Operation & Maintenance Manual

SEAM041E0102

WD600-1

WHEEL DOZER

SERIAL NUMBERS **WD600-10001** and up

KOMATSU

FOREWORD

This manual describes procedures for operation, handling, lubrication, maintenance, checking, and adjustment. It will help the operator or anyone realize peak performance through effective, economical and safe machine operation and maintenance.

- Please read this manual carefully BEFORE operating the machine.
- Please continue studying this manual until proper operation is completely reinforced into personal habit.
- This manual describes the basic techniques. Skill is performed as the operator or anyone get the correct knowledge and performance of the machine.
- Operation, inspection, and maintenance should be carefully carried out, and the safety must be given the first priority. Safety precautions are indicated with ⚠ marks and technical precautions with ★ marks in this manual. The safety information contained in this manual is intended only to supplement safety codes, insurance requirements, local laws, rules and regulations.
- Some photographs and illustration pictures are different from your machine as technical improvement is continuously reflected on it. Revision to up-to-date manual's content is performed in later editions.
- This operation & maintenance manual may contain attachments and optional equipment that are not available in your area. Please consult your local Komatsu distributor for those items you may require.
  Materials and specifications are subject to change without notice.

BREAKING IN YOUR NEW MACHINE

Each machine is carefully adjusted and tested before shipment. However, a new machine requires careful operation during the first 100 hours to break in the various parts.

If a machine is subjected to unreasonably hard use at the initial operation stage, the potential of performance will prematurely deteriorate and the service life will be reduced. A new machine must be operated with care, particularly with regard to the following items.

- After starting, let the engine idle for 5 minutes to allow proper engine warm-up prior to actual operation.
- Avoid operation with heavy loads or at high speeds.
- Sudden starting or acceleration, unnecessarily abrupt braking and sharp turning should be avoided.
- If the machine is delivered without any cooling water in the radiator, flush the cooling system with ample clean water to clean the system, then fill the radiator with cooling water.

★ When replacing oil filter elements (cartridges), check their interiors for dirt and dust. If heavily collected, check for possible cause before starting operation.

★ Hours of operation are indicated by the service meter.

CONTENTS

OPERATION

MAINTENANCE

SAFETY HINTS· · · ⚠

Protect yourself and others. Safety is always first.

OPERATION

GENERAL

- Wear well-fitting helmet, safety shoes and working clothes. If the nature of the work requires safety, wear protective goggles or mask, thick gloves, ear plugs or other protection.
- Take care of your health. Do not operate when tired, or after drinking.
- When there is a leader, fix standard signals and always follow these signals when operating.
- Learn the prohibitions, cautions and rules about work procedures in the work site.
- Read the Operation and Maintenance Manual carefully. Learn how to use the control devices, gauges and warning devices. Be sure you understand the meaning of the caution plates.
- Confirm that all gauges and warning devices are functioning correctly, and that the gauge readings are within the prescribed range.
- Learn about the safety devices on your own machine and about how to use them.
- Never allow another person to operate the machine.
- If there should be an accident or fire or any other such unexpected mishap, deal with it quickly, using the nearest apparatus.
  Learn beforehand the locations of the first aid boxes and fire extinguishers and how to use them. It is also important to know the emergency contact system.
- Fuel or oil are dangerous substances.
  Never handle fuel, oil, grease or oily cloth in places where there is any fire of flame.

CHECKING JOBSITE CONDITIONS

- Examine the lay of the land and the kind of soil at the work site to determine the dangerous points and the best method of operation. Proceed with the work only after making safety arrangements about the dangerous points.
- Do not work when visibility is reduced by smoke, fog or dust. If the jobsite is dark, install lighting if necessary.
- Keep work site flat!
  By continually grading the work site, work efficiency will be improved and machines will be able to drive smoothly over the site. If the work site is very sandy or dusty, sprinkle water over the ground before working on the site.
- Check the load limits of bridges before crossing.
- When operating a machine in water or fording streams, survey the water depth, ground condition and velocity of the water in advance. Do not take the machine in water exceeding the allowable depth (up to the underside of the axle housing).
- The overall height of the machine is restricted by tunnels, roof height or overhead electric wires, so check first whether the jobsite is safe. Be particularly careful when working near power lines as electric shock can be caused if the machine touches the electric cables.

BEFORE STARTING OPERATION

CHECK BEFORE STARTING

- Carry out checks before starting the machine. If any problem is found, do not start the engine, but inform the foreman immediately. Always keep the machine in good condition.
- Before operating the machine, be sure to check the bar and pins for setting in storage position.
  The machine can not be steered with frames locked. (In articulate frame model)
- Always stop the engine when adding fuel. After adding fuel, tighten the fuel cap properly. Repair any fuel or oil leakage, and wipe off all dirty oil.
- Combustible objects such as pieces of wood, dead leaves, and pieces of paper may cause fire, so inspect the inside of the engine room and remove them.

- Do not leave parts or tools lying around in the vicinity of or on the floor of the operator's compartment. Keep everything in its proper place.
  Wipe off thoroughly any grease, oil or mud on the handrail, floor or control levers. Failure to do this may cause you to slip.

PRECAUTIONS WHEN GETTING ON THE MACHINE

- If the machine is fitted with a cab, make sure the windows are clean and check the visibility. Always lock the door before starting operations.
- When getting on or off the machine, use the handrail and step provided. Do not jump up onto or down from the machine.
- If a seat belt is provided, always use it. If the belt is damaged or worn, replace it with a new one.

PRECAUTIONS WHEN STARTING THE ENGINE

- Before starting the engine, confirm that all control levers are in neutral position.
- Exhaust gas is dangerous. When working inside, be particularly careful to have good ventilation.
- To ensure the safety of workers near the machine, always sound the horn to warn them before starting the engine and moving the machine. Be particularly careful to check that the rear is clear before backing the machine.

DURING OPERATION

CHECKS AFTER STARTING THE ENGINE

- Before starting work, test drive the machine in a safe place and check that the transmission, brakes, accelerator, and steering are working properly. At the same time, check that there is not abnormal noise or vibration, or any abnormality in the instruments and gauges.

- Always sit in the operator's seat when operating the machine.
- Do not allow anyone except the operator on the machine.
- Always be aware of the operating capacity of the machine. Using the machine to do work beyond its capacity will not only damage the machine, but may even cause unexpected accidents.
- The machine condition can be judged from many factors. Changes in the gauges, sound, vibration, exhaust gas color or response of the control levers can indicate the occurrence of some disorder. If any disorder occurs, park the machine immediately in a safe place and take appropriate action.

ATTENTION TO SURROUNDINGS

- To ensure the safety of workers near the machine, always sound the horn to warn them before starting the engine and moving the machine. Be particularly careful to check that the rear is clear before backing the machine.
- Do not allow unauthorized persons into the work area.
- Always concentrate. It is extremely dangerous to allow yourself to be distracted or to think of other things when operating a machine.
- Do not bring the blade over people's heads.

- In dangerous places or in places where the visibility is poor, get down from the machine and check that it is safe before continuing the operation.
- Always operate slowly in crowded places. On haul roads or in narrow places, give way to loaded machines.
- When traveling, keep the work equipment close to the ground to maintain the stability of the machine. Pay particularly careful attention to the stability of the machine when traveling with a load.
- If the machine has to travel on rough ground, be careful to avoid obstacles as far as possible.
- Always travel at a slow speed, and do not suddenly change direction.
- Do not use the blade as a brake except in emergencies.
- If the engine stops when the machine is traveling, it is impossible to use the steering. (When emergency steering system is not installed.) This is dangerous, so apply the brake immediately to stop the machine.
- The machine should always be operated at a speed where it can be correctly controlled. Never do the following:
  - ★ Speeding
  - ★ Sudden starting, sudden braking, sudden turning
  - ★ Snaking
  - ★ Coasting

RESTRICTIONS CREATED BY JOBSITE

- Do not approach the edge of the cliff or road shoulder.
- In dangerous places, always work in teams of two; one man to operate the machine, and the other to give instructions.
- On windy days, always load downwind.
- When continuing operations after rain, remember that conditions will have changed from those before the rain started, so proceed with caution.
  Be careful when working on the place made of piled soil, after earthquakes or after blasting.
- Always travel directly up or down slopes. When traveling down a slope, use the same gear speed as when going up the slope. When traveling down a slope, never put the transmission in neutral.

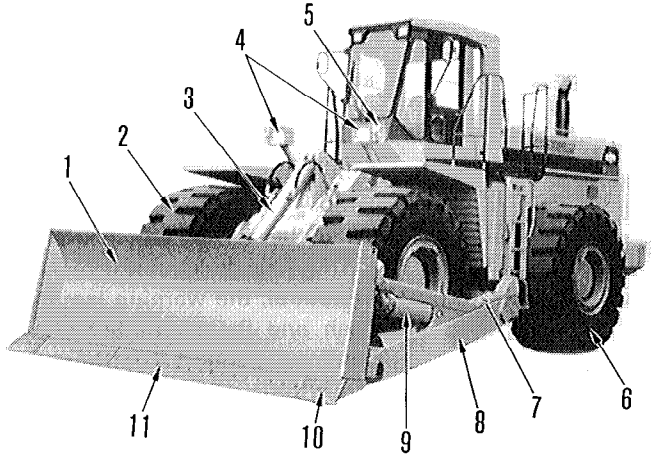
- If the engine stops on a slope, apply the brake quickly and carefully. Next, lower the work equipment to the ground and apply the parking brake. Then put the directional and speed control levers in neutral, and start the engine again.
- Be careful when traveling on planks or steel plates, as these can cause slippage.
- When operating at night, remember the following points:
  - Be sure to arrange an adequate lighting system.
  - At night it is very easy to make mistakes in assuming the distance and height of objects and land.
- Before towing operations, always check the wire rope.
- Before starting towing operations, make sure that no one is near the machine. Start the machine slowly to take up the slack in the wire rope. Then start towing carefully. Do not tow any machine whose brakes or steering have broken down.
- When operating at the edge of a cliff or on the shoulder of a road, remember the following points:
  - When dumping soil over a cliff, dump the first excavated soil without dumping it over, and use each succeeding excavated soil to push the previous excavated soil over. Be sure not to approach the edge by mistake.
  - When working on river embankments or other places made of piled soil, there is the danger that the weight or vibration of the machine may cause the machine to sink into the piled soil, so be extremely careful when operating in such places.

PARKING

- When operating on slopes, remember the following points:
  - When driving on a slope, always drive directly up or down it. Never drive horizontally or diagonally across the slope, as this may cause the machine to roll over or slip sideways.
  - As far as possible, avoid turning the machine on a slope. It may cuase the machine to roll over or slip sideways.
- When parking the machine, park it in a safe place outside the working area, or in the specified place. The following factors should be considered when choosing a parking place: it should be on flat, firm ground where there is no danger of rockfalls, landslides or floods.
- If the machine has to be parked on a slope, it should be parked facing directly up or down the slope, and chocks should be placed under the tires.
- When leaving the machine, always lower the work equipment completely to the ground, and put all control levers in neutral. Next, apply the parking brake and lock all levers. Then put blocks under the tires.
- After stopping the engine, always remove the starting key.

GENERAL LOCATIONS AND SPECIFICATIONS

1. Blade
2. Front wheel
3. Lift cylinder
4. Head lamp
5. Turn signal lamp
6. Rear wheel
7. Safety bar
8. Straight frame
9. Tilt and pitch cylinder
10. End bit
11. Cutting edge



With cab and ROPS canopy

PERFORMANCE

1. Blade capacity (SAE)	7.5 m^3
2. Travel speeds	
Forward	Max. 35.0 km/h
Reverse	Max. 37.9 km/h

OPERATING WEIGHT 40280 kg

ENGINE

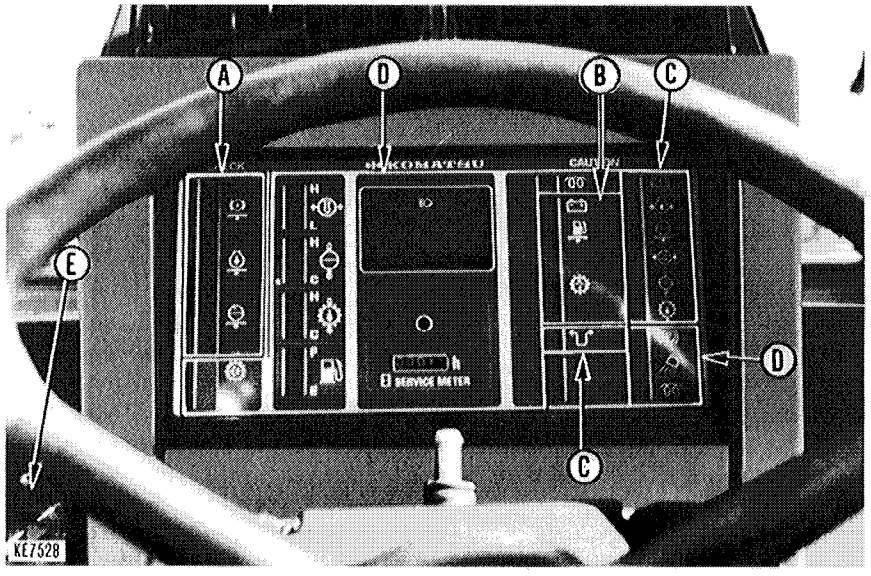
1. Model	Komatsu S6D170-1 diesel engine
2. Flywheel horsepower (at 2000 rpm)	454 HP

NOTE: Specifications are subject to change without notice.

INSTRUMENTS AND CONTROLS

MONITOR PANEL

This monitor system consists of monitor lamp groups (Ⓐ, Ⓑ, Ⓒ), meter group Ⓓ and warning lamp Ⓔ.



- To check the monitor system, turn the starting switch to ON before starting the engine. Then all the monitor lamps, the gauges and the warning lamp light up for about 3 seconds and the alarm buzzer sounds for about 1 second. Three figures, 188, are displayed on the speedometer while the monitor system is being checked. After that all lamps go off and the buzzer stops. If any monitor lamp does not light up, ask your Komatsu distributor to inspect that monitor lamp.

★ When the starting switch is turned to ON, if the directional lever is not at neutral, the warning lamp will flash and the alarm buzzer will continue to sound. If this happens, return the lever to neutral. The lamp will go out and the buzzer will stop.

★ To check the monitor immediately when the engine is stopped, wait for at least 30 seconds after the engine is stopped.

Ⓐ CHECK MONITOR GROUP (Check items before starting)

If there is any abnormality, the appropriate monitor lamp will flash.

Check the location where the monitor lamp is flashing, and carry out the checks before starting.

★ When the engine is started, these monitor lamps will go off even if there are abnormalities.

Ⓑ CAUTION MONITOR GROUP (Caution items)

If any abnormality occurs while the engine is running, the appropriate monitor lamp and the warning lamp will flash to indicate the abnormality at the same time.

★ Even if any monitor lamp flashes, the machine can operate, but it should be repaired as soon as possible.

Ⓒ CAUTION MONITOR GROUP (Emergency stop items)

If any abnormality occurs while the engine is running, the appropriate monitor lamp and the warning lamp will flash and the alarm buzzer will sound intermittently at the same time.

★ If any monitor lamp flashes, stop the work, and repair it immediately.

★ However, when the emergency steering is being operated, only the monitor will flash. The alarm buzzer will not sound, and the warning lamp will not light up.

Ⓓ METER GROUP

This group consists of air pressure gauge, engine water temperature gauge, torque converter oil temperature gauge, fuel gauge, speedometer, service meter and pilot display.

Ⓔ WARNING LAMP

The warning lamp will flash when there is an abnormality in any Ⓑ group item.

The warning lamp will flash and the alarm buzzer will sound when there is an abnormality in any Ⓒ group item or when the parking brake is applied, but the directional lever is not at neutral.

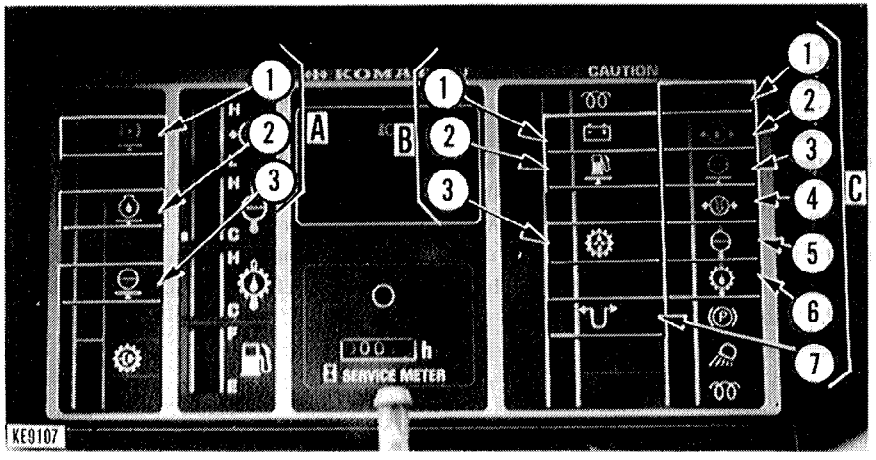
A: CHECK MONITOR GROUP (Check items before starting)

★ Do not rely on the "CHECK MONITOR GROUP (Check before starting)" only for the check before starting. Always make the check by referring to the section on CHECK BEFORE STARTING.

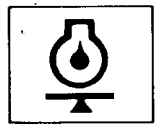
1. BRAKE OIL LEVEL MONITOR

This monitor indicates a low brake oil level.

If the monitor lamp flashes, check the oil level and add brake oil as required.



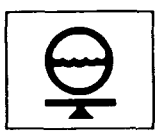
2. ENGINE OIL LEVEL MONITOR



This monitor indicates a low oil level in the engine oil pan.

If the monitor lamp flashes, check the oil level in the engine oil pan and add oil as required.

3. COOLANT LEVEL MONITOR



This monitor indicates a low radiator coolant level.

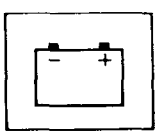
If the monitor lamp flashes, check the coolant level and add water as required.

★ Park the machine on level ground and check the monitor lamps.
★ Confirm that these monitor lamps light for about 3 seconds after turning the starting switch to **ON**. If any monitor lamp does not light, ask your Komatsu distributor to inspect that monitor lamp.

B: CAUTION MONITOR GROUP (Caution items)

If any abnormality occurs while the engine is running, the appropriate monitor lamp and the warning lamp will flash to indicate the abnormality at the same time.

1. CHARGE MONITOR



This monitor indicates an abnormality in the charging system while the engine is running.

If the monitor lamp flashes, check the charging circuit.

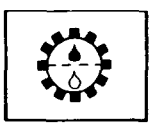
★ This monitor lamp flashes and the alarm buzzer sounds, when the starting switch is turned to ON immediately after the engine is started or immediately before the engine is stopped. It does not indicate an abnormality.

2. FUEL LEVEL MONITOR

This monitor indicates there is less than 100 liters of fuel in the tank.

If the monitor lamp flashes, add fuel.

3. TRANSMISSION OIL FILTER MONITOR



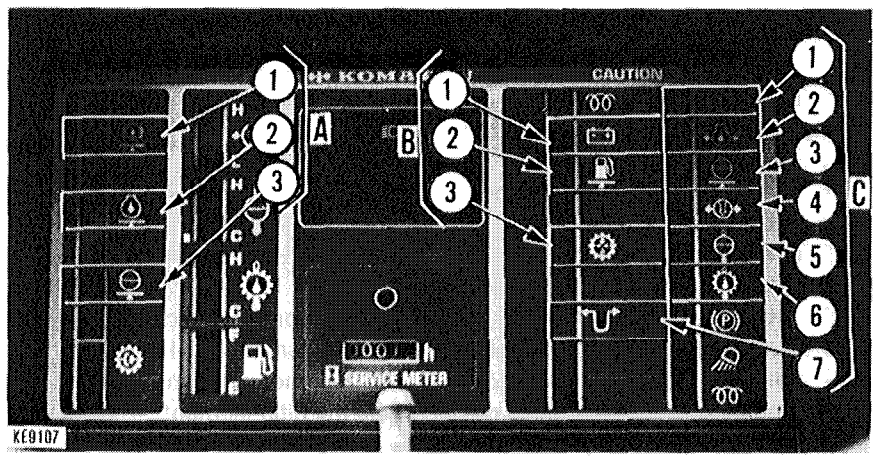
This monitor indicates clogging of the transmission oil filter.

If the monitor lamp flashes, replace the filter element.

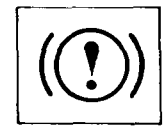
★ Park the machine on level ground and check the monitor lamps.
★ Confirm that these monitor lamps light for about 3 seconds after turning the starting switch to **ON**. If any monitor lamp does not light, ask your Komatsu distributor to inspect that monitor lamp.

C: CAUTION MONITOR GROUP
(Emergency stop items)

If any abnormality occurs while the engine is running, the appropriate monitor lamp and the warning lamp will flash and the alarm buzzer will sound intermittently at the same time.



1. BRAKE LINE FAILURE MONITOR

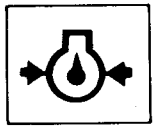


This monitor indicates a drop in the brake oil pressure when the brakes are operated.

If the lamp flashes, stop the machine immediately and check the brake system.

★ After checking and repair of brake system, push in over-stroke sensor rod. If this operation is not done, a buzzer and lamp will continue to warn of brake line trouble.

2. ENGINE OIL PRESSURE MONITOR

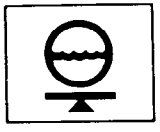


This monitor indicates a low engine oil pressure.

If the lamp flashes, the engine oil pressure is below the lower limit. Immediately stop the engine.

★ This monitor lamp flashes and the alarm buzzer sounds, when the starting switch is turned to ON immediately after the engine is started or immediately before the engine is stopped. It does not indicate an abnormality.

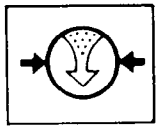
3. COOLANT LEVEL MONITOR



This monitor indicates a low radiator coolant level.

Check the coolant level when the monitor lamp flashes, stop engine and add water as required.

4. AIR PRESSURE MONITOR

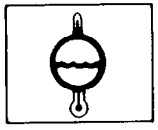


This monitor indicates a drop in the air pressure in the air tank.

If the lamp flashes, increase the engine speed and wait until the lamp goes out.

★ Park the machine on level ground and check the monitor lamps.
★ Confirm that these monitor lamps light for about 3 seconds after turning the starting switch to **ON**. If any monitor lamp does not light, ask your Komatsu distributor to inspect that monitor lamp.

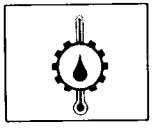
5. COOLANT TEMPERATURE MONITOR



This monitor indicates a rise in the cooling water temperature.

When the monitor lamp flashes, run the engine with no load at midrange speed until the green range of the engine water temperature gauge lights.

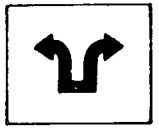
6. TORQUE CONVERTER OIL TEMPERATURE MONITOR



This monitor indicates a rise in the torque converter oil temperature.

When the monitor lamp flashes, stop the machine and run the engine with no load at midrange speed until the green range of the temperature gauge lights.

7. EMERGENCY STEERING OPERATION MONITOR



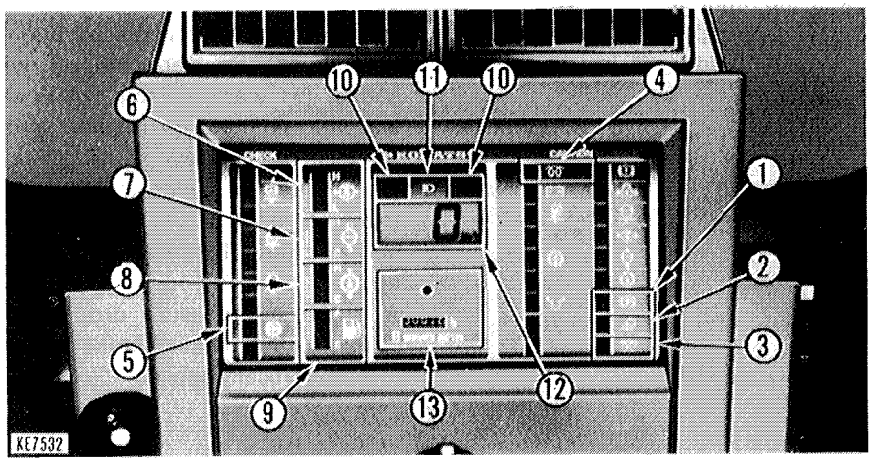
If the engine stops while the machine is traveling or an abnormality occurs in the pump circuit, the operator will be warned that the emergency steering is in operation. When flashing begins, stop the machine immediately.

★ Park the machine on level ground and check the monitor lamps.
★ Confirm that these monitor lamps light for about 3 seconds after turning the starting switch to **ON**. If any monitor lamp does not light, ask your Komatsu distributor to inspect that monitor lamp.

D: METER GROUP

PILOT DISPLAY

When the starting switch is turned to ON, this lights up to indicate that the display items are working.



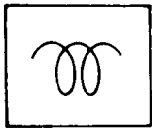
1. PARKING BRAKE PILOT LAMP

This lamp lights up when the parking brake is applied.

2. PILOT LAMP FOR WORKING LAMP

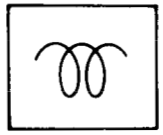
This lamp lights up when the working lamps are switched on.

3. ENGINE PRE-HEATING MONITOR



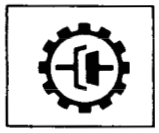
When using APS (automatic priming system) and when starting, switch on lamp and you will be informed that pre-heating has started.

4. AFTERHEATING MONITOR



When using APS (automatic priming system) in cold weather, and when starting, after the engine starts, the lamp will flash until the water temperature reaches 20°C, informing you that afterheating has started.

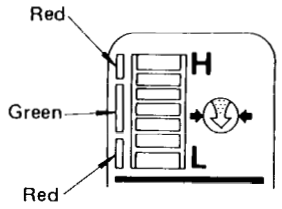
5. TRANSMISSION CUT-OFF SELECTOR PILOT LAMP



This lamp lights up when the transmission cut-off selector switch is turned to ON.

★ If the monitor lamp is ON and the left brake pedal is depressed, the transmission will be returned to neutral.

6. AIR PRESSURE GAUGE



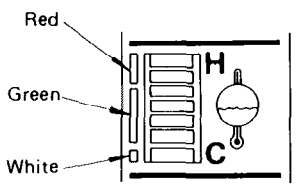
This gauge indicates the air pressure in the air tank. The green range should be lighted during normal operation.

If the red range lights up during operations, the alarm buzzer will sound, the warning lamp will flash, and the air pressure monitor lamp will flash.

If this happens, stop the machine, increase the engine speed and wait until the green range lights up.

★ If the air pressure drops even lower, the parking brake will be automatically applied.

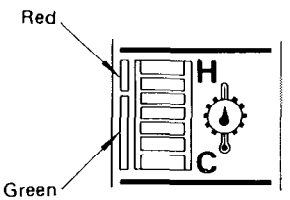
7. ENGINE COOLING WATER TEMPERATURE GAUGE



This gauge indicates the temperature of the cooling water. If the temperature is normal during operation, the green range will light. If the red range lights during operation, stop the machine and run the engine with no load at midrange speed until the green range lights.

If the top lamp in the red range lights up, the alarm buzzer will sound, the warning lamp will flash and the coolant temperature monitor lamp will flash at the same time.

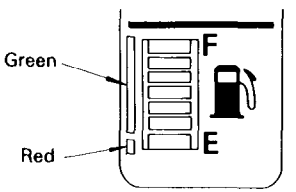
8. TORQUE CONVERTER OIL TEMPERATURE GAUGE



This gauge indicates the temperature of the torque converter oil. If the temperature is normal during operation, the green range will light. If the red range lights during operation, stop the machine and run the engine with no load at midrange speed until the green range lights.

If the top lamp in the red range lights up, the alarm buzzer will sound, the warning lamp will light up and the torque converter oil temperature monitor lamp will flash at the same time.

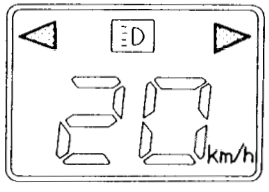
9. FUEL GAUGE



This gauge indicates the amount of fuel in the fuel tank. If there is enough fuel in the tank while the engine is running, the green range lights. If the red range lights, there is less than 100 liters of fuel in the tank.

When the red range lights, add fuel.

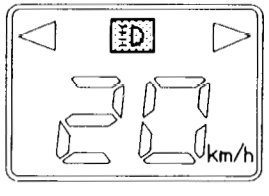
10. TURN SIGNAL PILOT LAMP



When the turn signal lamp flashes, the pilot lamp also flashes.

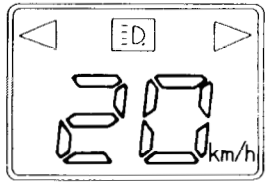
★ If the wiring of the turn signal lamp is disconnected, the pilot lamp will flash faster.

11. HIGH BEAM PILOT LAMP



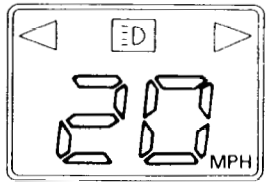
This lamp lights up when the head lamp is at high beam.

12. SPEEDOMETER

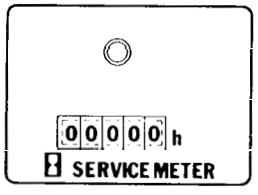


This meter indicates the running speed of the machine.

★ A speedometer for MPH is also available.



13. SERVICE METER



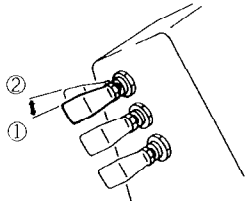
This meter shows the total operation hours of the machine. The service meter advances while the engine is running - even if the machine is not traveling.

Refer to the section "SERVICE METER".

★ While engine is running, green pilot lamp on the service meter flashes to show the service meter advances.

SWITCHES

1. TRANSMISSION CUT-OFF SELECTOR SWITCH



This switch selects the operation of the left brake pedal. Normally, put this switch in ON position.

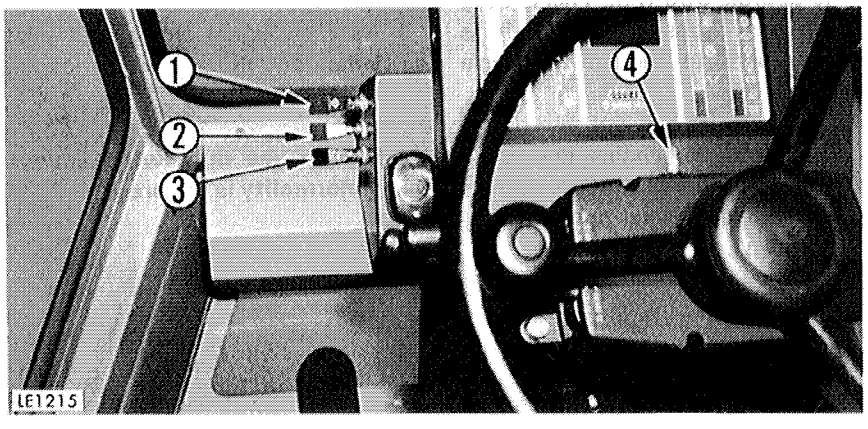
① OFF:

Acts as normal brake (like right brake pedal).

② ON:

Acts as normal brake, but also switches transmission to NEUTRAL.

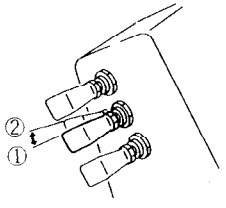
★ If the switch is at ON, the transmission cut-off selector pilot lamp will light up.



⚠ If the machine has to be started on a slope, always turn the transmission cut-off selector switch to OFF and depress the left brake pedal. Then depress the accelerator pedal while releasing the left brake pedal to start the machine off slowly.

★ Put the switch to the desired position according to working condition to make operation easy.

2. FUEL CUT-OFF SWITCH



Engine fuel consumption will be cut.

When using APS (automatic priming system) in cold weather, use when starting.

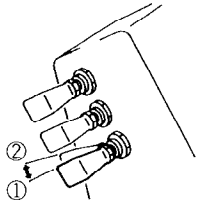
① OFF:
Fuel is not supplied to the engine.

② ON:
Fuel is supplied to the engine.

★ When hand is removed from OFF position, switch returns to ON position.

★ For detailed method of usage, refer to "starting in cold weather".

3. ENGINE LOW IDLING SELECTOR SWITCH

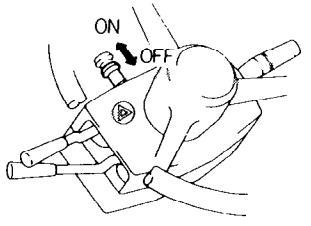


The engine low idling speed can be switched between two levels.

① ON:
The engine low idling speed is set to approx. 950 rpm. This is used on busy jobsites where it is necessary to reduce the cycle time.

② OFF:
This sets the engine low idling speed to approx. 650 rpm. This is used for normal operations at low idling.

4. HAZARD LAMP SWITCH



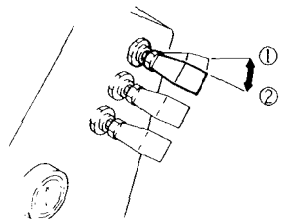
This switch is used in emergencies, such as when the machine breaks down.

ON: All turn signal lamps flash.

★ All turn signal lamps and pilot lamp on the steering column flash.

⚠ **Do not use this switch unless abnormality is occured.**

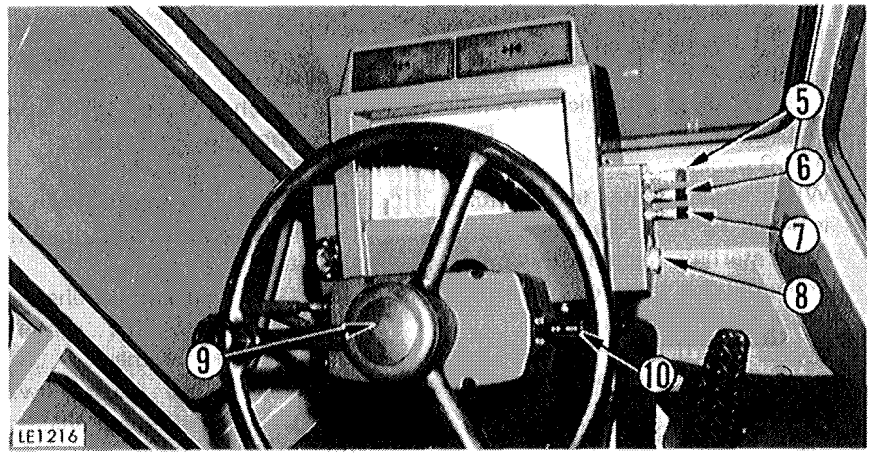
5. PARKING BRAKE SWITCH



This switch operates the parking brake.

① ON position:
The parking brake is applied, and the parking brake pilot lamp lights up.

② OFF position:
The parking brake is released.



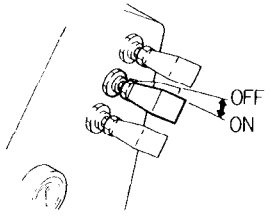
⚠ Always apply the parking brake when leaving the machine or parking it.

★ If the directional lever is placed in F (FORWARD) or R (REVERSE) with the parking brake applied, the warning lamp will flash and the alarm buzzer will sound.

★ When the starting switch is turned to OFF, the parking brake is automatically applied.
Before starting the engine, turn the parking brake switch to ON, then turn it to OFF.

★ The machine does not start when the directional lever is operated with parking brake applied.

6. WORKING LAMP SWITCH

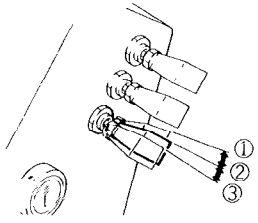


When the front and rear working lamps are turned ON, the pilot lamp and illumination lamp for monitor panel will also light up.

ON: Working lamps are ON.

⚠ **When travelling on public roads, turn the working lamps OFF.**

7. PREHEATER SWITCH (APS (automatic priming system) switch)



When using APS, engine intake air is heated. Usually, the switch is in the OFF position.

① OFF position:
The pre-heat function is not working.

② AUTO position:
When engine water temperature is below 13°C, APS starts.
After starting, maintain this position until the lamp of the after-heating monitor goes out.

★ Before starting APS, put the switch to ON and then put it to this position.

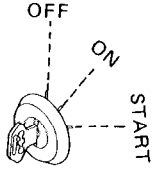
③ ON position:
If the switch is moved again from AUTO position and upward to ON, APS operation will begin.

★ If the switch is released when at the ON position, it will automatically return to AUTO.

★ Method of using preheater switch, refer to the section "starting in cold weather".

★ When the engine settle down after starting, put the preheater switch in OFF position.

8. STARTING SWITCH



This switch is used to start or stop the engine.

OFF

Key insertion-withdrawal position. None of electrical circuits activate.

The hazard lamp, parking lamp and the room lamp will remain on, however, when the switch is turned OFF.

To stop the engine, turn the switch to OFF.

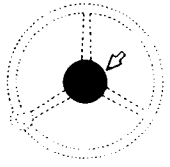
ON

Charging, lamp and accessary circuits activate. Keep key at ON after starting.

START

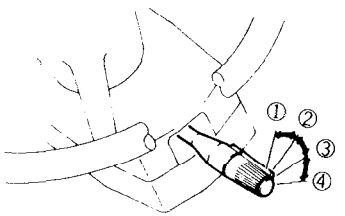
At this key position, the starting motor will crank the engine. Release the key immediately after starting, and the key will return automatically to ON.

9. HORN BUTTON



When the button in the center of the steering wheel is pressed, the horn will sound.

10. LAMP SWITCHES
(for lamps, turn signal lamps, dimmer switch)



Lamp switch

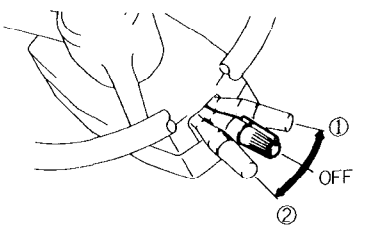
Position ① ·P≦ :
Parking lamp lights up.

Position OFF ② –· • :
Lamps go off.

Position ③ ≧O·O≦ :
Clearance lamps, tail lamps and machine monitor lighting light up.

Position ④ ≧D· :
Head lamps light up in addition to the lamps in position ③ ≧O·O≦ .

★ The lamp switch can be operated regardless of the position of the lever.



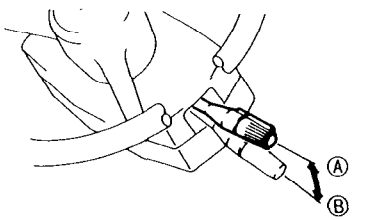
Turn signal lever

This lever operates the turn signal lamps.

① LEFT TURN:
Push lever FORWARD.

② RIGHT TURN:
Pull lever BACK.

★ When the lever is operated, the turn signal pilot lamp will also light up.

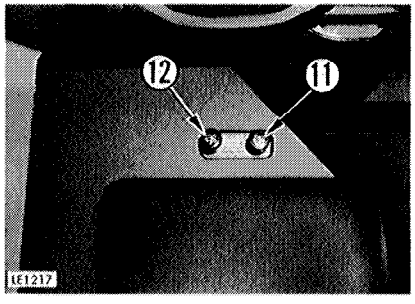


★ When the steering wheel is turned to the neutral position, the turn signal lever will return automatically to OFF. If not, return the lever to OFF manually.

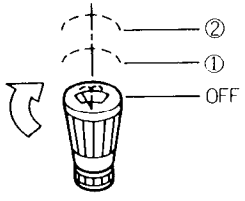
Dimmer switch

This switches the head lamp between high beam and low beam.

Ⓐ Low beam
Ⓑ High beam

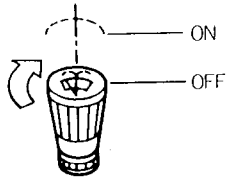


11. FRONT WIPER SWITCH

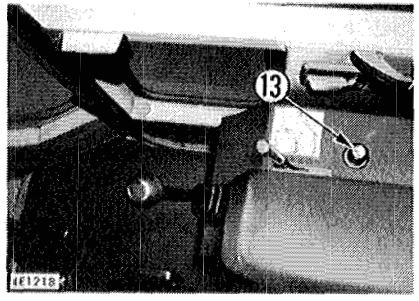


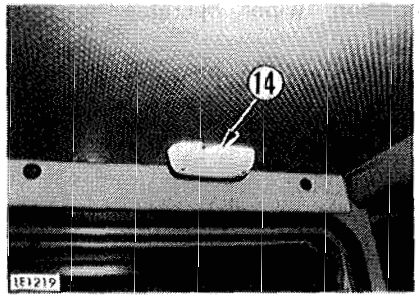
① The wiper is actuated at low speed.
② The wiper works at high speed.
When this switch is turned clockwise, solvent will be sprayed on glass.

12. REAR WIPER SWITCH

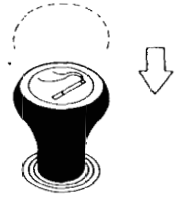


When this switch is pulled to ON position, wiper operates on rear glass.
When this switch is turned clockwise, solvent will be sprayed on glass.



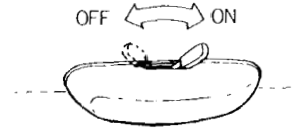


13. CIGARETTE LIGHTER



This is used to light cigarettes. To use, push the lighter in. After the few seconds it will spring back. At that time, remove the lighter and light your cigarette.

14. ROOM LAMP SWITCH



When this switch is moved to ON position, room lamp will light.

PEDALS AND LEVERS

1. ACCELERATOR PEDAL

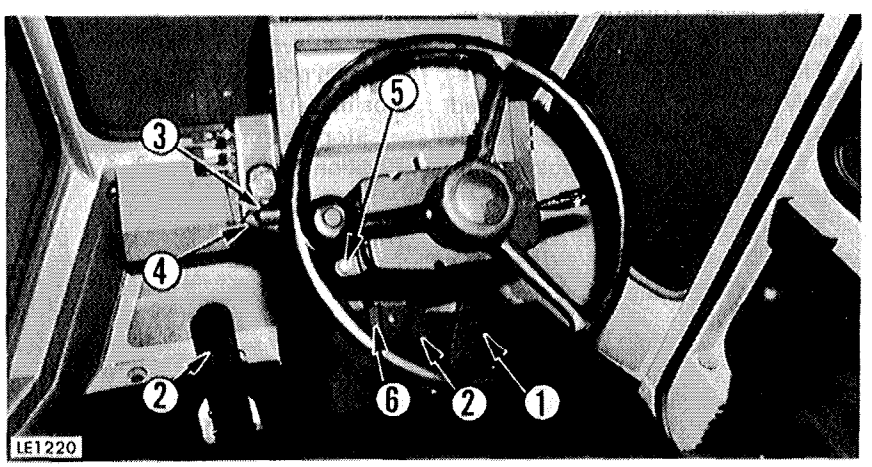
This pedal controls the engine speed and output. The engine speed can be freely controlled between low idling and full speed.

2. BRAKE PEDALS

Right brake pedal

The right brake pedal operates the wheel brakes, and is used for normal braking.

⚠ **When traveling downhill, use the engine as a brake, and always use the right brake pedal.**



Left brake pedal

The left brake pedal operates the wheel brakes, and if the transmission cut-off selector switch is at ON, it also returns the transmission to neutral.

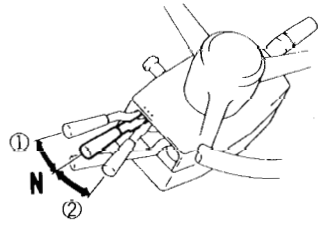
If the transmission cut-off selector switch is at OFF, the left brake pedal acts in the same way as the right brake pedal.

⚠ **Do not use the brake pedals repeatedly unless necessary.**

⚠ **Do not use the brake pedals as footrests. Use them only when applying the brakes.**

★ When the accelerator is being used for operating the work equipment, always use the left brake pedal to slow or stop the machine after putting the transmission cut-off selector switch in ON.

3. DIRECTIONAL LEVER

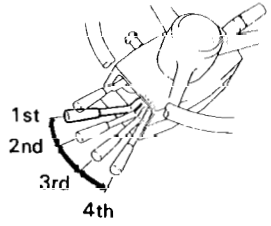


This lever is used to change the direction of travel of the machine.

① Forward
② Reverse
Ⓝ Neutral

★ The engine cannot be started if the directional lever is not at N (neutral).
★ When operating the directional lever, place your hand on a steering wheel and operate it by your fingers.

4. SPEED CONTROL LEVER



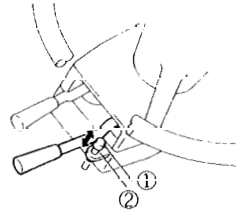
This lever controls the travel speed of machine.

This machine has a 4-FORWARD, 4-REVERSE speed transmission. Place the speed control lever in a suitable position to obtain the desired speed range.

1st and 2nd speeds are used for working.

3rd and 4th speeds are used for traveling.

5. SPEED CONTROL LEVER STOPPER

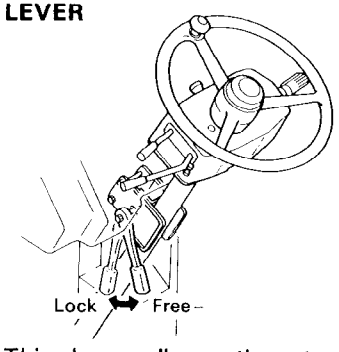


This stopper prevents the speed control lever from entering the 3rd and 4th positions, when working.

Position ①
Stopper actuated.

Position ②
Stopper released.

6. STEERING COLUMN TILT LEVER

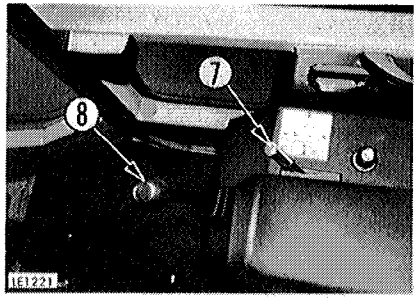


This lever allows the steering column to be tilted forward or backward.

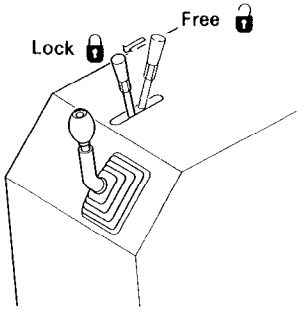
Pull the lever up and move the steering wheel to the desired position. Then push the lever down to lock the steering wheel in position.

★ Range of adjustment:
100 mm (stepless)

⚠ Stop the machine before adjusting the angle of the steering wheel.



7. SAFETY LOCK

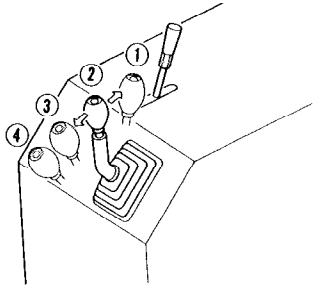


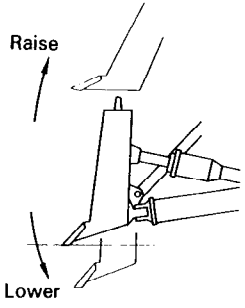
This is used to lock the blade control lever.

⚠ When parking or leaving the machine, or when the performing maintenance, always lower the blade to the ground, put the blade control lever in hold position and check that safety lock lever is locked.

8. BLADE CONTROL LEVER

Lift operation

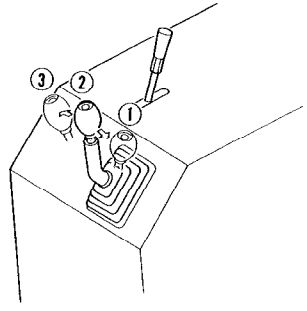




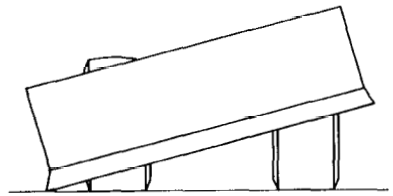
① Raise
② Hold:
The blade is kept in the same position.
③ Lower
④ Float:
The blade moves freely under external force.

★ If the lever is released at positions ① and ③, it will return to the HOLD position.
★ If the lever is released at position ④, it will not return to the HOLD position. Return it by hand.

Tilt operation



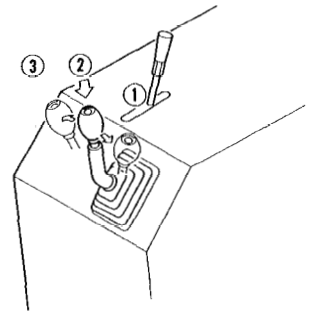
① Left tilt
② Hold:
The blade is kept in the same position.
③ Right tilt



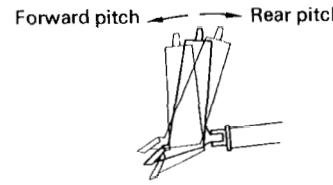
Right tilt

★ If the lever is released at positions ① and ③, it will return to the HOLD position.
★ Operate the tilt, and when the tilt cylinder reaches the end of its stroke, return the lever to the HOLD position as quickly as possible.
★ When tire chains are fitted, do not operate the tilt cylinder to the end of its stroke. Stop it at a position where it does not hit the chain.

Pitch operation

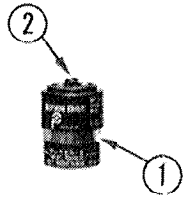


Press down the switch at the tip of the lever and operate the lever.
① Rear pitch
② Hold
③ Forward pitch



★ When the cylinder reaches the end of its stroke, return the lever to the HOLD position as quickly as possible.

DUST INDICATOR



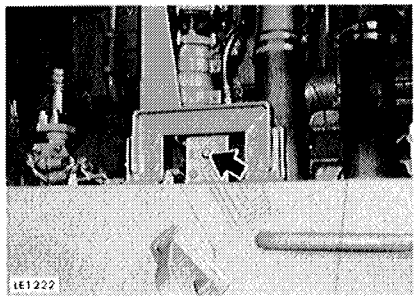
T8774

This device indicates clogging of the air cleaner element. When red piston (1) appears in the transparent part of this indicator, the element is clogged. Immediately clean element.

After cleaning, push indicator button (2) to return red piston to original position.

There are dust indicator on the front of the engine hood behind the cab.

CIRCUIT BREAKER (MAIN)



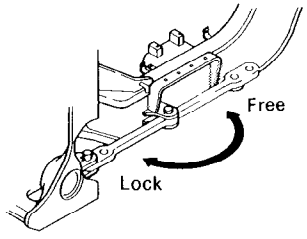
LE1222

This prevents damage to the electrical components and electric wiring.

When the breaker has been actuated, press the reset button to reset the system. However, if the circuit breaker is actuated again after the button is pressed, or the circuit breaker is frequently actuated, there may be a short circuit in the electrical system. In such cases, contact your Komatsu distributor for repairs.

★ The main breaker is not reset for 45 seconds after the breaker is actuated.

SAFETY BAR

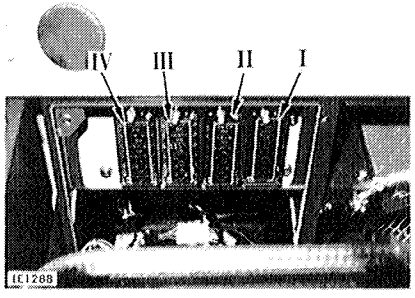


The safety bar is used during maintenance or when transporting the machine. It locks the front frame and rear frame, and prevents the front and rear frames from bending.

⚠ Always use the safety bar for maintenance or when transporting the machine.

⚠ Always remove the safety bar during normal travel operations.

CIRCUIT BREAKER



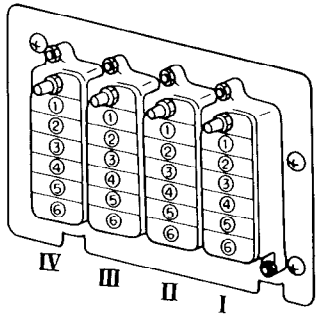
Circuit breaker is in cover behind the operator's seat.

When breaker has been actuated, press the reset button to reset the system.

Pressing the reset button will reset all six breakers in the breaker box at the same time.

⚠ When resetting the breaker, always turn off the electrical current before starting (turn starting switch OFF).

Breaker arrangement and circuit



Circuit breaker I

No.	Breaker capacity	Circuit
①	20A	Air conditioner (Fan outside room)
②	10A	Air conditioner (Fan inside room)
③	10A	Radio, Room lamp
④	10A	Cigarette lighter
⑤	10A	Rear wiper Rear washer
⑥	10A	Front wiper Front washer

Circuit breaker II

No.	Breaker capacity	Circuit
①	20A	APS (automatic priming system)
②	10A	APS (automatic priming system)
③	10A	Monitor panel
④	10A	Pitch control solenoid valve
⑤	10A	Rear working lamp
⑥	10A	Front working lamp

Circuit breaker III

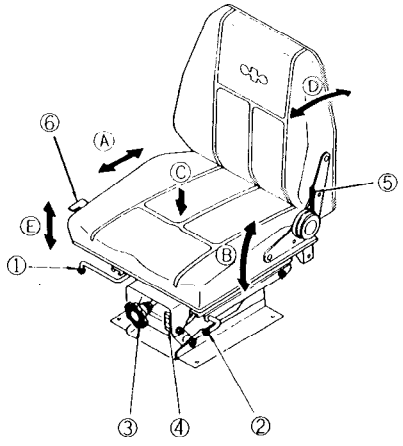
No.	Breaker capacity	Circuit
①	20A	Head lamp, parking lamp Clearance lamp, Tail lamp
②	10A	Turn signal lamp
③	10A	Brake lamp, Back up lamp
④	10A	Transmission control valve
⑤	10A	Horn, Parking brake
⑥	10A	Low idling selector solenoid valve

Circuit breaker IV

No.	Breaker capacity	Circuit
①	20A	Starting switch
②	10A	Hazard lamp
③	10A	Left head lamp
④	10A	Right head lamp
⑤	20A	Left side clearance lamp
⑥	10A	Right side clearance lamp

OPERATOR'S SEAT

The seat adjustment should be checked at the beginning of each shift and when operators change.



A: Forward-backward adjustment

Move lever (1) to the right, move the seat to the best position and release the lever. The seat can be moved forward or backward within a range of 140 mm in 7 stages.

B: Seat angle adjustment

Move lever (2) up, set the seat to the desired angle, and release the lever.

The seat can be tilted up or down about 3°.

C: Seat cushion adjustment

Rotate grip (3) under the seat to adjust scale (4) on the cushion adjustment to your own weight. (50 to 120 kg)

D: Backrest adjustment

Pull lever (5), move the backrest to the best position and release the lever. The backrest can be set to 11 steps.

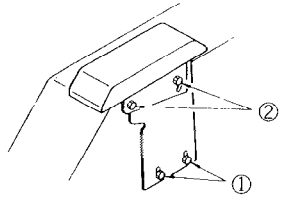
E: Seat height adjustment

Move lever (6) upward, set the seat to the desired height and release the lever.

The seat can be set within 50 mm.

⚠ Park the machine in a safe place and stop the engine when carrying out adjustment of the operator's seat.

RIGHT SIDE ARMREST



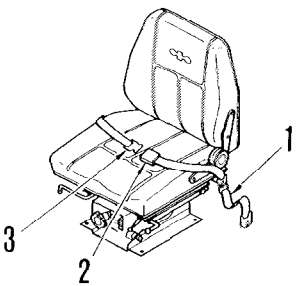
Forward-backward adjustment

Loosen bolts (1) to move the arm-rest to the desired position, and tighten the bolts.

Angle adjustment

Loosen bolts (2) to move the armrest to the desired angle and tighten the bolts.

SEAT BELT



⚠ **Before fastening the seat belt, inspect the securing brackets and belt for abnormal conditions.**

Fasten the belt and remove it in the following manner.

1. Adjust the seat so that the brake pedal can be depressed all the way with the operator's back against the backrest.
2. After positioning the seat, install the tether belt (1). With the seat unoccupied, tense the belt slightly across the seat and install.

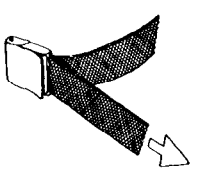
⚠ **Check that there are no kinks in the belt.**

3. Sit in the seat. Hold buckle (2) and insert (3) into the buckle (2). Check that the belt has locked by pulling it.
4. When removing the belt, raise the tip of the buckle lever to release it.

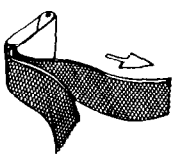
★ Fasten belt along your body without kinking it. Adjust the lengths of the belt on both the buckle and the insert sides so that the buckle is located at the mid-point of your body front.

Adjust the belt length in the following manner.

i) To shorten the belt, pull the free end of the belt on either the buckle body or insert side.



ii) To lengthen, pull the belt while holding it at a right angle to buckle or insert.



5. When operating a machine equipped with ROPS, be sure to use the seat belt.

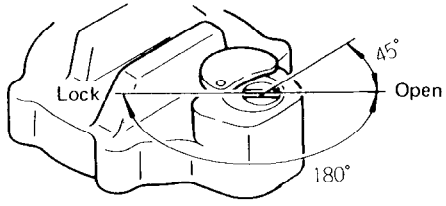
★ Inspect bolts and fittings on the chassis for tightness. Retighten any loose bolts to 2 to 3 kgm torque.

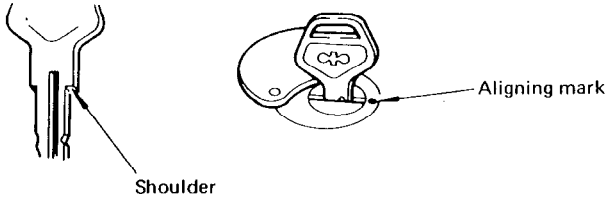
★ If the seat is scratched or frayed or if any of the fittings are broken or deformed from long service, replace the seat belt immediately.

LOCKING CAP

A locking cap is available as an optional radiator cap, fuel tank cap or hydraulic tank cap. Open and close locking caps as follows:

1. To open the cap
   1) Insert the key into the cap.
      ★ Insert the key as far as it will go. If the key is turned before it is inserted all the way, it may break.
   2) Turn the key counterclockwise and bring the rotor groove in line with the aligning mark on the cap. Turn the cap slowly until a "clicking" sound is made. This releases the lock and allows the cap to be opened.
2. To lock the cap
   1) Turn the cap into place.
   2) Turn the key clockwise and take the key out.
      ★ When the cap is locked (against vandalism), it rotates freely.





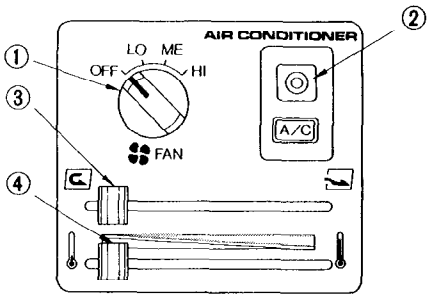
OPERATING THE AIR CONDITIONER

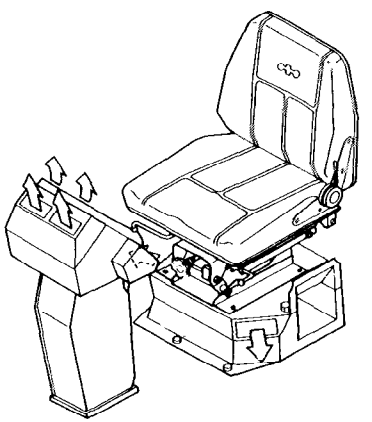
It is possible to use the air conditioner to good effect in dusty jobsites. The outside air is passed through the filter and is sent to the operator's cab to increase the pressure inside the cab. In this way, dust is prevented from entering, so comfortable operating conditions are always maintained for the operator.

EQUIPMENT ON CONTROL PANEL

① Fan switch

- This controls the air flow when the air conditioner is used for cooling or heating.
  - ○ There are 3 levels: L (Low), M (Medium), and H (High).





② Air conditioner switch

- This is the control switch for cooling.

  ON:

  When this button is pressed, the dehumidifying and cooling systems are switched ON.

  The green lamp inside the button lights up to indicate that cooling is in operation.

  OFF:

  If the button is pressed when the cooling is ON, the cooling is switched OFF.

★ Turn the fan switch on before turning the air conditioner switch on.

③ Air selector lever

- This lever switches the source for the cooling air or heating air.
  - ○ FRE (fresh air)
    Fresh air is brought into the cooling system from outside. (This position is used for normal cooling and heating, and when increasing the pressure inside the cab.)
  - ○ REC (recirculate)
    The air conditioning system uses only the air inside the cab. (This position is mainly used for cooling or heating the air inside the cab quickly.)

④ Temperature control lever

- This lever regulates the temperature when cooling.
  - ○ The closer the lever is to COOL, the lower the temperature of the air becomes.
  - ○ The closer the lever is to WARM, the higher the temperature of the air becomes.

Precautions for using air conditioner

When cooling, change the air occasionally.

- Smoking in the air-conditioned cab will cause your eyes to get sore. While smoking, open the window to let the smoke out of the cab.
- While using the air conditioner, open the window once every hour.

Be careful not to overcool the cab.

The cab should feel cool when entering there from outside (5°C or 6°C lower than the outside temperature). It is not good for the health to have the temperature in the cab too low. Always give careful consideration to temperature regulation.

Handling the air conditioner in season

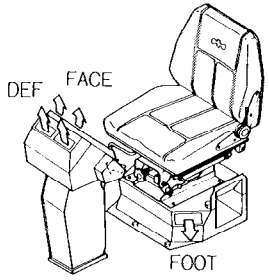
To use the air conditioner comfortably during its season, ask your Komatsu distributor to check the air conditioner and add the refrigerant if necessary.

Handling the air conditioner in off-seasons

To lubricate each part of the compressor during the off-seasons, operate the air conditioner for a few minutes two or three times a month.

METHOD OF OPERATION

SELECTING AIR VENT



Purpose \ Vent	FACE	FOOT	DEF
Cooling	Open	Open or closed	Closed
Heating	Open or closed	Open	Open or closed
Defrosting	Closed	Open or closed	Open
Ventilation	Open	Open	Open

★ The effectiveness of the air conditioning system can be increased by selecting the most suitable vent.

★ Do not turn the fan switch on when all the vents are closed.

OPERATION OF CONTROL PANEL

Purpose \ Lever, switch		Fan switch	Air conditioner switch	Temperature control lever	Air selector lever
Cooling	Quick	H	ON	COOL (moved fully to COOL side)	REC
	Normal	H – L	ON	COOL – Middle	FRE
Dehumidifying, heating		H – L	ON	Middle – WARM	FRE
Heating	Quick	H	OFF	WARM (moved fully to WARM side)	REC
	Normal	H – L	OFF	Middle – WARM	FRE
Defrosting		H	ON	Middle – WARM (to remove frost quickly or to prevent the window from misting up, move the lever to the top)	FRE
Ventilation or pressurizing		H – L	OFF	COOL (move fully to COOL side)	FRE

★ If the outside air is extremely dusty, set the fan switch to the H position. This will pressurize the cab and prevent the dust from entering.

CHECK BEFORE STARTING

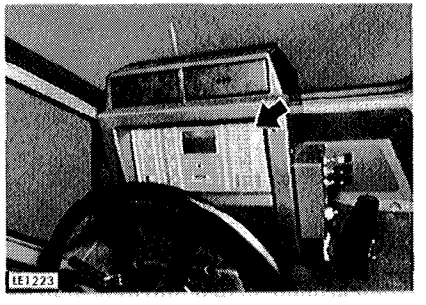
Pre-operation checks forestall machine trouble. Never neglect them.

a. WALK-AROUND CHECK

Look around the machine and under the machine to check for loose nut or bolts, collection of dirt, or leakage of oil, fuel, or coolant, and check the condition of the work equipment and hydraulic system. Check also for loose wiring, play, and collection of dust at places which reach high temperatures.

1. Check end bit and cutting edge for wear.
2. Check transmission case joints for oil leak.
3. Check brake system for air leak and oil leak.
4. Check tightness of air cleaner mounting bolt.
5. Check tightness of battery terminal.
6. Check radiator for water leak.
7. Check around the engine for water and oil leaks.
8. Check axle for oil leak.
9. Check hydraulic tank joint for oil leak.
10. Check for oil leak at high pressure hose and high pressure hose joints.

b. CHECK MONITOR PANEL

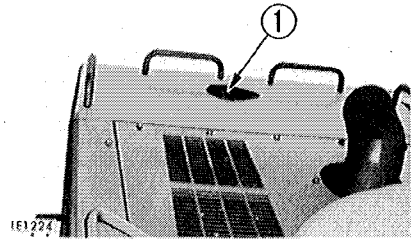


1. Turn the starting switch to ON.
2. Check that all the monitor lamps, the gauges and the warning lamp light up for about 3 seconds and the alarm buzzer sounds for about 1 second.

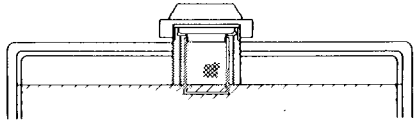
★ If any monitor lamp does not light up, ask your Komatsu distributor to inspect that monitor lamp.

★ Always make the check by referring to this section on CHECK BEFORE STARTING.

c. CHECK AND REFILL COOLANT



Remove radiator cap (1) on rear machine body, and check that cooling water is filled up to depth indicated by shadowed portion. If not, add water.

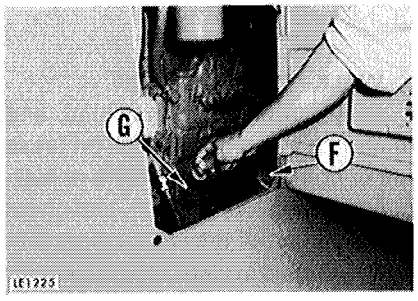


★ If the volume of coolant added is more than usual, check for possible water leakage.

★ Confirm that any oil is not in coolant.

⚠ **Do not remove the cap while cooling water is hot. Hot water may spout out.**
Before removing radiator cap, turn cap slowly to relieve inner pressure.

d. CHECK OIL LEVEL AND REFILL IN ENGINE OIL PAN

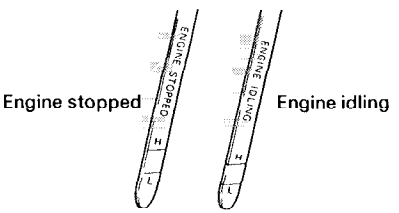


1. Open the inspection window at the rear right side of the machine.
2. Use dipstick (G) to check the oil level.
3. The oil level should be between mark L and H, if necessary, add oil at oil filler (F).

★ The type of lubricant used depends on the ambient temperature. Select according to the table "FUEL, COOLANT AND LUBRICANTS".

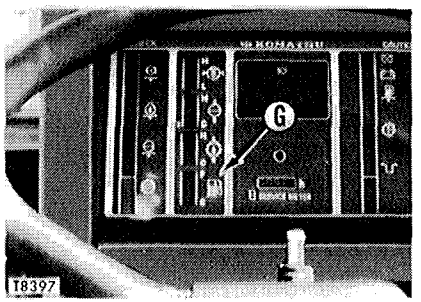
★ After checking, be sure to tighten the handle of (G) and (F).

★ Make an oil level check before starting engine or 15 minutes or more after the engine is stopped.
If oil remains at various portions of the engine, the correct oil level cannot be measured.
★ When checking oil level, park the machine on level ground and stop the engine.
★ Do not add oil above the H level mark.
★ While adding oil, take out the oil level gauge through the gauge guide to bleed the air from the crankcase.

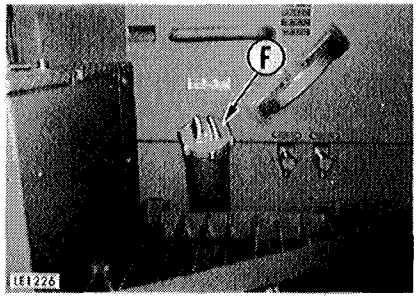


★ The gauge is stamped with ENGINE STOPPED and ENGINE IDLING.
★ Checking the oil level with the engine idling may be allowed, if the following precautions are thoroughly satisfied:
i) Check that the engine water temperature gauge shows green range.
ii) Remove the oil filler cap.
iii) Read the dipstick on its reverse side when it is stamped, "ENGINE IDLING."

e. CHECK FUEL LEVEL AND REFILL FUEL

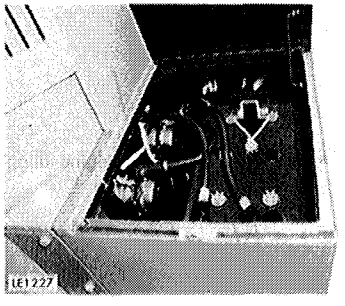


1. Check the fuel level using fuel gauge (G) on the monitor panel.
2. Upon completion of work, pour in addition fuel from filler (F) until the fuel tank is full.



★ Fuel capacity: 610 ℓ
★ When adding fuel, never let the fuel overflow. This may cause a fire.

f. CHECK ELECTROLYTE LEVEL IN BATTERY



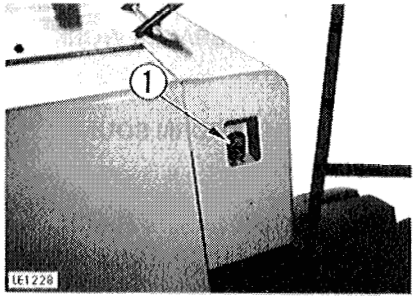
1. Open the battery box covers.
2. If the electrolyte level is lower than the prescribed level (10 to 12 mm above the plate), supply distilled water.

★ Should any of the acid be spilt, have it replenished by the nearest battery shop with acid of the correct specific gravity.
★ When inspecting electrolyte level, clean the air hole of the battery cap.

⚠ **If the electrolyte gets on your skin or clothes, immediately wash with plenty of clean water.**

⚠ **To avoid gas explosions, do not bring fire or sparks near the battery.**

g. CHECK DUST INDICATOR

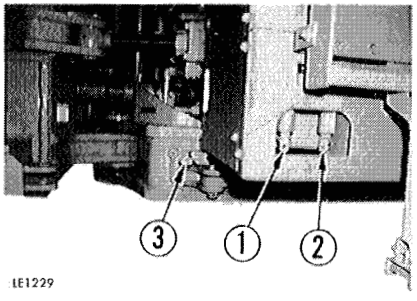


When air cleaner element is clogged, the red piston of dust indicator (1) reaches service level and gets locked.

In that case, clean element referring to the section "WHEN REQUIRED".

After cleaning element, push button to return red piston.

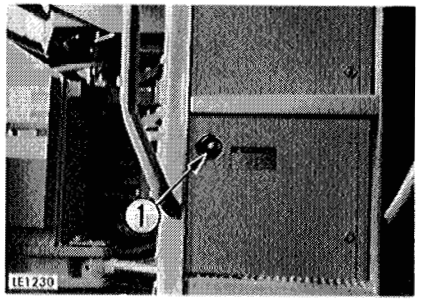
h. DRAIN WATER FROM AIR TANK



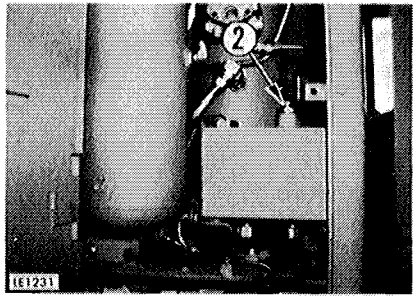
Upon completion of work, open drain valves (1), (2), (3) and drain water out of the tank.

★ When operating in cold weather, after operating the machine, drain water from air tank.

i. CHECK AND REFILL OF OIL IN BRAKE OIL TANK



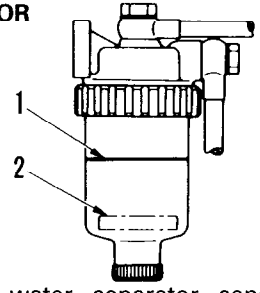
1. Check that the oil level in tank at the left side of the body is in sight gauge (1).
2. Open side cover and cap (2) and refill engine oil, if necessary.



★ The type of lubricant used depends on the ambient temperature. Select according to the table "FUEL, COOLANT AND LUBRICANTS".

⚠ **Always use engine oil to refill the brake oil tank.**

j. CHECK FOR SEDIMENT AND WATER IN THE WATER SEPARATOR



The water separator separates water mixed in the fuel. If float (2) is at or above red line (1), drain the water. For the draining procedure, see section "WHEN REQUIRED".

★ Even if a water separator is installed, be sure to check the fuel tank to remove water and sediment in the fuel.

k. CHECK THAT PARKING BRAKE WORKS PROPERLY.

l. CHECK THAT BRAKES WORK PROPERLY.

m. CHECK THAT HORN SOUNDS PROPERLY.

n. CHECK THAT LAMPS FLASH PROPERLY; CHECK FOR DIRT OR DAMAGE.

o. CHECK DIRECTION OF REAR VIEW MIRROR; CHECK FOR DIRT OR DAMAGE.

p. CHECK THAT ENGINE EXHAUST GAS COLOR AND SOUND ARE NORMAL.

q. CHECK THAT GAUGES AND INSTRUMENTS WORK PROPERLY.

r. **CHECK STEERING PLAY; CHECK THAT STEERING WORKS PROPERLY.**

s. **CHECK THAT BACK-UP BUZZER SOUNDS PROPERLY.**

t. **CHECK ELECTRICAL WIRING**

Check for damage of the fuse and any sign of disconnection or short circuit in the electric wiring. Check also for loose terminals and tighten any loose parts.

Check the following points carefully.

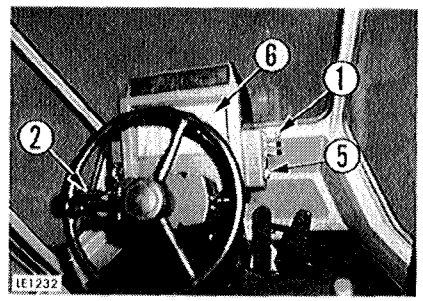
- Battery
- Starting motor
- Alternator

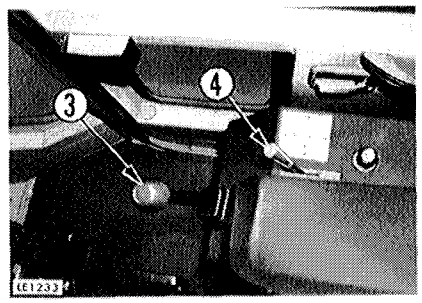
⚠ **If the fuse is damaged or there is any sign of shortcircuiting in the electric wiring, always investigate the cause and correct it.**

★ Please contact your Komatsu distributor for investigation and correction of the cause.

OPERATING YOUR MACHINE

BEFORE STARTING THE ENGINE

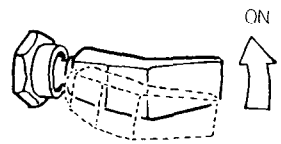




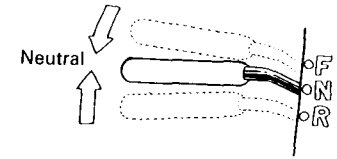
1. Carry out an initial inspection. (For details of the inspection, see CHECK BEFORE STARTING.)

2. With your back against the back rest of the operator's seat, adjust the seat position so that the brake pedals can be easily depressed.

3. Is the parking brake switch (1) in ON position?



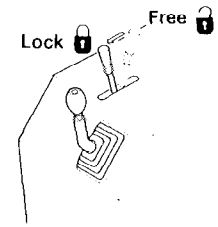
4. Is the directional lever (2) in N (neutral) position?



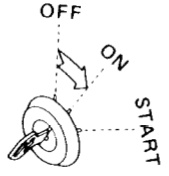
★ The engine will not start while the directional lever (2) is in any position other than N (neutral).

5. Is blade control lever (3) locked by safety lock (4) in hold position?

★ Do not start the engine while blade control lever (3) are in any position other than hold position.

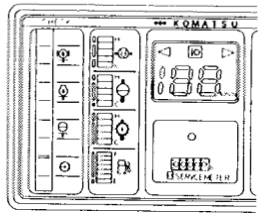


6. Turn the key of starting switch (5) to the ON position.

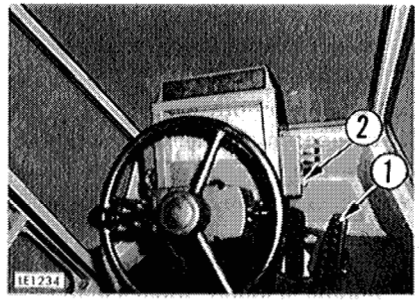


7. In machine monitor (6), confirm that there is no warning indication of following:
   - brake oil amount
   - engine oil amount
   - radiator water level.

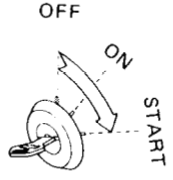
   When there is a warning indicator in the monitor, refer to item, "A check group" explanation of each device.



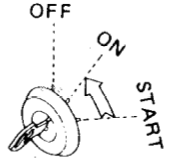
TO START THE ENGINE



1. Depress accelerator pedal (1) lightly.
2. Turn the key of starting switch (2) to the START position to start engine.



3. When engine is started, release the key of starting switch (2) and the key will return automatically to ON.



★ If engine will not start, repeat the starting procedure after about 2 minutes.
★ Do not leave the key in START for more than 20 seconds.
★ To start engine in cold weather, refer to COLD WEATHER OPERATION.

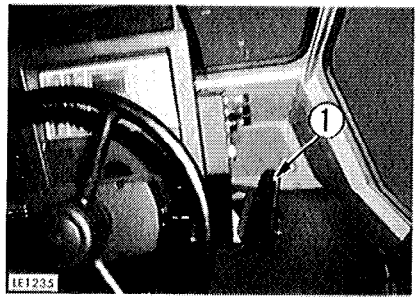
Special starting

When starting after running out of fuel, fill with fuel, then fill the fuel filter cartridge with fuel and bleed the air from the fuel system before starting.

Refer to FUEL FILTER in every 500 hours services.

CHECKS AFTER STARTING

After starting make the following checks.



1. Depress accelerator pedal (1) lightly and run the engine with no load at midrange speed for about 5 minutes.
2. After warm-up run is completed, check monitor lamps for proper operation.

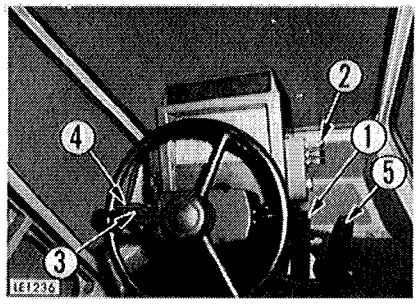
★ Continue to run the engine at light load until the green ranges of the engine water temperature gauge and torque converter oil gauge light.

3. Check if the exhaust color is normal or whether there is any abnormal noise or vibration.

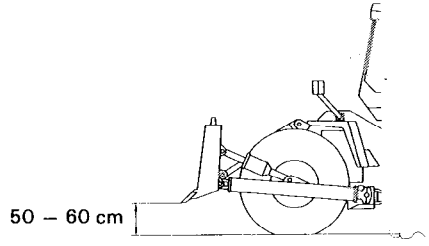
★ Avoid abruptly accelerating the engine until the completion of warm-up.

★ Do not run the engine at low idling or high idling for more than 20 minutes. If it is necessary to run the engine at idling, apply a load from time to time or raise the engine speed to a midrange speed.

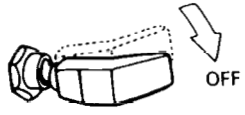
TO MOVE THE MACHINE OFF



1. Check that the warning item is not displayed on the monitor panel.
2. Free the safety lock for the blade control lever. Bring the work equipment in the traveling posture.

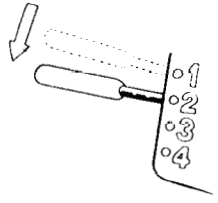


3. Depress right brake pedal (1), and turn parking brake switch (2) to OFF (release) to release the parking brake.



★ When the parking brake is applied with parking brake switch (2) put in OFF, put switch (2) to ON and return it to OFF again.

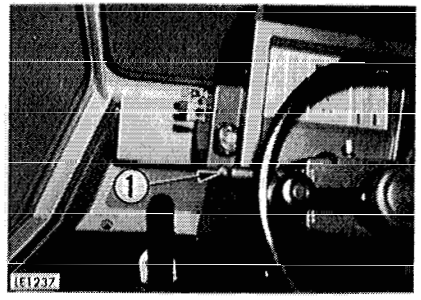
4. Set speed control lever (3) and directional lever (4) to the desired position.



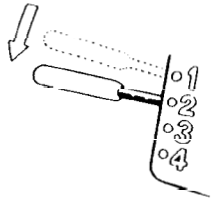
5. Release right brake pedal (1), then depress accelerator pedal (5) to move the machine off.

⚠ **If the machine has to be started on a slope, always turn the transmission cut-off selector switch to OFF and depress the left brake pedal. Then depress the accelerator pedal while releasing the left brake pedal to start the machine off slowly.**

CHANGING GEAR SPEED



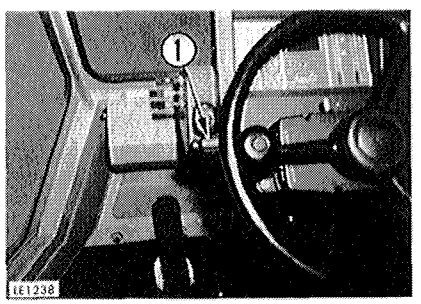
Move speed control lever (1) to the desired position.



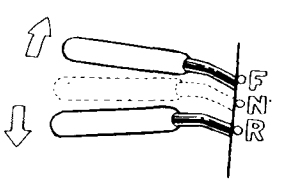
★ To use 1st or 2nd speeds for digging and loading operations, actuate speed control lever stopper.

CHANGING DIRECTION

There is no need to stop the machine even when switching between FORWARD and REVERSE.



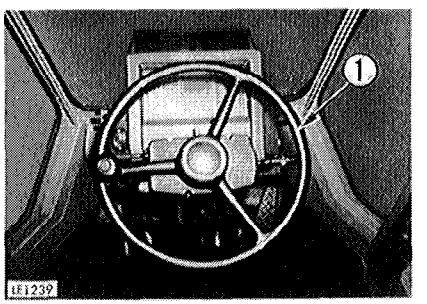
Place directional lever (1) in the desired position.



⚠ **Before changing direction, check that it is safe.**

⚠ **Never change between FORWARD and REVERSE at high speed.**

TURNING



When traveling, use steering wheel (1) to turn the machine.

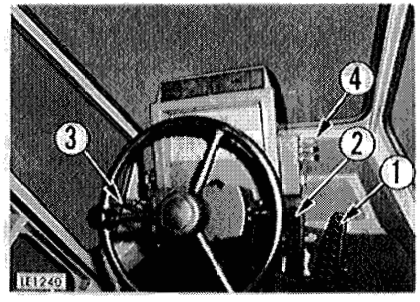
★ With this machine, the front frame is joined to the rear frame at the center of the machine by the center pin. The front and rear frames bend at this point, and the rear wheels follow in the same track as the front wheels when turning.

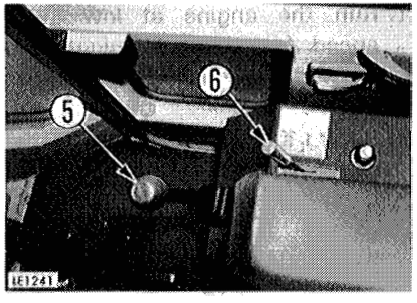
★ Turn the steering wheel lightly to follow the machine as it turns. When turning the steering wheel fully, do not turn it beyond the end of the stroke.

⚠ **It is dangerous to turn the machine suddenly at high speed, or to turn on steep hills.**

⚠ **When the engine stops while the machine is traveling, the emergency steering will operate. But, since this device is an emergency steering device, never stop the engine while the machine is traveling. It is especially dangerous on a hill.**

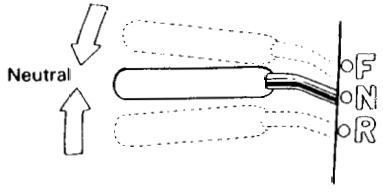
TO STOP THE MACHINE



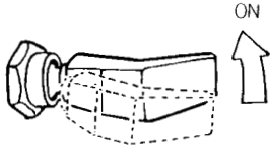


1. Release accelerator pedal (1), and depress brake pedal (2) to stop the machine.

2. Place directional lever (3) in N (neutral).

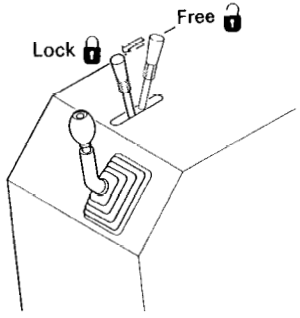


3. Turn parking brake switch (4) to ON to apply the parking brake.



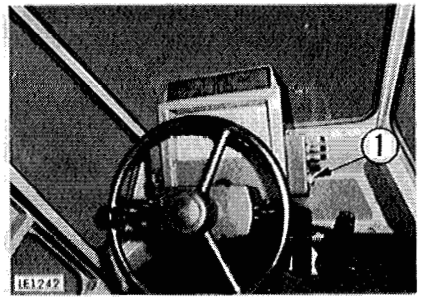
★ When the parking brake is applied, the transmission is automatically returned to neutral.

4. Operate blade control lever (5) and lower the blade to the ground, then lock safety lock (6).



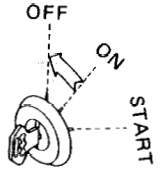
⚠ **Stop the machine in a safe place on firm level ground. If the machine has to be stopped on a slope, put blocks under the wheels. In addition, dig the blade into the ground to increase safety.**

TO STOP THE ENGINE



1. Run the engine at low idling speed for about 5 minutes to allow it to gradually cool down.

2. Return starting switch (1) to the OFF position and remove the key.



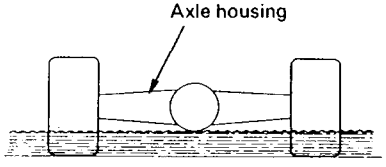
★ If the engine is abruptly stopped before it has cooled down, engine life may be greatly shortened. Consequently, do not abruptly stop the engine apart from an emergency.

★ In particular, if the engine has overheated, do not abruptly stop it but run it at medium speed to allow it to cool gradually, then stop it.

MAXIMUM DEPTH OF WATER

When working in water or on swampy ground, do not let the water come above the bottom of the axle housing.

★ After finishing the operation, wash and check the lubricating points.



IF WHEEL BRAKE DOES NOT WORK

If the machine is not stopped by depressing brake pedal, use the parking brake to stop the machine.

PRECAUTIONS WHEN DRIVING UP OR DOWN SLOPES

Lower the center of gravity when turning.

When turning on slopes, lower the work equipment to lower the center of gravity before turning. It is dangerous to turn the machine with the work equipment raised.

Braking on downhill slopes

If the service brake is used too frequently when traveling downhill, the brake may overheat and be damaged. To avoid this problem, shift down to a low range and make full use of the braking force of the engine. When braking, use the right brake pedal.

If the speed control lever is not placed in a proper speed position, the torque converter oil may overheat. If it overheats, place the speed control lever in the next lower gear speed to lower the oil temperature.

If the temperature gauge does not indicate the green range of the scale even with the lever in the 1st speed position, stop the machine, place the lever in neutral, and run the engine at medium speed until the gauge indicates the green range.

If engine stops

If the engine stops on a slope, depress the right brake pedal fully. Next, lower the work equipment to the ground and apply the parking brake. Then put the directional and speed control levers in neutral, and start the engine again. (If the directional lever is not in neutral, the engine will not start.)

WHEEL DOZER'S WORK

DITCHING

For ditch excavation, tilt the blade. Ground can be dug effectively by a tilted blade.

SMOOTHING

Uneven ground surfaces remaining after digging can be levelled off by fine operation of blade. The basic method is to operate the machine at low speeds with the blade fully loaded with soil and sand. A flat finished surface is also possible by slowly backing the machine with the blade "floating" so it is dragged across the surface. However, avoid this on rocky or stony ground, as it may damage the blade.

DOZING

A wheel dozer transports dirt in a forward direction. Slope excavation can always be most effectively carried out by proceeding from the top downward.

FELLING AND UPROOTING

A tree, 10 to 30 cm in diameter, can be felled by giving 2 or 3 pushes with the blade held off the ground. Next, back the machine and lower the blade to cut into the earth. Break the roots and push them forward while digging.

Never allow the machine to butt against, or give strong impact to a tree by operating at high speeds.

⚠ When carrying out operations, push the objects from directly in front.
Avoid applying loads to only one side of the blade.

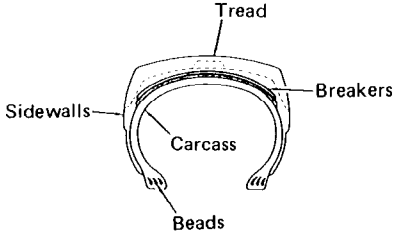
⚠ Avoid hitting hard bedrock or hitting at an angle with force. This is dangerous, and also reduces the life of the machine.

HANDLING THE TIRES

PRECAUTIONS WHEN HANDLING TIRES

If the following defects are found in tires, for safety reasons the tire should be replaced with a new tire.

- Bead wire is broken or bent, or the tire is greatly deformed.
- Wear is excessive and the carcass ply (excluding breaker) is exposed for more than 1/4 of the circumference.
- Damage to the carcass exceeds 1/3 of the tire width.
- Tire layers are separated.
- Radial cracks reach the carcass.
- Deformation or damage which makes the tire unsuitable for use.



PRECAUTIONS WHEN DRIVING MACHINE

When the machine travels at high speed for a long distance, the tires become extremely hot. This causes early wear of the tires, so it should be avoided as far as possible. If the machine must be driven for a long distance, take the following precautions.

- Follow the regulations related to this machine, and drive carefully.
- The most suitable tire pressure, travel speed, or tire type differ according to the condition of the travel surface. Contact your Komatsu distributor or tire dealer for information.
- The following is a guide to suitable tire pressures and speeds when traveling on a paved surface with standard tires.
  Tire pressure: Front 4.0 kg/cm^2
  Rear 4.0 kg/cm^2
  Speed: 13 km/h
- Check the tire pressure before starting, when the tire is cool.
- After traveling for 1 hour, stop for 30 minutes. Check the tires and other parts for damage; also check the oil and coolant levels.
- Always travel with the bucket empty.
- Never put calcium chloride or dry ballast in the tires when traveling.

TIRE PRESSURE

Measure the tire pressure before starting operations, when the tires are cool.

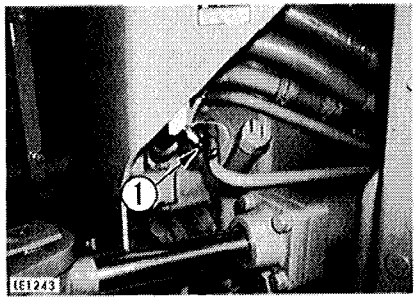
If the inflation pressure is too low, it causes overload on the tires; if the inflation pressure is too high, the tire may be cut or may burst under shock. Therefore adjust the inflation pressure to the values in the following table.

- For operations on normal road surfaces: ..... High end of range in air pressure chart
- Stockpile operations on soft ground: ..... Average pressure in air pressure chart
- Operations on sand: ..... Low end of range in air pressure chart

If the deflection of the tire is excessive, raise the inflation pressure within the limits given in the table to give a suitable deflection (see deflection ratio).

★ Stockpile operations mean the loading of sand and other loose materials.

Inflating tires

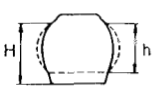


Connect the air charge hose to air pickup (1) to inflate the tires.

Tire size (pattern)	Ply rating	H Free height (mm)	Inflation pressure (kg/cm²)		
			Soft ground (sandy ground)	Normal road	When shipped from factory
35/65 – 33 (L-4 Rock)	24	527	3.0 – 3.5	3.0 – 4.0	Front tire: 3.5 Rear tire: 3.5

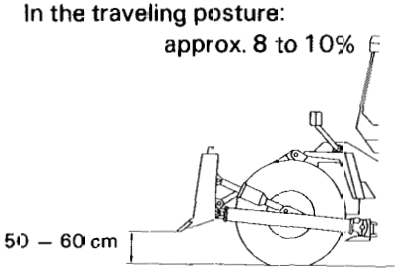
★ Deflection ratio (deflection/free height)

$$= \frac{H - h}{H} \times 100$$



H: Free height
h: Height when loaded

As a guide for visual checks, the deflection ratio (deflection/free height) of the front tire should be as follows.
In the traveling posture:



★ When checking the tire pressure, check also for small cracks and damage, and for wire or small pieces of metal which may cause punctures. Check also for abnormal wear.
★ Operating costs can be reduced and tire life increased by keeping the operating area in good condition and free from fallen rocks.

TOWING

TOWING THE MACHINE

This machine must not be towed except in emergencies. When towing the machine, take the following precautions.

⚠ **If there is a failure in the brake line, the brakes cannot be used, so be extremely careful when towing.**

When engine can be used.

- Always keep the engine running when towing the machine, so that the steering and braking can be used.

When engine cannot be used.

- Never move the machine more than 800 m.
- If the machine has to be moved more than 800 m, remove the front and rear drive shafts before moving the machine.
- For machines without the emergency steering system, the steering cannot be operated, so disconnect the steering cylinder and steering linkage.

★ Do not tow the machine at a speed faster than 8 km/h.

★ If the pressure inside the air tank drops abnormally, the parking brake is actuated, so release the parking brake before towing the machine.

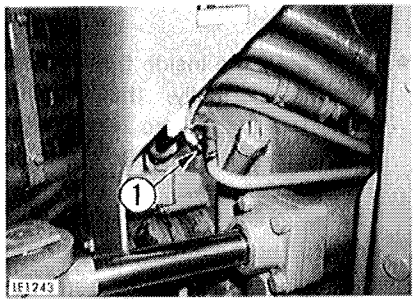
★ The machine should be towed only to the nearest place for inspection and maintenance.

⚠ **Do not tow the machine for long distances.**

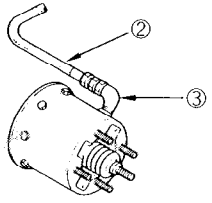
★ Do not tow the machine for a long distance. No air is supplied, so the braking effect is lost, so the brakes cannot be used.

★ If the air pressure inside the air tank drops because of leakage of air from the air circuit, the parking brake is actuated. Release the parking brake before towing the machine.

RELEASING PARKING BRAKE



1. Remove air charge socket (1) installed on the front left of the rear frame.
2. Remove air hose (2) and elbow (3) of the brake spring cylinder, then install the socket again.



3. Install the air charge hose for the tire to the air charge socket.

⚠ **If there is a failure in the air circuit, the brakes cannot be used. This is dangerous, so always tow the machine at low speed. Keep the engine running so that the steering can be used.**

4. Push the end of the hose on the tire valve, and air will be supplied to the brake chamber to release the brake.
5. When the parking brake is released, remove the air charge hose. Tow the machine immediately to a safe place.

⚠ **Stop the machine on a flat surface when releasing the parking brake, and check that the surroundings are safe. In emergencies or when the parking brake must be released on a hill, block the tires carefully before releasing the brake.**

★ Contact your Komatsu distributor for details.

TRANSPORTATION

When transporting the machine, observe the various road rules, road transportation vehicle laws and vehicle limit ordinances, etc. It is a good idea to obtain a special platform for loading and unloading the machine. When it is unavoidably necessary to use a gangplank, however, at the very least observe the following for the sake of safety.

1. Properly apply the brakes on the trailer and insert blocks beneath the tires to ensure that it does not move. Then fix the gangplank in line with the centers of the trailer and the machine.

★ Make sure the gangplank has sufficient width, length and thickness to enable the machine to be safely loaded and unloaded.
If the gangplank sags appreciably, reinforce it with blocks, etc.

2. Determine the direction of the gangplank, then slowly load or unload the machine.

★ When transmission cut-off switch is put in OFF, the left brake pedal and accelerator pedal can be operated at the same time.

★ Remove all the mud from the undercarriage to prevent the machine from slipping to the side on hilly roads.

⚠ **Do not on any account change the direction of the machine while it is on the gangplank. To change the direction of the machine, first take it down from the gangplank.**

3. Correctly load the machine onto the specified part of the trailer.

4. Lower the blade and lock each control lever using safety lock.

5. When transportating the machine, place blocks underneath the front and rear wheels to prevent the machine from moving about. Also, hold it down with chains or wire ropes.

★ Determine the route for transporting the machine by taking into account the width, height and weight of the machine.

⚠ **When loading the machine, park the trailer on a flat firm roadbed. Keep a fairly long distance between the road shoulder and the machine.**

HANDLING OF BATTERY

PRECAUTIONS FOR CHARGING BATTERY

1. Before charging, disconnect the cable from the negative (−) terminal of the battery. Otherwise, an unusually high voltage will damage the alternator.
2. While charging the battery, remove all battery plugs for satisfactory ventilation.
   To avoid gas explosions, do not bring fire or sparks near the battery.
3. If the electrolyte temperature exceeds 45°C, stop charging for a while.
4. Turn off the charger as soon as the battery is charged.
   Overcharging the battery may cause followings:
   1) Overheating the battery
   2) Decreasing the quantity of electrolyte.
   3) Damaging the electrode plate.
5. If the electrolyte gets on your skin or clothes, immediately wash with plenty of clean water.
6. Do not mix up cables (positive (+) to negative (−) or negative (−) to positive (+)), as it will damage the alternator.
7. When inspecting or servicing a battery, be sure to stop the engine and turn the starting switch key to "OFF" position.
8. When performing any service to battery besides checking the electrolyte level or measuring the specific gravity, disconnect cables from the battery.

REMOVAL AND INSTALLATION OF BATTERY

⚠ **When removing battery, first disconnect the cable with the black tube from the ground (normally, from the negative (−) terminal). If a tool touches a cable connecting the positive terminal and the chassis, there is danger of sparks being emitted.**

- When installing battery, the ground cable should be connected to the ground terminal as the last step.

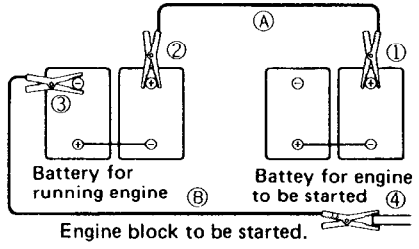
★ The batteries are mounted on both side of the machine. The grounding cable is connected to the left side battery.

STARTING ENGINE WITH A BOOSTER CABLE

When starting up the engine with a booster cable, do as follows:

1. Before connecting the booster cable
   1) Size of booster cable and clip should be suitable for the battery size.
   2) Check cables and clips for breaks, corroded surfaces, etc.
   3) Make sure cables and clips are firmly secured.
   4) Keep the starting switch in "OFF" position.
   5) The battery of the running engine must be the same capacity as that of engine to be started.
2. Connect the booster cables in the following manner.
   1) Connect one clip of booster cable A to the positive (+) terminal of the engine to be started.
   2) Connect the other clip to the positive (+) terminal to the engine which is running.
   3) Connect one clip of booster cable B to the negative (−) terminal of the engine which is running.
   4) Connect the other clip to the engine block to be started.

★ Make sure the clips are firmly connected to battery terminals. Then, start the engine.



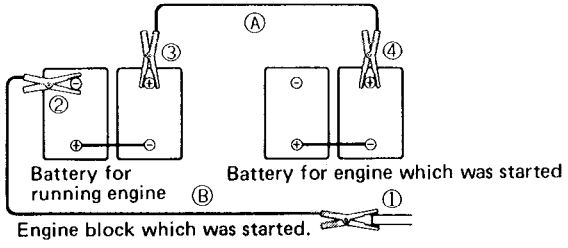
⚠ **When connecting the cables, never contact the positive (+) and negative (−) terminals.**

⚠ **Make sure that the booster cable connections are correct. Connect the booster cable to the engine block as far as possible from the battery.**

3. Starting engine
   1) Turn the starting switch to START position and start up the engine.
   2) If the engine doesn't start at first, try again after 2 minutes or so.

After the engine has started, the booster cables should be disconnected in the reverse order in which they were connected.

1. Disconnecting the booster cables
   1) Disconnect the clip of booster cable B from the engine block which was started.
   2) Disconnect the other clip from the negative (−) terminal of the running engine.
   3) Disconnect the clip of booster cable A from the positive (+) terminal of the running engine.
   4) Disconnect the other clip from the positive (+) terminal of the engine which was started.



COLD WEATHER OPERATION

PREPARATION FOR LOW TEMPERATURE

If the temperature becomes low, it becomes difficult to start the engine, and the coolant may freeze, so do as follows.

FUEL AND LUBRICANTS

Change to fuel and oil with low viscosity for all components.
For details of the specified viscosity, see the TABLE OF FUEL, COOLANT AND LUBRICANTS.

COOLANT

After cleaning inside of the cooling system, add antifreeze to the coolant to prevent the coolant from freezing when the machine is not being used.

★ For details of the antifreeze mixture when changing the cooling water, see WHEN REQUIRED.

Care in using Antifreeze

Use a Permanent Antifreeze (ethylene glycol mixed with corrosion inhibitor, antifoam agent, etc.) meeting the standard requirements as shown below. With permanent antifreeze, no change of coolant is required for a year. If it is doubtful that an available antifreeze meets the standard requirements, ask the supplier of that antifreeze for information.
Standard requirements for permanent antifreeze

- SAE J1034
- FEDERAL STANDARD
  ..... O-A-548D

★ Never use methanol, ethanol or propanol based antifreeze.
★ Where no permanent antifreeze is available, an ethylene glycol antifreeze without corrosion inhibitor may be used only for the cold season. In this case, clean the cooling system twice a year (in spring and autumn). When refilling the cooling system, add antifreeze in autumn, but do not add any in spring.
★ Absolutely avoid using any water leak preventing agent irrespective of whether it is used independently or mixed with an antifreeze.
★ Do not mix one antifreeze with a different brand.

⚠ **Antifreeze is flammable, so keep it away from any flame.**

• Battery
As ambient temperature drops, battery capacity will drop, and electrolyte may sometimes freeze if battery charge is low. Maintain battery at a charge level of approx. 100% and insulate it against cold temperature so that machine can be readily started the next morning.
★ Measure specific gravity of fluid and obtain rate of charge from the following conversion table:

Temp. of fluid / Rate of charge	20°C	0°C	−10°C	−20°C	−30°C
100%	1.28	1.29	1.30	1.31	1.32
90%	1.26	1.27	1.28	1.29	1.30
80%	1.24	1.25	1.26	1.27	1.28
75%	1.23	1.24	1.25	1.26	1.27

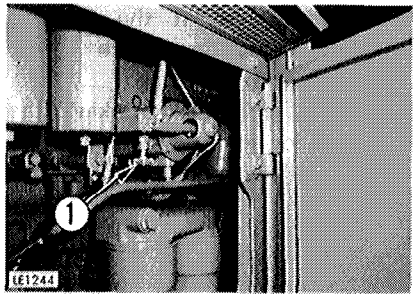
★ When electrolyte level is low, add distilled water in the morning before work instead of after the day's work. This is to prevent fluid from freezing at night.

⚠ **To avoid gas explosions, do not bring fire or sparks near the battery.**

⚠ **If the electrolyte gets on your skin or clothes, immediately wash with plenty of clean water.**

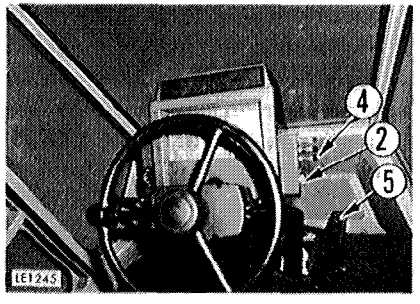
STARTING IN COLD WEATHER
(Starting by automatic priming system (APS))

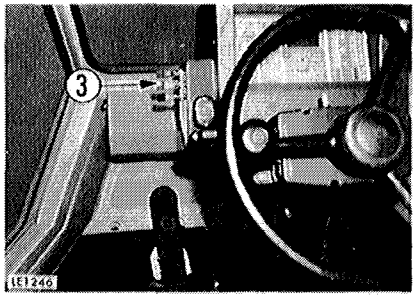
When the ambient temperature drops and it is difficult to start the engine normally, use the following starting procedure.



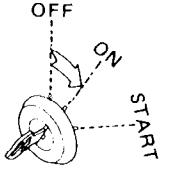
1. Open fuel valve (1) of the automatic priming system.

★ Keep the fuel valve (1) open when the temperature drops during the season the APS is used.

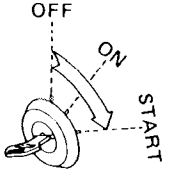




2. Turn starting switch key (2) to ON position.



3. Keep fuel cut-off switch (3) in OFF position (pull forward). Put starting switch (2) in START position and engine will start in about 10 seconds.



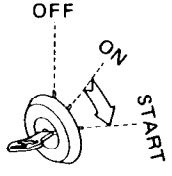
4. Put fuel cut-off switch (3) in ON position.
   (When releasing the switch, it will return to ON position.)

5. When preheater switch (4) is put in the ON position, the pre-heat monitor will light and automatic pre-heating will start.

★ If the pre-heating monitor lights, return the preheater switch to AUTO position. (When releasing the switch, it will return to AUTO position.)

★ When the engine cooling water temperature is over 13°C, if the preheat switch is returned to AUTO, the preheating monitor will go out and automatic pre-heating cannot be carried out.
If normal starting is difficult, use the procedure given in "Starting using manual preheating" to start the engine.

6. Depress the accelerator pedal (5) about half way.
7. Pre-heating finishes in about 80 seconds. The pre-heating monitor lamp will stop illuminating so turn starting switch key (2) to START position to start.

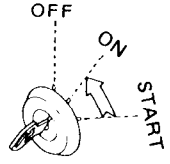


★ When the pre-heat monitor is still illuminated and the starting switch is put in START position, the glow plug will get wet, and there will be no ignition, so be careful of starting problems.

★ When starting, and the starting motor is rotating, the monitor will start to flash. If the flashing stops after the engine starts, there is nothing wrong.

★ Do not continue cranking the engine for more than 20 seconds.

8. If starting, return key of starting switch (2) to ON position.
   (When releasing the key, it will automatically return to ON.)



★ If the engine does not start through the steps specified above, turn key of the starting switch to OFF position and repeat Steps 2 to 8 at an interval of approx. 2 minutes.

9. After starting the engine, when afterheating monitor goes off, turn preheater switch (4) in OFF position.

★ After starting the engine, when the water temperature reaches about 20°C, the after-heating is automatically cancelled and the after-heating monitor lamp goes out. The time taken for the after-heating lamp to go out depends on the ambient temperature.

Ambient temperature	Time taken after starting engine until after-heating monitor goes out
15 – 0°C	1 – 2 minutes
Below 0°C	3 – 5 minutes

★ If a work operation starts with forgetting to turn preheater switch to OFF position, the exhaust color will become bad, the horsepower will drop, and the life of the glow plug will be shortened, therefore, always be sure to put preheater switch in OFF position.

★ Do not run engine rpm higher than middle speed rpm.

STARTING USING MANUAL PREHEATING

When the engine water temperature is above 13°C, automatic preheating cannot be carried out. (When the preheat switch is turned to AUTO, the preheating monitor lamp goes out.) If it is difficult to start the engine, use the following procedure.

1) Put starting switch key to ON position.
2) Keep the preheater switch in ON position with hand until the preheating monitor goes off.
3) As soon as light goes off, quickly return starting switch to START position, and start engine.
4) After starting, put preheater switch in OFF position.

⚠ **There is a danger of explosion when using a starting aid liquid for starting the engine, therefore, never use it.**

CAUTIONS AFTER COMPLETION OF WORK

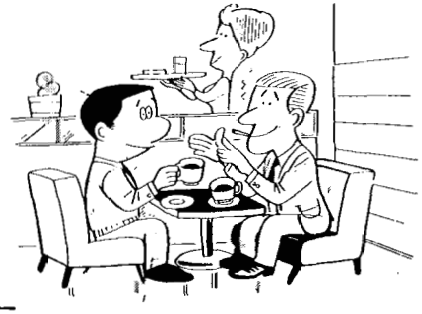
1. Mud and water on the machine body should be completely removed.
   Park the machine on concrete or hard ground. If this is impossible, park the machine on wooden boards. This will prevent the accessories from freezing to the ground thereby preventing machine movement the next morning. Particular attention should be given to water drops collected on the surface of the hydraulic cylinder piston rods. Such droplets must be fully wiped off because if water is frozen to the rod when the cylinder is utilized, the cylinder oil seals may be damaged.
2. Drain water collected in air tank and fuel system so that such water may be frozen at night.
3. As battery capacity drops at low ambient temperature, cover the battery or remove it from the machine to be kept warm at night.

AFTER COLD WEATHER

When weather becomes warm, perform the following without fail:

- Replace lubricating oils for various units with the ones specified for warm-weather use.
- If for any reason permanent antifreeze cannot be used, and an ethyl glycol base antifreeze (winter, one season type) is used instead, or if no antifreeze is used, drain the cooling system completely, then clean out the inside of the cooling system thoroughly, and fill with fresh water.
- As the APS (Automatic Priming System) becomes useless (at 15°C or above), be sure to close the fuel vlave for the APS.

MEMO



PERIODIC MAINTENANCE

Proper lubrication and maintenance assure trouble-free operation and long machine life. Time and money spent for scheduled periodic maintenance will be amply compensated by prolonged machine operation and reduced operating cost.

All hourly figures given in the following descriptions are based on service meter readings. In practice, however, it is recommended to rearrange all of them into units of days, weeks and months to make the maintenance schedule more convenient. Under rough job site or operating conditions, it is necessary to somewhat shorten the maintenance intervals stated in this manual.

PRECAUTIONS FOR MAINTENANCE

GENERAL

- Wear well-fitting helmet, safety shoes and working clothes. When drilling, grinding or hammering, always wear protective goggles.
- When working with others, choose a group leader and work according to his instructions. Do not perform any maintenance beyond the agreed work.
- Hand a caution sign in the operator's compartment (for example "Do not start" or "Maintenance in progress").
  This will prevent anyone from starting or moving the machine by mistake.
- Smoke only in designated places. Never smoke while working.
- Always keep the work shop in good condition. Make sure there is no mud or oil on the floor.
- Keep oily cloths and other combustible things in a safe place away from fire. In addition, learn the location and method of operation of fire extinguishers.
- Always stop the engine before cleaning the machine or adding fuel.
- Flame should never be used instead of lamps. Never use a naked flame to check leaks or the level of oil, fuel, anti-freeze or electrolyte.
- Always use non-inflammable cleaning agents when cleaning parts.

BEFORE MAINTENANCE

- Before starting work, stop the machine on a firm, level surface, and use blocks to keep the machine from moving during operations.
- Lower the blade to the ground. If this is impossible, use the safety pin and blocks to hold the work equipment securely in position. In addition, apply the locks to all control levers.
- Always lock the front and rear frames before inspecting and servicing the machine.
  (In articulate frame model)
- Remove all oil and mud from the machine. In particular, be sure that the steps, hand grips, and the floor of the operator's compartment are clean.
- Always use the standard ROPS equipment. Do not modify the ROPS equipment.

DURING MAINTENANCE

- When getting on or off the machine, use the steps, hand grips and ladders. Never jump on or off the machine. If the steps, hand grips, or ladder cannot be used, use a stand to give firm footing.
- If necessary, remove the cables from the battery terminals. When charging the battery, make sure the area is well ventilated.
- Exhaust gas is dangerous. When working inside, be particularly careful to have good ventilation.
- When opening inspection covers, stop the engine. If the hood or other covers are fitted with a lock, always apply the locks securely when opening or closing the hood or cover.
- Always stop the engine before adjusting belt tension or before checking or servicing the water pump.
- Be particularly careful when removing the radiator cap or the hydraulic oil tank filler cap. If this is done immediately after using the machine, there is a danger that boiling water or oil may spurt out.
- Always release the pressure in the circuit before checking or servicing the oil, water or air circuits.
- When the engine stops, the water and oil in the circuit is hot, so be careful not to get burned. Wait for the water and oil to cool before starting any work on the machine.

MISCELLANEOUS

- Thoroughly wash the machine, particularly the oiling and greasing parts and the vicinity, thereof, in order to prevent the ingress of dust.
- Use genuine Komatsu replacement parts specified in the parts list.
- Use Komatsu specified oil and grease. Use oil and grease having the recommended viscosity for the particular ambient temperature.
- Use clean oil and grease and keep them in clean containers to avoid the ingress of dust.
- Inspect or replace oil in a dust-free location to prevent the ingress of dirt.
- Drain off used oil after heating it to a suitable temperature (about 20 to 40°C).

- After replacing oil, filter element or strainer, bleed the air from the circuit.
- When the strainer is located in the oil filler, the strainer must not be removed while adding oil.
- When adding oil or checking the oil level, check that the oil is at the correct level.
  When adding oil or fuel, do not let the oil or fuel overflow.
- If oil or water are spilled, always wipe it up. Spilled oil or water may cause people to slip; spilled oil may cause fire.
  If soil is piled on top of a place where fuel has been spilled, remove the soil.
- After greasing up, always wipe off the old grease that was forced out.
- When changing the oil or filter, check the drained oil and filter for any signs of excessive metal particles or other foreign materials.
- When removing parts containing O-rings, gaskets or seals, clean the mounting surface and replace with new sealing parts.
- When washing the machine, ensure that water does not get onto the alternator.
- Special measuring apparatus is needed for testing hydraulic pressure.
- Thoroughly wash the machine. In particular, be careful to clean the filler caps, grease fittings and the area around the dipsticks. Be careful not to let any dirt or dust into the system.
- When check an open cover there is a risk of dropping things in. Before removing the covers to inspect cover, empty everything from your pockets. Be particularly careful to remove wrenches and nuts.
- When working on the sea shore, carefully clean all electrical equipment to ensure that is does not corrode.
- Before working in muddy water, rain or snow, check that the various plugs, valves, are properly screwed up. Upon completion of work, wash the machine, then check the various parts of the machine for cracking, scratching, loose or missing nuts and bolts. Also, oil and grease the various parts of the machine.
- When working on rocky ground, be careful of damage to the undercarriage, loose nuts and bolts, cracks, wear and other damage.

- When working in a dusty location, be careful of the following:

1) Inspect the dust indicator to see whether the air cleaner is blocked up. Clean the air cleaner as soon as it becomes dirty.
2) Clean the radiator core so that it does not become blocked up.
3) Clean or replace the fuel filter as soon as it becomes dirty.
4) Clean the electrical equipment, particularly the starting motor and alternator, to prevent accumulation of dust.

- When installing car radio and a walkie-talkie or citizen band, contact your Komatsu distributor.
- When washing the machine, take care not to splash water over the electrical equipment. If it is soaked with water, it may not operate normally.
- After disconnecting the connector, cover it with a vinyl bag to prevent oil or dust from sticking to its contact section.
- When welding, be careful of the following:

1) Turn OFF the power (starting switch).
2) Do not continuously apply more than 200 V.
3) Install the ground cable at least 1 m from the range to be welded.
4) Take care not to install the seals between the grounded point and the range to be welded.

★ Use ordinary automobile washer fluid. Be careful not to let dirt or dust get in.

Greasing the rod end

Because of the rod end is the oilless type, no greasing is required, although a grease nipple is fit to the rod end on the lever linkage.

The rod end should be greased only when it becomes stiff after using it for a long span of time.

BLEEDING AIR FROM CIRCUIT

BLEEDING AIR FROM HYDRAULIC CIRCUIT

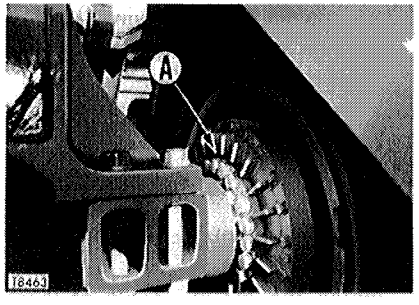
- After replacing oil, filter element or strainer, bleed the air from the circuit.

To bleed the air from the hydraulic cylinders or hydraulic piping, run the engine at low idling and do as follows.

1) Operate each hydraulic cylinders 4 to 5 times, stopping 100 mm from stroke end.
2) Next, operate each cylinder 3 to 4 times to the stroke end.

★ If the engine is run at high speed at first, or if the cylinder is moved to the end of its stroke, the air in the cylinder may damage the piston packing, etc.

BLEEDING AIR FROM BRAKE HYDRAULIC CIRCUIT



After removing piping of brake hydraulic circuit, air bleed the inside of the circuit as follows:

★ After assembling the piping, be sure to check that the connectors are not loose.

1. Remove the cap of air bleeder plug (A).
2. Depress brake pedal, loosen air bleeder plug (A) about 3/4 of a turn and after closing plug, release pedal.
3. Repeat until air bubbles stop coming out of air bleeder plug (A). After bleeding air, close plug and fit cap.

★ Bleed air at 4 locations.

★ After bleeding air, check the oil level in the brake oil tank. If it is insufficient, add engine oil.

⚠ **Always use engine oil to refill the brake oil tank.**

PERIODICAL REPLACEMENT OF SAFETY PARTS

The users of our machine should carry out periodical maintenance in order to ensure the working and operation safety. Those parts, as listed on the right, which are closely connected with safety, must be replaced periodically so that the highest safety standard can be maintained.

These parts with the passage of time have a great tendency to deteriorate in quality, and to wear or deform. Furthermore, their defective condition is difficult to detect during periodical maintenance. These parts must, therefore, be replaced with new ones after a predetermined service period even though there is no apparent abnormality.

It goes without saying that if any abnormality should be found, these parts must be replaced or repaired even before the predetermined period expires.

The periodical replacement is completely different from the replacement due to the claim against the guarantee by the manufacturer, so they must be treated separately.

	Safety parts for periodic replacement	Replacement interval	Remarks
1	Brake hose	Every year	
2	Rubber parts of power cluster	Every year	Replace with repair kit
3	Packings, seals, O-rings for steering sylinder	Every 2 years	
4	Rubber hose for steering cylinder	Every 2 years	
5	Fuel hose	Every 2 years	
6	Rubber parts for treadle valve	Every year	Replace with repair kit
7	Rubber parts for parking brake spring cylinder	Every year	Replace with repair kit
8	Rubber parts for slack adjuster	Every year	Replace with repair kit

MAINTENANCE TABLE

No.	ITEM	SERVICE	PAGE
	CHECK BEFORE STARTING		
a	Walk-around check		45
b	Monitor panel	Check	45
c	Coolant	Check and supply	46
d	Engine oil pan	Check and supply	46
e	Fuel tank	Check and supply	47
f	Battery electrolyte	Check fluid level	48
g	Dust indicator	Check	49
h	Air tank	Drain water and sediment	49
i	Brake oil tank	Check and supply	49
j	Water separator	Check	50
k	Parking brake	Check function	50
l	Foot brake	Check function	50
m	Horm	Check function	50
n	Lamps	Check function	50

No.	ITEM	SERVICE	PAGE
o	Rear view mirror	Check	50
p	Exhaust gas and color	Check	50
q	Instrument	Check function	50
r	Steering wheel	Check play	51
s	Back-up buzzer	Check function	51
t	Electrical wiring	Check	51
	EVERY 50 HOURS SERVICE		
a	Fuel tank	Drain water and sediment	91
b	Tires	Check air pressure and damage	91
	EVERY 100 HOURS SERVICE		
a	Lubricating		92
-1	Rear axle pivot pin	Lubricate 3 points	92
b	Hydraulic tank	Check and supply	92
c	Air conditioner filter	Clean	93

No.	ITEM	SERVICE	PAGE
	EVERY 250 HOURS SERVICE (The items marked * are carried out after the first 250 hours only for new machines.)		
*	Fuel filter	Replace cartridge	94
*	Transmission oil filter	Replace element	94
*	Engine valve clearance	Check and adjust	94
a	Lubricating		94
-1	Lift cylinder ball joint	Lubricate 2 points	94
-2	Blade center support pin	Lubricate 5 points	94
-3	Steering cylinder pin	Lubricate 4 points	95
-4	Transmission mount trunnion	Lubricate 1 point	95
b	Engine oil pan and filter	Change oil and replace cartridge	95
c	Alternator belt	Check tension	97
d	Wheel hub nuts	Check and retighten	98
e	Fuel filter	Drain water and sediment	98
f	Air conditioner compressor belt	Check tension	98

No.	ITEM	SERVICE	PAGE
	EVERY 500 HOURS SERVICE		
a	Fuel filter	Replace cartridge	100
b	Transmission oil filter	Replace element	101
c	Fan belt	Check	101
d	Lubricating		102
-1	Center drive shaft spline	Lubricate 1 point	102
	EVERY 1000 HOURS SERVICE		
a	Transmission case and strainer	Change oil and clean strainer	103
b	Transmission case breather	Clean	104
c	Lubricating		105
-1	Center hinge pin	Lubricate 2 points	105
-2	Drive shaft center support	Lubricate 1 point	105
-3	Front drive shaft	Lubricate 3 points	105
-4	Rear drive shaft	Lubricate 2 points	105
-5	Center drive shaft	Lubricate 2 points	105
-6	Upper drive shaft	Lubricate 2 points	106

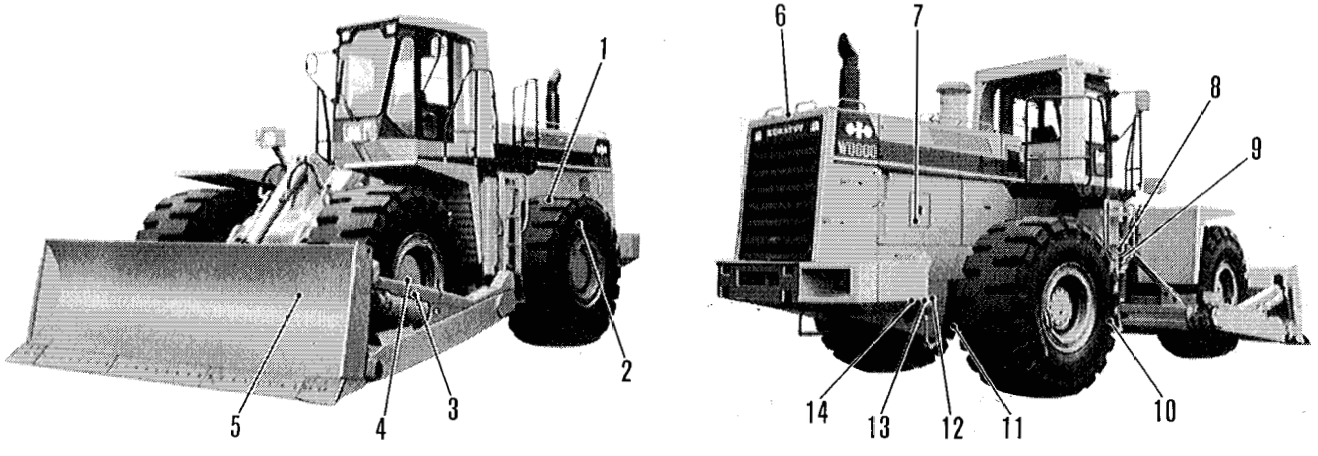
MAINTENANCE TABLE

No.	ITEM	SERVICE	PAGE
	(EVERY 1000 HOURS SERVICE)		
-7	Parking brake linkage	Lubricate 2 points	106
-8	Fan pulley and tension pulley	Lubricate 3 points	106
d	Turbocharger various fasteners	Check and retighten	106
e	Fuel strainer	Check and clean	107
f	Corrosion resistor	Replace cartridge	107
	EVERY 2000 HOURS SERVICE		
a	Hydraulic tank and filter	Change oil and replace element	108
b	Axle (Front and rear)	Change oil	110
c	Hydraulic tank breather	Repalce element	111
d	Engine breather	Clean element	112
e	Air conditioner filter	Replace element	112
f	Turbocharger rotor	Check play	113
g	Turbocharger	Clean and check rotating condition	113
h	Alternator and starting motor	Check	114
i	Engine valve clearance	Check and adjust	114
j	Brake disc	Check and repair	114
k	Air dryer	Clean element	114
	EVERY 4000 HOURS SERVICE		
a	Water pump	Check	115
b	Engine vibration damper	Check	115
c	Fan pulley and tension pulley	Check	115
d	Air compressor	Check	115
	WHEN REQUIRED		
a	Cooling system	Clean	116
b	Air cleaner element	Check, clean or replace when required	119
c	Transmission oil	Check and supply	121
d	Rediator fins	Clean	122
e	Axle oil	Check and supply	122
f	Lubricating		123
-1	Work equipment control valve linkage	Lubricate 6 points	123

No.	ITEM	SERVICE	PAGE
-2	Accelerator pedal linkage	Lubricate 2 points	123
-3	Steering column	Lubricate 1 point	124
g	End bit and cutting edge	Replace	124
h	Air conditioner	Check	125
i	Condenser of air conditioner	Check and clean	126
j	Window washer	Check and supply	126
k	Axle case breather	Clean	127
l	APS (Automatic priming system)	Check	127
m	Water separator	Drain water	128

OIL FILLER AND LEVEL GAUGE POSITIONS

1. Cylinder block drain valve
2. Torque converter cooler drain valve
3. Final drive case drain plug
4. Final drive case level plug
5. Front axle drain plug
6. Cooling water inlet
7. Engine oil pan level gauge and oil filler
8. Hydraulic tank oil filler
9. Hydraulic tank oil level gauge
10. Hydraulic tank drain valve
11. Rear axle drain plug
12. Engine oil pan drain valve
13. Cooling water drain valve
14. Fuel tank oil filler



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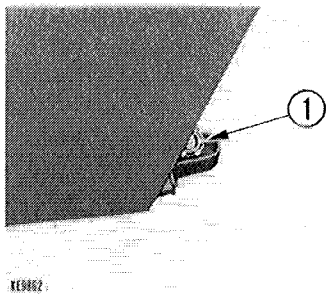
CHECK BEFORE STARTING

See the section on CHECK BEFORE STARTING aforementioned.

EVERY 50 HOURS SERVICE

a. FUEL TANK



Loosen valve (1) on the right side of the tank so that the precipitation and mixed water will be drained in accompaniment with fuel.

b. TIRE

Measure the inflation pressure before operations when the tires are cool. (Refer to HANDLING THE TIRES.)

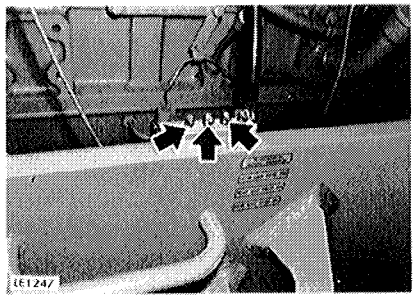
EVERY 100 HOURS SERVICE

★ **Maintenance for every 50 hours should be carried out at the same time.**

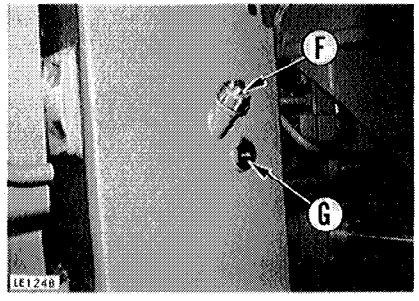
a. LUBRICATING

Apply grease to the grease fittings shown by arrows.

1. Rear axle pivot pin (3 points)



b. HYDRAULIC TANK

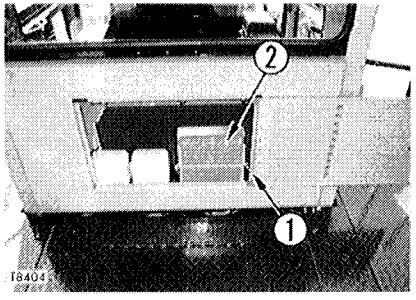


1. Lower the bucket horizontally to the ground and stop the engine. Wait for 5 minutes, then check sight gauge (G). The oil should be visible in sight gauge (G).
2. Add engine oil from oil filler (F), if necessary.

★ The type of lubricant used depends on the ambient temperature. Select according to the table "FUEL, COOLANT AND LUBRICANTS".

⚠ **When removing the cap, turn it slowly to relieve inner pressure.**

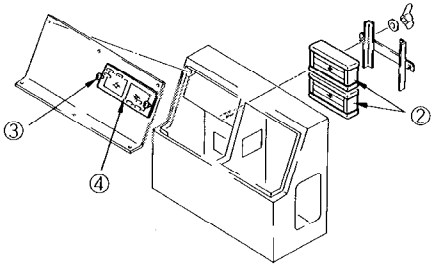
c. AIR CONDITIONER FILTER



If the air conditioner has been used, the air filter should be cleaned.

★ Stop the air conditioner before cleaning the element.

1. Open the cover located on the behind of the operator's seat.
2. Loosen screw (1) of holder holding the filter element, pull out element (2) and clean it.



3. Align the direction of the arrows and assemble.

★ Direct dry compressed air (less than 7 kg/cm^2) to element from inside along its folds, then direct it from outside along its folds and again from inside, and check element.

⚠ **When using compressed air, wear safety glasses and other things required to maintain safety.**

4. Move the operator's seat forward, then tilt the backrest forward.
5. Loosen screw and open the cover.
6. Remove screw (3) holding the filter element, then take out element (4) and clean it.
7. After cleaning the element, install it.

EVERY 250 HOURS SERVICE

★ **Maintenance for every 50 hours should be carried out at the same time.**

Carry out the following maintenance only after the first 250 hours.

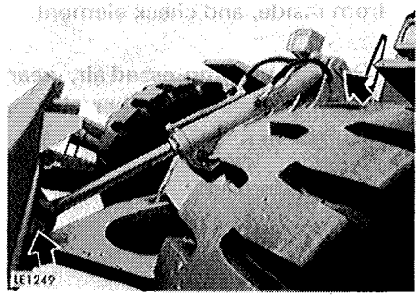
- **FUEL FILTER, REPLACE CARTRIDGE**
- **TRANSMISSION OIL FILTER, REPLACE ELEMENT**
- **ENGINE VALVE CLEARANCE, CHECK AND ADJUST**

For details of the method of replacing or maintaining, see the section on EVERY 500 HOURS AND 2000 HOURS SERVICE.

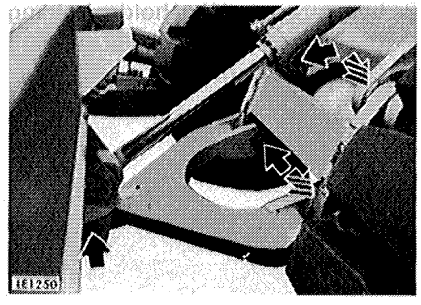
a. LUBRICATING

Apply grease to the grease fittings shown by arrows.

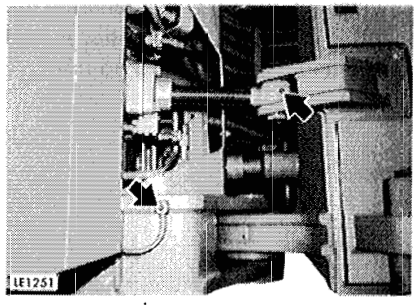
1. Lift cylinder ball joint (2 points)



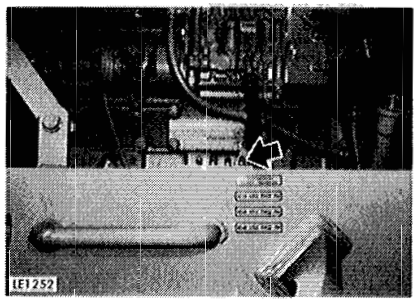
2 .Blade center support pin (5 points)



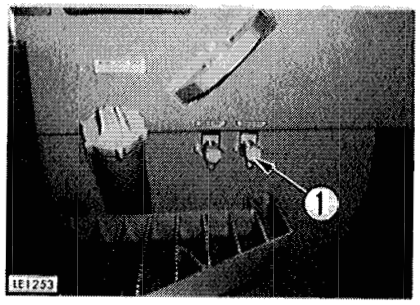
3. Steering cylinder pin (4 points)



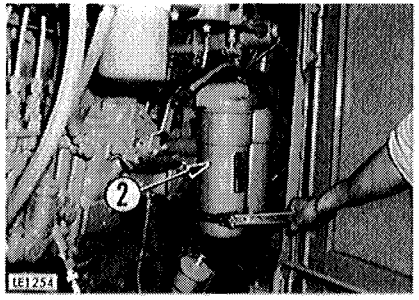
4. Transmission mount trunnion (1 point)



b. ENGINE OIL PAN AND FILTER

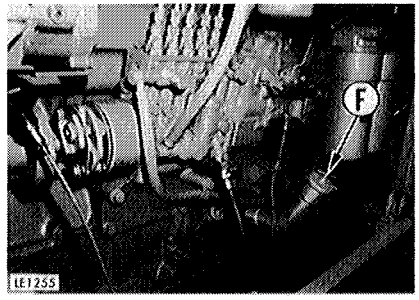


1. Open the engine side cover located on the right of engine hood.
2. Open oil filler and remove drain plug (1) to drain oil. After draining, tighten the drain plug.



3. Using a filter wrench, remove cartridge (2) of the engine oil filter by turning it counterclockwise.
4. Clean the filter holder, coat the seal and thread of the new filter cartridge with engine oil (a thin coat of grease is also possible), then install the cartridge.

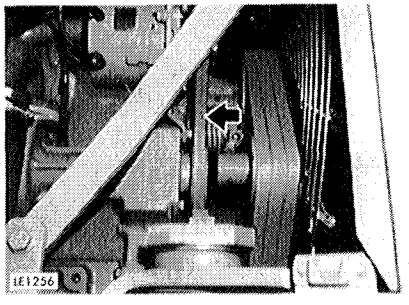
★ When installing, to prevent overtightening, screw in until the seal surface contacts the filter holder, then tighten a further 3/4 to 1 of a turn.

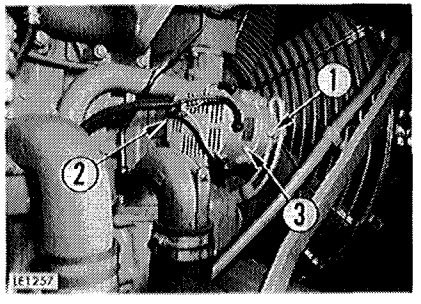


5. After replacing the cartridge, pour in the specified quantity of engine oil from oil filler (F).
6. After pouring in oil, run the engine for several minutes, then once again check the oil level and ensure that it is correct.
7. Close the engine side cover.

★ Refill capacity: 43 ℓ
★ The type of lubricant used depends on the ambient temperature. Select according to the table "FUEL, COOLANT AND LUBRICANTS".
★ Be sure to fit a genuine Komatsu cartridge.
★ Replace once every 6 months, regardless of the number of hours operated.
★ If filter cartridge (2) is removed immediately after stopping the engine, oil will spill. Wait at least 10 minutes after stopping the engine before replacing the filter cartridge.
★ Use API category CD class oil. If CC class oil must be used, change the oil and replace the oil filter at half the usual interval (125 hours).

c. ALTERNATOR BELT





1. The belt tension should normally deflect by about 10 to 15 mm when pressed with the finger at a point midway between the alternator pulley and the drive pulley (approx. 6 kg).
2. To adjust the belt tension, loosen bolt (1) and nut (2) and shift alternator (3) slightly.
3. After adjustment, tighten bolt (1) and nut (2) securely.

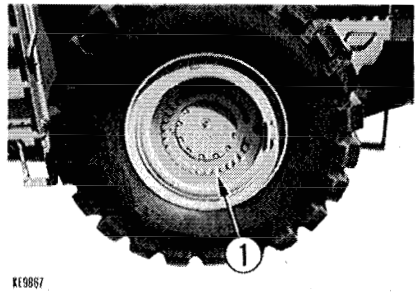
★ After operating the machine for one hour with a newly exchanged V-belt, test and adjust the V-belt again.

★ When adjusting the V-belt, do not attempt to push alternator (3) directly with a bar or the like, but use a wood pad to prevent damage to the core.

★ Check each pulley for damage, and V-grooves and V-belt for wear. Particularly, check whether V-belt is in contact with bottom of V-groove through wear.

★ Replace belt if it has stretched, leaving no allowance for adjustment, or if there is a cut or crack on belt.

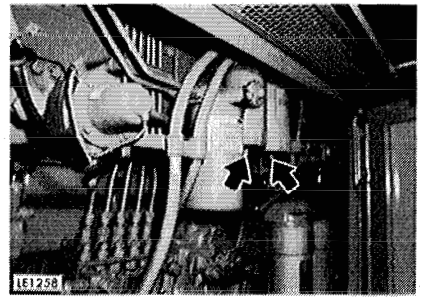
d. WHEEL HUB NUTS



If wheel hub nuts (1) are loose, tire wear will be increased ands accidents may be caused. If any hub nuts are loose, tighten them to the specified tightening torque.

★ Tightening torque: 84 ± 9 kgm
★ If any wheel nut is broken, replace all nuts for that wheel.
★ Always rotate in the direction of tightening when checking for loose nuts.

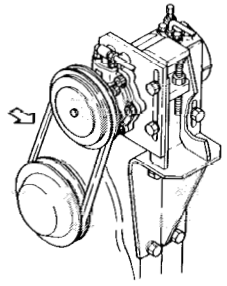
e. FUEL FILTER



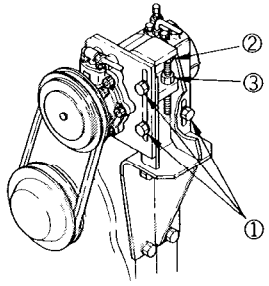
Loosen the air bleeding plug and remove the drain plug on the bottom of the filter to drain water and sediment accumulated on the bottom of the fuel filter. (At two filters)

After draining, move the feed pump up and down to bleed air. When no air bubbles come out of the air bleeding plug hole, tighten the plug.

f. AIR CONDITIONER COMPRESSOR BELT



1. The belt tension should normally deflect by about 10 mm when pressed with the finger at a point midway between the air conditioner compressor pulley and the drive pulley (approx. 6 kg).



2. To adjust the belt tension, loosen bolts (1) and lock nut (3), and rotate adjusting bolt (2).
3. After adjustment, tighten bolts (1) and lock nut (3) securely.

★ After operating the machine for one hour with a newly exchanged V-belt, test and adjust the V-belt again.

★ When adjusting the V-belt, do not attempt to push the compressor directly with a bar or the like, but use a wood pad to prevent damage to the core.

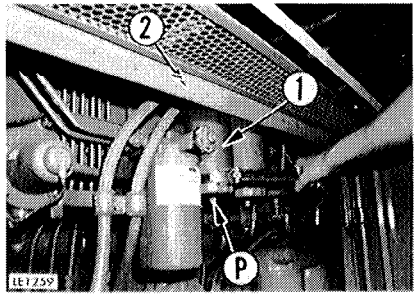
★ Check each pulley for damage, and V-grooves and V-belt for wear. Particularly, check whether V-belt is in contact with bottom of V-groove through wear.

★ Replace belt if it has stretched, leaving no allowance for adjustment, or if there is a cut or crack on belt.

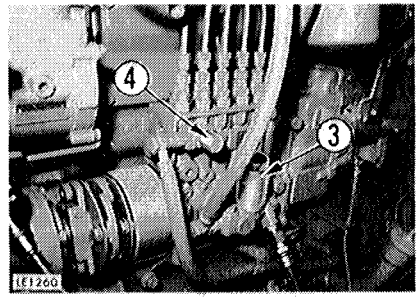
EVERY 500 HOURS SERVICE

★ Maintenance for every 50, 100 and 250 hours should be carried out at the same time.

a. FUEL FILTER



1. Remove drain plug (P) on the bottom of the filter to drain fuel.
2. Using a filter wrench, remove cartridge (1) by turning it counterclockwise.
3. Fill the new cartridge with fuel and refit it after applying a dab of oil to the gasket face.



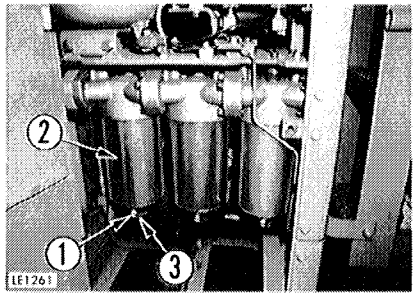
★ To refit the cartridge, place the gasket face in contact with the seal face of the filter stand, then screw up the cartridge 1/2 to 3/4 of a turn (be careful not to tighten it up excessively).

4. After replacing cartridge (1), loosen air vent plug (2).
5. Loosen the knob of feed pump (3) and move the pump up and down to draw off fuel until air ceases to come out of plug (2).
6. Tighten up air vent plug (2).
7. Loosen overflow valve (4). Bleed air from the fuel injection pump using the same procedure as described for the fuel filter.
8. After bleeding air, tighten overflow valve (4).
   Push in the knob of feed pump (3) and tighten it.

★ After replacing the cartridge, start up the engine and check the filter seal face for possible oil leakage.

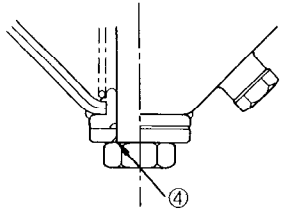
★ Be sure to use a genuine Komatsu cartridge.

b. TRANSMISSION OIL FILTER



1. Remove the side panel.
2. Remove drain plug (1) at the bottom of the filter case, and drain the oil. After draining the oil, tighten the plug.
3. Hold case (2) and loosen center bolt (3), then remove case (2).
4. Remove the element, and clean the inside of the case. Assemble a new element, then install the case.

★ Be careful not to apply excessive torque to center bolt (3).
Tightening torque: 18.5 ± 1.5 kgm



★ When tightening center bolt (3), install so that chamfered surface (4) of the washer faces the hexagonal head of the center bolt.

5. Run the engine for a short time at idling speed, then stop the engine. Check that the oil is at the specified level (for details, see WHEN REQUIRED).

★ Use a genuine Komatsu element.
★ Replace the filter gasket and O-rings with new parts. Coat the gasket and O-rings with clean engine oil before installing.

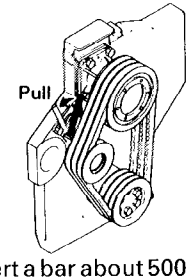
c. FAN BELT

Check the V-belt and when the following conditions exist, exchange the V-belt:

- When the V-belt makes contact with the bottom of the groove in each pulley.
- When the V-belt is worn, and its surface is lower than the outer diameter of the pulley.
- When cracking and peeling of the V-belt occurs.

• **Replacement**

Exchange V-belt as follows:



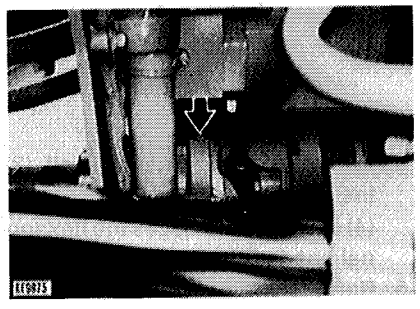
1. Insert a bar about 500 mm in length into the hole (ø18 mm) of the tension pulley bracket and pull forward strongly.
2. The spring tension loosens and the tension pulley moves inward, so remove the old belt.
3. In the same way, install a new belt.

★ When changing belts, do not only change one belt. Always change as a set.

d. LUBRICATING

Apply grease to the grease fitting shown by arrow.

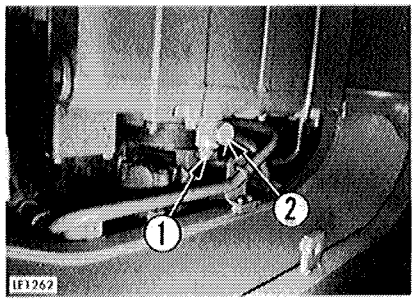
1. Center drive shaft spline (1 point)



EVERY 1000 HOURS SERVICE

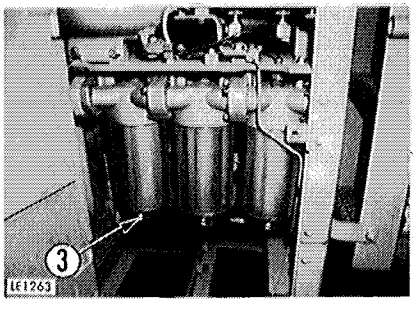
★ **Maintenance for every 50, 100, 250 and 500 hours should be carried out at the same time.**

a. TRANSMISSION CASE AND STRAINER

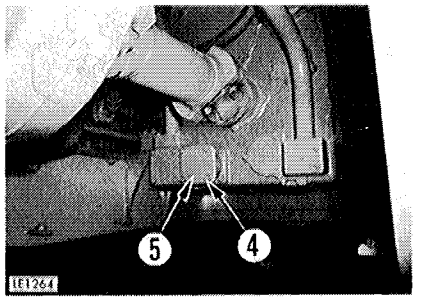


1. Remove drain plug (1) and loosen plug (2) to drain oil. After draining off the oil, tighten up drain plugs.

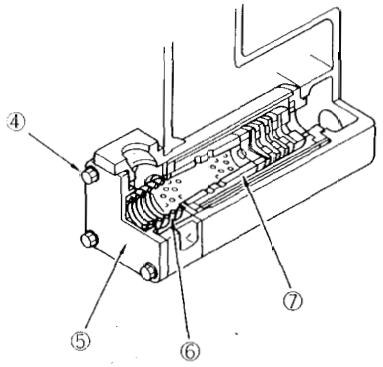
★ After loosening drain plug (2), pull out the plug slowly to prevent the oil spouting out.



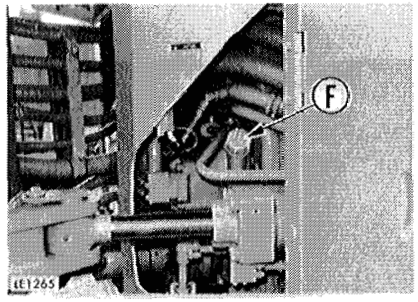
2. Loosen drain plugs (3) (3 pieces) of transmission oil filter to drain oil. After draining off the oil, tighten up drain plugs (3).



3. Remove bolt (4) and cover (5), then remove spring (6) together with strainer (7).
4. Remove all dirt from the surface of strainer (7), then wash in clean light oil. If strainer (7) is damaged, replace with a new part.
5. Install spring (6) and strainer (7) in cover (5). Replace the O-ring of the cover with a new part, then install the cover.

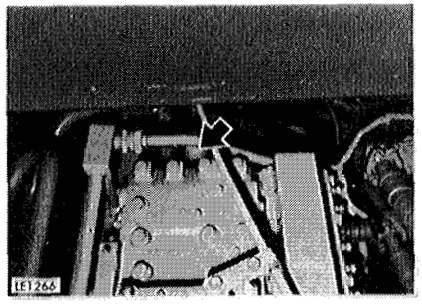


6. Pour in the specified amount of engine oil from oil filler (F).
7. After refilling, check the oil level and ensure that it is correct. (Refer to WHEN REQUIRED.)



★ Refill capacity: 110 ℓ
★ The type of lubricant used depends on the ambient temperature. Select according to the table "FUEL, COOLANT AND LUBRICANTS".
★ Check for oil leak at transmission case and filter.
★ Make an oil level check before starting engine or 15 minutes or more after the engine is stopped. If oil remains at various portions, the correct oil level cannot be measured.

b. TRANSMISSION CASE BREATHER

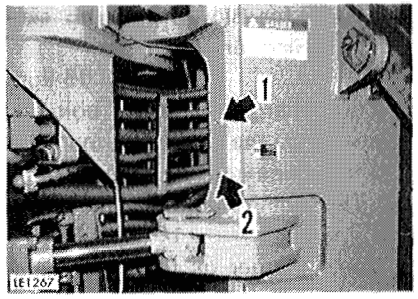


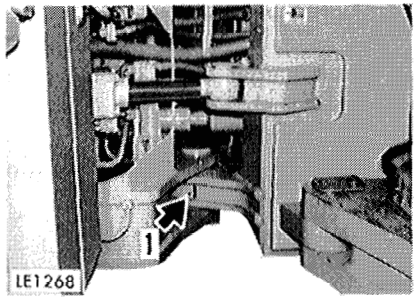
Remove all mud and dirt from around the breather, then remove the breather. Put in cleaning fluid and clean the breather.

c. LUBRICATING

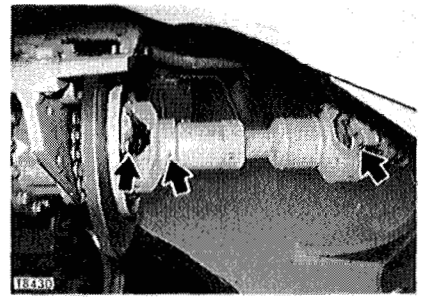
Apply grease to the grease fittings shown by arrows.

1. Center hinge pin (2 points)
2. Drive shaft center support (1 point)

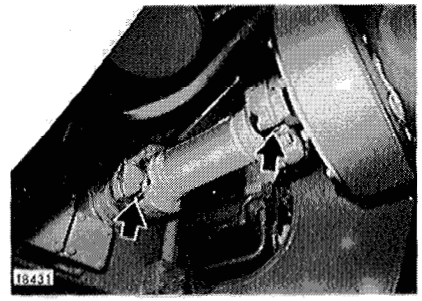




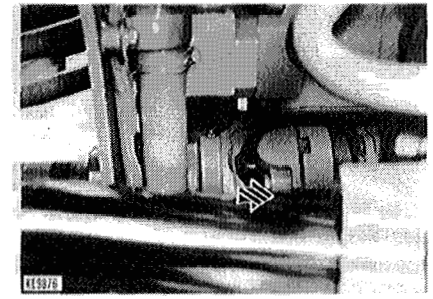
3. Front drive shaft (3 points)

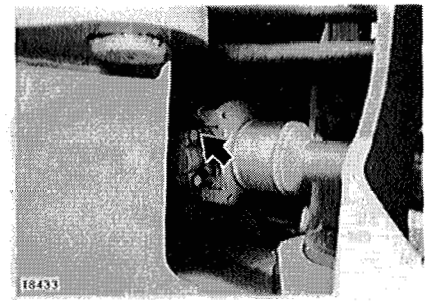


4. Rear drive shaft (2 points)

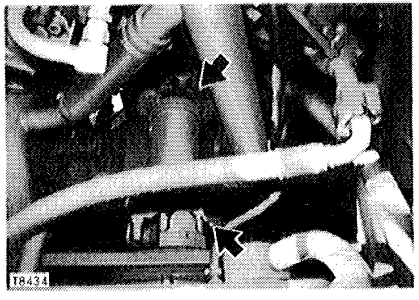


5. Center drive shaft (2 points)

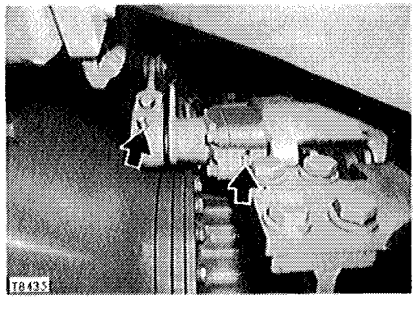




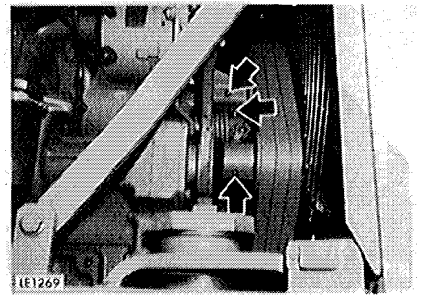
6. Upper drive shaft (2 points)



7. Parking brake linkage (2 points)



8. Fan pulley and tension pulley (3 points)

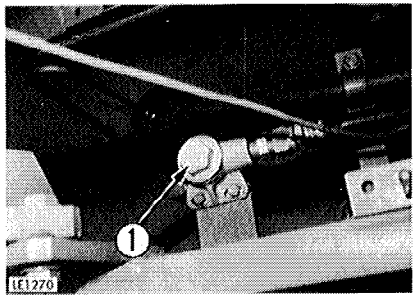


d. TURBOCHARGER VARIOUS FASTENERS

Periodically inspect all joints for looseness. Tighten when necessary.

- Turbine housing side clamp
  Tightening torque:
  0.9 – 1.0 kgm
- Clamp for Blower housing side
  Tightening torque:
  0.55 – 0.65 kgm
- Turbocharger mounting bolt (for securing the exhaust manifold and turbine housing together)
  Tightening torque:
  10 – 11.5 kgm
- Turbocharger oil feed pipe (inlet line)
  Tightening torque:
  2.8 – 3.5 kgm
- Turbocharger oil feed pipe (Outlet line)
  Tightening torque:
  6.0 – 7.5 kgm

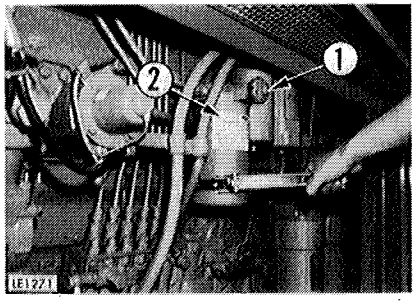
e. FUEL STRAINER



1. Remove plug (1), then remove spring together with strainer.
2. Remove all dirt from the surface of the strainer, then wash in clean light oil. If strainer is damaged, replace with a new part.
3. Install strainer and spring, then install plug (1).

★ If O-ring of the plug is damaged, replace with a new part.

f. CORROSION RESISTOR



1. Open the engine side cover located on the right of engine hood.
2. Close valve (1).
3. Using the filter wrench provided, remove cartridge (2) by turning it counterclockwise.
4. Fit a new cartridge after applying a dab of engine oil to the seal face.

★ To fit the cartridge, put the seal face in contact with head, then screw it up about 1/2 to 3/4 of a turn. (Be careful not to apply excessive torque.)

5. After replacement, open valve (1).

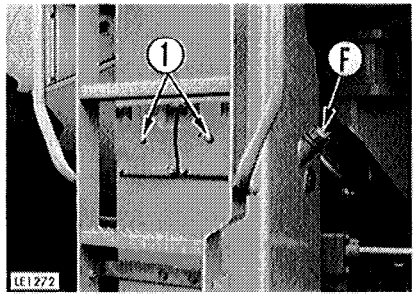
★ Be sure to use a genuine Komatsu cartridge.

★ After replacing the cartridge, start the engine and check that there is no leakage of water from the filter seal surface.

EVERY 2000 HOURS SERVICE

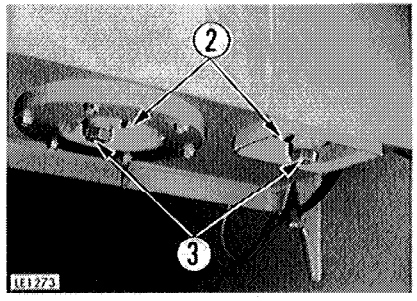
★ **Maintenance for every 50, 100, 250, 500 and 1000 hours should be carried out at the same time.**

a. HYDRAULIC TANK AND FILTER



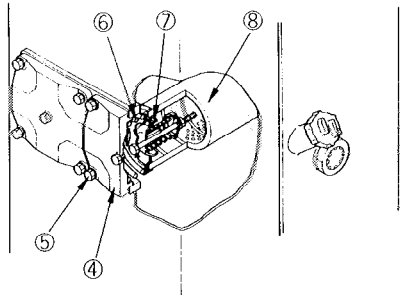
1. Lower the blade horizontally to the ground and apply the parking brake, then stop the engine.
2. Remove the cap of oil filler (F) and air vent plug (1) on filter case.

⚠ **When removing the cap, turn it slowly to relieve inner pressure.**



3. Remove drain plug (3) and loosen drain valve (2) to drain oil. After draining off the oil tighten up them.

★ After loosing drain valve (2), pull it out slowly to drain oil.



4. Remove mounting bolt (5) of the filter cover (4), then remove cover (4).

⚠ **The cover is pushed by a spring, so hold the cover when removing the bolts.**

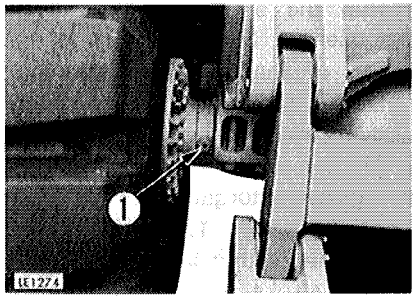
5. Remove spring (6) and bypass valve (7), then remove element (8).
★ Check that there is no foreign matter inside the tank before cleaning it.
6. Install a new element, then install bypass valve (7), spring (6), and cover (4).
★ If the O-ring of the cover is damaged or deteriorated, replace it with a new part.
★ When installing the cover bolts, push down the cover and tighten the bolts evenly.
7. Pour in the specified quantity of engine oil from filler (F).
★ Refill capacity: 21 7 ℓ
8. Start the engine, raise and lower the work equipment, and operate the steering to circulate the oil. Then lower the blade horizontaly to the ground and stop the engine.
9. Check the oil level and ensure that is correct. (Refer to EVERY 100 HOURS SERVICE.)
★ Check that there is no oil leaking from the filter cover mount.
★ The type of lubricant used depends on the ambient temperature. Select according to the table "FUEL, COOLANT AND LUBRICANTS".

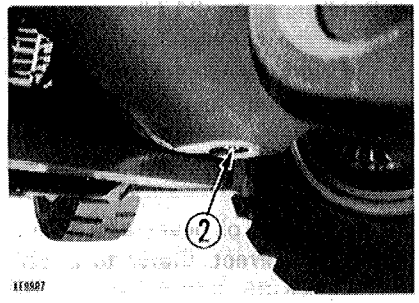
Bleed the air from the hydraulic circuit as follows.

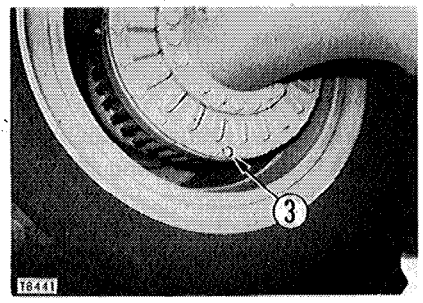
1. Run the engine at low idling, loosen air bleed plug (1) at the top of the oil filter case, and leave until the oil starts to overflow.
2. Tighten air bleed plug (1).
★ Tightening torque:
1.15 ± 0.15 kgm
3. Operate each cylinder to the end of its stroke, depress the accelerator pedal fully, and keep in this position for approx. 1 minute.
Carry out this operation 3 — 5 times for each cylinder.

b. AXLE

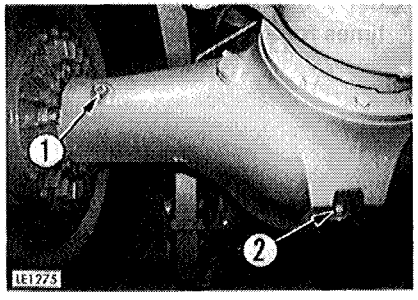
Front



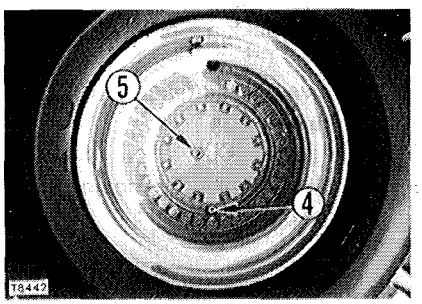




Rear

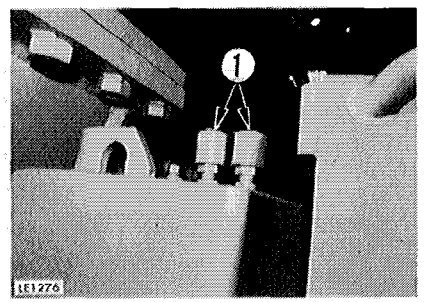


1. Remove front and rear oil filler plugs (1), then remove drain plugs (2) to drain the oil.
2. Remove drain plug (3) to drain the oil. After draining, tighten up it.
3. Stop the machine so that drain plug (4) of the final drive is at the bottom. Remove oil filler plug (5) and drain plug (4), and fit the tube of attached tool in hole of plug (4) and drain the oil.
4. After draining the oil, clean drain plugs (2), (3) and (4), then install them.
5. Add oil to the specified level through the oil filler ports (1) and (5) of the axle housing and left and right final drives.
6. Check the oil level and ensure that is correct. (Refer to WHEN REQUIRED.)



★ Use the same procedure to change the oil for the front and rear axles.
★ Refill capacity: 110ℓ (each axle)
★ The type of lubricant used depends on the ambient temperature. Select according to the table "FUEL, COOLANT AND LUBRICANTS".

c. HYDRAULIC TANK BREATHER

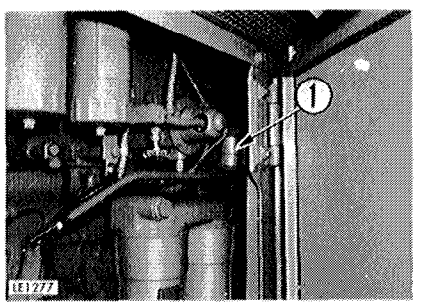


1. Remove cap of oil filler.

⚠ **When removing the cap, turn it slowly to relieve inner pressure.**

2. Remove snap ring on breather (1), then remove breather cap.
3. Replace filter element with a new part, then install cap and snap ring.
★ It is possible to replace the element with the breather installed in the tank. However, if the breather is removed, do not wrap the taper thread of the breather with seal tape when assembling again, and be careful not to tighten too much.

d. ENGINE BREATHER

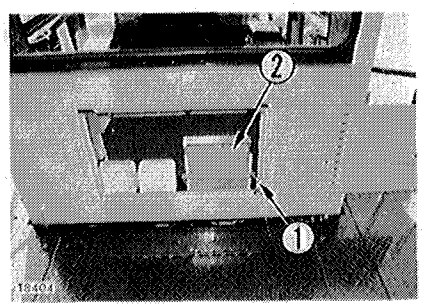


1. Remove the bolt, take breather out of place and wash element (1) in clean light oil to remove dust from it.
2. After cleaning, fill with clean fuel.
3. After cleaning, dry fuel with air.

★ Before removing the breather, clean around the breather to remove the dirt.

★ Replace the O-rings with new parts. Coat the O-rings with clean engine oil before installing.

e. AIR CONDITIONER FILTER



1. Open the cover located on the behind of the operator's seat.
2. Loosen nut (1) holding the filter element, pull out element (2).
3. Install a new element and close the cover.

f. TURBOCHARGER ROTOR PLAY

Contact your Komatsu distributor for checking, or proceed as follows:

Remove air intake pipe from turbocharger.

1. Axial play
   Check axial play by moving rotor in axial direction.
   Play:
   Standard 0.08 – 0.18 mm
2. Radial play
   Measure radial play by moving rotor holding both ends by hands in radial direction in parallel.
   Play:
   Standard 0.25 – 0.60 mm

★ If the play is over the limit, consult your Komatsu distributor.

★ If the rotor is excessively soiled with dust or carbon or if any oil leakage caused by turbocharger trouble is noted, have the turbocharger repaired by your Komatsu distributor.

g. TURBOCHARGER

Excessive carbon or oil sludge adhering to the turbocharger blower impeller may deteriorate normal performance of the turbocharger and may sometimes damage it.

Contact your Komatsu distributor.

1. Remove the turbocharger oil supply tube and the drain tube. Then, remove the connection area of the intake manifold and the blower housing so that the blower impeller can be seen.
2. Using light oil, wash the impeller to eliminate carbon adhered on the surface. Do not use wire brushes or the like to prevent damage to the impeller surface.
3. Pour light oil through the turbocharger oil filer. Turn the blower impeller several turns so that foreign materials such as sludge can be washed away.
4. Using your fingers, turn the impeller vigorously for one revolution or more. If there is no sigh of interference or catching, the impeller is normal.
   If the impeller seems to turn heavily, contact your Komatsu distributor to ask for repair or replacement.
5. If the impeller is found normal after this check, supply engine oil to the turbocharger.

h. ALTERNATOR AND STARTING MOTOR

As the hours of engine employment indicate that the brushes are already worn out, you should request repair from a Komatsu distributor.

★ They should be repaired every 1000 hours, if the machine is frequently operated at night.

i. ENGINE VALVE CLEARANCE

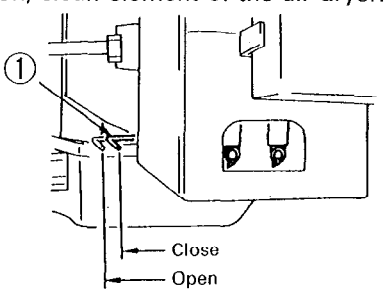
Ask Komatsu distributor to check engine valve clearance because special tools should be used.

j. BRAKE DISC

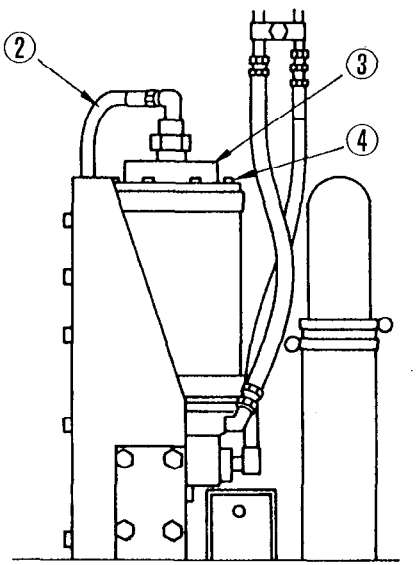
Ask Komatsu distributor to check and repair brake disc.

k. AIR DRYER

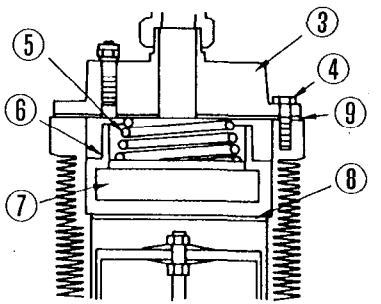
If the air dryer is installed as an option, clean element of the air dryer.



1. Stop the machine on level ground, lower the blade to the ground, and stop the engine.
2. Pull drain lever (1) of the air tank (wet) to release the air inside the tank.
3. Remove hose (2) between the air tank and air dryer.
4. Remove mounting bolts (4) of top cover (3) of the air dryer.



⚠ **The top cover is being pushed by the force of a spring, so when removing the bolts, hold the cover down and remove carefully.**



5. Remove spring (5) and filter cup (6), then remove element (7).
6. After cleaning the element, install it inside the case, then install filter cup (6), spring (5), and cover (3) in order.

★ When assembling, replace packing (8) and gasket (9).

★ When installing top cover (3), push down the cover and tighten uniformly.

★ Clean the element every 2000 hours or every 6 months.

EVERY 4000 HOURS SERVICE

★ **Maintenance for every 50, 100, 250, 500, 1000 and 2000 hours should be carried out at the same time.**

a. WATER PUMP

Inspect the water pump for play in the alternator drive pulley, grease leakage and water leakage.

If any fault is detected, ask Komatsu distributor to disassemble and repair or replace.

b. ENGINE VIBRATION DAMPER

Check decrease of damper fluid, dent or out-of-flat. If there is any abnormality, contact your Komatsu distributor for repair.

c. FAN PULLEY AND TENSION PULLEY

Check the pulley to see if there is any leaking grease. If any abnormality is found, ask your Komatsu distributor to repair or replace it.

d. AIR COMPRESSOR

Ask your Komatsu distributor to check and repair or replace.

WHEN REQUIRED

a. CLEAN INSIDE OF COOLING SYSTEM

Clean the inside of the cooling system, change the coolant, and replace the corrosion resistor, according to the table.

★ Stop the machine on level ground when cleaning or changing the coolant.

★ Use a permanent type of antifreeze. If, for some reason, it is impossible to use permanent type antifreeze, use an antifreeze containing ethylene glycol.

★ Be sure to replace the corrosion resistor cartridge.

★ Use city water for the cooling water.
If river water, well water or other such water supply must be used, contact your Komatsu distributor.

⚠ **Antifreeze is flammable, so keep it away from any flame.**

Type of antifreeze solution	Cleaning inside of cooling system and changing coolant	Replacing corrosion resistor
Permanent type antifreeze (All season type)	Every year (autumn) or every 2000 hours whichever comes first	Every 1000 hours and when cleaning the inside of the cooling system and when changing coolant
Non permanent type antifreeze containing ethylene glycol (Winter, one season type)	Every 6 months (spring, autumn) (Drain antifreeze in spring, add antifreeze in autumn)	
When not using antifreeze	Every 6 months or every 1000 hours whichever comes first	

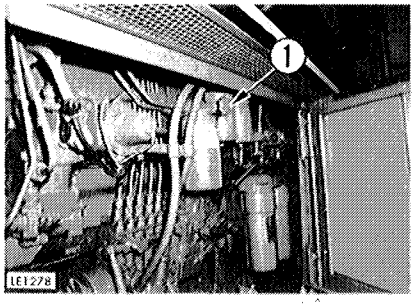
● Add antifreeze in the cooling water
When deciding the ratio of antifreeze to water, check the lowest temperature in the past, and decide from the mixing rate table given below.
It is actually better to estimate a temperature about 10°C lower when deciding the mixing rate.

Mixing rate of water and antifreeze

Min. atmospheric temperature (°C)	-5	-10	-15	-20	-25	-30
Amount of antifreeze (ℓ)	31	40.5	48.5	55.5	62	67.5
Amount of water (ℓ)	104	94.5	86.5	79.5	73	67.5

★ We recommend use of an antifreeze density gauge to control the mixing proportions.

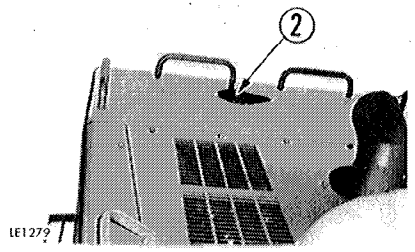
Corrosion resistor



1. Stop the engine and tighten up corrosion resistor valve (1).
2. Turn cap (2) slowly until it comes off.

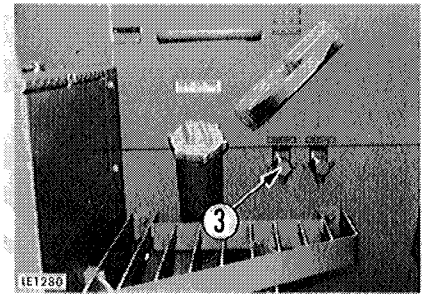
⚠ Do not remove the cap while cooling water is hot. Hot water may spout out.
When removing radiator cap, lift the lever to relieve inner pressure.

Water filler



3. Open drain valve (3) at the bottom of the radiator and plug (4) on the side of cylinder block and plug (5) on the side of torque converter cooler to drain off the cooling water.
4. Drain off all the water, then close up drain valve (3), plug (4), and pour in soft water (ex: city water) up to the vicinity of the water filler.

Drain valve (bottom of radiator)

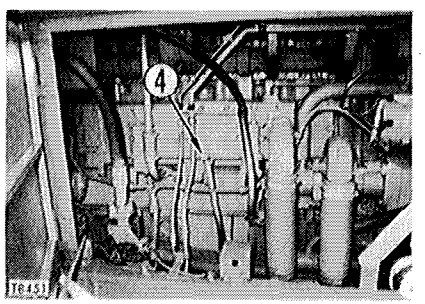


5. When the water reaches the vicinity of the water filler, put the engine at low idling, open drain valve (3), and plugs (4) and (5), then pass water through the cooling system for 10 minutes.

★ When doing this, adjust the inflow and outflow of water so that the radiator is always full.

6. After flushing with water, stop the engine. Close drain valve (3), drain plugs (4) and (5), after draining water.

Drain plug (cylinder block)

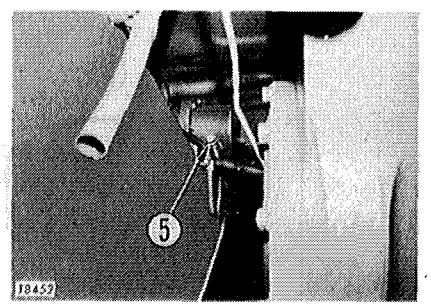


7. After draining water, use a flushing agent to clean.

★ We recommend the use of Komatsu genuine goods as the flushing agent. Follow the instructions on the label of the flushing agent to clean the system.

8. After washing the cooling system, drain off all the water, then close up drain valve (3), plugs (4) and (5), and pour in soft water (ex: city water) up to the vicinity of the water filler.

Drain plug (torque converter cooler)



9. When the water reaches the vicinity of the water filler, put the engine at low idling, open drain valve (3) and plug (4), then pass water through the cooling system until clean water comes out from drain valve (3), plugs (4) and (5).

★ When doing this, adjust the inflow and outflow of water so that the radiator is always full.

10. When the water becomes completely clean, stop the engine, close drain valve (3), plugs (4) and (5).

11. Repalce the corrosion resistor cartridge and open corrosion resistor valve (1).

★ For details of replacement of the corrosion resistor, see EVERY 1000 HOURS SERVICE.

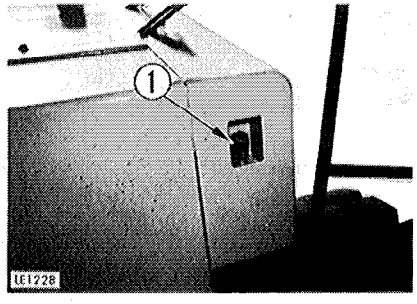
12. Supply water up to the vicinity of the water filler.

13. Run the engine for 5 minutes at low idling to eliminate air trapped in the cooling system, and run the engine for 5 minutes at high idling. (leave water filler cap (2) off during this operation.)

14. Stop the engine and 3 minutes later supply water again up to vicinity of the water filler and tighten water filler cap (2).

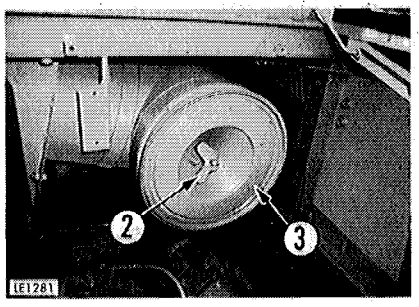
b. CHECK, CLEAN AND REPLACE AIR CLEANER ELEMENT

Checking



Whenever the red piston in dust indicator (1) appears, clean the air cleaner outer element. Stop the engine when cleaning the element.

Cleaning or replacing outer element



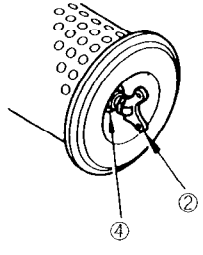
1. Remove wing nut (2) and outer element (3).
2. Clean the air cleaner body interior and the removed cover.
3. Clean and inspect the element. (See the item "Cleaning outer element" for cleaning procedure.)
4. Install the cleaned element.
5. Push the dust indicator reset button to return the red piston to the original position.

★ Replace the outer element which has been cleaned 6 times repeatedly or used throughout a year. Replace the inner element at the same time.

★ Replace both inner and outer elements when the dust indicator red piston appears soon after installing the cleaned outer element even though it has not been cleaned 6 times.

★ Remove one seal from the outer element. The number of times the outer element has been cleaned can be seen by the number of removed seals.

★ Check inner element mounting nuts for looseness and, if necessary, retighten.
★ Replace seal washer (4) or wing nut (2) if they are broken.



Replacing inner element

1. First remove the outer element.
2. Remove the inner element.
3. Place the cover over the air intake part to prevent dust entering.
4. Clean the air cleaner body interior, then remove the cover from the air intake port.
5. Fit a new inner element and tighten it with nuts.
6. Install the outer element and the cover. Push the dust indicator reset button.

★ Do not attempt to reinstall a cleaned inner element.

⚠ **Do not clean or replace the air cleaner element with the engine running.**

Cleaning outer element

With compressed air

Direct dry compressed air (less than 7 kg/cm^2) to element from inside along its folds, then direct it from outside along its folds and again from inside, and check element.

⚠ **When using compressed air, wear safety glasses and other things required to maintain safety.**

The following methods require spare parts.

With water

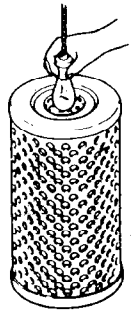
Dash city water (less than 3 kg/cm²) on element from inside along folds, then from outside and again from inside. Dry and check it.

With cleaning agent

For removing oils and fats as well as carbon etc. attached on the element, the element may be cleaned in lukewarm solution of mild detergent, then rinsed in clean water and left to drip dry.

★ Drying can be speeded up by blowing dried compressed air less than 7 kg/cm²) from the inside to the outside of the element.
Never attempt to heat the element.

★ Using warm water (about 40°C) instead of soapy water may also be effective.



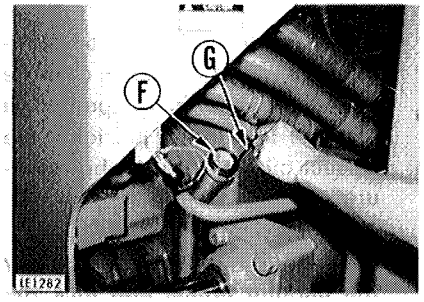
★ If small holes or thinner parts are found on element when it is checked with an electric bulb after cleaning and drying, replace the element.

★ Do not use element whose folds or gasket or seal are damaged.

★ When cleaning element, do not hit it or beat it against something.

c. CHECK AND REFILL TRANSMISSION OIL

Carry out this procedure if there is any sign of oil on the transmission case, or if there is oil mixed with the cooling water.



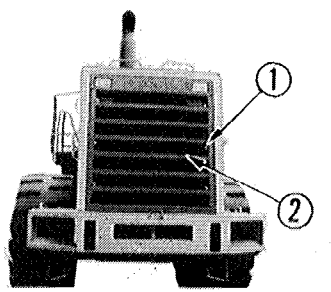
1. Stop the engine and remove the cap of oil filler (F).
2. Use dipstick (G) to check the oil level.
3. The oil level should be between mark L and H, if necessary, add oil at the oil filler (F).

★ The type of lubricant used depends on the ambient temperature. Select according to the table "FUEL, COOLANT AND LUBRICANTS".
★ Stop the engine when checking the oil level.
★ Make an oil level check before starting engine or 15 minutes or more after the engine is stopped. If oil remains at various portions, the correct oil level cannot be measured.

⚠ **When checking the oil level, apply the parking brake, and lock the front and rear frames with the safety bar and pin.**

d. CLEAN RADIATOR FINS

Carry out this procedure if there is any mud or dirt seen stuck to the radiator.



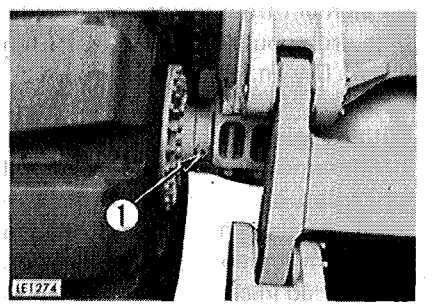
1. Loosen bolt (1) and remove radiator grille (2).
2. Clean the radiator fins and oil cooler fins clogged with mud, dust and leaves with compressed air. Steam or water may be used instead of compressed air.

★ The rubber hose should be checked at the same time. If the hose is found to have cracks or to be hardened by ageing, such hose should be replaced by new one. Further, loosened hose clamp should also be checked.

e. CHECK AND REFILL AXLE OIL

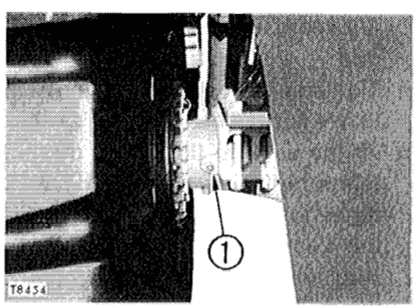
Carry out this procedure if there is any sign of oil on the axle case.

Front



Remove oil level plug (1), and check that the oil level reaches the bottom of the plug hole. If necessary, add oil through the hole of plug (1).

Rear



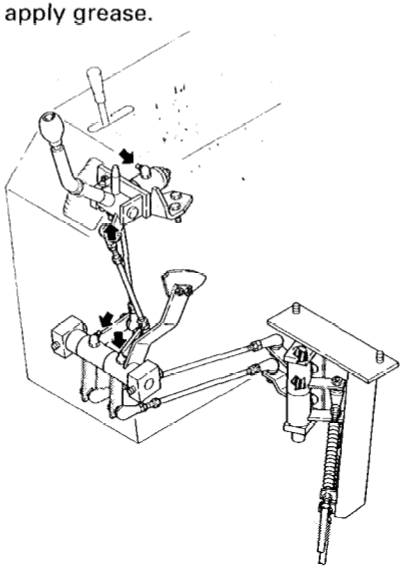
★ The type of lubricant used depends on the ambient temperature. Select according to the table "FUEL, COOLANT AND LUBRICANTS".

f. LUBRICATING

Apply grease to the grease fittings shown by arrows.

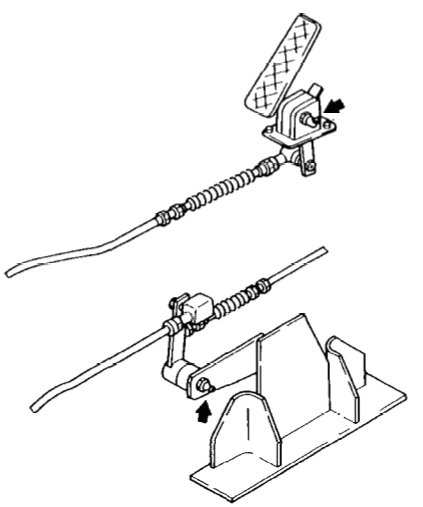
1. Work equipment control valve linkage (6 points)

If the work equipment control lever is heavy or does not move smoothly, apply grease.



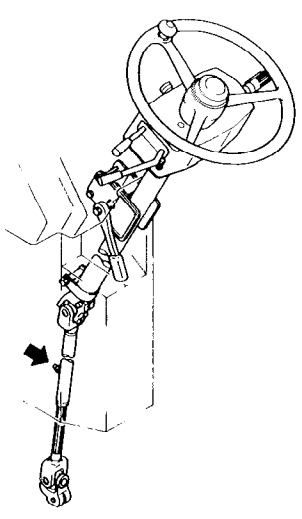
2. Accelerator pedal linkage (2 points)

If the accelerator pedal is heavy or does not return properly, apply grease.



3. Steering column (1 point)

If the play of the steering column is heavy or does not return properly, apply grease.



g. REPLACING END BIT AND CUTTING EDGE

When the end bit and the cutting edge are worn, replace them as follows.

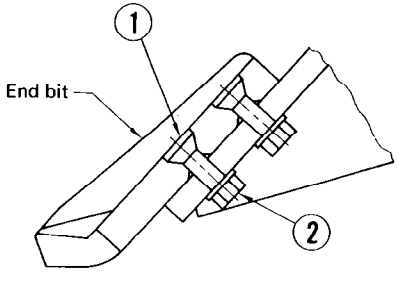
1. Raise the blade to a convenient height, and put blocks under the blade to prevent it from coming down.

★ Raise the blade so that the bottom is horizontal.

2. Remove bolt (1) and nut (2), then replace the end bit with new one.

★ If the bolt and nut are worn out, replace with new one.

★ Tightening torque of mounting bolt: 92 ± 4 kgm



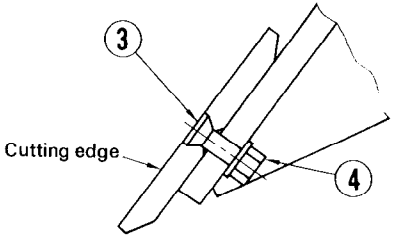
3. Remove bolt (1) and nut (2), then reverse the cutting edge.

★ If the cutting edges on both sides are worn out, replace with new one.

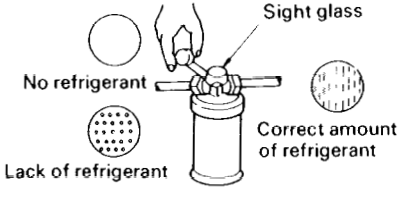
★ Tightening torque of mounting bolt: 92 ± 4 kgm

★ Fit the edge to the blade, tighten temporarily, lower the blade 3 – 5 times to the ground, and remove the clearance at bolts (1) and (3). After doing this, tighten the bolts to the correct tightening torque.

★ After operating for several hours, tighten again to the correct tightening torque.



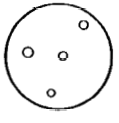
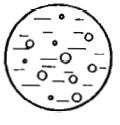
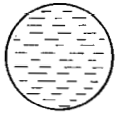
h. CHECK AIR CONDITIONER



Check refrigerant (gas) level

If the refrigerant level is too low, the cooling effect is reduced. When the cooler is being operated at high speed, air bubbles cannot usually be seen in the sight glass (inspection window) installed on the receiver on the right side of the air cleaner.

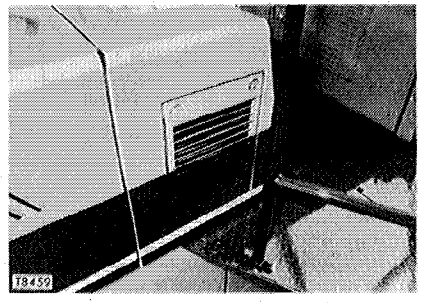
If air bubbles are formed, the refrigerant level is too low, so have your dealer add refrigerant immediately.

Cooler condition	Normal	Abnormal	
Temp. of high, and low pressure pipes	High pressure pipe is hot. Low pressure pipe is cold. Clear difference in temperature	High pressure pipe is warm. Low pressure pipe is cold. Little difference in temperature	Almost no difference in temperature between high and low pressure pipes.
Sight glass	Almost transparent. Any bubbles disappear if the engine speed is raised or lowered. 	Bubbles are always flowing. Sometimes becomes transparent, or white bubbles appear. 	Misty substance is flowing. 
Connections of pipes	Properly connected	Some parts dirty with oil	Some parts very dirty with oil
General condition of cooler	Coolant level correct, no abnormalities. Ready for use	May be a leak somewhere. Call service repair shop for inspection.	Almost all coolant has leaked out. Contact service repair shop immediately.

⚠ **The cooler refrigerant is colorless and odorless and does not cause pollution of the atmosphere. However it may cause injury if it gets in the eyes or on the hands, so never loosen any parts of the refrigerant circuit.**

i. CLEAN CONDENSER OF AIR CONDITIONER

If there is mud or dust on the air conditioner condenser, clean it with water.

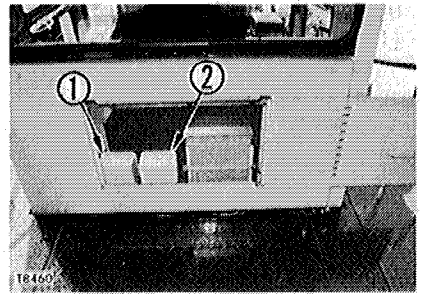


★ If the water pressure is too high, the fins may get deformed. When washing with a high pressure washing machine, apply the water from a reasonable distance.

⚠ **Do not wash the condenser with a steam cleaner. Otherwise, the condenser will get hot and may break down.**

j. CHECK AND REFILL WINDOW WASHING FLUID

Carry out this procedure if there are any bubbles in the window washer fluid.



Check the washing fluid levels in washer tank (1) and (2). When the fluid has run short, add automotive window washing fluid.

(1): Front window washing fluid tank

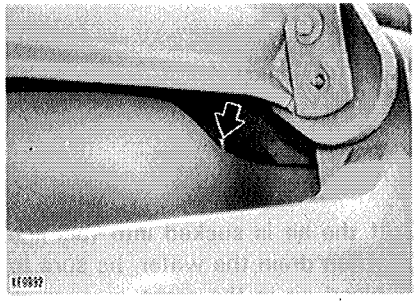
(2): Rear window washing fluid tank

★ To prevent the nozzles from clogging, be careful not to let dust get into the fluid.

k. CLEAN AXLE CASE BREATHER

Carry out this procedure if there is any mud or dirt stuck around the breather.

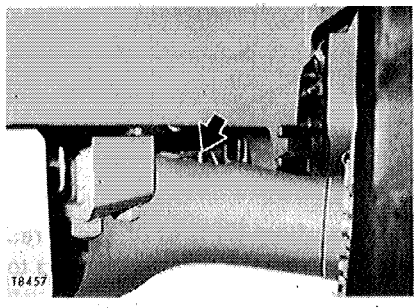
Front



Remove all mud and dirt from around the breather with brush.

Then, remove breather, immerse in cleaning fluid and clean.

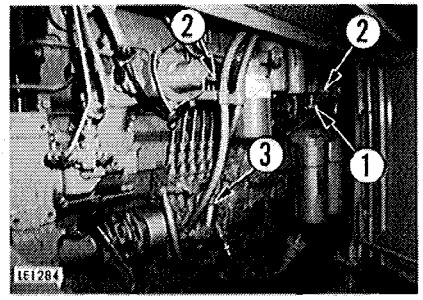
Rear



★ Clean the breathers of the front and rear axles in the same way.
★ Do not let dirt get into the port while breather is removed.
★ If dust sticks to area around breather, clean with a brush.

l. CHECKING OF APS (automatic priming system)

Checking is performed in autumn (when the ambient temperature is below 15°C).

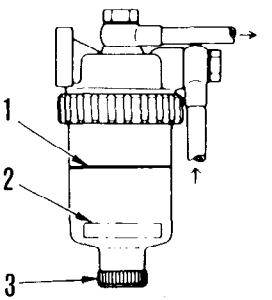


1. Open fuel valve (1) of automtic priming system, and remove hose (2) at entrance of nozzle.
2. Move feed pump (3) up and down, and bleed air until air bubbles stop coming out of opening of hose (2).
   Perform the next test the same way.
   - Is there a fuel leak?
   - Is the fuel piping plugged?

3. After putting preheater switch in ON position and after returning to auto, check the following items:
   - Does the pre-heat monitor lamp turn off after about 80 seconds?
   - When the pre-heat monitor lamp turns off, are the glow plugs (2 pieces) red hot?

★ When hand is removed from preheater switch when in ON position, switch will return to AUTO position automatically.

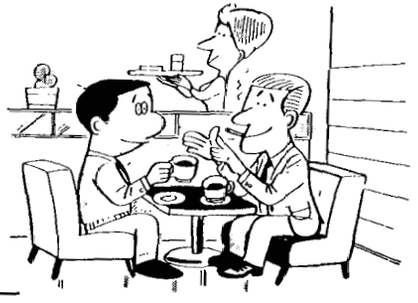
m. DRAIN WATER FROM WATER SEPARATOR



When float (2) is at or above red line (1), drain the water according to the following procedure:

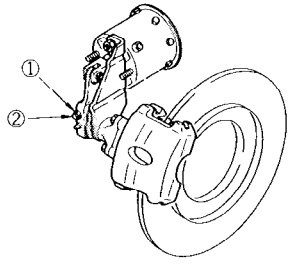
1. Loosen drain plug (3) and drain the accumulated water until the float reaches the bottom.
2. Tighten drain plug (3).
3. If the air is sucked into fuel line when drain the water, be sure to bleed air in the same manner as for the fuel filter.
   (See Fuel Filter Cartridge in EVERY 500 HOURS SERVICE section.)

MEMO

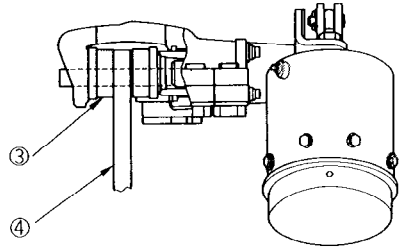


ADJUSTMENT

If the parking brake fails to work properly, adjust it in the following manner.



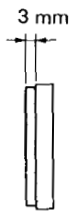
1. Confirm that the indication of the air pressure gauge is in the green range and then release the parking brake.
2. Turn bolt (2) clockwise while pressing bolt retainer (1) and let pads (3) on both sides come into close contact with disc (4).
3. Back off bolt (2) a half turn counter-clockwise while pressing bolt retainer (1).



4. Restore bolt retainer (1) to the original position and confirm that the retainer is in locking position to bolt (2).

⚠ **When adjusting the parking brake, be sure to put chocks on the tires so that the slippage can be prevented.**

⚠ **Maintain the air pressure at a sufficiently high pressure to prevent the parking brake from operating automatically while adjusting the brake.**
To prevent a third person from operating the parking brake by mistake, be sure to attach a caution tag to the parking brake switch.



Check the lining for wear and replace the pad, if the thickness of the lining is reduced to less than 3 mm.

★ Ask your Komatsu distributor for replacement of the pad.

Take care not to stain the brake pad and the disc surface with oil or grease.

TROUBLE SHOOTING GUIDE

This guide is not intended to cover every conditions, however many of the more common possibilities are listed.

ELECTRICAL SYSTEM

Lamp does not glow brightly even when engine runs at high speed.
Lamp flickers while engine runs.
- Check for loose terminals and open-circuit wiring.
- Adjust belt tension.

Charge monitor does not go out even when engine runs at high speed.
- Replace the alternator.
- Inspect and repair wiring.

Unusual noise is emitted from the alternator.
- Replace the alternator.

Starting motor does not turn when starting switch is turned on.
- Inspect and repair the wiring.
- Charge the battery.

The pinion of the starting motor keeps going in and out.
- Charge the battery.

Starting motor turns the engine sluggishly.
- Charge the battery.
- Replace the starting motor.

The starting motor disengages before the engine starts up.
- Check and repair the wiring.
- Charge the battery.

The engine pre-heating monitor does not flash.
- Check and repair wiring.
- Replace the heater relay.
- Replace the monitor.

The engine oil pressure monitor does not light up when engine is stationary (when the starting switch is in ON position.)
- Replace the monitor.
- Repair or replace the sensor.
- Check wiring.

Charge monitor does not light up when the engine is stationary. (When the starting switch is in ON position.)
- Replace the monitor.
- Inspect and repair the wiring.

ENGINE

The engine oil pressure monitor flashes.
- Add the oil to the specified level.
- Replace the oil element.
- Check oil leakage from the pipe or the joint.
- Replace the monitor.

Steam is emitted from the front part of the radiator (the pressure valve).

Engine oil temperature monitor flashes.
- Supply the coolig water and check leakage.
- Adjust fan belt tension.
- Wash out inside of cooling system.
- Clean or repair the radiator fin.
- Replace the thermostat.
- Tighten the radiator cap firmly or replace the gasket of it.
- Replace the monitor.

The engine does not start when the starting motor is turned over.
- Add fuel.
- Repair where air is leaking into fuel system.
- Replace the injection pump or the nozzle.
- Check the valve clearance.
- Check engine compression pressure.
- Refer to the section of electrical system.

Exhaust gas is white or blue.
- Adjust to specified oil quantity.
- Replace with specified fuel.

Exhaust gas occasionaly turns black.
- Clean or replace the air cleaner element.
- Replace the nozzle.
- Check engine compression pressure.
- Clean or replace the turbocharger.

Combustion noise occasionally changes to breathing sound.
- Replace the nozzle.

Unusual combustion noise or mechanical noise.
- Replace with specified fuel.
- Check over-heating.
- Replace the muffler.
- Adjust valve clearance.

CHASSIS

Transmission

Engine is running but machine will not move.

- Release parking brake.
- Put directional lever in position properly.
- Add oil to transmission case to the specified level.

Even at full throttle, machine moves slowly and lacks power.

- Add oil to transmission case to the specified level.
- Disassemble transmission strainer and clean.

Oil overheats

- Add oil to transmission case to the specified level or drain oil.
- Use a suitable gear speed.
- Reduce time using torque converter at stall speed.
- Check engine.

Abnormal noise is produced.

- Add oil to transmission case to the specified level.

Axle

Abnormal noise is produced.

- Add oil to axle case to the specified level.

Disc brake

Brake does not work when pedal is depressed.

- Raise air pressure to specified level.
- Replace disc.
- Add brake oil.
- Bleed air from brake system.

Brake drags or stays applied

- Clean exhaust hole of treadle valve.
- Clean breather of power cluster.
- Check and repair slack adjuster.

Brake slips.

- Replace disc.

Parking brake

Brake does not work properly.

- Adjust linkage.
- Clean brake pad.
- Replace spring in air cylinder.
- Adjust or replace brake pad.

Steering

Steering wheel is heavy.

- Adjust steering gear.
- Check linkage, replace parts.

Hydraulic system

Blade lacks lifting power.
Blade lifting speed is slow.

- Add oil.
- Replace filter in hydraulic tank.

Many bubbles from in oil.

- Replace with specified oil.
- Add oil.
- Bleed air from oil line.

Oil pressure is too low.

- Add oil and bleed air.

Cylinder vibrates when operating.

- Add oil.

STORAGE

BEFORE STORAGE

To place the machine in storage for an extended period of time, the following measures must be taken to insure that it can be returned to operation with minimum of service.

- After every part is washed and dried, the machine shall be housed in a dry building. Never leave it outdoors.
  In case it is indispensable to leave it outdoors, lay wood plates on the ground, and park the machine on the wood plates and cover it with canvas etc.
- Completely fill fuel tank, lubricate and change oil before storage.
- Apply a thin coat of grease to metal surface (hydraulic piston rods and splined shaft).
- As to batteries, remove the terminals and cover them, or remove them from the machine and store separately.
- When the ambient temperature is anticipated to drop below 0°C, always add antifreeze in the cooling water.
- Set each control levers to neutral or hold position, lock them and apply the parking brake.
- Open the drain valve of the air tank to drain condensation. Close after completely drained.

DURING STORAGE

- Operate the engine and move the machine for a short distance once a month so that new oil film will be coated over movable parts and component surfaces.
- Before operating the work equipment, wipe off the grease on the hydraulic piston rod.

⚠ **If it is unavoidably necessary to carry out rust-preventive operation while the machine is indoors, open up doors and windows to improve vetilation and prevent the gas poisoning.**

AFTER STORAGE

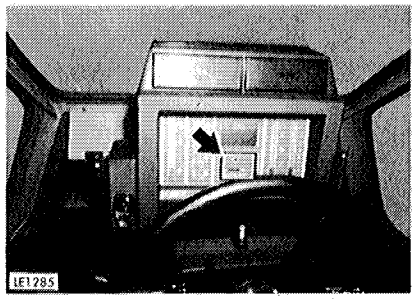
Carry out the following procedure when taking the machine out of long-term storage.

- Wipe off the grease on the hydraulic piston rod.
- Completely fill fuel tank, lubricate and add oil.

★ If the machine is stored without carrying out the monthly rust prevention operation, request your Komatsu distributor for service.

SERVICE METER

This meter indicates the integrated work hours. So, use it according to the following instructions.



- Record the readings at the start and the end of work, this is the work record of the machine.
- This record will indicate, when periodical maintenance is due.
- It also indicates the integrated working hours when machine problems are encountered.

★ **How the meter progresses**

The service meter progresses by 1 when the engine is operated for one hour, regardless of the engine speed.

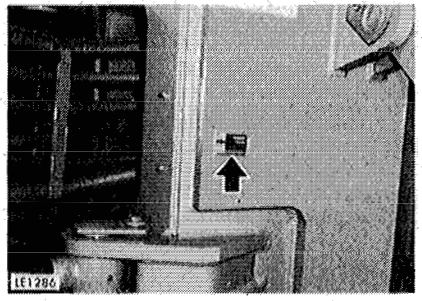
Consequently, if the engine is running, the service meter will advance even if the machine does not move.

- While engine is running, green pilot lamp on the service meter flashes to show the service meter advances.

MACHINE AND ENGINE SERIAL NUMBERS

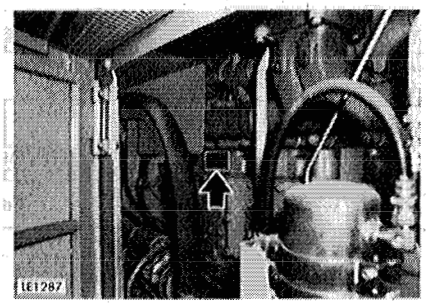
When calling for a service of mechanic or when making replacement-parts order, be sure to give Komatsu distributor the machine and engine serial numbers as well as the service meter reading before mentioned. These numbers are founds on the plates shown in the photos below.

- **Location of the machine serial number mark**



This is seen on the center right of the front frame.

- **Location of the engine serial number mark**



This is seen on the left of the cylinder block, when seen from the fan side.

FUEL, COOLANT AND LUBRICANTS

PROPER SELECTION OF FUEL, COOLANT AND LUBRICANTS

RESERVOIR	KIND OF FLUID	AMBIENT TEMPERATURE −22 −4 14 32 50 68 86 104 122°F −30 −20 −10 0 10 20 30 40 50°C	CAPACITY (ℓ) Specified	CAPACITY (ℓ) Refill
Engine oil pan	Engine oil	SAE 30 / SAE 10W / SAE 10W-30 / SAE 15W-40	61	43
Transmission case	Engine oil	SAE 30 / SAE 10W	120	110
Brake Hydraulic system	Engine oil	SAE 10W	8 412	8 217
Axle (Front and rear)	Engine oil	See NOTE (4)	each 110	each 110
Fuel tank	Diesel fuel	ASTM D975 No. 1 / ASTM D975 No. 2	610	–
Cooling system	Water	Add antifreeze	135	–

NOTE:

(1) When fuel sulphur content is less than 0.5%, change oil in the oil pan every periodic maintenance hours described in this manual.
Change oil according to the following table if fuel sulphur content is above 0.5%.

Fuel sulphur content	Change interval of oil in engine oil pan
0.5 to 1.0%	1/2 of regular interval
Above 1.0%	1/4 of regular interval

ASTM: American Society of Testing and Material
SAE: Society of Automotive Engineers
API: American Petroleum Institute

(2) When starting the engine in an atmospheric temperature of lower than 0°C, be sure to use engine oil of SAE10W, SAE10-30 and SAEISW-40, even though an atmospheric temperature goes up to 10°C more or less in the day time.

(3) Use API classification CD as engine oil and if API classification CC, reduce the engine oil change interval to half.

(4) For axle oil, use only recommended oil as follows.
SHELL: DONAX TT or TD
CALTEX: RPM TRACTOR HYDRAULIC FLUID
CHEVRON: TRACTOR HYDRAULIC FLUID
TEXACO: TDH OIL
MOBIL: MOBILAND SUPER UNIVERSAL

★ It is possible to substitute engine oil CLASS-CD SAE30 for axle oil.
If noise comes from the brake, it is no problem of durability.

Specified capacity: Total amount of oil including oil for components and oil in piping.
Refill capacity: Amount of oil needed to refill system during normal inspection and maintenance.

No.	Supplier Name	**Engine Oil [CD]** SAE10W, SAE30, SAE10W/30, SAE15W/40	**Grease [Lithium-Base]** NLGI-2	**Anti-Freeze Coolant [Ethylene Glycol Base] [Permanant Type]**
1	AGIP	Diesel Sigma S Superdiesel Multigrade	GR M	–
2	AMOCO	Amoco 300	Super Permalube Grease	–
3	ARCO	Arco Fleet S-3 Plus	Litholine H-EP	–
4	BP	Vanellus C-3	Energrease L2 Energrease LS2	Antifreeze
5	CALTEX	RPM Delo 300 RPM Delo 400	Marfak Multipurpose Marfak All Purpose	AF Engine Coolant
6	CASTROL	RX Super CRD	LM Grease	Antifreeze
7	CHEVRON	Delo 300 Delo 400	Multi-Motive Grease Ultra-Duty Grease 2	–
8	ELF	Multiperformance 3C Performance 3C	Multi EPEXA 2	Glacelf
9	EXXON (ESSO)	Essolube D-3 Essolube XD-3 Essolube XD-3 Extra	Multi Purpose Grease Beacon EP2	–

No.	Supplier Name	**Engine Oil [CD]** SAE10W, SAE30, SAE10W/30, SAE15W/40	**Grease [Lithium-Base]** NLGI-2	**Anti-Freeze Coolant [Ethylene Glycol Base] [Permanent Type]**
10	GULF	Super Duty	Gulfcrown Grease No. 2 Gulfcrown EP Special Grease No. 2	Cruisemaster Antifreeze and Summer Coolant
11	MOBIL	Delvac 1300 Delvac 1400 Delvac 1400 Super	Mobilgrease MP Mobilgrease 77 Mobilgrease 532 Mobilux EP2	Permazone
12	PENNZOIL	Supreme Duty Fleet Multi-Duty	Multi-Purpose No. 705 Wheel Bearing No.707L	Anti Freeze & Summer Coolant
13	SHELL	Rimula Rimula X	Alvania Grease EP	–
14	SUN	Sunfleet Dieselube XL Sunfleet Super C	Sunfleet HP Sun Prestige 742 EP	Sunoco Multi-Season Anti-Freeze
15	TEXACO	Ursa Super Plus Ursa Oil LA Ursa Super LA	Marfak All Purpose Marfak Multi Purpose 2	Startex AF & Summer Coolant
16	TOTAL	Rubia S Rubia x	Multis EP2	Antifreeze
17	UNION	Guardol	Unoba EP	–

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PROPOSAL FOR MANUAL REVISION

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PROPOSER		
	NAME OF COMPANY:	LOCATION:
		PHONE NO:
	DEPARTMENT:	DATE:
	NAME:	

MANUAL NAME:				
MANUAL NO:				
MACHINE MODEL: S/N IF APPLICABLE:				

PAGE NO:

PROBLEM:

Attach photo or sketch.
If more space is needed, use another sheet.

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CORRECTIVE ACTION:

PFMR1 081696