Operation & Maintenance Manual

HYDRAULIC
MINING
EXCAVATOR

PC7000-11

SERIAL NUMBER 35014

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. 2-8.

- 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.

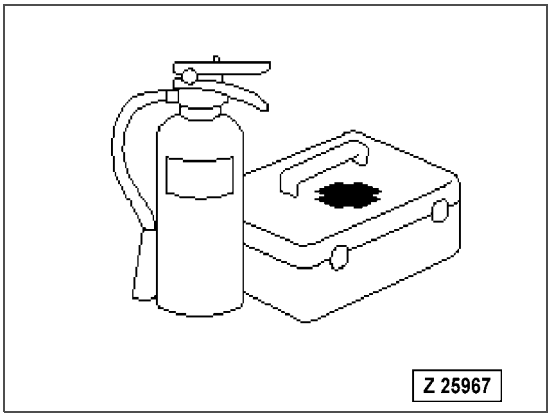


Fig. 2-8

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 gauges, 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. 2-9:

- 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.

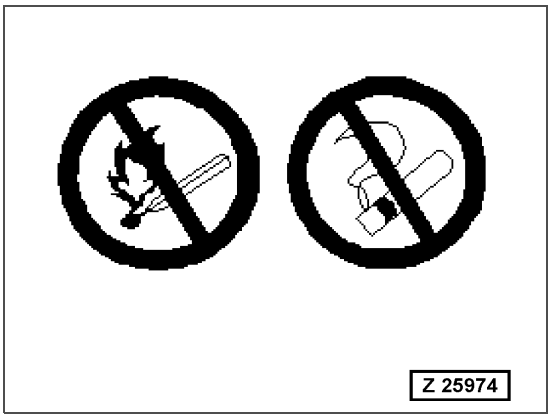


Fig. 2-9

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, A maximum of two people are allowed in the cabin and they must be sitting in appropriate seats. Stop working when the storm is close, lower the attachment to the ground and wait for the storm to pass.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 2-51. 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

2.5.3.2 HANDLING HIGH PRESSURES HOSES OR PIPES

– If oil or fuel leaks from high-pressure hoses, it may cause fire or defective operation, which may lead to serious injury or death. If any loose bolts are found, stop work and tighten to the specified torque. If any damaged hoses are found, stop operations immediately and contact your Komatsu distributor.

Replace the hose if any of the following problems are found.

– Damaged or leaking hydraulic fitting.
– Frayed or cut covering or exposed reinforcement wire layer.
– Covering swollen in places.
– Twisted or crushed movable portion.
– Foreign material embedded in covering.

2.5.3.3 REPLACEMENT OF HOSE LINES

Hydraulic hoses are subjected to natural aging. Hence, their usable lifetime is limited to maximum 6 years.

NOTICE

HYDRAULIC HOSE STORAGE!

The hydraulic hose lifetime can become porous.
The maximum permissible storage time of hydraulic hoses must be observed.

– This storage period is part of the usable lifetime and must be considered when installing a new hose line. If, for example, a hose line with a one year storage time is to be installed, the remaining service life of the hose line must be considered. All hose lines are marked with the date of production.
– Hose lines considered as Safety Critical Parts have to be replaced earlier. Refer to the chapter "Lubrication and Maintenance Schedule" in the MAINTENANCE section of the Operation and Maintenance Manual for further information.

All hydraulic hoses of the excavator have to be replaced when their service life has expired, even if there is no visible damage. Refer to the chapter "Lubrication and Maintenance Schedule" in the MAINTENANCE section of the Operation and Maintenance Manual for further information.

NOTICE

GENUINE PARTS!

Genuine parts are guaranteed.
Repairs on hydraulic hoses are not allowed. Use ONLY GENUINE Komatsu Germany replacement hose lines.

2.5.3.4 INSPECTION OF HOSE LINES

⚠ WARNING

FLUID UNDER HIGH PRESSURE!

The hydraulic system is always under internal pressure and can lead to serious injury when leaking.
When inspecting or replacing piping or hoses, always check that the pressure in the hydraulic circuit has been released.

Inspect all hoses, hose lines and fittings carefully during the course of the daily walk-around inspection. Check for leaks and damages. Beware of pinhole leakages. Replace damaged parts without delay.

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.

No entry to the machinery house while the motor is running
Fig. 2-59**.**
Part number **518 659 98**
Hot surfaces and rotating parts will cause injury.

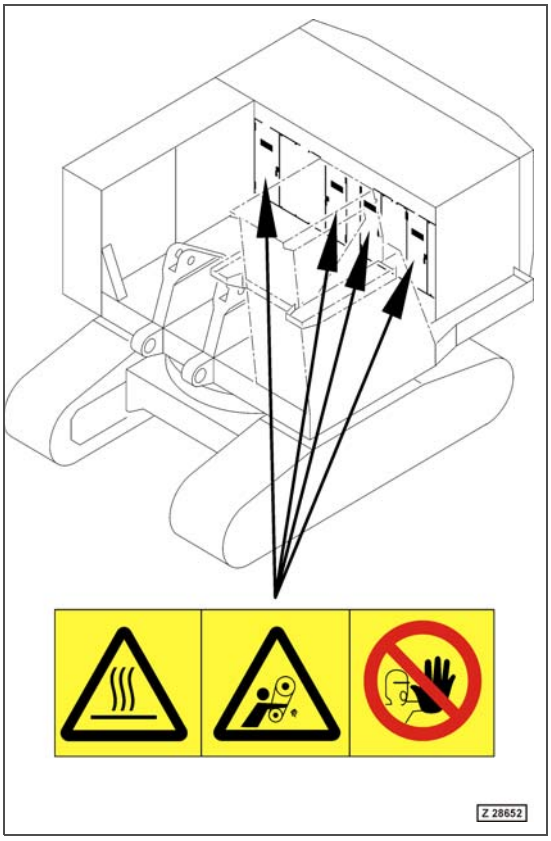


Fig. 2-59

Always wear a safety harness
Fig. 2-60
Part number **518 510 98**
Before accessing the boom, ensure that a safety harness is worn at all times. Refer to "SAFETY HARNESS IN CONFORMITY WITH EN 361 (EUROPEAN STANDARD)" on page 2-48.

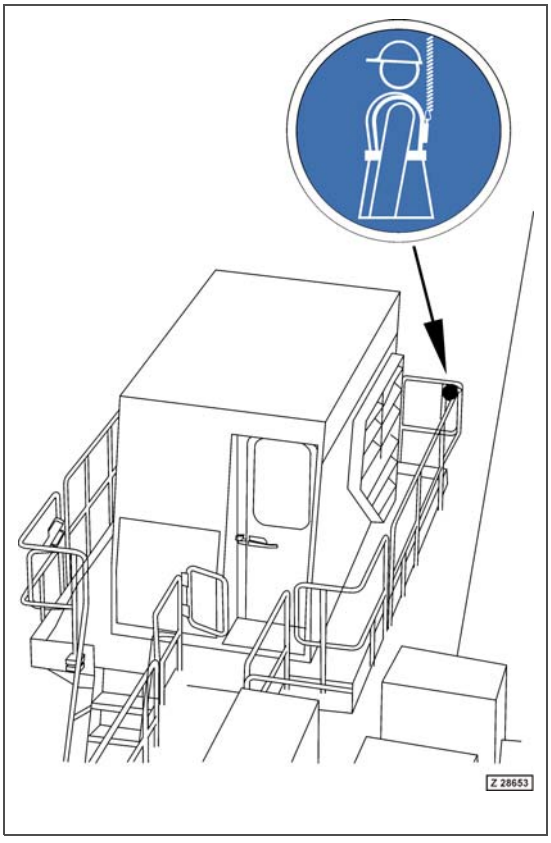


Fig. 2-60

Please continue reading on the next page.

Risk of explosion.

PC3400
Fig. 2-84
Part number **09659A057B**
Handling the accumulators.

1. Decal placed on the accumulators to show risk of explosion.
2. Accumulators in the pump area
3. Accumulators on the drain tank
4. Accumulators on the track tensioning system.
5. Accumulators on the control and filter plate
6. Accumulators on the emergence ladders (right side shown)
7. Accumulators on the track system

⚠ WARNING

RISK OF EXPLOSION!
The accumulators are charged with nitrogen and when mishandled can explode causing serious injury or death.
Never carry out welding, soldering or mechanical work on a charged accumulator vessel.
Before carry out work on the hydraulic systems, depressurize and secure against restarting.

Legend for Fig. 3-90

(1) Hydraulically operated access/egress stairway, see “HYDRAULICALLY OPERATED ACCESS/ EGRESS STAIRWAY” on page 114 for more information

(2) Lower deck

(3) Coolant radiator for front engine 2

(4) Coolant radiator for rear engine 1

(5) Rear diesel engine, designated as engine number 1 (the illustration shows the engine and pumps rotated 180°)

(6) Front diesel engine, designated as engine number 2 (the illustration shows the engine and pumps rotated 180°)

(7) Coupling for rear engine 1

(8) Coupling for front engine 2

(9) Rear PTO (pump distributor gear)

(10) Front PTO (pump distributor gear)

(11) Main hydraulic pumps for rear engine 1

(12) Main hydraulic pumps for front engine 2

(13) Grease containers on machinery house roof.

(14) Emergency escape ladder from machinery house roof

(15) Area of emergency escape ladder from engine compartment to machinery house.

(16) Exhaust muffler

(17) Engine air cleaner

(18) Main hydraulic oil reservoir

(19) Hydraulic oil cooler

(20) Control valves with high pressure in-line filters

(21) slew gears

(22) Emergency escape ladder from upper deck

(23) Cabin base

(24) Diesel fuel tank

(25) Operator’s cabin showing:-

Operator’s seat, see on page 3-137 for more information

Instrument panel, see on page 3-149 for more information

(26) DEF tanks

3.2.4.1 EMERGENCY ESCAPE FROM THE OPERATOR'S CABIN

Legend for Fig. 3-95

(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. Further information is found on page 3-135.

⚠ CAUTION

BEWARE OF GLASS!
Broken glass can cause injuries.
When escaping, remove the broken pieces of the glass fso 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. Information for location of the emergency escape hammer is on page 3-135. 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.

3.2.6.1 ENGINE SHUTDOWN SYSTEM ACTUATED FROM GROUND MAN (SPECIAL EQUIPMENT)

Legend for Fig. 3-100

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

(2) Komtrax Plus display on the instrument panel in the operator's cab. When a man on the ground pulls down one of the chains (1), both engines will be stopped and the following message **Engine shut down has been actuated from ground man** will appear.

NOTICE

Never stop the engines when excavator is fully loaded except in case 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.

3.2.6.2 OPERATOR WARNING SYSTEM (SPECIAL EQUIPMENT)

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

Legend for Fig. 3-100

(1) Actuating chains for emergency shut down of both engines.

(3) 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 engines will be stopped and the following message **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.

3.2.7.5 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 excavator 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 excavator. 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.
– There is significant bleaching due to ultra-violet sunlight exposure, has become stiff or leaves a powdery residue.

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, color 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.

REMARKS: 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. 3-110

(1) Monitor of the **machine monitor >Komtrax Plus<**

The monitor (1) displays the condition of the excavator, 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 on page 3-156 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 on page 3-182 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 excavator.
Secure the door in open position with the locking device provided.

Please continue reading on the next page.

3.4.5.3 MACHINE SETTING

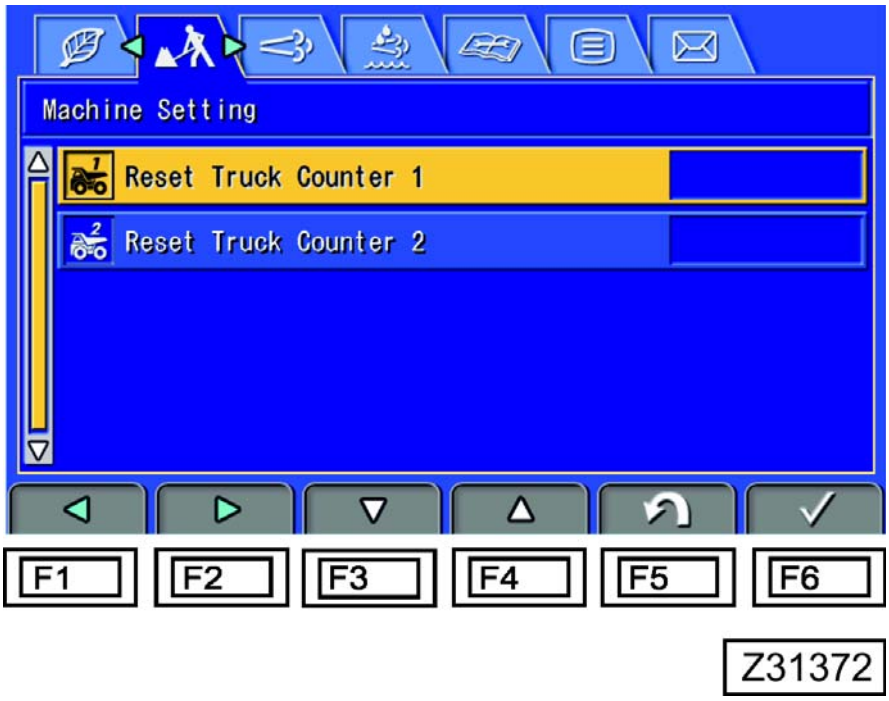


Fig. 3-123

Press button F3 to scroll down and F4 to scroll up in the menu. To display one of the items in the list scroll to it and press button F6. The buttons F1 and F2 scroll horizontally in the top menu, F1 to the left, F2 to the right. Push return button F5 to go back to the last displayed Main Gauge Screen.

3.4.5.4 RESET TRUCK COUNTER

Fig. 3-124

Confirm with F6, press F5 to quit without deletion.

Truck counter 2 is reset in the same way.

3.4.11 ACTION CODES

Action Code	Contents of Message
L01	After operation, perform inspection and maintenance. Please contact your KOMATSU distributor as needed.
L03	Stop the machine in a safe place and carry out inspection. Please contact your KOMATSU distributor.
L04	Stop the machine immediately and carry out the inspection. Please contact your KOMATSU distributor.

3.4.11.1 EXAMPLE OF ACTION CODE L01

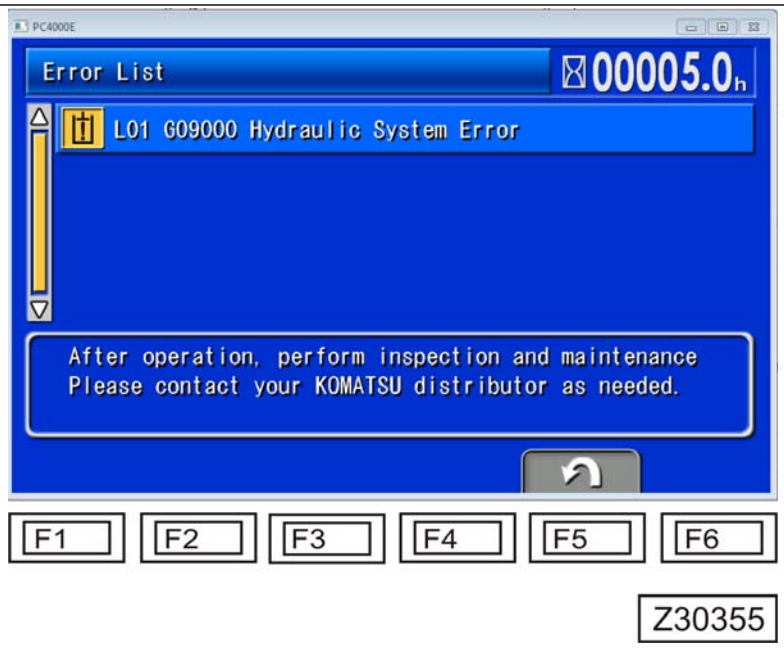


Fig. 3-135

3.6.6 CHECKS BEFORE OPERATION

⚠ WARNING

ENSURE PROPER FUNCTION!

Not carrying out daily checks of the KomVision system may result in defects that may cause a serious accident.

Always perform daily checks of the KomVision system

– Make sure there are no obstacles in the vicinity of the excavator.
– Make sure the checking area is big enough for the purpose.
– Make sure people do not approach the excavator.

Please continue reading on the next page.

⚠ WARNING

ENSURE THE AREA IS SAFE BEFORE STARTING THE ENGINES!
People in and around the machine are at risk of injury when the engines are started.
Before starting the engines, make sure that no one will be endangered.

Check the following items:

Legend for Fig. 3-155

(power unit viewed from operator's cab side)

(1) Radiator expansion tank with side level gage.

(2) Coolant expansion tank of front engine radiator

(3) Radiator pressure caps

(4) Coolant expansion tank of rear engine radiator

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

(6) Engine oil pan dipstick oil level gage

(7) Oil filler tube for engine oil pan

(8) Pressure relief button

Walk-around Inspection

Make a "Walk-around" inspection of the excavator. Refer to Maintenance Section 4. for the daily inspection items and the daily inspection sheets in the binder volume 2.

Check oil level in front and rear engine oil pans and in both reserve tanks

Check oil level with excavator standing on level ground. Check oil level in engine oil pan with the dipstick oil gage (1). For accurate readings, the oil level should not be checked until the oil has settled into the oil pan after the engine has been shut down (about 5 minutes).

REMARKS: The oil level in the engine oil pan can vary between the MIN and MAX marking on gage (1) depending on the operating condition of the reserve system when the engine was stopped.
With sufficient oil in the reserve tank and with the reserve system in proper working order, there is no need to fill the engine oil pan even with the oil level at the MIN mark on gage (1). If the oil level is below the MIN marking on the gage, corrective action must be taken. Fill the reserve tank and check the reserve system. The function of each reserve system is monitored by an indicator light located on the "X2" switch board in the cab base.

3.10.1.1 COLD WEATHER STARTING AT AMBIENT TEMPERATURES BELOW –25°C AND TO –40°C

NOTICE

When starting the engine at such extremely low temperatures, it is vital to proceed according to the following start-up procedure. The reliability of the excavator and equipment will be seriously impaired if the following procedure is not properly carried out. The hydraulic system should be filled with one of the specified hydraulic oils listed on page 4-302, "FLUIDS AND LUBRICANTS"

1. Record the Outside Ambient Temperature. If it is colder than –40°C, then
   DO NOT start the excavator and keep the electrical preheating systems activated.

2. If the Outside Ambient Temperature is between –40°C and –25°C, then check that the preheating systems are duly energized and that all the Heaters are functioning properly.

3. Let the preheating systems warm the hydraulic oil and the engine coolant up to a temperature of –25°C or warmer. These temperatures are indicated on the health monitor (3) .
   (With heaters properly functioning, these temperatures should never fall below –25°C).

3.1. If the preheating systems were not energized during the standstill period, the warm-up phase may last several hours, depending on the actual ambient temperature the excavator was exposed to, and the length of time the excavator stood still, until the minimum starting temperature of –25°C for the hydraulic oil and engine coolant is reached.

3.2. If the outside ambient temperature is below –40°C, warm up the entire excavator, using any safe means of heat generation such as hot air blower and/or any other appropriate means, before start-up, especially when the excavator has been shutdown for a long period, moreover when the preheating systems were not energized during the standstill period.

4. When the hydraulic oil and the engine coolant have been warmed-up to the minimum starting temperature of –25°C, switch off the engine coolant pre-heating systems. All other heating systems remain active.

REMARKS: If a different hydraulic oil with a different viscosity is in the system, the minimum starting temperature may change. Refer to the "Hydraulic Oil Viscosity and Temperature Chart" on page 3-225 for the permissible starting temperatures.

5. Start cranking the engine, up to three times.

6. Once the engine is started, keep it at low idle speed for five minutes, then shift engine to high idle speed in order to warm-up the engine for a long period, moreover when the preheating systems were not energized during the standstill period.

REMARKS: If the excavator is equipped with a Two Speed Range travel drive, always use the low speed range when traveling on a slope.
Never go downhill with fast speed range engaged.
The low travel speed range must also be used during cornering.

PARKING BRAKE

The excavator is equipped with spring loaded disk type parking brakes. These brakes engaging and releasing automatically. They are arranged between the hydraulic motors and travel gears. When the motor/engine is running the parking brakes are automatically released by pilot oil pressure. With the motor/engine at standstill the parking brakes are engaged.

3.11.1.1 TRAVEL ALARM / BACK-UP ALARM

(Special equipment)

The excavator can be equipped with one of the above alarm systems. The back-up alarm will sound at reverse travel. The travel alarm will sound at forward and reverse travel.

3.11.2 TRAVELING INSTRUCTIONS

- Never travel the excavator without first making certain that no one will be endangered.
- Be sure to sound the signal horn before starting to drive to make your intention clear.
- Before traveling long distances slew the superstructure parallel to the undercarriage and apply the slew brake.
- When traveling over inclines and gradients raise the working attachment only to such a height, that the bucket has sufficient ground clearance.
- Ensure that the cylinders are not completely retracted
- Do not travel cross-ways to slope.
- Whenever possible operate the excavator with the sprockets to the rear in the direction of travel.
- On steep terrain make sure that the final drives are at the rear in relation to travel direction.
- Before traveling over a bridge find out whether its bearing capacity is sufficient for the operating weight of the excavator.
- Check for sufficient clearance and use a spotter.
- Pay attention to high voltage lines. On rough terrain observe movement of the boom.
- Travel speed must conform to local conditions so that the excavator can be stopped at any time.
- Change traveling direction only after the excavator is stopped.
- In order to avoid damage to track rollers and links, never turn the undercarriage over ditches and troughs.
- When working attachment is removed, the reduced stability of the excavator has to be considered during traveling or slewing and when basic boom is operated. The stability can be improved, when the final drives are positioned opposite to counterweight.
- Observe permissible tilt angle of the diesel engine when traveling uphill or downhill (superstructure must be in line with the undercarriage). Refer to Engine Operation Manual for the respective data.

3.13 WORKING WITH THE ATTACHMENT

⚠ WARNING

INTERFERENCE TO THE ELECTRONIC CONTROL SYSTEM!

The interference of electromagnetic radiation can cause the excavator to respond in an unexpected manner which could lead to serious injury or death.
In the event of unexpected movement, release all control levers and pedals and strike the emergency shut-down button.

NOTICE

The control pattern shown below is set as standard ex-works. Variations may exist. Please check and confirm if the control pattern is implemented on your excavator.

Backhoe

LH control lever

- A - Extending stick
- B - Retracting stick

RH control lever

- C - Filling bucket (roll back)
- D - Emptying bucket (roll forward)
- E - Lifting boom
- F - Lowering boom

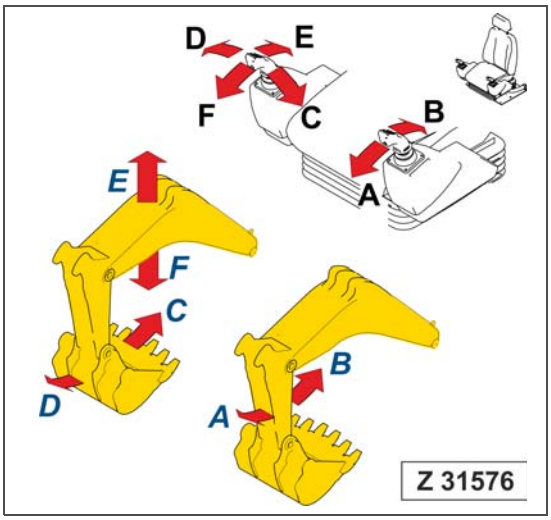


Fig. 3-174

Front shovel

LH control lever

- A - Extending stick
- B - Retracting stick

RH control lever

- C - Emptying bucket (roll back)
- D - Filling bucket (roll forward)
- E - Lifting boom
- F - Lowering boom

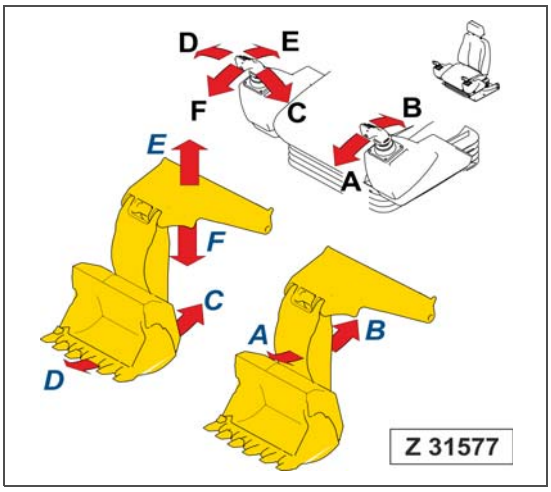


Fig. 3-175

3.14.3 LOADING TRUCKS

See Fig. 3-192

1. Position the truck as closely as possible to the excavator.
2. Do not slew the attachment over unprotected driver cabs.
   slew the attachment at a sufficient height over the loading platform
3. Always keep the excavator as close as possible to the work area. Short boom trips - high efficiency.
4. Distribute material evenly on loading platform.
   Do not overload the truck.
5. When turning into a pit, the rotating motion must not be stopped by the walls of the pit.
6. Only a bucket with a complete set of teeth and cutting edges in good condition ensures efficient performance. Correct bucket size and properly adjusted equipment prevents overloading and ensures maximum operating efficiency of the excavator.
7. Loosen hard material and rocks with the bucket, not with the stick crowding thrust.

3.17.2.2 SLEW CIRCLE LUBRICATION SYSTEM "SLS”

Repairs on the Slew circle Lubrication System (SLS) 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 (2), Fig. 3-200 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 (4).

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

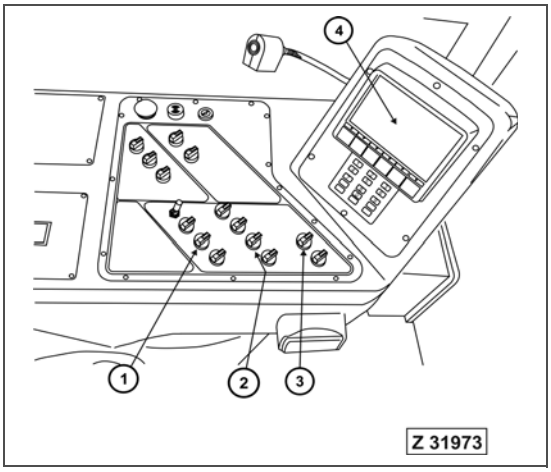


Fig. 3-200

3.17.2.3 ADJUSTMENTS OF THE SLEW CIRCLE 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.

3.17.2.4 DEFINING THE LUBRICATION SYSTEM GREASING AREAS

CLS 1 - Slew bearing, lower bearing of slew gearbox, Lower bearing of boom cylinder

CLS 2 - Attachments pins and bushings.

SLS - Open gear toothing of slew ring.

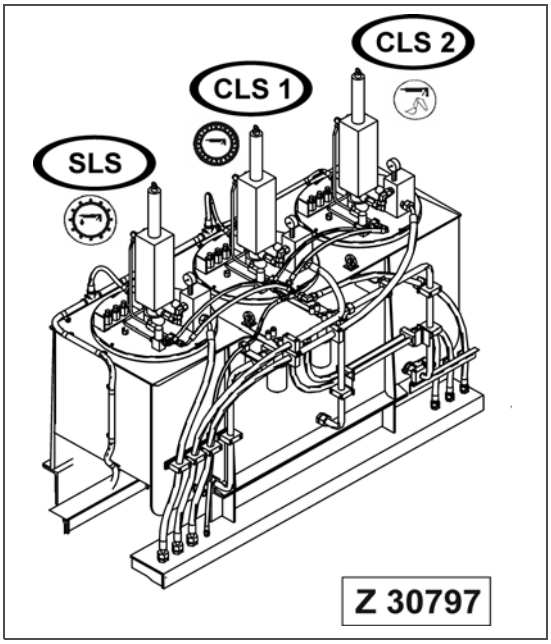


Fig. 3-201

3.19.2 OPERATING THE HYDRAULIC SERVICE ARM

REMARKS: With enabling switch (1) in ON position ”1” and/or service arm (5) not in fully lifted home position, the pilot control system is inoperative i.e. no excavator movement possible.

A - With Diesel Engines 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. 3-206 to ON position ”1”.
3. Activate switch on stairway (4) to lower service arm (5)
4. Release switch (4) when service arm (5) is in the fully lowered position.

REMARKS: Release the switch (4) when the service arm (5) is to be stopped in any position

5. Before leaving the excavator turn enabling switch (1) to OFF position ”0” and remove the main switch key.

B - With Diesel Engines Running

Control the service arm as follows:

1. Turn enabling switch (1 Fig. 3-206) to ON position ”1”.
2. To lower the service arm (5) activate switch (3) and hold until the service arm is fully lowered. To reverse the direction, turn switch to stop and turn again in opposite direction to raise.

NOTICE

When lowering the service arm, the superstructure must always be aligned parallel to the tracks. Do not lower the service arm when the superstructure is rotated through 90°.

3. To lift the service arm (5) turn switch (3) and hold until the service arm is completely lifted into its home position.

NOTICE

Be sure the service arm is completely lifted to its home position otherwise the safety sensor in the guide frame of the service arm will not release the pilot control system.

3.19.4 REFILLABLE GREASE CONTAINERS OF THE AUTOMATIC LUBRICATION SYSTEMS

Legend for Fig. 3-211

(1) Grease container for the superstructure lubricating system for slew connection bearing and boom cylinder foot bearings known as Central Lubrication System 1 (CLS 1)

(2) Grease container of the central lubrication system for the attachment known as Central Lubrication System 2 (CLS 2)

(3) Grease container of the slew circle pinion lubrication system known as (SLS)

(4) Grease filter for the grease container (1) of the superstructure lubrication system and for the grease container (2) of the loader attachment lubrication system . Before filling the grease containers, ensure the filter is not obstructed. Service the filter element according to the instructions in the maintenance manual.

(5) Grease filter for the grease container (3) of the slew ring gear lubrication system. Before filling the grease container make sure the filter is not obstructed. Service the filter element according to the instructions in the maintenance section.

(6) **Hydraulic motors with pump units.**

(7) Grease pressure gage

(8) Pump outlet control filter

(9) Level indicator, grease barrel empty

(10) Level indicator, preliminary warning that grease level is low in barrel

(11) Level indicator, grease barrel full

(12) Breather Filter

(13) Dipstick
before reinserting the dipstick, clean the insertion opening and ensure all areas are free of contamination

REMARKS: The grease containers (1 and 2) are linked together by an opening in the upper part of the containers for compensation of the grease level.

Refill the respective grease container, when the fault message ”Central lube system grease container on reserve” or ”slew circle lube system grease container on reserve” is displayed on the Komtrax Plus monitor.

NOTICE

The central lubrication system and the slew circle pinion lubrication system have to be filled with different types of grease. Select the correct greases according to the lubricant charts in volume 2.

As soon as a grease container is filled up to the correct level the corresponding indicator lamp (7, 7A or 8 Fig. 3-211) lights up and the signal horn sounds. In order to ensure proper operation of the lubrication systems carry out the periodic maintenance of the grease filters (4 and 5 Fig. 3-211). Refer to the maintenance section. Periodic inspection of the grease pumps (6) at least once a year is advisable. After finishing the refilling operation, cover the adapters with the protection caps provided. Carry out a test-run of the lubrication systems by actuating the switches on the instrument panel.

3.20.3 LOCATION OF THE EXTINGUISHING AGENT TANK ASSEMBLIES AND EXPELLANT GAS CARTRIDGES ON POWER HOUSE ROOF

Legend for Fig. 3-216

- A - Components of the dry chemical fire suppression system LT-A-101
- B - Components of the liquid agent fire suppression system LVS
(1) Extinguishing agent tank assembly of the dry chemical suppression system LT-A-101
(2) Name plate
(3) Fill cap
(4) Extinguishing agent tank assembly of the liquid agent fire suppression system LVS
(5) Relief valve
(6) Manual actuator switch at the radiator door
(7) Manual actuator switch at the rear power house post
(8) From automatic detection system
(9) Extinguishing agent outlet to nozzle
(10) Pressure switch for engine shutdown
(12) Mounting clamp
(15) Nitrogen expellant gas cartridge
(20) Pneumatic actuation line

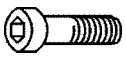
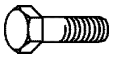
REMARKS: Check extinguishing agent tank assemblies (1 and 4) and expellant gas cartridges (15) for good condition and proper mounting.
Check filling level of Extinguishing agent tank assembly (1) of the dry chemical suppression system LT-A-101 according to the instructions in the separate Inspection and Maintenance manual LT-A-101 VEHICLE FIRE SUPPRESSION SYSTEM.
When checking the filling level, make sure the extinguishing powder is not compacted. Stir up the extinguishing powder with a suitable stick until it is in a free flowing condition.

4 MAINTENANCE

4.5 STANDARD TORQUE LIST

NOTICE

When using or replacing bolts, always ensure that the bolt is compatible to the component, is in no way damaged or faulty, and is a genuine Komatsu replacement part.

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

NOTICE

Threads and bolt heads for high strength bolt connections must be lubricated with a multi-purpose grease (MPG - without lubricating solids of the kind KP2K).
The contact surfaces of parts which should be screwed together have to be metallically blank and free of grease.

4.6.5 MAINTENANCE SCHEDULES OF FILTER ELEMENTS AND OTHER COMPONENTS

A - Hydraulic filters and screens/strainers/pulsation dampers.

REMARKS: Always replace the seal kits when exchanging or inspecting the filters and screens

Interval	Element	Action	Comments
1000 hrs	Return & leakage oil Filters	Replace elements	6 return oil filters 1 leakage oil, on page 4-457
1000 hrs	Hydraulic pressure Filters	Clean	PTO oil filters can not be cleaned and must be replaced, on page 4-466 for information.
1000 hrs without oil sample	High pressure Filter	Clean	Inspect elements for damage. If damaged - replace, on page 4-563
1000 hrs	Breather Filters	Replace elements	on page 4-461
1000 hrs	Return & leakage oil screen	Clean	6 return oil filters 1 leakage oil, on page 4-473
2000 hrs	Pulsation Damper	Replace together with O-ring	on page 4-485
2000 hrs with oil sample	High pressure Filter	Clean	Inspect elements for damage. If damaged - replace, on page 4-463 for information.
2000- 6000 hrs (*)	Suction strainer of suction oil reservoir	Replace together with gaskets	on page 4-493 for information
2000- 6000 hrs (*)	Suction Strainer of main hydraulic pumps	Replace together with gaskets	Replace with hydraulic oil change, on page 4-493
2000 - 6000 hrs (*)	Return oil strainer of oil cooler circuit	Replace together with gaskets	Also after major repairs, on page 4-493
6000 hrs	Hydraulic pressure Filters	Replace together with gaskets	PTO oil filters can not be cleaned and must be replaced,on page 4-466
6000 hrs	High pressure Filter	Replace together with gaskets	on page 4-563

(*) Replacement interval of the strainers depends on the hydraulic oil change interval which can, after a positive oil sample analysis result, be extended up to 6000 operating hours.

B - Grease Filters

Interval	Element	Action	Comments
250 hrs	Breather Filter	Clean	on page 4-405
6000 hrs	Pump outlet filter	Replace	on page 4-560

4.8.3 ENGINE FUEL FILTER LOCATIONS

The 7 micron first stage fuel filters for engine 1 and 2 are relocated on the fuel tank (3 and 4). The 3 micron second stage filters (13) are located on the pump compartment side of the firewall. See Fig. 4-224.

⚠ WARNING

FIRE RISK!

Fuel is flammable. When inspecting or performing service or repair on the fuel system, to reduce the possibility of fire and resulting severe personal injury, death or property damage, never smoke or allow sparks or flames (such as pilot lights, electrical switches, or welding equipment) in the work area.

Legend for Fig. 4-224

A	View showing location of first stage fuel filters on the fuel tank
(1)	Fuel tank
(2)	Covering door for the first stage fuel filters
(3)	First stage fuel filters for front engine 1
(4)	First stage fuel filters for rear engine 2
(5)	Water filter
B	View showing fuel lines
(6)	Fuel level gage on fuel tank
(7)	Fuel flow pipe to front engine 1
(8)	Fuel flow pipe to to rear engine 2
(9)	Return line to fuel tank from rear engine 2
(10)	Return line to fuel tank from front engine 1
(11)	Fuel line to cab heater
(12)	Return fuel line from cab heater
C	View showing location of second stage fuel filters (and the oil filters) on rear of firewall

NOTICE

DO not pre-fill the second stage filters

(13)	Second stage fuel filters.
(14)	Engine oil filter for rear engine 2

4.9.5 SLEW CIRCLE TOOTHING LUBRICATION

See Fig. 4-230

All teeth of the ring gear (1, Fig. 4-230) must be completely covered with grease when in operation.

REMARKS: All new slew rings are protected against corrosion with a special protective liquid. This must be cleaned off using an alkaline cleaner during assembly.

Initially, the teeth have to be lubricated with special adhesive spray grease, (2) or a spread (paste) type adhesive grease (3), This special grease (compound) is specified in the Parts Catalog. The spread type (paste) grease can be applied, for example, with a brush.

The teeth must then be completely covered using an open gear grease (an automatic central lubrication for the teeth which is used called the SLS (4), or the Slew gear Lubrication System)

The bearing (or inner raceway) of the slew circle is lubricated using a different kind of grease (a multi purpose gearing grease with EP additives of the type KP2K.) Make sure that the multi-purpose grease of the slew circle bearing (inner raceway) does not come in contact with the open gear grease on the teeth of the slew circle because this will diminish lubrication capability of the open gear slew circle teeth grease.

The bearing (inner raceway) must always be liberally greased so that a collar of grease is visible around the whole circumference of the bearing gap and lip seals. Remove this regularly in order to prevent moisture building up. Observe the instructions on the grease container for correct use of the lubricant.

If the excavator is equipped with gear ring guard (5), remove covers (6) for slew circle teeth inspection.

BLEEDING THE HYDRAULIC SYSTEM

Legend for Fig. 4-237

(1)	Suction oil reservoir
(2)	Main pump
(3)	Main pump
(4)	Main pump
(5)	Hydraulic pump for hydraulic oil cooler fan drive
(6)	Hydraulic pump for water cooler fan drive
(7)	Hydraulic pump for control oil circuit
(8)	Flushing oil gear pump for slew gear motor
(A1 and A2)	Vent plugs on suction oil reservoir
(B)	Vent plugs on the suction flange of the six main pumps
(D)	Bleeder plugs on the suction flange of the secondary pumps
(F)	Bleeder plug on the suction flange of the flushing oil gear pump for slew gear motor at the suction pipe at the bottom.
(X)	Bleeder plug on the secondary pumps
(Y)	Bleeder plug on the main pumps

4.10.4 ENGINE AIR CLEANER MAINTENANCE

NOTICE

Never service air cleaner while engine is running.
Exchange main filter element as soon as the fault message "Air cleaner element restricted" is displayed on the Komtrax Plus monitor.

Legend for Fig. 4-242

(1) Excavator roof
(2) Air cleaners of rear engine (engine 1)
(3) Air cleaners of front engine (engine 2)
(4) Safety filter element
(5) Main filter element
(6) Protection cover
(7) Chain to secure protection cover
(8) Cyclone
(9) Dust hose
(10) Rubber elbow joint of air cleaner
(11) Dust cup
(12) Clamp ring
(13) Gasket
(14) Valve

4.10.4.1 CHECK THE DUST CUP

The dust cup (11) requires minimum maintenance but the valve (14) may become clogged.

1. Undo the clamp ring (12) on the dust hose (9).
2. Swing the dust hose (9) downwards to gain access to the dust cup (11).
3. Remove the dust cup (11) and inspect the valve.
4. If the valve is clogged, remove the blockage with a stiff brush. Replace the valve if it shows any sign of damage or is inverted.
5. If the gasket (13) is damaged, replace it.
6. Refasten the dust cup (11) ensuring is sealed properly 360° around.
7. Refasten the dust hose (9) using the clamp ring (12).

4.11.1 WALK - AROUND INSPECTION

⚠ WARNING

CARE BEFORE MAINTENANCE!

Before carrying out any maintenance on this excavator, make sure the stairway, ladders, handrails and walkways are properly installed and in good condition. Keep the ladders, stairway, steps, 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.

REMARKS: For a comprehensive and detailed procedure of the checks that are to be performed on a daily basis, refer to the Daily Inspection Sheets filed in the binder Operation & Maintenance Manual Volume 2.

Legend for Fig. 4-248

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

(2) Hydraulic cylinders. Check cylinders, hydraulic lines and connections for leakage and damage.

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

Check condition of the loader bucket. Both loader bucket versions, bottom dump bucket 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 leakage.

(5) Check carrier rollers.

(6) Check track rollers.

NOTICE

If leakage is found on guide wheels, 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.

4.11.4.2 BOOM - CHECK LADDER AND WALKWAY

Check all bolts and clamps on the ladder, walkway and catwalk and make sure they are secure and show no signs of damage.

Legend for Fig. 4-253

A	Boom for backhoe
B	Boom for face shovel
(1)	Access/egress stairway for boom
(2)	Walkway to catwalk
(3)	Catwalk

NOTICE

Before accessing the boom, wear a safety harness as described in the chapter " "SAFETY HARNESS IN CONFORMITY WITH EN 361 (EUROPEAN STANDARD)" on page 2-15.

4.12.1.1 TRAVEL GEAR BOX - CHECK OIL LEVEL

Fig. 4-258:

Remove oil level gage (2A) or (2B) and wipe it clean. Insert the gage and remove again. Oil level should be at the upper mark of gage (2A) or (2B). If necessary add oil through filler opening (3). Insert gage (2A) or (2B) and filler plug (3) and tighten securely. Check breather filter (18 Fig. 4-258) on page 4-391 for restriction. If necessary, remove breather filters, blow out with compressed air from inside to outside and reinstall.

4.12.1.2 MOTOR ADAPTER HOUSINGS - CHECK OIL LEVEL

Check oil level by removing oil level plugs (8).
Oil level should be at lower edge of openings (8). If necessary, remove connector (9) for breather filter line and add oil through filler opening. Install level plugs (8) and screw in breather filter line connectors (9).
Check breather filter (19), Fig. 4-259 on page 4-391 for restriction. If necessary, remove breather filters, blow out with compressed air from inside to outside and reinstall.

4.12.1.3 FINAL DRIVE HOUSING - CHECK OIL LEVEL

Remove oil level gage (13) and wipe it clean. Screw in the gage and remove again. Oil level should be at the upper mark of gage (13). If necessary add oil through filler opening (14). Insert gage (13) and filler plug (14) and tighten securely. Check breather filter (20 Fig. 4-258) on page 4-391 for restriction. If necessary, remove breather filters, blow out with compressed air from inside to outside and reinstall.

4.12.4 HYDRAULIC OIL COOLERS - INSPECT AND CLEAN IF NECESSARY

NOTICE

Provide adequate working platform for safe access to the hydraulic oil coolers.

⚠ WARNING

RISK OF COOLER DOOR DETACHING!

A falling door may result in serious injury or death.
Before removing mounting bolts (1) of the hydraulic oil cooler door (2) check to make sure that all door hinges are in good condition and properly fastened on their carrier frames. If cracks are found at the welded joints of the hinges, DO NOT remove mounting bolts (1) otherwise the cooler door may become detached and fall off. Repair the damage immediately.

NOTICE

Never clean the oil coolers with the engine running or with the cooler fans still rotating.

1. Loosen mounting bolts (1) and open door (2).
   Details (A and B) in the illustration show LH hinged oil coolers. The description below applies also to RH hinged oil coolers.
2. Loosen fasteners (3) and swing out oil coolers (4 and 5).
3. Secure door (2) and oil coolers (4 and 5) with locking bars (7, 8 and 9).
4. Clean the oil coolers with compressed air, hot pressure water or steam cleaner. Use only clear water for cleaning the coolers. Direct the flow from inside to outside. When using hot pressured water, operate the cleaner at a max. 150 bar and keep the nozzle at a distance of at least 20cm.

⚠ WARNING

RISK OF SCALDING AND OF FLYING PARTICLES!

Hot steam and flying particles can cause serious personal injury.
When using a steam cleaner to clean the cooler doors, always wear safety glasses and protective clothing.

5. After cleaning, swing back the oil coolers to their home position.
6. Disengage locking bars (7, 8 and 9) and fix them in storage position (10). Swing back inner cooler (5). Take care guide pin (A) fits into hole (B) of main frame (6). Secure cooler (5) with fastener (3). Swing back outer cooler (4); observe (A - B) and secure with fastener (3). Close door (2); observe (B - A). Install mounting bolts (1) and tighten securely.
7. After cleaning the oil coolers, inspect the hydraulic hose lines.

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

Legend for Fig. 4-268

(1) Air conditioner door with filter mat

(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

(9) Low pressure switch

(10) High pressure switch

(11) Expansion valves

(12) Evaporator blower

(13) Evaporator

(14) Cool air outlets

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 the filter mats of condenser (7) and evaporator (13).

REMARKS: Servicing of the air conditioning systems is restricted to workshops especially equipped for this purpose. Refer to the separate booklet "AIR CONDITIONING" in Service Literature Binder – Volume 2 and for further instructions, ask your Komatsu distributor.

4.14.1.4 CHECKING THE SLIDERS (OPTIONAL EQUIPMENT) FOR WEAR

Legend for Fig. 4-275

1. Track slider element
2. Attachment points
3. M30 Bolts of quality 10.9

When the wear on the sliders is great, each individual slider element (1) can be replaced. Unscrew the bolts (3) that hold them in place and replace with a new one together with the washers

The slider measures 75mm. When an individual slider falls below a dimension of 40mm then it is classed as worn and must be changed.

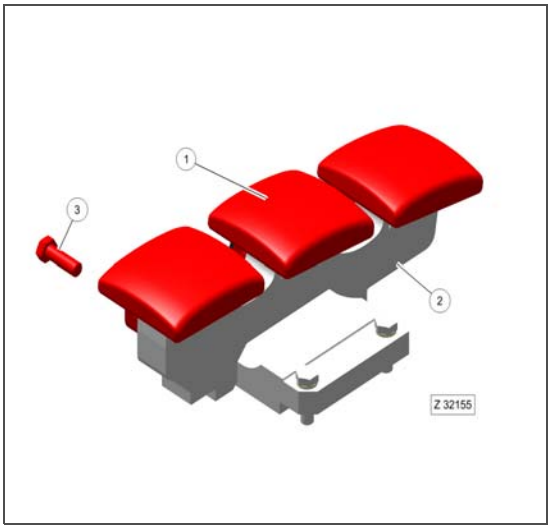


Fig. 4-275

CHECK ADJUSTING RANGE FOR GUIDE WHEELS (continued)

NOTICE

The cocks (9), Fig. 4-280 must always be in OPEN position. Close only in such cases, when the adjusting cylinders (10 and 11) must remain under pressure while servicing other components of the system.

4.14.4.2 BLEEDING THE SYSTEM

1. Make sure pressure relief cock (5) Fig. 4-280 is in closed position “C”; and shutoff cocks (6 and 9) are in open position “O”.
2. Start the engine/motor.
3. Slowly open vent valves (12) on all four adjusting cylinders until bubble free oil flows out. Close the vent valves (12).
4. Move the excavator forward and reverse to distribute tension.
5. Check adjusting range “X” according to Fig. 4-279 on previous page.
6. Check the complete system for leakages.

REMARKS: Further track group inspection and wear measurement procedures should be carried out. For further instructions, ask your Komatsu distributor.

4.15.1 CRITICAL BOLT CONNECTIONS

4.15.1.1 CHECK MOUNTING OF OPERATOR'S CAB

Fig. 4-285

Reference No.:	*Bolt size mm*	*Grade*	*SW *mm*	*Tightening torque Nm*	*Qty.*
(1) gate to attachment					
(2) viscous mount					
(3) Bolt	M24	10.9	36	880	44
(4) Bolt	M12	10.9	19	108	72
(5) Bolt	M16	10.9	24	265	21

* SW = Wrench size

Re-tighten mounting bolts to their correct torque and replace missing or damaged bolts.

– Check condition and fastening of gate (1).
– Check the silicone oil filled viscous mounts (2) for leakage and signs of fatigue.

4.15.4 ELECTRICAL EQUIPMENT - MAINTENANCE

– Check all cables and components of the electrical equipment on the excavator (working lights, signal horn, sensors, switches etc.).
– Repair any loose connections
– Check and repair any defects on the protective coverings especially in areas where the cables are likely to rub.
– Check for deteriorating and broken cables, especially in conditions of high ambient and local heat, or areas of extreme external contamination or dirt.
– Check switches, lamps and buttons for functionality and correct movement.
– Check connections for water and/or dampness and dry where necessary.
– Inspect plugs and sockets for functionality.
– Any electrical components, cables, plugs or sockets that do not work or have deteriorated or are defective, must be replaced immediately,

4.15.8 BLEEDING AIR FROM THE SUCTION OIL CHAMBERS

Air may enter the hydraulic system whenever the filters are removed from the return oil chambers, e.g. during exchange. In order to avoid this, the chambers must be bled of excess air.

Any residual air from the hydraulic oil tank (2, **Fig. 4-295**) is sucked through by the pumps (1) to the suction oil tank (4). They are then evacuated in the bleed line (3).

Legend for Fig. 4-295

(A) Hydraulic oil tank, suction oil tank and pumps from working view

(1) Main pumps

(2) Hydraulic oil tank

(3) Line to bleed air from hydraulic tank via the suction tank

(4) Suction tank

(B) View of hydraulic oil tank roof

(5) Breather filters

(6) Filter cover

(7) Filter cover flange

(8) Oil separator element

(9) Vent plug on top of the main oil reservoir.

(10) Sight glass

(11) Return oil filters in hydraulic tank (6x)

(12) Leakage oil filter in hydraulic tank (1x)

(13) Stop-cock on line to bled air from hydraulic tank via suction oil tank

REMARKS: It is shown open. It is in the closed position when servicing work is in progress

(14) Hand wheel of main shut-off valve located between suction oil reservoir and main oil reservoir

To OPEN the valve, turn hand wheel CCW to the stop

To CLOSE the valve, turn hand wheel CW to the stop

A proximity switch located on the gearbox of the shut-off valve monitors the valve position. With the valve not fully open, a corresponding message will be displayed on the Komtrax Plus screen in the operator's cab.

Before starting the engine, make sure the shut-off valve is completely open by turning hand wheel fully to the left (CCW).

REMARKS: Ensure all filter covers are properly closed.

The stop-cock (13) on the bleeding line (3) on top of the suction oil tank (4) has to be open (shown open in **Fig. 4-295**.

The bleeding line on top of the suction oil tank must incline about 10° to ensure proper release of air.

FILTER SERVICE (continued)

Clean or replace pressure filter elements, Fig. 4-300, as follows:

1. Place working equipment on the ground and shut-off the engines.
   See relieve pressure in the hydraulic system on page 3-255 in the operation section.
2. Place a suitable container below the filter in order to collect outflowing oil.
3. Remove plug (A) and drain the oil.
4. Unscrew case (C) of the respective filter and clean the filter case.

REMARKS: Carefully inspect elements for damage. Always install new elements if ruptures or other damages are found.

5. Remove element (F) and clean. Take care not to contaminate the "Clean" inside of the element when flushing.
6. Inspect O-rings and back-up ring. Replace if necessary.
7. Install drain plug (A) with new packing ring (B).
8. Lubricate the thread at the filter head and at filter case (C) with multi-purpose grease (MPG - as found for example in the CLS grease container).
9. Insert the cleaned element or a new element (F) with new O-ring (G).
10. Fill the case (C) half way up with clean hydraulic oil.
11. Screw the case (C) into the head and tighten.
12. After short operating period check filter for leakage.
13. Check restriction indicator (H) for proper mounting and good condition.

REMARKS: Replace elements (F) after three cleanings or after every 6000 operating hours, whichever occurs first.

4.15.14 HYDRAULIC OIL COOLER - INSPECT AND LUBRICATE DOOR HINGES

– Ensure there is safe access to the hydraulic oil cooler.

– Check all door hinges (2) for good condition and proper fastening to their carrier frames. If cracks or distortion at the weld area of the hinges are found corrective action must be taken. DO NOT try to open the cooler doors before the damage has been repaired otherwise the cooler door may become detached and fall off.

Legend for Fig. 4-305

(1) Hydraulic oil cooler

(2) Cooler hinges

(3) Grease lines from distributor to hinges

(4) Grease nipples on hinges

(5) Distributor

(6) Grease fittings on distributor

– Lubricate all cooler hinges (2) by attaching a grease gun to the grease fittings (6) on the distributor (5). Grease will be pumped through the grease lines (3) and the grease nipples (4) into the hinges (2).

– Check to make sure that the hinges (2) are properly secured.

HYDRAULIC SYSTEM - REPLACING SUCTION STRAINERS (continued)

Inspection of Strainer (7) between Oil Changes

For inspection of strainer (7) between oil changes proceed as follows:

1. Close main shut-off valve (1), Fig. 4-310
2. Open vent plug (10) on the six main pumps to prevent negative pressure in the system.
3. Use the transfer pump for emptying the suction oil reservoir, see on page 3-260 for transfusion procedure.
4. Remove drain plug (5) and drain the oil from the intermediate pipe (3) into a receptacle.
5. Remove bottom cover (4).
6. Inspect strainer (7) and replace if necessary.
7. Install bottom cover (4) using a new O-ring.
8. Install drain plug (5).
9. Bleed the hydraulic system according to the instructions on page 4-348, **Bleeding the Hydraulic System**.

4.16.4 PREVENTATIVE MAINTENANCE (PM) CLINIC - PERFORM TEST

NOTICE

Preventative Maintenance is to be performed by Komatsu qualified personnel only.

For cost effective help in minimizing excavator downtime, the Preventative Maintenance (PM) Clinic Test is a tool that ensures the excavator is regularly checked before a failure can occur.

PM Clinics are excavator-specific, comprehensive inspections where the individual test results are noted on a multi-sided chart which is designed to monitor the performance of the excavator. By monitoring key diagnostic measurements, such as engine speeds and hydraulic pressures, it is possible to track trends and make recommendations to enhance the excavator's performance.

(1) on Fig. 4-315 shows **an example** of a PM-Clinic as a 'BH' Parts & Service News as it can be obtained your Komatsu distributor.

This document describes the procedure for performing a Preventative Maintenance (PM) test and also provides the PM Data Sheets that are to be filled out with the values collected during the test. See (2) on Fig. 4-315.

The test form can be used in two ways. It can be printed out (4) and the values manually entered during the test or it can be electronically used directly from a laptop computer. If it is manually filled out, the values should be transfered to the electronic version after the test has been completed.

The PM Test can then be saved (5) to a file and emailed (6) directly to the Komatsu Germany Service Department. These options can be found on the last page (3) of the PM Clinic document.

4.17.1 TRAVEL GEARS, MOTOR ADAPTER HOUSINGS AND FINAL DRIVES CHANGE OIL

NOTICE

The excavator is equipped with the gearbox type 631053 but the gearbox type of 2063 may be used as a replacement. Please check the nameplate and the list for filling capacities on **on page 4-307**

Legend for Fig. 4-320

- A -	View of the RH Final drive. The configuration of the LH Final drive is the same.
(1)	Travel gear
(2A)	Oil level gage on gearboxes of the type 2063
(2B)	Oil level gage on gearboxes of the type 631053
(3)	Oil filler plug
(4)	Oil drain plug
(5)	Connector for breather filter line. The breather filter is located inside the center frame, see Fig. 4-259 on page 4-391.
(6)	Travel brake housing
(7)	Motor adapter housing
(8)	Oil level plug
(9)	Connector for breather filter line, the breather filter is located inside the center frame, see Fig. 4-259 on page 4-391. The port of connector (9) is also used as oil filler opening.
(10)	Oil drain plug
(11)	Hydraulic motors
(12)	Final drive housing contains the lubricating oil for sprocket bearing lubrication.
(13)	Oil level gage
(14)	Oil filler plug
(15)	Oil drain plug
(16)	Connector for breather filter line, the breather filter is located inside the center frame, see Fig. 4-259 on page 4-391.

NOTICE

Threads and bolt heads for high strength bolt connections must be lubricated with a multi-purpose grease (a multi purpose grease with EP additives of the type KP2K.) The contact surfaces of parts which should be screwed together must be metallically blank and free of grease.

4.18.1 CRITICAL BOLT CONNECTIONS - CHECK TORQUE LOAD

Check high-strength bolt connections and securing elements for damage and looseness. If any damages, failures or wrong condition are found, corrective action must be taken.

– If the torque load is not otherwise stated, refer to standard torque chart for torque data.

– Lubricate the bolts with multi-purpose grease (MPG - a multi purpose grease with EP additives of the type KP2K.) on thread and head.

REMARKS: When selecting the tightening torque observe quality grade and bolt size

NOTICE

A visual check of the security and the condition of the bolt connections must be performed every 1000 hours.

All bolts are to be inspected immediately in cases of unexpected impacts, collisions or when loosening is suspected (peeling paint on the screws or obvious signs of unscrewing.

All contact surfaces must be metallically blank and free of grease.

Critical Bolt Connections (continued)

4.18.1.5 CHECK FASTENING AND CONDITION OF HYDRAULIC OIL COOLER

Fig. 4-329

Reference No.:	Bolt size mm	Grade	SW * mm	Tightening torque Nm	Qty.
(1)	M36	10.9	55	3100	4
(2)	M36	10.9	55	3100	4

* SW = Wrench size

Re-tighten mounting bolts to their correct torque and replace missing or damaged bolts.

Critical Bolt Connections (continued)

4.18.1.10 POWER HOUSE ROOF

Fig. 4-334

– Check fastening and condition of power house roof segments (1) and hoods
– Check sealing elements (2) between roof segments are seated correctly and are in good condition.

Reference No.:	*Bolt size mm*	*Grade*	*SW * mm*	*Tightening torque Nm*	*Qty.*
(3)	M12	8.8	19	74	170

* SW = Wrench size

Re-tighten mounting bolts to their correct torque and replace missing or damaged bolts.

Critical Bolt Connections (continued)

4.18.1.15 CHECK CONDITION AND FASTENING OF SWIVEL JOINT (A)

Fig. 4-339

Reference No.:	*Bolt size mm*	*Grade*	*SW * mm*	*Tightening torque Nm*	*Qty.*
(1)	M 16	10.9	24	265	4
(2)	M 16	10.9	24	265	8
(3)	M 24	10.9	36	880	8

* SW = Wrench size

Re-tighten mounting bolts to their correct torque and replace missing or damaged bolts.

Critical Bolt Connections (continued)

4.18.2.1 ROOF-MOUNTED CRANE FOR GREASE BARREL REPLACEMENT (SPECIAL EQUIPMENT) CHECK CONDITION AND FASTENING OF THE CRANE

Legend for Fig. 4-344

1	Crane post
2	Outrigger
7	Ropes for securing the outrigger (2) in home position
8	Ring for fastening the wire ropes (7).
9	Storage box for hoist chain
10	Crane mounting bolts, M27 quality grade 8.8. Tightening torque 920 Nm.

Be sure to check security and tightening torque of the crane mounting bolts (10) after the first 100 operating hours and thereafter every 1000 operating hours. Check condition of fastening ropes (7) and ring (8).