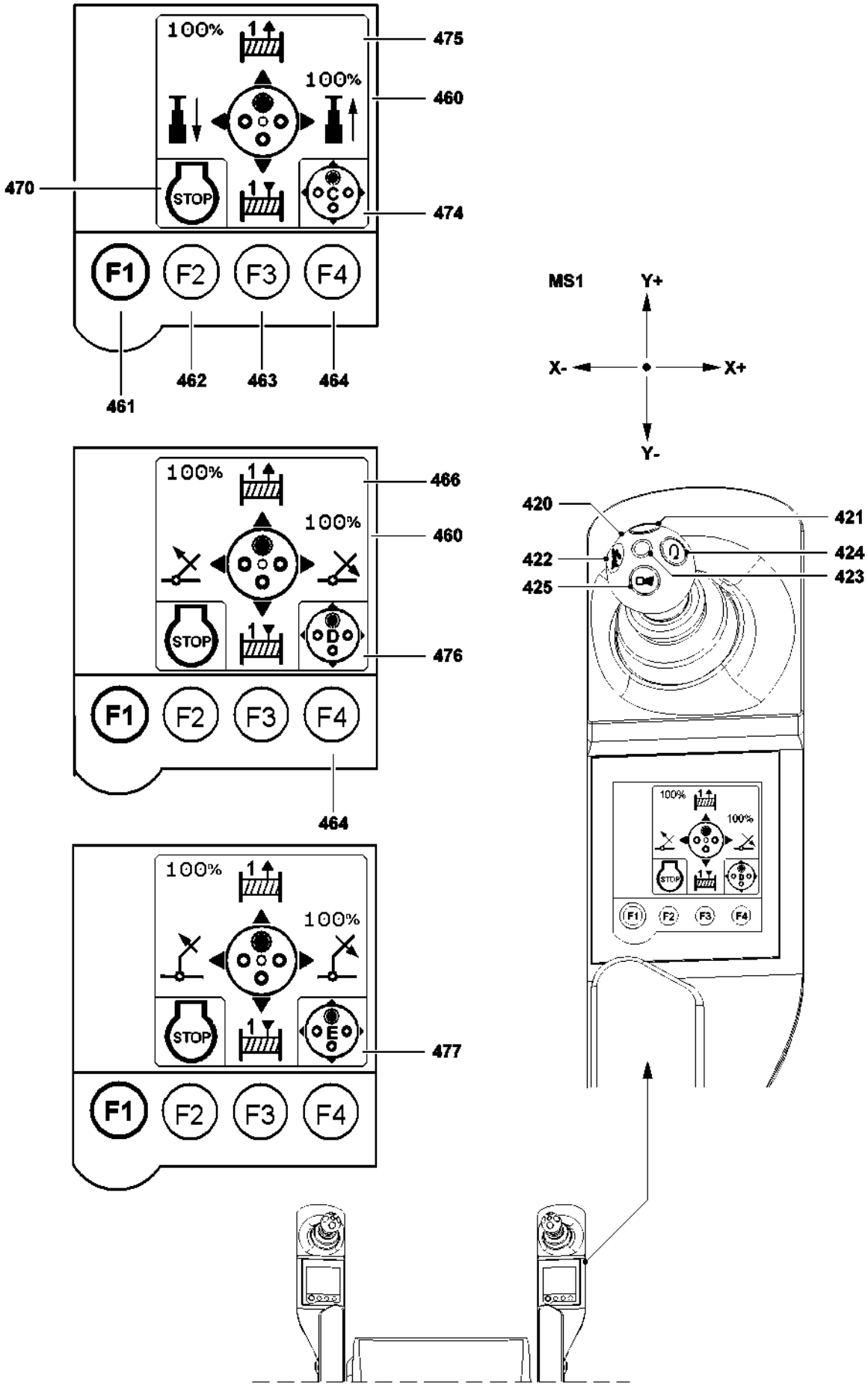

Fig.112194

Note

- ▶ To switch between the master switch configurations for one and two winch devices, press function key „F4“ **464** for longer than 3 s (continuous actuation) in the „Driving mode and master switch configuration“ menu on the right touch display.
- ▶ When the changeover has taken place, a short acoustic signal is heard.

Right master switch assignment

420 Master switch - right (MS 1)

Hoist gear 1:
- Move the master switch **420** in direction Y+ (forward): Winch 1 spools out and the load is lowered.
- Move the master switch **420** in direction Y- (backward): Winch 1 spools up and the load is raised.

Telescoping gear: Master switch assignment „C“ **474** is active:
- Move the master switch **420** in direction X+ (toward the right): Telescope the telescopic boom out.
- Move the master switch **420** in direction X- (toward the left): Telescope the telescopic boom in.

Luffing gear - telescopic boom: Master switch assignment „D“ **476** is active:
- Move the master switch **420** in direction X+ (toward the right): Luff the telescopic boom down.
- Move the master switch **420** in direction X- (toward the left): Luff the telescopic boom up.

Luffing the auxiliary boom*: Master switch assignment „E“ **477** is active:
- Move the master switch **420** in direction X+ (toward the right): Luff the auxiliary boom down.
- Move the master switch **420** in direction X- (toward the left): Luff the auxiliary boom up.

421 Button
- Bypass of seat contact button. **Or** if the seat contact button is actuated: Activation of vibration sensor **423**.

422 Button
- Adding rapid mode for the hoist gear(s) and luffing up

423 Vibration sensor
- Winch turn sensor, (vibrator) winch 1

424 Button
- Lock of engine regulation of superstructure engine
  Note:
  Pressing the button **424** will lock the engine regulation in the current position.

425 Button
- Horn

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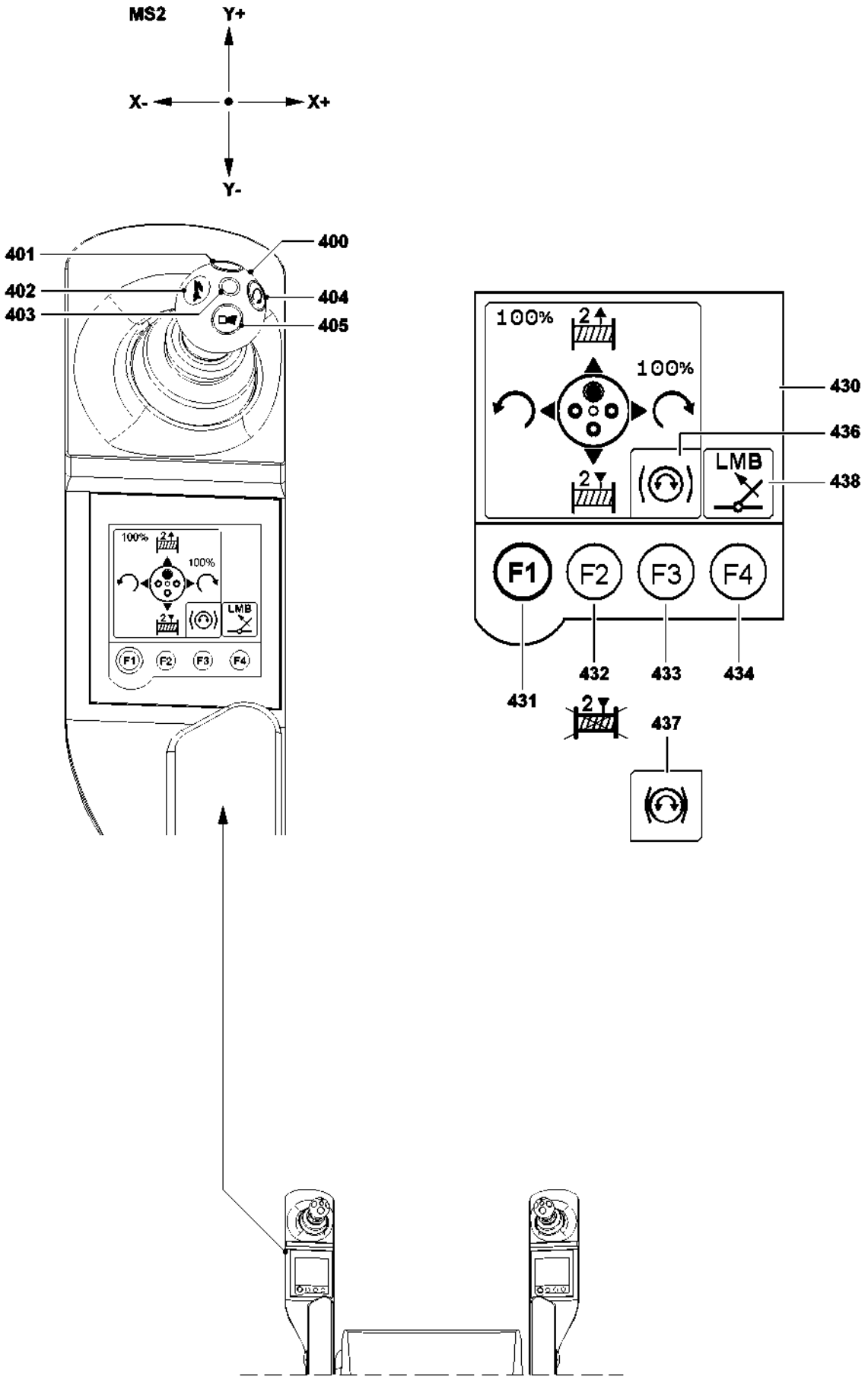

Fig.103964

3.3.2 The „Master switch configuration“ menu (left touch display)

The function key line

431 Function key F1
- Change to next menu

432 Function key F2
- Winch changeover - Winch 2
  Activate / deactivate the winch
  Conditions:
  Neutral position master switch 2 **400** (MS2) right.
  Crane driving speed = 0 km/h
  Danger of accident!
  Never activate / deactivate winch 2 while a crane movement is being actuated.
  Note:
  The winch status (winch activated / deactivated) can be seen on the touch display.
  Driving direction icon N **467**: Neutral position is selected.

433 Function key F3
- Open / close slewing gear brake (with freely rotating slewing gear)
  - **436** Slewing gear brake released
  - **437** Slewing gear brake applied

434 Function key F4 (touching)
- Exceeding the overload protection (icon **438**), used to luff in with suspended load
  Danger:
  The exceedance may only be carried out if the overload was caused by luffing down at freely suspended load and the crane operator is absolutely certain that luffing up the load will take it out of the overload range.

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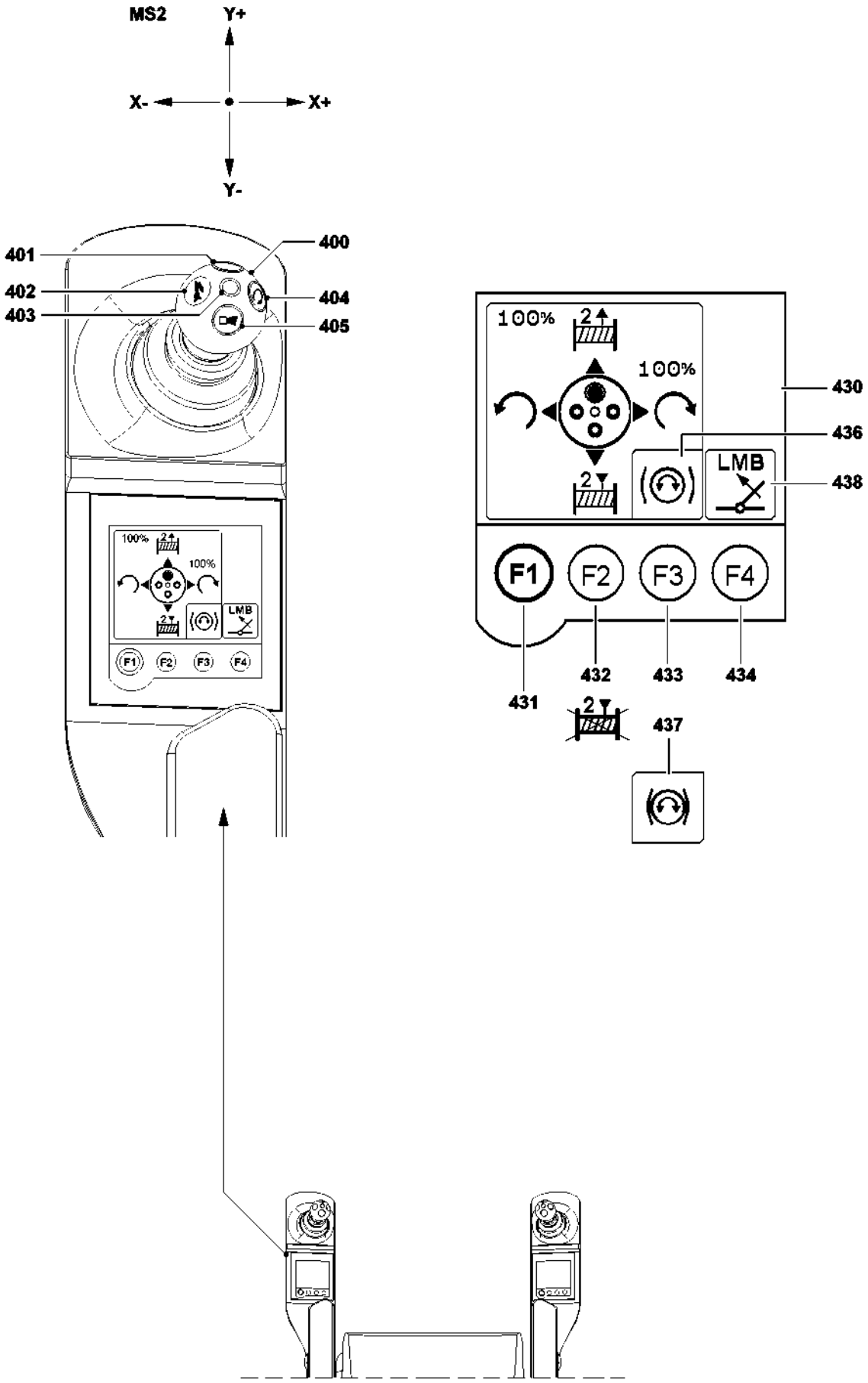

Fig.103964

Left master switch assignment:

400 Master switch left (MS 2)

Hoist gear 2:
- Move the master switch **400** in direction Y+ (forward): Winch 2 spools out and the load is lowered.
- Move the master switch **400** in direction Y- (backward): Winch 2 spools up and the load is raised.

Slewing gear:
- Move the master switch **400** in direction X+ (toward the right): Slewing gear turns to the right.
- Move the master switch **400** in direction X- (toward the left): Slewing gear turns to the left.

401 Button
- Bypass of seat contact button. **Or** if the seat contact button is actuated: Activation of vibration sensor **403**.

402 Button
- Addition of the rapid gear for winch(es) and luffing up

403 Vibration sensor
- Winch turn sensor, (vibrator) winch 1 or winch 2 **or** turn sensor, (vibrator) slewing gear

404 Button
- Lock of engine regulation of superstructure engine
  Note:
  Pressing the button **404** will lock the engine regulation in the current position.
  The idling speed can be increased up to the maximum rpm.
- Can be „overridden“ with the engine regulation (gas pedal)
- At continued actuation of the engine regulation (gas pedal), the current rpm is taken over
- By pressing the button **404** with the engine regulation (gas pedal) **not actuated**, the manual throttle is cancelled
- If the engine rpm is locked, the „dynamic engine rpm display“ (driving mode) and the „dynamic load utilization bar display“ (crane operation) contain a **„+“**

405 Button
- Horn

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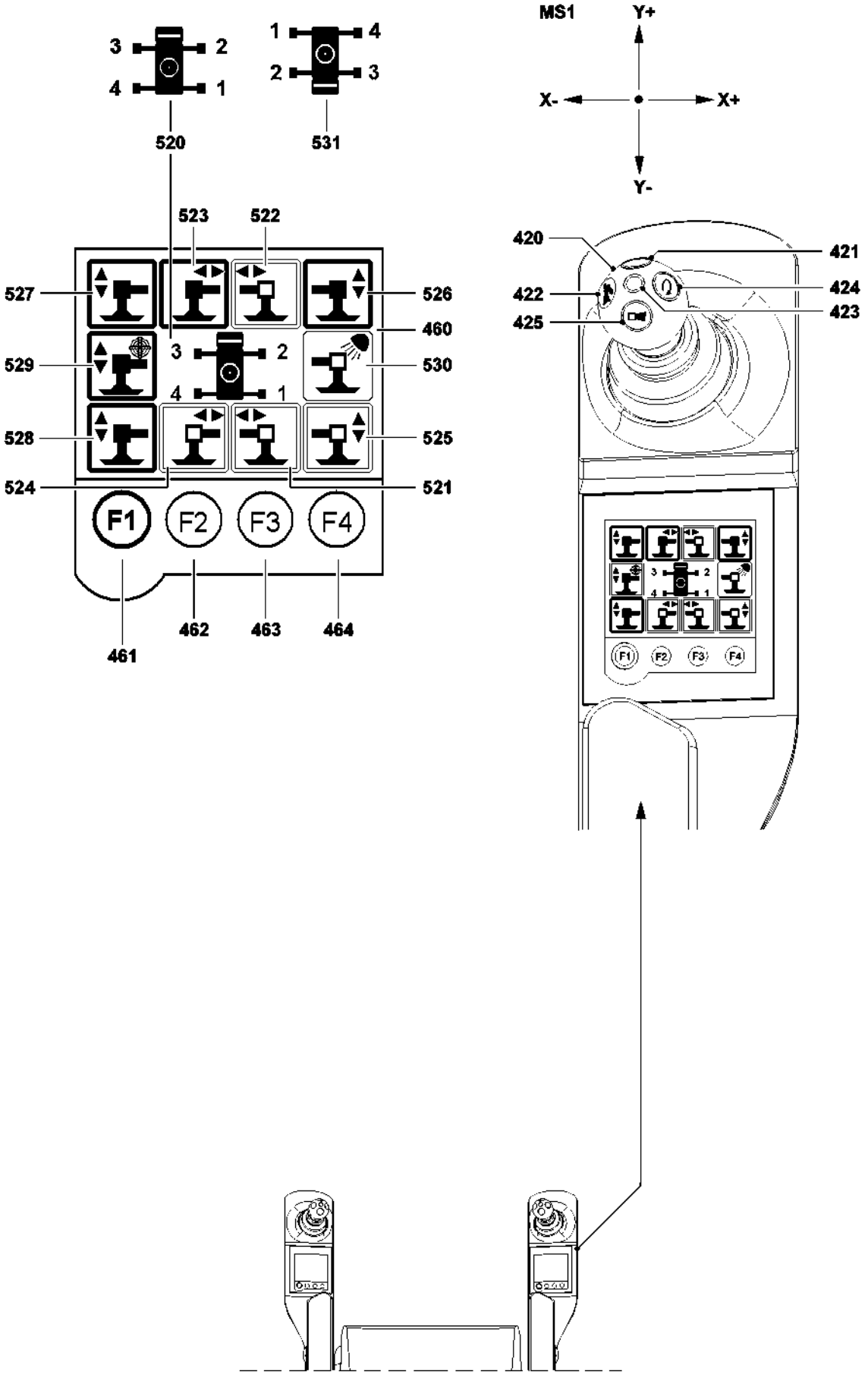

Fig.103967

3.4 The menus (operating functions)

3.4.1 The „Support / sliding beams“ menu (right touch display)

The function key line

461 Function key F1
- Change to next menu

462 Function key F2
- **No** function

463 Function key F3
- **No** function

464 Function key F4
- Sliding beam illumination ON / OFF (icon **530**)

Touch functions in the support / sliding beams menu

521 Sliding beam
- Select sliding beam

522 Sliding beam
- Select sliding beam

523 Sliding beam
- Select sliding beam

524 Sliding beam
- Select sliding beam

525 Support cylinder
- Select support

526 Support cylinder
- Select support

527 Support cylinder
- Select support

528 Support cylinder
- Select support

529 Automatic support
- Select automatic mode

Note

Pay attention to sliding beam and support cylinder assignments!

▶ The sliding beam / support cylinder assignment on the touch display depends on the operating direction of the crane in the „Support / sliding beams“ menu. If the working direction of the crane is changed from working direction „to the front“ **520** to working direction „to the rear“ **531** - or vice versa - by rotating the turntable, then the sliding beam / support cylinder assignment on the touch display changes accordingly. The sliding beam „extend / retract“ movements (X+ / X-), which are actuated with the master switch, are reversed if the working direction changes.

Sliding beams

For safety reasons, only **one** sliding beam at once can be selected on the touch display („touch“) and „extended / retracted“ using the master switch (MS1).

Note

▶ The extension / retraction of the sliding beams is „coupled“ to the X+ and X- deflection direction of master switch 1 **420** (MS1), right.

The selected sliding beam can be extended or retracted by pressing the button **421** (seat contact bypass) and then moving the right master switch 1 **420** (MS1) in the X+ or X- direction.

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Note
If the master switch is moved from X+ or X- to Y+ or Y- when a sliding beam is being retracted or extended, the current sliding beam movement is stopped.

- ▶ Move the right master switch 1 **420** (MS1) to the neutral position.
- ▶ Now you can extend / retract the sliding beam to the required position using the master switch.

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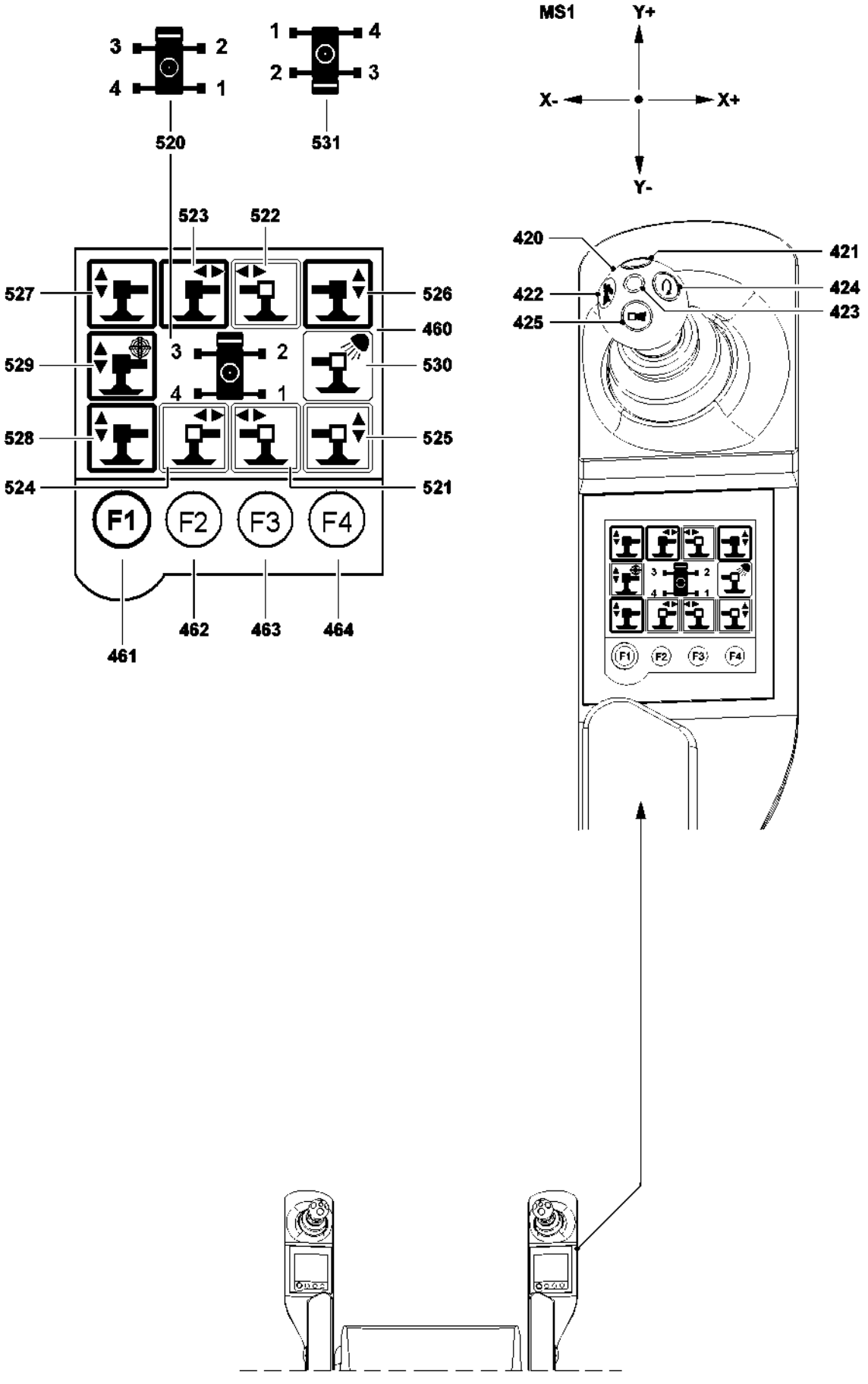

Fig.103967

Support cylinder

The crane driver can select between manual support and automatic support in the „Support / sliding beams“ menu. The crane driver can also control the extending / retracting speed of the support cylinder using the master switch.

Two extension / retraction speeds of the support cylinder are available:

Master switch deflection < 80 % = slow

Master switch deflection ≥ 80 % = fast

The selected support cylinder can be extended or retracted by pressing the button **421** (seat contact bypass) and simultaneously moving the right master switch 1 **420** (MS1) in the Y+ or Y- direction.

Note

If the master switch deflection is changed from Y+ or Y- to X+ or X- when the selected support cylinders are being retracted or extended, the current movement is shut off.

- ▶ Move the right master switch 1 **420** (MS1) to the neutral position.
- ▶ Now you can extend / retract the support cylinder to the required position using the master switch.

Supporting manually

0 - 4 supports can be selected on the touch display („touch“) simultaneously and „extended / retracted“ via the master switch (MS1). When a support cylinder is selected, the automatic support **529** selection is cancelled.

Note

- ▶ The extension / retraction of the support cylinder is „coupled“ to the Y+ and Y- deflection direction of master switch 1 **420** (MS1), right.

Moving the master switch in direction Y+ causes the selected support cylinder(s) to extend.

Moving the master switch in direction Y- causes the selected support cylinder(s) to retract.

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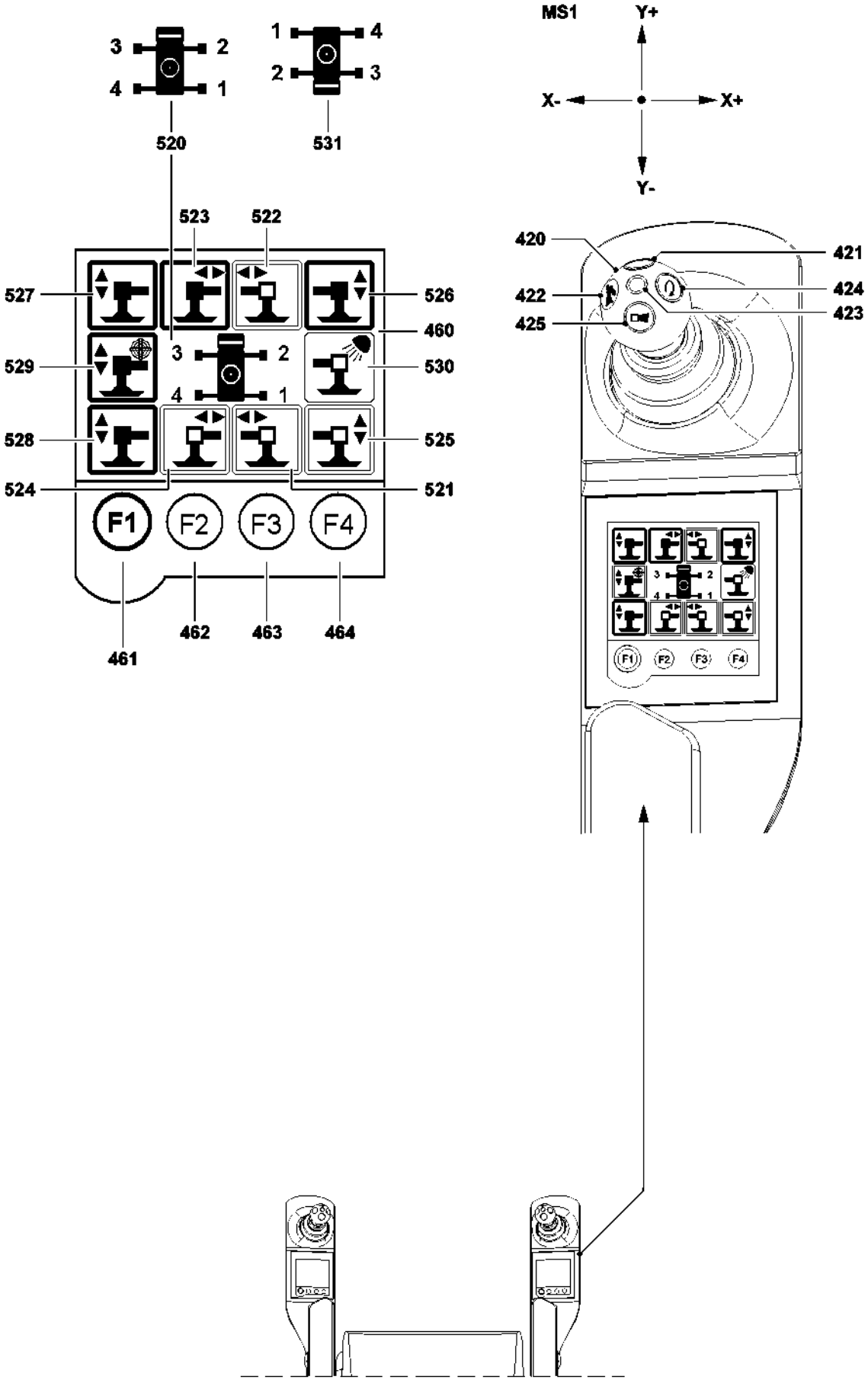

Fig.103967

Automatic support

By selecting („touch“) the automatic support **529** cancels all manual support function selections.

Note

- ▶ The extension / retraction of the support cylinder is „coupled“ to the Y+ and Y- deflection direction of master switch 1 **420** (MS1), right.
- ▶ Moving the MS1 in direction Y+ levels the crane by extending the support cylinders.
- ▶ Moving the MS1 in direction Y- levels the crane by retracting the support cylinders.

If the automatic support **529** has been selected, the support function is carried out via the master switch deflection. The automatic support function automatically levels the crane during the support procedure.

Sliding beam illumination

When a function is activated for the first time in the „Support / sliding beams“ menu, the sliding beam illumination automatically turns itself on.

The sliding beam illumination **530** remains turned on until:

- The crane reaches a driving speed of more than 3 km/h.
- The sliding beam illumination is manually turned off with the function key F4 **464**.
- The engine is stopped.

Note

- ▶ If the sliding beam illumination has been turned off with the function key F4 **464**, the automatic turn-on function is not reactivated until the **F4** key has been pressed again or the crane and the LIC-CON computer system has been restarted using „Ignition ON“.

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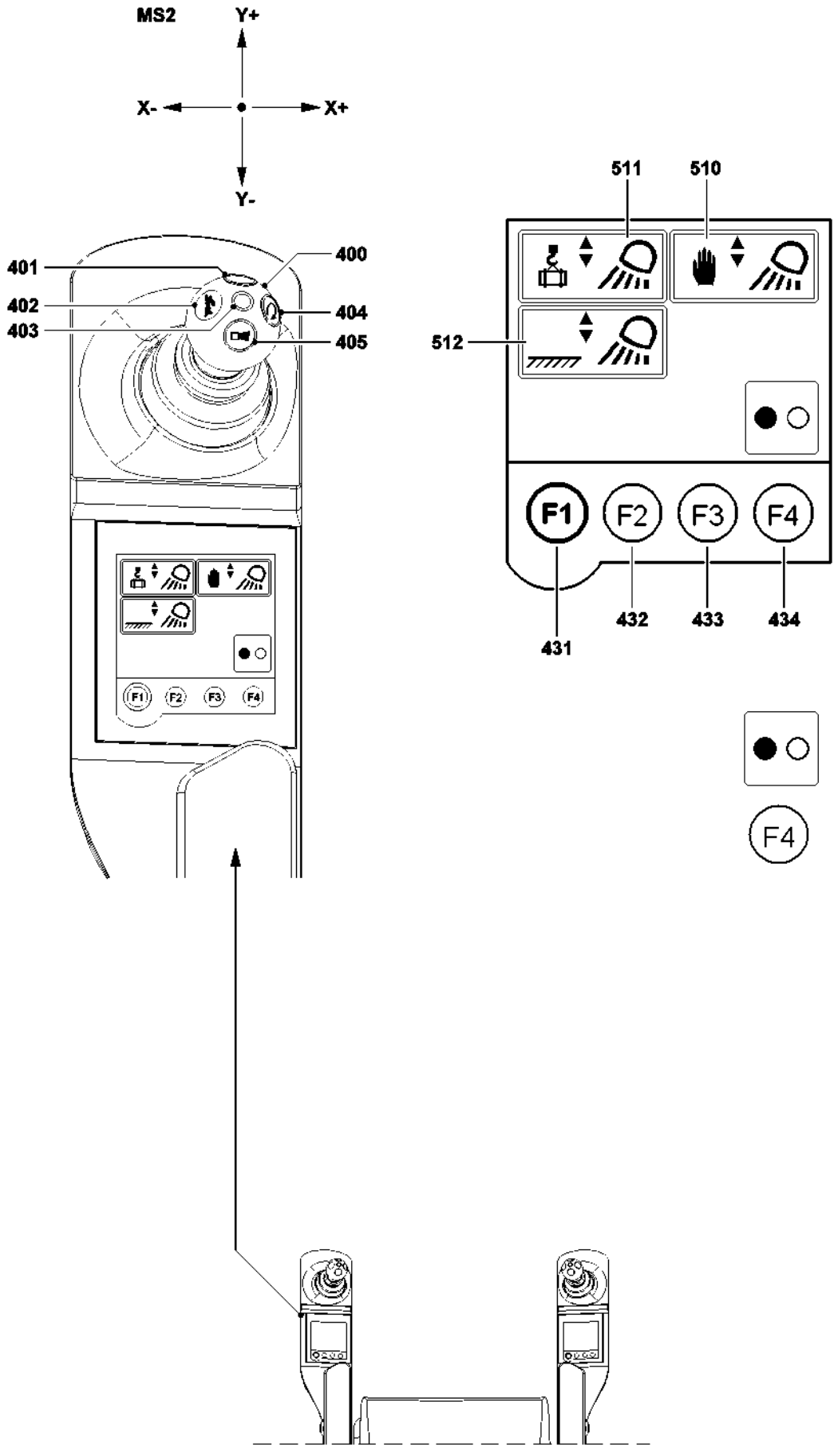

Fig.103969

3.4.2 The „Working floodlight“* menu (left touch display)

In the „Working floodlight“***** menu the crane operator has the opportunity to manually align the working floodlight to suit the current load or the planned working range. In crane operation, the previously aligned working floodlight changes its position according to the movement direction of the load (load-following) or the working range (fixed to working range).

Note

- ▶ The Working floodlight menu***** is only available if the floodlight is installed and connected.
- ▶ „Touching“ the desired floodlight function does not directly activate this function, instead it only **selects the function**.
- ▶ Only if a floodlight function has been selected, can function key F4 **434** be used to turn it on or off.

The function key line

431 Function key F1
- Change to next menu

432 Function key F2
- **No** function

433 Function key F3
- **No** function

434 Function key F4
- Working floodlight ON / OFF

Touch functions in the Working floodlight menu*

510 Working floodlights
- Select „Manually“

511 Working floodlights
- Select „Load following“

512 Working floodlights
- Select „Fixed to working range“

Note

- ▶ Before the required operating mode of the working floodlight is selected, the „starting position“ of the working floodlight must be manually selected in „Working floodlight manual“ operating mode by moving the Master switch 2 **400** (MS2) left in direction Y+ or Y-.

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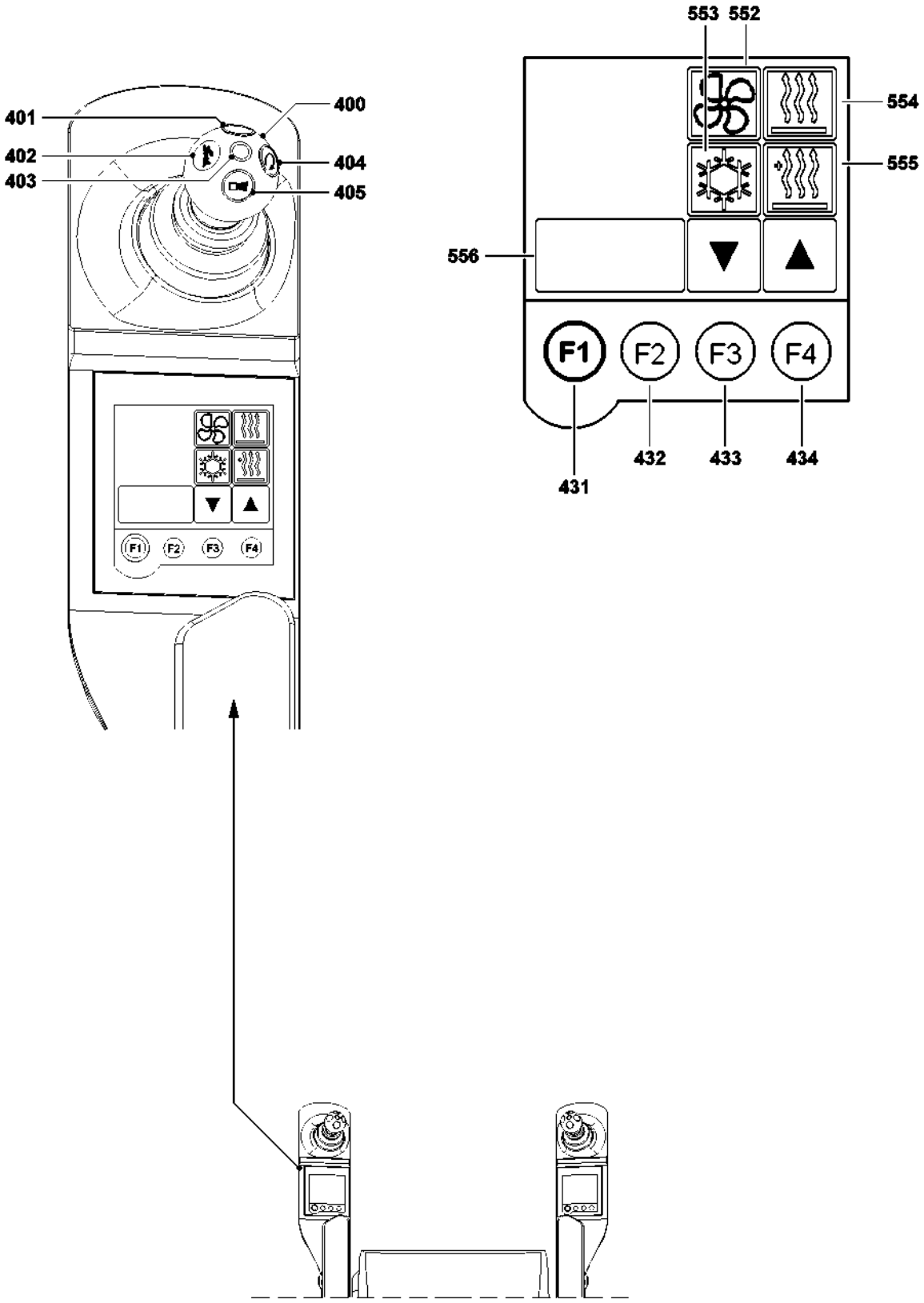

Fig.108674

3.4.3 The „Climate control settings“ menu (left touch display)

In the „Climate control settings“ menu the crane driver has the opportunity to make any heater, air conditioning and ventilation settings.

The function key line

431 Function key F1
- Change to next menu

432 Function key F2
- Automatic climate control „ON“ / „OFF“
- **Note:**
  The **automatic** climate control can only be turned on if the Climate control system **553** has been selected.

433 Function key F3
- „Minus“ - reduce stage / temperature or turn „OFF“

434 Function key F4
- „Plus“ - increase stage / temperature or turn „ON“

Touch functions in the Climate control settings menu

Note
Note
▶ „Touching“ a function in the „Climate control settings“ menu causes a black border to appear around the relevant icon (function selection) and at the same time the current setting, the selected level or the on / off status („ON“ / „OFF“) for a function is displayed in the Status display **556**.
▶ Only one function at a time can be selected or edited in the „Climate control settings“ menu.

552 Fan / blower
- Function selection

553 Climate control system
- Function selection

554 Heater
- Function selection

555 Auxiliary heater
- Function selection

556 Status display
- Display function

The status display **556** shows the following, depending on the selected function:
- The adjustment ratios for air distribution.
- The constant heater stage setting in manual heating mode.
- The temperature setting in AUTOmatic heating mode.
- Climate control system „ON“.
- Climate control system „OFF“.
- The programming display for auxiliary heater.

Note
▶ Refer to the chapter 6.01 of the crane operating instructions for a detailed description of the heater / air conditioning and ventilation settings!

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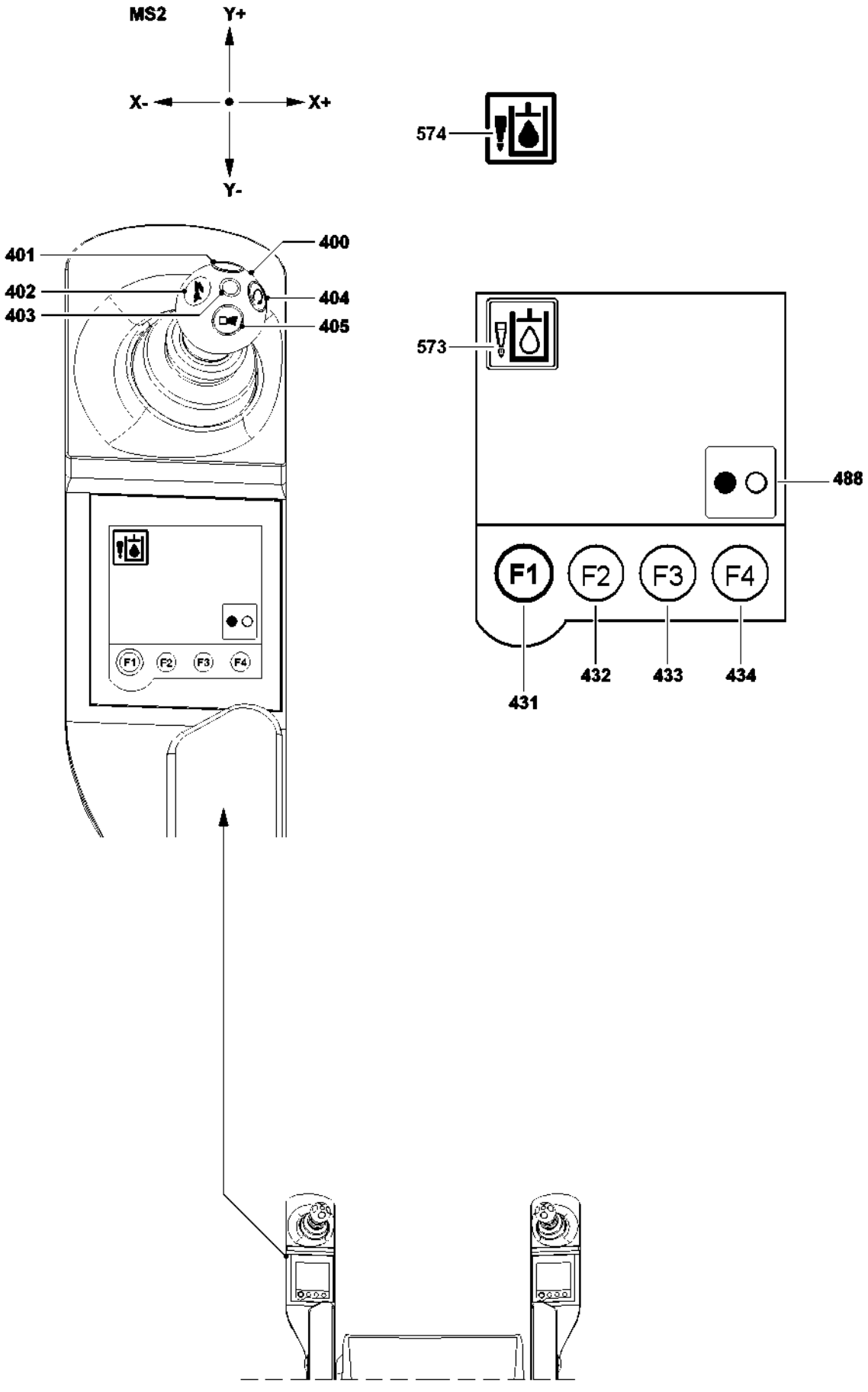

Fig.108197

3.4.4 The „oil preheating“ menu (left touch display)

The function key line

431 Function key F1
- Change to next menu

462 Function key F2
- **No** function

463 Function key F3
- **No** function

434 Function key F4
- Changeover ON / OFF of the selected touch function Hydraulic oil preheating

Touch functions in the Steering / warning lights menu*

573 Hydraulic oil preheating
- Select hydraulic oil preheating „OFF“

574 Hydraulic oil preheating
- Select hydraulic oil preheating „ON“
  Hydraulic oil preheating is turned on

488 Changeover ON / OFF
- Changeover ON / OFF is made by pressing **F4**.
  Can only be applied to the selected or preselected function „Hydraulic oil preheating“
  .

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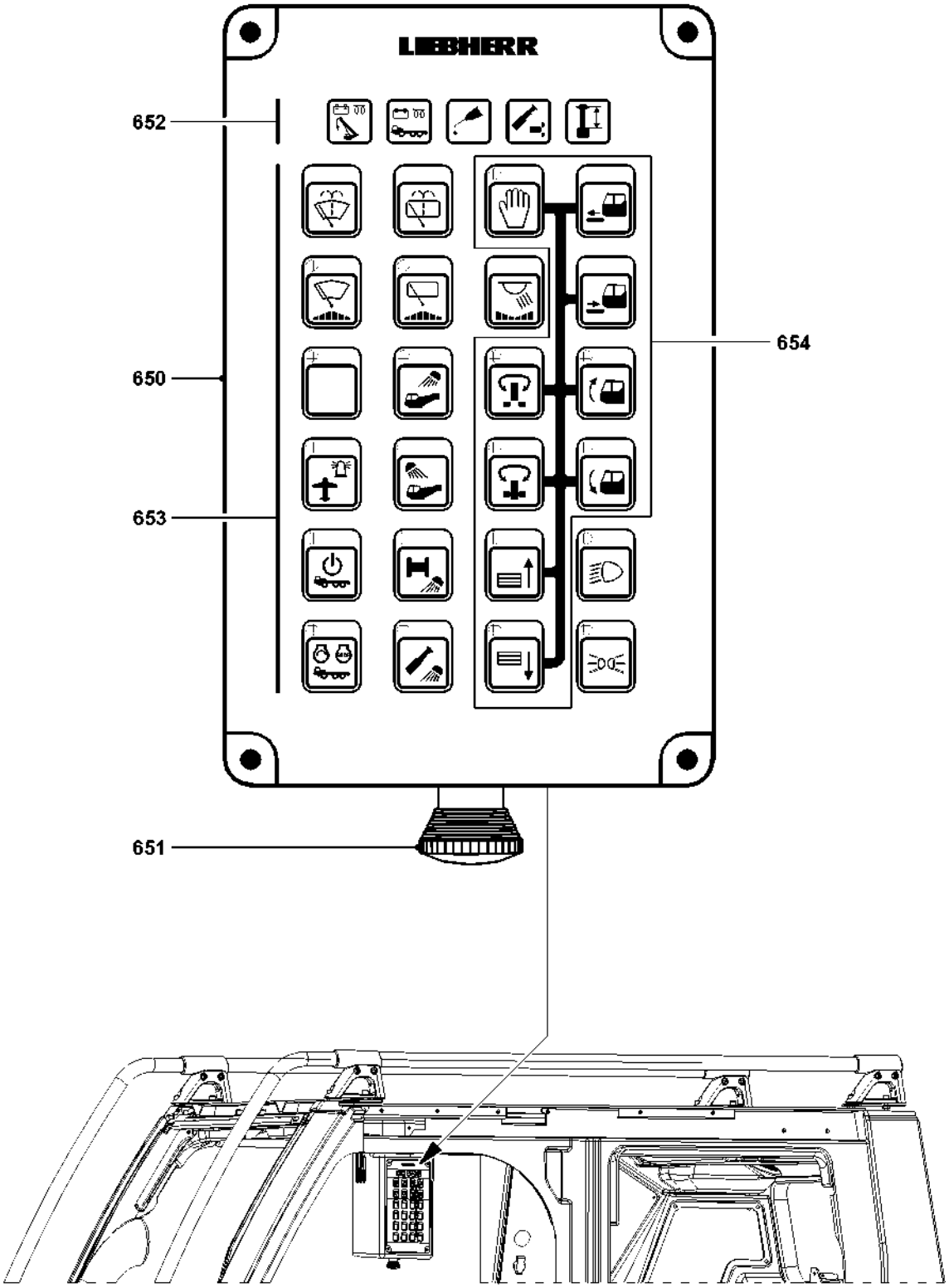

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Fig.103926

4 Operating elements on the operating and control unit (BKE)

4.1 Operating console

Note
▶ The indicator lights as well as the operating keys are described in detail in the following sections.

650 Operating console
- Housing with indicator lights and keys

651 EMERGENCY OFF switch*****
- Impact switch

652 Indicator lights on the BKE

653 Operating keys on the BKE
- Standard assignment

654 Operating keys on the BKE for release control
- Standard assignment

4.2 Indicator lights on the BKE „652“

Position	Indicator light	LED condition	Description
660	 Engine monitoring superstructure	Yellow	Engine preheat active
		Yellow blinking (slow)	Engine ready to start
		Yellow blinking (fast)	Engine preheating Error / problem
		Off	Engine is running (after engine has been started)
		Red	Engine is running, alternator does not charge
661	 Engine monitoring chassis	Yellow	Engine preheat active
		Yellow blinking (slow)	Engine ready to start
		Yellow blinking (fast)	Engine preheating Error / problem
		Off	Engine is running (after engine has been started)
		Red	Engine is running, alternator does not charge
662	 Central lubrication system	Yellow + red (orange)	Functional readiness (is shown after engine start for 1.5 s)
		Yellow	Lubrication active
		Red	Error / problem
		Off	Central lubrication not active
663	 Pinning tele / cylinder	Yellow	Unpin cylinder
		Green	Tele unpinned
664		Yellow	Gripper in position

Position	Indicator light	LED condition	Description
	Cylinder in position		

4.3 Operating keys on the BKE „653“

Note

▶ With the LEDs in the operating keys, the operating conditions and problems can be recognized quickly and reliably by the crane driver.

Position	Button	Function	LED	Description
670	 Windshield washer system „Front“	„On“	–	Clean the window: By pressing and holding the button „Front“ or „Roof“.
			Note:	After releasing the button „Front“ or „Roof“, three additional wipe movements are carried out before the wiper blades return to their original position.
671	 Windshield washer system „Roof“	„Off“	–	By releasing the button „Front“ or „Roof“
672	 Windshield wiper „Front“		**Note:**	There are three different wipe stages.
				1. Wiper „On“: Continuous operation. 2. Intermittent 1: Wipe with long pauses. 3. Intermittent 2: Wipe with short pauses. 4. Wiper „Off“
673	 Windshield wiper „Roof“			Every time the button „Front“ or „Roof“ is pressed, the wipe stages change incrementally
		„On“	Lights up	By pressing the button „Front“ or „Roof“
		„Off“	Off	By pressing the button „Front“ or „Roof“ longer than one second until a „beep“ sounds **or** By pressing the button „Front“ or „Roof“ until the LED is off **or** Ignition „Off“
674			**Note**:	The interior lighting can also be turned on when the ignition is „off“, by pressing the button longer than 1 s.

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Position	Button	Function	LED	Description
	Interior light cab	„On“ (100 %)	–	By opening the door **or** By pressing the button
		Dim	–	There are three different dimmer stages: 1. 75 % 2. 50 % 3. 25 % 4. „Interior lighting Off“ When the interior light is turned on: Each time the button is pressed, the brightness is reduced incrementally.
		„Off“	–	By pressing the button for longer than one second **or** By pressing the button until the light turns „Off“ **or** If the following conditions are present simultaneously for longer than 30 s: - The driver's seat is not occupied. - The door is closed. - The engine is „off“.
679	 Airplane warning			**Note**: The airplane warning can also be actuated when the ignition is „Off“, by pressing the button longer than 1 s.
		„Off“	Off	By pressing the button
		„On“	Lights up	By pressing the button
		„On“	Blinks	Error / problem
680	 Ignition chassis	„Off“	Off	By pressing the button
		„On“	Lights up	By pressing the button
		„On“	Blinks	Transmission error to chassis
681	 Start the engine in chassis	„Off“	Off	By pressing the button
		„On“	Lights up	By pressing the button
		„On“	Blinks	Error / problem
682		„Off“	Off	By pressing the button

Position	Button	Function	LED	Description
	Floodlight on front of turntable	„On“	Lights up	By pressing the button
		„On“	Blinks	Error / problem
683	 Floodlight on rear of turntable	„Off“	Off	By pressing the button
		„On“	Lights up	By pressing the button
		„On“	Blinks	Error / problem
684	 Floodlight, winch	„Off“	Off	By pressing the button
		„On“	Lights up	By pressing the button
		„On“	Blinks	Error / problem
685	 Floodlight pivot section	„Off“	Off	By pressing the button
		„On“	Lights up	By pressing the button
		„On“	Blinks	Error / problem
686	 Low beam	„Off“	Off	By pressing the button
		„On“	Lights up	By pressing the button
		„On“	Blinks	Error / problem
687	 Parking lights	„Off“	Off	By pressing the button
		„On“	Lights up	By pressing the button
		„On“	Blinks	Error / problem

4.4 Operating keys on the BKE for release control „654“

Note

- ▶ The following functions require the activation of the „release button“.
- ▶ The „release button“ is active for 30 s. If an operating key is pressed during this time, the release time is reset to 30 s. The release stops after 30 s.
- ▶ A function is triggered by activation of the „release button“ and then pressing the corresponding operating key.
- ▶ For the listed key combinations, hold the corresponding operating key until the desired end position is reached.

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Position	Key combination	Function	LED	Description
675	 Release button		**Note**:	After pressing the release button, the functions, which require a release can be activated. The release is indicated by the green LED on the release button.
		„On“	Lights up	Press the release button
		„Off“	Off	By pressing the button **or** As long as no button is pressed, which requires a release: Automatically after 30 s.
675+676	 Extend the step	„On“		Activate „release key“ and press „Extend step“ key
675+677	 Retract the step	„On“		Activate „release key“ and press „Retract step“ key
675+688	 Unpin the turntable lock	„Off“	Off	Function inactive
		„On“	Blinks slowly	The unpinning procedure „runs“
		„On“	Blinks fast	Error / problem
		„On“	Lights up	The „top“ end position has been reached, an acoustic signal will sound when the end position is reached
675+689	 Pin the turntable lock	„Off“	Off	Function inactive
		„On“	Blinks slowly	The pinning procedure „is running“
		„On“	Blinks fast	Error / problem
		„On“	Lights up	The „bottom“ end position has been reached, an acoustic signal will sound when the end position is reached
675+690	 Raise the counterweight	„Off“	Off	Function inactive
		„On“	Blinks slowly	The counterweight is raised
		„On“	Blinks fast	Error / problem
		„On“	Lights up	The „top“ end position has been reached, an acoustic signal will sound when the end position is reached

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Position	Key combination	Function	LED	Description
675+691	 Lower the counter-weight	„Off“	Off	Function inactive
		„On“	Blinks slow-ly	The counterweight is lowered
		„On“	Blinks fast	Error / problem
		„On“	Lights up	The „bottom“ end position has been reached, an acoustic signal will sound when the end position is reached
675+692	 Raise the cab	„Off“	Off	Function inactive
		„On“	Blinks	Error / problem
		„On“	Lights up	The cab is raised
675+693	 Lower the cab	„Off“	Off	Function inactive
		„On“	Blinks	Error / problem
		„On“	Lights up	The cab is lowered

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Fig.197077

1 General

Note

▶ The monitor illustrations in this chapter are only examples. The display values in the individual icons and charts do not have to necessarily match the crane exactly. 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 cranes. In addition to the overload protection (Load moment limitation = **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
- „Telescoping“ program
- „Working range limitation“ program*****
- „Support force monitoring“ program*****

From the application programs you can switch directly into the settings window for „Speed reduction master switch“. See the section, settings window „Speed reduction master switch“.

The electrical and electronic components in the chassis and the superstructure are linked via data bus transmission technology (Liebherr System Bus = LSB).

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1

2

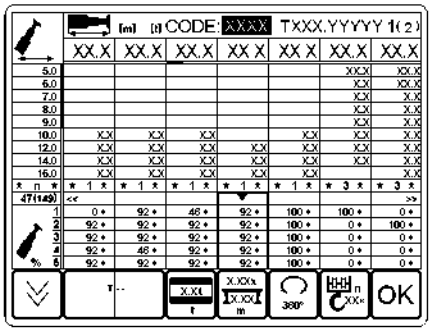

Fig.108835

1.1 Overload protection (load moment limiter)

The overload protection is carried out on the LICCON monitor. 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 luffing cylinder, which is measured by pressure sensors.

The **boom momentum** is calculated with data from the angle sensors (boom angle), the length sensors (boom length) and from crane data (boom weights) for the set operating mode.

The **boom radius** is calculated with data from the angle sensors (boom angle), the length sensors (boom length) and from geometry 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 crane configuration, for the set reeving and for the calculated radius, based on the load charts.

1.1.3 Comparison

The actual load and the „maximum load according to the loading chart and reeving“ are compared. When they approach the specified limit, an advance warning is issued. If this limit is exceeded, the overload stop is triggered and any crane movements which increase the load momentum are turned off.

2 LICCON computer system boot up

All the components of the LICCON computer system run through a self-test after turning the computer on.

During the self-test, the LICCON monitor displays the start screen, illustration **1**, and after a successful starting procedure, the configurations screen illustration **2**.

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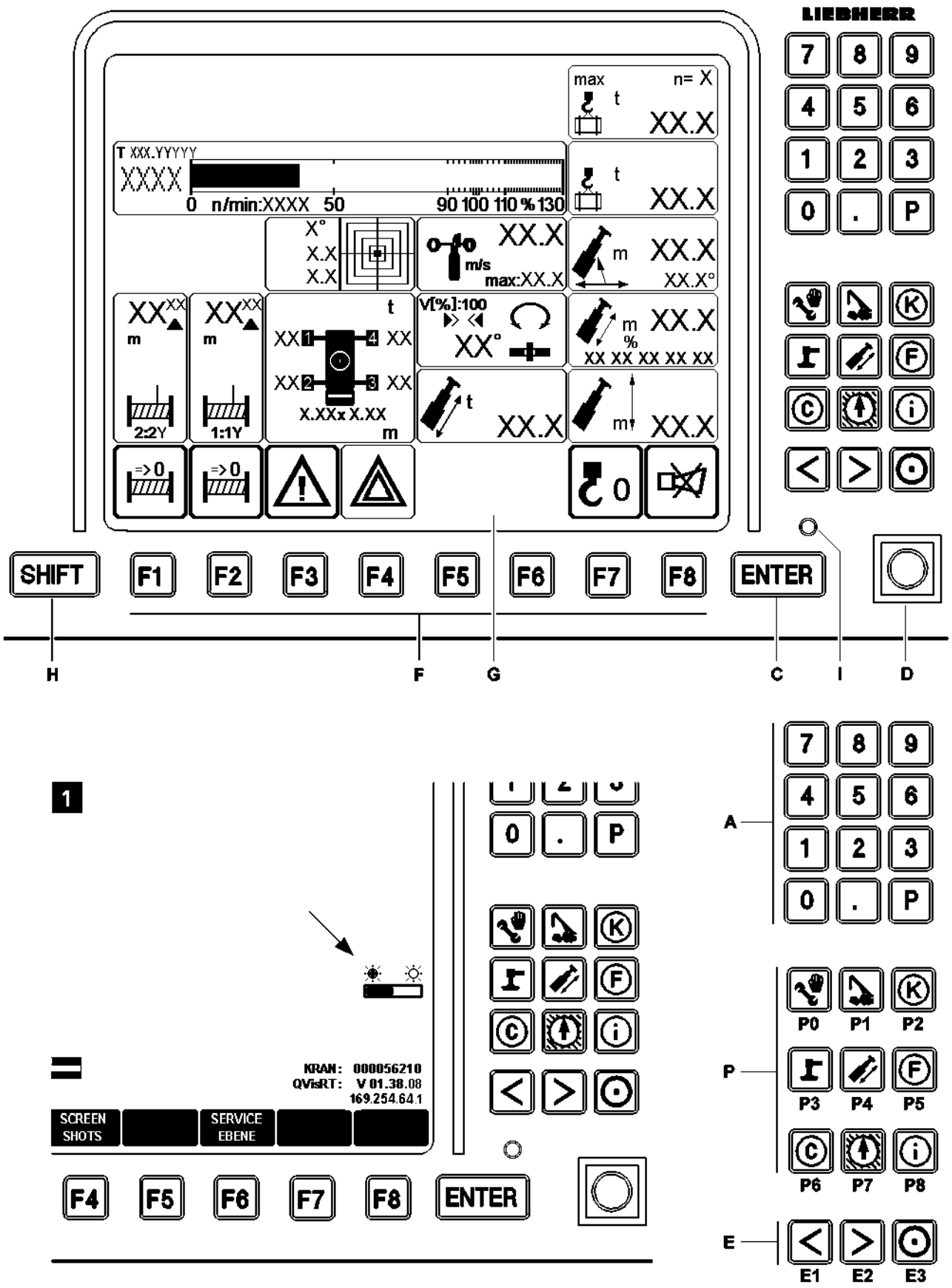

Fig.110274

3 Operating elements of the LICCON computer system

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 Numeric keypad

P Program keys
- Selection of the individual LICCON programs

P0 Set up

P1 Crane operation

P2 Not assigned
- Correction coefficients (LIEBHERR Service)

P3 Supporting force editor

P4 Telescoping

P5 Not assigned

P6 Not assigned

P7 Working range limitation*****

P8 Test system

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!

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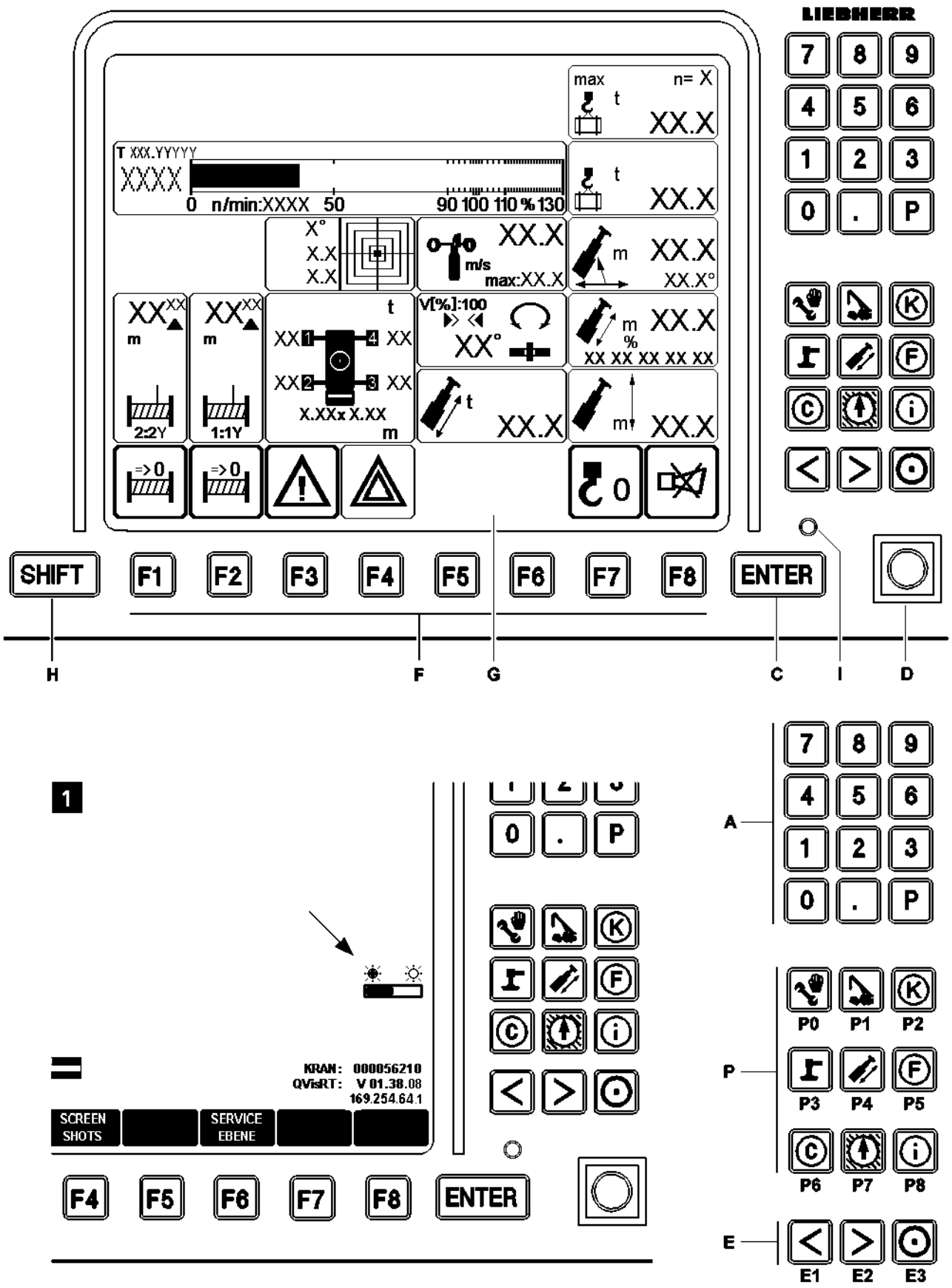

Fig.110274

E Special function keys
- Monitor brightness adjustment
- Press **E3** (hold down) and **E1**: 6-stage „night design“.
- Press **E3** (hold down) and **E2**: Brightness setting in 7 stages.
  The brightness adjustment can be made from all available programs (for example: Set up, Crane operation).
  Note:
  The LICCON monitor has an automatic brightness adjustment. The brightness of the LICCON monitor is automatically matched to the ambient light conditions. If the LICCON monitor is set to „medium brightness level“, then the regulating spectrum of the adjustment is optimally utilized. If the manual brightness setting of the LICCON monitor is on the „lowest“ or the „highest“ level, then the automatic brightness adjustment is **ineffective**. The current brightness setting of the LICCON monitor can only be checked in the „BSE Test system“, illustration **1** (arrow) (see chapter 20.10).
- 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 TFT display
- Display of the individual programs (example: „Crane operation“ program)

H „SHIFT“ key
- Second level key assignments, for example Supervisor function

I LED displays
- = Power supply for monitor available

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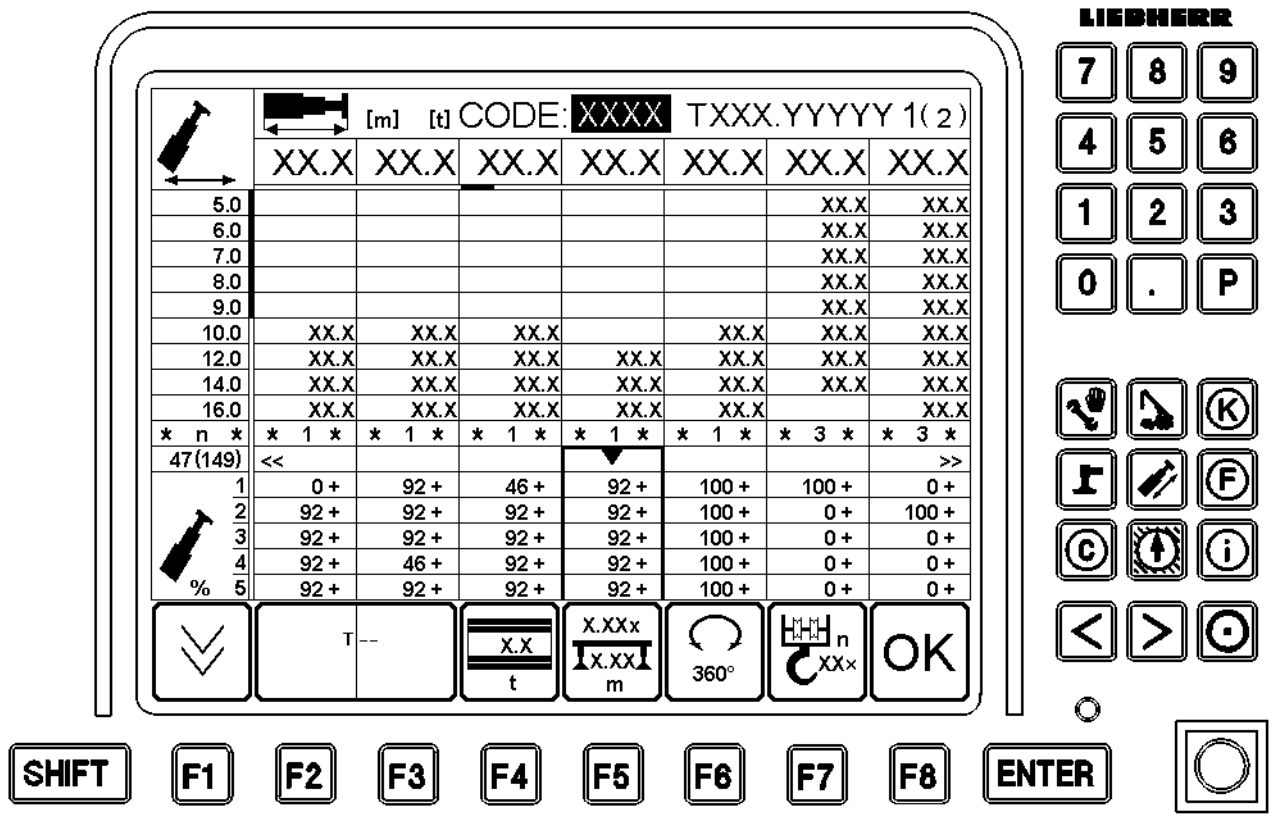

Fig.108829

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4 „Set up“ program

After turning the LICCON computer system on and correct completion of the boot up procedure, the „Configuration“ program appears automatically.

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, the first valid operating mode, the first valid set up configuration and reeving number „1“ appear in the set up screen.

You can see the programmed load charts in the „Set up“ program.

You can set the desired operating mode and the desired set up configuration for the crane in the „Set up“ program to be able to operate the crane.

4.1 Setting the operating mode and set up configuration

The crane operator can select the operating mode and the set up configuration using the function keys or by entering a short code.

4.1.1 Setting the operating mode and set up configuration via the function keys

The function keys are explained in the section „Function key line“ in this chapter.

▶ Select the respective function keys.
▶ Press the **Enter** key to confirm and accept the settings.

Result:

– The data of the selected load chart can be viewed.

4.1.2 Setting the operating mode and set up configuration with the short code

The function keys are explained in the section „Function key line“ in this chapter.

▶ Enter a short code using the keypad on the LICCON monitor.
▶ Press the **Enter** key to confirm and accept the settings.

Result:

– The data of the selected load chart can be viewed.

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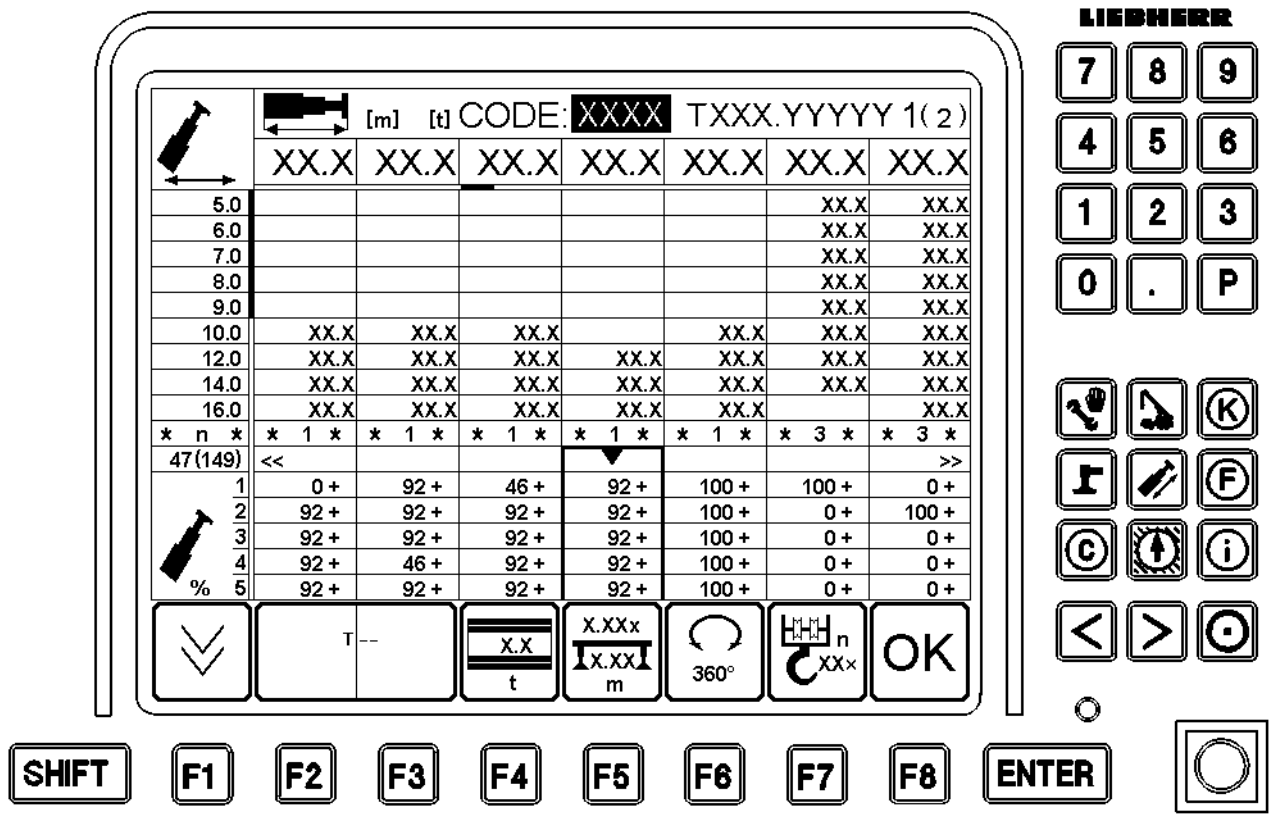

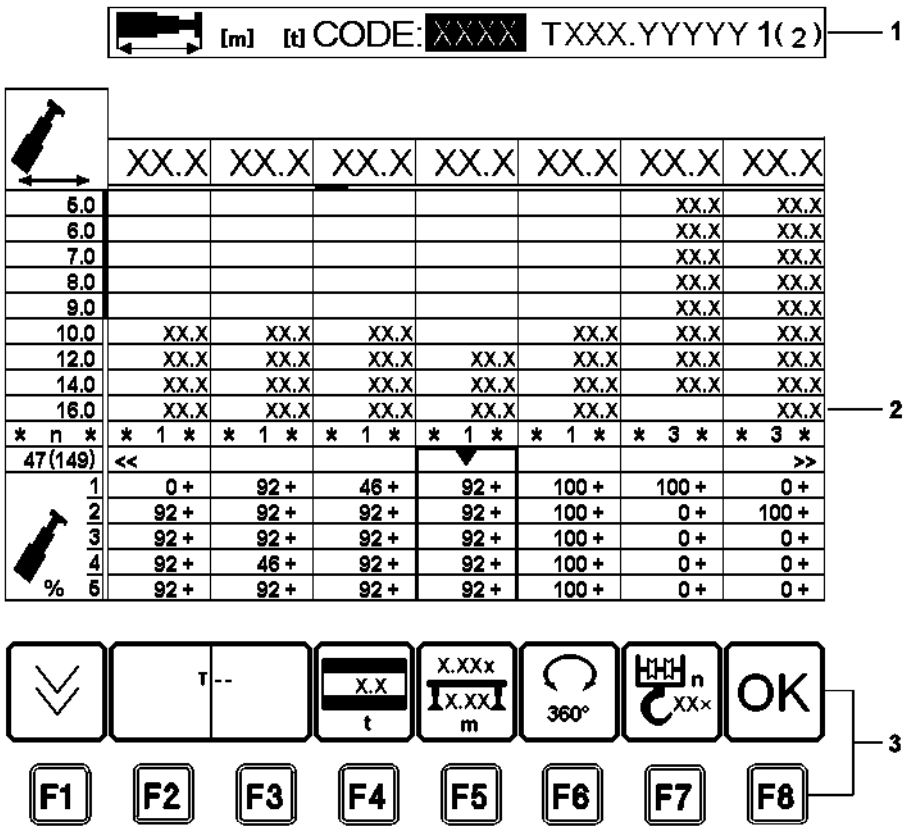

Fig.108837

4.2 „Set up“ program areas

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 (Set up)

Note
- ▶ The monitor illustrations in this chapter are only examples.
- ▶ The display values in the individual icons and charts do not have to necessarily match the crane exactly.
- ▶ The programmed load charts for the crane are binding.

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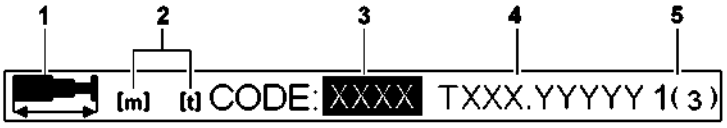

Fig.103988

4.2.1 General information line

1 „Telescopic boom length“ icon
- **Note:**
  The icon is identical for all operating modes.

2 Abbreviations
- For the programmed length units (LE) and weight units (GE)
  Possible length units are [m] and [ft]
  Possible weight units are [t] and [lbs]

3 4-digit short code
- Stands next to the word „CODE“
- Each short code uniquely identifies a crane 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.
- If, via the function key line:
  - An invalid set up configuration is selected, then the short code „0000“ is shown in white on red background.
  - An invalid set up configuration is selected, then the short code is shown in white on blue background. The values are entered into the load value field only after pressing the ENTER key.

4 Organization number
- For internal Liebherr load chart administration

5 Page number
- Relates to the currently displayed part of the load chart
- The total number of pages in this load chart is in parentheses

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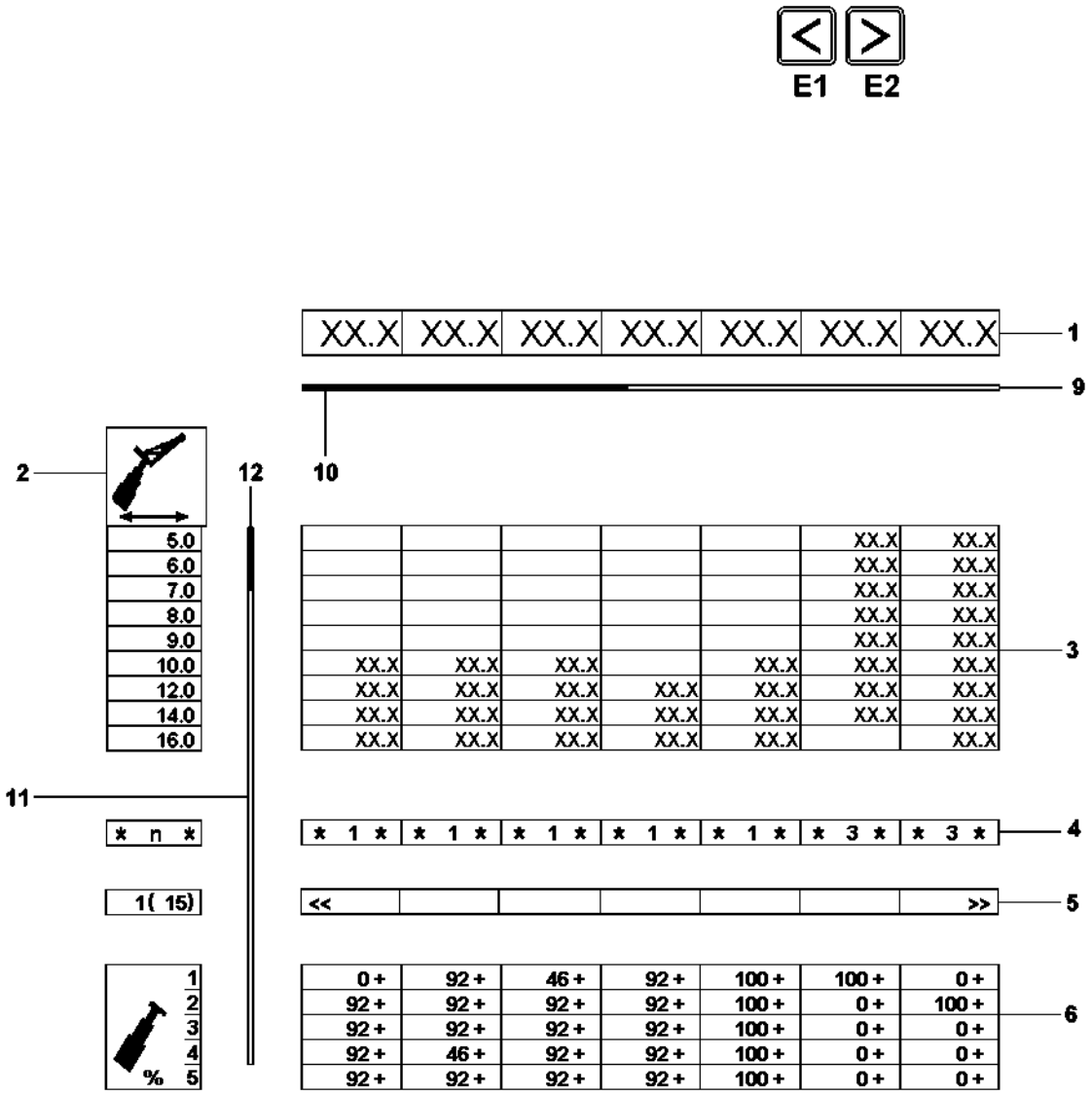

Fig.108838

4.2.2 Display area of load chart values

1 Telescopic boom lengths
- In [m] or [ft]
  Maximum of 7 columns per display page
- Displayed as the horizontal axis of the load value field

2 „Boom radius“ icon
- Operating mode dependent
- In [m] or [ft]
- Maximum 9 lines of radius values
- Displayed as the vertical axis of the load value field

3 Load value field
- Columns under the telescopic boom lengths and in the lines to the right of the radius values
- Load values depending on boom length and radius

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
  Note:
  If an exclamation mark („!“) is next to the reeving number, then an auxiliary device is required for at least for one load value in the column, see Crane operating instructions, chapter 4.06.

5 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, 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**.
  As supporting information, the currently selected column number and the number of columns in the chart are shown, for example, 1(15) corresponds to the first of 15 columns.
- **Note:**
  By pressing **E1** or **E2** twice in quick succession, you can „browse“ left or right by 7 load chart columns (equals the display area of the LICCON monitor).
  „SHIFT“ (hold down) + „E1“: Jump to first column in load chart.
  „SHIFT“ (hold down) + „E2“: Jump to last column in load chart.

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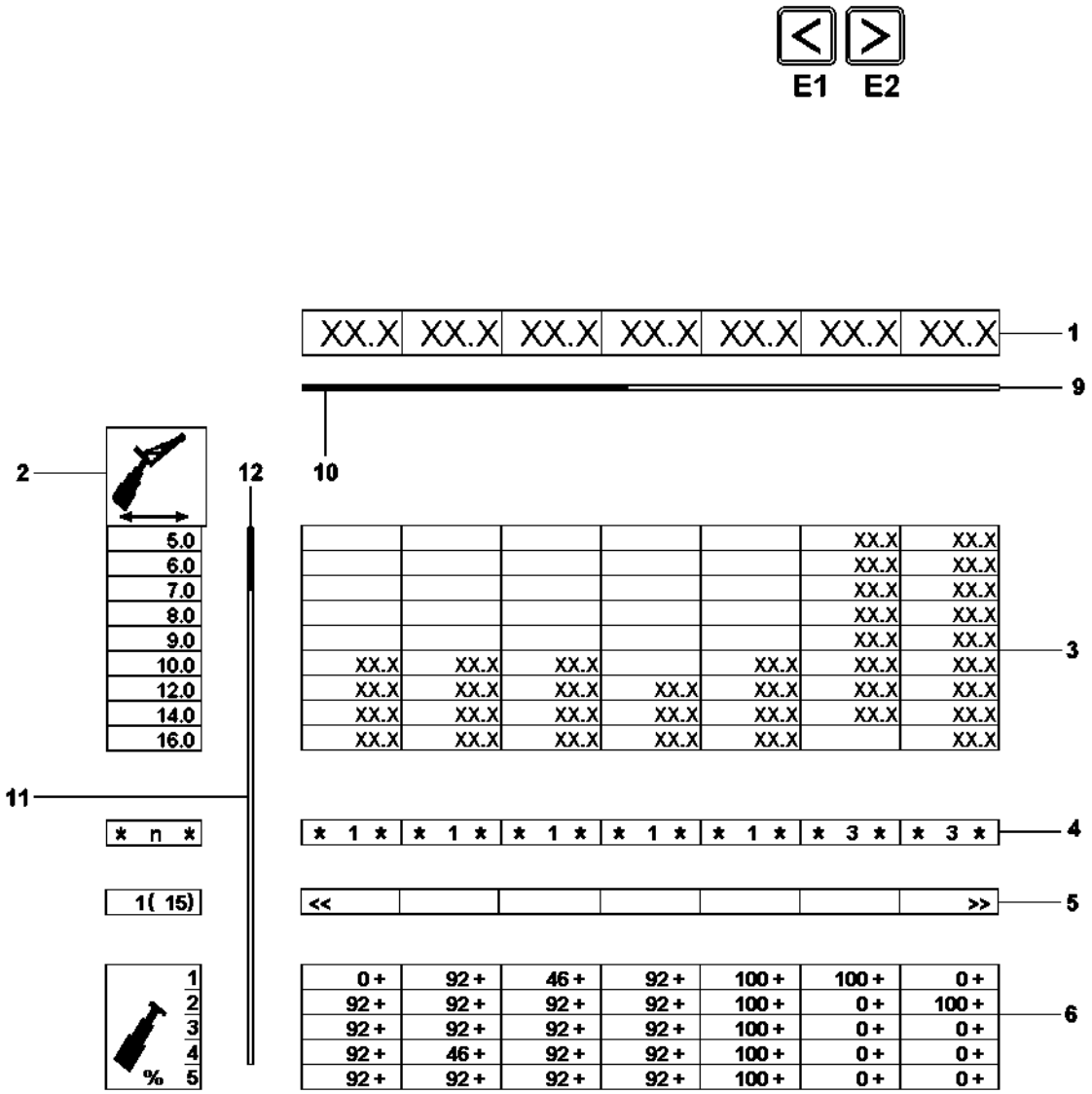

Fig.108838

6 Extension condition of telescopic sections
- In percent [%]
- The first column contains the „Boom length“ icon [%].
  Next to that are the lines for the extension condition of the telescopic sections. The number in the icon column describes the corresponding telescopic section (highest number = outermost telescopic section). The value in the boom length column displays the extension condition of the telescope in percentages, which must be maintained for the corresponding boom length.
  The status indicator „-“ next to the percentage extension status value means that the telescopic boom can be telescoped to the percentage extension condition value under load (according to the load chart).

9 Horizontal orientation display
- The „horizontal orientation display“ shows the crane driver by the display element **10** (color red), where he is in the load chart in a horizontal direction.
  Note:
  If the display element **10** in the „horizontal orientation display“ **9** is displayed on the left-hand edge, then it is in the first column of page 1 in the load chart of the set operating mode.

11 Vertical orientation display
- The „vertical orientation display“ shows the crane driver by the display element **12** (color red), where he is in the load chart in a vertical direction
  Note:
  If the display element **12** in the „vertical orientation display“ **11** is displayed at the top, then it is in the first row of the maximum number of available rows in the load chart of the set operating mode.

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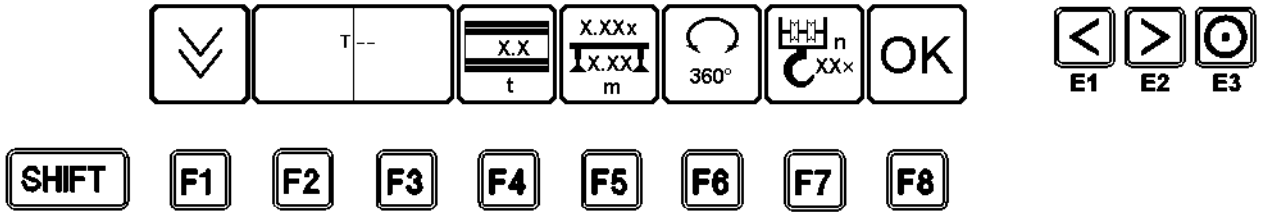

Fig.108839

4.2.3 The function key line (Set up)

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 crane 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.

Note

- ▶ By simultaneously actuating the special function key **E3** and the function key **F3**, it is possible to „switch“ by groups through the accessories. This allows quicker access to the operating mode required for crane application.
- ▶ See also description „**E3** and **F3**“, as well as „**E3** and **SHIFT** and **F3**“.

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.

SHIFT and **F1**
- Previous page of the load chart (page numbers in the „general information line“ are counted backwards 1 at a time)

F2 Main geometry status
- Options for setting the different main geometry conditions of the crane (if available). The types are described by abbreviations and length data in the icon.
- Example:
  T for **Telescopic boom**.

SHIFT and **F2**
- Previous main geometry status (if present)

F3 Accessories
- Options for selecting the different accessory geometry conditions of the crane (if available). The types are described using abbreviations, angle and length data in the icon.
- Example:
  TK for **Crane operation with mechanically adjustable folding jib**.
  or
  TNZK* for **Crane operation with a hydraulically adjustable folding jib / auxiliary boom (depending on crane type)**.
- **Note:**
  Pressing the function key **F2** and / or the function key **F3** deletes all operating mode and configuration dependent data from the monitor and sets the short code in the general information line to a new value. The „Code 0000“ is displayed in white on red background if the set configuration for function keys **F4**, **F5** and / or **F6** does not exist or has not been programmed. For the existing set up configuration, the short code, more than 0, appears in white on blue background.
- **Operating mode dependent data:**
  - Telescopic boom length icon for the general information line
  - Length units and weight units
  - Load chart organization number
  - Boom radius icon
  - Telescopic boom lengths
  - Telescopic boom length icon in area „Extension status of telescopic section in percentages [%]“
  - Extension condition of telescopic section with status indicator in percentages
- **Set up dependent data:**
  - Numbering of current page number and total number of pages in load chart

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- Radius values in length units
- Load values in weight units

SHIFT and **F3**
- Previous accessory geometry condition

E3 and **F3**
- Select the accessories in groups forward („K*****“, „HK*****“) by pressing key combination **E3** (hold down) and then pressing function key **F3**
  Note:
  The first accessory for the next accessory group it set.

E3 and **SHIFT** and **F3**
- Reverse select the accessories in groups („HK*****“, „K*****“) by pressing key combination **E3** and **SHIFT** (holding down both) and then pressing function key **F3**
  Note:
  The first accessory for the previous accessory group it set.

F4 Counterweight
- Adjustment option for the current counterweight, which must be on the superstructure in order to achieve the values in the current chart. When pressing a key, the following icon appears with additional text in the counterweight icon.

SHIFT and **F4**
- Previous counterweight

F5 Support base
- Adjustment option for support base. The supports must be extended and pinned to the dimensions shown in the icon in order to work with the current load chart.

SHIFT and **F5**
- Previous support base

F6 Slewing range - Superstructure
1. Adjustment option for slewing range
2. Example:
   - 360° slewing range: Unlimited rotation is possible.
   - 0° slewing range: Toward the rear (locked).

SHIFT and **F6**
- Previous slewing range

F7 Hoist rope reeving
- Option to set the number of hoist rope strands, which is reeved on the boom in order to reach a certain lifting capacity.
  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 for the respective operating mode. After that the counter restarts from a fixed 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.
  Note:
  For **crane types** with operating mode THKH, the hoist rope reeving is „0“ and cannot be edited.

SHIFT and **F7**
- Reduce the reeving number by 1

F8 Function key „OK“
- Accept the selected set up status and automatic change over to operating screen
  Prerequisites:
  The configuration mode setting must be completed, i.e. a valid short code is displayed and load capacity values are in the chart field.
  The external conditions for this configuration state, if specified, must be fulfilled (e.g. locking the superstructure).
  If the crane is equipped with sliding beam monitoring*****, the sliding beams must be extended to the support base specified in the selected load chart.

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If these preconditions are met, then the „O.K.“ key confirms that the chosen configuration state and the selected reeving are correct and transfers the parameters to the „Crane operation“ program.

Note:

Make sure that after switching to the operating screen, the selected set up configuration (short code) and the hoist rope reeving(s) have been accepted correctly.

If the active set up configuration is to be changed:

- The crane may not be utilized by more than 20 %, and the load suspended on the hook may not be heavier than 0.5 t.

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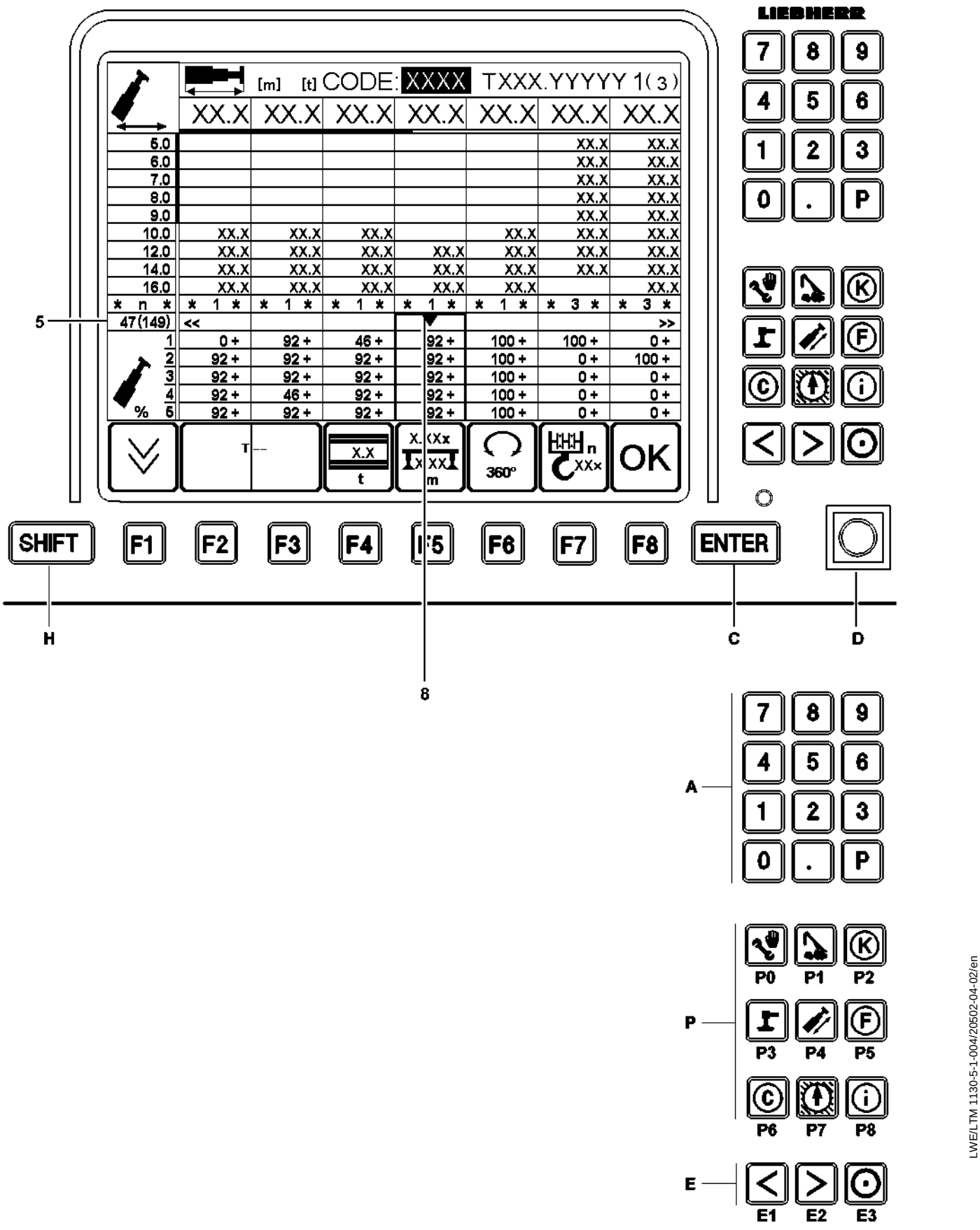

Fig.108840

4.2.4 Other operating elements

A Numeric keypad

- Pressing the keypad deletes all operating mode and set up configuration 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. During entry, the short code is displayed in „green“.

  The key **P** and the key **.** have no function in the „Set up“ program.

P Program keys

- Selection among the individual programs. The settings in the set up program are discarded and the set up configuration and reeving most recently confirmed with the **O.K.** key will continue 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 as well as for any change in the set up configuration via the function keys
- **ENTER** after entering the short code searches for the short code in the programmed load charts. If the relevant load chart has been programmed, it is displayed in full. If the relevant load chart has **not** been programmed, the short code is displayed in white on red background and an acoustic signal is heard („horn“).
- **ENTER** after a changing the operating mode using the function key **F2** and / or the function key **F3** displays the load chart (if the chart exists) plus the short code on the LICCON monitor.

  Note:

  If no load chart is defined or available for the changed operating mode, then, after pressing the ENTER key, the first available set up state in this operating mode with the appropriate load chart and short code will be displayed on the set up screen.
- **ENTER** after a change in the set up configuration using the function key **F4**, the function key **F5** and the function key **F6**, displays the load chart (if the chart exists) plus the short code on the LICCON monitor.

  Note:

  If no load chart is defined or available for the changed set up configuration, then, after pressing the ENTER key, the first available set up configuration in the set operating mode with the appropriate load chart and short code will be displayed on the set up screen.

D Set up key

- Has no function in the „Set up“ program

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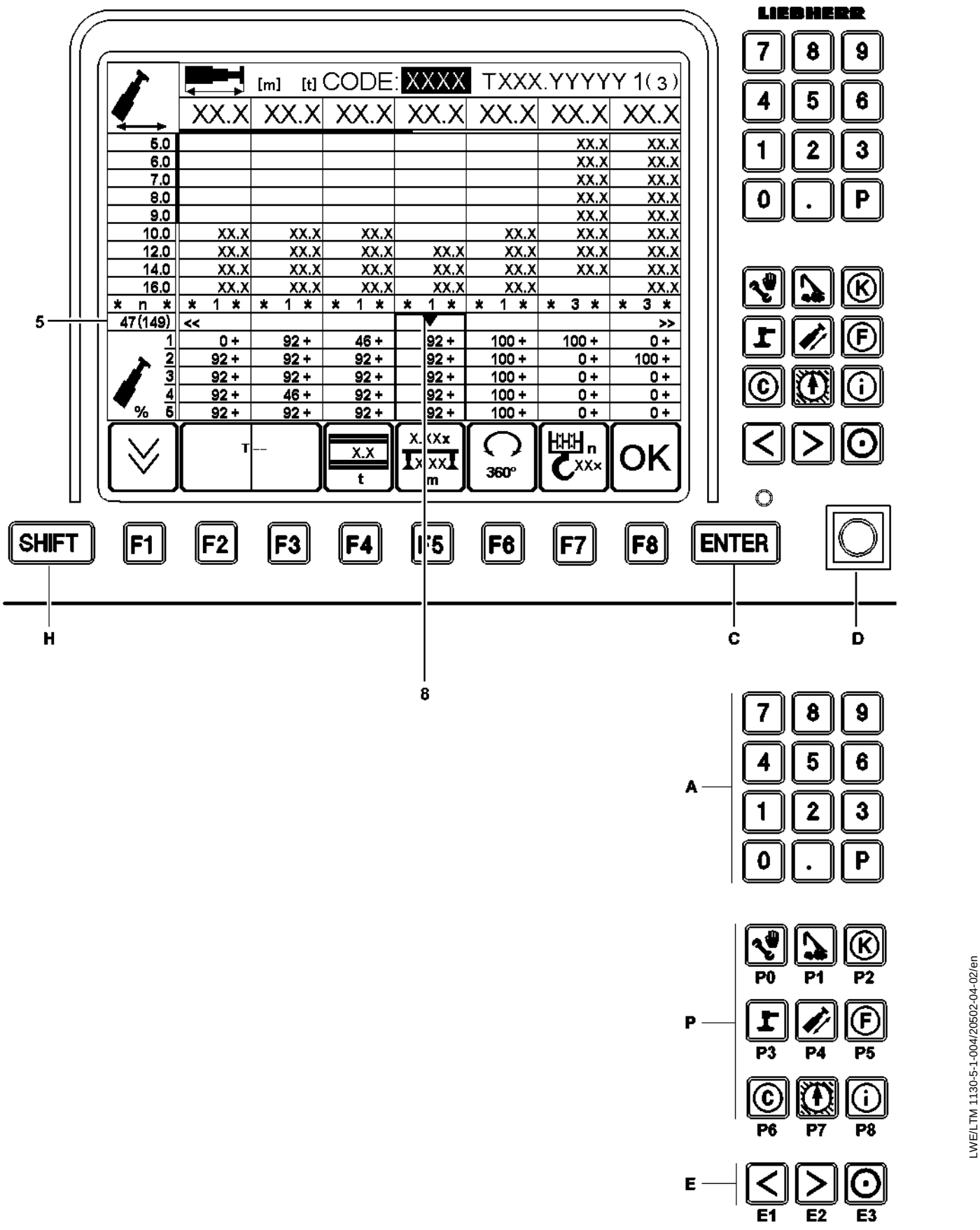

Fig.108840

E Horizontal paging

- The key **E1** and key **E2** only have a function if this is indicated in the „line for special displays **5**“.
  If a load chart consists of more than seven columns, the first display of the configuration state only shows columns 1 to 7.
  - With the key **E1**, the cursor **8** can be moved to the left.
  - With the key **E2**, the cursor **8** can be moved to the right.

  The double arrow at the right edge of the line points to additional columns in either direction. If the cursor **8** (movement mark) is moved to an edge marked with arrows, then, for example, when pressing the key **E2** again, the chart columns are moved by 3 columns to the left.
  Note:
  By pressing key **E1** or key **E2** twice in quick succession, you can „page“ to the left or right by 7 load chart columns (equals the display area of the LICCON monitor).

H „SHIFT“ key

- „SHIFT“ (hold down) + „E1“: Jump to first column in load chart.
- „SHIFT“ (hold down) + „E2“: Jump to last column in load chart.

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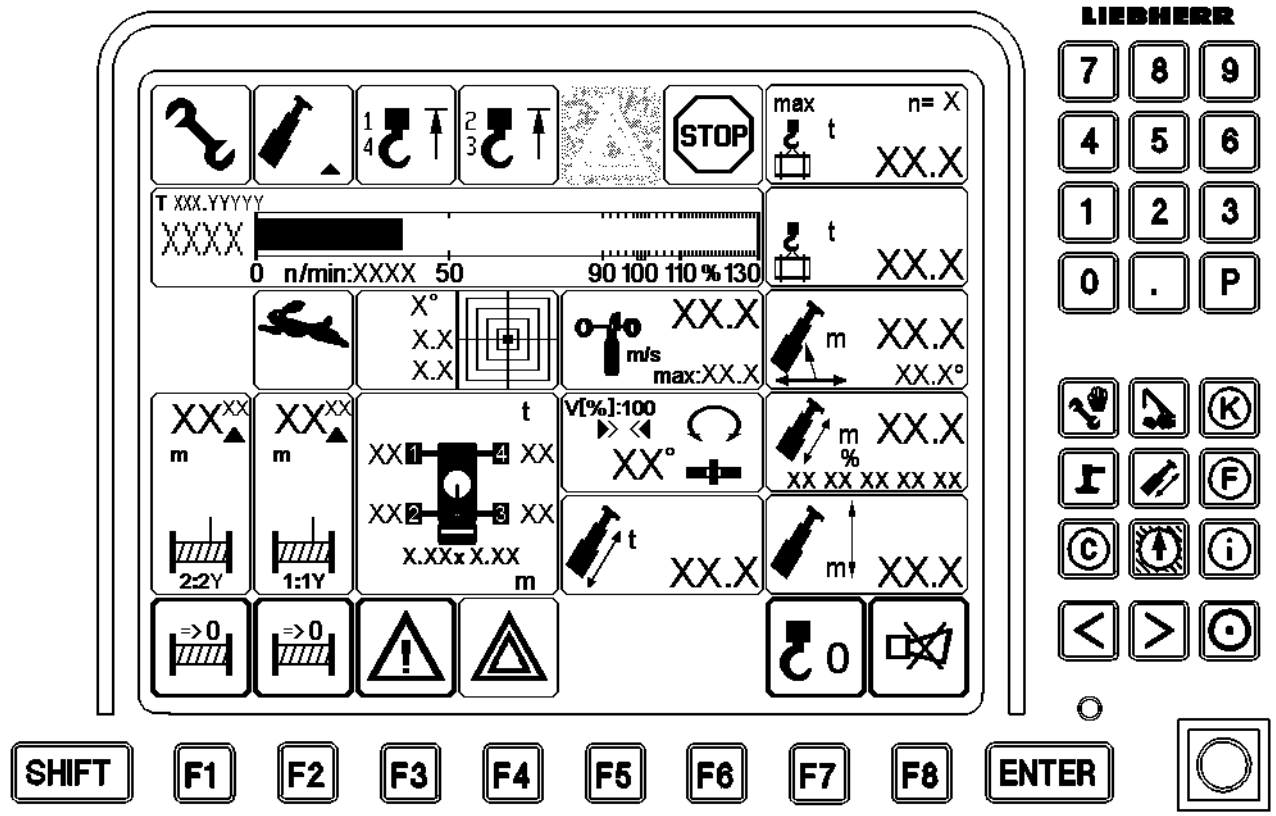

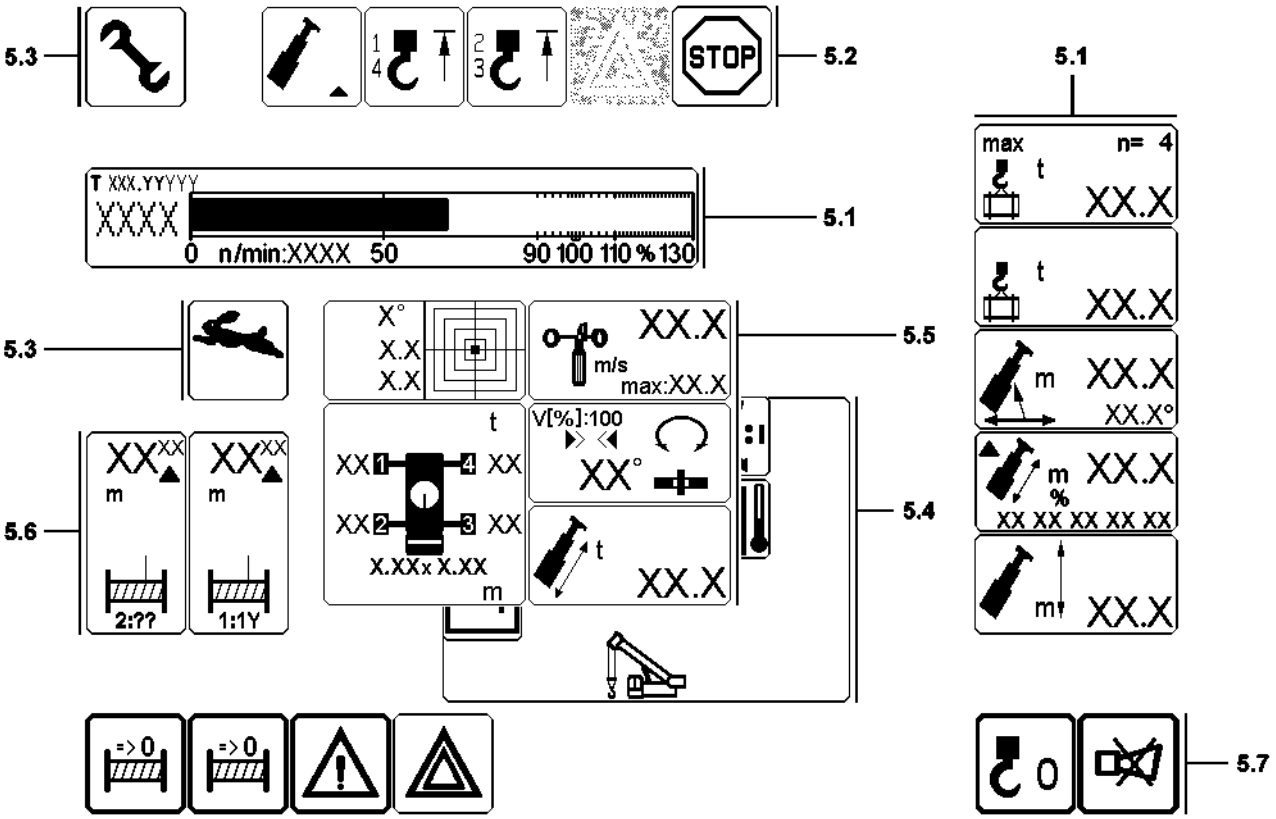

Fig.115203

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5 „Crane operation“ program

The LICCON program „Crane operation“ assists the crane driver by displaying clearly on the monitor the data needed for operating the crane. 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, the system shuts off.

The monitor is divided into seven areas in the „Crane operation“ program:
- **5.1** Crane geometry and load information
- **5.2** Alarm functions
- **5.3** Special functions
- **5.4** Monitoring functions during crane operation
- **5.5** Monitored auxiliary functions
- **5.6** Winch display
- **5.7** Function key line (crane operation)

Note
- ▶ The monitor illustrations in this chapter are only examples. The display 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!

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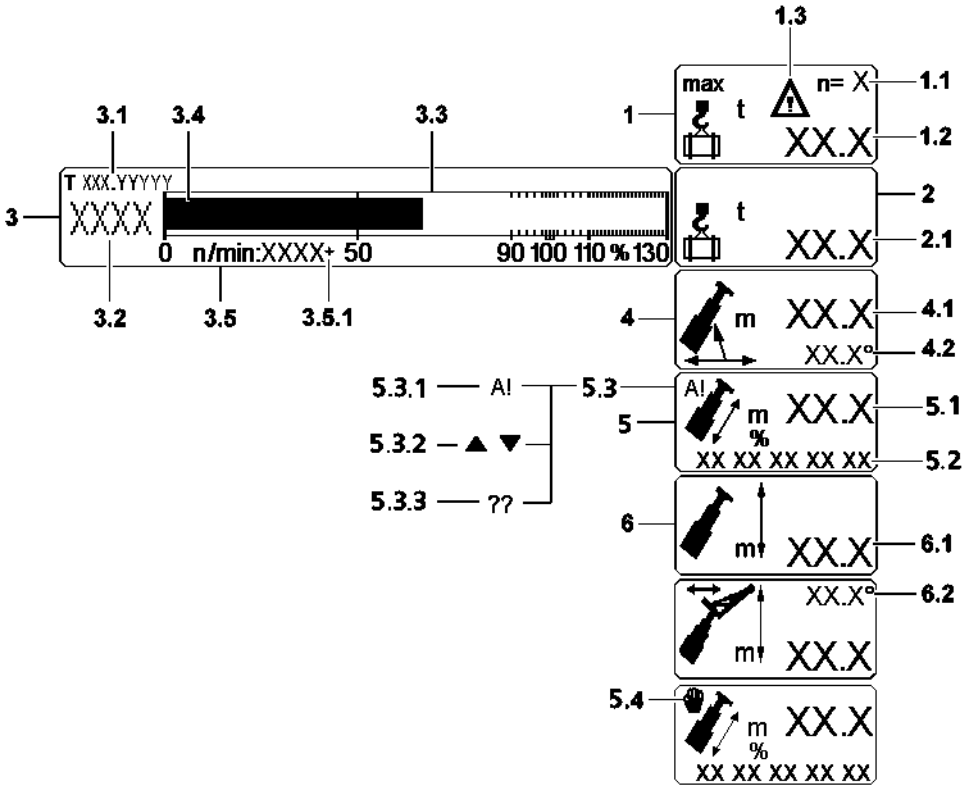

Fig.115202

5.1 Crane geometry and load information

5.1.1 Maximum load

1 „Maximum load“ icon
- With text for MU [t] or [lbs]

1.1 Reeving number of hoist rope
- n = Reeving number of hoist rope that is reeved at the pulley head selected via the load chart (previously selected in the „Set up“ program)

1.2 Maximum load according to load chart and reeving
- In [t] or [lbs]
- It depends on:
  - The selected operating mode
    - The main boom configuration
    - The accessory configuration
  - The selected set up configuration
    - Counterweight
    - Support base
    - Turning range
    - Reeving
  - The boom radius

Note

▶ „? ? ? . ?“ if a value in the load chart cannot be accessed, for example because the crane is not within the load chart range or one or more sensors are missing or so defective, so that the load cannot be calculated.

1.3 Warning icon
- The warning icon **1.3** is shown when:
  - The maximum wind speed is exceeded.
  - The sliding beam length does not correspond to the set up nominal status.*****
  - The permissible crane incline is exceeded.

WARNING

Danger of toppling the crane if the warning icon **1.3** appears!
Personnel can be killed and the crane can be damaged!

▶ If the warning icon **1.3** appears on the LICCON monitor, crane operation is prohibited!

▶ Initiate measures to counteract the warning message and to bring the crane into a safe operating status!

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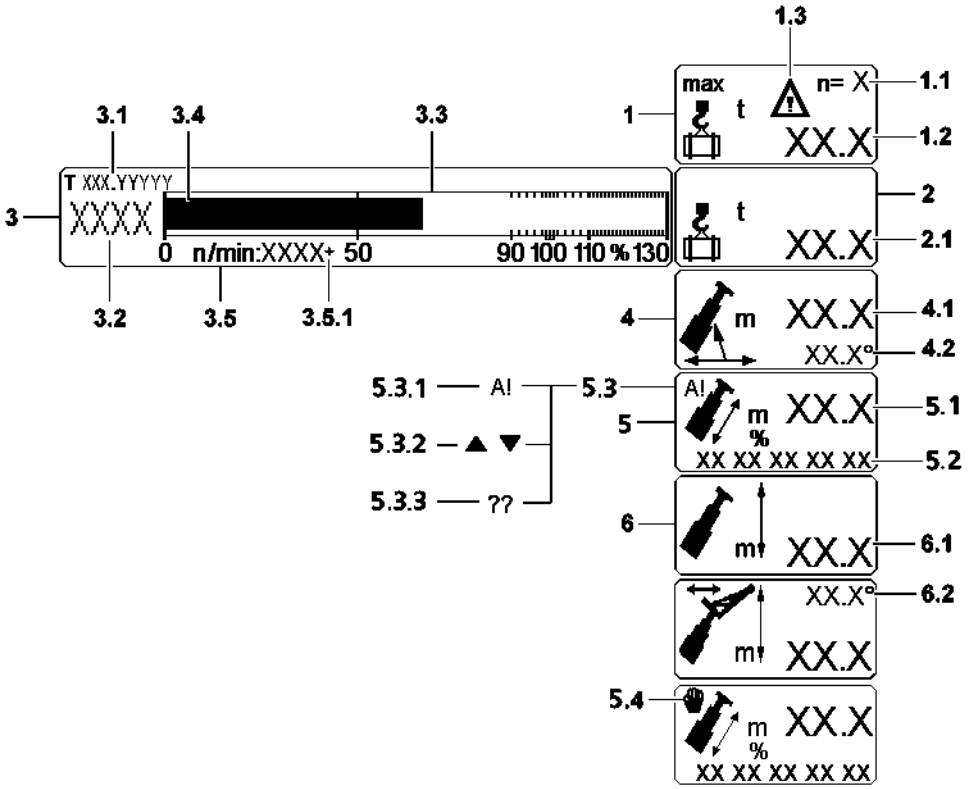

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Fig.115202

5.1.2 Current load

2 „Current load“ icon
- With text for MU [t] or [lbs]

2.1 Current load on the boom
- Actual load display = Load in [t] or [lbs] that is currently suspended on the selected boom
- Display of the calculated total load including the weights of the load carrying, the lifting and / or the fastening equipment.
  By using the function „Tare“ (see description of function key **F7** in section „Function key line (crane operation)“) the display can be changed over to display the net load. The icon is displayed in „red“ and the word „net“ is also displayed.

Note

▶ „? ? ? . ?“ is displayed if one or more sensors are missing or so defective that the „actual load on the boom“ **cannot** be calculated. This is always the case if the boom projection radius **4.1** and the pulley head height **6.1** cannot be calculated and / or the sensors to measure the pressure in the luffing cylinder are defective.

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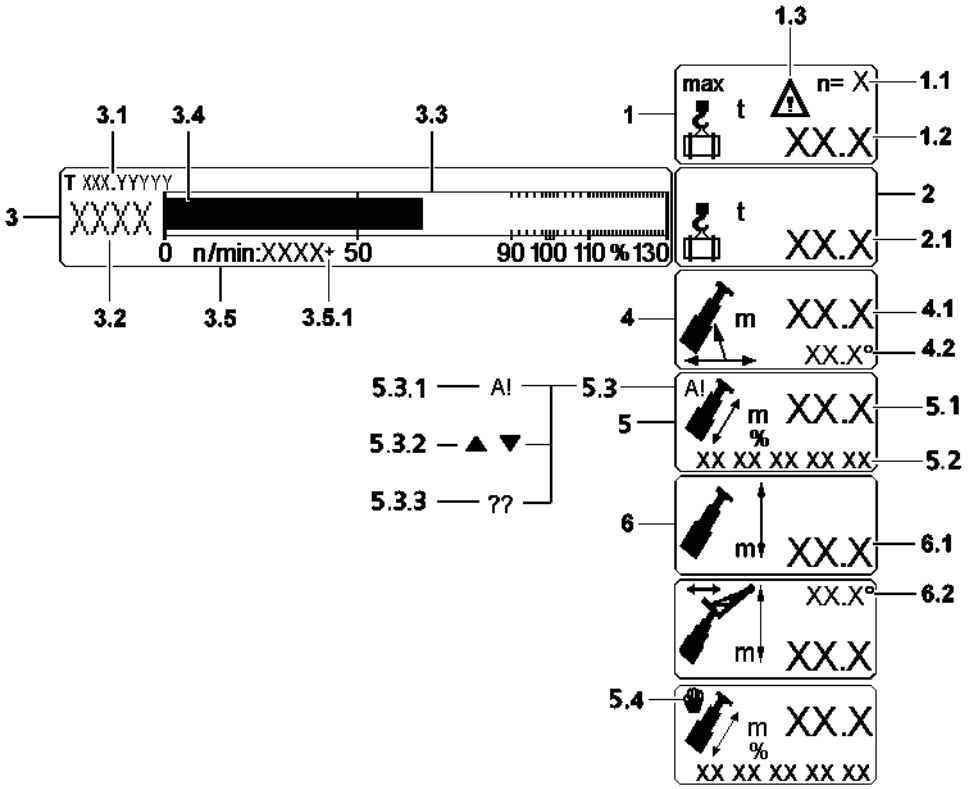

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Fig.115202

5.1.3 Dynamic load utilization bar display

3 „Dynamic utilization bar display“ icon

3.1 8-digit organization number
- Identifies the type of load chart that has been selected and the operating mode

3.2 Short code
- Identifies the selected set up configuration

3.3 Utilization scale
- The percentage utilization of the crane is displayed in different colors in the bar display of the utilization scale
- The utilization scale changes to:
  - Blue if the load is less than 0.5 t or at a utilization of less than 20 %.
    Note:
    The crane can be reconfigured!
  - Green at a utilization of less than 90 %.
  - Yellow: At a utilization of less than 100 %, **Advance warning**.
  - Red at a utilization of more than or equal to 100 %, **LMB-STOP shut off**.

3.4 Utilization bar of crane
- According to load chart and reeving

3.5 Engine speed
- In [rpm]
- **Note:**
  „????“ is displayed for an invalid rpm value (for approximately 10 seconds). If there is a problem, it changes to low idle rpm. The digital display blinks, and an error message is displayed.

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.

5.1.4 Radius

4 „Boom radius“ icon

4.1 Radius
- In [m] or [ft]
  Identifies the horizontal center of gravity distance of the load (on the load hook selected by the operating mode) from the center of rotation of the 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 an angle sensor on the main boom or on the accessory or the length sensor on the main boom is defective, so that the radius cannot be calculated.

4.2 Main boom angle to the horizontal
- In [°]
- **Note:**
  „? ? ? . ?“ is shown if the angle sensor on the pivot section is defective.

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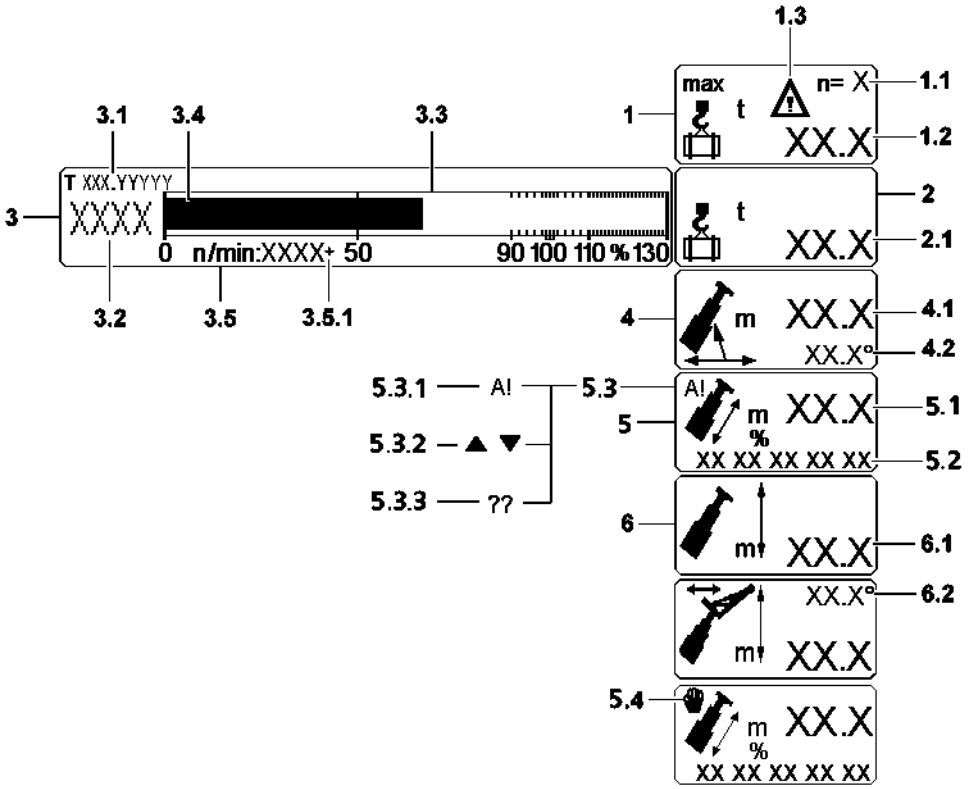

Fig.115202

5.1.5 Main boom length

5 „Main boom length“ icon

5.1 Length of main boom
- In [m] or [ft]

5.2 Extension conditions of individual telescopic sections
- In [%]
  The extension conditions of telescope 1, telescope 2 etc. are shown from the left to the right

5.3 TELEMATIC
- Special functions in „Operation“ program
  Note:
  In the „Main boom length“ icon all the information required is displayed to enable an experienced crane operator to telescope the telescopic boom to a desired length without switching to the „Telescoping“ program.

5.3.1 Preselected telescoping target reached

5.3.2 Nominal deflection direction of master switch
- Request: Telescope in = down arrow
- Request: Telescope out = arrow up

5.3.3 Error in system

5.4 TELEMATIC
- Manual telescoping is activated.

5.1.6 Pulley head height

6 „Pulley head height“ icon

6.1 Pulley head height
- In [m] or [ft]
- Identifies the vertical distance from the crane base to the selected pulley head axle, for which the displayed maximum load applies.
- **Note:**
  „? ? ? . ?“ is shown if an angle sensor on the main boom or on the accessory or the length sensor on the main boom is defective, that the pulley head height cannot be calculated.

Note

▶ The icon **6.2** „Angle of hydraulically adjustable folding jib“ is only shown for certain crane types with hydraulically adjustable folding jib.

6.2 Angle of hydraulically adjustable folding jib*****
- In [°]
- The display is in the form of the relative angle between the telescopic boom head and the folding jib.
- **Note:**
  „? ? ? . ?“ is displayed, when the geometry data or the sensor values are missing, so that the angle of the hydraulically***** adjustable folding jib cannot be calculated.

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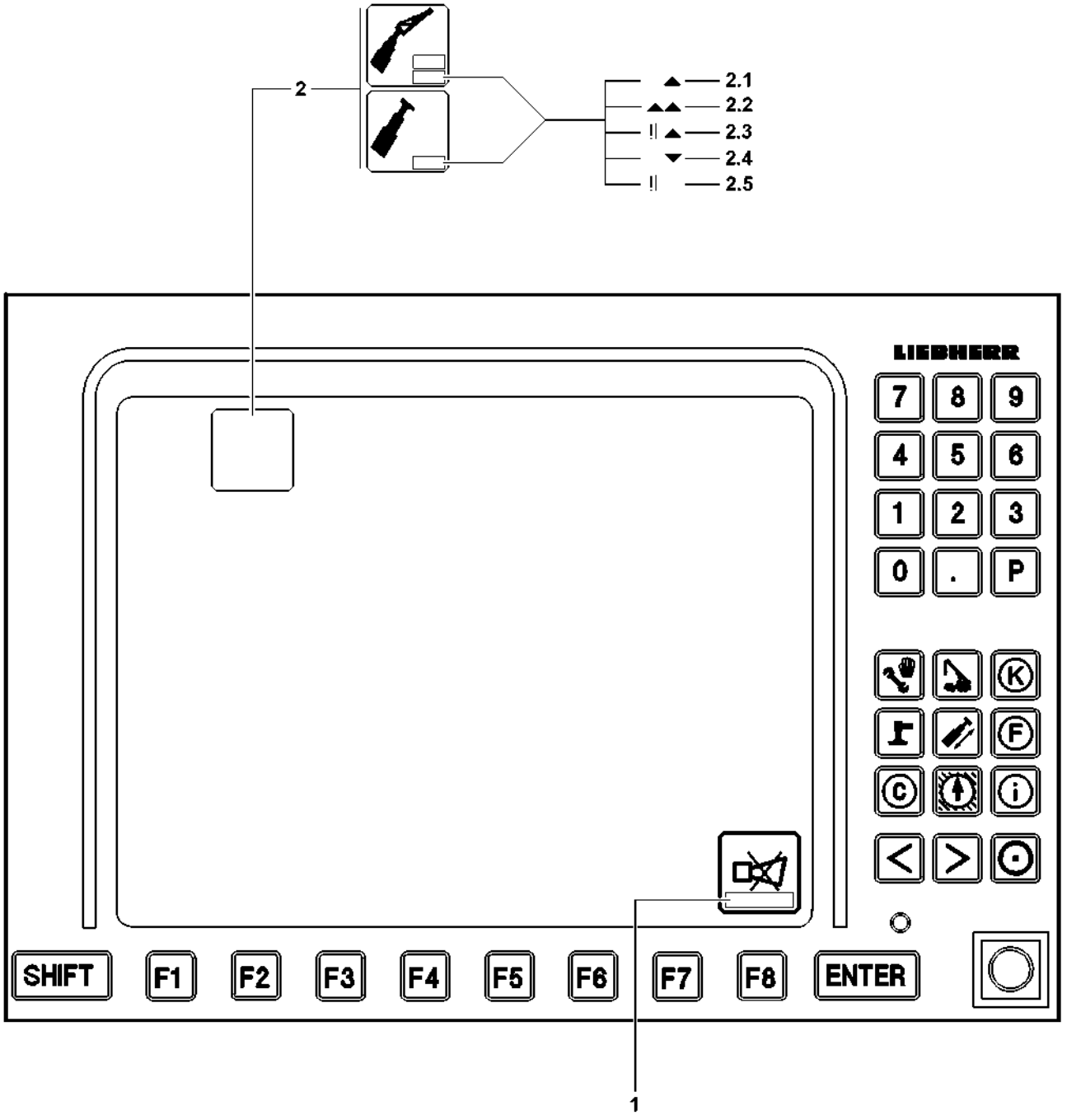

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Fig.111387

5.2 Alarm functions

The limit ranges of the crane movements are monitored. The crane operator is alerted that the limits have been reached when the following blinking icons are shown.

Note

▶ If a LICCON error code is shown in the field **1** horn icon, then the present error can be determined through it, see Diagnostics manual.

5.2.1 Boom limitation

2 „Boom limitation“ icon

- The luffing range of the boom is limited upward as well as downward. This icon appears if an end position determined by the load chart is reached when luffing the boom or when luffing up the boom is disabled by a proximity switch. Exclamation marks show when an associated sensor is defective.
  Note: The icon „Boom limitation“ **2** can change in different operating modes, but it is shown always at the same position in the LICCON monitor.

Position	Icon	Description (main boom)
2.1	▲	The shut off „luffing up the main boom“ has been triggered by running against the upper limit. **Note:**Luffing down the main boom is still possible.
2.2	▲▲	The shut off „luffing up the main boom“ was triggered by running against the proximity switch (boom steep) on the turntable. **Note:**Luffing down the main boom is still possible.
2.3	!!▲	An associated sensor on the main boom is defective and the shut off „luffing up the main boom“ has been triggered by running against the proximity switch (boom steep) on the turntable.
2.4	▼	The shut off „luffing down the main boom“ is made by running against the lower limit. **Note:**Luffing up the main boom is still possible.
2.5	!!	An associated sensor on the main boom is defective.

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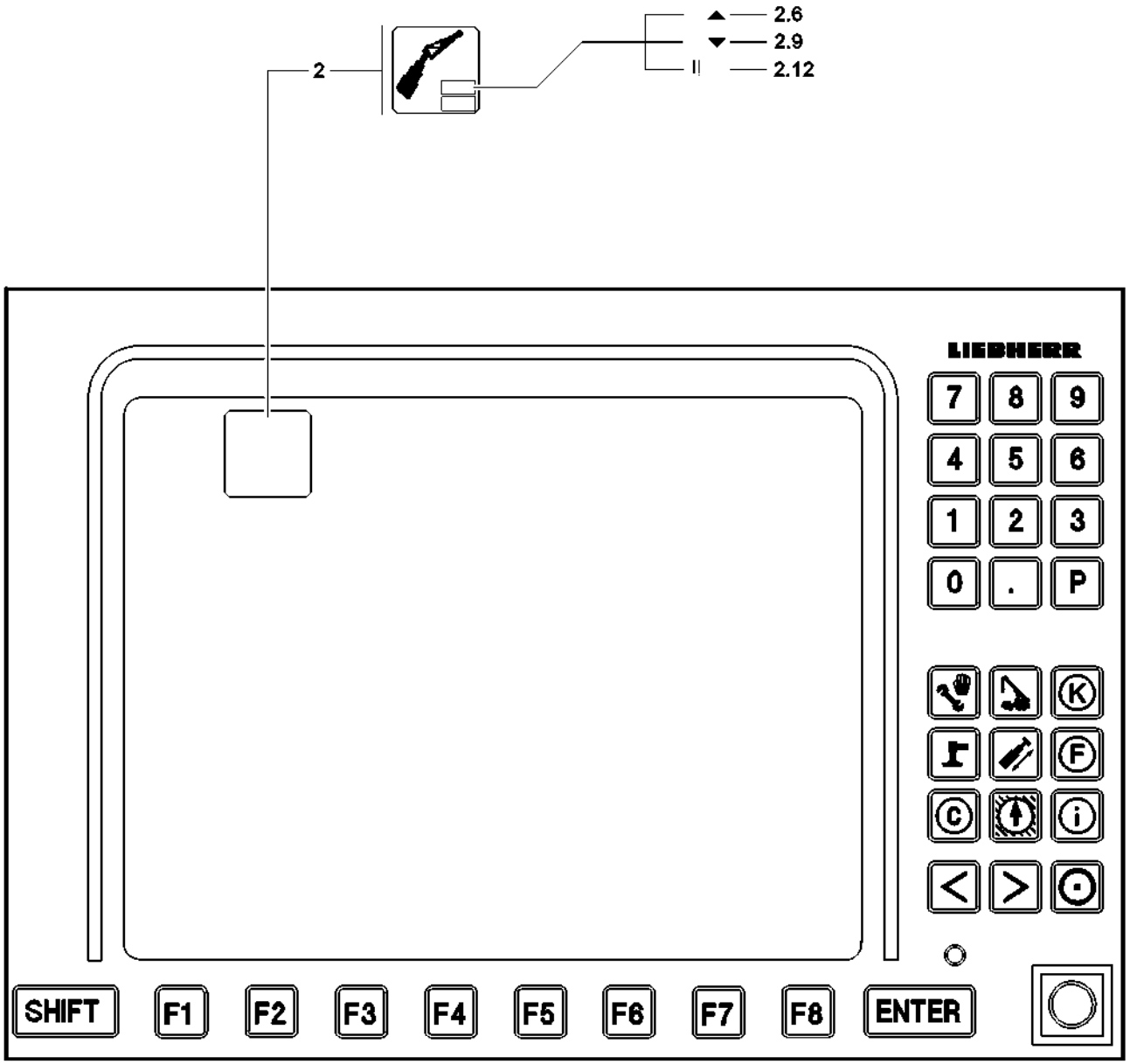

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Fig.111424

Note

▶ The icon description for the hydraulic folding jib is only shown for certain crane types with hydraulically adjustable folding jib.

Position	Icon	Description of hydraulic* folding jib
2.6	▲	The shut off „luffing up the hydraulic***** folding jib“ has been triggered by running against the upper limit. **Note:** Luffing down the hydraulic***** folding jib remains possible.
2.9	▼	The shut off „luffing down the hydraulic***** folding jib“ has been triggered by running against the lower limit. **Note:** Luffing up the hydraulic***** folding jib remains possible.
2.12	!!	An associated sensor on the hydraulic***** folding jib is defective.

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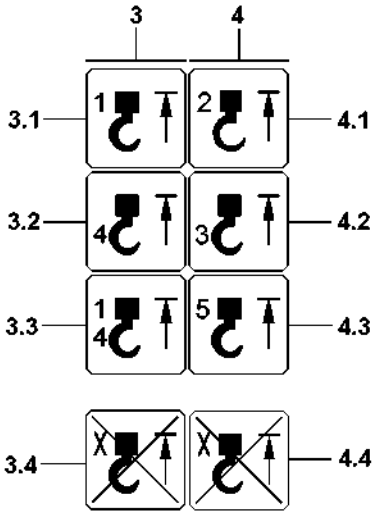

Fig.111425

5.2.2 Hoist top limit switch HES1 and HES4*

3 „Hoist top on HES1 / HES4***** icons“
- 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, an operating error message is issued. Four hoist limit switches are possible.

3.1 HES1
- Installation location: Telescopic boom head, right
- The icon appears if:
  - The hook block moves against the HES1 on the right of the telescopic boom head.
  - HES1 is not active, although it must be present on the bus.
  - HES1 has an internal error.
- **Note:**
  The crane movements spool up hoist winch, luff down telescopic boom, telescope out the telescopic boom are shut off.

3.2 HES4*****
- Installation location: Telescopic boom head left or boom nose*****
- The icon appears if:
  - The hook block moves against the HES4 on the left telescopic boom head or the boom nose*****.
  - HES4 is not active, although it must be present on the bus.
  - HES4 has an internal error.
- **Note:**
  The crane movements spool up hoist winch, luff down telescopic boom and telescope out the telescopic boom are shut off.
  The HES4 must be plugged in in operation mode Boom nose*****. If this is not the case, an operating error message is issued.

3.3 HES1 and HES4*****
- The icon appears when icon HES1 **3.1** and HES4 **3.2** appear simultaneously.

3.4 „Hoist top“ icons are bypassed
- If the shut off „hoist top“ is bypassed, the icons are shown crossed out, see Crane operating instructions, chapter 4.20.

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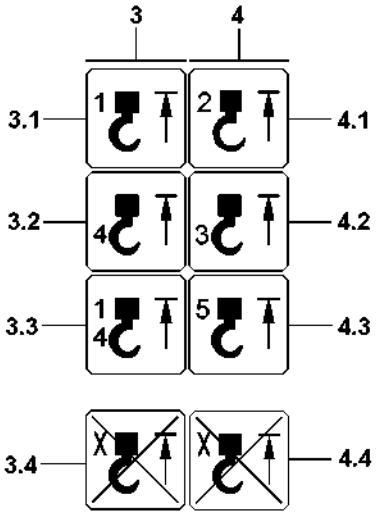

Fig.111425

5.2.3 Hoist top limit switch HES2*, HES3* and HES5*

4 Icons „Hoist top on HES2***** / HES3***** / HES5***** “
- 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, an operating error message is issued.

4.1 HES2*****
- Installation location: Single folding jib*****
- The icon appears if:
  - The hook block is pulled against the HES2.
  - HES2 is not active, although it must be present on the bus.
  - HES2 has an internal error.
- **Note:**
  The crane movements spool up hoist winch, luff down telescopic boom and telescope out the telescopic boom are shut off.
  The HES2 must be plugged in in the „Single folding jib“ operating mode. If this is not the case, an operating error message is issued.

4.2 HES3*****
- Installation location: Double folding jib*****
- The icon appears if:
  - The hook block is pulled against the HES3.
  - HES3 is not active, although it must be present on the bus.
  - HES3 has an internal error.
- **Note:**
  The crane movements spool up hoist winch, luff down telescopic boom and telescope out the telescopic boom are shut off.
  The HES3 must be plugged in in operation mode „Double folding jib“. If this is not the case, an operating error message is issued.

4.3 HES5*****
- Installation location: Auxiliary boom
- The icon appears if:
  - The hook block moves against the HES5 on the left of the boom head or the boom nose.
  - HES5 is not active, although it must be present on the bus.
  - HES5 has an internal error.
- **Note:**
  The crane movements spool up the hoist winch, luff down the telescopic boom, and telescope the telescopic boom out are shut off for **T and THK***.
  The HES5 must be plugged in for operation mode „Auxiliary boom THK“. If this is not the case, an operating error message is issued.

4.4 „Hoist top“ icons are bypassed
- If the shut off „hoist top“ is bypassed, the icons are shown crossed out, see Crane operating instructions, chapter 4.20.

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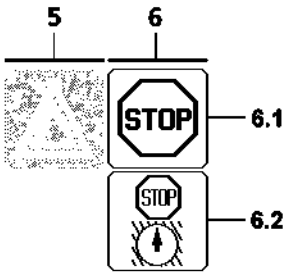

Fig.105406

5.2.4 Advance warning / STOP, Working range limitation*

5 „Advance warning“ icon
- Load chart utilization
  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 exceeds the **90 %** limit programmed in for advance warning.

6 „STOP“ icon

6.1 Load carrying capacity exceeded
- The „STOP“ icon is displayed if the load chart load („current load“ greater than „maximum load according to the load chart and the reeving“) exceeds the **100 % mark**
- **Note:**
  All crane movements that increase the load momentum are shut off.

6.1 Sensor error
- The „STOP“ icon appears when a sensor which is required to monitor the load chart has an error
- **Note:**
  All crane movements are shut off.

6.1 No load chart
- The „STOP“ icon appears if no load chart is available
- **Note:**
  All crane movements are shut off.

6.2 Working range limitation*****
- If a programmed working range limitation***** is actuated, then this condition is shown by the „STOP iconWorking range limitation*** 6.2**“ instead of the normal icon „Load moment limitation STOP“ **6.1**
  Note:
  If a „Load moment limitation STOP“ occurs at the same time, the „ STOP icon Working range limitation*****“ **6.2** continues to be displayed. The „Load moment limitation STOP“ is identifiable if the utilization bar exceeds 100 % or if a maximum load of 0 t is shown.

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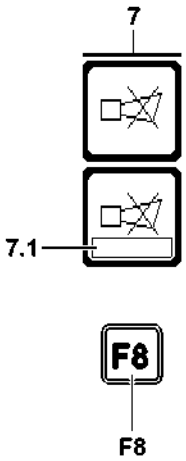

Fig.111270

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5.2.5 Acoustic warning on the LICCON monitor

Acoustic warnings on the LICCON monitor 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 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 the angle range of the load chart
   - Boom outside radius range of the load chart
   - Extension condition of telescopic sections not in accordance with 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
   - 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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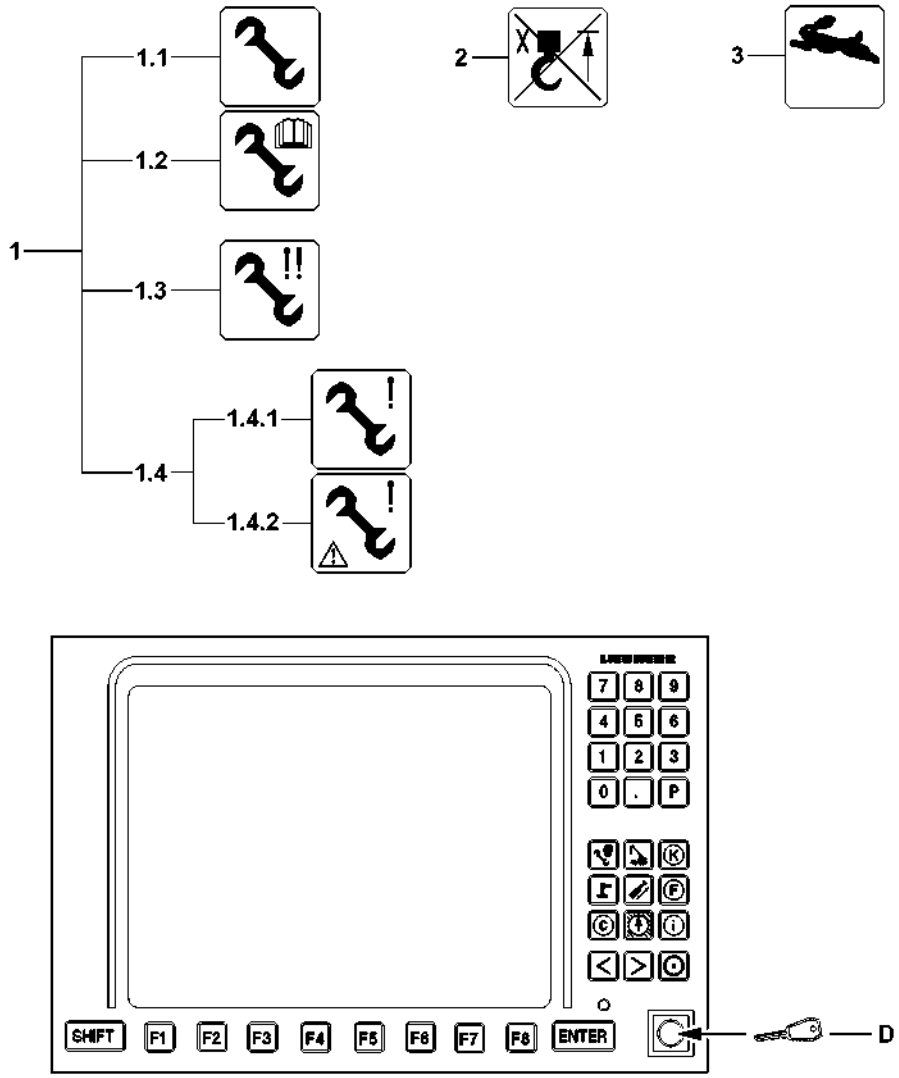

Fig.114099

5.3 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. Two icons **1** cannot appear simultaneously.
▶ For operation and specifications for using the set up key **D** or the sensor **317** via the transponder **318**, see Crane operating instructions, chapter 4.04, chapter 4.20 and chapter 7.15.

5.3.1 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.

5.3.2 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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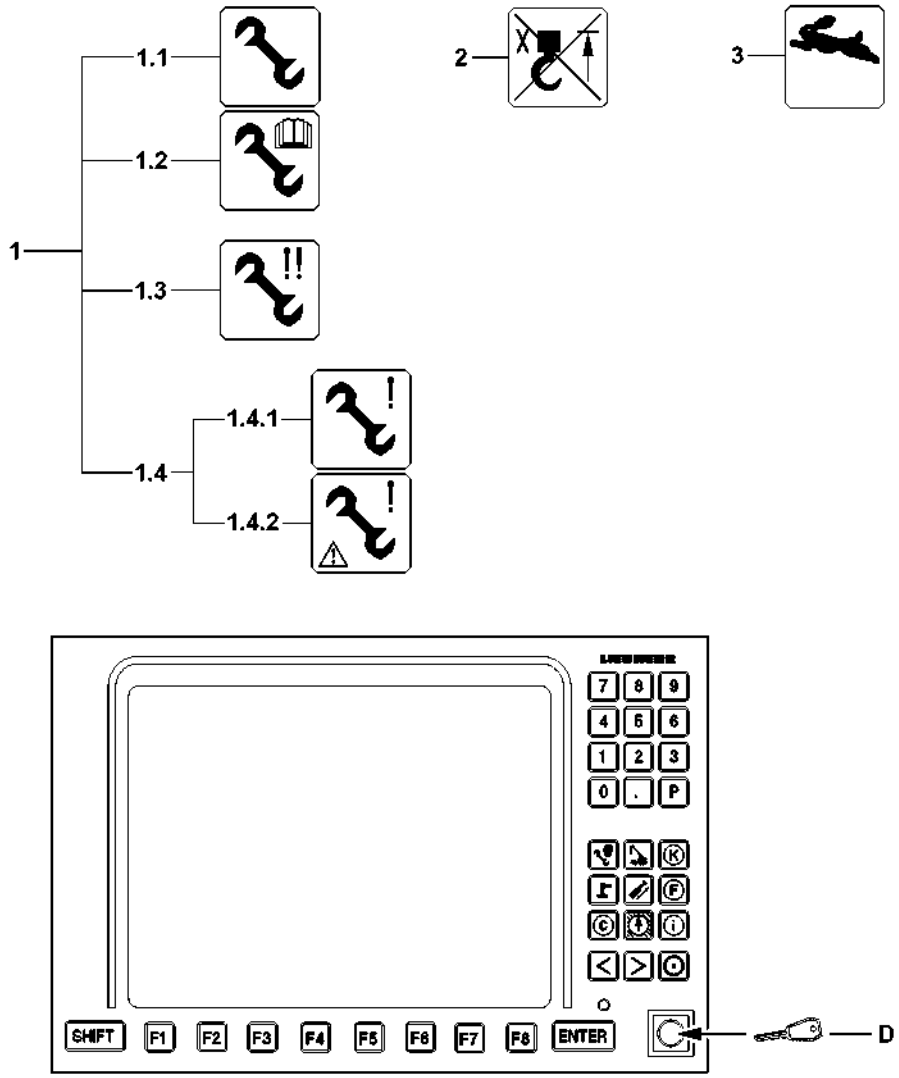

Fig.114099

5.3.3 Emergency operation LICCON overload protection (according to EN 13000:2010)

1.3 LMB emergency operation activated
- The icon appears:
  - When the emergency operation LICCON overload protection (LMB emergency operation) is activated via the sensor **317** with the transponder **318**.
  - **Note**:
    The Crane operation program is locked, meaning, no other program can be turned on via the program keys.

5.3.4 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 engaged by the set up key **D**!
▶ Only crane without CE-mark: If the emergency operation LICCON overload protection is needed, press the set up key **D**!

1.3 LMB emergency operation activated
- Icon appears:
  - When the LMB emergency operation is activated.
  - **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.

5.3.5 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!
Personnel can be killed or injured!
This could result in property damage!
▶ Deactivate additional operating modes **1.4** again or contact Liebherr Service and coordinate further procedure.

1.4 Additional emergency operating modes
- Icon **1.4.1** or icon **1.4.1** appears if additional emergency operating modes were activated.

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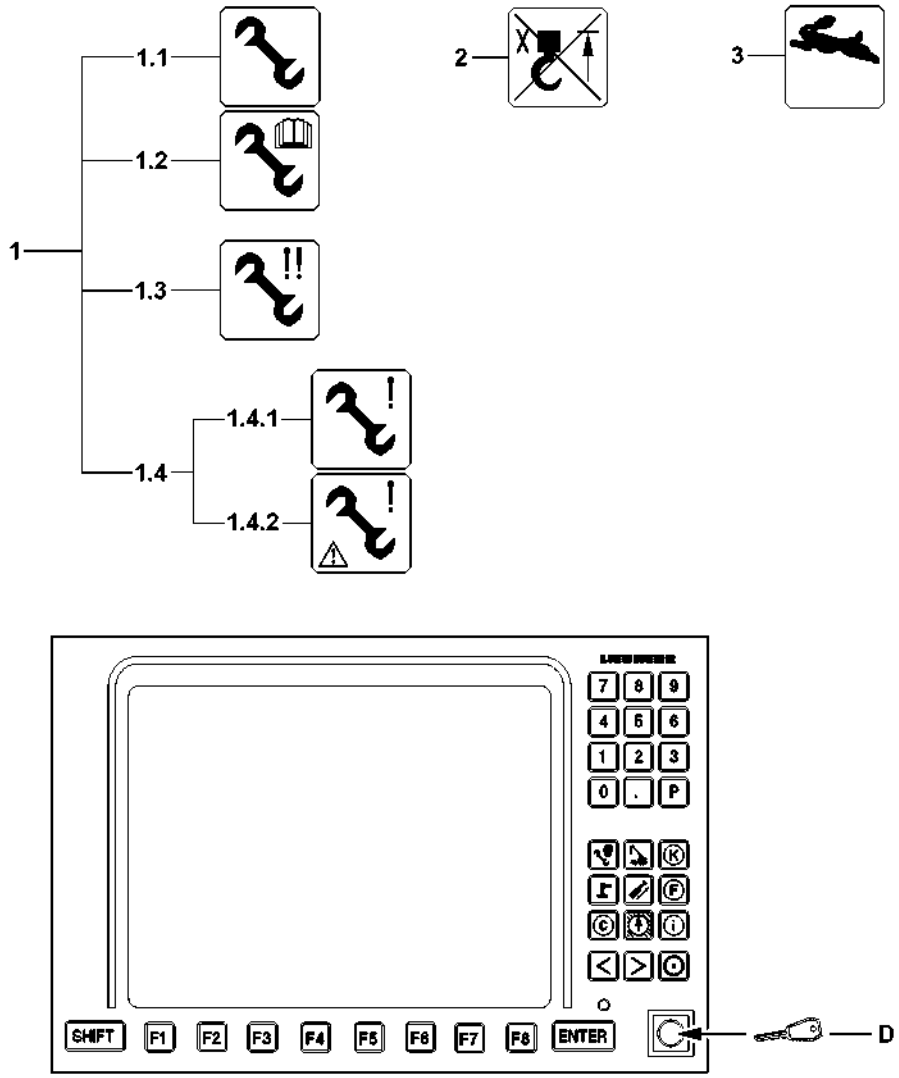

Fig.114099

5.3.6 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.

5.3.7 Fast mode (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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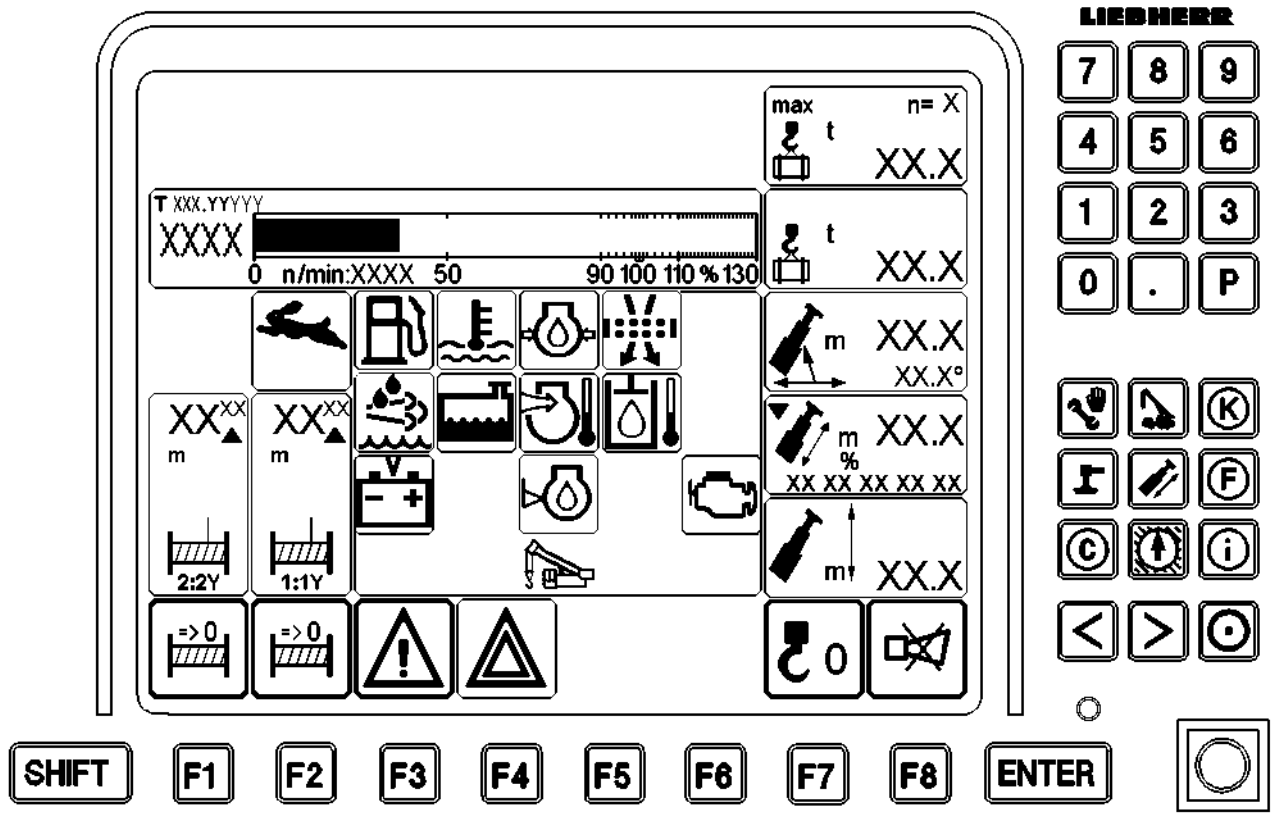

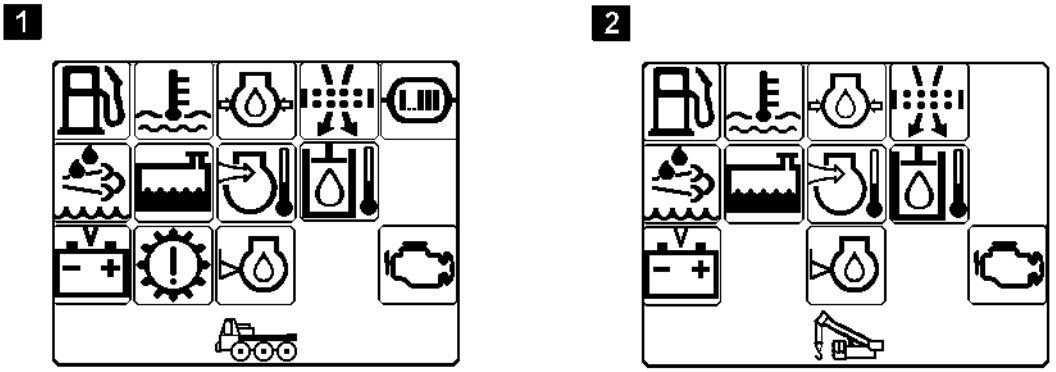

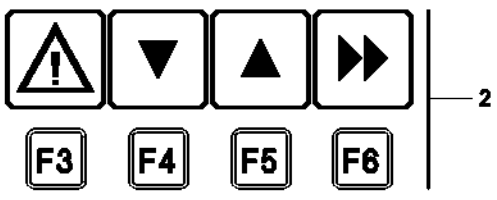

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Fig.114824

5.4 Monitoring functions during crane operation

In crane operations, there are several monitoring functions which can be shown in the monitoring field or which are displayed automatically to the crane driver if a warning event occurs.

The monitoring functions in the monitoring field are always active. The monitoring field has its fixed place on the LICCON monitor and can be hidden.

Using the function key **F3**, the monitoring field with its monitoring functions can be shown on the LICCON monitor.

Note

▶ When showing the monitoring field by pressing the „**F3**“ function key, the assignments of the **„F4“** to **„F6“** function keys are changed at the same time. The function keys are explained more fully in this section.

If a warning event occurs in one or more monitoring functions in the monitoring field, this is indicated by warning icon „**F3**“ in the function key line. The warning icon is displayed statically and in the color of the monitoring function that triggered the warning event. See also section entitled „The function key line“.

Fig.197063

Note

▶ Press function key „F3“ to change to the „monitoring field with monitoring functions“.

5.4.1 Monitoring field with monitoring functions

In the monitoring field for the crane vehicle or for the crane superstructure***** (depending on crane type) appear the following monitoring functions:

Monitoring display	Icon display	Status
 *Fuel reserve*	Green:	Fuel reserve **more** than 5 %.
	Yellow:	Fuel reserve approx. 3 % - 4 %.
	Red:	Fuel reserve **less** than 3 %.
 *Coolant temperature*	Green:	Coolant temperature OK.
	Red:	Coolant temperature **too high**.

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Monitoring display	Icon display	Status
 *Charge monitoring display*	Green:	Alternator OK (engine on).
	Red:	Alternator does not charge (engine on).
 *Coolant level*	Green:	Coolant level OK.
	Red:	Insufficient coolant. **Note:** Increase the coolant level, see chapter 7.05 „Maintenance guidelines Crane superstructure“.
 *Engine oil level*	Green:	Engine oil level OK.
	Red:	Engine oil level too low or too high. **Note:** Call up analog display and adjust the engine oil according to the display. See section „individual indicator displays with analog values“.
 *Engine oil pressure*	Green:	Engine oil pressure OK (engine on).
	Red:	Engine oil pressure too low (engine on). **Note:** Bring the crane to a standstill immediately and turn the engine off.
 *Brake circuits I to III*	Green:	Pressures in brake circuits I to III ok.
	Red:	Pressure in one or more brake circuits too low.
 *Battery voltage*	Green:	Battery voltage OK.
	Red:	On-board power supply over / undervoltage.
 *Hydraulic oil temperature*	Green:	Hydraulic oil temperature crane drive OK.
	Red:	Hydraulic oil temperature crane drive too high.

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Monitoring display	Icon display	Status
 *Charge air temperature*	Green:	Charge air temperature OK.
	Red:	Charge air temperature too high.
 *Air filter*	Green:	Air filter OK.
	Yellow:	Air filter is dirty.
	Note:	Clean or replace air filter.
 *Gearbox****	Green:	Gear ok.
	Yellow / red:	Problem in gear.
	Note:	Bring the crane to a standstill immediately and turn the engine off.

DANGER
Danger of accident!
Insufficient pressure in brake circuits I, II and III means a danger that braking performance declines sharply, or that the braking system fails totally.
▶ If the air pressure supply in one of the brake circuits drops into the red area, the crane must be stopped immediately and the cause of the problem remedied.

5.4.2 Monitoring field for engine stage 3b

Note
▶ At every change of the monitoring display, a signal sound is issued.

Monitoring display	Icon display	Status
 Urea tank	Green:	Urea available.
	Yellow:	Urea is getting low or faulty function of the exhaust aftertreatment.
	Note:	Add urea or remedy the faulty function of the exhaust aftertreatment.
	Red:	Urea almost empty or faulty function of the exhaust aftertreatment.
	Note:	Add urea immediately or remedy the faulty function of the exhaust aftertreatment.
	Green:	Exhaust aftertreatment OK.

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Monitoring display	Icon display	Status
Exhaust after treatment	Yellow:	Urea is getting low or faulty function of the exhaust aftertreatment. **Note**: Add urea or remedy the faulty function of the exhaust aftertreatment.

5.4.3 Monitoring field for engine Tier 4i

Note
- ▶ At every change of the monitoring display, a signal sound is issued.
- ▶ The reduction of the maximum engine speed is made in stages.

WARNING
Significant limitation of driveability!
Due to the reduction of the maximum engine speed, dangerous situations can occur!
The mobile crane can significantly obstruct traffic!
- ▶ Add urea in time or remedy faulty function of the exhaust aftertreatment!

Monitoring display	Icon display	Status
 Urea tank	Green:	Urea available.
	Yellow:	Urea is getting low or faulty function of the exhaust aftertreatment. **The maximum engine torque is reduced.** **Note**: Add urea or remedy the faulty function of the exhaust aftertreatment.
	Red:	Urea almost empty or faulty function of the exhaust aftertreatment. **The maximum engine torque is significantly reduced.** **Note:** Add urea immediately or remedy the faulty function of the exhaust aftertreatment.
 Exhaust after treatment	Green:	Exhaust aftertreatment OK.
	Yellow:	Urea is getting low or faulty function of the exhaust aftertreatment. **The maximum engine torque is reduced.** **Note:** Add urea or remedy the faulty function of the exhaust aftertreatment.
	Red:	Faulty function of exhaust aftertreatment. **The maximum engine torque is significantly reduced.** **Note:** Add urea immediately or remedy the faulty function of the exhaust aftertreatment.

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5.4.4 Individual control displays

Note

▶ Display values, which are saved in the system for some of the monitoring functions in the monitoring field can be displayed by „toggling“ function keys **„F4“** (down) or **„F5“** (up). The values in the depicted individual indicator displays are only examples!

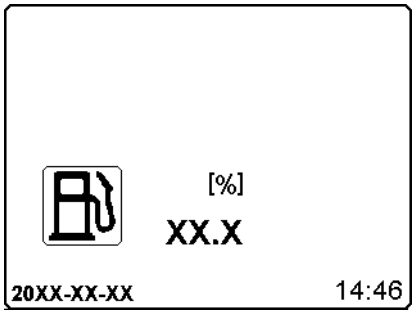

Fig.106120: Fuel reserve

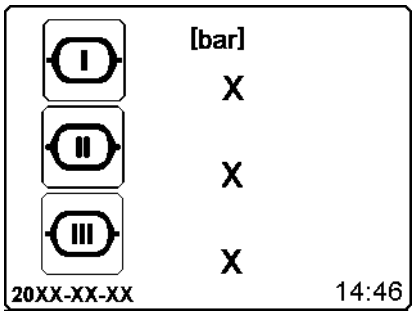

Fig.111876: Brake circuits I, II, III

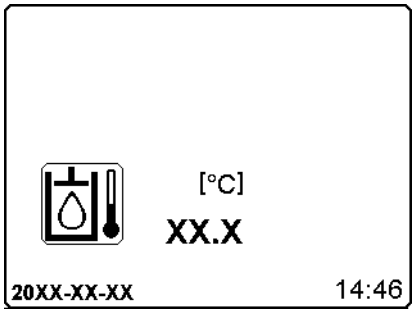

Fig.106158: Hydraulic oil temperature

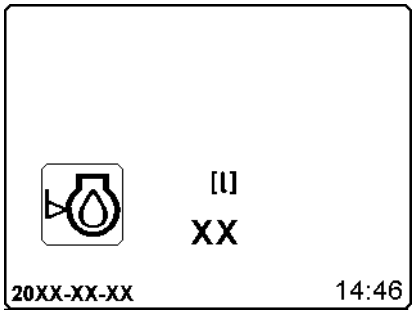

Fig.111875: Engine oil level

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Note

- The analog display of the engine oil level shows how much engine oil is to be added or drained.
- Example: 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.

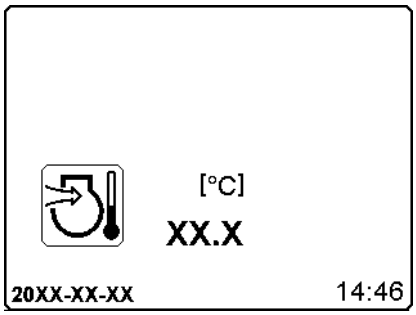

Fig.106159: Charge air temperature

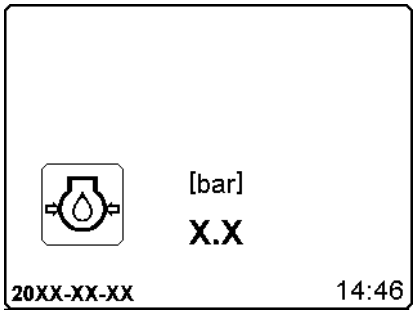

Fig.106155: Engine oil pressure

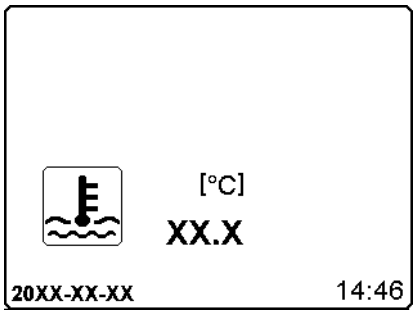

Fig.106152: Coolant temperature

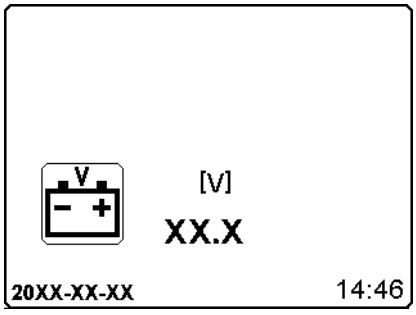

Fig.106157: Battery voltage

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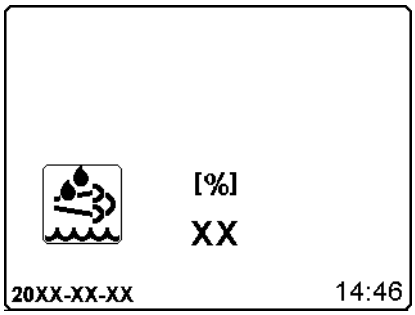

Fig.113759: Urea reserve

5.4.5 The „function key line“

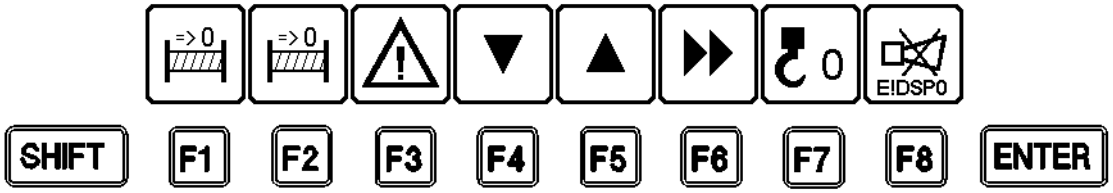

Fig.197069

Note

▶ When showing the monitoring field by pressing the „**F3**“ function key, the assignments of the **„F4“** to **„F6“** function keys are changed at the same time.

Not all function keys have to be assigned icons on the LICCON monitor.

Function key F3 „Advance warning“

Fig.197070

The warning icon on function key „**F3**“ is used as a collective warning for the monitoring functions in the monitoring area.

Icon display	Status
Green	No error / no fault
Yellow	At least one monitoring function has reported a warning
Red	At least one monitoring function has reported an error or a problem.

Note

▶ The monitoring functions in the monitoring field can be displayed by pressing function key **„F3“**.

▶ Pressing function key **„F3“** again will hide the monitoring field.

Function key F4 „Function selector“

Fig.197071

Function key **„F4“** can be used to „shift“ „down“ through the different monitoring functions.

Note

▶ Function key **„F4“** can be used to display the monitoring functions which contain a display value, individually and in sequence in the monitoring field.

Function key F5 „Function selector“

Fig.197072

Function key **„F5“** can be used to „shift“ „up“ through the different monitoring functions.

Note

▶ Function key **„F5“** can be used to display the monitoring functions which contain a display value, individually and in sequence in the monitoring field.

Function key F6 „Return key“

Fig.197073

Note

▶ Pressing function key **„F6“** causes you to „jump back“ a level.

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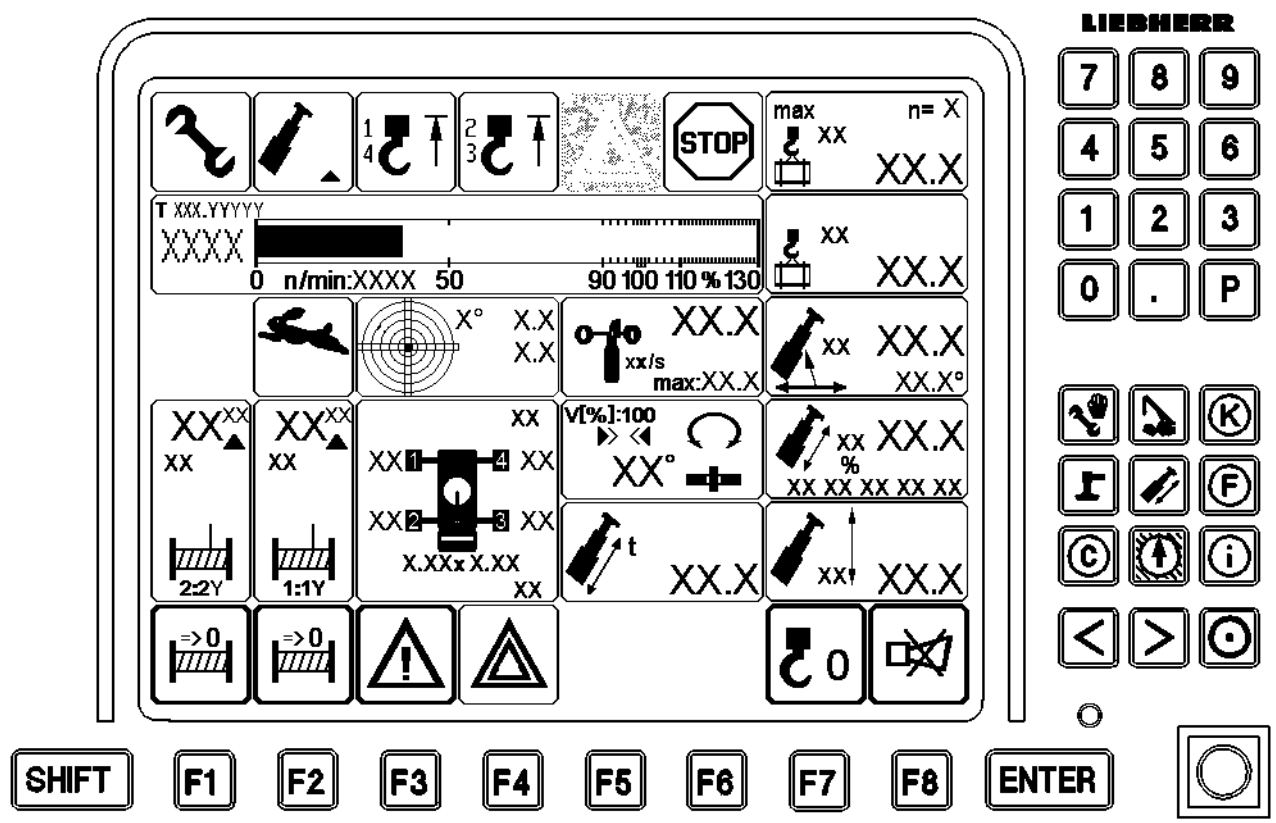

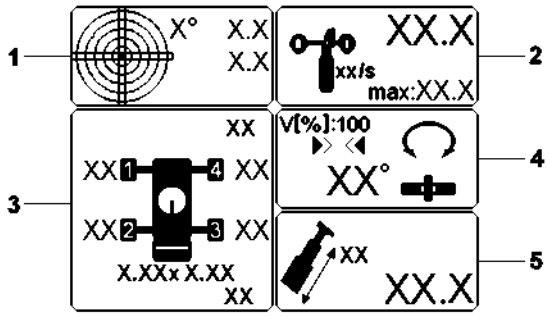

Fig.115207

5.5 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 during „normal“ crane operation, only the icons may be hidden. The icons of the monitored auxiliary functions have their fixed place on the LICCON monitor.

Using the function key **F4**, you can show the icons for the monitored auxiliary functions.

Auxiliary functions:
1 Crane incline
2 Wind speed
3 Support force display*****
4 Turning range
5 Telescopable load

The display changed depending if the monitored auxiliary functions are turned on or off.

Monitored auxiliary functions turned off:
– No error:
  Icons are not shown.
– Error in one function:
  Icon with error message is shown.

Monitored auxiliary functions turned on:
– Optional icons (customer request) are displayed permanently.

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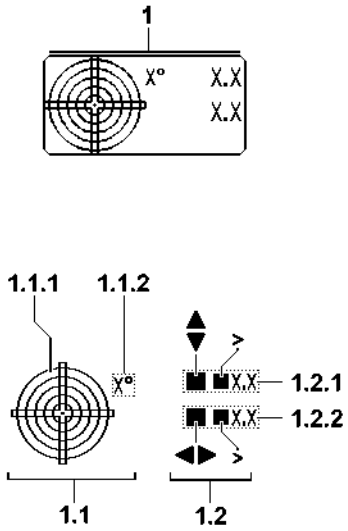

Fig.113461

LWE/LTM 1130-5-1-004/20502-04-02/en

5.5.1 Crane incline

WARNING
The crane can topple over!
The „larger than symbol“ shows that the crane is inclined further than can be shown!
The exact incline can then not be read!
▶ Do not exceed the permissible incline of the crane!

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 directional data refers to the direction of the crane superstructure (view from the cab)

1.1 Graphic part

1.1.1 Graph
- The graphic display is in the form of a spirit level, with a moving dot representing the air bubble. The center of the dot shows the incline value.

1.1.2 Resolution of view
- This value describes the resolution of the graphic view. The resolution is matched automatically to the incline.

1.2 Numeric part

1.2.1 Longitudinal direction
- Incline of crane in longitudinal direction in [°]
- The arrow shows the direction of the incline
- If the „larger than symbol“ appears, then the crane is inclined further than can be shown!

1.2.2 Lateral direction
- Incline of crane in lateral direction in [°]
- The arrow shows the direction of the incline
- If the „larger than symbol“ appears, then the crane is inclined further than can be shown!

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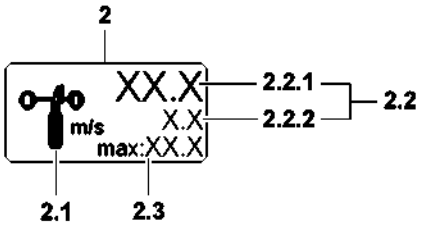

Fig.106976

5.5.2 Wind speed

2 „Wind speed“ icon
- The wind speeds are displayed in [m/sec.] or [ft/sec.] depending on the customer specific units of measurement

WARNING
Danger of accidents due to non-existing or defective wind sensor!
If the following notes are not observed, dangerous situations can arise up to toppling of the crane.
Personnel can be severely injured or killed!
- ▶ Make sure, before operating the crane, that the wind sensor or sensors are „plugged in“ and fully „functioning“.
- ▶ There is no automatic system monitoring for the „presence“ of the wind sensor during crane operation! For that reason, it is imperative that the crane operator regularly checks for the „presence“ of the wind sensor, (see function key F4 in Crane operation section).

2.1 „Wind speed“ icon
- In [m/s] or [ft/s]

2.2 Current wind speeds

2.2.1 Current wind speed WG 1
- In crane operation with equipment / accessories: Double folding jib*****, Auxiliary boom*****
- **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 location of the wind sensor, from „outside“ (accessory) to „inside“ (telescopic boom). The wind speed of the „exterior“ wind sensor is displayed in **2.2.1** („large“) and the wind speed of the „interior“ wind sensor is displayed in **2.2.2** („small“).
  Note:
  If only one wind sensor is installed and connected to the LSB bus, the wind speed is displayed in **2.2.1**.

2.2.2 Current wind speed WG 2
- If two wind sensors are installed and connected to the LSB bus, the wind speed of the „inner“ wind sensor is displayed in **2.2.2**.

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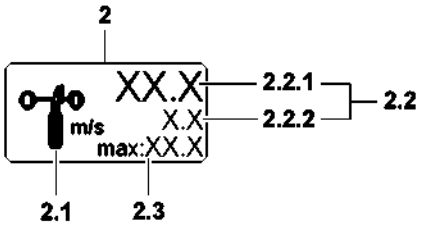

Fig.106976

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.

WARNING
Danger of toppling the crane!
If the maximum permissible wind speed is **exceeded** on an erected crane boom system – the maximum value starts to blink and the acoustical alarm „Short horn“ sounds – then dangerous situations can arise (for example: due to swinging load), up to toppling the crane.
Personnel can be severely injured or killed!
- ▶ **The crane movements will not be shut off!**
- ▶ The danger notes in chapter 2.04 in the Crane operating instructions must be strictly observed and adhered to.

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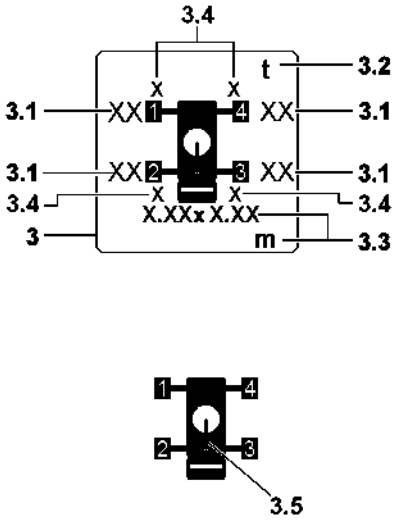

Fig.115204

5.5.3 Support force display

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.
  The icon „Support force display“ **3** may be displayed by program „Crane operation“, if required, or the icon appears automatically with the alarm signal „short horn“ when a critical situation occurs, when a support has reached or exceeded maximum force or has reached or fallen below the minimum force. The corresponding value is shown by a blinking display.

Note

- ▶ The same maximum support force and a common minimum support force is programmed for each support at the factory. These 5 values may be changed in the support force editor depending on the situation. (Refer to section „Changing minimum and maximum support force limits“.)
- ▶ Independent of the programmed minimum / maximum values monitoring is continuous, if the total of the two lowest support forces is less than 15 % of the total support forces. If this limit is fallen below, the two supports with the lowest forces are shown blinking.
- ▶ If length sensors***** are installed in the sliding beams, the extension length is shown in [%] in the icon „Support force display“ **3**. If the extension length corresponds to the nominal value for the set equipment configuration, then the value is shown in „green“. If the extension length does not correspond to the nominal value for the set equipment configuration, then the value is shown in „red“.

WARNING

Danger of accident!

- ▶ When reaching the programmed minimum / maximum support force limits, there is **no** automatic shut off of crane movements!

WARNING

Danger of tipping backward!

- ▶ When the two supports with the lowest forces are in the direction of the boom, telescoping in and luffing up the telescopic boom is shut off.

3.1 Display of current support force

- Display of support force for each support

NOTICE

Danger due to erroneous support force display!
The support force display may in some circumstances be defective or inaccurate.

- ▶ Also refer to hazard warnings in section „Support force monitoring“.

3.2 Weight unit of support force

- In [t] or [kips]

3.3 Display of support base

3.4 Extension length of sliding beam

- In [%]

3.5 Alignment of telescopic boom

- The bar symbolizes the current alignment of the telescopic boom

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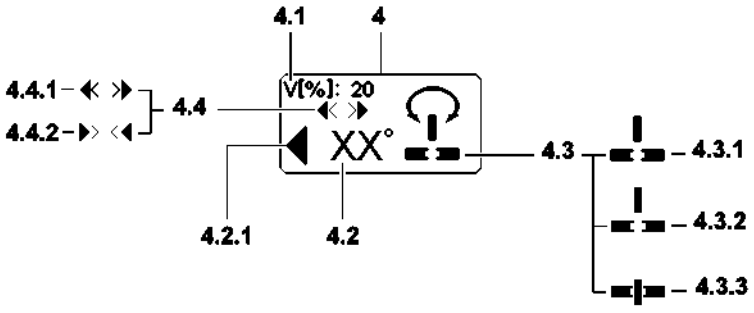

Fig.106978

5.5.4 Turning range

4 „Turning range“ icon

4.1 Maximum rotation speed
- V: [%]
- Identifies the current (selected) „maximum rotation speed“ of the slewing gear with a fully deflected master switch, relating to the maximum attainable rotation speed of the slewing gear at a preselected speed of 100 %.
  This value can be infinitely preselected, see section settings window „Speed reduction master switch“.

DANGER
Danger of accidents in case of excessive rotation speed!
▶ Make the preselection according to the specifications in the load chart.

4.2 Current superstructure position*****
- In relation to the working direction „to the rear“ (0 [°])
  Increases up to the maximum value of 180°

4.2.1 Direction of rotation of superstructure

The arrow in front of the value indicates the direction of rotation of the superstructure.
- Arrow to the right: The superstructure is turned to the right.
- Arrow to the left: The superstructure is turned to the left.

4.3 Status of turntable pinning between superstructure and chassis

4.3.1 Lock is unpinned and static
- Locking pin on top: Turntable unpinned.

4.3.2 Lock is unpinned and blinking
- Locking pin in intermediate position: Error.

4.3.3 Lock is pinned and static
- Locking pin on the bottom, turntable pinned

Note
▶ The turntable pinning and unpinning is carried out on the operating and control unit (BKE), see chapter 4.01.

4.4 Operating mode of the slewing gear*****

4.4.1 Flexible slewing gear „freely rotating / coasting“

4.4.2 Flexible slewing gear „fixed“

Note
▶ The operating modes of the slewing gear and their settings are described in section „The settings window - Speed reduction master switch“.

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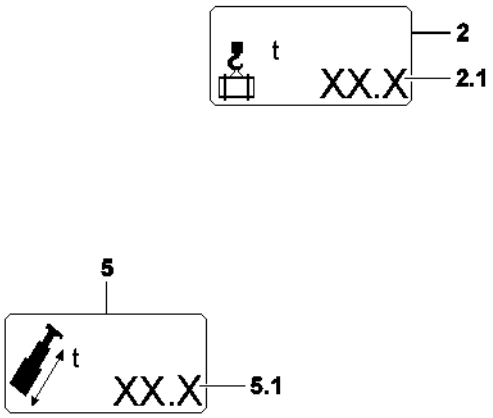

Fig.106979

5.5.5 Telescopable load

5 „Telescopable load“ icon
- The „telescopable load“ **5.1** with which the boom can be telescoped is shown in the icon.
- This icon is automatically shown when the „telescopable load“ **5.1** is „0“ or smaller than the „current load“ **2.1** (actual load)
- The value of the „telescopable load“ **5.1** blinks
  Note:
  The „Telescopable load“ icon **5** cannot be faded out on the LICCON monitor if the value is blinking.
- The „Telescopable load“ **5** icon can be faded out when the „current load“ **2.1** (actual load) is smaller or the same as the „telescopable load“.

5.1 Telescopable load
- In [t] or [lbs]
- The weight unit [t] or [lbs] defined in the load chart is displayed in the icon, under which the telescopic boom can still be telescoped

Note
▶ Exceeding the „Telescopable load“ results in no shut offs.
▶ The icon „Telescopable load“ can be faded in manually via function key „**F3**“.

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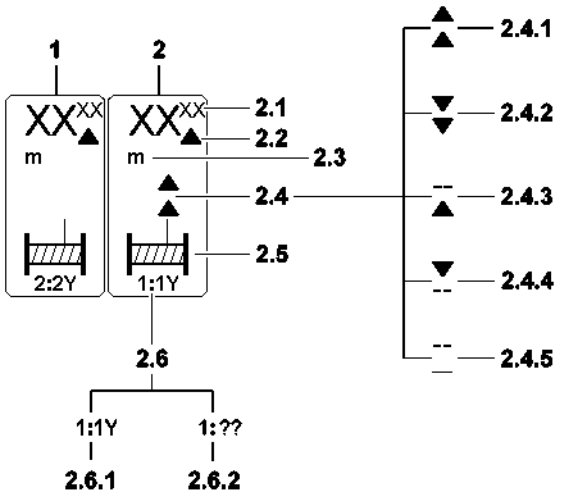

Fig.106980

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5.6 „Winch display“ icon

5.6.1 Winch 2

1 „Winch 2“ icon
- **Note:**
  The meaning of the icons for winch 1 and winch 2***** is identical and is explained on icon „winch 1“ **2**.

5.6.2 Winch 1

2 „Winch 1“ icon

2.1 Rope length spooled up / out
- In [m] or [ft]
  From a zero point to be determined.
- For individual operation (all winches individually controllable) with the reeving set in the „Set up“ program: Completed hook path.
- The positions before the decimal point are displayed with a maximum of 3 large digits. The digits after the decimal point are displayed with small digits. (Also refer to the description of the function keys **F1** and **F2**.)
- A prerequisite for a correct display is that the value entered equals the actual number of rope strands between the boom head and the hook block.
  If the set reeving does not match the reeving of the winch involved (for example, winch on the auxiliary boom at a set load chart for the main boom), then the correct hook path can be calculated from the displayed hook path as follows:

$$s_{Hk} = \frac{s_{Ha} \times n_e}{n_t}$$

Fig.197057

Legend:
- s_{Hk} = correct hook path
- s_{Ha} = displayed hook path
- n_e = selected reeving
- n_t = actual reeving
- 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.

2.2 Direction of hook movement

The arrows on the length value show the direction of the hook movement in relation to the zero point:
- Arrow pointing up: Hook has moved upward from the zero point.
- Arrow pointing down: Hook has moved down from the zero point.

2.3 Length unit for hook path display
- In [m] or [ft]

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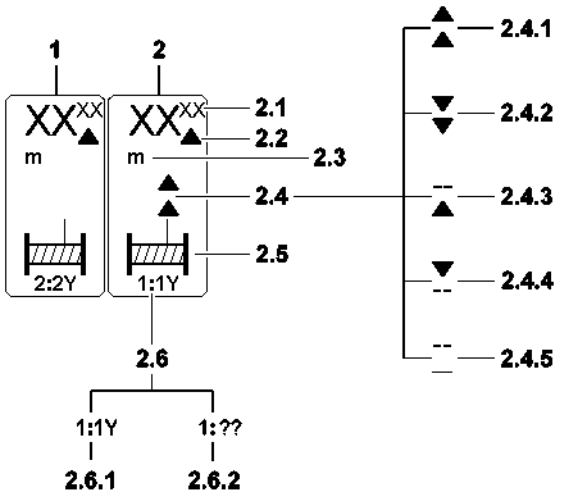

Fig.106980

LWE/LTM 1130-5-1-004/20502-04-02/en

2.4 Winch status display
- There are five winch status icons:

2.4.1 Spool out **2.4.1** (blinking)

2.4.2 Spool up **2.4.2** (blinking)

2.4.3 Spooled out
- Spooling out is blocked

2.4.4 Spooled up
- Spooling up is blocked

2.4.5 Winch is deactivated or unplugged, or the turn sensor is defective or not present on the system bus
- Spooling up and spooling out are blocked (deactivate / activate winch(es), see chapter 4.01)
- **Note:**
  If no winch status icon appears, the activated winch is inactive and is neither spooled up nor spooled out.

2.5 Winch icon
- (with rope end for winch status icon)

2.6 Winch number with master switch number and master switch operating direction

2.6.1 Winch **activated**
- **1 : 1 Y**
  - First digit (1): Winch number.
  - Second digit (1): Master switch number.
  - Letter (Y): Master switch operating direction.

2.6.2 Winch **deactivated**
- **1 : ??**
  - First digit (1): Winch number.
  - Second digit (??): Winch 1 is deactivated; no operating direction or master switch has been assigned.

Note

▶ Activating or deactivating the winches is described in chapter 4.01.

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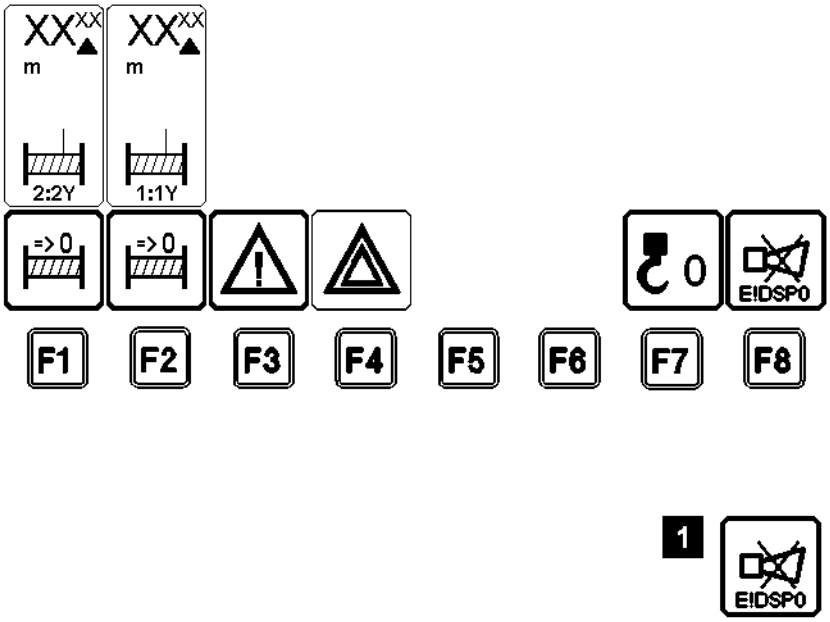

Fig.106981

5.7 The function key line (crane operation)

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 have icons assigned to them. 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
- Set the current hook position as the zero point for the 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 travel display in the winch icon above is set to „000.00“ when the key is pressed. The path measurement begins here.

F2 Function key
- Set the current hook position as the zero point for the 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.

F3 Function key
- Show monitoring field
- Using the function key **F3**, the „monitoring field with its monitoring functions“ can be shown

Note

▶ The monitoring functions in the monitoring field are always active; only the monitoring field can be hidden.

▶ If a warning event occurs, there is an acoustic warning (horn) and the „monitoring area with a warning icon“ is displayed on the LICCON monitor, even if the monitoring area was previously hidden. Pressing function key **F3** changes to the „monitoring field with monitoring functions“.

F4 Function key
- Fading monitored auxiliary functions in or out
- The function key **F4** 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

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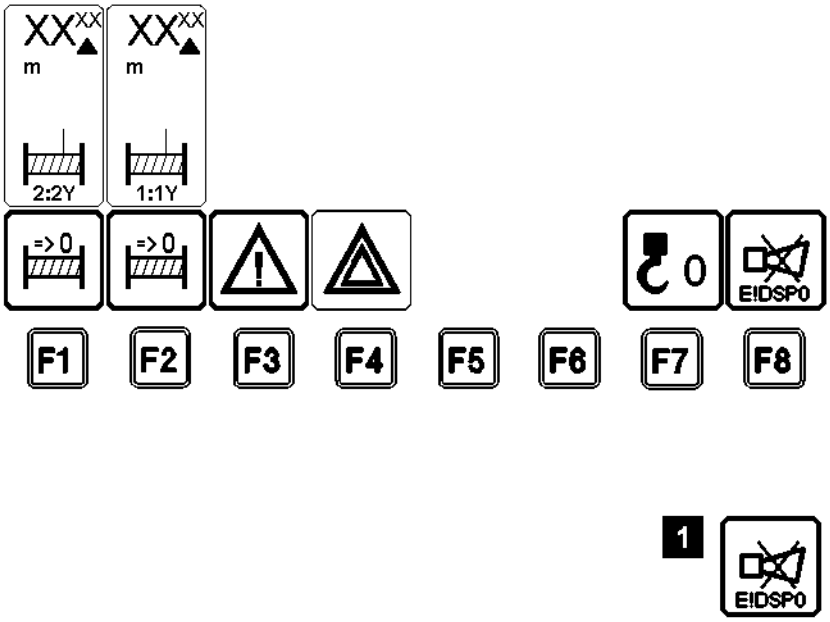

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Fig.106981

F5 Function key
- Not assigned

F6 Function key
- Not assigned

F7 Function key
- Turn tare function on or off
- Pressing the function key **F7** sets the actual load display to „zero“ and the icon of function key **F7** is displayed in „red“. 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, lifting 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.
- The taring is cancelled by one of the following three actions:
  1.By pressing the function key **F7** again.
  2.By telescoping the boom by more than 3 LE (dm or 1/10 ft.).
  3.By luffing by more than ±4°.

F8 Function key
1.Turn the horn off / error diagnostics
2.Turn off the acoustic warning
  The „Horn“ and „Short horn“ acoustic warnings can be turned off by pressing the function key **F8**.
  A new error turns the acoustic warning on again.
3.Error message in „Horn“ icon
  If a system, application or operating error occurs, an error message appears in the „Horn“ icon (refer to illustration **1**).
  Example: E!DSP0
  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**).

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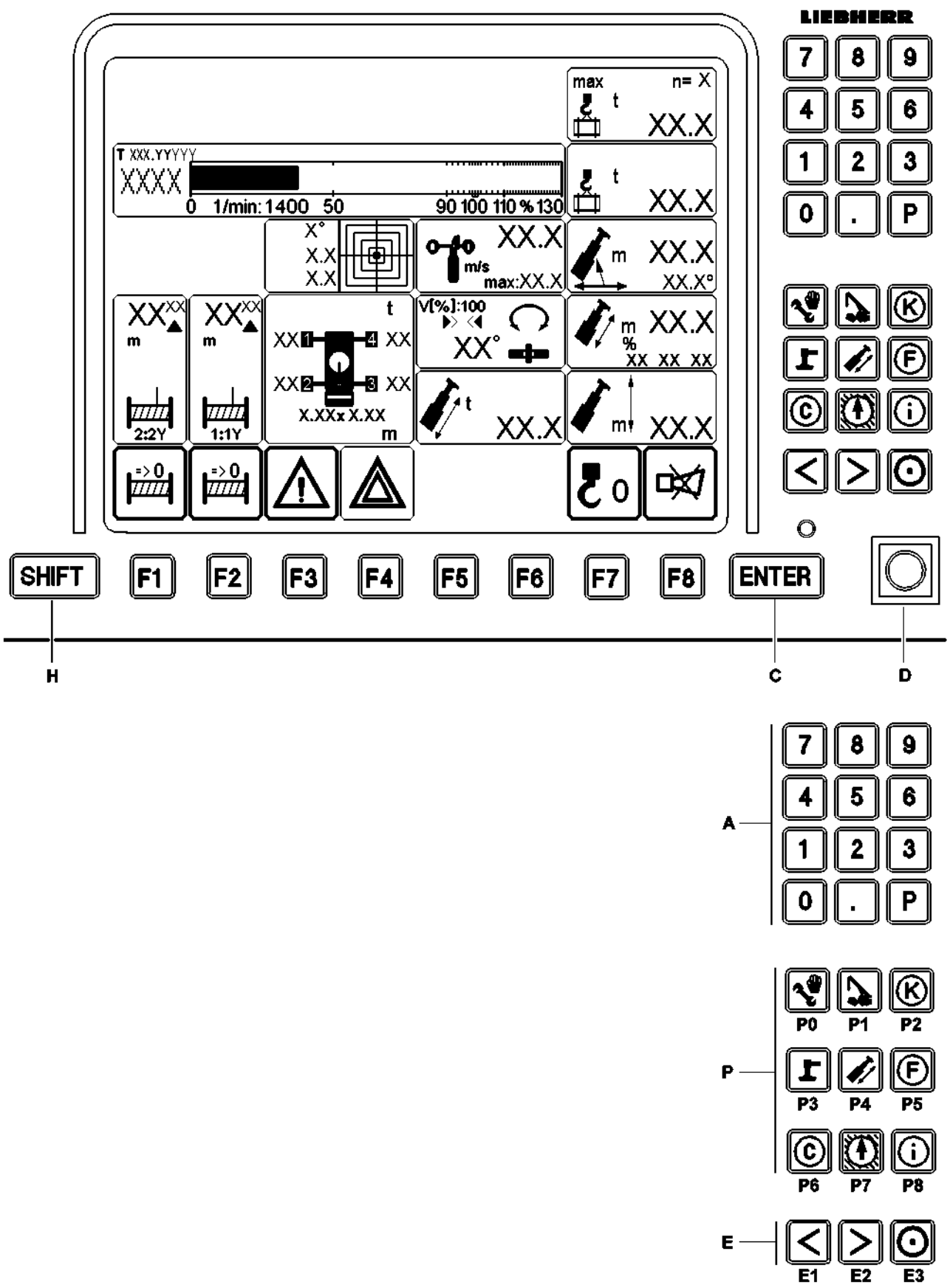

Fig.115208

5.8 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 program „Crane operation“.

A Numeric keypad
Keys „0“ to „9“ and „P“ have no function in the „Crane operation“ program.

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“ using the „O.K.“) must always be observed.
  Note:
  The program currently running **cannot** be called up again using its program key.
  The programs can only be called up with the program key when no functions are activated via the set up key **D** at the same time.

C Enter key
- No function in „Crane operation“ program

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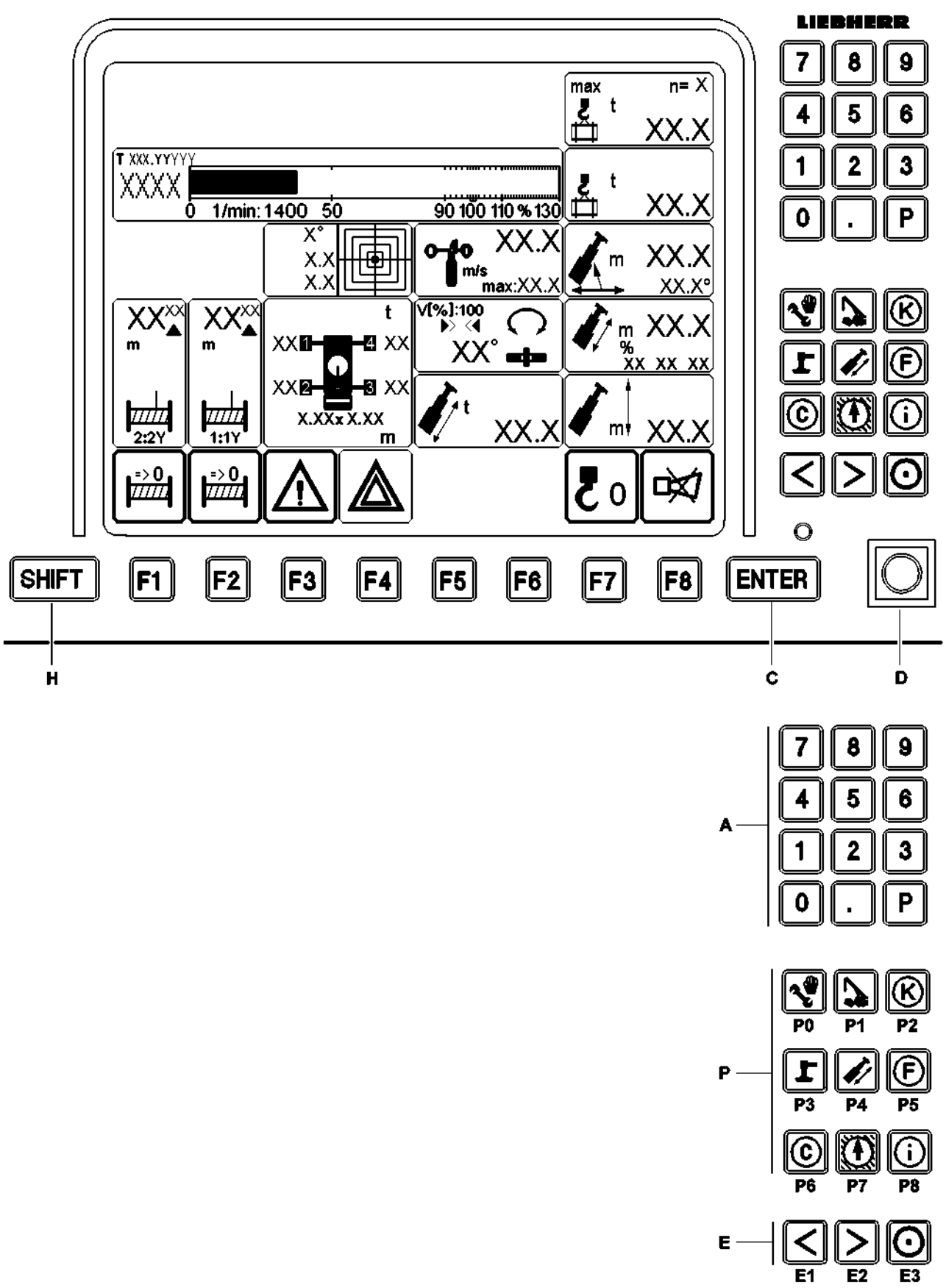

Fig.115208

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 off limits can be exceeded by the set up key **D** in the „right touching“ position. To do so, chapter 4.20 in the Crane operating instructions must be observed!

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!

- **Bypass of the hoist top shut off**
  If the hook block contacts the hoist limit switch weight during its upward movement, the hoist limit switch is triggered. The crane movements „Spool up winches“, „Luff telescopic boom down“ and „Telescope telescopic boom out“ are shut off. This shut off can be bypassed by the set up key **D** in the „right touching“ position. To do so, chapter 4.20 in the Crane operating instructions must be observed!

E Special function keys
- Monitor brightness adjustment (see section „Operating elements of the LICCON computer system“)

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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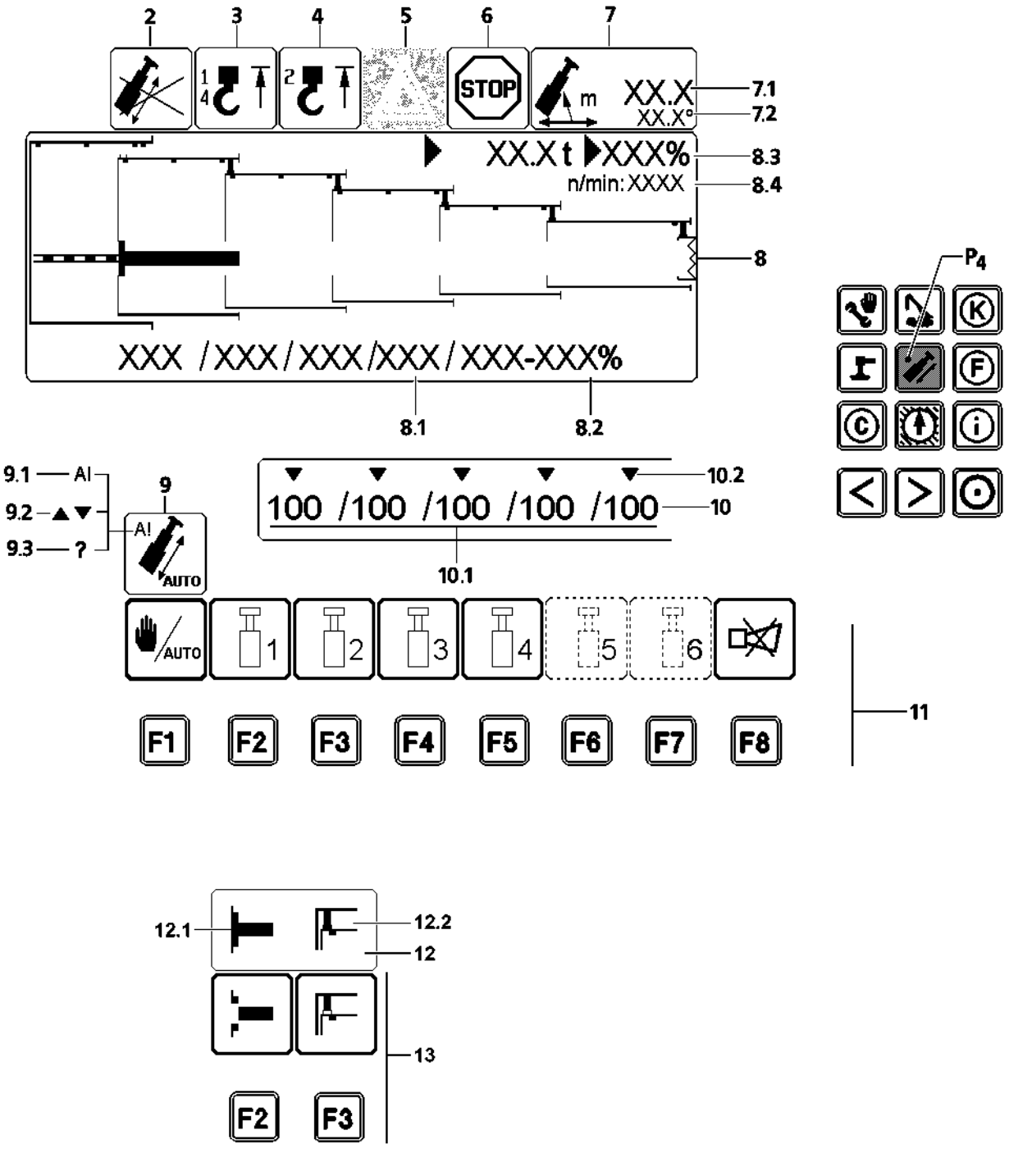

Fig.111451

6 „Telescoping“ program

The telescoping screen shows the crane operator the pinned state of the telescopic boom, the position of the individual telescopes and the extension state of the telescopic cylinder, in full dynamic graphics (refer to chapter 4.05 „Crane operation“).

6.1 Starting the program

▶ Press program key **P4**.
or
Automatic start from „Operation“ program when telescoping target (A!) **9.1** is reached and telescoping at master switch.

6.2 User interface

For a description of icons 2 to 7, see section „Alarm functions“ in the „Operation“ program.

2 Preventing further telescoping processes in relation to the telescoping cylinder
- Due to exceeding the expected load in the unpinned state
- **Note:**
  This is the same program-specific illustration of the same topic as in section „Telescopable load“.

3 „Hoist top“ on HES1 and / or HES4 icon

4 „Hoist top“ icon on HES2 or HES3

5 „Advance warning“ icon

6 „STOP“ icon

7 „Boom radius“ icon

7.1 Radius
- In [m] or [ft]

7.2 Main boom angle to the horizontal
- In [°]

8 „Stylized illustration of the telescopic boom“ icon

8.1 Current extension condition of the telescopes
- In [%]

8.2 Current extension condition of telescoping cylinder
- In [%]

8.3 Display of actual load and utilization of crane in percentages
- In [t] or [lbs] and in [%]

8.4 Engine speed
- In [rpm]

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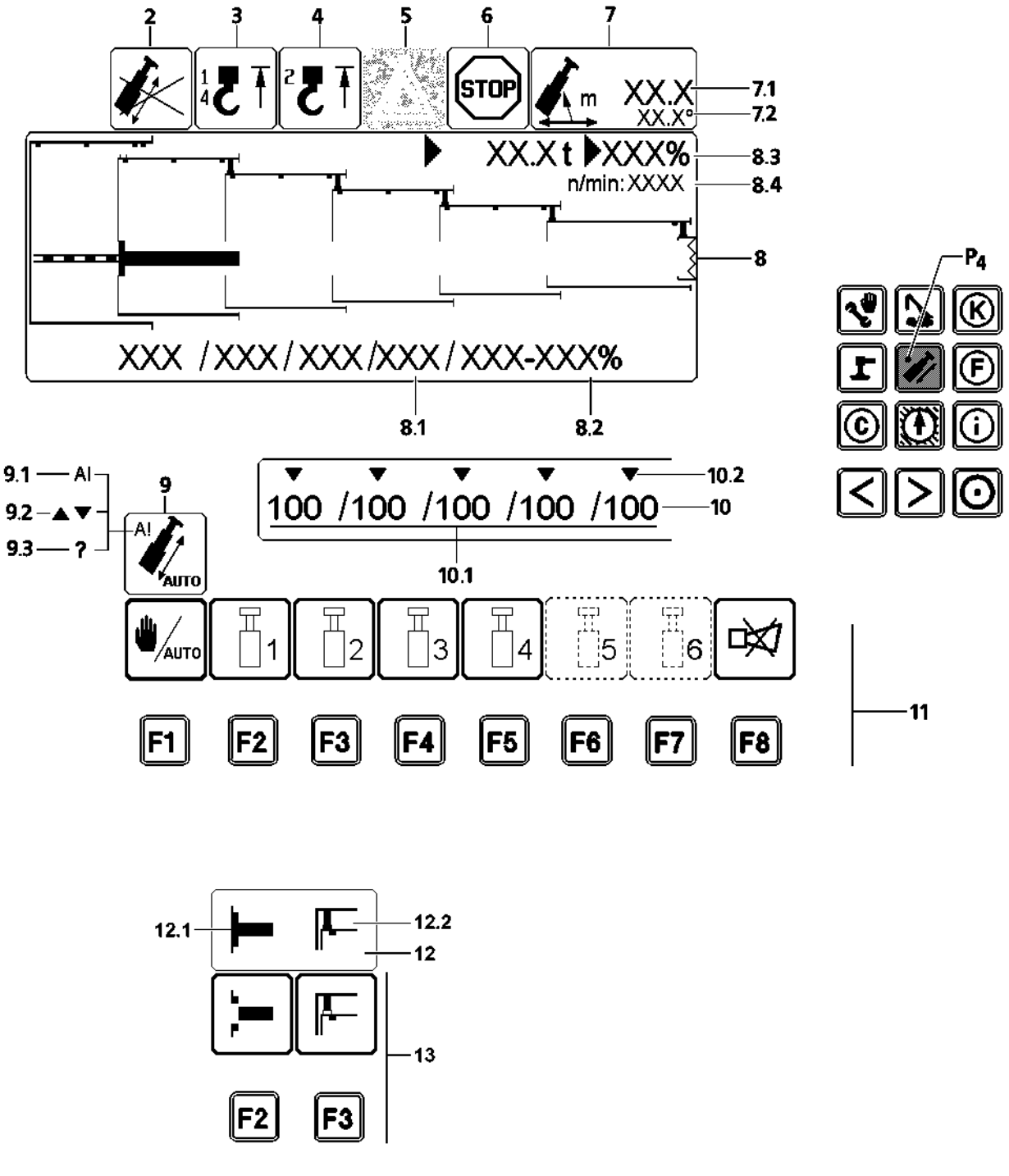

Fig.111451

9 „Automatic telescoping mode“ icon

9.1 Preselected telescoping target reached

9.2 Nominal deflection direction of master switch

Request:
Telescope in = down arrow
Telescope out = arrow up

9.3 Error in system

10 „Selected telescoping targets of the individual telescopes“ icon

10.1 Target selection for the individual telescopes

10.2 Blinking marker (arrows)
- To the selected telescoping target
- As a warning in the event of incorrect operation, target already reached, or enter new target

11 Function key line

F1 Function key
- Switch between automatic operation and manual telescoping

F2 Function key
- Target selection Telescope 1

F3 Function key
- Target selection Telescope 2

F4 Function key
- Target selection Telescope 3

F5 Function key
- Target selection Telescope 4

F6 Function key
- Target selection telescope 5***** (only for certain crane types)

F7 Function key
- Target selection telescope 6***** (only for certain crane types)

F8 Function key
- Press once:
  Turn the acoustic signal off.
- Press twice:
  Errors shown in the „Horn“ icon are automatically displayed in the error determination screen (see chapter „Diagnostics“).

12 Icon „Reports for manual telescoping“

12.1 Telescoping cylinder
- Display telescoping cylinder unpinned / pinned

12.2 Telescope pinning
- Display telescope unpinned / pinned

13 Function key bar manual telescoping

F2 Function key
- Telescoping cylinder unpinned / pinned

F3 Function key
- Telescope pinning unpinned / pinned

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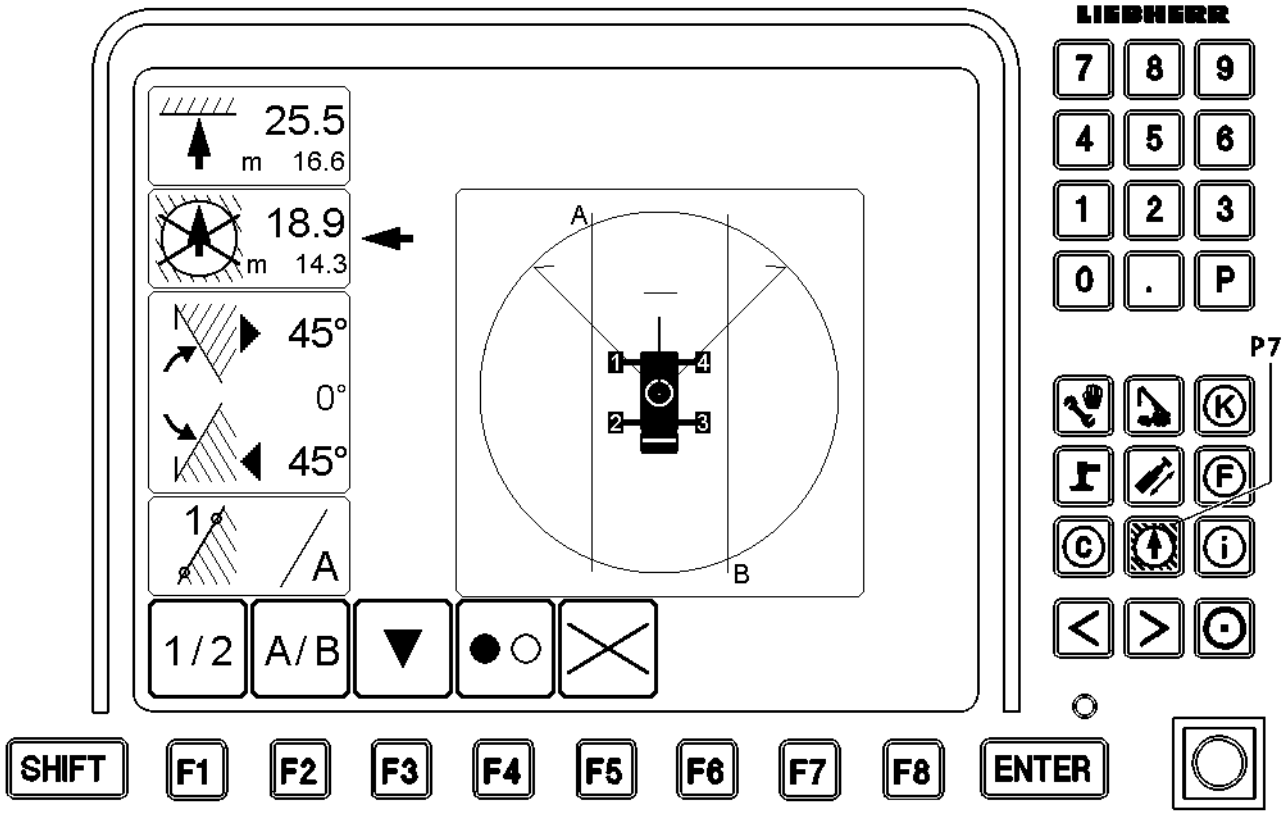

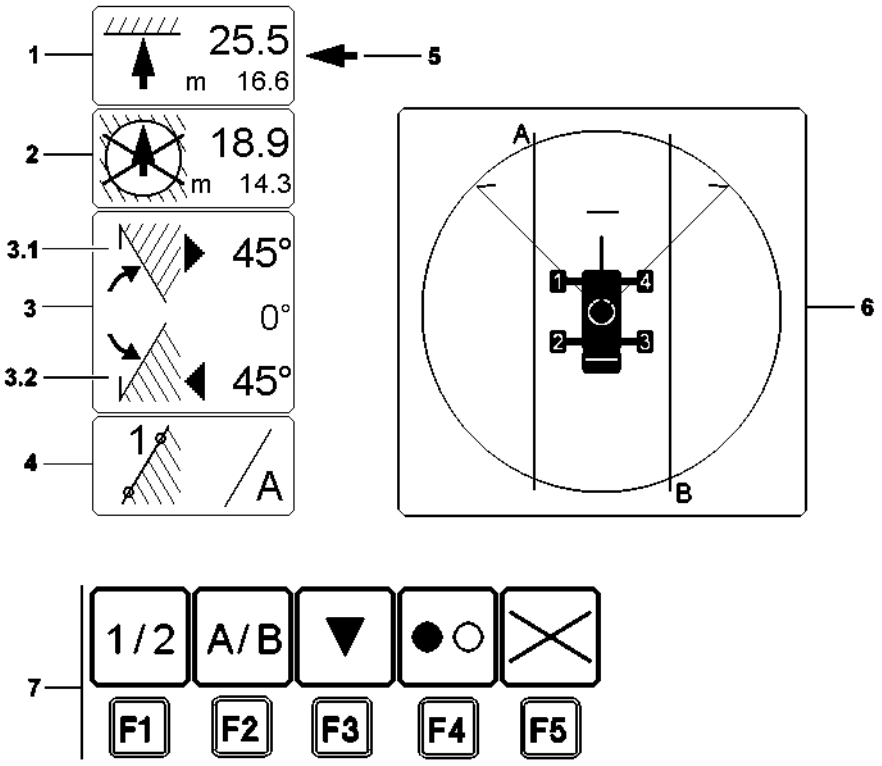

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Fig.197068

7 The „Working range limitation“ program*

A detailed description of operating range limitation can be found in the separate operating instructions for „Working range limitation“.

7.1 Starting the program

▶ Press program key **P7**.

7.2 User interface

1 „Limitation of pulley head height“ icon

2 „Radius limitation“ icon

3 „Slewing limit stop“ icon

3.1 Right slewing limit stop
- The right limit stop is shown in black

3.2 Left slewing limit stop
- The left limit stop is shown in red

4 „Edge limit with edge and point selection“ icon
- The limit function icons are shown crossed out if they are inactive

5 Function selector
- For selecting limiting functions

6 „Graphic display of programmed limits“ icon

7 Function key line

F1 Function key
- Select point 1 or 2 of selected edge A (red) or B (black)

F2 Function key
- Selected edge A (red) or B (black) that is being programmed

F3 Function key
- The function selector is moved down by one limit function

F4 Function key
- ON / OFF
  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

7.3 Displays in „Crane operation“ program

If a programmed working range limit is activated, this condition is indicated in the „Crane operation“ program by an alternative STOP icon in the position of the normal load moment limiter STOP icon (see section „Alarm functions“ in „Crane operation“ program).

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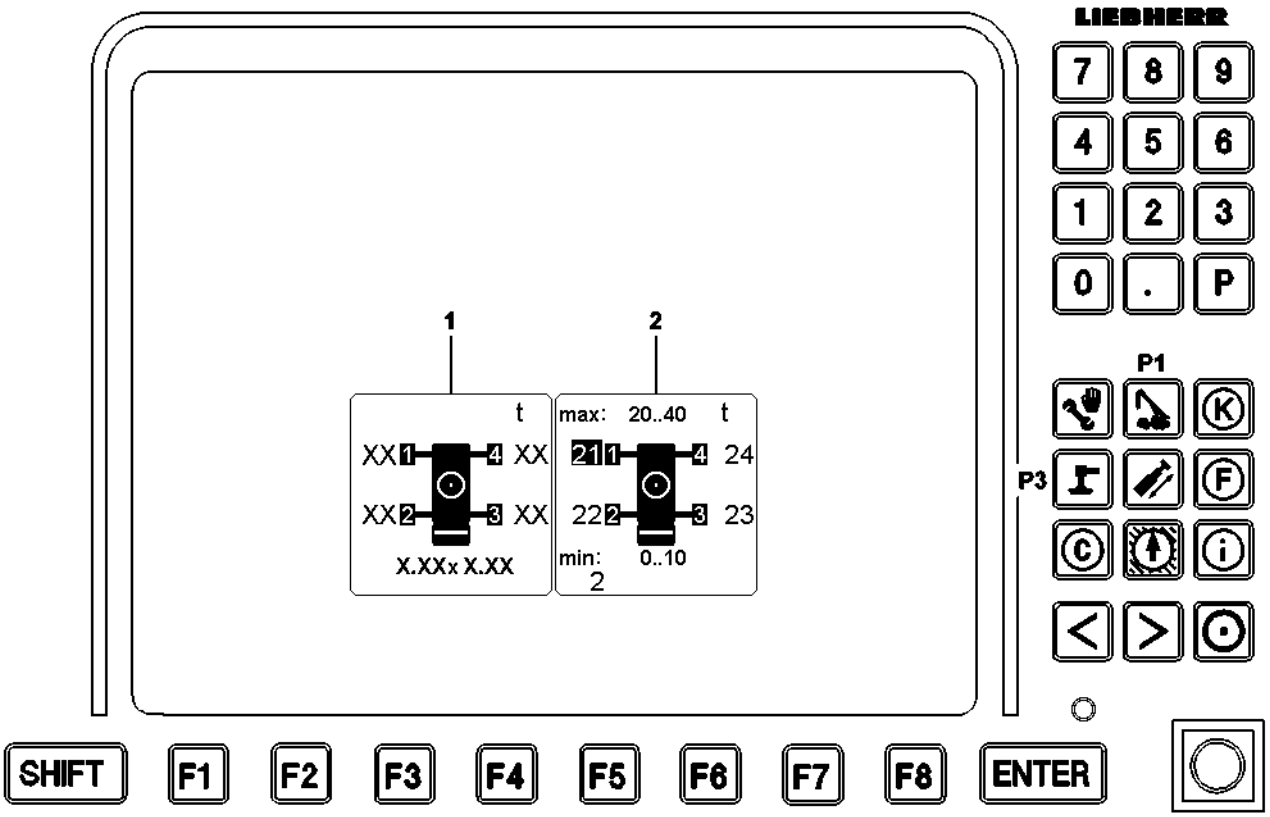

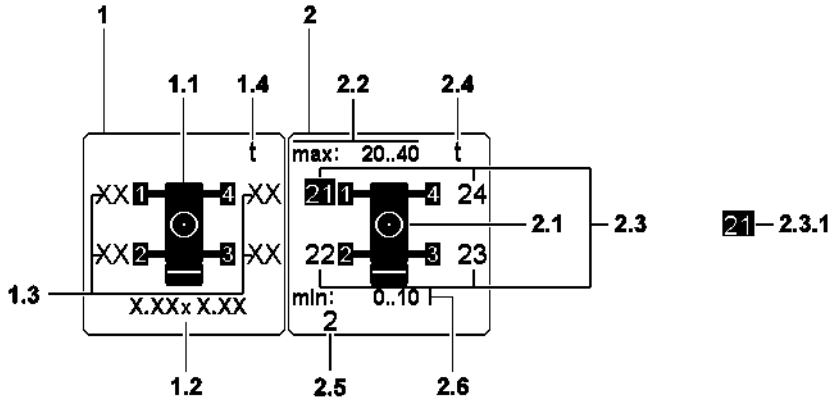

Fig.106984

8 The „Support force monitoring“ program*

Note
▶ The display values in the icons are only examples and may differ from the crane.

The monitor screen shows the complete configuration of the „Support force monitoring“ program.

Once the „Support force monitoring“ program is started, if there is no input, then after 10 s the „Support force monitoring“ program is ended, and the system switches back to the „Crane operation“ program.

DANGER
Danger of accident!
▶ The LICCON support force monitoring is only an aid. It does **not** prevent a possible crane overload!
▶ Never use the support force monitoring to utilize the crane up to its tipping limit!

8.1 Starting / stopping the program

8.1.1 Starting the program

▶ Press the program key **P3**.

8.1.2 Stopping the program

▶ Press any program key.
or
Wait 10 s.

Result:

– „Support force monitoring“ program is ended.
– System switches back to the „Crane operation“ program.

8.1.3 Program configuration

– **Support force monitoring***
This support force monitoring records the current pressure continuously during crane operation at all four support cylinders using pressure sensors, and displays this as the supporting force for every support. Because the limit values are variable and programmable, the support force monitoring can also be used for advance warning.

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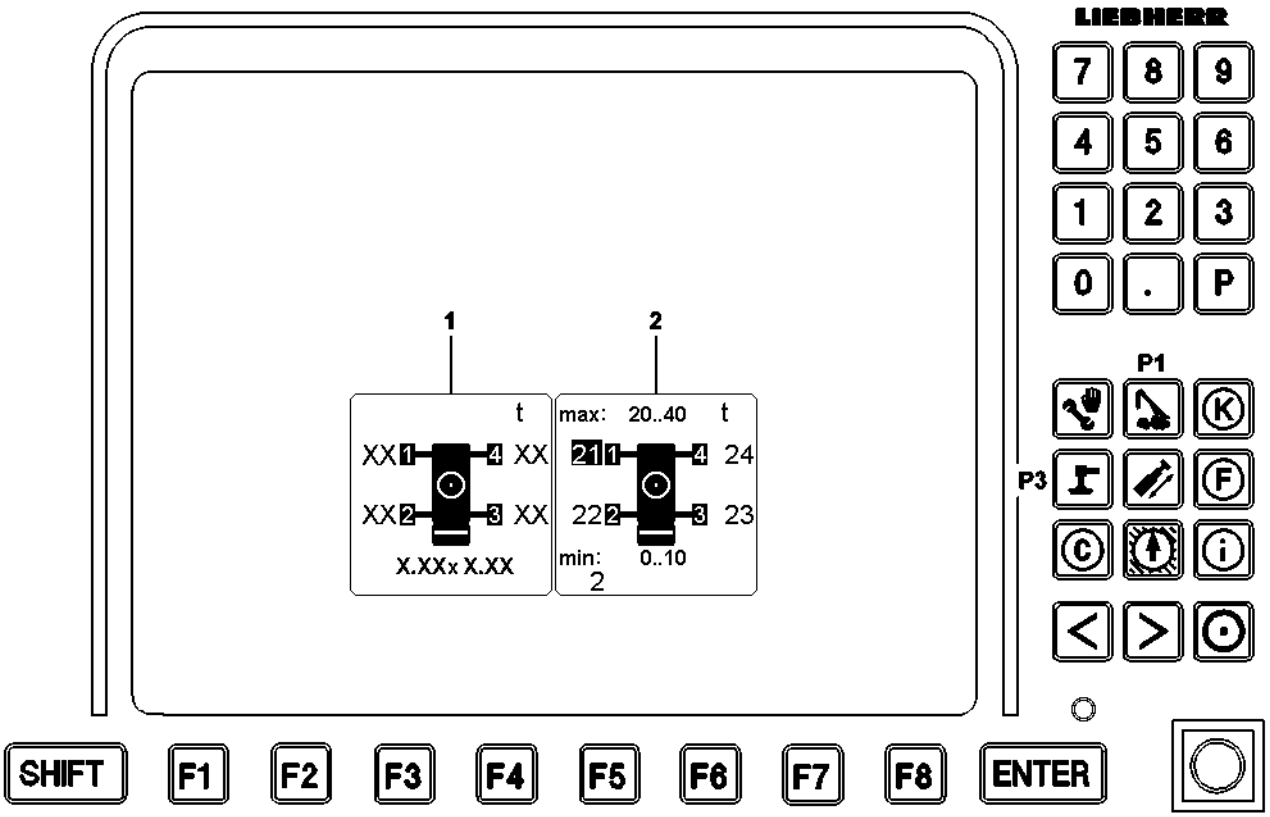

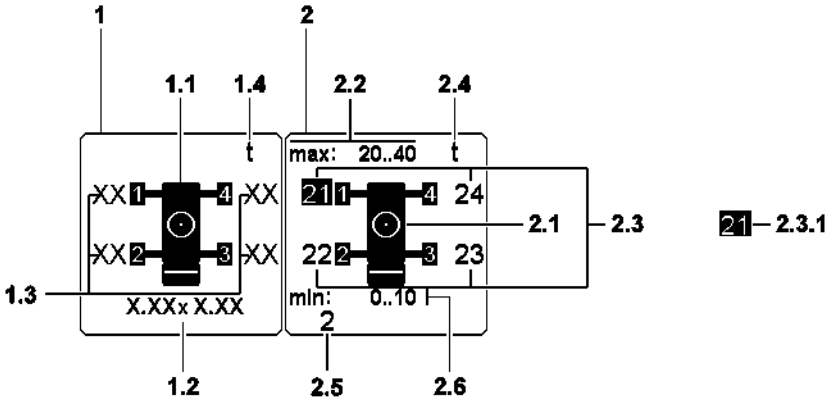

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Fig.106984

8.2 User interface

1 Monitoring and control field

1.1 Crane icon with support numbers

1.2 Selected support base
- In [m] or [ft]

1.3 current support force values
- In [t] or [kips]

1.4 Unit of displayed support forces
- In [t] or [kips]

2 Setting field for support force limits

2.1 Crane icon with support numbers

2.2 Permissible range „Maximum support force limit values“
- **Max:** In [t] or [kips].
- Permissible range of support force limits, for example from 20 t to 40 t

2.3 Set **maximum** support force limit values
- In [t] or [kips]
- The maximum support force limit values must also be entered for every support

2.3.1 Editable support force limit value
- **Note:**
  After pressing the ENTER key, the cursor „jumps“ to the next support cylinder.

2.4 Unit of maximum support force limit values
- In [t] or [kips]

2.5 Set **minimum** support force limit value
- In [t] or [kips]
- Applies to all four supports

2.6 Permissible range „Minimum support force limit values“
- **Min:** In [t] or [kips].
- Permissible range of support force limits from 0 t to 10 t

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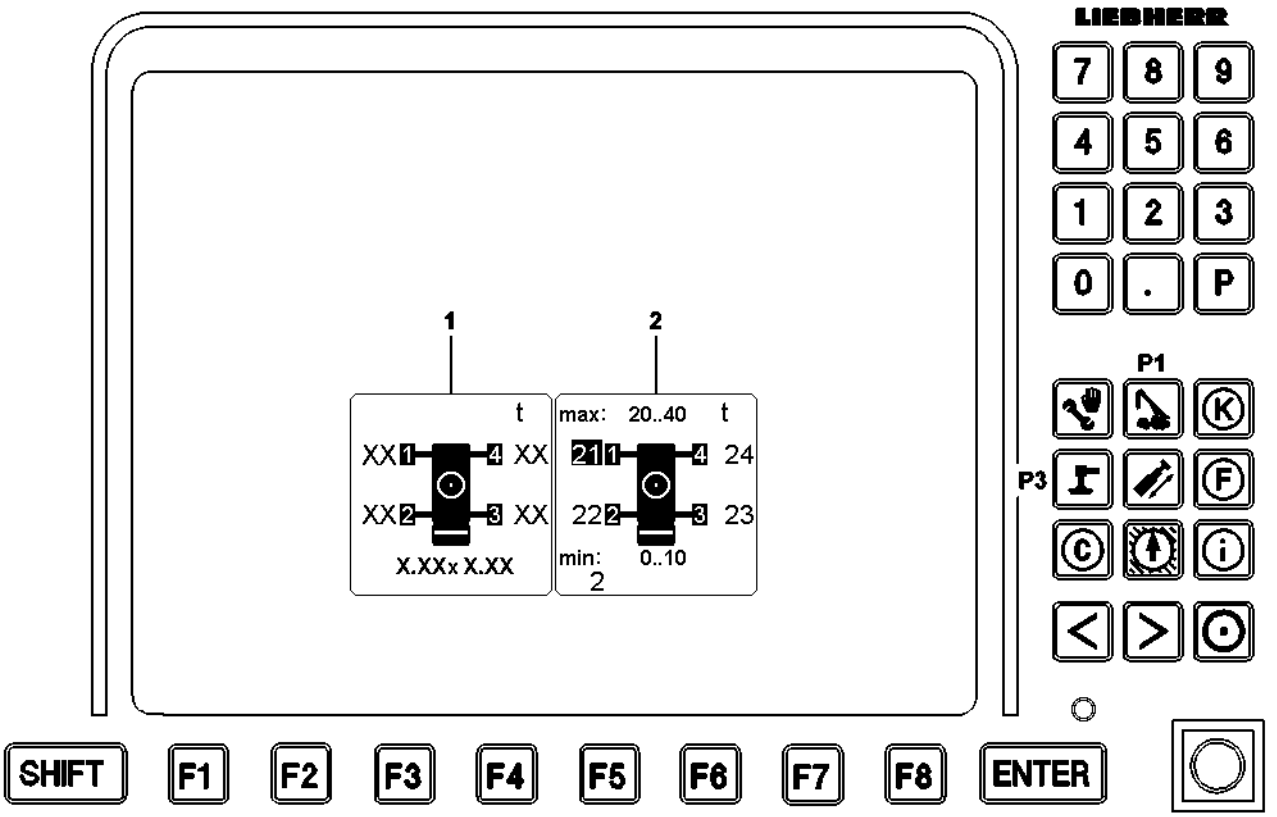

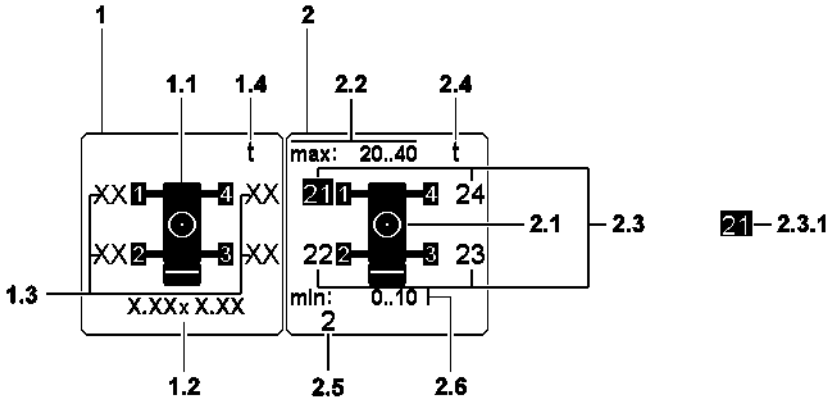

Fig.106984

8.2.1 Display current support forces

Display current support forces in operating screen, see „Monitored additional function for crane operation“.

8.2.2 Remarks

Because of the option to determine limit values yourself, the LICCON support force monitoring can also be used as a way of giving advance warning.

Be aware that the screen display may be inaccurate. Because of friction in the support cylinders, depending on the type of machine, a measurement error of up to ± 2 % of the maximum load carrying capacity of a crane is possible.

This applies particularly:
- In case of large support forces.
- In case of far extended support cylinders.
- When extending the support cylinders (up to 15 minutes afterwards).

In order to ensure that the LICCON supporting force monitoring system operates correctly, do not let the support cylinders move either on „bottom block“ or on „top block“. Otherwise the support force display will be incorrect.

WARNING
Danger of tipping over!
If a support lifts off, then, due to the friction forces in the support cylinder, a support force of more than 0 t can be shown even though no load is resting on the support any longer.
▶ Watch the support cylinders.

Note
▶ The **maximum** support force limit must be entered separately for each support.

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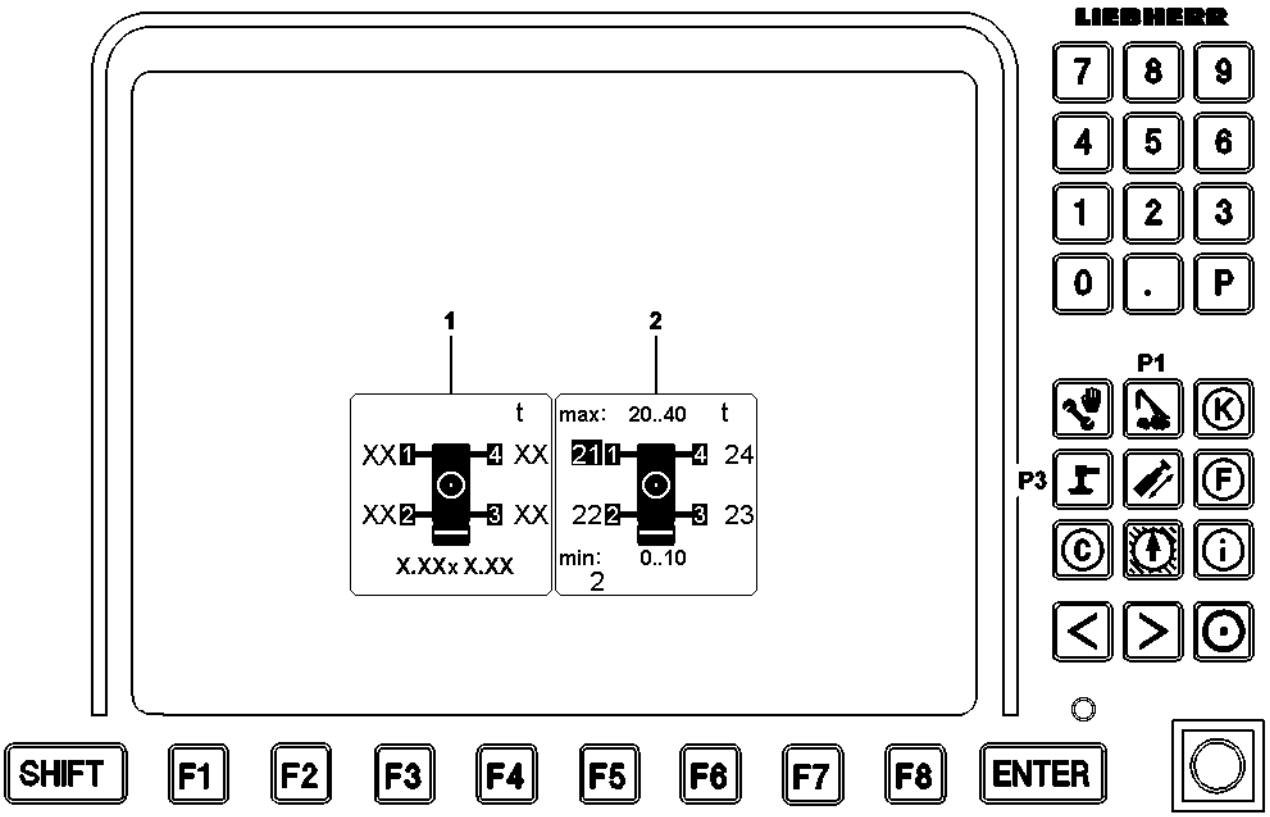

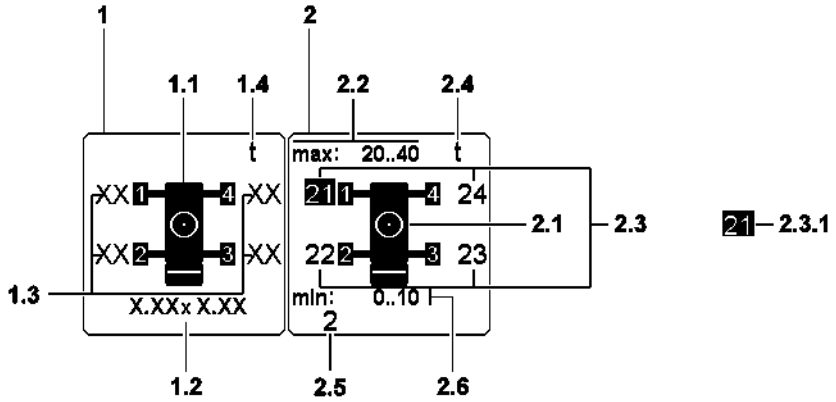

Fig.106984

8.2.3 Changing minimum and maximum support force limits

As an additional safety precaution, this program monitors the set up key **D**. If it is actuated, the system switches back to the „Crane operation“ program.

In the Monitoring and control field **1** 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 adjustment field **2**.

Ensure that:
- The crane is supported during operation.
- The set up key **D** is not pressed.

Adjustment procedure for support force limit values

Once the „Support force monitoring“ program has started, the cursor is on the maximum value for the support force limit for support 1 and is editable.

By pressing the **„ENTER“** key, the cursor changes its position in the following sequence. Starting at support 1 to supports 2, 3, 4 and then to the input field for the minimum value for the support force limit monitoring. Pressing the **„ENTER“** key again repeats this sequence.

If the support force limit values are not changed before pressing **„ENTER“**, then the existing support force limit values are used.

Procedure:

Using the numeric keypad, enter the maximum support force limit for the desired support.

Press „**ENTER**“ key.

The maximum support force limit entered for the selected support is accepted, and the cursor „jumps“ to the next support.

Note
- If a maximum support force limit of **greater than** 40 t is entered, and the „**ENTER**“ key is pressed, then the input value will be reset to the **highest** permissible maximum value of 40 t .
- If a maximum support force limit of **less than** 20 t is entered, and the „**ENTER**“ key is pressed, then the input value will be reset to the **lowest** permissible maximum value of 20 t .
- The input of minimum values (permissible range 0 t to 10 t) is done in the same way as the input for maximum values.

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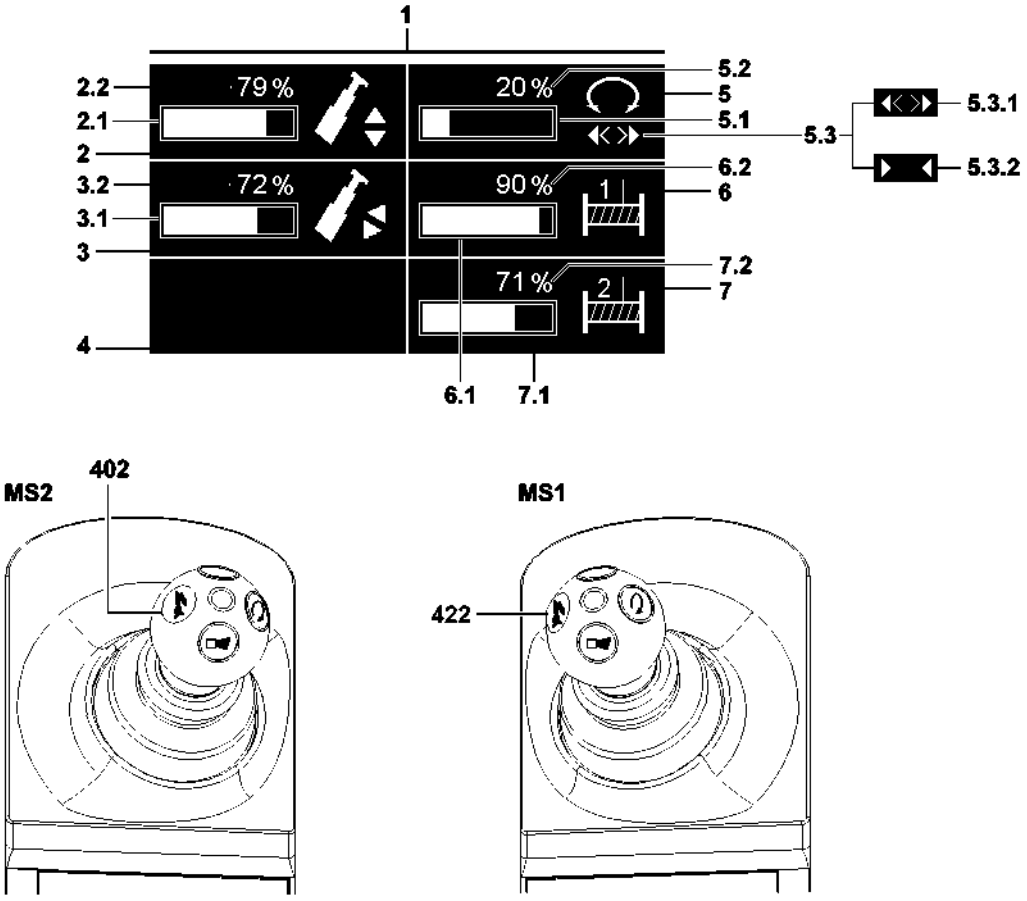

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Fig.105926

9 The settings window „Speed reduction master switch“

In the Settings window „speed reduction master switch“ **1** the speeds of various crane functions can be set from 20 % to 100 % (infinitely variable).

If a crane function is actuated by **maximum deflection** of a master switch, then the speed of the crane function is reduced to the speed sets in the settings window.

Note

- ▶ When the Rapid mode function is turned on, speed reductions of „winch 1“, „winch 2*****“ and „luffing up the boom“ are ineffective.
- ▶ Please refer to chapter 4.05.

9.1 Operating interface „settings window“

1 Settings window „Speed reduction master switch“

2 Adjustment field „Speed reduction luffing tele“

2.1 Dynamic bar display „Luffing speed tele“

2.2 Display value „Luffing speed tele“
- In [%]

3 Adjustment field „Speed reduction telescoping“

3.1 Dynamic bar display „telescoping speed“

3.2 Display value „Telescoping speed“
- In [%]

4 Adjustment field not assigned

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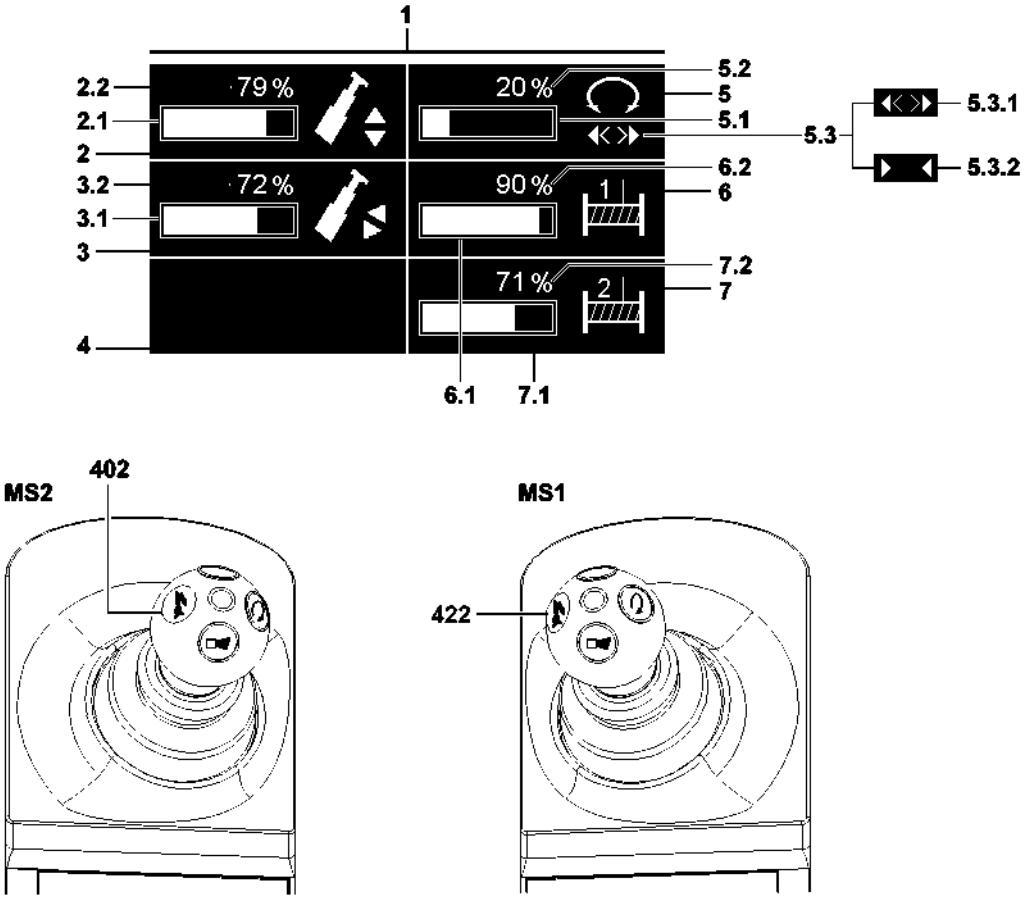

Fig.105926

5 Settings field „Speed reduction turning“

5.1 Dynamic bar display „Slewing speed“

5.2 Display value „Slewing speed“
- In [%]

5.3 Slewing gear operating mode

5.3.1 Flexible slewing gear
- „Freely turning“

5.3.2 Flexible slewing gear
- „Fixed“

6 Adjustment field „Speed reduction winch 1“

6.1 Dynamic bar display „winch speed Winch 1“

6.2 Display value „winch speed Winch 1“
- In [%]

7 Adjustment field „Speed reduction winch 2“

7.1 Dynamic bar display „winch speed Winch 2“

7.2 Display value „winch speed Winch 2“
- In [%]

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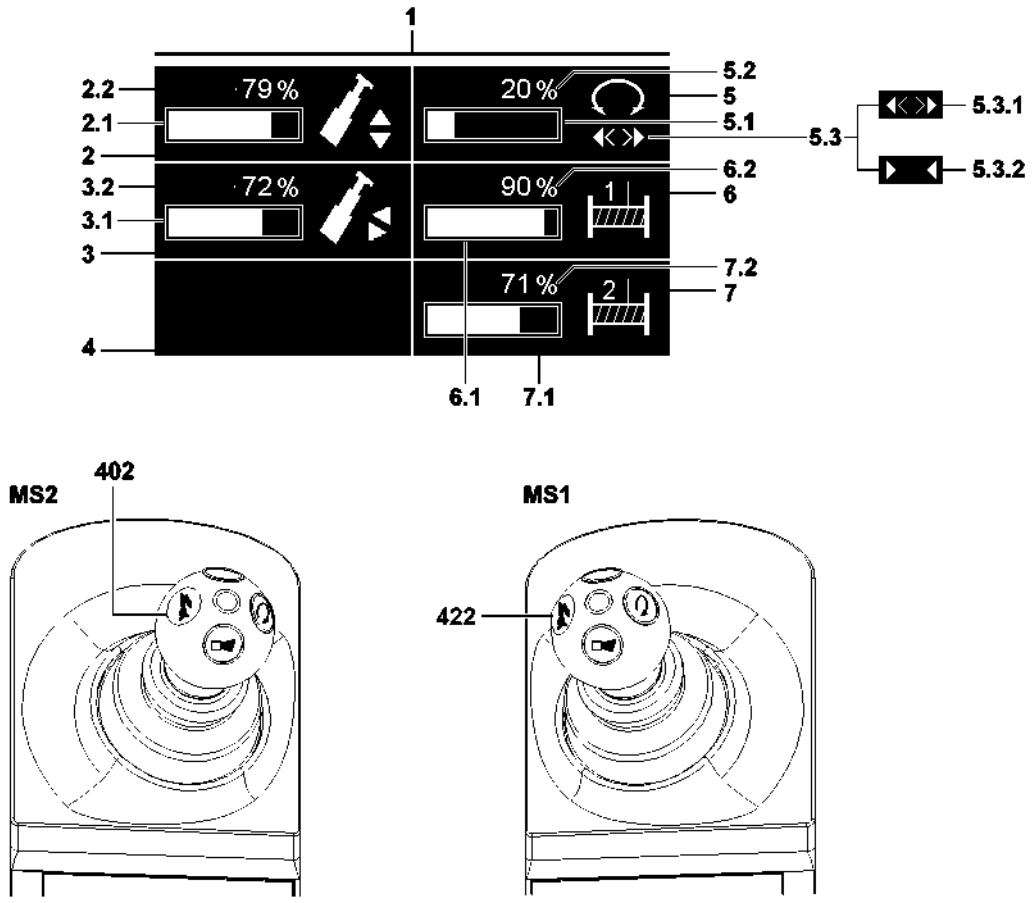

Fig.105926

9.2 Showing the settings window „Speed reduction master switch“

▶ Press the key rapid gear **402** on the master switch **MS1** for longer than 2 seconds.
or
Press the key rapid gear **422** on the master switch **MS2** for longer than 2 seconds.

Result:

– The settings window „Speed reduction master switch“ **1** is shown.

Note

▶ The settings window is automatically hidden after 10 s , if during that time there is no access to the speed reduction of a crane function.

▶ Press the key rapid gear **402** on the master switch **MS1** for longer than 2 seconds.
or
Press the key rapid gear **422** on the master switch **MS2** for longer than 2 seconds.

Result:

– The settings window „Speed reduction master switch“ **1** is hidden.

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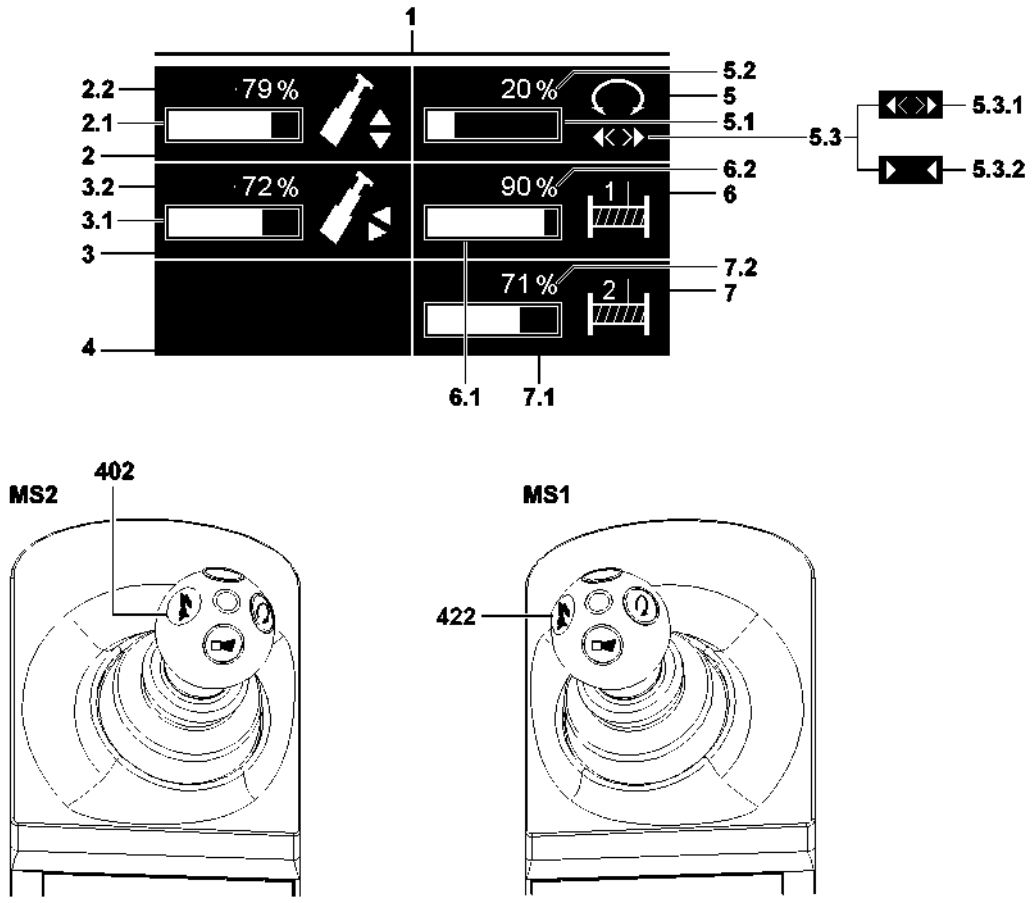

Fig.105926

9.3 Implementing speed reduction

The procedure in the settings window „Speed reduction master switch“ is identical for all crane functions.

Using the example „Speed reduction turning“, the individual steps are explained.

Note

▶ Before using speed reduction, preselect the master key assignments on the touch display on which the desired crane function is located (see chapter 4.01).

▶ Be careful with the master switch assignment for cranes with one or two winches, as the master switch assignment differ.

Make sure that the following prerequisites are met:

– The desired master switch assignment is active on the respective touch display.
– The settings window „Speed reduction master switch“ is shown on the LICCON monitor.

9.3.1 Procedure

Note

▶ The „speed reduction turning“ is set via the master switch.

▶ If the master switch is deflected lightly, the value is slowly increased / reduced.

▶ If the master switch is deflected strongly, the value is quickly increased / reduced.

▶ Move master switch MS2 in direction X- (to the left).

Result:

– The value of the slewing speed **5.2** is reduced.
– The dynamic bar display **5.1** „moves“ to the left.

▶ Move master switch MS2 in direction X+ (to the right).

Result:

– The value of the slewing speed **5.2** is increased.
– The dynamic bar display **5.1** „moves“ to the right.

–

9.4 Changing the operating mode of the slewing gear

9.4.1 Procedure

The adjustments in the operating mode of the slewing gear **5.3** can only be entered or changed in the settings window „Speed reduction master switch“ **1**.

▶ When the settings window **1** is shown on master switch MS2, press the key **402**.

Result:

The status of the slewing gear changes between:
– „Freely turning **5.3.1**“
– „Fixed **5.3.2**“

Note

▶ The status („freely turning / coasting“ or „fixed“) of the „flexible slewing gear“ is displayed in the operating screen in „Monitored additional functions“.

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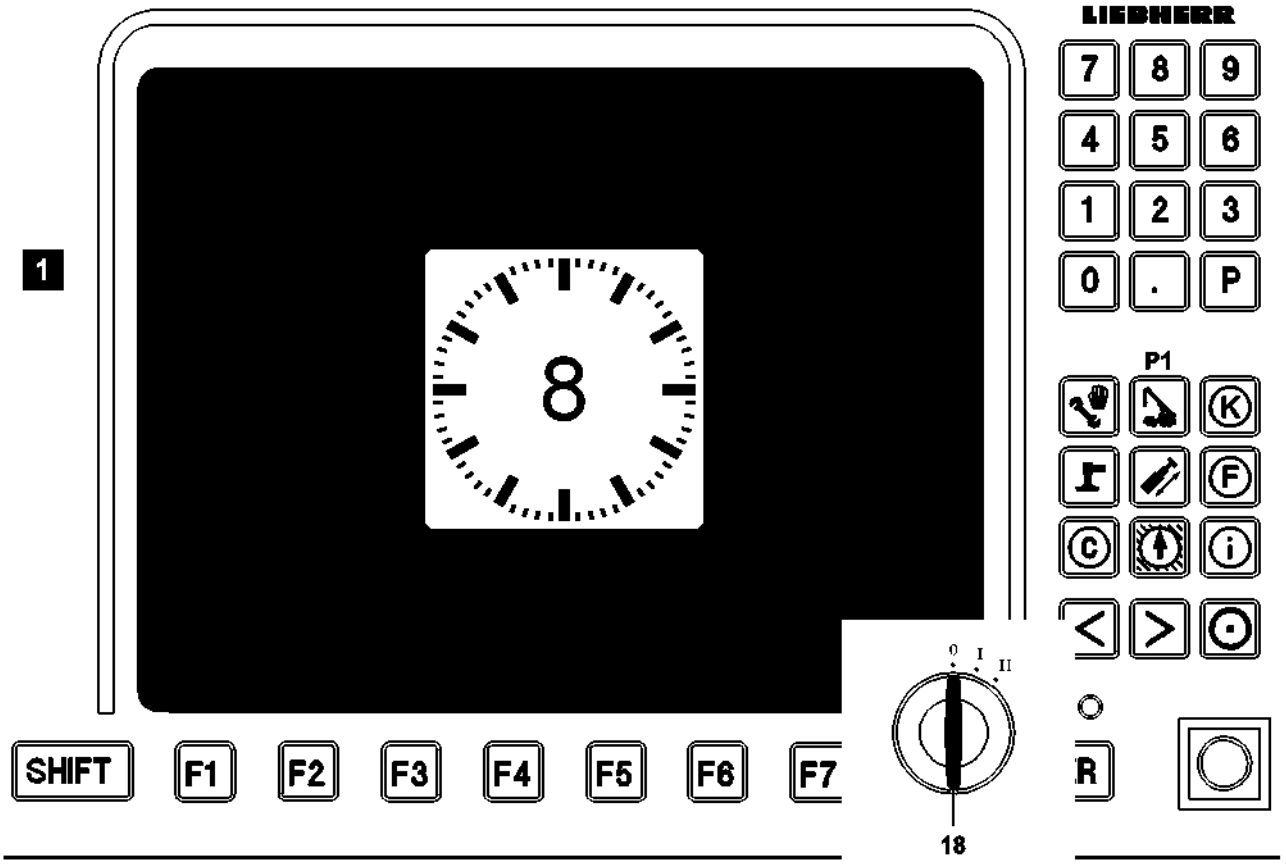

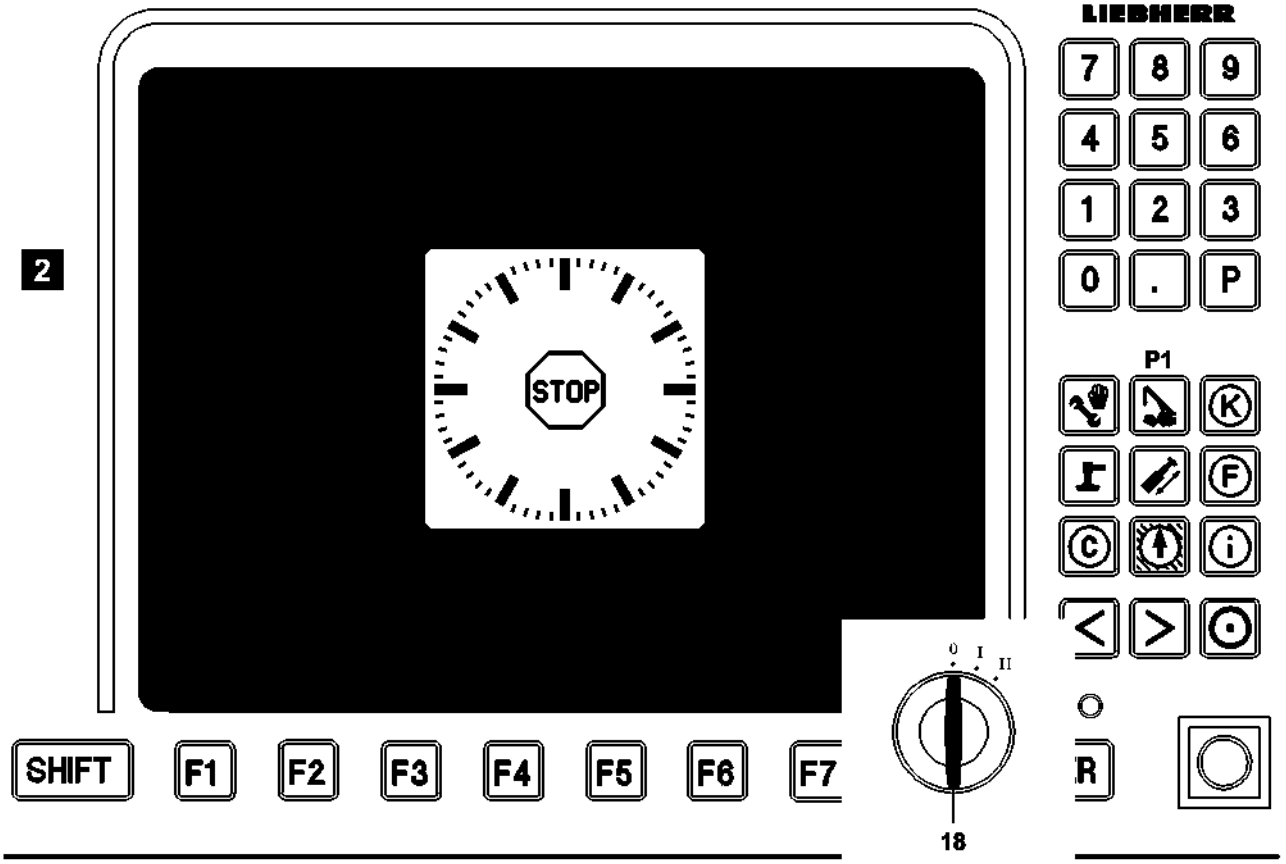

Fig.105523

10 Power-Save and Stand-by mode in the LICCON computer system

10.1 The Power-Save mode

If the crane engine - by turning the ignition switch **18** - is turned off to position 0 (ignition **OFF**), the LICCON computer system changes to Power-Save mode.

The Power-Save mode enables the crane driver - within 8 seconds of turning the ignition off - either to change to Stand-by mode or to start the crane engine again without having to start the LICCON computer system again.

If no program key is pressed within 8 seconds, then after 8 seconds are up the LICCON computer system turns off completely.

Note

▶ In the Power-Save mode, no crane movements are possible.

Turn the crane engine off.

▶ Turn the ignition switch **18** to position 0 (ignition **OFF**).

Result:

– The crane engine is turned off.
– The **Power-Save mode** is active.
– The display area on the LICCON monitor turns black, illustration **1**.
– The clock with a Power-Save run time (8 seconds) appears, illustration **1**.

Note

▶ After 8 seconds have expired, a clock appears briefly with an integrated STOP icon, which displays the complete turning off of the LICCON computer system.

– The clock with integrated STOP icon appears for a few seconds, illustration **2**.
– All processes on the LICCON computer system are stopped.
– The LICCON computer system turns completely off.

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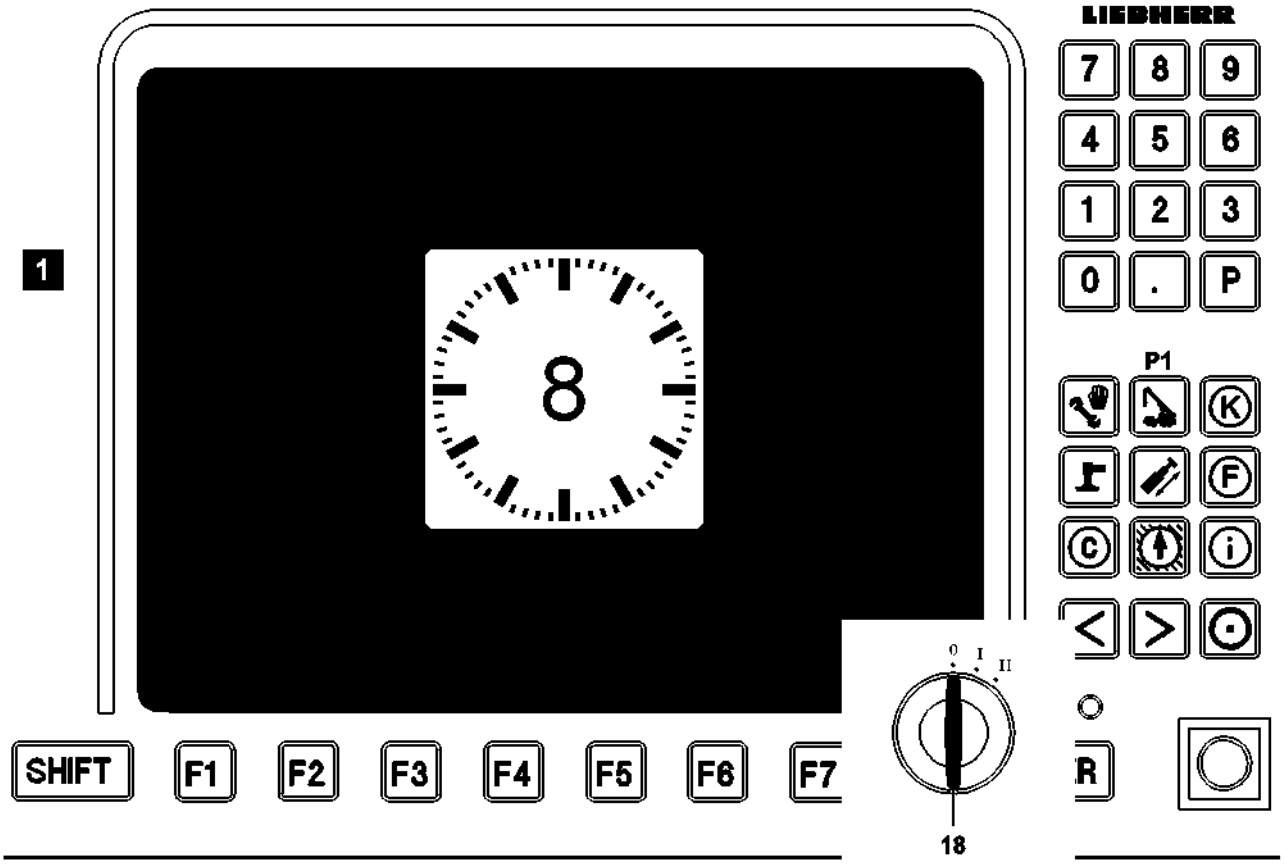

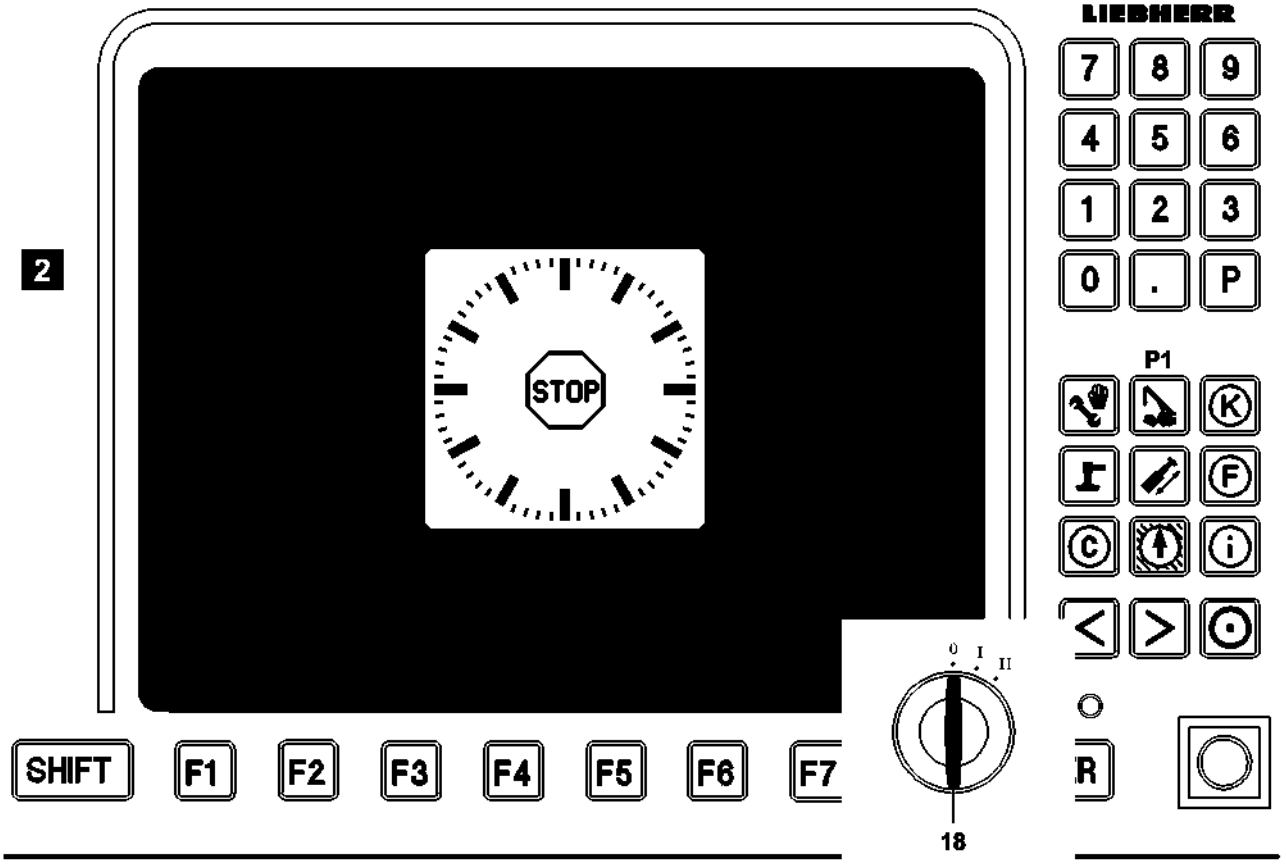

Fig.105523

Press any key in Power-Save mode once

Note

▶ Pressing a key in Power-Save mode once shortens the Power-Save alarm time to 5 seconds.

▶ Press any key.

Result:

– The Power-Save alarm time is shortened to 5 seconds.

Press any key in Power-Save mode twice

▶ Press any key twice in succession.

Result:

– The Power-Save alarm time is set to 0.
– The clock with integrated STOP icon appears for a few seconds, illustration **2**.
– All processes on the LICCON computer system are stopped.
– The LICCON computer system turns completely off.

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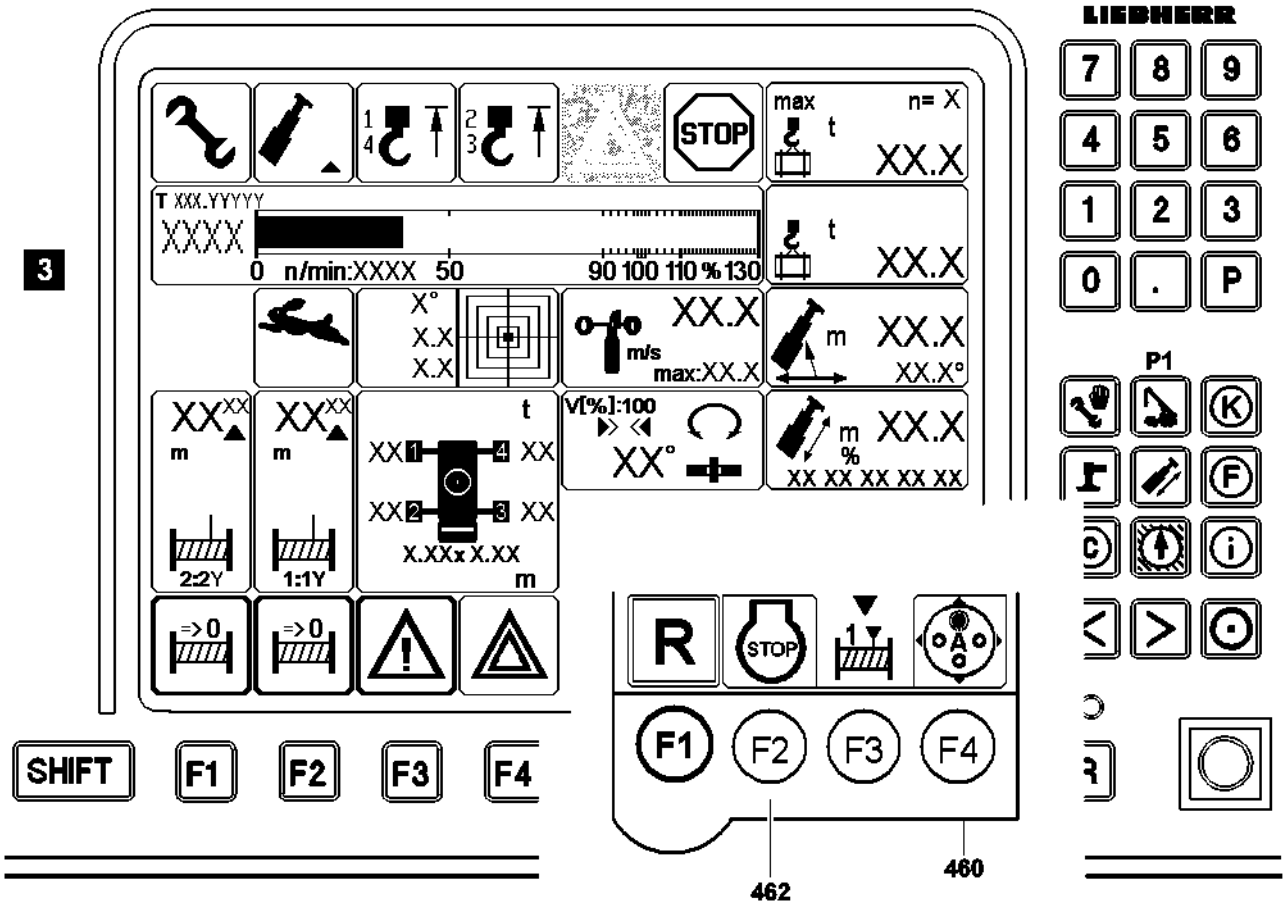

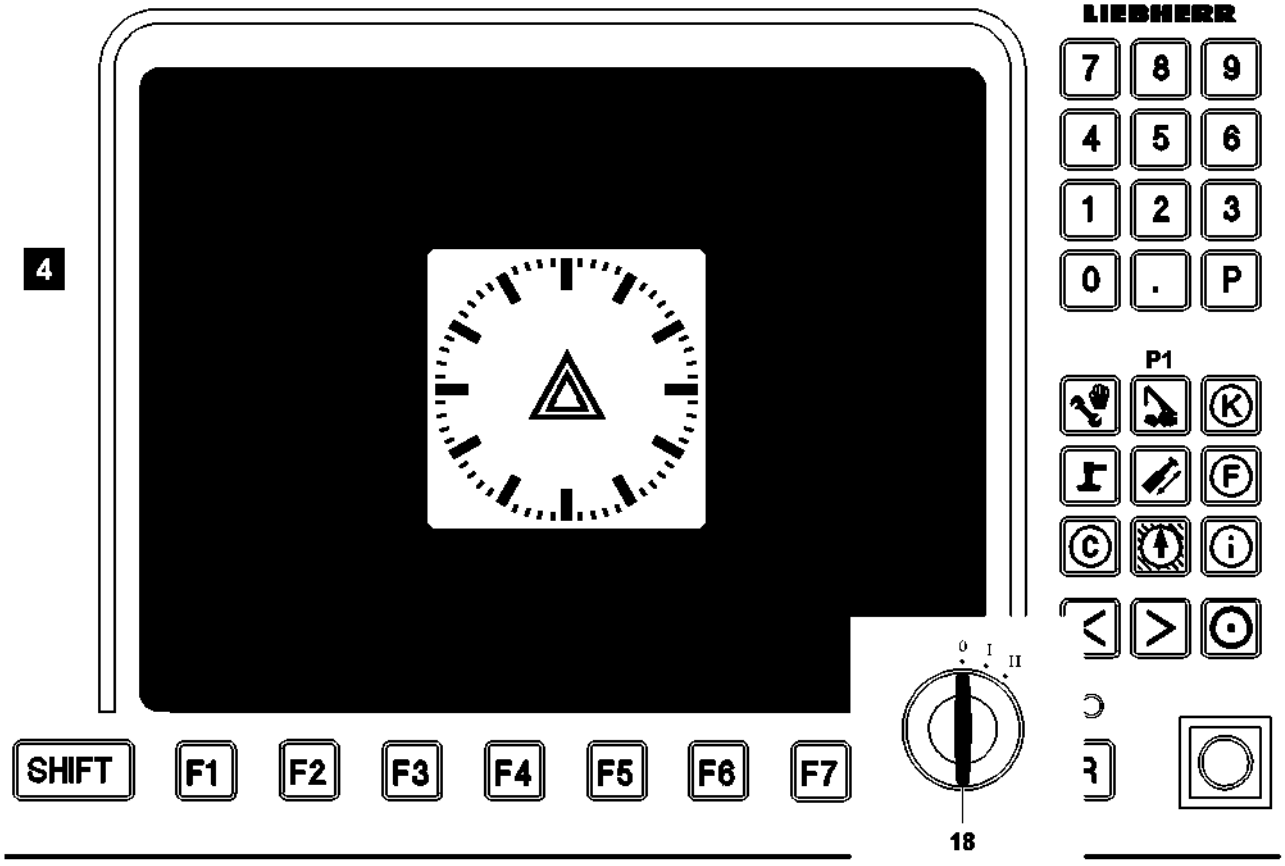

Fig.110279

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10.2 Stand-by mode

After pressing the Engine STOP key F2 **462** - the crane engine is turned off - on the LICCON monitor, the operating interface of the most recently active application program continues to be displayed (Stand-by delay time 10 minutes), illustration **3**.

After 10 minutes from pressing the Engine STOP key F2 **462**, Stand-by mode is reached. The Stand-by mode is displayed by the Stand-by clock + warning icon on the LICCON monitor, and by a repeated acoustic signal (rhythmic horn).

Note

▶ In the stand by mode, no crane movements are possible.

There are two ways of achieving stand-by mode with the LICCON computer system.

Turn the crane engine off.

Turning off the engine with the engine STOP key F2 **462** on the right touch display **460** from menu:
– „Driving mode and master switch configuration“

▶ Press engine-STOP key F2 **463** in menu „Driving mode“ + „Master switch configuration“ (see chapter 4.01).
▶ Leave the ignition key **18** in position „I“, illustration **4**.

Result:

– The crane engine is turned off.
– Stand-by delay time (10 minutes) expires.

▶ Press **any key** within the Stand-by delay time.

Result:

– The Stand-by time is reset again to 10 minutes.
– The Stand-by delay time starts again.

▶ Press **no key** within the Stand-by delay time.

Result:

– After 10 minutes, **Stand-by mode** is reached.
– The display area on the LICCON monitor turns black.
– The stand-by clock with a warning icon is shown, illustration **4**.
– A recurring acoustic signal sounds (30 s interval).

Note

▶ The Stand-by mode does not lead to any automatic turn off of the LICCON computer system.

Turning the LICCON computer system off from the Stand-by mode

▶ Turn the ignition switch to position 0.

Result:

– The Power-Save mode is active.

Note

▶ See section „Power-Save mode“.

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Fig.195219

1 Checks before start up

Various checks must be performed every time before operating 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 circuit 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 chapter 7.06 and chapter 7.07 in the Crane operating instructions!

1.1 Checking the general condition of the crane

WARNING
Danger of accident due to falling parts!
Loose parts, such as pins, spring retainers or ice, which are on the boom or crane superstructure can fall down during crane operation and hit personnel!
Personnel can be killed or seriously injured!
- ▶ Before starting crane operation, make sure that there are no loose parts on the boom and crane superstructure!

- ▶ Check the crane for visible damage before starting crane operation.
- ▶ Carry out a function test of available safety devices.
- ▶ Make sure that the crane is standing on level, load bearing ground.
- ▶ Make sure that the crane is properly supported and horizontally aligned.
- ▶ Make sure that the gear ring of the rotary 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.
- ▶ Make sure that the cable / rope drum and the limit switches are free of snow and ice.
- ▶ Make sure that there are no loose parts on the boom and the crane superstructure.

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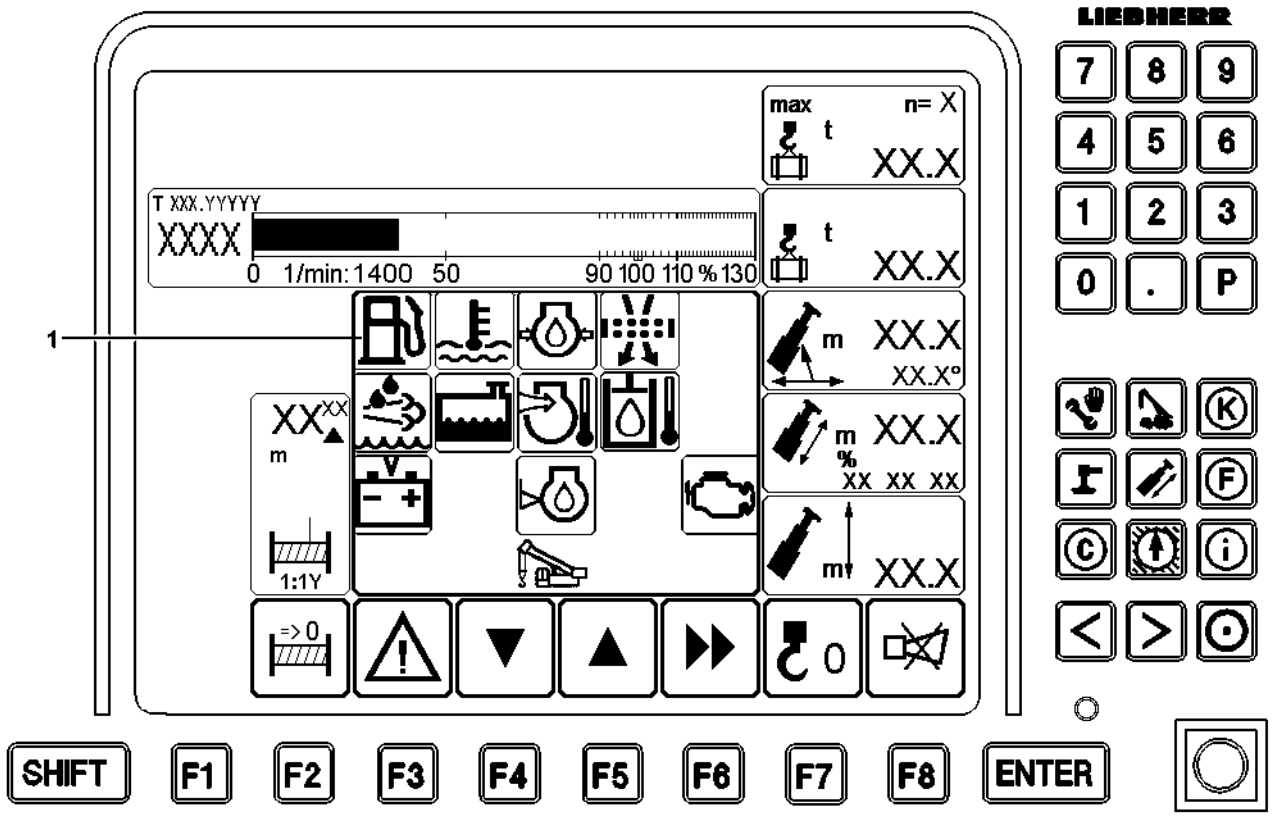

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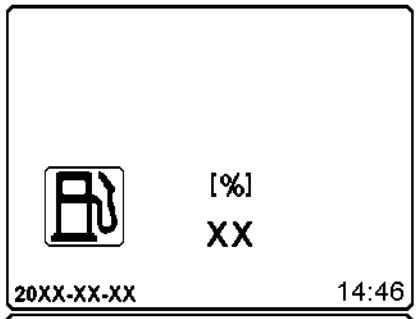

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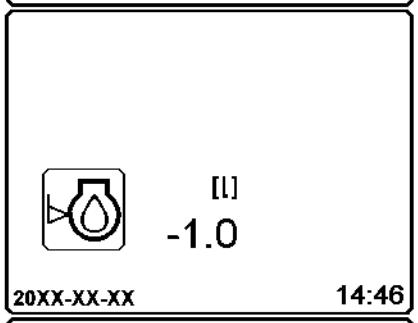

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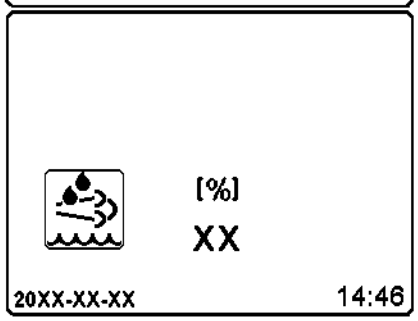

Fig.113761

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1.2 Checking the fuel / engine oil and the urea reserve on the LICCON monitor

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!
- ▶ Display for urea reserve (illustration **3**), only for Diesel engines with exhaust aftertreatment SCR (Selective Catalytic Reduction).

The „fuel and urea reserve“ is shown on the LICCON monitor in percentages and the engine oil level is shown in liters.

The „urea reserve“ display and the „engine oil level“ display are only possible for Diesel engines with SCR .

▶ In the „Crane operation“ program, press the function key **F3**.

Result:

– The monitoring area **1** with its monitoring functions is displayed on the LICCON monitor.

▶ Press the function key **F5**.

Result:

– The fuel reserve is shown in the LICCON monitor, see illustration **1**.

▶ Add fuel, if necessary.
▶ Press the function key **F5** several times.

Result:

– The engine oil level is shown in the LICCON monitor, see illustration **2**.

The engine oil level can be read on the display:
– If „0.0“ is shown on the display, then the engine oil level is ok.
– If „-1.0“ is shown on the display, then 1 liter of engine oil must be drained.
– If „+1.5“ is shown on the display, then 1.5 liter of engine oil must be added.

▶ Add engine oil, if necessary.
▶ Press the function key **F5** several times.

Result:

– The urea reserve display is shown in the LICCON monitor, see illustration **3**.

▶ Add urea, if necessary.
▶ Press the function key **F6** several times.

Result:

– The „Crane operation“ program is displayed.

Note
▶ For a detailed description, see Crane operating instructions, chapter 4.02, section „Individual control displays“.

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1.3 Checking the oil level on the Diesel engine with the dipstick

For details on how to check the oil level and filter, see Crane operator's instructions, chapter 7.04 and separate operating instructions of the engine manufacturer.

▶ Check the engine oil level.

1.4 Checking the coolant level

WARNING
Danger of injury due to scalding of the skin!
▶ Never open the cap on the coolant reservoir as long as the engine is warm! The cooling system is under pressure!
▶ To protect face, hands and arms from hot steam of hot coolant, cover the cap with a large rag when opening!

▶ Check the coolant level.

If the coolant level is too low:

▶ Add coolant, see Crane operating instructions, chapter 7.04.

1.5 Checking the oil level and filter on hydraulic tank

For detailed description of checking the oil level and filter, see Crane operating instructions, chapter 7.05.

▶ Check the oil level in the hydraulic tank.
▶ Check the filter on the hydraulic tank.

1.6 Checking the central lubrication system

The grease container must be filled at all times with sufficient lubricant.

▶ Check the grease container.

If the lubricant level is too low:

▶ Add lubricant, see Crane operating instructions, chapter 7.05.

1.7 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.

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Empty page!

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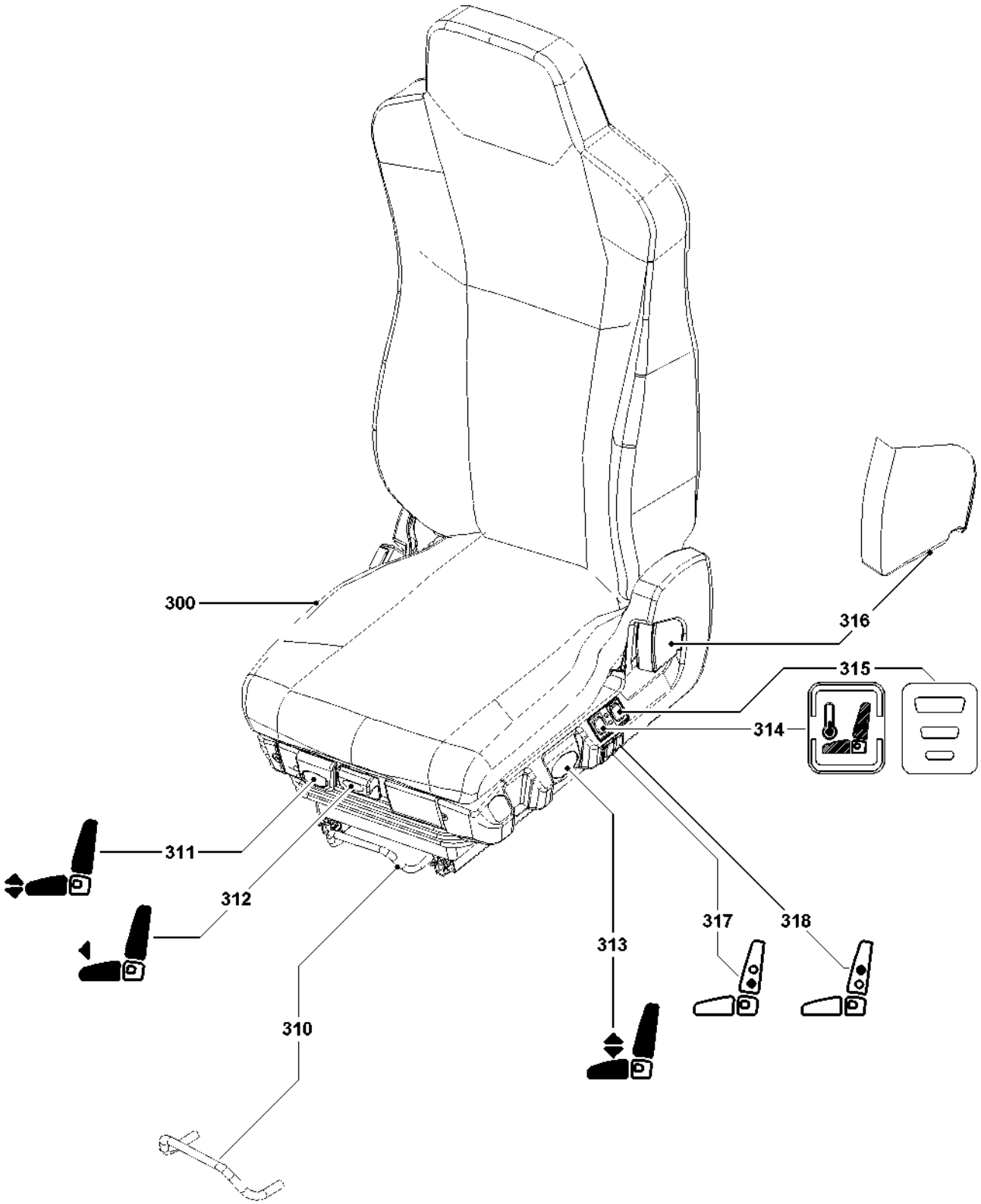

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Fig.112623

2 Work station - Crane operator’s cab

2.1 Adjusting the crane operator’s seat

WARNING
Danger of injury!
When the crane operator’s cab is tilted, the crane operator’s seat can move suddenly when it is adjusted!
Limbs can be caught and injured!
▶ Carry out adjustments on the crane operator’s seat only when the crane operator’s cab is in horizontal position!

Adjusting the seat position

▶ With the bar **310** adjust the seat in horizontal direction by moving it back or forth.
▶ With the lever **311** adjust the seat incline.
▶ With the lever **312** adjust the position of the seat cushion.
▶ With the lever **313** adjust height of seat.
▶ With the lever **316** adjust the angle of the backrest.
▶ With the button **317** adjust the lumbar area support „on the bottom“.
▶ With the button **318** adjust the lumbar area support „on top“.

Turn the seat heater* / seat climate control* on

The seat heater or climate control is turned on / off with the switch **314**.

There are three switch positions:
– Center position: Heater and climate control is turned off.
– Pushed on top: Heater turned on (red light).
– Pushed on the bottom: Climate control turned on (blue light).

▶ Select the seat heater / climate control on with switch **314**.
▶ Adjust the fan stage with switch **315**.

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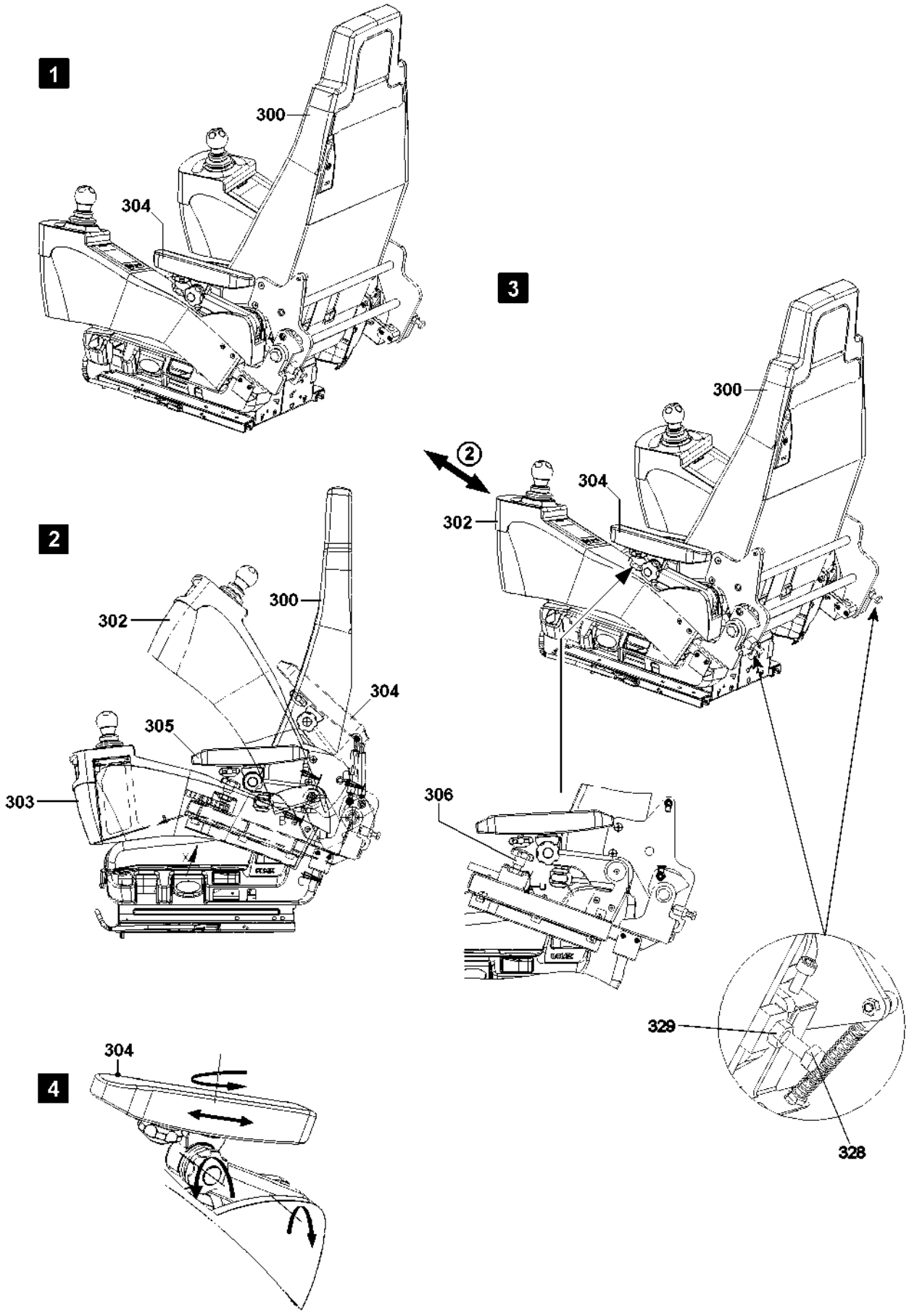

Fig.112031

2.2 Adjusting the consoles

The control platform, with the consoles on the left and right hand side of the crane operator's seat **300** allows the crane operator to adjust the consoles for „crane operation" to suit his body size optimally.

Note

▶ The left and right consoles are individually adjustable.

Two different console positions are possible:

– „Crane operating position"
– „Entering / exiting"

DANGER

Danger of accident!

If the left console **302** is swung up (position „entering / exiting"), see illustration **2**, when operating the crane - specially during severe braking maneuvers - there is an increased risk of accidents as well as a danger of property damage due to uncontrolled „down" or „forward" swing of the console(s).

▶ Driving the crane with upward swung consoles is **prohibited**.
▶ Before starting to drive, always bring the consoles into „crane operating position".

You can move the left console from „crane operating position" to „entering / exiting" position by swinging it up.

Note

▶ When swinging the console upward, hold on to it until the end position „entering / exiting" is reached.
▶ When the console is swung down, it returns to the previously set „crane operating position".

The consoles can be adjusted with **one hand**.

2.2.1 Adapting the consoles to the crane driver

Note

▶ The consoles can be adjusted to suit the crane driver as described for the left console **302**.

▶ Release the star handle screw **306** and pull the adjustment via the latch pin, see illustration **3**.
▶ Move console **302** forward / backward as you prefer (point **2**).
▶ Tighten the star handle screw **306**.

Result:

– The console is adjusted.

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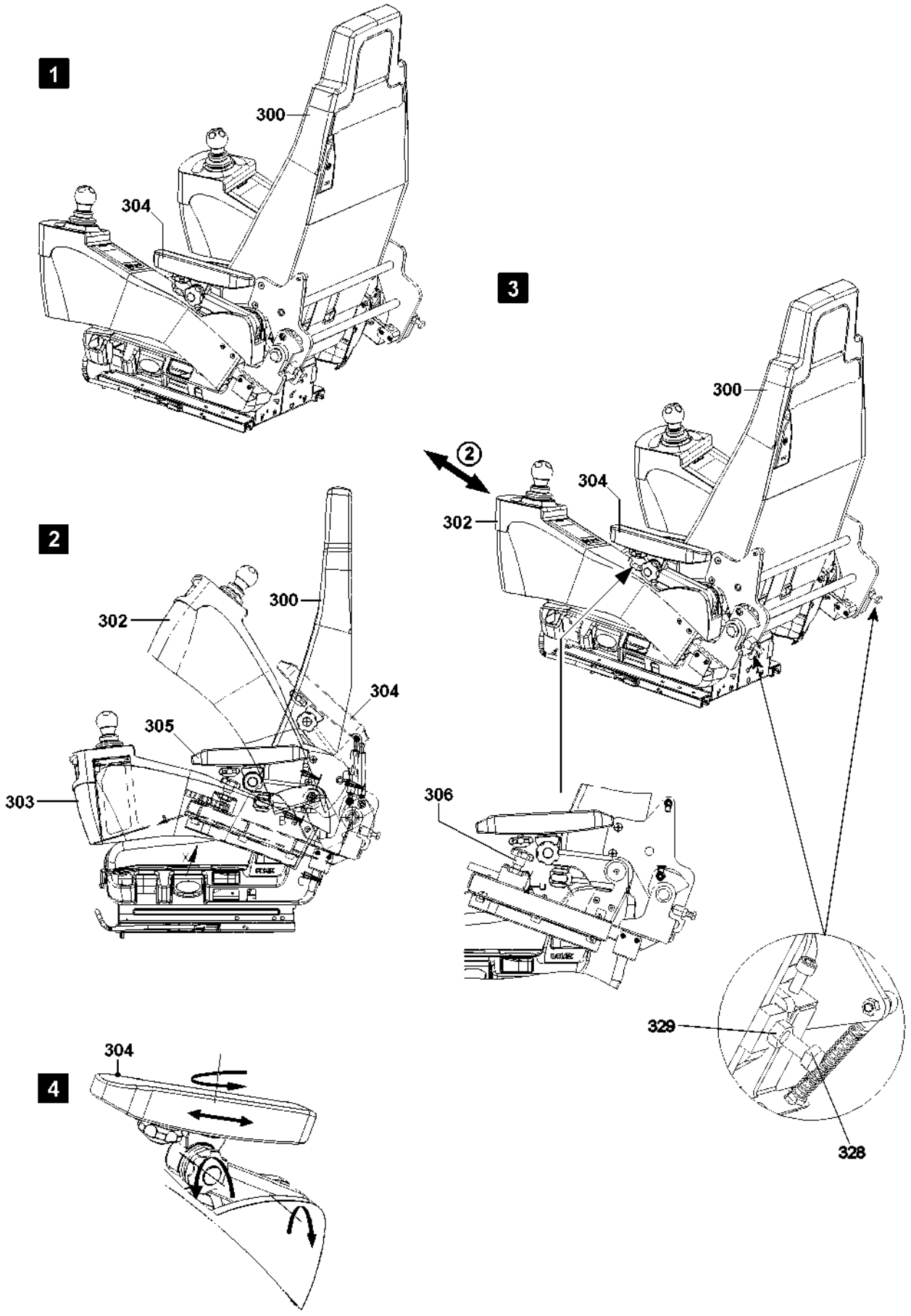

Fig.112031

2.2.2 Adjusting the incline of the consoles

- ▶ Adjust the stop screw **328** until the console has reached the desired incline.
- ▶ Secure the stop screw with the nut **329**.

2.2.3 Armrests

The armrests **304** left and right, offer a variety of adjustment possibilities, see illustration **4**.

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.

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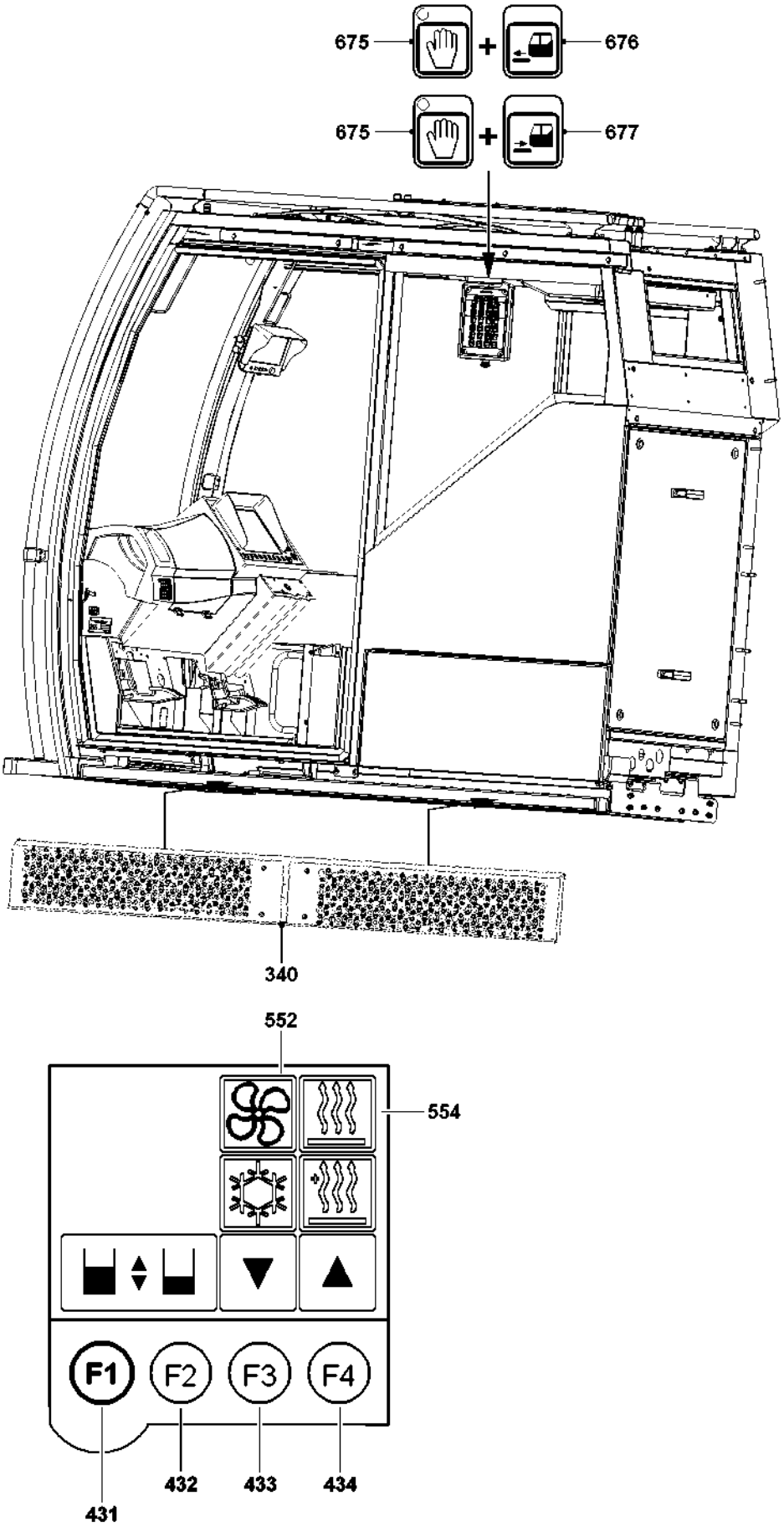

Fig.108856

2.3 Step

In order to make it easier for the crane operator to enter and leave the crane operator's cab, the step **340** can be extended or retracted.

The step **340** latches in the end positions.

WARNING
Danger of falling!
If the step is not extended or retracted completely, personnel can fall down!
Personnel can be severely injured or killed!
- ▶ Always retract or extend the step completely!
- ▶ Access on the step only if it is completely extended!

NOTICE
Observe the safety notes!
- ▶ See Crane operating instructions, chapter 2.04 „Crane operator's cab with retractable / extendable step"!

2.3.1 Extend the step

- ▶ Activate the release button **675** and then actuate the control button **676** until the step **340** is fully extended.

2.3.2 Retract the step

- ▶ Activate the release button **675** and then actuate the control button **677** until the step **340** is fully retracted.

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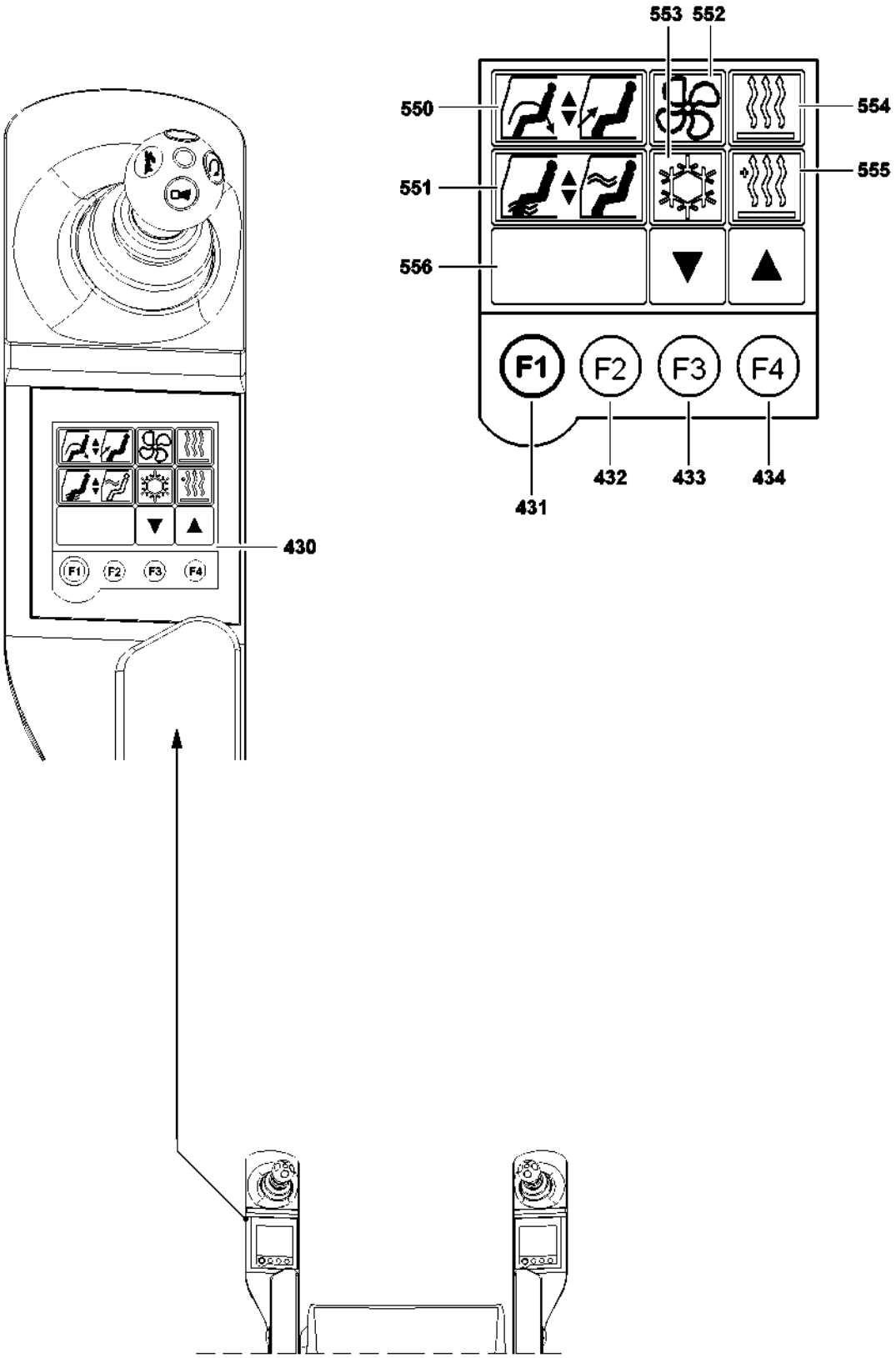

Fig.103973

2.4 Adjusting the heater / ventilation

The crane cab can be heated or ventilated depending on the desired temperature, see detailed description in the Crane operating instructions, chapter 6.02.

Adjust the heater, ventilation and air conditioning system***** on the left touch display **430**.

▶ Press the button **431** until the „Climate control settings“ menu appears.

The current settings of the individual functions are shown in the status display **556**.

▶ Adjust the recirculated air / fresh air: Press icon **550** „touch“, wide border appears.

Result:

– The distribution of recirculated / fresh air can be set with button **433** and button **434**.

▶ Set the ventilation distribution: Press icon **551** „touch“, wide border appears.

Result:

– The ventilation distribution can be set with button **433** and button **434**.

▶ Set the blower output, press icon **552** „touch“, wide border appears.

Result:

– The blower output can be set with button **433** and button **434**.

▶ Set the air conditioning system*****: Press icon **553** „touch“, wide border appears.

Result:

– The air conditioning system***** can be turned off with button **433** and turned on with button **434**.

▶ Set the heater, press icon **554** „touch“, wide border appears.

Result:

– The heater mode can be switched with button **432**.
– The temperature can be set with button **433** and button **434**.

▶ Set the auxiliary heater: Press icon **555** „touch“, wide border appears.

Result:

– The auxiliary heater can be set with button **432**, button **433** and button **434**.

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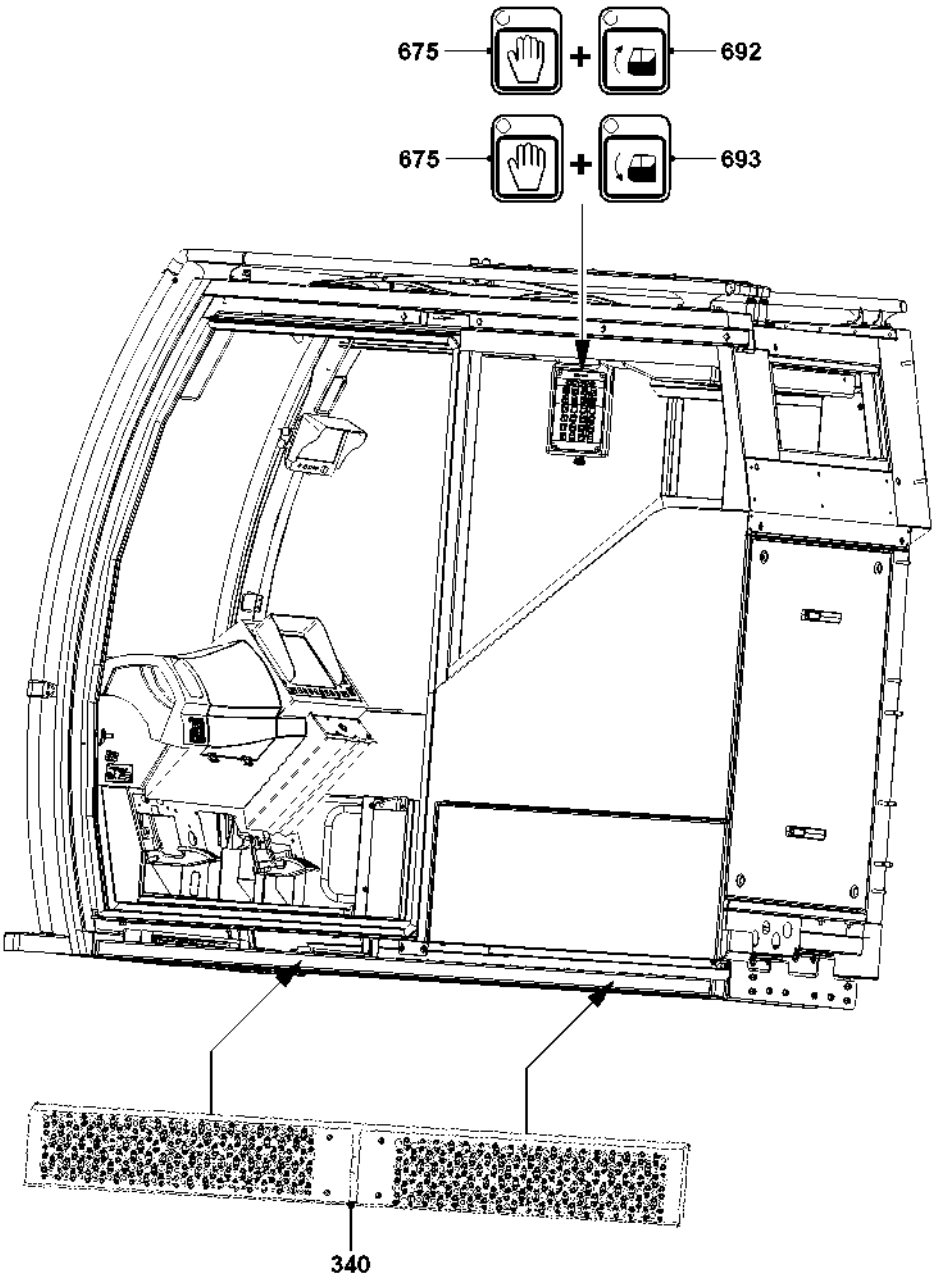

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Fig.120256

2.5 Tilting the crane cab*

To give the crane driver a better field of vision, the cab can be tilted upwards.

When you have finished working with the crane, always set the cab to horizontal position.

WARNING
Death when tilting the crane cab!
When tilting the crane cab, personnel can fall from the step **340**!
▶ It is prohibited for anyone to remain on the step **340** while tilting the crane cab!

WARNING
Danger of crushing!
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!
▶ Set the crane cab horizontally, then open the door of the crane cab!

2.5.1 Tilting the cab upward

▶ Activate the release key **675** and then press the control button **692**.

Result:

– The cab swings upward.

2.5.2 Moving the cab into horizontal position

▶ Activate the release key **675** and then press the control button **693**.

Result:

– The cab swings downward.

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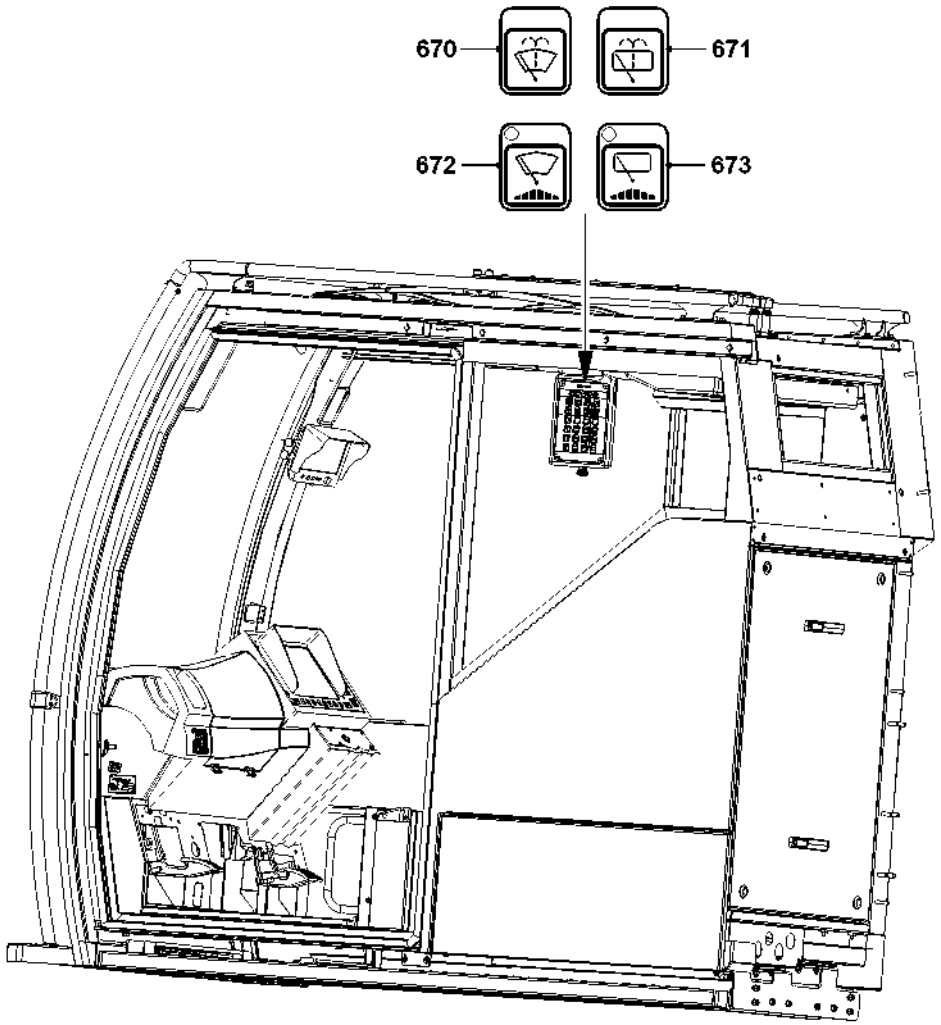

Fig.106265

2.6 Operating the windshield wiper / windshield washer system

2.6.1 Operating the windshield wiper

The windshield wipers are turned on by pressing control button **672** (front window) and control button **673** (roof window). The following description refers to the operation of the windshield wipers for the front window. The operation of the roof window wipers is identical.

To activate the windshield wiper on the front window:
▶ Press the control button **672**.

Result:

– The windshield wiper runs continuously.
– The indicator light on control button **672** lights up.

If the windshield wiper is running continuously:
▶ Press the control button **672**.

Result:

– The windshield wiper is now running at a „long interval“.

If the windshield wiper is running at a „long interval“:
▶ Press the control button **672**.

Result:

– The windshield wiper is now running in „short interval“.

If the windshield wiper is running in „short interval“:
▶ Press the control button **672**.

Result:

– The windshield wiper is turned off.
– The indicator light on control button **672** turns off.

Note
▶ If the control button **672** is pressed longer than 1 s during „continuous“, „long interval“ or „short interval“ operation, then the windshield wiper is turned off.

▶ Press the control button **672** longer than 1 s.

Result:

– The windshield wiper is turned off; this is confirmed by a short „beep“, the indicator light on the control button **672** turns off.

2.6.2 Operating the windshield washer system

Activate the windshield washer system to support the windshield wipers by pressing control button **670** (front window) and control button **671** (roof window). The following description refers to the operation of the windshield washer system for the front window. The operation of the windshield washer system for the roof window is identical.

Before the start of the cold season, fill the container for the window washer fluid with standard antifreeze mix.

To operate the windshield washer system for the front window:
▶ Press the control button **670**.

Result:

– The windshield wipers and water pump will run as long as control button **670** is pressed. After releasing control button **670**, the windshield wiper continues to run 3 times.

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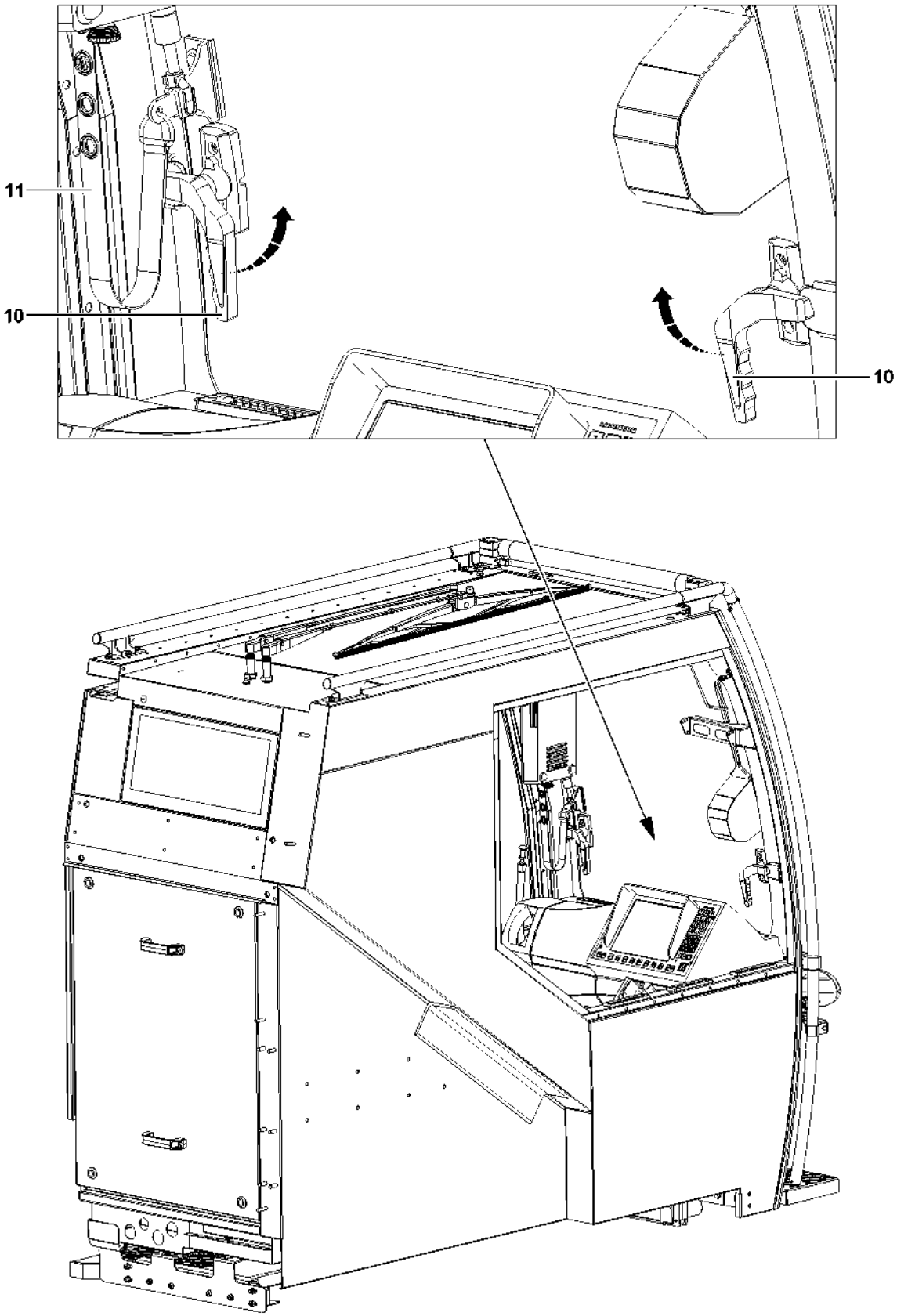

Fig.105497

2.7 Opening the crane operator’s cab front window

WARNING
Danger of crushing!!
Danger of trapping hands when closing the front window.
▶ Be careful with your hands when closing the front window.

A pair of nitrogen gas cylinders support the lifting movement of the front window.

▶ Opening the front window: Unlock the left and right handles **10**.
▶ To open from inside, just push on the front window.
or

If you only want to partly open the window:
Use the attached perforated strap **11** to set the desired opening angle.

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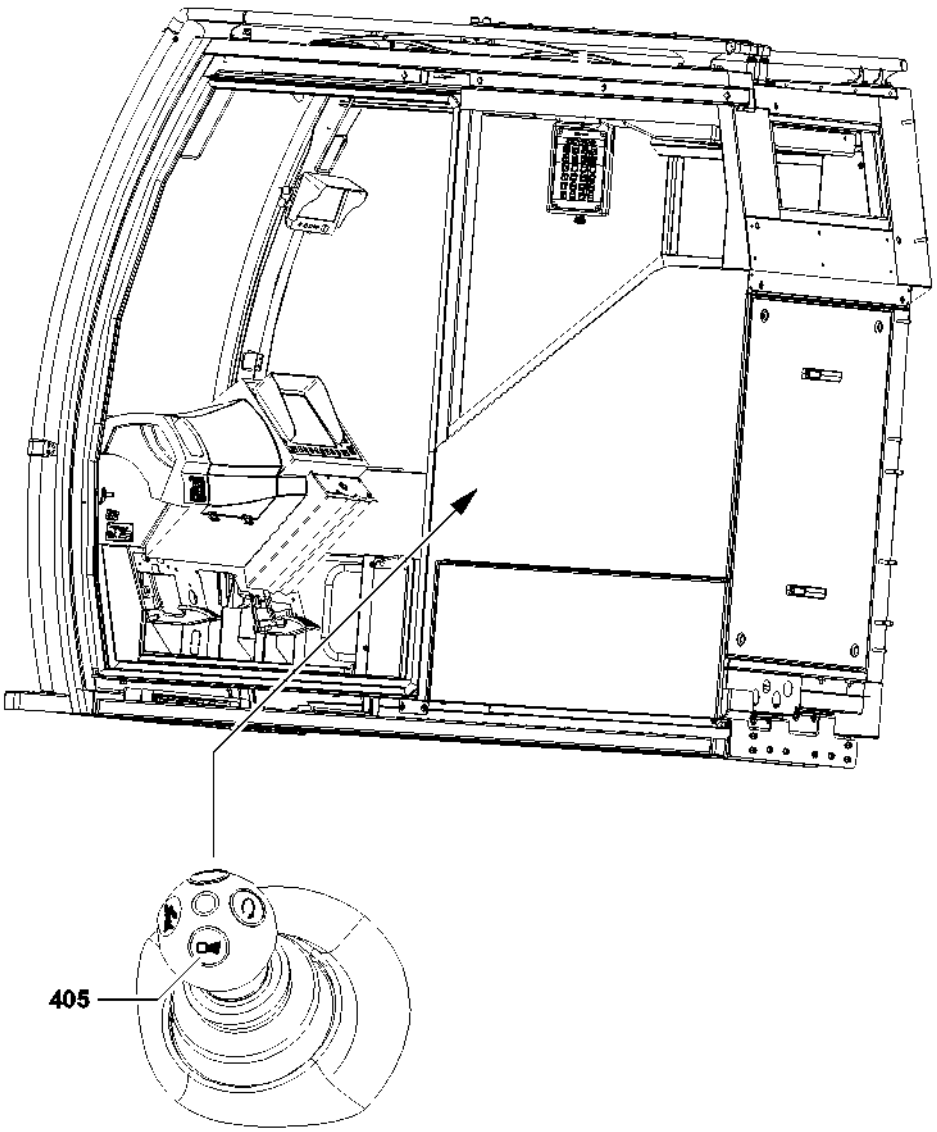

Fig.114839

2.8 Checking the horn

WARNING
Improper use of horn!
If the horn is used outside of danger situations, then it can loose its warning effect!
If the horn looses its warning effect, then severe injuries can occur as a result!
▶ Do not use the horn unnecessarily!

Make sure that the following prerequisite is met:
– Any personnel in the vicinity has been notified that the horn is being checked for function.

Before starting to work, check that the horn is functioning:
▶ Press the button **405**.

Problem remedy
The horn does not sound?
The horn is not functioning.
▶ Repair the horn before starting crane operation.

After successful testing of the horn:

▶ Notify any personnel in the vicinity that the testing of the horn has been completed.

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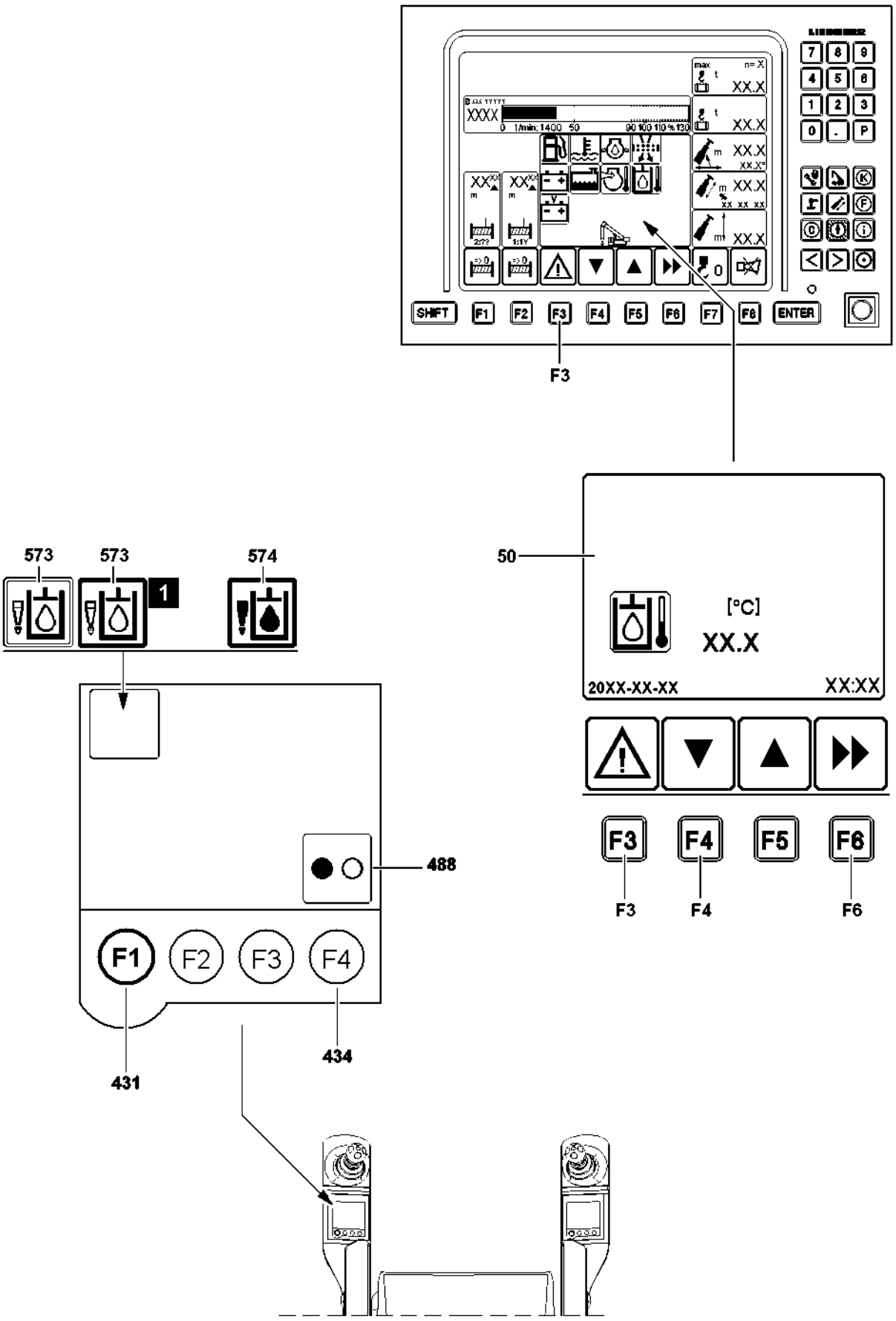

Fig.112677

3 Preheating the hydraulic oil with the Hydraulic oil preheating*

The hydraulic oil can be preheated with the Hydraulic oil preheating*****.

Note
- ▶ Always preheat the hydraulic oil at low ambient temperatures.
- ▶ From a hydraulic oil temperature above 25 °C , do not turn the Hydraulic oil preheating***** on.
- ▶ The current hydraulic oil temperature can be called up via the individual control display hydraulic oil temperature **50** on the LICCON monitor.

3.1 Turning the Hydraulic oil preheating* on

Make sure that the following prerequisite is met:
– The crane engine is running.

Note
When the Hydraulic oil preheating***** is turned on, various crane movements are turned off.
- ▶ If necessary, turn the Hydraulic oil preheating***** off.

▶ In the „Crane operation“ program, press the function key **F3**.

Result:

– The monitoring area with its monitoring functions is displayed on the LICCON monitor.

▶ Press the function key **F4** until the individual control display hydraulic oil temperature **50** is shown on the LICCON monitor.

Result:

– The current hydraulic oil temperature can be read.

▶ Press the function key **431** on the left touch display until the „Hydraulic oil preheating“ menu appears.
▶ Select „Hydraulic oil preheating“ **573** function by „touching“.

Result:

– The icon „Hydraulic oil preheating“ **573** is bordered in black, see illustration **1**.

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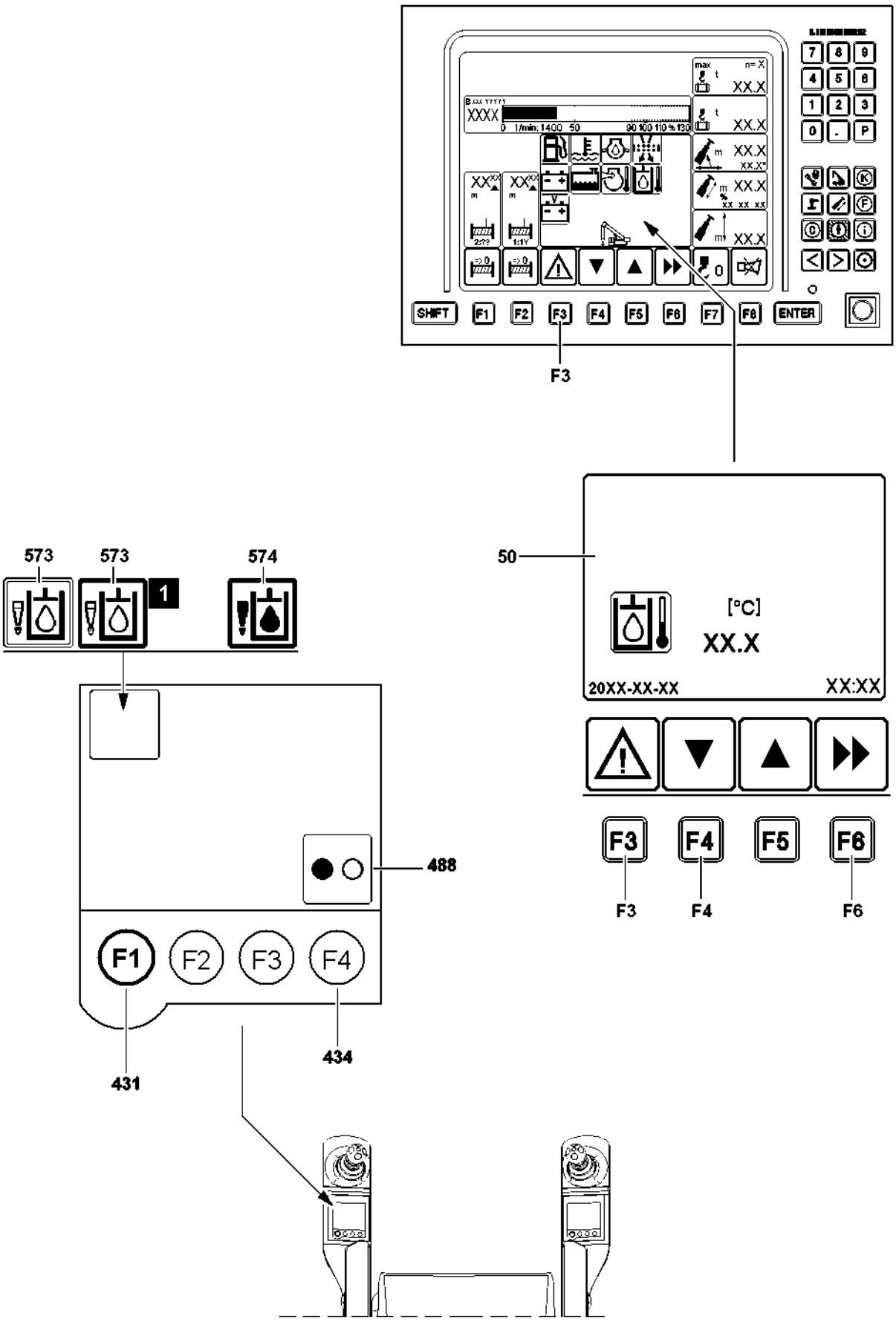

Fig.112677

▶ Press the function key **434**.

Result:

– The hydraulic oil preheating is turned on.
– Icon „Hydraulic oil preheating“ **574** appears.

When the hydraulic oil temperature in the individual control display **50** has reached the operating temperature:
▶ Press the function key **434**.

Result:

– The hydraulic oil preheating is turned off.
– Icon „Hydraulic oil preheating“ **573** appears.

▶ Press the function key **F3**.
or
Press the function key **F6** twice.

Result:

– The monitoring field with monitoring functions is not displayed.

▶ At low ambient temperatures, run through all hydraulic crane functions without a load for approx. 15 minutes. This will warm up cylinders, valves, oil motors and hoses.

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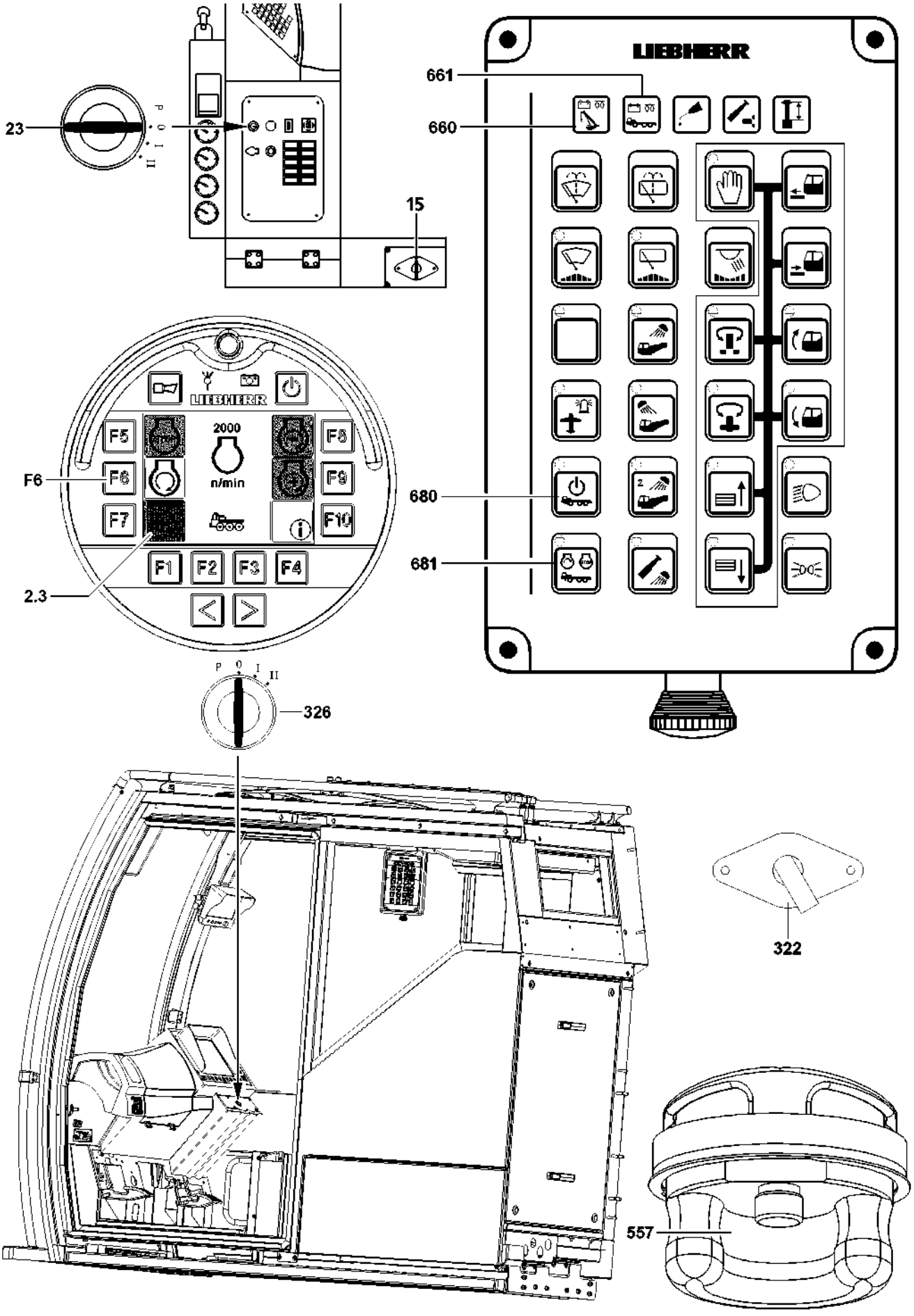

Fig.112844

4 Starting the engines from the crane operator’s cab

The engines can only be subjected to a full load after the operating temperature has been reached.

4.1 Starting the chassis engine from the crane operator’s cab

Make sure that the following prerequisites are met:
- The battery master switch **322** in the chassis is turned on.
- The battery master switch **322** in the superstructure is turned on.
- The transmission is in neutral position „N“.
- The ignition in the chassis is turned off.

▶ Turn the ignition switch **326** to position „I“.
▶ Press the button **680**.

Result:

- Ignition „on“.

NOTICE
Danger of property damage!
▶ Start the engine only if the indicator light **661** blinks yellow (1 Hz).

When the indicator light **661** blinks yellow (1 Hz), the engine is ready to start.
▶
▶ Press the button **681**.

Result:

- The engine starts.

4.2 Starting the chassis engine via the BTT

Make sure that the following prerequisites are met:
- The battery master switch **15** in the chassis is turned on.
- The transmission is in neutral position „N“.
- Ignition switch **23** in the chassis is in position „I“.
- In the BTT, the menu „Engine operation chassis“ is selected.
- The indicator light **2.3** lights up „green“.

▶ Actuate the 2-hand keypad **557** on the rear of the BTT.

Result:

- The icon at function key **F6** turns purple.

▶ Press the function key **F6** on the BTT.

Result:

- The engine starts.

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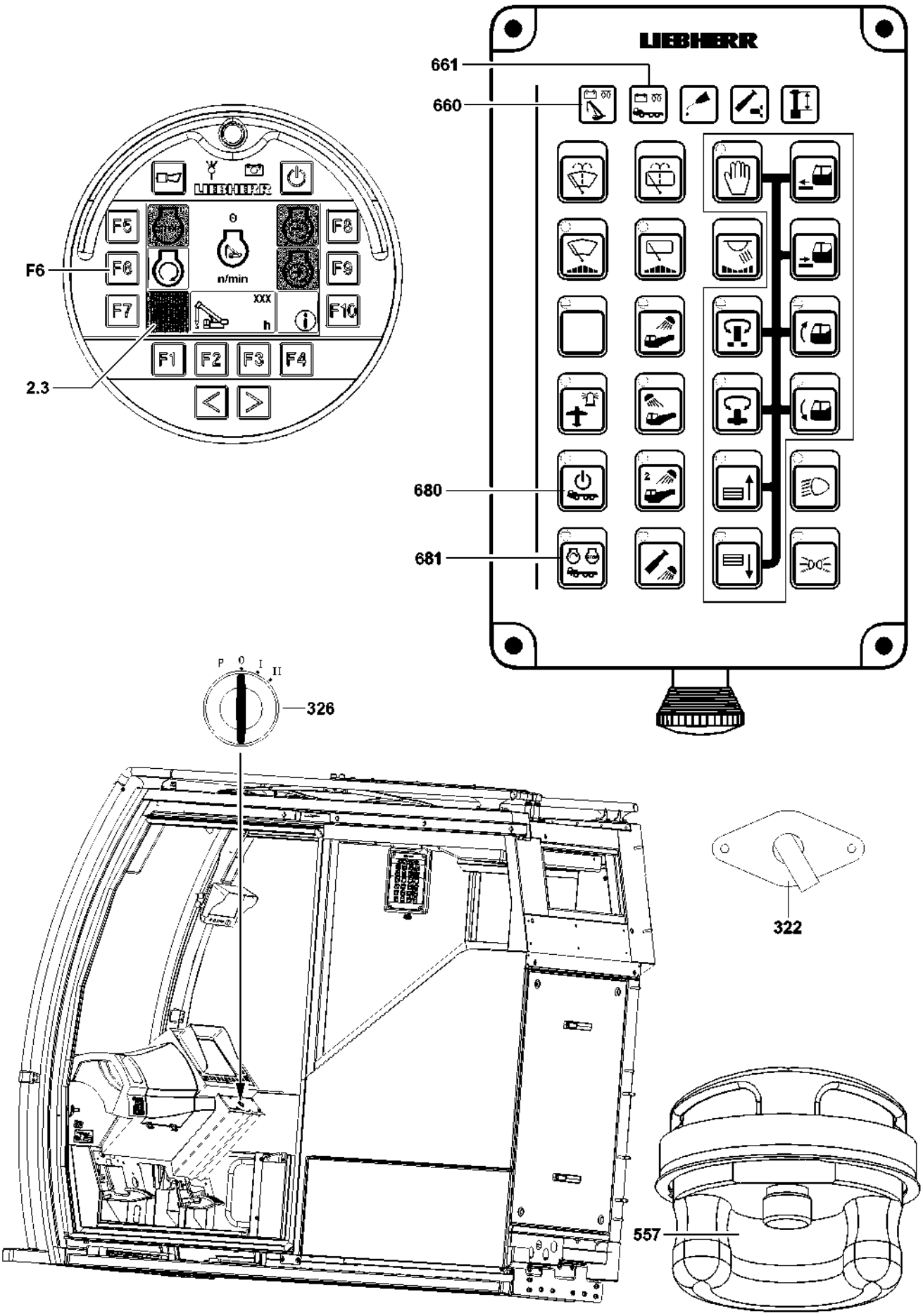

Fig.112845

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4.3 Starting superstructure engine from the crane operator’s cab

Make sure that the following prerequisites are met:
- The battery master switch **322** in the superstructure is turned on.
- The transmission is in neutral position „N“.
- The ignition in the chassis is turned off.

▶ Turn the ignition switch **326** to position „I“.

Result:

- The indicator light **660** lights up yellow.
  Engine preheating is active.

NOTICE
Danger of property damage!
▶ Start the engine only if the indicator light **660** blinks yellow (1 Hz).

When the indicator light **660** blinks yellow (1 Hz), the engine is ready to start.
▶ Turn the ignition switch **326** to position „II“.

Result:

- The engine starts.

4.4 Starting the superstructure engine via BTT

Make sure that the following prerequisites are met:
- The battery master switch **322** in the superstructure is turned on.
- The transmission is in neutral position „N“.
- Ignition switch **326** is in position „I“.
- In the BTT, the menu „Engine operation superstructure“ is selected.
- The indicator light **2.3** lights up „green“.

▶ Actuate the 2-hand keypad **557** on the rear of the BTT.

Result:

- The icon at function key **F6** turns purple.

▶ Press the function key **F6** on the BTT.

Result:

- The engine starts.

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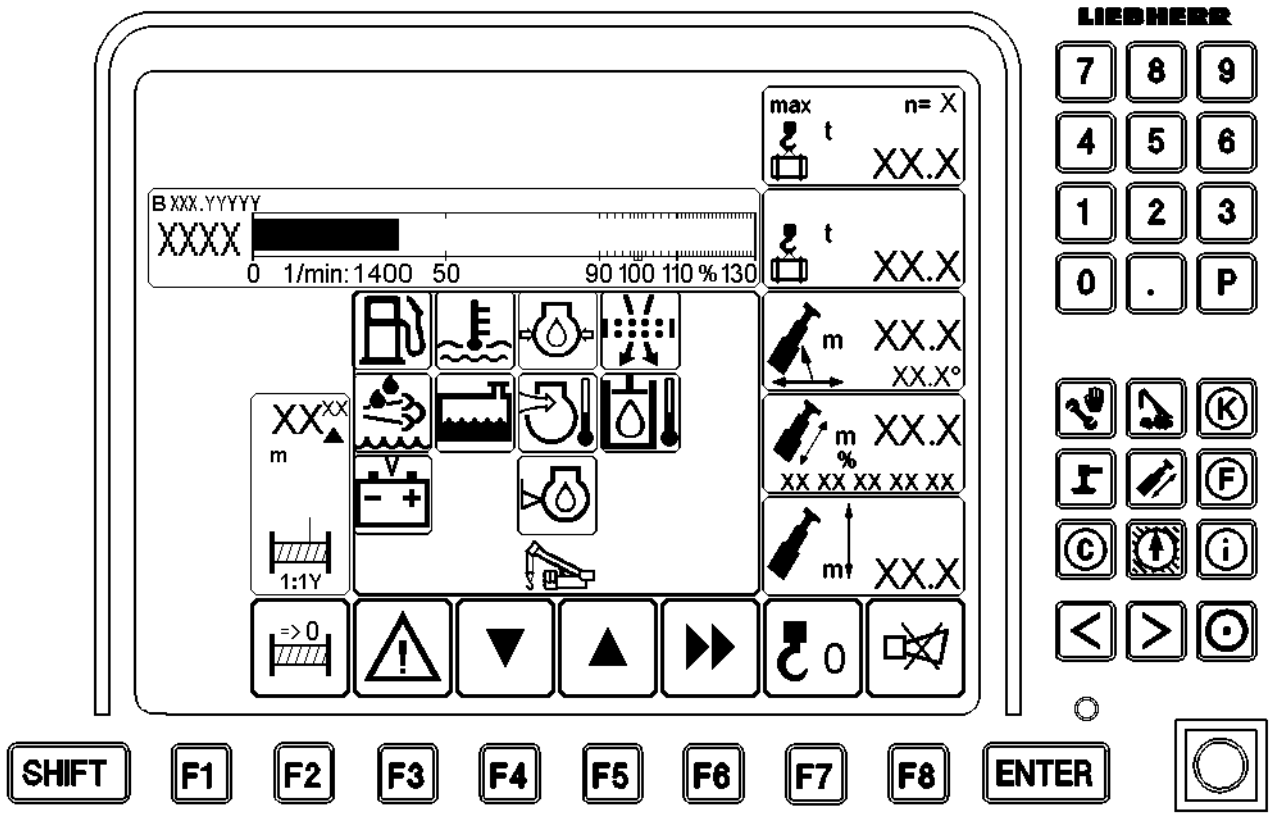

1

F3

2

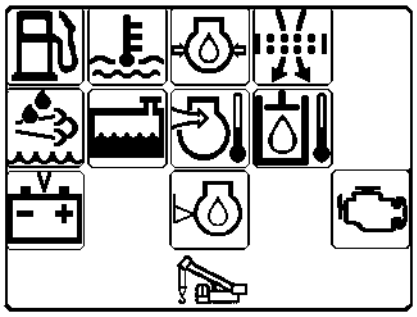

Fig.114837

4.5 Checking the instruments after starting the engine

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 LICCON computer system follows and after several seconds the set up configuration screen appears on the monitor.

4.5.1 Checking the instruments on LICCON monitor

Note

▶ The monitor illustrations in this chapter are only examples. The numerical values in the individual icons do not need to match exactly to the crane. 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.

▶ Check the LICCON monitor for warning messages.

4.5.2 Warnings on the LICCON monitor

If the warning icon of the function key **F3** turns „yellow“ or „red“, illustration **1**, then there is an error on the crane or a critical condition. For detailed description of the individual warnings and error displays, see Crane operating instructions, chapter 4.02.

The warnings are called up using the function key **F3**.

▶ Press the function key **F3**.

Result:

– The „monitoring field with monitoring functions“ appears on the LICCON monitor, see illustration **2**.
– The erroneous function is displayed in the monitoring field in „red“ or „yellow“.

If an erroneous function is shown:

▶ Turn off the engine immediately and remedy the problem.

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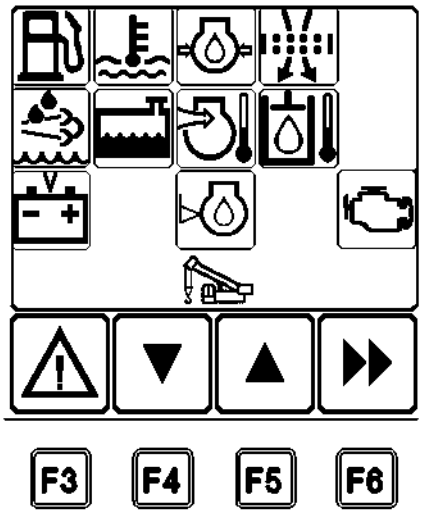
3



4

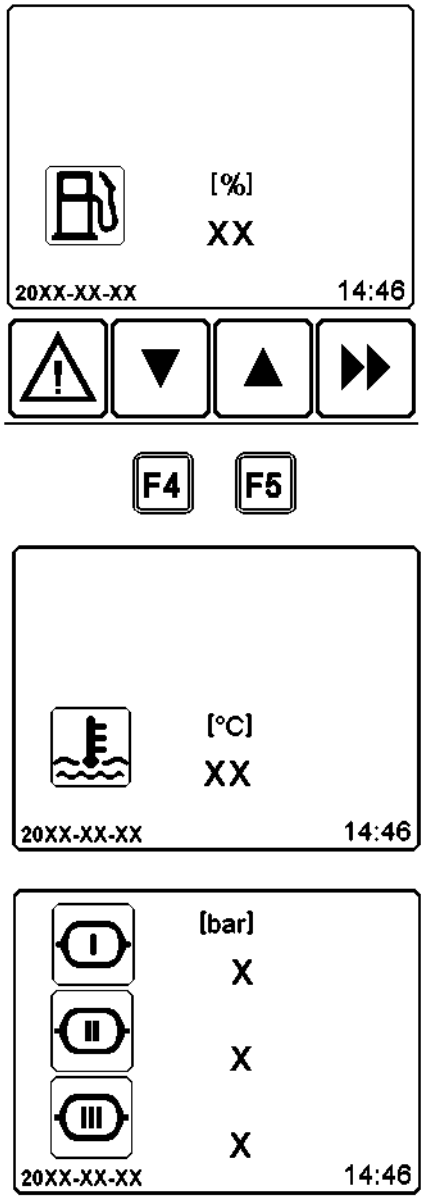


Fig.114838

4.5.3 Displaying monitoring functions with analog values

Note

▶ For the monitoring functions or individual indicator displays, see Crane operating instructions, chapter 4.02.

The relevant values for some monitoring functions in the monitoring field can be displayed as analog values.

▶ Press function key **F4** or function key **F5**, see example in illustration **3**.

Result:

– The individual monitoring function with analog value is displayed, see illustration **4**.

You can change back to the monitoring field with the monitoring functions using the function key **F6**.

▶ Press the function key **F6**.

Result:

– The monitoring field with all the monitoring functions is displayed, see illustration **3**.

The monitoring field can be exited using the function key **F3**.

▶ Press the function key **F3**.

Result:

– The monitoring field is faded out.

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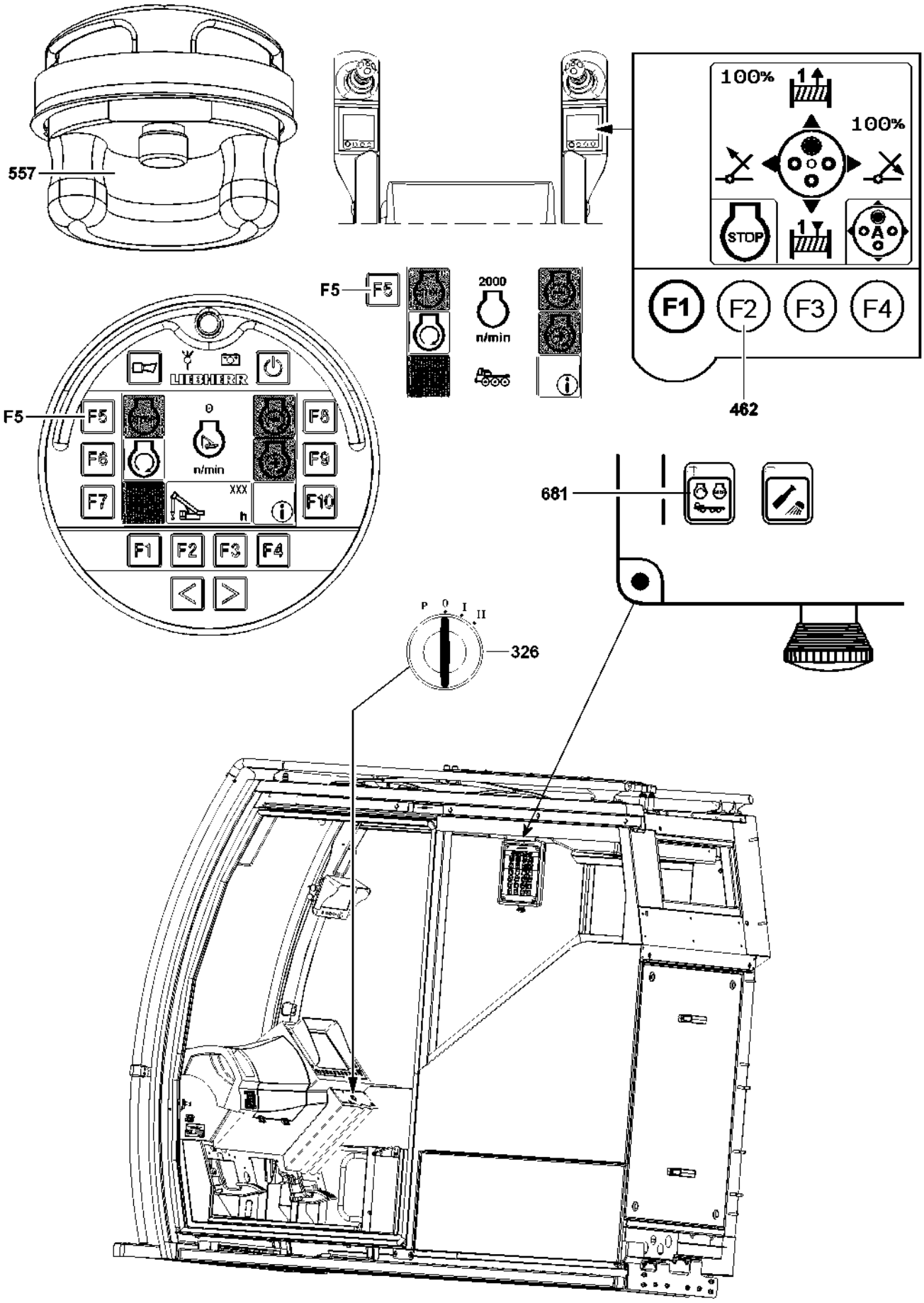

Fig.112846

4.6 Turning the engines off from the crane operator's cab

If the crane has been operated at full engine output or with very high coolant temperatures (above 95 °C), let the engine run without a load for 1-2 minutes at low idle speed.

4.6.1 Turning the chassis engine off with the engine stop button

Turn the chassis engine off in the crane operator's cab:

▶ Press the button **681**.

4.6.2 Turning the chassis engine off via BTT

Make sure that the following prerequisites are met:

– In the BTT, the menu „Engine operation chassis" is selected.

▶ Actuate the 2-hand keypad **557** on the rear of the BTT.

Result:

– The icon at function key **F5** turns purple.

▶ Press the function key **F5** on the BTT.

4.6.3 Turning the superstructure engine off

▶ Turn the ignition switch **326** back to the stop.

▶ Pull the ignition switch **326** off and store in a safe place.

4.6.4 Turning the superstructure engine off with the engine stop button

Turn the superstructure engine off in the crane operator's cab:

▶ Press the function key **462** in the left touch display.

4.6.5 Turning the superstructure engine off via BTT

Make sure that the following prerequisites are met:

– The menu „Engine operation superstructure" on the BTT is selected.

▶ Actuate the 2-hand keypad **557** on the rear of the BTT.

Result:

– The icon at function key **F5** turns purple.

▶ Press the function key **F5** on the BTT.

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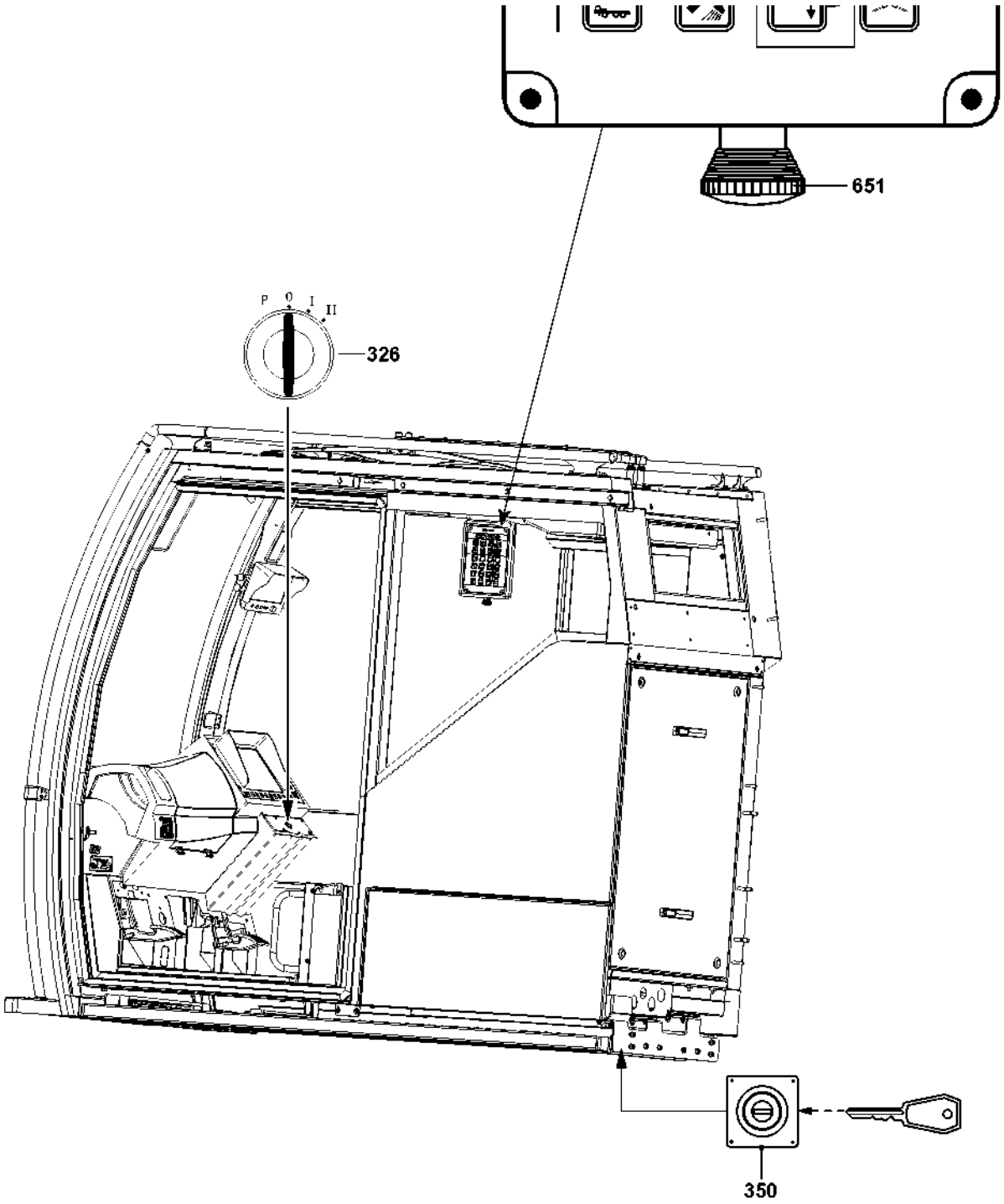

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Fig.112847

4.6.6 Turning the superstructure engine off in the event of danger

CAUTION
Operation of the emergency stop switch
▶ Only use the emergency stop switch*** 350** or the emergency stop switch **651** in case of true emergency situations. Use of the emergency stop switch*** 350** or the emergency stop switch **651** in normal situations is prohibited!

▶ Actuate the emergency stop switch*** 350**.
or
Actuate the emergency stop switch*** 651**.

Result:

– The crane movement is stopped.

After an emergency stop, the LICCON computer system must be reset.

Reset the LICCON computer system after an emergency stop:
▶ Release the actuated emergency stop switch.
▶ Turn the ignition switch **326** momentarily to position „0“ and then again to position „I“.

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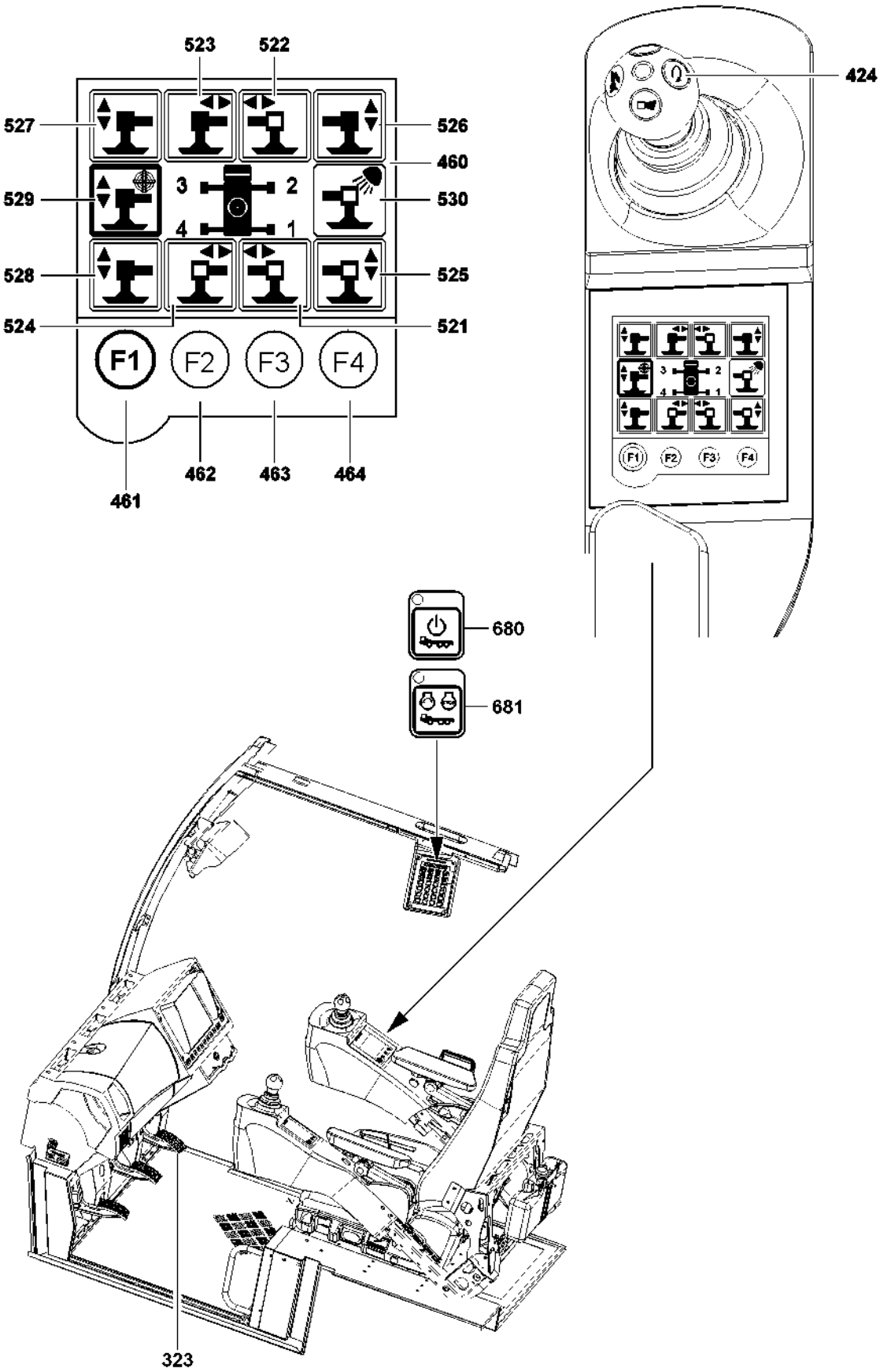

Fig.106720

5 Engine regulation from the crane driver's cab

The engine rpms for the engines in the crane superstructure and in the crane chassis can be regulated with the pedal **323** in the crane driver's cab.

In crane operation, only the engine rpm for the engine in the crane superstructure is regulated with the pedal **323**.

To be able to control the menus „Support / Sliding beams" from the crane operator's cab, the engine in the crane chassis must be started. If the engine in the crane chassis is started from the crane driver's cab and a function in one of the above menus is selected, then the pedal **323** affects only the engine rpm in the crane chassis.

As long as a function within one of the above menus is selected, the engine rpm in the engine in the crane superstructure cannot be changed anymore with the pedal **323**.

Note

▶ After setting the pedal **323** to „neutral position", the assignment is changed, even if the active or selected function is selected or deleted, as described above.

5.1 Procedure

Note

▶ The assignment of the pedal **323**, after starting the engine in the crane chassis from the crane driver's cab in menus „Travel operation"*****, „Support / sliding beams", „Travel operation and steering adjustment"***** or „Axle suspension"***** from the crane driver's cab is identical and is explained on the example „Support / sliding beams".

Make sure that the following prerequisite is met:

– The engine in the crane superstructure is running.

▶ Turn the ignition in the crane chassis on: Press the button **680**.
▶ Start the engine in the crane chassis: Press the button **681**.
▶ Select the menu „Support / sliding beams": Press the function key F1 **461** on the touch-display until the „Support / sliding beams" menu appears.

Note

▶ If you would like to continue to work with the crane superstructure while adjusting the support cylinders, then you can lock the engine rpm of the engine in the crane superstructure in via the button **424** on the master switch 1.

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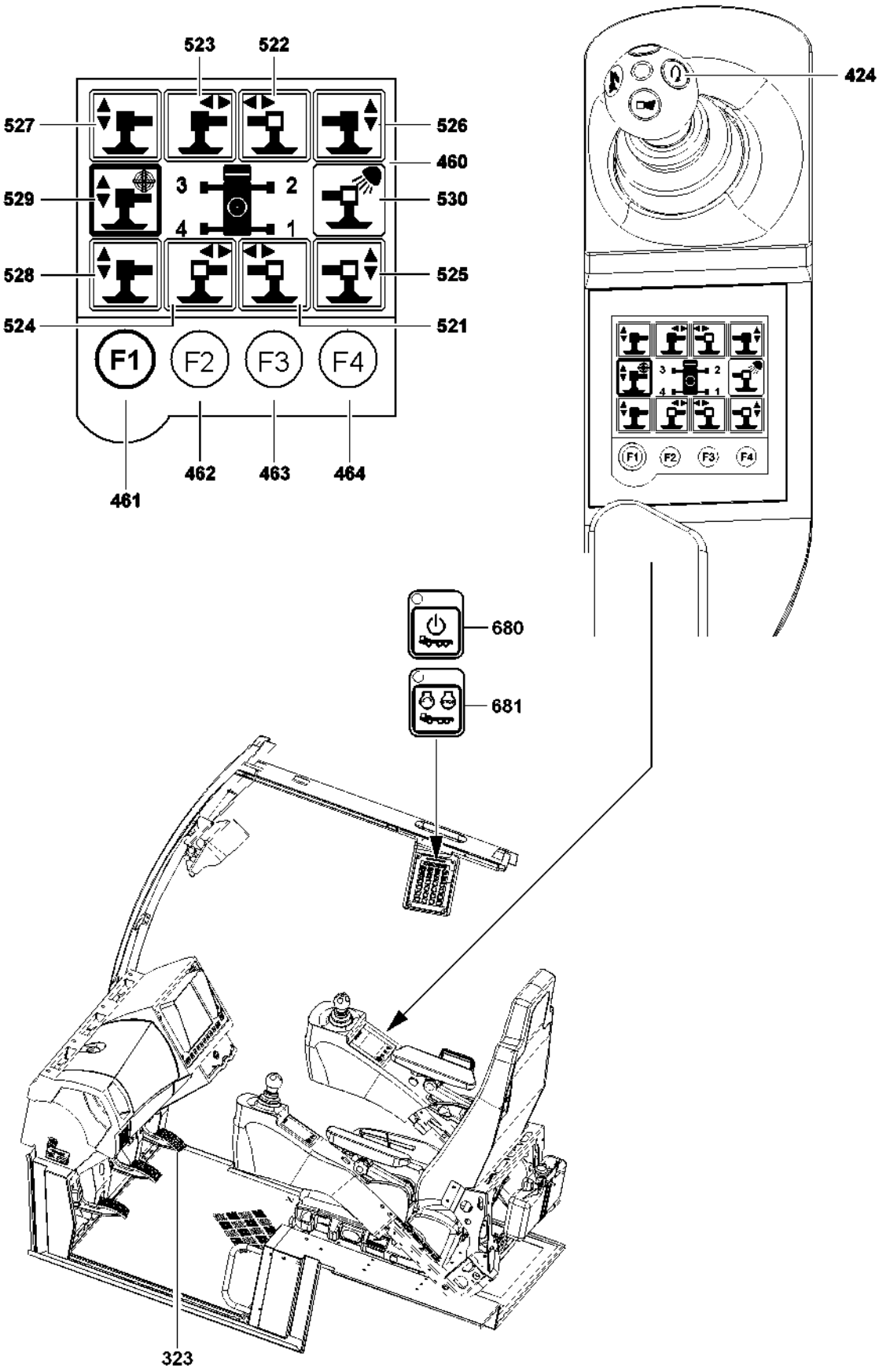

Fig.106720

▶ Select icon **529** by „touching“ the touch display.

Result:

– The icon is bordered in black.
– In the menu „Support / sliding beams“ and „Axle suspension“*****, the engine rpm of the engine in the crane chassis is slightly increased.
– The pedal **323** acts now on the engine rpm of the engine in the crane chassis.

Note

▶ The selection of any touch icon in one of the above menus has the same effect on the function of the pedal **323** as the icon **529**.

▶ Make the required adjustments of the „Support / sliding beams“.

If the pedal **323** is to have an effect on the engine rpm in the engine of the crane superstructure:

▶ Press the function key F1 **461** on the touch display until a crane superstructure menu appears.
or
Turn the engine in the crane chassis off: Press the button **681**.

Result:

– The pedal **323** acts now on the engine rpm of the engine in the crane superstructure.

▶ Turn the ignition in the crane chassis off: Press the button **680**.

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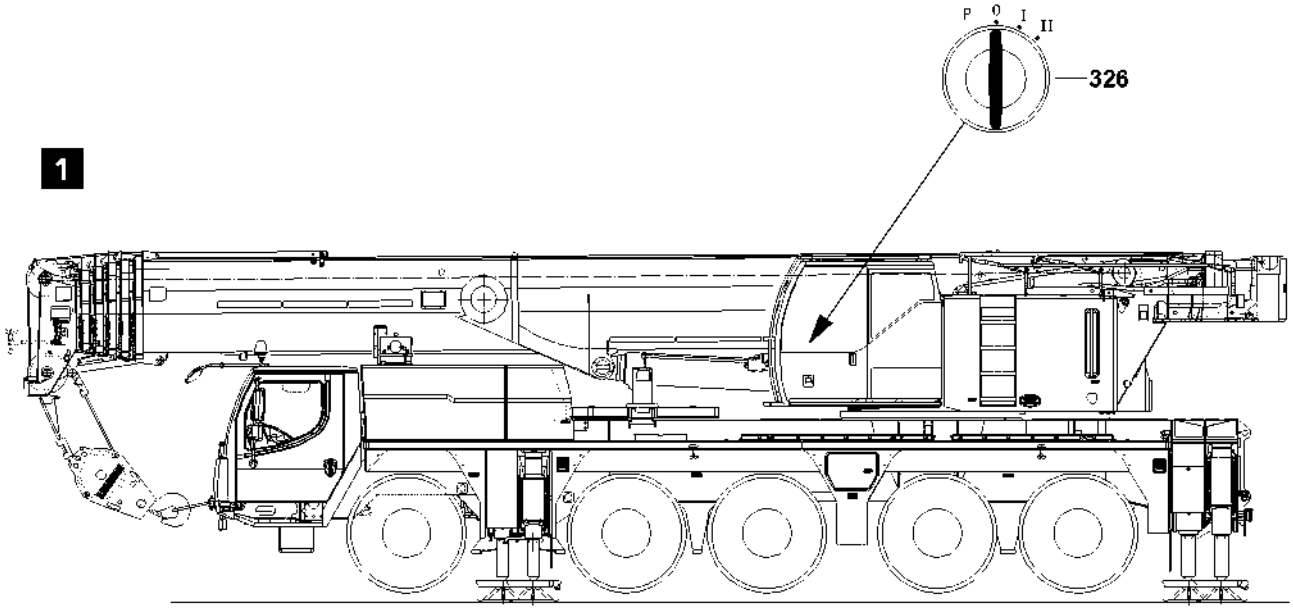

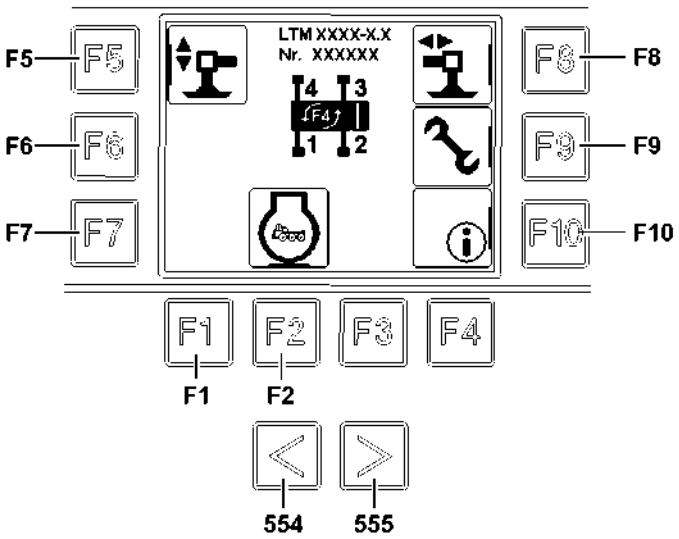

Fig.112619

6 Detaching / attaching the hook block on the fastening point

Note
Use of the Bluetooth™ Terminals (BTT)
- ▶ For the description of the work steps, the use of the BTT is assumed!
- ▶ If the work steps are to be carried out without the BTT, then all crane movements can also be carried out from the crane cab.

6.1 Unhooking the hook block

In driving operation, the hook block is attached on the fastening point. It must be unhooked for crane operation. This procedure can be carried out using the Bluetooth™ Terminal (BTT)!

WARNING
Do not stay in danger zone!
If the danger zone is entered to operate the crane via the BTT, there is a risk of accidents!
- ▶ Select the location to operate the crane via the BTT is such a way that the danger zone is always clear and well visible!

Note
- ▶ The icons assigned to the individual function keys are always directly on. A small bar **1** marks the assigned button, see example in illustration **2**.

Make sure that the following prerequisites are met:
- The crane is properly supported and horizontally aligned.
- The crane superstructure is pinned forward with the crane chassis.
- The telescopic boom is fully telescoped in.
- A valid set up configuration is entered and confirmed.
- The Bluetooth™ Terminal (BTT) is in the charging cradle.

- ▶ Start the superstructure engine via the ignition switch **326**.

Result:

- The engine starts, the Bluetooth™ Terminal (BTT) turns on and changes to the „Menu overview“, see illustration **2**.

Problem remedy
The Bluetooth™ Terminal (BTT) does not turn on?
- ▶ Turn the Bluetooth Terminal (BTT) on, see Crane operating instructions, chapter 5.31.

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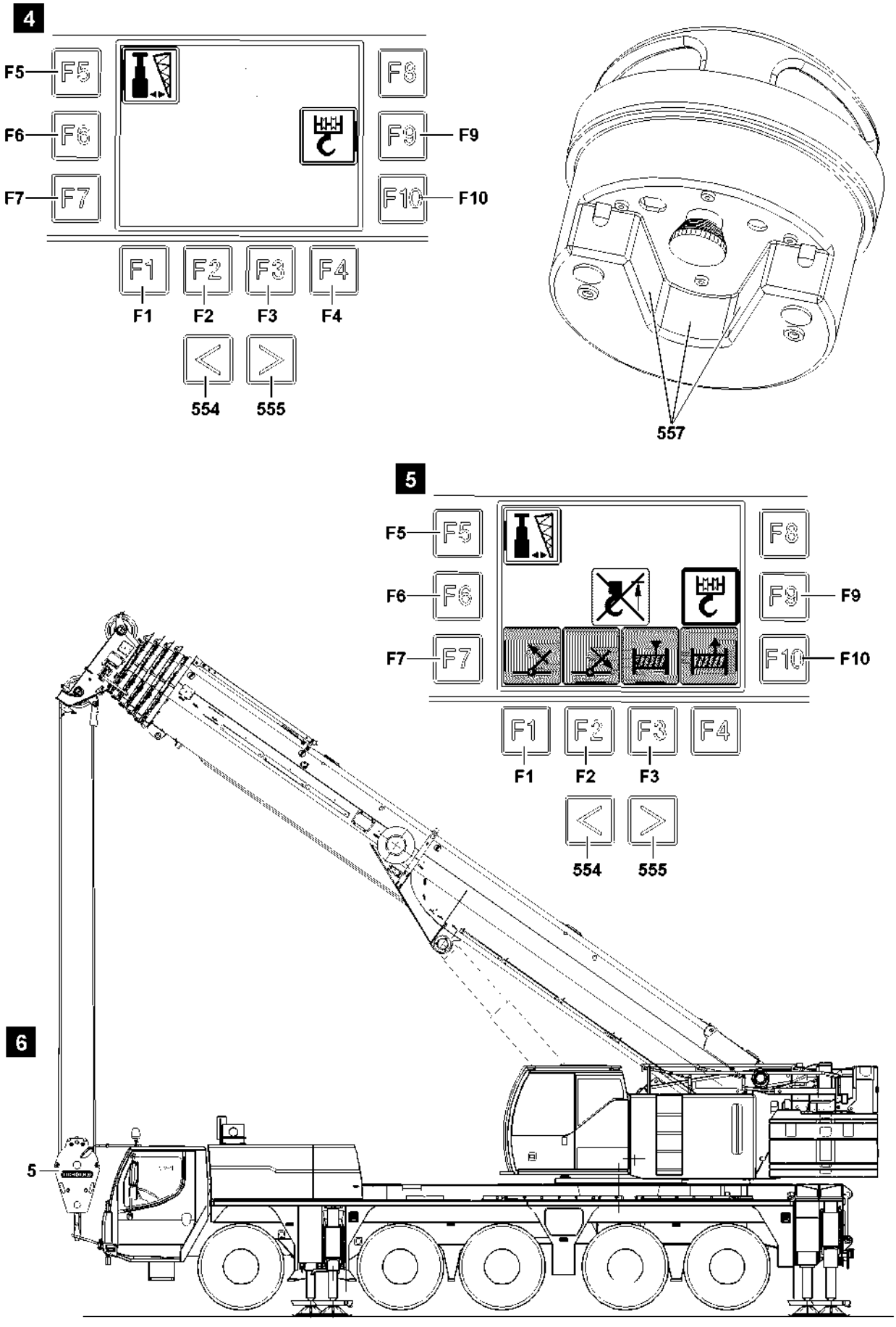

Fig.112620

Note

▶ The menu „Assembly functions“ can only be controlled completely when a valid set up configuration has been entered and confirmed on the LICCON monitor. If no valid set up configuration has been entered and confirmed, then an operating error is issued on the BTT.

▶ Press the function key **F9**.

Result:

– The BTT display changes to the „Assembly functions“ menu, see illustration **4**.

NOTICE

Hoist limit switch bypassed!
When using the BTT for hook block assembly, the hoist limit switch on the pulley head is automatically bypassed by the control up to a boom angle of 10°, see illustration **5**.
▶ Do not let the hook block collide with the pulley head!

▶ Press the function key **F9**.

Result:

– The icons required for hook block assembly are displayed, see illustration **5**.
– The hoist limit switch is bypassed.

NOTICE

Collision hook block and pulley head!
If the position of the hook block is not simultaneously monitored while luffing the telescopic boom, there is the danger that the hook block is pulled against the pulley head!
This could result in property damage!
▶ Monitor the position of the hook block and adjust it, if necessary, by spooling the hoist rope up / out!

NOTICE

Collision hook block and driver’s cab!
If the distance between the hook block and the driver’s cab is too small, a collision can occur!
This could result in property damage!
▶ Make sure there is sufficient distance between the hook block and the driver’s cab!

Note

▶ The function key **F2**, function key **F3**, function key **F7** and function key **F10** have 2 speed stages.
▶ For example, if the function key **F10** is actuated lightly, the hoist rope is spooled out at reduced speed (70 % speed). If the function key **F10** is actuated harder, the hoist rope is spooled out quickly (100 % speed).

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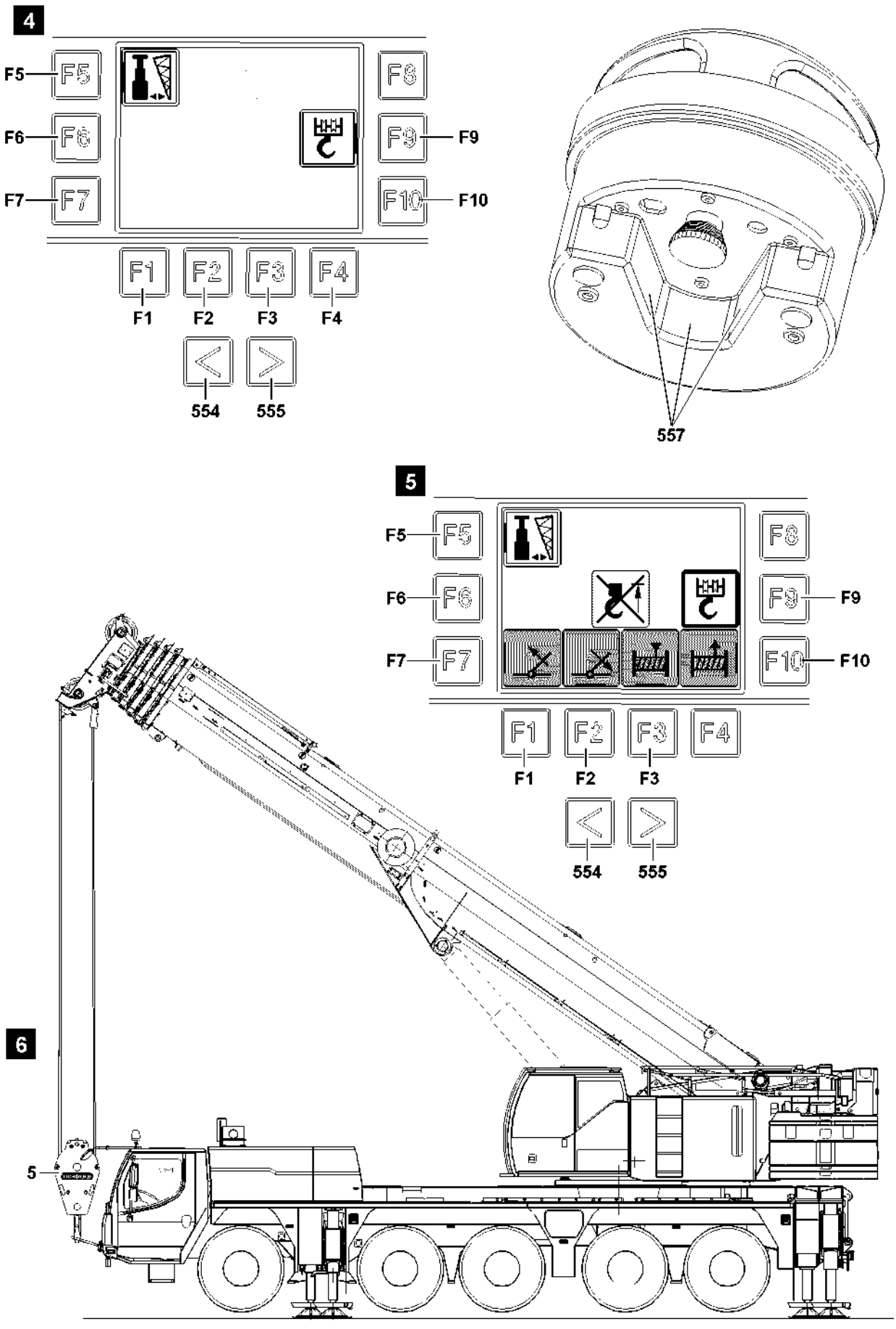

Fig.112620

▶ Actuate the 2-hand keypad **557** on the rear of the BTT.

Result:

– The icons at function key **F2**, **F3**, **F7** and **F10** turn purple.

Problem remedy
The icons at function key **F2**, **F3**, **F7** and **F10** do not turn purple?
The 2-hand keypad **557** at the rear of the BTT is not pressed.
▶ Actuate the 2-hand keypad **557** on the rear of the BTT again.

▶ Press the function key **F10** and spool the hoist rope out slightly.
▶ Spool the hoist rope out further via the function key **F10** and luff the telescopic boom up **simultaneously** via the function key **F7** until the hook block **5** can be easily unhooked, see illustration **6**.

Note
▶ Any actuation of the 2-hand keypad **557** is stored for 30 seconds. If no movement is performed within this 30 second window, or the 2-hand keypad **557** is not operated, the stored actuation is deleted and a signal tone sounds.

▶ Unhook the hook block **5** on the fastening point.
▶ Press the function key **F9**.

Result:

– The hook assembly icons are hidden, see illustration **4**.

▶ Press the function key **F1**.

Result:

– The BTT display changes to the „Main menu“.

▶ Place the Bluetooth™ Terminal in the charging cradle.
▶ Proceed with crane operation.

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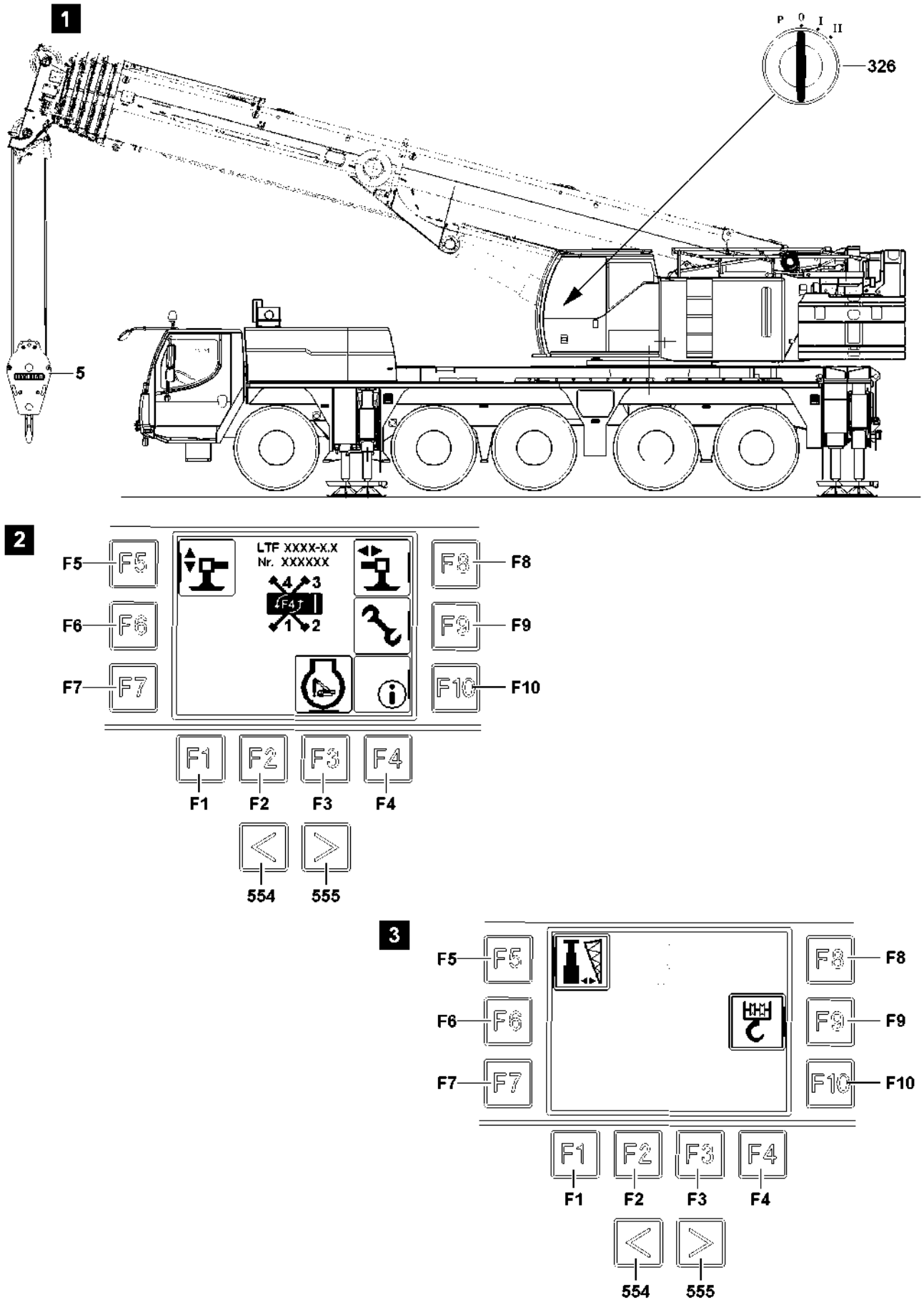

Fig.112621

6.2 Hooking in the hook block

For driving operation, the hook block **5** must be attached on the fastening point. This procedure can be carried out using the Bluetooth™ Terminal (BTT).

WARNING
Do not stay in danger zone!
If the danger zone is entered to operate the crane via the BTT, there is a risk of accidents!
▶ Select the location to operate the crane via the BTT is such a way that the danger zone is always clear and well visible!

Make sure that the following prerequisites are met:
– The crane is properly supported and horizontally aligned.
– The crane superstructure is pinned forward with the crane chassis.
– The crane engine is running.
– A valid set up configuration is entered and confirmed.
– The telescopic boom is fully telescoped in.
– The boom is luffed down to the point where the hook block is in front of the driver's cab, see illustration **1**.
– The BTT is in the menu overview, see illustration **2**.

Note
▶ The icons assigned to the individual function keys are always directly on. A small bar **1** marks the assigned button, see example in illustration **2**.

▶ Press the function key **F9**.

Result:

– The BTT display changes to the „Assembly functions" menu, see illustration **3**.

Problem remedy
The Bluetooth™ Terminal (BTT) is not operational?
▶ Turn the Bluetooth Terminal (BTT) on, see Crane operating instructions, chapter 5.31.

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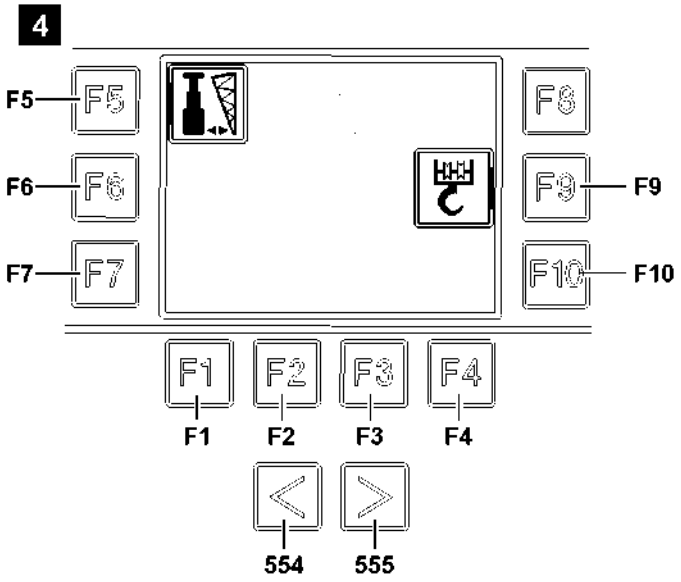

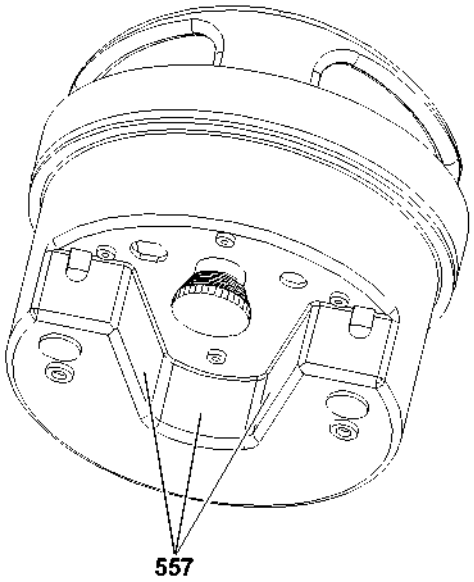

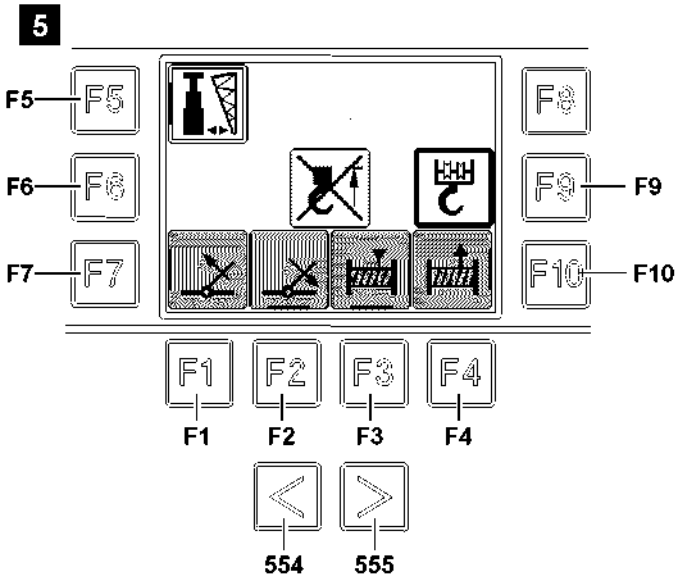

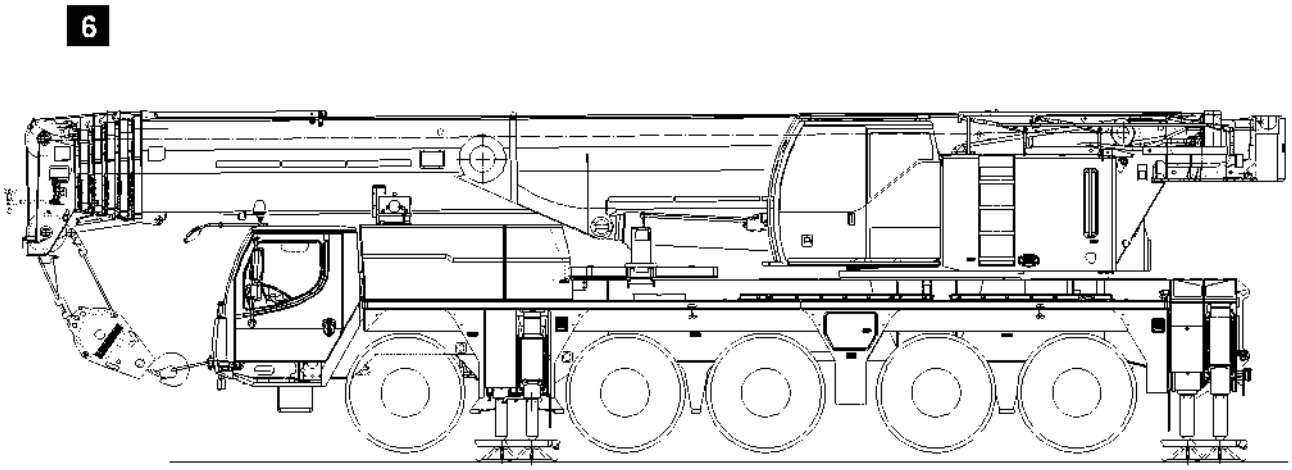

Fig.112622

Note

▶ The menu „Assembly functions“ can only be controlled completely when a valid set up configuration has been entered and confirmed on the LICCON monitor. If no valid set up configuration has been entered and confirmed, then an operating error is issued on the BTT.

▶ Press the function key **F9**.

Result:

– The icons required for hook block assembly are displayed, see illustration **4**.
– The hoist limit switch is bypassed.

NOTICE

Hoist limit switch bypassed!
When using the BTT for hook block assembly, the hoist limit switch on the pulley head is automatically bypassed by the control up to a boom angle of 10°, see illustration **4**.
▶ Do not let the hook block collide with the pulley head!

NOTICE

Collision hook block and pulley head!
If the position of the hook block is not simultaneously monitored while luffing the telescopic boom, there is the danger that the hook block is pulled against the pulley head!
This could result in property damage!
▶ Monitor the position of the hook block and adjust it, if necessary, by spooling the hoist rope up / out!

NOTICE

Collision hook block and driver’s cab!
If the distance between the hook block and the driver’s cab is too small, a collision can occur!
This could result in property damage!
▶ Make sure there is sufficient distance between the hook block and the driver’s cab!

Note

▶ The function key **F2**, function key **F3**, function key **F7** and function key **F10** have two speed stages.
▶ For example, if the function key **F10** is actuated lightly, the hoist rope is spooled out at reduced speed (70 % speed). If the function key **F10** is actuated harder, the hoist rope is spooled out quickly (100 % speed).

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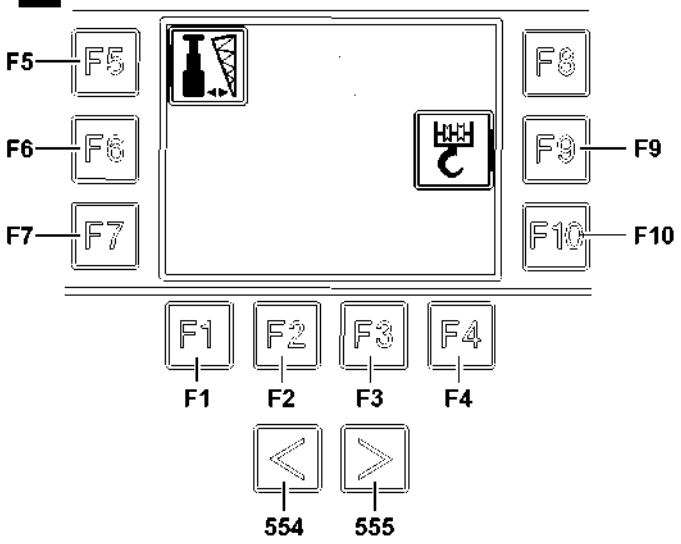
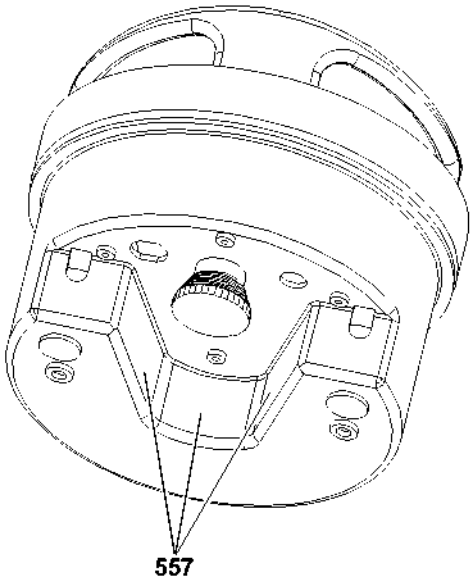
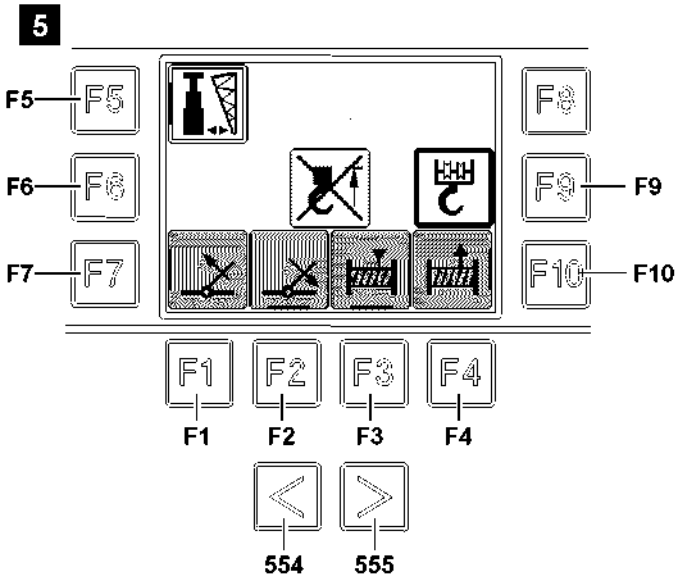




5



6

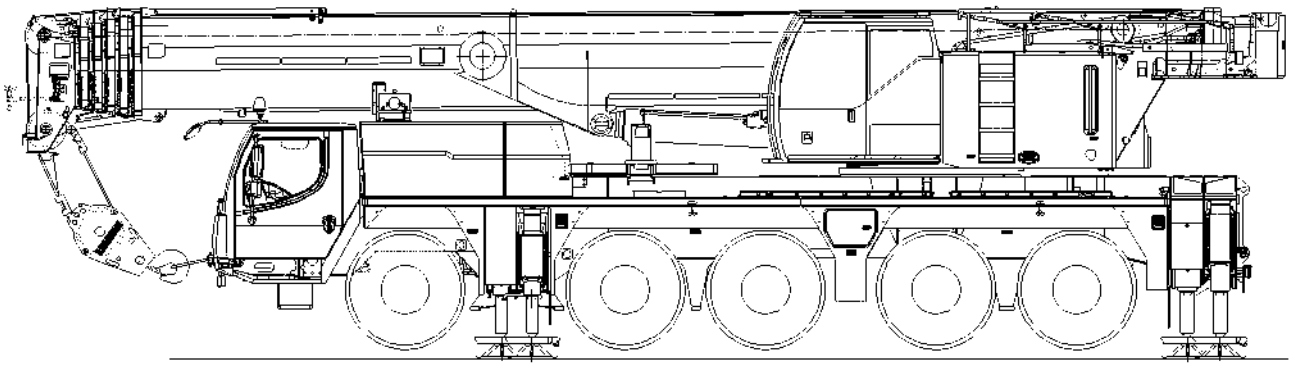


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Fig.112622

▶ Actuate the 2-hand keypad **557** on the rear of the BTT.

Result:

– The icons at function key **F2**, **F3**, **F7** and **F10** turn purple, see illustration **5**.

Problem remedy
The icons at function key **F2**, **F3**, **F7** and **F10** do not turn purple?
The 2-hand keypad **557** at the rear of the BTT is no longer actuated.
▶ Actuate the 2-hand keypad **557** on the rear of the BTT again.

▶ Luff up the telescopic boom via the function key **F7** and spool the hoist rope out **simultaneously** via thefunction key **F10** until the hook block **5** can be hooked easily.

Note
▶ Any actuation of the 2-hand keypad **557** is stored for 30 seconds. If no movement is performed within this 30 second window, or the 2-hand keypad **557** is not operated, the stored actuation is deleted and a signal tone sounds.

▶ Attach the hook block **5** on the fastening point.

NOTICE
The hoist rope is improperly tensioned!
If the hoist rope is tensioned too much, then the rope pulleys, trailer coupling or hoist rope can be damaged!
If the hoist rope is not tensioned enough, then the driver's cab can be damaged!
▶ Tension the hoist rope in such a way that overloads and damage on components is avoided!

▶ Luff down the telescopic boom via the function key **F2** and spool the hoist rope up **simultaneously** via the function key **F3** until the telescopic boom is resting on its support and the hoist rope is properly tensioned, see illustration **6**.
▶ Press the function key **F9**.

Result:

– The hook assembly icons are hidden.

▶ Press the function key **F1**.

Result:

– The BTT display changes to the „Main menu".

▶ Place the Bluetooth™ Terminal in one of the charging cradles.

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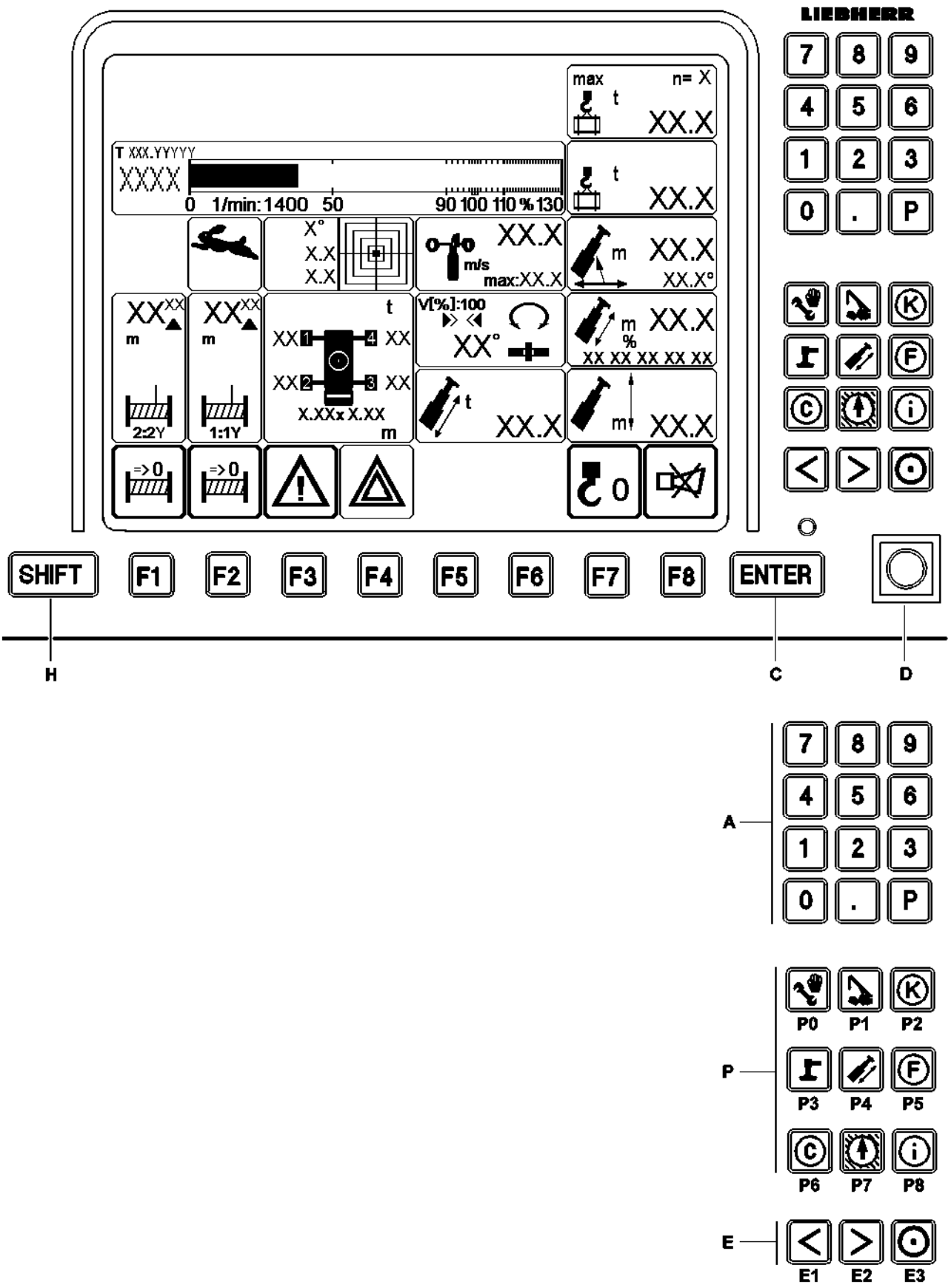

Fig.108845

7 LICCON computer system after engine start

The LICCON computer system is only operational when the engine is running.

7.1 Waiting for the boot up phase

After being turned on, the LICCON computer system boots up and carries out a self-test, see Crane operating instructions, chapter 4.02.

▶ Wait for the boot up phase.

Result:

– The set up screen appears on the LICCON monitor.
– Normally the previously selected set up configuration is displayed.

Problem remedy
An error message appears on the LICCON monitor?
If, during the boot up phase, a master switch is moved away from the neutral position, the boot up phase is interrupted and an error message appears on the monitor.
▶ Turn the engine and the ignition off and restart.

Problem remedy
The LICCON monitor does not show the most recently set set up configuration and 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.

7.2 Taking over the previously selected set up configuration and hoist rope reeving

Check in the operating screen if the correct short code and the correct reeving number have been set.

If the settings on the operating screen are correct:
▶ Press function key „F8“ (O.K.).

Result:

– The „set up“ program is terminated and the adjusted parameters are accepted for the newly started „Crane operation“ program.

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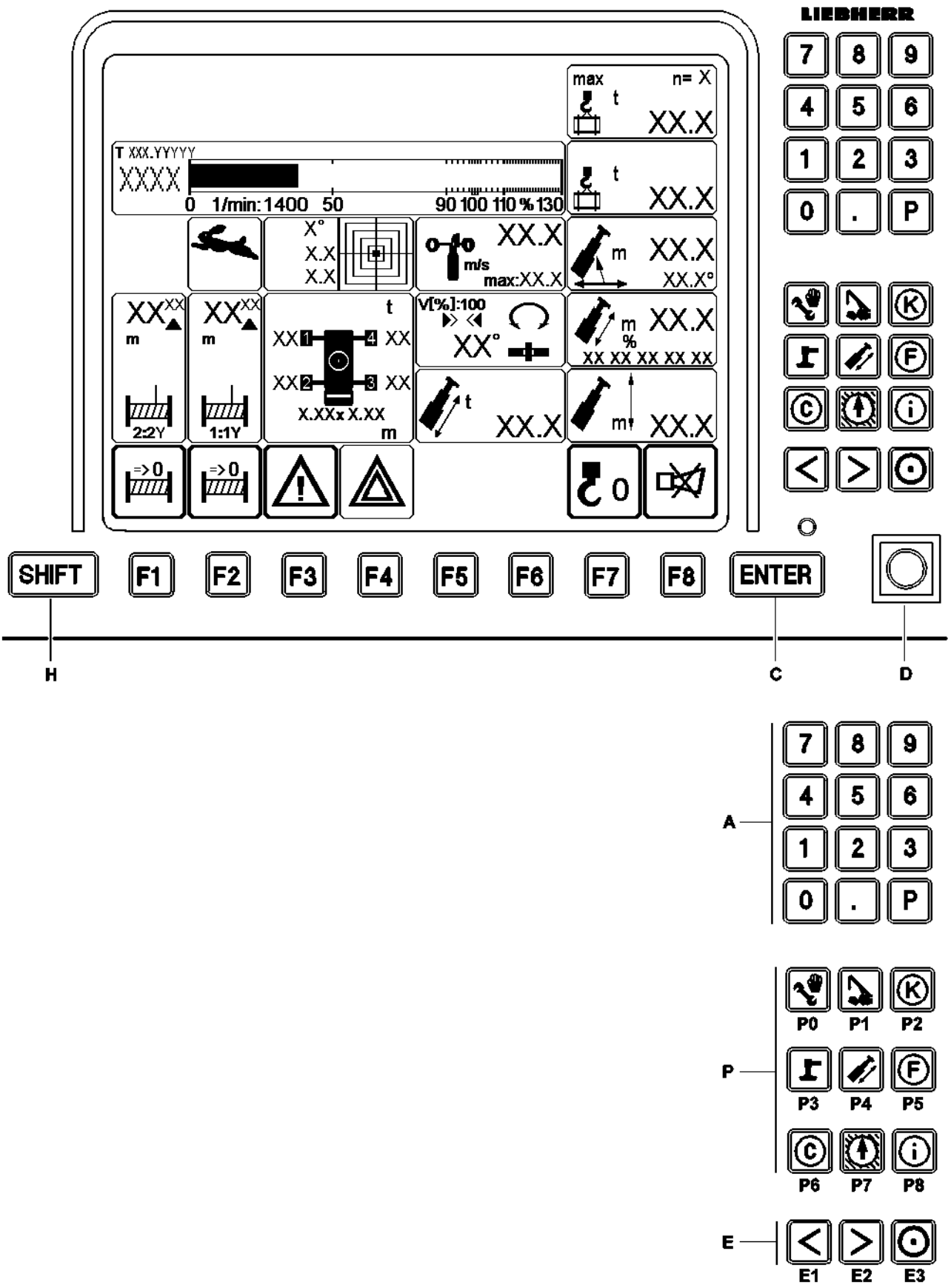

Fig.108845

7.3 Setting a new set up configuration and new hoist rope reeving

The selected and displayed set up configuration can be changed with the function keys or by entering the short code.

7.3.1 Setting a new set up configuration with the function keys

- ▶ Press function key „F2“ until the desired main geometry status is selected.
- ▶ Press function key „F3“ until the desired accessory status is selected.
- ▶ Press function key „F4“ until the desired counterweight is selected.
- ▶ Press function key „F5“ until the desired support base is selected.
- ▶ Press function key „F6“ until the desired turning area of the crane superstructure is selected.
- ▶ Press the „Enter“ key.
- ▶ Check the set load chart.

7.3.2 Setting a new set up configuration with short code

The short code can be found in the load chart.

- ▶ Entering the 4-digit short code using the keypad **A**.
- ▶ Press the „Enter“ key.

Result:

– The data of the selected load chart can be viewed.
Note:
For a more detailed description of the „Set up“ program, see Crane operating instructions, chapter 4.02.

- ▶ Check the set load chart.

7.3.3 Setting a new hoist rope reeving

- ▶ Press function key „F7“ until the desired reeving number is selected.
or
Press function keys „SHIFT“ + „F7“ until the desired reeving number is selected.

7.3.4 Checking and accepting the new set up configuration and hoist rope reeving

Check in the operating screen if the correct short code and the correct reeving number have been set.

If the settings on the operating screen are correct:
- ▶ Press function key „F8“ (O.K.).

Result:

– The „set up“ program is terminated and the adjusted parameters are accepted for the newly started „Crane operation“ program.

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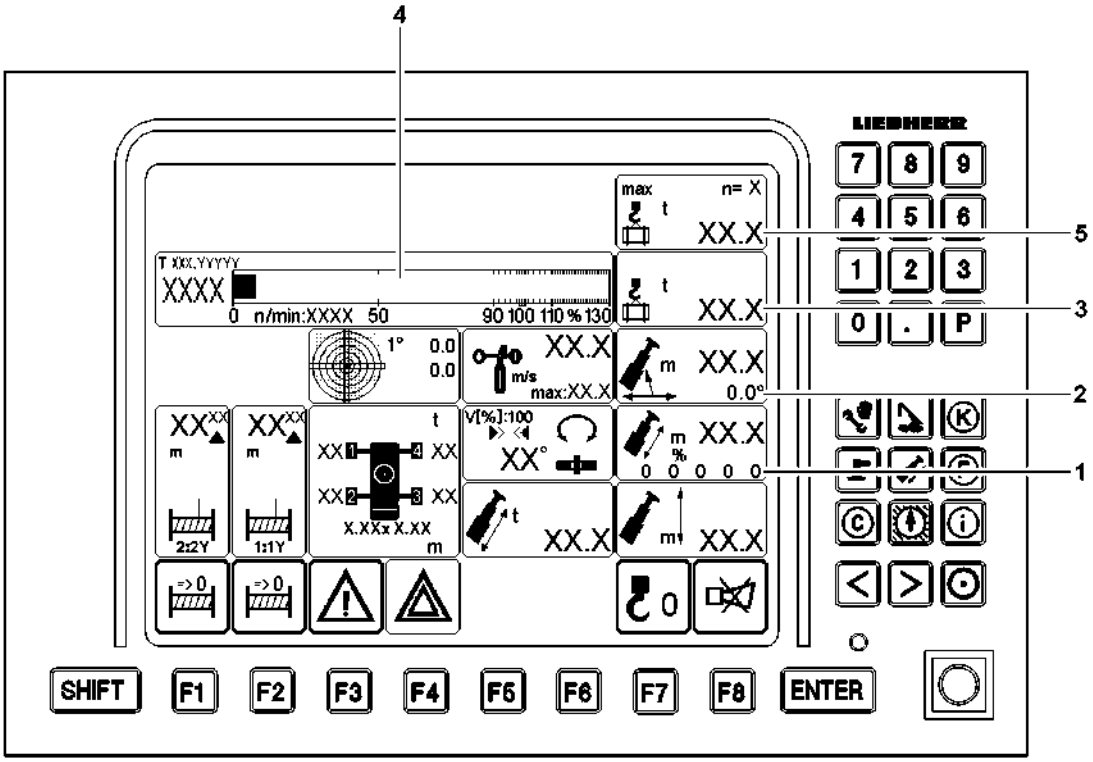

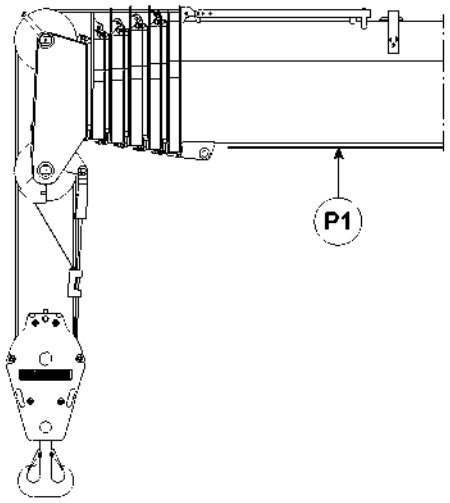

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Fig.112697

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 properly supported and horizontally aligned.
– There is no load on the hook.

Note
▶ The horizontal alignment of the telescopic boom can be checked with a spirit level on point **P1**.

When the telescopic boom is completely telescoped in and horizontally aligned, the LICCON computer system must show the following:
– Display Extension status telescopes **1**: all values on 0 %
– Display Telescopic boom angle **2**: 0°

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 properly supported and horizontally aligned.

The respective displayed values must be plausible:
– **3** Actual load display
– Utilization bar **4** (ratio of value Actual load display **3** to maximum load value **5**)

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: length sensor, 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!

4.2.2 Bypass of overload protection: Failure of overload protection (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 %.

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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!

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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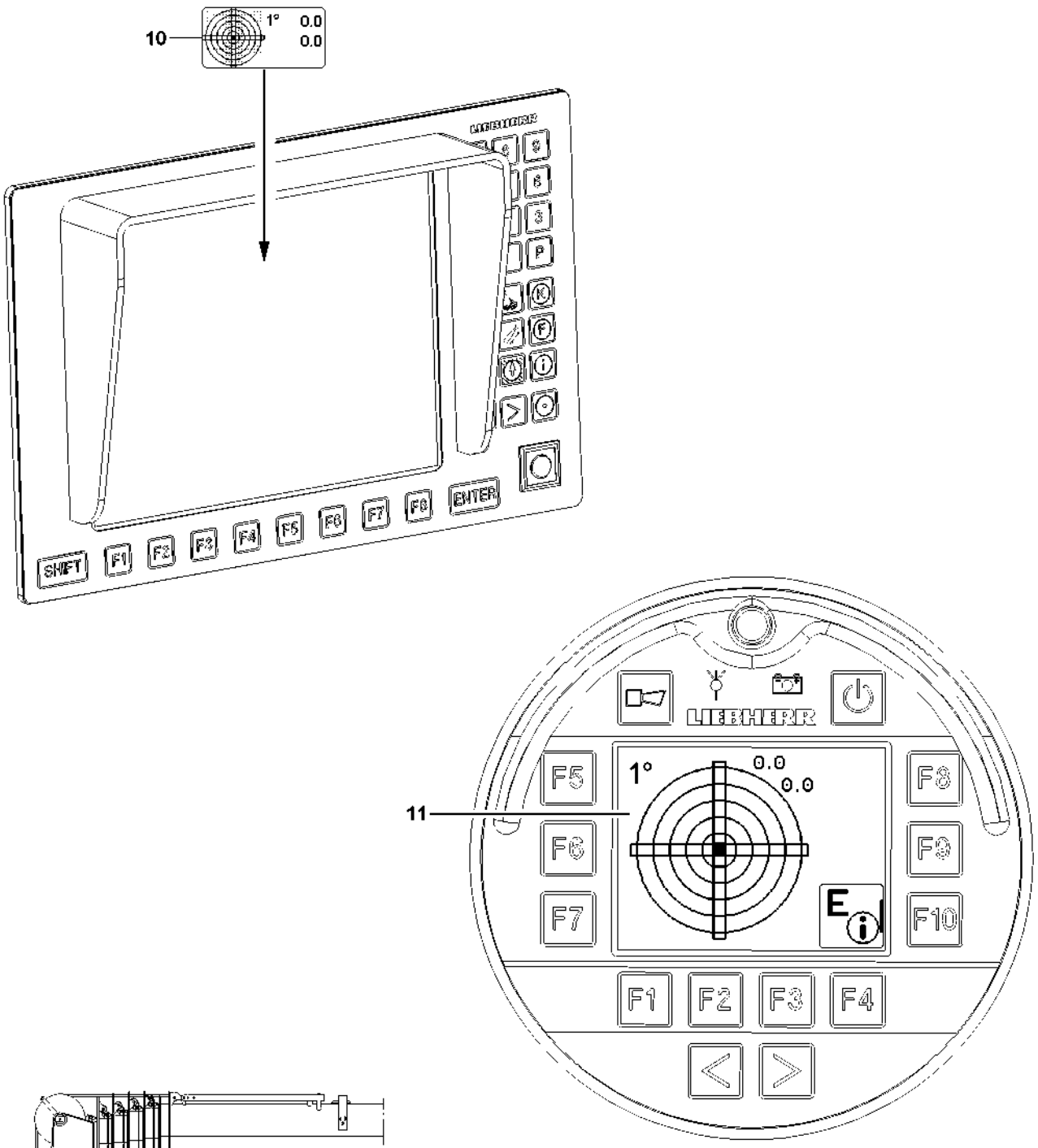

Fig.112699

5 Safety devices on the crane

5.1 Leveling instruments

To ensure the working safety of the crane, the crane must be aligned horizontally on level ground with sufficient load bearing capacity. Alignment of the crane, see Crane operating instructions, chapter 3.05.

The current values are displayed continuously in the leveling instruments, see Crane operating instructions, chapter 4.02 and chapter 5.31.

The maximum permissible deviation from the horizontal position of the crane is ± 0.5 % (± 0.3°).

WARNING
The crane can topple over!
If the leveling instruments are defective, there is a danger that the crane is not horizontally aligned!
A crane which is not horizontally aligned can topple over!
Personnel can be killed or seriously injured!
This could result in property damage!
▶ It is imperative that the crane is aligned in horizontal direction!

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 3.05 and 4.02.

5.1.2 Leveling instrument in the BTT

The incline of the crane is shown in the Incline display menu **11** graphically as well as numerically, see Crane operating instructions, chapter 3.05 and 5.31.

5.1.3 Quick test Leveling instrument

Make sure that the following prerequisites are met:
– The crane is properly supported and horizontally aligned.
– There is no load on the hook.

For horizontally aligned crane:
– The telescopic boom must be aligned horizontally at telescopic boom angle 0° over the entire slewing range of the turntable.

Note
▶ The horizontal alignment of the telescopic boom can be checked with a spirit level on point **P1**.

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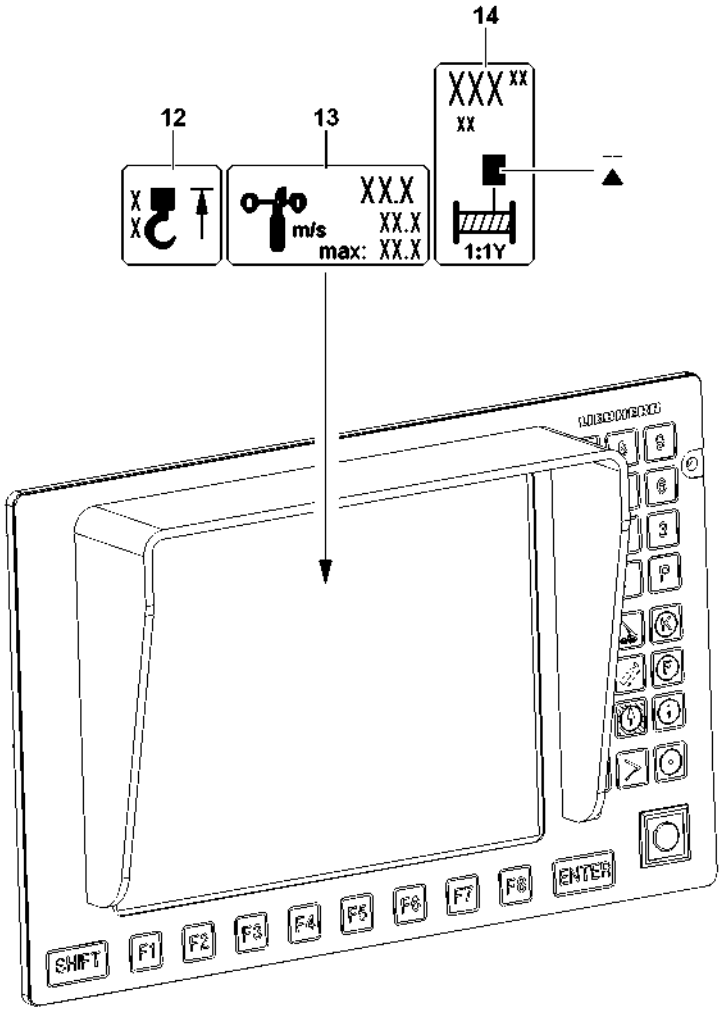

Fig.112700

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 movements „Spool up winch“, „Luff telescopic boom down“ and „Telescope the telescopic boom out“ 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.

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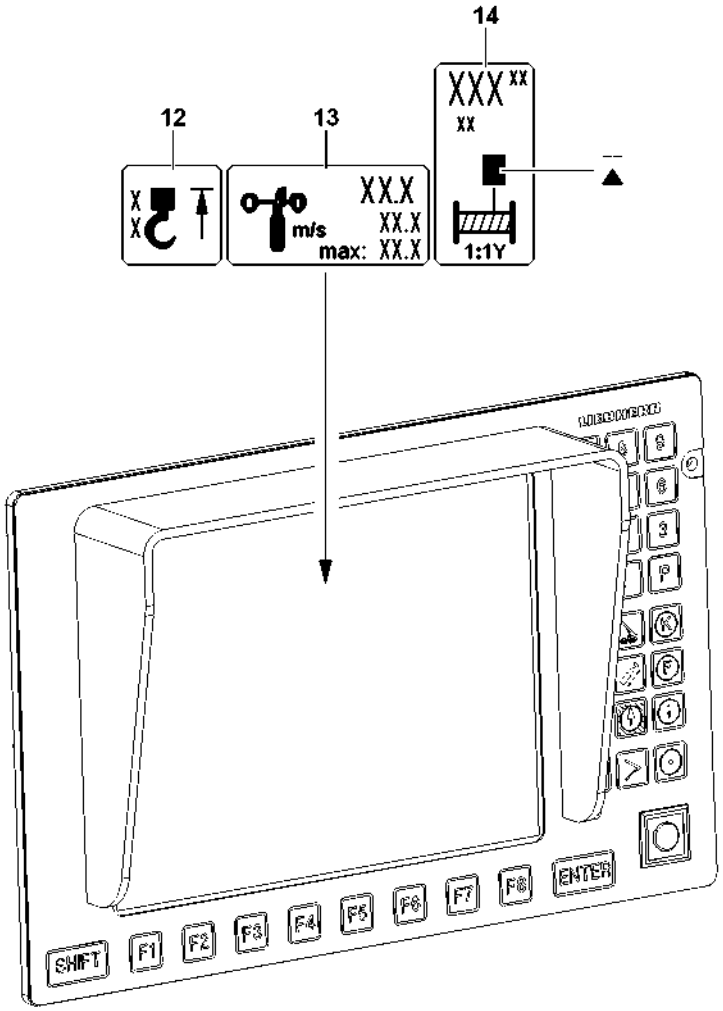

LWE/LTM 1130-5-1-004/20502-04-02/en

Fig.112700

5.4 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.

5.4.1 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“.

5.5 Limit switch winch spooled out

The winch turn sensor is adjusted in the factory. If used properly, the winch turn sensor will not need readjustment.

Note
Minimum rope coils on the shut off point!
▶ For the winches, a minimum of 4 rope coils are set on the winch turn sensor.

WARNING
The load can fall off!
If the winch turn sensor does not turn off when four minimum rope coils are reached, then there is the danger that the rope lock is pulled out and the load falls down when the rope is spooled out further!
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 four minimum rope coils, have the winch turn sensor readjusted by **Liebherr Service**!

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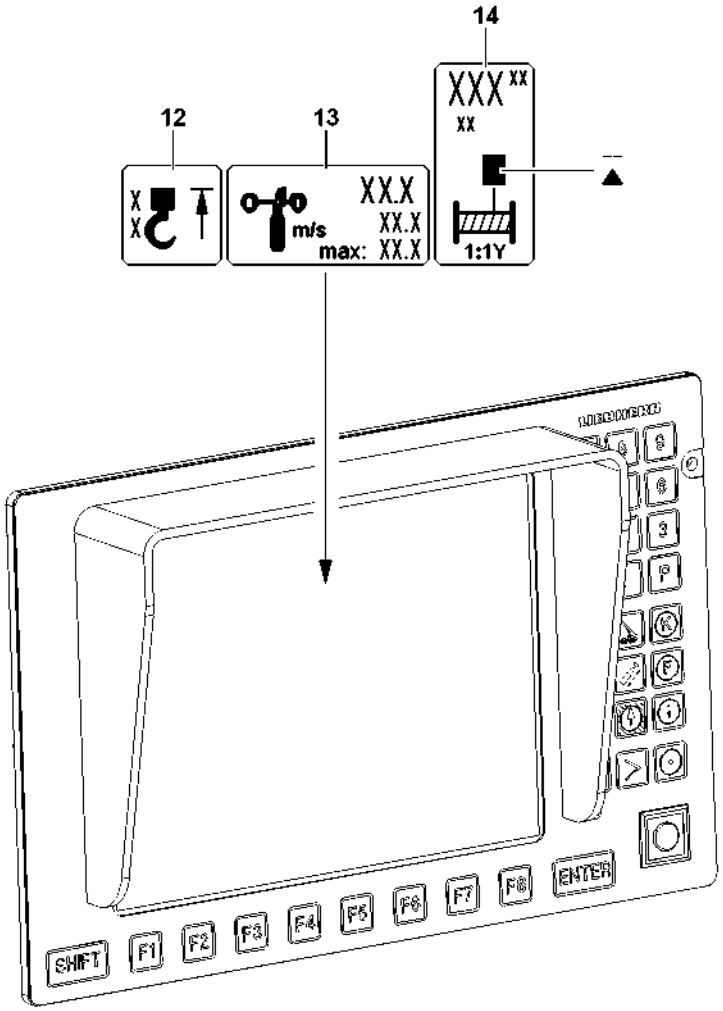

Fig.112700

WARNING
The load can fall off!
If the rope is not spooled up or out properly, then the adjustment of the winch turn sensor is changed!
If the adjustment of the winch turn sensor has changed, there is a risk that 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 winch turn sensor adjustment has changed: 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**. The crane movement „Spool winch out“ is shut off.

5.5.1 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.

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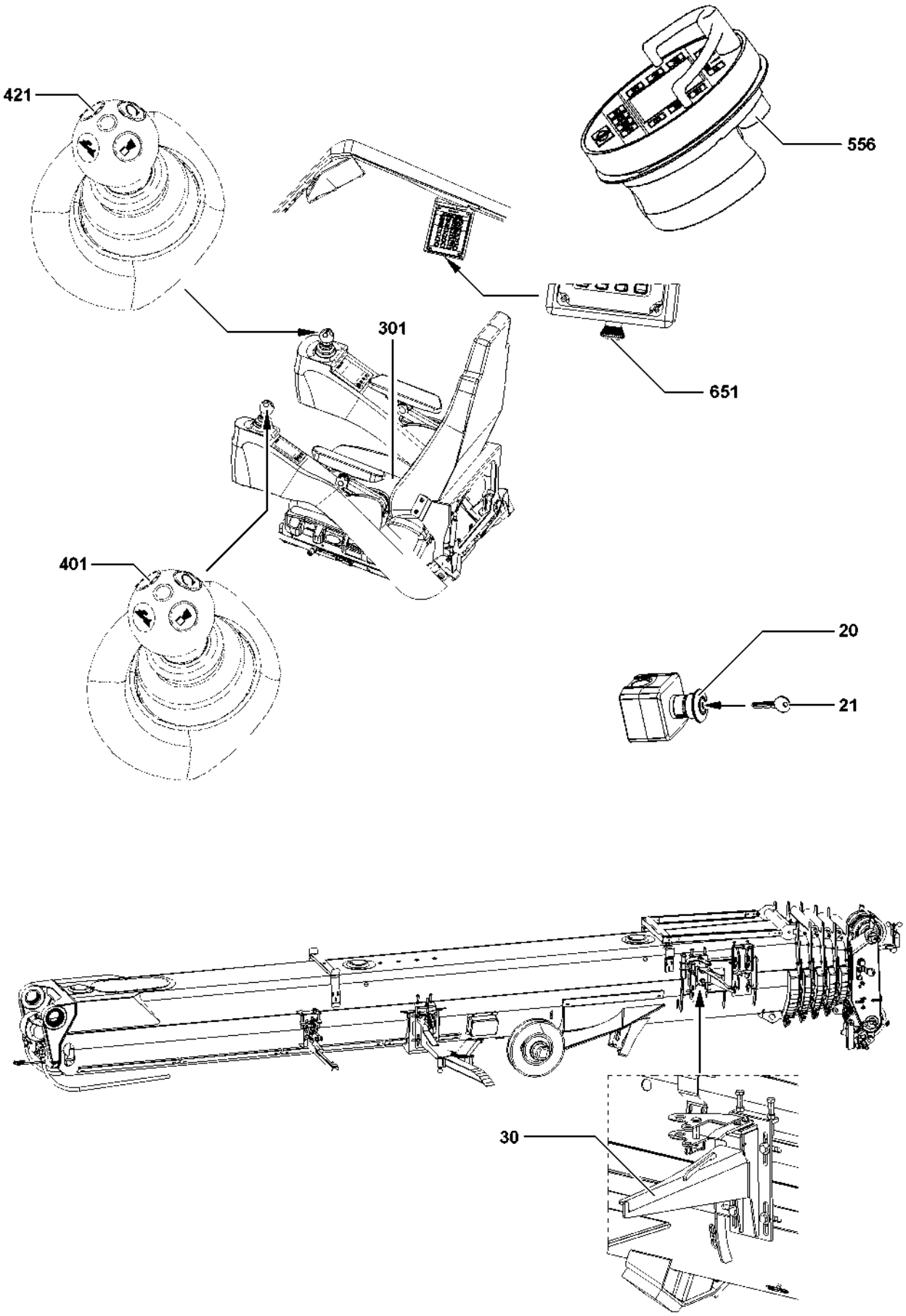

Fig.112698

5.6 EMERGENCY STOP switch / EMERGENCY OFF switch

If an EMERGENCY STOP switch / EMERGENCY OFF switch is actuated, then every carried out movement can be stopped immediately.

WARNING
Defective EMERGENCY STOP switch / EMERGENCY OFF switch!
If the crane is operated with a defective EMERGENCY STOP switch / EMERGENCY OFF switch, then the 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 shut off abruptly!
Abrupt shut off of 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 three versions:
- 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 **651**, the release is obtained by turning and unlocking the knob and subsequently turning the ignition „Off - On“ momentarily.
- After actuation of the switch **556**, the release is obtained by turning and unlocking the knob and subsequently turning the ignition „Off - On“ momentarily.

Note
- ▶ The switch **556** on the BTT is only activated when working with the BTT.

5.6.1 Quick test EMERGENCY STOP switch / EMERGENCY OFF switch

After actuation of the EMERGENCY STOP switch / EMERGENCY OFF switch:
- The crane movements must be shut off.
- 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.

5.7 Control release

The control release can be made via three switches:
- **301** Seat contact button
- Button **401** Master switch MS1 (right control console)
- Button **421** Master switch MS2 (left control console)

The seat contact button **301** 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.

The button **401** and button **421** bypass the seat contact button **301** if it becomes necessary for the operator to work standing up.

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5.8 Catch bar

Note
▶ Only for cranes with folding jib.

The catch bar **30** on the telescopic boom pivot section is a mechanical safety device!

WARNING
Danger of fatal injuries due to toppling folding jib!
Due to incorrectly installed, damaged or non-existing catch bar **30** on the telescopic boom pivot section, the folding jib can fall down - in case of an installation error!
Personnel can be hit and killed or seriously injured!
This could result in property damage!
▶ Before folding jib assembly make sure that the catch bar **30** has been installed properly on the telescopic boom pivot section and that it is not damaged!
▶ The catch bar **30** is a mechanical safety device. For that reason, it is prohibited to change the catch bar **30** and its installation in any way!

5.9 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 luffing cylinder and the support cylinders.
– Check valves
  • Control and secure the flow direction.

5.10 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!

5.11 Limit switch Telescopic boom

On the telescopic boom, the limit switches monitor the „steepest position“ and the „lowest position“.

5.12 Limit switch Luffing accessories

Note
▶ Only for cranes with luffing accessories

For operation with luffing accessories (for example a luffing lattice jib) limit switches monitor the „steepest position“ and the „lowest position“.

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5.13 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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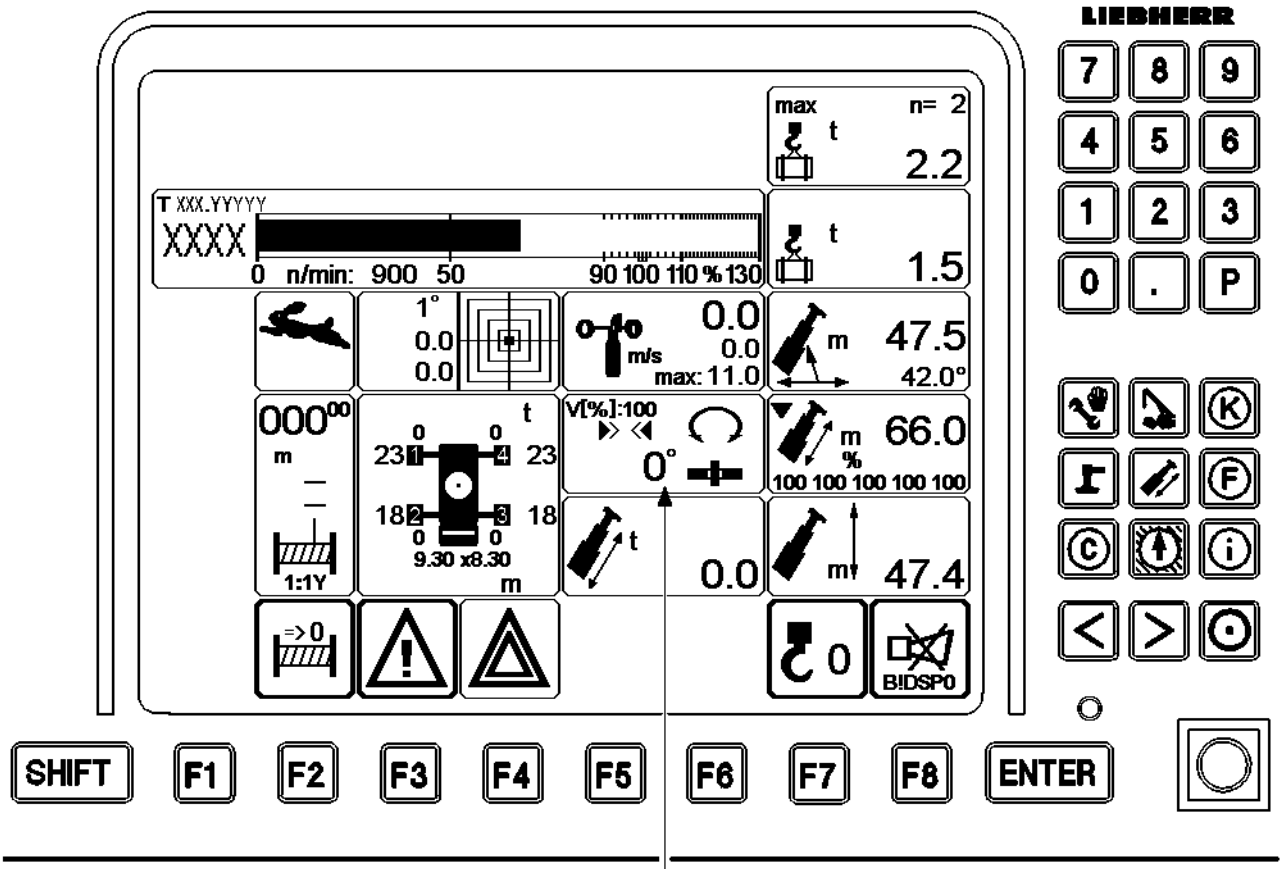

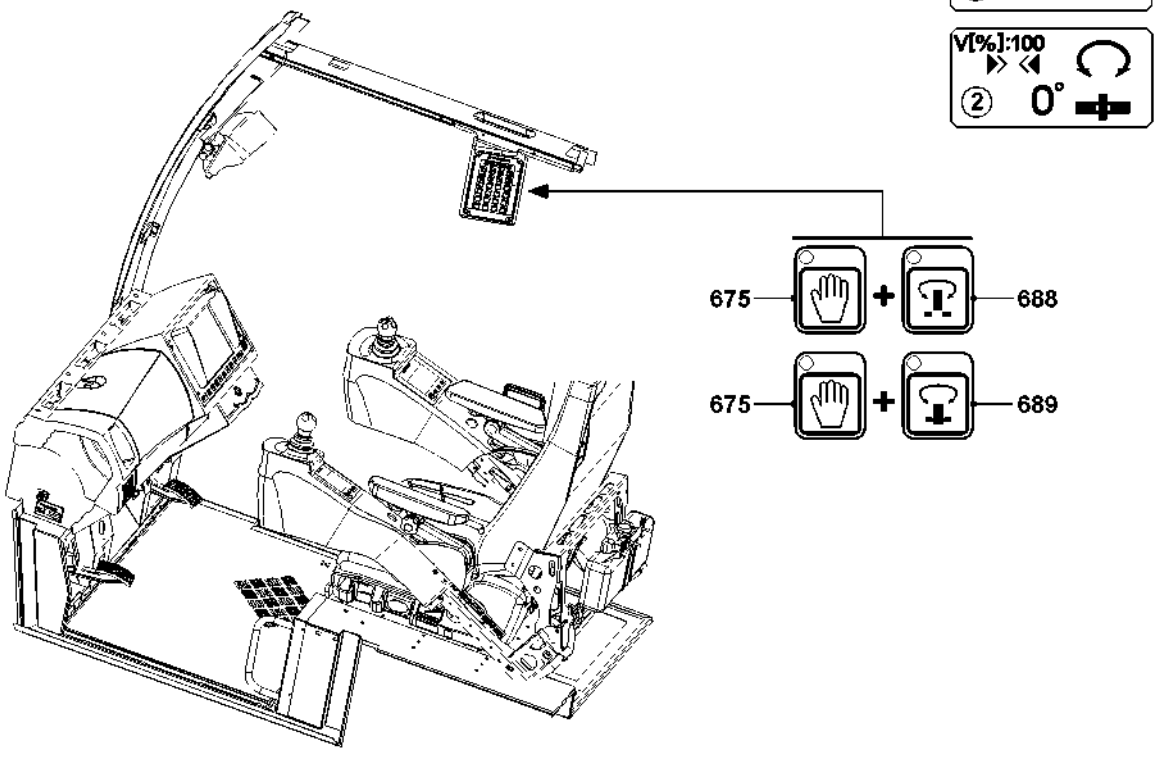

Fig.106288

1 General

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 step at the entry of the crane operator's cab is moved out.
- The counterweight is attached and secured according to the data in the load chart.
- The crane engine is running.
- The hook block is correctly reeved as shown in reeving plan.
- All safety equipment has been adjusted according to the data in the load chart.
- There are no persons or objects in the danger zone.

Note
- ▶ In order to protect the crane and reduce the danger of accidents always use 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 short warning signal (horn) before starting a crane movement.

1.1 Crane superstructure

1.1.1 Locking the crane superstructure

When „driving in equipped condition", mechanically lock the crane superstructure to the crane chassis.

Note
LICCON overload protection
- ▶ The release of LICCON overload protection is only issued when the crane superstructure is properly locked to the crane chassis.
- ▶ The procedure for locking / unlocking the crane superstructure with the crane chassis is performed via the operating and control unit (BKE) in the crane operator's cab, see chapter 4.01.

When the crane superstructure is unlocked:
- ▶ Activate the 2-hand button **675** (hand button) and then press button **689** until the LED on the button **689** continuously lights up and an acoustic signal sounds.

Result:

- The locking mechanism for the crane superstructure is locked.
- The icon **2** appears on the LICCON monitor.

1.1.2 Unlocking the crane superstructure lock

When the crane superstructure is locked:
- ▶ Activate the 2-hand button **675** (hand button) and then press button **688** until the LED on the button **688** continuously lights up and an acoustic signal sounds.

Result:

- The locking mechanism for the crane superstructure is unlocked.
- The icon **1** appears on the LICCON monitor.

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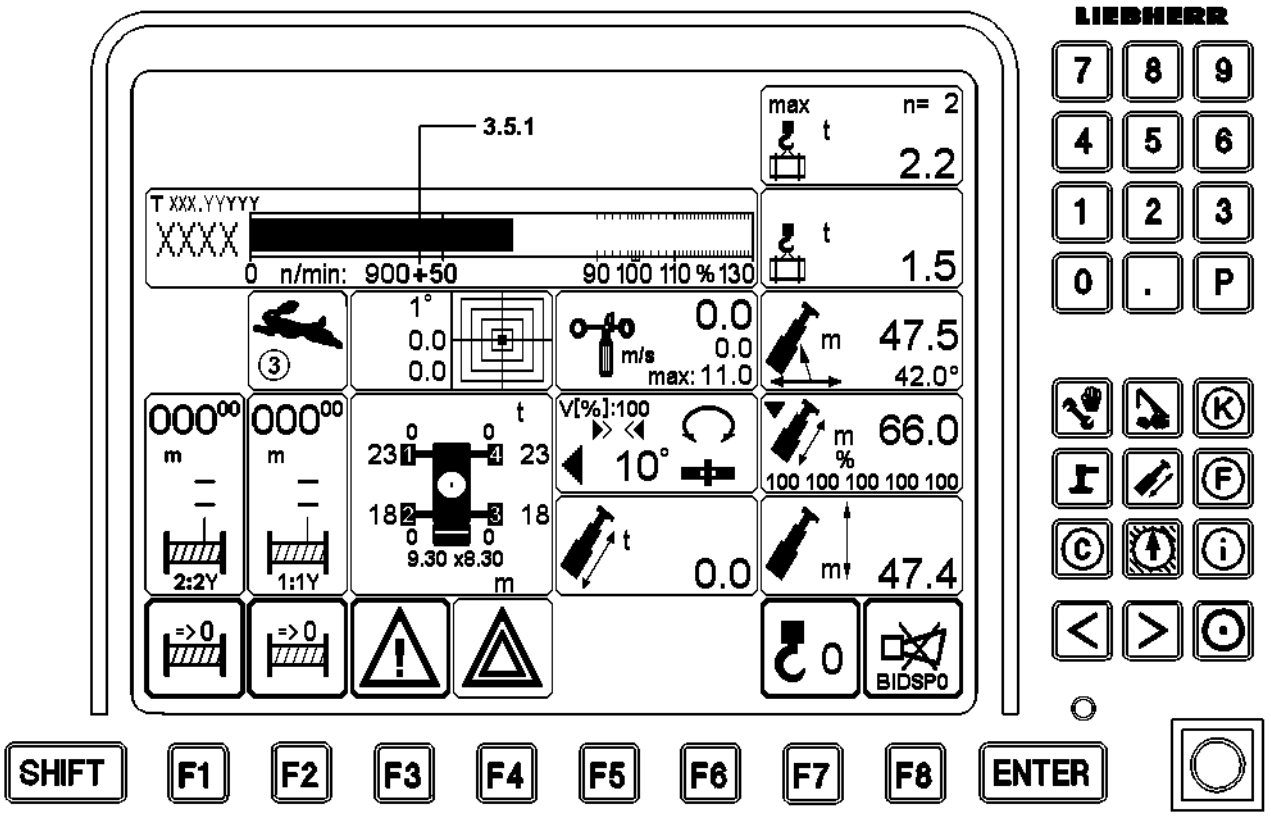

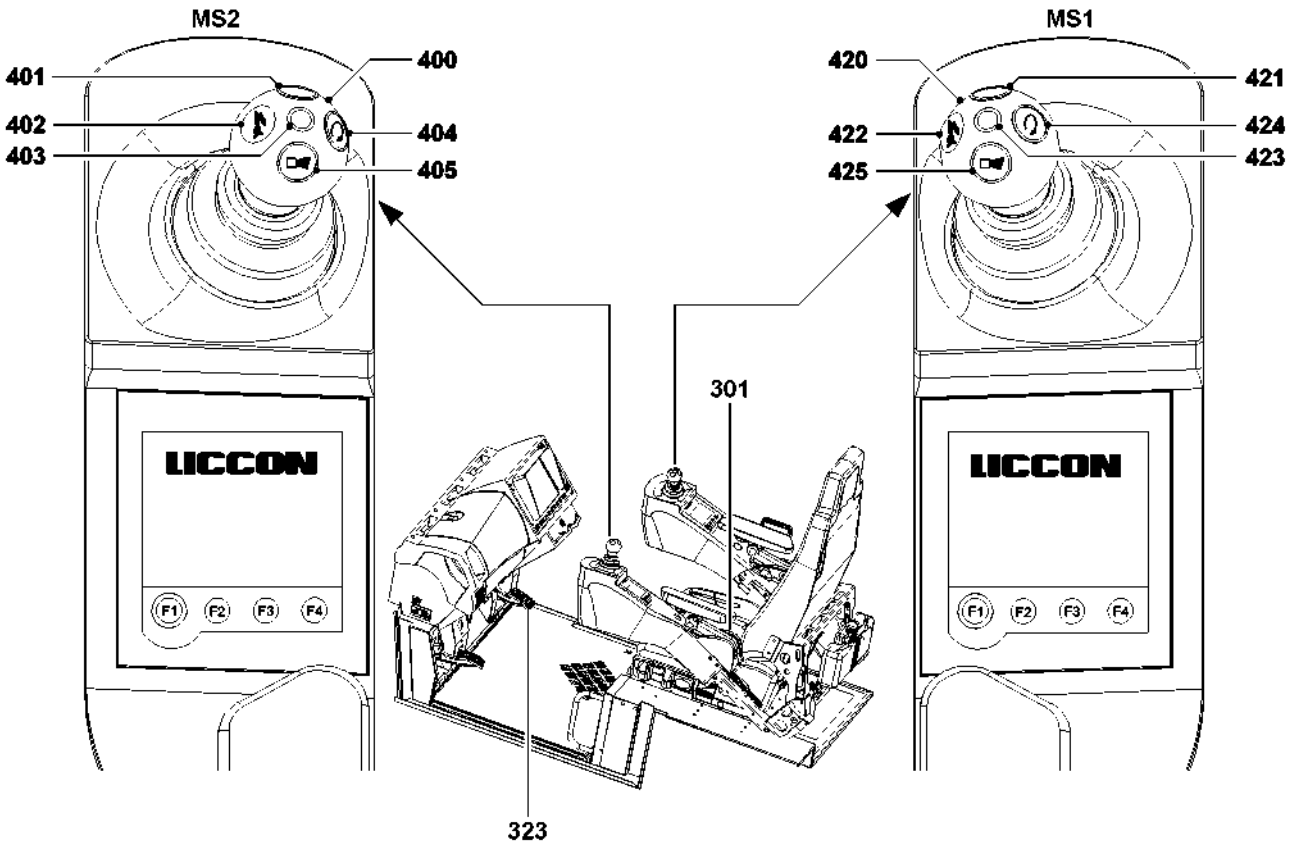

Fig.106289

1.2 Engine speed

1.2.1 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 regulation can be locked in any position.

▶ Press the pedal **323** down for the engine regulation until the desired rpm is reached.
▶ Press the button **404**.
or
Press the button **424**.

Result:

– The engine rpm is locked.
– The icon „+“ **3.5.1** appears on the LICCON monitor.

1.2.2 Releasing the engine rpm lock

When the engine rpm is locked:
▶ Press the button **404**.
or
Press the button **424**.

Result:

– The engine rpm lock is revoked.
– The icon „**+**“ **3.5.1** turns off on the LICCON monitor.

1.3 Fast mode (Rapid gear)

1.3.1 Turning the rapid gear on

Using the button **402** or the button **422** will increase the speed of the crane movement for „luffing up“ and „lift / lower“.

DANGER
Danger of accident in the event of one to three strand reeving!
▶ Do **not** turn the rapid gear on if the crane is loaded to more than 50 % of its maximum permitted load carrying capacity for the respective radius.

▶ Press the button **402**.
or
Press the button **422**.

Result:

– The rapid gear is turned on.
– The icon **3** appears on the LICCON monitor.

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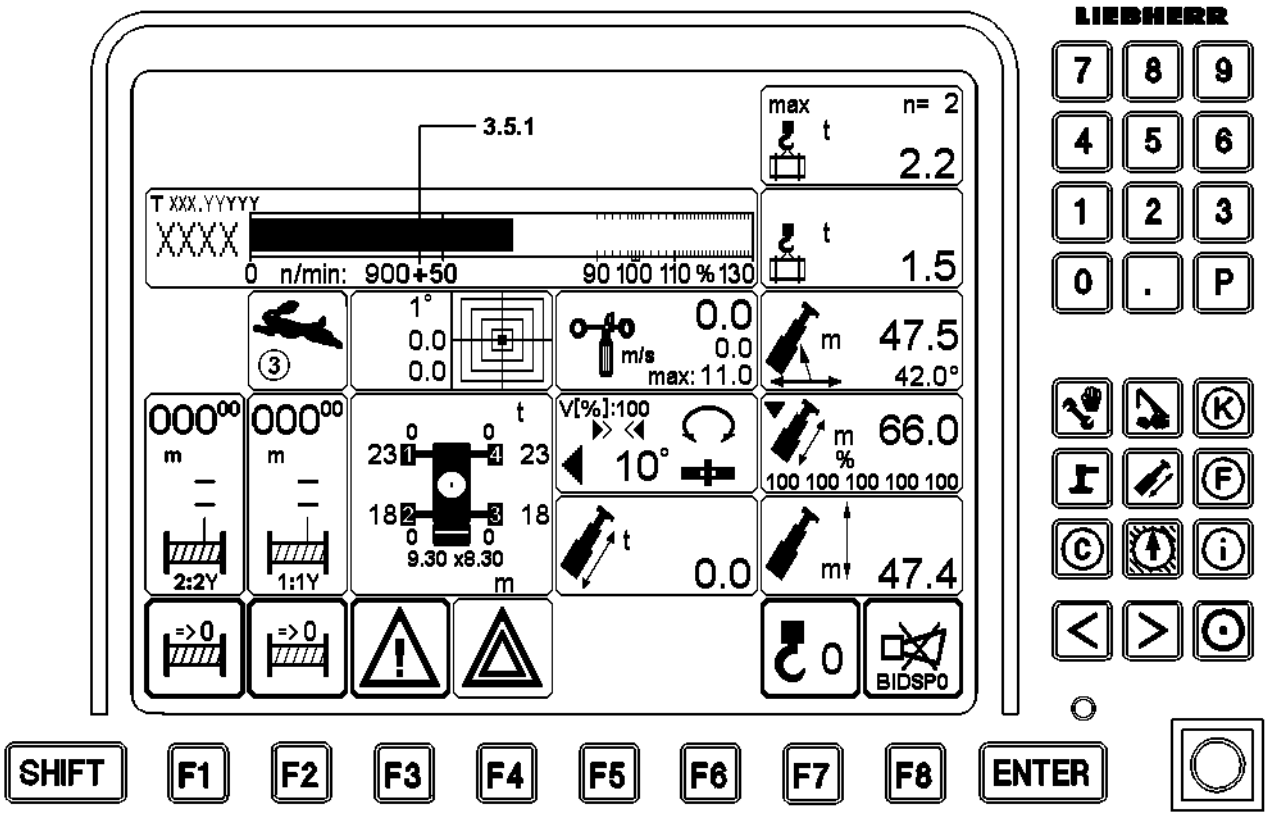

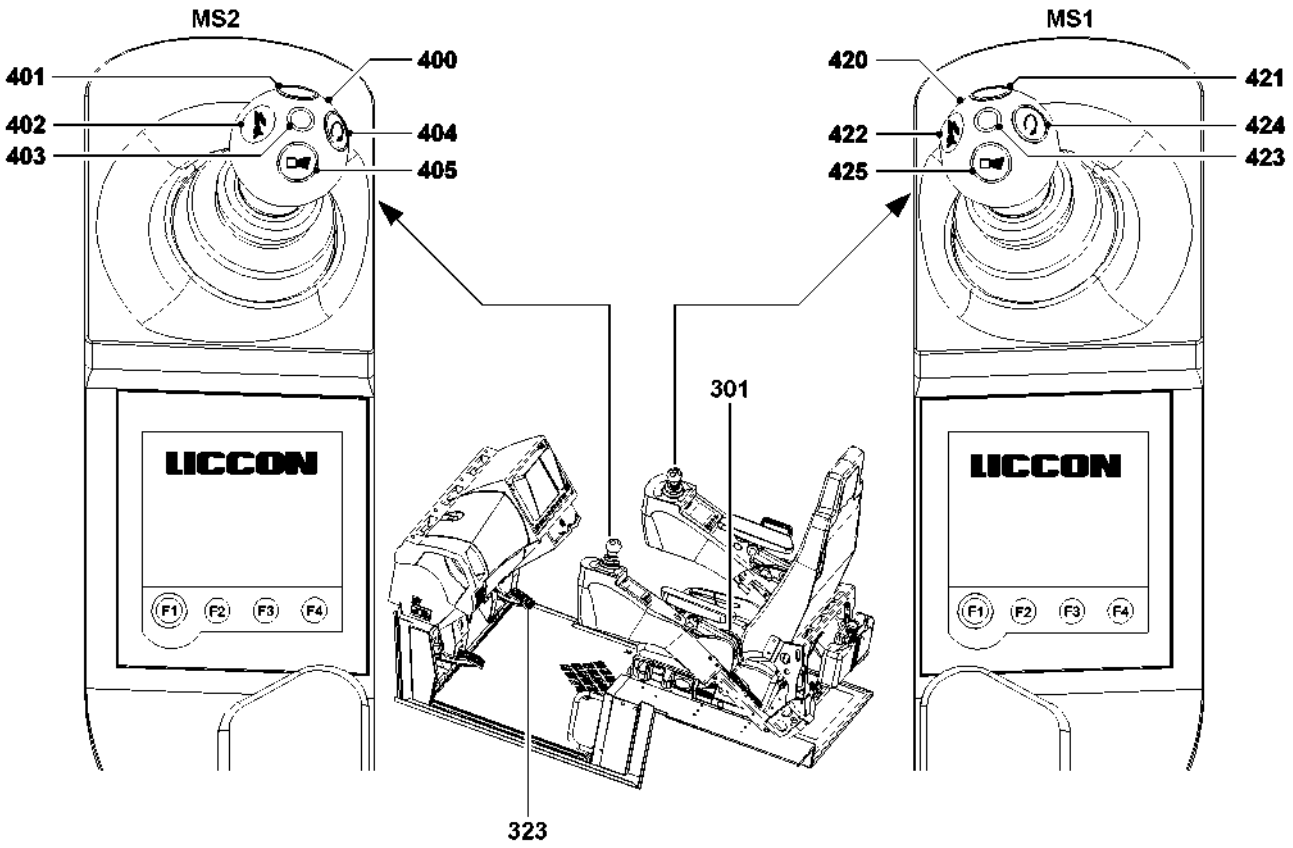

Fig.106289

1.3.2 Turning the rapid gear off

When the rapid gear is turned on:

▶ Press the button **402**.
or
Press the button **422**.

Result:

– The rapid gear is turned off.
– The icon **3** turns off on the LICCON monitor.

1.4 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 **301** is actuated.

1.4.1 Winch 1

▶ Press the button **421**.

Result:

– The vibration sensor **423** is turned on.

When the vibration sensor **423** is turned on:
▶ Press the button **421**.

Result:

– The vibration sensor **423** is turned off.

1.4.2 Winch 2 or slewing gear

If winch 2 and the slewing gear are operated, the vibration sensor **403** will react to the first deflecting movement.

▶ Press the button **401**.

Result:

– The vibration sensor **403** is turned on.

When the vibration sensor **403** is turned on:
▶ Press the button **401**.

Result:

– The vibration sensor **403** is turned off.

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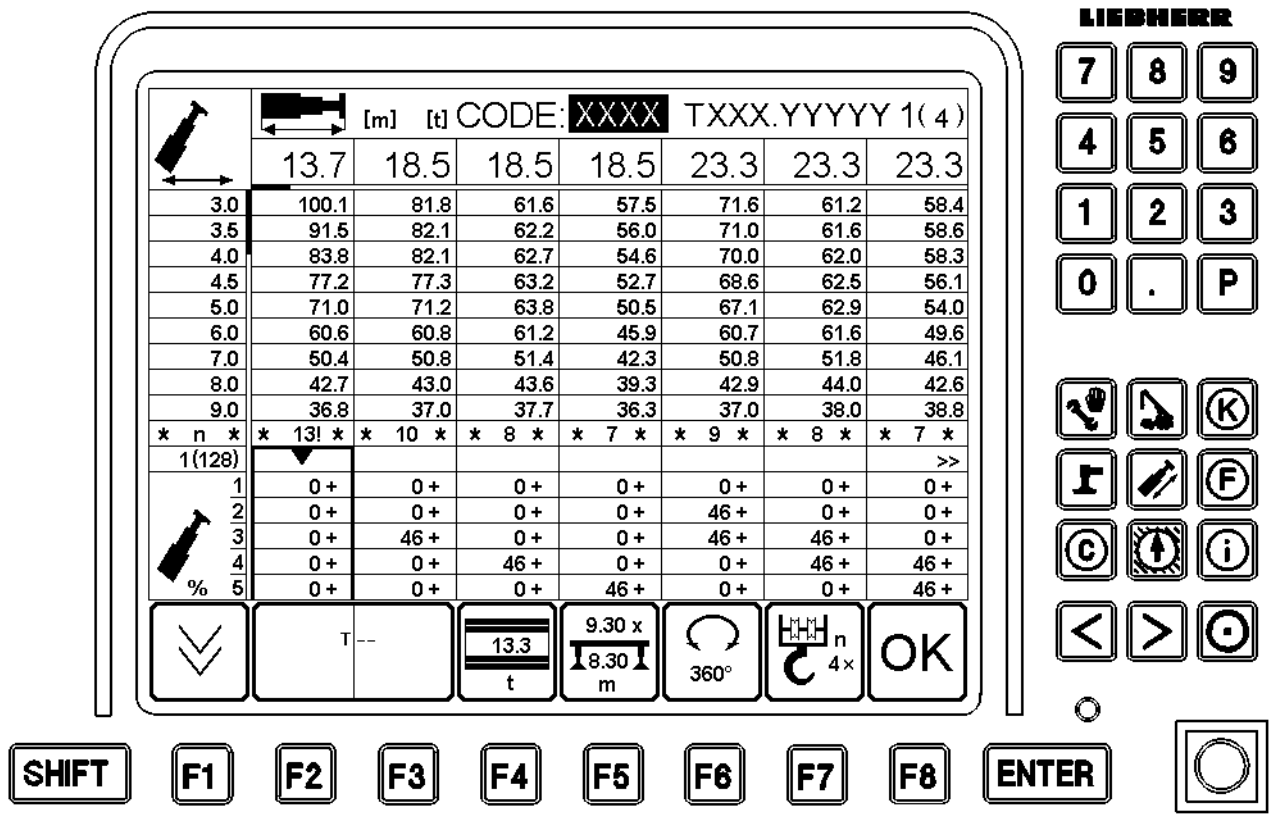

Fig.106271

2 LICCON computer system

See chapter 4.02.

2.1 The crane engine is running

Make sure that the following prerequisites are met:
- The batteries are charged by the alternator.
- A stable voltage is present.

The electric crane control system and the LICCON computer system are turned on automatically. A self test of the LICCON computer system follows.

▶ Await the self test.

Result:

- After a few seconds the set up screen appears on the monitor.

2.2 Stand-by mode

No crane movements are possible. See chapter 4.02.

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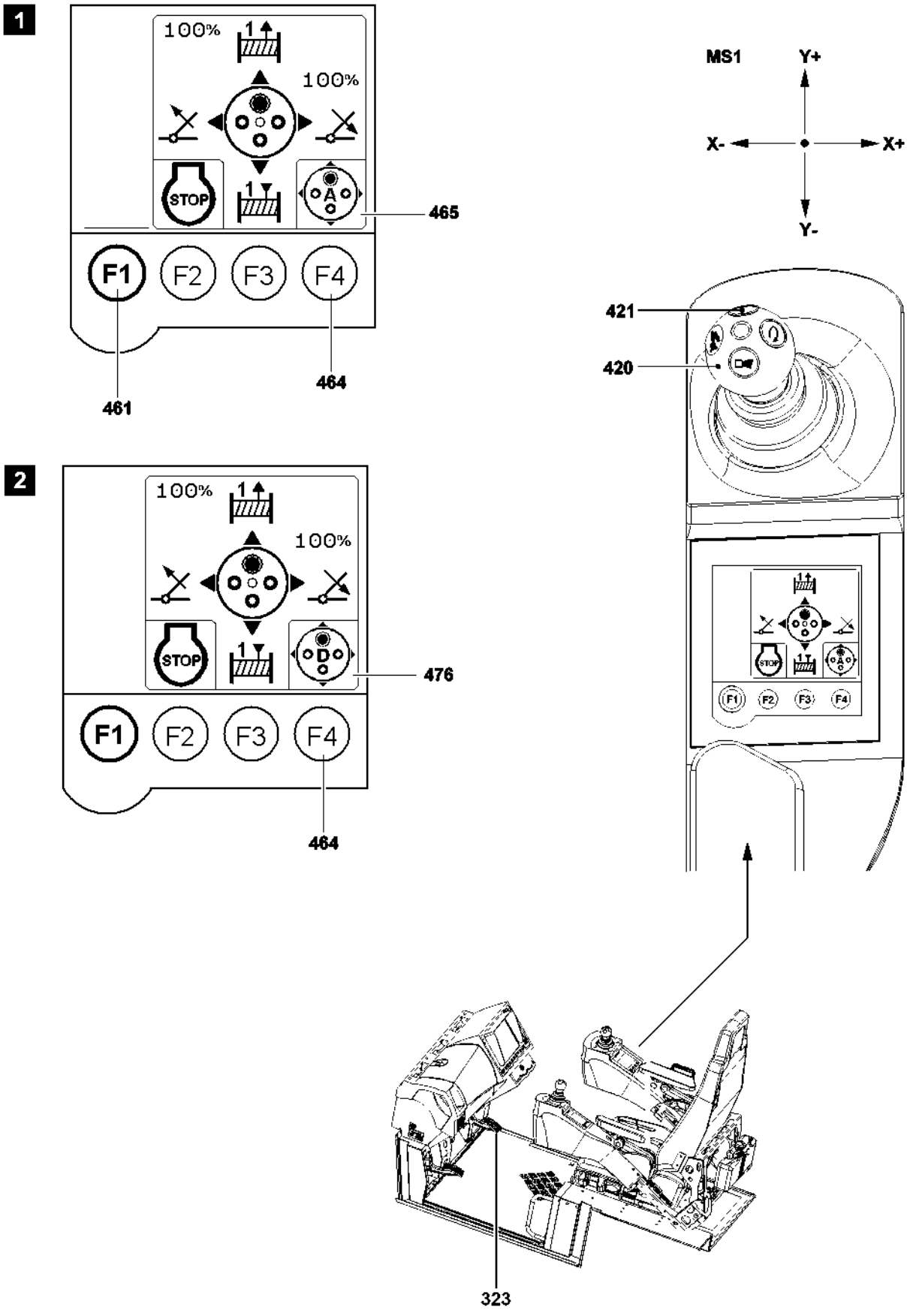

Fig.106290

3 Luffing

Speed of crane movement „luffing“ is controlled by the deflection of master switch **420** and by the pedal **323** of the engine regulation.

NOTICE
Crane can be damaged or topple over!
▶ If an attempt to lift a load with the hoist gear causes the LICCON overload protection to turn off, then the load may not be lifted by luffing up the boom.

3.1 Luffing the telescopic boom

The maximum luffing speed of the telescopic boom can be preselected in the settings window „Speed reduction master switch“.

See chapter 4.02.

3.1.1 Luffing the telescopic boom on cranes with one winch, illustration 1

Make sure that the following prerequisites are met:
– The master switch **420** is in the neutral position.

▶ Press the function key **461** on the right touch display until the „Master switch assignment“ menu appears.
▶ Press the function key **464** until the master switch assignment **476** „**A**“ is active.
▶ Deflect the master switch **420** in direction X-.

Result:

– The telescopic boom is luffed up.

▶ Deflect the master switch **420** in direction X+.

Result:

– The telescopic boom is luffed down.

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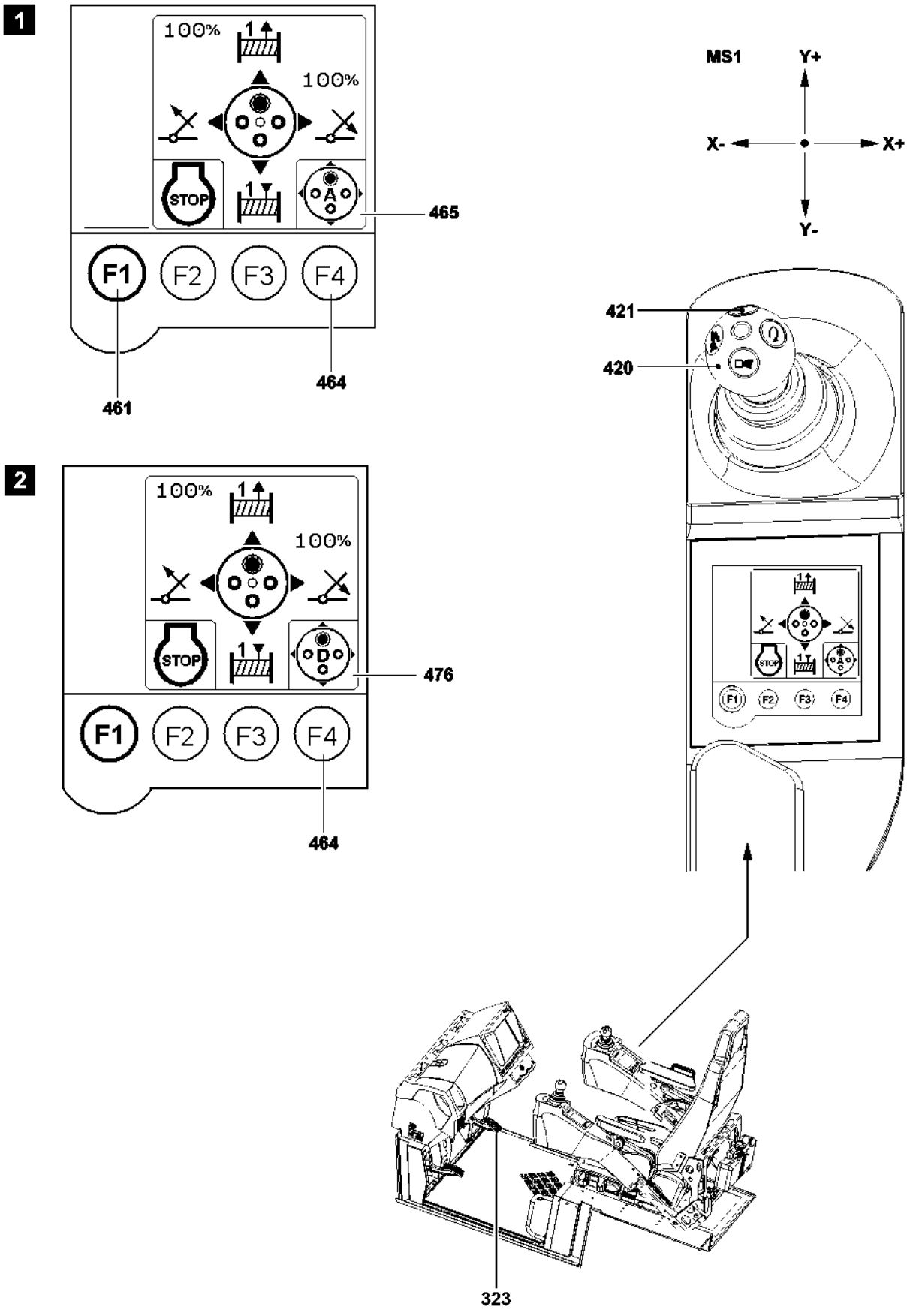

Fig.106290

3.1.2 Luffing the telescopic boom on cranes with two winches, illustration 2

Make sure that the following prerequisites are met:
– The master switch **420** is in the neutral position.

▶ Press the function key **461** on the right touch display until the „Master switch assignment“ menu appears.
▶ Press the function key **464** until the master switch assignment **476** „**D**“ is active.
▶ Deflect the master switch **420** in direction X-.

Result:

– The telescopic boom is luffed up.

▶ Deflect the master switch **420** in direction X+.

Result:

– The telescopic boom is luffed down.

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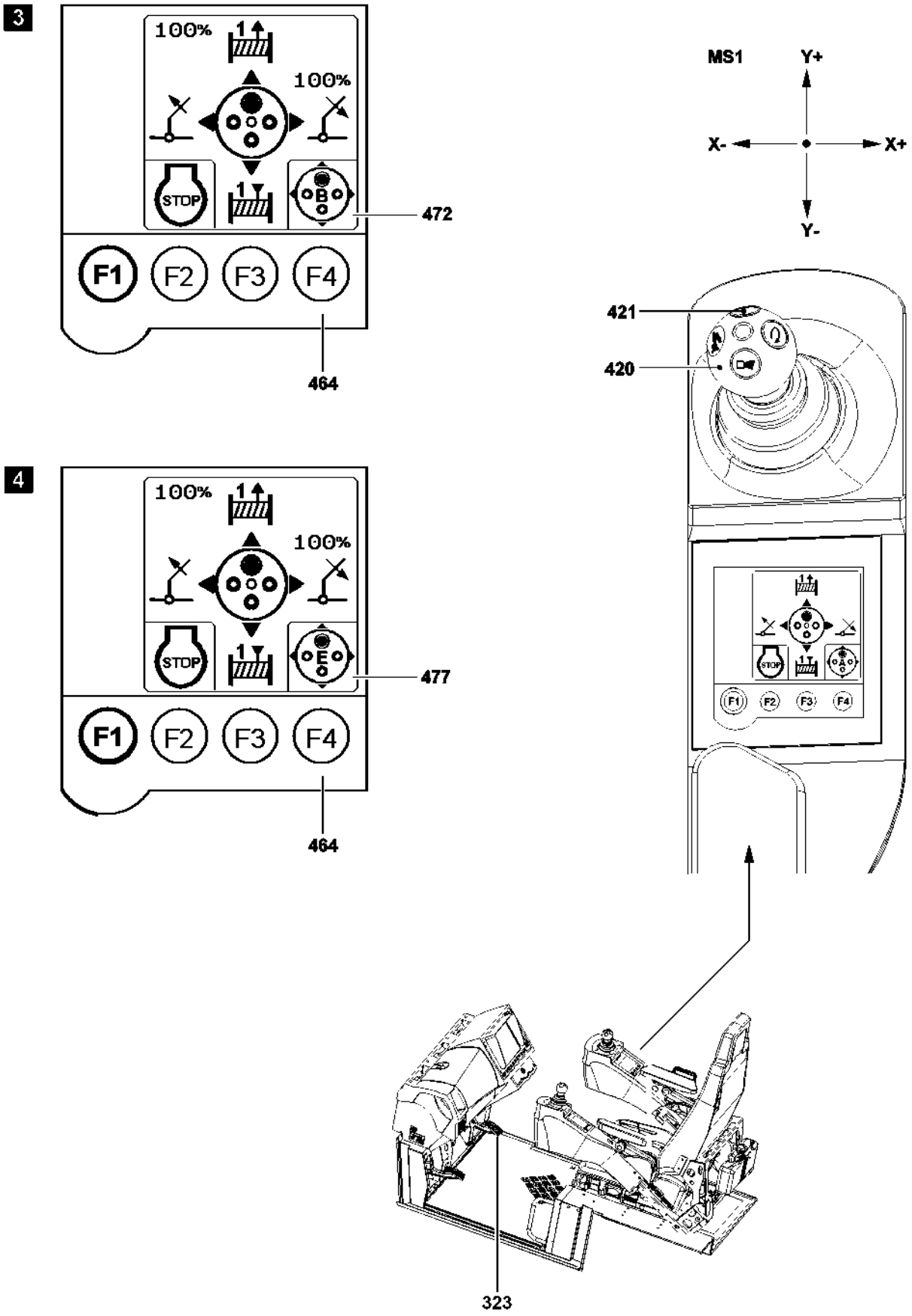

Fig.106291

3.2 Luffing the hydraulic folding jib* on cranes with one winch, see illustration 3

Make sure that the following prerequisites are met:
- The master switch **420** is in the neutral position.
- An operating mode or set up configuration **with** hydraulic folding jib***** has been set and confirmed on the LICCON computer system.

▶ Press button **461** on the right Touch display until the „Master switch configuration“ menu appears.
▶ Press button **464** until master switch configuration **472** „**B**“ is active.
▶ Deflect the master switch **420** in direction X-.

Result:

- The hydraulic folding jib***** is luffed up.

▶ Deflect the master switch **420** in direction X+.

Result:

- The hydraulic folding jib***** is luffed down.

3.3 Luffing the hydraulic folding jib* on cranes with two winches, see illustration 4

Make sure that the following prerequisites are met:
- The master switch **420** is in the neutral position.
- An operating mode or set up configuration **with** hydraulic folding jib***** has been set and confirmed on the LICCON computer system.

▶ Press button **461** on the right Touch display until the „Master switch configuration“ menu appears.
▶ Press button **464** until master switch configuration **477** „**E**“ is active.
▶ Deflect the master switch **420** in direction X-.

Result:

- The hydraulic folding jib***** is luffed up.

▶ Deflect the master switch **420** in direction X+.

Result:

- The hydraulic folding jib***** is luffed down.

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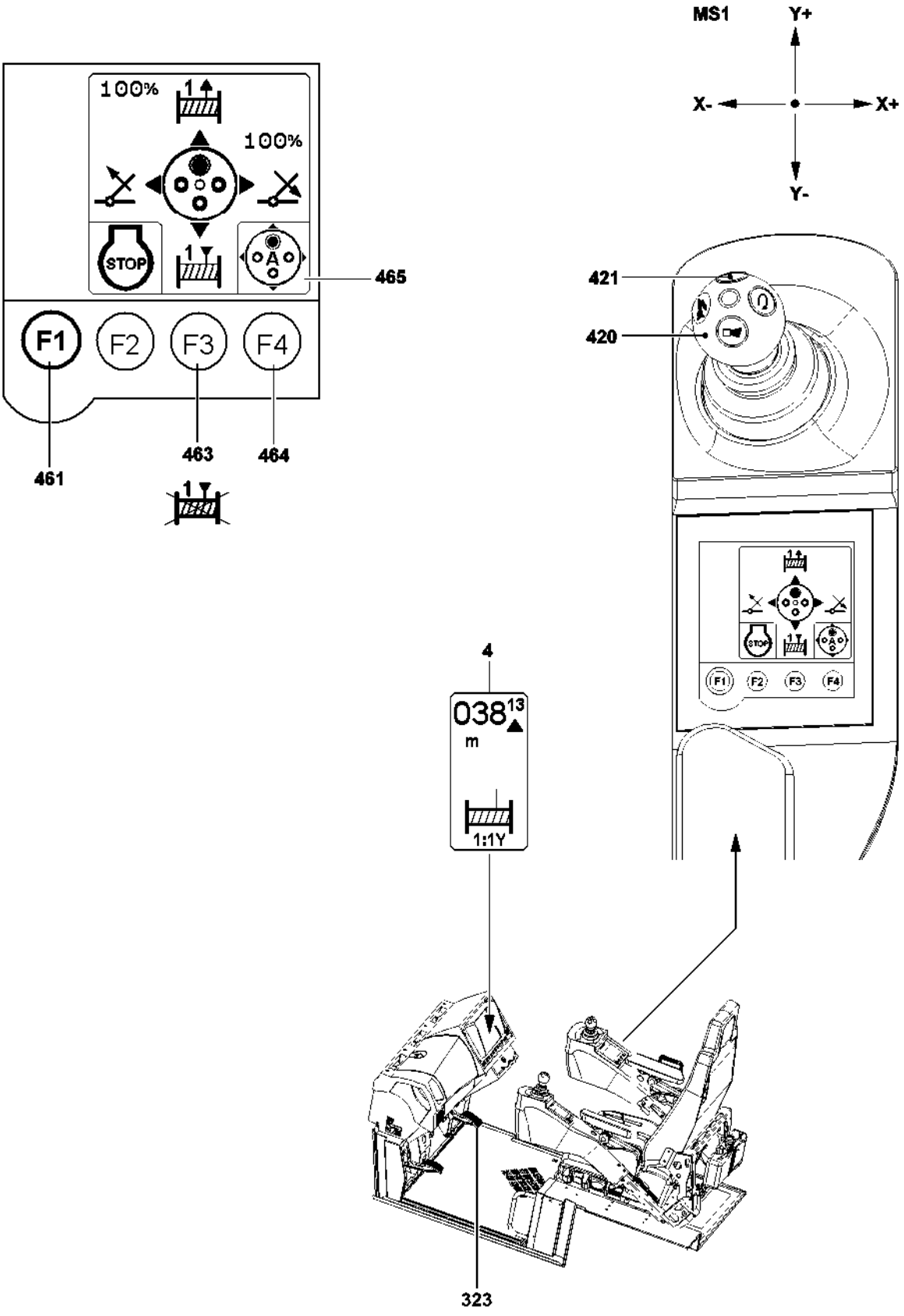

Fig.106292

4 Lifting / lowering

NOTICE
Danger of damaging the hoist rope when spooling up and / or spooling out!
▶ Do not allow slack rope formation.

The speed of the crane movement „Lifting“ is controlled via the deflection of the respective master switch and via the pedal **323** of the engine regulation.

The maximum winch speed can be reduced or increased in the „Speed reduction master switch“ menu. It is also possible to deactivate or activate the individual winches.

See chapter 4.02.

4.1 Lifting / lowering on cranes with one winch

The winch icon **4** shows that winch 1 is turning, even when because of multiple reeving and low speed, no hook movement is visible.

Make sure that the following prerequisites are met:
– The master switch **420** is in the neutral position.
– The crane is at a standstill.

▶ Press the function key **461** on the right touch display until the „Master switch assignment“ menu appears.

WARNING
Danger of accident!
▶ During the actuation of a crane movement, **never** deactivate / activate winch 1.

If winch 1 is deactivated:
▶ Press the function key **463** on the right touch display.

Result:

– Winch 1 is activated.
– The winch status is indicated on the right touch display and by the winch icons on the LICCON monitor.

▶ Deflect the master switch **420** in direction Y+.

Result:

– Winch 1 spools out and the load is lowered.

▶ Deflect the master switch **420** in direction Y-.

Result:

– Winch 1 spools up and the load is lifted.

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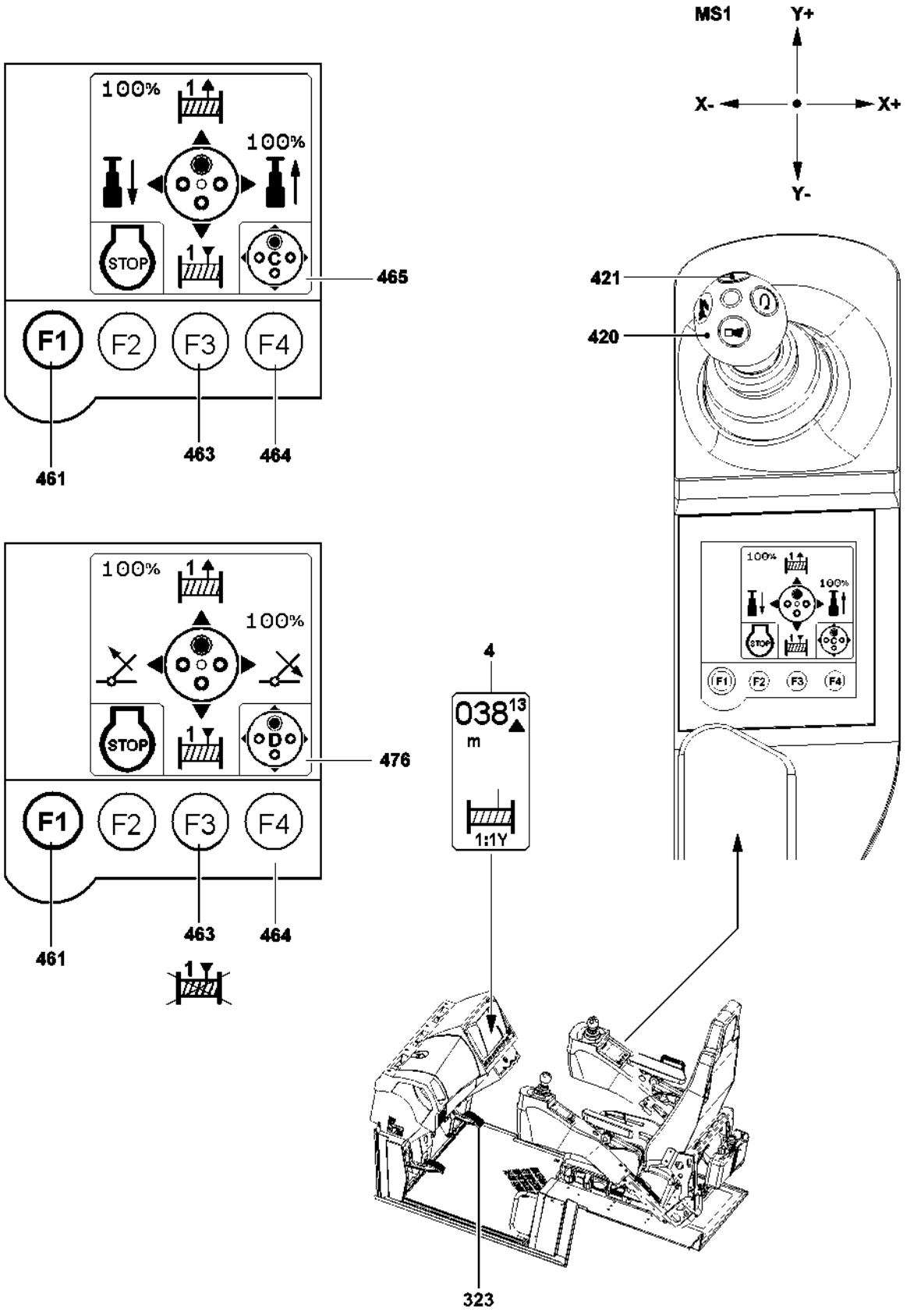

Fig.106293

4.2 Lifting / lowering on cranes with two winches

4.2.1 Lifting / lowering winch 1

The winch icon **4** shows that winch 1 is turning, even when because of multiple reeving and low speed, no hook movement is visible.

Make sure that the following prerequisites are met:
- The master switch **420** is in the neutral position.
- The crane is at a standstill.

▶ Press the function key **461** on the right touch display until the „Master switch assignment“ menu appears.
▶ Press the function key **464** until the master switch assignment **465** „**C**“ or master switch assignment **476** „**D**“ is active.

WARNING
Danger of accident!
▶ During the actuation of a crane movement, **never** deactivate / activate winch 1.

If winch 1 is deactivated:
▶ Press the function key **463** on the right touch display.

Result:

- Winch 1 is activated.
- The winch status is indicated on the right touch display and by the winch icons on the LICCON monitor.

▶ Deflect the master switch **420** in direction Y+.

Result:

- Winch 1 spools out and the load is lowered.

▶ Deflect the master switch **420** in direction Y-.

Result:

- Winch 1 spools up and the load is raised.

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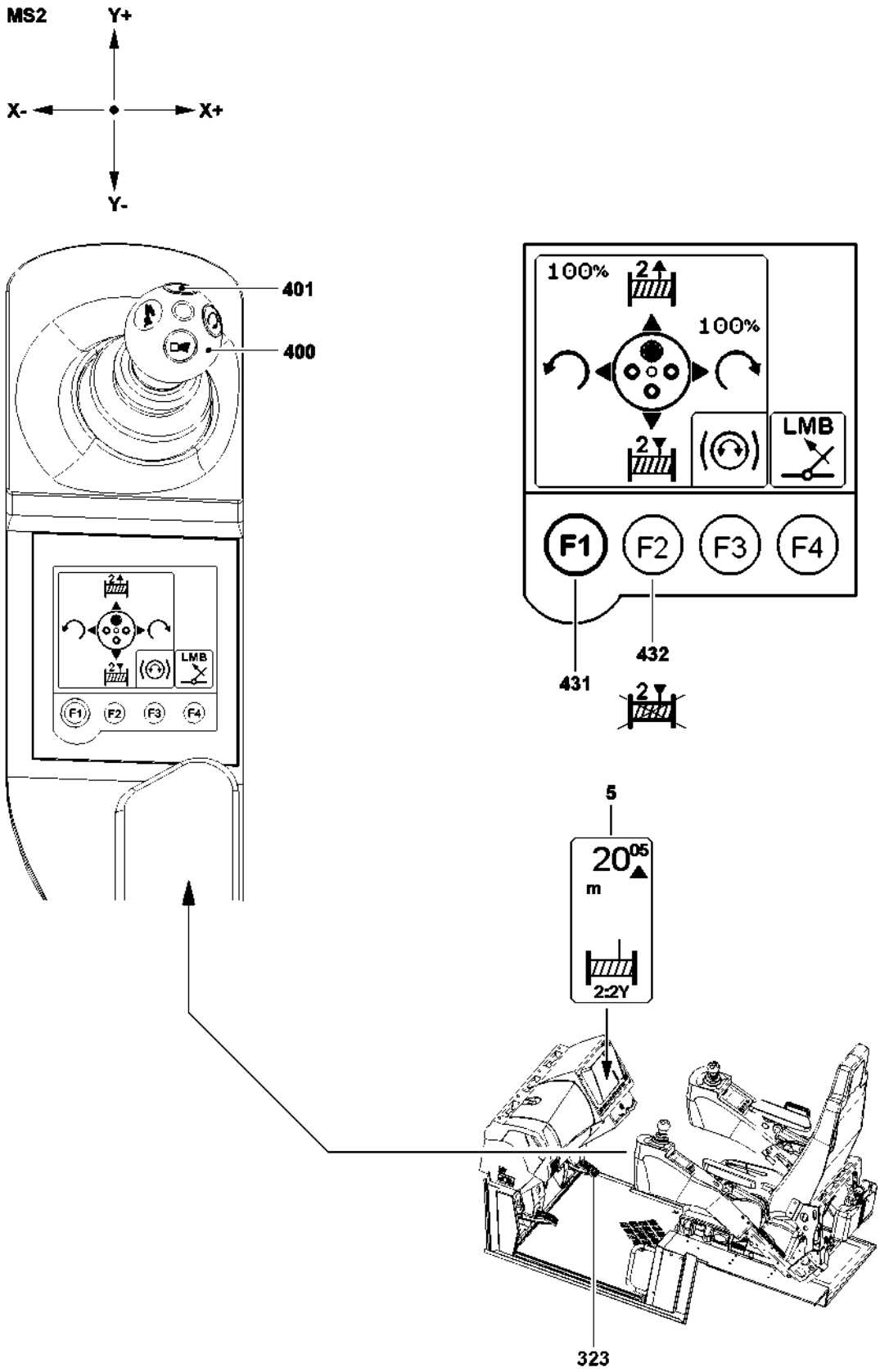

Fig.106294

4.2.2 Lifting / lowering winch 2

The winch icon **5** shows that winch 2 is turning, even when because of multiple reeving and low speed, no hook movement is visible.

Make sure that the following prerequisites are met:
- The master switch **400** is in the neutral position.
- The crane is at a standstill.

▶ Press the function key **431** on the left touch display until the „Master switch configuration“ menu appears.

WARNING
Danger of accident!
▶ During the actuation of a crane movement, **never** deactivate / activate winch 2.

If winch 2 is deactivated:
▶ Press the function key **432** on the left touch display.

Result:

- Winch 2 is activated.
- The winch status is indicated on the left touch display and by the winch icons on the LICCON monitor.

▶ Deflect the master switch **400** in direction Y+.

Result:

- Winch 2 spools out and the load is lowered.

▶ Deflect the master switch **400** in direction Y-.

Result:

- Winch 2 spools up and the load is raised.

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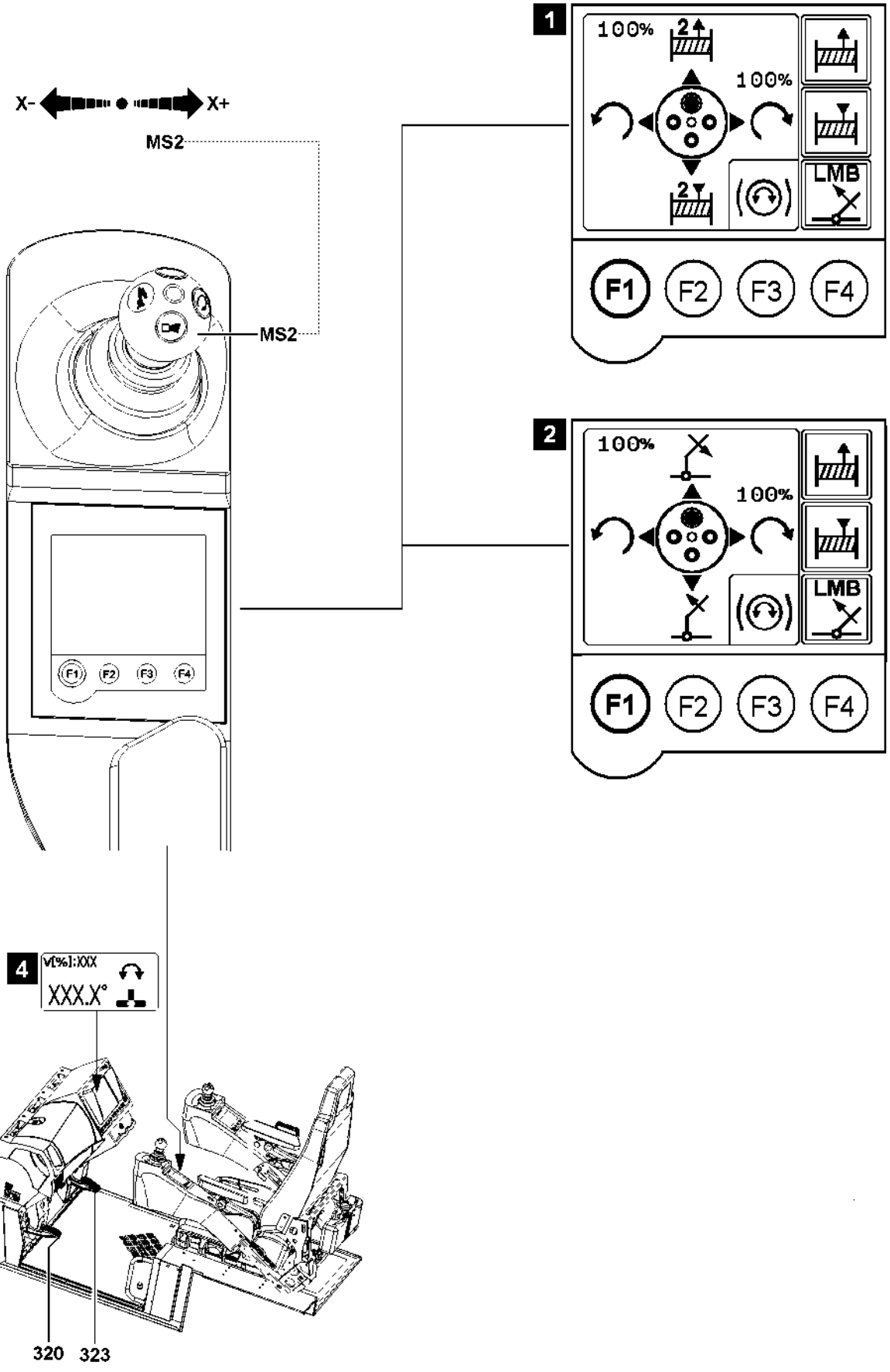

Fig.118015

5 Turning

WARNING
Danger of fatal injury!
If there are any personnel on the crane chassis or in any other danger zone of the crane during the slewing movement of the crane superstructure, then there is a danger of accidents.
Personnel can be killed or seriously injured.
- ▶ It is prohibited for personnel to remain in the danger zone.
- ▶ Make sure that there are no obstacles within the working range of the crane.
- ▶ Give a short warning signal (horn) before starting a crane movement.
- ▶ When slewing with a load, initiate the turning movement very carefully, and apply the brakes.

5.1 Preselection of slewing speed

The load chart manual lists the maximum slewing speeds in percentages. The maximum permissible slewing speeds can be set on the LICCON monitor in the settings window „Speed reduction master switch“, see Crane operating instructions, chapter 4.02. Always move at slower speed with a longer boom and a heavier load.

WARNING
The crane can topple over!
If the following instructions are not observed, life threatening situations could arise even causing the crane to topple over.
- ▶ Set the slewing speed specified in the load chart manual and in the crane documentation.
- ▶ Observe additional specifications regarding the slewing speed from the crane documentation.
- ▶ Do **not** exceed the specified maximum speed.
- ▶ Initiate and slow down every turning movement extremely sensitively!

- ▶ Determine the maximum slewing speed according to the load chart manual and additional specifications in the crane documentation, depending on the situation.
- ▶ Make any settings in the setting window „Speed reduction Master switch“, see Crane operating instructions, chapter 4.02

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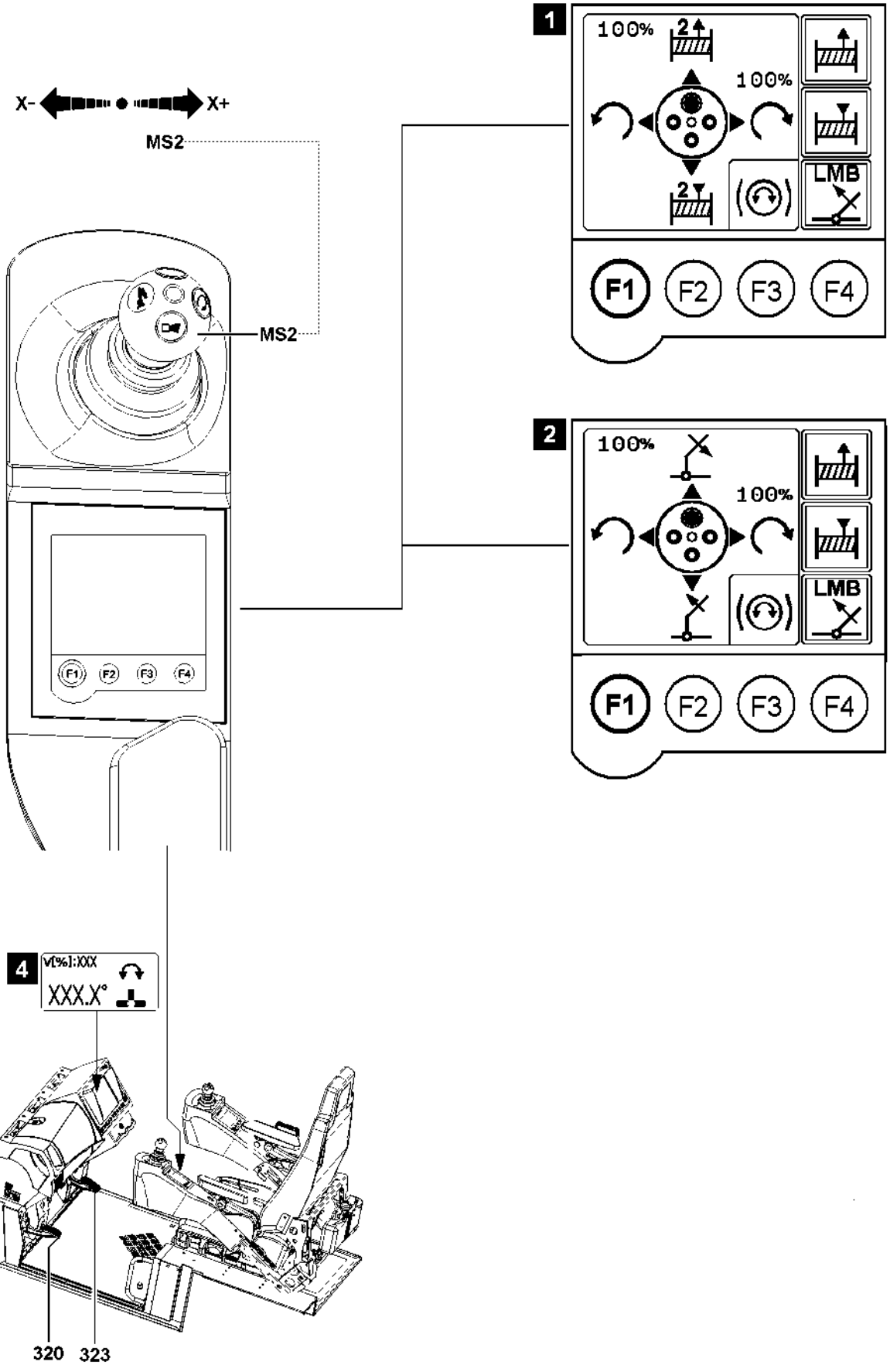

Fig.118015

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5.2 Turning the crane superstructure

Depending on the set up configuration of the crane, there are various master switch assignments to turn the crane superstructure, see illustration **1** or illustration **2**.

Depending on the set up configuration, not all master switch assignments are always available.

The crane superstructure is always turned with master switch **MS2** in direction of the X-axis.

Make sure that the following prerequisites are met:
- The desired master switch assignment to turn the crane superstructure is active, see illustration **1** or illustration **2**.
- The crane superstructure is **not** locked to the crane chassis.
- The seat contact button is actuated or bypassed, see section „Releasing the crane movement“.
- The crane engine is running.

▶ Deflect the master switch **MS2** in direction X+.

Result:

- The crane superstructure turns to the right.

▶ Deflect the master switch **MS2** in direction X-.

Result:

- The crane superstructure turns to the left.

Note

▶ In the Turning range icon (illustration **4**) the current position of the crane superstructure is always shown.

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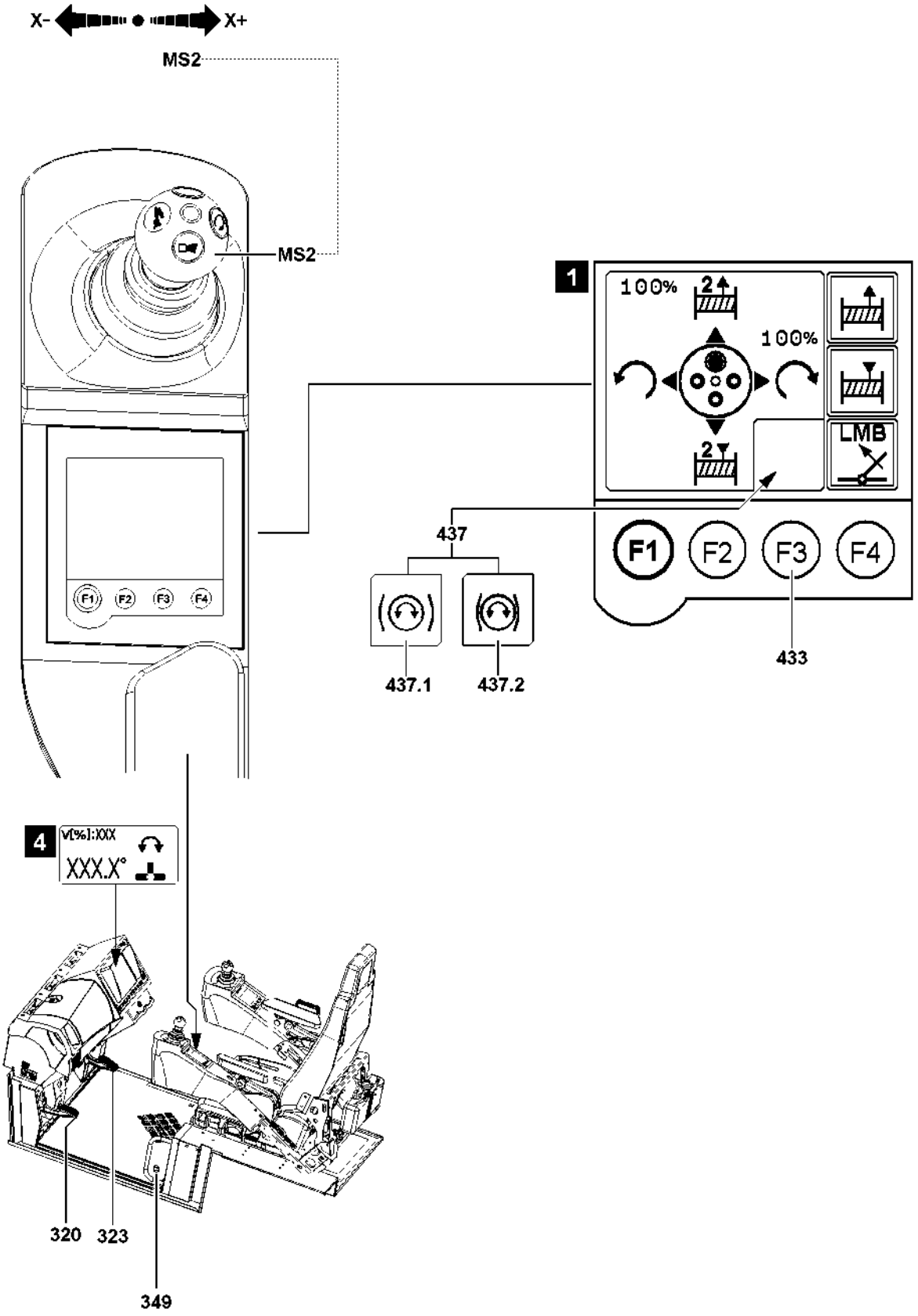

Fig.118016

5.3 Slewing gear

There are two ways to brake the slewing gear:
- Slewing gear brake (left pedal)
  Use only for certain applications, see section „Slewing gear brake (pedal)“.
- Parking brake (left touch display)
  The slewing gear can be operated with the parking brake **released** or **applied**, see section „Parking brake slewing gear“.

Freewheeling slewing gear:
- To be able to position the boom easier over the load, the slewing gear can be switched to freewheeling (coasting), see section „Switching the slewing gear to freewheeling“.

5.4 Slewing gear brake (pedal)

CAUTION
Risk of damaging the slewing gear or the roller ring connection!
The slewing gear brake cannot brake the full turning momentum. Failure to comply with the following instructions could damage the slewing gear or roller ring connection.
- ▶ The pedal **320** may only be used at minimal rotation speeds, in other words with master switch **MS2** almost at the neutral position!
- ▶ Do not brake the turning movement of the crane by moving the master switch **MS2** back to the neutral position and by simultaneously applying the pedal **320**!

Use the pedal **320** only for the following situations:
- Starting the slewing movement in strong side wind
- Stopping the slewing movement in strong side wind

5.4.1 Starting the slewing movement in strong side wind

When turning against the wind in strong side wind and with a long boom system, then the superstructure will turn into the opposite direction due to leakage in the hydraulic motor.

This can be avoided as follows:

- ▶ Actuate the pedal **320** and deflect the master switch **MS2** into the desired turning direction.
- ▶ Slowly release the pedal **320** until the superstructure turns in the desired turning direction.

5.4.2 Stopping the slewing movement in strong side wind

- ▶ Slow down the crane with master switch **MS2** to minimum turning speed.
- ▶ Apply the pedal **320** carefully, until the crane has come to a standstill at the desired position.

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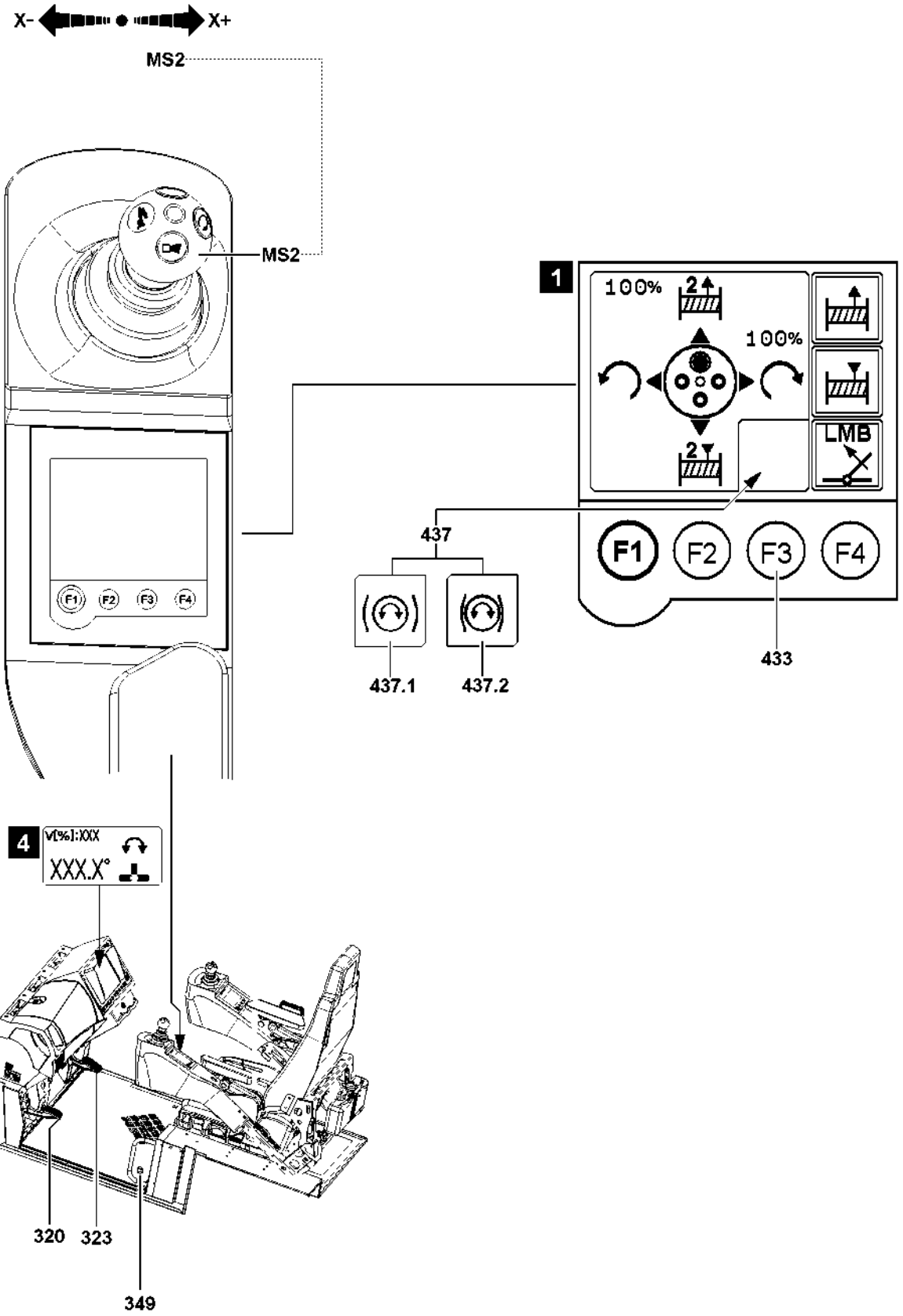

Fig.118016

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5.5 Parking brake - Slewing gear

Note

- ▶ Once the parking brake is **released**, it **remains released**, regardless of whether the slewing gear is actuated using the master switch **MS2** or if it is not actuated. This is to prevent a sudden stop.
- ▶ If the parking brake is **engaged**, it is released as soon as the master switch **MS2** is deflected and the slewing gear is actuated. The parking brake is **applied** again as soon as the master switch **MS2** is in neutral position again.

NOTICE

Uncontrolled turning of the slewing gear!

As long as the parking brake of the slewing gear **is released**, the slewing gear can turn in an uncontrolled manner due to wind, incline position or diagonal pull!

- ▶ Apply the parking brake of the slewing gear if necessary.

The parking brake of the slewing gear can be applied or released with the function key **433** on the left touch display.

- – If the icon **437.1** appears, the parking brake is released.
- – If the icon **437.2** appears, the parking brake is applied.

The parking brake can **not** be released if:

- – The working range limitation is active.
- – A load chart with limited slewing range is selected.
- – The seat contact button is neither actuated nor bypassed, see section „Releasing the crane movement“.

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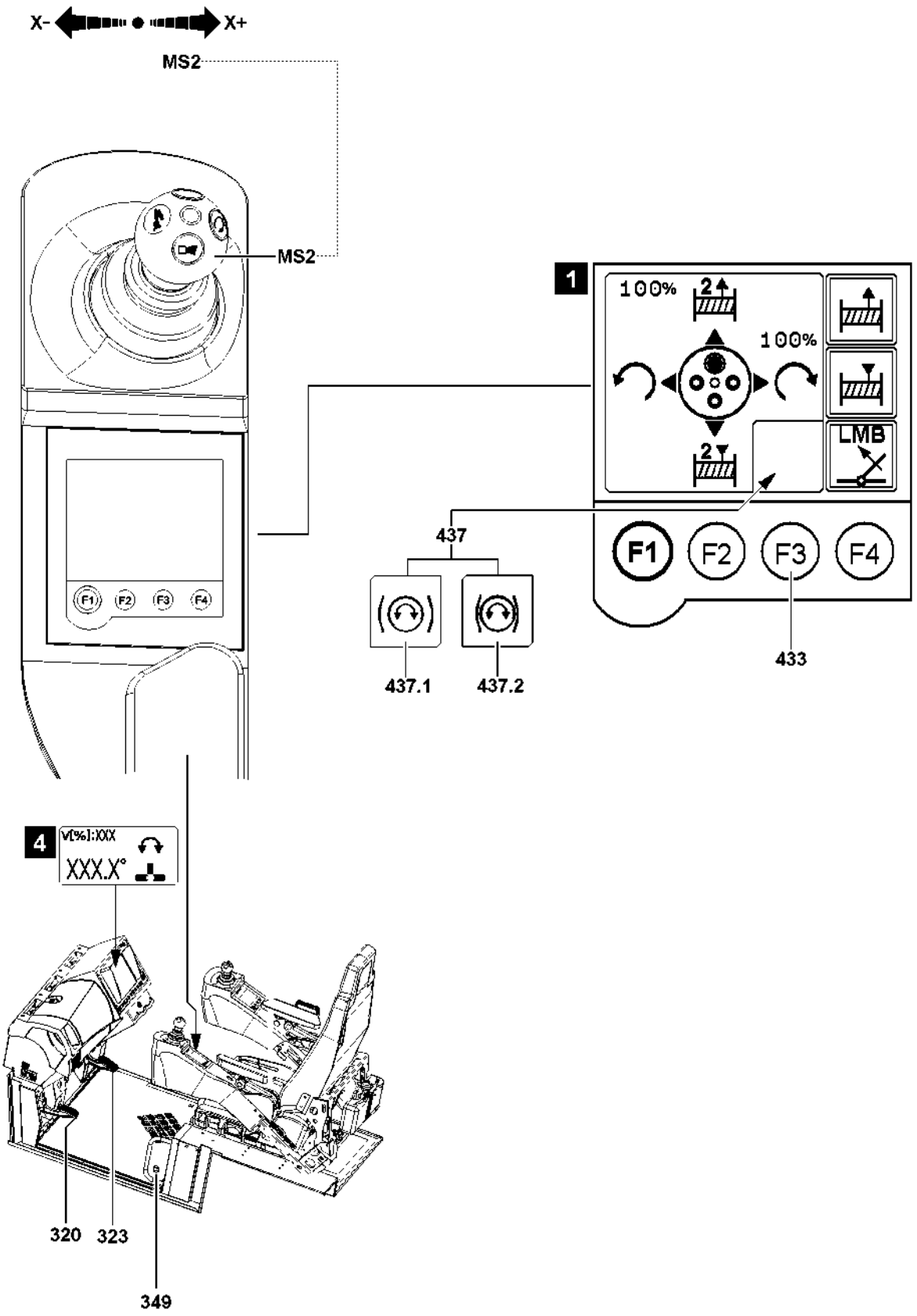

Fig.118016

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5.5.1 Releasing the parking brake

Make sure that the following prerequisites are met:
- The parking brake is **applied**.
- The icon **437.2** appears on the left touch display.
- The seat contact button is actuated or bypassed, see section „Releasing the crane movement“.
- The crane engine is running.

▶ Press the function key **433**.

Result:

- The parking brake is **released**.
- The icon **437.1** appears on the left touch display.

5.5.2 Applying the parking brake

Make sure that the following prerequisites are met:
- The parking brake is **released**.
- The icon **437.1** appears on the left touch display.

▶ Press the function key **433**.
or
Turn the engine off.
or
To cancel the release for the crane movement, see section „Releasing the crane movement“

Result:

- The parking brake is **applied**.
- The icon **437.2** appears on the left touch display.

Note
Automatic application of the parking brake
▶ If no crane movement is released (seat contact button neither actuated nor bypassed, see section „Releasing a crane movement“), then the parking brake is automatically applied.

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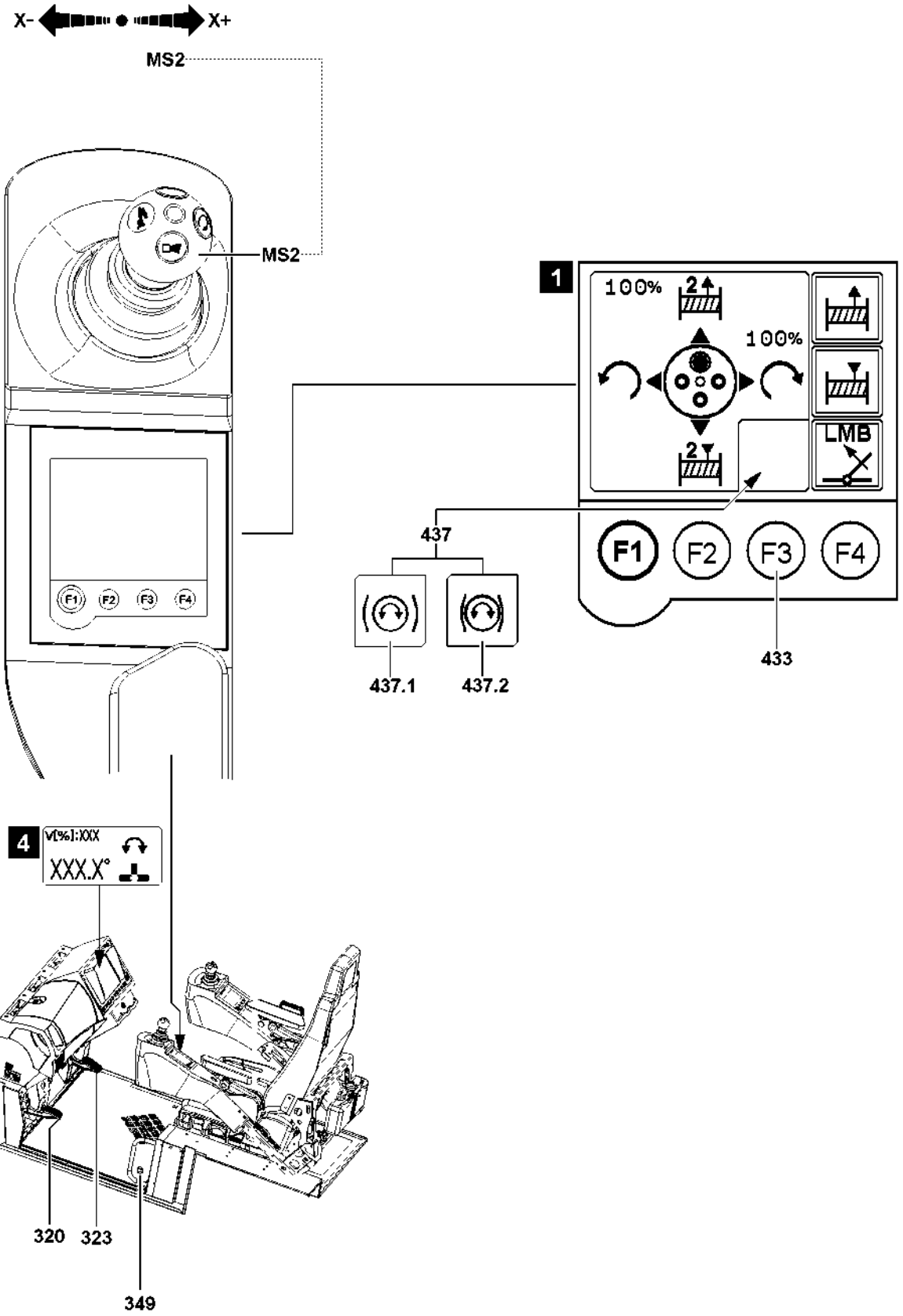

Fig.118016

5.6 Switching the slewing gear to freewheeling

In order to position the boom over the load more easily, the slewing gear can be switched to freewheeling.

WARNING
Uncontrolled turning of the crane superstructure!
As long as slewing gear is switched to coasting, the crane superstructure can turn in an uncontrolled manner due to wind, incline position or diagonal pull.
▶ Add freewheeling of the slewing gear only when an uncontrolled rotation of the crane superstructure is impossible.

Make sure that the following prerequisites are met:
– The seat contact button is actuated or bypassed, see section „Releasing the crane movement“.
– The crane engine is running.
– The master switch **MS2** is not deflected.

The slewing gear **cannot** be switched to freewheeling if:
– A load chart with limited slewing range is selected.
– The working range limitation is active.

▶ Press the foot button **349**.

Result:

– The slewing gear is switched to freewheeling.

Note
The activation of freewheeling and actuation of the slewing movement via the master switch **MS2** are mutually exclusive!
▶ When the master switch **MS2** is deflected, then the slewing gear cannot be switched to freewheeling via the foot button **349**!
▶ When pressing the foot button **349**, the slewing movement can **not** be carried out by deflecting the master switch **MS2**!

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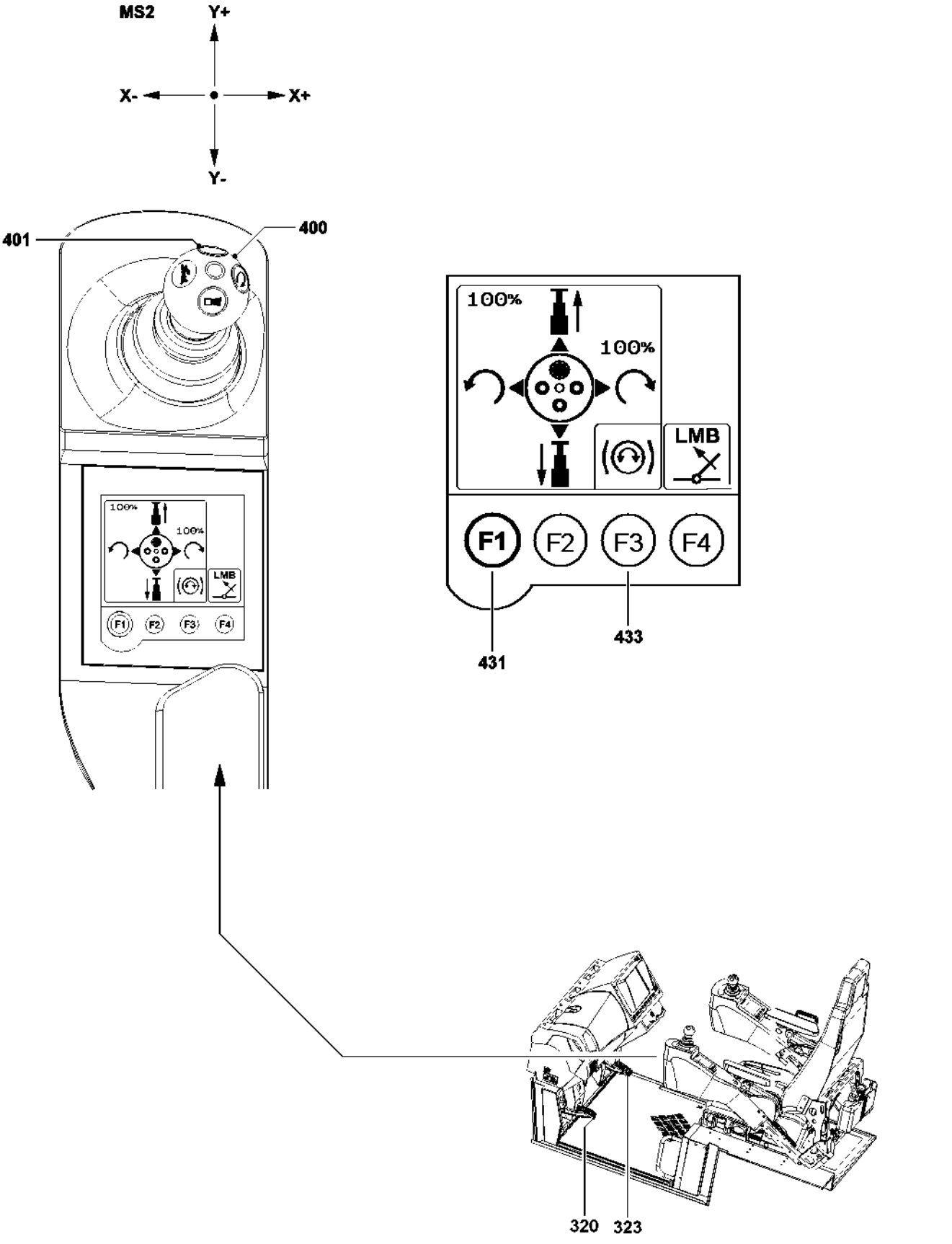

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Fig.106297

6 Telescoping

NOTICE
Damage of the push out mechanism on the telescopic boom!
If the following conditions are not observed, there is a danger that the telescopic boom is significantly distorted on the side during the telescoping procedure and that the telescoping cylinder can no longer retract into the corresponding telescope, but hits against the end section on the front.
This can cause damage to the push out mechanism on the telescopic boom!

- ▶ In particular, when telescoping the telescopic boom with the auxiliary boom or boom extension, ensure that:
- ▶ The crane vehicle is supported and horizontally aligned.
- ▶ The telescopic boom is not significantly heated up on one side due to sun exposure.
- ▶ There is no strong side wind.

6.1 Control of crane movement „Telescoping“

6.1.1 „Telescoping“ on cranes with one winch

Make sure that the following prerequisites are met:
- The master switch **400** is in the neutral position.
- The crane is at a standstill.

▶ Press function key F1 **431** on the left touch display until the „Master switch configuration“ menu appears.
▶ Move the master switch **400** in direction Y+ (forward).

Result:

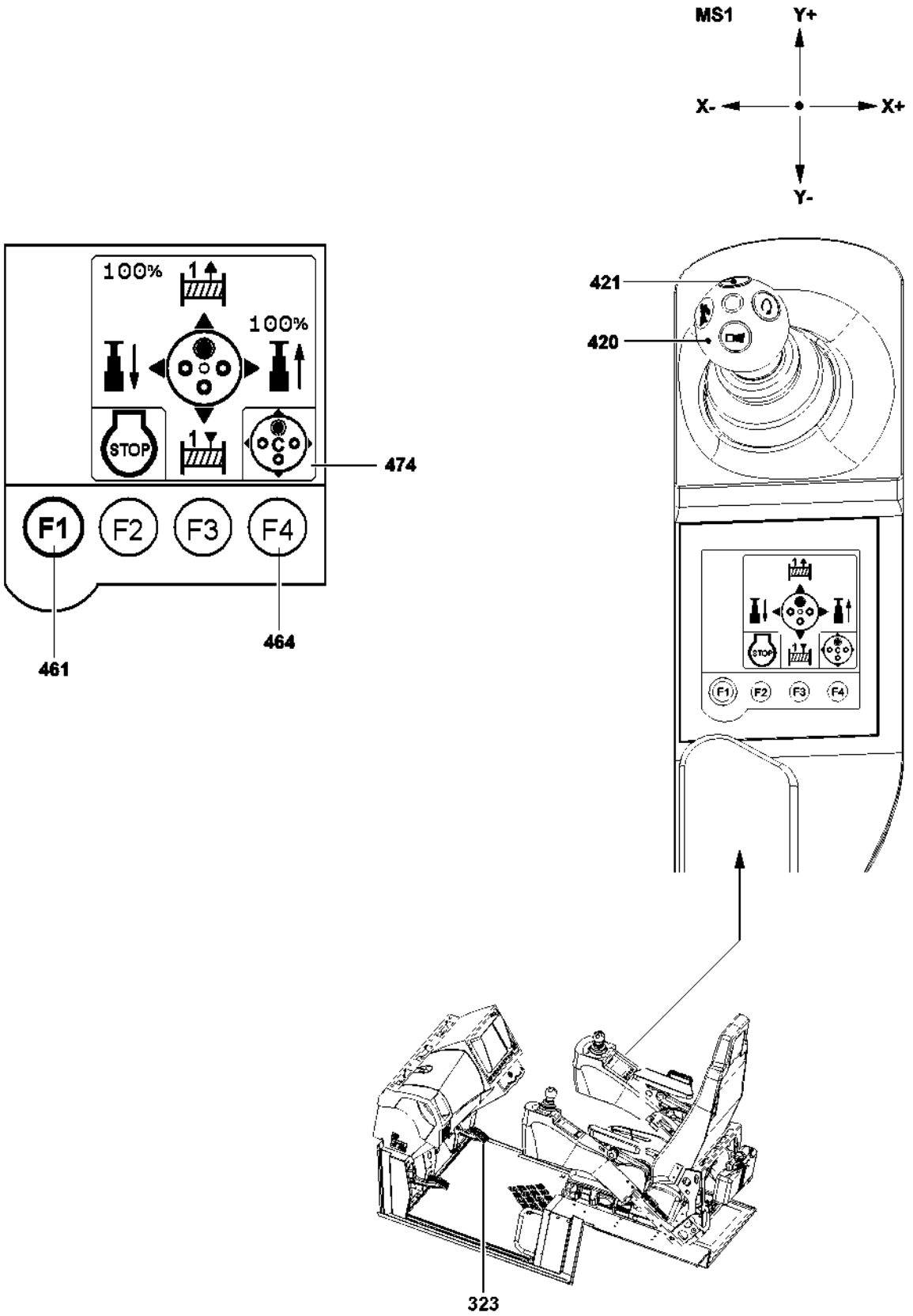
- The telescopic boom is telescoped out.

▶ Move the master switch **400** in direction Y- (backward).

Result:

- The telescopic boom is telescoped in.

LWE/LTM 1130-5-1-004/20502-04-02/en



LWE/LTM 1130-5-1-004/20502-04-02/en

Fig.106298

6.1.2 „Telescoping“ on cranes with two winches

Make sure that the following prerequisites are met:
- The master switch **420** is in the neutral position.
- The crane is at a standstill.

▶ Press the function key F1 **461** on the right touch display until the „Master switch configuration“ menu appears.
▶ Press the function key F4 **464** until the master switch assignment **474** „**C**“ is active.
▶ Move the master switch **420** in direction X+ (to the right).

Result:

- The telescopic boom is telescoped out.

▶ Move the master switch **420** in direction X- (to the left).

Result:

- The telescopic boom is telescoped in.

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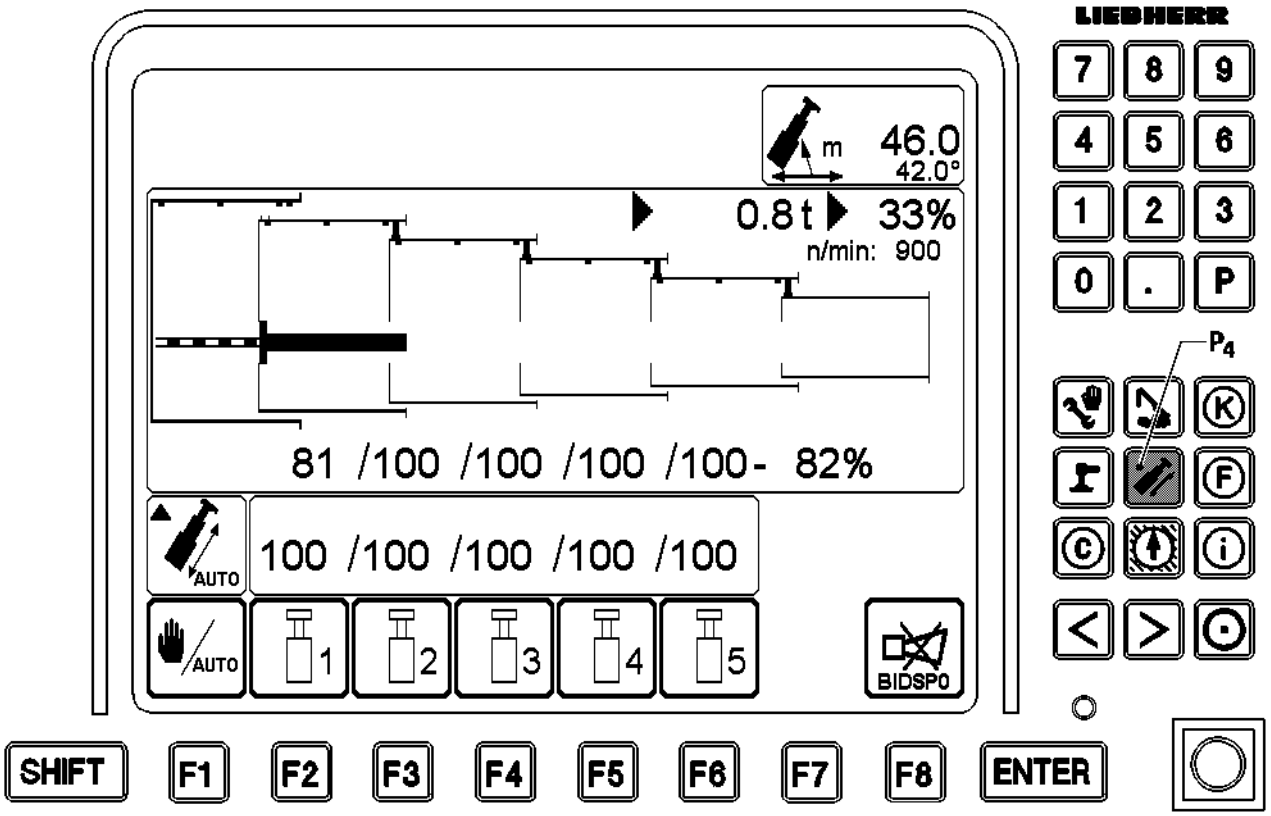

Fig.106299

6.2 General

The „Telematik“ automatic telescopic boom control system consists of:
- The dual action telescoping cylinder
- The hydraulically operated gripper pinning
- The hydraulically operated boom pinning.

The gripper and boom pinning is mechanically interlinked, which means a telescope section can only be unpinned when the gripper is locked simultaneously with this telescope section.

In the LICCON telescoping screen the crane operator can see, in dynamic graphics, the pinning state of the telescopic boom, the position of the individual telescopes in relation to each other and the extension status of the telescoping cylinder.

Due to the automatic telescoping procedure, the crane operator can easily telescope the telescoping boom, as he does not have to concern himself with the pinning or unpinning of the telescoping cylinder or the telescopes. The LICCON telescoping control system therefore makes very straightforward telescoping possible, only the desired telescoping target needs to be entered into the system.

The LICCON telescoping control system decides the sequence in which the individual telescopes will be moved in order to achieve the desired end state. After setting the desired telescoping targets, all telescoping movements, as well as locking and unlocking, are carried out fully automatically.

The following procedures are carried out by the system:
- Locking and unlocking of the telescoping cylinder.
- Pinning and unpinning of the telescopes.
- Sequence for the telescopes to be telescoped in order to achieve the desired end state.

This automatic process will however only be carried out as long as the master switch is operated.

The master switch determines the direction and the speed of the telescoping movement. In this way the crane operator has continuous control over the crane.

The direction of the cylinder movement is set by the LICCON computer system.

If the telescopic boom is lengthened, with the result that currently unreachable telescopes must be moved, then they must first be retracted until the last telescope to be moved is reached. In this case, in order to lengthen the telescopic boom (telescope out), telescoping in must first take place.

The LICCON computer system displays the direction in which the next telescoping must be done. The master switch must also be pressed to correspond to this direction setting. In this way the connection between the direction of movement of the appropriate master switch and the telescope continues.

In this way it is possible to move to a telescoping target automatically without an operating screen. It is therefore also not essential to keep watching the LICCON monitor all the time.

If the direction needs to be changed by the master switch, the telescopic boom remains stationary if the current direction is to be maintained. This also means that the master switch must be moved in the other direction. If there is no further movement in the other direction, this means that the telescoping target has been reached. This state is displayed visually on the operating screen. If the master switch is still being pressed, then after 3 to 5 seconds, the system switches to the telescoping screen.

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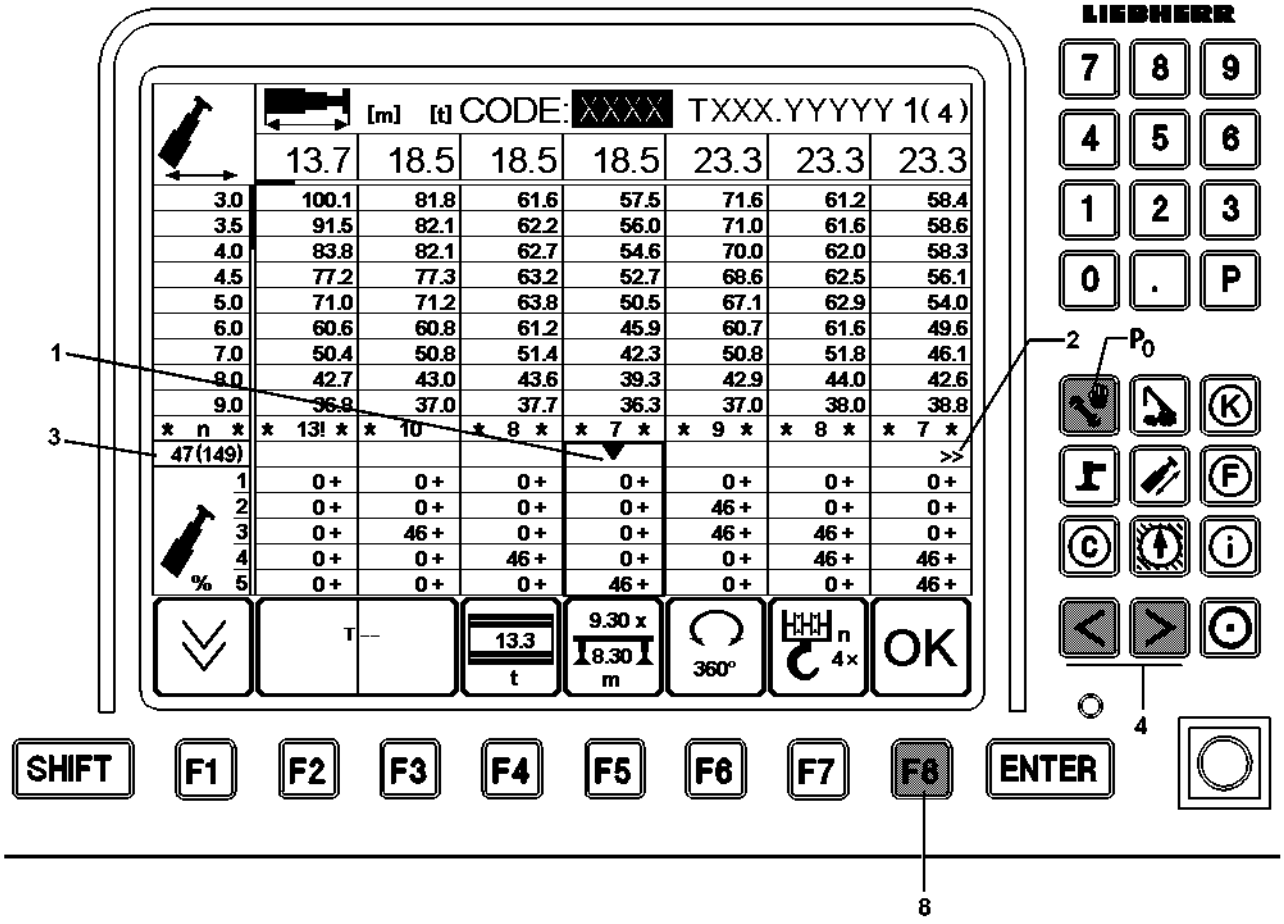

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Fig.106300

6.3 Selecting the telescoping target

There are two options for selecting the telescoping target:
1. Target selection via the set up screen
2. Target selection via the telescoping screen

6.3.1 Target selection via the set up screen

▶ Press the program key **P0**.

Result:

– The set up screen appears on the LICCON monitor.

▶ Using the arrow keys **4**, move the cursor **1** to the left or the right into the column corresponding to the desired telescopic boom length.

As supporting information, the currently selected column number **3** and the number of columns in this chart are shown. For example, 47(149) means 47 of 149 columns.

The status indicator (±) on the left next to the percentage extension condition value means:
– „+“ the corresponding telescopic section must be pinned.
– „-“ the corresponding telescopic section can be telescoped up to the percentage value of the extension status value under load (according to the load chart).

The double arrow **2** at the left and / or right edge of this line points to additional columns in either direction.

If the cursor **1** touches an edge marked with arrows, the next movement in this direction will display the next load chart column(s).

The cursor **1** itself will be set on the next column, if possible in the middle.

A change in the telescoping target is only possible if the master switch is at neutral.

If no cursor appears in the set up screen, this means that on the telescoping screen a boom configuration that is not supported in the charts was selected and perhaps even started!

▶ Press function key „F8“ **8**.

Result:

– The selected telescoping target will be activated.
– The selected column for the respective telescoping target will be marked in bold along the side.

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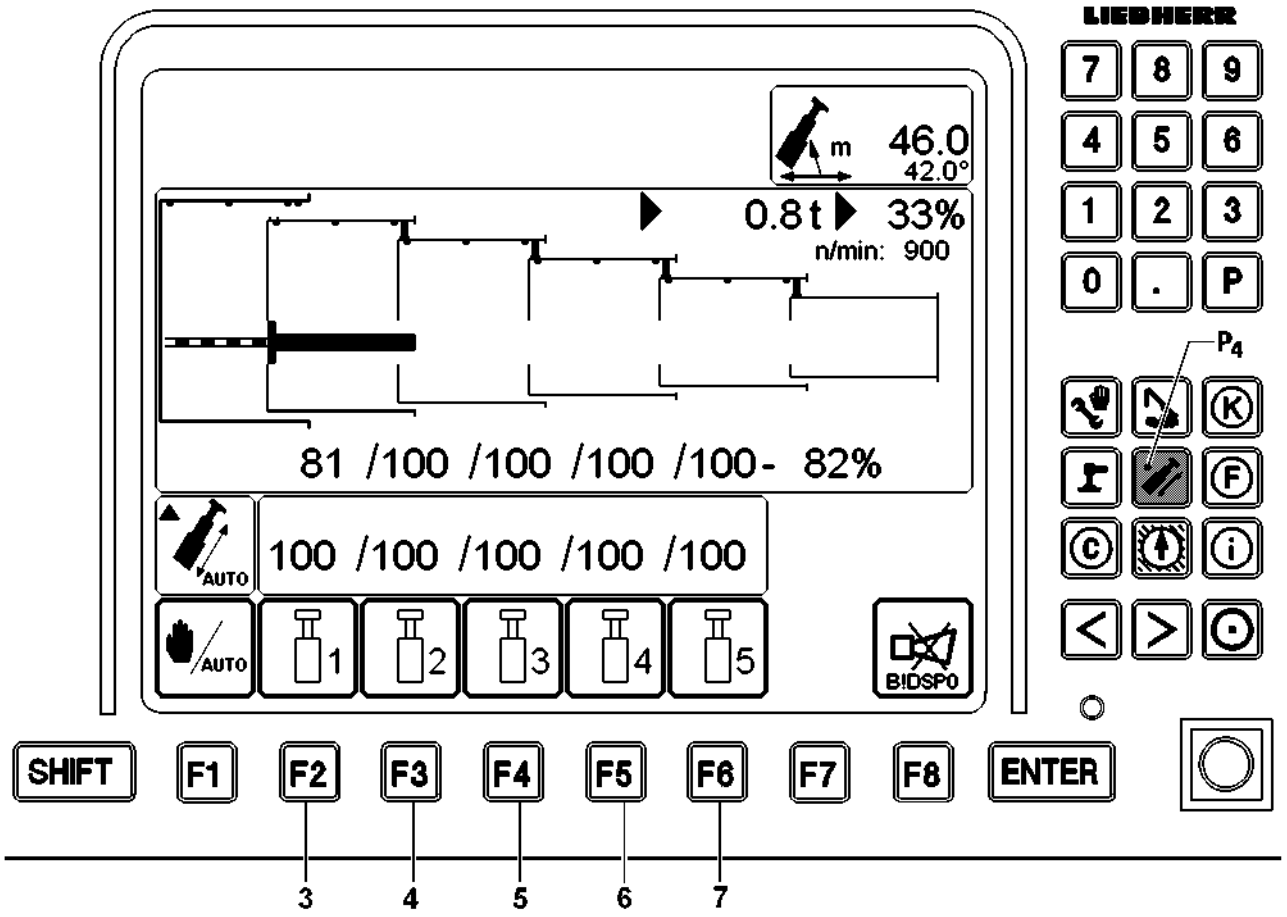

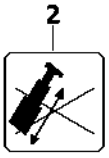

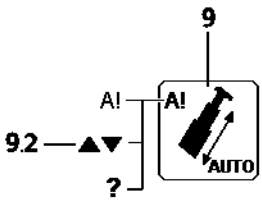

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Fig.106565

6.3.2 Target selection via the telescoping screen

▶ Press the program key **P4**.

Result:

– The telescoping screen appears on the LICCON monitor.

The selection of the telescoping target is achieved by pressing the function key assigned to the telescope concerned several times. After every button press, the intended extension status of the associated telescope changes to the next percentage value where there is a pin bore.

In contrast to the set up screen, the telescoping length is displayed immediately as a target, without further confirmation, as soon as the function key is pressed. No confirmation is required, as the assigned function keys do not have any other functions.

The appearance of a direction arrow in the automatic icon **9.2** immediately after a change in the telescoping target can be interpreted as feedback.

If the blinking icon **2** appears on the LICCON monitor, then:
– The telescopic sections cannot be unpinned.
– The unpinned load is exceeded.
– No load chart is available.

▶ Press function key „F2“ **3**.

Result:

– The following appears on telescope 1: 0 %, 46 %, 92 % or 100 %.

▶ Press function key „F3“ **4**.

Result:

– The following appears on telescope 2: 0 %, 46 %, 92 % or 100 %.

▶ Press function key „F4“ **5**.

Result:

– The following appears on telescope 3: 0 %, 46 %, 92 % or 100 %.

▶ Press function key „F5“ **6**.

Result:

– The following appears on telescope 4: 0 %, 46 %, 92 % or 100 %.

▶ Press function key „F6“ **7**.

Result:

– The following appears on telescope 5: 0 %, 46 %, 92 % or 100 %.

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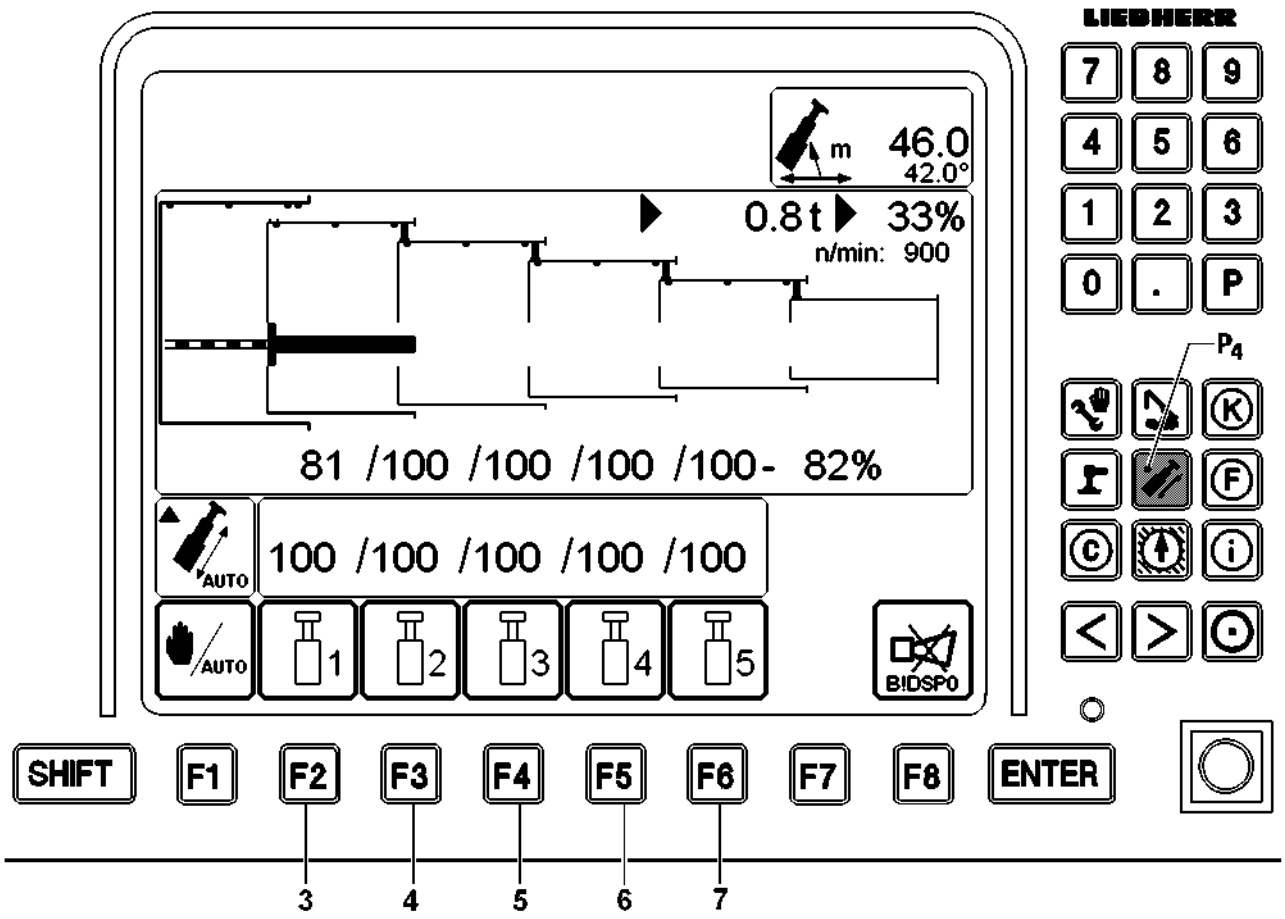

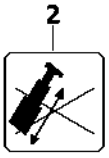

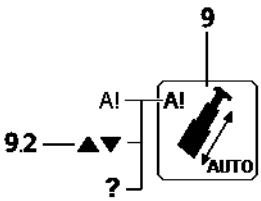

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Fig.106565

6.4 Telescoping to the selected target

If the desired telescoping target is set, then the direction in which the master switch must be deflected is displayed on the operating screen and on the telescoping screen.

If the master switch is moved against the specified direction, the telescope remains stationary. The default direction remains visible as a possible error criterion.

If the set telescoping target has been reached, then the telescopic boom remains stationary, regardless of any movements of the master switch, and the markings on the set telescoping target begin to blink. The target has thus been reached.

If the arrow **9.2** up appears in the automatic icon **9**:
▶ Move the master switch forward in direction Y+.

Result:

– The telescopic boom is telescoped out.

If the arrow **9.2** down appears in the automatic icon **9**:
▶ Move the master switch backward in direction Y-.

Result:

– The telescopic boom is telescoped in.

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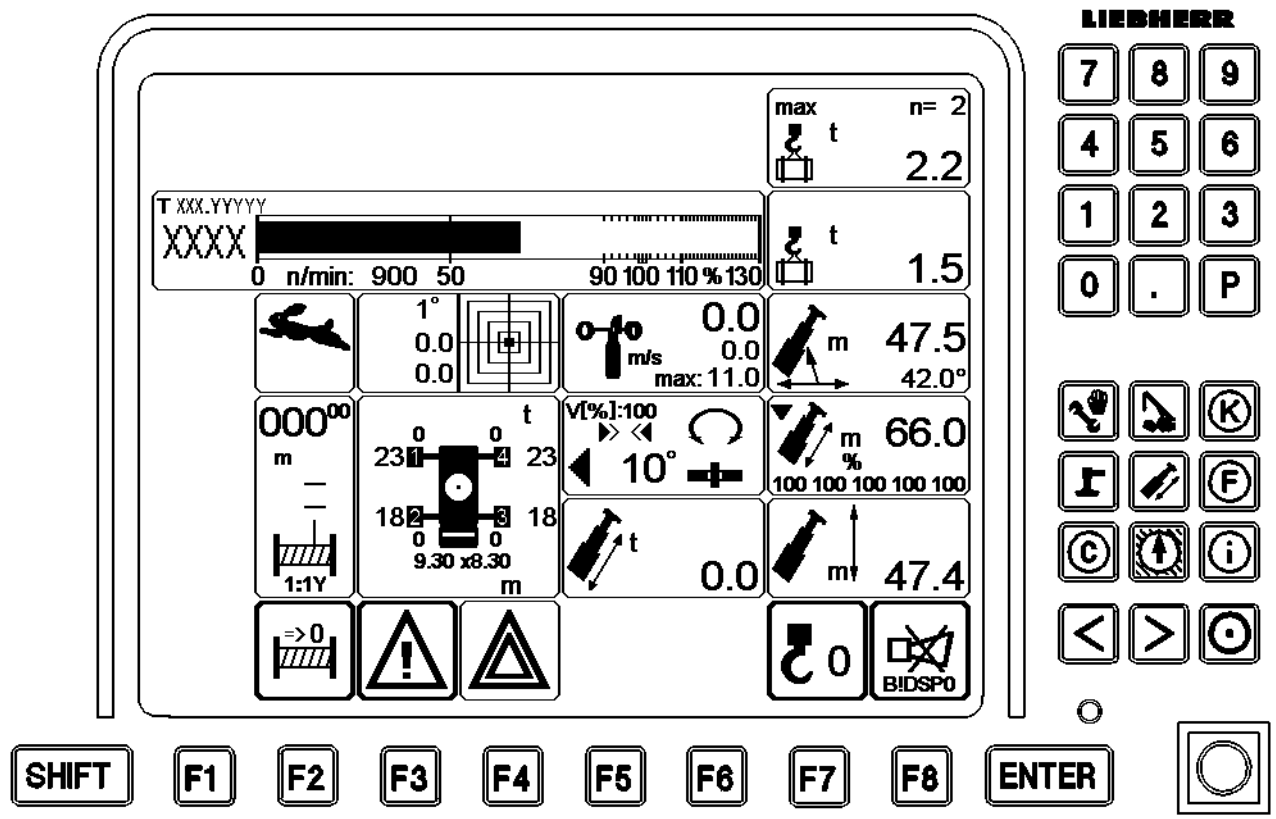

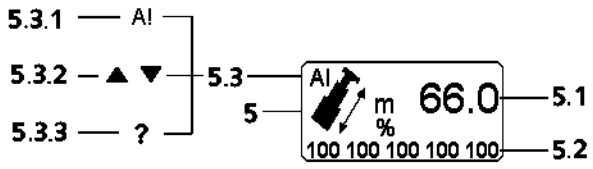

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Fig.106566

6.5 Telescoping with the operating screen

The telescoping system is designed so that an experienced crane driver can telescope without the telescoping screen, in other words using just the operating screen.

The crane driver receives information about the direction in which the master switch must be moved from the arrow **5.3.2** in the icon **5**.

If the crane operator attempts further telescoping once the telescoping target has been reached, then there is an automatic changeover from the operating screen to the telescoping screen. If the master switch is still being deflected, then the markings on the set telescoping target blink. This means that the telescoping target has been reached.

If the arrow **5.3.2** up appears in the icon **5**:
▶ Move the master switch forward in direction Y+.

Result:

– The telescopic boom is telescoped out.

If the arrow **5.3.2** down appears in the automatic icon **5**:
▶ Move the master switch backward in direction Y-.

Result:

– The telescopic boom is telescoped in.

Once the telescoping target is reached, icon A! **5.3.1** appears.

▶ Press the master switch for another 3 seconds or so until the telescope is resting on the pin.

Note
▶ If icon **5.3.3** appears, there is an error in the LICCON computer system.

6.6 Aborting telescoping

Telescoping can be aborted at any time.

The pins, the telescoping cylinder and the telescopes remain where they were, in the last state they were in when the master switch was still being pressed.

If desired, a new telescoping target can be set and telescoped to automatically.

It is also possible to proceed manually by switching over to manual operation.

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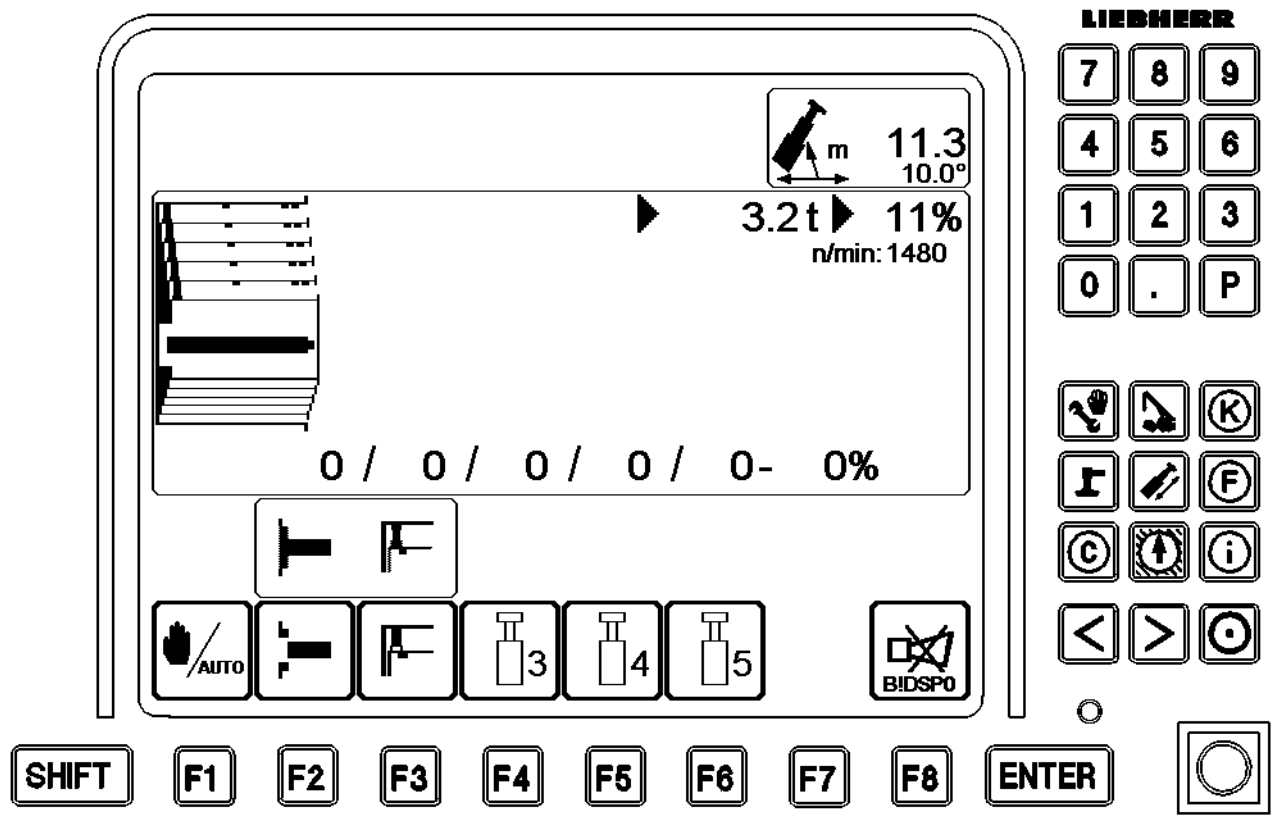

Fig.106589

6.7 Manual telescoping

NOTICE
Damage to telescoping cylinder!
If the telescoping cylinder is not retracted before starting crane operation, then it can be damaged!
- ▶ After reaching the telescoping target and pinning the telescopic section, the telescoping cylinder must be extended until the pins for the telescopic section pinning touch on the bores!
- ▶ For manual telescoping, move after pinning to stop (tension) to avoid any stress on the telescoping cylinder.

Manual telescoping is regarded as an exception mode, as automatic mode makes it possible to reach any chosen extension state.

In manual telescoping, pinning and unpinning of the telescoping cylinder and telescoping must be carried out manually.

The marking on the telescoping screen will indicate in which telescope the pinning equipment of the telescoping cylinder is currently located.

The proximity to a telescope pin bore can be inferred on the telescoping screen to an accuracy of 1 %.

Note
- ▶ To get into manual telescoping mode, you have to switch to „manual telescoping“ in the „telescoping“ program.
- ▶ Manual telescoping is identical for all telescopes. As an example, manual telescoping of telescope 1 is described.

Make sure that the following prerequisites are met before manual telescoping:
- – The „manual telescoping mode“ is set and all telescopes are telescoped in.

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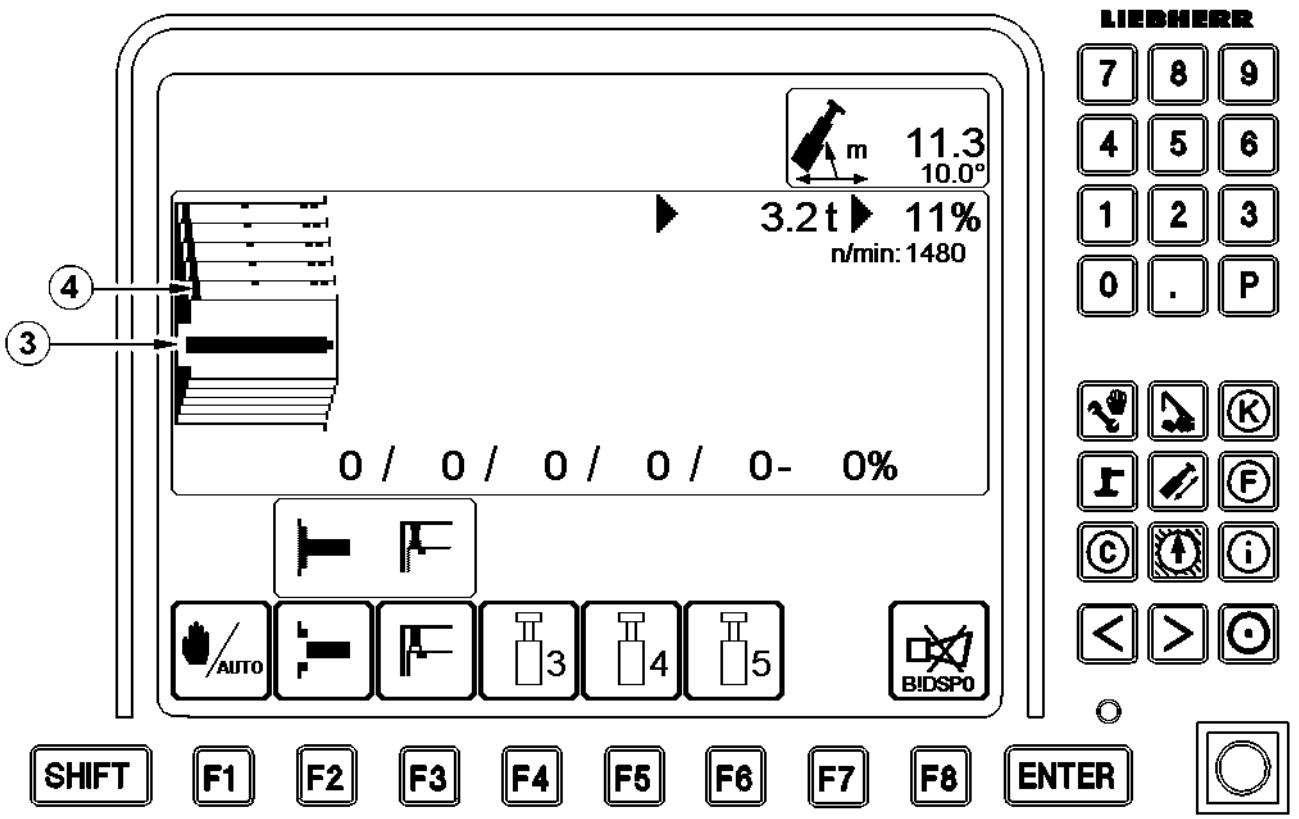

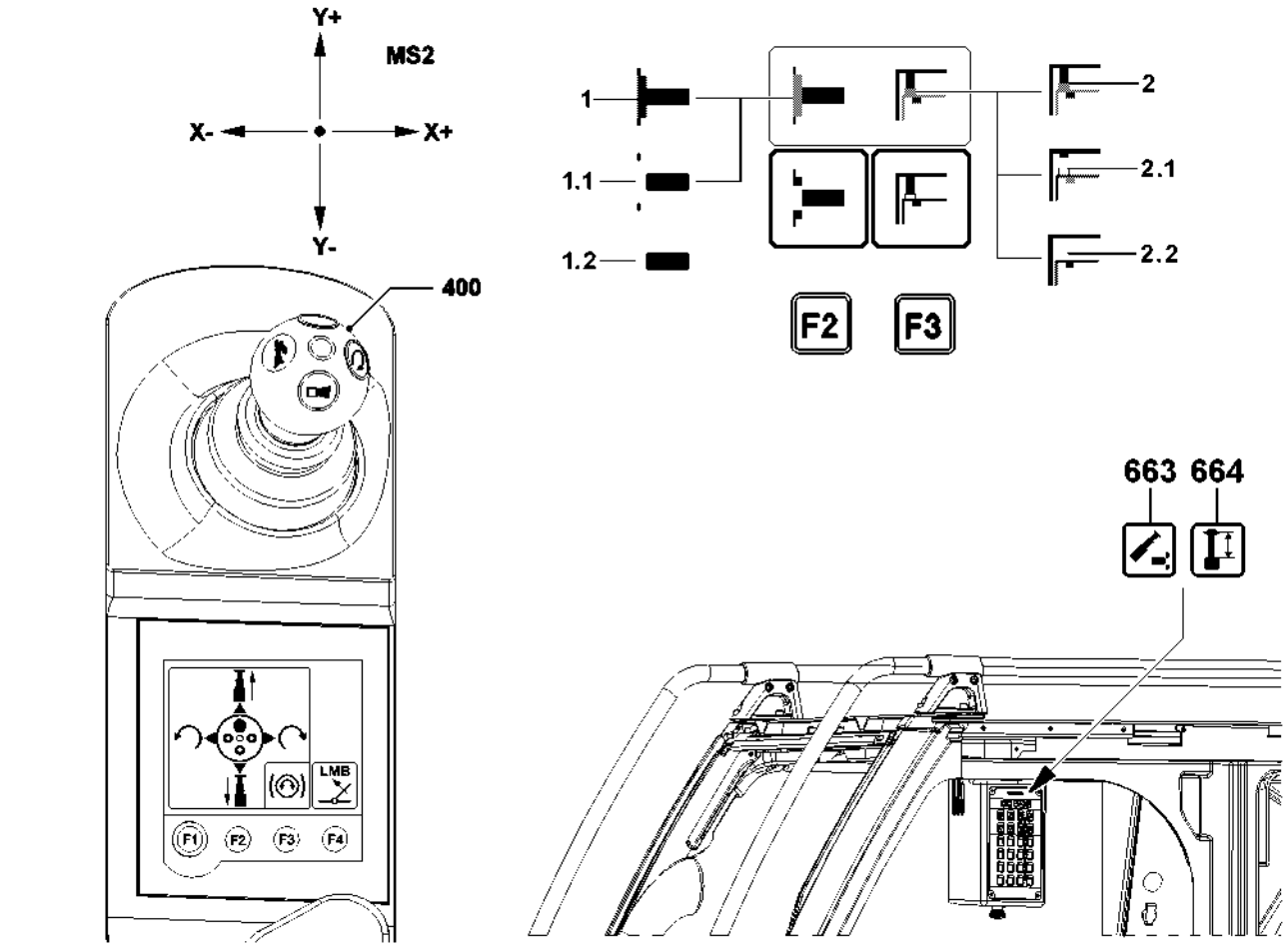

Fig.106590

6.7.1 Manual telescoping on machines with one winch

Note

▶ In this description it is assumed that telescope 5 is selected and pinned.

▶ Press the function key **F1**.

Result:

– The telescoping cylinder is pinned, see icon **1**.
– The telescope 5 is pinned, see icon **2**.
– The indicator light **664** lights up „yellow“.

▶ Press the function key **F2**.

Result:

– The icon above the function key **F2** is bordered in red.
– The telescoping cylinder is unpinned, see icon **1.1**.
– The indicator light **663** lights up „yellow“.

▶ Actuate the master switch 2 **400** in direction Y- (to the rear) and retract the telescoping cylinder until the „telescope 1“ on the Liccon monitor appears „green“.

Result:

– The „telescope 1“ is selected and appears „green“ on the Liccon monitor.
– The indicator light **663** and indicator light **664** light up „yellow“.

▶ Press the function key **F2**.

Result:

– The telescoping cylinder is unpinned on telescope 1 and the icon **1** appears „green“.
– The indicator light **663** lights up „green“.

Problem remedy

The icon **1** does not appear on point **3** but the icon **1.2** appears yellow?

▶ Deflect the master switch 2 **400** in direction Y- (to the rear) or in direction Y+ (to the front) until the icon **1** on point **3** appears „green“.

Before carrying out any other steps, make sure that the locking pin has latched in audibly.

▶ Press the function key **F3**.

Result:

– The telescope 1 is unpinned, see icon **2.1**.
– The icon above the function key **F3** is bordered in red.

Problem remedy

The icon **2.2** appears blinking?

▶ Deflect the master switch 2 **400** in direction Y- (to the rear) or in direction Y+ (to the front) until the icon **2.1** appears static.

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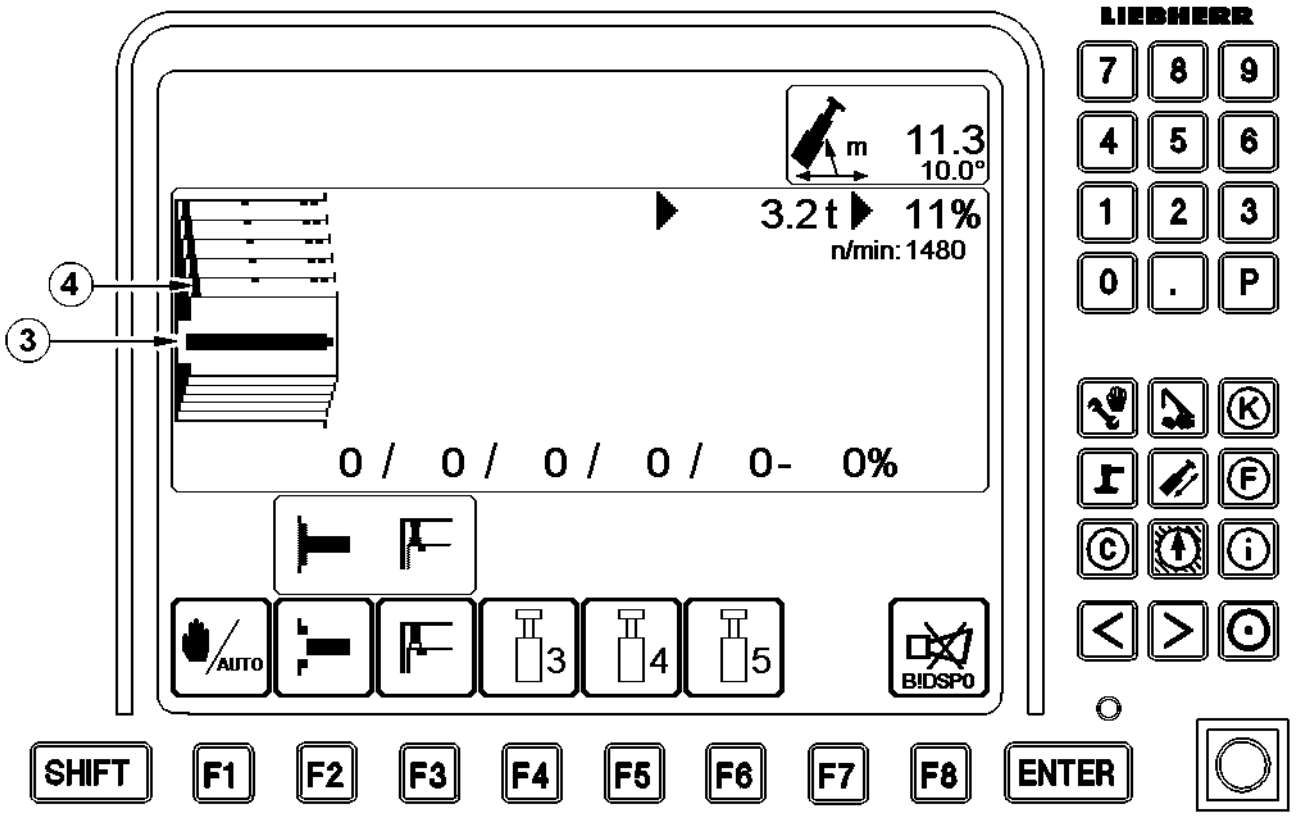


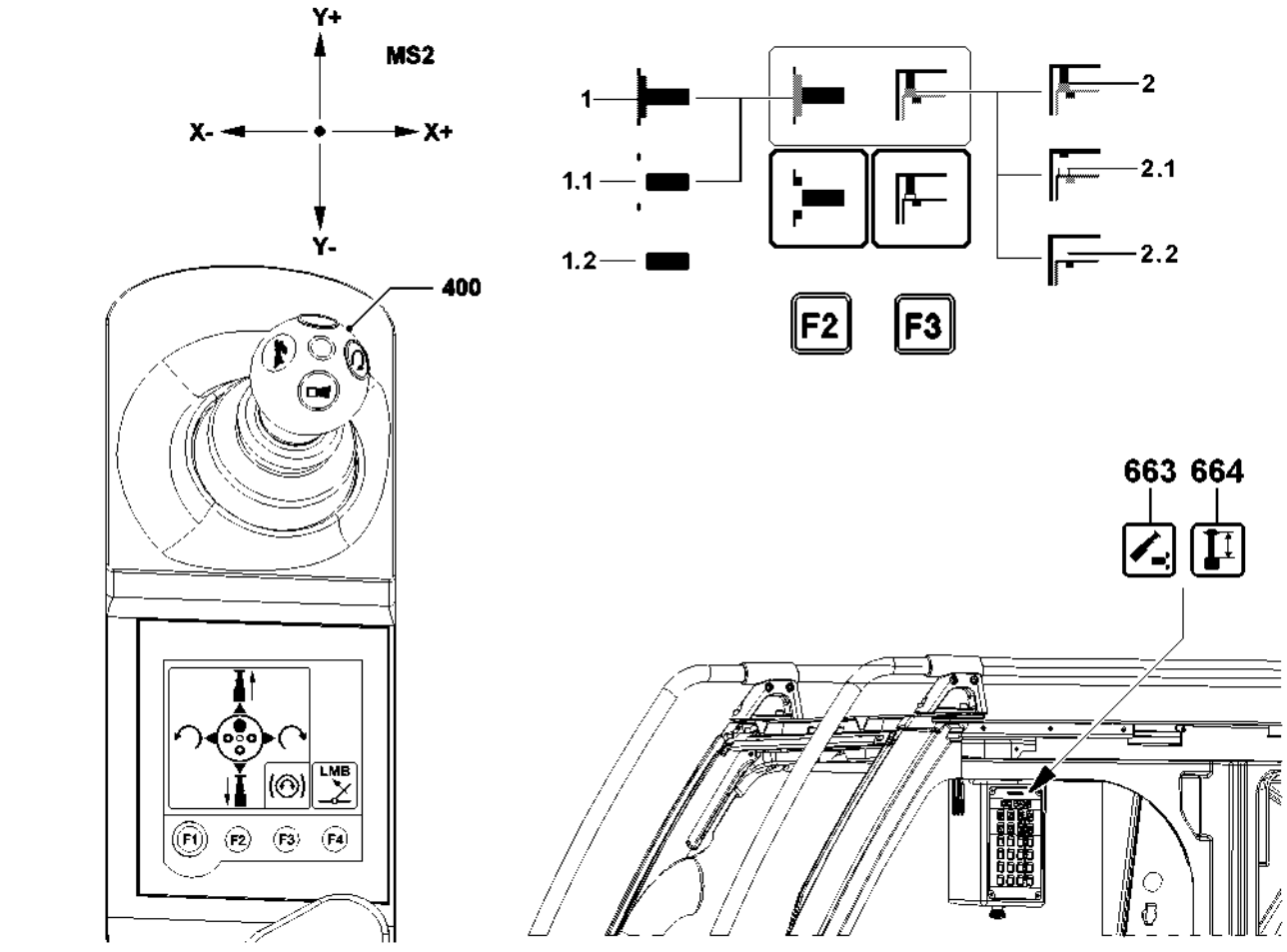


Fig.106590

NOTICE
Danger of damaging the tele lock!
▶ Lock the telescoping cylinder in the intended pin points.
▶ The locking pins must latch in audibly.

▶ Deflect the master switch 2 **400** in direction Y+ (to the front) and telescope the telescope 1 out to the desired length.

Result:

– The indicator light **664** lights up when the specified pin point is reached.

Problem remedy
The indicator light **664** does not light up?
▶ Deflect the master switch 2 **400** in direction Y- (to the rear) or in direction Y+ (to the front) until the indicator light **664** lights up.

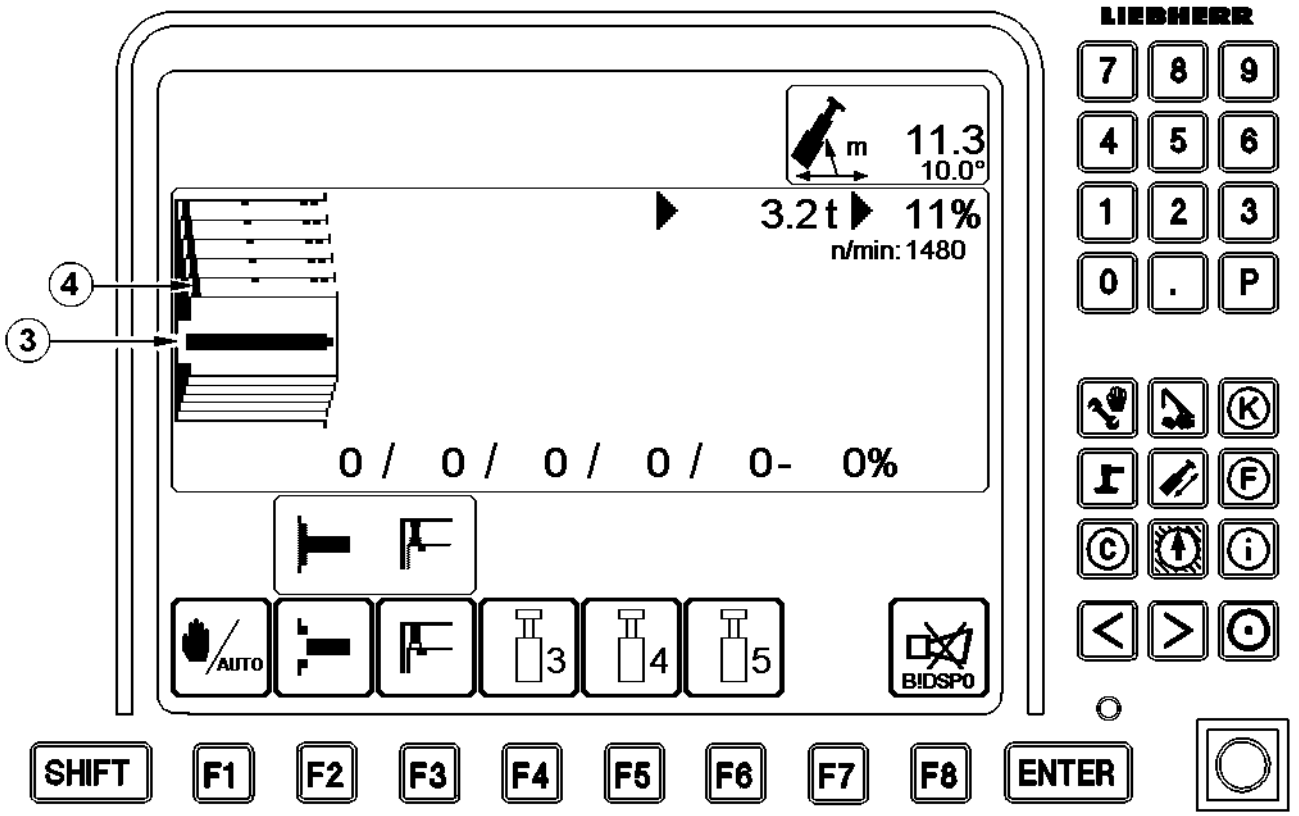
▶ Press the function key **F3**.

Result:

– The telescope 1 is pinned on the desired length.
– The icon **2** appears „green“.

Problem remedy
The icon **2.2** appears yellow on point **4**?
▶ Deflect the master switch 2 **400** in direction Y- (to the rear) or in direction Y+ (to the front) until the icon **2** on point **4** appears „green“.

Note
▶ Telescope the remaining telescopic sections out as described above.



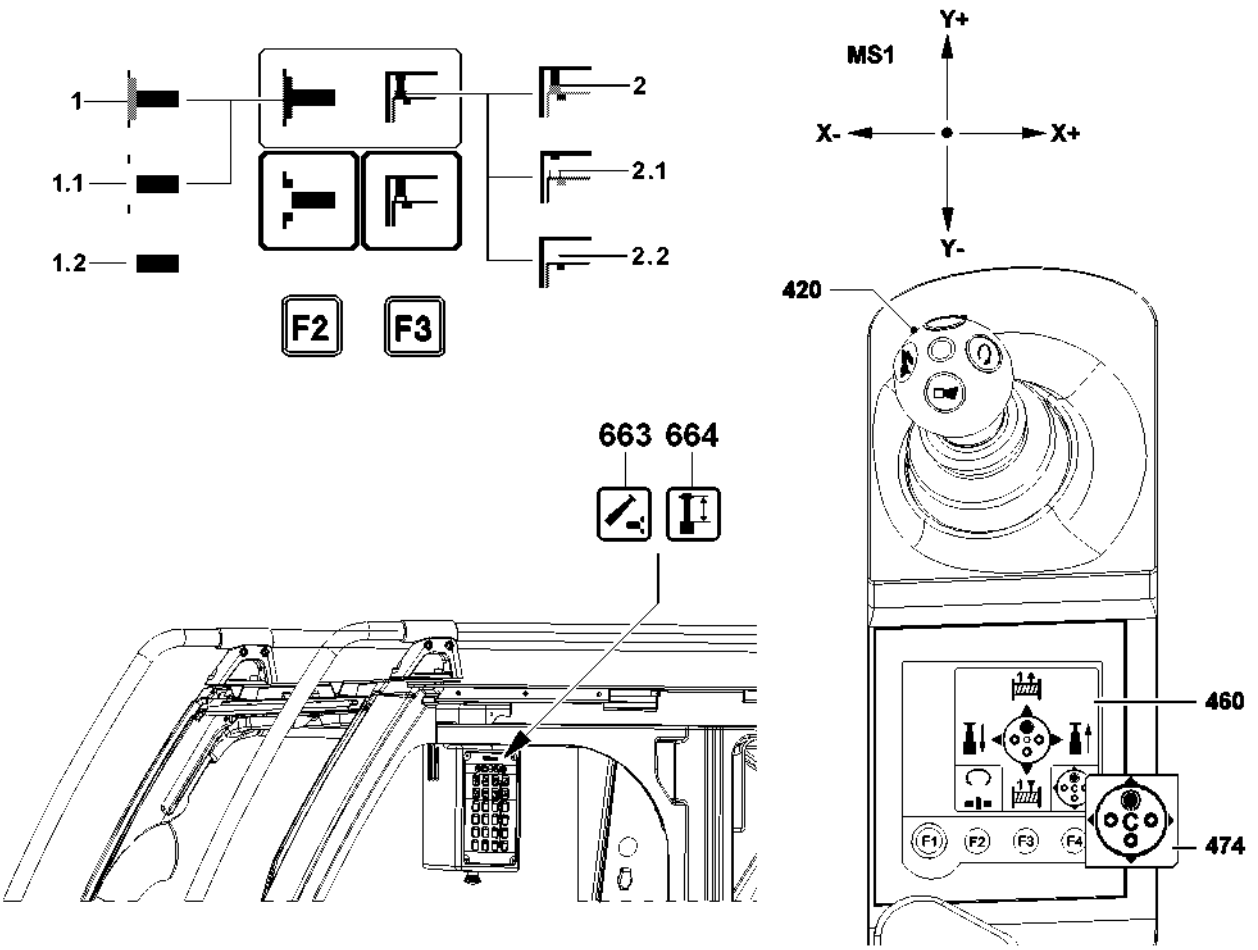


Fig.106591

6.7.2 Manual telescoping on cranes with two winches

For manual telescoping, the master switch assignment „C“ **474** must be set on the touch display right **460** – with function key „F4“ **464**.

▶ Press the function key **F1**.

Result:

– The telescoping cylinder is pinned, see icon **1**.
– The telescope 5 is pinned, see icon **2**.
– The indicator light **664** lights up „yellow“.

▶ Press the function key **F2**.

Result:

– The icon above the function key **F2** is bordered in red.
– The telescoping cylinder is unpinned, see icon **1.1**.
– The indicator light **663** lights up „yellow“.

▶ Actuate the master switch 2 **420** in direction Y- (to the rear) and retract the telescoping cylinder until the „telescope 1“ on the Liccon monitor appears „green“.

Result:

– The „telescope 1“ is selected and appears „green“ on the Liccon monitor.
– The indicator light **663** and indicator light **664** light up „yellow“.

▶ Press the function key **F2**.

Result:

– The telescoping cylinder is unpinned on telescope 1 and the icon **1** appears „green“.
– The indicator light **663** lights up „green“.

Problem remedy
The icon **1** does not appear on point **3** but the icon **1.2** appears yellow?
▶ Deflect the master switch 2 **420** in direction Y- (to the rear) or in direction Y+ (to the front) until the icon **1** on point **3** appears „green“.

Before carrying out any other steps, make sure that the locking pin has latched in audibly.

▶ Press the function key **F3**.

Result:

– The telescope 1 is unpinned, see icon **2.1**.
– The icon above the function key **F3** is bordered in red.

Problem remedy
The icon **2.2** appears blinking?
▶ Deflect the master switch 2 **420** in direction Y- (to the rear) or in direction Y+ (to the front) until the icon **2.1** appears static.

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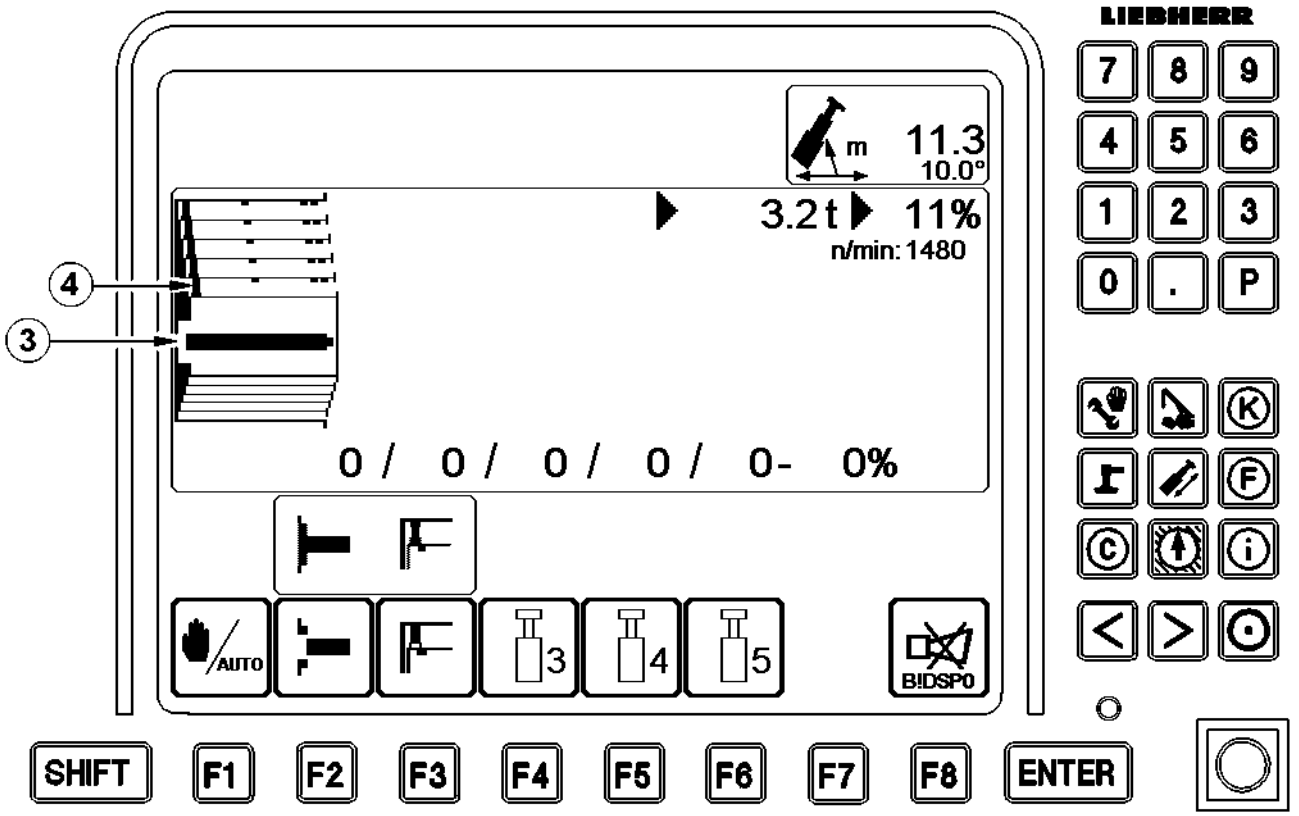

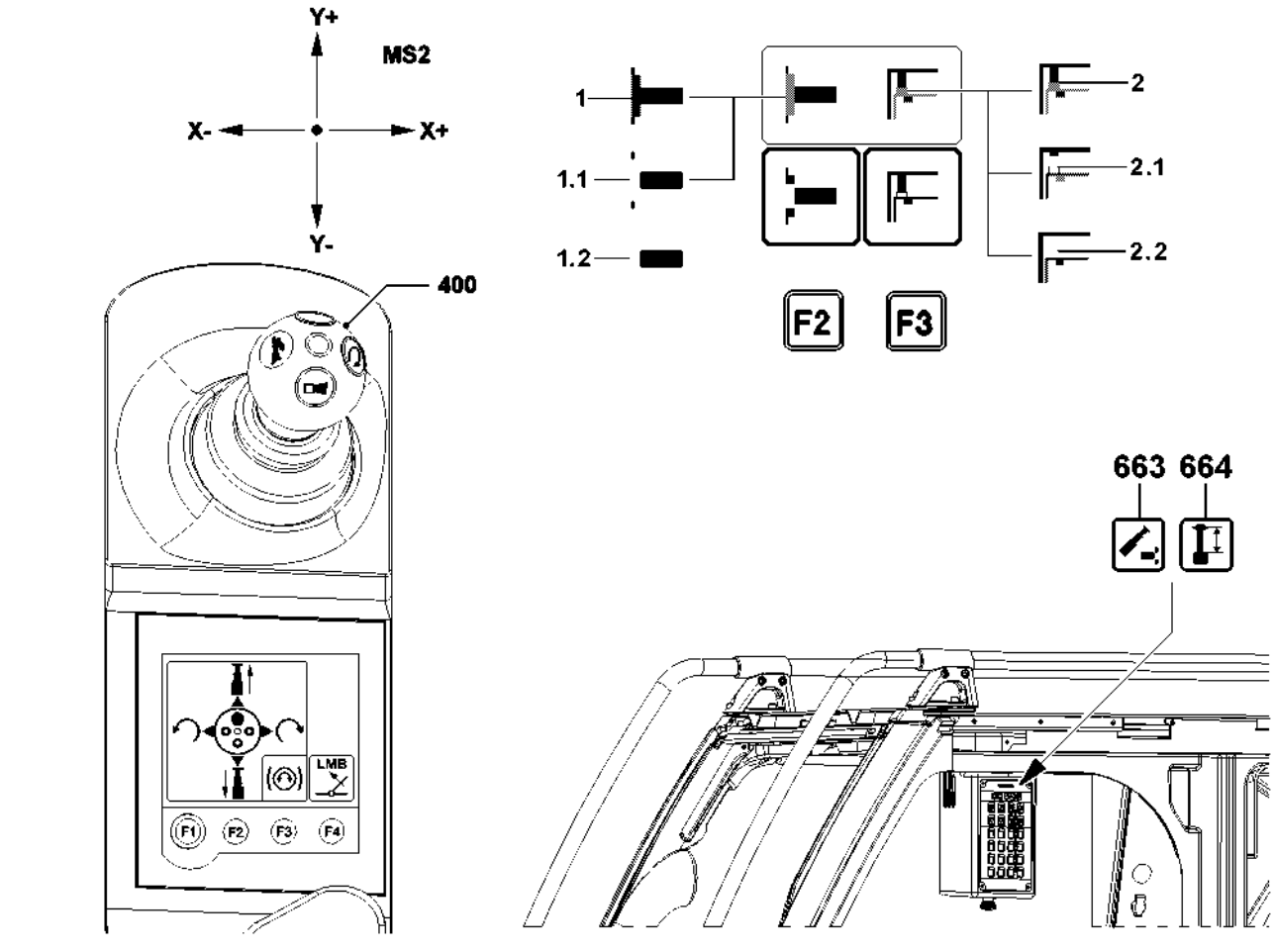

Fig.106590

NOTICE
Danger of damaging the tele lock!
▶ Lock the telescoping cylinder in the intended pin points.
▶ The locking pins must latch in audibly.

▶ Deflect the master switch 2 **420** in direction Y+ (to the front) and telescope the telescope 1 out to the desired length.

Result:

– The indicator light **664** lights up when the specified pin point is reached.

Problem remedy
The indicator light **664** does not light up?
▶ Deflect the master switch 2 **420** in direction Y- (to the rear) or in direction Y+ (to the front) until the indicator light **664** lights up.

▶ Press the function key **F3**.

Result:

– The telescope 1 is pinned on the desired length.
– The icon **2** appears „green“.

Problem remedy
The icon **2.2** appears yellow on point **4**?
▶ Deflect the master switch 2 **420** in direction Y- (to the rear) or in direction Y+ (to the front) until the icon **2** on point **4** appears „green“.

Note
▶ Telescope the remaining telescopic sections out as described above.

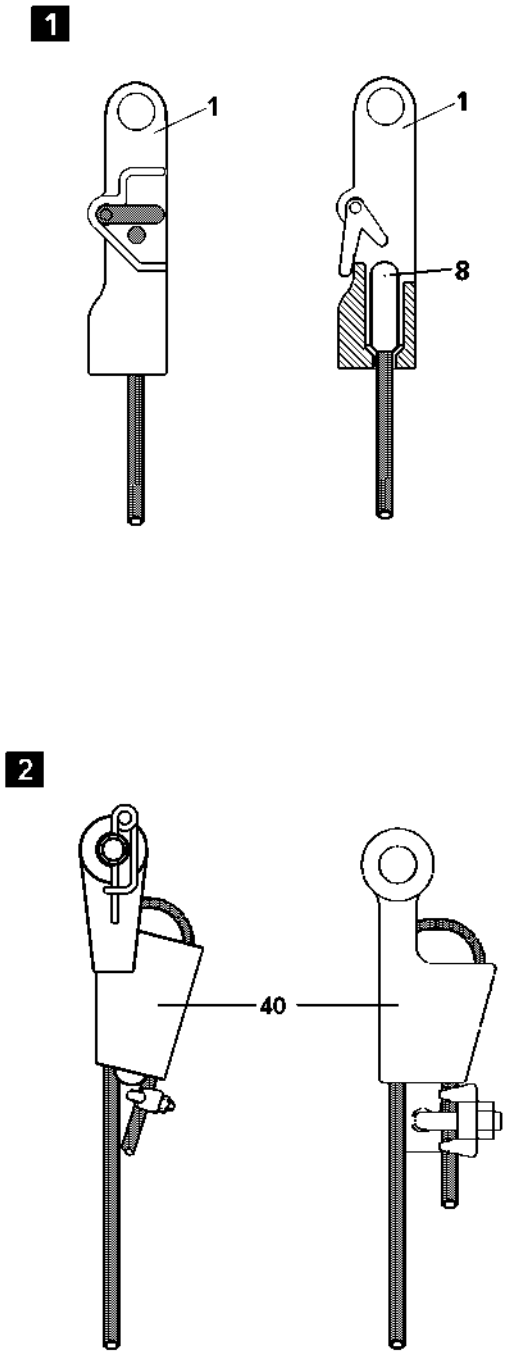

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Fig.108118

1 Wire ropes and rope end connections

1.1 Wire ropes

Please check if a **rotating resistant** or a **non-rotating** rope is required for the application. The type of rope that is selected then determines the required type of rope end connections, see Crane operating instructions, chapter 8.04.

Note

▶ The correct choice and use of wire rope and rope end connections are decisive preconditions for proper and accident-free crane operation!

DANGER

Danger of serious personnel injury and equipment 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 rope clamp **8**
  For that, use a rope lock **1**, see illustration **1**.
– Rope end connections without rope clamp
  For that, use a wedge lock **40**, see illustration **2**.

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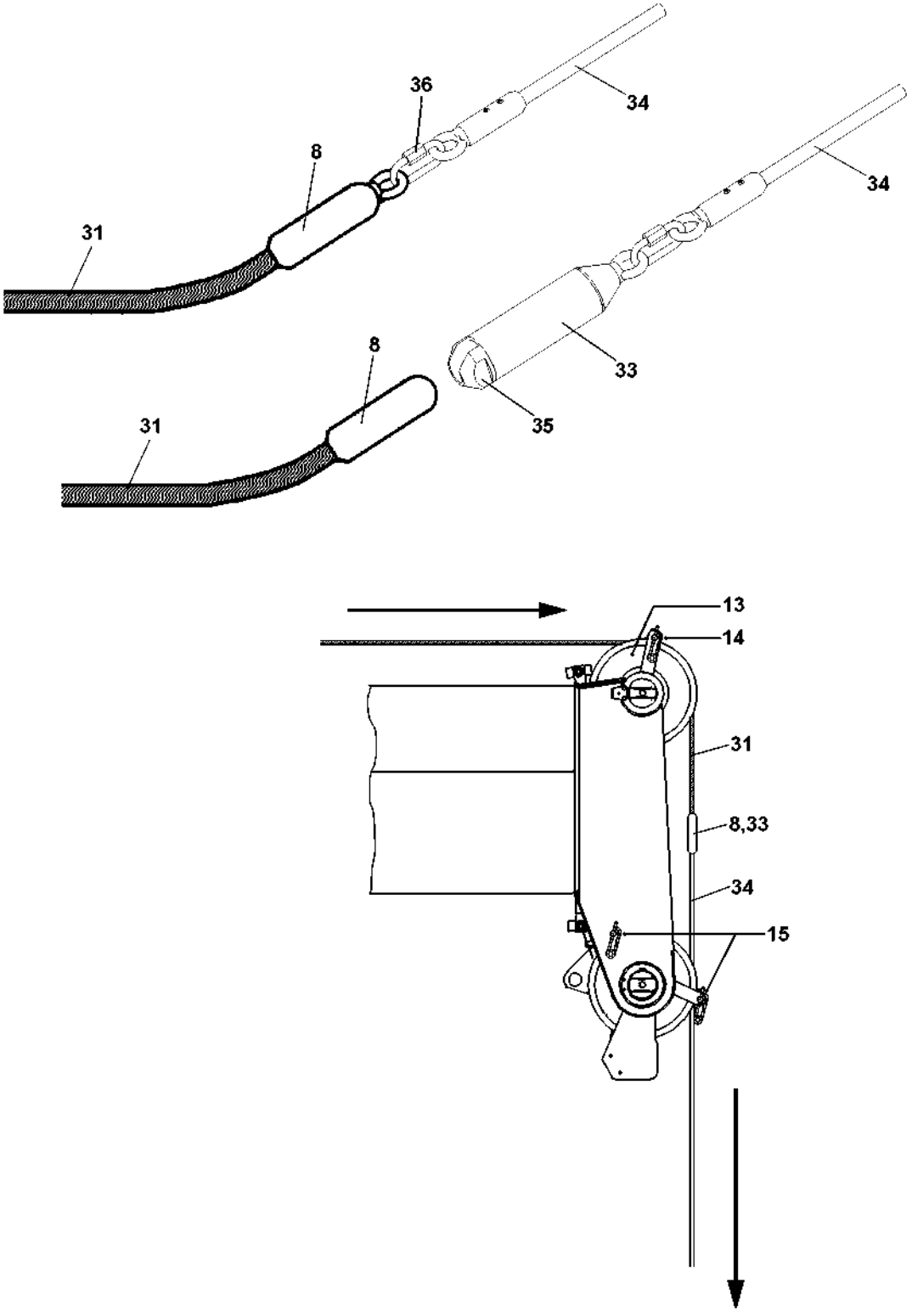

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Fig.110411

2 Reeving the hoist rope with the auxiliary reeving rope

WARNING
Risk of falling!
The assembly personnel, due to an erroneous operation of the crane function or slip on the telescopic boom, can fall and be killed!
- ▶ The telescopic boom 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 telescopic boom, then the assembly personnel must hang an approved fall arrest system to the retaining ropes of the telescopic boom on the left and right with both snap hooks and secure themselves in case of falls. See crane operating instructions, chapter 2.04 and chapter 2.06!
- ▶ Without appropriate safety measures, it is **strictly** prohibited to step on the telescopic boom!
- ▶ 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 place!

2.1 Reeving procedure

Make sure that the following prerequisites are met:
- The crane is properly supported and horizontally aligned.
- The crane is ballasted according to the load chart.
- The LICCON overload protection has been set according to the load chart.
- The telescopic boom is fully telescoped in.
- The telescopic boom has been luffed to the rear or the side.
- The telescopic boom is luffed down in 0° position.

- ▶ Wear approved fall arrest system and protective equipment, see Crane operating instructions, chapter 2.04.
- ▶ Install the hook device on the ladder, see Crane operating instructions, Chapter 2.06.

WARNING
Risk of falling!
- ▶ Hang the ladder in such a way onto the hoist gear and on the telescopic boom that it cannot fall over! See Crane operating instructions, chapter 2.06.

If no railing is installed on the crane superstructure:
- ▶ Hang the ladder on the hoist gear and set it up safely, see Crane Operating instructions, Chapter 2.06.

If a railing is installed on the crane superstructure:
- ▶ Set the railing on the crane superstructure into assembly / disassembly position, see Crane operating instructions, chapter 2.06.
- ▶ Secure the assembly personnel from falling: Hook assembly personnel with fall arrest system on the respective fastening points, see Crane operating instructions, chapter 2.06.

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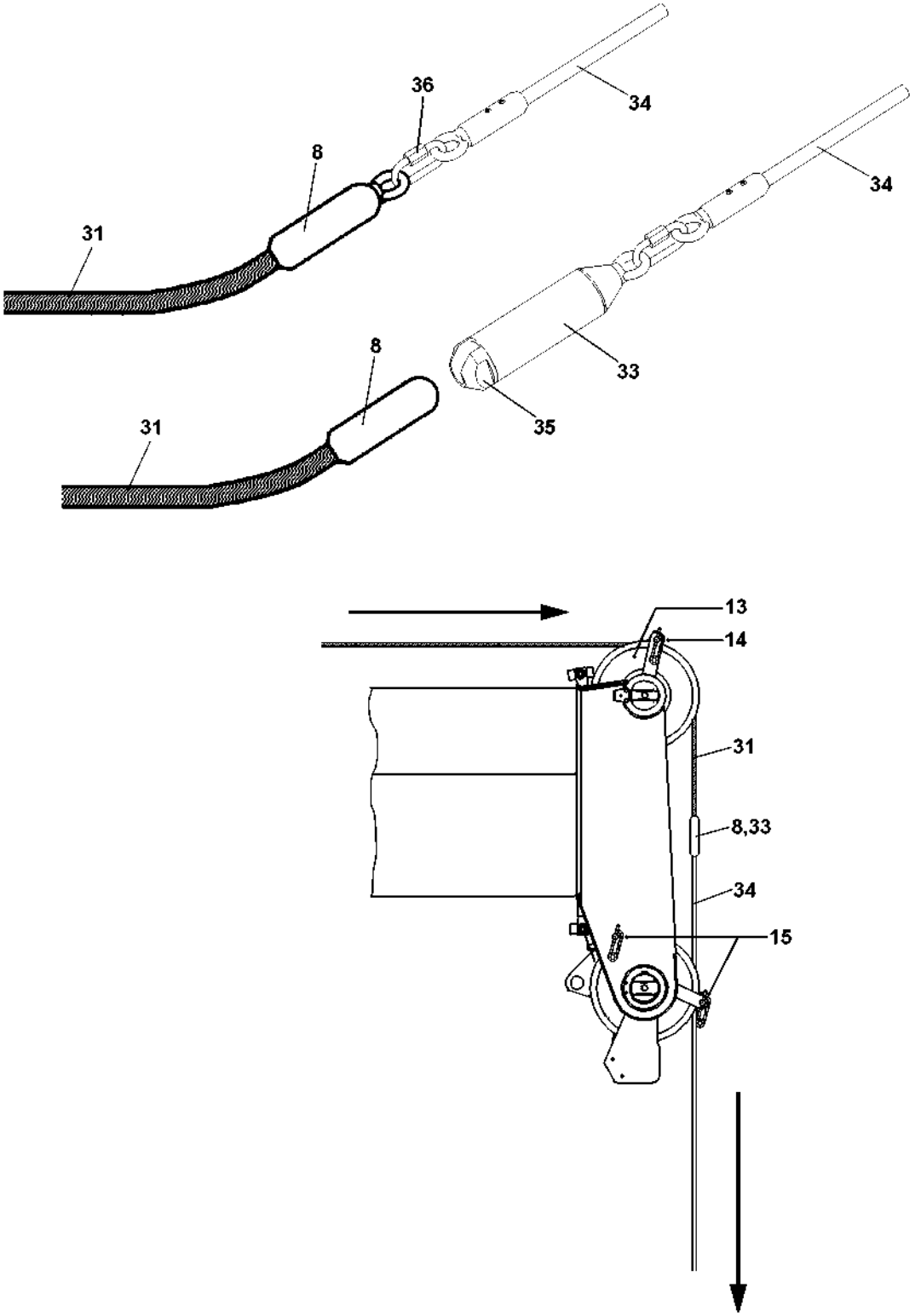

Fig.110411

With the auxiliary reeving rope **34**, the hoist rope **31**can be reeved safely.

When **a** intake sleeve **33** is installed on the auxiliary reeving rope **34**:

- ▶ Connect the auxiliary reeving rope **34** with the hoist rope **31**: Slide the intake sleeve **33** onto the locking clamp **8** and close off with the sleeve plug **35**.

When **no** intake sleeve **33** is installed on the auxiliary reeving rope **34**:

- ▶ Connect the auxiliary reeving rope **34** with the hoist rope **31**: Open the chain lock **36**, connect it with the eyehook of the lock clamp **8** and close the chain lock **36**.
- ▶ Place the auxiliary reeving rope **34** forward over the pulley head.
- ▶ Hang the ladder on the telescopic boom and set it up safely, see Crane Operating instructions, Chapter 2.06.
- ▶ Secure the assembly personnel from falling: Hook assembly personnel with fall arrest system on the respective fastening points, see Crane operating instructions, chapter 2.06.
- ▶ Remove the rope retaining pipe **14** and rope retaining pipe **15** on the pulley head.
- ▶ Place the auxiliary reeving rope **34** over the upper rope pulley **13**.

NOTICE

Danger of slack rope formation!

If the auxiliary reeving rope **34** is not held tight when spooling the winch out, slack rope can form on the hoist rope **31**!

- ▶ Hold the auxiliary reeving rope **34** tight!

- ▶ Slowly spool out the winch by deflecting the master switch and pull the auxiliary reeving rope **34** with the hoist rope **31** over the upper rope pulley **13**.
- ▶ Detach the auxiliary reeving rope **34** on the hoist rope **31** and reeve the hoist rope **31** into the hook block.
- ▶ Insert and secure the rope retaining pipe **14** and the rope retaining pipe **15** on the pulley head.

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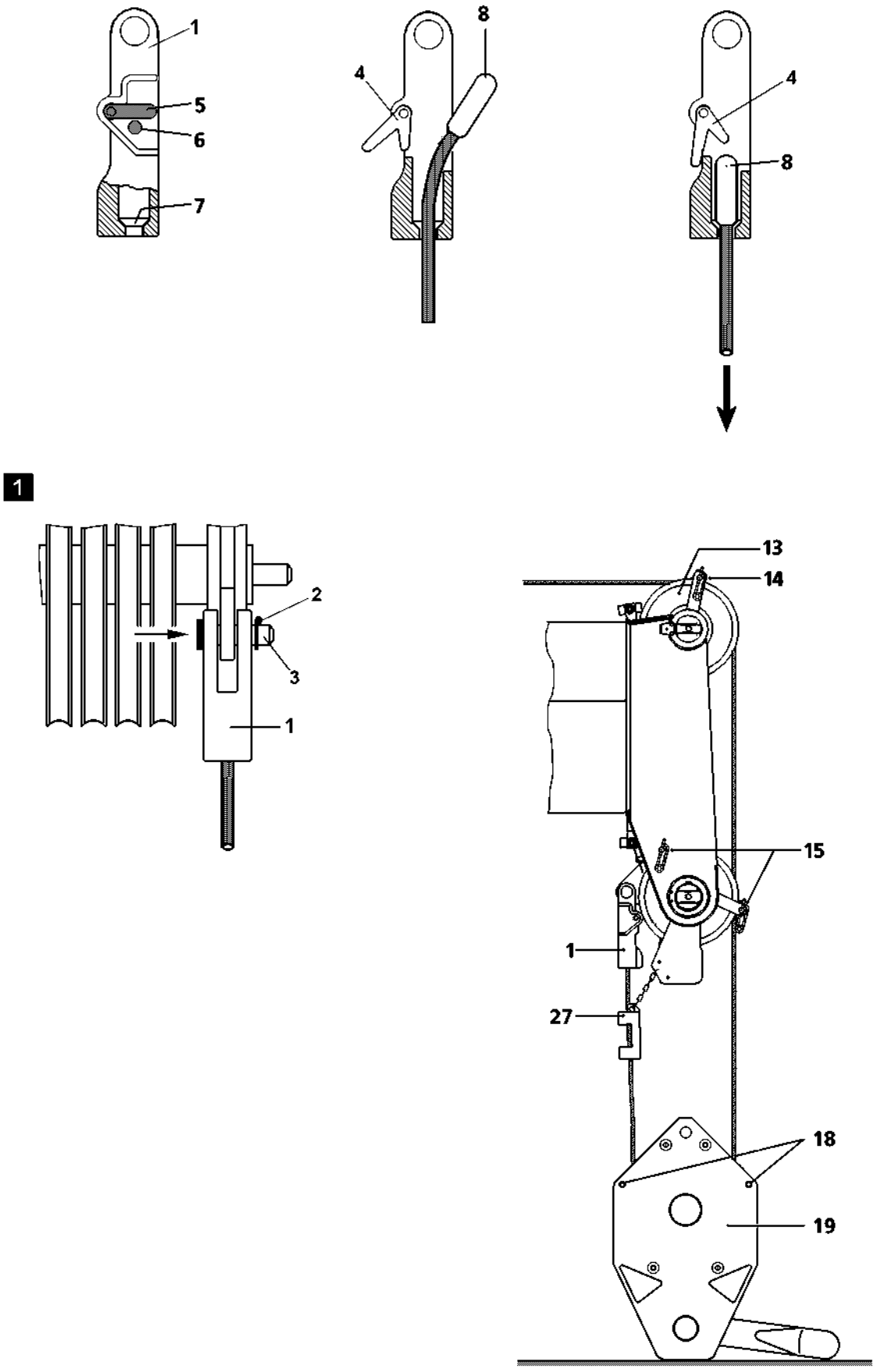

Fig.108124

3 Reeving the hook block in and out

3.1 Reeving in the hook block

3.1.1 Preparing the hook block

NOTICE
Damage to the hoist rope!
An incorrectly reeved hoist rope or the incorrect selection of the rope fixed point can cause the hook block not to hang vertically and thus cause damage to the hoist rope!
- ▶ Always carry out the reeving of the hoist rope according to the reeving plan!
- ▶ The rope fixed point on the hook block is to be selected in such a way that the last strand runs parallel to the remaining rope strands, as much as possible!

- ▶ Place the required hook block under the pulley head of the telescopic boom.
- ▶ At the hook block **19**, remove the spring retainers **18** for both rope retaining pins and pull them both out.

WARNING
Risk of falling!
The assembly personnel, due to an erroneous operation of the crane function or slip on the telescopic boom, can fall and be killed!
- ▶ The telescopic boom 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 telescopic boom, then the assembly personnel must hang an approved fall arrest system to the retaining ropes of the telescopic boom on the left and right with both snap hooks and secure themselves in case of falls. See crane operating instructions, chapter 2.04 and chapter 2.06!
- ▶ Without appropriate safety measures, it is **strictly** prohibited to step on the telescopic boom!
- ▶ 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 place!

- ▶ Reeve in the hoist rope, see section „Reeving the hoist rope with the auxiliary reeving rope“.
- ▶ Insert the rope retaining pipes again and secure with spring retainers.

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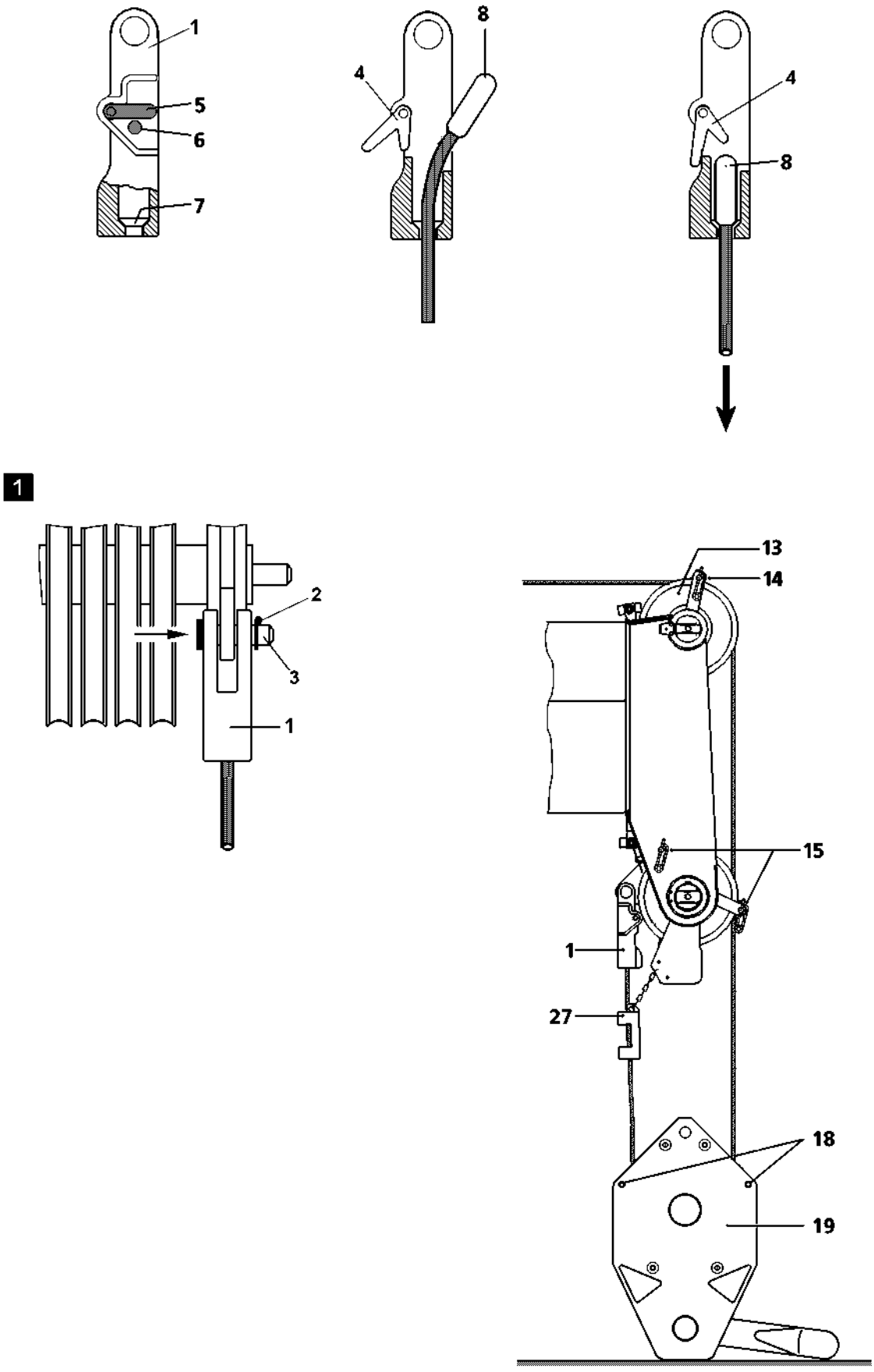

Fig.108124

3.1.2 Fastening the hoist 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, see fig. **1**.

▶ The rope lock **1** must be pinned in either at the pulley head or on the hook block and secured with linch pins **2**, depending on reeving.
▶ Push the retaining pin **6** on the rope lock **1** in, move the lever **5** „downward“ and hold it in this position.

Result:

– The latch **4** will be swivelled downward.

▶ Attach the rope end with the locking clamp **8** in the rope lock and pull the rope firmly „downward“ (in direction of arrow), until the locking clamp **8**is placed in the cone **7**.

WARNING
Danger of accident due to incorrect mounting of locking clamp!
▶ 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 retaining pin **6**.

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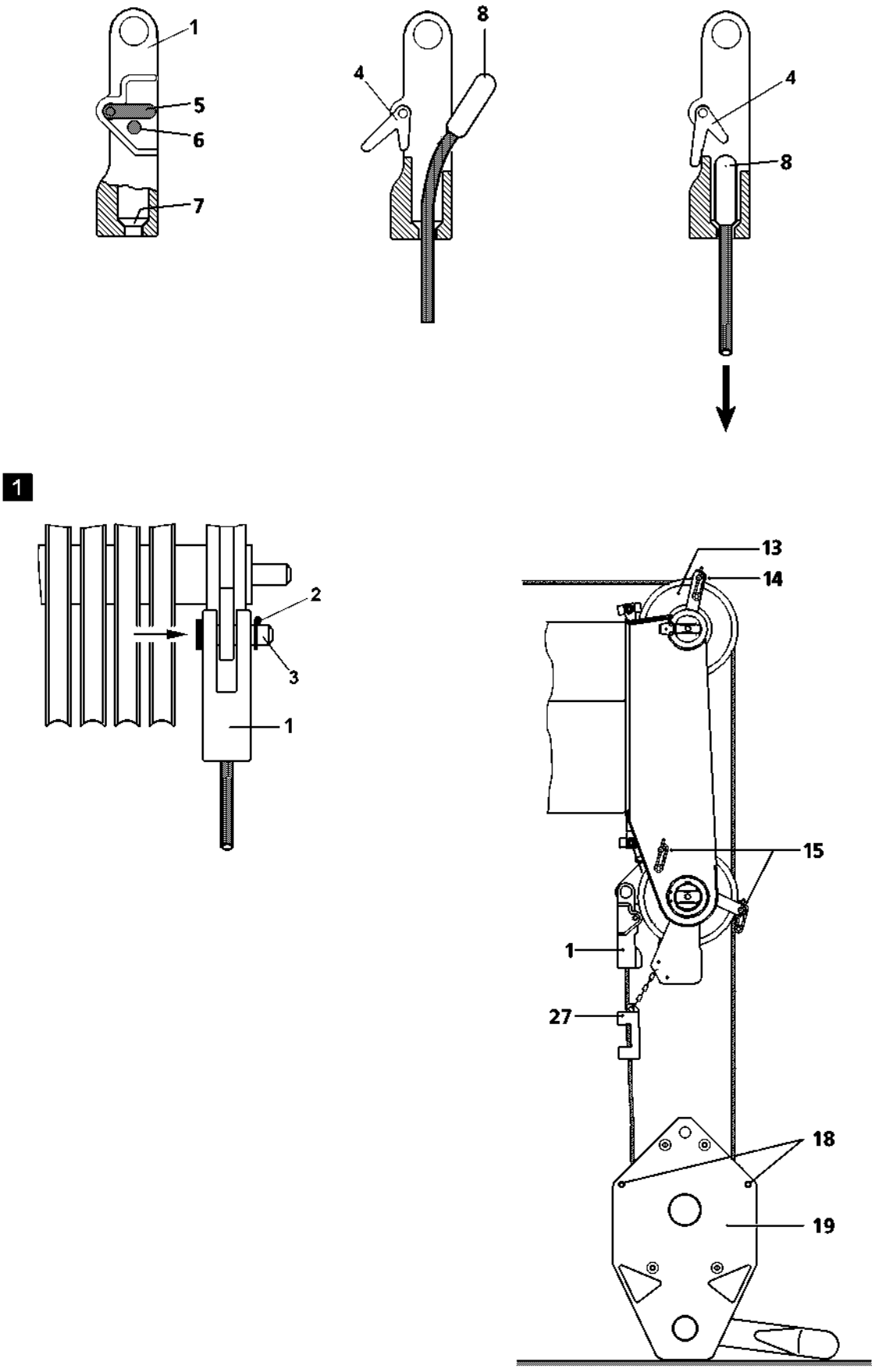

Fig.108124

3.2 Unreeving the hook block

Make sure that the following prerequisites are met:
- The crane is properly supported and horizontally aligned.
- The crane is ballasted according to the load chart.
- The LICCON overload protection has been set according to the load chart.
- The telescopic boom is fully telescoped in.
- The telescopic boom has been luffed to the rear or the side.
- The telescopic boom is luffed down in 0° position.
- The ground is level and of sufficient load carrying capacity.

3.2.1 Lowering the hook block

WARNING
Crushing of hands!
When guiding the hook block by hand, hands or fingers can be crushed!
When unreeving the hook block, it can topple over!
- ▶ 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, see section „Removing the hoist limit switch weight“.

3.2.2 Detaching the hoist rope

- ▶ Push in retaining pin **6** on the rope lock **1** move the lever **5** downward and hold it in this position.

Result:

- The latch **4** is moved to the side and the locking clamp **8** is released.

- ▶ Push the hoist rope up and detach the locking clamp **8**.
- ▶ At the hook block **19**, remove the spring retainers **18** for both rope retaining pins and pull both rope retaining pins out, see section „Reeving the hoist rope with the assembly winch“
- ▶ On the pulley head remove the spring retainers on the rope retaining pipe **14** and on the rope retaining pipe **15** and pull the rope retaining pipes out, see section „Reeving the hoist rope with the auxiliary reeving rope“
- ▶ Unreeve the hoist rope from the hook block and the pulley head.
- ▶ Insert the rope retaining pipes again and secure with spring retainers.

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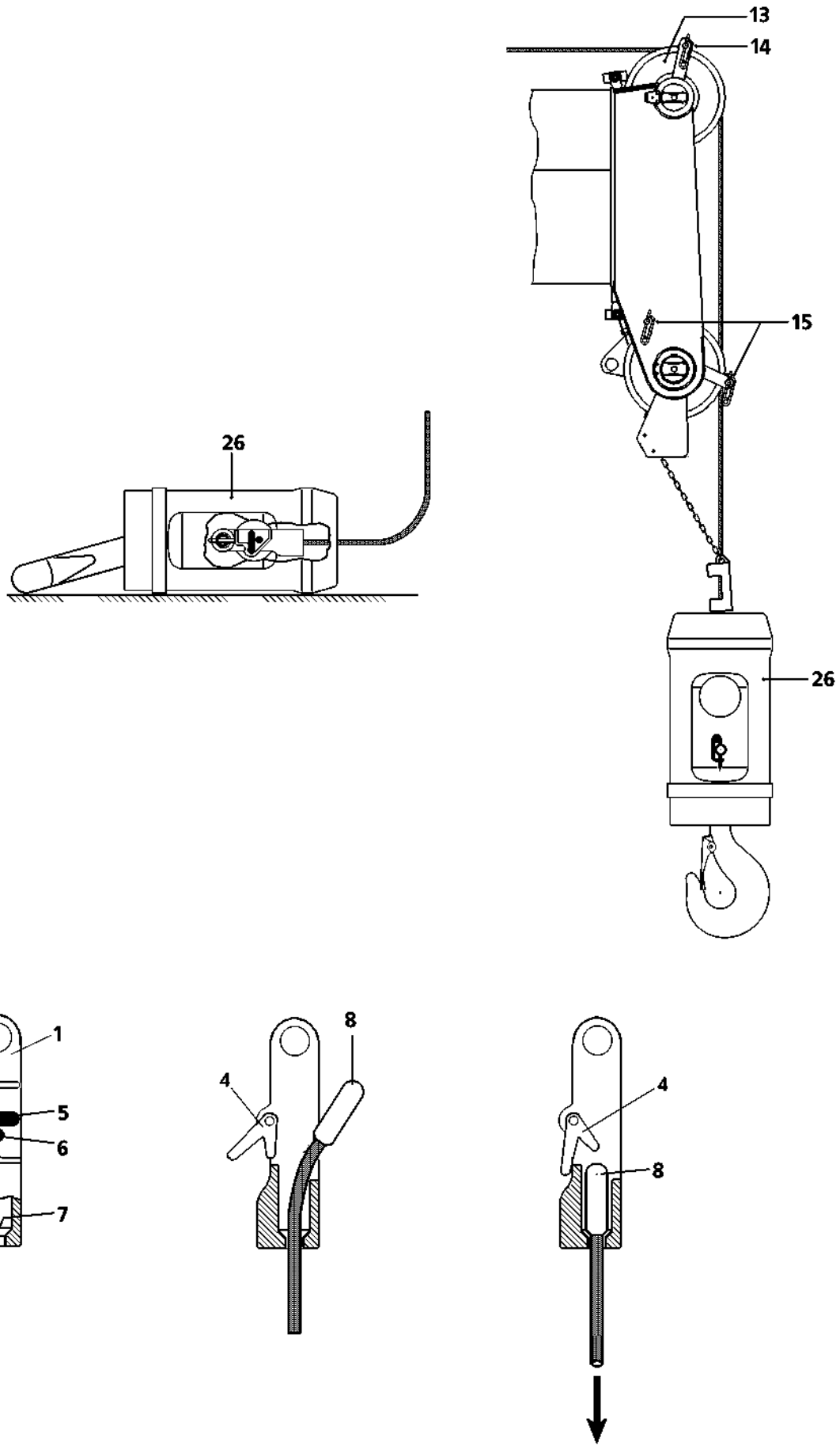

Fig.108125

4 Securing and removing the load hook*

4.1 Securing the load hook*

4.1.1 Assembling the load hook*

- ▶ Place the load hook under the pulley head of the telescopic boom.
- ▶ At the pulley head remove the spring retainers on the rope retaining pipe **14** and on the rope retaining pipe **15** and pull the rope retaining pipe out.

WARNING
Risk of falling!
The assembly personnel, due to an erroneous operation of the crane function or slip on the telescopic boom, can fall and be killed!

- ▶ The telescopic boom 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 telescopic boom, then the assembly personnel must hang an approved fall arrest system to the retaining ropes of the telescopic boom on the left and right with both snap hooks and secure themselves in case of falls. See crane operating instructions, chapter 2.04 and chapter 2.06!
- ▶ Without appropriate safety measures, it is **strictly** prohibited to step on the telescopic boom!
- ▶ 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 place!

- ▶ Place the hoist rope over the upper rope pulley **13**, see section „Reeving the hoist rope with the auxiliary reeving rope“.
- ▶ Insert the rope retaining pipe **14** and the rope retaining pipe **15** and secure with spring retainers.
- ▶ Pin the rope lock **1** in the load hook **26** and secure with spring retainers.

4.1.2 Fastening the hoist rope

- ▶ Push the retaining pin **6** into the rope lock **1**, move the lever **5** sideways and hold it in this position.

Result:

– The latch **4** is moved to the side.

- ▶ Hang in the rope end with the locking clamp **8** in the rope lock and pull the rope firmly in the direction of the arrow, until the locking clamp **8** contacts the cone **7**.

WARNING
Danger of accident due to incorrect mounting of locking clamp!

- ▶ 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 retaining pin **6**.

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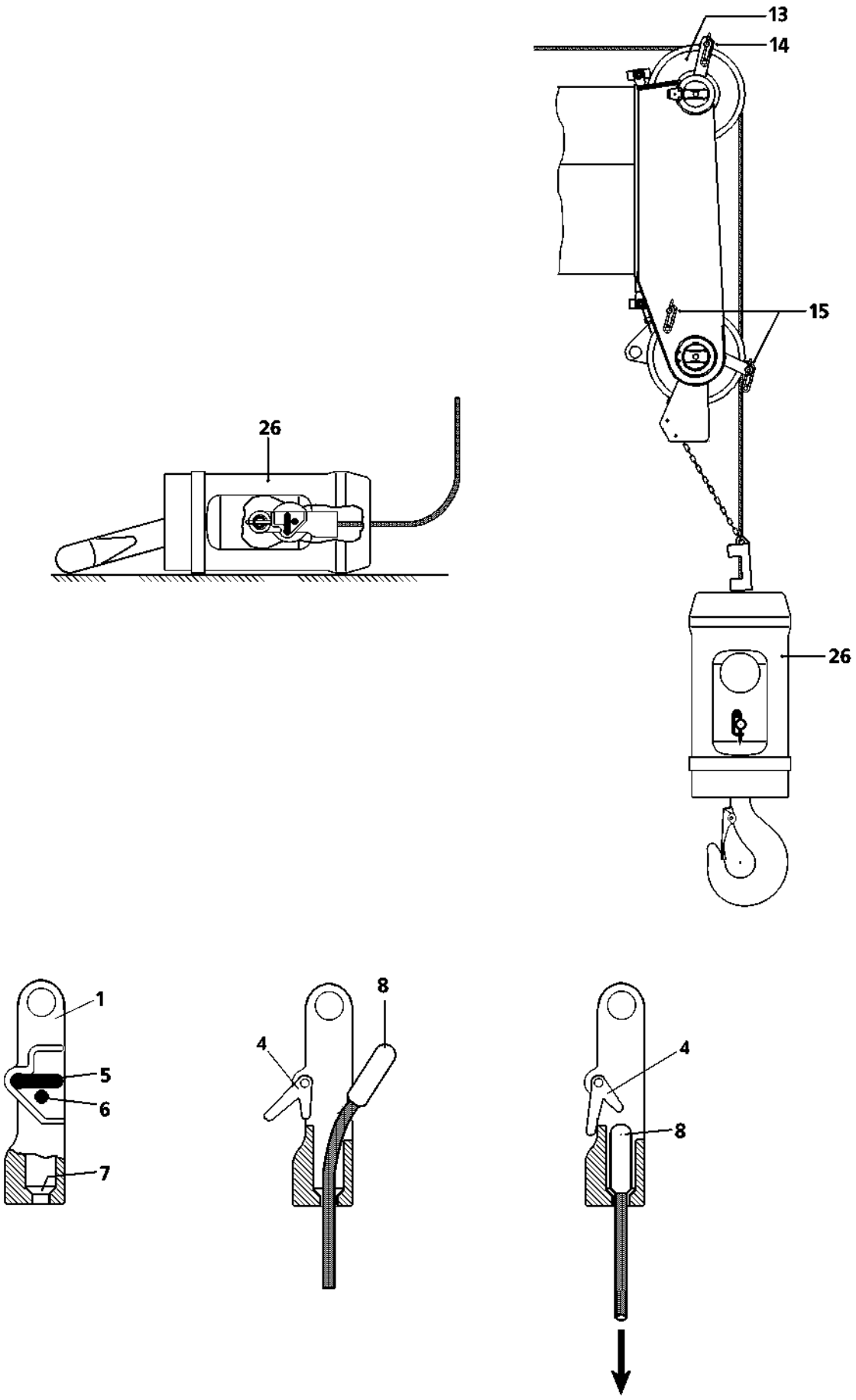

Fig.108125

4.2 Removing the load hook*

Make sure that the following prerequisites are met:
- The crane is properly supported and horizontally aligned.
- The crane is ballasted according to the load chart.
- The LICCON overload protection has been set according to the load chart.
- The telescopic boom is fully telescoped in.
- The telescopic boom has been luffed to the rear or the side.
- The telescopic boom is luffed down in 0° position.
- The ground is level and of sufficient load carrying capacity.

4.2.1 Lowering the load hook

WARNING
Crushing of hands!
When guiding the load hook by hand, hands or fingers can be crushed!
The load hook could roll away!
▶ Make sure the load hook is safely positioned!

▶ Place the load hook **26** on the ground.
▶ Remove the hoist limit switch weight, see section „Removing the hoist limit switch weight“.

4.2.2 Detaching the hoist rope

▶ Push the retaining pin **6** into the rope lock **1**, move the lever **5** sideways and hold it in this position.

Result:

- The latch **4** is moved to the side and the locking clamp **8** is released.

▶ Push the hoist rope in the direction of the load hook and detach the locking clamp **8**.
▶ At the pulley head remove the spring retainers on the rope retaining pipe **14** and on the rope retaining pipe **15** and pull the rope retaining pipe out, see section „Reeving the hoist rope with the assembly winch“.
▶ Unreeve the hoist rope from the pulley head.
▶ Insert the rope retaining pipes again and secure with spring retainers.

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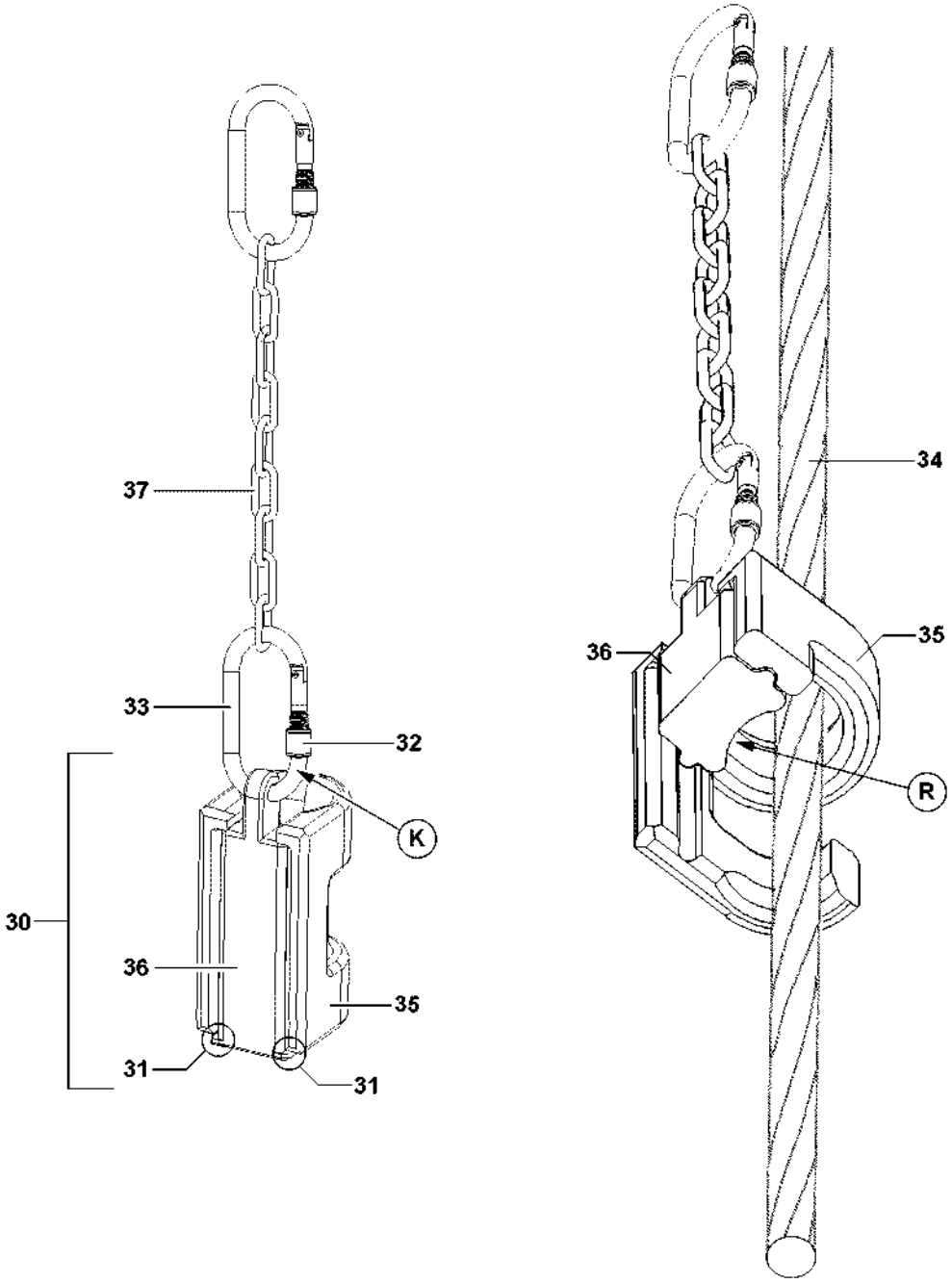

Fig.106127

5 Attaching / removing the hoist limit switch weight

5.1 Attaching the hoist limit switch weight

The hoist limit switch weight **30** consists of 2 parts, which are pushed into each other:
- The weight **35**.
- The carrier section **36**.

▶ Loosen and open the screw retainer **32**.

WARNING
The hoist limit switch can fall down!
If the hoist limit switch weight is incorrectly assembled, components can fall down!
Personnel can be severely injured or killed!
▶ 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 stubs **31** of the carrier section **36** touch 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 diagonal 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**.

▶ Close the screw retainer **32** on the snap hook **33**.

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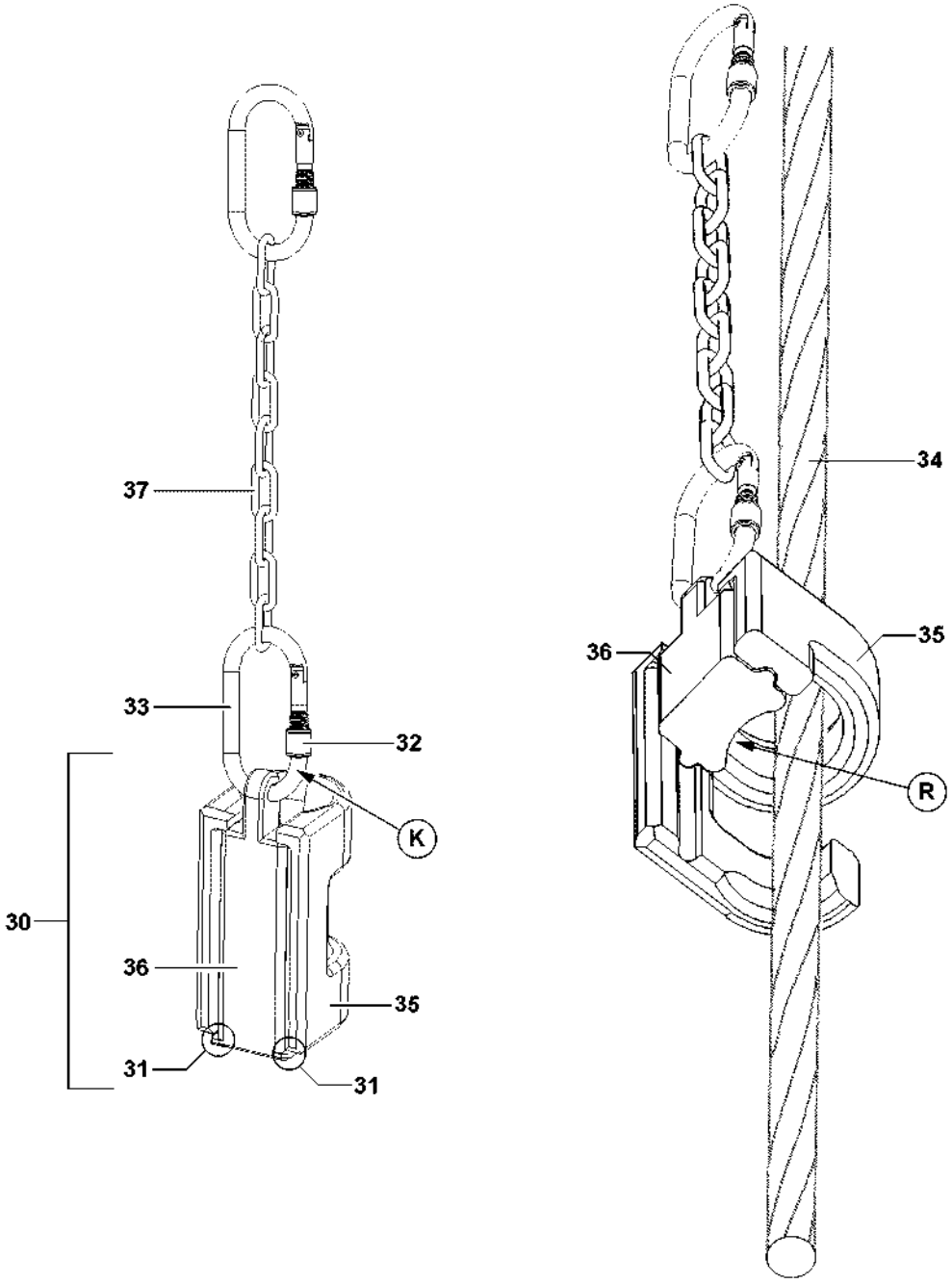

Fig.106127

5.2 Removing the hoist limit switch weight

WARNING
The hoist limit switch can fall down!
If the hoist limit switch weight is incorrectly removed, components can fall down!
Personnel can be severely injured!
- ▶ 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 for anyone to remain in 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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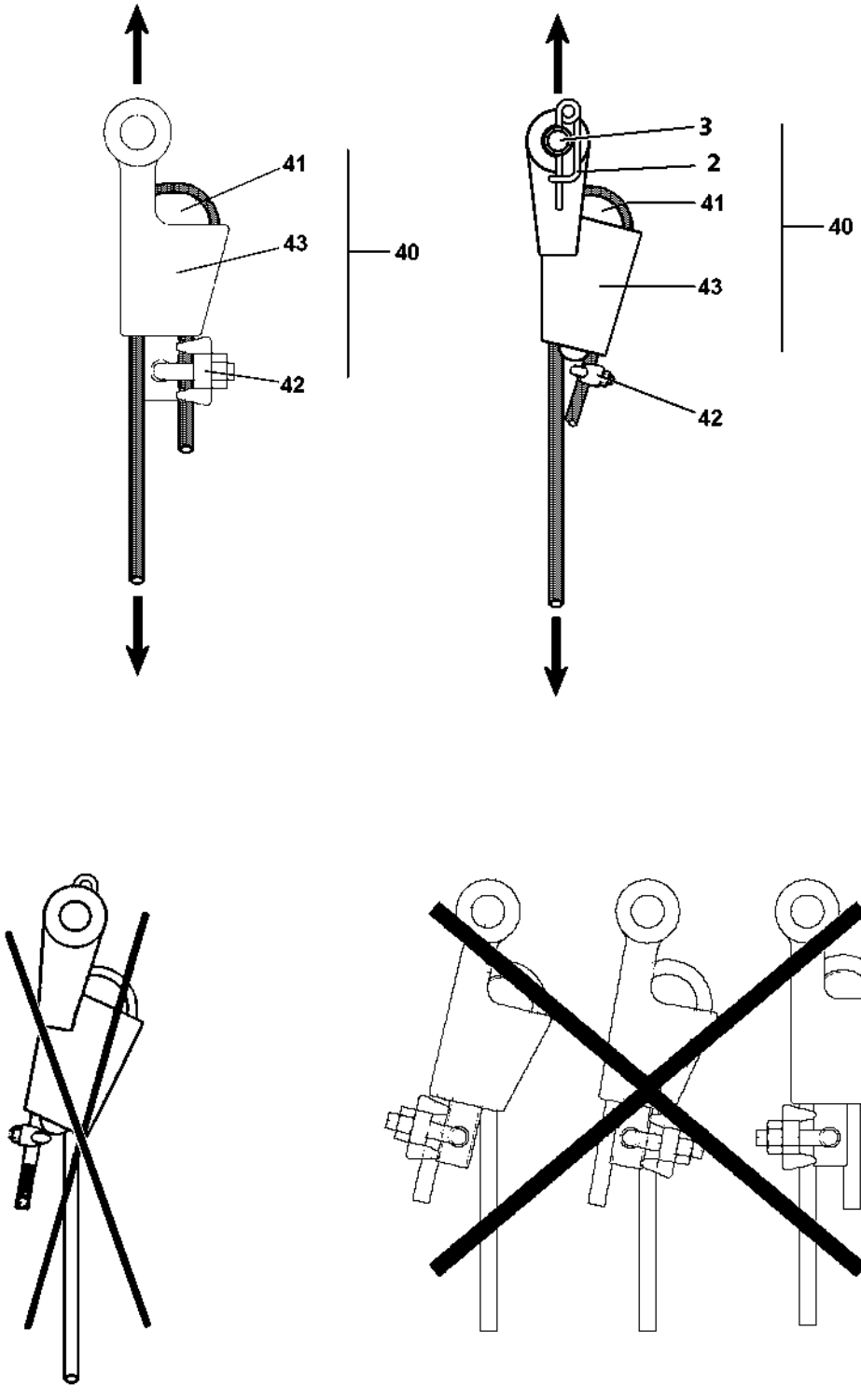

Fig.108119

6 Assembling / disassembling the 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 are ready for assembly.

6.1 Installing the wedge lock

WARNING
Danger of fatal accidents due to falling load!
If an incorrect wedge lock **40** is used or if the wedge lock **40** is incorrectly assembled, the hoist rope can rip off or the hoist rope can be pulled through the wedge lock **40**!
The hook block and the load can fall down and kill personnel!
- ▶ Use only a wedge lock **40** approved by Liebherrwerk Ehingen!
- ▶ Assembling 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 that of the hook block or on the load hook, depending on the reeving plan.

6.2 Disassembling 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**.

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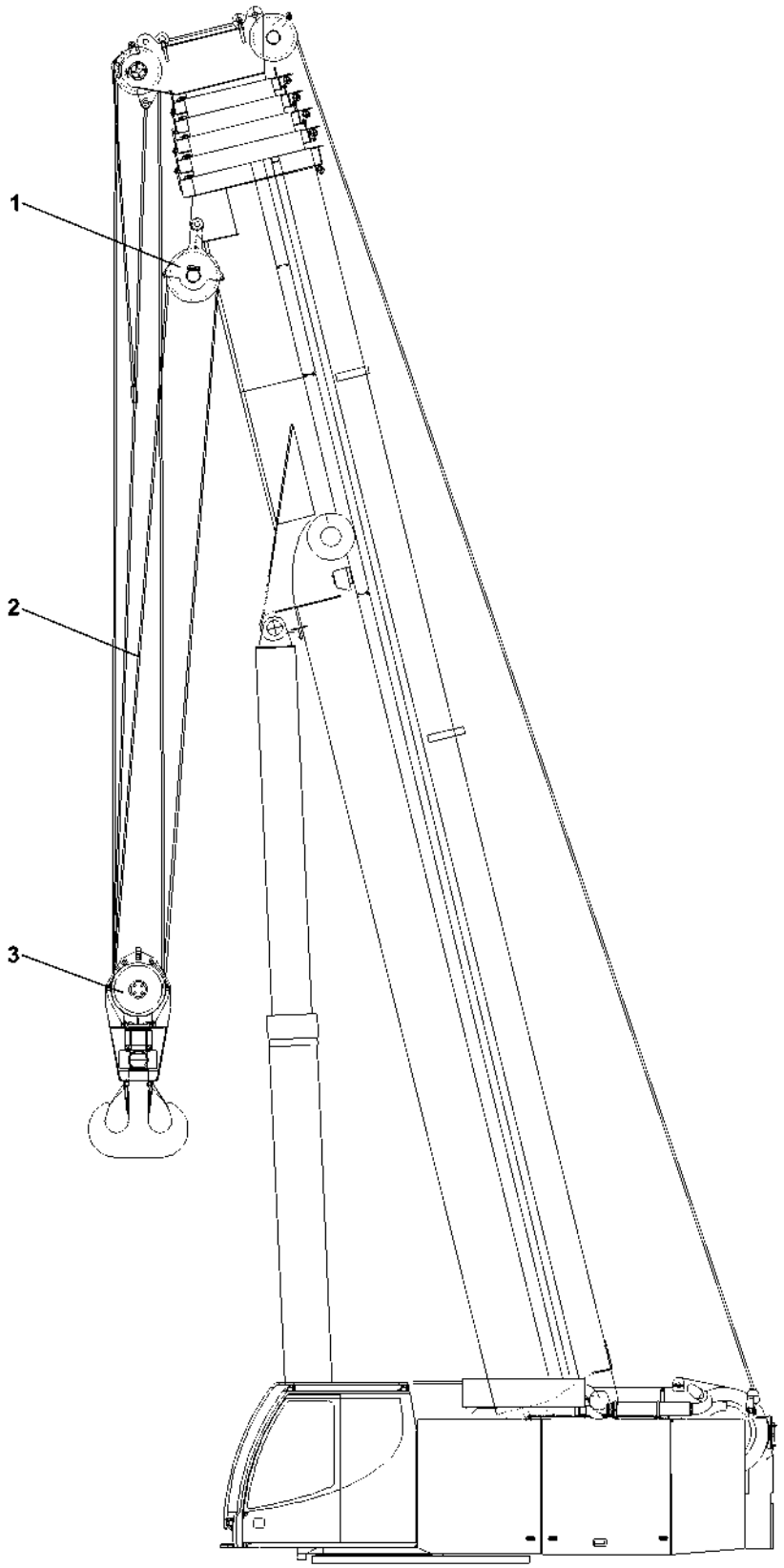

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Fig.108222

7 Crane operation with auxiliary block* on the telescopic boom

7.1 Crane operation with auxiliary block*

For crane operation with auxiliary block **1**, the following prerequisites are required:
- The TY guying has been disassembled (if present).
- The working floodlights on the telescopic boom have been disassembled.

Note

▶ For crane operation with auxiliary block **1** on the telescopic boom, move only to the radius ranges, which are present in the load chart!

NOTICE

Damage of hook block, auxiliary block or hoist rope!
If the following notes are not observed, the hook block **3**, the hoist rope **2** or the auxiliary block **1** can be damaged!
If the hoist limit switch chain on the hoist limit switch weight is too short, the hook block **3** can run on the auxiliary block **1** when spooling up the hoist rope **2** and damage it severely.

▶ Before crane operation with auxiliary block **1**, assemble the longer hoist limit switch chain!
▶ Before crane operation with auxiliary block **1**, remove the rope protection pipes on the hook block **3**!
▶ When the hook block **3** is on the ground, ensure that the hoist rope **2** remains in the pulleys!
▶ For operation with auxiliary block **1**, do **not** telescope the telescopic boom out and run only the radii ranges, which are specified in the load chart!

▶ Carry out crane operation with auxiliary block **1** carefully.

8 Rope reeving

Note

▶ For reeving plans, see Crane operating instructions, chapter 4.15!

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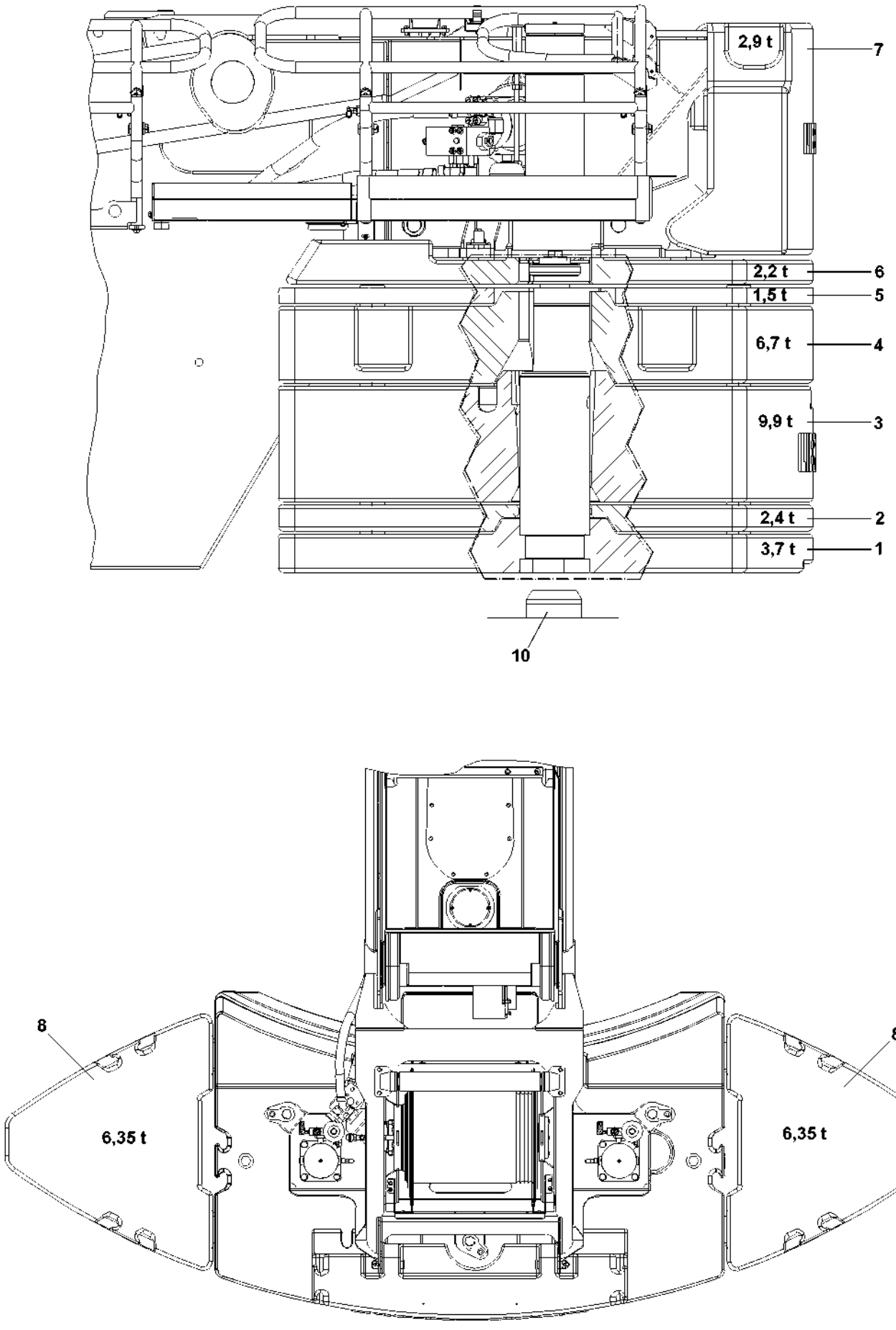

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Fig.103261

1 General

Before travel operation on public roads, the counterweight distribution must be made as described in chapter 3.04.

The counterweight plates are marked with their own weights.

DANGER
The crane can topple over!
If a different counterweight than the one listed in the load chart is used, the crane may be damaged or topple over.
▶ Attach the counterweight in accordance with the information in the load table!

1.1 Counterweight combinations

DANGER
The crane can topple over!
The crane can topple over if another counterweight combination is used than specified in the charts.
▶ Counterweight combinations specified in the following charts must be used!

Counterweight [t]	Combination	Individual weight [t]
0.0*	No counterweight	0.0

Counterweight [t]	Combination	Individual weight [t]
2.2*	Counterweight plate **6**	2.2

Counterweight [t]	Combination	Individual weight [t]
2.9	Counterweight plate **7**	2.9

Counterweight [t]	Combination	Individual weight [t]
3.7*	Counterweight plate **1**	3.7

Counterweight [t]	Combination	Individual weight [t]
5.1	Counterweight plate **7**	2.9
	Counterweight plate **6**	2.2

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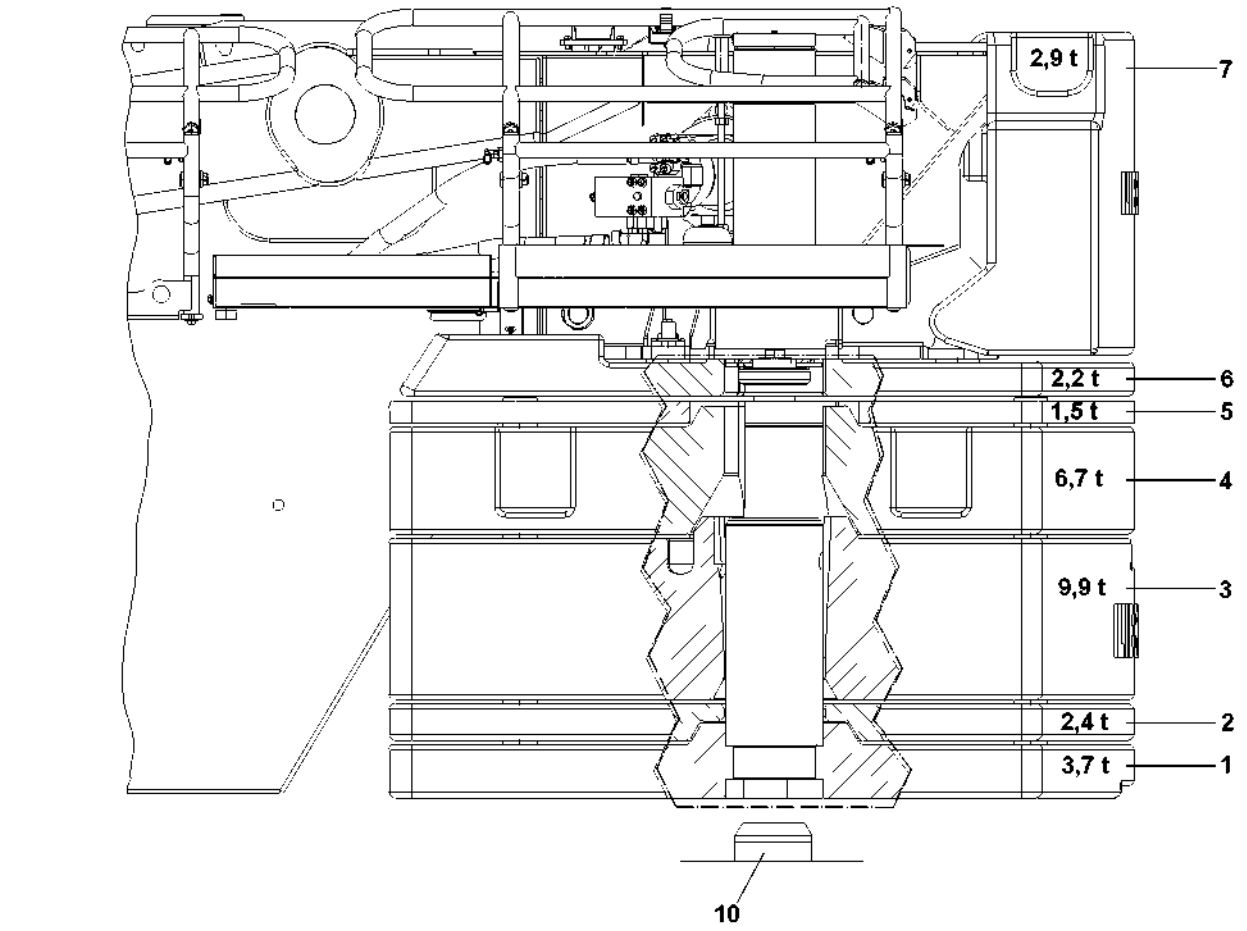

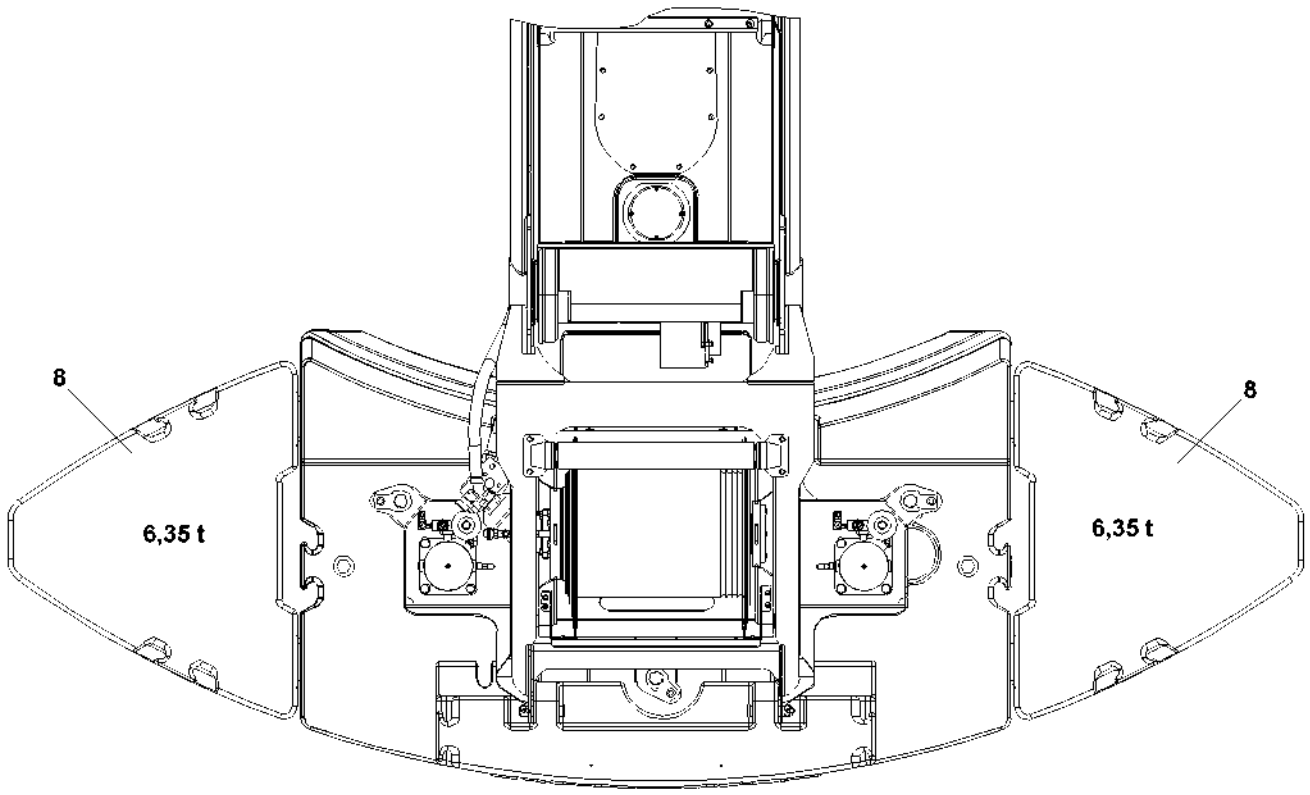

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Fig.103261

Counterweight [t]	Combination	Individual weight [t]
5.9*	Counterweight plate **6**	2.2
	Counterweight plate **1**	3.7

Counterweight [t]	Combination	Individual weight [t]
6.1*	Counterweight plate **1**	3.7
	Counterweight plate **2**	2.4

Counterweight [t]	Combination	Individual weight [t]
6.6	Counterweight plate **7**	2.9
	Counterweight plate **1**	3.7

Counterweight [t]	Combination	Individual weight [t]
7.4*	Counterweight plate **1**	3.7
	Counterweight plate **5**	1.5
	Counterweight plate **6**	2.2

Counterweight [t]	Combination	Individual weight [t]
8.3*	Counterweight plate **6**	2.2
	Counterweight plate **2**	2.4
	Counterweight plate **1**	3.7

Counterweight [t]	Combination	Individual weight [t]
8.8	Counterweight plate **7**	2.9
	Counterweight plate **6**	2.2
	Counterweight plate **1**	3.7

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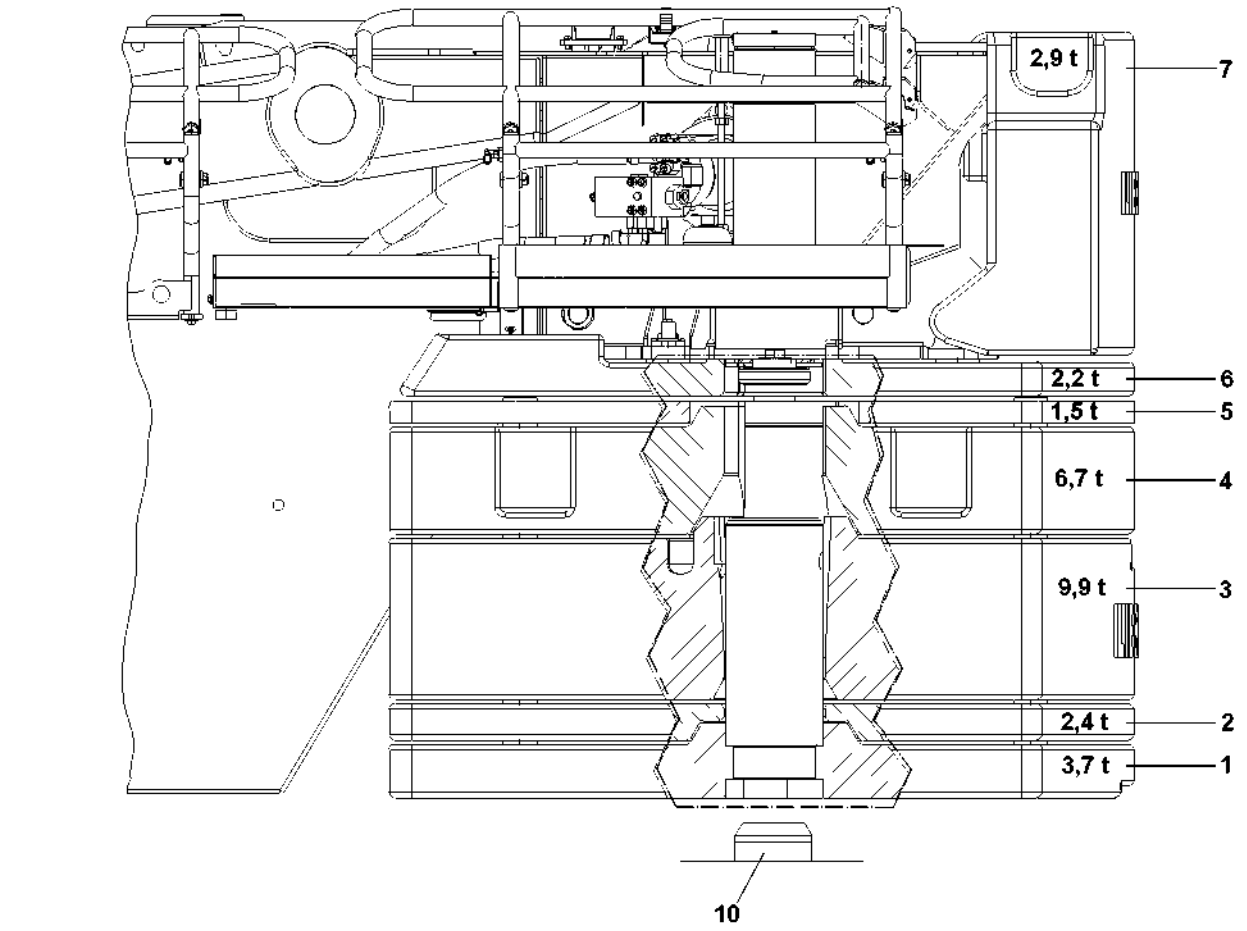

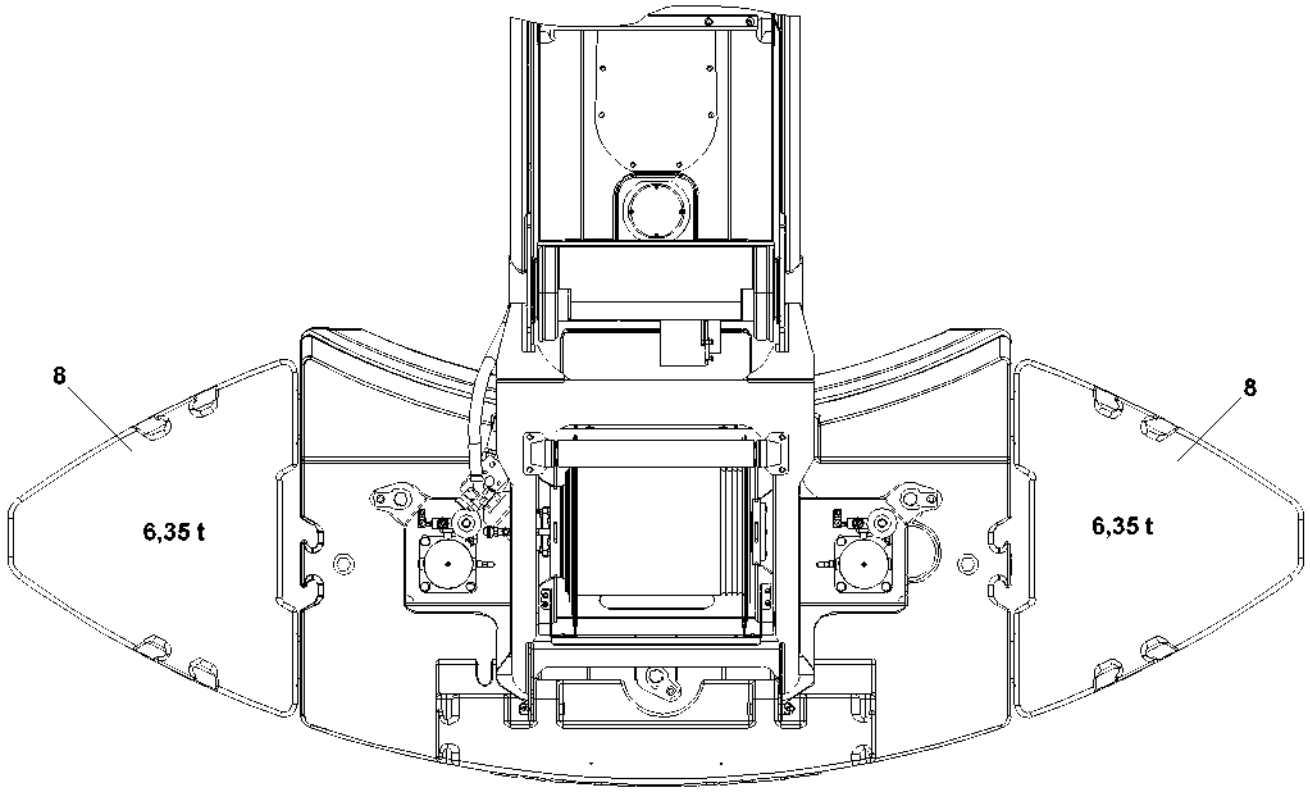

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Fig.103261

Counterweight [t]	Combination	Individual weight [t]
9.0	Counterweight plate **7**	2.9
	Counterweight plate **2**	2.4
	Counterweight plate **1**	3.7

Counterweight [t]	Combination	Individual weight [t]
9.8*****	Counterweight plate **6**	2.2
	Counterweight plate **5**	1.5
	Counterweight plate **2**	2.4
	Counterweight plate **1**	3.7

Counterweight [t]	Combination	Individual weight [t]
10.3	Counterweight plate **7**	2.9
	Counterweight plate **6**	2.2
	Counterweight plate **5**	1.5
	Counterweight plate **1**	3.7

Counterweight [t]	Combination	Individual weight [t]
11.2	Counterweight plate **7**	2.9
	Counterweight plate **6**	2.2
	Counterweight plate **2**	2.4
	Counterweight plate **1**	3.7

Counterweight [t]	Combination	Individual weight [t]
12.7	Counterweight plate **7**	2.9
	Counterweight plate **6**	2.2
	Counterweight plate **5**	1.5
	Counterweight plate **2**	2.4
	Counterweight plate **1**	3.7

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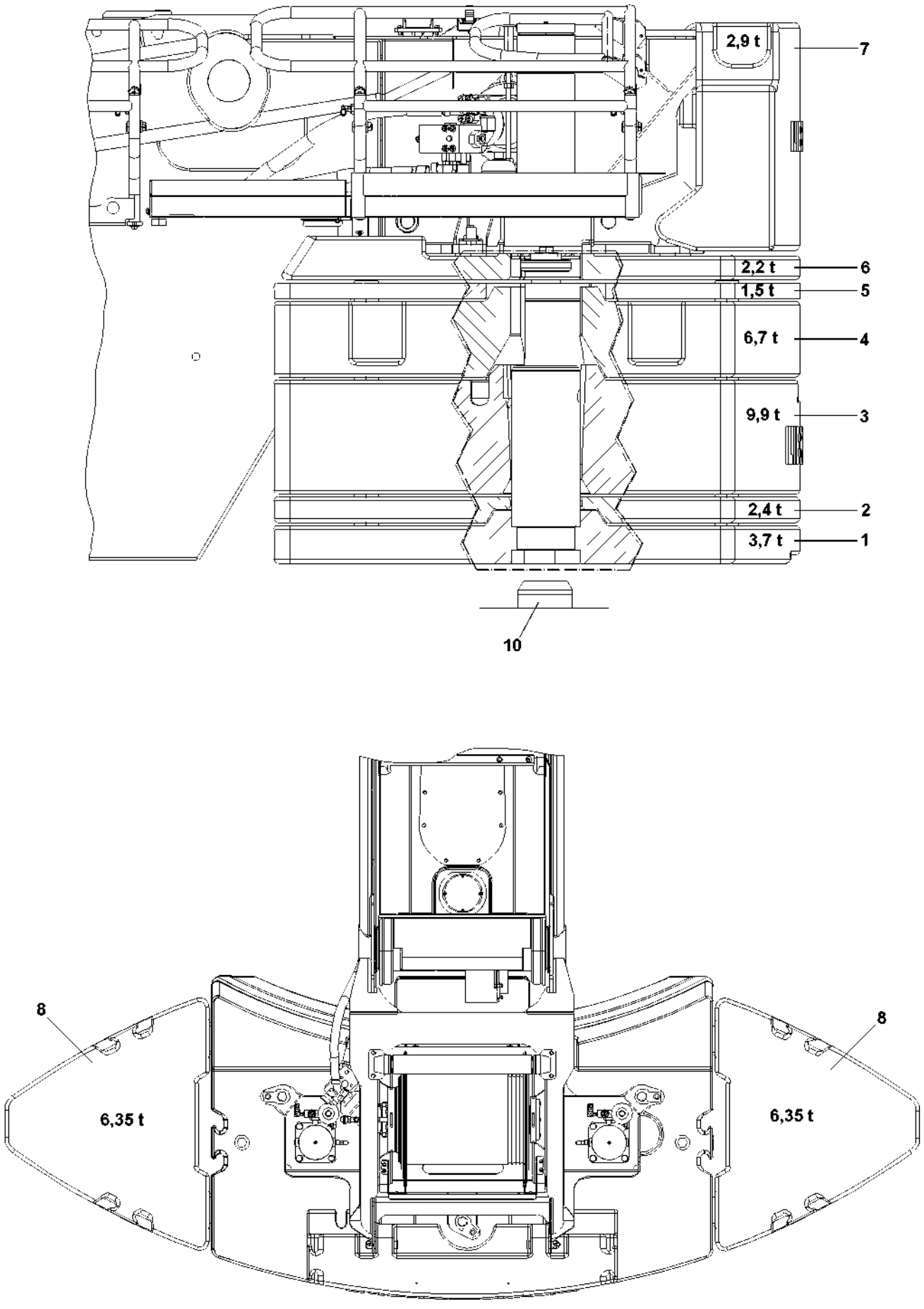

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Fig.103261

Counterweight [t]	Combination	Individual weight [t]
16.0*	Counterweight plate **3**	9.9
	Counterweight plate **2**	2.4
	Counterweight plate **1**	3.7

Counterweight [t]	Combination	Individual weight [t]
18.9*	Counterweight plate **7**	2.9
	Counterweight plate **3**	9.9
	Counterweight plate **2**	2.4
	Counterweight plate **1**	3.7

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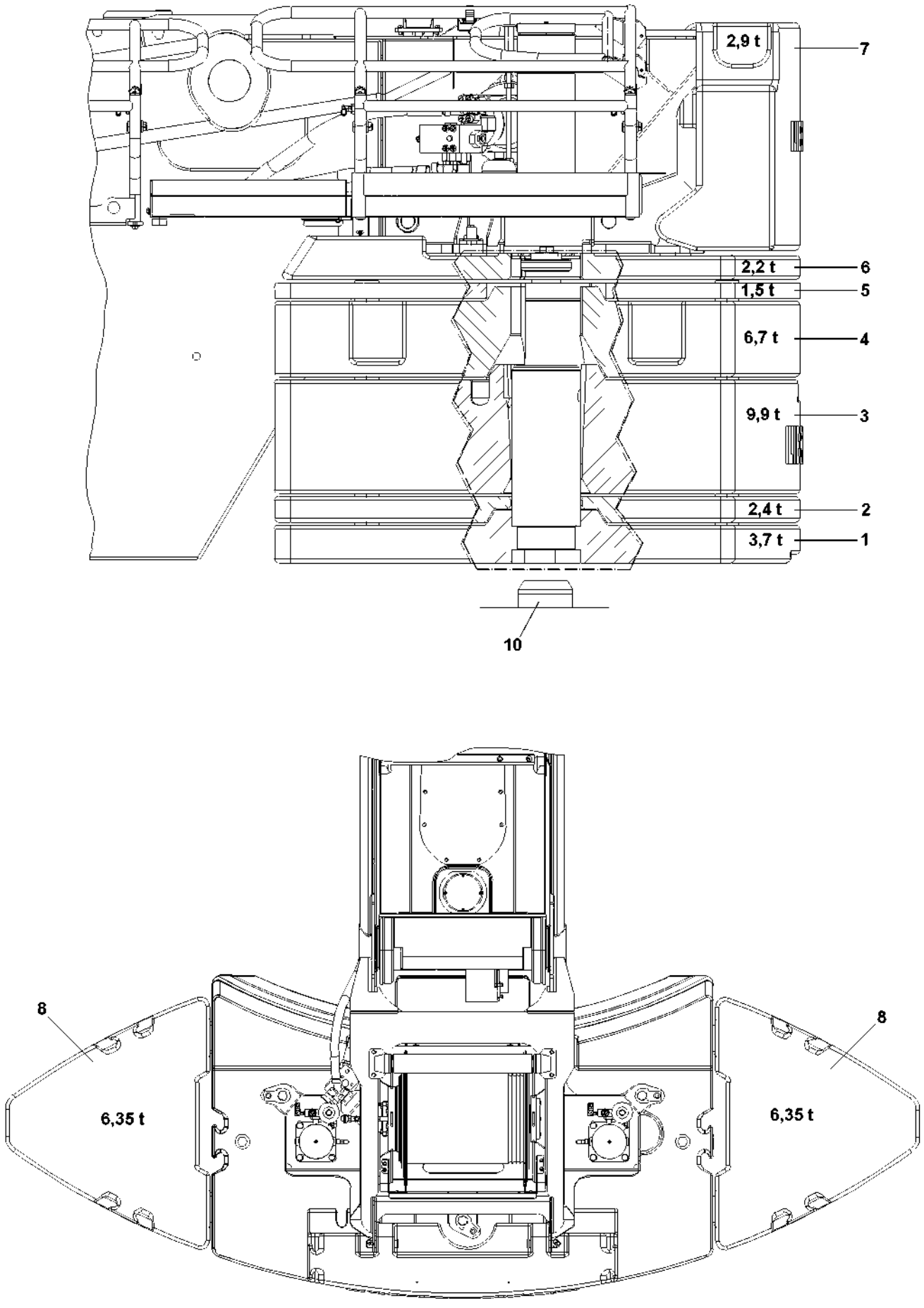

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Fig.103261

Counterweight [t]	Combination	Individual weight [t]
19.7	Counterweight plate **6**	2.2
	Counterweight plate **5**	1.5
	Counterweight plate **3**	9.9
	Counterweight plate **2**	2.4
	Counterweight plate **1**	3.7

Counterweight [t]	Combination	Individual weight [t]
20.2	Counterweight plate **7**	2.9
	Counterweight plate **6**	2.2
	Counterweight plate **5**	1.5
	Counterweight plate **3**	9.9
	Counterweight plate **1**	3.7

Counterweight [t]	Combination	Individual weight [t]
22.6	Counterweight plate **7**	2.9
	Counterweight plate **6**	2.2
	Counterweight plate **5**	1.5
	Counterweight plate **3**	9.9
	Counterweight plate **2**	2.4
	Counterweight plate **1**	3.7

Counterweight [t]	Combination	Individual weight [t]
22.7*****	Counterweight plate **4**	6.7
	Counterweight plate **3**	9.9
	Counterweight plate **2**	2.4
	Counterweight plate **1**	3.7

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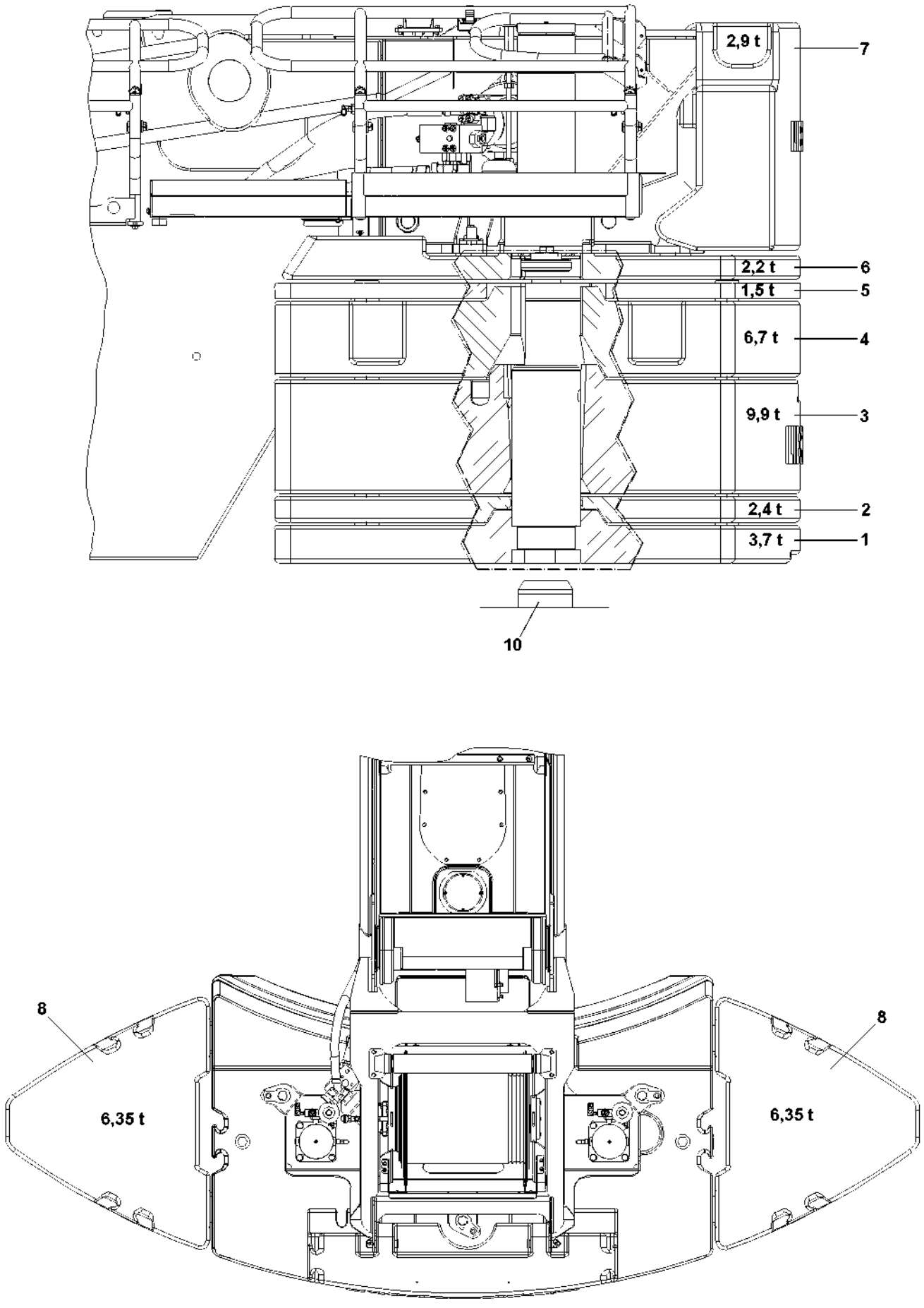

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Fig.103261

Counterweight [t]	Combination	Individual weight [t]
23.2	Counterweight plate **7**	2.9
	Counterweight plate **4**	6.7
	Counterweight plate **3**	9.9
	Counterweight plate **1**	3.7

Counterweight [t]	Combination	Individual weight [t]
25.6	Counterweight plate **7**	2.9
	Counterweight plate **4**	6.7
	Counterweight plate **3**	9.9
	Counterweight plate **2**	2.4
	Counterweight plate **1**	3.7

Counterweight [t]	Combination	Individual weight [t]
26.4*****	Counterweight plate **6**	2.2
	Counterweight plate **5**	1.5
	Counterweight plate **4**	6.7
	Counterweight plate **3**	9.9
	Counterweight plate **2**	2.4
	Counterweight plate **1**	3.7

Counterweight [t]	Combination	Individual weight [t]
29.3	Counterweight plate **7**	2.9
	Counterweight plate **6**	2.2
	Counterweight plate **5**	1.5
	Counterweight plate **4**	6.7
	Counterweight plate **3**	9.9
	Counterweight plate **2**	2.4
	Counterweight plate **1**	3.7

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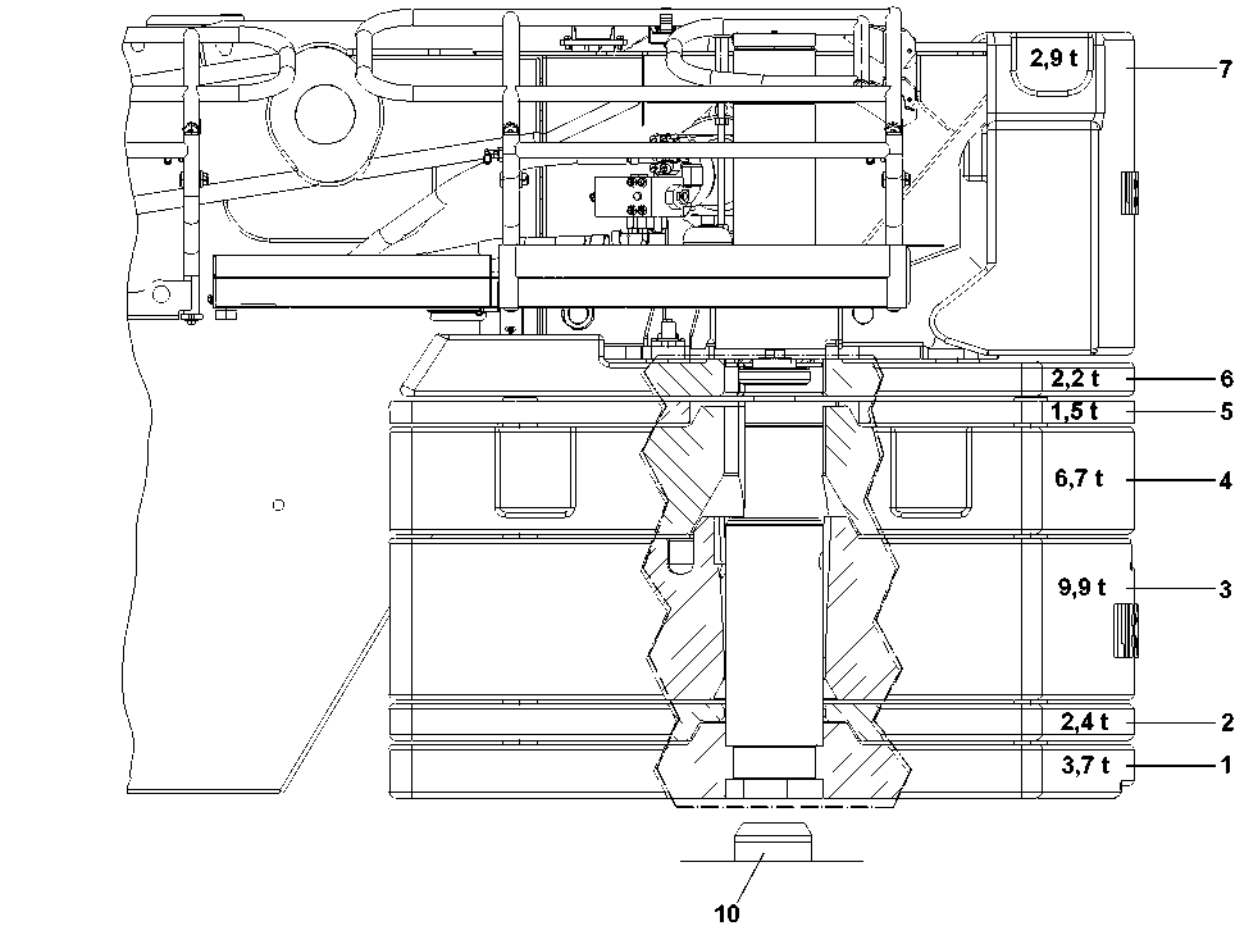

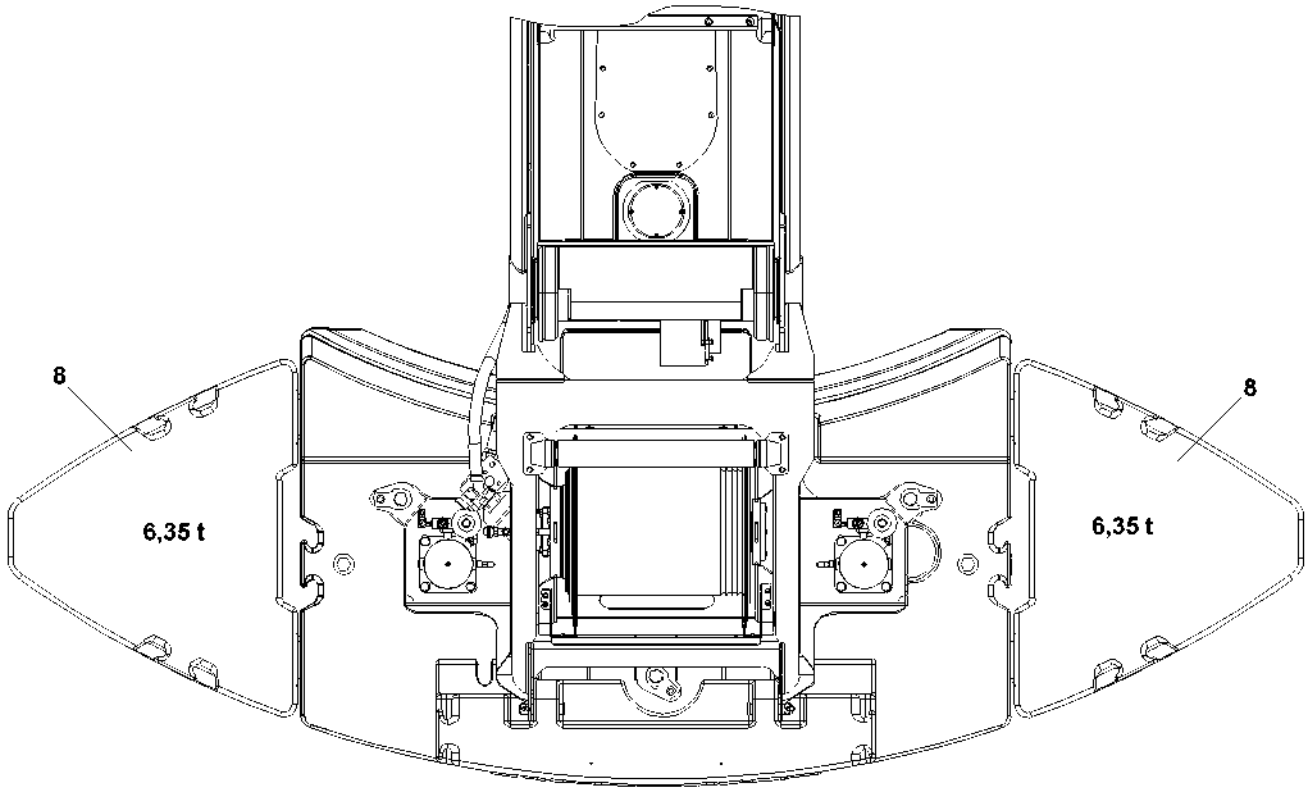

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Fig.103261

Counterweight [t]	Combination	Individual weight [t]
39.1*	Counterweight plate **6**	2.2
	Counterweight plate **5**	1.5
	Counterweight plate **4**	6.7
	Counterweight plate **3**	9.9
	Counterweight plate **2**	2.4
	Counterweight plate **1**	3.7
	2× auxiliary ballast **8**	6.35

Counterweight [t]	Combination	Individual weight [t]
42.0	Counterweight plate **7**	2.9
	Counterweight plate **6**	2.2
	Counterweight plate **5**	1.5
	Counterweight plate **4**	6.7
	Counterweight plate **3**	9.9
	Counterweight plate **2**	2.4
	Counterweight plate **1**	3.7
	2× auxiliary ballast **8**	6.35

1.2 Checking the counterweight plates

DANGER
Risk of accident due to damaged counterweight plates!
If damaged counterweight plates are ballasted, the stable seating of the counterweight plates can no longer be guaranteed.
▶ Replace damaged counterweight plates!

Before assembling or disassembling the counterweight plates, check visually for damage and foreign matter.

When depositing the counterweight plate **1** on the centering cone **10** and stacking the counterweight plates, make sure that no foreign matter gets between the counterweight plates.

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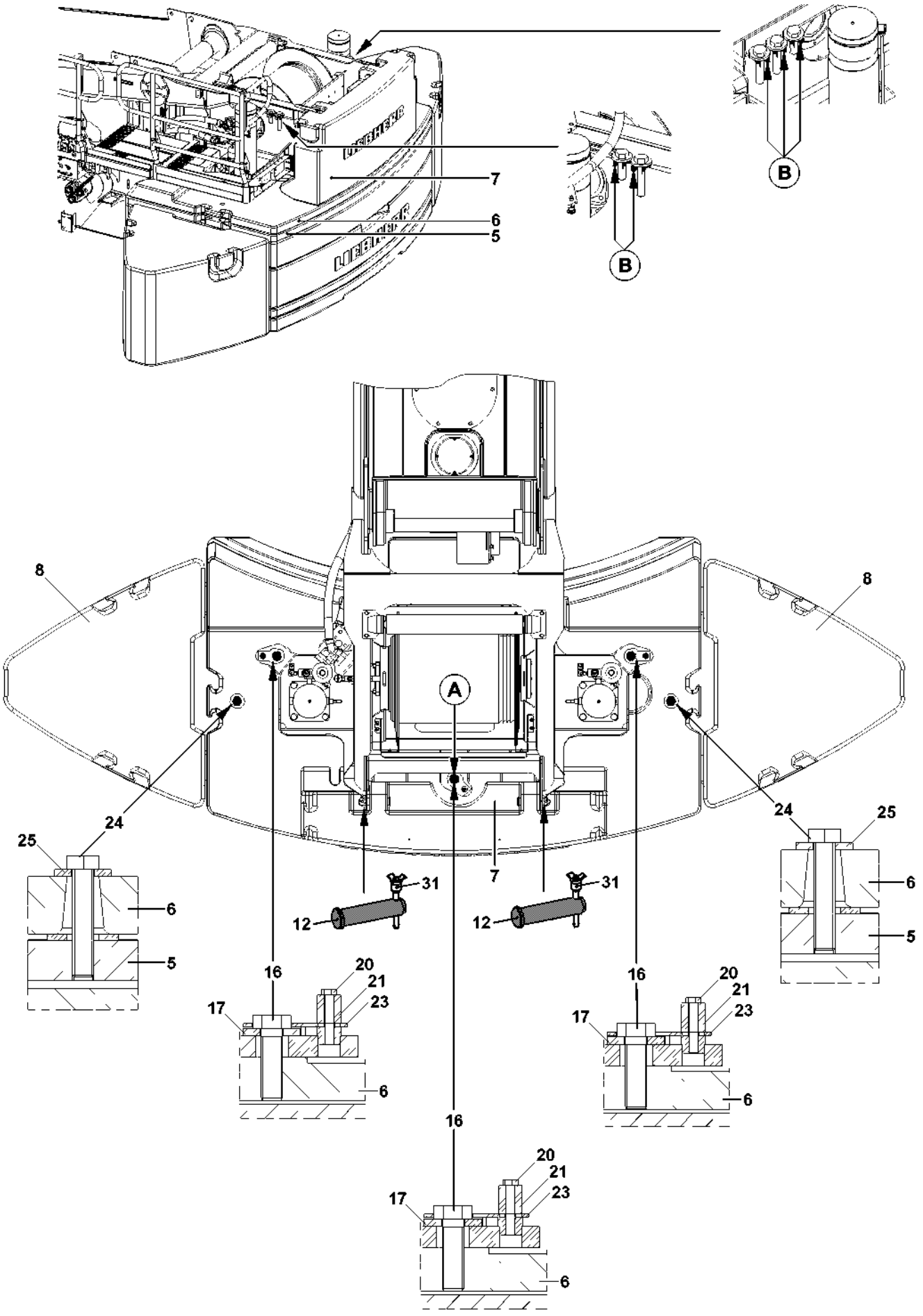

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Fig.105200

1.3 Bolting the counterweight plates together

Note

- ▶ Lubricate the threads and top contact area of screws with „Gleitmo 815“.
- ▶ The tightening torque for M30 screw connections is 1000 Nm.
- ▶ To tighten or loosen the bolt **16** on point **A**, a socket wrench with extension is required.
- ▶ The bolts **16** and bolts **24** are to be carried along in the corresponding transport retainers on the turntable, see points **B**.

If the following counterweight plates are carried, the following must be noted:

- The replacement weight **7** must be pinned on the turntable with pins **12** on both sides. The pins **12** must be secured with ball pins **31**.
- The counterweight plate **6** must be assembled on the turntable with „3 bolts M30×100 **16**“, 5 washers **17** and with „3 bolts M12×70 **20**“, 3 sleeves **21** and 3 retaining plates **23**.

1.4 Bolting the counterweight plates together as a package

Note

- ▶ Lubricate the threads and top contact area of screws with „Gleitmo 815“.
- ▶ The tightening torque for M30 screw connections is 1000 Nm.

- The counterweight plate **5** and counterweight plate **6** can be bolted together as a package: Install counterweight plate **5** onto the counterweight plate **6** with 2 bolted connections, consisting of „2 bolts M30×150 **24**“ and 2 washers **25**.

1.5 Lifting the counterweight plates together as a package

WARNING

Overload of the fastening points **P1** on the counterweight plates!
If more than the permissible number of counterweight plates are lifted together, then the fastening points **P1** can be overloaded! Counterweight plates can fall down!
Personnel can be severely injured or killed!

- ▶ Attach only the maximum permissible number of counterweight plates per lift with the approved fastening equipment!

1.5.1 Permissible counterweight assemblies

Counterweight assembly 6.1 t , illustration 1

Counterweight plate **1** (3.7 t) and counterweight plate **2**(2.4 t).

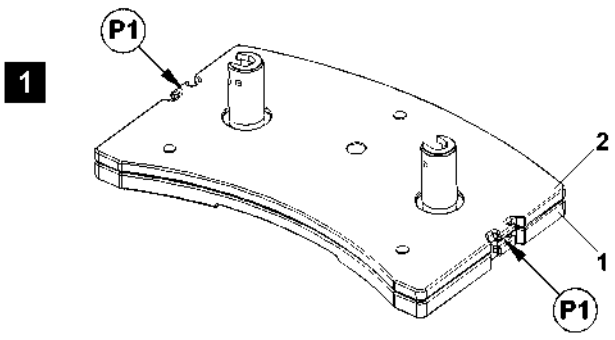

Fig.112831

Counterweight assembly 7.6 t , illustration 2

Counterweight plate **1**(3.7 t), counterweight plate **2** (2.4 t) and counterweight plate **5**(1.5 t).

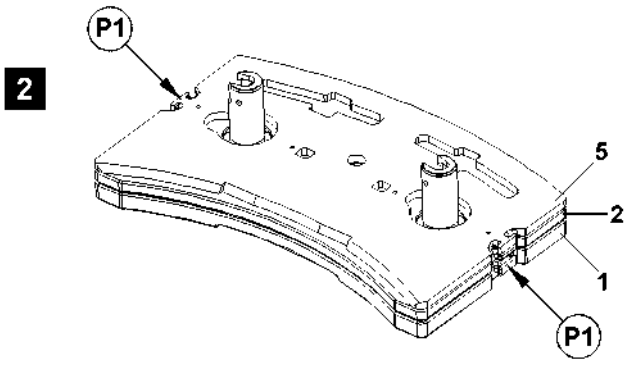

Fig.112832

Counterweight assembly 12.3 t , illustration 3

Counterweight plate **2** (2.4 t) and counterweight plate **3**(9.9 t).

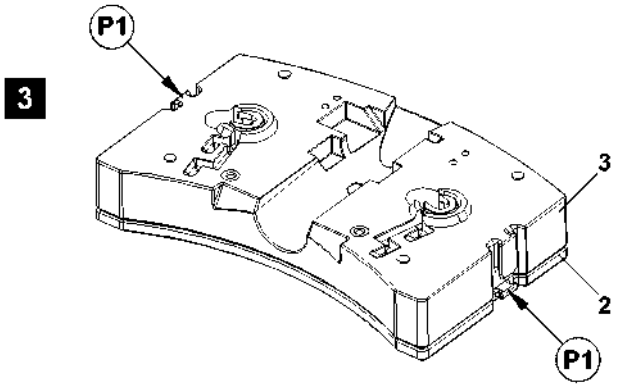

Fig.112833

Counterweight assembly 8.2 t , illustration 4

Counterweight plate **4** (6.7 t) and counterweight plate **5**(1.5 t).

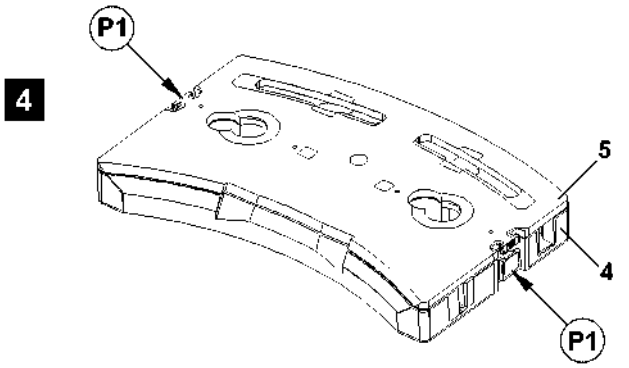

Fig.112834

Counterweight assembly 10.4 t , illustration 5

Counterweight plate **4**(6.7 t), counterweight plate **5** (1.5 t) and counterweight plate **6**(2.2 t).

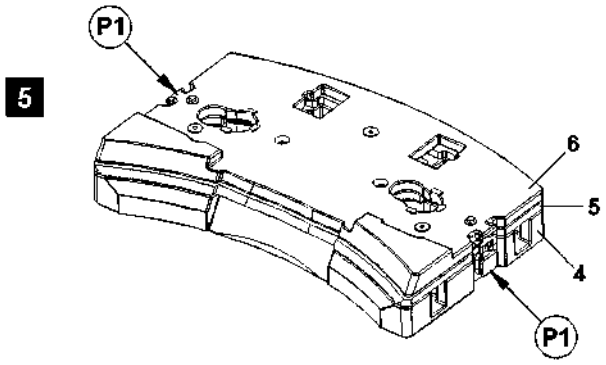

Fig.114865

Counterweight assembly 3.7 t , illustration 6

Counterweight plate **5** (1.5 t) and counterweight plate **6**(2.2 t).

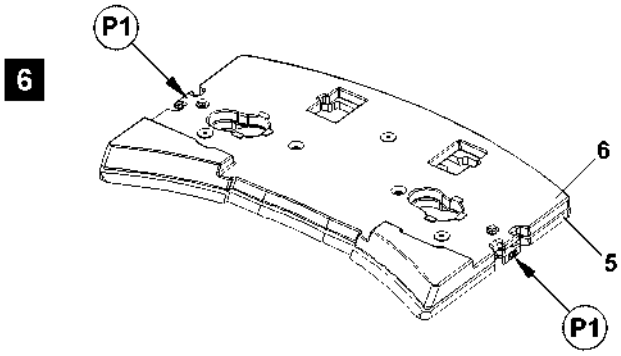

Fig.112780

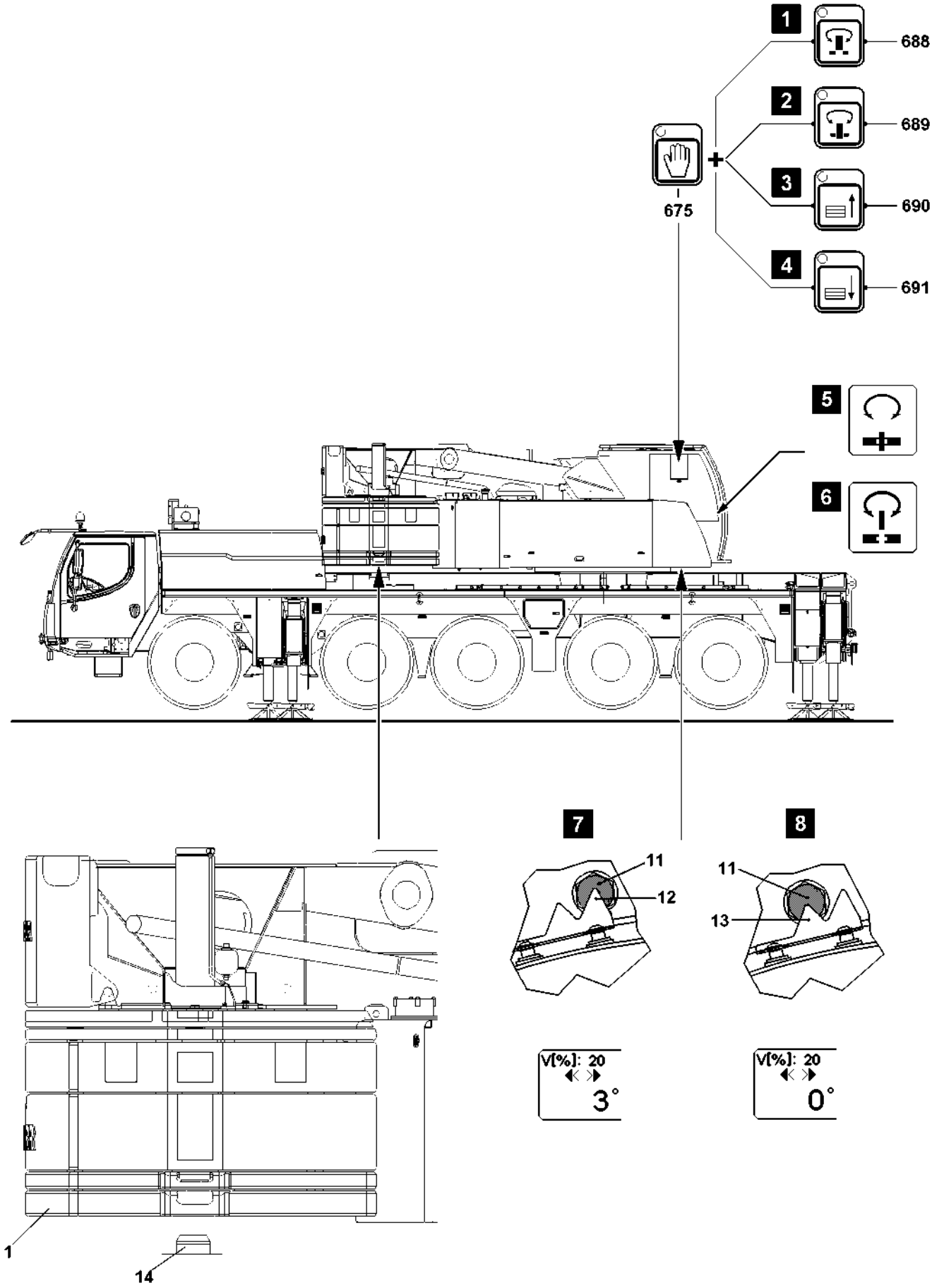

Fig.112505

2 Assembly

2.1 General

Make sure that the following prerequisites are met:
- The crane is properly supported and horizontally aligned.
- The transport vehicle with the counterweight plates is in the immediate vicinity of the supported crane.
- The ballasting cylinders are fully retracted.

WARNING
The crane can topple over!
In steep boom positions, for which no load values are given in the load charts, there is a danger of toppling over when turning the crane superstructure! There is a particular risk if the support base has been reduced or if the crane is supported with the sliding beams retracted.
▶ The specifications in the load charts must be adhered to!

2.2 Stacking the counterweight plates on the vehicle

▶ Start the engine.

WARNING
The crane can topple over!
Before the boom is lifted from the transport receptacle, the crane must be supported according to the load chart and the LICCON overload protection must be set according to the relevant load chart! The boom lengths and radii specified in the load chart may not be exceeded during ballasting!
▶ Comply with the load chart specifications!

▶ Set LICCON overload protection according to the load chart and the counterweight assembled on the turntable.

The counterweight plate **1**, as the load-bearing plate for the other counterweight plates, must always be deposited on the centering cone **14** first.

If necessary:
▶ Attach the counterweight plate **1** on the fastening ropes and place it on the centering cone **14** on the storage frame using the own crane.
▶ Place the required counterweight plates on the counterweight plate **1**.

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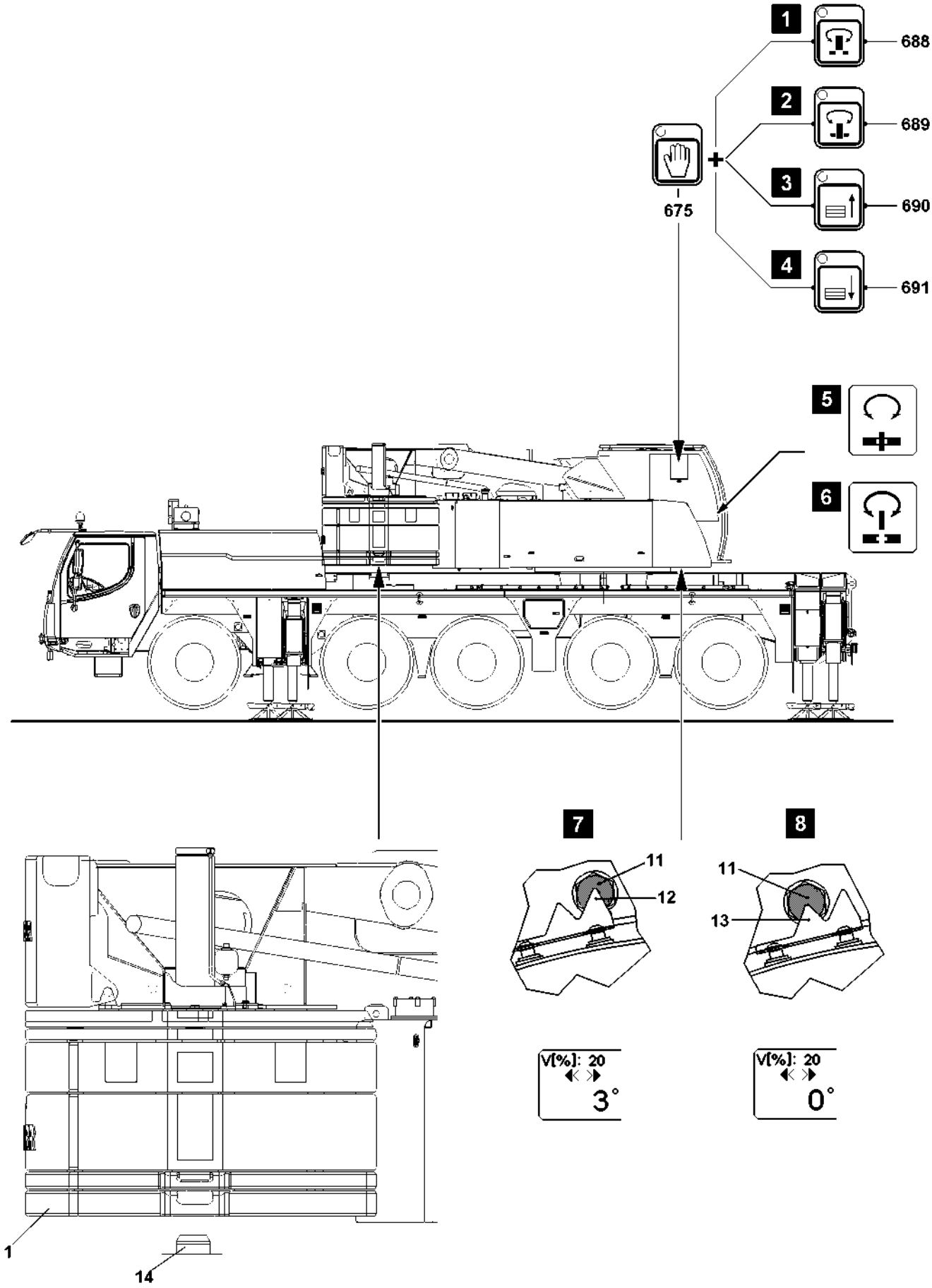

Fig.112505

2.3 Picking the counterweight plates up

Note

▶ Use the release key **675** to control the necessary release functions. The release key **675** is deactivated 30 s after a button is last pressed on the BKE.

▶ Turn the crane superstructure until the large pointer **12** on the slewing ring aligns with the marked bolt **11** (3° angle position), see illustration **7**.

Result:

– The ballasting cylinders are now located next to the intake openings for the counterweight plate **1**.
– The LICCON monitor displays the 3° angle setting on the „Slewing range“ icon, see illustration **7**.

▶ Activate the release key **675** and then press the key **689**.

Result:

– The LED on key **689** blinks as the turntable is pinned.
– During pinning, the LICCON monitor displays a blinking pin in the „Slewing range“ icon in the „nominal position **bottom**“.
– As soon as the superstructure is locked with the crane chassis, the icon illustration **5** appears on the operating screen of the LICCON monitor and the LED on key **689** lights up (static).

Once the pinning procedure of the turntable lock has been completed:
▶ Release the key **689**.
▶ Press the key **691** until an acoustic signal sounds.

Result:

– The LED on key **691** blinks as the ballasting cylinders extend.
– When the acoustic signal sounds, the ballasting cylinders are extended and the LED on key **691** lights up (static).

Once the ballasting cylinders are fully extended:
▶ Release the key **691**.
▶ Press the button **688**.

Result:

– The LED on button **688** blinks as the turntable is unpinned.
– During the unpinning procedure, the pin in the „Slewing range“ icon blinks on the LICCON monitor in the „nominal position **top**“.
– As soon as the superstructure is unlocked from the crane chassis, the icon illustration **6** appears on the operating screen of the LICCON monitor and the LED on key **688** lights up (static).

Once the unpinning of the turntable lock has been completed:
▶ Release the key **688**.

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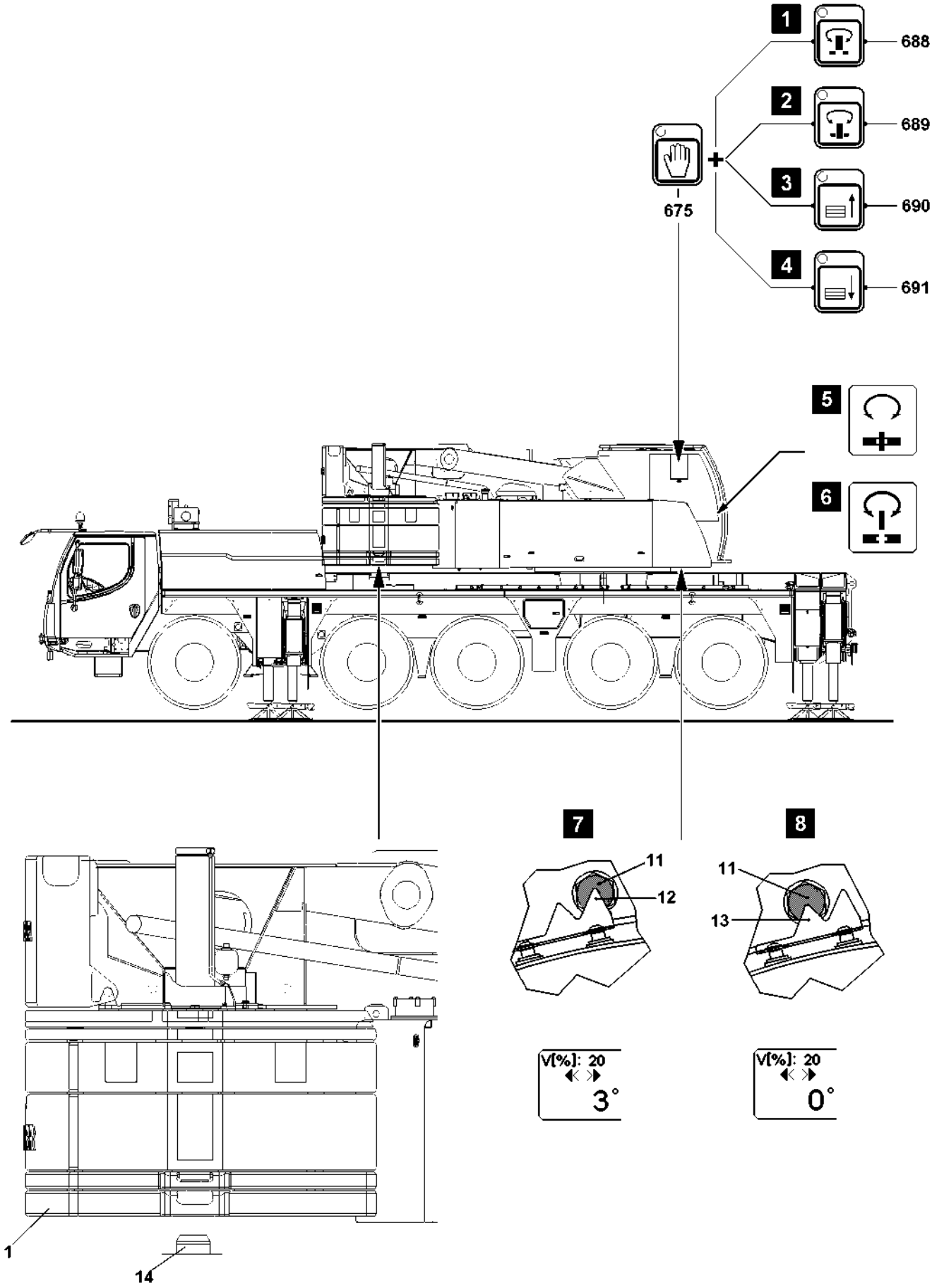

Fig.112505

▶ Turn the crane superstructure carefully to the right until the small pointer **13** on the slewing ring aligns with the marked screw **11** (0° angle position), illustration **8**.

Result:

– The ballasting cylinders are now entered into the receptacles of the counterweight plate **1**.
– The LICCON monitor displays the 0° angle setting on the „Slewing range“ icon, see illustration **8**.

▶ Activate the release key **675** and then press the key **689**.

Result:

– The LED on key **689** blinks as the turntable is pinned.
– During pinning, the LICCON monitor displays a blinking pin in the „Slewing range“ icon in the „nominal position **bottom**“.
– As soon as the superstructure is locked with the crane chassis, the icon illustration **5** appears on the operating screen of the LICCON monitor and the LED on key **689** lights up (static).

Once the pinning procedure of the turntable lock has been completed:
▶ Release the key **689**.

WARNING
Danger of accident!
▶ No movement (lift / lower counterweight) may be carried out as long as the crane superstructure is not locked to the chassis!

▶ Press the key **690** until an acoustic signal sounds.

Result:

– The LED on key **690** blinks as the ballasting cylinder is retracted and the counterweight is raised.
– When the acoustic signal sounds, the ballasting cylinders completely retracted, the counterweight fully raised and the LED on key **690** lights up (static).

Once the ballasting cylinders are completely retracted and the counterweight is fully raised:
▶ Release the key **690**.
▶ Press the button **688**.

Result:

– The LED on button **688** blinks as the turntable is unpinned.
– During the unpinning procedure, the pin in the „Slewing range“ icon blinks on the LICCON monitor in the „nominal position **top**“.
– As soon as the superstructure is unlocked from the crane chassis, the icon illustration **6** appears on the operating screen of the LICCON monitor and the LED on key **688** lights up (static).

Once the unpinning of the turntable lock has been completed:
▶ Press key **688** and release key **675**.

Result:

– The release key **675** is deactivated.

▶ Set LICCON overload protection according to the load chart and the attached counterweight.

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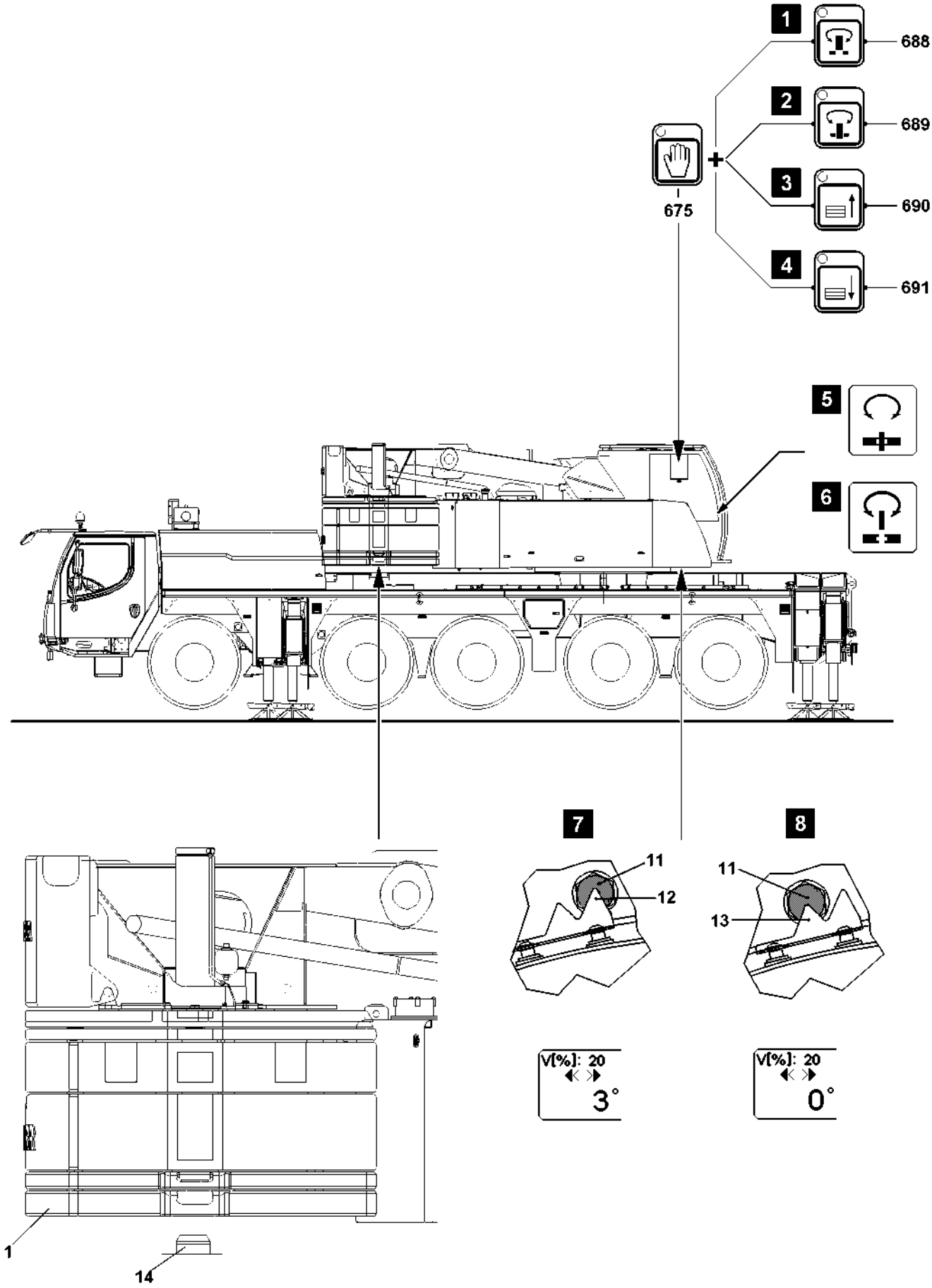

Fig.112505

3 Disassembly of the counterweight plates

3.1 General

Make sure that the following prerequisites are met:
- The crane is properly supported and horizontally aligned.
- The transport vehicle for the counterweight plate holder is in the immediate vicinity of the supported crane.

WARNING
The crane can topple over!
In steep boom positions, for which no load values are given in the load charts, there is a danger of toppling over when turning the crane superstructure! There is a particular risk if the support base has been reduced or if the crane is supported with the sliding beams retracted.
▶ The specifications in the load charts must be adhered to!

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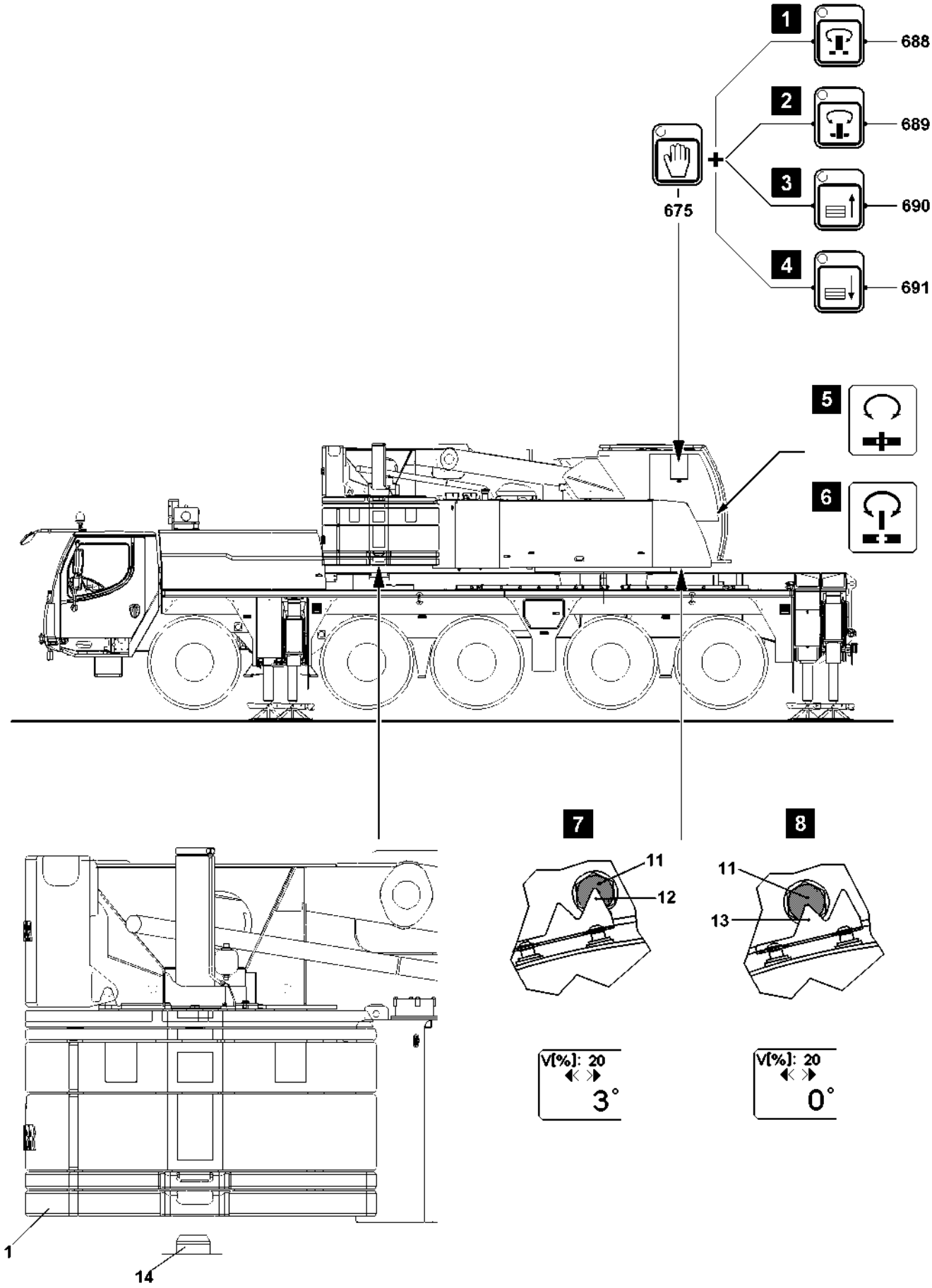

Fig.112505

3.2 Removing the counterweight plates

Note

▶ Use the release key **675** to control the necessary release functions. The release key **675** is deactivated 30 s after a button is last pressed on the BKE.

▶ Turn the crane superstructure until the small pointer **13** on the slewing ring aligns with the marked bolt **11** (0° angle position), see illustration **8**.

Result:

– The LICCON monitor displays the 0° angle setting on the „Slewing range“ icon, see illustration **8**.

WARNING

Danger of accident!

The superstructure must be locked to the crane chassis, so that the counterweight can be set and placed on the centering cone **14**.

▶ Lock the crane superstructure with the crane chassis.

▶ Activate the release key **675** and then press the key **689**.

Result:

– The LED on key **689** blinks as the turntable is pinned.
– During pinning, the LICCON monitor displays a blinking pin in the „Slewing range“ icon in the „nominal position **bottom**“.
– As soon as the superstructure is locked with the crane chassis, the icon illustration **5** appears on the operating screen of the LICCON monitor and the LED on key **689** lights up (static).

Once the pinning procedure of the turntable lock has been completed:

▶ Release the key **689**.
▶ Press the key **691** until an acoustic signal sounds.

Result:

– The LED on key **691** blinks as the ballasting cylinders extend and the counterweight is lowered onto its support.
– When the acoustic signal sounds, the ballasting cylinders are completely extended, the counterweight is completely placed down and the LED on key **691** lights up (static).

When the ballasting cylinders are completely extended and the counterweight is completely placed down on the counterweight mount:

▶ Release the key **691**.
▶ Press the button **688**.

Result:

– The LED on button **688** blinks as the turntable is unpinned.
– During the unpinning procedure, the pin in the „Slewing range“ icon blinks on the LICCON monitor in the „nominal position **top**“.
– As soon as the superstructure is unlocked from the crane chassis, the icon illustration **6** appears on the operating screen of the LICCON monitor and the LED on key **688** lights up (static).

Once the unpinning of the turntable lock has been completed:

▶ Release the key **688**.

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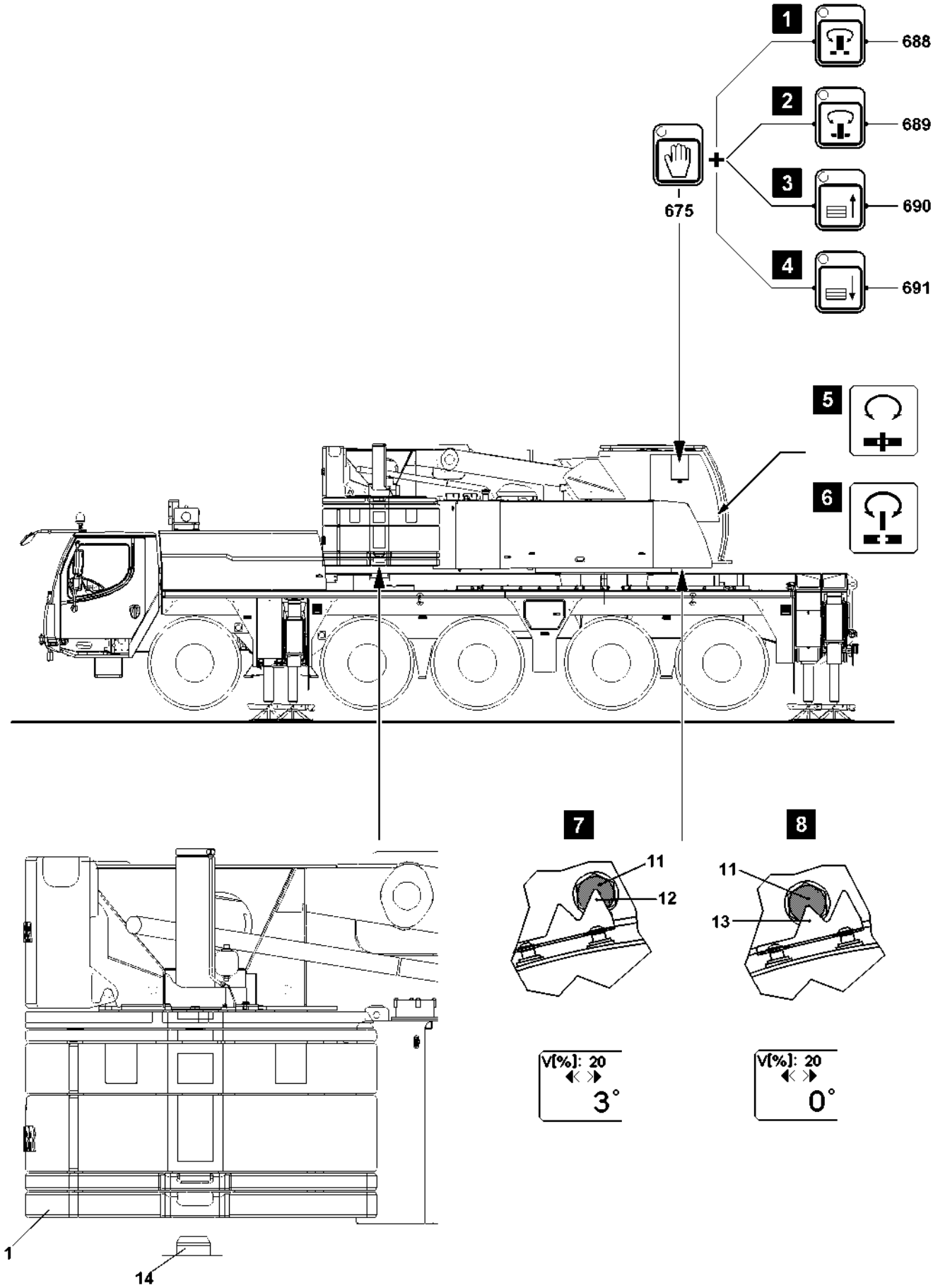

Fig.112505

▶ Turn the crane superstructure to the left until the large pointer **12** on the slewing ring aligns with the marked bolt **11** (3° angle position), see illustration **7**.

Result:

– The ballasting cylinders are now located next to the intake openings for the counterweight plate **1**.
– The LICCON monitor displays the 3° angle setting on the „Slewing range“ icon, see illustration **7**.

▶ Activate the release key **675** and then press the key **689**.

Result:

– The LED on key **689** blinks as the turntable is pinned.
– During pinning, the LICCON monitor displays a blinking pin in the „Slewing range“ icon in the „nominal position **bottom**“.
– As soon as the superstructure is locked with the crane chassis, the icon illustration **5** appears on the operating screen of the LICCON monitor and the LED on key **689** lights up (static).

Once the pinning procedure of the turntable lock has been completed:
▶ Release the key **689**.
▶ Press the key **690** until an acoustic signal sounds.

Result:

– The LED on key **690** blinks as the ballasting cylinder is retracted.
– When the acoustic signal sounds, the ballasting cylinders are completely retracted and the LED on key **691** lights up (static).

Once the ballasting cylinders are fully retracted:
▶ Release the key **690**.
▶ Press the button **688**.

Result:

– The LED on button **688** blinks as the turntable is unpinned.
– During the unpinning procedure, the pin in the „Slewing range“ icon blinks on the LICCON monitor in the „nominal position **top**“.
– As soon as the superstructure is unlocked from the crane chassis, the icon illustration **6** appears on the operating screen of the LICCON monitor and the LED on key **688** lights up (static).

Once the unpinning of the turntable lock has been completed:
▶ Press key **688** and release key **675**.

Result:

– The release key **675** is deactivated.

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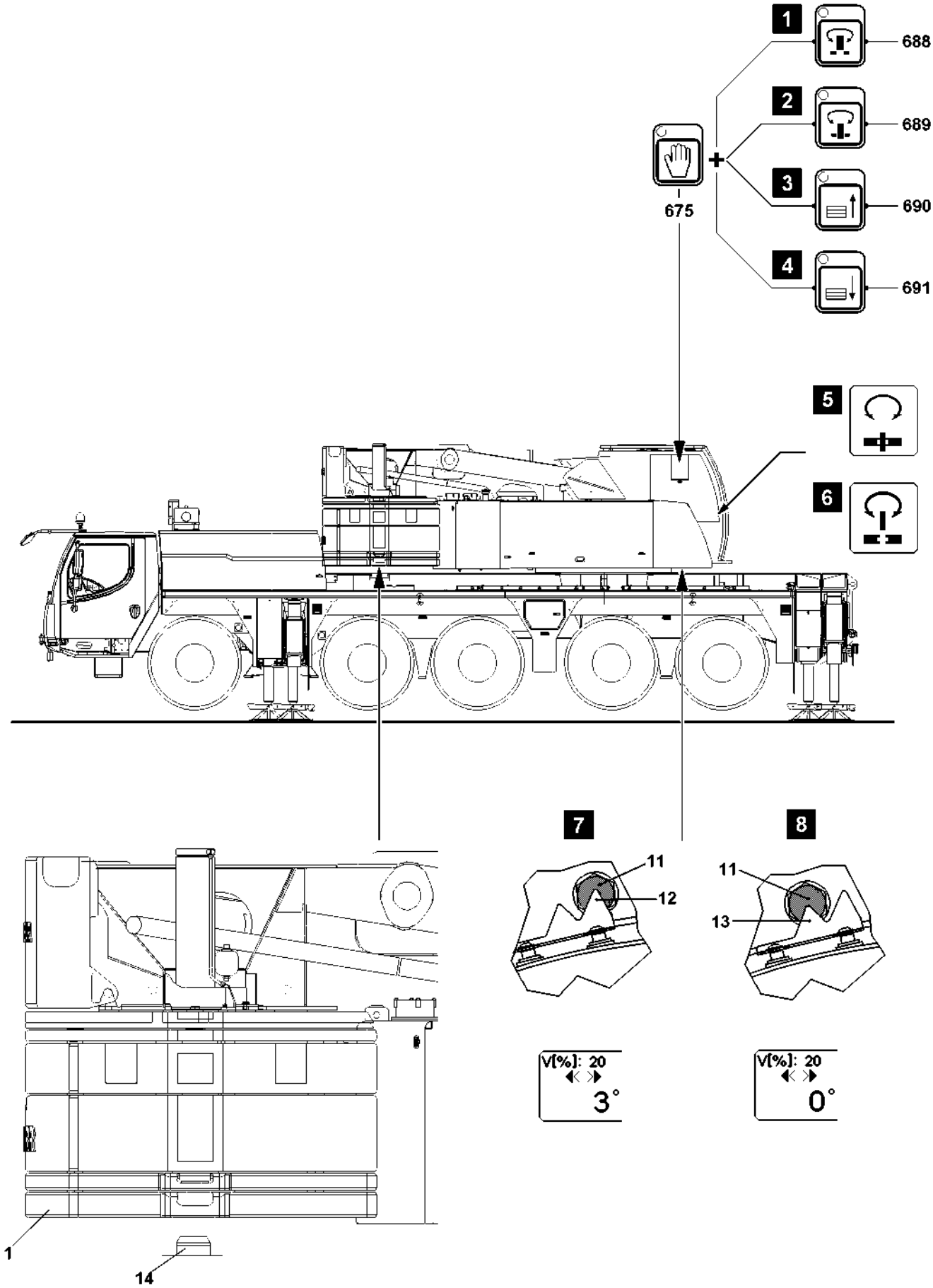

Fig.112505

3.3 Lifting the individual counterweight plates from the vehicle frame with the own crane

Adjust the LICCON overload protection according to the load chart and ballasted counterweights.

WARNING
The crane can topple over!
The boom lengths and boom radii specified in the load chart may not be exceeded! If this is not observed, there is a risk of accidents as the crane can topple over!
▶ The boom lengths and boom radii noted in the load chart must be strictly observed!

▶ Hang the counterweight plates individually on the fastening ropes and place them with the own crane on the transport vehicle.

3.4 Driving with counterweight plates placed on vehicle frame

The axle loads increase with the counterweight plates on the vehicle.

DANGER
Exceeding the axle load and total weight increases the risk of accidents!
If the axle loads and the overall vehicle weight are excessively increased due to non-compliance, the brake performance is also reduced in direct proportion to the excess weight! The steering system, service brake, parking brake and retarder no longer meet EU guidelines!
▶ Do not exceed the specified axle load or total weight under any circumstances!

3.4.1 Securing the counterweight plate on vehicle frame

▶ Telescope the telescopic boom all the way in and place it in the transport receptacle.

Result:

– A retainer on the pivot section of the telescopic boom secures the placed down counterweight plate to prevent it from falling down.

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Fig.195219

1 Safety technical instructions for working with a load

For more information, see chapter 2.04.

WARNING
The crane can topple over!
For steep boom positions, for which no loads are specified in the load charts there is a risk of the crane superstructure toppling when turning „backward“, i.e. towards the counterweight side! There is a particular danger if the support base has been reduced and supported with the sliding beams retracted!
Personnel can be severely injured or killed!
▶ The radii specified in the load chart must be observed!

WARNING
Danger of accident due to erroneous operation!
If the reeving number on the pulley head is less than the reeving number set on the LICCON computer system and if the load is lifted with the luffing gear, it can result in an overload of the hoist rope, as a result, the hoist rope can rip, causing the load to drop!
Personnel can be severely injured or killed!
▶ Always comply with the reeving numbers specified in the load chart for maximum loads!
▶ The reeving on the pulley head and the reeving set on the LICCON computer system must match, otherwise crane operation is prohibited!

DANGER
Danger of fatal accidents due falling load!
If the number of three coils is fallen below (for example due to a technical defect), the hoist rope is ripped from the winch drum and the load falls down.
Personnel can be severely injured or killed!
▶ The crane operator must ensure that there are always at least three windings on the winch drum!

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.

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.

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 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 in the crane danger zone.

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WARNING
Danger of accidents when turning the crane superstructure!
By turning the crane superstructure in restricted space conditions on the job site, especially in the rear area of the counterweight and towards the chassis, personnel can be crushed and severely injured or killed!
- ▶ Give a short warning signal (horn) before starting a slewing movement!
- ▶ Ensure before starting any slewing movement that there are no people or objects in the danger zone!

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 that 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 failures in the indicator and warning lights
- Damage to the hoist ropes
- Functional failures in the safety devices
- Leakages 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 boom. 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 carrying capacity is being utilized when a telescopic boom extension such as a fixed lattice jib, luffing lattice jib or folding jib is being used, then in 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.

WARNING
Danger of accident because of component overloading!
If the telescopic boom has become distorted because of one-sided sun exposure 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 auxiliary 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.

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– There is no strong side wind.

WARNING
Damage of 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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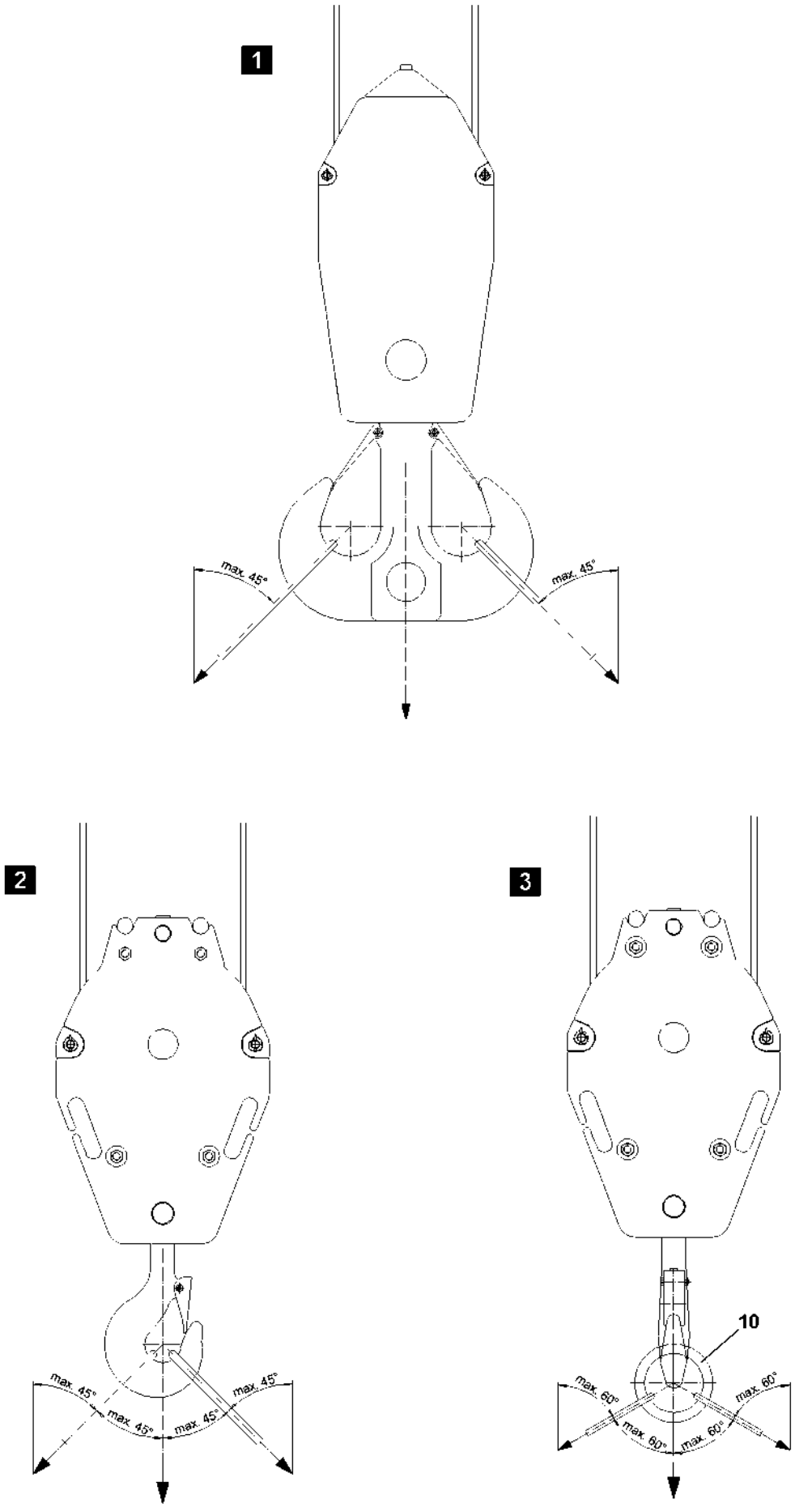

Fig.112108

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.
- The counterweight is installed according to the load chart.
- The hook block or the load hook is correctly reeved.

4.1 Attaching the load

WARNING
The crane can topple over!
If the following conditions are not met, the crane can topple over and cause fatal injuries!
This could result in high property damage!
- ▶ Observe own weight of the load tackle!
- ▶ Observe own weight of the load tackle!
- ▶ The maximum permissible incline of the strands fastened on single or double hooks in the hook jaws is 45°! See illustration **1** and illustration **2**.

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 **3**.
- ▶ 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 crossbars or two cranes for taking up the load!

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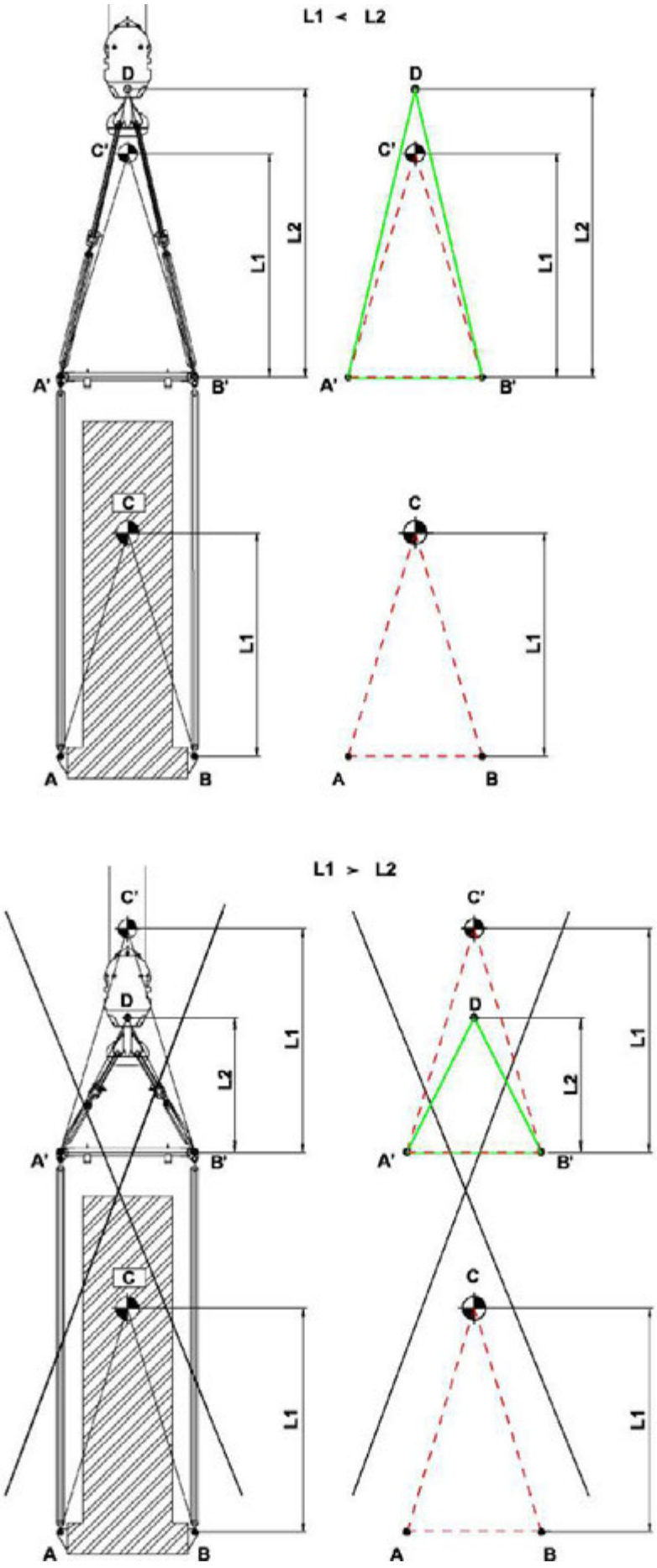

Fig.116274

4.2 Load take up with cross bar

Cross bars are load lifting 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 bar 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 bar 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!

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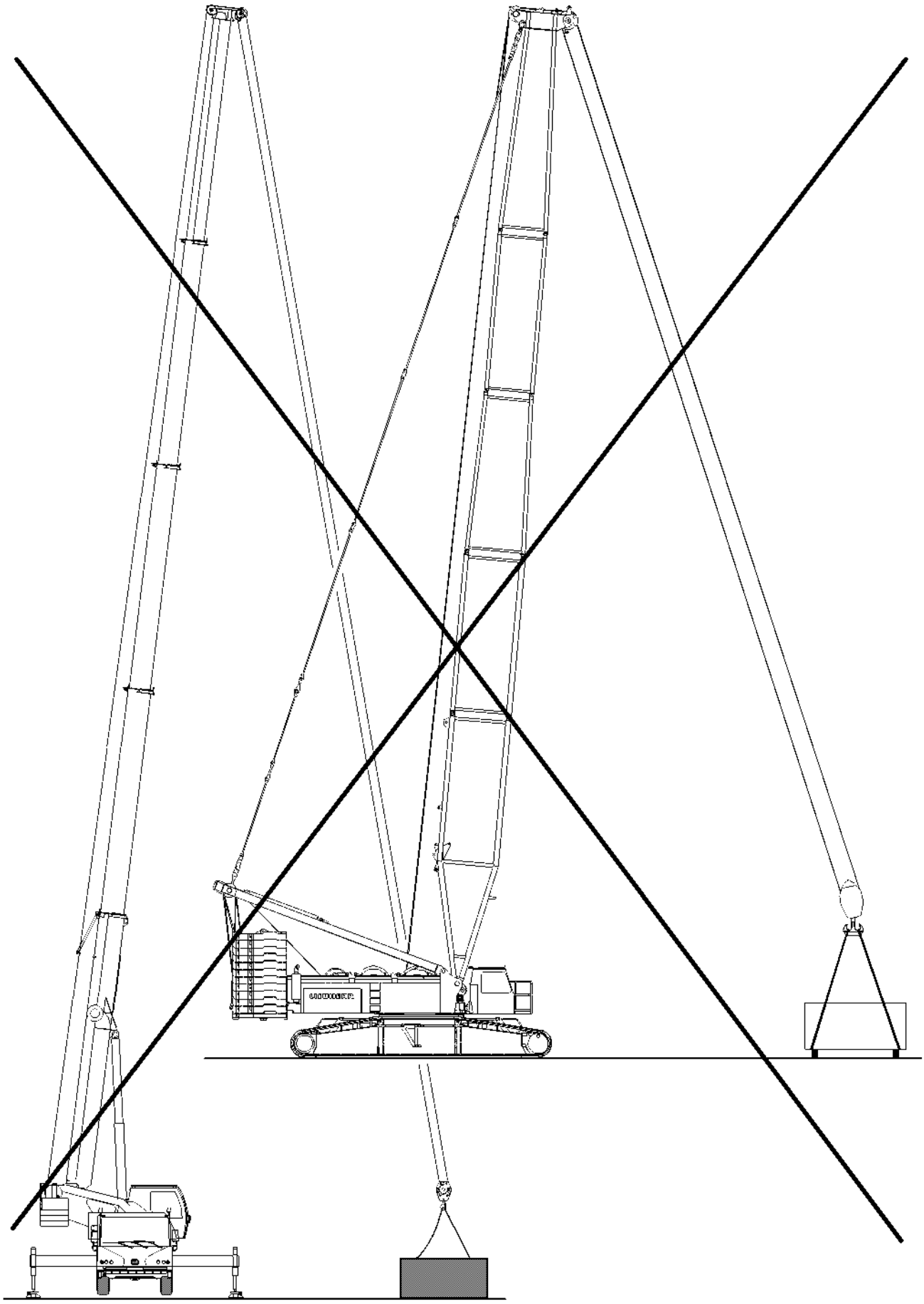

Fig.102716

4.4 Lifting the load

WARNING
Danger of crushing for people in the load zone!
If personnel are 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 for anyone to remain in the danger zone!
- ▶ It is prohibited for anyone to be under the load! Keep a safety distance!
- ▶ Swinging of the load is prohibited!
- ▶ Exercise extreme caution when lifting a load!

WARNING
The crane can topple over!
If an attempt to lift a load above the hoist gear causes the LICCON overload protection to turn off, then the load may not be lifted by luffing up the boom. This leads to overloading and toppling of the crane!
Personnel can be severely injured or killed!
- ▶ Do not lift the load by luffing up the boom from 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!
- ▶ Attach (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!
- ▶ 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 in addition to the vertical forces, for which the boom is not designed.

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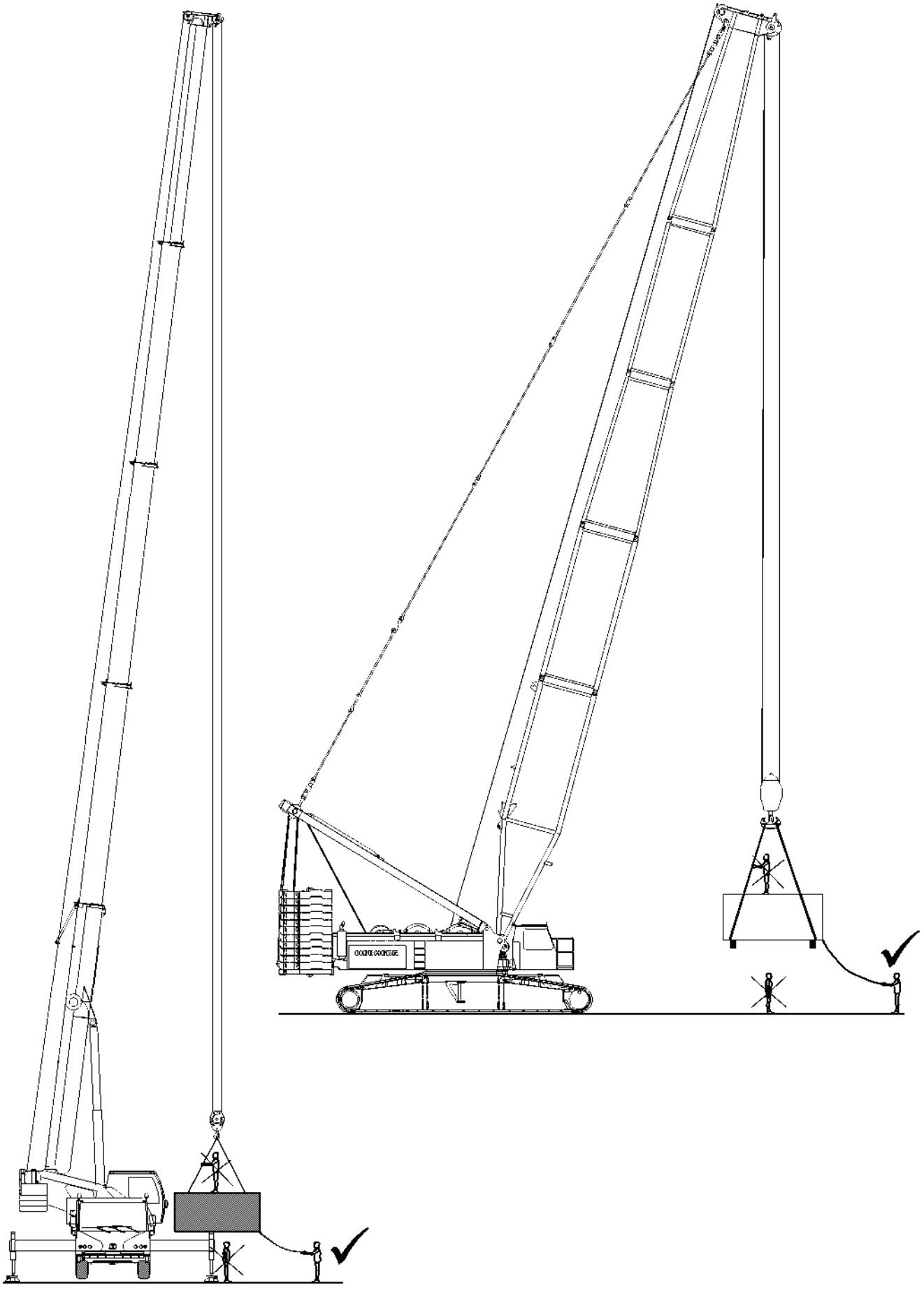

Fig.102717

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
Risk 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 loads is prohibited!

NOTICE
Damage of rope pulleys!
▶ Place down hook blocks, booms, folding jibs, auxiliary 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 to manage the load more precisely and to prevent the load from swaying. This will prevent undesirable movements of the load and consequent damage.

5.3 Danger of being crushed!

WARNING
Danger of fatal injury!
Extreme care is needed when lowering a load! Mortal danger 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!

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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 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 out 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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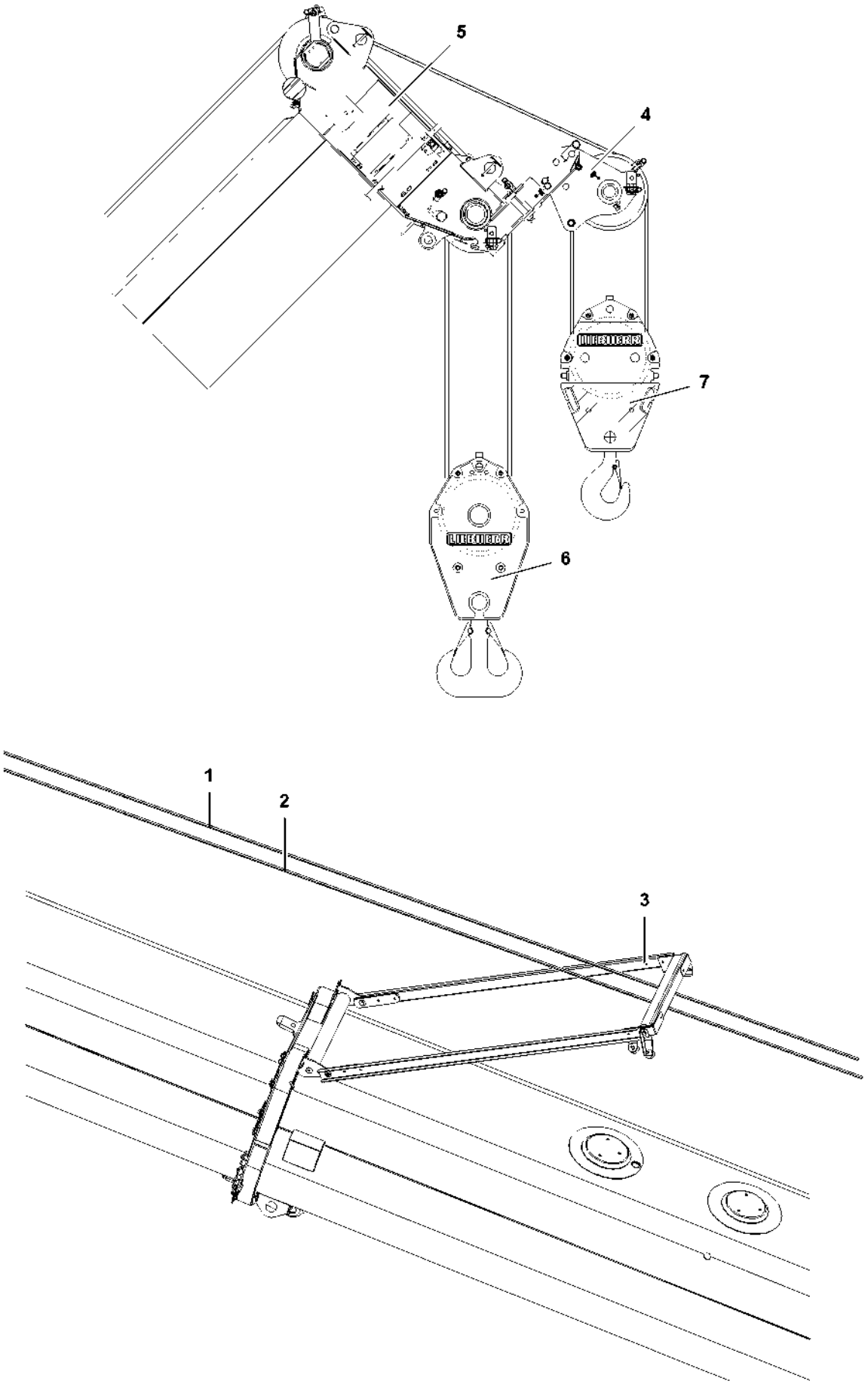

Fig.117830

1 Operating modes

A distinction is made between the following operating modes:
- Operation with boom nose* on the telescopic boom
- Operation with boom nose* on lattice jib
- „Two hook operation“ with auxiliary boom* (folding jib, auxiliary jib, lattice jib)

2 Operation with boom nose* on the telescopic boom

NOTICE
Damage to the hoist ropes!
▶ Guide the hoist rope **1** and hoist rope **2** through the bracket **3** on the telescopic boom during reeving.

The operation „boom nose on telescopic boom“ is set up for quick lifts via the boom nose **4**. The hook block **6** can remain reeved on the boom head **5**.

2.1 Setting the LICCON overload protection

Add the following weights to the load:
- Hook block **6** on boom head **5**
- Hook block (load hook) **7** on the boom nose **4**
- **4** Boom nose
- Fastening equipment

WARNING
Danger of accidents because of imprecise radius and load display!
In operation with „boom nose on telescopic boom“ the radius and load display of the LICCON overload protection is not precise. The boom geometry is not taken into account!
▶ Do not overload the crane.

For operation „boom nose on telescopic boom“ no special load charts are available. For operation „boom nose on telescopic boom“ set operating mode „telescopic boom“ on the LICCON overload protection.

▶ Set operating mode „telescopic boom“ on the LICCON overload protection.

WARNING
Overload of crane!
Protection through the LICCON overload protection is only possible when the reeving on the boom head **5**, is equal to / larger than the reeving on the boom nose **4**.
▶ Reeve in a boom head **5** equal to / larger than the boom nose **4**.

Setting it to the smaller reeving of the two hooks ensures that the crane cannot be overloaded.

▶ Set the LICCON overload protection to the smaller reeving (reeving on the boom nose **4**).

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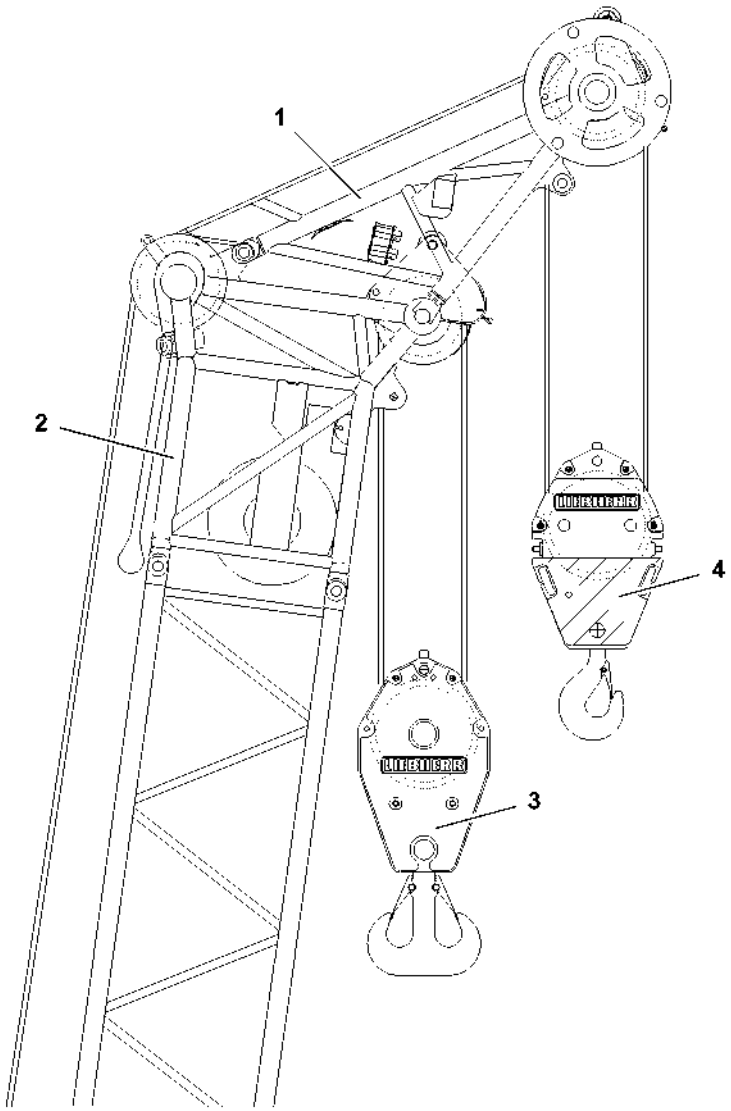

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Fig.117753

3 Operation with boom nose* on lattice jib

The operation „boom nose on lattice jib“ is set up for quick lifts via the boom nose **1**. The hook block **3** can remain reeved on the boom head **2**.

3.1 Setting the LICCON overload protection

Add the following weights to the load:
– Hook block **3** on boom head **2**
– Hook block (load hook) **4** on the boom nose **1**
– **1** Boom nose
– Fastening equipment

WARNING
Danger of accidents because of imprecise radius and load display!
In operation with „boom nose on lattice jib“ the radius and load display of the LICCON overload protection is not precise. The boom geometry is not taken into account!
▶ Do not overload the crane.

For operation „boom nose on lattice jib“ no special load charts are available. For operation „boom nose on lattice jib“ set operating mode „lattice jib“ on the LICCON overload protection.

▶ Set operating mode „lattice jib“ on the LICCON overload protection.

WARNING
Overload of crane!
Protection through the LICCON overload protection is only possible when the reeving on the boom head **2**, is equal to / larger than the reeving on the boom nose **1**.
▶ Reeve in a boom head **2** equal to / larger than the boom nose **1**.

Setting it to the smaller reeving of the two hooks ensures that the crane cannot be overloaded.

▶ Set the LICCON overload protection to the smaller reeving (reeving on the boom nose **1**).

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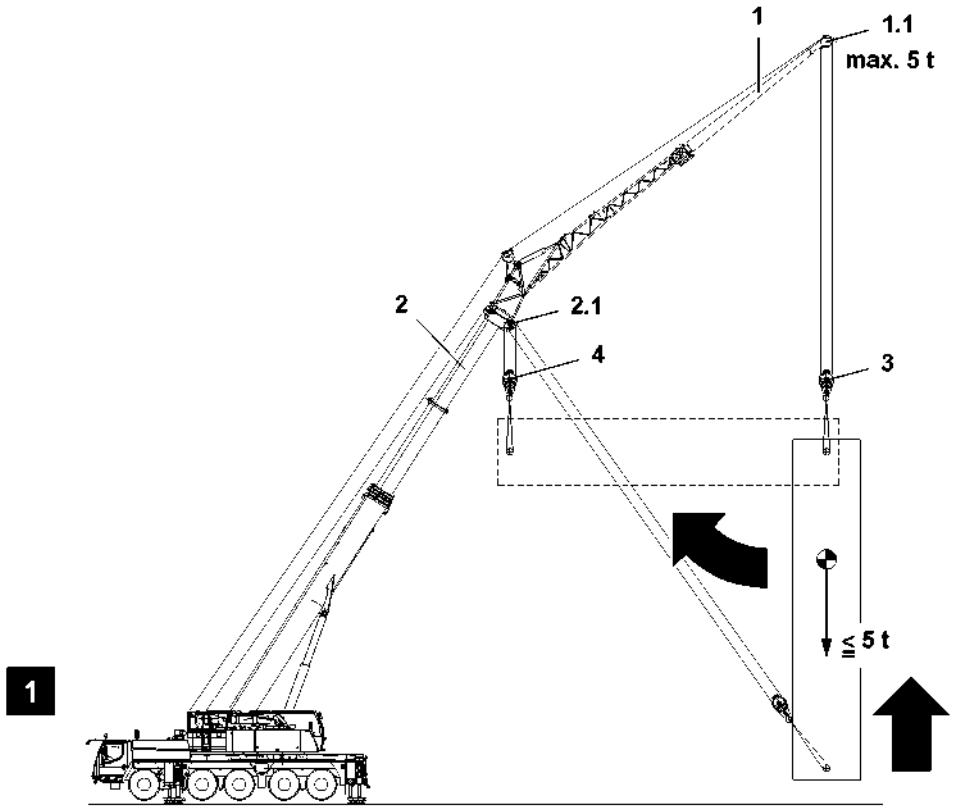

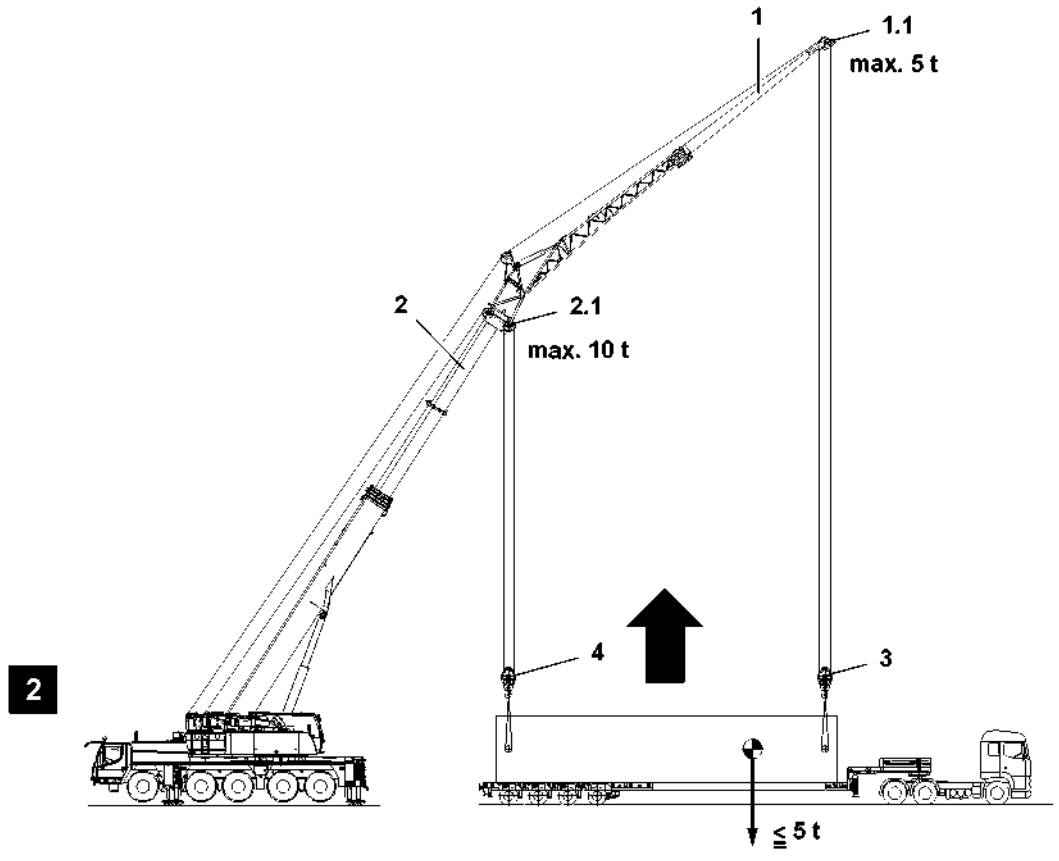

Fig.117833

4 „Two hook operation“ with auxiliary boom*

The „two hook operation“ with main boom and auxiliary boom **1** (folding jib, auxiliary jib, lattice jib) is set up for turning loads with simultaneous operation of both hoist gears.

For „two hook operation“ with auxiliary boom **1** there are two possibilities:
1. Lift / lower load exclusively with the auxiliary boom, illustration **1**
2. Lift / lower load with the main boom and auxiliary boom, illustration **2**

WARNING
Danger of fatal accident due to overloading the crane!
The „two hook operation“ is not monitored!
To avoid an overload of the crane, the information given in the operating instructions must be strictly adhered to.
- ▶ The total weight of the load must be smaller / equal to the maximum permissible load of the auxiliary boom **1**.
- ▶ „Two hook operation“ with a load larger than the maximum permissible load of the auxiliary boom **1** is prohibited!
- ▶ Lift the load no higher than to the height of the main boom head **2.1**.
- ▶ If there is a load on both hooks, then it is prohibited to luff down the boom! There is no protection provided by the LICCON overload protection.
- ▶ Lift and lower the load vertically.
- ▶ „Two hook operation“ with TY-guying and eccentric or spacer is prohibited!

Add the following weights to the load:
- Hook block **4** on main boom head **2.1**
- Hook block (load hook) **3** on auxiliary boom head **1.1**
- Fastening equipment

The minimum reeving can be obtained from the erection and take down charts.

For „two hook operation“ with folding jib, auxiliary jib, fixed lattice jib, the minimum reeving in the erection and take down charts is sufficient.

WARNING
Danger of accident in case of incorrect minimum reeving!
For „two hook operation“ with luffing lattice jib, the minimum reeving in the erection and take down charts is **not**sufficient!
- ▶ Increase the specified minimum reeving according to the erection and take down charts by 1 rope strand.

NOTICE
Rubbing hoist ropes!
In „two hook operation“ angular pull is only permissible in boom direction with raised load.
- ▶ Make sure that the hoist ropes do not rub on the rope retaining pipes of the rope pulleys during angular pull.

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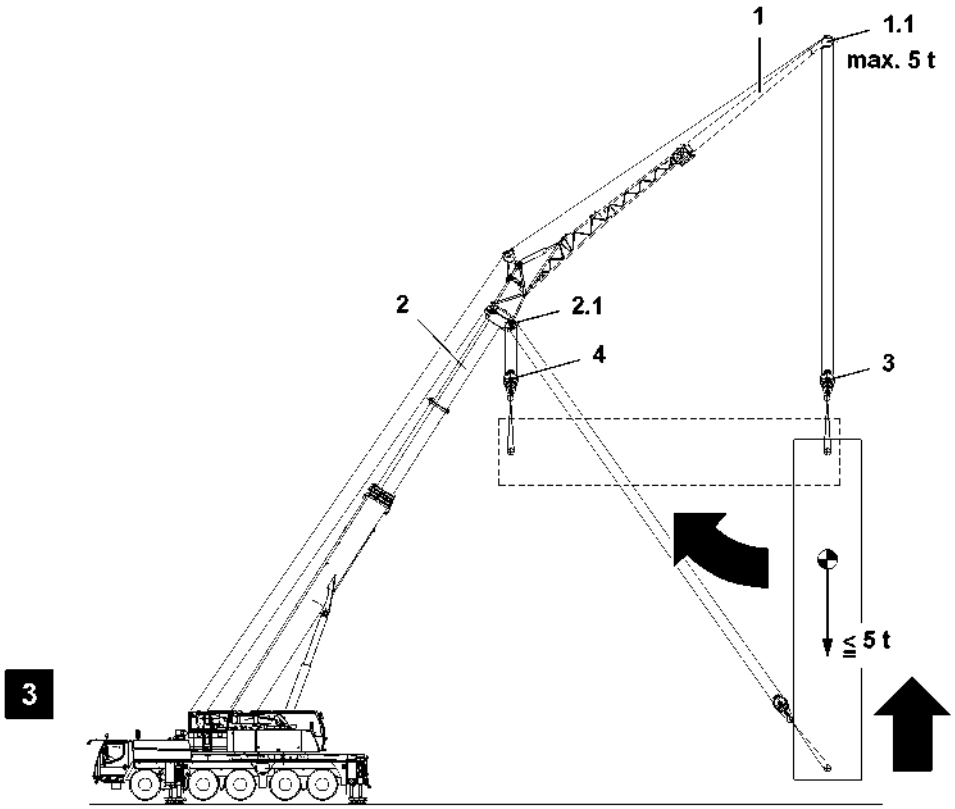

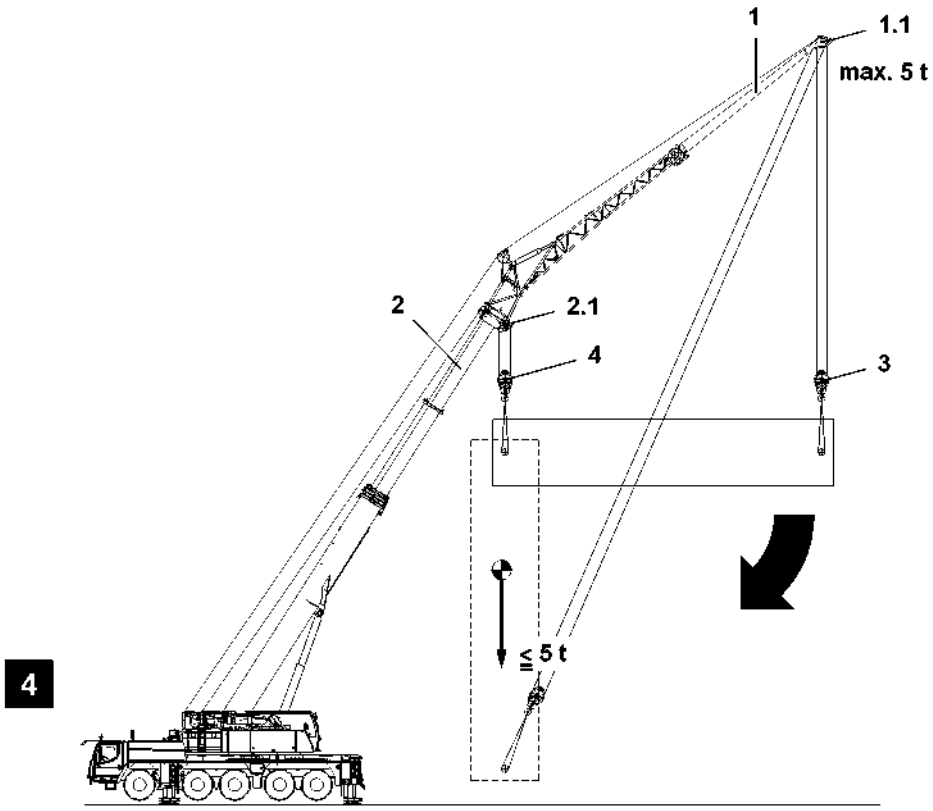

Fig.117834

4.1 Setting the LICCON overload protection

For „two hook operation“ with main boom and auxiliary boom **1** the LICCON overload protection must be set to operating mode auxiliary boom (folding jib, auxiliary jib, lattice jib).

▶ Set operating mode „auxiliary jib“ (folding jib, auxiliary jib, lattice jib) on the LICCON overload protection.

Result:

– The displayed boom radius is according to the installed auxiliary boom **1**.

WARNING
Overload of crane!
Protection through the LICCON overload protection is only possible when the reeving on the main boom head **2.1**, is equal to / larger than the reeving on the auxiliary boom head **1.1**.
▶ Reeve in the main boom head **2.1** equal / larger than the auxiliary boom head **1.1**.

Setting it to the smaller reeving of the two hooks ensures that the crane cannot be overloaded.

▶ Set the LICCON overload protection to the smaller reeving (reeving on the auxiliary boom head **1.1**).

4.2 Lifting / lowering the load exclusively with the auxiliary boom

Make sure that the following prerequisite is met:
– The total weight of the load is smaller / equal to the maximum permissible load of the auxiliary boom **1**.

WARNING
Danger of fatal accident due to overloading the crane!
If the total weight or the center of gravity of the load is not exactly known, then the load must first be lifted or lowered with the auxiliary boom **1**.
▶ Lift the load with auxiliary boom **1** (folding jib, auxiliary jib, lattice jib) to 100 %.
▶ Lower the load with auxiliary boom **1** (folding jib, auxiliary jib, lattice jib) to 100 %.

▶ Lift the load with auxiliary boom **1** to 100 %, illustration **3**.
▶ Take over the load with the main boom **2**, illustration **4**.

Result:

– As soon as the load hangs on the main boom **2.1** is the load display of the LICCON overload protection incorrect.

When the load is to be lowered:
▶ Take over the load with the auxiliary boom **1** to 100 % and then place it down.

Result:

– As soon as the load hangs by 100 % on the auxiliary boom head **1.1** is the load display of the LICCON overload protection correct.

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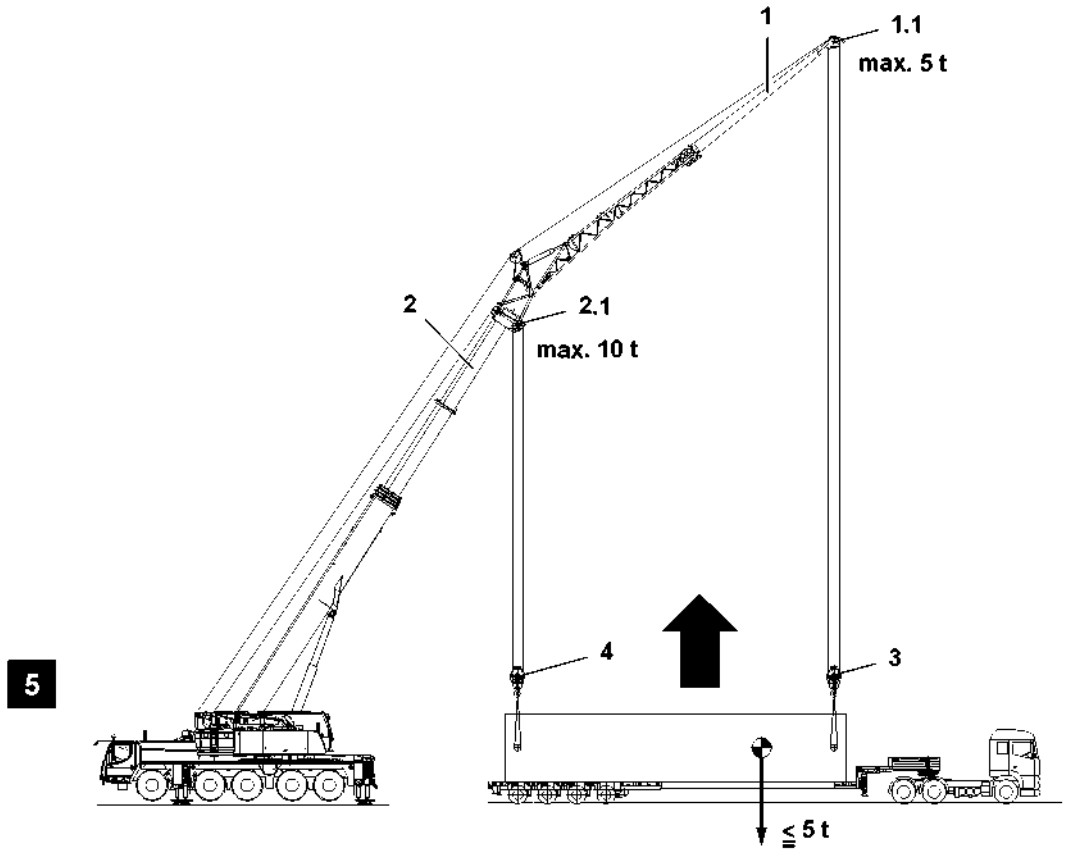

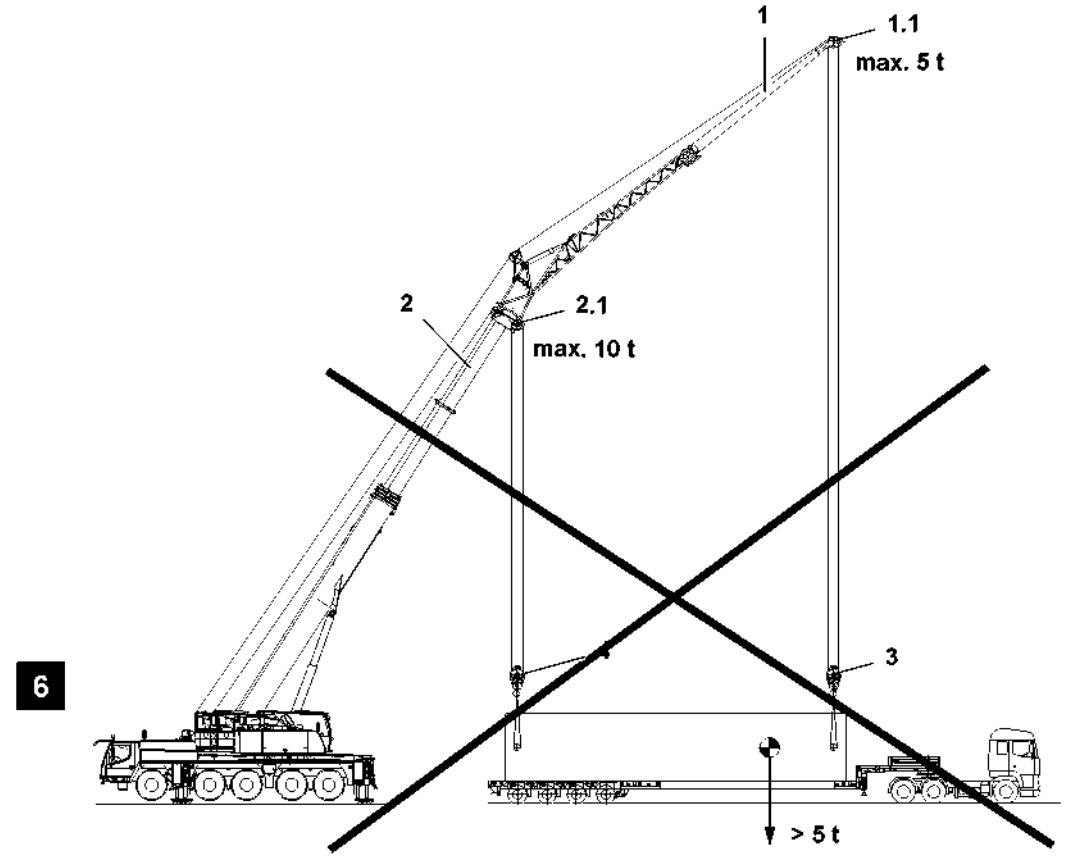

Fig.117835

4.3 Lifting / lowering the load with the main boom and auxiliary boom

Make sure that the following prerequisite is met:

– The total weight of the load is smaller / equal to the maximum permissible load of the auxiliary boom **1**.

WARNING

Danger of fatal accident due to overloading the crane!

▶ The total weight and the center of gravity of the load must be known exactly.

▶ „Two hook operation“ with a load larger than the maximum permissible load of the auxiliary boom **1** is strictly prohibited, illustration **6**!

▶ Lift the load with the main boom **2** and auxiliary boom **1**, illustration **5**.

Result:

– As soon as the load hangs on the main boom **2.1** is the load display of the LICCON overload protection incorrect.

When the load is to be lowered:

▶ Place the load down with the main boom **2** and auxiliary boom **1**.

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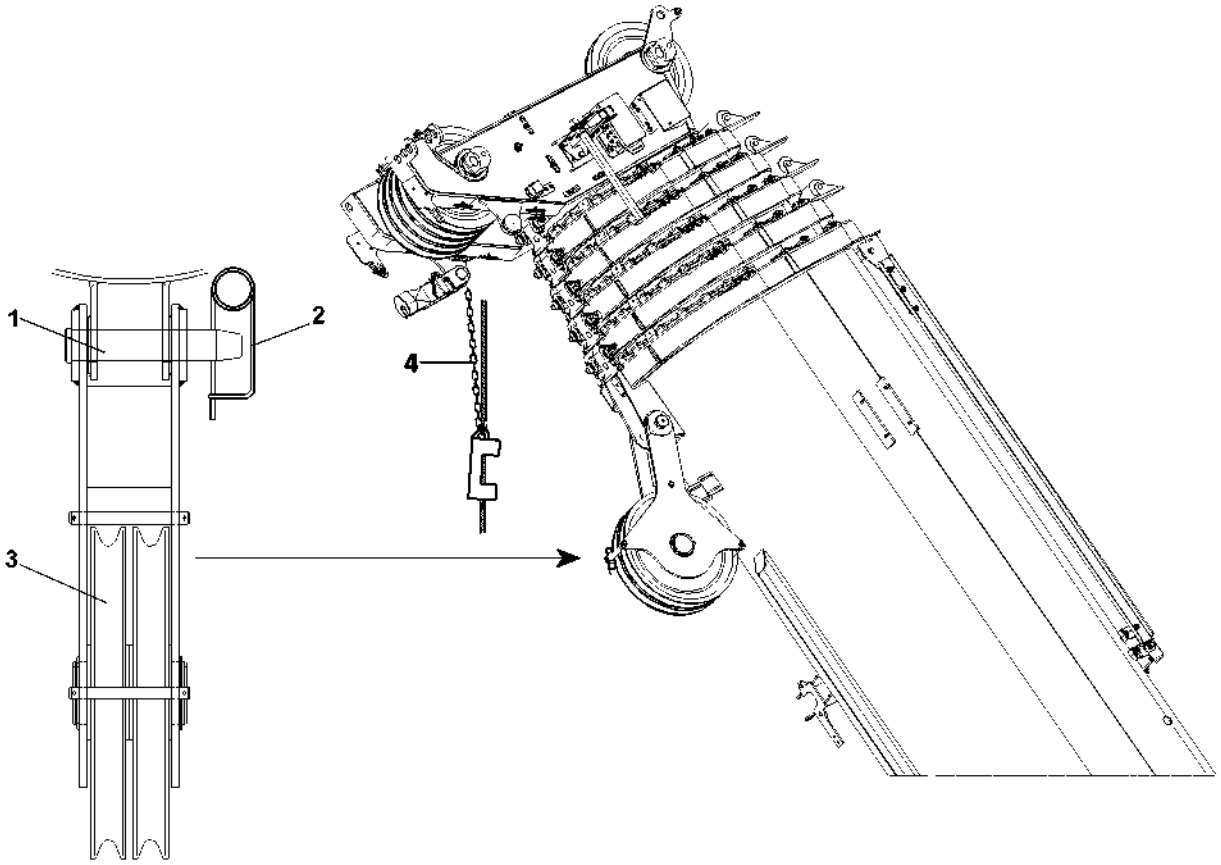

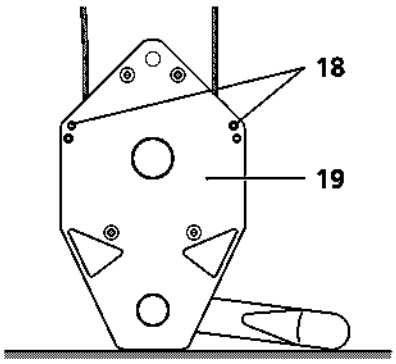

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Fig.120424

1 Reeving plans

1.1 Assembling the auxiliary equipment*

- ▶ Affix the auxiliary pulleys **1** on the intended bores.
- ▶ Insert the pin **2**.
- ▶ Secure pins **2** with spring retainers **3**.

1.2 Operation with auxiliary pulley block on pivot section*

NOTICE
Damage to auxiliary device!
If the following notes are not observed, the hook block, the hoist rope or the auxiliary block can be damaged!
For operation with auxiliary pulley block on the pivot section, do **not** telescope out and run only the radii ranges, which are specified in the load chart.
Before operation with the auxiliary pulley block, the rope guard pins on the hook block must be removed!
When the hook block is on the ground, it must be ensured that the ropes remain in the pulleys!
If the limit switch chain **4** on the hoist limit switch weight is set too short, then the hook block can run onto the auxiliary device when the hoist rope is spooled up and damage it severely.

- ▶ Do not telescope out!
- ▶ On the hook block **19**, remove the spring retainers **18** and pull out the rope guard pin!
- ▶ Check if all ropes are in the pulleys.
- ▶ Before operation with the auxiliary device, set the limit switch chain **4** on the hoist limit switch weight to maximum length.

- ▶ Check if all prerequisites have been met.

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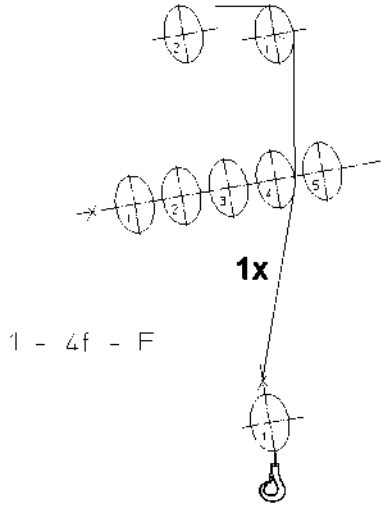

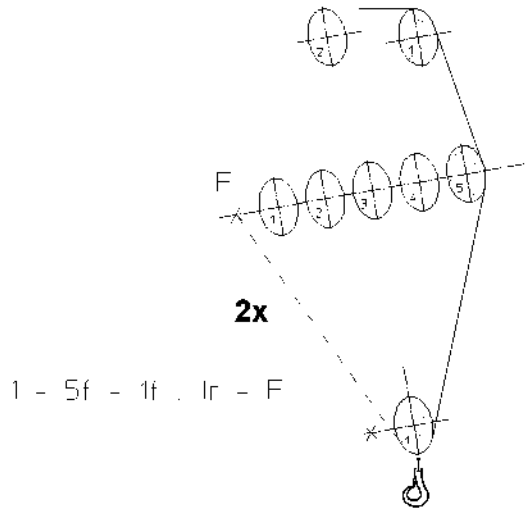

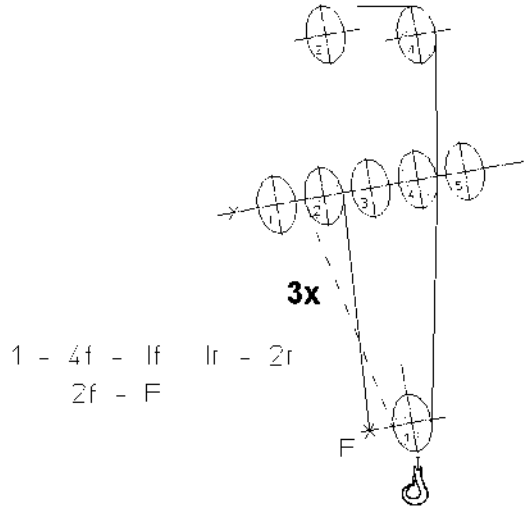

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Fig.120417

2 Reeving, T-operation

Explanation of symbols on the reeving plans:
- The number denotes the number of the respective rope pulley on the pulley head.
- The letter **f** means reeve on the **front** over the rope pulley on the pulley head.
- The letter **r** means reeve on the **rear** over the rope pulley on the pulley head.
- The letter **F** means **rope fixed point**.

2.1 1-pulley hook block / load hook

Reeving	Rope fixed point
1x	On the hook block or on the load hook fixed point
2x	On the pulley head
3x	On the hook block

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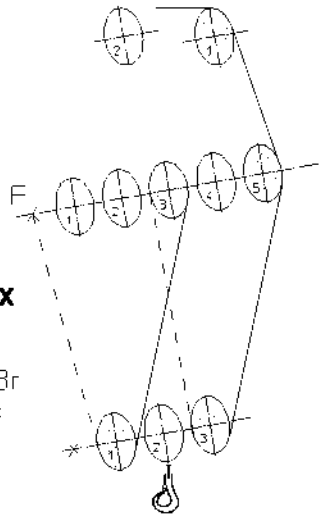
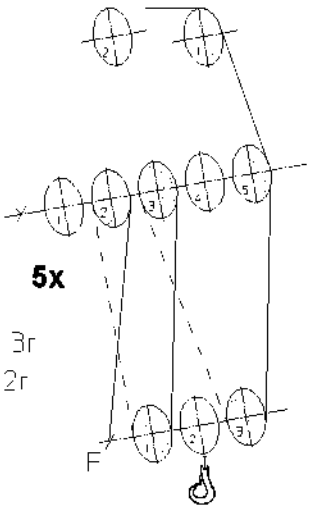
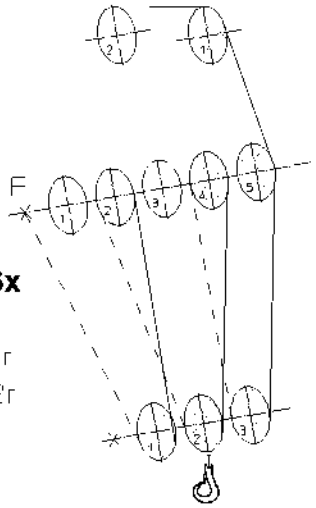


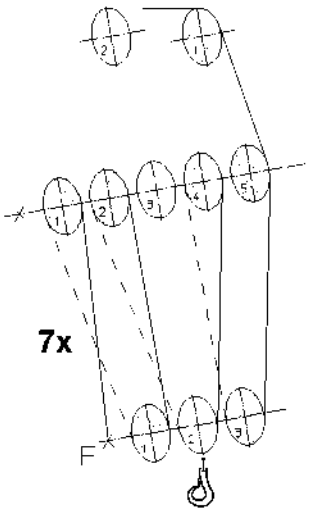
1 - 5f - 3f . 3r - 3r
3f - 1f . 1r - F



1 - 5f - 3f . 3r - 3r
3f - 1f 1r - 2r
2f - F



1 - 5f - 3f . 3r - 4r
4f - 2f . 2r - 2r
2f - 1f . 1r - F



1 - 5f - 3f . 3r - 4r
4f - 2f 2r - 2r
2f - 1f . 1r - 1r
1f - F

Fig.120418

2.2 3-pulley hook block

Reeving	Rope fixed point
4x	On the pulley head
5x	On the hook block
6x	On the pulley head
7x	On the hook block

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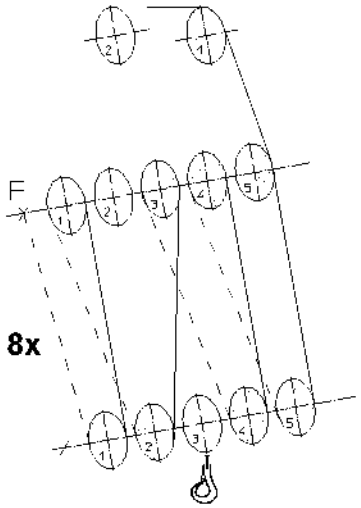
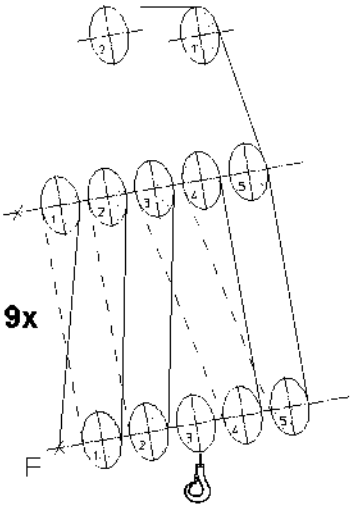
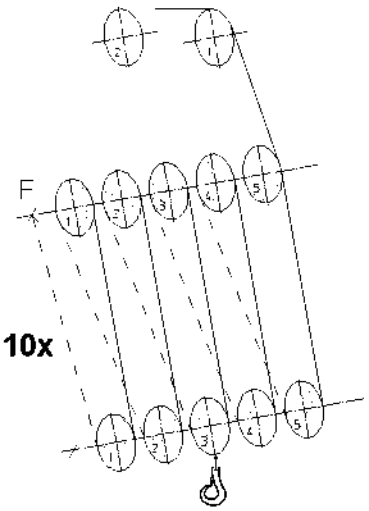


1 - 5f - 5f . 5r - 4r
4f - 4f 4r - 3r
3f - 2f . 2r - 1r
1f - 1f . 1r - F



1 - 5f - 5f 5r - 4r
4f - 4f . 4r - 3r
3f - 2f 2r - 2r
2f - 1f . 1r - 1r
1f - F



1 - 5f - 5f 5r - 4r
4f - 4f 4r - 3r
3f - 3f . 3r - 2r
2f - 2f 2r - 1r
1f - 1f . 1r - F

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Fig.120419

2.3 5-pulley hook block

Reeving	Rope fixed point
8x	On the pulley head
9x	On the hook block
10x	On side of pulley head

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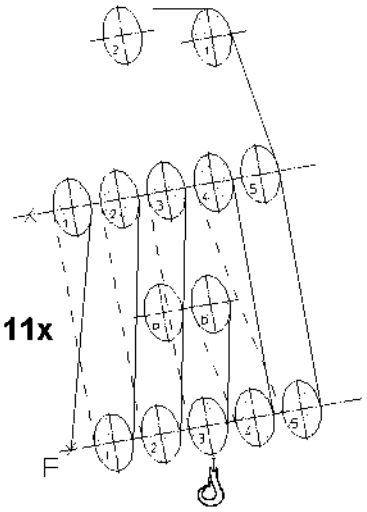
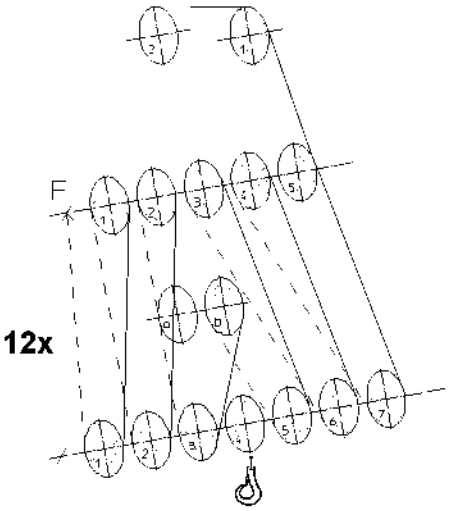
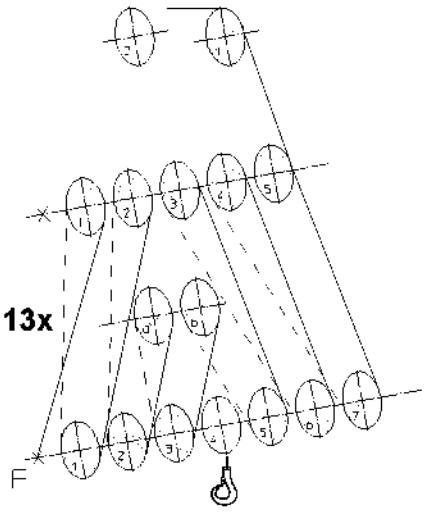
1 - 5f - 5f . 5r - 4r
4f - 4f . 4r - 6r
6f - 3f . 3r - 3r
3f - 2f . 2r - 2r
2f - 1f . 1r - 1r
1f - F



1 - 5f - 7f . 7r - 4r
4f - 6f . 6r - 3r
3f - 5f . 5r - 6r
6f - 3f . 3r - 2r
2f - 2f . 2r - 1r
1f - 1f . 1r - F



1 - 5f - 7f . 7r - 4r
4f - 6f . 6r - 3r
3f - 5f . 5r - 6r
6f - 3f . 3r - 6r
6f - 2f . 2r - 2r
2f - 1f . 1r - 1r
1f - F



1 - 5f - 7f . 7r - 4r
4f - 6f . 6r - 3r
3f - 5f . 5r - 6r
6f - 4f . 4r - 6r
6f - 3f . 3r - 2r
2f - 2f . 2r - 1r
1f - 1f . 1r - F

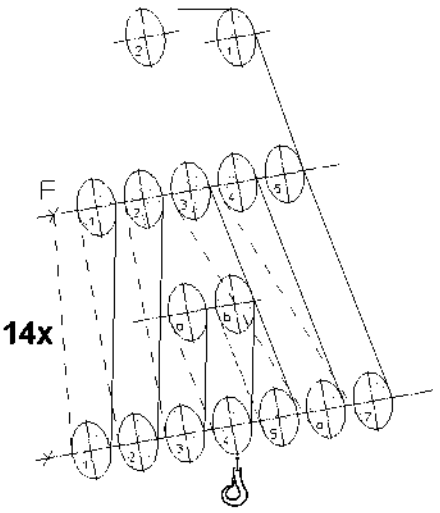


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Fig.120420

2.4 Reeving with auxiliary device*

2.4.1 5-pulley hook block

Note
▶ 11-way reeving is only possible with an auxiliary device!

Reeving	Rope fixed point
11x	On the hook block

2.4.2 7-pulley hook block

Note
▶ 12x, 13x and 14x reeving is only possible with auxiliary device!

Reeving	Rope fixed point
12x	On the pulley head
13x	On the hook block
14x	On the pulley head

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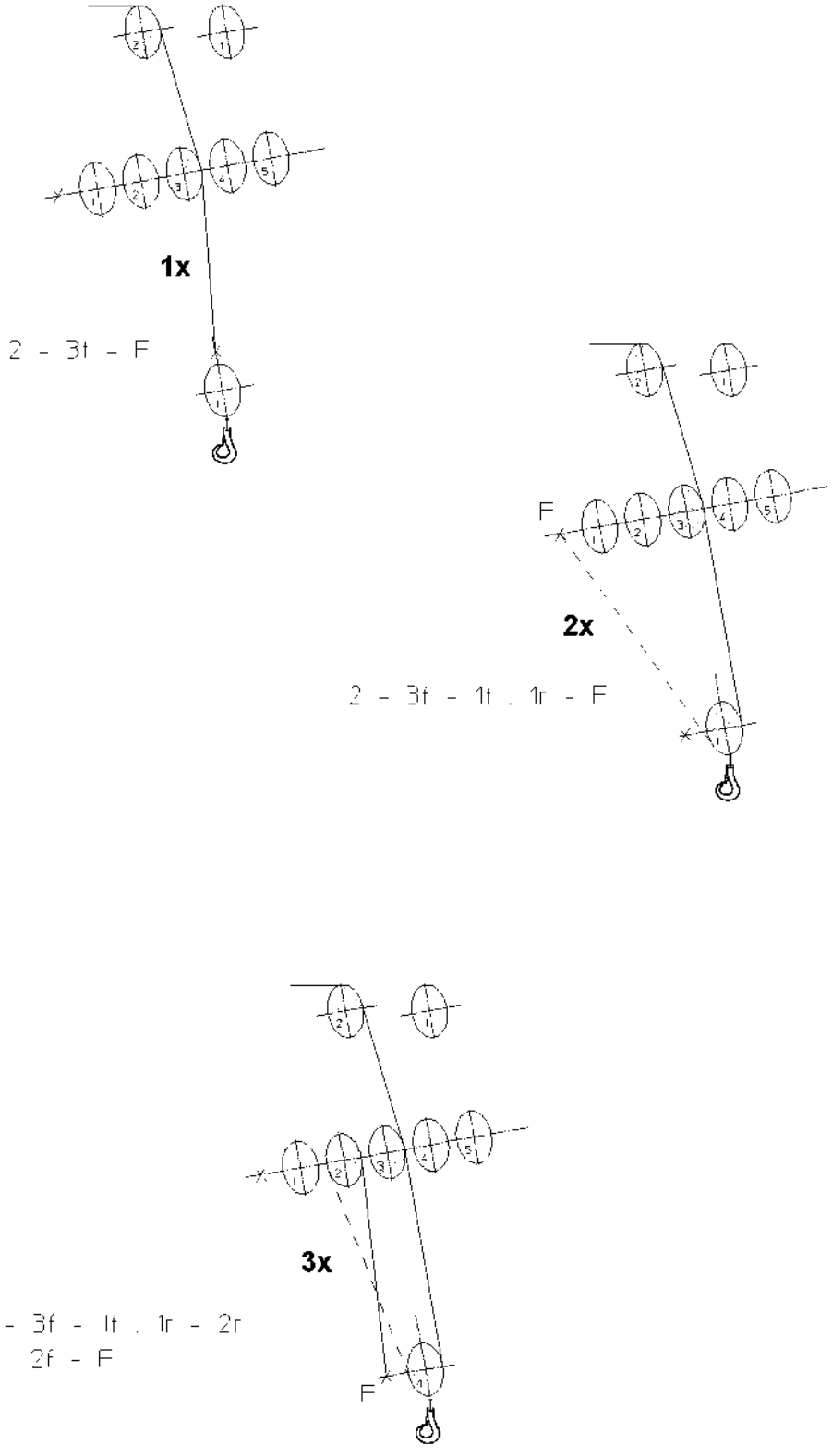

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Fig.120421

2.5 Special reeving 1-pulley hook block / load hook

Note

▶ The special reeving are exclusively for T-operation. For the special reevings the rope friction is reduced and the life expectancy of the rope is increased.

Reeving	Rope fixed point
1x	On the hook block or on the load hook fixed point
2x	On the pulley head
3x	On the hook block

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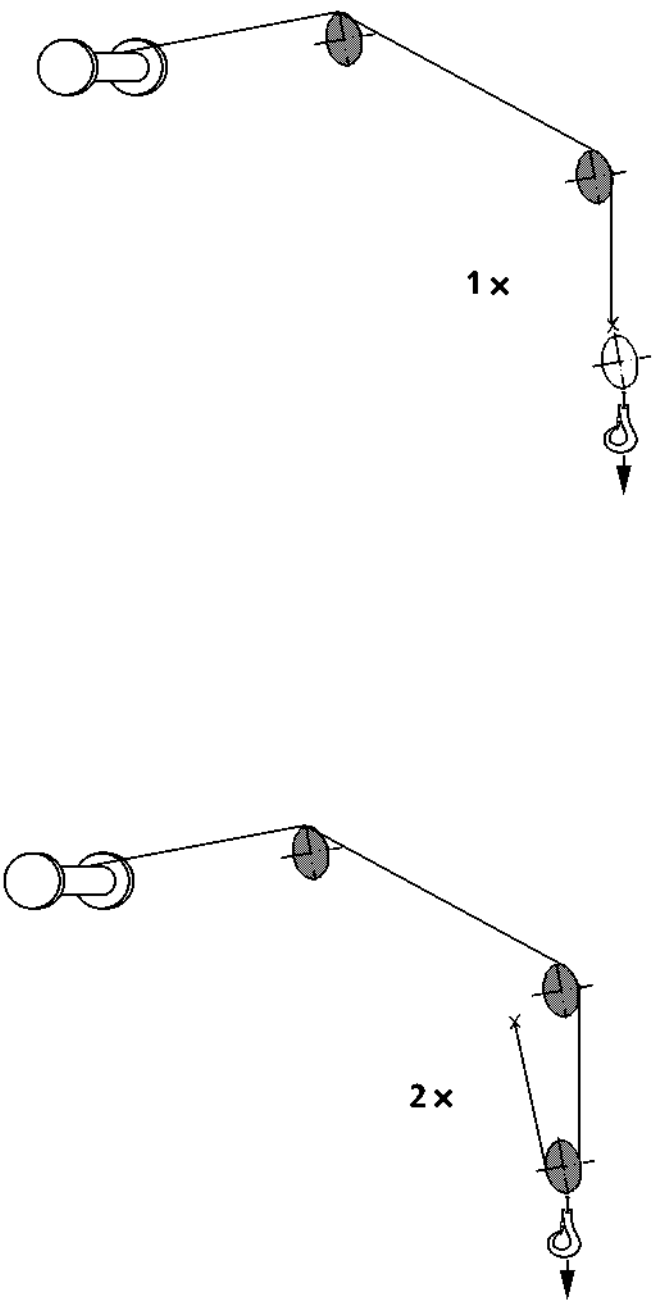

Fig.191932

3 Reeving TK/TVK/TNZK/TVNZK operation

3.1 1-pulley hook block / load hook

Reeving	Rope fixed point
1x	On the hook block or on the load hook fixed point
2x	On the pulley head

3.2 3-pulley hook block

Reeving	Rope fixed point
2x	On the pulley head

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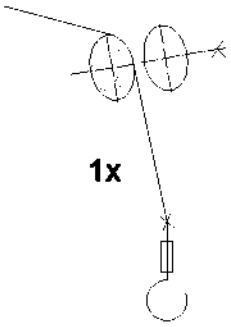

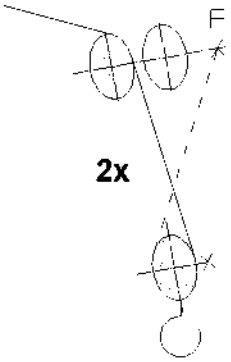

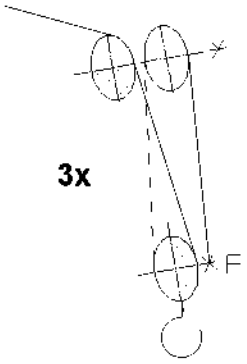

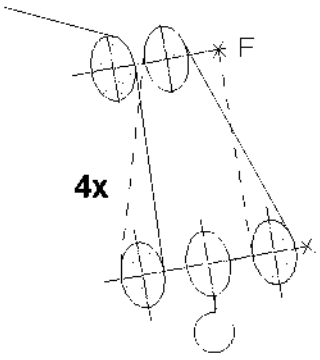

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Fig.120423

4 Reeving THK-2.9-operation*

4.1 1-pulley hook block / load hook

Reeving	Rope fixed point
1x	On fixed point load hook
2x	On the pulley head
3x	On the hook block

4.2 3-pulley hook block

Reeving	Rope fixed point
4x	On the pulley head

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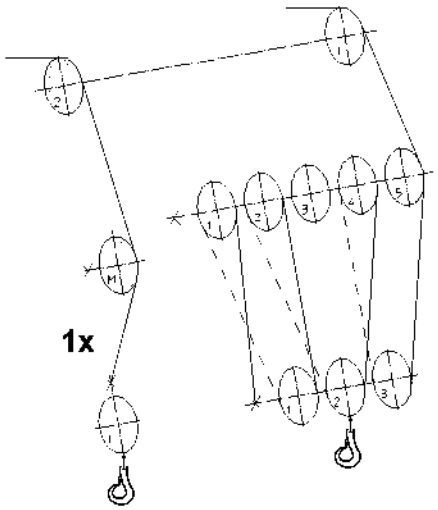
1 - 5f - 3f 3r - 4r
4f - 2f . 2r - 2r
2f - 1f 1r - 1r
1f - F
2 - Mf - F



1 - 5f - 3f . 3r - 4r
4f - 2f . 2r - 2r
2f - 1f 1r - 1r
1f - F
2 - Mf - 1f 1r - F

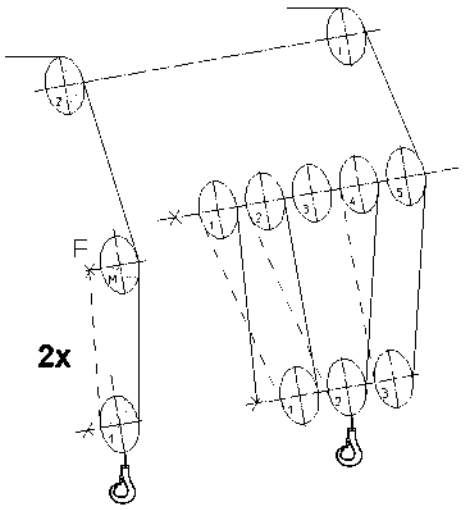


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Fig.120422

5 Reeving Boom nose*

Note

▶ The quoted implementations are examples for reeving the telescopic boom. Only the reevings for the telescopic boom may be used, see section Reevings T-operation.

WARNING

The crane can topple over!

Death, severe injuries, property damage.

▶ For operation with boom nose* on the telescopic boom reeve exclusively the reevings for T-operation.

▶ The special reevings for the telesopic boom are **prohibited** for operation with boom nose.

Explanation of symbols on the reeving plans:

– The number denotes the number of the respective rope pulley on the pulley head.
– The letter **f** means reeve on the **front** over the rope pulley on the pulley head.
– The letter **r** means reeve on the **rear** over the rope pulley on the pulley head.
– The letter **F** means **rope fixed point**.

5.1 Boom nose with load hook

Reeving Boom nose	Rope fixed point
1x	On the hook block or on the load hook fixed point

5.2 Boom nose with 1-pulley hook block

Reeving Boom nose	Rope fixed point
2x	On boom nose

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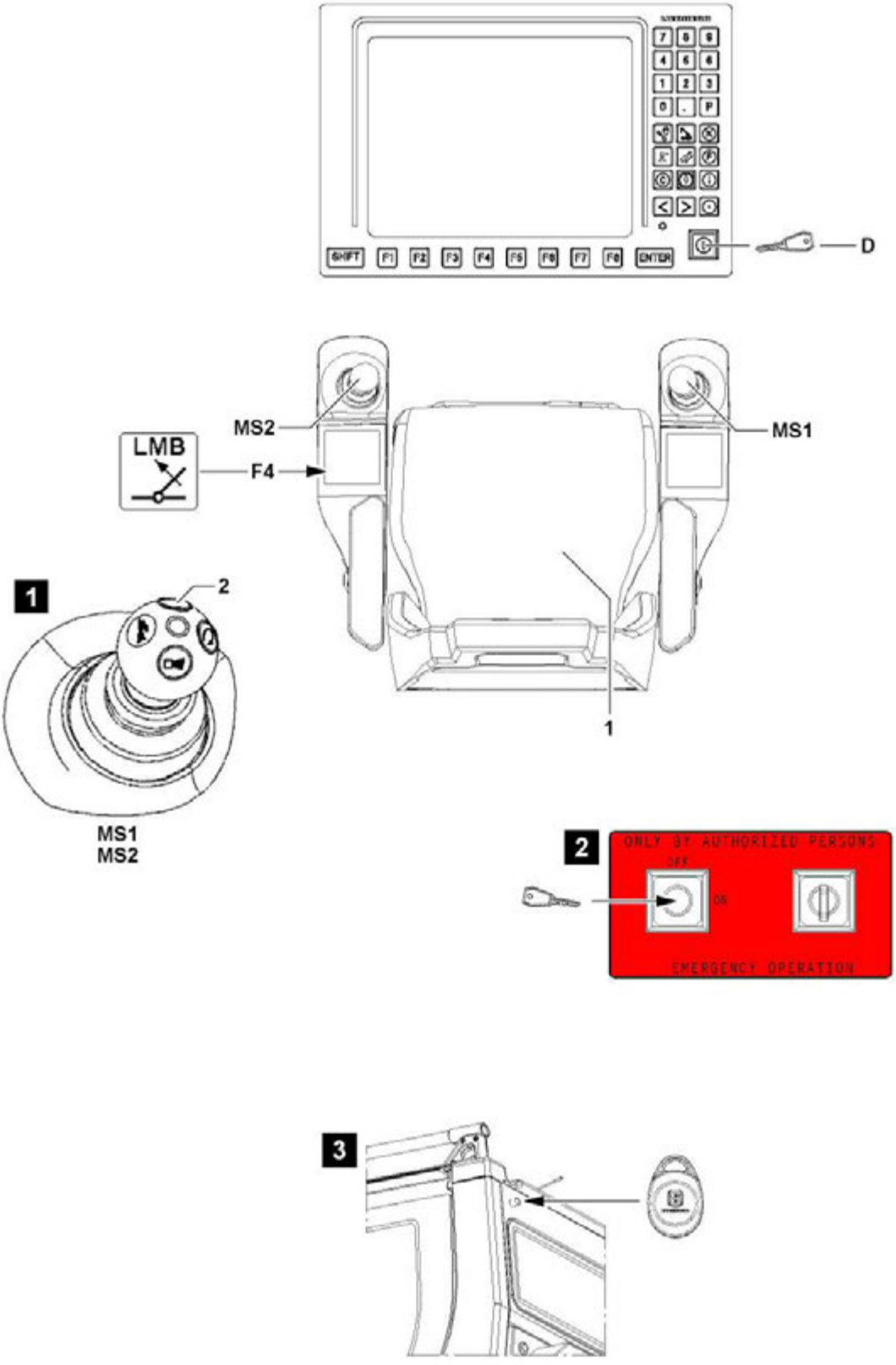

Fig.117245

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1 General

WARNING
Limits of LICCON computer system!
The LICCON computer system cannot reduce the danger of accidents in case of unsuitable or careless operation nor abrogate physical limits.
The LICCON computer system cannot take into account errors or judgment / erroneous operation.
- ▶ The responsibility for safe crane operation / assembly operation and crane application is resting solely with the crane operator and operating personnel.
- ▶ Always match crane operation / assembly operation and crane application with the operating conditions.

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 display and assignment of the icons can deviate, depending on the set up configuration, operating status and configuration of the crane.
- ▶ In addition, many of the illustrations show the maximum configuration of the LICCON monitor with icons.
- ▶ In crane operation, an identical display will **not** appear on the LICCON monitor.

Note
- ▶ Load hook and hook block are generally also described as hooks.

1.1 Operating elements for special cases at operation of the LICCON overload protection

Within the crane operator's cab, two buttons are installed as operating elements for „Special cases at operation of the LICCON overload protection“

- Button **F4** in the left control console.
- Set up key **D** on LICCON monitor 0

Depending on the crane configuration, an additional operating element can be installed outside the crane operator's cab as operating element for „Special cases at operation of the LICCON overload protection“:
- Key switch LMB-emergency operation in switch cabinet, see illustration **2**.
- Transponder/Sensor LMB-emergency operation on rear of crane cab, see illustration **3**

If a crane movement is to be carried out with master switch **MS1** or master switch **MS2**, then at least one of the following buttons must be actuated:
- **1** Seat contact button
  - Is actuated by sitting properly on the seat.
- **2** Button
  - To bypass the seat contact button **1**, to be able to work while standing up, if necessary.

1.2 Special cases at operation of the LICCON overload protection

When special cases at operation of the LICCON overload protection occur, then the functionality of the LICCON overload protection is accessed.

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WARNING
Access into the functionality of the LICCON overload protection!
If the functionality of the LICCON overload protection is accessed by pressing the key **F4**, set up key **D** or possibly the activation of the LMB-emergency operation, then the LICCON overload protection is entirely deactivated, bypassed or limited.
It is possible to exceed several shut off limits of the LICCON overload protection simultaneously or one after the other.
It is possible to carry out crane movements, which are not monitored by the LICCON overload protection.
Without the LICCON overload protection, no additional protection against overload of the crane via the crane control is present.

- ▶ When accessing the functionality of the LICCON overload protection, take into account that the LICCON overload protection is deactivated totally or limited.
- ▶ Carry out any access into the functionality of the LICCON overload protection exclusively according to the specifications in the Operating instructions.

Possible limitation in the crane control:

- During certain „Special cases at operation of the LICCON overload protection“, the working speed of the crane is significantly reduced.
- During certain „Special cases at operation of the LICCON overload protection“, the possibility to control the crane is limited in time.
- During certain „Special cases at operation of the LICCON overload protection“, the individual display instruments show no values.

1.2.1 Special operating conditions

If a special operating status occurs, such as self-blocking of overload protection („Deadlock“), pressing key **F4** or set up key **D** can provide a remedy.

By pressing the key **F4** you can:

- Luffing in with suspended load

By pressing the set up key **D**, the function „Exceeding the shut off limits of the LICCON overload protection“ is activated. This makes it possible:

- To exceed the maximum permissible load moment.
- To exceed the maximum value of the F-load display in crane operation
- To make it possible to carry out some limited crane movements after LMB-STOP due to sensor errors, when the erroneous sensor is not required for monitoring by the LICCON overload protection.

Note

- ▶ If there is no defect at a sensor and a load chart is available, then the display values remain for the crane utilization (load capability display).
- ▶ Depending on the crane configuration, exceeding the maximum permissible load moment is limited to 110 %.

1.2.2 Assembly / disassembly procedures

By pressing the set up key **D** you can:

- Bypass the LICCON overload protection to carry out erection / take down procedures and assembly procedures
- Bypass hoist top shut off (erection / take down procedures and assembly procedures)

Note

- ▶ For assembly / disassembly procedures, there may not no or significantly fewer reduced display values available.
- ▶ The display of required display values or determination of required values is ensured when correctly proceeded.

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1.2.3 Failure of components

WARNING
Erroneous operation of the crane!
If the LICCON overload protection turns the crane movement off due to failure of components, then the exact cause for the shut off must be determined.
After a failure of components, no normal operating status can be reached. No normal crane operation is possible.
▶ Procedure, see special chapter for Diagnostics and Maintenance.
▶ Assume normal crane operation only when the cause for the shut off has been remedied and the crane control is fully functioning.

Depending on the crane configuration, a shut off due to „failure of components“ can be bypassed by:
– Activating the LMB-emergency operation:
  • Key switch LMB-emergency operation in switch cabinet
    or
  • Transponder/Sensor LMB-emergency operation on rear of crane cab

  or
– **D** Set up key

The activated function contains the following:
– Allows crane movements in case of failure of components, for example sensors which are required for monitoring by the LICCON overload protection.

1.2.4 Emergency situations

WARNING
Overload of crane!
If the LICCON overload protection is bypassed, then the LICCON overload protection is entirely deactivated.
If the LICCON overload protection is bypassed, there is no further protection against crane overload.
There is no longer a load moment limitation.
If the LICCON overload protection is bypassed, the crane can be overloaded readily.
Overload of the crane can lead to accidents.
During accidents, personnel could be killed or seriously injured.
▶ If the LICCON overload protection is bypassed, take into account that the LICCON overload protection is entirely deactivated.
▶ If the LICCON overload protection is bypassed, the crane operator assumes the full responsibility for his actions.

Depending on the crane configuration, the LICCON overload protection can be bypassed by:
– Activating the LMB-emergency operation:
  • Key switch LMB-emergency operation in switch cabinet
    or
  • Transponder/Sensor LMB-emergency operation on rear of crane cab

  or
– **D** Set up key

The activated function contains the following:
– Allowing crane movements in emergency situations without monitoring by the LICCON overload protection

Note
▶ Installation location of operating elements, see Chapter 4.01

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1.3 Operating status of crane

A **„normal operating status“** can only be reached if all of the following statements apply:
- The crane is in proper condition.
- The crane is set up according to the specifications in the Operating instructions.
- The set up configuration of the crane has been entered correctly into the LICCON computer system.
- The crane is in the range of a valid load chart.
- The crane utilization is in the range of 0 % to 100 %.
- The F-load display is in the permissible range.
- All required displays in the LICCON monitors provide the correct display values.
- All required display instruments are functioning.
- The local conditions meet the specifications for crane application.

„**No normal operating status**“ is, among others, if one or more of the following statements apply:
- The crane has defects, which compromise the operational safety.
- The crane is not set up according to the specifications in the Operating instructions.
- The set up status of the crane deviates from the entries in the LICCON computer system.
- The limit values from the load charts are exceeded.
- The maximum permissible load moment is exceeded.
- The hoist top shut off is bypassed.
- The limit values from the F-load display are exceeded.
- Required displays in the LICCON monitors provide no correct display values.
- Required display instruments are not functioning.
- The functionality of the LICCON overload protection has been accessed by pressing the key **F4**, set up key **D**.
- When the LMB emergency operation is activated.
- Crane movements are carried out without functioning overload protection.
- Crane movements are carried out outside of the load charts.
- A special case at operation of the LICCON overload protection has occurred.

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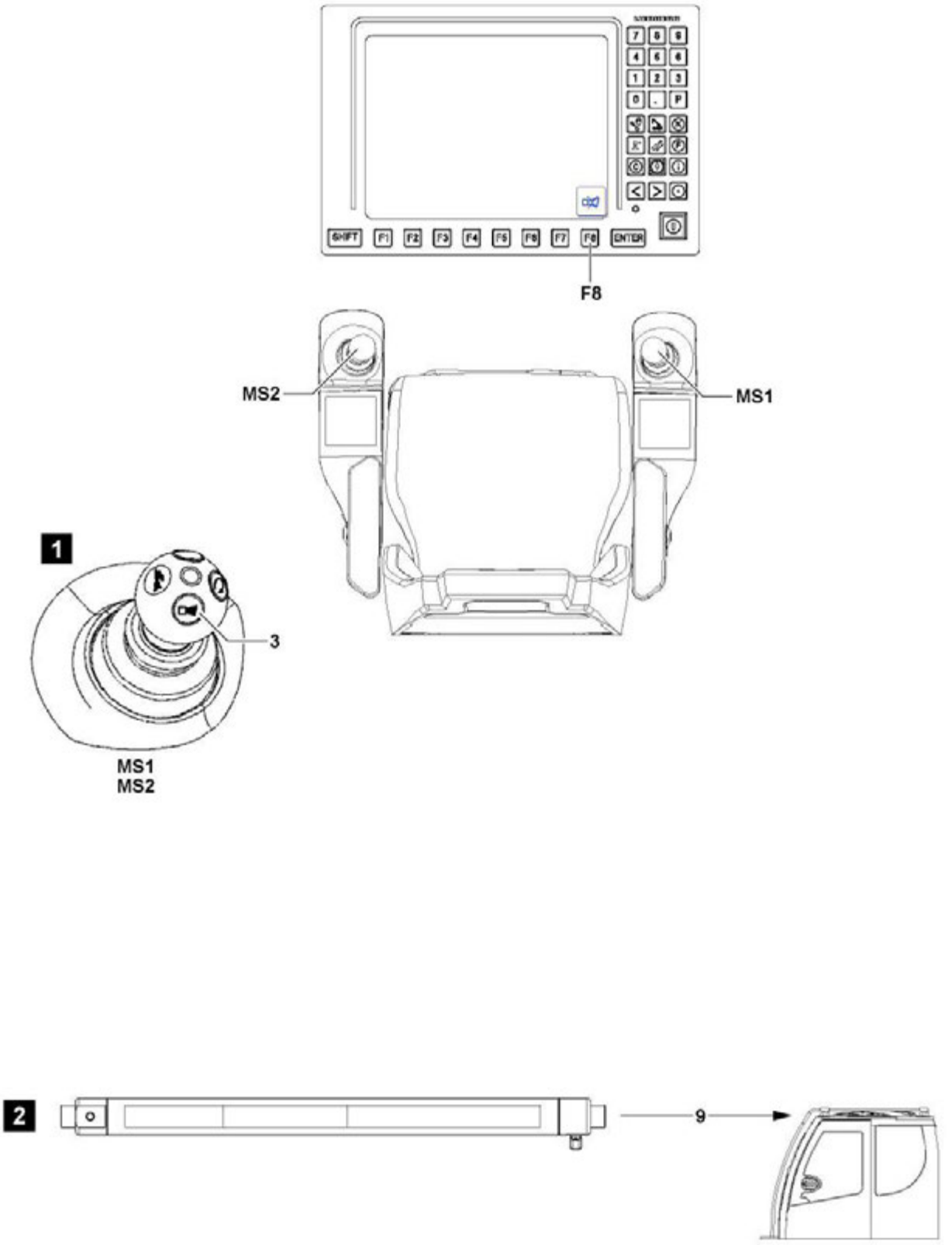

Fig.117246

1.4 Overview of acoustic / optical warnings

- Via the signal sounds of the LICCON monitor, the acoustic warnings are issued to the crane operator.
- Via a horn on the turntable, the acoustic warnings are issued to the crane surrounding area.
- Via warning icons in display instruments, the optical warnings are issued to the crane operator.
- Via the LMB-warning lights, optical warnings are issued to the area surrounding the crane.
- The acoustic warnings within the crane operator's cab are turned off by pressing the key **F8** on the corresponding LICCON monitor.
- The shut off of the acoustical warnings outside the crane operator's cab is made by pressing the button **3** (signal horn / horn, illustration **1**) on master switch **MS1** or master switch **MS2**.

1.4.1 General notes regarding the acoustic / optical warnings to the crane surrounding area

WARNING
Disregard of acoustic or optical warnings!
If persons in the crane surrounding area are not informed about the meaning of acoustic / optical warnings of the crane, then there is a danger of accidents.
▶ Only persons who have been informed how to proceed correctly according to the acoustic / optical warnings may be in the area surrounding the crane.

In reference to the horn on the turntable, the following applies:
- An intermittent sound is heard: A special case in the operation of the LICCON overload protection has occurred or the overload protection has turned the crane movement off.

In reference to the three color light **9**, (illustration **2**) the following applies:
- The three color light **9** lights up green: The crane is in normal operating status.
- The three color light **9** lights up yellow: The crane is still in normal operating status, an advance warning for upcoming shut off exists.
- The three color light **9** lights up red: The crane movement was turned off by the overload protection.
- The three color light **9** blinks yellow: A special case at operation of the LICCON overload protection has occurred.
- The three color light **9** blinks red: A special case at operation of the LICCON overload protection has occurred.

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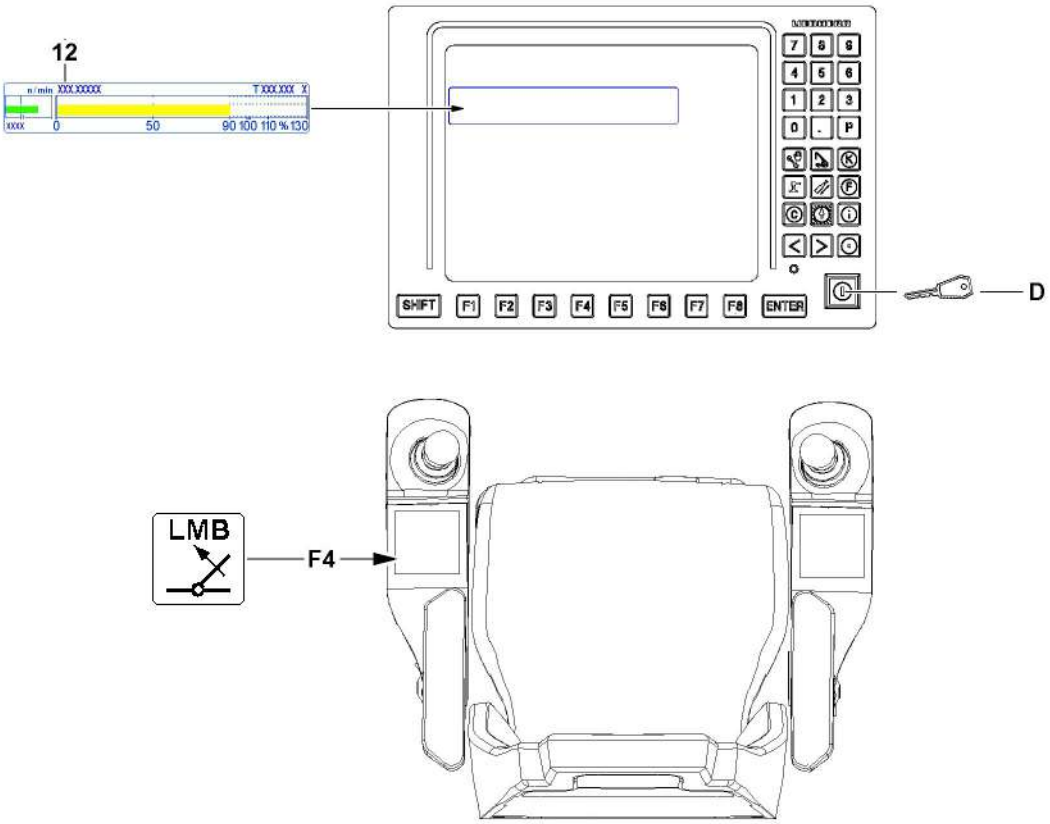

Fig.117247

1.4.2 Description of acoustic / visual warnings

The occurrence of acoustic / optical warnings in crane operation is explained via sample situations. The situation numbers from the chart „Overview of possible situations“ is valid for the following charts in this chapter:

- Acoustic / visual warnings on the LICCON monitor
- LMB warning lights
- Horn on the turntable

Note

▶ The percentage values in the „Overview of possible situations“ refers to the crane utilization according to the display in the bar diagram for utilization **12**.

Overview of possible situations	
Situation number	**Sample description of the situation**
Situation 001	Normal operating status with crane utilization of 0 % to 100 %.
Situation 003	The crane movement was turned off due to a crane utilization above 100 % - LMB-STOP was triggered.
Situation 004	The crane movement was turned off even though the crane utilization is below 100 % - LMB-STOP was triggered.
Situation 005	The crane movement „luffing in with suspended load“ is carried out at a crane utilization above 100 % via the **F4** key.
Situation 006	Failure of components
Situation 010	The shut off limits of the LICCON overload protection are deactivated / exceeded with the set up key **D**.
Situation 011	An actuated hoist limit switch (hoist top shut off) is bypassed with the set up key **D**.
Situation 020	The assembly operation was activated with the set up key **D** to erect / take down the boom system. No load chart is available.

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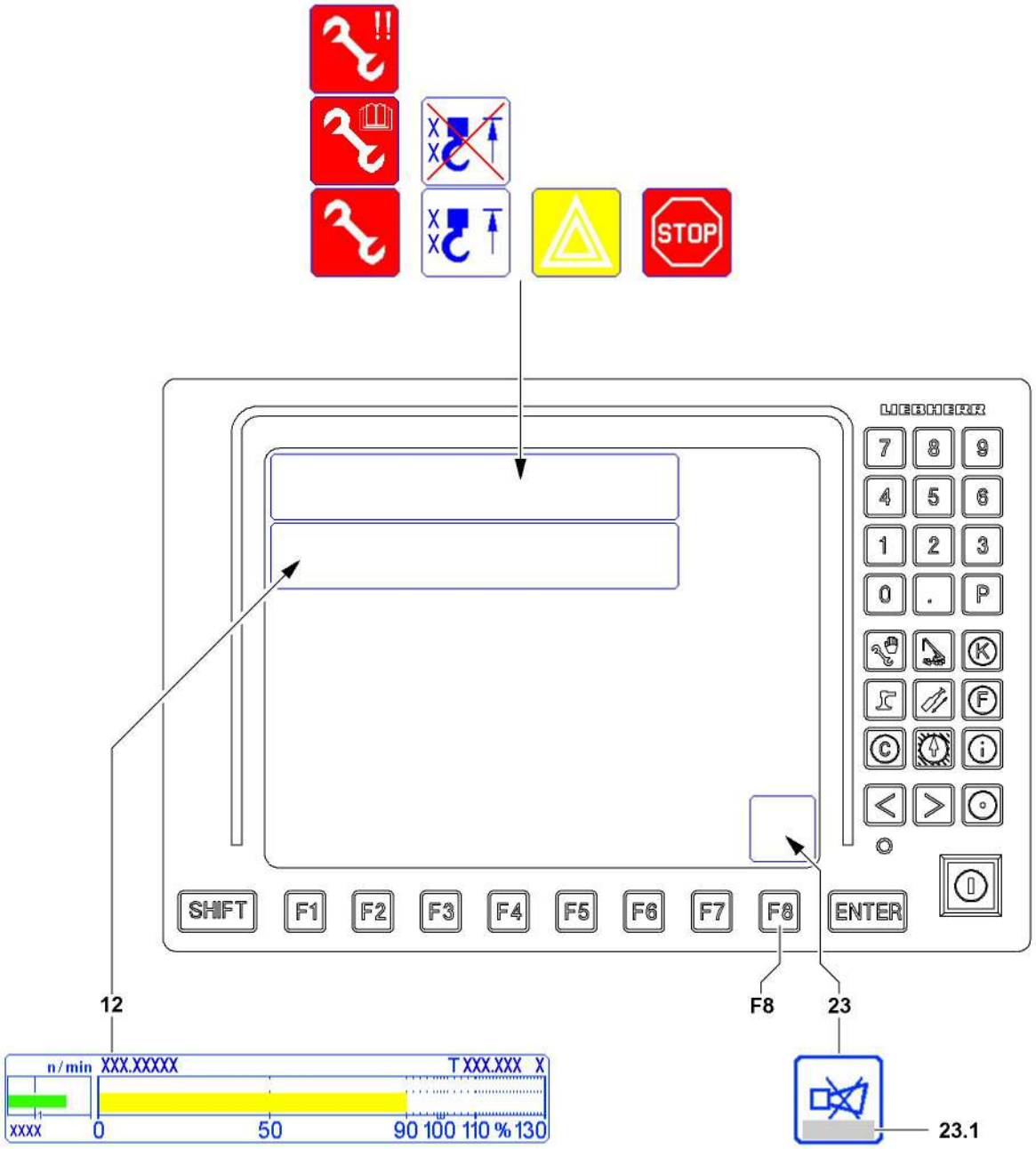

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Fig.117248

1.4.3 Acoustic / visual warnings within the crane operator's cab

Note

- For description of the situations assigned to the situation numbers, see chart „Overview of possible situations“
- The percentage values refer to the crane utilization according to the display in the bar diagram for utilization **12**.

WARNING

Erroneous operation of the crane!

- In relation with acoustic / optical warnings in the horn **23** icon, pay attention to the notes regarding error messages **23.1**.

Acoustic / visual warnings on the LICCON monitor							
Situation number	**Acoustic warning**		**Visual warning LICCON monitor**				
	Horn short[2]	**Horn long**[2]	**Warning signs**		**Special signs**		
							
Situation 001	From 90 %	-	From 90 %	-	-	-	-
Situation 003	From 90 %	From 101 %	From 90 %	From 101 %	-	-	-
Situation 004	-	Always	-	Always	-	-	-
Situation 005	-	From 101 %	From 101 %	From 101 %			
Situation 006				Always		Always[3]	
Situation 010	From 90 %	From 101 %	From 90 %	From 101 %	Always	-	-
Situation 011[1]	-	Always	-	-	-	-	Always
Situation 020	-	Always	-	-	-	Always	-

1) Is in part superseded by other warnings

2) Can be turned off immediately on the LICCON monitor key **F8**

3) Depending on the crane configuration, a similar icon appears, in which two exclamation marks (upper right) appear, see also chapter 4.02

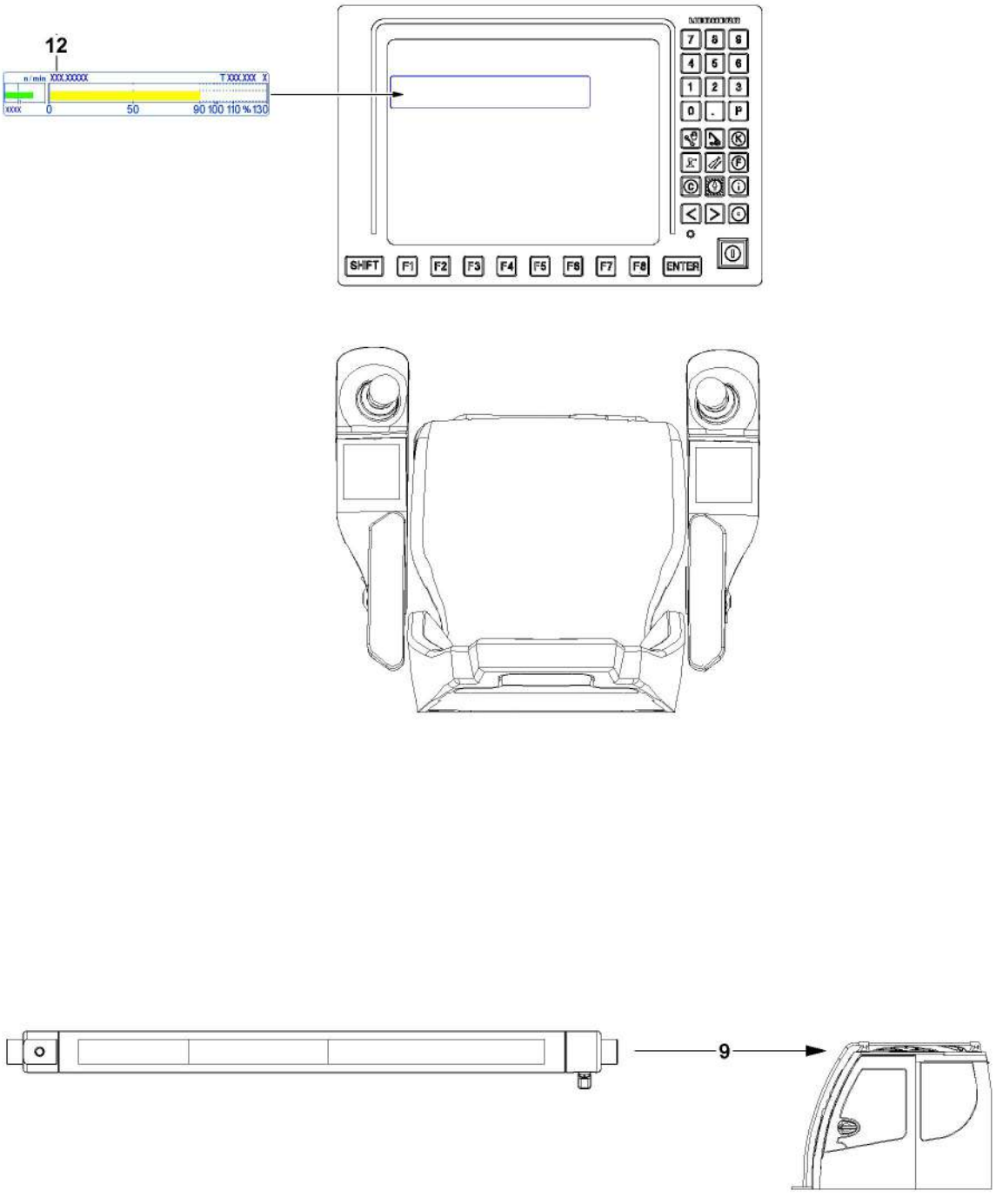

Fig.117249

1.4.4 Acoustic / visual warnings outside the crane operator's cab

Note

- For description of the situations assigned to the situation numbers, see chart „Overview of possible situations“
- The percentage values refer to the crane utilization according to the display in the bar diagram for utilization **12**.

LMB warning lights				
Situation number	**At utilization of crane**	Three color light **9**		
		Green	**Yellow**	**Red**
Situation 001	0 % to 89 %	Lights up		
	90 % to 100 %		Lights up	
Situation 003	From 101 %			Lights up
Situation 004	Always			Lights up
Situation 005	From 101 %			Blinks
Situation 006	Always			Blinks
Situation 010[4)]	0 % to 89 %	Lights up		
	90 % to 100 %		Lights up	
	101 % to 110 %		Blinks	
	From 111 %			Lights up
Situation 010	0 % to 89 %	Lights up		
	90 % to 100 %		Lights up	
	From 101 %			Blinks
Situation 011[1)]	Always		Blinks	
Situation 020	No display value		Blinks	

1) Is in part superseded by other warnings

4) Cranes according to EN13000:2010

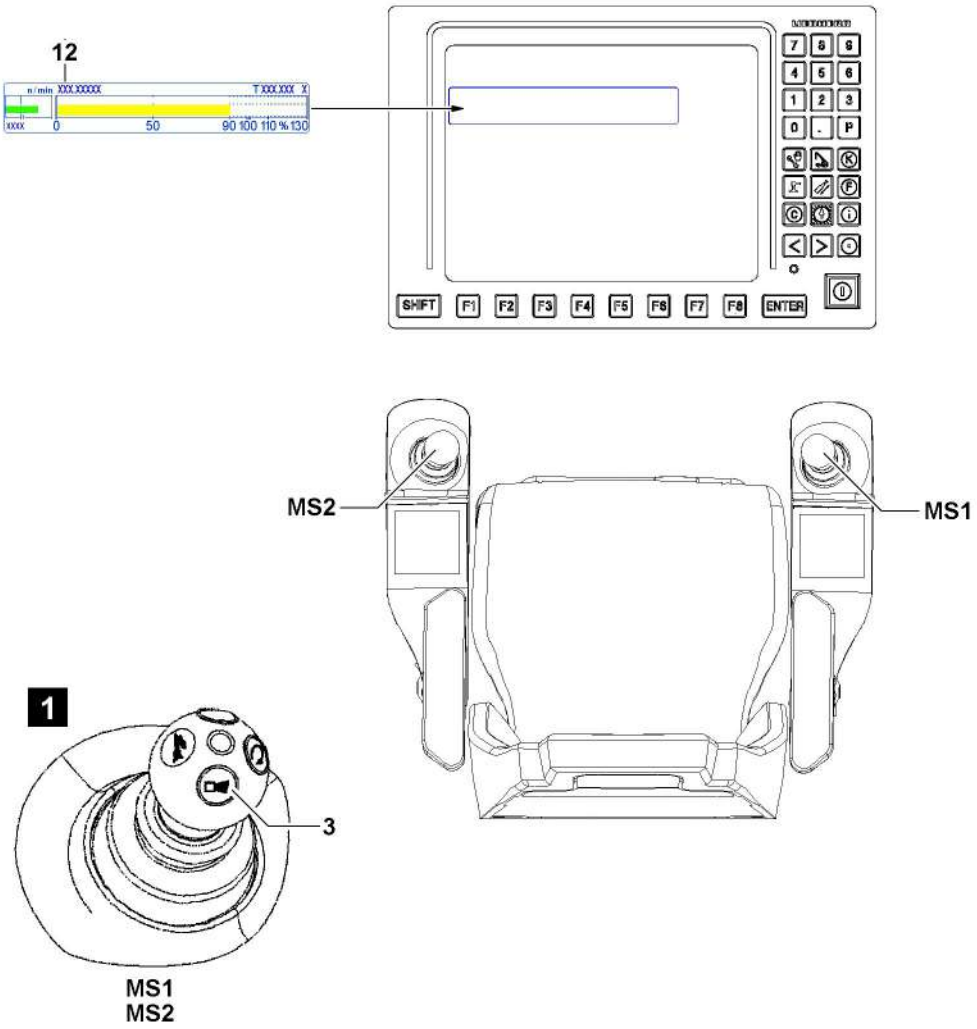

Fig.117250

Note

- For description of the situations assigned to the situation numbers, see chart „Overview of possible situations“
- The percentage values refer to the crane utilization according to the display in the bar diagram for utilization **12**.

The shut off of the acoustical warnings outside the crane operator's cab is made by pressing the button **3** (signal horn / horn, illustration **1**) on master switch **MS1** or master switch **MS2**. The signal shut off is effective no earlier than after five seconds.

Signal turntable		
Situation number	**At utilization of crane**	**Signal type**
Situation 001	0 % to 89 %	-
Situation 002	90 % to 100 %	-
Situation 003	From 101 %	Intermittent sound, can be shut off after five seconds
Situation 004	Always	-
Situation 005	From 101 %	Intermittent sound, can be shut off after five seconds
Situation 006	Always	Intermittent sound
Situation 010	From 111 %	Intermittent sound, can be shut off after five seconds
Situation 011[1)]	Always	Intermittent sound, can be shut off after five seconds
Situation 020	No display value	-

1) Is in part superseded by other warnings

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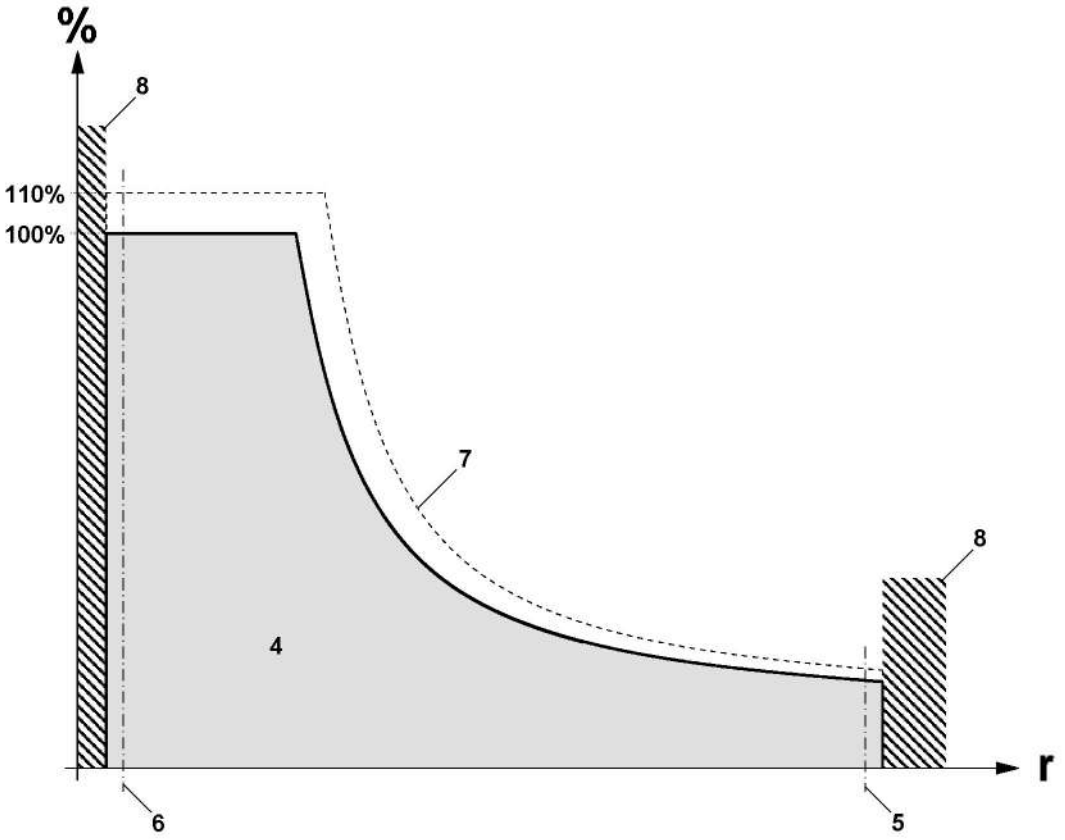

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Fig.115265

2 Instructions to resume the crane movement

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.

2.1 Overview Load chart

Sample overview of a load chart.

Axle	Description
r	Radius boom (working radius)
%	Utilization of the crane in percentages

Position	Description
4	Range „Load chart available“
5	Lower limit angle load chart
6	Upper limit angle load chart
7	Curve utilization 110 %
8	Range „No load chart available“

2.2 Shut off of crane movement

The LICCON overload protection carries out the following shut offs if a limit value is exceeded in crane operation:
– Shut off of overload
– Shut off Luffing the telescopic boom up / down
– Shut off Luffing the auxiliary boom / accessory up / down
– Shut off Telescoping the telescopic boom out (limit length)
– Shut off Telescoping the telescopic boom in
– Shut off Spooling the winch up / out
– Shut off Hoist top
– Shut off Crane movement with danger of tipping to the rear
– Shut off Maximum value F-load display
– Shut off Telescoping cylinder (pressure too high)
– Shut off due to error message

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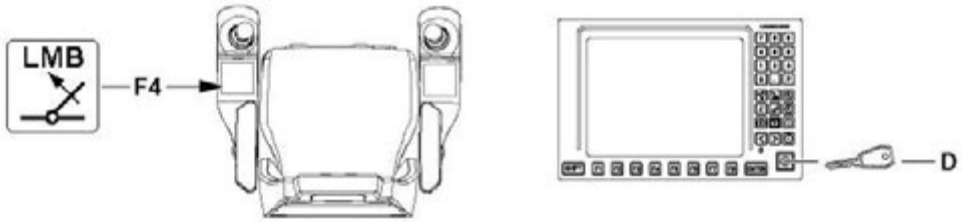

Fig.117251

WARNING
Erroneous operation of the crane!
If the LICCON overload protection turns the crane movement off, then the exact cause for the shut off must be determined first.
- ▶ Determine the cause for the shut off and remedy it if possible without pressing the key **F4** „Luffing in with suspended load“ or the set up key **D**.
- ▶ If it is not possible to reset the crane movement causing the shut off, see section „Procedure for special cases at operation of the LICCON overload protection“.

2.2.1 Shut off of overload

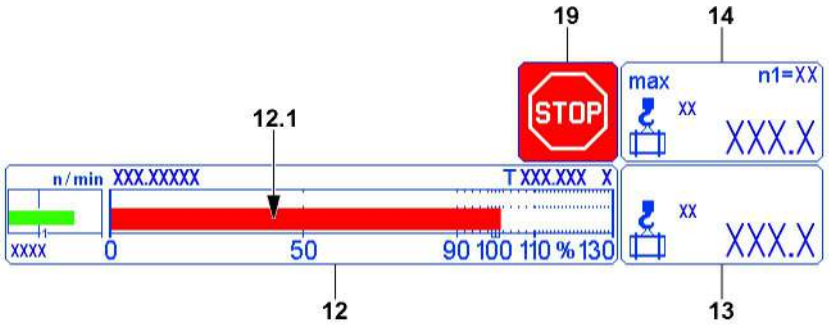

Fig.117252

In the bar diagram utilization **12** the utilization bar **12.1** exceeds the 100 % mark. The LICCON overload protection has turned off the crane movement, icon LMB-STOP **19** appears. The actual load **13** has exceeded the maximum load **14**.

Note
The crane and load may be swaying.

If possible:
- ▶ Wait until the crane and load came to a complete standstill.

When the bar diagram utilization **12** levels off at less or equal 100 %:
- ▶ Carry out crane movements in such a way that no repeated shut off by the LICCON overload protection occurs.

When the bar diagram utilization **12** levels off at more than 100 %:
- ▶ Check if there are permissible tasks, which positively influence the utilization of the crane.

When necessary and possible:
- ▶ Set down the load.

Note
It is possible that the following tasks can positively influence the utilization of the crane:
- ▶ Set down the load and reduce.
- ▶ Reduce the radius.
- ▶ Set down the load and reconfigure the crane to obtain higher load chart values.
- ▶ Set down the load and reduce the radius by changing the crane.

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▶ Carry out permissible tasks which reduce the utilization of the crane.

Problem remedy

The crane operation is limited because the maximum load **14** is seemingly too low or reached too soon?

▶ Make sure that the load capacity of the crane is sufficient for the upcoming crane application.
▶ 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 specifications in the Operating instructions.
▶ 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 environmental influences (for example wind influence) onto the crane are not too great.
▶ Contact Liebherr Service.

When the shut off cannot be remedied despite noting all points listed here:

▶ Change to section „Procedure for special cases at operation of the LICCON overload protection“.

2.2.2 Shut off Luffing the telescopic boom up / down

Note

▶ The illustration of icon **15** depends on the set up status of the crane.

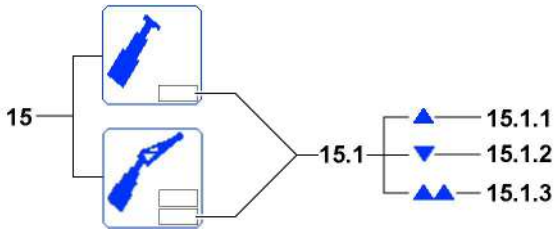

Fig.117253

In the icon **15** the arrow **15.1.1** or arrow **15.1.2** blink and the LICCON overload protection has shut off the crane movement.

„Luffing the telescopic boom up“ (arrow **15.1.1**) or „Luffing the telescopic boom down“ (arrow **15.1.2**) was shut off because the upper / lower limit angle of the selected load chart was exceeded or fallen below.

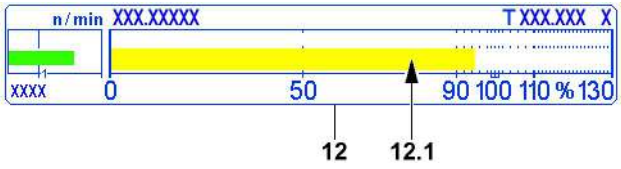

Fig.117254

Note

▶ If the utilization of the crane approaches 100 % (in the bar diagram utilization **12** the utilization bar **12.1** is just before 100 %) and the maximum load according to the load chart (falling load capacity) drops by continuing to luff up the boom, then the arrow **15.1.1** also appears and the crane movement „Luffing the telescopic boom up“ is turned off.

If the double arrow **15.1.3** appears, then:

– **either** it was luffed up to a limit switch or the limit switch has turned off the crane movement „Luffing the telescopic boom up“
– **or** there is an error on one of the limit switches „Telescopic boom top“

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The arrow **15.1.1** appears and the crane movement „luffing the telescopic boom up“ was turned off:

▶ Luff the telescopic boom down.

Result:

– Crane operation is possible again.

The arrow **15.1.2** appears and the crane movement „luffing the telescopic boom down“ was turned off:

▶ Luff the telescopic boom up.

Result:

– Crane operation is possible again.

The double arrow **15.1.3** appears and the crane movement „Luffing the telescopic boom up“ was turned off:

▶ Luff the telescopic boom down.

Result:

– Crane operation is possible again.

Problem remedy
The double arrow **15.1.3** appears continuously?
If a double arrow **15.1.3** appears without having luffed the telescopic boom up to a limit switch, then there may be an error in the limit switches / sensors.
▶ Check if there is an error message from the LICCON computer system, see section „Shut off due to error message“.
▶ If yes: Remedy the error immediately.

WARNING
Limited warning functions!
If one of the double version limit switches / sensors 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.

2.2.3 Shut off luffing the auxiliary boom / accessory up / down

Note
▶ Only in operating modes with auxiliary boom / accessory
▶ The illustration of icon **15** depends on the set up status of the crane.
▶ The description „auxiliary boom / accessory“ comprises all boom types which are installed on the telescopic boom luffable / adjustable.

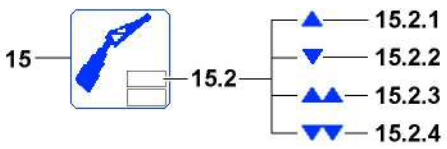

Fig.117255

In the icon **15** (upper field) the arrow **15.2.1** or arrow **15.2.2** blink and the LICCON overload protection has shut off the crane movement.

„Luffing the auxiliary boom / accessory up“ (arrow **15.2.1**) or „Luffing the auxiliary boom / accessory down“ (arrow **15.2.2**) was shut off because the upper / lower limit angle of the selected load chart was exceeded / fallen below.

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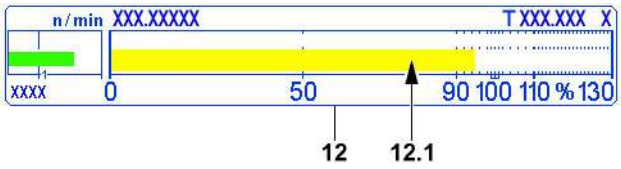

Fig.117254

Note

▶ If the utilization of the crane approaches 100 % (in the bar diagram utilization **12** the utilization bar **12.1** is just before 100 %) and the maximum load according to the load chart (falling load capacity) drops by continuing to luff up the boom, then the arrow **15.2.1** also appears and the crane movement „Luffing the auxiliary boom / accessories up“ is turned off.

If the double arrow **15.2.3** 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“
- **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 double arrow **15.2.4** 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 arrow **15.2.1** 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 arrow **15.2.2** 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 double arrow **15.2.3** 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 double arrow **15.2.3** appears continuously?
If a double arrow **15.2.3** 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 section „Shut off due to error message“.
▶ If yes: Remedy the error immediately.

The double arrow **15.2.4** appears and the crane movement „Luffing the auxiliary boom / accessory down“ was turned off:

▶ Luff the auxiliary boom / accessory up.

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Result:

– Crane operation is possible again.

Problem remedy
The double arrow **15.2.4** appears continuously?
If a double arrow **15.2.4** appears without having luffed down to a limit switch, then there may be an error in the limit switches / sensors.
▶ 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 / sensors 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 / sensor.

▶ Carry out crane movements in such a way that no repeated shut off by the LICCON overload protection occurs.

2.2.4 Shut off Telescoping the telescopic boom out (limit length)

Fig.117258

In the „Horn“ icon, illustration **1** appears an error message. An acoustical signal sounds, the LICCON overload protection has interrupted the crane movement „Telescoping the telescopic boom out“. Depending on the crane type, the double arrow in the icon **16** will also blink.

The crane movement „Telescoping the telescopic boom out“ was shut off because the **limit length** of the selected load chart has been exceeded.

▶ Telescope the telescopic boom in.

Result:

– Crane operation is possible again.

2.2.5 Shut off Telescoping the telescopic boom in

Fig.117258

In the „Horn“ icon, illustration **1** appears an error message. An acoustical signal sounds, the LICCON overload protection has interrupted the crane movement „Telescoping the telescopic boom in“. Depending on the crane type, the double arrow in the icon **16** will also blink.

The crane movement „Telescoping the telescopic boom in“ was shut off because the **limit length** of the selected load chart has been fallen below.

▶ Telescope the telescopic boom out.

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Result:

– Crane operation is possible again.

2.2.6 Shut off spooling the winch up / out

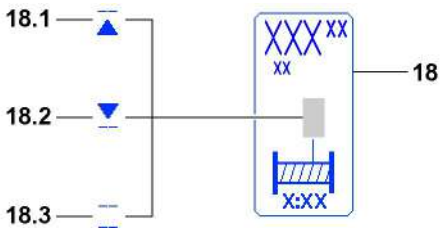

Fig.117256

In the icon **18**, the line / arrow **18.1**, arrow / line **18.2** or line / line **18.3** appears and the LICCON overload protection has shut off the crane movement.

„Spooling the winch out“ (line / arrow **18.1**) or „Spooling the winch up“ (arrow / line **18.2**) was shut off because the upper / lower limit angle of the rope for the selected winch was exceeded or fallen below.

If line / line **18.3** appears blinking in the icon **18**, then the affected winch is deactivated.

The line / arrow **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 arrow / line **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 chapter 4.02.

Result:

– Crane operation is possible again.

2.2.7 Shut off hoist top

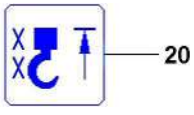

Fig.115281

The icon „hoist top“ **20** appears in the LICCON monitor and the LICCON overload protection has turned off crane movement.

Spooling the hoist winch up was turned off because the hook (hook block / load hook) has touched 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 (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.

2.2.8 Shut off Crane movement with danger of tipping to the rear

Note

▶ Applies only for cranes with support force monitoring*.

WARNING

Danger of tipping backward!
When reaching the programmed minimum / maximum support force limits there is **no** automatic shut off of crane movements.
Exception: When the two supports with the lowest forces are in boom direction, then some crane movements which increase the „danger of tipping to the rear“ significantly are turned off.

▶ If there is a „danger of tipping to the rear“, luff the boom down carefully or telescope out until the support limit forces are again within the minimum / maximum values.

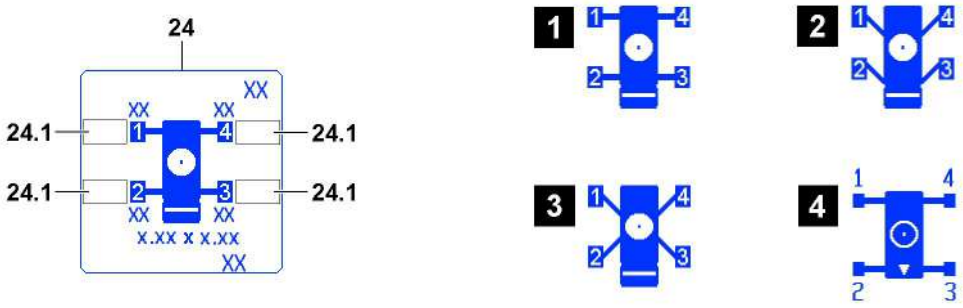

Fig.117257

The icon **24** (depending on the crane similarly to illustration **1** to illustration **4**) is shown in the LICCON monitor with blinking values in the fields **24.1** of the supports with the lowest forces. An acoustical signal sounds and the LICCON overload protection has shut off the crane movement.

Crane movements which increase the „danger of tipping to the rear“ significantly were turned off.

▶ Luff the boom down carefully until the support limit forces are again within the minimum / maximum values and no value in the fields **24.1** blinks any longer.

Result:

– Crane operation is possible again.

Note

Possibilities to counteract the tipping danger to the rear:

▶ Luff down the boom.
▶ Telescope the boom out.
▶ Reduce the counterweight.

2.2.9 Shut off Maximum value F-load display

Note

▶ Applies only for certain crane types with respective display in the second LICCON monitor.

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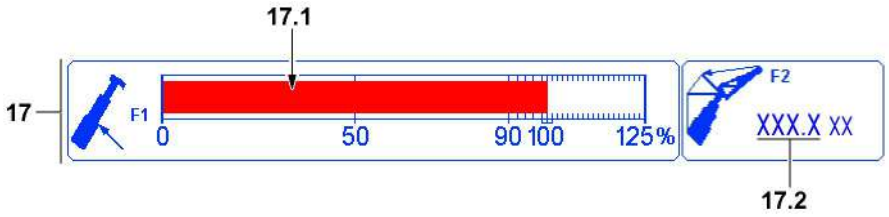

Fig.117259

– F1-utilization bar **17.1** = Test point F1 (Pressure display luffing cylinder)
– F2-actual value **17.2** = Test point F2 (force of guying auxiliary boom / accessories)
Note: Appears only for a corresponding boom system

In the F-load display **17** the F1-utilization bar **17.1** exceeds the 100 % mark and the LICCON overload protection has shut off the crane movement. $F1_{actual}$ has exceeded $F1_{max}$.

All subsequent movements, which lead to a deterioration of the force ratios on the test point F1 are shut off.

▶ Reverse any crane movement which has caused the shut off.
or
Initiate an alternative crane movement, which improves the force ration on test point F1.

Result:

– Crane operation is possible again.

▶ Carry out crane movements in such a way that no repeated shut off by the LICCON overload protection occurs.

Problem remedy
The crane operation is limited because the $F1_{max}$ 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 specifications in the Operating instructions.
▶ 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.

When the shut off cannot be remedied despite noting all points listed here:
▶ Change to section „Procedure for special cases at operation of the LICCON overload protection“.

2.2.10 Shut off Telescoping cylinder (pressure too high)

Note
▶ Applies only for certain crane types with respective display in the second LICCON monitor.

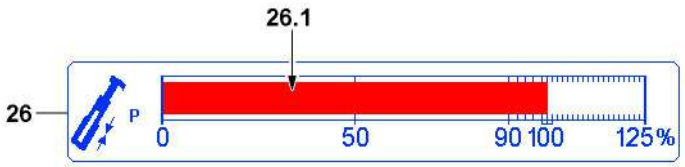

Fig.117260

In the icon **26** (telescoping cylinder pressure) the utilization bar **26.1** reaches the 100 % mark and the LICCON overload protection has shut off the crane movement.

All further movements, which directly lead to an increase of the telescoping cylinder pressure are shut off.

▶ Lower the telescoping cylinder pressure by lowering the load.
or
Initiate an alternative crane movement, which lowers the telescoping cylinder pressure.

Result:

– Crane operation is possible again.

In assembly operation:

Make sure that the specifications in the erection / take down charts are observed.

▶ Check that the specifications are observed.

2.2.11 Shut off due to error message

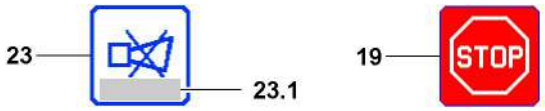

Fig.115283

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 are connected properly.
▶ Check if all end plugs (dust caps 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 status.
▶ Fix / replace the sensor, contact Liebherr Service if necessary.

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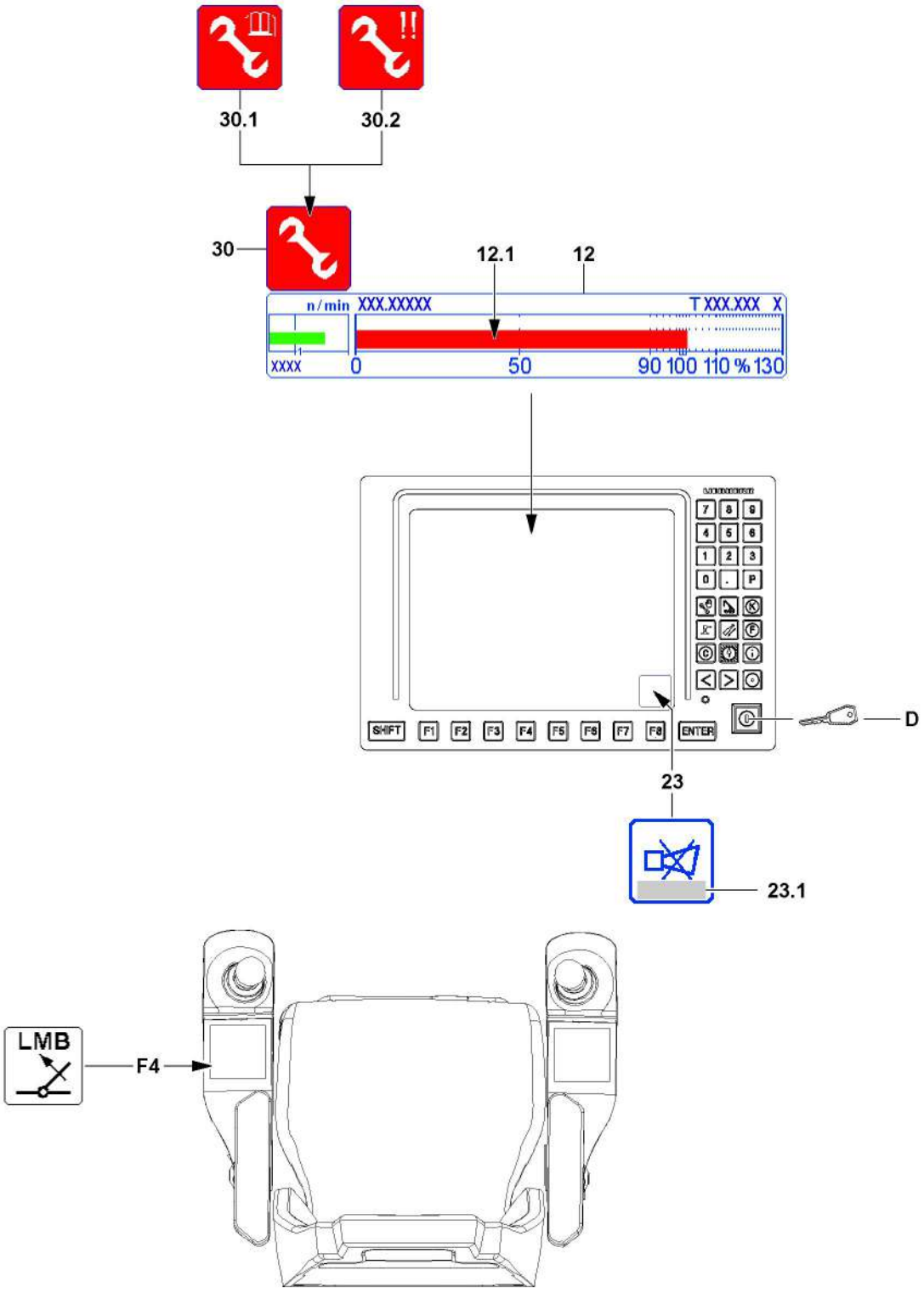

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Fig.117261

2.3 Procedure for special cases at operation of the LICCON overload protection

Within the crane operator's cab, the following operating elements available for Special cases at operation of the LICCON overload protection:
- Button **F4** in the left control console.
- Set up key **D** on the right LICCON monitor

By pressing key **F4** and set up key **D** the functionality of the LICCON overload protection is accessed.
If the set up key **D** is actuated, the assembly icon **30** appears in the LICCON monitor 0.

The assembly icon **30** appears, depending on the situation, also as:
- assembly icon **30.1** - no load chart / assembly status / sensor defect
- assembly icon **30.2** - emergency operation (also with only one exclamation mark)

In the horn icon **23** also appear error messages **23.1**:
- Observe and evaluate error messages **23.1**, see also Diagnostics manual.

WARNING
Risk of overloading and toppling of the crane!
If the functionality of the LICCON overload protection is accessed without knowing the exact cause for the shut off, then the crane can be overloaded and topple over.
Personnel can be severely injured or killed.
- ▶ Before accessing the functionality of the LICCON overload protection, determine the exact cause for the shut off.
- ▶ Observe and evaluate error messages **23.1**.

WARNING
Access into the functionality of the LICCON overload protection!
When accessing the functionality of the LICCON overload protection, the LICCON overload protection is deactivated totally or limited.
It is possible to exceed several shut off limits of the LICCON overload protection simultaneously or one after the other.
It is possible to carry out crane movements, which are not monitored by the LICCON overload protection.
Without the LICCON overload protection, no additional protection against overload of the crane via the crane control is present.
- ▶ When accessing the functionality of the LICCON overload protection, take into account that the LICCON overload protection is deactivated totally or limited.
- ▶ Carry out any access into the functionality of the LICCON overload protection exclusively according to the specifications in the Operating instructions.
- ▶ Outside of the load charts, the data in the erection / take down charts is binding.

WARNING
Leaving the load chart!
If the set up key **D** is actuated, it is possible that the crane leaves the range of the load charts.
Without a load chart, various display values are no longer displayed in the crane operating screen.
A load on the hook can no longer be monitored by the LICCON overload protection.
Severe accidents due to crane overload can result.
Personnel can be severely injured or killed.
- ▶ Do not leave the range of the load charts.

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WARNING
Danger of accident due to incorrect procedure!
Due to erroneous operation or deliberate misuse, the crane could collapse, the boom can break off or the crane can topple over.
Key **F4** „Luffing in at suspended load“ and set up key **D** may only be actuated when it is ensured that without their actuation no normal operating status (see section „operating status of the crane“) can be reached.

- ▶ Actuate the set up key **D** only when no normal operating status can be reached with the key **F4** „Luffing in with suspended load“.
- ▶ The set up key **D** may only be actuated by persons who are aware of the effects of their acts regarding the access into the functionality of the LICCON overload protection.
- ▶ Access into the functionality of the LICCON overload protection requires the presence of an authorized person and must be performed with utmost caution.
- ▶ Access into the functionality of the LICCON overload protection is prohibited in normal crane operation.

WARNING
Expanded working / danger zone of the crane!
Due to an access into the functionality 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.

- ▶ During a special case at operation of the LICCON overload protection take an expanded working / danger zone of the crane into account and monitor it.

WARNING
Overload of crane!
Luffing in / pulling in of a load standing on the ground is not permissible.
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.

WARNING
Self-blockade of overload protection (Deadlock)
After activation of the function „exceeding the shut off limits of the LICCON overload protection“, if no crane movements are initiated, which lead immediately to a normal operating status (see section „operating status of the crane“), then the overload protection can be self-blocking (Deadlock).
At a self-blocked overload protection it is no longer possible to control the crane.

- ▶ After activation of the function „exceeding the shut off limits of the LICCON overload protection“ initiate crane movements which lead immediately to a normal operating status (see section „operating status of the crane“).

Possible limitation in the crane control during certain „Special cases at operation of the LICCON overload protection“:

- During certain „Special cases at operation of the LICCON overload protection“ the shut off limits of the overload protection can be exceeded by pressing the set up key **D** maximum to 110 %.
- During certain „Special cases at operation of the LICCON overload protection“, the working speed of the crane is significantly reduced.
- During certain „Special cases at operation of the LICCON overload protection“, the possibility to control the crane is limited in time.
- During certain „Special cases at operation of the LICCON overload protection“, the individual display instruments show no values.

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Note

Depending on the number of load positions, the display in the bar diagram utilization **12** changes for certain crane types.

- If an additional utilization bar appears next to the utilization bar **12.1**, then the description applies accordingly.
- For a detailed description of the Bar diagram utilization **12**, see chapter 4.02.

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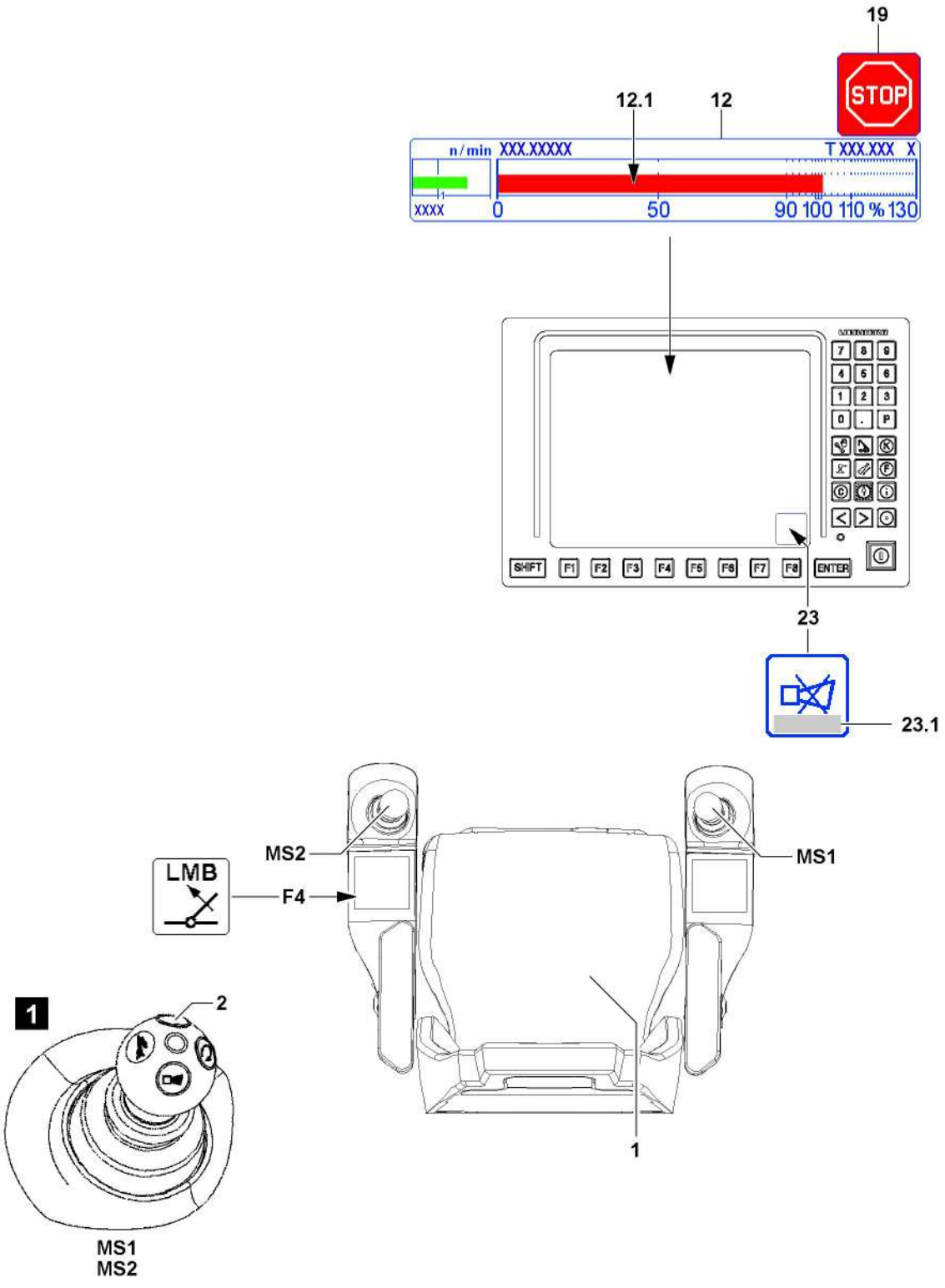

Fig.117262

2.3.1 Luffing in with suspended load

If the maximum permissible load torque is exceeded, the LICCON overload protection turns off all crane movements that increase the load torque.

In the bar diagram utilization **12** (load moment display) the utilization bar **12.1** 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 **F4** „Luffing in with suspended load“.

Make sure that the following prerequisites are met:
- The load hangs freely.
- The load hook / hook block and boom system have no ground contact.
- Either the seat contact button **1** or one of the buttons **2** (illustration **1**) of the master switches (MS1, MS2) is actuated.

Note
If the load is reduced by luffing up or the values in the bar diagram utilization **12** are exceeded too far, then the key **F4** „Luffing in with suspended load“ is possibly not functioning.
- ▶ Pay attention to notes regarding error messages **23.1** occurring in the horn **23** icon.
- ▶ For the procedure when the button **F4** „Luffing in with suspended load“ is not functioning, see section „Exceedance of maximum permissible load moment“.

▶ Press the key **F4** „Luffing in with suspended load“ and hold it.

Result:

- The LICCON overload protection is inactive.

▶ Luff the load in.

The function „Luffing in with suspended load“ is deactivated:
- When the key **F4** „Luffing in with suspended load“ is not longer actuated.
- When neither the seat contact button **1** nor one of the buttons **2** of the master switches (MS1, MS2) is actuated.

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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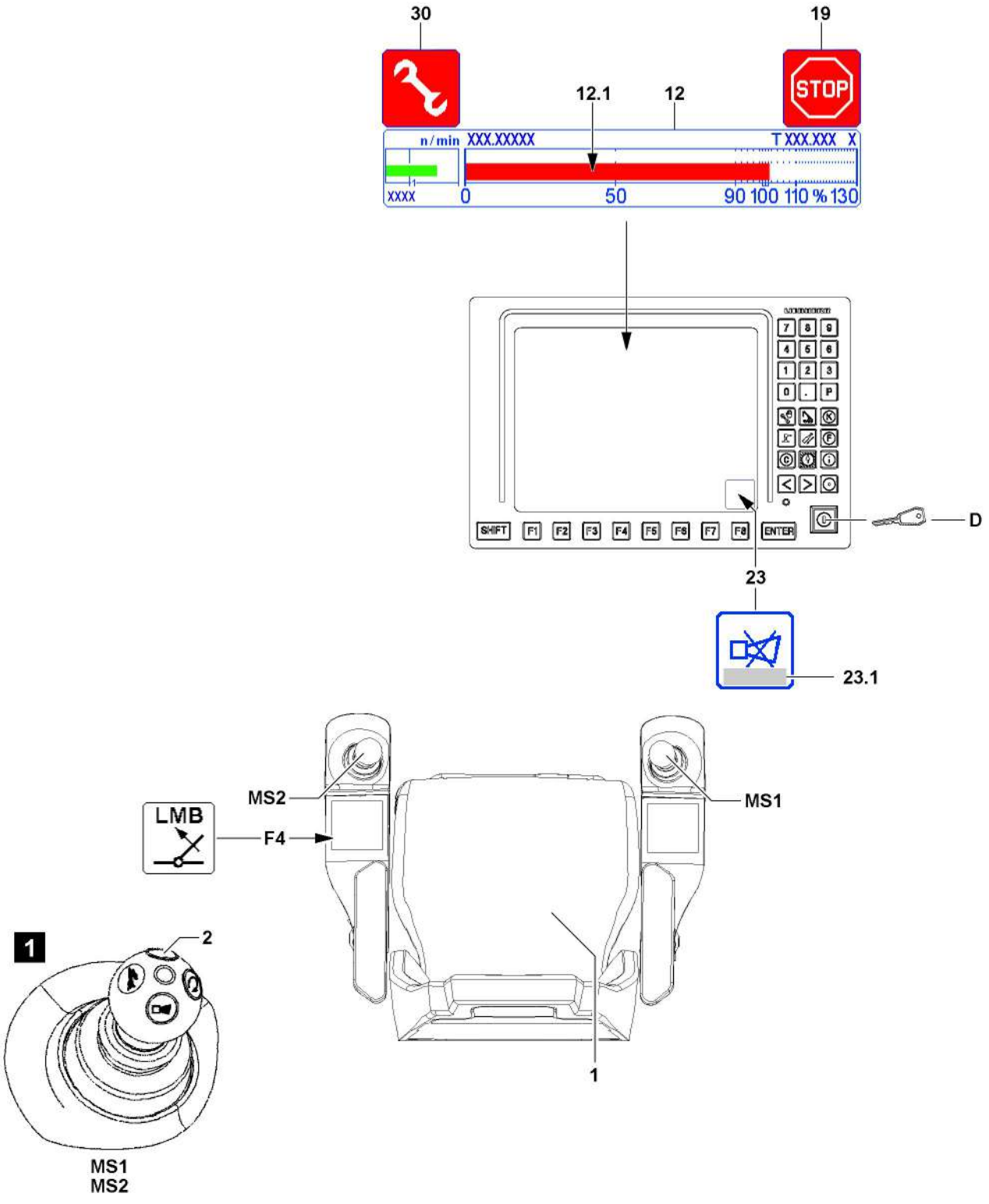

Fig.117263

2.3.2 To exceed the maximum permissible load moment.

If the maximum permissible load torque is exceeded, the LICCON overload protection turns off all crane movements that increase the load torque.

In the bar diagram utilization **12** (load moment display) the utilization bar **12.1** has exceeded the 100 % mark and in the LICCON monitor appears the icon **19**.

This limit value 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.
▶ All notes regarding the „Special cases at operation of LICCON overload protection“ must be observed.

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 **F4** „Luffing in with suspended load“ no normal operating status (utilization below 100 % and no active shut off) can be reached.
– All master switches are in zero position (not deflected).
– Either the seat contact button **1** or one of the buttons **2** (illustration **1**) of the master switches (MS1, MS2) is actuated.
– The crane is in the range of a load chart.

Note
If the values in the bar diagram utilization **12** are exceeded too far, then the functionality of the set up key **D** may be disabled.
▶ Pay attention to notes regarding error messages **23.1** occurring in the horn **23** icon.

▶ 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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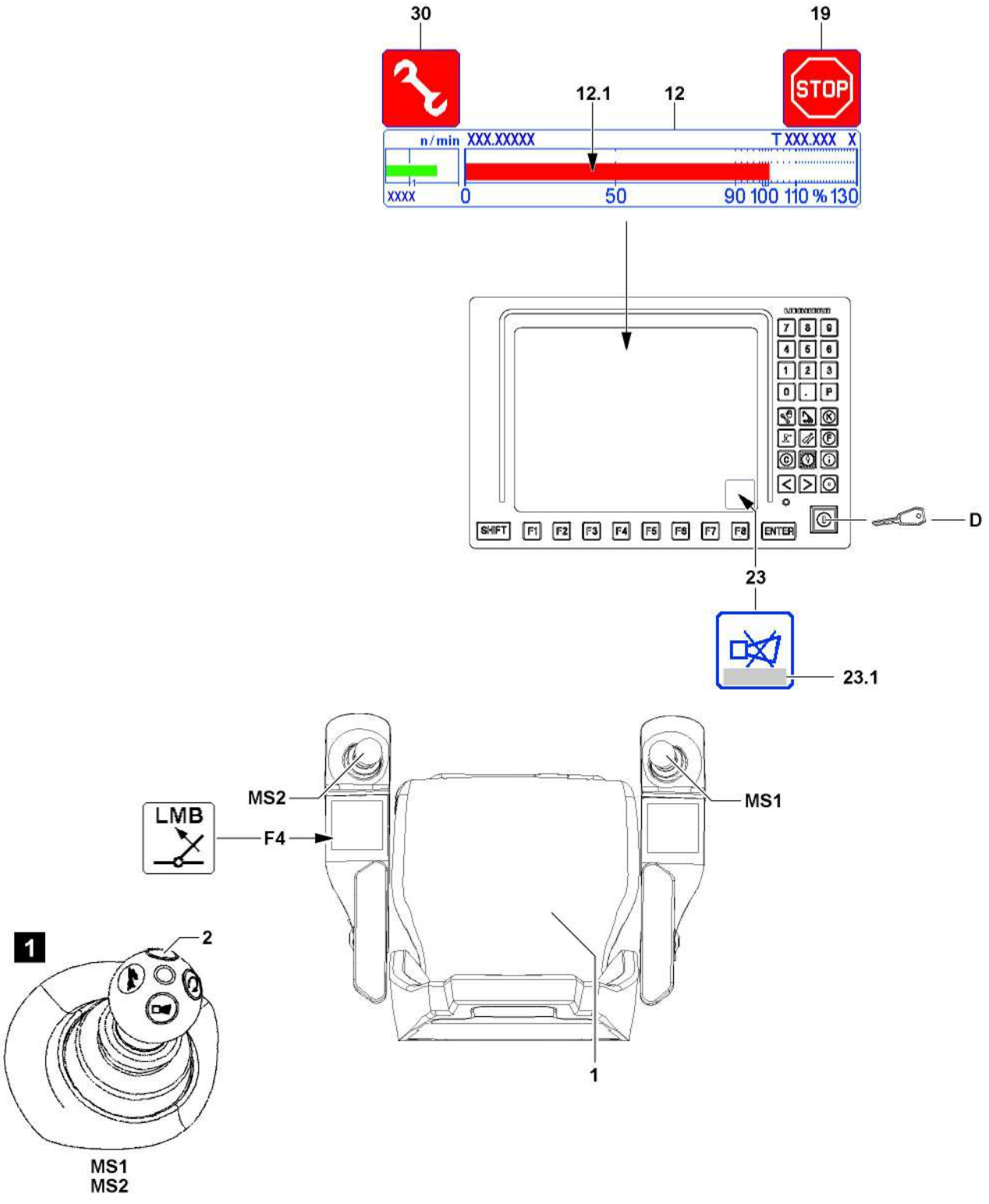

Fig.117263

▶ Initiate crane movements which lead immediately to a normal operating status (see section „operating status of the crane“).

The function „Exceedance of shut off limits of LICCON overload protection“ turns off immediately also:
– If the set up key **D** is actuated again.
– If all master switches are in neutral position for 10 seconds.
– When neither the seat contact button **1** nor one of the buttons **2** of the master switches (MS1, MS2) is actuated.
– When a hoist top shut off occurs.

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 possibly reduced until all master switches 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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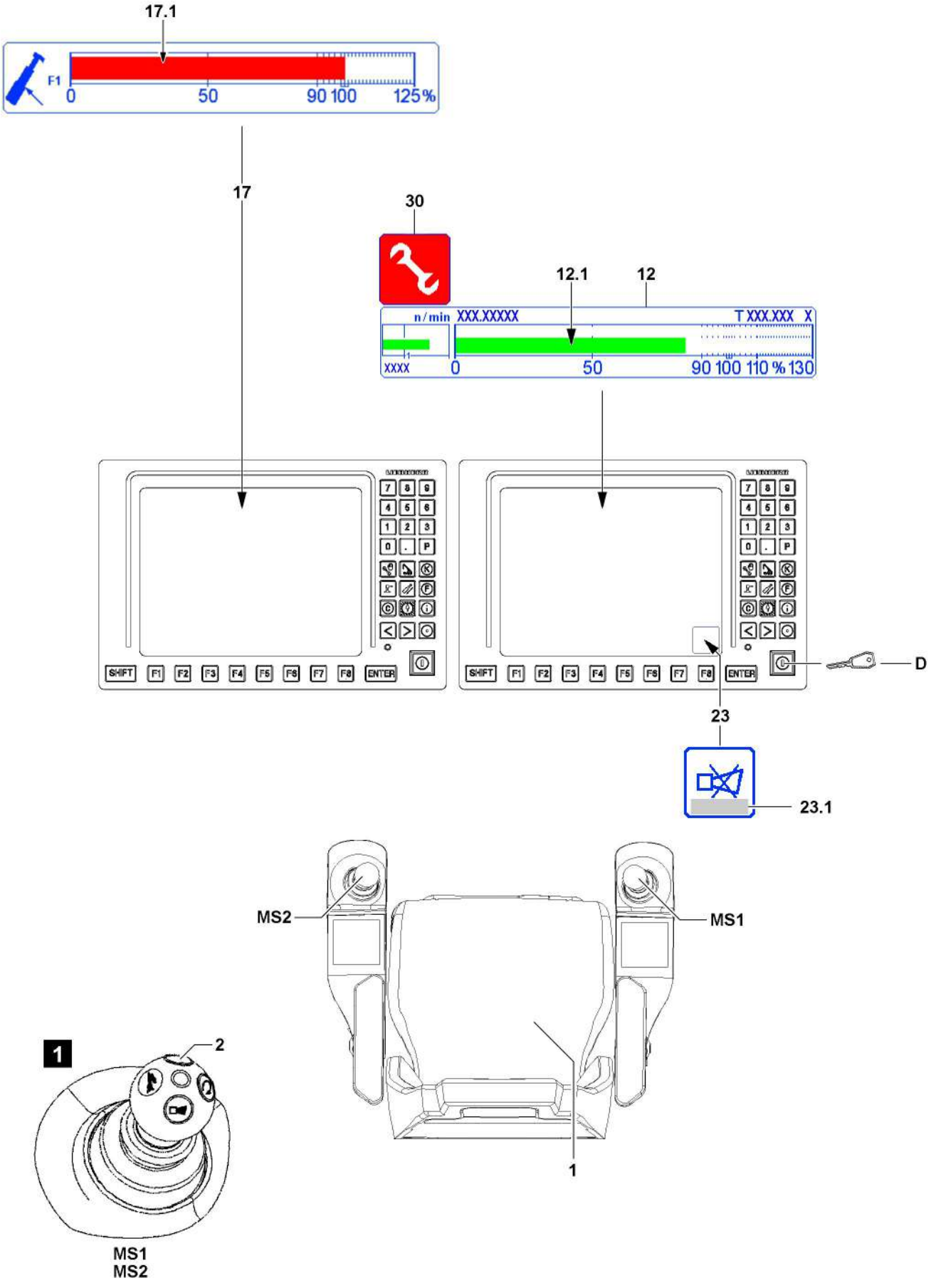

Fig.117264

2.3.3 To exceed the maximum value of the F-load display in crane operation

Note

▶ Applies only for certain crane types with respective display in the second LICCON monitor.

WARNING

Shut off safety device!

By pressing the set up key **D** if the maximum value of the F-load display is exceeded, then the function „Exceedance of shut off limits of the LICCON overload protection“ is automatically activated Thus there is no shut off if the maximum permissible load moment is exceeded.

▶ All notes regarding the „Special cases at operation of LICCON overload protection“ must be observed.

▶ The utilization bar **12.1** of the bar diagram utilization **12** must be observed.

▶ The F1-utilization bar **17.1** of the F-load display **17** must be observed.

Note

▶ See also section „Maximum values of F-load display reached“.

In the F1-load display **17** the utilization bar_{actual} **17.1** exceeds the 100 % mark and the LICCON overload protection has shut off the crane movement. $F1_{actual}$ has exceeded $F1_{max}$ value.

All other movements, which lead to a decline of the force ratio in the F-load display **17** are turned off.

Note

If the values in the F-load display **17** or in the bar diagram utilization **12** are outside the permissible range, then the functionality of the set up key **D** my be disabled.

▶ Pay attention to notes regarding error messages **23.1** occurring in the horn **23** icon.

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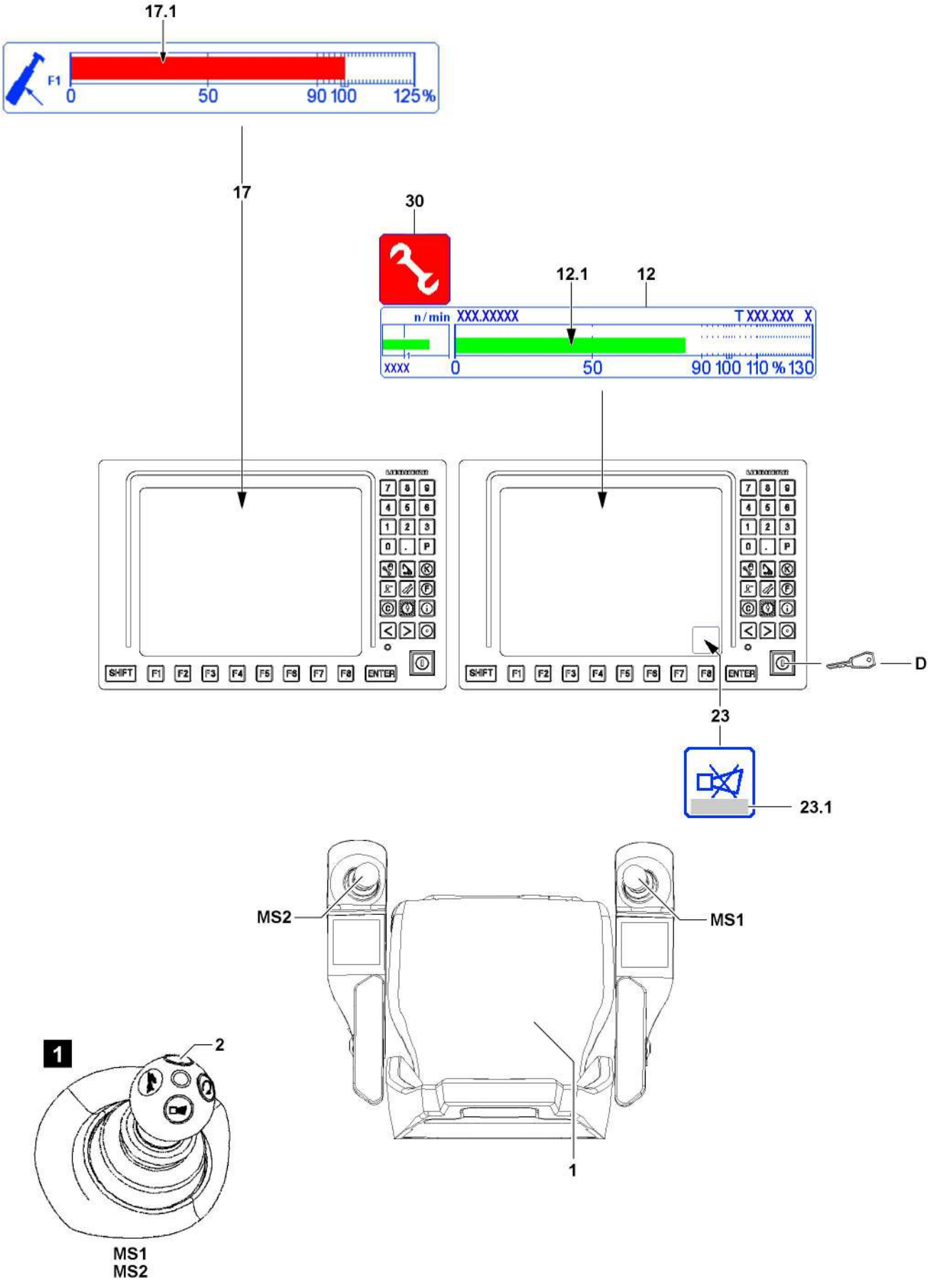

Fig.117264

Make sure that the following prerequisites are met:
- All master switches are in zero position (not deflected).
- Either the seat contact button **1** or one of the buttons **2** (illustration **1**) of the master switches (MS1, MS2) is actuated.
- The crane is in the range of a load chart.

▶ Turn the set up key **D** to the right (touching).

Result:

- The function „Exceedance of shut off limits of the LICCON overload protection“ is activated. As a result the maximum value of the F-load display can be exceeded.
- The assembly icon **30** appears.
- $F1_{max}$ can be exceeded.

▶ Initiate crane movements which lead immediately to a normal operating status (see section „operating status of the crane“).

The function „Exceedance of shut off limits of LICCON overload protection“ turns off immediately also:
- If the set up key **D** is actuated again.
- If all master switches are in neutral position for 10 seconds (with load chart available).
- When neither the seat contact button **1** nor one of the buttons **2** of the master switches (MS1, MS2) is actuated.
- When a hoist top shut off occurs.

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 possibly reduced until all master switches 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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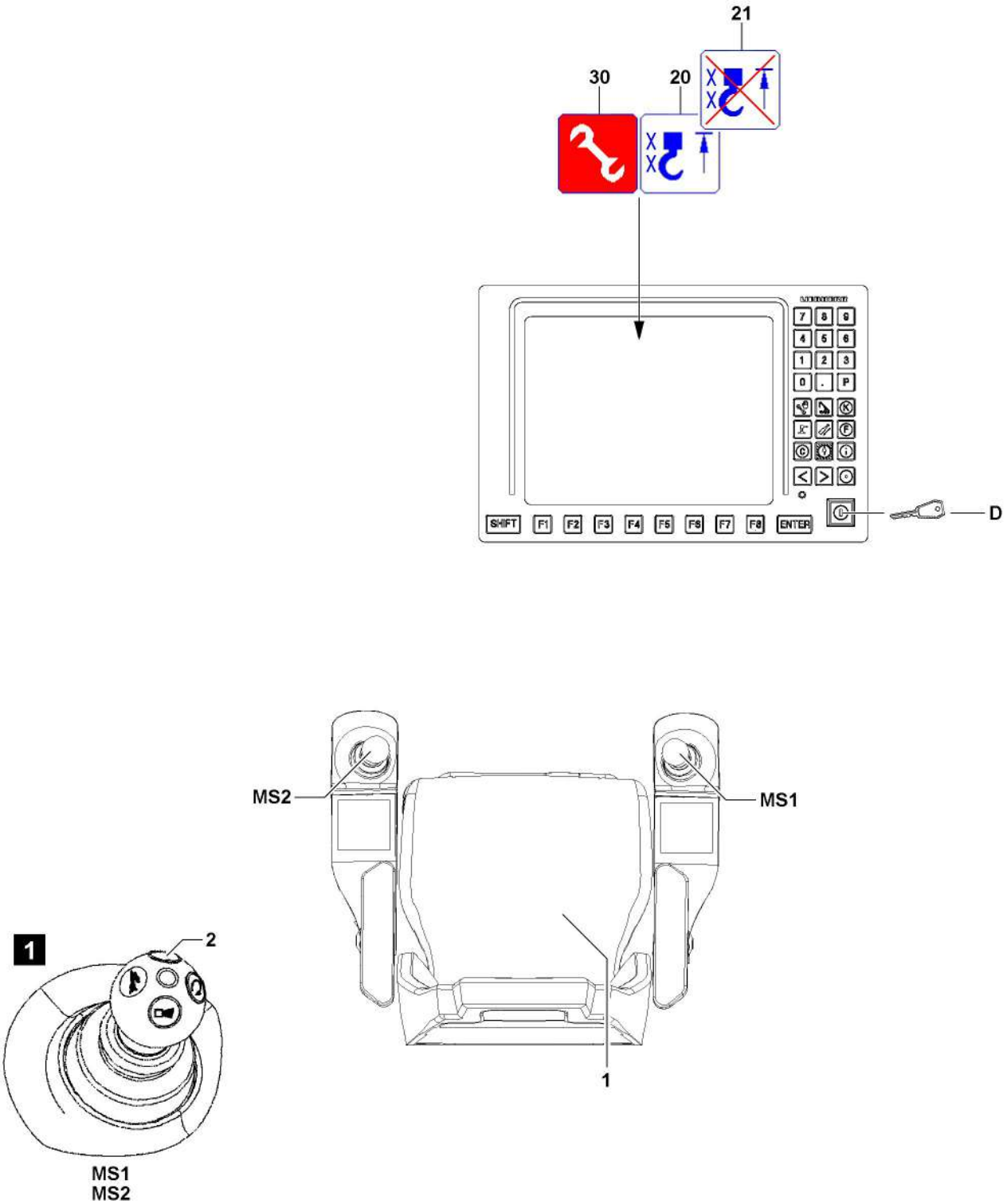

Fig.117265

2.4 Bypassing 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 (hook block / 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 telescopic boom or the auxiliary boom / accessory.
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 made if the crane operator is able to determine otherwise that there is a sufficient distance between hook block / load hook and boom head.
▶ Carry out all crane movements with utmost caution.

Note
▶ A bypass of the hoist top shut off is only possible in some circumstances when the shut off has already occurred due to a triggered hoist limit switch.
▶ 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** appear.

Spooling the hoist winch up was turned off because the hook (hook block / load hook) has touched a hoist limit weight during the upward movement and the affected hoist limit switch was triggered.

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 **1** or one of the buttons **2** (illustration **1**) of the master switches (MS1, MS2) is actuated.
– All master switches are in zero position (not deflected).

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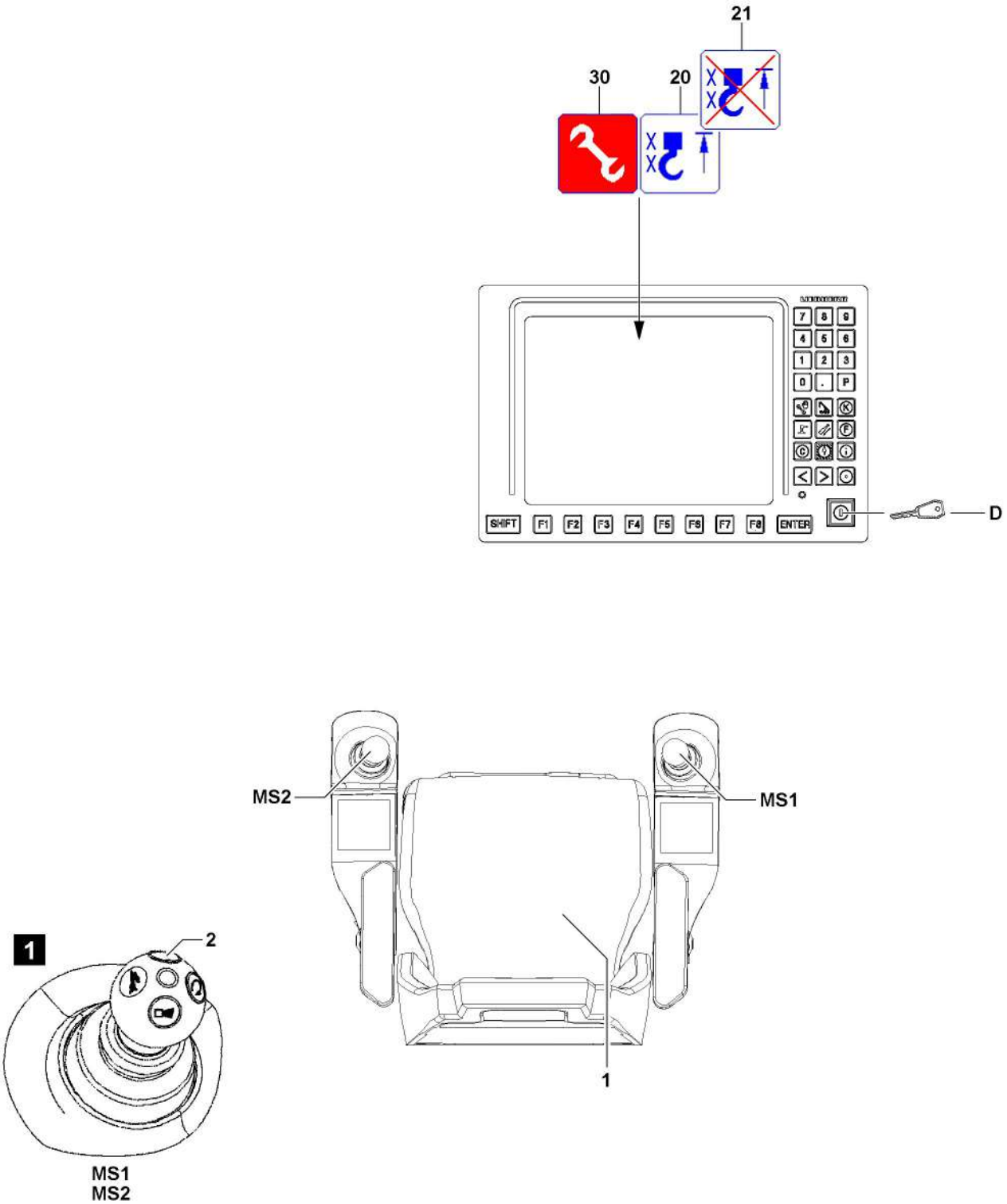

Fig.117265

– To bypass the hoist top shut off, a combined actuation of the set up key **D** and at least one master switch (MS1, MS2) is required.

▶ Turn the set up key **D** to the right (touching).

Result:

– The assembly icon **30** (assembly operation) appears in the LICCON monitor.
– The hoist top icon **20** in the LICCON monitor changes to the icon **21**.

Note

▶ Depending on the situation, it may be possible that the bypass of the hoist top shut off remains only active as long as the master switch (MS1, MS2) is deflected.

Within 10 seconds, if the master switch (MS1, MS2) to lift the hoist gear is deflected, the hoist limit switches are bypassed.

▶ Carry out a crane movement 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) was deflected for 10 seconds.
– When neither the seat contact button **1** nor one of the buttons **2** of the master switches (MS1, MS2) is actuated.
– If there is no longer a shut off of a hoist limit switch.

The function „Bypass of the hoist top shut off“ has / was turned off:
– The assembly icon **30** (assembly operation) in the LICCON monitor turns off.
– The icon **21** on the LICCON monitor turns off.

▶ Make sure that the assembly icon or the assembly icon **30** (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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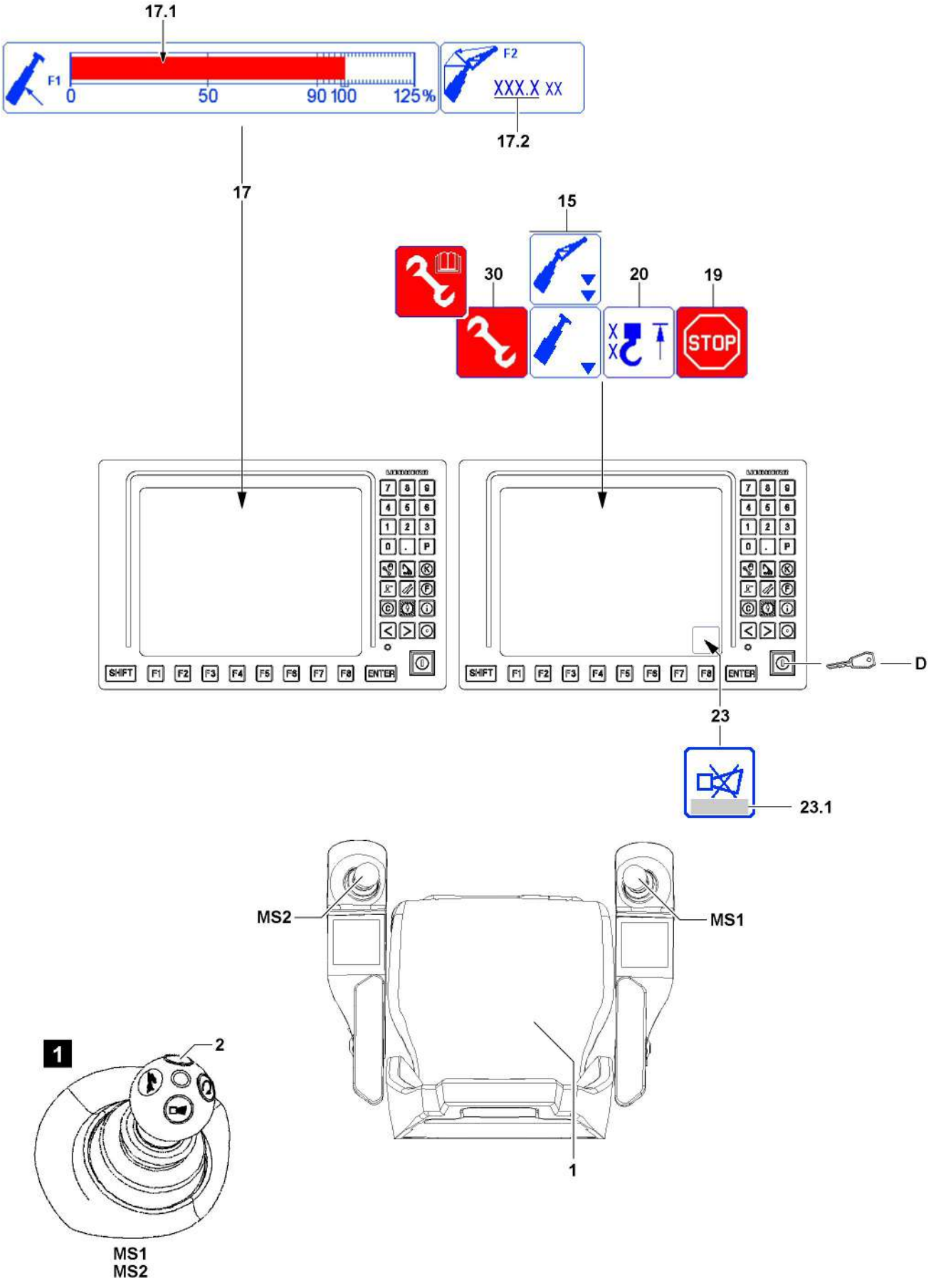

Fig.117266

2.5 Carrying out the erection / take down procedures

To carry out the erection / take down procedures and assembly procedures, the LICCON overload protection can be bypassed with the set up key **D**.

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 pressing the set up key **D** all erection / take down procedures and assembly procedures can be carried out according to the specifications in the Operating instructions.

WARNING

Danger of accident during erection / take down procedures!
If the specifications of the Operating instructions are not observed, the crane can collapse, the boom can break off or the crane can topple over.
Personnel can be severely injured or killed.

- ▶ Make sure to adhere to all specifications in the Operating instructions.
- ▶ Press the set up key **D** only when the configuration status has been entered correctly in the LIC-CON computer system and matches the actual situation.

Additional information for cranes with F-load display:

- F1-load display
  Pressure display luffing cylinder
- F2-load display
  Force of guying Auxiliary boom / accessory
  Note:
  Appears only for corresponding boom system

Note

The permissible maximum value corresponds to 100 % in the bar display.

- ▶ The F1-utilization bar **17.1** shows the relationship $F1_{actual}$ to $F1_{max}$.
- ▶ F2-load display, the F2 $value_{actual}$ **17.2** is only shown. When $F2_{max}$ is reached, an error message **23.1** is issued.
- ▶ When leaving the range „load chart available“ the display of the assembly icon **30** changes.

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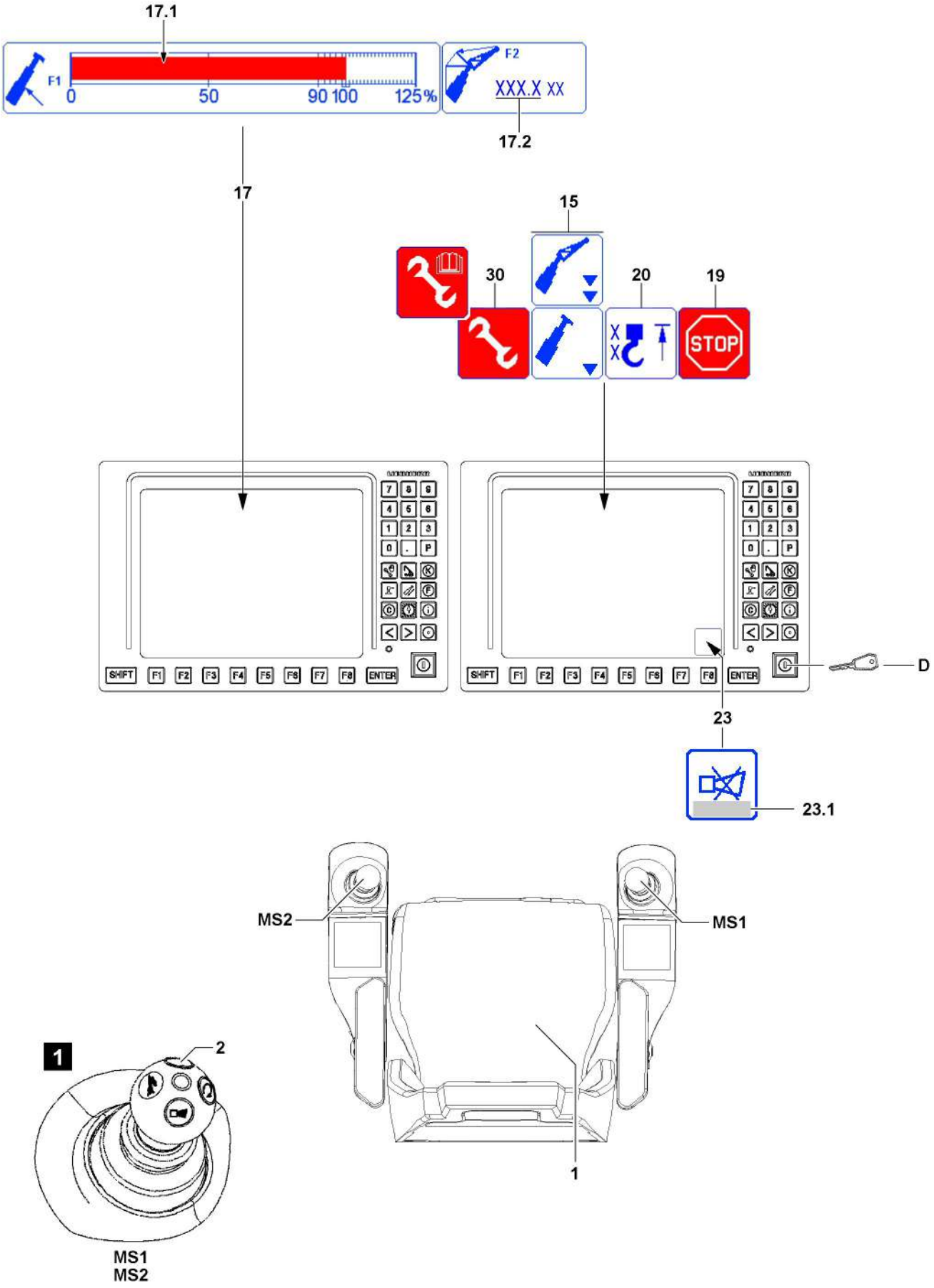

Fig.117266

2.5.1 Carrying out erection procedures

Make sure that the following prerequisites are met:
- The set up status corresponds to the specifications in the Operating instructions.
- The set up status has been entered correctly into the LICCON computer system.
- All master switches are in zero position (not deflected).
- Either the seat contact button **1** or one of the buttons **2** (illustration **1**) of the master switches (MS1, MS2) is actuated.

Note
- ▶ Depending on the situation, the hoist top shut off (icon **20** appears) must be bypassed at the same time.
- ▶ Depending on the situation, one of the icons **15** appears, because a limit angle load chart is reached.

▶ Turn the set up key **D** to the right (touching).

Result:

- The assembly icon **30** appears.
- The erection procedure can be carried out.

Problem remedy

The functionality of the set up key **D** is disabled by the crane control?
- ▶ Pay attention to notes regarding error messages **23.1** occurring in the horn **23** icon.
- ▶ Check the electrical connections.
- ▶ Check if all sensors or dummy plugs with integrated electric have been connected properly.

▶ Luff the boom system according to the specifications of the Operating instructions.
▶ Observe the F-load display **17**, all values must be within the permissible range.

Problem remedy

The erection / take down procedure cannot be carried out due to exceeding of the maximum values?
- ▶ See section „Maximum values of F-load display reached“.

The „Bypass of the LICCON overload protection“ via the set up key **D** 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 are in neutral position for 10 seconds (with „load chart available“).
- When neither the seat contact button **1** nor one of the buttons **2** of the master switches (MS1, MS2) is actuated.

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.

▶ After completion of the erection / take down procedures, make sure that the assembly icon **30** no longer appears in the LICCON monitor.

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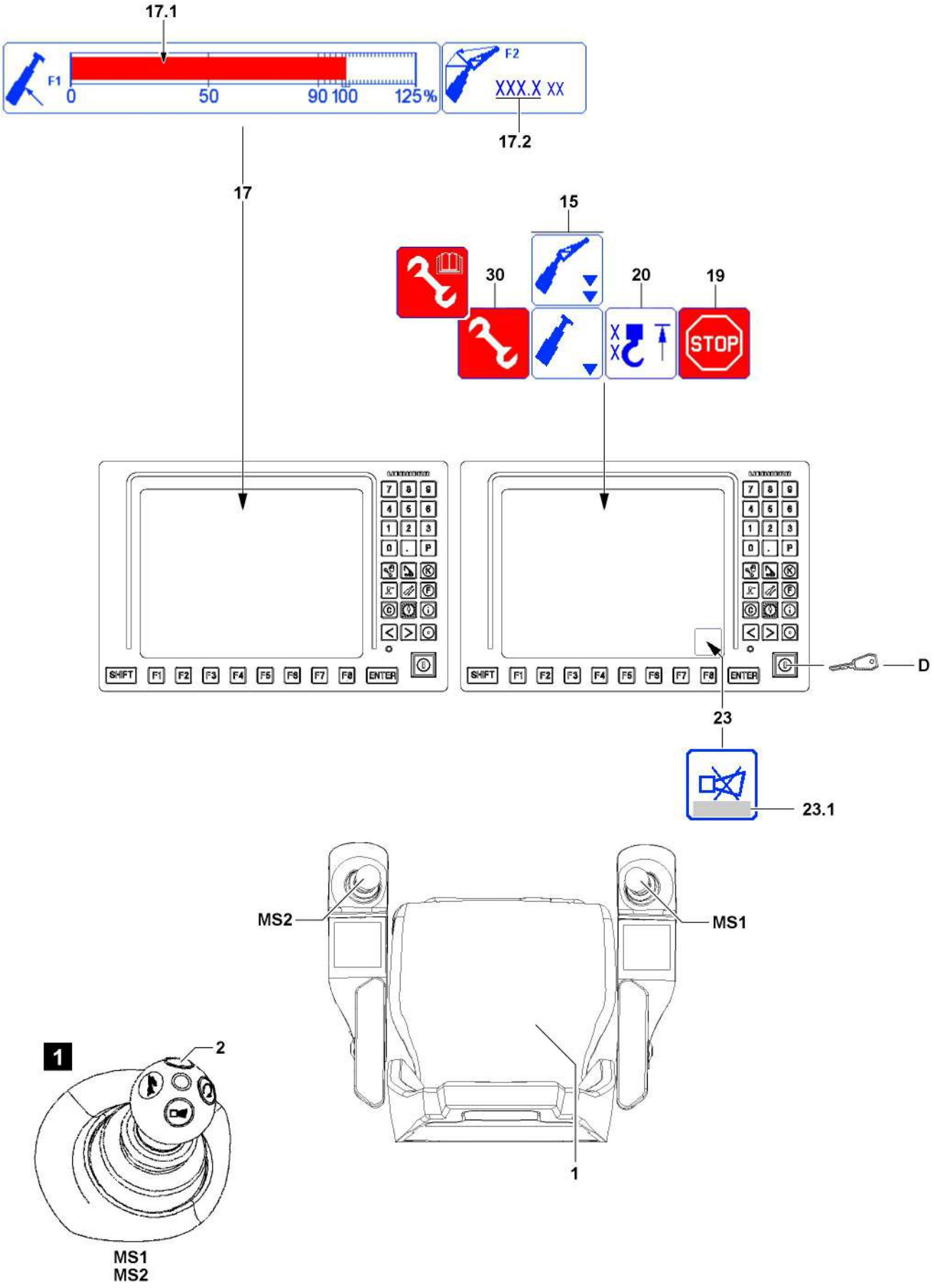

Fig.117266

2.5.2 Carrying out take down procedures

WARNING
Danger of accidents when placing the boom system down!
When the shut off luffing the telescopic boom / auxiliary boom / accessory down is bypassed, then the LICCON overload protection as a whole is deactivated, bypassed or limited.
The telescopic boom and / or auxiliary boom / accessory can be luffed from the range of the load chart.
In case of deviations from the specifications of the Operating instructions, severe accidents can be the result.
Personnel can be severely injured or killed.
▶ Always proceed according to the specifications of the Operating instructions.
▶ Carry out all crane movements with utmost caution.

Make sure that the following prerequisites are met:
– One of the icons **15** appears (limit angle load chart reached) and the LICCON overload protection has shut off the crane movement.
– Either the seat contact button **1** or one of the buttons **2** (illustration **1**) of the master switches are actuated.
– All master switches are in zero position (not deflected).
– There is no load on the hook (hook block / load hook).
– If necessary, the hook (hook block / load hook) is placed on the ground.
– The set up status corresponds to the specifications in the Operating instructions.
– The set up status has been entered correctly into the LICCON computer system.

Note
▶ When leaving the range „load chart available“ the display of the assembly icon **30** changes.

▶ Turn the set up key **D** to the right (touching).

Result:

– The assembly icon **30** appears in the LICCON monitor.
– The take down procedure can be carried out.

▶ Place the boom system down according to the specifications of the Operating instructions.
▶ Observe the F-load display **17**, all values must be within the permissible range.

Problem remedy
The erection / take down procedure cannot be carried out due to exceeding of the maximum values?
▶ See section „Maximum values of F-load display reached“.

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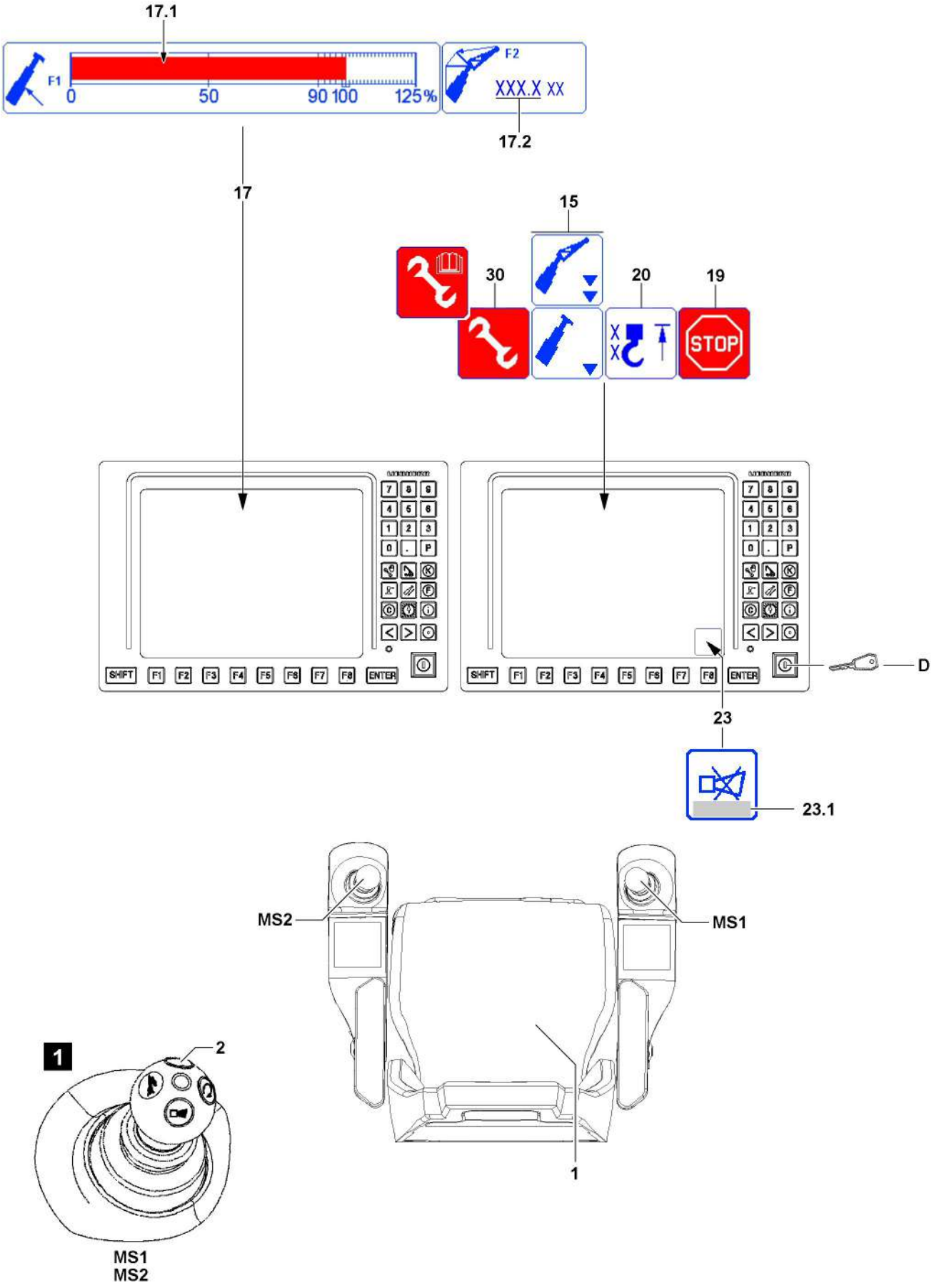

Fig.117266

Note

▶ Depending on the situation, the hoist top shut off (icon **20** appears) must be bypassed at the same time.

The „Bypass of the LICCON overload protection“ via the set up key **D** turns off:
– If the set up key **D** is actuated again.
– When neither the seat contact button **1** nor one of the buttons **2** of the master switches (MS1, MS2) is actuated.
– When an area with existing load chart is reached.

The bypass of the LICCON overload protection is / was turned 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.

2.5.3 Carrying out the assembly procedures

WARNING

Danger of accident during assembly procedures!
In case of deviations from the specifications of the Operating instructions for the assembly procedures, severe accidents can be the result.
Personnel can be severely injured or killed.

▶ Always proceed according to the specifications of the Operating instructions.
▶ **If you cannot proceed according to the Operating instructions, contact Liebherr Service before carrying out any subsequent steps and agree on the procedure.**

Make sure that the following prerequisites are met:
– The set up status corresponds to the specifications in the Operating instructions.
– The set up status has been entered correctly into the LICCON computer system.

▶ Operate the set up key **D** according to the specifications of the Operating instructions.

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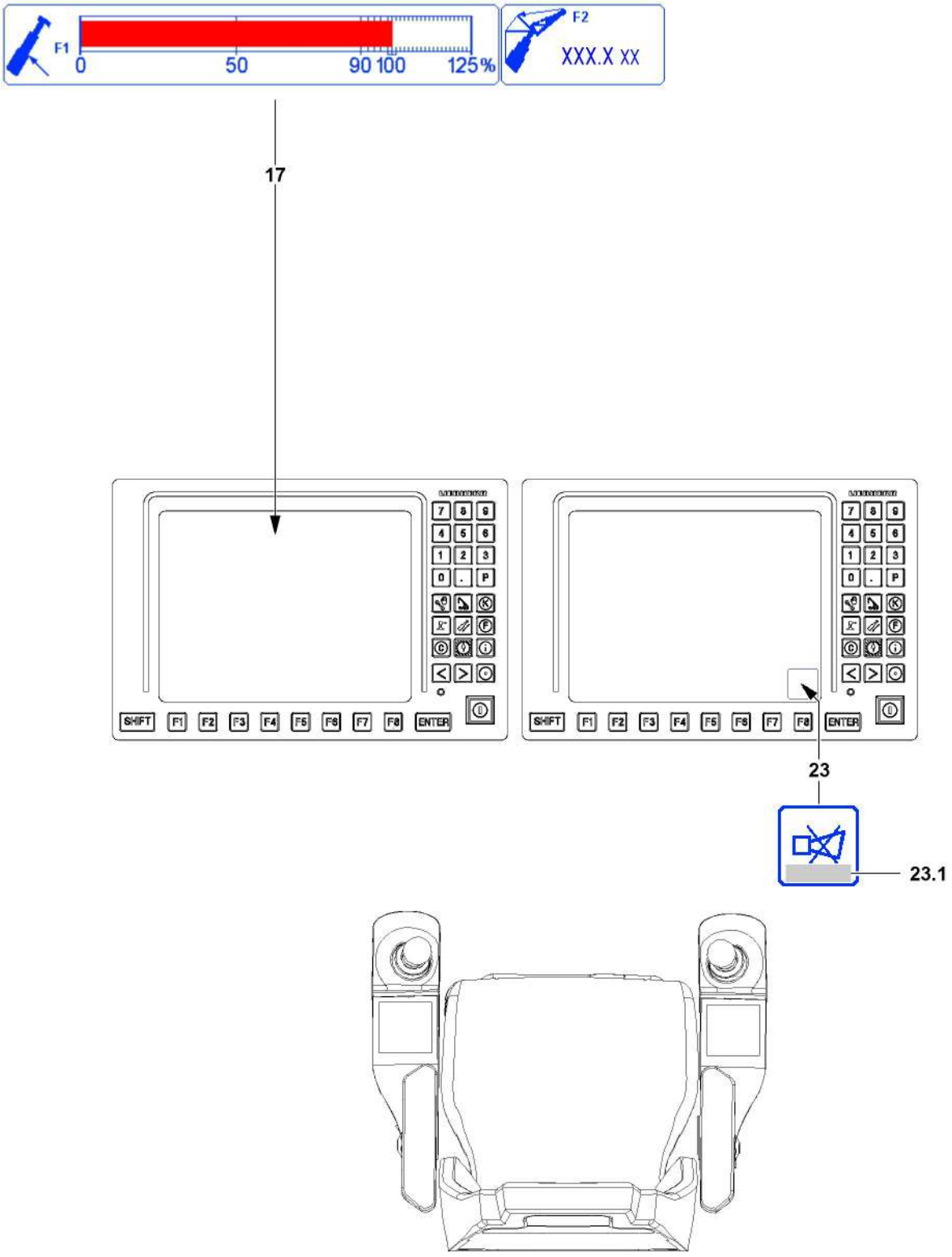

Fig.117267

2.6 Maximum values of F-load display reached

Note

▶ The display and assignment of the F-load display **17** can deviate depending on the set up status, operating status and configuration of the crane, see chapter 4.02.

In the F-load display **17** the maximum values were reached.

Make sure that the following prerequisites are met:
- The crane is assembled according to the specifications in the Operating instructions.
- A valid set up configuration has been entered on the LICCON computer system (Set up program).
- The actual set up configuration has been entered on the LICCON computer system (Set up program).
- The hook block / load hook is correctly installed and reeved.
- All attachment parts and guy rods on the boom system, which are not needed, have been removed (weight).
- The boom system is free of snow and ice (weight).
- The wind influence onto the crane is not too great.
- The local conditions (terrain incline) are in the permissible range.
- Possible notes regarding error messages **23.1** occurring in the horn **23** icon were observed.

▶ Check if a crane movement was initiated, which leads to an improvement of the force ratio in the F-load display **17**.

Note

In the permissible framework of specifications of the Operating instructions, a positive influence of the force ratio in the F-load display **17** can be reached by:

▶ Erection of the telescopic boom: Carry the hook (hook block / load hook) along.

▶ In difficult local conditions (terrain incline): Support the placed down boom system to obtain more favorable angle conditions.

▶ In difficult local conditions (terrain incline): Support the placed down boom system to reduce flexation.

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5 Equipment

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Fig.195219

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
Failure of retaining element!
If the spring force of the retaining element is not sufficient or in case of mechanical damage / distortion, the retaining element can fail!
If the correct retention of the pin is no longer ensured, then the pin can unpin by itself! Accidents with bodily injuries / property damage can result!
▶ Use exclusively **functioning** retaining elements in proper condition.

2 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!

3 Checking the 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

3.1 Placing the hoist / control ropes

In order to guarantee safety and operating characteristics, only original Liebherr replacement parts or parts approved by Liebherr may be used.

NOTICE
Damage of hoist / control rope!
If a hoist / control rope is placed with worn rope pulleys, damage can occur!
▶ Before placing a rope, check the rope pulleys. See Crane operating instructions, chapter 8.01!
▶ Replace worn or damaged rope pulleys!

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NOTICE
If the following notes are not observed, the cam limit switch / winch turn 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.
- ▶ Never pull the hoist rope ends under the winch by spooling the winch up!
- ▶ Never pull the hoist rope off from the „stationary“ winch.
- ▶ The winch turn sensor must also be readjusted, if it is determined during operation or when changing the hoist rope that the winch does not turn off when the minimum rope coils are reached.

3.1.1 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).

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!

3.1.2 Cranes with winch turn sensor

The winch turn 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 turn sensor must be checked!
- ▶ The winch turn sensor must be set to turn off when only 4 hoist rope coils remain on the winch!

4 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 be overloaded, topple over or be damaged!
Personnel can be killed or injured!
- ▶ 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!

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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.

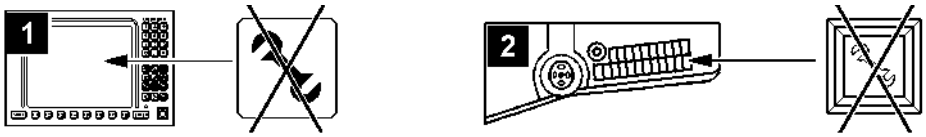

Fig.113437

Make sure that the following prerequisites are met:
- The overload protection is not bypassed.
- No assembly operation is activated.
- Crane operation can be carried out with minimum boom radius.

4.1 General control measures before crane operation

- Make sure that no visible damage is visible 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 drum and the limit switches are free of snow and ice.
- Make sure that the gear ring of the rotary connection is clean and greased.
- Make sure that the air supply to the oil and water cooler is clear.
- Make sure that the step, ladders and pedestals 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 sufficient 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 devices are 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.

4.2 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).

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– Make sure that the track chains are secured to prevent them from sagging (crawler crane).

4.3 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.

4.4 Additional controls for cranes with derrick boom

– Make sure that the shut off via the limit switch - derrick is functioning.
– Make sure that the entire swing range of the suspended ballast / ballast trailer is free of personnel and obstacles.

4.5 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 swing range and is functioning.

4.6 Additional controls for certain crawler cranes

For existing crawler assembly key button:
– Make sure that the crawler assembly key button is turned off.

5 Dangerous conditions without shut off

5.1 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 down the load onto 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 hoist gear down function!
▶ Actuate the opposite direction of movement which caused the block position and eliminate the block position!

6 Transporting components

WARNING
Danger of accident!
▶ If any components are transported on an auxiliary vehicle, then they must be properly secured. If necessary, transport these components on supports or using a special transport device.

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6.1 Transporting lattice sections

WARNING
Danger of accident!
- ▶ If the lattice sections are pushed into each other for transport, the lattice sections must be safely rigged on the transport vehicle and secured on at least two independent points.

7 Pneumatic springs for assembly support of components

Pneumatic springs are installed on various crane components to simplify the installation 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 risk 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!

8 Manual rope winches for assembly support of components

Manual rope winches are installed on various components to simplify the installation or removal 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 risk 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!

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9 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 intermediate sections) or folded together (for example the folding jib), then the total weight is given by the sum of the individual components!

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!

10 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 risk of accidents!

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 large for erection!

- ▶ Disassemble and remove the guy rods which 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“.

11 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.

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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!

12 Bypassing the overload protection

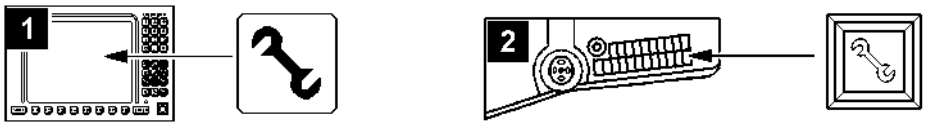

Fig.113438

- 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!
As section 4.2.6.3.2 of EN 13000 does not put the requirements of appendix 1 of the EC machinery directive 89/37/EC into concrete terms, the overload protection has not been designed according to this definition.
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.
Prohibited crane operation with bypassed overload protection – with the aim of increasing the maximum load capacity of the crane above the rated value in the load chart, or to extend the designated working range of the crane – does not constitute a **sensibly foreseeable erroneous operation**, rather **a deliberate improper use with high risk of accident**!
The possible risks and consequences of such deliberate improper use are detailed in the Crane operating instructions.
Such deliberate improper use can neither be prevented by means of the constructive 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!

12.1 Bypassing the overload protection

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 by:
- 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.

WARNING
Increased danger of accident due to bypass of the overload protection!
If the overload protection is bypassed, there is no additional 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 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!
▶ Crane operation with bypassed overload protection is strictly prohibited!

12.1.1 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 console.
– Key button on the LICCON monitor.
– Key button in the instrument panel.
– Key button in the switch cabinet.
– Sensor for transponder on the crane cab.

▶ 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, acoustical and / or optical warning signals (blinkers, flashing lights, bells and horns).

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 acoustical and / or optical warning signals which were triggered by the bypass are turned off again.

12.1.2 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.

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▶ Actuate the bypass key button and turn the PAT overload protection on.

Result:

– The PAT overload protection is active.

13 Bypassing the hoist top shut off

Note

▶ Applies only for cranes with hoist limit switch!

If the hook block contacts the hoist limit switch weight during its upward movement, the hoist limit switch is triggered. 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 a risk 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 care and minimum speed.

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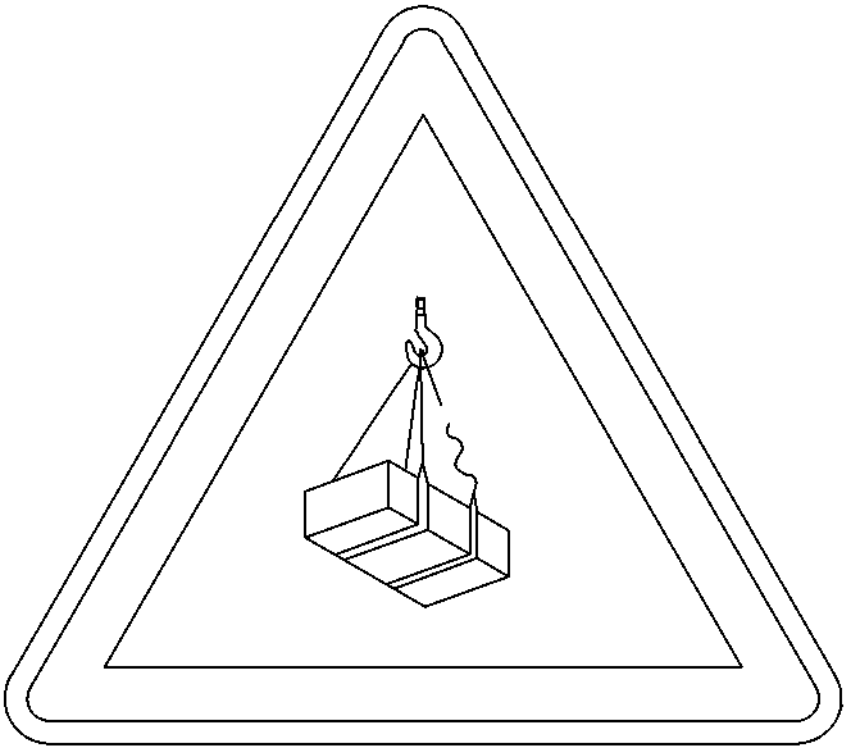

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Fig.108048

14 Assembly / disassembly

WARNING
Risk of fatal injury due to incorrect assembly or disassembly!
The assembly / disassembly of components may never be performed by untrained personnel.
Incorrect assembly / disassembly can result in death or severe injuries!
- ▶ Assembly and disassembly may only be carried out by authorized and trained expert personnel!
- ▶ 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!
- ▶ The winch use is regulated in the master switch assignment in the Electric wiring diagram. The winches may only be operated according to this master switch assignment specified in the Electric wiring diagram.
- ▶ 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 and crushing!
There is a risk of impact and crushing when standing in the vicinity of suspended loads moving sideways.
- ▶ During assembly / disassembly no one may be in the dangerous area around or underneath the suspended load before the load has been secured!

Part of the category „Aids for working aloft“ are, for example:
- Lifting platforms
- Scaffolding
- Auxiliary cranes

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!
- ▶ 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, 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 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 walk on the telescopic or an auxiliary boom without suitable protective devices!
- ▶ Stepping or walking on crane components and lattice sections, which have an incline of more than 20° is prohibited!

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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 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 and fatally injure personnel!
▶ Do not unpin the components until they are secured by an auxiliary crane!

WARNING
Falling components and tools!
Whenever working aloft, for example on the crane or on an aerial platform, components or tools can fall down. Personnel can be severely injured or killed.
▶ Make sure that the danger zone under the work area is blocked off and marked.

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! Personnel can be severely injured or killed!
▶ 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 booms or equipment.
▶ The detailed information and danger notes in the respective chapters must be observed and adhered to.

14.2 Pin connections

WARNING
Danger due to pin connections!
If the pins / pin connections are not properly greased or lubricated before assembly, then they can corrode, seize in the pin bores and / or be damaged!
This could result in high property damage!
Personnel can be severely injured or killed due to suddenly releasing pins at disassembly!
▶ 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.
▶ Make sure that all pins are secured with the intended retaining elements to prevent them from loosening up by themselves.
▶ Never pin or unpin pins by force.

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14.3 Guiding crane sections, lattice sections or crane components

WARNING
Danger due to oscillating load!
During the assembly of crane sections, lattice sections or crane components with the auxiliary crane, they can start to swing back and forth!
Personnel can be severely injured or killed!

- ▶ To guide and position crane sections, lattice sections or crane components always use a guide rope.
- ▶ Make sure that the guide rope is sufficiently long and that the assembly personnel does not enter the danger zone.

14.4 Assembly / disassembly 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.

- ▶ The hook block must always be attached vertically over the center of gravity of the load to be lifted!
- ▶ Angular pull is prohibited!

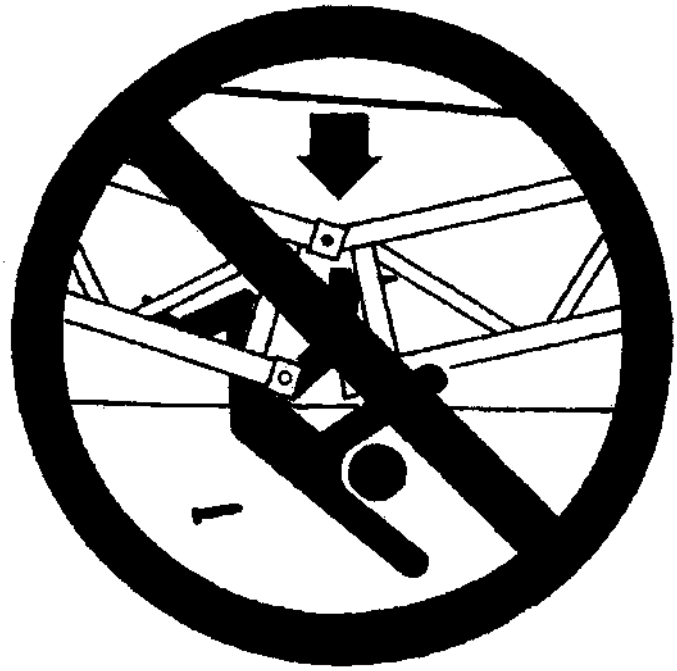

Fig.113444

WARNING
Danger of accident at assembly / disassembly of booms!
The disassembling of unsecured or unsupported booms may result in fatal injury or mutilation.

- ▶ 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 bearing points 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!

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WARNING
Danger of accident due to distorted pins!
Angular pulling or excessive / low hoisting force of the auxiliary crane may result in distortion of the pins.
Distorted parts can suddenly detach themselves when the pins are unpinned. This represents a fatal injury risk to assembly personnel.
- ▶ When the pins are unpinned, the „lifting force“ of the crane must be adapted to the „weight“ of the parts being lifted!
- ▶ Do **not** remove difficult to remove pins by force!
- ▶ Remedy the cause of the distortion!

WARNING
If the following specifications are not observed, accidents can result:
- ▶ Pin or unpin both pins at the same horizontal level, i.e. **left and right**!
- ▶ Pin the lower collar pins **from the inside to the outside** and unpin from the **outside to inside**!
- ▶ Insert and unpin horizontally installable double cone pins from the **outside to inside**!
- ▶ Insert and unpin vertically installable double cone pins from **top to bottom**!

Make sure that the following prerequisites are met:
- – 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.
- – Select the height of the support so that the parts of the equipment are not in contact with the ground.
- – Place the parts of the equipment with rope pulleys down 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.

14.5 Fastening positions for assembly / disassembly 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!

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14.5.1 Closing the end section

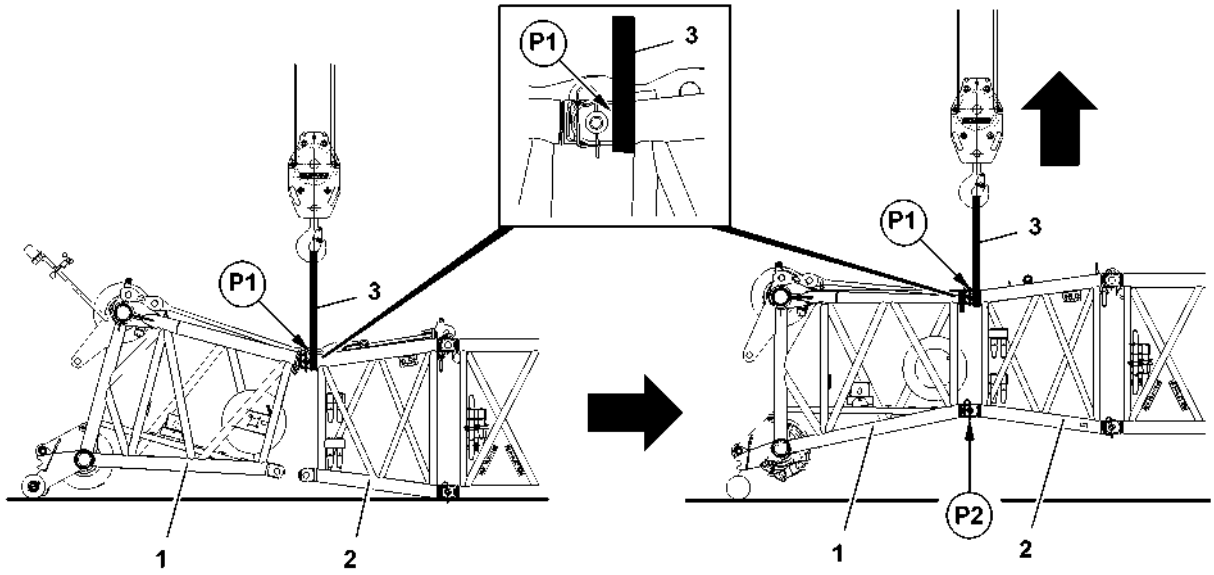

Fig.117840: Closing the end section

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**.

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14.5.2 Placing the lattice jib into the pulley cart

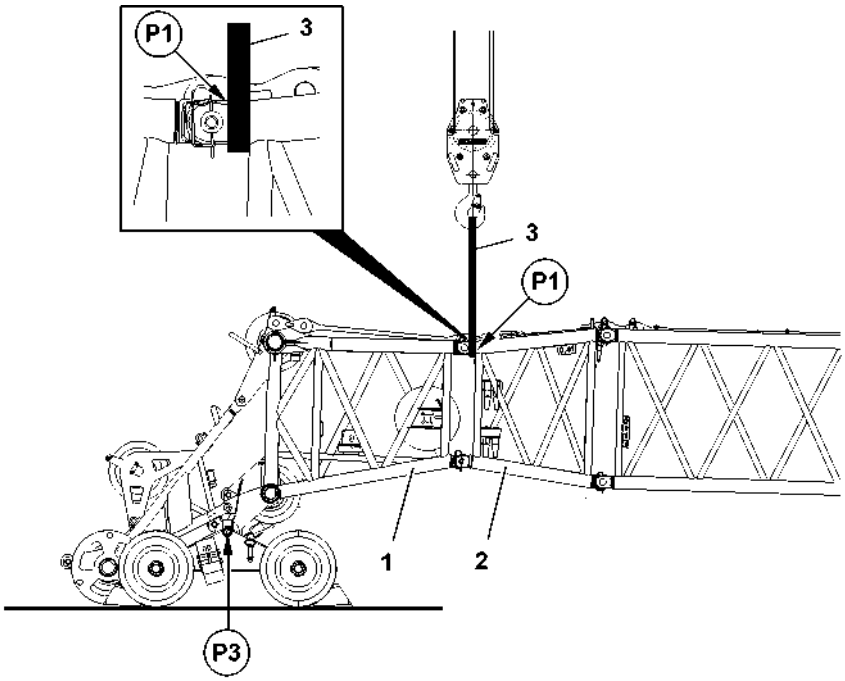

Fig.117842: Placing the lattice jib into the pulley cart

When placing it into the pulley 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 place it in the pulley cart **4**.
- ▶ Pin the end section **1** with the pulley cart **4** on the pin points **P3** on the left and right.
- ▶ Remove the textile type fastening equipment **3**.

Note
- ▶ The disassembly and removal of the pulley cart **4** is handled accordingly.

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14.5.3 Opening the end section

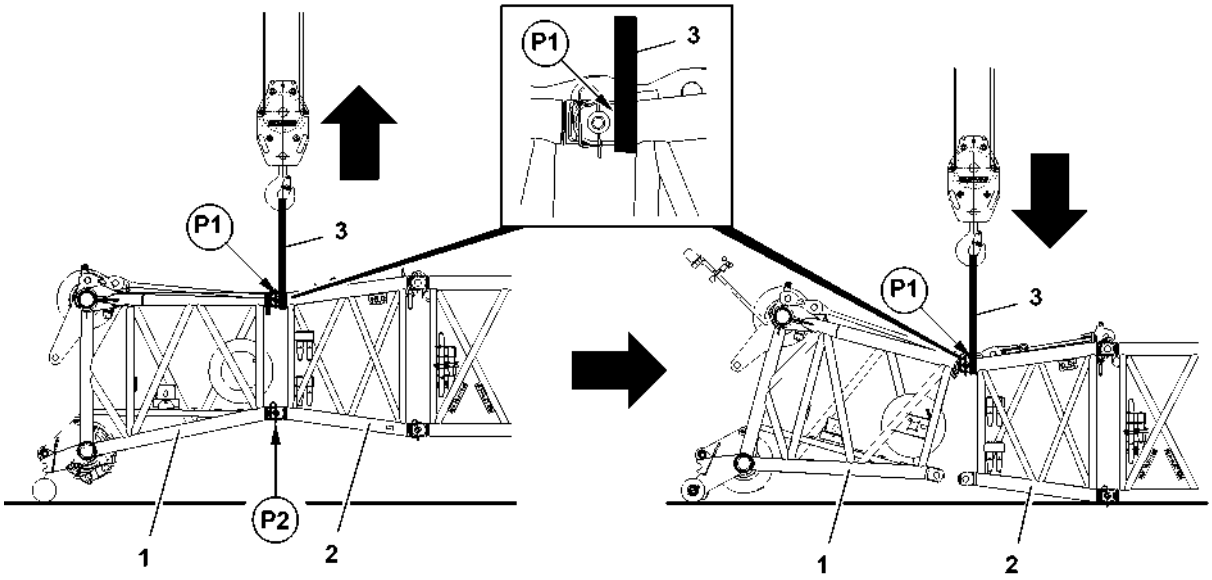

Fig.117841: Opening the end section

For opening the end section, observe the following:
- The pulley 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.
- ▶ Place the lattice jib on the ground.
- ▶ Remove the textile type fastening equipment **3**.

14.5.4 Holding the luffing lattice jib

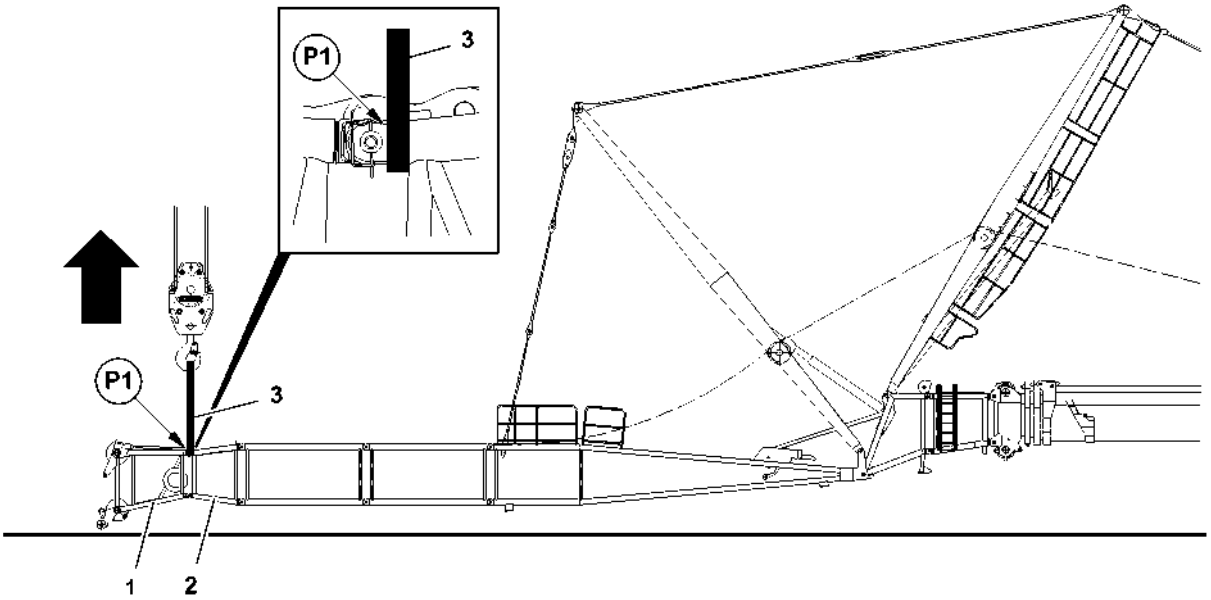

Fig.117843: Holding the luffing lattice jib

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.

14.5.5 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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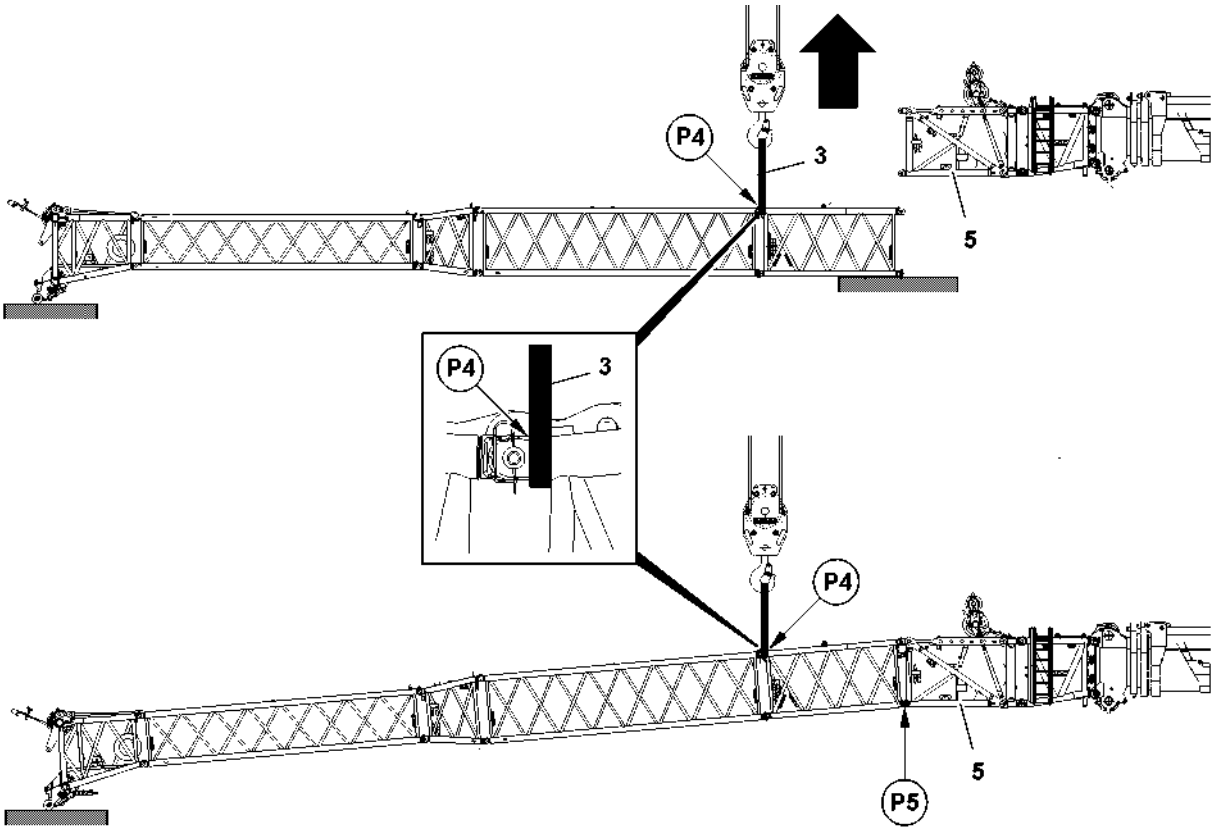

Fig.117844: Assembling the lattice jib on the TF-adapter

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 observe the permissible lattice jib length at disassembly.

▶ Disassemble accordingly.

14.5.6 Closing the fixed lattice jib

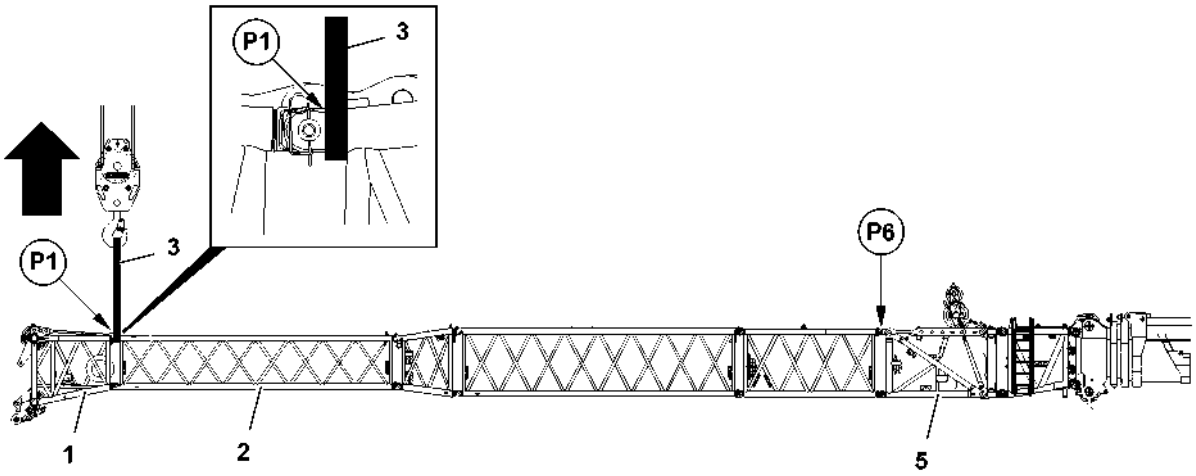

Fig.117850: Closing the lattice jib

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.

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14.5.7 Angle adjustment on the fixed lattice jib

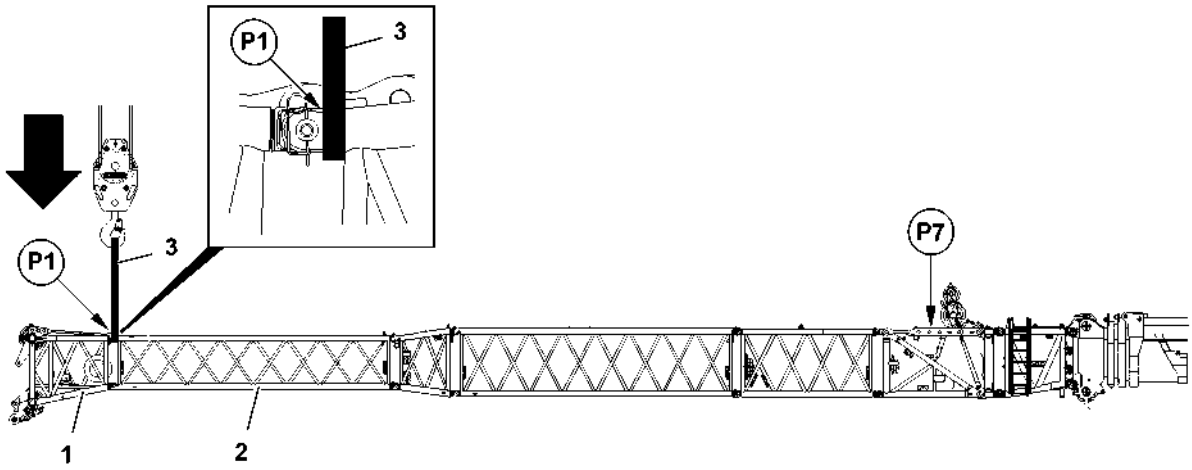

Fig.117851: Angle adjustment on the fixed lattice jib

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.
- ▶ Lower the lattice jib and adjust the respective angle on the lattice jib.
- ▶ Pin the angle adjustment **P7**, see Crane operating instructions, chapter 5.03.

After pinning:
- ▶ Remove the textile type fastening equipment **3**.

14.5.8 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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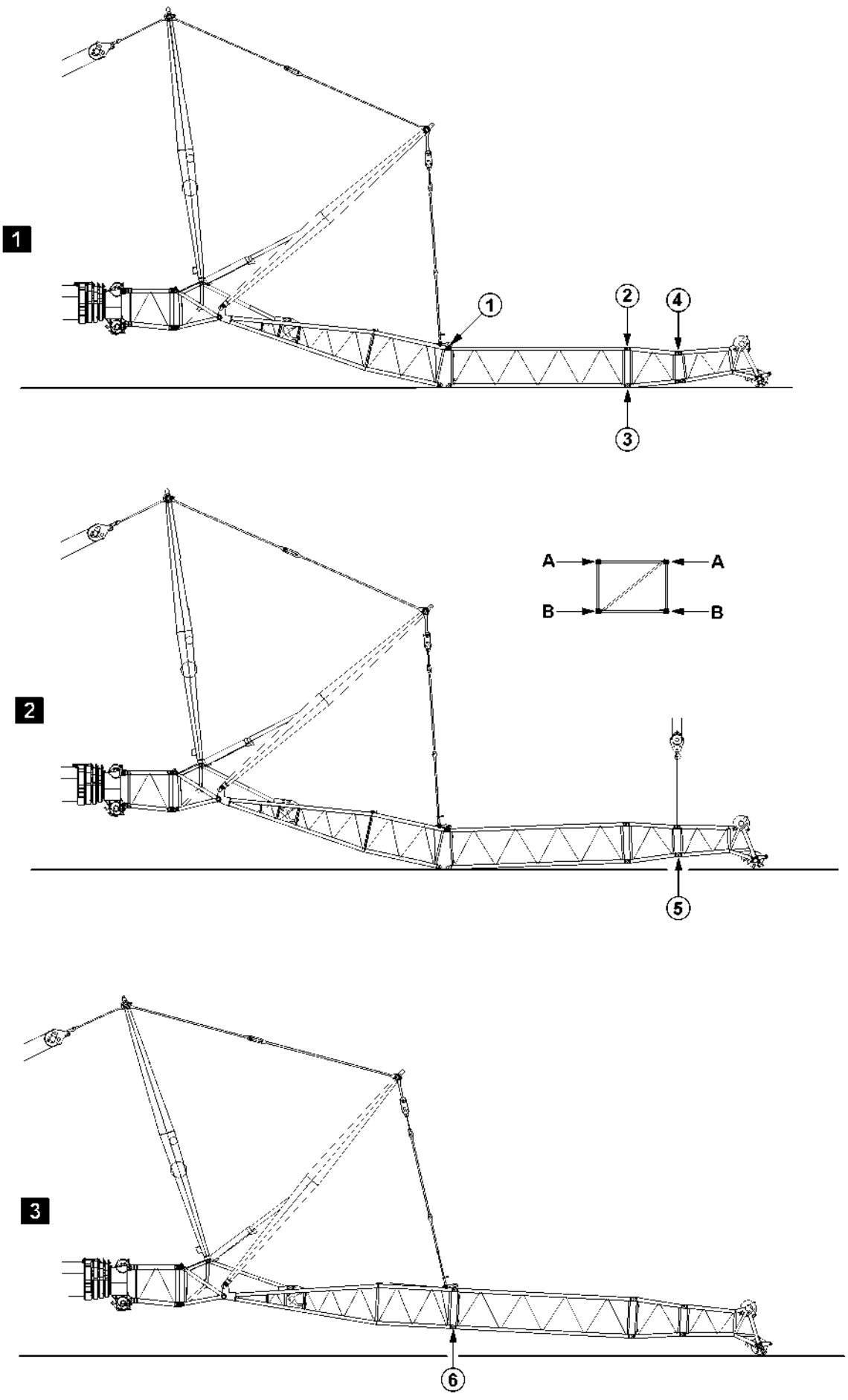

Fig.197718: Example for cranes with telescopic boom

14.6 Assembly of lattice sections for telescopic cranes

14.6.1 Assembly of lattice sections for guyed 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.
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**.
▶ 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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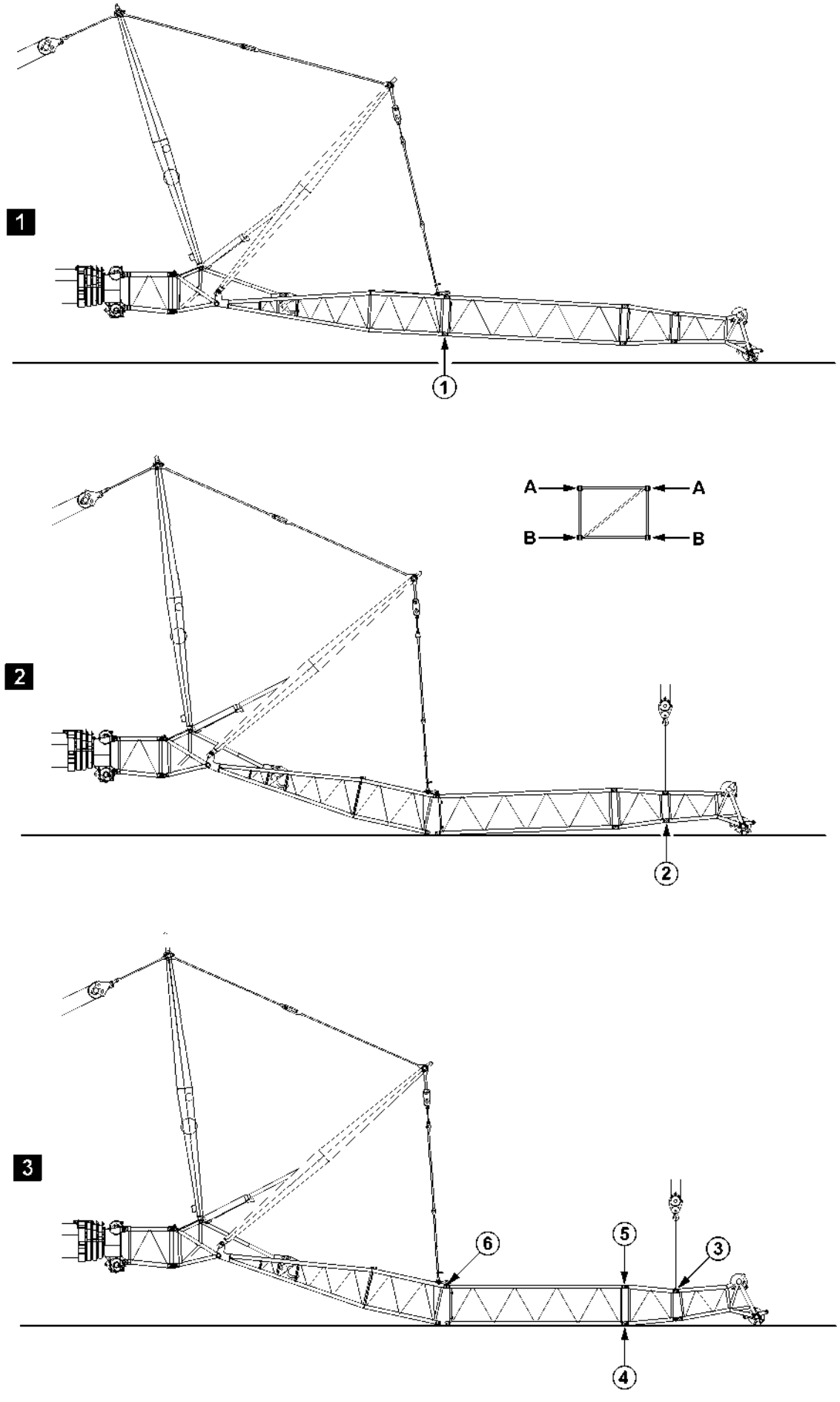

Fig.197719: Example for cranes with telescopic boom

14.6.2 Disassembly of lattice sections for guyed auxiliary boom with an auxiliary crane

The illustrations serve as examples. The illustrations may differ depending on the crane.

WARNING
Risk 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.
Personnel can be killed or seriously injured!
▶ Pins must be unpinned in the order specified!

▶ Luff the auxiliary boom down until the end section touches the ground slightly, illustration **1**.
▶ Release and unpin the pins at both sides (level **B**) at point **1**, illustration **1**.
▶ Completely remove the lattice sections, illustration **2**.
▶ Lift the end section with the auxiliary crane, illustration **2**.
▶ Release and unpin the pins at both sides (level **B**) at point **2**, illustration **2**.
▶ Release and unpin the pins at both sides (level **A**) at point **3**, illustration **3**.
▶ Release and unpin the pins at both sides (level **B**) at point **4**, illustration **3**.
▶ Release and unpin the pins at both sides (level **A**) at point **5**, illustration **3**.
▶ Release and unpin the pins at both sides (level **A**) at point **6**, illustration **3**.

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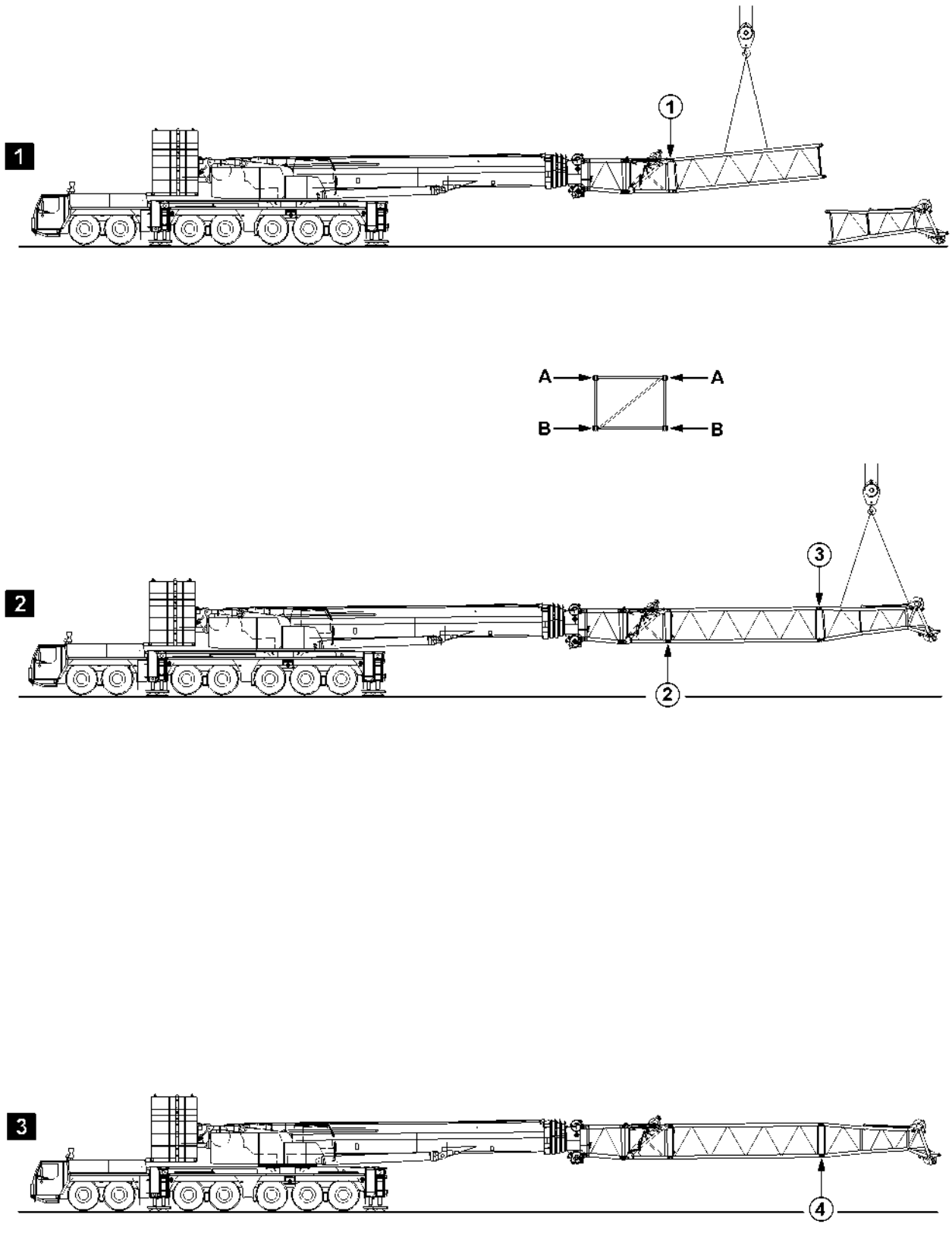

Fig.197705: Example for cranes with telescopic boom

14.6.3 Assembly of lattice sections on self-supporting auxiliary booms using 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.
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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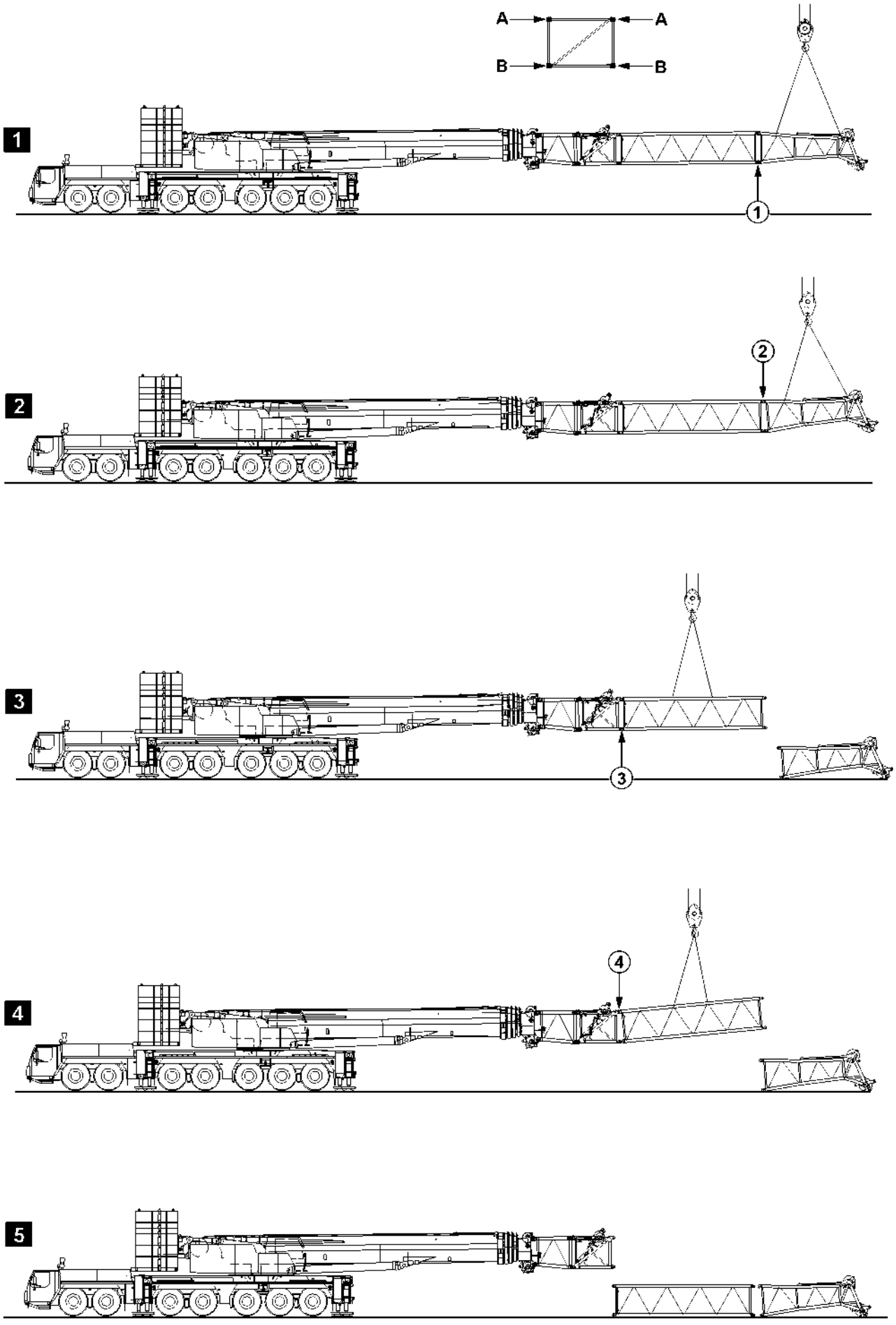

Fig.105510: Example for cranes with telescopic boom

14.6.4 Disassembly of lattice sections on self-supporting auxiliary booms using an auxiliary crane

The illustrations serve as examples. The illustrations may differ depending on the crane.

WARNING
Risk 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.
Personnel can be killed or seriously injured!
▶ Pins must be unpinned in the order specified!

▶ Release and unpin the pins at both sides (level **B**) at point **1**, illustration **1**.
▶ Release and unpin the pins at both sides (level **A**) at point **2**, illustration **2**.
▶ Release and unpin the pins at both sides (level **B**) at point **3**, illustration **3**.
▶ Release and unpin the pins at both sides (level **A**) at point **4**, illustration **4**.

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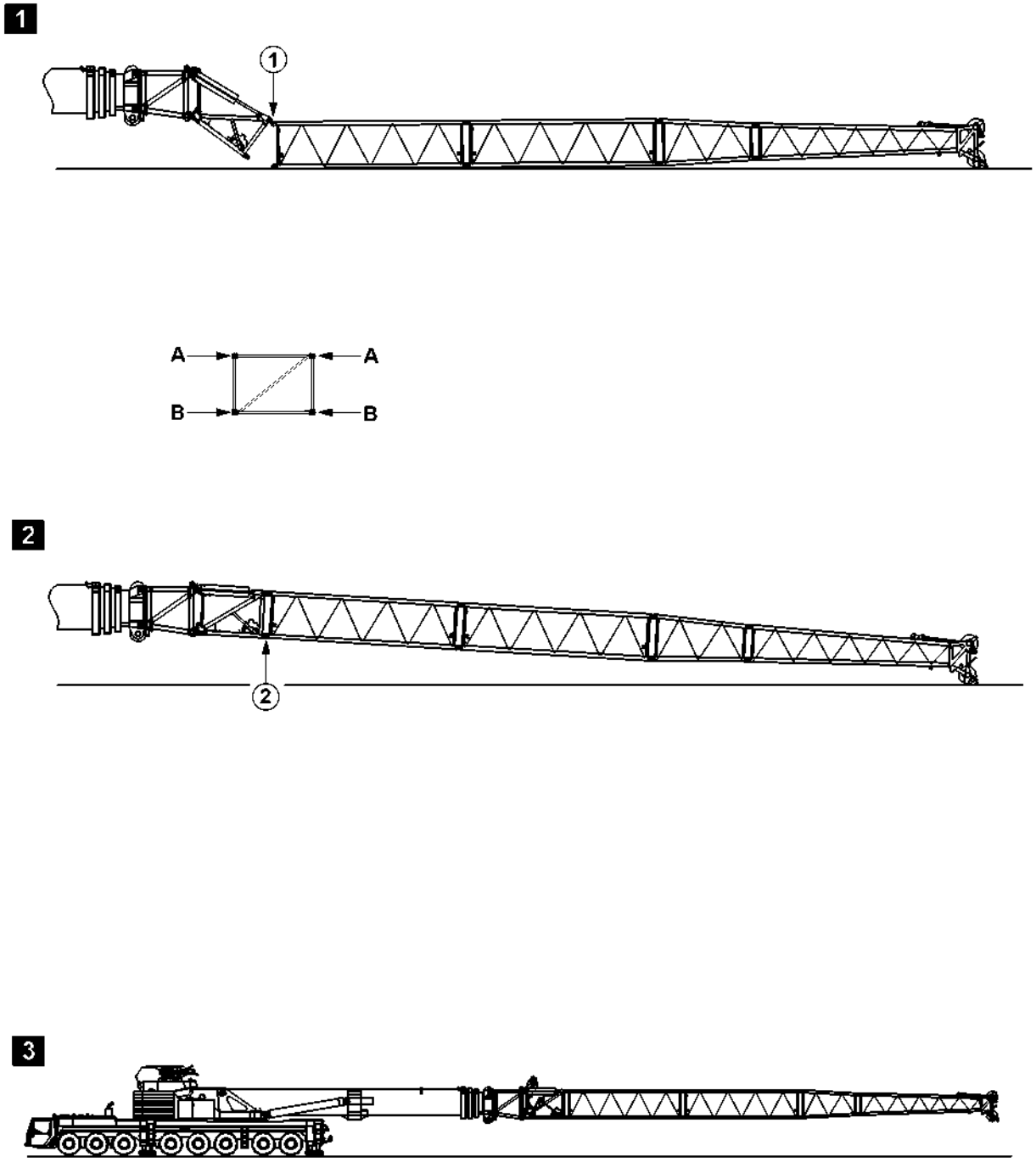

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Fig.197712: Example for cranes with telescopic boom

14.6.5 Assembly of lattice sections on self-supporting auxiliary booms, without 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.
Personnel can be killed or seriously injured!
▶ 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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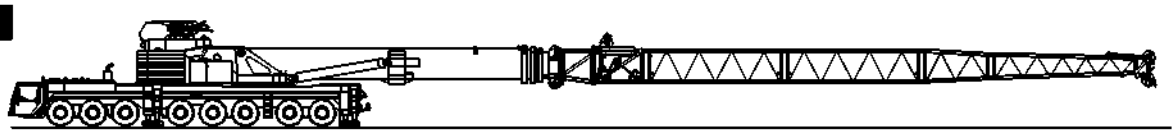

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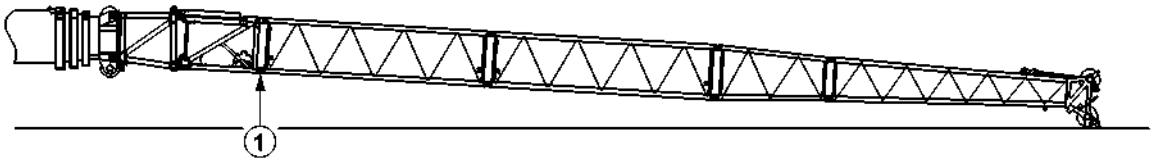

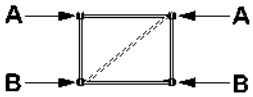

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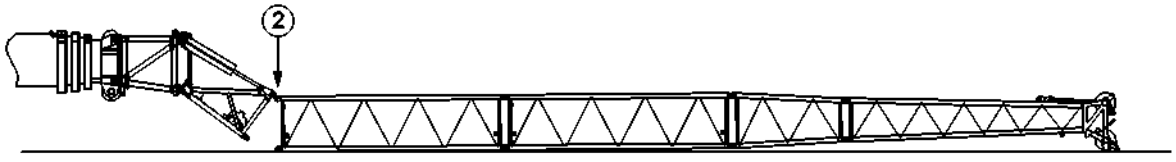

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Fig.197713: Example for cranes with telescopic boom

14.6.6 Disassembly of lattice sections on self-supporting auxiliary booms, without auxiliary crane

The illustrations serve as examples. The illustrations may differ depending on the crane.

WARNING
Risk 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.
Personnel can be killed or seriously injured!
▶ 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**.
▶ Release and unpin the pins at 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 at both sides (level **A**) at point **2**, illustration **3**.
▶ Completely remove the auxiliary boom.

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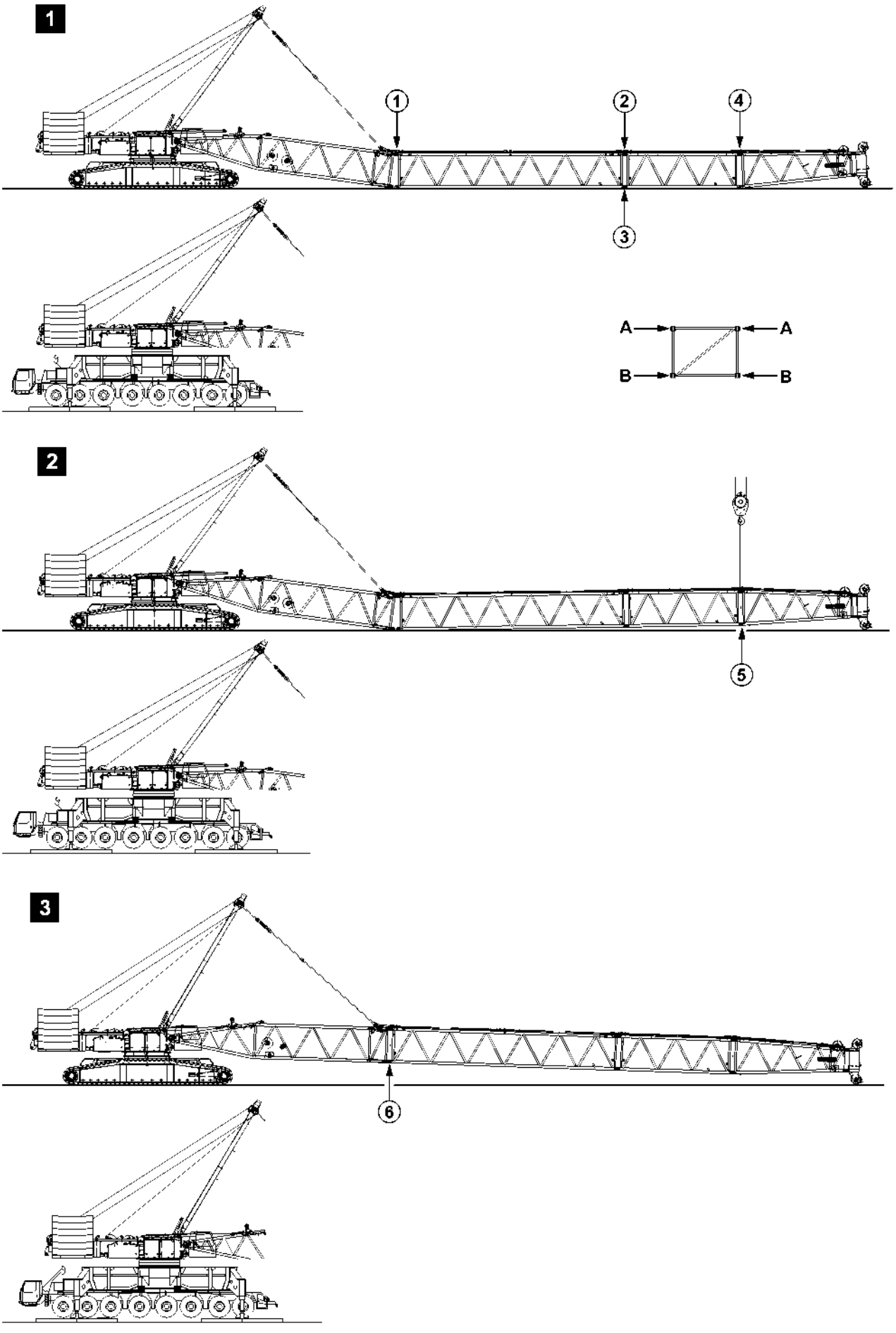

Fig.197710: Example for cranes with lattice mast booms

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14.7 Assembly of lattice sections for lattice mast cranes

14.7.1 Assembly of lattice sections

The illustrations serve as examples. The illustrations may differ depending on the crane.

WARNING
Risk 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**.
▶ Lift the lattice sections, illustration **3**.
▶ Pin and secure pins at both sides (level **B**) at point **6**, illustration **3**.

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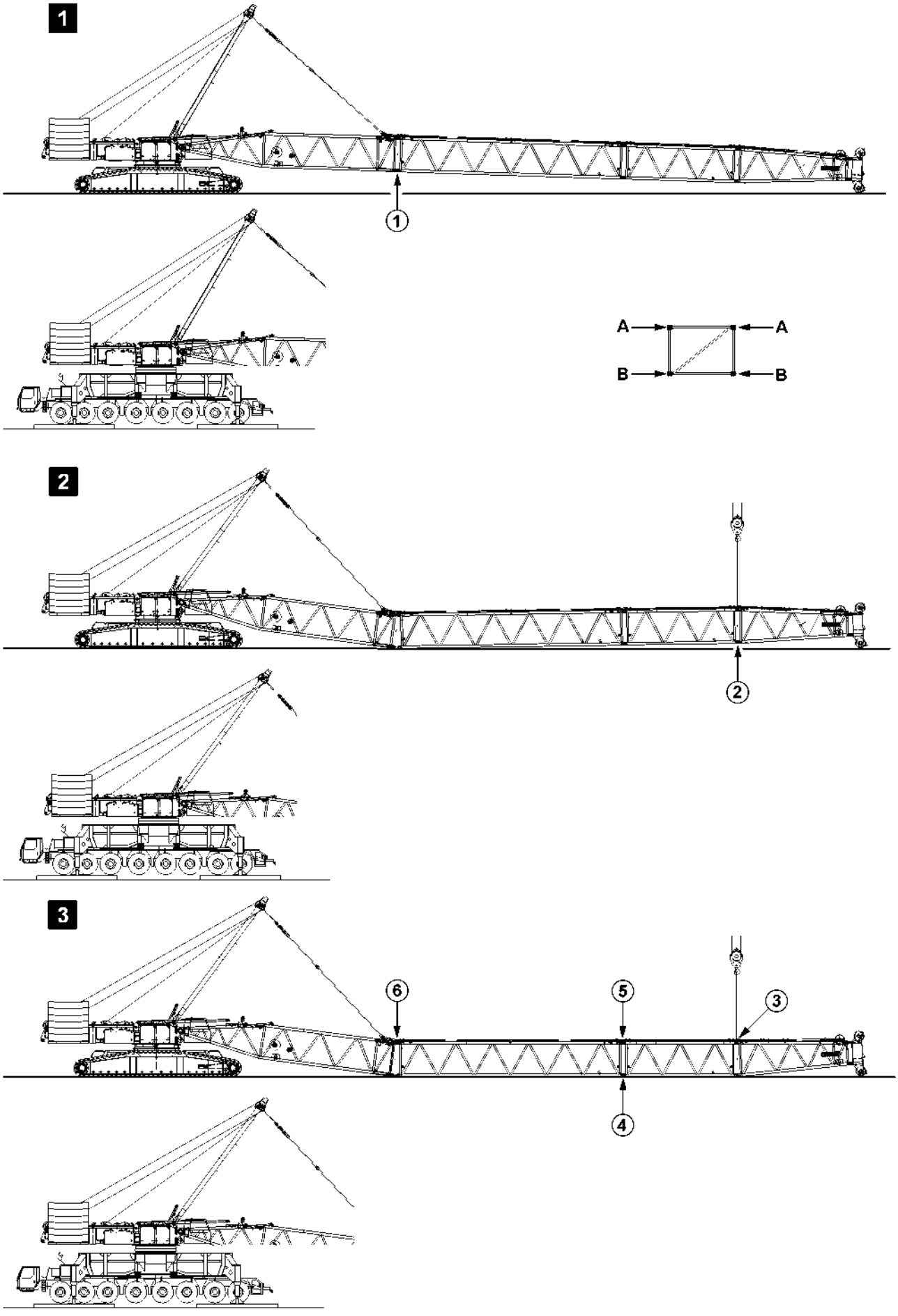

Fig.197711: Example for cranes with lattice mast booms

14.7.2 Disassembly of lattice sections

The illustrations serve as examples. The illustrations may differ depending on the crane.

WARNING
Risk 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!

▶ Luff the boom down until the end section touches the ground slightly, illustration **1**.
▶ Release and unpin the pins at both sides (level **B**) at point **1**, illustration **1**.
▶ Completely remove the lattice sections, illustration **2**.
▶ Lift the end section with the auxiliary crane, illustration **2**.
▶ Release and unpin the pins at both sides (level **B**) at point **2**, illustration **2**.
▶ Release and unpin the pins at both sides (level **A**) at point **3**, illustration **3**.
▶ Release and unpin the pins at both sides (level **B**) at point **4**, illustration **3**.
▶ Release and unpin the pins at both sides (level **A**) at point **5**, illustration **3**.
▶ Release and unpin the pins at both sides (level **A**) at point **6**, illustration **3**.

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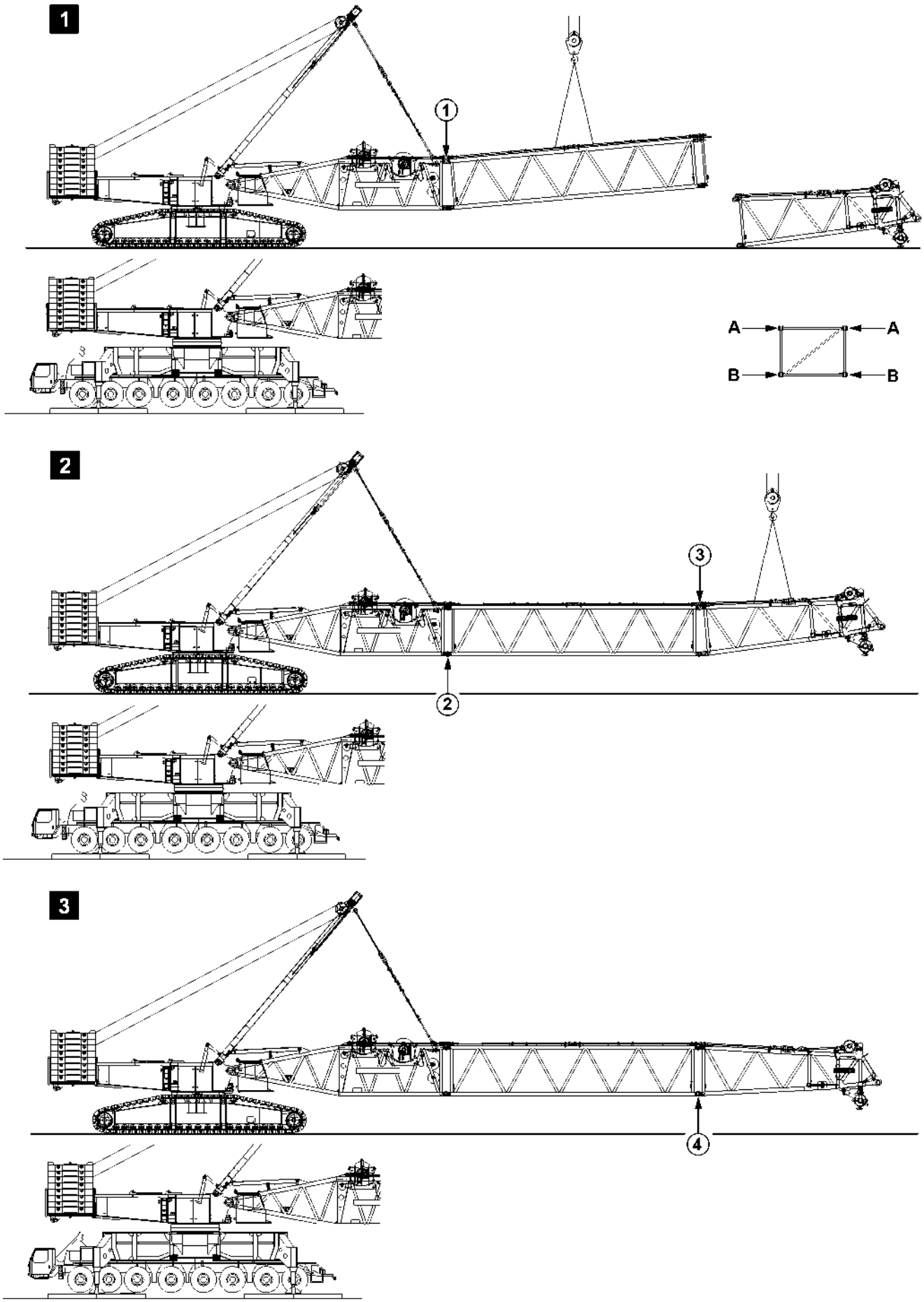

Fig.198182: Example for cranes with lattice mast booms

14.7.3 Flying assembly of lattice sections

The illustrations serve as examples. The illustrations may differ depending on the crane.

WARNING
Risk 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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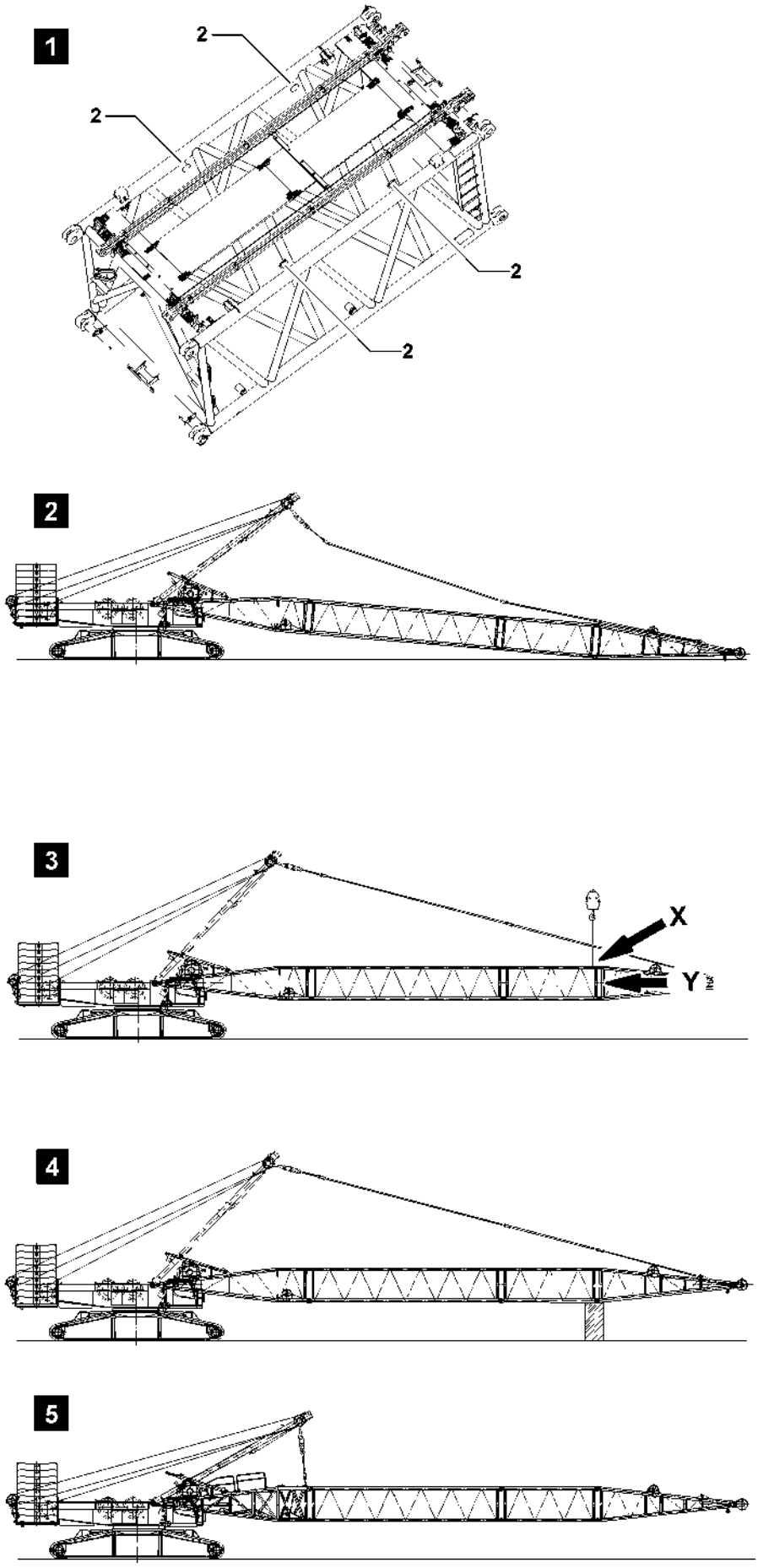

Fig.111448: Guying the pivot section with the SA-frame

14.7.4 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

▶ Place 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 the 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 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.

▶ Place 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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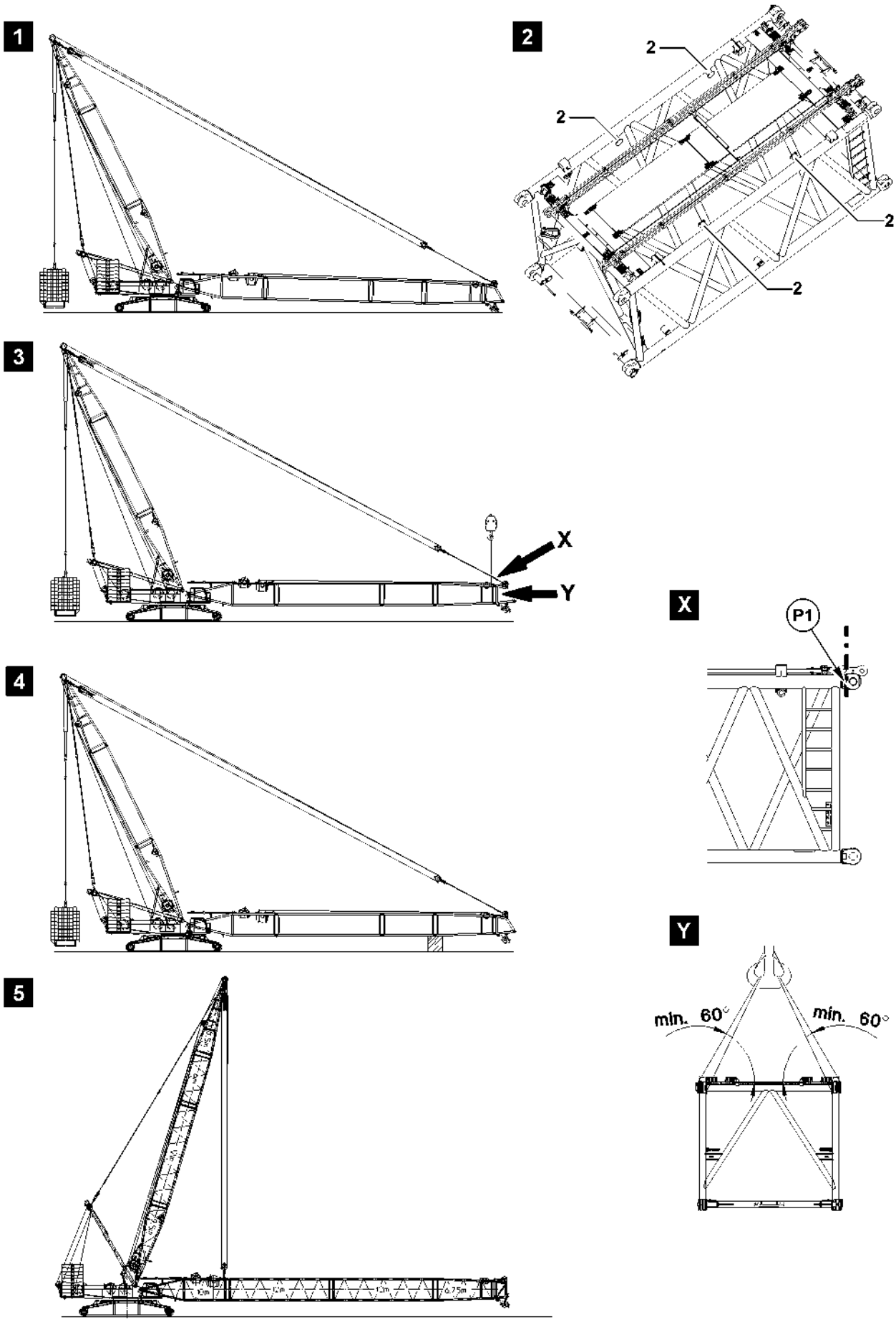

Fig.111449: Guying the pivot section with the derrick boom

Guying the pivot section in flying mode with the derrick boom

▶ Place 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 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.

▶ Place down, secure and disassemble the guy rods.
▶ Pin and secure the 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 SA-frame, see illustration **5**.
– The lattice sections can be disassembled in flying mode.

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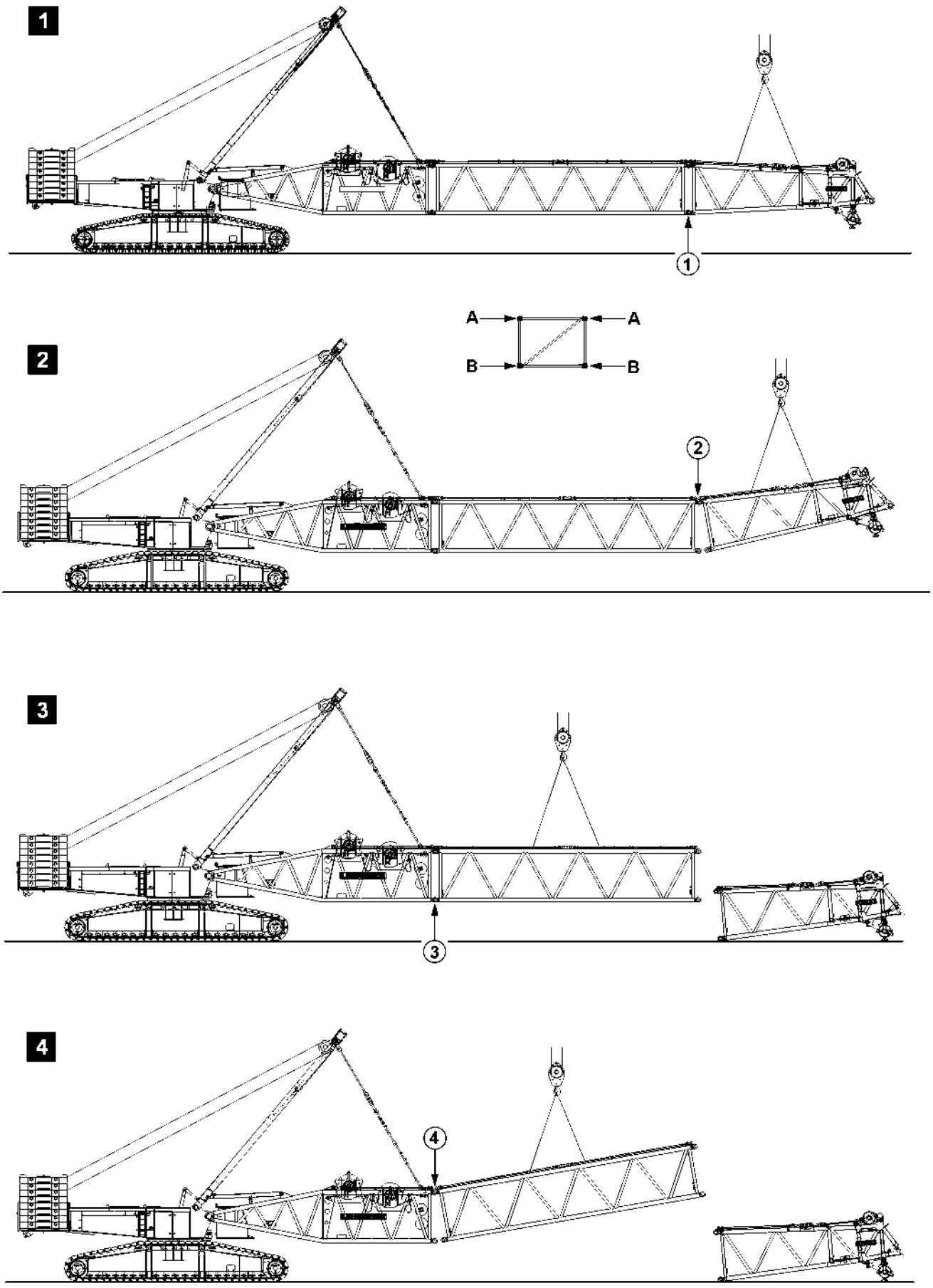

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Fig.105511: Example for cranes with lattice mast booms

Unpinning the lattice components

WARNING
Risk 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 at both sides (level **B**) at point **1**, illustration **1**.
▶ Release and unpin the pins at both sides (level **A**) at point **2**, illustration **2**.
▶ Release and unpin the pins at both sides (level **B**) at point **3**, illustration **3**.
▶ Release and unpin the pins at both sides (level **A**) at point **4**, illustration **4**.

14.8 Bypass for assembly and disassembly

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.

WARNING
High risk of accident in crane operation with activated „Bypass at assembly and disassembly“!
At activated „Bypass at assembly and disassembly“ the overload protection and possible the hoist limit switches are bypassed!
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 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)!

14.8.1 Activating the Bypass at assembly and disassembly

Note
▶ Applies only for cranes with LICCON overload protection.
▶ Indicator light „Assembly“ is only present in the instrument panel for certain crane types.

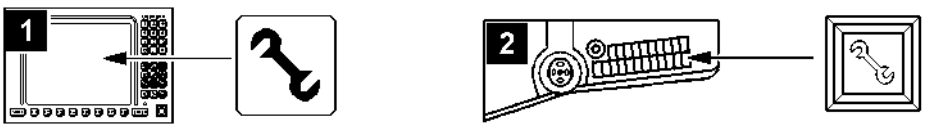

Fig.113438

– 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, acoustical and / or optical warning signals (blinkers, flashing lights, bells and horns).

14.8.2 Bypass at assembly and disassembly

Note
▶ Applies only for cranes with LICCON overload protection.
▶ Indicator light „Assembly“ is only present in the instrument panel for certain crane types.

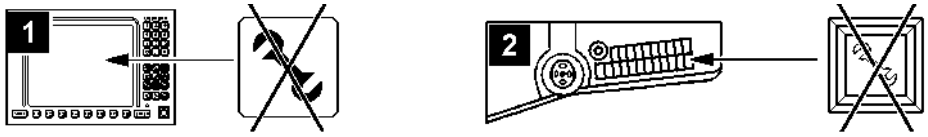

Fig.113437

▶ 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 acoustical and / or optical warning signals which were triggered by the bypass are turned off again.

14.9 Bypassing during crawler assembly

Note
▶ Applies only for cranes with crawler assembly key button.

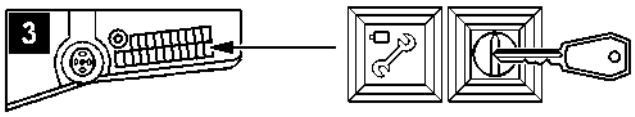

Fig.113441

– Illustration **3**: Crawler assembly key button and indicator light

Make sure that the following prerequisite is met:
– The LICCON overload protection is bypassed / inactive and the „Bypass at assembly and disassembly“ is activated.

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WARNING
High risk of injury in case of actuated crawler assembly key button!
Operating the crawler assembly key button bypasses the overload protection! No shut off at overload will occur in assembly mode or in crane operations!
In the event of deliberate misuse, the crane can topple over!
Personnel can be killed!
This could result in high 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!

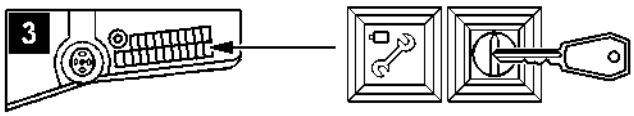

Fig.113441

▶ Actuate the crawler assembly key button.

Result:

– The LICCON overload protection is inactive.
– The indicator light „Crawler assembly“ lights up.

If the bypass at crawler assembly is to be turned off:
▶ Turn the crawler assembly off by pressing the off button.

Result:

– The indicator light in the button turns off.

14.10 Assembling / disassembly of 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-release couplings (particularly return lines) can result in serious accidents due to component failure!
Personnel can be severely injured or killed!
▶ Check the quick-release couplings after installation for correct connection.

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!
Personnel can be severely injured or killed!
▶ 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 and disconnecting: Turn the engine off and wait for short time.
▶ 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.

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14.11 Assembly / disassembly of electrical lines

NOTICE
Danger of damage of 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 Service at Liebherr-Werk Ehingen!

NOTICE
Corroding of plug connections!
The plug connections are only protected when plugged in. If the plug connections are not plugged in, then the contact surfaces can corrode!
- ▶ Always plug or screw the plug connections together properly!
- ▶ Keep plug connections clean and dry! Clean contact surfaces provide the best signal transfer.

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 dust caps or place them in intended parking retainers.

If locking brackets are present:
- ▶ Close the locking bracket.

15 Erection / take 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.
- ▶ The required counterweight must always be in direct vicinity of the crane.
- ▶ The crane operator must ensure that the required counterweight 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, spring retainers, ice etc.) can cause accidents.

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WARNING
Danger of fatal injury due to damaged guy rods!
If the boom system is placed on the ground or a load bearing support in strong wind or longer downtime, the guy rods can be damaged due to wind influence on the boom guying.
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 checked for damage and cracks before resuming crane operation.
- ▶ Make sure that the maintenance intervals of the guy rods are adhered to.

15.1 Rigging / taking down the guy rods on lattice booms on placed down boom system

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 support.
- ▶ 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.

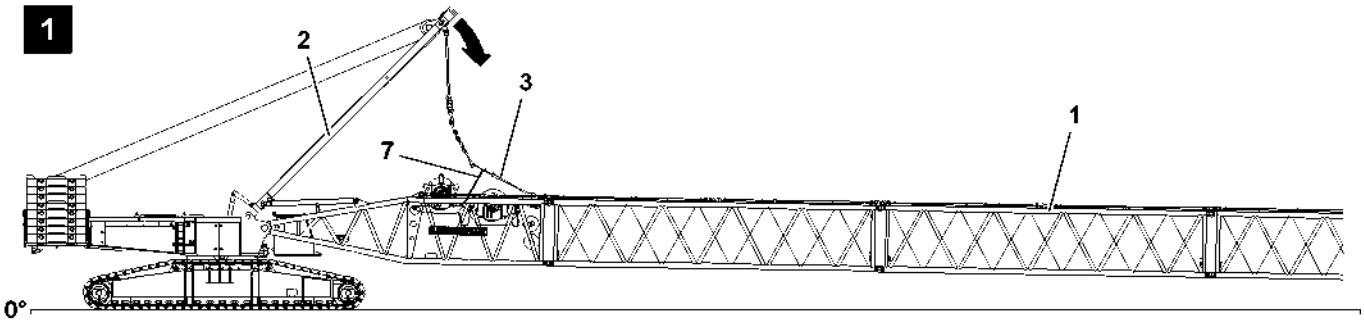

Fig.120722: Guying placed in transport receptacle and SA-frame guying relieved

- ▶ Place the guy rods 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**.

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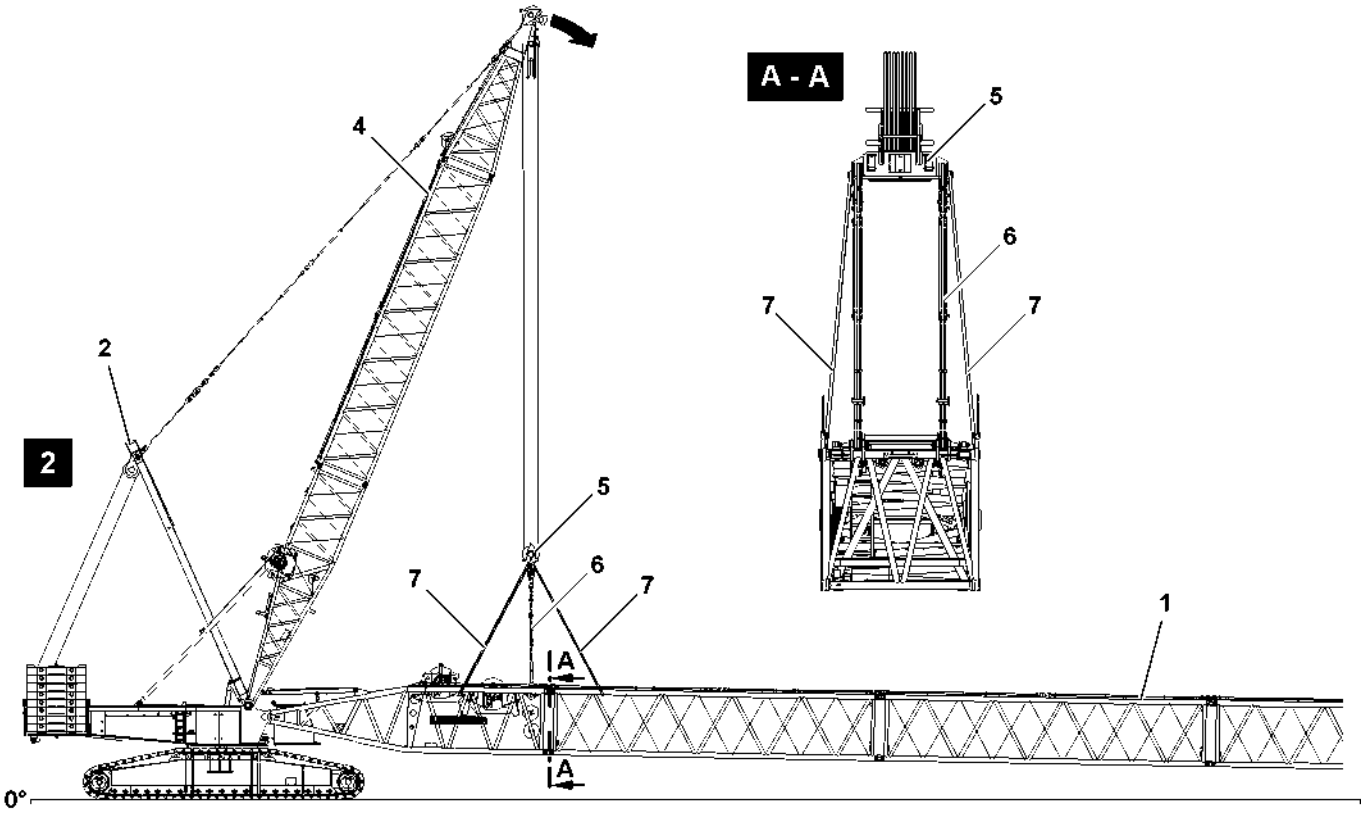

Fig.120771: Guying placed in transport receptacle and upper pulley block rigged against the boom

- ▶ Place the boom system down and - if present - remove the derrick ballast.
- ▶ Place the guy rods on the lattice sections **1**: Luff the D-boom **4** down to the front until the 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**.

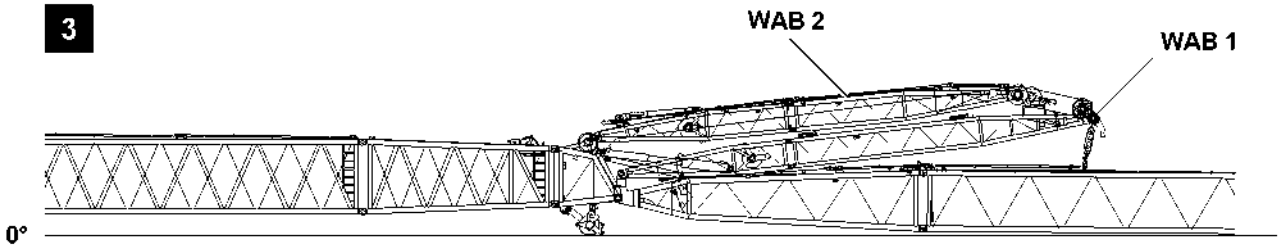

Fig.120821: Guying in transport receptacle(s) and WA-frames placed down to the front (example lattice mast crane)

For lattice mast cranes with luffing lattice jib the following applies:

WARNING
Danger of accident when removing the W-guying!
When placing 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 place them into the transport receptacles.
- ▶ Place the WA-frames (WA-frame 1 **WAB 1** and WA-frame 2 **WAB 2**) down to the front.

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For telescopic cranes with luffing lattice jib the following applies:

WARNING
Danger of accident when placing the NA-frames down!
When placing 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 place the NA-frames down to the front so that the guy rods are relieved.

15.2 Erection / take 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.
– The derrick ballast (suspended ballast or ballast trailer ballast) is installed according to the load chart or the erection / take down charts.
– The telescopic boom is fully telescoped in.
– 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 installed and are fully functional.
– All pin connections have been secured.
– No personnel is within the danger zone.
– There are no loose parts on the boom or the auxiliary boom.
– In winter, the exposed rope pulleys must be kept free of snow, frost and ice.
– In winter, the telescopic boom, the auxiliary boom and their associated components (limit switches, cable drum, flashing beacon, wind speed sensor etc.) must be kept free of ice and snow.

▶ Check if all prerequisites have been met.

15.3 Erection / take down for crawler cranes

Make sure that the following prerequisites are met:
– The crane is horizontally aligned.
– The crane is properly supported (cranes with support).
– The counterweight has been installed on the turntable according to the load chart.
– The central ballast has been installed according to the load chart.
– The counterweight is installed according to the load chart or the erection / take down charts.
– The derrick ballast (suspended ballast or ballast trailer ballast) is installed according to the load chart or the erection / take down charts.
– 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 installed and are fully functional.
– All pin connections have been secured.
– No personnel is within the danger zone.
– There are no loose parts on the boom or the auxiliary boom.
– In winter, the exposed rope pulleys must be kept free of snow, frost and ice.
– In winter, the boom, the auxiliary boom and their associated components (limit switches, cable drum, flashing beacon, wind speed sensor etc.) must be kept free of ice and snow.

▶ Check if all prerequisites have been met.

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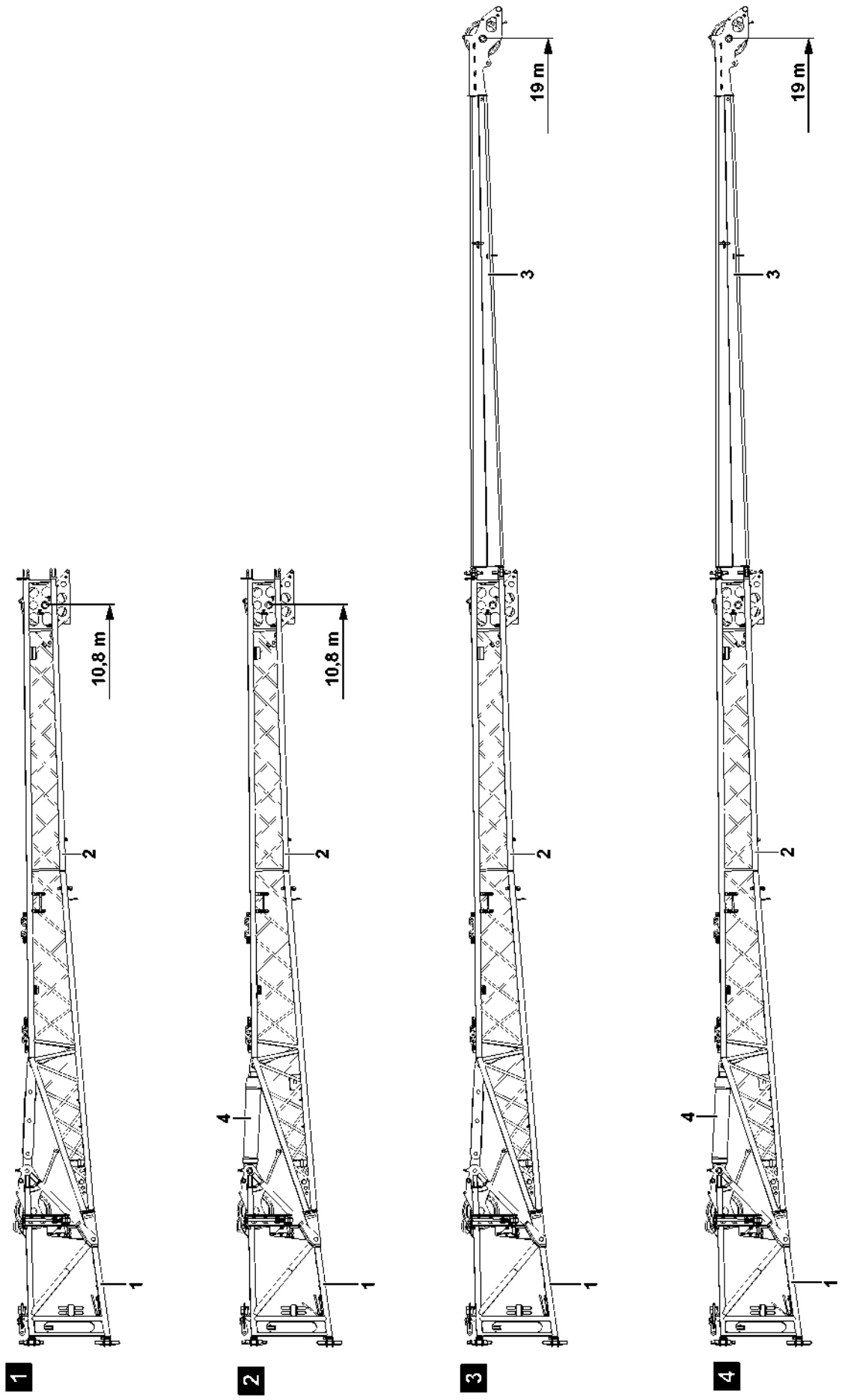

Fig.108689

1 General

The folding jib versions for TK operation (mechanical angle adjustment) and TNZK operation (hydraulic angle adjustment) can be self-assembled on the telescopic boom.

The folding jib can be operated as a single folding jib with a height of 10.8 m or as a double folding jib with a height of 19 m.

A folding jib with „mechanical angle adjustment“ can be assembled on the telescopic boom from 0° to 20° and maximum 40°.

A folding jib with „hydraulic angle adjustment“ can be luffed under load from 0° to 40°.

DANGER
Danger of accident when driving with folding jib!
- ▶ Before on road travel, the folding jib must always be brought into the transport position and mechanically secured.
- ▶ Make sure that the folding jib is properly secured before moving the crane on public roads.

1.1 Folding jib variations

The following folding jib variations are possible:
- Single folding jib with „mechanical angle adjustment“
- Double folding jib with „mechanical angle adjustment“
- Single folding jib with „hydraulic angle adjustment“
- Double folding jib with „hydraulic angle adjustment“

1.1.1 Single folding jib, see illustration 1 and 2

Position	Description	Length
1	Adapter	
2	Pivot section	
4	Control cylinder	
Length of single folding jib		10.8 m

1.1.2 Double folding jib, see illustration 3 and 4

Position	Description	Length
1	Adapter	
2	Pivot section	
3	End section	
4	Control cylinder	
Length of double folding jib		19.0 m

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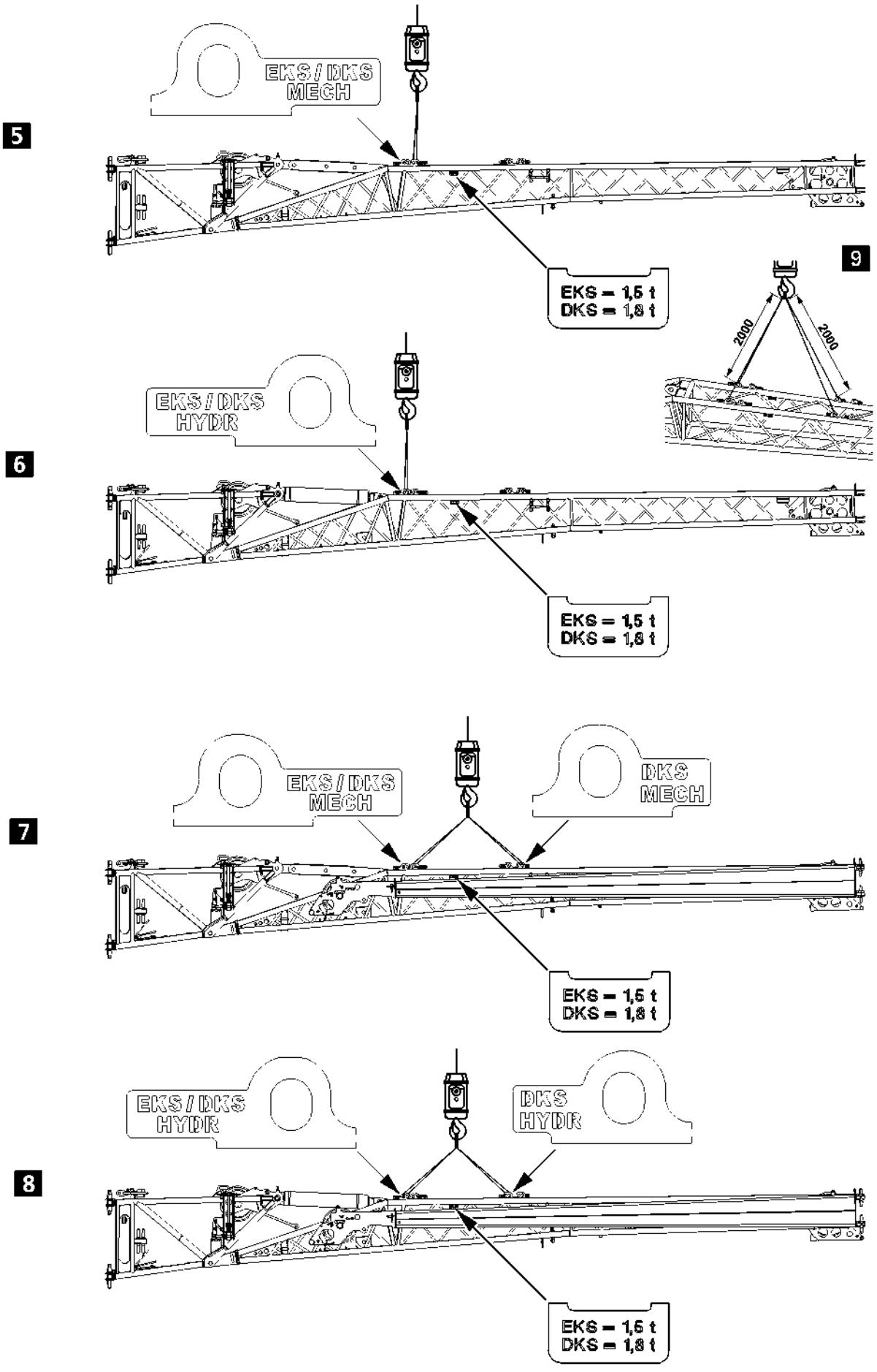

Fig.112195

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1.2 Fastening points

The end section, if also carried along, must be folded in and locked on the fastening points.

Various fastening eyes are installed on the folding jib for the different transport variations. The transport variations are differentiated in single or double folding jib or „mechanical angle adjustment“ or „hydraulic angle adjustment“.

The appropriate fastening eyes and points are marked with tags.

DANGER
Danger of accident due to incorrect attachment!
Life-threatening situations can arise if the folding jib is improperly or incorrectly attached!
- ▶ Attach the folding jib according to the fastening points shown on the signs!
- ▶ When attaching the double folding jib, the end section **3** must be folded in, locked and secured, see illustration **7** and illustration **8**!

CAUTION
Damage of fastening points!
If the fastening equipment is too short, then the fastening points on the folding jibs can be damaged!
- ▶ To attach the folding jib, fastening equipment with a strand length of at least 2000 mm each must be used, see illustration **9**!

Description	Abbreviation
Single folding jib	**EKS**
Double folding jib	**DKS**
Hydraulically luffable	**HYDR**
Mechanically luffable	**MECH**

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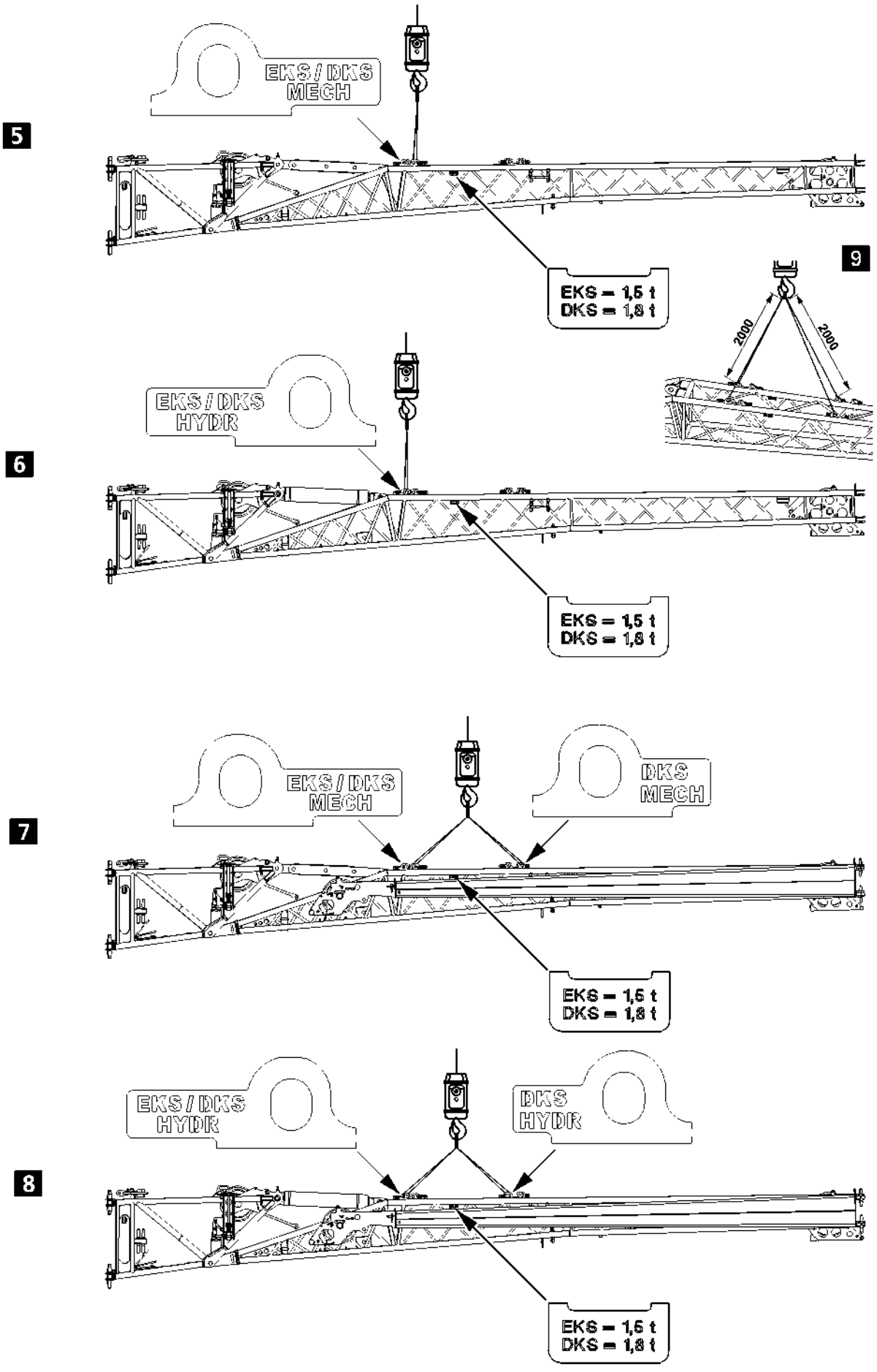

Fig.112195

1.2.1 Single folding jib, see illustration 5

Single folding jib with „mechanical angle adjustment“.

Description	Abbreviation	Weight
Single folding jib	EKS MECH	1.5 t

1.2.2 Single folding jib, see illustration 6

Single folding jib with „hydraulic angle adjustment“.

Description	Abbreviation	Weight
Single folding jib	EKS HYDR	1.5 t

1.2.3 Double folding jib, see illustration 7

Double folding jib with „mechanical angle adjustment“.

Description	Abbreviation	Weight
Double folding jib	DKS MECH	1.8 t

1.2.4 Double folding jib, see illustration 8

Double folding jib with „hydraulic angle adjustment“.

Description	Abbreviation	Weight
Double folding jib	DKS HYDR	1.8 t

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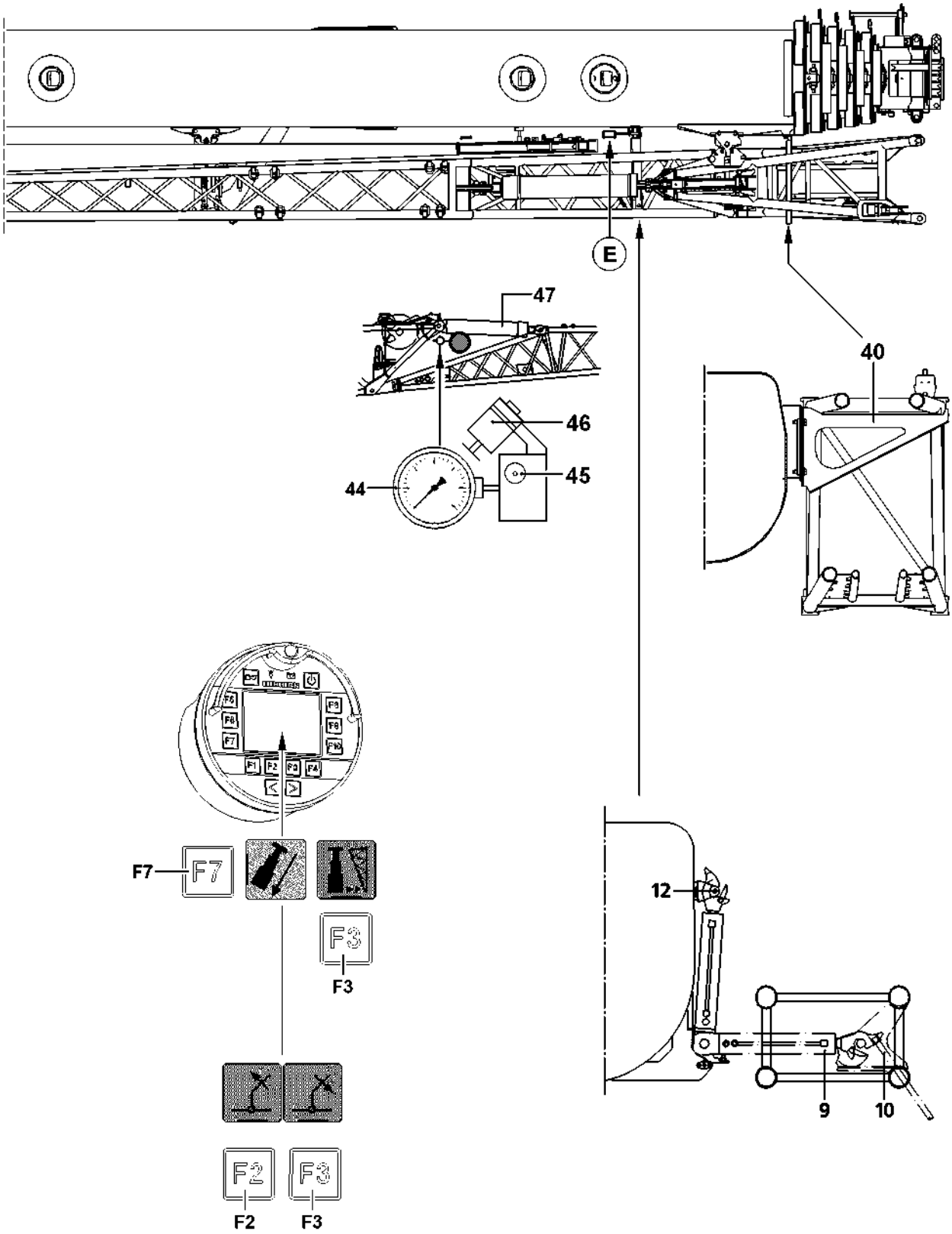

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Fig.120253

2 Assembling the folding jib

In tele operation, the swing cylinder **9** can be folded up, if necessary, and secured with a pin **12**.

2.1 General

DANGER
Danger of fatal injuries due to falling folding jib!
The folding jib could fall down due to an assembly error.
- ▶ Standing under the folding jib during the swing procedure is prohibited!
- ▶ Standing in the swing range as well as in the folding area of the folding jib is prohibited!
- ▶ The folding jib must be secured by an auxiliary rope during the swinging process!

DANGER
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 injuries.
- ▶ All assembly work from a height of 2 m must normally be carried out using suitable aids (lifting platforms, scaffolding, ladders, auxiliary crane etc.)! The height above which assembly / disassembly work must be carried out with aids depends on national regulations. The national regulations must be adhered to!
- ▶ If work cannot be carried out using these aids or from the ground, then assembly personnel must protect themselves from falling with suitable aids (such as safety harnesses)!
- ▶ Do not walk on the telescopic boom or folding jib!

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 telescopic boom is fully telescoped in.
- – The folding jib has been attached for transport on the telescopic boom pivot section.
- – The telescopic boom has been luffed down to the rear or the side in the 0° position.

DANGER
Danger of accident if the folding jib swings out by itself when it is unpinned!
If the telescopic boom is not in the 0° position, there is a danger of accidents if the folding jib swings out by itself when it is unpinned.
- ▶ Move the telescopic boom to 0° position.

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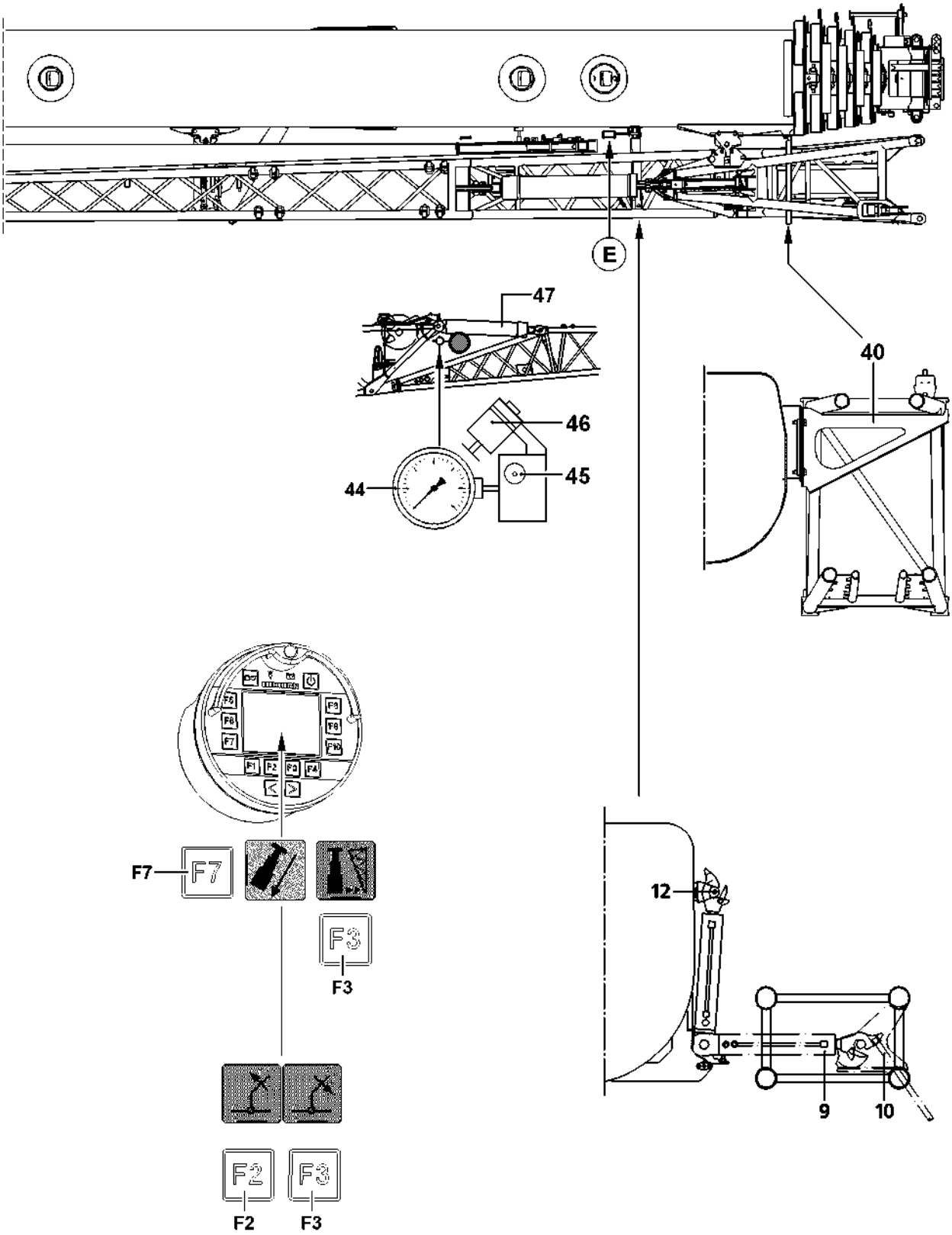

Fig.120253

2.2 Reeving out the hoist rope on the telescopic boom head

In order to speed up subsequent reeving in of the hoist rope after assembling the folding jib, the hook block can be set down at a distance from the crane approximating to the subsequent distance of the telescoped in telescopic boom **with** assembled folding jib.

- ▶ Telescope the telescopic boom out to the respective length.
- ▶ Place the hook block on the ground.
- ▶ Disengage the hoist rope on the rope fixed point.
- ▶ For safety reasons, remove the hoist limit switch weight and the chain.

Note

- ▶ The hoist limit switch must be pulled mechanically and the operating rope must be attached to the telescopic boom head using the snap-hook when operating the folding jib.
- ▶ The telescopic boom may remain reeved if the hoist rope of winch 2 is used for folding jib operation.

- ▶ Remove the rope retaining pipes on the pulley head and on the back pulley.
- ▶ Telescope the telescopic boom in again completely.

2.3 Important check before swinging out the hydraulic folding jibs (TNZK operation)

DANGER

Danger of fatal injury if the folding jib involuntarily folds down!

When using hydraulic folding jibs (TNZK operation), before swinging the folding jib out, check if a pressure of 60 bar is shown on the pressure gauge **44**. If the pressure on the pressure gauge **44** is too low, fatal accidents can occur if the folding jib folds down by itself!

- ▶ It is **expressly prohibited** to swing out the folding jib with less than 60 bar on the pressure gauge **44**.

The restrictor **45** may only be operated during maintenance operations.

If the pressure gauge **44** shows low pressure:

- ▶ Connect the hydraulic lines.
- ▶ Luff the folding jib up with the master switch until a pressure of at least 60 bar is shown on the pressure gauge **44**.
  or
  On the Bluetooth™ Terminal (BTT) call up the „Lift / lower the folding jib“ menu.
- ▶ Press the key **F2** until a pressure of at least 60 bar is shown on the pressure gauge **44**, see Crane operating instructions, chapter 5.31.

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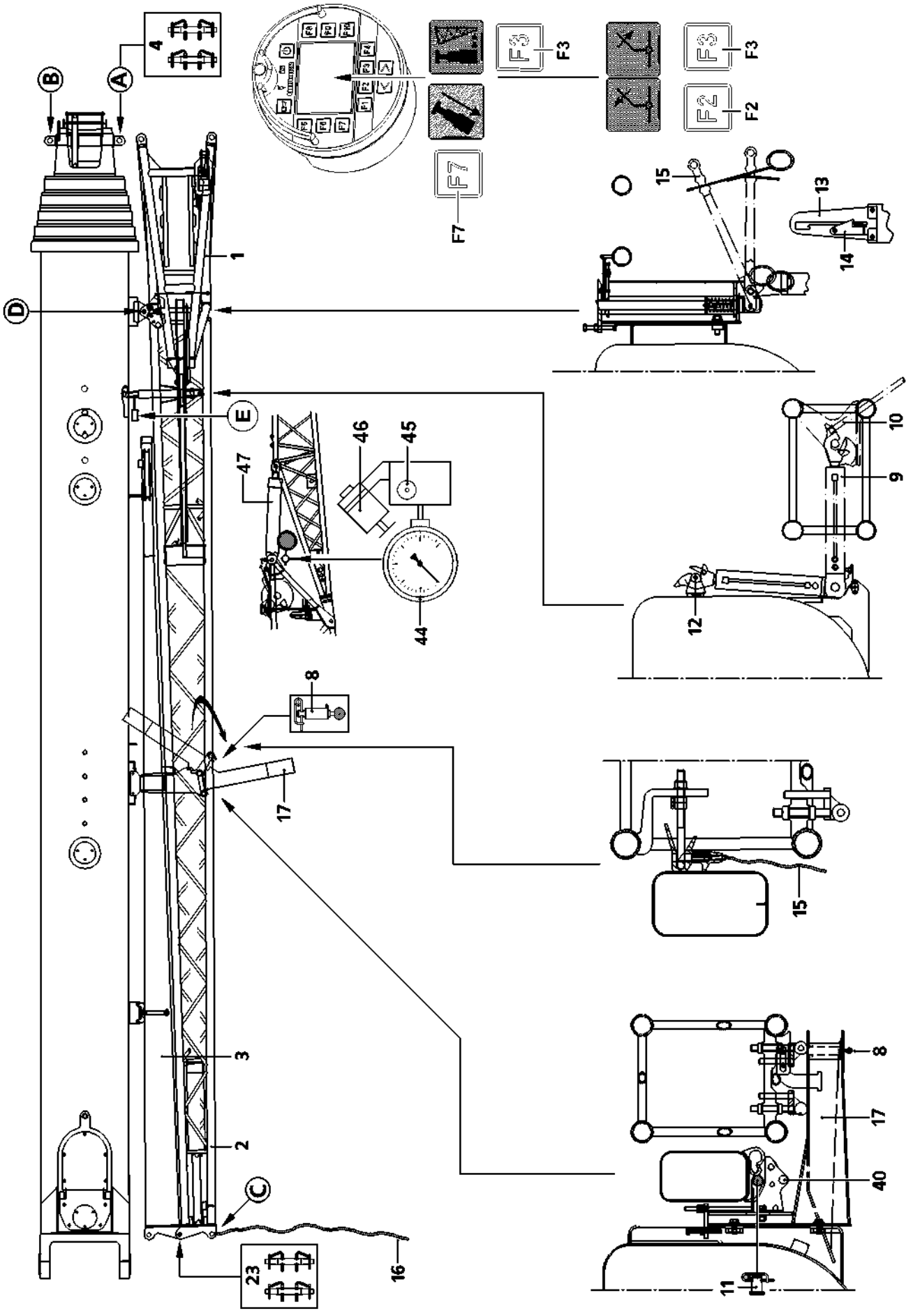

Fig.120252

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2.4 Assembly of the single folding jib carried on the crane

The end section **3**, which is not required, remains pinned to the telescopic boom during single folding jib operation.

DANGER
Danger of fatal injury if the end section falls down!
During operation with the single folding jib, the end section **3** may not be unpinned from the telescopic boom. Otherwise there is a danger of accident due to falling end section **3**.
▶ Do not unpin the end section on the telescopic boom!

If carried:
▶ Disconnect the cable of the flashing beacon on the driver's cab and remove the flashing beacon.

When swinging the folding jib support **17** in and out, ensure that the spring pin **8** is unlocked with one hand and that the folding jib support **17** is moved overhead with the other hand.

▶ Release and unpin the spring pin **8**.
▶ Swing the folding jib support **17** out until the spring pin **8** locks again.

With „hydraulic folding jibs" (TNZK operation), the hydraulic line must be disconnected before swinging out the folding jib.

If a hydraulic folding jib is carried along:
▶ Disconnect hydraulic line to hydraulic cylinder **47** at point **E**.
▶ Attach the auxiliary rope **16** on point **C**.

If a double folding jib is carried along:
▶ Release and unpin the pin **23**.

If a double folding jib is carried along:
▶ Pull the nylon rope **15** and loosen the locking mechanism between the end section **3** and the pivot section **2**.
▶ Start the crane engine.
▶ Press the function key **F3** on the BTT and swing out the folding jib with swing cylinder until it can be pinned at point **A**.

Problem remedy
If the pin bores on point **A** do not align, the telescopic boom can be tensioned with the function key **F7**:
▶ Place the telescopic boom down and telescope all telescopes in completely.
▶ Pin telescope 4.

WARNING
Danger of severe crushing!
For the „Tension the telescope boom" function, all telescoping sections are pulled together, which can lead to severe crushing injuries of fingers.
▶ As long as the function „Tension telescopic boom" is carried out, it is prohibited for any personnel to remain in the push out range of the telescoping sections!

▶ Press the function key **F7** on the BTT.

Result:

– All telescopic sections are pulled together.

Note
▶ For BTT, see the Crane operating instructions, chapter 5.31.

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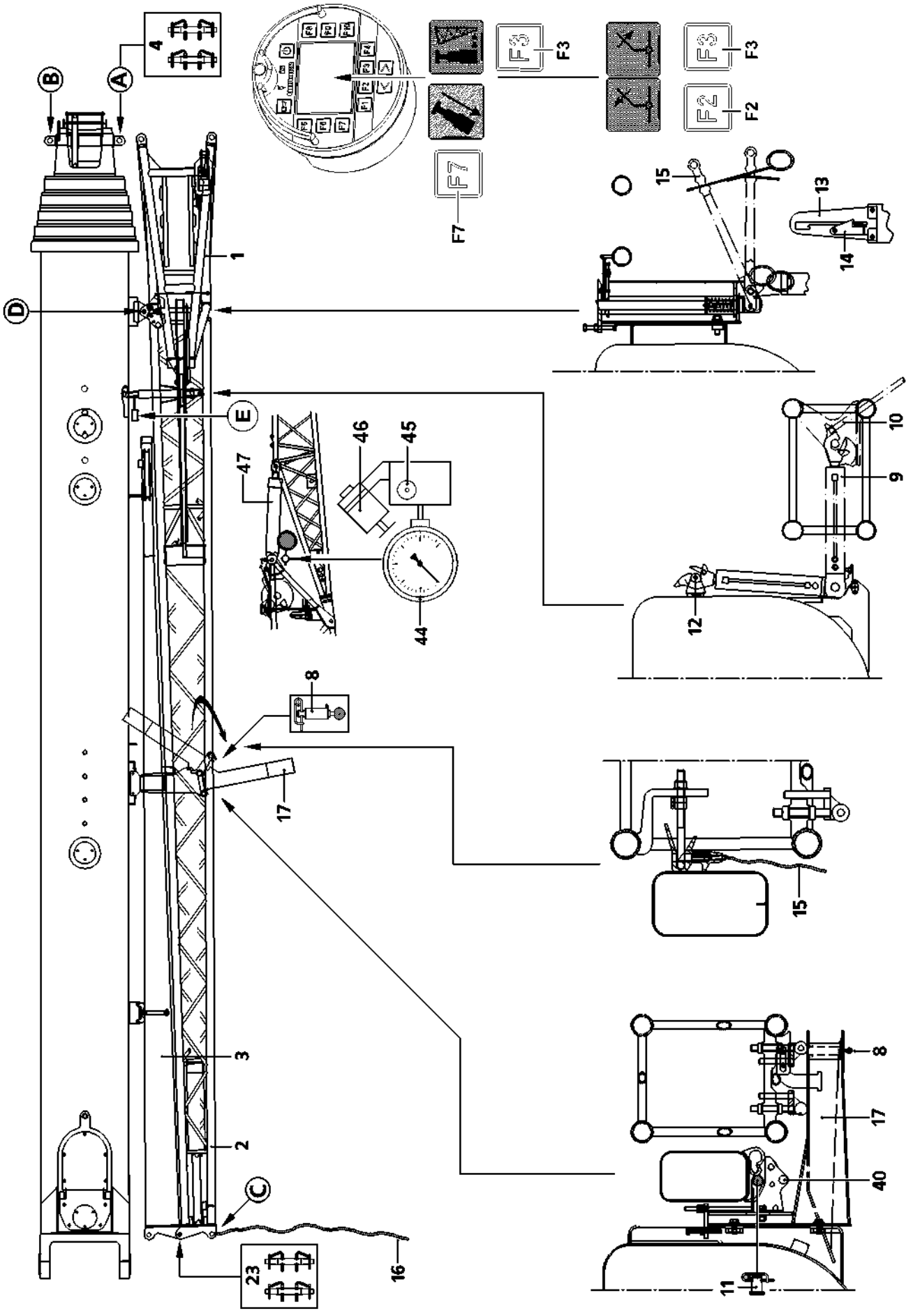

Fig.120252

▶ Insert the pins **4** on top and bottom on point **A** and secure.

DANGER
Danger of fatal injury due to toppling folding jib!
Special retaining clips must be used to secure the pins **4**. The use of spring pins or spring retainers on the pins **4** is not permitted. The folding jib may only be unlocked at point **D**, when the pins **4** are pinned and secured at the top and bottom at point **A**.

▶ Pin and secure pins **4** at point **A** on top and bottom.

▶ Swing the safety bracket **14** with assembly rod **10** to the side.
▶ Push lever **15** with assembly rod **10** upwards and latch into the platform.
▶ Press button **451** and swing the folding jib with the swing cylinder all the way out.
▶ Unlock the swing cylinder **9** with assembly rod **10**.

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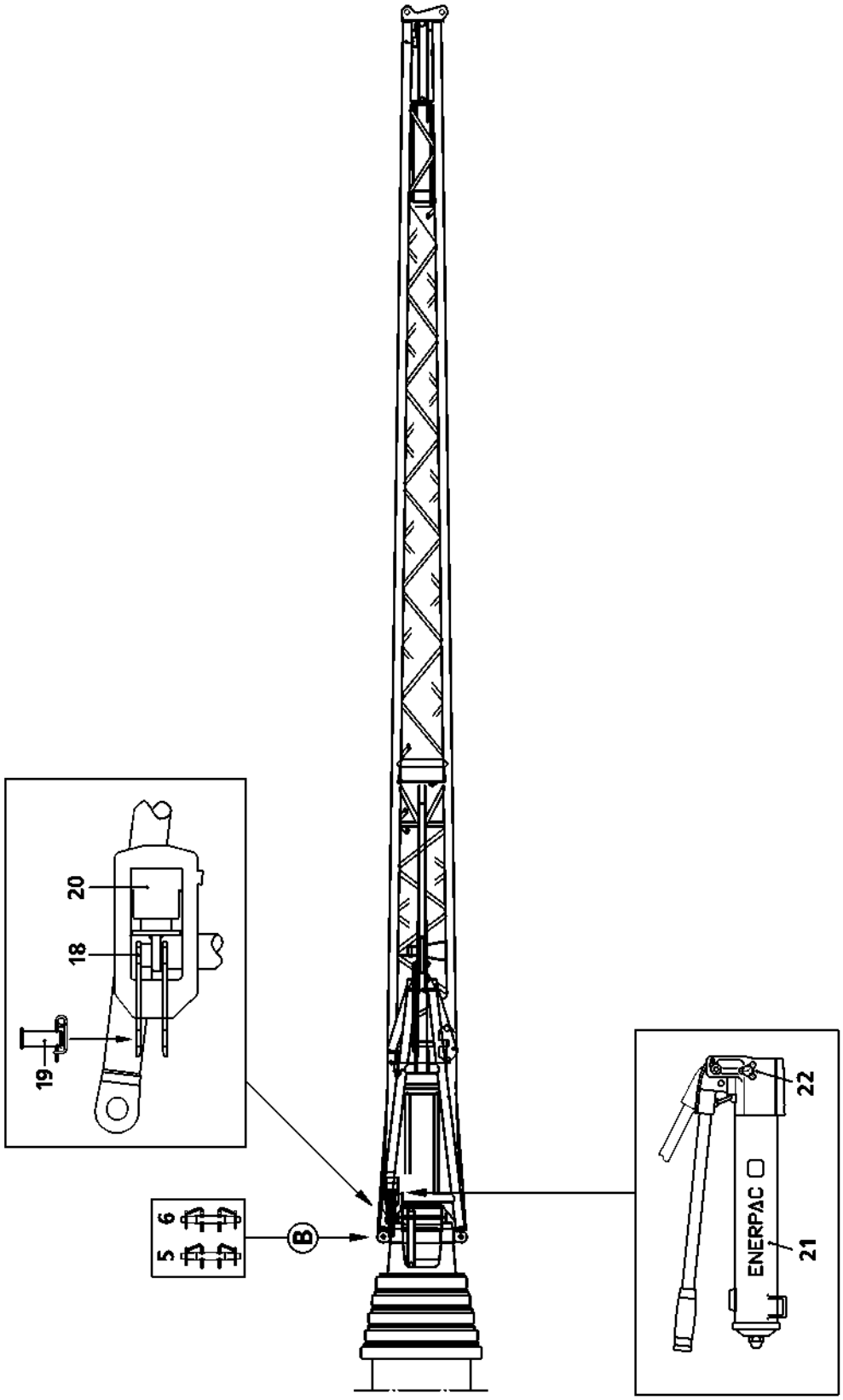

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Fig.190754

DANGER
Danger of fatal injuries due to falling folding jib!
The folding jib could fall down due to an assembly error.
- ▶ Standing under the folding jib during the swing procedure is prohibited!
- ▶ Standing in the swing range as well as in the folding area of the folding jib is prohibited!

▶ Swing pivot section **2** with auxiliary rope **16** by 180° until it can be pinned at top and bottom at point **B**.

DANGER
Danger of accident!
- ▶ The use of spring pins or retaining springs is prohibited on pins **5** and pins **6**!
- ▶ To secure the pin **5** and the pin **6**, use the special retaining clips.

▶ Pin and secure the pin **5** on the bottom at point **B**.

In order to be able to pin on top on point **B**, the hydraulic / mechanical assembly aid **20** must be used.

- ▶ Release the pin **19** and unpin from bore **18**.
- ▶ Pin and secure the assembly aid **20** to the towing bracket with pin **19**.
- ▶ Close the knob **22** on the hand pump **21**.
- ▶ Extend the hydraulic cylinder of the assembly aid **20** by operating the hand pump **21** until the bore is aligned at the opening of the folding jib and the telescopic boom.
- ▶ Pin and secure the pin **6** on top on point **B**.
- ▶ Open the knob **22**.

Result:

– The hydraulic cylinder of the assembly aid **20** returns to the starting position and the pin **19** is released.

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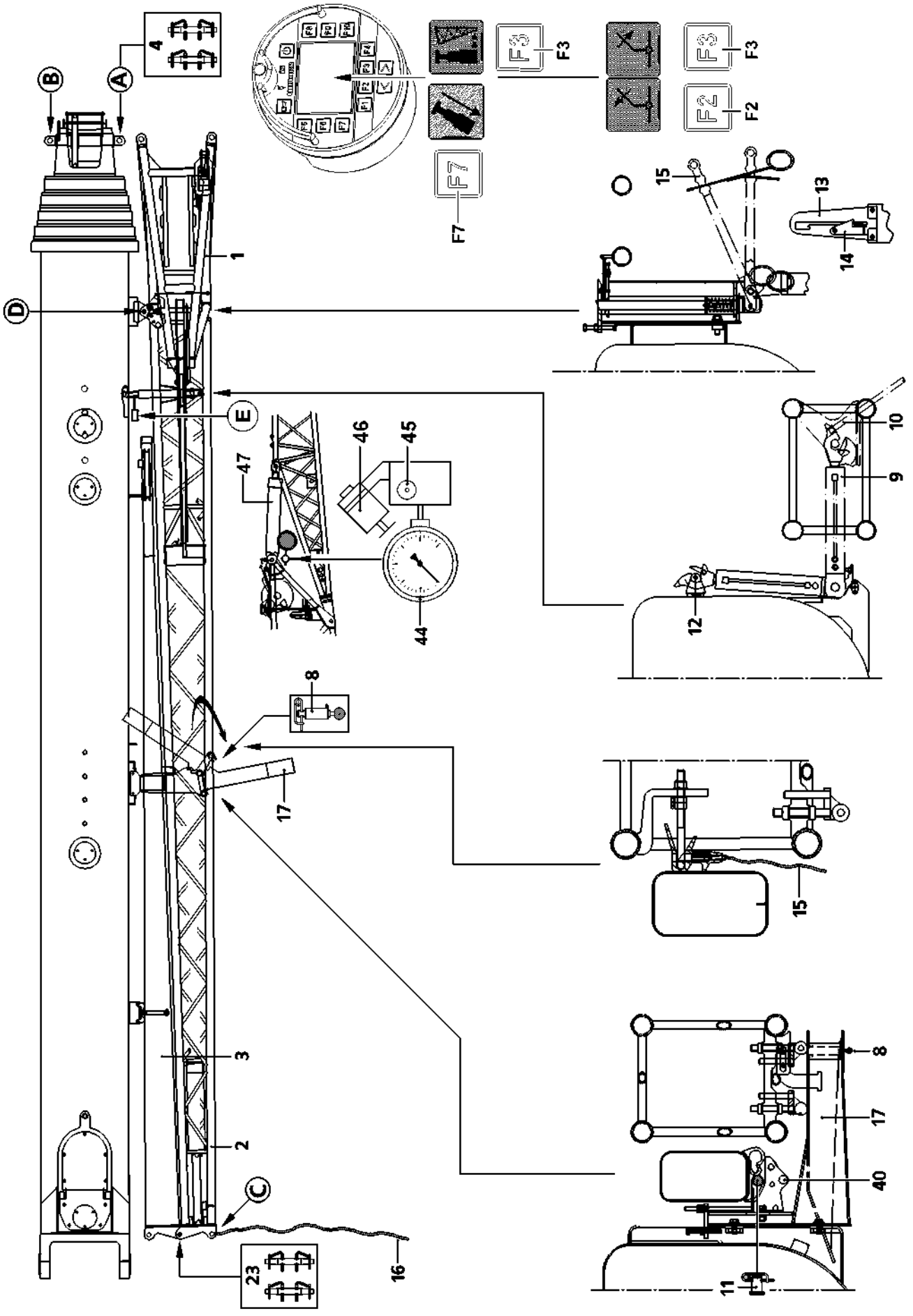

Fig.120252

2.5 Assembly of the double folding jib carried on the crane

2.5.1 Assembly of pivot section

If carried:

▶ Disconnect the cable of the flashing beacon on the driver's cab and remove the flashing beacon.

When swinging the folding jib support **17** in and out, ensure that the spring pin **8** is unlocked with one hand and that the folding jib support **17** is moved overhead with the other hand.

▶ Release and unpin the spring pin **8**.
▶ Swing the folding jib support **17** out until the spring pin **8** locks again.

With „hydraulic folding jibs" (TNZK operation), the hydraulic line must be disconnected before swinging out the folding jib.

If a hydraulic folding jib is carried along:

▶ Disconnect hydraulic line to hydraulic cylinder **47** at point **E**.
▶ Attach the auxiliary rope **16** on point **C**.
▶ Release and unpin pin **11** and insert into bore **40**.
▶ Start the crane engine.
▶ Press the function key **F3** on the BTT and swing out the folding jib with swing cylinder until it can be pinned at point **A**.

Problem remedy

If the pin bores on point **A** do not align, the telescopic boom can be tensioned with the function key **F7**:

▶ Place the telescopic boom down and telescope all telescopes in completely.
▶ Pin telescope 4.

WARNING

Danger of severe crushing!

For the „Tension the telescope boom" function, all telescoping sections are pulled together, which can lead to severe crushing injuries of fingers.

▶ As long as the function „Tension telescopic boom" is carried out, it is prohibited for any personnel to remain in the push out range of the telescoping sections!

▶ Press the function key **F7** on the BTT.

Result:

– All telescopic sections are pulled together.

Note

▶ For BTT, see the Crane operating instructions, chapter 5.31.

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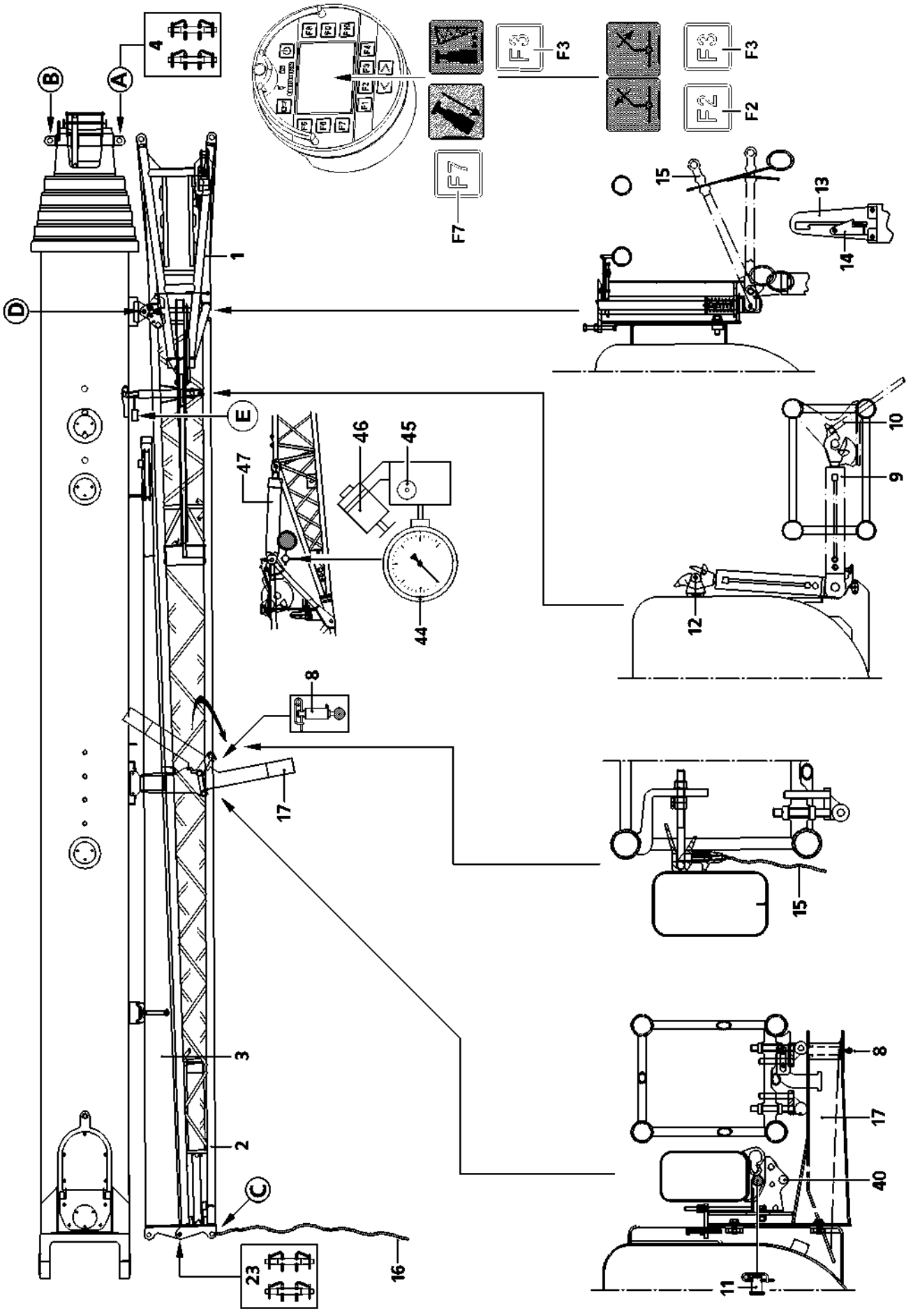

Fig.120252

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▶ Pin upper and lower pins **4** at point **A** and secure.

DANGER
Danger of fatal injury due to toppling folding jib!
Special retaining clips must be used to secure the pins **4**. The use of spring pins or spring retainers on the pins **4** is not permitted. The folding jib may only be unlocked at point **D**, when the pins **4** are pinned and secured at the top and bottom at point **A**.
▶ Pin and secure pins **4** at point **A** on top and bottom.

▶ Swing the safety bracket **14** with assembly rod **10** to the side.
▶ Push lever **15** with assembly rod **10** upwards and latch into the platform.
▶ Press the function key **F3** on the BTT and swing the folding jib with the swing cylinder all the way out.
▶ Unlock the swing cylinder **9** with assembly rod **10**.

DANGER
Danger of fatal injury due to toppling folding jib!
It is prohibited to stand under the folding jib during the swing operation, since the folding jib could topple if it was incorrectly installed.
▶ No persons or objects may be present in the swinging or folding area of the telescopic boom or folding jib.

▶ Swing the folding jib with the auxiliary rope **16** by 180° until it can be pinned at the top and bottom at point **B**.

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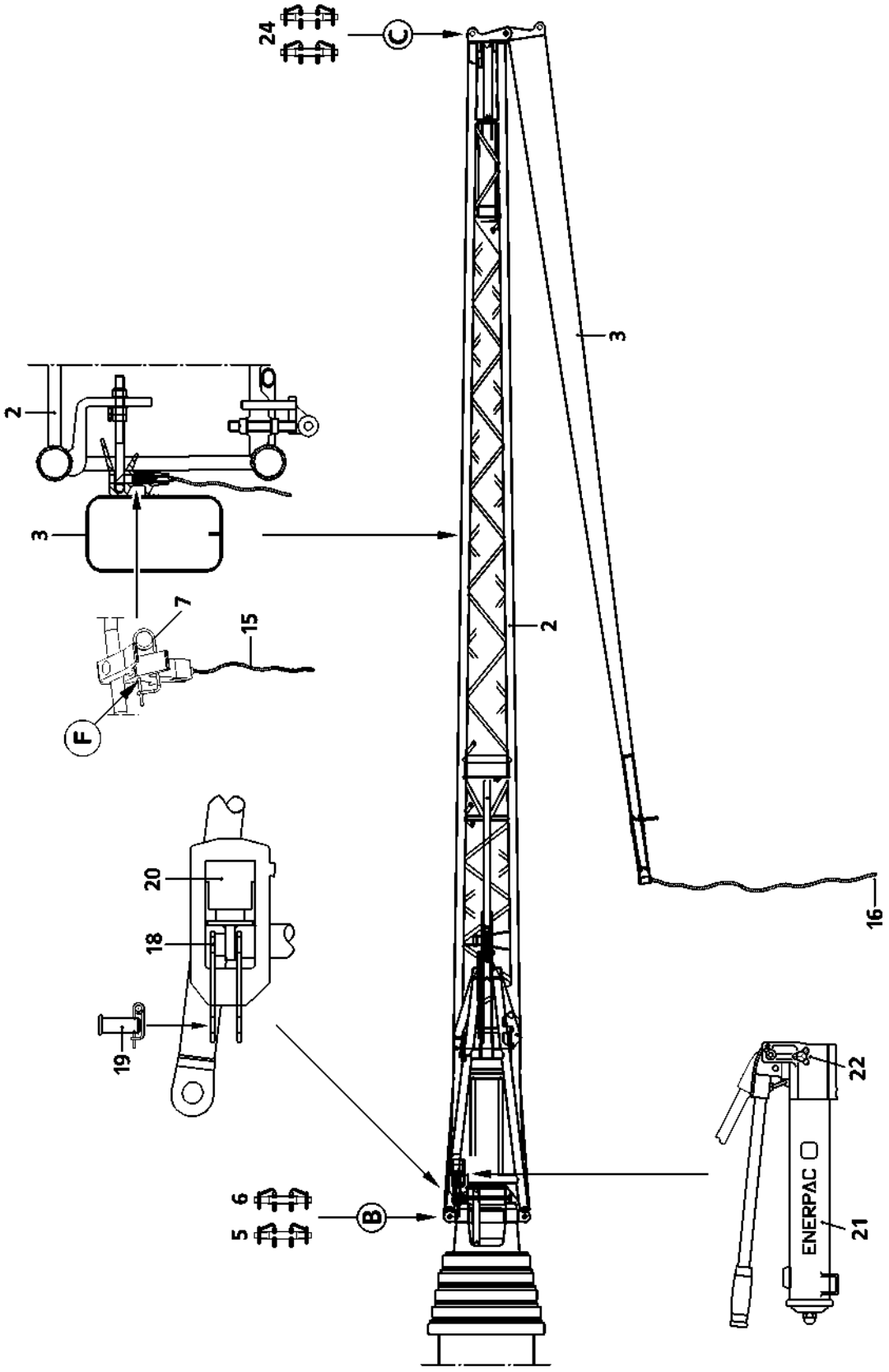

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Fig.103414

DANGER
Danger of accident!
- ▶ The use of spring pins or retaining springs is prohibited on pins **5** and pins **6**!
- ▶ To secure the pin **5** and the pin **6**, use the special retaining clips.

▶ Pin and secure the pin **5** on the bottom at point **B**.

In order to be able to pin on top on point **B**, the hydraulic / mechanical assembly aid **20** must be used.

▶ Release the pin **19** and unpin from bore **18**.
▶ Pin and secure the assembly aid **20** to the towing bracket with pin **19**.
▶ Close the knob **22** on the hand pump **21**.
▶ Extend the hydraulic cylinder of the assembly aid **20** by operating the hand pump **21** until the bore is aligned at the opening of the folding jib and the telescopic boom.
▶ Pin and secure the pin **6** on top on point **B**.
▶ Open the knob **22**.

Result:

– The hydraulic cylinder of the assembly aid **20** returns to the starting position and the pin **19** is released.

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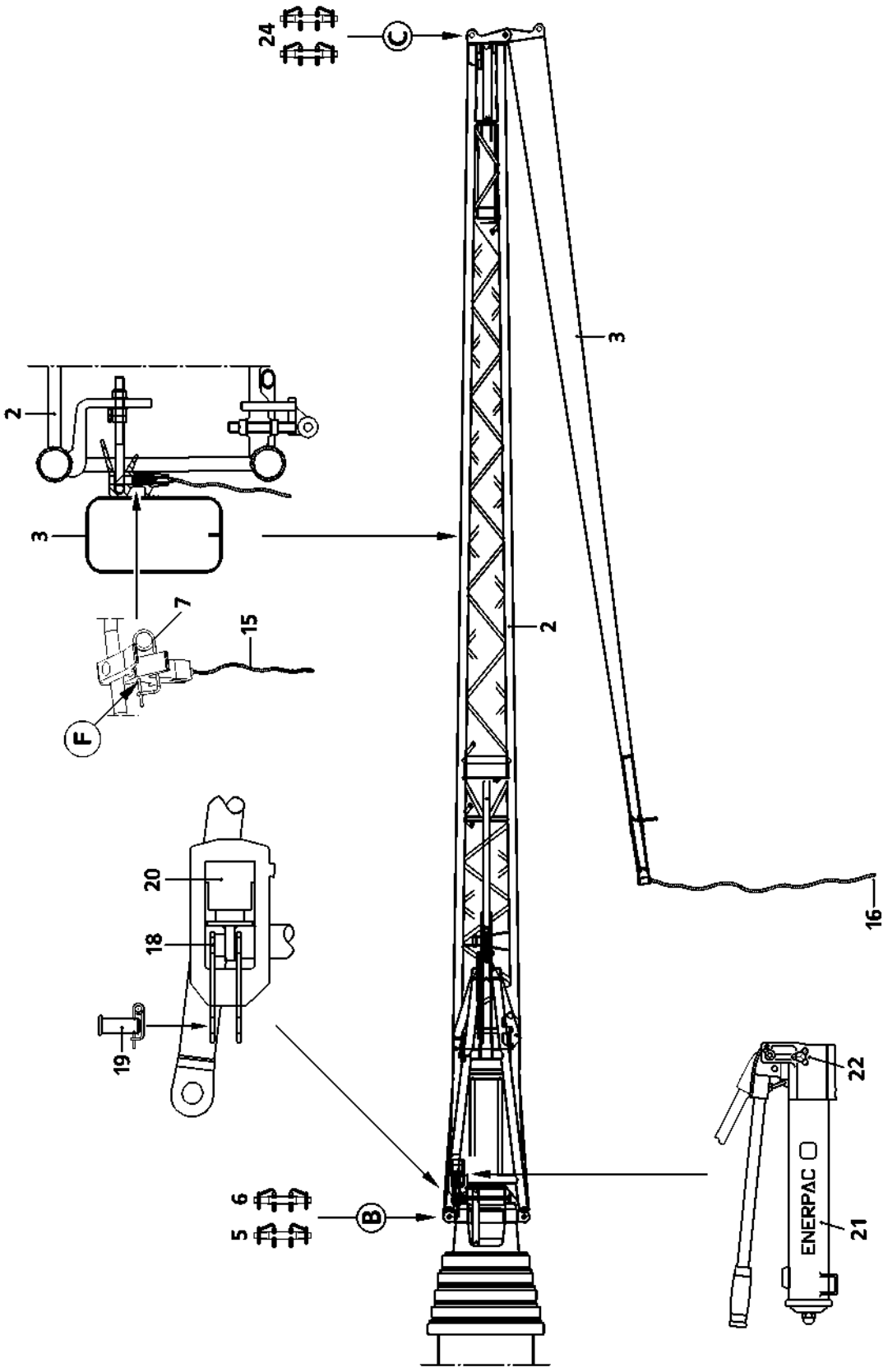

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Fig.103414

2.5.2 Assembly of end section

- ▶ Remove the auxiliary rope **16** on point **C** and attach on the end section **3**.
- ▶ Remove the spring retainer **7** on point **F**.

CAUTION
The end section **3** can swing out involuntarily!
When the lock is being released, the end section **3** can swing out involuntarily.

In order to prevent an involuntary swinging of the end section **3**:
- ▶ Hold the end section **3** with the auxiliary rope **17**!

- ▶ Pull the nylon rope **15** and loosen the locking mechanism between the end section **3** and the pivot section **2**.
- ▶ Swing the end section **3** forward by 180° until it can be pinned at point **C**.

DANGER
Danger of fatal injury due to toppling folding jib!
It is prohibited to stand under the folding jib during the swing operation, since the folding jib could topple if it was incorrectly installed.
- ▶ No persons or objects may be present in the swinging or folding area of the telescopic boom or folding jib.

- ▶ Pin and secure pins **24** at top and bottom using safety clips.
- ▶ Remove the auxiliary rope **16**.

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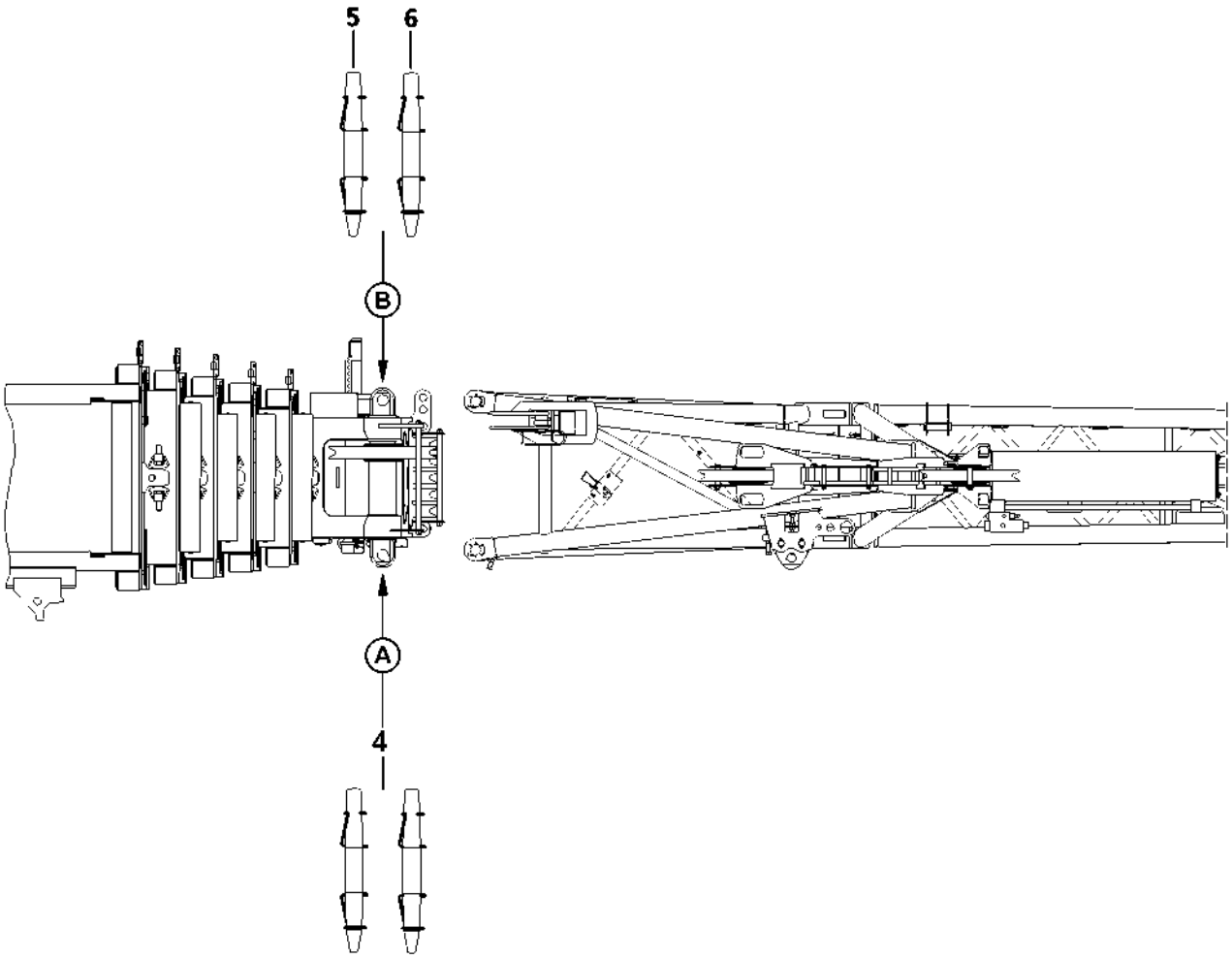

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Fig.103435

2.6 Assembling the separately transported folding jib on the crane

2.6.1 Assembling the separately transported folding jib for crane operating position

For description of fastening points, see section „Fastening points“.

- ▶ Attach the auxiliary crane on the respective fastening points of the folding jib.
- ▶ Lift the folding jib with the auxiliary crane and insert it into the pin points on the telescopic boom.

DANGER
Danger of accident!
- ▶ The use of spring cotters or spring retainers is prohibited at pins **4**, **5** and **6**!
- ▶ Use the special safety clips to secure pins **4**, **5** and **6**.

- ▶ Pin the folding jib with the telescopic boom:
- ▶ Pin and secure the pin **4** on top on point **A**.
- ▶ Pin and secure the pin **5** on top on point **B**.
- ▶ Pin and secure the pin **4** on the bottom at point **A**.
- ▶ Pin and secure the pin **6** on the bottom at point **B**.
- ▶ For more information concerning the double folding jib assembly, see section „Assembly of the end section“.

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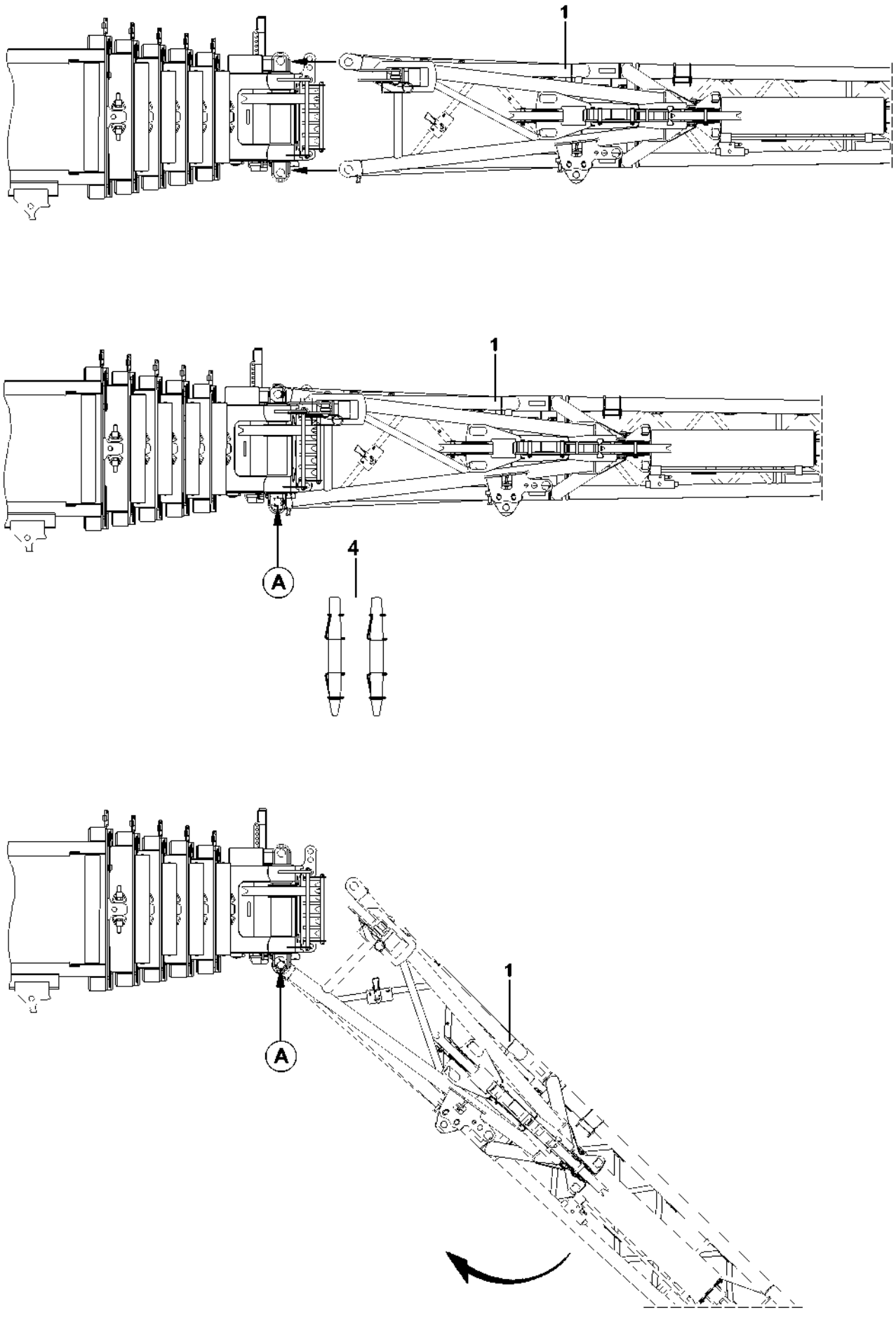

Fig.103436

2.6.2 Installing separately transported folding jib for transport position

An auxiliary crane must be available for the assembly of the separate folding jib **1**.

Make sure that the following prerequisites are met:
- The crane is properly supported and horizontally aligned.
- The telescopic boom is fully telescoped in.
- The telescopic boom is in travel direction in 0° position.

DANGER
Danger of accident from involuntary swinging out of the folding jib when removing the fastening equipment!
If the telescopic boom is not in 0° position, a danger of accident exists due to involuntary swinging out of the folding jib when the fastening equipment is removed.
▶ Move the telescopic boom to 0° position.

▶ Attach the auxiliary crane to corresponding fastening points on folding jib, see section „Fastening points“.

CAUTION
Danger of property damage!
If the following notes are not observed, the folding jib can move uncontrolled and as a result, damage can occur in the area of the telescopic boom and the driver’s cab.
▶ Carry out auxiliary crane movements only with utmost care and the least possible acceleration.
▶ The folding jib must be secured with an auxiliary rope during the assembly procedure!

▶ Lift the folding jib with the auxiliary crane and guide it into pin points on the telescopic boom head.

DANGER
Danger of accident!
▶ The use of spring pins or spring retainers is prohibited on the pins **4**!
▶ Special retaining clips must be used to secure the pins **4**.

▶ Pin the folding jib with the telescopic boom:
▶ Pin and secure pins **4** on top and on the bottom at point **A**.

DANGER
Danger of fatal injuries due to falling folding jib!
Due to improperly pinned folding jib on the telescopic boom, life threatening or even fatal injuries can occur.
▶ Before removing the auxiliary crane, make sure that the folding jib is pinned and secured on point **A** on top and bottom.

▶ Remove the auxiliary crane.

Note
▶ For further procedure to fold the folding jib onto the telescopic boom or in transport position, refer to section „Removing the folding jib“.

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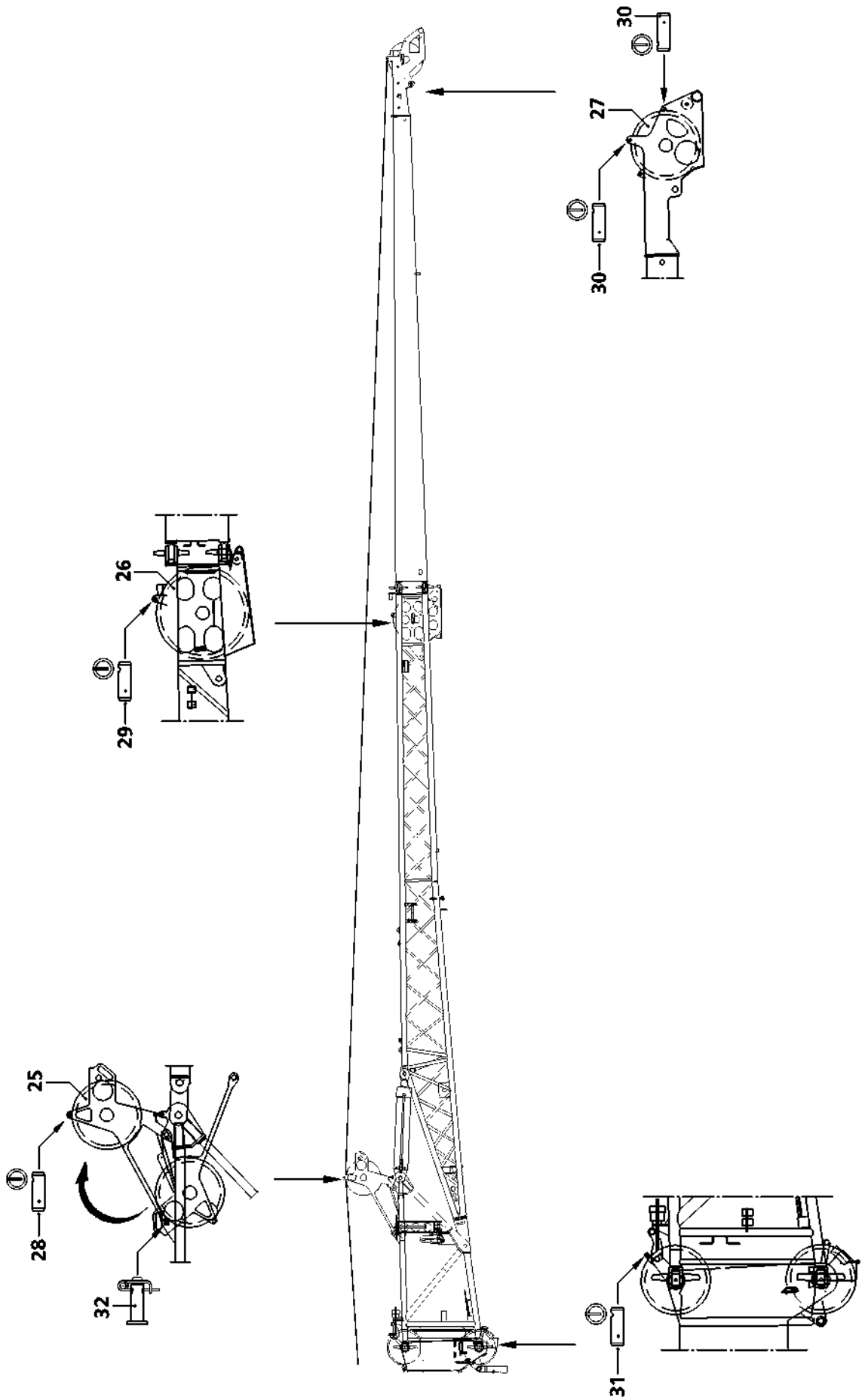

Fig.103278

3 Reeving the hoist rope

DANGER
Danger of falling from folding jib!
When walking on the folding jib, for example to reeve the hoist rope in or out, there is a risk of slipping and falling from the folding jib.
▶ Do not step on the folding jib!

3.1 Swinging the rope guide pulley into operating position

▶ Release and unpin the pin **32**.
▶ Swing rope guide pulley **25** into operating position.
▶ Pinning rope guide pulley **25** into operating position: Insert and secure pin **32**.

3.2 Reeving the hoist rope

NOTICE
Damage to the hoist rope or the rope retaining pins!
If the hoist rope is reeved via hoist gear 2 at operation with single or double folding jib in 0°-position, then the hoist rope can lift off from the rope guide pulley **25** and scrape on the rope retaining pins!
The hoist rope, rope retaining pin **28**, rope retaining pin **29** or rope retaining pin **30** can be damaged!
▶ Reeving the hoist rope via the hoist gear 2 at operation with the single or double folding jib in 0°-position is prohibited!
▶ At operation with the single or double folding jib in 0°-position, reeve the hoist rope only via hoist gear 1!

▶ Release and unpin the rope retaining pin **28** and rope retaining pin **29**.

For operation with double folding jib:
▶ Release and unpin the rope retaining pins **30**.
▶ Place hoist rope over the rope guide pulley **25** and over the end pulley **26** at 10.8 m or over the end pulley **27** at 19 m.
▶ Insert the rope retaining pin again and secure with locking pins.

NOTICE
Damage to the hoist rope!
If the rope retaining pin **29** is pinned in during operation with the double folding jib, the slack hoist rope can scrape against the rope retaining pin **29** and become damaged.
▶ **Do not** insert the rope retaining pin **29** during double folding jib operation!

▶ Attach and secure the load hook on the hoist rope on the fixed point, or reeve in the hoist rope into the hook block.
▶ Attach the hoist limit switch weight.

Note
▶ In folding jib operation with the hook block reeved in on the telescopic boom, the weight of the reeved in hook block on the telescopic boom must be deducted from the load.

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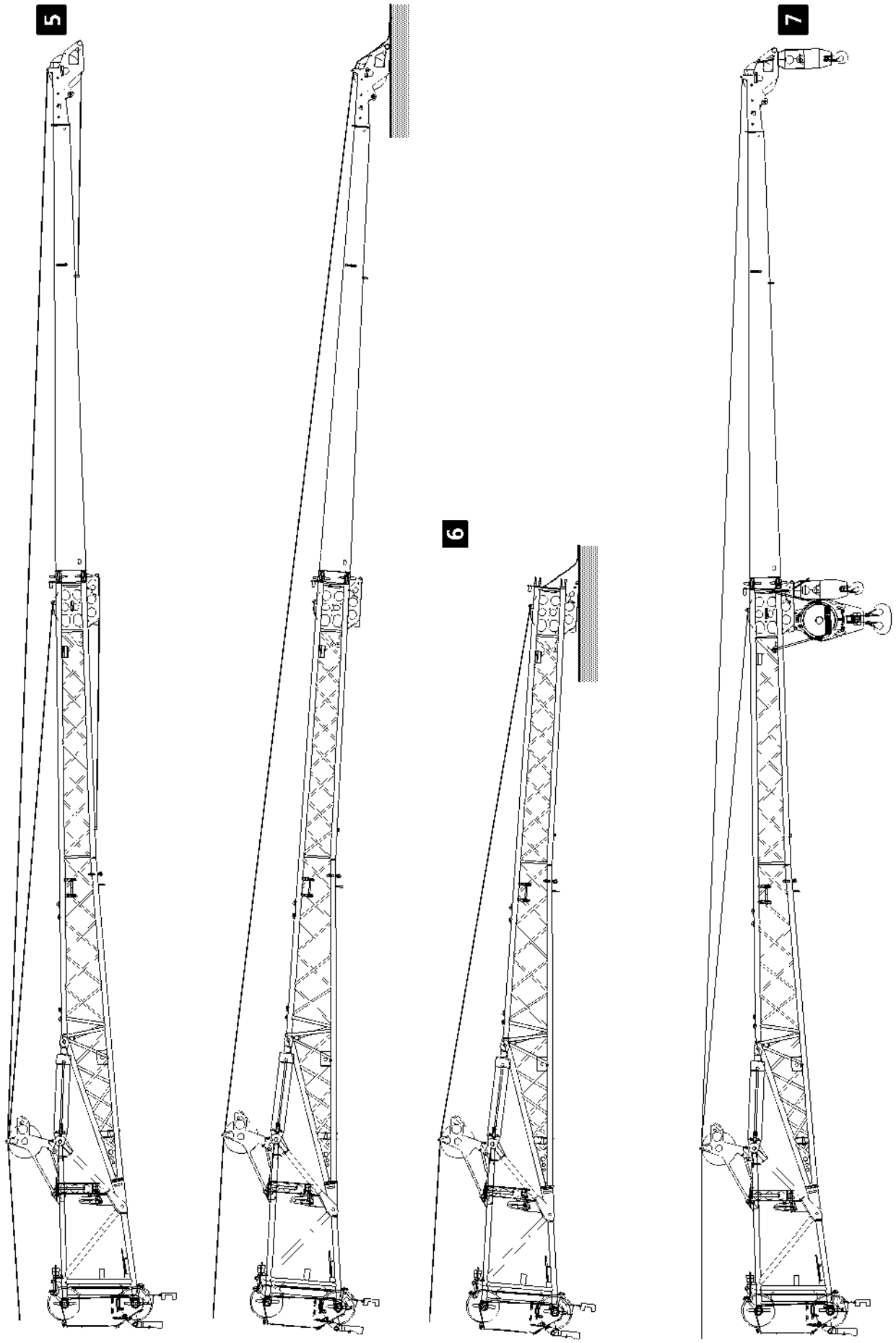

Fig.103279

LWE/LTM 1130-5-1-004/20502-04-02/en

4 Changing the mechanical folding jib from 0° to 20° or 40°

DANGER
Danger of fatal injury!
If the following danger notes are not observed, fatal injuries can occur during assembly and change over work on the folding jib.
▶ No persons may remain within the danger zone of the crane.

There are 3 ways of changing the mechanical folding jib to 20° or 40°:
1. Changing the folding jib with the hoist rope, illustration **5**
   Only permitted for operation with single folding jib and double folding jib.
2. Changing the folding jib by supporting it from below, illustration **6**
3. Changing the folding jib with hook block or load hook, illustration **7**

Note
▶ The angle assembly with load hook is only possible with a rope lock „without swivel“.
▶ With a rope lock „with swivel“, the angle assembly with load hook is not possible.

Make sure that the following prerequisites are met:
– The crane is properly supported and horizontally aligned.
– The telescopic boom is fully telescoped in.
– The folding jib is attached as a straight extension in the 0° position.
– The telescopic boom has been swung to the rear or the side.

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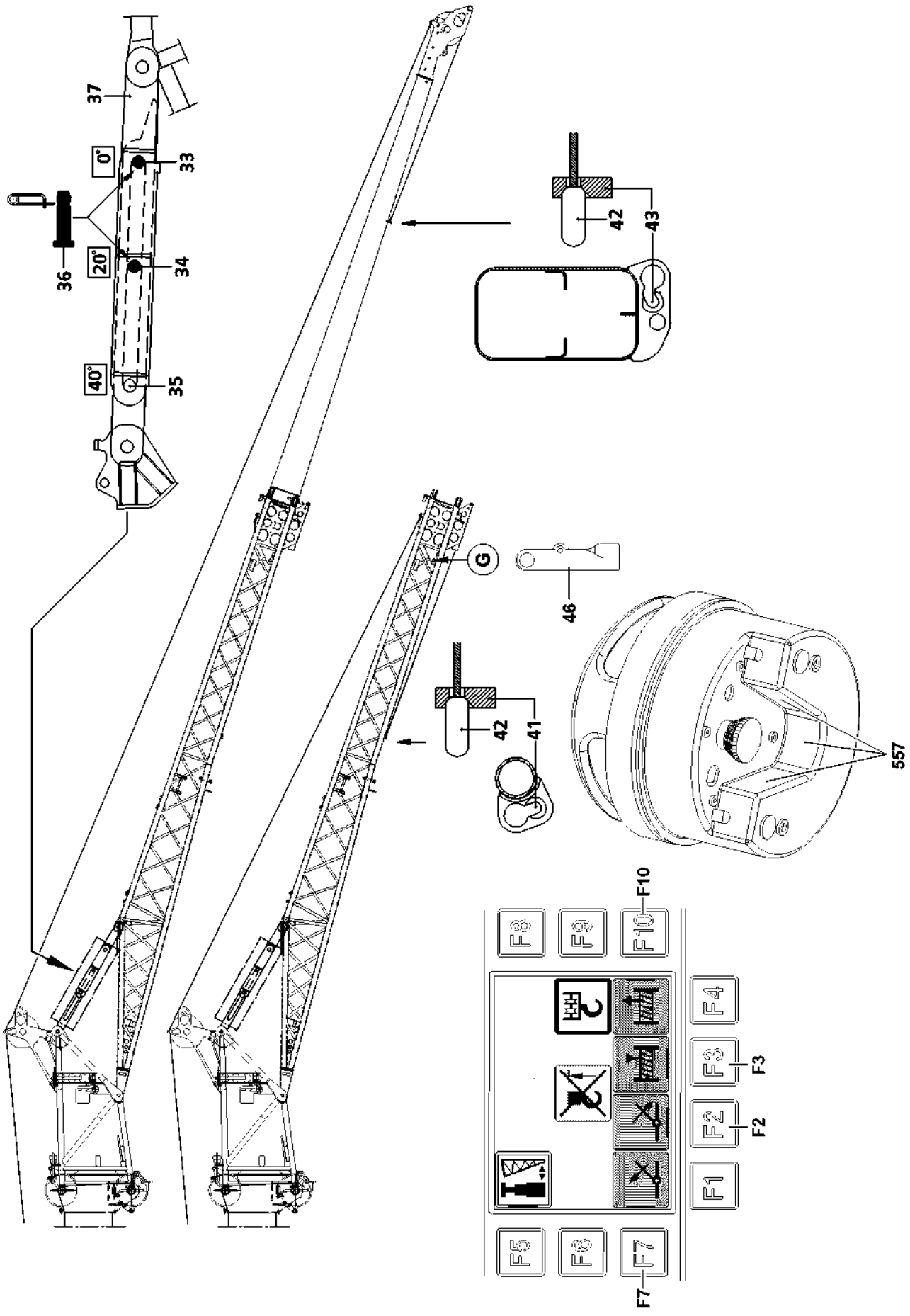

Fig.108692

4.1 Changing the folding jib with the hoist rope

CAUTION
Danger of damage to the folding jib and the hoist rope!
If the telescopic boom is telescoped out or luffed down as long as the hoist rope is tightened on the assembly fixed point, the hoist rope can rip and the folding jib can be damaged.
▶ Do not telescope out or luff down the telescopic boom with the hoist rope attached on the assembly fixed point!

WARNING
Danger of fatal injury during angle assembly via the BTT!
Due to jerky movements at angle installation of the folding jib with the hoist rope, the boom along with the folding jib can swing up. This can cause the folding jib to fold down uncontrolled!
Personnel can be severely injured or killed!
▶ All movements must be actuated extremely sensitively via the BTT!
▶ Make sure that there are no persons within the danger zone of the folding jib!

Note
▶ When changing the folding jib with the hook block or load hook via the BTT, the hoist limit switch is bypassed.

4.1.1 Preparatory work

▶ Unreeve the hoist rope on the lock.
▶ Remove the hoist limit switch weight.

CAUTION
Damage to the hoist rope!
The hoist rope can be damaged by the rope lock **46**.
▶ Remove the rope lock **46** on point **G**!

For operation with double folding jib:
▶ Guide the press fitting **42** into the assembly fixed point **43**.
or

For operation with single folding jib:
Guide the press fitting **42** into the assembly fixed point **41**.
▶ Tighten the hoist rope by **carefully deflecting** the appropriate master switch.
or
Tighten the hoist rope by actuating the 2-hand keypad **557** and the function key **F3**.

Note
▶ For BTT, see the Crane operating instructions, chapter 5.31.

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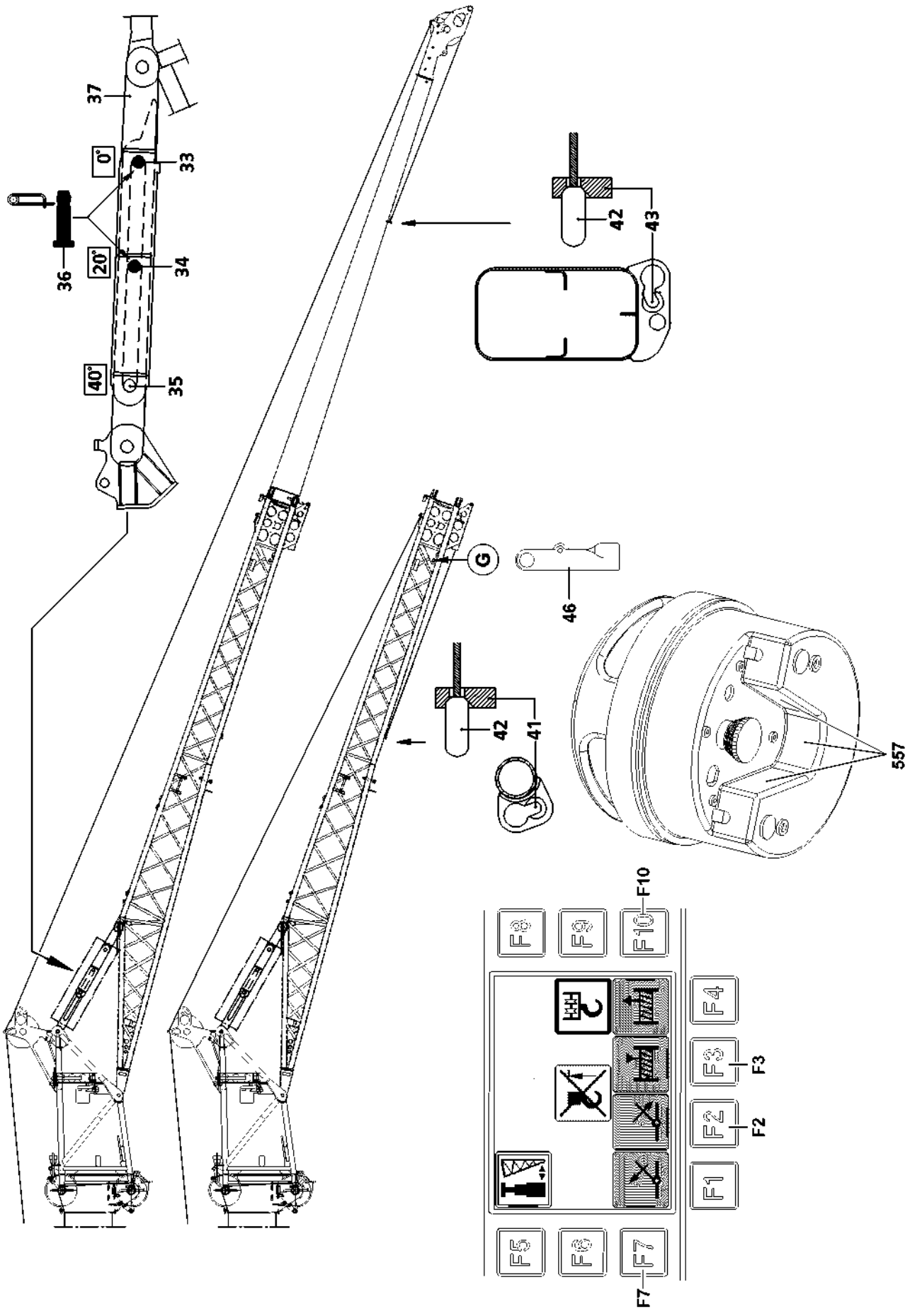

Fig.108692

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4.1.2 Changing the angle with the hoist rope

You can operate the folding jib at three different angles. The required angle is set with the pin **36**. In the „Basic setting“, immediately after assembling the folding jib, the folding jib is in the 0° position.

DANGER
Danger of fatal injury!
Danger of accident if the folding jib suddenly „folds downward“!
- ▶ Make sure that there are no persons within the danger zone of the folding jib.
- ▶ Ensure that **before unpinning** the pin **36**, the hoist rope is taut and that the folding jib is actually held in position by the hoist rope.
- ▶ Unpinning the retaining pins **35** at the 40° pin bores is **prohibited**!

Angle setting 20°

- ▶ Release the pin **36** and unpin from the 0° bore **33**.
- ▶ Insert the pin **36** into the 20° bore **34** and secure.

Angle setting 40°

- ▶ Release the pin **36** and unpin from the 0° bore **33**.
- ▶ Insert the pin **36** into the pin receptacle and secure.

Positioning the folding jib

Make sure that the pin **36** is properly pinned in and secured for the required angle setting.

- ▶ Spool the hoist rope out by carefully deflecting the corresponding master switch and simultaneously luffing the telescopic boom up.
  or
  Spool out the hoist rope by actuating the 2-hand keypad **557** and the function key **F10** on the BTT. At the same time, luff the telescopic boom up slowly and carefully by pressing the function key **F7**.

Result:

- – The pull bracket **37** places itself against the respective pin in the selected angle setting.
- – The folding jib is held by the respective pin.

Note
- ▶ For BTT, see the Crane operating instructions, chapter 5.31.

- ▶ Release the press fitting from the assembly fixed point.
- ▶ Install the rope lock **46** on point **G**!

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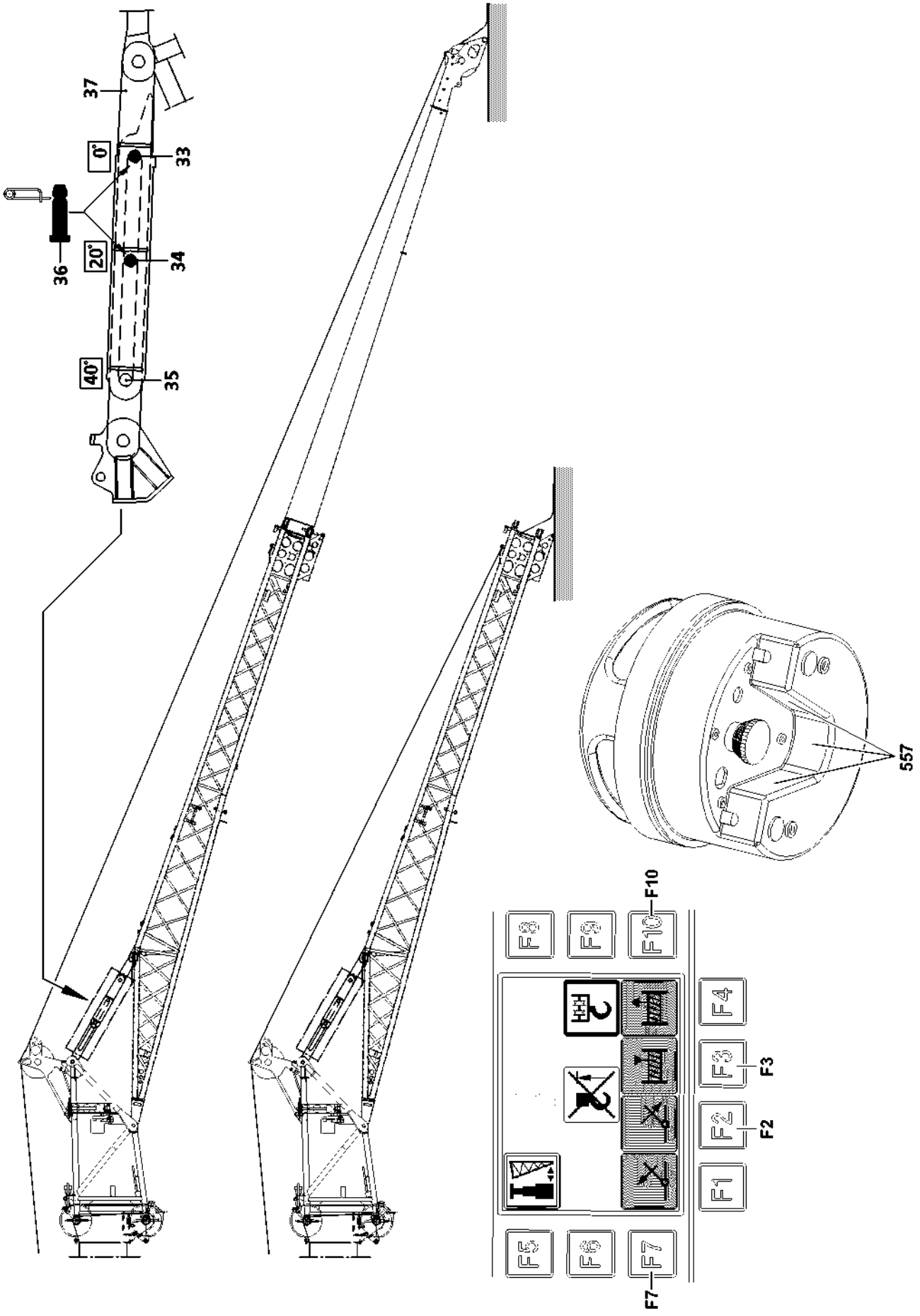

Fig.108693

4.2 Changing the folding jib by supporting it

WARNING
Danger of fatal injury during angle assembly via the BTT!
- ▶ All movements must be actuated extremely sensitively via the BTT!
- ▶ Make sure that there are no persons within the danger zone of the folding jib!

Note
- ▶ When changing the folding jib with the hook block or load hook via the BTT, the hoist limit switch is bypassed.

4.2.1 Preparatory work

Note
- ▶ The folding jib can lie on the ground or must be properly supported, if necessary.

CAUTION
Danger of property damage!
- ▶ When placing down the folding jib, make sure that the folding jib is **not** placed on the rope pulley. Otherwise it will be damaged. Also make sure that the hoist rope is **not** damaged.

- ▶ Completely luff down the telescopic boom until the folding jib lies the ground.

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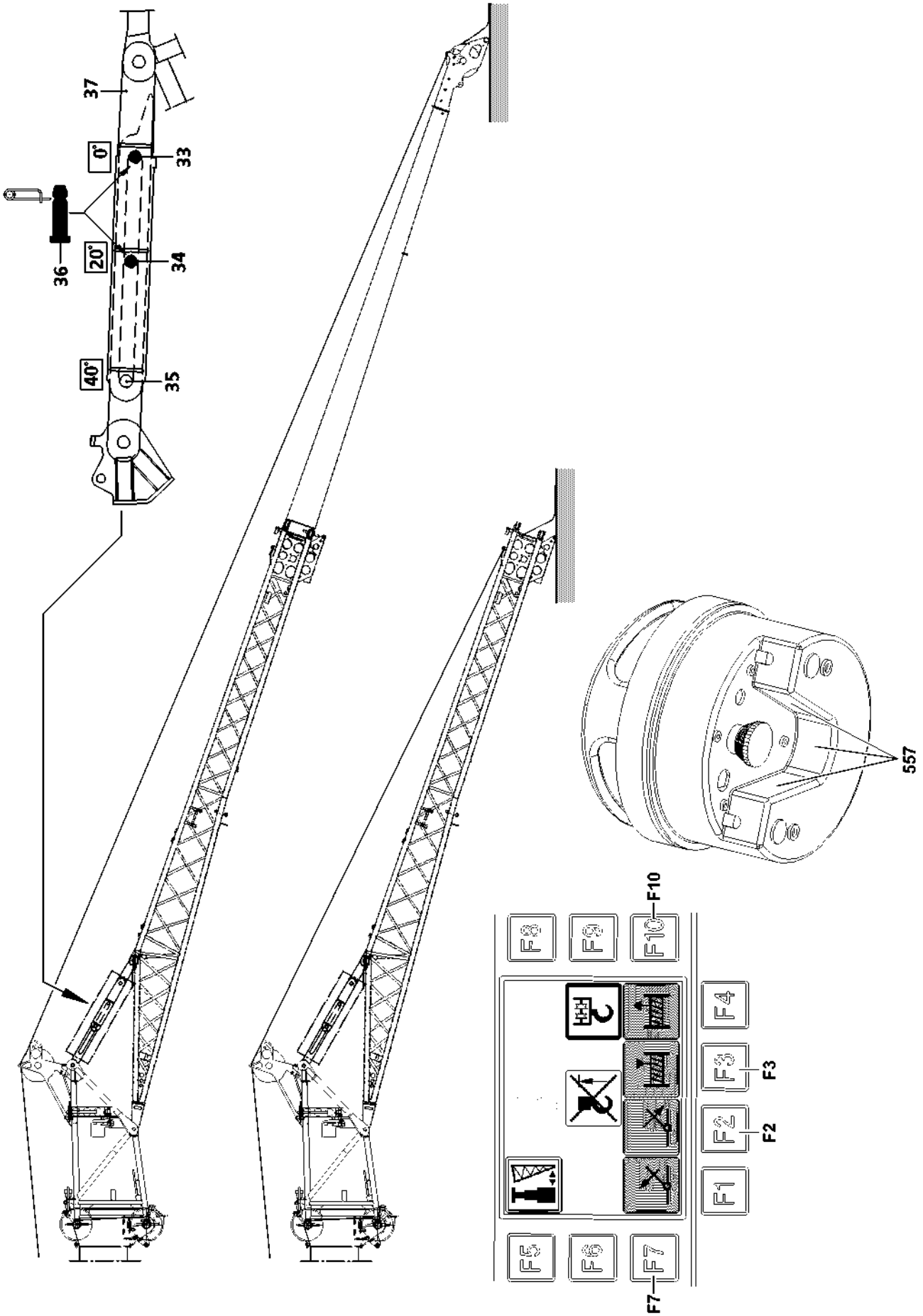

Fig.108693

4.2.2 Changing angle with folding jib supported

You can operate the folding jib at three different angles. The required angle is set with the pin **36**. In the „Basic setting“ - immediately after assembling the folding jib - the folding jib is in the 0° position.

DANGER
Danger of fatal injury!
Danger of accident if the folding jib suddenly „folds downward“!
- ▶ Make sure that there are no persons within the danger zone of the folding jib.
- ▶ Make sure that **before unpinning** the pin **36**, the folding jib is lying on the ground or on a proper and secure support.
- ▶ Unpinning the retaining pins **35** at the 40° pin bores is **prohibited**!

Angle setting 20°

- ▶ Release the pin **36** and unpin from the 0° bore **33**.
- ▶ Insert the pin **36** into the 20° bore **34** and secure.

Angle setting 40°

- ▶ Release the pin **36** and unpin from the 0° bore **33**.
- ▶ Insert the pin **36** into the pin receptacle and secure.

Positioning the folding jib

Make sure that the pin **36** is properly pinned in and secured for the required angle setting.

- ▶ Spool the hoist rope out by deflecting the corresponding manual control lever and at the same time luff up the telescopic boom slowly and carefully.
  or
  Luff the telescopic boom up slowly and carefully by actuating the 2-hand keypad **557** and the function key **F7** on the BTT.

Result:

- – The pull bracket **37** places itself against the respective pin in the selected angle setting.
- – The folding jib is held by the respective pin.

Note
- ▶ For BTT, see the Crane operating instructions, chapter 5.31.

- ▶ Install the hoist limit switch weight and chain.
- ▶ Attach the hoist limit switch weight on the hoist rope.

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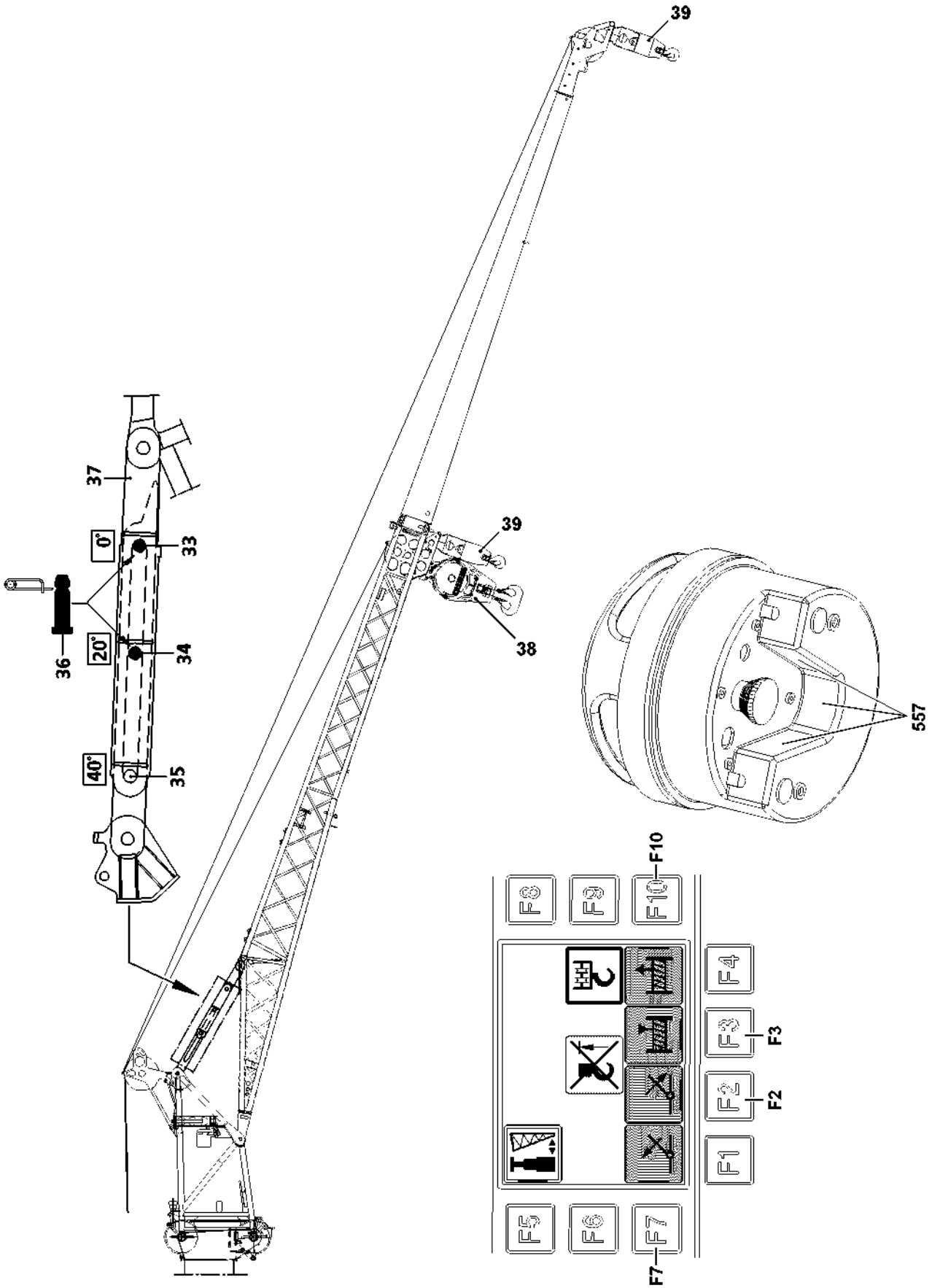

Fig.108694

4.3 Changing the folding jib with hook block or load hook

Note

- The angle assembly with load hook is only possible with a rope lock „without swivel“.
- With a rope lock „with swivel“, the angle assembly with load hook is not possible.
- When changing the folding jib with the hook block or load hook via the BTT, the hoist limit switch is bypassed.

On a single folding jib, the angle assembly can be carried out with 1–roller (G = 450 kg) or 3–roller hook block **38** (G = 500 kg) or with load hook **39** (G = 250 kg).

On double folding jib, the angle assembly may only be carried out with load hook **39** (W = 250 kg).

WARNING

Danger of fatal injury during angle assembly via the BTT!
Due to jerky movements during the angle assembly of the folding jib with the hook block or the load hook, the boom along with the folding jib can swing up. This can cause the folding jib to fold down uncontrolled!
Personnel can be severely injured or killed!

- All movements must be actuated extremely sensitively via the BTT!
- Make sure that there are no persons within the danger zone of the folding jib!

4.3.1 Preparatory work

WARNING

Danger of damage to the folding jib and the hoist rope!

- Do not telescope the telescopic boom out nor luff it down as long as the hook block / load hook touches the stop on the folding jib.

- Remove the hoist limit switch weight with chain.
- Bypass „the hoist top shut-off“ on the LICCON computer system.
- Carefully deflect the corresponding master switch and run the hook block or load hook carefully to the stop of the folding jib and tension via the hoist gear.
  or
  By actuating the 2-hand keypad **557** and the function key **F3** on the BTT, move the hook block or the load hook carefully to the stop of the folding jib and tension it via the hoist gear.

Note

- For BTT, see the Crane operating instructions, chapter 5.31.

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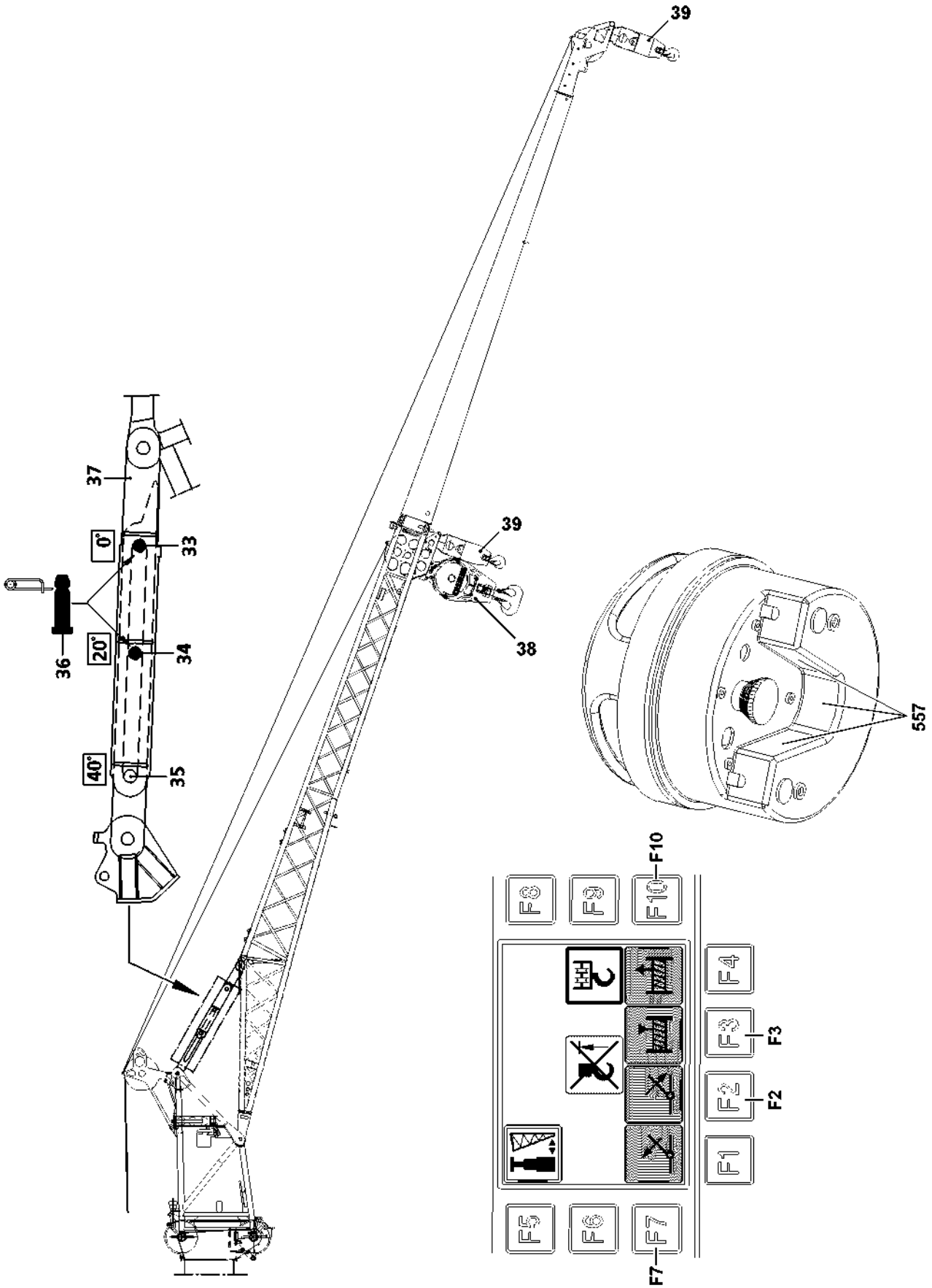

Fig.108694

4.3.2 Changing the angle with hook block or load hook

You can operate the folding jib at three different angles. The required angle is set with the pin **36**. In the „Basic setting“ - immediately after assembling the folding jib - the folding jib is in the 0° position.

DANGER
Danger of fatal injury!
Danger of accident if the folding jib suddenly „folds downward“!
- ▶ Make sure that there are no persons within the danger zone of the folding jib.
- ▶ Make sure that the folding jib is held by the hook block / load hook via the hoist rope **before unpinning** the pin **36**.
- ▶ Unpinning the retaining pins **35** at the 40° pin bores is **prohibited**!

Angle setting 20°

- ▶ Release the pin **36** and unpin from the 0° bore **33**.
- ▶ Insert the pin **36** into the 20° bore **34** and secure.

Angle setting 40°

- ▶ Release the pin **36** and unpin from the 0° bore **33**.
- ▶ Insert the pin **36** into the pin receptacle and secure.

Positioning the folding jib

Make sure that the pin **36** is properly pinned and secured in the required angle position or that it is inserted into the transport retainer.

- ▶ Spool the hoist rope out by deflecting the corresponding manual control lever and at the same time luff up the telescopic boom slowly and carefully.
  or
  Spool out the hoist rope by actuating the 2-hand keypad **557** and the function key **F10** on the BTT. At the same time, luff the telescopic boom up slowly and carefully by pressing the function key **F7**.

Result:

- – The pull bracket **37** places itself against the respective pin in the selected angle setting.
- – The folding jib is held by the respective pin.

Note
- ▶ For BTT, see the Crane operating instructions, chapter 5.31.

- ▶ Assemble the hoist limit switch weight and chain.
- ▶ Attach the hoist limit switch weight on the hoist rope.

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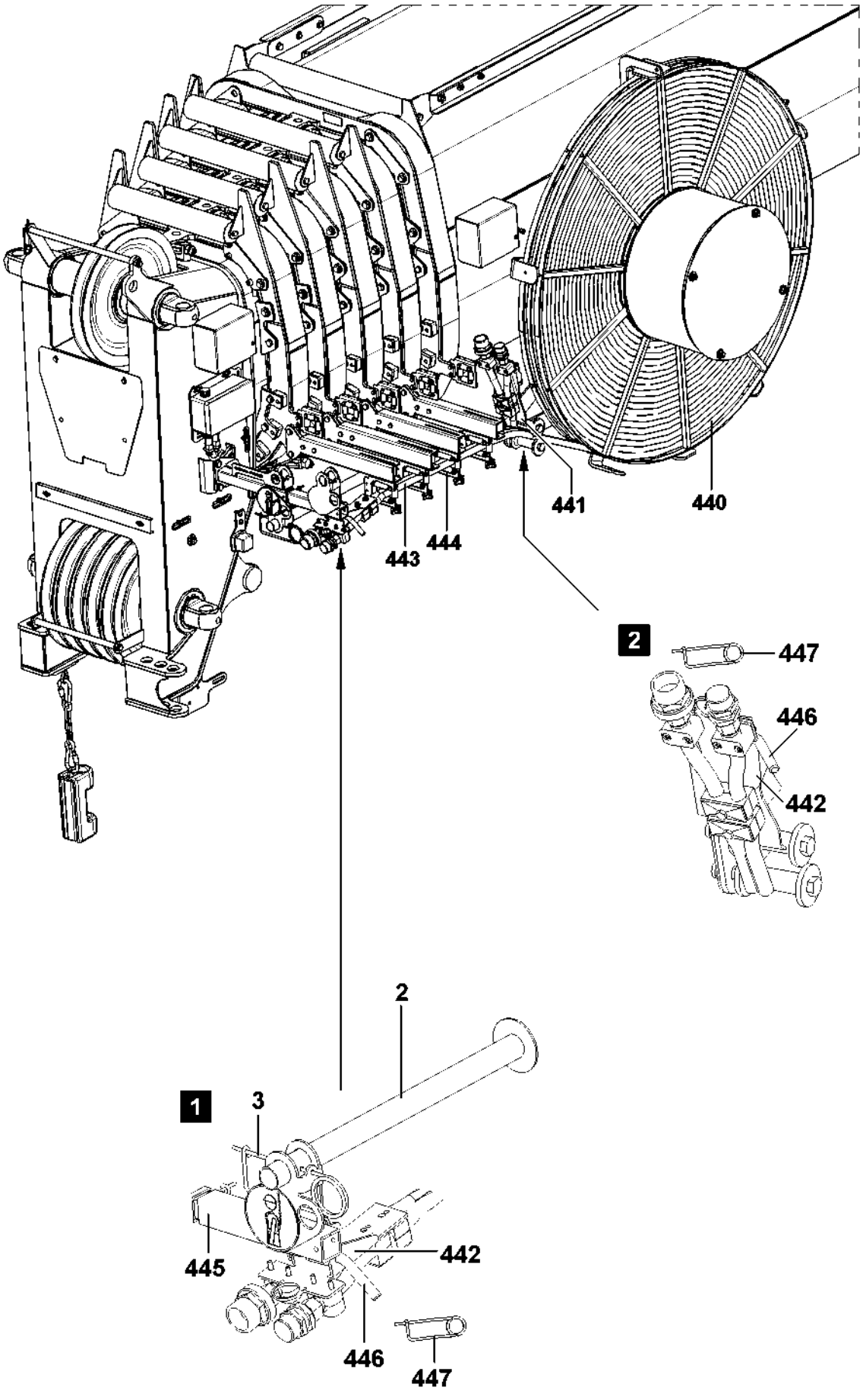

Fig.110283

5 Hydraulic connections

5.1 Establishing the hydraulic connections

A hydraulic connection to the folding jib only has to be established for hydraulic angle adjustment (TNZK operation). Hydraulic lines cannot be incorrectly connected due to the different diameters of the hydraulic connections.

For operation with a hydraulic folding jib:
▶ Establish the hydraulic connections.

After operation with a hydraulic folding jib:
▶ Protect the connections from contamination.

5.2 Installing the hose couplings in operating or neutral position

The hydraulic supply to the folding jib is made via the hydraulic hose drum **440** on the telescopic boom. For extended telescopic boom operation, the bracket **442** should be installed in the retainer **441** in the „neutral position“.

This avoids having to spool the hydraulic hoses up and out unnecessarily.

CAUTION
Danger of accident due to rebounding hydraulic hoses!
The hydraulic hoses are under spring tension. If the removed bracket **442** is released, it snaps back against the hydraulic hose drum **440** due to the spring force. This can cause injury to assembly personnel or damage the hydraulic hose drum **440**.
▶ Do not allow removed bracket **442** to snap back!
▶ Hold the removed bracket **442** and then reinstall it!

5.2.1 Assembling the hose couplings in operating position (illustration 1)

▶ Change the pipe **2** and secure with spring retainer **3**, see illustration **1**.
▶ Unpin the bracket **442** with the hydraulic couplings from the retainer **441**.
▶ Place the two-fold hydraulic hose **443** into the guides **444**.
▶ Insert and secure the bracket **442** into the retainer **445**, see illustration **1**.
▶ Insert the pin **446** and secure with spring retainer **447**, see illustration **1**.
▶ Secure the hydraulic hose **443** in the guides **444**.

5.2.2 Assembling the hose couplings in resting position (illustration 2)

▶ Release the hydraulic hose **443** in the guides **444**.
▶ Remove the bracket **442** with the hydraulic couplings from the retainer **445** on the boom head, to do so, release and remove the pin **446**, see illustration **1**.
▶ Remove the two-fold hydraulic hose **443** from the guides **444**.
▶ Insert and secure the bracket **442** with the hydraulic couplings in the retainer **441**, see illustration **2**.
▶ Insert the pin **446** and secure with spring retainer **447**, see illustration **2**.

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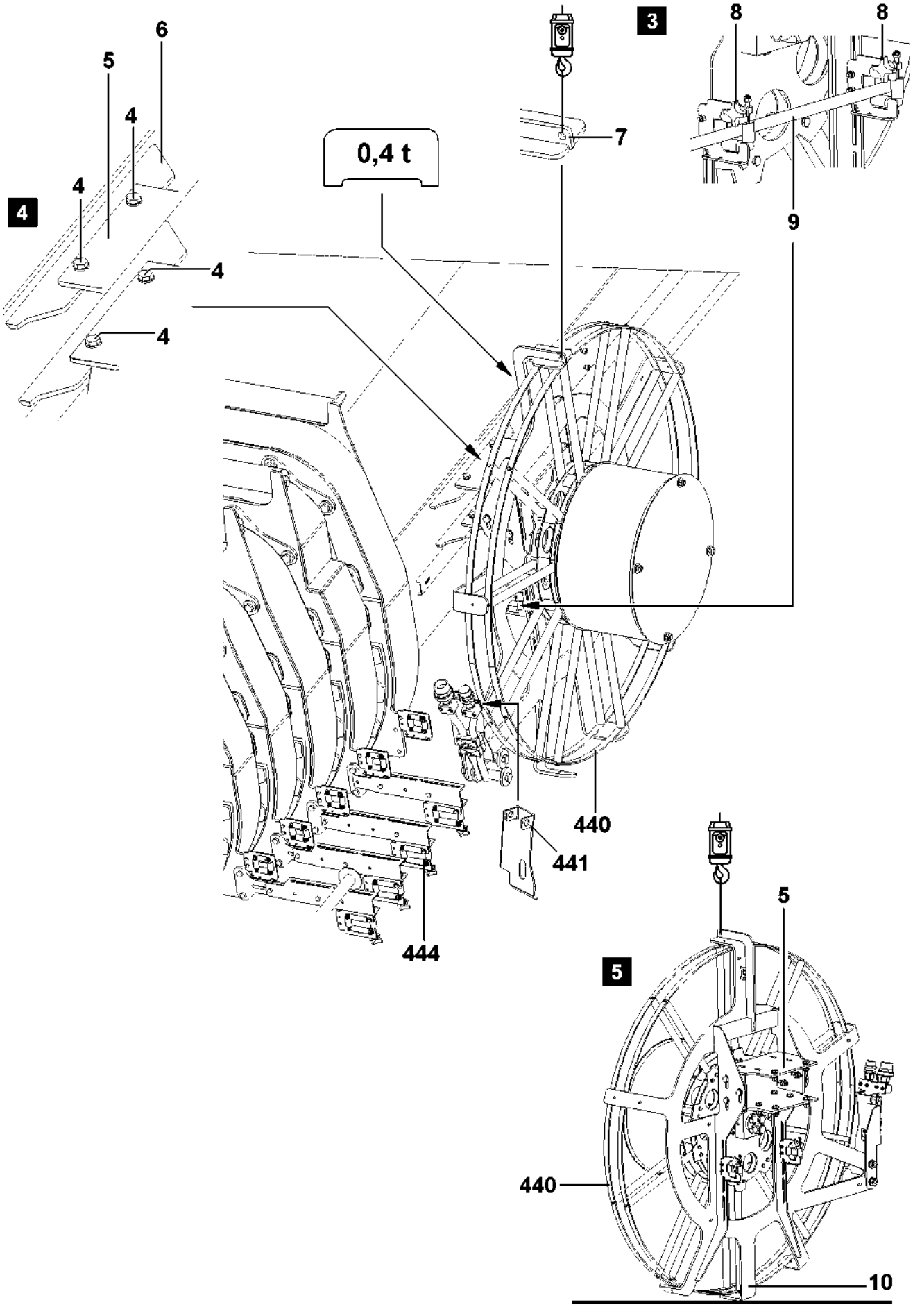

Fig.107186

5.3 Removing the hydraulic hose drum

WARNING
Danger of falling!
During installation and removal of the hydraulic hose drum **440**, personnel must be secured with appropriate fall arrest 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 „chapter 2.04“!
- ▶ Only step on such aids with clean shoes!
- ▶ Keep aids clean and free of snow and ice!
- ▶ It is prohibited to walk on the telescopic boom!

WARNING
Danger of fatal injuries due to toppling hose drum!
- ▶ Due to an assembly / disassembly error, the hydraulic hose drum **440** can fall down!
- ▶ It is prohibited for anyone to remain under the hydraulic hose drum **440** during assembly or disassembly!

Make sure that the following prerequisites are met:
- – The telescopic boom is luffed down, telescoped in and swung by 90° to the side **or** to the rear.
- – The hydraulic connections of the hose couplings to the folding jib are released and the hose couplings are installed in resting position, see section „Assembling the hose couplings in resting position“.
- – An auxiliary crane with suitable fastening equipment is available for removing the hydraulic hose drum **440**.

- ▶ Attach the auxiliary crane on the suspension lug **7** of the hydraulic hose drum **440** with suitable fastening equipment and secure, see illustration **3**.
- ▶ Unscrew the cross handles **8** from the pulley sections and remove the cable **9** from the pulley sections, see illustration **3**.

WARNING
Danger of burning due to hot oil!
When releasing hydraulic connections, hot oil can emerge!
- ▶ When releasing hydraulic connections, it is imperative to use suitable work gloves!

- ▶ Release all hydraulic connections from the telescopic boom to the hydraulic hose drum **440**.
- ▶ Remove all **four** hex head screws **4** from the retainer **5** and bracket **6**, see illustration **4**.
- ▶ Lift the hydraulic hose drum **440** with the auxiliary crane and remove.

WARNING
Danger of crushed limbs!
When placing the hydraulic hose drum **440** down, limbs can be crushed!
- ▶ Place the hydraulic hose drum **440** down especially carefully!

- ▶ Place the hydraulic hose drum **440** on the center spoke **10** on level ground, see illustration **5**.
- ▶ Place the hydraulic hose drum **440** slowly on the retainer **5**, see illustration **5**.

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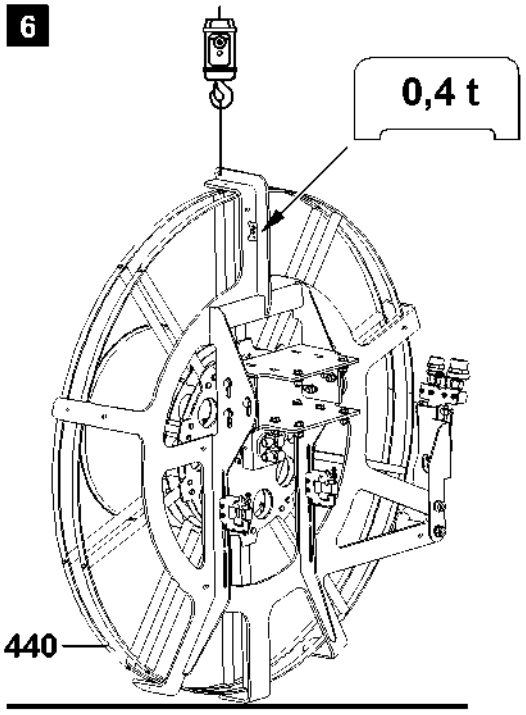

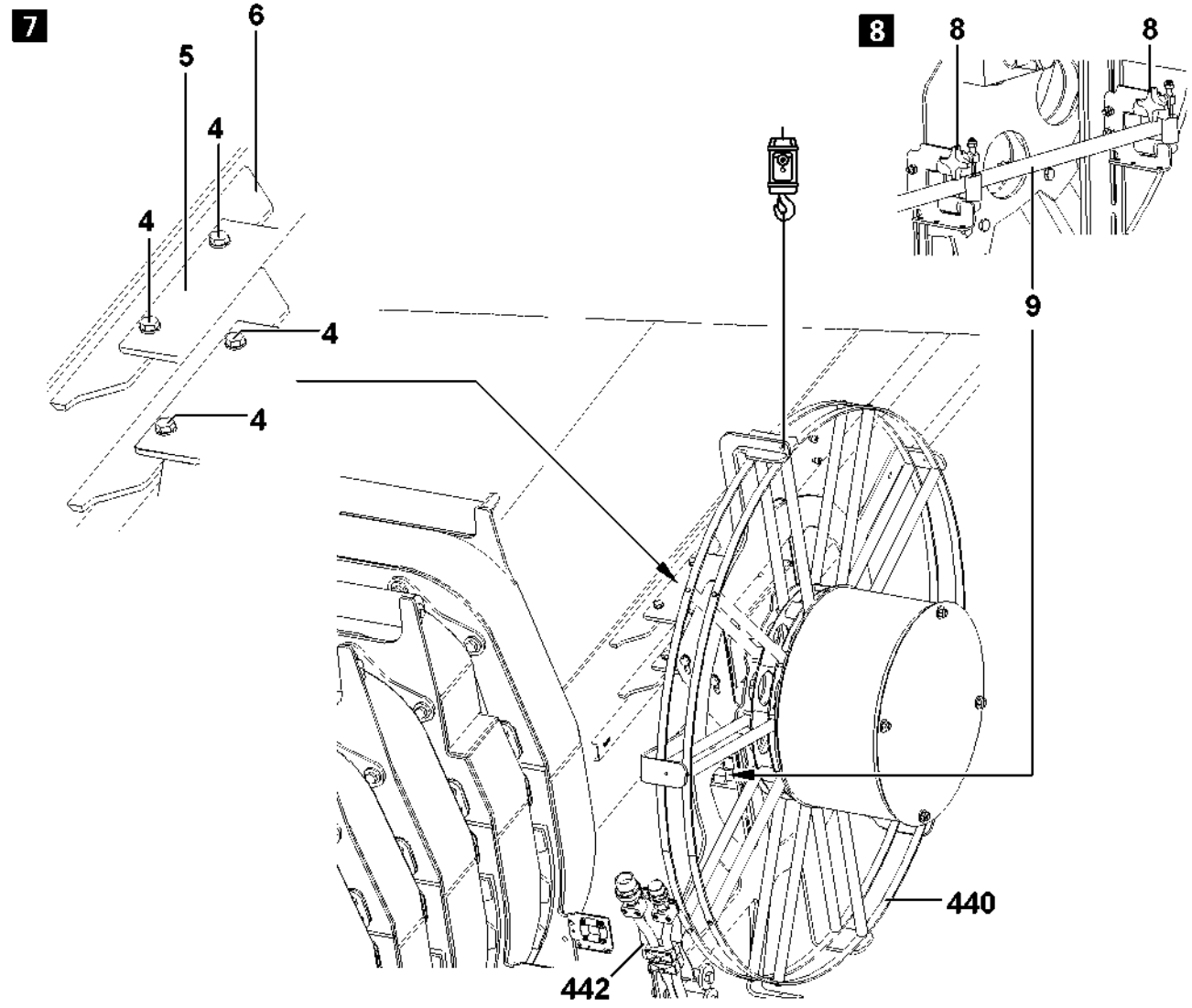

Fig.107270

5.4 Installing the hydraulic hose drum

WARNING
Danger of falling!
During installation and removal of the hydraulic hose drum **440**, personnel must be secured with appropriate fall arrest 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 „chapter 2.04“!
- ▶ Only step on such aids with clean shoes!
- ▶ Keep aids clean and free of snow and ice!
- ▶ It is prohibited to walk on the telescopic boom!

WARNING
Danger of fatal injuries due to toppling hose drum!
- ▶ Due to an assembly / disassembly error, the hydraulic hose drum **440** can fall down!
- ▶ It is prohibited for anyone to remain under the hydraulic hose drum **440** during assembly or disassembly!

Make sure that the following prerequisites are met:
- – The telescopic boom is luffed down, telescoped in and swung by 90° to the side **or** to the rear.
- – An auxiliary crane with suitable fastening equipment is available for removing the hydraulic hose drum **440**.

- ▶ Attach the auxiliary crane on the suspension lug **7** of the hydraulic hose drum **440** with suitable fastening equipment and secure, see illustration **6**.
- ▶ Lift the hydraulic hose drum **440** with the auxiliary crane and affix on the telescopic boom.

WARNING
Danger of crushed limbs!
When installing the hydraulic hose drum **440** on the telescopic boom, limbs can be crushed!
- ▶ Be especially careful at installation of the hydraulic hose drum **440**!

- ▶ Screw the retainer **5** on the bracket **6** with all **four** hex head screws **4** and **new self-locking nuts**, see illustration **7**.
- ▶ Guide the cable **9** into the pulley sections and attach the cross handles **8** tightly, see illustration **8**.
- ▶ Establish all hydraulic connections from the telescopic boom to the hydraulic hose drum **440**.
- ▶ Remove the auxiliary crane.
- ▶ Install the bracket **442** with hose couplings in operating position, if needed, see section „Installing the hose couplings in operating position“.

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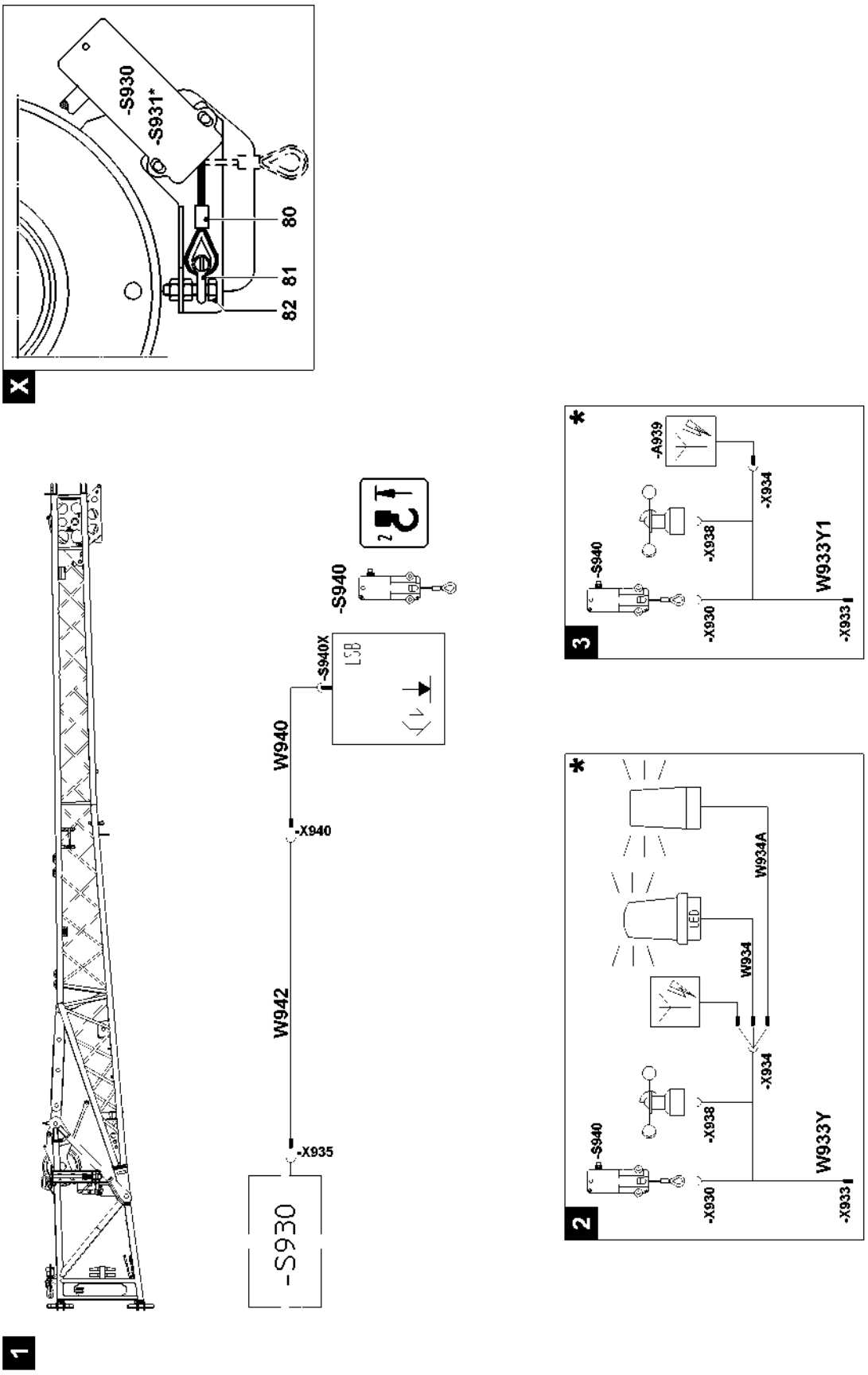

Fig.106017

6 Electrical connections

Note

▶ After folding jib operation, protect the electrical connections from contamination with caps.

6.1 Mechanically actuating the hoist limit switch, illustration X

If you are working in „Single hook mode“ with the installed folding jib, the hoist limit switch **-S930** and hoist limit switch*** -S931** which is not required must be actuated manually.

▶ Remove the hoist limit switch weight and chain.
▶ Pull the hoist limit switch rope **80** and attach to the fixed point **82** with the shackle **81**.

6.2 Establishing the electrical connections on the single folding jib

6.2.1 Establishing the electrical connection to the hoist limit switch

Note

▶ In single hook operation, only the hoist limit switch **-S940** on the single folding jib is active. The hoist limit switch **-S930** and the hoist limit switch*** -S931** must be mechanically actuated, see illustration **X**.
▶ In two hook operation, the hoist limit switch **-S940** on the single folding jib and the hoist limit switch **-S930** on the telescopic boom are active. The hoist limit switch*** -S931** must be actuated mechanically, see illustration **X**.

▶ Plug in the cable **W942** with the plug **-X935.S** on the terminal box **-S930**.
▶ Plug the cable **W940** with the plug **-X940.S** into the socket **-X940.B**.
▶ Plug the cable **W940** with the socket into the hoist limit switch **-S940.X**.

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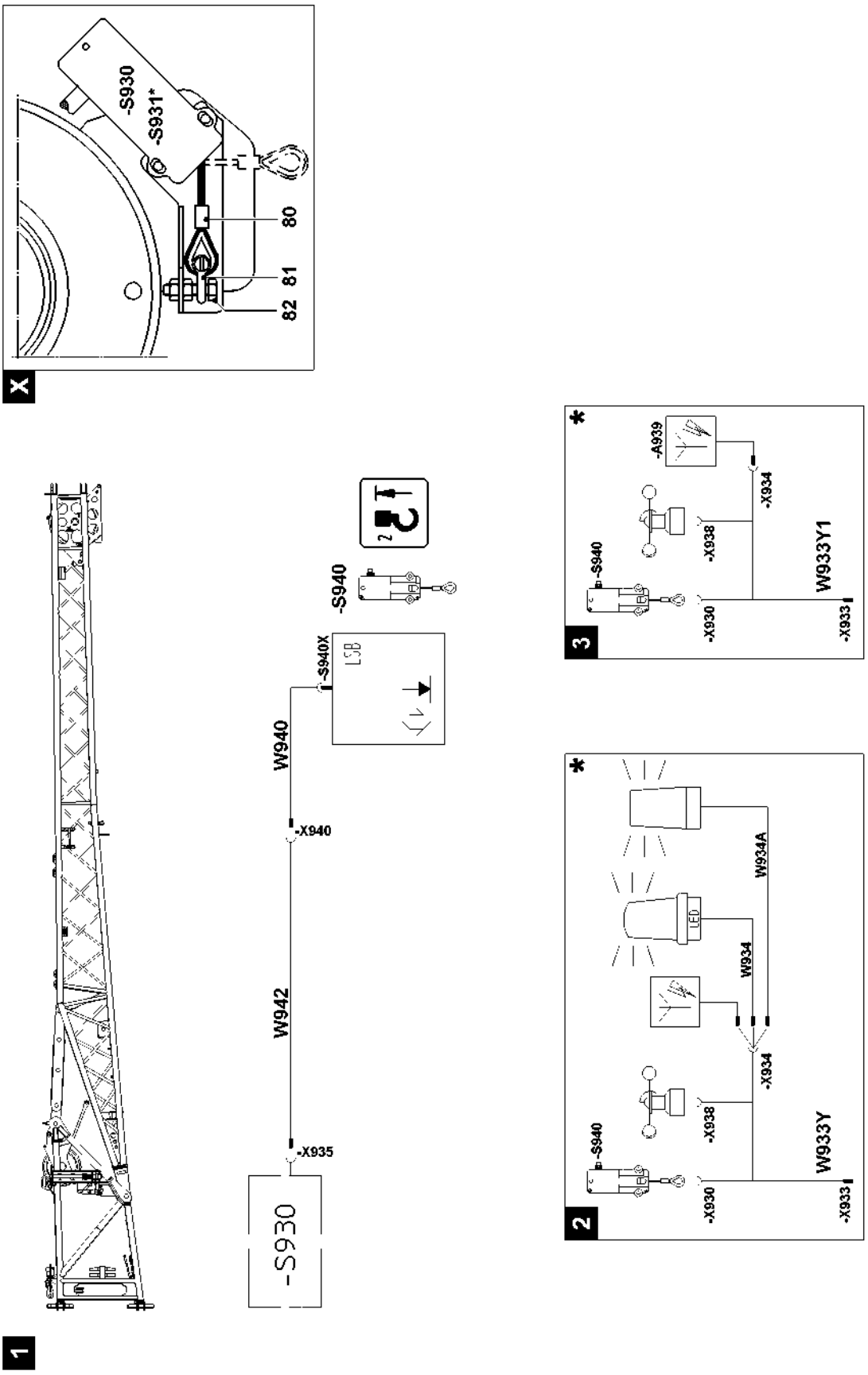

Fig.106017

6.2.2 Establishing the electrical connection to the LED continuous light* or flashing beacon*

Note

- ▶ To be able to establish the electrical connection to the LED continuous light and the rotating beacon, the Y-adapter **W933Y** on the cable **W942** must be plugged in the socket **-X940.B**, see illustration **2**.
- ▶ Ensure that only the LED continuous light **or** flashing beacon can be plugged in on the plug **-X934**.
- ▶ Ensure that only the Y-adapter **W933Y or** the Y-adapter **W933Y1** can be plugged in on the cable **W942** in the socket **-X940.B**.

- ▶ Plug the Y-adapter **W933Y** with the plug **-X933.S** into the socket **-X940.B**.
- ▶ Plug the cable **W934** with the plug **-X934.S** into the socket **-X934.B**.
  or
  Plug the cable **W934A** with the plug **-X934.S** into the socket **-X934.B**.

6.2.3 Establishing the electrical connections to the high voltage warning device*

Note

- ▶ To be able to establish the electrical connection to the high voltage warning, the Y-adapter **W933Y1** on the cable **W942** must be plugged in the socket **-X940.B**, see illustration **3**.
- ▶ Ensure that only the Y-adapter **W933Y or** the Y-adapter **W933Y1** can be plugged in on the cable **W942** in the socket **-X940.B**.

- ▶ Plug the Y-adapter **W933Y** with the plug **-X933.S** into the socket **-X940.B**.
- ▶ Plug the antenna **-A939** with the plug **-A939.S** into the socket **-X934.B**.

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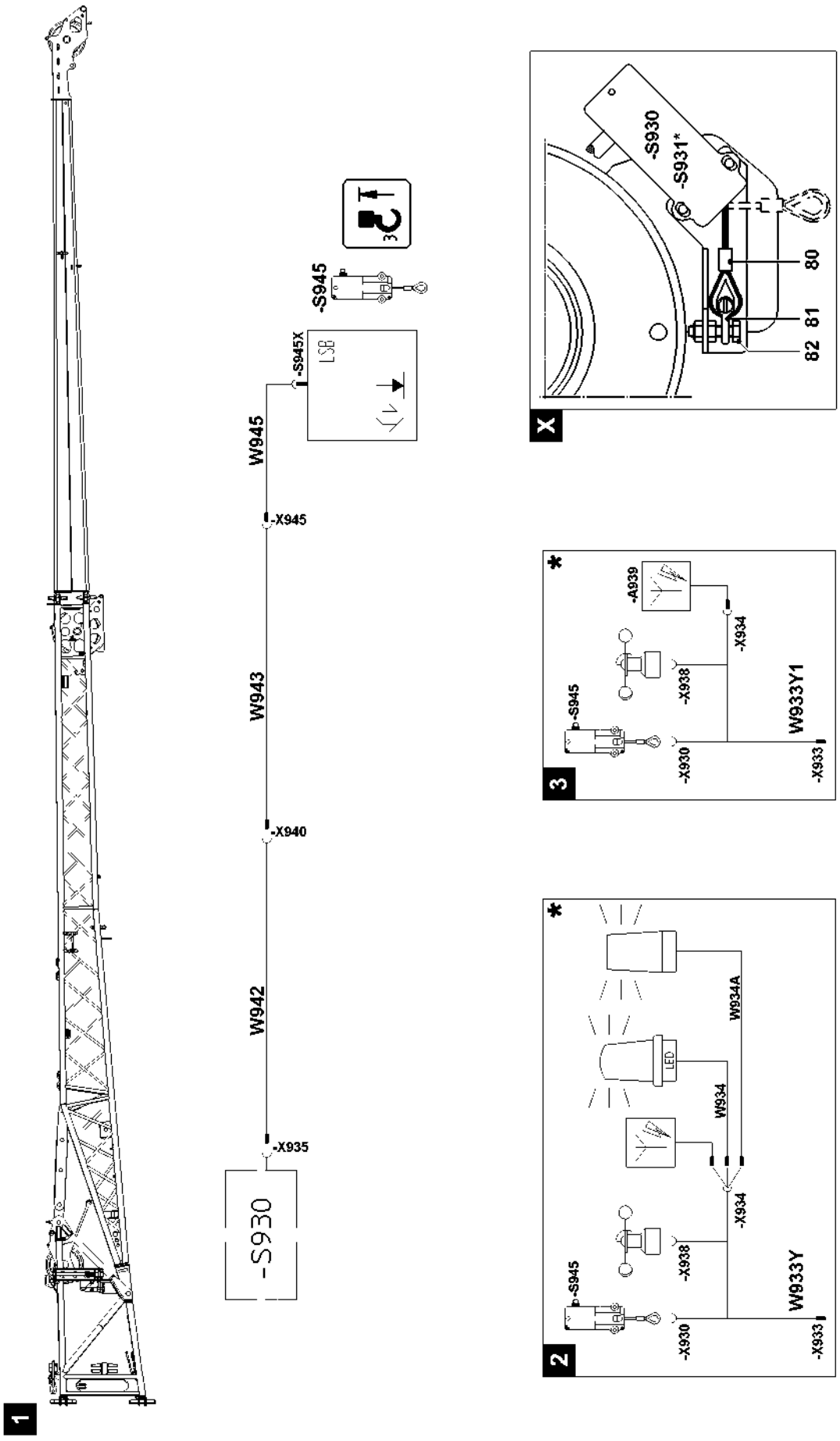

Fig.106018

6.3 Establishing the electrical connections on the double folding jib

6.3.1 Establishing the electrical connection to the hoist limit switch

Note

- Only the hoist limit switch **-S945** on the double folding jib is active during single hook operation. The hoist limit switch **-S940** on the single folding jib must be unplugged. The hoist limit switch **-S930** and the hoist limit switch*** -S931** must be mechanically actuated, see illustration **X**.
- In two hook operation, the hoist limit switch **-S945** on the double folding jib and the hoist limit switch **-S930** on the telescopic boom are active. The hoist limit switch **-S940** must be unplugged and the hoist limit switch*** -S931** must be mechanically actuated, see illustration **X**.

- Plug in the cable **W942** with the plug **-X935.S** on the terminal box **-S930**.
- Plug the cable **W943** with the plug **-X940.S** into the socket **-X940.B**.
- Plug the cable **W945** with the plug **-X945.S** into the socket **-X945.B**.
- Plug the cable **W945** with the socket into the hoist limit switch **-S945.X**.

6.3.2 Establishing the electrical connection to the LED continuous light* or flashing beacon*

Note

- To be able to establish the electrical connection to the LED continuous light and the rotating beacon, the Y-adapter **W933Y** on the cable **W943** must be plugged in the socket **-X945.B**, see illustration **2**.
- Ensure that only the LED continuous light **or** flashing beacon can be plugged in on the plug **-X934**.
- Ensure that only the Y-adapter **W933Y or** the Y-adapter **W933Y1** can be plugged in on the cable **W943** in the socket **-X945.B**.

- Plug the Y-adapter **W933Y** with the plug **-X933.S** into the socket **-X945.B**.
- Plug the cable **W934** with the plug **-X934.S** into the socket **-X934.B**.
  or
  Plug the cable **W934A** with the plug **-X934.S** into the socket **-X934.B**.

6.3.3 Establishing the electrical connections to the high voltage warning device*

Note

- To be able to establish the electrical connection to the high voltage warning, the Y-adapter **W933Y1** on the cable **W943** must be plugged in the socket **-X945.B**, see illustration **3**.
- Ensure that only the Y-adapter **W933Y or** the Y-adapter **W933Y1** can be plugged in on the cable **W943** in the socket **-X945.B**.

- Plug the Y-adapter **W933Y** with the plug **-X933.S** into the socket **-X945.B**.
- Plug the antenna **-A939** with the plug **-A939.S** into the socket **-X934.B**.

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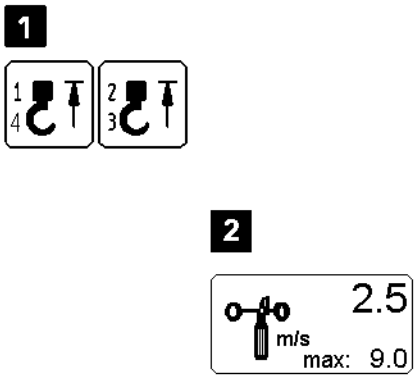

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Fig.105574

6.4 Function check

Make sure that the following prerequisites are met:
- All electrical connections have been established.
- The crane engine is running
- The appropriate folding jib operating mode is set on the LICCON monitor.

6.4.1 Hoist limit switch

▶ Actuate all active hoist limit switches manually.

Result:

- The corresponding symbol element „Hoist top“ appears on the LICCON monitor.
- The hoist winch turns off in the lift direction, see illustration **1**.

Note
The respective symbol element „Hoist top“does not appear on the monitor when manually actuating the hoist limit switch?
Is spool winch up and luff telescopic boom down blocked?
The auxiliary boom is not compatible with the LICCON overload protection!
▶ Contact the next **Liebherr Service location** or **Liebherr-Werk Ehingen**!

Note
▶ When replacing or changing the 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).

6.4.2 Wind sensor

WARNING
Danger of accident due to toppling crane!
The wind speed can no longer be determined when attaching a defective wind sensor.
▶ Check the function of the wind sensor after every assembly.

▶ Manually actuate the wind sensor.

Result:

- The icon „Wind speed“, see illustration **2**, appears on the LICCON monitor.

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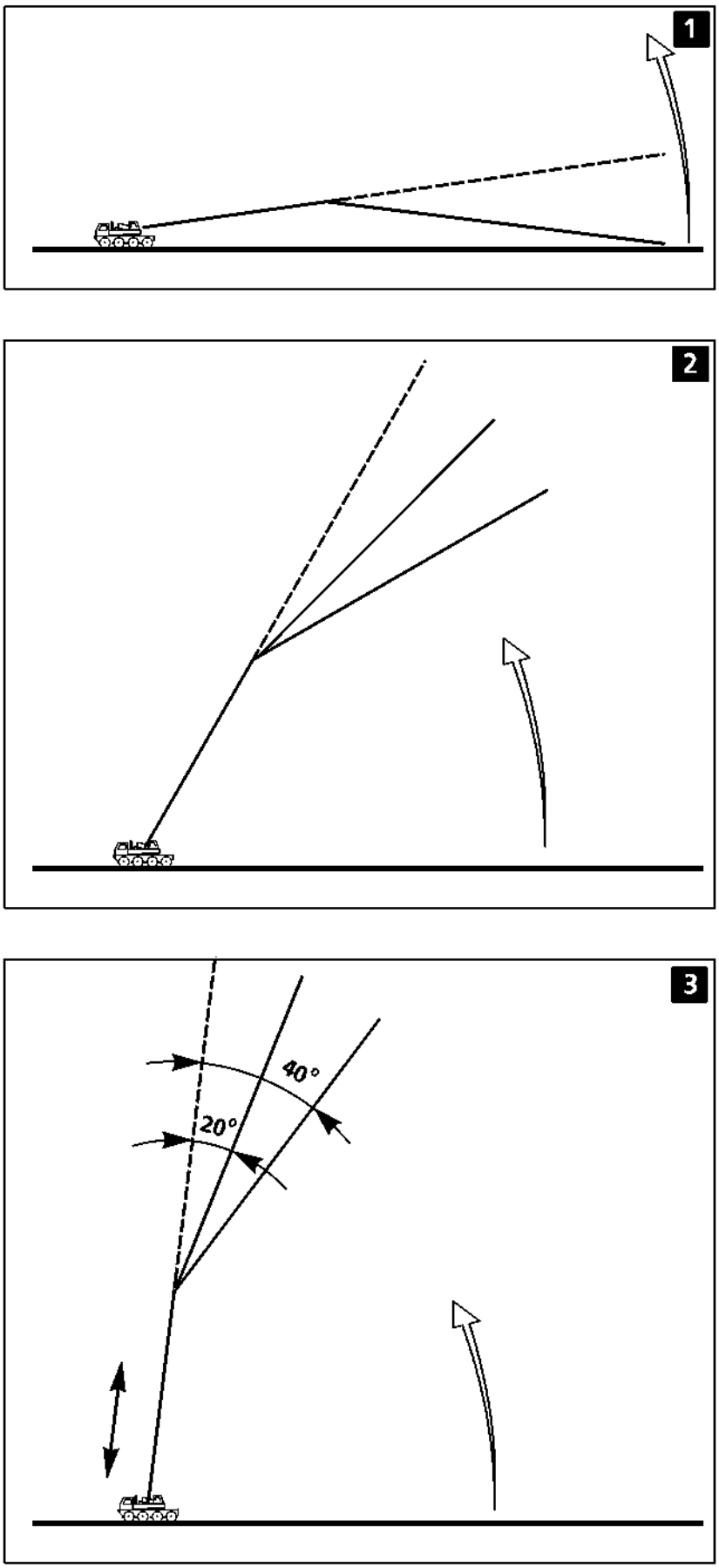

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Fig.185908

7 Erection

7.1 Preparatory work

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 telescopic boom is fully telescoped in.
- The folding jib has been assembled according to the load chart and the operating instructions.
- All limit switches have been correctly installed and are fully functional.
- All pin connections have been secured.
- The hoist rope has been correctly placed in the rope pulleys and is secured with the rope retaining pins to prevent it from jumping out.
- There are no foreign objects on the telescopic boom and the folding jib.
- The telescopic boom, the folding jib and its components (such as: Limit switch, airplane warning light, wind speed sensor) must be free of snow and ice in winter.

DANGER
Danger of accident!
Incorrectly installed or non-functioning limits switches as well as falling components (such as: pins, cotter / spring pins, ice) can cause accidents!
▶ Install all limit switches, pins and spring pins properly.

▶ Check if all prerequisites have been met.

7.2 Erection procedure

DANGER
Danger of fatal injury!
The radii specified in the load chart may not be exceeded or fallen below, even if there is no load on the hook! If this regulation is not observed, the crane can topple over.
▶ Compare and check the settings on the LICCON computer system with the actual configuration status!

Adjustment of the LICCON overload protection, refer to Crane operating instructions, chapter 4.02.

▶ Set and confirm the LICCON overload protection according to the required set up configuration.
▶ Luff the telescopic boom up with the folding jib attached until the LICCON signals the release.
▶ Telescope the telescopic boom out to the values specified in the load chart.

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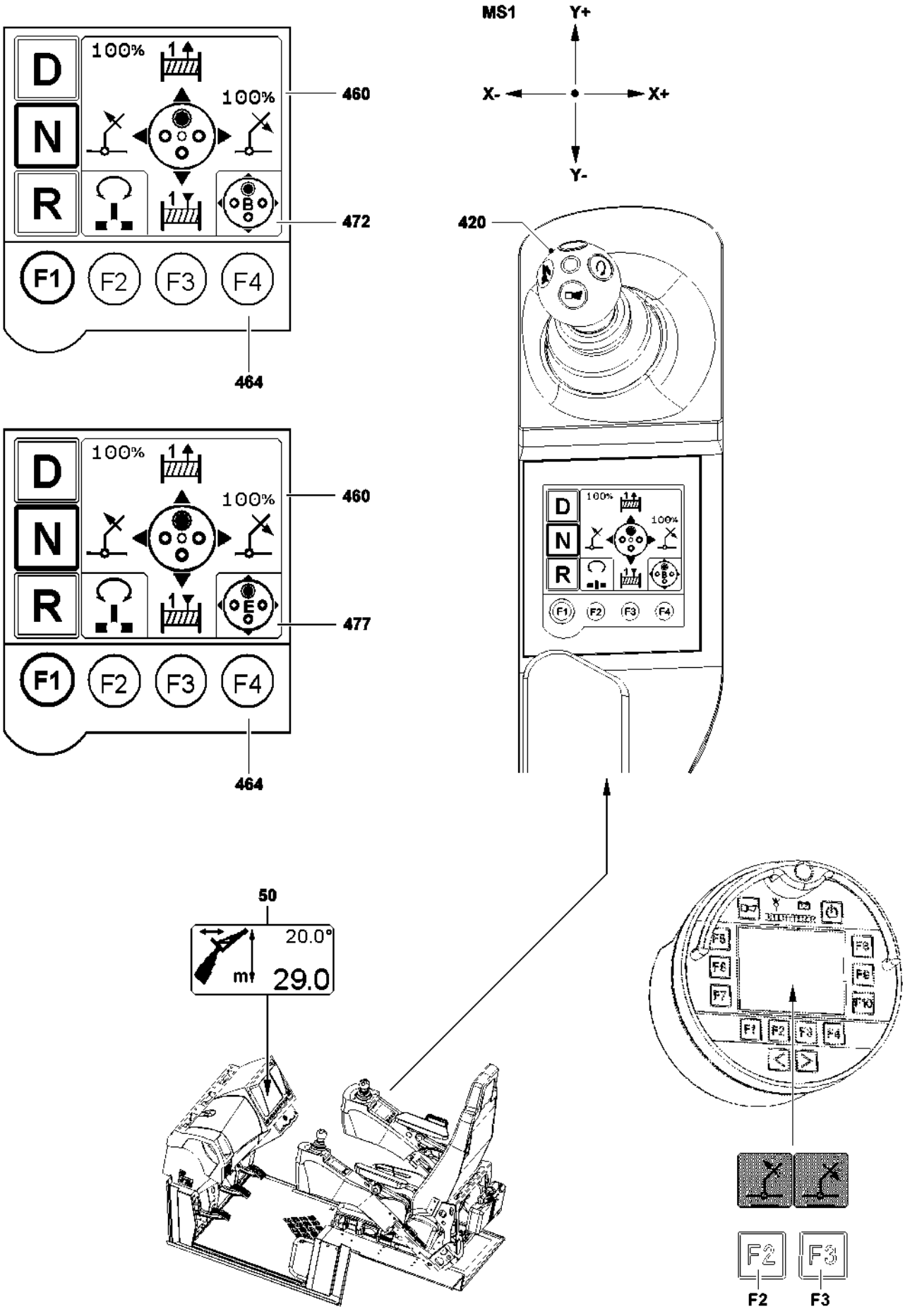

Fig.106107

8 Adjusting the folding jib angle hydraulically*

8.1 Folding jib with hydraulic* angle adjustment

The adjustment range of the folding jib lies between 0° and 40° to the telescopic boom. It is possible to luff the hydraulically adjustable folding jib under load.

DANGER
Danger of accident due to toppling crane!
The crane may topple if the maximum load is exceeded.
- ▶ The specifications in the load charts must be adhered to!
- ▶ The load charts for the hydraulically adjustable folding jib are only valid for angles of 0°, 20° and 40°!
- ▶ For the adjustment angles between the nominal angles of 0°, 20° and 40°, the maximum load carrying capacity will be determined by the LICCON computer system shown on the LICCON monitor.

Make sure that the following prerequisites are met:
- – All hydraulic connections have been made.
- – All electrical connections have been made.
- – The crane engine is running.
- – The operating mode **TNZK** has been set and confirmed on the LICCON computer system.

8.1.1 Angle display for folding jib

The folding jib angle **50** is shown on the LICCON monitor as the relative angle between the telescopic boom pulley head and the folding jib.

8.1.2 Luffing with „hydraulic angle adjustment“

Make sure that the following prerequisites are met:
- – The right touch display **460** appears on the „Driving mode + Master switch configuration“ menu.
- – The master switch configuration „B“ **472** is active (for devices with one winch).
- – The master switch assignment „E“ **477** is active (for devices with two winches).

The folding jib angle adjustment can be made under load.

If the folding jib is to be luffed down:
- ▶ Deflect the master switch **420** to the right in direction X+.

Result:

- – The hydraulic folding jib is luffed down.

If the folding jib is to be luffed up:
- ▶ Deflect the master switch **420** to the left in direction X-.

Result:

- – The hydraulic folding jib is luffed up.

Note
- ▶ Alternatively, the hydraulic angle adjustment can also be made with the BTT.
- ▶ The hydraulic folding jib can be luffed up with the function key **F2** or luffed down with the function key **F3**, see chapter 5.31, section „The menu Assembly functions on the BTT“.

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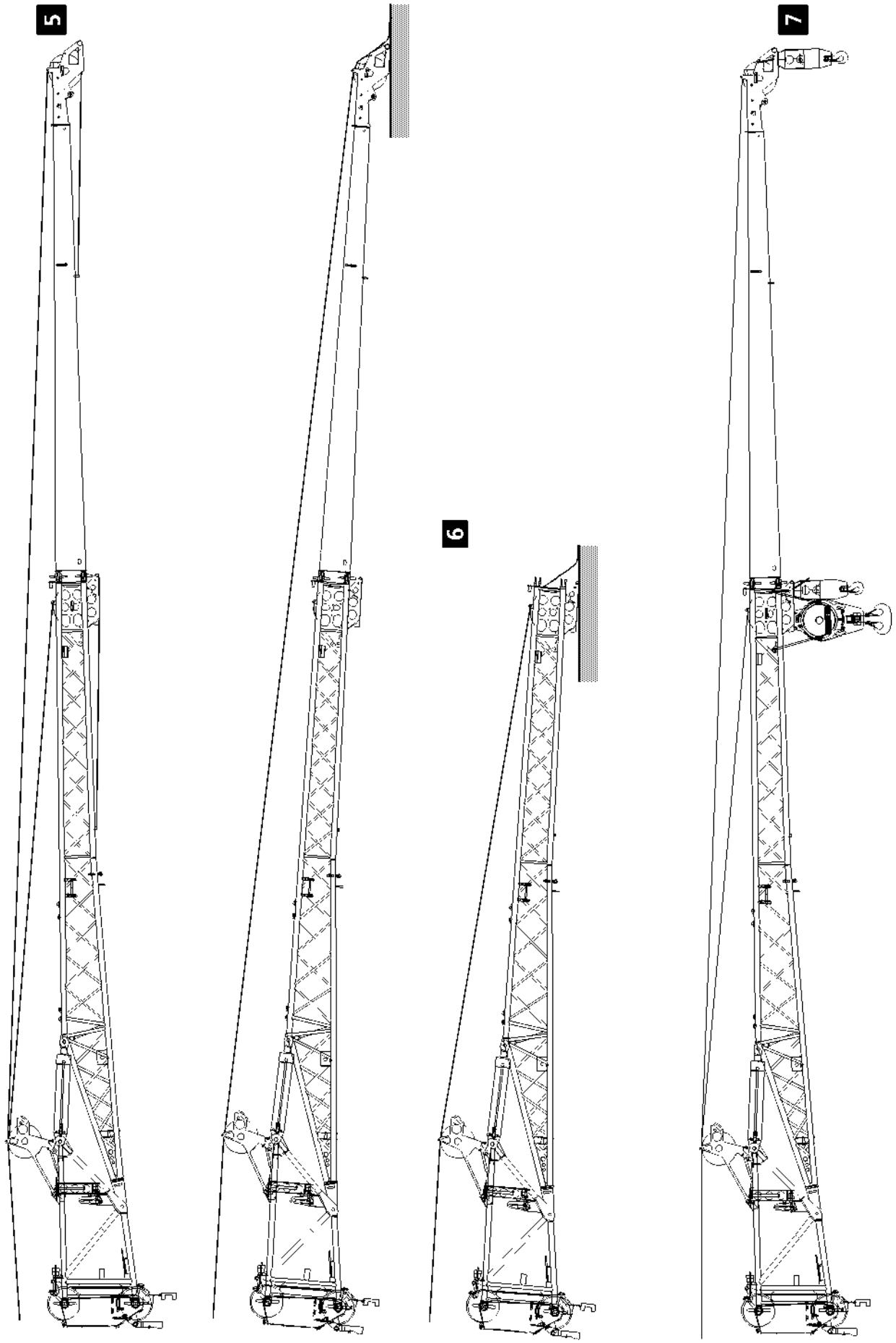

Fig.103279

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9 Changing the mechanical folding jib from 20° or 40° to 0°

DANGER
Danger of fatal injury!
If the following danger notes are not observed, fatal injuries can occur during assembly and change over work on the folding jib.
▶ No persons may remain within the danger zone of the crane.

There are 3 ways of changing the mechanical folding jib to 0°:
1. Changing the folding jib with the hoist rope, illustration **5**
   Only permitted for operation with single folding jib and double folding jib.
2. Changing the folding jib by supporting it from below, illustration **6**
3. Changing the folding jib with hook block or load hook, illustration **7**

Note
▶ Change over with load hook is only possible with a rope wedge socket „without swivel“.
▶ With a rope wedge socket „with swivel“, changing with load hook is not possible.

Make sure that the following prerequisites are met:
– The crane is properly supported and horizontally aligned.
– The telescopic boom is fully telescoped in.
– The counterweight has been installed on the turntable according to the load chart.
– The folding jib is installed at an angle of 20° or 40°.
– The telescopic boom has been swung to the rear or the side.

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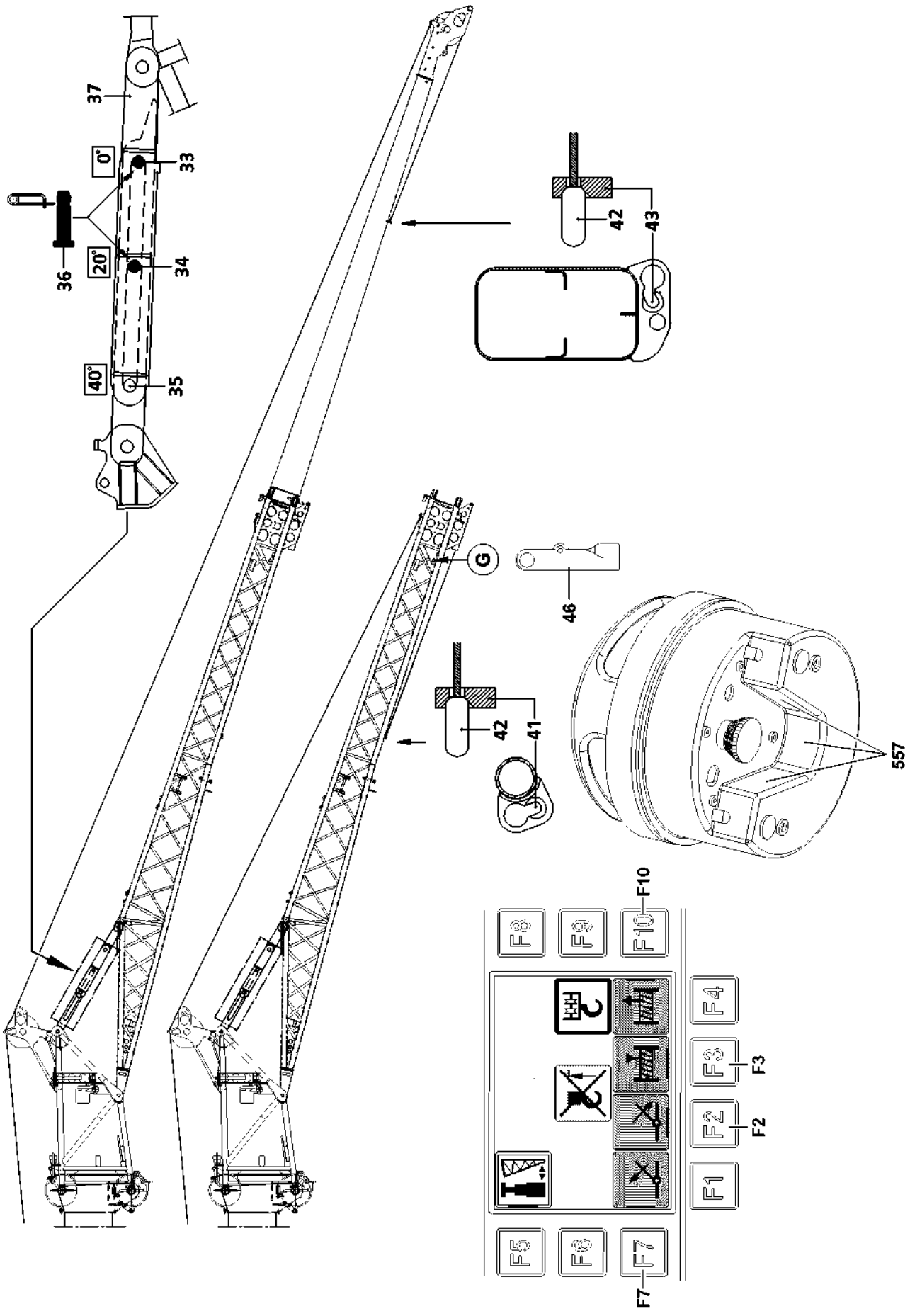

Fig.108692

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9.1 Changing the folding jib with the hoist rope

WARNING
Danger of fatal injury during angle assembly via the BTT!
Due to jerky movements at angle installation of the folding jib with the hoist rope, the boom along with the folding jib can swing up. This can cause the folding jib to fold down uncontrolled!
Personnel can be severely injured or killed!
- ▶ All movements must be actuated extremely sensitively via the BTT!
- ▶ Make sure that there are no persons within the danger zone of the folding jib!

Note
- ▶ When changing the folding jib with the hook block or load hook via the BTT, the hoist limit switch is bypassed.

9.1.1 Preparatory work

- ▶ Lower the telescopic boom until the hook block can be reeved out on the end section of the folding jib.
- ▶ Unreeve the hoist rope on the hook block.
- ▶ Remove the hoist limit switch weight.

CAUTION
Danger of damage to the folding jib and the hoist rope!
If the telescopic boom is telescoped out or luffed down as long as the hoist rope is tightened on the assembly fixed point, the hoist rope can rip and the folding jib can be damaged.
- ▶ Do not telescope out or luff down the telescopic boom with the hoist rope attached on the assembly fixed point!

For operation with double folding jib:
- ▶ Guide the press fitting **42** into the assembly fixed point **43**.

or

For operation with single folding jib:
Guide the press fitting **42** into the assembly fixed point **41**.
- ▶ Tighten the hoist rope by **carefully deflecting** the appropriate manual control lever.

or

Tighten the hoist rope by actuating the 2-hand keypad **557** and the function key **F3**.

Note
- ▶ For BTT, see the Crane operating instructions, chapter 5.31.

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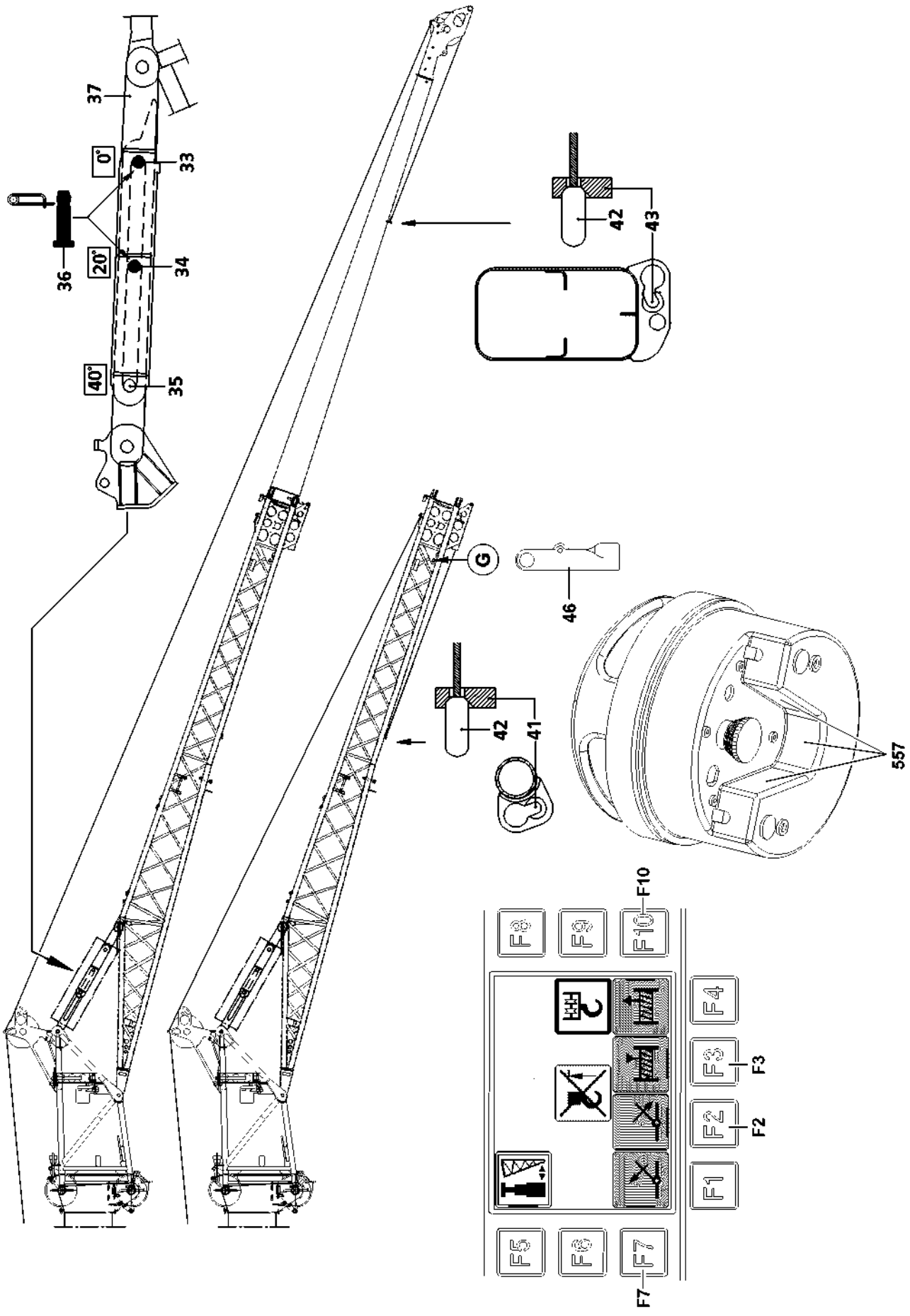

Fig.108692

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9.1.2 Changing the angle with the hoist rope

CAUTION
Danger of damage to the folding jib and the hoist rope!
- ▶ As soon as the folding jib has reached the 0° position (stop at pull bracket), the „Lifting“ and „Luffing“ movement must be stopped immediately.

- ▶ Luff down telescopic boom and simultaneously spool up the hoist rope so that the pivot section of the folding jib is always kept at the same height, approx. 1.0 m - 1.5 m , above the ground until the 0° position (stop on pull bracket) has been reached.
  or
  Luff the telescopic boom down via the BTT by actuating the 2-hand keypad **557** and the function key **F2**. Spool up the hoist rope simultaneously with the function key **F3** so that the pivot section of the folding jib is always held at the same height, approx. 1.0 m to 1.5 m above the ground until the 0 ° position „Stop on pull bracket“ is reached.

Note
- ▶ For BTT, see the Crane operating instructions, chapter 5.31.

DANGER
Danger of fatal injury!
Danger of accident if the folding jib suddenly „folds downward“!
- ▶ Make sure that there are no persons within the danger zone of the folding jib.
- ▶ Ensure that **before unpinning** the pin **36**, the hoist rope is taut and that the folding jib is actually held in position by the hoist rope.
- ▶ Unpinning the retaining pins **35** at the 40° pin bores is **prohibited**!

- ▶ Release the pins **36** and unpin from the 20° bore **34 or** remove from the transport retainer.
- ▶ Insert the pin **36** into the 0° bore **33** and secure.
- ▶ Disengage the hoist rope on the assembly fixed point.
- ▶ Install the rope lock **46** on point **G**!

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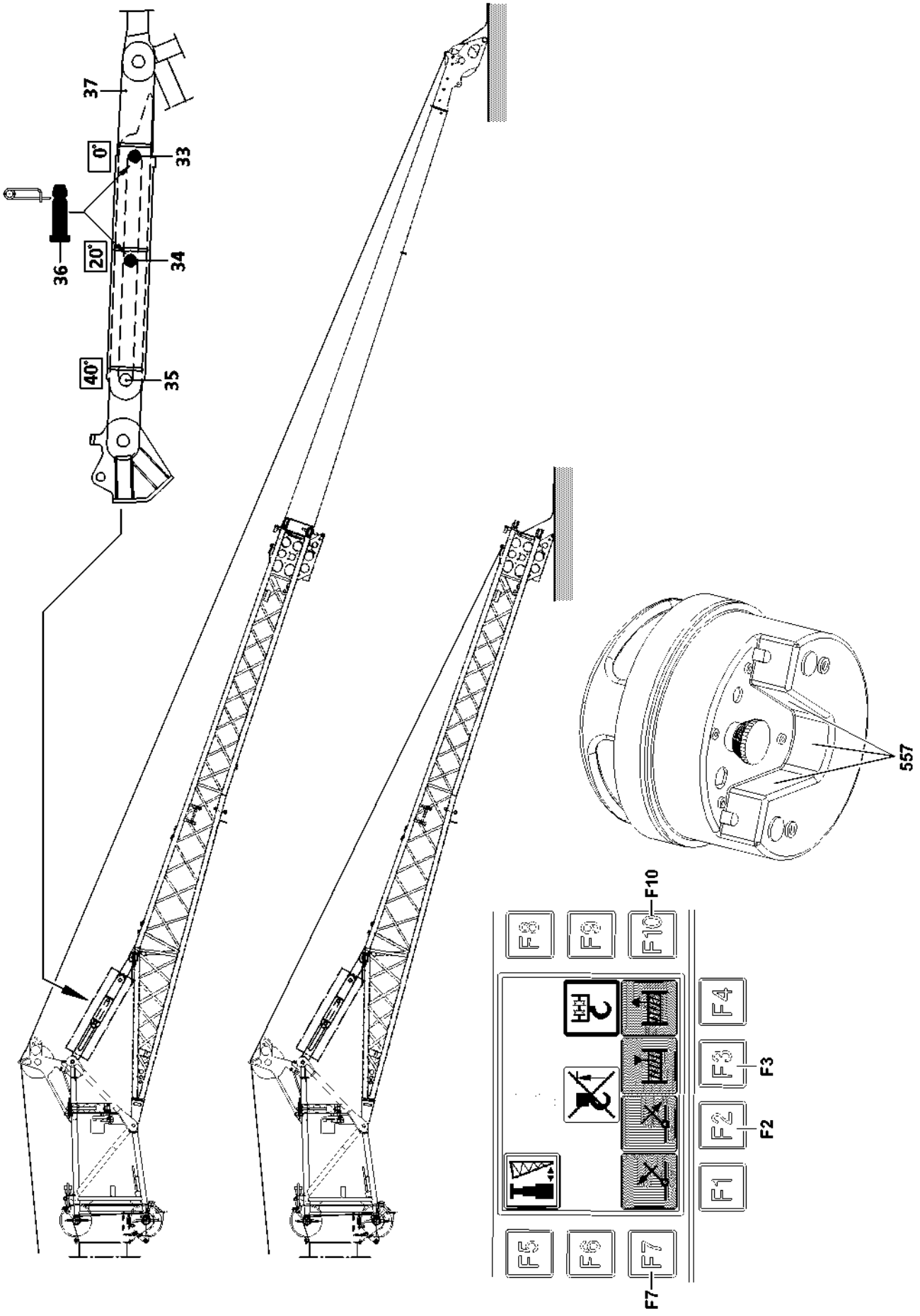

Fig.108693

9.2 Changing the folding jib by supporting it

WARNING
Danger of fatal injury during angle assembly via the BTT!
- ▶ All movements must be actuated extremely sensitively via the BTT!
- ▶ Make sure that there are no persons within the danger zone of the folding jib!

Note
- ▶ When changing the folding jib with the hook block or load hook via the BTT, the hoist limit switch is bypassed.

- ▶ Luff the telescopic boom down via the master switch until the hook block can be reeved out.
- ▶ Remove the lock and the hoist limit switch weight.

CAUTION
Danger of property damage!
- ▶ When placing down the folding jib, make sure that the folding jib is **not** placed on the rope pulley. Otherwise it will be damaged. Also make sure that the hoist rope is **not** damaged.
- ▶ Make sure that the ground is firm and even, so that the folding jib does not sink into the ground when it is lowered.

- ▶ Luff the telescopic boom down completely until the folding jib lies on the ground.
  or
  Luff the telescopic boom down all the way by actuating the 2-Hand key field **557** and the function key **F2** on the BTT until the folding jib is laying on the ground.

Note
- ▶ For BTT, see the Crane operating instructions, chapter 5.31.

- ▶ Continue to luff down the telescopic boom carefully until the 0° position (stop at pull bracket) is reached.

DANGER
Danger of fatal injury!
Danger of accident if the folding jib suddenly „folds downward“!
- ▶ No persons may remain within the danger zone of the crane.
- ▶ Make sure that **before unpinning** the pin **36**, the folding jib is lying on the ground or on a proper and secure support.
- ▶ Unpinning the retaining pins **35** at the 40° pin bores is **prohibited**!

- ▶ Release the pins **36** and unpin from the 20° bore **34 or** remove from the transportation retainer.
- ▶ Insert the pin **36** into the 0° bore **33** and secure.

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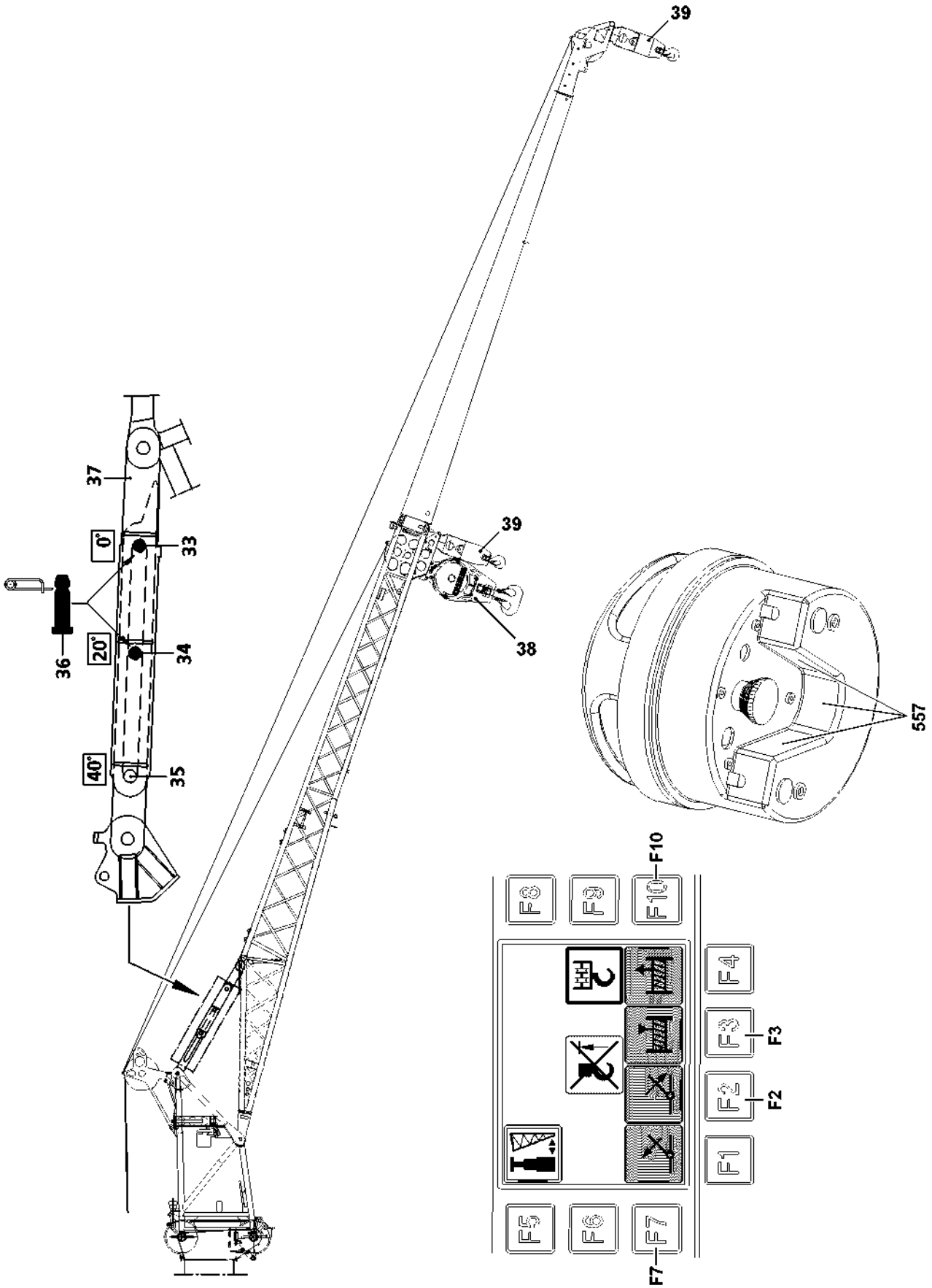

Fig.108694

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9.3 Changing the folding jib with hook block or load hook

Note

- ▶ The angle assembly with load hook is only possible with a rope lock „without swivel“.
- ▶ With a rope lock „with swivel“, the angle assembly with load hook is not possible.

On a single folding jib, the angle assembly can be carried out with 1–roller (G = 450 kg) or 3–roller hook block **38** (G = 500 kg) or with load hook **39** (G = 250 kg).

On double folding jib, the angle assembly may only be carried out with load hook **39** (W = 250 kg).

WARNING

Danger of fatal injury during angle assembly via the BTT!
Due to jerky movements during the angle assembly of the folding jib with the hook block or the load hook, the boom along with the folding jib can swing up. This can cause the folding jib to fold down uncontrolled!
Personnel can be severely injured or killed!

- ▶ All movements must be actuated extremely sensitively via the BTT!
- ▶ Make sure that there are no persons within the danger zone of the folding jib!

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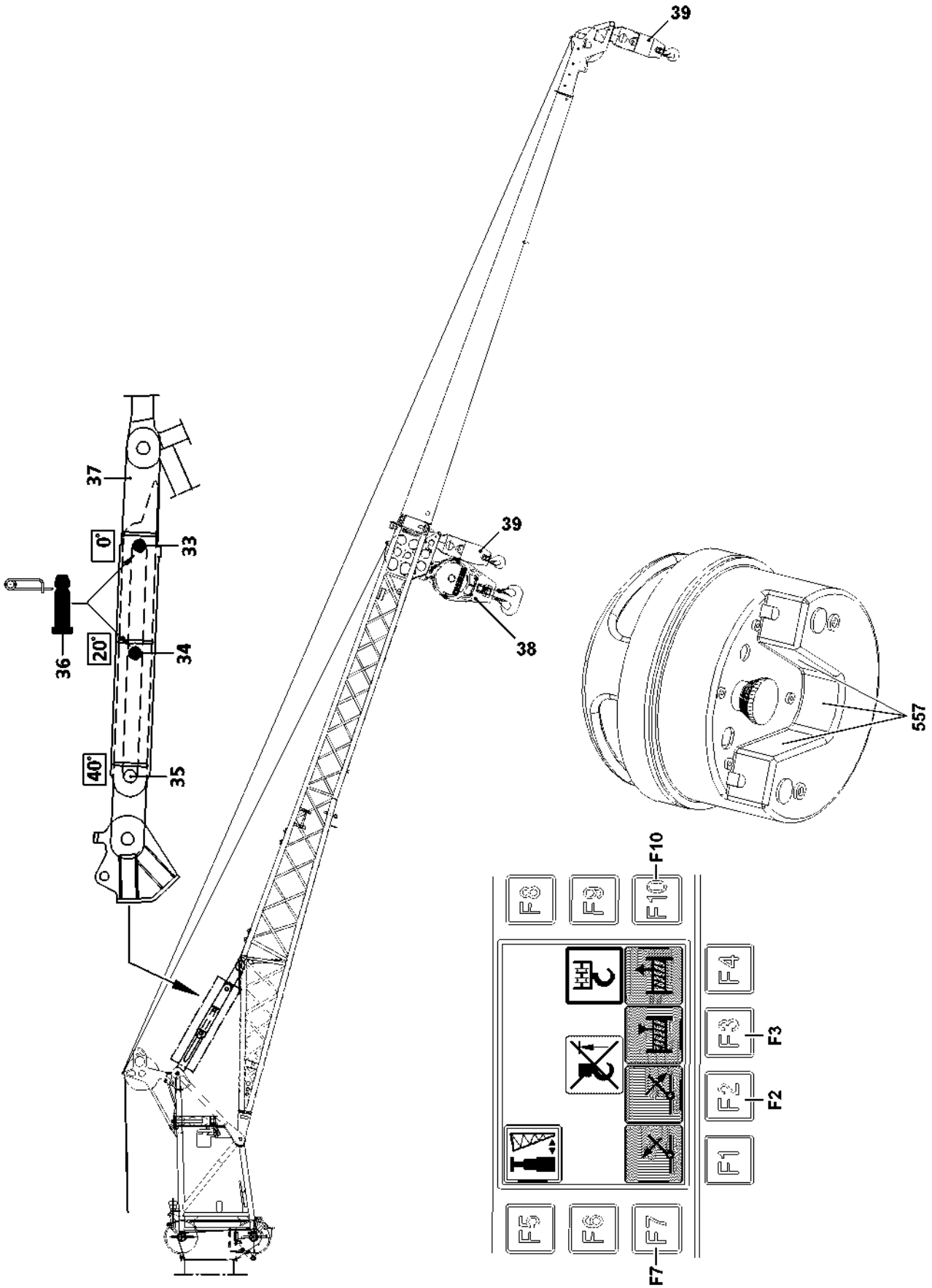

Fig.108694

9.3.1 Preparatory work

WARNING
Danger of damage to the folding jib and the hoist rope!
▶ Do not telescope the telescopic boom out nor luff it down as long as the hook block / load hook touches the stop on the folding jib.

▶ Remove the hoist limit switch weight with chain.
▶ Turn the bypass key button **D** on the LICCON monitor to the right and release it.

Result:

– The „Hoist top shut off“ is bypassed.

▶ Carefully deflect the corresponding master switch and run the hook block or load hook carefully to the stop of the folding jib and tension via the hoist gear.
or
By actuating the 2-hand keypad **557** and the function key **F3** on the BTT, move the hook block or the load hook carefully to the stop of the folding jib and tension it via the hoist gear.

WARNING
Danger of damage!
▶ As soon as the folding jib has reached the stop 0 ° , the „Lifting“ and „Luffing“ movement must be stopped immediately.

▶ Luff down the telescopic boom and at the same time, spool up the hoist rope so that the pivot section of the folding jib is always held at the same height, approx. 1.0 m to 1.5 m above the ground, until the 0 ° position – „stop on the pull bracket“ is reached.
or
Luff the telescopic boom down via the BTT by actuating the 2-hand keypad **557** and the function key **F2**. Spool up the hoist rope simultaneously with the function key **F3** so that the pivot section of the folding jib is always held at the same height, approx. 1.0 m to 1.5 m above the ground until the 0 ° position „Stop on pull bracket“ is reached.

Note
▶ For BTT, see the Crane operating instructions, chapter 5.31.

9.3.2 Positioning the folding jib

▶ Release the pin **36** and unpin from bore **34 or** remove from the pin store.
▶ Pin and secure the pin **36** in the bore **33**.
▶ Assemble the hoist limit switch weight and chain.
▶ Attach the hoist limit switch weight on the hoist rope.

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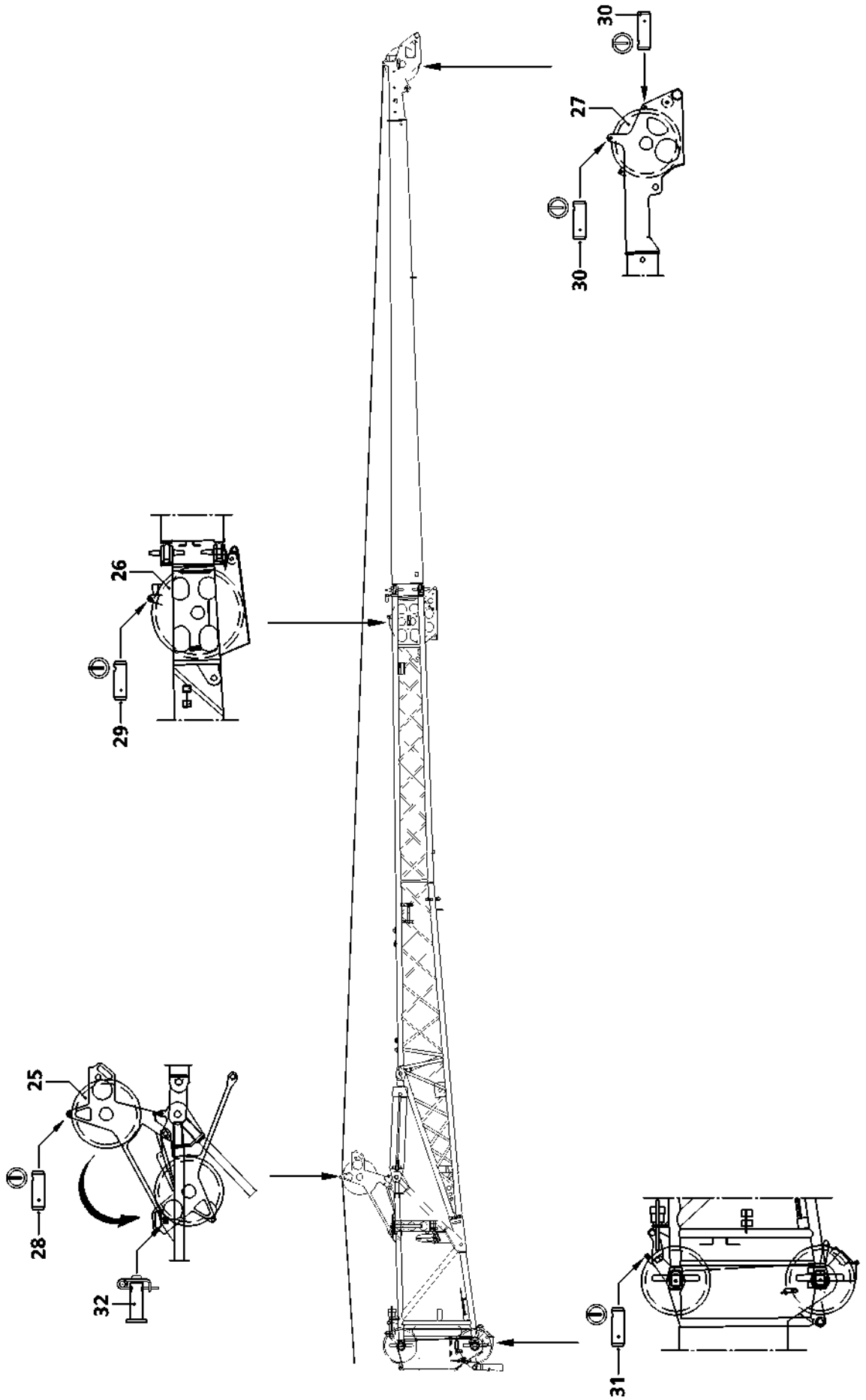

Fig.103283

10 Unreeving the hoist rope

DANGER
Danger of falling from folding jib!
When walking on the folding jib, for example to reeve the hoist rope in or out, there is a risk of slipping and falling from the folding jib.
▶ Do not step on the folding jib!

Make sure that the following prerequisites are met:

– The telescopic boom is telescoped in.
– The hook block / load hook has been placed on the ground.
– The hoist rope is detached from the rope fixed point.
– The hoist limit switch weight and the chain have been removed.

10.1 Unpinning / pinning the rope retaining pin

▶ Release and unpin the rope retaining pin **28** and rope retaining pin **29**.

For operation with double folding jib:
▶ Release and unpin the rope retaining pin **30**.
▶ Spool the hoist rope up.
▶ Repin the rope retaining pin **28**, rope retaining pin **29** and rope retaining pin **30** and secure with locking pins.

10.2 Swinging the rope guide pulley into transport position

▶ Release and unpin the pin **32**.
▶ Swing the rope guide pulley **25** into transport position.
▶ Pin the rope guide pulley **25** with pin **32** and secure.

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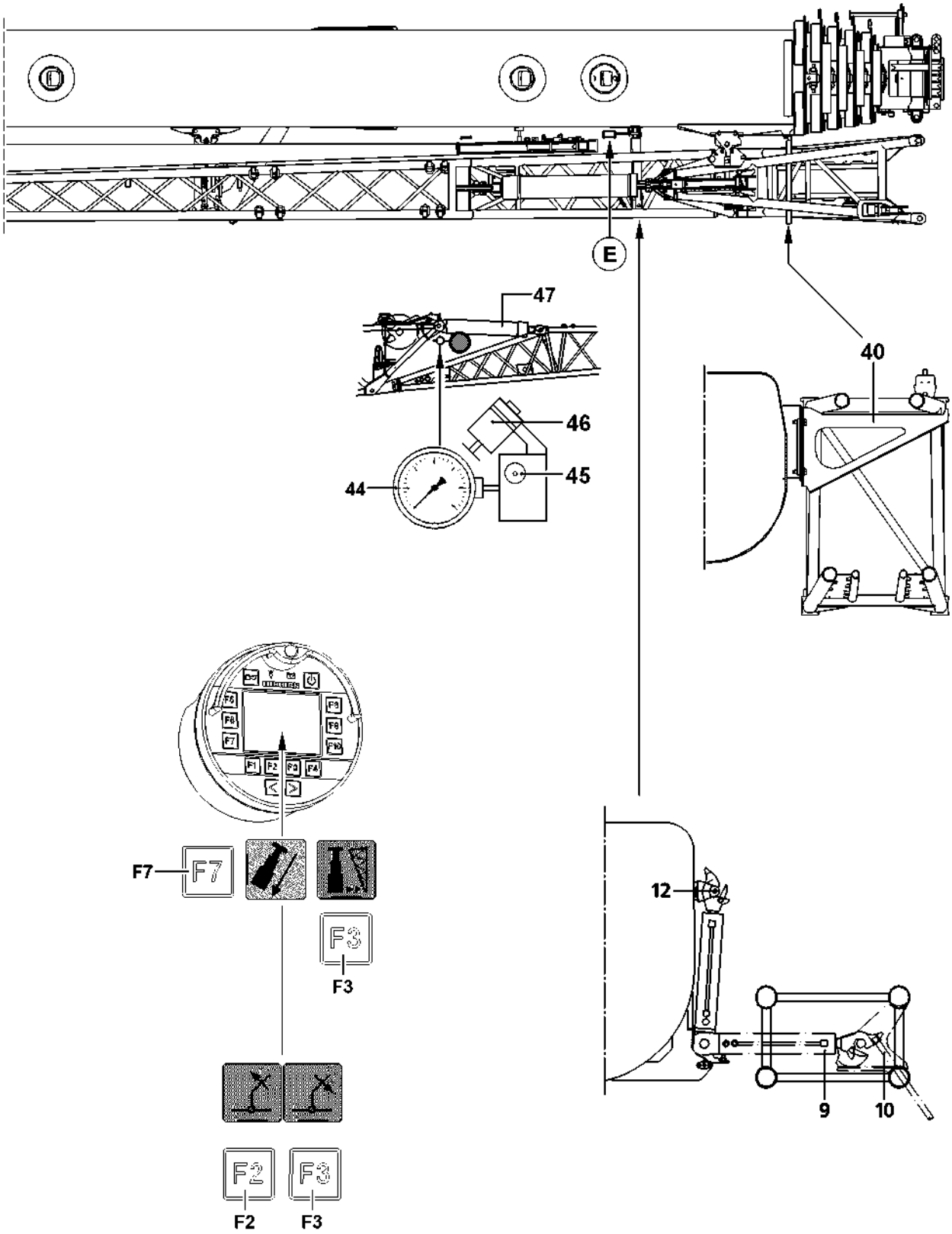

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Fig.120253

11 Removing the folding jib

11.1 General

DANGER
Danger of fatal injuries due to falling folding jib!
The folding jib could fall down due to a disassembly error.
- ▶ Standing under the folding jib during the swing procedure is prohibited!
- ▶ Standing in the swing range as well as in the folding area of the folding jib is prohibited!
- ▶ The folding jib must be secured with an auxiliary rope during the swing procedure!

DANGER
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 injuries.
- ▶ All assembly work from a height of 2 m must normally be carried out using suitable aids (lifting platforms, scaffolding, ladders, auxiliary crane etc.)! The height above which assembly / disassembly work must be carried out with aids depends on national regulations. The national regulations must be adhered to!
- ▶ If work cannot be carried out using these aids or from the ground, then assembly personnel must protect themselves from falling with suitable aids (such as safety harnesses)!
- ▶ Do not walk on the telescopic boom or folding jib!

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 telescopic boom is fully telescoped in.
- The folding jib is in the 0° position.
- The electrical / hydraulic connections on the folding jib have been released.
- The rope guide pulley has been folded from the operating position into transport position.
- The telescopic boom has been luffed down to the rear or the side in the 0° position.

DANGER
Danger of accident if the folding jib swings out by itself when it is unpinned!
The telescopic boom must be in 0° position, otherwise there is a danger of accidents if the folding jib swings out by itself when it is unpinned.
- ▶ Move the telescopic boom to 0° position.

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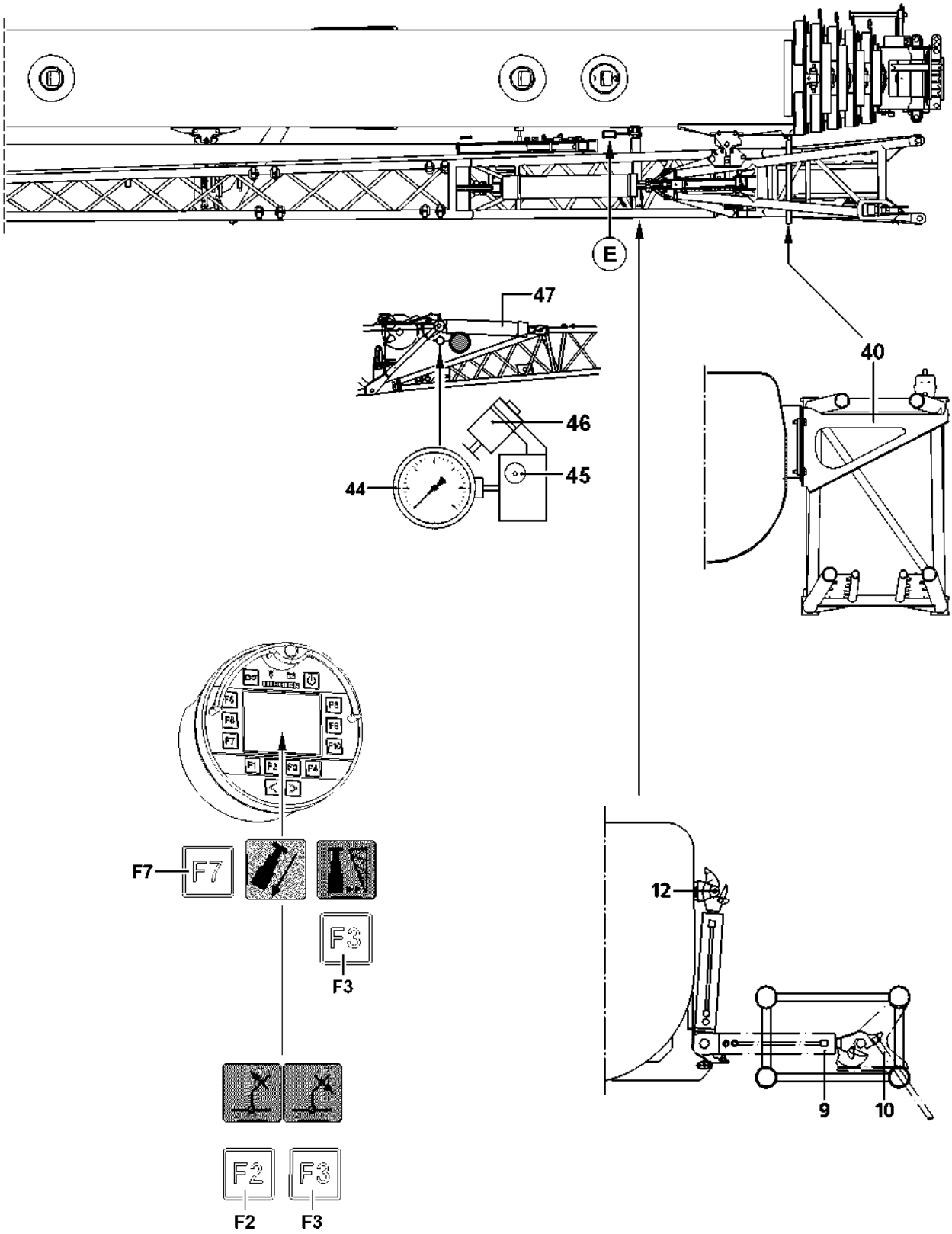

Fig.120253

11.2 Preparatory work before swinging in hydraulic folding jibs

DANGER
Danger of fatal injury if the folding jib inadvertently folds down!
When using hydraulic folding jibs (TNZK operation), prior to swinging in the folding jib, check if a pressure of at least 200 bar is shown on the pressure gauge **44**. If the pressure on the pressure gauge **44** is too low, fatal accidents can occur if the folding jib folds down by itself!

▶ It is **expressly prohibited** to swing in the folding jib with less than 200 bar on the pressure gauge **44**.

Prior to swinging in the hydraulic folding jib*****, the folding jib must be completely luffed up and held in the end position for approximately 15 seconds. This causes the hydraulic reservoir to fill.

If the oil pressure on the pressure gauge **44** is below 200 bar

▶ Luff the folding jib completely up with the master switch and move it to end position.
or
On the Bluetooth™ Terminal (BTT) call up the „Lift / lower the folding jib“ menu.

▶ Press the key **F2** until a pressure of at least 200 bar is shown on the pressure gauge **44**, see Crane operating instructions, chapter 5.31.

Result:

– The pressure gauge **44** then must show 200 bar to 250 bar.

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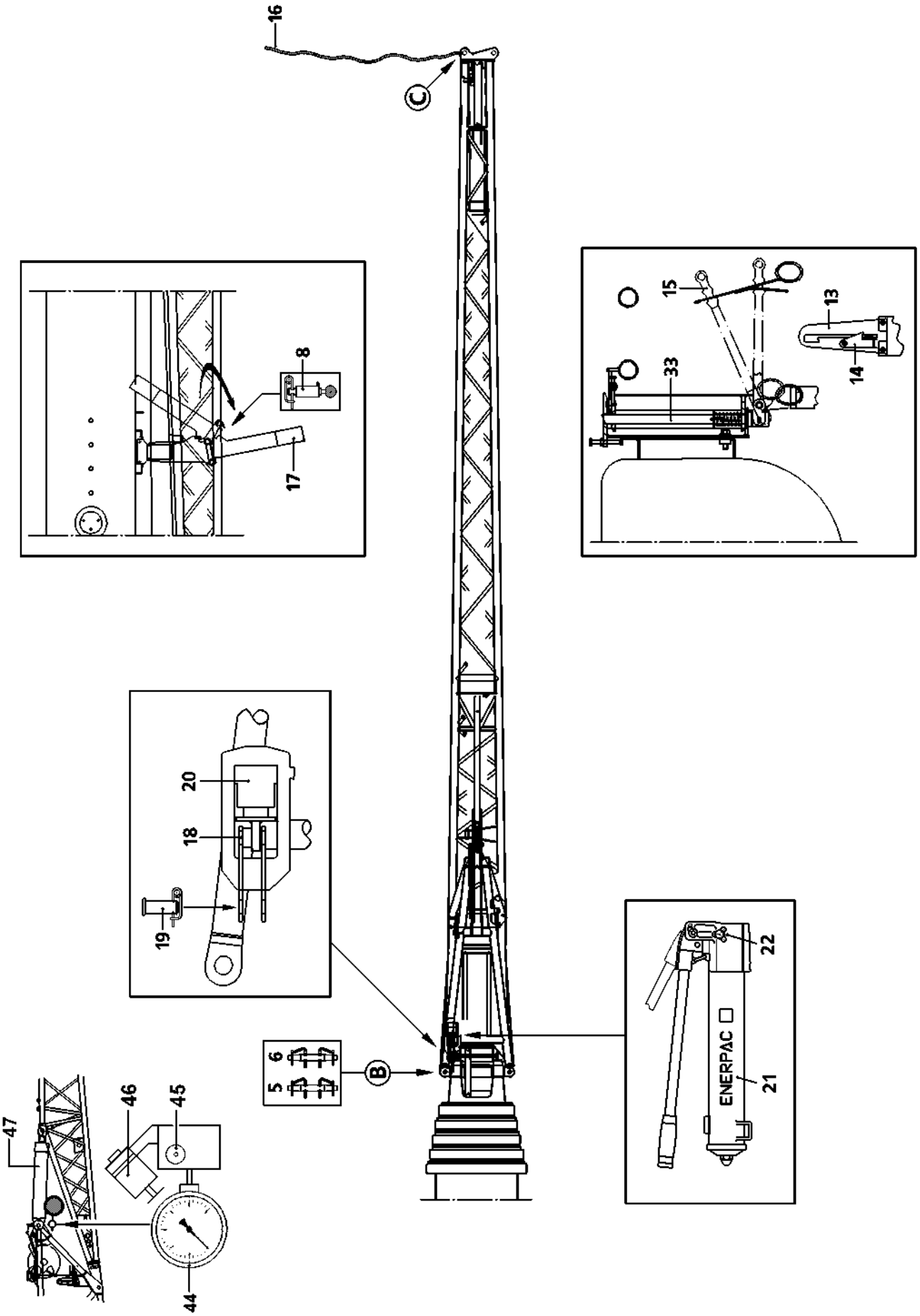

Fig.199427

11.3 Removing the single folding jib carried on the crane

▶ Disengage the lever **15** with the assembly rod from the link **13** and pull downward.
▶ Attach the auxiliary rope **16** on point **C**.

When swinging the folding jib support **17** in and out, ensure that the spring pin **8** is unlocked with one hand and that the folding jib support **17** is moved overhead with the other hand.

▶ Release and unpin the spring pin **8**.
▶ Swing out the folding jib support **17** until the spring pin **8** engages again.

In order to unpin on top of point **B**, the hydraulic / mechanical assembly aid **20** must be used.

▶ Close the knob **22** on the hand pump **21**.
▶ Extend the hydraulic cylinder of the assembly aid **20** by operating the hand pump **21** until the pin **6** can be unpinned.
▶ Release and unpin the pin **6** on top.
▶ Open the rotary knob **22** on the hand pump **21**.

Result:

– The hydraulic cylinder of the assembly aid **20** returns to the starting position.

▶ Unpin the pins **19** and insert into bore **18** and secure.

DANGER
The folding jib can swing out inadvertently!
When removing the pin **5**, the folding jib can swing out inadvertently.

In order to prevent the folding jib from swinging out by itself:
▶ Hold the folding jib with the auxiliary rope!
▶ Do not lean the ladder against the folding jib!

▶ Release the pin **5** on the bottom and unpin.

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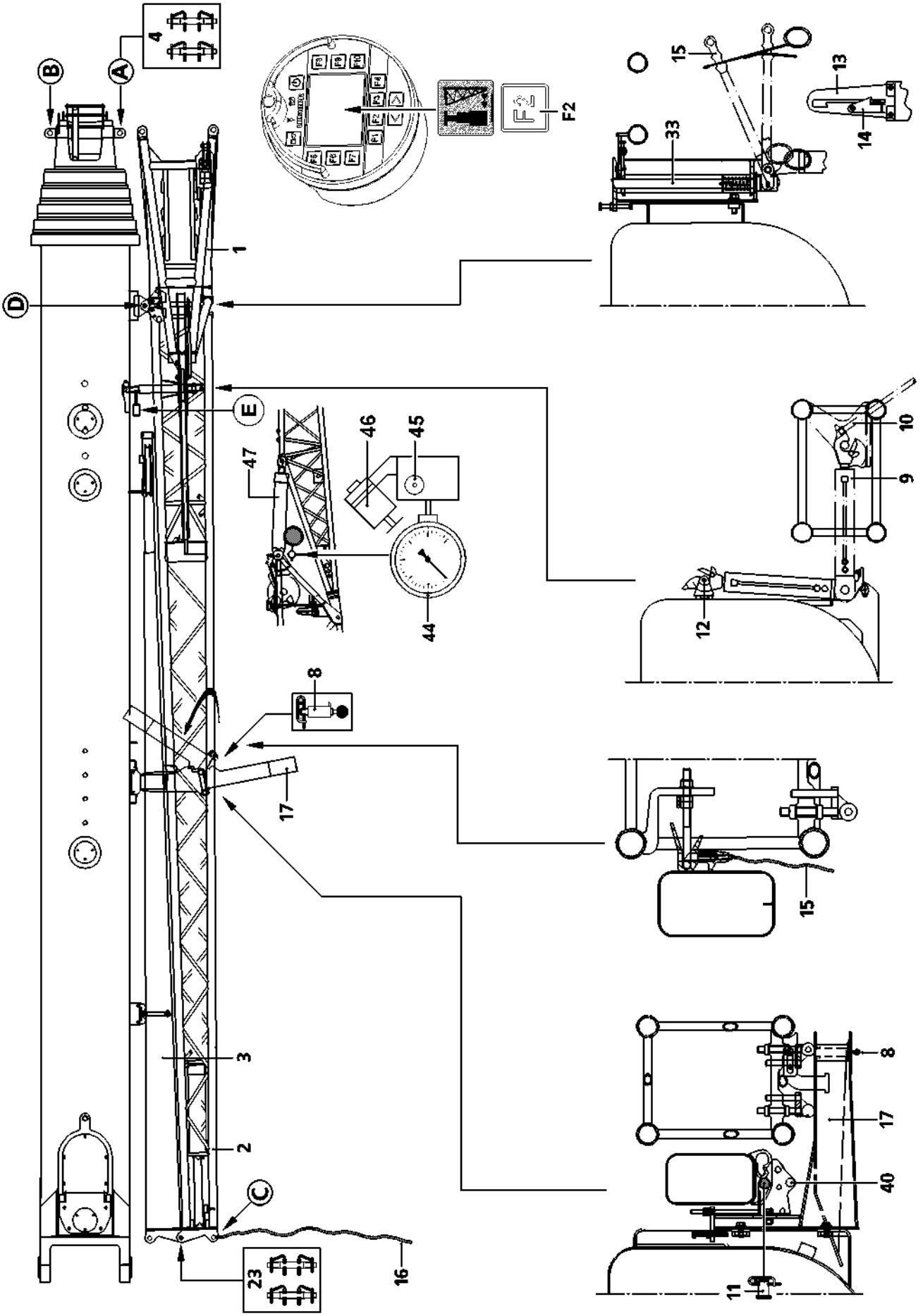

Fig.108695

LWE/LTM 1130-5-1-004/20502-04-02/en

DANGER
Danger of fatal injuries due to falling folding jib!
The folding jib could fall down due to a disassembly error.
▶ Standing under the folding jib during the swing procedure is prohibited!
▶ Standing in the swing range as well as in the folding area of the folding jib is prohibited!

▶ Swing the folding jib backward until the swing cylinder **9** is locked to the folding jib.
▶ Start the crane engine.
▶ Press the function key **F2** on the BTT and swing in the folding jib with the swing cylinder until the lock **33** engages audibly.
▶ Check if the lock **33** is engaged properly.

DANGER
Danger of fatal injury when unpinning the pins **4**!
If the pins **4** are unpinned before the lock **33** has engaged, then the folding jib will fall down and possibly cause fatal injury to the assembly personnel.
▶ The pins **4** may not be unpinned until the lock **33** has engaged and the manual lever **16** has been secured with the safety bracket **15**.

▶ Secure the manual lever **15** with the safety bracket **14**.
▶ Release the pin **4** at point **A**, unpin and insert into transport retainer.
▶ Press the function key **F2** on the BTT and swing the folding jib with swing cylinder in all the way.

Result:

– When transporting the double folding jib, the pivot section **2** is locked with the end section **3**.

If a double folding jib is carried along:
▶ Insert and secure pin **23**.

When swinging the folding jib support **17** in and out, ensure that the spring pin **8** is unlocked with one hand and that the folding jib support **17** is moved overhead with the other hand.

▶ Unpin the spring pin **8** and swing in the folding jib support **17** until the spring pin **8** engages.
▶ Secure the spring pin **8**.

If a hydraulic folding jib is carried along:
▶ Connect hydraulic line to hydraulic cylinder **47** at point **E**.
▶ Remove the auxiliary rope **16**.

If necessary:
▶ Install the flashing beacon on the folding jib and plug the cable for the flashing beacon in on the driver's cab.

On hydraulic folding jibs, an overflow tank is installed on the hydraulic cylinder. The overflow tank must be emptied when it is full. Even if the folding jib is not transported on the crane.

For operation with a hydraulic folding jib:
▶ Empty the overflow tank on the hydraulic cylinder.

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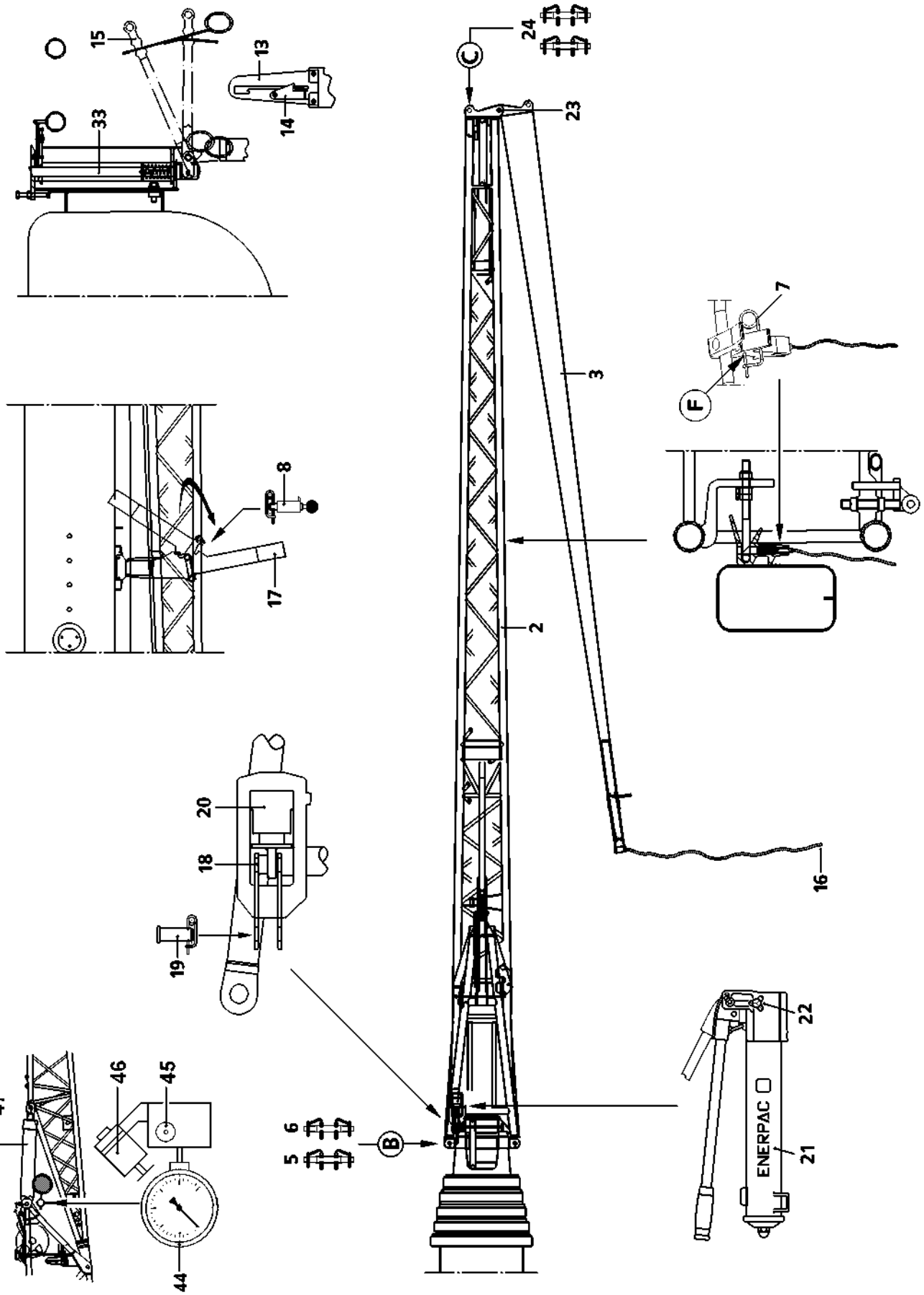

Fig.103415

11.4 Removing the double folding jib carried on the crane

11.4.1 Removing the end section

▶ Attach the auxiliary rope **16** on the end section.

DANGER
The folding jib can swing out inadvertently!
When removing the pins **24**, the folding jib may swing out unintentionally.

In order to prevent the folding jib from swinging out by itself:
▶ Hold the folding jib with the auxiliary rope!
▶ Do not lean the ladder against the end section **3**!

▶ Release and unpin the pin **24**.

DANGER
Danger of fatal injuries due to falling folding jib!
The folding jib could fall down due to a disassembly error.
▶ Standing under the folding jib during the swing procedure is prohibited!
▶ Standing in the swing range as well as in the folding area of the folding jib is prohibited!
▶ The pins **23** must remain pinned.

▶ Swing in the end section **3** until the end section **3** is locked to the pivot section **2**.

DANGER
The end section can swing out inadvertently!
To prevent the lock between the end section **3** and the pivot section **2** from opening inadvertently, the spring retainer **7** must also be inserted on point **F**.
▶ Insert the spring retainer **7** on point **F**.

▶ Check if the end section **3** and the pivot section **2** are properly locked.
▶ Remove the auxiliary rope **16** from the end section **3** and attach on point **C**.
▶ Disengage the lever **15** with the assembly rod from the link **13** and pull downward.

When swinging the folding jib support **17** in and out, ensure that the spring pin **8** is unlocked with one hand and that the folding jib support **17** is moved overhead with the other hand.

▶ Release and unpin the spring pin **8**.
▶ Swing out the folding jib support **17** until the spring pin **8** engages again.

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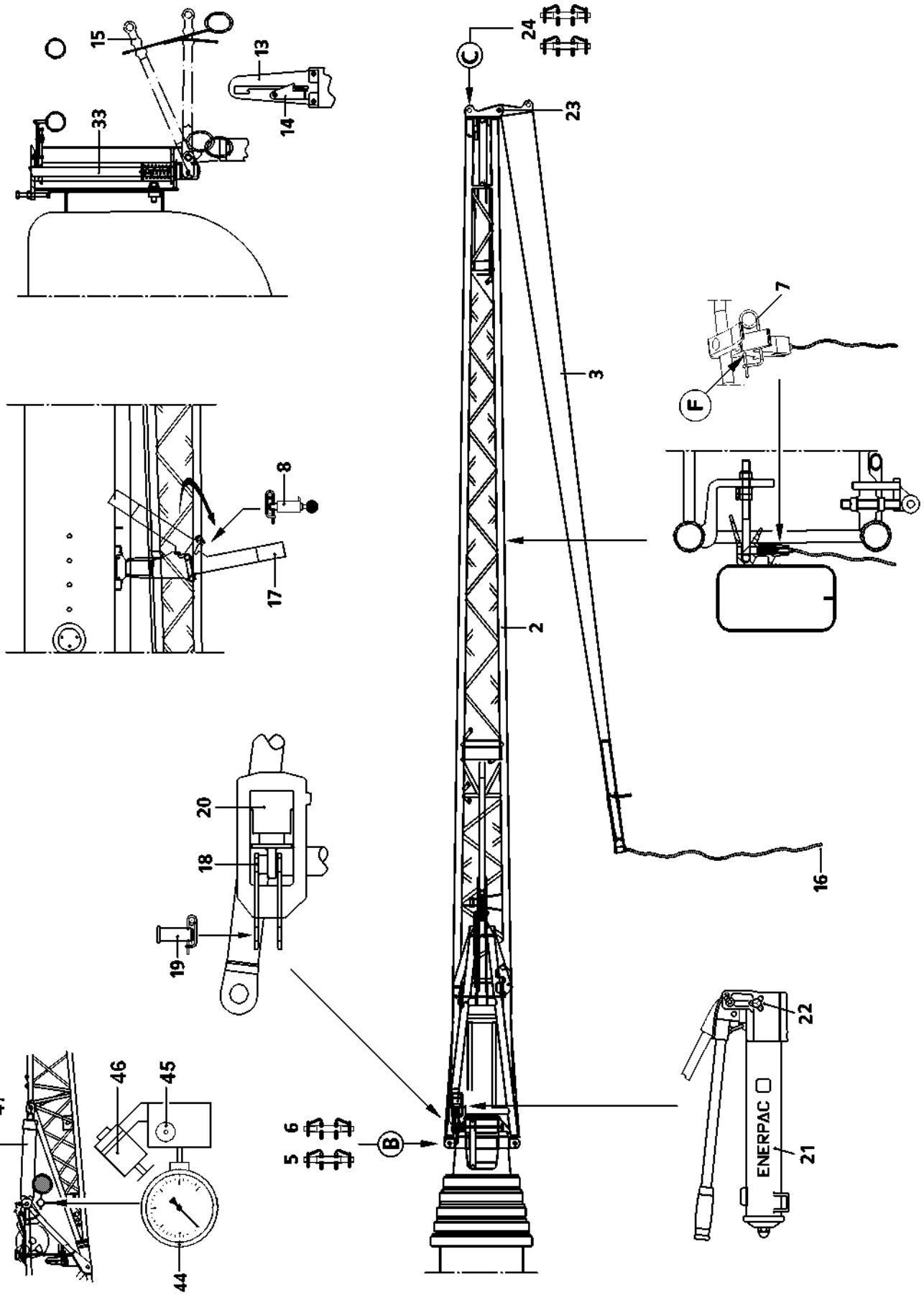

Fig.103415

11.4.2 Disassembly of the pivot section

In order to unpin on top of point **B**, the hydraulic / mechanical assembly aid **20** must be used.

- ▶ Close the knob **22** on the hand pump **21**.
- ▶ Extend the hydraulic cylinder of the assembly aid **20** by operating the hand pump **21** until the pin **6** can be unpinned.
- ▶ Release and unpin the pin **6** on top.
- ▶ Open the knob **22** on the hand pump **21**.

Result:

– The hydraulic cylinder of the assembly aid **20** returns to the starting position.

- ▶ Unpin the pins **19** and insert into bore **18** and secure.

DANGER
The folding jib can swing out inadvertently!
When removing the pin **5**, the folding jib can swing out inadvertently.

In order to prevent the folding jib from swinging out by itself:
- ▶ Hold the folding jib with the auxiliary rope!
- ▶ Do not lean the ladder against the folding jib!

- ▶ Release the pin **5** on the bottom and unpin.

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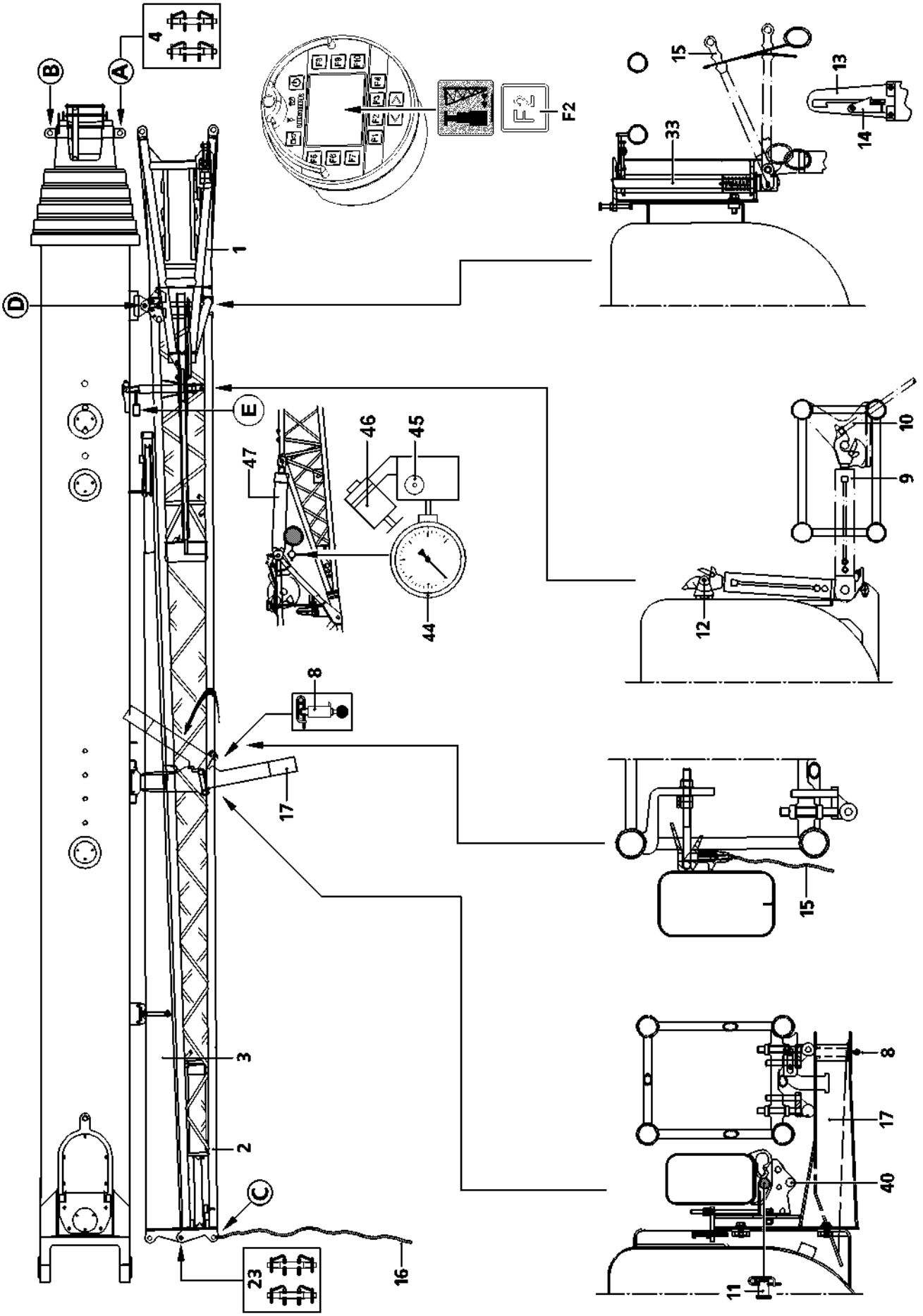

Fig.108695

LWE/LTM 1130-5-1-004/20502-04-02/en

DANGER
Danger of fatal injuries due to falling folding jib!
The folding jib could fall down due to a disassembly error.
- ▶ Standing under the folding jib during the swing procedure is prohibited!
- ▶ Standing in the swing range as well as in the folding area of the folding jib is prohibited!

- ▶ Swing the folding jib backward until the swing cylinder **9** is locked to the folding jib.
- ▶ Start the crane engine.
- ▶ Press the function key **F2** on the BTT and swing in the folding jib with the swing cylinder until the lock **33** engages audibly.
- ▶ Check if the lock **33** is engaged properly.

DANGER
Danger of fatal injury when unpinning the pins **4**!
If the pins **4** are unpinned before the lock **33** has engaged, then the folding jib will fall down and possibly cause fatal injury to the assembly personnel.
- ▶ The pins **4** may not be unpinned until the lock **33** has engaged and the manual lever **16** has been secured with the safety bracket **15**.

- ▶ Secure hand lever **15** with retaining bracket **14**.
- ▶ Release the pin **4** at point **A**, unpin and insert into transport retainer.
- ▶ Press the function key **F2** on the BTT and swing the folding jib with swing cylinder in all the way.
- ▶ Unpin the pin **11** from bore **40**, pin the folding jib with pin **11** and secure.

When swinging the folding jib support **17** in and out, ensure that the spring pin **8** is unlocked with one hand and that the folding jib support **17** is moved overhead with the other hand.

- ▶ Unpin the spring pin **8** and swing in the folding jib support **17** until the spring pin **8** engages.
- ▶ Secure the spring pin **8**.

If a hydraulic folding jib is carried along:
- ▶ Connect hydraulic line to hydraulic cylinder **47** at point **E**.
- ▶ Remove the auxiliary rope **16**.

If necessary:
- ▶ Install the flashing beacon on the folding jib and plug the cable for the flashing beacon in on the driver's cab.

On hydraulic folding jibs, an overflow tank is installed on the hydraulic cylinder. The overflow tank must be emptied when it is full. Even if the folding jib is not transported on the crane.

For operation with a hydraulic folding jib:
- ▶ Empty the overflow tank on the hydraulic cylinder.

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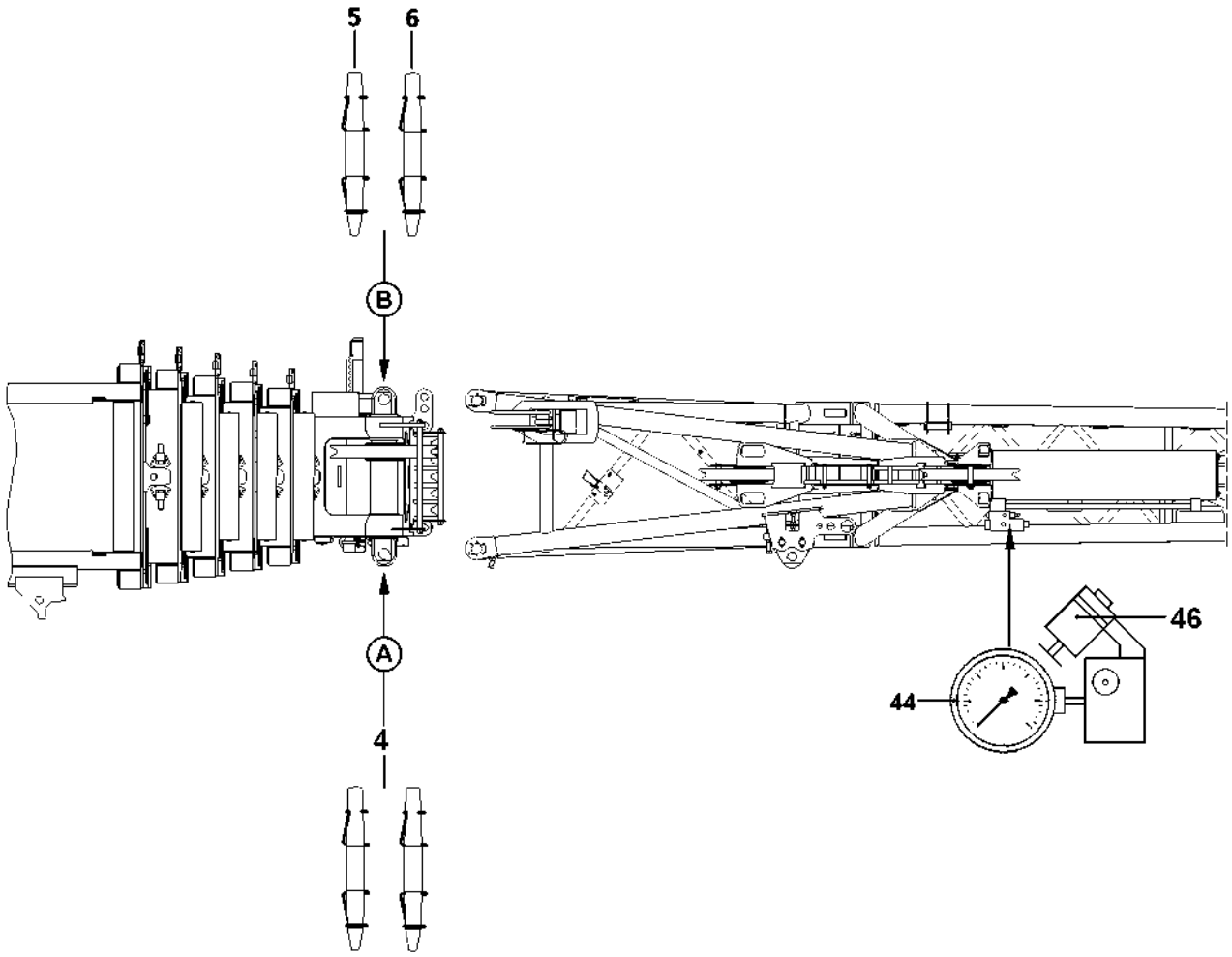

Fig.103467

11.5 Disassembly of the separately transported folding jib

Make sure that the following prerequisite is met:
– The end section is locked to the pivot section.
  See section „Disassembly of the end section“.

For description of fastening points, see section „Fastening points“.

▶ Attach the auxiliary crane on the respective fastening points of the folding jib.

DANGER
Danger of accident when disassembling the folding jib!
If the following conditions are not met, then the assembly personnel can be fatally injured during disassembly.
▶ When knocking out the pins, no one may remain under the folding jib!
▶ Attach the auxiliary crane so that no angular pull occurs!
▶ Only lift a weight with the auxiliary crane that corresponds to the weight of the folding jib that is being removed!
▶ The folding jib can suddenly release due to distortion!
▶ Do not remove the folding jib until it has been secured with the auxiliary crane to prevent it from falling!
▶ Do not lean the ladder against the folding jib!

▶ Tighten the fastening ropes until the folding jib is secured to prevent it from falling.
▶ Unpin the folding jib from the telescopic boom:
▶ Release the pin **4** on top on point **A** and unpin.
▶ Release the pin **5** on top on point **B** and unpin.
▶ Release the pin **4** on the bottom on point **A** and unpin.
▶ Release the pin **6** on the bottom on point **B** and unpin.
▶ Place the folding jib onto the transport vehicle.

On hydraulic folding jibs, an overflow tank **46** is installed on the hydraulic cylinder. The overflow tank **46** must be emptied when it is full. Even if the folding jib is not transported on the crane.

For operation with a hydraulic folding jib:
▶ Empty the overflow tank **46** on the hydraulic cylinder.

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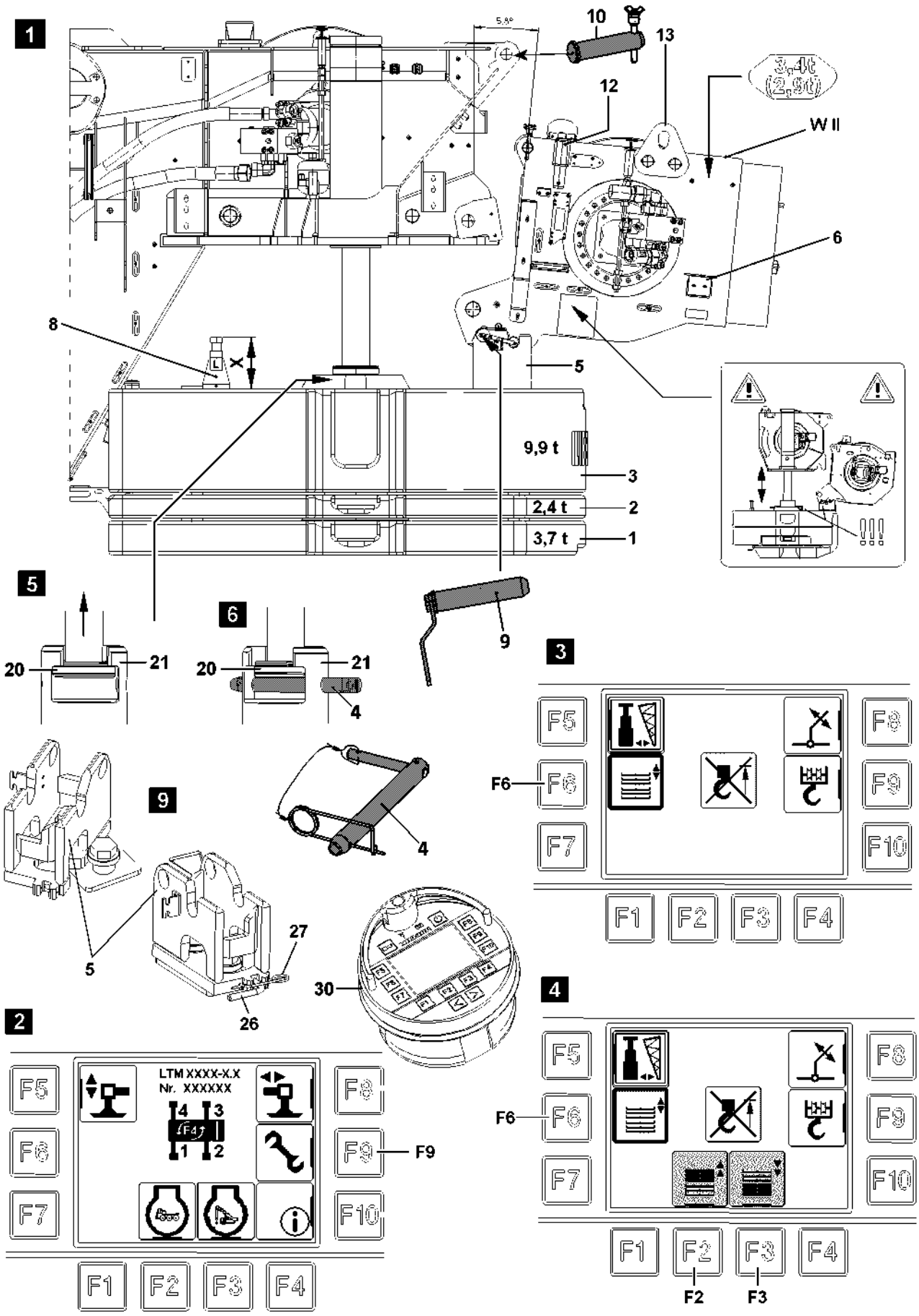

Fig.112838

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1 General

This crane can be equipped with consoles **5**, which allow assembly or disassembly of winch 2***** without an auxiliary crane.

Winch 2***** weighs approximately 3.4 t with the hoist rope.

2 Assembly

Make sure that the following prerequisites are met:
- The crane is properly supported and horizontally aligned.
- The counterweight plate **1**, the counterweight plate **2** and the counterweight plate **3** are placed on the crane chassis.

2.1 Installing the consoles

- ▶ Remove the consoles **5** from the transport box, remove the spring retainer **27** and retaining pin **26**.
- ▶ Hang the consoles **5** in counterweight plate **3** and swing into the retainer, see illustration **9**.
- ▶ Secure the consoles **5**: Pin the retaining pin **26** and secure with a spring retainer **27**.

2.2 Assembling Winch 2*

- ▶ Suspend winch 2 **WII** on the eyehooks **13** from the crane.
- ▶ Set winch 2 **WII** on the consoles **5**, see illustration **1**.

DANGER
Winch 2 can fall down!
When winch 2 **WII** is released from the crane before winch 2 **WII** is pinned with the consoles **5**, then winch 2 **WII** can fall down!
Personnel can be severely injured or killed!
- ▶ Do not disengage the crane until winch 2 **WII** has been pinned with consoles **5** and secured!

- ▶ Pin and secure the pins **9** on both sides in the consoles **5**, see illustration **1**.
- ▶ Release winch 2 **WII** from the crane.
- ▶ Swing the crane superstructure, extend the ballasting cylinder and swing into the receptacle of the counterweight.

Note
- ▶ The spacers **8** must be turned in to the dimension **X**, approx. 190 mm.
- ▶ The spacers **8** are marked with letters **L** or **R**.
- ▶ Insert the spacer **8** marked with the letter **L** on the left side, see illustration 1.
- ▶ Insert the spacer **8** marked with the letter **R** on the right side, see illustration 1.

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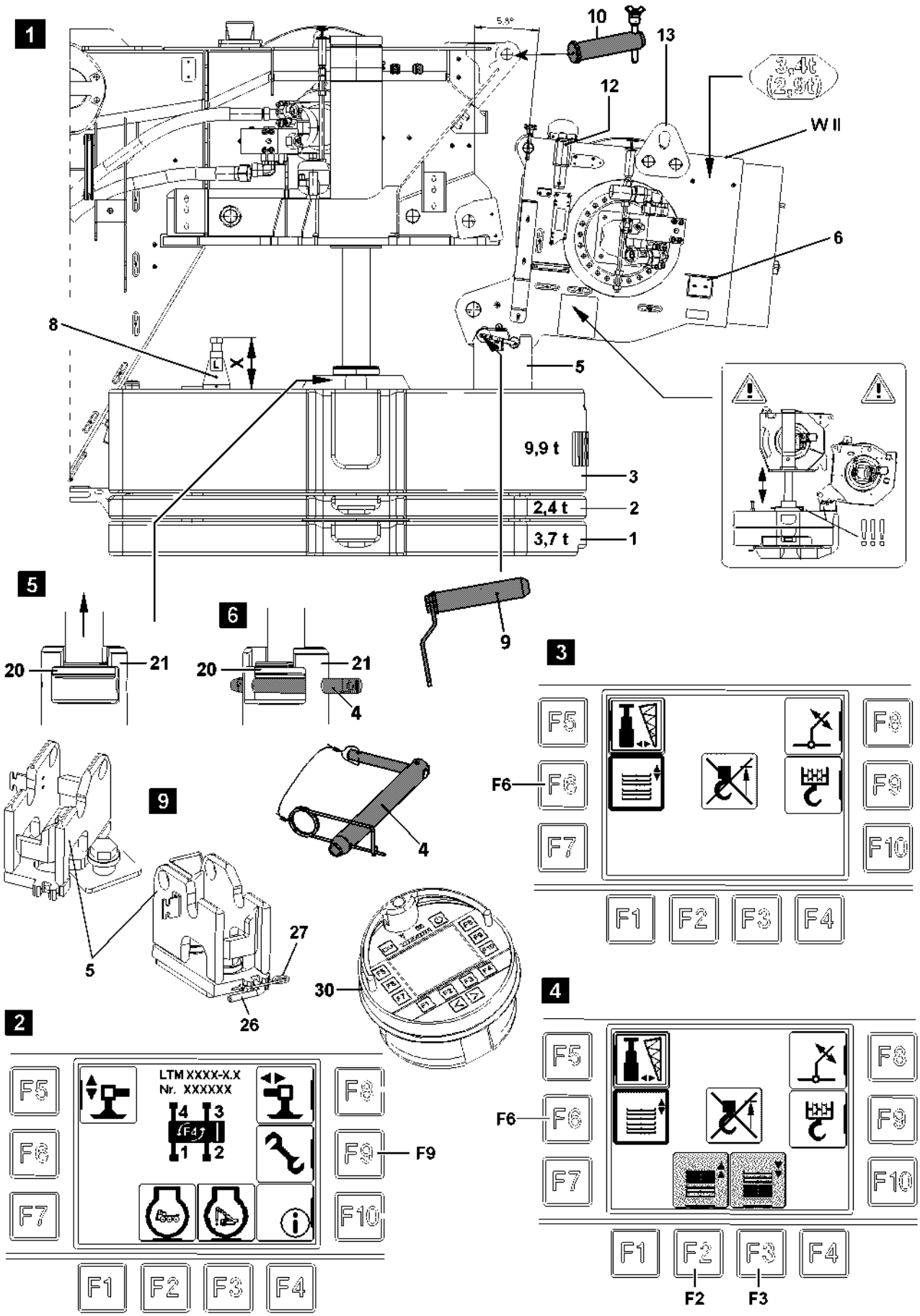

Fig.112838

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▶ Insert the spacer **8** in the counterweight plate **3**, see illustration **1**.
▶ Press function key **F9** on the BTT **30**, see illustration **2**.

Result:

– The menu „Ballasting cylinder“ appears, see illustration **3**.

▶ Press the function key **F6** on the BTT **30**.

Result:

– The menu „Ballasting cylinder“ is active, see illustration **4**.

▶ Raise the ballasting cylinder with the function key **F2** until the plates **20** are touching inside in the receptacles **21**, see illustration **5**.

Note

▶ The pins **4** must then be inserted on both sides „under“ the plates **20**, see illustration **6**.
▶ The pins **4** must be pinned and secured in such a way that the handles of the pins **4** are in horizontal position.

DANGER

The counterweight plates with winch 2 can fall down!
If the pins **4** are not pinned, then the counterweight plates with winch 2 **WII** can fall down!
Personnel can be severely injured or killed!

▶ Before the counterweight plates are raised with winch 2 **WII**, it must be ensured that the pins **4** are pinned and secured in the receptacles **21**, see illustration **6**.

▶ Secure the counterweight plate **1**, counterweight plate **2**, counterweight plate **3** and winch 2 with the pins **4** to prevent them from tipping over.
▶ Insert the pins **4** on both sides in the receptacles **21** and secure with spring retainers, see illustration **6**.
▶ Press the function key **F2** and carefully raise the ballasting cylinders until winch 2 **WII** tips slightly forward and the pins **10** can be inserted on top on both sides.

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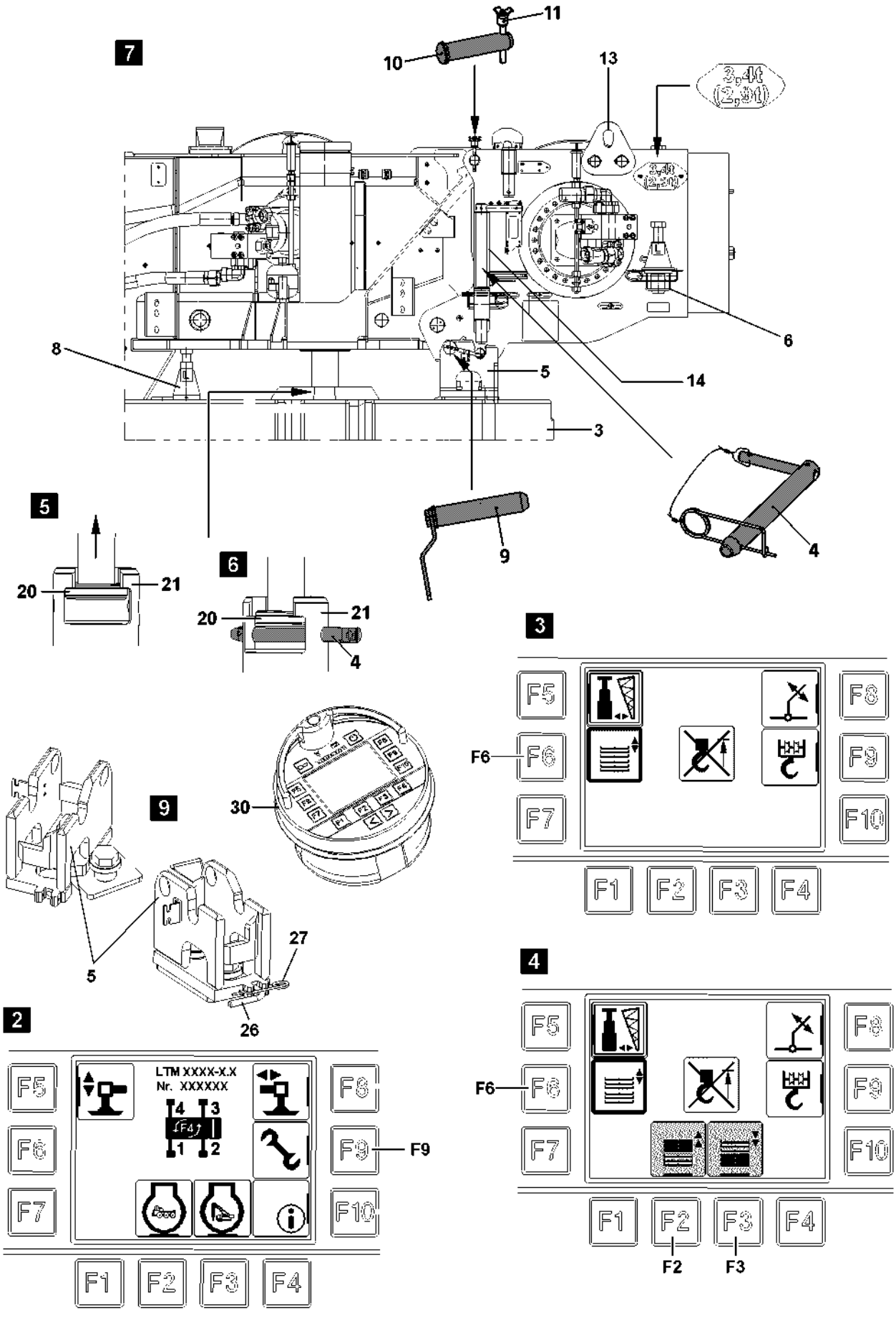

Fig.112839

- ▶ Pin winch 2 **WII** with pins **10** on both sides, see illustration **7**.
- ▶ Insert pins **10** on both sides with ball locking pins **11** and secure, see illustration **7**.

DANGER
Winch 2 can fall down!
Personnel can be severely injured or killed!
- ▶ Before pins **9** may be unpinned, pins **10** must be pinned on top on both sides and secured with the ball locking pins **11**!

- ▶ Release and unpin the pins **9** on both sides, see illustration **7**.

NOTICE
The pins **4** can be damaged!
- ▶ If the ballasting cylinders are lowered too far, then the pins **4** or the receptacles **21** can be damaged, see illustration **6**!

- ▶ Press the function key **F3**, carefully lower the ballasting cylinders and place the counterweight plates on the crane chassis.
- ▶ Unpin the pins **4** on both sides and pin and secure in the transport retainers **14**, see illustration **7**.
- ▶ Unpin the spacers **8** and insert into the transport retainers **6** and secure with spring retainers, see illustration **7**.

2.3 Connecting the supply lines

- ▶ Establish the electrical connection for winch 2 **WII**.
- ▶ Establish the supply line for the central lubrication system.

The engine must be turned off before connecting and disconnecting hydraulic lines.

The different diameters of the hydraulic lines prevent incorrect coupling.

- ▶ Establish the hydraulic connection for winch 2 **WII**.

2.4 Removing the consoles

NOTICE
Danger of damage!
If the consoles are not removed after winch assembly, then the winch or the ballasting can be damaged!
- ▶ Removing the consoles **5**!

- ▶ Release the consoles **5**: Remove the spring retainer **27** and retaining pin **26**.
- ▶ Swing the consoles **5** to the side and unhook, see illustration **9**
- ▶ Insert the retaining pin **26**and the spring retainer **27** into the consoles **5** and secure.

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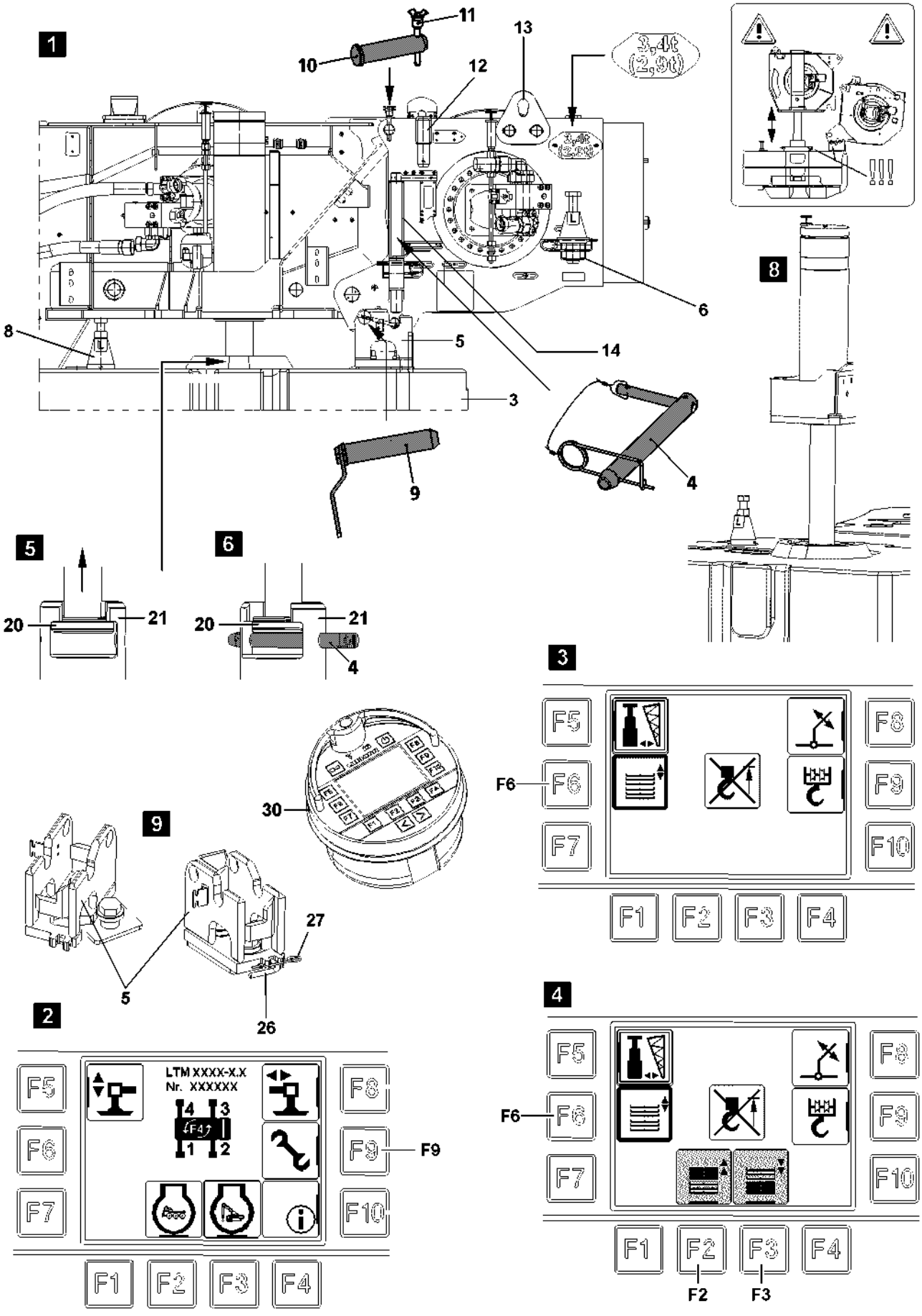

Fig.112840

3 Disassembly

Make sure that the following prerequisites are met:
- The crane is properly supported and horizontally aligned.
- The counterweight plate **1**, the counterweight plate **2** and the counterweight plate **3** are placed on the crane chassis.

3.1 Preparatory work

- ▶ Remove the consoles **5** from the transport box, remove the spring retainer **27** and retaining pin **26**.
- ▶ Hang the consoles **5** in counterweight plate **3** and swing into the retainer, see illustration **9**.
- ▶ Secure the consoles **5**: Pin the retaining pin **26** and secure with a spring retainer **27**.
- ▶ Spool up the hoist rope of winch 2 **WII**.
- ▶ Secure the hoist rope.
- ▶ Block winch 2 **WII** via the LICCON computer system.

3.2 Releasing the supply lines

The engine must be turned off before connecting and disconnecting hydraulic lines.

- ▶ Removing hydraulic connection for winch 2.
- ▶ Removing electrical connection for winch 2.
- ▶ Remove the supply line for central lubrication system.
- ▶ Secure the supply lines in transportation retainers.

3.3 Removing winch 2

- ▶ Swing the crane superstructure, extend the ballasting cylinder and swing into the receptacle of the counterweight, see illustration **8**.
- ▶ Press function key **F9** on the BTT **30**, see illustration **2**.

Result:

- The menu „Ballasting cylinder“ appears, see illustration **3**.

- ▶ Press function key **F6** on the BTT **30**, see illustration **3**.

Result:

- The menu „Ballasting cylinder“ is active, see illustration **4**.

- ▶ Raise the ballasting cylinder with the function key **F2** until the plates **20** are touching inside in the receptacles **21**, see illustration **5**.

Note
- ▶ The pins **4** must then be inserted on both sides „under“ the plates **20**, see illustration **6**.
- ▶ The pins **4** must be pinned and secured in such a way that the handles of the pins **4** are in horizontal position.

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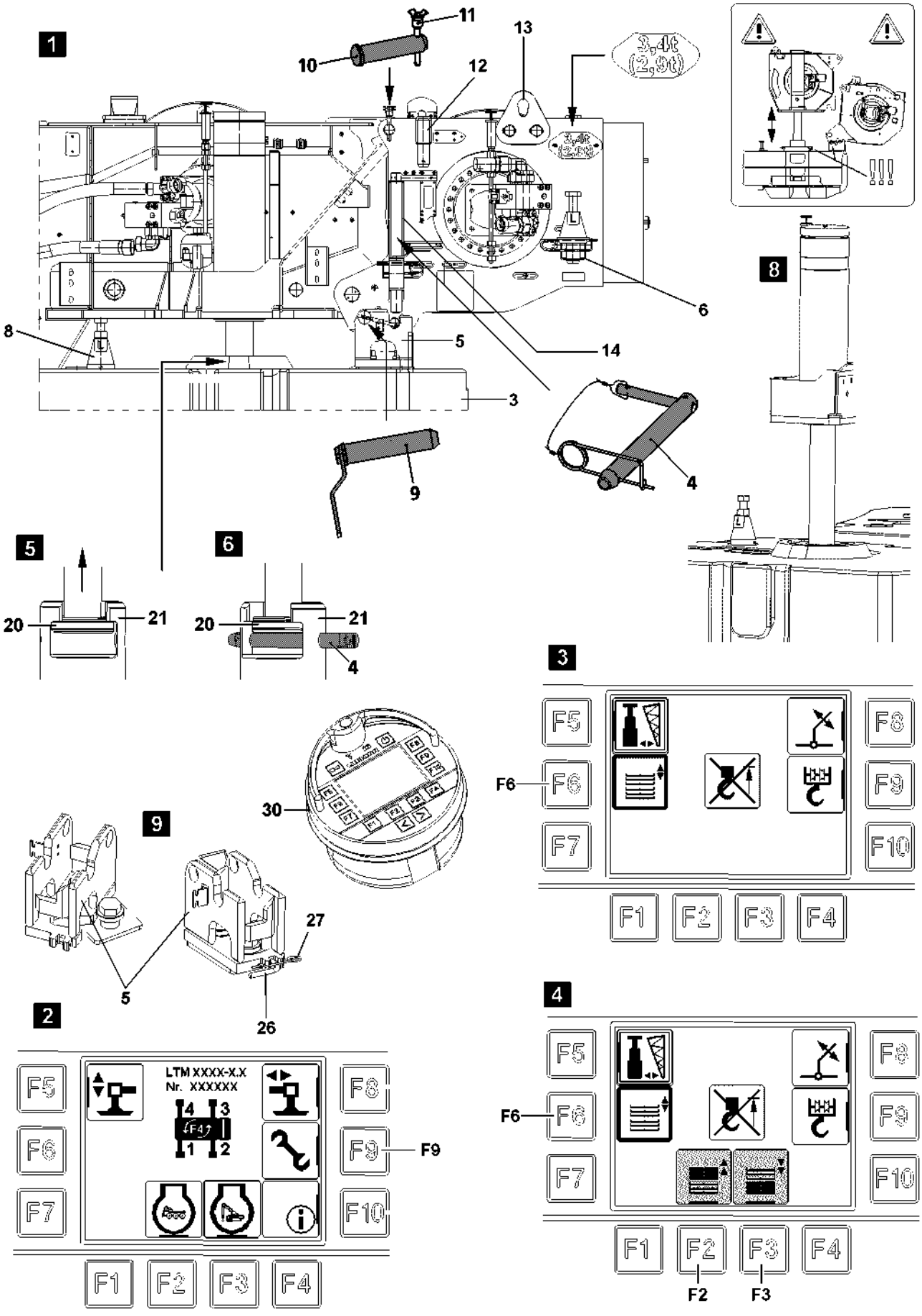

Fig.112840

DANGER
The counterweight plates with winch 2 can fall down!
If the pins **4** are not pinned, then the counterweight plates can fall down!
Personnel can be severely injured or killed!
▶ Before the counterweight plates are raised, it must be ensured that the pins **4** are pinned on both sides pinned and secured in the receptacles **21**, see illustration **6**.

▶ Secure the counterweight plate **1**, counterweight plate **2** and counterweight plate **3** with the pins **4** to prevent them from tipping over.
▶ Pin and secure the pins **4** on both sides in the receptacles **21**, see illustration **6**.

Note
▶ The spacers **8** must be turned in to the dimension **X**, approx. 190 mm.
▶ The spacers **8** are marked with letters **L** or **R**.
▶ Insert the spacer **8** marked with the letter **L** on the left side, see illustration 1.
▶ Insert the spacer **8** marked with the letter **R** on the right side, see illustration 1.

▶ Insert the spacer **8** in the counterweight plate **3**, see illustration **1**.
▶ Press the function key **F2** and carefully raise the ballasting cylinder until the pins **9** can be inserted on both sides into the consoles **5**.
▶ Insert and secure pin **9**.

DANGER
Risk of accident from winch 2 falling down!
Personnel can be severely injured or killed!
▶ Do not release the pins **10** and unpin them until after the winch 2 **WII** and the consoles **5** have been pinned and secured on both sides with the pins **9**.

▶ Release and unpin the pins **10** on both sides.
▶ Insert pin **10** into the transportation retainer **12** and secure, see fig. **1**.

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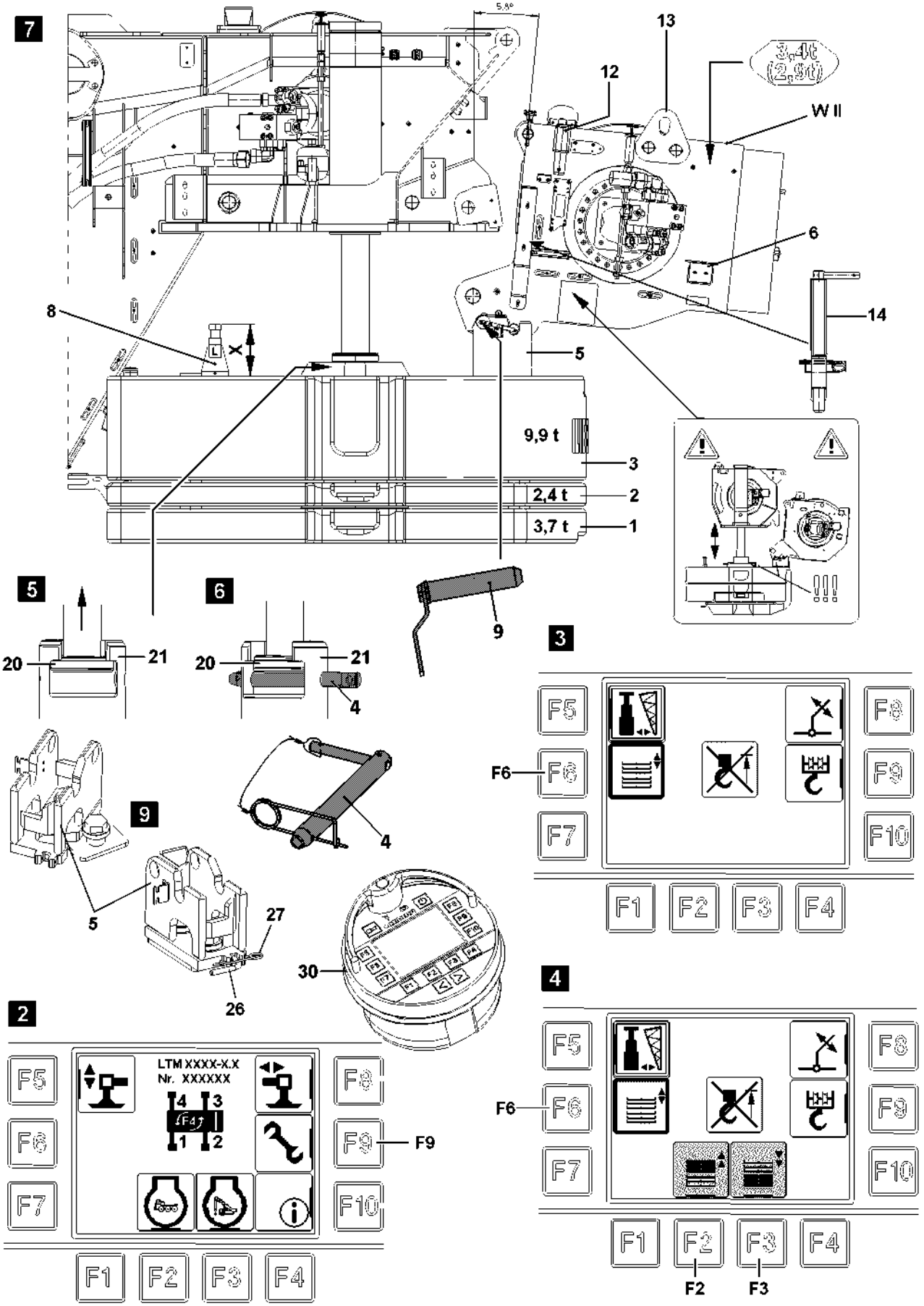

Fig.112841

LWE/LTM 1130-5-1-004/20502-04-02/en

NOTICE
The pins **4** can be damaged!
▶ If the ballasting cylinders are lowered too far, then the pins **4** or the receptacles **21** can be damaged, see illustration **6**!

▶ Press the function key **F3** and carefully place winch 2 **WII** with the counterweight plates on the crane chassis.
▶ Unpin the pins **4** on both sides and pin and secure in the transport retainers **14**, see illustration **7**.

DANGER
Risk of accident from winch 2 falling down!
Personnel can be severely injured or killed!
▶ The pins **9** may only be unpinned after winch 2 **WII** has been attached to the crane on the eyehooks **13** and secured.

▶ Hang winch 2 **WII** on the eyehooks **13** from the crane and secure.
▶ Release and unpin the pins **9** on both sides.
▶ Place winch 2 **WII** on the transport vehicle.
▶ Unpin the spacers **8** and insert into the transport retainers **6** and secure with spring retainer, see illustration **7**.

3.4 Removing the consoles

NOTICE
Danger of damage!
If the consoles are not removed after winch assembly, then the winch or the ballasting can be damaged!
▶ Removing the consoles **5**!

▶ Release the consoles **5**: Remove the spring retainer **27** and retaining pin **26**.
▶ Swing the consoles **5** to the side and unhook, see illustration **9**
▶ Insert the retaining pin **26**and the spring retainer **27** into the consoles **5** and secure.

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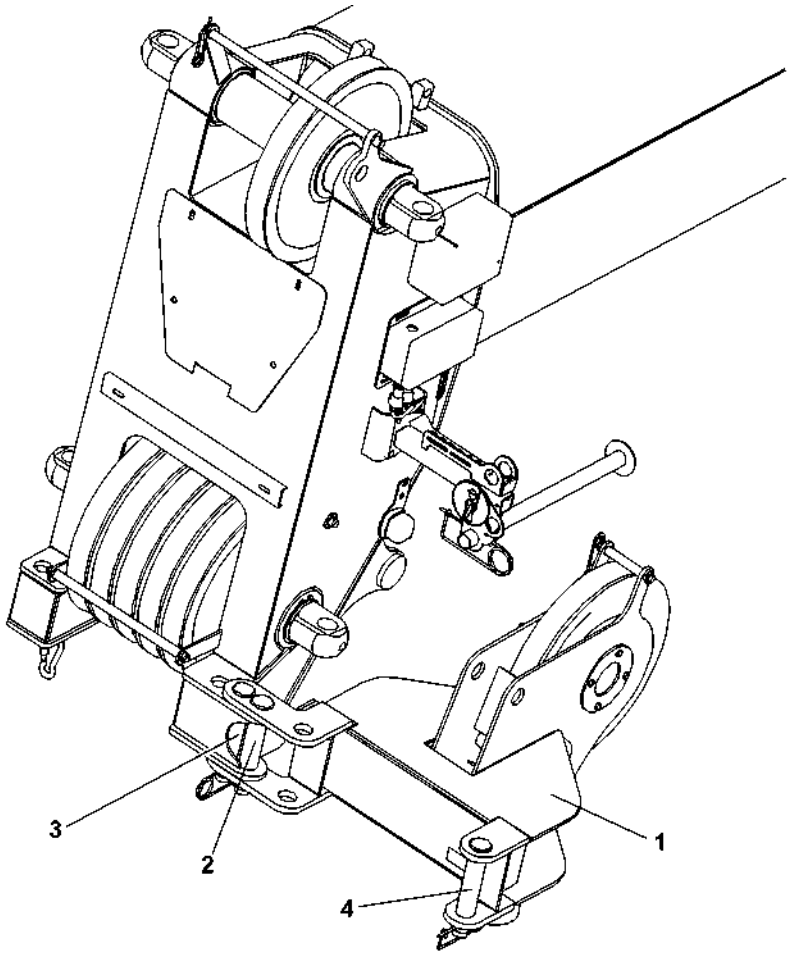
1



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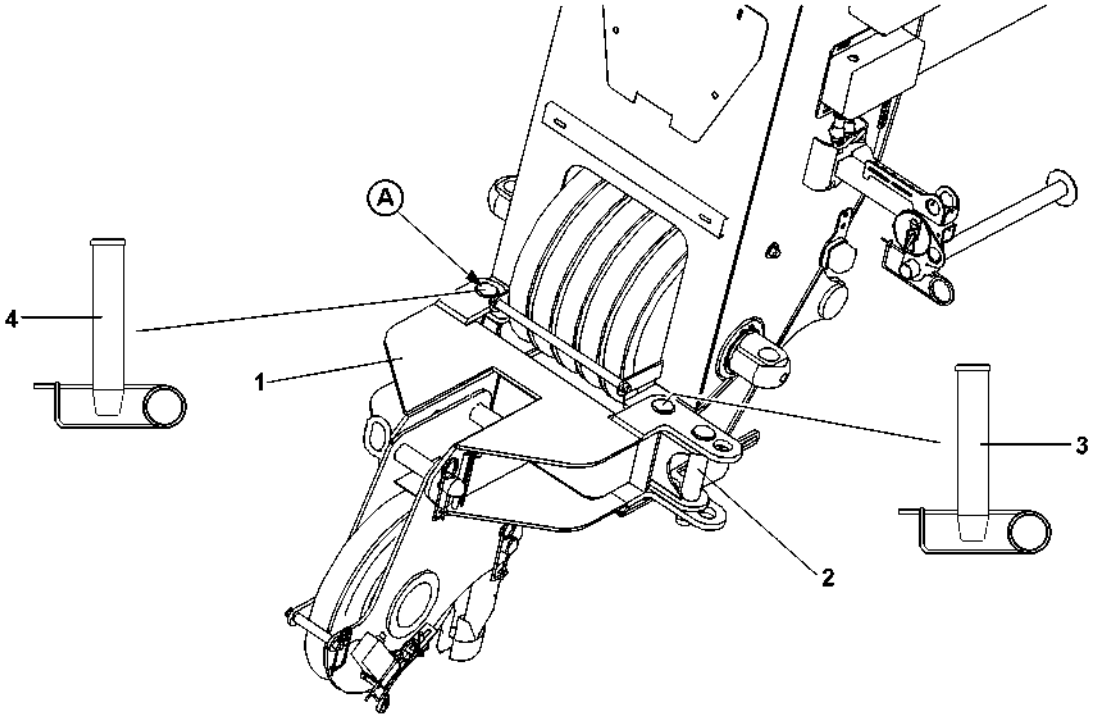

Fig.103063

1 General

Operation with the boom nose is intended for quick lifts via the boom nose, whereby the hook block can remain reeved on the telescopic boom.

During two-hook operation it is vital to pay attention to chapter 4.12.

The boom nose weighs approx. 115 kg.

Note
Load charts
▶ No special load charts are available for boom nose operations. The boom nose is generally run in the telescopic boom operating mode. However, the load is reduced by the weight of the boom nose and the lifting and fastening equipment that is used.

DANGER
Risk of accident by overloading the hoist gear or hoist rope!
Protection via the overload protection is only provided if the reeving on the telescopic boom is equal to or greater than the reeving on the boom nose.
▶ Set the overload protection to the smaller reeving of the two hooks.

2 Assembly

2.1 Swinging the boom nose into operating position, illustrations 1 and 2

DANGER
Risk of accident if the boom nose falls down!
If the swing pin **2** is unpinned the boom nose will fall down.
▶ Never unpin the swing pin **2**!

▶ Release the pin **3** and the pin **4** and unpin.

CAUTION
Danger of crushing fingers!
Fingers could be crushed between the telescopic boom and the boom nose when the boom nose is swivelled.
▶ Do not put fingers between the boom nose and the telescopic boom!

▶ Swing the boom nose **1** by 180 ° until the pin **4** can be inserted on point **A**.
▶ Pin and secure the pin **4**.
▶ Pin and secure the pin **3**.

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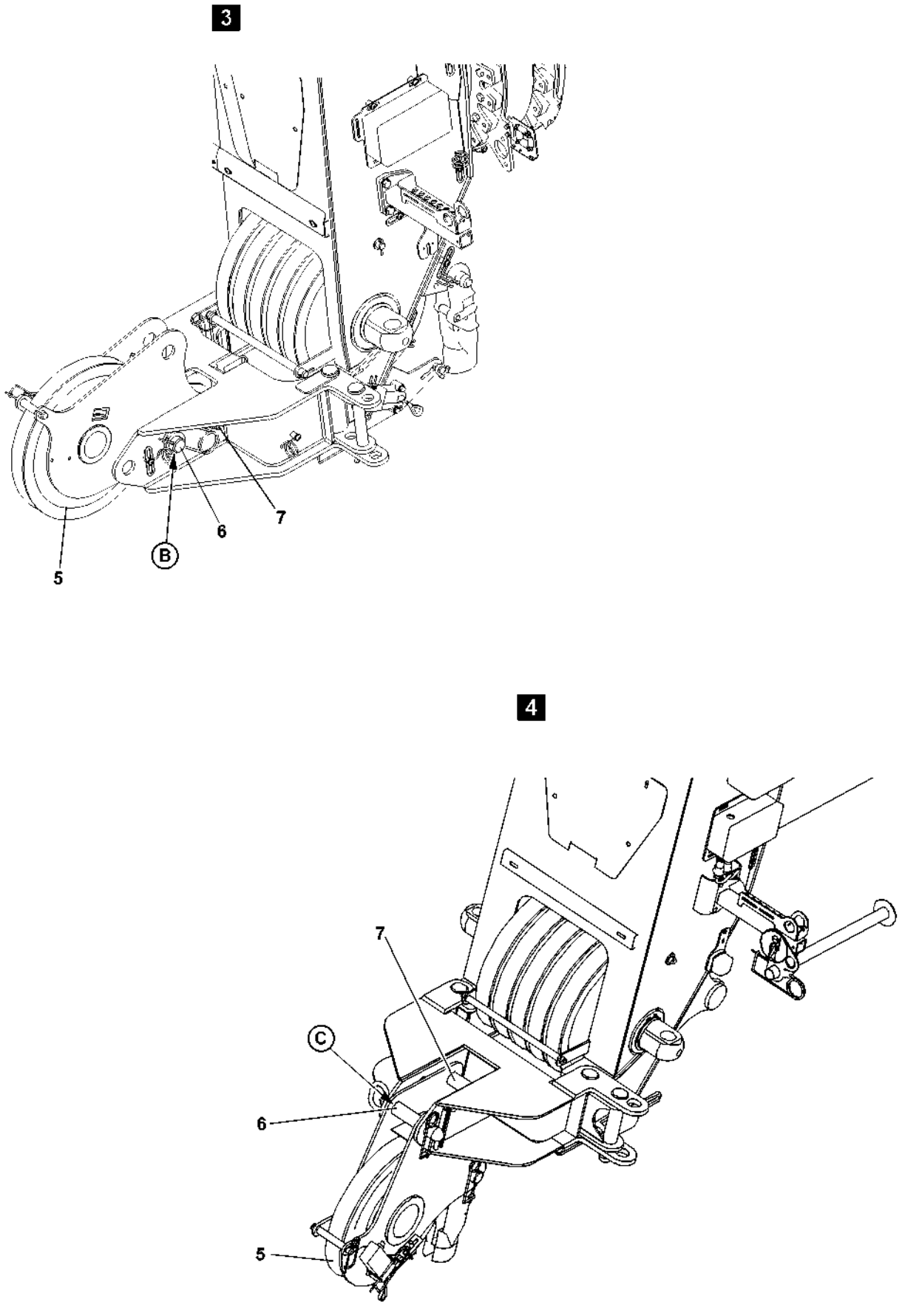

Fig.103064

2.2 Folding the boom nose into operating position, illustrations 3 and 4

DANGER
Risk of accident if the boom nose falls down!
If the swing pin **7** is unpinned the boom nose will fall down.
▶ Never unpin the swing pin **7**!

▶ Release the pin **6** at the point **B** and unpin.

CAUTION
Danger of crushing fingers!
Fingers can be crushed when the boom nose is moved.
▶ Do not crush your fingers when the rope pulley **5** folds down!

▶ Fold the rope pulley **5** down until it can be pinned at point **C**.
▶ Pin and secure the pin **6**.

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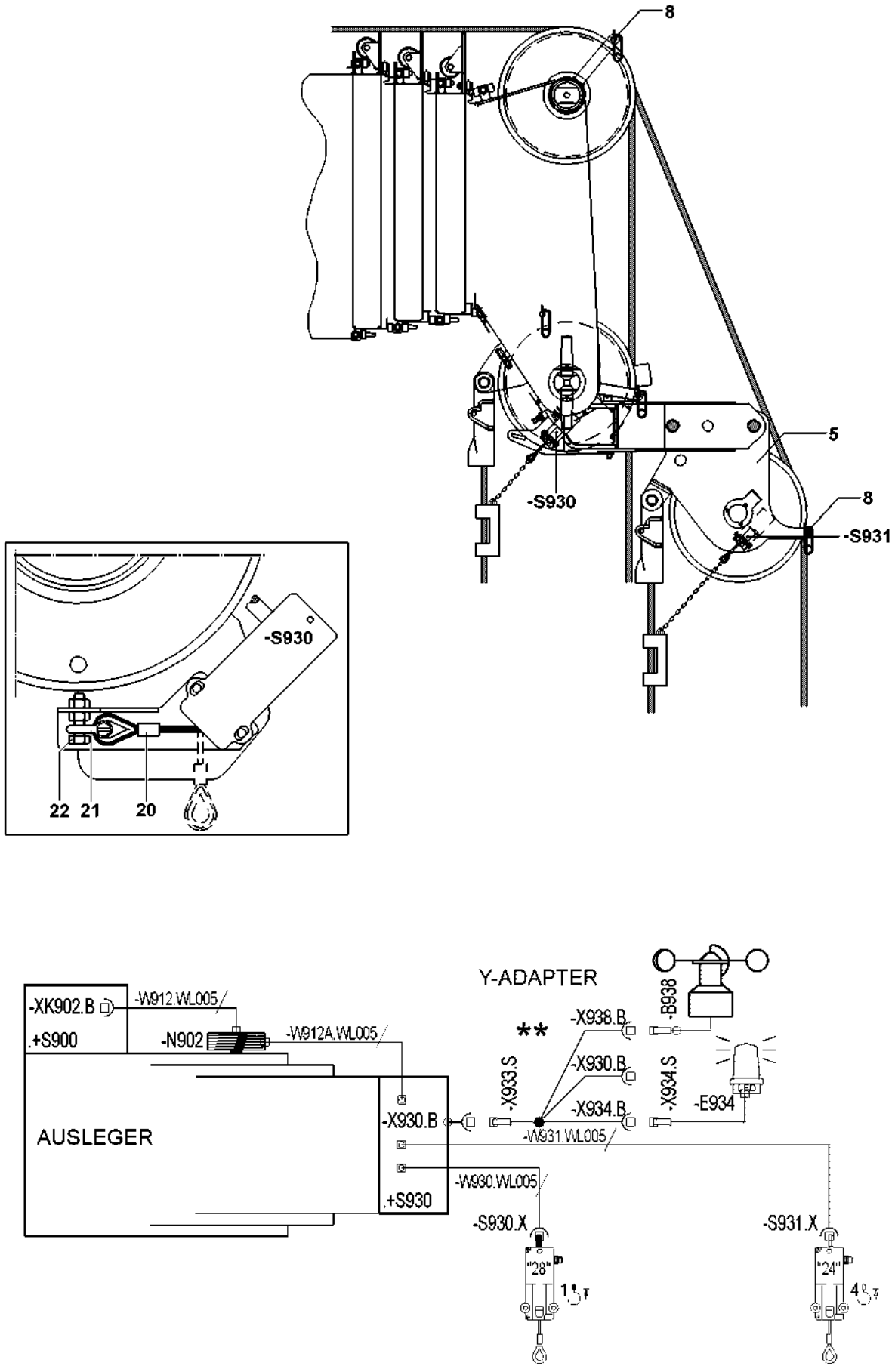

Fig.112604

2.3 Reeving in the hoist rope

Can be reeved in a maximum of 2 times on the boom nose.

- ▶ Release and unpin the rope retaining pipes **8**.
- ▶ Place the hoist rope over the end pulley on the telescopic boom and over the rope pulley **5**.
- ▶ Pin the rope retaining pipes **8** and secure.
- ▶ Reeve in the load hook or hook block.
- ▶ Attach the hoist limit switch weight.

2.4 Hoist limit switch

The hoist limit switch **-S930**, the airplane warning light***** and the wind sensor***** remain attached on the telescopic boom head.

If the hoist limit switch **-S931** is attached to the telescopic boom:

- ▶ Remove the hoist limit switch **-S931** from the telescopic boom and assemble to the boom nose.

2.5 Single hook operation

If you are working in „single hook mode“, the hoist limit switch **-S930** that is not required must be operated manually.

- ▶ Remove the hoist limit switch weight and chain.
- ▶ Pull the hoist limit switch rope **20** and attach to the fixed point **22** with the shackle **21**.

Result:

– The hoist limit switch **-S930** is operated manually.

2.6 Two hook operation

During two hook operation the hoist limit switch **-S930** on the telescopic boom and the hoist limit switch **-S931** on the boom nose are active!

2.7 Function check

The function check **must** be performed by the operator before lifting a load.

The following checks must be performed.

- ▶ Check that the hoist limit switch, wind sensor***** and airplane warning light***** connections are properly connected.
- ▶ Check wind sensor***** operation on LICCON monitor.
- ▶ Check the function of the airplane warning light*****.

Check the movement of hoist limit switches. The following steps are required to perform these checks.

- ▶ Manually actuate the hoist limit switch.
- ▶ Check that „Hoist top“ icon is displayed on LICCON monitor for main boom or boom nose.
- ▶ Check that hoist winch switches off correctly.

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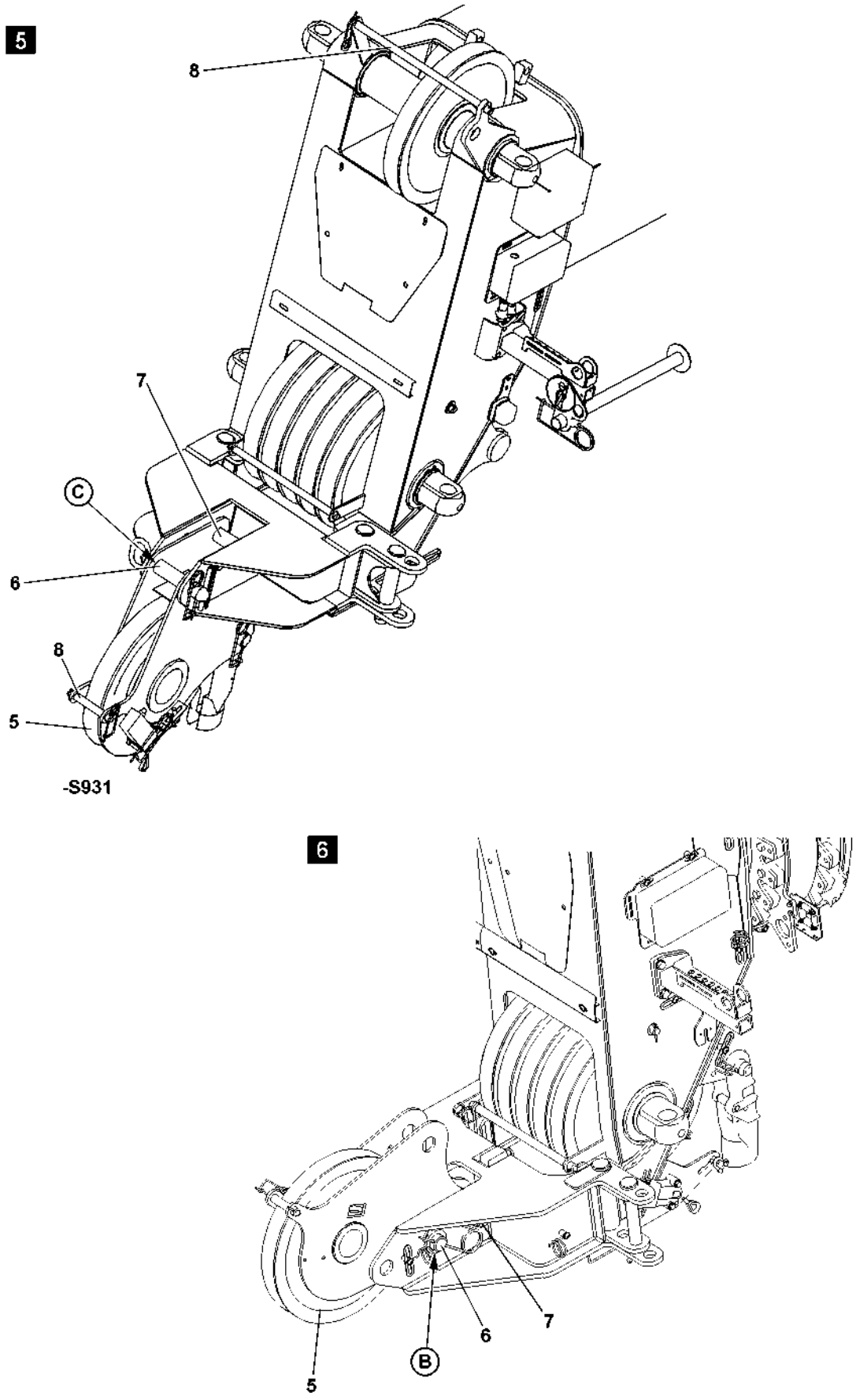

Fig.103269

3 Disassembly

3.1 Folding the boom nose into transport position, illustrations 5 and 6

- ▶ Remove the hoist limit switch weight.
- ▶ Reeve out the load hook / hook block to boom nose.
- ▶ Release and unpin the rope retaining pipes **8**.

Do not pull hoist rope beneath the winch when reeling in.

- ▶ Spool the hoist rope up.

Note

- ▶ During operation **without** the boom nose, you must use the hoist limit switch **-S931** as an additional hoist limit switch for the telescopic boom **or** mechanically pull the hoist limit switch **-S931** and attach it to the rope fixed position with a shackle.

DANGER

Risk of accident if the boom nose falls down!
If the swing pin **7** is unpinned the boom nose will fall down.

- ▶ Never unpin the swing pin **7**!

- ▶ Release the pin **6** at the point **C** and unpin.

CAUTION

Danger of crushing fingers!
Fingers can be crushed when the boom nose is moved.

- ▶ Do not crush your fingers when the rope pulley **5** folds up!

- ▶ Move the rope pulley **5** up until it can be pinned at the point **B**.
- ▶ Pin and secure the pin **6**.

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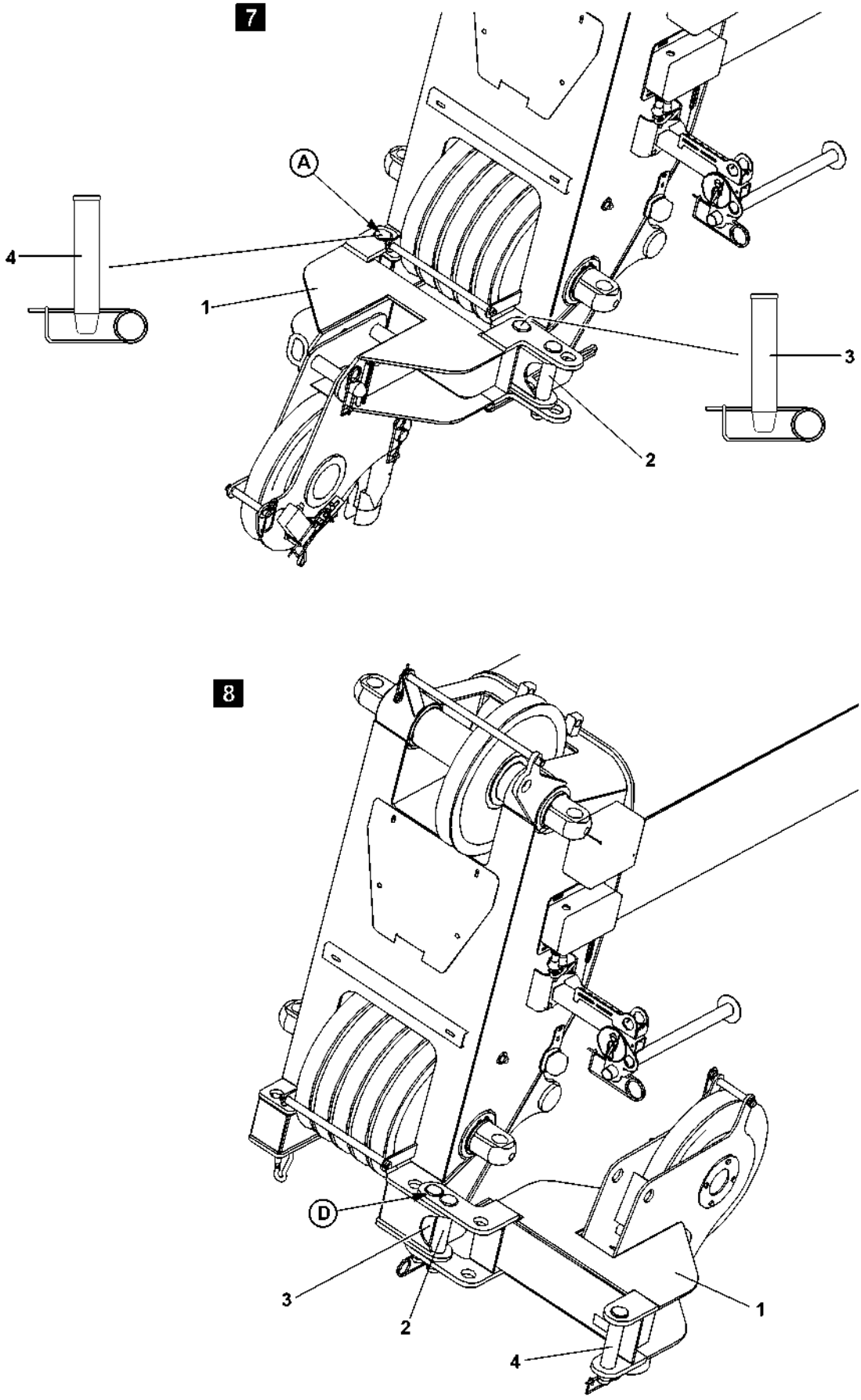

Fig.103270

3.2 Swinging the boom nose into transport position, illustrations 7 and 8

DANGER
Risk of accident if the boom nose falls down!
If the swing pin **2** is unpinned the boom nose will fall down.
▶ Never unpin the swing pin **2**!

▶ Release the pin **3** and the pin **4** and unpin.

CAUTION
Danger of crushing fingers!
Fingers could be crushed between the telescopic boom and the boom nose when the boom nose is swivelled.
▶ Do not put fingers between the boom nose and the telescopic boom!

▶ Swing the boom nose **1** by 180 ° until the pin **3** can be inserted on point **D**.
▶ Insert and secure pin **3**.
▶ Pin the pin **4** on the boom nose and secure.

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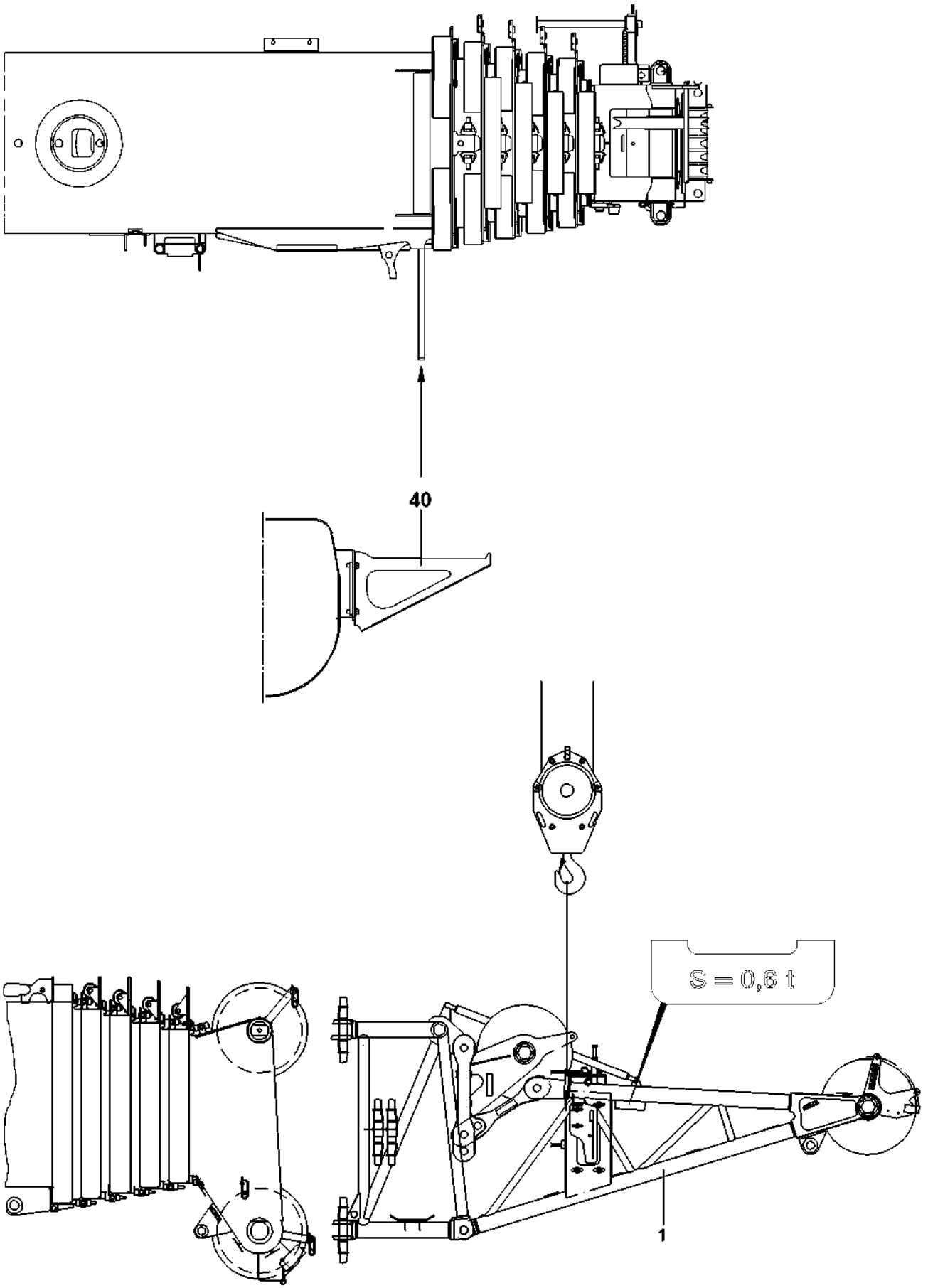

Fig.103263

1 General

CAUTION
The auxiliary boom can collide with the catch bar **40** for the single / double folding jib!
▶ Remove the catch bar **40** before installing the auxiliary boom.

DANGER
Danger of fatal injuries due to toppling folding jib!
As a result of improperly assembled, damaged or non-existing catch bar **40** on the telescopic boom pivot section, the „Folding jib“ – due to an assembly error – can fall down and cause fatal injuries.
▶ Make sure that the catch bar **40** is property installed again and not damaged „before assembling the single or the double folding jib“, see also Crane operating instructions, chapter 5.02.

The auxiliary boom can be self-assembled on the telescopic boom.

DANGER
Danger of accident when driving with the auxiliary boom!
▶ Before being driven on roads, the auxiliary boom must always be brought to the transport position and mechanically secured.
▶ Make sure that the auxiliary boom is properly secured before driving the crane on public roads.

1.1 Components overview

Position	Description	Length	Weight
1	Auxiliary boom	2.9 m	0.55 t

1.2 Fastening point

Please refer to left diagram.

Description	Abbreviation
Auxiliary boom	**S**

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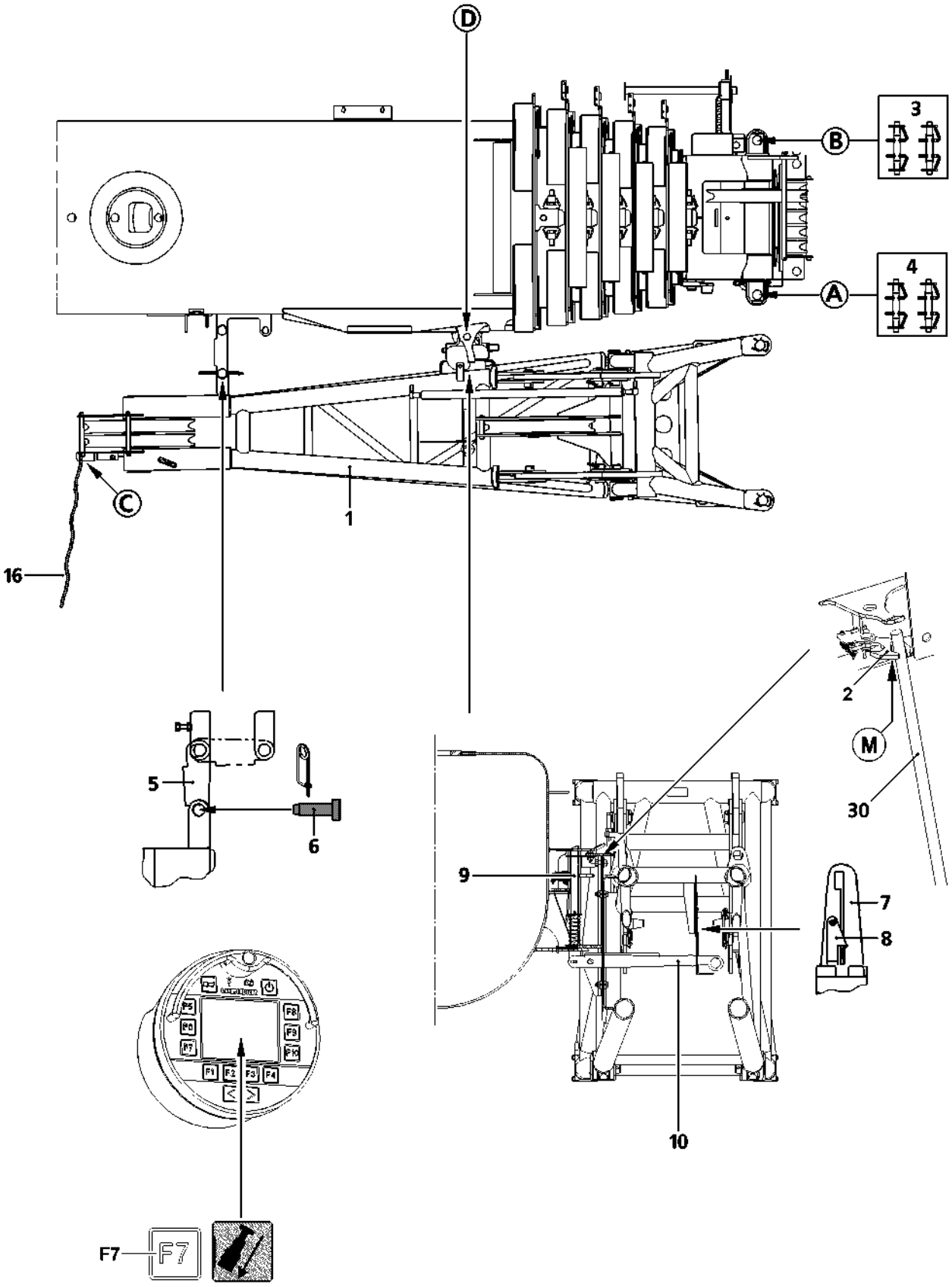

Fig.108696

2 Assembly of the auxiliary boom

2.1 General

DANGER
Danger of fatal injury due to toppling auxiliary boom!
Due to an assembly error, the auxiliary boom could fall down.
- ▶ Standing under the auxiliary boom during the swing operation is prohibited!
- ▶ It is prohibited for anyone to remain within the swinging area or the folding area of the auxiliary boom!
- ▶ The auxiliary boom must be secured by an auxiliary rope during the swing process!

DANGER
Danger of falling!
During assembly and disassembly, 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 injuries.
- ▶ All assembly work from a height of 2 m must normally be carried out using suitable aids (lifting platforms, scaffolding, ladders, auxiliary crane etc.)! The height above which assembly / disassembly work must be carried out with aids depends on national regulations. The national regulations must be adhered to!
- ▶ If work cannot be carried out using these aids nor from the ground, then assembly personnel must protect themselves from falling with suitable aids (such as safety harnesses)!
- ▶ Do not walk on the telescopic boom or auxiliary boom!

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 telescopic boom is fully telescoped in.
- The auxiliary boom is attached on the telescopic boom pivot section for transport.
- The telescopic boom has been luffed down to the rear or the side in the 0° position.

DANGER
Danger of accident due to involuntary swinging out of the auxiliary boom when it is unpinned!
If the telescopic boom is not in the 0° position, a risk of accident exists due to involuntary swinging out of the auxiliary boom when it is unpinned.
- ▶ Move the telescopic boom to 0° position.

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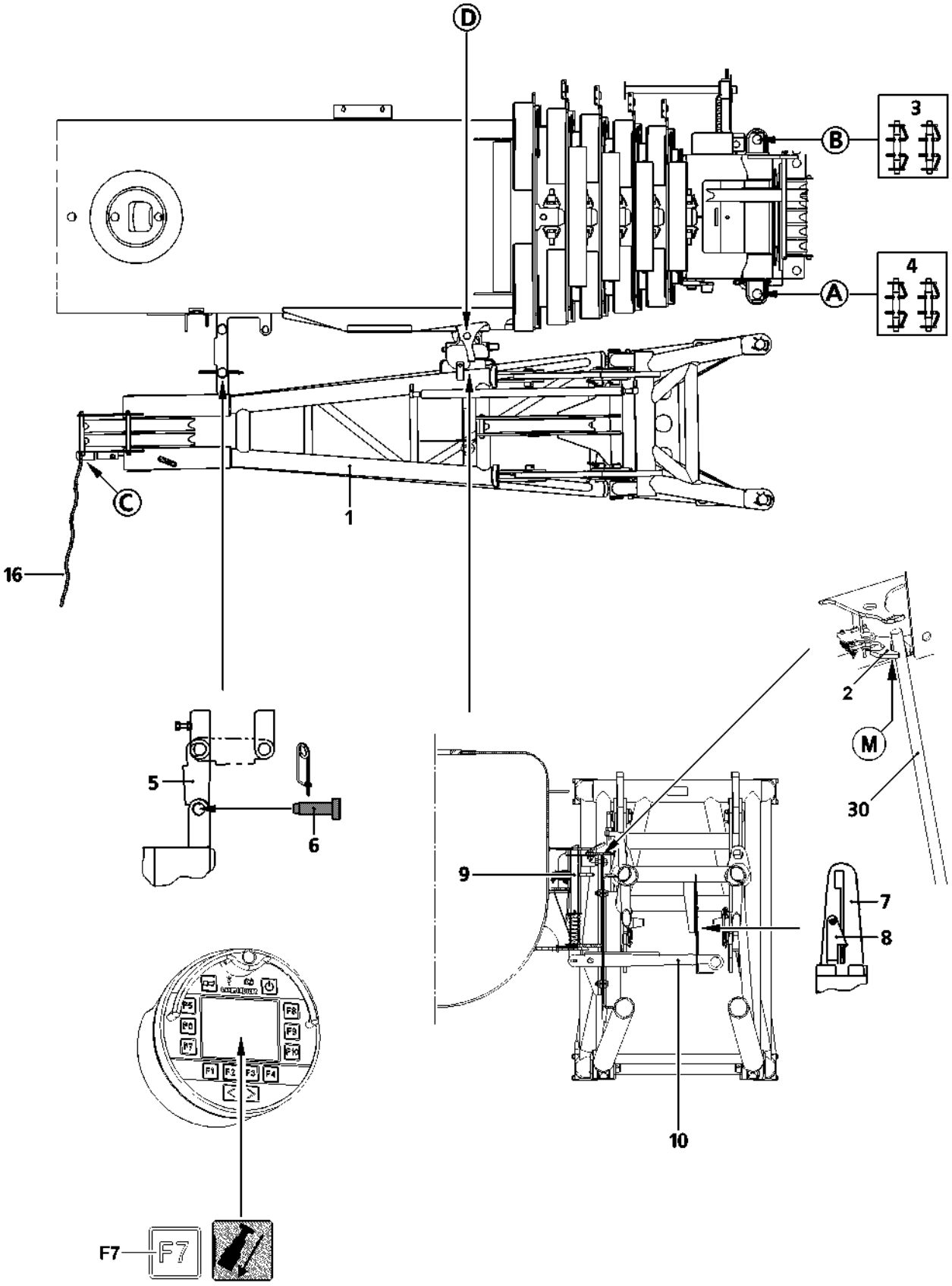

Fig.108696

2.2 Reeving out the hoist rope on the telescopic boom head

Note

▶ The telescopic boom may remain reeved in, if the hoist rope of winch 2 is used for auxiliary boom operation.

▶ Telescope the telescopic boom out to approx. 3 m.
▶ Place the hook block on the ground.
▶ Disengage the hoist rope on the rope fixed point.
▶ Disassemble the hoist limit switch weight and the chain for safety reasons.
▶ Remove the rope retaining pipes on the pulley head and on the back pulley.
▶ Telescope the telescopic boom in again completely.

2.3 Swinging the auxiliary boom into operating position

▶ Attach the auxiliary rope **16** on point **C**.
▶ Release and unpin the pin **6**.
▶ Swing the auxiliary boom **1** out until it can be pinned at point **A**.

Problem remedy

If the pin bores on point **A** do not align, the telescopic boom can be tensioned with the function key **F7**on the BTT in the „Assembly functions on the BTT“ menu:

▶ Start the crane engine.
▶ Place the telescopic boom down and telescope all telescopic sections in all the way.
▶ Pin telescope 5.

Note

▶ Bluetooth Terminal (BTT), see Crane operating instructions, chapter 5.31.

WARNING

Danger of severe crushing!

For the function „Guy the telescopic boom“, all telescoping sections are pulled together. This can result in severe crushing injuries on fingers.

▶ As long as the function „Tension telescopic boom“ is carried out, it is prohibited for any personnel to remain in the push out range of the telescoping sections!

▶ Press the function key **F7** on the BTT.

Result:

– All telescoping sections are pulled together.

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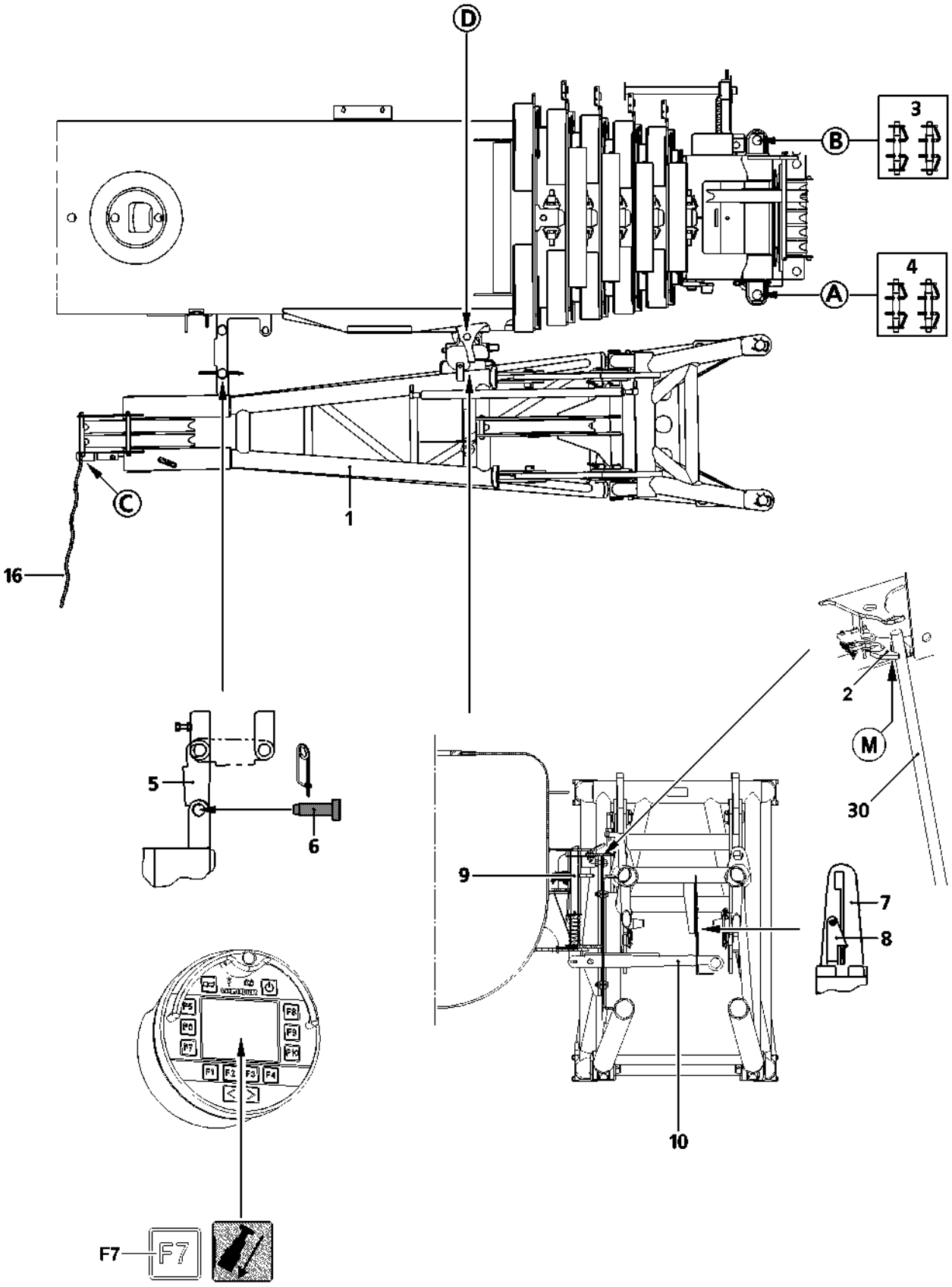

Fig.108696

▶ Insert the pins **4** on top and bottom at point **A** and secure.

DANGER
Danger of fatal injury due to toppling auxiliary boom!
Special retaining clips must be used to secure the pins **4**. The use of spring pins or spring retainers on the pins **4** is not permitted. The auxiliary boom may only be released at point **D** if the pins **4** are pinned and secured at the top and bottom at point **A**.
▶ Pin and secure pins **4** at point **A** on top and bottom.

▶ Swing the safety bracket **8** with the assembly rod to the side.
▶ Push the lever **10** with the assembly rod up and latch into the bracket **7**.

Note
▶ Open the catch claw **2** with the special assembly rod **30** from the ground.

▶ Guide the assembly rod **30** from below in point **M** and leverage the catch claw **2** on the side in direction of the boom head.

Result:

– The catch claw **2** opens and the auxiliary boom **1** is leveraged from the console of the transport retainer.

▶ Swing the auxiliary boom **1** out from the catch claw **2**.
▶ Swing the auxiliary boom **1** with the auxiliary rope **16** by 180 ° until it can be pinned at point **B** at the top and bottom.

DANGER
Risk of accident!
▶ The use of cotter pins or spring retainers is prohibited on the pins **3**!
▶ Special retaining clips must be used to secure the pins **3**.

▶ Insert the pins **3** on top and bottom at point **B** and secure.
▶ Remove the auxiliary rope **16**.

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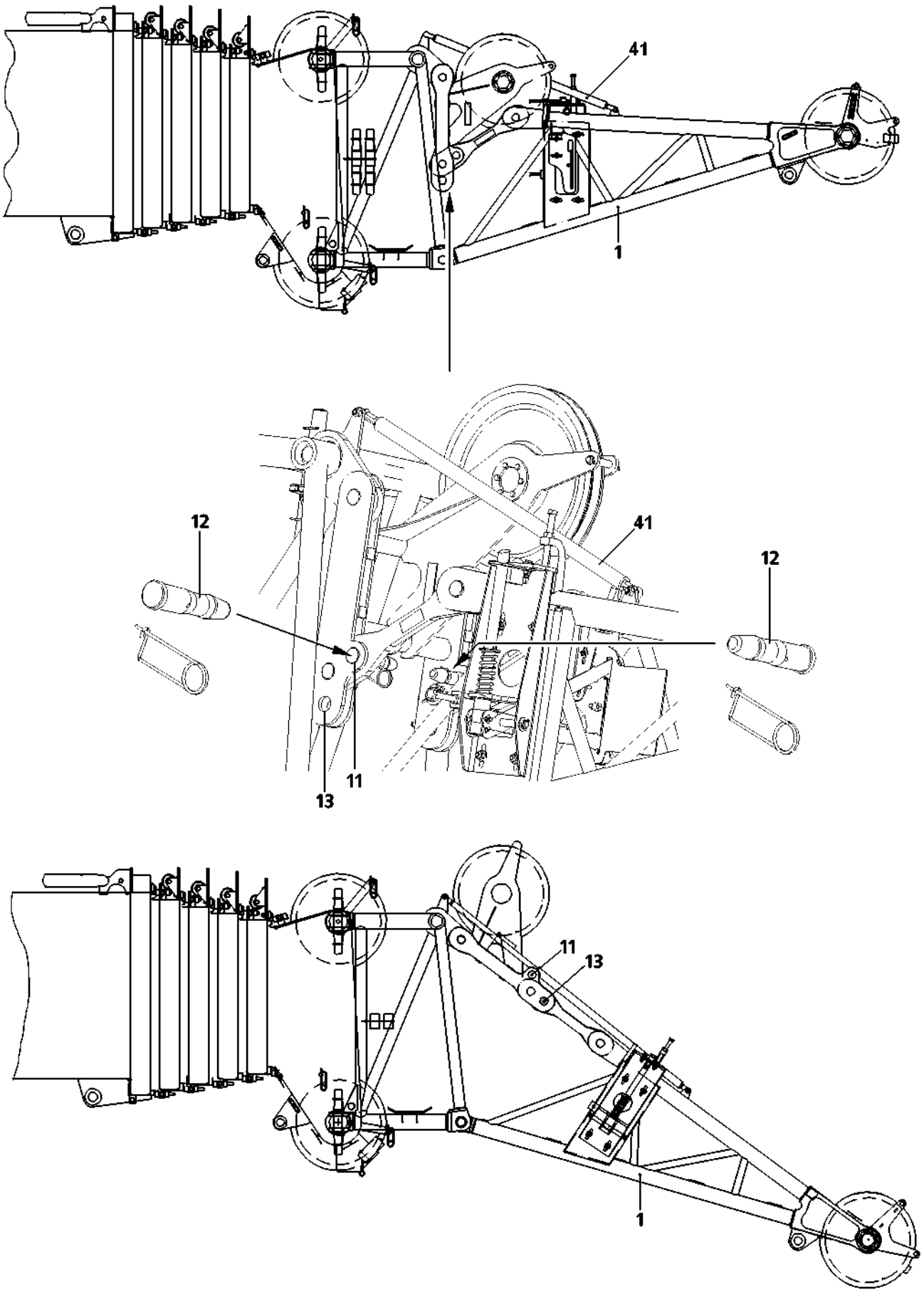

Fig.104953

2.4 Folding the auxiliary boom into operating position

DANGER
Danger of fatal injury in case of defective pneumatic spring!
The pins **12** are easy to remove when the pneumatic spring **41** is working correctly.
If the pneumatic spring **41** is **defective**, the pins **12** can **not** be removed!
Defective pneumatic springs **41** no longer provide the supporting properties on the movable components on the auxiliary boom **1**!
If the pneumatic spring **41** is defective, the auxiliary boom **1** can fall down and fatally or seriously injure personnel!
There is an increased danger of accidents!

- ▶ Before unpinning the pin **12** and before actuation, check the pneumatic spring **41** for external damage!
- ▶ Do not use auxiliary boom **1** with defective pneumatic spring **41**! Replace defective pneumatic springs **41**!
- ▶ If the pneumatic spring **41** is defective, support the auxiliary boom **1** from below or hang it on an auxiliary crane.
- ▶ It is strictly prohibited for personnel or objects to remain within the movement range of the auxiliary boom **1**!
- ▶ It is prohibited for personnel or objects to remain within the danger zone of the moveable components!

DANGER
Danger of fatal injury due to toppling auxiliary boom!
Before unpinning the pins **12** it must be ensured that no persons or objects are in the danger zone, particularly beneath the auxiliary boom.

- ▶ Do not unpin pins **12** until all persons and objects have been removed from the danger zone!

- ▶ Unpin the pins **12** on both sides from the bores **11**.
- ▶ Fold the auxiliary boom **1** down until the bores align.

Note

- ▶ The folding procedure is simplified if a hook block is reeved in.
- ▶ The rope retaining pins must be unpinned before the folding procedure, see paragraph „Reeving the hoist rope“.
- ▶ Lift the hook block to the point where the bores align.

- ▶ Fit the pins **12** on both sides in bores **13** from „outside to inside“ and secure with spring retainers.

Before starting to use the auxiliary boom **1**, the auxiliary boom **1** must be folded down and pinned.

- ▶ Check if the auxiliary boom **1** has been pinned as described in the operating instructions.

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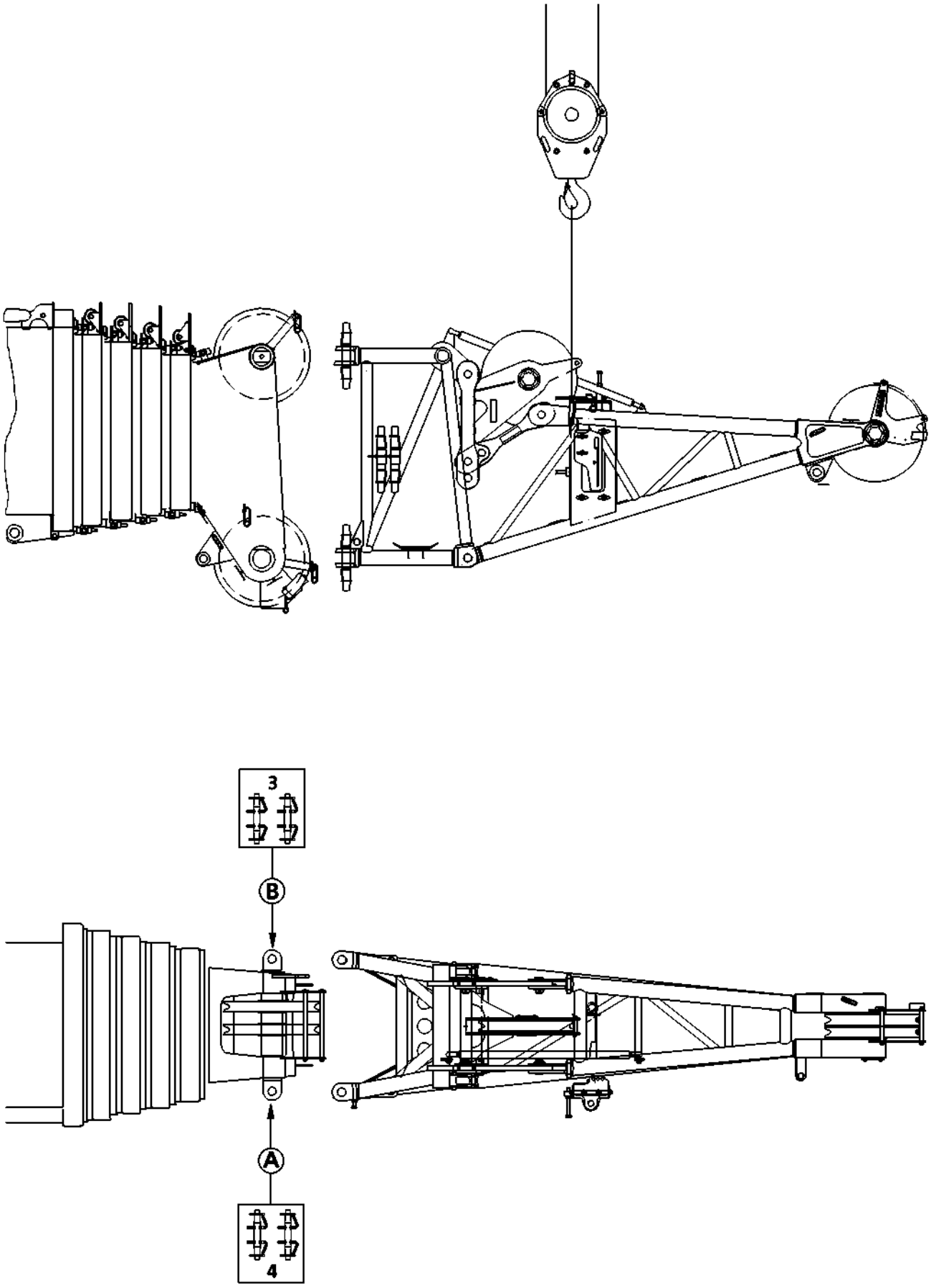

Fig.192473

2.5 Assembling the separately transported auxiliary boom

▶ Hang the auxiliary boom on the auxiliary crane and guide in the fork heads on the telescopic boom.

DANGER
Risk of accident!
▶ The use of cotter pins or spring retainers is prohibited on pins **3** and pins **4**!
▶ To secure the pin **3** and the pin **4**, use the special retaining clips.

▶ Pin the auxiliary boom with the telescopic boom:
▶ Pin and secure the pin **4** on top on point **A**.
▶ Pin and secure the pin **3** on top on point **B**.
▶ Pin and secure the pin **4** on the bottom at point **A**.
▶ Pin and secure the pin **3** on the bottom at point **B**.
▶ For the rest of the assembly see section „Folding the end section into operating position“.

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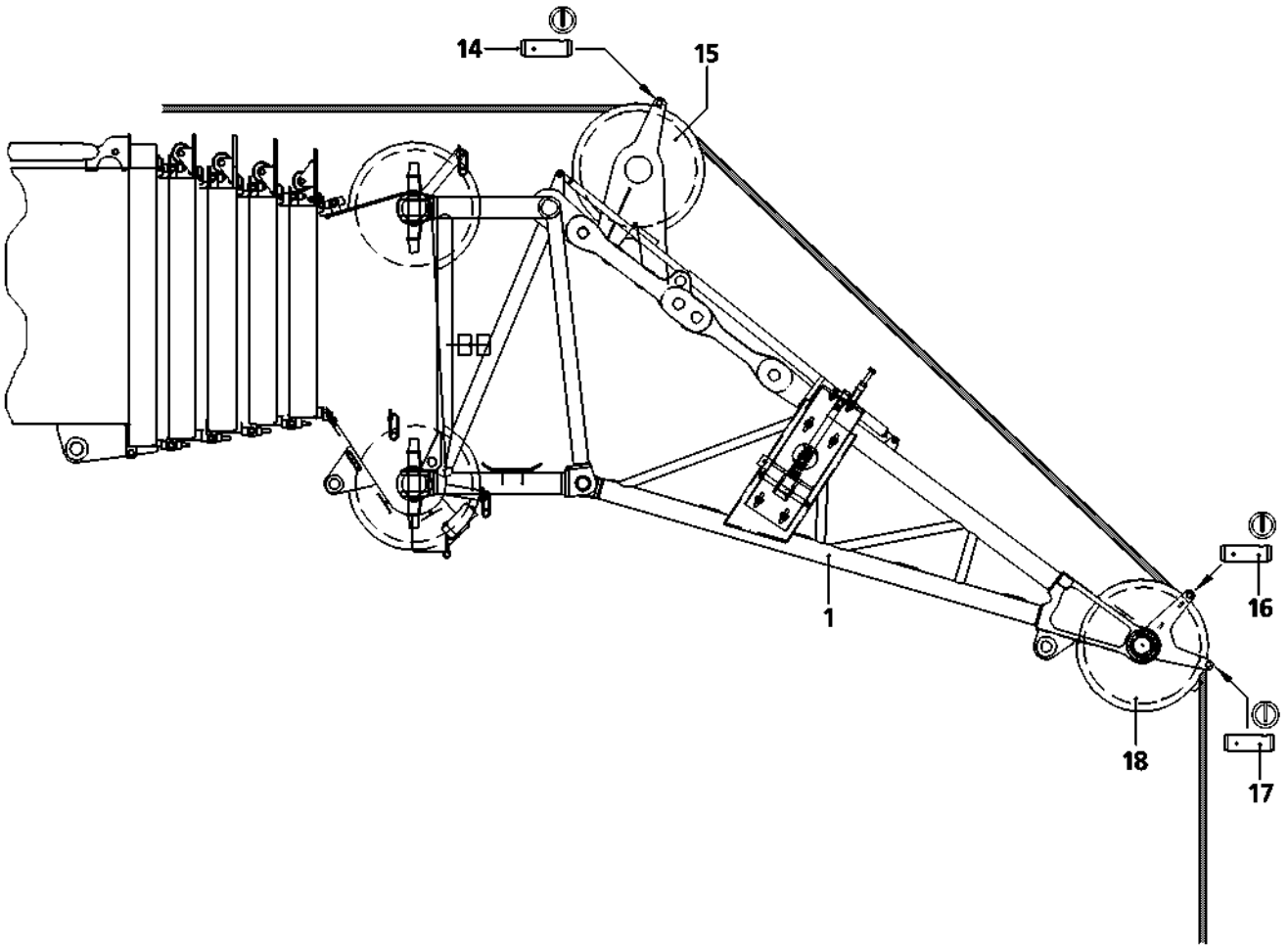

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Fig.192470

2.6 Reeving in the hoist rope

DANGER
Danger of falling from auxiliary boom!
When walking on the auxiliary boom to reeve the hoist rope in or out, there is a risk of slipping and falling from the auxiliary boom.
▶ Do not walk on the auxiliary boom!

▶ Release and unpin rope retaining pin **14**, rope retaining pin **16** and rope retaining pin **17**.
▶ Run the hoist rope over the rope guide pulley **15** and over the main pulley **18**.
▶ Insert the rope retaining pin again and secure with linch pins.
▶ Reeve in the hoist rope.
▶ Attach the hoist limit switch weight.

Note
▶ The weight of the hook block that is reeved into the telescope boom must be deducted from the load during auxiliary boom operations with the hook block reeved into the telescope boom.

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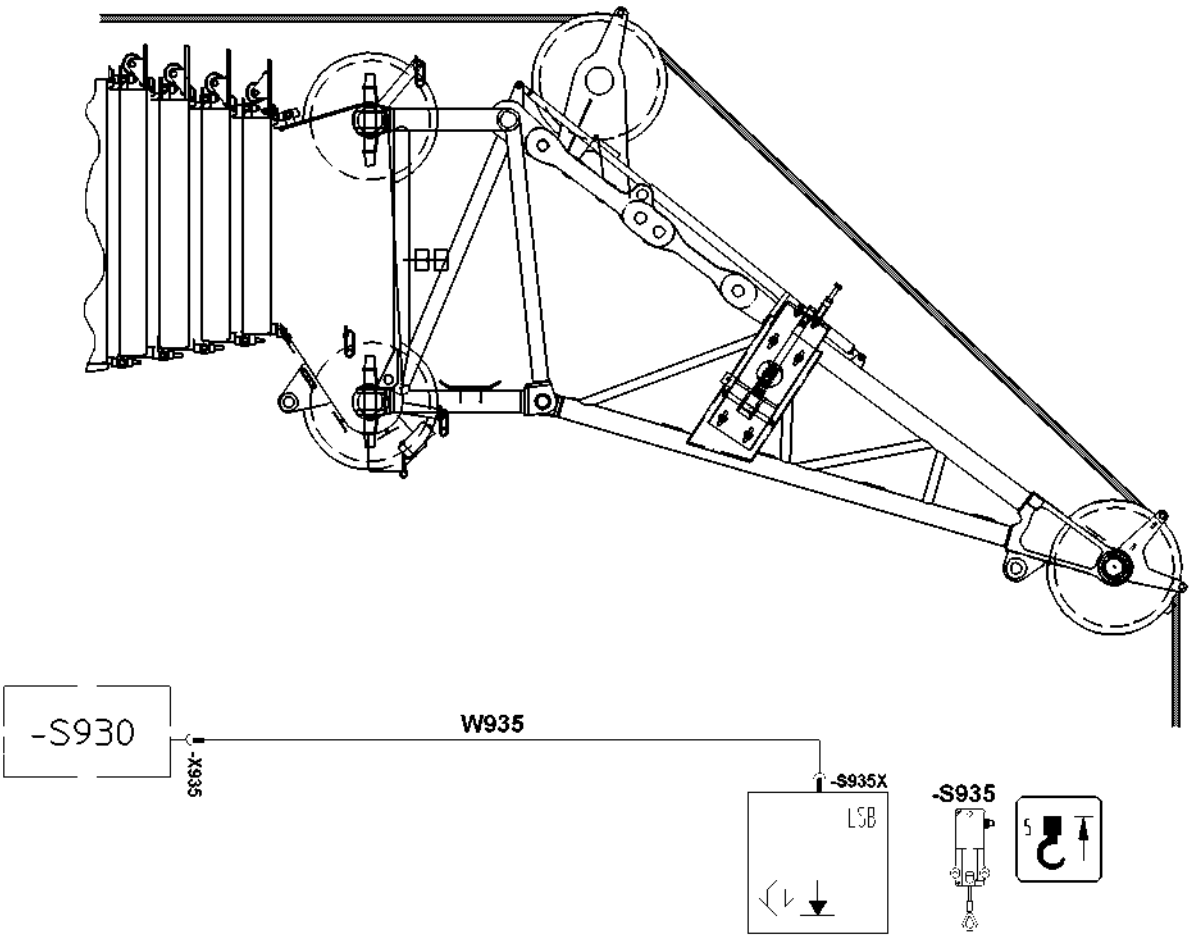

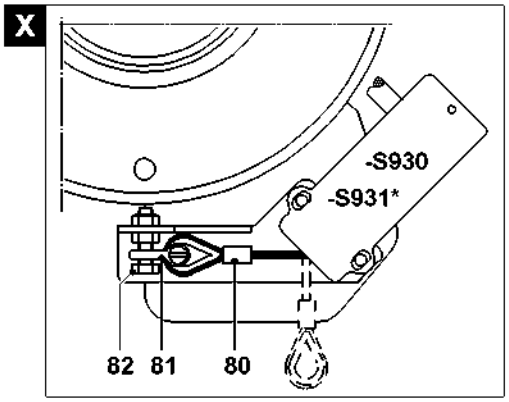

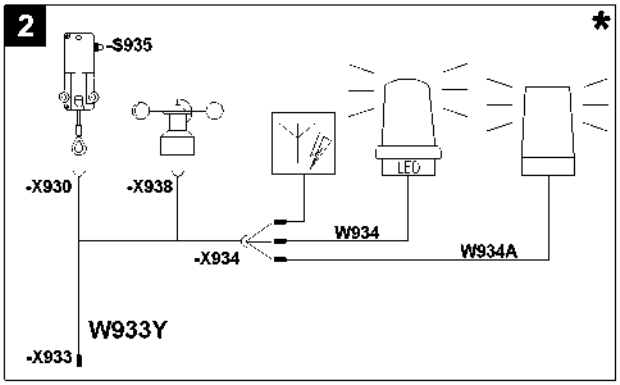

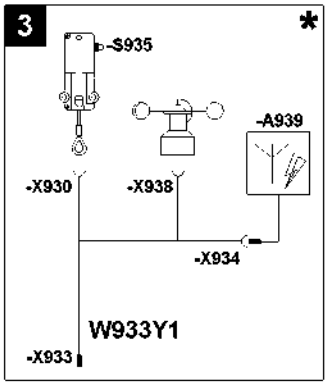

Fig.108697

3 Electrical connections on auxiliary boom

3.1 Mechanically actuating the hoist limit switch, illustration X

If you are working in „Single hook mode“ with the assembled auxiliary boom, the hoist limit switch **-S930** and hoist limit switch*** -S931** which is not required must be actuated manually.

- ▶ Remove the hoist limit switch weight and chain.
- ▶ Pull the hoist limit switch rope **80** and attach to the fixed point **82** with the shackle **81**.

3.2 Establishing the electrical connections on the auxiliary boom

3.2.1 Establishing the electrical connection to the hoist limit switch

Note

- ▶ Only the hoist limit switch **-S935** on the auxiliary boom is active during single hook operation. The hoist limit switch **-S930** and the hoist limit switch*** -S931** must be mechanically actuated, see illustration **X**.
- ▶ During two hook operation the hoist limit switch **-S935** on the auxiliary boom and the hoist limit switch **-S930** on the telescopic boom are active! The hoist limit switch*** -S931** must be actuated mechanically, see illustration **X**.

- ▶ Plug in the cable **W935** with the plug **-X935.S** on the terminal box **-S930**.
- ▶ Plug the cable **W935** with the socket into the hoist limit switch **-S935.X**.

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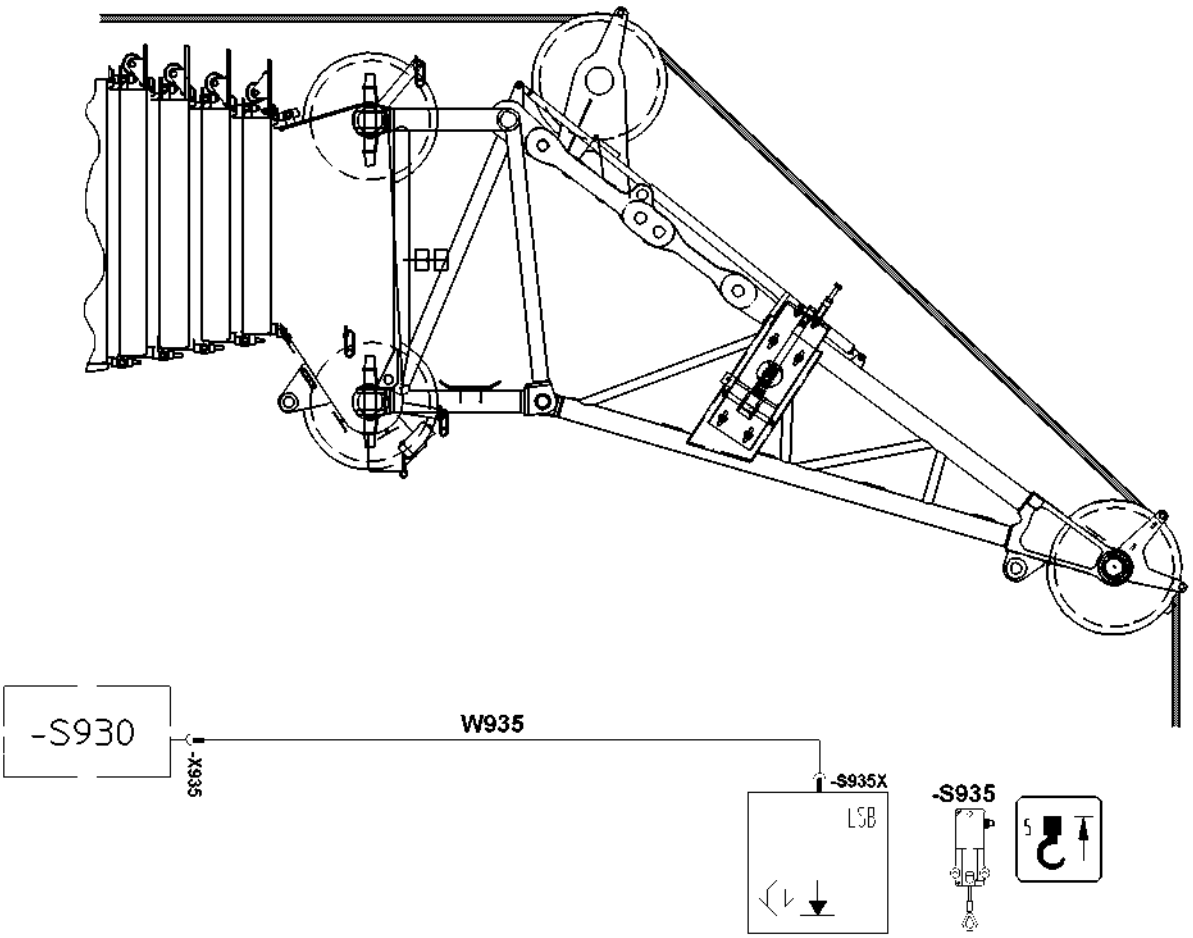

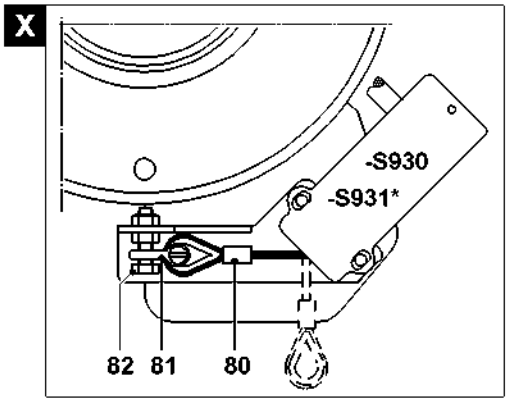

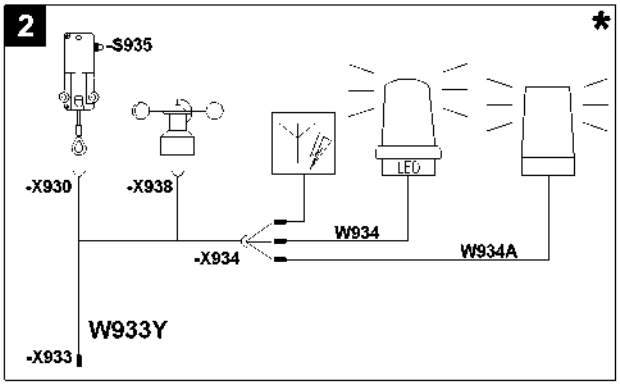

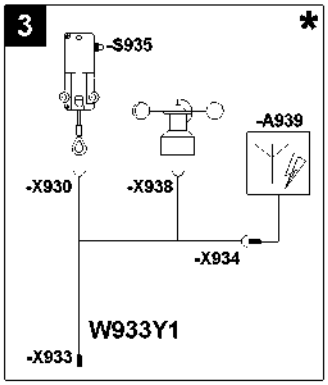

Fig.108697

3.3 Establishing the electrical connection to the LED continuous light* or flashing beacon*

Note

- ▶ To be able to establish the electrical connection to the LED continuous light and the rotating beacon, the Y-adapter **W933Y** on the cable **W935** must be plugged in the socket **-X935.B**, see illustration **2**.
- ▶ Ensure that only the LED continuous light **or** flashing beacon can be plugged in on the plug **-X934**.
- ▶ Ensure that only the Y-adapter **W933Y or** the Y-adapter **W933Y1** can be plugged in on the cable **W935** in the socket **-X935.B**.

- ▶ Plug the Y-adapter **W933Y** with the plug **-X933.S** into the socket **-X935.B**.
- ▶ Plug the cable **W934** with the plug **-X934.S** into the socket **-X934.B**.
  or
  Plug the cable **W934A** with the plug **-X934.S** into the socket **-X934.B**.

3.4 Establishing the electrical connections to the high voltage warning device*

Note

- ▶ To be able to establish the electrical connection to the high voltage warning, the Y-adapter **W933Y1** on the cable **W935** must be plugged in the socket **-X935.B**, see illustration **3**.
- ▶ Ensure that only the Y-adapter **W933Y or** the Y-adapter **W933Y1** can be plugged in on the cable **W935** in the socket **-X935.B**.

- ▶ Plug the Y-adapter **W933Y** with the plug **-X933.S** into the socket **-X935.B**.
- ▶ Plug the antenna **-A939** with the plug **-A939.S** into the socket **-X934.B**.

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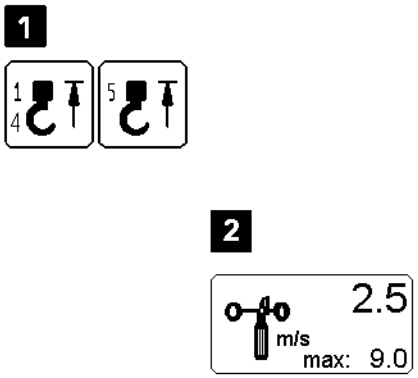

Fig.106063

3.5 Function check

Make sure that the following prerequisites are met:
- All electrical connections have been made.
- The LICCON computer system is running.

3.5.1 Hoist limit switch

▶ Actuate all active hoist limit switches manually.

Result:

- The appropriate icon element „Hoist top“ appears on the monitor.
- The winch turns off in the lift direction, see illustration **1**.

Note
The respective symbol element „Hoist top“does not appear on the monitor when manually actuating the hoist limit switch?
Is spool winch up and luff telescopic boom down blocked?
The auxiliary boom is not compatible with the LICCON overload protection!
▶ Contact the next **Liebherr Service location** or **Liebherr-Werk Ehingen**!

Note
▶ When replacing or changing the hoist limit switch, the respective hoist limit switch must have the correct bus address and the correct software version in order to be detected by the bus system.

3.5.2 Wind sensor

CAUTION
Danger of accidents due to toppling of the crane!
The wind speed can no longer be determined when attaching a defective wind sensor.
▶ Check the function of the wind sensor every time it is installed.

▶ Manually actuate the wind sensor.

Result:

- The icon „Wind speed“, see illustration **2**, appears on the monitor.

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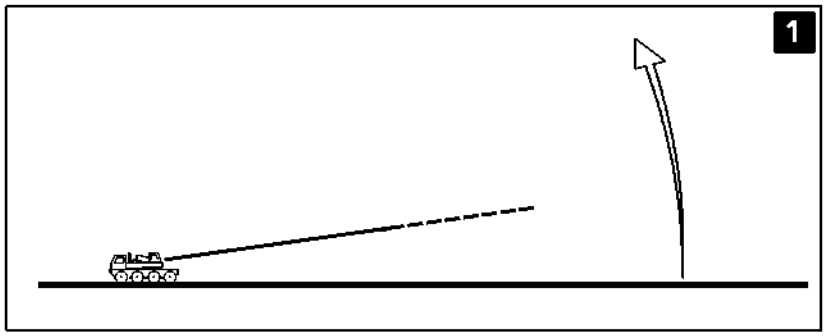

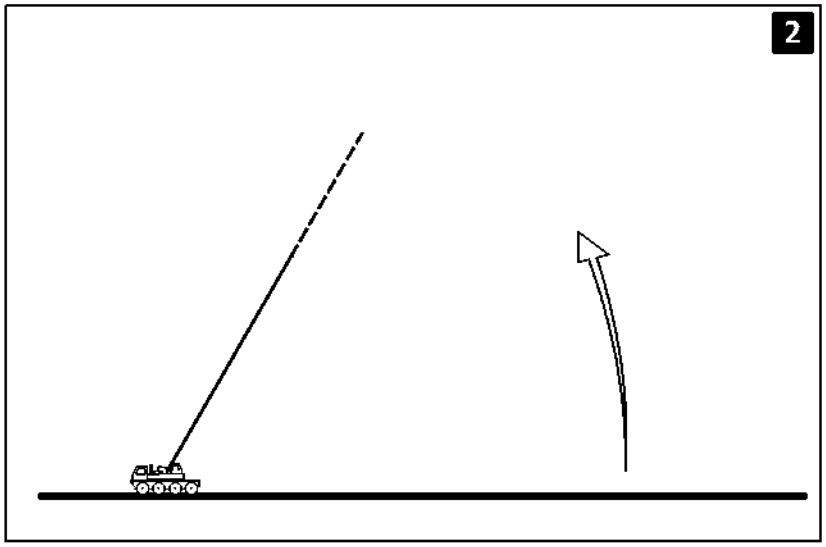

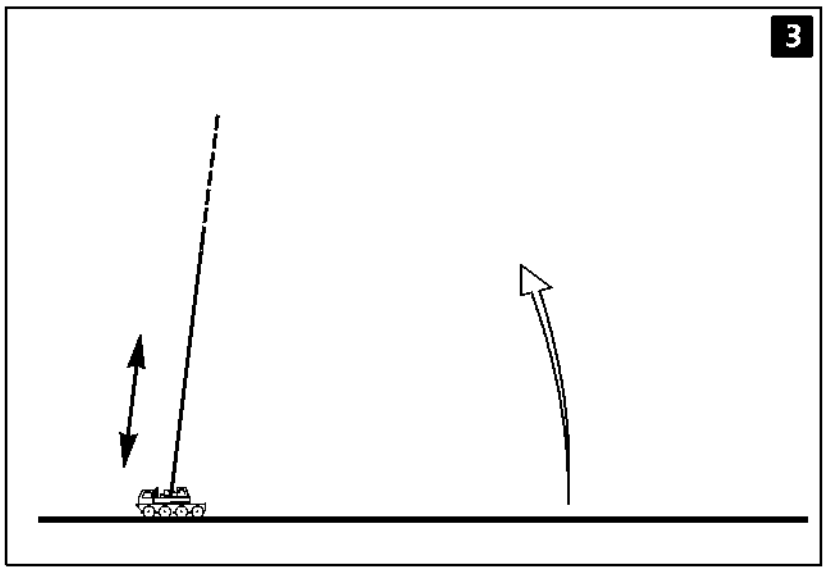

Fig.192389

4 Erection

4.1 Preparatory work

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 telescopic boom is fully telescoped in.
- The auxiliary boom has been assembled according to the load chart and the operating instructions.
- All limit switches have been correctly installed and are fully functional.
- All pin connections have been secured.
- The hoist rope has been correctly placed in the rope pulleys and is secured with the rope retaining pins to prevent it from jumping out.
- There are no loose parts on the telescopic boom or the auxiliary boom.
- The telescopic boom, the auxiliary boom and its components (such as: Limit switch, airplane warning light, wind speed sensor) must be free of snow and ice in winter.

DANGER
Risk of accident!
Incorrectly installed or non-functioning limits switches as well as falling parts (such as: pins, cotter pins, ice) can cause accidents!
▶ Install all limit switches, pins and cotter pins properly.

▶ Check if all prerequisites have been met.

4.2 Erection procedure

DANGER
Danger of accidents due to toppling of the crane!
The radii specified in the load chart may not be exceeded or fallen below, even if there is no load on the hook! If this regulation is not observed, the crane can topple over.
▶ Compare and check the settings on the LICCON computer system with the actual configuration status!

Adjustment of the LICCON overload protection, refer to Crane operating instructions, chapter 4.02.

▶ Set and confirm the LICCON overload protection according to the required set up configuration.
▶ Luff the telescopic boom up with installed auxiliary boom until the LICCON issues the release.
▶ Telescope the telescopic boom out to the values specified in the load chart.

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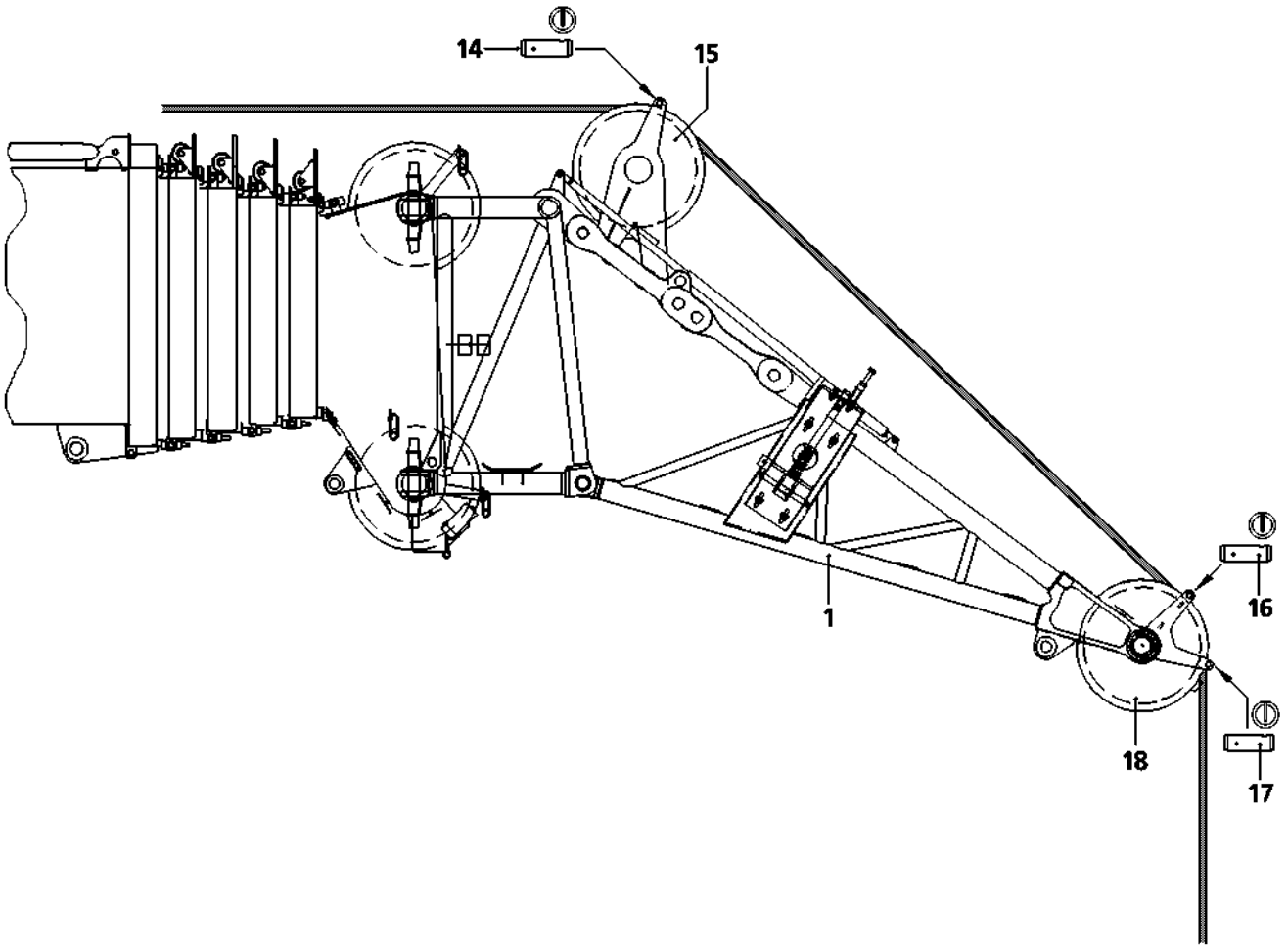

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Fig.192470

5 Disassembling the auxiliary boom

5.1 General

DANGER
Danger of fatal injury due to toppling auxiliary boom!
The auxiliary boom may topple if it is incorrectly disassembled.
- ▶ Standing under the auxiliary boom during the swing operation is prohibited!
- ▶ It is prohibited for anyone to remain within the swinging area or the folding area of the auxiliary boom!
- ▶ The auxiliary boom must be secured by an auxiliary rope during the swing process!

DANGER
Danger of falling!
During assembly and disassembly, 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 injuries.
- ▶ All assembly work from a height of 2 m must normally be carried out using suitable aids (lifting platforms, scaffolding, ladders, auxiliary crane etc.)! The height above which assembly / disassembly work must be carried out with aids depends on national regulations. The national regulations must be adhered to!
- ▶ If work cannot be carried out using these aids nor from the ground, then assembly personnel must protect themselves from falling with suitable aids (such as safety harnesses)!
- ▶ Do not walk on the telescopic boom or auxiliary boom!

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 telescopic boom is fully telescoped in.
- The electrical / hydraulic connections on the auxiliary boom have been released.
- The telescopic boom has been luffed down to the rear or the side in the 0° position.

DANGER
Danger of accident due to involuntary swinging out of the auxiliary boom when it is unpinned!
The telescopic boom must be in 0° position, otherwise there is a risk of accident due to involuntary swinging out of the auxiliary boom when it is unpinned.
- ▶ Move the telescopic boom to 0° position.

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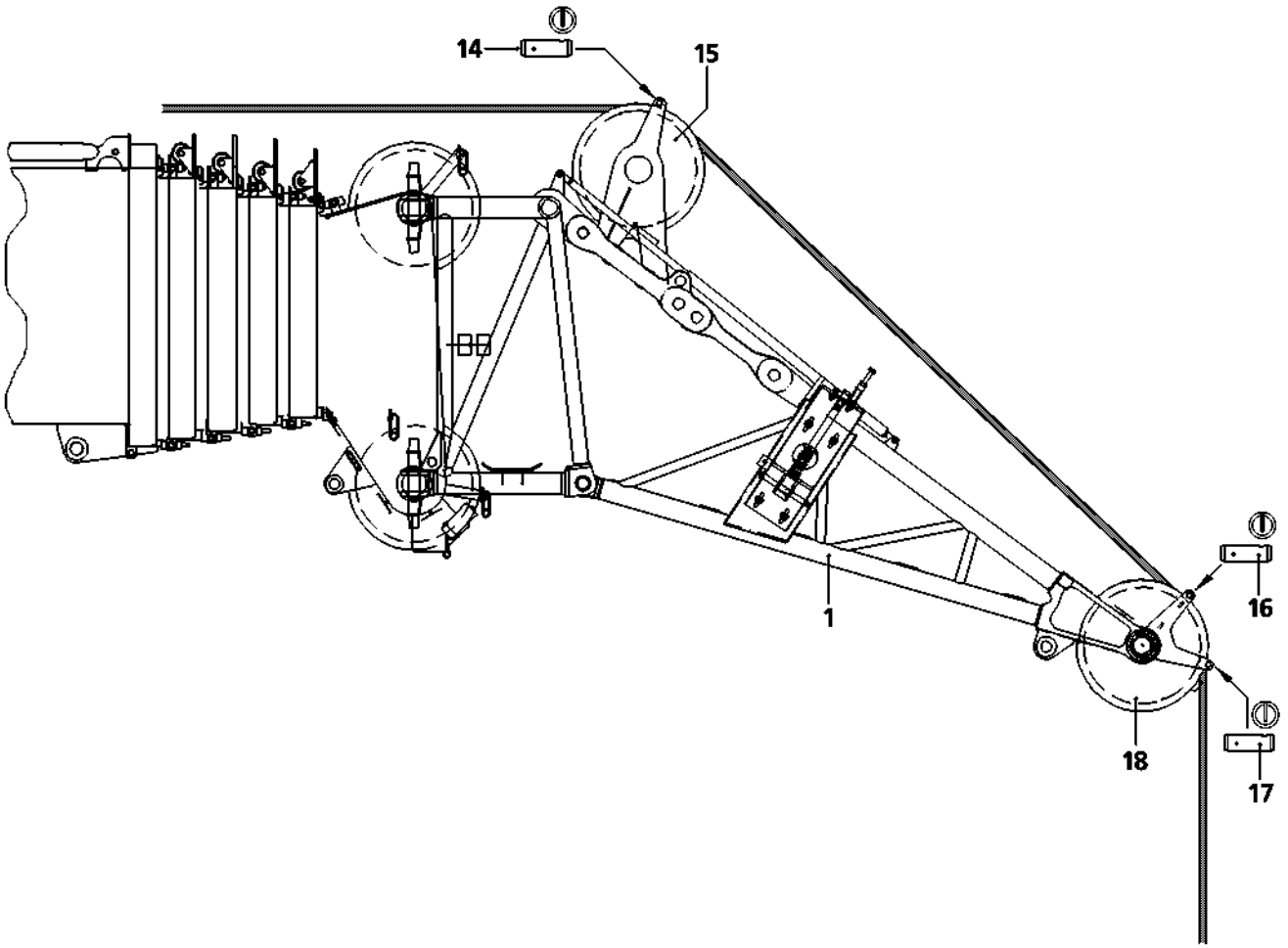

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Fig.192470

5.2 Unreeving the hoist rope

DANGER
Danger of falling from auxiliary boom!
When walking on the auxiliary boom to reeve the hoist rope in or out, there is a risk of slipping and falling from the auxiliary boom.
▶ Do not walk on the auxiliary boom!

▶ Release and unpin rope retaining pin **14**, rope retaining pin **16** and rope retaining pin **17**.
▶ Spool the hoist rope up.
▶ Repin the rope retaining pin **14**, rope retaining pin **16** and rope retaining pin **17** and secure with linch pins.

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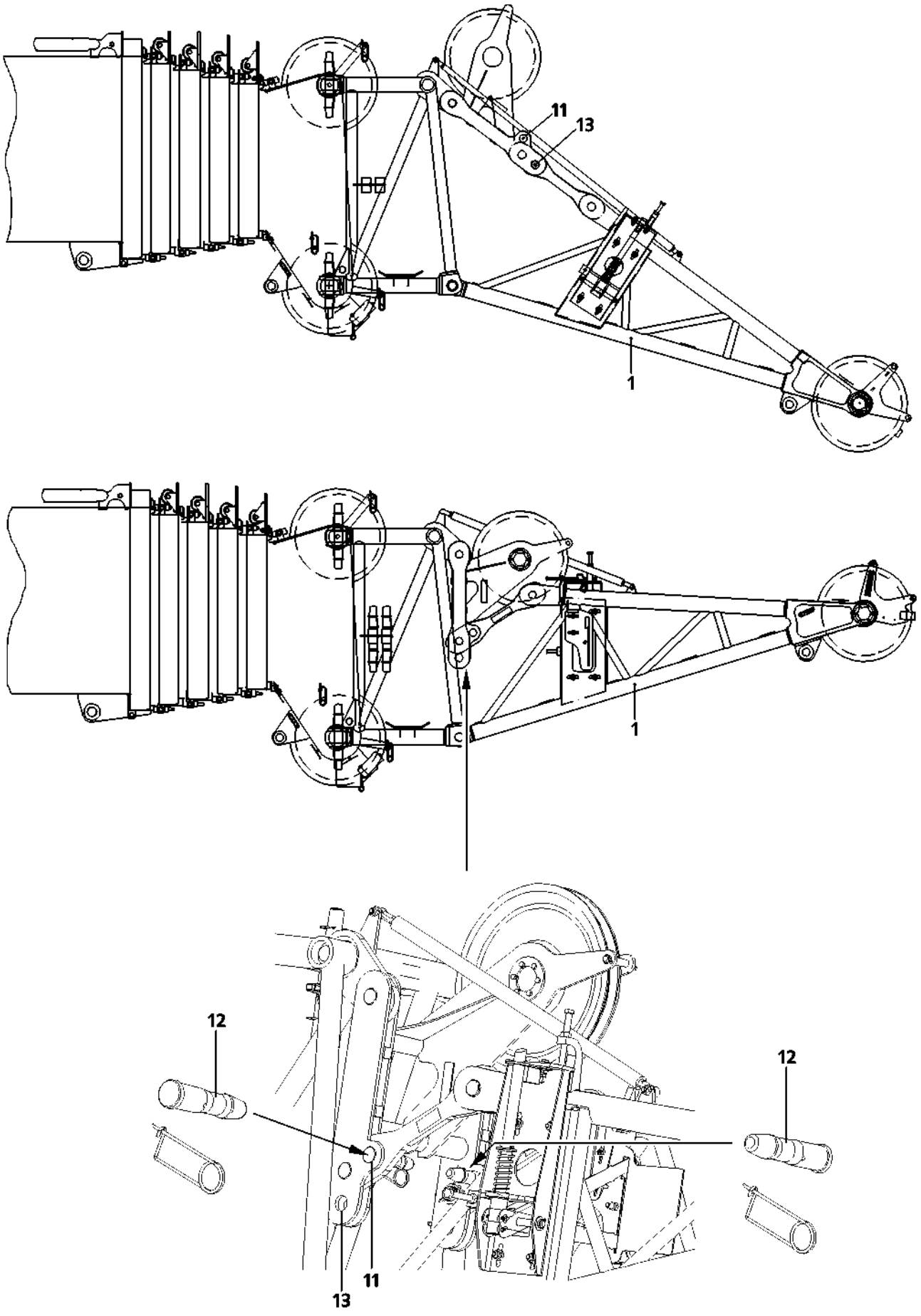

Fig.104954

5.3 Folding the auxiliary boom into transport position

DANGER
Risk of accident!
Before the auxiliary boom **1** may be swung into transport position, the auxiliary boom **1** must be folded up into transport position and pinned.
Before unpinning the pins **12** it must be ensured that no persons or objects are in the danger zone, particularly beneath the auxiliary boom.

- ▶ Do not unpin pins **12** until all persons and objects have been removed from the danger zone!
- ▶ Insert pins **12** from the „outside to the inside“.

- ▶ Release the pins **12** on both sides and unpin them from the bores **13**.
- ▶ Fold the auxiliary boom **1** up in transport position until the bores align.
- ▶ Fit the pins **12** on both sides in bores **11** from „outside to inside“ and secure with spring retainers.

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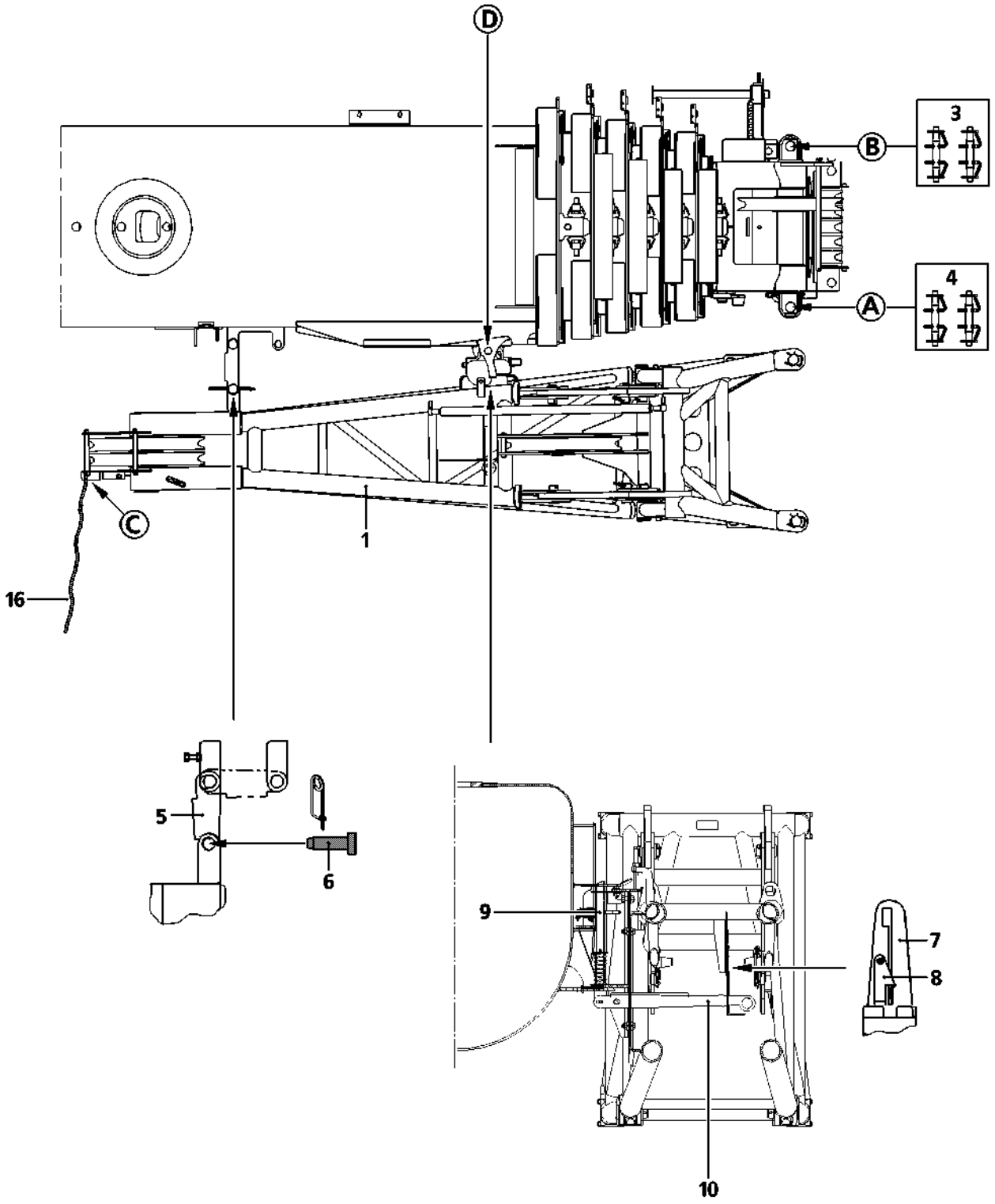

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Fig.107278

5.4 Swivelling the auxiliary boom into the transport position

▶ Attach the auxiliary rope **16** on point **C**.

DANGER
The auxiliary boom may swing out involuntarily!
While unpinning the pin **3**, the auxiliary boom may swing out unintentionally.

In order to prevent the auxiliary boom from involuntarily swinging out:
▶ Hold down auxiliary boom using the auxiliary rope **16**!
▶ Do not lean the ladder against the auxiliary boom!

▶ Release and unpin the pin **3**.
▶ Disengage the lever **10** with the assembly rod from the bracket **7** and pull downward.
▶ Swing in auxiliary boom **1** with auxiliary rope **16** until locking **9** audibly engages.
▶ Perform a visual inspection.
▶ Secure the lever **10** with the safety bracket **8**.

DANGER
Danger of accident from auxiliary boom falling down!
If the pins **4** are unpinned before the lock **9** is engaged and secured with the safety bracket **8**, the auxiliary boom will fall down!
▶ Unpin the pins **4** only if the lock **9** is engaged and secured with the safety bracket **8**.

▶ Release and unpin the pin **4**.
▶ Swing the auxiliary boom **1** in until the pin **6** can be pinned.
▶ Pin the auxiliary boom **1** with the telescopic boom: Insert and secure pin **6**.
▶ Remove the auxiliary rope **16**.

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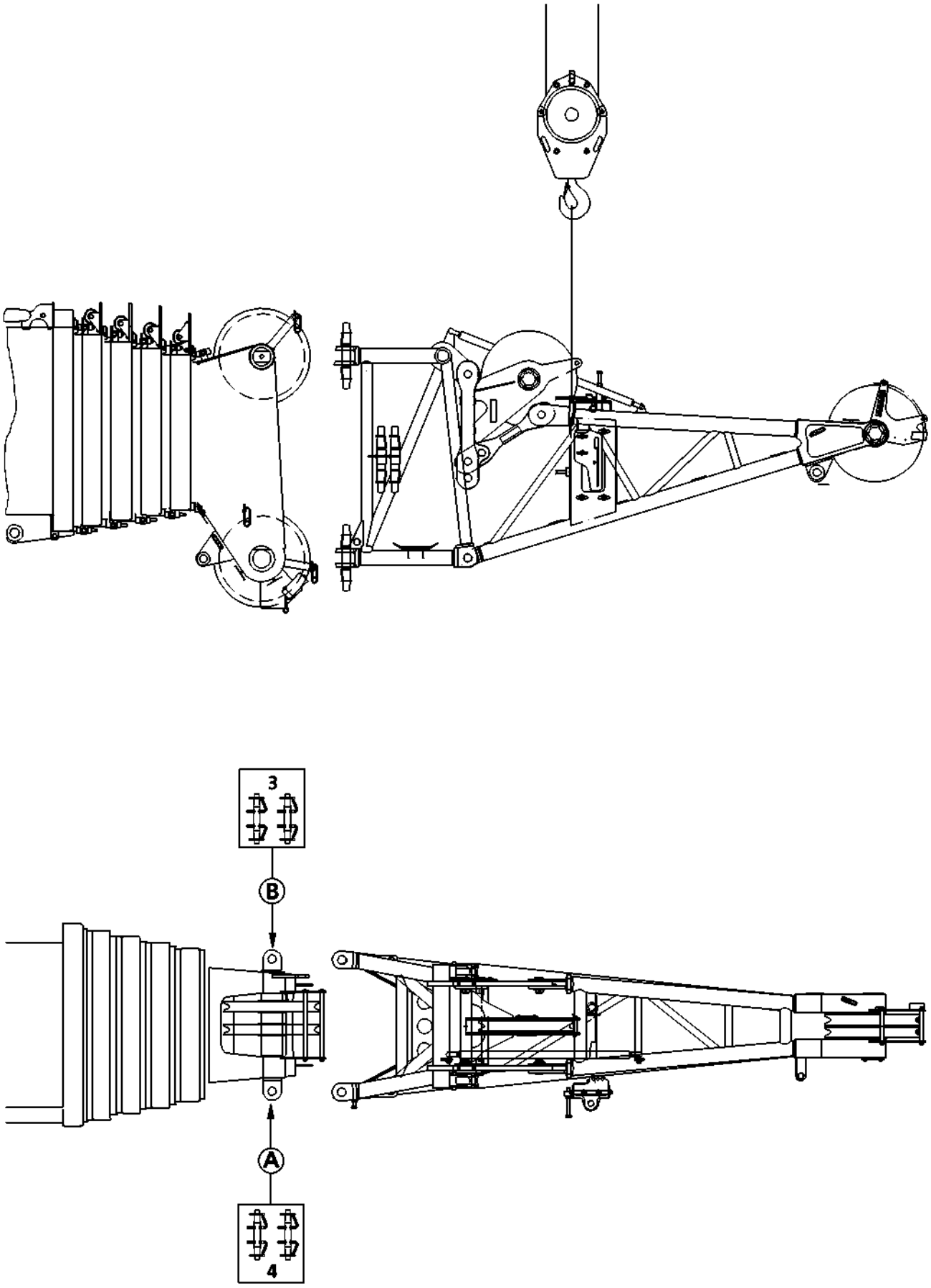

Fig.192473

5.5 Removing the separately transported auxiliary boom

Make sure that the following prerequisites are met:
– The auxiliary boom is folded in operating position.

▶ Attach the auxiliary crane on the fastening point of the auxiliary boom.

DANGER
Danger of accident when removing the auxiliary boom!
Failing to comply with the following conditions may result in fatal injury to the assembly personnel during disassembly.
▶ When knocking out the pins, no personnel may remain under the auxiliary boom!
▶ Attach the auxiliary crane so that no angular pull occurs!
▶ Match the „hoisting power“ of the auxiliary crane to the „weight“ of the auxiliary boom!
▶ The auxiliary boom may detach suddenly because of distortion!
▶ Do not remove auxiliary boom until it has been secured with the auxiliary crane to prevent it from falling!
▶ Do not lean the ladder against the auxiliary boom!

▶ Tighten the ropes so that auxiliary boom is prevented from falling.
▶ Unpin the auxiliary boom on the telescopic boom:
▶ Release the pin **4** on top on point **A** and unpin.
▶ Release the pin **3** on top on point **B** and unpin.
▶ Release the pin **4** on the bottom on point **A** and unpin.
▶ Release the pin **3** on the bottom on point **B** and unpin.
▶ Place the auxiliary boom onto the transport vehicle.

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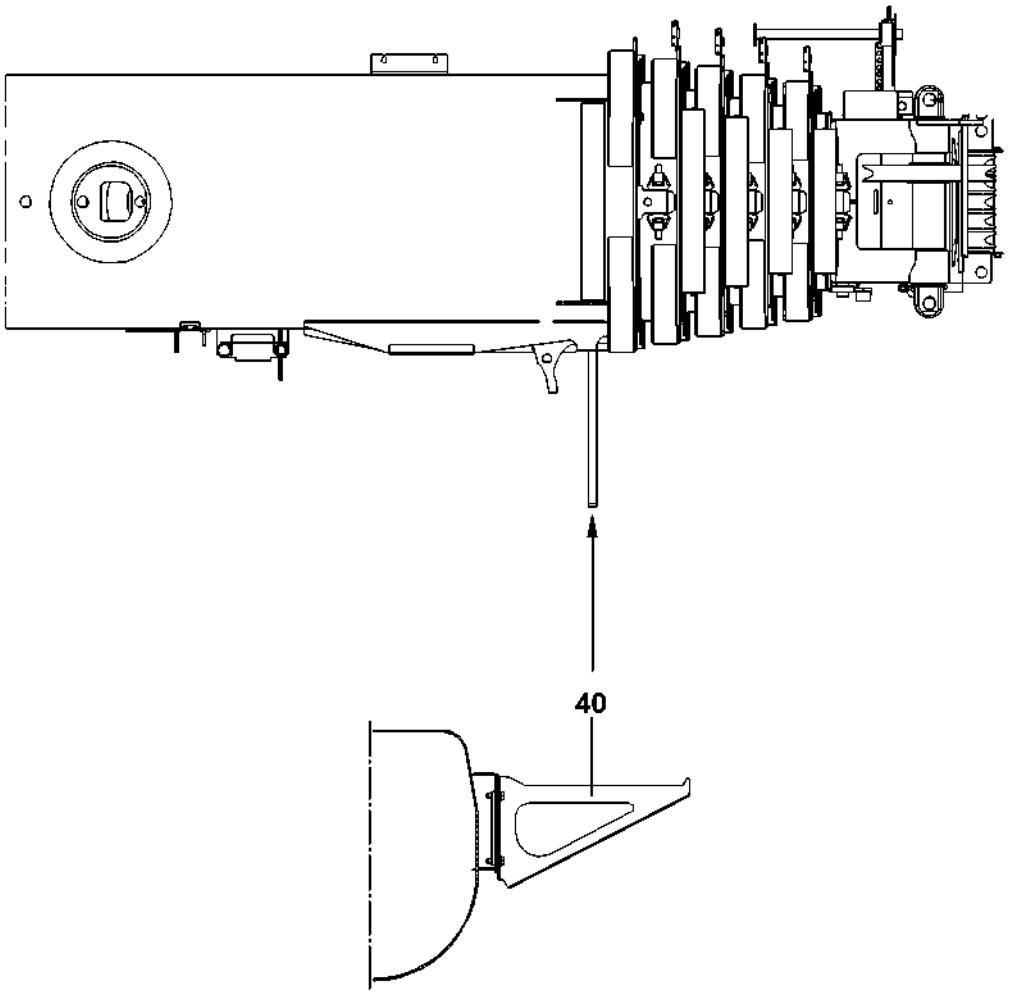

Fig.103264

5.6 Assembling the catch bar on the telescopic boom pivot section

DANGER
Danger of fatal injuries due to toppling folding jib!
As a result of improperly assembled, damaged or non-existing catch bar **40** on the telescopic boom pivot section, the folding jib – due to an assembly error – can fall down and cause fatal injuries.

- ▶ After the auxiliary boom is removed from the telescopic boom, the catch bar **40** must be re-assembled properly.
- ▶ Make sure that the catch bar **40** is property installed again and not damaged „before assembling the single or the double folding jib“, see also Crane operating instructions, chapter 5.02.

- ▶ Install the catch bar **40** properly on the telescopic boom pivot section.

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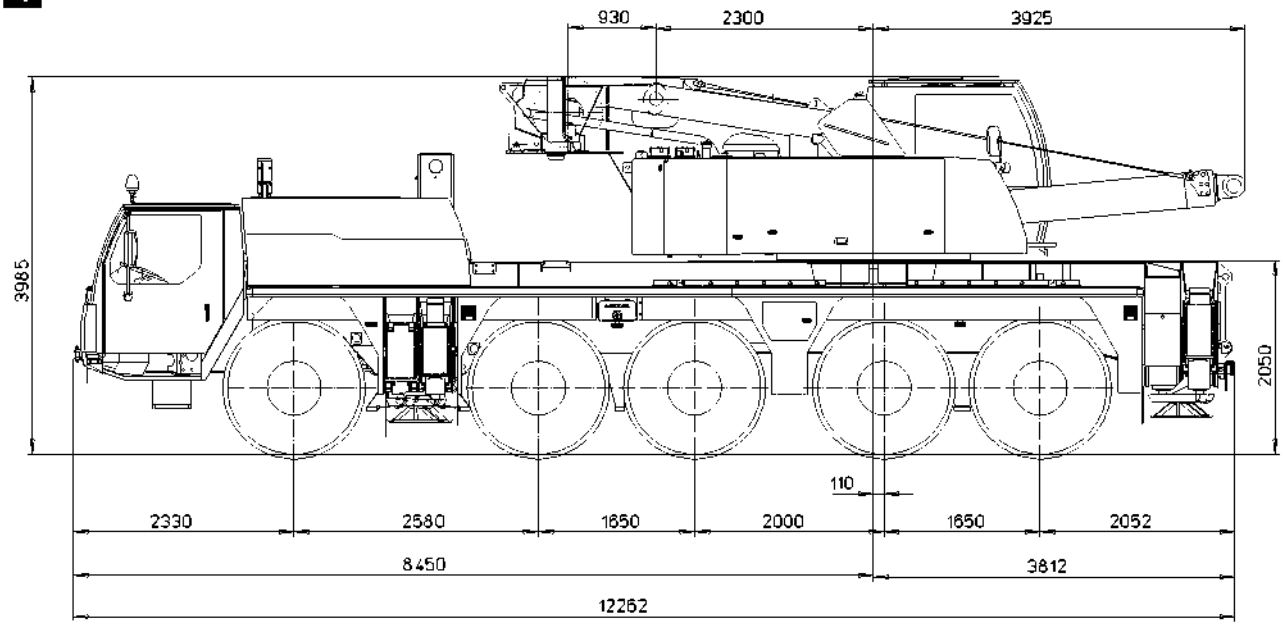
1



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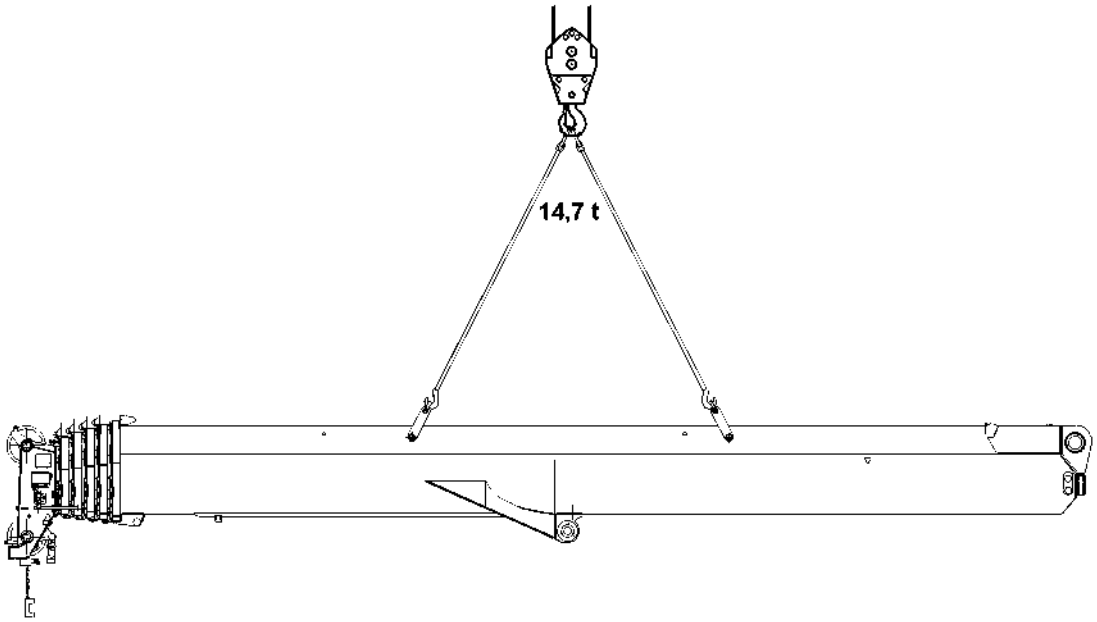

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Fig.108102

1 General

To reduce the axle loads on this crane, the telescopic boom can be removed.

1.1 Dimensions, illustration 1

Dimensions, see illustration **1**.

1.2 Weight, illustration 2

Telescopic boom	
Total weight	14.7 t

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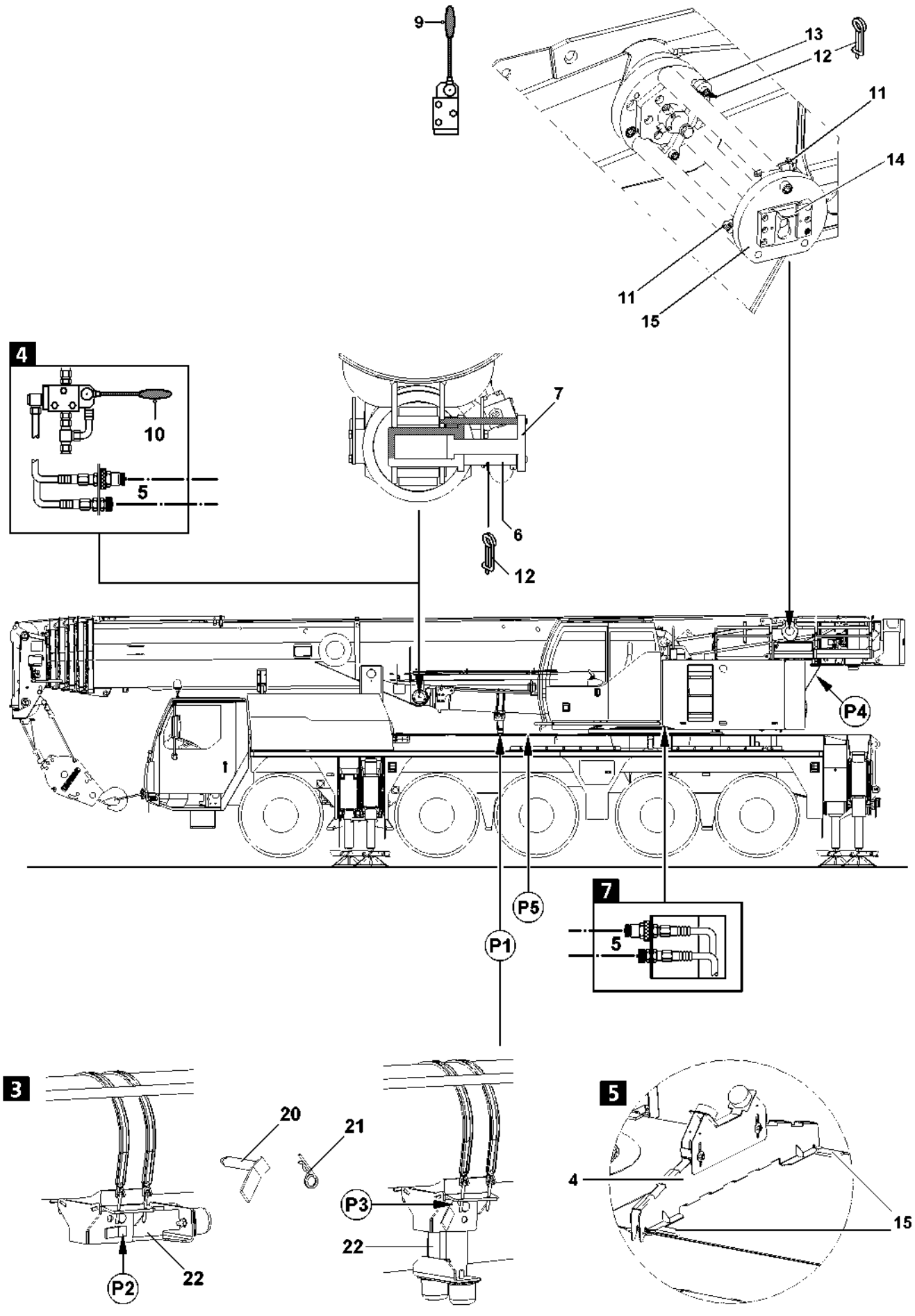

Fig.120848

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2 Disassembly

Make sure that the following prerequisites are met:
- The axle suspension is blocked.
- The sliding beams are extended and pinned.
- The support cylinders are extended to the point where the support plates touch the ground but the weight of the crane is on the wheels.
- The counterweight, the hydraulic hose drum and the folding jib are disassembled.
- The crane superstructure is positioned in driving direction to the front.
- The telescopic boom is completely telescoped in and placed down.
- The hook block is unreeved and the hoist rope is spooled up.
- The telescoping cylinder is pinned in telescoping section 1.

2.1 Folding the luffing cylinder support out

Before the luffing cylinder support **22** can be folded out on point **P1**:
- ▶ Luff up the telescopic boom slightly.
- ▶ Release the pin **20** on point **P2** and unpin, see illustration **3**.
- ▶ Fold the luffing cylinder support **22** out.
- ▶ Insert the pin **20** on point **P3** and secure with cotter pin **21**, see illustration **3**.
- ▶ Luff the telescopic boom down until the telescopic boom is laying in the telescopic boom receptacle.

  or

For crane types with receptacle frame*****, see illustration **5**:

Release and unpin the receptacle frame **4** on point **P5**.
- ▶ Set the receptacle frame **4** on point **P1** and push in to stop **15**.

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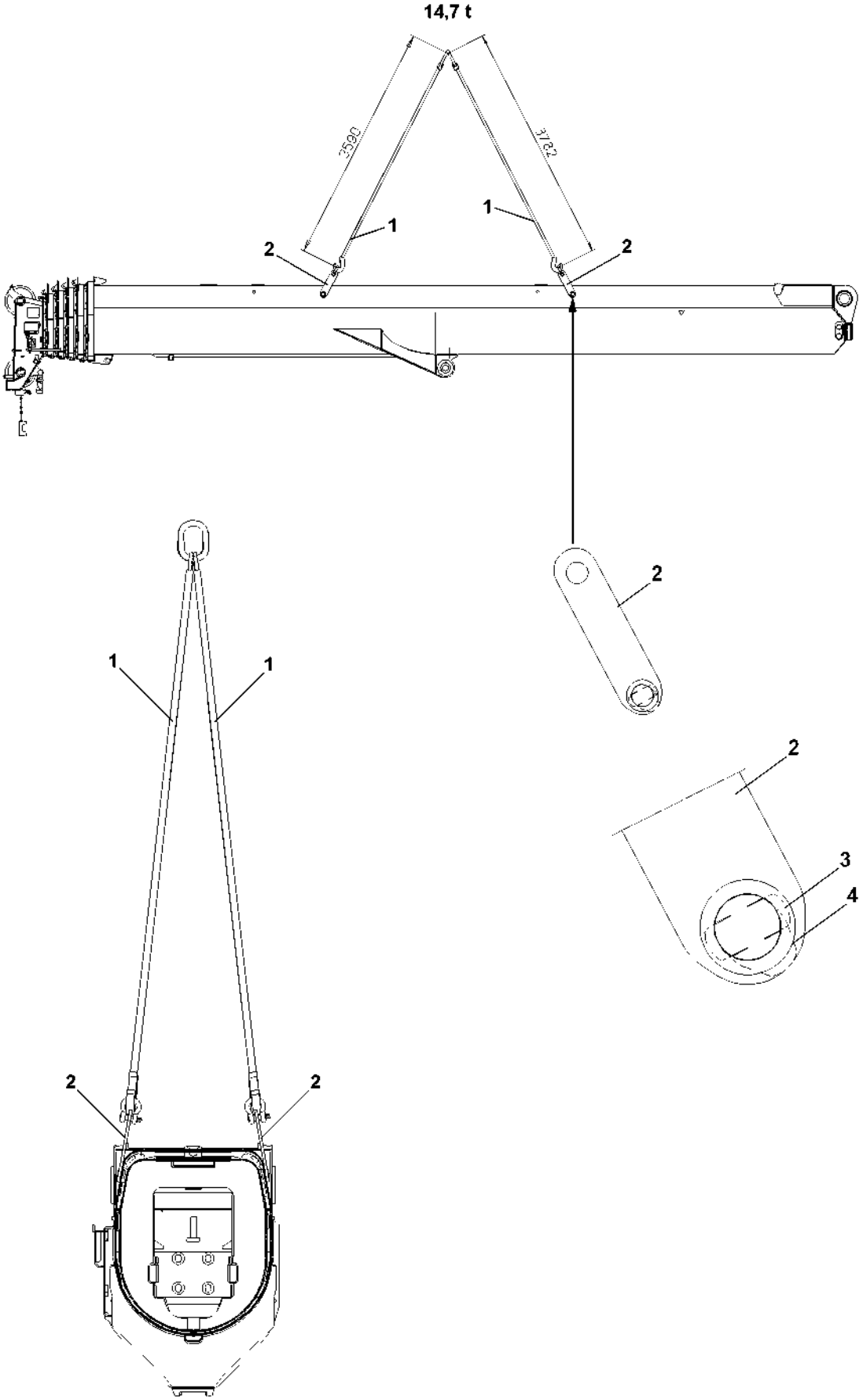

Fig.108103

2.2 Hanging the telescopic boom on the auxiliary crane

To hang the telescopic boom correctly, the lifting chain **1** on the front strands must be 3590 mm long and on the rear strands it must be 3782 mm long.

The front strands must therefore be shortened by 4 chain links.

▶ Hang the lifting chain **1** onto the auxiliary crane.

To be able to hang the lashing lugs **2** on the telescopic boom, they must be turned until the lugs **3** snap into the bores **4**.

▶ The lashing lugs **2** must be hooked in on all 4 suspension points.

By tightening the lifting chain **1**, the lashing lugs **2** will be locked.

▶ Tighten the lifting chain **1** with the auxiliary crane.

DANGER
Danger of accidents, as the telescopic boom may fall down!
If the telescopic boom is not hooked properly onto the lashing lugs **2**, the telescopic boom may fall off during the removal procedure.
▶ Only disassemble the telescopic boom after attaching the lashing lugs **2** and tightening the lifting chain **1**.

▶ Check if all 4 lashing lugs **2** are properly attached on the telescopic boom.

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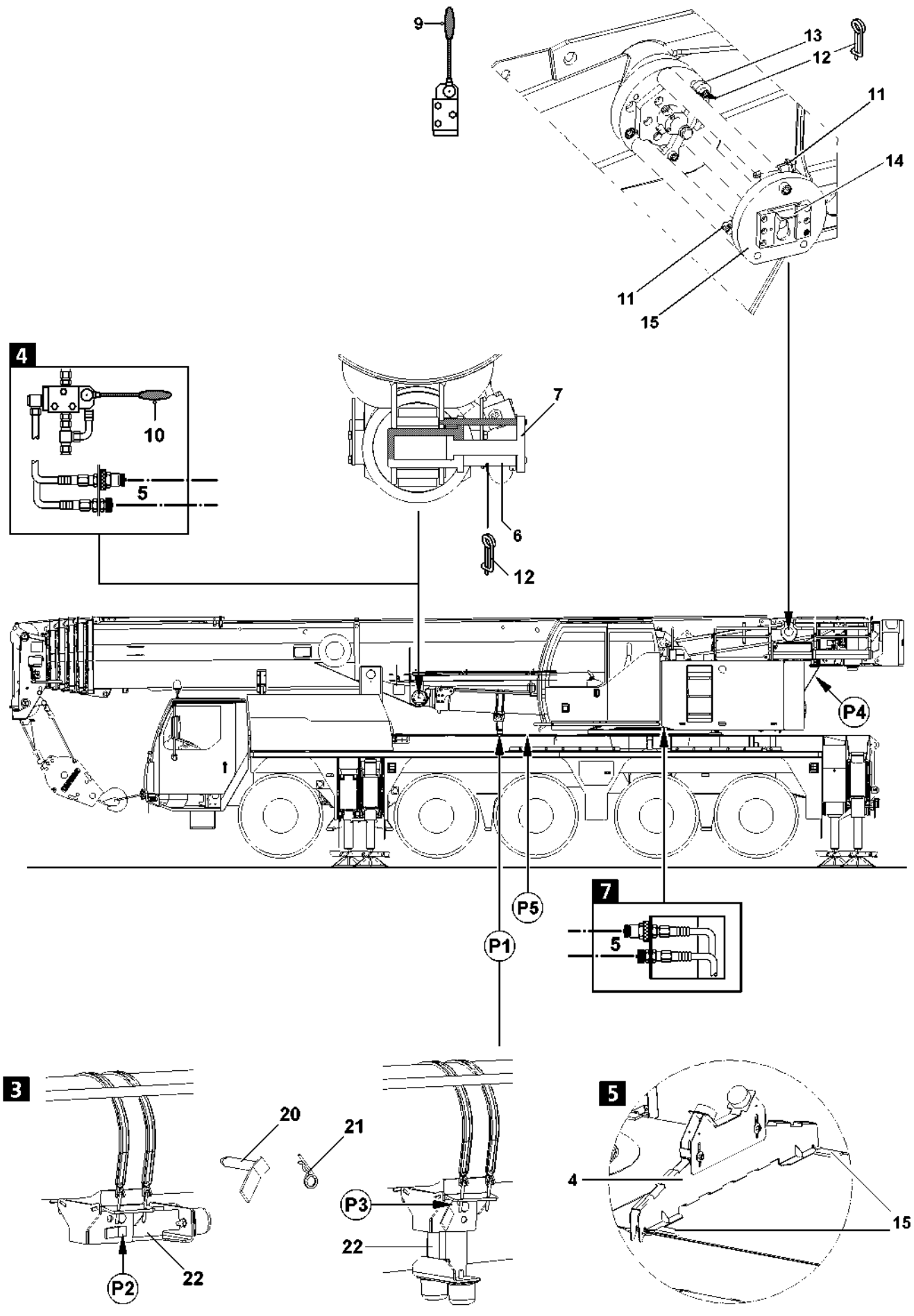

Fig.120848

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2.3 Disconnecting the supply lines between the turntable and telescopic boom

▶ Turn the crane engine off
▶ Release the electric and hydraulic connections at point **P4**.

Note
▶ Turn the engine off before connecting and disconnecting hydraulic lines.
▶ The engine must be idle for at least 5 minutes before the pressure in the hydraulic system is relieved.
▶ The supply lines must be separated prior to unpinning the luffing cylinder.
▶ If the supply lines are not accessible, the telescopic boom must be luffed up and luffed down again after the supply lines are released.

▶ Protect the electrical and hydraulic connections from contamination.

2.4 Disassembling the telescopic boom

Make sure that the following prerequisites are met:
– The telescopic boom is properly attached and secured on the 4 lashing lugs of the auxiliary crane.
– The lashing chain is slightly tightened.
– All the supply lines for the telescopic boom are released.
– The key hole plate **14** is pushed up.
– The hydraulic connection to the pin pulling device **15** is established.
– The luffing cylinder support **22** is folded out on point **P1**.

▶ Establish the hydraulic connections **5** to the pin pulling device **7** on the luffing cylinder, see illustration **4** and illustration **7**.
▶ Release and remove the retaining plates **6** on the pin pulling devices **7**.

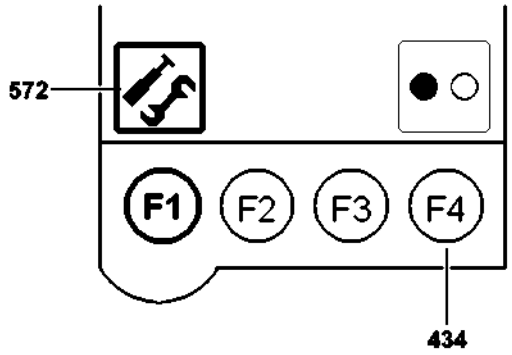

Fig.115950

▶ Preselect the pressure boost for the pin pulling device: Press the button **572**.

Result:

– The button **572** is surrounded with a black border.

▶ Add the pressure boost for the pin pulling device: Press function key F4 **434**.

Result:

– The icons in the button **572** are bolded.

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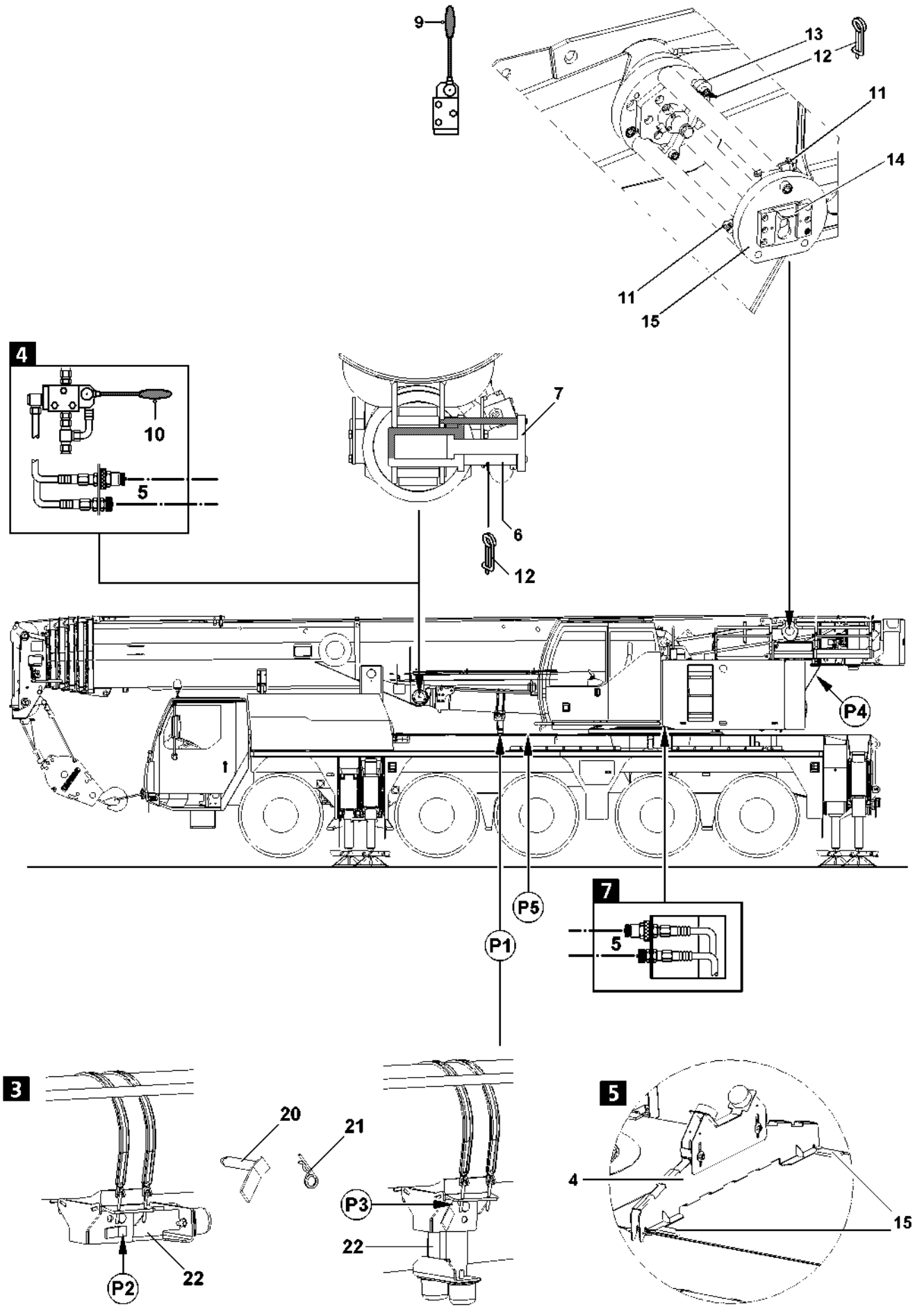

Fig.120848

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▶ Remove all locking pins **11**.

WARNING
Danger of crushing fingers!
Fingers can be crushed when pinning and unpinning.
▶ Do not place your fingers between pin and bore hole.

▶ Move the manual lever **9** and telescope the pin pulling device **15** out completely.

WARNING
If the locking pins **11** are not pinned when the telescopic rods are telescoped out or in, then the telescopic rods can telescope out or in uncontrolled!
▶ When the telescopic rods are telescoped out or in, all locking pins **11** must be pinned!

▶ Insert all locking pins **11** again.
▶ Push the key hole plate **14** down.
▶ Remove spring retainer **12** and retaining plate **13**.
▶ Move the manual lever **9** and unpin the telescopic boom on the turntable.
▶ Release and remove the retaining plate **6** on the pin pulling device **7**.
▶ Operate the hand lever **10** and unpin the luffing cylinder, seeillustration **4**.

Result:

– After unpinning, the luffing cylinder is laying on the luffing cylinder support **22** or on the receptacle frame **4**.

▶ Release the hydraulic connections **5** to the pin pulling device on the luffing cylinder.
▶ Carefully lift the telescopic boom with the auxiliary crane from the turntable.
▶ Continue to lift the telescopic boom and place it on the transport vehicle.

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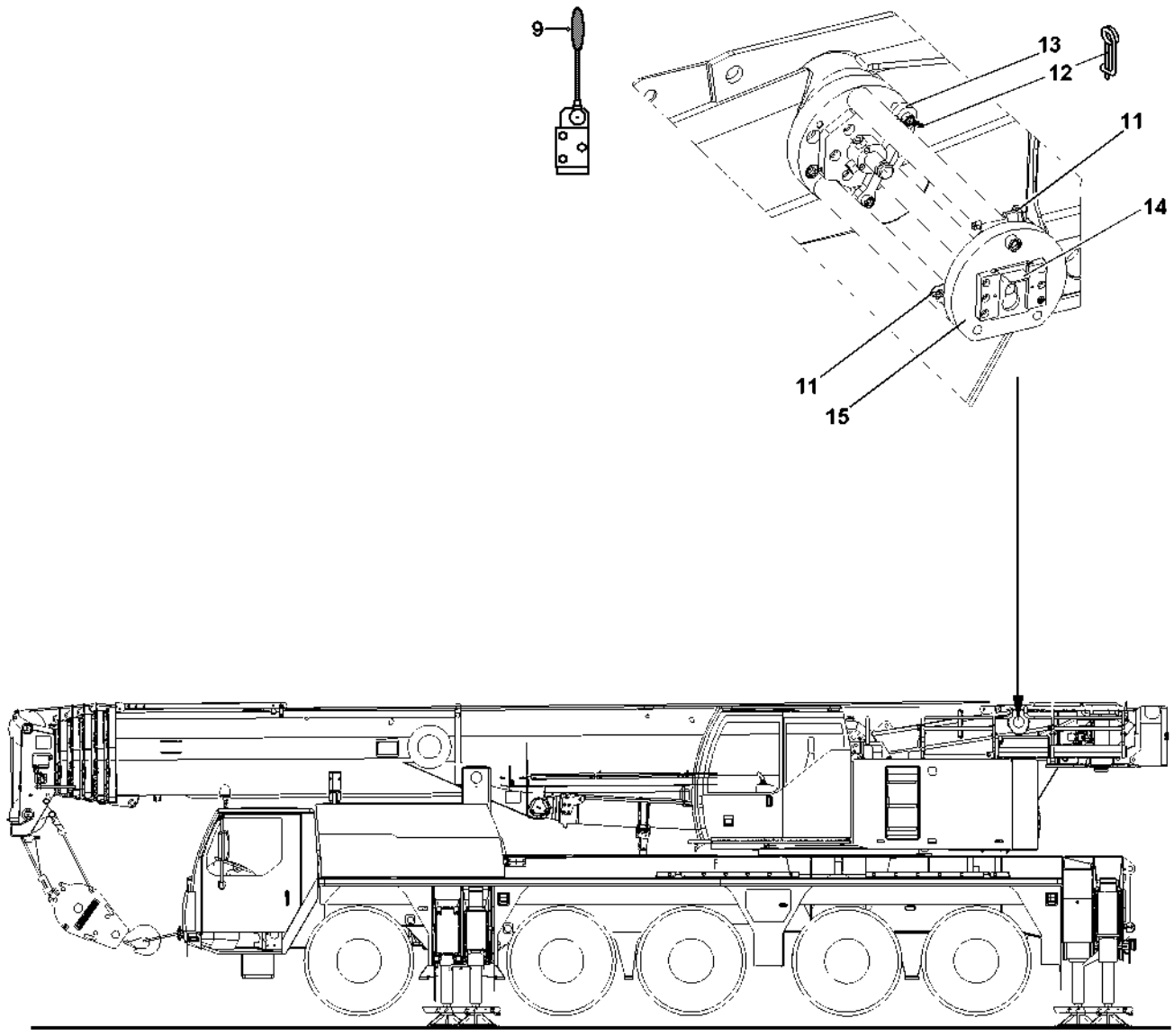

Fig.118995

2.5 Retracting the pin pulling devices on the turntable

Note

▶ The pin pulling device **15** must be retracted so that the crane vehicle is not excessively wide for travel.

Make sure that the following prerequisites are met:
- The telescopic boom is removed.
- The telescopic rod of the pin pulling device **15** is telescoped out and secured with locking pin **11**.
- The key hole plate **14** is pushed down.

WARNING

Danger of crushing fingers!
Fingers can be crushed when pinning and unpinning.

▶ Do not place your fingers between pin and bore hole.

▶ Move the manual lever **9** and insert the pin.
▶ Secure the pin with retaining plate **13**.
▶ Secure the retaining plate **13** with spring retainer **12**.
▶ Remove all locking pins **11**.
▶ Actuate the manual lever **9** and telescope the telescopic rod on the pin pulling device **15** in until it can be pinned.

WARNING

If the locking pins **11** are not pinned when the telescopic rods are telescoped out or in, then the telescopic rods can telescope out or in uncontrolled!

▶ When the telescopic rods are telescoped out or in, all locking pins **11** must be pinned!

▶ Insert all locking pins **11** again.
▶ Push the key hole plate **14** up.
▶ Actuate the manual lever **9** and telescope the piston rod on the pin pulling device **15** all the way in.

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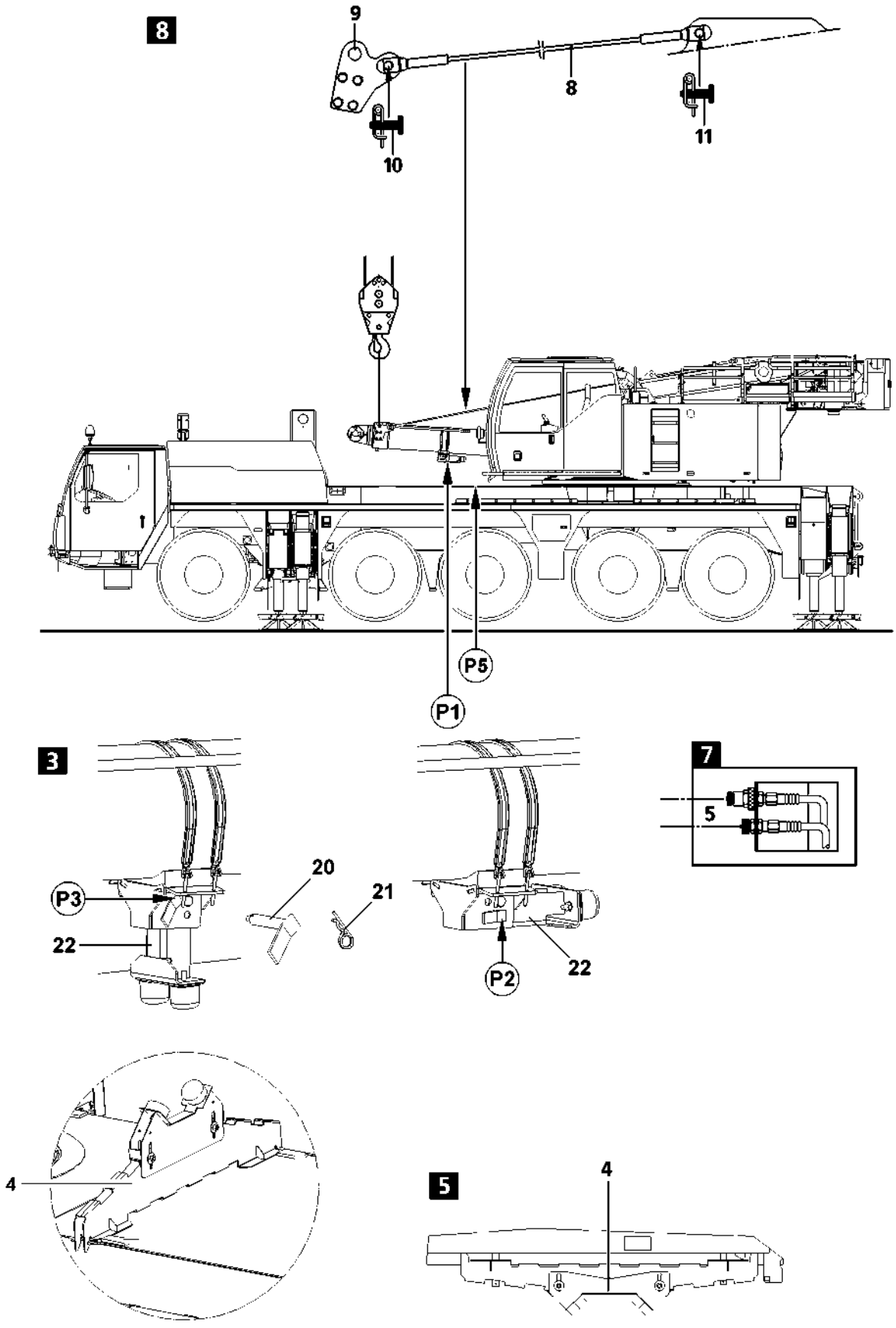

Fig.120849

2.6 Securing the luffing cylinder with the auxiliary rope

Make sure that the following prerequisites are met:
- The telescopic boom is disassembled.
- The luffing cylinder is laying on the luffing cylinder support **22** or on the receptacle frame **4**.
- The hydraulic connections **5** to the pin pulling device on the luffing cylinder have been removed, see illustration **7**.

NOTICE
The hydraulic connections can be ripped off!
▶ Before turning the superstructure, the hydraulic connections **5** to the pin pulling device on the luffing cylinder must be removed.

2.6.1 Assembling the retaining rope

▶ Hang the auxiliary crane on the retaining bracket **9**, see illustration **8**.
▶ Lift the luffing cylinder with the auxiliary crane until the retaining rope **8** can be pinned.
▶ Pin and secure the retaining ropes **8** on both sides on the luffing cylinder with pins **10**, see illustration **8**.
▶ Pin and secure the retaining ropes on both sides of the turntable with the pins **11**, see illustration **8**.
▶ Lower the luffing cylinder with the auxiliary crane until the retaining rope **8** is tensioned.
▶ Disengage the auxiliary crane on the retaining bracket **9**.

2.6.2 Folding the luffing cylinder support in

NOTICE
Damage to the luffing cylinder support!
If the luffing cylinder support **22** is not folded in, then the luffing cylinder support **22** can be damaged!
▶ Fold the luffing cylinder support **22** in on the luffing cylinder before the turntable is turned!

▶ Release the pin **20** on point **P3** and remove, see illustration **3**.
▶ Fold the luffing cylinder support **22** on, see point **P1**.
▶ Insert the pin **20** on point **P2** and secure with cotter pin **21**, see illustration **3**.
or

For crane types with receptacle frame*****, see illustration **5**:
Remove the receptacle frame **4** on point **P1** and insert, pin and secure on point **P5** in transport position.

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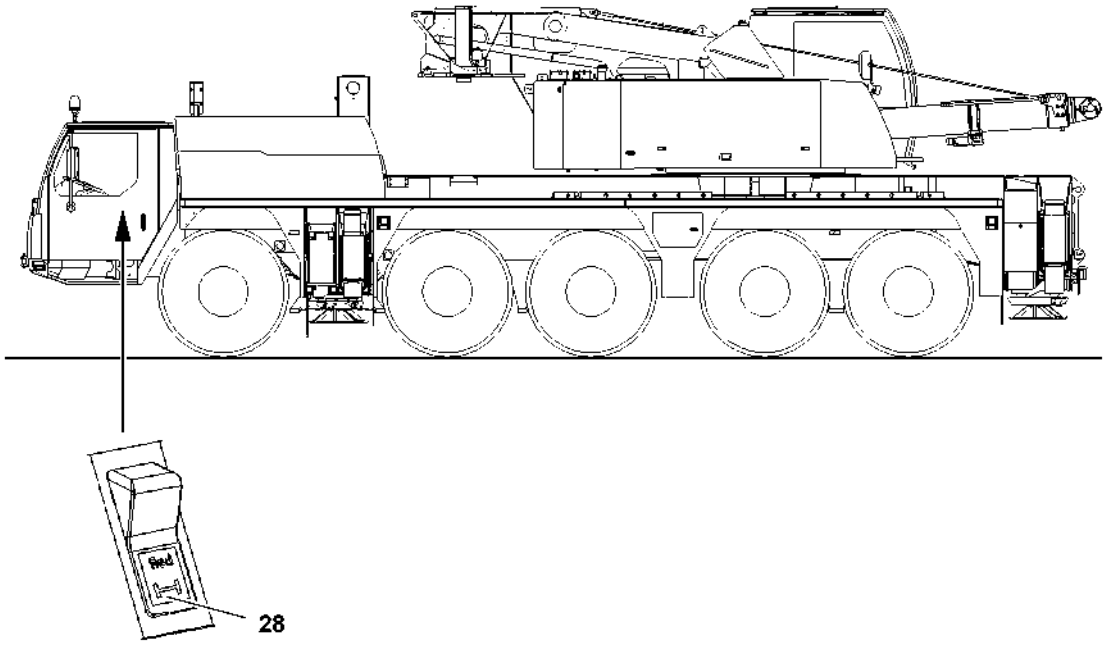

Fig.118992

2.7 Final tasks

WARNING
The crane can topple over!
If the crane superstructure is turned without the crane being fully supported and horizontally aligned, then the crane can topple over and fatally injure personnel!
▶ Support the crane completely and align it horizontally!

▶ Turn the turntable by 180 ° to the rear.
▶ Lock the crane superstructure with the crane chassis.

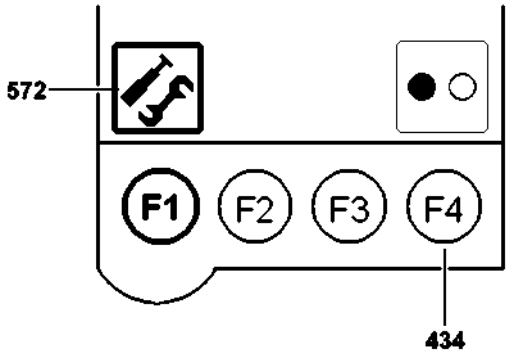

Fig.115950

▶ Turn the pressure boost for the pin pulling device off: Press function key F4 **434**.

Result:

– The icons in the button **572** are **no** longer bolded.

▶ Deselect the pressure boost for the pin pulling device: Press the button **572**.

Result:

– The button **572** is **no** longer surrounded with a black border.

▶ Retract the support cylinders and sliding beams.
▶ Turn off the axle suspension lock.

DANGER
Danger of accident due to overbraking the crane vehicle!
If one doesn't switch over to reduced axle load when the telescopic boom is removed, then the brake of the crane vehicle is oversized.
▶ Driving with a disassembled telescopic boom is only permitted if the brake force reduction is activated!
▶ When the telescopic boom is removed, use the brake on the crane carefully!
▶ Switch the diaphragm reservoirs to reduced axle load before „driving with removed telescopic boom“ .

▶ Actuate the switch **28**.

Result:

– The diaphragm reservoirs of the axle suspension are manually switched over to reduced axle load.
– The indicator light in the switch **28** lights up.

▶ Activate the automatic level control, refer to chapter 3.03.

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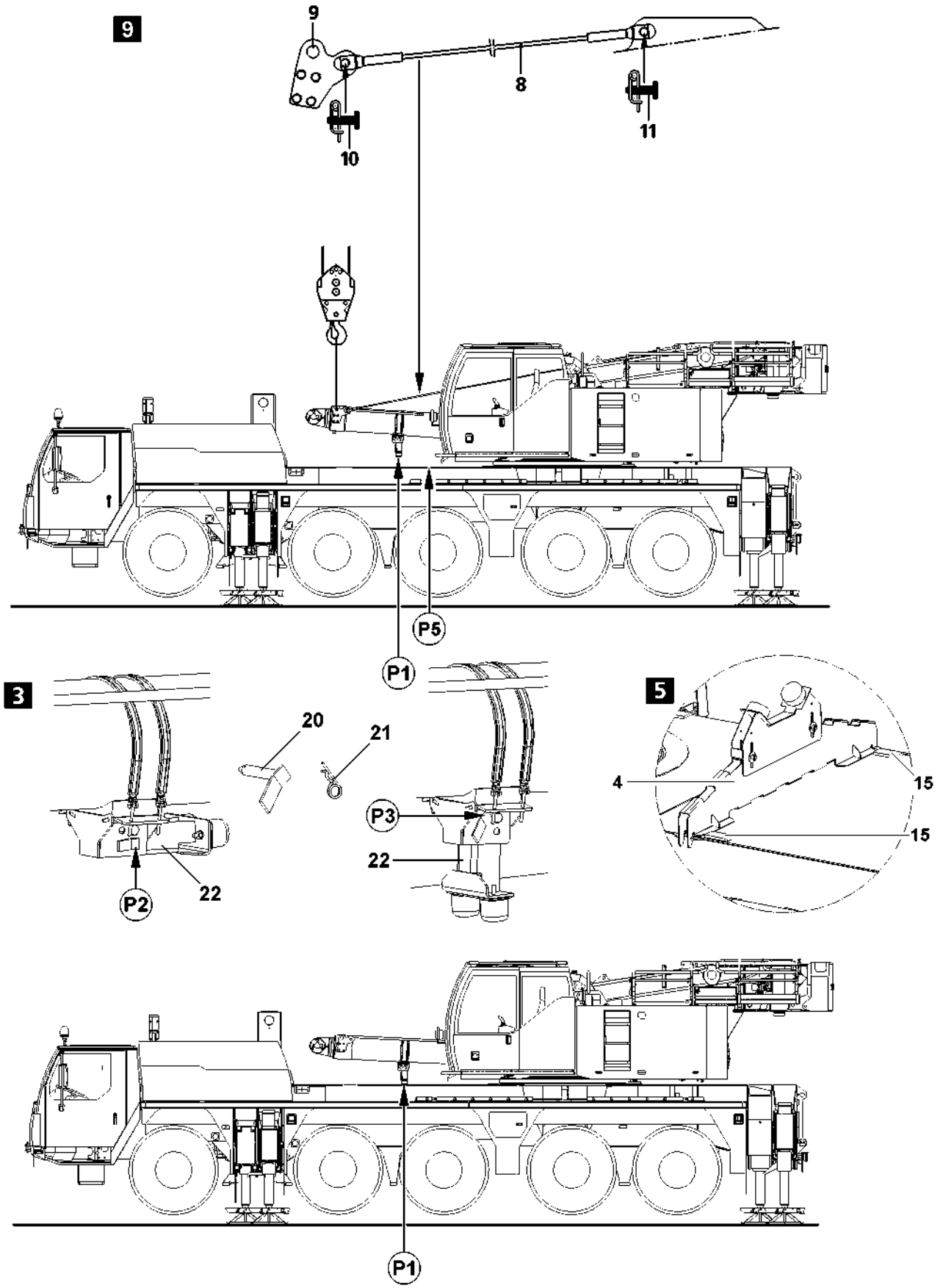

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Fig.120850

3 Assembly

WARNING
Danger of accident!
▶ The crane must be properly supported, horizontally aligned and the axle suspension must be blocked before turning the crane superstructure!

Make sure that the following prerequisites are met:
– The crane is properly supported and horizontally aligned.
– The axle suspension is blocked.
– The crane superstructure is positioned in travel direction to the rear.
– The crane engine is running.

3.1 Placing the luffing cylinder down to the front

▶ Unlock the turntable from the crane vehicle.
▶ Turn the turntable by 180 ° to the front.
▶ Release the pin **20** on point **P2** and unpin, see illustration **3**.
▶ Fold the luffing cylinder support **22** out on point **P1**.
▶ Insert the pin **20** on point **P3** and secure with cotter pin **21**, see illustration **3**.
▶ Hang the auxiliary crane on the retaining bracket **9**, see illustration **9**.
▶ Lift the luffing cylinder with the auxiliary crane.
▶ Release pin **10** and pin **11** and unpin on both sides.
▶ Store the retaining ropes **8**.
▶ Place the luffing cylinder down with the auxiliary crane until the luffing cylinder support **22** is laying on the crane chassis at point **P1**.
▶ Disengage the auxiliary crane on the retaining bracket **9**.
▶ Retract the support cylinder on the crane vehicle to the point where the support plates touch the ground but the weight of the crane is on the wheels.
▶ Hang the telescopic boom properly on the auxiliary crane and secure, see section „Hang the telescopic boom on the auxiliary crane“.

or

For crane types with receptacle frame*****, see illustration **5**:
Release and unpin the receptacle frame **4** on point **P5**.
▶ Set the receptacle frame **4** on point **P1** and push in to stop **15**.
▶ Unlock the turntable from the crane vehicle.
▶ Turn the turntable by 180 ° to the front.
▶ Hang the auxiliary crane on the retaining bracket **9**, see illustration **9**.
▶ Lift the luffing cylinder with the auxiliary crane.
▶ Release pin **10** and pin **11** and unpin on both sides.
▶ Store the retaining ropes **8**.
▶ Place the luffing cylinder with the auxiliary crane on the receptacle frame **4** on the crane chassis at point **P1**.
▶ Disengage the auxiliary crane on the retaining bracket **9**.
▶ Retract the support cylinder on the crane vehicle to the point where the support plates touch the ground but the weight of the crane is on the wheels.
▶ Hang the telescopic boom properly on the auxiliary crane and secure, see section „Hang the telescopic boom on the auxiliary crane“.

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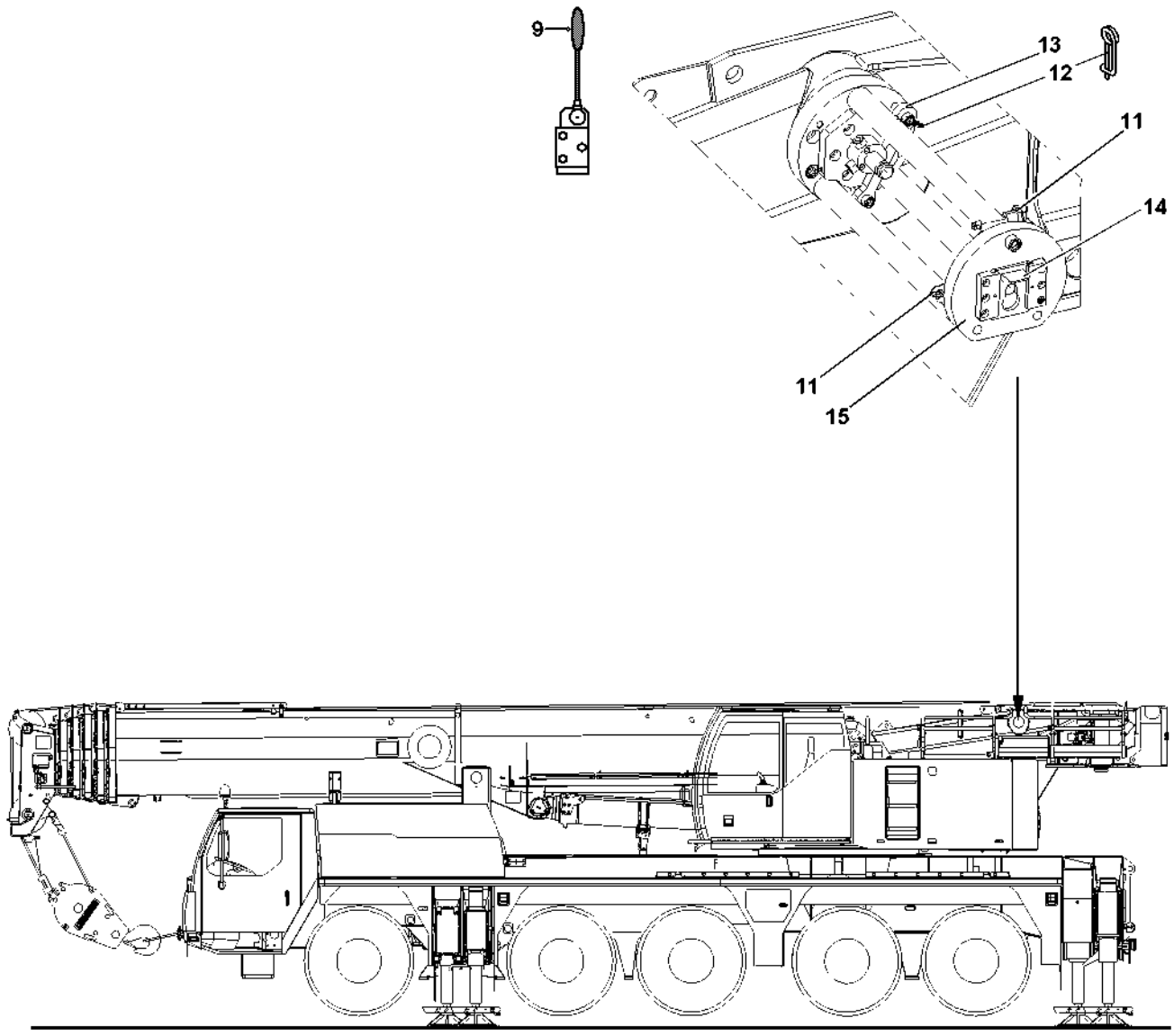

Fig.118995

3.2 Extending the pin pulling devices on the turntable

Make sure that the following prerequisites are met:
- The key hole plate **14** is pushed up.
- The hydraulic connection to the pin pulling device **15** is established.

▶ Start the crane engine.

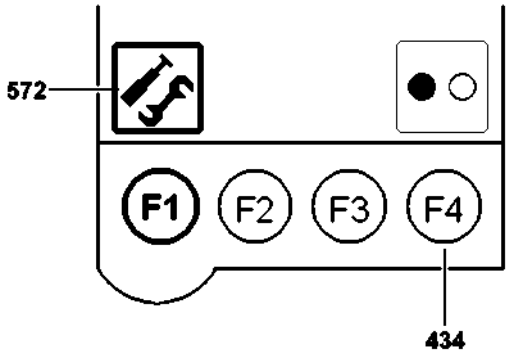

Fig.115950

▶ Preselect the pressure boost for the pin pulling device: Press the button **572**.

Result:

- The button **572** is surrounded with a black border.

▶ Add the pressure boost for the pin pulling device: Press function key F4 **434**.

Result:

- The icons in the button **572** are bolded.

▶ Remove all locking pins **11**.

WARNING
Danger of crushing fingers!
Fingers can be crushed when pinning and unpinning.
▶ Do not place your fingers between pin and bore hole.

▶ Move the manual lever **9** and extend the pin pulling device **15** fully.

WARNING
If the locking pins **11** are not pinned when the telescopic rods are telescoped out or in, then the telescopic rods can telescope out or in uncontrolled!
▶ When the telescopic rods are telescoped out or in, all locking pins **11** must be pinned!

▶ Insert all locking pins **11** again.
▶ Push the key hole plate **14** down.

Result:

- The piston rod is locked.

▶ Remove spring retainer **12** and retaining plate **13**.
▶ Move the manual lever **9** and remove the pin.

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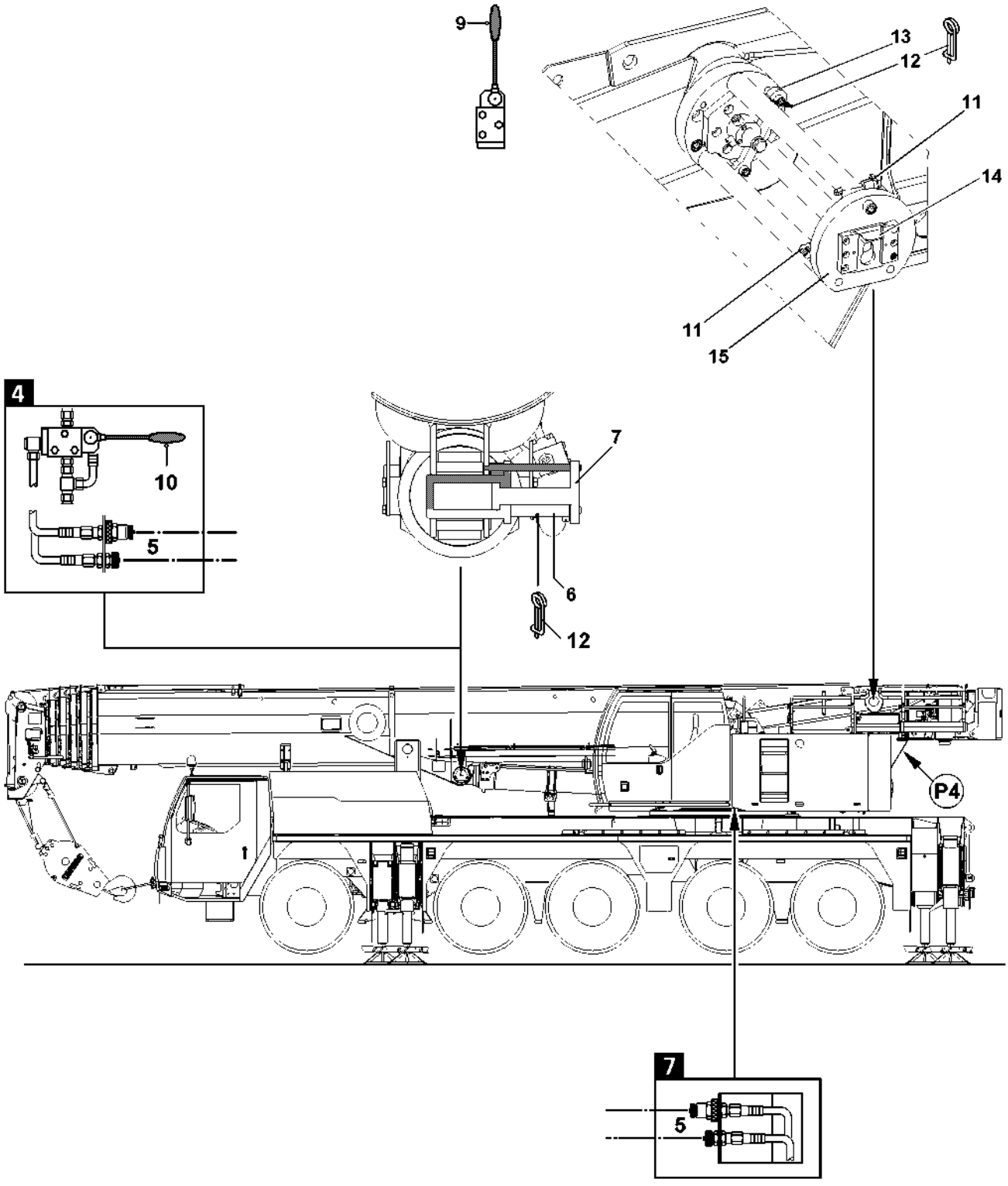

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Fig.118997

3.3 Assembling the telescopic boom

Make sure that the following prerequisites are met:
- The telescopic rods of the pin pulling devices **15** are telescoped out and secured with locking pins **11**.
- The key hole plate **14** is pushed down.

▶ Establish the hydraulic connections **5** to the pin pulling device **7** on the luffing cylinder, see illustration **4** and illustration **7**.

WARNING
Danger of damaging the pins or bore holes!
If the bore holes and pins are **not** aligned when pinning, then the bore holes or the pins may be damaged.
▶ Carefully lower the telescoping boom into the turntable until the bore holes of **telescopic boom - turntable** align.

▶ Use the auxiliary crane to carefully lower the telescopic boom into the turntable until the bore holes of the telescopic boom – turntable align.

CAUTION
Danger of crushing fingers!
Fingers can be crushed when pinning and unpinning the telescopic boom.
▶ Do not place your fingers between pin and bore hole.

▶ Move the manual lever **9** and pin the telescopic boom on the turntable.

DANGER
The pin connections can loosen up by themselves!
▶ Secure the pinnings of telescopic boom - turntable with retaining plate **13** and spring retainer **12**.

▶ Secure the pinnings telescopic boom - turntable: Secure the pinning with retaining plate **13**.
▶ Secure the retaining plate **13** with spring retainer **12**.
▶ Remove all locking pins **11**.
▶ Actuate the manual lever **9** and telescope the telescopic rod on the pin pulling device **15** in until it can be pinned.

WARNING
If the locking pins **11** are not pinned when the telescopic rods are telescoped out or in, then the telescopic rods can telescope out or in uncontrolled!
▶ When the telescopic rods are telescoped out or in, all locking pins **11** must be pinned!

▶ Insert all locking pins **11** again.

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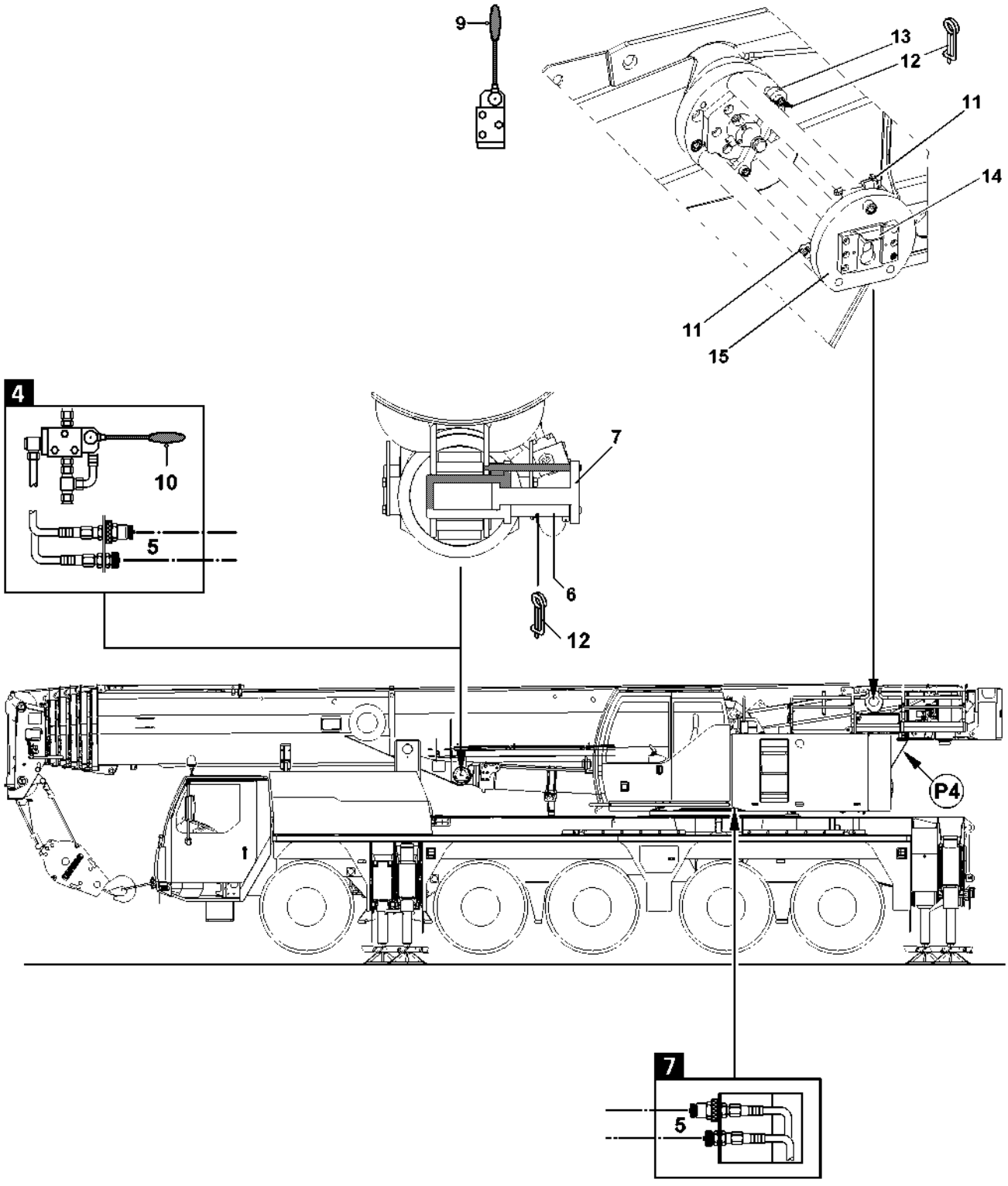

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Fig.118997

- ▶ Push the key hole plate **14** up.
- ▶ Move the manual lever **9** and telescope the piston rod on the pin pulling device **15** all the way in.

WARNING
Danger of damaging the pin or bore hole!
The bore hole of the **telescopic boom - luffing cylinder** must align in the lowered condition.
If this is not observed, the pins and bore holes can be damaged during the pinning procedure.
- ▶ Carefully lower the telescopic boom until the bore hole **telescopic boom - luffing cylinder** aligns.

- ▶ Release and remove the retaining plate **6** on the pin pulling device **7**.
- ▶ Move the manual lever **10** and pin the luffing cylinder.

DANGER
The pin connections can loosen up by themselves!
- ▶ Insert the retaining plate **6** on the pin pulling devices **7** and secure with the spring retainer **12**.

- ▶ Release the hydraulic connections **5** to the pin pulling device **7** on the luffing cylinder, see illustration **4** and illustration **7**.

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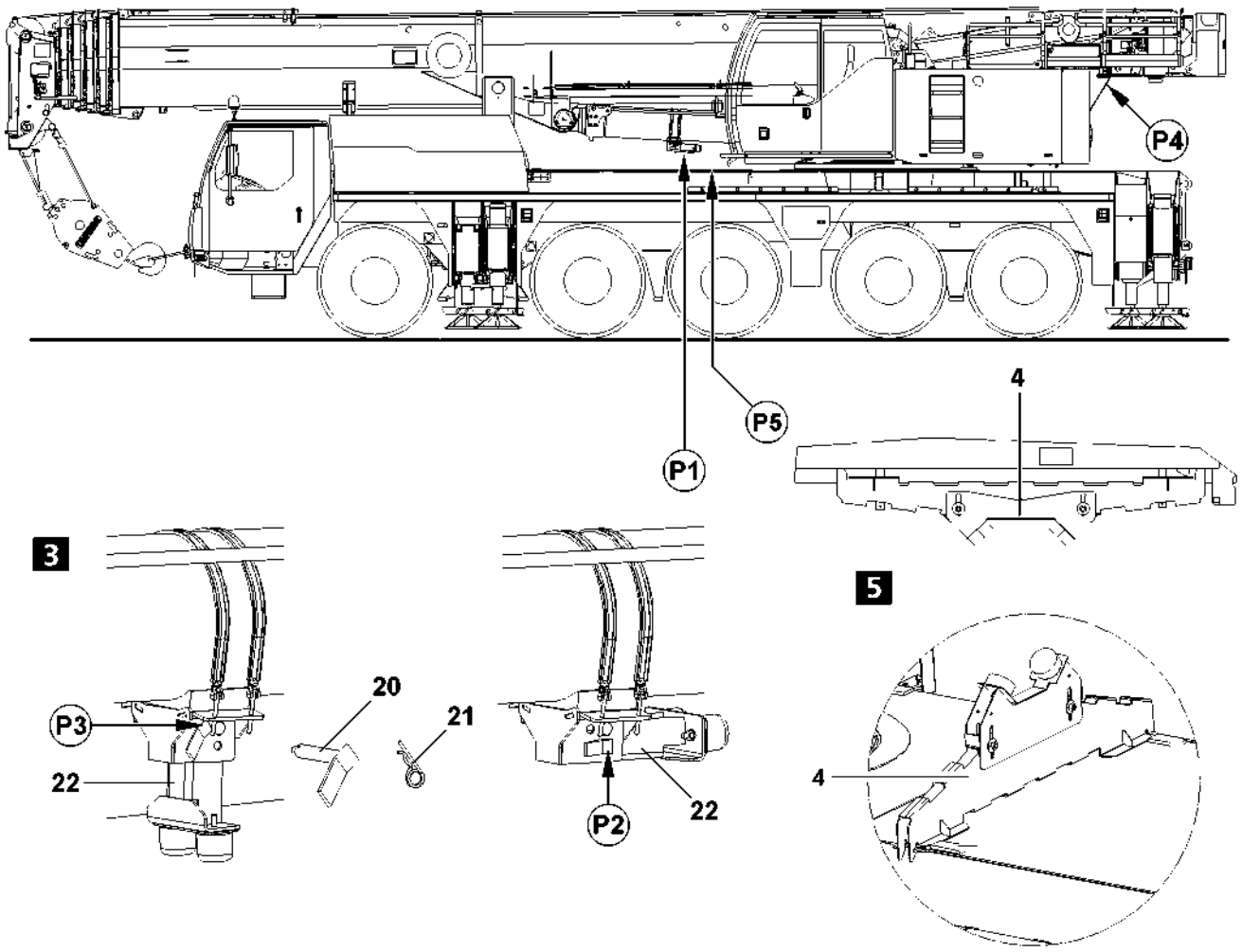

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Fig.120851

3.4 Establishing the supply lines for the telescopic boom

- ▶ Establish the electrical connections for the telescopic boom at point **P4**.
- ▶ Establish the hydraulic connections for the telescopic boom at point **P4**.

DANGER
Danger of accident due to loss of pressure or leakage!
When connecting hydraulic lines with quick couplings, make sure that the coupling procedure is carried out correctly.
Incorrectly connected couplings can lead to loss of pressure or sudden leaks and therefore accidents!

- ▶ Check the quick couplings after installation for correct connection.
- ▶ The couplings may only be tightened by hand.

- ▶ Make sure that all hydraulic connections have been properly connected and established.

The coupling procedure is described in the following section.

Note

- ▶ Turn the engine off before connecting and disconnecting hydraulic lines.
- ▶ The engine must be idle for at least 5 minutes before the pressure in the hydraulic system is relieved.

- ▶ Turn the engine off and wait approximately **5 minutes** until the hydraulic system pressure is relieved.
- ▶ Combine the coupling components (sleeve and connector) and screw them together with the knurled nut.
- ▶ Turn the knurled nut over the O-ring until you feel a noticeable, fixed stop.
- ▶ Tighten the hydraulic couplings **by hand**.

3.5 Folding the luffing cylinder support in

Before the luffing cylinder support **22** can be folded in on point **P1**:

- ▶ Luff up the telescopic boom slightly.
- ▶ Release the pin **20** on point **P3** and remove, see illustration **3**.
- ▶ Fold the luffing cylinder support **22** on, see point **P1**.
- ▶ Insert the pin **20** on point **P2** and secure with cotter pin **21**, see illustration **3**.
- ▶ Luff the telescopic boom down.

or

For crane types with receptacle frame*****, see illustration **5**:
Remove the receptacle frame **4** on point **P1** and insert, pin and secure on point **P5** in transport position.

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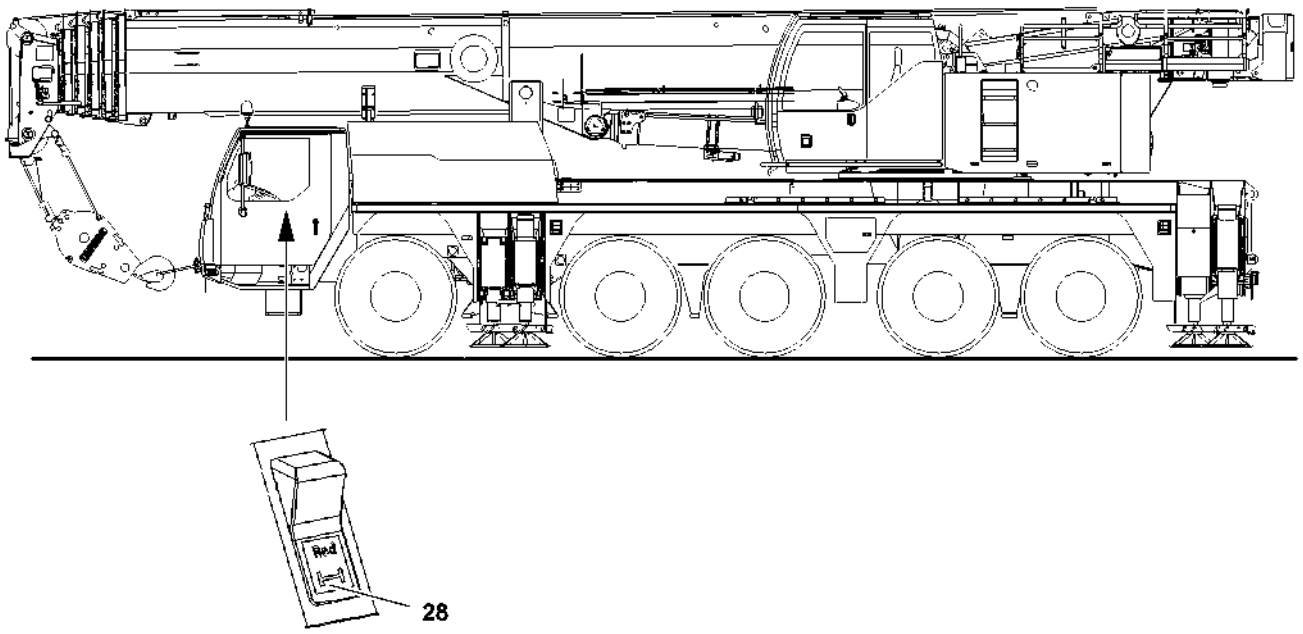

Fig.118994

3.6 Final tasks

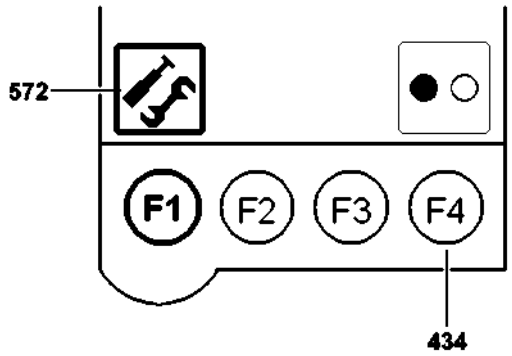

Fig.115950

▶ Turn the pressure boost for the pin pulling device off: Press function key F4 **434**.

Result:

– The icons in the button **572** are **no** longer bolded.

▶ Deselect the pressure boost for the pin pulling device: Press the button **572**.

Result:

– The button **572** is **no** longer surrounded with a black border.

▶ Retract the support cylinders and sliding beams.
▶ Turn off the axle suspension lock.

DANGER
Danger of accident!
▶ The diaphragm reservoirs of the axle suspension must be manually changed to 12 t axle load before „driving with the telescopic boom“.

▶ Actuate the switch **28**.

Result:

– The diaphragm reservoirs of the axle suspension are manually switched over to 12 t axle load.
– The indicator light in the switch **28** does not light up.

▶ Activate the automatic level control, refer to chapter 3.03.

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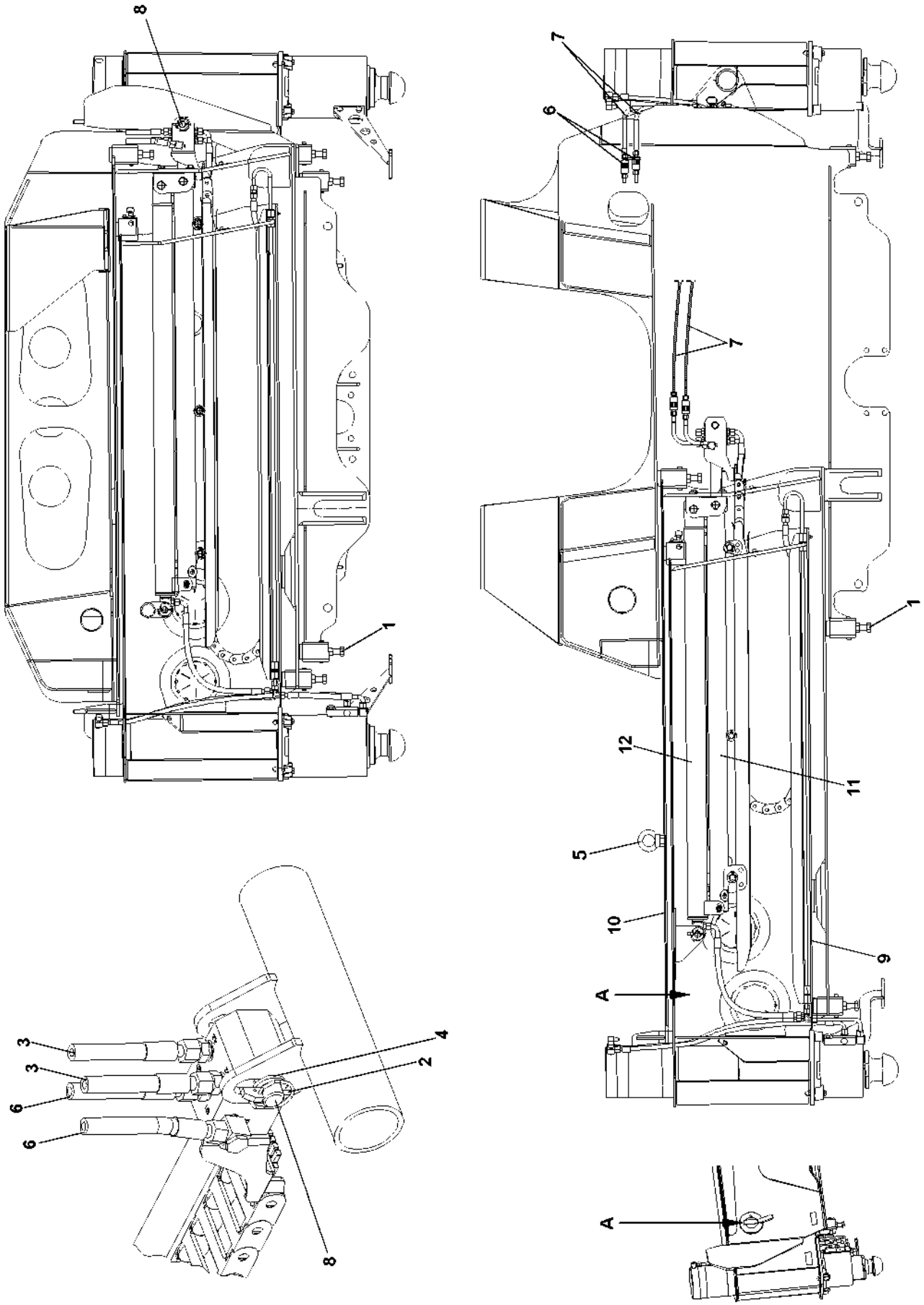

Fig.104959

1 General

In order to reduce the axle loads of this crane, the sliding beams can be removed. The sliding beams are removed and reinstalled complete with the support and extension cylinders.

There are two possibilities:
- Remove / install sliding beams with auxiliary crane
- Remove / install sliding beams **on the front** with own crane

1.1 Components

	Component
1	Glide section
2	Locking pin
3	Hydraulic connection for the support cylinder
4	Washer
5	Eyebolt
6	Hydraulic connection for the extension cylinder
7	Hydraulic extension hoses
8	Pins for attachment of extension cylinder
9	Sliding beam 1
10	Sliding beam 2
11	Extension cylinder 1
12	Extension cylinder 2

1.2 Weights

Component	Weight
Rear sliding beams	1.0 t
Front sliding beams	0.8 t

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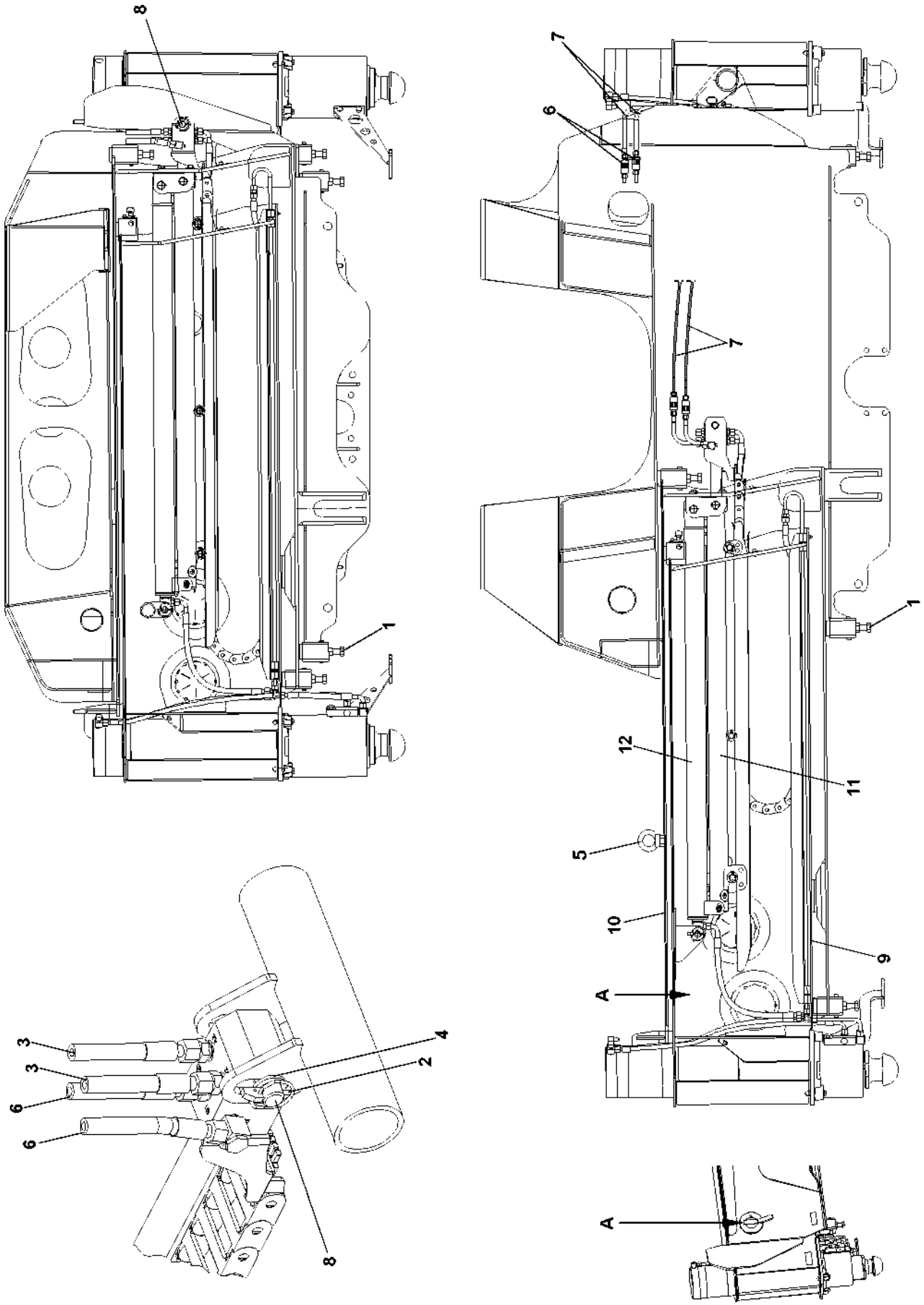

Fig.104959

2 Remove sliding beams with auxiliary crane*

Make sure that the following prerequisites are met:
- The sliding beams and support cylinders are fully retracted.
- The covers of the sliding beam boxes have been removed.
- An auxiliary crane is available.

2.1 Disassembly of the sliding beams

If the crane is equipped with support force monitoring*****:
▶ Release the plug connection for the support force monitoring system.

If the crane is equipped with a sliding beam monitoring system*****:
▶ Disengage the cable for the sliding beam monitoring system.

In order to obtain better movement of the sliding beams, the sliding sections **1** must be released.

▶ Back out the bolts of the sliding sections **1** by approximately 2 turns.
▶ Release the hydraulic connection (A2 + B2) **3** for the support cylinders.
▶ Protect the hydraulic connection (A2 + B2) **3** from contamination.

If the crane is equipped with a sliding beam monitoring system*****:
▶ Disengage the cable for the sliding beam monitoring system.
▶ Extend the sliding beam 2 **10** completely.
▶ Pin and secure the sliding beam on the pin point **A**, see chapter 3.05.
▶ Install the eyebolt **5** in sliding beam 2 **10** and tighten.
▶ Attach the auxiliary crane on the eyebolt **5** and tension the tackle cable slightly.
▶ Release the hydraulic connection (A1 + B1) **6** for the sliding beams.
▶ Connect the hydraulic extension hoses **7** between the hydraulic connection (A1 + B1) **6** and the extension cylinder 1 **11**.
▶ Release the pin connection of the extension cylinder 1 **11**: Release and unpin the pin **8**.
▶ Retract the extension cylinder 1 **11** completely.

When retracting the extension cylinders, make sure that the hydraulic extension hoses **7** are easy to move over the entire retraction length.

▶ Disconnect the hydraulic extension hoses **7** on the hydraulic connection (A1 + B1) **6** and protect it from contaminants.
▶ Slightly lift the sliding beams with the auxiliary crane until they are easy to move in their guides.
▶ Move the sliding beams without twisting from the sliding beam box.
▶ Disconnect the hydraulic extension hoses **7** from the extension cylinder 1 **11** and protect them from contaminants.

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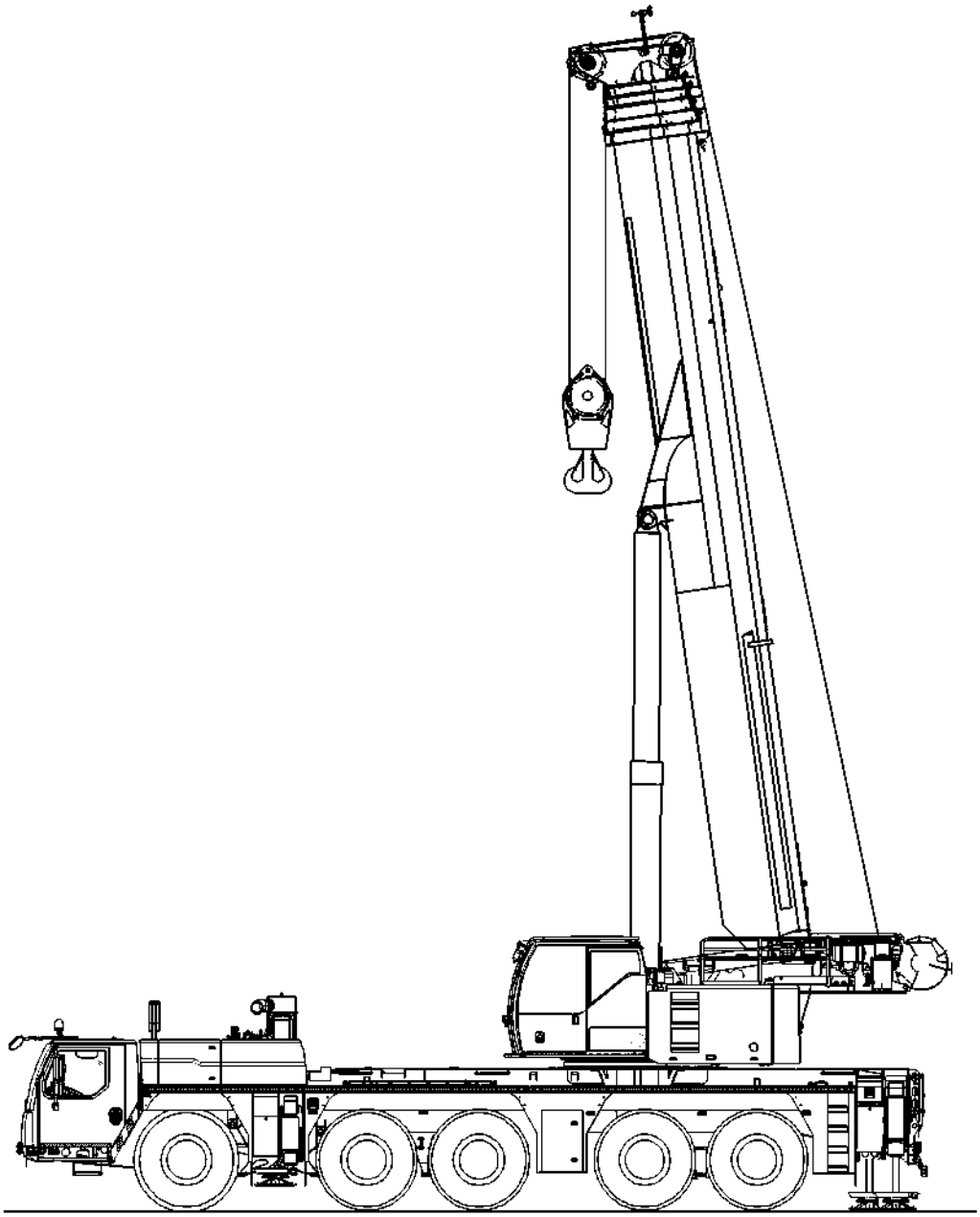

Fig.116598

3 Removing the front sliding beams with own crane*

DANGER
The crane can topple over!
- ▶ The removal and installation of the front sliding beams is only permissible with the load chart programmed just for this purpose!
- ▶ The load chart „Crane supported on the rear, support width 5 m , front freely on tires“ may only be used for the removal and installation of the **front** sliding beams!
- ▶ Removing / installing the sliding beams with the own crane **on the front and rear is prohibited**!

Make sure that the following prerequisites are met:
- The counterweight has been removed.
- The telescopic boom is fully telescoped in.
- The ground is level and of sufficient load bearing capacity.

3.1 Preparing the crane

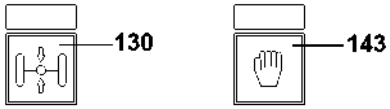

Fig.197683

▶ Press button **143** and button **130**.

Result:

- The function control on the button **130** lights up.
- The axles are blocked.

▶ Extend and pin the rear sliding beams to a support width of 5 m.

The wheels may **not** be raised off the ground when supporting the crane.

▶ Extend the rear support cylinders and support the crane to support width of 5 m.

WARNING
The crane can topple over!
If the crane is operated with the incorrect load chart, the crane can topple over!
- ▶ Set up operation with removed front sliding beams is only permissible with the load chart programmed just for this purpose!

▶ Set the load chart „Crane supported on rear, support width 5 m , front freely on tires“ on the LICCON overload protection.

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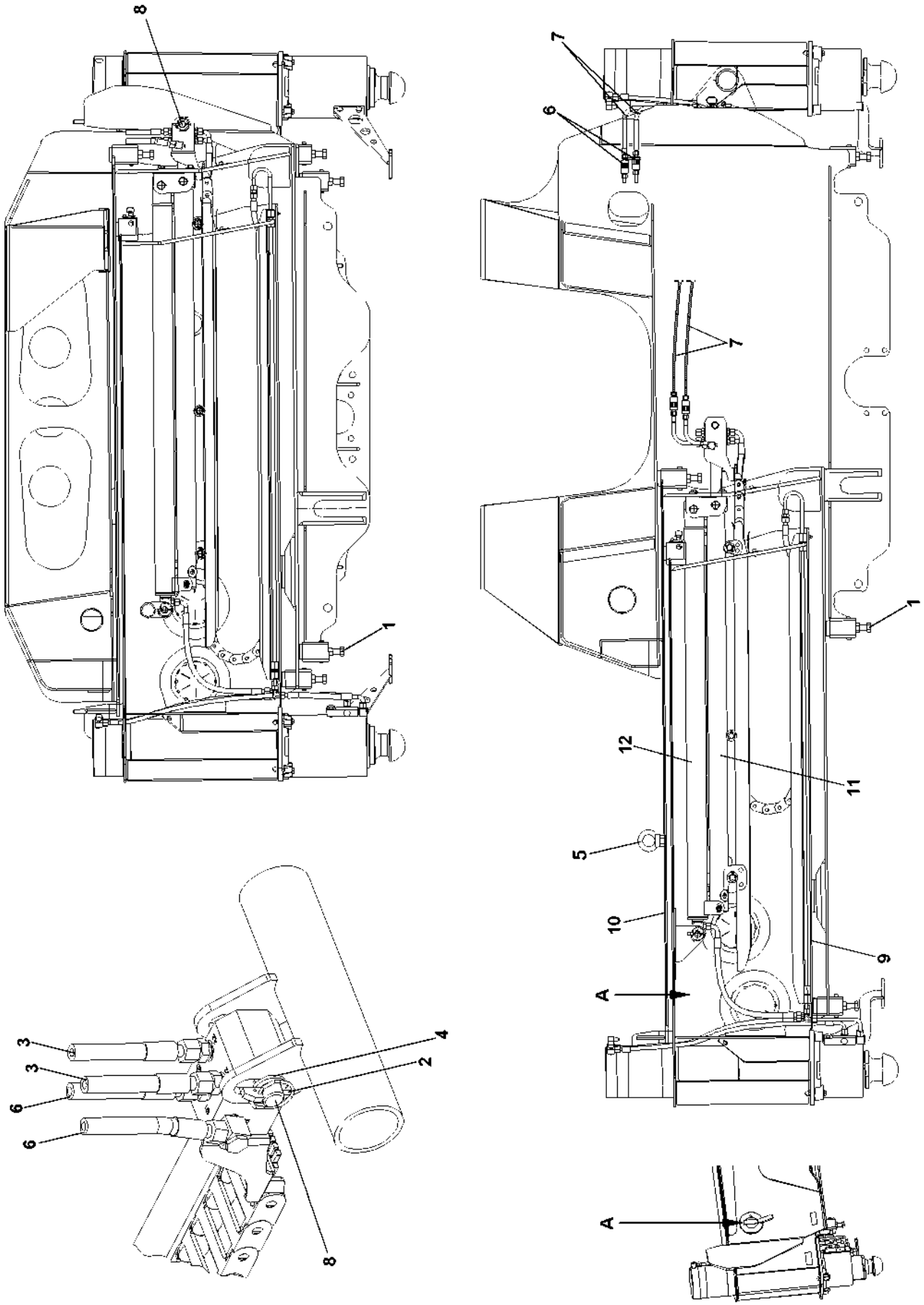

Fig.104959

3.2 Removing the front sliding beams

Make sure that the following prerequisites are met:
- The covers of the sliding beam boxes have been removed.
- The load chart „Crane supported on rear, support width 5 m , front freely on tires“ is set on the LIC-CON overload protection.

If the crane is equipped with support force monitoring*****:
▶ Release the plug connection for the support force monitoring system.

If the crane is equipped with a sliding beam monitoring system*****:
▶ Disengage the cable for the sliding beam monitoring system.

In order to obtain better movement of the sliding beams, the sliding sections **1** must be released.

▶ Back out the bolts of the sliding sections **1** by approximately 2 turns.
▶ Release the hydraulic connection (A2 + B2) **3** for the support cylinders.
▶ Protect the hydraulic connection (A2 + B2) **3** from contamination.

If the crane is equipped with a sliding beam monitoring system*****:
▶ Disengage the cable for the sliding beam monitoring system.
▶ Extend the sliding beam 2 **10** completely.
▶ Pin and secure the sliding beam on the pin point **A**, see chapter 3.05.
▶ Install the eyebolt **5** in sliding beam 2 **10** and tighten.
▶ Attach the auxiliary crane on the eyebolt **5** and tension the tackle cable slightly.
▶ Release the hydraulic connection (A1 + B1) **6** for the sliding beams.
▶ Connect the hydraulic extension hoses **7** between the hydraulic connection (A1 + B1) **6** and the extension cylinder 1 **11**.
▶ Release the pin connection of the extension cylinder 1 **11**: Release and unpin the pin **8**.
▶ Retract the extension cylinder 1 **11** completely.

When retracting the extension cylinders, make sure that the hydraulic extension hoses **7** are easy to move over the entire retraction length.

▶ Disconnect the hydraulic extension hoses **7** on the hydraulic connection (A1 + B1) **6** and protect it from contaminants.
▶ Slightly lift the sliding beams with the auxiliary crane until they are easy to move in their guides.
▶ Move the sliding beams without twisting from the sliding beam box.
▶ Disconnect the hydraulic extension hoses **7** from the extension cylinder 1 **11** and protect them from contaminants.

3.3 Final tasks

▶ Place the telescopic boom in the boom receptacle.
▶ Lock the crane superstructure with the crane chassis.
▶ Retract and pin the rear support cylinders and rear sliding beams.

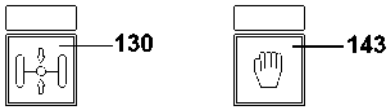

Fig.197683

▶ Press button **143** and button **130**.

Result:

– The function control on the button **130** turns off.
– The axle blocking is turned off.

▶ Level the crane to level for on road travel, see Crane operating instructions, chapter 3.03.
▶ Start driving operation.

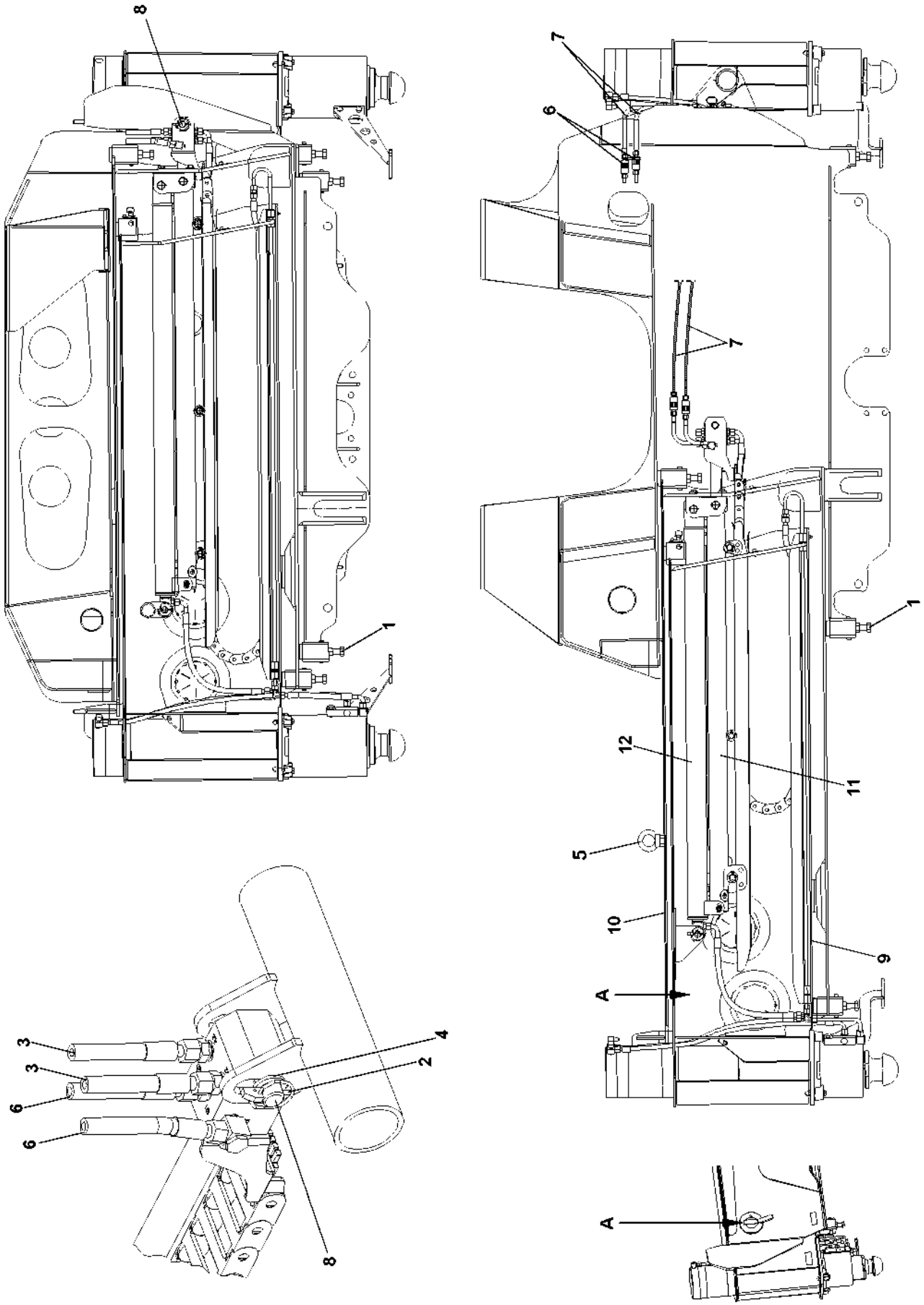

Fig.104959

4 Installing the sliding beams with the auxiliary crane*

Make sure that the following prerequisites are met:
- The covers of the sliding beam boxes have been removed.
- An auxiliary crane is available.

4.1 Installation of the sliding beams

▶ Attach the sliding beams to the auxiliary crane and lift them from the transport vehicle.
▶ Connect the hydraulic extension hoses **7** on the extension cylinder 1 **11** and guide the open ends through the sliding beam box.

Guide the hydraulic extension hoses **7** into the sliding beam boxes when inserting the sliding beams. This will prevent the hydraulic extension hoses **7** from getting jammed in the sliding beam box.

▶ Push the sliding beams into the sliding beam box as far as possible.
▶ Connect the hydraulic extension hoses **7** on the hydraulic connection (A1 + B1) **6**.
▶ Release and unpin the sliding beams on the pin point **A**.

CAUTION
Danger of crushing!
Hands may be crushed when assembling the extension cylinder 1 **11**!
▶ Carefully extend and fit extension cylinder 1 **11**.

▶ Extend the extension cylinder until the extension cylinder 1 **11** can be pinned with the sliding beam box.
▶ Pin the extension cylinder 1 **11** with the sliding beam box: Insert the pin **8** and secure with locking pin **2** and washer **4**.
▶ Disconnect the hydraulic extension hoses **7** from the extension cylinder **11** and from the hydraulic connection (A1 + B1) **6**.
▶ Connect the hydraulic connection **6** with the hydraulic system on the extension cylinder 1 **11**.
▶ Detach the auxiliary crane.

CAUTION
Risk of damaging the sliding beam box!
If the eyebolt **5** is not removed before retracting the sliding beams, the sliding beam box may be damaged.
▶ Remove the eyebolt **5** before retracting the sliding beams!

▶ Unscrew and remove the eyebolt **5**.
▶ Retract the sliding beams.
▶ Establish the hydraulic connection (A2 + B2) **3** for the support cylinders.

If the crane is equipped with a sliding beam monitoring system*****:
▶ Engage the cable for the sliding beam monitoring system.

If the crane is equipped with a support force monitoring system*****:
▶ Establish the plug connection for the support force monitoring system.
▶ Adjust, tighten and counter the sliding sections **1** to the previous dimension (before removal).

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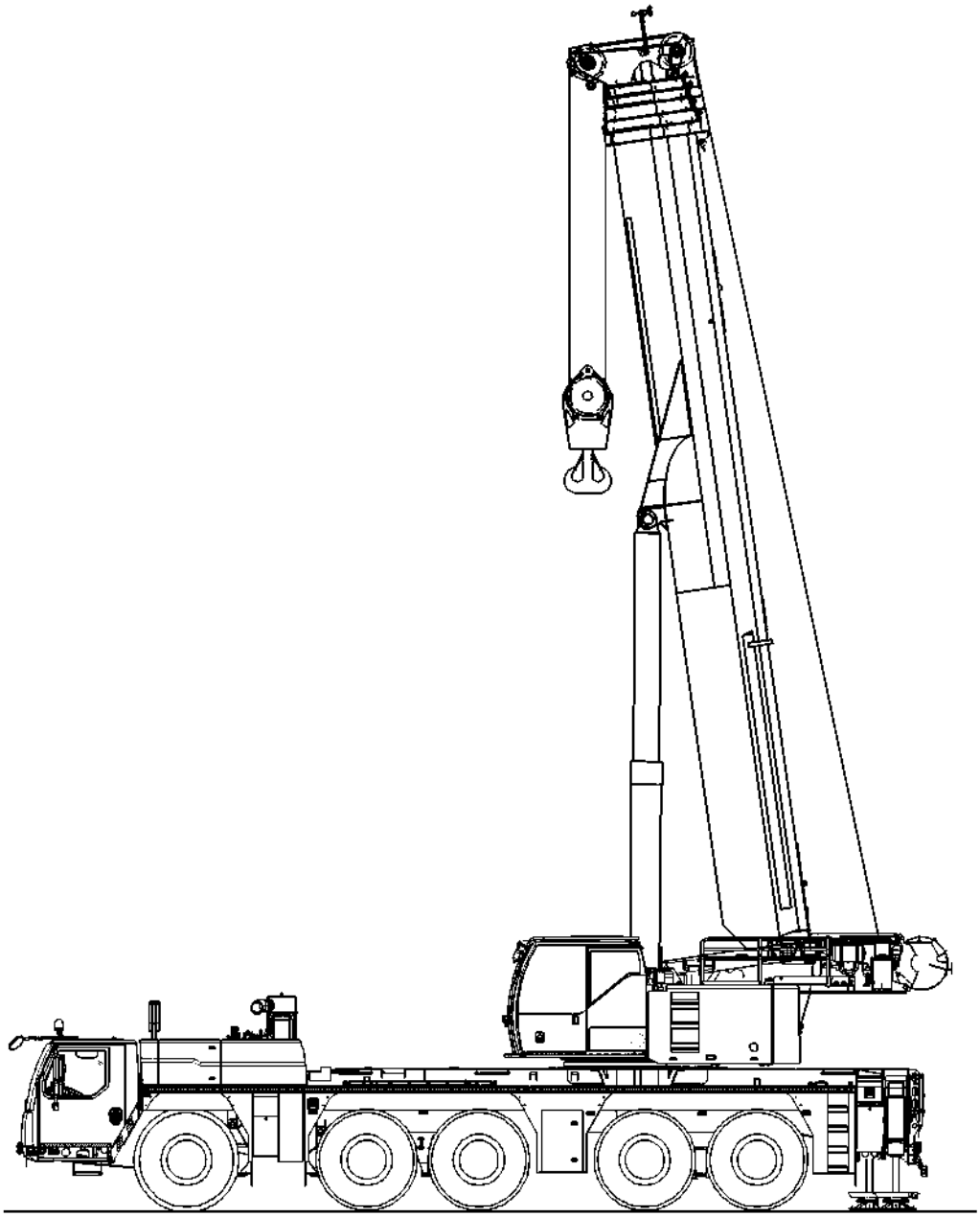

Fig.116599

5 Installing the front sliding beams with own crane*

DANGER
The crane can topple over!
- ▶ The removal and installation of the front sliding beams is only permissible with the load chart programmed just for this purpose!
- ▶ The load chart „Crane supported on the rear, support width 5 m , front freely on tires“ may only be used for the removal and installation of the **front** sliding beams!
- ▶ Removing / installing the sliding beams with the own crane **on the front and rear is prohibited**!

Make sure that the following prerequisites are met:
- The counterweight has been removed.
- The telescopic boom is fully telescoped in.
- The ground is level and of sufficient load bearing capacity.

5.1 Preparing the crane

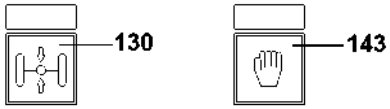

Fig.197683

▶ Press button **143** and button **130**.

Result:

- The function control on the button **130** lights up.
- The axles are blocked.

▶ Extend and pin the rear sliding beams to a support width of 5 m.

The wheels may **not** be raised off the ground when supporting the crane.

▶ Extend the rear support cylinders and support the crane to support width of 5 m.

WARNING
The crane can topple over!
If the crane is operated with the incorrect load chart, the crane can topple over!
- ▶ Set up operation with removed front sliding beams is only permissible with the load chart programmed just for this purpose!

▶ Set the load chart „Crane supported on rear, support width 5 m , front freely on tires“ on the LICCON overload protection.

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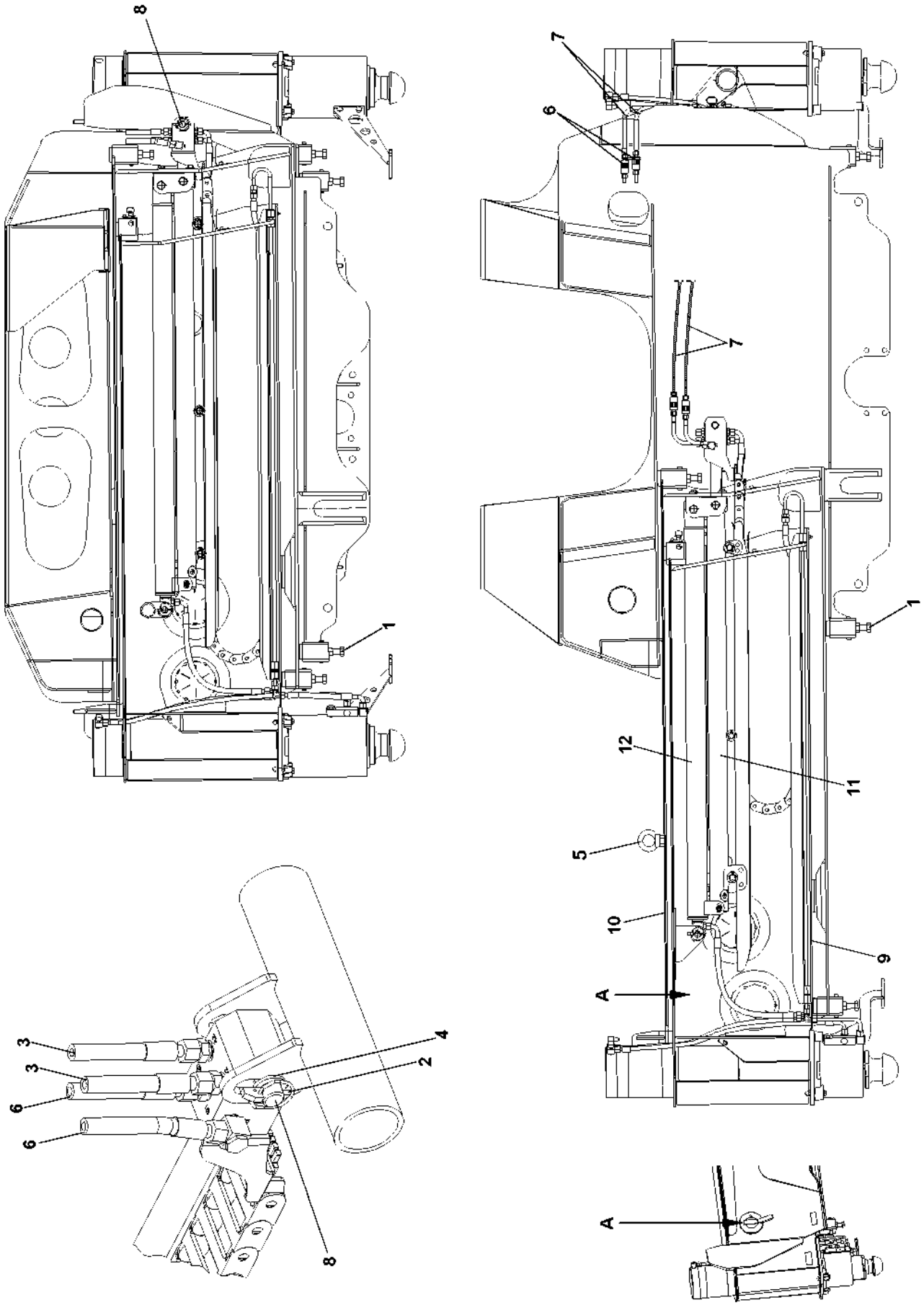

Fig.104959

5.2 Installing the front sliding beams

Make sure that the following prerequisites are met:
– The load chart „Crane supported wide, support width 5 m , front freely on tires“ is set on the LIC-CON overload protection.

▶ Attach the sliding beams to the auxiliary crane and lift them from the transport vehicle.
▶ Connect the hydraulic extension hoses **7** on the extension cylinder 1 **11** and guide the open ends through the sliding beam box.

Guide the hydraulic extension hoses **7** into the sliding beam boxes when inserting the sliding beams. This will prevent the hydraulic extension hoses **7** from getting jammed in the sliding beam box.

▶ Push the sliding beams into the sliding beam box as far as possible.
▶ Connect the hydraulic extension hoses **7** on the hydraulic connection (A1 + B1) **6**.
▶ Release and unpin the sliding beams on the pin point **A**.

CAUTION
Danger of crushing!
Hands may be crushed when assembling the extension cylinder 1 **11**!
▶ Carefully extend and fit extension cylinder 1 **11**.

▶ Extend the extension cylinder until the extension cylinder 1 **11** can be pinned with the sliding beam box.
▶ Pin the extension cylinder 1 **11** with the sliding beam box: Insert the pin **8** and secure with locking pin **2** and washer **4**.
▶ Disconnect the hydraulic extension hoses **7** from the extension cylinder **11** and from the hydraulic connection (A1 + B1) **6**.
▶ Connect the hydraulic connection **6** with the hydraulic system on the extension cylinder 1 **11**.
▶ Detach the auxiliary crane.

CAUTION
Risk of damaging the sliding beam box!
If the eyebolt **5** is not removed before retracting the sliding beams, the sliding beam box may be damaged.
▶ Remove the eyebolt **5** before retracting the sliding beams!

▶ Unscrew and remove the eyebolt **5**.
▶ Retract the sliding beams.
▶ Establish the hydraulic connection (A2 + B2) **3** for the support cylinders.

If the crane is equipped with a sliding beam monitoring system*****:
▶ Engage the cable for the sliding beam monitoring system.

If the crane is equipped with a support force monitoring system*****:
▶ Establish the plug connection for the support force monitoring system.
▶ Adjust, tighten and counter the sliding sections **1** to the previous dimension (before removal).

5.3 Final tasks

▶ Place the telescopic boom in the boom receptacle.
▶ Lock the crane superstructure with the crane chassis.
▶ Retract and pin the rear support cylinders and rear sliding beams.

Fig.197683

▶ Press button **143** and button **130**.

Result:

– The function control on the button **130** turns off.
– The axle blocking is turned off.

▶ Level the crane to level for on road travel, see Crane operating instructions, chapter 3.03.
▶ Start driving operation.

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Empty page!

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Fig.195219

1 Minimum required hook block weight

WARNING
Falling components and hook block!
If the chosen hook block weight is not large enough. then the hoist rope pulls the hook block between the boom head and the winch from a certain hoisting height suddenly upward. As a result, the boom head and the hook block can be damaged. Damaged components and the hoist rope between the boom head and the winch can fall down.
If slack rope forms between the winch and the boom head when spooling the winch out, then the hook block can suddenly fall down.
Personnel can be severely injured or killed!
- ▶ Calculate the minimum required hook block weight before lifting the load!
- ▶ Select the weight of the hook block depending on the calculation!

If the weight of the hook block is not sufficient:
- ▶ Select a heavier hook block or increase the weight of the hook block with fastening items, load tackle, auxiliary weights or modification kits!

NOTICE
Rope damage due to insufficient weight of the hook block!
If the hook block is operated with a higher reeving than is required by the load on the respective boom length, the minimum required hook block weight increases.
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. Rope damage can result.

If no minimum system-related hoist reeving is required for the operating mode:
- ▶ Reeve the hook block at the minimum depending on the maximum rope pull and the weight of the load to be lifted!

If loads are taken up at great heights:
- ▶ If possible, increase the reeving!

If the reeving was increased:
- ▶ Deduct the hoist rope weight for the additional strands from the load.

If the hook is lowered under the crane placement surface:
- ▶ Deduct the hoist rope weight of the hoist rope under the crane placement surface from the load.

If the weight of the hook block is not sufficient:
- ▶ Select a heavier hook block or increase the weight of the hook block with fastening items, load tackle, auxiliary weights or modification kits!

Note
Recommendation for selection of hook block weight!

If the maximum load capacity for the respective boom configuration is not exceeded by an additional weight increase of the hook block:
- ▶ Increase the minimum required hook block weight additionally by at least 10 %!

If an additional weight increase of the hook block due to the maximum load capacity for the respective boom configuration is not possible:
- ▶ Lower the hook block only with utmost caution!

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Note
Observe the permissible hook block weights for erection and take down of the boom system!
If the permissible hook block weight for erection and take down of the boom system is exceeded due to the own weight increase of the hook block, then the boom system cannot be erected or taken down with this hook block weight.

▶ Observe the permissible hook block weights for erection and take down in the erection and take down charts!

If the permissible hook block weight for erection and take down is exceeded:

▶ Remove auxiliary weights for the erection and take down of the boom system!

1.1 Calculating the minimum required hook block weight

$$G = L \times M \times N \times F$$

Fig.109881: Formula to determine the minimum required hook block weight

Abbreviation	Description	Unit
G	Minimum required hook block weight	kg
L	Overall boom length	m
M	Rope weight	kg/m
N	Reeving	-
F	Factor	-

Explanation of variables to calculate the minimum required hook block weight

1.2 Determining the rope weight for the rope diameter

Rope diameter	Rope weight M
13 mm	0.85 kg/m
15 mm	1.12 kg/m
17 mm	1.45 kg/m
19 mm	1.81 kg/m
21 mm	2.24 kg/m
23 mm	2.67 kg/m
25 mm	3.09 kg/m
28 mm	3.94 kg/m
30 mm	4.46 kg/m
32 mm	5.09 kg/m
38 mm	7.21 kg/m
40 mm	7.99 kg/m
52 mm	13.50 kg/m

Rope diameter and rope weight

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1.3 Determining the factor for reeving

Reeving N	Factor F
1	1.31
2	1.34
3	1.36
4	1.39
5	1.41
6	1.44
7	1.46
8	1.49
9	1.52
10	1.54
11	1.57
12	1.60
13	1.63
14	1.65
15	1.68
16	1.71
17	1.74
18	1.77
19	1.80
20	1.83
21	1.87
22	1.90
23	1.93
24	1.96
25	2.00
26	2.03
27	2.06
28	2.10
29	2.13
30	2.17

Reeving and factor

1.4 Calculation examples

1.4.1 Calculating the required hook block weight for crane operation with 1 hoist rope winch in single operation with single hook block

Crane configuration:

– Length of main boom: 70 m

- Length of auxiliary boom: 28 m
- Rope diameter: 28 mm
- Reeving: 12 rope strands

Variables for calculation:

L = overall boom length = 98 m
M = rope weight for rope diameter 28 mm = 3.94 kg/m
N = reeving = 12
F = factor for 12 rope strands = 1.60

Calculation:

G = **L** x **M** x **N** x **F**

G = 98 m x 3.94 kg/m x 12 x 1.60

G = 7414 kg

The minimum required hook block weight must be 7414 kg and must be increased additionally by at least 10 % (741 kg) to 8155 kg. The maximum load capacity for the respective boom configuration may not be exceeded by the additional weight increase of the hook block.

1.4.2 Calculating the required hook block weight for crane operation with 2 hoist rope winches in parallel operation with double hook block

Crane configuration:

- Length of main boom: 70 m
- Length of auxiliary boom: 28 m
- Rope diameter: 28 mm
- Reeving: 2 x 8 rope strands

Variables for calculation:

L = overall boom length = 98 m
M = rope weight for rope diameter 28 mm = 3.94 kg/m
N = reeving = (2 x 8)
F = factor for 8 rope strands = 1.49

Calculation:

G = **L** x **M** x (**2** x **N**) x **F**

G = 98 m x 3.94 kg/m x (2 x 8) x 1.49

G = 9205 kg

The minimum required hook block weight must be 9205 kg and must be increased additionally by at least 10 % (921 kg) to 10126 kg. The maximum load capacity for the respective boom configuration may not be exceeded by the additional weight increase of the hook block.

2 Procedure in case of slack rope

2.1 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.

2.1.1 Spooling up 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!

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2.1.2 Luffing the boom down

NOTICE
Risk 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.

2.1.3 Lowering the hook block

▶ Lower the hook block carefully with the hoist gear.

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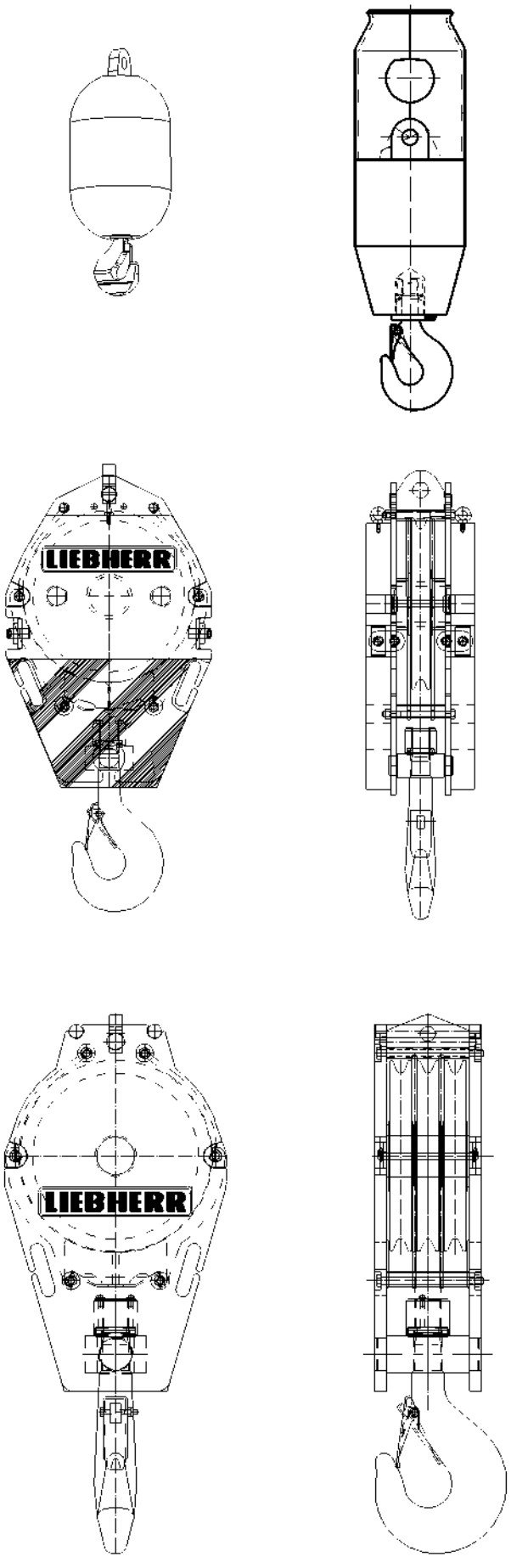

Fig.108963

3 Hook block overview

3.1 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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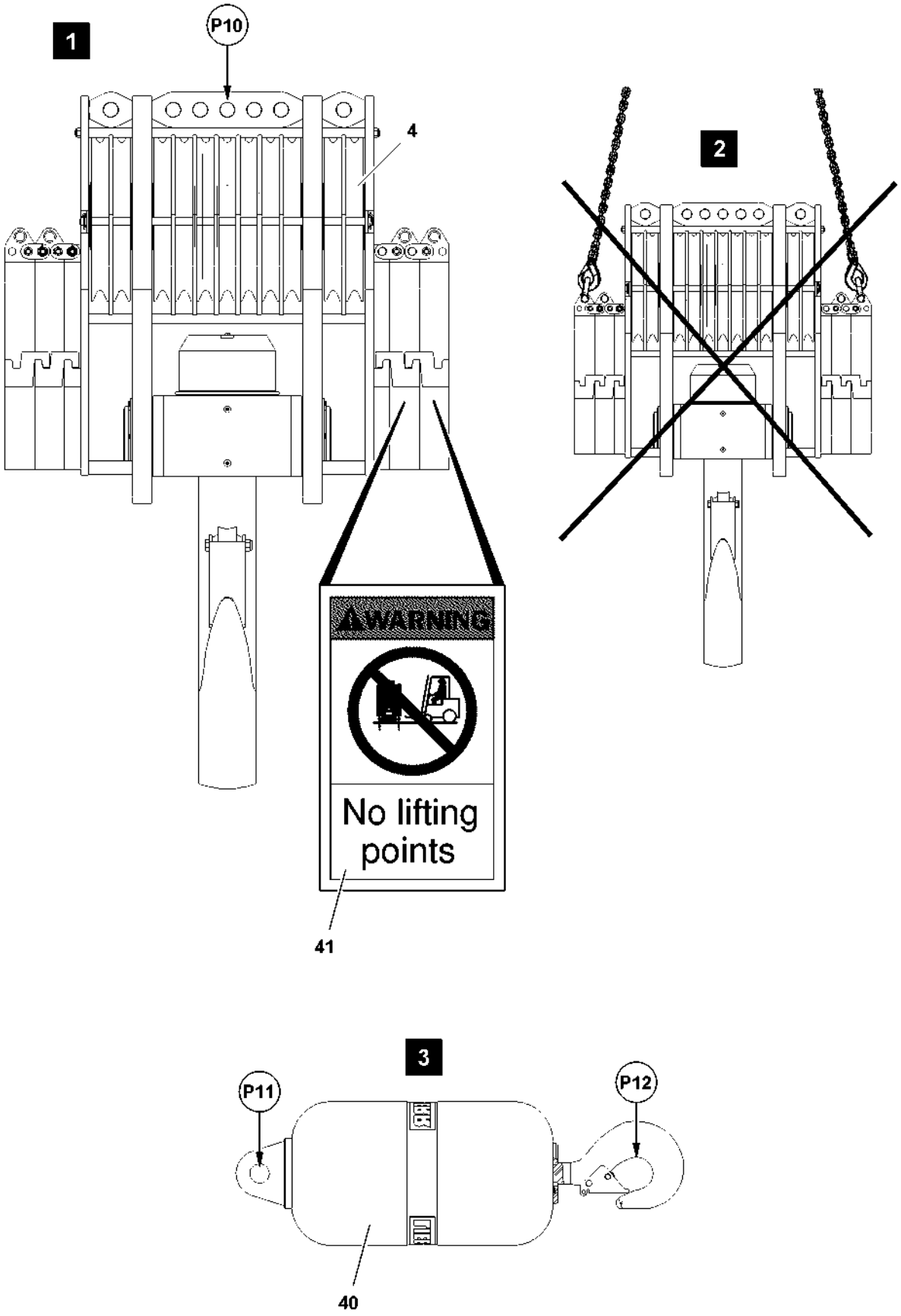

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Fig.118076

4 Transporting the hook block / load hook

4.1 Transporting the hook block / load hook with the crane

WARNING
Falling hook block during transport!
If the hook block **4** is fastened incorrectly, then the fasting point can fail and the hook block **4** can fall down!
Personnel can be killed or seriously injured!
- ▶ Fasten the hook block **4** exclusively in the center on the fastening point **P10**, illustration **1**.
- ▶ Do **not** fasten the hook block **4** on the auxiliary weights, illustration **2**.

▶ Fasten the load hook **40** on the fastening point **P11** or on the hook **P12**, illustration **3**.

4.2 Transporting the hook block / load hook with the forklift

WARNING
Falling hook block during transport!
If the hook block **4** is lifted with a forklift on the auxiliary weights, the auxiliary weights can fail and the hook block **4** can fall down! See sign **41**.
Personnel can be killed or seriously injured!
- ▶ Place the hook block **4** for transport on the EU-pallet.
- ▶ Do **not** lift the hook block **4** with a forklift on the auxiliary weights.

▶ Transport the hook block **4** with a EU-pallet.

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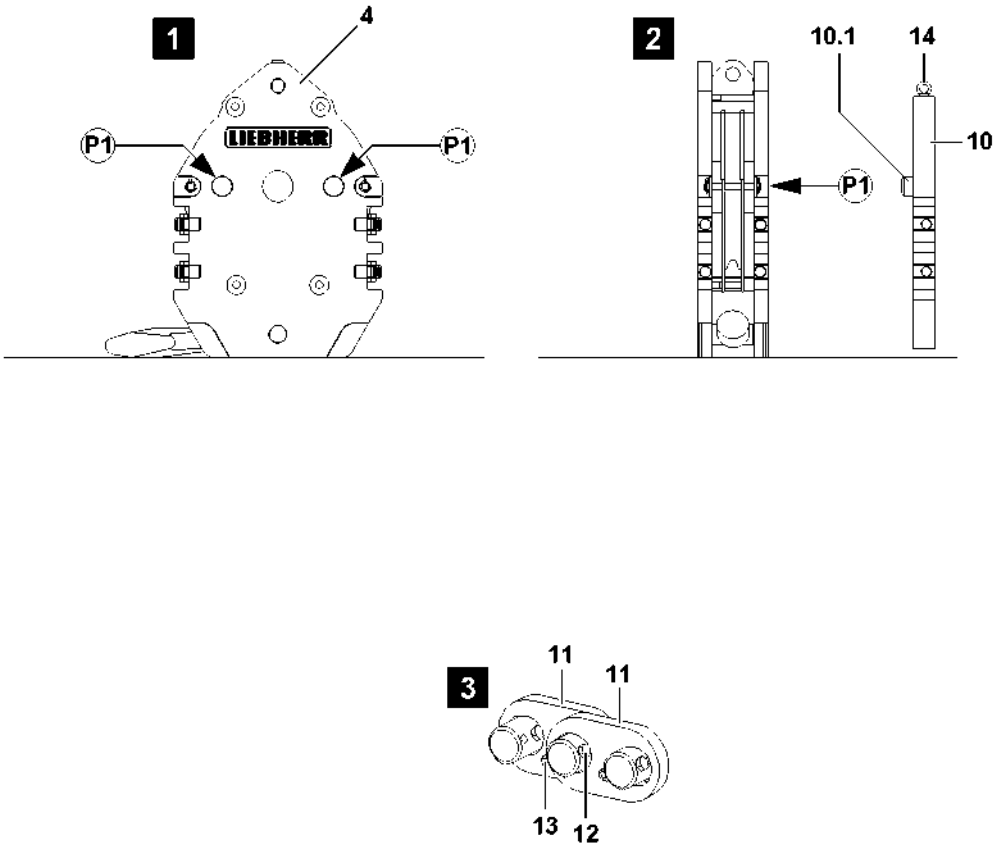

Fig.108965

5 Installing the single blocks

5.1 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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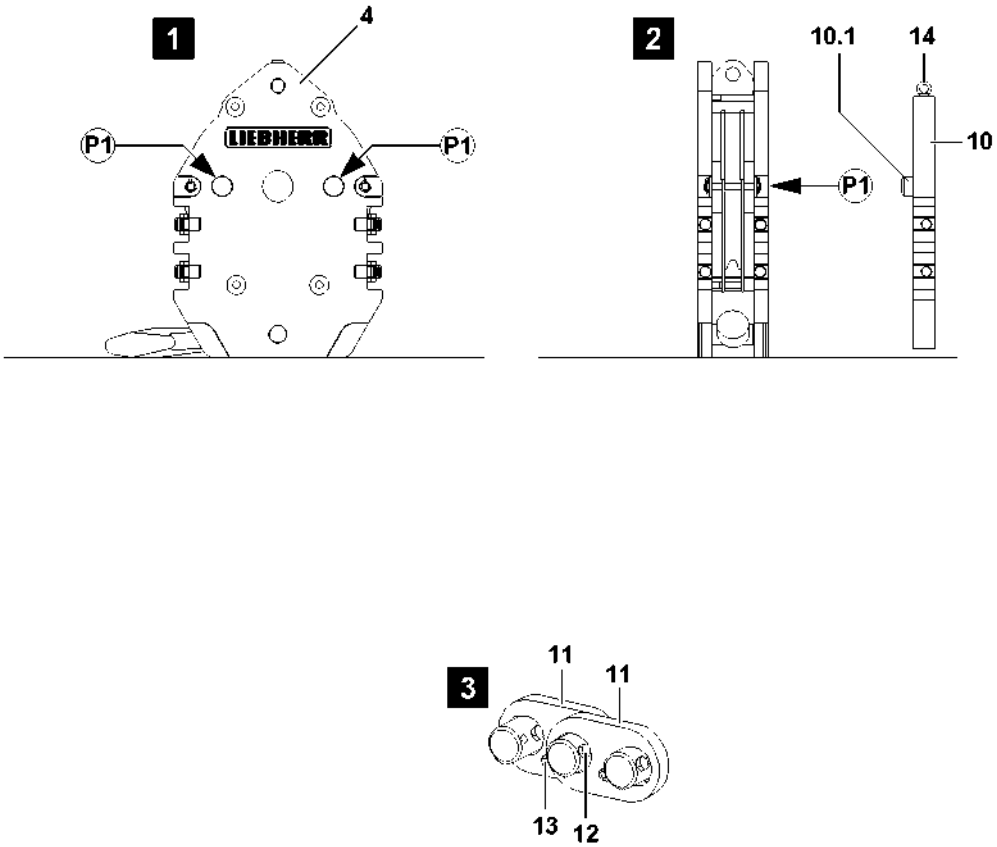

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Fig.108965

- ▶ Align the auxiliary weight **10** on the hook block.
- ▶ Move the centering pin **10.1** of the auxiliary weight into the centering bores **P1** 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.

5.2 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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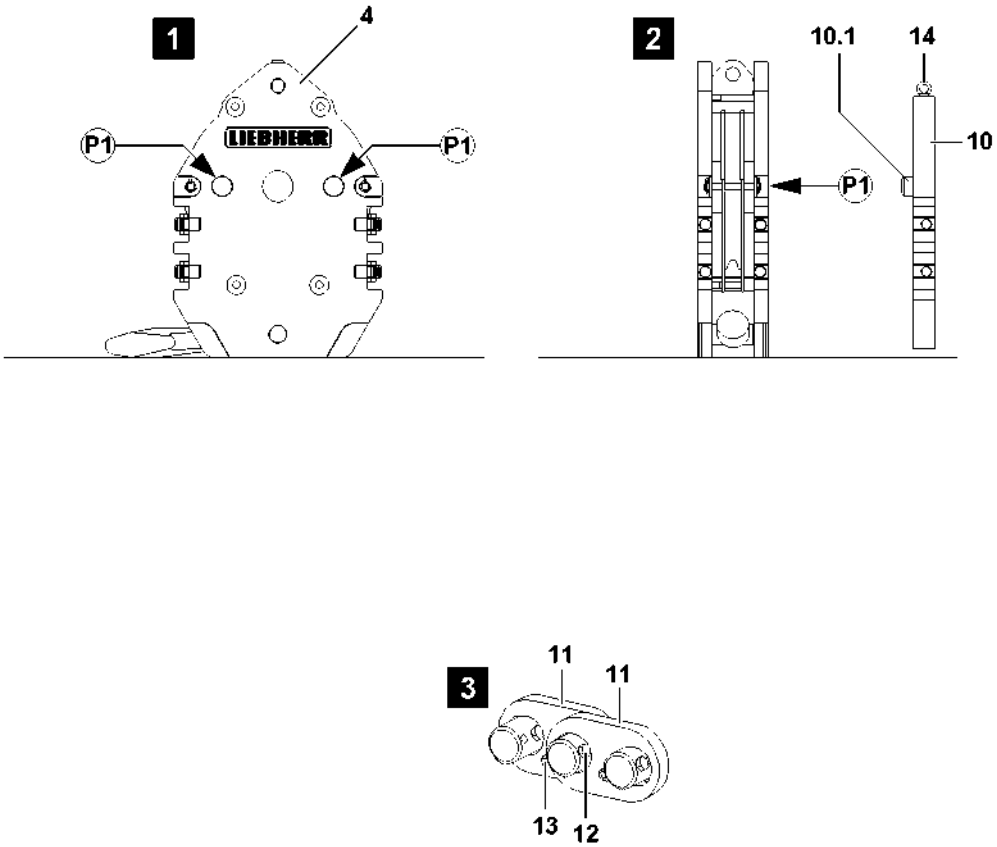

Fig.108965

6 Removing the single blocks

6.1 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!

6.2 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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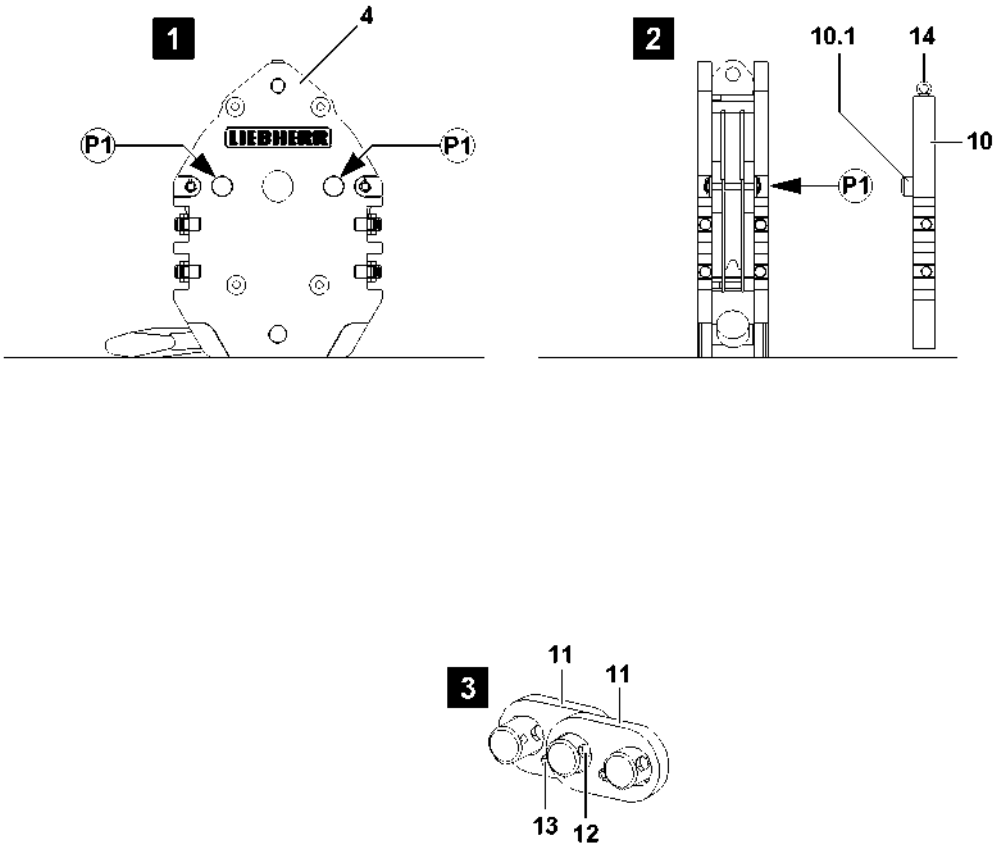

Fig.108965

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 **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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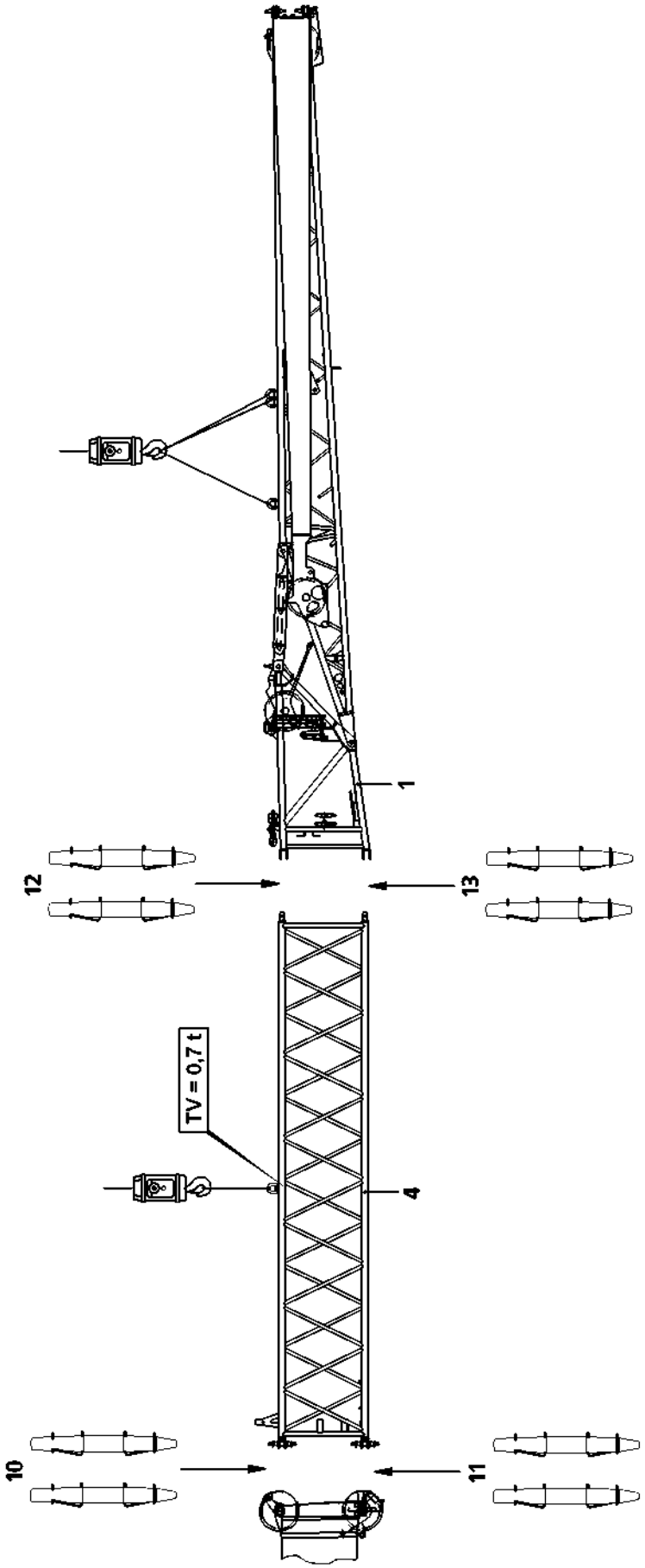

Fig.199435

1 General

To increase the lifting height, a 7 m long telescopic boom extension or two 7 m long telescopic boom extensions can be installed on this crane.

DANGER
Danger of falling!
During assembly and disassembly, 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 injuries.
▶ Also refer to hazard warnings in chapter 5.01, section „Assembly / disassembly“.

1.1 Telescopic boom extension fastening points

There is special fastening point for assembling / disassembling the telescopic boom extension.

The fastening point is marked with a tag.

Description	Abbreviation	Weight
Telescopic boom extension	TV	0.7 t

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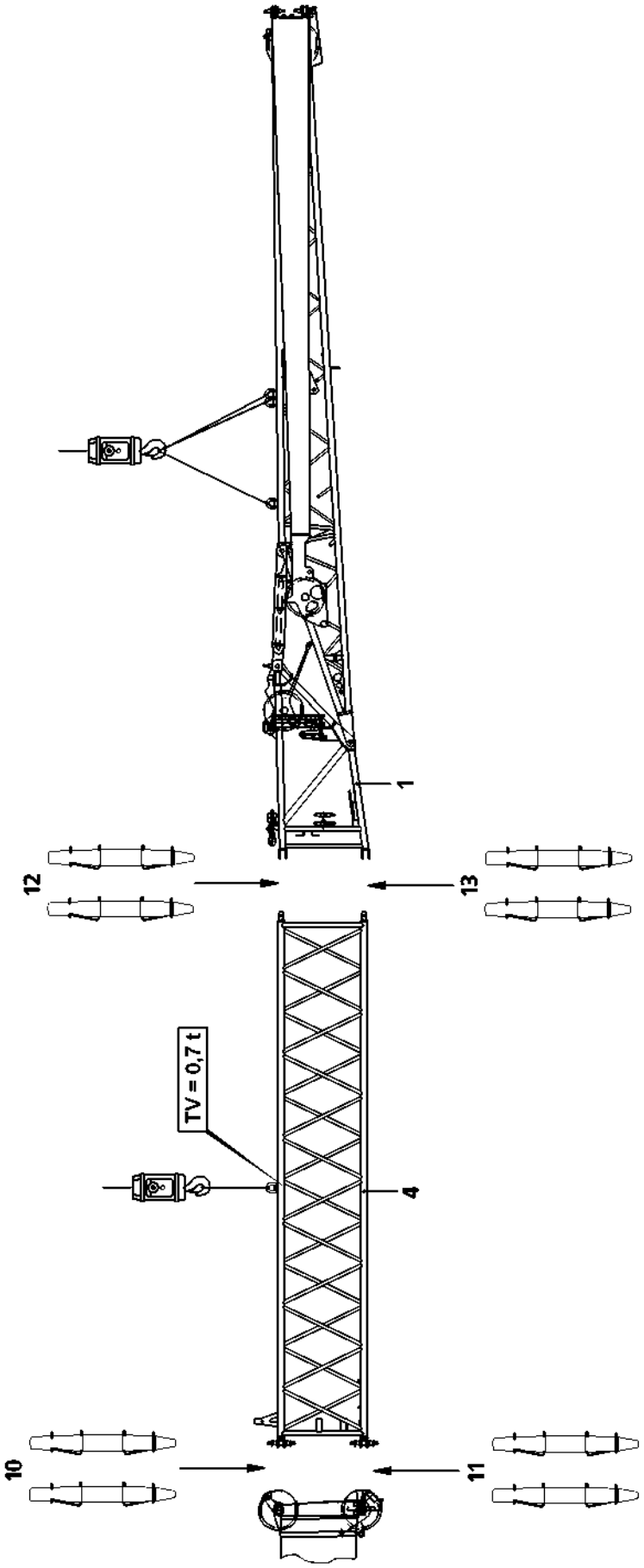

Fig.199435

2 Assembly

In the following sections, the assembly with one 7 m long telescopic boom extension is described.

DANGER
Danger of accident during the assembly / disassembly of the telescopic boom extension!
If the following conditions are not fulfilled, people may be fatally injured during assembly / disassembly.

- ▶ When knocking the pins out, no personnel may be underneath the telescopic boom extension!
- ▶ Unpin or insert the pins in the sequence specified in the operating instructions!
- ▶ Unpin or insert the pins from the top to the bottom!
- ▶ The use of spring cotters or spring retainer is prohibited on pins **10**, **11**, **12** and **13**!
- ▶ Use the special safety clips to secure pins **10**, **11**, **12** and **13**.
- ▶ Attach the auxiliary crane so that no angular pull occurs!

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 telescopic boom is fully telescoped in.
- The telescopic boom has been luffed down to the rear or the side in the 0° position.

2.1 Assembly procedure

- ▶ Attach telescopic boom extension **4** to the auxiliary crane and insert into the fork heads at the telescopic boom.
- ▶ Pin the telescopic boom extension **4** with the telescopic boom: Insert the pins **10** on both sides from top to bottom and secure.
- ▶ Insert the pins **11** on both sides from top to bottom and secure.

For the fastening points of the folding jib, see chapter 5.02.

- ▶ Attach folding jib to the auxiliary crane and insert into the fork heads at the telescopic boom extension **7**.
- ▶ Pin the folding jib with the telescopic boom extension **4**: Insert the pins **12** on both sides from top to bottom and secure.
- ▶ Insert the pins **13** on both sides from top to bottom and secure.

For more information concerning folding jib assembly see chapter 5.02.

- ▶ Completely assemble the folding jib.

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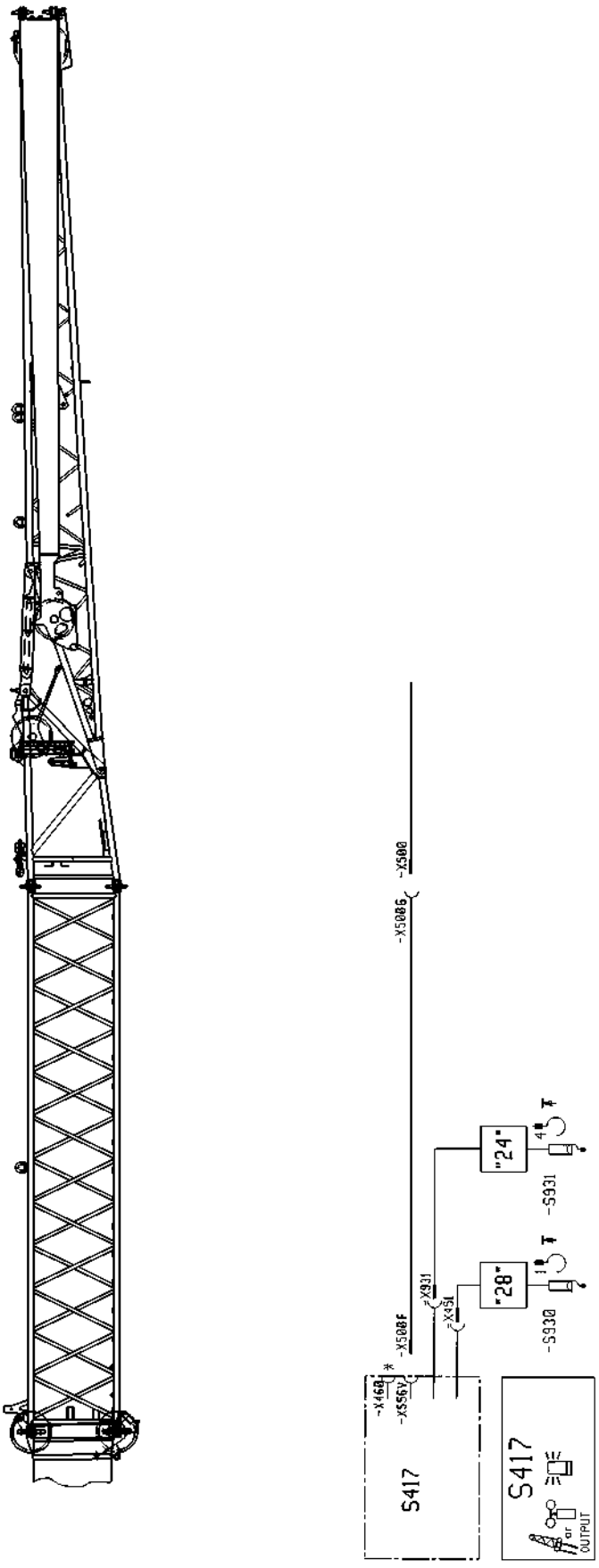

Fig.192297

LWE/LTM 1130-5-1-004/20502-04-02/en

3 Establishing the electrical / hydraulic connections

3.1 Establishing the hydraulic connection

A hydraulic connection to the folding jib must only be established for a hydraulic angle adjustment (TNZK operation). Hydraulic lines cannot be incorrectly connected due to the different diameters of the hydraulic connections.

For operation with a hydraulic folding jib:

▶ Establish the hydraulic connections.

After operation with a hydraulic folding jib:

▶ Protect the connections from contamination.

3.2 Establishing the electrical connection

▶ Insert the cable plug **-X500F** into the socket **-X556V**.

▶ Insert the cable plug **-X500** into the socket **-X500G**.

For more information concerning electrical connections to the folding jib, see chapter 5.02.

▶ Establish the electrical connection for the folding jib.

4 Erection

Carry out the erection according to chapter 5.02.

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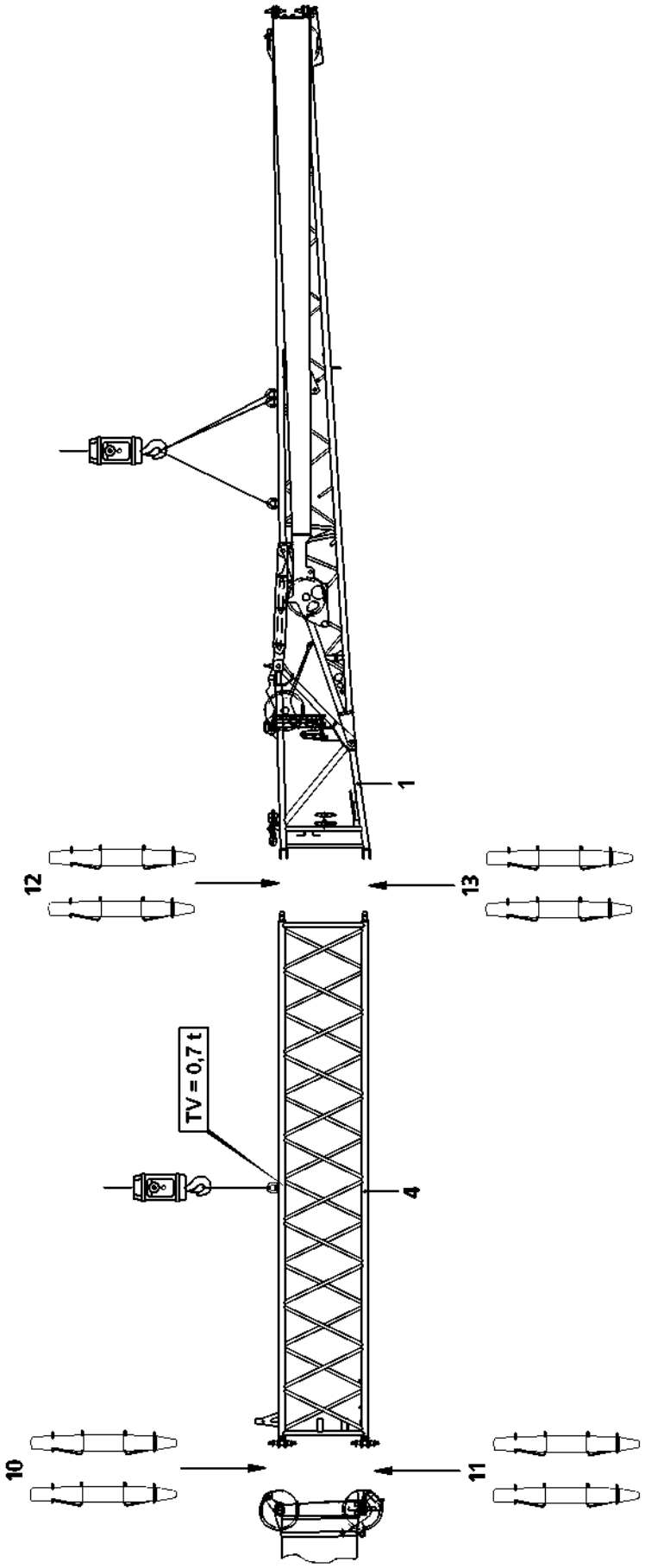

Fig.199435

5 Disassembly

In the following sections, the removal of the 7 m long telescopic boom extension is described.

DANGER
Danger of accident during the assembly / disassembly of the telescopic boom extension!
If the following conditions are not fulfilled, people may be fatally injured during assembly / disassembly.

- ▶ When knocking the pins out, no personnel may be underneath the telescopic boom extension or the folding jib!
- ▶ Remove or insert the pins in the sequence specified in the operating instructions!
- ▶ Unpin or insert the pins from the top to the bottom!
- ▶ Attach the auxiliary crane so that no angular pull occurs!
- ▶ Only lift a weight with the auxiliary crane that corresponds to the weight of the folding jib or telescopic boom extension that is being removed!
- ▶ The folding jib or telescopic boom extension may detach suddenly because of distortion!
- ▶ Do not remove folding jib or telescopic boom extension until it has been secured with the auxiliary crane to prevent it from falling!
- ▶ Leaning the auxiliary ladder on the folding jib or the telescopic boom extension is prohibited if it is just being removed!

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 telescopic boom is fully telescoped in.
- The telescopic boom has been luffed down to the rear or the side in the 0° position.
- The folding jib is in the 0° position.
- The end section, if it is carried along, is folded in and locked.
- The electrical and hydraulic lines have been disconnected.

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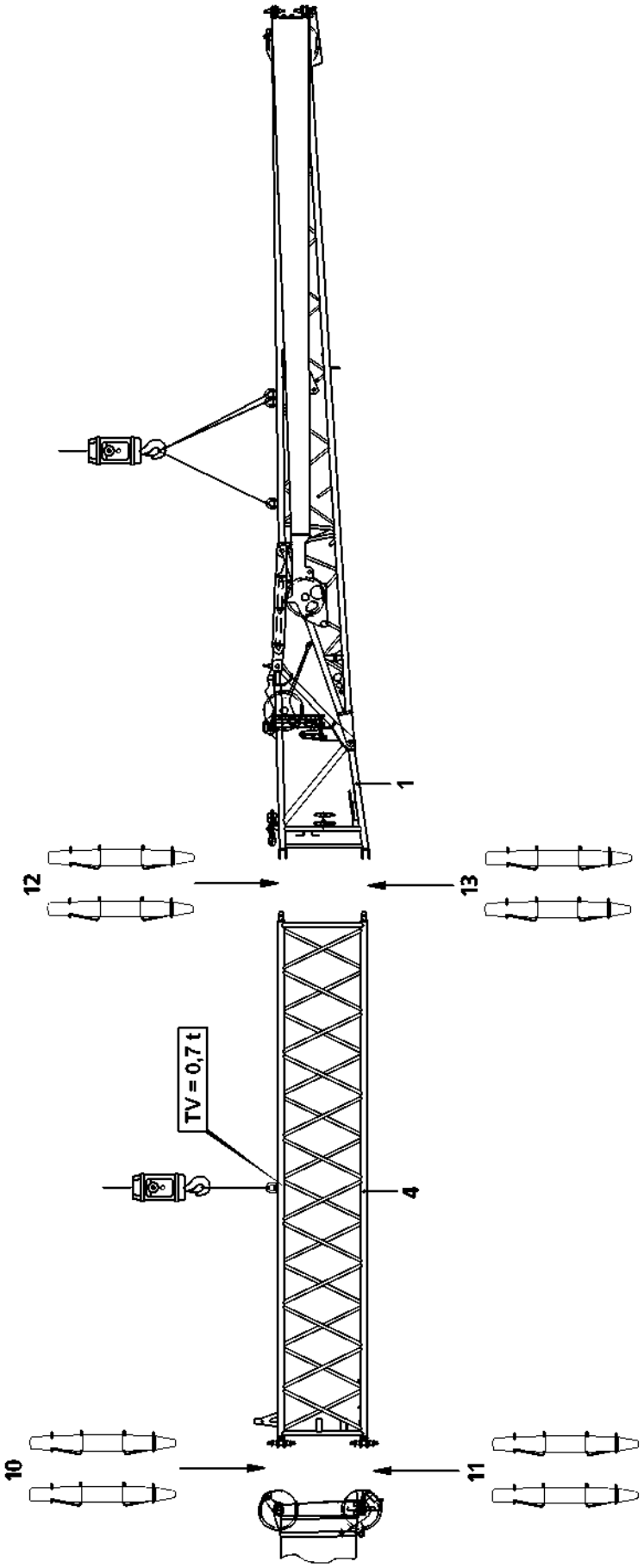

Fig.199435

5.1 Disassembly procedure

- ▶ Attach the fastening ropes on the folding jib and tighten until the folding jib is secured to prevent it from falling.
- ▶ Release pins **12** at both sides and unpin from top to bottom.
- ▶ Release pins **13** at both sides and unpin from top to bottom.
- ▶ Put down folding jib.
- ▶ Attach the fastening ropes on the telescopic boom extension **4** and tension until the telescopic boom extension **4** is secured to prevent it from falling down.
- ▶ Release pins **10** at both sides and unpin from top to bottom.
- ▶ Release pins **11** at both sides and unpin from top to bottom.
- ▶ Place the telescopic boom extension **4** down.

The following tasks are only necessary if the folding jib is to be driven along with the crane.

- ▶ Attach folding jib to the auxiliary crane and insert into the fork heads at the telescopic boom.
- ▶ Pin the folding jib to telescopic boom: Insert the pins **10** on both sides from top to bottom and secure.
- ▶ Insert the pins **11** on both sides from top to bottom and secure.

For more information concerning folding jib disassembling see chapter 5.02.

- ▶ Completely disassemble the folding jib.

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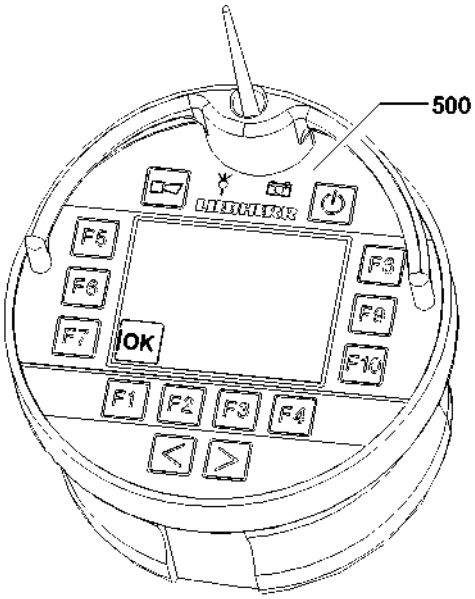

Fig.114221

1 Display / operating element Bluetooth™ Terminal

The Bluetooth™ Terminal **500** (abbreviated BTT) is a combined display / operating element for the crane. Selected crane movements can be carried out. The data exchange is made via the Bluetooth™ Basis (abbreviated BTB) installed on the crane. The data exchange can also be made wireless as well as via a connector cable.

The BTT is operated using function keys F1 - F10 and two changeover buttons.

Note

- ▶ The illustrations and / or icons on the BTT display only serve as examples.
- ▶ They may differ from the crane!
- ▶ The Bluetooth™ Terminal **500** is abbreviated in the description as „BTT“.
- ▶ The Bluetooth™ Basis is abbreviated in the description as „BTB“.

In the BTT **500**, you can call up various menus. Various crane functions can be selected or preselected, turned on or off, or directly activated in these menus.

If the BTT is in the charging cradle, the following menu points can be selected:
- Menu Kilometer display and operating hours
- Menu Climate control setting for auxiliary heater
- Menu Incline indicator

If the turned on BTT is pulled from the charging cradle, the following menu points can be selected:
- Menu Engine operation
- Menu Support
- Menu Axle suspension
- Menu Sliding beam movement
- Menu Assembly functions
- Menu Test system

The operation of the BTT **500** via the function keys and changeover buttons:

Function keys
- The function of the function keys is menu dependent. For exact description, see the respective menu section.

Changeover buttons
- The function of the changeover buttons is menu dependent. For exact description, see the respective menu section.

NOTICE

The BTT will be destroyed!

- ▶ Under no circumstances clean the BTT **500** with a jet of water or a steam cleaner.

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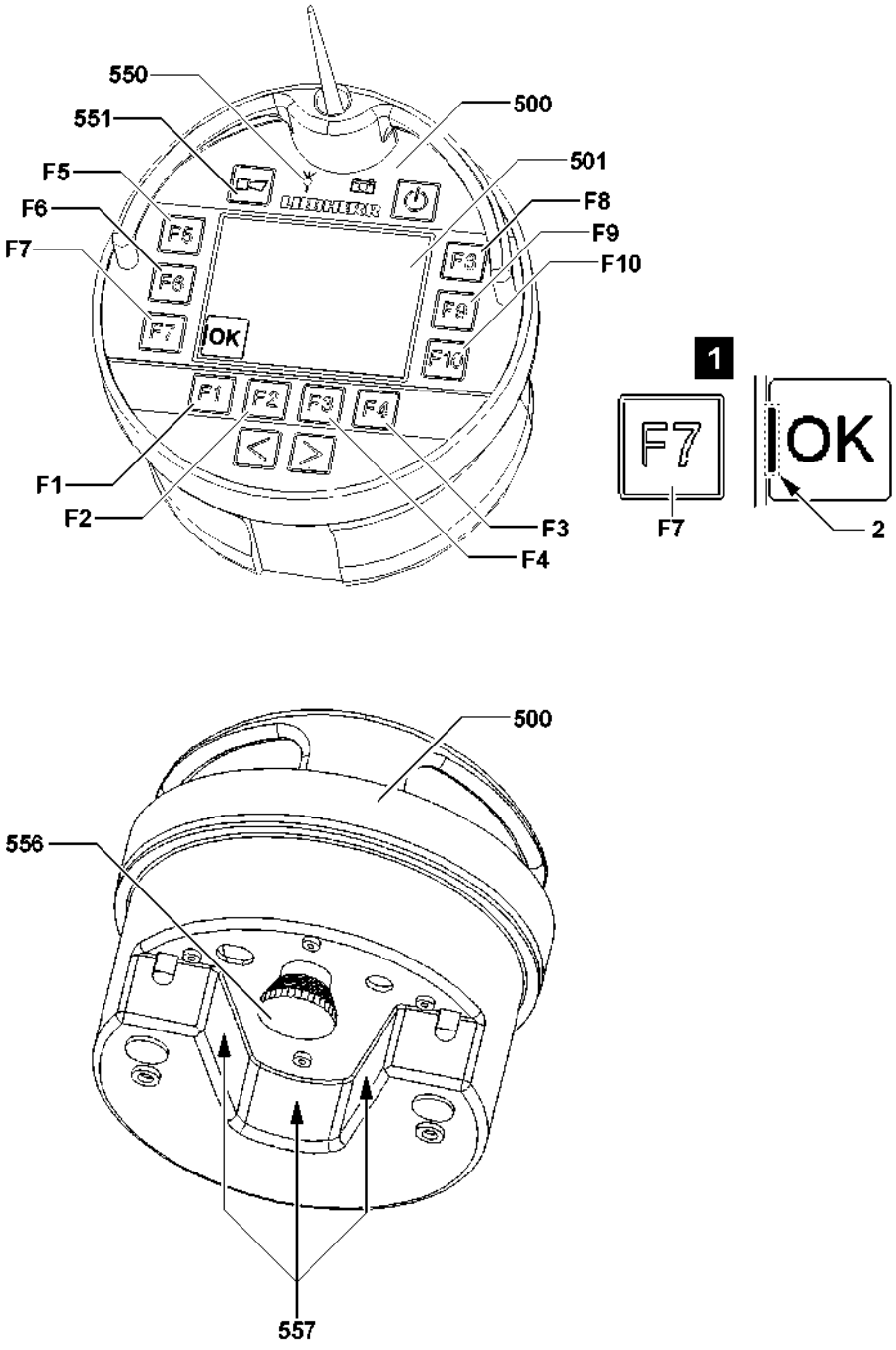

Fig.114222

1.1 Important information for BTT

The following important information must be observed for operation with the BTT **500**:

- The machine number on the data tag of the crane cab must match the machine number on the BTT display **501**.
- It can only be turned on when the EMERGENCY STOP switch **556** on the rear of the BTT is **not** actuated.
- The rechargeable battery of the BTT is only charged if the EMERGENCY STOP switch **556** on the rear of the BTT is **not** actuated when plugging it into the charging module.
- When a function is selected via a function key, the corresponding icon is surrounded with a black border. In some case, additional icons are shown on the display.
- The operation of the BTT must be made with two hands, for safety reasons, see section „Release of button block on the BTT“.
- During crane operation with the BTT **500**, the complete crane must be in the field of visibility of the operator.
- Before any movement, which is controlled with the BTT **500**, the horn **551** must be actuated.
- As soon as the reception of the radio signal deteriorates, the indicator light **550** lights up orange.
- The reach of the radio signal can fluctuate due to local conditions.
- If the radio contact between the BTT **500** and the BTB is interrupted or the EMERGENCY STOP switch **556** on the rear of the BTT **500** is actuated, the crane movement stops.
- Keep the BTT **500** and the charging module clean.
- Protect the BTT **500** from direct sun exposure.
- Protect the BTT **500** from dirt and moisture.

Note

Function keys **F1** to **F10**

▶ Icons are assigned to the individual function keys. A small bar **2** marks the assigned button, see illustration **1**. Example for function key **F7**.

1.2 Release of the button block on the BTT

To prevent inadvertent crane operation, movements to be carried out on the BTT are secured by a button block. The 2-hand keypad **557** can be activated with the touch of a finger and the button block is released.

After selecting a function, the actual movement (operation) is only released after activation of the 2-hand keypad **557**. Released icons are highlighted with the color **purple**.

If the icon is released and the respective function key is pressed, the movement is carried out.

Note

▶ Any actuation of the 2-hand keypad **557** is stored for 30 seconds. If no movement is actuated within these 30 seconds or if the 2-hand keypad **557** is actuated again, then the button block is activated and a signal tone sounds.

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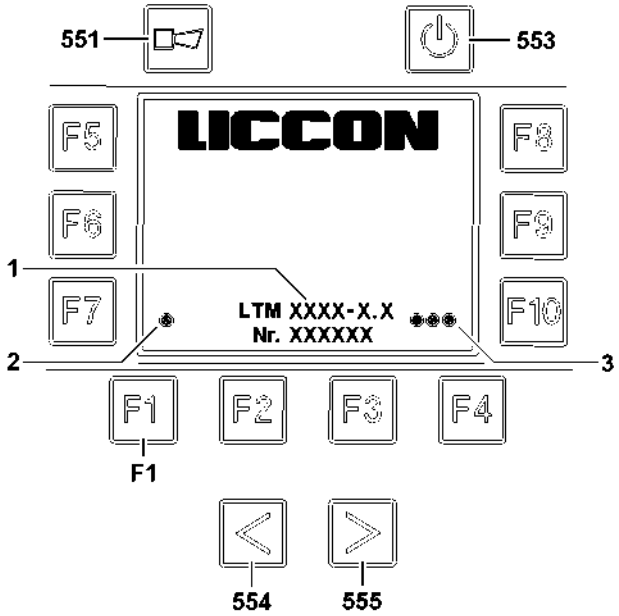

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Fig.115121

1.3 Connecting the BTB and the BTT

Note

▶ If crane type and crane number **1** do not match, a connection from BTB and BTT is not possible.

To be able to control the crane via the Bluetooth™ Terminal (BTT), a connection to the Bluetooth™ Basis (BTB) must be established.

The connection is based on a pairing process and a code calibration.

1.3.1 Pairing process

If the BTT is plugged into the charging module when the ignition is turned on, then a pairing process is carried out automatically with the Bluetooth™ Basis (BTB).

Carry out the pairing process by hand:

To do so, the turned on BTT must be plugged into the charging module. Various connecting parameters are compared and checked for a match via an infrared interface.

When the pairing process is completed successfully, the indicator light **2** lights up green.

Note

▶ If the pairing process does not run successfully, contact your **Liebherr Service location** or **Liebherr-Werk Ehingen**!

1.3.2 Code calibration

If the BTT is plugged into the charging module when the ignition is turned on, then the code calibration is made automatically.

Carry out the code calibration by hand:

One after the other, press the button **554**, then the button **555** and then the function key **F1**.

When the code calibration is completed successfully, all indicator lights **3** light up green.

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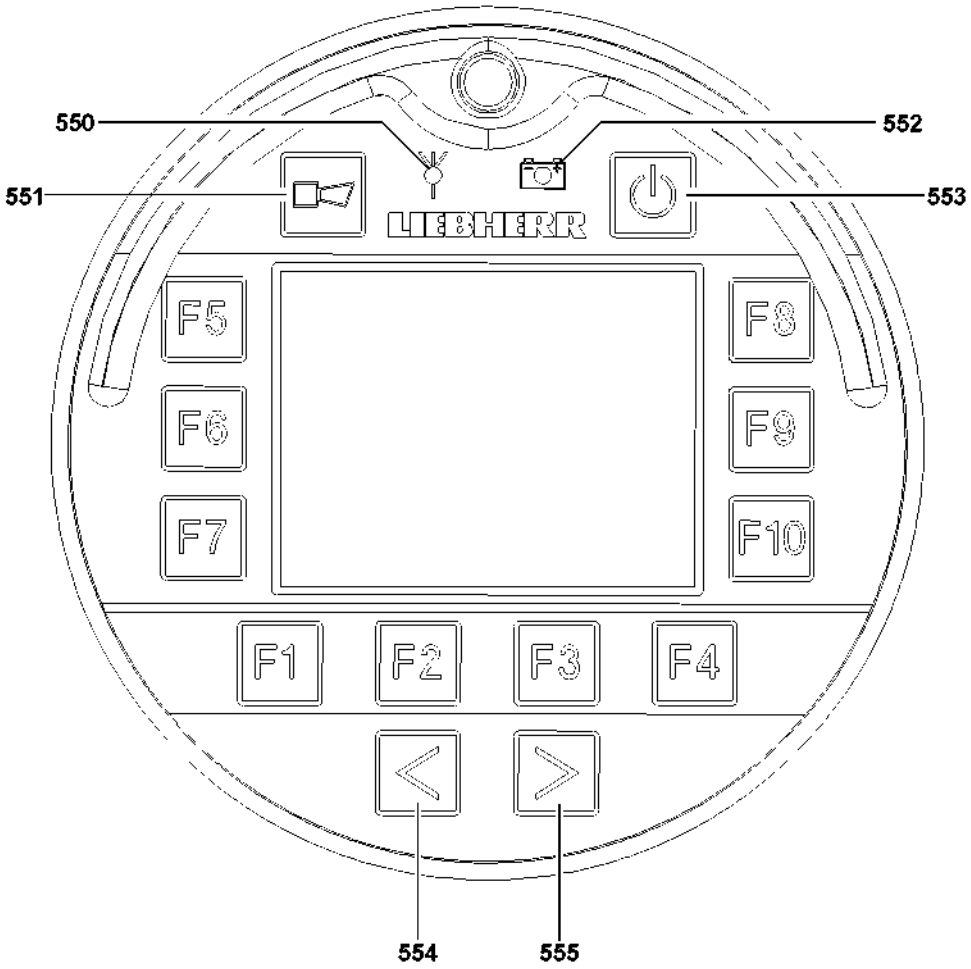

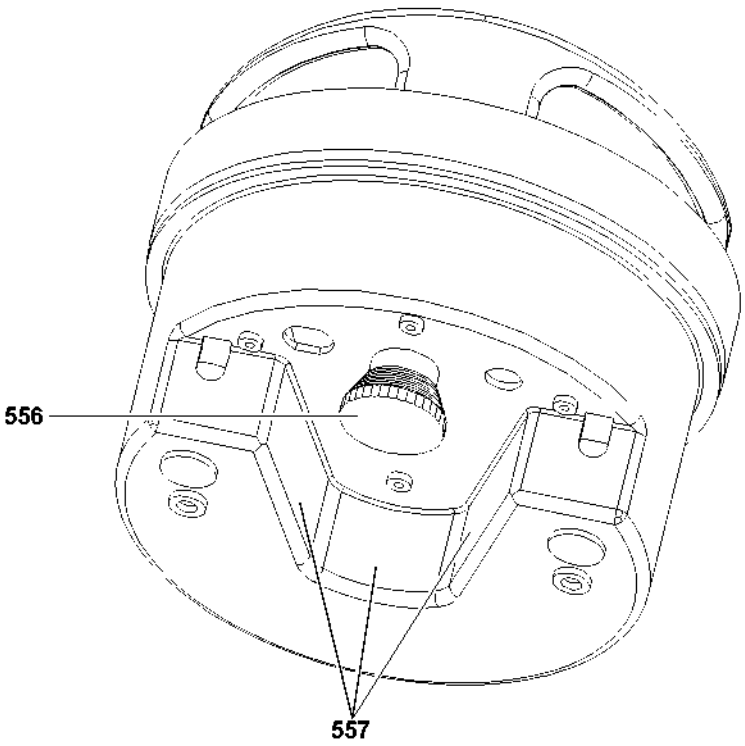

Fig.110315

1.4 General for BTT

550 Indicator light

Transmission signal for Bluetooth™ Terminal (BTT):
- Green: Transmission signal ok.
- Yellow: Transmission signal about to be lost.
- Red: Transmission signal not available.

551 Button
- Operate the acoustic signal of the crane (horn)

552 Indicator light

Battery charge condition for Bluetooth™ Terminal (BTT):
- Green: Rechargeable battery fully charged.
- Yellow: Rechargeable battery almost discharged.
- Red: Rechargeable battery discharged.

Note

▶ To recharge the rechargeable battery, the BTT **500** must be plugged into the charging cradle.

553 Button
- ON / OFF button: Turn the Bluetooth™ Terminal (BTT) on / off

554 Button
- Changeover button (menu dependent)

555 Button
- Changeover button (menu dependent)

556 EMERGENCY STOP switch
- **Note:**
  The EMERGENCY STOP switch **556** is on the underside of the Bluetooth™ Terminal (BTT).

557 2-hand keypad
- **Note:**
  The 2-hand keypad **557** must be actuated first in order to be able to actuate a movement with the BTT.

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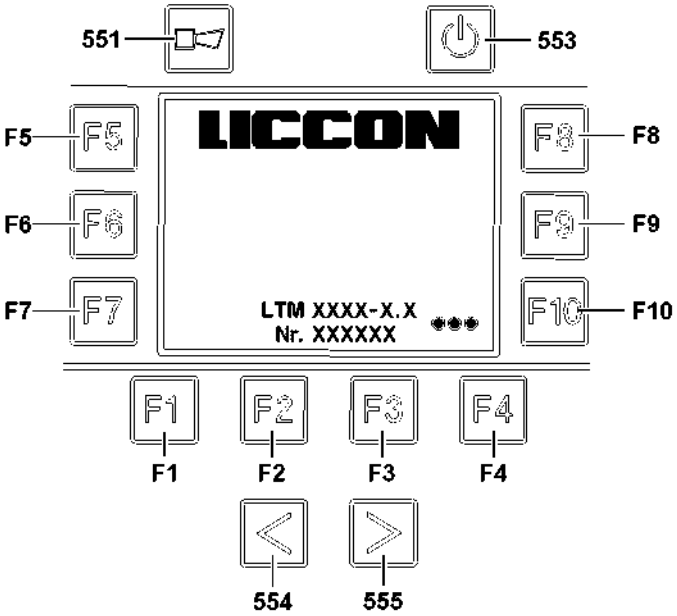

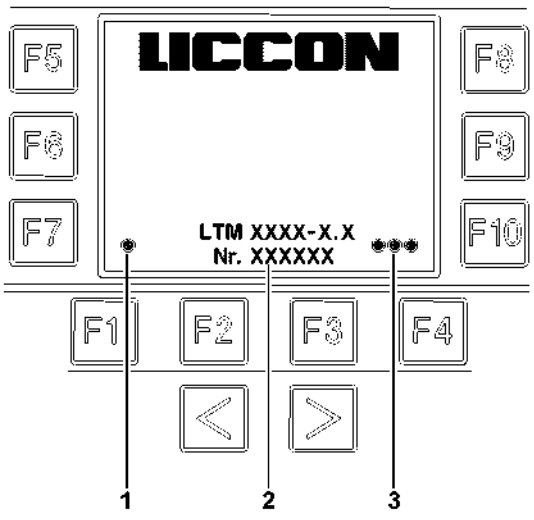

Fig.115122

1.5 Start screen BTT

1.5.1 Icon explanation Start screen BTT

1 Indicator light

Status display connection to BTT receiver
- Yellow / red: Not connected
- Yellow: Transmission signal being build up or severed
- Green / magenta: Connection prepared
- Green: Connection established
- Red: No connection between BTB and BTT
  Note:
  If necessary, the pairing process must be repeated, see section „Connecting the BTB and BTT“

2 Crane type and crane number

3 Indicator lights

Status indicator code entry:
- Green: Code entry OK.
- Red: No code entered, code entry incorrect.

F Function keys
- **Note**:
  Once the code has been successfully entered, press any function key **F1-F10** to switch back to the selection overview.

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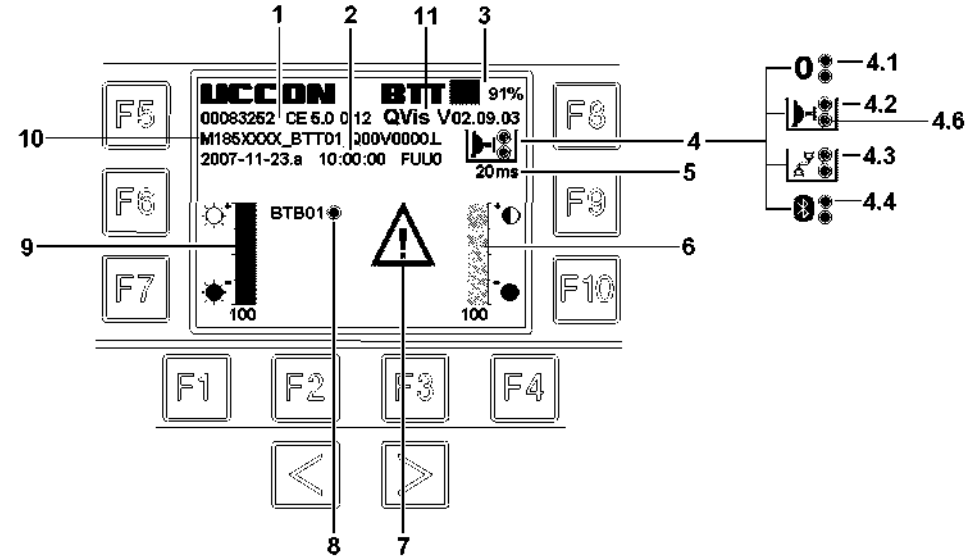

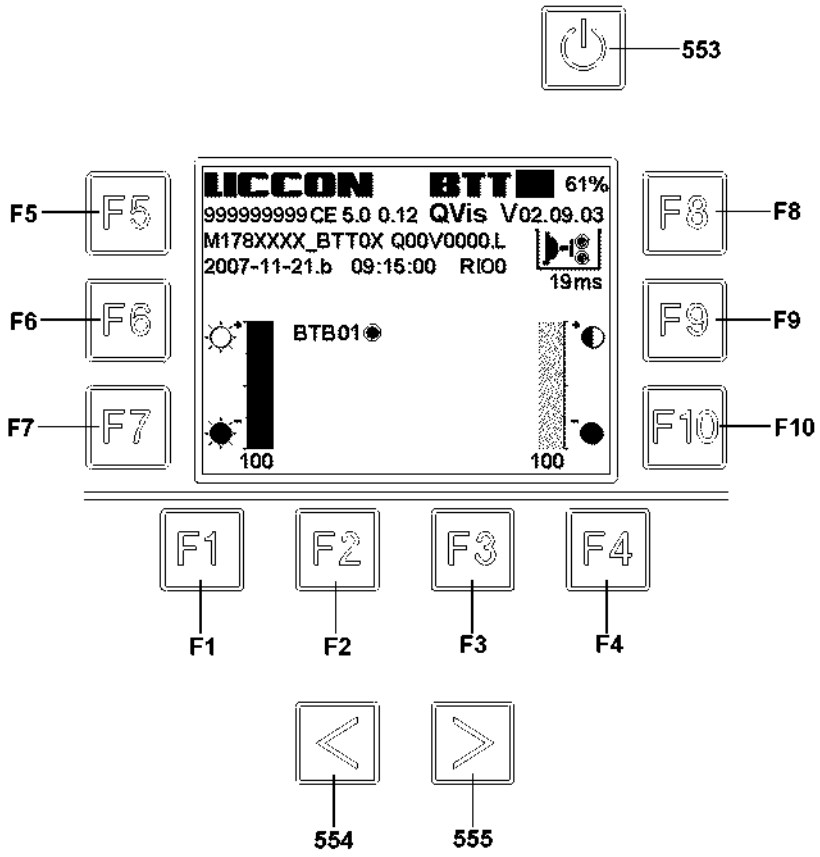

Fig.110316

1.6 System screen BTT

1.6.1 Icon explanation in system screen BTT

1 Project number and version
- Machine number, System info

2 Additional BTT project info
- Date, Set up date, Author

3 Battery icon
- Battery charge condition for Bluetooth™ Terminal (BTT) in [%]

4 Connection type
- **4.1** No connection
- **4.2** Infrared
- **4.3** Cable
- **4.4** Bluetooth™

4.6 Charging cradle
- Green blinking: BTT in charging cradle and charging pulse present.
- Gray: BTT not in charging cradle.

5 Icon
- BTT response time in [ms]

6 Icon
- Contrast indicator

7 Warning icon
- No valid project found on BTT

8 Connection status

Status display Bluetooth™ Basis (BTB):
- Yellow / red: Not connected
- Yellow: Transmission signal being build up or severed
- Green / magenta: Connection prepared
- Green: Connection established
- Red: No connection between BTB and BTT

Note:
If necessary, the pairing process must be repeated, see section „Connecting the BTB and BTT“

9 Icon
- Brightness indicator

10 BTT system info

11 BTT project info

1.6.2 The function keys in the system screen

553 Button
- ON / OFF button pressed long: Turn the BTT off.

554 Button
- Changeover to next sub menu

555 Button
- Changeover to next sub menu

F1 Function key
- Return to selection overview

F2 Function key
- System (bound)

F3 Function key
- Horn

F4 Function key

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- Horn

F5 Function key
- Horn

F6 Function key
- Brightness +

F7 Function key
- Brightness -

F8 Function key
- Horn

F9 Function key
- Contrast +

F10 Function key
- Contrast -

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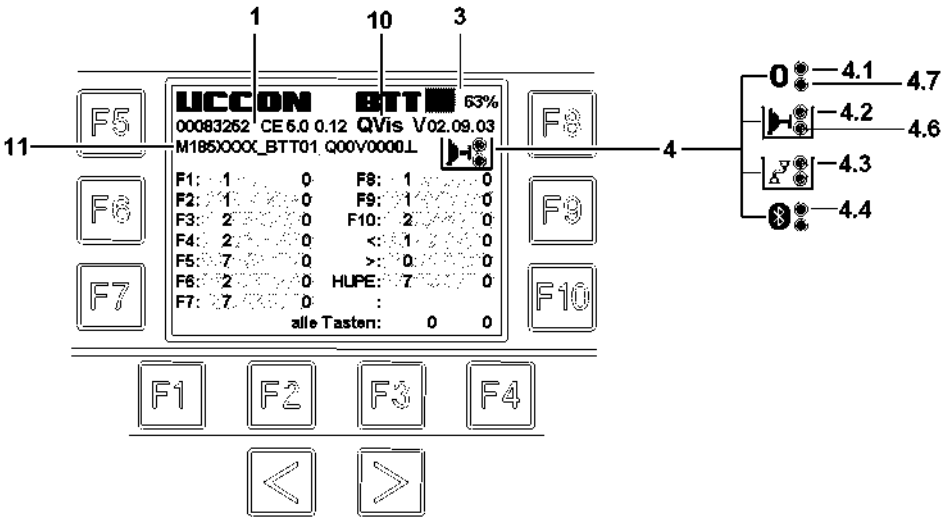

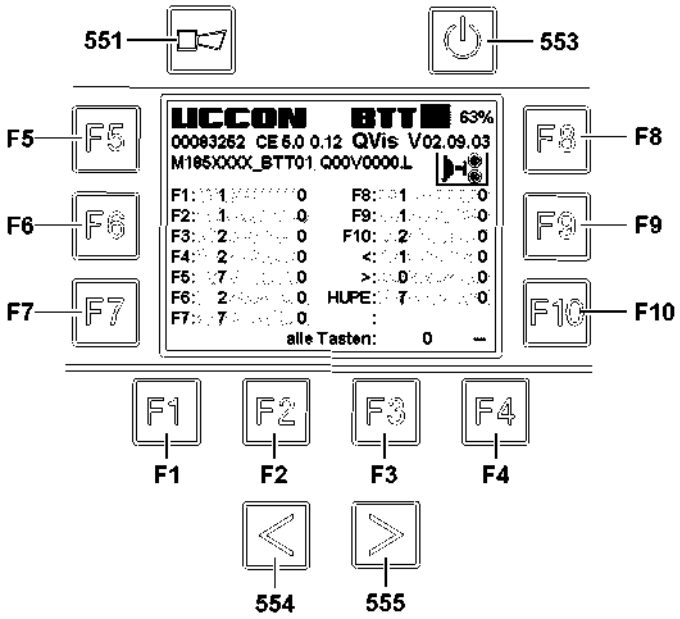

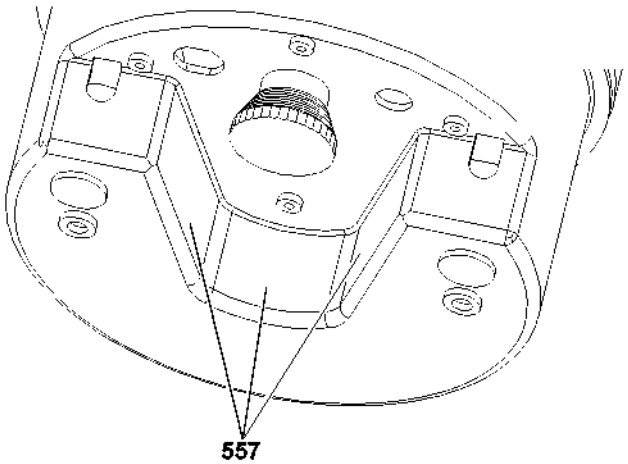

Fig.110318

1.7 Operating screen Button test

1.7.1 Icon explanation in operating screen button test

1 Project number and version
- Machine number, System info

3 Battery icon
- Battery charge condition for Bluetooth™ Terminal (BTT) in [%]

4 Connection type
- **4.1** No connection
- **4.2** Infrared
- **4.3** Cable
- **4.4** Bluetooth™

4.6 Charging cradle
- Green blinking: BTT in charging cradle and charging pulse present.
- Gray: BTT not in charging cradle.

10 BTT system info

11 BTT project info

1.7.2 The function keys in operating screen button test

551 Button
- Analog / digital value of the button **551** is displayed

553 Button
- Press the button briefly: Return to system screen.
- Press the button longer: Turn the BTT off.

554 Button
- Analog / digital value of the button **554** is displayed

555 Button
- Analog / digital value of the button **555** is displayed

F1 Function key
- Analog / digital value of function key **F1** is displayed

F2 Function key
- Analog / digital value of function key **F2** is displayed

F3 Function key
- Analog / digital value of function key **F3** is displayed

F4 Function key
- Analog / digital value of function key **F4** is displayed

F5 Function key
- Analog / digital value of function key **F5** is displayed

F6 Function key
- Analog / digital value of function key **F6** is displayed

F7 Function key
- Analog / digital value of function key **F7** is displayed

F8 Function key
- Analog / digital value of function key **F8** is displayed

F9 Function key
- Analog / digital value of function key **F9** is displayed

F10 Function key
- Analog / digital value of function key **F10** is displayed

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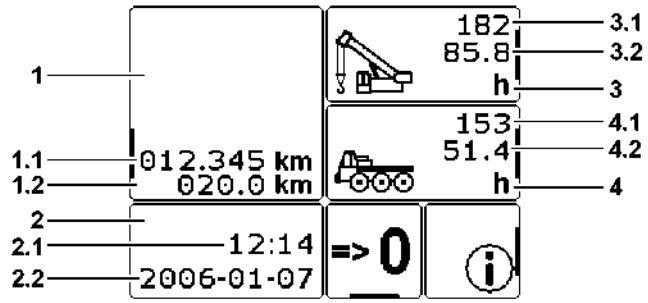

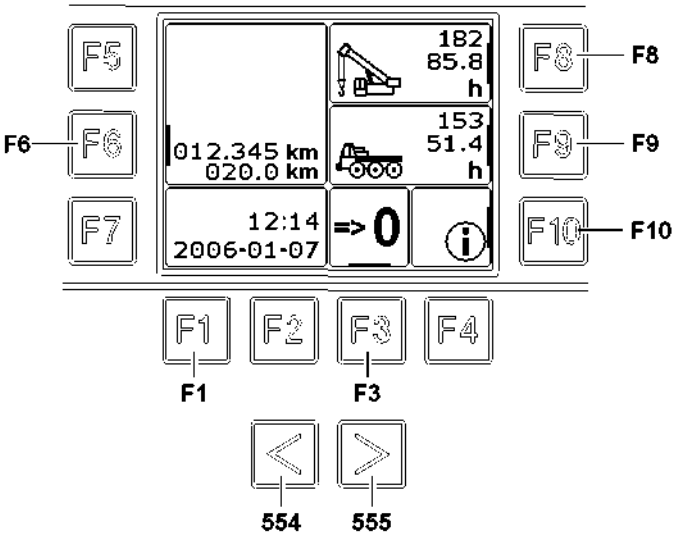

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Fig.105256

2 The Bluetooth™ Terminal (BTT) is plugged into the instrument console

2.1 Menu „Kilometer display and operating hours“ on BTT

2.1.1 Explanation of icons on the BTT display

1 Kilometer display
- The kilometer display displays the total and daily kilometer count

1.1 Total mileage
- In kilometers (km) or miles (m)

1.2 Daily kilometer display
- In kilometers (km) or miles (m)

2 Time and date display

2.1 Time

2.2 Date

3 Operating hours display for superstructure
- The operating hour display indicates the total as well as the daily operating hours for the superstructure.

3.1 Total operating hours for superstructure

3.2 Daily operating hours for superstructure

4 Operating hours for chassis
- The operating hour display indicates the total as well as the daily operating hours for the chassis.

4.1 Total operating hours for chassis

4.2 Daily operating hours for chassis

2.1.2 The function keys

554 Button
- Change to previous menu

555 Button
- Change to next menu

F1 Function key
- Change to next menu

F2 Function key
- **No** function

F3 Function key
- Reset daily trip odometer or operating hour meter

F4 Function key
- **No** function

F5 Function key
- **No** function

F6 Function key
- Select reset daily trip odometer

F7 Function key
- **No** function

F8 Function key
- Select Reset daily operating hours - Superstructure

F9 Function key
- Select Reset daily operating hours - chassis

F10 Function key

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- Change to test system

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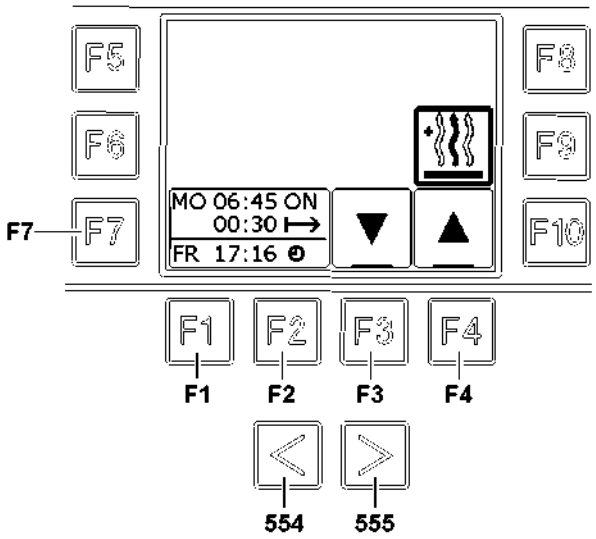

Fig.105257

2.2 Menu „Climate control settings for auxiliary heater“* on BTT

2.2.1 The function keys

554 Button
- Change to previous menu

555 Button
- Change to next menu

F1 Function key
- Change to next menu

F2 Function key
- Move cursor in the edit field for the timer

F3 Function key
- Timer function „minus“ / Activate / deactivate timer

F4 Function key
- Timer function „plus“ / Activate / deactivate timer

F7 Function key
- Select to set timer for auxiliary heater

Note

▶ Refer to the Crane operating instructions, chapter 6.01 for a detailed description of the heater / air conditioning and ventilation settings.

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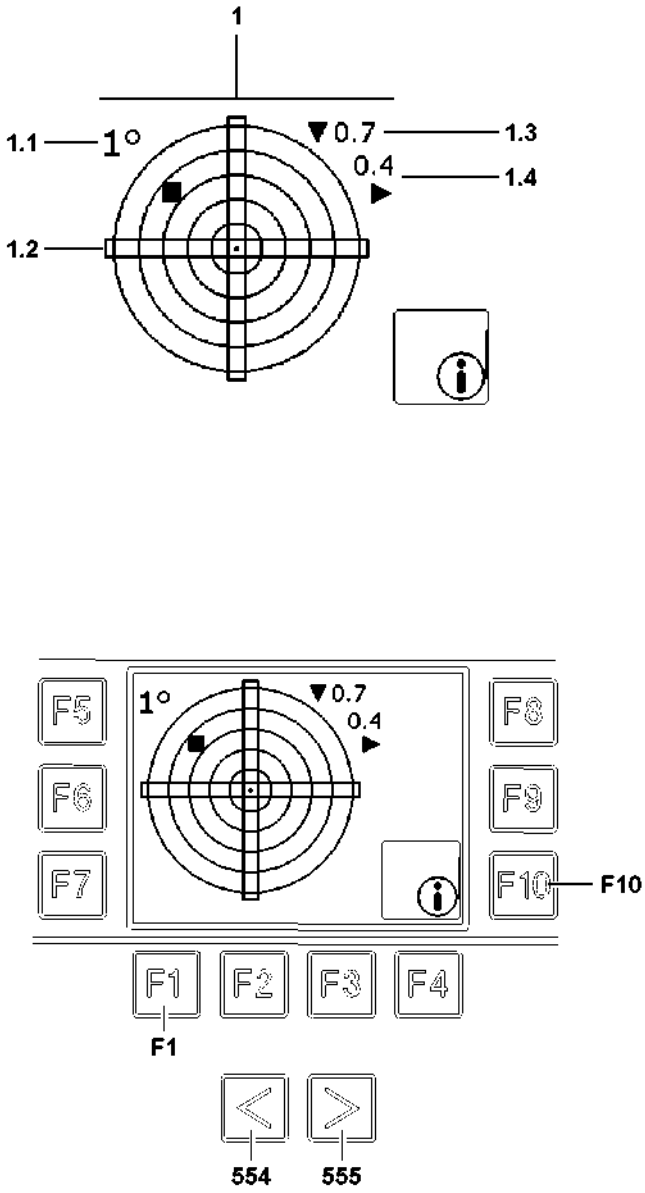

Fig.105258

2.3 Menu „Incline indicator“ on BTT

2.3.1 Explanation of icons on the BTT display

1 Crane incline

1.1 Incline range
- 1° or 5°

1.2 Incline icon
- Display of graphic incline icon

1.3 Incline
- Incline of crane in lengthwise (longitudinal) direction

1.4 Incline
- Incline of crane in lateral direction

2.3.2 The function keys

554 Button
- Change to previous menu

555 Button
- Change to next menu

F1 Function key
- Change to next menu

F10 Function key
- Change to test system

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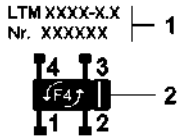

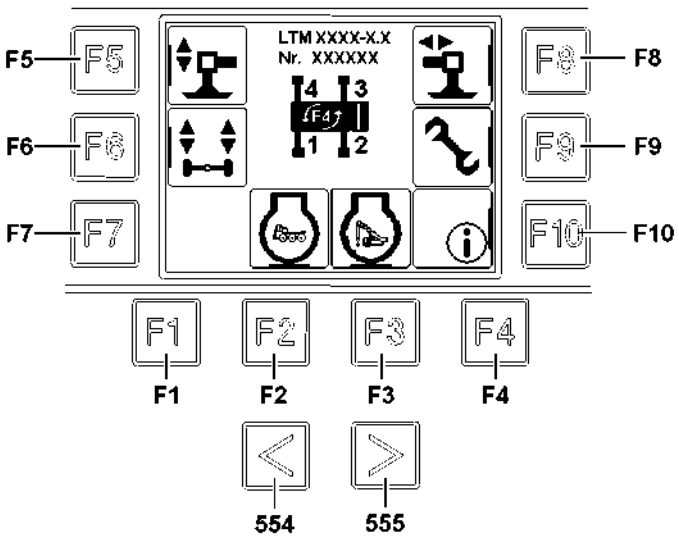

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Fig.114537

3 The Bluetooth™ Terminal (BTT) removed from its charging cradle

3.1 The menu overview

3.1.1 Explanation of icons on the BTT display

1 Crane type and crane number

2 Crane icon
- The crane icon **2** displays the numbered sliding beams

3.1.2 The function keys

WARNING
Danger of accident if operator is incorrectly positioned to the crane!
If this is not observed, personnel can be killed or severely injured!
▶ The crane icon on the BTT display must correspond to the actual direction of the operator to the crane!

554 Button
- Change to previous menu

555 Button
- Change to next menu

F2 Function key
- Select menu „Engine operation chassis“

F3 Function key
- Select menu „Engine operation superstructure“

F4 Function key
- Turn crane icon **2** in 180° increments

F5 Function key
- Select menu „Support“

F6 Function key
- Selection Menu „Axle suspension“

F8 Function key
- Select menu „Sliding beam movement“

F9 Function key
- Select menu „Assembly functions“

F10 Function key
- Change to test system

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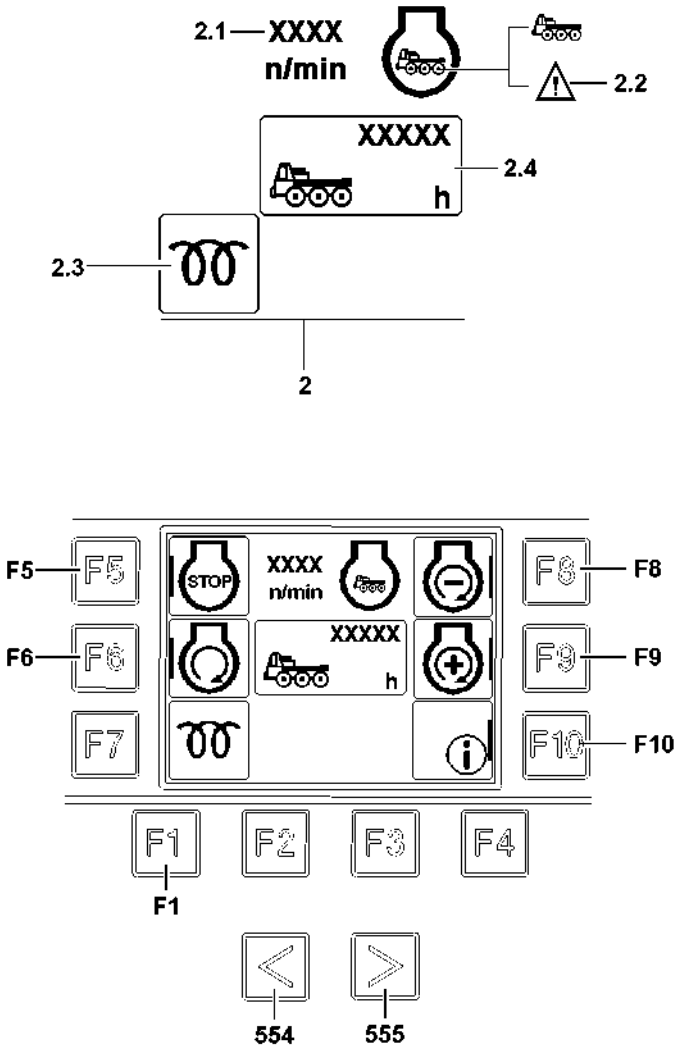

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Fig.118776

3.2 The menu „Engine regulation“ on the BTT

3.2.1 Explanation of icons on the BTT display

2 Icons Engine operation

2.1 Engine speed
- Actual engine speed in rpm

2.2 Engine monitoring
- Engine warning
- **NOTICE:**
  Call up engine monitoring functions and evaluate.

2.3 Monitoring display
- The indicator light lights up green: Engine ready to start
- The indicator light lights up yellow: Engine preglow is active.
- The indicator light lights up red: Engine not ready to start

2.4 Operating hour meter
- Operating hours Engine

3.2.2 The function keys

554 Button
- Call up monitoring functions for engine

555 Button
- Call up monitoring functions for engine

F1 Function key
- Back to the start menu

F5 Function key
- Press momentarily (less than 0.5 seconds): Reset settings in the engine operation menu
- Press long: Turn the engine off
- **Note**: The control release must have been made by touching the 2-Hand keypad in the rear of the BTT, see section „Release of button block on BTT“

F6 Function key
- Turn the engine on

F8 Function key
- Decrease engine rpm
- **Note**: The control release must have been made by touching the 2-Hand keypad in the rear of the BTT, see section „Release of button block on BTT“

F9 Function key
- Increase engine rpm
- **Note**: The control release must have been made by touching the 2-Hand keypad in the rear of the BTT, see section „Release of button block on BTT“

F10 Function key
- Change to test system

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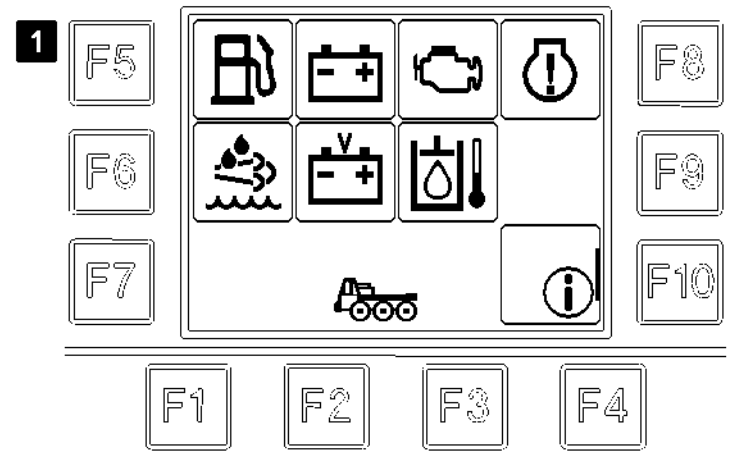

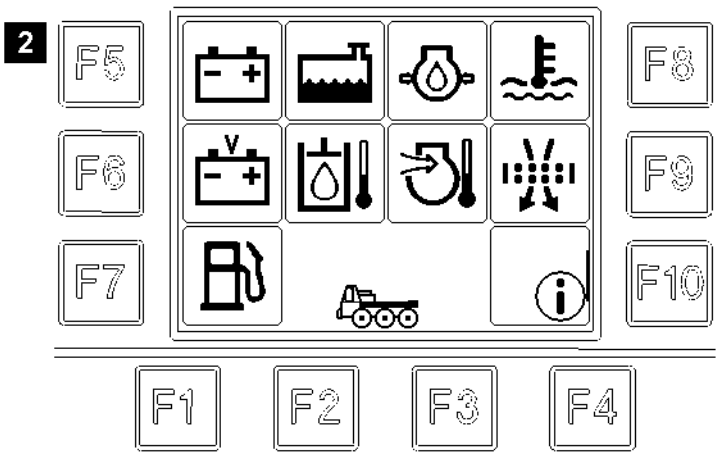

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Fig.118777

3.2.3 Monitoring of engine functions

Note

- ▶ Engines **with** exhaust aftertreatment, system SCR - Display in BTT display, see illustration **1**.
- ▶ Engines **without** exhaust aftertreatment - Display in BTT display, see illustration **2**.
- ▶ If a function is highlighted **green**, this function is operating correctly.
- ▶ If a function is highlighted **red** or **orange**, then this function has an error.

NOTICE

Property damage can result if a malfunction is not immediately rectified!

- ▶ Immediately rectify the faulty function!

Monitoring display	Icon display	Condition
 *Information field*		**B / E:** If a B (operating error) or E (system error) appears in the information field, then at least one error message is present. Call up and evaluate the error message by pressing function key F10 on the BTT, see also Diagnostics Manual.

Monitoring display	Icon display	Condition
 *Fuel reserve*	Green:	Fuel reserve **more** or equal to 5 %
	Yellow:	Fuel reserve approx. 3 % to 4 %
	Red:	Fuel reserve **less** than 3 % **NOTICE**: Turn the engine off immediately and remedy the problem, pay attention to the error message!

Monitoring display	Icon display	Condition
 *Hydraulic oil temperature*	Green:	Hydraulic oil temperature OK
	Red:	Hydraulic oil temperature too high **NOTICE**: Turn the engine off immediately and remedy the problem, pay attention to the error message!

Monitoring display	Icon display	Condition
 *Charge monitoring display*	Green:	Alternator OK (engine on)

Monitoring display	Icon display	Condition
	Red:	Alternator does not charge (engine on) **NOTICE**: Turn the engine off immediately and remedy the problem, pay attention to the error message!

Monitoring display	Icon display	Condition
 *Battery voltage*	Green:	Battery voltage OK
	Red:	On-board power supply over / undervoltage **NOTICE**: Turn the engine off immediately and remedy the problem, pay attention to the error message!

Monitoring display	Icon display	Condition
Note: Monitoring display only present on certain crane types!		
 *Engine oil level*	Green:	Engine oil level OK
	Red:	Engine oil level too low or too high **NOTICE**: Call up individual monitoring displays and adjust the engine oil level according to the display, see section „Overview of individual monitoring displays“.

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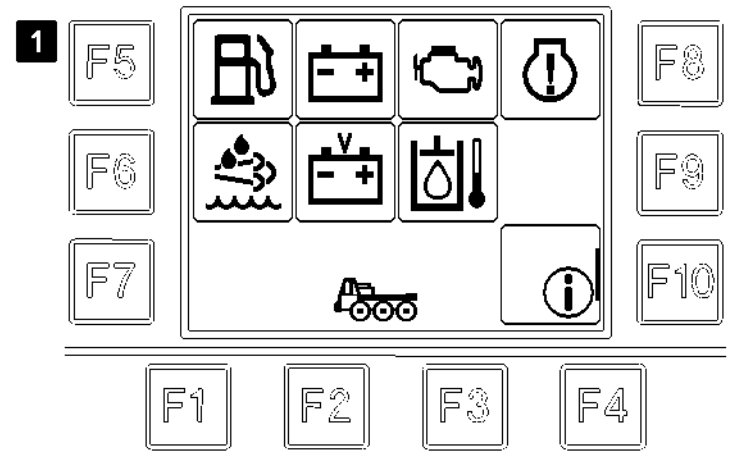

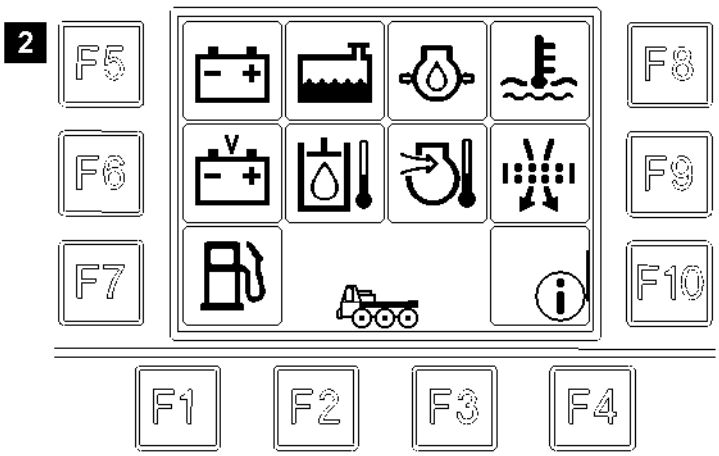

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Fig.118777

3.2.4 Additional monitoring functions for engines with exhaust aftertreatment, system SCR (Selective Catalytic Reduction)

Note

▶ Display in BTT display, see illustration **1**.

WARNING

Triggers power reduction or start block of engine!
If Urea level is too low or if there is a faulty function in the exhaust aftertreatment, then a power reduction or start block of the engine can be triggered.
The mobile crane can significantly obstruct traffic!
The crane operation and travel operation can be limited or disabled!

▶ Add Urea in time!
▶ Remedy the faulty function of the exhaust aftertreatment immediately!
▶ Observe any valid national / regional regulations and the vehicle configuration!

Monitoring display	Icon display	Condition
 *Urea tank*	Green:	Urea available
	Yellow / red:	Urea level too low or erroneous function of exhaust aftertreatment system **NOTICE**: Add urea or remedy the faulty function of the exhaust aftertreatment. Under some circumstances a power reduction or start block of the engine [1] is triggered, pay attention to the error message!

Monitoring display	Icon display	Condition
 *Exhaust aftertreatment*	Green:	Exhaust aftertreatment OK
	Yellow / red:	Urea level too low or erroneous function of exhaust aftertreatment system **NOTICE**: Add urea or remedy the faulty function of the exhaust aftertreatment. Under some circumstances a power reduction or start block of the engine [1] is triggered, pay attention to the error message!

Monitoring display	Icon display	Condition
 *Collective warning*	Green:	No warning messages present

Monitoring display	Icon display	Condition
	Generally at yellow or red:	A warning is present **NOTICE**: Determine the cause with the error message or in the LICCON monitor and observe the following description.
	Yellow:	Air intake opening / air filter dirty **NOTICE**: Turn the engine off immediately and remedy the problem, pay attention to the error message!
	Red:	Engine oil pressure too low or too high **NOTICE**: Turn the engine off and remedy the problem, pay attention to the error message!
	Red:	Engine oil level too low or too high **NOTICE**: Call up the display for the engine oil level in the LICCON monitor and match the engine oil level according to the display. See Crane operating instructions, chapter 4.02. Pay attention to error message!
	Red:	Coolant level too low **NOTICE**: Turn the engine off and add coolant, see Crane operating instructions, chapter 7.04 or chapter 7.05. Pay attention to error message!
	Red:	Coolant temperature too high **NOTICE**: Bring the coolant temperature into a permissible range, turn the engine off if necessary. Pay attention to error message!
	Red:	Charge air temperature too high **NOTICE**: Bring the charge air temperature into a permissible range, turn the engine off if necessary. Pay attention to error message!

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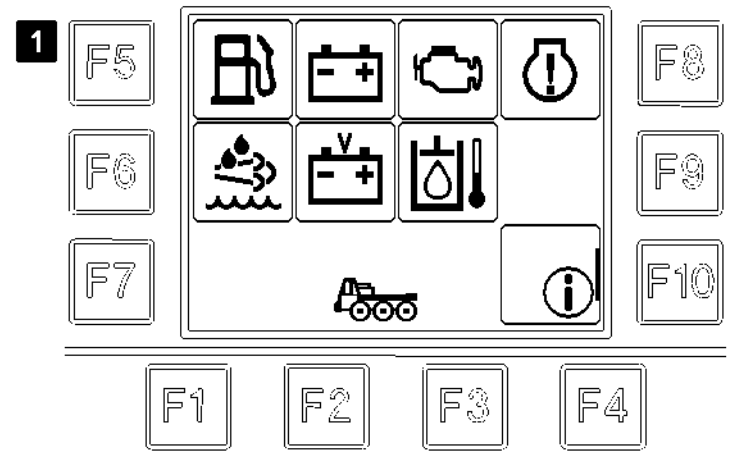

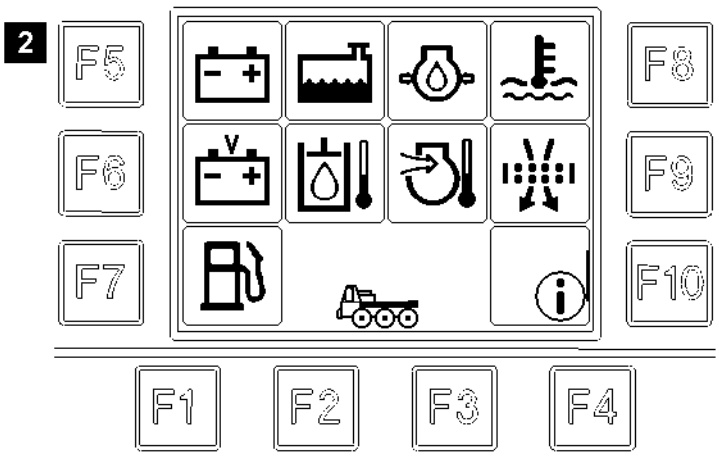

Fig.118777

3.2.5 Additional monitoring functions for engines without exhaust aftertreatment

Note
▶ Display in BTT display, see illustration **2**.

Monitoring display	Icon display	Condition
 *Coolant temperature*	Green:	Coolant temperature OK
	Red:	Coolant temperature **too high** **NOTICE**: Turn the engine off and remedy the problem, pay attention to the error message!

Monitoring display	Icon display	Condition
 *Engine oil pressure*	Green:	Engine oil pressure OK (engine on)
	Red:	Engine oil pressure too low (engine on) **NOTICE**: Turn the engine off and remedy the problem, pay attention to the error message!

Monitoring display	Icon display	Condition
 *Air filter*	Green:	Air filter OK
	Yellow:	Air filter is dirty **NOTICE**: Turn the engine off and remedy the problem, pay attention to the error message!

Monitoring display	Icon display	Condition
 *Coolant level*	Green:	Coolant level OK
	Red:	Insufficient coolant **NOTICE**: Turn the engine off and remedy the problem, pay attention to the error message!

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Monitoring display	Icon display	Condition
 *Charge air temperature*	Green:	Charge air temperature OK
	Red:	Charge air temperature too high **NOTICE**: Turn the engine off and remedy the problem, pay attention to the error message!

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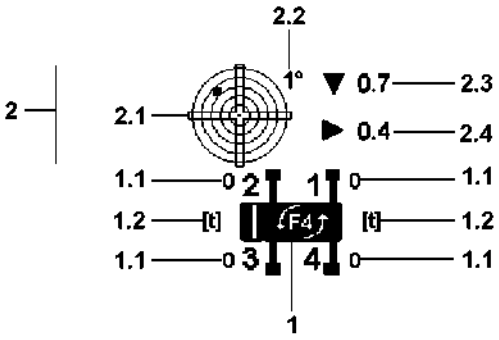

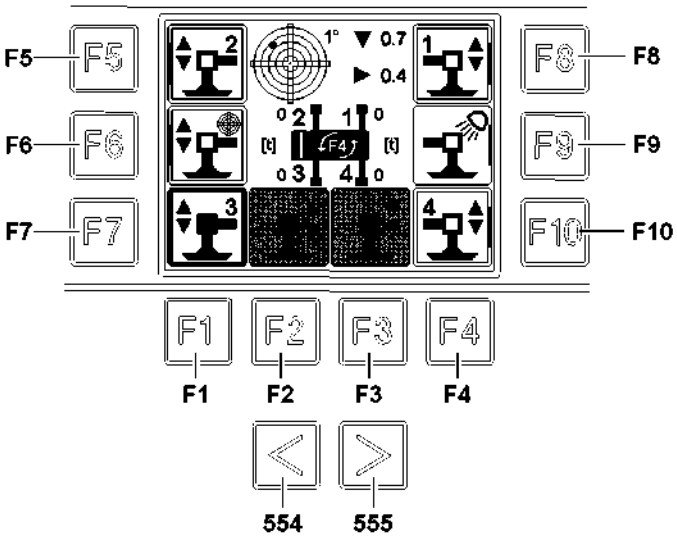

Fig.105261

3.3 Menu „Support“ on BTT

The crane driver can select between manual support and automatic support in the „Support“ menu.

Note

- ▶ Set the crane icon **1** on the BTT display via the function key **F4** before selecting the support cylinder, corresponding to the actual orientation of the user to the crane.
- ▶ The respective movement during the support procedure is only possible when the 2-Hand keypad on the rear of the BTT is pressed first.

3.3.1 Explanation of icons on the BTT display

1 Crane icon
- The crane icon displays the numbered sliding beams

1.1 Support force values*****
- In [t] or [kips]

1.2 Unit*****
- Unit of displayed support force

2 Crane incline

2.1 Incline icon
- Display of graphic incline icon

2.2 Incline range
- 1° or 5°

2.3 Incline
- Incline of crane in lengthwise (longitudinal) direction

2.4 Incline
- Incline of crane in lateral direction

3.3.2 The function keys

554 Button
- Change to previous menu

555 Button
- Change to next menu

F1 Function key
- Return to main screen

F2 Function key
- Retract selected support(s)

F3 Function key
- Extend selected support(s)

F4 Function key
- Turn the crane icon in 180° increments

F5 Function key
- Selection / deselection of the support according to crane position

F6 Function key
- Selection / deselection of the automatic support

F7 Function key
- Selection / deselection of the support according to crane position

F8 Function key
- Selection / deselection of the support according to crane position

F9 Function key
- Turn the sliding beam illumination on / off

F10 Function key
- Selection / deselection of the support according to crane position

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3.3.3 Manual support

Up to 0 - 4 supports can be simultaneously selected on the BTT via the function key **F5**, function key **F7**, function key **F8**, function key **F10** and extended or retracted via the function key **F3** and the 2-hand keypad or function key **F2** and the 2-hand keypad respectively. When a support cylinder is selected, the automatic support selection is cancelled.

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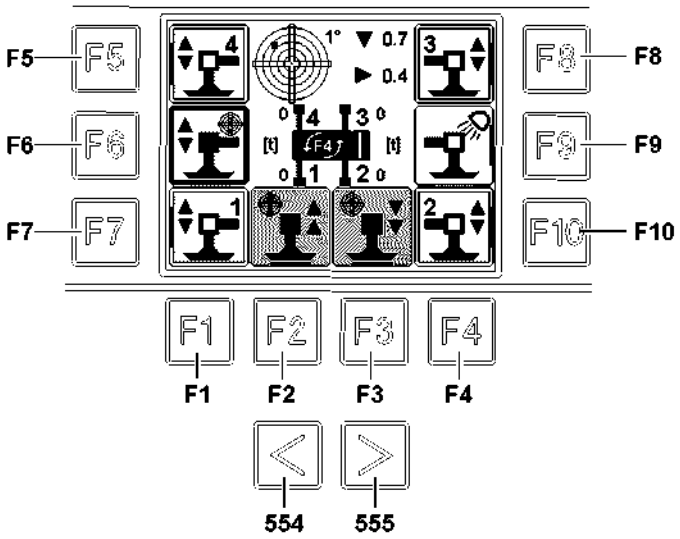

Fig.105262

3.3.4 Automatic support

Selecting the automatic support using function key **F6** cancels the selection of all manual support functions.

Note

- ▶ The extension / retraction of the support cylinder is „coupled“ to function key **F2** and function key **F3** on the BTT.
- ▶ The function key **F3** and the 2-hand keypad affect the levelling of the crane by extending the support cylinders.
- ▶ The function key **F2** and the 2-hand keypad affect the levelling of the crane by retracting the support cylinders.

The automatic support function automatically levels the crane during the support procedure.

3.3.5 Sliding beam illumination

When a function is activated for the first time in the „Support“ menu, the sliding beam illumination automatically turns itself on.

The sliding beam illumination remains turned on until:

- The crane reaches a driving speed of greater than 3 km/h.
- The sliding beam illumination is manually turned off using function key **F9**.
- The engine is stopped.

Note

- ▶ If the sliding beam illumination has been turned off using function key **F9**, the automatic turn on function is not reactivated until the function key **F9** has been pressed again or the crane has been restarted via „Ignition ON“.

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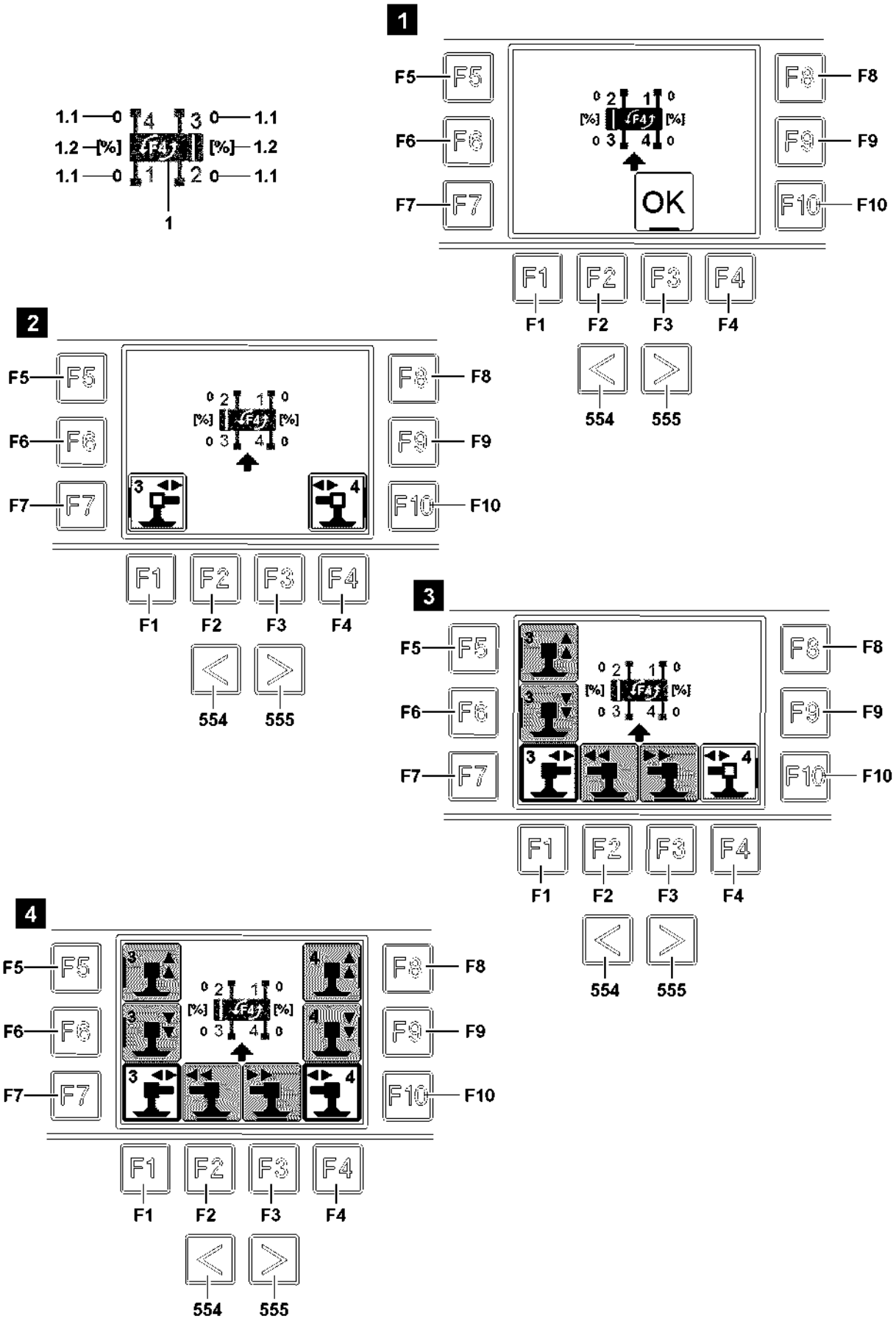

Fig.105263

3.4 Menu „Sliding beam movement“ on the BTT

Note

- ▶ Set the crane icon **1** on the BTT display via the function key **F4** before selecting the sliding beams, corresponding to the actual orientation of the user to the crane.
- ▶ The respective movement during the support procedure is only possible when the 2-Hand keypad on the rear of the BTT is pressed first.

3.4.1 Explanation of icons on the BTT display

1 Crane icon
- The crane icon displays the numbered sliding beams

1.1 Sliding beam lengths*****
- In [%]

1.2 Unit*****
- Unit of displayed support force

3.4.2 The function keys

554 Button
- Change to previous menu

555 Button
- Change to next menu

F1 Function key
- Return to main screen

F2 Function key
- Retract selected sliding beam(s)

F3 Function key
- Extend selected sliding beam / confirm alignment of user to crane

F4 Function key
- Turn the crane icon in 180° increments

F5 Function key
- Retract the support cylinders for the selected sliding beam

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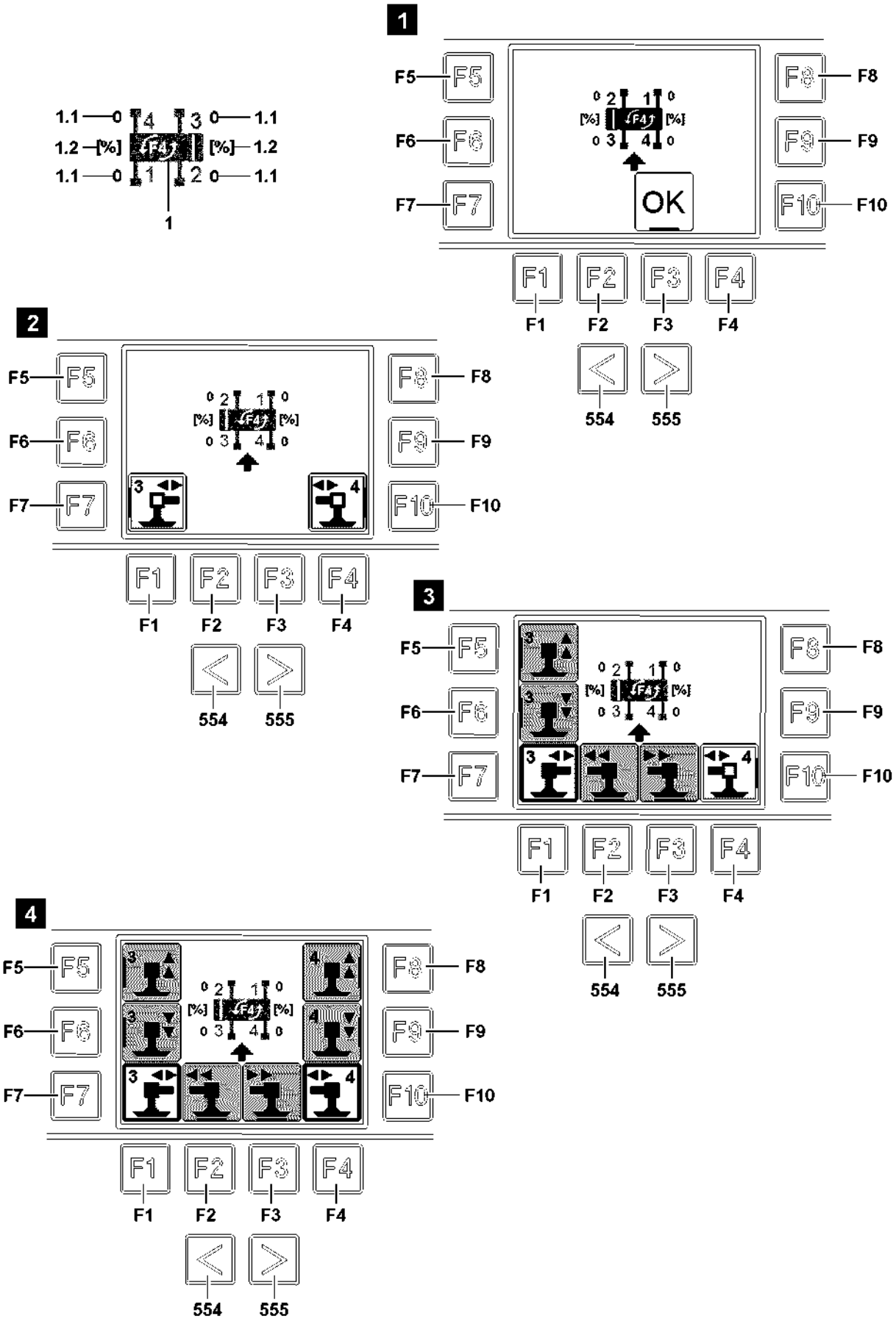

Fig.105263

F6 Function key
- Extend the support cylinders for the selected sliding beam

F7 Function key
- Selection / deselection of the sliding beam according to crane position

F8 Function key
- Retract the support cylinders for the selected sliding beam

F9 Function key
- Extend the support cylinders for the selected sliding beam

F10 Function key
- Selection / deselection of the sliding beam according to crane position

3.4.3 Sliding beams

To extend the sliding beams, first set the crane icon **1** on the BTT display via the function key **F4**, before selecting the sliding beam and to correspond to the actual orientation of the user to the crane, and then confirm by pressing the function key **F3**, see illustration **1**. Press function key **F7** and function key **F10** to select the particular sliding beam, see illustration **2**. After selecting a particular sliding beam, the associated icons for retracting / extending are displayed. The movements are only carried out after the 2-hand keypad has been actuated and the icons are highlighted in purple, see illustration **3**. Use function key **F2** and function key **F3** to retract and extend the sliding beam respectively. The function key **F6** can also be used to extend the support cylinders on the sliding beam, whereas function key **F5** is used to retract the cylinders.

CAUTION
Extended danger zone
▶ When extending / retracting the sliding beams, they can be selected and moved on both the driver and passenger side at the same time, see illustration **4**. The crane driver must be able to see the entire extended danger zone.

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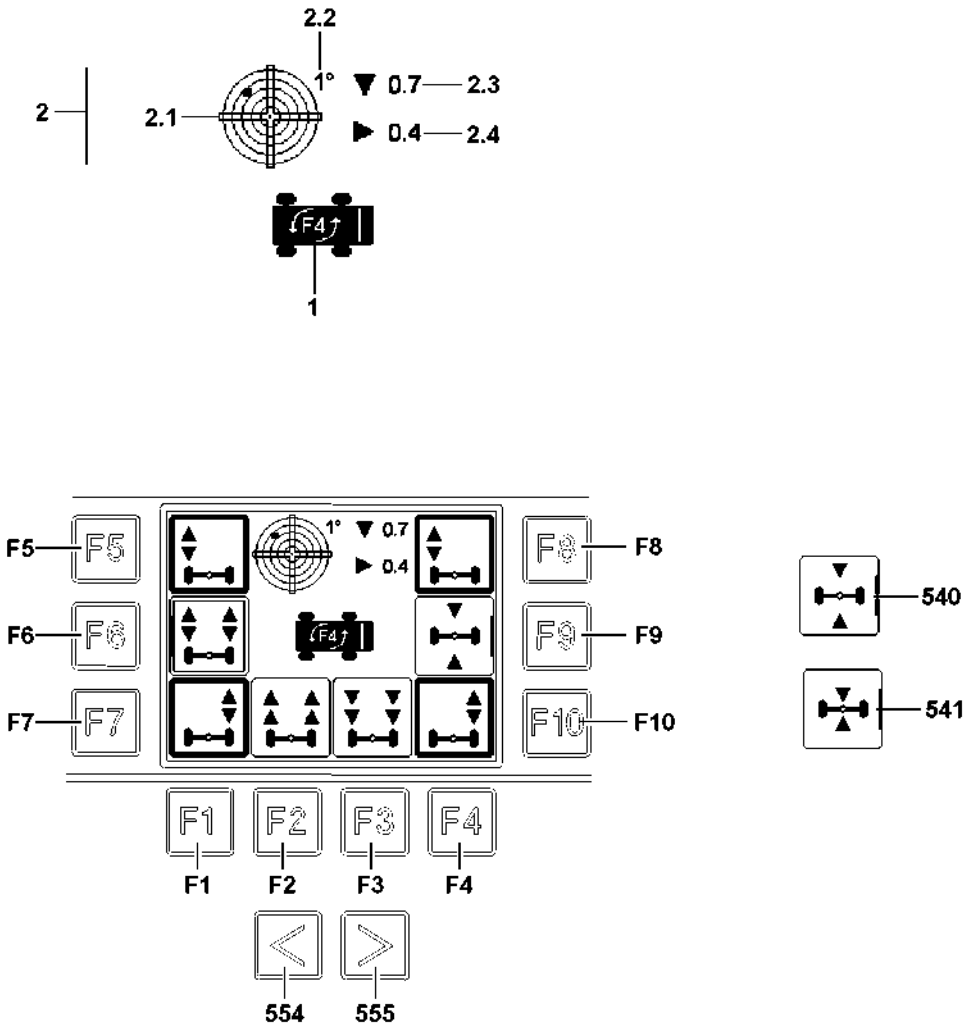

Fig.110858

3.5 The menu „Axle suspension“ on BTT

Note

- ▶ Before actuating the axle suspension, the function key **F4** must first be set to the correct view on the crane chassis.
- ▶ The respective movement is only possible when the 2-Hand keypad on the rear of the BTT is pressed first.

3.5.1 Explanation of icons on the BTT display

1 Crane icon

2 Crane incline

2.1 Incline icon
- Display of graphic incline icon

2.2 Incline range
- 1° or 5°

2.3 Incline
- Incline of crane in lengthwise (longitudinal) direction

2.4 Incline
- Incline of crane in lateral direction

3.5.2 The function keys

554 Button
- Change to previous menu

555 Button
- Change to next menu

F1 Function key
- Return to main screen

F2 Function key
- Raise the vehicle or level the axle suspension

F3 Function key
- Lowering the vehicle

F4 Function key
- Turn the crane icon in 180° increments

F5 Function key
- Selection / deselection of the axle according to the crane position

F6 Function key
- Selection / deselection of level the axle suspension

F7 Function key
- Selection / deselection of the axle according to the crane position

F8 Function key
- Selection / deselection of the axle according to the crane position

F9 Function key
- Turn the blocking of the axle suspension on / off
  - If the axle suspension is not blocked, the icon **540** appears.
  - If the axle suspension is blocked, the icon **541** appears.

F10 Function key
- Selection / deselection of the axle according to the crane position

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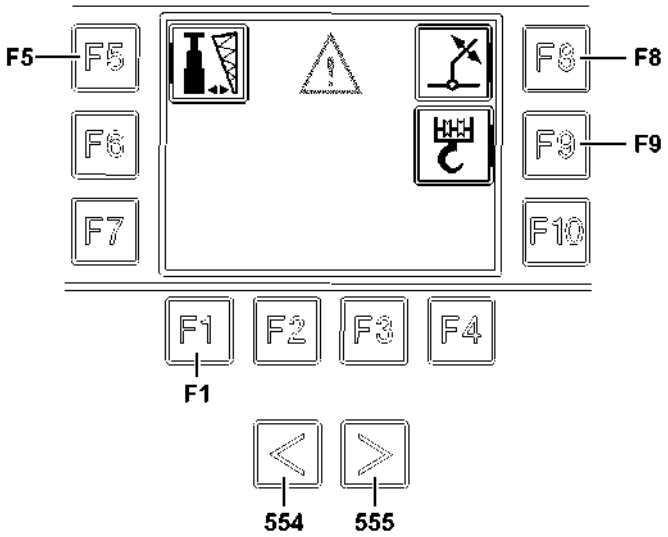

Fig.106071

3.6 The menu „Assembly functions“ on BTT

Note

- ▶ The function key **F5** in the „Assembly functions“ menu only remains active as long as the telescopic boom is completely telescoped in and the main boom angle is less than 5°.
- ▶ The function key **F8** in the „Assembly functions“ menu only remains active when the equipment is installed.
- ▶ The function key **F9** in the „Assembly functions“ menu only remains active as long as the telescopic boom is completely telescoped in.

3.6.1 The function keys

554 Button
- Change to previous menu

555 Button
- Change to next menu

F1 Function key
- Return to main screen

F5 Function key
- Selection / deselection of folding jib assembly

F8 Function key
- Selection / deselection of luffing the hydraulic folding jib

F9 Function key
- Selection / deselection of attach the hook block

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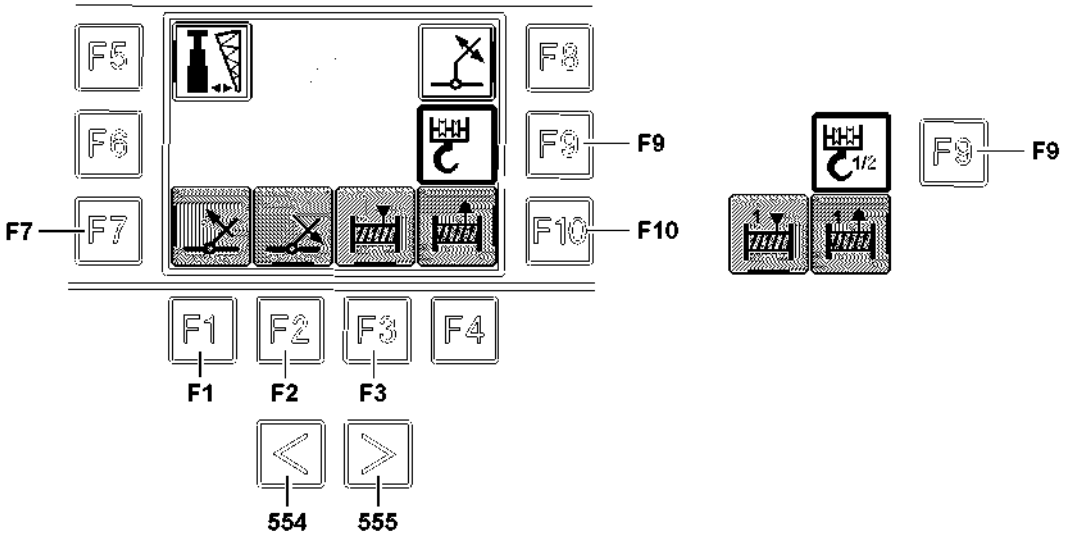

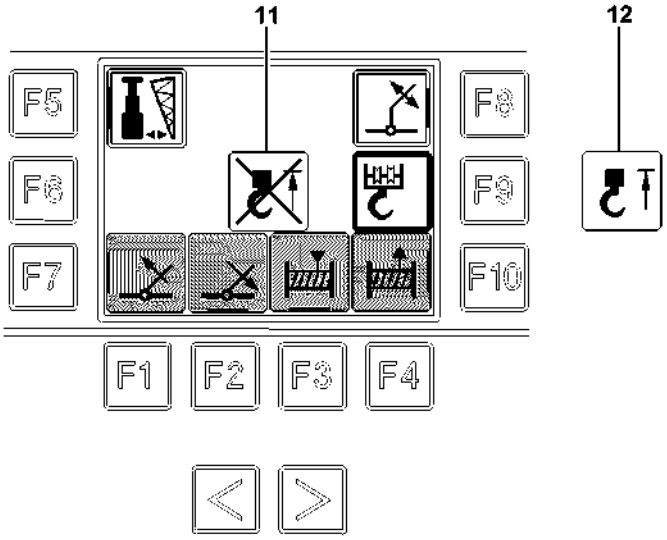

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Fig.115124

3.6.2 Attaching the hook block

Note

▶ The function key **F1**, function key **F2**, function key **F3** and function key **F4** have 2 speed stages. For example, if the function key **F4** is actuated lightly, the hoist rope is spooled out slowly. If the function key **F4** is actuated harder, the hoist rope is spooled out quickly.

▶ The respective movement is only possible when the 2-Hand keypad on the rear of the BTT is pressed first.

Explanation of icons on the BTT display

11 Hoist top limit switch bypassed
- In the assembly range 0° to 10° boom angle, the hoist top limit switch is automatically bypassed by the control system

12 Hoist top limit switch
- Icon appears when:
  - Boom angle is greater than 10°.
  - Hoist top limit switch actuated.

The function keys

554 Button
- Change to previous menu

555 Button
- Change to next menu

F1 Function key
- Return to main screen

F2 Function key
- Movement luffing cylinder down

F3 Function key
- Movement spool up winch

F7 Function key
- Movement luffing cylinder up

F9 Function key
- Selection / deselection of attach the hook block
  Note:
  When winch 2***** is installed: Selection / deselection of winch 1/2*****
  Select the correct winch in the BTT.

F10 Function key
- Movement spool out winch

Description of function

In order to move the hook block, function key **F9** must be pressed. After selecting function key **F9**, the icons for the luffing cylinder and hoist gear functions are displayed. The movements are only carried out when the 2-hand keypad has been actuated first on the rear of the BTT and the icons are highlighted in purple. Use function key **F7** to luff the boom up and function key **F2** to luff the boom down. In addition, function key **F3** and function key **F10** can be used to lower or raise the hoist gear respectively.

Note

▶ When using the BTT to operate the hook block, pin the turntable to the front.

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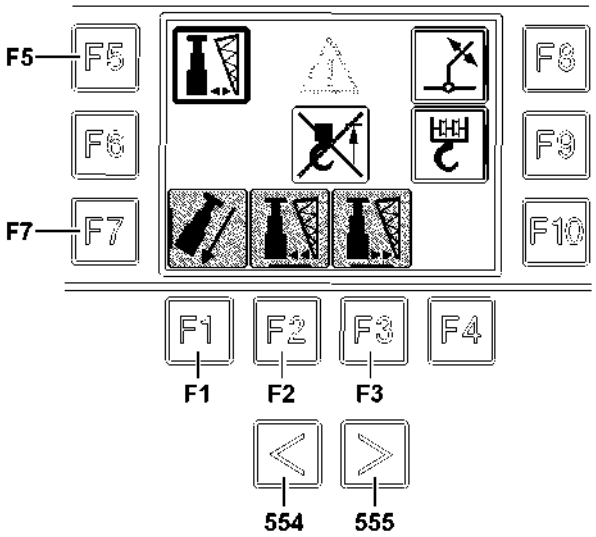

Fig.106707

3.6.3 Assembling the folding jib / swinging the folding jib

The function keys

Note

▶ The respective movement is only possible when the 2-Hand keypad on the rear of the BTT is pressed first.

554 Button
- Change to previous menu

555 Button
- Change to next menu

F1 Function key
- Return to main screen

F2 Function key
- Movement swing the folding jib in*****

F3 Function key
- Movement swing the folding jib out*****

F5 Function key
- Selection / deselection of swinging the folding jib

F7 Function key
- Movement tension telescopic boom

Tensioning the telescopic boom

WARNING

Danger of severe crushing!

For the Tension the telescope boom function, all telescoping sections are pulled together, which can lead to severe crushing injuries of fingers.

▶ As long as the function „Tension telescopic boom“ is carried out, it is prohibited for any personnel to remain in the push out range of the telescoping sections!

To be able to pin the folding jib on the boom head, it can be possible that the pin bores do not align. In that case, the telescopic boom must be tensioned via the function key **F7**. When doing so, all telescoping sections are pulled together.

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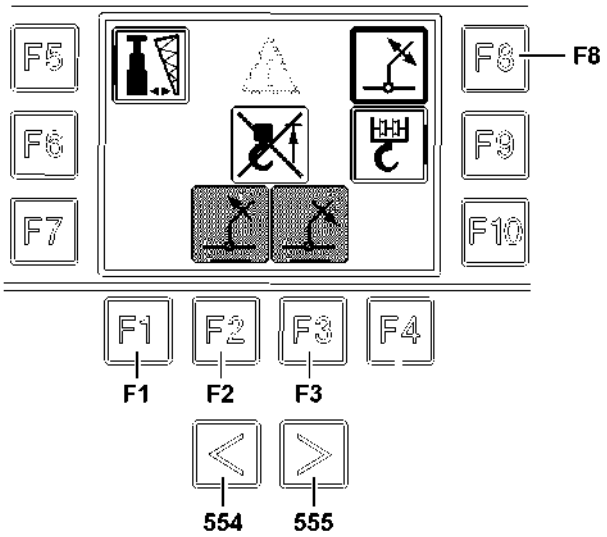

Fig.105588

3.6.4 Luffing the hydraulic folding jib*

Note

▶ The respective movement is only possible when the 2-Hand keypad on the rear of the BTT is pressed first.

Make sure that the following prerequisite is met:

– An operating mode or set up configuration with hydraulic folding jib* has been set and confirmed on the LICCON computer system.

The function keys

554 Button
- Change to previous menu

555 Button
- Change to next menu

F1 Function key
- Return to main screen

F2 Function key
- Luff up hydraulic folding jib* movement

F3 Function key
- Luff down hydraulic folding jib* movement

F8 Function key
- Selection / deselection of luffing the hydraulic folding jib*

Description of function

The hydraulic* folding jib can be luffed up or down in assembled condition. To do so, the folding jib can be luffed up via the function key **F2** and luffed down via the function key **F3**, see Crane operating instructions, chapter 5.02.

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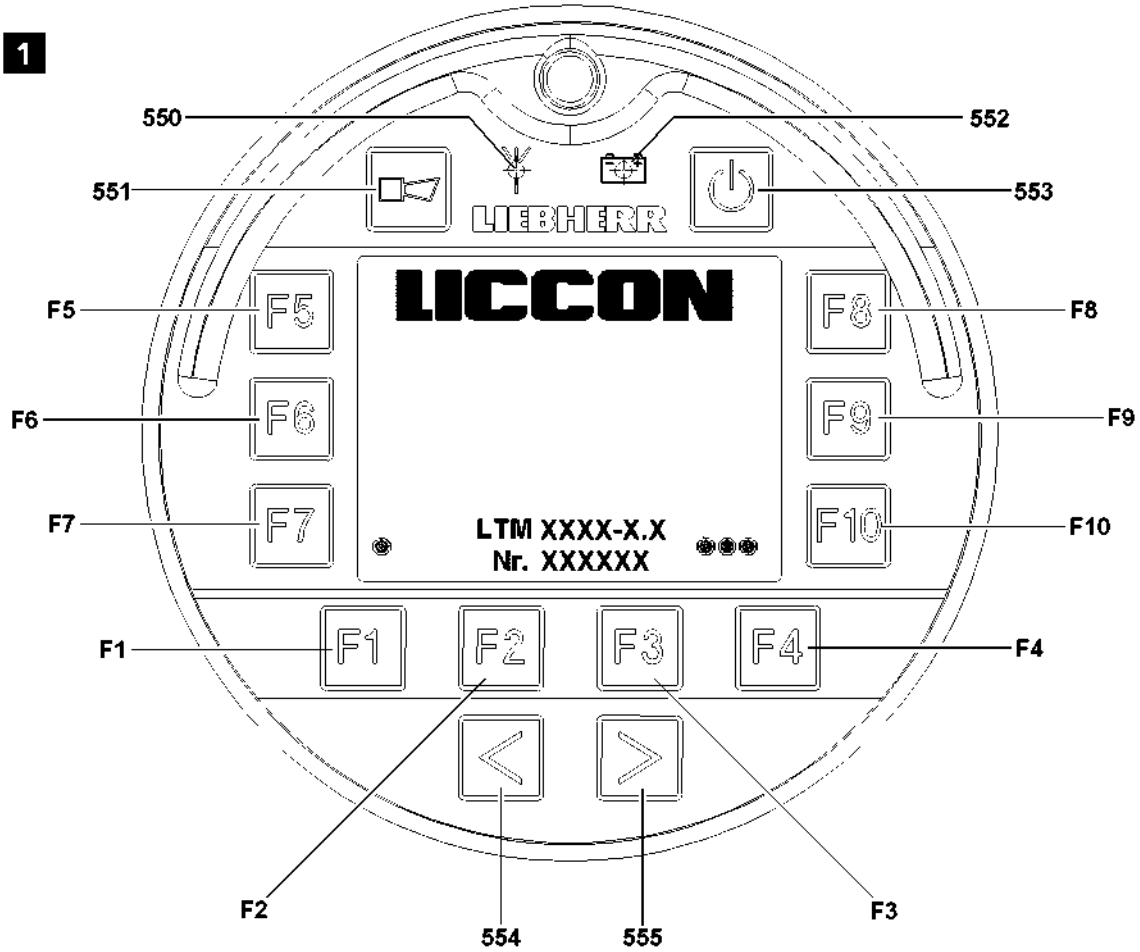
1



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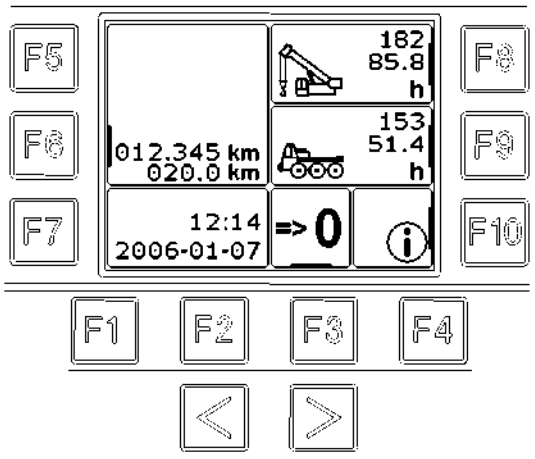

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Fig.115125

4 Operation of the Bluetooth™ Terminal (BTT)

There are two ways of turning on the Bluetooth™ Terminal (BTT):
- Turning the Bluetooth™ Terminal (BTT) on via „ignition ON“.
- Turning the Bluetooth™ Terminal (BTT) on via the ON / OFF button

4.1 Turning the Bluetooth™ Terminal (BTT) on via „ignition ON“.

Make sure that the following prerequisites are met:
- The Bluetooth™ Terminal (BTT) is plugged into the fitting.
- The crane ignition is turned off.

▶ Turn the crane ignition on.

Result:

- The Bluetooth™ Terminal (BTT) turns itself on.
- The indicator light **550** and indicator light **552** light up orange until the BTT has booted before changing to green, see illustration **1**.
- The start screen is displayed before the display changes to the „Kilometer display and operating hours“ menu, see illustration **2**.

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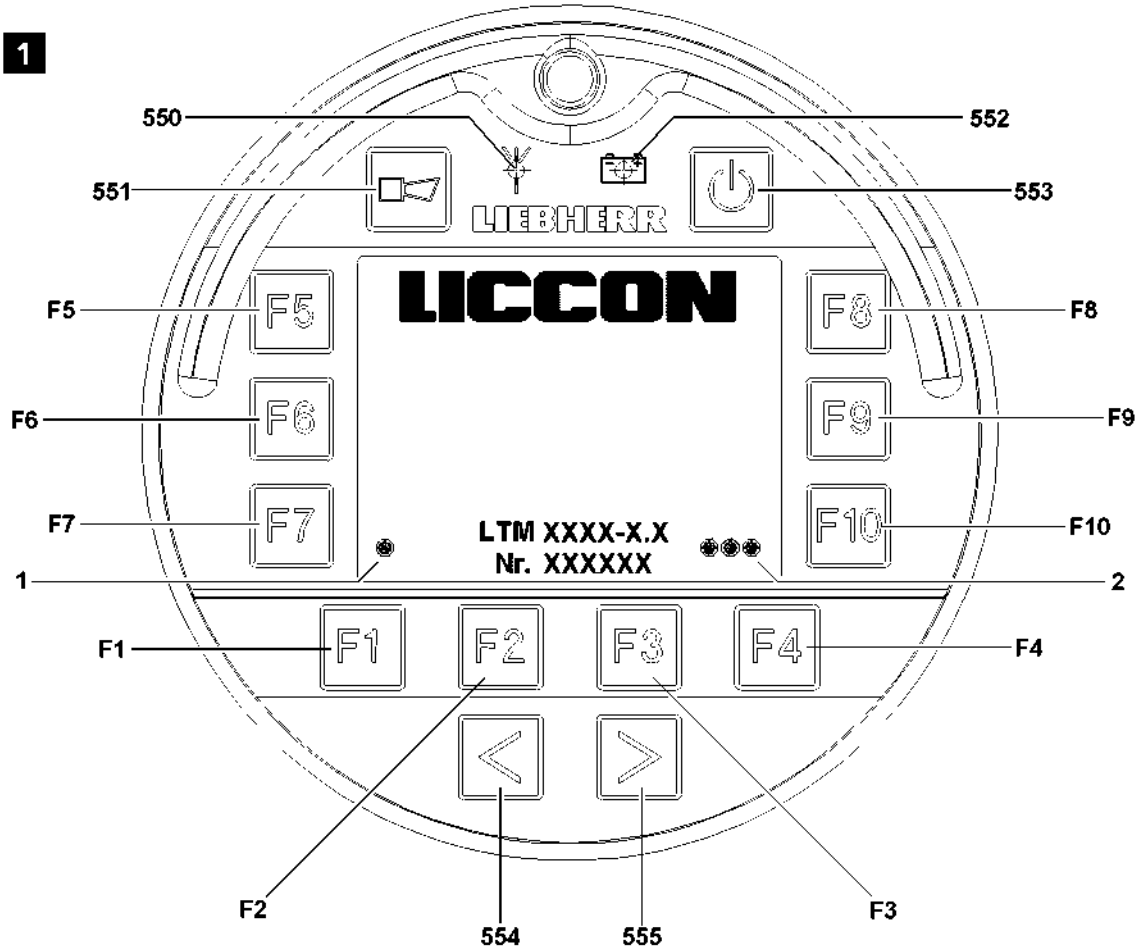
1



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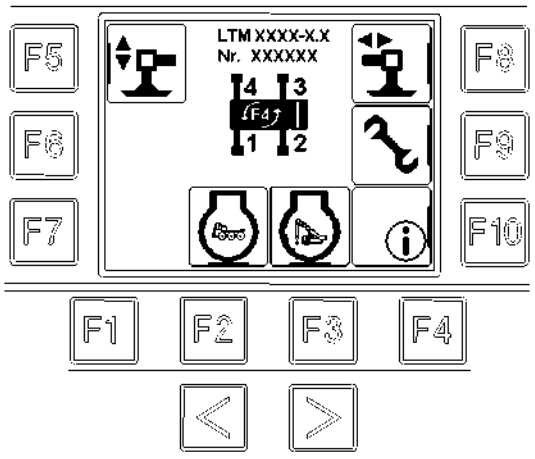

Fig.115126

4.2 Turning the Bluetooth™ Terminal (BTT) on via the ON / OFF button

Make sure that the following prerequisites are met:
- The Bluetooth™ Terminal (BTT) has been removed from its charging cradle.
- The Bluetooth™ Terminal (BTT) is turned off.
- The crane ignition is turned off.

Note
- ▶ The chassis ignition must be turned on for **chassis operation**.
- ▶ The superstructure ignition must be turned on for **superstructure operation**.

▶ Turn on the chassis ignition.
or
Turn on the superstructure ignition.
▶ Turn the Bluetooth™ Terminal (BTT) on: Press the button **553**.

Result:

- The Bluetooth™ Terminal (BTT) turns itself on.
- The indicator light **550** and indicator light **552** light up in orange.
- The start screen is displayed, see illustration **1**.

▶ Enter the code: Press button **554**, then button **555** and then function key **F1**.

Result:

- The indicator light **550** and indicator light **552** light up in green.
- The indicator light **1** and indicator light **2** light up green.
- The connection between the BTT and the receiver is established.

▶ Press any function key.

Result:

- The BTT displays the „Menu overview“, see illustration **2**.

Note
- ▶ During **chassis operation**, the „Assembly functions“ icon is **not** shown on function key **F9**.

▶ Select the menu with the appropriate function key, see relevant technical chapter.

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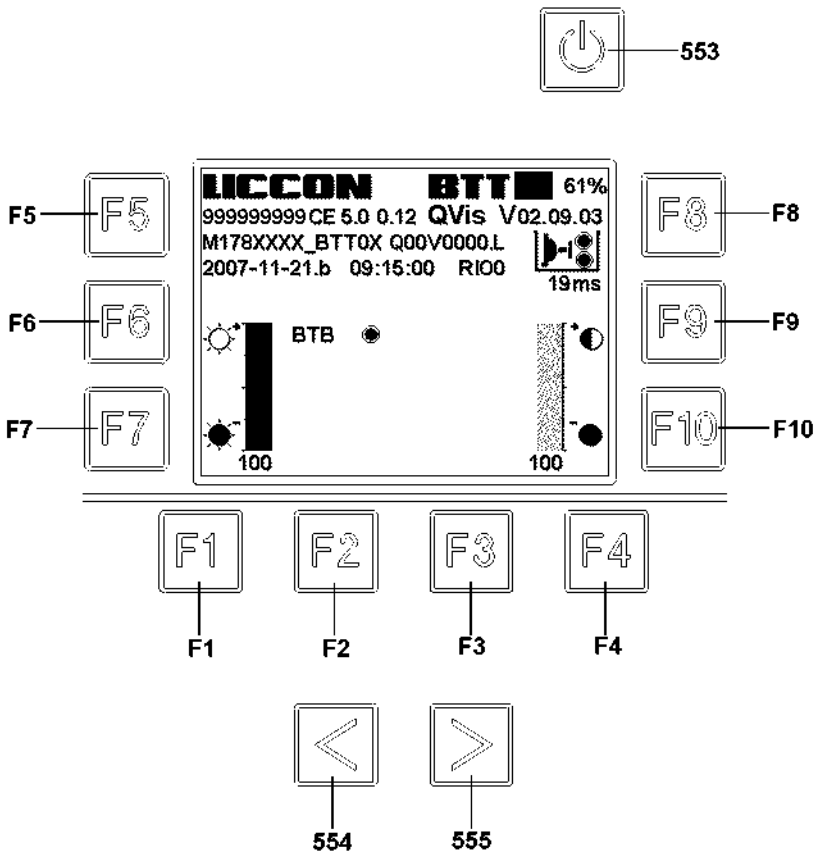
1



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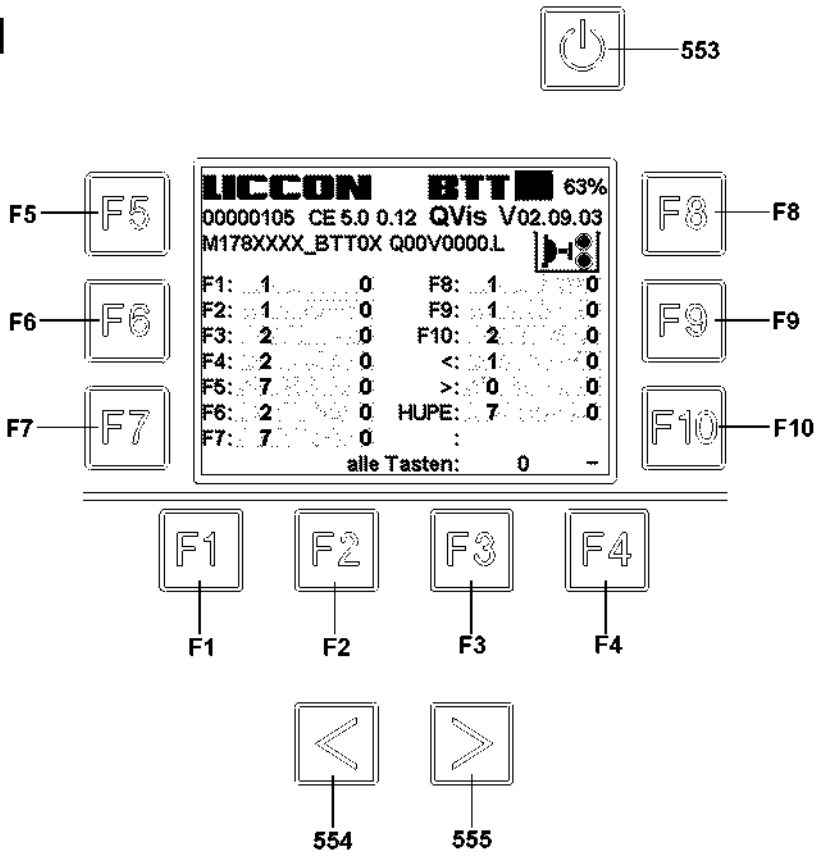

Fig.110326

4.3 Changing the Bluetooth™ Terminal (BTT) from driving to crane operation

Note

▶ The following description refers to chassis operation. The superstructure ignition must be turned on for superstructure operation.

Make sure that the following prerequisites are met:
– The chassis ignition is turned on or the engine is running.
– The BTT is turned on and the main screen is displayed.

▶ Remove the Bluetooth™ Terminal (BTT) from its charging cradle.

Result:

– The BTT display changes to the „Menu overview“.

4.4 Changing into the system screen

See illustration **1**.

Make sure that the following prerequisite is met:
– The „Main menu“ is displayed.

▶ Select the „System screen“: Press the button **553** briefly.
▶ To change back to the „Main menu“: Press the function key **F1**.

4.5 Changing into the operating screen button test

See illustration **2**.

Make sure that the following prerequisite is met:
– The System screen is selected.

▶ Select operating screen „Button test“: Press the button **554**.
▶ To change back to the „System screen“: Press the button **553** briefly.

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6 Additional equipment

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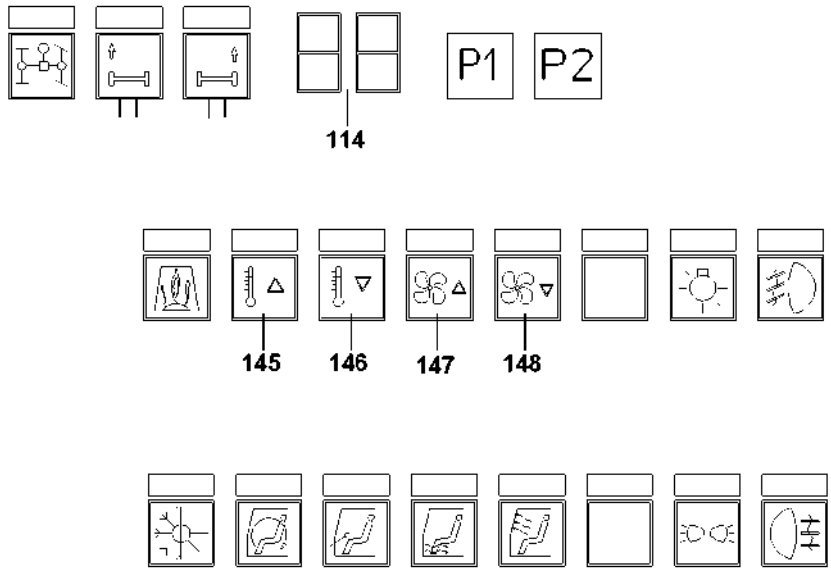

Fig.114844

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.

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.

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 the 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 the 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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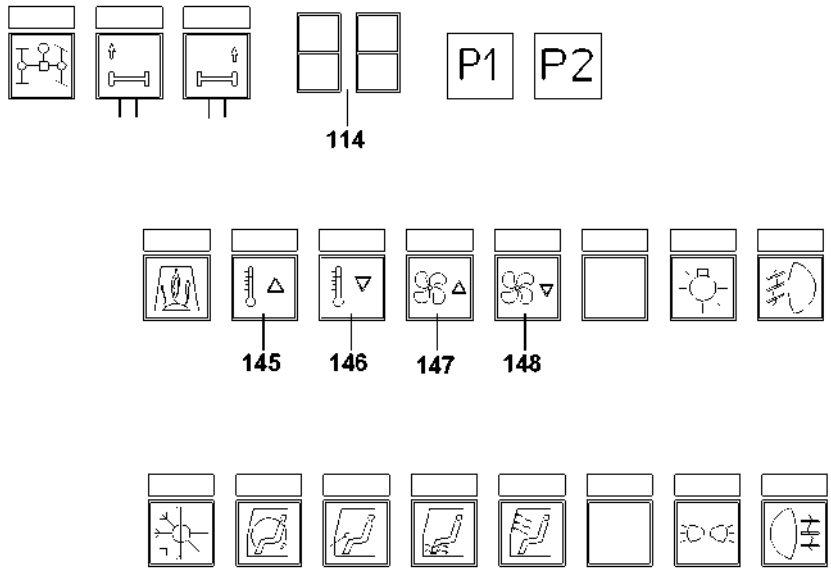

Fig.114844

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 the 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 the button **148**.

Result:

– The function control on button **148** lights up.
– The display unit **114** briefly displays the set fan speed.

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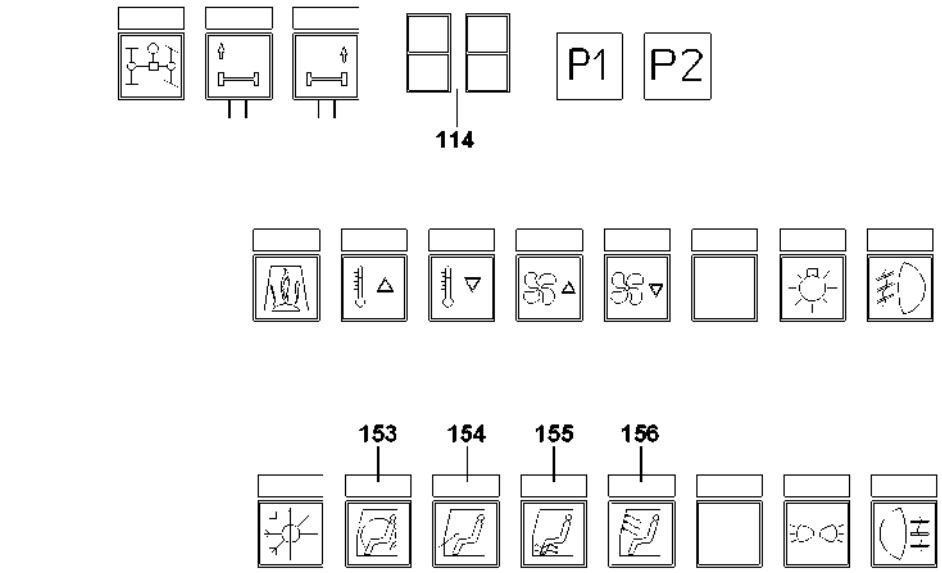

Fig.114845

1.1.3 Adjusting the recirculating air / fresh air

The supply of fresh air into the cab can be controlled using button **153** and button **154**.

Recirculating air button **153**	**Fresh air** button **154**	**Air distribution**
On	Off	Recirculating air only
Off	On	Fresh air only
On	On	Approx. 70 % recirculating air and 30 % fresh air
Off	Off	Approx. 30 % recirculating air and 70 % fresh air

▶ Press the button **153**.

Result:

– The function control on button **153** lights up.
– The button **153** has been turned on.

▶ Press the button **154**.

Result:

– The function control on button **154** lights up.
– The button **154** has been turned on.

1.1.4 Ventilating the floorboard / 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 the button **155**.

Result:

– The function control on button **155** lights up.
– The button **155** has been turned on.

▶ Press the 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.

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▶ Close the air vent **44**.

Result:

– The air distribution is completed.

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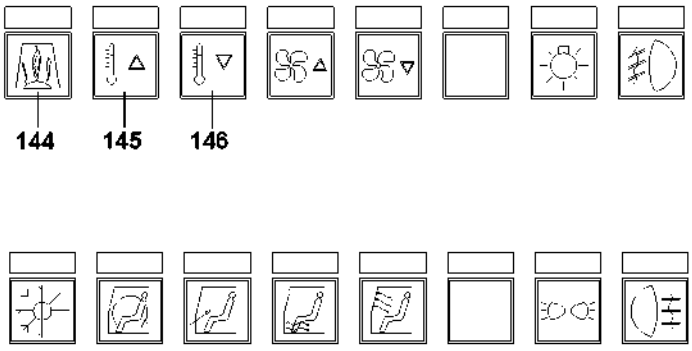

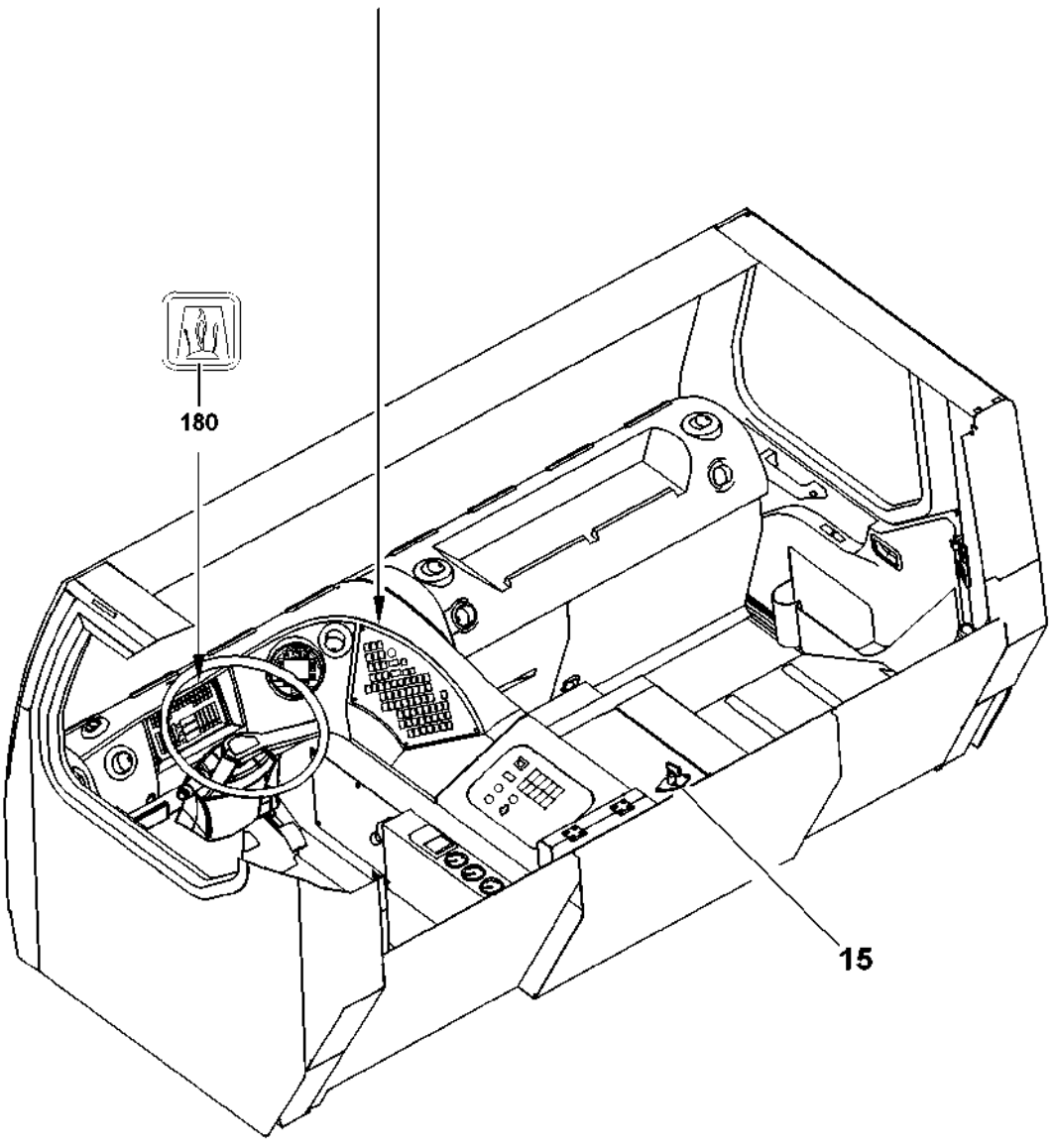

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Fig.114846

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

NOTICE
Risk of damage to auxiliary heater!
▶ Fill all units with sufficient service fluids for winter operation according to the lubrication chart.

DANGER
Risk of poisoning and suffocation in enclosed areas!
▶ Only operate the heater with the BTT in enclosed areas, such as garages or workshops, if an exhaust 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 the button **144**.

Result:

– The function control on the button **144** lights up.
– The indicator light **180** lights up.
– The fan runs automatically at level 1 in order to prevent the auxiliary heater from overheating.

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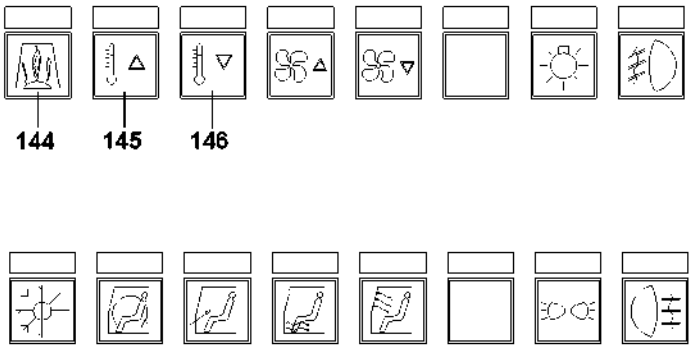

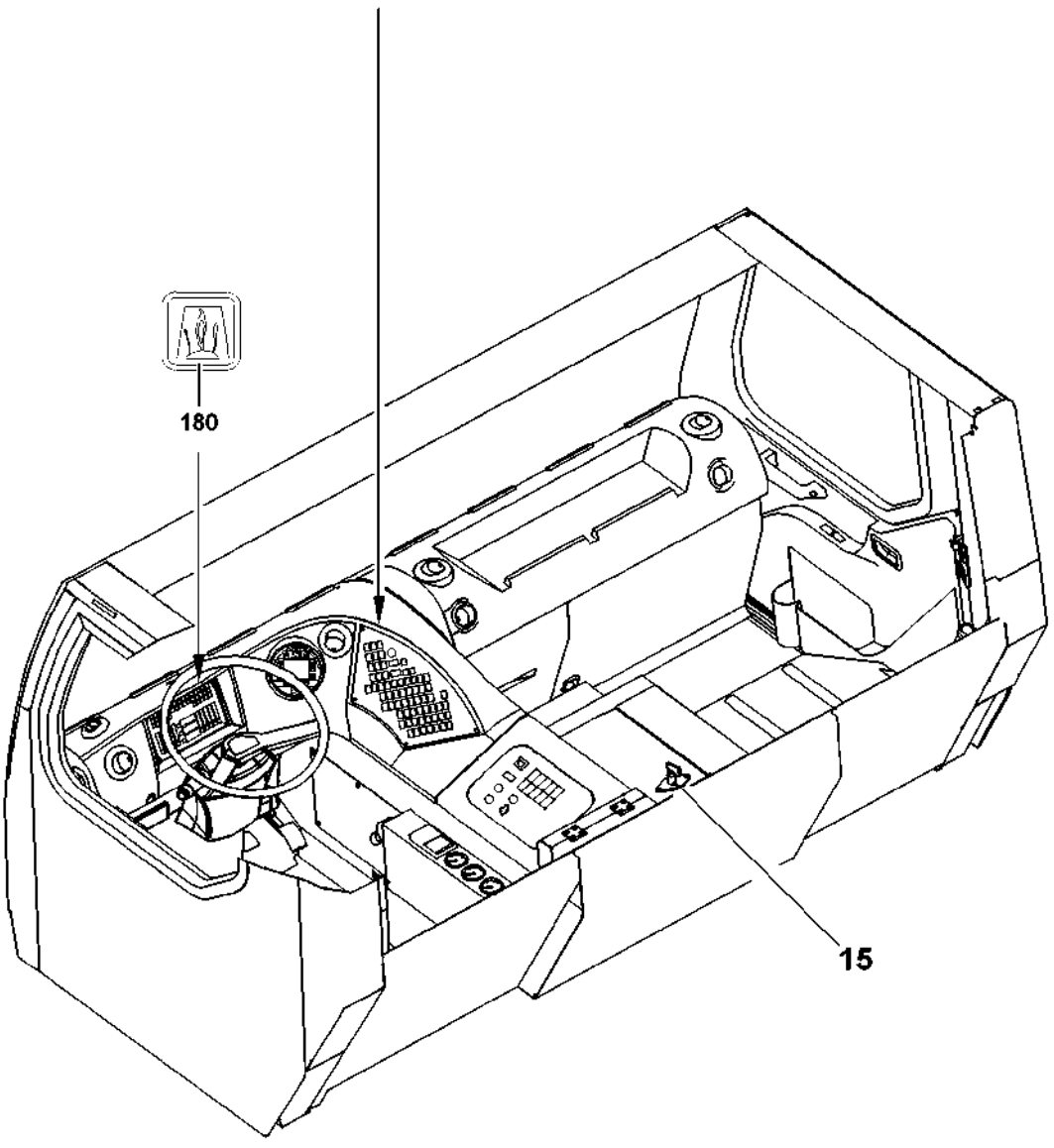

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Fig.114846

1.2.2 Turning off

▶ Press the button **144**.

Result:

– The function control on the button **144** turns off.
– An shut off delay is carried out each time the auxiliary heater is turned off.
The keypad unit remains on even if the ignition key has been removed.

NOTICE
Danger of property damage!
▶ Turn the battery master switch off only when the heater shut off delay is over.

Once the shut off delay is ended:
– The indicator light **180** turns off.
– The keypad unit turns off automatically.

1.2.3 Venting the system

When draining off 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 equalizing reservoir of the engine cooling circuit as specified in the lubricant chart.
▶ Start the engine as described in the Crane operating instructions, 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.

Once no more air bubbles appear in the expansion tank:
▶ Set the button **146** for the driver's cab temperature to level 0.

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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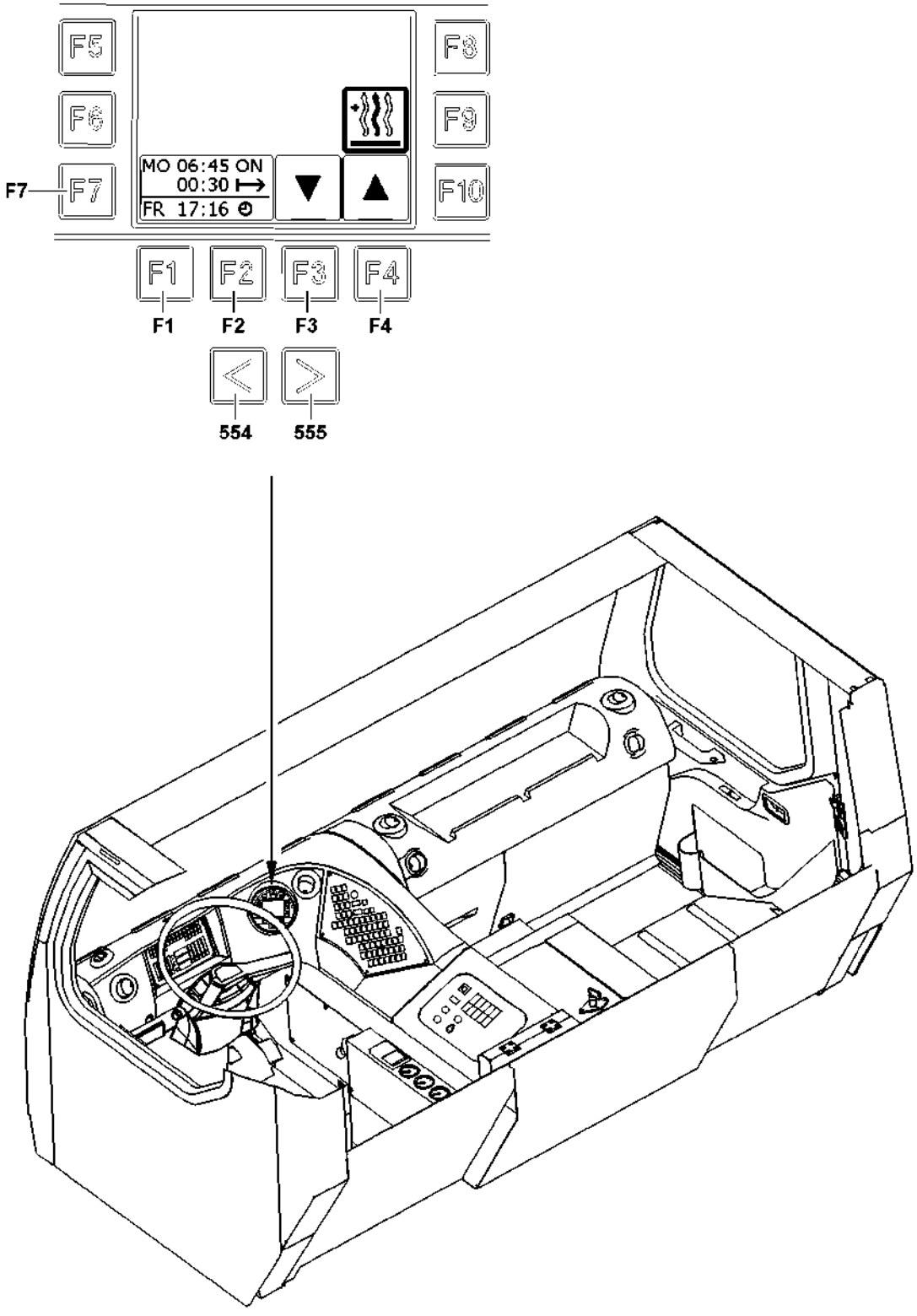

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Fig.114847

1.2.4 Setting the timer for auxiliary heater * with the BTT

Make sure that the following prerequisite is met:
– The BTT is placed in the charging cradle.

▶ Press button **554** or button **555** until the menu „Climate control settings for auxiliary heater" is displayed.
▶ Press the function key **F7**.

Result:

– The timer for the auxiliary heater is selected.

▶ Press the function key **F2**.

Result:

– The cursor blinks on the „weekday".

▶ Press function key **F3** „minus" or the function key **F4** „plus" until the desired weekday appears (for example: Monday).
▶ Press the function key **F2**.

Result:

– The cursor blinks on the „hours".

▶ Press the function key **F3** „minus" or the function key **F4** „plus" until the desired hour appears (for example: 6 o'clock).
▶ Press the function key **F2**.

Result:

– The cursor blinks on the „minutes".

▶ Press the function key **F3** „minus" or the function key **F4** „plus" until the desired minute appears (for example: 45 minutes).
▶ Press the function key **F2**.

Result:

– The cursor blinks for the „turn on duration".

▶ Set the desired turn on duration (for example: 30 minutes).
▶ Press function key **F4** „Activate / deactivate the timer".

Result:

– The programmed settings are taken over.
– The timer is activated with „ON".
– In this example the auxiliary heater is set to: Monday, Start 6:45, turn on duration 30 minutes.

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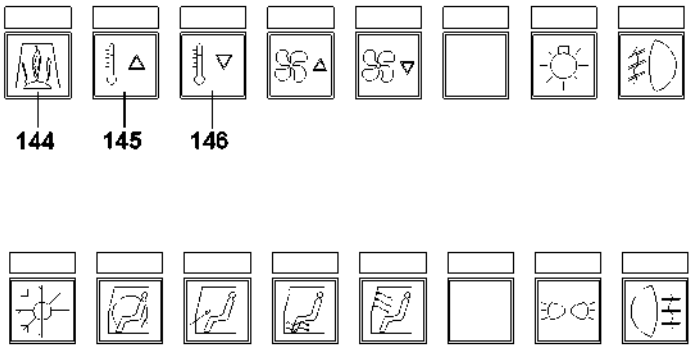

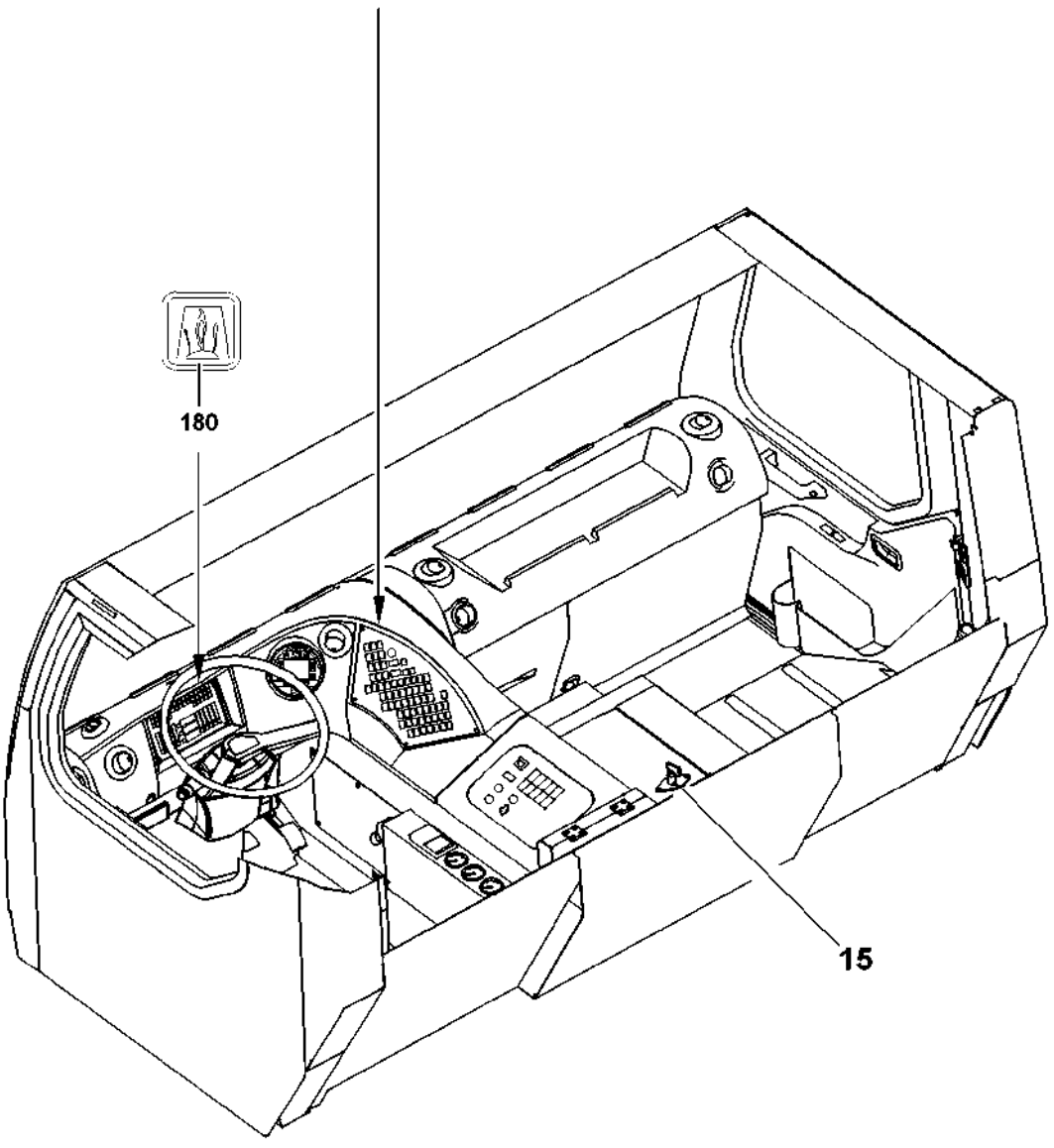

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Fig.114846

1.3 Operating the engine-independent auxiliary heater for engine preheating*

At ambient temperatures of less than -20 °C, the engine must be preheated by the engine preheating 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

NOTICE
Risk of damage to auxiliary heater!
▶ Fill all units with sufficient service fluids for winter operation according to the lubrication chart.

DANGER
Risk of poisoning and suffocation in enclosed areas!
▶ Operate the heater with the BTT in enclosed areas such as garages or workshops only if an exhaust system is in use!

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 the 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.

1.3.2 Turning off

When the preheating period is over:
▶ Press the button **144**.

Result:

– The function control on the button **144** turns off.
– Engine preheating is completed.
– A shut off delay of the engine preheating will run up to 150 seconds.

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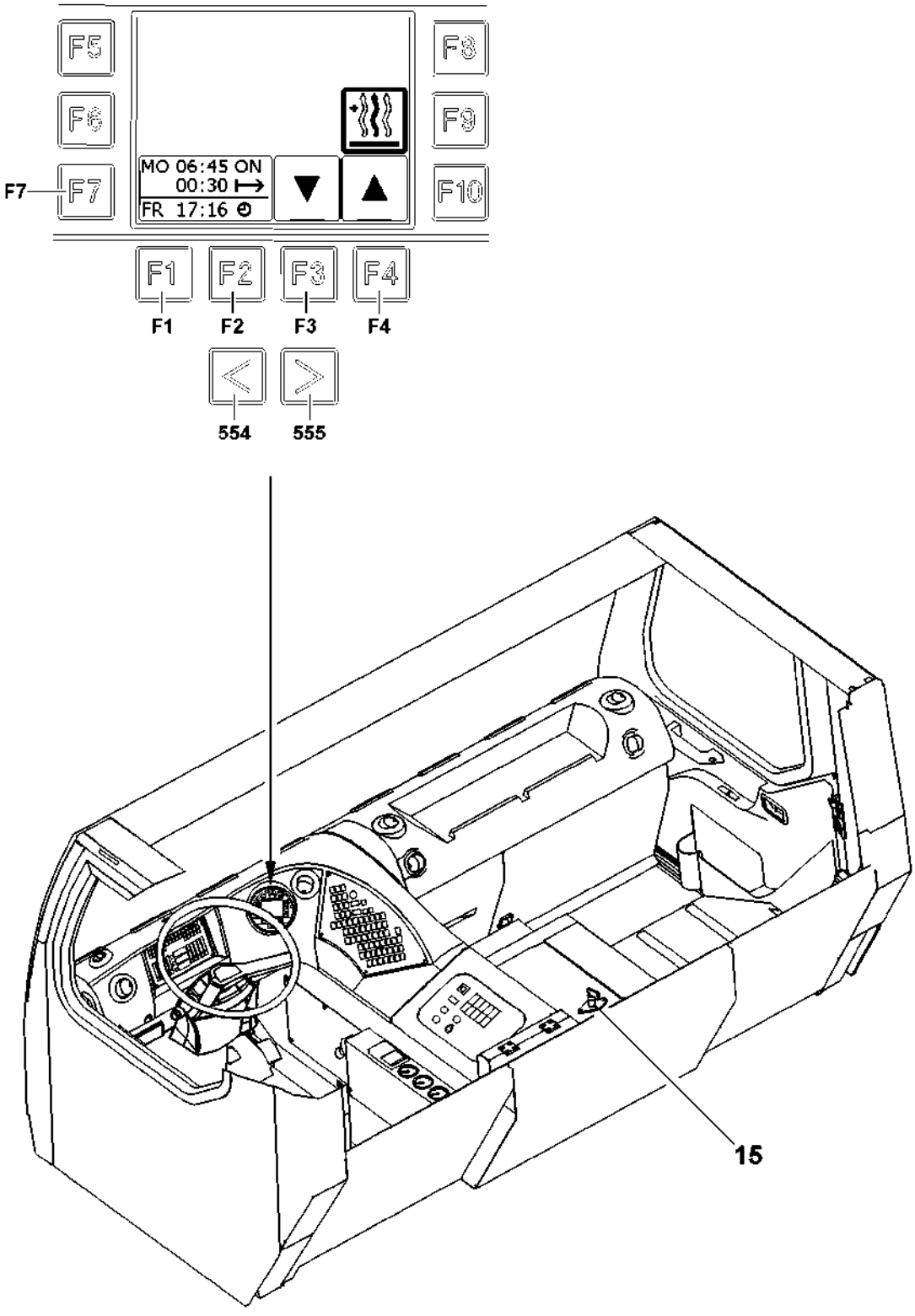

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Fig.114848

1.3.3 Start up with the BTT

▶ Turn the battery master switch **15** on.
▶ Before turning off the engine, set the temperature selection to level 0=„cold".
▶ Use the BTT to turn 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 the BTT

When the preheating period is over:
▶ Turn the BTT off.

Result:

– A shut off delay of the engine preheating will run up to 150 seconds.

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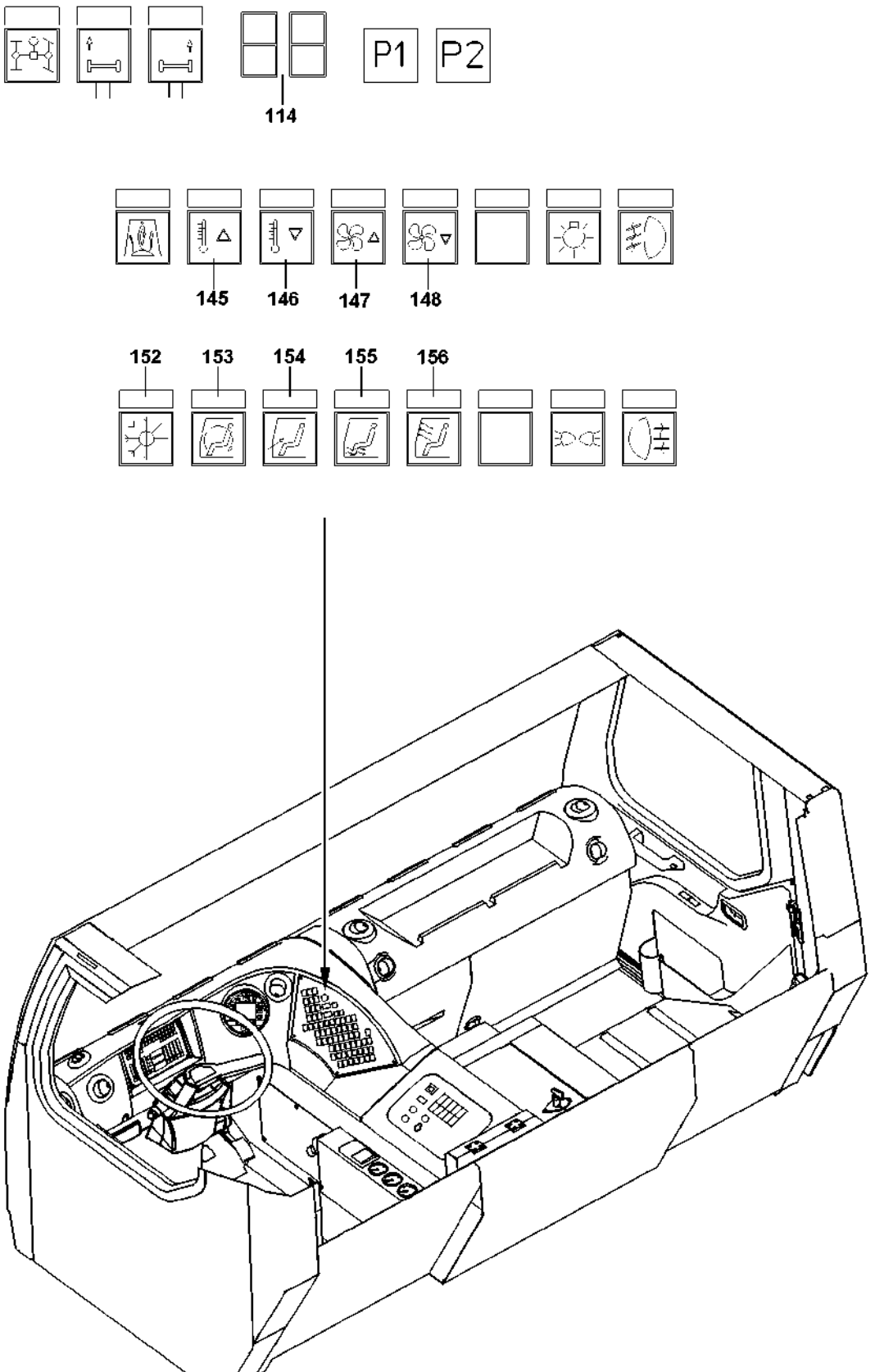

Fig.114849

1.4 Climate control system* operation

The climate control system is a combination of heater and ventilation system as well as an air conditioning system, which is used to dehumidify and cool the air in the driver's cab.

Please note:
- In air conditioning operation, the humidity in the driver's cab is decreased. This prevents the windows from fogging up.
- In case of high outside humidity and high outside temperatures, condensation can drip from the evaporator of the air conditioning system and form a puddle under the mobile crane. This is normal and no sign of leaks.

WARNING
Injuries to persons and property damage!
If the climate control system is turned off and in air circulation operation, the windows can fog up!
- ▶ If the windows are fogged up, proceed according to section „Procedure in case of fogged up windows“!
- ▶ Do not expose personnel to low interior temperatures!
- ▶ Repair work on the climate control system and maintenance work on the cooling circuit must be carried out solely by a Service technician from Liebherr-Werk Ehingen!

Note
- ▶ In order not to compromise the heater or cooling output and to prevent the windows from fogging up, the air intake must be clear of ice, snow and contaminants.
- ▶ The climate control system works best if the windows and doors are closed. However, if the driver's cab is heated up too much when the mobile crane is at a standstill due to sun rays, then the cool off procedure can be accelerated by opening the windows or doors for a short time.
- ▶ Do not cover up the air circulation intake with clothing or other objects!

The maximum cooling output is reached when:
- All air vents are open.
- The air supply is exclusively switched to air circulation.
- The air distribution is exclusively set on the window.
- The fan speed is set to maximum power.
- The temperature stage is set to zero.

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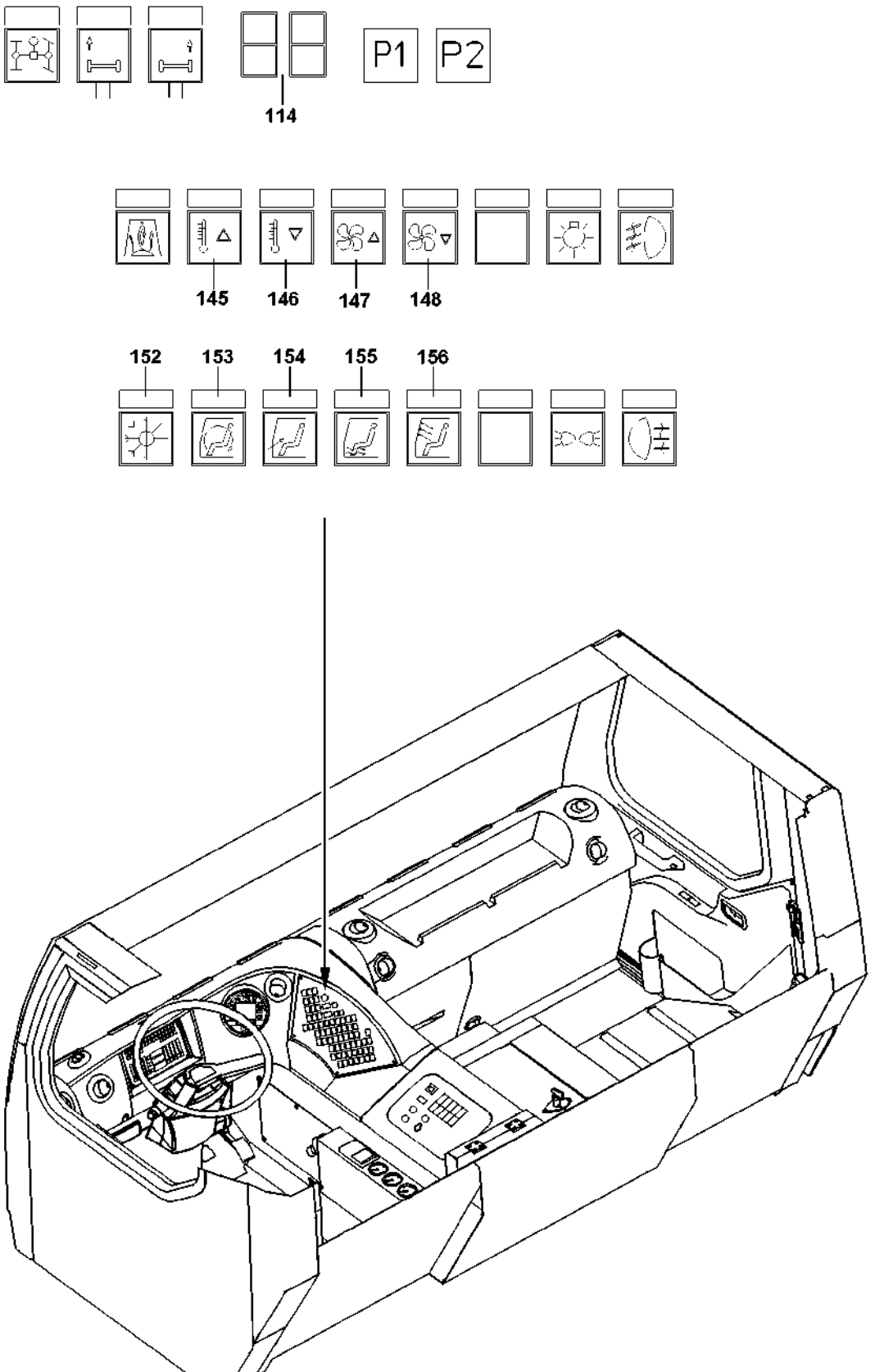

Fig.114849

1.4.1 Operating the climate control system

Make sure that the following prerequisites are met:
– The doors and windows are closed.
– The engine is running.

▶ Press the button **146** and set the temperature to cold.

Result:

– The display **114** shows the selected temperature stage.

▶ Press the button **147** and set the fan speed at least to stage 1.

Result:

– The display **114** shows the selected fan speed.

▶ Press the button **152** and turn the climate control system on.

Result:

– The function control on the button **152** lights up.

To change the air supply:
▶ Press button **153** or button **154**.

To change the fan speed:
▶ Press button **147** or button **148**.

Problem remedy
The temperature from the air vents is not noticeably below the ambient temperature?
The air circulation or the fresh air filter or evaporator are dirty.
▶ Check the air circulation and fresh air filter for contaminants and clean or replace, as necessary.
▶ Check the evaporator for contaminants and clean, if necessary.
▶ If none of these measures are helpful, contact the Service Dept. of Liebherr-Werk Ehingen!

If the climate control system is to be turned off:
▶ Press the button **152** again.

Result:

– The function control on the button **152** turns off.

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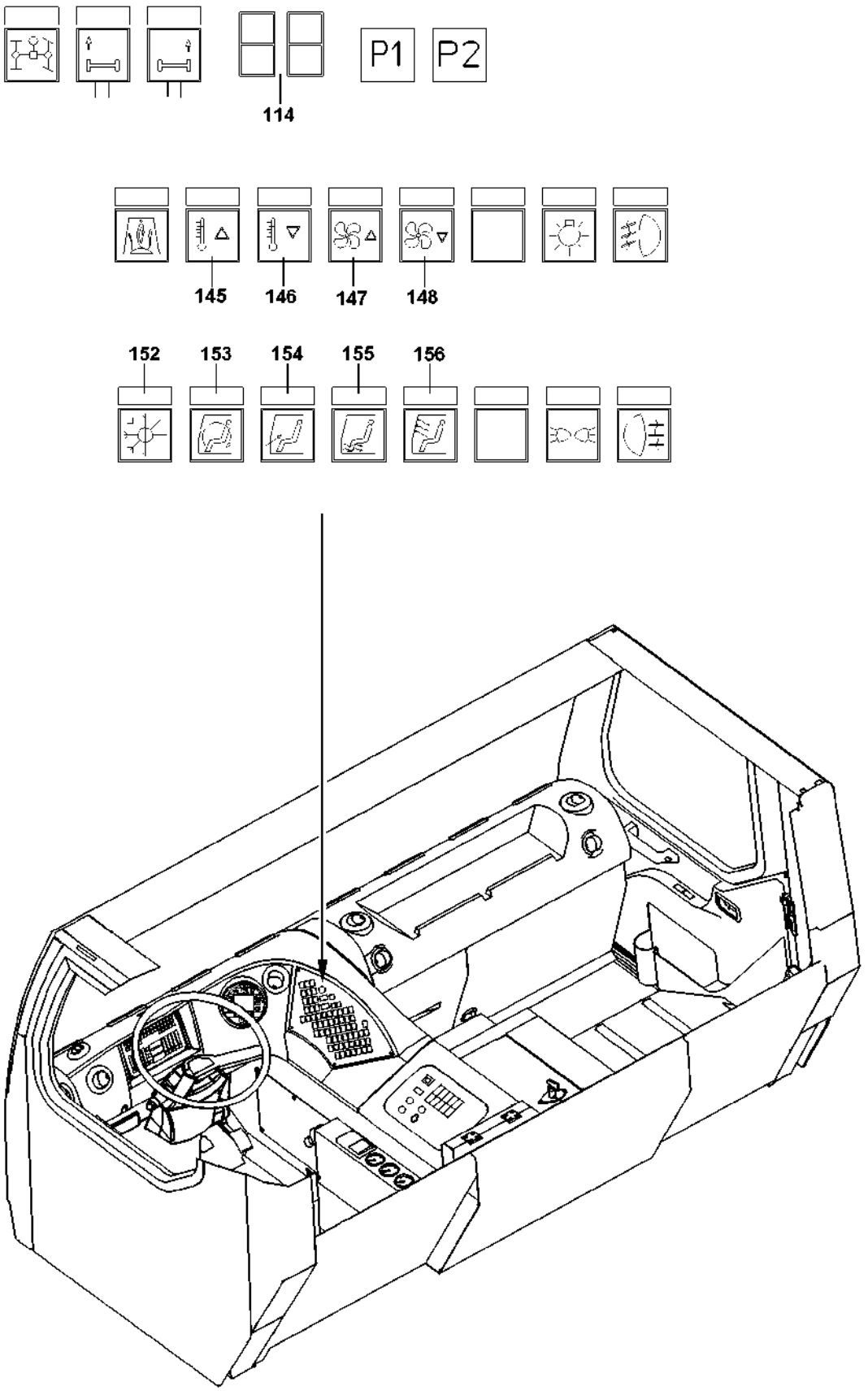

Fig.114849

1.5 Procedure in case of fogged up windows

To be able to clear the windows quickly, observe a certain sequence of the settings.

- ▶ Set the air distribution: Turn the button **155** „Floorboard" off and turn the button **156** „Front windshield" on.
- ▶ Open the air vents.
- ▶ Set the recirculating air distribution: Turn the button **153** „Air circulation" on and turn the button **154** „Fresh air" off.
- ▶ Press the button **147** and set the fan speed to the highest stage.
- ▶ Press the button **152** and turn the climate control system***** on.

Note

- ▶ The higher the temperature in the driver's cab, the better the air will be dehumidified.

- ▶ Press the button **145** and set the temperature stage to the highest stage.
- ▶ Press the button **144** and turn the auxiliary heater***** on.

2 Maintaining the engine independent heater

Note

- ▶ The maintenance guidelines of the heater manufacturer remain valid and binding!

If an engine independent heater (auxiliary heater) is installed on the crane, maintenance must be carried out in regular intervals.

WARNING
Danger of accident!
On locations, where flammable vapors or dust can form (for example on gas stations), there is a danger of explosion when operating the engine independent heater!

- ▶ Do not operated the engine independent heater in case of a danger of explosion!
- ▶ Do not breathe in the exhaust of the engine independent heater!

The maintenance of the engine independent heater includes:
- – Monthly: Function test.
- – Before every heating period: Checks.
- – according to the specification of the heater manufacturer: Replacing components of the heater
- – After fuel tank was empty: Bleed the fuel line.

2.1 Perform function tests

Operate the engine independent heater once a month for at least 10 minutes.

Make sure that the following prerequisites are met:
- – The crane is outside or a sufficient exhaust suction is ensured.
- – The location has been selected in such a way that there is no danger of explosion when operating the engine independent heater.
- – Combustion air infiltration and exhaust emission of the heater are free of foreign particles.
- – Pollen filter / dust filter of the heater are continuous (if present).
- – Heating circuit is bled.
- – Fuel line is bled.
- – Heating circuit is completely cold.
- – The crane engine is turned off.

- ▶ Turn the engine independent heater and heater blower on.

Result:

- – The circulation pump starts.

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– The combustion air blower starts.
– After maximum four minutes an exhaust emission on the exhaust pipe is noticeable.
– The engine independent heater runs: The heating circuit starts to warm up.

▶ Check the heat effect on the air vents of the vehicle.
▶ Engine preheating***** (Engine must be off!): Check if the engine temperature increases.

2.2 Checks to be performed

Before every heating period, carry out the following checks.

Make sure that the following prerequisites are met:
– The heater and the heating circuit are completely cold.
– A function check was completed successfully.
– In the error stack of the heater **and** in the error stack of the LICCON computer system are no error messages listed for the heater.

Note
The error stack of the heater can only be read by expert personnel.
▶ Contact Customer Service at Liebherr-Werk Ehingen.

▶ Clean the heater externally (avoid water infiltration).
▶ Check the electrical connections for contact corrosion and tight seating.
▶ Check the exhaust and combustion air line for damage and free passage.
▶ Check the fuel line and fuel filter (if installed separately) for leaks and cracks.
▶ Replace the fuel filter (if installed separately).
▶ Check the circulation pump for leaks.
▶ Check the heating circuit for leaks and cracks.
▶ Check the anti-corrosion / antifreeze in the heating circuit (specification: 50 % anti-corrosion fluid / antifreeze).

2.3 Replacing components of the heater

The heater manufacturer specifies time frames, after which the components of the heater must be replaced.

– No later than after 3000 operating hours, the burner of the heater must be replaced.
– No later than after 10 years, the heat exchanger of the heater must be replaced.

2.4 Bleed the fuel line.

If the fuel tank of the engine independent heater was run dry, then it is possible that the fuel line must be bled.

In addition, it may be possible that a new start must be carried out on the control unit of the engine independent heater.

Note
New start of the control unit of the engine independent heater.
▶ Contact Customer Service at Liebherr-Werk Ehingen and coordinate the procedure.

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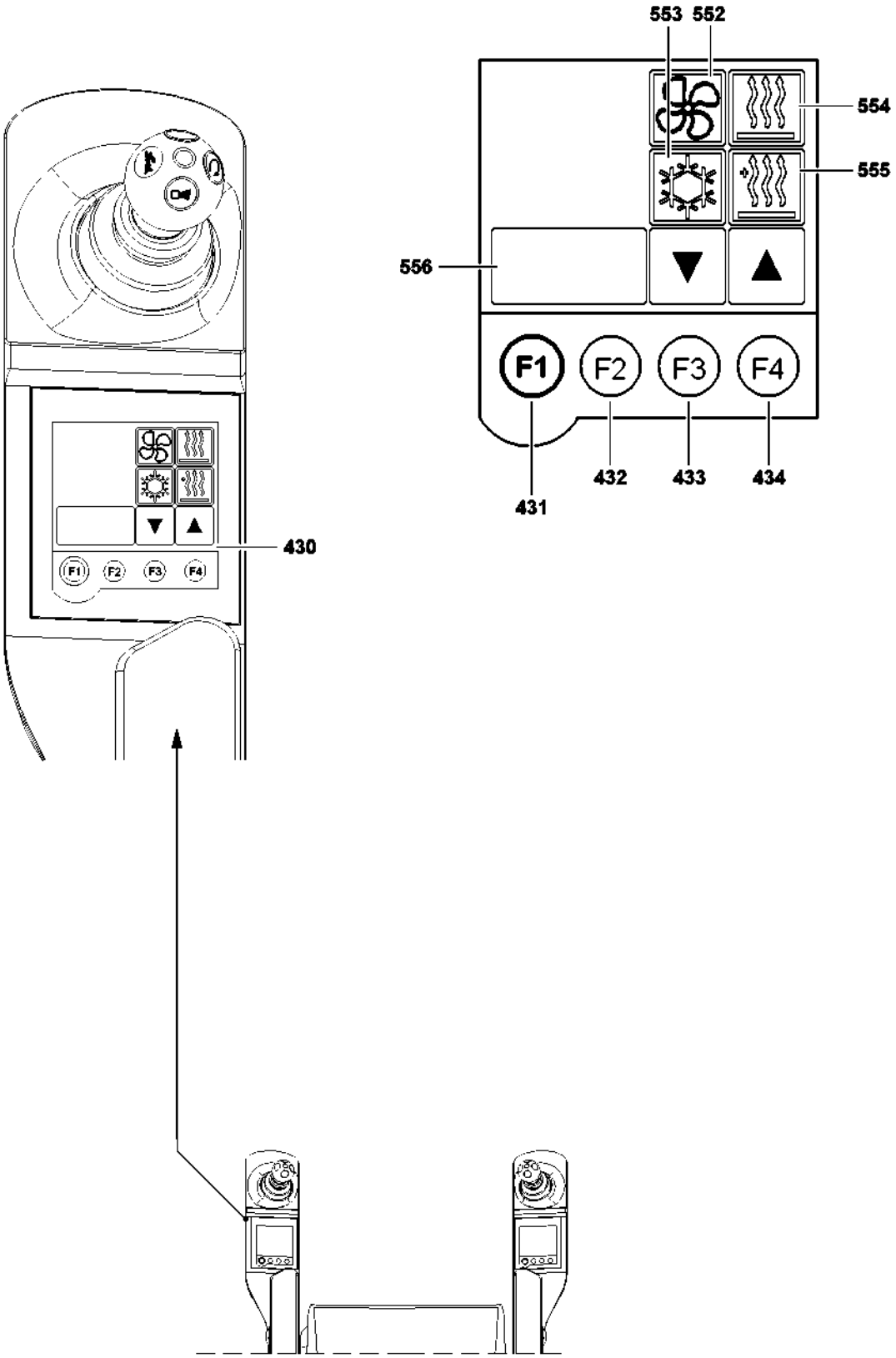

Fig.105534

1 Heating the crane operator's cab

The cab can be heated with an independent heater:
- Auxiliary heater for ambient temperatures of up to -40 °C, WEBASTO; Thermo 90 ST*****
- Engine preheating with auxiliary heater*****

The individual adjustment of the heater is made solely via the menu „Climate control settings“ on the Touch display left **430**.

NOTICE
Risk of damage in the electrical / electronic component area 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 Menu „Climate control settings“

2.1 General

The „Climate control settings“ menu is accessed, with the ignition turned, on by pressing function key F1 **431** on the left touch display **430**.

Note
▶ The „Climate control settings“ menu is removed automatically after 30 sec. if no settings are changed during this time.
▶ The screen on the left touch display changes to the „Master switch configuration“ menu.

If the crane ignition is turned off, the LICCON computer system and the touch display also turn themselves off. The settings in the „Climate control settings“ menu remain except for the function selection auxiliary heater **555**.

Note
▶ If the auxiliary heater has been programmed, the settings are saved when the ignition is turned „OFF“. The crane display appears on the left and right touch displays.

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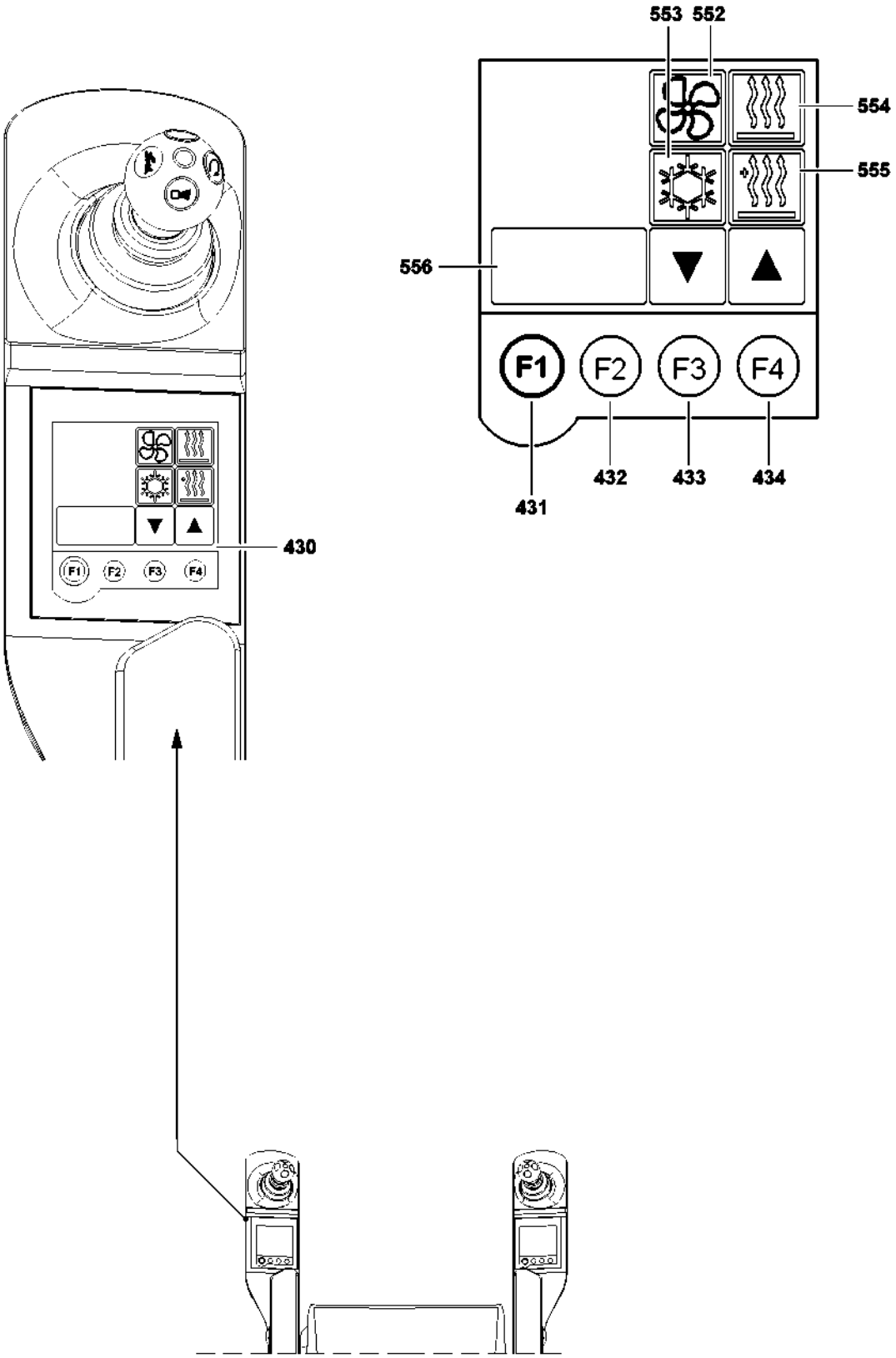

Fig.105534

2.2 Operating the left touch display

The left touch display **430** contains all the functions for making and operating all heater, ventilation and climate control settings and for programming the auxiliary heater on the crane:

- **552** Fan / blower
  - Function selection
- **553** Climate control system
  - Function selection
- **554** Heater
  - Function selection
- **555** Auxiliary heater
  - Function selection
- **556** Status display
  - Display function

  The status display **556** shows the following, depending on the selected function:
  - The adjustment ratios for air distribution.
  - The constant heater stage setting in manual heating mode.
  - The temperature setting in AUTOmatic heating mode.
  - Climate control system „ON".
  - Climate control system „OFF".
  - The programming indicator for auxiliary heater / Engine preheating*****.

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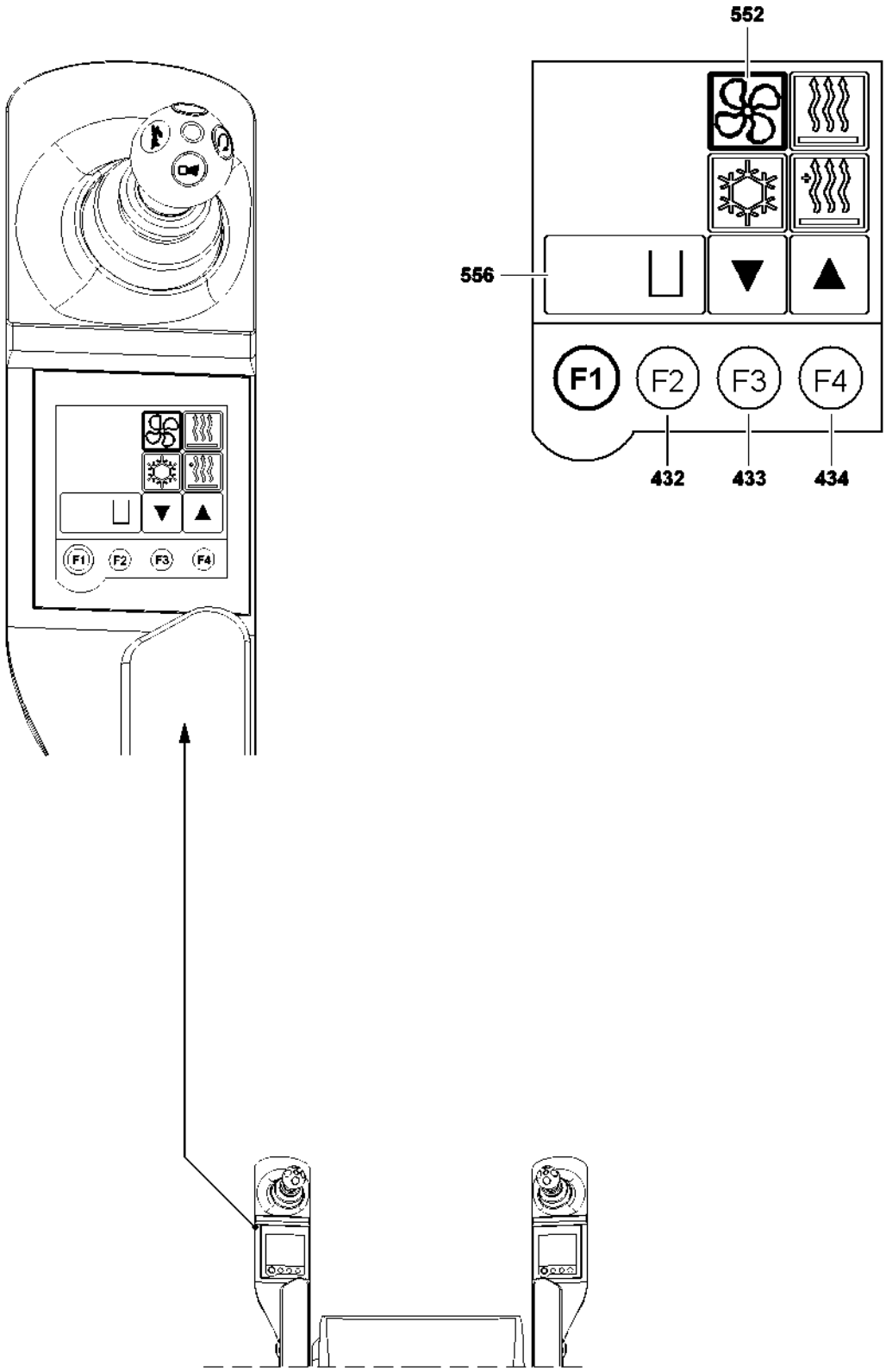

Fig.105535

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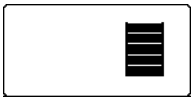
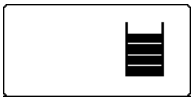
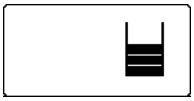
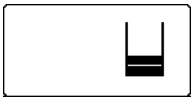
2.3 Fan / blower adjustment

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 **556**.

The „Fan" / „blower setting" can be reduced with the function key F3 **433** and increased with the function key F4 **434**.

„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 **556**, the „Fan" / „blower stage" is shown as a bar display.

▶ Press function key F3 **433**.

Result:

– The „Fan" / „blower stage" is reduced.

▶ Press function key F4 **434**.

Result:

– The „Fan" / „blower stage" is increased.

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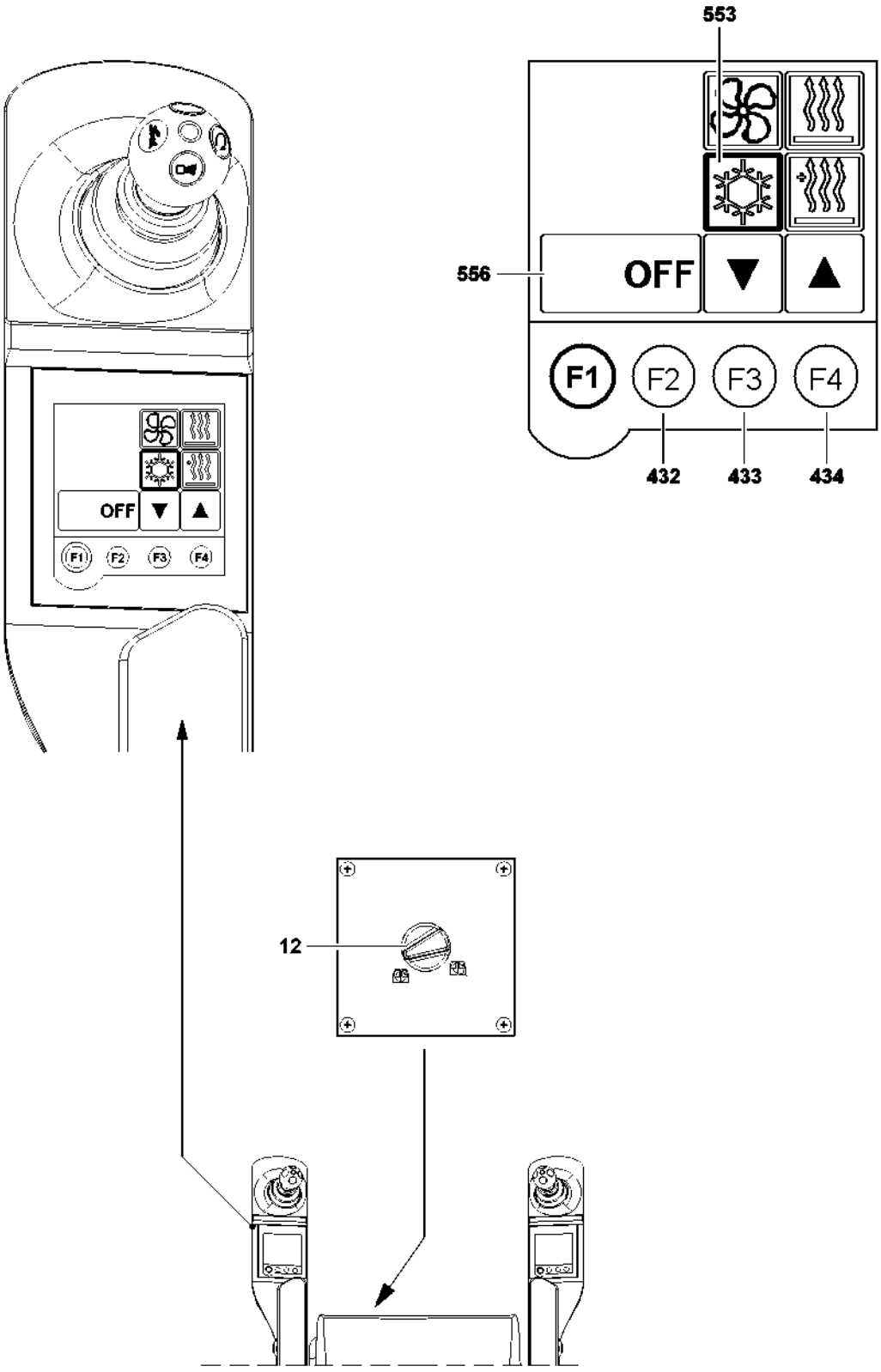

Fig.107393

2.4 Climate control system* Crane operator's cab

The climate control system is a combination of an automatic heater and ventilation system as well as an air conditioning system, which is used to dehumidify and cool the air in the crane operator's cab.

Please note:
- In air conditioning operation, the humidity in the crane operator's cab is decreased. This prevents the windows from fogging up.
- In case of high outside humidity and high outside temperatures, the condensation can drip from the evaporator of the air conditioning system and form a puddle under the crane. This is normal and no sign of leaks.
- In automatic mode:
  In low ambient temperatures, the blower does not switch to a higher speed until the coolant has reached a sufficient temperature.

WARNING
Injuries to persons and property damage!
If the climate control system is turned off and in air circulation operation, the windows can fog up!
- ▶ If the windows are fogged up, proceed according to section „Procedure in case of fogged up windows“!
- ▶ Do not expose personnel to low interior temperatures!
- ▶ Repair work on the climate control system and maintenance work on the cooling circuit must be carried out solely by a Service technician from Liebherr-Werk Ehingen!

Note
- ▶ In order not to compromise the heater or cooling output and to prevent the windows from fogging up, the air intake must be clear of ice, snow and contaminants.
- ▶ The climate control system works best if the windows and door are closed. However, if the crane operator's cab is heated up too much when the mobile crane is at a standstill, due to sun rays, then the cool off procedure can be accelerated by opening the windows or door for a short time.
- ▶ Do not cover up the air circulation intake with clothing or other objects!

The maximum cooling output is reached when:
- All air vents are open.
- The air supply is exclusively switched to air circulation.
- The air distribution is exclusively set on the window.
- The Fan / the blower is set to maximum power.

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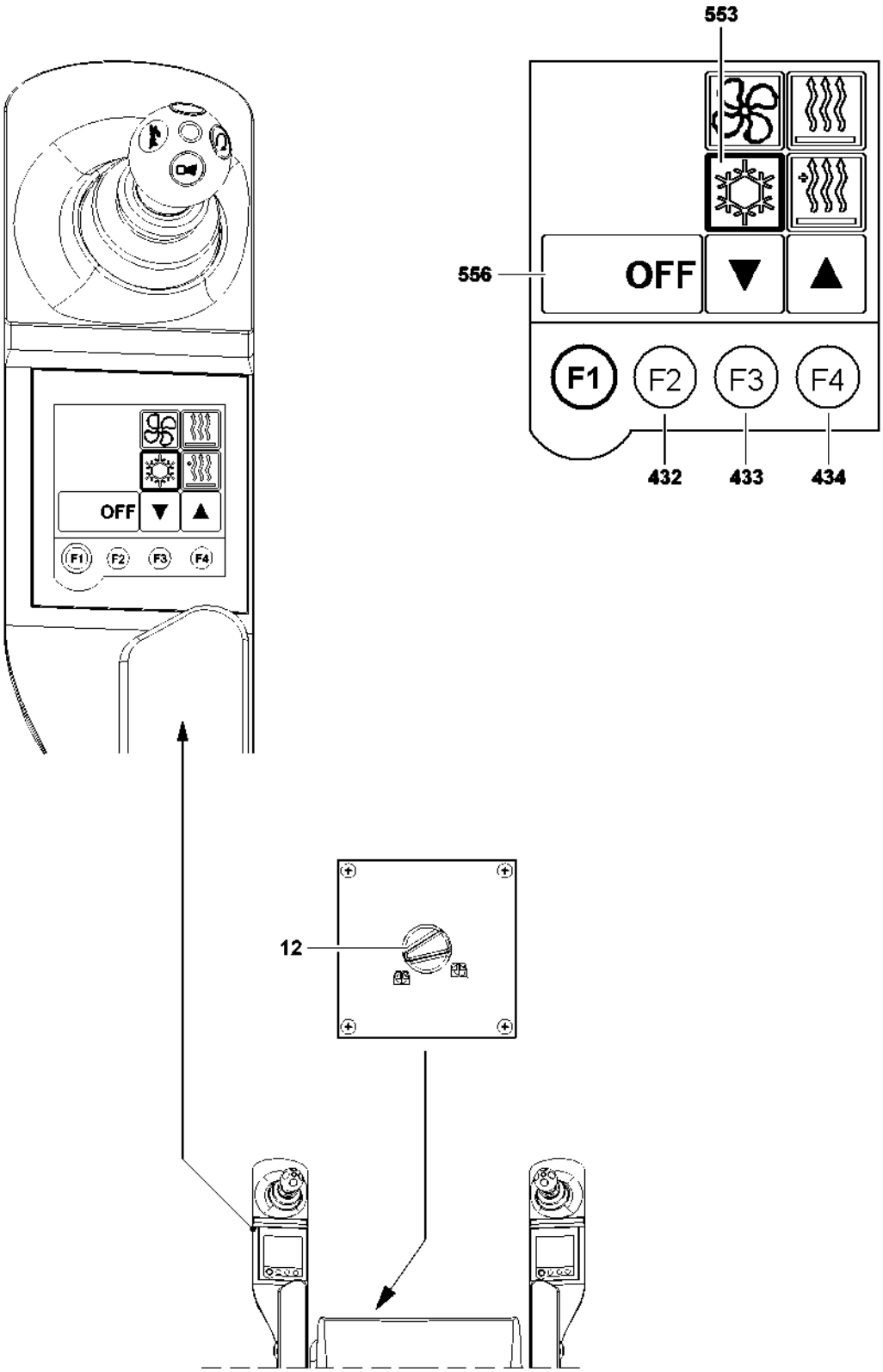

Fig.107393

2.4.1 Climate control system* operation

The „Climate control system" function is selected by „touching" the icon **553** in the left touch display.

The status of the climate control system is displayed in the status display **556**.

Note

▶ The climate control system turns itself on automatically if the „AUTO" heating mode is activated.

Climate control system		
Status display	Status	Icon display
OFF	**„OFF"**	
ON	**„ON"**	

Make sure that the following preconditions are met before starting up the climate control system:

- The windows and the cab door are closed.
- The engine is running.
- The rotary switch **12** has been moved to air circulation.

▶ Select „Climate control system **553**" function by „touching".

Result:

- The „Climate control system" icon is then surrounded with a black border.
- The switching status of the climate control system appears in the status display **556**.

▶ Press the function key F4 **434** and turn the climate control system on.

In heating mode - „AUTO" the fan / blower preselection occurs automatically.

In heating mode - „MANUAL" the fan / blower preselection must be manually selected.

▶ Select the heater and change into „AUTO" heating mode.
or
Select the heater and change into „MANUAL" heating mode.
▶ Set the Fan / blower.

If necessary:
▶ Set the air distribution window or floorboard area.

If necessary:
▶ Adjust the recirculating air / fresh air.

Problem remedy

The temperature from the air vents is not noticeably below the ambient temperature?
The air circulation or the fresh air filter or evaporator are dirty.
▶ Check the air circulation and fresh air filter for contaminants and clean or replace, as necessary.
▶ Check the evaporator for contaminants and clean, if necessary.
▶ If none of these measures are helpful, contact the Service Dept. of Liebherr-Werk Ehingen!

If the climate control system is to be turned off:
▶ Press function key F3 **433**.

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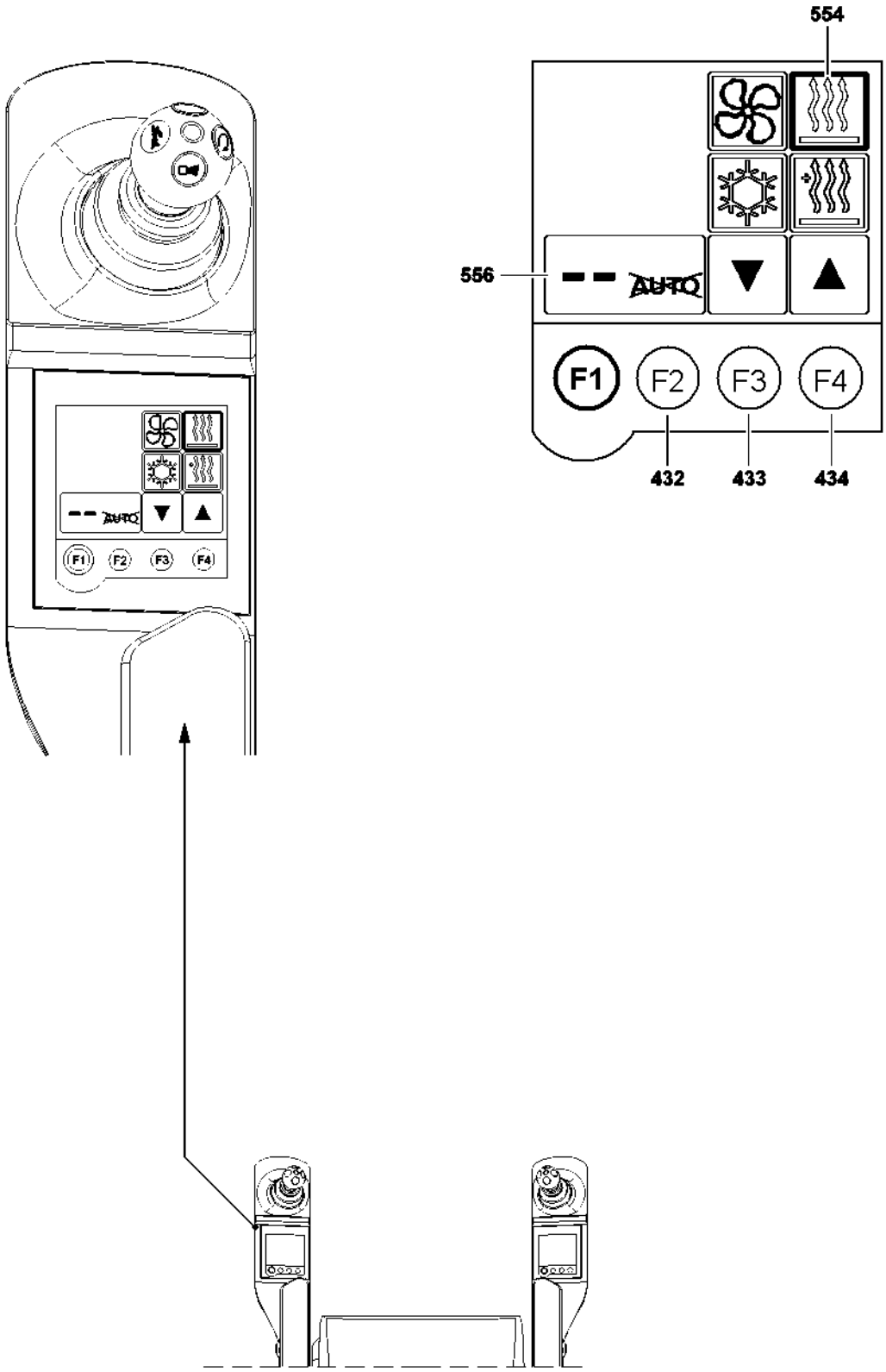

Fig.105537

2.5 Turning the heater on

2.5.1 General

The „Heating“ function is selected by „touching“ the icon **554** on the left touch display.

The status of the heater is displayed in the status display **556**.

The temperature for the „AUTO“ heating mode or the preselect of the constant heat stages in „MANUAL“ heating mode is preset via the function keys function key F3 **433** („reduce“ temperature) and function key F4 **434** („increase“ temperature).

Use the function key F2 **432** to switch from „MANUAL“ heating mode to „AUTO“ heating mode and vice-versa.

2.5.2 Manual heating mode

In „MANUELL“ heating mode, the constant heat stages - from stage 1 to stage 16 - are available to the crane driver.

The temperature setting can be reduced in stages by pressing function key „F3“ from level 16 to „Heater OFF“.

Note

- ▶ If the status „Heater OFF“ is reached, the heater does not operate.
- ▶ The crane operator's cab is **not** heated.

Function key „F4“ can be pressed to leave „OFF“ status and the temperature can be increased in stages from temperature level 1 to 16.

Heating mode „MANUAL“			
Status display	Status	Stage	Icon display
-- AUTO	**„OFF“**	**— —**	*Heater „OFF“*
1 AUTO	**„ON“**	**1**	
16 AUTO	**„ON“**	**16**	

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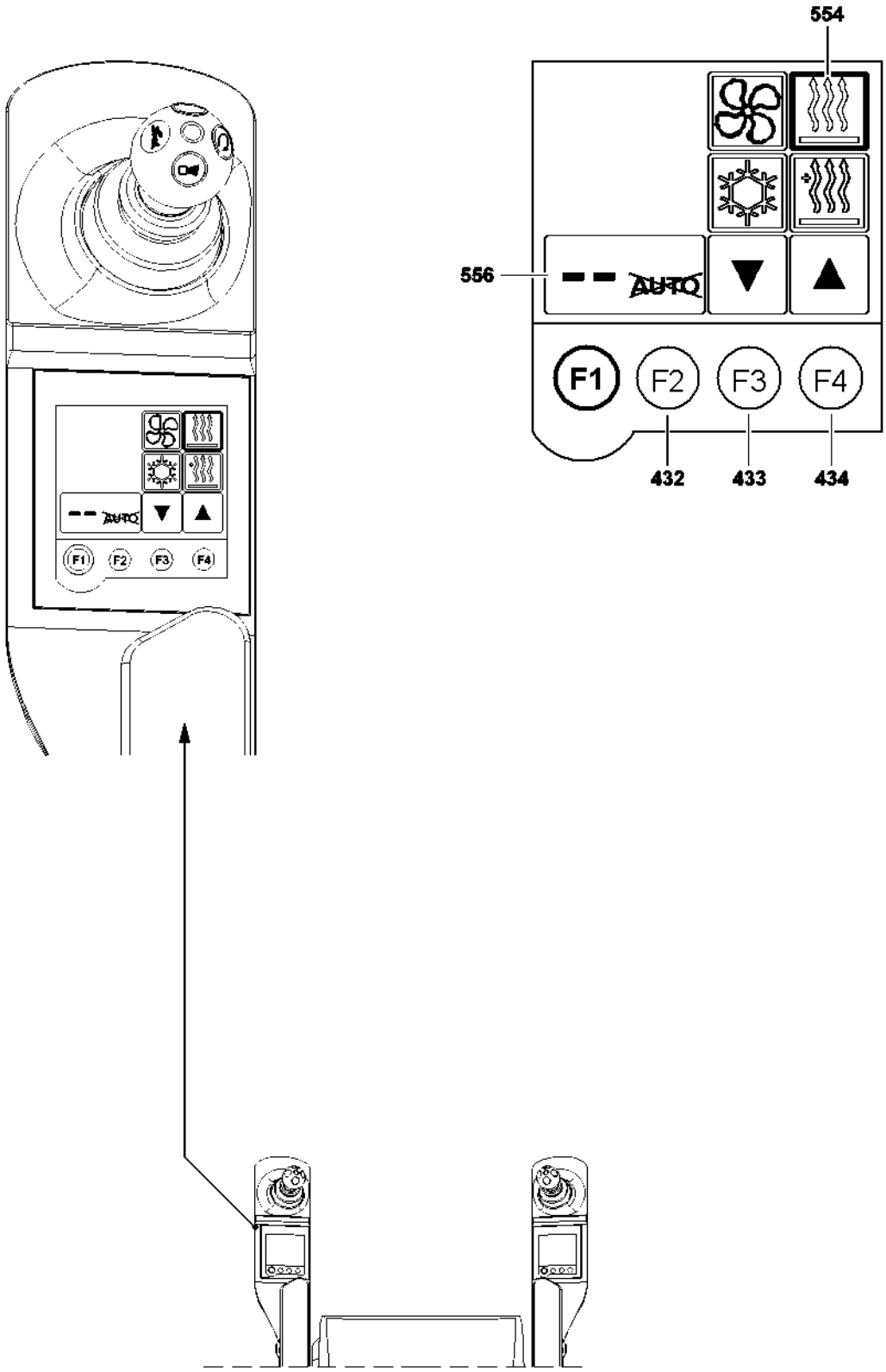

Fig.105537

▶ Select the „Heater **554**“ function by „touching“.

Result:

– The „Heater“ icon is then surrounded with a black border.
– The status display **556** contains the current status of the „Heater“.

▶ Press function key F2 **432**.

Result:

– Switch from heating mode „AUTO“ to heating mode „MANUAL“.

▶ Press function key F3 **433**.

Result:

– The „constant heat stages“ are reduced one level at a time.
– The amount of warm air supply into the crane operator's cab is reduced accordingly.

▶ Press function key F4 **434**.

Result:

– The „constant heat stages“ are increased one level at a time.
– The amount of warm air supply into the crane operator's cab is increased.

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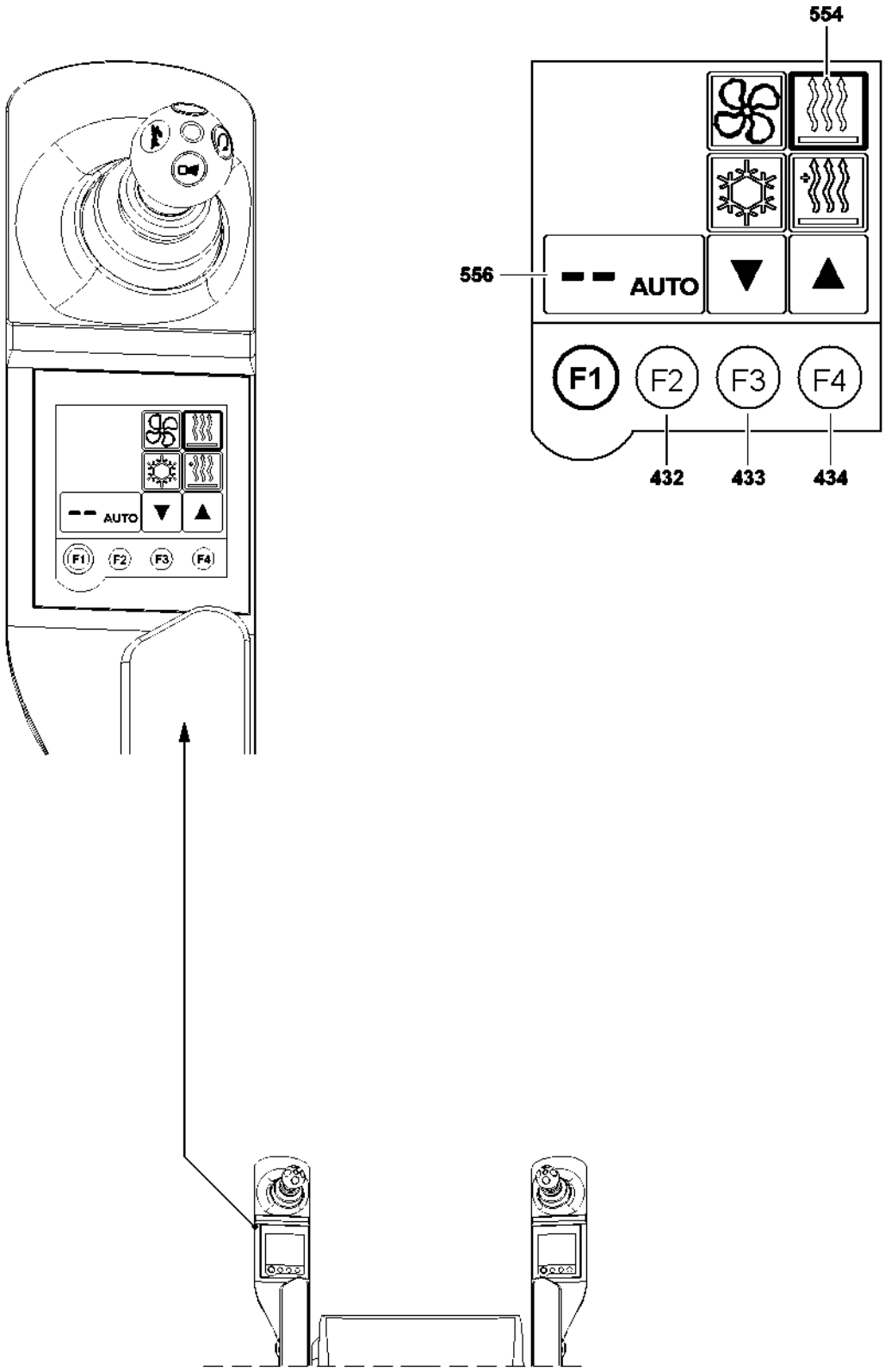

Fig.105538

2.5.3 AUTO heating mode

If the „AUTO“ heating mode is selected, the air conditioning system is automatically added, if needed.

Note

- ▶ The blower / fan stage is automatically regulated in the „AUTO“ heating mode.
- ▶ In addition, the blower / fan stage can also be regulated manually.

In „AUTO“ heating mode, the crane driver can adjust the temperature in 1 °C increments.

By pressing the function key F3 **433**, the temperature is reduced steplessly from maximum value to minimum value and if the „function key F3 **433**“ is pressed again, the heater is turned off.

Note

- ▶ If a status „Heater OFF“ has been reached, the heater does **not** operate but the cab can continue to be cooled.
- ▶ The crane operator's cab is **not** heated.

Leave the „OFF“ state by pressing the function key F4 **434** 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**	

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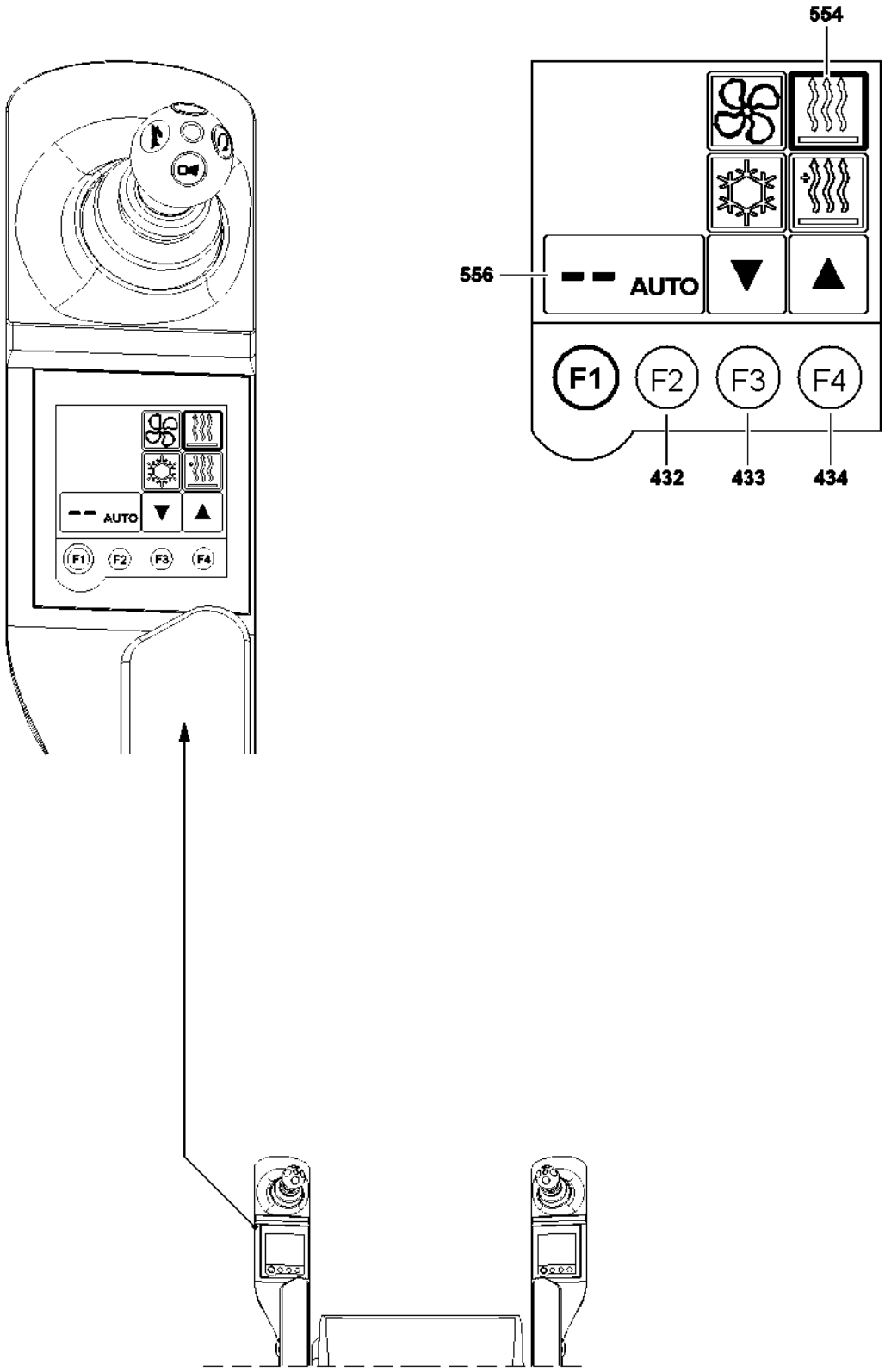

Fig.105538

▶ Select the „Heater **554**“ function by „touching“.

Result:

– The „Heater“ icon is then surrounded with a black border.
– The status display **556** contains the current status of the „Heater“.

▶ Press function key F2 **432**.

Result:

– Change from „MANUAL“ heating mode to „AUTO“ heating mode.

▶ Press function key F3 **433**.

Result:

– The „temperature setting“ is reduced in stages in 1 °C increments.
– The amount of warm air supply into the crane operator's cab is controlled according to the current temperature setting.

▶ Press function key F4 **434**.

Result:

– The „temperature setting“ is increased in stages in steps of 1 °C.
– The amount of warm air supply into the crane operator's cab is controlled according to the current temperature setting.

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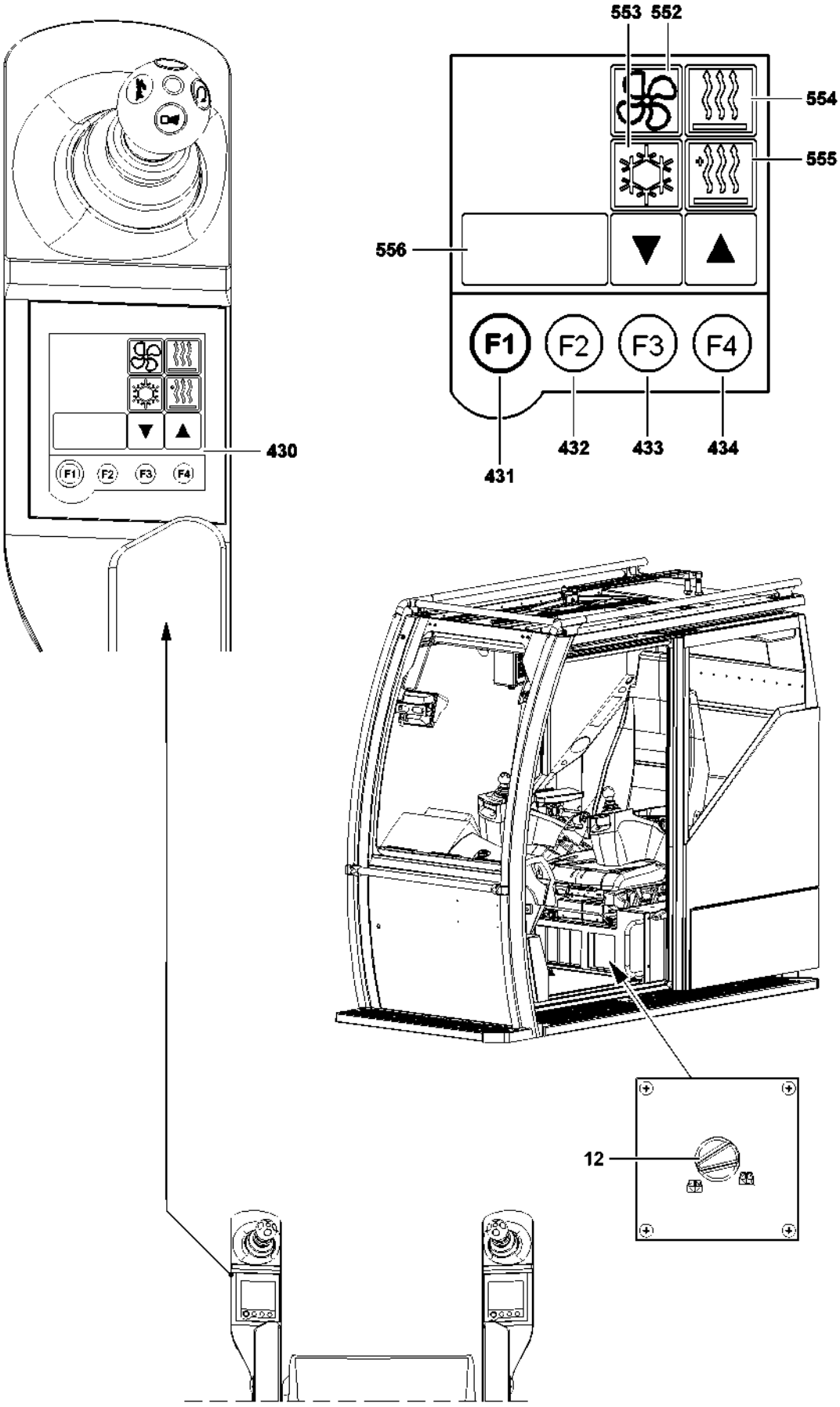

Fig.105539

2.6 Procedure in case of fogged up windows

To be able to clear the windows quickly, observe a certain sequence of the settings.

The settings can be made manually or in „**AUTO**“ heating mode.

2.6.1 Making the settings manually

- ▶ Open the air vents.
- ▶ Set the knob **12** to recirculated air.
- ▶ Set the fan / blower **552** to maximum level - stage 5.
- ▶ Set the climate control system*** 553** to „ON“.

Note

- ▶ The higher the temperature in the crane operator's cab, the better will the air be dehumidified.

- ▶ Set the heater **554** to maximum possible level in „**MANUAL**“ heating mode.
- ▶ Add the auxiliary heater*** 555**.

2.6.2 Making the settings in „AUTO“ heating mode

- ▶ Set the heater **554** to „AUTO“ heating mode.
- ▶ Open the air vents.
- ▶ Add the auxiliary heater*** 555**.

Note

- ▶ The other functions are automatically added by the system.

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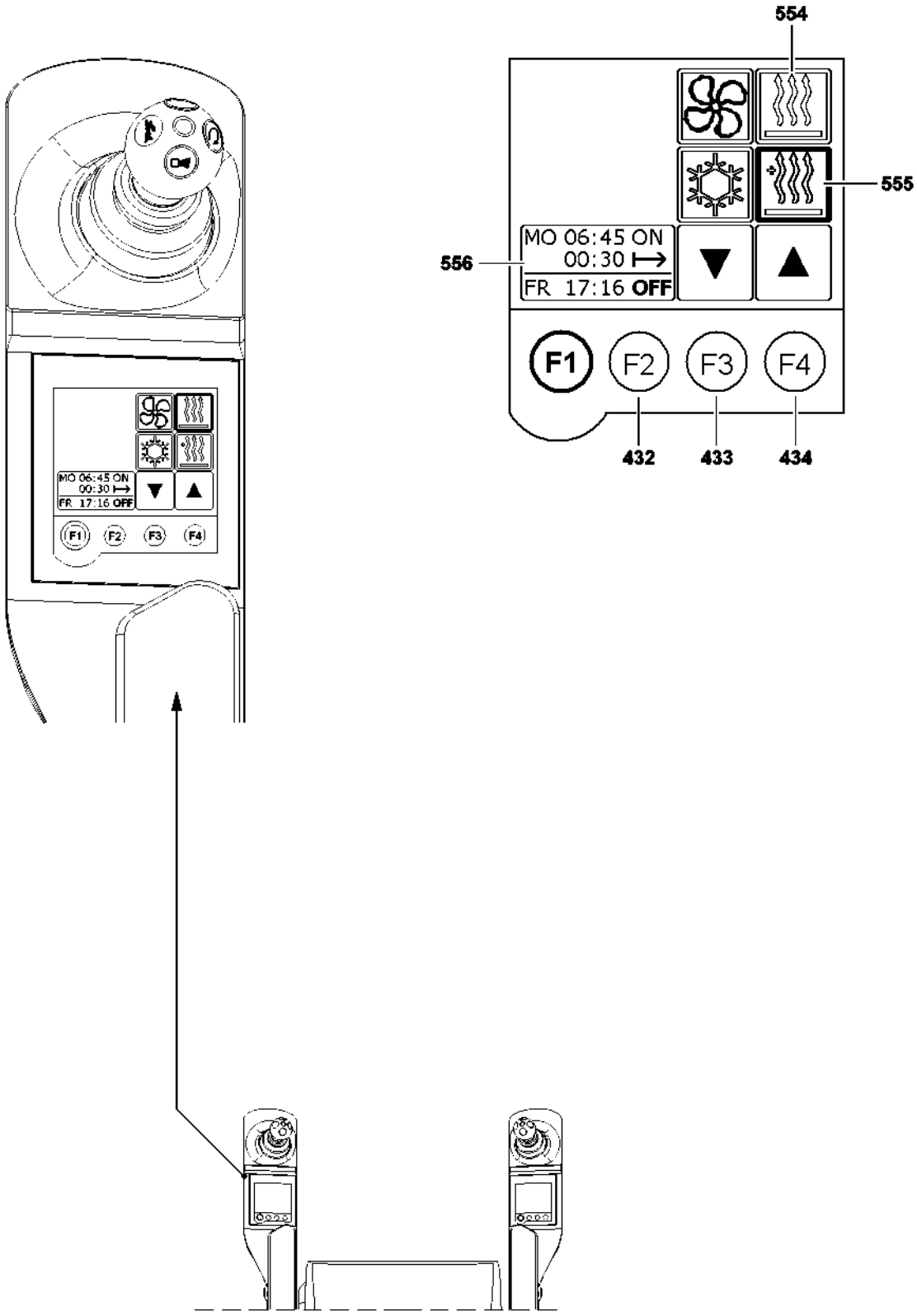

Fig.105540

2.7 Operating the engine-independent auxiliary heater

The engine-independent auxiliary heater is used to heat the crane operator's cab when the engine is turned off and to provide additional heat at low ambient temperatures if the engine-dependent heater is insufficient.

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.

2.7.1 General

NOTICE

Risk of damage to auxiliary heater!

▶ Fill all units with sufficient service fluids for winter operation according to the lubrication chart.

WARNING

Risk 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“.

WARNING

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 the auxiliary heater off.

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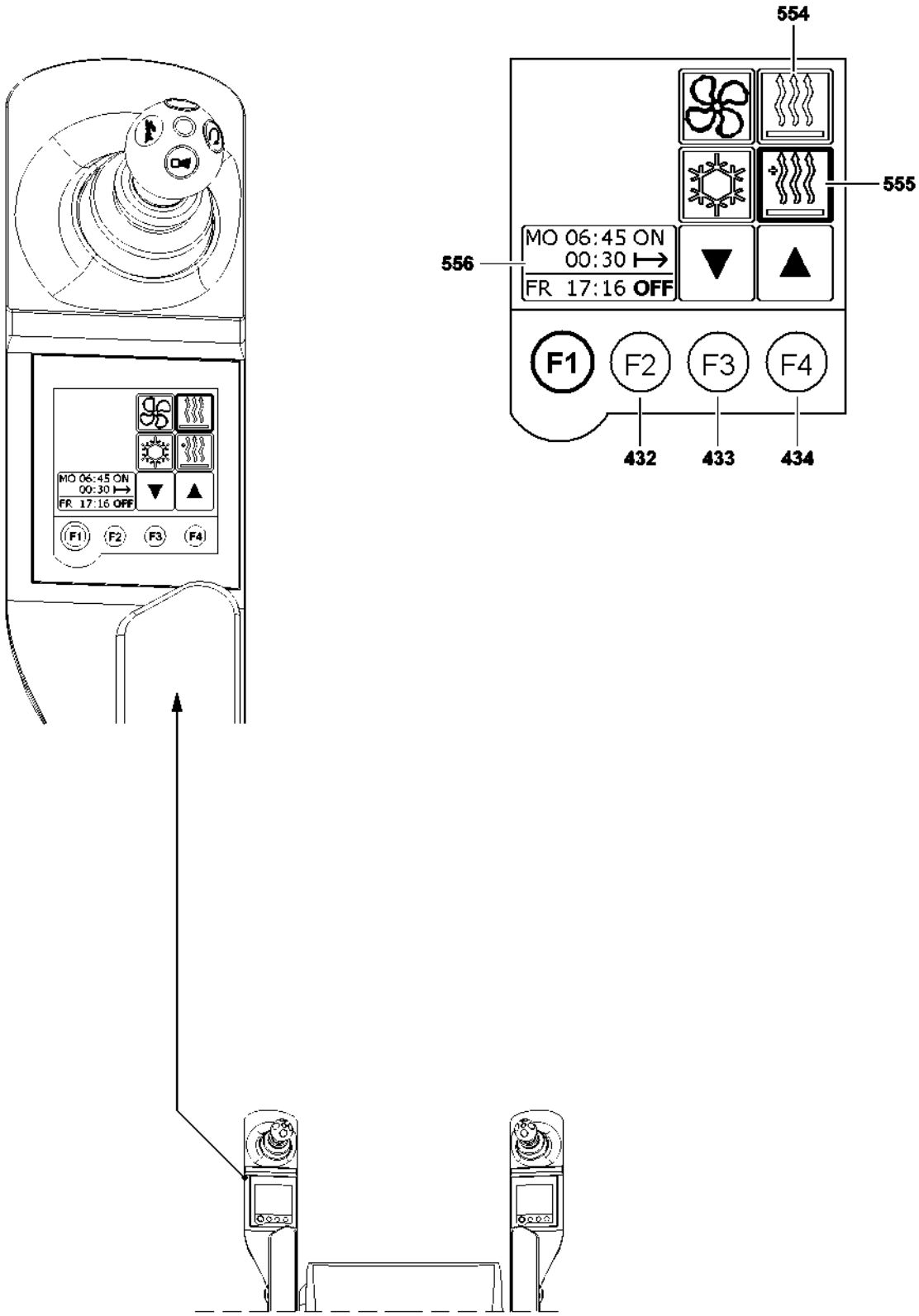

Fig.105540

2.7.2 Adding the engine-independent auxiliary heater manually

The engine-independent auxiliary heater can be added manually in driving or crane operation mode. The auxiliary heater, icon **555**, must be selected and turned on.

If the auxiliary heater is in the „OFF" state, press the function key F4 **434** once to add the cab auxiliary heater.

Note

▶ If the auxiliary heater it added for engine pre-heating, then the crane operator's 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"*

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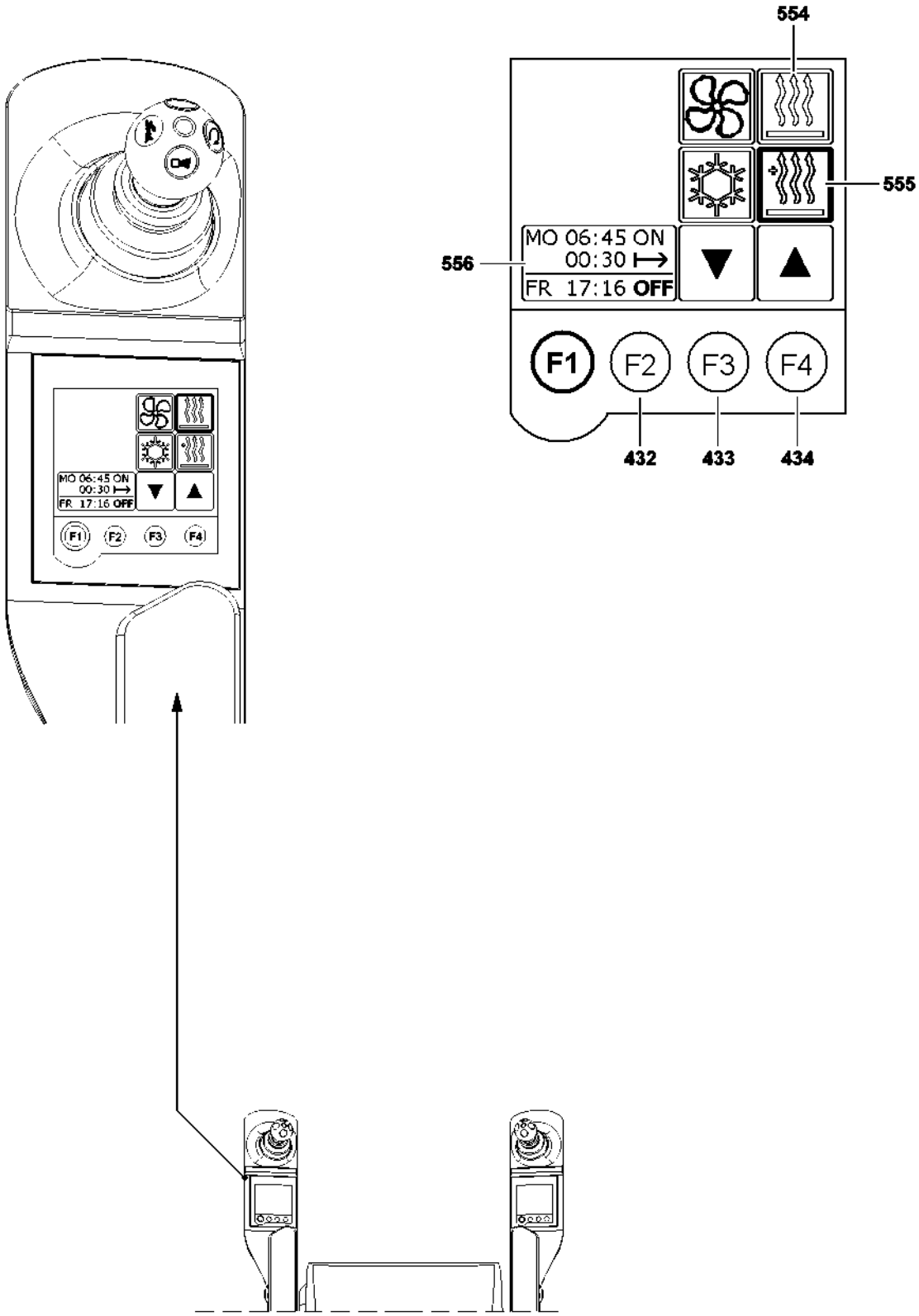

Fig.105540

Adding the auxiliary heater

▶ Select heater **554** and set the required temperature via „function key F3 **433**" or „function key F4 **434**" (see section „Turning the heater on").

Note

▶ The temperature adjustment via „function key F3 **433**" or „function key F4 **434**" is only needed to heat the crane operator's cab!

▶ Select auxiliary heater **555** and press „function key F4 **434**" or „function key F3 **433**" until the required setting is displayed in the status display **556** (see chart).

Result:

– The auxiliary heater is added.
– Depending on the setting, the crane operator's cab or the engine is heated.

Note

▶ When the crane operator's 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 **555** and press the function key F3 **433** until the status display **556** shows the setting auxiliary heater „OFF" (**OFF**).

Result:

– The auxiliary heating is turned off.
– Whenever the auxiliary heater is turned off, a shut off delay occurs.

NOTICE

Danger of property damage!

▶ Turn the battery master switch off only when the heater shut off delay is over.

▶ Turn the battery master switch off if the crane is temporarily not being used.

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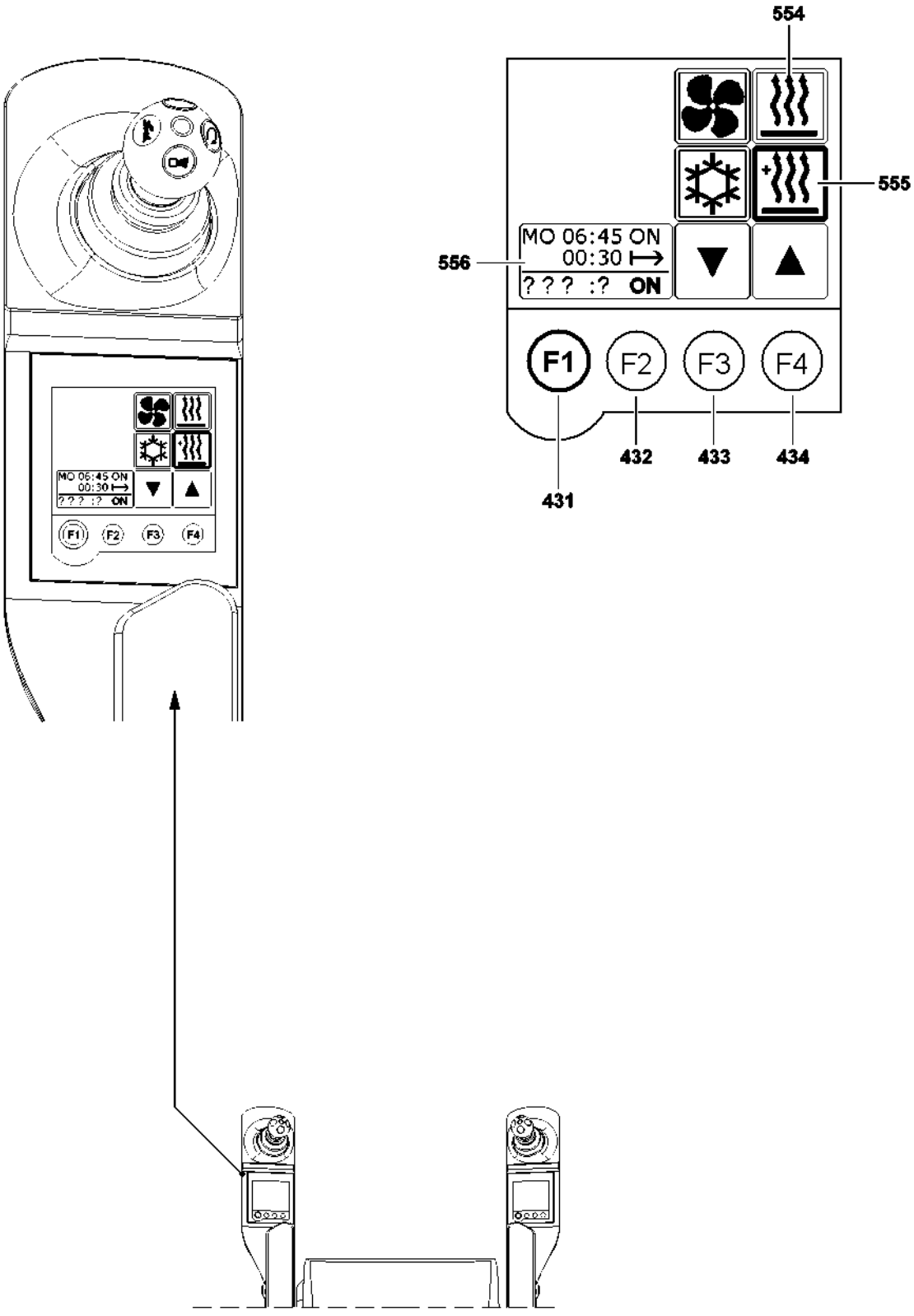

Fig.107696

2.7.3 Adding the engine independent auxiliary heater at ignition „OFF“

The engine independent heater can be turned on to heat the cab when the ignition is „OFF“.

Note

- ▶ Operating the engine independent auxiliary heater can discharge the battery when the battery master switch is turned on. It might no longer be possible to start the crane engine!
- ▶ Operation of the engine independent auxiliary heater without turned on battery master switch is not possible!
- ▶ If the engine independent heater is turned on when the ignition is OFF, then the timer cannot be programmed. Question marks appear in the status display **556**, see illustration.

Make sure that the following prerequisite is met:

– The battery master switch is turned on.

▶ Press the function key F1 **431** on the left touch display until the „Climate control settings“ menu appears.

Result:

– The „Climate control settings“ menu is displayed.

Note

- ▶ If the auxiliary heater is not turned on with the function key F4 **434** after releasing the function key F1 **431** within 4 seconds, the display in the touch display turns off.

▶ Turn the auxiliary heater on with function key F4 **434**.

Result:

– The auxiliary heater is turned on.
– The display in the touch display turns off only after the auxiliary heater has been turned off with the function key F3 **433**.

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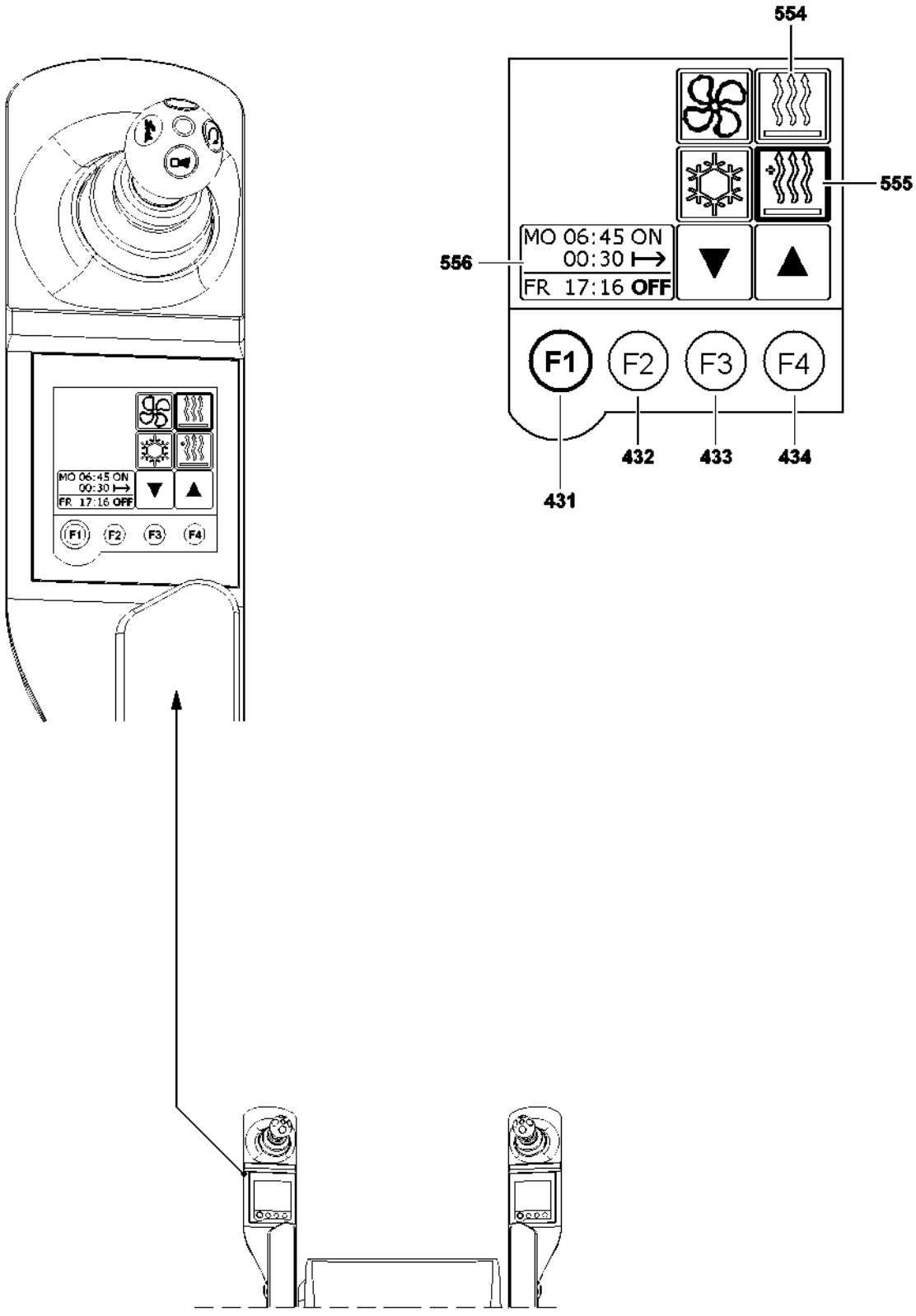

Fig.107697

2.7.4 Continuing operation with the engine independent auxiliary heater after crane operation

The engine independent heater can continue to be operated to heat the cab after crane operation when the ignition is „OFF".

Note

- ▶ Operating the engine independent auxiliary heater can discharge the battery when the battery master switch is turned on. It might no longer be possible to start the crane engine!
- ▶ Operation of the engine independent auxiliary heater without turned on battery master switch is not possible!
- ▶ If the engine independent auxiliary heater is continued to be operated after crane operation, the preprogrammed timer can be selected once.

Make sure that the following prerequisites are met:
– The auxiliary heater is turned on.
– The ignition on the crane superstructure is turned on.

▶ Press the function key F1 **431** on the left touch display.

Result:

– Change the menus on the touch display.

▶ Turn the ignition on the crane superstructure off and press the function key F1 **431** on the left touch display until the „Climate control settings" menu appears and the LICCON monitor is down.

Result:

– The display on the right touch display turns off.
– The climate control settings menu is shown on the left touch display.
– The auxiliary heater is turned on.
– The display in the touch display turns off only after the auxiliary heater has been turned off with the function key F3 **433**.

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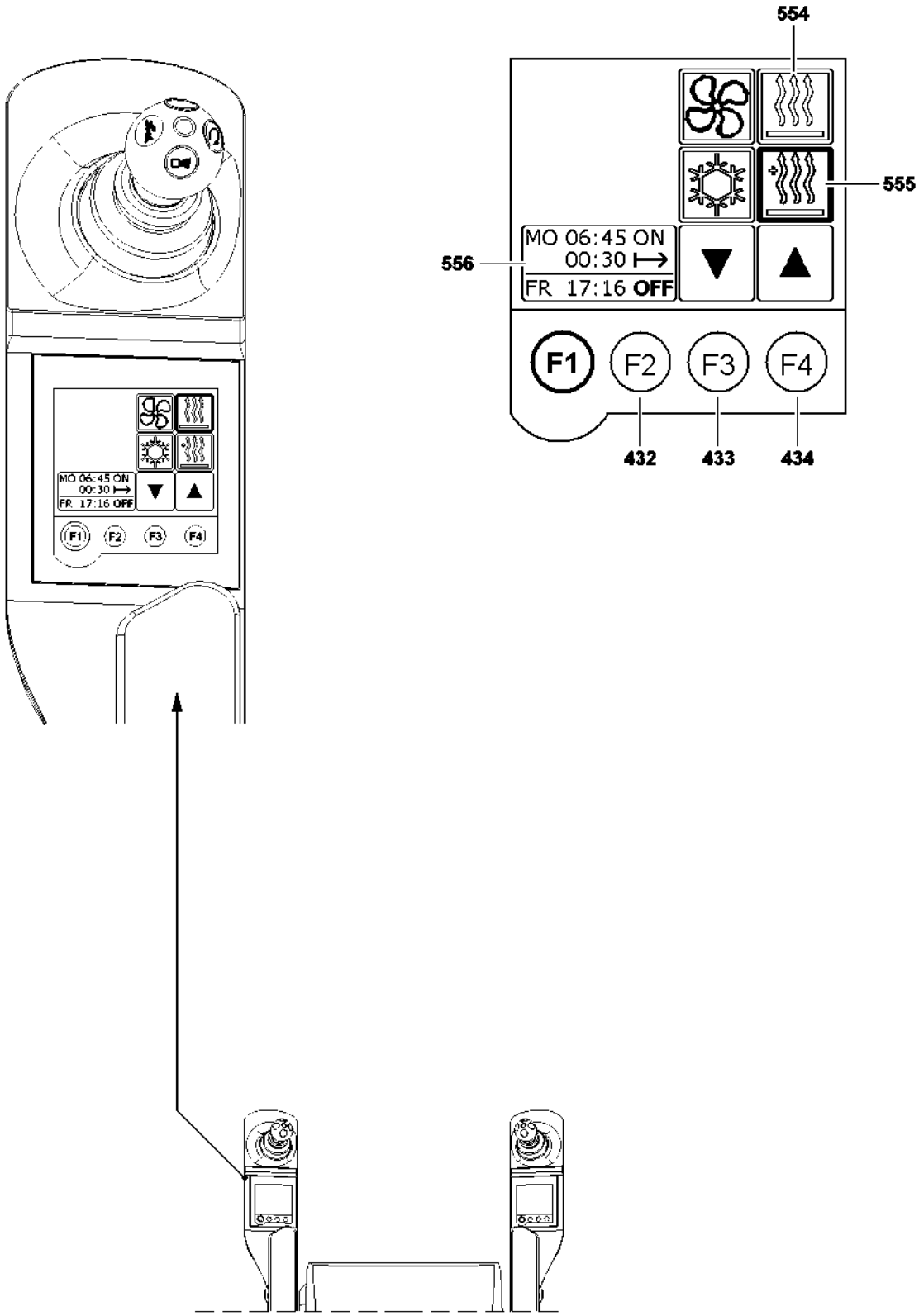


Fig.105540

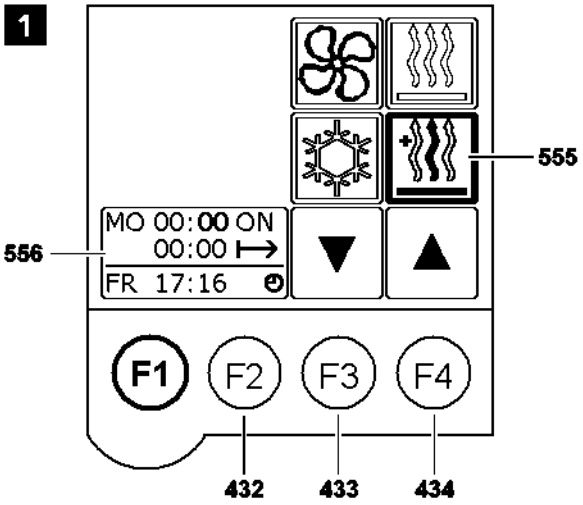
2.7.5 Adding the engine-independent auxiliary heater in programming mode

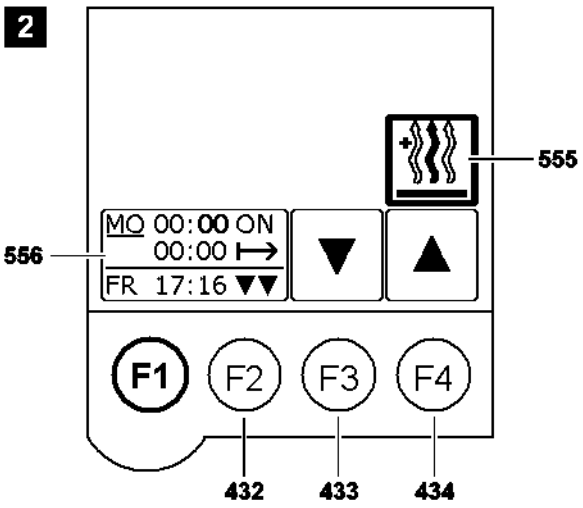
With the engine-independent auxiliary heater to heat the cab, the next point in time to turn the auxiliary heater on can be programmed a **maximum** of one week in advance.

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.

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“*
	▲ F4	▼ F3	
MO 06:45 ON 00:30 ↦ FR 17:16 ⏲	▲ F4	▼ F3	*Cab auxiliary heater*





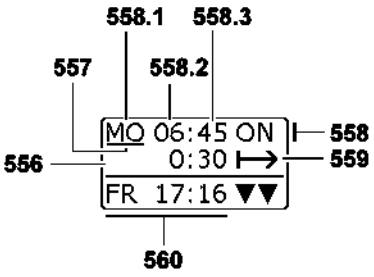


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Fig.105541

Programming the auxiliary heater

In order to access auxiliary heater programming mode, press the function key F4 **434** 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 **556** contains the current day of the week with the time **560**. The time in the status display **556** is coupled to the „real-time clock“ in the test system.

Note

▶ The procedure for programming the auxiliary heater (to heat the crane operator's cab or to preheat the engine) is identical in both cases.

Make sure that the following preconditions 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 **432**.

Result:

– The auxiliary heater programming interface is displayed, illustration **2**.
– In the status display **556** appears the cursor **557** under the editable input value.

Note

▶ The cursor **557** is positioned on day programming **558** by default.

▶ Press the function key F4 **434** and select the required day of the week **558.1** (**ascending** order).
or
Press the function key F3 **433** and select the required day of the week **558.1** (**descending** order).

Result:

– The selected day of the week is „set“.

▶ Press the function key F2 **432**.

Result:

– The cursor **557** changes from day programming **558.1** to hour programming **558.2**.

▶ Press the function key F4 **434** and select the desired hour **558.2** (**ascending** order).
or
Press the function key F3 **433** and select the desired hour **558.2** (**descending** order).

Result:

– The selected hour is „set“.

▶ Press the function key F2 **432**.

Result:

– The cursor **557** changes from hour programming **558.2** to minute programming **558.3**.

▶ Press the function key F4 **434** and select the desired minute **558.3** (**ascending** order).
or
Press the function key F3 **433** and select the desired minute **558.3** (**descending** order).

Result:

– The selected minute is „set“.

▶ Press the function key F2 **432**.

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Result:

– The cursor **557** changes from minute programming **558.3** to turn on programming **559**.

▶ Press the function key F4 **434** and select the desired turn on duration **559** (ascending).
or
Press the function key F3 **433** and select the desired turn on duration **559** (descending).

Result:

– The selected turn on duration **559** is „set".

Note
▶ The turn on duration **559** for the auxiliary heater is restricted to a maximum of **0:55 minutes**!
▶ The cursor **557** automatically changes to the minutes setting for the turn on duration **559**.
▶ The turn on duration **559** can only be changed in 5 minute increments.

▶ Press the function key F2 **432**.

Result:

– The cursor **557** changes from turn on duration **559** to day programming **558**.
– The programming for the auxiliary heater is complete.

▶ Select the auxiliary heater **555** 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.
– 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 **556** 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.

2.8 Bleeding the heating system

When draining off 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 equalizing reservoir of the engine cooling circuit as specified in the lubricant chart.
▶ Start the engine as described in the Crane operating instructions, chapter 3.04.
▶ Set the heater in manual mode to Stage 8.
▶ Check the expansion tank for air bubbles.

Result:

– The engine and the heater circuit is bled as soon as no more air bubbles rise up.

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3 Maintaining the engine independent heater

Note

▶ The maintenance guidelines of the heater manufacturer remain valid and binding!

If an engine independent heater (auxiliary heater) is installed on the crane, maintenance must be carried out in regular intervals.

WARNING

Danger of accident!

On locations, where flammable vapors or dust can form (for example on gas stations), there is a danger of explosion when operating the engine independent heater!

▶ Do not operated the engine independent heater in case of a danger of explosion!

▶ Do not breathe in the exhaust of the engine independent heater!

The maintenance of the engine independent heater includes:

– Monthly: Function test.
– Before every heating period: Checks.
– According to the specification of the heater manufacturer: Replacing components of the heater
– After fuel tank was empty: Bleed the fuel line.

3.1 Perform function tests

Operate the engine independent heater once a month for at least 10 minutes.

Make sure that the following prerequisites are met:

– The crane is outside or a sufficient exhaust suction is ensured.
– The location has been selected in such a way that there is no danger of explosion when operating the engine independent heater.
– Combustion air infiltration and exhaust emission of the heater are free of foreign particles.
– Pollen filter / dust filter of the heater are continuous (if present).
– Heating circuit is bled.
– Fuel line is bled.
– Heating circuit is completely cold.
– The crane engine is turned off.

▶ Turn the engine independent heater and heater blower on.

Result:

– The circulation pump starts.
– The combustion air blower starts.
– After maximum four minutes an exhaust emission on the exhaust pipe is noticeable.
– The engine independent heater runs: The heating circuit starts to warm up.

▶ Check the heat effect on the air vents of the vehicle.

▶ Engine preheating***** (Engine must be off!): Check if the engine temperature increases.

3.2 Checks to be performed

Before every heating period, carry out the following checks.

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Make sure that the following prerequisites are met:
- The heater and the heating circuit are completely cold.
- A function check was completed successfully.
- In the error stack of the heater **and** in the error stack of the LICCON computer system are no error messages listed for the heater.

Note
The error stack of the heater can only be read by expert personnel.
▶ Contact Customer Service at Liebherr-Werk Ehingen.

▶ Clean the heater externally (avoid water infiltration).
▶ Check the electrical connections for contact corrosion and tight seating.
▶ Check the exhaust and combustion air line for damage and free passage.
▶ Check the fuel line and fuel filter (if installed separately) for leaks and cracks.
▶ Replace the fuel filter (if installed separately).
▶ Check the circulation pump for leaks.
▶ Check the heating circuit for leaks and cracks.
▶ Check the anti-corrosion / antifreeze in the heating circuit (specification: 50 % anti-corrosion fluid / antifreeze).

3.3 Replacing components of the heater

The heater manufacturer specifies time frames, after which the components of the heater must be replaced.

- No later than after 3000 operating hours, the burner of the heater must be replaced.
- No later than after 10 years, the heat exchanger of the heater must be replaced.

3.4 Bleed the fuel line.

If the fuel tank of the engine independent heater was run dry, then it is possible that the fuel line must be bled.

In addition, it may be possible that a new start must be carried out on the control unit of the engine independent heater.

Note
New start of the control unit of the engine independent heater.
▶ Contact Customer Service at Liebherr-Werk Ehingen and coordinate the procedure.

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Empty page!

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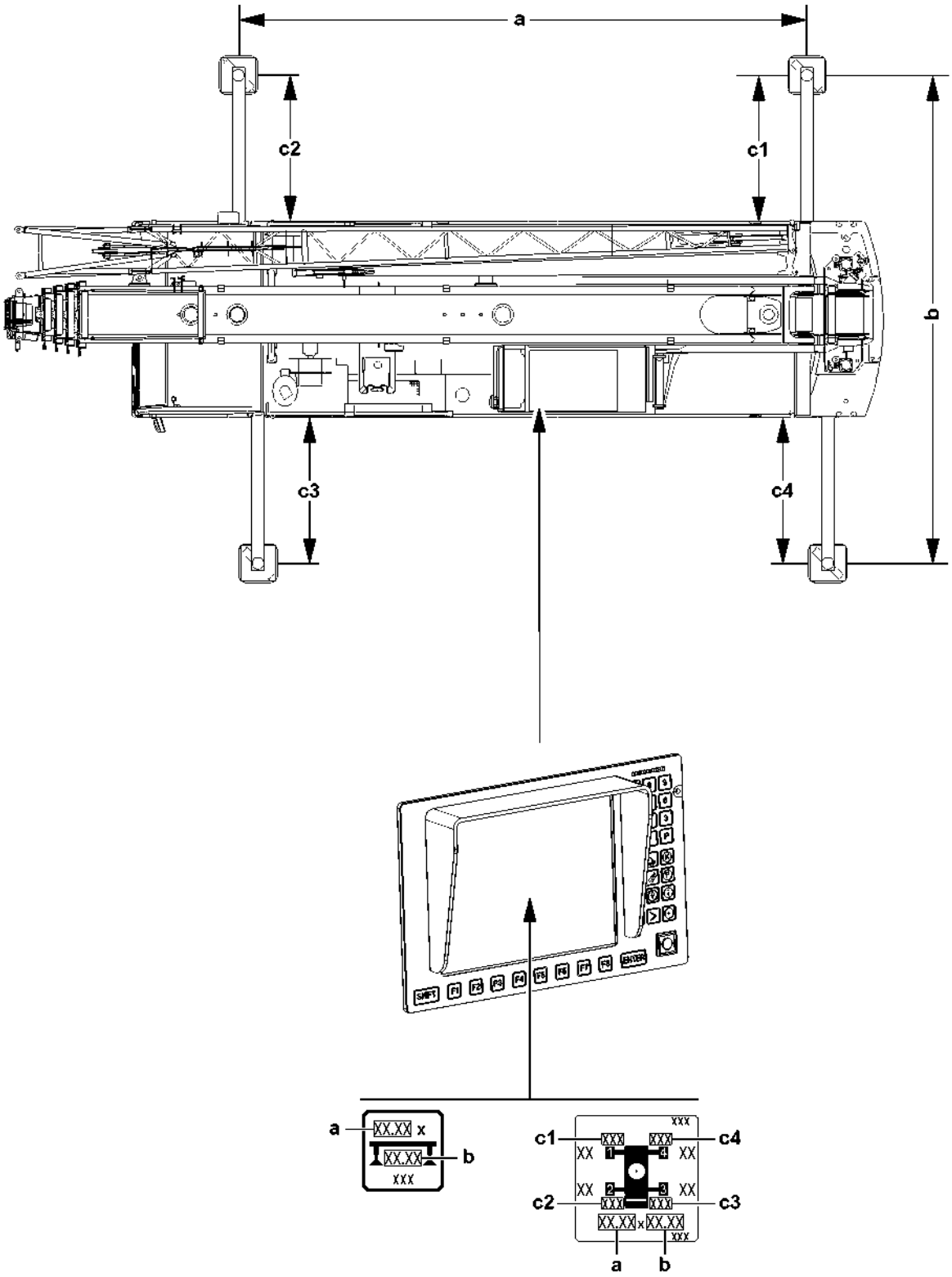

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Fig.112987

1 General

The LICCON sliding beam monitoring* checks the information entered by the crane driver who had entered it regarding the support base for selection if the load chart in the Set up program.

Note

- ▶ The LICCON sliding beam monitoring* does **not** monitor the proper support of the crane.
- ▶ The LICCON sliding beam monitoring* does **not** monitor the pinning of the swingable sliding beams to the designed positions.
- ▶ As a rule, the sliding beams must be pinned and secured on the pin points according to the required support base.
- ▶ Numbers and letters in the illustrations in this chapter can be replaced by place holders!

2 Support bases

This crane can be operated on different support bases.

The dimension **a** of all support bases is 8.1 m and is not adjustable.

The dimension **b** must be set on the crane according to the load chart and the settings in the set up program:

Support base in lateral direction		
Support base	**Dimension b**	**Extension length c1 - c4**
Wide (8.1 m **x** 7.50 m)	7.50 m	100 %
Reduced (8.1 m **x** 5.00 m)	5.00 m	50 %
Retracted (8.1 m **x** 2.40 m)	2.40 m	0 %

Tolerances in extension length **c1** - **c4** of ±2 % are possible. The determining factor is that the sliding beams are pinned on the respective pin points.

2.1 Setting the support bases

The following applies:

- The support base must be selected in such a way that all sliding beams have the extension length of the same support base and can be pinned.
- The extension lengths of the sliding beams on both sides must be symmetrically and correspond to the selected support base.
- The sliding beam with the extension length limited the most determined the support base and therefore the resulting load chart.
- Individual sliding beams may not be extended further, regardless if they can be pinned or not.

WARNING

The crane can topple over!
If the following conditions are not met, the crane can topple over and cause fatal injuries!
This could result in high property damage!

- ▶ All sliding beams must be pinned to preclude any subsequent movement of the support surfaces!
- ▶ All retaining pins must be inserted and locked!
- ▶ Only the support bases exclusively specified in the load chart may be used!
- ▶ Intermediate positions of the sliding beams are prohibited!
- ▶ Support and operate the crane only on the specified sliding beam lengths.
- ▶ If not all sliding beams can be extended to the same extension length due to obstacles, then the sliding beam with the lowest extension length determines the support base.

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- ▶ Always retract or extend the sliding beam to a position defined by the support base.
- ▶ Always pin and secure the sliding beams, see the respective chapter in the Crane operating instructions.
- ▶ Use only the support bases specified by the load chart.

3 Working with the LICCON sliding beam monitoring*

3.1 Preparing the crane

Make sure that the following prerequisites are met:
- The sliding beams are swung in and extended to the width required for crane operation.
- The sliding beams are pinned and secured.
- The support base, load chart and settings in the Set up program match.
- The crane is supported and horizontally aligned.
- The crane operating screen is shown in the LICCON monitor.
- The crane is operational.

3.2 Method of operation of LICCON sliding beam monitoring*

The LICCON sliding beam monitoring***** monitors the position of the individual sliding beams and checks if these positions match the entries from the program.

If at least one sliding beam is not in such a range, then the system points it out visually and acoustically:
- In the LICCON monitor appears an error message and the deviating value is highlighted (by blinking and through color).
- An acoustical signal sounds, issued by the LICCON monitor:

3.3 The LICCON sliding beam monitoring* in crane operation

The position of the sliding beams is continually monitored during crane operation by the LICCON sliding beam monitoring***** and compared with the support base of the selected load chart. If any deviations are found, then the LICCON sliding beam monitoring***** reacts automatically, see the following example.

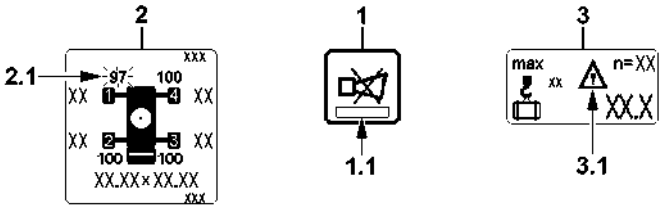

Fig.115314: Sliding beam not correctly extended

As an example it is assumed, that a sliding beam was not correctly extended, see illustration:
- In the Horn icon **1** an error message **1.1** is issued.
- The acoustic signal „short horn“ sounds.
- The support icon **2** appears (if not already displayed).
- The respective value **2.1** of the sliding beam which was extended incorrectly is shown red blinking.
- Only for certain crane types: In the maximum load icon **3** appears a warning icon **3.1**.

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3.4 Failure of LICCON sliding beam monitoring*

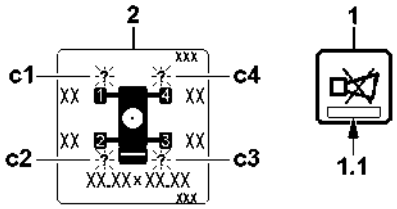

Fig.115315: Sliding beam length sensor defective.

For example, if the sliding beam length sensors are defective, the display values cannot be determined, see illustration.

In the Horn icon **1** an error message **1.1** is issued.

In the support icon **2** appear red blinking question marks instead of the extension lengths **c1-c4**.

The acoustic signal „short horn“ sounds.

The LICCON sliding beam monitoring***** is not operational.

To make the LICCON sliding beam monitoring***** operational again:

▶ Set crane operation and remedy the error.

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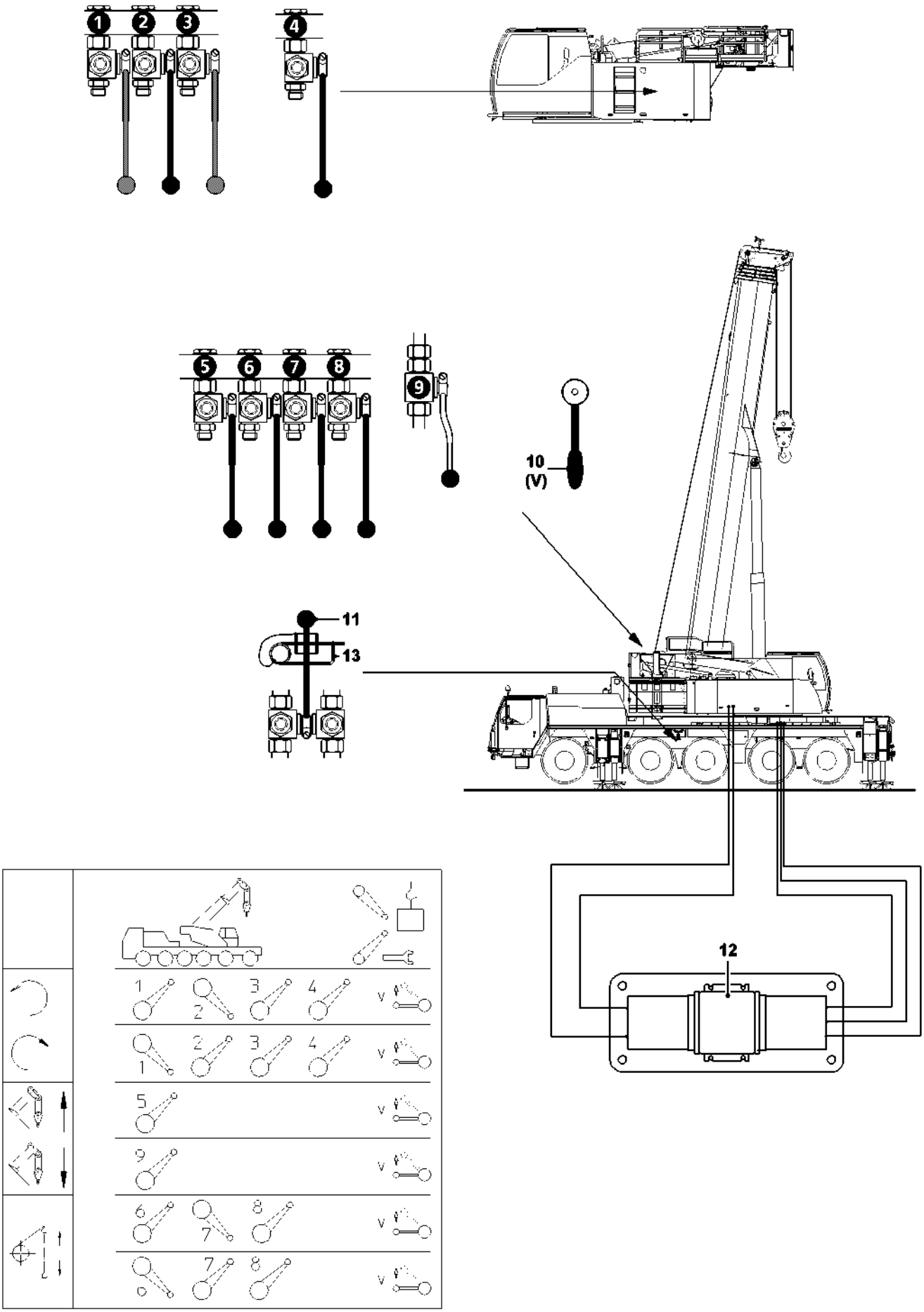

Fig.112624

1 Emergency control

To be able to take down the crane in case of failure of the crane hydraulic, the crane electrical system or the crane engine, ball valves and a hand lever **10** (**V**) are installed on the superstructure. Via the ball valves, the corresponding crane movement can be preselected and carried out by deflecting the hand lever **10** (**V**).

1.1 General

DANGER
Increased risk of accident during emergency operation!
The crane movements are no longer monitored by LICCON in emergency operation.
Due to incorrect operation, the boom can break off or the crane can topple over!
Personnel can be killed!

- ▶ Observe all notes and danger notes as described in chapter 6.02.
- ▶ Emergency operation and particularly luffing down of the telescopic boom may only be carried out in accordance with the information in the load chart.
- ▶ If possible, set down the load first.
- ▶ All crane movements must be carried out with extreme caution and slowly.

- For normal „crane operation“, turn the ball valves downward.
- For „emergency operation“, the corresponding ball valves must be switched upward, opposite their position for „crane operation“, (see following section or emergency operation tag on the crane's superstructure).
- Only one movement can be carried out at a time.
- The ball valves must always be changed over completely into the corresponding switch position.

1.2 Emergency operation with travel motor / engine

For cranes with two motors (crane motor and driving motor), the superstructure can be supplied with power using the driving motor and a hydraulic transformer **12**.

1.2.1 Preparing the crane for emergency operation

- ▶ Remove the dummy plugs on the hydraulic connections.

The different diameters of the hydraulic lines prevent incorrect connection.

- ▶ Establish the hydraulic connections from the chassis to the transformer **12**.
- ▶ Establish the hydraulic connections from the transformer **12** to the superstructure.
- ▶ Remove spring retainers **13**.
- ▶ Switch the ball valve **11** to emergency operation („downwards“).

1.2.2 Emergency control

- ▶ Start the travel motor.
- ▶ Refer to the section „Ball valve positions during emergency operation“ or to the emergency operations tag on the crane superstructure to select the ball valves (1 -9) for the appropriate crane movement.

The deflection of the hand lever **10** (**V**) determines the speed of the each crane movement.

- ▶ Operate the hand lever **10** (**V**) and carry out the relevant crane movement carefully.

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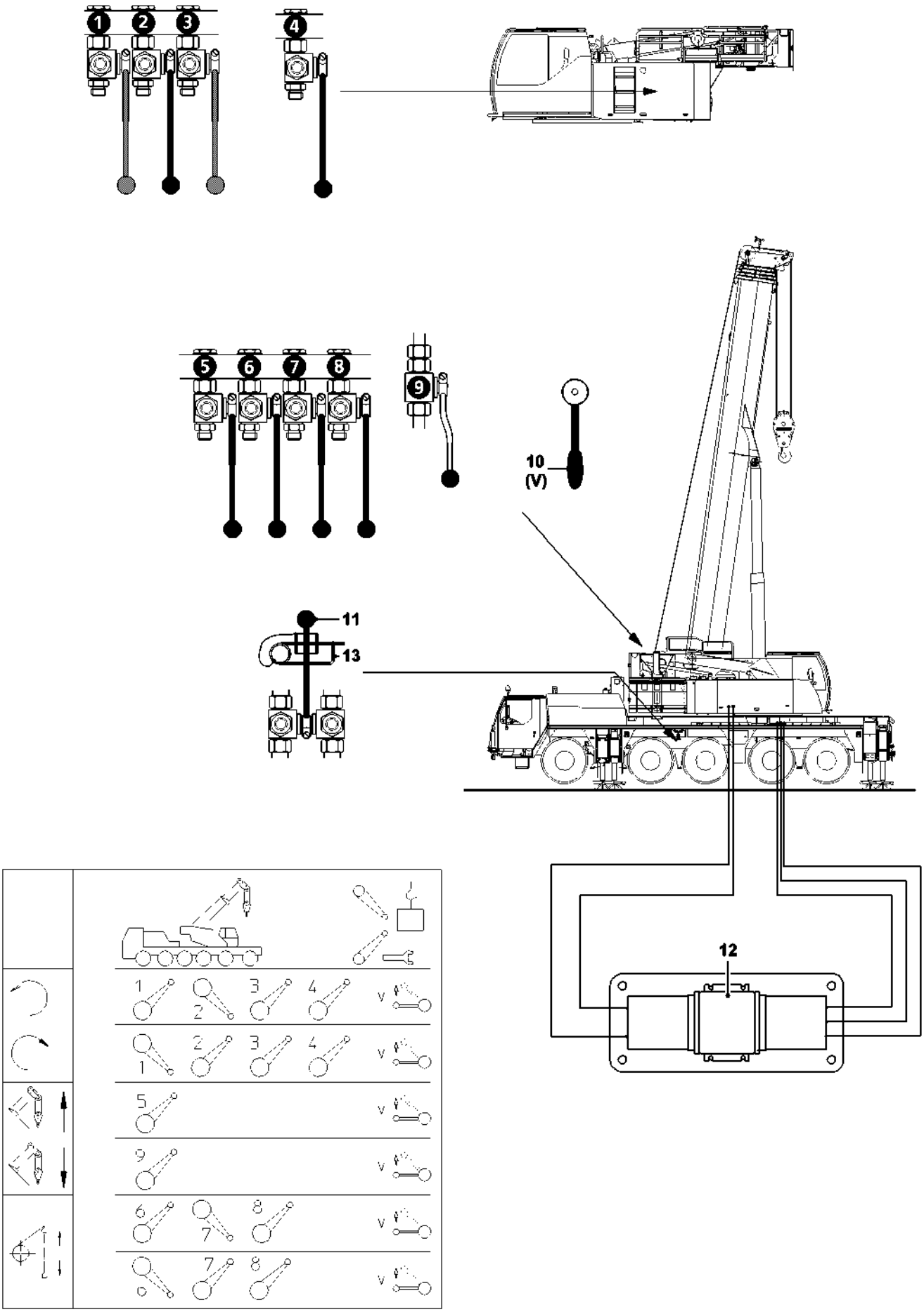

Fig.112624

1.3 Ball valve positions during emergency operation

1.3.1 Turning the turntable to the left

▶ Move the ball valve **1**, ball valve **3** and ball valve **4** upwards.
▶ Move the ball valve **2** downward.
▶ Move the hand lever **10** (**V**) carefully.

Result:

– The turntable turns to the left.

1.3.2 Turning the turntable to the right

▶ Move the ball valve **2**, ball valve **3** and ball valve **4** upwards.
▶ Move the ball valve **1** downward.
▶ Move the hand lever **10** (**V**) carefully.

Result:

– The turntable turns to the right.

1.3.3 Luff the telescopic boom up.

▶ Move the ball valve **5** upward.
▶ Move the hand lever **10** (**V**) carefully.

Result:

– Telescopic boom is luffed up.

1.3.4 Luff the telescopic boom down.

▶ Move the ball valve **9** upward.
▶ Move the hand lever **10** (**V**) carefully.

Result:

– Telescopic boom is luffed down.

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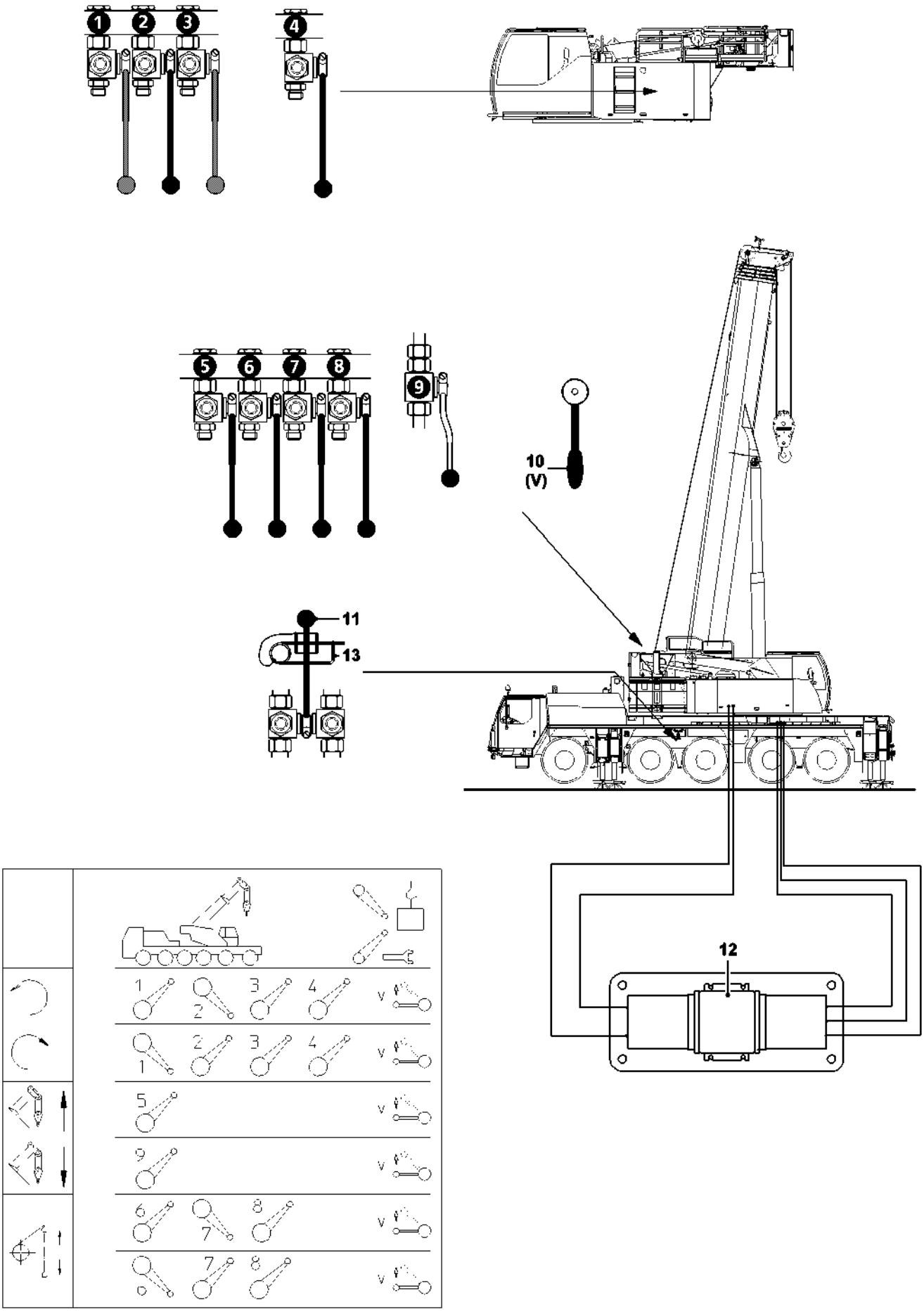

Fig.112624

1.3.5 Raising the hoist gear

- ▶ Move the ball valve **6** and ball valve **8** upward.
- ▶ Move the ball valve **7** downward.
- ▶ Move the hand lever **10** (**V**) carefully.

Result:

– The hoist gear spools up.

1.3.6 Lowering the hoist gear

- ▶ Move the ball valve **7** and ball valve **8** upward.
- ▶ Move the ball valve **6** downward.
- ▶ Move the hand lever **10** (**V**) carefully.

Result:

– The hoist gear spools out.

1.4 Ending emergency operation

DANGER
Risk of accident!
- ▶ Following the „emergency operation“, always turn all ball valves to „crane operation“.

- ▶ Switch ball valve **11** to „crane operation“ and secure using spring retainer **13**.
- ▶ Turn the travel motor off.
- ▶ Disconnect the hydraulic lines and screw in dummy plugs.

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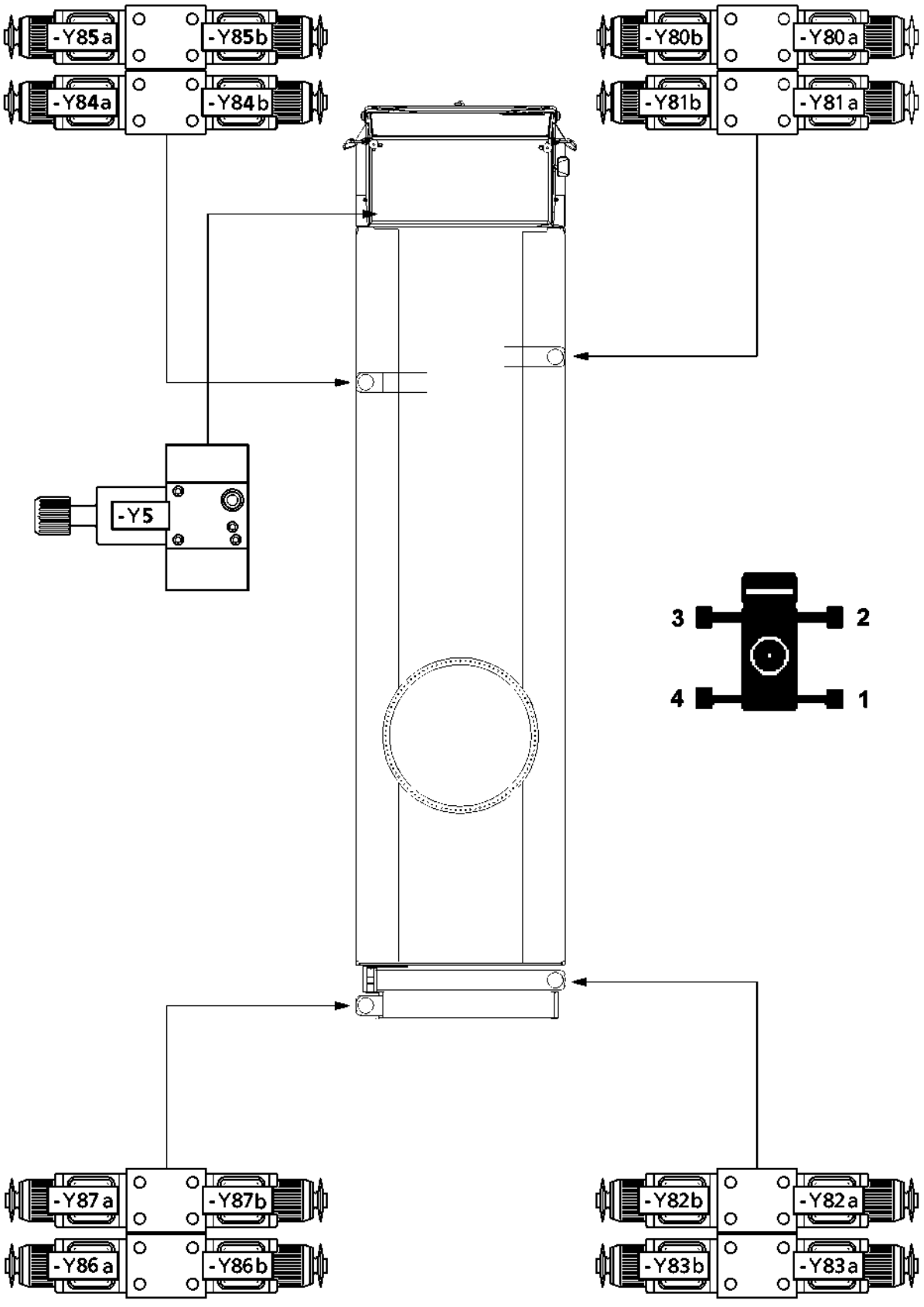

Fig.110959

1 Emergency operation of support

1.1 Can the support cylinders or sliding beams no longer be actuated?

In the event that the electrical controls of the directional valve for the support should fail, these can be manually retracted and extended by pressing in the magnetic piston on the corresponding directional valve. The pressure stage must also be preselected.

As soon as the pressure on the magnetic piston is removed, the movement carried out stops.

To ensure the emergency operation of the sliding beams and the support, the valve **-Y5** must be manually actuated. For this purpose, a special „cap“ is required, which is installed on the solenoid of the valve **-Y5**. The sliding beams as well as the supports can now only be retracted or extended by manually actuating the corresponding valves.

WARNING
Danger of fatal injury when extending and retracting the sliding beams!
- ▶ The operator must monitor the extending and retracting of the sliding beams.
- ▶ Ensure that there are no persons or objects in the danger zone when the sliding beams are being extended and retracted.

Make sure that the following prerequisites are met:
- – The engine is running.
- – The hydraulic system is operative.
- – The valve **-Y5** is activated.

1.1.1 Functional block diagram Retract the support cylinders

Support cylinder	Valve	Side
Left front (3)	-Y81	B
Left rear (4)	-Y83	B
Right front (2)	-Y85	B
Right rear (1)	-Y87	B

1.1.2 Functional block diagram Extend the support cylinders

Support cylinder	Valve	Side
Left front (3)	-Y81	A
Left rear (4)	-Y83	A
Right front (2)	-Y85	A
Right rear (1)	-Y87	A

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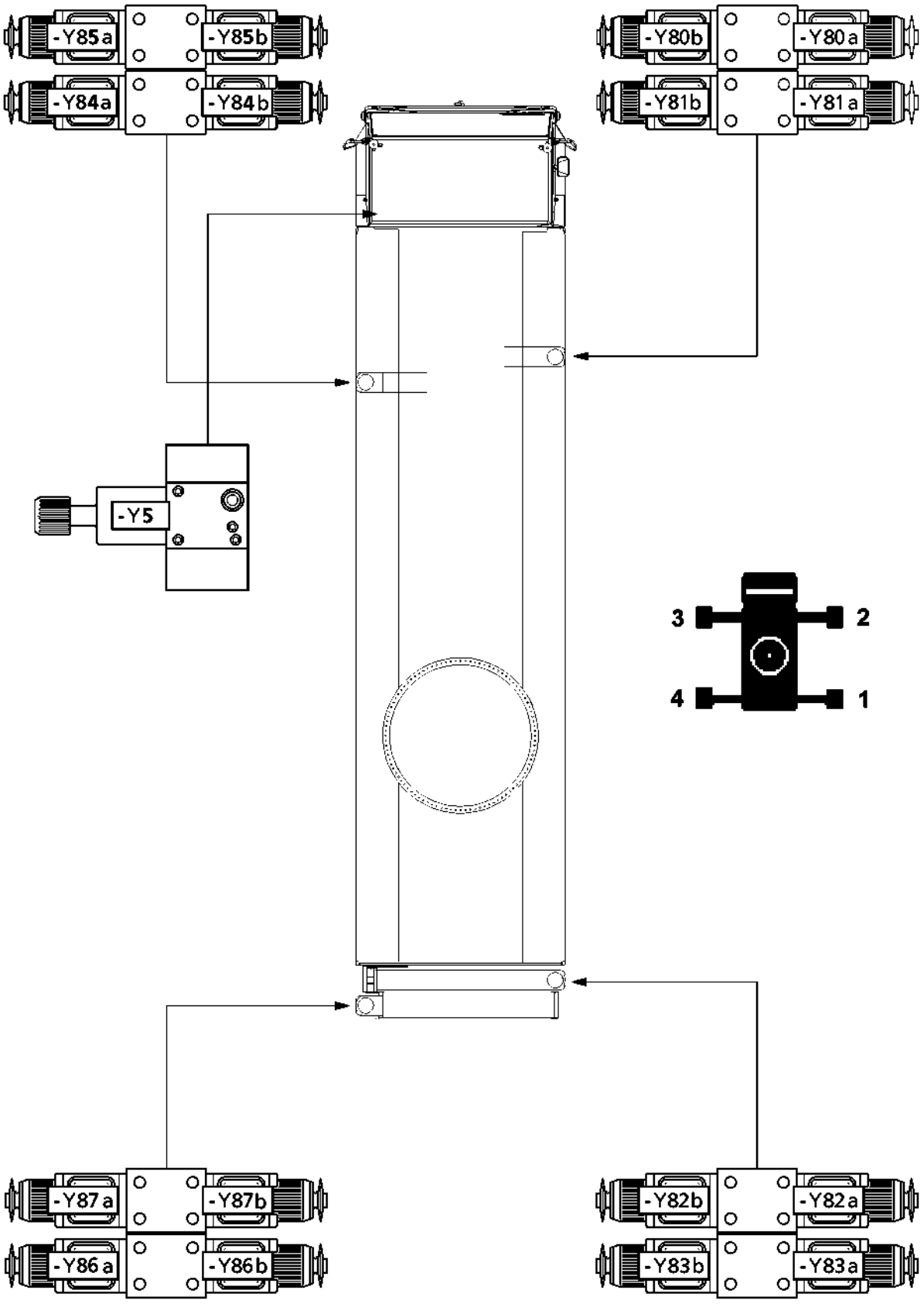

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Fig.110959

1.1.3 Functional block diagram Retract the sliding beams

Sliding beam	Valve	Side
Left front (3)	-Y80	A
Left rear (4)	-Y82	A
Right front (2)	-Y84	A
Right rear (1)	-Y86	A

1.1.4 Functional block diagram Extend the sliding beams

Sliding beam	Valve	Side
Left front (3)	-Y80	B
Left rear (4)	-Y82	B
Right front (2)	-Y84	B
Right rear (1)	-Y86	B

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Fig.195219

1 Emergency operation - crane control

WARNING
Designated use of the crane!
- ▶ The destined use of the crane is **lifting of loads**!
- ▶ **Lifting of personnel** is **not** considered to be destined use of the crane!
- ▶ The **national laws, regulations and standards** for **lifting personnel** must be adhered to!

To bring persons in the personal lifting device into a safe position in case the crane hydraulic, the crane electric or the crane engine fails, a device for the emergency control of the crane is installed on the crane superstructure.

WARNING
Increased danger of accident during emergency operation of the crane!
In emergency operation, the crane movements are no longer monitored by the LICCON overload protection!
During emergency operation, the speed of the crane movements reaches approx. 15 % compared to normal crane operation!
- ▶ Observe all notes and danger notes!
- ▶ The emergency operation may only be carried out by trained persons!
- ▶ The emergency control and especially luffing down the telescopic boom may only be carried out according to the specifications in the load charts or the erection / take down charts!
- ▶ A shut off by the LICCON overload protection may not be circumvented with an emergency control!
- ▶ If normal „crane operation“ is possible, then the emergency control may not be activated!
- ▶ Always only one crane movement after the other may be carried out!
- ▶ All crane movements must be carried out with extreme caution and slowly!

WARNING
Sequence of crane movements!
The crane movement „lift / lower the hook“ is preferential to all other crane movements when carrying out the emergency control.
- ▶ Carry out other crane movements only when the persons in the personal lifting device can **not** be brought to safety directly via the crane movement „lift / lower the hook“.

Note
Identification of plug connections - Emergency control!
- ▶ Plug connections, which must be established for the emergency control, are always housing color „white“ on „white“!

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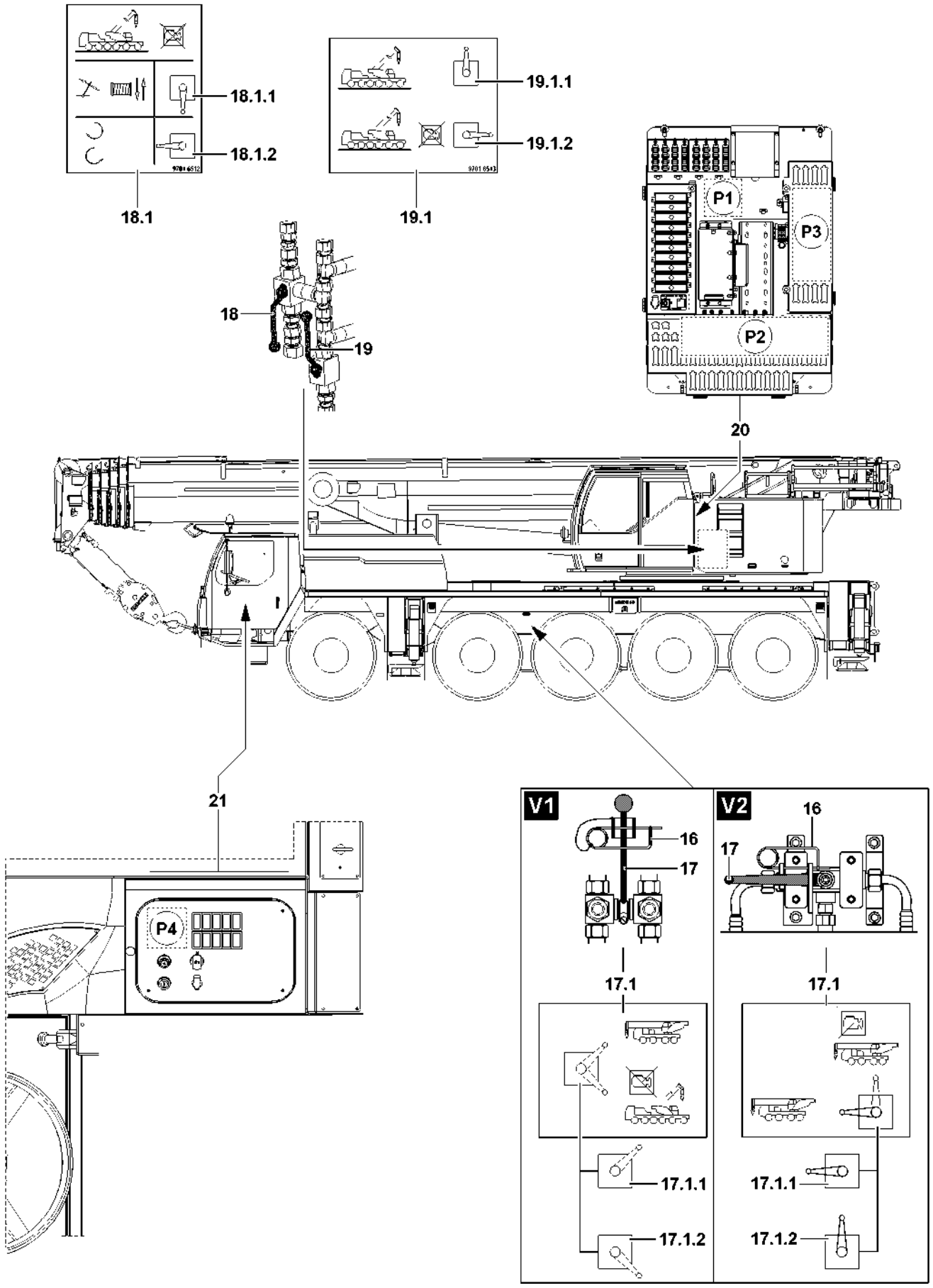

Fig.119850

1.1 Illustrations

Note

▶ The illustrations of the crane model in this chapter are examples and generally valid. The operation and location of the elements for emergency control are accordingly.

1.2 Overview plug connections emergency control

Note

▶ In the switch cabinet crane superstructure **20** are the plug connections on position **P1**, position **P2** and position **P3**!

▶ In the center console in the driver's cab **21** (open flap) are the plug connections on position **P4**!

Plug connections on position **P1**

Plug connection -X487
- Plug -X487.B: black
- Plug location -X487: white

Plug connections on position **P2**

Plug connection -X467
- Plug -X467.B: white
- Plug location -X467: black

Plug connection -XNOT1
- Plug location -XNOT1: white

Plug connection -XNOT2
- Plug -XNOT2.B: black
- Plug location -XNOT2: white

Plug connection -XNOT4
- Plug -XNOT4.B: black
- Plug location -XNOT4: white

Plug connection -XNOT6
- Plug -XNOT6.B: black
- Plug location -XNOT6: white

Plug connections on position **P3**

Plug connection -X412
- Plug -X412.B: white
- Plug location -X412: black

Plug connection -X416
- Plug -X416.B: white
- Plug location -X416: black

Plug connections on position **P4**

Plug connection -X191
- Plug -X191B: white
- Plug location -X191S: black
- Plug location -X191NS: white

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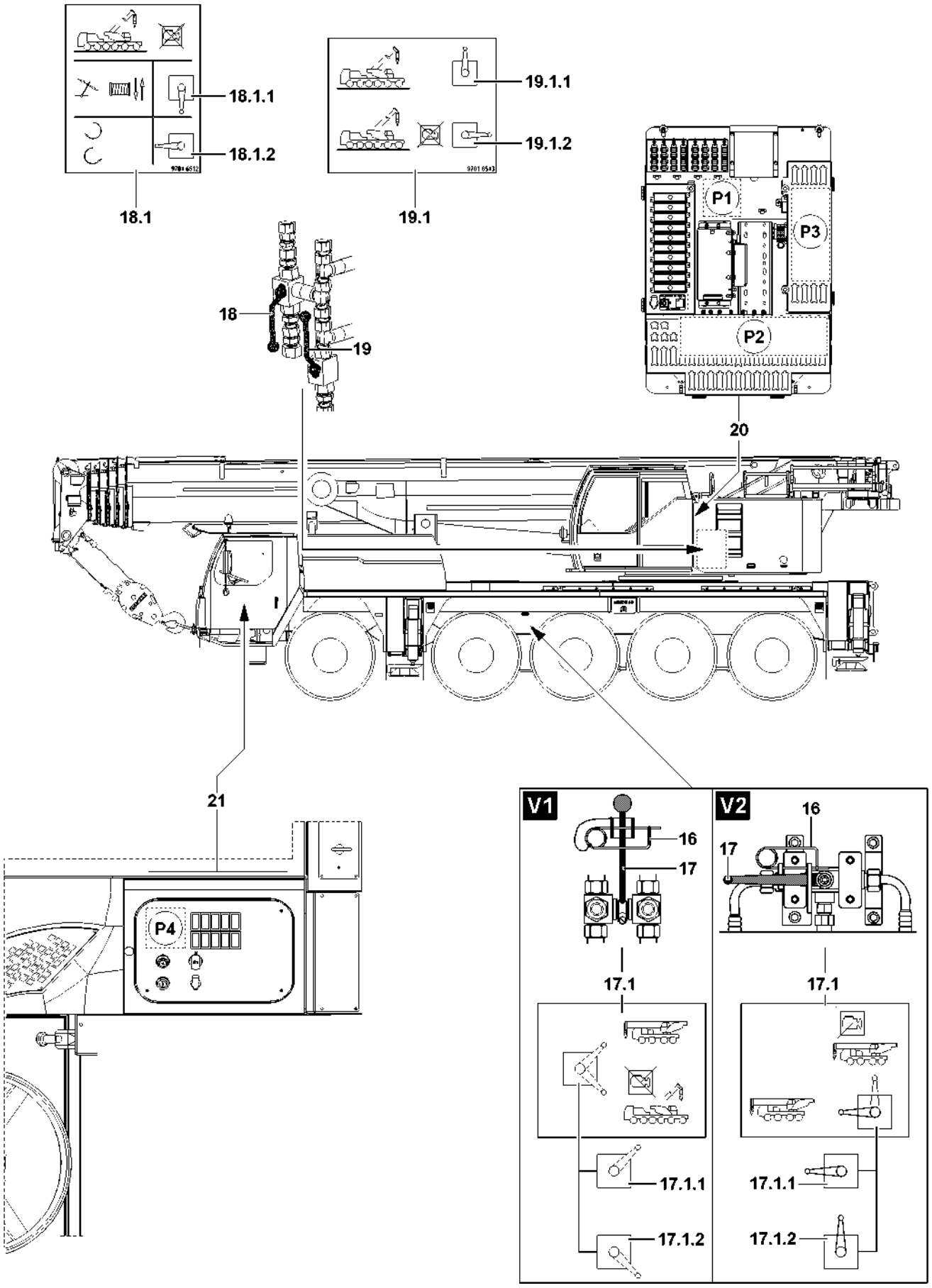

Fig.119850

1.3 Overview Ball valves emergency control

17 Ball valve
- Change over crane chassis
- Depending on the configuration if the crane, either the ball valve variation **V1** or the ball valve variation **V2** is installed.
- Ball valve variation **V1**:
  - **17.1** Sign
    Position "up" **17.1.1**: NORMAL OPERATION
    Position "down" **17.1.2**: EMERGENCY CONTROL
- Ball valve variation **V2**:
  - **17.1** Sign
    Position “to the side” **17.1.1**: NORMAL OPERATION
    Position "up" **17.1.2**: EMERGENCY CONTROL
- **Note:**
  The ball valve **17** is secured in Position **17.1.1** (NORMAL OPERATION) with the spring retainer **16**.

18 Ball valve
- Change over movement emergency control
- **18.1** Sign
  Position "down" **18.1.1**: HOIST WINCH / LUFFING
  Position “to the side” **18.1.2**: SLEWING GEAR

19 Ball valve
- Change over crane superstructure
- **19.1** Sign
  Position "up" **19.1.1**: NORMAL OPERATION
  Position “to the side” **19.1.2**: EMERGENCY CONTROL

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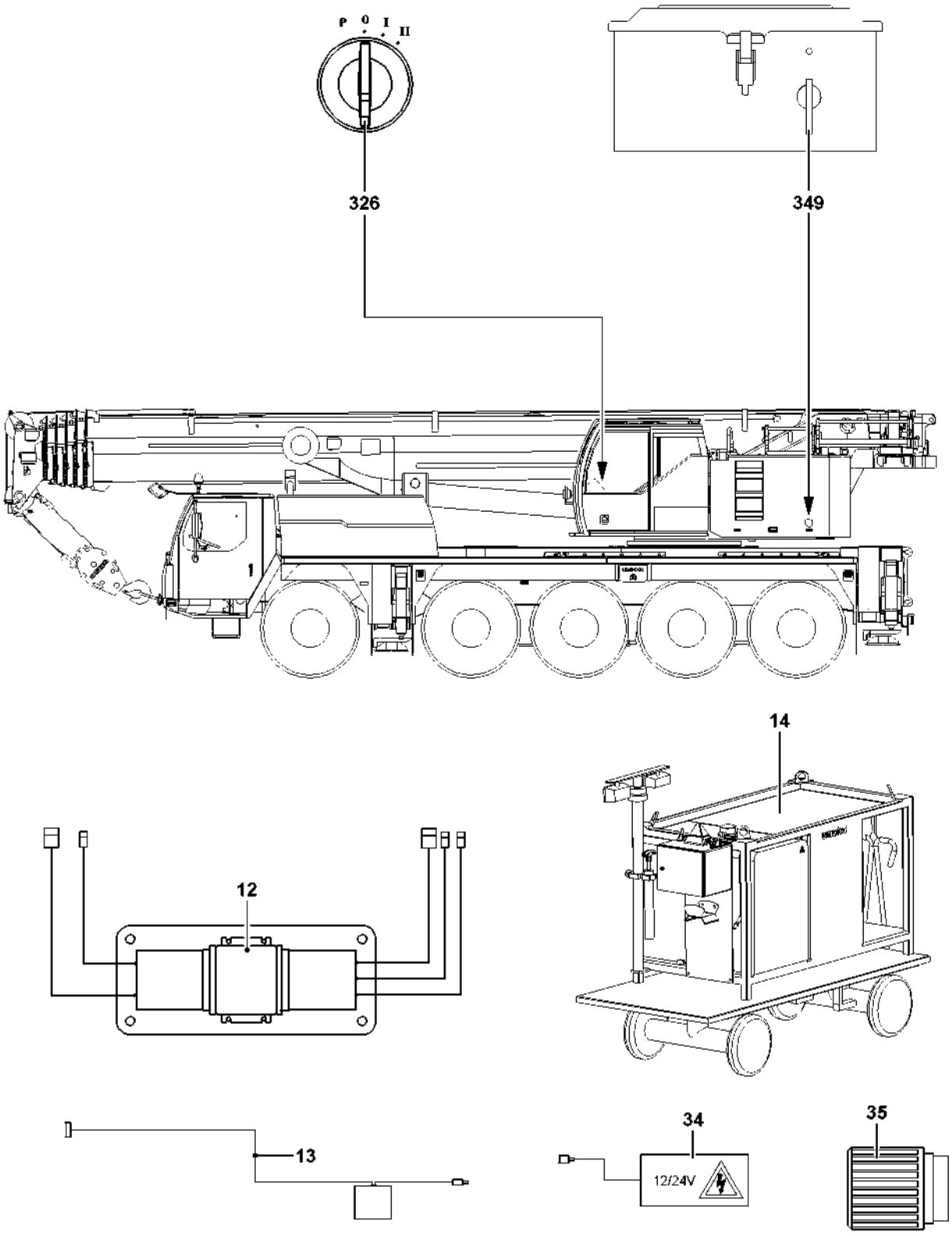

Fig.111938

2 Preparing for emergency control

Make sure that the following prerequisites are met:
- Crane function is no longer possible.
- Ignition switch crane superstructure **326** is in position 0.
- Battery master switch crane superstructure **349** is turned off.
- Hydraulic transformer **12** is available.
- Supply cable **13** is available.

When valve Y-500 is designed for operation with an emergency control cap **35** (only for certain crane types):
- Emergency control cap **35** is available.
- **Note**: Valve Y-500 can be also operated as the other valves, see section „Crane movement via manually actuated valves“

If the hydraulic supply must be made from an external source, the following applies additionally:
- Hydraulic aggregate **14** is available.

If the electrically supply must be made from an external source, the following applies additionally:
- An external electrical power supply source **34** (12V/24V - for example through a truck or another crane vehicle) is available.

Note
▶ The illustration of the hydraulic aggregates **14** is exemplary. Other models and versions with appropriate output and connections can also be used for the emergency control.

2.1 Checking the supply via the crane chassis

Note
▶ This section is only relevant if the hydraulic supply is not made via an external auxiliary aggregate **14**!
▶ For hydraulic supply via the external auxiliary aggregate **14**: Change to section „Supply via external auxiliary aggregate“!

To determine if the supply of the emergency control can be made by the crane itself, the functionality of the required crane components must be checked first. To do so, an electrical connection must be established in the center console of the driver’s cab.

NOTICE
Damage of electrical components!
If current carrying electrical connections are separated / connected, then there is the danger that electrical components can be damaged!

Turn the current off on electrical connections before disconnection / connection:
▶ Set all ignition switches to position **0**!
▶ Turn all battery master switches off!

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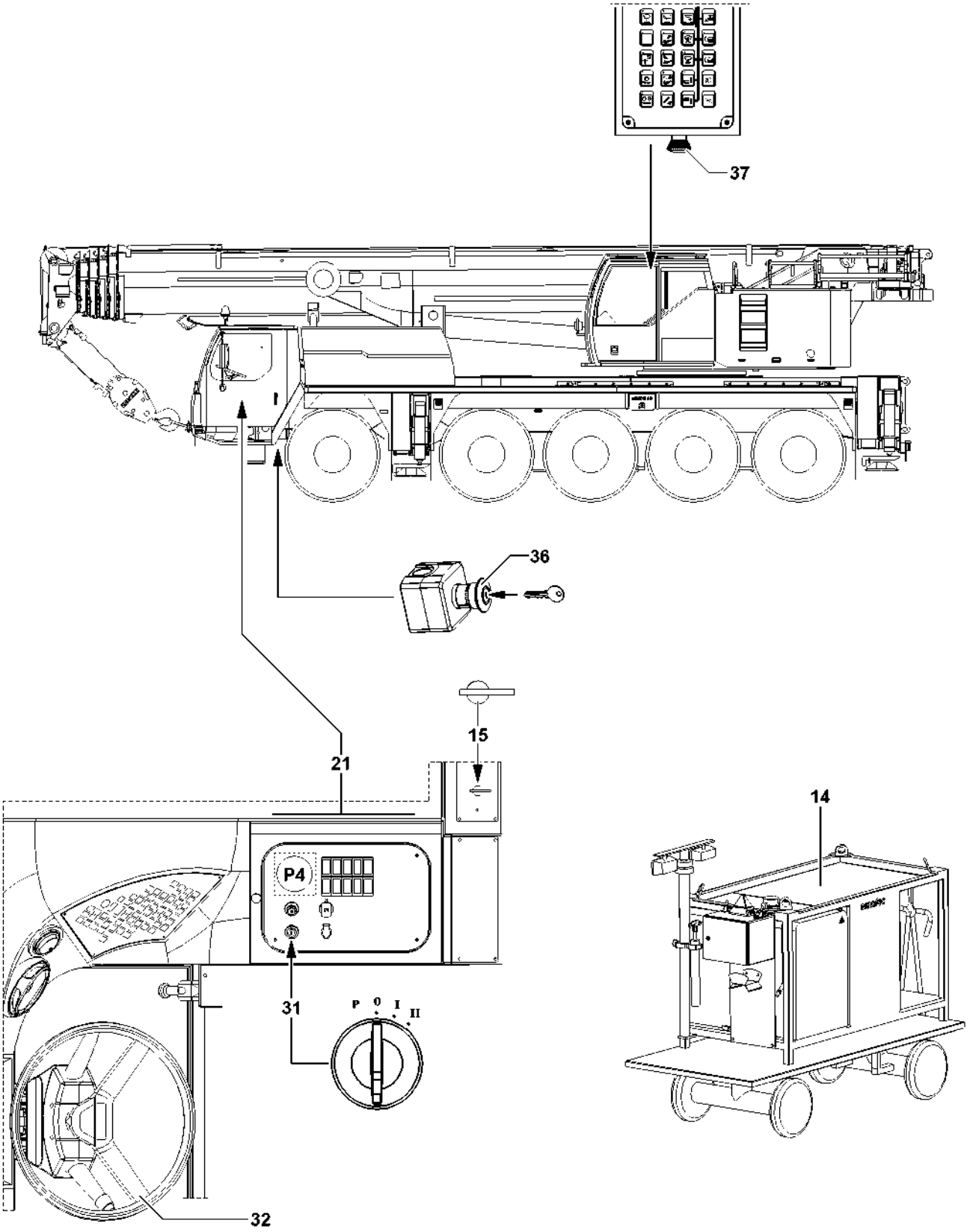

Fig.115300

Make sure that the following prerequisites are met:
– Ignition switch crane chassis **31** is in position 0.
– Battery master switch crane chassis **15** is turned off.

Center console driver's cab **21**:

▶ Position **P4**: Unplug plug -X191.B from plug location -X191.S.
▶ Position **P4**: Insert plug -X191.B in plug location -X191.NS.

Result:

– The electrical connection has been made.

▶ Turn the battery master switch crane chassis **15** on.
▶ Operate the emergency stop switch*** 36** or the emergency stop switch **37**.
▶ Turn the ignition switch crane chassis **31** to position **I**.
▶ Wait for five seconds.
▶ Release the emergency stop switch*** 36** or the emergency stop switch **37**.
▶ Wait for ten seconds.
▶ Turn the ignition switch crane chassis **31** to position **II**.

Result:

– The engine starts.

WARNING
Compromised stability!
In crane operation on tires, the stability can be compromised due to excessive steering movements!
▶ Do not deflect the steering wheel more than necessary to test functionality!

▶ Carefully deflect the steering wheel **32** while watching the wheels.

Result:

The engine and the steering are functioning:
– The supply of the emergency control can be made by the crane itself.
– Plug connections on position **P4** are prepared for emergency control.

Problem remedy
The engine does not start or the steering wheel cannot be deflected because the steering hydraulic is not working?
▶ The supply can **not** be made by the crane chassis!
▶ Prepare the auxiliary aggregate **14** for emergency control and change to section „Supply via external auxiliary aggregate"!

▶ Turn the engine off again: Set the ignition switch crane chassis **31** to position **0**.

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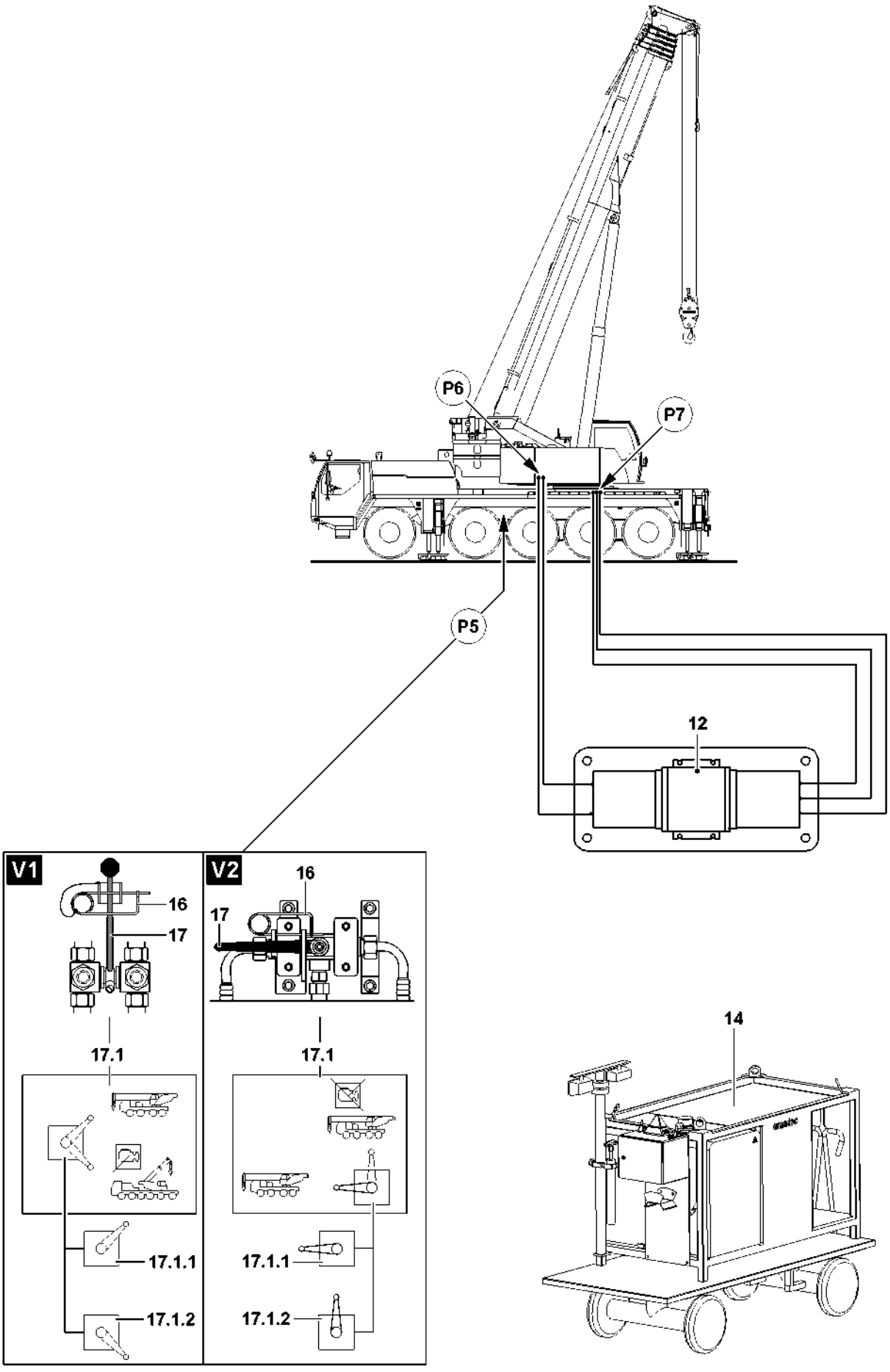

Fig.119851

2.2 Supply via crane chassis

Note

- ▶ This section is only relevant if the supply is not made via an external auxiliary aggregate **14**!
- ▶ For supply via the external auxiliary aggregate **14**: Change to section „Supply via external auxiliary aggregate“!
- ▶ If the supply via the external auxiliary aggregate **14** is already available: Change to section „Carry out crane movement“!

For supply with the aid of the crane chassis, the respective electrical and hydraulic connections must be established.

Make sure that the following prerequisite is met:
– The supply via the crane chassis is possible.

2.2.1 Establishing the hydraulic connections

WARNING
Pressure in the hydraulic lines!
If the pressure in the hydraulic system is not released 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 hydraulic pressure supply and wait for a short time.
- ▶ The auxiliary aggregate **14** and crane engine must be turned off.

WARNING
Loss of pressure or leakage!
Incorrectly coupled or self-loosening quick couplings (particularly return lines) can result in serious accidents due to faulty functions!
Personnel can be severely injured or killed!

- ▶ Check that the quick couplings have been properly connected before using the emergency control!

Note

- ▶ The different diameters of the hydraulic lines prevent incorrect connection!
- ▶ Point **P5**: The respective switch positions of the ball valve **17** are shown on the respective sign **17.1**!

Make sure that the following prerequisites are met:
– Ball valve **17** is set to position **17.1.1** (NORMAL OPERATION) and secured with spring retainer **16**.
– All ignition switches of the crane are in position **0**.

- ▶ Remove the caps on the hydraulic connections.
- ▶ Point **P6**: Establish the hydraulic connections from the crane superstructure to the transformer **12**.
- ▶ Point **P7**: Connect the hydraulic connections from the crane chassis to the transformer **12**.

Result:

– The hydraulic connections are established.

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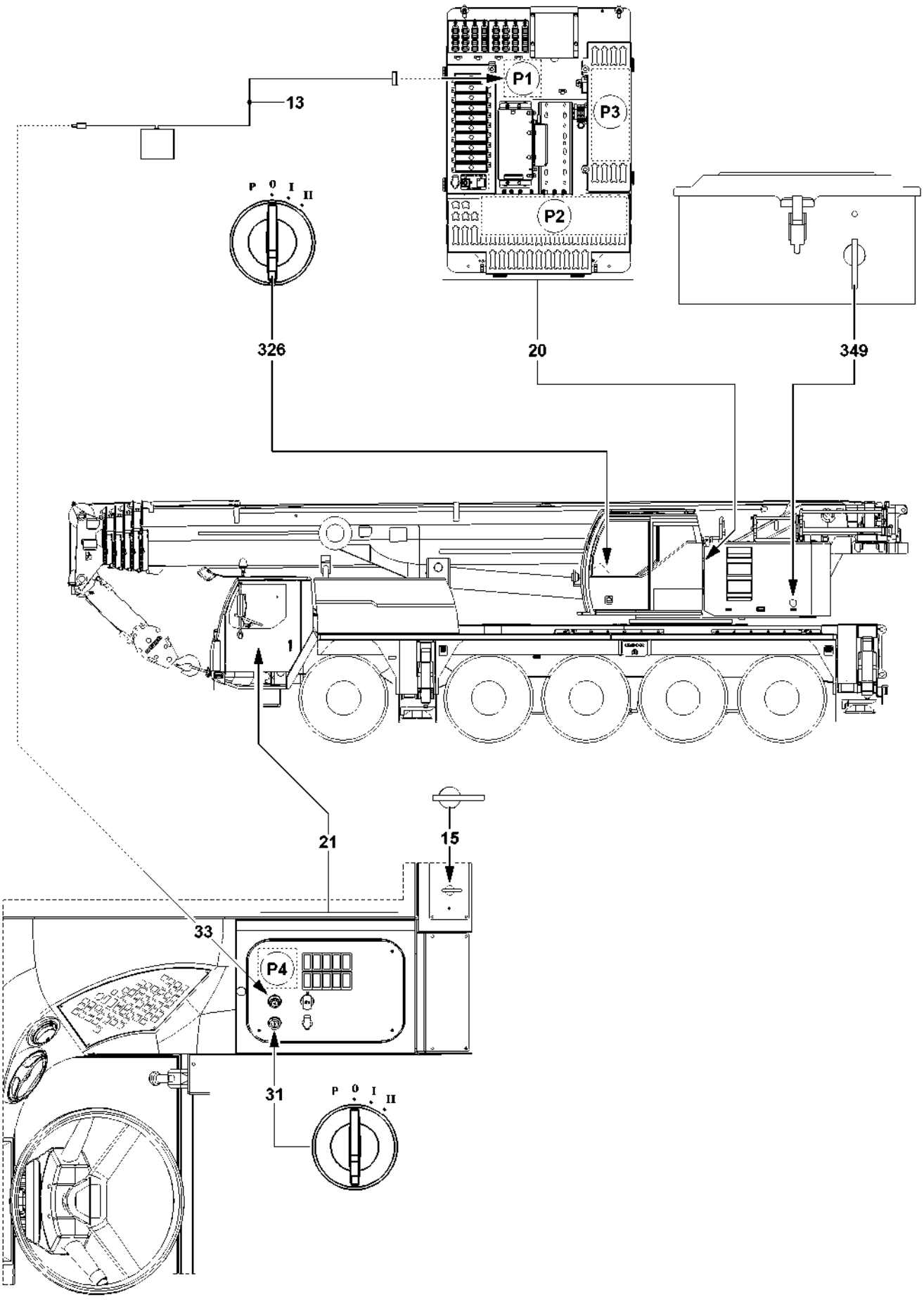

Fig.112293

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2.2.2 Establishing the electrical connections

Note

- ▶ This section is only relevant if the emergency control is to be made via the master switches!
- ▶ For control of crane movements through manually actuated valves: Change to section „Carry out crane movement“!

NOTICE

Damage of electrical components!
If current carrying electrical connections are separated / connected, then there is the danger that electrical components can be damaged!

Turn the current off on electrical connections before disconnection / connection:

- ▶ Set all ignition switches to position **0**!
- ▶ Turn all battery master switches off!

Make sure that the following prerequisites are met:

- – Ignition switch crane chassis **31** is in position **0**
- – Battery master switch crane chassis **15** is turned off.
- – Ignition switch crane superstructure **326** is in position **0**
- – Battery master switch crane superstructure **349** is turned off.

Switch cabinet crane superstructure **20**:

- ▶ Position **P1**: Unplug plug -X487.B from plug location -X487.
- ▶ Position **P1**: Insert the plug of the supply cable **13** in plug location -X487.
- ▶ Position **P2**: Unplug plug -X467.B from plug location -X467.
- ▶ Position **P2**: Insert plug -X467.B in plug location -XNOT1.

Note

- ▶ If the supply via the crane chassis was checked, then the electrical connections in the center console driver’s cab **21** (position **P4**) are already established!

Center console driver’s cab **21**:

- ▶ Insert the supply cable **13** with the other end in the cigarette lighter **33**.
- ▶ Position **P4**: Unplug plug -X191.B from plug location -X191.S.
- ▶ Position **P4**: Insert plug -X191.B in plug location -X191.NS.

Result:

- – The electrical connections have been made.

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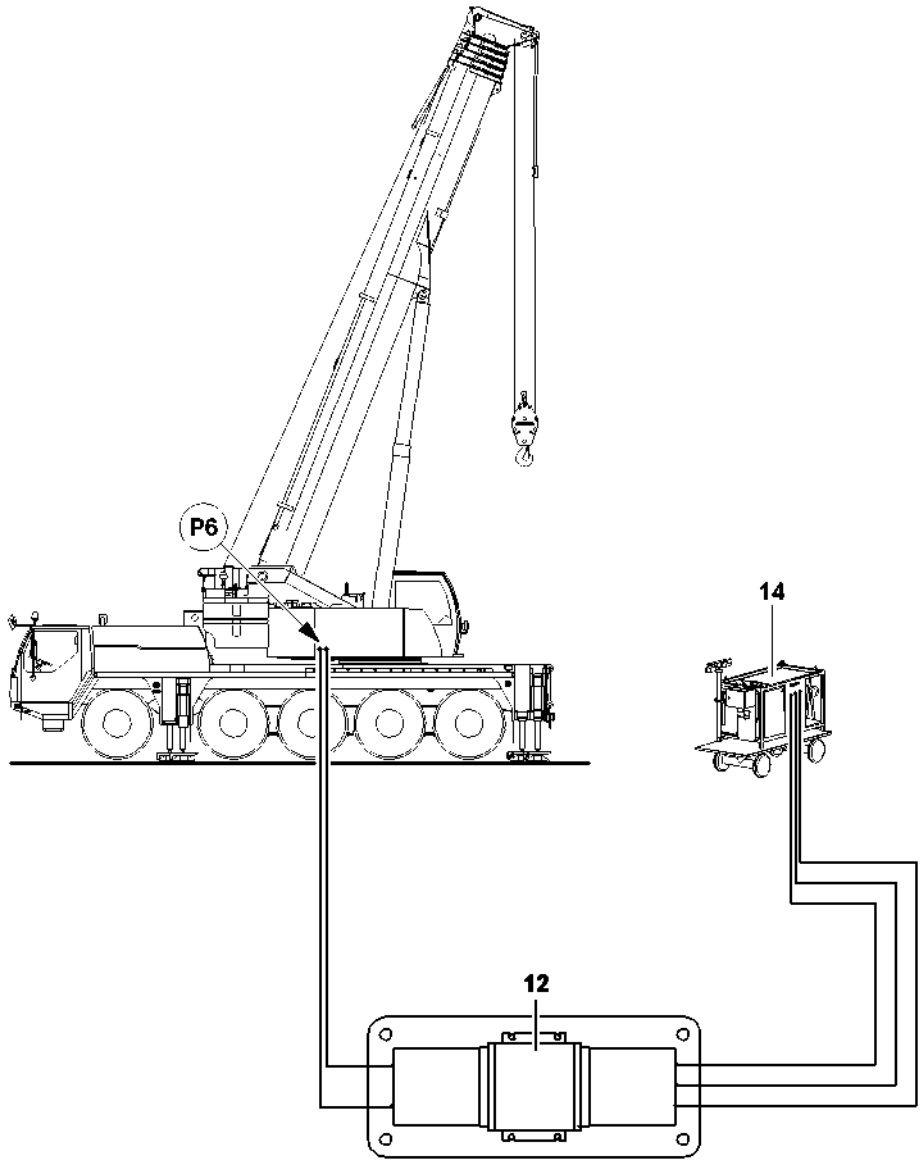

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Fig.112295

2.3 External supply

Note

- ▶ This section is only relevant if the supply is not made via the crane chassis!
- ▶ For supply via the crane chassis: Change to section „Supply via crane chassis“!
- ▶ If the supply via the crane chassis is already available Change to section „Carry out crane movement“!

To be able to establish the external supply, the respective electrical connections as well as the hydraulic connections must be established.

2.3.1 Establishing the hydraulic connections

WARNING
Pressure in the hydraulic lines!
If the pressure in the hydraulic system is not released 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 hydraulic pressure supply and wait for a short time.
- ▶ The auxiliary aggregate **14** and crane engine must be turned off.

WARNING
Loss of pressure or leakage!
Any quick couplings which are not connected completely (especially return lines) can release by themselves!
Dirt on the sealing surfaces causes loss of pressure or leakage!
Severe accidents due to faulty functions can result!
Personnel can be severely injured or killed!

- ▶ Check that the quick couplings have been properly connected before using the emergency control!
- ▶ Always keep the sealing surfaces clean!

NOTICE
Operation auxiliary aggregate!

- ▶ Observe the separate operating instructions Auxiliary aggregate **14**!

Note

- ▶ The different diameters of the hydraulic lines prevent incorrect connection!

Make sure that the following prerequisite is met:

- – The auxiliary aggregate **14** is turned off.
- – All ignition switches of the crane are in position **0**.

- ▶ Remove the caps on the hydraulic connections.
- ▶ Establish the hydraulic connections from the auxiliary aggregate **14** to the transformer **12**.
- ▶ Point **P6**: Establish the hydraulic connections from the crane superstructure to the transformer **12**.

Result:

- – The hydraulic connections are established.

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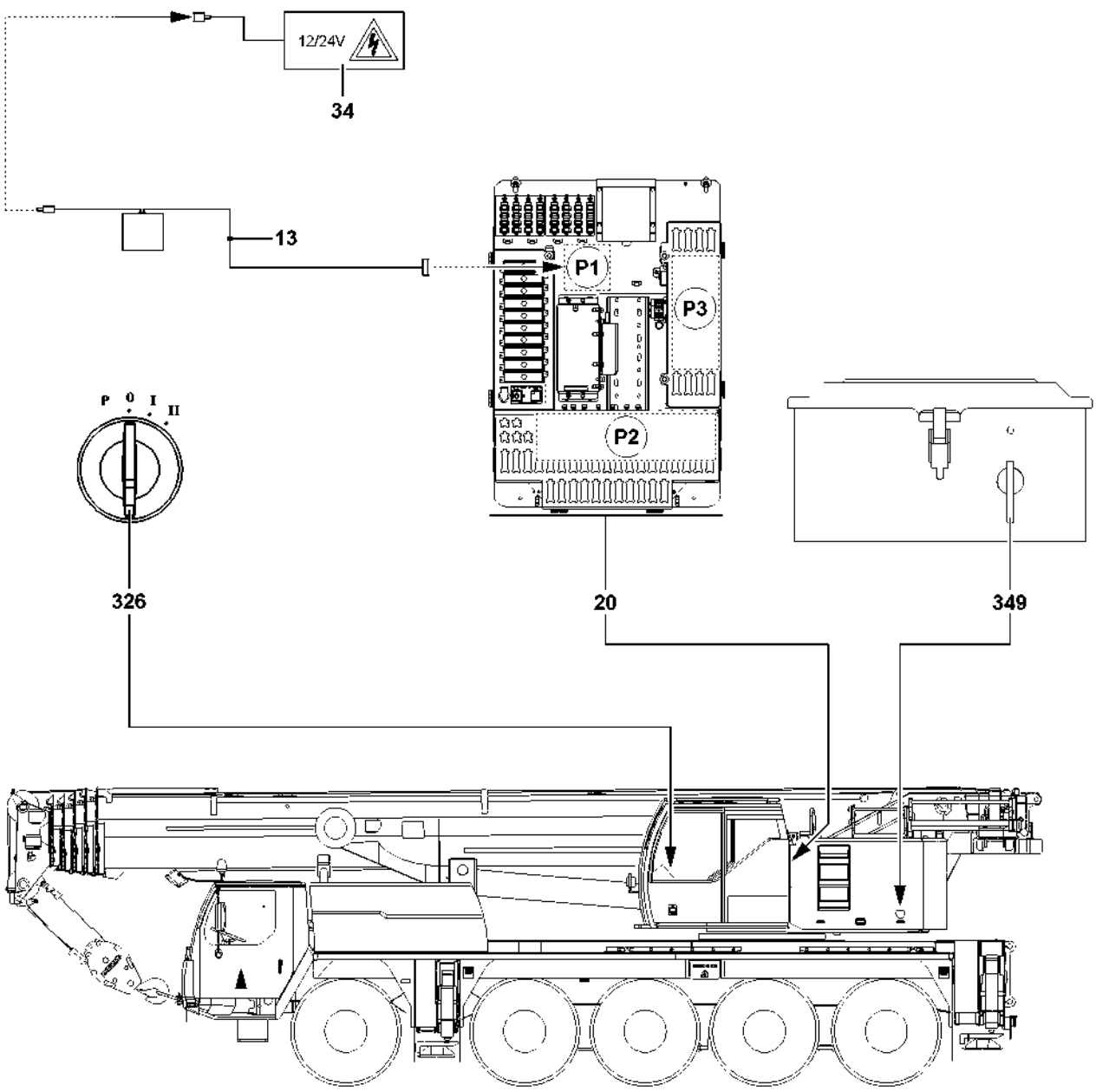

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Fig.112291

2.3.2 Establishing the electrical connections

Note

- ▶ This section is only relevant if the emergency control is to be made via the master switches!
- ▶ For control of crane movements through manually actuated valves: Change to section „Carry out crane movement“!

NOTICE

Damage of electrical components!
If current carrying electrical connections are separated / connected, then there is the danger that electrical components can be damaged!

Turn the current off on electrical connections before disconnection / connection:

- ▶ Set all ignition switches to position **0**!
- ▶ Turn all battery master switches off!

Make sure that the following prerequisites are met:

- – Ignition switch crane superstructure **326** is in position **0**
- – Battery master switch crane superstructure **349** is turned off.

Switch cabinet crane superstructure **20**:

- ▶ Position **P1**: Unplug plug -X487.B from plug location -X487.
- ▶ Position **P1**: Insert plug -X487.NOT (supply cable **13**) in plug location -X487.
- ▶ Position **P2**: Unplug plug -X467.B from plug location -X467.
- ▶ Position **P2**: Insert plug -X467.B in plug location -XNOT1.
- ▶ Plug in the supply cable **13** with the other end on the external electrical power supply source **34**.

Result:

- – The electrical connections have been made.

Note

- ▶ Make sure that the external electrical power supply source **34** supplies electric power permanently and sufficiently!

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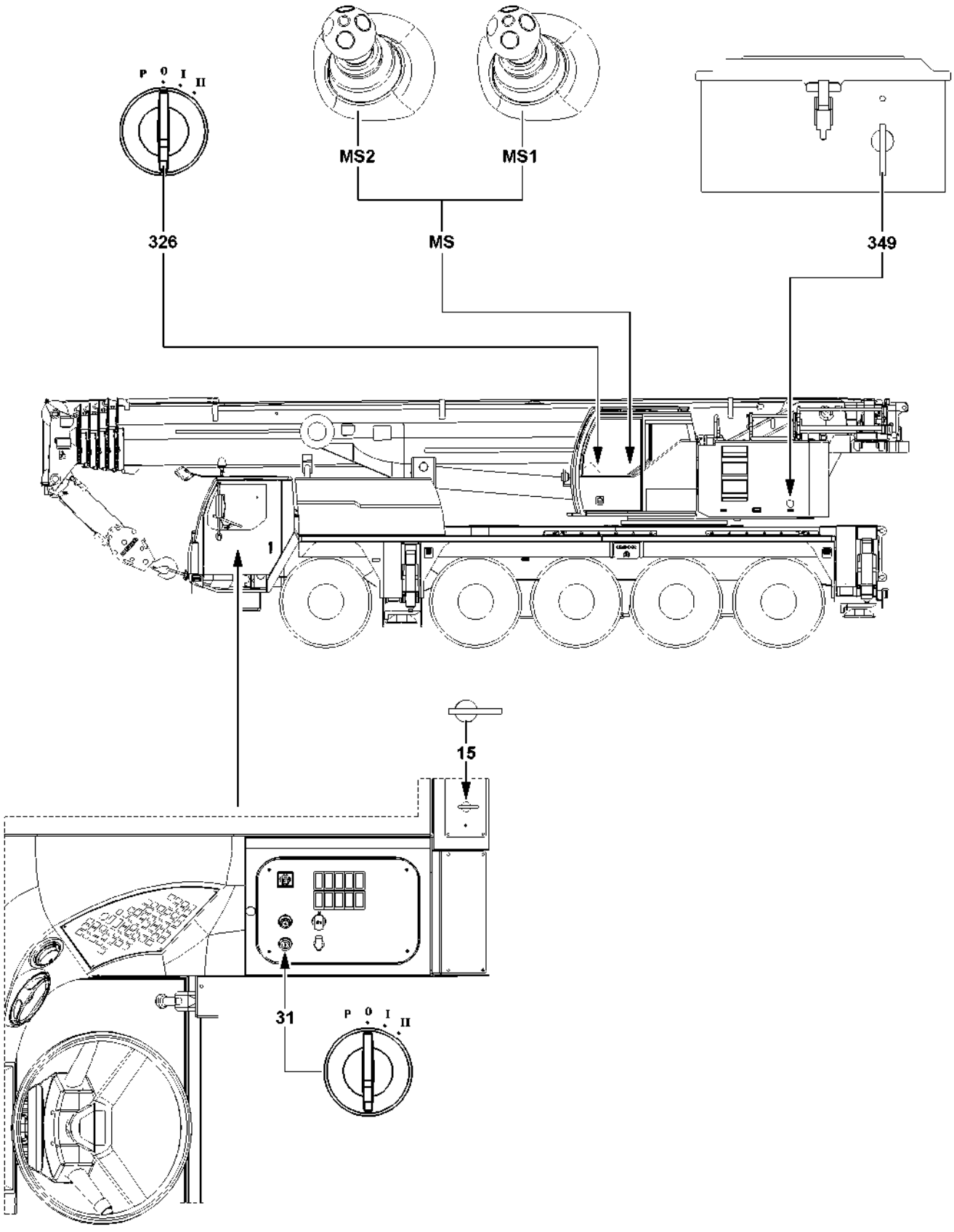

Fig.112288

3 Control of crane movements via master switches: Preselect crane movements for master switch

Note

- ▶ This section is only relevant if the control of the crane movements is to be made via a master switch **MS**!
- ▶ For crane movement through manually actuated valves: Change to section „Carry out crane movement“!

Since in emergency control only one crane movement after the other can be carried out, only one of the master switches **MS** can be selected for the control of the crane movements.

Every crane movement in emergency control can be carried out via master switch **MS1** as well as via master switch **MS2**.

Possible crane movements:
- Lifting / lowering the hook (HOIST WINCH)
- Luffing the boom (LUFFING)
- Turning the crane superstructure (SLEWING GEAR)

NOTICE

Damage of electrical components!
If current carrying electrical connections are separated / connected, then there is the danger that electrical components can be damaged!

Turn the current off on electrical connections before disconnection / connection:
- ▶ Set all ignition switches to position **0**!
- ▶ Turn all battery master switches off!

Before disconnecting / connecting electrical connections, make sure that the following prerequisites are met:
- Ignition switch crane chassis **31** is in position **0**
- Battery master switch crane chassis **15** is turned off.
- Ignition switch crane superstructure **326** is in position **0**
- Battery master switch crane superstructure **349** is turned off.

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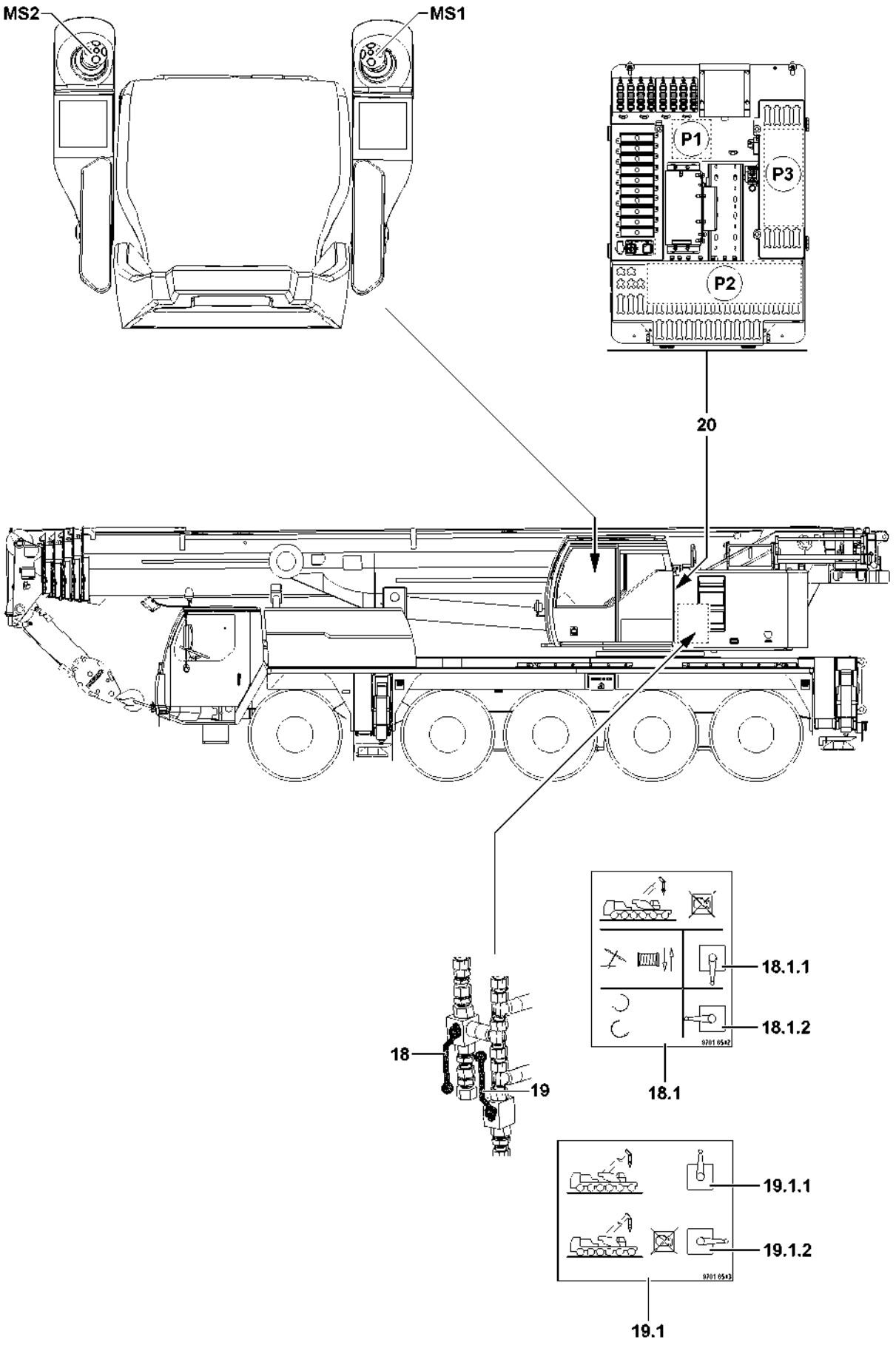

Fig.114185

3.1 Preselecting lifting / lowering the hook

Make sure that the following prerequisite is met:
– Ball valve **19** is set to position „up“: Position **19.1.1** (NORMAL OPERATION)

3.1.1 Selecting master switch MS1 for the crane movement

Switch cabinet crane superstructure **20**:

▶ Position **P2**: Unplug plug -XNOT4.B from plug location -XNOT4.
▶ Position **P3**: Unplug plug -X412.B from plug location -X412.
▶ Position **P2**: Insert plug -X412.B in plug location -XNOT4.
▶ Set the ball valve **18** „down“: Position **18.1.1** (HOIST GEAR / LUFFING).

Result:

– Crane movement „lift / lower the hook“ is preselected.

Note
▶ Master switch **MS2** only has to be selected if it is found or known that master switch **MS1** is defective!
▶ For the emergency control only one master switch is required: Select either master switch **MS1 or** master switch **MS2**!

3.1.2 Selecting master switch MS2 for the crane movement

Switch cabinet crane superstructure **20**:

▶ Position **P2**: Unplug plug -XNOT4.B from plug location -XNOT4.
▶ Position **P3**: Unplug plug -X416.B from plug location -X416.
▶ Position **P2**: Insert plug -X416.B in plug location -XNOT4.
▶ Set the ball valve **18** „down“: Position **18.1.1** (HOIST GEAR / LUFFING).

Result:

– Crane movement „lift / lower the hook“ is preselected.

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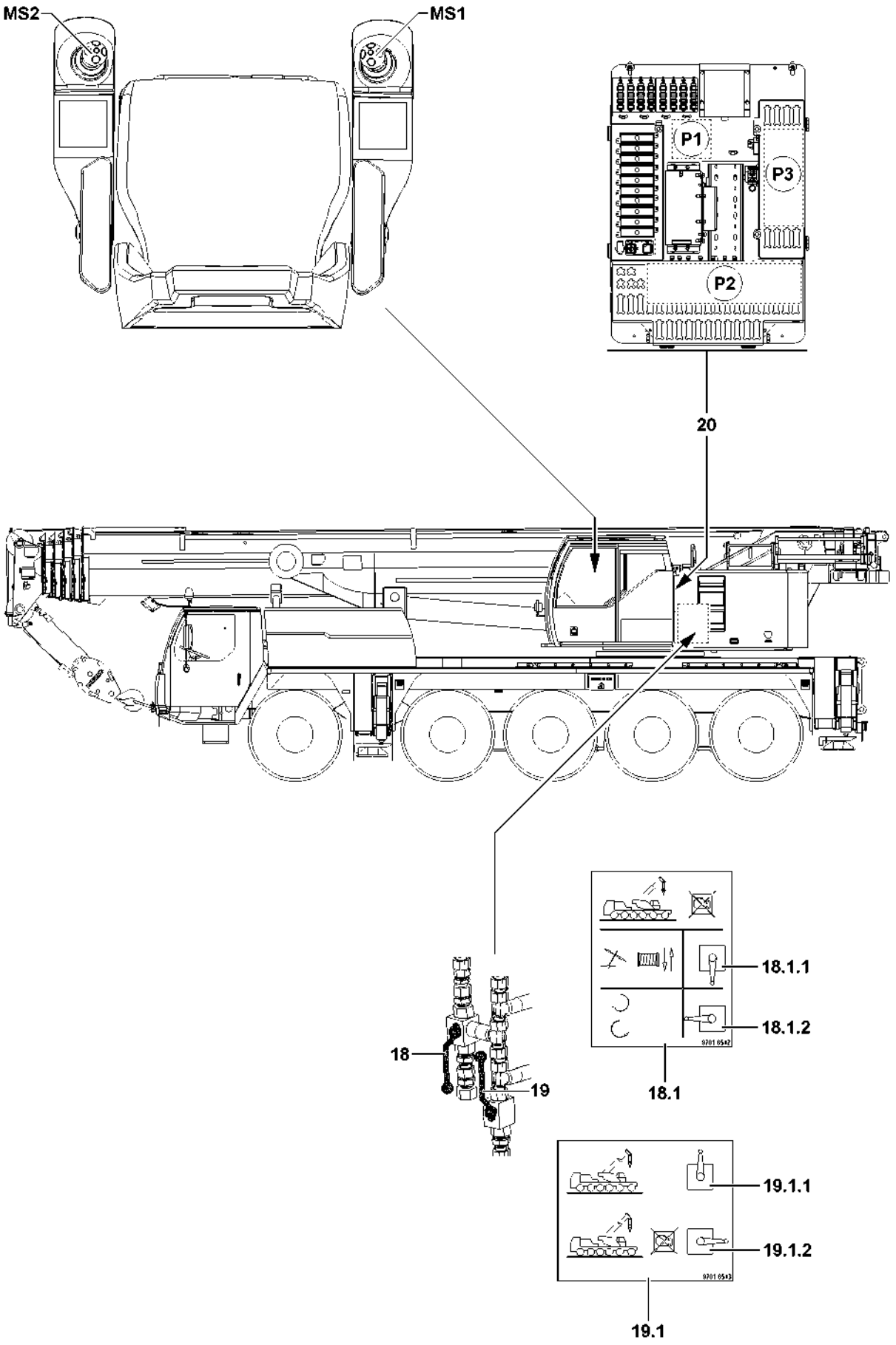

Fig.114185

3.2 Preselecting luffing the boom

Make sure that the following prerequisite is met:
– Ball valve **19** is set to position „up“: Position **19.1.1** (NORMAL OPERATION)

3.2.1 Selecting master switch MS1 for the crane movement

Switch cabinet crane superstructure **20**:

▶ Position **P2**: Unplug plug -XNOT6.B from plug location -XNOT6.
▶ Position **P3**: Unplug plug -X412.B from plug location -X412.
▶ Position **P2**: Insert plug -X412.B in plug location -XNOT6.
▶ Set the ball valve **18** „down“: Position **18.1.1** (HOIST GEAR / LUFFING).

Result:

– Crane movement „luffing the boom“ is preselected.

Note
▶ Master switch **MS2** only has to be selected if it is found or known that master switch **MS1** is defective!
▶ For the emergency control only one master switch is required: Select either master switch **MS1 or** master switch **MS2**!

3.2.2 Selecting master switch MS2 for the crane movement

Switch cabinet crane superstructure **20**:

▶ Position **P2**: Unplug plug -XNOT6.B from plug location -XNOT6.
▶ Position **P3**: Unplug plug -X416.B from plug location -X416.
▶ Position **P2**: Insert plug -X416.B in plug location -XNOT6.
▶ Set the ball valve **18** „down“: Position **18.1.1** (HOIST GEAR / LUFFING).

Result:

– Crane movement „luffing the boom“ is preselected.

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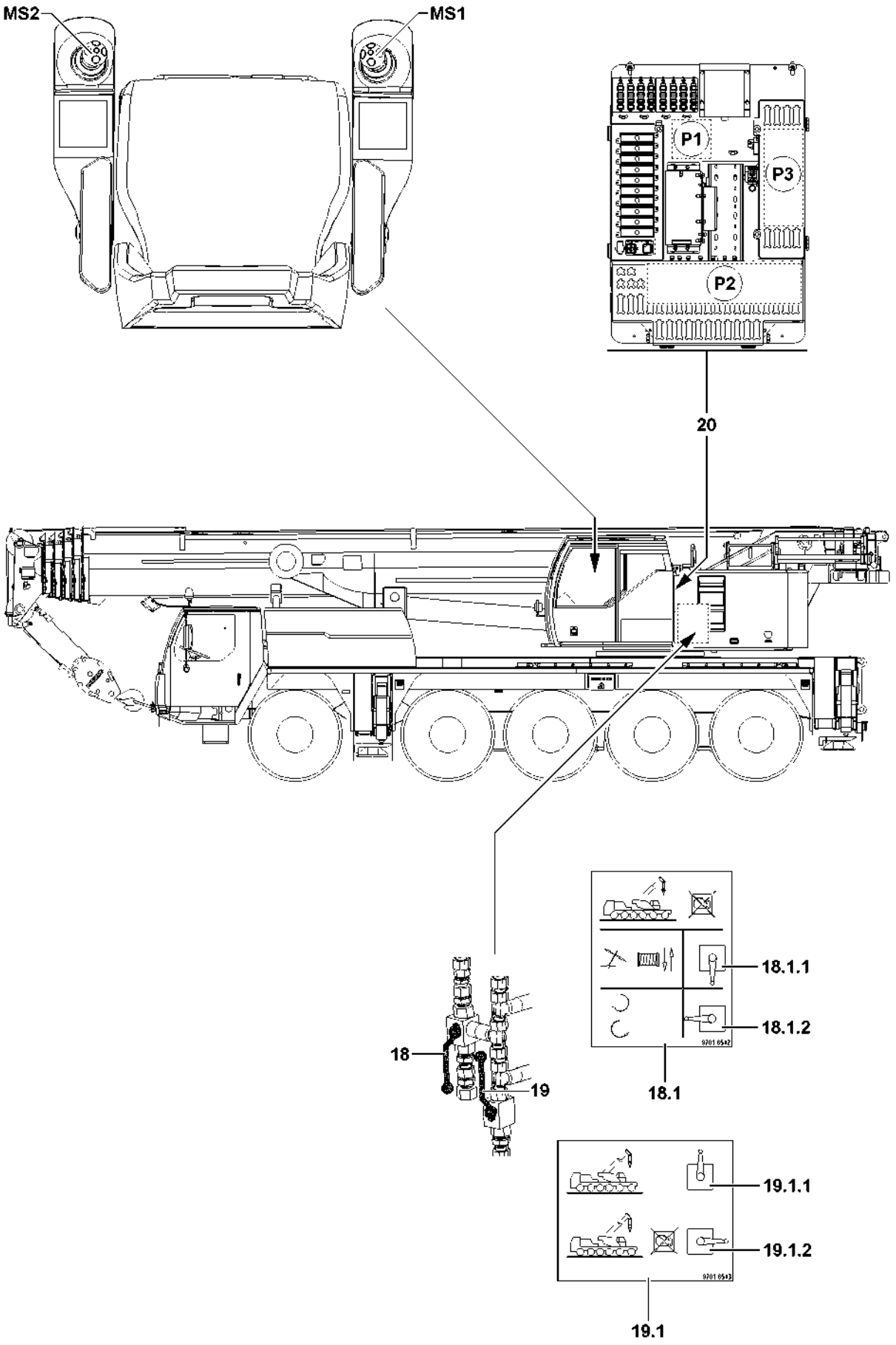

Fig.114185

3.3 Preselecting turning the crane superstructure

Make sure that the following prerequisite is met:
– Ball valve **19** is set to position „up“: Position **19.1.1** (NORMAL OPERATION)

3.3.1 Selecting master switch MS1 for the crane movement

Switch cabinet crane superstructure **20**:

▶ Position **P2**: Unplug plug -XNOT2.B from plug location -XNOT2.
▶ Position **P3**: Unplug plug -X412.B from plug location -X412.
▶ Position **P2**: Insert plug -X412.B in plug location -XNOT2.
▶ Set the ball valve **18** „to the side“: Position **18.1.2** (SLEWING GEAR).

Result:

– Crane movement „turn the crane superstructure“ is preselected.

Note
▶ Master switch **MS2** only has to be selected if it is found after the following steps that master switch **MS1** is defective!
▶ For the emergency control only one master switch is required: Select either master switch **MS1 or** master switch **MS2**!

3.3.2 Selecting master switch MS2 for the crane movement

Switch cabinet crane superstructure **20**:

▶ Position **P2**: Unplug plug -XNOT2.B from plug location -XNOT2.
▶ Position **P3**: Unplug plug -X416.B from plug location -X416.
▶ Position **P2**: Insert plug -X416.B in plug location -XNOT2.
▶ Set the ball valve **18** „to the side“: Position **18.1.2** (SLEWING GEAR).

Result:

– Crane movement „turn the crane superstructure“ is preselected.

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Fig.195219

4 Carrying out crane movement

There are three ways to carry out the crane movements:

1. **Carry out crane movement via master switches**
   - if a master switch for emergency control is connected.
2. **Crane movement through manually actuated valves**
   - when the crane movement is carried out by manually actuated valves (without master switch).
3. **Crane movement via master switches in connection with manual valve actuation**
   - if it is suspected that maximum one valve does not react to the deflection of the master switch.

WARNING
Danger of tipping over!
In emergency control, the crane movements are no longer monitored by the LICCON overload protection.
▶ Crane movements, especially **luffing down the boom** may only be carried out according to the specifications in the load charts or the erection / take down charts.
▶ All crane movements must be carried out individually and with extreme caution.

WARNING
Sequence of crane movements!
The crane movement „lift / lower the hook“ is preferential to all other crane movements when carrying out the emergency control.
▶ Carry out other crane movements only when the persons in the personal lifting device can **not** be brought to safety directly via the crane movement „lift / lower the hook“.

WARNING
Danger of burns due to hot crane components!
Crane components can heat up and cause burns if skin is unprotected.
▶ Wear suitable protective clothing.
▶ Keep sufficient distance to hot crane components.

NOTICE
Displays in LICCON monitor!
During the emergency control, the displays in the LICCON monitor are not monitored and can be erroneous.
The display may change into stand-by operation without prior notice.
▶ During emergency control, do not rely on the displays in the LICCON monitor.

Make sure that the following prerequisites are met:
– The emergency control is prepared, see section „Preparing emergency control“
– The supply is added, see „Adding supply“

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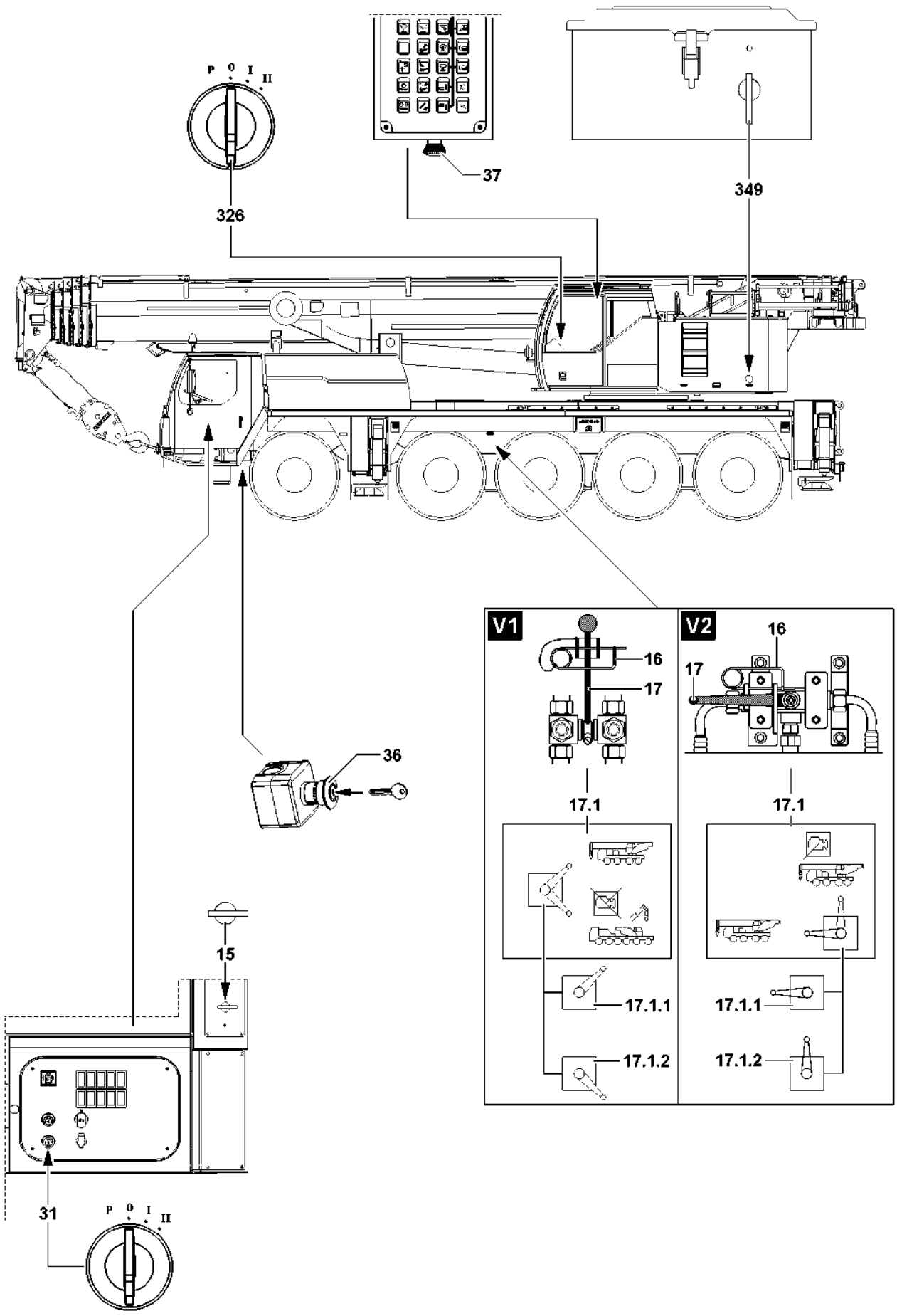

Fig.119852

4.1 Adding the supply

Make sure that the following prerequisites are met:
- Ignition switch crane chassis **31** is in position **0**
- Battery master switch crane chassis **15** is turned off.
- Ignition switch crane superstructure **326** is in position **0**
- Battery master switch crane superstructure **349** is turned off.
- All hydraulic connections have been made.

Note
▶ Depending on how the supply it to be made, either section „Adding supply with the aid of the crane chassis“ **or** „Adding the supply with an external auxiliary aggregate“ must be followed!

4.1.1 Adding the supply with the aid of the crane chassis

Note
▶ Only relevant if the supply is **not** made via the auxiliary aggregate **14**!

Note
If the sequence of the steps is not adhered to, then it is possible that the engine cannot be started!
▶ Make sure to adhere to the sequence of the steps!

▶ Turn the battery master switch crane chassis **15** on.
▶ Operate the emergency stop switch*** 36** or the emergency stop switch **37**.
▶ Turn the ignition switch crane chassis **31** to position **I**.
▶ Wait for five seconds.
▶ Release the emergency stop switch*** 36** or the emergency stop switch **37**.
▶ Wait for ten seconds.
▶ Turn the ignition switch crane chassis **31** to position **II**.

Result:

– The engine starts.

Note
▶ The pump output for the emergency control can be influenced via the engine rpm!
▶ The maximum pump output is reached from an engine rpm of more than 1300 rpm!
▶ The engine rpm is not shown during emergency control and must be estimated!
▶ The idling speed of the engine is at approx. 600 rpm!
▶ The maximum engine rpm is at approx. 2200 rpm!

▶ Remove the spring retainer **16**.
▶ Set the ball valve **17** to position **17.1.2** (EMERGENCY CONTROL).

Result:

– The supply with the aid of the crane chassis is added.

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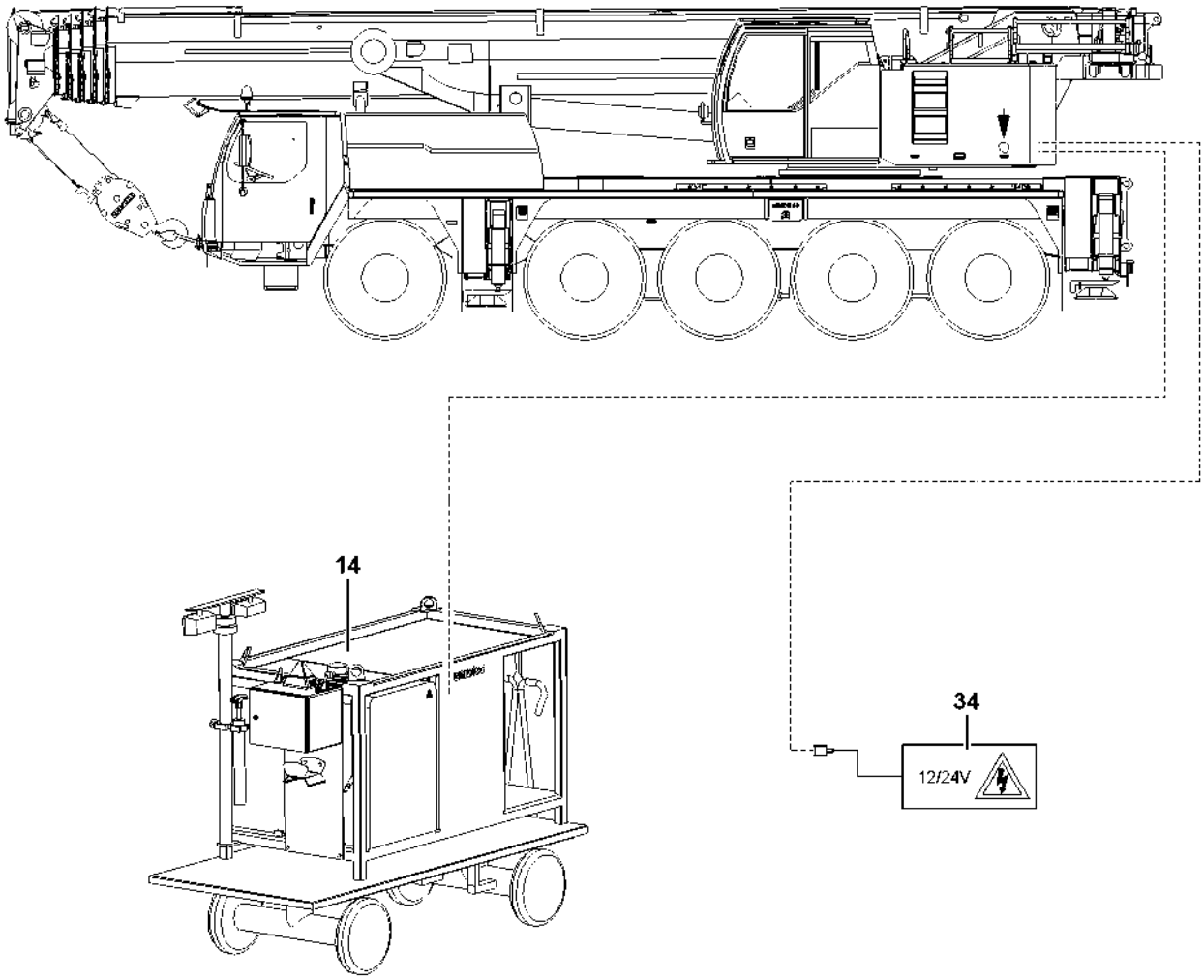

Fig.112356

4.1.2 Adding the supply with an external auxiliary aggregate

Note

▶ Only relevant if the supply is **not** made via the crane chassis!

NOTICE

Operation auxiliary aggregate!

▶ Observe the separate operating instructions Auxiliary aggregate **14**!

Make sure that the following prerequisite is met:

– The external electric power supply source **34** is ready.

▶ Start the auxiliary aggregate **14** and open the hydraulic supply line.

Result:

– The supply with an external auxiliary aggregate **14** is added.

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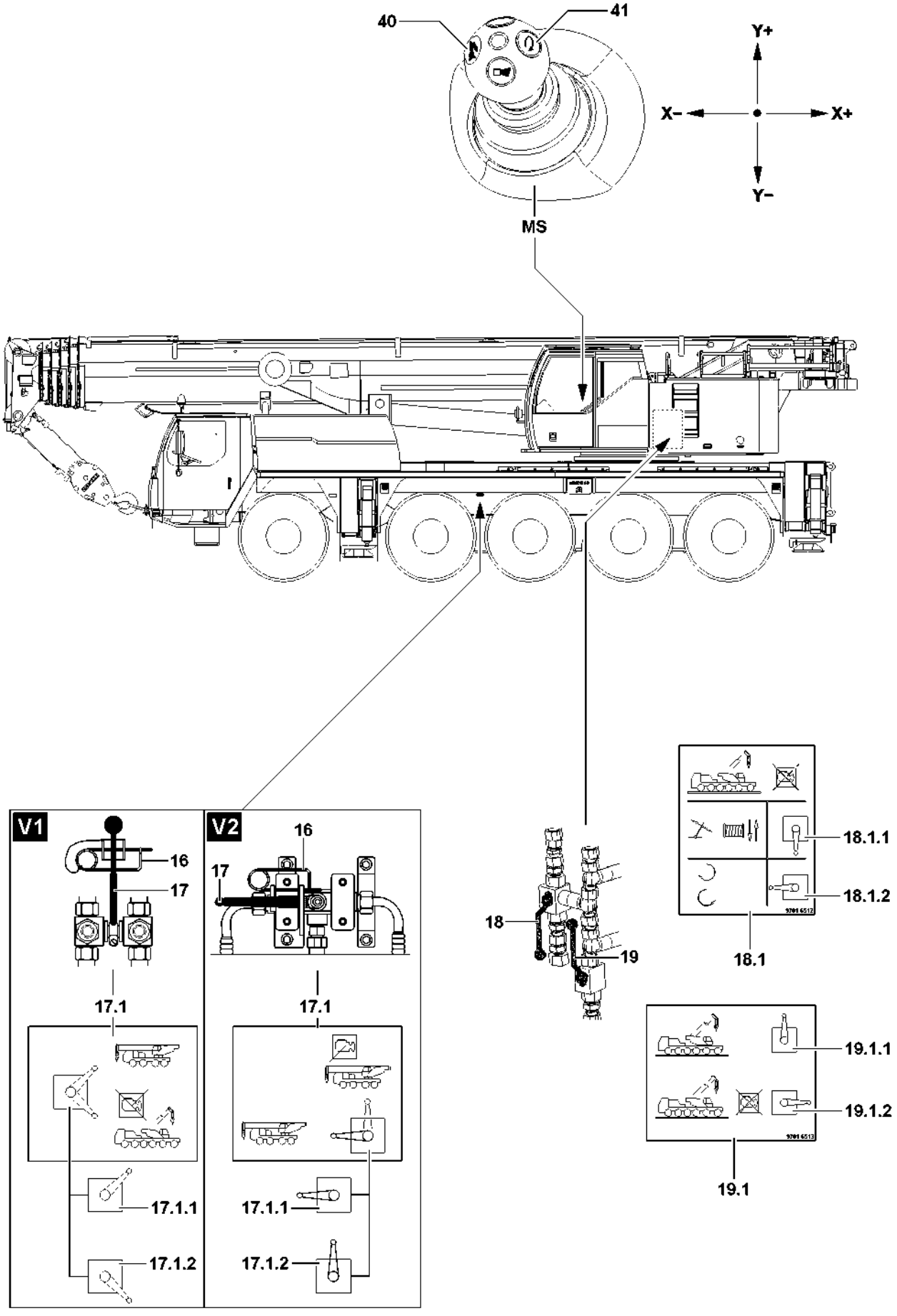

Fig.119853

4.2 Carry out crane movement via master switches

WARNING
Deviating assignment of master switches!
During emergency control the assignment of the master switches changes.
Erroneous operation of the crane can be the result.
- ▶ Note: During emergency control, only one crane movement is possible for every master switch.
- ▶ Note: The direction of the deflection for the crane movement is preset and cannot be changed.

Make sure that the following prerequisite is met:
- The desired crane movement is preselected, see section „Control of crane movements via master switches: Preselect crane movements for master switch“

To avoid unintended crane movements by deflecting a master switch **MS**, in addition to the deflection movement at least one of the following buttons on the respective master switch must be pressed:
- **40** Button
- **41** Button

Note
Rhythmic vibration of the selected master switch
Depending on the selected crane movement, the selected master switch vibrates rhythmically:
- ▶ If the crane movement „lift / lower the hook“ is selected, then there is a rhythmic double vibration.
- ▶ If the crane movement „luff the boom“ is selected, then there is a rhythmic triple vibration.
- ▶ If the crane movement „turn crane superstructure“ is selected, then there is a rhythmic quadruple vibration.

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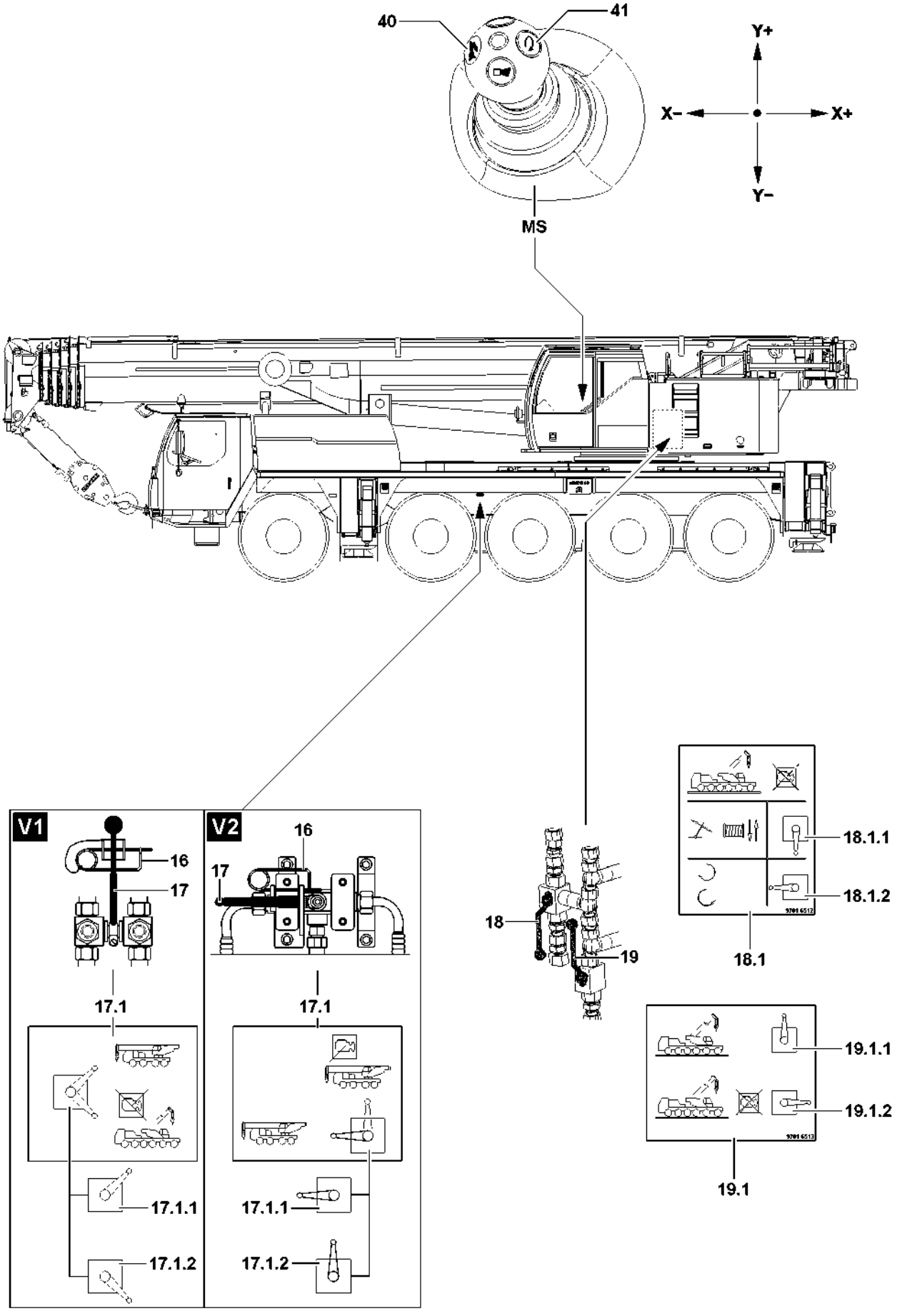

Fig.119853

4.2.1 Crane movement Lifting / lowering the hook (HOIST WINCH)

Icon	MS - deflection direction	Crane movement	Position of ball valves	
			18	19
		Lower the hook (spool hoist winch out)	**18.1.1**	**19.1.2**
		Lift the hook (spool hoist winch up)	**18.1.1**	**19.1.2**

▶ Set the ball valve **18** „down“: Position **18.1.1** (HOIST GEAR / LUFFING)
▶ Set the ball valve **19** „to the side“: Position **19.1.2** (EMERGENCY CONTROL)
▶ Press the button **40** or button **41** on the selected master switch **MS** and hold.
▶ Carefully deflect the master switch **MS** into the respective deflection direction.

Result:

– Crane movement is carried out.

Problem remedy
Crane movement is not carried out?
Selected master switch **MS** is not functioning.
▶ Set the ball valve **19** „up“: Position **19.1.1** (NORMAL OPERATION).
▶ Set the ball valve **17** into position **17.1.1** (NORMAL OPERATION).
▶ Secure the ball valve **17** with spring retainer **16**.
▶ Turn off the engine.
▶ Connect another master switch **MS**, see section „Control of crane movements via master switches: Preselect crane movements for master switch“.

Problem remedy
Crane movement is not carried out even with other master switches **MS**?
Valve(s) are without control signal!
▶ Actuate the valves, see section „Crane movement via manually actuated valves“.
or
▶ Actuate the individual valves manually, see section „Control via master switches in connection with manual valve actuation“.

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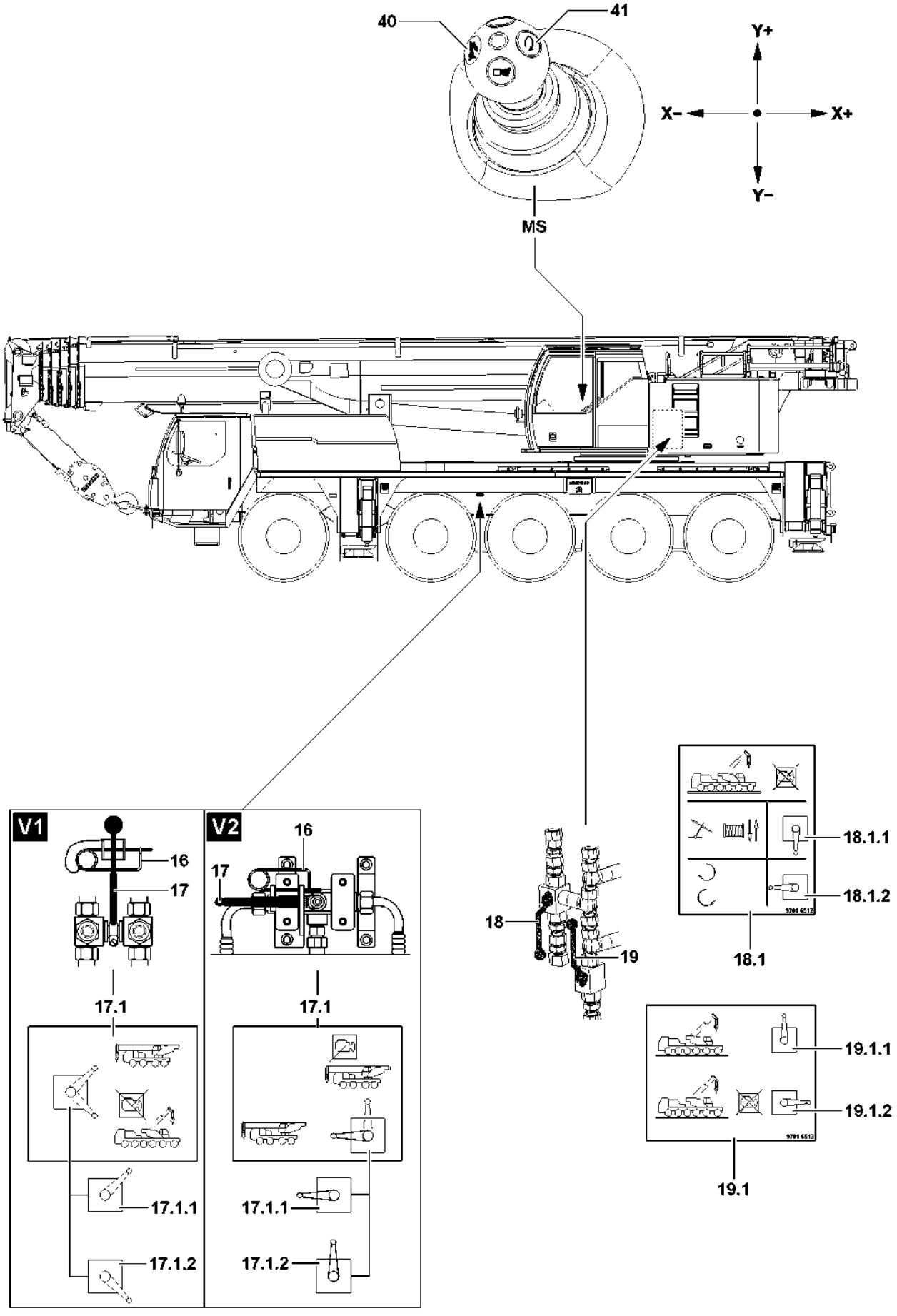
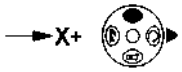


Fig.119853

4.2.2 Crane movement Turning the crane superstructure (SLEWING GEAR)

Icon	MS - deflection direction	Crane movement	Position of ball valves	
			18	19
		Turn the crane superstructure to the left (in counterclockwise direction)	**18.1.2**	**19.1.2**
		Turn crane superstructure to the right (clockwise)	**18.1.2**	**19.1.2**

▶ Set the ball valve **18** „to the side“: Position **18.1.2** (SLEWING GEAR)
▶ Set the ball valve **19** „to the side“: Position **19.1.2** (EMERGENCY CONTROL)
▶ Press the button **40** or button **41** on the selected master switch **MS** and hold.
▶ Carefully deflect the master switch **MS** into the respective deflection direction.

Result:

– Crane movement is carried out.

Problem remedy
Crane movement is not carried out?
Selected master switch **MS** is not functioning.
▶ Set the ball valve **19** „up“: Position **19.1.1** (NORMAL OPERATION).
▶ Set the ball valve **17** into position **17.1.1** (NORMAL OPERATION).
▶ Secure the ball valve **17** with spring retainer **16**.
▶ Turn off the engine.
▶ Connect another master switch **MS**, see section „Control of crane movements via master switches: Preselect crane movements for master switch“.

Problem remedy
Crane movement is not carried out even with other master switches **MS**?
Valve(s) are without control signal!
▶ Actuate the valves, see section „Crane movement via manually actuated valves“.
or
▶ Actuate the individual valves manually, see section „Control via master switches in connection with manual valve actuation“.

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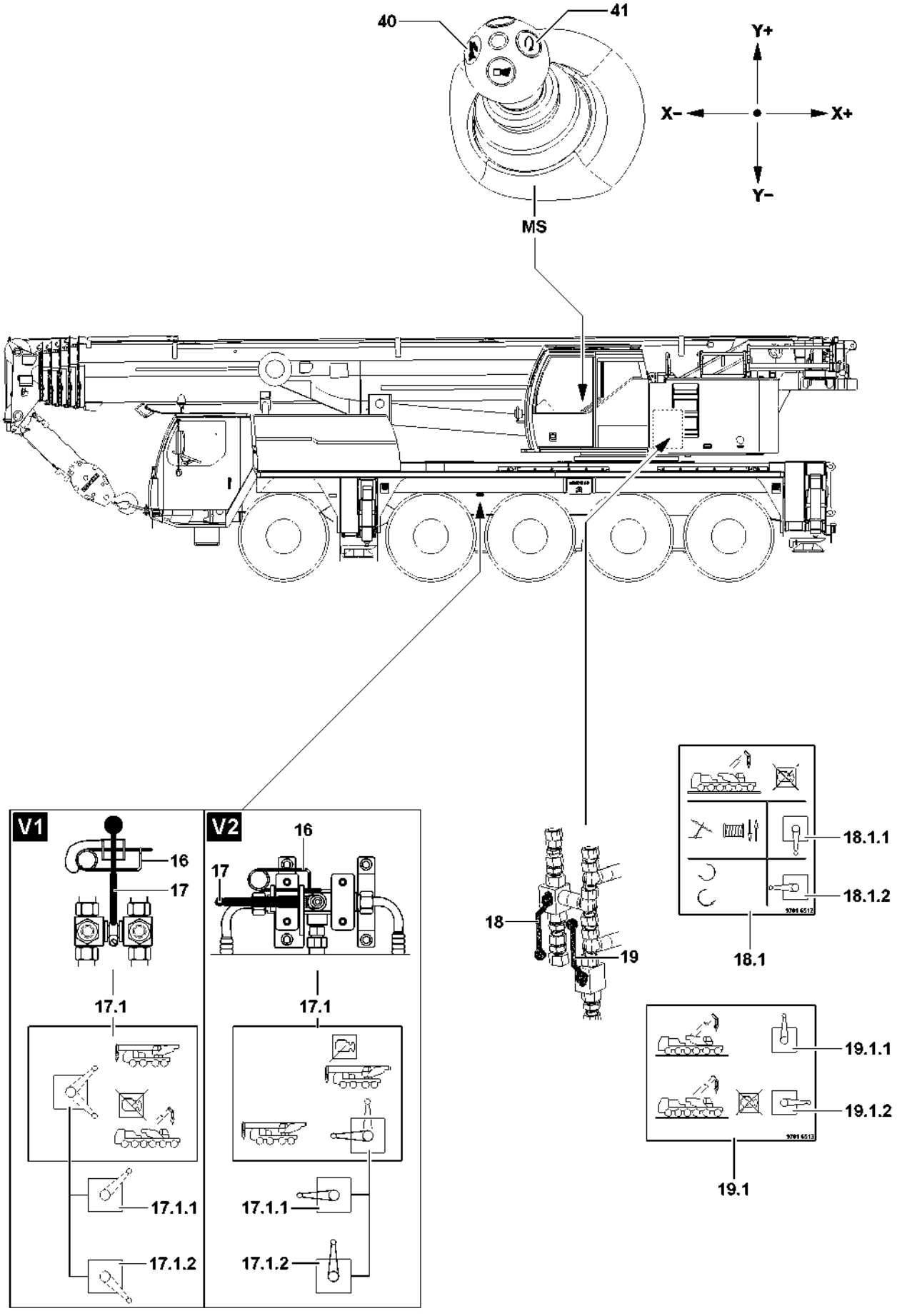
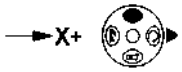


Fig.119853

4.2.3 Crane movement Luffing the boom (LUFFING)

Icon	MS - deflection direction	Crane movement	Position of ball valves	
			18	19
		Luff the boom up	**18.1.1**	**19.1.2**
		Luffing the boom down	**18.1.1**	**19.1.2**

▶ Set the ball valve **18** „down“: Position **18.1.1** (HOIST GEAR / LUFFING)
▶ Set the ball valve **19** „to the side“: Position **19.1.2** (EMERGENCY CONTROL)
▶ Press the button **40** or button **41** on the selected master switch **MS** and hold.
▶ Carefully deflect the master switch **MS** into the respective deflection direction.

Result:

– Crane movement is carried out.

Problem remedy
Crane movement is not carried out?
Selected master switch **MS** is not functioning.
▶ Set the ball valve **19** „up“: Position **19.1.1** (NORMAL OPERATION).
▶ Set the ball valve **17** into position **17.1.1** (NORMAL OPERATION).
▶ Secure the ball valve **17** with spring retainer **16**.
▶ Turn off the engine.
▶ Connect another master switch **MS**, see section „Control of crane movements via master switches: Preselect crane movements for master switch“.

Problem remedy
Crane movement is not carried out even with other master switches **MS**?
Valve(s) are without control signal!
▶ Actuate the valves, see section „Crane movement via manually actuated valves“.
or
▶ Actuate the individual valves manually, see section „Control via master switches in connection with manual valve actuation“.

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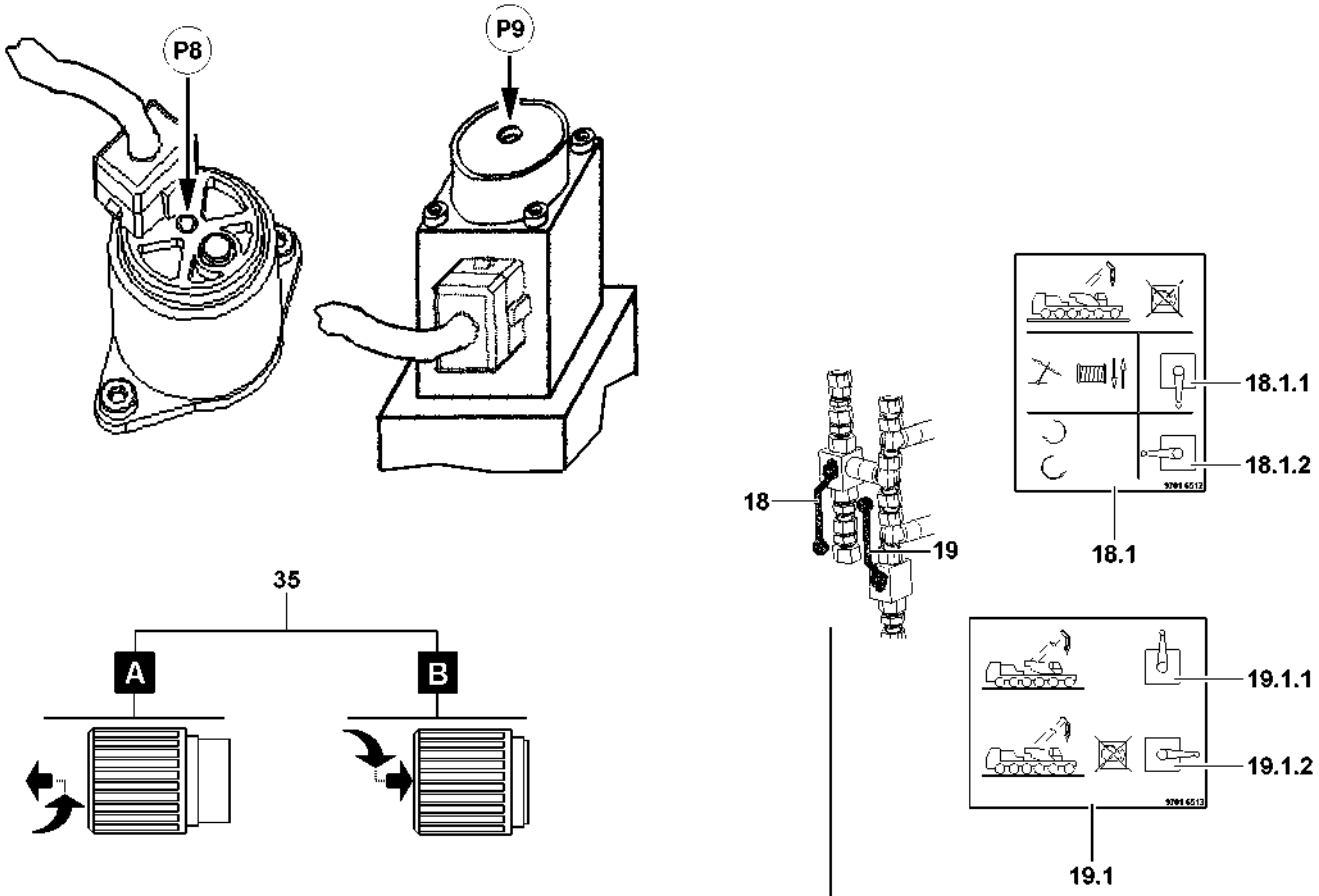

		1	2								
		-Y500	-Y511	-Y512	-Y516	-Y517	-Y518	-Y536	-Y538	-Y539	-Y540	-Y513
A		X		X								X
B		X	X									X
C		X			X		X					
D		X				X	X					
E		X						X				
F		X							X	X	X	

Fig.114187

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4.3 Crane movement through manually actuated valves

Crane movement is carried out via combined manual actuation of the required valves (without master switch)

WARNING
Danger of accident!
All associated operators must be constantly in visual and acoustic contact, for example visually or through radio.
If the visual or acoustic contact is interrupted, then there is a danger of accident due to uncoordinated operation.
- ▶ Make sure that the visual and acoustic contact of all associated operators is not interrupted.
- ▶ If the visual **or** acoustic contact to one associated operator is interrupted, all operations, which could lead to a crane movement are prohibited.

WARNING
Immediate crane movement!
If all valves are actuated, then the crane movement is carried out immediately when the hydraulic supply is added.
Personnel / operators can be caught by the crane movement and severely injured or killed.
- ▶ For manual actuation of the valves and ball valves keep sufficient distance to all moveable crane components.
- ▶ Make sure that every crane movement can be interrupted by all associated operators.
- ▶ The crane movement may not expose associated personnel to a danger of accident.

Note
Actuation points on valves
Depending on the design of the valve, either point **P8** or point **P9** must be actuated for manual valve actuation.
- ▶ Actuate the valve with a suitable aid (such as a 3 mm socket wrench): Push the valve in on point **P8** or point **P9** in direction of the arrow to the stop! **NOTICE**: The object may not be pointed!

When valve Y-500 is designed for operation with an emergency control cap **35** and the emergency control cap **35** is available (only for certain crane types):
- ▶ For valve **-Y500** unscrew the cap and install the emergency control cap **35**. The emergency control cap **35** has two positions: „Valve not actuated-position **A**“ **or** „Valve actuated-position **B**“! Otherwise valve **-Y500** is actuated as the other valves.

4.3.1 Crane movement A: Lower the hook (spool hoist winch out)

- ▶ Set the ball valve **18** „down“: Position **18.1.1** (HOIST GEAR / LUFFING).
- ▶ Actuate valve **-Y500** and valve **-Y512** and valve **-Y513** manually.
- ▶ Set the ball valve **19** „to the side“: Position **19.1.2** (EMERGENCY CONTROL).

Result:

– Crane movement „lower the hook“ (spool hoist winch out) is carried out: Carry out the emergency control
or
– Crane movement is **not** carried out: Check if all steps have been carried out correctly.
If all steps have been carried out correctly: Emergency control is not possible.

4.3.2 Crane movement B: Lift the hook (spool hoist winch up)

- ▶ Set the ball valve **18** „down“: Position **18.1.1** (HOIST GEAR / LUFFING).
- ▶ Actuate valve **-Y500** and valve **-Y511** and valve **-Y513** manually.
- ▶ Set the ball valve **19** „to the side“: Position **19.1.2** (EMERGENCY CONTROL).

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Result:

– Crane movement „lift the hook“ (spool hoist winch up) is carried out: Carry out the emergency control
or
– Crane movement is **not** carried out: Check if all steps have been carried out correctly.
If all steps have been carried out correctly: Emergency control is not possible.

4.3.3 Crane movement C: Turn the crane superstructure to the left (in counterclockwise direction)

▶ Set the ball valve **18** „to the side“: Position **18.1.2** (SLEWING GEAR).
▶ Actuate valve **-Y500** and valve **-Y516** and valve **-Y518** manually.
▶ Set the ball valve **19** „to the side“: Position **19.1.2** (EMERGENCY CONTROL).

Result:

– Crane movement „turn crane superstructure to the left“ (counterclockwise) is carried out: Carry out the emergency control
or
– Crane movement is **not** carried out: Check if all steps have been carried out correctly.
If all steps have been carried out correctly: Emergency control is not possible.

4.3.4 Crane movement D: Turn crane superstructure to the right (clockwise)

▶ Set the ball valve **18** „to the side“: Position **18.1.2** (SLEWING GEAR).
▶ Actuate valve **-Y500** and valve **-Y517** and valve **-Y518** manually.
▶ Set the ball valve **19** „to the side“: Position **19.1.2** (EMERGENCY CONTROL).

Result:

– Crane movement „turn crane superstructure to the right“ (clockwise) is carried out: Carry out the emergency control
or
– Crane movement is **not** carried out: Check if all steps have been carried out correctly.
If all steps have been carried out correctly: Emergency control is not possible.

4.3.5 Crane movement E: Luff the boom up

▶ Set the ball valve **18** „down“: Position **18.1.1** (HOIST GEAR / LUFFING).
▶ Actuate valve **-Y500** and valve **-Y536** manually.
▶ Set the ball valve **19** „to the side“: Position **19.1.2** (EMERGENCY CONTROL).

Result:

– Crane movement „luff the boom up“ is carried out: Carry out the emergency control
or
– Crane movement is **not** carried out: Check if all steps have been carried out correctly.
If all steps have been carried out correctly: Emergency control is not possible.

4.3.6 Crane movement F: Luffing the boom down

▶ Set the ball valve **18** „down“: Position **18.1.1** (HOIST GEAR / LUFFING).
▶ Actuate valve **-Y500** and valve **-Y538** and valve **-Y539** and valve **-Y540** manually.
▶ Set the ball valve **19** „to the side“: Position **19.1.2** (EMERGENCY CONTROL).

Result:

– Crane movement „luff the boom down“ is carried out: Carry out the emergency control
or
– Crane movement is **not** carried out: Check if all steps have been carried out correctly.
If all steps have been carried out correctly: Emergency control is not possible.

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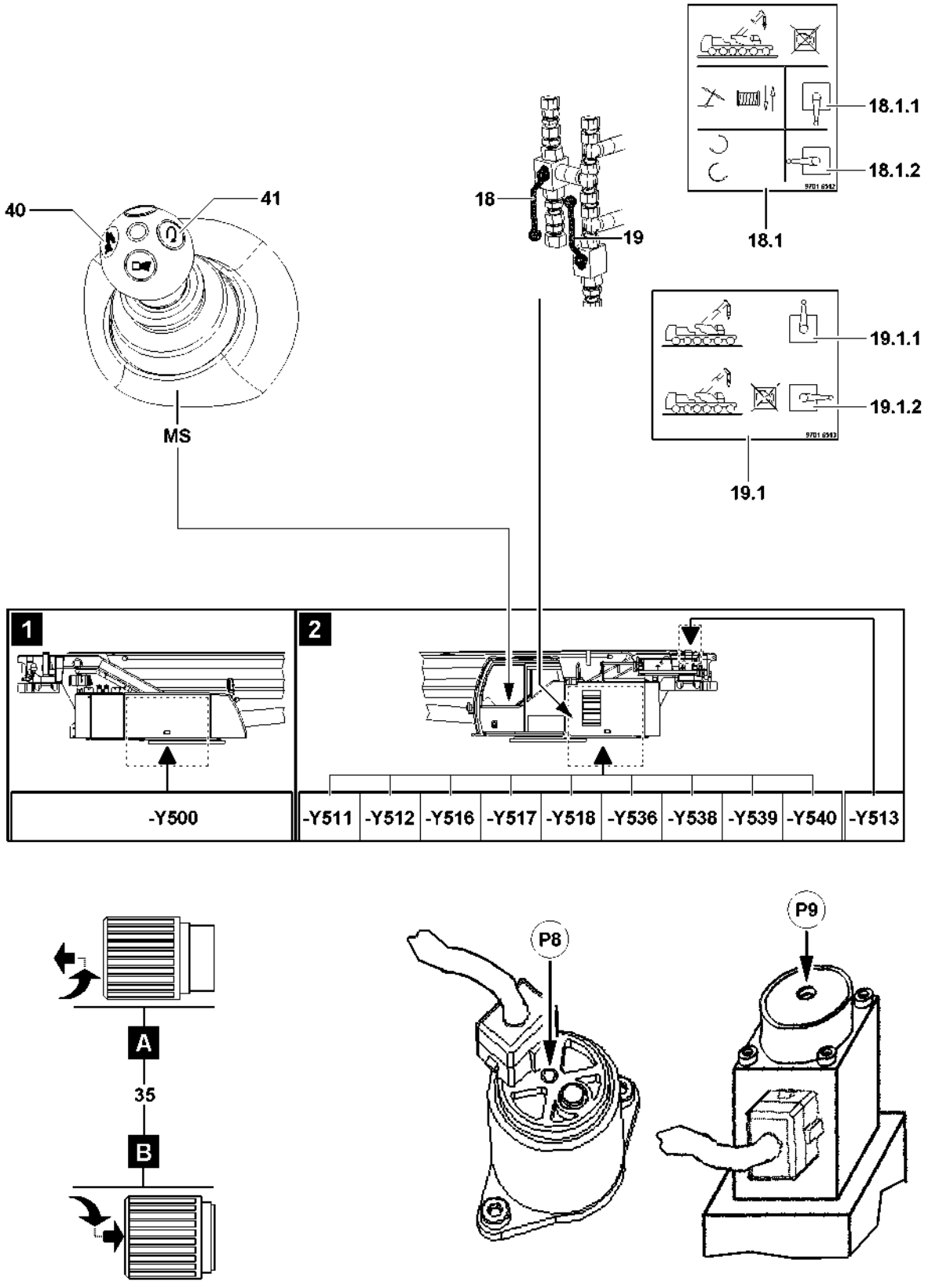

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Fig.114188

4.4 Control via master switches in connection with manual valve actuation

Note

- ▶ Use only if it is suspected that maximum one valve does not react to the deflection of the master switch **MS**!
- ▶ The valves are hereby actuated individually, one after the other!

Two operators are required to carry it out:

- The first operator (operator1) actuates the individual valves manually.
- The second operator (operator2) is in the crane operator's cab and deflects the selected master switch **MS** for the emergency control accordingly.

WARNING

Danger of accident!

For individual actuation of the valves at least two operators are required! All operators must be constantly in visual and acoustic contact!

If the visual and acoustic contact is interrupted, then there is a danger of accident due to uncoordinated operation!

- ▶ Make sure that the visual and acoustic contact of all associated operators is not interrupted!
- ▶ If the visual **or** acoustic contact to one associated operator is interrupted, all operations, which could lead to a crane movement are prohibited!

WARNING

Immediate crane movement!

By actuation of a valve, the crane movement may possibly be carried out immediately!

If the function of the valve returns immediately **and** the master switch **MS** is deflected, the crane movement is carried out!

- ▶ For manual actuation of a valve keep sufficient distance to all moveable crane components!
- ▶ Make sure that every crane movement can be interrupted by all associated operators!
- ▶ There may be no danger of accident for associated personnel from the crane movement which is carried out by actuation of a valve!

Note

Actuation points on valves

Depending on the design of the valve, either point **P8** or point **P9** must be actuated for manual valve actuation.

- ▶ Actuate the valve with a suitable aid (such as a 3 mm socket wrench): Push the valve in on point **P8** or point **P9** in direction of the arrow to the stop! **NOTICE**: The object may not be pointed!

When valve Y-500 is designed for operation with an emergency control cap **35** and the emergency control cap **35** is available (only for certain crane types):

- ▶ For valve **-Y500** unscrew the cap and install the emergency control cap **35**. The emergency control cap **35** has two positions: „Valve not actuated-position **A**“ **or** „Valve actuated-position **B**“! Otherwise valve **-Y500** is actuated as the other valves.

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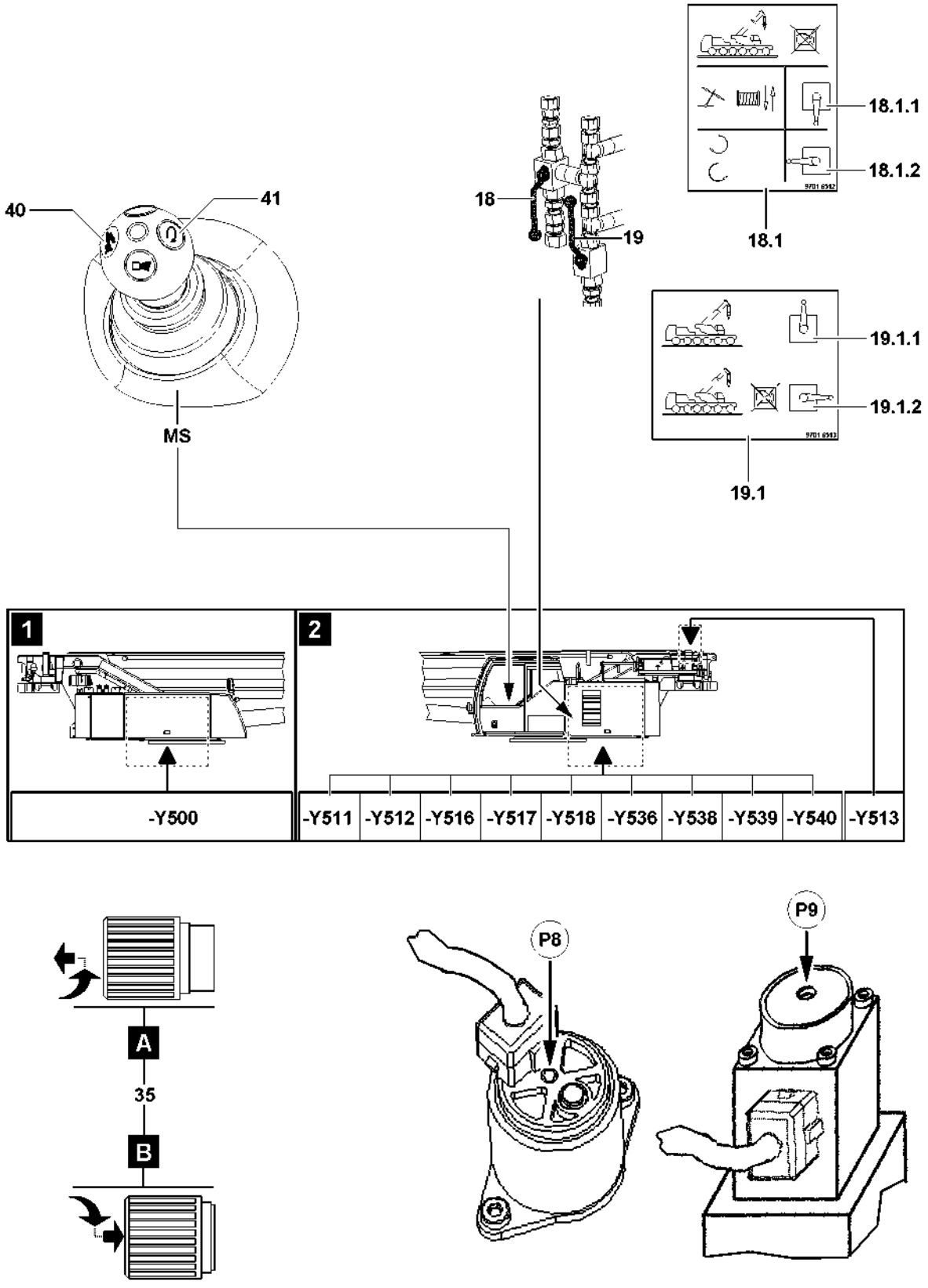

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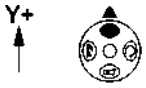
Fig.114188

4.4.1 Crane movement Lower the hook (spool hoist winch out)

Icon	MS - deflection direction	Crane movement	Required valves
		Lower the hook (spool hoist winch out)	**-Y500 -Y512 -Y513**

Make sure that the following prerequisites are met:
- Ball valve **18** is set to position „down“: Position **18.1.1** (HOIST GEAR / LUFFING)
- Ball valve **19** is set to position „to the side“: Position **19.1.2** (EMERGENCY CONTROL)

▶ Operator1 localizes the valve **-Y500**.
▶ Operator2 deflects the master switch **MS** with actuated button **40** or button **41** in direction Y+ (to the front).
▶ Operator1 actuates valve **-Y500** manually.

Result:

- Crane movement is carried out:
  Carry out the emergency control
  or
- Crane movement is **not** carried out:
  Operator2: Bring the master switch **MS** to zero position.
  Operator1: End manual operation of valve **-Y500** and continue with the next required valve (-Y512).

▶ Operator1 localizes valve **-Y512**.
▶ Operator2 deflects the master switch **MS** with actuated button **40** or button **41** in direction Y+ (to the front).
▶ Operator1 actuates valve **-Y512** manually.

Result:

- Crane movement is carried out:
  Carry out the emergency control
  or
- Crane movement is **not** carried out:
  Operator2: Bring the master switch **MS** to zero position.
  Operator1: End manual operation of valve **-Y512** and continue with the next required valve (-Y513).

▶ Operator1 localizes valve **-Y513**.
▶ Operator2 deflects the master switch **MS** with actuated button **40** or button **41** in direction Y+ (to the front).
▶ Operator1 actuates valve **-Y513** manually.

Result:

- Crane movement is carried out:
  Carry out the emergency control
  or
- Crane movement is **not** carried out:
  If all valves were actuated individually without success, see section „Crane movement via manually actuated valves“ for additional steps.

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4.4.2 Crane movement Lift the hook (spool hoist winch up)

Icon	MS - deflection direction	Crane movement	Required valves
		Lift the hook (spool hoist winch up)	**-Y500 -Y511 -Y513**

Make sure that the following prerequisites are met:
- Ball valve **18** is set to position „down“: Position **18.1.1** (HOIST GEAR / LUFFING)
- Ball valve **19** is set to position „to the side“: Position **19.1.2** (EMERGENCY CONTROL)

▶ Operator1 localizes the valve **-Y500**.
▶ Operator2 deflects the master switch **MS** with actuated button **40** or button **41** in direction Y- (to the rear).
▶ Operator1 actuates valve **-Y500** manually.

Result:

- Crane movement is carried out:
  Carry out the emergency control
  or
- Crane movement is **not** carried out:
  Operator2: Bring the master switch **MS** to zero position.
  Operator1: End manual operation of valve **-Y500** and continue with the next required valve (-Y511).

▶ Operator1 localizes valve **-Y511**.
▶ Operator2 deflects the master switch **MS** with actuated button **40** or button **41** in direction Y- (to the rear).
▶ Operator1 actuates valve **-Y511** manually.

Result:

- Crane movement is carried out:
  Carry out the emergency control
  or
- Crane movement is **not** carried out:
  Operator2: Bring the master switch **MS** to zero position.
  Operator1: End manual operation of valve **-Y511** and continue with the next required valve (-Y513).

▶ Operator1 localizes valve **-Y513**.
▶ Operator2 deflects the master switch **MS** with actuated button **40** or button **41** in direction Y- (to the rear).
▶ Operator1 actuates valve **-Y513** manually.

Result:

- Crane movement is carried out:
  Carry out the emergency control
  or
- Crane movement is **not** carried out:
  If all valves were actuated individually without success, see section „Crane movement via manually actuated valves“ for additional steps.

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4.4.3 Crane movement Turn the crane superstructure to the left (in counterclockwise direction)

Icon	MS - deflection direction	Crane movement	Required valves
		Turn the crane superstructure to the left (in counterclockwise direction)	**-Y500 -Y516 -Y518**

Make sure that the following prerequisites are met:
- Ball valve **18** is set to position „to the side“: Position **18.1.2** (SLEWING GEAR)
- Ball valve **19** is set to position „to the side“: Position **19.1.2** (EMERGENCY CONTROL)

▶ Operator1 localizes the valve **-Y500**.
▶ Operator2 deflects the master switch **MS** with actuated button **40** or button **41** in direction X- (to the left).
▶ Operator1 actuates valve **-Y500** manually.

Result:

- Crane movement is carried out:
  Carry out the emergency control
  or
- Crane movement is **not** carried out:
  Operator2: Bring the master switch **MS** to zero position.
  Operator1: End manual operation of valve **-Y500** and continue with the next required valve (-Y516).

▶ Operator1 localizes valve **-Y516**.
▶ Operator2 deflects the master switch **MS** with actuated button **40** or button **41** in direction X- (to the left).
▶ Operator1 actuates valve **-Y516** manually.

Result:

- Crane movement is carried out:
  Carry out the emergency control
  or
- Crane movement is **not** carried out:
  Operator2: Bring the master switch **MS** to zero position.
  Operator1: End manual operation of valve **-Y516** and continue with the next required valve (-Y518).

▶ Operator1 localizes valve **-Y518**.
▶ Operator2 deflects the master switch **MS** with actuated button **40** or button **41** in direction X- (to the left).
▶ Operator1 actuates valve **-Y518** manually.

Result:

- Crane movement is carried out:
  Carry out the emergency control
  or
- Crane movement is **not** carried out:
  If all valves were actuated individually without success, see section „Crane movement via manually actuated valves“ for additional steps.

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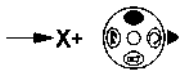
4.4.4 Crane movement Turn crane superstructure to the right.

Icon	MS - deflection direction	Crane movement	Required valves
		Turn crane superstructure to the right (clockwise)	**-Y500 -Y517 -Y518**

Make sure that the following prerequisites are met:
- Ball valve **18** is set to position „to the side“: Position **18.1.2** (SLEWING GEAR)
- Ball valve **19** is set to position „to the side“: Position **19.1.2** (EMERGENCY CONTROL)

▶ Operator1 localizes the valve **-Y500**.
▶ Operator2 deflects the master switch **MS** with actuated button **40** or button **41** in direction X+ (to the right).
▶ Operator1 actuates valve **-Y500** manually.

Result:

- Crane movement is carried out:
  Carry out the emergency control
  or
- Crane movement is **not** carried out:
  Operator2: Bring the master switch **MS** to zero position.
  Operator1: End manual operation of valve **-Y500** and continue with the next required valve (-Y517).

▶ Operator1 localizes valve **-Y517**.
▶ Operator2 deflects the master switch **MS** with actuated button **40** or button **41** in direction X+ (to the right).
▶ Operator1 actuates valve **-Y517** manually.

Result:

- Crane movement is carried out:
  Carry out the emergency control
  or
- Crane movement is **not** carried out:
  Operator2: Bring the master switch **MS** to zero position.
  Operator1: End manual operation of valve **-Y517** and continue with the next required valve (-Y518).

▶ Operator1 localizes valve **-Y518**.
▶ Operator2 deflects the master switch **MS** with actuated button **40** or button **41** in direction X+ (to the right).
▶ Operator1 actuates valve **-Y518** manually.

Result:

- Crane movement is carried out:
  Carry out the emergency control
  or
- Crane movement is **not** carried out:
  If all valves were actuated individually without success, see section „Crane movement via manually actuated valves“ for additional steps.

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4.4.5 Crane movement „luff up the boom“

Icon	MS - deflection direction	Crane movement	Required valves
		Luff the boom up	**-Y500 -Y536**

Make sure that the following prerequisites are met:
- Ball valve **18** is set to position „down“: Position **18.1.1** (HOIST GEAR / LUFFING)
- Ball valve **19** is set to position „to the side“: Position **19.1.2** (EMERGENCY CONTROL)

▶ Operator1 localizes the valve **-Y500**.
▶ Operator2 deflects the master switch **MS** with actuated button **40** or button **41** in direction X- (to the left).
▶ Operator1 actuates valve **-Y500** manually.

Result:

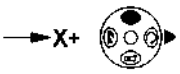
- Crane movement is carried out:
  Carry out the emergency control
  or
- Crane movement is **not** carried out:
  Operator2: Bring the master switch **MS** to zero position.
  Operator1: End manual operation of valve **-Y500** and continue with the next required valve (-Y536).

▶ Operator1 localizes valve **-Y536**.
▶ Operator2 deflects the master switch **MS** with actuated button **40** or button **41** in direction X- (to the left).
▶ Operator1 actuates valve **-Y536** manually.

Result:

- Crane movement is carried out:
  Carry out the emergency control
  or
- Crane movement is **not** carried out:
  If all valves were actuated individually without success, see section „Crane movement via manually actuated valves“ for additional steps.

4.4.6 Crane movement „luff down the boom“

Icon	MS - deflection direction	Crane movement	Required valves
		Luffing the boom down	**-Y500 -Y538 -Y539 -Y540**

Make sure that the following prerequisites are met:
- Ball valve **18** is set to position „down“: Position **18.1.1** (HOIST GEAR / LUFFING)
- Ball valve **19** is set to position „to the side“: Position **19.1.2** (EMERGENCY CONTROL)

▶ Operator1 localizes the valve **-Y500**.
▶ Operator2 deflects the master switch **MS** with actuated button **40** or button **41** in direction X+ (to the right).
▶ Operator1 actuates valve **-Y500** manually.

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Result:

– Crane movement is carried out:
  Carry out the emergency control
  or
– Crane movement is **not** carried out:
  Operator2: Bring the master switch **MS** to zero position.
  Operator1: End manual operation of valve **-Y500** and continue with the next required valve (-Y538).

▶ Operator1 localizes valve **-Y538**.
▶ Operator2 deflects the master switch **MS** with actuated button **40** or button **41** in direction X+ (to the right).
▶ Operator1 actuates valve **-Y538** manually.

Result:

– Crane movement is carried out:
  Carry out the emergency control
  or
– Crane movement is **not** carried out:
  Operator2: Bring the master switch **MS** to zero position.
  Operator1: End manual operation of valve **-Y538** and continue with the next required valve (-Y539).

▶ Operator1 localizes valve **-Y539**.
▶ Operator2 deflects the master switch **MS** with actuated button **40** or button **41** in direction X+ (to the right).
▶ Operator1 actuates valve **-Y539** manually.

Result:

– Crane movement is carried out:
  Carry out the emergency control
  or
– Crane movement is **not** carried out:
  Operator2: Bring the master switch **MS** to zero position.
  Operator1: End manual operation of valve **-Y539** and continue with the next required valve (-Y540).

▶ Operator1 localizes valve **-Y540**.
▶ Operator2 deflects the master switch **MS** with actuated button **40** or button **41** in direction X+ (to the right).
▶ Operator1 actuates valve **-Y540** manually.

Result:

– Crane movement is carried out:
  Carry out the emergency control
  or
– Crane movement is **not** carried out:
  If all valves were actuated individually without success, see section „Crane movement via manually actuated valves“ for additional steps.

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Empty page!

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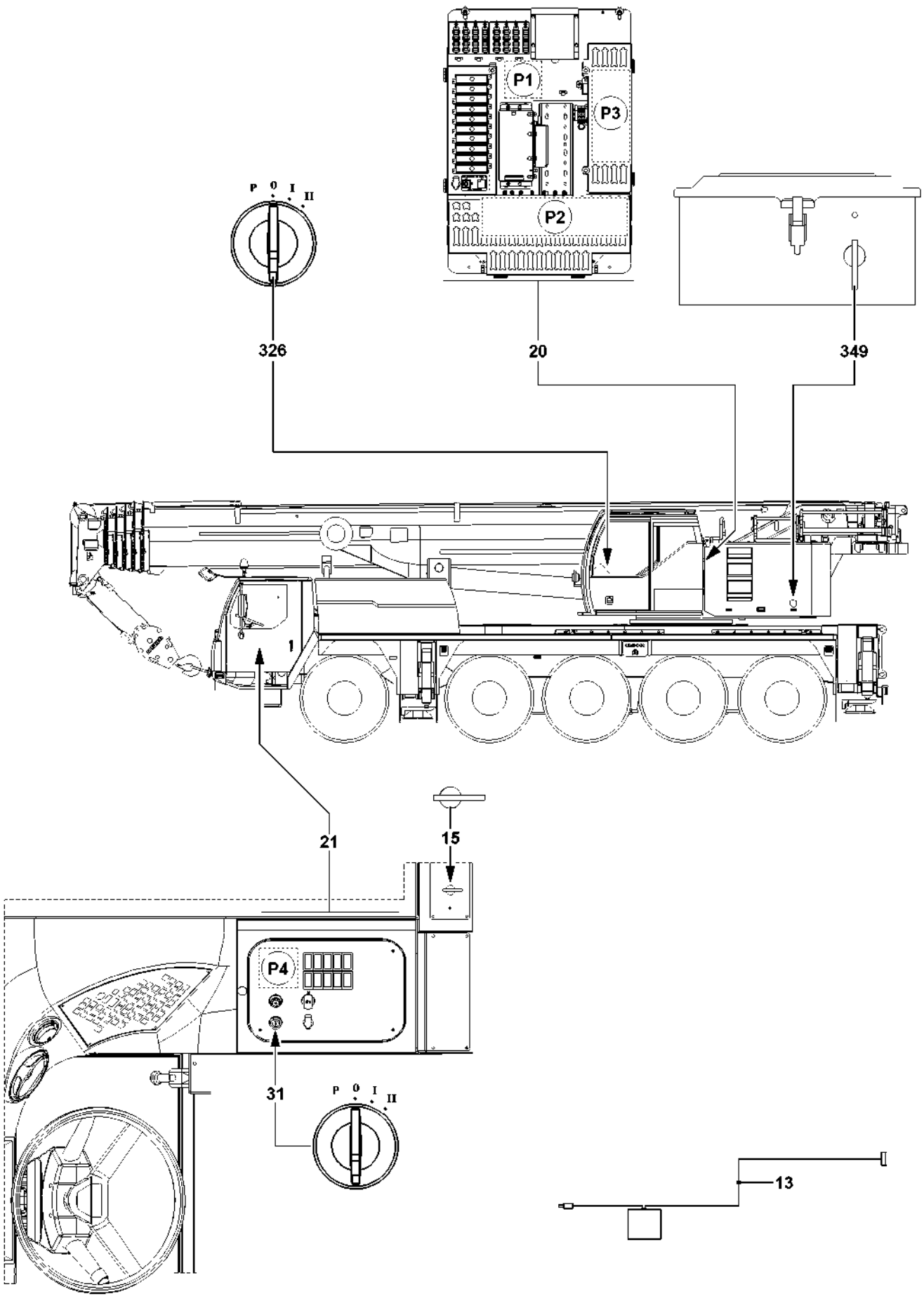

Fig.112349

5 Completing emergency control

When the emergency control is completed and the triggering cause has been remedied, the crane must be reset to normal operation.

DANGER
Erroneous function crane control!
- ▶ Make sure to reset all electrical connections to normal operation after completed emergency control!
- ▶ Make sure to reset all ball valves to normal operation after completed emergency control!

5.1 Resetting the electrical connections to normal operation

NOTICE
Damage of electrical components!
If current carrying electrical connections are separated / connected, then there is the danger that electrical components can be damaged!

Turn the current off on electrical connections before disconnection / connection:
- ▶ Set all ignition switches to position **0**!
- ▶ Turn all battery master switches off!

Note
- ▶ In the switch cabinet crane superstructure **20** are the plug connections on position **P1**, position **P2** and position **P3**!
- ▶ In the center console in the driver's cab **21** are the plug connections on position **P4**!

Before disconnecting / connecting electrical connections, make sure that:
- – Ignition switch crane chassis **31** is in position 0.
- – Battery master switch crane chassis **15** is turned off.
- – Ignition switch crane superstructure **326** is in position 0.
- – Battery master switch crane superstructure **349** is turned off.
- – Supply cable **13** is removed.

Plug connections on position **P1**:
- – Plug -X487.B is plugged in plug location -X487.

Plug connections on position **P2**:
- – Plug -X467.B is plugged in plug location -X467.
- – Plug -XNOT2.B is plugged in plug location -XNOT2.
- – Plug -XNOT4.B is plugged in plug location -XNOT4.
- – Plug -XNOT6.B is plugged in plug location -XNOT6.

Plug connections on position **P3**:
- – Plug -X412B is plugged in plug location -X412.
- – Plug -X416.B is plugged in plug location -X416.

Plug connections on position **P4**:
- – Plug -X191.B is plugged in plug location -X191.S.

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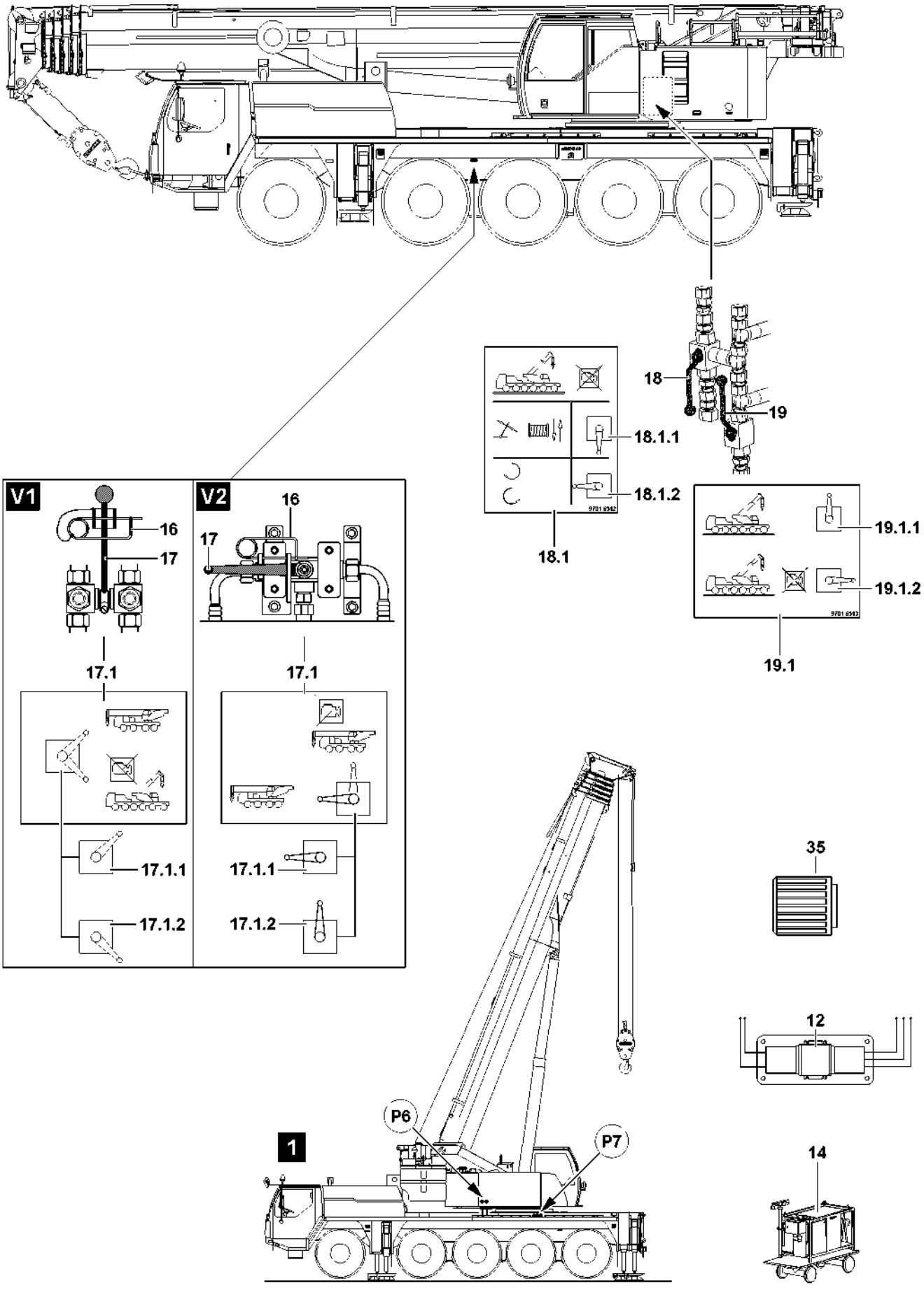

Fig.119854

5.2 Resetting the hydraulic connections to normal operation

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 in the hydraulic system is not released 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 hydraulic pressure supply and wait for a short time.
- ▶ The auxiliary aggregate **14** and crane engine must be turned off.

Make sure that the following prerequisite is met:
- The ball valve **17** is set to position **17.1.1** (NORMAL OPERATION).
- Ball valve **17** is secured with spring retainer **16**.
- Ball valve **19** is set to position „up“: Position **19.1.1** (NORMAL OPERATION)
- Point **P6**, when an emergency control cap **35** was used: The emergency control cap **35** has been removed from valve **-Y500** and the normal cap is installed.

WARNING
Danger of accident!

When an emergency control cap **35** was used:
- ▶ Make sure that the emergency control cap **35** has been removed from valve **-Y500**.

Note
- ▶ The position of the ball valve **18** is not relevant in normal operation.

Disconnect all hydraulic connections from the emergency control:

- ▶ Install the coupling components (sleeve and connector) with the hand-tightened nut.
- ▶ Disconnect the hydraulic connections.
- ▶ Install dust caps on the quick couplings.

Make sure that:
- All hydraulic connections between the crane superstructure (point **P6**) and the transformer **12** as well as the transformer **12** and crane chassis (point **P5**) or the auxiliary aggregate **14** have been separated.

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Fig.195219

1 Technical safety instructions

WARNING
Bypass of overload protection!
Toppling crane, death, property damage.
▶ Make sure that load charts are available for the complete erection procedure and take down procedure.
▶ Do **not** bypass overload protection.

WARNING
Boom erected at excessive wind speed!
Toppling crane, death, property damage.

Once crane operation is completed:
▶ Telescope the telescopic boom all the way in and place the boom down.

2 Variable support

The variable support makes it possible to optimally use the crane in difficult space conditions.

If the individual sliding beams cannot be fully extended due to local conditions, then a maximum of load capacity, lifting height and radius is made possible for any slewing range (slewing angle of turntable).

3 Assembling / disassembling the auxiliary boom

Assembly and disassembly of the auxiliary boom is not monitored by the LICCON overload protection.

WARNING
Reduced stability!
Toppling crane, death, property damage.
▶ Support the crane. Use the support base according to the following charts.
▶ For the support base, ballast the required counterweight.

Make sure that the following prerequisites are met:
– The crane is supported with the required support base.
– The required counterweight is installed.
– The crane is aligned in horizontal direction.
– The telescopic boom is fully telescoped in.

3.1 Support base 8.1 m x 7.5 m

– All four sliding beams are 100 % extended.

Support base 8.1 m x 7.5 m				
Auxiliary boom	Working position at assembly / disassembly: 360°		Working position at assembly / disassembly: 0° (to the rear)	
	Minimum counterweight	Maximum counterweight	Minimum counterweight	Maximum counterweight
K-2.9	0 t	42 t	0 t	42 t
K-10.8	0 t	42 t	0 t	42 t

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Support base 8.1 m x 7.5 m				
Auxiliary boom	Working position at assembly / disassembly: 360°		Working position at assembly / disassembly: 0° (to the rear)	
	Minimum counterweight	Maximum counterweight	Minimum counterweight	Maximum counterweight
K-19.0	0 t	42 t	0 t	42 t
V-7.0 + K-10.8	6.6 t	42 t	6.6 t	42 t
V-7.0 + K-19.0	6.6 t	42 t	6.6 t	42 t
V-14.0 + K-10.8	6.6 t	42 t	6.6 t	42 t
V-14.0 + K-19.0	6.6 t	42 t	6.6 t	42 t

Assemble / disassemble the required counterweight for the auxiliary boom

3.2 Support base between 8.1 m x 7.5 m and 8.1 m x 5.0 m

– All four sliding beams are extended between 50 % and 100 %.

Support base between 8.1 m x 7.5 m and 8.1 m x 5.0 m				
Auxiliary boom	Working position at assembly / disassembly: 360°		Working position at assembly / disassembly: 0° (to the rear)	
	Minimum counterweight	Maximum counterweight	Minimum counterweight	Maximum counterweight
K-2.9	0 t	42 t	0 t	42 t
K-10.8	6.6 t	42 t	0 t	42 t
K-19.0	6.6 t	42 t	0 t	42 t
V-7.0 + K-10.8	12.7 t	42 t	6.6 t	42 t
V-7.0 + K-19.0	12.7 t	42 t	6.6 t	42 t
V-14.0 + K-10.8	16 t	42 t	6.6 t	42 t
V-14.0 + K-19.0	16 t	42 t	6.6 t	42 t

Assemble / disassemble the required counterweight for the auxiliary boom

3.3 Support base arbitrary

– At least one sliding beam is extended below 50 %.

Support base arbitrary				
Auxiliary boom	Working position at assembly / disassembly: 360°		Working position at assembly / disassembly: 0° (to the rear)	
	Minimum counterweight	Maximum counterweight	Minimum counterweight	Maximum counterweight
K-2.9	Assembly prohibited	Assembly prohibited	0 t	26.4 t
K-10.8	Assembly prohibited	Assembly prohibited	0 t	26.4 t
K-19.0	Assembly prohibited	Assembly prohibited	0 t	26.4 t
V-7.0 + K-10.8	Assembly prohibited	Assembly prohibited	6.6 t	26.4 t
V-7.0 + K-19.0	Assembly prohibited	Assembly prohibited	6.6 t	26.4 t

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Support base arbitrary				
Auxiliary boom	Working position at assembly / disassembly: 360°		Working position at assembly / disassembly: 0° (to the rear)	
	Minimum counterweight	Maximum counterweight	Minimum counterweight	Maximum counterweight
V-14.0 + K-10.8	Assembly prohibited	Assembly prohibited	6.6 t	26.4 t
V-14.0 + K-19.0	Assembly prohibited	Assembly prohibited	6.6 t	26.4 t

Assemble / disassemble the required counterweight for the auxiliary boom

3.4 Assembly / disassembly procedure

Assembly / disassemble the folding jib. See Crane operating instructions, chapter 5.02.

Assemble / disassemble the telescopic boom extension. See Crane operating instructions, chapter 5.25.

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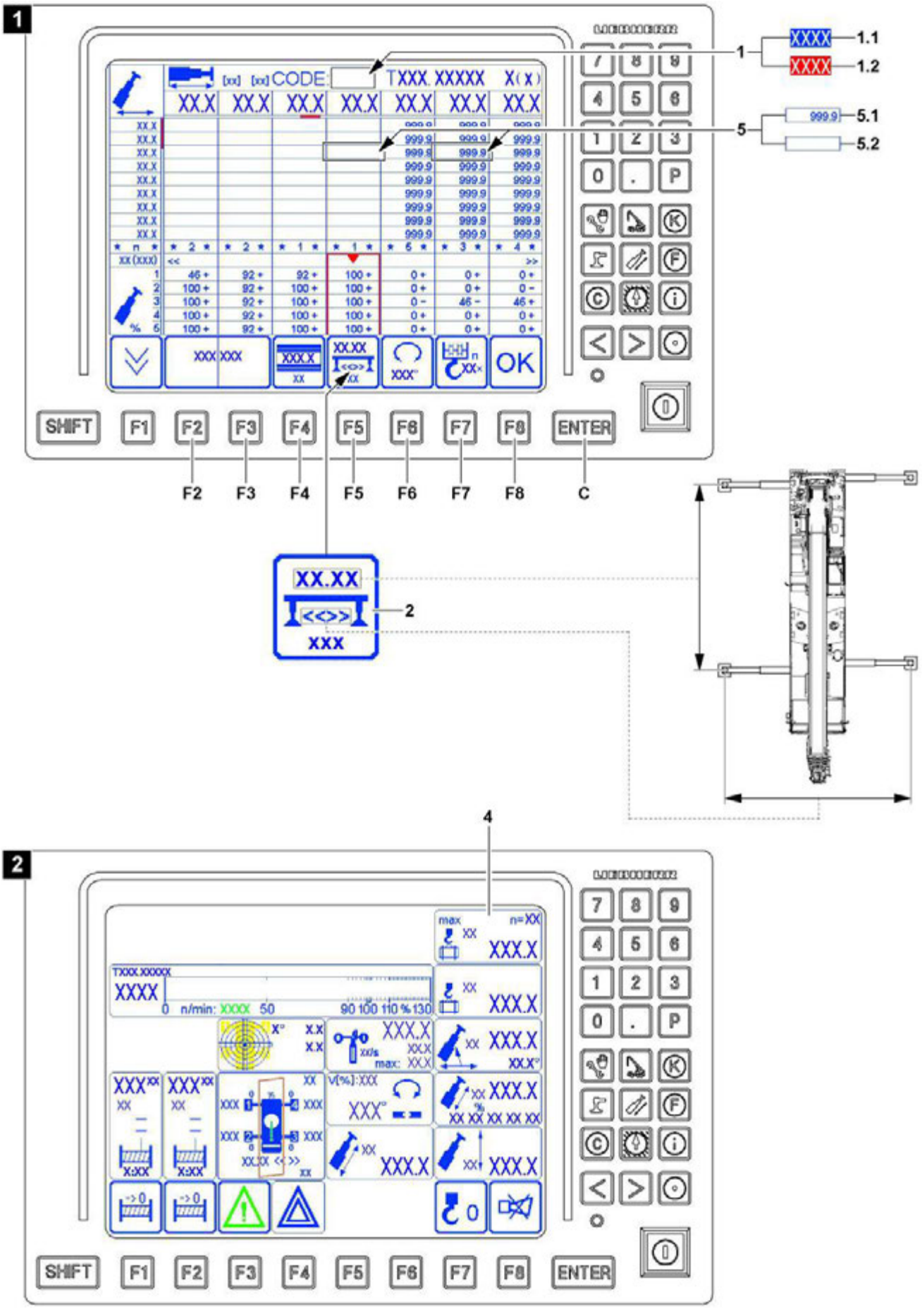

Fig.118386

4 Set up of variable support

– **F5** Support base

  • Adjustment option for support base: The variable support is displayed in the set up program via the icon **2**. For the variable support, instead of the value for the support width, the character string „<<>>“ is shown.
  • For the variable support, **no load chart values** are shown in the load columns in the Set up program. Observe section „Load chart values for variable support“.
  • **Note:**
    If you are not working with the variable support, the supports must be extended and pinned to the dimensions noted in the icon. Only this way it is permitted to work with the selected load chart.

4.1 Entering the set up configuration into the LICCON computer system

Make sure that the following prerequisites are met:
– The set up program is called up, see illustration **1**.
– Via function key **F2**, the correct main boom geometry was selected.
– Via function key **F3**, the correct accessory (if present) was selected.
– Via function key **F4**, the correct counterweight was selected.

▶ Press the function key **F5** and select the variable support.

Result:

– The icon **2** is shown in the set up program.

▶ Press the function key **F6** and select the slewing range.
▶ Press the function key **F7** and select the reeving.

Note
Illustration CODE **1**
A CODE **1.1** with blue background is valid.
A CODE **1.2** with red background is invalid.

If a CODE **1.2** is shown with red background (invalid):
▶ Check the selection of function keys **F2** to **F7** and correct.

If a CODE **1.1** is shown with blue background (valid):
▶ Press the ENTER **C** key and call up the load chart.
▶ Press the function key **F8** and take over the selected load chart.

Result:

– The set up program is closed, the crane operation screen appears, see illustration **2**.

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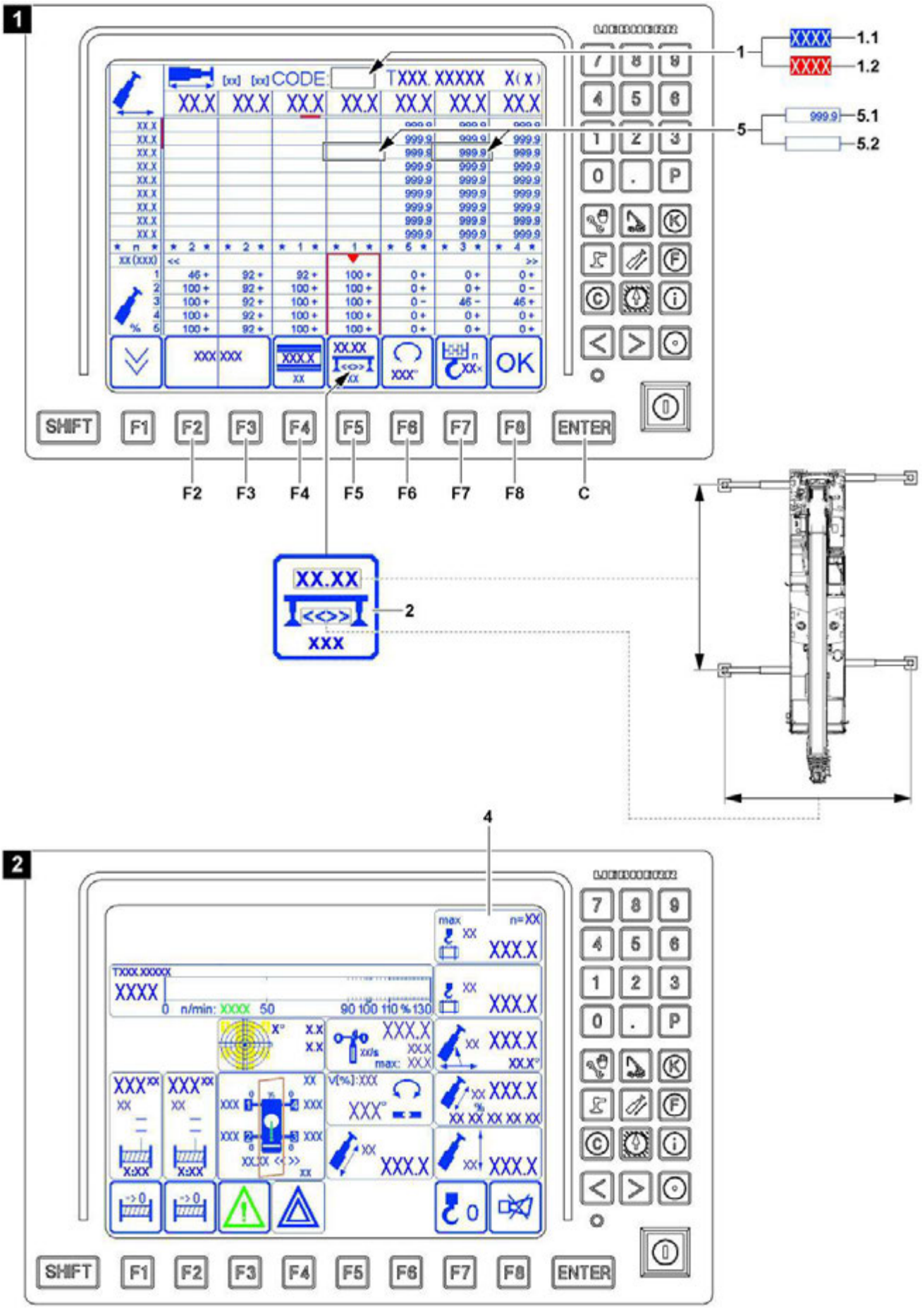

Fig.118386

4.2 Load chart values for variable support

Display values for the load for variable support base in the set up screen:

– If a place holder **5.1** „999.9“ appears as a load chart value **5**, then an optimized maximum load can be obtained in this area of the load column. Due to the multitude of possibilities because of the various slewing angles of the turntable (slewing range), a general value cannot be shown.

  • In the simulation mode of the Planner program, the optimized maximum load for the respective slewing angle of the turntable can be determined, see section „Program Planner“. No crane movement is necessary for this.
  • In the „Maximum load“ icon **4** of the crane operation screen, the optimized maximum load for the respective slewing angle of the turntable is shown. For this a respective crane movement is necessary.

– If a space **5.2** appears as load chart value **5**, then there is no valid load in this section of the load chart column.

▶ Call up the simulation mode of the Planner program and set the crane model into the respective position, see section „Program Planner“.

Result:

– The load chart values can be displayed without crane movement.

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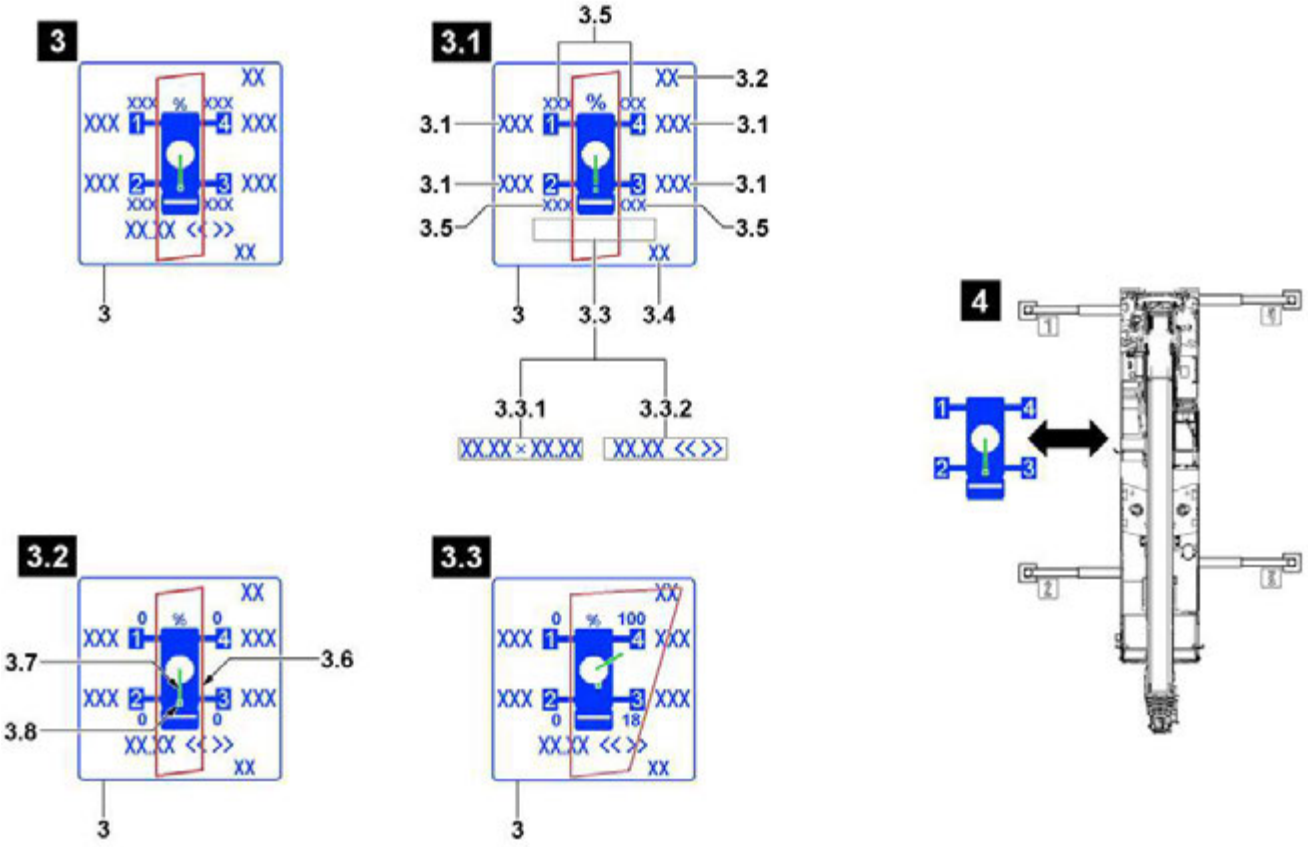

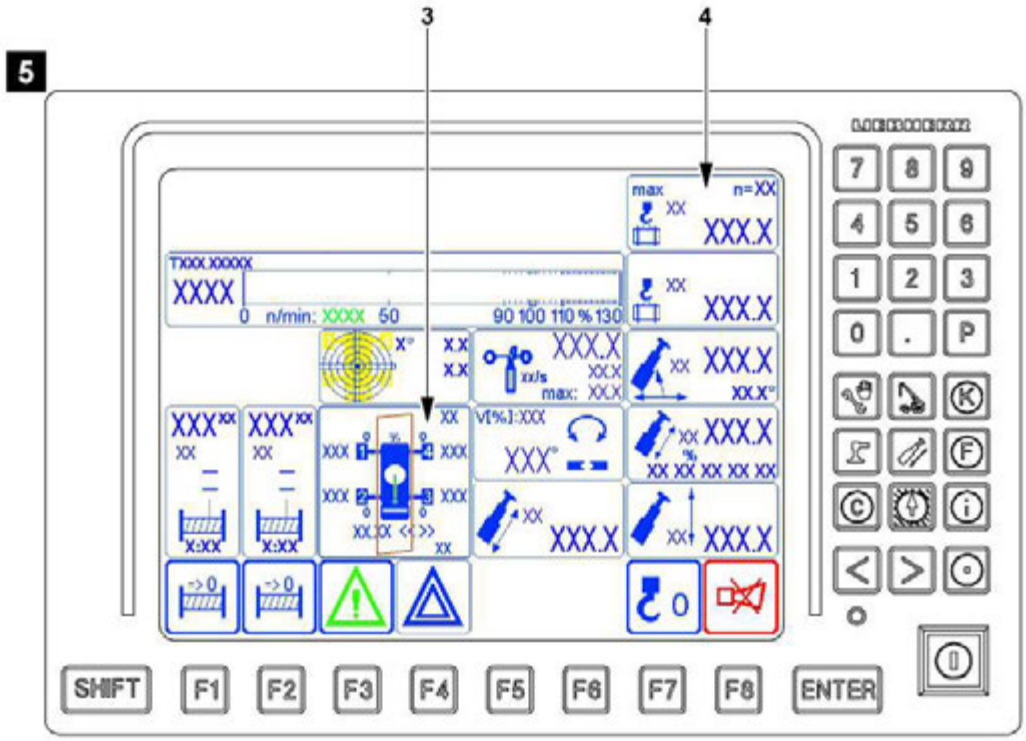

Fig.114237

5 Crane operation with the variable support

5.1 Additional displays in the LICCON monitor

The „support“ icon **3** contains various monitoring functions.

Assignment of „support“ icon to the crane, see illustration **4**.

Position of the icons in the crane operation screen, see illustration **5**.

– **Support force monitoring**

  • The support force monitoring determines the current support force on all four support cylinders. For every support a maximum support force and a common minimum support force can be programmed in the support force editor, see Crane operating instructions, chapter 4.02.

– **Sliding beam length monitoring**

  • The sliding beam length monitoring measures the current extension length on all 4 sliding beams with length sensors and provides a percentage value for each support.

– **Center of gravity display**

  • The center of gravity display determines an individual center of gravity, taking into account the support surface and support forces.

3 „Support“ icon
- The „Support“ icon **3** is shown in the „Crane operation“ program, see illustration **3**. It can be faded out. The icon reappears automatically when a critical support force value is reached.

3.1 Display of current support force
- Display of support force per support (the value is displayed next to the assigned support cylinder)
- A critical support force value is shown blinking when:
  - A support has reached / exceeds the maximum force.
  - A support has reached / fallen below the minimum force.
  - The sum of the two lowest support force values is less than 15 % of the total support forces.

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, an incorrect measurement is possible!
▶ Do not move the support cylinder to block!
▶ Take possible tolerances in the display values into account!

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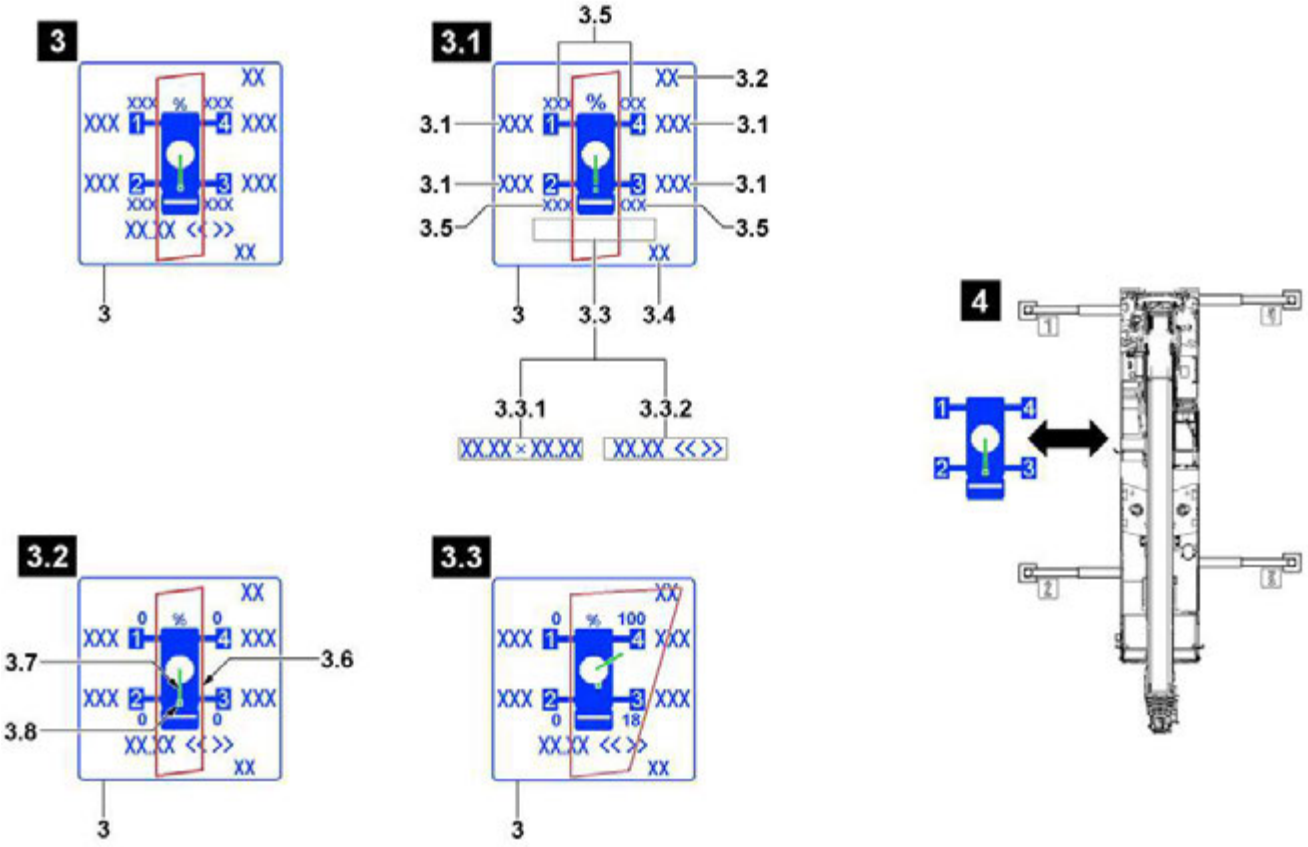

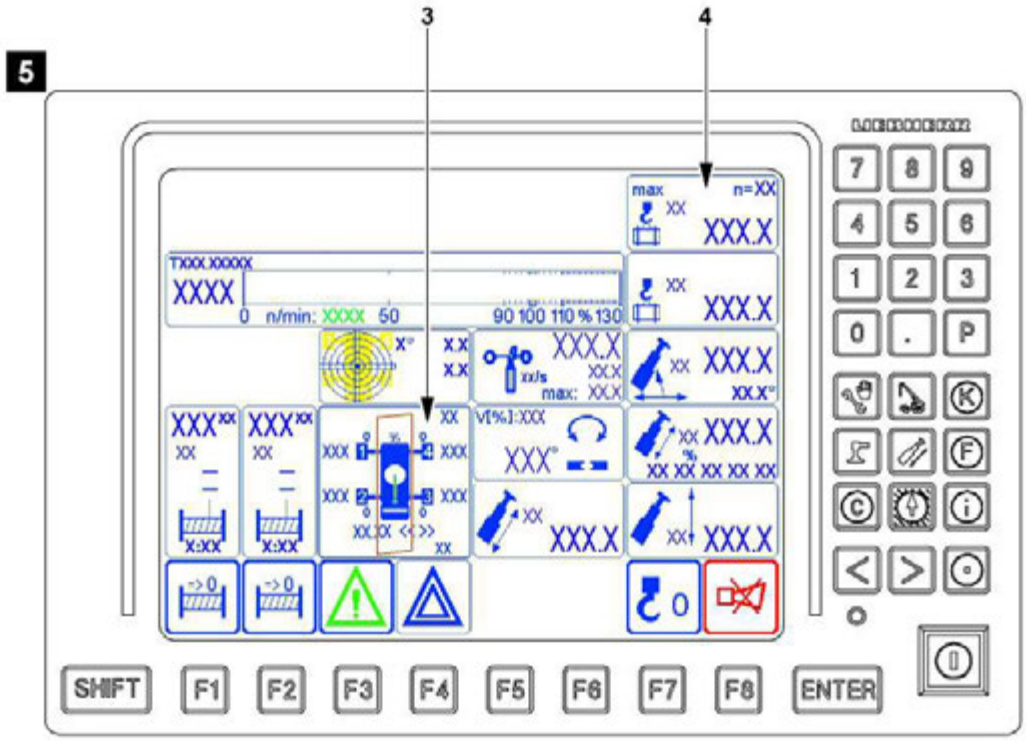

Fig.114237

WARNING
Reduced stability!
Toppling crane, death, property damage.
If the sum of the two lowest support forces is less than 15 % of the total support forces **and** the two supports with the least forces are in boom direction, then there is a danger of tipping toward the counterweight side!
Telescoping in and luffing the telescopic boom up as well as luffing the accessories up is turned off in this case!
- ▶ Initiate a crane movement which works against the tipping danger toward the counterweight side, for example luff down or telescope the telescopic boom out!
- ▶ Make sure that all support force values are within the minimum / maximum support forces!

WARNING
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 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!
- ▶ Do not use the displayed support force values of the support force display to utilize the crane up to the tipping limit!
- ▶ Make sure that all support force values are within the minimum / maximum support forces!

3.2 Weight unit of support force
- In [t] or [kips]

3.3 Display of support base
- Nominal value of support base **3.3.1** from the set up screen (no variable support base selected)
- Variable support **3.3.2**: The value for the support width is replaced by the following signs „<<>>“.

3.4 Measuring unit of support base
- In [m] or [ft]

3.5 Extension length of sliding beam
- The value in [%] is displayed next to the assigned sliding beam.

Note
- ▶ If the extension length of the sliding beam **3.5** corresponds to the nominal value of the entered set up configuration: The value is shown in „green“.
- ▶ If the extension length does not match the nominal value of the entered set up configuration: The value is shown in „red“.
- ▶ For the variable support every value is valid and is shown in „blue“.

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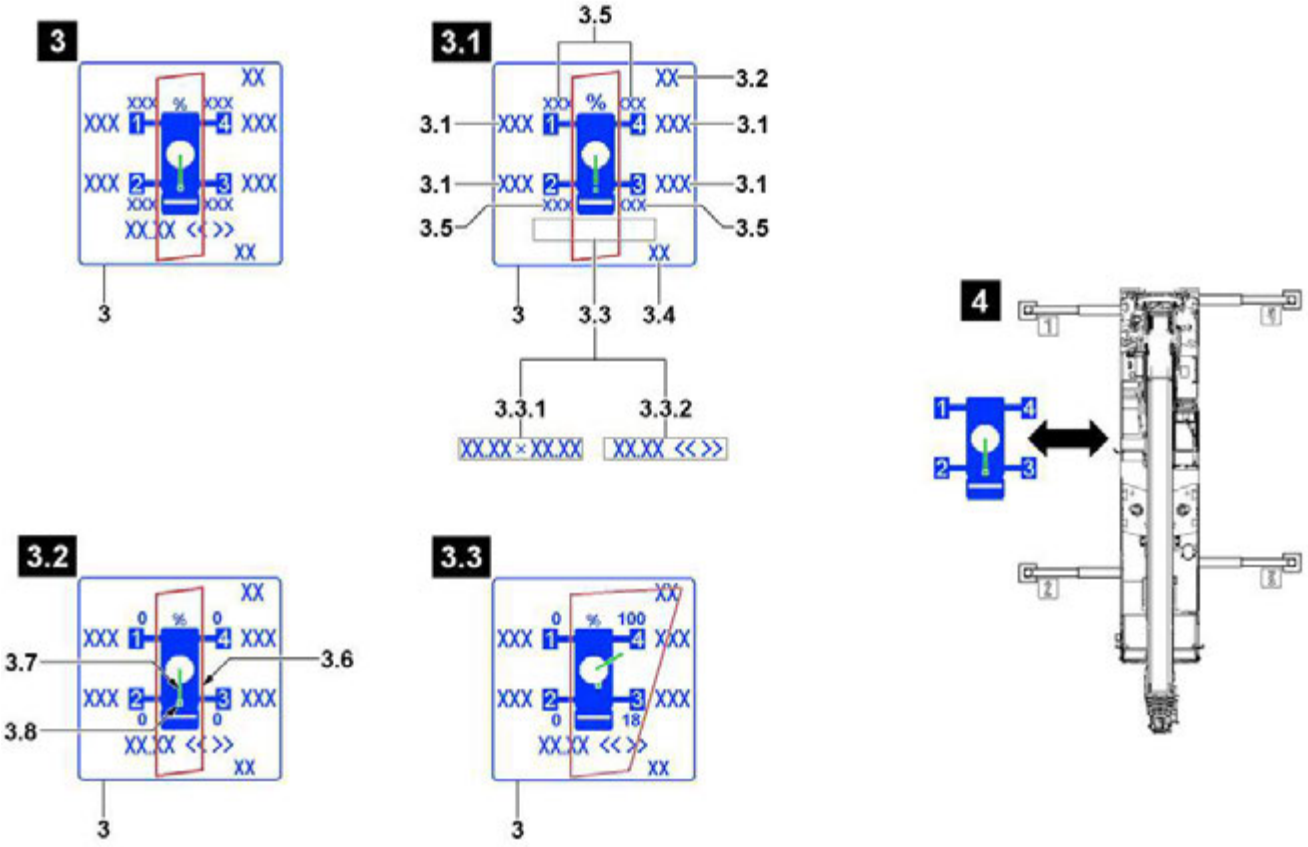

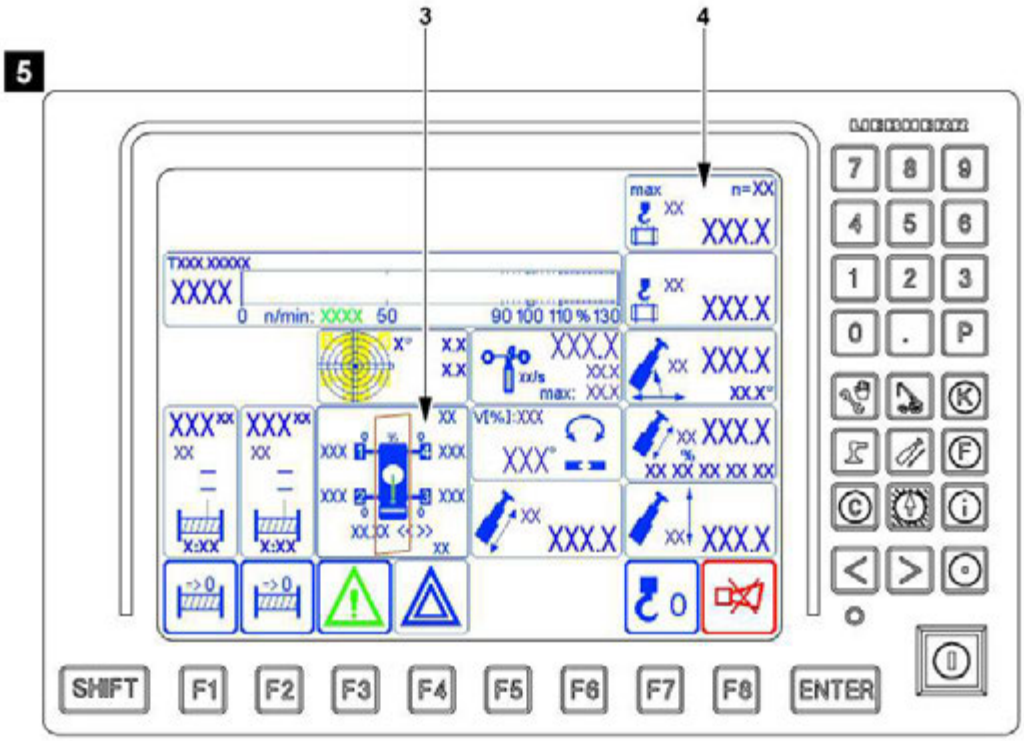

Fig.114237

3.6 Tipping edge
- The red rectangle symbolizes the tipping edge of the crane. The tipping edge is adjusted depending on the extension status of the sliding beams.
- The center of gravity **3.8** must remain within the red bordered field of the tipping edge **3.6**.

3.7 Alignment of main boom
- The green bar symbolizes the current alignment of the main boom. In illustration **3.2** it extends past the driver's cab. In illustration **3.3** is extends past the support cylinders of sliding beam number 4.

3.8 Center of gravity
- The green dot symbolizes the center of gravity of the crane.

WARNING
The crane can topple over!
The displays of tipping edge **3.6** and center of gravity **3.8** are subject to fluctuating influences by operator and environment!
The resulting expanded tolerance field of the determined values may not utilized the center of gravity display to determine the tipping edge of the crane!
▶ Do not use the displays of tipping edge **3.6** and center of gravity **3.8** to utilize the crane up to the tipping edge!

6 Preparing crane operation with the variable support

Make sure that the following prerequisites are met:
– The sliding beams are extended as far as possible.
– The sliding beams are pinned if possible.
– For the working range a sufficient load is available:
  - Check through simulation, see Section Planner program
  - or: Check through a crane movement without a load on the hook with the display in the „Maximum load" icon **4**
  - or: check via the LICCON Job planner, see user and reference manual.

If sufficient load capacity is available in the entire working range:
▶ Fasten the load properly and sensitively and anticipatorily carry out the crane movement.

Problem remedy
Crane movement was turned off by the LICCON computer system.
▶ Reverse the last crane movement the same way until the crane is again in a safe status.

When the crane is again in a safe status:
▶ Plan the crane application in such a way that no repeated shut off of crane movement occurs.

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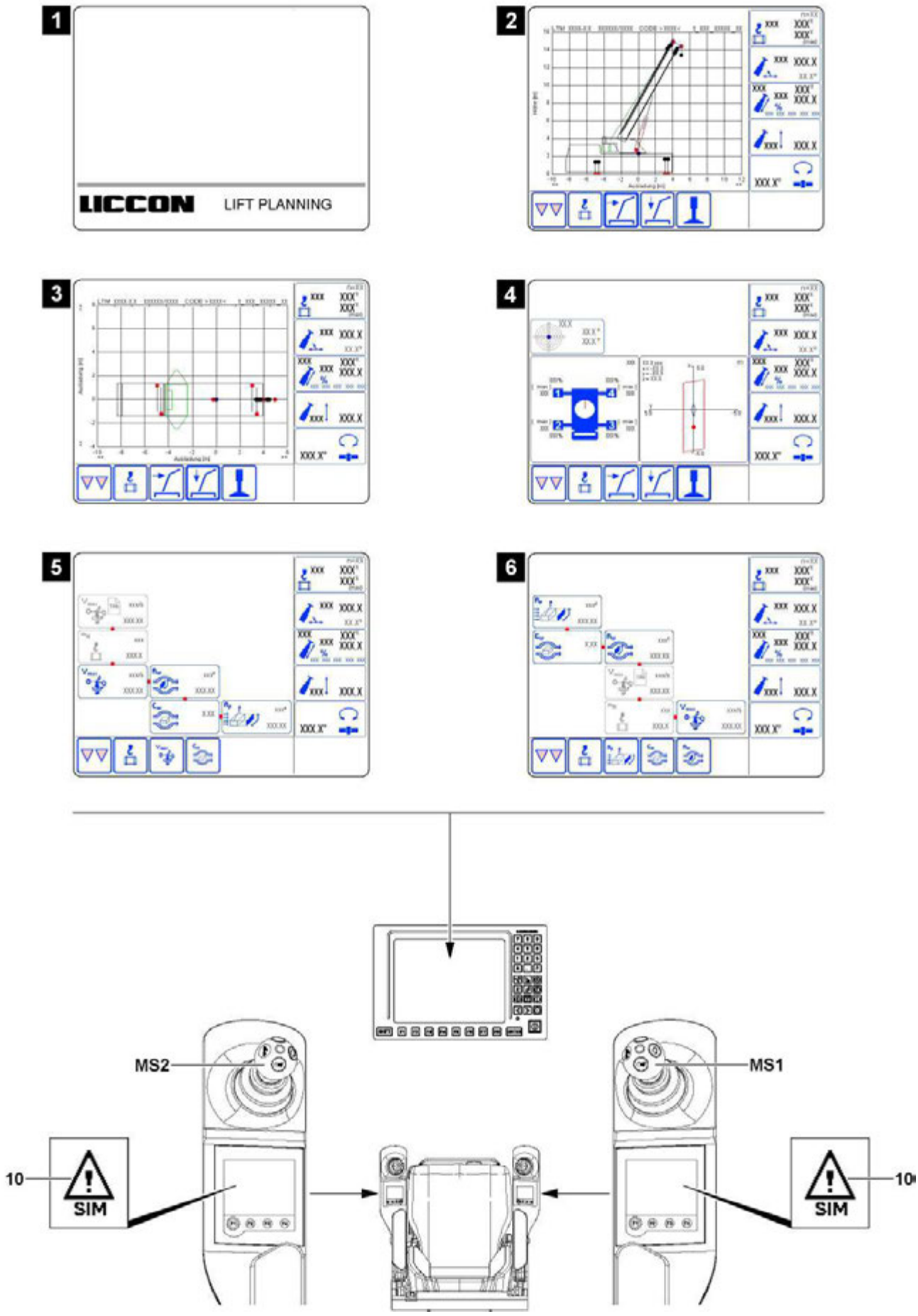

Fig.118361

7 Planner program

The Planner program contains selected and in part modified sections of the PC Job Planner.

The Planner program does not replace a detailed job planning with the PC Job Planner.

When calling up the program, a start screen appears momentarily, see illustration **1**.

The program is operational as soon as the first view of the simulation mode appears, see illustration **2**.

The Planner program on the crane includes up to three sub programs:

- the simulation mode
  - the current set up configuration as well as a freely selectable set up configuration can also be simulated.
  - in the simulation mode you can switch between three views:
    - Illustration **2**: Two dimensional side view
    - Illustration **3**: Two dimensional overhead view
    - Illustration **4**: Two dimensional support pressure / surface pressure view
- The wind surface calculator, illustration **5**
  - Calculation program for the wind surface
- The wind speed calculator, illustration **6**
  - Calculation program for the wind speed

As soon as the Planner program is called up, the master switches are also in simulation mode.

As long as the master switches are in simulation mode, the Simulation **10** icon appears in the touch display.

As long as the Planner program is active, no crane movements with the master switches are possible.

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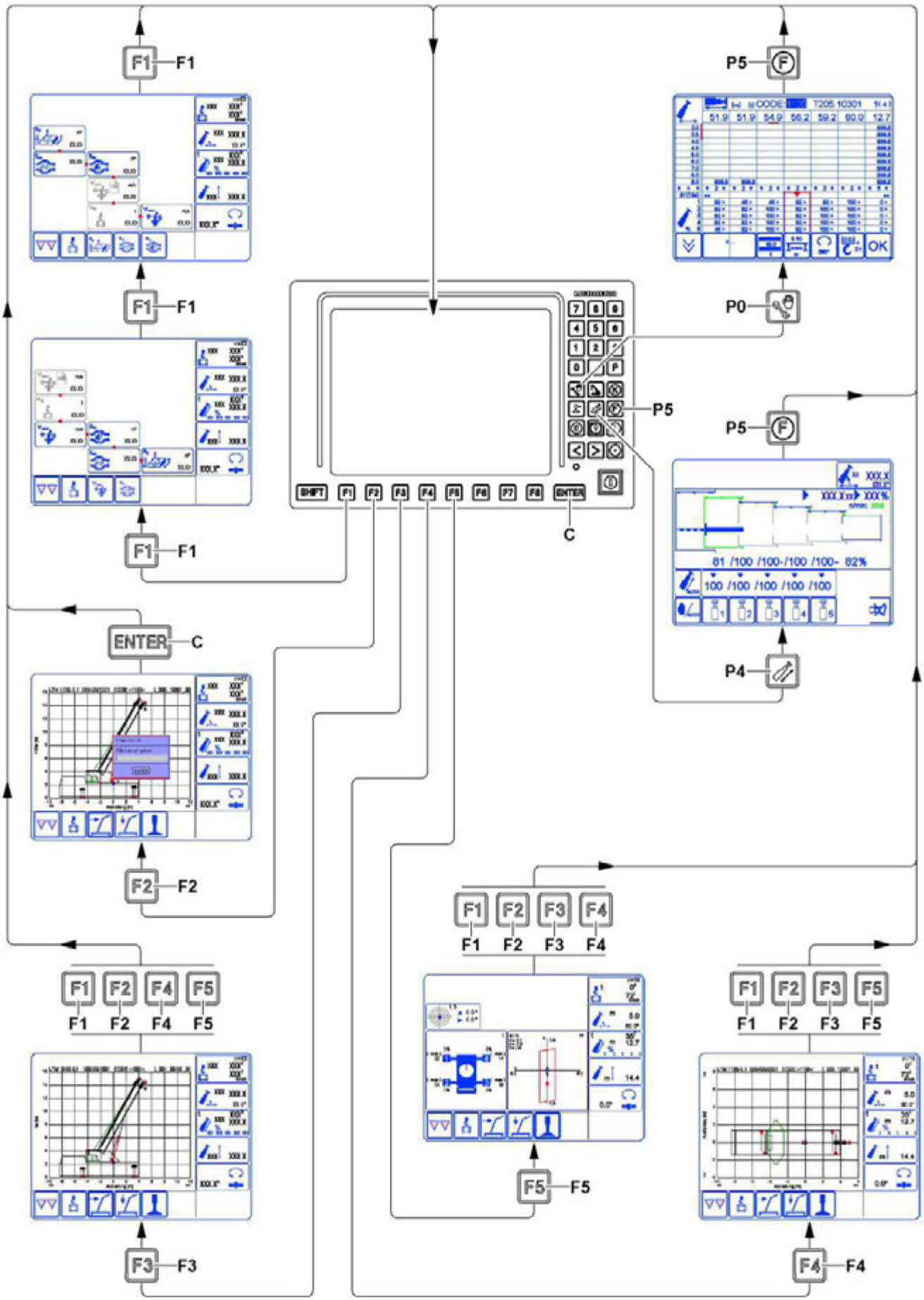

Fig.118360

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7.1 Overview of Planner program

Function key / menu description			
F1	Call up the wind surface calculator		
>>	**F1**	Call up the wind speed calculator	
>>	**F1**	back to the simulation mode	
F2	Call up the input window for load		
>>	**C**	Close the input window for load	
F3	Call up the side view		
>>	**F1**	Call up the wind surface calculator	
>>	**F2**	Call up the input window for load	
>>	**F4**	Call up the overhead view	
>>	**F5**	Call up the support pressure / surface pressure view	
F4	Call up the overhead view		
>>	**F1**	Call up the wind surface calculator	
>>	**F2**	Call up the input window for load	
>>	**F3**	Call up the side view	
>>	**F5**	Call up the support pressure / surface pressure view	
F5	Call up the support pressure / surface pressure view		
>>	**F1**	Call up the wind surface calculator	
>>	**F2**	Call up the input window for load	
>>	**F3**	Call up the side view	
>>	**F4**	Call up the overhead view	
P4	Call up the Telescoping program		
>>	**P5**	Call up the Planner program	
P0	Call up the set up program		
>>	**P5**	Call up the Planner program	

7.2 Planner program: Set up the set up configuration of the crane

The Planner program can be run two ways:

– with the actual set up configuration of the crane
  - hereby the actual geometric data of the crane for incline, boom angle, slewing angle of crane superstructure, support width etc. are taken over in the Planner program.

– with a freely selectable set up configuration of the crane
  - hereby the basic setting for the geometry data of the crane is taken over into the Planner program.
  - changes on the set up configuration are temporary and are deleted when closing / leaving the Planner program.
  - **Note**: After closing / leaving the Planner program work can continue immediately with the actual set up configuration of the crane.
    Changes on the basic settings cannot be saved and must be made again when the program is restarted.

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7.2.1 Taking over the actual set up configuration of the crane

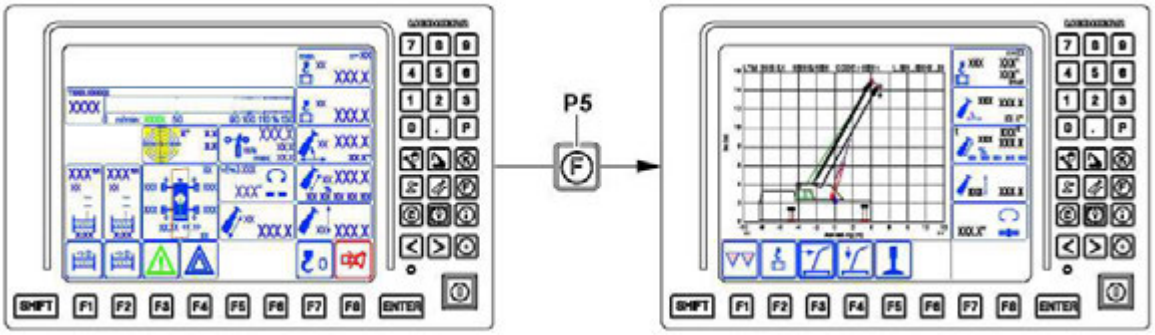

Fig.118364

To take over the actual set up configuration of the crane, you must change directly from the crane operating screen into the Planner program.

Make sure that the following prerequisites are met:
- In the Set up program, the actual set up configuration of the crane is set.
- The Crane operation program is called up.
- If you intend to telescope out in the Planner program, then a respective telescoping target must be entered.

▶ Press the program button **P5**.

Result:

- The Planner program is started with the current set up configuration and the actual geometry data of the crane.

7.2.2 Taking over a freely selectable set up configuration of the crane

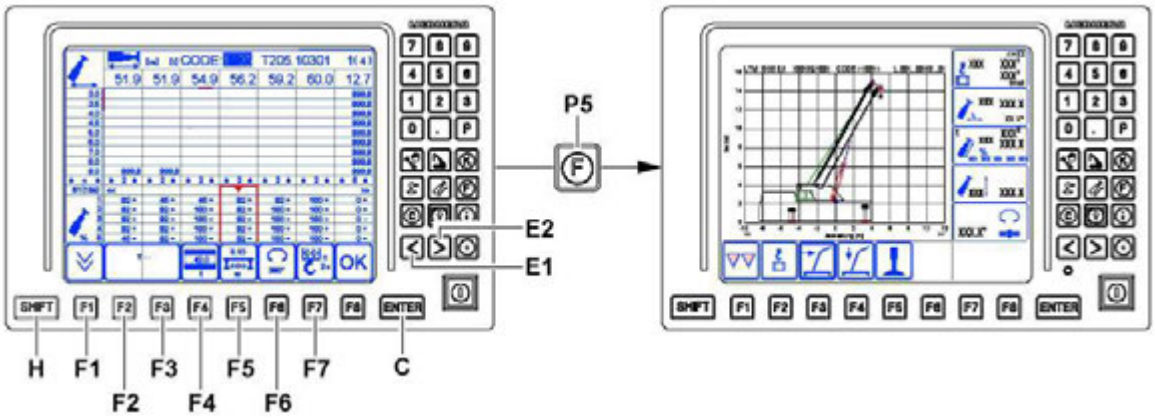

Fig.118365

To take over a freely selectable set up configuration of the crane, you must change directly from the set up screen into the Planner program.

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Make sure that the following prerequisite is met:
– The set up program is called up.

WARNING
Crane operation with incorrect set up configuration!
Under no circumstances may the changed set up configuration be confirmed with the „OK“ button.
Otherwise it is possible that the crane will be overloaded or incorrectly operated.
▶ Select the freely selected set up configuration only with the „ENTER“ key.
▶ Under no circumstances confirm the freely selected set up configuration with the „OK“ button.

▶ Set the desired set up configuration via function keys **F2 - F6**.

Note
Setting the reeving
In the Planner program, the maximum reeving is generally taken over according to the load chart.
▶ Do not set the reeving via the function key **F7**.

▶ Select the desired telescoping target via function keys **E1/E2**.

Note
Select the telescoping target in the Set up program:
▶ One column sideways: Press function key **E1** or function key **E2** individually.
▶ One page (7 columns) sideways: Press function key **E1** or function key **E2** twice in quick succession.
▶ Jump to the last column: At the same time, press button„SHIFT“ **H** and function key **E2**.
▶ Jump to the first column: At the same time, press button„SHIFT“ **H** and function key **E1**.

▶ Press the ENTER key **C**.
▶ Press the program button **P5**.

Result:

– The Planner program is started with the entered set up configuration and the basic setting for the geometry data of the crane.

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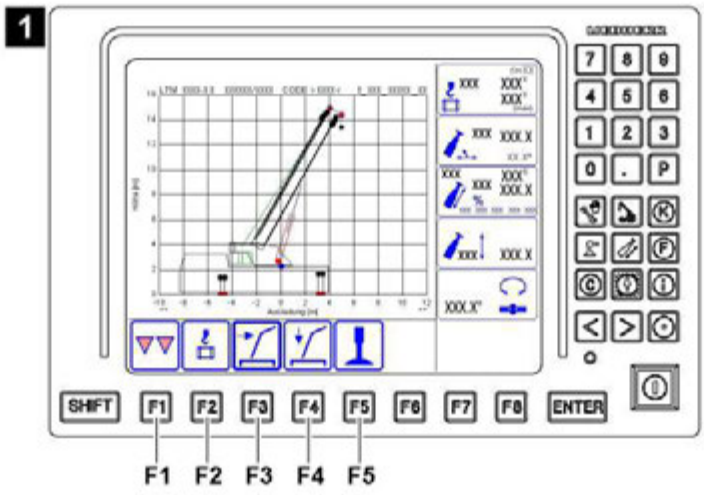

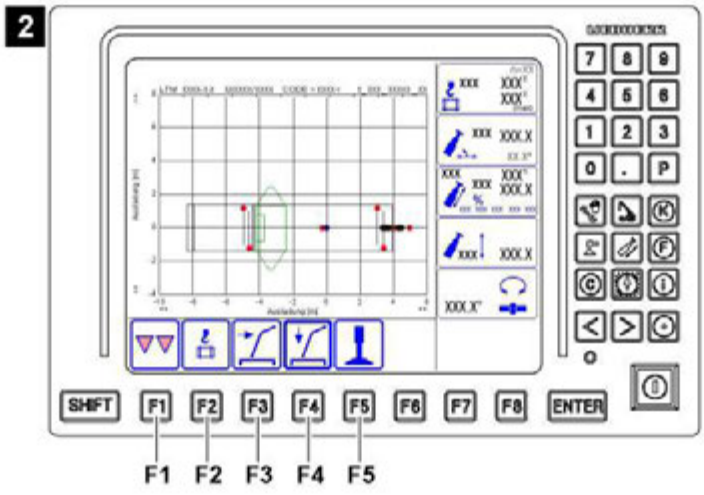

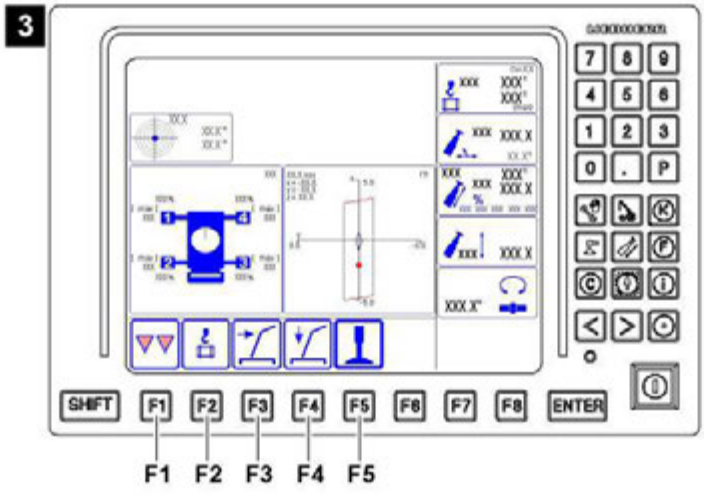

Fig.118363

LWE/LTM 1130-5-1-004/20502-04-02/en

7.3 Simulation mode

In simulation mode, a two dimensional crane model is controlled in the LICCON monitor.

7.3.1 Function keys in side view (Illustration 1)

F1 Function key
- Call up the wind surface calculator
- Press twice: Call up the wind speed calculator

F2 Function key
- Call up the input window for load

F3 Function key
- No function in the side view
  Note: As long as the side view is active, the frame around the icon is highlighted.

F4 Function key
- Call up the overhead view

F5 Function key
- Call up the support pressure / surface pressure view

7.3.2 Function keys in overhead view (Illustration 2)

F1 Function key
- Call up the wind surface calculator
- Press twice: Call up the wind speed calculator

F2 Function key
- Call up the input window for load

F3 Function key
- Call up the side view

F4 Function key
- No function in the overhead view
  Note: As long as the overhead view is active, the frame around the icon is highlighted.

F5 Function key
- Call up the support pressure / surface pressure view

7.3.3 Function keys in the support pressure / surface pressure view (Illustration 3)

F1 Function key
- Call up the wind surface calculator
- Press twice: Call up the wind speed calculator

F2 Function key
- Call up the input window for load

F3 Function key
- Call up the side view

F4 Function key
- Call up the overhead view

F5 Function key
- No function in the support pressure / surface pressure view
  Note: As long as the support pressure / surface pressure view is active, the frame around the icon is highlighted.

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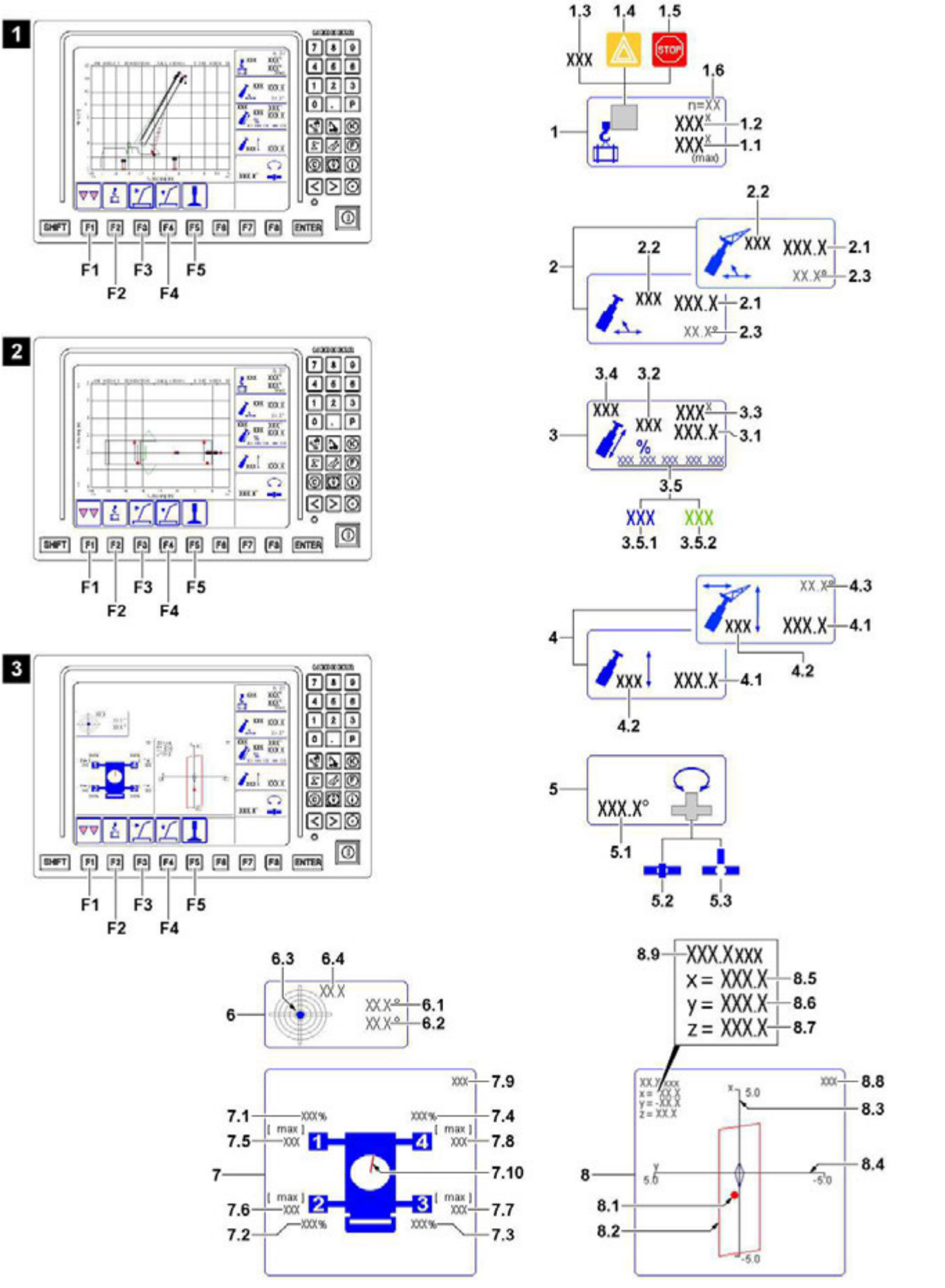

Fig.118366

7.3.4 Displays in the simulation mode

1 Load icon

1.1 Maximum load
- Calculated maximum load based on the simulation

1.2 Actual load
- Simulated value: Accepted / entered actual load
  Note: Can be changed in the input window for the load.

1.3 Measuring unit for load
- In [t] or [lbs]

1.4 Advance warning
- Appears if 90 percent [%] of the utilization of the crane is reached in simulation.

1.5 LMB Stop
- Appears if more than 100 % of the utilization of the crane is reached in simulation.

1.6 Reeving
- Simulated value: Reeving of hook block, calculated with the Planner program

2 Boom radius icon
- The display and assignment depends on the set up configuration, which is used for calculation in the Planner program.

2.1 Radius
- Simulated value: Horizontal distance of the load hook from the center of rotation of the crane superstructure

2.2 Measuring unit radius
- In [m] or [ft]

2.3 Boom angle
- Simulated value: Angle of main boom to the horizontal [°]

3 Boom length icon

3.1 Length of main boom
- Simulated value for the length of the main boom

3.2 Measuring unit of boom length
- In [m] or [ft]

3.3 Telescopeable load
- Calculated value based on the simulation

3.4 Measuring unit for load
- In [t] or [lbs]

3.5 Extension status telescopes
- Simulated values in [%]
- Sequence ascending to the right, beginning with telescope T1
- **3.5.1** blue value: Telescope pinned
- **3.5.2** green value: Telescope not pinned

4 Icon Pulley head

4.1 Pulley head height
- Simulated value: Marks the vertical distance from the placement surface of the crane to the selected pulley head axle.

4.2 Measuring unit of pulley head height
- In [m] or [ft]

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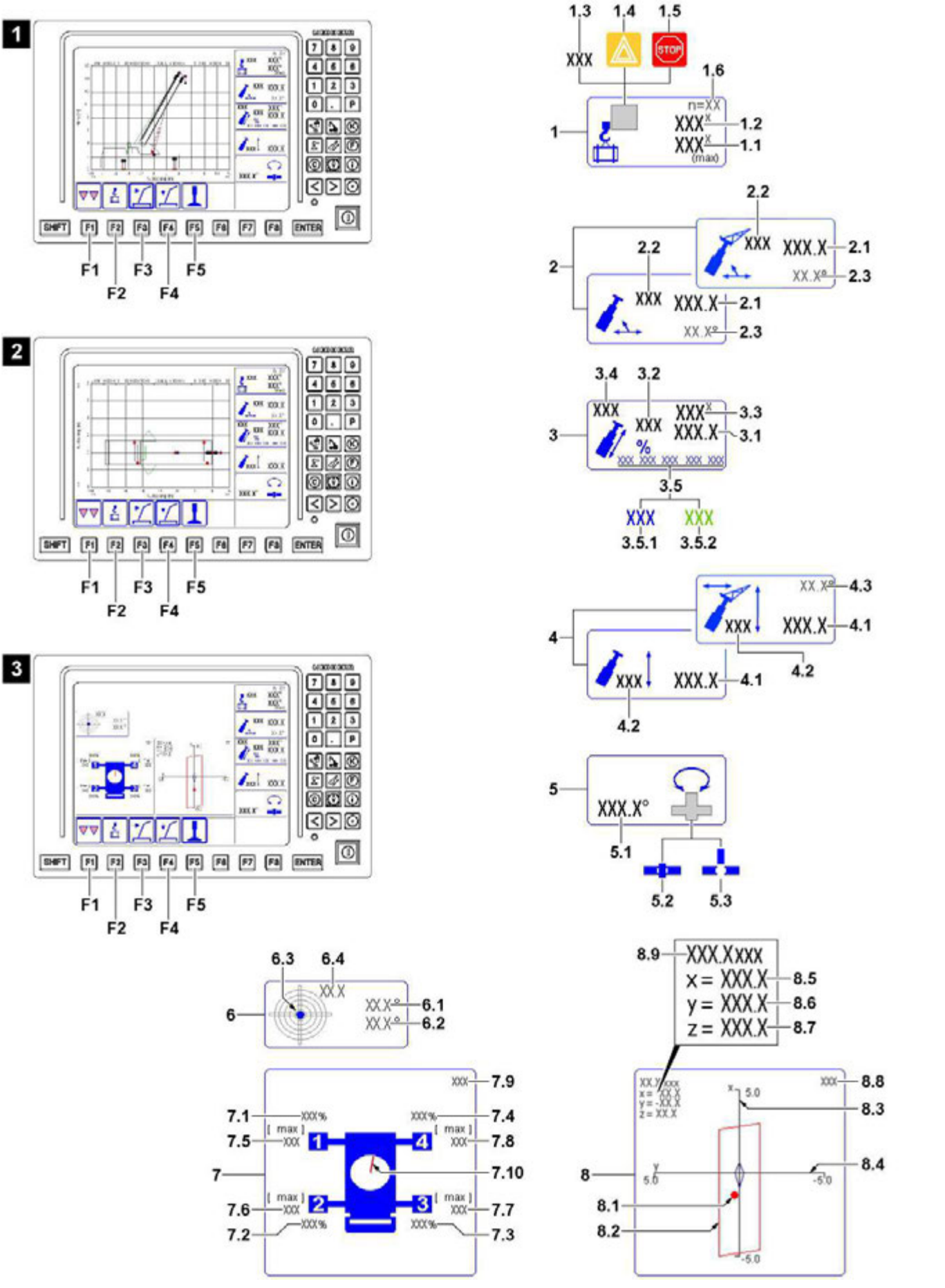

Fig.118366

4.3 Angle Auxiliary boom / accessory
- Simulated value: Absolute angle or relative angle of auxiliary boom / accessory in [°]
- **Note**: Only for set up configurations with auxiliary boom / accessory. Depending on the set up configuration and the load chart, a differentiation is made between an absolute angle display or a relative angle display.
  - Absolute angle auxiliary boom / accessory
    - The angle of the auxiliary boom / accessory to the horizontal in [°]
    - Display absolute angle: For operating modes with load chart for specified angles of the main boom.
  - 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 specified angles of the auxiliary boom / accessory.

5 Slewing range display

5.1 Slewing angle
- Simulated value: Slewing angle of the superstructure in [°] in relation to the working direction „to the rear“ (0°)
  Increases on both sides up to the maximum value of ±180°.

5.2 Pinned
- Is displayed when the crane superstructure is pinned in simulation.

5.3 Unpinned
- Is displayed when the crane superstructure is unpinned in simulation.

Additional displays in the support pressure / surface pressure view (Illustration 3)

6 Incline display
- Display of the incline of the crane to the horizontal in longitudinal and lateral direction. The display is graphic as well as numeric.

6.1 Longitudinal direction
- Incline of crane in longitudinal direction in [°]
- The direction arrow shows the direction of the incline

6.2 Lateral direction
- Incline of crane in lateral direction in [°]
- The direction arrow shows the direction of the incline

6.3 Graphic display
- The graphic display has the form of a sight gauge. In the sight gauge is a moving dot, which represents the air bubble.

6.4 Resolution of view
- This value describes the resolution of the graphic view **6.3**. The resolution is matched automatically to the incline.

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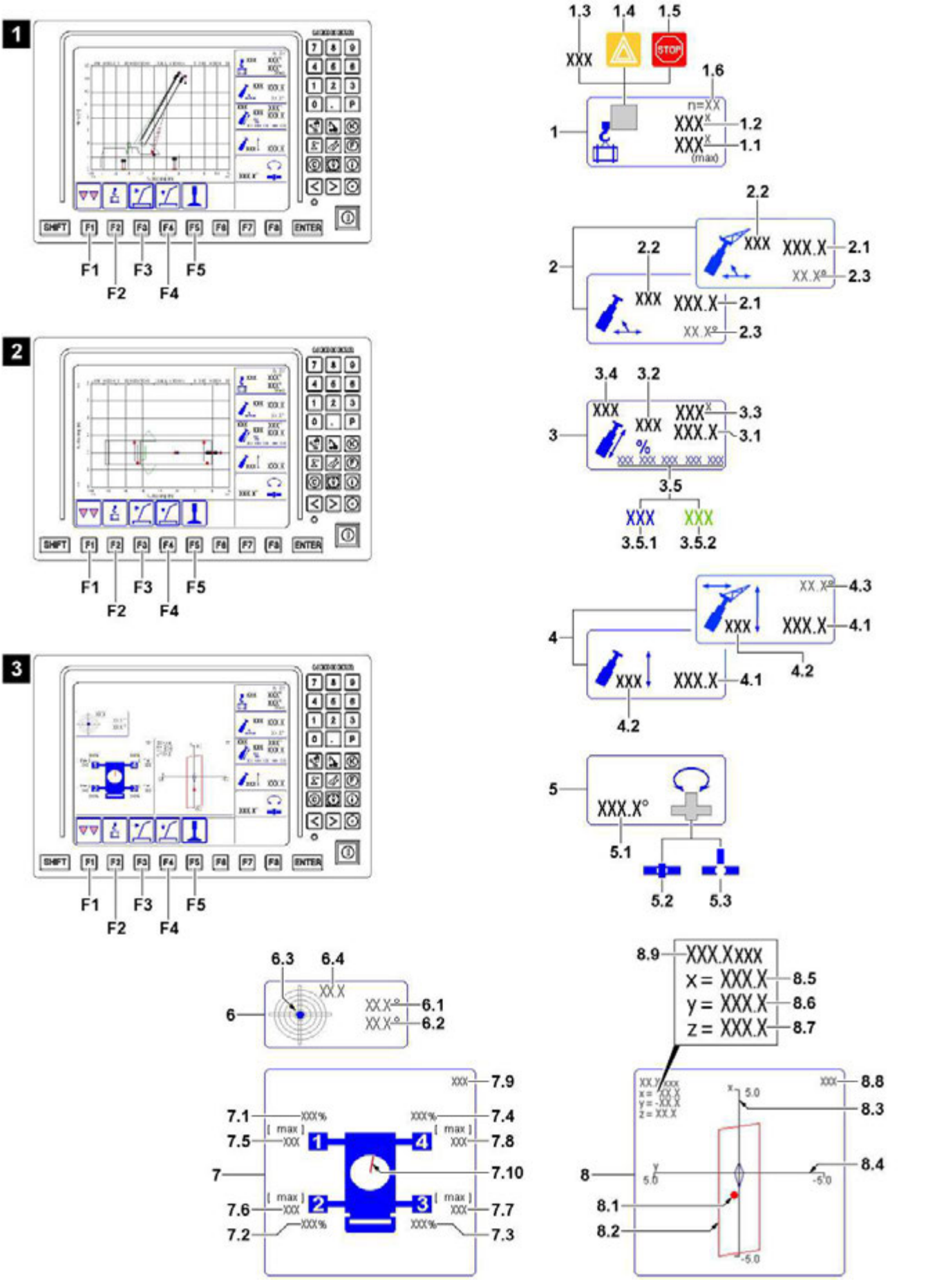

Fig.118366

7 Support display

7.1 Extension condition
- Simulated value: Extension condition for sliding beam 1 in [%]

7.2 Extension condition
- Simulated value: Extension condition for sliding beam 2 in [%]

7.3 Extension condition
- Simulated value: Extension condition for sliding beam 3 in [%]

7.4 Extension condition
- Simulated value: Extension condition for sliding beam 4 in [%]

7.5 Support force
- Simulated value: Support force for support 1

7.6 Support force
- Simulated value: Support force for support 2

7.7 Support force
- Simulated value: Support force for support 3

7.8 Support force
- Simulated value: Support force for support 4

7.9 Weight unit
- Weight unit of support force in [t] or [kips]

7.10 Alignment of telescopic boom
- The bar symbolizes the current alignment of the telescopic boom.

8 Center of gravity display

8.1 Center of gravity
- Calculated center of gravity displayed graphically in direction x/y
- **Note**: The position is in direct relation to the values center of gravity position x **8.5** and center of gravity position y **8.6**.

8.2 Tipping edge
- Calculated tipping edge of the crane, the center of gravity **8.1** must remain within the red bordered field of the tipping edge.

8.5 x-axis
- The x-axis **8.5** is assigned to the crane travel gear in longitudinal direction according to the support display **7**.

8.6 y-axis
- The y-axis **8.6** is assigned to the crane travel gear in lateral direction according to the support display **7**.

8.5 Center of gravity position x
- Calculated center of gravity position in direction „x“ (laterally to the crane travel gear)

8.6 Center of gravity position y
- Calculated center of gravity position in direction „y“ (longitudinally to the crane travel gear)

8.7 Center of gravity position z
- Calculated center of gravity position in direction „z“ (upward over the crane travel gear)

8.8 Measuring unit Center of gravity position
- In [m] or [ft]

8.9 Weight data
- Calculated total weight of the crane including the load in [t] or [kips]

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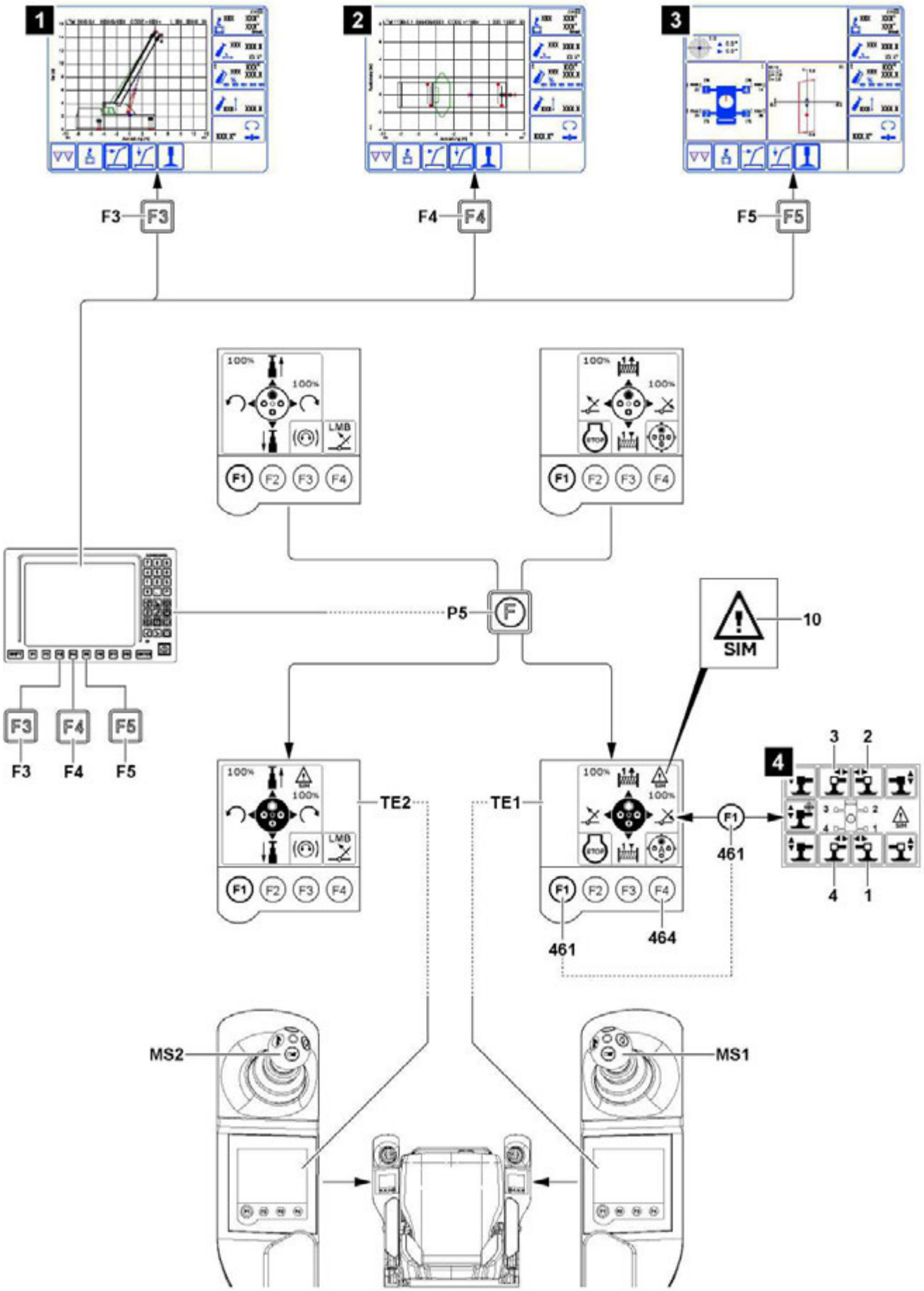

Fig.118362

7.4 Operating the simulation mode

- As soon as the Planner program is called up via the program key **P5**, the master switch **MS1** and master switch **MS2** are also in simulation mode.
- As long as the master switches are in simulation mode, the blinking Simulation **10** icon appears in the Touch display **TE1** and Touch display **TE2**.
- As long as the Planner program is active, no actual crane movements with the master switch **MS1** and master switch **MS2** are possible.

Note

▶ Only the master switch assignments from the current crane operation view are available.

7.4.1 Controlling the crane model in the LICCON monitor

- By deflecting master switch **MS1** and master switch **MS2** the crane model can be controlled in all three views in the simulation mode.
  - Illustration **1**: Two dimensional side view (function key **F3**)
  - Illustration **2**: Two dimensional overhead view (function key **F4**)
  - Illustration **3**: Two dimensional support pressure / surface pressure view (function key **F5**)
- The functions of the master switches in the simulation mode correspond to those in crane operation.
- The speed of the simulated crane movements is controlled by the degree of the deflection of the master switch. The speed reduction of the master switches is deactivated.

Controlling the crane model in the LICCON monitor:

▶ Deflect the master switch **MS1** according to the icons in the Touch display **TE1**.
▶ Deflect the master switch **MS2** according to the icons in the Touch display **TE2**.

Note

If several master switch assignments are available for selection:

▶ Press the F4-key **464** to change the master switch assignment.

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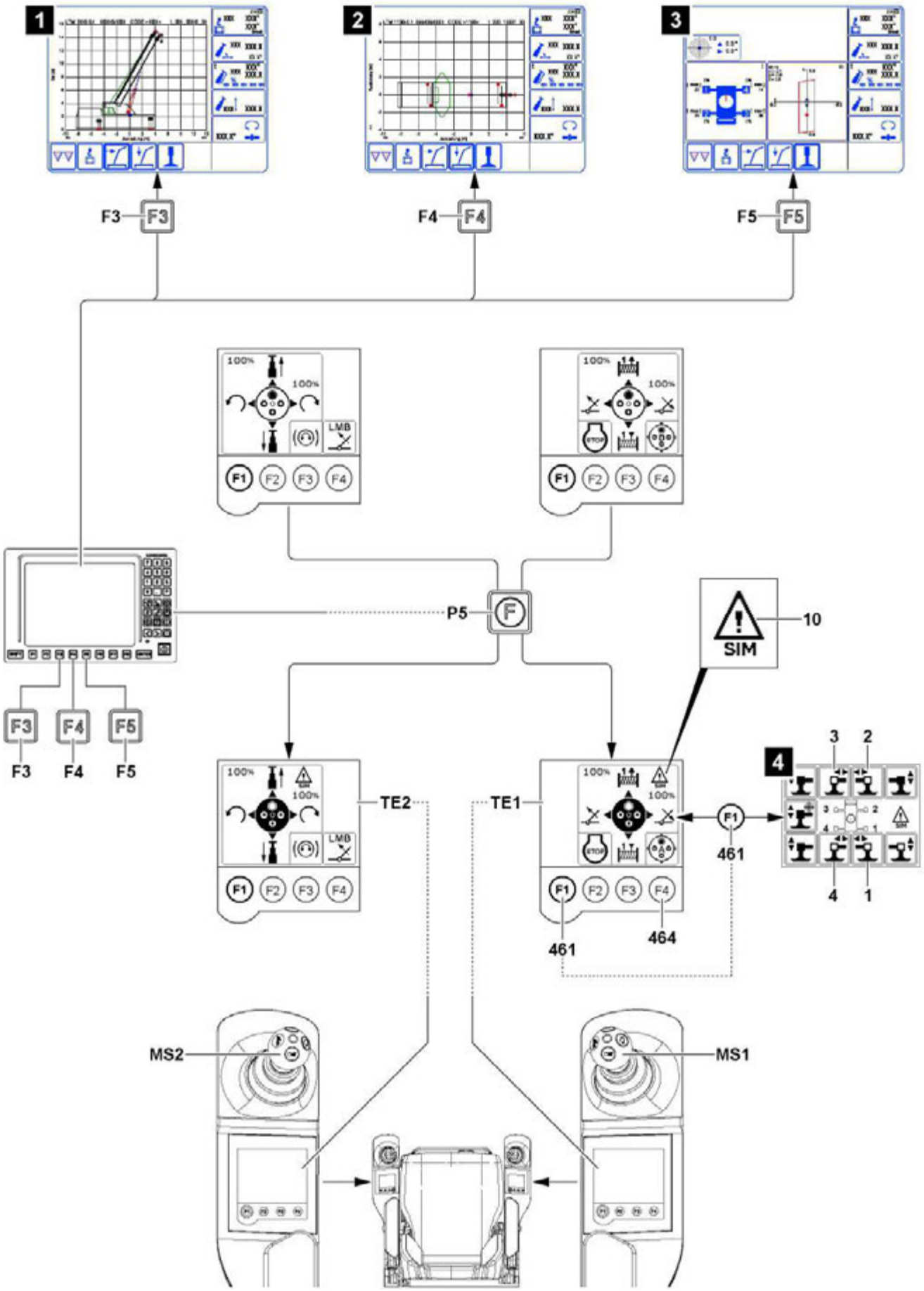

Fig.118362

7.4.2 Extending / retracting the sliding beams of the crane model in the LICCON monitor

Make sure that the following prerequisite is met:
- The support pressure / surface pressure view is called up (function key **F5**, see illustration **3**)

▶ Press the F1-key **461** on Touch display **TE1** to call up the Support menu.
▶ Activate the sliding beam by clicking the respective icon.

– Icon **1**: Sliding beam 1
– Icon **2**: Sliding beam 2
– Icon **3**: Sliding beam 3
– Icon **4**: Sliding beam 4
– **Note**: A sliding beam is only activated when the frame around the icon is highlighted in black.

▶ Extending / retracting the sliding beam in the simulation by deflecting master switch **MS1** in x-axis

Result:

– The value for the extension status of the sliding beam changes accordingly.
– The tipping edge in the center of gravity display icon changes accordingly.
– The new set extension status is taken over directly into the simulation.

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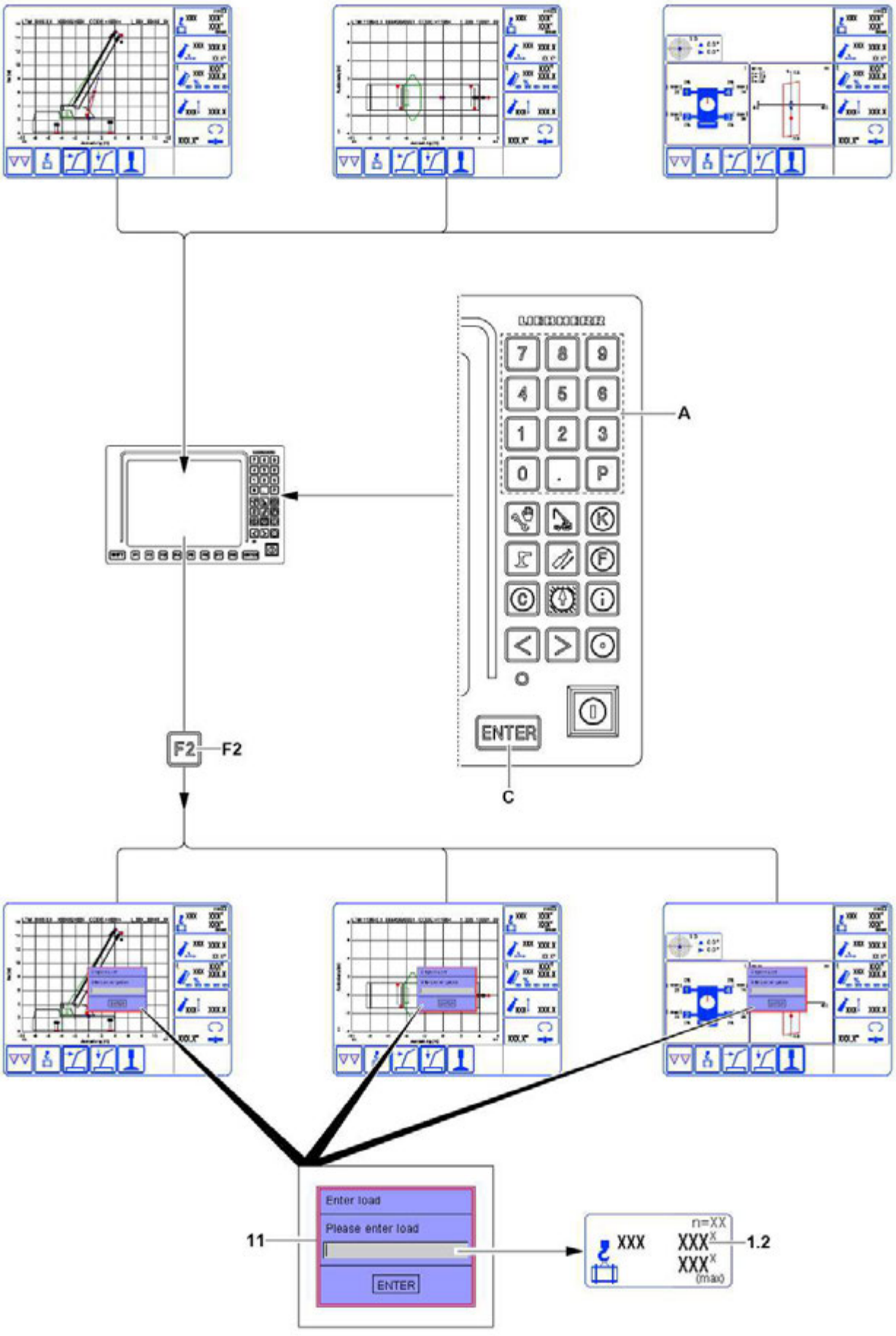

Fig.118367

7.4.3 Entering the load in the simulation mode

Make sure that the following prerequisite is met:
– The simulation mode is called up.

▶ Press the function key **F2** to call up the input window for load **11**.
▶ Enter the desired load via the keyboard **A**.

Result:

– The entered value is displayed in the input window for load **11**.

▶ Press the ENTER key **C**.

Result:

– The value is shown as the new Actual load **1.2**.
– The new Actual load **1.2** is taken over directly into the simulation.
– The input window for load **11** is closed.

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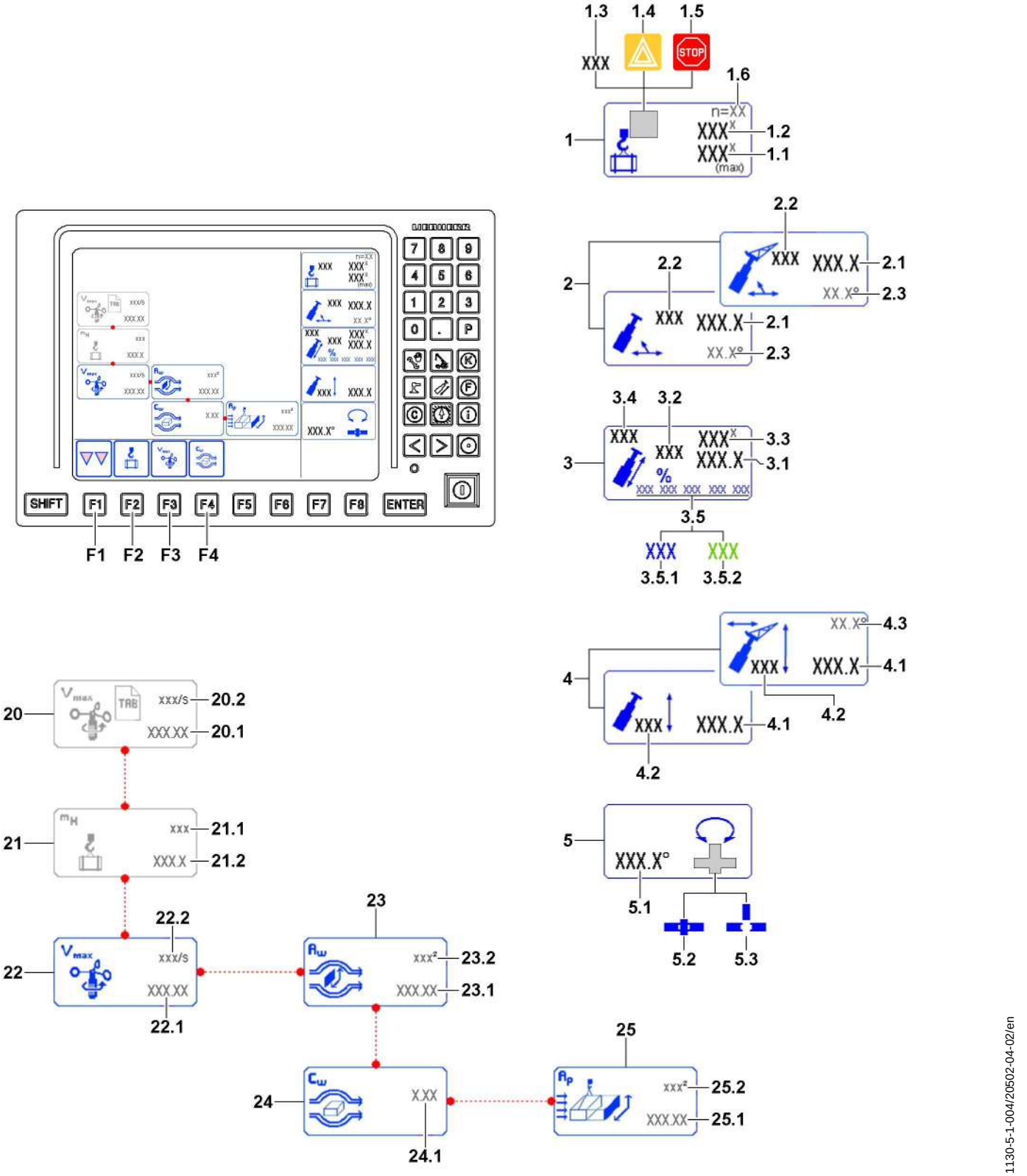

Fig.118370

7.5 Wind surface calculator

7.5.1 Function keys in the wind surface calculator

F1 Function key
- Change between wind surface calculator, wind speed calculator and simulation mode

F2 Function key
- Call up the input window for load

F3 Function key
- Call up the input window for maximum wind speed v_{max}

F4 Function key
- Call up the input window for wind resistance coefficient c_w

7.5.2 Displays in the wind surface calculator

The displayed values and conditions refer to the simulation mode.

1 Load icon

1.1 Maximum load
- Calculated maximum load based on the simulation

1.2 Actual load
- Simulated value: Accepted / entered actual load
  Note: Can be changed in the input window for the load.

1.3 Measuring unit for load
- In [t] or [lbs]

1.4 Advance warning
- Appears if 90 percent [%] of the utilization of the crane is reached in simulation

1.5 LMB Stop
- Appears if more than 100 % of the utilization of the crane is reached in simulation

1.6 Reeving
- Simulated value: Reeving of hook block, calculated with the Planner program

2 Boom radius icon
- The display and assignment depends on the set up configuration, which is used for calculation in the Planner program

2.1 Radius
- Simulated value: Horizontal distance of the load hook from the center of rotation of the crane superstructure

2.2 Measuring unit radius
- In [m] or [ft]

2.3 Boom angle
- Simulated value: Angle of main boom to the horizontal in [°]

3 Boom length icon

3.1 Length of main boom
- Simulated value for the length of the main boom

3.2 Measuring unit of boom length
- In [m] or [ft]

3.3 Telescopeable load
- Calculated value based on the simulation

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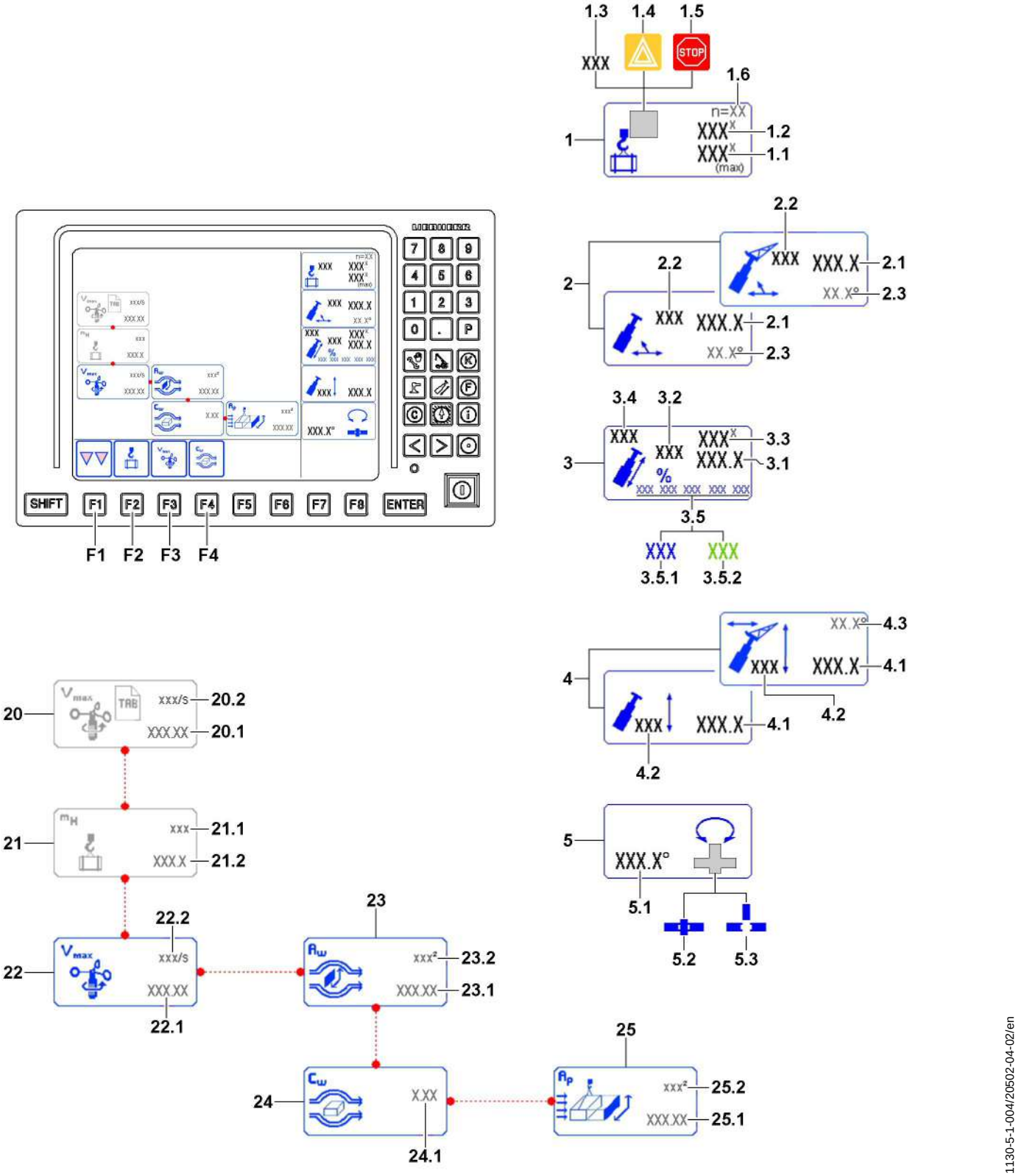

Fig.118370

3.4 Measuring unit for load
- In [t] or [lbs]

3.5 Extension status telescopes
- Simulated values in [%]
- Sequence ascending to the right, beginning with telescope T1
- **3.5.1** blue value: Telescope pinned
- **3.5.2** green value: Telescope not pinned

4 Icon Pulley head

4.1 Pulley head height
- Simulated value: Marks the vertical distance from the placement surface of the crane to the selected pulley head axle.

4.2 Measuring unit of pulley head height
- In [m] or [ft]

4.3 Angle Auxiliary boom / accessory
- Simulated value: Absolute angle or relative angle of auxiliary boom / accessory in [°]
- **Note**: Only for set up configurations with auxiliary boom / accessory. Depending on the set up configuration and the load chart, a differentiation is made between an absolute angle display or a relative angle display.
  - Absolute angle auxiliary boom / accessory
    - The angle of the auxiliary boom / accessory to the horizontal in [°]
    - Display absolute angle: For operating modes with load chart for specified angles of the main boom.
  - 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 specified angles of the auxiliary boom / accessory.

5 Slewing range display

5.1 Slewing angle
- Simulated value: Slewing angle of the superstructure in [°] in relation to the working direction „to the rear“ (0°)
  Increases on both sides up to the maximum value of ±180°.

5.2 Pinned
- Is displayed when the crane superstructure is pinned in simulation.

5.3 Unpinned
- Is displayed when the crane superstructure is unpinned in simulation.

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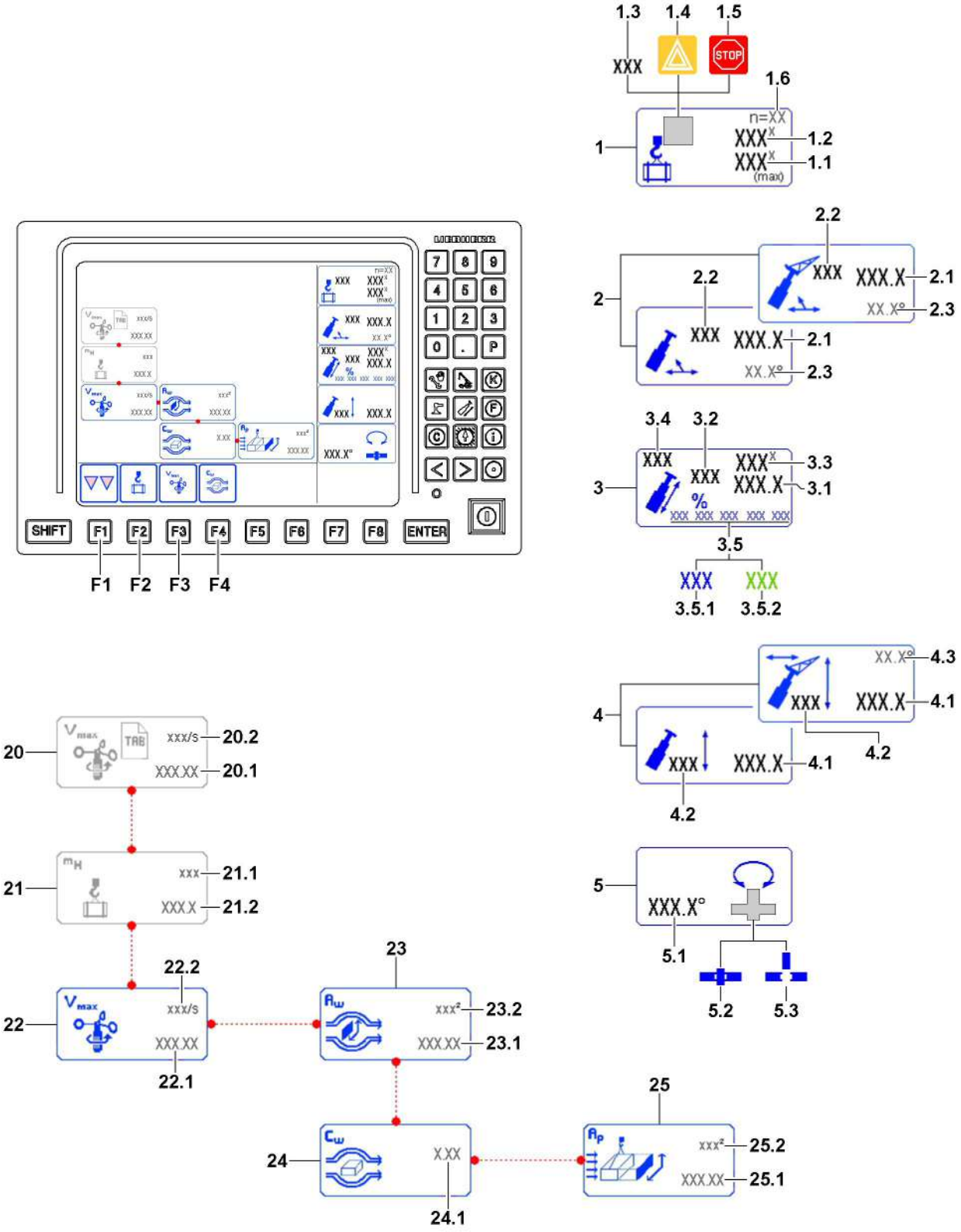

Fig.118370

20 Wind speed v_{max_TAB}
- Maximum permissible 3 second wind gust speed in maximum lifting heights, which are specified for the load chart values in the load chart.

20.1 Value v_{max_TAB}
- Chart value taken from the load chart for v_{max_TAB}

20.2 Measuring unit v_{max_TAB}
- In [m] or [ft] per second

21 Hoist load m_H
- Weight to be lifted including fastening equipment, hook block and hoist rope section at nominal reeving

21.1 Value m_H
- Current value for m_H

21.2 Measuring unit m_H
- In [m] or [ft] per second

22 Wind speed v_{max}
- **Maximum expected** 3 second wind gust speed at maximum lifting height.

22.1 Value v_{max}
- Maximum permissible value for v_{max}

22.2 Measuring unit v_{max}
- In [m] or [ft] per second

23 Wind exposure surface A_W
- Wind exposure surface = projection surface multiplied with wind resistance coefficient $A_W = A_P * c_W$

23.1 Value A_W
- Current value for A_w

23.2 Measuring unit A_W
- In [m²] or [ft²]

24 Wind resistance coefficient c_W
- Value for the flow resistance of wind flowing around a body.

24.1 Value c_W
- Current value for c_W

25 Projection surface A_P
- Applicable for the calculation of the wind exposure surface, vertically to the surface directed to the flow.

25.1 Value A_P
- Current value for A_P

25.2 Measuring unit A_P
- In [m²] or [ft²]

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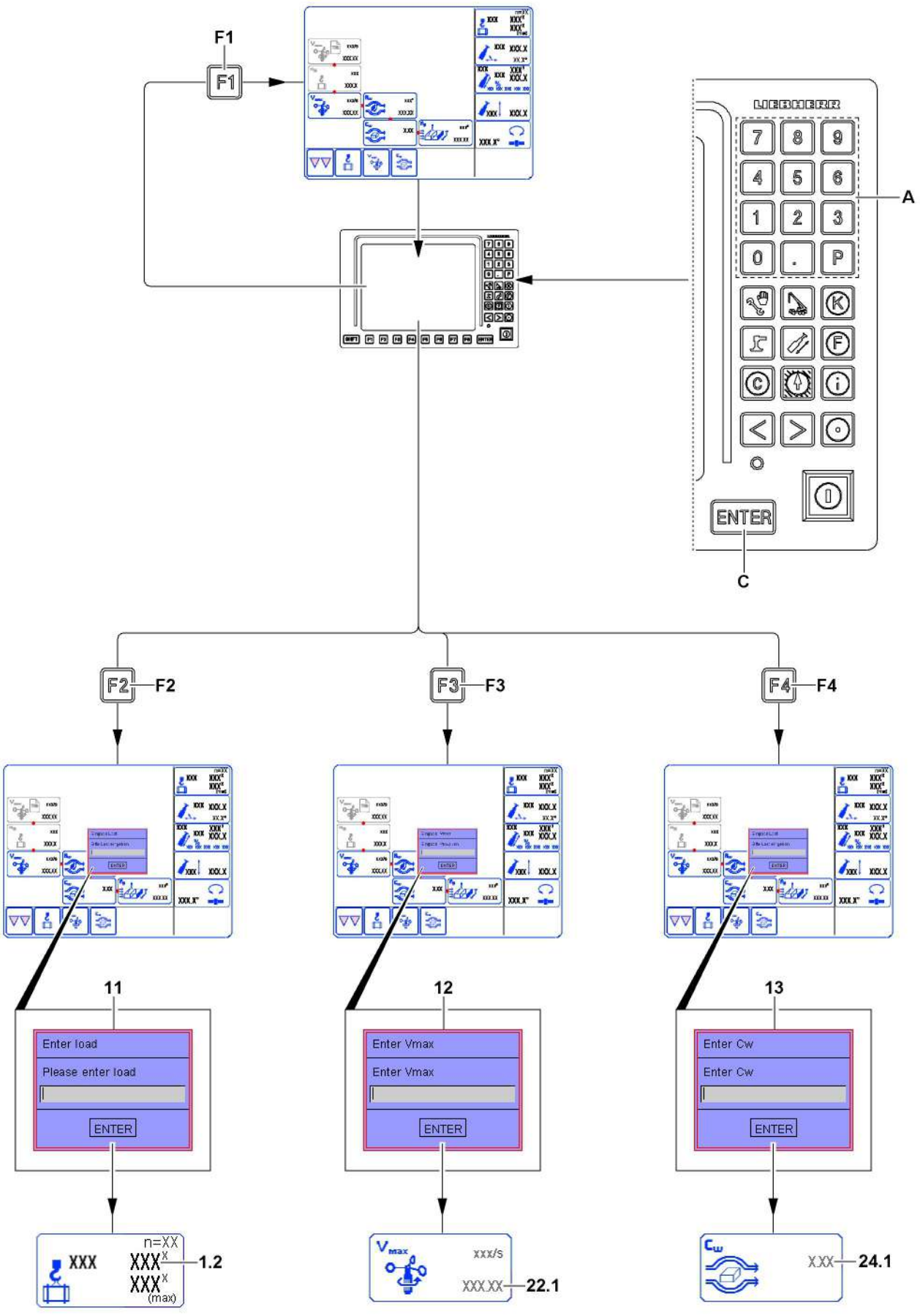

Fig.118368

7.6 Values entered in the wind surface calculator

▶ Press the function key **F1** until the wind surface calculator appears.

Enter the load:

▶ Press the function key **F2** to call up the input window for load **11**.
▶ Enter the desired load via the keyboard **A**.

Result:

– The entered value is displayed in the input window for load **11**.

▶ Press the ENTER key **C**.

Result:

– The value is shown as the new Actual load **1.2**.
– The new Actual load **1.2** is taken over directly into the wind surface calculator.
– The input window for load **11** is closed.

Enter the **Wind speed v_{max}:**

▶ Press the function key **F3** to call up the input window for wind speed v_{max} **12**.

Note
Input window Wind speed v_{max} **12**
▶ Enter the **maximum expected** 3 second wind gust speed at maximum lifting height here.

▶ Enter the desired wind speed v_{max} via the keyboard **A**.

Result:

– The entered value is displayed in the Input window Wind speed v_{max} **12**.

▶ Press the ENTER key **C**.

Result:

– The value is shown as the new Value v_{max} **22.1**.
– The new Value v_{max} **22.1** is taken over directly into the wind surface calculator.
– The Input window Wind speed v_{max} **12** is closed.

Enter the **Wind resistance coefficient c_w:**

▶ Press the function key **F4** to call up the input window for wind resistance coefficient c_w **13**.
▶ Enter the desired wind resistance coefficient c_w via the keyboard **A** .

Result:

– The entered value is displayed in the Input window Wind resistance coefficient c_w **13**.

▶ Press the ENTER key **C**.

Result:

– The value is shown as the new Value c_w **24.1**.
– The new Value c_w **24.1** is taken over directly into the wind surface calculator.
– The Input window wind resistance coefficient c_w **13** is closed.

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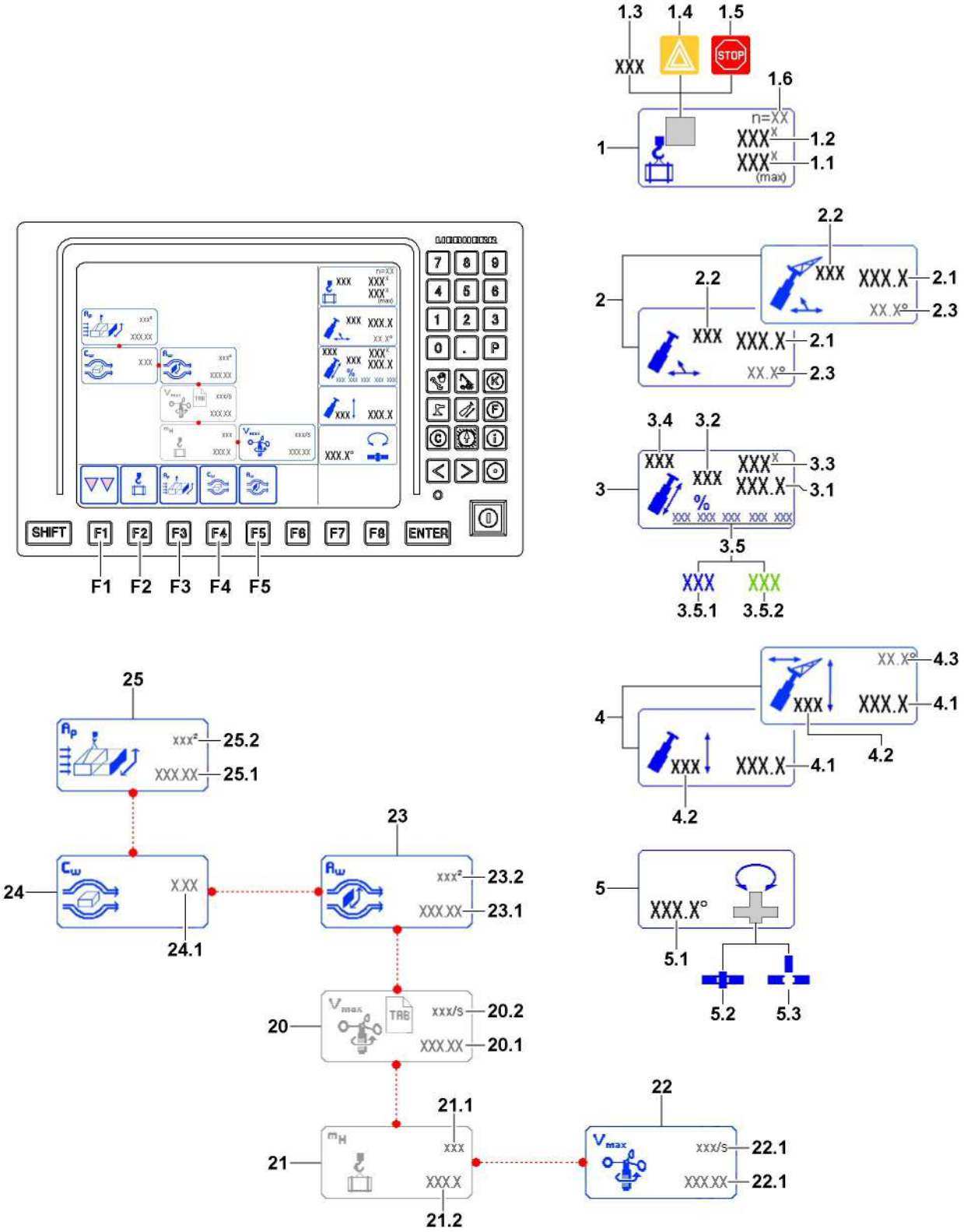

LWE/LTM 1130-5-1-004/20502-04-02/en

Fig.118371

7.7 Wind speed calculator

7.7.1 Function keys in the wind speed calculator

F1 Function key
- Change between wind surface calculator, wind speed calculator and simulation mode.

F2 Function key
- Call up the input window for load

F3 Function key
- Call up the input window Projection surface A_P

F4 Function key
- Call up the input window for wind resistance coefficient c_w

F4 Function key
- Call up the input window Wind exposure surface A_w

7.7.2 Displays in the wind speed calculator

The displayed values and conditions refer to the simulation mode.

1 Load icon

1.1 Maximum load
- Calculated maximum load based on the simulation.

1.2 Actual load
- Simulated value: Accepted / entered actual load
  Note: Can be changed in the input window for the load.

1.3 Measuring unit for load
- In [t] or [lbs]

1.4 Advance warning
- Appears if 90 percent [%] of the utilization of the crane is reached in simulation.

1.5 LMB Stop
- Appears if more than 100 % of the utilization of the crane is reached in simulation.

1.6 Reeving
- Simulated value: Reeving of hook block, calculated with the Planner program

2 Boom radius icon
- The display and assignment depends on the set up configuration, which is used for calculation in the Planner program.

2.1 Radius
- Simulated value: Horizontal distance of the load hook from the center of rotation of the crane superstructure

2.2 Measuring unit radius
- In [m] or [ft]

2.3 Boom angle
- Simulated value: Angle of main boom to the horizontal in [°]

3 Boom length icon

3.1 Length of main boom
- Simulated value for the length of the main boom

3.2 Measuring unit of boom length
- In [m] or [ft]

3.3 Telescopeable load
- Calculated value based on the simulation.

3.4 Measuring unit for load
- In [t] or [lbs]

LWE/LTM 1130-5-1-004/20502-04-02/en

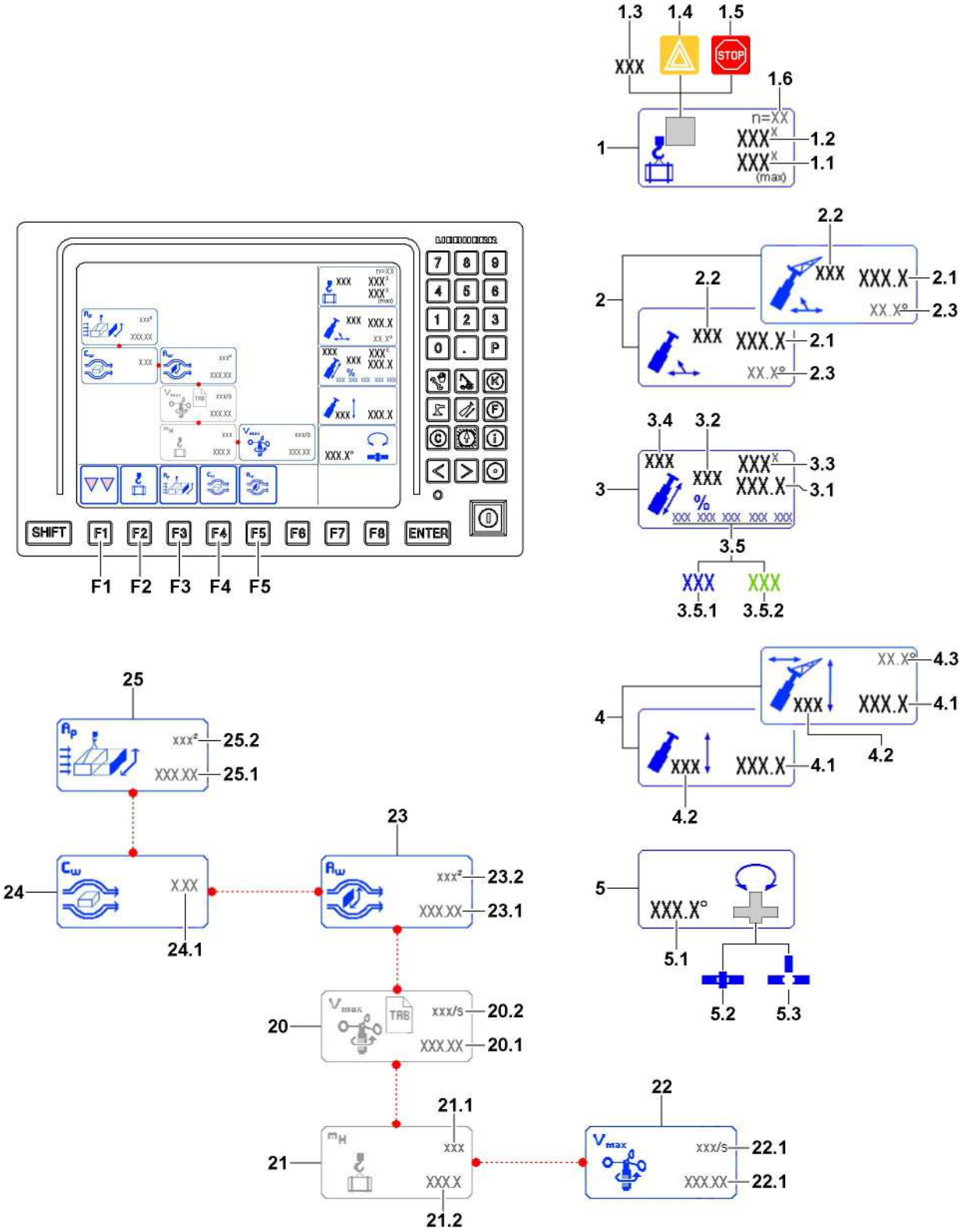

Fig.118371

3.5 Extension status telescopes
- Simulated values in [%]
- Sequence ascending to the right, beginning with telescope T1
- **3.5.1** blue value: Telescope pinned
- **3.5.2** green value: Telescope not pinned

4 Icon Pulley head

4.1 Pulley head height
- Simulated value: Marks the vertical distance from the placement surface of the crane to the selected pulley head axle.

4.2 Measuring unit of pulley head height
- In [m] or [ft]

4.3 Angle Auxiliary boom / accessory
- Simulated value: Absolute angle or relative angle of auxiliary boom / accessory in [°]
- **Note**: Only for set up configurations with auxiliary boom / accessory. Depending on the set up configuration and the load chart, a differentiation is made between an absolute angle display or a relative angle display.
  - Absolute angle auxiliary boom / accessory
    - The angle of the auxiliary boom / accessory to the horizontal in [°]
    - Display absolute angle: For operating modes with load chart for specified angles of the main boom.
  - 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 specified angles of the auxiliary boom / accessory.

5 Slewing range display

5.1 Slewing angle
- Simulated value: Slewing angle of the superstructure in [°] in relation to the working direction „to the rear“ (0°)
  Increases on both sides up to the maximum value of ±180°.

5.2 Pinned
- Is displayed when the crane superstructure is pinned in simulation.

5.3 Unpinned
- Is displayed when the crane superstructure is unpinned in simulation.

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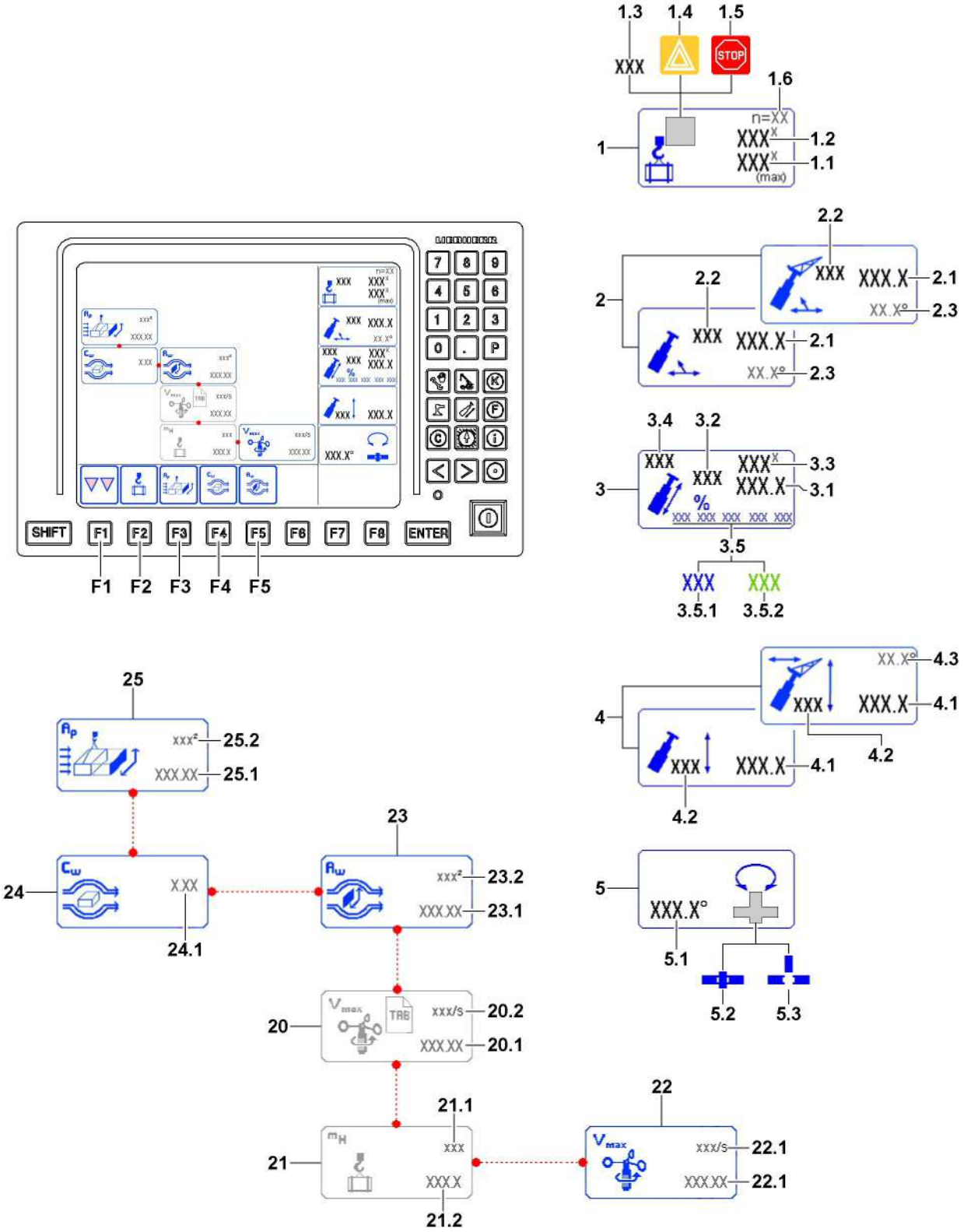

Fig.118371

20 Wind speed v_{max_TAB}
- Maximum permissible 3 second wind gust speed in maximum lifting heights, which are specified for the load chart values in the load chart.

20.1 Value v_{max_TAB}
- Chart value taken from the load chart for v_{max_TAB}

20.2 Measuring unit v_{max_TAB}
- In [m] or [ft] per second

21 Hoist load m_H
- Weight to be lifted including fastening equipment, hook block and hoist rope section at nominal reeving

21.1 Value m_H
- Current value for m_H

21.2 Measuring unit m_H
- In [m] or [ft] per second

22 Wind speed v_{max}
- **Maximum permissible** 3 second wind gust speed at maximum lifting height.

22.1 Value v_{max}
- Maximum permissible value for v_{max}

22.2 Measuring unit v_{max}
- In [m] or [ft] per second

23 Wind exposure surface A_W
- Wind exposure surface = projection surface multiplied with wind resistance coefficient $A_W = A_P * c_W$

23.1 Value A_W
- Current value for A_W

23.2 Measuring unit A_W
- In [m²] or [ft²]

24 Wind resistance coefficient c_W
- Value for the flow resistance of wind flowing around a body.

24.1 Value c_W
- Current value for c_W

25 Projection surface A_P
- Applicable for the calculation of the wind exposure surface, vertically to the surface directed to the flow.

25.1 Value A_P
- Current value for A_P

25.2 Measuring unit A_P
- In [m²] or [ft²]

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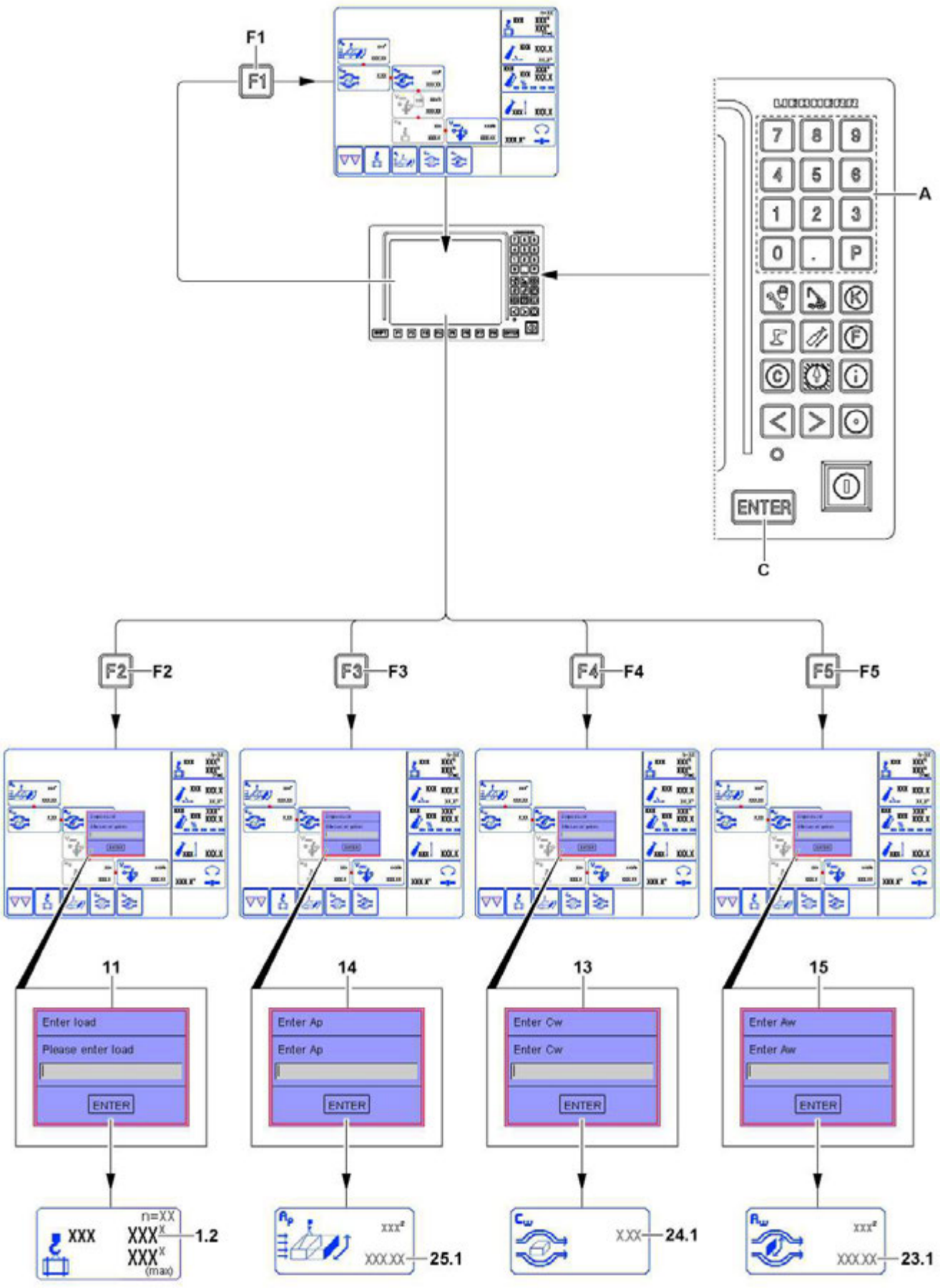

Fig.118369

7.8 Values entered in the wind speed calculator

▶ Press the function key **F1** until the wind speed calculator appears.

Enter the load:

▶ Press the function key **F2** to call up the input window for load **11**.
▶ Enter the desired load via the keyboard **A**.

Result:

– The entered value is displayed in the input window for load **11**.

▶ Press the ENTER key **C**.

Result:

– The value is shown as the new Actual load **1.2**.
– The new Actual load **1.2** is taken over directly into the wind speed calculator.
– The input window for load **11** is closed.

Enter the **Projection surface A_P:**

▶ Press the function key **F3** to call up the Input window Projection surface A_P **14**.
▶ Enter the desired projection surface A_P via the keyboard **A**.

Result:

– The entered value is displayed in the Input window Projection surface A_P **14**.

▶ Press the ENTER key **C**.

Result:

– The value is shown as the new Value A_P **25.1**.
– The new Value A_P **25.1** is taken over directly into the wind speed calculator.
– The Input window Projection surface A_P **14** is closed.

Enter the **Wind resistance coefficient c_W:**

▶ Press the function key **F4** to call up the input window for wind resistance coefficient c_W **13**.
▶ Enter the desired wind resistance coefficient c_W via the keyboard **A** .

Result:

– The entered value is displayed in the Input window Wind resistance coefficient c_W **13**.

▶ Press the ENTER key **C**.

Result:

– The value is shown as the new Value c_W **24.1**.
– The new Value c_W **24.1** is taken over directly into the wind speed calculator.
– The Input window wind resistance coefficient c_W **13** is closed.

Enter the **Wind exposure surface A_W:**

▶ Press the function key **F5** to call up the input window for wind exposure surface A_W **15**.
▶ Enter the desired wind exposure surface A_W via the keyboard **A**.

Result:

– The entered value is displayed in the Input window Wind exposure surface A_W **15**.

▶ Press the ENTER key **C**.

Result:

– The value is shown as the new Value A_W **23.1**.
– The new Value A_W **23.1** is taken over directly into the wind speed calculator.
– The Input window wind exposure surface A_W **15** is closed.

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7 Service and maintenance

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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 7.03: Maintenance intervals - Crane superstructure [1)]
- Crane operating instructions, chapter 7.04: Maintenance guidelines - Crane chassis [2)]
- Crane operating instructions, chapter 7.05: Maintenance guidelines - Crane superstructure [2)]
- Crane operating instructions, chapter 7.06: Fill quantities, lubrication chart
- Crane operating instructions, chapter 7.07: Service items and lubricants

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 driving or crane operation during maintenance or repair tasks!
Death, severe injury, severe property damage.
- ▶ Make sure that driving 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.
- ▶ Carry out maintenance or repair tasks exclusively with authorized and trained expert personnel.
- ▶ Make sure that **exclusively** authorized persons are within the danger zone.

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 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 Crane operating instructions, chapter 2.04.
- ▶ It is prohibited to step on the driver’s cab or cab roof and specially marked surfaces. See Crane operating instructions, chapter 2.05.

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!

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1.7 Preventing fires

WARNING
Excess fuel, excess oil in engine compartment during operation!
Death, severe injury, fire damage.
- ▶ Check the V-area after repairs and Service tasks but also in regular intervals for oil and fuel.
- ▶ Make sure that the V-area of the Diesel engine is free of oil and fuel.

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
Insulation (sound insulation) are contaminated with solvents or foreign matter!
Solvents, engine oils, gear oils, hydraulic oils or fuels can ignite the insulation.
Severe burns, fire damage.
- ▶ Remove any polluted insulation **immediately** and **replace immediately** with **Original Liebherr spare parts**.

1.8 Protecting from burns

WARNING
Hot surfaces of crane components, especially on the exhaust system or travel gear!
Severe burns.
- ▶ Let any components to be maintained or inspected cool off.
- ▶ Do not spill any service fluids over the hot components.
- ▶ Avoid 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 could 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.

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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 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 notes and the lubrication chart.
- ▶ Replace damaged crane components immediately.

1.13 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 guidelines. See Crane operating instructions, chapter 2.02.

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 notes and the lubrication chart.

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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 operational use and may be used without risking safety.

The buyer in entitled to warranty or coverage only:
– when exclusively Original Liebherr spare parts are used.
– 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.

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4 Oil and lubricant analysis

NOTICE
Oil analysis intervals and oil change intervals **not** adhered to!
Gear damage.
- ▶ Strictly adhere to the oil analysis and oil change intervals.
- ▶ If an earlier oil change is required due to oil analysis results: Change the oil.
- ▶ Carry out regular lubricant analysis for gear oils in travel gear, slewing gear and winch gears.
- ▶ Adhere to the maintenance intervals. See Crane operating instructions, chapter 7.02 and chapter 7.03.

The following properties of the oil can be determined through oil analysis:
- Degree of wear of gear components
- Composition of mechanical abrasion in the oil
- Viscosity of the oil
- Degree of oil contamination
- Other relevant properties of the oil

Advantages of oil or lubricant analysis:
- Technical evaluation regarding further use of the gear or the oil
- The gear oil change intervals can be matched according to the operating conditions and the results of the oil analysis, without risk, effectively and economically.
- A just starting gear damage can be recognized in time and as a result, the correct time of gear replacement can be determined.
- Operating times or repairs can be planned more effectively.
- Am earlier repair of gear components protects from larger and unforeseen damage.
- Subsequent damage can therefore be avoided to the greatest possible extent.

4.1 Taking an oil sample

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:
- Gear was shut down immediately
- Oil has normal operating temperature

- ▶ Always take oil on the same location of the gear.
- ▶ Take oil always according to the same method.
- ▶ For gears with double slipring seal: Take oil additionally from the slipring sealing chamber.
- ▶ Do **not** take oil right after an oil change.
- ▶ Do **not** take oil immediately after larger amounts of oil have been added.

Note
Recommendation:
- ▶ Fill oil into original sample containers.

- ▶ Fill oil exclusively in a clean and dry sample container.

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5 Cleaning

5.1 Exhaust system

NOTICE
Infiltration of water into the exhaust system on engines with exhaust aftertreatment SCR!
Sensors for exhaust aftertreatment can be destroyed, the coating of the SCR catalytic converter can be washed off.
- ▶ Make sure that no water gets into the exhaust.
- ▶ During cleaning, keep sufficient distance to the exhaust.

5.2 Insulation (sound insulation)

NOTICE
Improper cleaning (tools or cleaning methods)!
Insulation 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 insulation and with low water pressure.
- ▶ Do **not** use solvents for cleaning.

Note
- ▶ Sound insulation may **not** be removed!

Sound insulation in the area of engines and other noise sources is an integral part of the total construction. Sound insulation limits the noise generation of vehicles and the sound level in the workplace to the legally specified values in connection with sound insulation and the design of the equipment. Sound insulation is therefore an integral part for the construction permits for the machines.

From a construction point of view, sound insulation has been designed to be maintenance-free. Sound insulation has been equipped with surfaces that repel dirt, oil and water. Sound insulation is very flame-resistant and in part, depending on application, is fireproof.

For these reasons, sound insulation requires no care. Any small dirt deposits can be disregarded, as the acoustic effectiveness of the parts is not reduced.

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 Service items 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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Fig.195219

1 Crane chassis 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
	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
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
						Every 2 years	Replacing the coolant
SCR Exhaust after-treatment							
			4500 h			Every 2 years	Replace foam and filter element of urea pump

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First maintenance after	Operating hour intervals or driven mileage			Calendar intervals			Work to be carried out
	250 h 5000 km	500 h 10000 km	1000 h 20000 km	Daily	Weekly	Annually	
Air filter							
				X			Check monitoring device
						X	Clean, change the filter insert Observe the instructions of the engine manufacturer
Receptacle frame telescoping boom							
	X						Grease
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	Have safe working condition checked by 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		Check steering using test program
				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.

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First maintenance after	Operating hour intervals or driven mileage			Calendar intervals			Work to be carried out
	250 h 5000 km	500 h 10000 km	1000 h 20000 km	Daily	Weekly	Annually	
					Every 2 weeks		Spray steering uncoupling LTC 1045-3.1
Hydraulic fan							
100 h		X					Replace pressure filter insert of hydraulic fan
Hydraulic supports							
	X						Check sliding beam for ease of movement, grease
	X						Check sliding beam cables
					X		Grease sliding beam cylinder mounting pins
						X	Lubricate bearing points of the swingable swing beams (folding beams)
					X		Check sight gauge, adjust if necessary
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
Automatic transmission AS-Tronic, AS-Tronic HD							
					X		Check the oil level
					X		Check for leaks
						Every 3 years [5)]	Oil change

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First maintenance after	Operating hour intervals or driven mileage			Calendar intervals			Work to be carried out
	250 h 5000 km	500 h 10000 km	1000 h 20000 km	Daily	Weekly	Annually	
						Every 3 years [5]	Replace oil filter
Torque converter transmission TC 2							
					X		Check the oil level
					X		Check for leaks
						X	Oil change
						X	Replace oil filter
Torque converter transmission TC HD							
					X		Check the oil level
					X		Check for leaks
						X	Oil change
						X	Replace suction filter
						X	Replace pressure filter
Drop box							
					X		Check for leaks
	X						Check mounting
1000 km			X			X	Oil change
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 on-road / off-road gear
					X		Check all-wheel drive enabling function
				Every 2 years			Have tachograph / trip recorder checked
			X			X	Clean breather nipple
Hydrostatic travel drive							
				X			Check hydraulic hoses for leaks and damage
100 h		X					Clean filter unit
			X				Replace filter insert
Pump distributor gear							

First maintenance after	Operating hour intervals or driven mileage			Calendar intervals			Work to be carried out
	250 h 5000 km	500 h 10000 km	1000 h 20000 km	Daily	Weekly	Annually	
					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
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 drive 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 steering knuckle 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							

First maintenance after	Operating hour intervals or driven mileage			Calendar intervals			Work to be carried out
	250 h 5000 km	500 h 10000 km	1000 h 20000 km	Daily	Weekly	Annually	
			10000 km			X	Grease steering knuckle bearings
	X						Check mounting
			X			X	Replace wheel hub grease filling
			X			X	Adjust wheel bearings
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 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

First maintenance after	Operating hour intervals or driven mileage			Calendar intervals			Work to be carried out
	250 h 5000 km	500 h 10000 km	1000 h 20000 km	Daily	Weekly	Annually	
				X			Check function of parking brake and service brake
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 drier granular cartridges
						X	Clean air drier 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
Window washer system, camera washer system							
				X			Check the fluid level in the reservoir for the washer system
Emergency control							
						X	Check for correct function
Support plates with equalization							
						X	Replace grease filling
						X	Perform function test

[1)] In frequent off-road application: every 500 km to 2000 km [2)] In frequent off-road application: at least 1x a year[3)] In hot climate zones: every 3 months[4)] Observe chapter 7.04, Maintenance guidelines - Crane chassis[5)] Only when using ZF-Ecofluid M, otherwise every 2 years[6)] In winter: when road salt is used or near the ocean

Fig.195219

1 Crane superstructure 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			Calendar intervals			Work to be carried out
	250 h	500 h	1500 h	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
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

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First maintenance after	Operating hour intervals 250 h	500 h	1500 h	Calendar intervals Daily	Weekly	Annually	Work to be carried out
				X			Check the coolant level in the expansion tank
						Every 2 years	Replace coolant
SCR Exhaust after-treatment							
			4500 h			Every 2 years	Replace foam and filter element of urea pump
Engine independent heater							
				X			Check the fluid level in the expansion tank
					Monthly		Operate for 10 minutes with cold engine and lowest fan setting
						X	Carry out service 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
Slewing ring connection							
	X						Lubricate the gears
						X [1)]	Lubricating the slewing ring connection
250 h			X			X	Check the mounting screws for tight seating
						X	Check the tilt play
Rope winches							
250 h						X	Check the mounting screws for tight seating
				X			Check for leaks
					X		Check the oil level
			200 h			X	Check the condition of the tooth flanks; determining factor is operating hours of the winch. (only LR 13000)
		X					Check the gear oil via oil analysis
			3000 h			Every 4 years	Replace the gear oil
						X	Check the remaining theoretical utilization life by a technical expert
						Every 4 years	Check the remaining theoretical utilization life by authorized specialist
Hoist gear brakes							

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First maintenance after	Operating hour intervals 250 h	500 h	1500 h	Calendar intervals Daily	Weekly	Annually	Work to be carried out
				X			Check for leaks
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
Guy rods							
						X	Check for cracks, damage and distortion by a technical expert
						Every 4 years	Check for cracks, damage and distortion by an authorized inspector
						X	Checking the retaining elements
Relapse supports							
		X				X	Lubricate the bearings
X [2), 6)]							Check the oscillation guard for easy movement
Relapse cylinder							
X [2), 6)]					X		Check for leaks
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-bracket							
		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							
1,000 km		or 10,000 km				X	Check tightening torque of mounting screws
Concrete ballast plates (ballast container) (only LR 13000)							
				X			Check for damage

First maintenance	Operating hour intervals			Calendar intervals			Work to be carried out
after	250 h	500 h	1500 h	Daily	Weekly	Annually	
						Every 5 years	Check by licensing agency
Ballasting							
	X					X	Lubricate the bearings
Press on pulleys of rope winches							
	X					X	Grease guides
Rope pulleys							
			X			X	Check for wear, damage, cracks and easy movement
			X			X	Grease
Crane ropes							
				X			Check for damage and distortion
					Monthly		Check, grease by expert personnel
						X	Check by technical expert
						Every 4 years	Check by authorized inspector
Hook blocks							
		X				X	Lubricate the hook
						X	Check distance dimension (y)
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 control
		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
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	1500 h	Calendar intervals Daily	Weekly	Annually	Work to be carried out
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	Check the mounting screws for tight seating
				X			Check for leaks
					X		Check the oil level
		X					Check the gear oil via oil analysis
			4000 h			Every 4 years	Replace the gear oil
Turntable lock							
		X				X	Grease
		X				X	Check for correct function
Bearings							
						X	Checking the retaining elements
Pump distributor gear							
				X			Check for leaks
					X		Check the oil level
500 h			X			X	Replace the gear oil

First maintenance after	Operating hour intervals 250 h	500 h	1500 h	Calendar intervals Daily	Weekly	Annually	Work to be carried out
Hydraulic hose lines							
				X			Check for leaks and damage
						X	Check for safe condition by 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
Hydraulic pressure accumulator (nitrogen)							
		X [4]				X [4]	Check pretension pressures
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 drier granular cartridges
						X	Clean air drier preliminary filter
Central lubrication system							
		X					Check for correct function
					X		Check the grease container fill level
Emergency control							
						X	Check for correct function
Lattice mast boom system							
X [6]						X	Grease the lube points of lattice sections
Telescopic boom with rope mechanism							
						X	Check telescopic boom for distortions and cracks

First maintenance after	Operating hour intervals 250 h	500 h	1500 h	Calendar intervals Daily	Weekly	Annually	Work to be carried out
	X					X	Grease the sliding surfaces of the telescopic boom bearing
			X			X	Check change over pulleys of push out mechanics for damage and cracks
	X					X	Grease the change over pulleys of push out mechanism
	X					X	Check mounting screws on change over pulleys for tight seating
250 h		X					Check, adjust rope mechanism
			20000 h			Every 10 years	Disassemble and check the boom
Telematik telescopic boom system							
						X	Check telescopic boom system for distortion, damage and cracks
						X	Check hydraulic components for leaks and damage
		X				X	Check telescoping cylinder for proper condition
						X	Check pull knob retainer and mounting screws for tight seating
						X	Check mounting screws of push out cylinder for tight seating
						X	Check twist guard of cylinder pinning and telescopic boom pinning
		X				X	Check push out gripper for proper condition
		X				X	Check locking pins and locking bores for proper condition
		X				X	Check inner and outer sliding surfaces for proper condition
						X [5)]	Lubricating the gliding surfaces
						X [5)]	Grease the guide rails on the telescoping cylinder
			20000 h			Every 10 years	Disassemble and check the boom
Telescopic boom guying							
						X	Check for distortions and cracks
					Every 3 months [5), 6)]		Lubricate the TA/TY-guying on the grease fittings
				X			Check guy winch for leaks

First maintenance after	Operating hour intervals 250 h	500 h	1500 h	Calendar intervals Daily	Weekly	Annually	Work to be carried out
					Every 6 months		Check the oil level on the guy winch
250 h		X				X	Check the mounting screws for tight seating
						X [4]	Check the rope connection between the guy rope and the auxiliary rope (only LTM 1400-7.1)
						Every 4 years	Replace gear oil of guy winch
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 operation: Check visually[3] in hot climate zones: Every 3 months[4] note chapter 7.05, Crane superstructure maintenance instructions[5] and as necessary[6] during assembly[7] in Great Britain: Every 6 months

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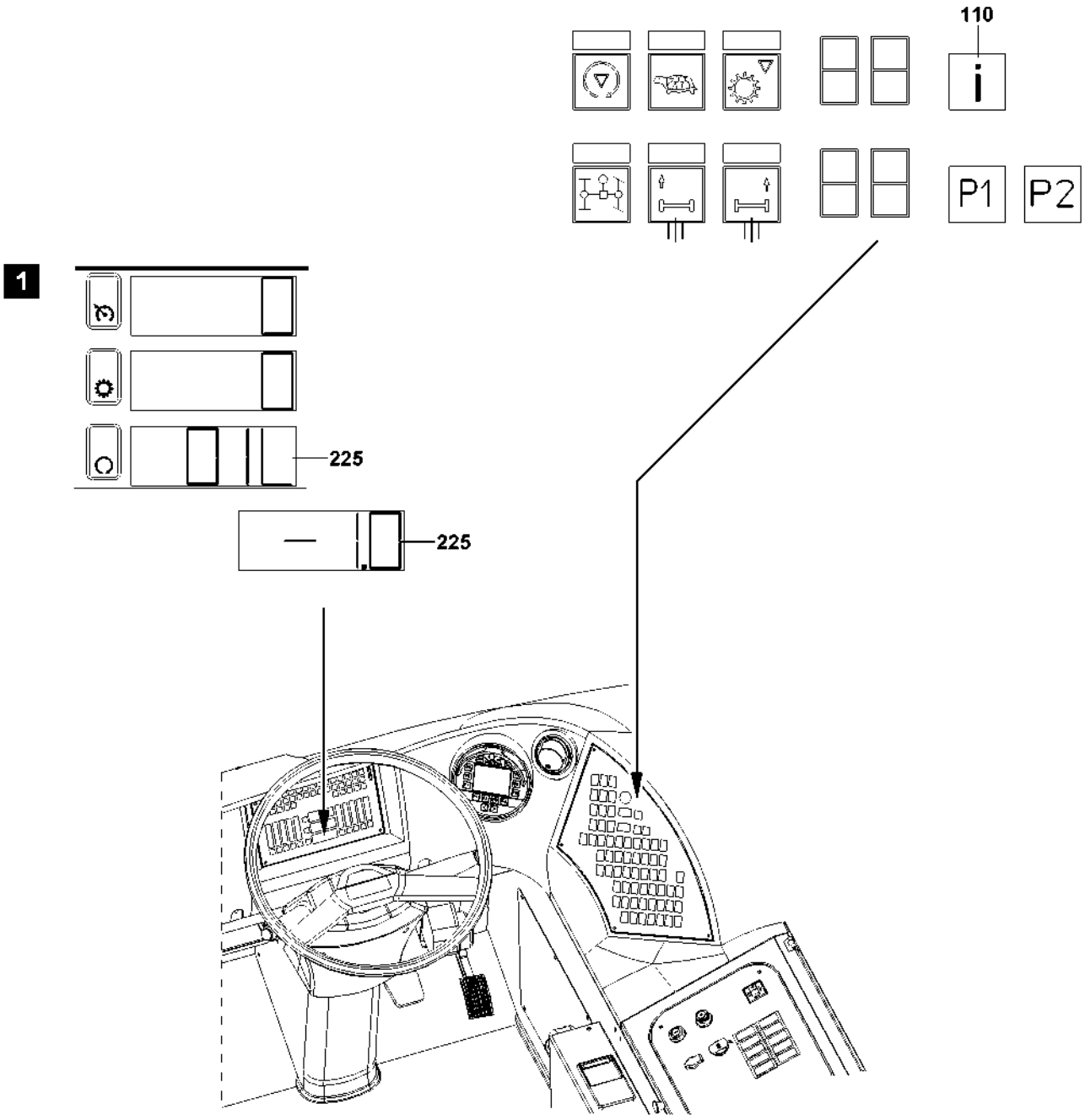

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Fig.114348

1 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 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 engine is turned off, 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 engine is operated with too much or not enough engine oil, the engine can be severely damaged!
- ▶ If too much engine oil is shown on the display **225**, 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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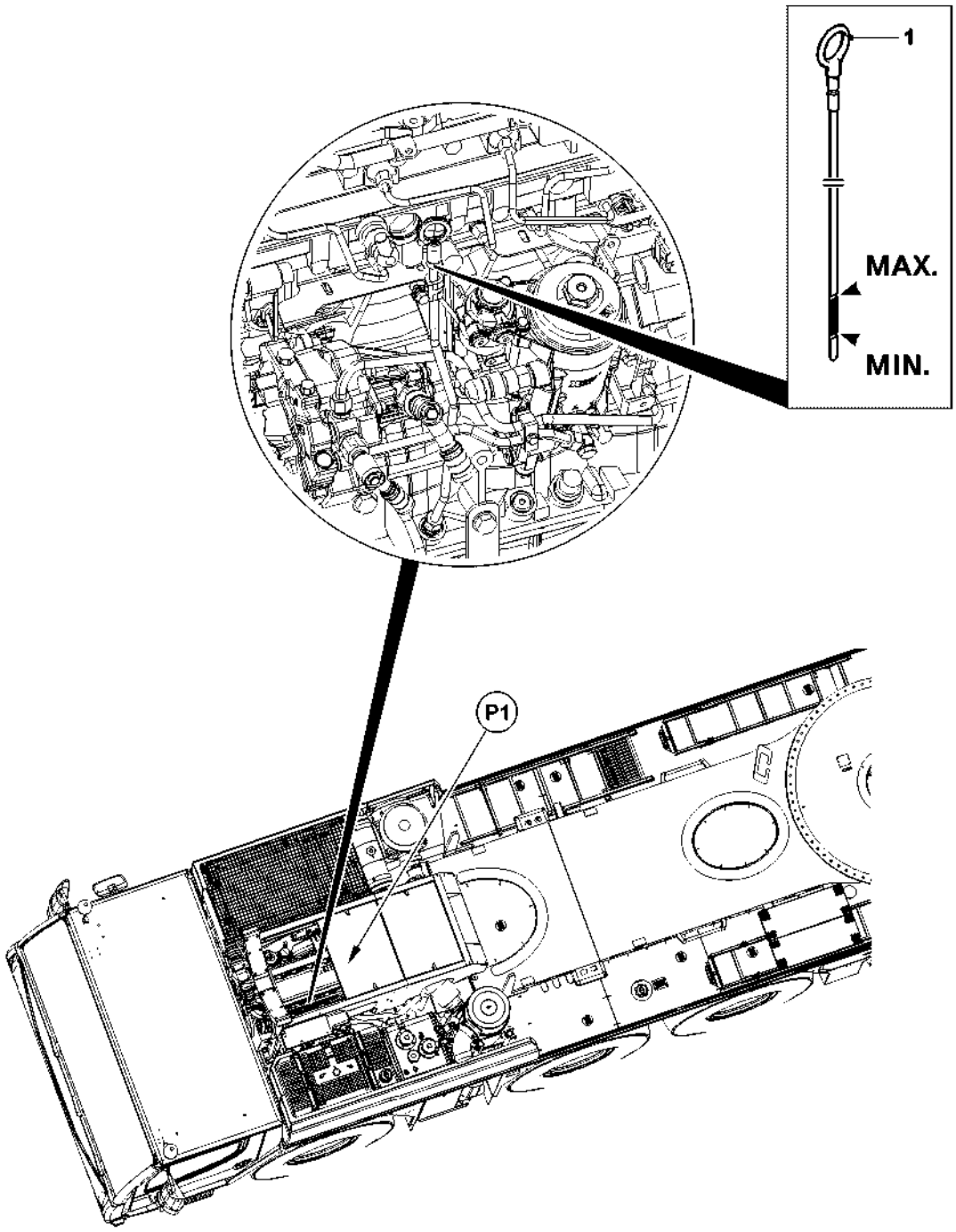

Fig.114899

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 telescopic boom is luffed up and the counterweight is removed.
- The cover for the dipstick **1** is removed.
- The diesel engine is turned off and the oil has collected in the oil pan.
- 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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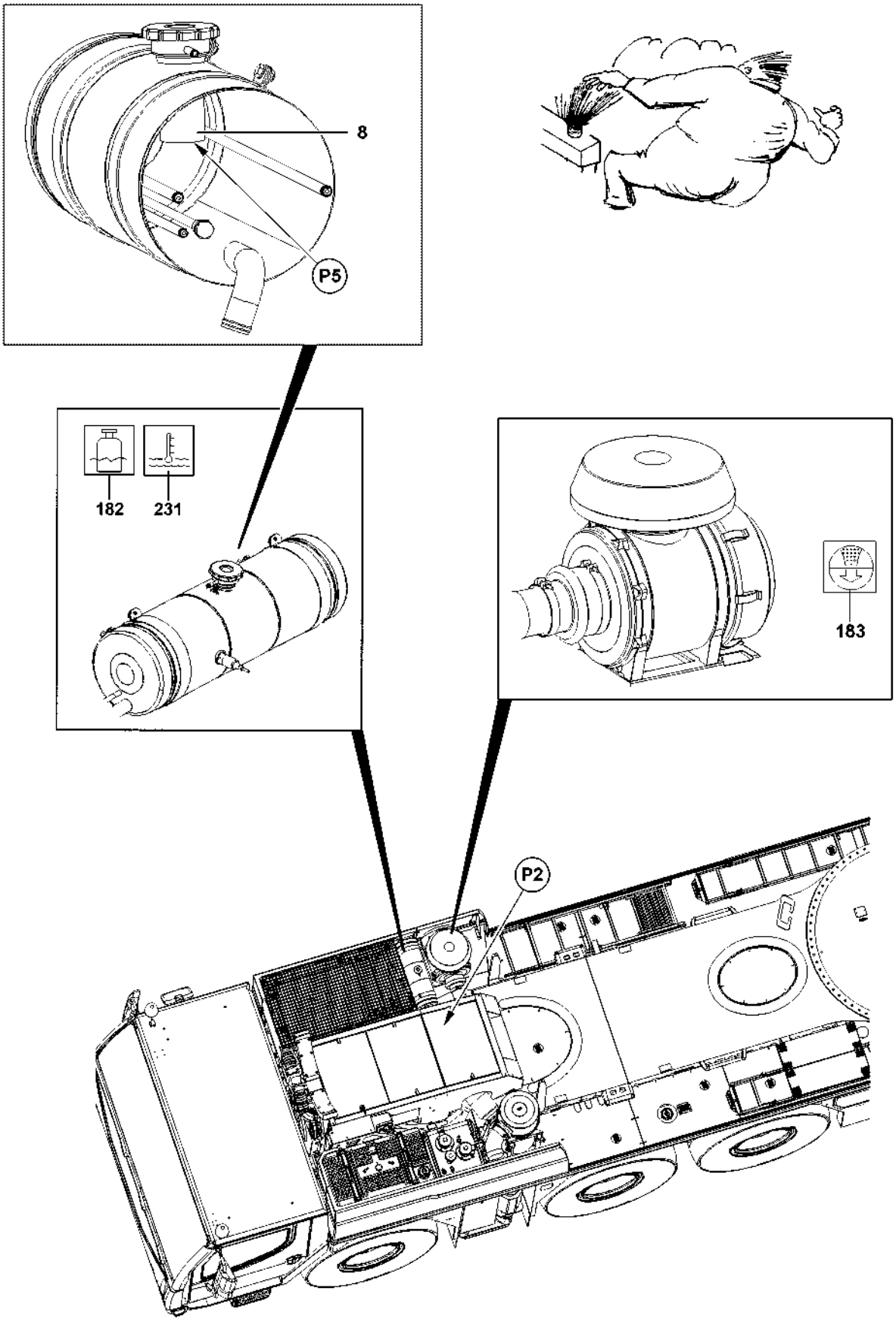

Fig.120255

1.2 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** „Engine coolant level too low“ lights up on the display unit.

The coolant temperature of the travel motor can be read on the display unit on the bargraph above the warning light **231**.

Make sure that the following prerequisites are met:
- The crane is in horizontal position.
- The telescopic boom is luffed up.
- The counterweight has been removed.
- The maintenance person is at position **P2**.

DANGER
Scalding due to hot coolant vapor!
▶ Check the coolant level on when the Diesel engine is cold.

▶ Turn the cap on the filler neck of the water cooler expansion tank to the first notch.
▶ Release excess pressure.
▶ Remove the cap.
▶ Check the coolant level.

NOTICE
Property damage due to incorrect coolant!
▶ Do **not** mix different coolant products.
▶ Do **not** dilute ready-made coolant - corrosion inhibitor - antifreeze mixtures.

Coolant contains corrosion inhibitor - antifreeze fluid.

You can differentiate coolant depending on the color of the corrosion inhibitor - antifreeze fluid.

See Service fill.

Corrosion inhibitor - antifreeze fluids	Liebherr Antifreeze Organic SF Mix	Liebherr Antifreeze Mix
Color:	Magenta	Blue green

If the coolant level is lower than at the starting point **P5** of the riser tube **8**:
▶ Add coolant to the starting point **P5** of the riser tube **8**.
▶ Add coolant only on the filler neck.

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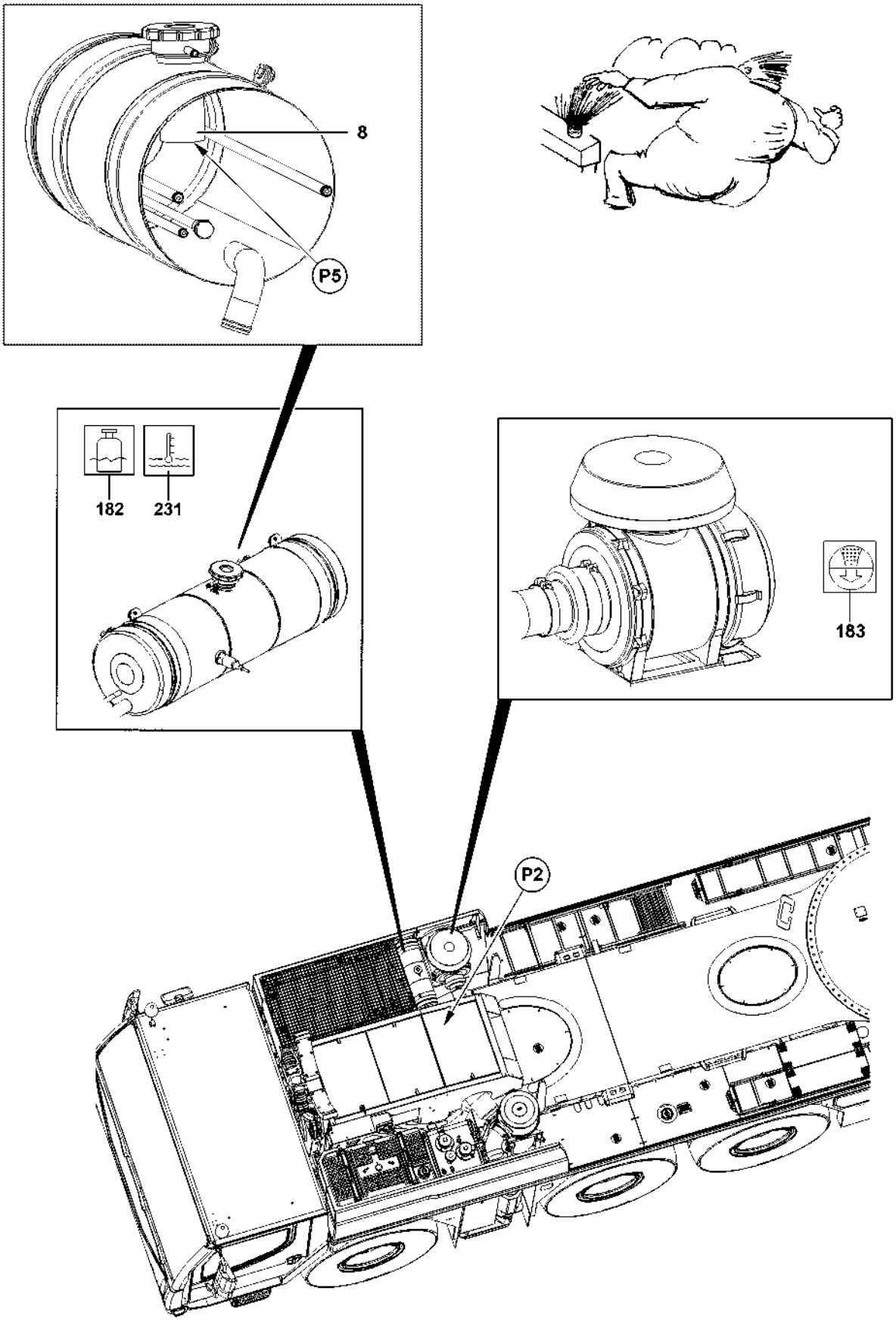

Fig.120255

1.3 Replacing the coolant

Note
When the coolant is changed:
▶ Empty the cooling system completely and flush.

▶ Make sure that the cooling system is completely empty.
▶ Add coolant to the starting point **P5** of the riser tube **8**.

1.4 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 prerequisites are met:
– The telescopic boom is luffed up and the counterweight is removed.
– The maintenance person is at position **P2**.

If the warning light **183** lights up:
▶ Clean or replace the filter insert.

1.5 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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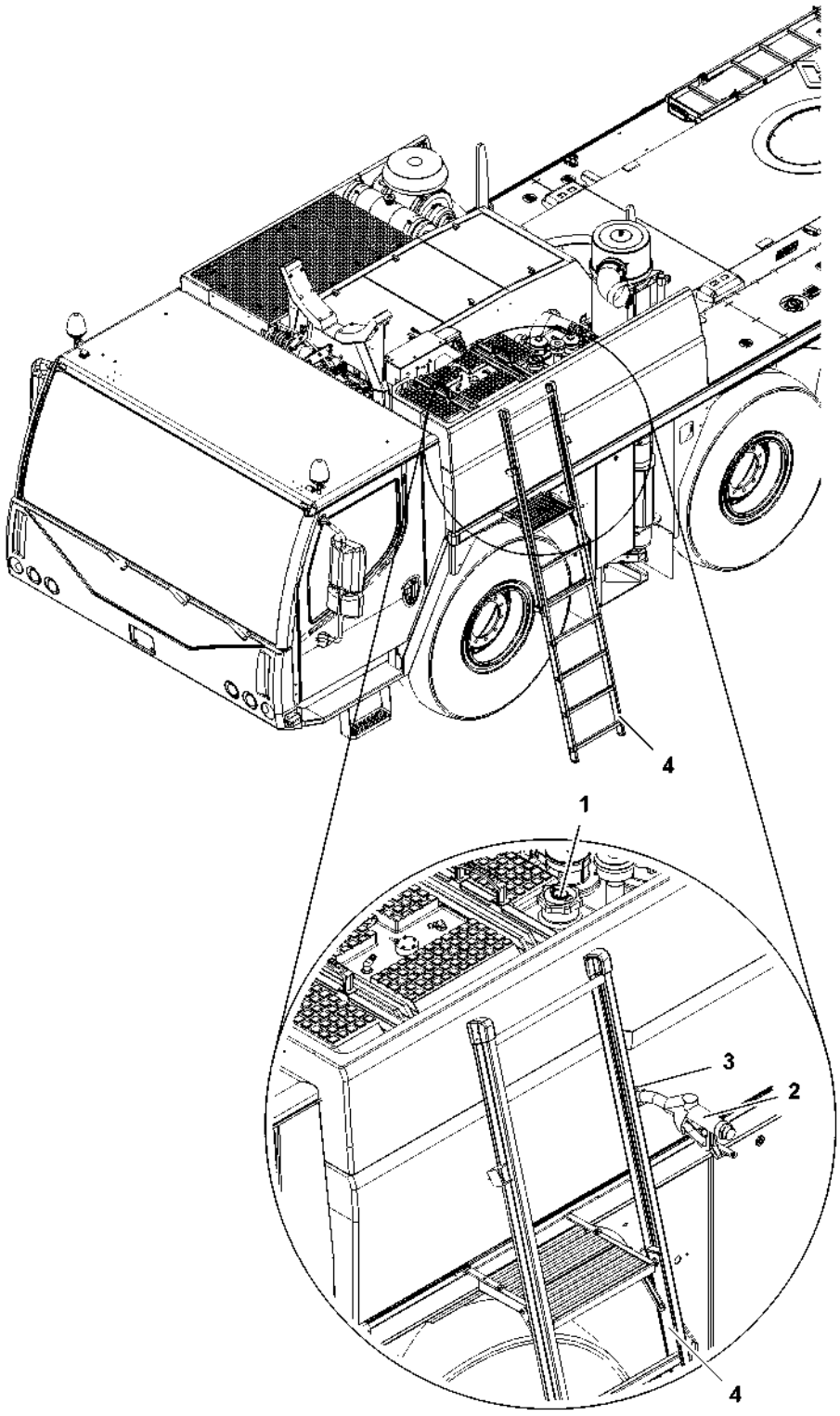

Fig.114903

2 Fuel system

2.1 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 engine and the ignition are turned off.

Note
▶ Also observe the danger notes in the Crane operating instructions, chapter 7.01.

▶ Set the refueling ladder **4** to access and descent position, see Crane operating instructions, chapter 2.07.
▶ Hang the fuel nozzle **2** in the retainer **3** on the refueling ladder **4** and secure it to prevent it from falling down.
▶ Access the refueling ladder **4**, see Crane operating instructions, chapter 2.07.
▶ Open the tank cover **1**.
▶ Insert the fuel nozzle **2** in the filler neck.
▶ Refuel the vehicle.

After the refueling procedure:
▶ Remove the fuel nozzle **2** from the filler neck and hang into the retainer **3**.
▶ Close the tank cover **1**, get down from the refueling ladder **4** and remove the fuel nozzle **2**.
▶ Secure the refueling ladder **4** in transport position, see Crane operating instructions, chapter 2.07.

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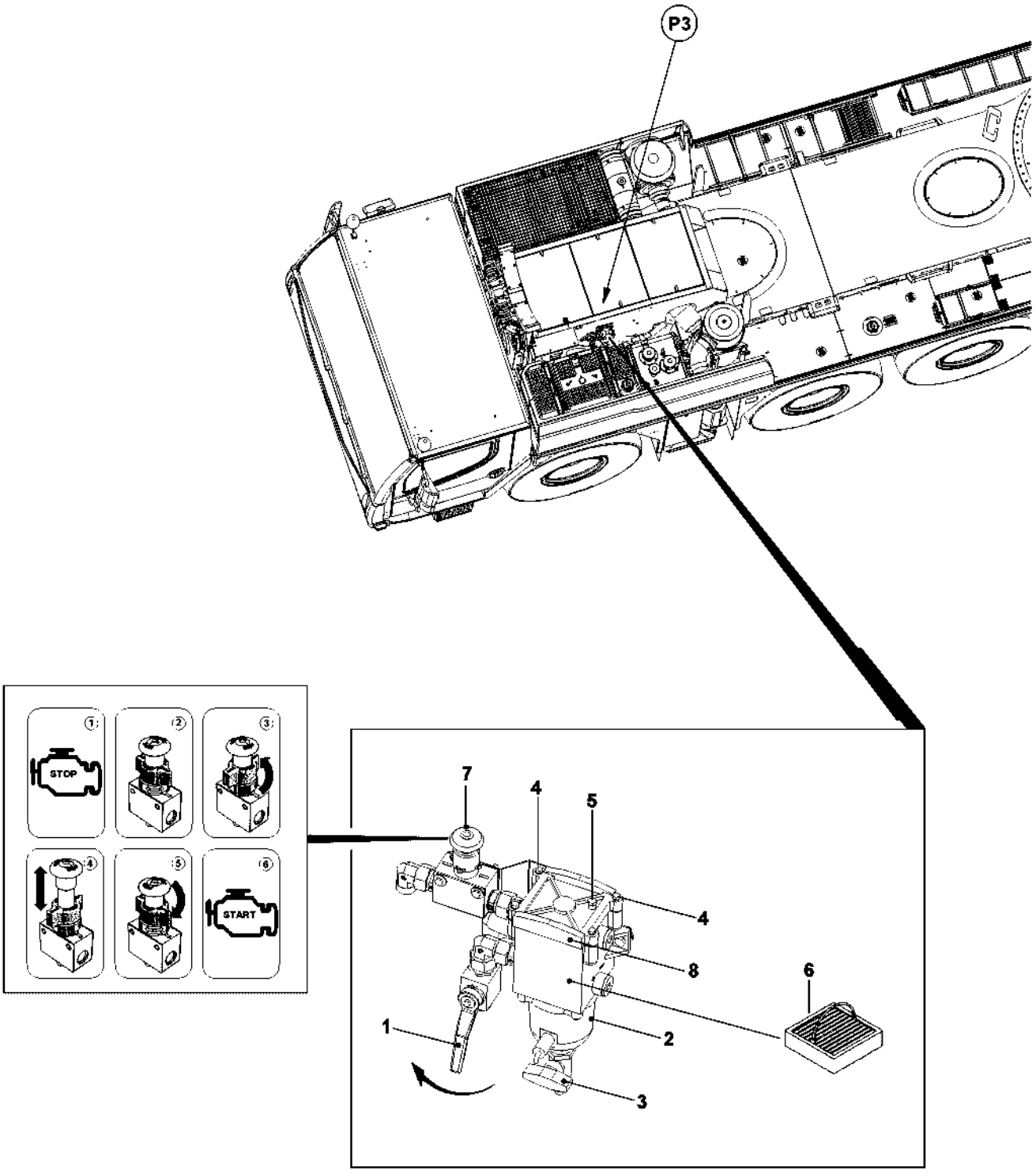

Fig.114896

2.2 Fuel preliminary filter

2.2.1 Draining the fuel preliminary filter

Note

▶ The water separator **2** on the fuel preliminary filter must be drained at regular intervals.

Make sure that the following prerequisites are met:
- The telescopic boom is luffed up and the counterweight is removed.
- The maintenance person is at position **P3**.

▶ 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.

2.2.2 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.

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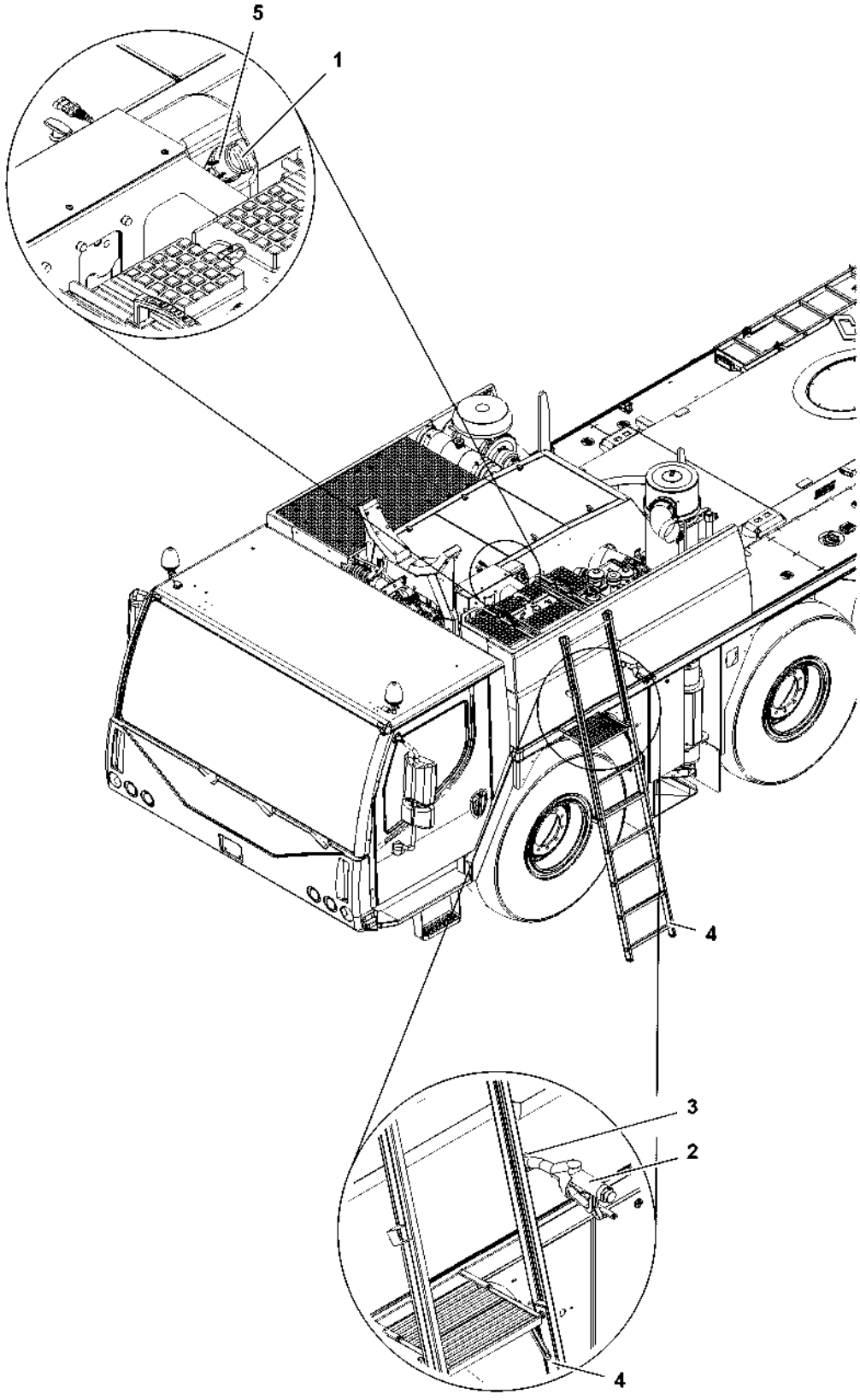

Fig.114904

3 Urea system

3.1 Adding Urea solution

Make sure that the following prerequisites are met:
- The auxiliary heater is turned off.
- The parking brake is applied.
- The engine and the ignition are turned off.

Note

▶ Also observe the danger notes in the Crane operating instructions, chapter 7.01.

▶ Set the refueling ladder **4** to access and descent position, see Crane operating instructions, chapter 2.07.
▶ Hang the fuel nozzle **2** in the retainer **3** on the refueling ladder **4** and secure it to prevent it from falling down.
▶ Access the refueling ladder **4**, see Crane operating instructions, chapter 2.07.
▶ Open the tank cover **1**.
▶ Insert the fuel nozzle **2** in the filler neck **5**.
▶ Refuel the vehicle.

After the refueling procedure:
▶ Remove the fuel nozzle **2** from the filler neck and hang into the retainer **3**.
▶ Close the tank cover **1**, get down from the refueling ladder **4** and remove the fuel nozzle **2**.
▶ Secure the refueling ladder **4** in transport position, see Crane operating instructions, chapter 2.07.

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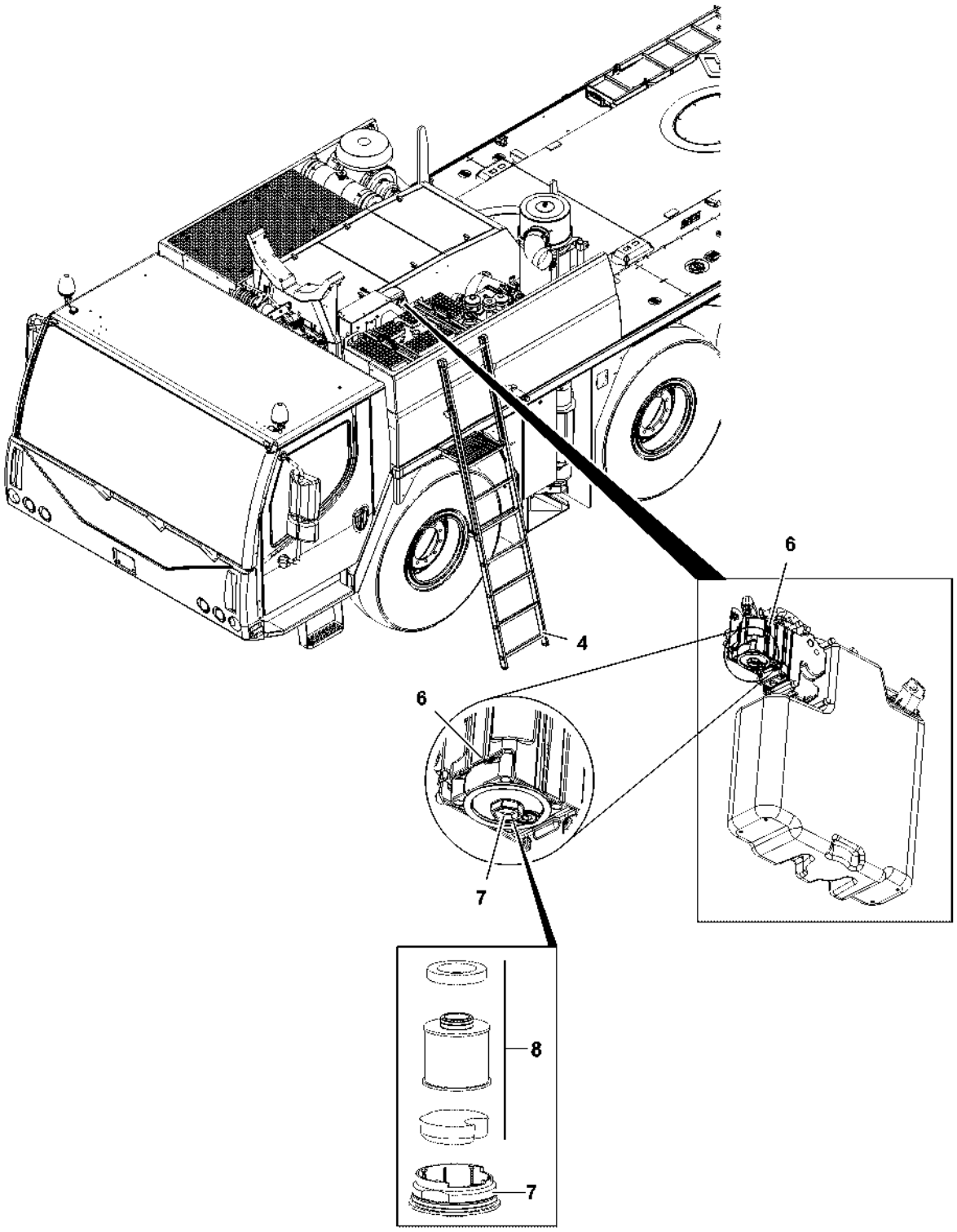

Fig.120254

3.2 Replacing the urea filter

NOTICE
Danger of corrosion due to spilled urea!
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
- ▶ Replace the filter insert **8** for the urea pump **6** according to the data in the maintenance intervals, see Crane operating instructions, chapter 7.02.
- ▶ Observe and adhere additionally to the operating instructions of the engine manufacturer.
- ▶ Replace the filter insert **8** only when the pressure is relieved.

- ▶ Turn the Diesel engine off.
- ▶ Set the refueling ladder **4** to access and descent position, see Crane operating instructions, chapter 2.07.
- ▶ Step on the crane chassis via the refueling ladder **4**, see Crane operating instructions, chapter 2.07.
- ▶ Open the housing cover **7** and replace the filter insert **8**.
- ▶ Close the filter housing with the housing cover **7** 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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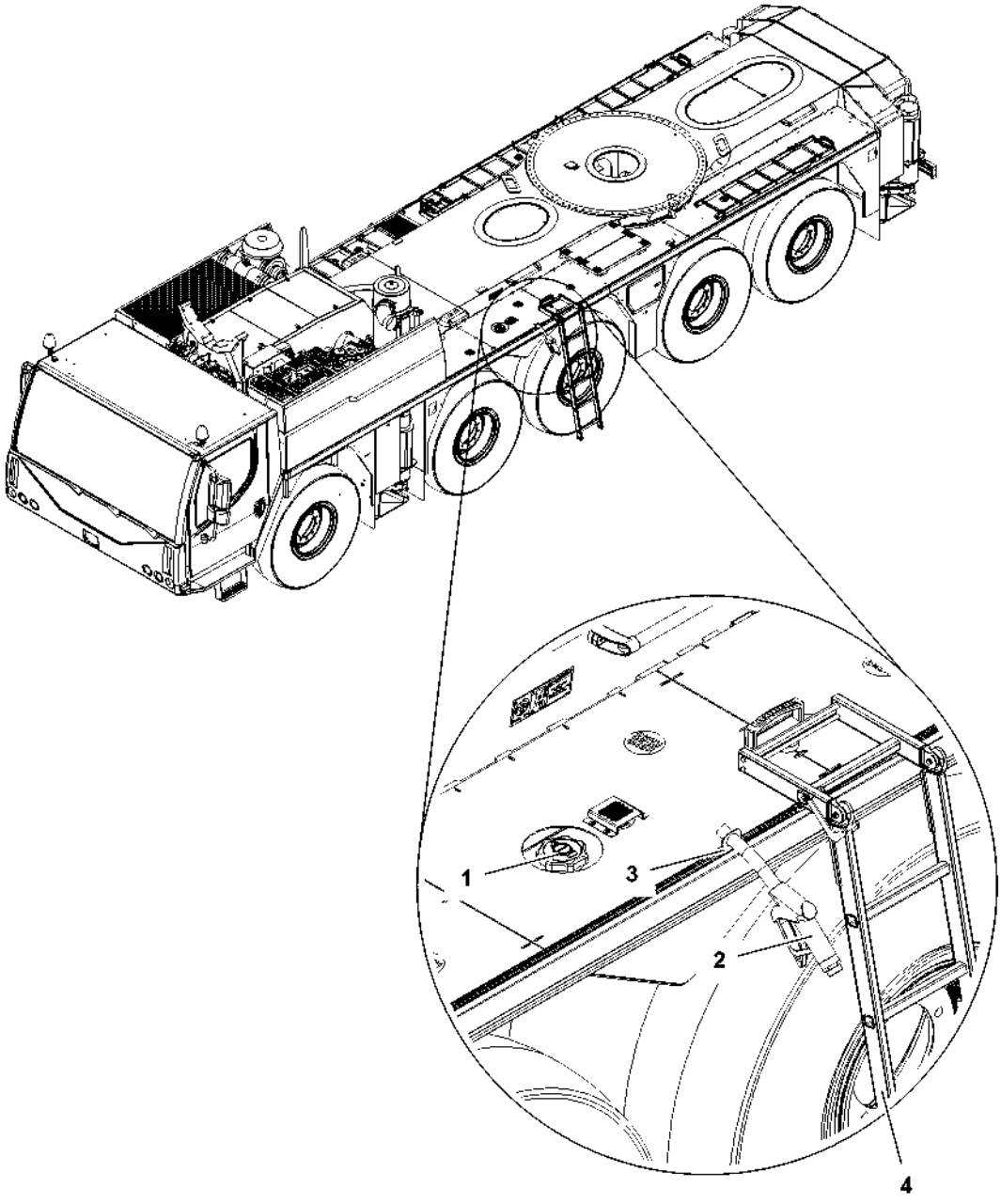

Fig.114905

4 Fuel container*

The fuel container* is optional and is only required for operation with auxiliary heater.

4.1 Refueling fuel

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 engine and the ignition are turned off.

Note

▶ Also observe the danger notes in the Crane operating instructions, chapter 7.01.

▶ Bring the folding ladder **4** to access position, see Crane operating instructions, chapter 2.07.
▶ Hang the fuel nozzle **2** in the retainer **3** and secure it to prevent it from falling down.
▶ Access the crane chassis, see Crane operating instructions, chapter 2.07.
▶ Open the tank cover **1**.
▶ Insert the fuel nozzle **2** in the filler neck.
▶ Refuel the vehicle.

After the refueling procedure:
▶ Remove the fuel nozzle **2** from the filler neck **5** and hang into the retainer **3**.
▶ Close the tank cover **1**, get down from the crane chassis and remove the fuel nozzle **2**.

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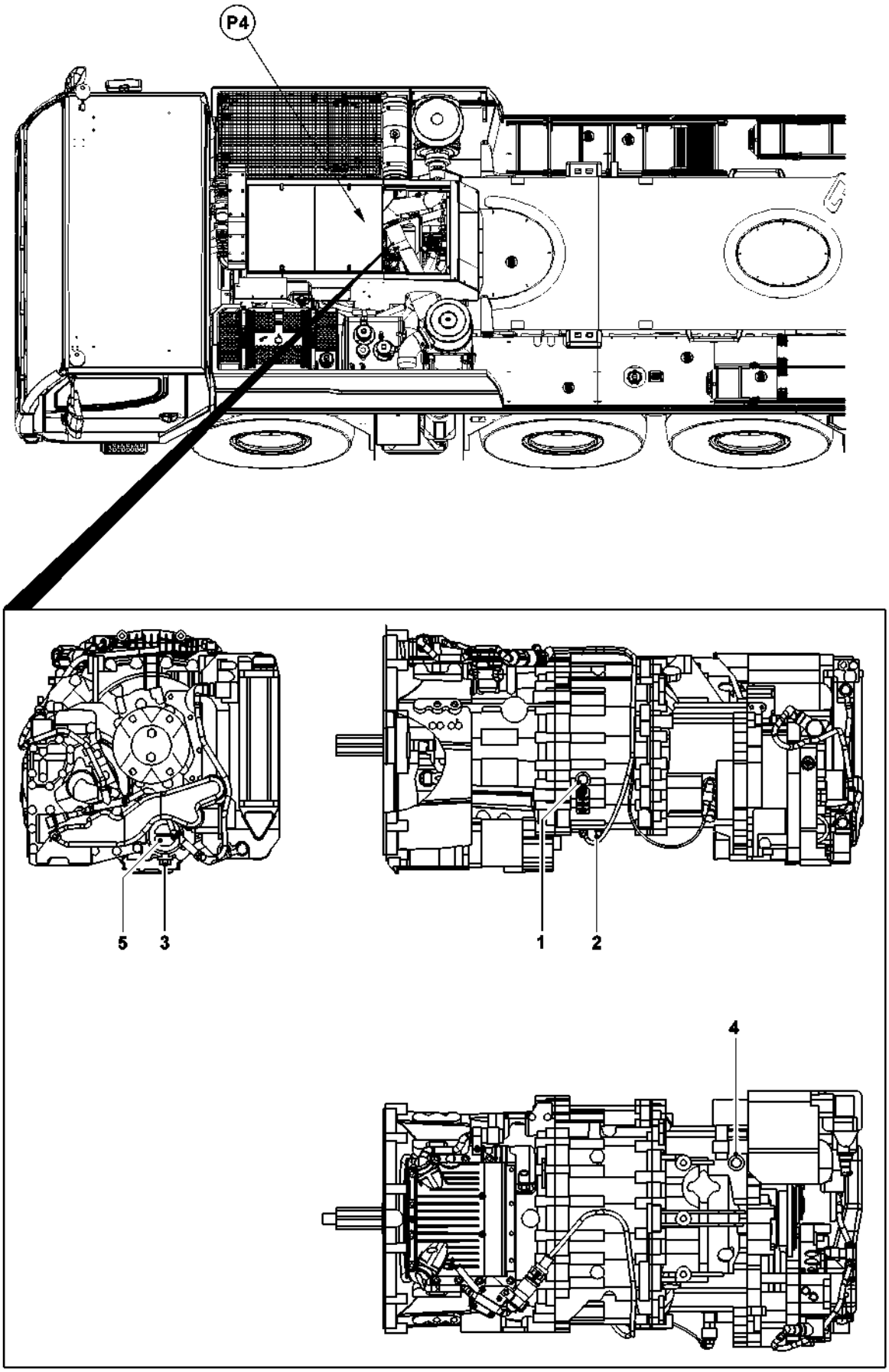

Fig.114898

5 Automatic transmission

NOTICE
Danger of gear damage!
- ▶ Maintain utmost cleanliness during all work to prevent any dirt from getting into the transmission!
- ▶ Check the transmission for leaks at regular intervals!
- ▶ Have a leaking transmission sealed immediately and professionally!

5.1 Checking the oil level on the automatic transmission

Make sure that the following prerequisites are met:
- The crane is in horizontal position.
- The gear oil has cooled down (less than 40 °C).
- The cover for the automatic transmission is removed.
- The maintenance person is at position **P4**.

▶ Remove the level control plug **1**.

The oil level must reach the edge of the bore.

▶ Perform a visual inspection.

If the level control screw **1** cannot be seen due to structural reasons, fluid must be added on the oil filler plug **4** until fluid escapes on the level control screw **1**.

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 causes the gear to overheat.
- ▶ Add oil up to the overflow level of the level control plug **1**, as specified in the lubrication chart and re-check the level.

▶ Reinstall the level control plug **1** with new seal and tighten.

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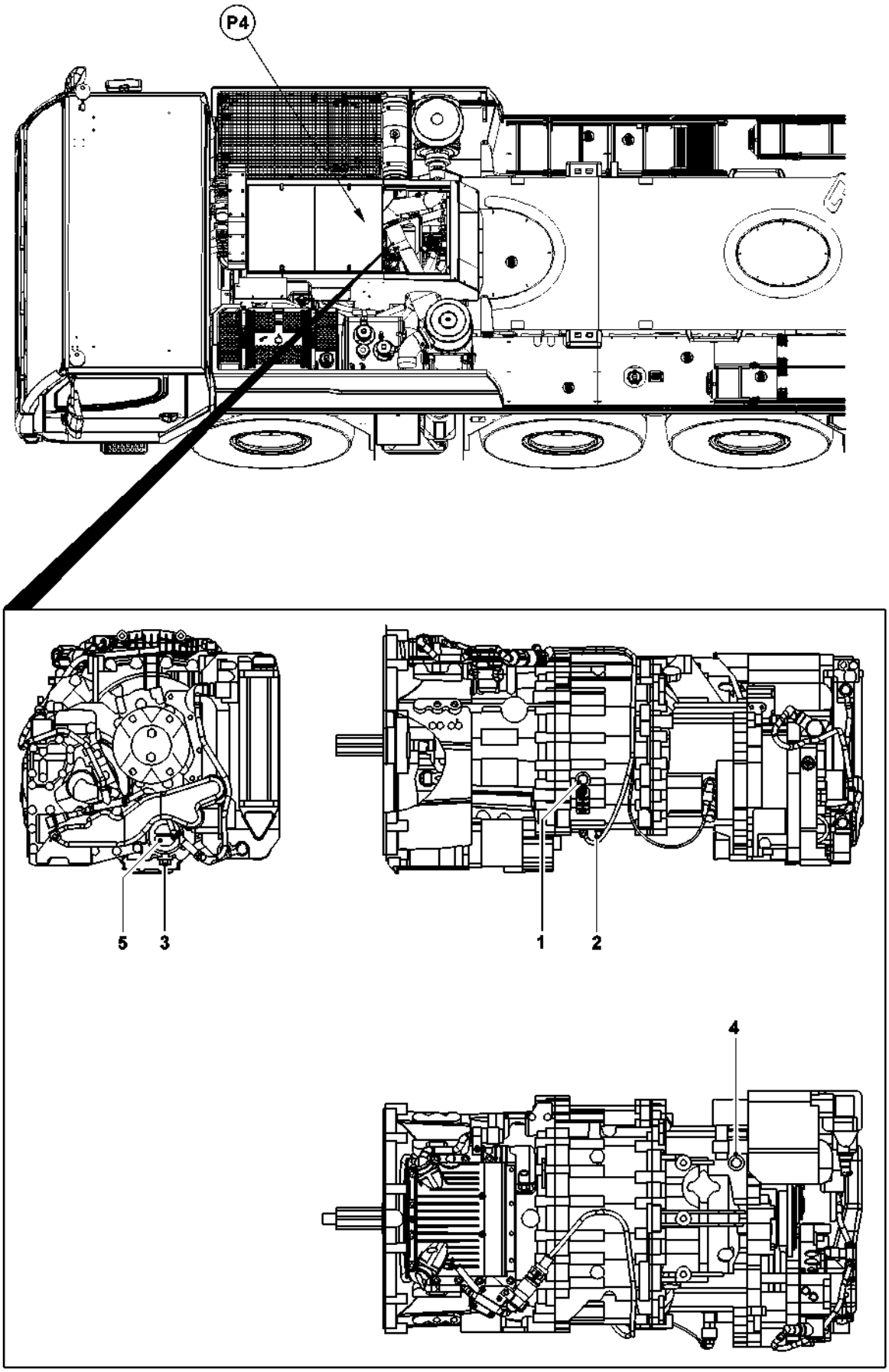

Fig.114898

5.2 Replacing the oil in the automatic transmission

Note

▶ Before changing the oil, do not slow down the vehicle with the intarder.

Make sure that the following prerequisites are met:
- The crane is in horizontal position.
- The transmission is at operating temperature.

▶ Remove the level control plug **1**.
▶ Remove the oil filler plug **4**.
▶ Remove the oil drain plug **2** and oil drain plug **3** and drain the 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 as specified in the lubrication chart on the oil filler plug **4** until it starts to overflow on the level control screw **1**.
▶ After adding oil, reinstall the oil filler plug **4** and the level control plug **1** with new seal and tighten.
▶ Test drive the vehicle.
▶ Check the oil level and add oil if necessary.

5.3 Changing the fine filter

The fine filter **5** must be changed during every oil change. Ensure that no pollutants or oil sludge can penetrate the circuit when changing the fine filter **5**.

▶ Unscrew the mounting screw for the fine filter.
▶ Remove the old fine filter.
▶ Properly install the new fine filter.
▶ Screw in and tighten the mounting screw.
▶ Test drive the vehicle without using the intarder.
▶ Check the oil level and add oil if necessary.

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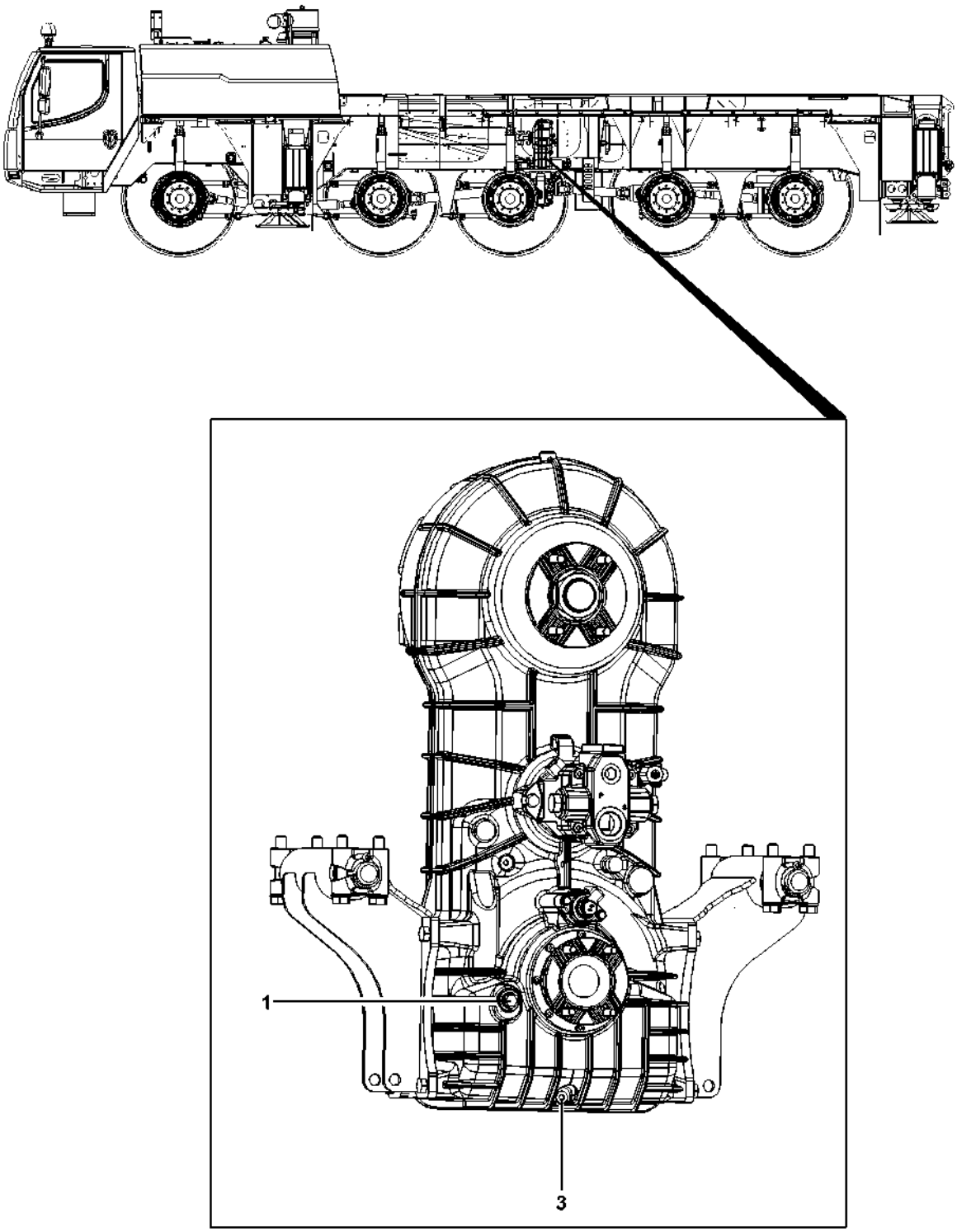

Fig.114897

6 Distributor gear

Maintain utmost cleanliness during all work to prevent any dirt from entering the inside of the gear.

6.1 Checking the oil level

Make sure that the following prerequisites are met:
– The crane is in horizontal position.

▶ Remove the oil filler / level control plug **1**.

The oil level must be up to the edge of the bore of the oil filler / level control plug **1**.

▶ Perform a visual inspection.

CAUTION
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 causes the gear to overheat.
▶ Add oil as specified in the lubrication chart until it overflows on the oil filler / level control plug **1** and recheck again.

▶ Install the oil filler / level control plug **1** with new seal and tighten.

6.2 Changing the oil

WARNING
Risk of burns during maintenance or inspection work due to hot oil!
If the oil drain plug **3** is opened when the transfer gearbox is too hot, hot oil can cause severe burns on hand, sink or eyes!
▶ Let the transfer gearbox cool down until „hand warm“!
▶ Use 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.

▶ Remove the oil filler / level control plug **1**.
▶ Remove the oil drain plug **3**, drain the oil and determine the oil quantity.
▶ Install the oil drain plug **3** with new seal and tighten.
▶ Add oil as specified in the lubricant chart on the oil filler / level control plug **1** until it starts to overflow on the edge of the bore. Then wait for 10 minutes until the oil is distributed completely in the gear. Then add oil again until it starts to run over on the edge of the bore.

Note
▶ For oil quantity for the transfer gearbox and lubrication chart, see separately supplied drawing and parts list.

▶ Install the oil filler / level control plug **1** with new seal and tighten.

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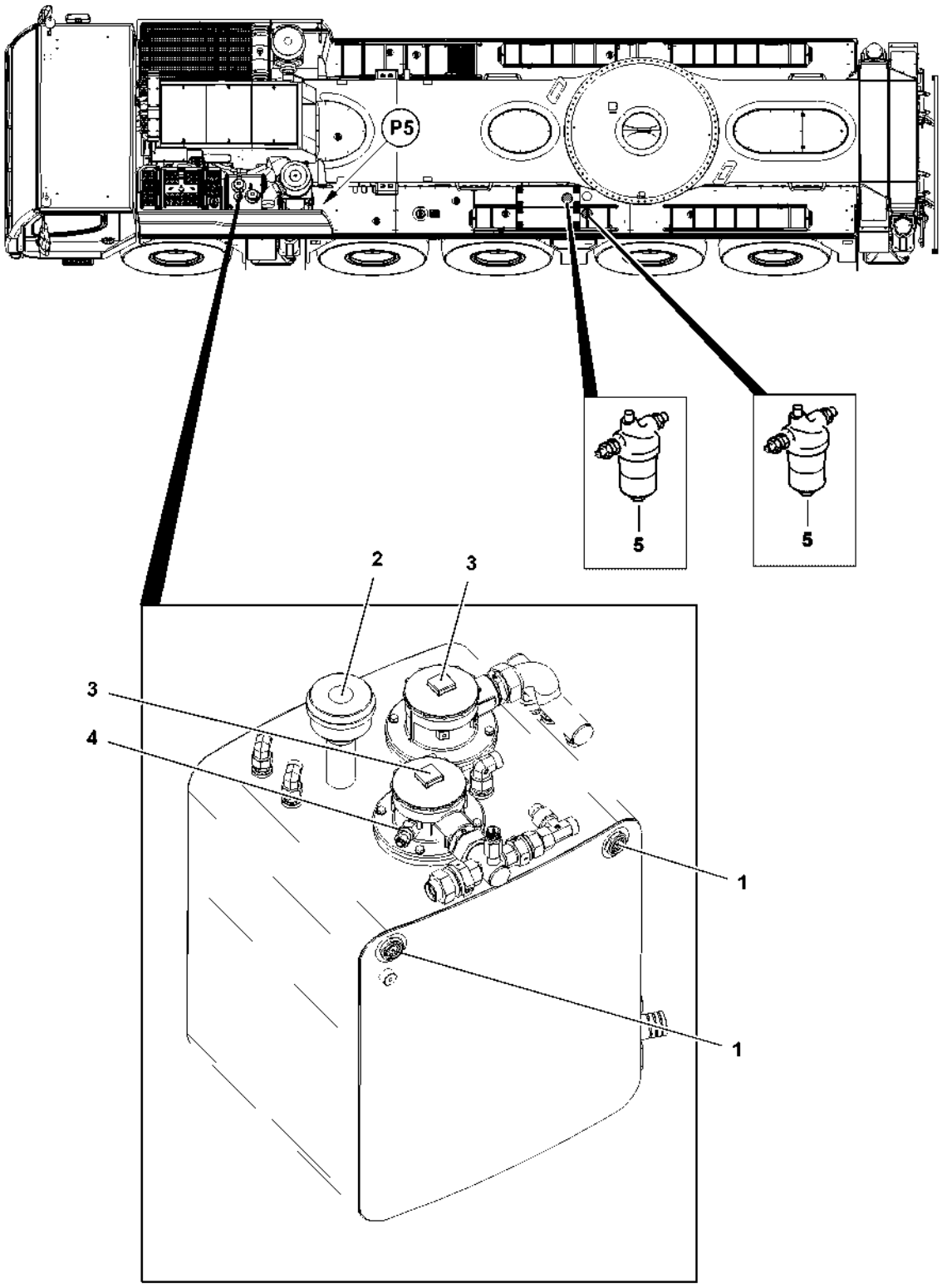

Fig.114900

7 Hydraulic system

Extreme cleanliness must be maintained when adding oil.

7.1 Hydraulic oil tank

7.1.1 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 person is at position **P5**.

DANGER
Danger of accident if hydraulic pump is damaged!
If the oil level is too low, the hydraulic pump may be damaged, which will increase the risk of accident because of incapacity to steer. 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 using a fine-meshed filter until the oil level is visible in center of oil level sight gauge **1**.

7.1.2 Checking the aeration / bleeder 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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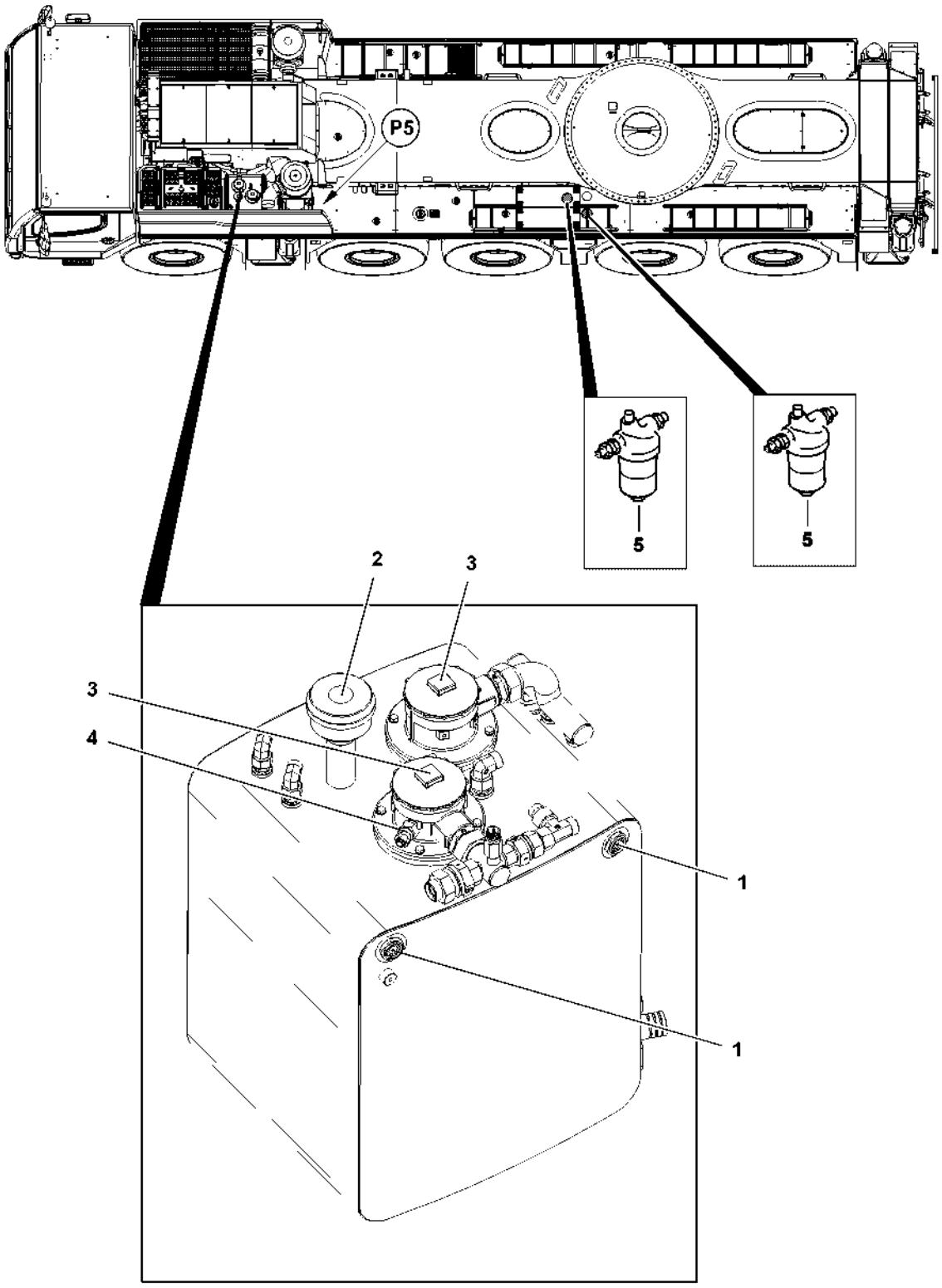

Fig.114900

7.1.3 Checking and replacing the return filter

One of the two return filters **3** is equipped with a maintenance indicator **4**.

If the red mark is visible when the oil is warmed up and ready for operation:

- ▶ Replace filter unit.
- ▶ Unscrew and remove both filter covers.
- ▶ Remove the filter units.
- ▶ Clean the sealing surface on the covers.
- ▶ Install new filter units.
- ▶ Lubricate the rubber seal rings in the covers with oil.
- ▶ Place both filter covers and tighten.
- ▶ Start the engine and check the filter for leaks.
- ▶ Check the oil level and add oil if necessary.

7.1.4 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 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 engine and check for leaks.

Result:

– This bleeds the hydraulic system.

- ▶ Check the oil level again and add oil, if necessary.

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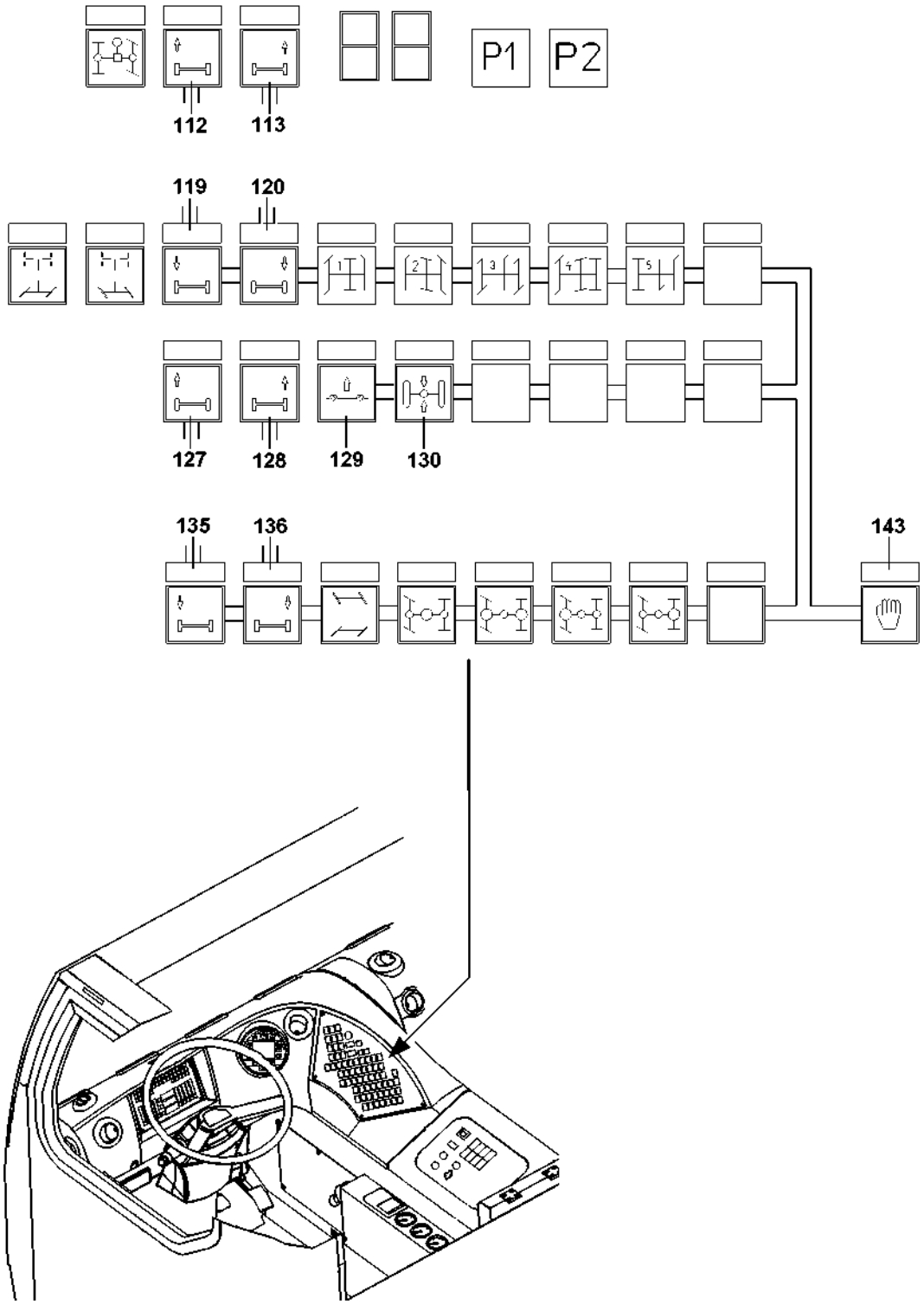

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Fig.114524

7.2 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.

DANGER
Danger of explosion!
The pressure in the nitrogen cylinder must be less than the maximum permitted operating pressure of the reservoir 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.
▶ 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 (for on-road driving).

7.3 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.

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**.

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7.3.1 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 conspicious findings, decisions and replacements comprehensibly, see Crane operating instructions, chapter 8.06.

7.3.2 Inspecting the hydraulic hose lines for leaks

▶ Check the crane for escaped hydraulic oil.
▶ Check the ground under the crane for leaks.

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 conspicious findings, decisions and replacements comprehensibly, see Crane operating instructions, chapter 8.06.

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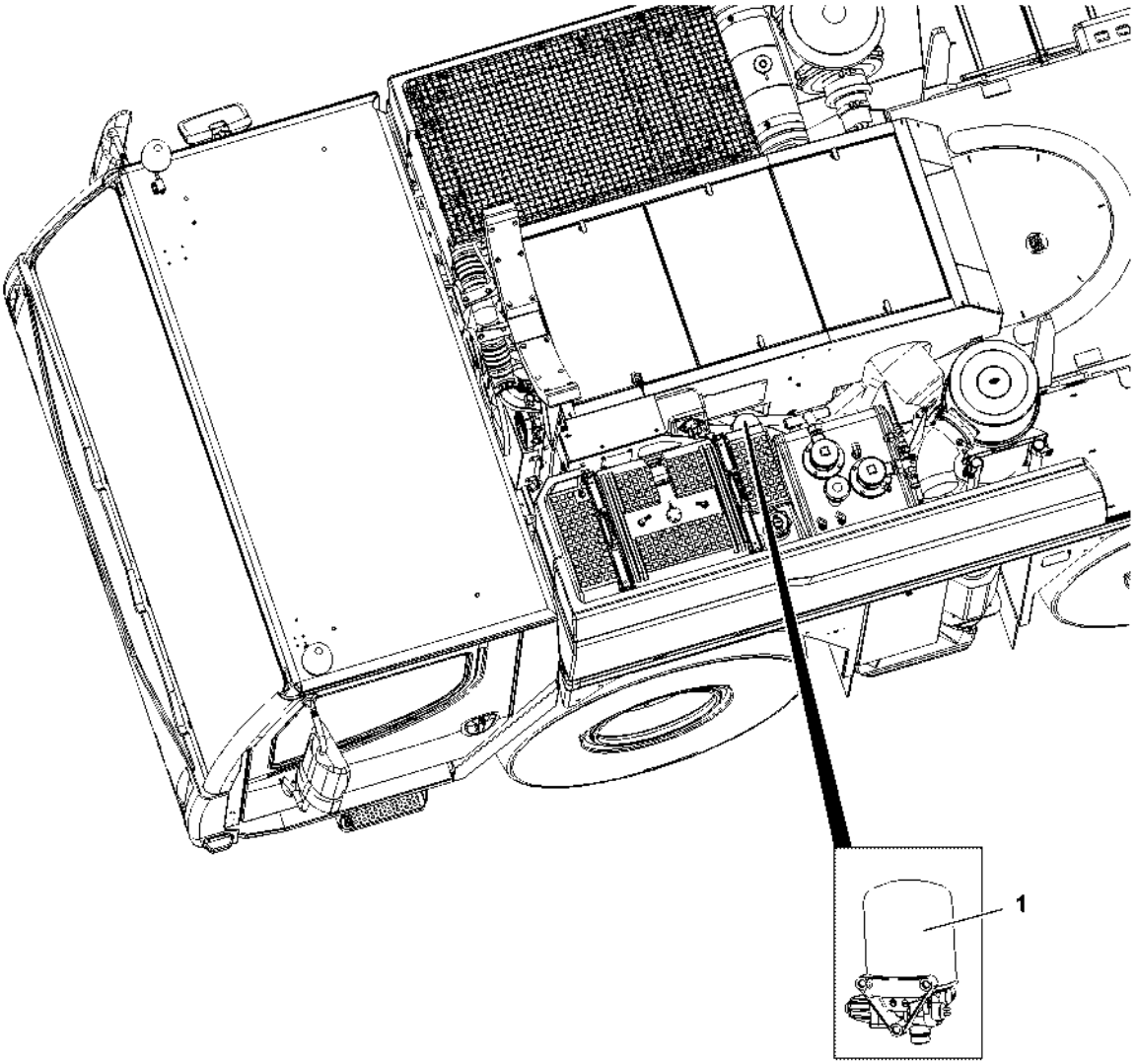

Fig.114902

8 Compressed air and brake system air dryer

8.1 Replacing the granular cartridge

CAUTION
Danger!
The granular cartridge of the air dryer **1** is under spring tension.
▶ Caution when replacing the cartridge.

▶ Replace the granular cartridge once a year.

9 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".

9.1 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.

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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).

Note
- ▶ Tires and disk wheels approved by **Liebherr-Werk Ehingen GmbH**. See Crane operating instructions, chapter 1.03.

9.1.1 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 profile depth of the tires must be the legally specified minimum value.

- ▶ Check the tread depth of the tires.
- ▶ Check tires for damage.

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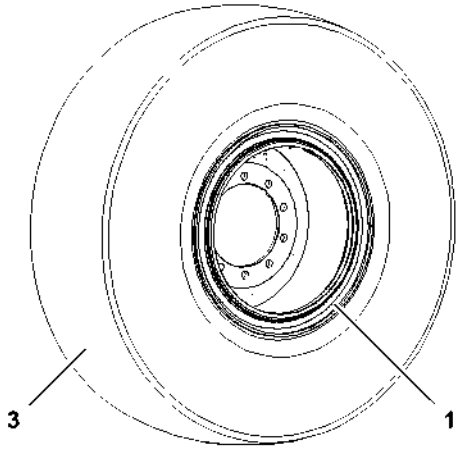

Fig.120146: Disk wheel with tire

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.

9.1.2 Inspecting the disk wheels

Types of disk wheels **1**:
- 1-part
- 3-part

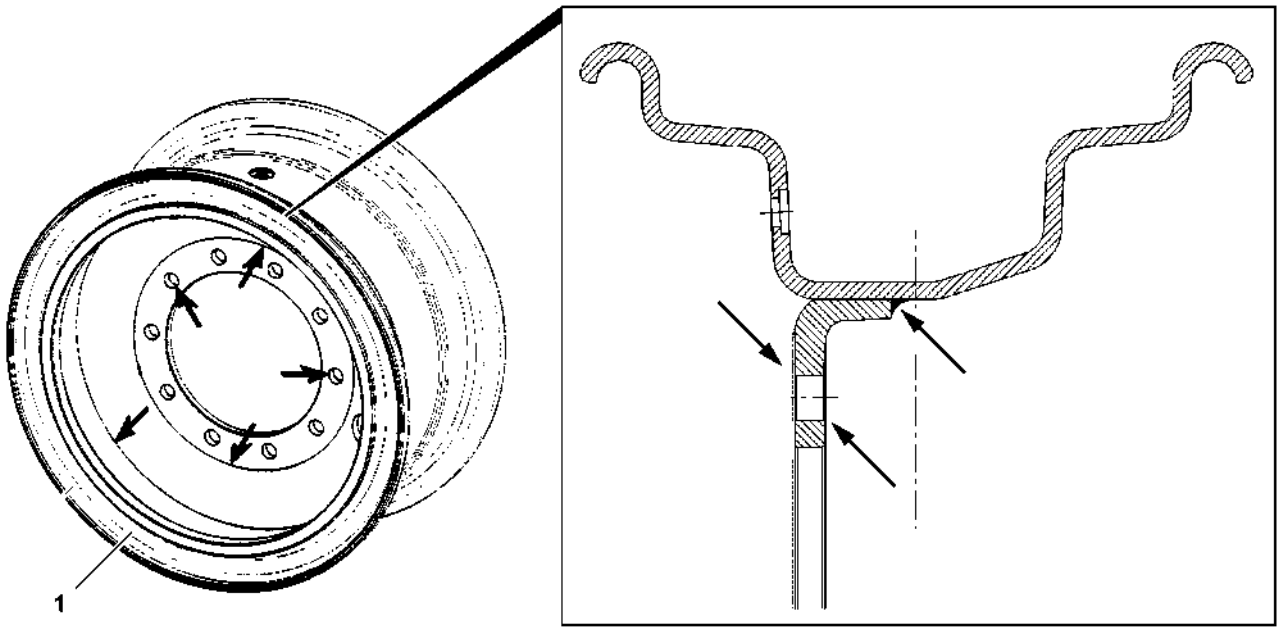

Fig.120144: 1-part disk wheel

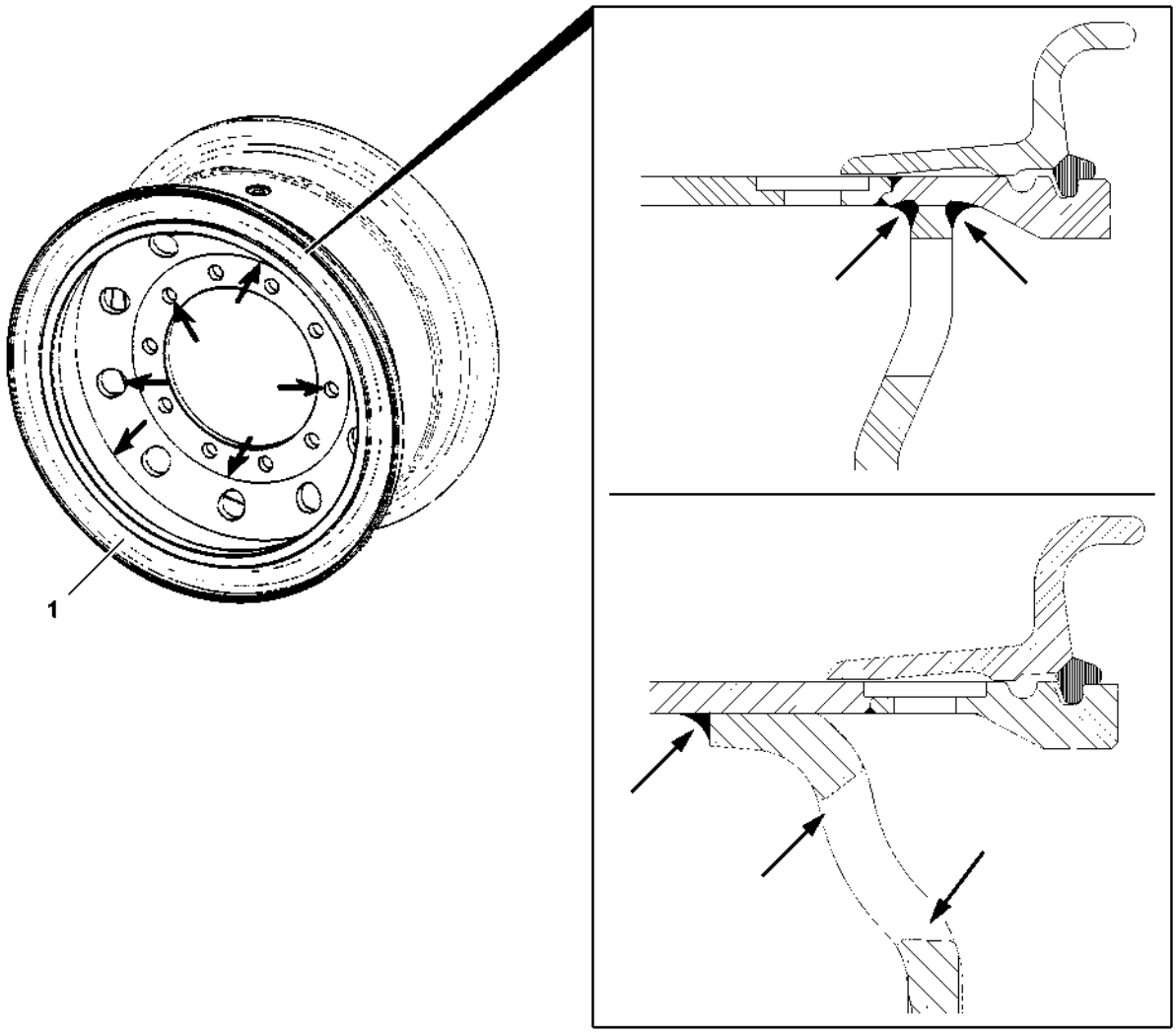

Fig.120143: 3-part disk wheel

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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9.1.3 Checking the side ring and locking ring

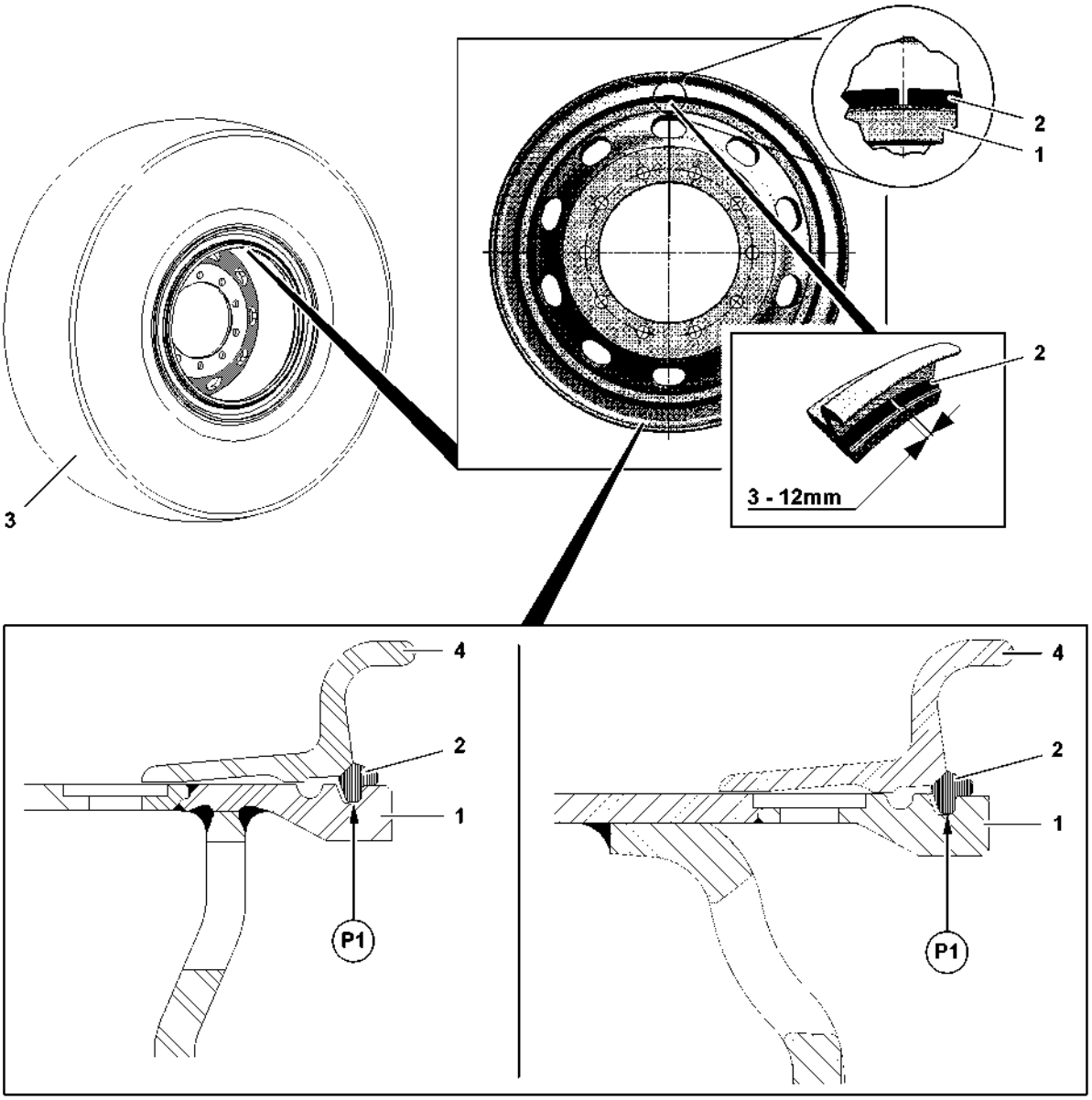

Fig.120142: 3-part disk wheel

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.

9.2 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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9.2.1 1-part disk wheel

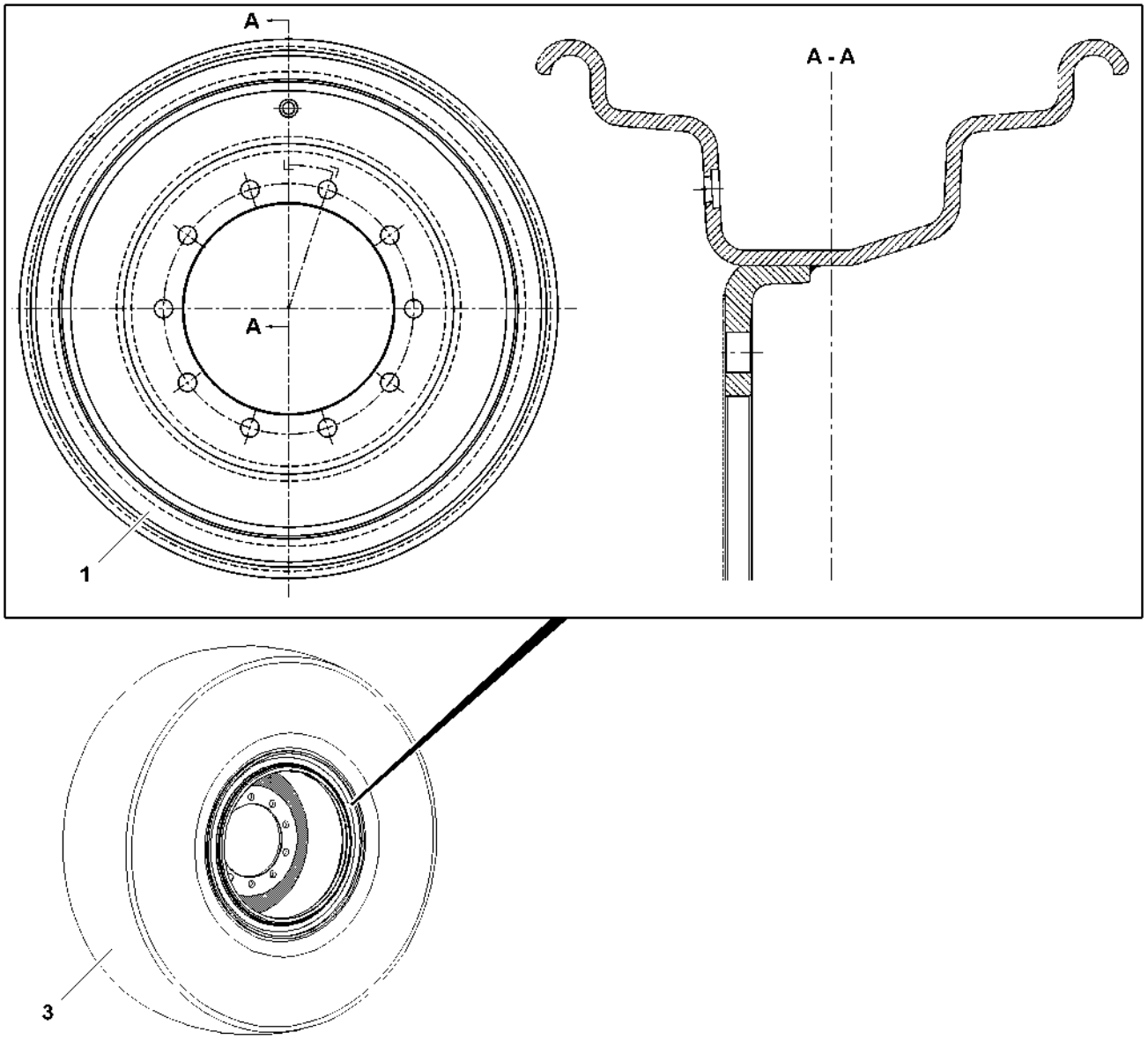

Fig.120145: 1-part disk wheel

Make sure that the following prerequisites are 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.

9.2.2 3-part disk wheel

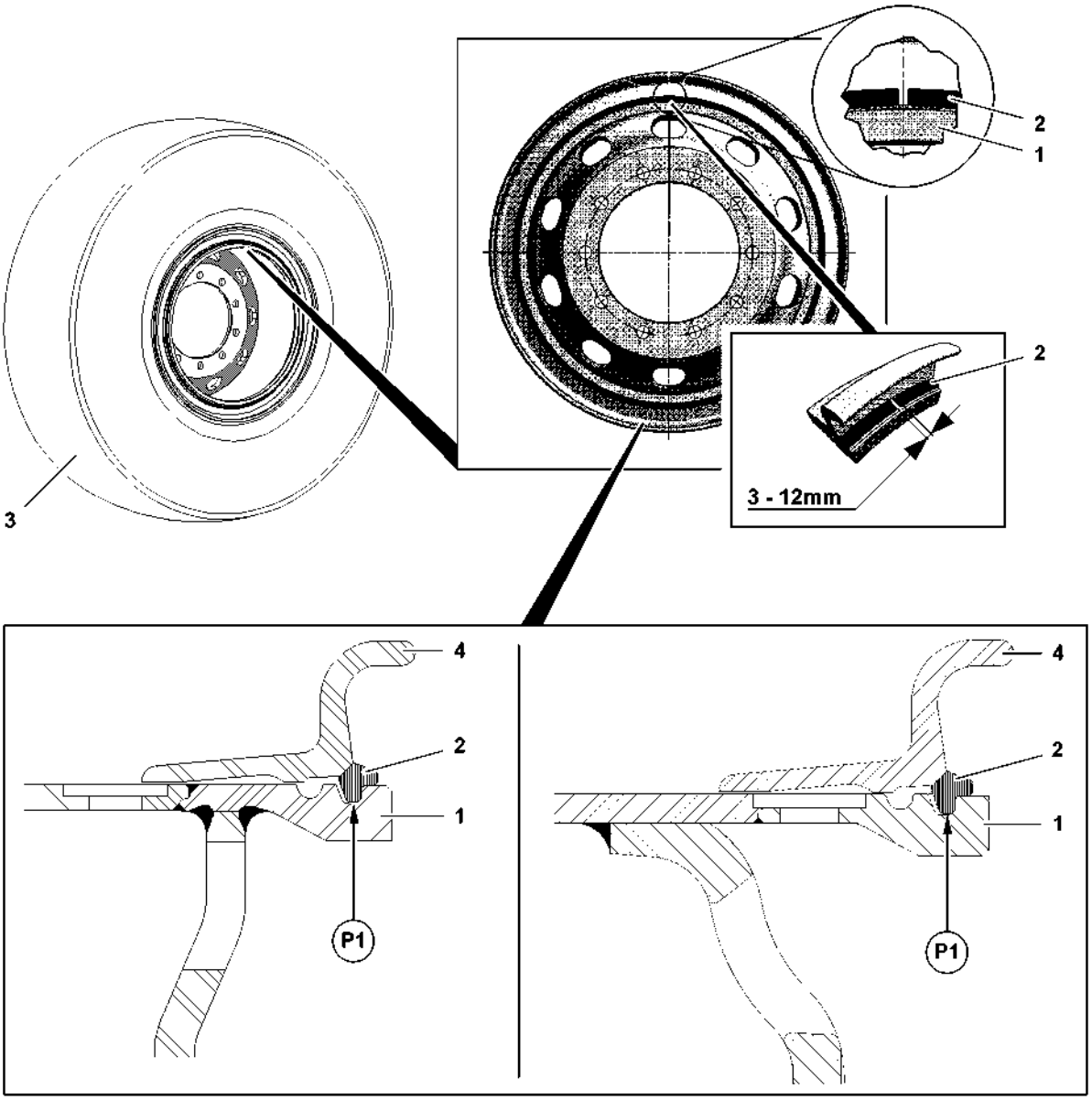

Fig.120142: 3-part disk wheel

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.

9.3 Changing the 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).

WARNING
Use of **non-approved** tires!
Death, severe injury, property damage.
Damage of mobile crane and surrounding area.
▶ Use exclusively replacement tires approved in writing by **Liebherr-Werk Ehingen GmbH**.
▶ Use of **non-approved** replacement tires is prohibited.

9.3.1 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.

9.3.2 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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9.4 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.

9.5 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).

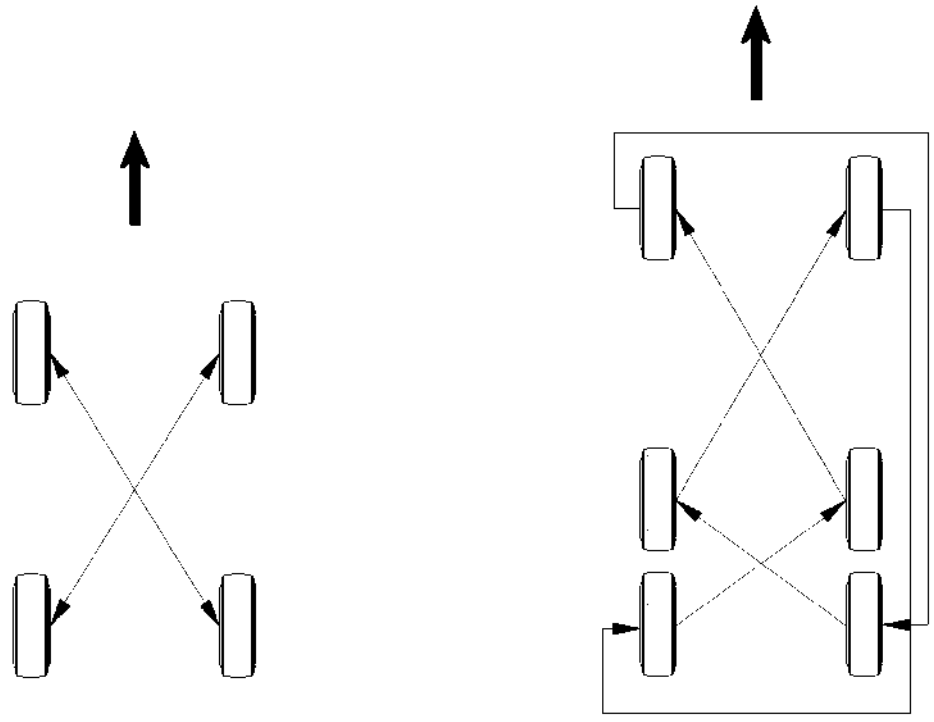

Fig.119259: Example of tire rotation

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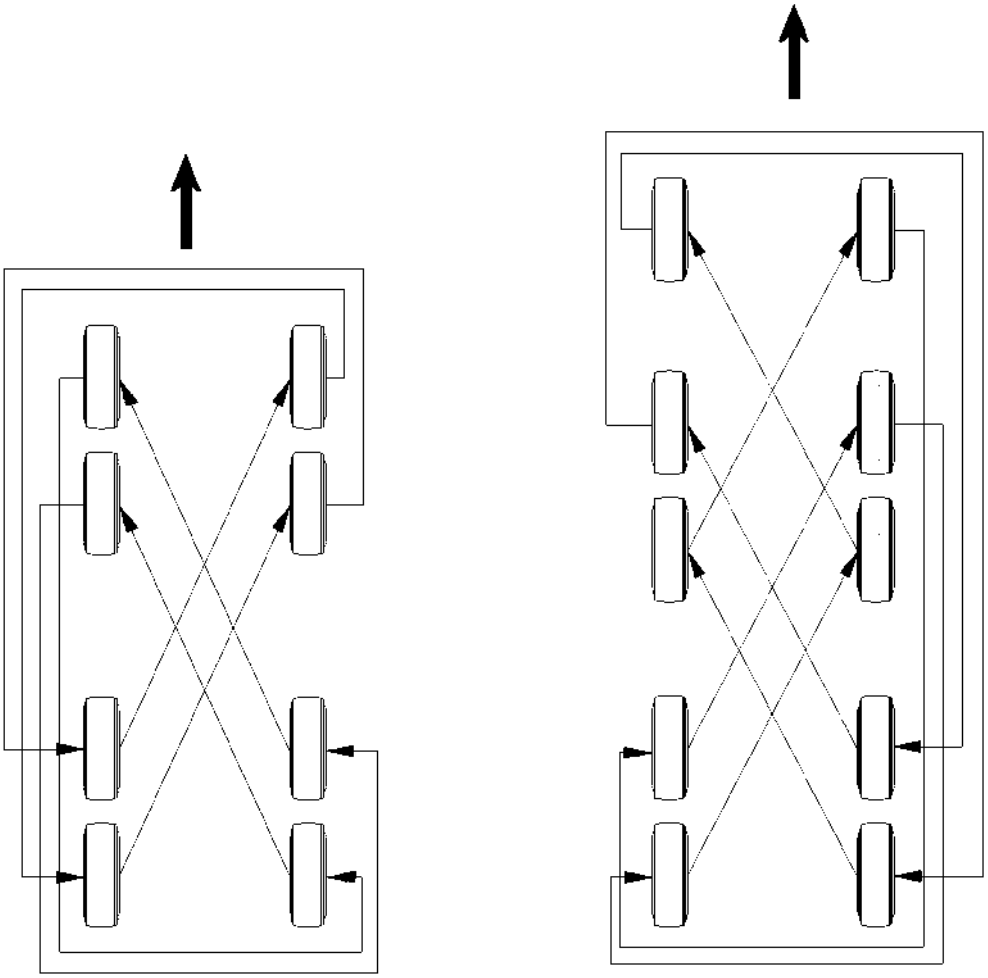

Fig.119260: Example of tire rotation

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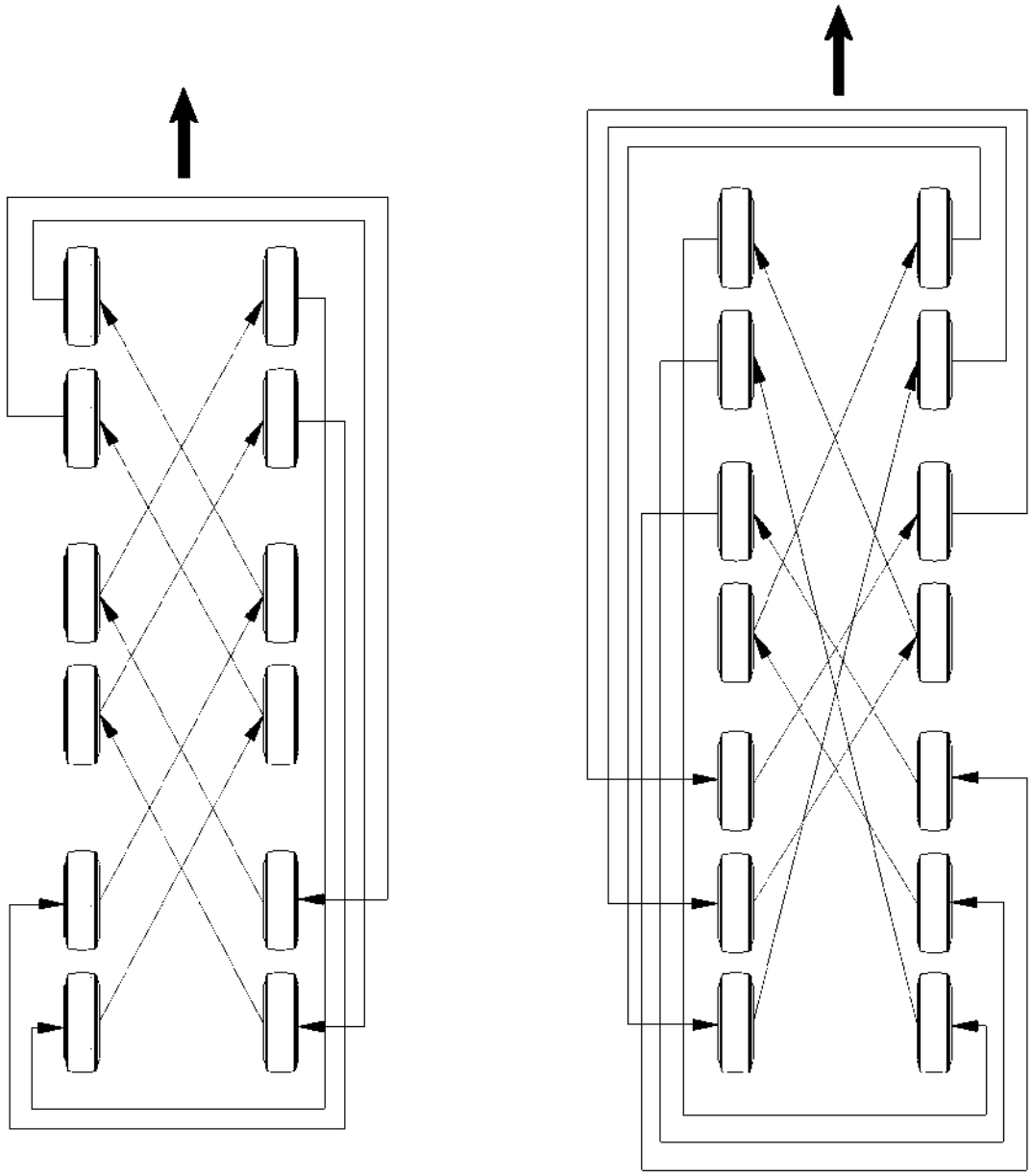

Fig.119261: Example of tire rotation

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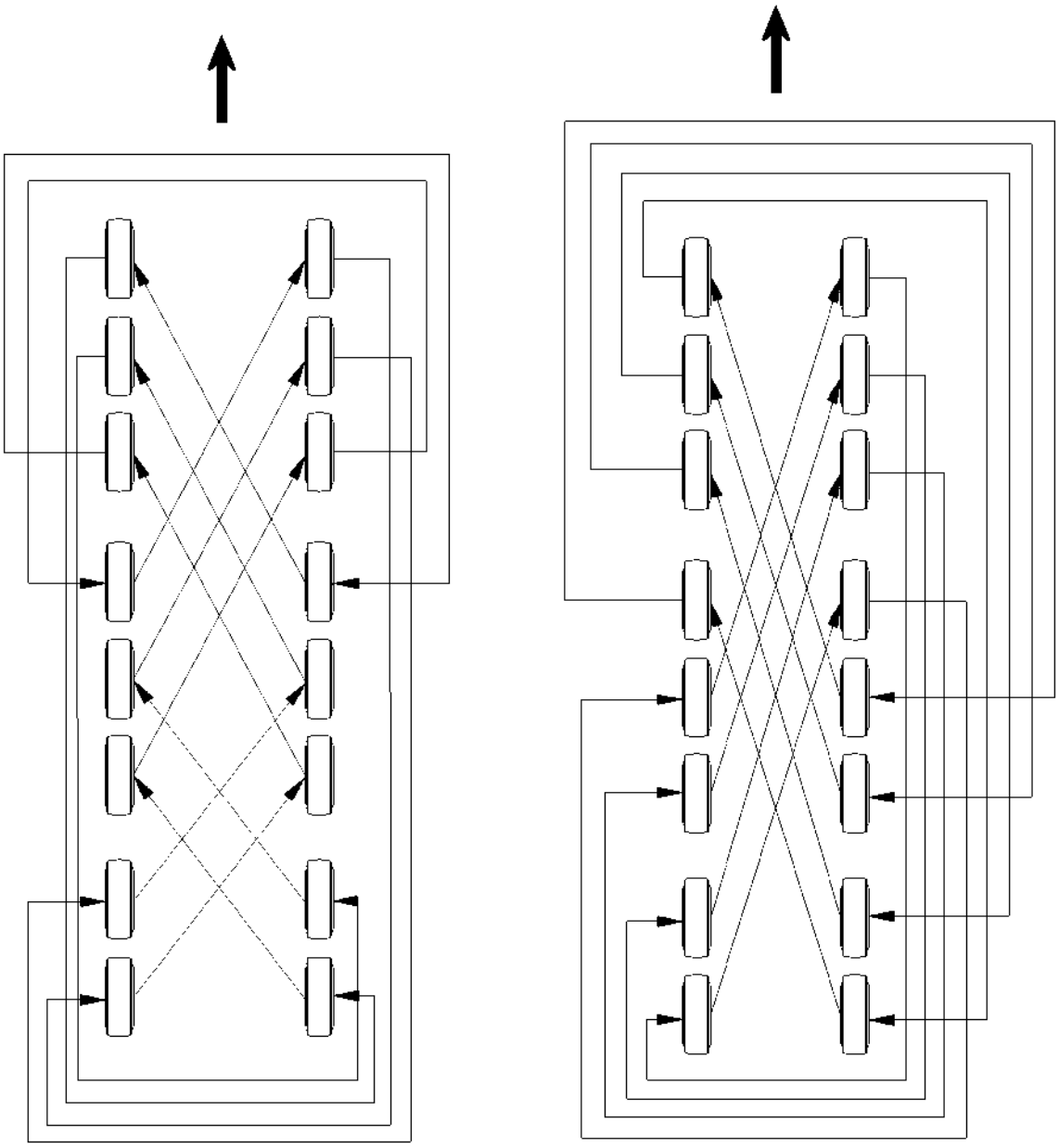

Fig.119263: Example of tire rotation

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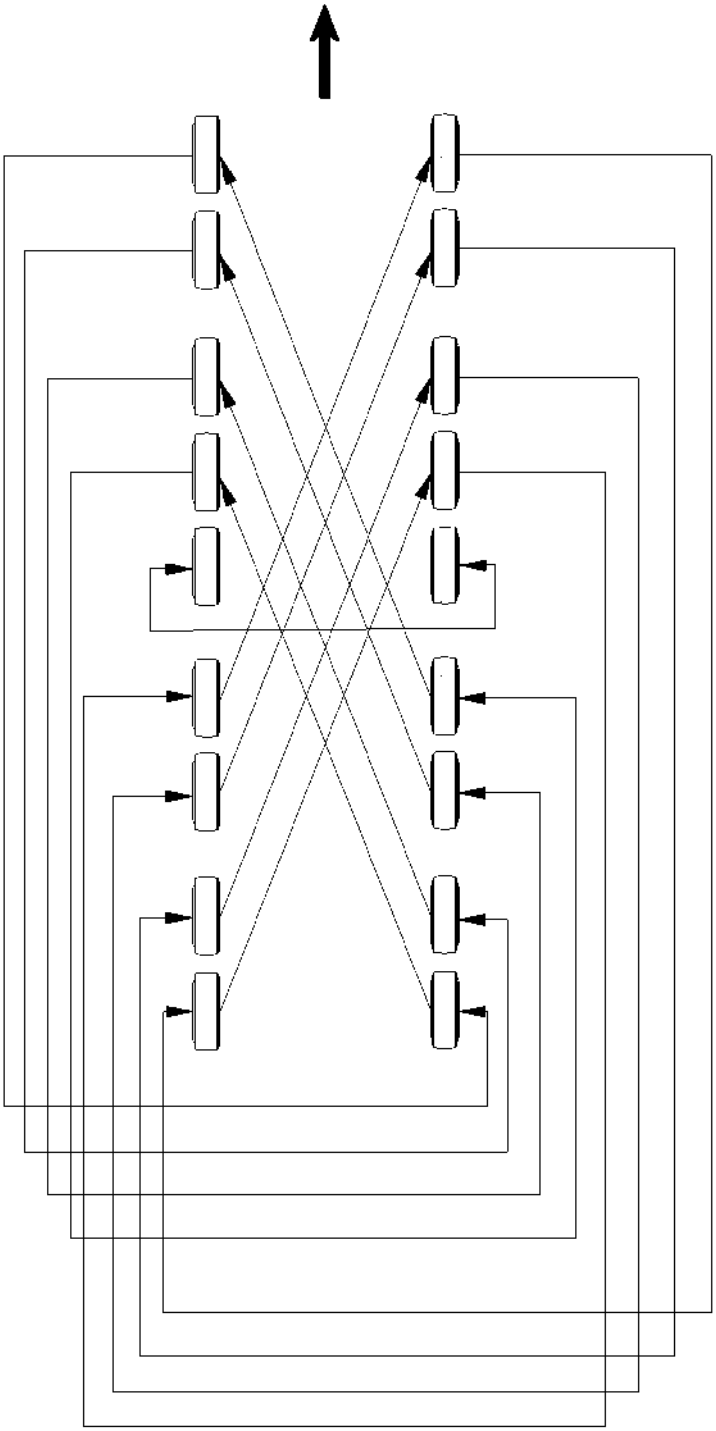

Fig.119262: Example of tire rotation

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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9.6 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.

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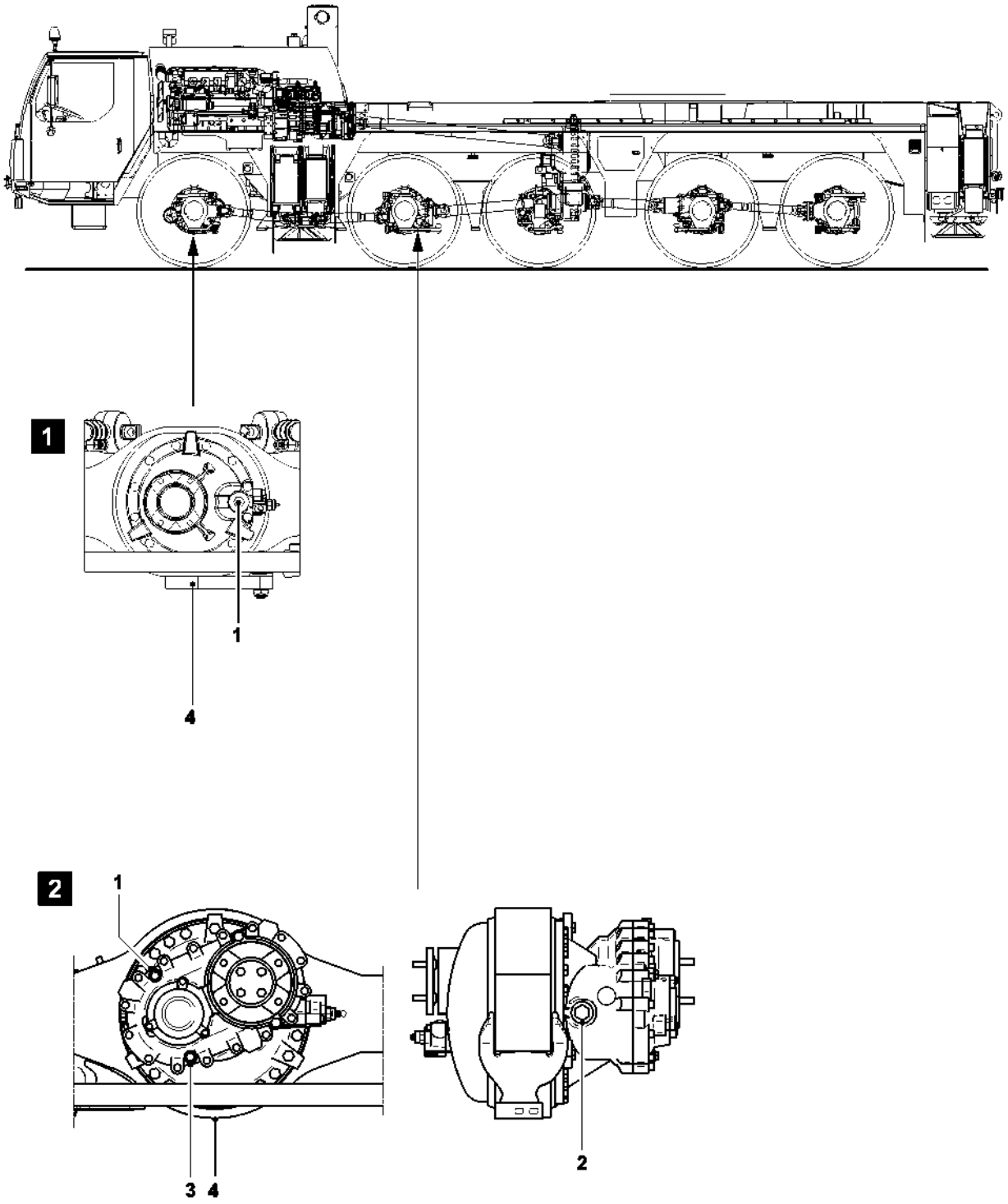

Fig.112592

10 Axles

Maintain extreme cleanliness during all work to prevent dirt from entering the interior of the axle casings.

10.1 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 prerequisites are met:
– The crane vehicle is in horizontal position.

10.1.1 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**.

10.1.2 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.

10.1.3 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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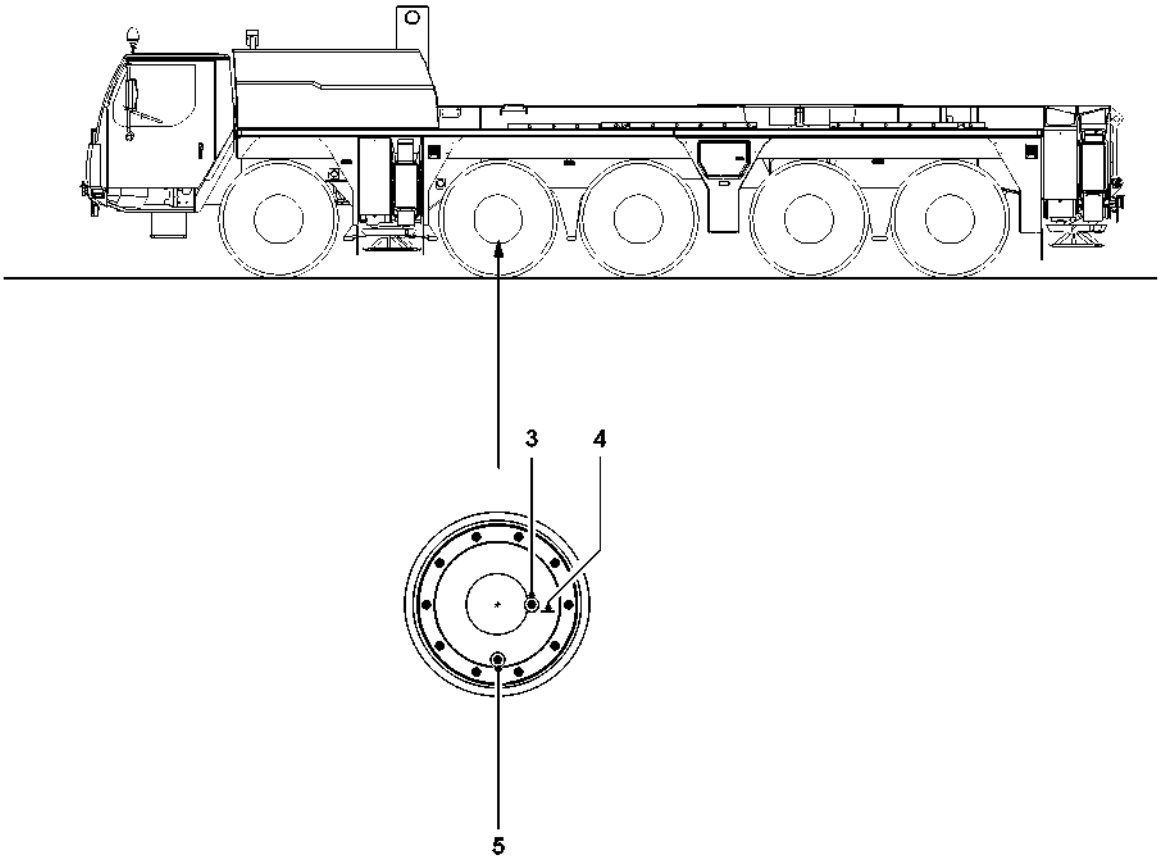

Fig.112593

10.2 Wheel hubs

Make sure that the following prerequisites are met:
- The crane vehicle is in horizontal position.
- The crane vehicle is supported.

10.2.1 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.

10.2.2 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.

11 Steering

11.1 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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11.1.1 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)

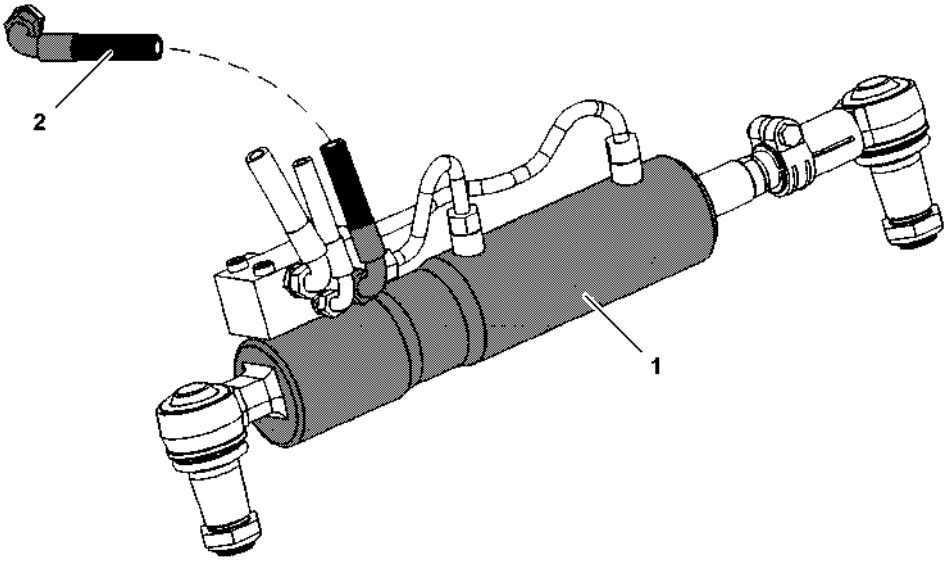

Fig.119290: Steering cylinder

▶ 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 conspicious findings, decisions and replacements comprehensibly, see Crane operating instructions, chapter 8.06.

11.1.2 Inspecting the hydraulic hose lines for leaks

▶ Check the crane for escaped hydraulic oil.
▶ Check the ground under the crane for leaks.

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 conspicious findings, decisions and replacements comprehensibly, see Crane operating instructions, chapter 8.06.

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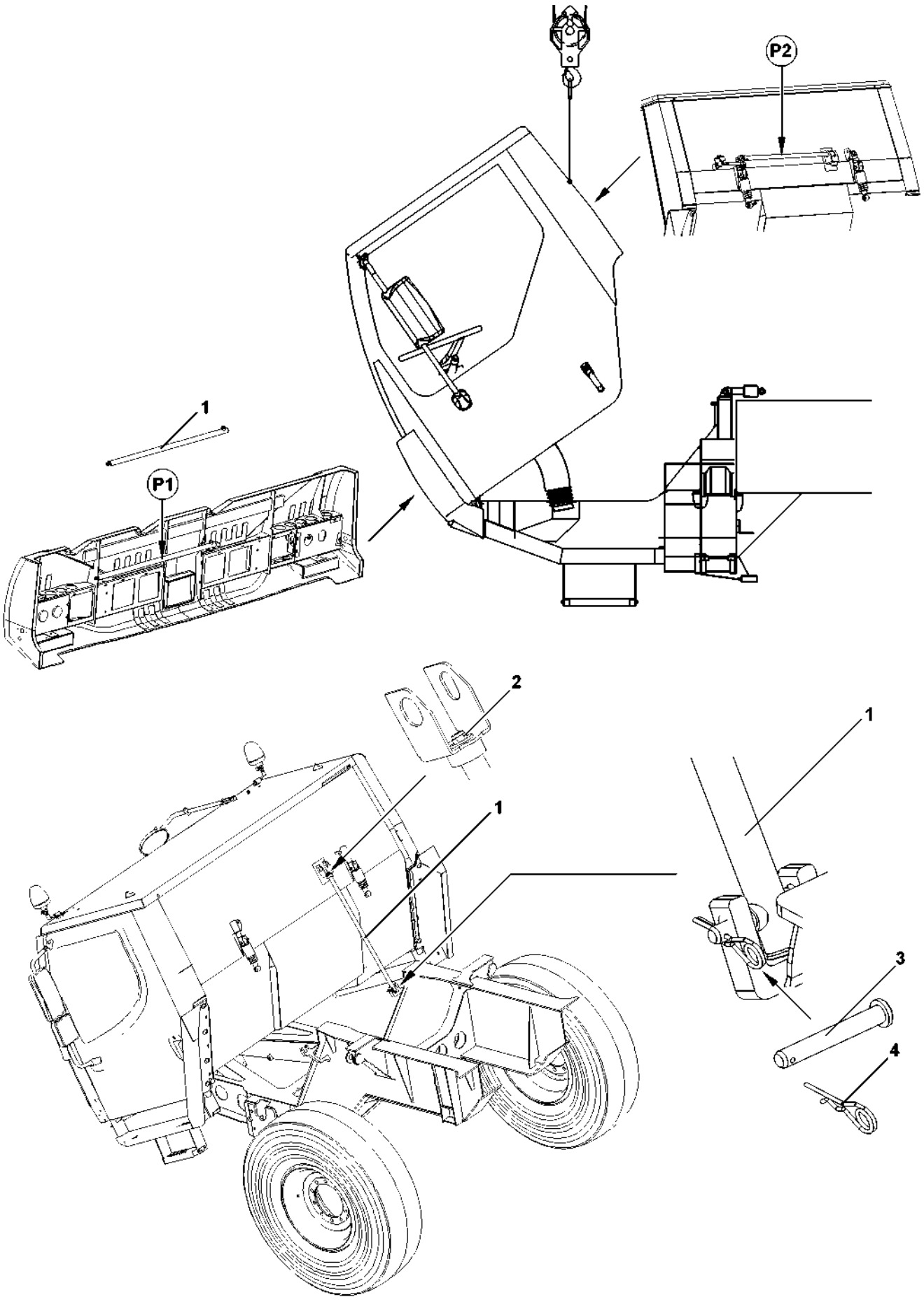

Fig.109852

12 Tilting the driver’s cab

The driver’s cab can be tilted forward for assembly or disassembly purposes to max. 24°.

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**!

12.1 Measures before tilting

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.

Pay attention to cables and hoses on underside of driver’s cab.

▶ Loosen any mountings, if necessary.

WARNING

Danger of accident if cab tilts forward in an uncontrolled manner!

▶ The maximum angle that the driver’s cab may be tilted forward is 24°.
▶ The driver’s cab must be properly supported in the tilted position and secured with a 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 driver’s 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.

13 Electrical system

13.1 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.

13.2 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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13.3 Batteries

13.3.1 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.

13.3.2 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

Reduced battery performance requires greater power requirements.

▶ Charge batteries in time.
▶ Make sure that batteries are charged in the cold season.

13.3.3 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.

13.3.4 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.

Charging the battery while installed

▶ Turn the battery master switch off.
▶ Use an external charger with a charge voltage of maximum 33 V.

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▶ 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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14 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.

14.1 Lubricating ladders

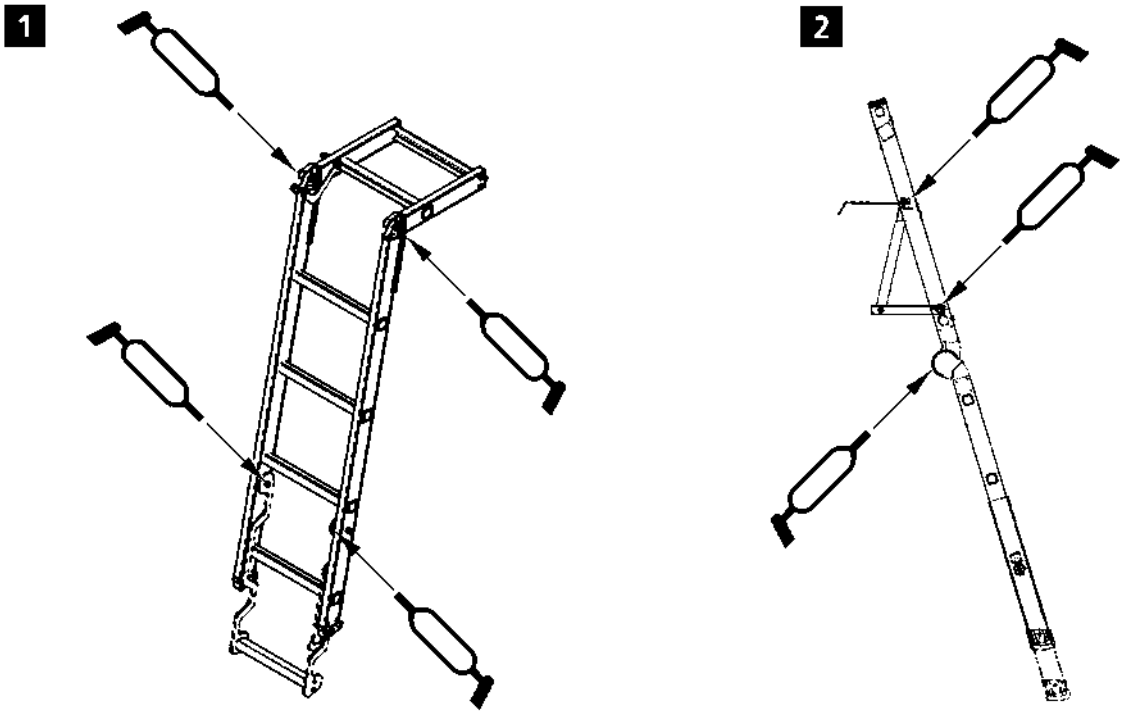

Fig.109766

- ▶ 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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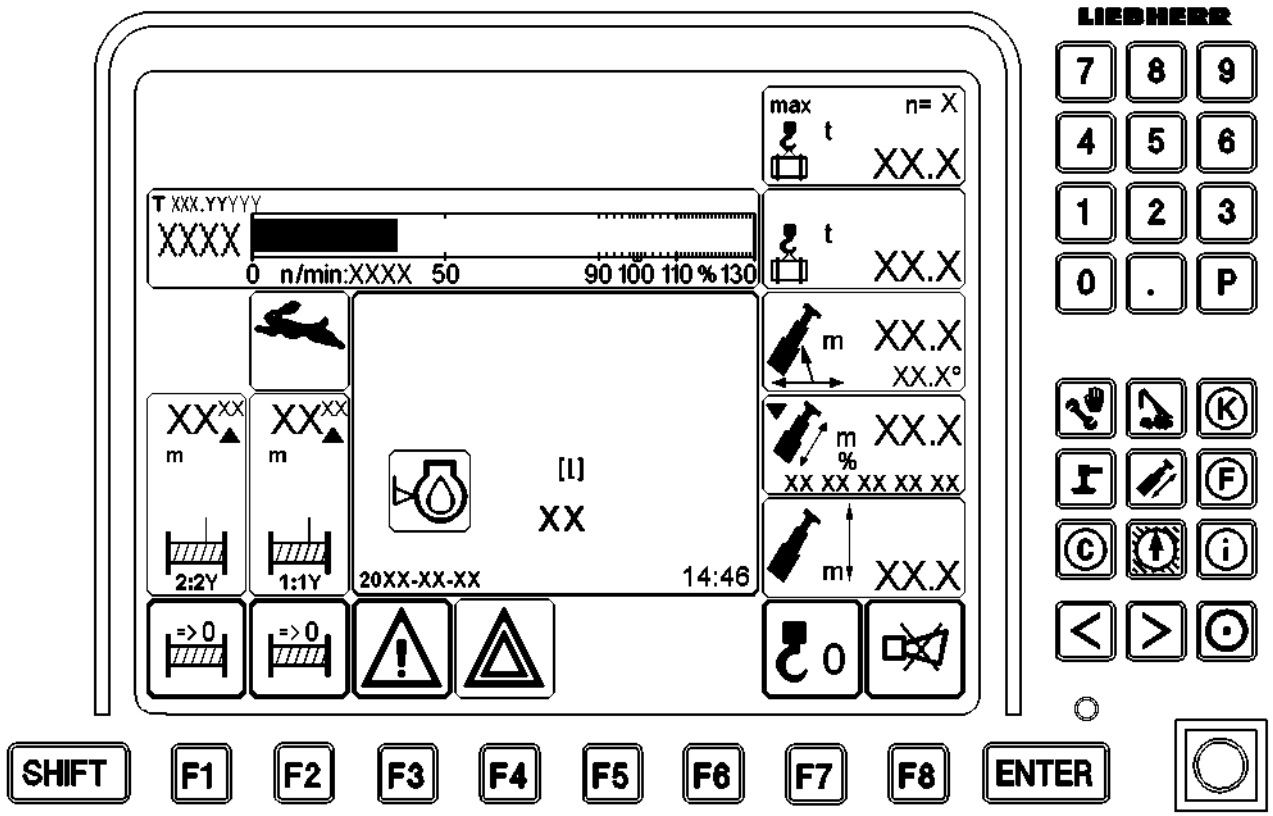

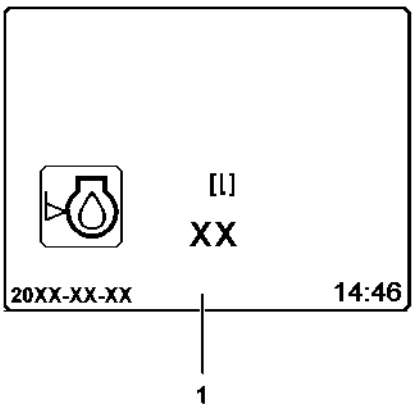

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Fig.115004

1 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.

1.1 Engine oil

1.1.1 Checking the oil level on the LICCON monitor

Make sure that the following prerequisites are met:
- – The crane is in horizontal position.
- – The engine is turned off, the ignition is turned on.
- – The oil has collected in the oil pan.

Note
- ▶ The analog display **1** of the engine oil level shows how much engine oil is to be added or drained.
- ▶ Example: 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.
- ▶ When filling the engine oil, wait for a few minutes until the engine oil has collected in the oil pan.

▶ Select the analog display **1** for the engine oil level, see Crane operating instructions, chapter 4.02.

NOTICE
Danger of damaging the engine!
If the engine is operated with too much or not enough engine oil, the engine can be severely damaged!
- ▶ If too much engine oil is shown on the analog display **1**, drain engine oil according to the analog display **1**!
- ▶ If not enough engine oil is shown on the analog display **1**, add engine oil according to the analog display **1** and the lubrication chart!

▶ Check the engine oil level on the analog display **1**.

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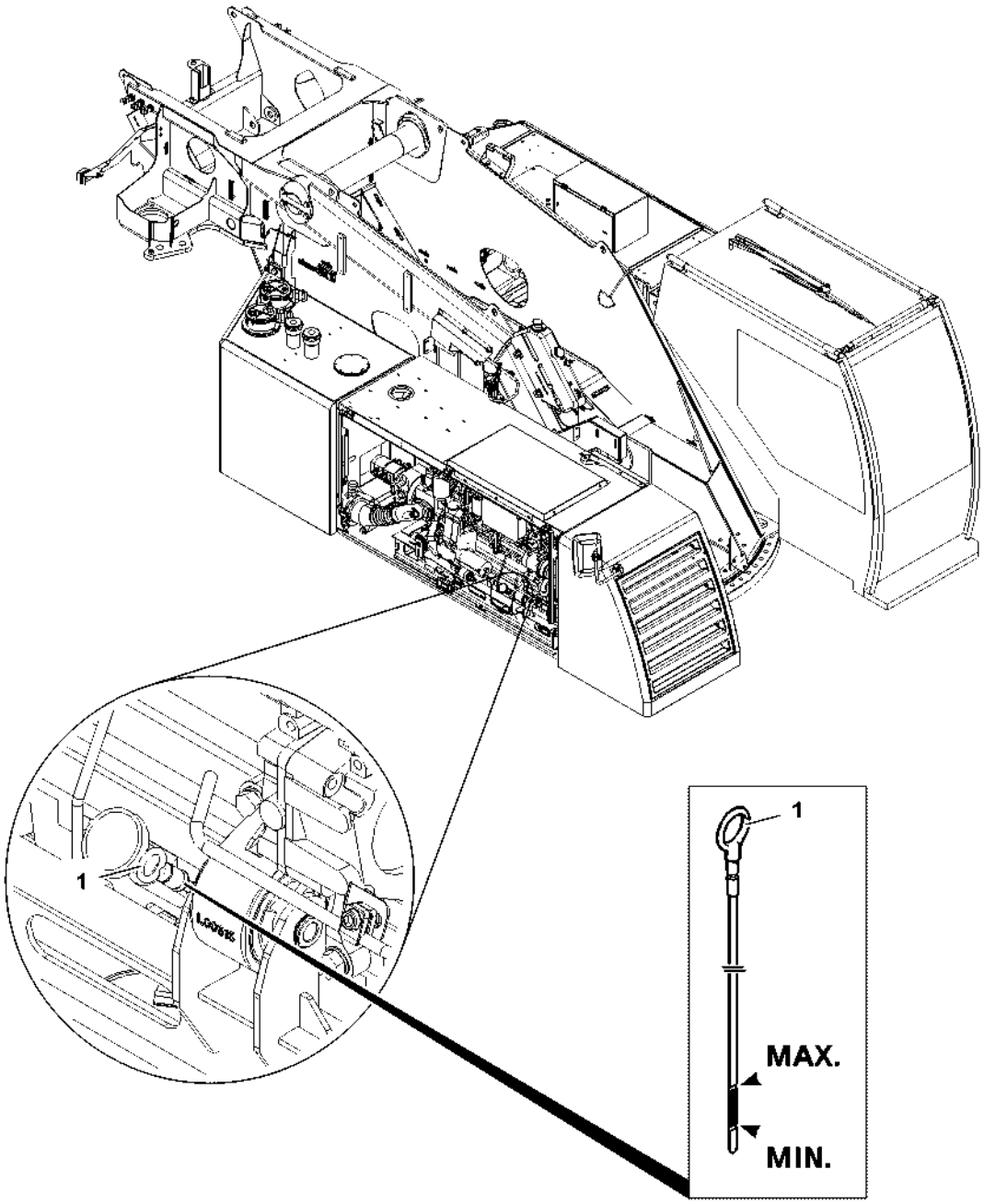

Fig.114906

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.

▶ 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.

CAUTION
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**.

1.1.3 Changing the oil

Refer to the separate operating instructions for „LIEBHERR Diesel engines“.

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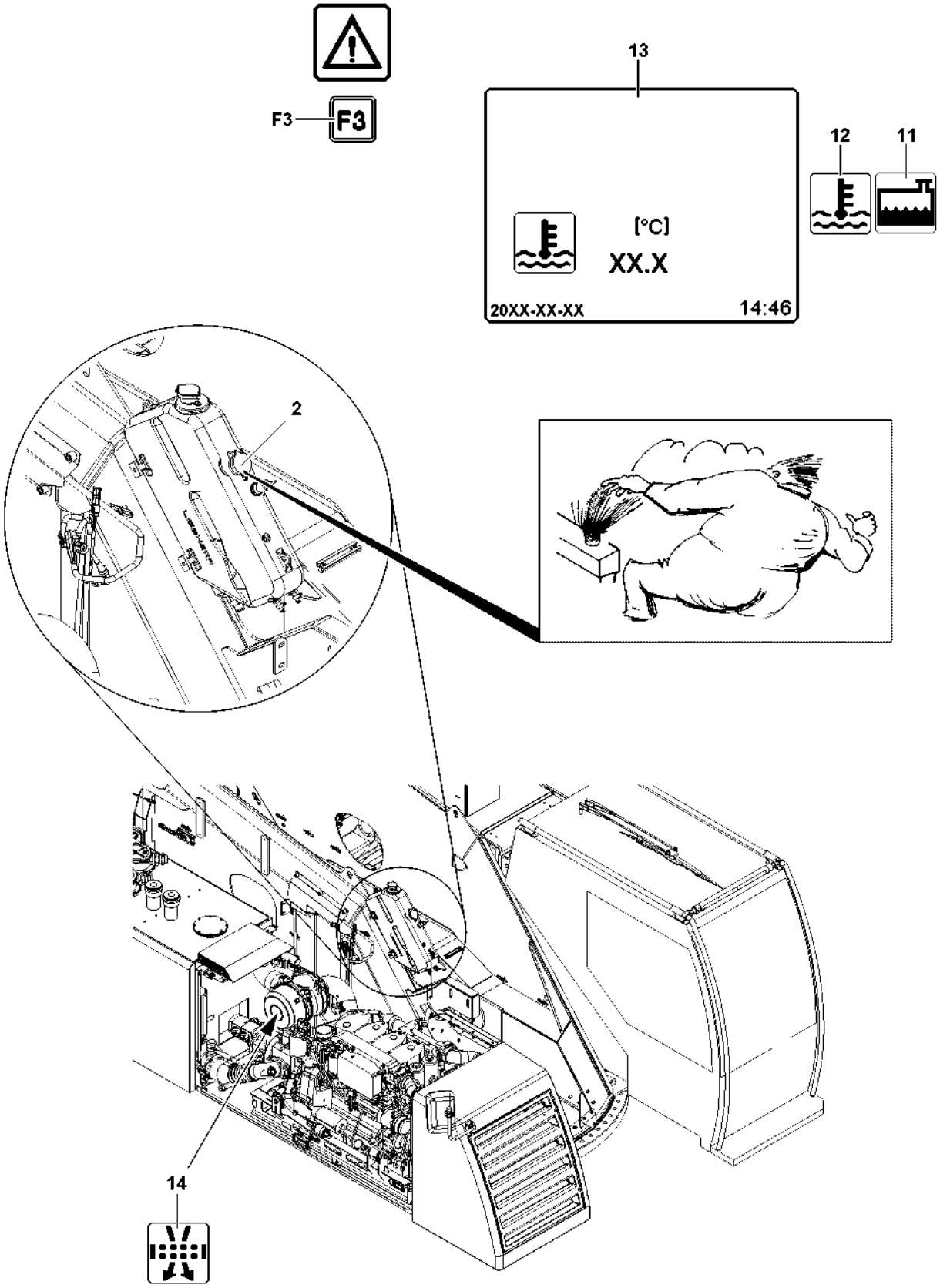

Fig.114908

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1.2 Coolant Engine cooling

The coolant level is monitored by the LICCON computer system. If, for example, the coolant level is too low, the warning icon on the function key **F3** is shown in red. By pressing the function key **F3** you get into the „monitoring field with monitoring functions“. There the icon **11** „Coolant level“ is shown in red.

If the coolant temperature is too high, then in case of an error, the icon **12** in the „monitoring field with monitoring functions“ is also shown in red.

The coolant temperature **13** of the diesel engine can also be shown in the individual control display on the LICCON monitor, see Crane operating instructions, chapter 4.02.

DANGER
Danger of skin burns!
▶ The Diesel engine must be cold when checking the coolant.

▶ 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.

1.3 Air filter

The air filters are monitored by the LICCON computer system. If an increased vacuum occurs in the suction line due to dirty filter inserts, then the warning icon on the function key **F3** is shown in red. By pressing the function key **F3** you get into the „monitoring field with monitoring functions“. There the icon „Air filter contaminated“ **14** is shown in yellow.

If the warning „Air filter contaminated“ **14** appears:
▶ Clean or replace the filter insert.

1.4 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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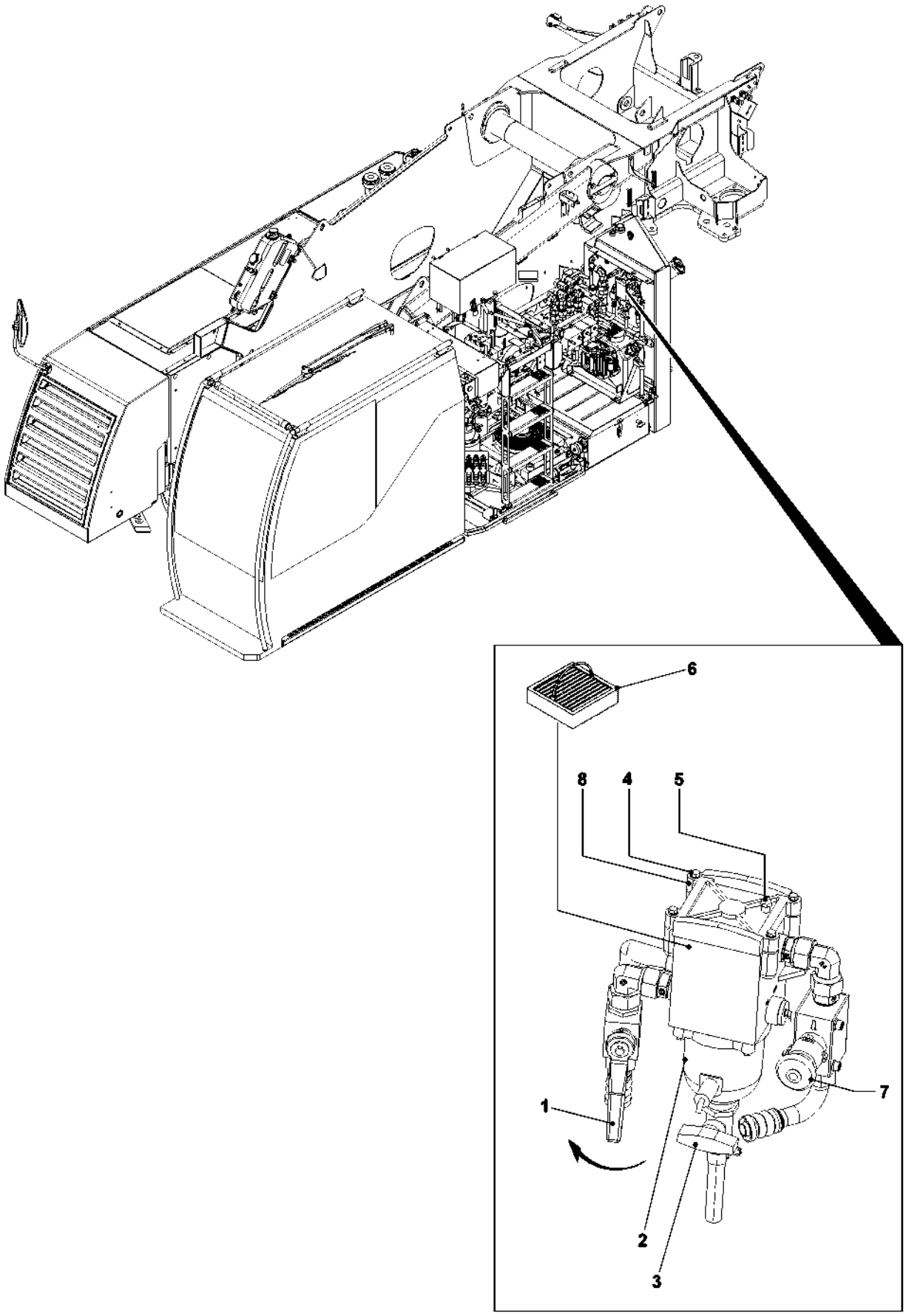

Fig.114907

1.5 Fuel preliminary filter

1.5.1 Draining the fuel preliminary filter

Note

▶ The water separator **2** on the fuel preliminary filter must be drained at regular intervals.

▶ 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.

1.5.2 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 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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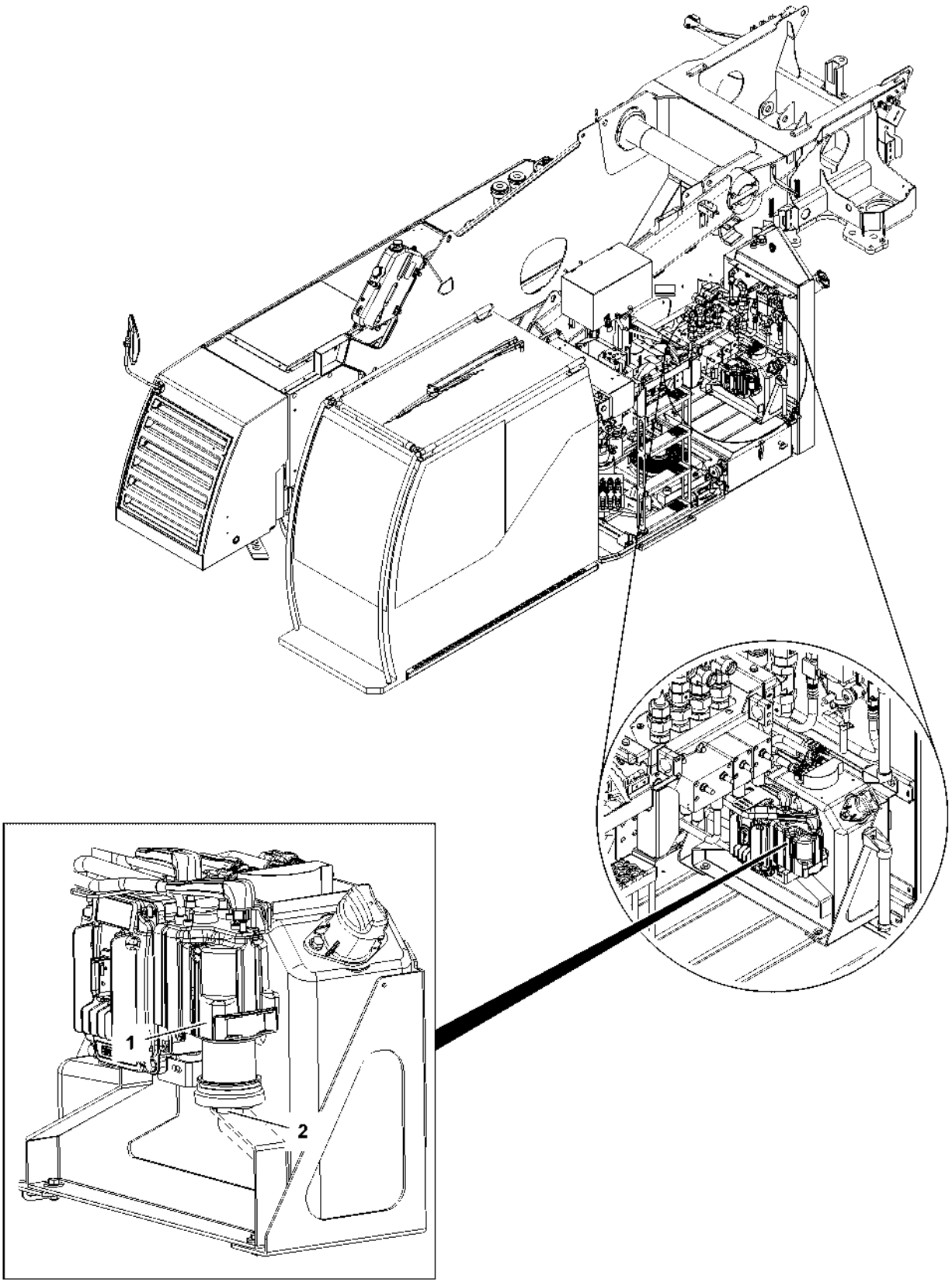

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Fig.114909

2 Urea filter

2.1 Replacing the filter unit

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 cautionary and sanitary protective measures!

Note
- ▶ Change the filter insert in urea pump **1** according to the data in the maintenance intervals, see Crane operating instructions, chapter 7.03!
- ▶ Change the filter insert only when the pressure is relieved!

- ▶ Turn the Diesel engine off.
- ▶ Place a catch basin under the urea pump **1**.
- ▶ Release the urea filter **2**, remove the old filter insert and dispose of it properly.
- ▶ Insert a new filter insert in the urea filter **2** and tighten the urea filter **2** with 32 Nm.
- ▶ Remove the catch basin and dispose of the urea.

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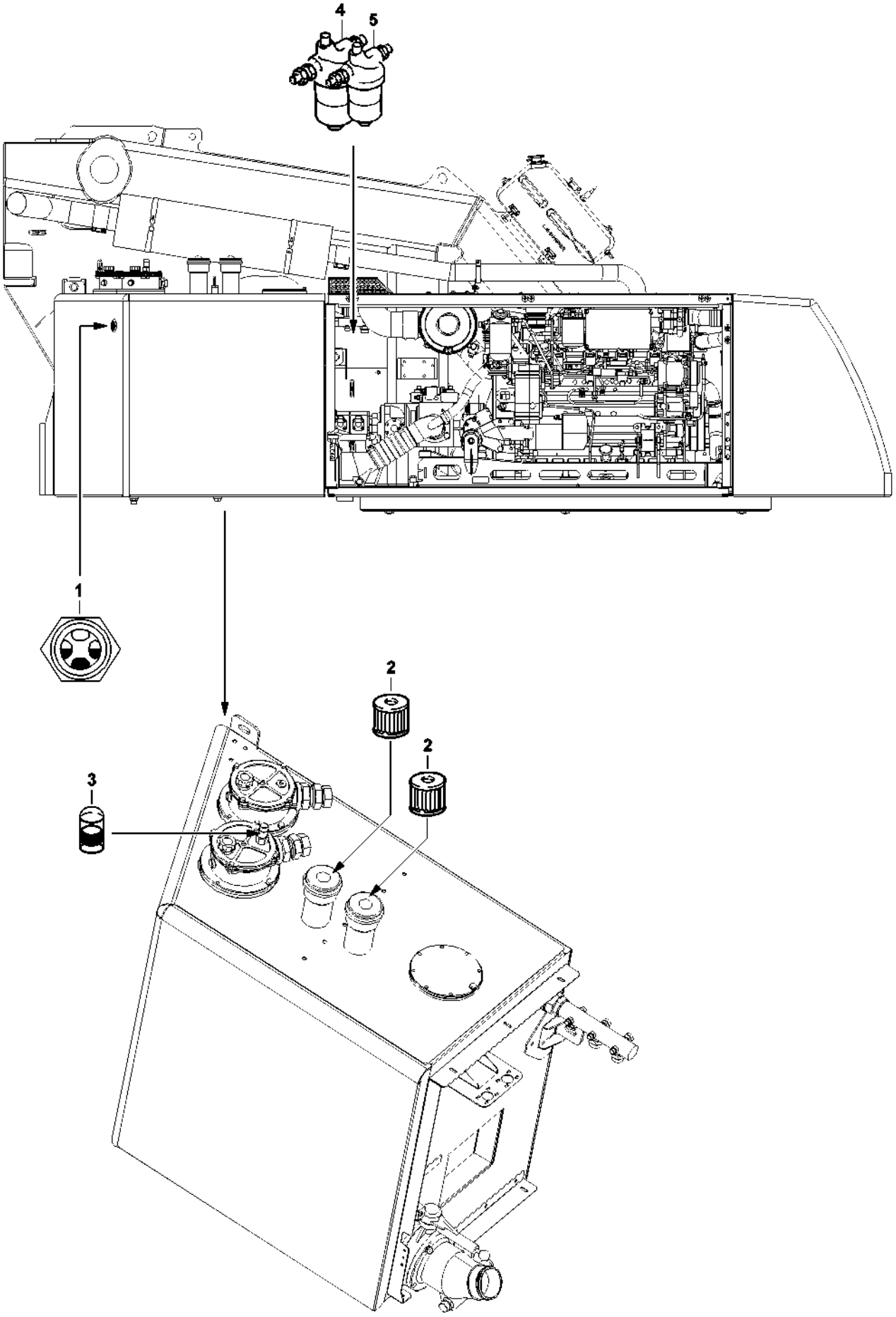

Fig.103106

3 Hydraulic system

When adding oil, observe utmost cleanliness.

3.1 Hydraulic tank

3.1.1 Checking the oil level

Make sure that the following prerequisites are met:
- The crane is in horizontal position.
- The luffing cylinder and the telescoping cylinder are fully retracted.

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**.

3.1.2 Checking the vent / breather filter

▶ Open the cover with the turn lock.
▶ Check filters **2** for impurities (visual inspection).

In the event of heavy contamination:
▶ Replace the filters **2**.
▶ Close the cover with the turn lock again.
▶ Start the engine.
▶ Slowly run through all crane movements.
▶ Check the oil level again and add oil if necessary.

3.1.3 Return filter

The return filters are equipped with a maintenance indicator **3**. If the red mark is visible when the oil is at operating temperature, then the filter insert must be replaced.

▶ Unscrew and remove both filter covers.
▶ 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 engine and check the filter for leaks.
▶ Check the oil level and add oil if necessary.

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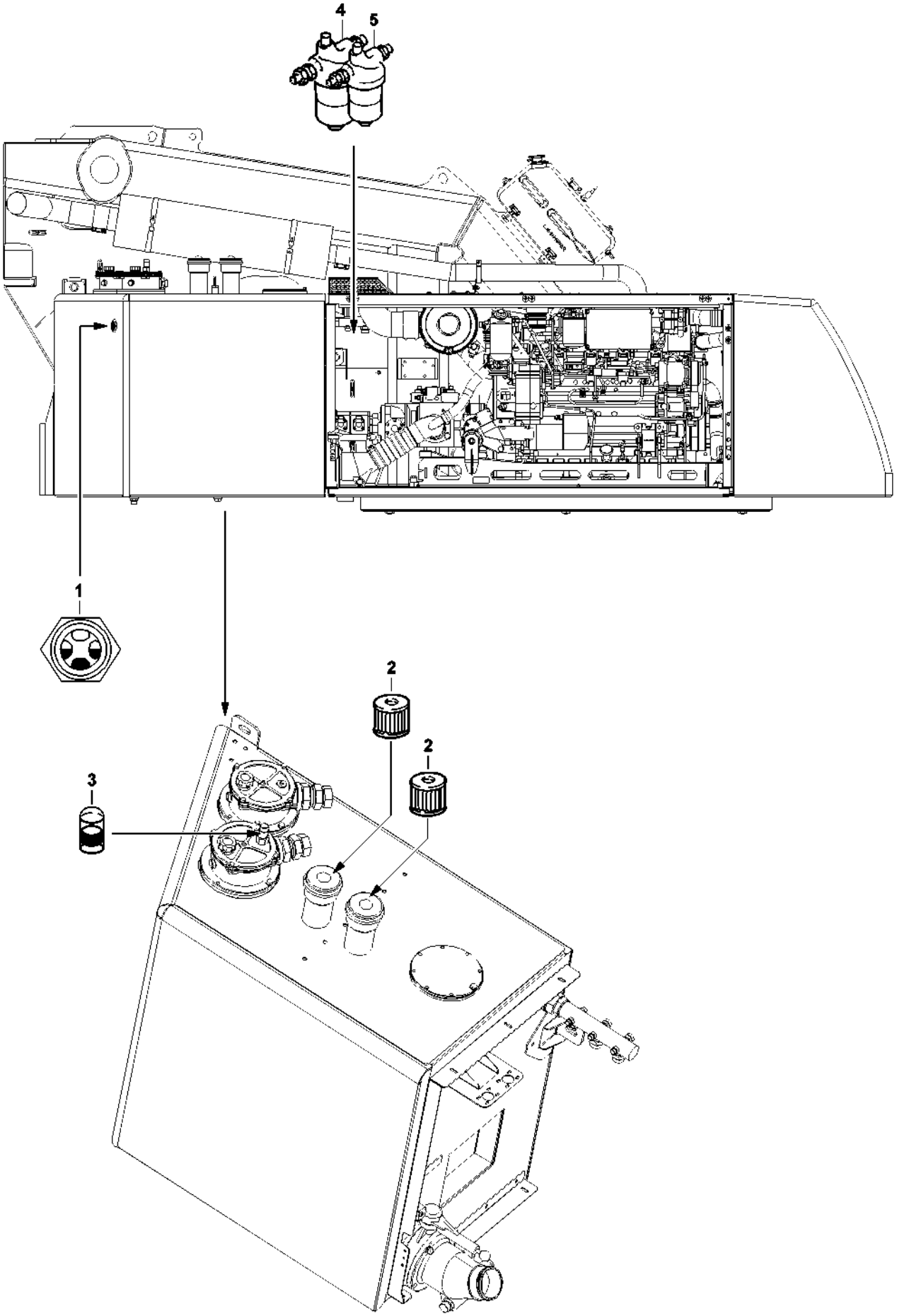

Fig.103106

3.2 Pressure filters in the crane hydraulic

The pressure filter **4** and pressure filter **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 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.

3.3 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.

CAUTION
Danger 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 gas accumulator pressures may change.
▶ Check the gas 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.

3.4 Checking the hydraulic hose lines

Check the hydraulic hose lines, see Crane operating instructions, chapter 7.04.

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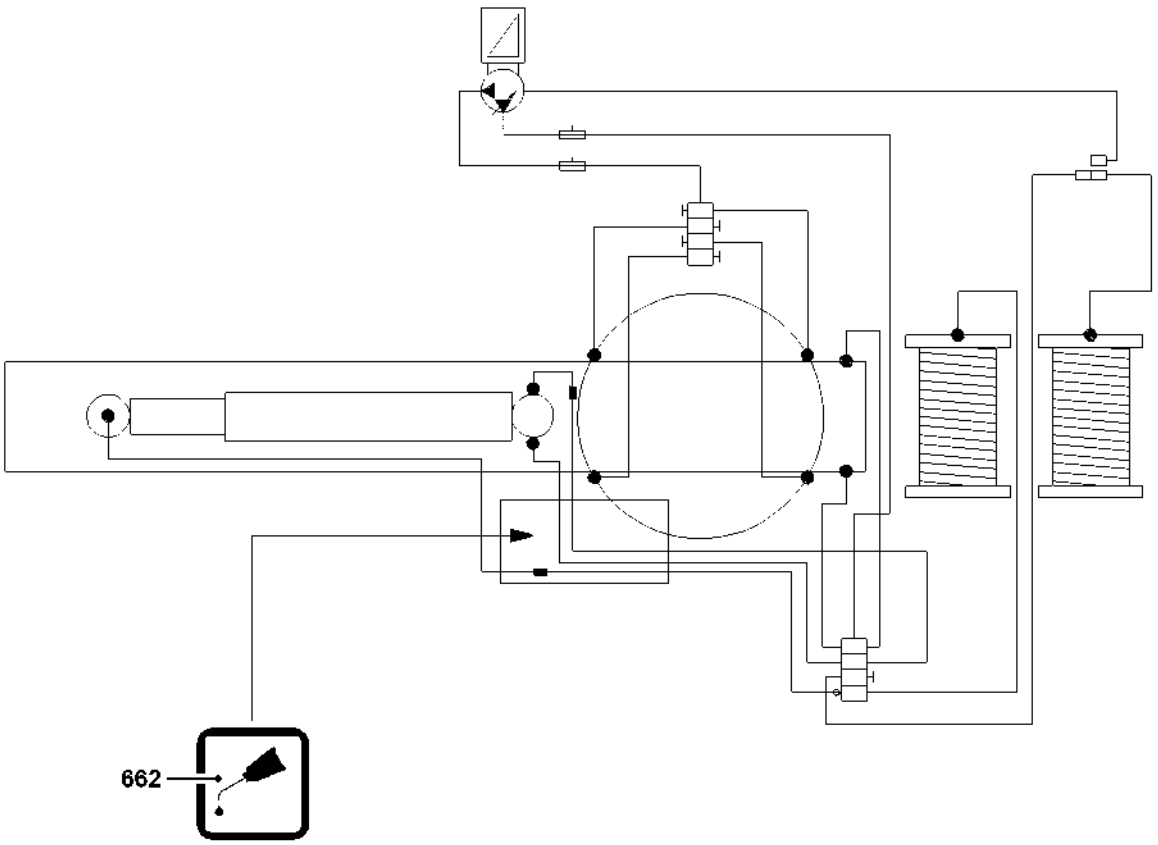

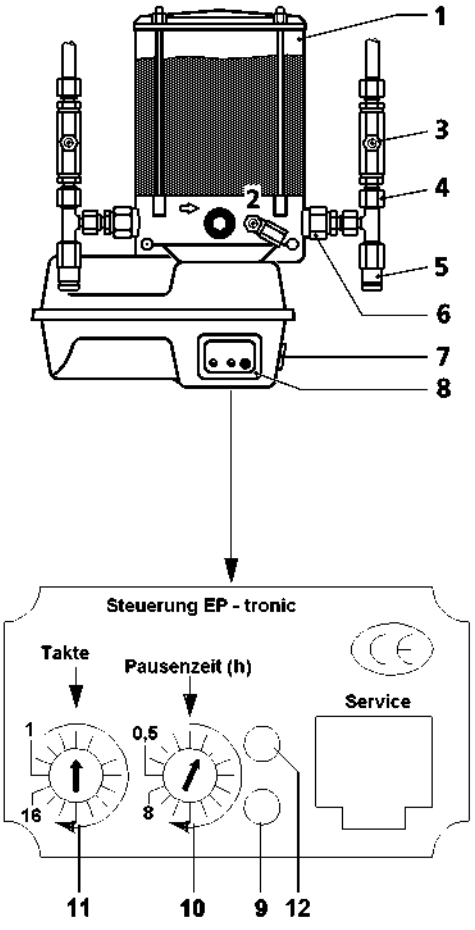

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Fig.112192

4 Central lubrication system

The crane superstructure is equipped with a central lubrication system. All grease points (refer to the guide on the left), the roller slewing ring, the bearing of the pivot section, the bearings of the luffing cylinder and the hoist winches are automatically supplied with the correct grease quantity.

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.

- Pump operation period: 5 cycles
- Pause time: 3 hours

Note

▶ Cleaning is permitted in washing bays or with steam cleaners!

4.1 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
- LED **9** (green): Function display
- Latched switch **10**: Pause time (h)
- Latched switch **11**: Cycles
- LED **12** (red): Fault display

4.2 Adjusting the lubrication and pause timing

During the lubrication procedure, the LED **9** on the engine protection housing lights up statically. 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 LED **9** lights up for approximately 2 seconds and displays the operational readiness of the control **8**.

4.3 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**.

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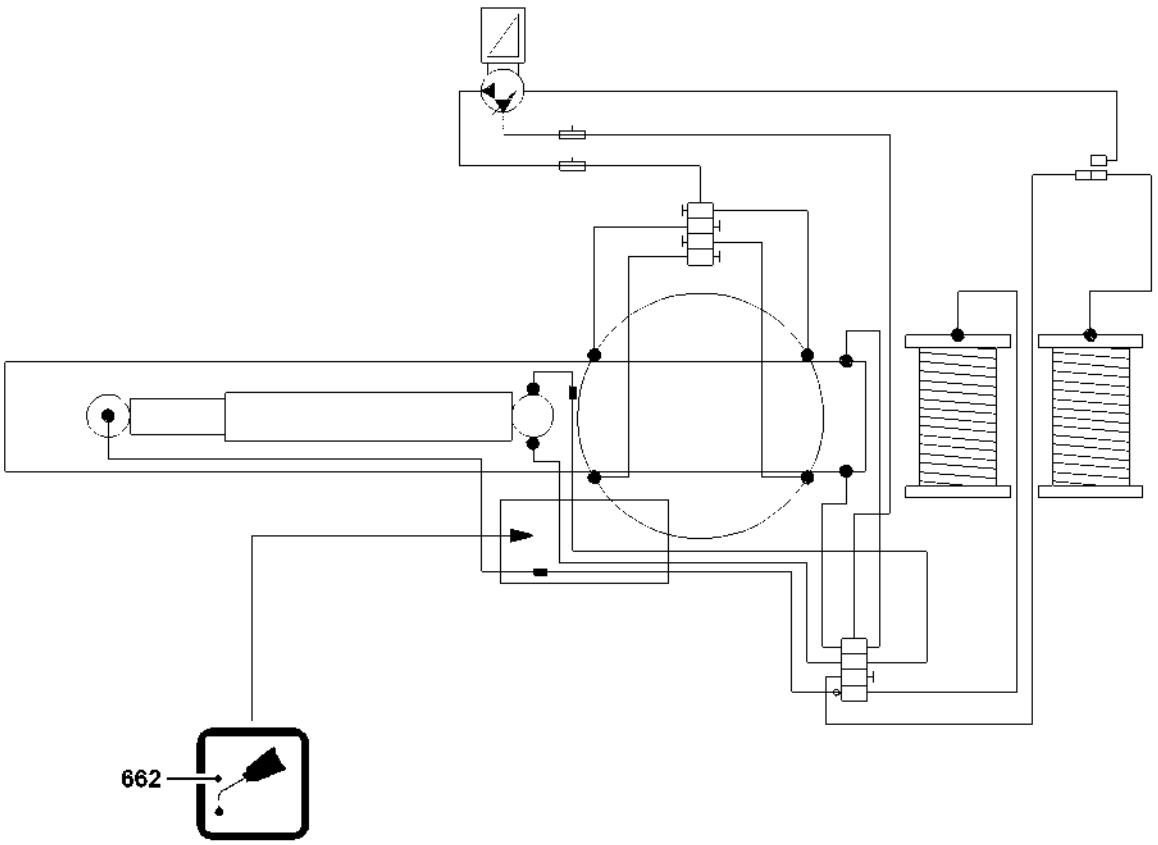

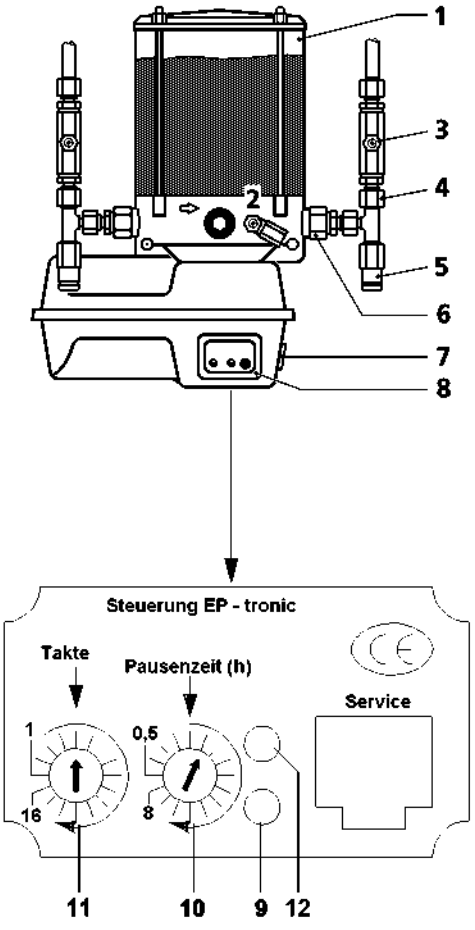

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Fig.112192

4.4 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 **662** displays a malfunction or a problem by blinking.

4.4.1 Blinker code - cycle control

During operation

- Ignition on, ready for operation:
  The indicator light **662** lights up for 1.5 s and turns off.
- Lubrication active:
  The indicator light **662** lights up statically.

In case of a problem

- Error of monitoring period of cycle input, lubrication time larger monitoring period cycle input.
  The indicator light **662** lights up for 1 s and is off for 1 s etc.
- Error CPU, Error memory
  The indicator light **662** lights up for 0.5 s and is off for 0.5 s etc.

4.5 Access to the automatic lubrication (intermediate lubrication)

Intermediate lubrications after washing the crane or after a repair.

▶ With the ignition turned on, press the red button **7** on the engine protection housing of the pump.

4.6 Filling the grease container

CAUTION
Risk of damage due to insufficient lubrication!
▶ There must be sufficient grease in the grease container **1** at all times.
▶ 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.

4.7 Bleeding the central lubrication system

If the grease container **1** has been emptied it may be necessary to bleed the 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.

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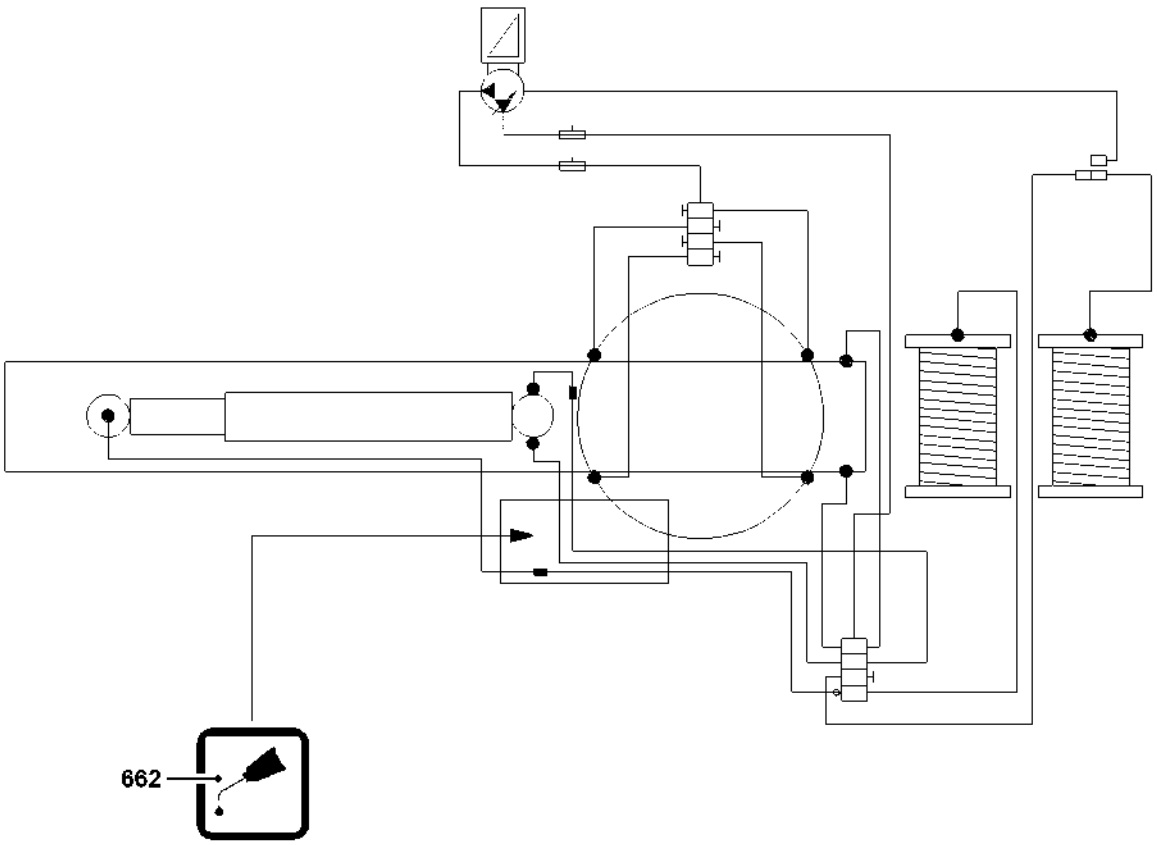

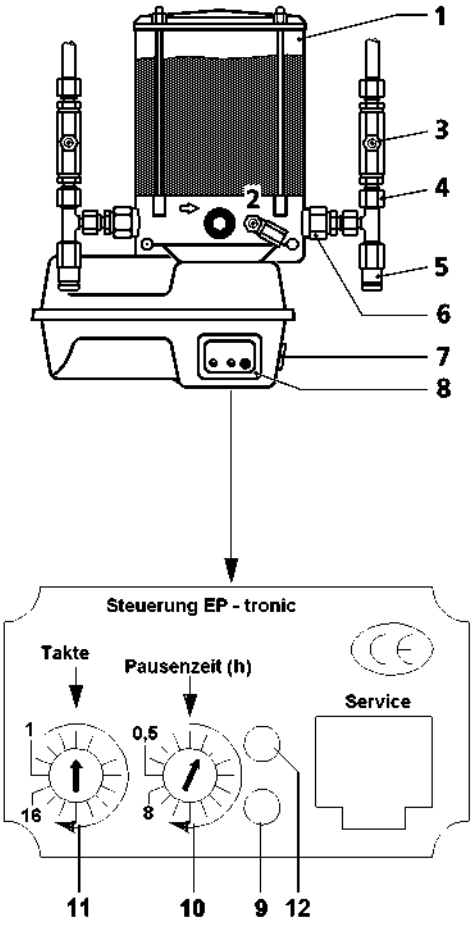

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Fig.112192

4.8 Filling the lubrication lines

CAUTION
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 assembly units.
- ▶ 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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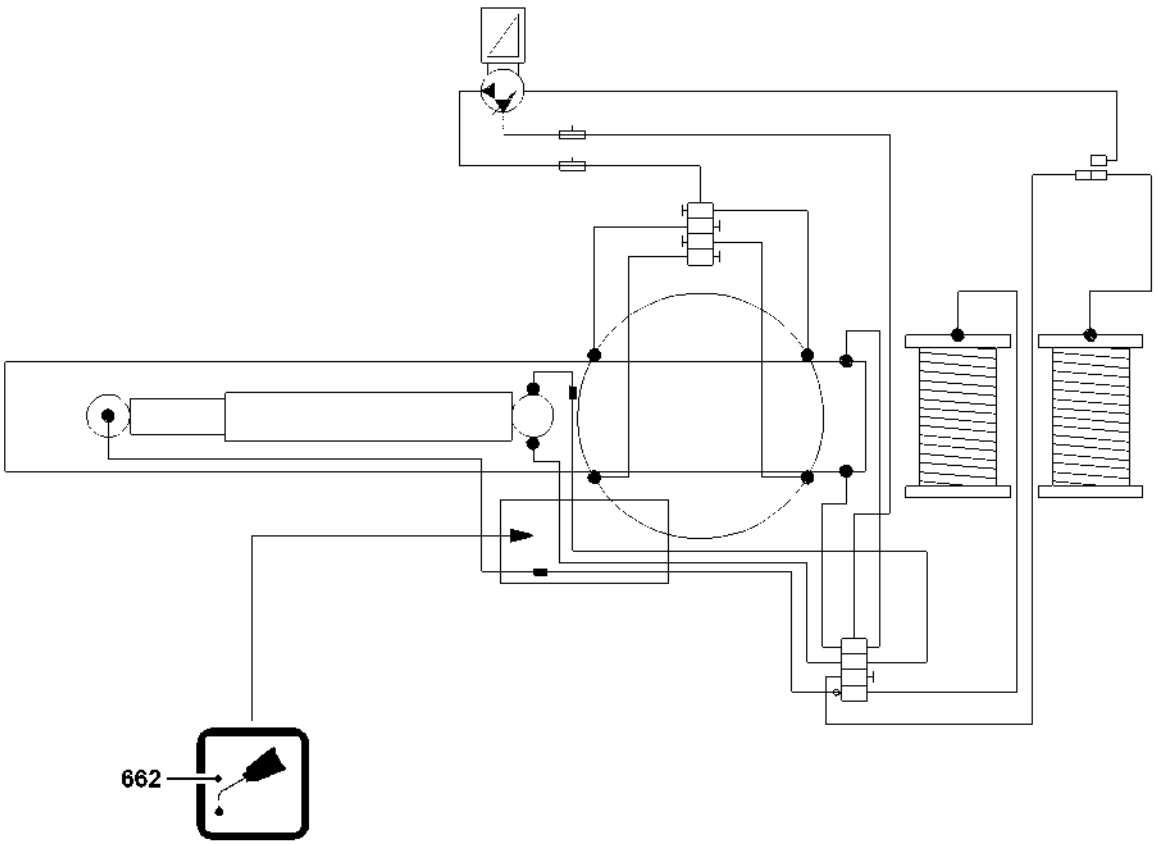

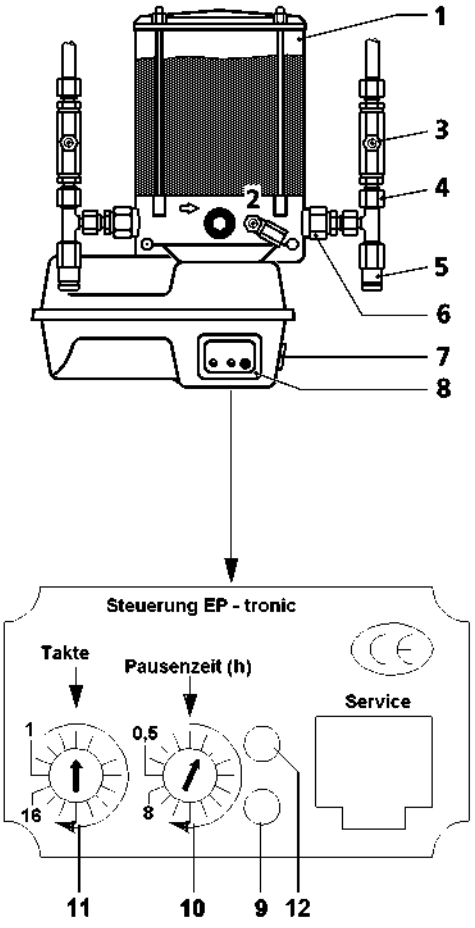

Fig.112192

4.9 Troubleshooting on the central lubrication system

Problem	Cause	Remedy
Pump is not working	Integrated electronic control defective, electrical line interrupted, pump defective	Replace lower part of motor protection housing, replace electrical line, replace pump
Pump operates, but does not deliver	Air cushion in delivery piston has dropped below minimum fill level, pump element defective	Bleed pump, fill reservoir, replace pump element
No grease collar on all lube points	Pump not operating, interval time too high or cycle time too short, system blocked	See „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
Pump speed reduced	High system pressure, low ambient temperature	Check system / bearing points, no damage: Try 1 or 2 intermediate lubrication operations.
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
Red LED lights up in 0.5 second interval	Error CPU / memory	Consult Liebherr Service
Red LED and control light blink in 1 second interval	Error in the monitoring period from cycle start	Proximity switch is defective, possibly consult Liebherr or BeKaMax customer service

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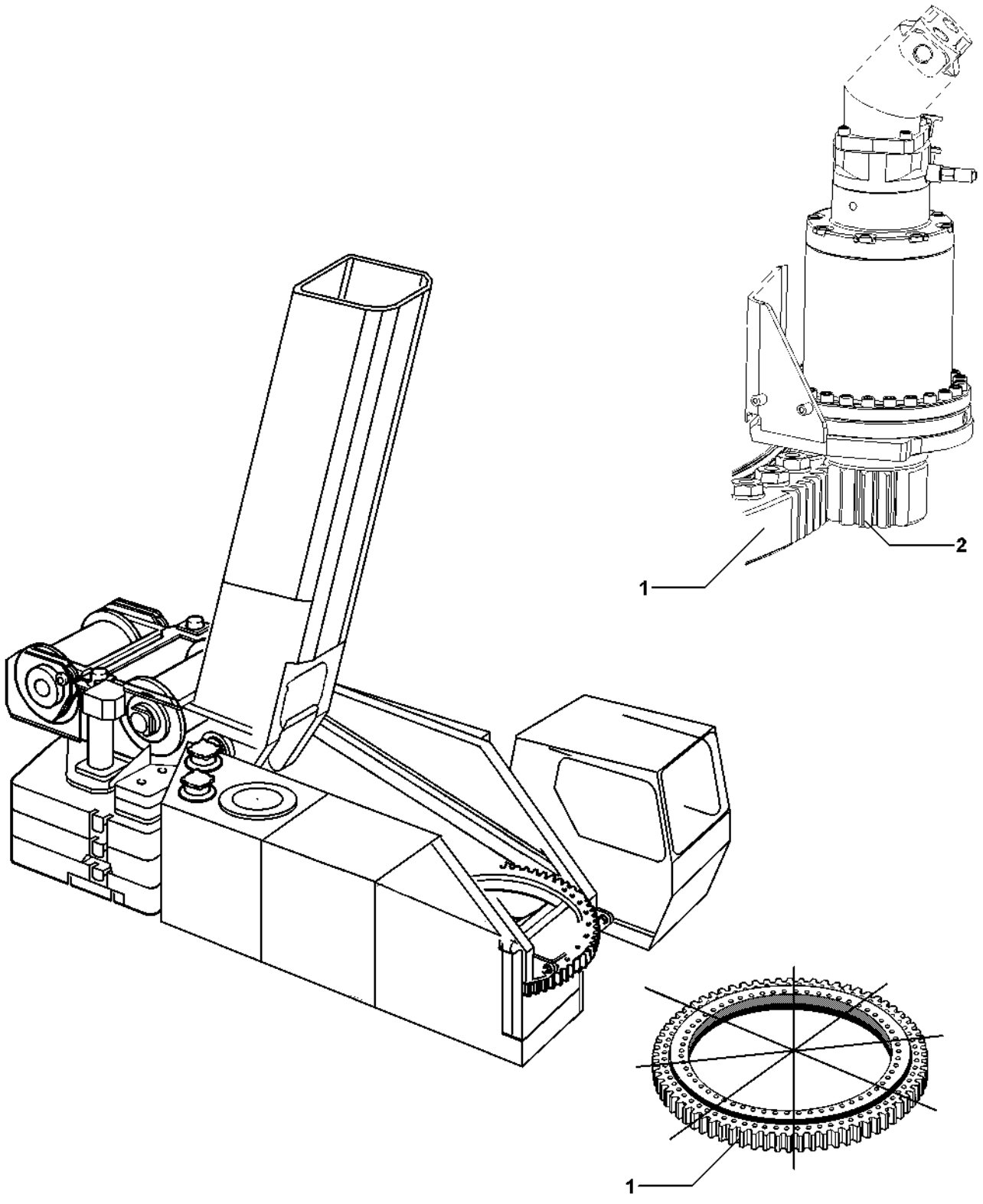

Fig.105098

5 Slewing ring connection

5.1 Lubricating the slewing ring connection

Before and after long breaks in operation, particularly before and after any winter break, carry out the lubrication procedure especially diligently 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 from all grease points, 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.

5.2 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.

5.3 Tilt play of roller ring connection

The wear of the roller ring connection is determined by measuring the „tilt play“ with the ring installed.

Note

▶ The determination of the „tilt play“ must be carried out according to the **test instructions** of **Liebherr-Werk Ehingen GmbH**.

▶ Contact the Service Dept. at **Liebherr-Werk Ehingen GmbH** for **test instructions**.

DANGER

Danger of accident if tilt play of roller ring connection is too large!

If the permissible tilt play of 2.0 mm is exceeded, then safe crane operation is no longer possible.

▶ Replace the roller ring connection if the tilt play is larger than 2.0 mm !

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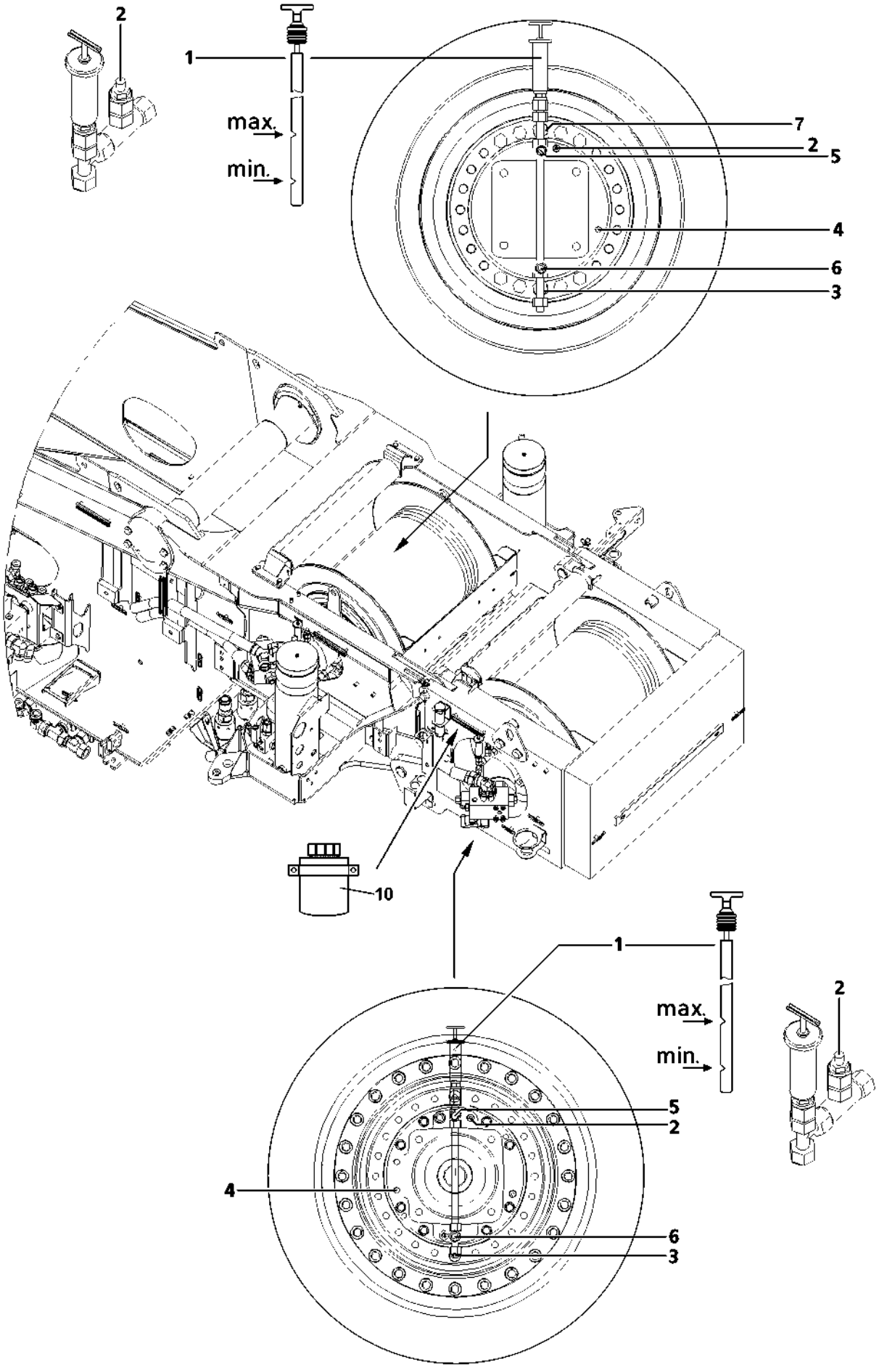

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Fig.103108

6 Hoist gears

Maintain utmost cleanliness during all work to prevent any dirt from entering the inside of the gear.

6.1 Overflow container

When the oil heats up in the hydraulic motor of winch 2*****, the oil can enter the overflow container **10** via a non-return valve, but cannot flow back into the hydraulic system after cooling. For this reason the oil that has collected in the overflow container **10** must be disposed of at regular intervals.

6.2 Winch 1, winch 2*

Make sure that the following prerequisites are met:
- The winch is inactive.
- The crane is in horizontal position.

6.2.1 Checking the oil level

▶ 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.

CAUTION
Danger of gear damage!
If the oil level has dropped below the minimum mark, add oil according to the lubrication chart until the oil level is between the minimum and maximum mark.
▶ Add oil and check again.

▶ Reinsert the dipstick **1**.

6.2.2 Changing the oil

▶ Unscrew the breather screw **2**.
▶ Unscrew the oil drain plug **3** with seal ring and drain oil into a suitable container.
▶ Install the oil drain plug **3** with new seal ring and tighten.
▶ Remove the oil filler plug **7**.
▶ Pull out the dipstick **1**.
▶ Add oil according to the lubrication chart on the oil filler port or on the oil filler plug **7**.
▶ Screw in and tighten the vent screw **2** and the oil filler plug **7**.
▶ Check the oil level as described above.

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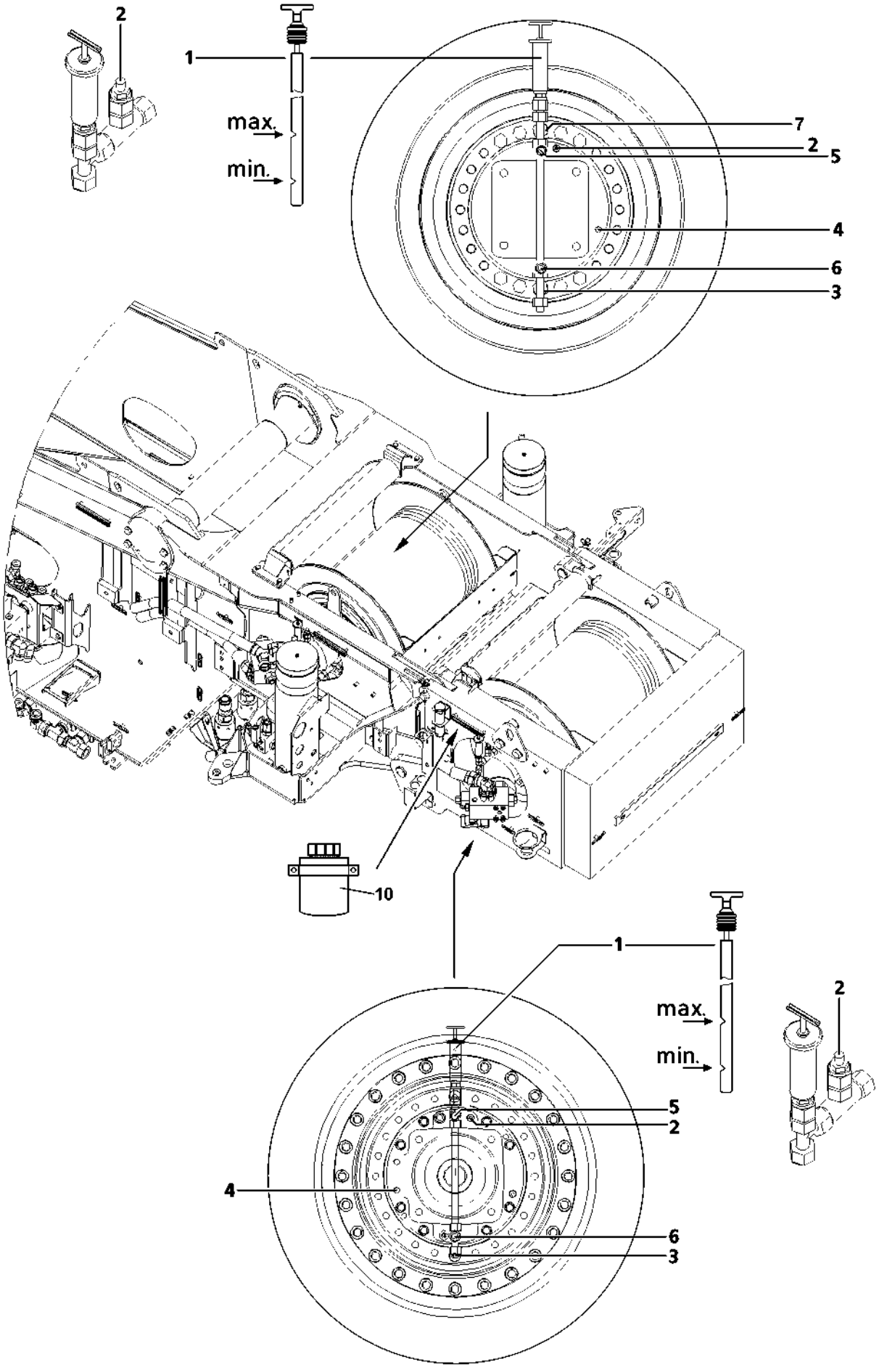

Fig.103108

6.3 Winch brake

Make sure that the following prerequisites are met:
- The winch is inactive.
- The crane is in horizontal position.

6.3.1 Checking the oil level

▶ Remove the plug **4**.

The oil level must reach the edge of the bore.

▶ Perform a visual inspection.

CAUTION
Danger of gear damage!
▶ If the oil level has dropped, add oil as specified in the lubrication chart until it overflows on the filler port.

▶ Clean the sealing surfaces on the housing and on the plug.
▶ Reinstall the plug **4** and tighten.

6.3.2 Changing the oil

▶ Remove the oil filler plug **5** and clean the sealing surface.
▶ Unscrew the oil drain plug **6** with seal ring and drain oil into a suitable container.
▶ Clean the oil drain plug **6** and sealing surface on the housing.
▶ Install the oil drain plug **6** with new seal ring and tighten.
▶ Add oil according to the lubrication chart on the filler port until the oil starts to overflow at the opening **4**.
▶ Clean the oil filler plug **5** and reinstall it with a new seal ring and tighten.
▶ Check the oil level as described above.

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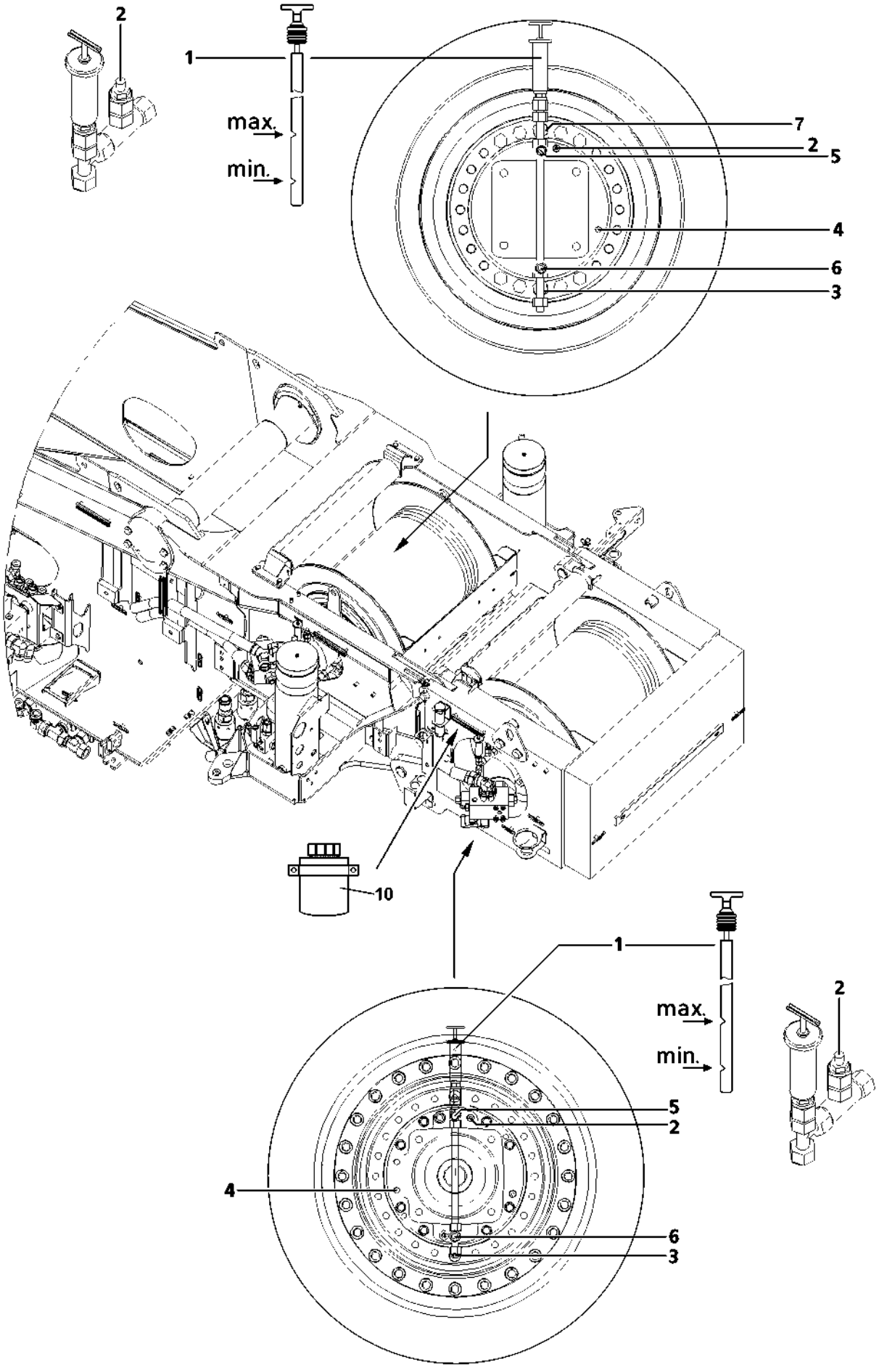

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Fig.103108

7 Replacing hoist rope / control rope

7.1 Replacing hoist rope / control rope

The winch turn sensor is adjusted in the factory. If the equipment is used properly the winch turn sensor will not need readjusting.

DANGER
The following situations must be observed, otherwise the winch sensor must be readjusted.
- ▶ Do **not** pull the end of rope underneath the winch by spooling the rope winch up!
- ▶ Do **not** pull the rope from the „stationary“ winch.
- ▶ The winch speed sensor must also be readjusted if it is established that the winch does not stop unwinding when 4 cable winds are left on the winch during operation or when changing the hoisting cable.

Procedure for „changing the hoist rope“

- ▶ Slowly spool out the hoist rope until shut off at 4 rope coils.
- ▶ Check the shut off.

If the rope winch does **not** shut off at 4 rope coils:
- ▶ Have the winch turn sensor readjusted by Liebherr Service.
- ▶ Change the winch over to emergency operation: For more information, see chapter „6.02 Emergency operation“, section „Emergency operation without LICCON“.
- ▶ Spool the remaining 4 rope coils out in emergency mode: For more information, see chapter „6.02 Emergency operation“, section „Emergency operation without LICCON“.
- ▶ Remove the old rope.
- ▶ Attach a new rope.
- ▶ Spool up at least 3 rope coils in emergency mode: For more information, see chapter „6.02 Emergency operation“, section „Emergency operation without LICCON“.
- ▶ Turn off the emergency mode: For more information, see chapter „6.02 Emergency operation“, section „Emergency operation without LICCON“.

DANGER
Risk of accident if rope rips out of its mount or due to uncontrolled winch shut off!
- ▶ Ensure that the winch has been correctly adjusted before resuming crane operation by checking the shut off point.
- ▶ Operating the crane with an incorrectly adjusted winch is strictly prohibited!

- ▶ Check the shut off point by carefully starting to drive: Shut off point - winch spooled out (less than 4 rope coils).

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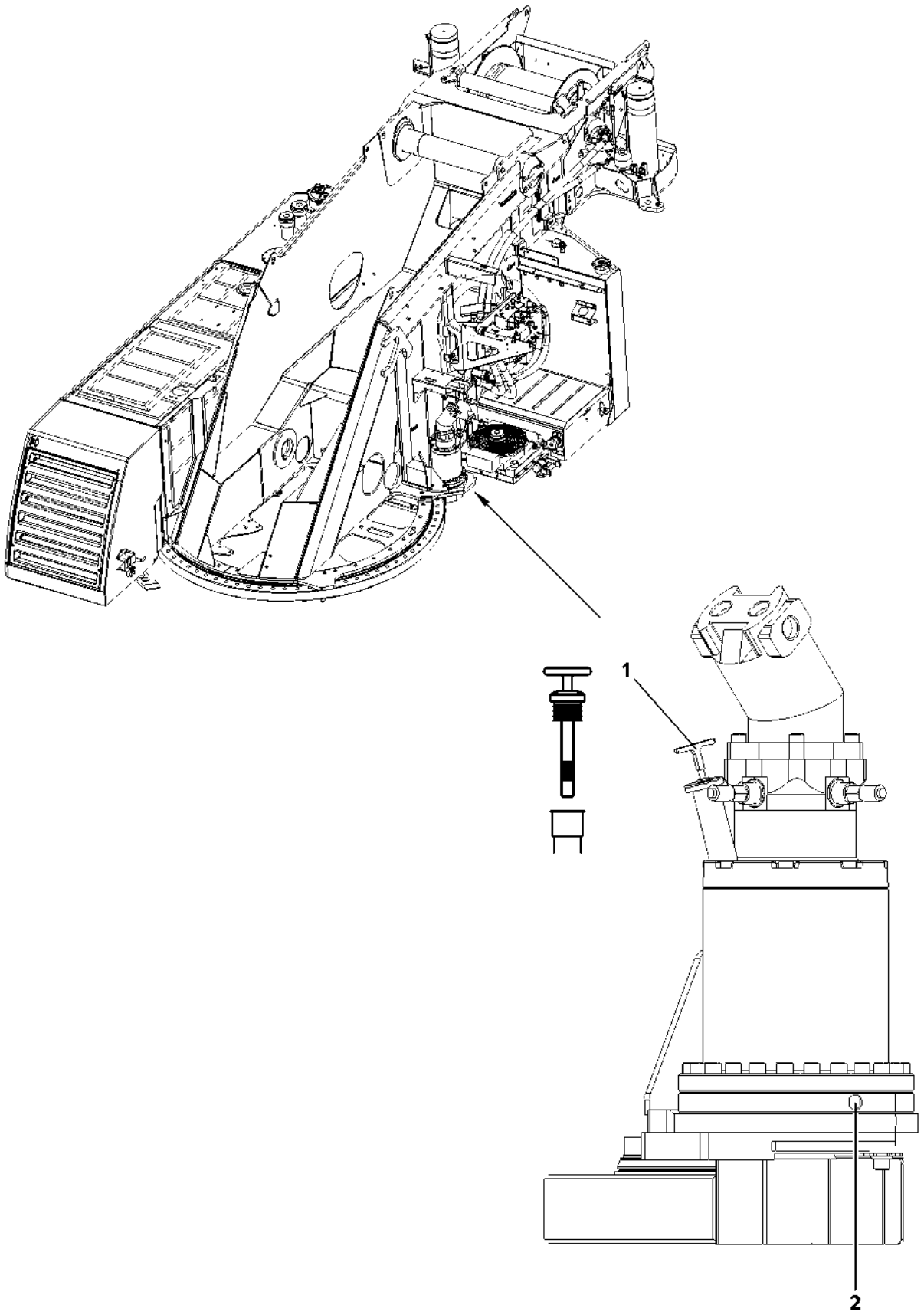

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Fig.103109

8 Slewing gear

Maintain utmost cleanliness during all work to prevent any dirt from entering the inside of the gear.

8.1 Checking the oil level

Make sure that the following prerequisites are met:
– 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 two notches on the dipstick **1**.

▶ Check the oil level.

CAUTION
Danger of gear damage!
If the oil level has dropped below the lower notch, add oil according to the lubrication chart until the oil level is between the two notches.
▶ Add oil and check again.

▶ Reinsert the dipstick **1**.

8.2 Changing the oil

Make sure that the following prerequisites are met:
– The crane is in horizontal position.
– The gear is warm.

▶ Open the oil filler port by unscrewing the dipstick **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 in the lubrication chart on the oil filler port until the oil level is between the two notches on the dipstick **1**.
▶ Close the oil filler port by screwing in the dipstick **1**.
▶ Check the oil level as described above.

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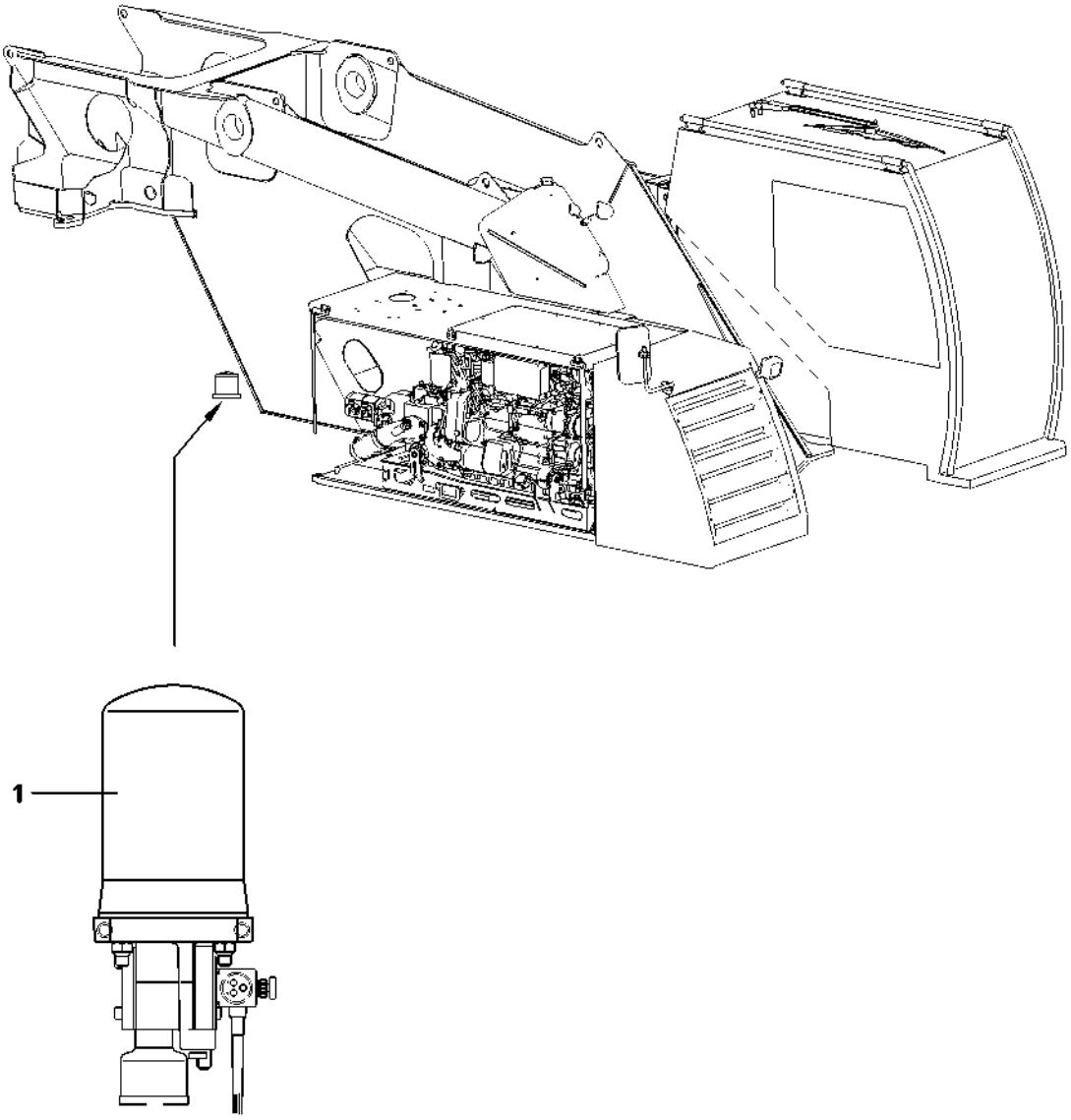

Fig.103268

9 Air dryer of the compressed air system of the crane superstructure

The air dryer **1** of the compressed air system of the crane's superstructure is maintenance-free.

9.1 Replacing the granular cartridge

CAUTION
Danger!
The granular cartridge is under spring tension.
▶ Caution when replacing the granular cartridge.

▶ Replace the granular cartridge once a year.

10 Electrical system - Lighting

Maintain electrical system and lighting in crane superstructure according to the maintenance data in chapter 7.04.

CAUTION
Loss of the settings if the power supply has been interrupted!
▶ The winch and the slewing gear must be re-calibrated after the power supply has been interrupted from the central unit or the power unit in the crane superstructure (for example, clamping off the battery).

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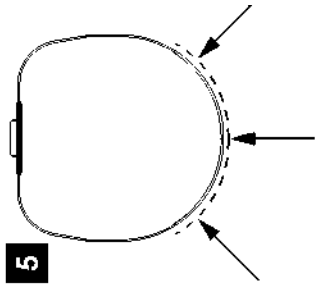

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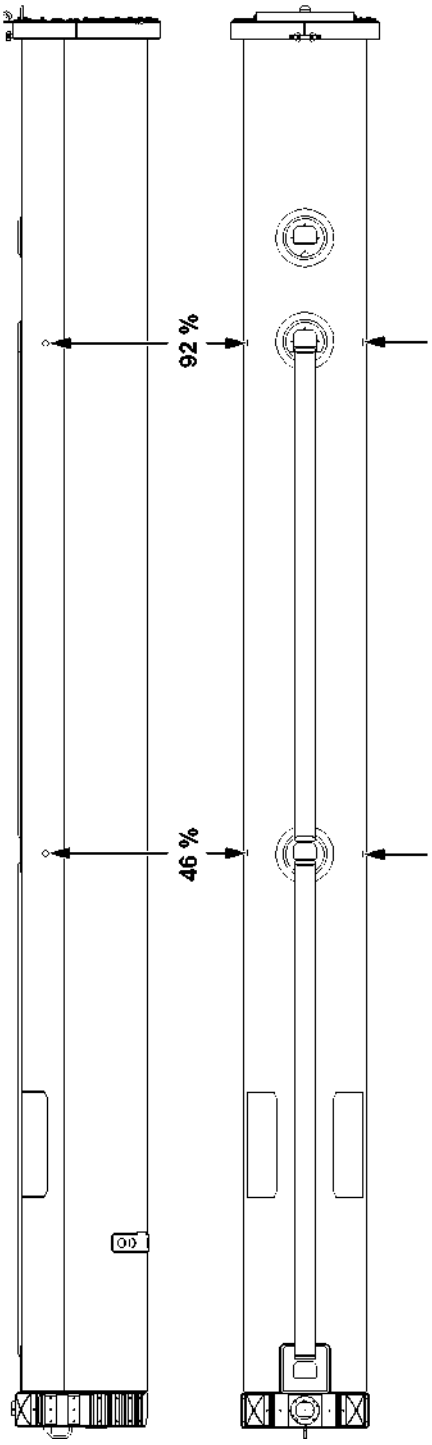

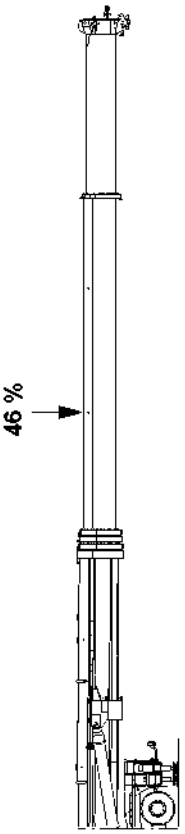

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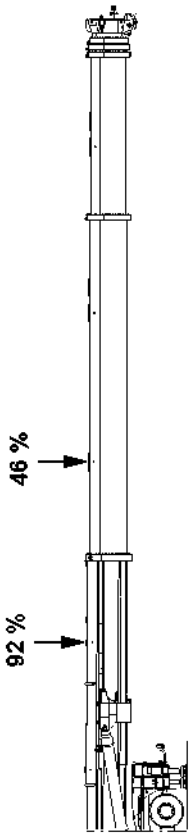

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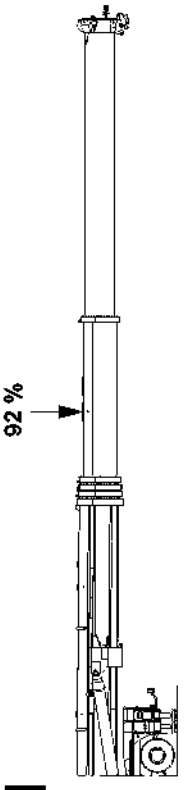

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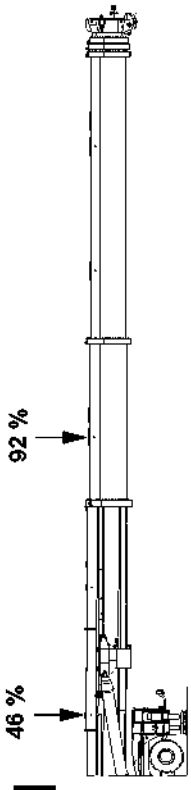

3

Fig.113385

11 Telescopic boom

11.1 Lubricating the telescopic boom

WARNING
The crane can topple over!
When lubricating the telescopic boom and the specified extension conditions of the telescopes are deviated from, there is a danger of accidents!
The crane can topple over and personnel can be killed or severely injured!
- ▶ For lubrication, adhere to the specified extension conditions of the telescopes!
- ▶ Do not telescope out more telescopic sections than specified!

WARNING
Danger of accident!
During telescoping, no personnel may remain within the danger zone of the telescopic boom!
Personnel can be killed or seriously injured!
- ▶ Make sure that during telescoping no personnel remains within the danger zone of the telescopic boom!
- ▶ Lubricate the telescopic boom only in resting status!

Note
- ▶ For the gliding surfaces of the telescopic boom use special grease according to the lubrication chart as lubricant, see Crane operating instructions, chapter 7.07.
- ▶ To grease the outer gliding surfaces, every telescopic section can be telescoped out individually to 100 %.
- ▶ The inner gliding surfaces of the telescopic sections (plastic glide bearing plates) are lubricated via grease fittings.
- ▶ These grease fittings can be accessed from the outside via inspection openings on both sides of the pivot section as well as on the telescopic sections.
- ▶ If the telescopic boom is pinned on the respective point, the grease fittings on the bearing shoes are automatically in the correct position.

Make sure that the following prerequisites are met:
- The crane is supported on a wide support base and horizontally aligned.
- At least a counterweight of 8.8 t is installed on the turntable.
- The telescopic boom is aligned in horizontal position to the rear (0°- main boom angle).
- No hook block is reeved (reeved n=1).
- No telescopic boom extension is installed.
- The hoist rope is spooled up and secured on the winch.
- The LICCON overload protection has been set according to the set up configuration.
- The telescoping program is selected on the LICCON computer system, see Crane operating instructions, chapter 4.05.

Note
- ▶ The folding jib can remain installed on the telescopic boom during lubrication in transport position.

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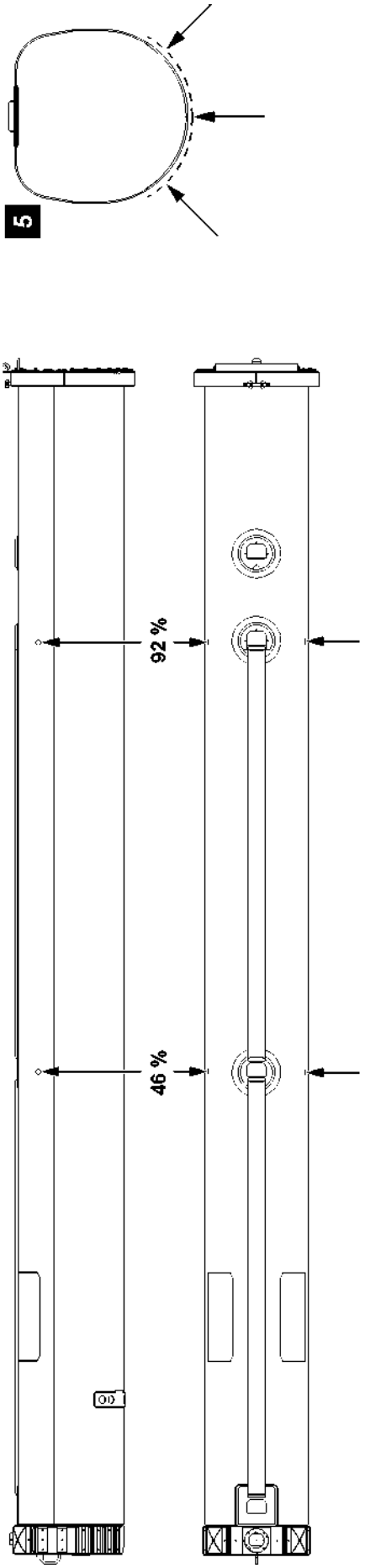

Fig.113385

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11.1.1 Lubricating on the inspection ports

Make sure that the following prerequisite is met:
– The telescopic boom is fully telescoped in.

Extension conditions of telescope	Lube points
(0/0/0/46/92)	Lubricate on the 92 % inspection ports on telescoping section 4, see illustration **1**.
(0/0/0/92/46)	Lubricate on the 46 % inspection ports on telescoping section 4, see illustration **2**.
(0/0/46/92/0)	Lubricate on the 92 % inspection ports on telescoping section 3.
(0/0/92/46/0)	Lubricate on the 46 % inspection ports on telescoping section 3.
(0/46/92/0/0)	Lubricate on the 92 % inspection ports on telescoping section 2.
(0/92/46/0/0)	Lubricate on the 46 % inspection ports on telescoping section 2.
(46/92/0/0/0)	Lubricate on the 46 % inspection ports on the pivot section and on the 92 % inspection ports on telescoping section 1, see illustration **3**.
(92/46/0/0/0)	Lubricate on the 92 % inspection ports on the pivot section and on the 46 % inspection ports on telescoping section 1, see illustration **4**.

▶ Run all extension conditions of the telescopes one after the other and lubricate the telescopic sections at the lube points.

11.1.2 Lubricating the gliding surfaces

▶ Telescope every telescopic section out individually to 100 % and spray special grease on the outer gliding surfaces, see illustration **5**.

Note
Optimum lubrication result
▶ To obtain an optimum lubrication result, let the sprayed on special grease cure four to eight hours before telescoping in!

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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 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 with the same color.

Different coolants are differentiated by different colors.

Coolants contain corrosion inhibitor - antifreeze fluid.

Add coolant only on the filler neck. See Service fill.

Note
If the coolant is changed:
- ▶ Empty the cooling system completely and flush!

- ▶ Check the coolant level. See Maintenance intervals and maintenance instructions.

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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.

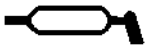

Fig.107729

Note

▶ Lube points are marked with a symbol.

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Fig.195219

1 Specified service items and lubricants for Liebherr cranes

No.	Crane components	Ambient temperature for driving and crane operation	
		-25 °C to +50 °C	**-40 °C to +30 °C**
1.1	Diesel engine **with**	**LWE Id. No.: 10871536**	**LWE Id. No.: 10871536**
	Exhaust aftertreatment	**Liebherr Motoroil 5W-30**	**Liebherr Motoroil 5W-30**
	US Tier 4	SAE 5W-30 and ACEA E4	SAE 5W-30 and ACEA E4
	EU-Stage IV	Observe the instructions of the engine manufacturer	Observe the instructions of the engine manufacturer
	EU-Stage III A Derivat	**Below -20 °C** with pre-heating	**Below -20 °C** with pre-heating
1.2	Diesel engine **with**	**LWE Id. No.: 10663796**	**LWE Id. No.: 11100934**
	Exhaust aftertreatment	**Liebherr Motoroil 10W-40 low ash**	**Liebherr Motoroil 5W-30 low ash**
	US Tier 4 interim	SAE 10W-40 low ash and ACEA E6	SAE 5W-30 low ash and ACEA E6
	EU-Stufe III B	Observe the instructions of the engine manufacturer	Observe the instructions of the engine manufacturer
		Below -20 °C with pre-heating	**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**	**LWE Id. No.: 861005308**	**LWE Id. No.: 10871536**
	Exhaust aftertreatment	**Liebherr Motoroil 10W-40**	**Liebherr Motoroil 5W-30**
	as 1.2 or	SAE 10W-40 and ACEA E4	SAE 5W-30 and ACEA E4
	optionally also	Observe the instructions of the engine manufacturer	Observe the instructions of the engine manufacturer
		Below -20 °C with pre-heating	**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**		
2	Drive axle	**LWE Id. No.: 861901008**	**LWE Id. 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 Id. No.: 861901008**	**LWE Id. 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 Id. No.: 861901008**	**LWE Id. No.: 10425142**
	KESSLER	**Liebherr Gear Hypoid 90 EP**	**Liebherr Syntogear Plus 75W-90**
	VG 1800, VG 2400, VG 2550, VG 2600, VG 3750	SAE 90 and API GL 5	SAE 75W-90 and API GL 5

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No.	Crane components	Ambient temperature for driving and crane operation	
		-25 °C to +50 °C	-40 °C to +30 °C
	W3750		
4.2	Vehicle Distributor gear with PTO for crane operation	**LWE Id. No.: 10425142**	**LWE Id. No.: 10425142**
	KESSLER	**Liebherr Syntogear Plus 75W-90**	**Liebherr Syntogear Plus 75W-90**
	VG 2700 with PTO	SAE 75W-90 and API GL 5	SAE 75W-90 and API GL 5
	VG 3751 mit PTO		
4.3	Vehicle distributor gear	**LWE Id. No.: 861901008**	**LWE Id. No.: 10425142**
	ZF Passau, STEYR PUCH	**Liebherr Gear Hypoid 90 EP**	**Liebherr Syntogear Plus 75W-90**
	VG 1200, VG 1600, VG 2000, VG 3800	ZF TE-ML 19	ZF TE-ML 19
5	Miter gear for crane operation	**LWE Id. No.: 10425142**	**LWE Id. No.: 10425142**
		Liebherr Syntogear Plus 75W-90	**Liebherr Syntogear Plus 75W-90**
		SAE 75W-90 and API GL 5	SAE 75W-90 and API GL 5
6	Offset gear (drop box)	**LWE Id. No.: 861901008**	**LWE Id. No.: 10425142**
	ZF Passau, STEYR PUCH	**Liebherr Gear Hypoid 90 EP**	**Liebherr Syntogear Plus 75W-90**
		ZF TE-ML 19	ZF TE-ML 19
7.1	Pump distributor gear	**LWE Id. No.: 861901008**	**LWE Id. No.: 10425142**
	filled with **mineral** gear oil	**Liebherr Gear Hypoid 90 EP**	**Liebherr Syntogear Plus 75W-90**
		SAE 90 and API GL 5	SAE 75W-90 and API GL 5
7.2	Pump distributor gear	**LWE Id. No.: 861901208**	**LWE Id. No.: 10664125**
	filled with **synthetic** gear oil	**Liebherr Gear PG 220**	**Liebherr Gear PG 150**
		CLP PG 220, DIN 51517-3	CLP PG 150, DIN 51517-3
		WARNING: May not be mixed with other oils!	**WARNING: May not be mixed with other oils!**
7.3	Pump distributor gear	**LWE Id. No.: 10425142**	**LWE Id. No.: 10425142**
	LTC 1055-3.1	**Liebherr Syntogear Plus 75W-90**	**Liebherr Syntogear Plus 75W-90**
		SAE 75W-90 and API GL 5	SAE 75W-90 and API GL 5
8.1	Powershift transmission	**LWE Id. No.: 861005308**	**LWE Id. No.: 861900608**
	ZF Torque converter transmission WG 120, WG 150, WG 180, WG 181, WG 200, WG 201	**Liebherr Motoroil 10W-40**	**Liebherr Hydraulic-Gear ATF**
		ZF TE-ML 03	ZF TE-ML 03
		Below -20 °C run until warm according to operating instructions	**Below -20 °C** run until warm according to operating instructions
8.2	Powershift transmission	**LWE Id. No.: 861900608**	**LWE Id. No.: 861900608**

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No.	Crane components	Ambient temperature for driving and crane operation	
		-25 °C to +50 °C	**-40 °C to +30 °C**
	ZF torque converter WG 251* ZF ERGOPOWER WG 210, WG 260, WG 310 * also for ambient temperatures above -10 °C	**Liebherr Hydraulic-Gear ATF** ZF TE-ML 03 **Below -20 °C** run until warm according to operating instructions	**Liebherr Hydraulic-Gear ATF** ZF TE-ML 03 **Below -20 °C** run until warm according to operating instructions
9	Powershift transmission CLARK	**LWE Id. No.: 861005308** **Liebherr Motoroil 10W-40** SAE 10W-40 and ACEA E4 **Below -20 °C** run until warm according to operating instructions	**LWE Id. No.: 861900608** **Liebherr Hydraulic-Gear ATF** ATF Dexron II D and ALLISON C4 **Below -20 °C** run until warm according to operating instructions
10	Offset gear (drop box) ALLISON	**LWE Id. No.: 861005308** **Liebherr Motoroil 10W-40** SAE 10W-40 and API CF, ACEA E4 **Below -20 °C** run until warm according to operating instructions	**LWE Id. No.: 861900608** **Liebherr Hydraulic-Gear ATF** ATF Dexron II D or ALLISON C4 **Below -20 °C** run until warm according to 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** ATF Dexron III or ALLISON C4 **Below -20 °C** run until warm according to operating instructions	**LWE Id. No.: 861903708** **CASTROL Transynd** ATF Dexron III or ALLISON C4 **Below -20 °C** run until warm according to operating instructions
11.2	Automatic transmission ZF	**LWE Id. No.: 861900608** **Liebherr Hydraulic-Gear ATF** ZF TE-ML 14 **Below -20 °C** run until warm according to operating instructions	**LWE Id. No.: 861900608** **Liebherr Hydraulic-Gear ATF** ZF TE-ML 14 **Below -20 °C** run until warm according to operating instructions
12	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
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

No.	Crane components	Ambient temperature for driving and crane operation	
		-25 °C to +50 °C	-40 °C to +30 °C
			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	Gearbox 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 Universalfett 9900** KPF2N-25, DIN 51502	**LWE Id. No.: 11000948** **Liebherr Universalfett 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	**LWE Id. No.: 861903508** **Liebherr Hydraulic 37** HVLP, DIN 51524-3	**LWE Id. No.: 10293807** **Liebherr Hydraulic Plus Arctic** HVLPD HC, DIN 51524-3
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** HVLPD HC, DIN 51524-3	**LWE Id. No.: 10293807** **Liebherr Hydraulic Plus Arctic** HVLPD HC, DIN 51524-3
19	Brake system	**LWE Id. No.: 861000108**	**LWE Id. No.: 861000108**

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No.	Crane components	Ambient temperature for driving and crane operation	
		-25 °C to +50 °C	-40 °C to +30 °C
	if hydraulically actuated	**DOT 4** SAE J 1703e	**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 Drive shaft if **not** maintenance-free	**LWE Id. No.: 861301308** **Liebherr Spezialfett 9610 Plus** KP2K-20, DIN 51502	**LWE Id. No.: 10296825** **Liebherr Universalfett Arctic** KPFHC1N-60, DIN 51502
22	Glide and roller bearing roller bearing joint	**LWE Id. No.: 861301308** **Liebherr Spezialfett 9610 Plus** KP2K-20, DIN 51502	**LWE Id. No.: 10296825** **Liebherr Universalfett Arctic** KPFHC1N-60, DIN 51502
23	Central lubrication system	**LWE Id. No.: 861301308** **Liebherr Spezialfett 9610 Plus** KP2K-20, DIN 51502	**LWE Id. No.: 10296825** **Liebherr Universalfett Arctic** KPFHC1N-60, DIN 51502
24.1	Slewing ring connection Roller bearing	**LWE Id. No.: 861301308** **Liebherr Spezialfett 9610 Plus** KP2K-20, DIN 51502	**LWE Id. No.: 10296825** **Liebherr Universalfett Arctic** KPFHC1N-60, DIN 51502
24.2	Slewing ring connection LR 13000	**LWE Id. No.: 11000948** **Liebherr Universalfett 9900** KPF2N-25, DIN 51502	**LWE Id. No.: 10296825** **Liebherr Universalfett Arctic** KPFHC1N-60, DIN 51502
25.1	Support plate with equalization	**LWE Id. No.: 861303608** **Liebherr Teleskopfett 9613 Plus** KP2K-30, DIN 51502	**LWE Id. No.: 861303608** **Liebherr Teleskopfett 9613 Plus** KP2K-30, DIN 51502
25.2	Glide shoes for cab guidance on vehicle frame LTC 1045-3.1	**LWE Id. No.: 861303608** **Liebherr Teleskopfett 9613 Plus** KP2K-30, DIN 51502	**LWE Id. No.: 861303608** **Liebherr Teleskopfett 9613 Plus** KP2K-30, DIN 51502
26	Sliding beam Plastic glide bearing Beam for track adjustment	**LWE Id. No.: 861303608** **Liebherr Teleskopfett 9613 Plus** KP2K-30, DIN 51502	**LWE Id. No.: 861303608** **Liebherr Teleskopfett 9613 Plus** KP2K-30, DIN 51502
27.1	Telescopic boom Plastic glide bearing Corner guide top	**LWE Id. No.: 861303608** **Liebherr Teleskopfett 9613 Plus** KP2K-30, DIN 51502	**LWE Id. No.: 861303608** **Liebherr Teleskopfett 9613 Plus** KP2K-30, DIN 51502

No.	Crane components	Ambient temperature for driving and crane operation	
		-25 °C to +50 °C	-40 °C to +30 °C
27.2	Telescopic boom Outer glide bearing Lower shell Inner glide bearing (only during assembly)	**LWE Id. No.: 861303308** **Liebherr Spezialfett 1336** KP2K-30, DIN 51502 Spray grease	**LWE Id. No.: 861303308** **Liebherr Spezialfett 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 Spezialfett 9610 Plus** KP2K-20, DIN 51502	**LWE Id. No.: 10296825** **Liebherr Universalfett Arctic** KPFHC1N-60, DIN 51502
29	Guide rail on Telescoping cylinder	**LWE Id. No.: 861303308** **Liebherr Spezialfett 1336** KP2K-30, DIN 51502 Spray grease	**LWE Id. No.: 861303308** **Liebherr Spezialfett 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
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 gear LTR 1060 LTR 1100	**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
33.3	Travel gear LTR 11200	**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!**

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No.	Crane components	Ambient temperature for driving and crane operation	
		-25 °C to +50 °C	-40 °C to +30 °C
34	Recovery winch	See data tag and manufacturer's instructions	See data tag and manufacturer's instructions
35	Recovery winch rope	See manufacturer's instructions	See manufacturer's instructions
36	Steering uncoupling LTC 1045-3.1	**LWE Id. No.: 10800345** **Teflon-Spray**	**LWE Id. No.: 10800345** **Teflon-Spray**

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8 Inspections of cranes

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Fig.195219

1 General

This crane was tested at the manufacturer's facilities prior to shipment in accordance with the valid ISO, FEM and DIN Standards and BGV D6 (BGG 905).

The safety level achieved during initial commissioning 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.

The crane operator is therefore obligated to have the crane inspected by an **expert**, at intervals depending on the operational conditions but at least once per year, from the first day of vehicle registration.

The crane must be inspected by an **authorized inspector** every four years after it has been licensed.

The crane must be annually inspected by an **authorized inspector** after its twelfth year of operation.

To ensure the high safety standard of the crane, we recommend - 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 **authorized inspector**. 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.

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 authorized inspector before placing it back into service!

In addition, all respective local and national regulations also apply.

Expert: Is a person whose technical training and experience means that he has adequate knowledge in the field of inspecting technical equipment. They must be familiar with regulations on safety at work, as well as guidelines and standards that allow them to assess the safe condition of technical equipment (e.g. cranes). Potential experts are workshop staff and customer service engineers.

Note
▶ Experts are not authorized inspectors!

Authorized inspector: Is a person whose technical training and experience means that he has explicit knowledge in the field of inspecting technical equipment. They must be familiar with regulations on safety at work, as well as guidelines and standards that allow them to assess the safe condition of technical equipment (e.g. cranes). They are responsible for testing technical equipment and giving an expert opinion. Authorized inspectors can be active engineers.

Note
▶ Authorized inspectors are legally recognized experts who have received special training!

Periodic inspection are principally a visual inspection, where the inspector (either type) appraises the condition of the crane and its components.

The purpose of the inspections is to avoid accidents by detecting deficiencies early on. Any deficiencies determined 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 / experts take sole responsibility for the crane inspections that they carry out.

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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!

A checklist for periodic inspections recommended for Liebherr mobile and crawler cranes is included in the appendix to assist the inspectors.

If the inspector has any questions they should be directed through our Service Department to Liebherr-Werk Ehingen GmbH's 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 expert or authorized inspector 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 structures must be checked by an expert or an authorized inspector 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.

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 13000:2010.

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Liebherr mobile and crawler cranes are designed for assembly operation and - according to EN 13000:2010, chapter 4.1.2.1 - they can only take on a limited number of work cycles (N = 32000) when grouping them into collective class Q_1 = light (k_p = 0.125).

Example of a load collective according to grouping in collective class Q_1 = light (k_p = 0.125).

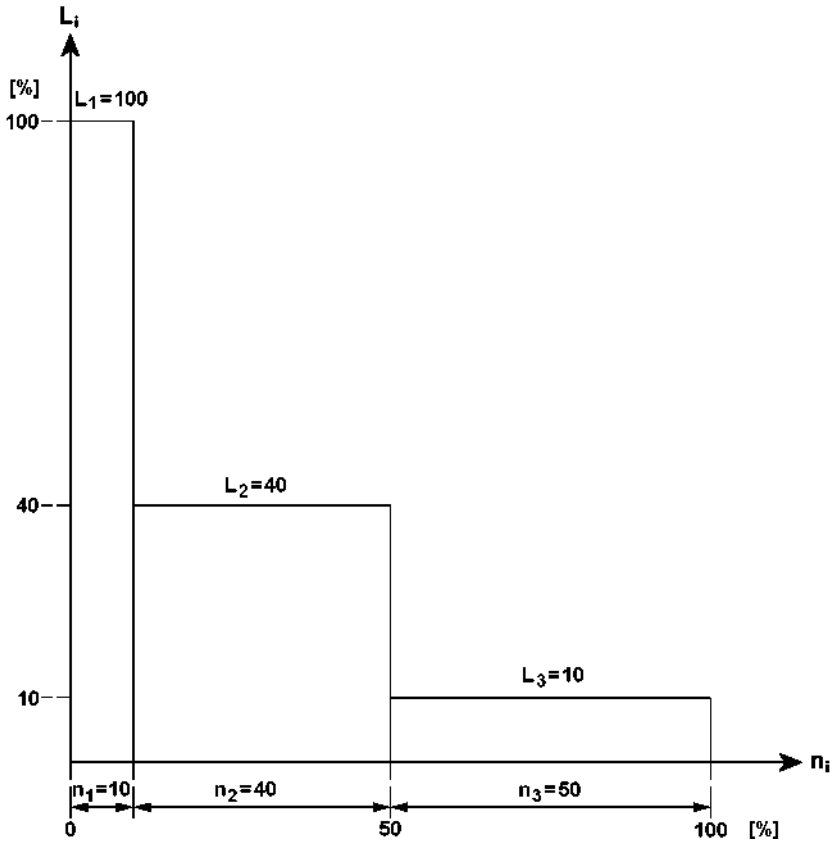

Fig.104716

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 an visual intensive inspection by the 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 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 basic sketches 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.

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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 basic sketches are provided to assist the inspector. The illustrations are only examples and are not necessarily 100 % complete!

2.2 Repair welds

If defects such as cracks or permanent deformation are detected on load-bearing steel components, they should be immediately reported to the Service Department at **Liebherr-Werk Ehingen GmbH** (hereinafter called LWE).

Furthermore, the defect must immediately be appraised by an authorized inspector in accordance with standard welding technology rules. The inspector must immediately ascertain whether or not the crane can continue to be safely operated until the time of the repair.

The following items apply to the repair weld:

- Repair welds may only be carried out by **LWE** personnel or third party personnel contracted by **LWE**, with appropriate welding qualifications according to EN 287-1 for the subject material and welding method!
- The repair weld must be carried out in accordance with the latest revision of **LWE's** internal welding guideline ISR B 010!
- The repaired structural component must subsequently be subjected to a load test.
  The required test loads and boom configurations are to be determined by **LWE** Service!
  Successful test results are to be documented in the crane inspection log!
- We also refer to observing the accident prevention regulations „Principles for testing cranes by authorized inspectors or experts in accordance with UVV **Cranes** BGV D6 and BGG 905"!

WARNING

Danger of accidents in case of defective repair welds!
Due to defective repair welds, severe personnel and property damage can result!

- ▶ Observe and adhere to the instructions and welding regulations!

Note

Exclusion of liability!
For repair welds, which are not made by **LWE** personnel or by personnel authorized by **LWE**, Liebherr-Werk Ehingen GmbH excludes liability for the system functionality as well as for the parts!

- ▶ Have repair welds only made by **LWE** personnel or by personnel authorized by **LWE**!

2.3 Example for test points

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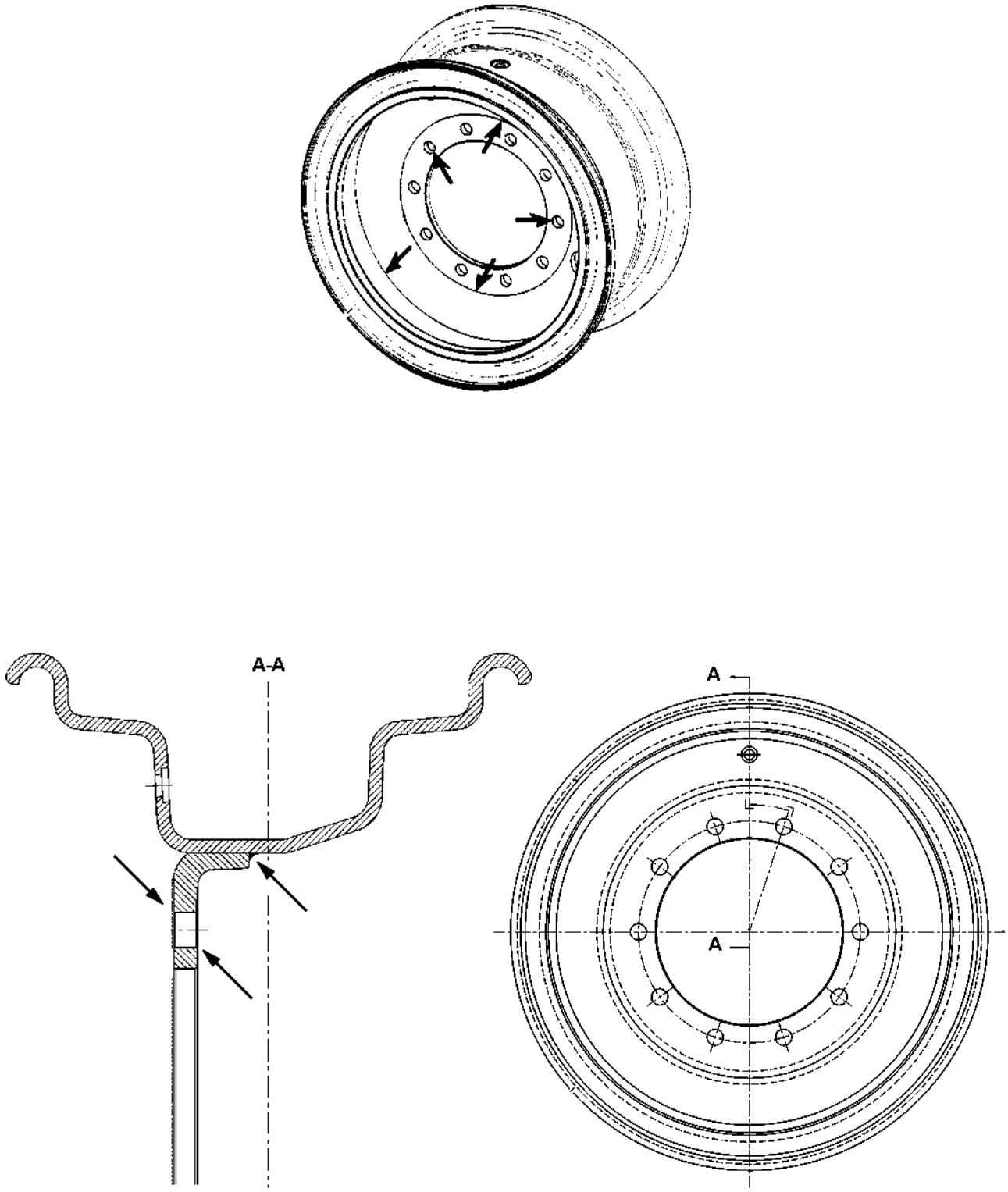

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Fig.118052: Example for 1-part disk wheel

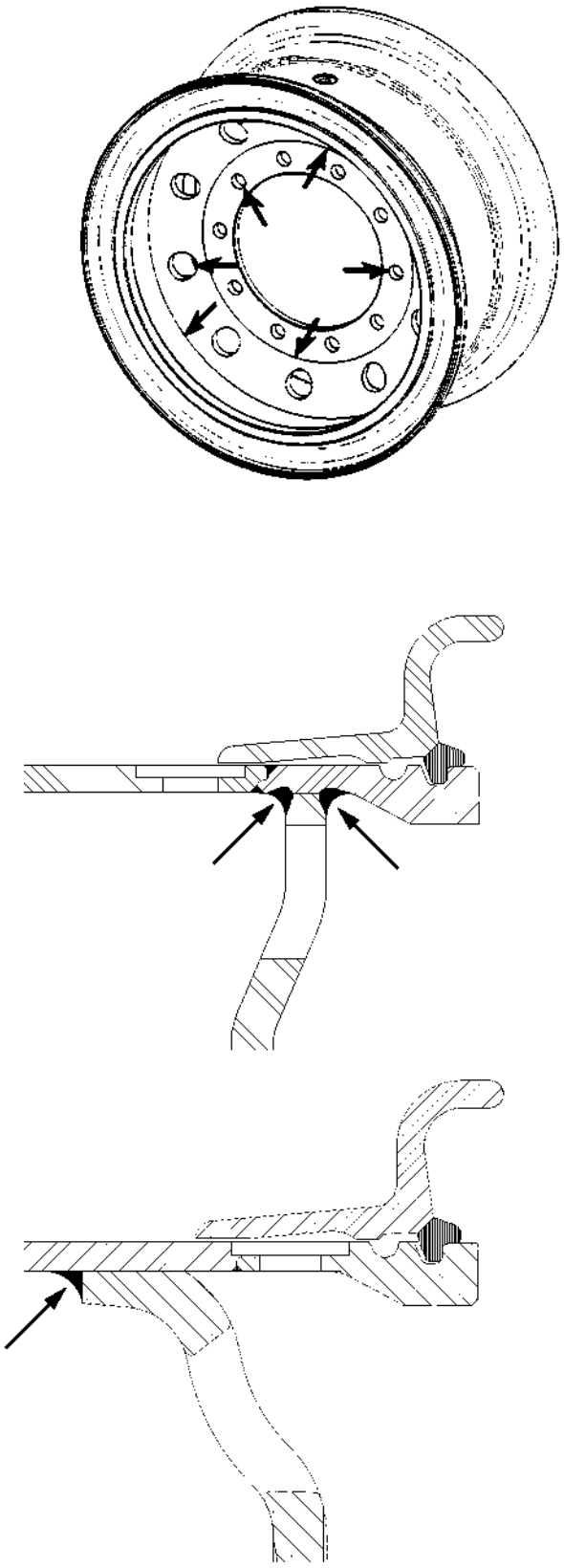

Fig.118053: Example for 3-part disk wheel

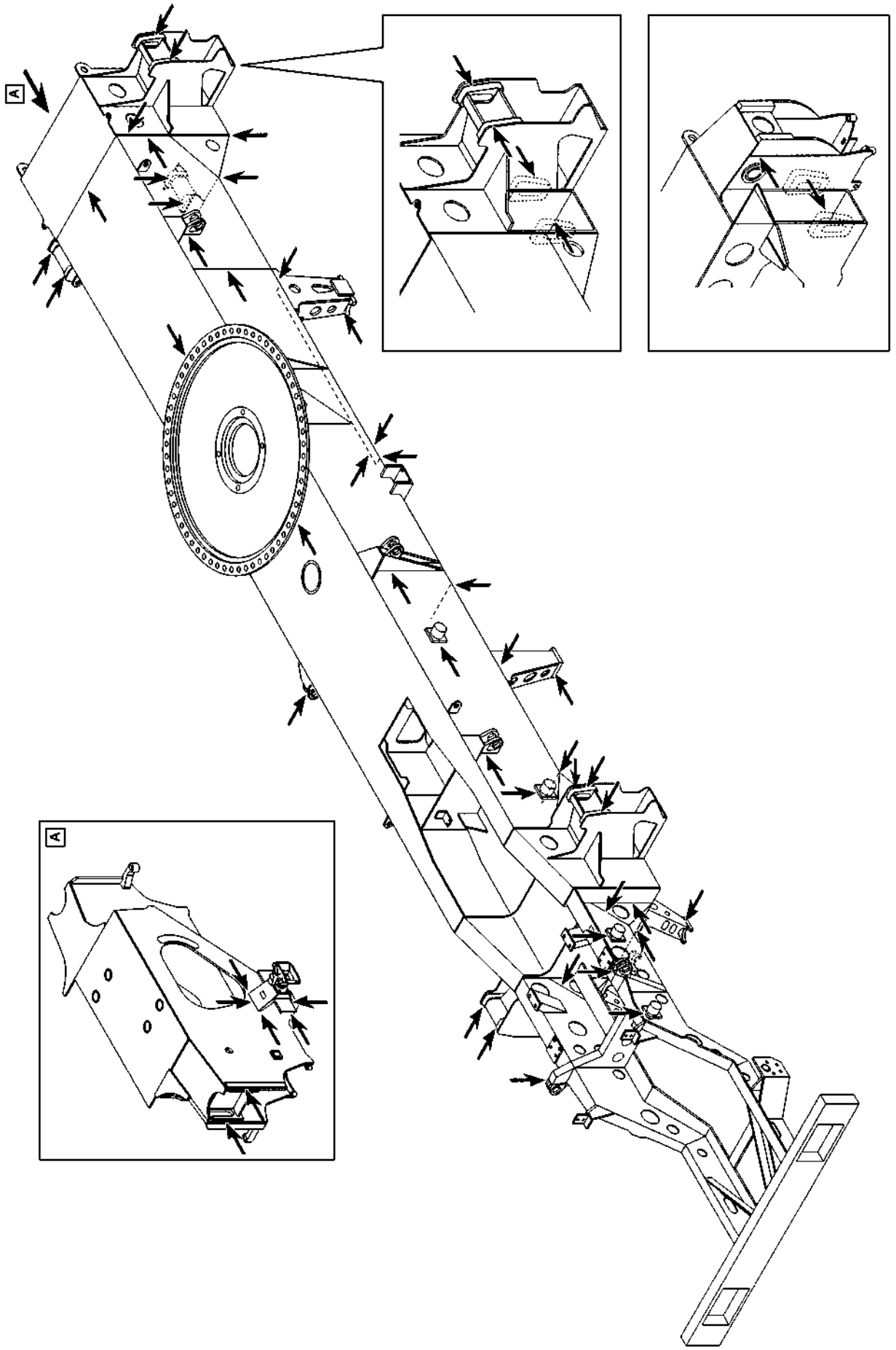

Fig.185046: Example for vehicle frames

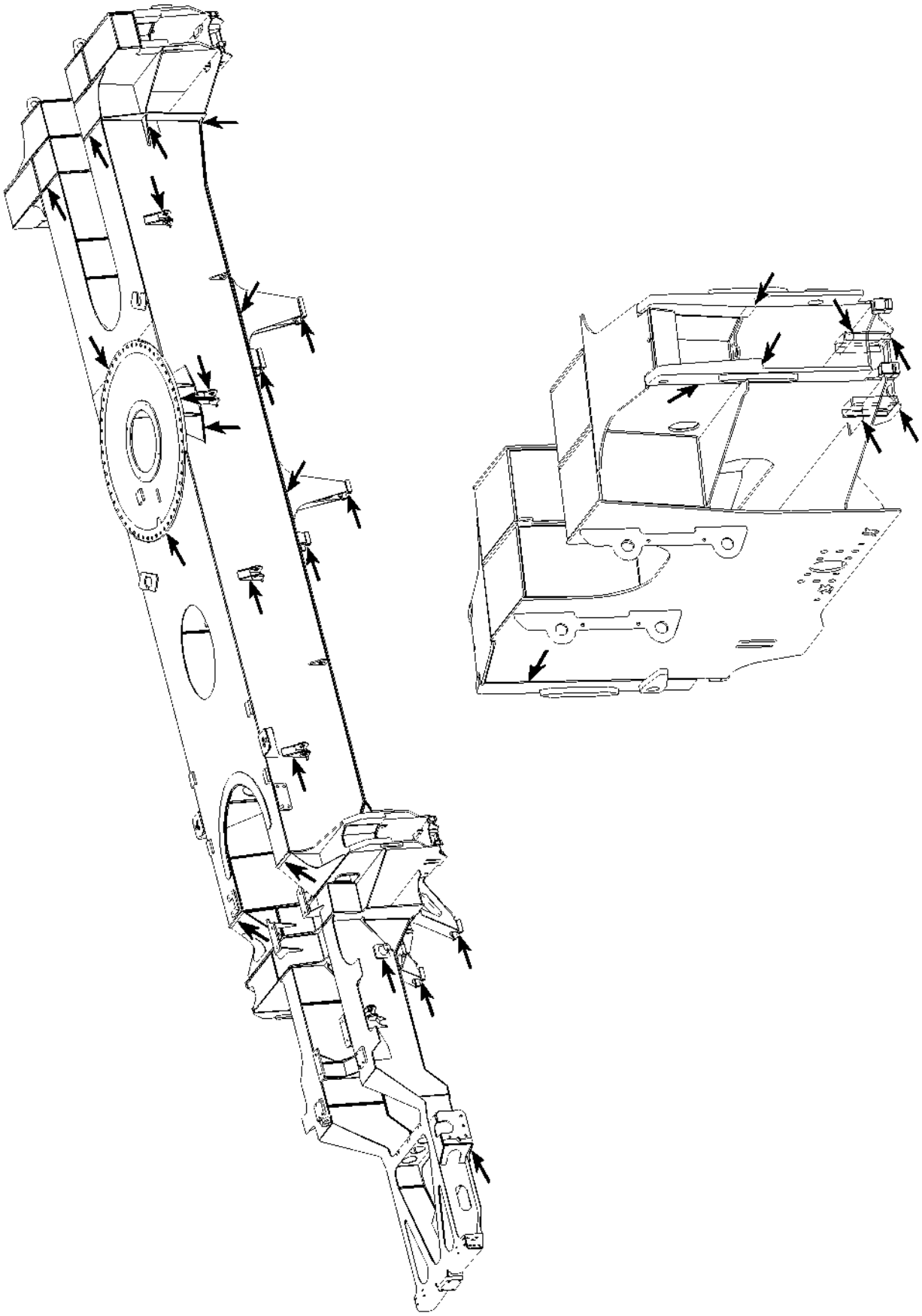

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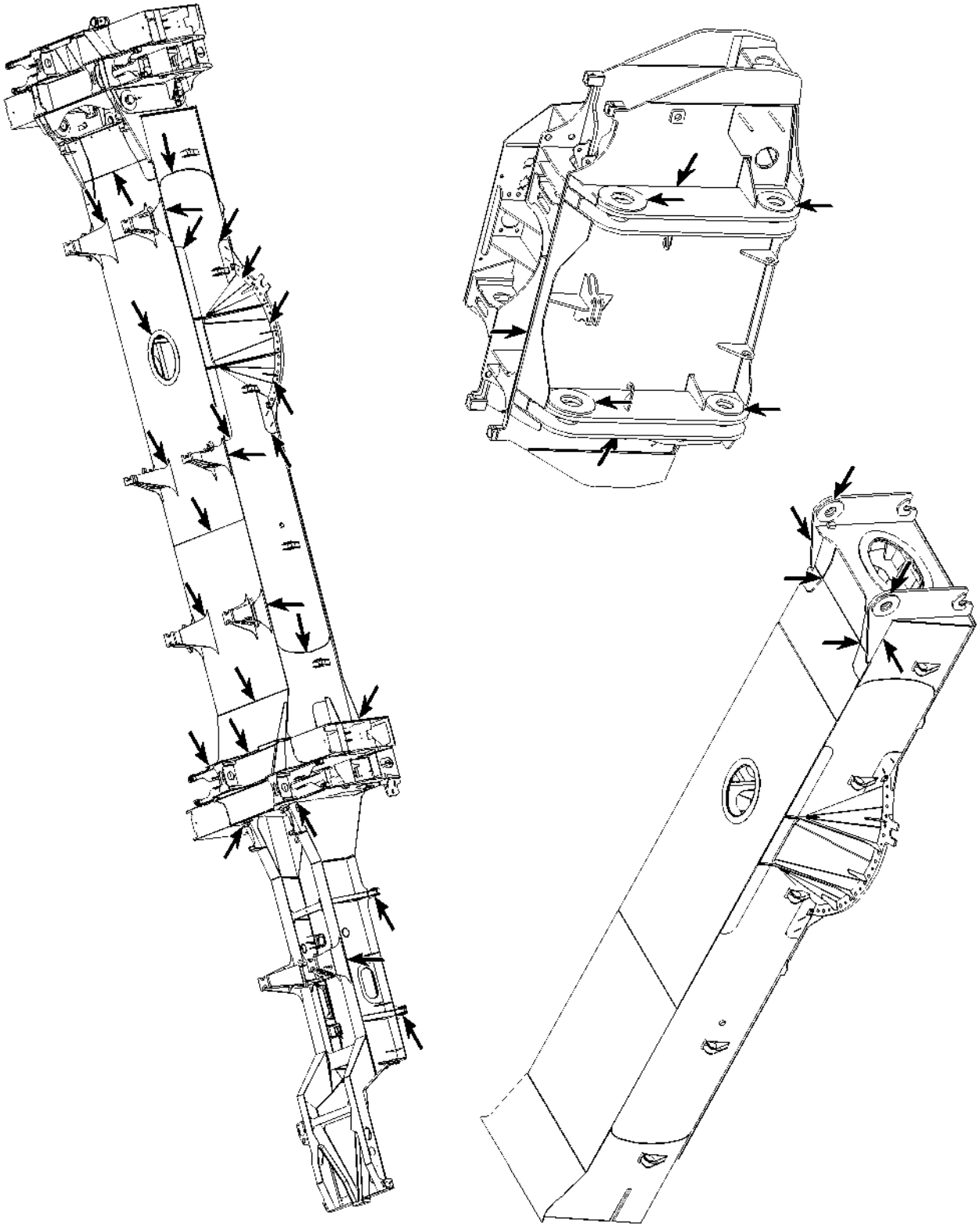
Fig.105702: Example for vehicle frames



LWE/LTM 1130-5-1-004/20502-04-02/en

Fig.105719: Example for vehicle frames

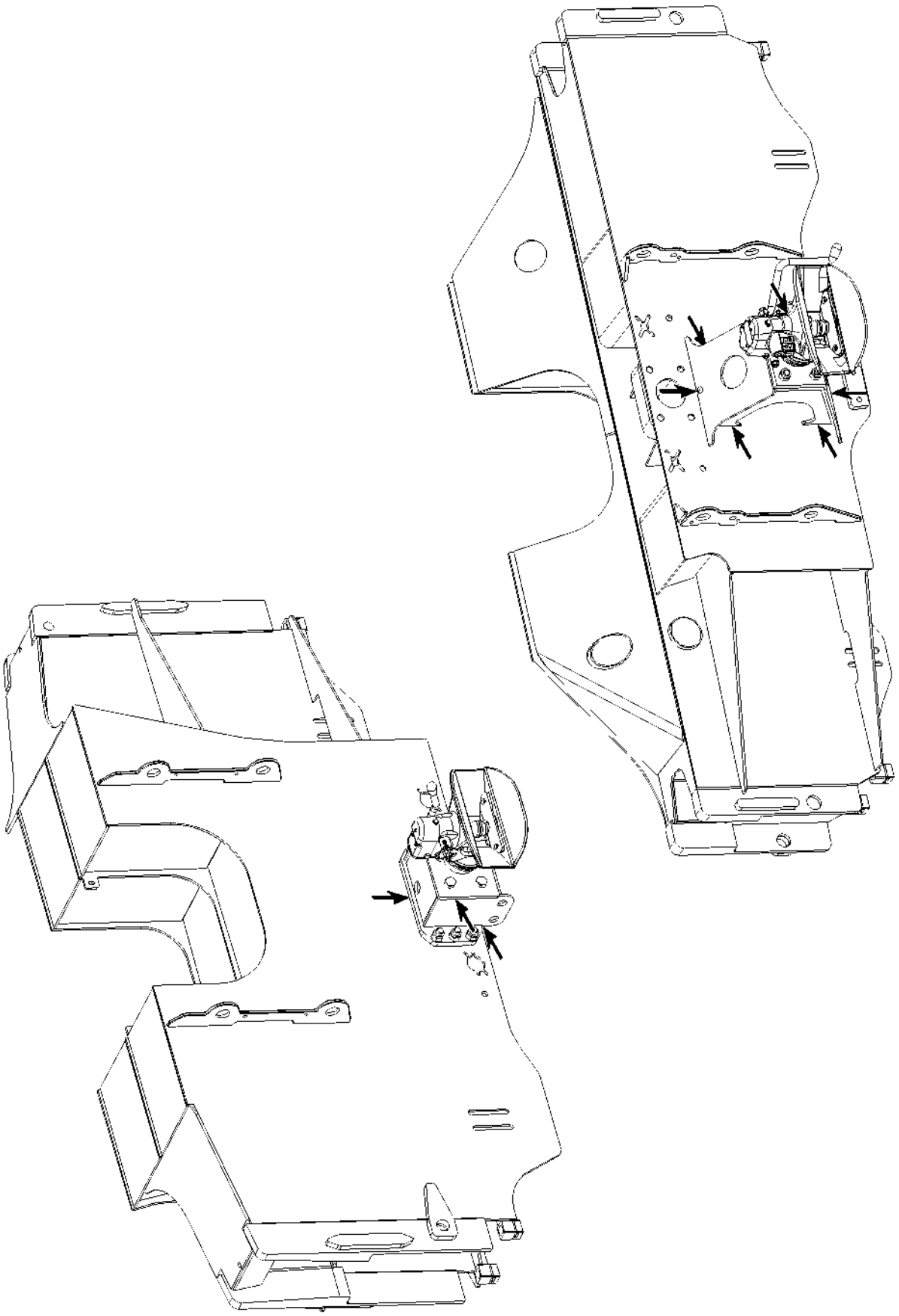


Fig.105687: Example for tow coupling

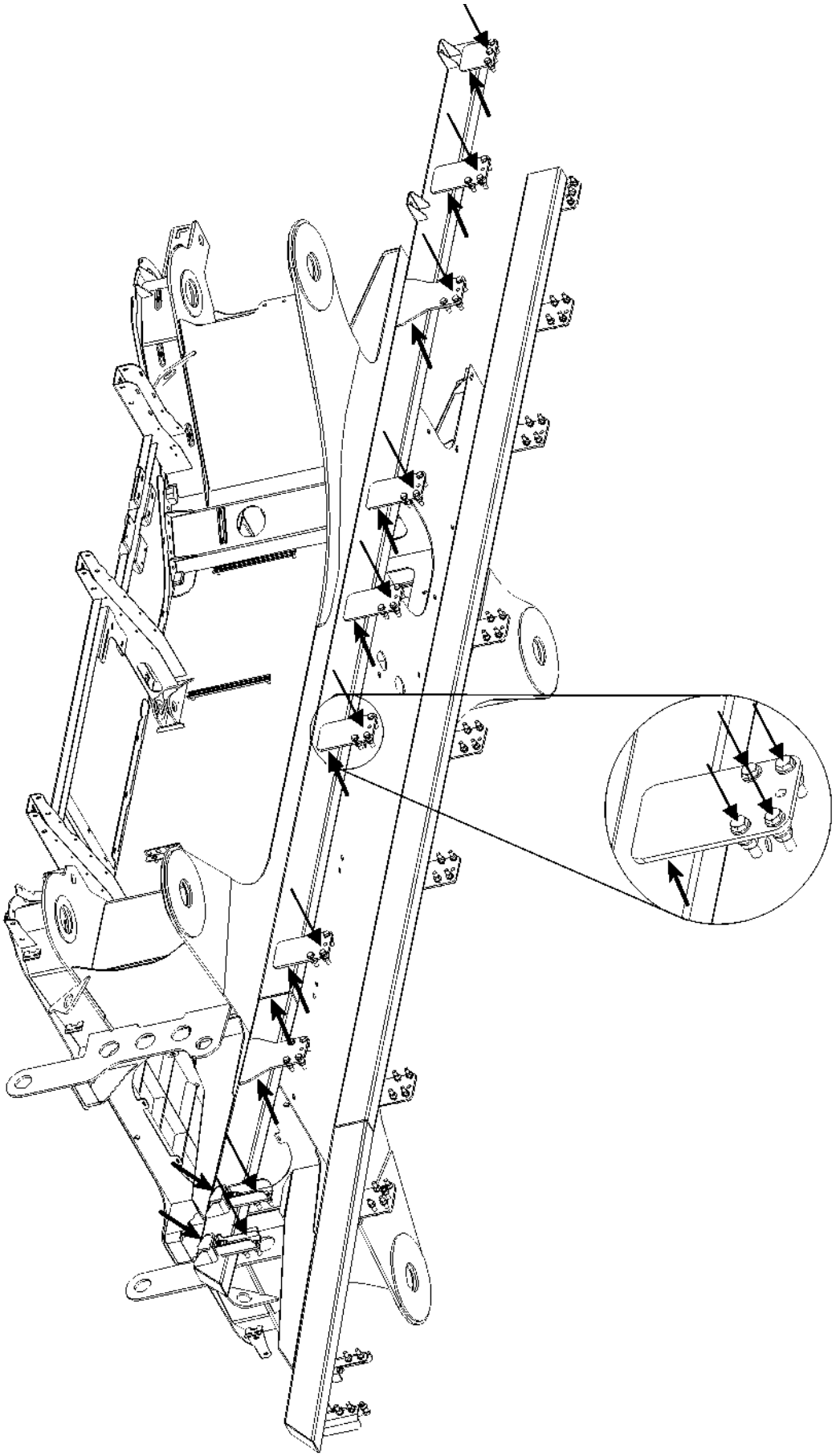
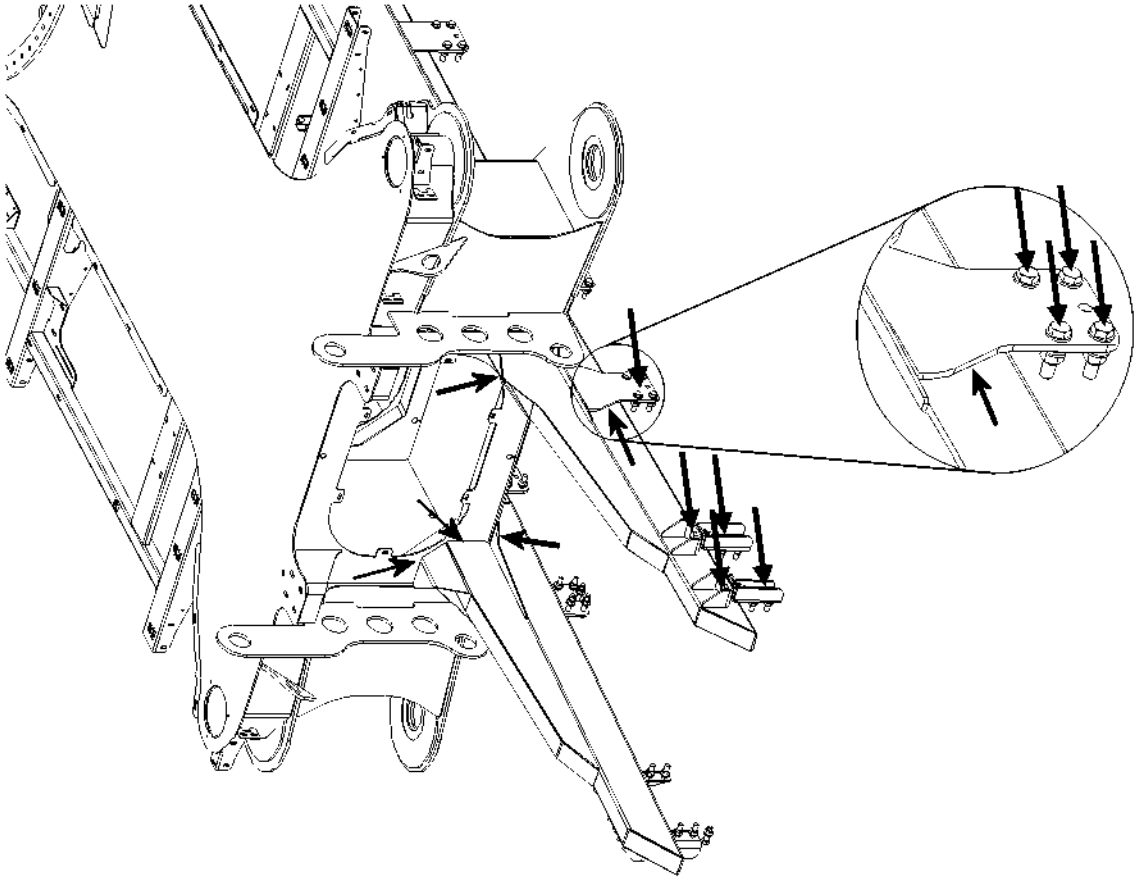


Fig.113940: Example for intermediate frame



LWE/LTM 1130-5-1-004/20502-04-02/en

Fig.114000: Example for intermediate frame

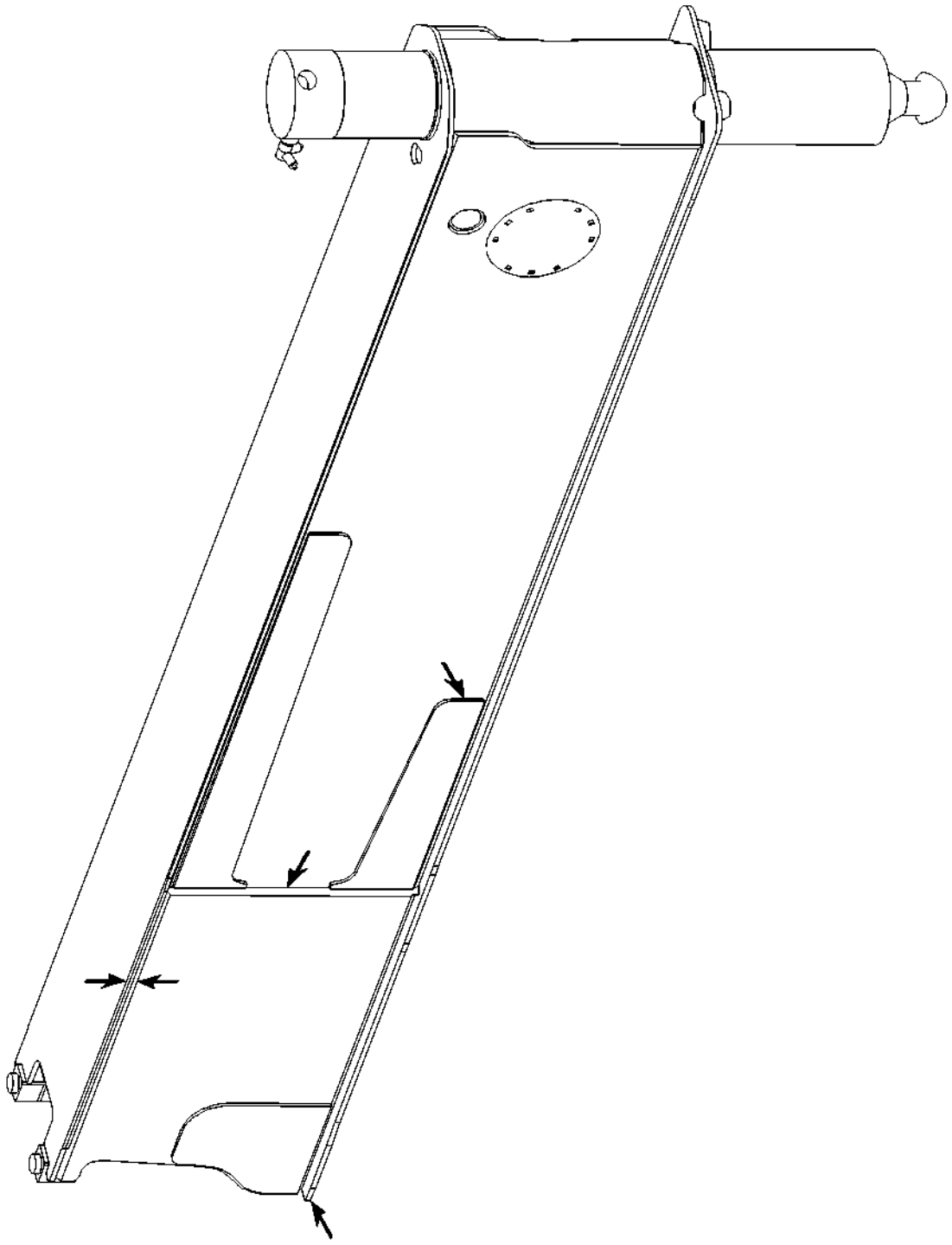
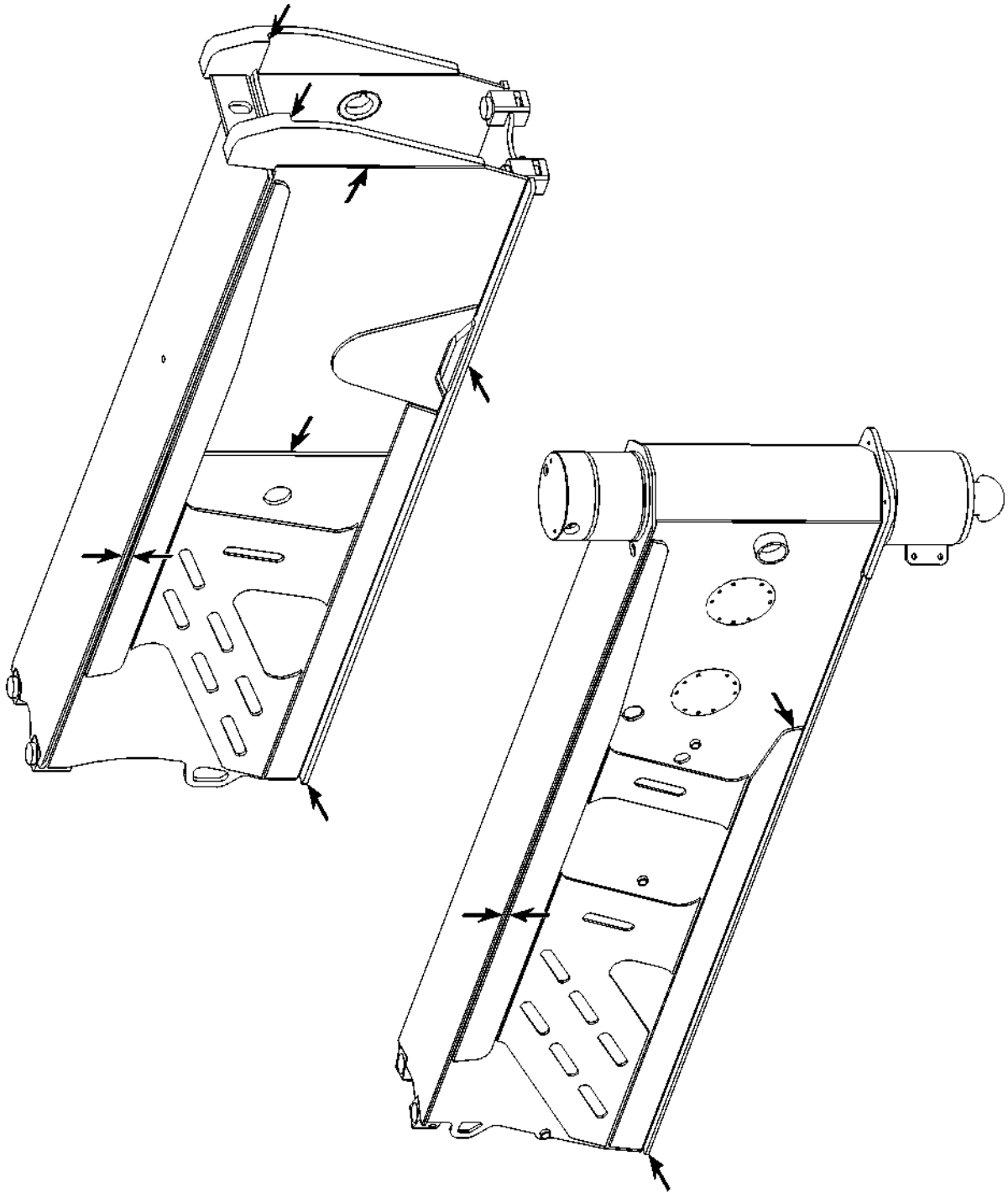


Fig.105698: Example for sliding beam



LWE/LTM 1130-5-1-004/20502-04-02/en

Fig.105717: Example for sliding beam

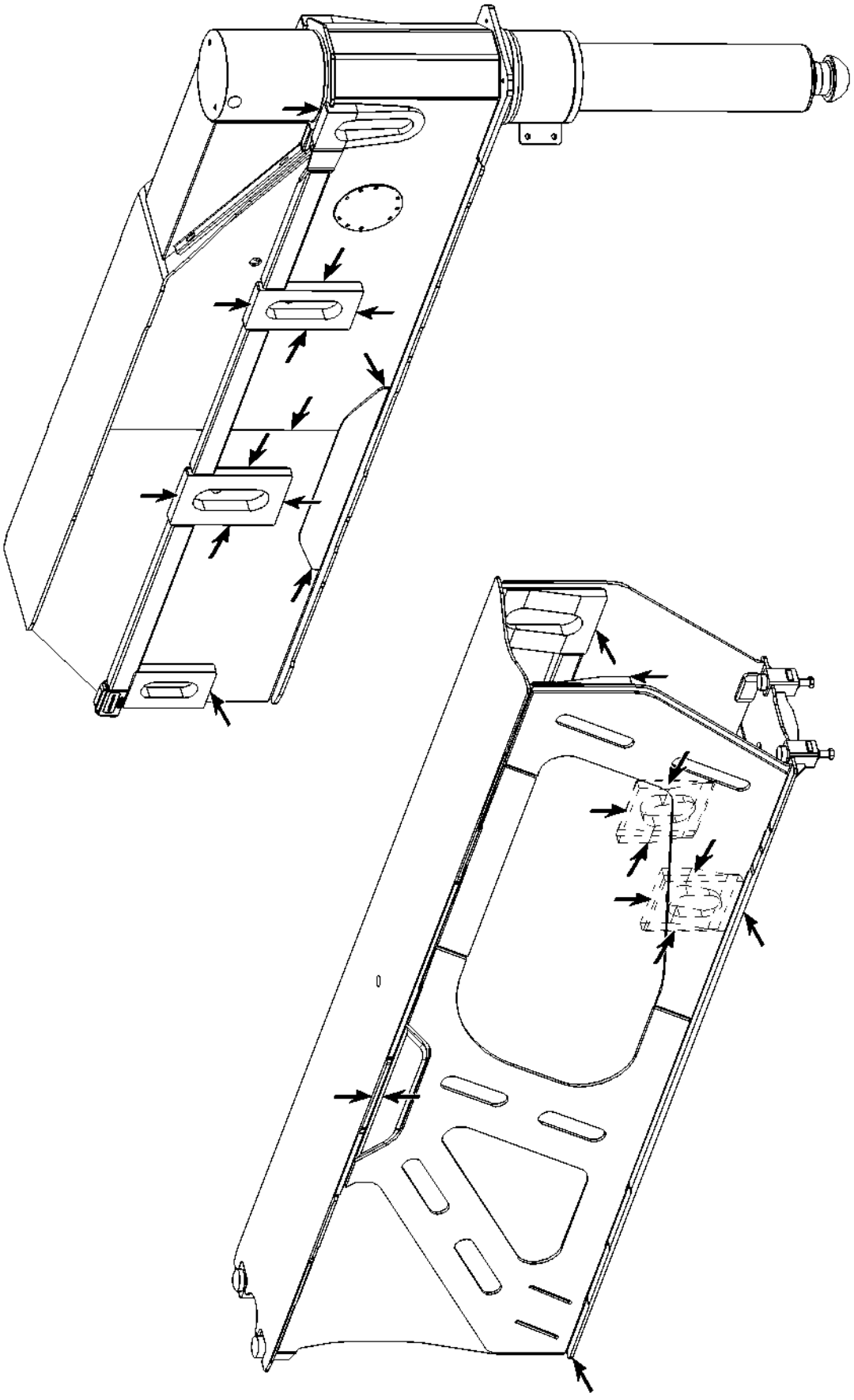


Fig.105718: Example for sliding beam

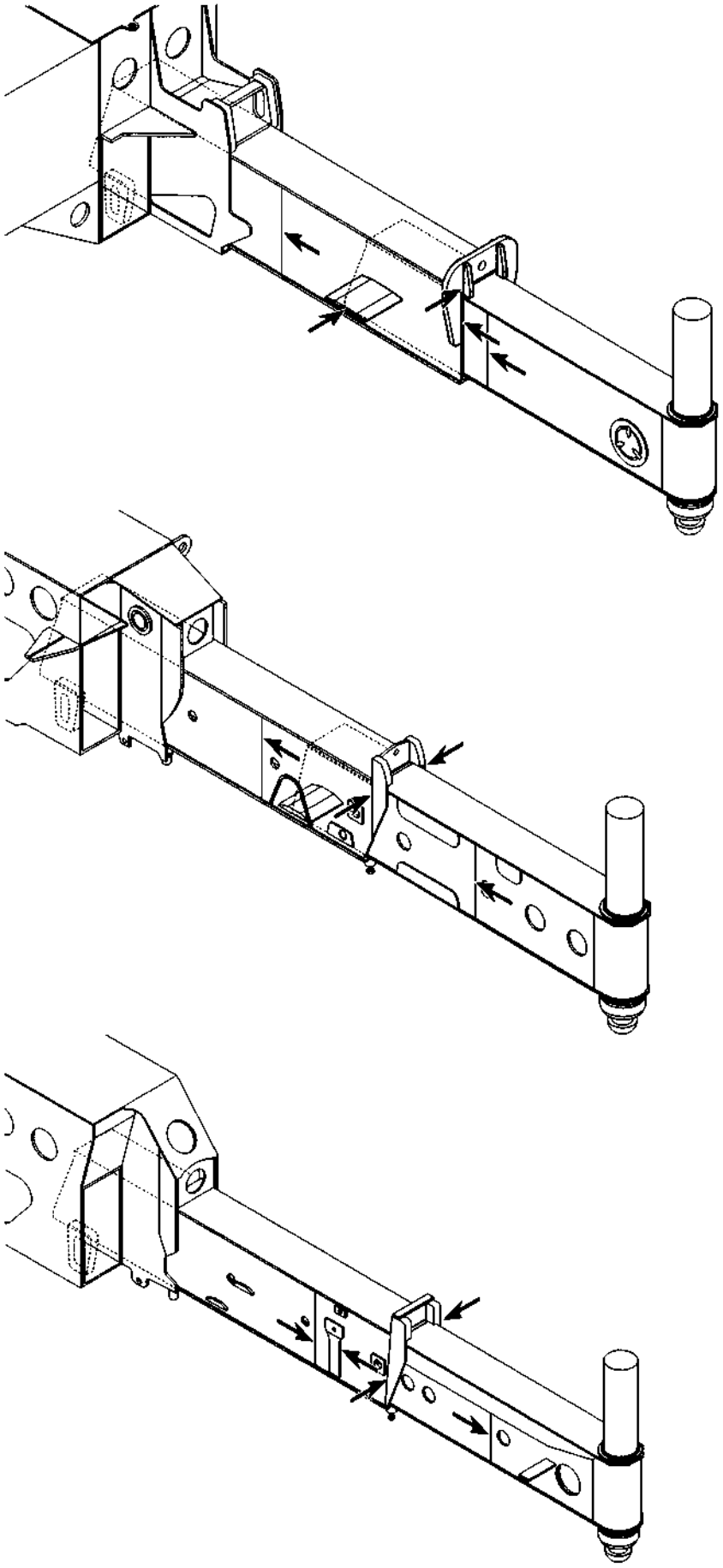


Fig.185047: Example for sliding beam

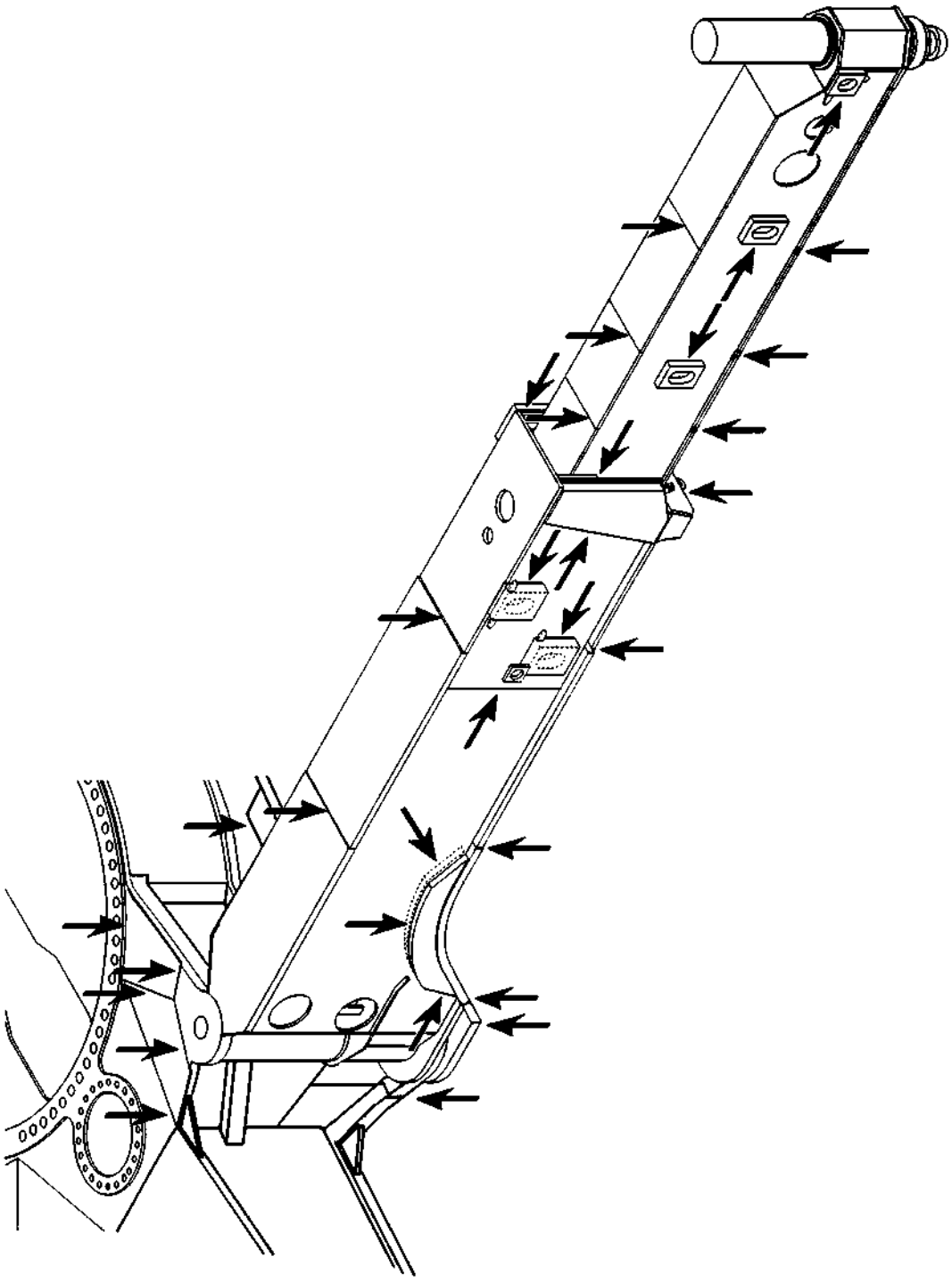
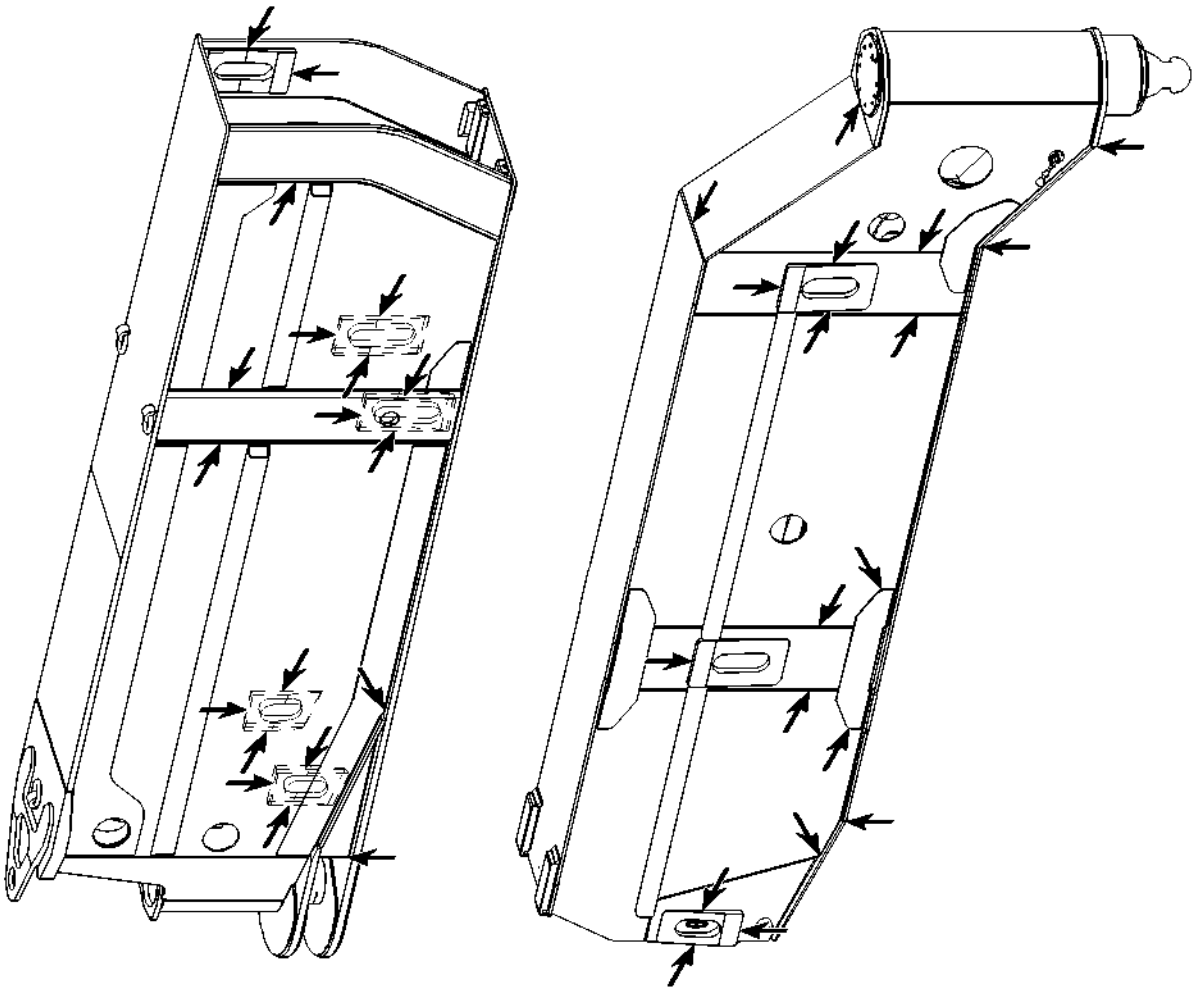


Fig.185060: Example for swingable sliding beam



LWE/LTM 1130-5-1-004/20502-04-02/en

Fig.105690: Example for swingable sliding beam

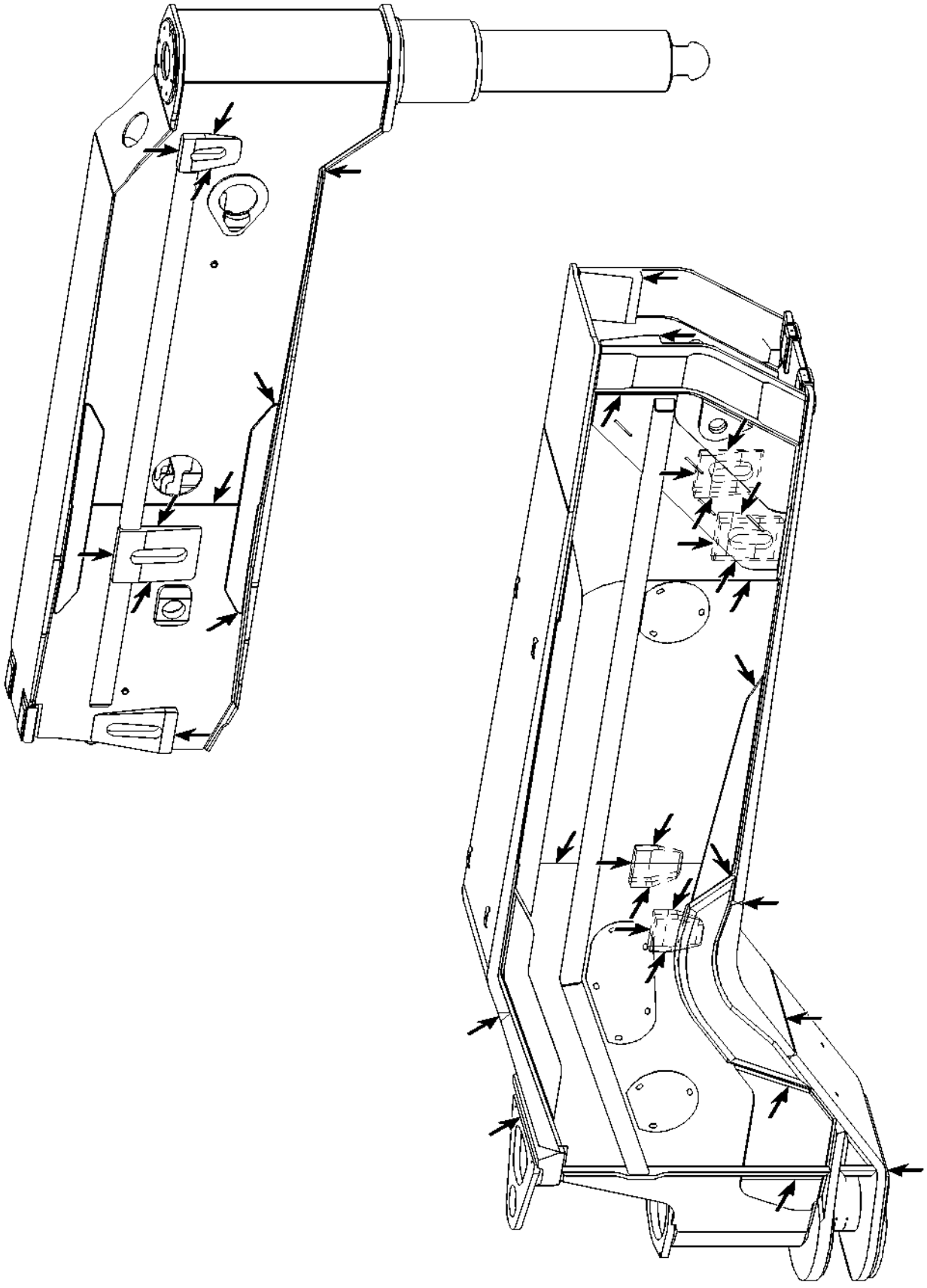


Fig.105704: Example for swingable sliding beam

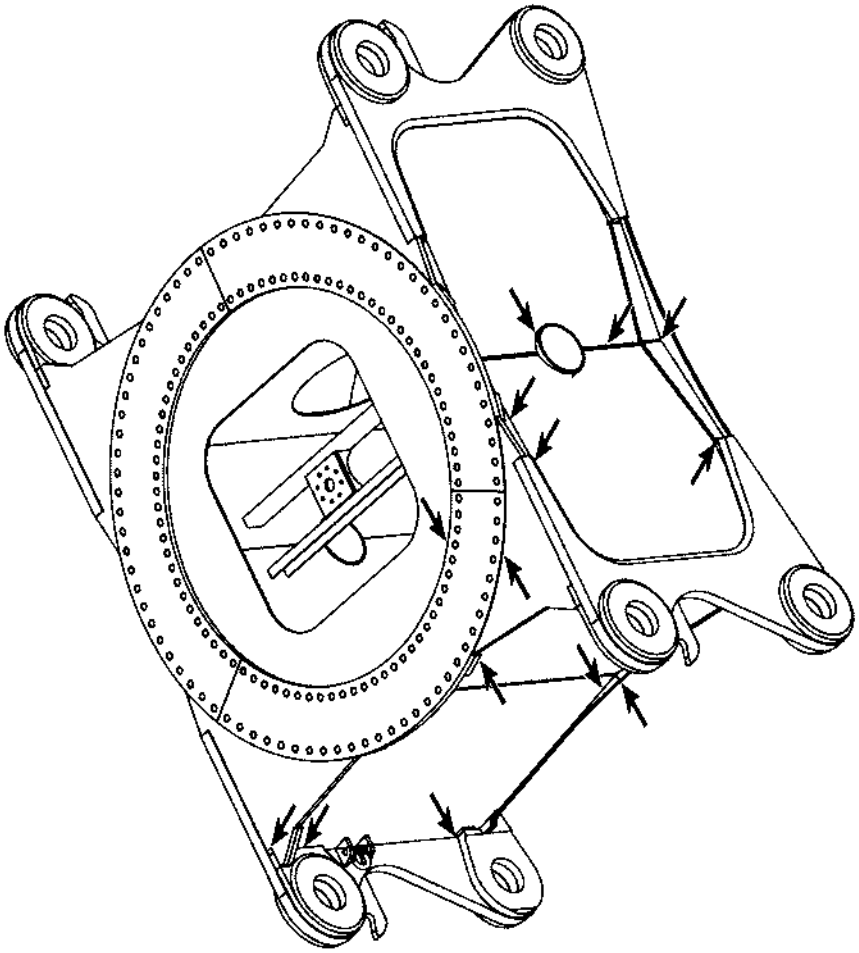


Fig.105725: Example for crawler center section

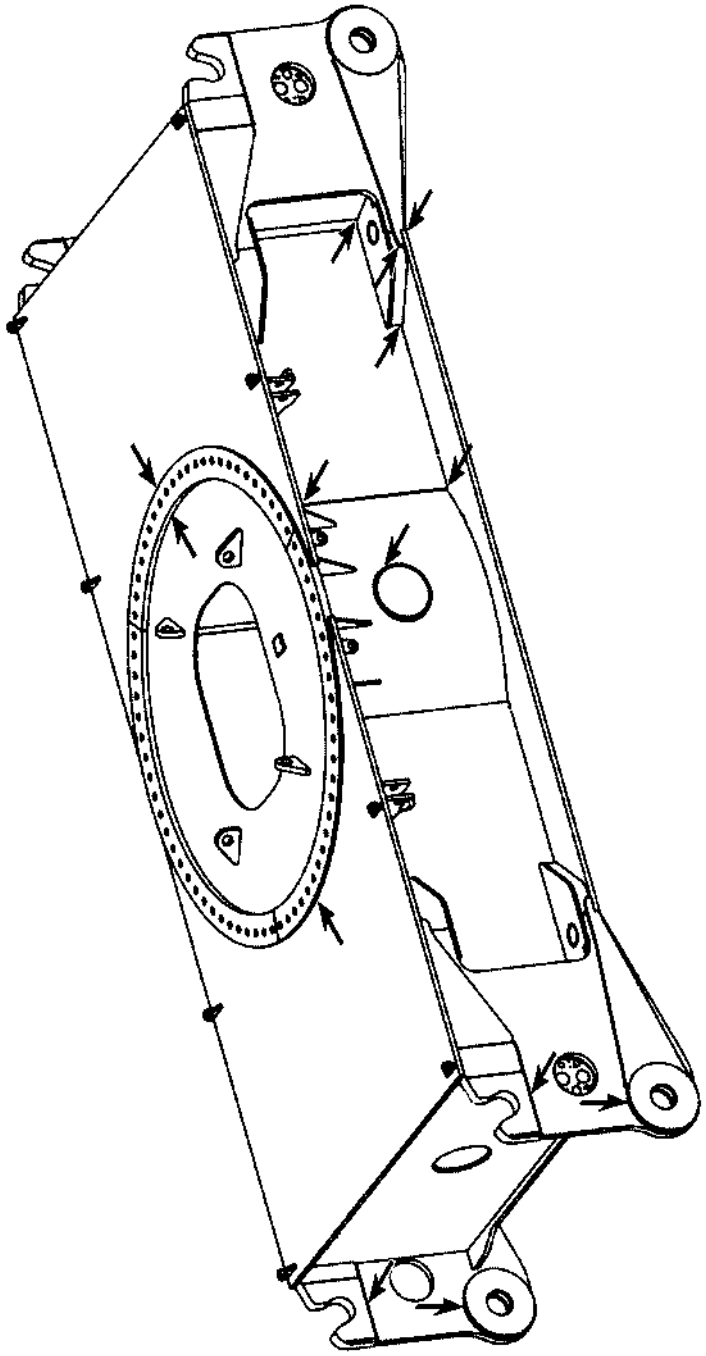
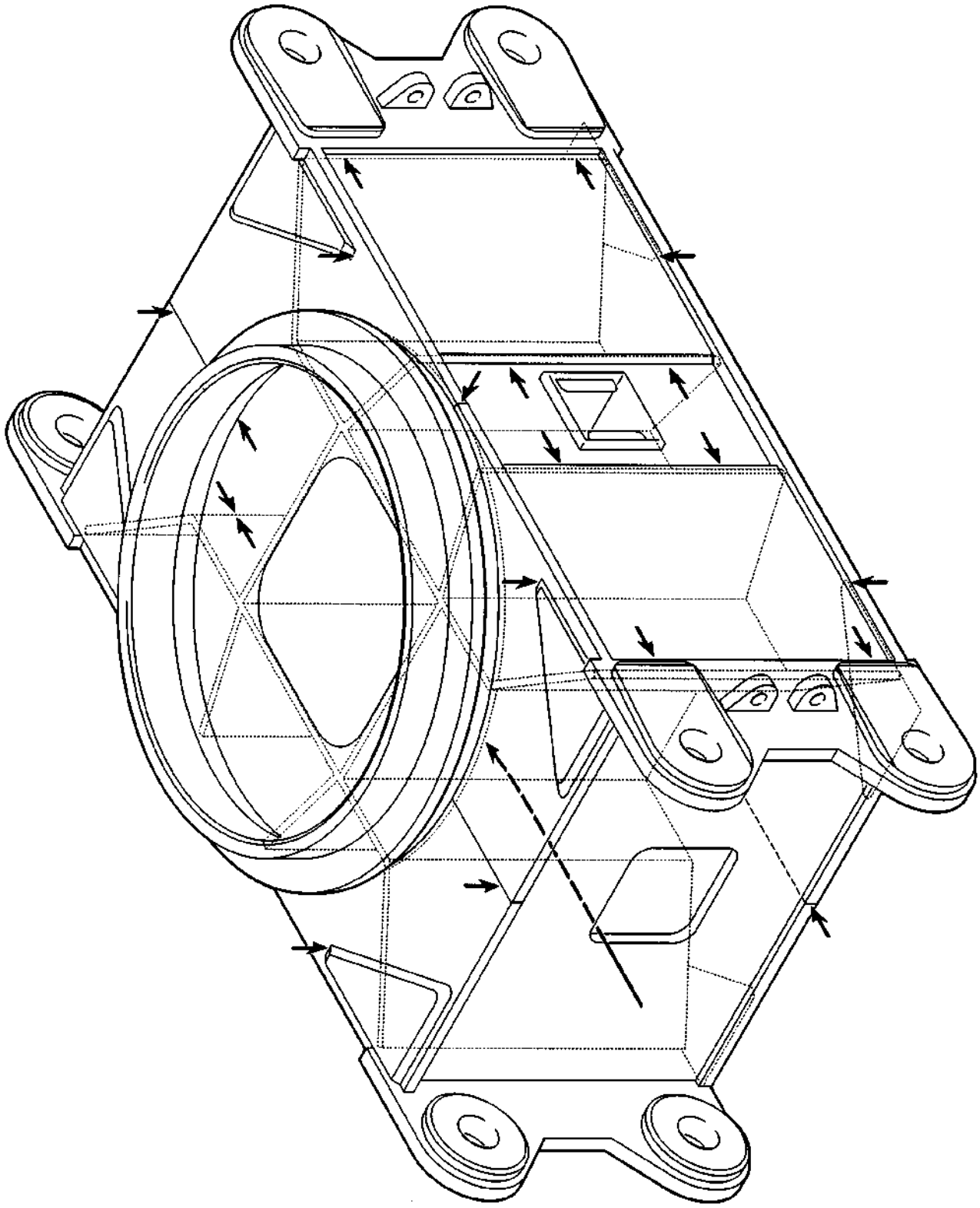
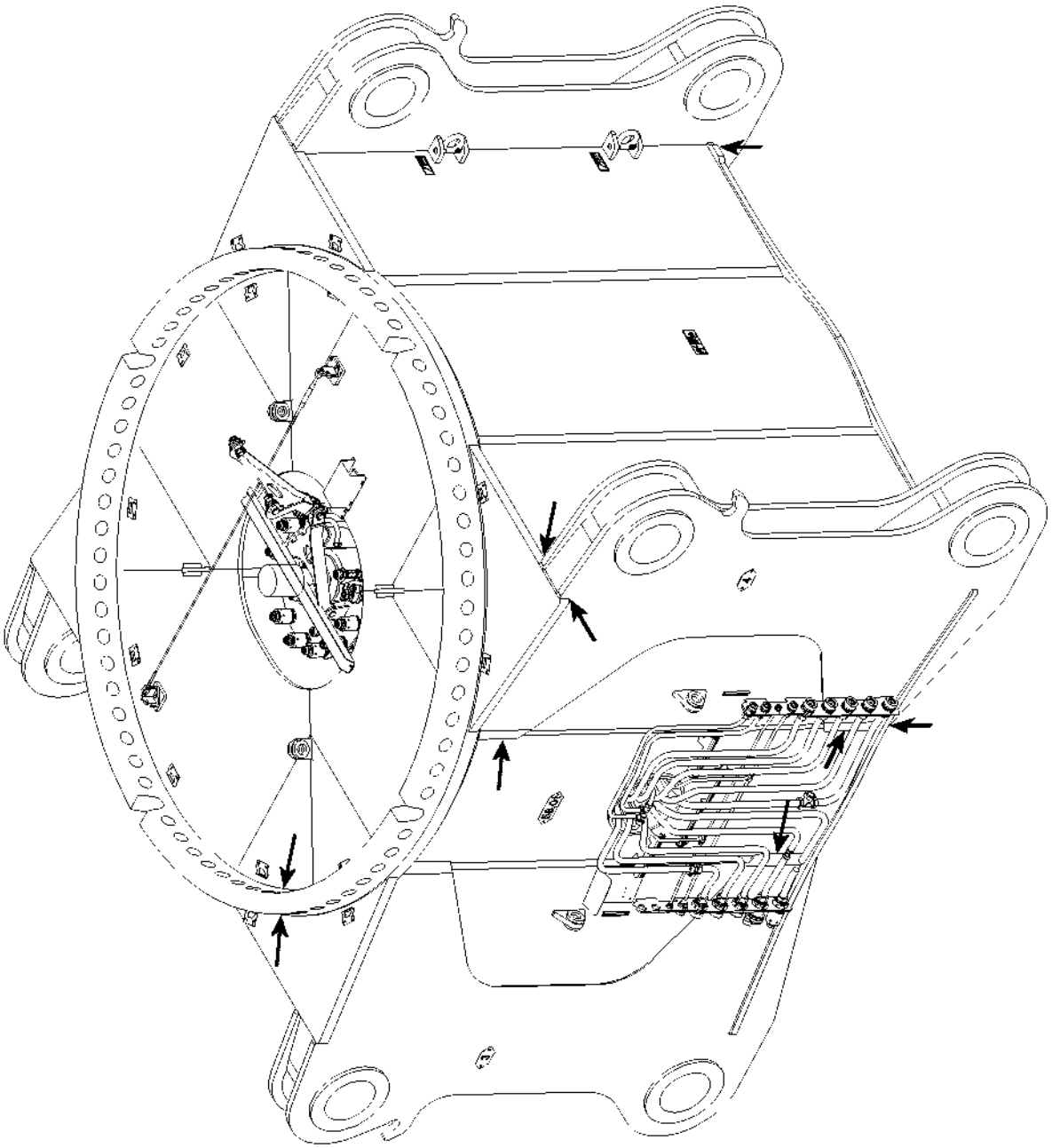


Fig.105726: Example for crawler center section



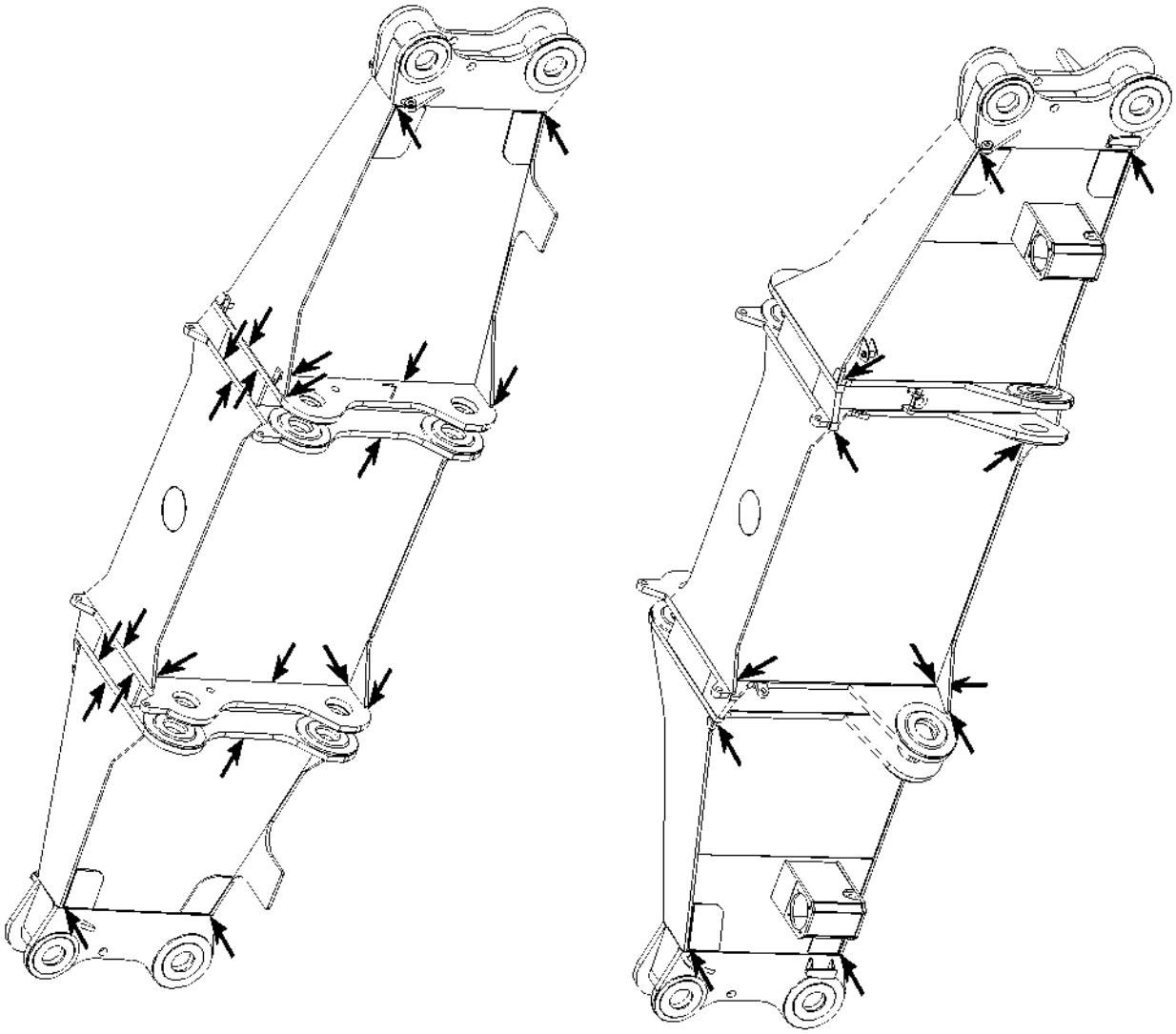
LWE/LTM 1130-5-1-004/20502-04-02/en

Fig.187347: Example for crawler center section



LWE/LTM 1130-5-1-004/20502-04-02/en

Fig.115920: Example for crawler center section



LWE/LTM 1130-5-1-004/20502-04-02/en

Fig.105727: Example for cross carrier

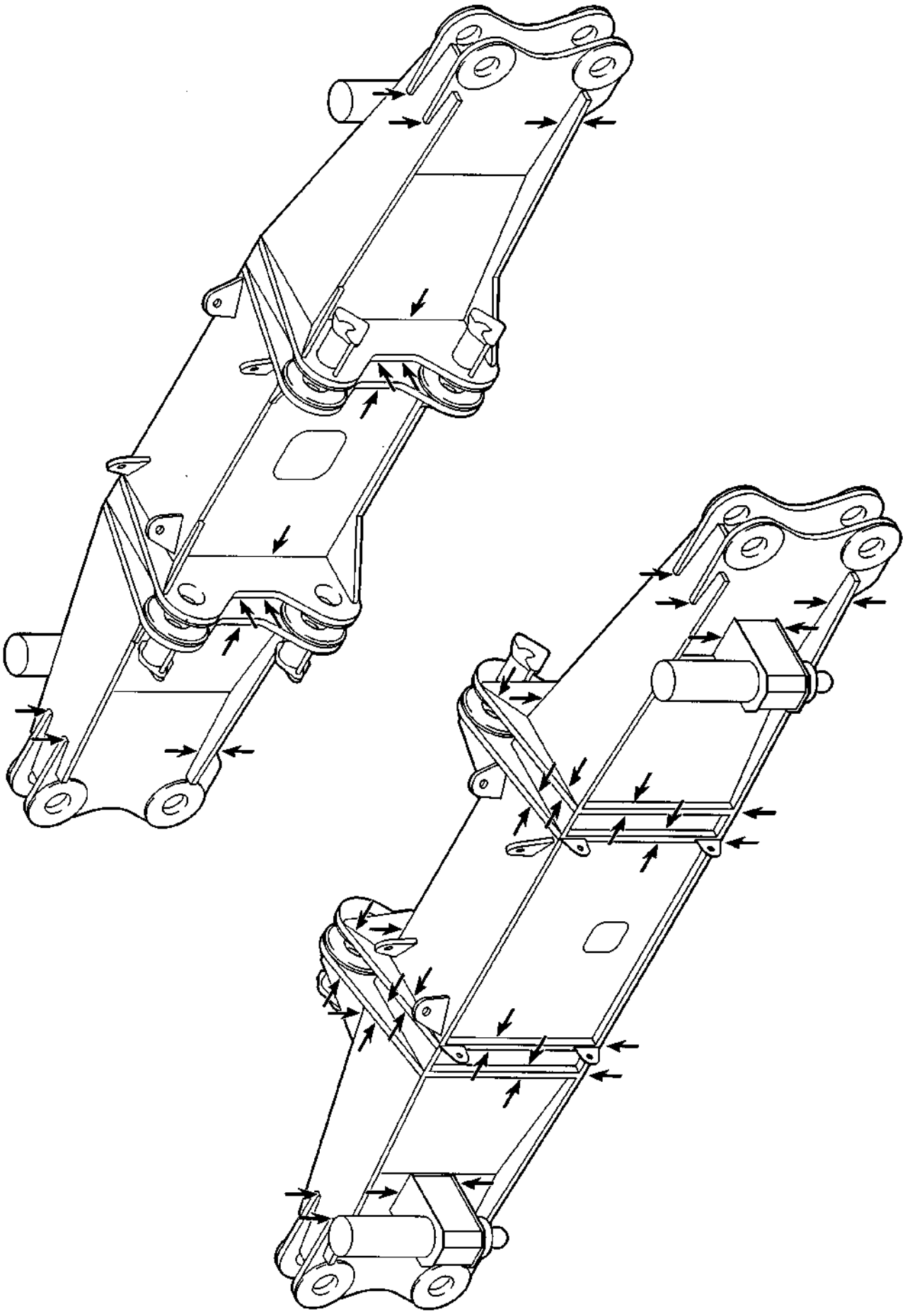


Fig.187348: Example for cross carrier

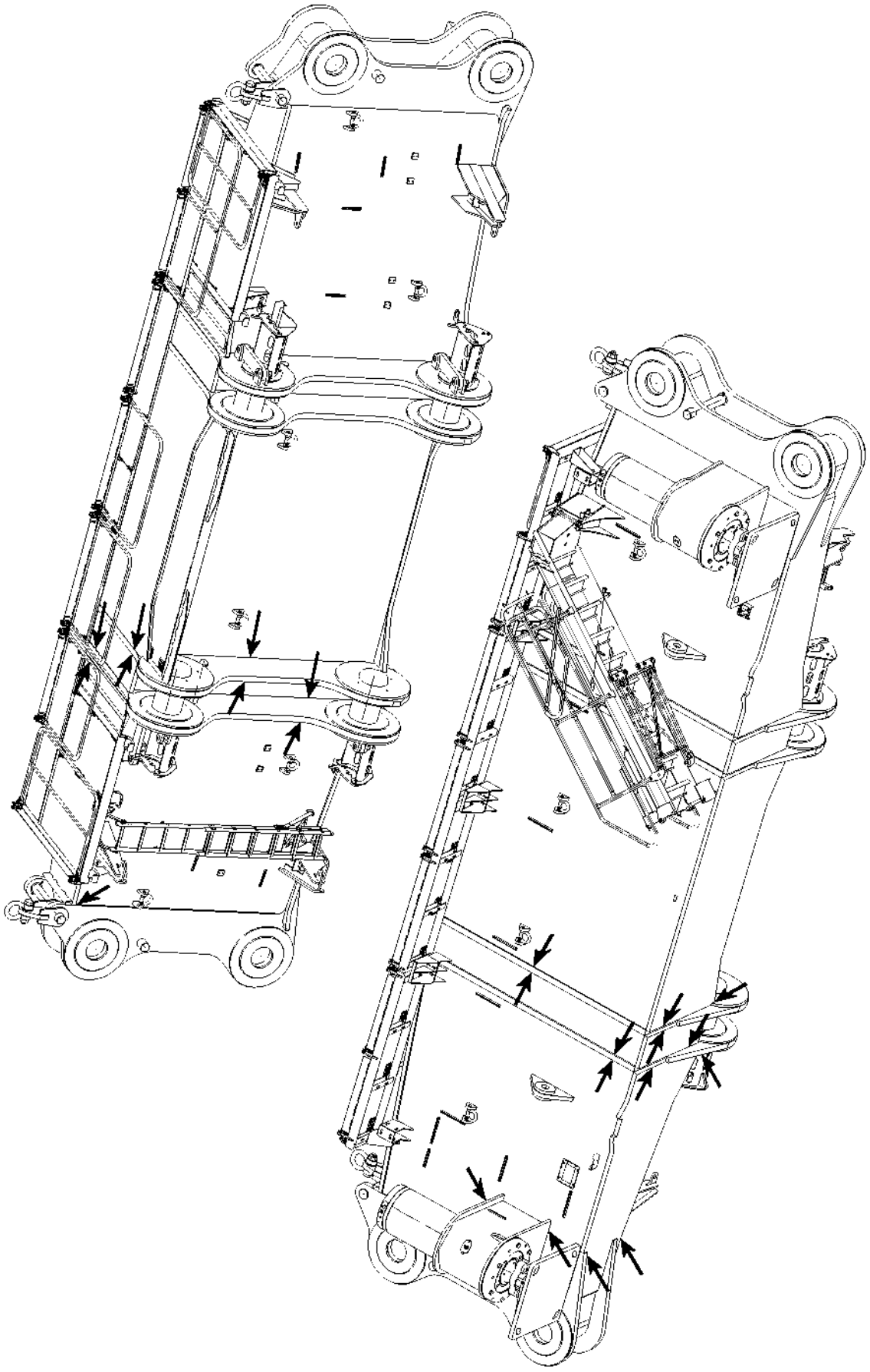


Fig.115921: Example for cross carrier

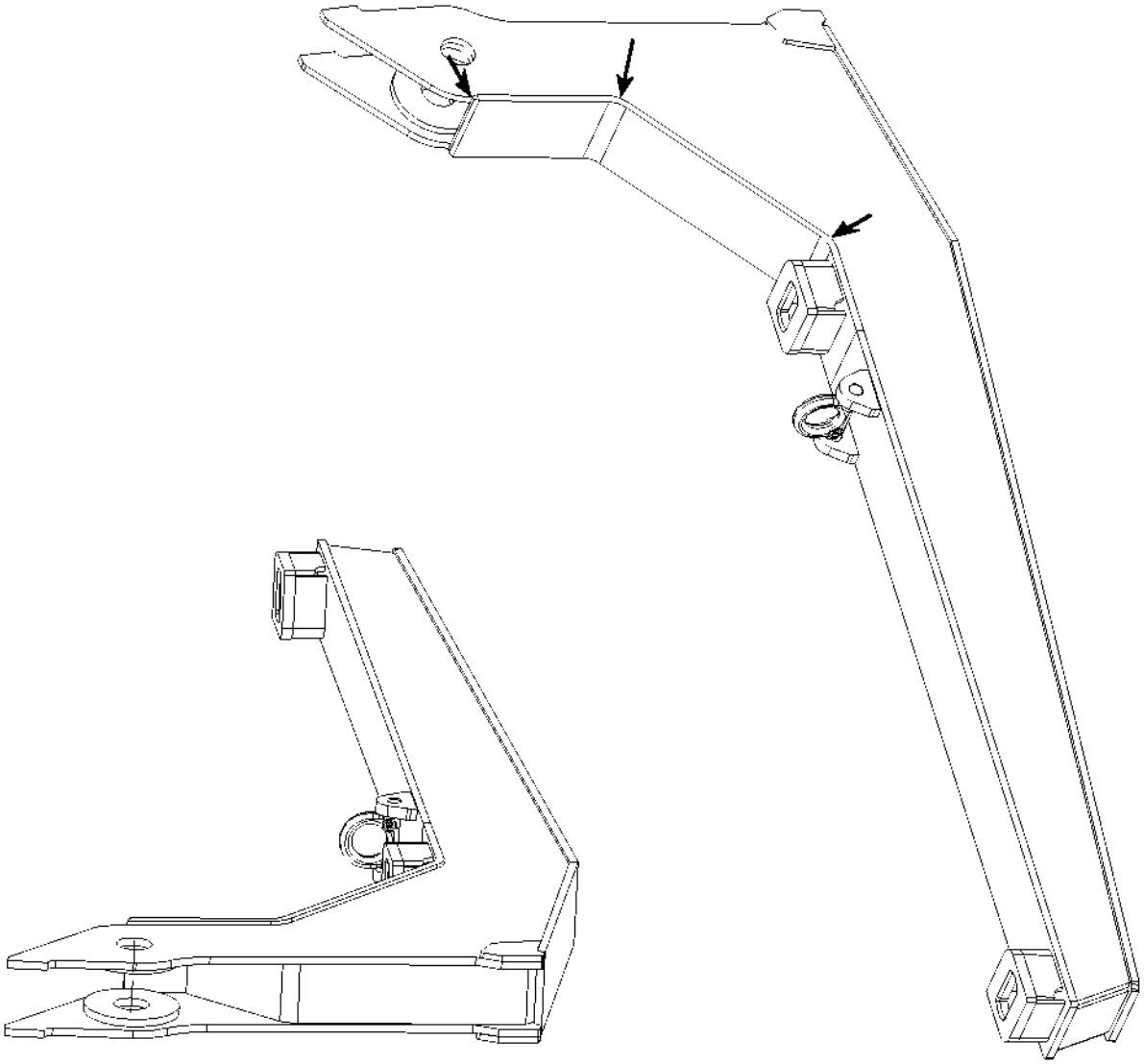
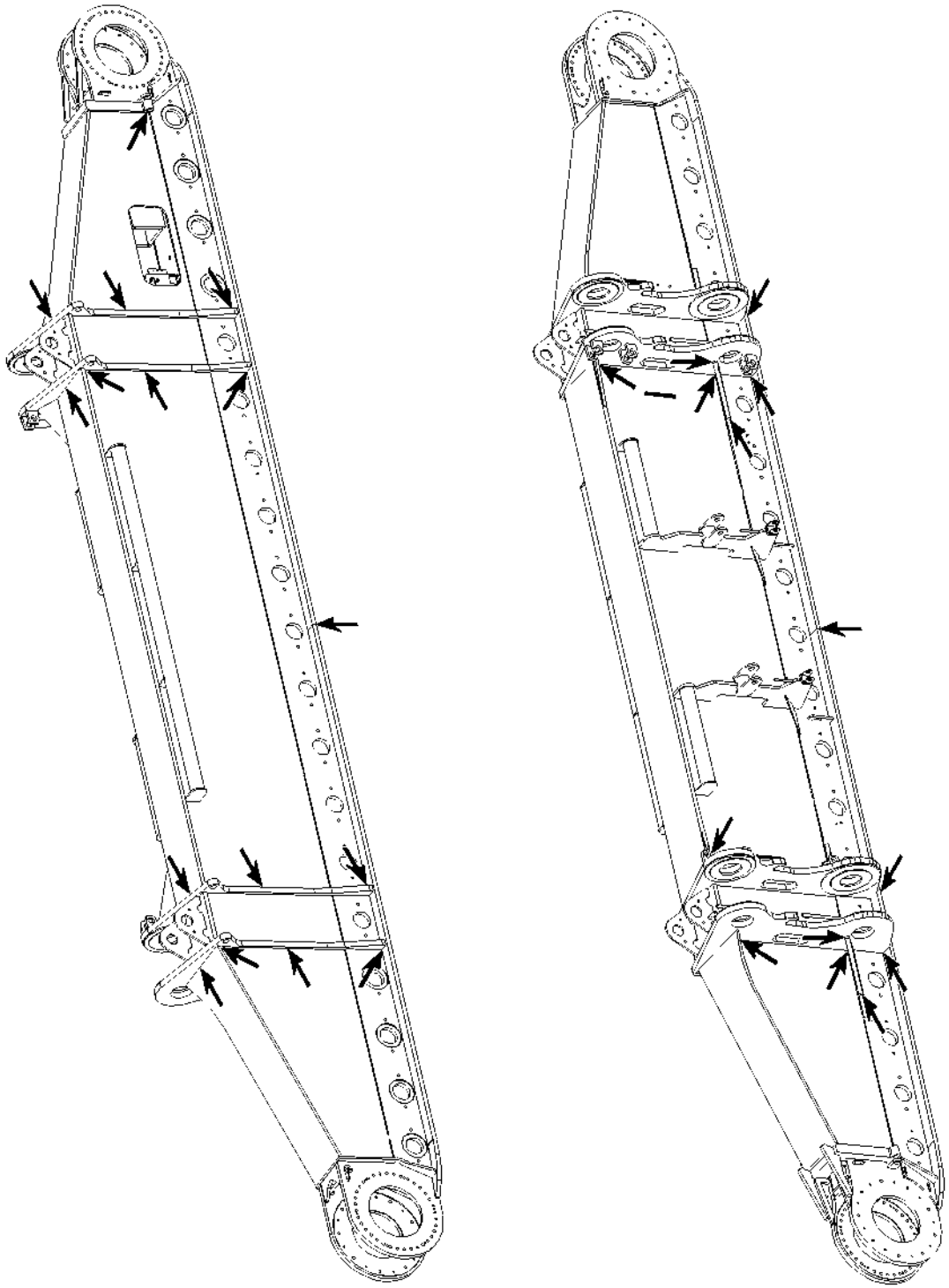


Fig.115919: Example for carrier for central ballast



LWE/LTM 1130-5-1-004/20502-04-02/en

Fig.105728: Example for crawler carrier

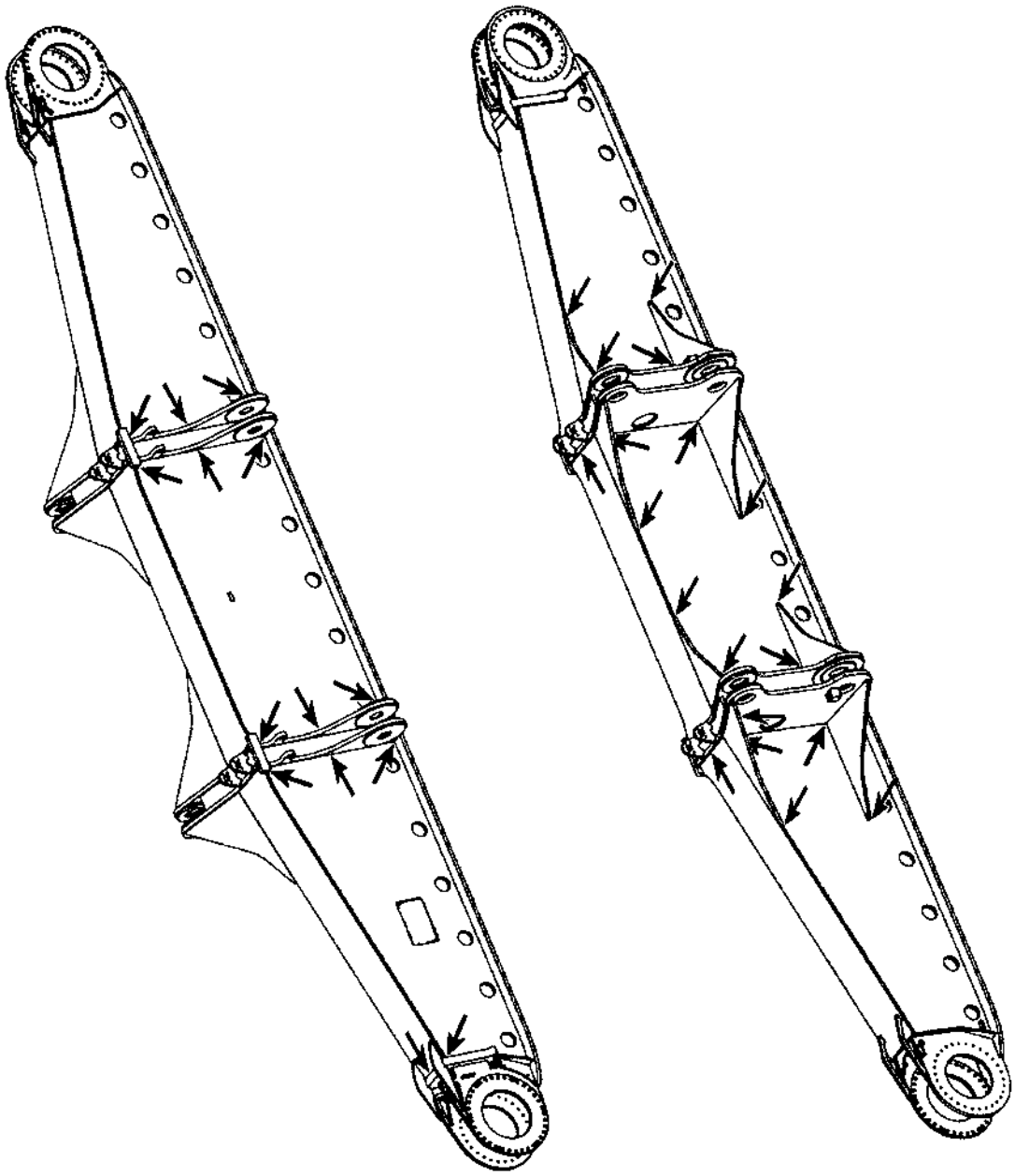
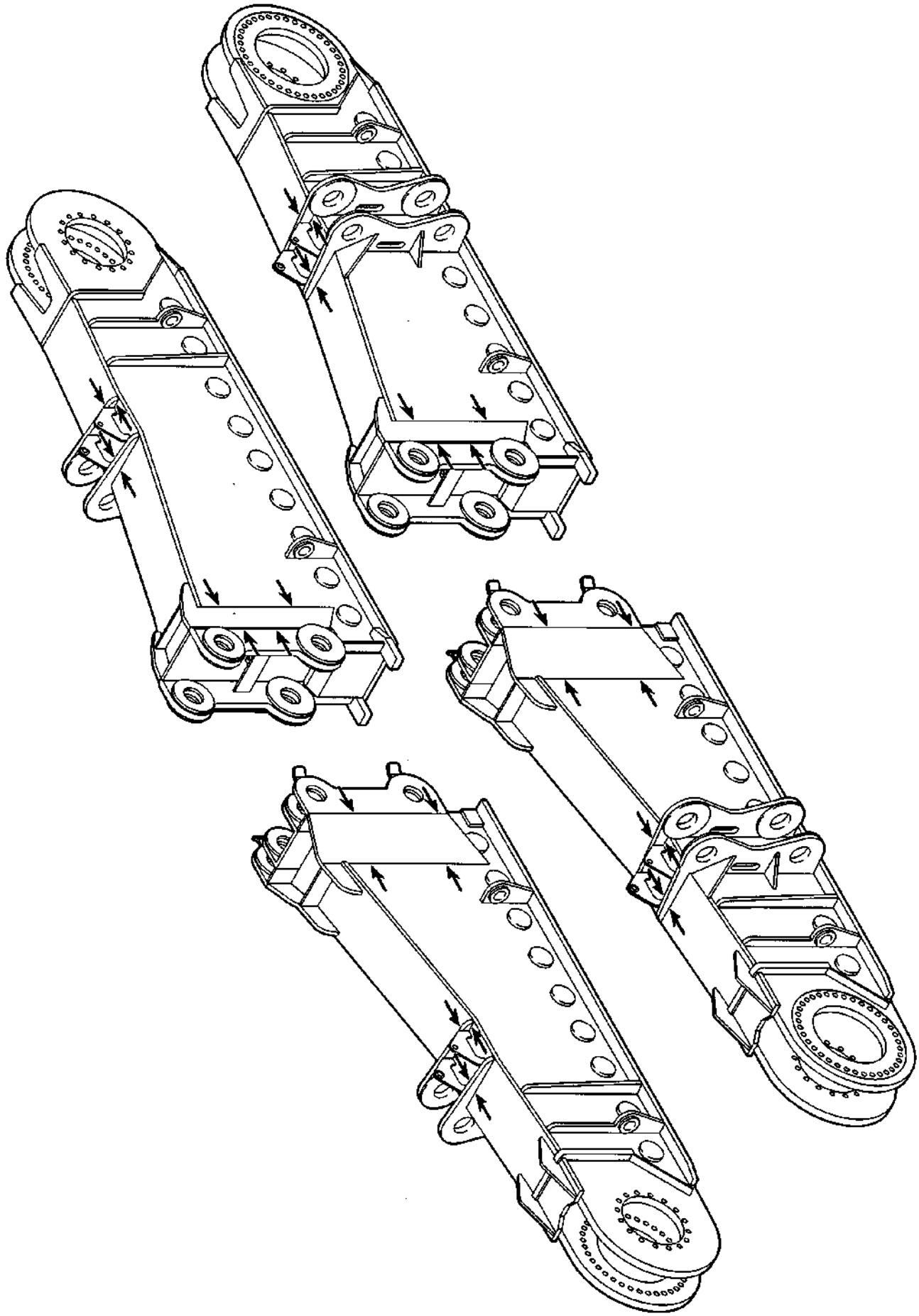


Fig.105729: Example for crawler carrier



LWE/LTM 1130-5-1-004/20502-04-02/en

Fig.187349: Example for crawler carrier

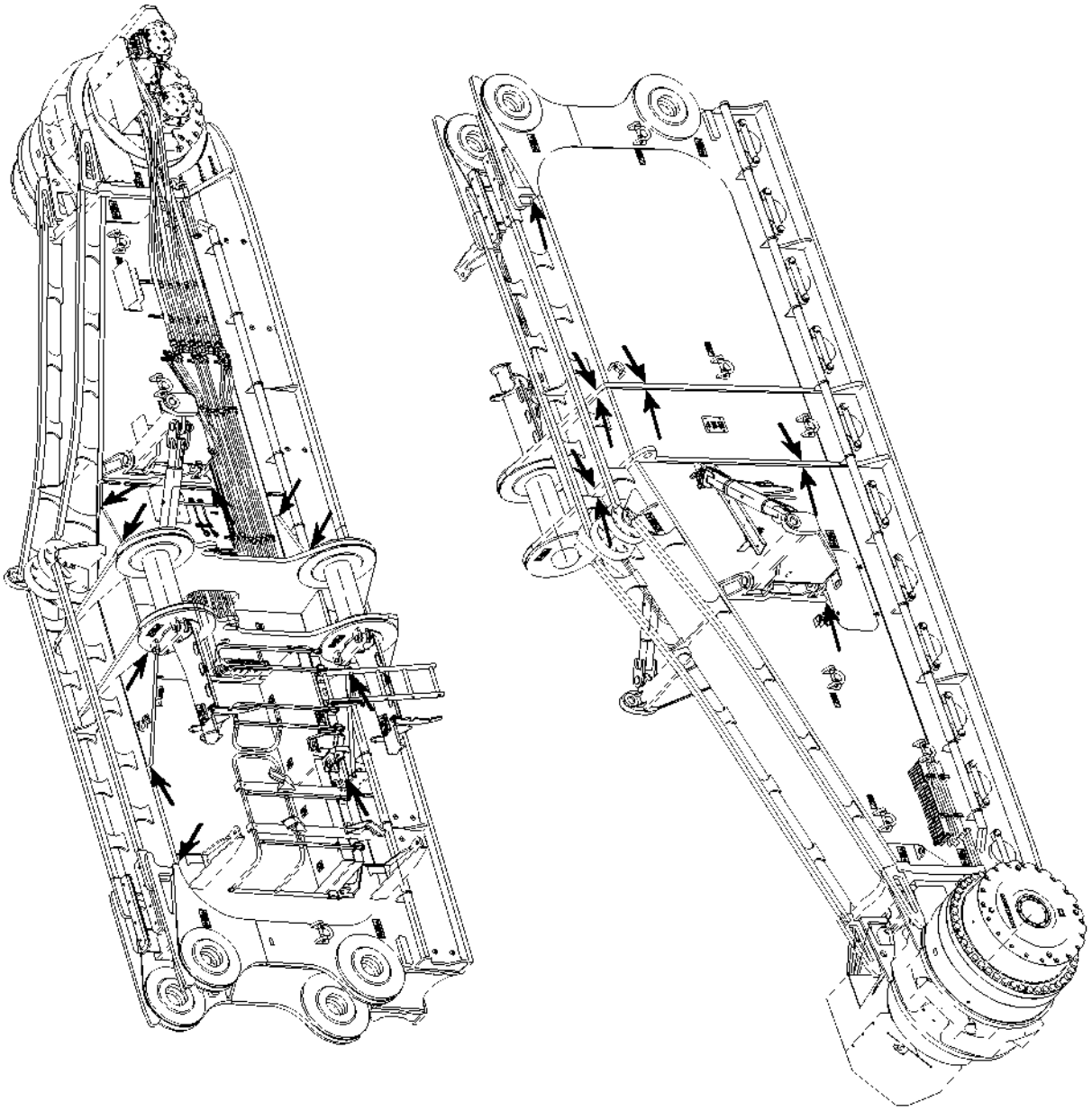
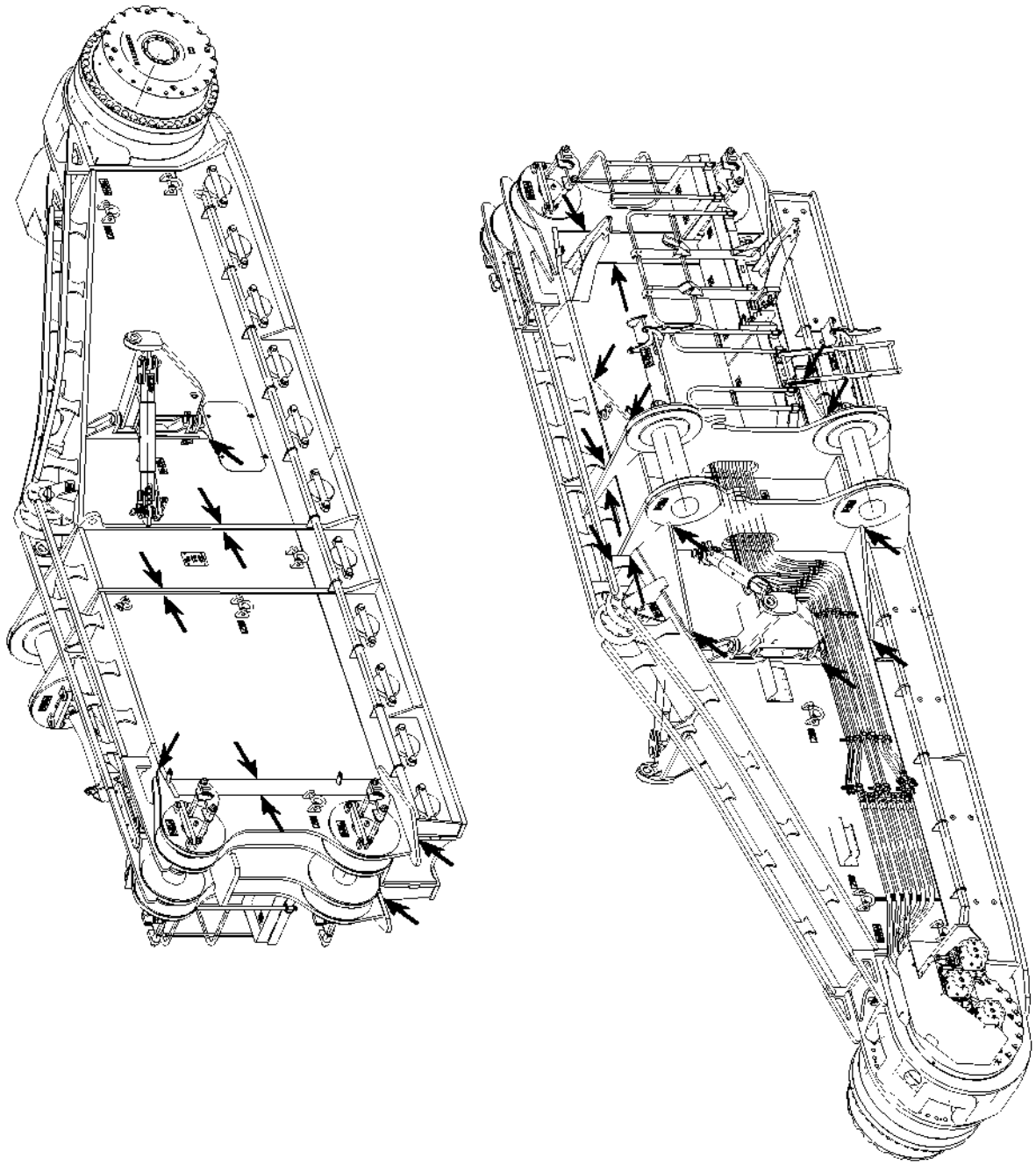


Fig.115917: Example for crawler carrier



LWE/LTM 1130-5-1-004/20502-04-02/en

Fig.115918: Example for crawler carrier

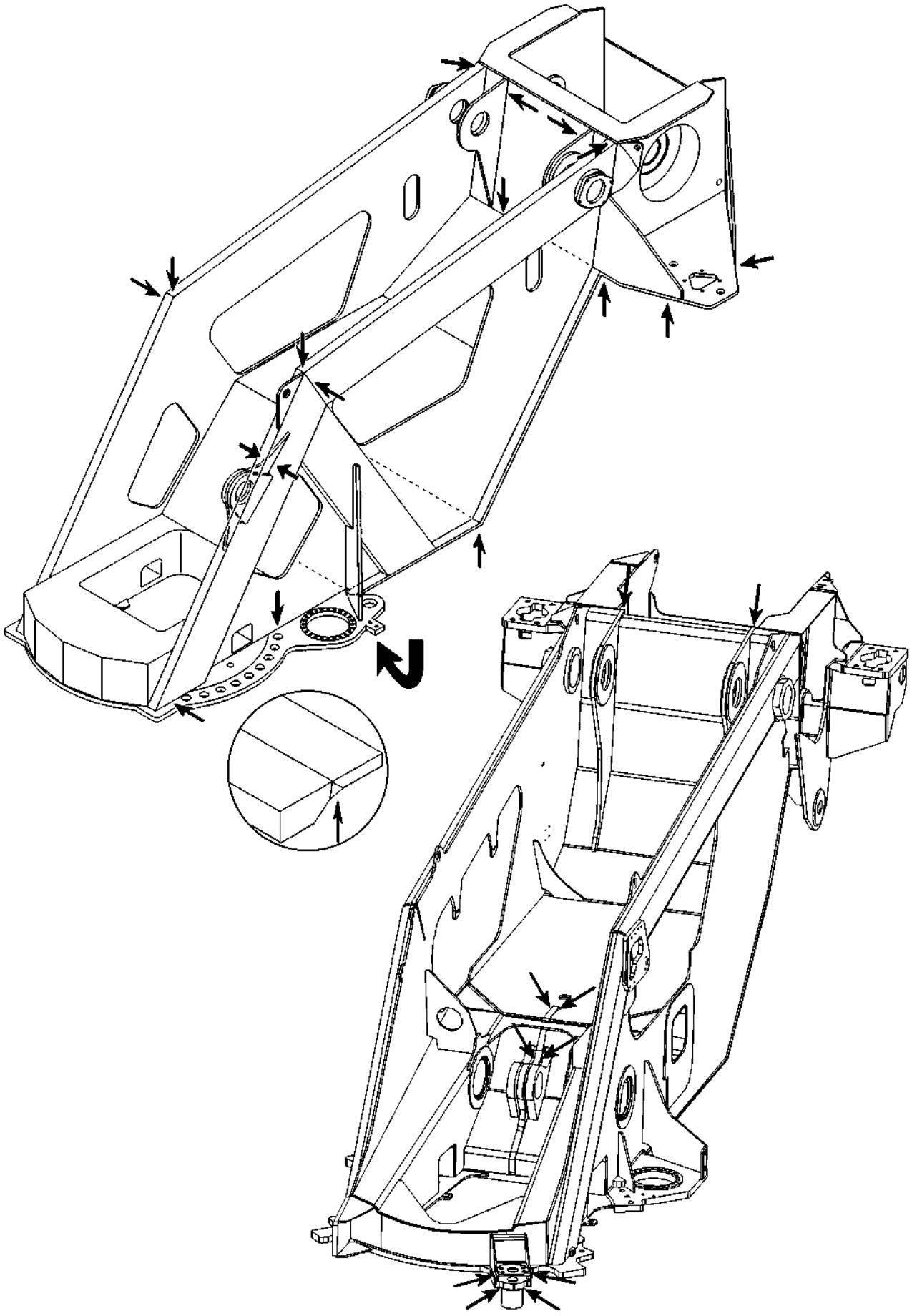
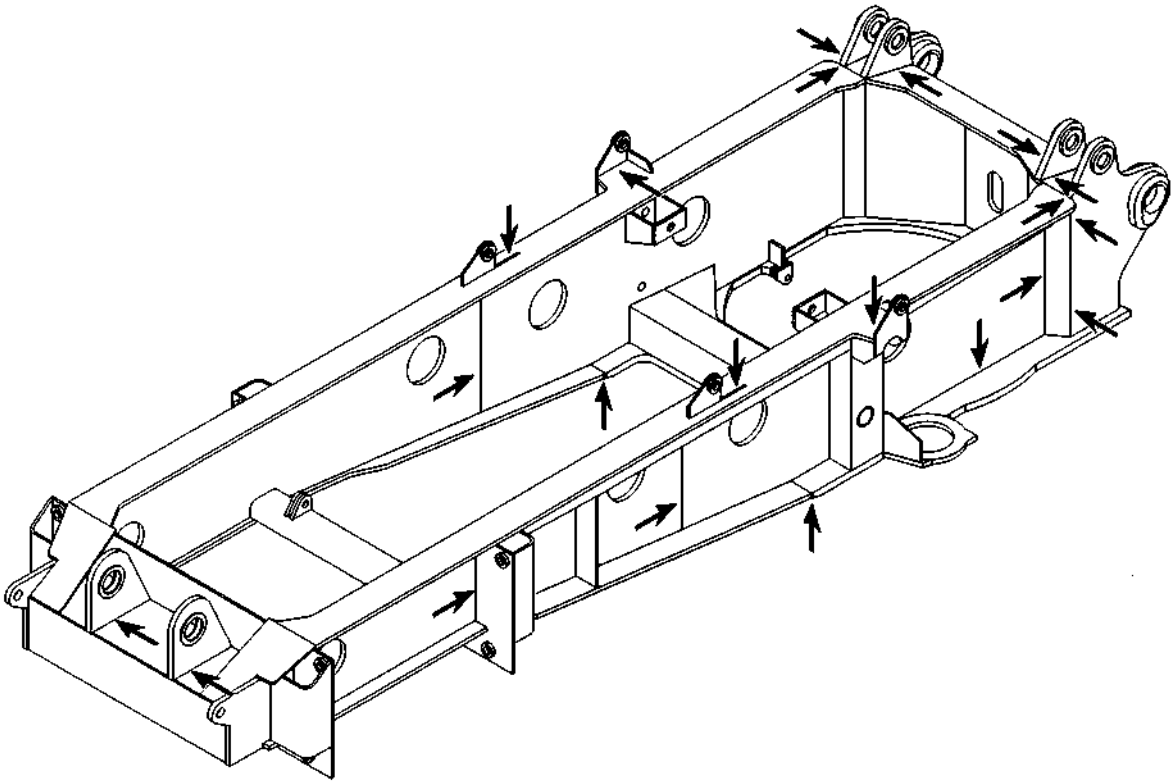
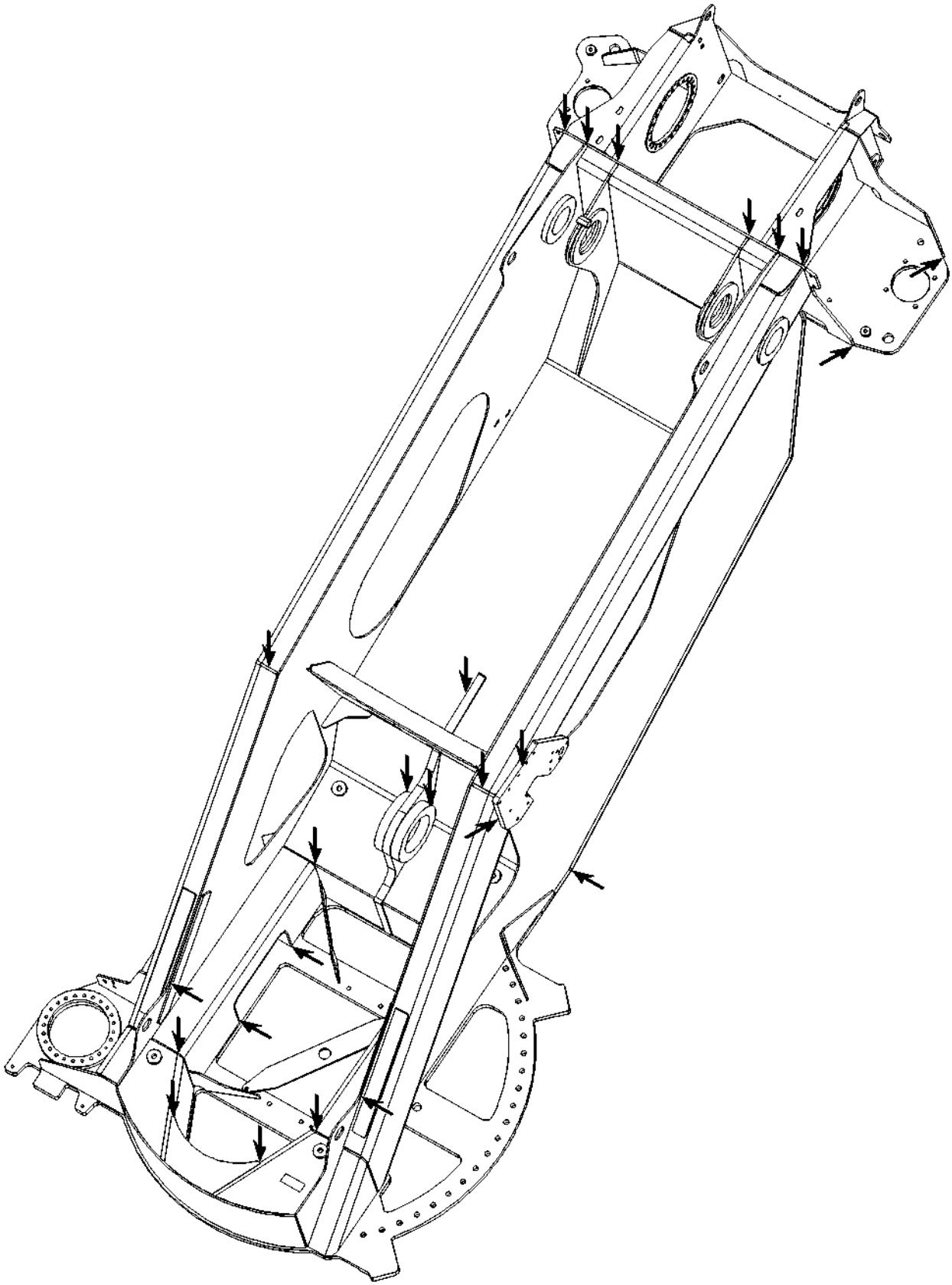


Fig.185048: Example for turntable frame



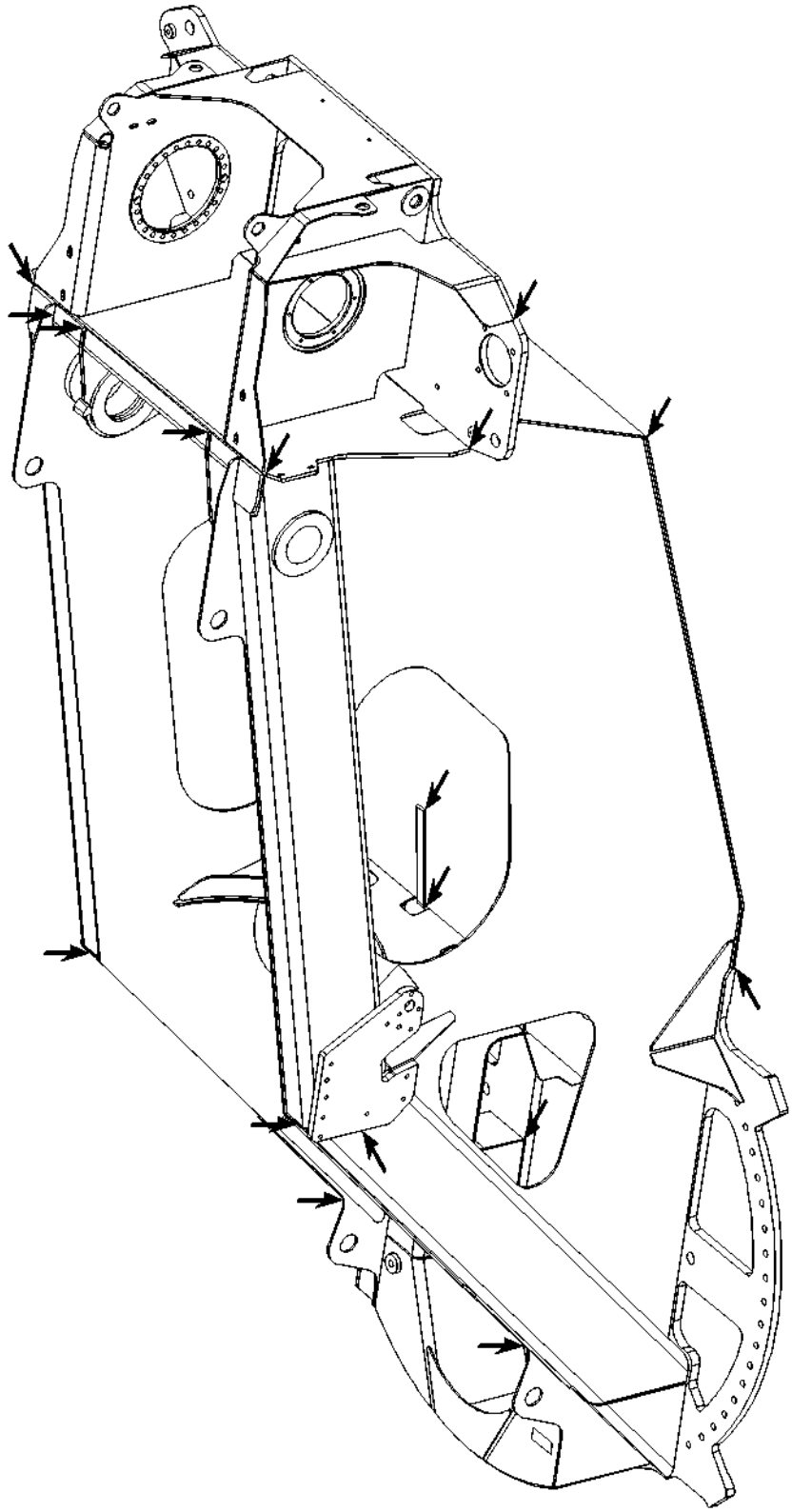
LWE/LTM 1130-5-1-004/20502-04-02/en

Fig.185049: Example for turntable frame



LWE/LTM 1130-5-1-004/20502-04-02/en

Fig.105700: Example for turntable frame



LWE/LTM 1130-5-1-004/20502-04-02/en

Fig.105701: Example for turntable frame

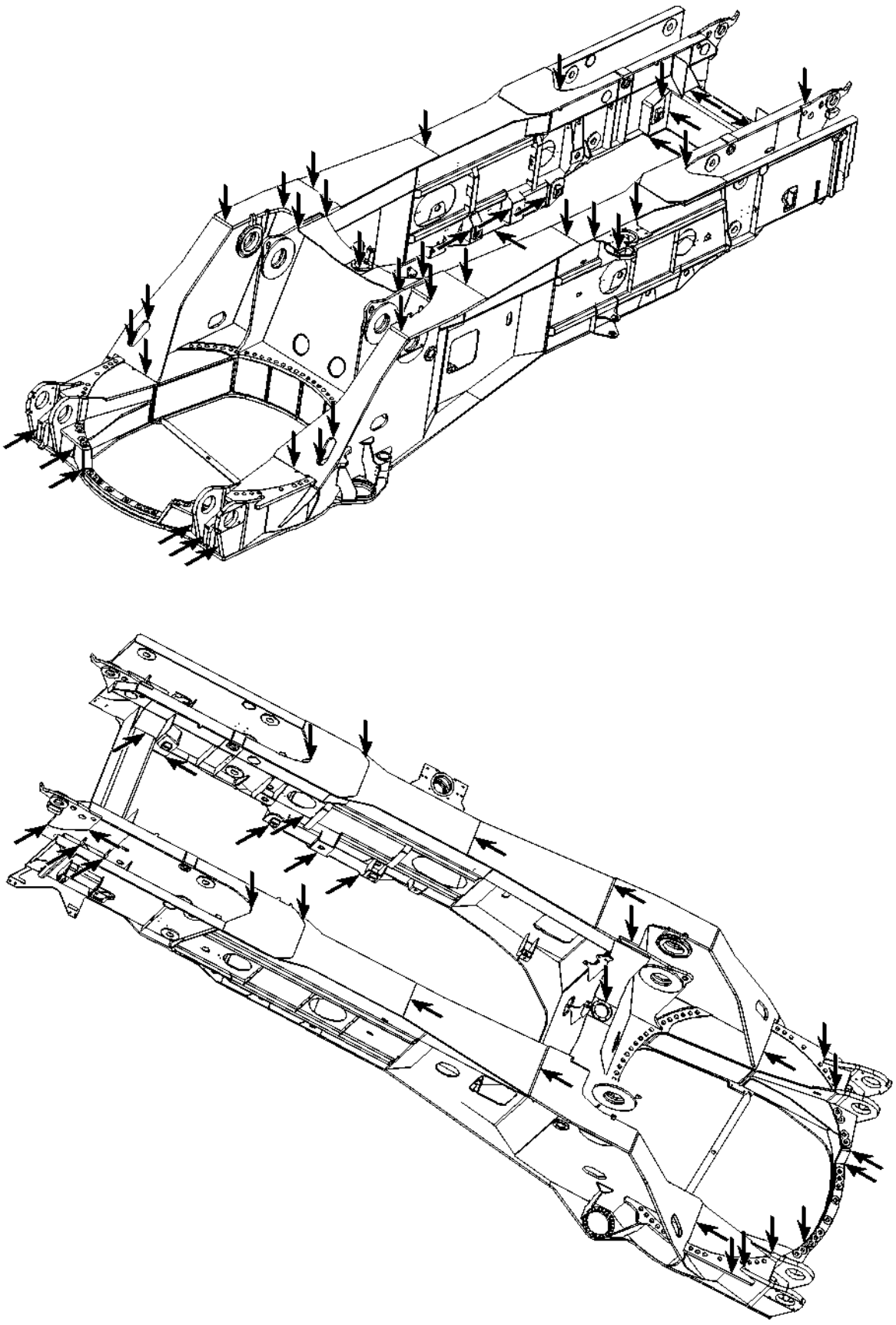
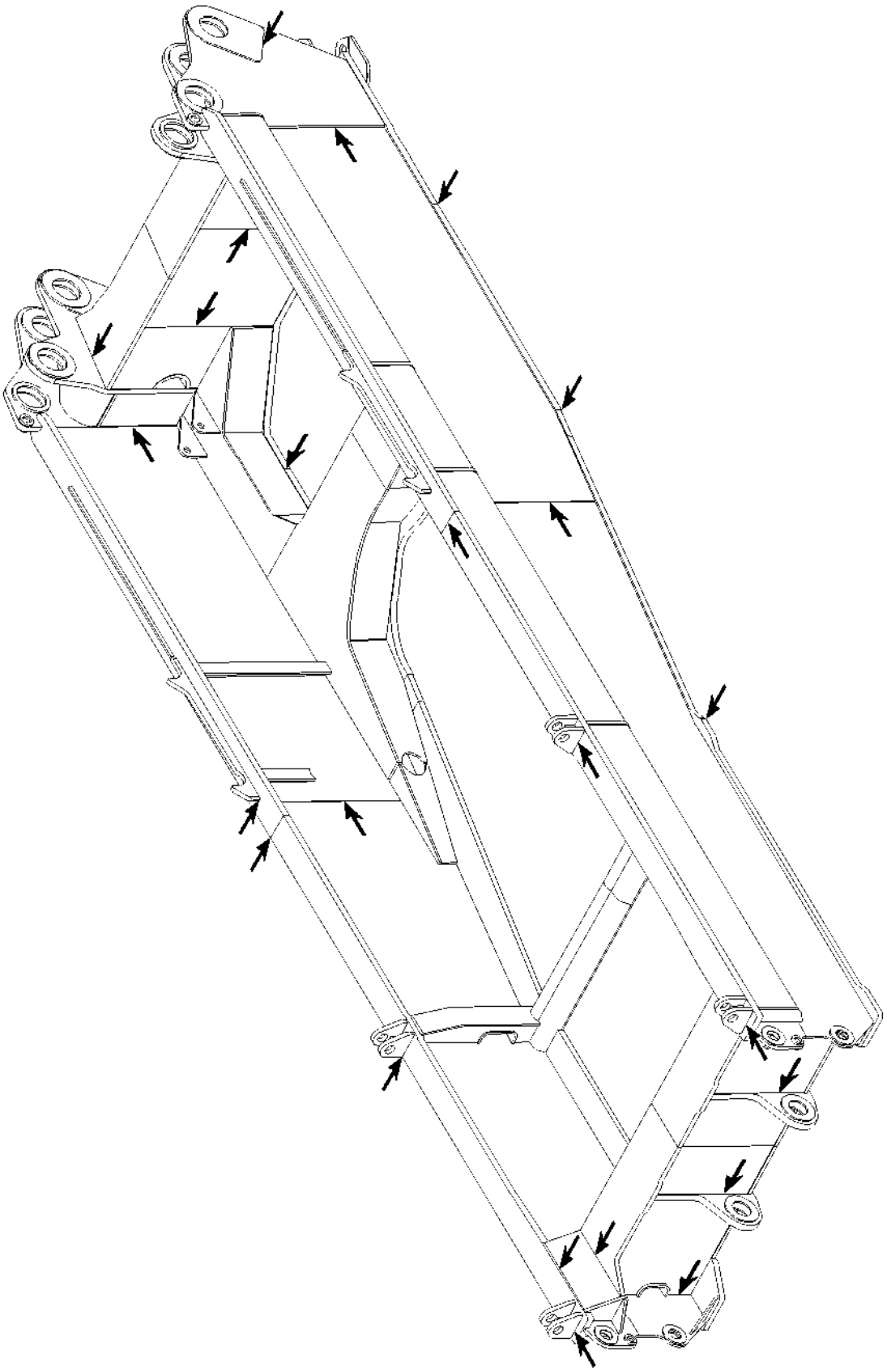
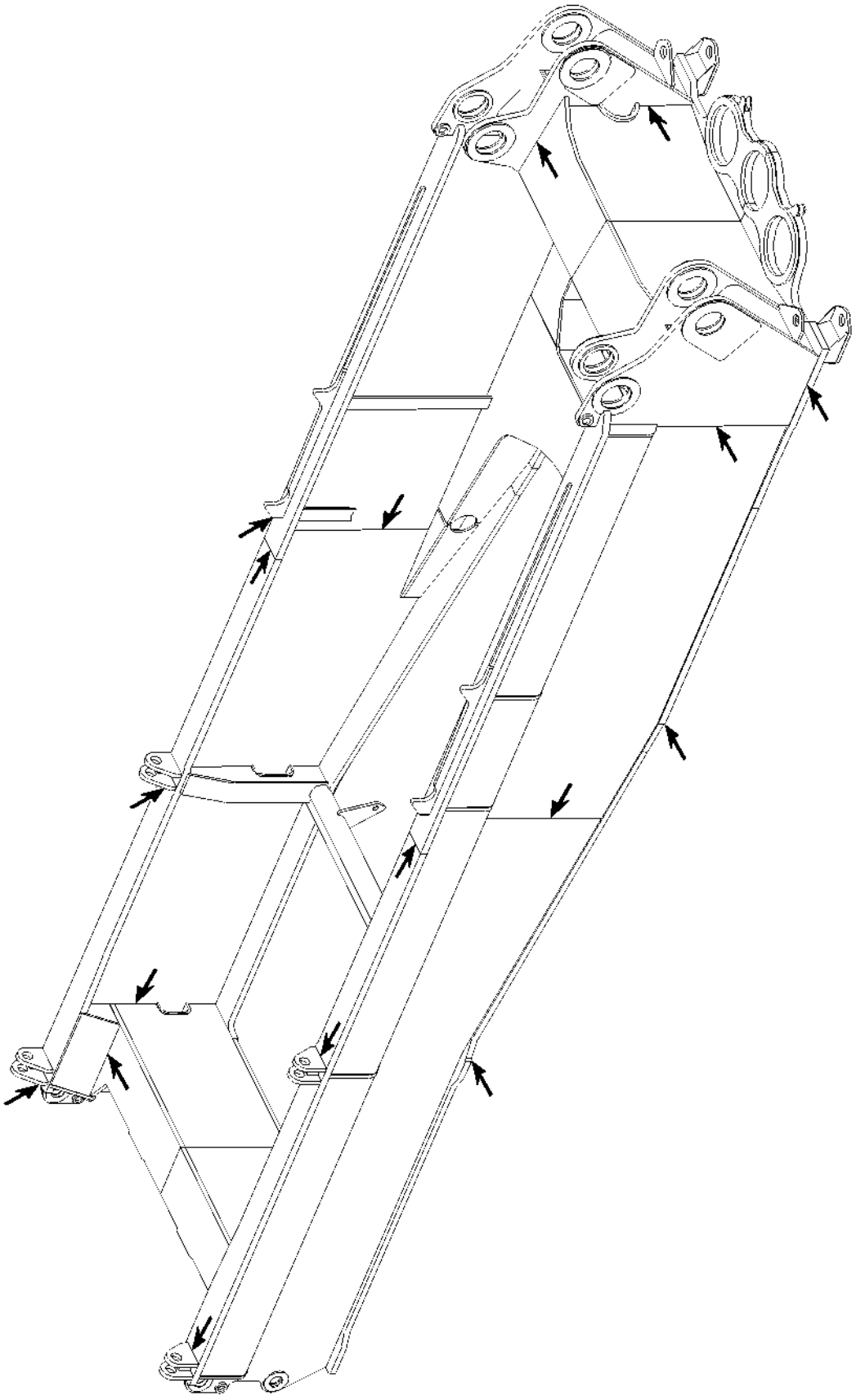


Fig.105706: Example for turntable frame



LWE/LTM 1130-5-1-004/20502-04-02/en

Fig.105694: Example for turntable frame



LWE/LTM 1130-5-1-004/20502-04-02/en

Fig.105695: Example for turntable frame

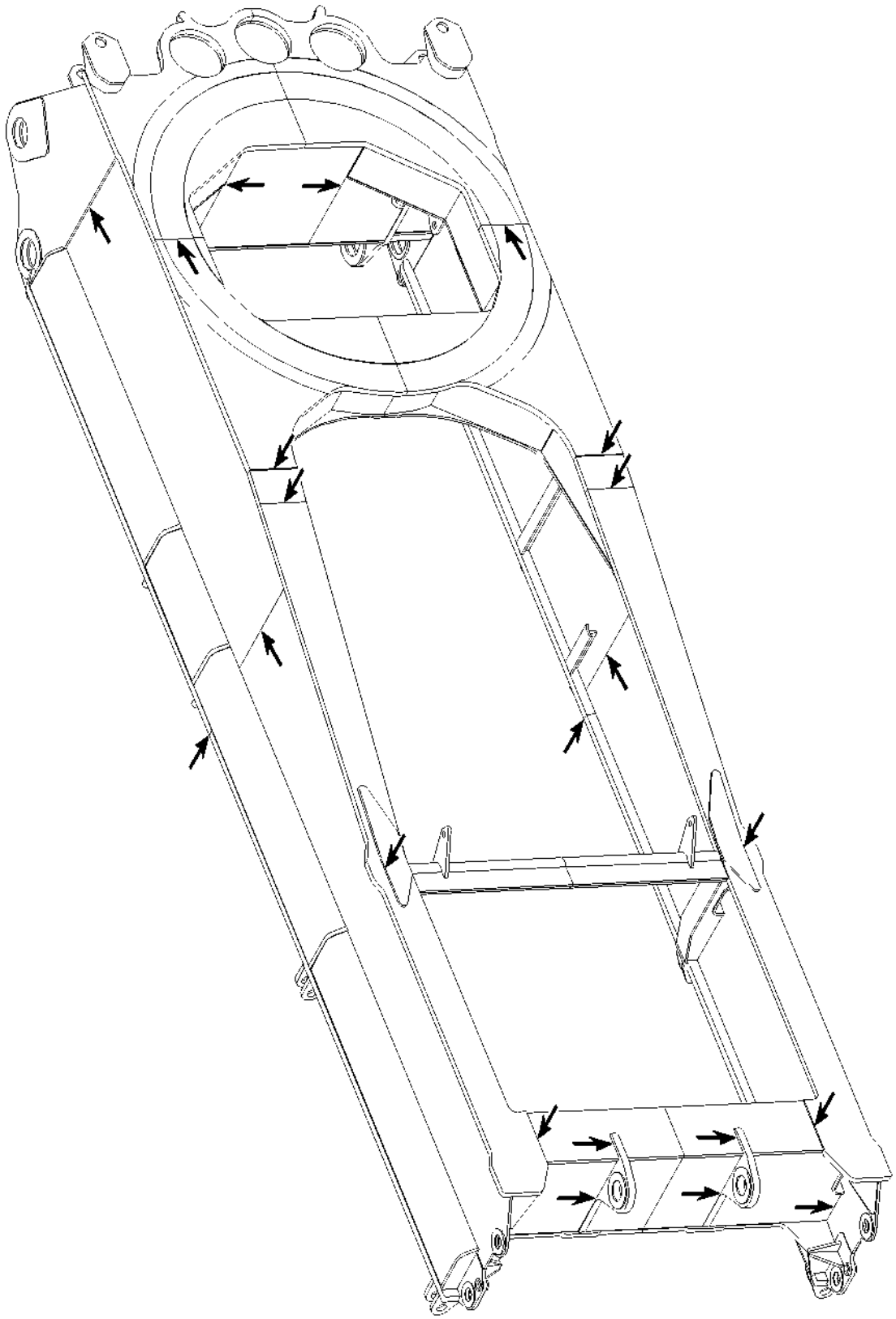


Fig.105696: Example for turntable frame

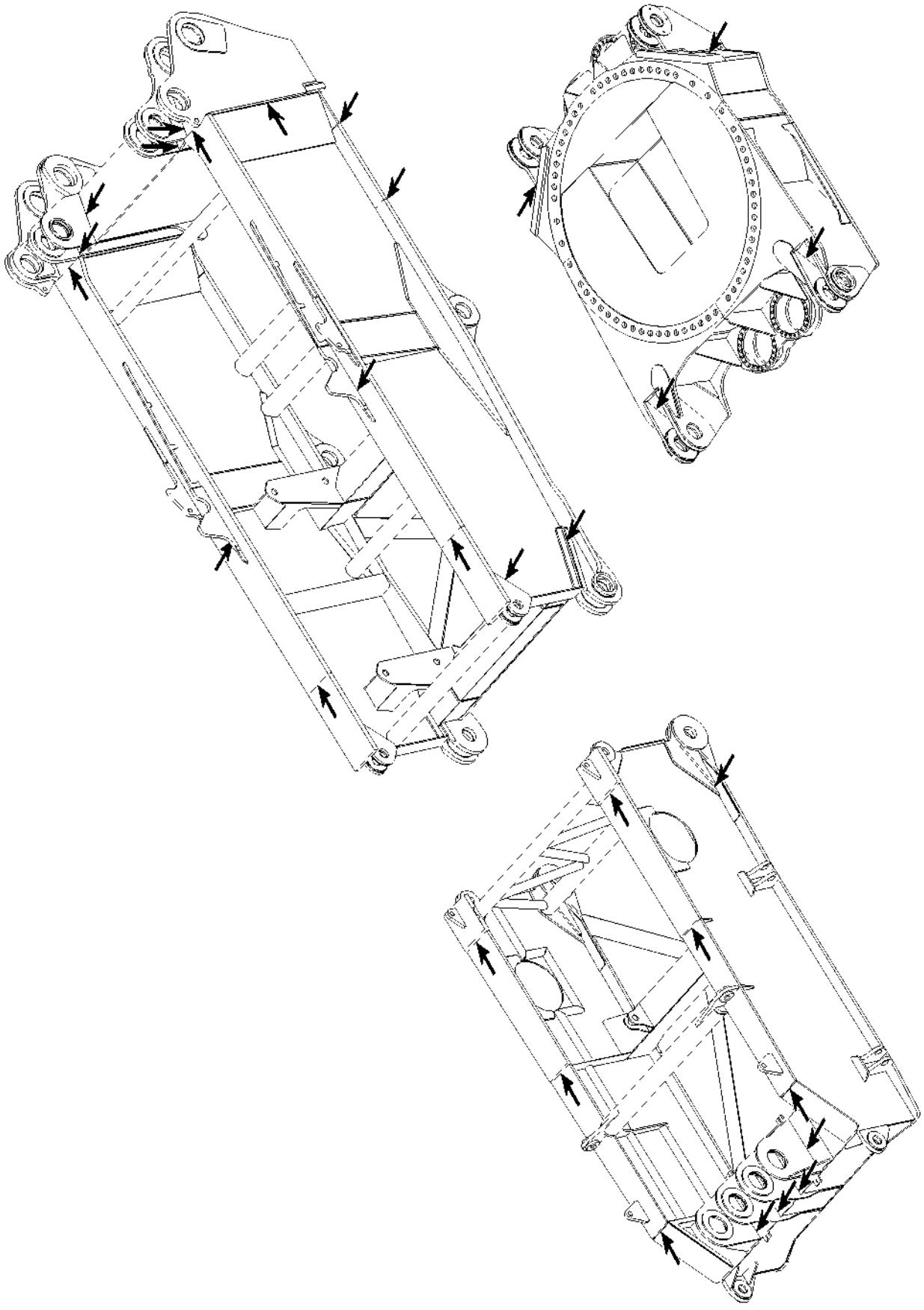
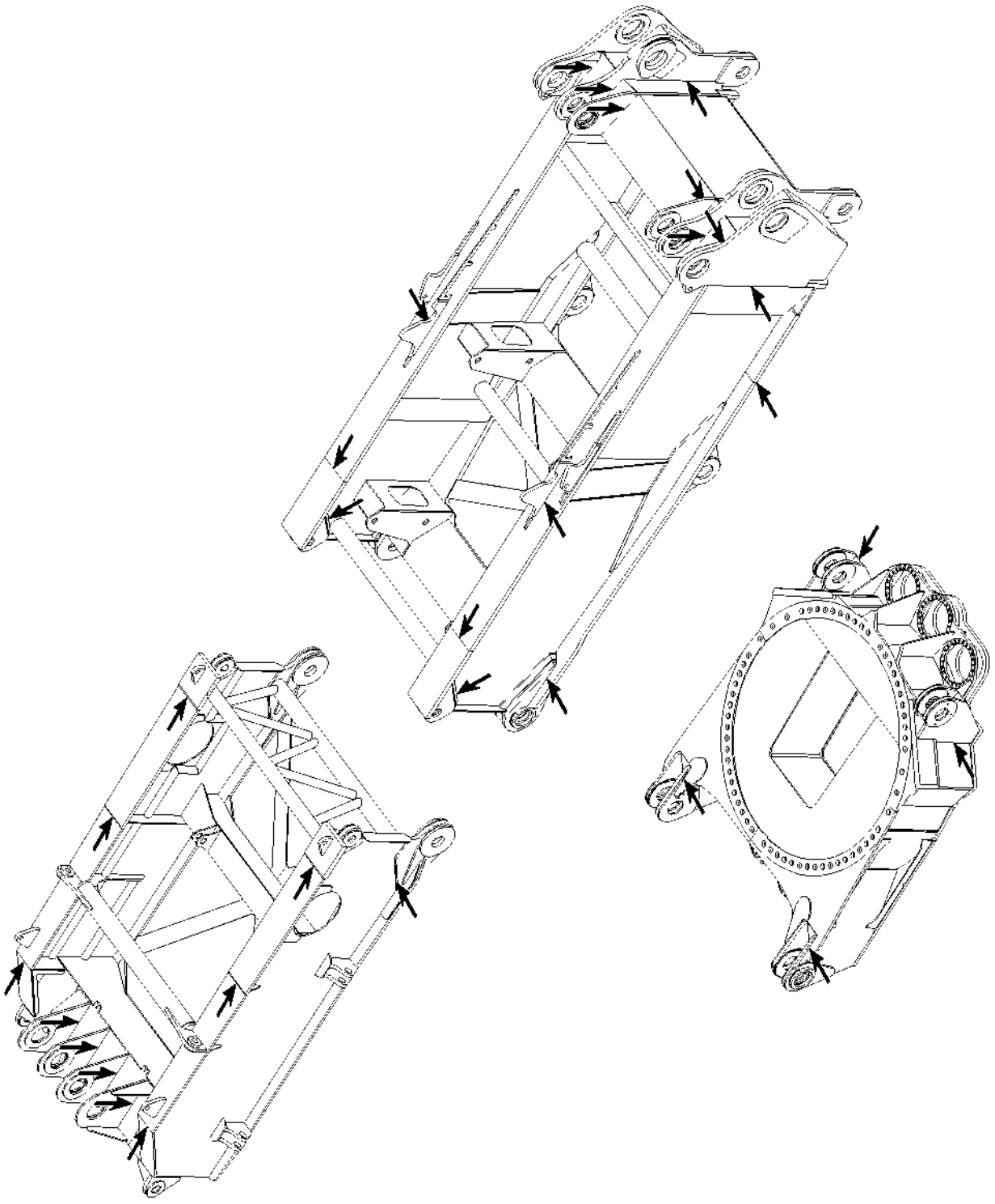


Fig.105691: Example for turntable frame



LWE/LTM 1130-5-1-004/20502-04-02/en

Fig.105692: Example for turntable frame

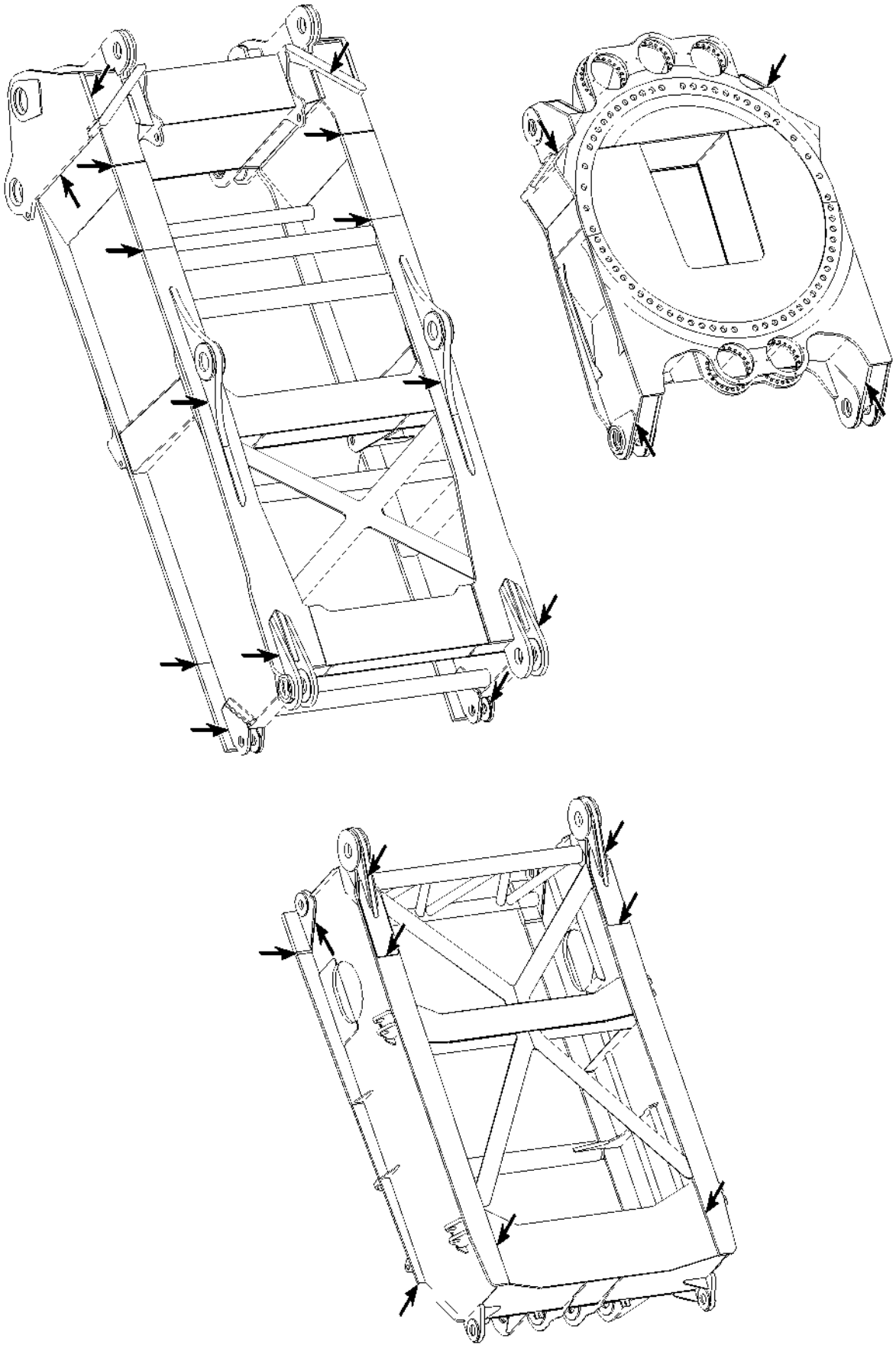
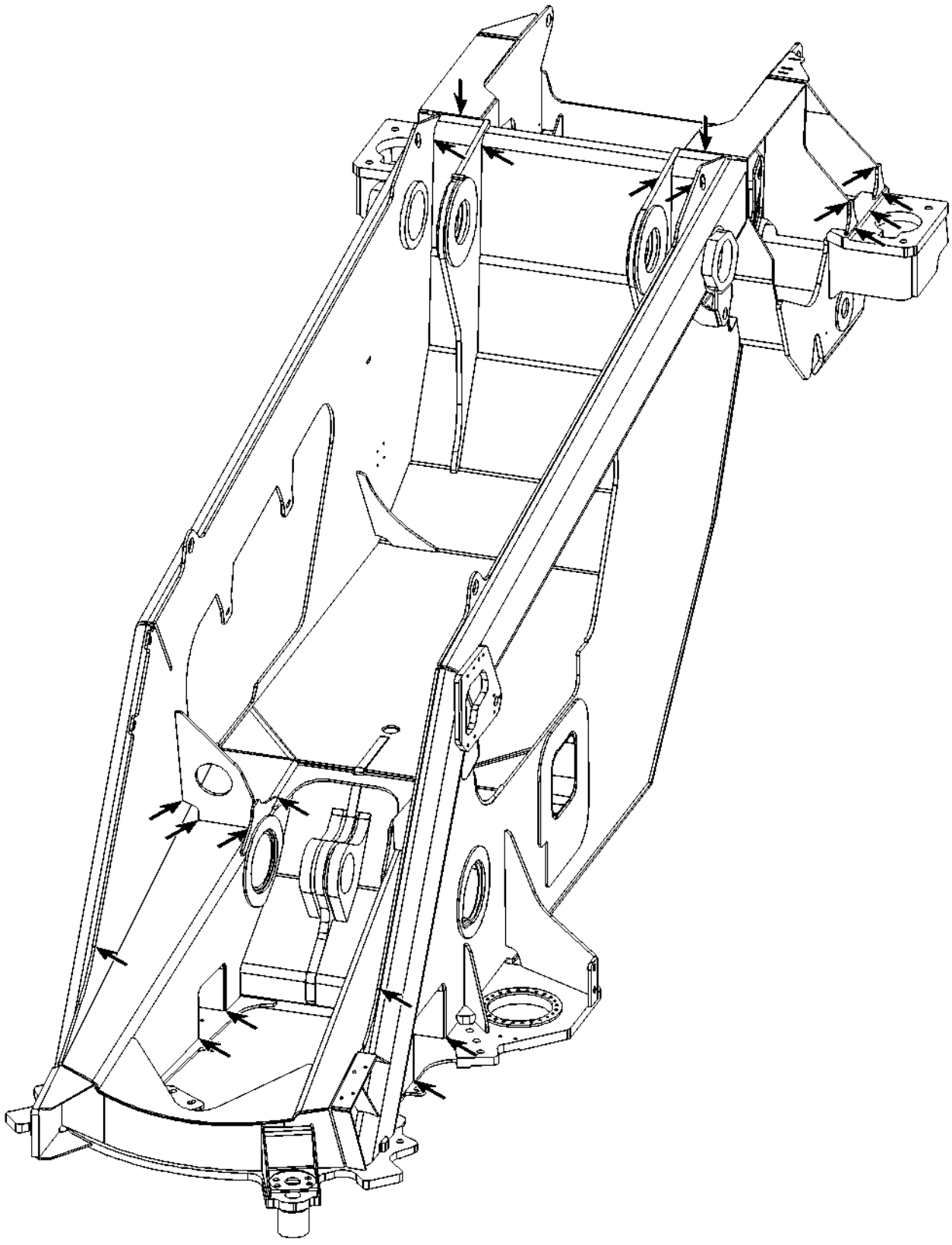
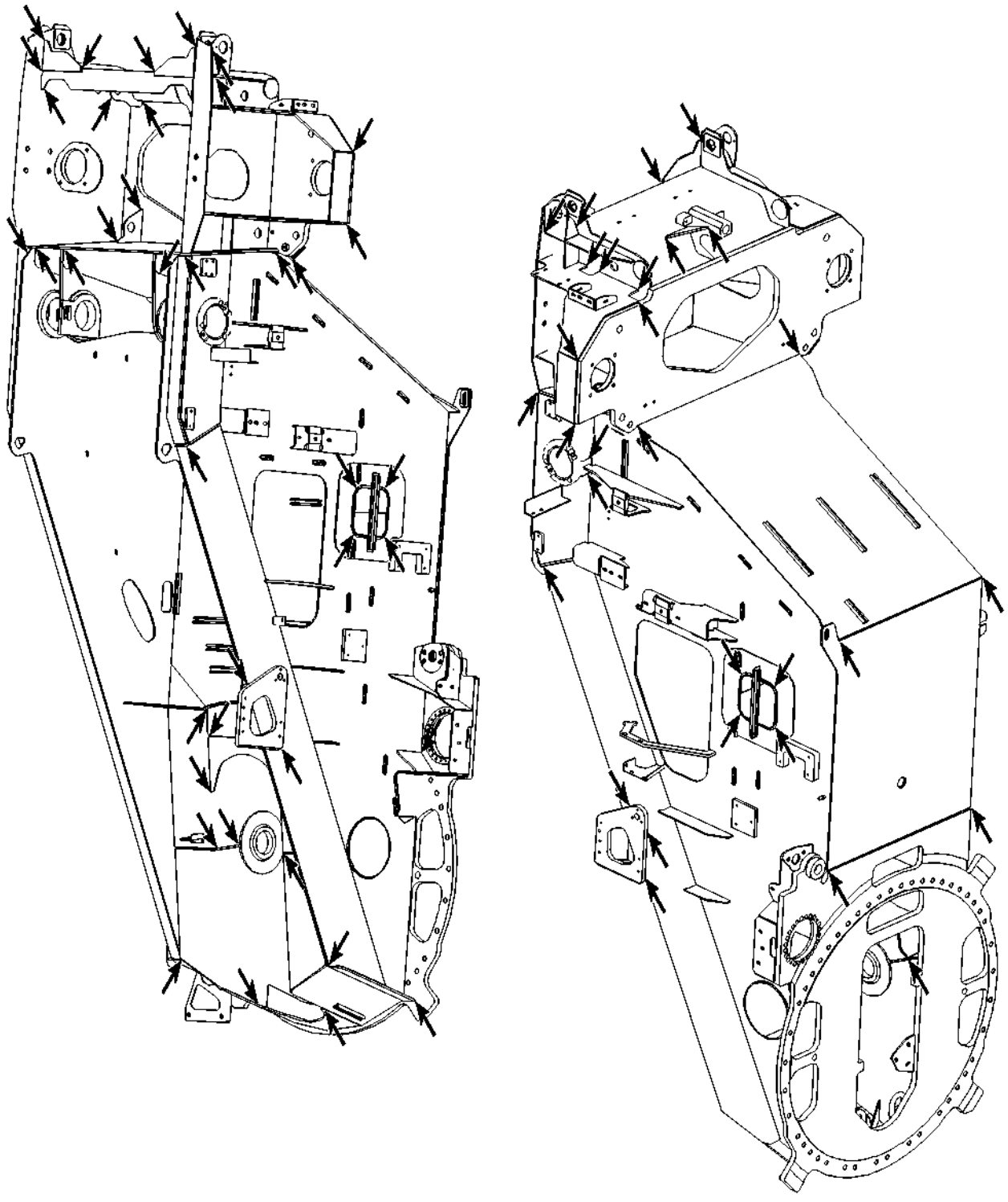


Fig.105693: Example for turntable frame



LWE/LTM 1130-5-1-004/20502-04-02/en

Fig.105722: Example for turntable frame



LWE/LTM 1130-5-1-004/20502-04-02/en

Fig.105932: Example for turntable frame

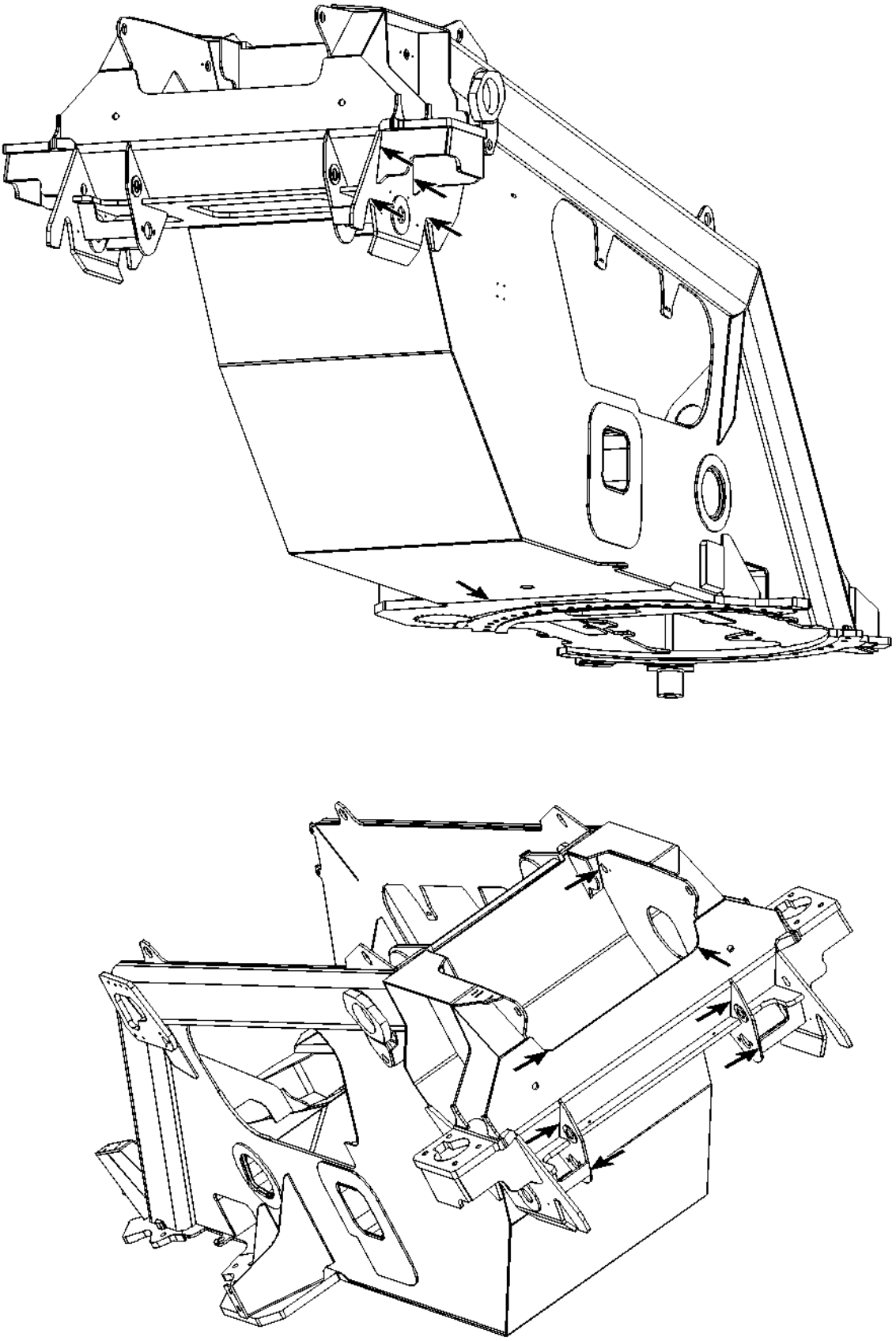


Fig.105723: Example for turntable frame

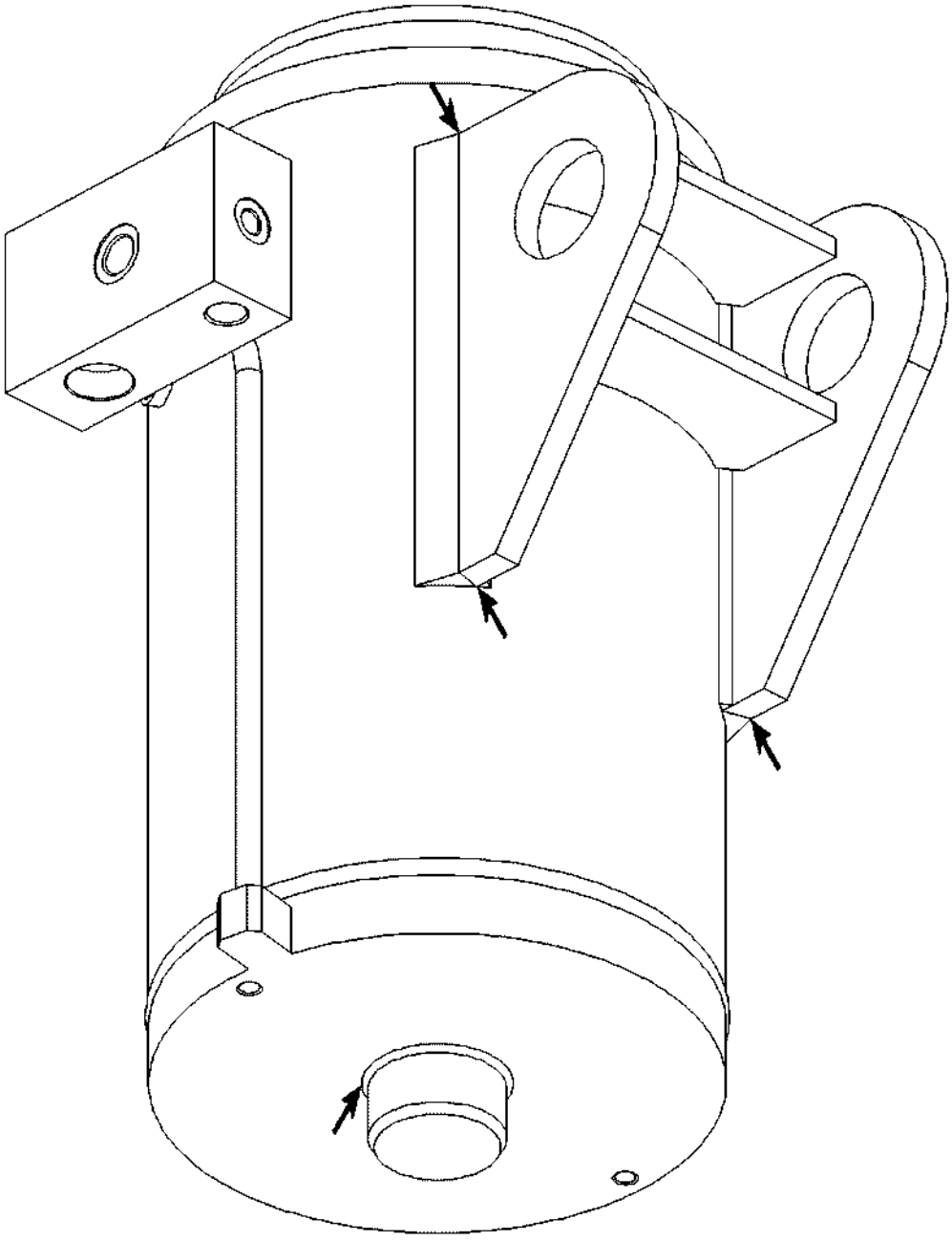


Fig.105801: Example for ballasting cylinder

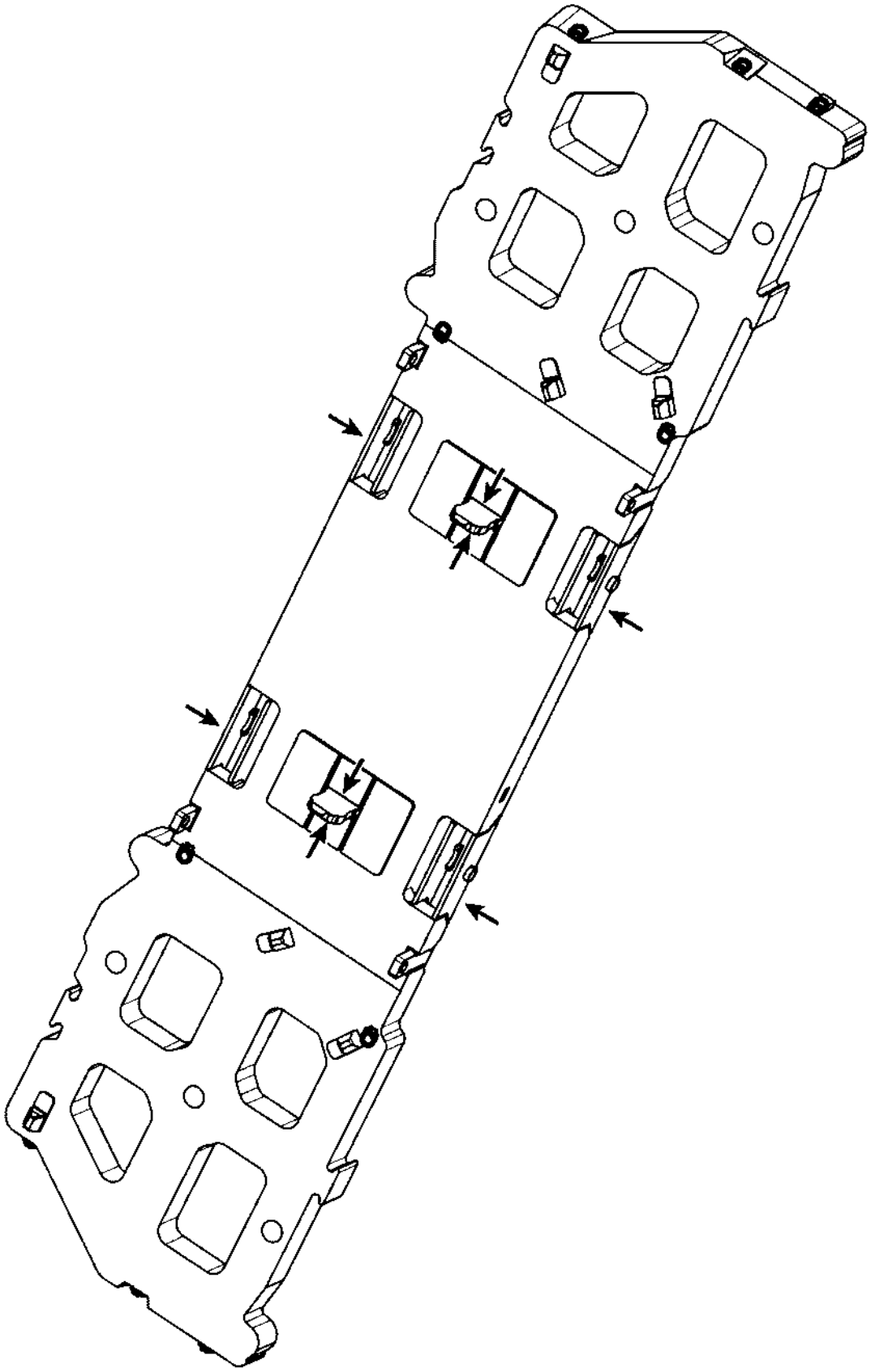


Fig.105705: Example for mounting plate

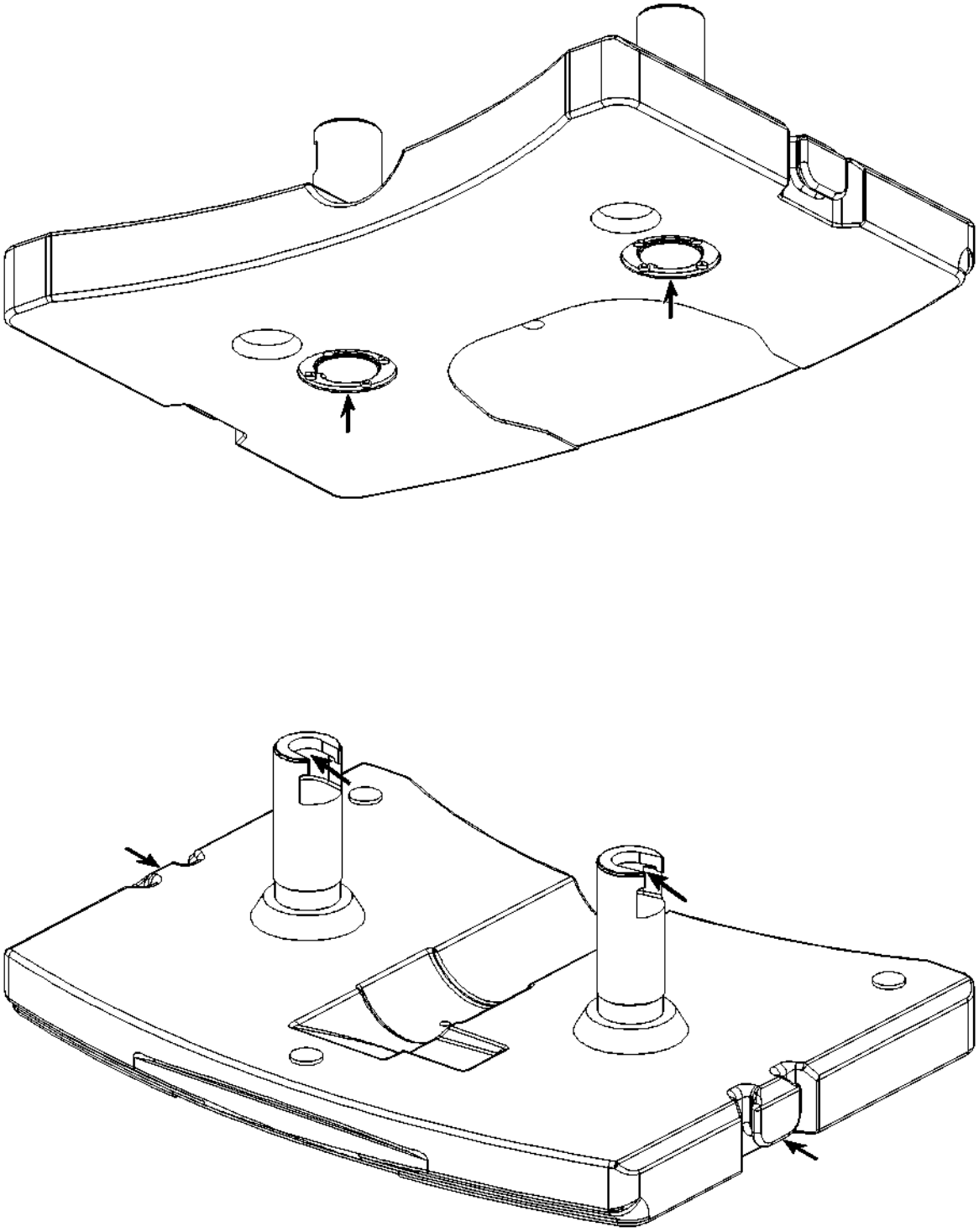


Fig.105807: Example for base plate

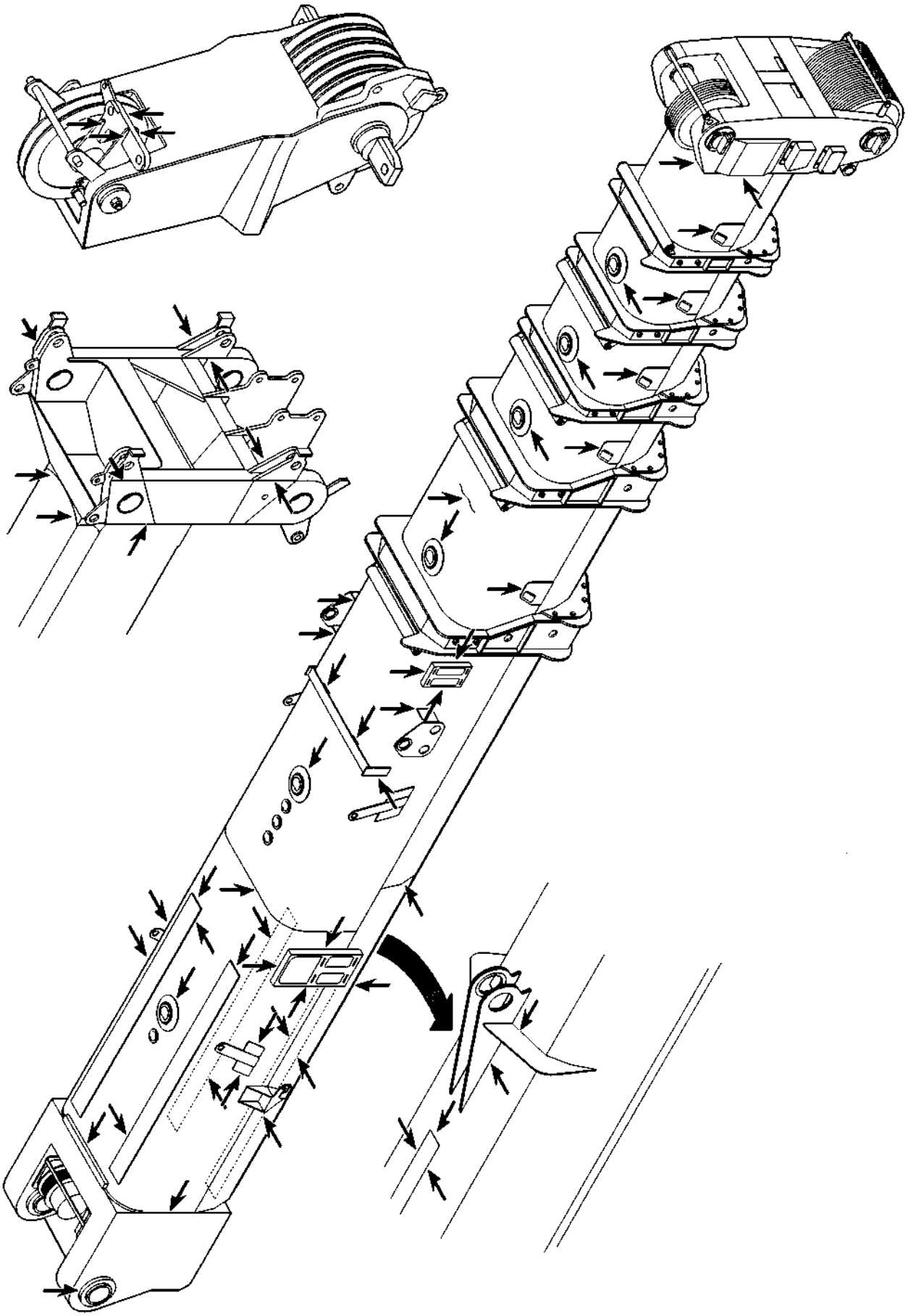


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Fig.185050: Example for telescopic boom

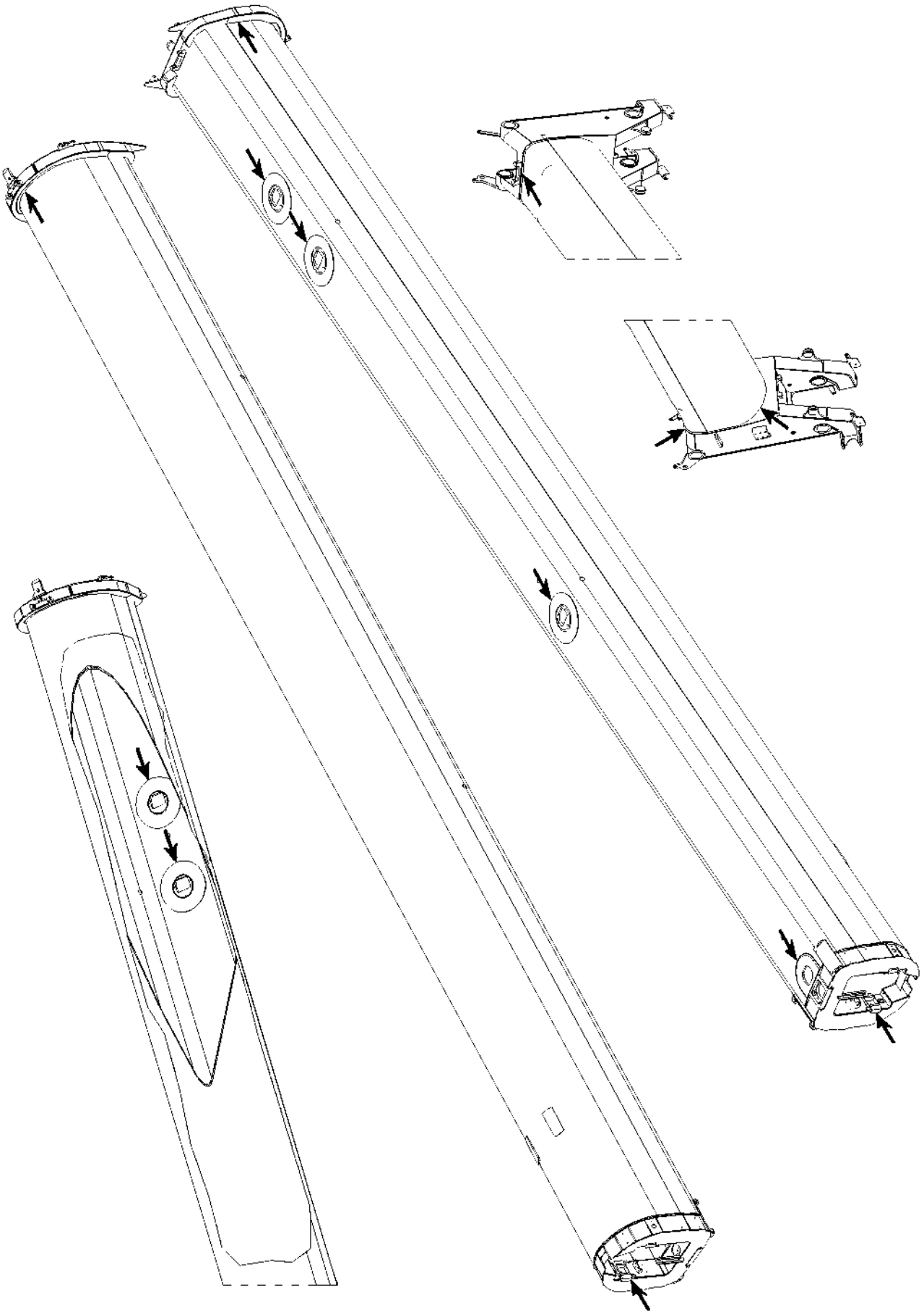
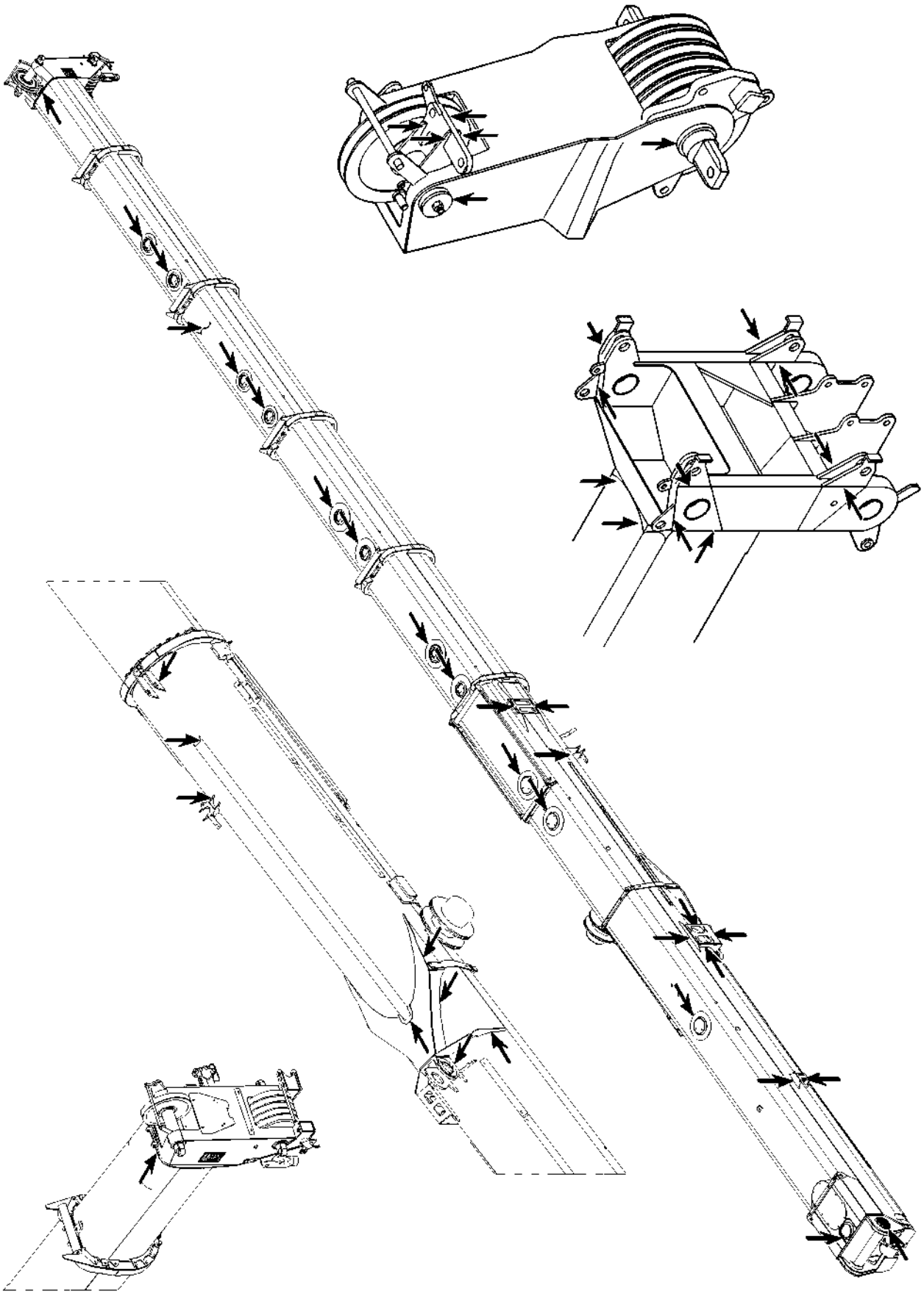


Fig.105710: Example for telescopic boom



LWE/LTM 1130-5-1-004/20502-04-02/en

Fig.105711: Example for telescopic boom

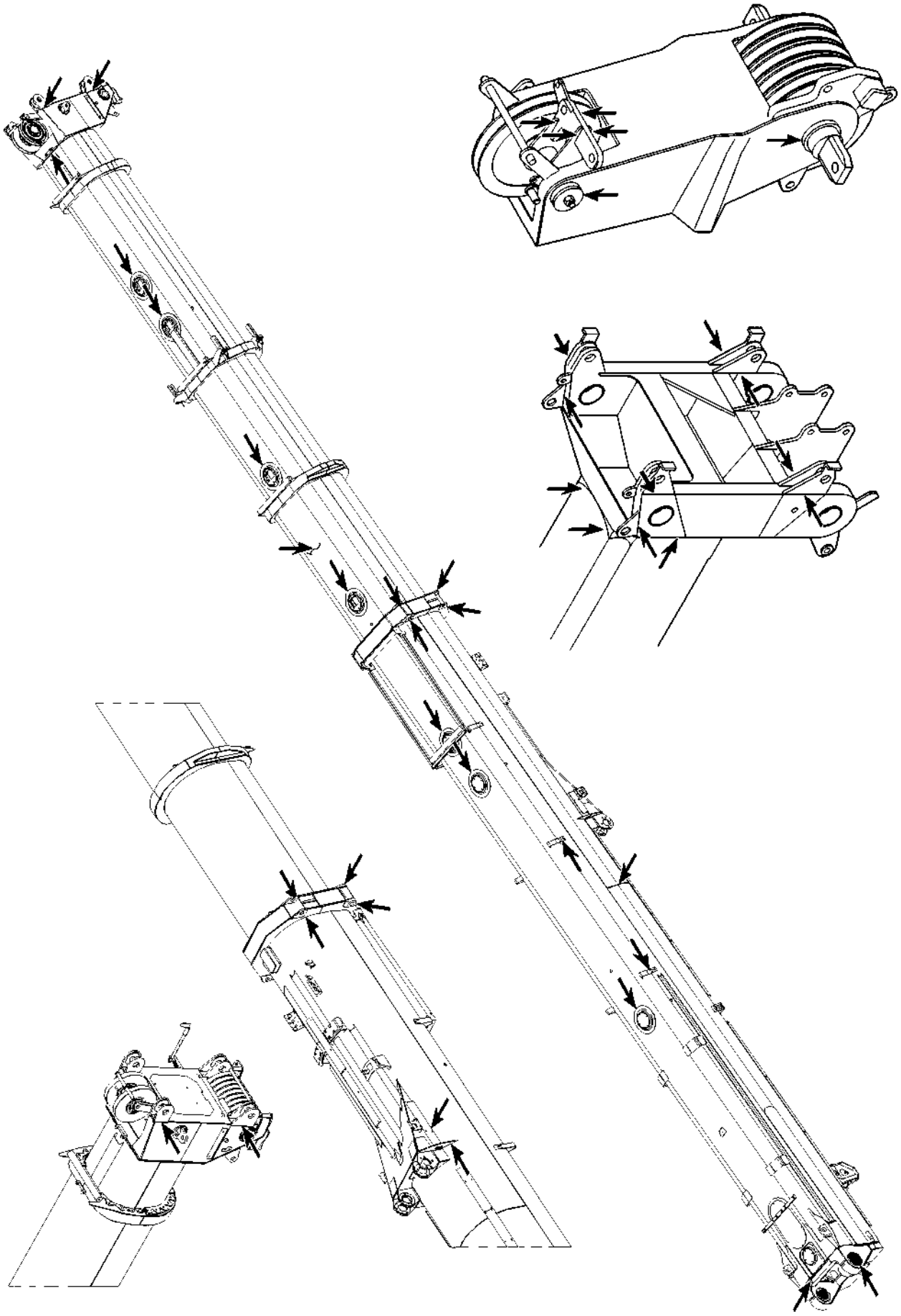


Fig.105720: Example for telescopic boom

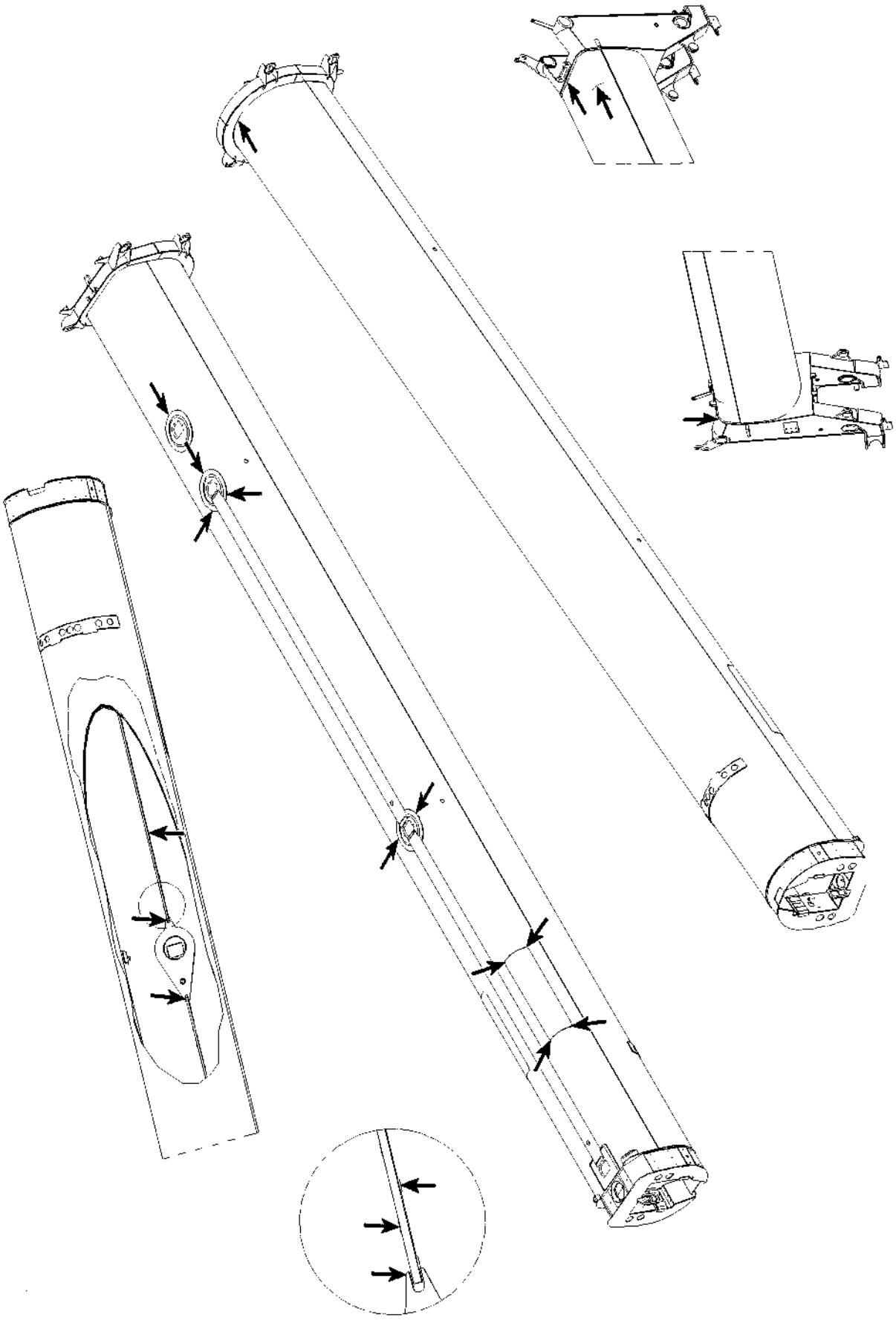


Fig.105721: Example for telescopic boom

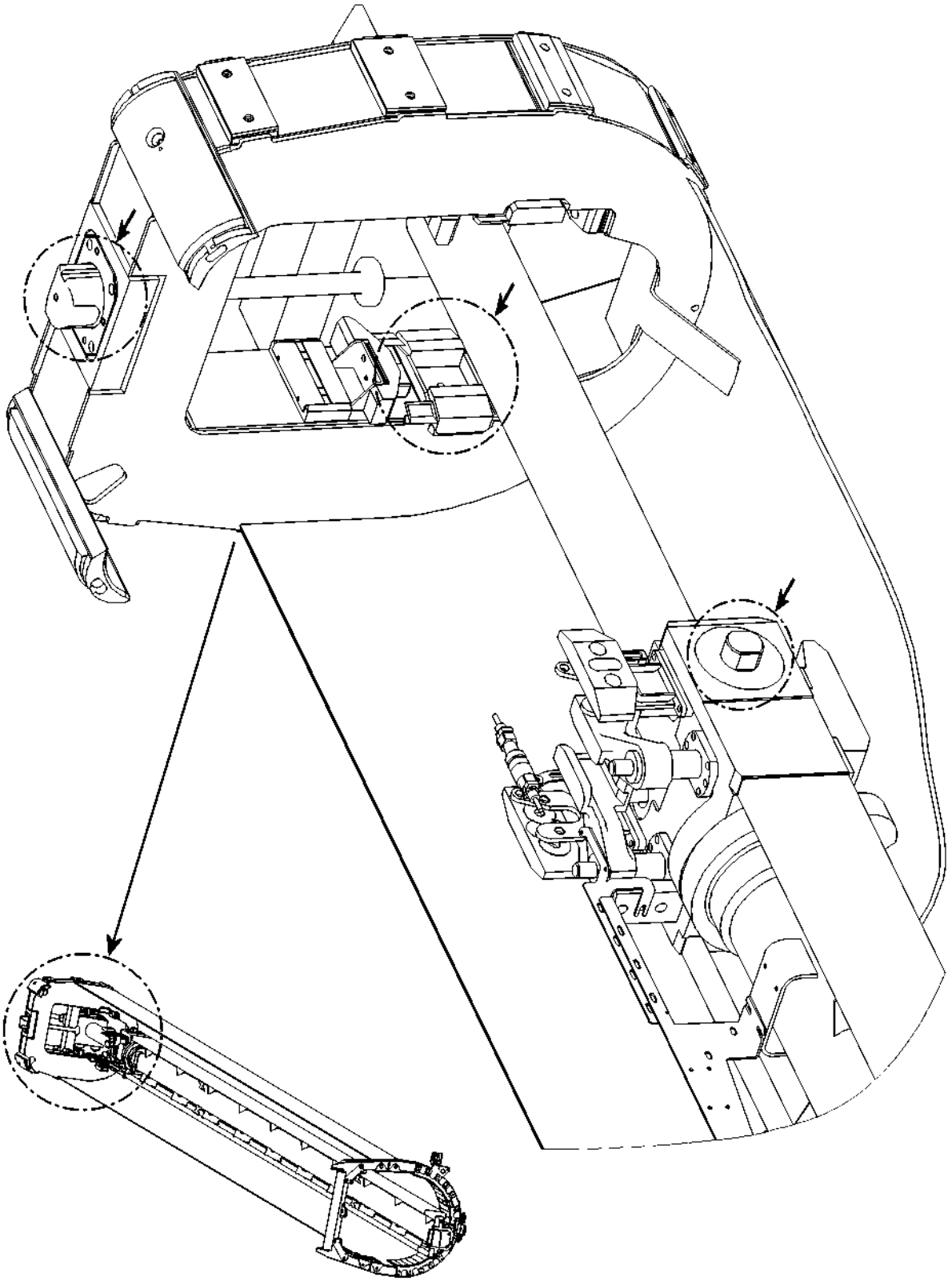
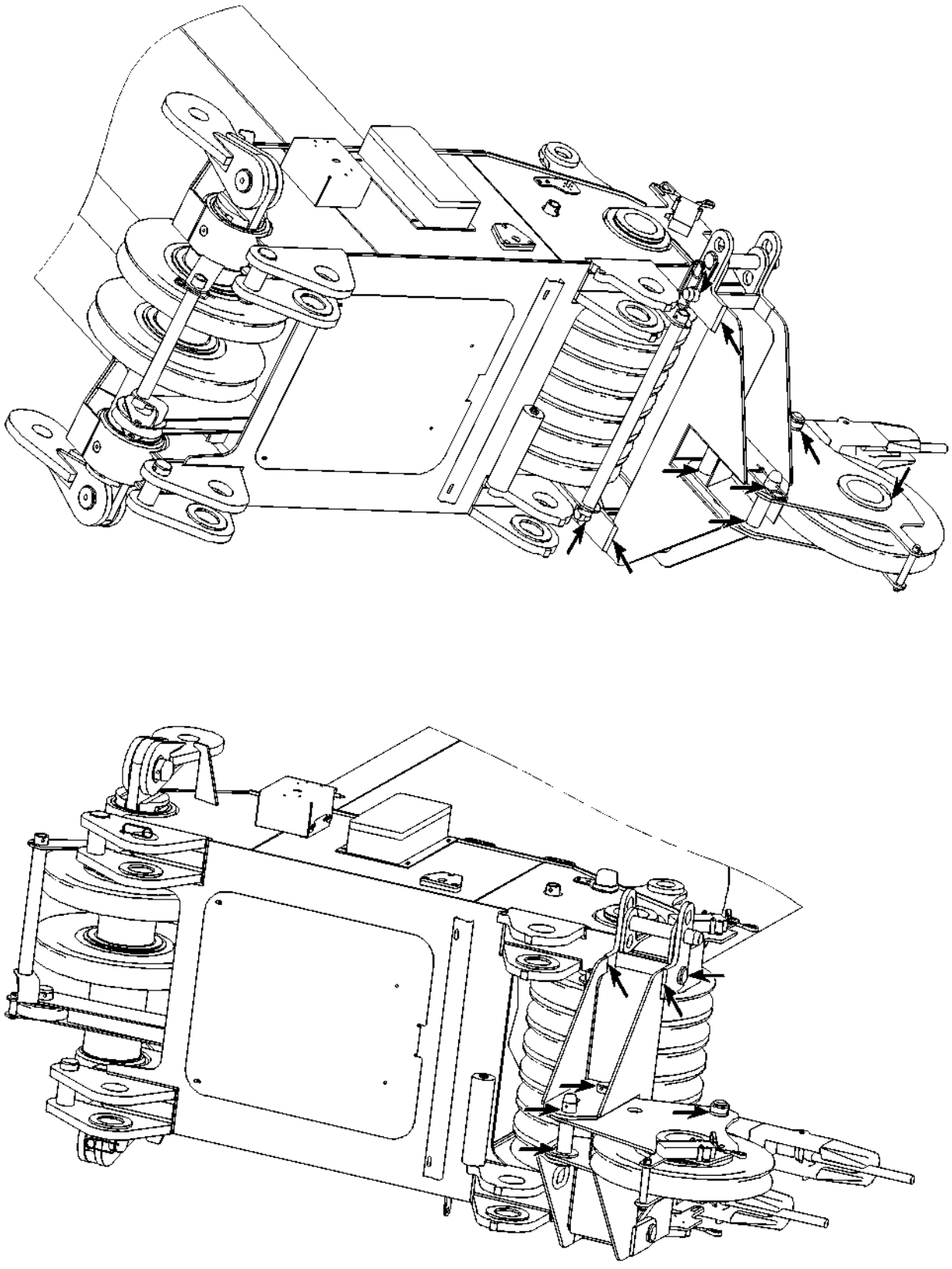


Fig.105891: Example for push out mechanics telescopic boom



LWE/LTM 1130-5-1-004/20502-04-02/en

Fig.105892: Example for boom nose

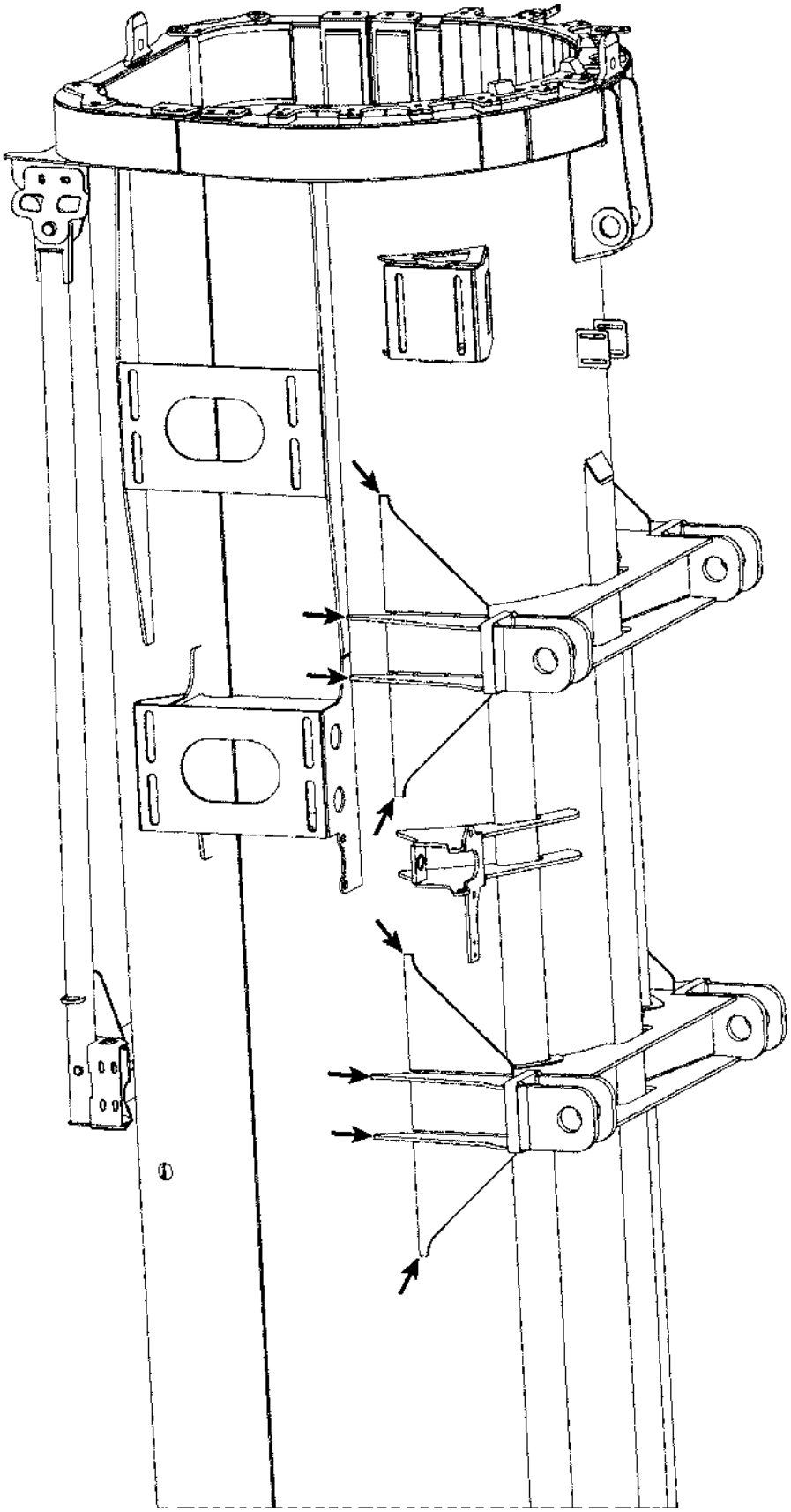
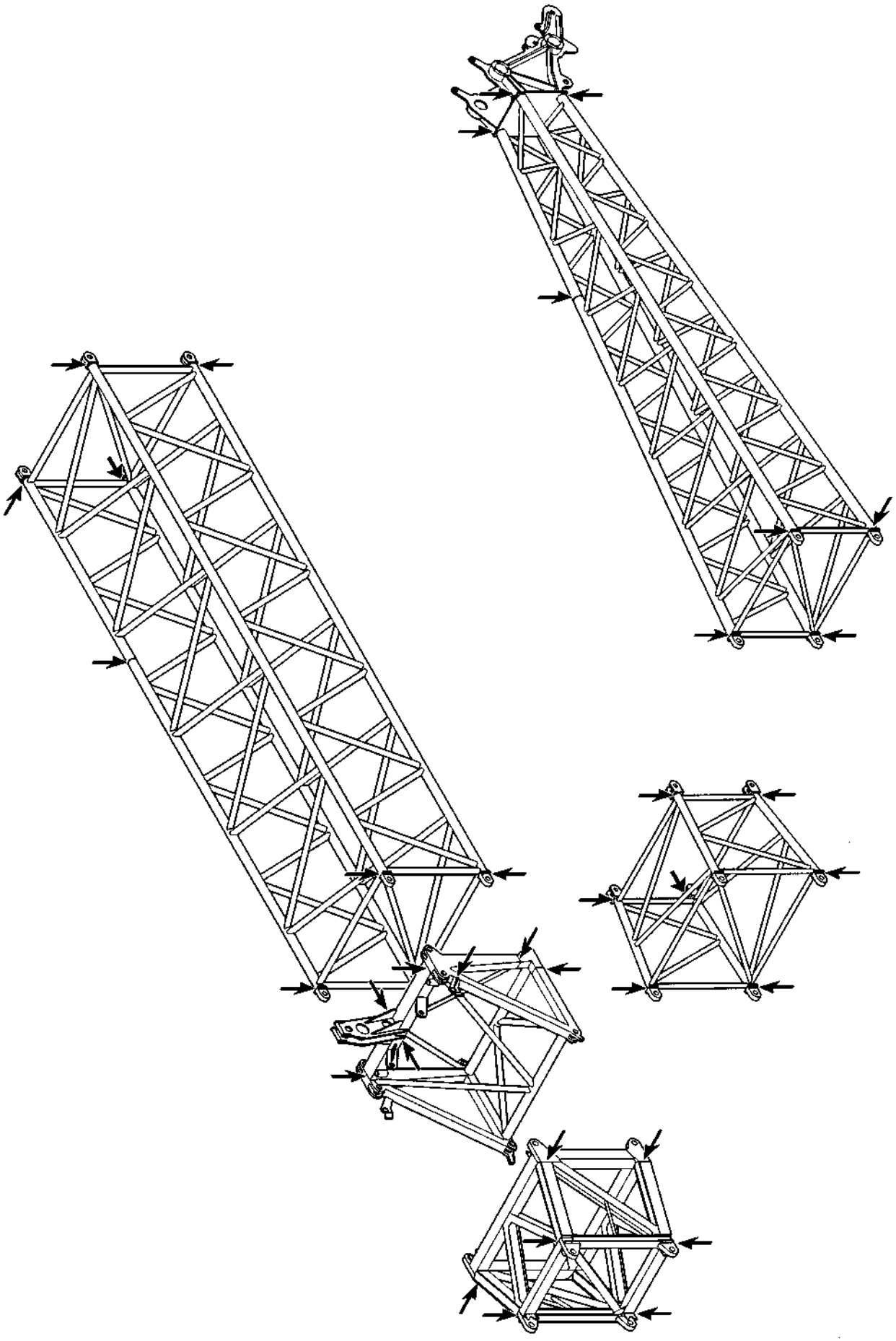


Fig.105689: Example for dolly console



LWE/LTM 1130-5-1-004/20502-04-02/en

Fig.185051: Example for lattice jib

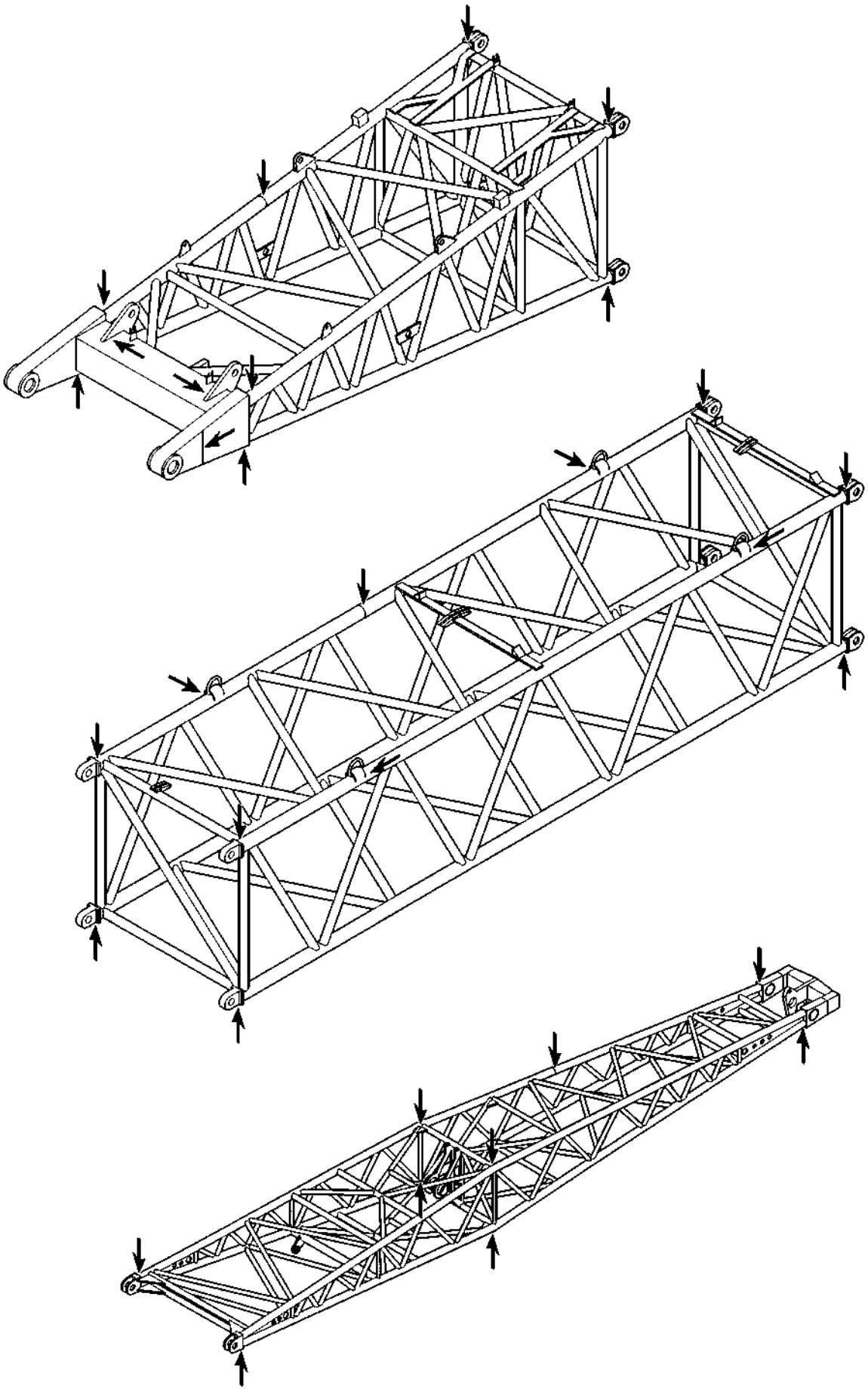


Fig.185052: Example for NA / WA-frame

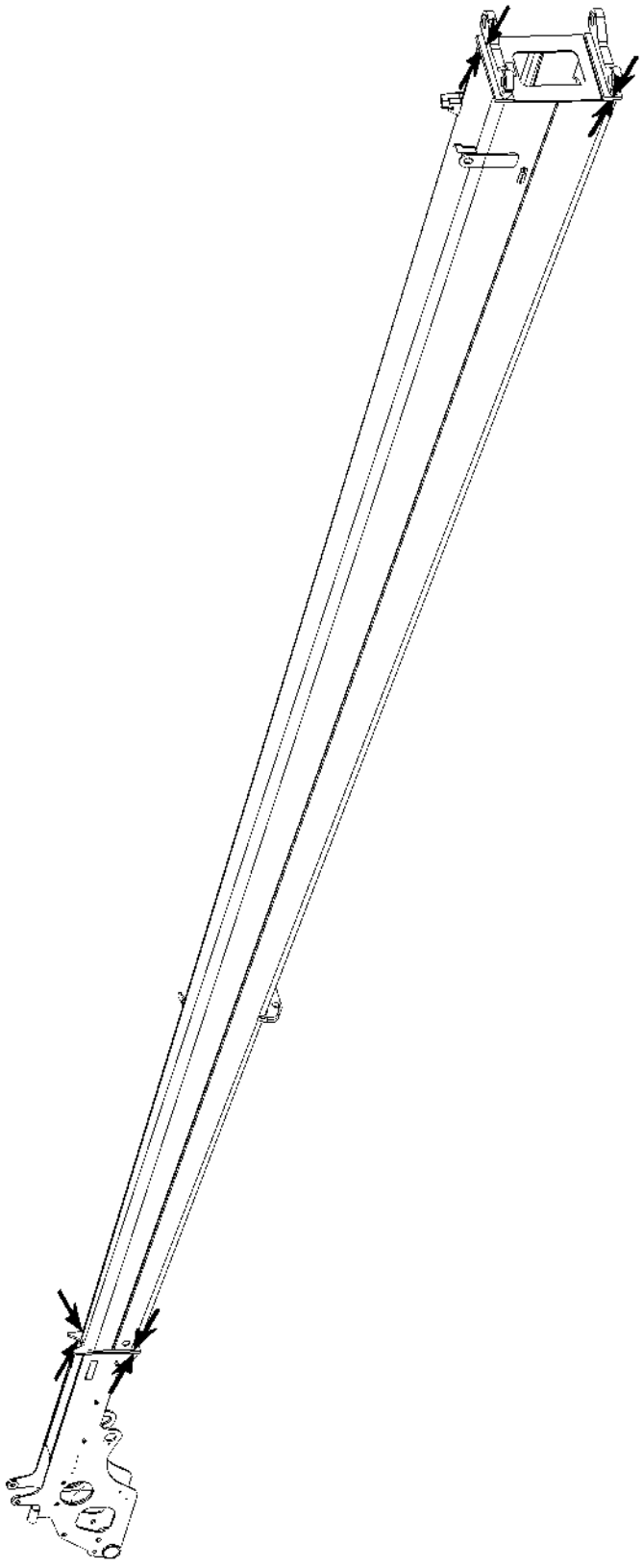


Fig.105713: Example for end section

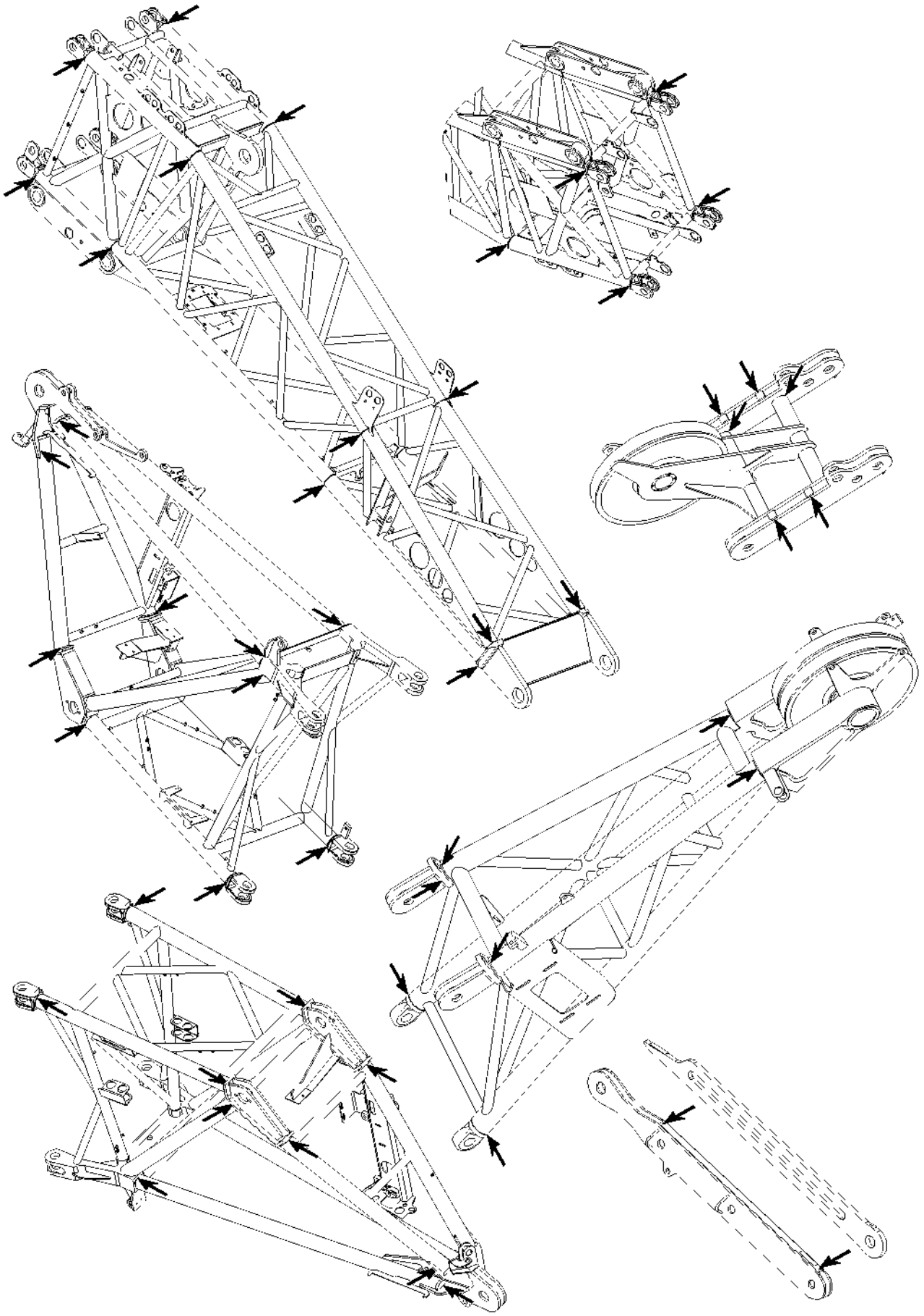


Fig.105836: Example for pivot section, adapter and boom nose

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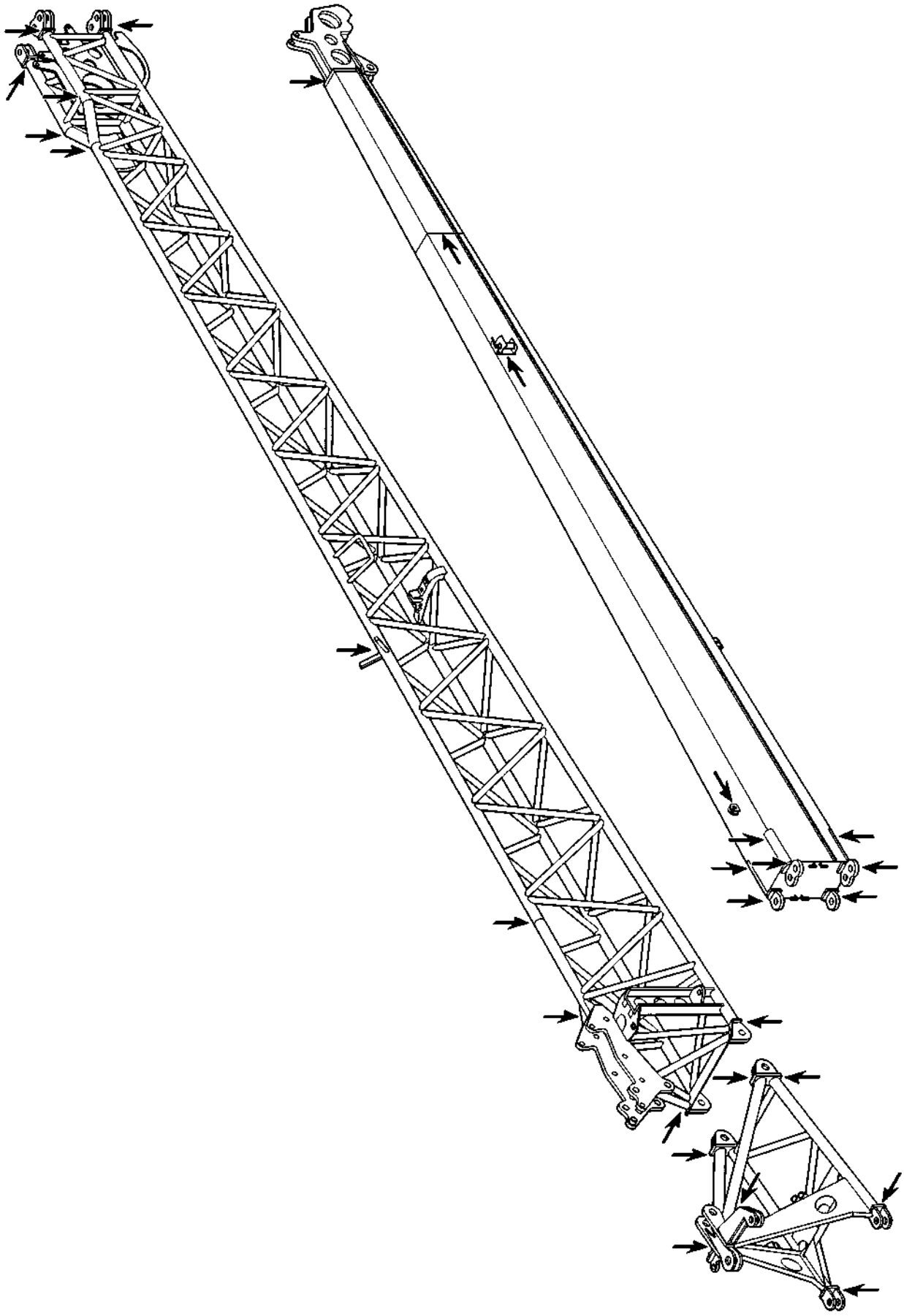

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Fig.185058: Example for folding jib

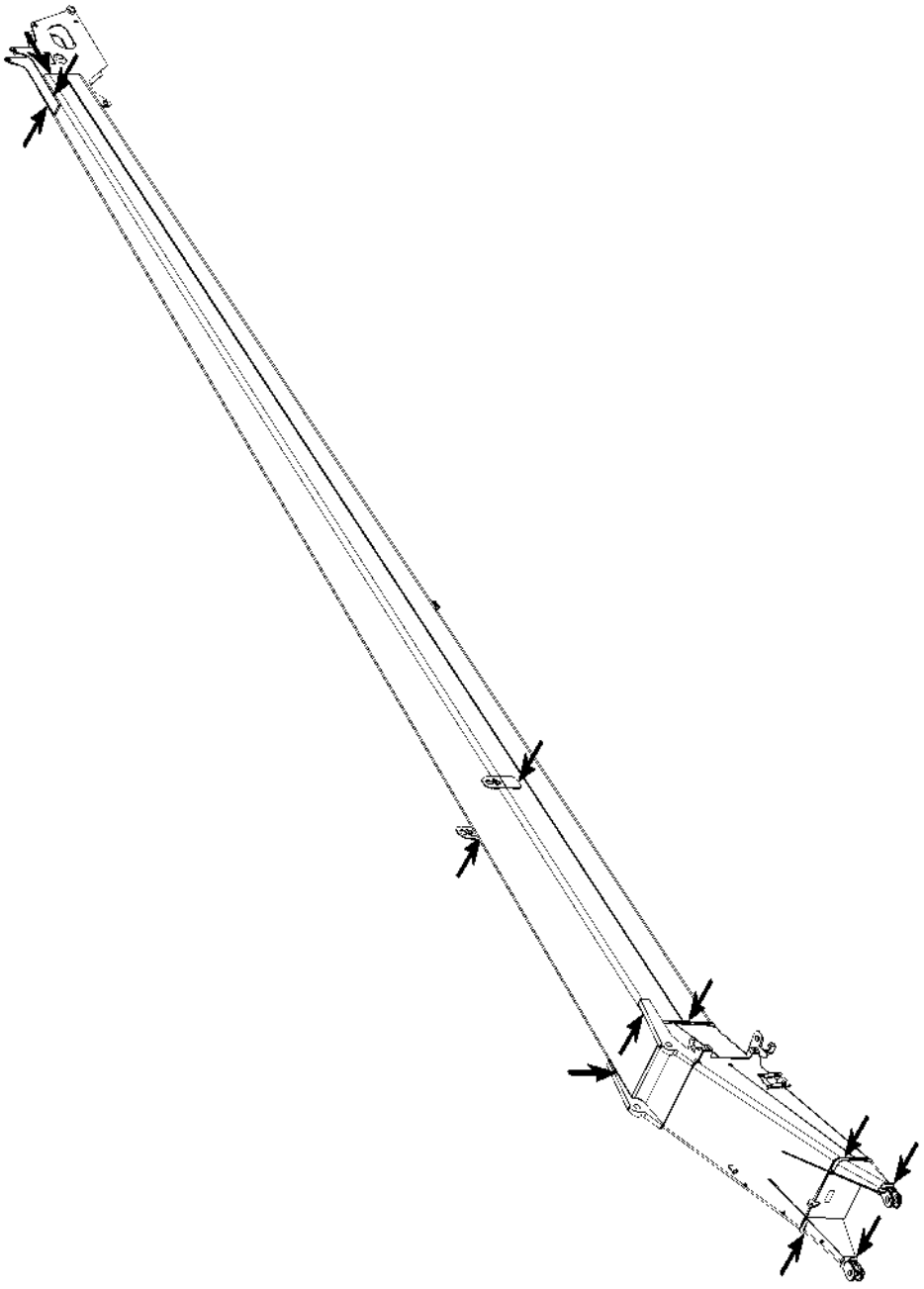

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Fig.105697: Example for folding jib

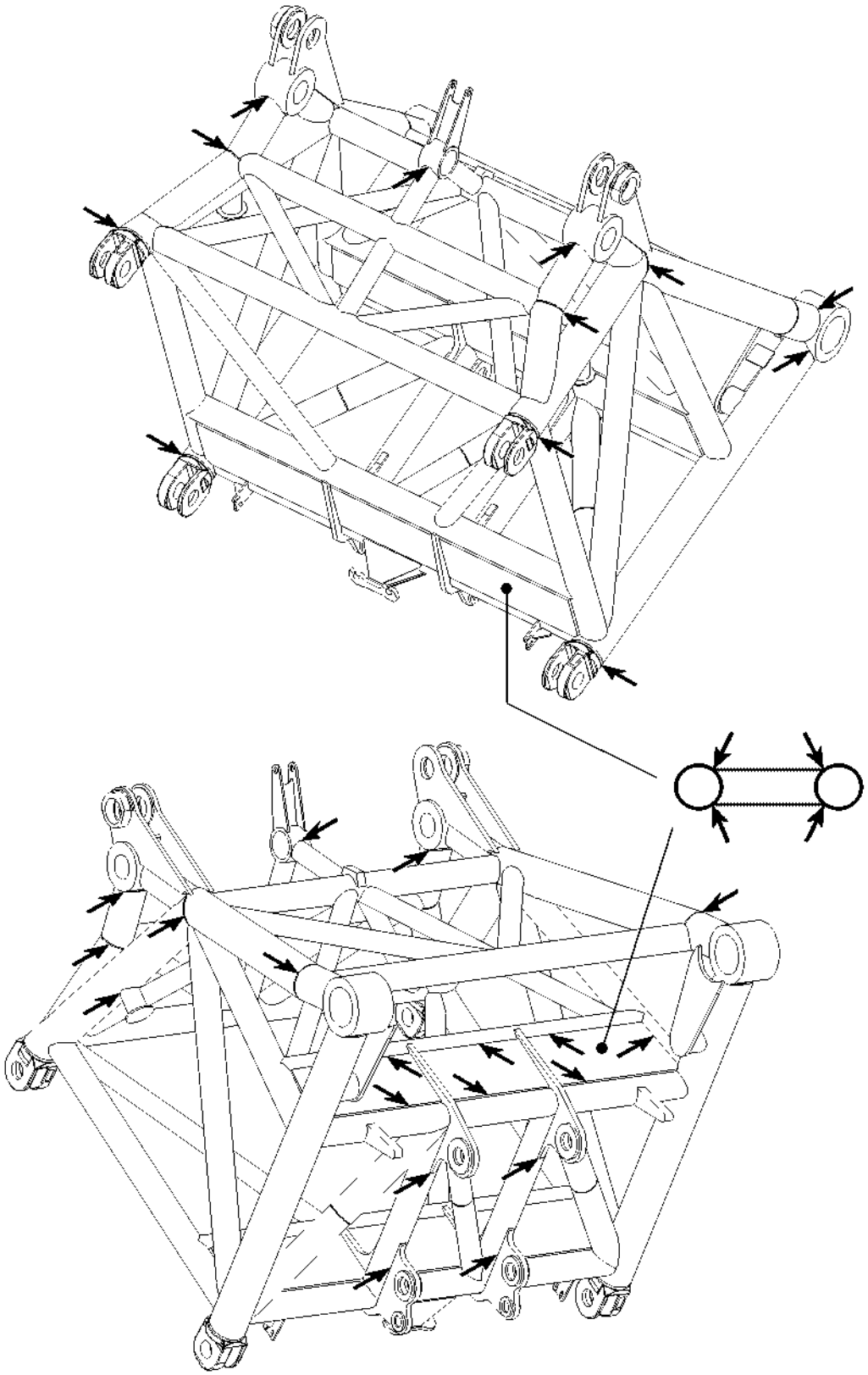

Fig.105732: Example for W-connector head

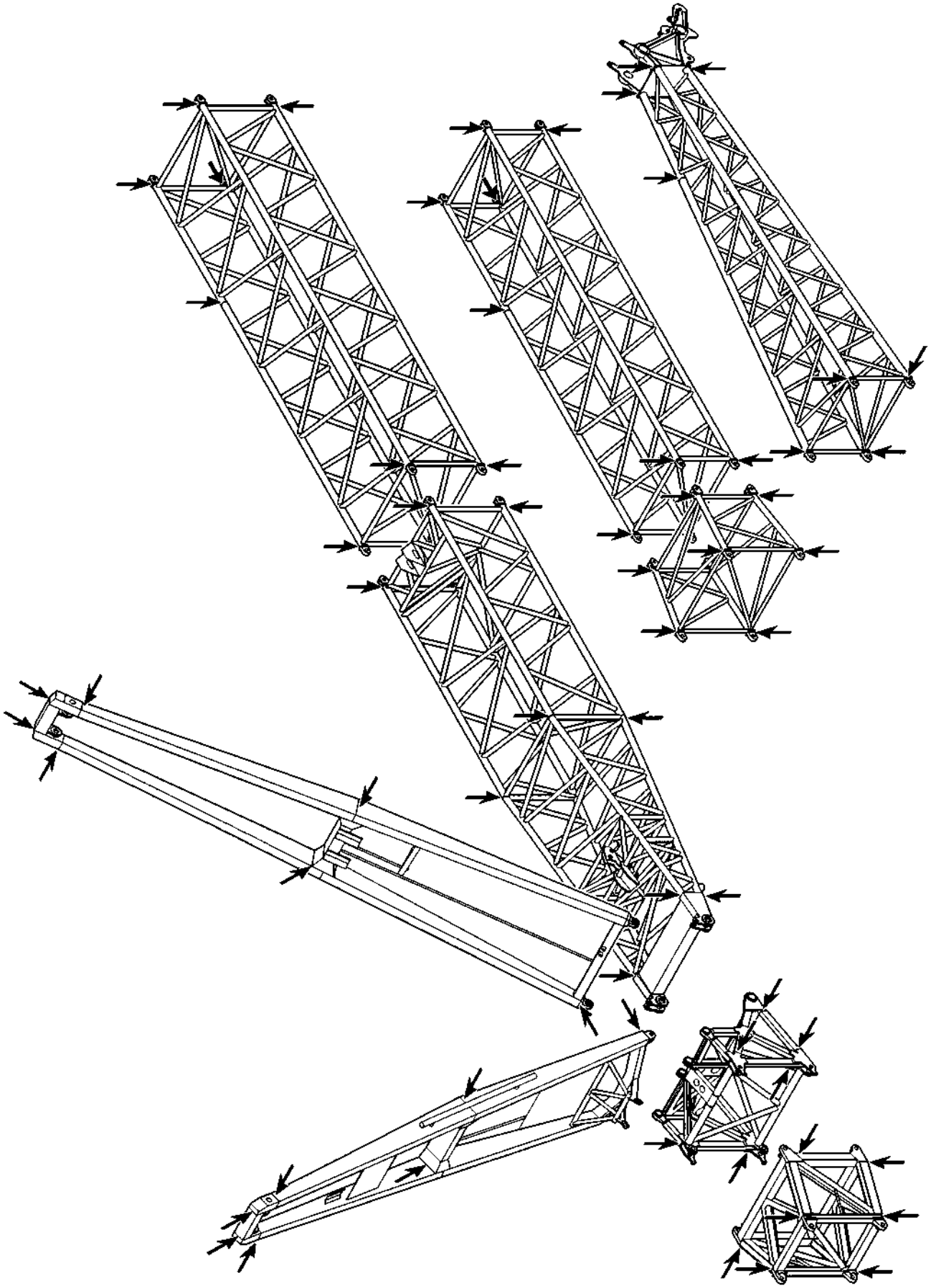

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Fig.185053: Example for assembly unit with lattice jib

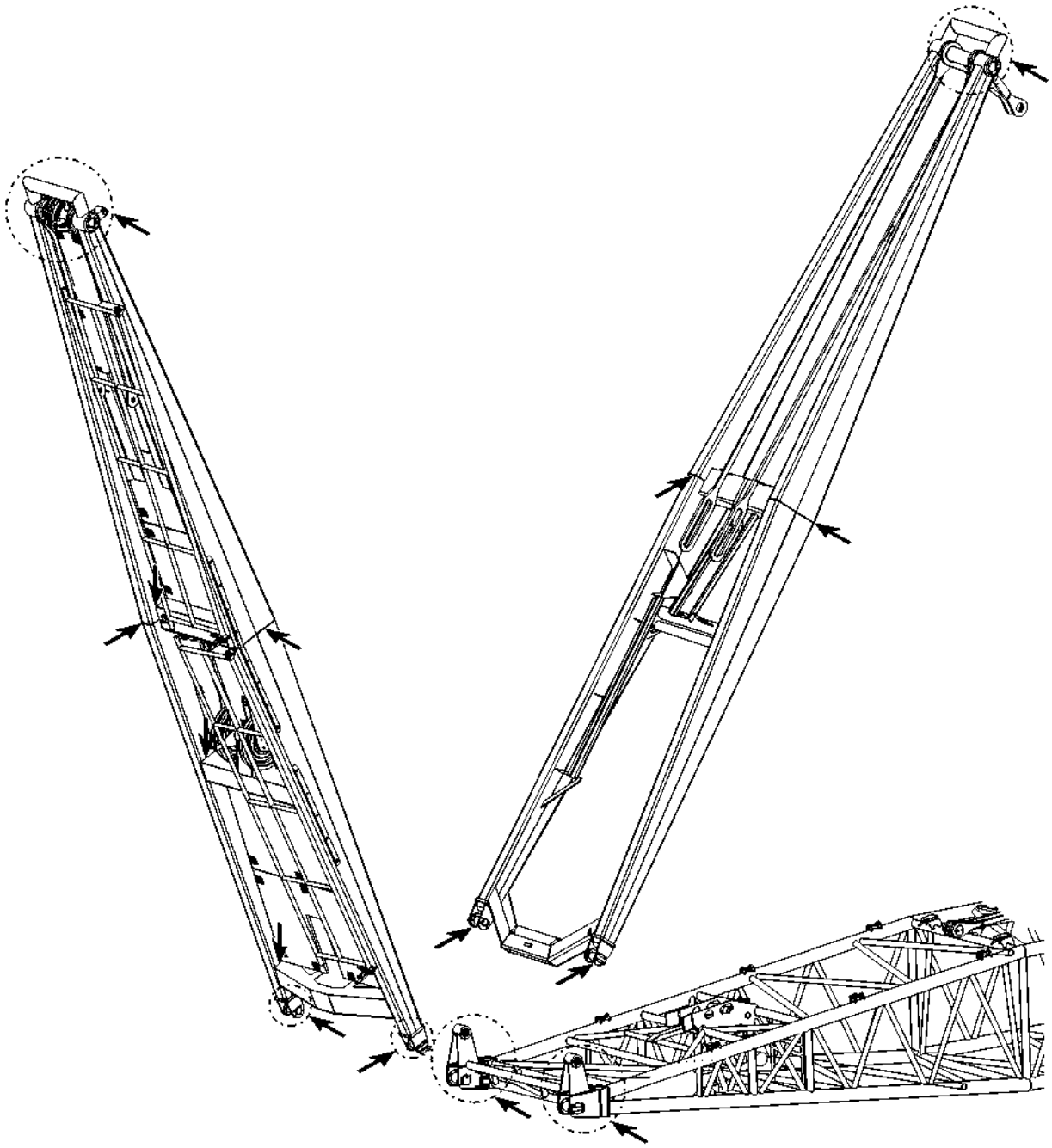

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Fig.105838: Example for NA frames

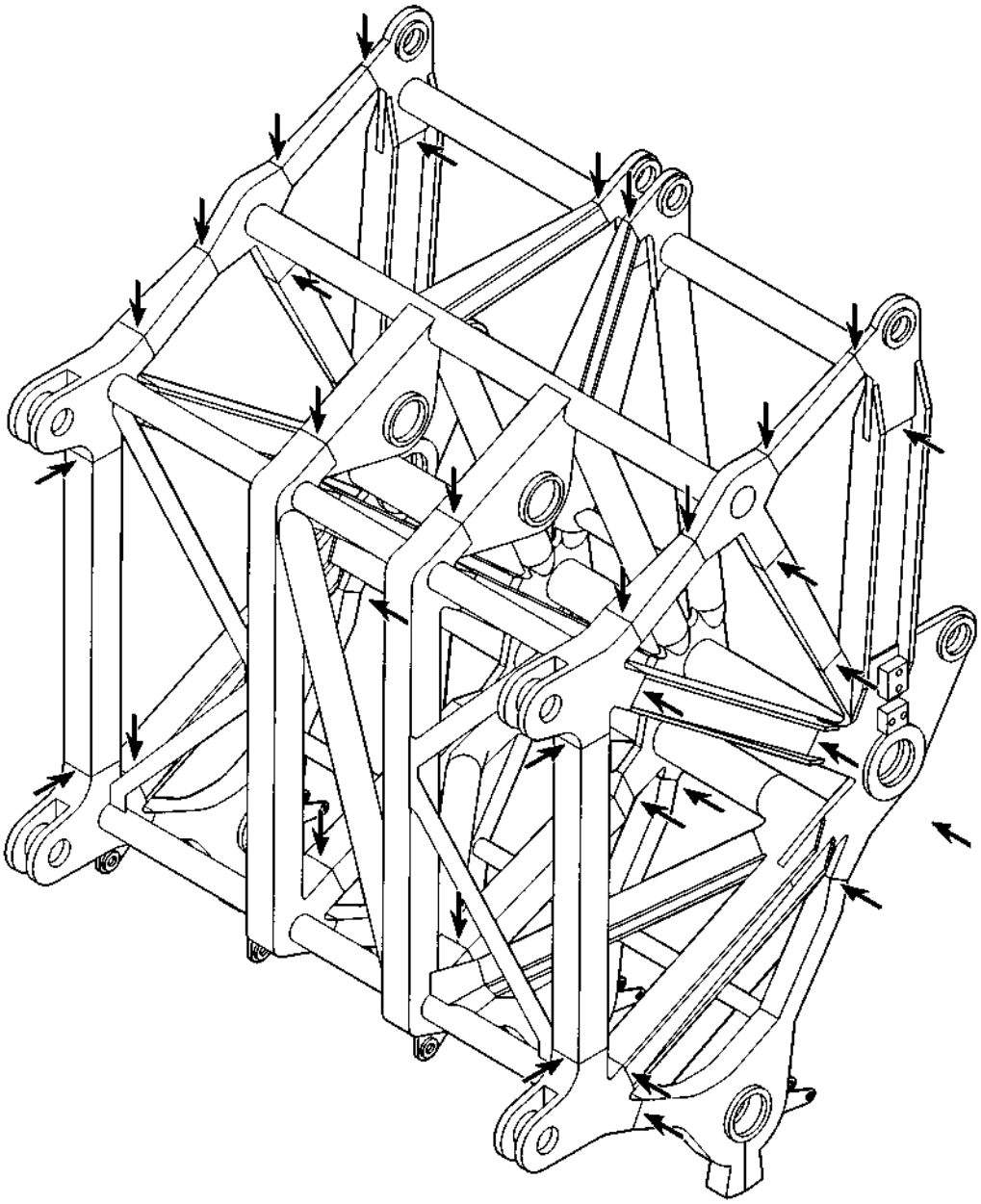

Fig.185054: Example for pulley head

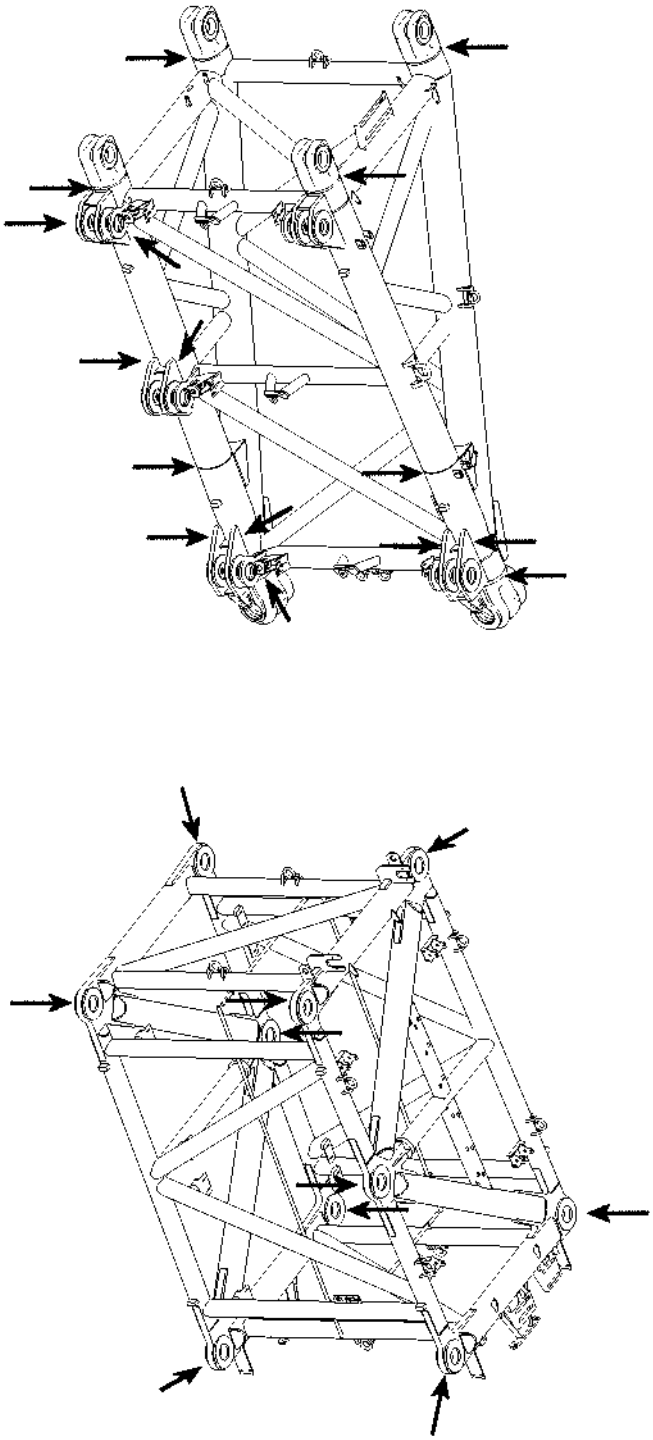

Fig.116609: Example for P-adapter

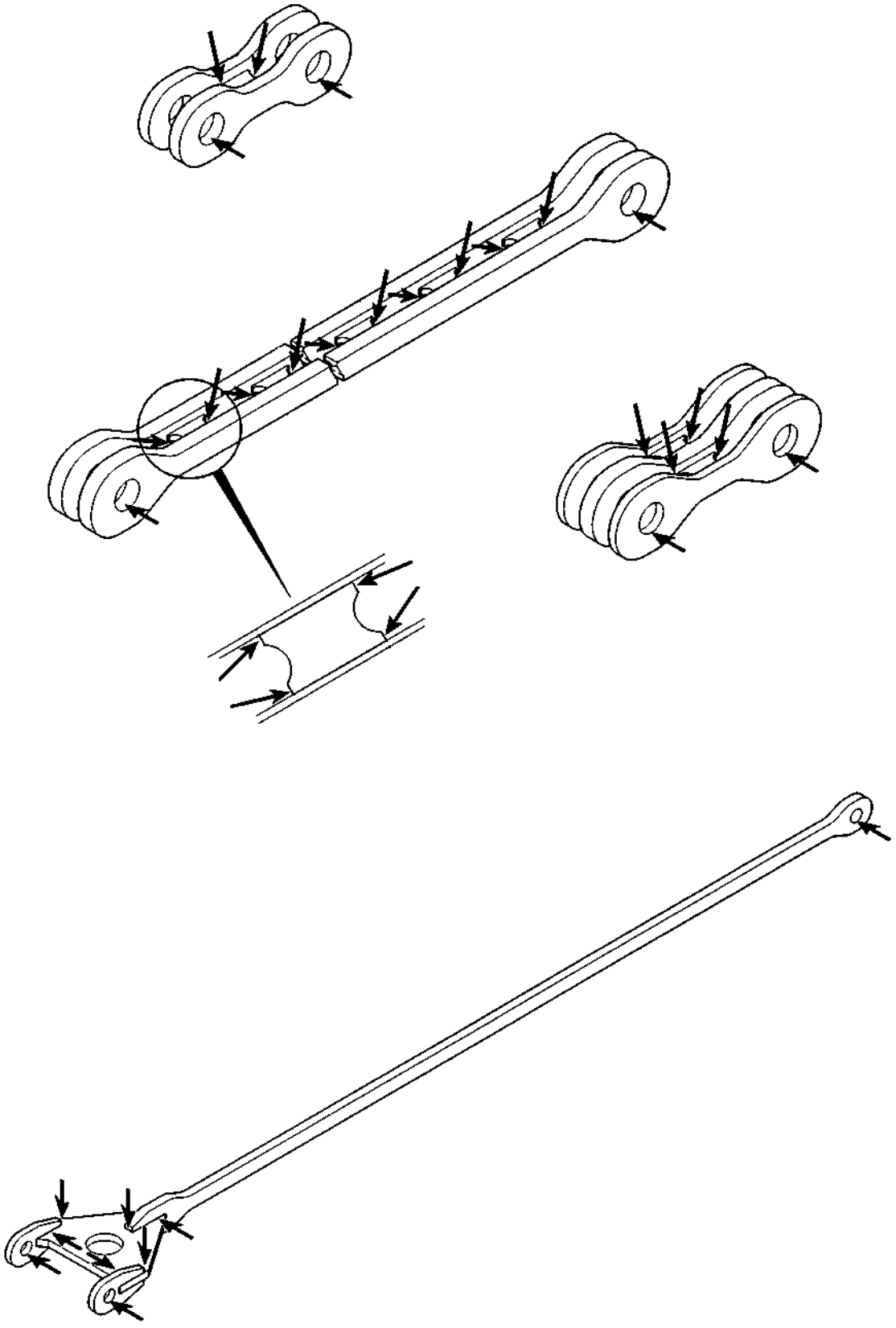

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Fig.185055: Example for guy rod

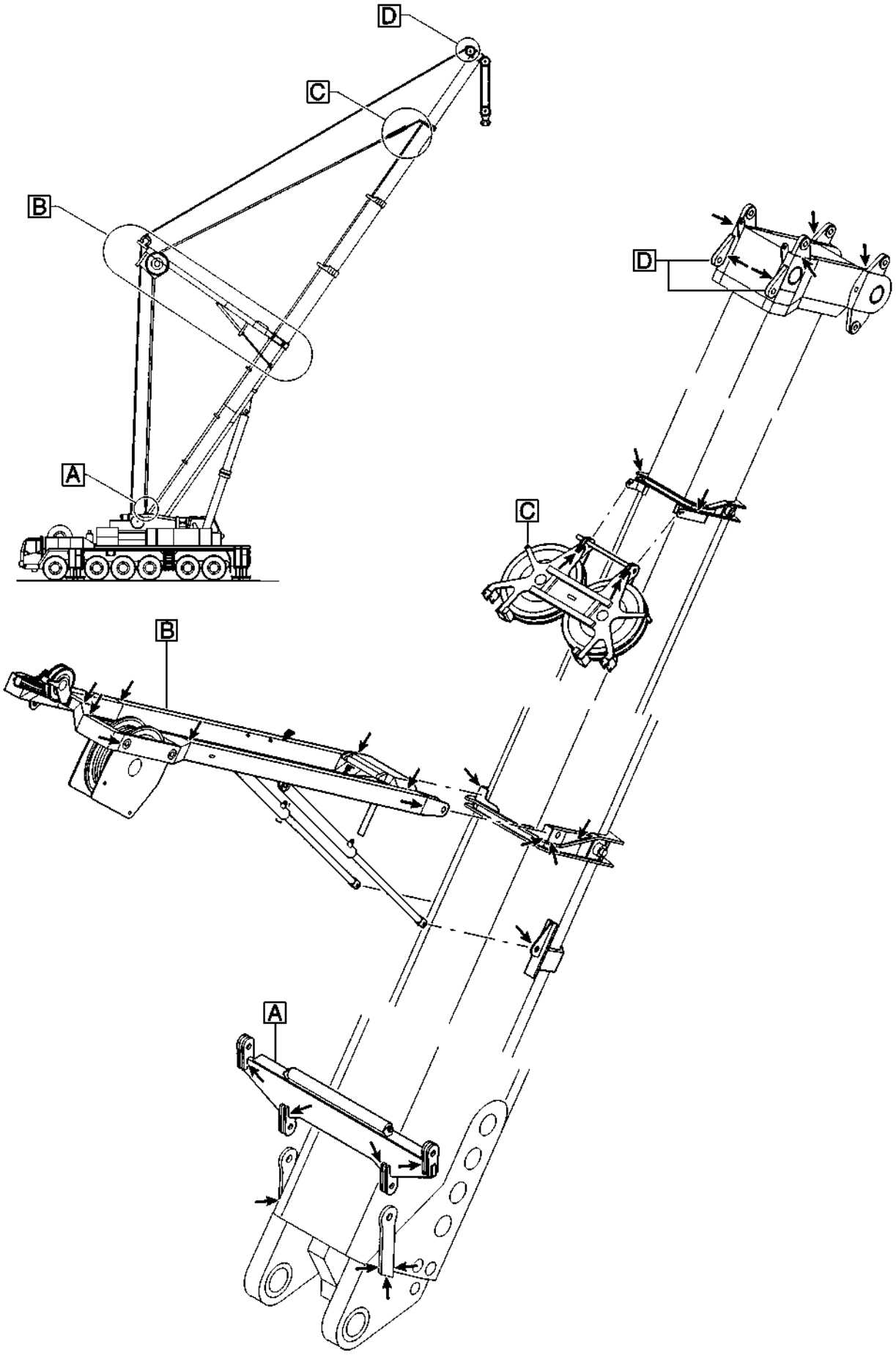

Fig.185059: Example for TA-guying

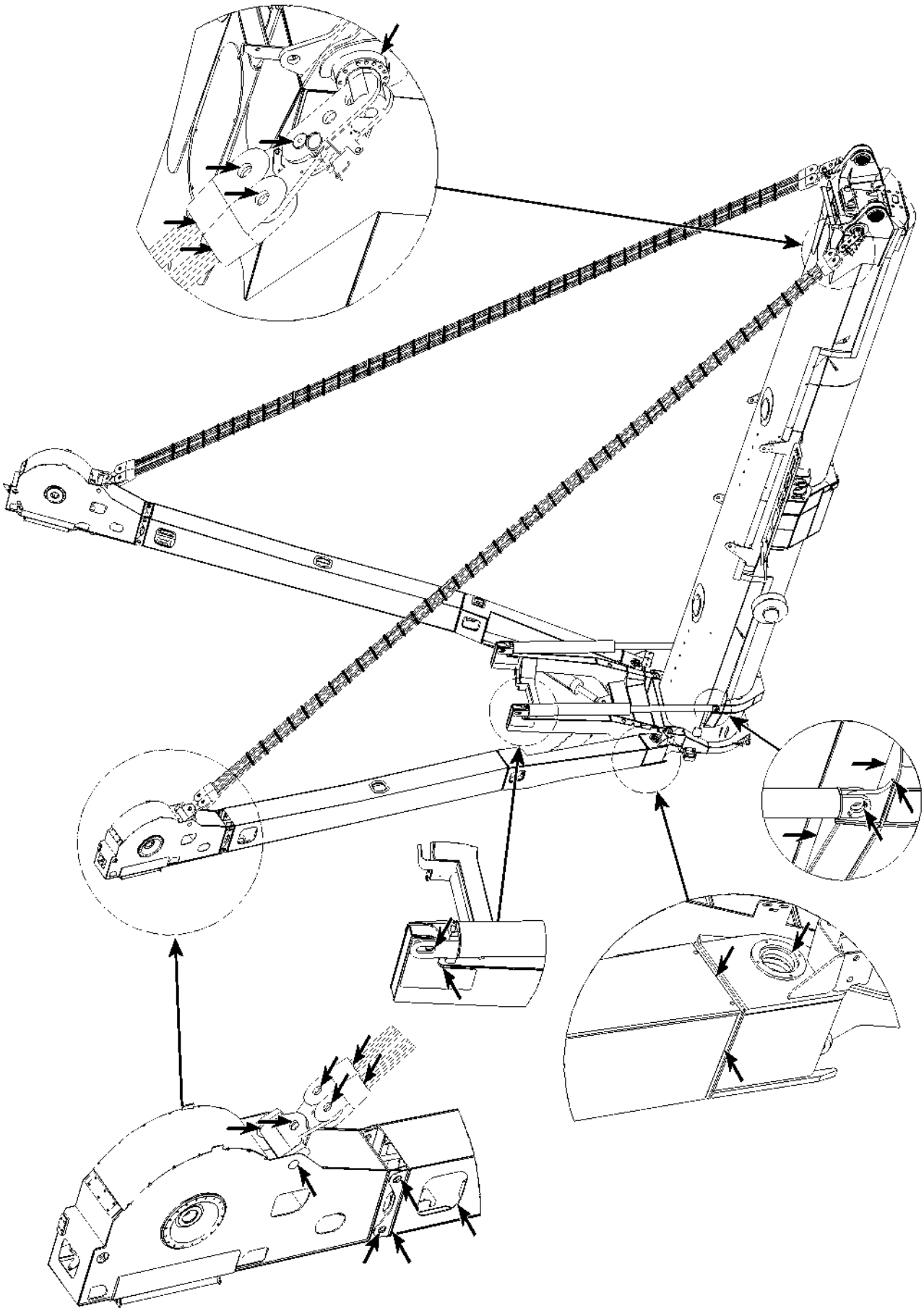

Fig.105707: Example for TY-guying

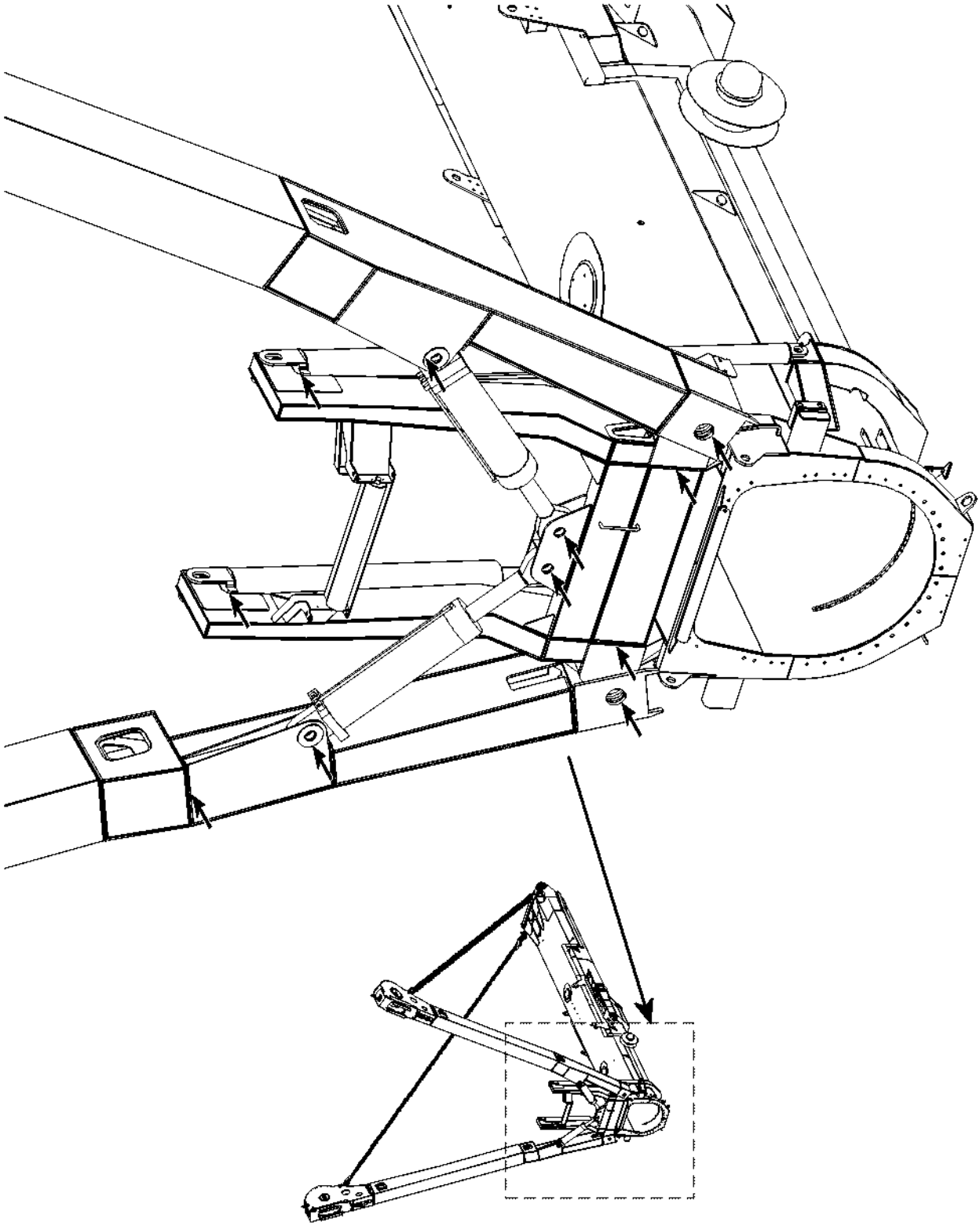

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Fig.105708: Example for TY-guying

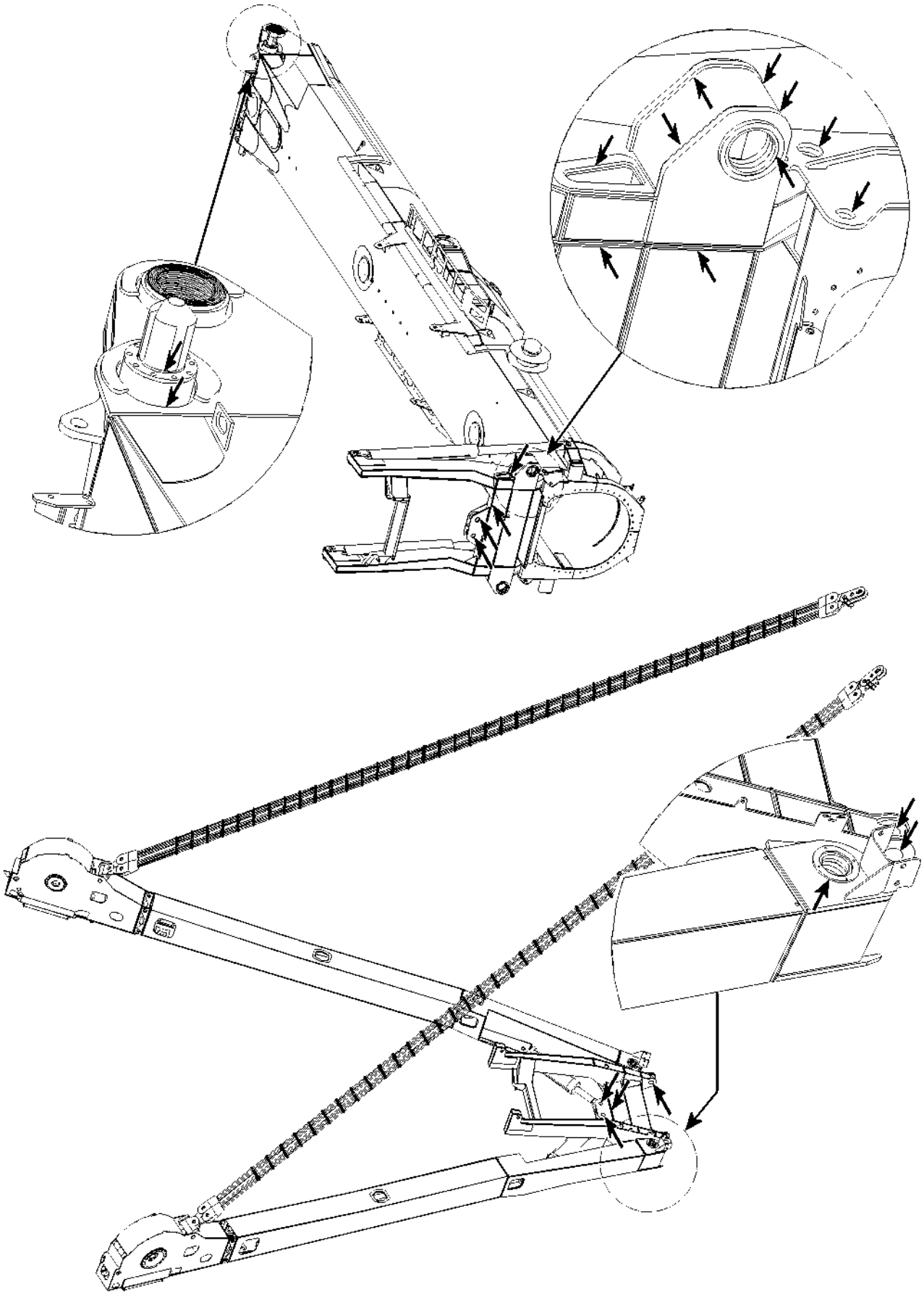

Fig.105709: Example for TY-guying

2.4 Inspection of lattice sections

Note

- ▶ The illustration is only an example and is valid for all lattice sections!
- ▶ Check all diagonal and frame pipe connections!

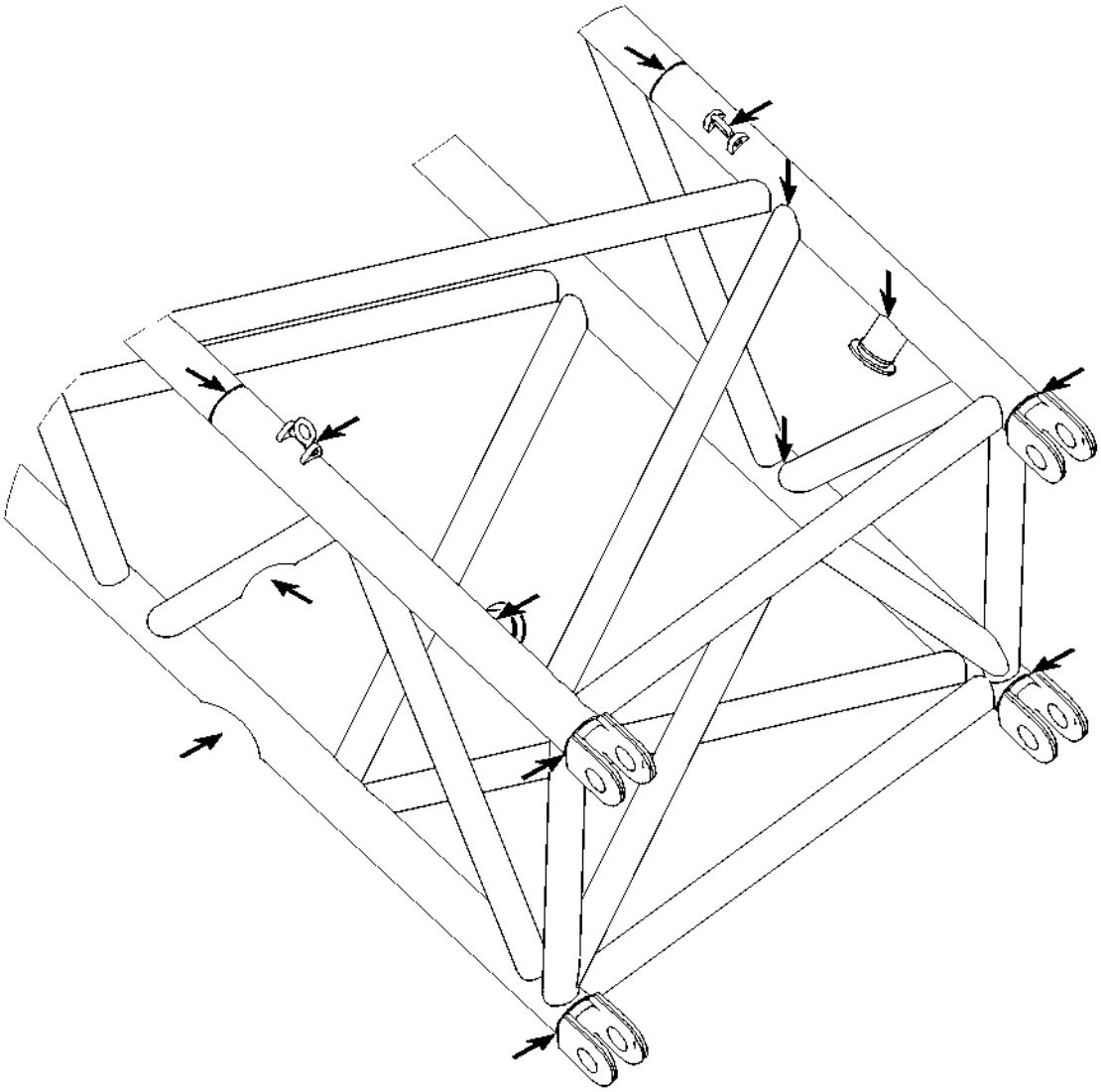

Fig.105688: Example for lattice sections

3 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.

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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 requirements.

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**.

3.1 Inspections

3.1.1 Inspection intervals

At least once a year, see Crane operating instructions, chapter 7.03.

3.1.2 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.

3.1.3 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.

3.1.4 Checking for solid foreign substances

As a rule, a qualified laboratory should carry out an oil analysis.

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 particles are detected, all the oil's properties must be examined by a qualified laboratory.

Note

- ▶ The evaluation of the foreign particles found in the oil must be made by a qualified laboratory!
- ▶ The maximum permissible quantity of foreign material measured by weight is 0.15 % of total oil weight!
- ▶ Maximum permissible foreign particle size from fine abrasion is 0.25 microns!
- ▶ If the above value have been exceeded, remove the gear and search for the cause of the increased abrasion!
- ▶ Damaged components must be replaced and the gear refilled with fresh oil!

NOTICE

Danger of property damage!

- ▶ Repairs may only be carried out by specialists with appropriate technical knowledge!

3.1.5 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.

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3.1.6 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 40 % of the maximum rope pull in the uppermost layer of the coil and raise it just off the ground.
- Remove the plug on the brake vent 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!

3.1.7 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".

3.2 Requirements for monitoring the winches

3.2.1 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

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  - Too much or too little oil
  - Contamination during oil change
- Assembly errors during repair and maintenance
- Undetected leakage
- Incorrectly set safety devices
- Hidden damage from accidents
- Extreme environmental conditions:
  - Extreme low or high temperatures
  - Corrosive atmosphere
  - Dust and dirt

3.2.2 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.

Determining the operating conditions (load spectrum)

The load spectrum of the crane is divided into groups, please refer to ISO 4301/1.

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

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

Graphic view:

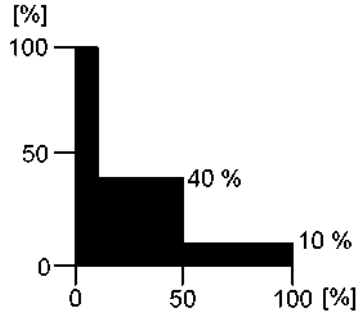

Fig.195234

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

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.
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

Graphic view:

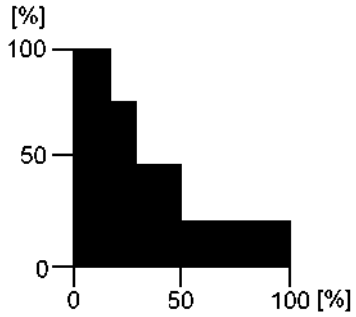

Fig.195235

Load spectrum class: Heavy 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

Graphic view:

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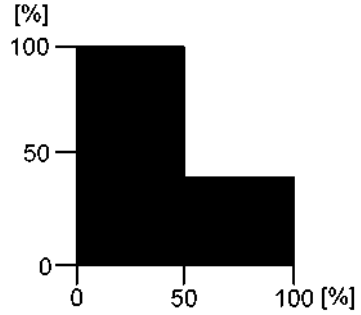

Fig.195236

Load spectrum class: Very heavy 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

Graphic view:

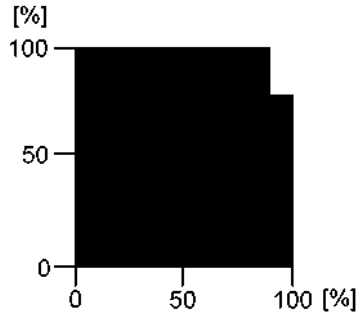

Fig.195237

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, 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 hours 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 %.

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4. No operating hour meter installed.
   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.

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 commissioning.

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 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 (leakage, 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.

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3.2.3 Example

According to the manufacturer's operating manual, a mobile crane with a separate operating hour meter for the crane engine and the crane drives 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:

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 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:

$$S_1 = \frac{0{,}125}{0{,}125} \times 160\ h = 160\ h$$

Fig.195231

Remaining theoretical service life:

$D_1 = 3200\ h - 160\ h = 3040\ h$

The above values are recorded in the crane inspection log.

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 hour meter indicates 2000 h ; i.e., during this period:

2000 h – 800 h = 1200 h (800 h were used in the first year of operation)

The winch was operated about 40 % of the time; i.e. $T_2 = 480$ h.

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:

$D_2 = 3040\ h - 1920\ h = 1120\ h$

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 hour meter indicates 3000 h ; i.e., during this period:

3000 h – 2000 h = 1000 h (2000 h were used in 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

3.2.4 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.102588

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: Q 1 (L1)
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: Q.....(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 : .....

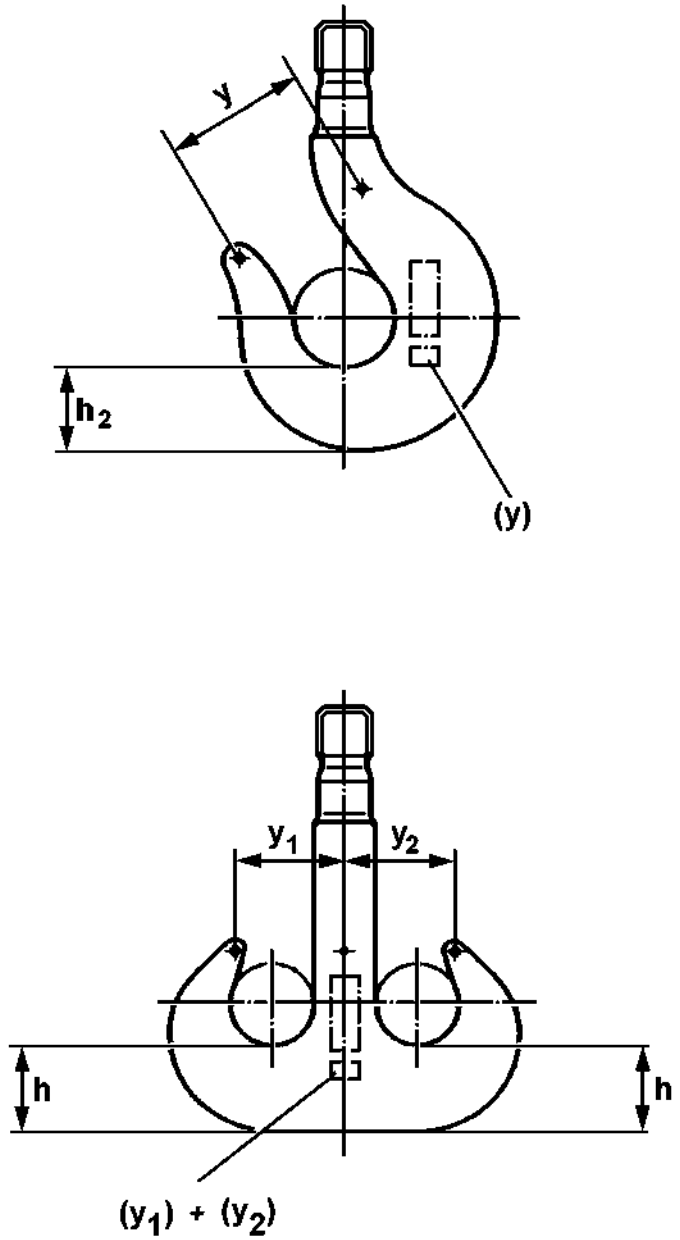

Fig.116850

4 Inspecting the load hooks

Load hooks must be inspected as needed, but at least once a year by an expert.

The inspection must be carried out by an authorized expert every 4 years.

The purpose of the inspections is to avoid accidents by detecting deficiencies early on.

Any defects found must be remedied and documented.

An inspection must be carried out before operation.

4.1 Inspections and monitoring procedures

4.1.1 Deformation

The initial dimension (y) for single hooks and (y_1) and (y_2) for double hooks is noted on the load hook.

Hook jaw expansion may not exceed 10 % of the original dimensions (y) or (y_1) and (y_2).

Measure between the punch marks.

DANGER
Danger of accident due to expansion of hook jaw!
▶ Replace the load hook in case of impermissible expansion!
▶ Contact the Service department at Liebherr-Werk Ehingen GmbH!

4.1.2 Surface cracks

If distorsions were found on the hook jaw, then an inspection must be made for surface cracks according to a suitable procedure or the respective part must be replaced.

DANGER
Danger of accident due to surface cracks on the load hook!
▶ Replace the load hook in case of surface cracks and damage!
▶ Contact the Service department at Liebherr-Werk Ehingen GmbH!

4.1.3 Wear

The wear on the hook base may be no more than 5 % of the initial nominal dimension (h_2) for single hooks or (h) for double hooks.

The initial 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

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Hook Number	Single hook h_2 [mm]	Double hook h [mm]
32	—	170
40	—	190
50	—	212
63	—	236
80	—	265
100	—	300
125	—	335
160	—	375
200	—	425
250	—	475
320	—	545

Dimensions (h_2) for single hooks and (h) for double hooks

DANGER
Danger of accidents due to hook base wear!
▶ Replace the load hook in case of impermissible wear!
▶ Contact the Service department at Liebherr-Werk Ehingen GmbH!

4.1.4 Corrosion and wear

Check the load hook thread and hook nut for corrosion and wear.

Wear on the hook nut is impermissible!

If recondition is required to remove corrosion grooves, then carry out an inspection for dimensional accuracy.

To check the threads regarding corrosion and wear, the nut must be unscrewed from the hook shaft.

DANGER
Danger of accidents due to corrosion and wear on the threads!
▶ Replace load hooks which are not dimensional accurate!
▶ Replace hook nuts in case of impermissible axial play!
▶ Contact the Service department at Liebherr-Werk Ehingen GmbH!

4.1.5 Weldings

Weldings on load hooks, for example to repair wear, are impermissible!

DANGER
Danger of accident due to weldings on the load hook!
▶ Replace the load hook in case of impermissible wear!
▶ Contact the Service department at Liebherr-Werk Ehingen GmbH!

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5 Inspection of the rope feed mechanism in the telescopic boom

5.1 Checking the ropes of the rope feed mechanism

- For inspection of rope end mounts, see Crane operating instructions, chapter 7.05.
- For inspection of the pretension on the retraction ropes, see Crane operating instructions, chapter 7.05.
- Inspection of ropes for damage according to ISO 4309, see Crane operating instructions, chapter 8.04.

5.2 Checking the change over pulleys of the rope feed mechanism

DANGER
Danger of accident in case of damage or cracks!
▶ Replace the change over pulley immediately!

Check the entire change over pulley assemblies for damage and cracks once a year.

Also check for wear in the rope groove. Replace the change over pulley if the bottom of the rope groove has been run down up to 1/4 of the rope diameter.

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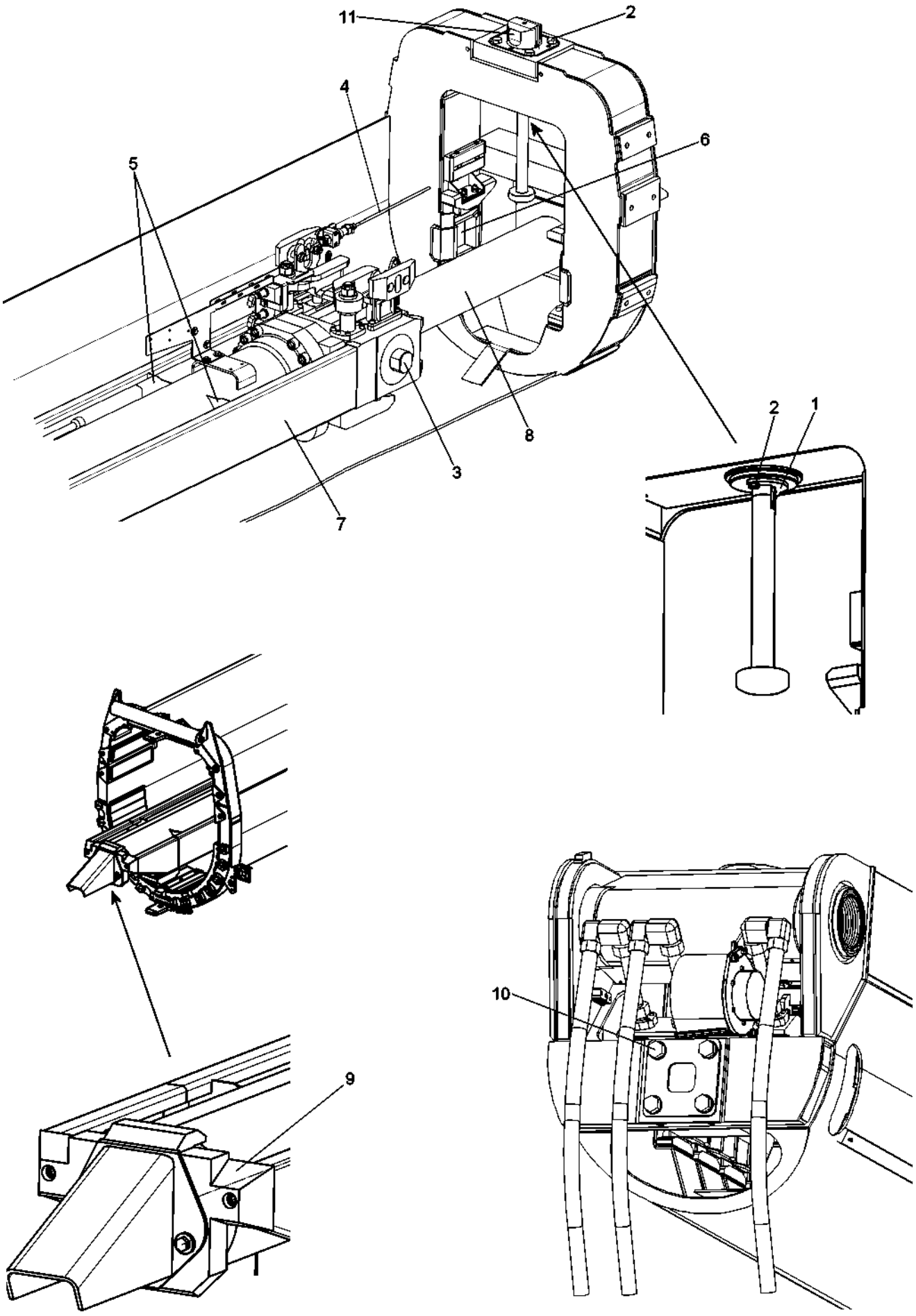

Fig.109286

6 Inspection of locking system of telescopic boom

6.1 For cranes with pneumatic boom locking system

- To check the function, see Crane operating instructions, chapter 8.11.
- To check the pin wear pattern, see Crane operating instructions, chapter 8.11.
- To check the wear, see Crane operating instructions, chapter 8.11.
- To check the safety control, see Crane operating instructions, chapter 8.11.

6.2 For cranes with telescopic boom system Telematik

- 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

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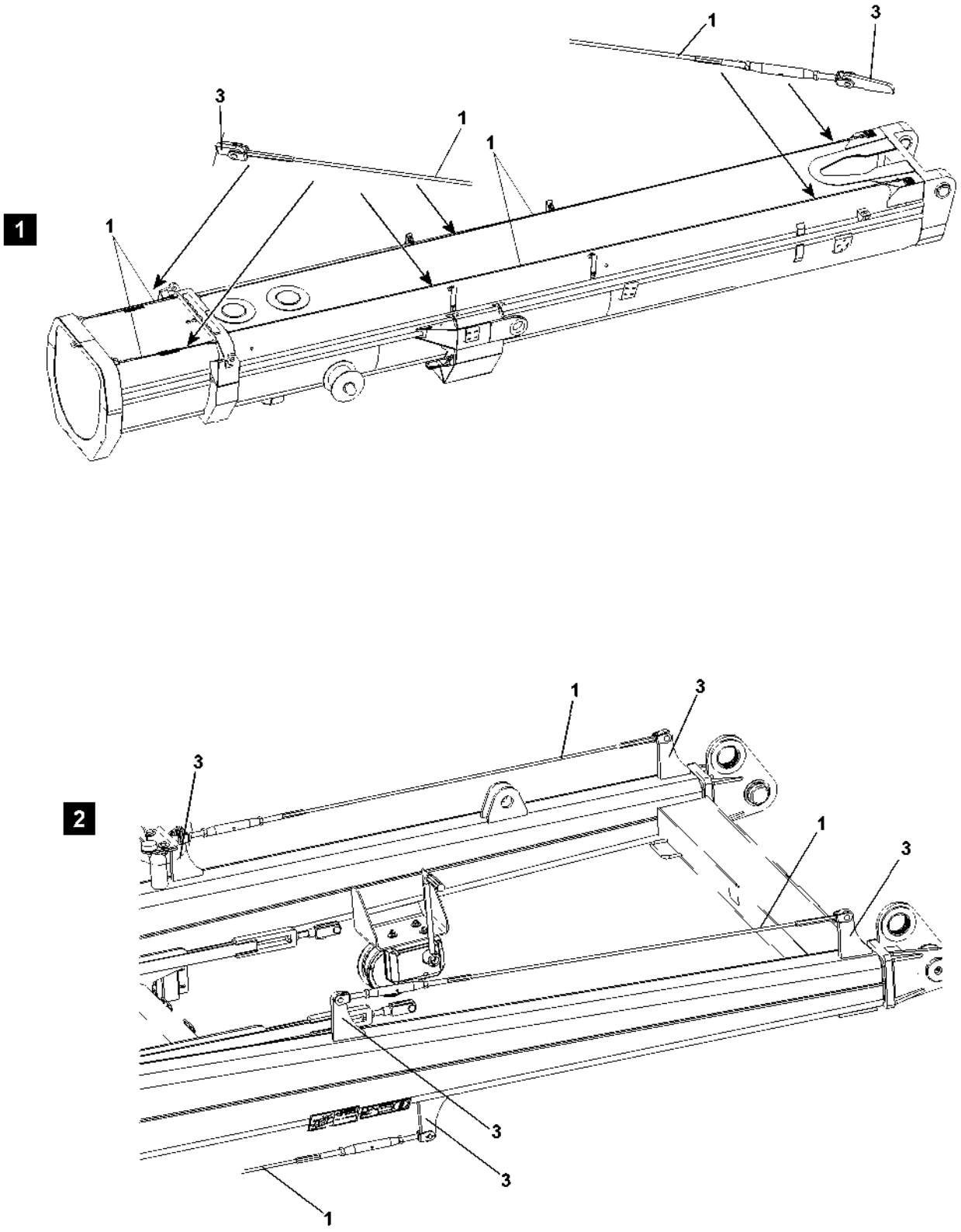

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Fig.112739

7 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!

- ▶ The rope pretension on the safety ropes must be 800 N !
- ▶ Have damaged safety ropes **1** or anchor points **3** replaced immediately by **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.

7.1 Check of rope pretension on telescopic booms, illustration 1

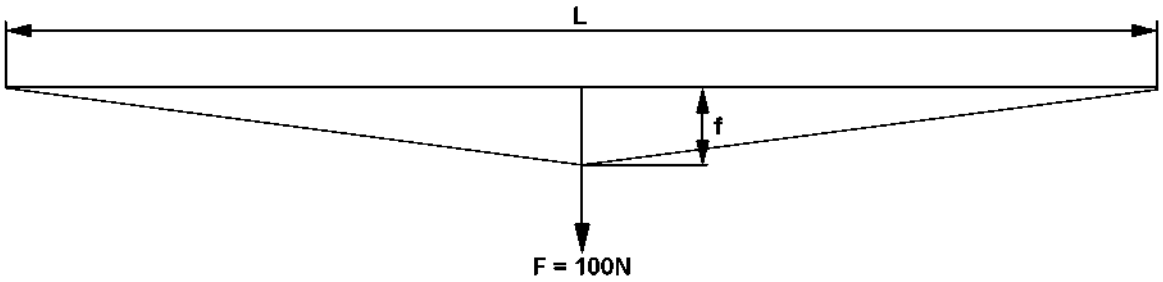

Fig.112738

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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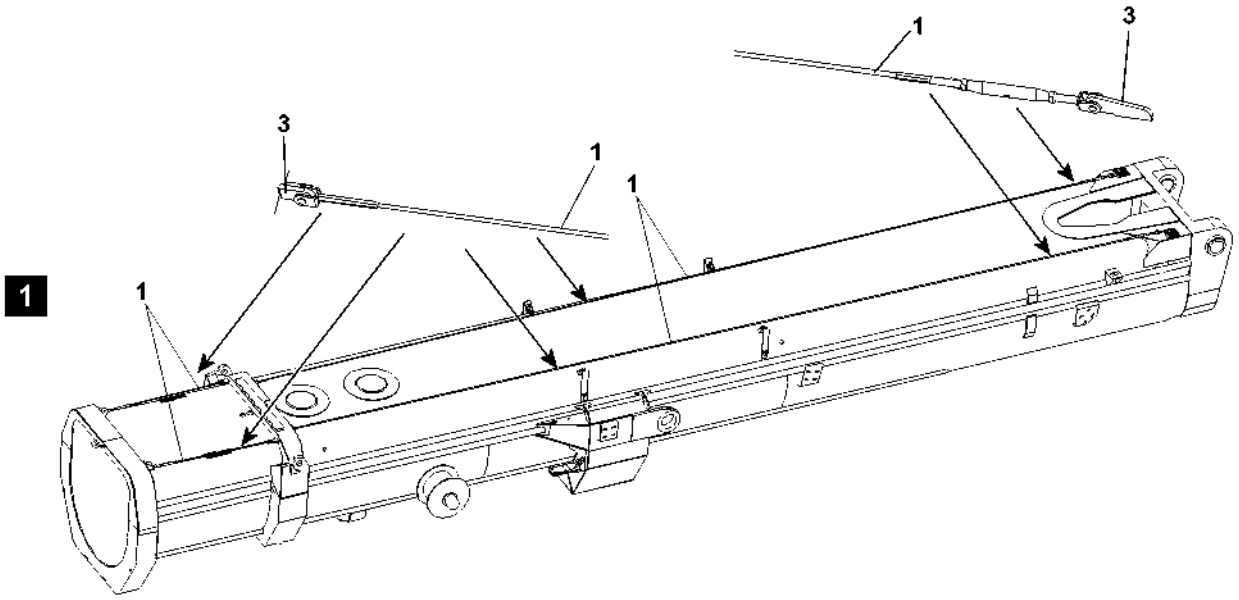

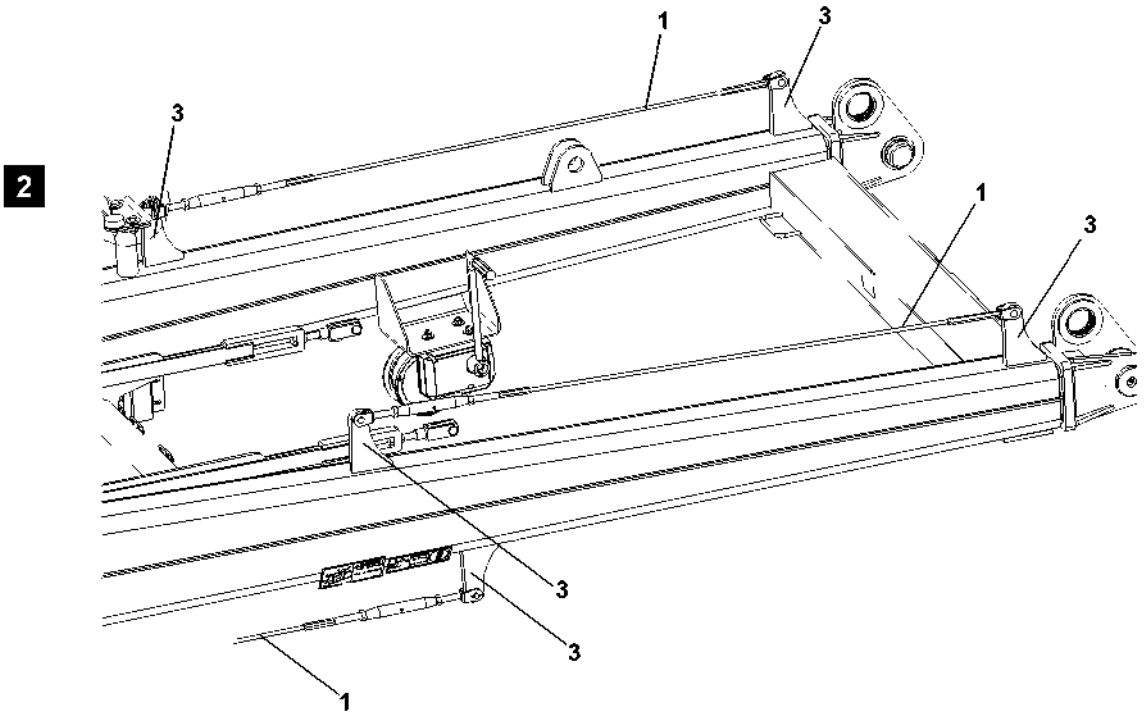

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Fig.112739

7.2 Check of rope pretension on lattice sections, illustration 2

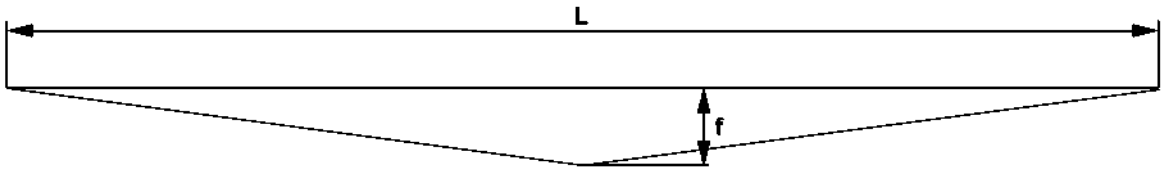

Fig.117747

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

8 Inspection of membrane accumulator

Note

▶ The national regulations for pressurized container inspection must be observed!

The inspection of the membrane accumulators for specified gas pressure must be carried out by authorized and trained expert personnel, see Crane operating instructions, chapter 7.04, 7.05.

9 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!

9.1 Pressure test of relapse cylinders

The relapse cylinders must be inspected annually by an authorized expert. The purpose of the inspections is to avoid accidents by detecting deficiencies early on.

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9.2 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 operation: 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 authorized and trained expert personnel for pressure tanks.

10 Inspection of the safety controls on the relapse cylinders

For inspection of the safety control or limit switches on the relapse cylinders and the boom A-frames, see Crane operating instructions, chapter 8.12.

11 Inspection of rope pulleys

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.

Also check for wear in the rope groove. Replace the rope pulley if the bottom of the rope groove has been run down up to 1/4 of the rope diameter.

12 Inspecting 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 indicator 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 radius.

13 Inspecting the roller slewing ring connection

For tilt play measurement, see Crane operating instructions, chapter 7.05

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14 Inspection of the mounting of the load bearing equipment

Check that the mounting bolts for the roller slewing ring, winches, slewing gears and hitch are properly seated.

The slewing ring connection mounting bolts are pre-stressed at the factory, so that no loosening of the screw connections will occur during normal crane operation.

However, the screw connection may become overloaded and the bolts may be permanently stretched if the crane is overloaded or if the load is pulled free. It is therefore important to check these screws for tight seating during the annual crane inspection or after an overload.

Remove loose screws completely as well as the two adjacent screws on the right and left and check them for damage closely. Inspect the screws especially for cracks or permanent distortion. If a screw has been stretched by more than 0.2 % (in relation to its original length) or if cracks or other damage are detected, then the damaged screws must be replaced. If the screws have been stretched or there is other damage, then the adjacent screws must also be replaced.

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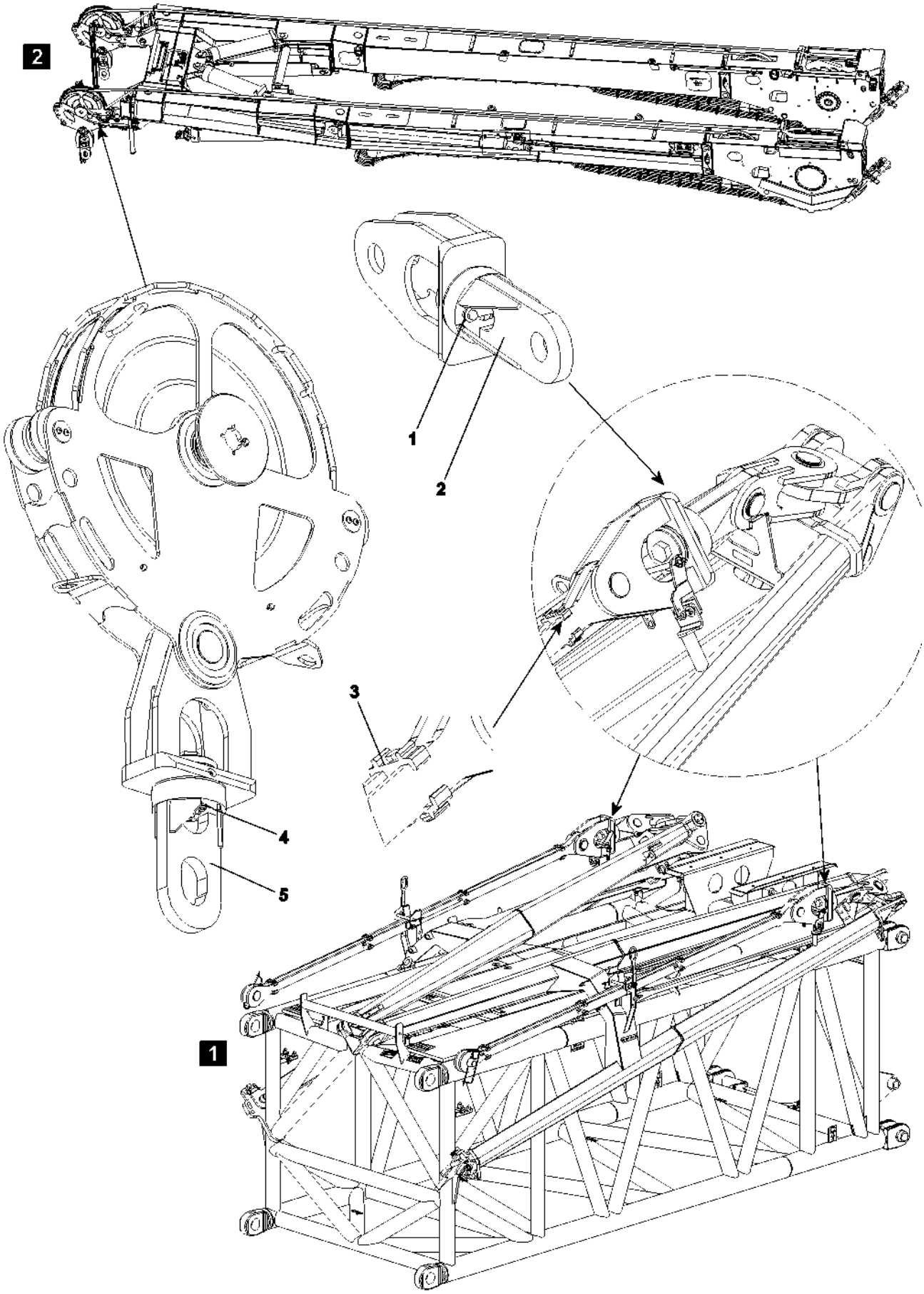

Fig.109096

15 Inspection of the tele extension with eccentric, illustration 1

- Inspection of twist guard **1** for damage and loose screw connection.
- Inspection of rotator **2** for easy turnability.
- Inspection of all clamps **3** for damage and function.

16 Inspection of change over pulleys, illustration 2

- Inspection of twist guard **4** for damage and loose screw connection.
- Inspection of rotator **5** for easy turnability.

17 Inspection of the oil and fuel reservoirs

Visually check the oil and fuel tanks at least once a year for leaks and safe mounting.

Repairs may only be carried out by trained and knowledgeable 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!

18 Inspection of the auxiliary reeving winch, recovery winch and spare gear winch

Determine the service life of the auxiliary reeving winch, the recovery and spare gear winches from their respective original manufacturer.

19 Appendix

The following is a checklist to assist the inspector during the periodic inspections of Liebherr mobile and crawler cranes.

19.1 Inspection recommendations for periodic inspections of Liebherr mobile and crawler cranes

Company:	**Inspector:**
Crane manufacturer: LIEBHERR	**Crane type:**
Serial number:	**Stock number:**
Construction year:	**Date:**
Inspector’s signature for No. 1 to 22:	

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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						
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						

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4. Inspection category: Chassis[1]						
Component to be inspected	**A**	**B**	**C**	**D**	**E**	**Comments**
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						
Windshield 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						
Filters						
Sound absorber						
Engine mount						
Oil levels						
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						

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7. Inspection category: Chassis - hydraulics[1]						
Component to be inspected	**A**	**B**	**C**	**D**	**E**	**Comments**
Motors						
Valves						
Lines						
Hoses						
Cylinder						
Pressure limiting valves						

8. Inspection category: Chassis - pressurized air system[1]						
Component to be inspected	**A**	**B**	**C**	**D**	**E**	**Comments**
Compressor						
Filters						
Air tanks						
Valves						
Lines						
Hoses						
Cylinder						

9. Inspection category: Chassis - electrical system[1]						
Component to be inspected	**A**	**B**	**C**	**D**	**E**	**Comments**
Motors						
Generators						
Battery						
Switch						
Lines						
Fuses						
Resistors						
Lighting						
Brake lights						
Indicator lights						
Tail lights						
Working lights						
Signaling systems						
Indicator lights						
Battery switch						
Limit switches: Transmission, steering, drive train						
Support pressure indicator[2]						

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10. Inspection category: Chassis - control devices[1]						
Component to be inspected	**A**	**B**	**C**	**D**	**E**	**Comments**
Engine regulation						
Transmission						
Couplings						
Circuits						
Brakes						
Steering						
Indicator displays						
Engine shut off line						
Control of supports[2]						
Axle suspension						
Crane leveling						
Rear axle steering						

11. Inspection category: Superstructure						
Component to be inspected	**A**	**B**	**C**	**D**	**E**	**Comments**
Frame						
Coverings						
Treads						
Bearings						
Counterweights						
Relapse retainer						
Slewing ring connection: Tilt play						
Slewing ring connection: Mounting screws						
Slewing ring connection: Gears						
Slewing gear: Mounting screws						
Slewing gear: Gears						

12. Inspection category: Superstructure - crane operator’s cab						
Component to be inspected	**A**	**B**	**C**	**D**	**E**	**Comments**
Doors						
Windows / windshields						
Windshield wipers						
Mirrors						
Seat						
Heater						
Ventilation						
Sound absorbers						

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12. Inspection category: Superstructure - crane operator’s cab						
Component to be inspected	**A**	**B**	**C**	**D**	**E**	**Comments**
Joystick for working functions						
Gear shifts						
Safety: Crushing / shear locations						

13. Inspection category: Superstructure - Retaining and protection devices						
Component to be inspected	**A**	**B**	**C**	**D**	**E**	**Comments**
Accesses, ladders						
Handles						
Coverings						
Covers						
Hatches						
Treads						

14. Inspection category: Superstructure - drive train						
Component to be inspected	**A**	**B**	**C**	**D**	**E**	**Comments**
Combustion engine						
Exhaust system						
Fuel tank						
Filters						
Sound absorber						
Engine mount						
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						

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16. Inspection category: Superstructure - electrical system						
Component to be inspected	**A**	**B**	**C**	**D**	**E**	**Comments**
Motors						
Generators						
Batteries						
Switch						
Lines						
Fuses						
Resistors						
Lighting						

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						
Monitoring indicators						

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]						
Rope pulleys						
Rope end connection						
Rope for winch 1						
Rope for winch 2						
Rope for winch 3						
Rope for winch 4						
Guy ropes						

19. Inspection category: Superstructure - hook						
Component to be inspected	**A**	**B**	**C**	**D**	**E**	**Comments**
Pulleys						
Rope guards on pulleys						
Axle support						

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19. Inspection category: Superstructure - hook						
Component to be inspected	**A**	**B**	**C**	**D**	**E**	**Comments**
Load hook						
Load hook mounting						
Hook retention						

20. 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 moment 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						

21. 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						

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21. Inspection category: Boom						
Component to be inspected	**A**	**B**	**C**	**D**	**E**	**Comments**
Boom extension ropes						
Boom retraction ropes						
Boom bearings						
Boom pinning						
Guy rods						
Relapse cylinders						

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						

Inspection criteria:

A = present / complete
B = condition / maintenance
C = function
D = repair / replace
E = reinspection 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 regarding the used portion of the theoretical service life.

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Fig.195219

1 Introduction

DANGER
Danger of fatal injury due to defective crane ropes!
▶ Please observe the following criteria.

The rope should be considered to be a wear part, which must be replaced if the inspection shows that its strength has reduced to such an extent that continued use may be dangerous.

Regular inspection of the rope is required in order to safely carry loads with correctly deployed equipment, meaning that the rope must be taken out of service at an appropriate point in time.

The take-down criteria with regard to broken wires, wear, corrosion and deformation can be applied immediately under all application conditions. The different factors are dealt with in ISO 4309, which is intended to serve as a guideline to competent experts who are involved in the maintenance and inspection of cranes.

We recommend to carry out an annual inspection by an **expert** according to the following standard (ISO 4309).

The ropes should be inspected every 4 years by an **authorized inspector**.

The scope of the inspection and the inspection results must be traceably documented, see addendum 2. This documentation must be retained as part of the crane records!

The criteria that are covered here are intended to provide an appropriate safety margin for movement of loads with cranes until the rope is taken down.

2 Wire rope

2.1 Condition before installing

The rope is usually replaced with a rope that is of the same type as the original. If the spare part is of another type, the user must ensure that the rope characteristics are at least as good as those of the rope that was taken down.

Before installing a new wire rope, the grooves of the rope drums and pulleys must be checked in order to ensure that the spare ropes is placed correctly in the rope grooves (see section entitled „Inspection“).

2.2 Installation

When the rope is removed from the spool or unwound from a reel, it must be ensured that the rope is not twisted, otherwise loops, reverse bends or kinks could originate in the rope.

If the rope is looped over any part of the system when it is not under strain, these areas must be protected accordingly.

Before starting to use the rope on the system the user must ensure that all components that are functionally associated with the rope have been set up in such a way that they will operate correctly.

To stabilize the wire rope, a few lifting procedures should be carried out at approximately 10 % of the normal load.

2.3 Maintenance

The maintenance of the wire ropes depends on the type of lifting device, its application, the environment as well as the type of rope that is used. If no other instructions from the crane or rope manufacturer are provided, the wire rope should be cleaned, if possible, and lubricated with grease or oil, particularly in areas in which the rope is subjected to bending when it runs over pulleys.

The kind of grease that is used must be suitable for steel ropes.

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Lack of maintenance will reduce the service life of the rope, particularly if the crane is used in a corrosive environment and if re-lubricating is not possible because of the nature of the respective deployment of the crane.

2.4 Inspection according to ISO 4309

2.4.1 Frequency

Daily inspection

If possible, all visible parts of the ropes must be checked for general wear and distortion every working day. Special attention must be paid to the rope end connections. Any suspected changes in the condition of the rope must be reported and the rope must be inspected by a trained expert inspector in accordance with the section „Points to be checked on the rope“.

If the lower rope layers on the drum are used infrequently or not at all, periodically unwind and rewind the entire drum under pretension. A rope is most cost-effective if it is used over its entire length. For that reason, it is recommended to use an appropriate rope length when operating the crane over longer periods.

Note

▶ If a rope is newly placed, then it must be pretensioned and placed with a pretension of at least 10 % of the maximum rope pull.

Special inspection as described in section „Points to be checked on the rope“

The rope must be checked after any events that may have led to damage to the rope and / or the rope ends and whenever the rope starts to be used again after being taken down and then reinstalled.

2.4.2 Checking the spooling behavior of the rope on the cable drum

To avoid spooling errors and connected rope damage, it is necessary to check the spooling behavior daily. If spooling errors are determined, the rope must be reeled off until there are only 3 rope coils on the winch. Thereafter, the rope is to be tensioned with a pretension of at least 10 % of the maximal rope pull and then placed again.

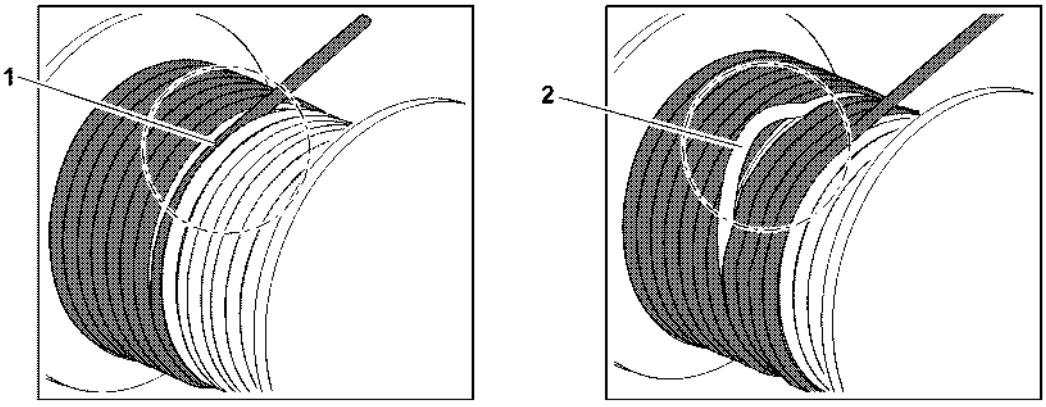

Fig.103456

Possible spooling errors:
- **1** Cutting into the lower rope layers
- **2** Loop formation in the lower rope layers

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2.4.3 Points to be checked on the rope

General

Although the entire length of the rope must be checked, particular attention must be paid to checking the following areas:
- At the rope end points at both sides, for both moving and fixed ropes.
- The part of the rope that runs through the block or over rope pulleys; particular attention must be paid to parts of the rope that are on rope pulleys when under load (see appendix 1) in systems that carry out repeated movements.
- Parts of the rope that run over a compensation pulley.
- In all rope parts, which could be subject to abrasion due to external elements (for example: protruding porthole edges).
- All parts of the rope that are subjected to the effects of heat.
- On the contact positions of the ropes when spooling up.
- Check the inside of the rope for corrosion and material fatigue.

The results of the inspection must be entered in the inspection log for the system (for typical example see section entitled „Rope inspection log“ and appendix 2).

Checking the rope in the uphill pitch zones of the rope coil for flat sections

In the cross area of the coiled up rope layers, the rope is under more strain and can therefore be flattened. To void flat sections, the rope can be shortened on the rope drum fixed point.

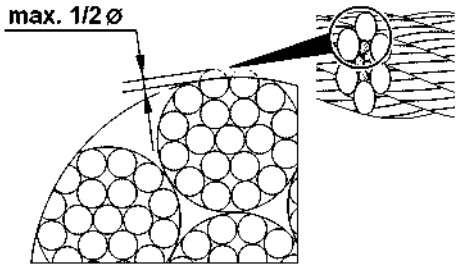

Fig.103454

If the wires in the outer braids are flattened to no more than maximum half the wire diameter:
- Shorten the rope by a length of 1/3 of the rope drum circumference and reset.

DANGER
Rope breakage!
If the following measures are not observed, the rope can break, the load can fall down and fatally injure personnel!
- ▶ Take the rope down when the take down criteria is reached, as described in section „Take down criteria“!
- ▶ Take the rope down when the wires in the outer braids are flattened by more than half the wire diameter!

Rope suspension and connection systems - except loops

The rope must be examined at the exits of the rope suspension and connection system, since this area is particularly susceptible to initial signs of material fatigue (broken wires) and corrosion. The rope suspension and connection systems must also be examined for signs of deformation or wear.

Check the rope suspensions and mountings with press-fit sleeves the same way. Check the sleeve for cracks in the sleeve material as well as for possible slipping of the wire rope in the sleeve.

Detachable rope suspension systems (cotters, rope clamps) must be checked for broken wires inside and beneath the mount or fastening; it must also be examined whether the cotters and screwed-on rope clamps are firmly connected to the rope. This check should also ensure that the requirements of the rope suspension and fastening system standards and procedural guidelines are complied with.

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2.5 Take-down criteria

The safe use of the rope is assessed in accordance with the following criteria:
1. Number of broken wires
2. Broken wire nests
3. Broken wire growth rate
4. Strand breaks
5. Rope diameter reduction, including the reduction caused by damage to the rope core
6. External and internal wear
7. External and internal corrosion
8. Deformation
9. Damage caused by the effects of heat or arc welders

These individual factors must be taken into consideration in accordance with the relevant criteria during all examinations. However, rope quality deterioration frequently results from a combination of the individual factors, meaning that a worsening effect occurs that must be detected by an expert and who has influence regarding the decision as to whether the rope has reached its rope removal limit and whether it can continue to be used.

The inspector must investigate if the deterioration has been caused by a fault in the system; if this is the case remedial action should be recommended before placing a new rope.

2.5.1 Number of broken wires

The number of broken wires must be determined by visually inspecting the entire length of the rope. When a wire break is found, sections that are 30 × d (d = nominal rope diameter) in length are marked at both sides of this point. These sections must be examined extremely carefully. All broken wires are now carefully counted in each section. Please compare the number of visible broken wires with appendix 4. If the number of visible broken wires is less than the number specified in the chart, then the area in which the most broken wires are found is marked over a length of 6 × d. Count the number of visible broken wires again. Compare the result with appendix 4. When the number of visible broken wires is less that noted in the chart, then the rope does not need to be taken down yet.

Note
Defining the interval until the next inspection
▶ The interval until the next inspection is set depending on the number of visible broken wires.

2.5.2 Broken wire nests

If the broken wires are extremely close together and form wire nests, the rope must be taken down. If the frequency of such broken wires occurs over a rope length of less than **6d** or is concentrated on one strand, taking the rope down is recommended, even if the number of broken wires is less than the maximum number specified in the tables.

2.5.3 Broken wire growth rate

For applications in which the main reason for damage to the rope is material fatigue, the first broken wires will not occur until a certain time has elapsed, but the number of broken wires will increase rapidly at ever-decreasing intervals.

Careful checking and logging of the increased number of broken wires over time is recommended in these cases.

2.5.4 Strand breaks

If an entire strand breaks, the rope must be taken down.

2.5.5 Reduction in rope diameter caused by damage to core rope

The rope diameter can be reduced as a result of damage to the core because of:
1. Internal wear and notching

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2. Internal wear due to friction between individual strands and wires in the rope, particularly if it is subjected to bending
3. Steel core breakage
4. Break in internal layers of multi-strand ropes

If the rope diameter (average of two diameter measurements) is reduced by 3 % of the nominal diameter (rotation resistant ropes) or 10 % of the nominal diameter of other ropes due to these factors, the ropes must be taken down, even if no broken wires are visible.

Note
Diameter of new ropes
▶ New ropes can have an actual diameter that is greater than the nominal diameter, meaning that proportionally greater wear is possible.

2.5.6 External wear

Abrasion of outer wires of outer rope strands as a result of rubbing contact under pressure with the grooves in the rope reels and drums. This condition is particularly evident in moving ropes in the areas in which they come into contact with rope pulleys when the load is being moved and braked, and manifest themselves as flattened surfaces on the outer wires. Wear is increased by lack of or incorrect lubrication and the effect of dust.

Wear reduces the breaking strain of steel ropes because the cross section of the steel is reduced. The rope must be taken down if the actual rope diameter has reduced by 7 % or more because of outer wear, even if no broken wires are visible.

2.5.7 External and internal corrosion

Corrosion is a particular problem in maritime climates and atmospheres that are polluted by industrial emissions, reducing breaking strain and accelerating material fatigue because of the reduction in the rope material cross section, leading to irregular surfaces which are the starting point for stress cracks. Extreme corrosion can reduce the elasticity of the rope.

1. External corrosion
   Corrosion of the outer rope wires can be determined by visual inspection.
2. Internal corrosion
   This condition is more difficult to detect than external corrosion.

Note
Internal corrosion
▶ If there are any signs of internal corrosion the rope must be checked by a competent expert.

DANGER
Occurrence of internal corrosion!
▶ If the suspicion of extreme internal corrosion is confirmed, the rope must be taken down immediately.

2.5.8 Rope deformations

A visible change to the rope structure is referred to as „rope deformation“ and can cause a change at the deformation point that results in irregular rope tension.

A distinction is made between the following important types of rope deformation on the basis of the rope appearance (see following sections):

1. Corkscrew-like deformation
2. Basket formation
3. Strands protruding from the rope
4. Wire loop formation
5. Flattening
6. Reverse bends or knots

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7. Kinks

Corkscrew-like deformation (see appendix 3, table 1)

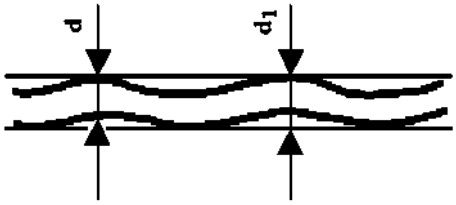

Fig.195723: Corkscrew-like deformation

If there is any corkscrew-like deformation the rope must be taken down if the following condition is met:

$$d_1 > \frac{4\,d}{3}$$

Fig.195722

d = nominal diameter of rope
$\mathbf{d}_1$ = rope sheath diameter of the distorted rope

Basket formation (see appendix 3, table 2)

If there are kinks in the rope it must be replaced immediately.

Strands protruding from the rope (see appendix 3, table 3)

The rope must be replaced immediately if this kind of deformation occurs.

Wire loop formation (see appendix 3, tables 4 and 5)

In this case, certain wires or groups of wires protrude from the rope at the side facing the rope pulley in the form of loops - this is normally the result of sudden strain. If serious deformation occurs, the rope must be taken down.

Flattening (see appendix 3, tables 8 and 9)

Flattening is the result of mechanical damage; if it is pronounced the rope must be replaced.

Reverse bends or knots (see appendix 3, tables 6 and 7)

If the rope has any reverse loops or knots it must be taken down immediately.

Kinks (see appendix 3, table 10)

Kinks are angled deformations in the rope caused by external influences. If there are kinks in the rope, it must be replaced immediately.

2.5.9 Damage caused by the effects of heat or arc welders

Steel ropes that have been subjected to extremely high temperatures, which can be detected externally because of the coloring that it causes, must be taken down.

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2.5.10 Distortion on non-rotation resistance control ropes

Note

▶ The erection and control procedure must be carried out with a pretension of at least 10 % of the maximum rope pull.

For crane types with control winches for the boom control, especially the first rope layer of the control winch must be checked for rope dents and / or rope distortions.

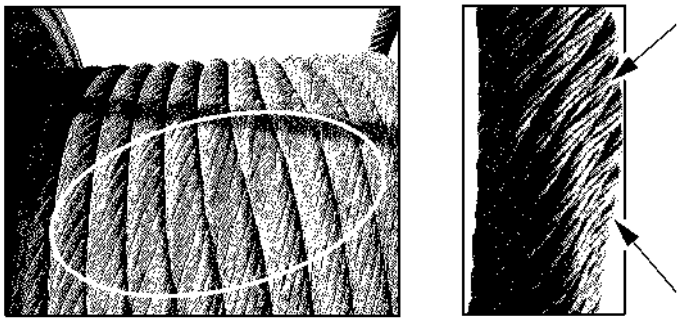

Fig.114002: Distortions on control ropes

- At a distortion of more than 5 %, the control rope must be checked before every assembly and erection procedure and the distortion must be documented. Example for inspection protocol: See Addendum 2.
- At a distortion of more than 10 %, the control rope must be taken down.

Calculation formula for rope distortion

$$[V]\,\% = \frac{(d_{max} - d_{min})}{d} \times 100$$

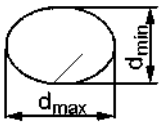

Fig.114001

[V] % = rope distortion in %

d = control rope nominal diameter

$\mathbf{d}_{max}$ = largest diameter of distortion area

$\mathbf{d}_{min}$ = smallest diameter of distortion area

3 Operating behavior of steel ropes

Exact logging of information by the checker can be useful for predicting the behaviour of a certain type of steel rope on a crane. This information is useful for planning and adapting maintenance instructions and controlling the stocking of spare ropes. The use of such a prediction system should not cause the examinations to be less strict or the rope usage time to be extended beyond the criteria that are specified in the previous sections of this guideline for monitoring and taking down of crane ropes.

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4 Condition of equipment that is functionally associated with the rope

Note
Groove radius
▶ The radius must not be smaller than the actual diameter of the rope.

Rope drums and pulleys must be checked at regular intervals in order to ensure that all these components rotate correctly in their bearings. Stiff or blocked rope pulleys wear rapidly and unevenly and cause serious rope abrasion. Ineffective compensation pulleys can lead to irregular rope tension. The radius at the bottom of the rope grooves of all rope pulleys and the drum must be suitable for the nominal diameter of the rope. If the radius has become too big or too small, then the rope groove must be reworked or the rope pulley replaced.

5 Rope inspection log

The user must provide a log for each of the regular inspections in which all rope inspection information is recorded. Typical example of a log - see appendix 2.

6 Rope storage and marking

Clean, dry rope storage facilities must be provided in order to prevent damage to ropes that are not in use; it must also be ensured that the ropes can be clearly and unambiguously assigned to their checking logs.

7 Wire ropes and rope end connections

DANGER
Danger of accident!
▶ Correct choice and use of the wire rope and the rope end connections are a decisive precondition for proper and accident-free crane operation.

The wire ropes and rope end connections selected in accordance with their usage. It must be determined whether a rotation-resistant or non-rotation free rope is required. The type of rope that is selected then determines the type of rope end connections that are used.

7.1 Rotation-resistant ropes and their rope end connections

Rotation-resistant ropes are special ropes that produce extremely little torque and twisting at the rope end connection when they are under strain.

Note
▶ Rotation-resistant ropes are used as **hoist ropes**.

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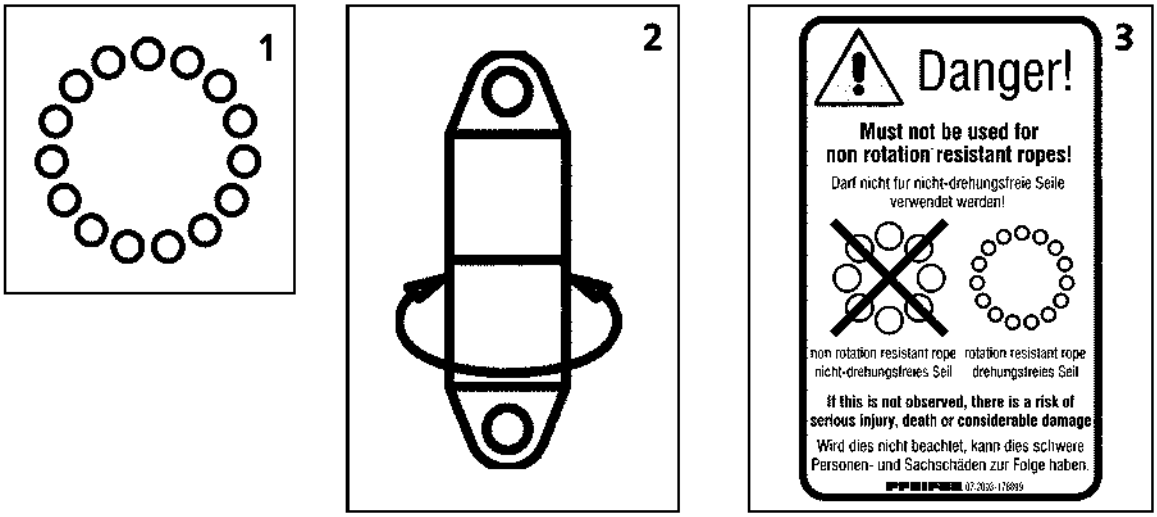

Fig.195653

Typical rotation-resistant wire rope structures are ropes with 15 to 18 outer strands. Rotation-resistant ropes are symbolically depicted with 15 outer strands (circles) (see table **1**).

Rotation-resistant ropes can be optionally used with the following rope end connections:
- Rope end connection **rotating** in the form of a PFEIFER link **with** swivel or spin stabiliser / swivel.
- Rope end connection **non-rotating** in the form of a PFEIFER link **without** swivel or gib and cotter.

If possible, preference should be given to the use of a twisting rope end connection to reduce torsional stress with **rotation-resistant ropes** (see table **2**).

DANGER
Danger of severe injuries to personnel and property damage!
▶ **Never** use rotating rope end connections with non-rotation free ropes!

Note
Usage warning notes
▶ The usage warning notes on the rotating PFEIFER link with pulley indicates that this rope end connection may **not** be used for non-rotation free ropes (see table **3**)!

7.2 Non-rotation free ropes and their rope end connections

Non-rotation free ropes generate high torque levels at the rope end connection when they are under load. For this reason, the rope ends must be protected from twisting using an appropriate rope end connection to prevent the rope from unscrewing under strain!

Note
▶ Non-rotation free ropes are used as **guy ropes** or **control ropes**.

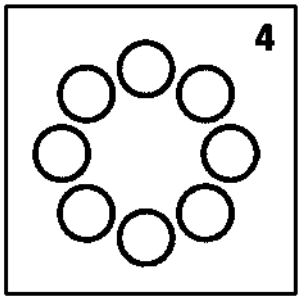

Fig.195654

Typical non-rotation free wire rope structures are ropes with 8 to 10 outer strands. Twisting ropes are symbolically depicted with 8 outer strands (circles) (see table **4**).

Non-rotation free ropes can only be used with the following rope end connections:

– Rope end connection **non-rotating** in the form of a PFEIFER link **without** swivel or gib and cotter. A non-rotation free rope end connection is also the mounting of the rope on the fixed point of the winch drum.

DANGER

Danger of severe injuries to personnel and property damage!

▶ **Never** use rotating rope end connections with non-rotation free ropes!

▶ Never install a twist compensator / swivel!

Note

Usage warning notes

▶ The usage warning note on PFEIFER links without swivel and cotter indicates that this rope end connection may **not** be used for non-twist free ropes **in combination** with a twist compensator / swivel (see table **5**)!

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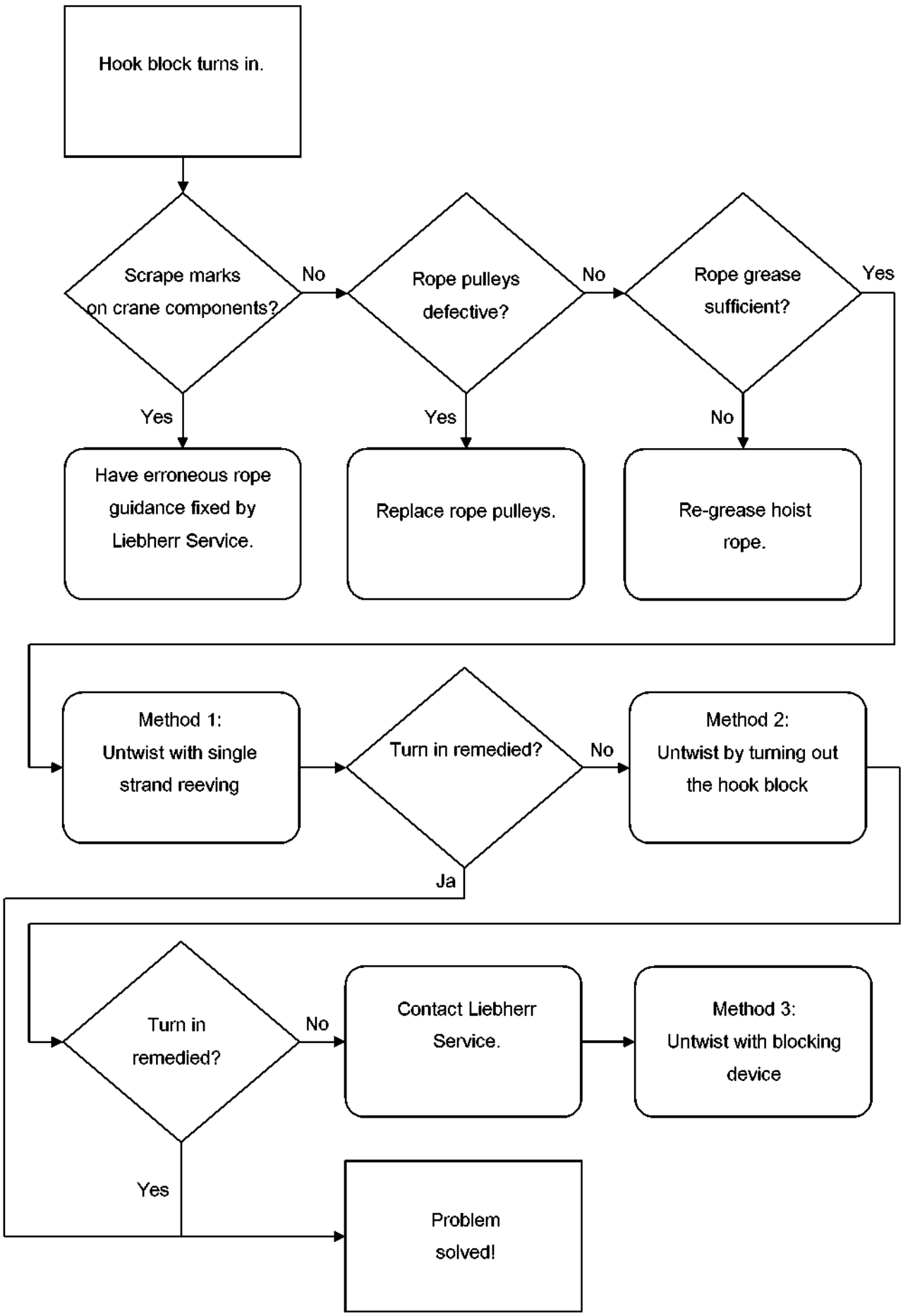

Fig.106181

8 Twisting caused by stretching in rotation-resistant ropes and its remedy

For procedure, see illustration opposite.

WARNING
Damage to the rope!
▶ Please proceed with extreme caution when performing the following actions.
▶ Observe the following instructions exactly.

8.1 General

The cause for the turn-in of the hook block can have various reasons. For that reason, check the crane first 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 pathway and rectify.
– 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 exchanged.
– Rope greasing: Has the hoist rope been sufficiently greased? If the rope surface is dry, the hoist rope must be re-greased.

If the crane does not display other features, the hoist rope must be spun out. Following, two methods are described by which the hoist rope can be spun out. The methods must be applied in the described sequence.

8.2 Turning out extremely rotation-resistant hoist ropes

8.2.1 Method 1: Spinning out with one strand reeve

1. Reeve in the one strand hoist rope.
2. Extend the boom to the maximal boom length and hook height.
3. Lower hooks to approximately 1 m above the ground and allow the hoist rope to spin out.
4. With an empty hook block, carry out one complete hoist cycle.
5. Lower the hook again to approximately 1 m above the ground and allow the hoist rope to spin out again.
6. Reeve the number of strands of hoist rope carefully and spin free where the twisting of the hook block is largest.
7. Carry out at least two complete hoist cycles at maximum boom length and hook height, in order to divide the spin out onto the entire rope length.

If the hook block turns in further, method 2 must be used.

8.2.2 Method 2: Spinning out by turning out the hook block

1. The hook block is reeved where the largest number of strands are twisted.
2. Extend the boom completely and lower the hook block.
3. Attach a load of approximately 10 % of the nominal rope pull on the hook block.
4. Before lifting the load, an assistant must carry out the following measures: Rotate the twisted hook block to a straight position by hand until the rope strands no longer touch each other.
5. Rotate the hook block further by a complete revolution, the rope strands touch each other again.
6. Hold the hook block in the prescribed position until the load lifts off the ground.
7. **NOTICE:**
   When the hook block comes under load, it will attempt to rotate back to a straight position. Release the hook block.
8. Move the load until approximately 15 m before the uppermost hook position of the completely extended boom.

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9. Lower load and set it down. The twisting should now be remedied.

If the hook block turns in further, then the process must be repeated. If this does not remedy the problem, contact Liebherr Service.

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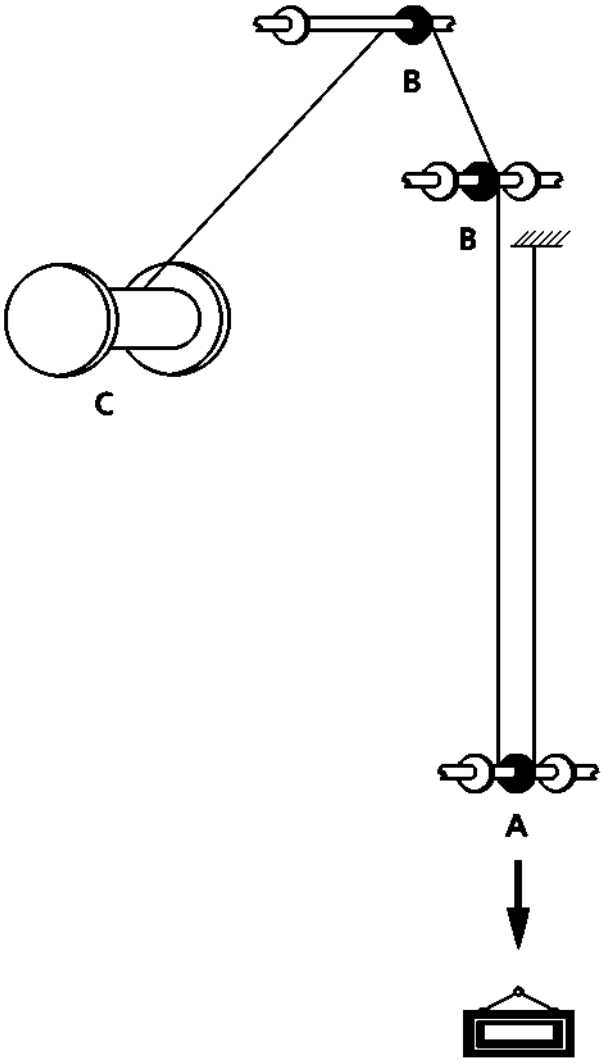

Fig. 1

Fig.193940

A Hook block **B** Rope pulley **C** Rope drum

9 Appendix 1

Diagram of possible defects with reference to different issues that must be considered during the inspection:

1. Check rope end connection at rope drum.
2. Examine for incorrect spooling up, which causes deformation (crushing) and wear, which can have serious consequences at rope crossing points
3. Examine for broken wires
4. Check for corrosion
5. Look for deformation as a result of hook block loading
6. Inspect parts of rope that run over rope pulleys for broken wires and wear
7. Rope suspension and rope mountings:
   - Check for broken wires and corrosion
   - Also inspect parts of rope that run on or next to compensating pulleys
8. Look for deformation
9. Check rope diameter
10. Carefully check length of rope that runs through the lower block, particularly the part that rests on the rope pulley under strain
11. Check for broken wires and surface wear
12. Check for corrosion

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Datasheet for ropes	Machine: ..... Application: .....
Construction:	Date fitted: .....
Direction of rope lay: RH / LH [1]	Date discarded: .....
Type of lay: Ordinary / Langs [1]	
Nominal diameter:	Minimum breaking load: .....
Tensile grade:	Working load: .....
Quality: ungalvanized / galvanized [1]	
Type of core:	Diameter measured: .....
steel / natural or synthetic textile / mixed [1]	under a load of: .....
Preformation:	
Length of rope:	
Type of termination:	

Visible broken wires		Abrasion of outer wires	Corrosion	Reduction of rope diameter	Positions measured	Overall assessment	Damage and deformations
Number in length of 6 d	Number in length of 30 d	Degree of deterioration [2]	Degree of deterioration [2]	%		Degree of deterioration [2]	Nature

	Date: ..... Signature: .....
Rope supplier:	Number of working hours: .....
Other observations:	Reasons for discard: .....

[1] Delete as applirope
[2] In these columns, describe the latter as: slight, medium, high, very high, discard.

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Fig.105034

10 Appendix 2

Typical example for an inspection log

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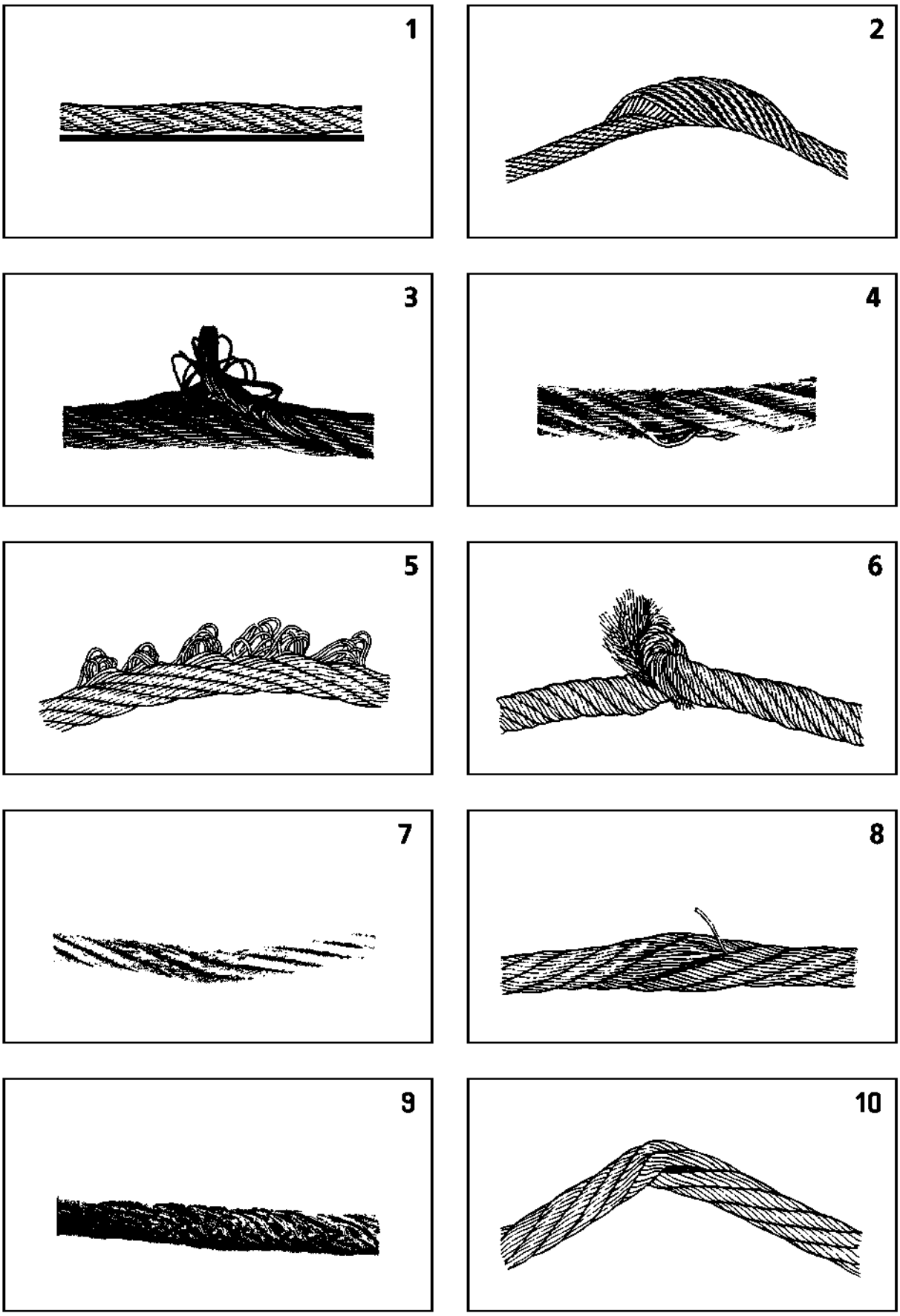

Fig.194071

11 Appendix 3

Note
Depiction of deformation
The deformation that is depicted on many pictures is exaggerated in order to show it more clearly.
▶ The ropes that are shown would have had to be taken down long before they reached this stage.

Typical examples of damage that can occur to wire ropes:

- Picture **1**:
  Corkscrew-like deformation: Deformation where rope is in the form of a spiral along its longitudinal axis.
  The rope must be taken down if the deformation exceeds the value that is mentioned in chapter „Take-down criteria“, section entitled „Corkscrew-like deformation“.
- Picture **2**:
  Basket formation on a multi-strand rope.
  Reason for immediate rope take-down.
- Picture **3**:
  Steel core rope exit, generally in combination with basket formation in the immediate vicinity.
  Reason for immediate rope take-down.
- Picture **4**:
  Only one strand is affected by loop formation, although the examination of a longer section of rope shows that the deformation is visible at regular intervals; normally deformation along the length of a lay.
  Reason for immediate rope take-down.
- Picture **5**:
  Serious worsening of the previous problem (see picture **4**) (typical of hoist rope in a ram system).
  Reason for immediate rope take-down.
- Picture **6**:
  A serious reverse bend or knot.
  Note the destroyed lay that leads to the exit of the fibre layer.
  Reason for immediate rope take-down.
- Picture **7**:
  A wire rope that has been kinked during installation but still taken into operation, and now suffers from localised wear and substandard rope tension.
  Reason for rope take-down.
- Picture **8**:
  Crushing as a result of local mechanical damage causing imbalance beneath the strands, resulting in broken wires.
  Reason for rope take-down.
- Picture **9**:
  Crushing of a multi-strand rope caused by incorrect spooling up on the rope drum.
  Note increase in length of outer strands of lay. Here too, imbalance would occur under load.
  Reason for rope take-down.
- Picture **10**:
  Example of serious kinking.
  Reason for rope take-down.

12 Appendix 4

Guideline for number of broken wires in accordance with ISO 4309

for power train classification groups M1, M2, M3 and M4

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Note
- ▶ The determining factor for the rope removal limit due to the number of visible broken wires is the rope category number **RCN** stated in the rope certificate.
- ▶ Listed in the following charts is data for the number of visible broken wires for various rope category numbers **RCN**.
- ▶ For data for additional rope category numbers **RCN**: see DIN ISO 4309:2010-06.

12.1 Hoist ropes

Rope category number RCN	Rope diameter	Number of visible broken wires requiring rope removal, over a length of	
		6 x rope diameter	30 x rope diameter
23-2	See chapter 1.03	5	10

Excerpt from DIN ISO 4309:2010-06, Chart 4

Note
- ▶ If a rotation-resistant hoist rope is placed on winch 5, then it can be used for the jib adjustment or as a hoist rope for the boom nose!

WARNING
Use of hoist rope as control rope!
Frequent jib adjustment movements with a rotation resistant hoist rope lead to significant wear and require premature take down of the hoist rope!
If it is not recognized in time that the rope needs to be taken down, the hoist rope can rip!
The crane can topple over and personnel can be severely injured or killed!
- ▶ In case of frequent jib adjustment movements, a non-rotation free control rope must be placed!
- ▶ Make sure that no spin stabilizer / swivels are used as rope end connections when using a non-rotation free control rope!
- ▶ Remove spin stabilizer or swivels!

12.2 Control ropes

Note
- ▶ Rope for boom adjustment and boom guying!

Rope category number RCN	Rope diameter Lang's lay	Number of visible broken wires requiring rope removal, over a length of	
		6 x rope diameter	30 x rope diameter
09	See chapter 1.03	9	18

Excerpt from DIN ISO 4309:2010-06, Chart 3

WARNING
Non-rotation free control ropes can rip off!
If a non-rotation free control rope is used in connection with a rotating rope end connection, the rope damage can occur or the control rope can rip off!
The crane can topple over and personnel can be severely injured or killed!
- ▶ Make sure that no spin stabilizer / swivels are used as rope end connections when using a non-rotation free control rope!
- ▶ Remove spin stabilizer or swivels!

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12.3 Assembly ropes

Note
▶ Ropes for auxiliary winches!

Rope category number RCN	Rope diameter	Number of visible broken wires requiring rope removal, over a length of	
		6 x rope diameter	30 x rope diameter
22	See chapter 1.03	4	8

Excerpt from DIN ISO 4309:2010-06, Chart 4

12.4 Telescoping ropes and return ropes

Note
▶ Ropes for telescopic boom with rope mechanism!

Rope category number RCN	Rope diameter Lang's lay	Number of visible broken wires requiring rope removal, over a length of	
		6 x rope diameter	30 x rope diameter
04	See chapter 1.03	5	10

Excerpt from DIN ISO 4309:2010-06, Chart 3

12.5 Band ropes Ballasting

Note
▶ Rope for lifting and lowering the counterweight!

Rope category number RCN	Rope diameter Lang's lay	Number of visible broken wires requiring rope removal, over a length of	
		6 x rope diameter	30 x rope diameter
06	See chapter 1.03	6	13

Excerpt from DIN ISO 4309:2010-06, Chart 3

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Fig.195219

1 Hydraulic hose lines

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

1.1 Intervals for inspection

The inspection of hydraulic hose lines must be carried out in the following intervals:
– When the crane is **maximum 10 years** old, at least one inspection per year
– When the crane is **older than 10 years**, at least one inspection every six months

1.2 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, such as temperature, humidity, corrosive air
– Use
– Working cycles
– Number of bending cycles
– Friction
– Fluid

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The following factors reduce the life expectancy significantly:
– Heat
– Repeated bending under pressure

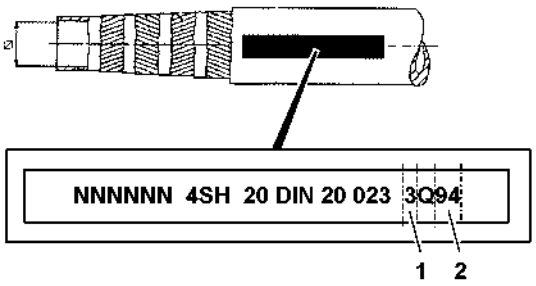

Fig.120159: Example for identification of hydraulic hose lines

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.

1.3 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 hydraulic hose lines are protected with a protective hose:
▶ Check the protective hose for 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.

1.4 Inspecting the hydraulic hose lines for leaks

▶ Check the crane for escaped hydraulic oil.
▶ Check the ground under the crane for leaks.

When the hydraulic system leaks:
▶ Have these leaks inspected immediately by authorized and trained expert personnel and remedied.
or
Contact Liebherr Service.

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1.5 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:
– 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.

1.6 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. Overbending. 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.

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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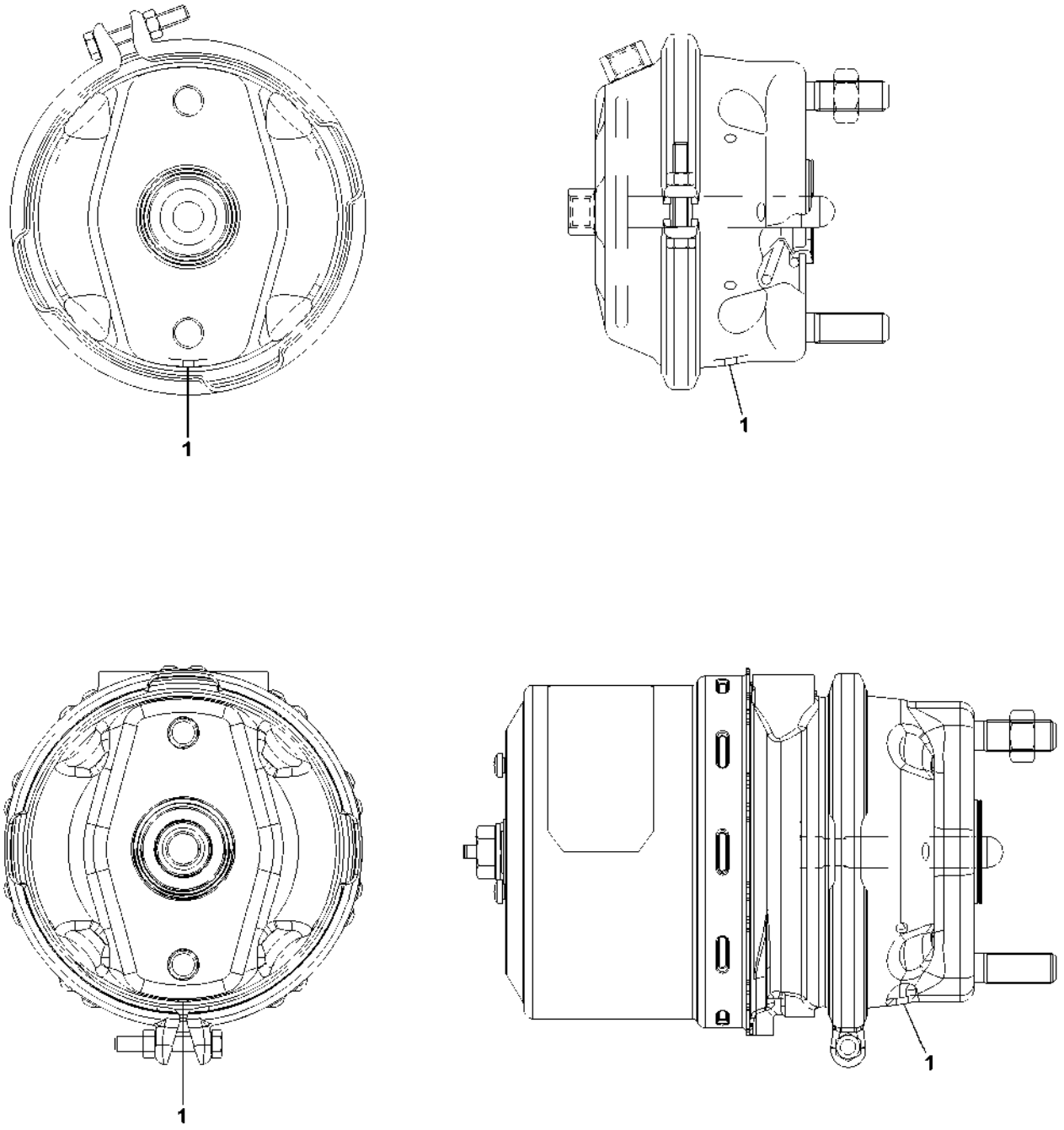

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Fig.103653

1 General

DANGER
Danger of fatal injury due to erroneous maintenance or repair on the wheel brake!
Incorrect maintenance or repair of the wheel brake can cause serious traffic accidents and subsequent death.
- ▶ All wheel brake maintenance and repair work may only be carried out by authorized and trained expert personnel!
- ▶ Use only original Liebherr spare parts!
- ▶ After completion of work on the brake system, carry out a brake function test on all wheels! If possible, we recommend a function test on the brake test bench.

The air disk brake systems on mobile cranes must be inspected annually.

In Germany, the main inspection and safety tests must be conducted in accordance with § 29 of STVZO.

The corresponding national regulations apply for other countries.

2 Visual inspection

Check that the following requirements are met:
- Pipe and hose lines are not damaged, not corroded and are properly routed
- Devices are properly installed and fastened
- The air pressure tank is not damaged and no external corrosion is visible
  The tank is labeled as specified.
  No welding nor heat treatments be conducted on the tank walls.
- Water has been removed from the air pressure tank
- Dust seals are not damaged
- The wheel brakes are properly adjusted (vent clearance, brake cylinder stroke, lining thickness)

DANGER
Danger of accidents due to overheating wheel brake!
If the lower breather bore **1** is closed, the wheel brake can run hot!
- ▶ The lower breather bore **1** may never the closed!

3 Function and performance test

3.1 Function test

- **Pressure regulator**, **air cylinder**: Check turn on pressure, shut off pressure and delivery rate
- **Pressurized air system**: Check for leaks and supply pressure
- **Multi-circuit safety valve**, **overflow valves** and **warning device**: Check function

3.2 Performance test

Note
- ▶ The following values are valid for an axle load of 12 t.

Check the function of the wheel brake:
- Press down the brake pedal: Both brake shoes contact the brake disk
- Release the brake pedal: Brake shoes immediately return to their starting position

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Check effectiveness of wheel brake:
1. Measure delay
2. Measure brake path
3. Determine brake performance on brake test bench

3.2.1 Determine delay with a decelerometer

At an applied pressure of 6.5 bar , the measured average delay d_m should be larger than 4.5 m/s^2.

3.2.2 Measure brake path

At an applied pressure of 6.5 bar , the brake path **s** should be smaller than the value given in the chart.

Test speed v	Brake path s
20 km/h	6.5 m
30 km/h	12.5 m
40 km/h	19.8 m
50 km/h	29 m

3.2.3 Measuring the braking performance on the brake test bench

When the brake forces are measured on the vehicle axles, determine the brake performance 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 = brake performance [%]
F_1 = brake force of the first axle, which was determined at pressure p_1 [N]
F_2 = brake force of the second axle, which was determined at pressure p_2 [N]
F_n = brake force of last axle, which was determined at pressure p_n [N]
$p_{N1...n}$ = max. brake pressure of corresponding axle [bar]
$p_{1...n}$ = brake pressure, which is actually applied into the wheel cylinder at the corresponding axle [bar] during the brake test

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4 Internal inspection of the wheel brake

Note
Check the brake pads and the brake disks in regular intervals, depending on the vehicle use, during maintenance interval as well as within the framework of lawful regulations.
- ▶ Check the condition of the brake pads every 4 months.
- ▶ Check the condition of the brake disks every 12 months.
- ▶ At least every 24 months, replace the retaining springs as well as seal rings, caps and convoluted rubber gaiters.

4.1 Checking the brake pads

DANGER
Danger of fatal injury!
Worn brake pads or brake disks can lead to a reduction of the brake force or failure of the wheel brake. This can result in accidents with fatal injuries.
- ▶ Observe the wear limits of the brake pads and the brake disks!
- ▶ Replace worn brake pads or brake disks!
- ▶ Replace the wheel brake if significantly damaged or if the castings are worn (for example, if they show cracks)!
- ▶ Change burnt, slick or oily brake pads as quickly as possible!
- ▶ Always replace all the brake pads on each axle!

The brake pads are electrically monitored and can also be optically checked on the brake pads.

4.1.1 Checking the brake pads electrically

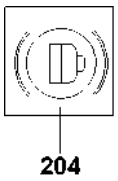

Fig.198008

If the warning light **204** on the display unit lights up, it is a sign that at least one brake pad on the crane is worn and has reached the wear limit.

To find the worn brake pad, see chapter 20.20.

DANGER
Danger of fatal injury in case of worn brake pads!
As soon as the warning light **204** lights up, the worn brake pads must be localized and replaced. If this is not done, the wheel brake can fail, which can cause fatal accidents, or the brake disks can be damaged.
- ▶ Replace worn brake pads!

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4.1.2 Checking the brake pads optically

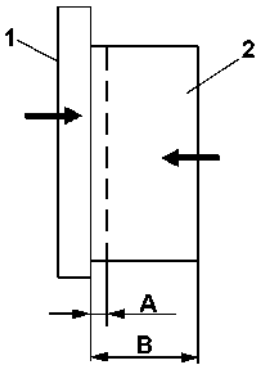

Fig.198001

DANGER
Danger of fatal injury in case of worn brake pads!
Replace brake pads no later than when the weakest point measures 2 mm of brake pad thickness over the brake pad carrier plate. The remaining pad thickness may not fall below 2 mm . If this is not done, the wheel brake can fail, which can cause fatal accidents, or the brake disks can be damaged.

- ▶ Replace worn brake pads!
- ▶ If the remaining pad thickness **A** is less than 2 mm it is imperative that the brake pads are replaced.

1 = Pad carrier plate

2 = Brake pad

	Component	Dimension
A	Remaining pad thickness	2 mm
B	Total pad thickness	23 mm

4.2 Checking the brake disks

4.2.1 Checking brake disk wear

DANGER
Danger of fatal injury!
Worn brake pads or brake disks can lead to a reduction of the brake force or failure of the wheel brake. This can result in accidents with fatal injuries.

- ▶ Replace worn brake pads or brake disks!
- ▶ If the brake disk reaches the wear limit of **D** = 33 mm , then it must be changed immediately!
- ▶ If the brake pad and the brake pad carrier plate reaches the minimum thickness of **H** = 11 mm , then the brake pad must be changed immediately!
- ▶ We recommend to change all the brake disks on each axle.
- ▶ Generally, after installing the new brake disks, we recommend to use new brake pads also.

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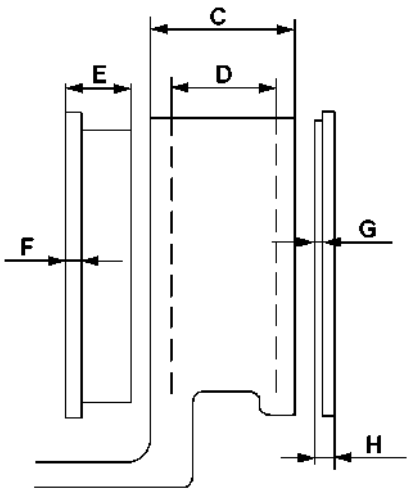

Fig.198002

Remove the brake pads and measure the brake disk thickness in the contact area of the brake pads.

	Component	Dimension
C	Total thickness of new brake disk	41 mm
D	Wear dimension limit brake disk	33 mm
E	Total thickness of new brake pad	32 mm
F	Brake pad carrier plate	9 mm
G	Minimum thickness of brake pad	2 mm
H	Absolute minimum thickness brake pad and brake pad carrier plate	11 mm

4.2.2 Checking brake disk condition

Check brake disks for cracks and surface condition as well as for maximum wear dimension.

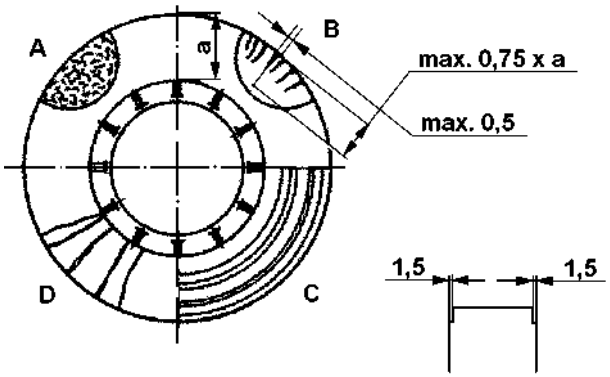

Fig.198003

a = Brake surface

	Irregularity	Evaluation
A	Net-like crack formation	permissible
B	Cracks running to hub center to maximum 0.5 mm width	permissible

	Irregularity	Evaluation
C	Irregularities of disk surface below 1.5 mm	permissible
D	Continuous cracks	impermissible

4.2.3 Checking brake disk impact

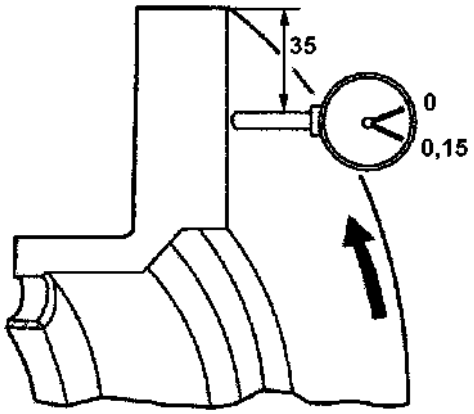

Fig.198004

DANGER
Risk of accident!
▶ If the brake disk impact exceeds the limit value of 0.15 mm , then the brake disk must be changed immediately!

– Attach the test gauge on the wheel brake carrier.
– With installed brake disk, check the brake disk impact by turning the wheel hub, see illustration.

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90 Appendix

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Fig.195219

1 Preface

This crane may only be used in 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 Changes and updates for Operating instructions

Changes and updates for Operating instructions, which you receive in the circular as Customer information, must be filed in the Operating instructions for the respective crane under chapter 90.05.

Note

Procedure after receiving customer information!

▶ Attach the decals **1**, which are enclosed in the customer information to the footer of the respective chapter. See following example.

▶ Fill out the update confirmation form in chapter 90.05 of the operating instructions,

▶ Insert changes and updates under chapter 90.05 of the operating instructions.

Fig.113870

Example:

A change or update affects the Crane operating instructions, chapter 2.04.

▶ Attach the decal **1** in the footer of chapter 2.04.

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Fig.195219

1 Update confirmation

Chapter	Change / update	Completed	
		on	by

LWE/LTM 1130-5-1-004/20502-04-02/en

2 Customer information

Empty page!

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