Operation & Maintenance Manual

HYDRAULIC
MINING
SHOVEL

PC7000E-6

SERIAL NUMBER 35003

Unsafe use of this machine may cause serious injury or death. Operators and maintenance personnel must read this manual before operating or maintaining this machine. This manual should be kept near the machine for reference and must be periodically reviewed by all personnel who will come into contact with it.

Komatsu has Operation and Maintenance Manuals written in other languages. If a foreign language manual is required, contact your local distributor for availability.

KOMATSU

1 FOREWORD

This is the original version of the Operation & Maintenance Manual, compiled in English, according to the serial number stated on the front cover.

2 SAFETY

IGNORING THE INSTRUCTIONS IN THIS MANUAL COULD LEAD TO SERIOUS INJURY OR DEATH.

Please read and make sure that you fully understand the precautions described in this section and the safety labels on the machine. When operating or servicing the machine, always follow these precaution strictly.

2.4.5.5 LEAVING OPERATOR'S SEAT WITH LOCK

Refer to Fig. 2-10:

– Before standing up from the operator's seat in order to adjust the seat, always lower the work equipment to the ground, turn off the motor, relieve the pressure in the hydraulic system and set lock lever to LOCK position (Position L). If the lock is not applied, there is danger of serious personal injury if the work equipment control levers are touched by mistake and the machine moves suddenly. For information on relieving the pressure in the hydraulic system, refer to chapter 'RELIEVING THE PRESSURE IN THE HYDRAULIC SYSTEM' in the 'OPERATION' part of this manual.

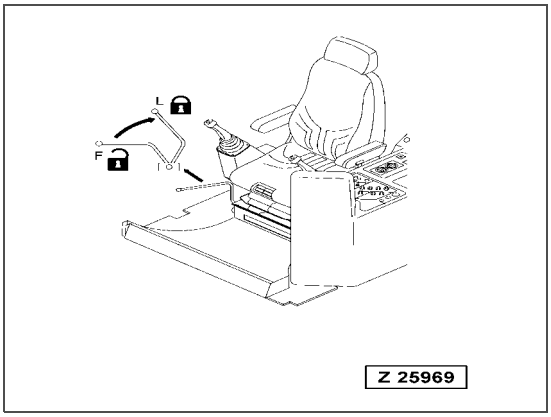


Fig. 2-10

2.4.5.6 LEAVING THE MACHINE

– When leaving the machine, always lower the work equipment completely to the ground, turn off the motor, relieve the pressure in the hydraulic system and set lock lever (1) securely to the LOCK position (L), then stop the motor. Always lock the cabin and take the cabin key with you, and keep it in a specified place. For information on relieving the pressure in the hydraulic system, refer to chapter 'RELIEVING THE PRESSURE IN THE HYDRAULIC SYSTEM' in the 'OPERATION' part of this manual.

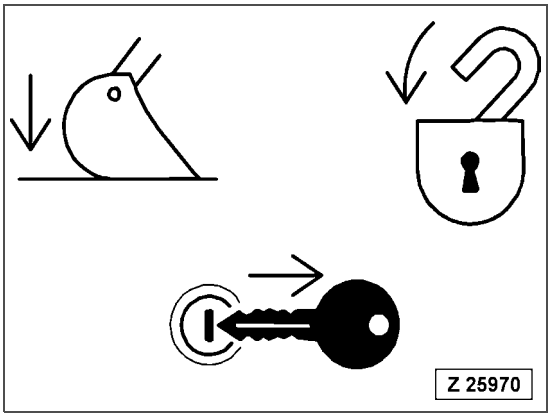


Fig. 2-11

2.4.6 BURN PREVENTION

2.4.6.1 HOT COOLANT

Refer to Fig. 2-12:

– To prevent burns from hot water or steam spurting out when checking or draining the coolant, wait for the water to cool to a temperature where it is possible to touch the radiator cap (Fig. 2-13) by hand before starting the operation. Even when the coolant has cooled down, loosen the cap slowly to relieve the pressure inside the radiator before removing the cap.

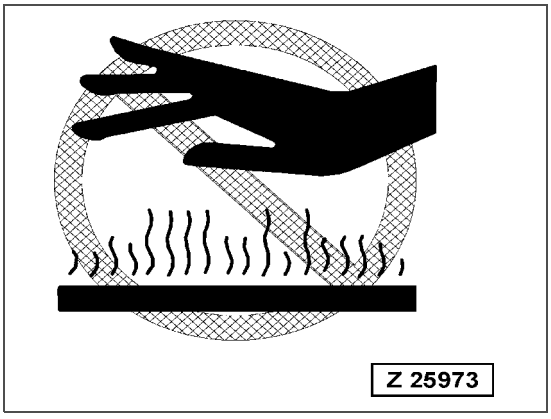


Fig. 2-12

2.4.12.2 PRECAUTIONS WHEN TRAVELLING IN FORWARD OR REVERSE

– Before traveling, set the machine so that sprocket (1) is behind the operator's seat (Fig. 2-22).
– If sprocket (1) is in front of the operator's cab, the machine moves in the opposite direction from the operation of the pedals (front and rear travel is reversed, left and right steering is reversed). Be extremely careful when operating the machine in this situation.

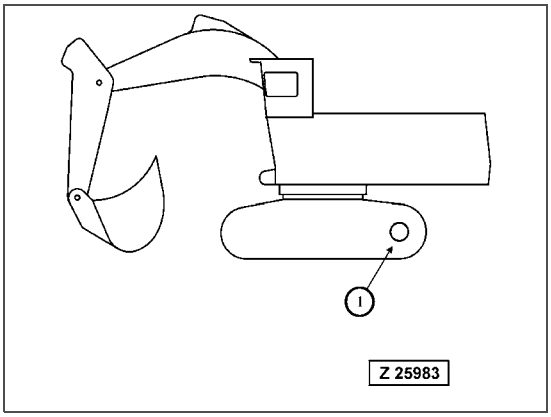


Fig. 2-22

– Before traveling, check again that there is no one in the surrounding area, and that there are no obstacles (Fig. 2-23).
– Before traveling, sound the horn to warn people in the area.
– Always operate the machine only when seated.
– Do not allow anyone apart from the operator to ride on the machine.
– Check that the travel alarm works properly.
– Secure the cab door when it is both open and closed.
– Always keep the cab door closed when operating the machine.

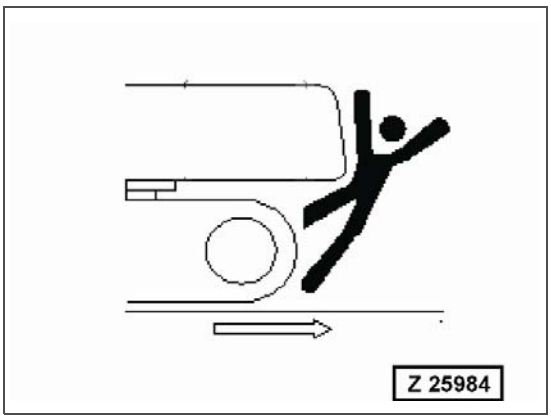


Fig. 2-23

– If there is an area to the rear of the machine which cannot be seen, position a signal person. Take special care not to hit other machines, objects or people when turning or swinging the machine (Fig. 2-24)

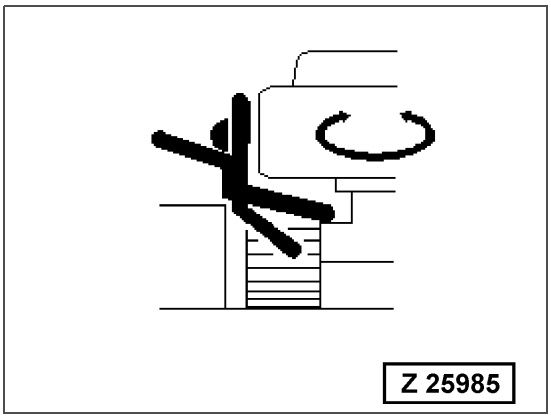


Fig. 2-24

NOTE! Always be sure to carry out the above precautions even when the machine is equipped with mirrors or camera systems.

2.5.1.6 TWO WORKERS FOR MAINTENANCE WHEN THE MACHINE IS RUNNING

– To prevent injury, do not perform maintenance or adjustments while the motor runs. If work must be carried out with the motor running, carry out the operation with at least two workers and do as follows:
  – One worker must always sit in the operator's seat and be ready to stop the motor at any time. All workers must maintain contact with each other and be fully aware of all relevant safety measures.
– For safety information when working with high pressure oil in the hydraulic system, refer to section 2.6 on page 2-39.
– When carrying out operations near rotating parts, there is a hazard of being caught in the parts, so be careful not to come close (Fig. 2-40).
– Do not touch any control levers or pedals. If they must be operated, always give a signal to other workers to warn them to move to a safe place.

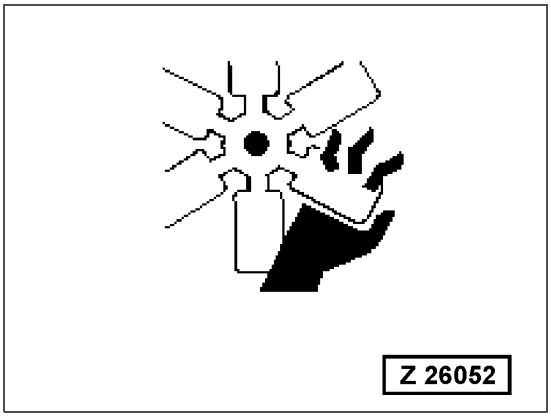


Fig. 2-40

2.5.1.7 INSTALLING, REMOVING OR STORING ATTACHMENTS

– Appoint a leader before starting removal or installation operations for attachments.
– Place attachments that have been removed from the machine in a stable condition so that they do not fall (Fig. 2-41). And take steps to prevent unauthorized persons from entering the storage area.

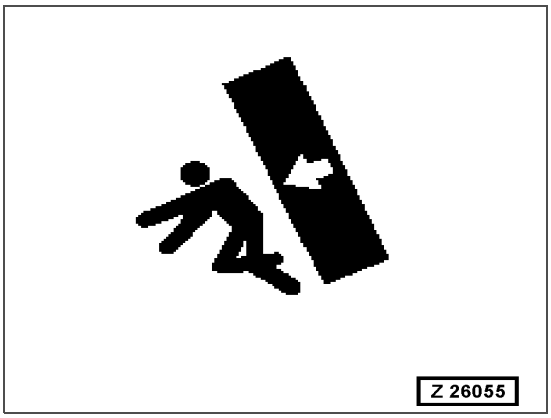


Fig. 2-41

2.7.1 FRONT GUARD PROTECTIVE STRUCTUR ’FOPS’ FOR OPERATOR’S CAB

The Shovel must be equipped with a front guard protective structure ”OPG Front Guard” if it is used for applications where there is a risk of hitting objects from the front.

2.7.2 OBJECT HANDLING

Object handling operations are not allowed.

2.7.3 LIGHTING

The Shovel must only be operated when the operator has sufficient visibility in relation to the work area. Disturbing shady areas or dazzling effects must be avoided.

If necessary, the Shovel must be retrofitted with additional lighting equipment (working lights) in order to ensure sufficient visibility conditions.

2.7.4 WARNING BEACON

The Shovel can be retrofitted with a warning beacon which is fitted on the cab roof by means of a magnetic bracket.

REMARKS: The above-mentioned special safety devices can be ordered as accessories together with the Shovel.
They are also available as a field package for installation through our service organization.

2.7.5 SAFETY HARNESS IN CONFORMITY WITH EN 361 (EUROPEAN STANDARD)

The safety harness should only be used together with connectors according to EN 354, and fall arrest according to EN 355, or fall protection devices according to EN 360.

See the following pages for further information.

2.7.5.1 SAFETY HARNESS IN CONFORMITY WITH EN 361 (EUROPEAN STANDARD)

⚠ WARNING

RISK OF FALLING!

Falling from the boom can cause serious injury or death.
Always use a Safety Harness (1) in conjunction with a strap type Fall Absorber (2), illust. (Fig. 2-51) before boarding the loader attachment or other unsecured areas on the Shovel.

– The Safety Harness is located in the Cabinet in the Operator’s Cab.
– The illustration (Fig. 2-51) shows the standard use of the safety harness with a strap type fall absorber.

SIGN PLATE IN THE OPERATOR'S CAB

Fig. 2-52

1. **Information on fire safety.**
   Part number **518 661 98**
   For fire prevention procedures, actions in the event of fire and fire fighting procedures, refer to the operating manual. See "FIRE PREVENTION" on page 2-7 and the chapter "Fire Prevention" in the "Operation" section of the Operation and Maintenance Manual.

2. **Risk of causing explosion.**
   Part number **0984500480**
   There is a risk of explosion caused by active radio transmission at a blast zone. Locate the machine a safe distance away from the blast zone or detonator.

⚠ WARNING

RISK OF EXPLOSION!

Transmitting two-way radio signals in a blast zone can result in an explosion that could result in serious injury or death.
If the machine is equipped with Komtrax Plus (with optional modem) two-way radio communication device, keep clear of the blast site. If the machine must work within 12m (40 ft) of a blast zone, or an active blasting machine, the wiring harness must be disconnected from the Komtrax Plus Komtrax Plusmodule.

3. **Information on hydraulic oil.**
   Part number **518 662 98**
   Refer to Operation and Maintenance Manual for further information on hydraulic oil.

4. **Information for lubrication intervals**
   Part number **518 676 98**
   Refer to Operation and Maintenance Manual for further information on points and areas of lubrication.

5. **Keep clear of high voltage cables**
   Part number **09801A0481**
   Do not travel or operate the machine near electric cables. See "DO NOT GO CLOSE TO HIGH VOLTAGE CABLES" on page 2-16.

6. **Ensure the machine is locked down.**
   Part number **09654A0481**
   Before leaving the operator's seat, ensure the bucket is lowered, the key is removed and the lock lever is set. See "LEAVING OPERATOR'S SEAT WITH LOCK" and "LEAVING THE MACHINE" on page 2-11.

7. **Read the Operation and Maintenance Manual.**
   Part number **09691A0481**
   Read, understand and follow all precautions and warnings in this manual and on the machine before operating and performing maintenance.

8. **Sound the travel alarm when reversing.**
   Part number **098021A0480**
   Before reversing the machine, sound the signal horn. Refer to "PRECAUTIONS WHEN TRAVELLING IN FORWARD OR REVERSE" on page 2-21 for further information.

9. **Backwards caution (for vehicles with a rear view camera)**
   Part number **09833AO881**
   Always be aware of the surrounding area and check all rear views. Do not rely too heavily on the rear view camera only.

1. **No naked flame**
   Fig. 2-65
   Part number **518 510 98**
   No fire, open flames or smoking on the machine

2. **Hazard strip**
   Part number **518 677 98**
   Positioned on the bottom of the access ladder

3. **Keep clear of ladder**
   Part number **518 833 98**
   Always keep clear of the moving range of the ladder when it is being elevated or lowered.

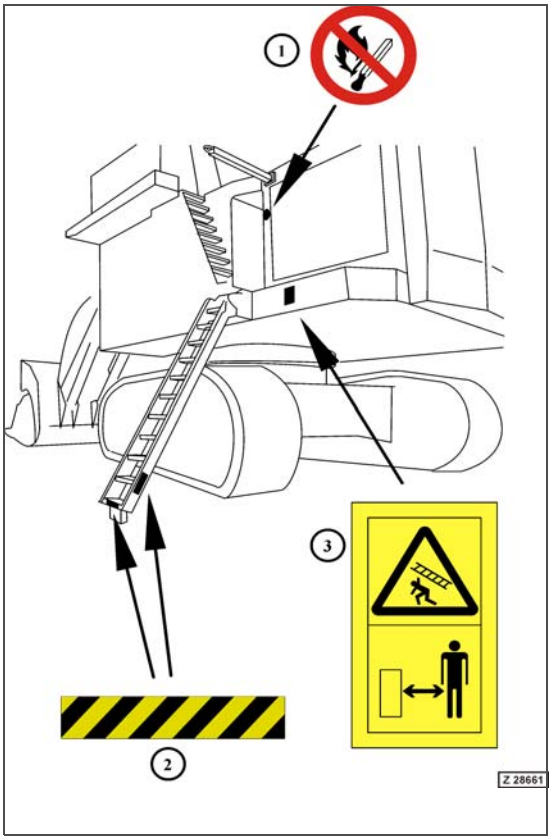


Fig. 2-65

1. **Keep clear of refilling arm**
   Fig. 2-66
   Part number **518 833 98**
   Keep clear of the moving range of the refilling arm.

2. **Travelling reflector strip**
   Part number **518 907 98**
   This red reflecting strip is to ensure better visiblity of the machine in low ambient.

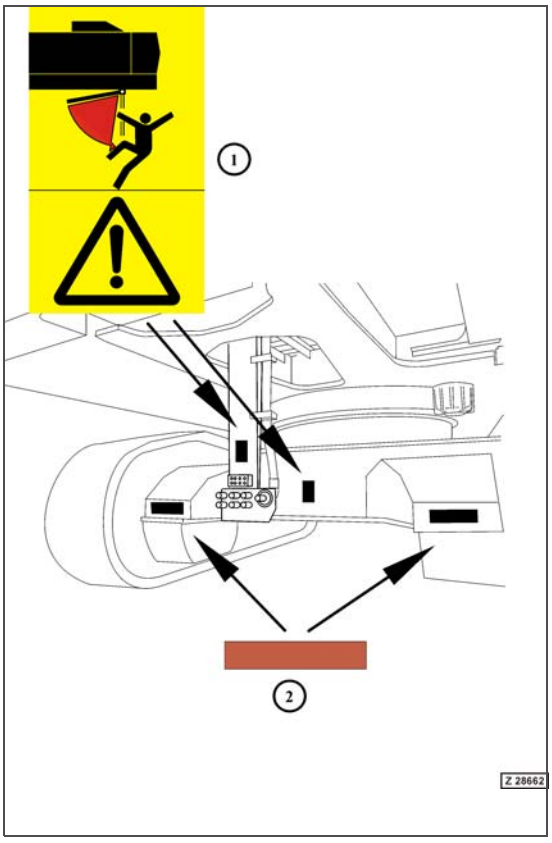


Fig. 2-66

A simplified table with all procedures is shown at the end of the document.

2.9.10.2 GENERAL PREPARATION BEFORE WORKING ON ELECTRICAL EQUIPMENT

These 5 safety rules are valid for these procedures and must be adhered to:

1. De-energize the equipment
2. Secure against unintentional reconnection
3. Make sure that the voltage testing meter is safe and tested. Verify that the equipment is de-energized.
4. Ground and short circuit the equipment
5. Provide protection against adjacent live parts

⚠ WARNING

Not all customers are using the pilot system. Without the pilot system, the substation power supply will not be cut if the high voltage cabinet is opened without power isolation.

2.9.10.3 WORKING EQUIPMENT & PERSONAL PROTECTION

2.9.10.4 SPECIAL TOOLS REQUIRED

A universal grounding short circuit device, including grounding cable and earthing rod.

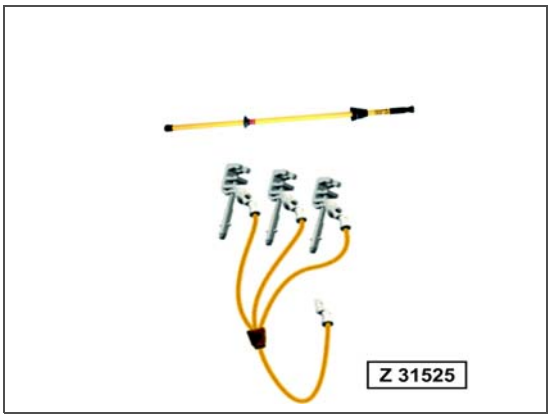


Fig. 2-1

Measuring rod that indicates if the element has zero electrical potential.

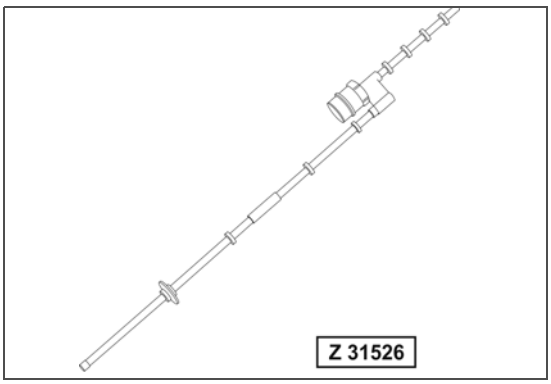


Fig. 2-2

Legend for Fig. 2-11

(1) Universal grounding short circuiting cable

(2) Grounding rod

(3) Single cable end of grounding cable

(4) Threaded bolt with wing nut

(5) Screwed clamps

(6) Ball headed stud on the copper conductor

(7) Screwed ends on clamps

REMARKS: This illustration may differ from your actual configuration but the components are the same. Please proceed according to the layout you have.

1. Ensure that the universal grounding short circuiting cables (1) are ready for use.
2. Always using the insulated grounding rod (2) and connect and secure the grounding cables as follows:
   - Connect the single cable end (3) of the cables (1) to the threaded bolt (4).
   - Connect the three remaining cable ends of the grounding cables (1) with their screw clamp ends (7) to the ball headed studs (6) of the copper conductors.
3. Secure clamps (5) to ball headed studs (6) by tightening the screws (7).

Legend for Fig. 3-18

(1)	Final drive, hub type travel gear	(6)	slew circle guard
(2)	Crawler carrier	(7/7a)	Hydraulically operated access ladder, see page 3-10 for more information. 7a shows the ladder in raised position.
(3)	Track roller	(8)	Position of hydraulic cylinder for access ladder
(4)	Carrier roller	(9)	Position of control switch for access ladder
(5)	Guide wheel	(10)	Battery main switches

(11) Position of emergency engine shut down switch and manual actuator switch for the fire suppression system, (if equipped).

NOTICE

Never stop the engines when machine is fully loaded except in cases of emergency!
If a hot engine is shut down without previous idling period of three to five minutes, the temperature in certain engine parts rising sharply after the cooling system ceases to function.
The resulting thermal stress, especially in the turbochargers, may cause serious damage.

(12) Cable drum

(13) Main hydraulic oil reservoir

(14) Sliding window of operator's cab, see page 3-26 for more information

(15) Hydraulically driven grease pump of the Central Lubrication System (CLS) for attachment

(16) Hydraulically driven grease pump of the Central Lubrication System (CLS) for superstructure

(17) Hydraulically driven grease pump of the Swing circle pinion Lubrication System (SLS)

(18) Emergency escape ladder from machinery house roof

(19) Emergency escape ladder from upper deck

(20) Emergency escape ladder from machinery house to machinery house roof

3.2.4.1 EMERGENCY ESCAPE FROM THE OPERATOR'S CABIN

Legend for Fig. 3-23

(1) LH side window, serves also for emergency exit.
Use the emergency escape hammer located next to the window inside the cab for breaking the window glass. See also page 3-31 for location of the emergency escape hammer.

⚠ CAUTION

BEWARE OF GLASS!
Broken glas can cause injuries.
When escaping, remove the broken pieces of the glass from the sash so that you will not cut yourself with them. Take care not to slip on the broken and scattered pieces.

REMARKS: Use the emergency escape hammer located next to the window inside the cab for breaking the window glass. See also page 3-31 for location of the emergency escape hammer.

If the operator's cab is equipped with external metal sun visors, disengage the four catches and push out the sun visor panel.

(2) Rigid part of emergency escape ladder

(3) Articulated part of emergency escape ladder

(4) Chained safety pin

(5) Lever release mechanism

(6) Foot activated catch release mechanism

(7) Hinged safety bar on hand railings

(8) Release lever for hinged railing bar (3)

(9) **Step plate to push away the ladder**

(10) Hand rail on rigid ladder

(11) Cylinder

Releasing the Escape Ladder

– Extract the safety pin (4) that is chained to the lever release mechanism (5)
– Turn and pull out the lever release (5)
– Push with foot against the foot activated catch release (6)
– Open the hinged safety bar on the hand railings (7) by turning the release lever bar (8)
– Push with foot against the step plate (9) to lower the ladder.

REMARKS: The emergency escape ladder falls under its own weight but is cushioned during the descent by the cylinder (in area of 11)

– Grasp the hand rail (10) on the rigid escape ladder and descend backwards.
– To raise the ladder, refer to the instructions on page 3-21

3.2.6.1 EMERGENCY MOTOR SHUTDOWN SYSTEM ACTUATED FROM GROUND MAN (SPECIAL EQUIPMENT)

Legend for Fig. 3-28

(1) Actuating chains for emergency shut down of both motors. To stop the motors, pull down one of the chains (1).

(2) komtrax Plus display on the instrument panel in the Operator's cab. When one of the chains (1) is being pulled down from ground man, both motors will be stopped and the following message will be displayed on the komtrax Plus monitor (3):
Motor shut down has been actuated from ground man.

NOTICE

Never stop the main drive motors with the actuating chains (1) except in case of emergency.

3.2.6.2 OPERATOR WARNING SYSTEM (SPECIAL EQUIPMENT)

This system is used to inform the Operator that someone wants to enter the Shovel or to draw the Operator's attention to special circumstances requiring his action.

Legend for Fig. 3-28:

(1) Actuating chains for pull switches of the Operator warning system

(2) Actuating chain for hydraulically operated service arm.

(3) komtrax Plus display on the instrument panel in the Operator's cab. When one of the chains (1) is being pulled down the following message will be displayed on the komtrax Plus monitor (3):
Warning: Pull switch from ground man actuated.

As soon as a chain (1) is pulled down, the above message will be displayed informing the Operator that someone wants his attention. In such a case, the Operator should stop work until he has received the ground man's request

.

3.2.7.4 INSTRUCTIONS TO USING AND LOOKING AFTER THE SEAT BELTS

⚠ CAUTION

CHECK SEAT BELT!

A defective seat belt may not prevent injury when the excavator is involved in an accident or moves suddenly or unexpectedly as planned.

REMARKS: To ensure the seat belt functions properly, we recommend replacing the seat belt and securing parts 3 years after commissioning the machine for initial use and thereafter every 3 years..

Before operating the excavator, adjust the seat comfortably and fasten the seatbelt. Adjust the seat belt to fit low around the hips to lessen the chance and severity of injury in the event of an accident. Do not adjust the seat belt around the abdomen. These instructions apply to both the main operator's seat and the passenger's jump seat.

The condition of the seat belt, all seat belt components, the seat belt retractors and and the seat belt mounting hardware should always be checked before operating the machine. Replace any defective parts immediately.

Replace the seat belt if:-

– The webbing material of the seat belt is overly worn, has a frayed appearance or has loose stitching.
– The buckle and tongue fastening no longer click together closed or they show other signs of damage.
– The retracting system does not pull the belt in.
– The slack take-up system, if equipped, no longer operates.

Always:-

– ensure that the seat belt mounting bolts are tight and are not in any way damaged.
– ensure items with sharp edges are kept away from the seat belt webbing.
– ensure the buckle and the tongue fastening are not lubricated.
– make sure the belt is cleaned using only soapy water and a mild detergent. Never use bleach, colour dye or solvents on the seat belt webbing.
– ensure the seat belt is flat and not twisted when not in use.
– use seat belt in accordance with the local safety regulations and laws.

NOTICE

The seat belt should be completely exchanged, together with all seat belt components and the mounting hardware.

The date of installation of the seat belt system should be marked and affixed where appropriate.

3.3.3 OPERATOR'S CONSOLE

Legend for Fig. 3-38

(1) Monitor of the **V**ehicle **H**ealth **M**onitoring **S**ystem >**Komtrax Plus**<

The monitor (1) displays the condition of the machine, the maintenance status, and messages for the operator and service man, and is also used to input the necessary data.

The key pads below the monitor are used to switch the screen and for input of data.

See page 3-56 for more information

(2) Ashtray

(3) Switch board, refer to next page for description of components

(4) Switch for left and right mirror adjustment

(5) Control unit for air conditioning and heating, see page 3-74 for more information

(6) Cigarette lighter

(7) Plug sockets, 24V DC

(8) Radio location

(9) Switch board lighting with flexible arm

⚠ CAUTION

KEEP DOOR CLOSED!

Make sure the cab door is always closed when working with the Shovel.
Secure the door in open position with the locking device provided.

3.3.6 INTERFACE PANEL FOR DIAGNOSTICS

Legend for Fig. 3-43

(1)	Interface panel on rear operator's console
(20X336)	Data link connector for programming the Komtrax Plus monitor
(20X0110)	Data link connector for Electronic Tool connection to the electronic pump control system RC4
(20X27A)	Data link connector for download of Komtrax Plus memory data.
(20X323)	Data link connector (LAN socket) for MTC connection
(2)	Portable fire extinguisher. Observe the local Fire Prevention Regulations in regard to number, size and location of portable fire extinguishers. Make sure the fire extinguisher is always charged and ready for use.

3.4.7.1 MAINTENANCE CONFIRMATION THROUGH SERVICE PERSONNEL

Maintenance indicated with yellow or red color of the icon above the maintenance key F5 should be confirmed through Service Personnel in the Service Menu subsequent to the execution of the maintenance. With the confirmation the actual value maintenance number is increased by 1. Thus, the length of the maintenance cycle is added to the display value and the gray color will appear on the maintenance icon.

The message in the Service Menu for maintenance confirmation then turns white instead of yellow.

For more information of maintenance confirmation refer to the Service Manual of the machine.

3.4.8 SETTINGS FOR OPERATOR

The User Menu Settings for Operator can be selected from the Main Gauge Screens 1, 2 or 3 by pressing the button F6.

Main Screen Settings for Operator, Fig. 3-52

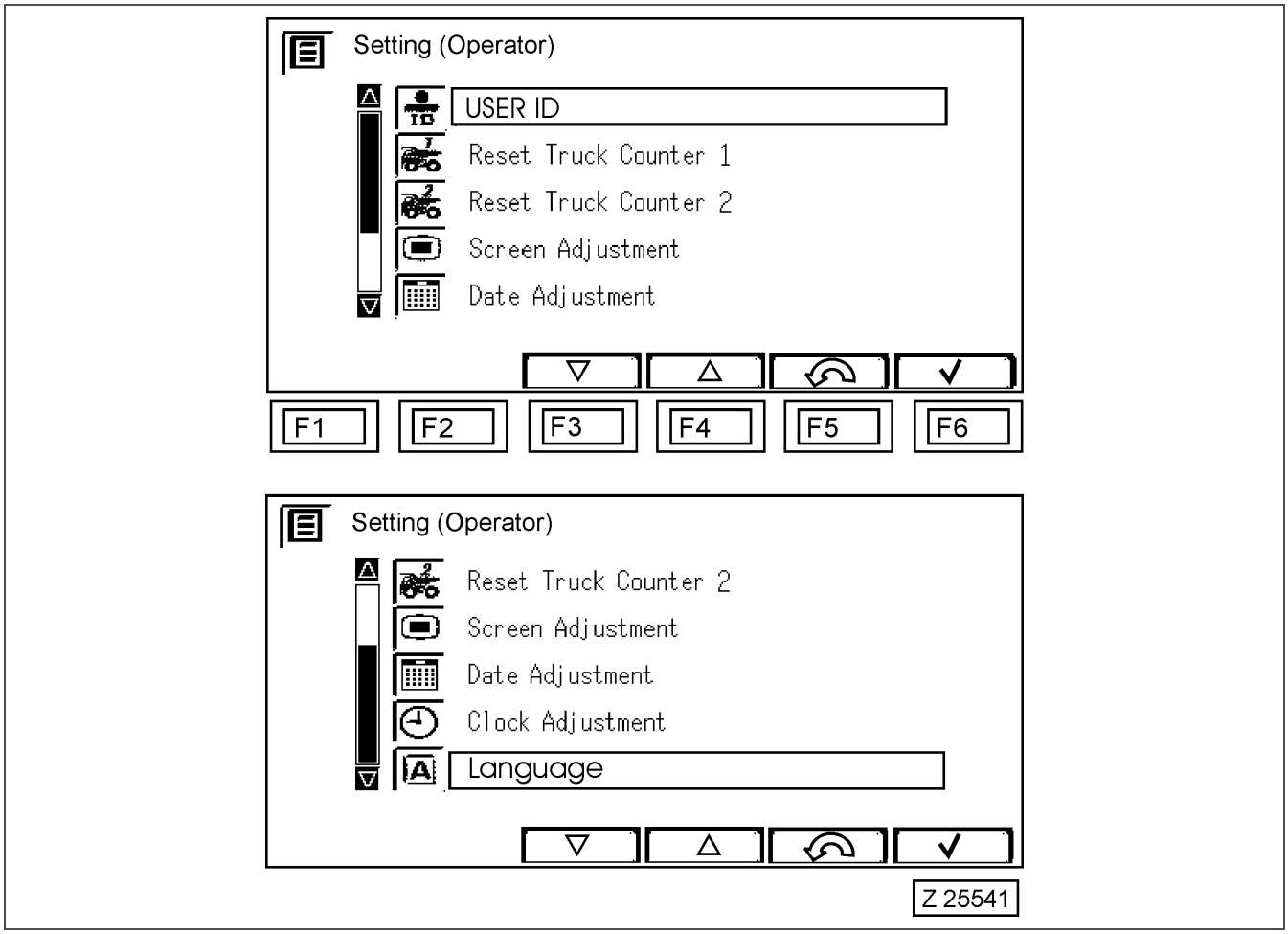


Fig. 3-52

Selection of Setting Screens

The selection menu for settings offers seven possibilities of setting screens. Starting with USER ID and ending with Language selection. Use scroll button F3 or F4 for selection of the desired screen. Push acknowledge button F6 for switching over the selected setting screen. Button F5 switches back to Main Gauge Screen 1.

The setting screens on the following pages appear in the same sequence as shown in the Main Setting Screen.

Key 2: Minus Key

Decreases interior temperature setpoint by one degree per stroke or decreases manual blower speed, depending on displayed mode.

Key T3: Recirculating Air/Fresh Air

Switches from recirculated air to fresh air and vice versa.

Key T4: Blower Control

Switches on the manual blower control. Press plus/minus key to select the following speeds: 1*) -2-3-4-5.
1*) to 5: adjusts the blowers to speeds 20%, 40%, 60%, 80%, 100%.
Off*): Switches off the blowers or switches to automatic.
Automatic: The blowers are controlled automatically based on the interior temperature.

Key T5: Automatic climate control

Switches on the automatic temperature control.

Key T2+T3: Temperature indication.

Shows the inside temperature for 10 seconds. If pressed a second time, it shows the outside temperature for 10 seconds (optional)

Key T3+T5: Reheat (optional)

Starts reheat mode fro 3 minutes. (Duration adjustable)

Key T3+T4: Controller Off Switches of all control functions and the display.

*) The following blower steps are disabled when the automatic climate control is on.
2-,3-Step: off continuously adjustable blower: Off, 1

Air Flow Control

– For defrosting the windshield close the slide in the seat base. The whole air flow is now directed to the windshield.
– To direct the air flow to your feet, open the slide in the seat base.

3.6.1.3 ARRANGEMENT OF THE CAMERAS

Legend for Fig. 3-67

(A) Camera mounted at top af access ladder on upper deck.
View angle horizontal: 102°

View angle vertical: 130°

(B) Camera system mounted on the hydraulic oil reservoir

View angle horizontal: 102°

View angle vertical: 130°

(C) Camera mounted on the top of the counterweight

View angle horizontal: 130°

View angle vertical: 102°

(1) Camera bracket

(2) Camera

NOTICE

Never remove the lens glass from the camera. The housing is filled with nitrogen which prevents moisture from getting into the camera. The nitrogen would escape if the lens glass is being removed.

3.8.1 COMPONENTS IN CAB BASE

⚠ DANGER

HIGH VOLTAGE!

The cab base may contain high voltage electrical appliances which cause serious injury and death.
Access to the cab base for authorized service staff only.
Do not touch cables, their terminals and connected components.
Grounding procedures by electricians, having the authorization for working on high voltage systems must be carried out before entering the high voltage areas.

Legend for Fig. 3-72

(1) Cab base.

(2) Cab base door. Keep the door always locked, access to the cab base for authorized personnel only.

(3) Fire fighting release button for internal fire extinguisher

(4) Air conditioning unit

(5) Activation switch

(6) Directional arrows showing inner wall components

Master Turbo Controller MTC - LED Indications (continued)

Legend for Fig. 3-77

(8) SYS field
PWR (Power) LED.

- OFF: No voltage applied
- OFF and red flashing (short flashing in 5 - 10 seconds interval): Voltage applied and key switch on dashboard OFF
- Green light: Voltage applied and key switch on dashboard ON, Controller active.
- Red and Green: Reset condition. Inform Service.

DIAG (Diagnostic) LED.

- OFF: User program not loaded or stopped
- Red: RAM memory fault, user program not started. Inform Service.
- Green: User program loaded and started.
- Green flashing: User program loaded and started. Data communication with on-line connection.

(9) CAN-Node 2 (11K302) Type ICND

(10) CAN-Node 3 (11K303) Type ICNV

(11) CAN-Node 4 (11K304) Type ICNV

(12) CAN-Node 5 (11K305) Type ICNV

3.9.1 HYDRAULIC OIL AND PTO GEAR OIL HEATINGS

Location of heaters and thermostats

Fig. 3-80

(A) Top view onto the superstructure

(B) View towards PTO's (from ther rear of machinery house)

(1) Immersion heater (5) installed in the suction oil reservoir

(2) Immersion heater installed in the PTO's

(C) View towards main hydraulic pumps

(3) Suction oil reservoir

(4) Immersion heater

(5) Immersion heater

(6) Immersion heater

(7) Thermostat

3.11.1 STARTING PROCEDURE

Fig. 3-87

REMARKS: Start the motors with the lock lever (11) in the fully rear LOCKED position. When both motors are running move the lock lever fully to the front in FREE position. In the FREE position of the lock lever the pilot control system is in working order.

Start the motors one after another, e.g. first front motor -1- then, after one minute pause time, the rear motor -2-. Both motors are started in the same way.

1. Insert battery main switch keys and turn to operating position.

2. Switch on the load cut-off switch.

3. Insert key into the switch (1) and turn to operating position. The warning buzzer (4) should emit an acoustic test signal. If the buzzer fails to function, corrective action must be taken.

4. Observe komtrax Plus display (3). Normally the basic display appears on screen (3). If a FAULT message or INFORMATION item is displayed, proceed according to section "VEHICLE HEALTH MONITORING SYSTEM Komtrax Plus – HEALTH MONITOR" on page 3-56.

5. Sound the signal horn (5).

– Start the motors by turning starter switches (6 and 8).
Wait one minute between starting of motor 1 and 2.

After starting observe the following:

The komtrax Plus System monitors the shovel's functions and provides information about the appropriate operational data.
If a FAULT message is displayed on screen (3), Fig. 3-87 the acoustic signal (2) will sound simultaneously for approximately 1 second. In such a case proceed according to the instructions of the komtrax Plus system on page 3-56.
Buzzer (2) will sound continuously when the hydraulic oil level is too low. In this case, stop the motors, locate and correct the cause immediately. Fill up hydraulic oil to the correct level.

Automatic motor shut down system (safety chain)

The motor(s) will be stopped automatically if a serious trouble condition occurs. The operator will be informed about the trouble condition by a corresponding message displayed on screen (3).

3.13.1.2 BRAKING THE SUPERSTRUCTURE

Braking of the superstructure from a slewing movement is carried out first by returning the control lever (1) or (2), Fig. 3-93 to the neutral position (N). This procedure can be shortened by depressing the slew brake pedal (3).

slew Parking Brake

The parking brake for the slew gears is a spring loaded disk type brake. This brake is switched ON and OFF with toggle switch (4).

NOTICE

The slew parking brake must only be applied with the Superstructure at complete standstill. Applying the parking brake with superstructure still slewing may result in severe damage to the brake.

Use the slew parking brake only in emergencies for stopping the rotating superstructure.

If the parking brake has been used for emergency stopping, it is necessary to shut down the Excavator and to have the parking brake of each swing gear inspected and repaired if necessary. Contact your Komatsu dealer for support.

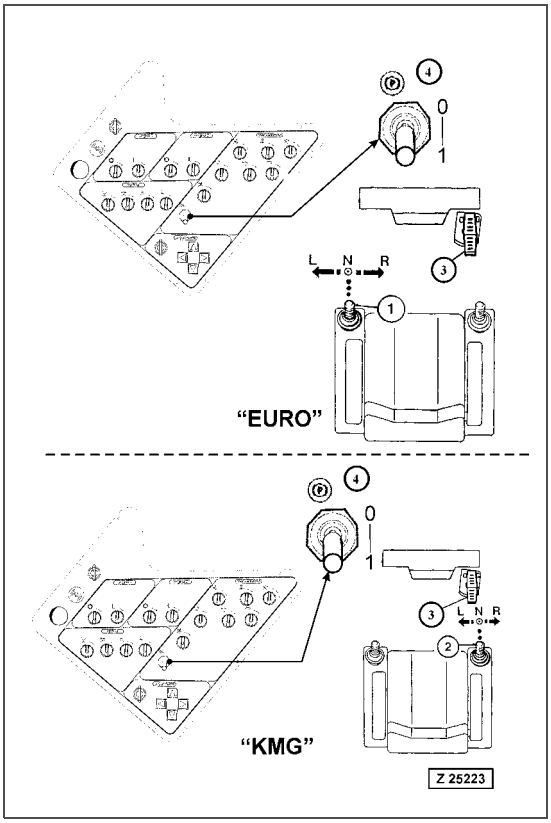


Fig. 3-93

Switch Positions, Fig. 3-93

- **"0"** Parking brake **OFF**
- **"1"** Parking brake **ON**

Applying the Parking Brake

Pull out toggle switch (4) against spring force and move down to position **"1"**.

Releasing the Parking Brake

Move up toggle switch (4) to position **"0"**. In this position the switch is automatically pulled down by spring force.

NOTICE

Be sure to release the parking brake before slewing the superstructure.

3.13.1.3 HYDRAULIC SLEW BRAKE ACTUATED BY HYDRAULIC ACCESS LADDER AND SERVICE ARM OF CENTRAL REFILLING SYSTEM

The hydraulic slew brake will be applied automatically when the access ladder and/or the service arm of the central refilling system is not in its completely lifted position.

Do not attempt to excavate hard and rocky ground with the working attachment. It is better to excavate it after breaking up by different means.

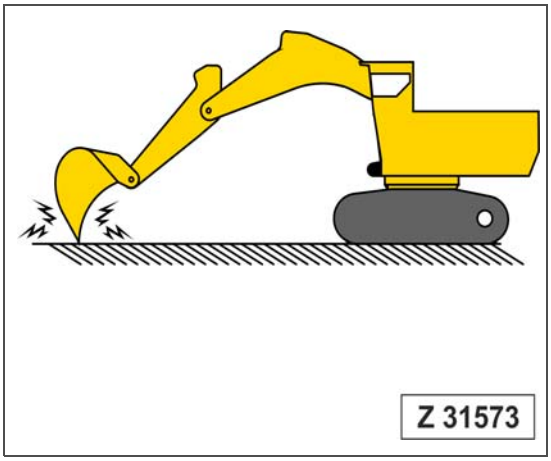


Fig. 3-107

Do not operate the hydraulic cylinders of the working attachment to the end of their strokes. This will bring excessive force onto the inner stoppers of the cylinders and will reduce the lifetime of the cylinders.
To prevent this, move the control levers to neutral position before the cylinders reach their end of stroke.

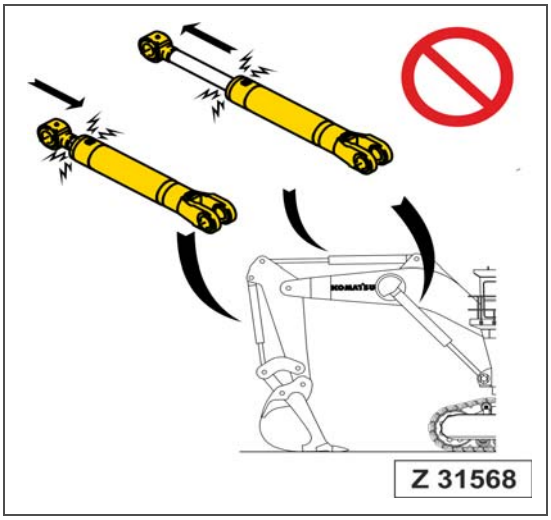


Fig. 3-108

When working with the bucket in the longitudinal direction, the final drives should be in the rear position for the following reasons:

- The travel motors and travel gears are protected from falling rocks etc.
- When the shovel is operated on muddy ground and the tracks are covered with mud, the sprocket runs on a clean track when backing up.

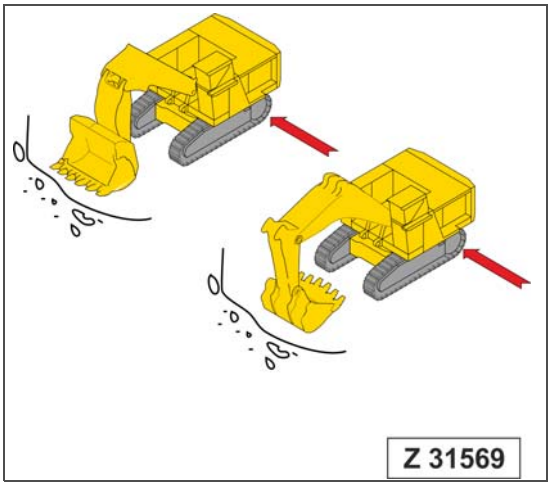


Fig. 3-109

3.18.1.2 ADJUSTMENTS OF THE CENTRAL LUBRICATION SYSTEM

The following adjustments can be made in the service menu of the Komtrax Plus system, under menu point 4.8.1:

Level 4: Service Menu / Settings 4.8.1

– *PAUSE TIME

– *LUBE CYCLE COUNTER

REMARKS: Refer to Service Manual Komtrax Plus system for description of adjustment procedure.

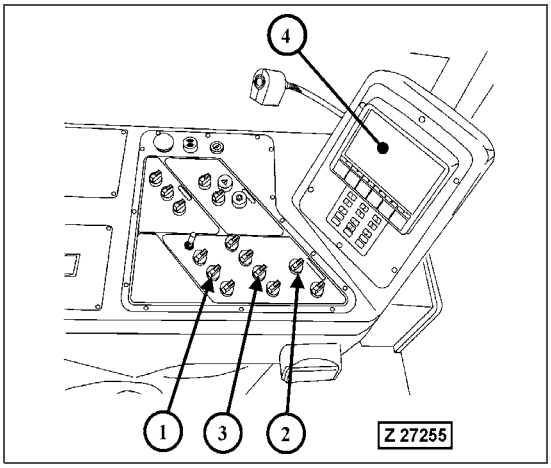


Fig. 3-118

Repairs on the Central Lubrication System with the Engine running or with the Engine OFF and Main Switch Key in ON position

If repairs under the above conditions have been carried out it is necessary to reset the control circuit of the lubrication system by actuating the rotary switch (1), Fig. 3-118 for a full lube cycle.

If this manually actuated lube cycle is not being carried out, the fault message ”LUBE SYSTEM FAILURE” will remain on the health monitor (3).

Resetting of the lube system control circuit can also be done by shutting down the engine and switching OFF the main switch key.

REMARKS: For more information regarding inspection, trouble shooting and maintenance of the lubrication system, refer to the separate manual LUBRICATION SYSTEMS in volume 2 binder.

3.18.2 SWING CIRCLE PINION LUBRICATION SYSTEM ”SLS”

This system works automatically as soon as the engine is running. The Komtrax Plus System monitors the function of the swing circle lubrication system. Trouble conditions of the lubrication system are indicated through fault messages on health monitor (3).

Legend for Fig. 3-119

1. Switch, manual actuation of central lubrication system for superstructure
2. Switch, manual actuation of central lubrication system for attachment
3. Switch, manual actuation of slew ring gear lubrication system
4. Health monitor

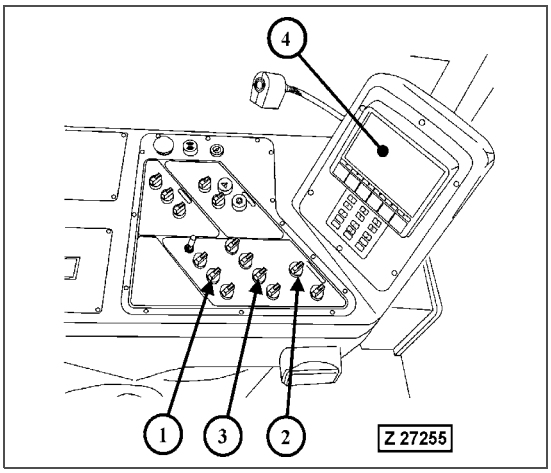


Fig. 3-119

Indication of Alarm Condition at Control Module (6), in the case of an AUTOMATIC Actuation of the Fire Suppression System -I-:

Fig. 3-125

Alarm to Shutdown Period - The RED alarm LED and the audio alarm will pulse at a rate of 2 times per second.
Shutdown to Discharge Period - The RED alarm LED and the audio alarm will pulse at a rate of 4 times per second.

Timer Setting (factory adjustment)

Alarm to Shutdown: 0 seconds

Shutdown to Discharge: 15 seconds

3.19.4 IN THE CASE OF A FIRE

⚠ WARNING

FIRE!

Act according to the circumstances and the applying safety regulations.

Evacuate area to lessen risk of injury from flames, heat, hazardous vapours, explosions, or other hazards that may be created.

Evacuate endangered Persons.

Inform the fire brigade.

Fight the fire.

⚠ WARNING

FIRE SYSTEMS MUST BE OPERABLE AT ALL TIMES!

Never operate the shovel with an exhausted fire system. Further fires may cause serious injuries or death. For continued protection, the Detection and Actuation System and the Fire Suppression Systems must be recharged through authorized Service Personnel immediately after operation.

3.19.4.1 INDICATION OF ALARM CONDITION AT CONTROL MODULE (5) WHEN THE ELECTRIC DETECTION AND WARNING SYSTEM -II- DETECTS A FIRE IN THE MACHINERY HOUSE:

The RED alarm LED and the audio alarm will pulse at a rate of 4 times per second.
Proceed according to the paragraph *In Case of Fire*

3.21.2 OPERATING THE HYDRAULIC SERVICE ARM

REMARKS: The pilot control system is inoperative when the enabling switch (1) is in the 'ON' position and/or the service arm (3) is not fully raised into the home position. This means that movement of the shovel is not possible.

A - Main Motors OFF

The service arm can only be lowered.

Proceed as follows:

1. Turn main key switch to ON position.
2. Turn enabling switch (1), Fig. 3-130, to ON position -1-
3. Activate switch on ladder (2) to lower service arm (3)
4. Release switch (2) when service arm (3) is in the fully lowered position.

REMARKS: Release the switch (2) when the service arm (3) is to be stopped in any position.

5. Before leaving the shovel, turn enabling switch (1) to OFF position -0- and remove the main key switch.

B - Main Motors Running

Control the service arm as follows:

1. Turn enabling switch (1), Fig. 3-130, to ON position -1-
2. To lower the service arm (3), activate switch (2) and hold until the service arm is fully lowered. To reverse the direction, turn switch to stop and turn in opposite direction to raise.
3. To lift the service arm (3) turn switch (2) and hold until the service arm is completely lifted into the home position.

NOTICE

Ensure that the service arm is completely raised into the home position otherwise the proximity sensor in the guide frame of the service arm will not release the pilot control system.

3.22.2.1 PRINCIPLE OF OPERATION

The cable drum is utilized to automatically wind up or wind off a suitable cable or support cable, which ensures power supply for a mobile excavator. The cable drum is driven by a transmission brake motor with slip ring rotor (91M906). Torque control of the motor is achieved by a rotor resistor (91R901) with 4 taps. When the cable is wound up (the shovel drives backwards) the rotor resistor is working with one tap and the motor is at 100%. When the cable is run out (the shovel is moving forwards) the motor is working at 40% ensuring constant tension on the cable and eliminating cable slackness

The cable is wound up and arranged uniformly on the drum by a control device, while the sensors 91B904a and 91B904b detect when the cable drum is full or the cable is fully run out (i.e. the drum is empty, except for a reserve of two windings), respectively.

Four proximity switches (91B908a, 91B908b and91B909a, 91B909b) attached to the cable guide attachment ensure that the cable is not pulled sideways above a maximum of 30° to either side. Voltage and signal transmission from the drum cable to the firmly installed cable on the excavator is carried out by a slip ring body incorporated in the drum body.

3.22.2.2 SIGNAL HORN BUTTON OVERRIDE

The signal horn button on the control lever joystick in the operator's cab (see page 3-36) is also used to override a cable drum initiated reverse travel cut-off in an emergency situation. It overrides the reverse travel initiated by the antenna sensors 91B910 and 91B911. The override will only work when the service control switch 91S901 is set to "3-Automatic Operation", which is the setting for normal operations.

If reverse travel cut-off occurs, the warning buzzer on the instrument panel sounds and the message "Reverse travel cut-off by cable drum" appears on the Komtrax plus display. There are two possible causes for reverse travel cut-off:-

– The ground contact sensors 91B910 and 91B911 of the cable drum registers an obstruction
– The temperature of the cable drum drive motor 91M906 is too high.

Call service personnel to solve the problem.

⚠ CAUTION

The power cable and/or cable drum may become damaged as a result of overriding the reverse cut-off .If a dangerous situation occurs that is a hazard for man or machine and requires reverse travel in order to move away from a collapsing face or bench, press the signal horn button (5, page 3-36), This will override reverse travel cut-off initiated by the sensors on the cable drum and the excavator can be moved away from the dangerous area. While performing this action, care is to be taken as far as is possible that the cable or machine does not become damaged. When in a safe position, call the supervisor and request advice.

3.22.2.3 OPERATION AND MAINTENANCE OF THE CABLE DRUM

For all operation and maintenance instructions refer to the separate Operation and Maintenance Manual -CABLE DRUM- filed in volume 2 binder.
In order to ensure safe and trouble-free operation of the cable drum, carry out the periodic maintenance according to the cable drum manual.

3.22.2.4 TECHNICAL DATA - RATING PLATE

The rating plate is mounted on the removable protection hood of the drum body (non-drive side) and contains the most important data of the cable drum. Be sure to observe the cable specifications and the permissible layers of cable windings on the drum body.

3.28 SHOVEL STORAGE

3.28.1 GENERAL

Storage periods up to 30 days require no special preservation when the unit is stored in a protected place. When the Shovel is placed in storage for 30 days or more follow the procedure below.

REMARKS: The description below includes special equipment which may not be installed in your machine.

3.28.2 PREPARING FOR STORAGE

1. Clean the Shovel thoroughly, lubricate all points according to the lubrication chart. Move the machine to a protected place or cover the Shovel with a tarpaulin. Retract all hydraulic cylinders as far as possible. Cover the protruding piston rods with grease.
2. Refer to Engine Operation and Maintenance Manual for Engine storage procedure.
3. Fill up cooling system with anti-freeze and coolant. Observe instructions in the Engine Manual.
4. Service the engine air cleaner.
5. Drain condensation from fuel tank and fill the fuel tank with a mixture of 90% Diesel fuel and 10% protection oil, e.g. Shell Ensis 20.
6. Seal the engine air intake, exhaust outlet, electrical components, fuel tank ventilation and breather on the hydraulic oil reservoir to prevent dirt and moisture from entering.
7. Remove the batteries and store them in a cool, dry place (0 to 10° C) to minimize self discharge. Be sure the batteries are fully charged. Never allow batteries to run down below ¾ full charge.
8. Loosen all drive belts.
9. Repaint areas that have paint damage with a good quality paint. Grease all machined unpainted surfaces with good quality grease to prevent rust.
10. Drain condensation from hydraulic oil reservoir. If necessary, add hydraulic oil.
11. Attach a tag to the instrument panel to indicate what work has been done.

3.28.3 ONE MONTH REPETITIVE SERVICE PERIOD

1. Service the engine according to the engine manual.
2. Check coolant level and cooling systems for leakage.
3. Check all oil levels according to the lubrication chart.
4. Drain condensation from fuel tank and hydraulic oil reservoir.
5. Operate air conditioning for approx. ½ hour.

3.28.4 SIX MONTH REPETITIVE SERVICE PERIOD

1. Perform steps 1 through 4 of the one month repetitive service period.
2. Lubricate the Shovel according to lubrication chart (manual lubrication only).
3. Completely fill the fuel tank.

4.3 FLUIDS AND LUBRICANTS

4.3.1 LUBRICANTS FOR OPERATION IN COLD AND ARCTIC CLIMATES

Lubrication Point	*Lubricant*	*Ambient Temp. °C*
Hydraulic System (preheated)	Shell Tellus S4 VX 32 *1) Mobiltrans AST 20 *6)	- 50 to + 35 - 45to + 28
Travel Gears	Shell S4 GX 220 *2)	All seasons
Final Drives	Shell S4 GX 220 *2)	All seasons
Swing Gears	Shell S4 GX 220 *2)	All seasons
Track Rollers and Idler Wheels	Shell S4 GX 220 *2)	All seasons
Pump Distributor Gears (pre-heated)	Shell Transaxle Oil 75W-90 Transmission SYN FE 75W-90 *7)	All seasons - 45 to + 35
Pump drive shaft housings on the Pump Distributor Gears	Shell Tellus S4 VX 32 *1)	All seasons
Brake housings and Motor adapter housings of Gears	Shell Tellus S4 VX 32 *1)	All seasons
Fan Bearing Housings of Radiators and Hydraulic Oil Coolers	Shell S4 GX 220 *2)	All seasons
Central Lubrication System	Fuchs Stabyl L-TS MO Shell Gadus S5 U100D1 *3) Fuchs Urethyn HGO	- 10 to + 35 - 30 to + 35 - 50 to - 10
Swing Circle Lubrication System	Shell Gadus S2 OG 80 *4) Shell Gadus S2 OG 15 *5) Fuchs Urethyn HG 0	- 10 to + 35 - 30 to 0 - 50 to - 10
Refrigerant Lubricant	Shell Clavus Oil R 68	- 50 to + 35
Refrigerant	Shell R 134 a	- 50 to + 35
Engine Oil	SAE15W-40 API Category CH-4SJ	All seasons
Flexible Couplings	SAE15W-40 API Category CH-4SJ	All seasons
Engine Coolant and Fuel	Refer to ENGINE OPERATION AND MAINTENANCE MANUAL for Specifications.	

– *1) Previously named Shell Tellus Arctic
– *2) Previously named Shell Omala HD 220
– *3) Previously named Shell Darina XL 102 Moly
– *4) Previously named Shell Malleus GL 400
– *5) Previously named Shell Malleus GL 25
– *6) Previously known as Essotrans Extra
– *7) Previously known as Tranself Synthese FE 75W-90

4.6 LUBRICATION AND MAINTENANCE SCHEDULE

4.6.1 INITIAL AND FIRST SERVICING

NOTICE

The initial and first service described here is of vital importance for proper operation and long service life of the machine.

4.6.1.1 INITIAL RUNNING-IN

Check the fuctionality of the greasing systems. For the CLS greasing system, check the injectors and greasing points on the attachment, the carbody and the inner raceway of the slew circle. For the SLS greasing system, check the injectors for the flywheel of the teething of the slew gear. See page 4-28 for further information.

4.6.1.2 AFTER THE FIRST 250 OPERATING HOURS

Change oil in Swing gears, Travel gears and PTO's (pump distributor gears). Thereafter every 3000 hours, but at least once a year. An oil sample analysis should be made every 1000 operating hours.

Hydraulic system: Replace return oil filter elements and leakage oil filter element. Inspect return oil strainers. Thereafter every 1000 hours.

The tightening torques of *all* critical bolt connection, except the undercarriage to car body bolts and the swing circle mounting bolts, are to be checked after the initial 250 operating hours.

4.6.1.3 AFTER THE FIRST 1000 OPERATING HOURS OR AFTER COMPONENT REPLACEMENT

NOTICE

The mounting bolts of the left and right crawler carrier to the undercarriage carbody have to be retightened after the first 1000 operating hours once only. The swing circle connection bolts need only to be checked after 1000 operating hours once only in accordance with PARTS & SERVICE NEWS No. AH00511 filed in volume 2 binder. See page 4-29 for further information.

NOTICE

All critical bolt connections are to be changed immediately in cases of unexpected impacts, collisions or when loosening is suspected (peeling paint on the screws or obvious signs of unscrewing).

It is strongly recommended to use new bolts when attaching replacement components.

4.8 FIRST SERVICING

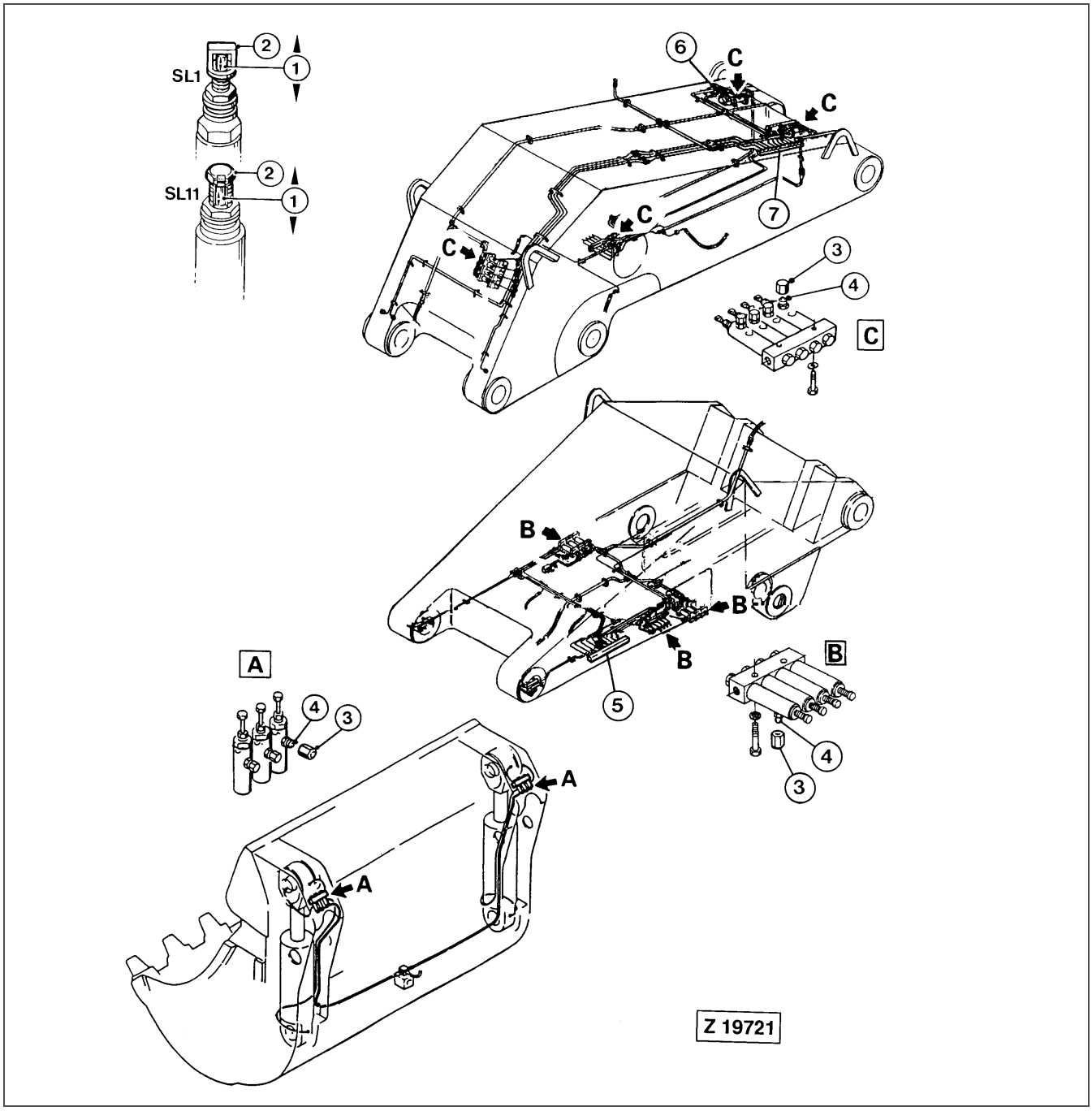


Fig. 4-144

4.8.1 WORKING ATTACHMENT - INITIAL CHECKS FOR PROPER LUBRICATION

The volume of injected grease is set to maximum in the factory.

The pause time is set to 10 min (minimum setting).

These settings are used for the initial (40 h) running-in time of the excavator.

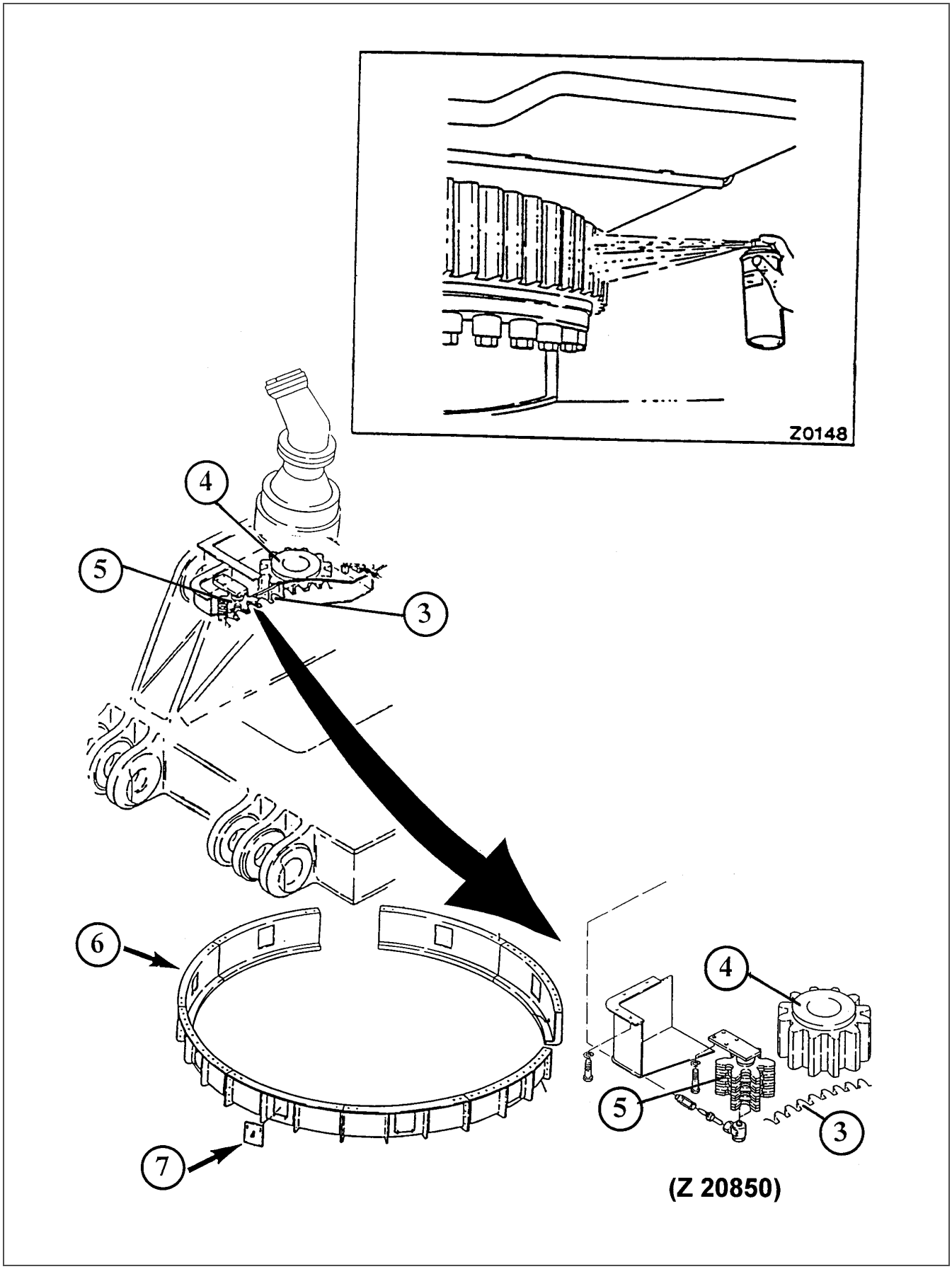


Fig. 4-152

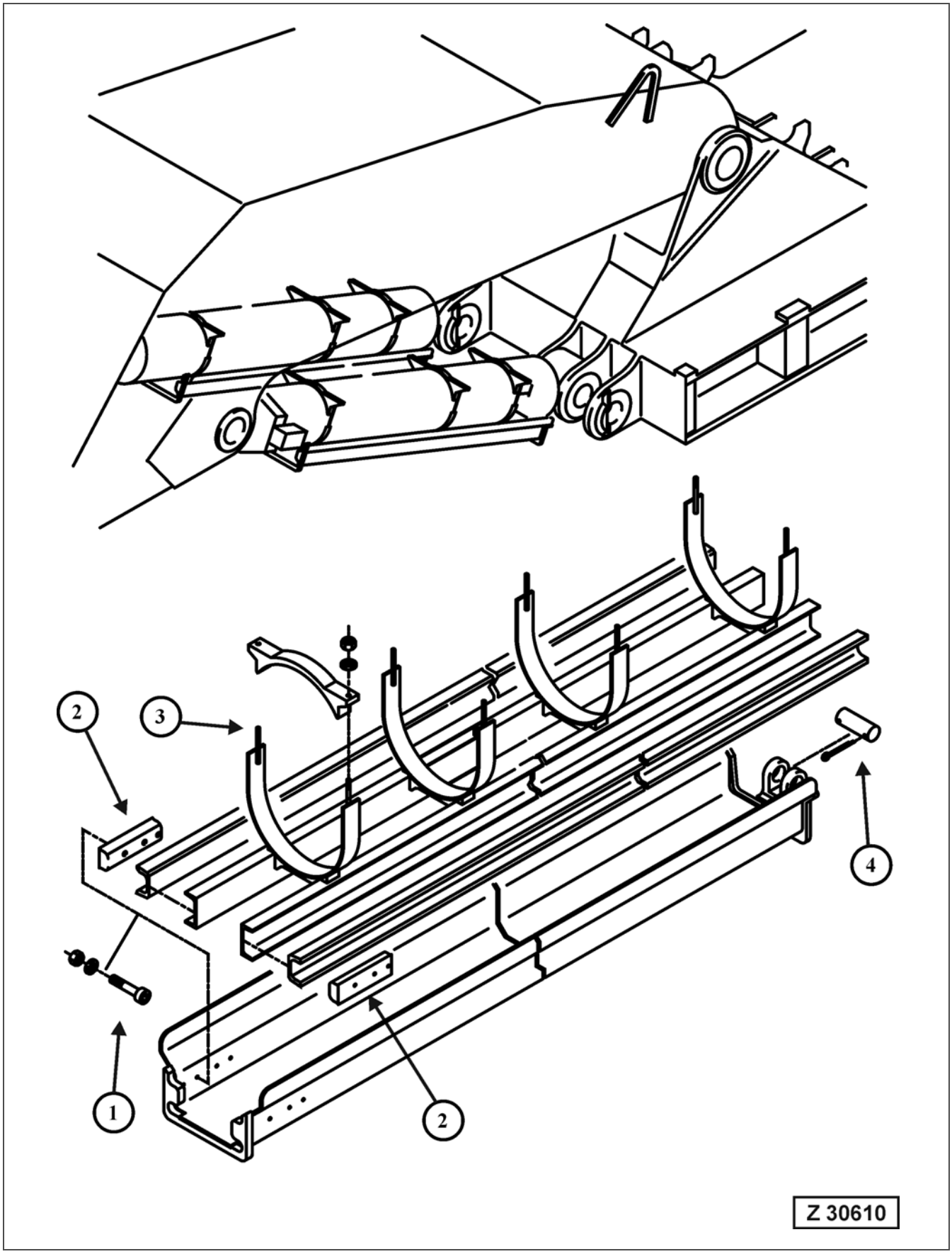
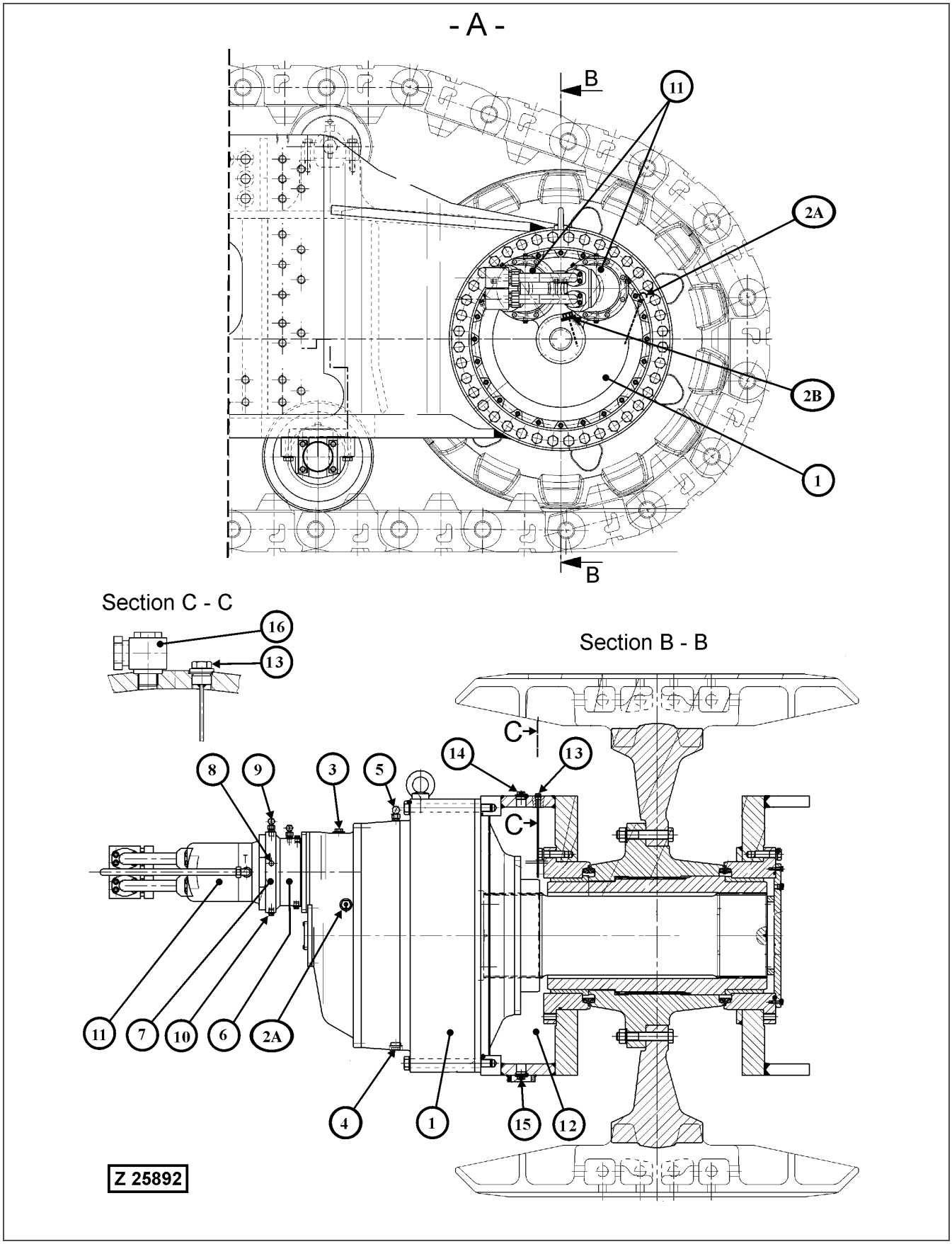


Fig. 4-158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B
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Fig. 4-163

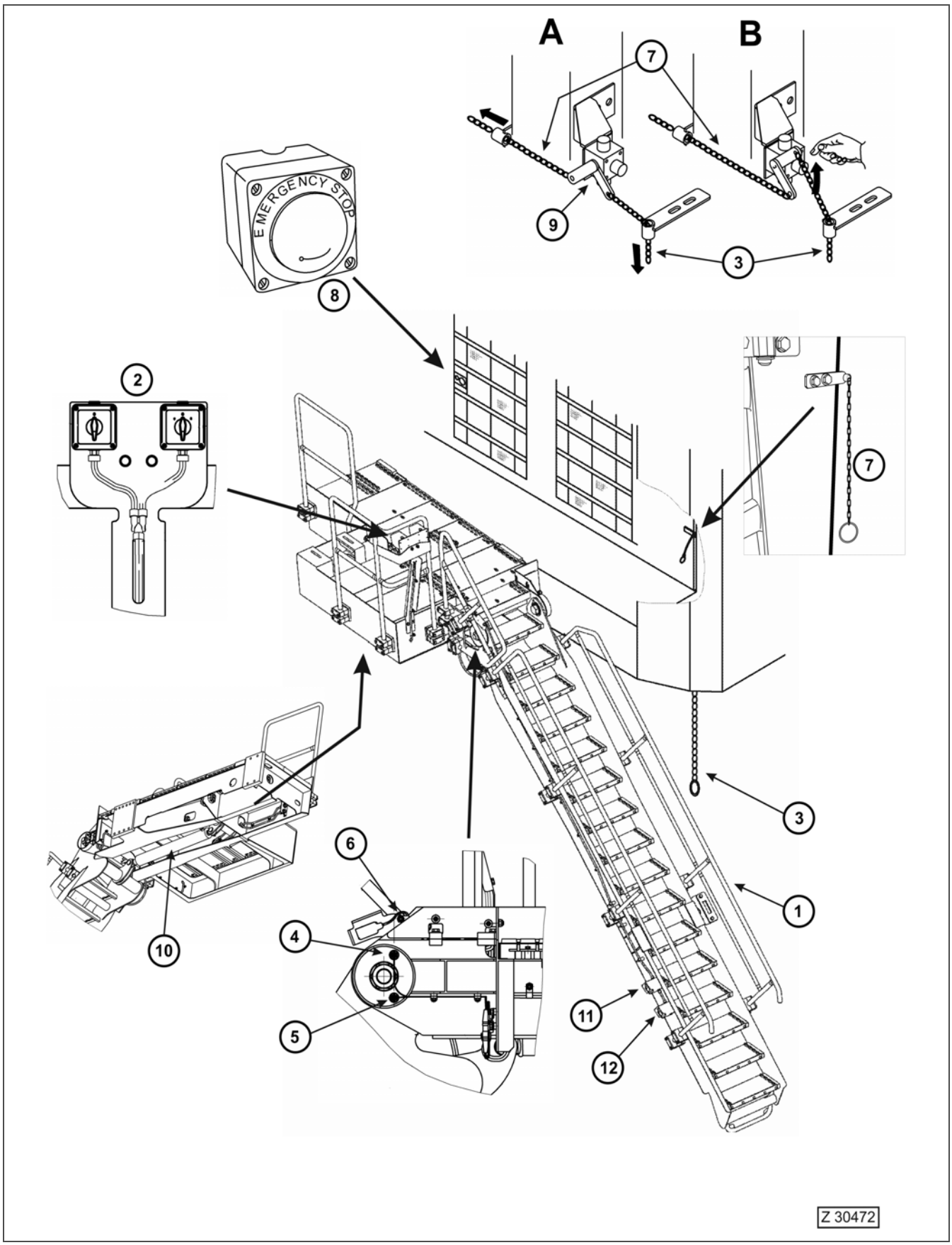

Fig. 4-168

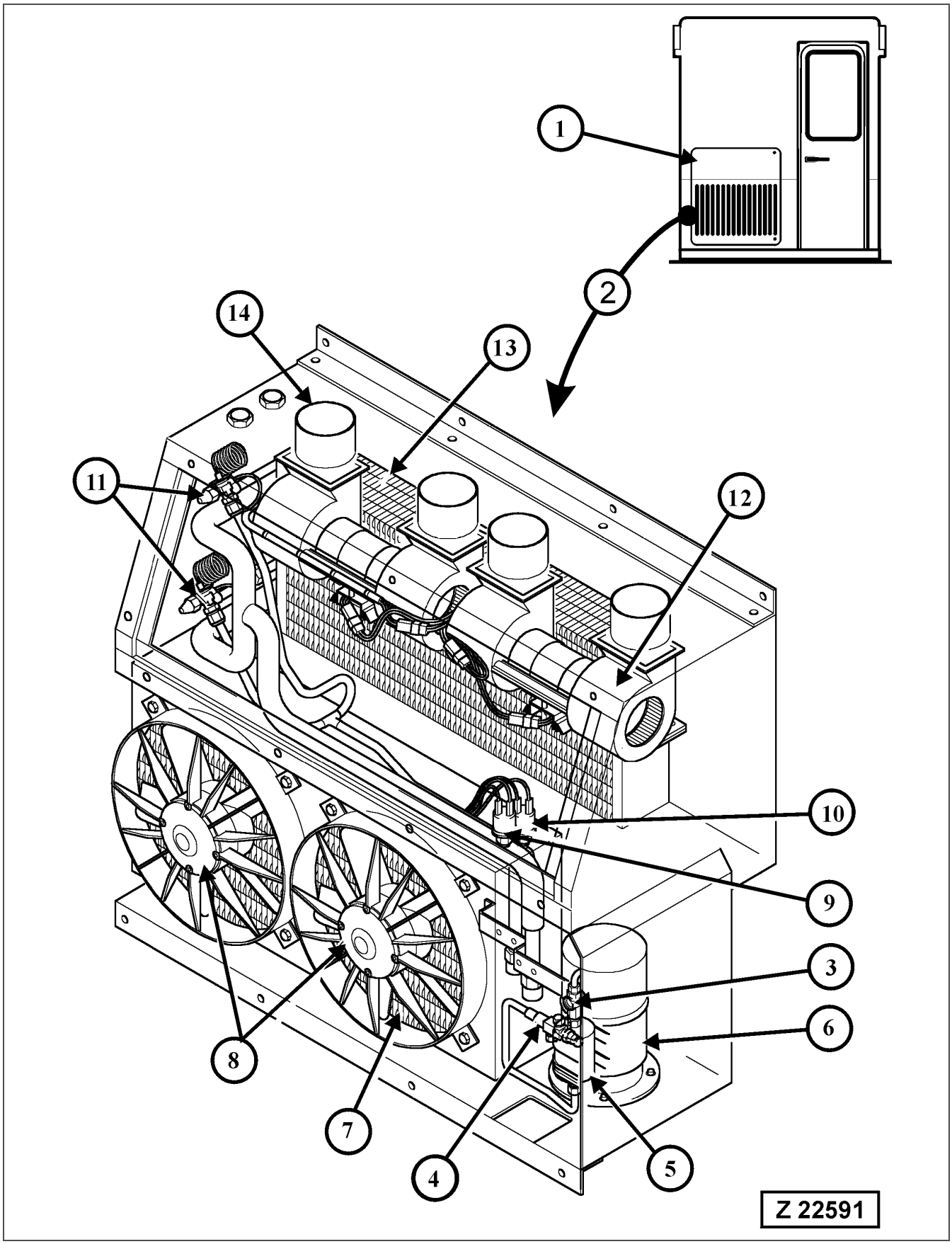

Fig. 4-173

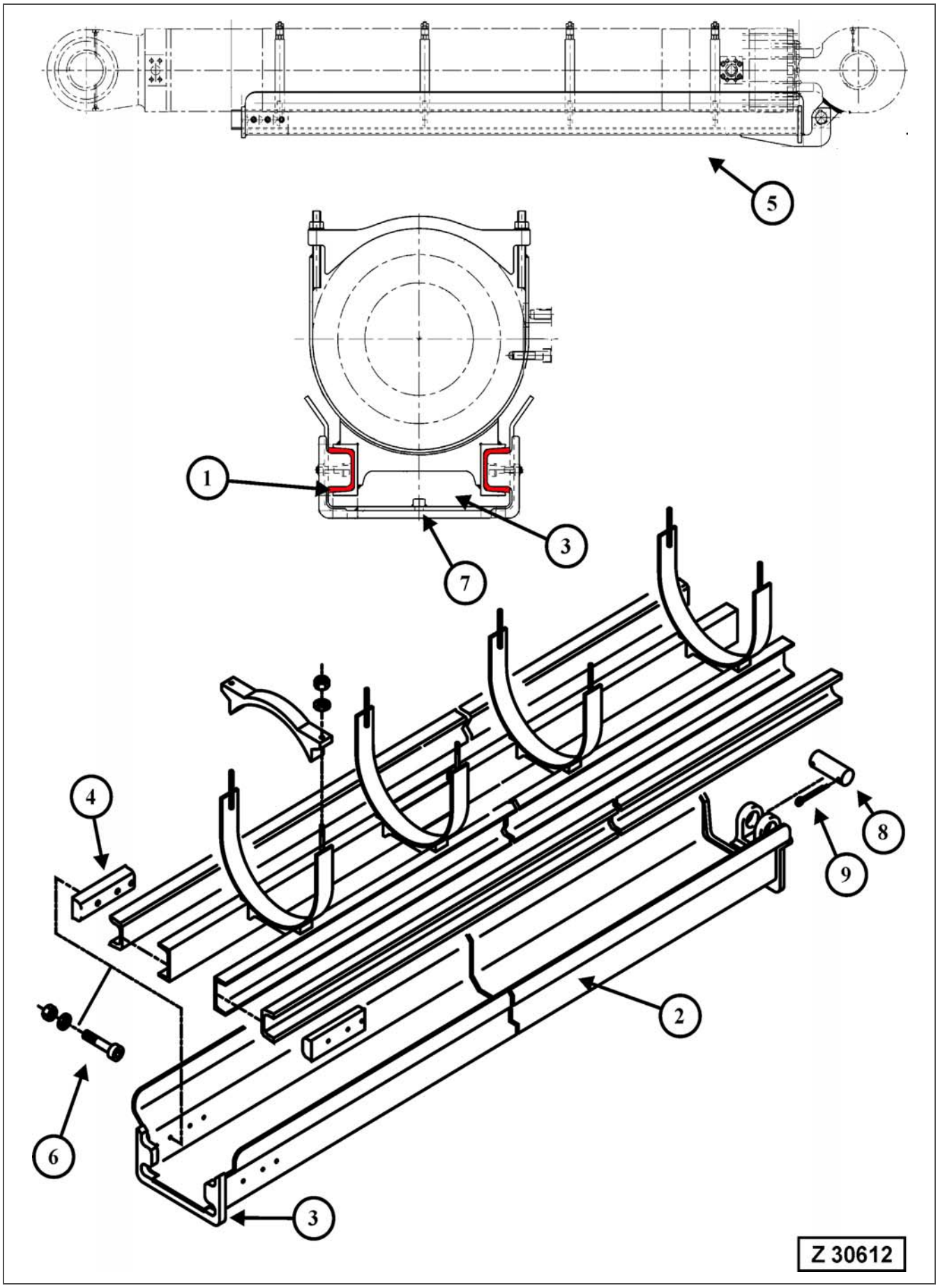

Fig. 4-180

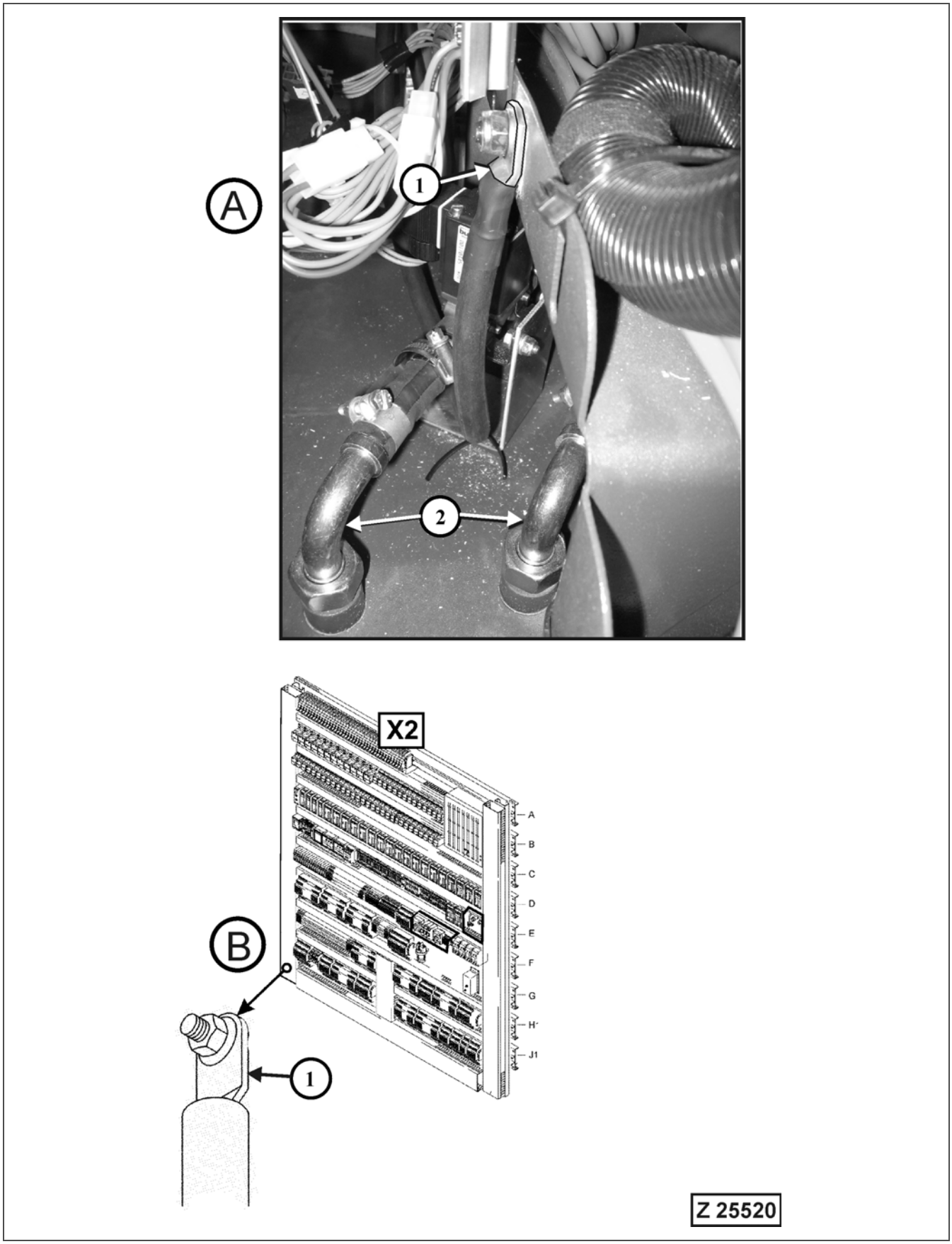

Fig. 4-185

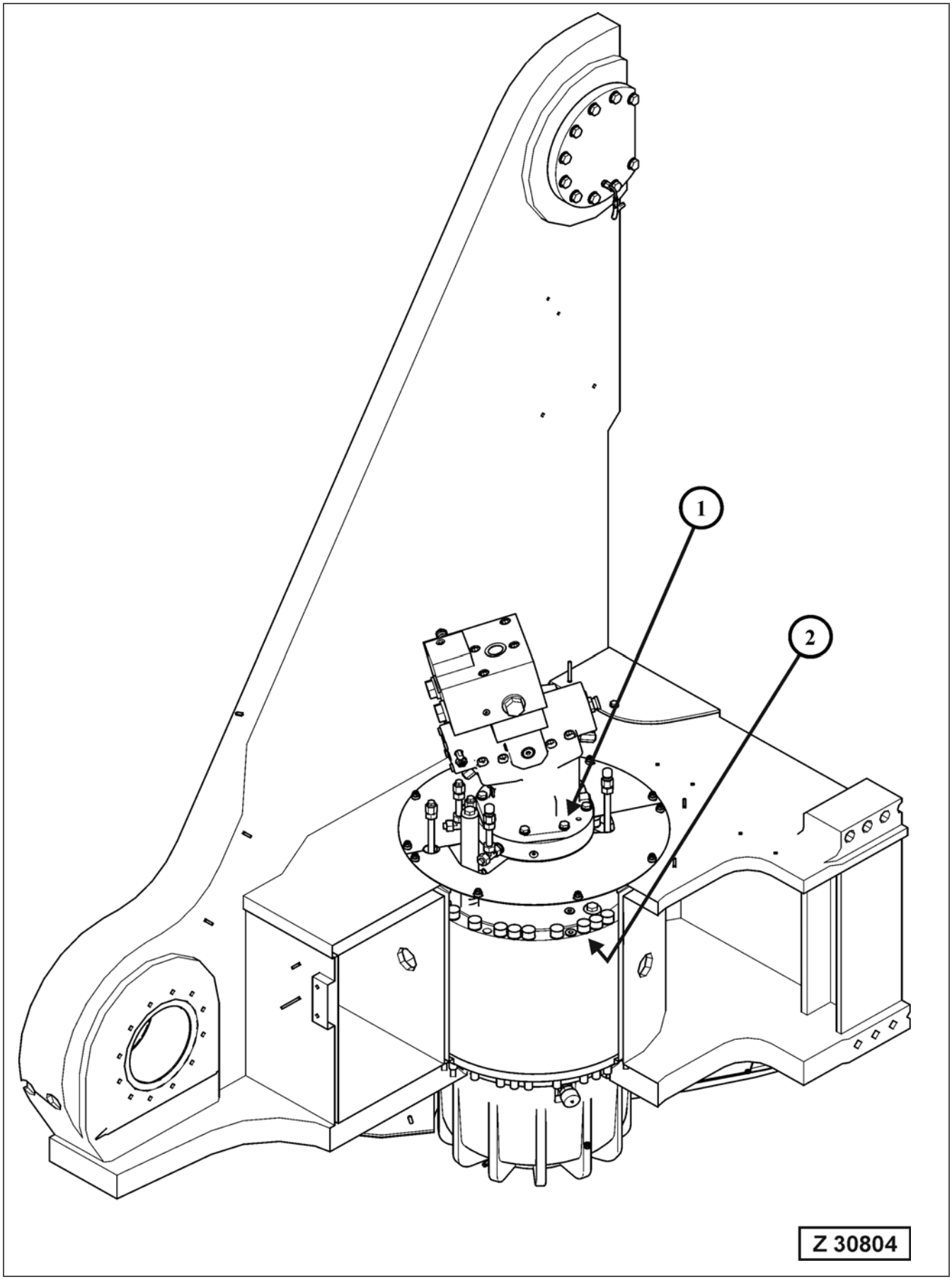

Fig. 4-190

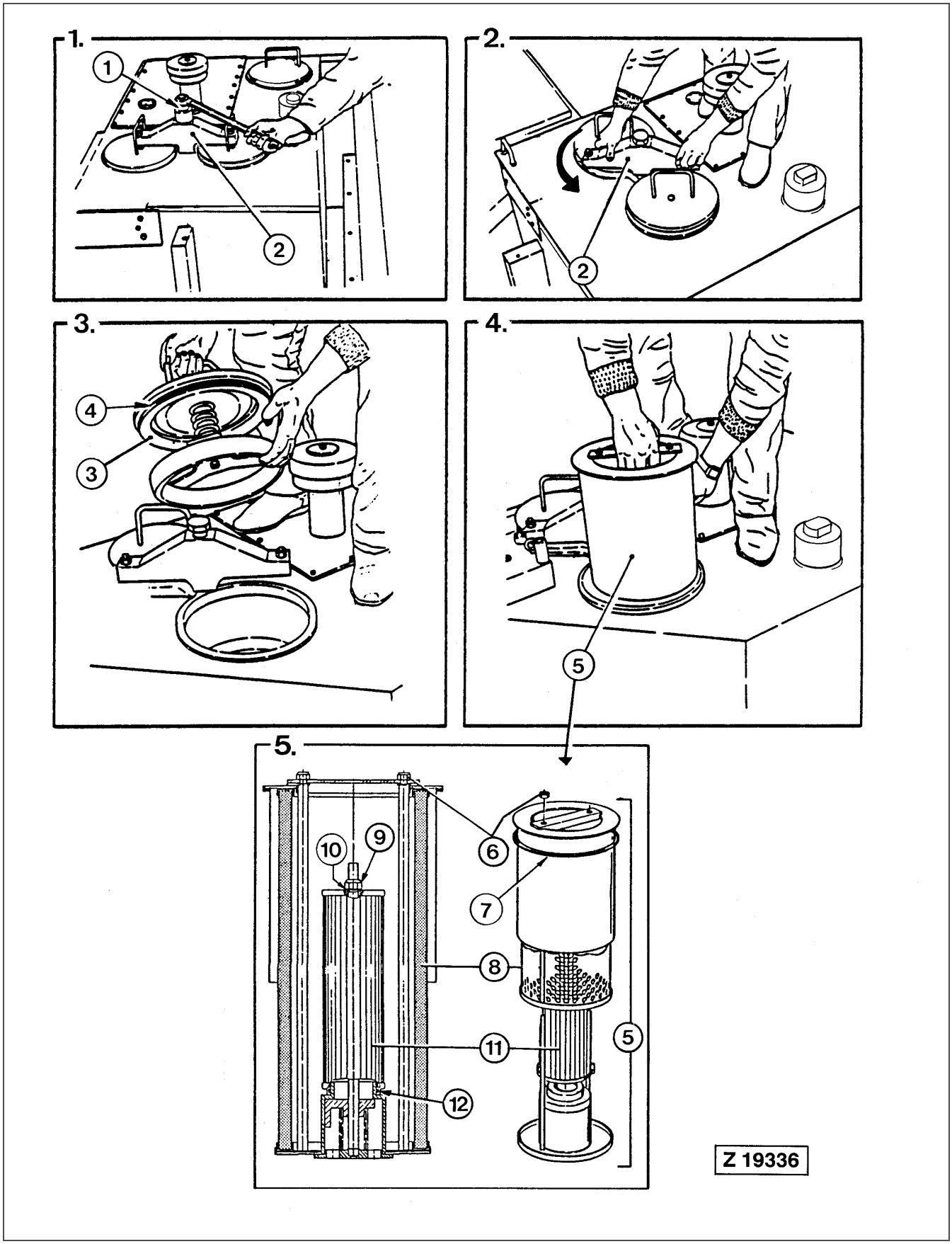

Fig. 4-195

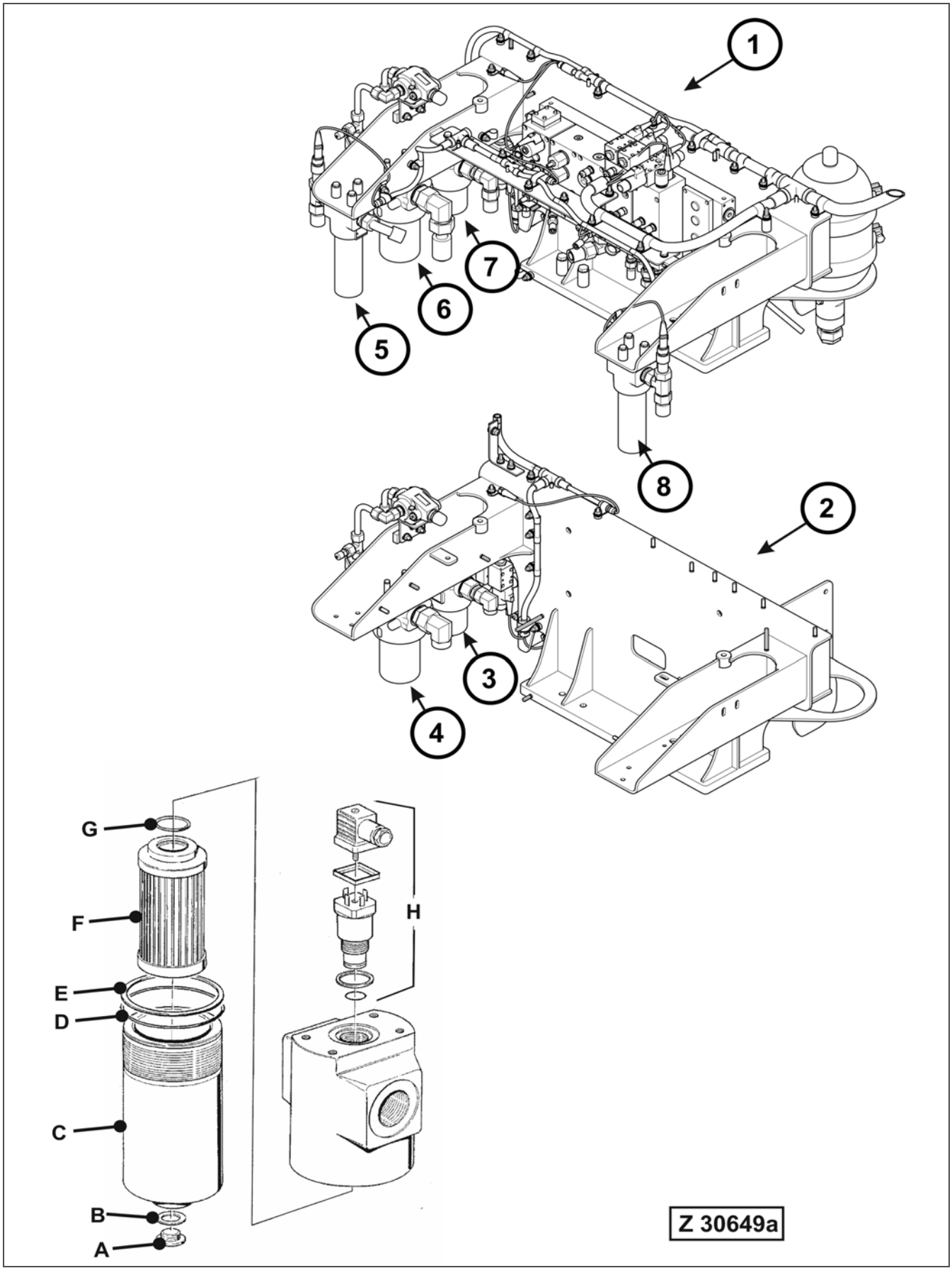

Fig. 4-200

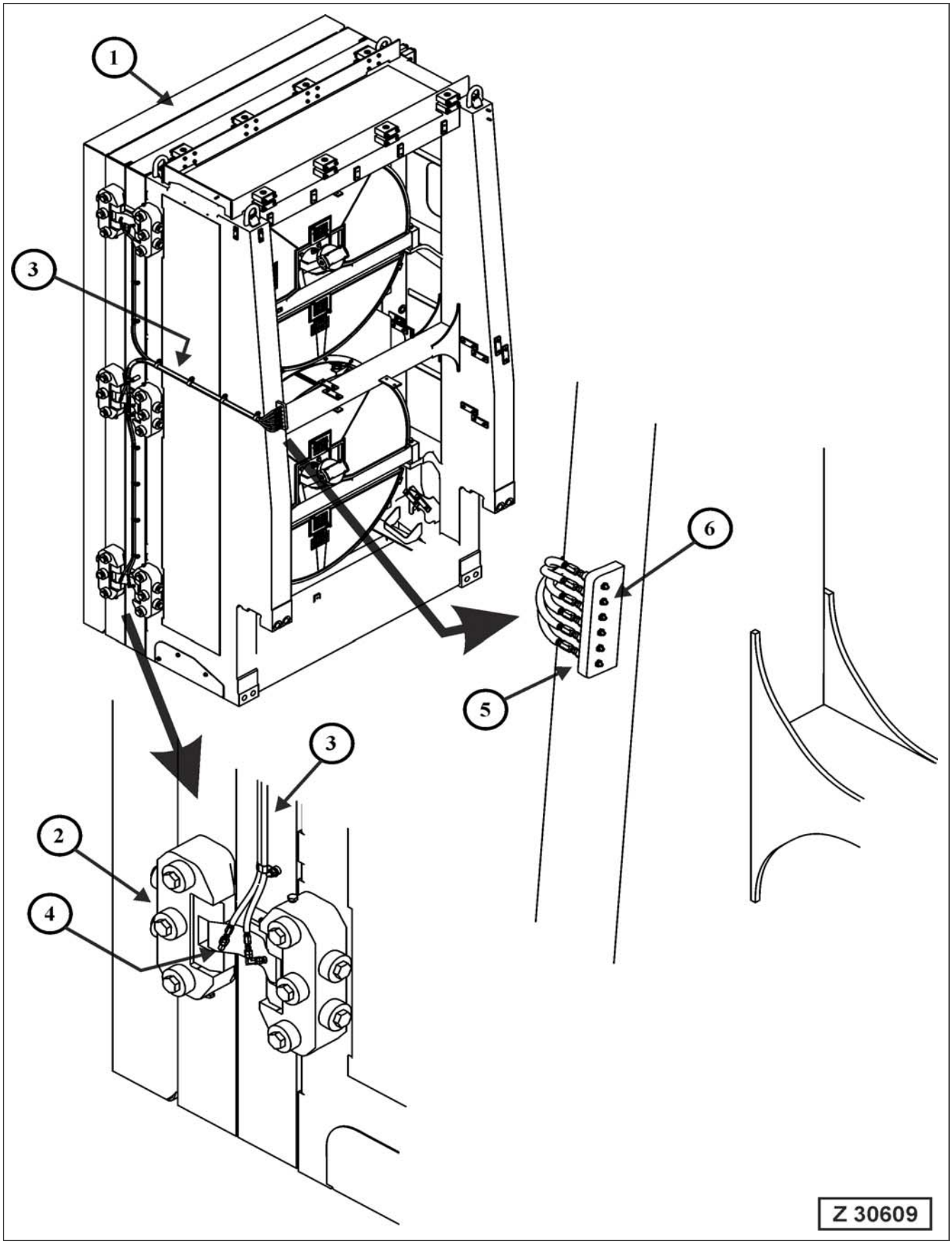

Fig. 4-205

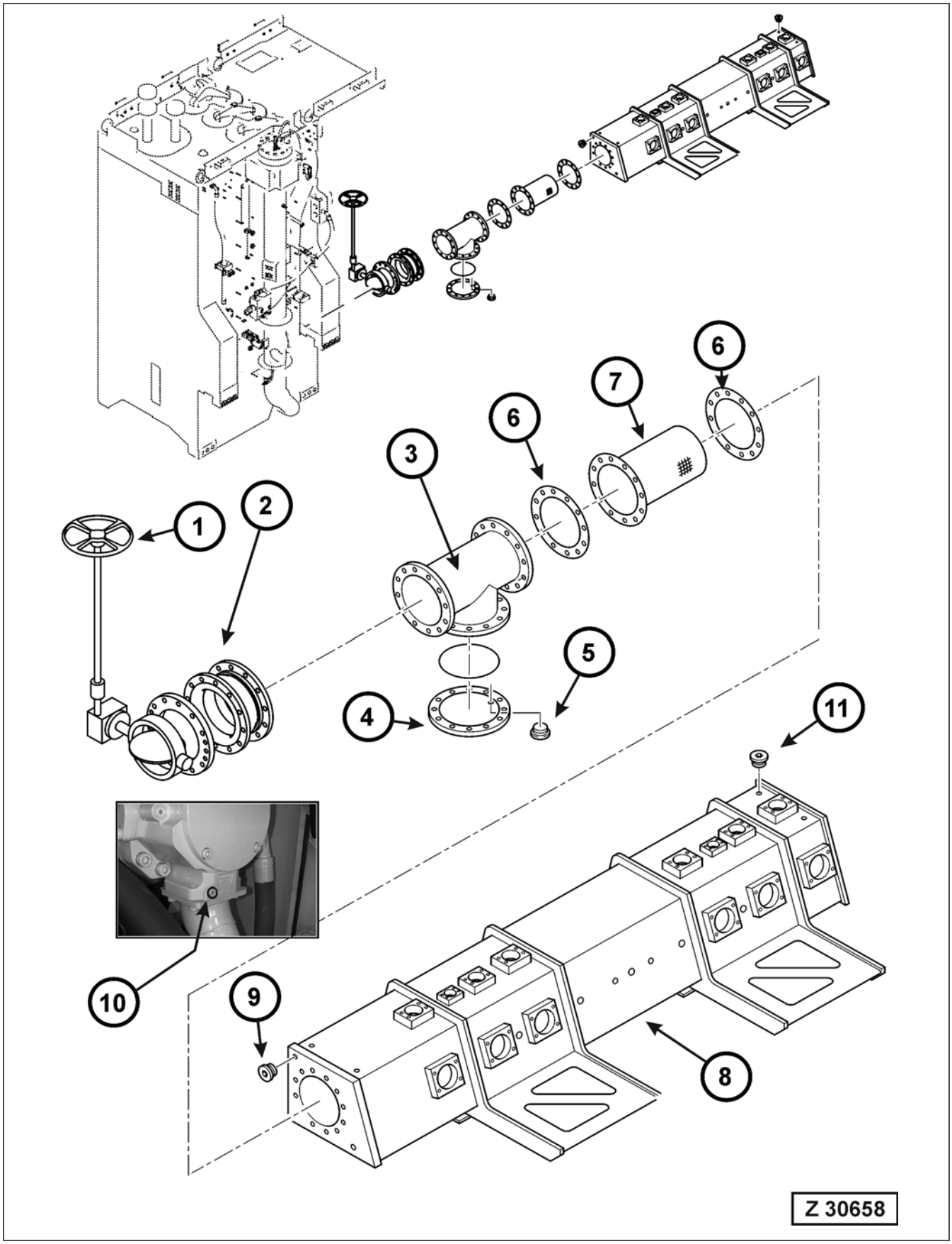

Fig. 4-210

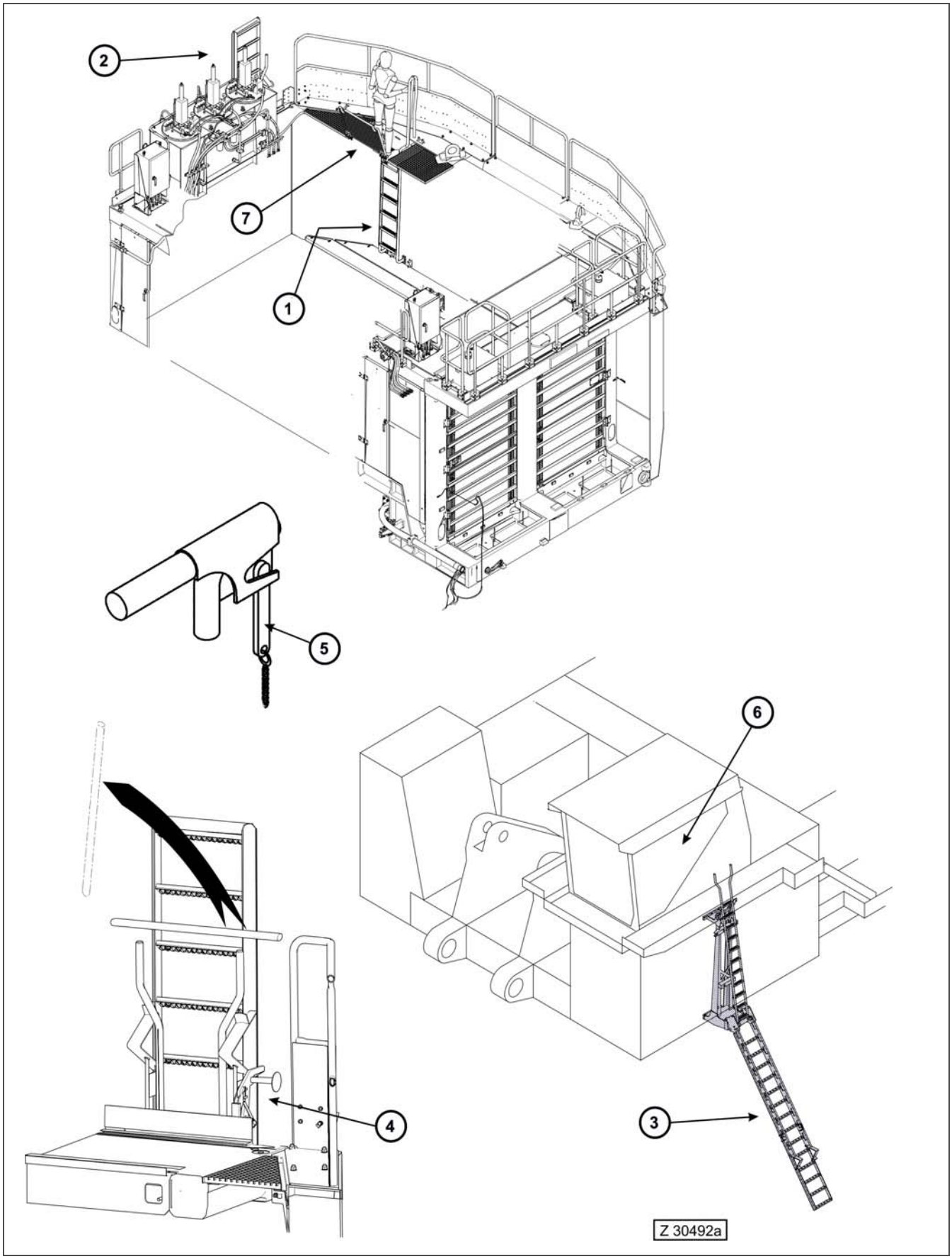

Fig. 4-216

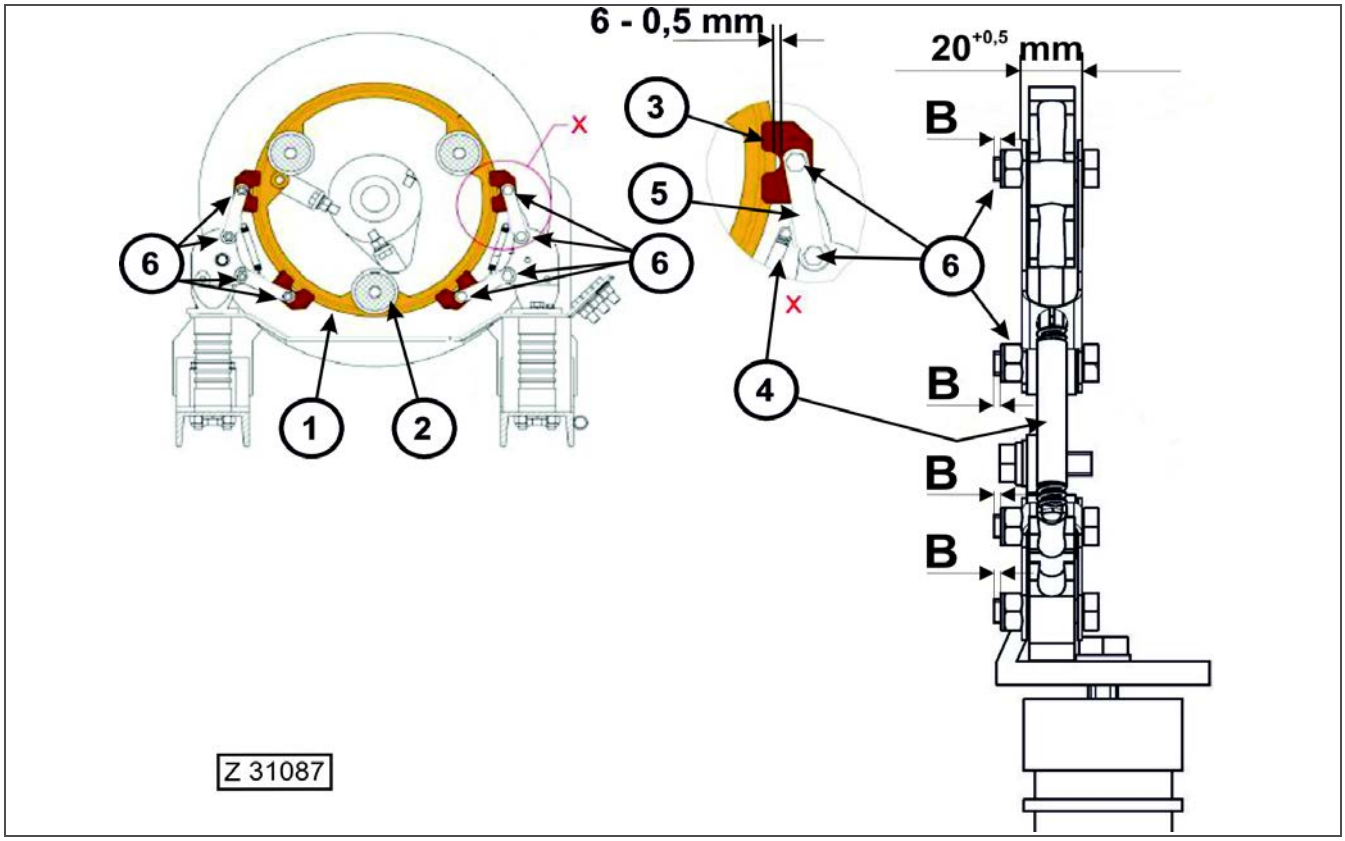

Fig. 4-222

Legend for Fig. 4-222

(1) Slip ring

(2) Isolators

(3) Copper graphite brushes

(4) Tensioning springs

(5) Brush retaining lever

(6) Lever retaining bolts with self-locking nuts

Check:-

– the lever bolts (6) must not be tightened. They must remain loose in order that the play of the levers retain a safe contact between the brushes (3) and the slip ring (1) by full spring forces.

– if the self-locking nuts are in the correct position.

REMARKS: If the self-locking nut is is lost or is not in the correct position, replace with new ones that are recommended by the Original Equipment Manufacturer (OEM) only.

– the whole slip ring unit assembly for defects and the completeness of all nuts and bolts

NOTICE

See Fig. 4-222. When tightening the nut and bolt connection of the lever, ensure enough play exists by tightening the nut (6) hand tight only and then loosening slightly (B) ensuring that thread from the bolt is clearly visible. The width between the levers holding the brushes must measure 20 +0.5 mm.

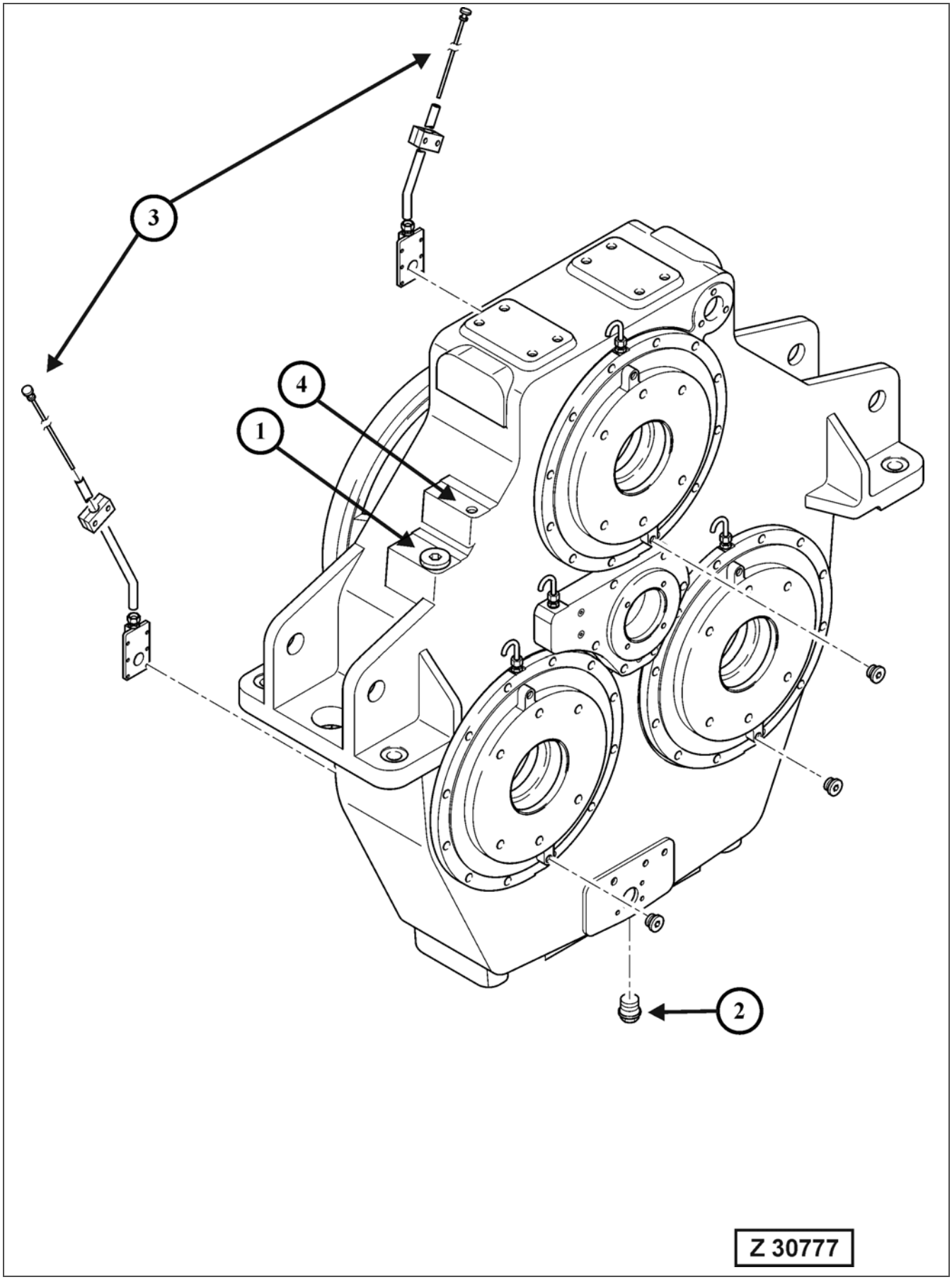

Fig. 4-227

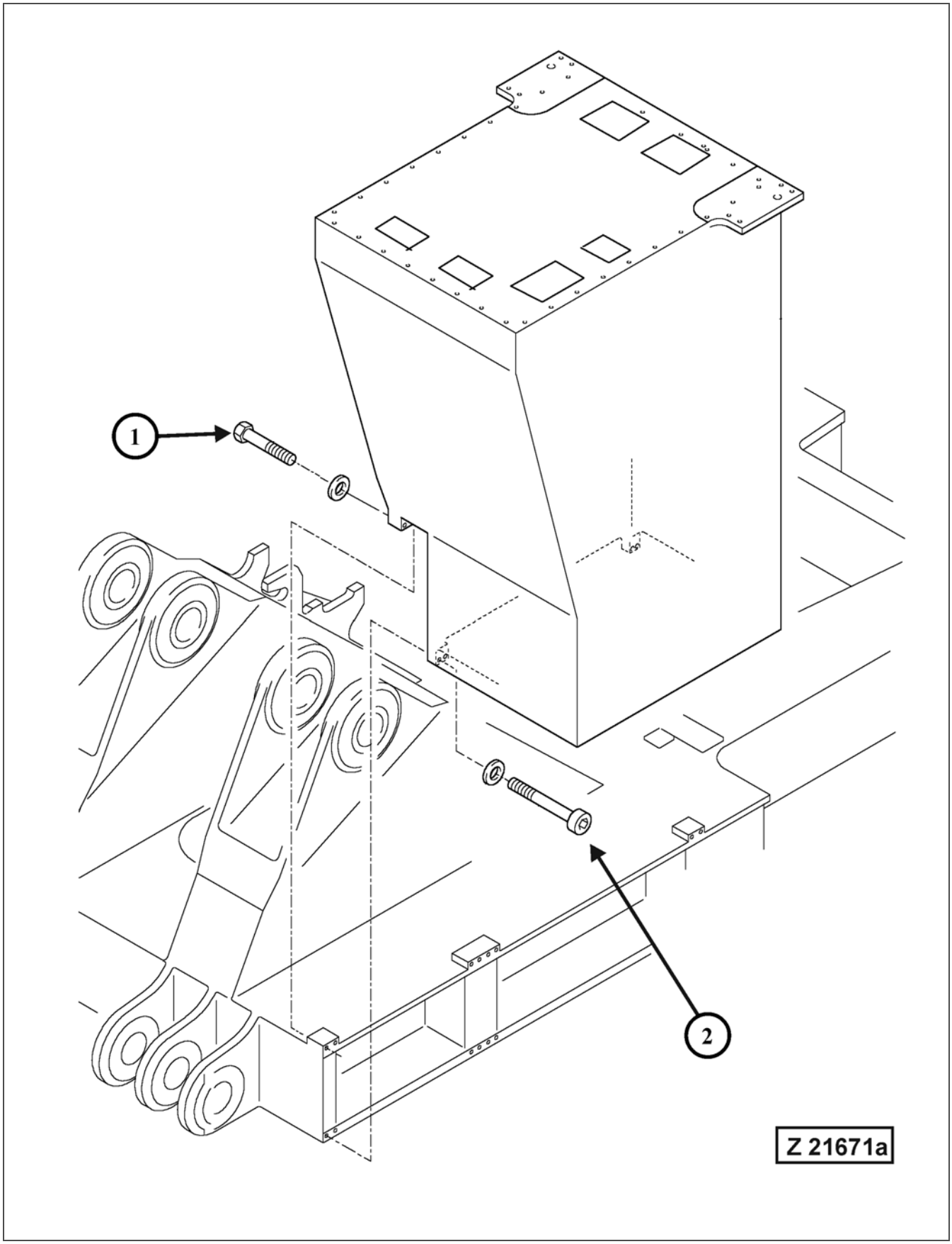

Fig. 4-231

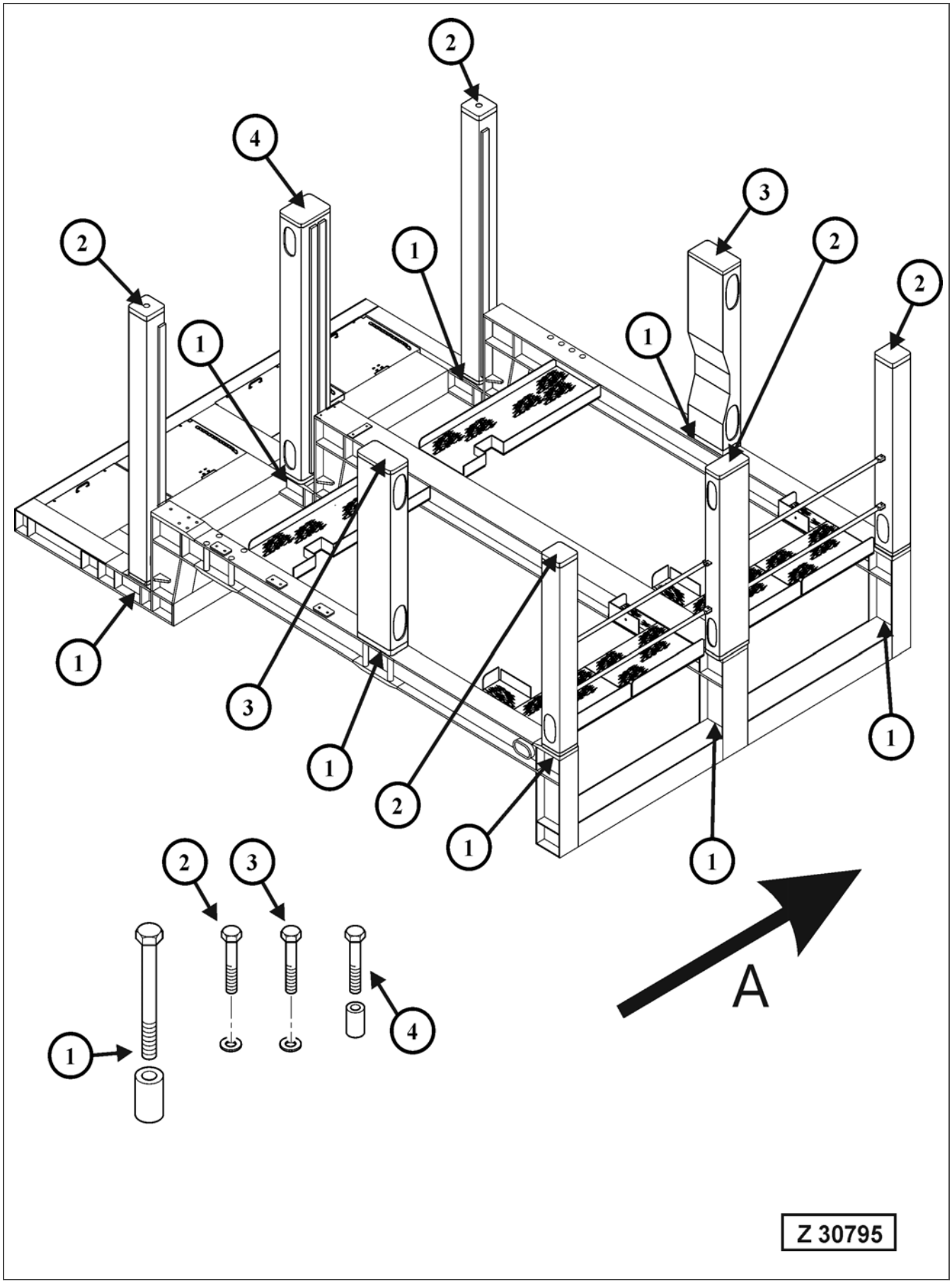

Fig. 4-236

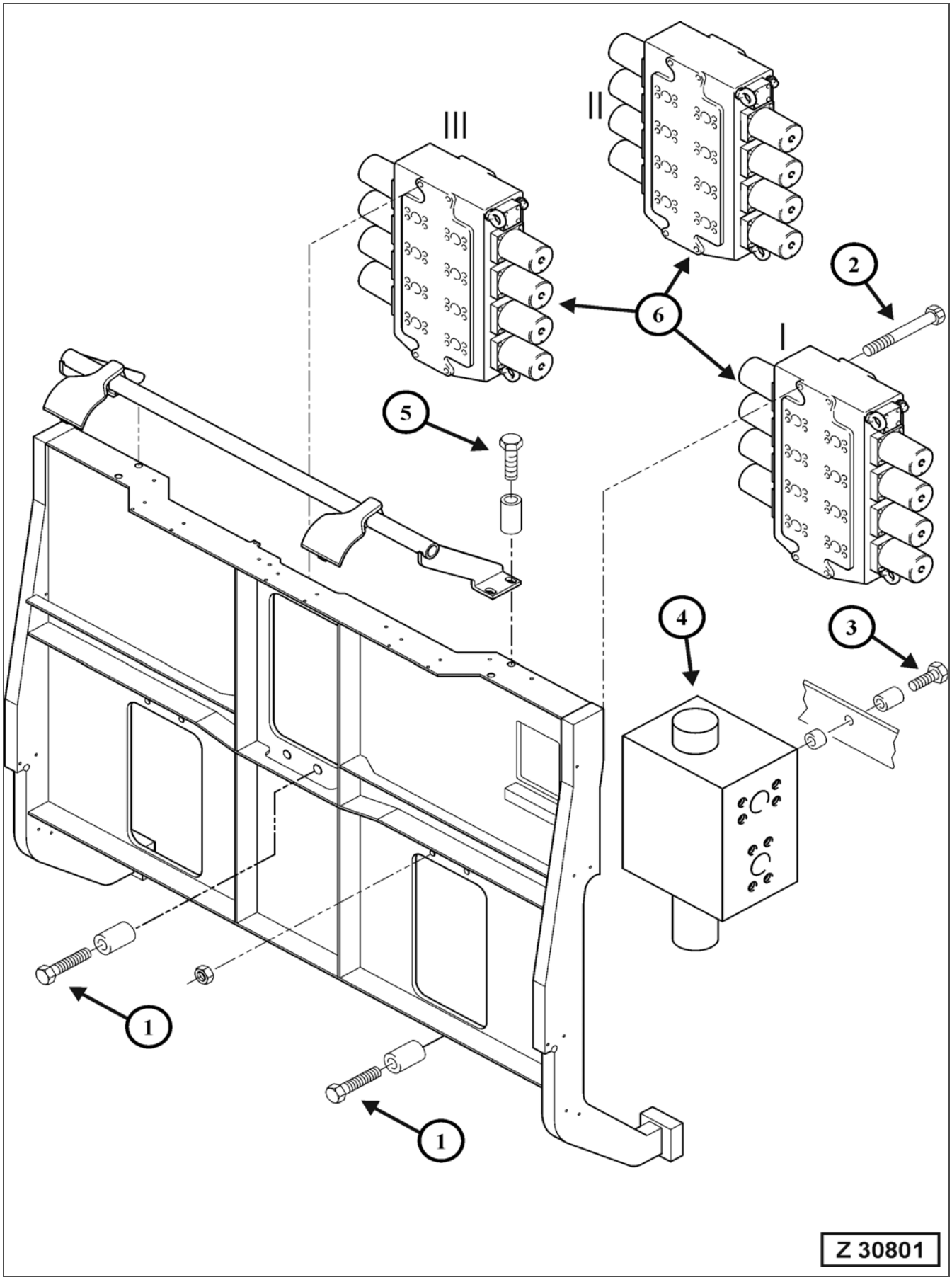

Fig. 4-241

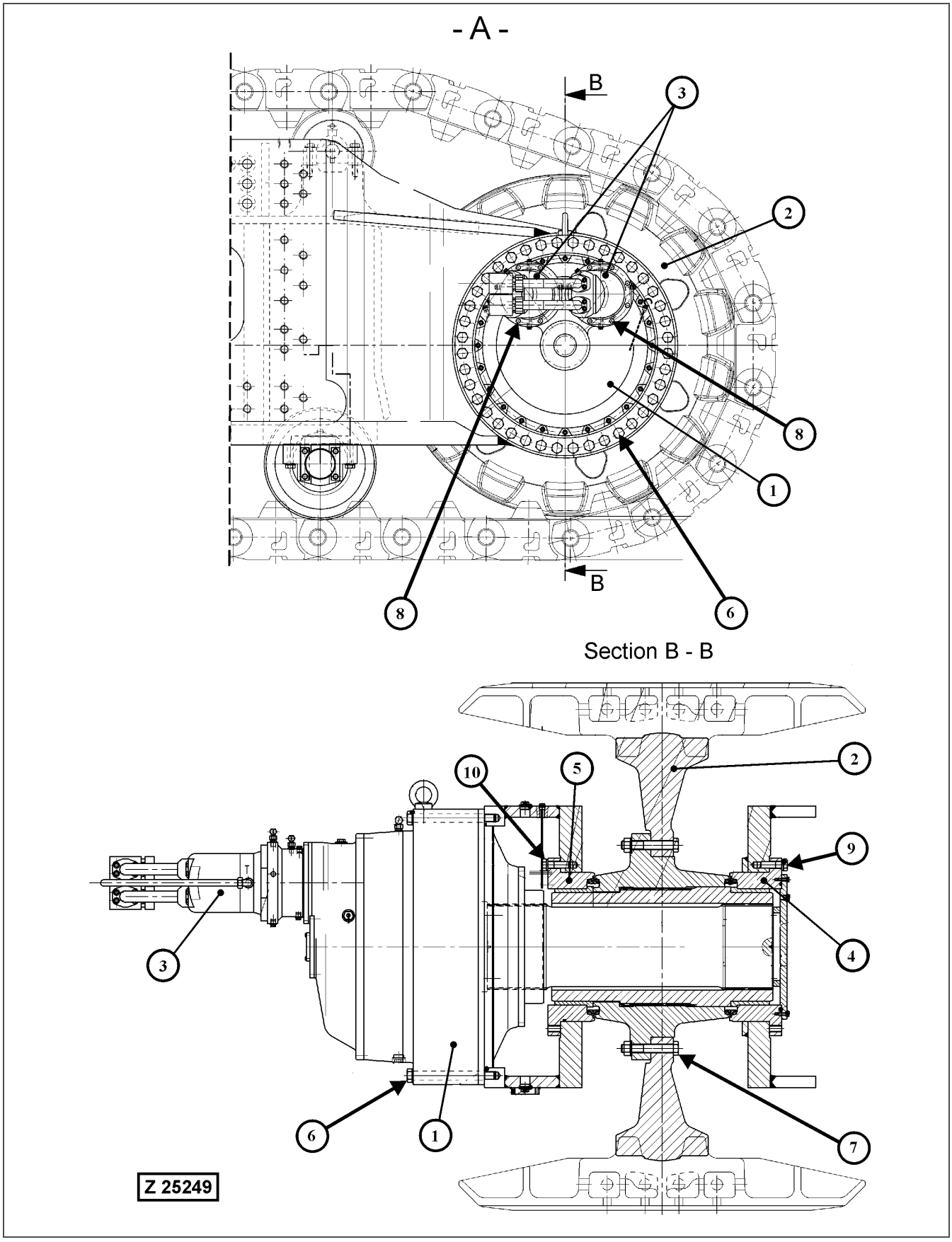

Fig. 4-246

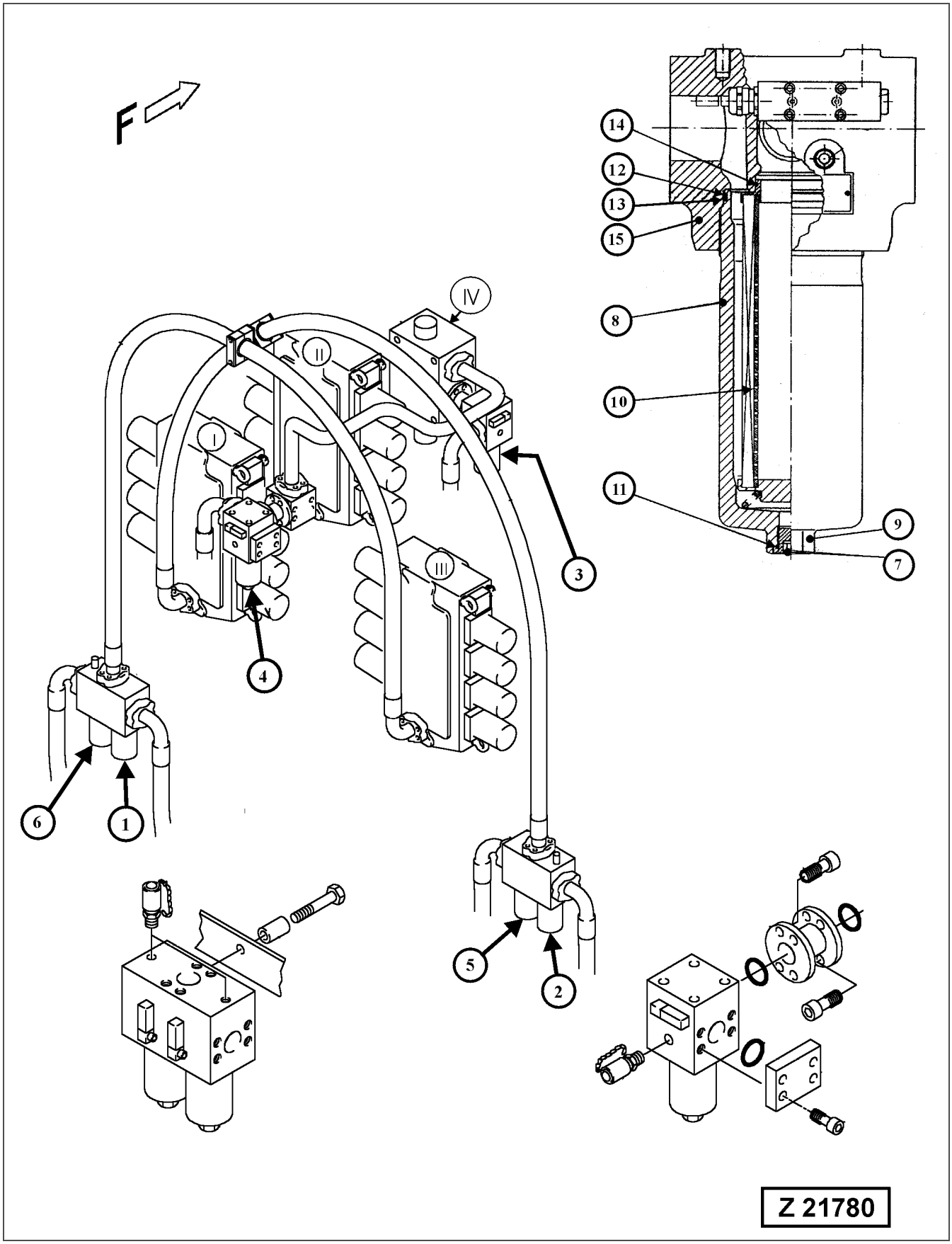

Fig. 4-251