Operation & Maintenance Manual

HYDRAULIC
MINING
EXCAVATOR

PC8000-11

SERIAL NUMBER 12117

Unsafe use of this excavator may cause serious injury or death.
Operators and maintenance personnel must read this manual before operating or maintaining this excavator. This manual should be kept near the excavator 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

1.6 SPECIFICATION AND SERIAL PLATE

Fig. 1-4

The specification and serial plate is located on the outside of the driver's cab near the door.

1.6.1 PRODUCT IDENTIFICATION NUMBER

The product Identification Number Code (PIN-Code) is printed in the space provided on the specification and serial plate. (Fig. 1-4)

2.4.3.6 PROVIDE FIRE EXTINGUISHER AND FIRST AID KIT

Always follow the precautions below to prepare for action if any injury or fire should occur, refer to Fig. 2-4.

– Be sure that fire extinguishers have been provided and read the labels to ensure that you know how to use them in emergencies.
– Carry out periodic inspection and maintenance to ensure that the fire extinguisher can always be used.
– Provide a first aid kit. Carry out periodic checks and add to the contents if necessary.

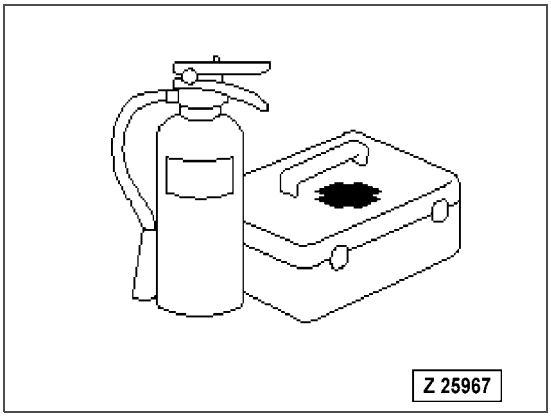

Fig. 2-4

2.4.3.7 IF A PROBLEM IS FOUND

If you find any problems in the excavator during operation and maintenance (noise, vibration, smell, incorrect gages, smoke, oil, leakage, etc., or any abnormal display on the warning devices or monitor), report to the person in charge and have the necessary action taken. Do not operate the excavator until the problem has been corrected.

2.4.4 FIRE PREVENTION

2.4.4.1 PRECAUTIONS TO PREVENT FIRE

Fire caused by fuel, oil, antifreeze, or window washer fluid.

Do not bring any flame or fire close to flammable substances such as fuel, oil, antifreeze, or window washer fluid. There is a danger they may catch fire. To prevent fire, always observe the following:

Refer to Fig. 2-5:

– Do not smoke or use any flame near fuel or other flammable substances.
– Stop the motors before adding fuel.
– Do not leave the excavator while adding fuel or oil.
– Tighten all fuel and oil caps securely.
– Be careful not to spill fuel on overheated surfaces or on parts of the electrical system.
– After adding fuel or oil, wipe up any spillage.
– Put greasy rags and other flammable materials into a safe container to maintain safety in the workplace.
– When washing parts with oil, use a non-flammable oil. Do not use diesel oil or gasoline. There is a danger that they may catch fire.
– Do not weld or use a cutting torch to cut any pipe or tubes that contain flammable liquids.
– Determine well ventilated areas for storing oil and fuel. Keep the oil and fuel in the determined place and do not allow unauthorized persons to enter.

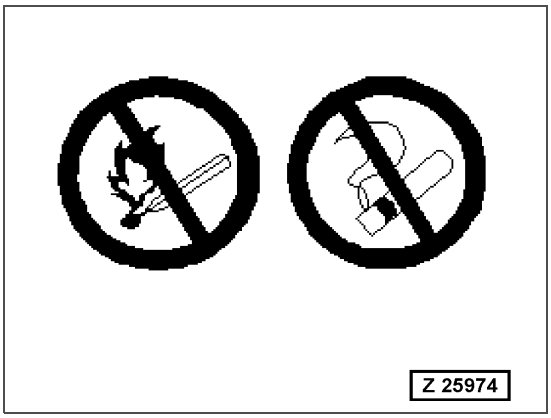

Fig. 2-5

On job sites where the excavator may go close to electric cables, always do as follows.

– Before starting work near electric cables, inform the local power company of the work to be performed, and ask them to take the necessary action.
– Always maintain a safe distance (see the table on the right) between the excavator and the electric cable. Check with the local power company about safe operating procedure before starting operations.
– To prepare for any possible emergencies, wear rubber shoes and gloves. Lay a rubber sheet on top of the seat, and be careful not to touch the chassis with any exposed part of your body.
– Use a signalman to give warning if the excavator approaches too close to the electric cables.
– When carrying out operations near high voltage cables, do not let anyone near the excavator.
– If the excavator should come too close or touch the electric cable, to prevent electric shock, the operator should not leave the operator's compartment until it has been confirmed that the electricity has been shut off. Also, do not let anyone near the excavator.

Voltage of Cables	Safety Distance
100 V - 200 V	Over 2 m (7 ft)
6,600 V	Over 2 m (7 ft)
22,000 V	Over 3 m (10 ft)
66,000 V	Over 4 m (14 ft)
154,000 V	Over 5 m (17 ft)
187,000 V	Over 6 m (20 ft)
275,000 V	Over 7 m (23 ft)
500,000 V	Over 11 m (36 ft)

2.4.11.7 LIGHTNING STRIKES

The excavator is vulnerable to strikes by lightning, The operator must not leave the cabin. All workers in the working area must be inside a secure room (cabin, machinery house, closed metallic container, etc). Stop working when the storm is close, lower the attachment to the ground and wait for the storm to pass. A possible lightning strike may damage the mechanical bearings and the electrical systems. Check the excavator after a lightning strike for possible damages and repair if necessary.

2.4.11.8 WORKING ON LOOSE GROUND

– Avoid traveling or operating your excavator too close to the edge of cliffs, overhangs, and deep ditches. The ground may be weak in such areas. If the ground should collapse under the weight or vibration of the excavator, there is a hazard that the excavator may fall or tip over. Remember that the soil after heavy rain or blasting or after earthquakes is weak in these areas.
– When working on embankments or near excavated ditches, there is a hazard that the weight and vibration of the excavator will cause the soil to collapse. Before starting operations, take steps to ensure that the ground is safe and to prevent the excavator from rolling over or falling.

2.5 PRECAUTION FOR MAINTENANCE

2.5.1 GENERAL PRECAUTIONS

- Observe the adjusting, maintenance and inspection activities and intervals set out in the Operation,- Lubrication and Maintenance Manual, including information on the replacement of parts and equipment. These activities may be executed by skilled personnel only.
- Brief operating personnel before beginning special operations and maintenance work, and appoint a person to supervise the activities.
- In any work concerning the operation, conversion or adjustment of the excavator and its safety-oriented devices or any work related to maintenance, inspection and repair, always observe the start-up and shut-down procedures set out in the Operation,- Lubrication and Maintenance Manual and the information on maintenance work.
- Ensure that the maintenance area is adequately secured.
- If the excavator is completely shut down for maintenance and repair work, it must be secured against inadvertent starting by:
  - locking the principal control elements and removing the ignition key and/or
  - attaching a warning tag to the main switch or control levers.
  - setting the maintenance safety switch to the 0 position and securing it with a padlock
- Carry out maintenance and repair work only if the excavator is positioned on stable and level ground and has been secured against inadvertent movement and buckling.
- To avoid the risk of accidents, individual parts and large assemblies being moved for replacement purposes should be carefully attached to lifting tackle and secured. Use only suitable and technically perfect lifting gear and suspension systems with adequate lifting capacity. Never work or stand under suspended loads.
- The fastening of loads and the instructing of crane operators should be entrusted to experienced persons only. The marshaller giving the instructions must be within sight or sound of the operator.
- For carrying out overhead assembly work always use specially designed or otherwise safety-oriented ladders and working platforms. Never use excavator parts as a climbing aid. Wear a safety harness when carrying out maintenance work at greater heights.
  Keep all handles, steps, handrails, platforms, landings, stairways and ladders free from dirt, snow and ice.
- Always tighten any screwed connections that have been loosened during maintenance and repair.
- Any safety devices removed for set-up, maintenance or repair purposes must be refitted and checked immediately upon completion of the maintenance and repair work.
- Ensure that all consumables and replaced parts are disposed of safely and with minimum environmental impact.
- Before starting any lubrication or maintenance work read the Fundamental Safety Instructions on page 2-23.
- Park the Excavator at a safe place on level ground. Proceed according to the instructions ”Parking the excavator”. Lower the attachment flat onto the ground. Move all control levers to neutral position.
- Stop the motors and move all control levers through their shift positions to relieve the pressure in the hydraulic system. Refer to ”Stopping the motors” for detailed description of the stopping procedure. Also see the chapter ’Relieving The Pressure In The Hydraulic System’ in the ’Operation’ part of this manual.
- Before any maintenance work is started, set the maintenance safety switch to 0 position.
  Find to the location of the maintenance safety switch refer to section 2.5.1.3 on page 2-52. In the 0 position the motors can not be started. Secure this position by inserting a padlock into the holes of the switch. Up to ten padlocks can be attached to the holes provided.
- A warning plate ”Caution excavator Maintenance” must be fixed in the Operator’s cab before any lubrication or maintenance work is started.
- Block the excavator to prevent excavator movement

2.5.3.1 PRECAUTIONS WITH HIGH FUEL PRESSURE

– For details of the method of releasing the pressure, see the latest version of the Operation and Maintenance Manual. If the circuit is still under pressure, do not carry out any inspection or replacement operation.
– If there is any leakage from the piping or hoses, the surrounding area will be wet, so check for cracks in the piping and hoses and for swelling in the hoses.
– When carrying out inspections, wear full-face protection and penetration resistant clothing and gloves (leather).
– There is a hazard that high-pressure oil leaking from small holes may penetrate your skin or cause blindness if it contacts your eyes directly (Fig. 2-49). If you are hit by a jet of high-pressure oil and suffer injury to your skin or eyes, wash the place with clean water, and consult a doctor immediately for medical attention.

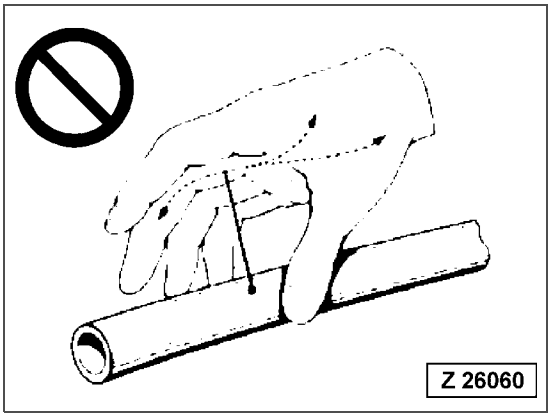

Fig. 2-49

High pressure is generated inside the motor fuel piping when the motor is running. When carrying out inspection or maintenance of the fuel piping system, wait for at least 30 seconds after stopping the motor to let the internal pressure go down before starting inspection or maintenance.

2.7.5.3 PRIOR TO USING THE HARNESS (1), THE WEARER SHALL

– Carry out a visual check of the system or component; correct functioning and perfect working order have to be assured.

– Make sure that the recommendations for use with other components of the system be observed in conformity with the instructions for use.

The system or component must no longer be used, if there are any doubts in respect of its safe condition. The equipment has to be inspected by the manufacturer or by a qualified person.

It is essential for safety reasons that a fall protection system or system component which has already been subjected to fall be removed from service and sent back to the manufacturer or an authorized qualified repair shop for maintenance and renewed testing.

Fall protection systems have to be treated with care and to be kept clean and ready for use. It has to be warned against bringing the systems into contact with acids or other caustic liquids and gases, oils, detergents, or sharp-edged objects.

Should the harness have become wet during use or cleaning, do not dry near a fire or other sources of heat, but rather in a natural way in not too warm rooms. Keep the harness freely suspended or loosely rolled up.

When using the fall protection systems, the pertaining safety regulations in force and the "Rules for Use of Personal Fall Arrest Systems" have to be observed for protection against danger.

The safety harness and its components have to be inspected at least every 12 months by a competent person authorized by the manufacturer and maintained, if the manufacturer considers it necessary.

2.7.5.4 RECOMMENDATIONS FOR USE OF THE HOLDING HOOKS AND HOLD-BACK HOOKS OF THE SAFETY HARNESS

The holding hooks should only be attached to the special attachment points (3) on the boom. Free-fall must be limited to 0.5m.

With the lateral holding hooks, work may only be carried out on horizontal or almost horizontal surfaces (roofs). The connectors have to be adjusted in such a way that the area, where danger of falling down prevails, cannot be reached.

Emergency escape route from machinery house
Fig. 2-60
Part number **518 669 98** (left upwards)
Part number **519 760 98** (to the right)
For further information, refer to the chapter "Emergency Escape Ladders" in the "Operation" section of the Operation and Maintenance Manual.

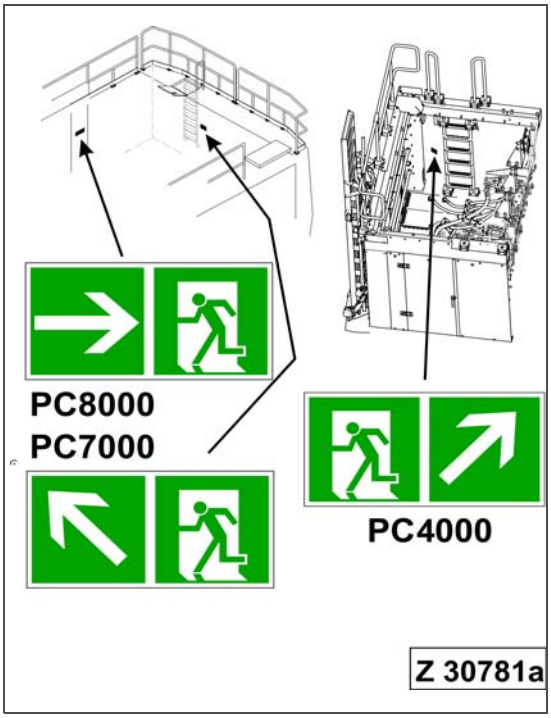

Fig. 2-60

Emergency escape route from machinery house roof to rear ladder (PC7000)
Fig. 2-61
Part number **519 756 98** (Instructions for operating the emergency escape ladder))

1. Turn pin handle CW (clockwise)
2. Remove pin handle
3. Kick against bar to disengage lever mechanism
4. Kick against bar to assist in lowering the ladder
5. Kick against angled section to push ladder downwards
6. Turn pin on latch on hand railing gateway CCW (counter-clockwise)
7. Remove pin
8. Raise hand raining gateway

Part number **519 758 98** (emergency escape ladder to the right))

For further information, refer to the chapter "Emergency Escape Ladders in the "Operation" section of the Operation and Maintenance Manual.

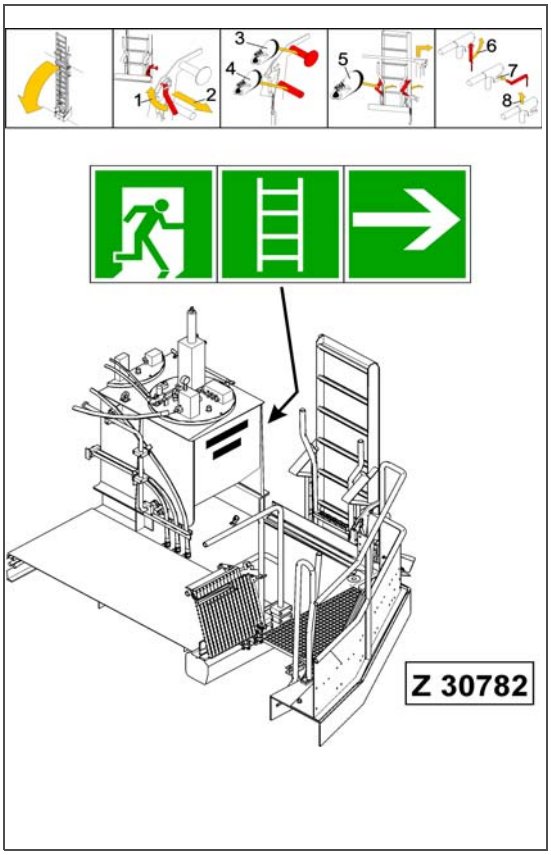

Fig. 2-61

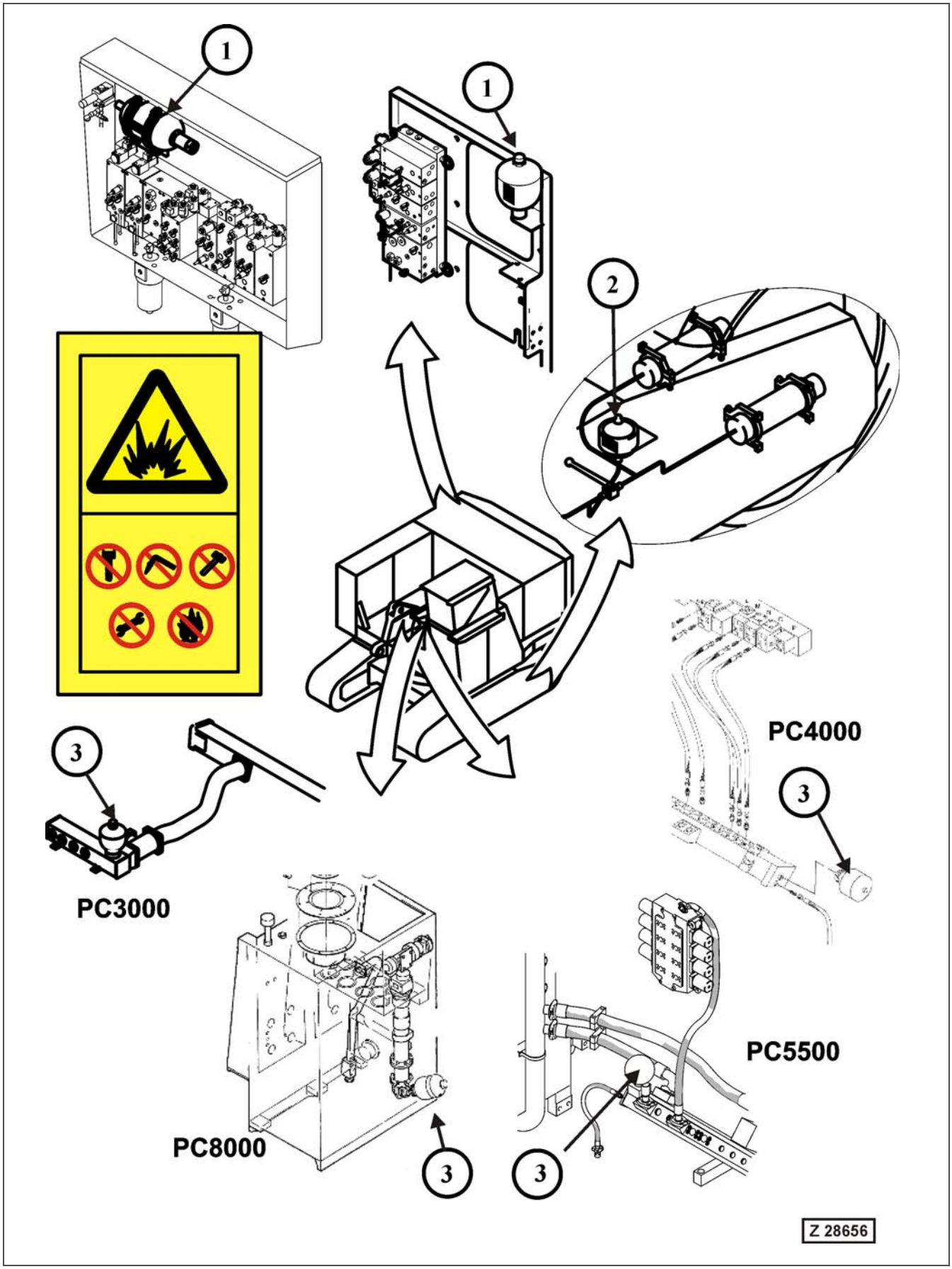

Fig. 2-74

Undercarriage and Superstructure (continued)

Legend for Fig. 3-79

(21) slew gear LH rear

(22) slew gear LH front

(23) Main hydraulic oil cooler

(24) DEF Tank for engine 1

(25) Hydraulic oil reservoir

(26) Emergency escape ladder on upper deck, see on page 3-112 for more information

(27) Pedestal for emergency escape ladder, see on page 3-112 for more information

(28) SCR exhaust systems

(29) Grease container with pump units for automatic lubrication systems

(30) Engine air cleaners

(31) Exhaust muffler

(32) Emergency escape hatch and ladder in the machinery house, see on page 3-120 for more information

(33) Counterweight

⚠ WARNING

RISK OF EXPLOSION!

Failure to properly expel the gases from the counterweight chambers can result in an explosion which may cause serious personal injury or death.
The chambers of the counterweight are filled with a mixture of concrete, granulated ore and steel pellets. This mixture can create explosive gases which will accumulate in the chambers of the counterweight. Before any welding, flame-cutting, grinding or drilling procedures are carried out on the counterweight it is vital to expel these gases from the counterweight chambers.
Ask Komatsu service about expelling the gases from the counterweight chambers.

(34) DEF tank for engine 2

(35) Fuel cooler

REMARKS: The access/ingress stairway shown is a generic view. The PC8000 has the access on the other side.

Legend for Fig. 3-85

(1) Access/ingress stairway in lowered position.

(2) (70S084 and 70S084b) Stairway control switch for lifting and lowering the stairway

(3) **REMARKS:** Pull chain for lowering of the access/ingress stairway and gaining access to the machine from ground

Use this chain only in emergencies when the operator does not respond to other communication signals.

(4) (70B122) Safety sensor, located on stairway pivot bracket.
This sensor is open when the stairway is lowered and closed when the ladder is raised

(5) (70B091) Monitor and control sensor
Function of sensor (70B091):
This sensor is open when the stairway is raised and closed when the stairway is lowered

(6) (70B114) Safety sensor
Function of sensor (70B114):
This sensor detects when the stairway is in the raised position

(7) Pull chain for lowering the access/ingress stairways when escaping the machine

REMARKS: Use this chain only in emergencies when the operator needs to escape the machine.

(8) emergency stop switch for main drive motor and position of manual actuator for the fire suppression system (if so equipped)

(9) Lever on emergency magnetic valve to activate lowering of stairway in an emergency

(10) View showing underside of platform with position of stairway hydraulic cylinder

(11) (70S155) Actuation switch for lowering and raising of hydraulic service arm for the service center if the service arm switch is used on the dashboard,.

(12) (70S018) Light switch for area of access to the excavator

Operating the Hydraulic access/ingress stairway

⚠ WARNING

OPERATING THE ACCESS/INGRESS STAIRWAY IMPROPERLY IS HAZARDOUS!

Operating the stairway improperly can result in serious injury or death.
Wait until the stairway has lowered completely before climbing. Do not lift people or objects (tools) with the stairway. Make sure the moving range of the stairway is clear of people when raising or lowering.

REMARKS: If there are any obstacles within the moving range of the stairway, stop by setting the control switches to -0- position

Legend to Fig. 3-90

(1) Emergency escape ladder

(2) Latching system that holds the ladder in place in unreleased position.

(3) Pin that secures the latching system in place

(4) Bar on latching system

(5) Angled plate attached to the ladder

(6) Release system on the handrail gateway

(7) Handrail on ladder

Releasing the escape ladder from the roof.

– Locate the pin (3) on the escape latch and pull it downwards. This unlocks the latching system (2).
– Release the latching system by pushing firmly with your foot on the bar (4)
– Push the ladder away from the roof by pushing firmly with your foot against the angled plate (5). The ladder will fall under it's own weight.
– The gate on the handrail (6) must be released to gain access to the ladder.
– Grasp the handrail on the ladder (7) and descend backwards.

To raise the ladder, refer to the instructions on page 3-121

Legend for Fig. 3-95

NOTICE

The operator's cab is equipped with an integrated Falling Object Protective Structure (FOPS) that meets the requirements of ISO 3449. Any modifications on the steel structure of the cab are inadmissible. Repairs on the FOPS must only be carried out by specialists having the authorization for repair work on Falling Object Protective Structures and in accordance with the manufacturer's repair instructions.

A Rear view of operator's cab

(1) Door handle

(2) Door latch (with door fully opened)

(3) Door locking pin, engages into latch (2) when the cab door is fully opened.

REMARKS: Lock the door in open position by engaging latch (2) into locking pin (3).

⚠ CAUTION

KEEP DOOR CLOSED DURING OPERATION!

If the door is open while the excavator is in operation, there is the danger that people or objects may fall out resulting in injuries.
Make sure the cab door is always closed when working with the excavator.

(4) Light switch for access area lighting

(5) Light switch for interior cab lighting

(6) Air conditioner door

(7) Outside mirrors with integrated heaters, both mirrors are adjusted electrically via a control switch on the instrument panel. More information can be found on page 3-147

(8) Main working lights

(9) Adapter for warning Beacon

B Front View of Operator's Cab

(10) Release lever for door lock (2 - 3)

(11) Door opener push button

(12) Lock lever, more information can be found on page 3-130 f

(13) Control levers for working attachment, more information can be found on page 3-138

(14) Operator's seat, more information can be found on page 3-135

(15) Windshield wiper

3.3.1.1 HYDRAULIC CONTROL SYSTEM

See Fig. 3-100

NOTICE

The control pattern shown on the next page is set as standard ex-works (Euro). Variations may exist. Please check and confirm if the control pattern is implemented on your machine.

REMARKS: For more information → "WORKING WITH THE ATTACHMENT" on page 233.

⚠ WARNING

OPERATE SAFELY!

Wrong or incorrect operation of the controls can lead to serious injury or death.
Always be aware of potential hazards before and during activation of the control levers.
Before starting the engine, make sure you know the location and function of each control.
Always sit in the operator's seat when operating this machine.
Observe the safety Instructions on on page 2-1.

3.3.1.2 SAFETY CIRCUIT FOR CONTROLS

(Pilot control system cut-out and actuation of hydraulic slew parking brake)

This system is controlled through the operator's seat, the hydraulic access/ingress stairways and the service arm of the refilling system, if so equipped. It prevents movements of the excavator and its attachment as long as the Operator is not sitting in his seat and/or the access/ingress stairway is in the lowered position or when the service arm of the service center is in its lowered position.

NOTICE

If the excavator responds in an unexpected manner, release all control levers and pedals and strike the emergency shut-off button

3.3.3.1 SWITCH BOARD

Legend for Fig. 3-105

(1) Key operated main switch

NOTICE

After switching OFF main switch (1), wait before the green lamp near to the battery main switches goes out before switching OFF the battery main switches. Komtrax Plus needs this period for saving data. The system operation lamp of the battery main switches lights green during this saving period. If batteries are switched OFF before this time period is over, data will be lost. Switch the battery main switches only OFF when the system operation lamp is OFF.

(2) High level alarm: **Automatic engine shutdown**.
The high level alarm (2) will sound approximately 10 seconds before an automatic engine shutdown occurs and will continue to sound during the 10 second period. At the same time a blinking message
SHUTDOWN will be displayed on the Komtrax Plus monitor.
REMARKS: Use the time period to move the machine to a safe place and lower the attachment to the ground. Inform service about the shutdown condition.

(3) Strike button, emergency shut down of both engines and pilot control system cut out.

NOTICE

In cases of emergency, push in this button to stop both engines and to cut out the pilot control circuit.
DO NOT use for normal stopping procedure.

To releasing the switch, turn and pull-up the strike button.

(4) WARNING lamp (Yellow) of front engine 1. This lamp is used to monitor engine out-of-range condition, in case the Komtrax Plus monitor fails to function. When this lamp illuminates, the engine can still be operated until end of shift, but it can lose some system features which sometimes results in power loss (de-rated condition). Inform Komatsu service about the engine problem.

(5) STOP lamp (Red) of front engine 1. This lamp is used to monitor engine out-of-range condition, in case the Komtrax Plus Monitor fails to function. When this lamp illuminates, stop the engine operation in a safe manner immediately.

(6) Rotary switch FRONT Engine 1 START

(7) Rotary switch FRONT Engine 1 STOP

Legend for Fig. 3-110

(1) Monitor screen displays the condition of the machine, the maintenance status, and messages for the operator and maintenance engineer.

(2) Function key group for changing the screen and for settings in the user menu,

(3) Key pad for entering data and Personal Identification Number (PIN)

(4) Main key switch on dashboard

(5) Opening message

(6) Acknowledgment button for opening messages

3.4.1 SEQUENCE OF DISPLAYS

When the main key switch (4), Fig. 3-110 is turned ON, the initialization screen (KOMATSU logo) Fig. 3-111 is displayed for approx. 3 seconds.

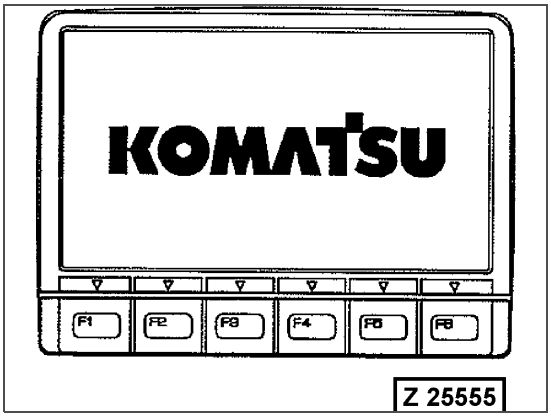

Fig. 3-111

3.4.2 OPENING SCREEN

The second display, see no. (5) in Fig. 3-110, is of general information for the operator.
Press function key (6) to acknowledge this message, the display will change to the Main gage Screen 1, see Fig. 3-112 on on page 3-160.

3.4.8 SETTINGS FOR OPERATOR

The user menu settings for operator can be selected from the main gage screens 1, 2 or 3 by pressing the button F6.

Main Screen Settings for Operator, Fig. 3-119

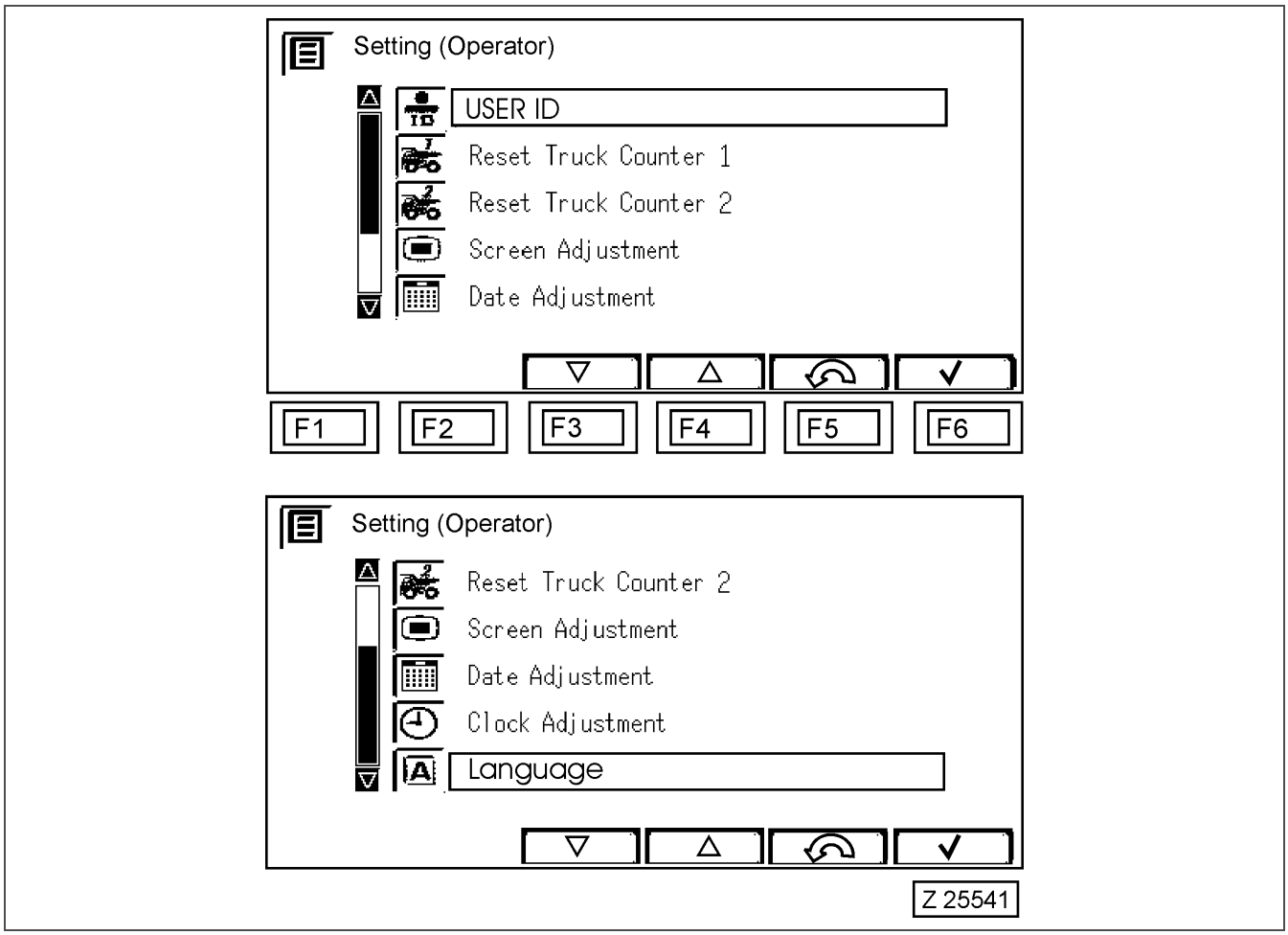

Fig. 3-119

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 gage screen 1.

The setting screens on the following pages appear in the same sequence as shown in the main setting screen.

3.5.2 DISPLAY ON OPERATOR'S CONSOLE

Legend for Fig. 3-130

1. Amber LED. Visual indication. Lights up as a warning of an error
2. Red LED. Visual indication. Lights up and shuts down the machine when an error occurs
3. Display
4. Enter key. Confirm selection or hide/view an active fault code.
5. Right arrow key. Scroll the screen and move the selection to the right or downwards
6. Left arrow key. Scroll the screen and move the selection to the left or upwards
7. Menu key. Enter or exit menu screen.

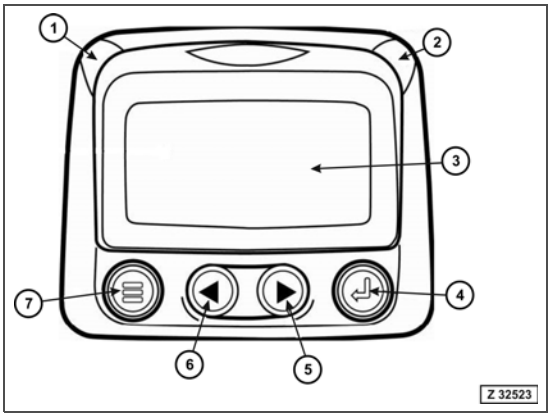

Fig. 3-130

REMARKS: For further operating instructions, please refer to the manual filed in the binder volume 2.

3.5.2.1 ENGINE AFTER-TREATMENT

In circumstance were the engine runs without load, the catalytic filter needs to be cleaned (desorbed). The maintenance functions automatically. Conditions are:-

– The lock lever in the operators cabin must be in the park position (lever raised). See "LEAVING OPERATOR'S SEAT WITH LOCK" on page 31.
– There must be enough fuel.
– The exhaust temperature is below internal limit and the controller requests cleaning the catalytic filter (desorb).

⚠ CAUTION

During filter cleaning (desorbtion), the revolution (RPM) of the engine will increase and the pumps have higher volume. This is noted by a change in sound.

NOTICE

If these conditions are not made, the display gives a warning and the engines capacity is reduced. After the third warning, an engineer from the engine manufacture has to reset the system to get the engine working normally again.

3.7.3 AUXILIARY HEATER FOR OPERATOR'S CAB

Special Equipment

The auxiliary cab heater is mounted on wall (2) inside the machinery house. View -X- shows the arrangement of components and the flow of water, fuel and air.

Legend for Fig. 3-135

(1) Fuel tank

(2) Machinery house wall

(3) Heater unit HYDRONIC 10, refer to the separate operation manual HYDRONIC 10 for all operating and maintenance instructions. The manual is filed in volume 2 binder.

(4) Water supply line from engine to cab heater

(5) Water return line from cab

(6) Valve block with thermostatic function

(7) Water line to auxiliary heater

(8) Hot water line from auxiliary heater to cab heater

(9) Fuel shut off-cock for fuel supply to heater (3)

(10) Fuel strainer

(11) Fuel supply line

(12) Fuel dosing pump

(13) Combustion air intake line

(14) Exhaust muffler

(15) Engine

(16) Cab heater

Operation

To activate the heater (3), open fuel shut off-cock (9). Select the desired heating stage with the control module (5) shown on on page 3-157.

Water flow of auxiliary heater, detail -Y-

– Water temperature below 67°C: Flow from A to B and from E to D. Port C closed.
– Water temperature above 67°C: Flow from A to B and from E to D. Port C slightly opened.
– Water and engine at operating temperature: Flow from C to B and from E to D. Port A closed.

During the warm season the fuel shut-off cock (9) should be closed.

3.9.1 STANDARD COMPONENTS IN CAB BASE

REMARKS: On excavators equipped with electrical preheating systems there are additional components in the cab base.

⚠ DANGER

HIGH VOLTAGE!

The cab base may contain high tension electrical appliances. Access to the cab base for authorized service staff only.

DO NOT touch cables and their terminals and connected components. Always contact authorized electricians having the permission to work on medium and high voltage systems.

Legend for Fig. 3-140

(1) Cabin base

(2) Entrance door to cab cabin base.

(3) Service Monitor

(4) KomVision controller

(5) Komtrax controller

(6) Low voltage switch cabinet

3.10.1 HYDRAULIC SYSTEM - CHECK OIL LEVEL

General Information

The hydraulic oil level in the main oil reservoir fluctuates depending on the oil temperature and the position of the loader attachment (hydraulic cylinders retracted / extended).

Legend for Fig. 3-145

(1) Main hydraulic oil reservoir

(2) Hydraulic oil level sight gage

(3) Oil level plate

(4) Oil filler plug

For checking the oil level lower the attachment (backhoe or bottom dump bucket) onto the ground in a position as shown on the oil level plate (3).

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).

Add hydraulic oil as necessary.

3.10.1.1 MACHINERY HOUSE DOORS

NOTICE

Make sure that all machinery house doors (1, Fig. 3-146) are securely closed before starting the engine and remain closed during operation of the excavator.

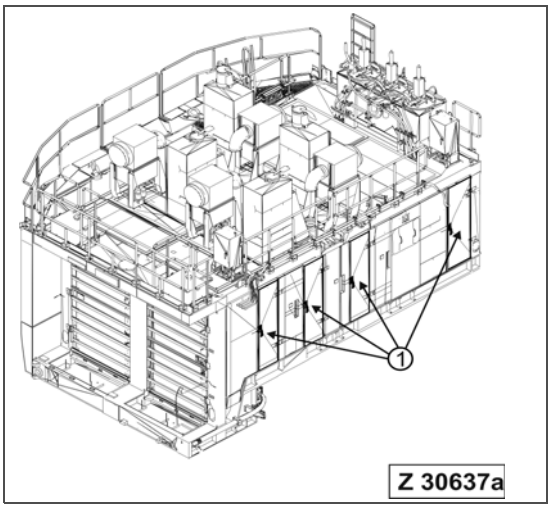

Fig. 3-146

3.10.1.2 OPERATOR'S SEAT ADJUSTMENT

Before operating the excavator adjust the seat and mirrors for operators maximum comfort, visibility, and complete control of the excavator.

REMARKS: Use seat belt in accordance with the local safety regulations and laws. More information on page 3-135.

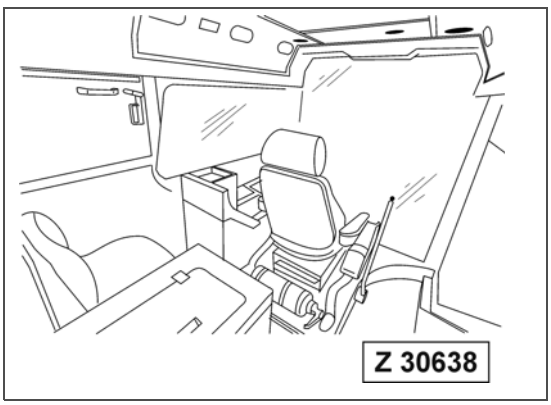

Fig. 3-147

After starting observe the following

The Komtrax Plus system monitors the excavator's functions and provides information about the appropriate operational data.

If a FAULT message is displayed on screen (3), the acoustic warning signal (12) will sound simultaneously for approximately 1 second. In such a case proceed according to the instructions of the displayed message.

Warning buzzer (12) will sound continuously when the hydraulic oil level is too low. In this case, stop the engine, locate and correct the cause immediately. Fill up hydraulic oil to the correct level.

NOTICE

DO NOT idle the engines for excessively long periods. Long periods of idling can damage the engine because combustion chamber temperature drop so low the fuel will not burn completely. Tis will cause carbon to clog the injector spray holes and piston rings and can cause the valves to stick.

Never let the engines run with disconnected batteries. This may cause alternator damage.

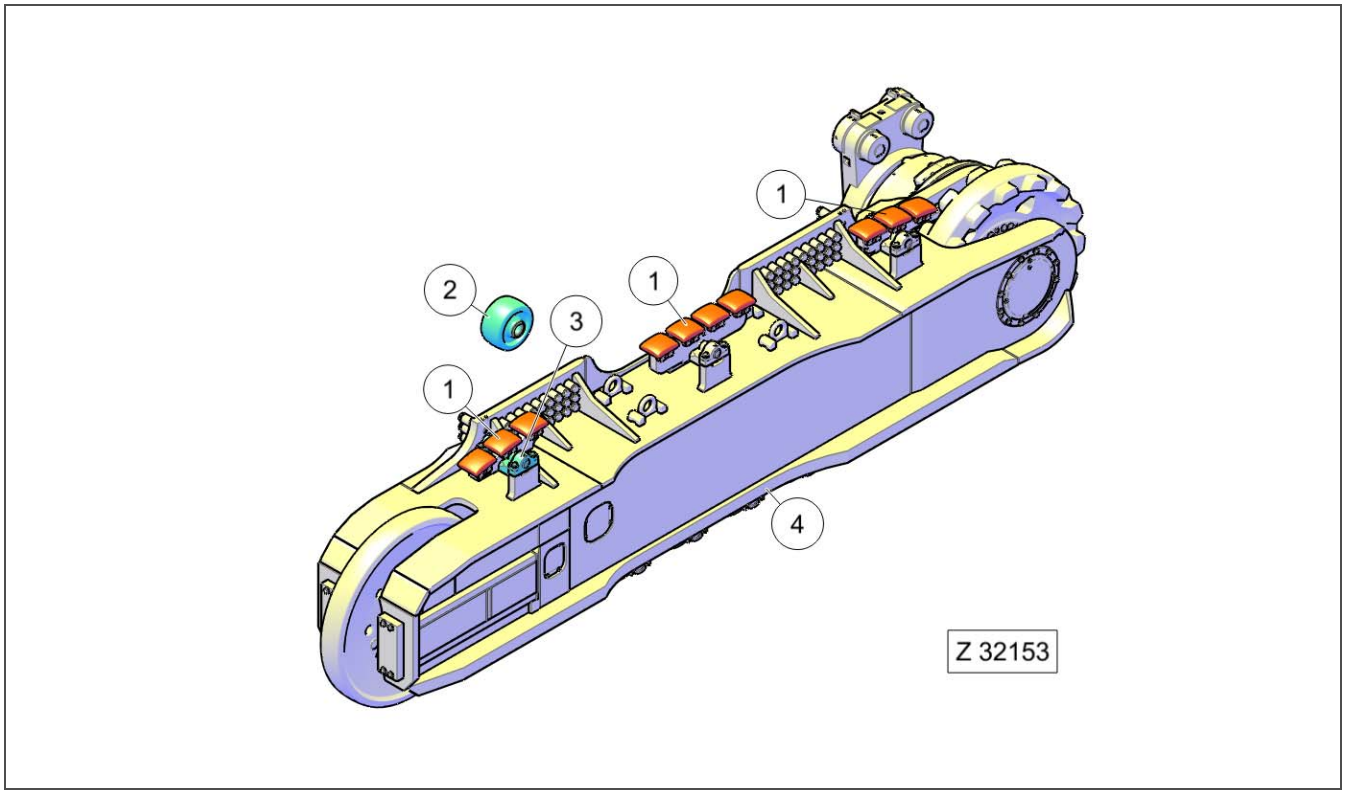

Fig. 3-158

Legend for Fig. 3-82

(1) Three sets of undercarriage sliders.

(2) Carrier roller

(3) Mounting point of roller or slider

(4) Left side undercarriage

There are three sets of sliders (1) and each set replaces a carrier roller (2) when and if they are changed over depending on the ambient temperature. The rollers or sliders are attached to the mounting points (3) on the undercarriage (4)

Unscrew the slider retaining bolts in order to change a slider element should there be evidence of excessive wear. Further information on page 4-397.

3.15.2 FURTHER OPERATING PRACTICES

DO NOT use the loader attachments to "sweep" an area in front of the excavator clean as this may result in severe damage on slew gear components.

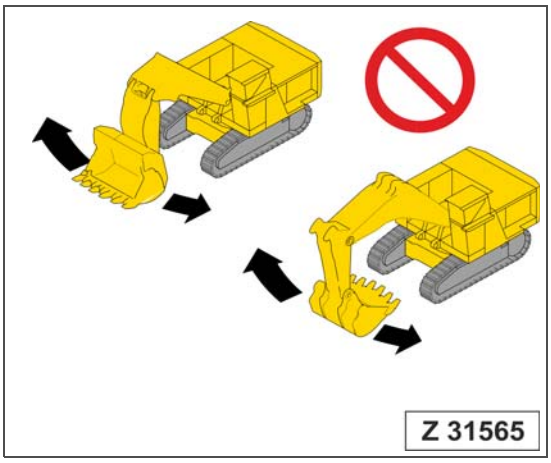

Fig. 3-171

DO NOT use the bucket clam for loosening or removing anchored rocks or other solid objects since such operations may result in severe damage to the clam pivot bearings.

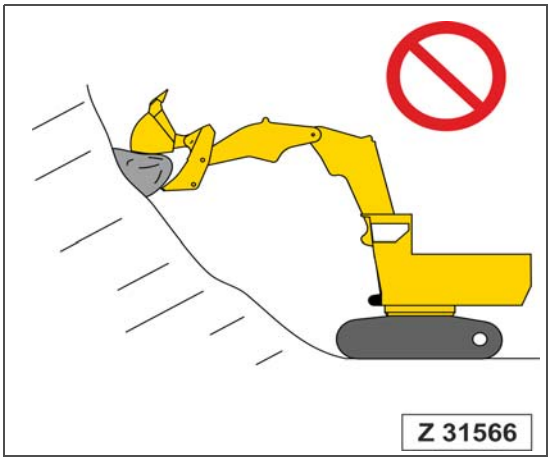

Fig. 3-172

When cleaning a facing slope, ensure the material is loose (blasted). If the slope is not loose, ensure that the excavator on the attachment does not scrape over protruding rocky outcrops which will cause the attachment to jerk downwards.

Do not hammer on to protruding material.

These actions will cause sever damage to the attachment components.

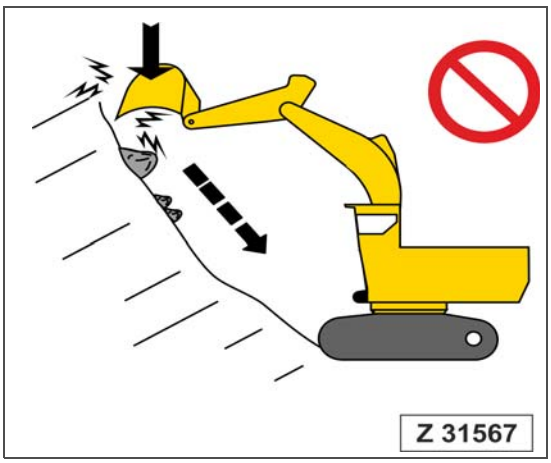

Fig. 3-173

3.17.1 RELIEVE PRESSURE IN THE HYDRAULIC SYSTEM

REMARKS: With the engines at standstill and main switch (1) in ON position, move all controls for working attachment and crawlers several times through all shift positions to relieve the pressure in the hydraulic system. The necessary oil pressure for shifting the spools of the main control valves is provided by a pressure accumulator in the pilot oil circuit.

The pressure accumulator in the pilot oil circuit serves also for lowering a raised working attachment to the ground with the engines at standstill. If, for example, the engines stall with the working attachment in a raised position, lowering of the working attachment is possible by operating the respective control lever.

6. Set main switch key (1) to ”0” position and remove.

NOTICE

After switching OFF main switch (1), wait before the green lamp near to the battery main switches goes out before switching OFF the battery main switches. Komtrax Plus needs this period for saving data. The system operation lamp of the battery main switches lights green during this saving period. If batteries are switched OFF before this time period is over, data will be lost. Switch the battery main switches only OFF when the system operation lamp is OFF.

7. Move lock lever (12) fully to the rear in LOCKED position.

8. Switch off the battery main switches and remove keys.

– C - Pumping the oil from the suction oil reservoir into the main oil reservoir

1. Close main valve (10).
2. Open valve (3), position ”0”.

REMARKS: In order to prevent build-up of a vacuum in the suction system, open at least two vent screws on the suction port of the main hydraulic pumps on both pump distributor gears. Refer to in the maintenance section for details.

3. Switch on pump with switch (4).
4. Observe oil level sight gage at the main oil reservoir. As soon as the oil level remains constant the suction reservoir is empty. Now switch off the transfer pump (5). When changing the hydraulic oil be sure to evacuate the main oil reservoir via the service panel connector simultaneously with the transfusion procedure to prevent overfilling of the main reservoir.
5. After completion of the maintenance job open main valve (10) and close valve (3).
6. Make sure the pump switch (4) is in ”OFF” position.
7. With the main shut-off valve (10) open, the suction oil reservoir will be filled with oil from the main oil reservoir. Open the vent screws on the suction port of all main hydraulic pumps to allow the air to escape from the suction oil reservoir.
8. When the suction oil reservoir is filled, vent all hydraulic pumps and check the oil level in the eight main pump housings.
9. Check oil level in the main reservoir. Fill up with new hydraulic oil as necessary.
10. Start the engines/motors and run for venting the suction system and hydraulic pumps.

NOTICE

DO NOT start the motors with the suction oil reservoir empty.

REMARKS: Refer also to the respective section in the Shop Manual and the Assembly Manual.

3.20.3.2 DRAINING PRODURE FOR DEF HOSES

(e.g. when ambient temperatures falls to -10°C and below.)

REMARKS: When the ambient temperature falls, the DEF hose, which is the hose that connects from the central refilling arm to the DEF tank, must be drained. This must be performed when the ambient temperature goes down to -10°C at its lowest in order to avoid a freezing of the DEF fluid in the hose.

Legend for Fig. 3-196

(1) Refueling arm

(2) DEF connector on refueling arm

(3) DEF tank on roof of machine.

(4) DEF hose between DEF tank and refueling arm

(5) Stopper on breather element

(6) Breather element on tank

(7) Stop cock on DEF tank to activate breather and to turn off DEF flow from tank to refueling arm

(8) Sensor indication to tell when DEF tank is full.

NOTICE

Always wear PPE (Personal Protective Clothing) when draining See "WEAR WELL FITTING CLOTHES AND PROTECTIVE EQUIPMENT" on page 2-28 for more information.

1. Remove the plastic stopper (5) on the breather (6) of the DEF tank (3).
2. Open the stop cock (7) on the DEF tank.
3. Lower the refueling arm (1)
4. Use a separate hose with an appropriate connector and attach it to the DEF connector on refueling arm (2). the other end of the hose is to be placed in a receptacle of at least 10l size.
5. The hose between the DEF tank and the refueling arm (4) is emptied.

⚠ CAUTION

HANDLE DEF WITH CARE!

DEF can cause injury. Avoid direct contact of DEF with your eyes and with your skin. Do not inhale. In case of contact, flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Wash clothing before reuse and clean shoes thoroughly before reuse.

6. When hose is emptied, ensure that the dust cap on the DEF connector on service arm is cleaned and replaced.
7. Close the stop cock on the DEF tank (7) and replace the stopper (5).

REMARKS: On machines with two engines, there are two tanks on the roof but only one refueling point on the refueling arm as shown (2). The hose is separated in the refueling system and a sensor indication (8) on the DEF tank (3) shows when it is full. Machines with two engines have a larger hose (4) capacity.

3.21.2 INTERFACE CONTROL MODULE

Legend for Fig. 3-201

(1) Interface control module

(2) Battery compartment cover

(3) Red color coded detection receptacle for circuits #1 and # 2

(4) Blue color coded release circuit receptacle

(5) Yellow color coded relay circuit receptacle for relay circuits #1 and #2

(6) Green color coded auxiliary output circuit receptacle

(7) Green color coded power circuit receptacle

(8) Black color coded receptacle for display module cable

(9) Programming interface

(10) Battery well

The interface control module (ICM) includes system electronics and receptacles for system cables. The battery well (10) is covered (2) and protects the internal power supply, the mini USB port as well as the programming interface (9), See the Checkfire 210 operator's manual filed in the volume 2 binder in order to program the system using the program interface (9).

The cable connections to the Interface Control Module can be seen on page 3-274.

Excessive oil foaming	– Air in hydraulic system – Poor quality oil – Excessive by-passing of oil over relief valves – Pressure hoses badly twisted or kinked – Restricted oil flow due to foreign matter – Breather on the reservoir clogged. – Relief valve improperly adjusted

3.26.4 FINAL DRIVES AND SLEW GEAR

Noisy operation	– Incorrect lubricant or oil level too low – Bearings scored or damaged. – Sun gear teeth excessively worn or damaged – Bearings of planetary pinions worn

3.26.5 CRAWLER TRACKS

Excessive track wear	– Wrong track tension – Track roller loose or out of alignment – Track shoes loose – Track links stuck – Worn drive sprocket
Excessive wear on drive sprocket	– Wrong track tension – Track links (pins/bores) Excessively worn – Sprocket, rollers and guide wheel out of alignment

4.4 FILLING CAPACITIES

Unit or System	*Liter (approx.)*
Engines	
– Cooling system	
– Front engine	475.0
– Rear engine	475.0
– Engine oil	
– Front engine oil pan	290.0
– Front Engine reserve tank (refill)	750.0 (665.0)
– Rear engine oil pan	290.0
– Rear engine reserve tank (refill)	750.0 (665.0)
– Fuel tank	14000.0
Hydraulics	
– Hydraulic oil reservoir	8350.0
– Total hydraulic system	11500.0
– Main hydraulic pumps, drive shaft housing	1.5
Power take-off	
– Pump distributor gearbox, **type 2063**	140
– Pump distributor gearbox, **type 631650**	130
slew	
– slew gears **type 2063**	42.00
– Motor adapter housing	0.6
– slew gears **type 632770**	60.0
– Motor adapter housing	0.6 ***1**
– Brake housing	0.2
Travel	
– Travel gearbox, **type 2063**	390.0
– Travel gearbox, **type 631053**	380.0
– Motor adapter housings	0.5
NOTICE **The brakes of the travel gears are dry type multiple disc brakes. DO NOT fill the housings with oil**	
– Final drives, each:	250.0

4.6.4.5 EVERY 250 OPERATING HOURS OR MONTHLY

Service Point	Service	See
Air con compressor	Check drive belt tension	on page 4-377
Signal horn compressor	Lubricate	on page 4-379
Oil cooler fan bearings and Radiator fan bearings	Check for leakages and clean breather filters	on page 4-379
Automatic lube systems	Replace pump outlet grease filters	on page 4-539
Cab, air clean	Inspect	on page 4-383
Windshield washer reservoir	Check fluid level	on page 4-385
Air conditioning for operator's cab	Check refrigerant level	on page 4-387
Additional Air conditioning	Check refrigerant level	on page 4-389
Cabin heater filter	Inspection	on page 4-391
Engine	Maintenance	(1)
Eliminator filter	Maintenance check	(5)
Fire suppression system	Inspection	(2)

4.6.4.6 EVERY 500 OPERATING HOURS OR QUATERLY

Service Point	Service	See
Batteries	Check fluid level	on page 4-393
Automatic lubrication systems	Check grease injector pins for proper function (move in and out freely). Remove excess grease.	on page 4-394
slew circle	Check	on page 4-394
Sliders (optional equipment)	Change if worn	on page 4-395
Cylinder rod protection (if equipped)	Inspect.	on page 4-397
Pump drive shaft housings on the PTO gears	Check oil level	on page 4-399
Fuel tank	Drain condensation	on page 4-401
Crawler tracks	Inspection	on page 4-403
Engine, starter motors and alternator ground cables	Check for correct connection	on page 4-409
Engine, fuel filters (1 and 2 stage)	Change (do not pre-fill)	on page 4-409
Cab ground cable	Check for correct connection	on page 4-411
Access/ingress stairway emergency lowering	Check functionality	on page 4-413
Hydraulic oil	Oil sample and analysis	
Fire detection and actuation system	Maintenance	(2)

Extended Service Intervals for Engines equipped with Engine Oil Management System (Continued)

Reserve System Oil Flow, Fig. 4-208

(1) Reserve oil tank, integrated part of the RH main frame side member

(2) Suction line to reserve system oil filters

(3) Oil filter of the reserve system. Replace both filter elements after every 500 operating hours.

(5) Pumping unit

(8) Oil feed-back line to reserve tank (1)

(9) Union for suction line (2)

(10) Union for oil feed-back line (8)

(11) Union for oil refill line from service arm

(12) Oil level sight gage. Check oil level in the reserve tank before starting the engine. If necessary refill reserve tank via service arm adapter, refer to the instructions on on page 3-195 for more information.

(13) Union for reserve tank breather line connected to engine crankcase

(14) Oil drain plug

After 20 working hours, check the settings of the lubrication system and ensure all points of lubrication have a well balanced quantity of grease.

Fine Adjusting the Pause Time and Injectors

The amount of grease to be injected is dictated by the working environment and conditions. To fine adjust the injectors and the pause time, proceed as follows:

1. Find the lubrication point (bearing seal or open bearing) with the lowest quantity of grease. This is the point of reference that will determine the following pause time setting.
2. If any of the bearing points have too much grease, adjust the injectors gradually to lower the volume. Do this by rotating the output adjusting screw (2) a maximum of 1-2 turns clockwise. Wait at least 40 hours and observe lubricated areas. Care must be taken while turning the screw (2) as turning too much will block the movement of the injector.

Reduce the quantity of grease by extending the pause time gradually, in steps of about 2-5 minutes, until only a small amount of fresh grease appears on the open bearing or bearing seal that is used as the reference point. Between each step, wait at least 40 hours while observing the lubricated areas daily.

NOTICE

Always operate the excavator with a sufficient amount and the recommended type of grease. If there is too little grease or the wrong type, correct this immediately.

There are two types of grease injectors installed “SL1” and “SL11” injectors, see Fig. 4-213.

4.9.2 ATTACHMENT (CLS 1)- CHECK GREASE INJECTORS AND GREASE CONNECTIONS

Legend for Fig. 4-213

A	Injectors on bucket	(3)	Protection cap
B	Injectors on stick	(4)	Grease fitting
C	Injectors on boom	(5)	Distributor ledge, stick
(1)	Indicator stem for visual indication of injector operation	(6)	Boom
(2)	Output adjusting screw	(7)	Distributor ledge, boom

REMARKS: See on page 4-394 for information on inspecting and maintaining the grease injectors.

4.10.1 ENGINE AIR CLEANER MAINTENANCE

Legend for Fig. 4-221

(1) Engine air cleaner
(2) Wing nut
(3) Gasket
(4) Lock (snap) ring
(5) Main filter element
(6) Clean indicator
(7) Safety filter element
(8) Bolt

NOTICE

Before servicing the filter elements clean dust cups of the precleaners.

Servicing the main filter elements, Fig. 4-221:

NOTICE

Never service air cleaner while engine is running.
Replace main filter elements as soon as the fault message “Air cleaner element restricted” is displayed on the Komtrax Plus screen.
Replace inner and outer elements after 6 cleanings or annually, whichever occurs first.

1. Remove elements in sequence of reference numbers (2 to 5).
2. Clean and check respectively. replace main filter element (5).
   Wipe out cyclone filter housing if necessary.

NOTICE

The change intervals are mandatory for the engine life time.

Always use OEM recommended parts

4.11.1 WALK - AROUND INSPECTION

⚠ WARNING

CARE BEFORE MAINTENANCE!

Before carrying out any maintenance on this excavator, make sure the mounting ladder, handrails and walkways are properly installed and in good condition. Keep the stairway, steps, ladders, handrails and walkways free of mud, oil and grease.

Always use the stairway, handrails and steps to get on or off the excavator. Jumping on or off the excavator can cause an injury.

Legend for Fig. 4-227

(1) Working attachment. Check overall condition. Inspect for loose or missing securing parts.

(2) Hydraulic cylinders. Check cylinders, hydraulic hoses and fittings for leakage and damage.

(3) Check bucket teeth and shrouds for proper mounting. Inspect for loose or missing securing parts.

Check condition of the loader bucket. Both loader bucket versions, front shovel and backhoe bucket are equipped with wear protection packages as specified in the contract. These wear packages protect the base body of the bucket from premature wear and tear. Therefore it is important to check the condition of the wear protection elements regularly. Worn or damaged protection elements should be replaced at an early stage in order to prevent damage to the base body of the bucket.
In case the bucket base is already weakened, reconditioning measures will be necessary. Contact your Komatsu dealer for support.

NOTICE

The position for the attachments are shown here in the maintenance park position as illustrated on the plate attached to the hydraulic oil reservoir.

(4) Check guide wheels for wear and leakage

(5) Check carrier roller for wear and leakage

(6) Check track rollers for wear and leakage

NOTICE

If leakage is found on guide wheels or rollers inspect the floating seals of the respective unit, replace if necessary. Fill the unit with the correct gear lubricant.

(7) Check final drives and hydraulic motors for leakage. Check hydraulic hoses, hose lines and fittings for leakage and damage.

(8) Check slew circle toothing for adequate lubrication.

(9) Check slew gears and hydraulic motors for leakage. Check hydraulic hoses, hose lines and fittings for leakage and damage.

(10) Check condition, fastening and security of access/ingress stairway.

4.11.4 EXPANSION TANK OF RADIATORS- CHECK COOLANT LEVEL

Legend for Fig. 4-232

(1) Coolant expansion tanks of front and rear engine radiators

(2) Coolant level sight gage on front and rear coolant expansion tanks

(3) Radiator pressure caps

(4) Pressure relief button

⚠ WARNING

RISK OF SCALDING!

The radiator pressure cap (3), when removed, can cause serious burns due to escaping steam or spray. DO NOT remove the radiator pressure cap (9), Fig. 4-232 when the engine is hot. Wait until the temperature is below 50°C before removing the pressure cap (9). Press button in center of cap to allow the pressure to escape, then turn the cap until it is free to be removed.

The coolant level should be in the upper field of the sight gages (2). If necessary add coolant.

REMARKS: Refer to the engine Operation and Maintenance Manual for the correct coolant composition.Komatsu coolant AF-NAC may be used.

4.11.5 TRACK GROUPS - REMOVE DIRT

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Fig. 4-232.

Remove dirt from track group.

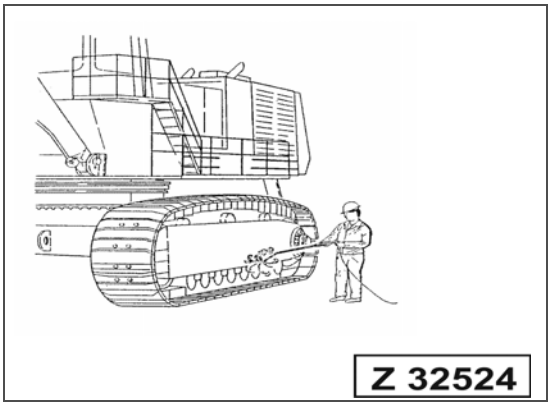

Fig. 4-233

4.12.3 FINAL DRIVE HOUSINGS - CHECK OIL LEVEL

Legend for Fig. 4-239

(1) Protection hood

(2) Mounting bolt

(3) Oil level gage

(4) Oil filler plug

(5) Breather filter

(6) Drain plug

Check final drive oil level:

1. Remove protection hood (1).
2. Remove oil level gage (3) and wipe it clean. Screw in the gage and remove again. Oil level should be at the upper mark of gage (3).
3. If necessary add oil through filler opening (4).
4. Remove breather filter (5). Blow out with compressed air from inside to outside and reinstall.
5. Install protection hood (1) and tighten bolt (2).

4.13.2 SIGNAL HORN COMPRESSOR - LUBRICATE

See Fig. 4-244

The compressor (1) is located in the cab base. Fill 4 to 6 drops of thin oil into the lubricator .
The oil must be free from resin and acid and must have the lowest solidifying-point possible (below - 40° C).

If the excavator is equipped with a second signal horn there is also a second compressor which has to be lubricated in the same way as the first one.

4.13.7 ADDITIONAL AIR CONDITIONING FOR OPERATOR'S CAB - CHECK REFRIGERANT LEVEL

(If equipped, illustration shows a generic view)

Legend for Fig. 4-249

(1) Additional air conditioner unit location on cab

(2) Air conditioner unit

(3) Sight glass for checking refrigerant filling

(4) Shut-off valve on dryer cartridge

(5) Dryer cartridge

(6) Refrigerant collector reservoir

(7) Condenser

(8) Condenser blower

Checking the refrigerant level:

Switch on air conditioning equipment and run at maximum capacity for approx. 5 minutes.
Observe inspection glass (3). A refrigerant flow loaded with bubbles or foam indicates a lack of refrigerant. In this case well equipped refrigeration specialists must check the circuit for tightness and must add the missing quantity or refrigerant. If more than 200 grams per year are lost, the oil level of the refrigerant compressor must also be checked. This is a special procedure and must be carried out by refrigeration specialists only. Isolated small bubbles in the inspection glass may be neglected.
Even with an absolutely tight equipment a certain amount of refrigerant is lost through the walls of the hoses. Therefore a small annual replenishment of the refrigerant quantity is normal.
The dryer cartridge (5) must be replaced after every 1000 operating hours or once a year by refrigeration specialists.

Clean all filter mats.

REMARKS: Servicing of the air conditioning systems is restricted to workshops especially equipped for this purpose.

4.14.3 DRIVE SHAFT HOUSINGS ON PTO GEARS - CHECK OIL LEVEL

Check oil level in all main- and fan pump drive shaft housings.

Legend for Fig. 4-257

(1) One main pump

(2) PTO

(3) Drive shaft on pump

(4) Hollow shaft that connects pump to the PTO gearbox

(5) Drive shaft housing on PTO of one pump

(6) Oil filler plug

(7) Breather pipe

(8 Oil level plug

(9) Oil drain plug

(A) View showing position of breather pipe on upper drive shaft housing

(B) View showing position of breather pipe on lower drive shaft housing

REMARKS: The position of the filler plugs and the breather pipes can be interchanged to help in easier access to them

Check Oil Level in Drive Shaft Housings

The oil level should be at the lower edge of level plug opening (8). Remove filler plug (6) and add gear oil through the filler opening up to the level opening (8).
Re-install plugs (6 and 8) and tighten securely.
If pump removal becomes necessary, drain the drive shaft housing oil by removing drain plug (9). Be sure to fill the drive shaft housing up to the filler opening (8) after mounting of the pump.

NOTICE

If oil starts coming out at one of the breather pipes (7), the oil seal ring of the respective pump drive shaft must be checked and replaced if necessary.Check the viscosity of the oil and the oil level.
SAE 10 or a HLP32 is to be used and not gear oil.

4.14.6 GROUND CABLES OF ENGINE, STARTER MOTORS AND ALTERNATOR - CHECK FOR CORRECT CONNECTION

Legend for Fig. 4-262

(A) Lower starter motor

(B) LH member of engine carrier frame

(C) Engine oil pan

(D) Alternator seen from flywheel end

(E) RH member of engine carrier frame

(1) Ground cable from lower starter motor (A) to LH member of engine carrier frame (B)

(2) Ground cable from LH member of engine carrier frame (B) to engine oil pan (C)

(3) Ground cable from alternator (D) to RH member of engine carrier frame (E)

(4) Identification plate (GND) for ground cables

(5) Typical ground cable

Check ground cables

1. Remove both battery main switch keys.
2. Check cables (1, 2 and 3) for good condition and secure fastening. Check also the ground cable connecting the lower and upper starter motor.

⚠ WARNING

GROUND CABLES!

Loose or missing ground cables can cause engine failure, fire, serious injury or death.

Be sure to replace any worn or damaged cable or fastening part without delay.

Critical Bolt Connections (continued)

4.15.1.3 CHECK CONDITION AND FASTENING OF ALL THREE SLEW GEARS (01) AND SLEW MOTORS (02),

Fig. 4-267

Reference No.:	Bolt size mm	Grade	SW * mm	Tightening torque Nm	Qty. **
(8)	M 16	10.9	24	265	24
(25) Socket head cap bolts	M 24	12.9	19	1030	102

* SW = Wrench size

** Quantity for all three slew gears

After checking and re-tightening of slew gear mounting bolts (25), attach protection caps (26) onto the bolt heads.

4.15.6 HIGH PRESSURE FILTERS

High Pressure Filters Fig. 4-272

REMARKS: The high pressure filter numbers (6 - 13) correspond to the numbering of the main pumps.

If a main pump fails, heavy contamination is seen in the filters. These filters should be checked and changed if necessary.

Legend for Fig. 4-272.

(1)	Control block I	(11)	High pressure filter for pump 3
(2)	Control block II	(12)	High pressure filter for pump 8
(3)	Control block III	(13)	High pressure filter for pump 4
(4)	Control block IV	(14)	Head of high pressure filter
(5)	High pressure filter	(15)	Seal ring
(6)	High pressure filter for pump 1	(16)	Filter element
(7)	High pressure filter for pump 5	(17)	Pressure spring
(8)	High pressure filter for pump 2	(18)	Seal ring
(9)	High pressure filter for pump 6	(19)	Support ring
(10)	High pressure filter for pump 7	(20)	Filter housing

1. Place working attachment on the ground and shut-off the engines. See “PARKING THE EXCAVATOR” on page 244.for further information
   Relieve pressure in the hydraulic system with several movements of the control levers. (System must be depressurized.)
2. Check the outside of the filter elements for obvious signs of damage. Clean where necessary. (A handy tip is to mark the body of filter case and filter head with a marking line to help with ease during a visual check)
3. Place a suitable container below the screen in order to collect outflowing oil. Dispose of oil according to local safety regulations.
4. Unscrew the filter case (20) and remove the filter element (16). Place on clean surface. Check for wear elements. If none, or only minor wear elements are present, clean the filter with appropriate cleaning agents. If major contaminating wear elements are present, an investigation must take place of the corresponding pump as shown in the above legend and the filter must be replaced together with all seals and gaskets.
5. Reassemble the filter unit in reverse order of the above using fresh seals and gaskets.

4.15.7 PTO'S (PUMP DISTRIBUTOR GEARS), SLEW GEARS AND TRAVEL GEARS - OIL SAMPLE ANALYSIS

The oil sample analysis gives information about the grade of contamination and aging of the gear oils. Refer to the separate manual 'Oil Analysis and Condition Monitoring' filed in the volume 2 binder for limits of contamination.

4.15.7.1 OIL PLUGS TO TAKE SAMPLES

Fig. 4-277

(1) PTO (Pump distributor gear)

(2) slew gears

(3) Travel gears (with final drive housing plug shown)

REMARKS: If the grade of contamination approaches to the "critical" values in the tables in Oil Condition Monitoring Manual, change the gear oil. However, the regular oil changes must be carried out every 3000 operating hours or once a year, whichever occurs first.

4.15.12 ALL OTHER HINGES AND AREAS TO LUBRICATE

Legend for Fig. 4-282

(1) Grease nipples as example

(2) Hinged areas as example

(3) Emergence escape ladder articulated joint

Every component that has a hinged area where it helps in the movement of that part must also be adequately lubricated with grease.

Most hinges have greasing points (nipples) to aid in lubrication.

Some components such as cylinders, have greasing points in order to lubricate the bearing

Where there are no grease nipples, adequate grease must be applied to the hinges to ensure clean and easy movement.

The emergency escape ladder has an articulated joint that must also be adequately lubricated.

Areas to lubricate are:

– certain hand rails that are also gates.
– certain catwalks, such as the battery covering
– machinery house and firewall doors
– the cover over the couplings that connects the engines to the pumps
– on the roof mounted air cleaners
– the area below the fuel tank
– the area below the hydraulic oil tank
– radiator doors and auxiliary radiator doors where they are present
– the door to the cab support and the high voltage cabinet on electrically driven excavators
– certain electric cable retainers that have to be lifted
– the movable joint of the refueling arm
– the observation door to the slip ring unit on electrically driven excavators
– the door on the counterweight on excavators that are so equipped
– the escape hatch onto the roof on excavators that are so equipped
– the fuel filter door on the fuel tank on excavators that are so equipped

4.16.1.2 HYDRAULIC SYSTEM - REPLACE SUCTION STRAINER, FILLER SCREEN AND PULSATION DAMPER

Fig. 4-287

1. Replace suction strainer (6) of suction oil reservoir ”B”.

– Install new screen (6) with new gaskets (5 and 7).
– Install intermediate pipe (3).
– Install inspection cover (3a) with new gasket.
– Make sure compensator (8) is properly fitted.

2. Remove pulsation damper (13), located on the bottom flange of collector pipe (C). Install new pulsation damper (13) with new O-ring.

3. Make sure main shut-off valve (A) is completely open.

4. Replace filler screen (11):

– Remove cover (10). Take out screen (11) with gaskets (12) and discard.
– Install new screen (11) with gaskets (12).
– Install cover (10) with filler plug (9).

Replace strainer (17) of the hydraulic oil cooler circuit after major repairs on the hydraulic system and after every 6000 operating hours. Proceed as follows:

– Remove bolts (14 and 15).
– Remove pipe (18) with strainer (17).
– Take out strainer (17) from pipe (18) and discard.
– Discard gaskets (16 and 19).
– Insert new strainer (17) with new gaskets (16) into pipe (18).
– Install pipe (18) with new gasket (19) into return oil collector pipe (C). Use new self locking nuts and tighten bolts (14 and 15) securely.

5. Replace the eight suction strainers of the main pumps, see next page for more information.

4.16.2.3 EMERGENCY ESCAPE LADDER ON THE UPPER DECK AND MACHINERY HOUSE ESCAPE DOOR

NOTICE

The emergency escape ladders are safety relevant parts and must always be in perfect working order.

Legend to Fig. 4-291

(1) Emergency escape ladder from roof

(2) Emergency escape ladder from machinery house

– Check the condition of the entire emergency escape ladder (2).

4.17.1.2 SLEW GEARS, TYPE 632770

Legend for Fig. 4-297

(A) Position of oil level gage for checking the oil level in slew gear and motor adapter housing

(B) Position of oil level gage for checking the oil level in brake housing

(1) slew gear

(2) Brake housing

(3) Compensator oil tank for slew gear

(4) Oil level gage for slew gear

(5) Oil drain plug for motor adapter housing

(6) Oil level gage for motor adapter housing

(7) Breather filter for brake housing

(8) Oil level gage for brake housing

(9) Oil drain plug for brake housing

(10) Breather filter

(11) Drain coupling or evacuation nozzle for refueling (Wiggins) system

Slew Gears - Change Oil

1. Use adequate working platform for draining the oil. Place receptacles of sufficient capacity (approx. 100 liter) below each drain coupling (11). Attach drain hose (part of tool set) to drain coupling (11). Remove parts (4 and 10) to speed up draining.
2. Clean breather filter (10) with compressed air from inside to outside and re-install.
3. After the oil is completely drained, flush the gear with the regular gear oil.
4. Remove drain hose from coupling (11) and attach the protection cap onto the drain coupling.
5. Fill gear housing through filler opening up to the MAX mark on level gage (4) with fresh oil and re-install oil filler plug.

REMARKS: For checking the oil level insert the level gage (4) but DO NOT screw in, see detail (A).

6. After short operating period check oil level and housings for leaks.

FINAL DRIVE HOUSINGS - CHANGE OIL

See Fig. 4-302

1. Loosen mounting bolt (2) and remove hood (1).
2. Remove the filler plug (4).
3. Unscrew the breather filter (5).
4. Blow out the breather filter (5) with compressed air from the inside to outside and re-install.
5. Remove drain plug (6) and drain the lubricating oil.
6. After the oil is completely drained, install the cleaned drain plug (6) and tighten securely.
7. Fill in new oil up to the ”MAX” marking on oil level gage (3).
8. Clean the filler plug (4) and reinstall.
9. After short operating period check oil level and gear for leaks.

CRITICAL BOLT CONNECTIONS (CONTINUED)

4.17.5.3 CHECK CONDITION AND FASTENING OF ALL EMERGENCY ESCAPE LADDERS,

Legend for Fig. 4-306

(1) Escape from engine room on to the roof, see “Emergency escape from the Machinery house, engine area” on page 115 for more information.

(2) Escape from roof. See “EMERGENCY ESCAPE FROM THE ROOF” on page 118 for more information.

(3) Escape from pump area. See “Emergency escape from the Machinery house, Pump area” on page 117 for more information

(4) Escape from operator’s cabin. See “EMERGENCY ESCAPE FROM THE OPERATOR’S CABIN” on page 113 for more information.

– Make sure all emergency escape ladders are in place and in good condition.
– Replace defective parts without delay.

CRITICAL BOLT CONNECTIONS (CONTINUED)

4.17.5.7 POWER HOUSE ROOF

Fig. 4-311

– Check fastening and condition of power house roof segments (2) to carrier (1).
– Check sealing elements (3) between roof segments for correct seat and good condition.

Reference No.:	Bolt size mm	Grade	SW * mm	Tightening torque Nm	Qty.
(4)	M12	8.8	19	74	14
(5)	M12	8.8	19	74	39

* SW = Wrench size

Re-tighten loose mounting bolts and replace missing or damaged bolts.

CRITICAL BOLT CONNECTIONS (CONTINUED)

4.17.5.12 CHECK CONDITION AND FASTENING OF ROTARY JOINT

Legend for Fig. 4-316

Reference No.:	Bolt size mm	Grade	SW * mm	Tightening torque Nm	Qty.
(1)	M16	10.9	24	265	4
(2)	M24	8.8	36	620	8
(3)	M16	10.9	24	265	8

– Check tightening torque of mounting bolts as indicated in the illustration.

Retighten mounting bolts to their correct torque and replace missing or damaged bolts.

4.17.7 DEF (DIESEL EXHAUST FLUID) TANK - DRAIN

REMARKS: For cleaning purposes, the DEF tank has to be drained. The DEF tank has fluid inside which means starting the drain procedure.

Legend for Fig. 4-321

(1) Drain valve, accessible in the machinery house

⚠ CAUTION

HANDLE DEF WITH CARE!

DEF can cause injury. Avoid direct contact of DEF with your eyes and with your skin. Do not inhale. In case of contact, flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Wash clothing before reuse and clean shoes thoroughly before reuse.

1. Ensure that the excavator parks on a level ground and that the engine is stopped.
2. Wear Personal Protection Equipment (PPE)
3. Starting in the machinery house, run the drain hose in the area of the fuel pump downwards between the superstructure platform and the refilling arm. Place this hose into a suitable container (capacity 600 l, DEF compatible). Provide a stable place for this container.

⚠ CAUTION

HANDLE DEF WITH CARE!

Toxic gases may develop.
Never use an iron or aluminum container when disposing of DEF fluid, because toxic gas may develop and a chemical reaction may corrode the container. Use a container made of resin (PP, PE) or stainless steel when catching the draining DEF as waste liquid.

REMARKS: For information about the position of the fuel pump refer to section 4.8.3 on page 4-323.

4. Connect the adapter of the drain hose to the drain valve (1).

REMARKS: The drain hose with the adapter is delivered in the hose box of the excavator.

5. Drain the DEF tank until the DEF tank is empty.
6. Dispose of the DEF in a container according to the environmental rules of your country.

NOTICE

Remove spilled DEF on the excavator with water. Spilled DEF causes corrosion.

7. Continue with chapter "DEF (DIESEL EXHAUST FLUID) TANK - Replace SUCTION AND VENT FILTERS" on page 4-531.

4.18.1 AUTOMATIC LUBRICATION SYSTEMS - REPLACE PUMP OUTLET GREASE FILTERS

Legend for Fig. 4-326

(1) Grease container cover with pump unit

(2) Grease filter assy.

(3) Filter element

(4) O- ring

(5) Screw plug

NOTICE

Before servicing, stop the engines and remove ignition key in order to prevent operation of the system. Be sure to vent system pressure before removing plug (18).

The pump outlet filter serves to filter the grease pumped out of the grease barrel to the injector points on the CLS system and the SLS system. A blocked filter can disintegrate under pressure and damage the automatic lube system.

Service grease filter

1. Unscrew plug (5 Fig. 4-326), and remove o-ring (4).
2. Take out filter element (3). Replace with a new one.
3. Assemble all parts according to the illustration. Make sure all sealing surfaces are clean. Install plug screw (5) with new sealing ring (19) and tighten with a wrench.

NOTICE

In extremely humid and dusty environments or in cases of grease contamination as a result of poor usage of the grease station, the pump outlet grease filter change intervals may be shorter