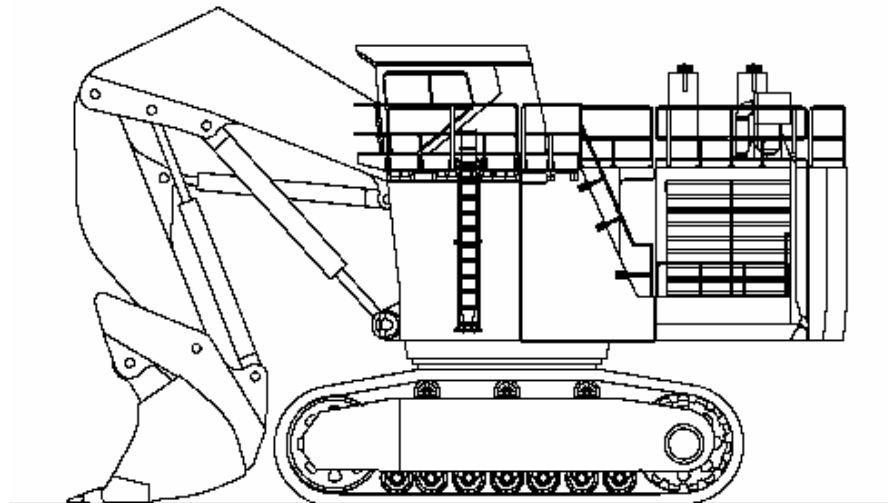
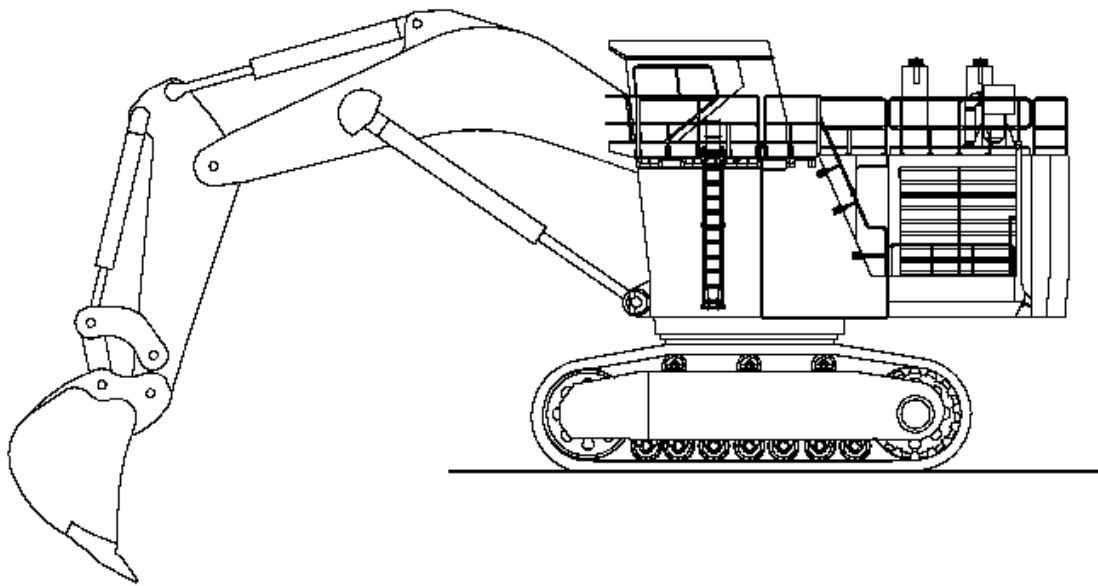
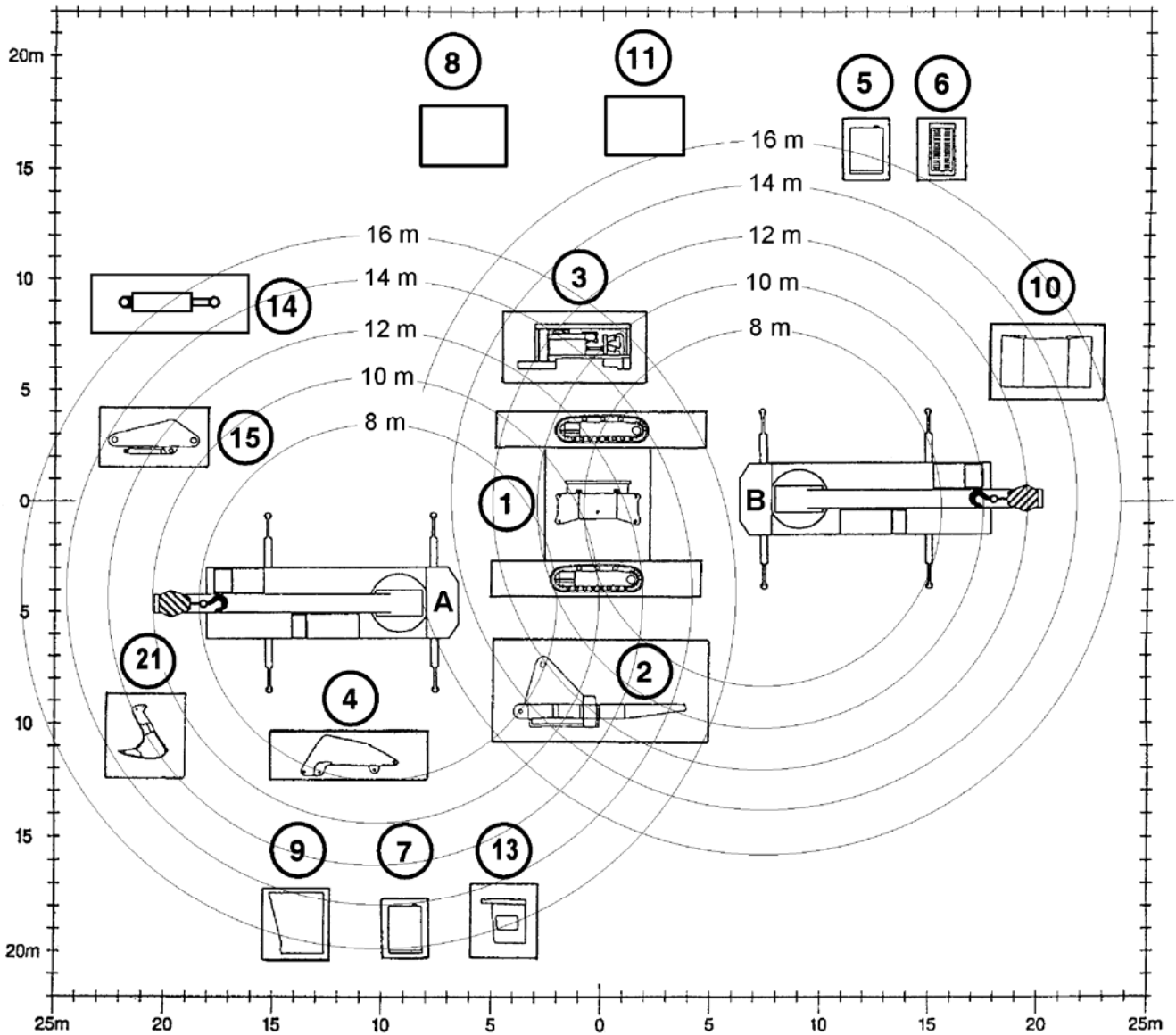


General Assembly Procedure

Hydraulic Mining Shovel PC4000





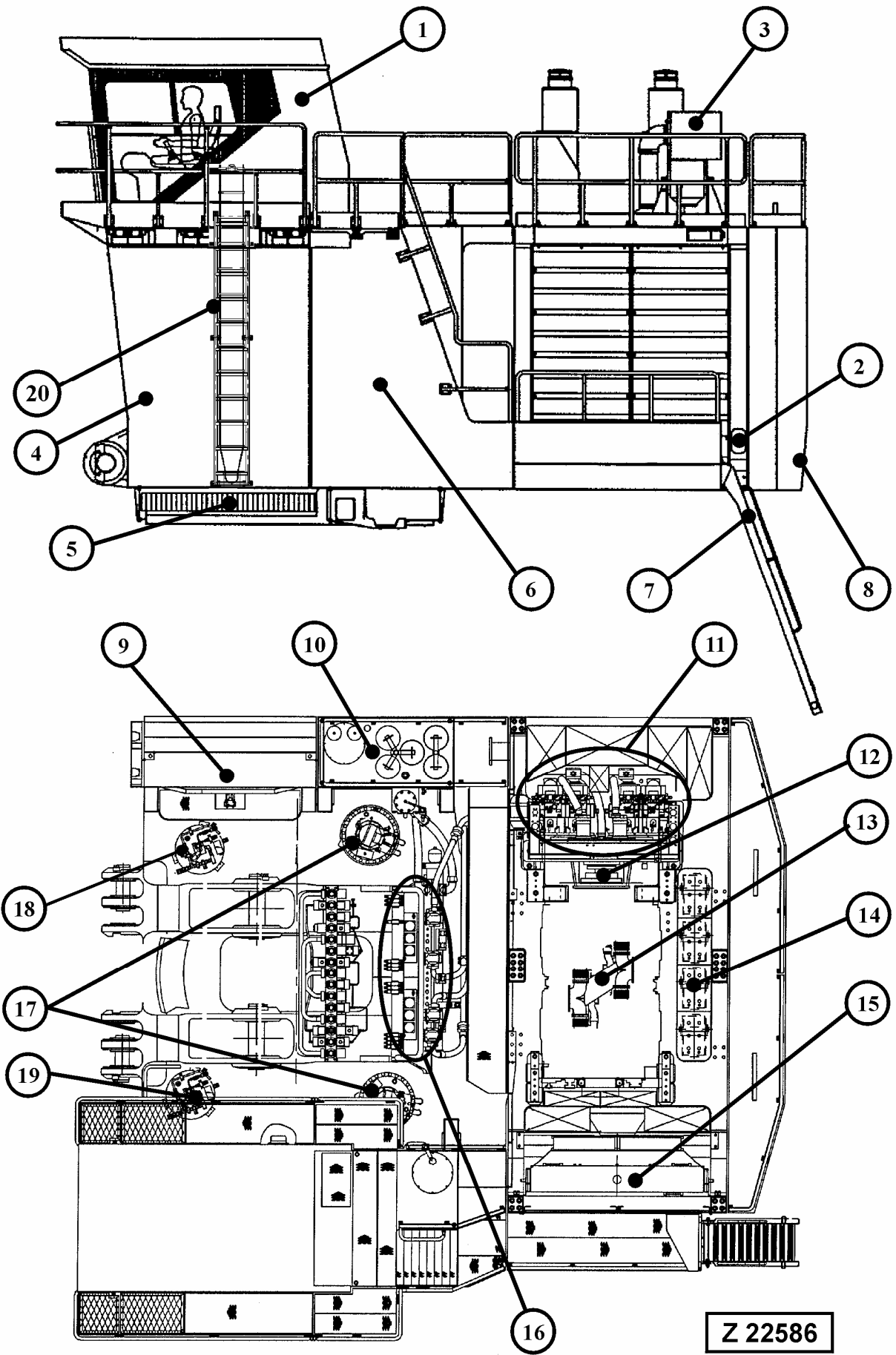
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All stated information corresponds to the present development and is subject to possible future changes without prior notice.

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2 cranes

1 crane

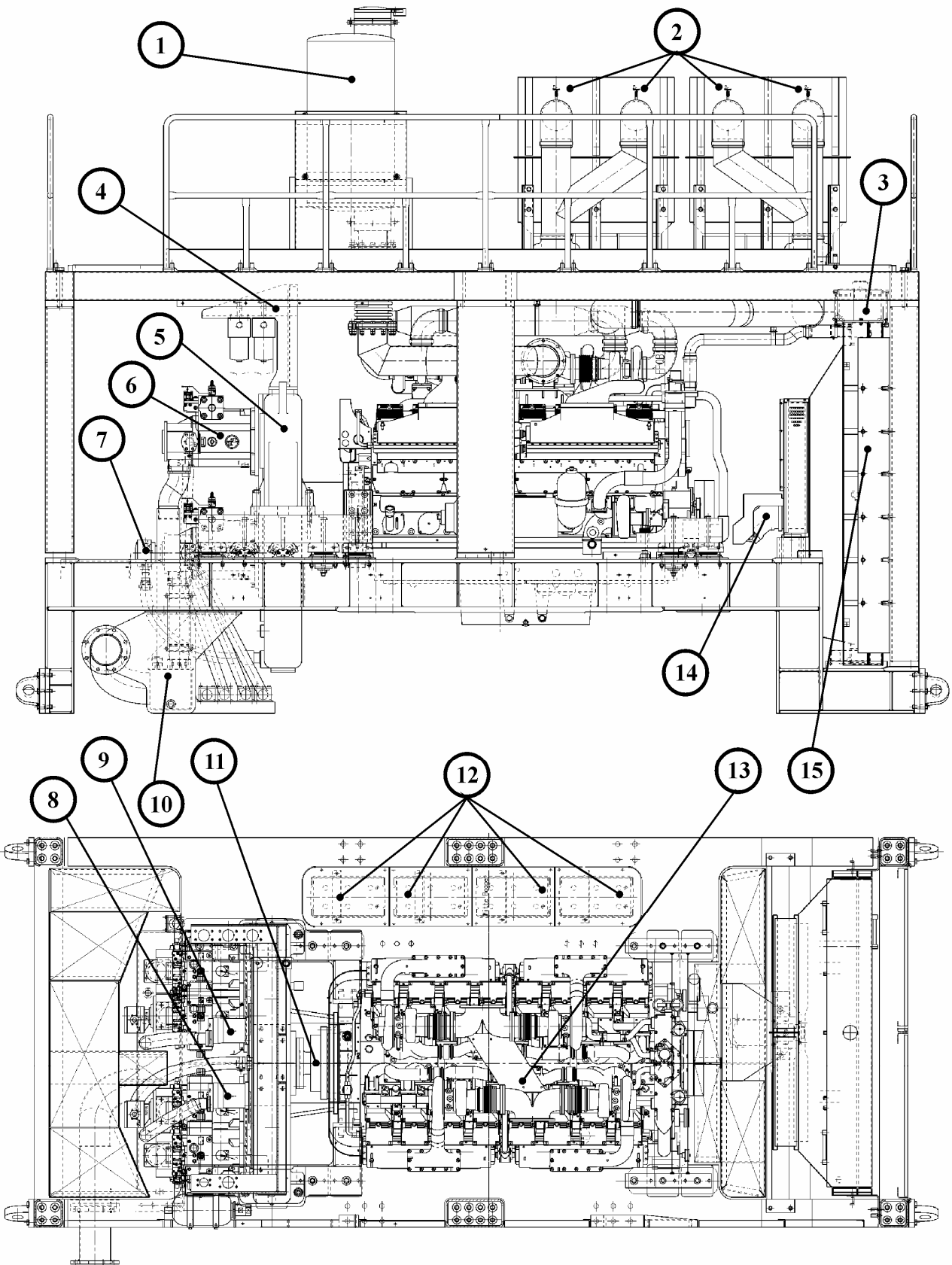


Z 22586

Z22586

1.1 Overview Superstructure (Z22586)

- (1) Operator's cab with Falling Object Protective Structure (FOPS)
- (2) Battery main switches
- (3) Air cleaner for engine
- (4) Cab support, contains the electric control system
- (5) Swing circle
- (6) Fuel tank
- (7) Hydraulically operated access ladder
- (8) Counter weight
- (9) Hydraulic oil cooler
- (10) Hydraulic oil reservoir
- (11) Power take off (PTO) with hydraulic pumps
- (12) Flexible coupling, oil filled
- (13) Diesel engine
- (14) Batteries
- (15) Radiator
- (16) Control valves with high pressure in-line filters
- (17) Swing machinery
- (18) Central lubrication system (CLS)
- (19) Swing circle pinion lubrication system (SLS)
- (20) Emergency escape ladder



Z21446

1.2 Overview Engine House (Z21446)

- (1) Exhaust mufflers
- (2) Engine air cleaner
- (3) Expansion tank for radiator
- (4) Central control and filter carrier
- (5) Power take off (PTO)
- (6) Main hydraulic pumps
- (7) Auxiliary piggyback hydraulic pumps
- (8) Hydraulic pump for radiator fan drive
- (9) Hydraulic pump for the hydraulic oil cooler fan drive
- (10) Suction oil reservoir
- (11) Flex coupling, oil filled
- (12) Batteries
- (13) Diesel engine
- (14) Hydraulic motor for radiator fan drive
- (15) Coolant radiator with fuel cooler section

2. General

2.1 Delivery of the Excavator

The excavator is being delivered disassembled into its main components. For the correct dimensions and weights please refer to the packing list of your machine.

For assembling the excavator follow the instructions in this manual.

2.2 Assembling of the Excavator



- **Personnel entrusted with work on the machine must have read the Assembly Manual, the Operation,- Lubrication- and Maintenance Manual and in particular the section on safety before beginning work. Reading the instructions after work has commenced is too late**

If there are any questions concerning the assembling procedure, contact your local Service Center.

Prior to first operation, inspect the excavator thoroughly with the Service Engineer responsible for the erection of the machine. Check all fluid levels according to the Lubrication and Maintenance Schedule.

Damages and defects caused by incorrect operation and maintenance are not covered by the manufacturers guarantee.



- **If the excavator is equipped with a fire suppression system, make sure that the system is ready for operation.**



- **Before assembling/disassembling, lifting or transporting this excavator contact your local Service Center for all the necessary instructions for safe and economic assembling/disassembling, lifting and transportation procedures of your excavator.**

The sequence of assembly as shown in this Manual. Disassembling is basically the reverse order of the assembling procedure.

2.3 Transportation and Lifting

The transport dimensions and weights of the excavator's components are listed in this manual are for general information only. For the correct dimensions and weights please refer to the packing list of your machine.

Observe the operating permits of the low-bed trailers used for transportation. They contain the permissible load, loading width and height.



- **Observe the federal, state and local laws and regulations for transportation of heavy units. Know the safety rules and laws before you transport this Excavator.**
- **Make sure the flat-bed trailer and the components of the Excavator are equipped with the correct safety devices.**
- **Secure the Excavator and all components transported on the trailer against movement.**
- **Use exclusively approved handling equipment.**
- **When lifting components make sure that the handling elements do not cause damage to the component.**
- **Secure the components safely before removing the lifting straps, ropes or chains.**



- Wear safety clothing, goggles, respirator and other safety devices, whenever working conditions make this necessary.
- Provide hoists of sufficient capacity to lift heavy units. Refer to the weight specifications.
- Be sure to observe the instructions in the "Assembly Procedure Manual".
- Lifting gear, tools and other suspension systems must be in good condition and of sufficient lifting capacity.
- Be sure hydraulic cylinders and attachment components are properly supported from hoist and securely fastened, before removing supporting pins.
- Floors must be clean and dry. After draining operations be sure all spillage is cleaned up.

2.4 Manpower / Assembly Time

Man Power (10 hour shift)		
1	Supervisor KMG or Dealer	15 days
6	Customer Mechanics	10 days
1	Operator Trainer	5 days depending on demand

Time Schedule		
	Responsible Dept.	10 Hours Day
Assembly	Service	8*
Setting and Test	Service	2
Customer Acceptance	Service	2
Operator Training	Techn. Support/ Application	5
Maintenance Training	Service	5

* Electric Drive Version 1 day longer

Schedule may change, depending on site preparation, man power, daily working hours and regulations.

Training time may vary, depending on knowledge and number of people.

2.5 Assembly Site Requirements

- Well leveled (not slanting) and compacted ground approx. 150 x 150 ft/ 50 x 50 m
- A container to store the tools, to keep the paper work and for sheltering
- 1 mobile crane 90 metric tons (1st to 3rd day)
- 1 mobile crane 60 metric tons (1st to 5th day)
- 1 mobile crane 25 metric tons (3rd to 7th day)
- 1 mobile hydraulic lift

Qty.	Specification	Designation
01	8 metric tons	Telescope fork lift
04	6 metric tons	Chain pull
04	35 metric tons	Shackles
04	5 metric tons t	Shackles
04	1 metric ton	Shackles
04	Piece M10 – M 30	Eye bolts
04	30 metric tons - 8 m length	Ropes
04	25 metric tons - 8 m length	Ropes
04	16 metric tons - 8 m length	Ropes
04	12 metric tons - 8 m length	Ropes
01	Ø 50 mm x 1000 mm length	Push bar
01	Ø 50 mm x 2000 mm length	Push bar
02	5 kg	Large hammer
30	300 x 300 x 1000 mm	Wooden blocks
10	300 x 300 x 2500 mm	Wooden blocks
02	10 – 50 metric tons	Hydraulic jacks
02	50 m	Cable drum
01	230/380 V	Emergency electricity generator or power connection
01	6 mm – 46 mm	Combination spanners
01	50 mm – 75 mm	Open end spanner
01	3/4"	Impact wrench
01	1 1/2"	Impact wrench
01	1/2"	Ratchet
01	3/4"	Ratchet
01	13 mm - 19 mm	Sockets for 1/2" Ratchet
01	24 mm - 36 mm	Sockets for 3/4" Ratchet
01	30 mm and 36 mm	Super heavy duty striking(slugging) wrench
01	0 - 7800 Nm	Hydraulic torque wrench PN 232 615 40)
01	300 - 750 Nm	Torque wrench (PN 232 262 40)
01	30 - 150 Nm	Torque wrench (PN 232 097 40)
01	1/2" 140 Nm	Cordless Impact Wrench

Yazaki Connector Set			
No.	Qty.	Designation	Part No.
1	2	Connector 3-pole	891 040 40
2	2	Connector 3-pole	891 032 40
3	2	Connector 2-pole	891 039 40
4	2	Connector 2-pole	891 031 40
5	2	Connector 1-pole	891 038 40
6	2	Connector 1-pole	891 030 40

Qty.	Specification	Designation
01	5, 6, 8, 10, 12, 14 mm	Screw driver sockets for 1/2" drive
01	14, 17, 19 mm	Screw driver sockets for 3/4" drive
01	2 up to 19 mm	Hex keys (Allen keys) L-type
01		Electric welding machine
01		Lights for the illumination of the working area
01		Hand lamp
01	13 mm Chuck and drill bit	Hand drill
07	600 bar	Pressure gauge
03	60 bar	Pressure gauge
03	25 bar	Pressure gauge
01	15 bar	Pressure gauge
02		Multi-meter (PN 232 619 40)
02		Cable set (PN 232 496 40)
01	0 - 2500 min-1	Contact less revolution indicator
02	1,5 mm ² 30 m	Cables with connectors
01	from M6 - M 36	Thread cutting set
01		Level gauge
01	Set	Yazaki connectors (refer to table at the back)
01	Set	Screw driver
04		Side cutter
01		Tip pliers
01		Combination pliers
01		Pipe pliers
01	Set	Cordless headphone intercom (PN 232 621 40)

* If available an electronic testing device for pressure, voltage and RPM, similar Hydrotechnic System 6000

For electric driven machines only

Qty.	Specification	Designation
01	5-10 kV Part No. 232 389 40 3-6 kV Part No. 232 390 40	Electronic unipolar voltage meter
01	Part No. 232 386 40	Universal grounding short-circuiting device
01	Part No. 232 387 40	Insulation tester
01	Part No. 232 388 40	Phase-sequence indicator
01	Part No. 232 593 40	Shock pulse measuring instrument
01	Part No. 232 594 40	Shock pulse transducer
01	Part No. 232 595 40	Shock pulse transducer
01	Part No. 793 827 73	Clip-on ammeter (1000A ac/dc)

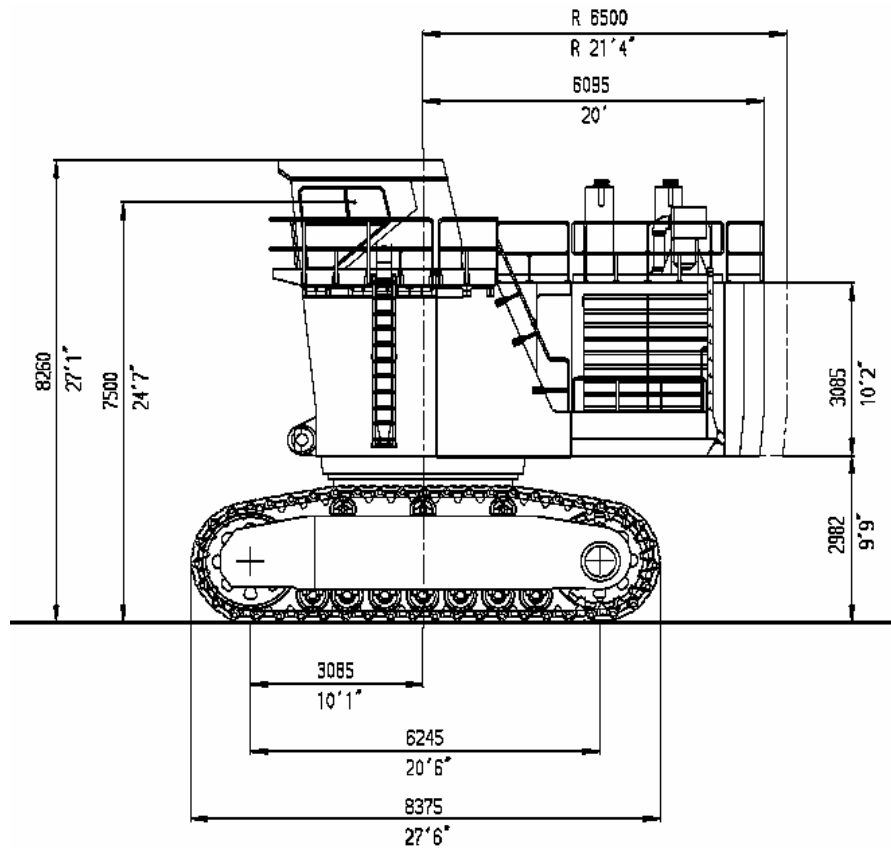
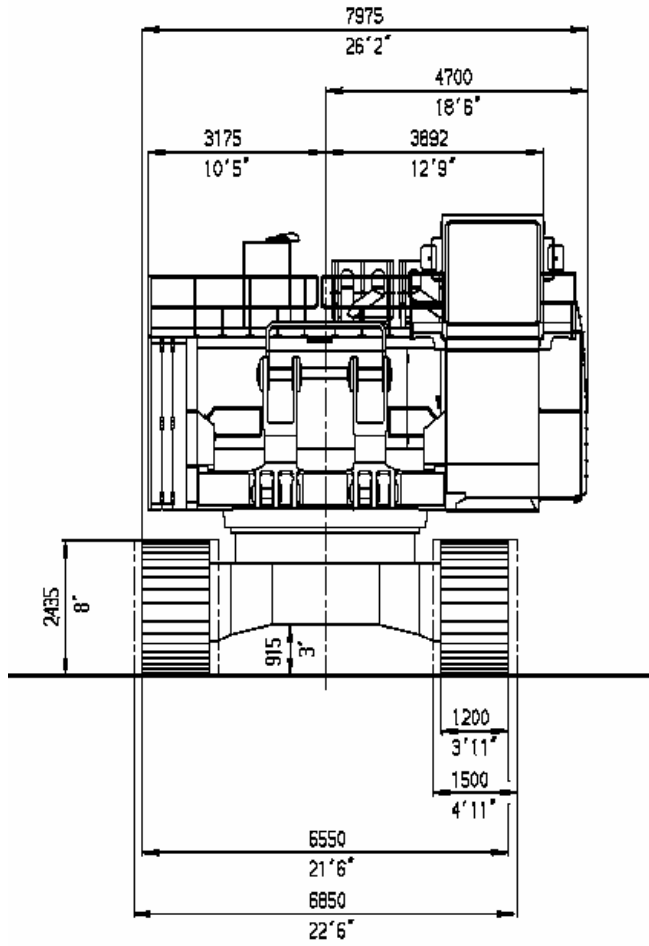
2.6 Space and Placing Requirements

On the following pages, the components are indicated in their approx. dimensions.

They are unloaded in a way that a min. space of 1 meter (3 ft) is left between the components, and that there is enough space for the trucks and the cranes.

2.7 Preparation for Assembly

- Unload all components so that no more move is necessary!
- All pins, bushings, borings, bearings and contact surfaces of components must be clean
- Torque values are listed in section 4.12 of the Lubrication- and Maintenance Manual - unless being listed in this Assembly Procedure Booklet.
- Obey all applicable safety and local regulations strictly!
- Ensure correct lifting procedures and ensure use of adequate lifting gears!
- High voltage installation works must be carried out by authorized specialists only.



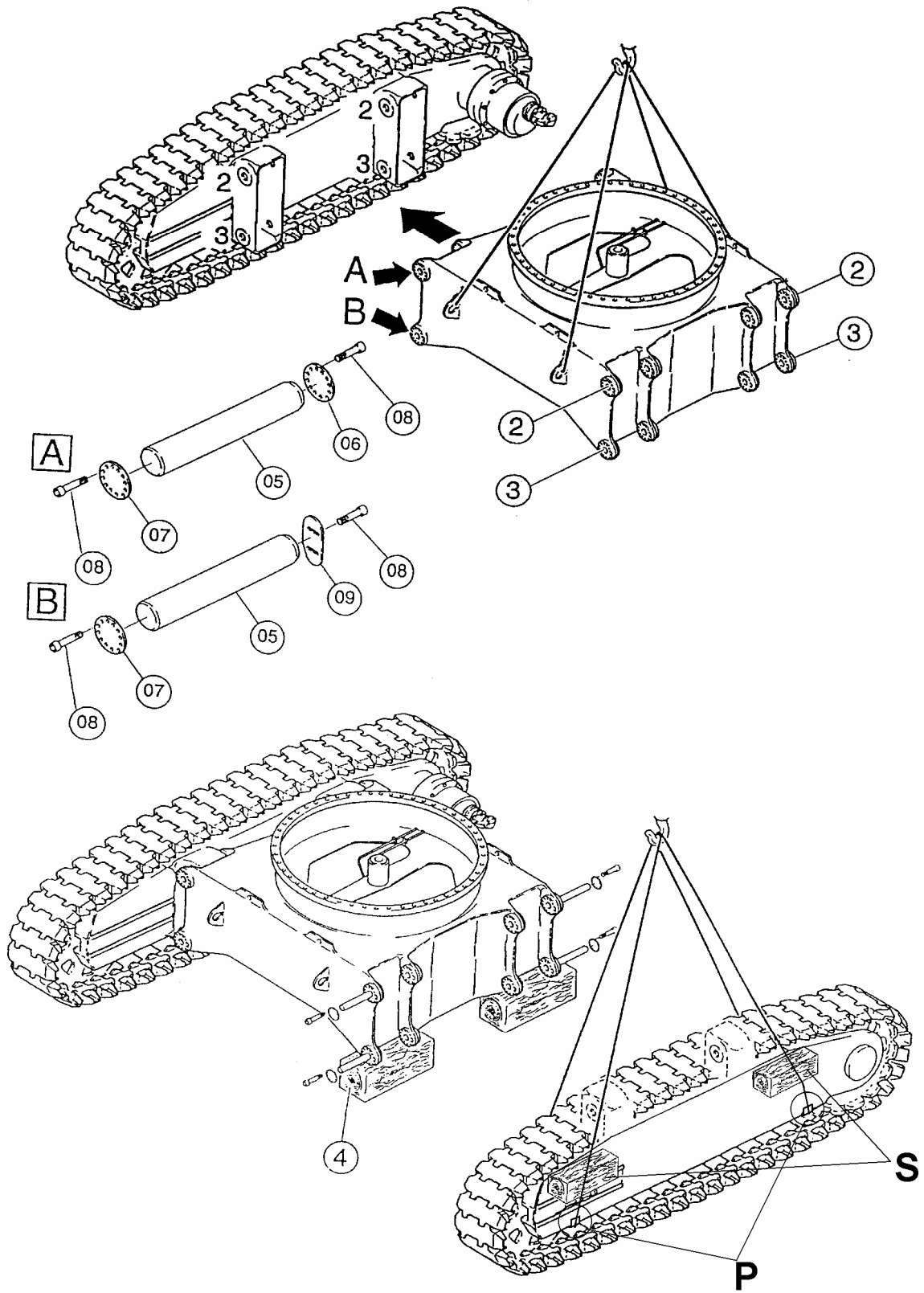
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2.8 Basic Measurements (Z23038)

2.9 Transport Dimensions and Weights (as example)

(For exact Dimensions and Weights refer to the packing list of your machine.)

Face Shovel			Backhoe		
L.H. and R.H. Crawler side frame			L.H. and R.H. Crawler side frame		
Track width	1200 mm		Track width	1200 mm	
Dimensions (mm)	8450 x 2700 x 2420		Dimensions (mm)	8450 x 2700 x 2420	
Weight	52,000 kg / 114,700 lb		Weight	52.000 kg / 114.700 lb	
Carbody centre			Carbody centre		
Dimensions (mm)	4420 x 4130 x 2350		Dimensions (mm)	4420 x 4130 x 2350	
Weight	29,000 kg / 64,000 lb		Weight	29.000 kg / 64.000 lb	
Counterweight			Counterweight		
Dimensions (mm)	6150 x 3420 x 700		Dimensions (mm)	6150 x 3420 x 700	
Weight	33,800 kg / 75,000 lb		Weight	33.800 kg / 75.000 lb	
Upper-structure main frame			Upper-structure main frame		
Dimensions (mm)	8420 x 4440 x 3700		Dimensions (mm)	8420 x 4440 x 3900	
Weight	57,500 kg / 126,800 lb		Weight	57.500 kg / 126.800 lb	
Main machinery house			Main machinery house		
Dimensions (mm)	6500 x 3000 x 3300		Dimensions (mm)	6500 x 3000 x 3300	
Weight	30,100 kg / 66,400 lb		Weight	30,100 kg / 66.400 lb	
Fuel tank			Fuel tank		
Dimensions (mm)	2400 x 2100 x 3230		Dimensions (mm)	2400 x 2100 x 3230	
Weight	3.600 kg / 8000 lb		Weight	4.800 kg / 10.600 lb	
Hydraulic tank			Hydraulic tank		
Dimensions (mm)	2400 x 1200 x 3300		Dimensions (mm)	2400 x 1200 x 3300	
Weight	3.200 kg / 7.100 lb		Weight	3.000 kg / 6.700 lb	
Cab base			Cab base		
Dimensions (mm)	2280 x 2100 x 3000		Dimensions (mm)	2280 x 2100 x 3000	
Weight	3.400 kg / 7.500 lb		Weight	2.500 kg / 5.600 lb	
Boom 7.15 m with 4 cylinders			Boom 9,75 m with cylinders		
Dimensions (mm)	7700 x 2500 x 3200		Dimensions (mm)	10500 x 2600 x 3700	
Weight	34.600 kg / 76.300 lb		Weight	32.300 kg / 71.200 lb	
Stick 4.9 m without cylinder			Stick 4.50 m with 2 bucket cylinders, linkage and control arm		
Dimensions (mm)	5300 x 2100 x 2000		Dimensions (mm)	6300 x 1250 x 2400	
Weight	14.350 kg / 31.700 lb		Weight	26.000 kg / 57.400 lb	
21 m³ shovel bullclam bucket bowl			22 m³ SAE backhoe		
Dimensions (mm)	4100 x 3500 x 3400		Dimensions (mm)	3800 x 4200 x 3100	
Weight	15.350 kg / 33.900 lb		Weight	23.300 kg / 49.300 lb	
5 cases with accessories			1 case oil cooler / 4 cases accessories		
Dimensions (mm)	Weight (kg)	Weight (lb)	Dimensions (mm)	Weight (kg)	Weight (lb)
5780 x 2490 x 1970	5.820	12.900	5770 x 2490 x 1980	5.500	12.200
4000 x 3300 x 3300	5.000	11.100	3970 x 3290 x 3280	4.950	11.000
5800 x 2490 x 1970	6.100	13.500	5770 x 2490 x 1980	3.450	7.700
4900 x 1200 x 1200	4.150	9.200	4870 x 1090 x 1280	6.400	14.200
1660 x 850 x 730	1.000	2.300	5870 x 1290 x 1380	9.300	20.500



Z21859

3.1. Assembly of Undercarriage (Z21859)

Align side frame horizontally in both directions very exactly.

From outside place water level gauge onto steel structure of side frame.

Pull back all 8 pins (05) out of the outer borings (2+3) of the center section. Attach carbody to the crane (oil supply lines to the travel motors pointing in direction of the travel motors).

Align carbody with the side frame; lower borings (3) first and insert pins (05).

Align upper borings (2) and insert pins (05).

Support carbody with wooden blocks (4) in a way that the free side is approx. 100 mm higher than the attached side. (This makes it easier to attach the 2nd side frame).

Lift the 2nd side frame with the crane and align with the carbody.

Lower borings first and insert pins.

Align upper borings and insert pins.

Lift the undercarriage so far that it is possible to remove the wooden blocks.

Secure all pins with the retainer plates (06, 07, 09).

Connect hose pipes between the oil supply lines of the carbody to the travel motors.

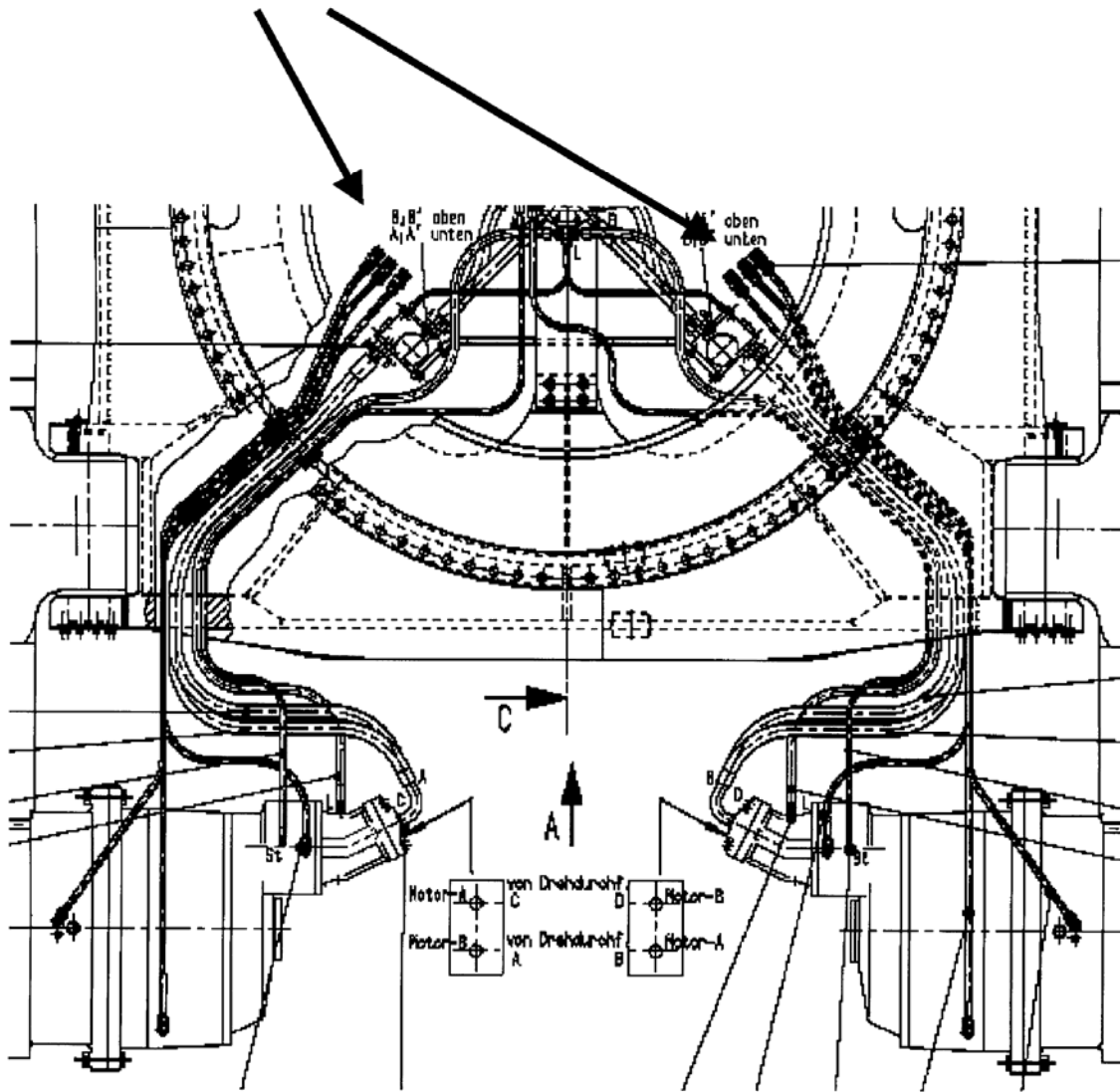
Open the cocks inside the side frames for the hydraulic crawler tensioning system.

Refer to section 4.12 in the Maintenance Manual.

Fill up and/or check the gear oil levels (travel gear, brake, final drive).



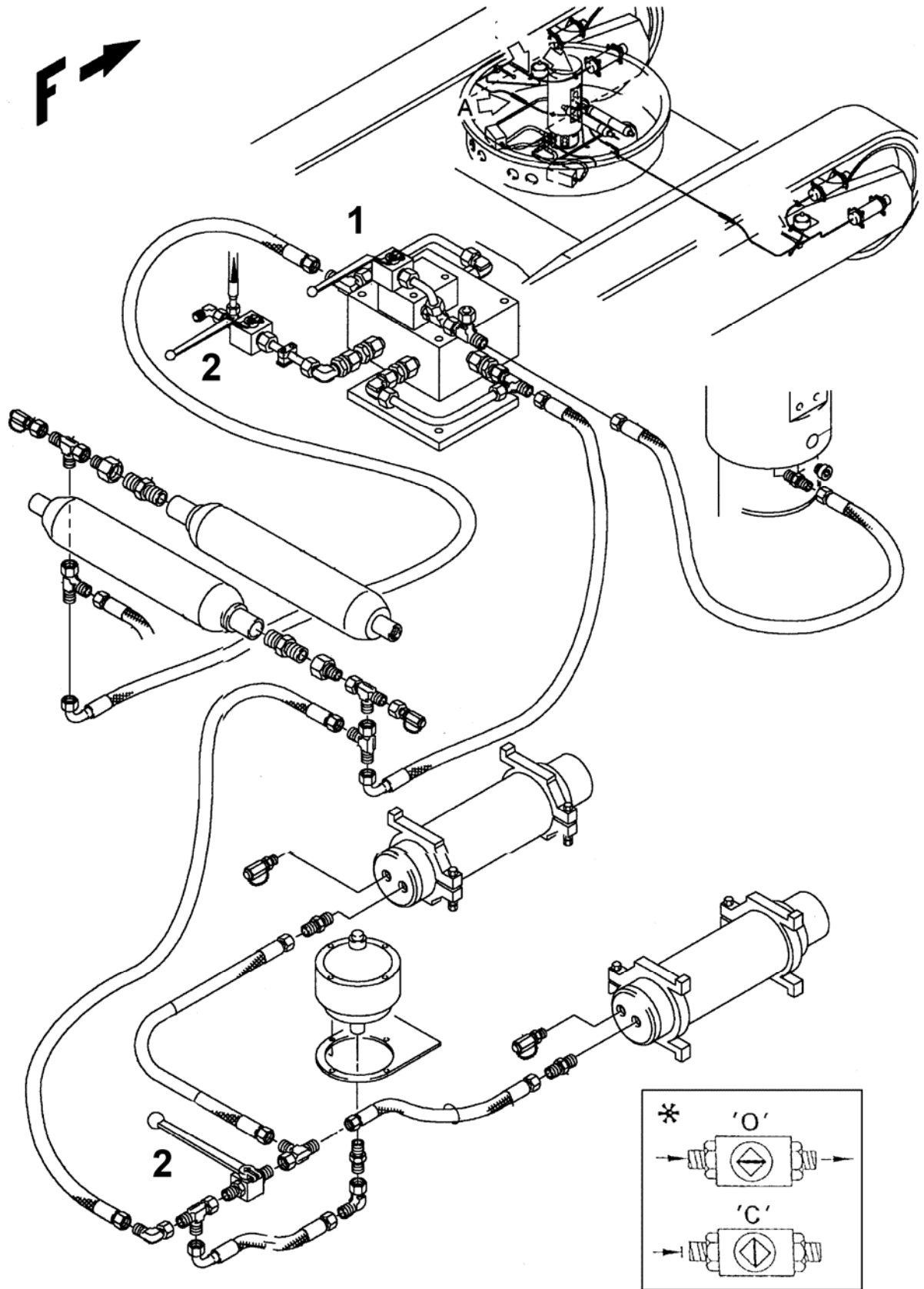
- **All pins (undercarriage and attachment) have to be installed lubricated with AL – Compound.**
- **Factory supply with the machine: 4.5 kg (Part No.: 509 623 98)**



Z23036

3.1.1. Mounting of travel gear breather filters (Z21860)

- Locate the breather filters of both travel gears in the centre part of the undercarriage.
- Route the hoses as shown in the illustration.



Z23037

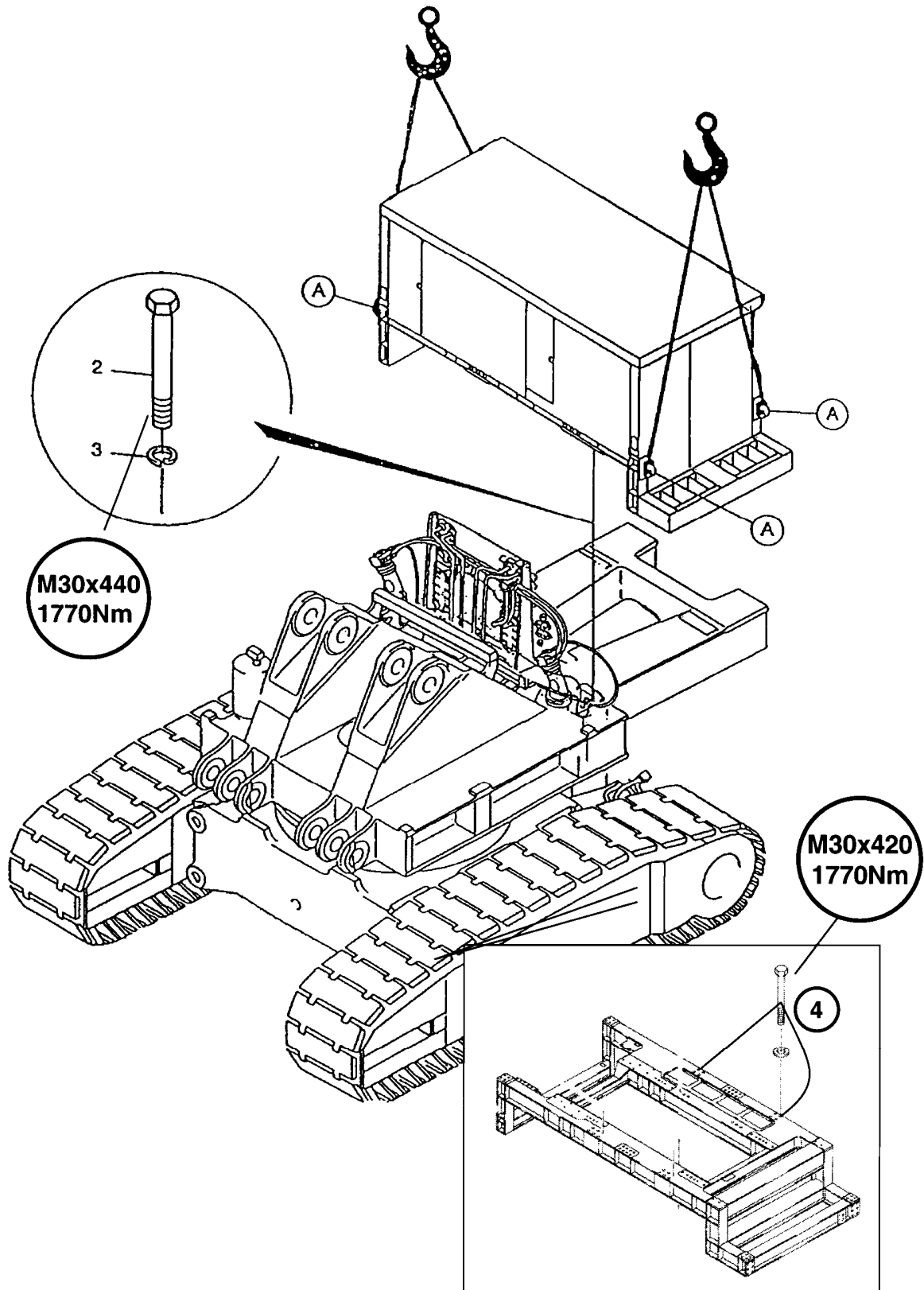
3.1.2 Track tensioning system (Z23037)

1. Working position: Closed
Ex works: closed
2. Working position: **Open**
Ex works: closed
3. Marking below the washer shows the valve position

“O” open
“C” closed



- **The valve position (open or closed) is not depend on the lever position.**
- **For the real status of the valve look at the groove on the square head of the valve (below the lever).**



Z21863

3.2. Assembly of Superstructure onto the Undercarriage (Z23863)

1. Attach the superstructure to the cranes, lift up the superstructure and very carefully clean the contact surfaces of the slew ring and the carbody from the paste with a appropriate solvent.
2. Check if the "S" position of the inner and outer ring of the slew ring is left and right of travel direction.
3. Prepare all bolts (2), washers (1) and grease the threads and the washers as well as the head surface of the bolts.
(Refer PARTS & SERVICE NEWS AH 00511 last edition)

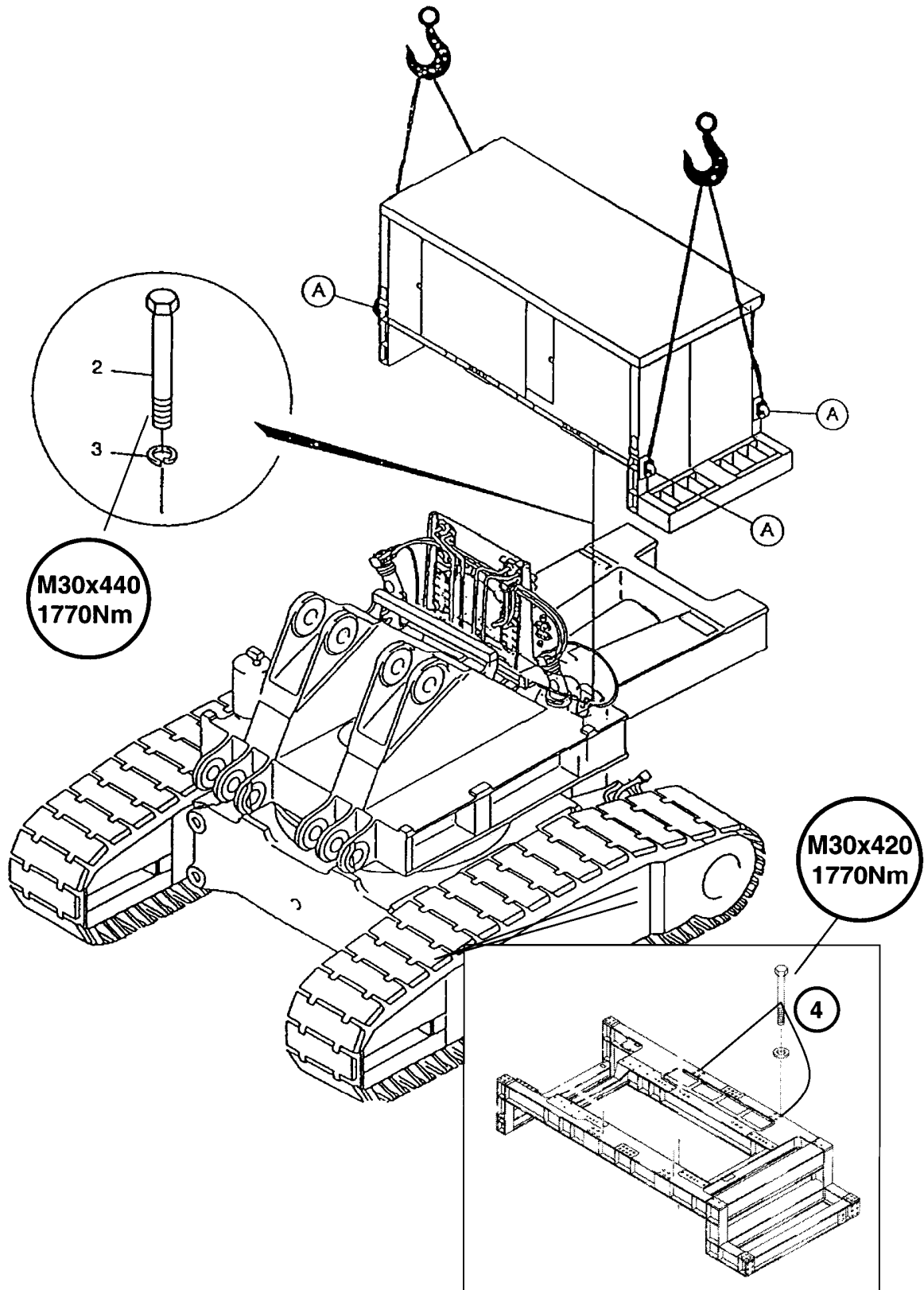


- **Install 2 threaded pins (M36 x 200 mm long, one end pointed, to be manufactured) displaced by 180° to slew ring at superstructure.
This simplifies the alignment of the slew ring to the undercarriage.**

4. Align superstructure to the carbody and lower the superstructure as required to insert 4 bolts.
5. Insert one bolt at each 90° (for guiding) and lower superstructure so that there is a very thin gap between slew ring and carbody.
6. Install all bolts and pre-tighten.
7. Tighten the bolts crosswise with the required torque.
(Refer PARTS & SERVICE NEWS AH 00511 latest edition)



- **If approx. 10 bolts (front and rear) are tightened the superstructure can be unhooked from the crane.**



Z 21863

3.3 Assembly of engine house (Z21863)

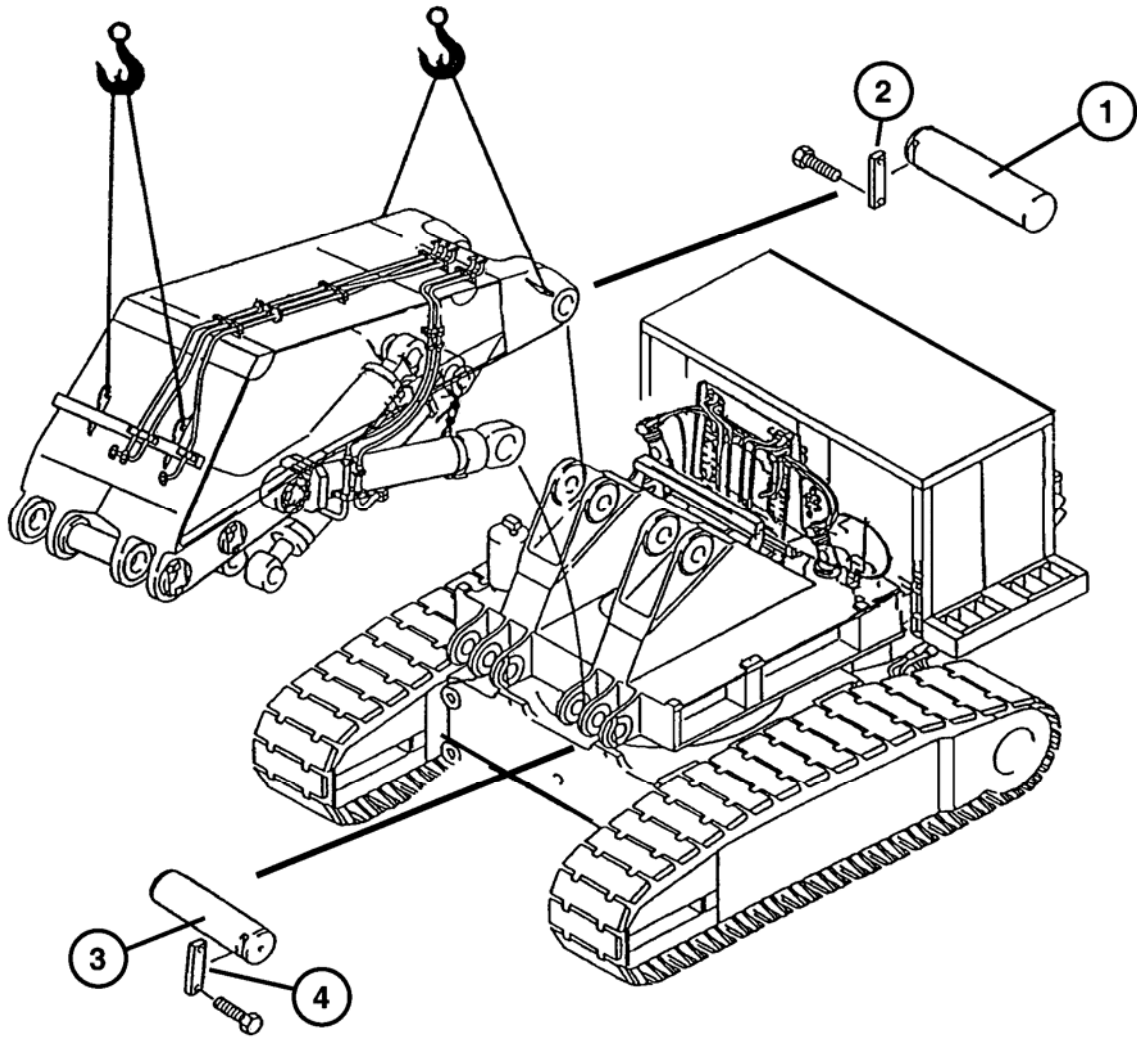
1. Attach the unit to the crane (use only the attached lifting points (A).
2. Lower the unit as required so that two bolts with washers (02 + 03) for guiding can be inserted.
3. Lower the unit fully and insert all bolts with washers. Tighten the bolts with the resp. torque. (This must be done directly because later-on it may be difficult to reach the bolts).



- **There are two kinds of bolts:**

(4): 8 bolts M30 x 420 long

and: 18 bolts M30 x 440 long



Z21864

3.4 Mounting of Boom (Z21864)



- **For the mounting of the pin seals please refer to page 78.**

1. Lift the boom with the cylinders attached. (You can alleviate your job, if you lift the front part of the boom higher than the back part.)
2. Align the boom with the boom bearings of the superstructure.
3. Lower the boom that the borings of the boom and the boom bearings are aligned.
4. Insert the two pins (01) and secure with the retainers (02)

The boom must be still attached to the crane!

5. Lift one boom cylinder with an other crane or chain pull and disconnect the transport fastenings.



- **Don't open the plugged hydraulic ports of the cylinder.**
- **Open the transport fastenings very carefully, because of a sliding cylinder rod by its own mass.**

6. Lower the boom cylinder until the boring of the cylinder and the superstructure bearings are aligned.

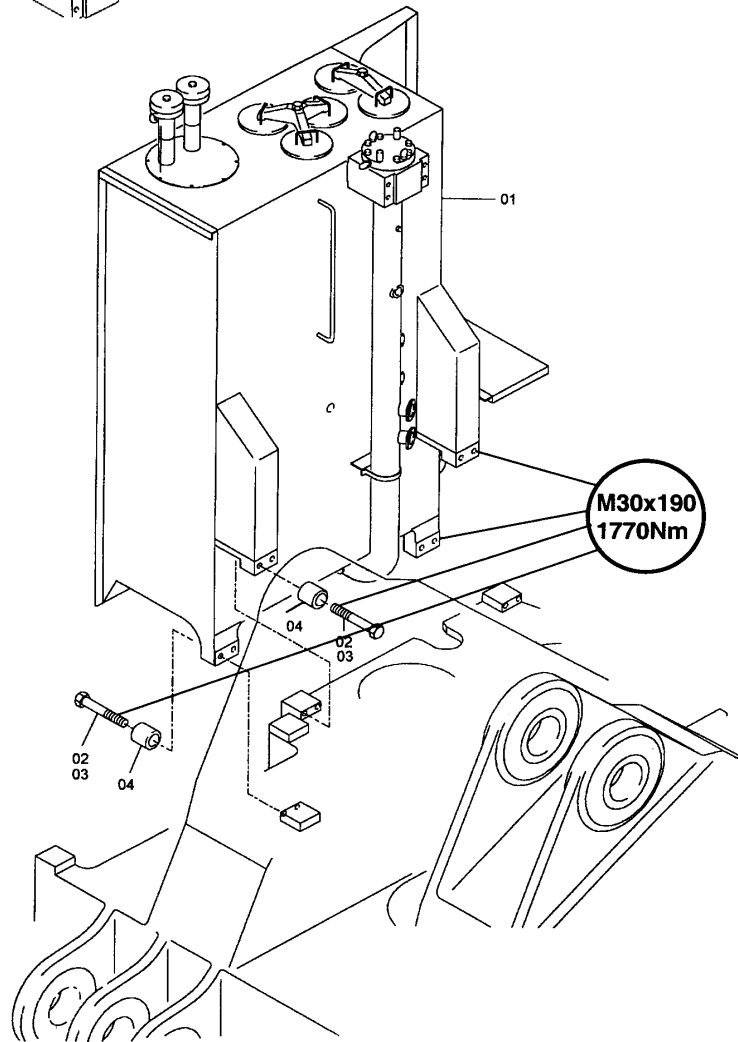
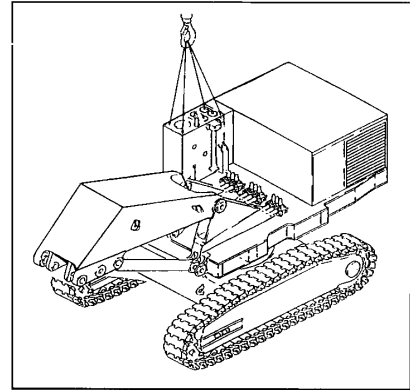
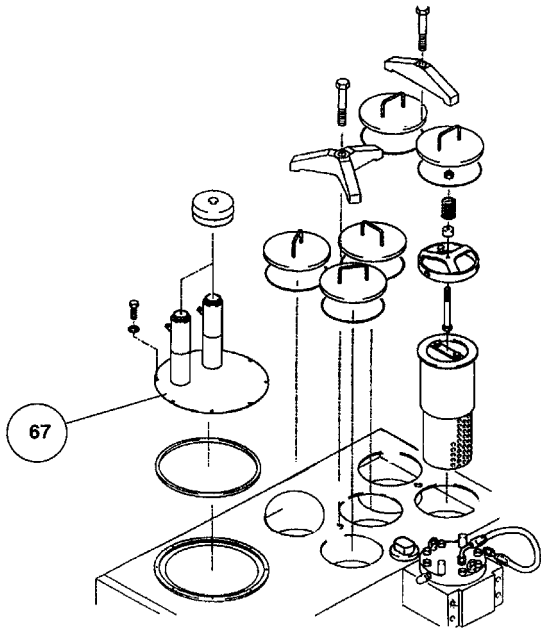


- **If necessary lower or raise the boom for easier alignment**

7. Insert the pin (03) and secure with the retainer (04).
8. Fix the 2nd cylinder in the same manner.
9. Connect the pipes resp. hoses for the boom and stick cylinders.
Unhook boom from the crane.



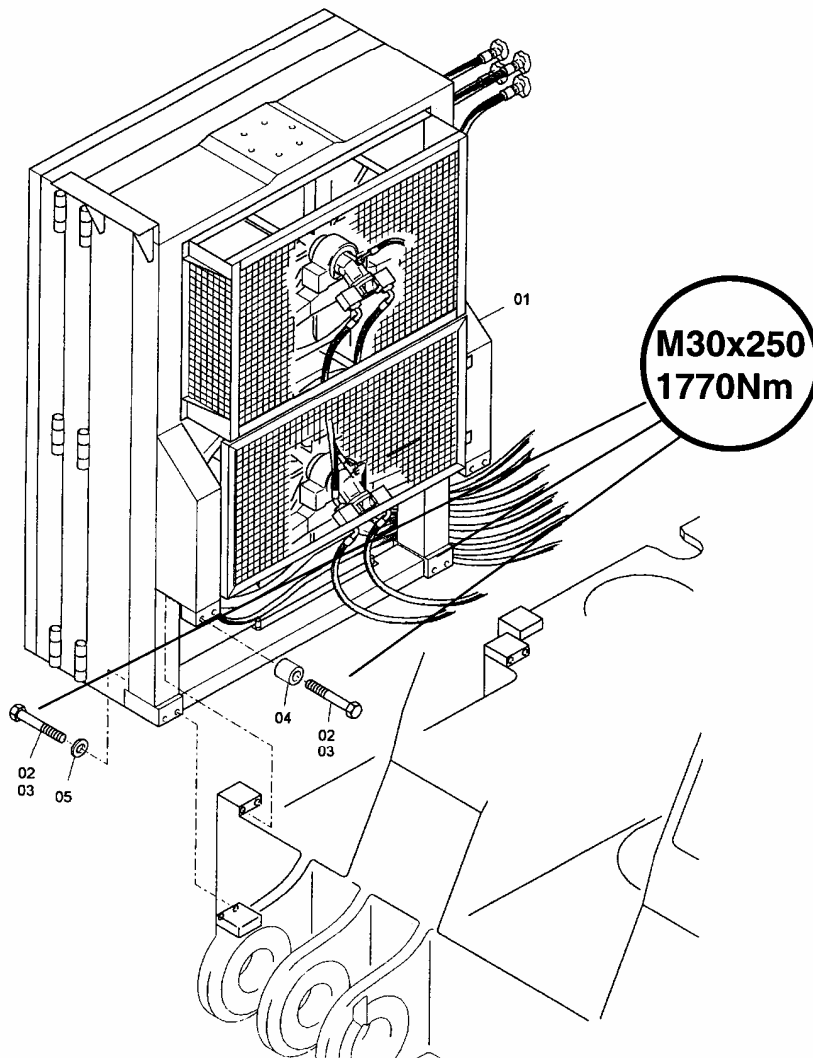
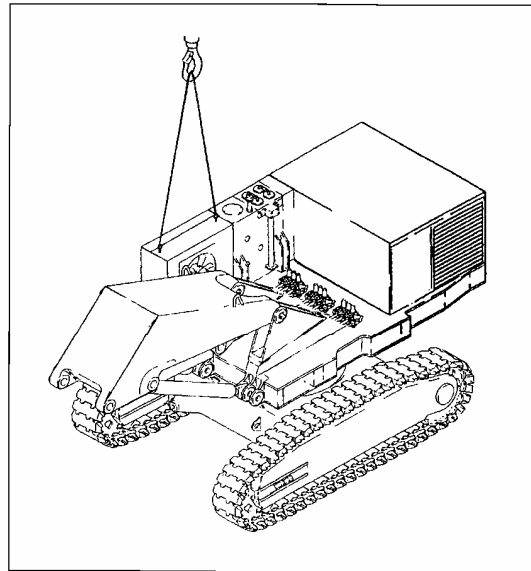
- **The boom may be unhooked earlier but be careful and pay attention while opening the hydraulic lines.
There may be still a little pressure in the system.
Therefore be careful when opening the hoses.**



Z23039

3.5. Mounting of Hydraulic Oil Tank (Z23039)

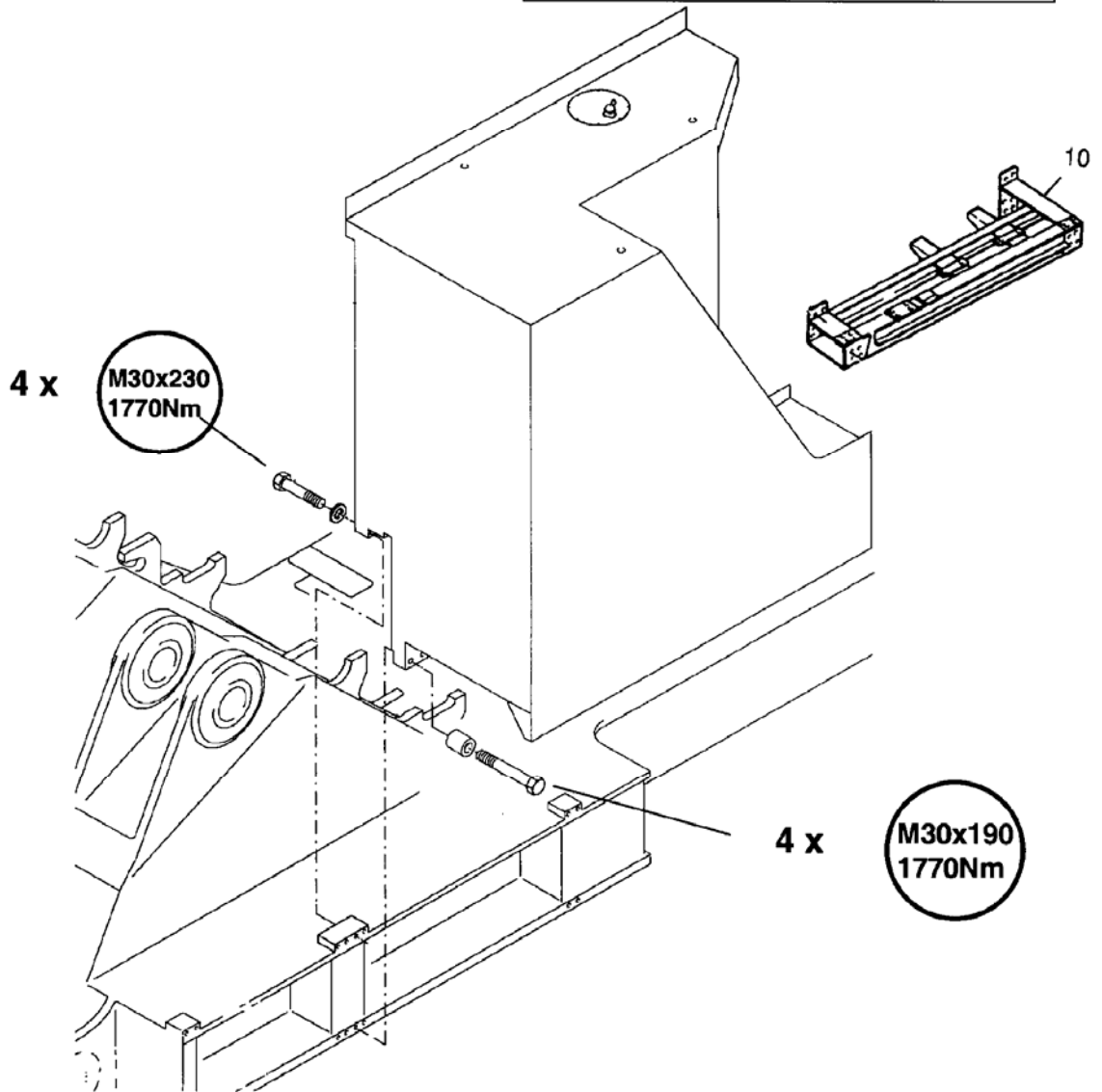
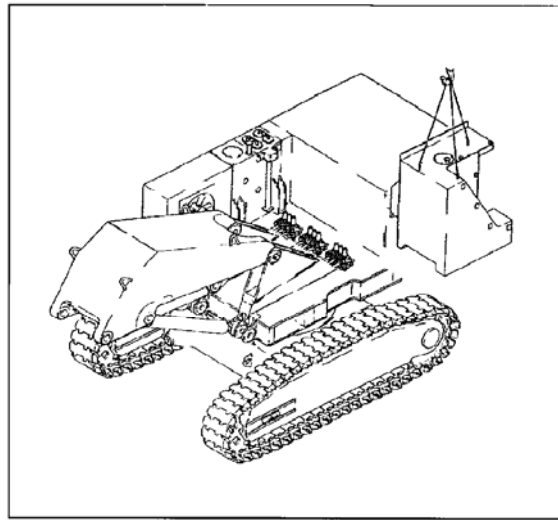
1. Lift the Hydraulic Oil Tank.
Lifting eyes are delivered with the machine.
2. Align the Hydraulic Oil Tank with the superstructure.
3. Lower the Hydraulic Oil Tank fully down and install all bolts.
Tighten the bolts with the resp. torque.
(Refer to section 4.12 of the Maintenance Manual).
4. Remove transport cover and install cover with breather filters (67).
8 bolts M8 with lock washers.
Tightening torque 21 Nm.
5. Connect all hoses, pipes and electric cables.
6. Connect the Suction Tank with the Hydraulic Oil Tank.



Z21866

3.6. Mounting of Hydraulic Oil Cooler (Z21866)

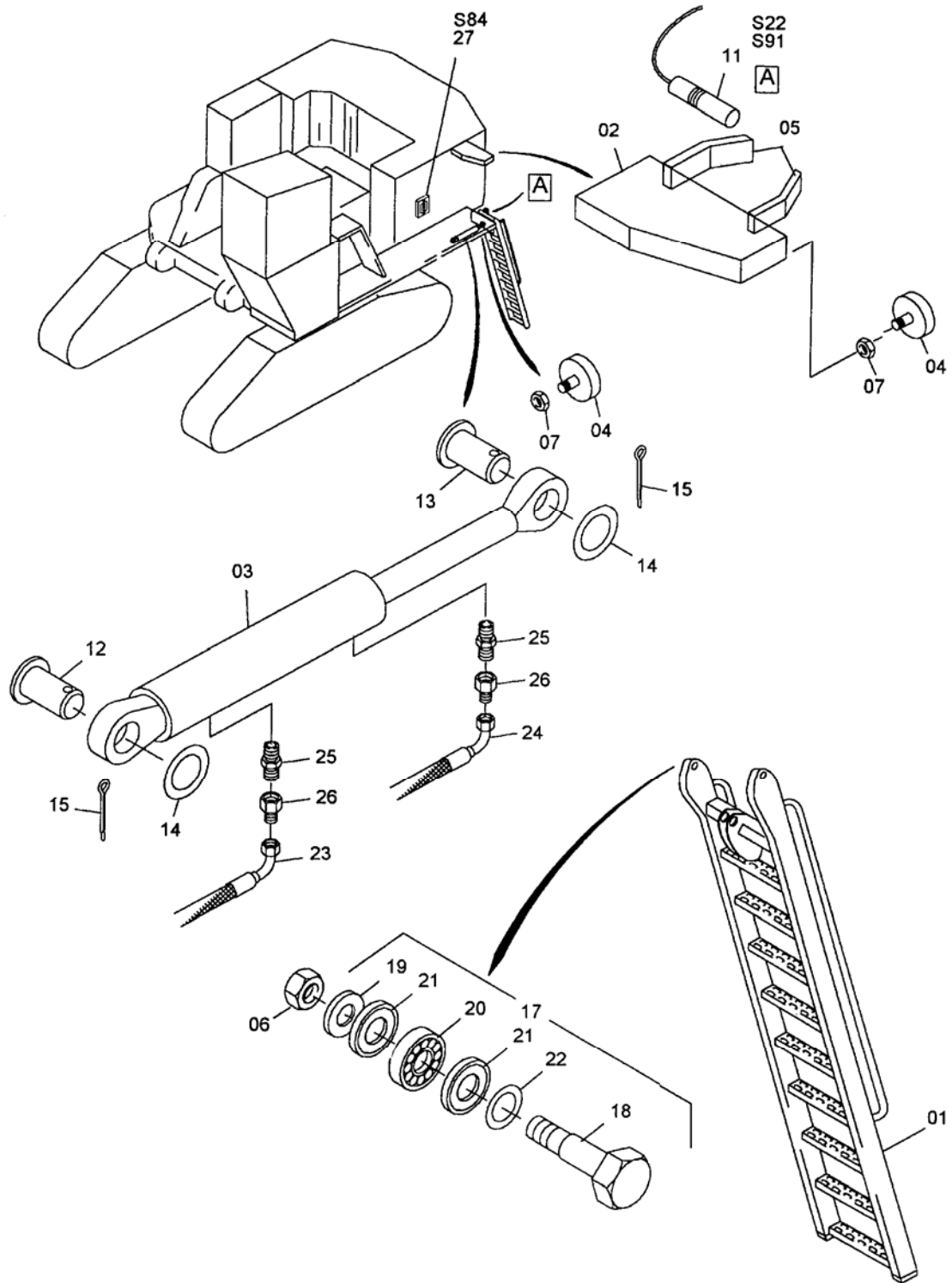
1. Lift the Hydraulic Oil Cooler.
Lifting eyes are delivered with the machine.
2. Align the Hydraulic Oil Cooler with the superstructure.
(Pay attention to the course of the hydraulic lines!)
3. Lower the Hydraulic Oil Cooler fully down and install all 8 bolts .
Tighten the bolts with the resp. torque.
(Refer to section 4.12 of the Maintenance Manual).
4. Connect all hoses, pipes and electric cables.



Z21867

3.7. Mounting of Fuel Tank (Z21867)

1. Lift the fuel tank.
Lifting eyes are delivered with the machine.
2. Align the fuel tank with the superstructure.
3. Lower the fuel tank fully down and install all bolts. Tighten the bolts with the resp. torque.
(Refer to section 4.12 of the Maintenance Manual).
4. Connect fuel lines and electric cables.
5. Installation of platform (10)



Z21871

3.8 Mounting of hydraulic access ladder (Z21871)

Mount hinged ladder(01);

Connect ladder lifting cylinder (03);

Assemble ladder bearing (17);

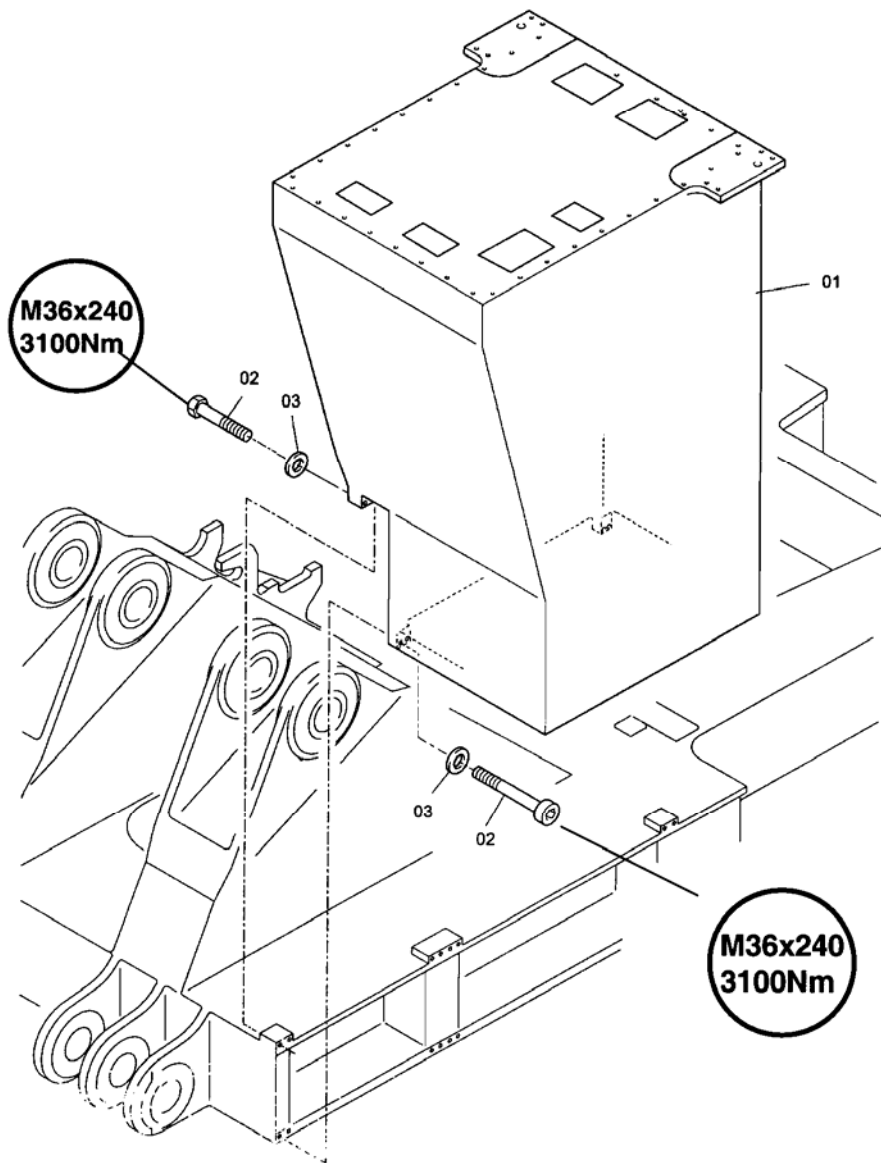
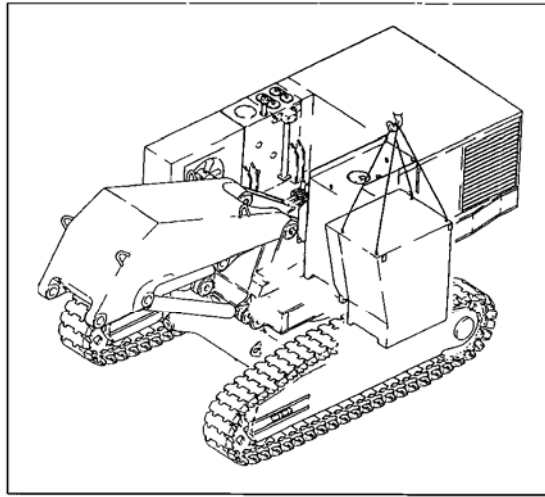
Tighten the self locking nuts (06) according to the values listed below.

Tightening Torque of Self Locking Nuts (06):

- New nut: 440 Nm
- Used nut: 350 Nm

Check clamping torque of the free turning nuts (06) before tightening the bolt connection. If clamping torque is less than the minimum value of 12 Nm, use new nut.

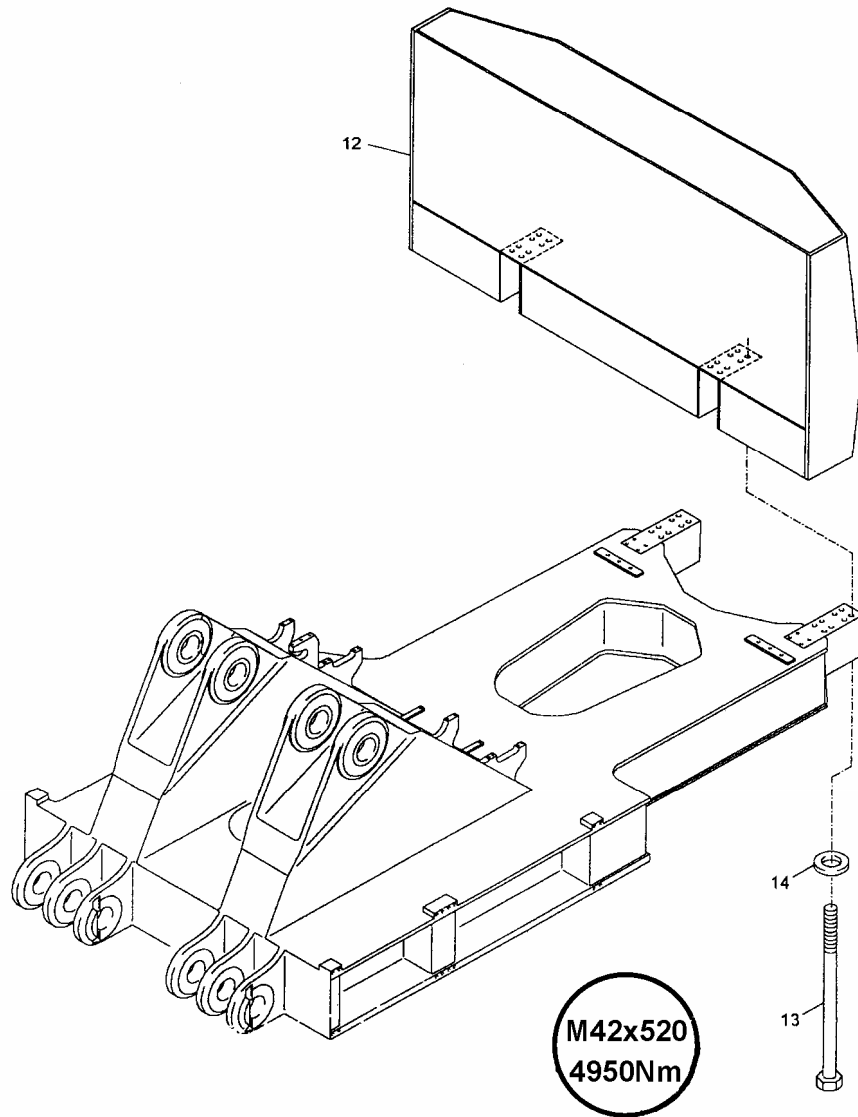
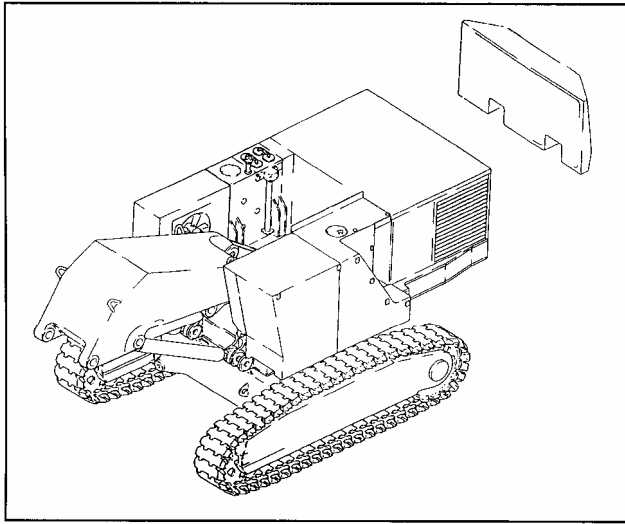
Lubricate both eyes of hydraulic cylinder (03). Make sure both pivot pins (12 and 13) are properly secured with cotter pins (15).



Z21868

3.9. Mounting of Cab Base (Z21868)

1. Lift the cab base.
Lifting eyes are delivered with the machine.
2. Align the cab base with the superstructure.
3. Lower the cab base fully down and install all bolts. Tighten the bolts with the resp. torque.
(Refer to section 4.12 of the Maintenance Manual).
4. Connect electric cables.



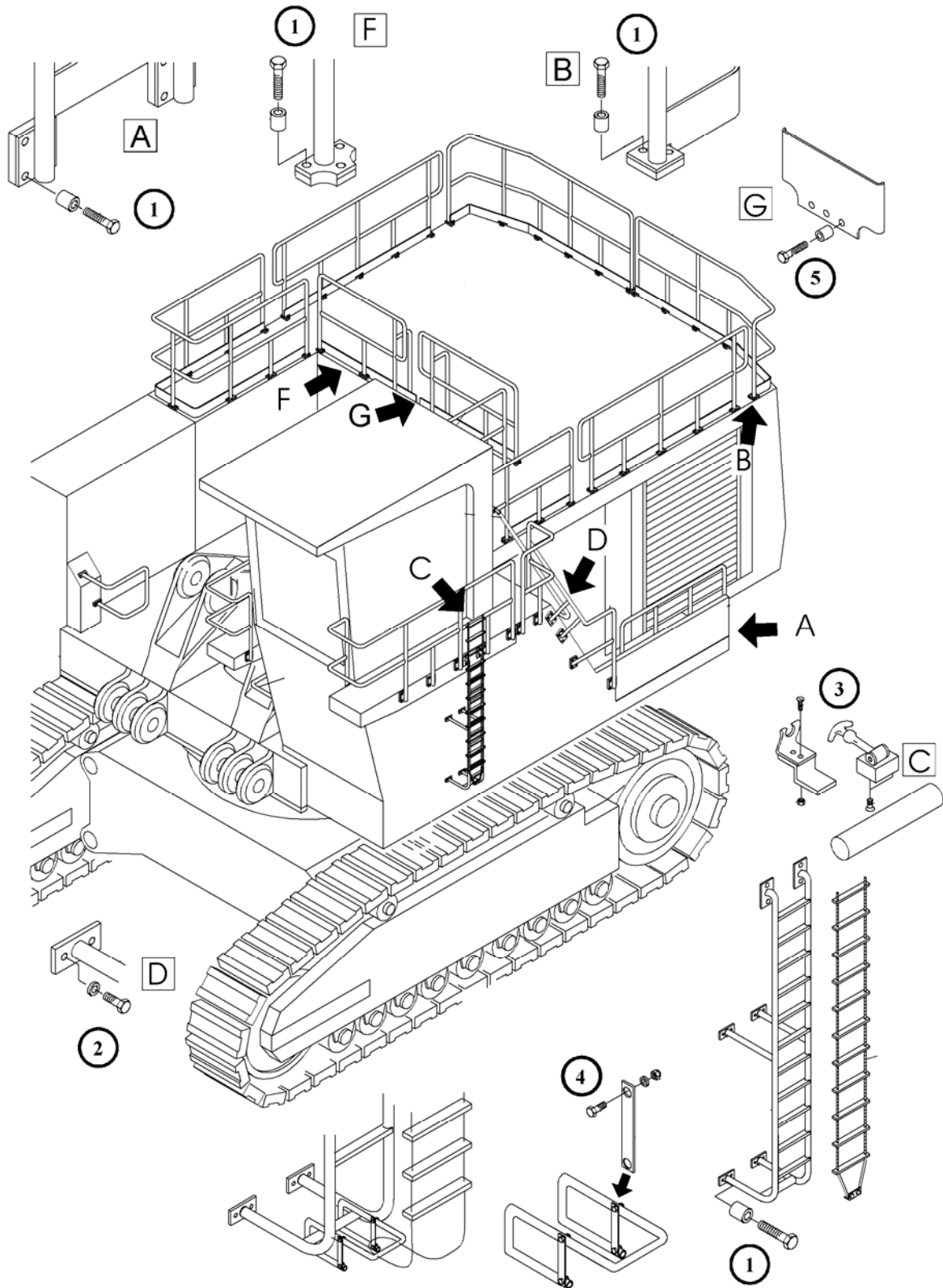
Z21869

3.10 Mounting of Counterweight (Z21869)

1. Lift the counterweight with 2 cranes.
(The hooks are delivered with the machine).
2. Align the counterweight with the superstructure.
3. Lower the counterweight fully down and fasten it with the bolts(13) and washers (14). Tighten the bolts with the resp. torque.
(Refer to section 4.12 of the Maintenance Manual).
4. You need only one crane up to now.



- **The contact surface between superstructure and counterweight must be absolute clean. Use a adequate solvent.**



Z23033

3.11 Mounting of Handrails, Steps and Gratings (Z23033)

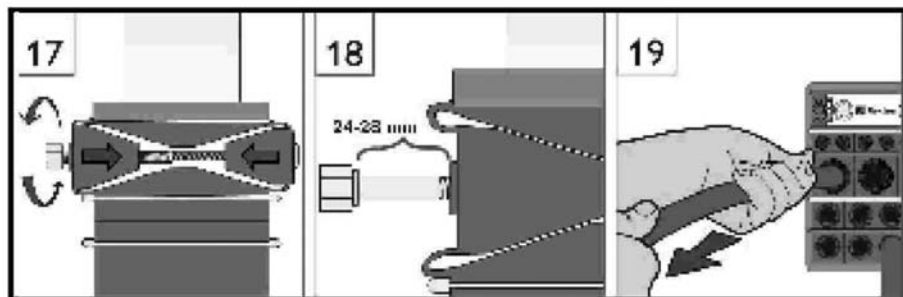
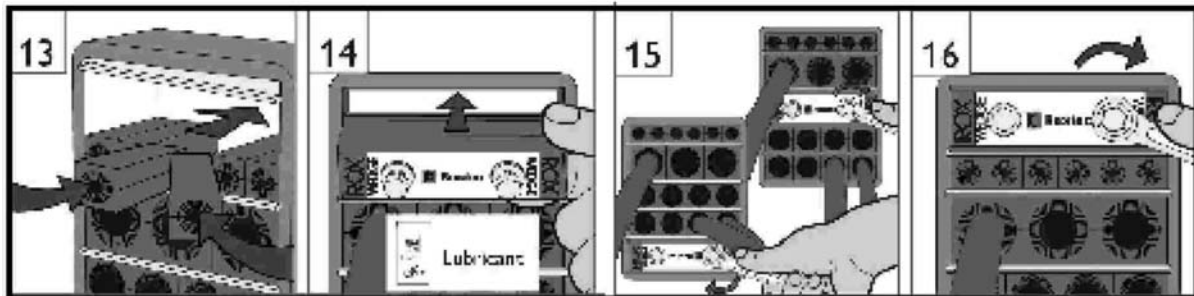
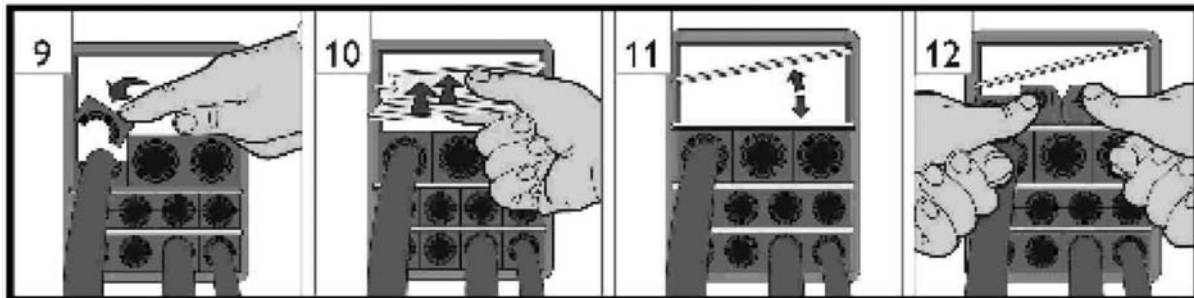
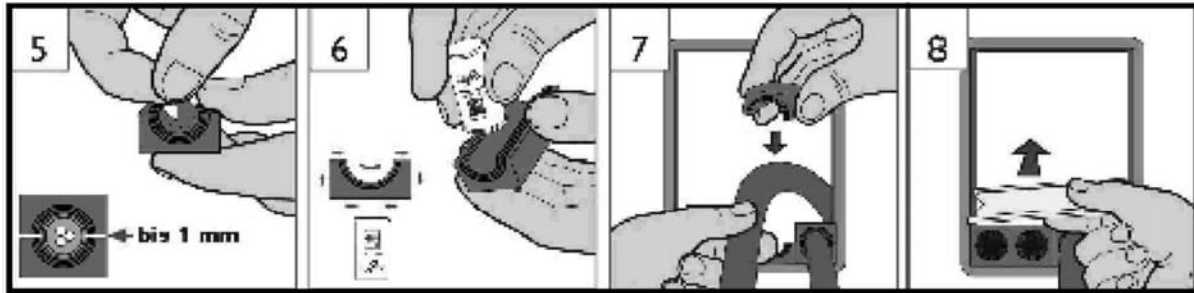
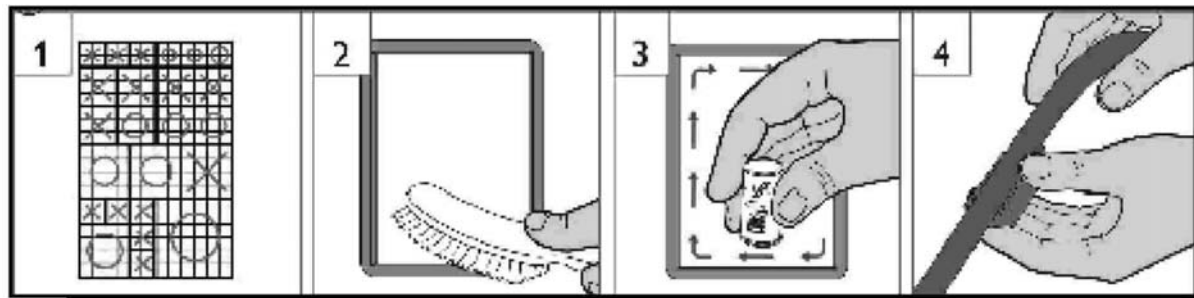
During this stage of assembly the handrails, steps and gratings can be mounted to the superstructure, cab base and machinery house.

This provides more safety during further assembly.



- Clean the contact surfaces between handrail flange and mounting flange from anticorrosive paste and paint.

Reference No.:	Bolt size (mm)	Grade	Wrench size (mm)	Tightening torque (Nm)	Qty.
1	M12x55	8.8	19	74	214
2	M12x25	8.8	19	74	2
3	M 4x16	8.8	7		8
4	M 5x35	8.8	8		4
5	M10x40	8.8	17	43	3

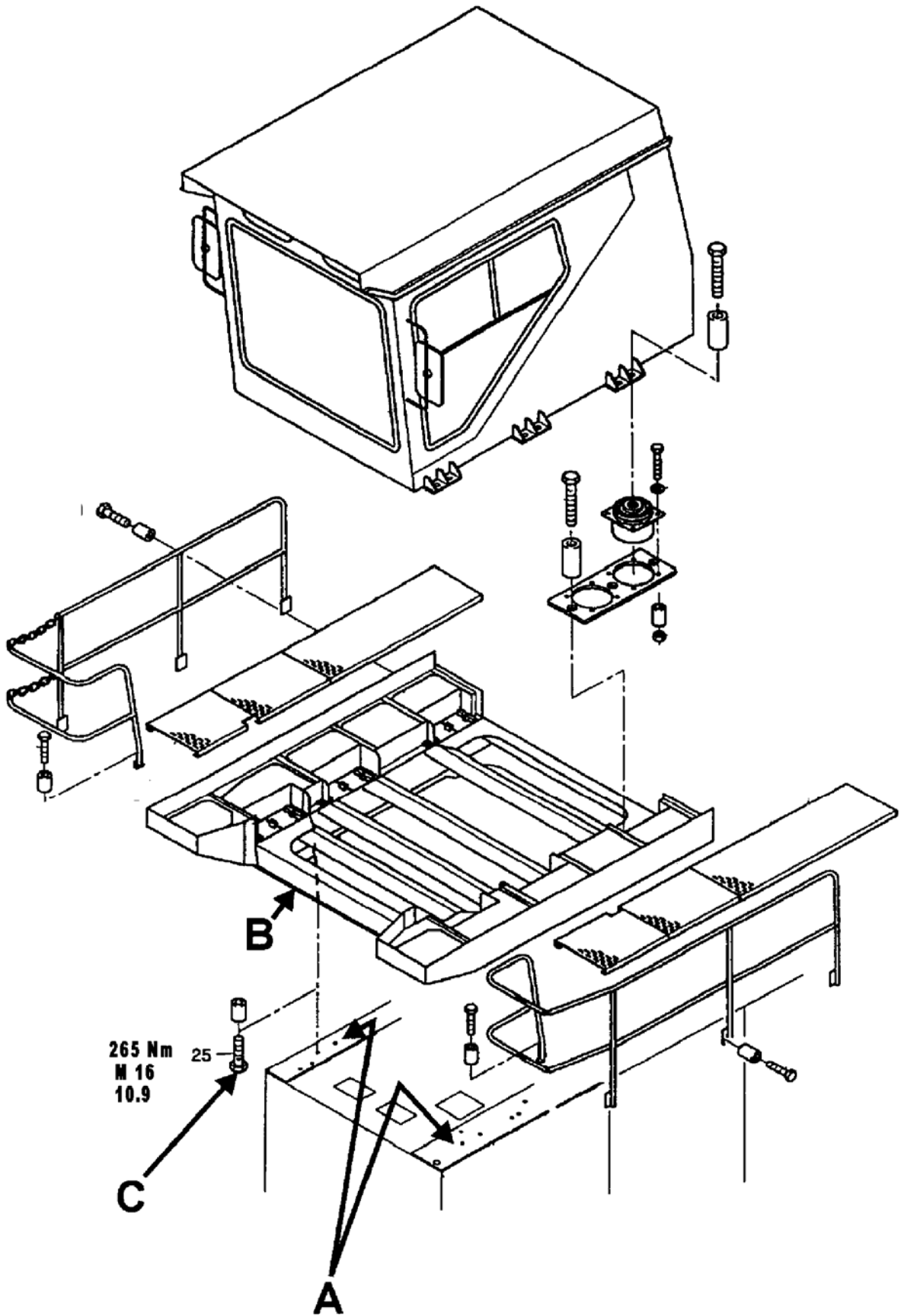


Z22937

3.12 Mounting of Cable transfer to the Operators Cab (Z22937)

The special Cable Transfer Elements for sealing the cab are stored in the cab refrigerator.

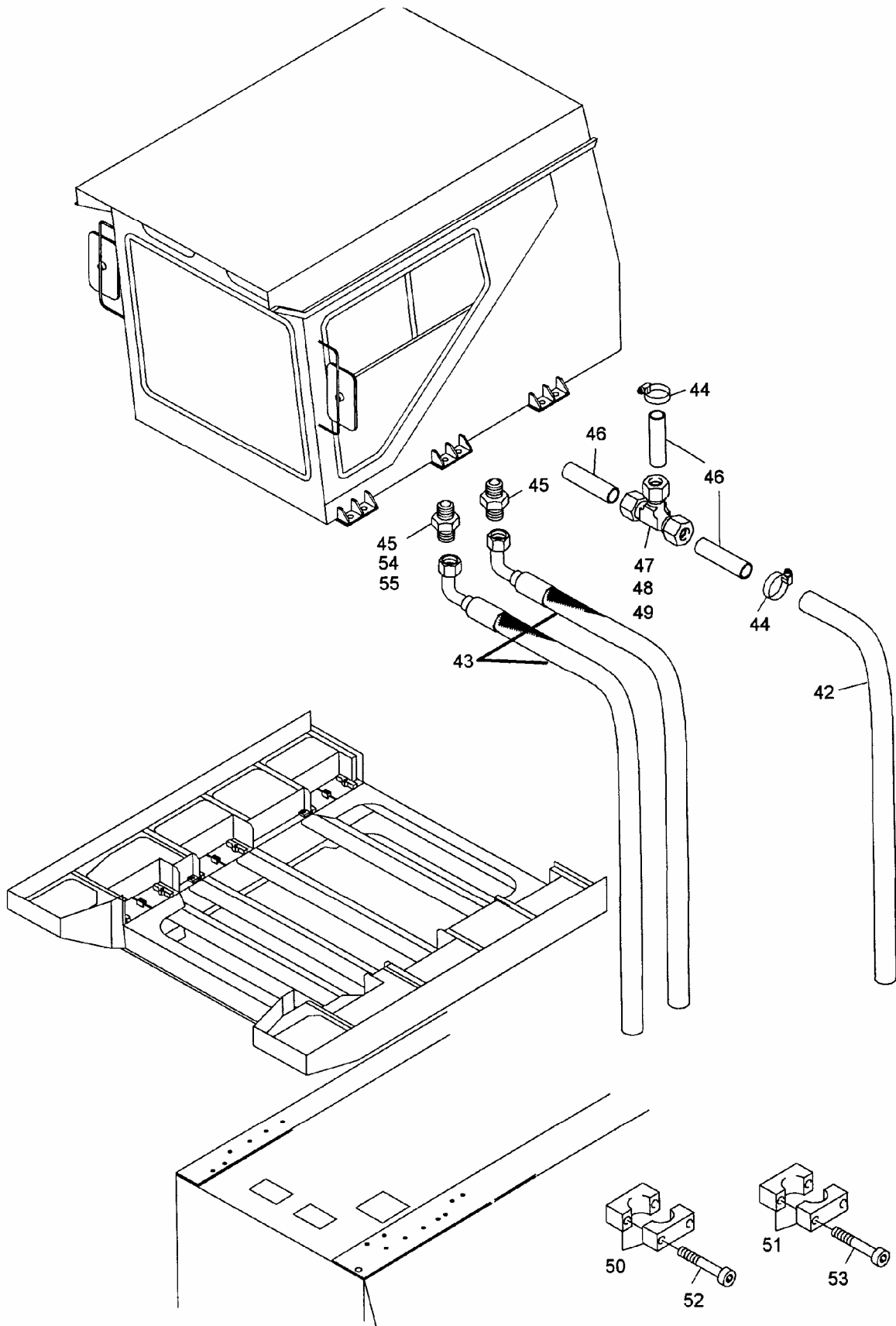
Install it as shown in the pictures on the previous pages.



Z22938



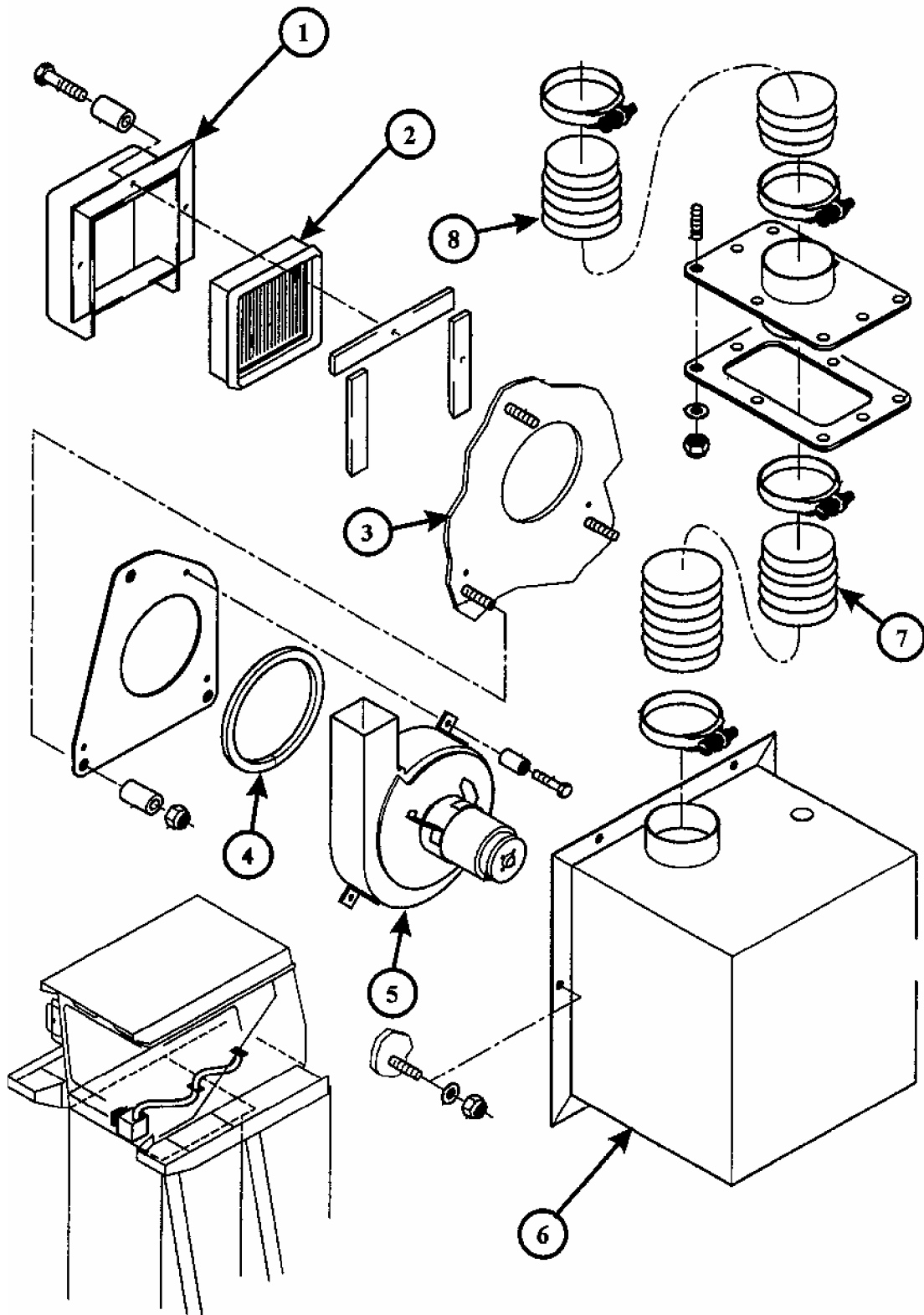
- **Before lowering the cab onto the cab base mount the air hose to cab bottom.
Refer to Illust. 22940 pos. (8) page 54.**



Z22939

3.13 Mounting of Cab with Support Frame (Z22938; Z22939)

1. Apply sealing compound “Epple 28” onto the whole contact surfaces (A) of the cab base. The sealing compound is delivered with the machine in a 1 liter can.
2. Lift the cab.
Lifting eyebolts are delivered with the machine.
3. Align the cab support frame (B) with the cab base contact surfaces (A).
4. Lower the cab support frame onto cab base.
5. Apply “Loctite 222” onto the thread of all 34 mounting bolts (C) and fasten the cab support frame (B) with bolts (C) and resilient sleeves onto the cab base. Loctite 222 is delivered with the machine in a 250 ml tube.
6. Connect electric cables.
7. If the machine is equipped with an air conditioner, connect the refrigerant hoses and electrical cables.
8. Mount the handrails to the cab support frame..



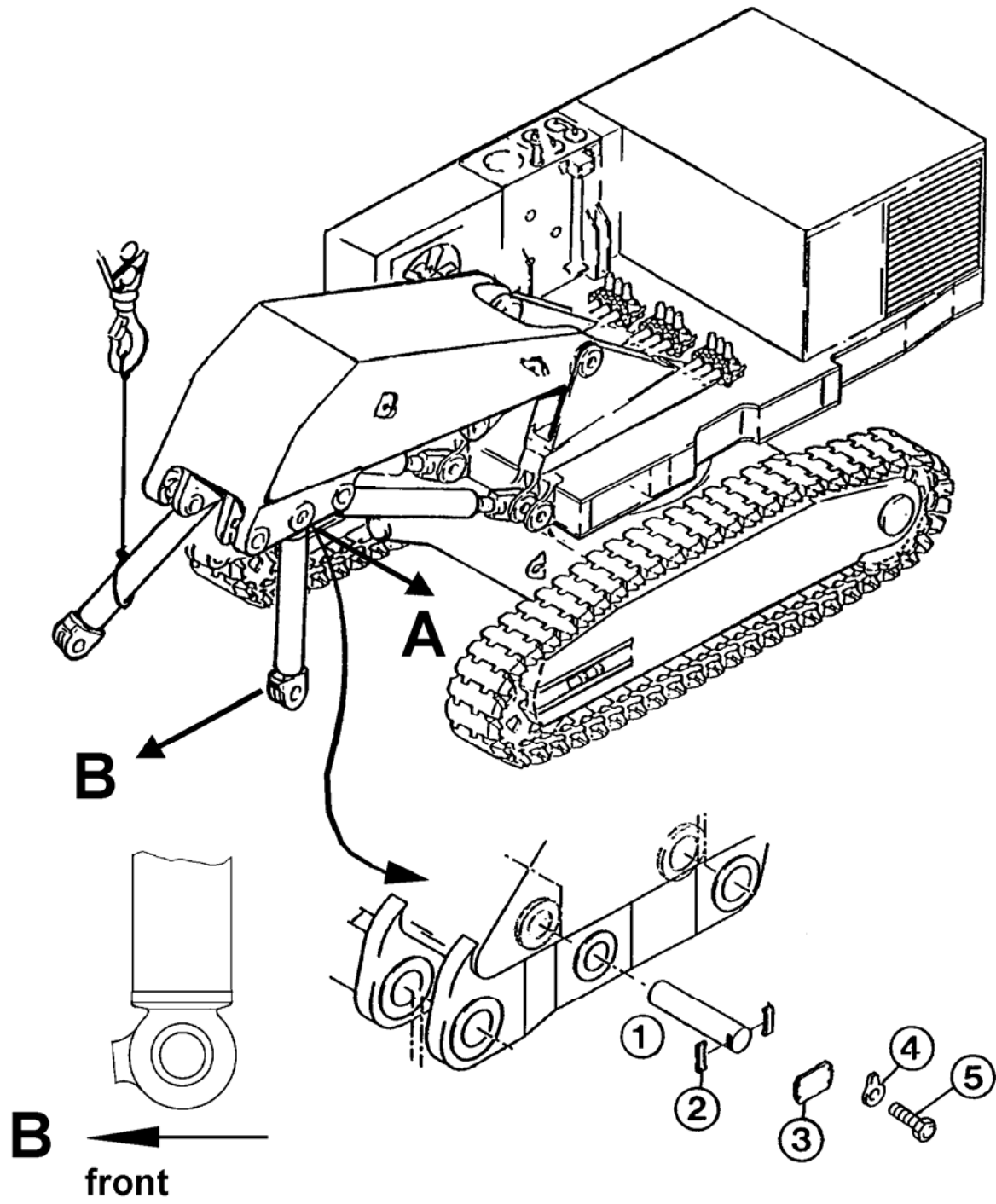
Z22940

3.13.1 Mounting of the Cab air cleaner (Cab support to Cab) (Z22940)

Legend for illustration Z22940

1. Air cleaner housing located on cab base
2. Filter element
3. Cab base wall
4. Seal ring
5. Cab blower
6. Blower housing
7. Air hose to base roof
8. Air hose to cab bottom

Connect the Cap air cleaner as shown at drawing Z22940.



Z21873

3.14 Mounting of Bucket Cylinders (Z21873)

Hook up bucket cylinders that way that rod side shows approx. 45° up to the bearings at the boom.

Align the rod eyes with borings at the boom. Install pin (1).

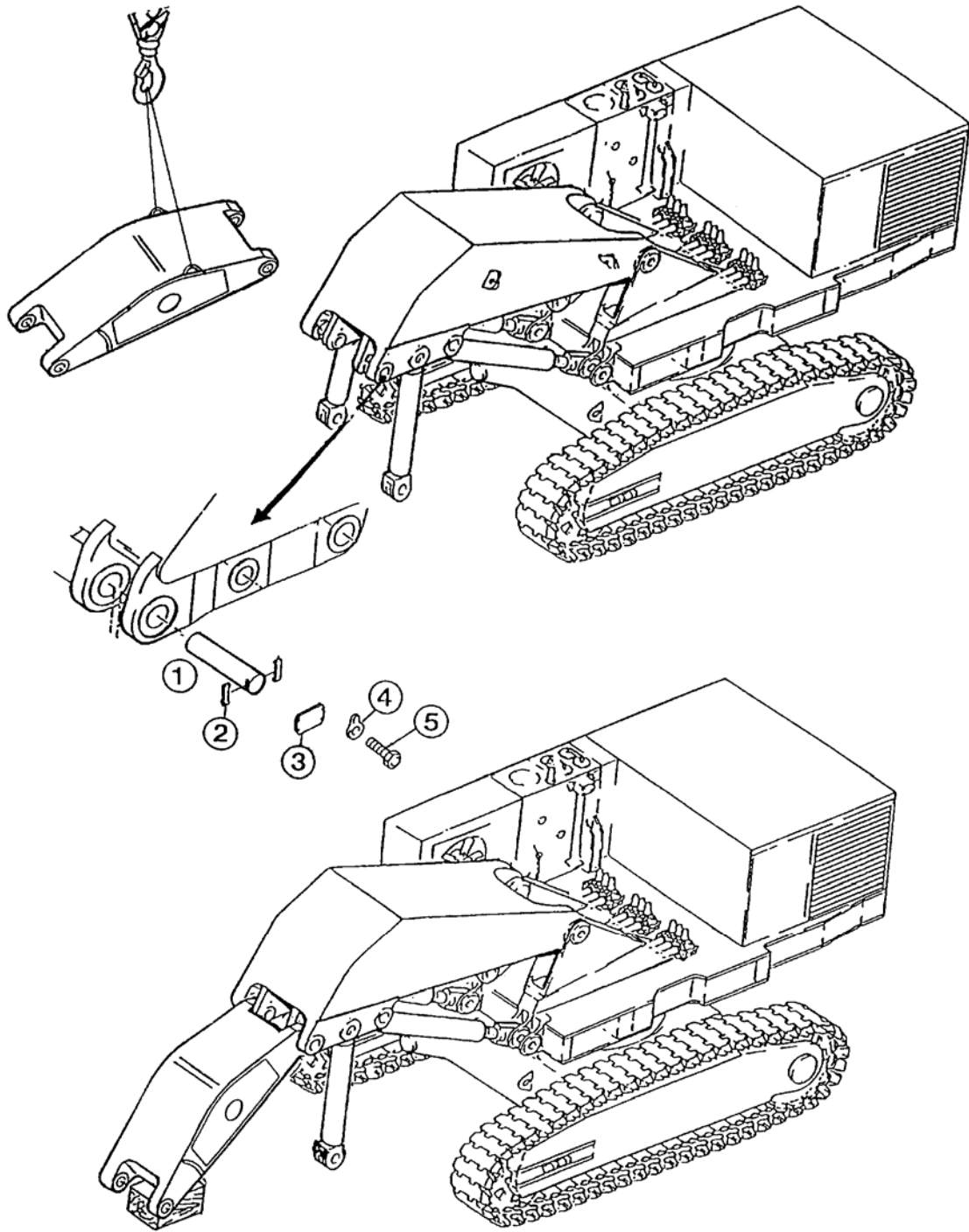
Install axle stirrup (2).

Install shackle (3) with washer (04) and bolt (5).

Place lower end of the cylinders onto a pile of wood.



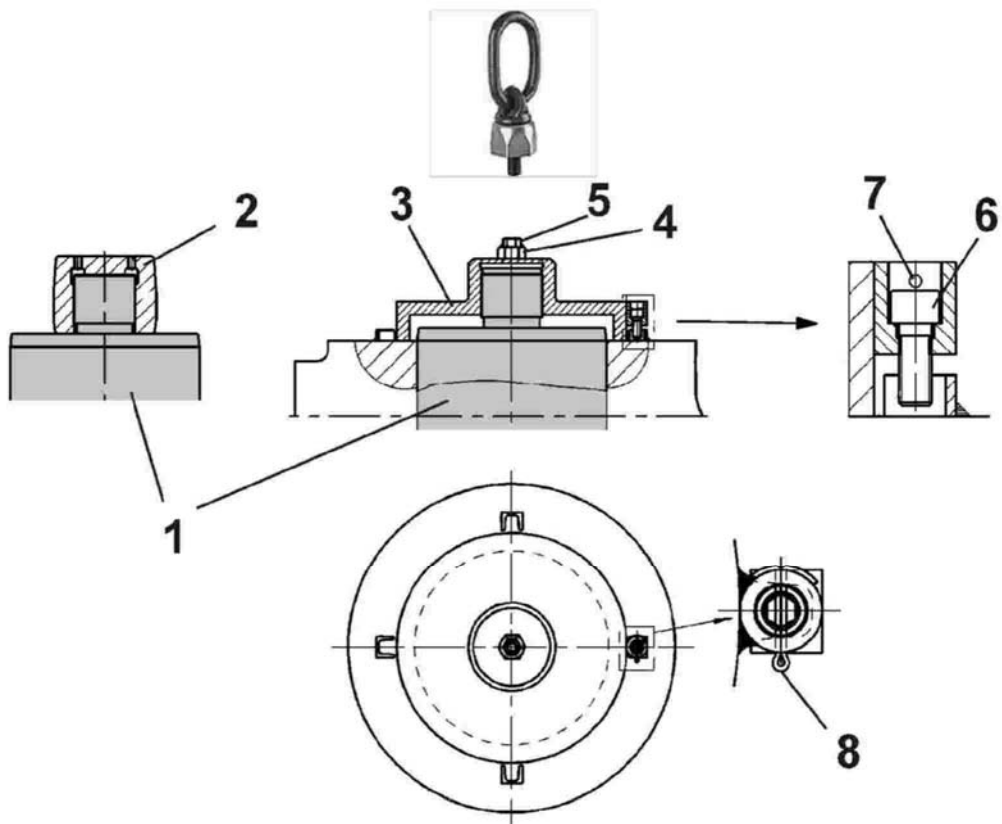
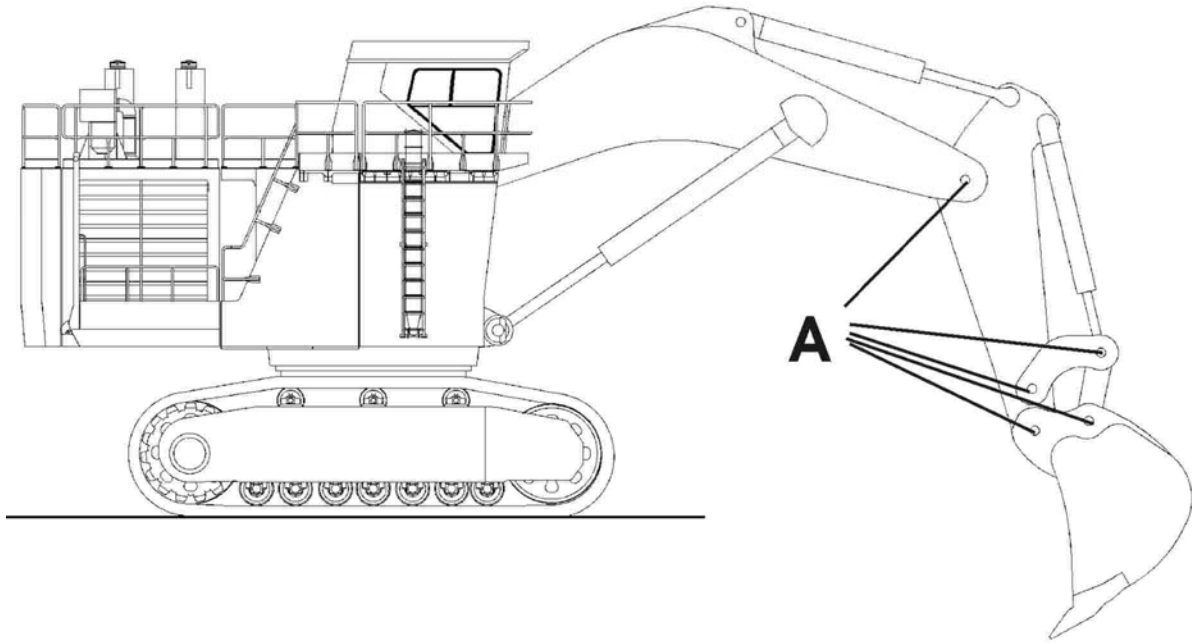
- **A: Hose connection of the cylinder rod must show to the outside.**
- **B: Flat area of the cylinder body must point to the front, away from the machine.**



Z 21874

3.15 Mounting of Stick (Bullclam bucket) (Z21874)

1. Lift the stick to the bearing position stick to the boom.
2. Lower the stick until stick and boom borings are aligned.
3. Install pin (1), stirrups (2), plate (3), washer (4) and bolt (5).
4. Lower the stick by means of crane and place lower end onto a pile of wood.



Z23034

3.15.1 Mounting of Stick (Backhoe attachment) (Z23034)

Legend

A Location of Pins with a fine thread end

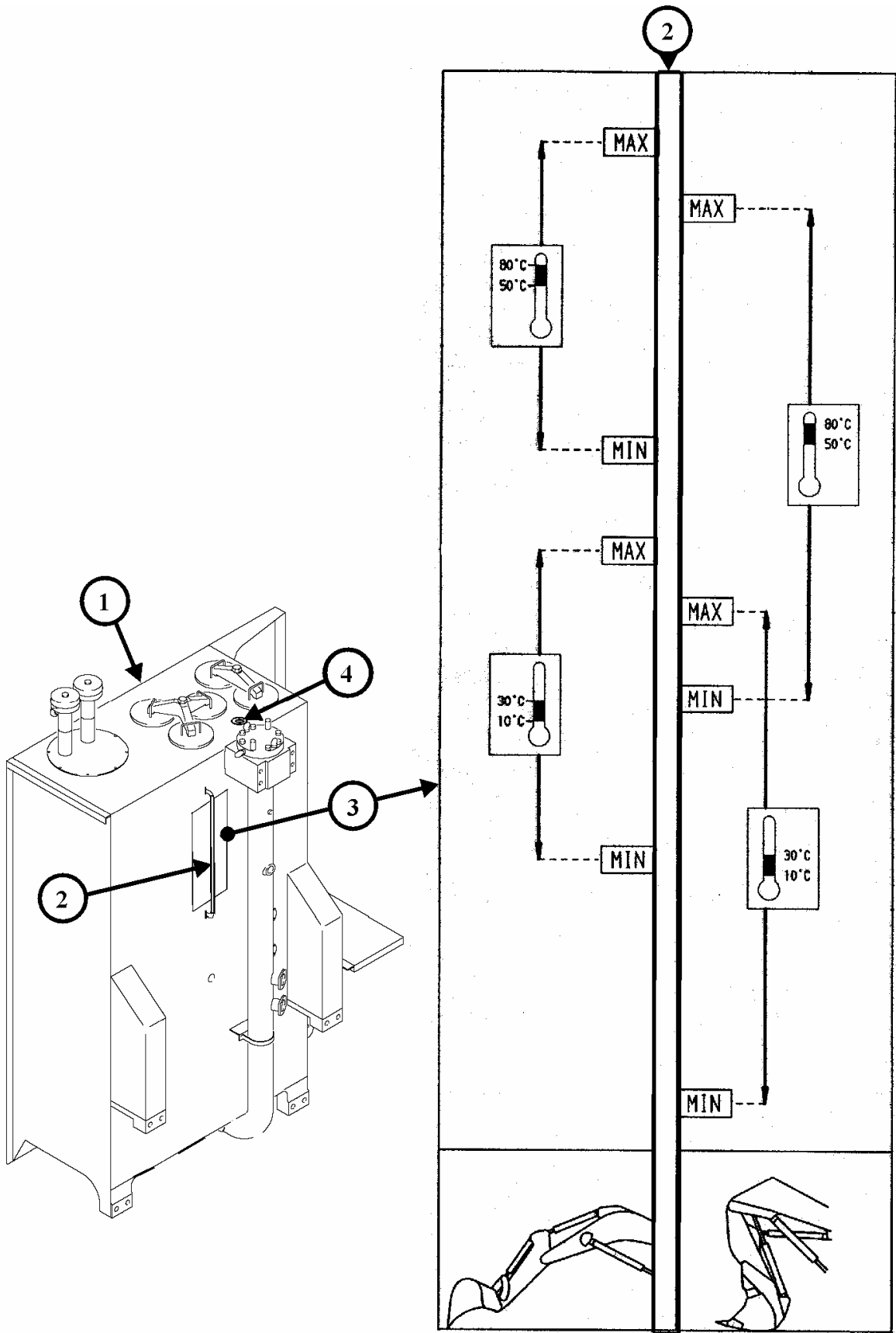
1. Pin
2. Cap for mounting
3. Final cap
4. Nut for mounting the final cap
5. Nut for mounting whirl
6. Safety bolt
7. Hole for the cotter pin
8. Cotter pin

Installing of this kind of pins:

1. Secure the thread with the mounting cap.
2. Install the pin.
3. Remove the mounting cap.
4. Install a whirl (M20) in the nut (5).
5. Lift the Final cap (3) with a crane, tilt it and turn it on the pin(1) by using the nut (4) (M30).
6. Secure the cap as shown with the bolt (6).
7. Secure the bolt (6) with the cotter pin (8).



- **There is only one mounting cap for all pins.**



Z21585

3.16 Filling up hydraulic oil tank (Z21585)

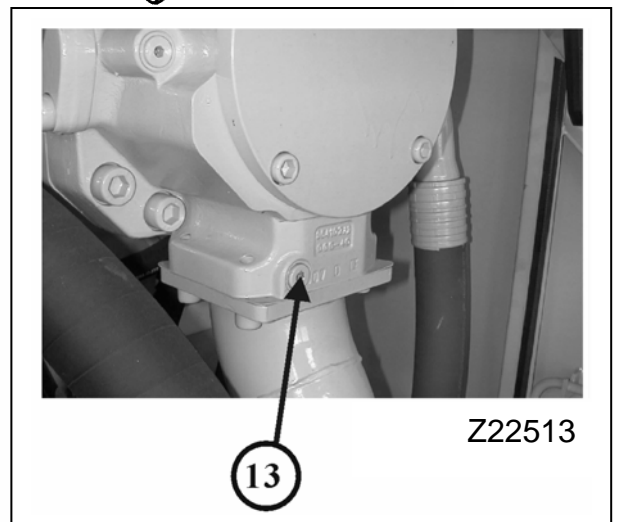
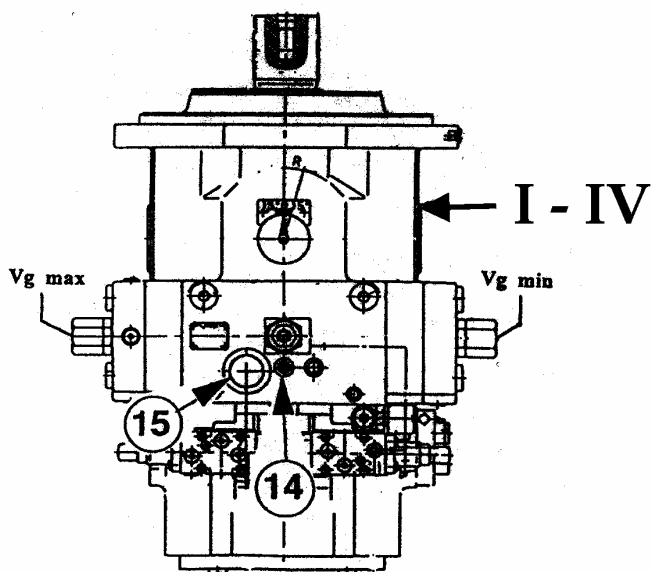
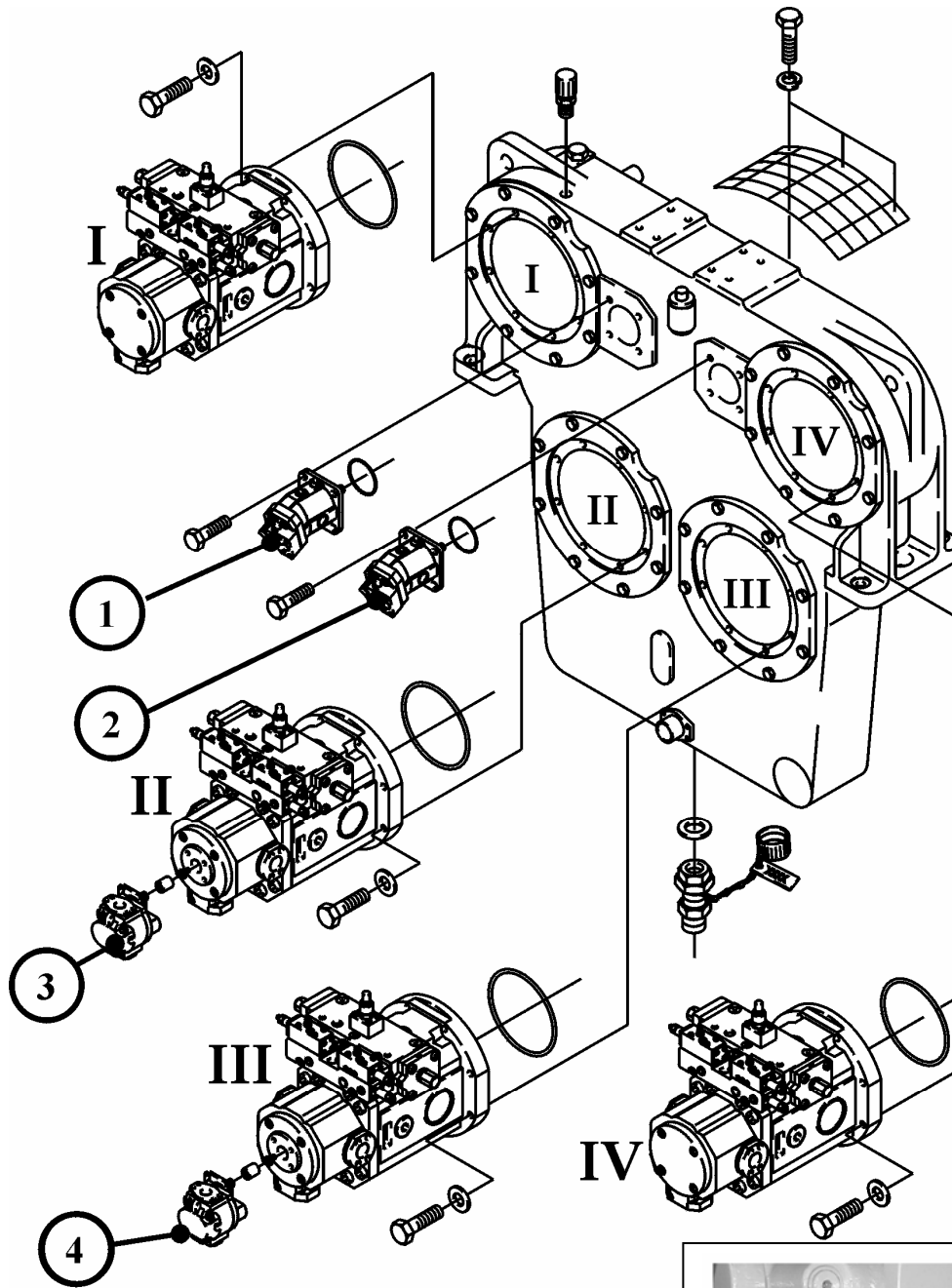


- **Connect all lines of the refilling arm* (hydraulic oil; fuel; grease).
*if so equipped**
- **Make sure main shut-off valve is in open position and all connections are securely tightened.**
- **Select hydraulic oil viscosity grade according to ambient temperatures. If the new hydraulic oil has a different viscosity grade compared with the drained oil it is necessary to enter the new viscosity grade into the appropriate "Service SETTINGS" group of the VHMS Menu Control.**

1. On machines equipped with Central Refilling System fill main hydraulic oil reservoir according to section "Central Refilling System" of the Maintenance Manual.
2. On machines without central refilling system fill main oil reservoir through opening (4), illustration Z 21585. Depending on type of attachment and the present oil temperature, select the applying oil level range on plate (3). Be sure to use the correct marking on oil level plate (3).

Legend for illustration Z 21585

- (1) Main hydraulic oil reservoir
- (2) Hydraulic oil level sight gauge
- (3) Oil level plate
- (4) Oil filler plug.



Z21693

3.17 Bleed air from all hydraulic pumps and check the Oil Level in all four Main Pump Housings (Z21693; Z22513)

Legend for illust. Z 21693

- I – IV Main hydraulic pumps (swash plate type)
- (1) Axial piston pump for hydraulic oil cooler fan drive
- (2) Axial piston pump for engine coolant radiator fan drive
- (3) Piggy-back gear pump for pump regulation and pilot oil circuit
- (4) Piggy-back gear pump for PTO gear lubrication system
- (14) Oil level and filler plug of main pump housing
- (15) Port of leakage oil return line

Bleeding air from pumps (1 - 4) and main pumps (I - IV)

Bleeding air from the hydraulic pumps and complete filling of the suction oil reservoir and the suction lines is essential, to prevent damages caused by air in the suction system (cavitation). Proceed as follows:

- (1) Open vent plug on top of pumps (1 and 2). Close the vent plugs as soon as bubble-free oil flows out.
- (2) Open vent plug (13), illust. Z22513 on the suction port of gear pumps (3 and 4) and wait until bubble-free oil flows out. Then tighten vent plug (13).
- (3) Open vent plug (13) on the pump suction port of all four main pumps. As soon as bubble free oil flows out tighten vent plug(13).

Check oil level in main pump housings (I - IV)

- (1) Remove level and filler plug (14), illust. Z 21693. The oil level in the pump housing must reach the lower edge of the opening.
- (2) If necessary add hydraulic oil up to the lower edge of the filler opening.
- (3) Insert level and filler plug (14) and tighten securely.



- **Make sure the main pump housings are correctly filled, otherwise the pump drive shaft bearings could be damaged due to lack of lubrication.**
- **Check hydraulic oil level.**
- **Check the whole hydraulic system for leakages.**

3.18 Filling up fuel tank

If so equipped do it via the service arm below the engine house, otherwise fill up direct through the refilling plug on top of the fuel tank.

Filling up via the service arm:

Connect the fuel supply hose from the fuel service truck to the coupling of the service arm. Use only a correct matched coupling. The fuel supply system of the service truck must be equipped with a pressure activated cut-out nozzle. The fuel nozzle cut-out pressure should be adjusted to 0,38 bar. If this pressure is too low for filling the fuel tank up to the correct level, gradually increase the cut-out pressure until the pressure is sufficient for filling up to the correct level. For this adjustment check the real fuel level via the tank plug on top of the fuel tank, use a suitable dip stick.

The maximum flow rate should not exceed 680 liter per minute.

3.19 Pre-checks for initial Start-up



- **The local working safety rules must be strictly observed.**
- **Only service personnel necessary for first start up testing are allowed to be on the excavator.**
- **The operator must have read and understood the operation manual.**
- **Remove all tools and other not fixed material from excavator especially from moving parts.**

- (1) Be sure that all hand rails, catwalks and steps etc. are correctly installed.
- (2) Make sure that all hoses and electrical connections are correctly established. Ex works, all disconnected hose lines and electrical cables are marked with identification numbers (refer to the electric and the hydraulic circuit diagrams).
- (3) Check all fluid levels and correct if necessary.*
- (4) Make sure that the automatic engine oil supply system "Reserve" is filled and correctly connected to the engine.*
- (5) Make sure that the shut off valve between the main hydraulic tank and the suction tank is completely open.
- (6) Make sure that the hoses for the hydraulic cylinders are covered with sealing plates if they are not assembled.
- (7) Bleed the engine fuel lines and filters.
- (8) Bleed the suction side of each main pumps *. To do this open the plug from suction flange of the respective pump.
- (9) Fill up each main pump housings with hydraulic oil.* To do this open the drain line connection of the pumps and put in clean hydraulic oil.
- (10) Bleed pump housing of the fan piston pumps *.
- (11) Fill up the main pump housings with hydraulic oil. To do this open drain line connection of the pumps and put in clean hydraulic oil.
- (12) Check to make sure that the pressure relief cocks for the hydraulic track tensioning system are CLOSED and the shut-off cocks in the crawler carriers are OPEN. To check the correct valve position remove lever and look to the marking. The valve is open if the marking is in line of the valve ports and closed if the marking is cross of the valve port line.

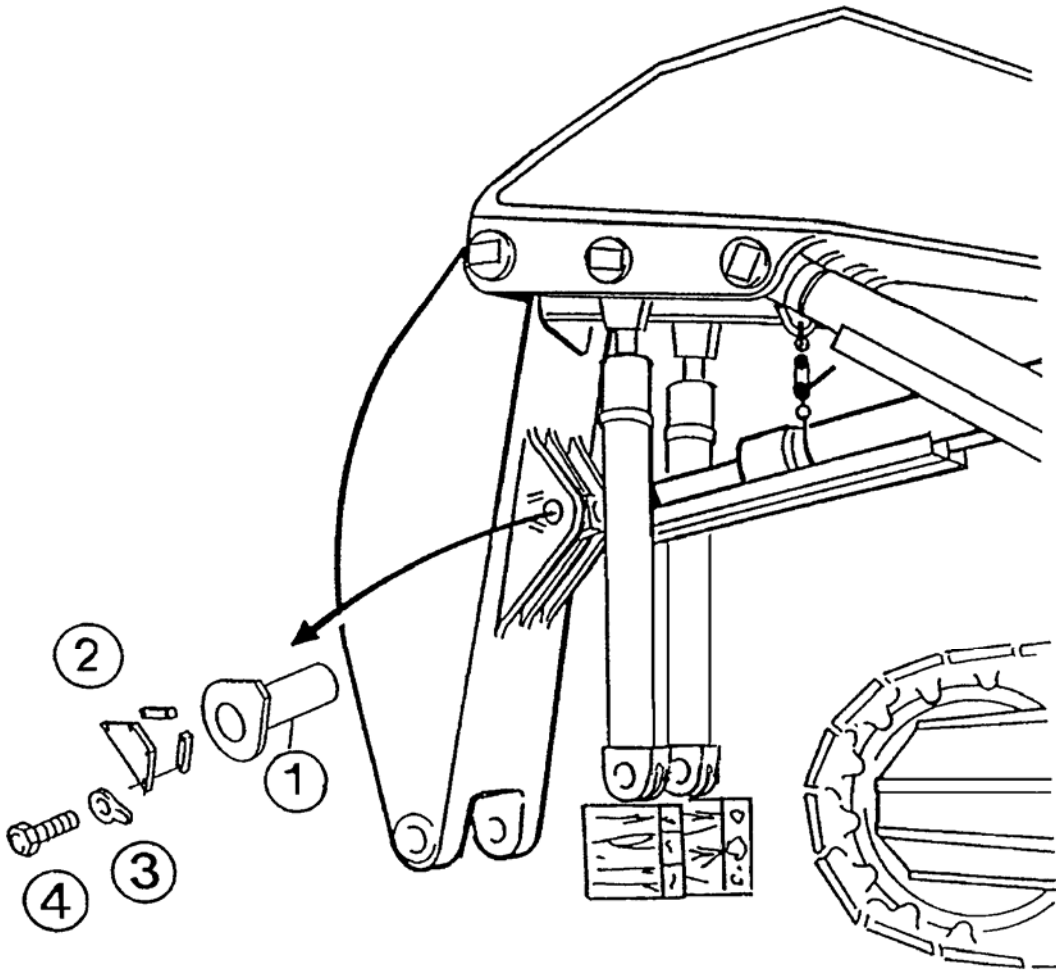
- (13) Connect main battery switch and activate electrical system by using the key switch S1.
- (14) Check messages from display.
- (15) Check function of electrical system.
- (16) Activate swing parking brake by using switch S29 on dash board.
- (17) Start engine. Let it run in low idle about 5 min.
- (18) Bleed proportional valves of the pilot control. To do this turn the screw a few turn out until oil comes out. Retighten screw.
- (19) Bleed proportional valve of pump regulation system. To do this turn screw a few turn out until oil comes out. Retighten screw.
- (20) Let engine run in high idle.
- (21) Check function of engine water cooling fan by disconnecting plug to solenoid Y136.
- (22) Check function of hydraulic oil cooling fan by disconnecting plug to solenoid Y6a and Y6b.



- **Be carefully, make sure that nobody stand by the fan during function check.**

- (23) Bleed track extending system. To do this open both plugs near by the idler of each side frames. Connect inside a test hose to the test stud from each track extending cylinder. Drain the out flowing oil into a suitable container. Let engine run until bubble free oil flowing out.

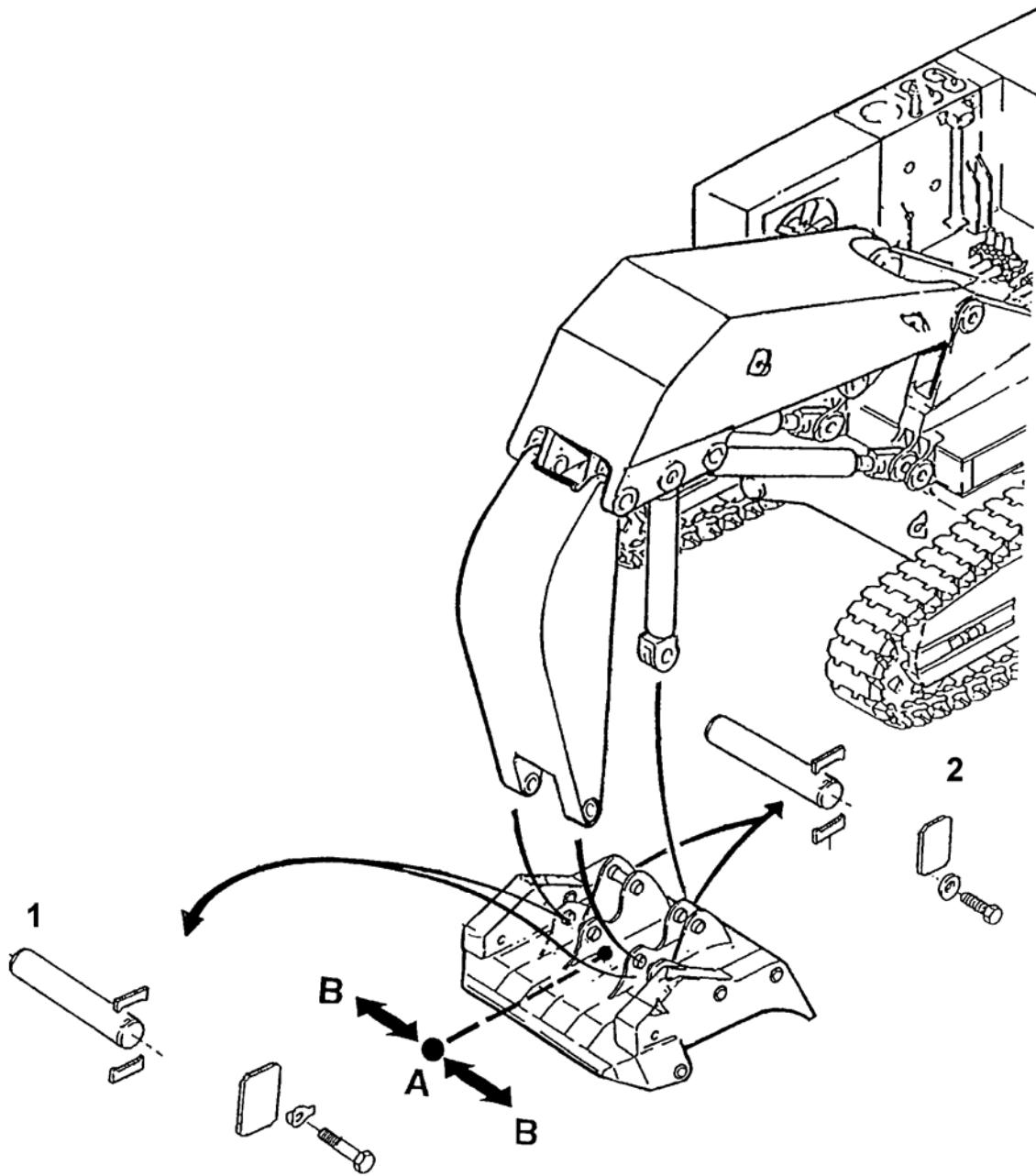
*(For more information refer to Maintenance Manual.)



Z21875

3.20 Mounting of stick cylinders to the stick (Z21875)

1. Hook up stick cylinders to chain pull and remove transport fastening.
2. Lower stick cylinder by means of chain pull.
3. Start the engine and extend cylinder rod. Align with bearing at stick.
4. Install pin (1), plat (2) and washer (3) with bolt (4).



Z21876

3.21 Assembly of Bullclam Bucket to the Stick (Z21876)

Delivery in two part (clam - rear wall)

1. Place the rear wall as shown on the ground.
2. Prepare the pin seals according to page 78.
3. Lift the attachment and retract the stick until the stick is in a vertical position.



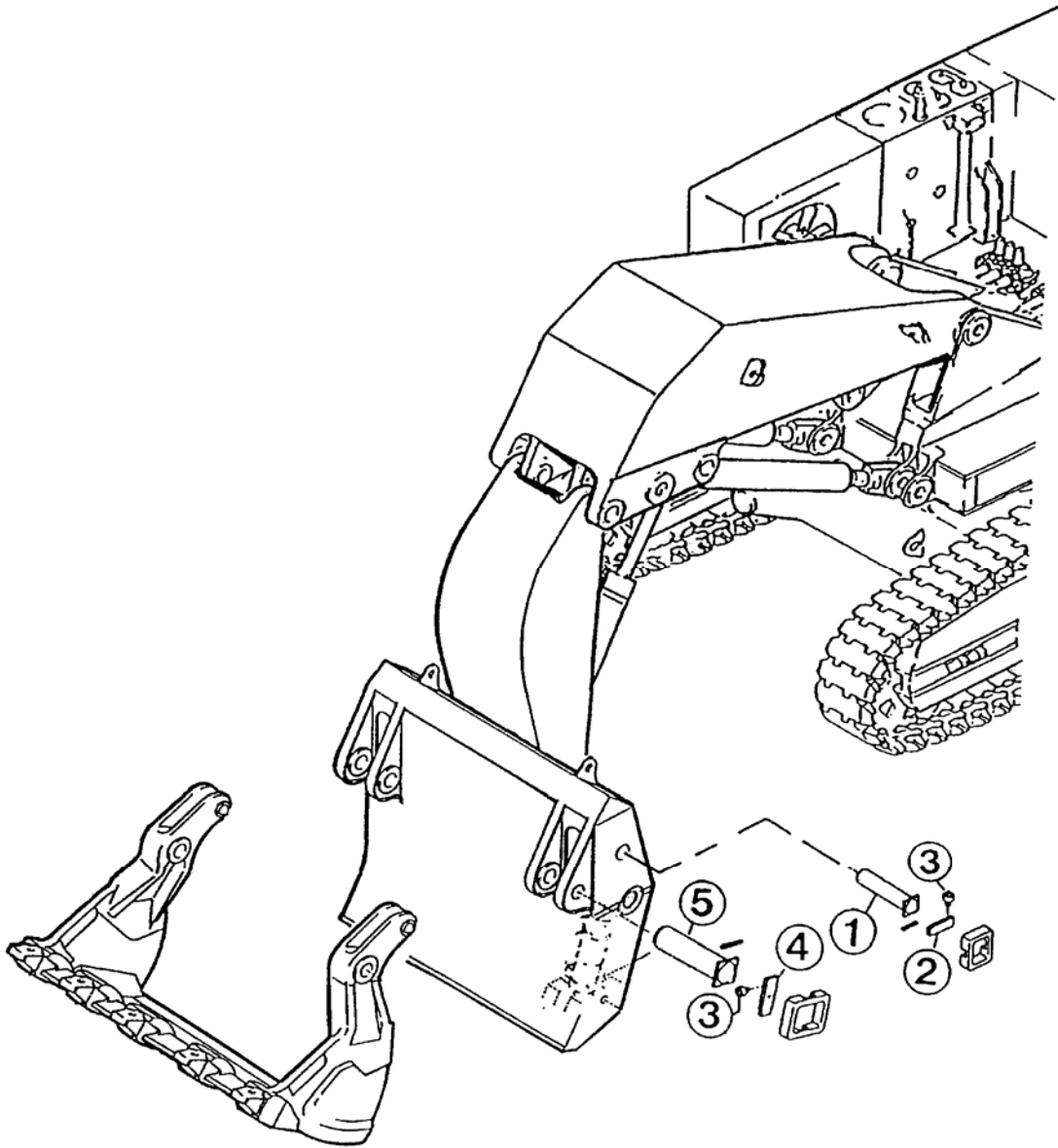
- For the mounting of the pin seals please refer to page 78.
- Be carefully, watch the stick cylinder hose, because the cylinder is not fixed.
- Make sure that the bucket cylinder is in correct position. The contact surface from the cylinder eye must point to the front, away from the machine.

4. Move the excavator to the rear wall.
5. Push the pins (1) from (A) to (B) so far as the stick can mount.
6. Align the bores of the stick with the bores of the rear wall.
7. Insert pins (1) from outside to inside (B to A) and secure with the axle stirrups and install lock plates (3)
8. Push the pins (2) from (A) to (B) so far as the bucket cylinders can mount.
9. By moving extending the bucket cylinders align the cylinder eyes with the bores of the rear wall.
10. Push pins (2) from outside to inside (B to A) so far that the axle stirrup (4) can be installed.
11. Connect the hydraulic hoses (clam cylinder hose) to the rear wall.
12. Retract the clam cylinder fully in
13. Place the clam shell into position as shown.
14. Push out all pins (1 and 5).
15. Align the rear wall borings by moving boom, stick and bucket cylinder with the clam borings.



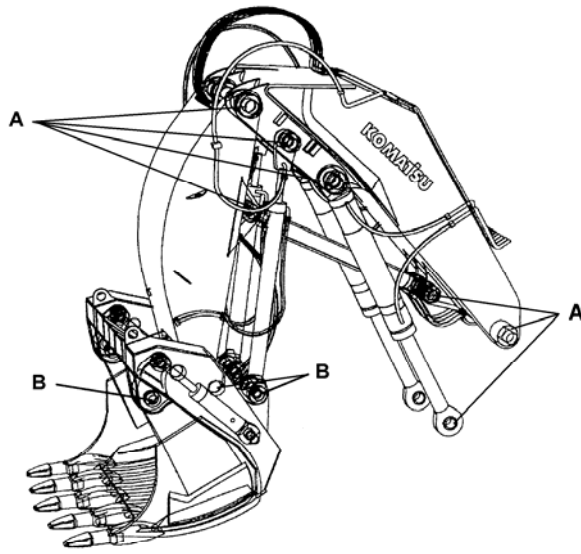
- Be carefully, watch the clam cylinder.

16. Install pins (5) and lock with catch (3+4).

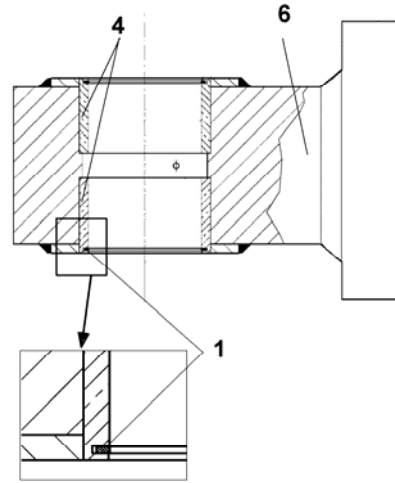


Z21877

17. Extend clam cylinders to align them with borings in the clam.
Install pins (1) and lock them with catch (2+3).
18. Connect all grease lines to the bucket and ensure that all
grease points are greased before machine is put into operation.
Connect line to the end of line switch.
Refer to Service Manual Hydraulic Driven Lube Pumps with
VHMS, Chapter "Incommissioning".



Example inner seal (A)



Example outer seal (B)

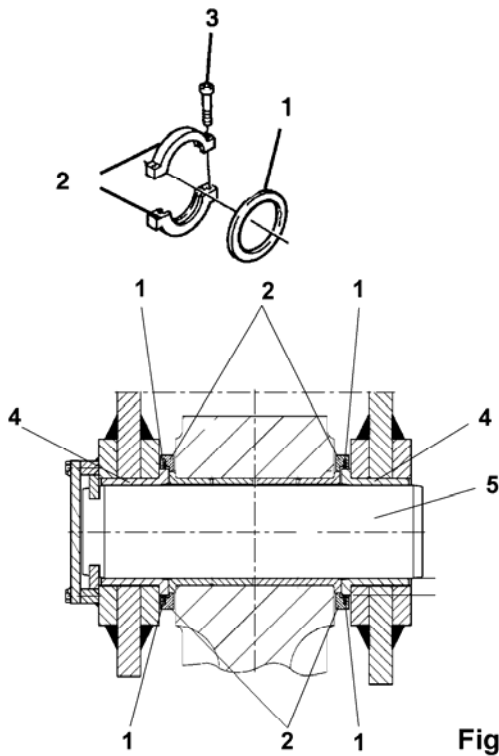


Fig. Y

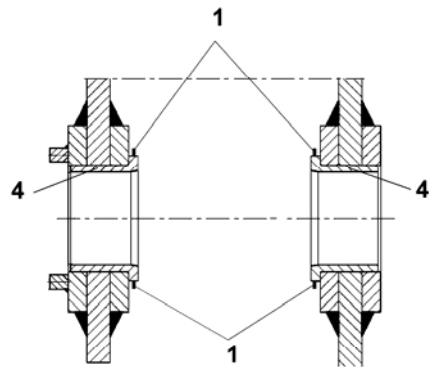
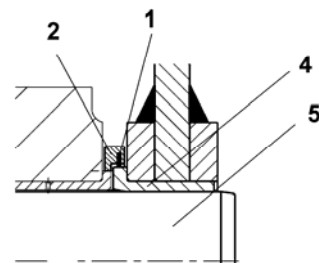


Fig. X



Z22042

3.22 Mounting of the Pin Seals (Z22042)

The illustration shows the mounting places of the outer bushing seals (A) and the inner bushing seals (B) of the front shovel attachment..

Mounting procedure inner pin seals (B):

1. Remove respective pins
2. Fill the grooves inside of the bushings with grease
3. Install the seals and align it.
4. Assemble the boom and the stick as described

Mounting procedure outer pin seals (A):

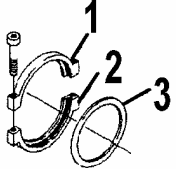
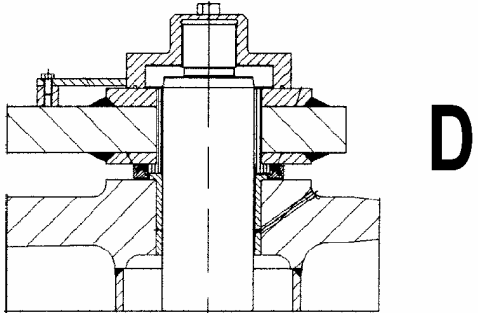
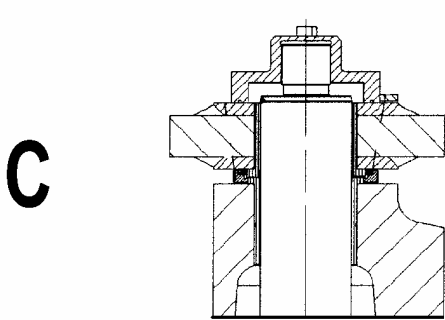
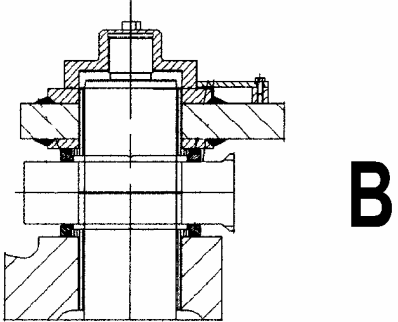
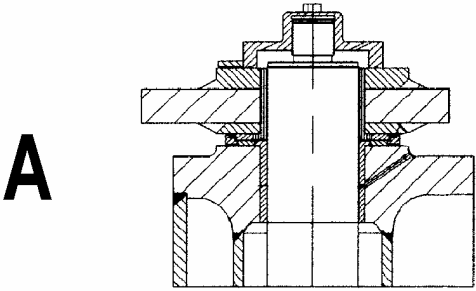
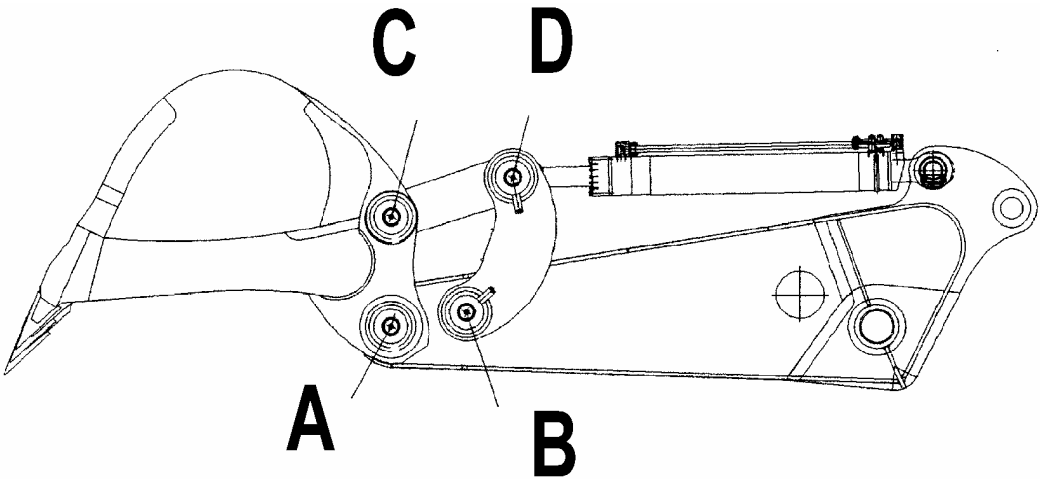
1. Remove respective pins.
2. Slide seals (1) on the collar of the respective bushings in the rear wall of bucket Fig. X.
3. Assemble the stick as described.
4. Install both fixing halves (2) over the seal ring (1) and tighten bolts (3). Fig. Y shows the already assembled pin connection.



- **The fixing halves can mount only in one position because of two different inner diameters.**
- **Fill the groove of the fixing halves before installing with grease.**
- **Proper functioning of the seal is only established in case of an intact seal ring.**

Legend illustr. Z 22042:

- | | |
|-----|--|
| A | Position of outer pin seal with fixing halve |
| B | Position of inner pin seal with seal groove |
| (1) | Seal ring |
| (2) | Fixing halve |
| (3) | Bolt |
| (4) | Bushing |
| (5) | Pin |
| (6) | Cylinder eye |

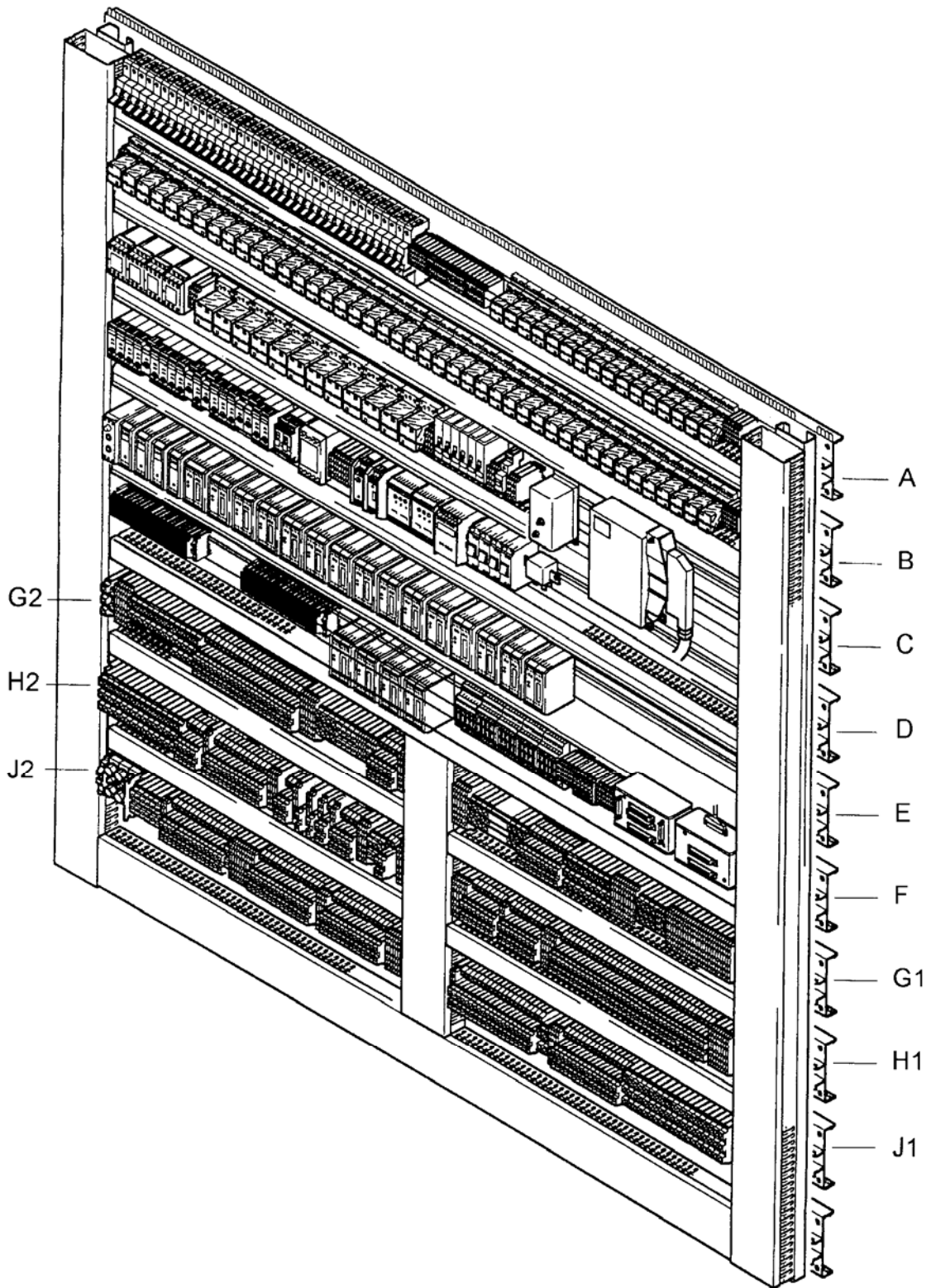


Z23035

3.22.1 Mounting of the Pin Seals (Backhoe) (Z23035)

Legend illustr. Z 23035:

- (1) Upper ring half
- (2) Lower ring half
- (3) Seal ring



Z21879

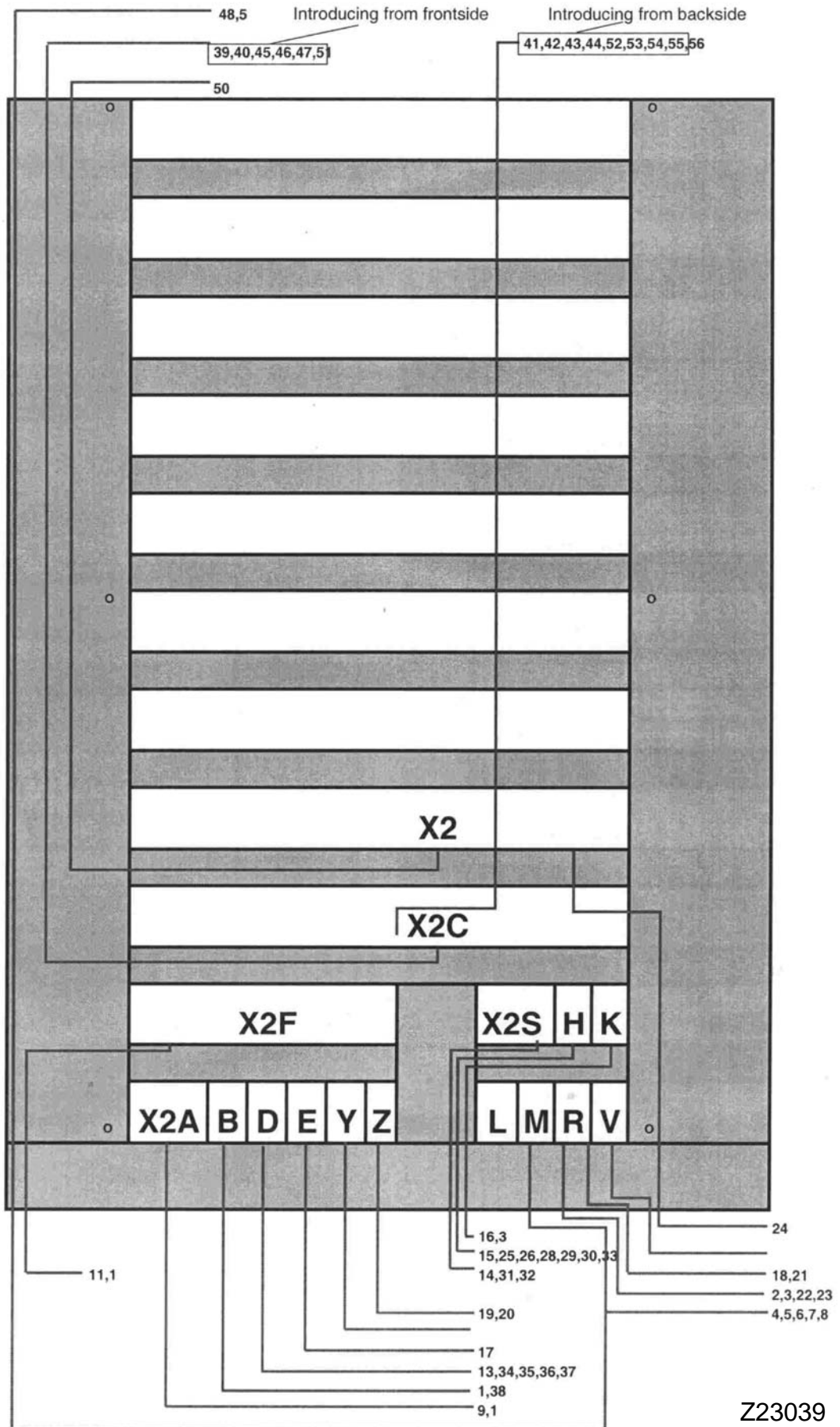
3.23 Connection of the cable harnesses to the terminal rails in the switch box “X2” (Z21879)

All harnesses are marked with numbers and letters. You find also these numbers and letters in the X2 – box showed on the picture one page before. So it is easy to locate the right connection point for each cable.

All cables with the following markings printed on are installed for reserve purposes and must not be connected to the terminal rails during first assembly at job site.

Markings on cables in the X2 switch box (Diesel Drive)		Cable coming from:
TANK 1	TANK 1	Hydraulic tank
TANK 2	TANK 2	
MOT.H1-1	MOT.H1-1	Engine rear
MOT.H1-2	MOT.H1-2	
MOT.H1-3	MOT.H1-3	
MOT.H1-4	MOT.H1-4	
MOT.V.1	MOT.V.1	Engine front
MOT.V.2	MOT.V.2	
MOT.V.3	MOT.V.3	
ST/F1-1	ST/F1-1	Central control frame (panel) machinery house
ST/F1-2	ST/F1-2	
ST/F1-3	ST/F1-3	
ST/F1-4	ST/F1-4	

X2 - box



No.	Harnesses	Terminal strip („going to“)	No.	Harnesses	Terminal strip („going to“)
1	Battery box 1	X2B	29	Pressure hydraulic oil cooler	X2H
2	Engine oil tank	X2M	30	Level sensor hydraulic tank	X2H
3	Engine	X2M	31	Control plate 3	X2S
4	Engine housing	X2L	32	Temperature gear oil	X2S
5	Lighting ladder	X2L	33	Pressure suction tank	X2H
6	Lighting control block area	X2L	34	Pressure pump 1	X2D
7	Lighting counterweight	X2L	35	Pressure pump 2	X2D
8	Travel alarm	X2L	36	Pressure pump 3	X2D
9	Emergency switch engine house	X2A	37	Pressure pump 4	X2D
10	Emergency switch stair	X2A	38	Battery box 2	X2B
11	Pilot control harness 1	X2F	39	Cab cable K1=30x1mm ²	X2C
12	Pilot control harness 2	X2F	40	Cab cable K2=30x1mm ²	X2C
13	High pressure filter	X2D	41	Cab cable K3=20x2.5mm ²	X2C
14	Control plate	X2S	42	Cab cable K4=20x2.5mm ²	X2C
15	Hydraulic oil tank	X2H	43	Cab cable K5=20x2.5mm ²	X2C
16	Refilling arm	X2K	44	Cab cable K6=7x6mm ²	X2C
17	Ladder	X2E	45	Cab cable K7=1x16mm ²	X2C
18	End of line pressure switch	X2R	46	Cab cable K9=2x0.5mm ² shielded, can bus	Plug Can-Bus into the right channel
19	End of line pressure switch	X2Z	47	Cab cable K10=4x1mm ² shielded	X2C
20	Central lubrication system	X2Z	48	Cab cable K11=2x0.75mm ²	X2M
21	Slew ring lubrication system	X2R	49	Cab cable K12=4x1mm ² shielded	X2M
22	Engine rear 1 + 2	X2M	50	Cab cable K13=4x1mm ² shielded	X2
23	Engine rear 3	X2M	51	Cab cable K14=30x1mm ²	X2C
24	Refilling pump M8	X2	52	Cab cable E19	X2C
25	Pressure leak oil chamber	X2H	53	Cab cable E20	X2C
26	Pressure return oil chamber	X2H	54	Cab cable E21A	X2C
27	Tank sensor	X2K	55	Cab cable E21B	X2C
28	Back pressure hydraulic oil tank	X2H	56	Cab cable E22	X2C

All 24 volt wires are blue and have a printed code (every 10 cm) at each end of the wire.

The first part of the code shows the required connection and the second part gives the information what is connected at the other side of the wire.

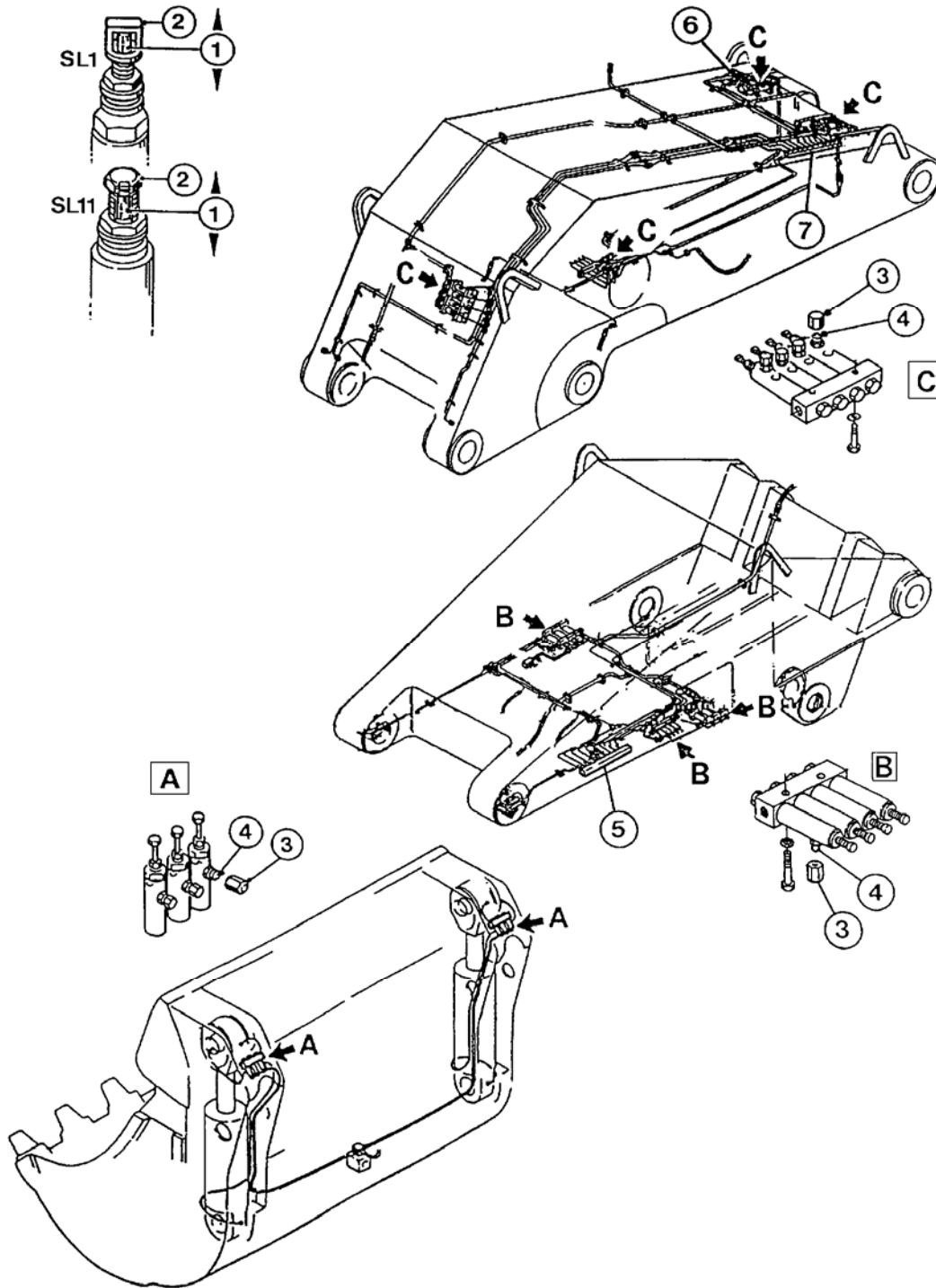
Example:



to
X2S = X2-Board, terminal group “S” **Y136** = Plug connector to solenoid

45 = Terminal No 45

.1 = Terminal 1 of connector



Z21880

3.24 Putting the Central Lubrication System into operation (Z21880)

In order to ensure adequate pre-lubrication of all attachment bearings. It is necessary to manually lubricate the attachment bearings by applying a grease gun to the grease fittings on each grease injector.

To this, remove protection cap (3) and press in grease until a grease collar appears at the connected bearing.



Be sure to repeat the procedure until all pivot bearings of the attachment and cylinder bearings are lubricated.



- **Before handing over the excavator to the customer the first PM Clinic Service has to be carried out according to the Inspection Procedure Manual.**

In order to keep the excavator in first-class operating condition use only genuine Komatsu Mining Germany replacement parts. The use of any part other than the genuine parts releases the Komatsu Mining Germany for any guarantee.

3.25 Metric standard thread

Bolt size (mm)	Wrench size (mm)		Tightening torque MA (Nm)		
			8.8	10.9	12.9
M 8	6	13	21	31	36
M 10	8	17	43	63	73
M 12	10	19	74	108	127
M 14	12	22	118	173	202
M 16	14	24	179	265	310
M 18	14	27	255	360	425
M 20	17	30	360	510	600
M 22	17	32	485	690	810
M 24	19	36	620	880	1030
M 27	19	41	920	1310	1530
M 30	22	46	1250	1770	2080
M 33	24	50	1690	2400	2800
M 36	27	55	2170	3100	3600
M 39		60	2800	4000	4700
M 42	32	65	3500	4950	5800
M 45		70	4350	6200	7200
M 48	35	75	5200	7500	8700
M 52		80	6700	9600	11200
M 56	41	85	8400	12000	14000
M 60		90	10400	14800	17400
M 64	46	95	12600	17900	20900
M 68		100	15200	21600	25500

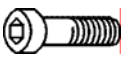
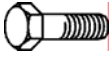
The torque indications on the chart attached are valid only when the bolts are manufactured according to DIN.

Threads and bolt heads must be greased carefully with grease KP2K.

The surfaces of contact which should be screwed together have to be free of grease.

Diverging torques: Bolts at excavator slew rings (see Service Bulletin AH00511 last issue)

Metric fine thread

Bolt size (mm)	Wrench size (mm)		Tightening torque MA (Nm)		
			8.8	10.9	12.9
M 8x1.00	6	13	23	33	39
M 10x1.00	8	17	48	70	82
M 12x1.25	10	19	81	119	139
M 14x1.50	12	22	127	187	219
M 16x1.50	14	24	191	280	330
M 18x2.00	14	27	270	385	450
M 20x2.00	17	30	380	540	630
M 22x2.00	17	32	510	720	850
M 24x2.00	19	36	680	960	1130
M 27x2.00	19	41	990	1410	1650
M 30x2.00	22	46	1380	1960	2300
M 33x2.00	24	50	1850	2650	3100
M 36x3.00	27	55	2300	3250	3850
M 39x3.00		60	3000	4200	4950
M 42x3.00	32	65	3750	5300	6200
M 45x3.00		70	4600	6600	7700
M 48x3.00	35	75	5700	8100	9500
M 52x3.00		80	7300	10400	12100
M 56x4.00	41	85	8900	12600	14800
M 60x4.00		90	11000	15600	18300
M 64x4.00	46	95	13300	19000	22200
M 68x4.00		100	16100	22900	27000

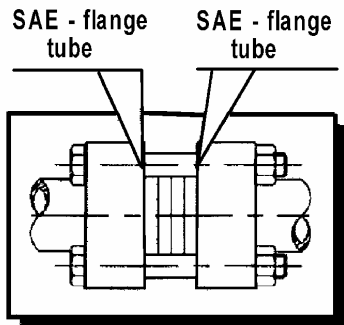
The torque indications on the chart attached are valid only when the bolts are manufactured according to DIN.

Threads and bolt heads must be greased carefully with grease KP2K.

The surfaces of contact which should be screwed together have to be free of grease.

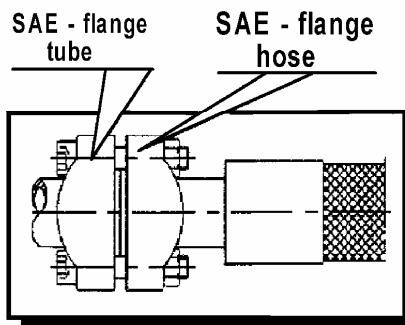
Diverging torques: Bolts at excavator slew rings (see Service Bulletin AH00511 last issue).

Example of assembly 1



4 X bolt + nut

Example of assembly 2

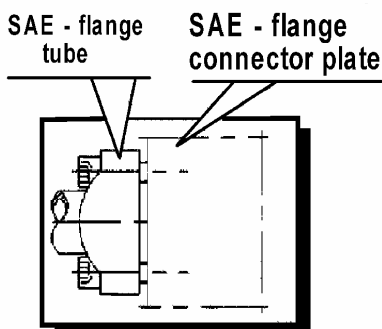


4 X cylinder head screw + nut

Torques:

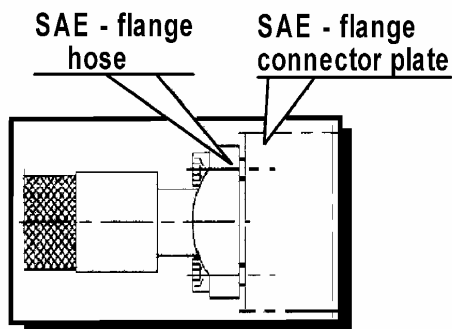
- M12 - 074 Nm
- M14 - 118 Nm
- M16 - 179 Nm
- M20 - 360 Nm

Example of assembly 3



4 X cylinder head screw

Example of assembly 4



4 X cylinder head screw

Torques:

- M12 - 108 Nm
- M14 - 173 Nm
- M16 - 265 Nm
- M20 - 510 Nm

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