KOMATSU

D455A-1
BULLDOZER

SERIAL NUMBERS
D455A-1501 and up

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 code, 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.

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.
- At the first 250 hours of operation*, the machine should be maintained in the following manner.

1) Change oil in the steering clutch case (including transmission, torque converter and bevel gear case), final drive cases and hydraulic tank.
2) Replace the hydraulic filter element and oil cooler fan driving filter element.

(For replacement procedure, refer to EVERY 1000 HOURS SERVICE.)

- * 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

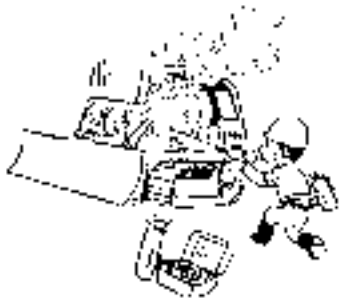
OPERATION

MAINTENANCE

SAFETY HINTS · · · ⚠

OPERATION
GENERAL

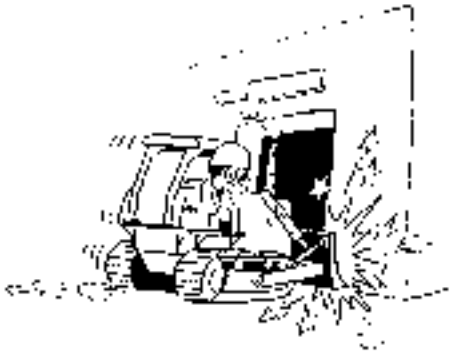
- Wear well-fitting helmet, safety shoes and working clothes. If the nature of the work requires safety, wear protective goggles or mask, thick gloves, ear plugs or other protection.
- Accidents or injuries are liable to occur when the operator is careless or slack. It is most important to bear safe operation in mind at all times.
- Take care of your health. Do not drive when tired, or after drinking.
- Learn the prohibitions, cautions and rules about work procedures in the work site.
  When there is a leader, fix standard signals and always follow these signals when operating.



- 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.
- Learn about the safety devices on your own machine and about how to use them. Confirm that they are correctly attached in the prescribed position.
  Such safety devices include:
  - ★ Guards
  - ★ Canopies
  - ★ Protective Devices
  - ★ Roll-Over Protective Structures
  - ★ Seat Belts, etc.

- 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. Remember the check points and checking method for engine oil, fuel, cooling water and hydraulic oil levels.

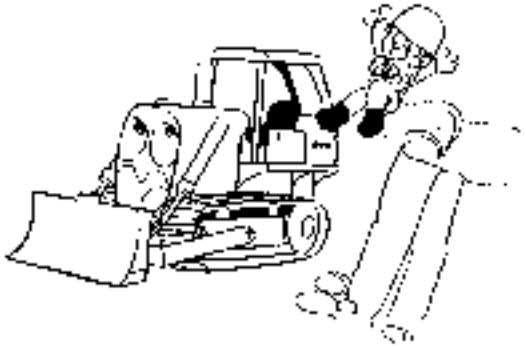
- Exhaust gas is dangerous. When running the engine for long periods in a poorly ventilated area, there is a danger of gas poisoning, so open the windows or doors to ensure a good supply of fresh air.



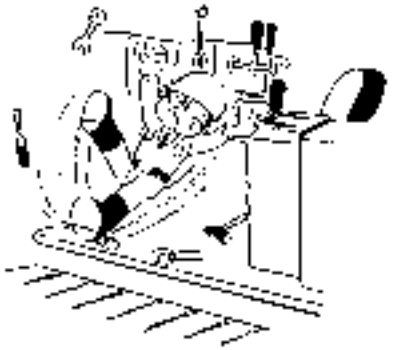
- When operating inside a building, always be sure of the clearances of the ceiling, entrances, aisles, etc. and the load limit of the floor.
- Never allow other person than the operator to ride on the machine during operation.

BEFORE STARTING OPERATION

- 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.
- Inspect leakages from the fuel, lubricating and hydraulic systems. Check that the slew bolts are not loose, and that no other parts are damaged or missing. Machines having such failures should not be operated.



- When getting on or off the machine, use the handrail and step provided. Do not jump up or down from the machine.



- 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 throughly any grease, oil or mud on the step, handrail, floor or control levers. Failure to do this may cause you to slip.
- Check the level of the fuel, lubricants and cooling water. Extinguish cigarettes before checking or replenishing. Check that the radiator cap and each oil filler caps or plugs are firmly tightened.
- Adjust the operator's seat until it is in the most comfortable position for operating. Always sit in the seat while operating. Do not operate the machine from any other position.

- Adjust the seat so that the brake pedal can be depressed all the way with the operator's back against the backrest.
- Before operating the machine, check and fasten the seat belt. (If equipped)
- Inspect the seat belt and fittings, replace any damaged or worn parts. (If equipped)

- 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.
- Inspect the inside of the engine room and remove any dead leaves or paper. Dead leaves or paper are highly inflammable and can cause fires.
- Before starting the engine, confirm that all control levers are in "NEUTRAL" or "HOLDING"

AFTER STARTING THE ENGINE

- Confirm that all gauges and warning devices are functioning correctly, and that the gauge readings are within the prescribed range
- Check the play and travel of each lever and pedal.

- Operate the blade and ripper to confirm that they are functioning normally

- Move the machine slowly and listen carefully to the engine or gears to confirm that they are not making any unusual noises
- Operate the gear shift lever to confirm that the travel speeds for forward and reverse are functioning normally. Also carry out a brake test at each travel speed.

- Choosing a safe place, turn the machine to the left and right to confirm that the steering devices are functioning normally.
- If these tests reveal anything wrong, however slight it may be, contact the man in charge of the machine and operate the machine only after obtaining his permission.

DURING OPERATION

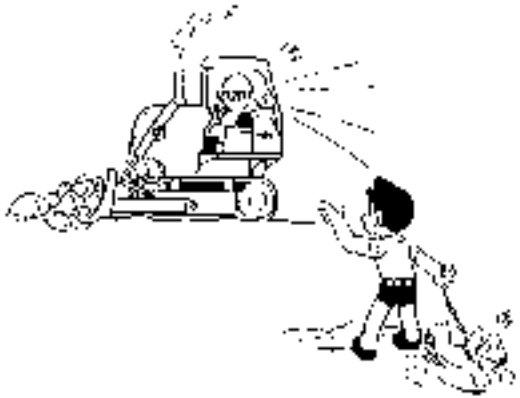
- Always concentrate. It is extremely dangerous to allow yourself to be distracted or to think of other things when operating a machine.
  In dangerous places, or where there is restricted visibility, it is important to get down from the machine and confirm whether it is safe before continuing work.

- The work area should be made as flat as possible. If the work area is flat, operation is made much easier and this reduces operator fatigue.

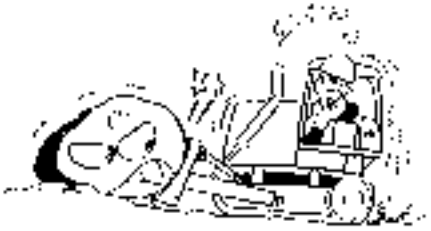
- The machine should always be operated at a speed where it can be correctly controlled. Never do the following:
  - * Speeding
  - * Sudden starting, sudden braking, sudden turning
  - * Snaking
  - * Coasting

- Be careful of those around you, and always confirm that there is no person or obstacle in the way before driving or turning the machine
- Always operate slowly in crowded places. On haul roads or in narrow places, give way to loaded vehicles.

- When driving the machine, keep the blade 40 to 50cm above the ground



- Do not allow unauthorized persons into the work area.



- 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. Be especially careful in the case of a fuel leak as there is danger of fire.

- If the machine breaks down and needs to be towed, first confirm that the brakes are working properly, and then tow, using a wire rope or any other suitable towing equipment.
- When parking the machine after discontinuing work, put the gear shift lever into "NEUTRAL", apply the brake lock, lower the blade and ripper to the ground, and put all safety levers into the "LOCK" position. Never leave the operator's seat without switching the engine off.

- When continuing operations after rain, remember that conditions will have changed from those before the rain started, so proceed with caution.
  Be particularly careful when approaching the shoulder of the road or cliffs, as they may have been loosened by the rain.

- Check the load limits of bridges before crossing.
- After earthquakes, confirm that the ground is still firm; after blasting, confirm that there are no unexploded charges remaining.

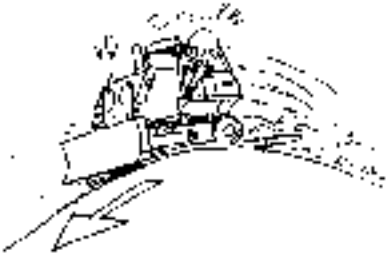
- When operating on uneven ground or in places where there are obstacles, remember the following points.
  - When operating on uneven ground, drive at as low a speed as possible and avoid sudden changes in direction.

  - Wherever possible, avoid travelling over large rocks, fallen trees, tree stumps and other such obstacles. Either use the working equipment to remove them, or travel round them.
    When it is impossible to avoid travelling over them put the gear shift lever into a low speed, reduce speed and mount over the obstacle. Just before the front of the machine tips down, reduce speed even more to make the shock of hitting ground as small as possible.

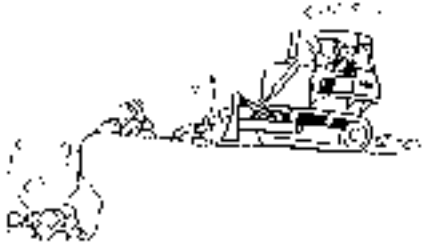
- Never mount over an obstacle at an angle; never disengage one steering clutch to travel over an obstacle.

- When operating at the edge of a cliff or on the shoulder of a road, remember the following points:

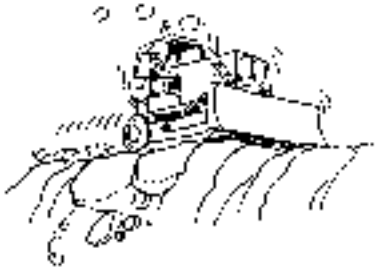
- When operating in a place where there is danger of the machine falling over the side, be doubly careful. Do not approach the edge of the cliff or road shoulder by mistake.



- At the instant when the soil is dumped over the cliff, or when the machine passes the summit of a slope, the machine speed suddenly increases. This is dangerous, so press the decelerator pedal or use the fuel control lever to reduce the speed, and at the same time return the gear shift lever to "NEUTRAL".



- 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.

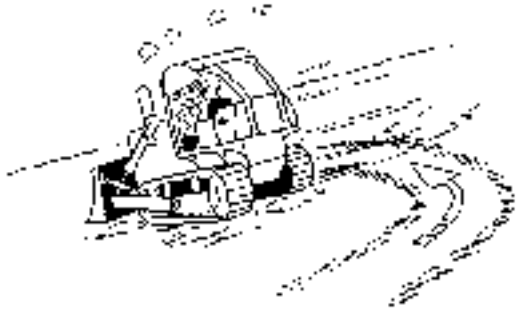


○ When working on river embankments or other places made of piled soil, there is the danger that the weight or vibration of the machine may cause the machine to sink into the piled soil, so be extremely careful when operating in such places.

● 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.

○ When going down a slope, use the engine as a brake. If this is not enough to control the speed of the machine, use the steering brake as well.
Never coast down a slope with the gear shift lever in "NEUTRAL".



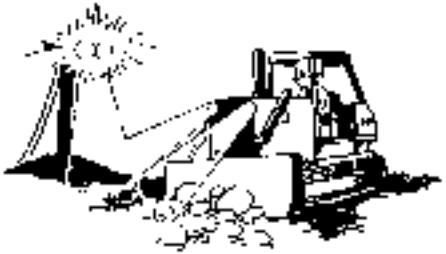
○ As far as possible, avoid turning the machine on a slope. It may cause the machine to roll over or slip sideways.

- In forest areas, do not mount fallen trees or logs. Piles of leaves or branches are also very slippery, so proceed with caution.
- Before going up or down a slope, select a travel speed most suited to the slope. Do not change gear on the slope.
- If the engine stalls on a slope, first use the brake to stop the machine, then return the gear shift lever to "NEUTRAL" before starting the engine again.
- When operating in water or in muddy areas, remember the following points.

- When operating in water or when crossing shallows, first check the bed soil condition and the depth and flow speed of water, then proceed taking care not to go beyond the permitted depth.

- If the machine gets stuck in mud, it is completely useless to increase the engine speed, causing the tracks to spin, or to rock the machine backwards and forwards. In such a case, raise the blade to reduce the load, and drive out slowly.

- When passing through a narrow space, be careful of the side and overhead clearances. Take special care not to touch any obstacles on either side or overhead. If necessary, have someone outside the machine call out instructions.
- When operating at night, remember the following points:



a Be sure to arrange an adequate lighting system.

b At night it is very easy to make mistakes in assuming the distance and height of objects and land.

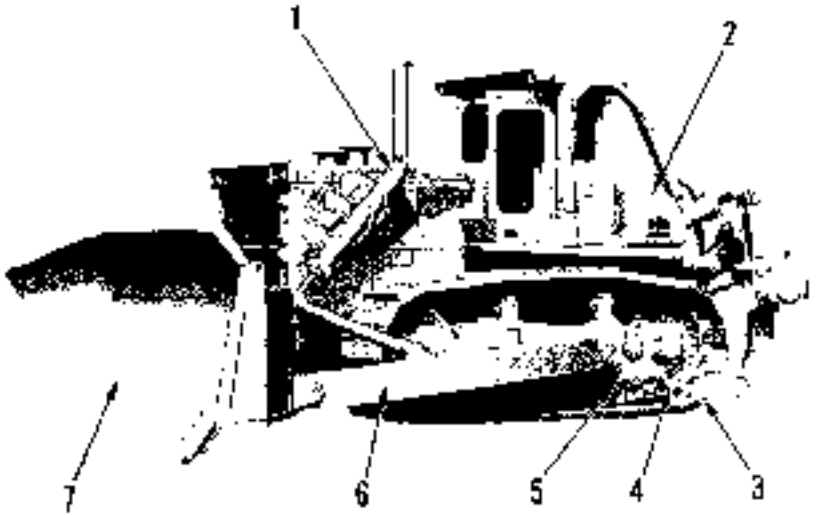
- When operating in fog, mist or smoke, where visibility is bad, be especially careful to confirm first whether operation is safe.
  When visibility drops below safety level, stop work and wait for the visibility to improve.
- When operating in snow, or clearing snow, remember the following points:
  - Even slight slopes can cause unexpected side slipping, so in such places, operate with extreme caution.

  - Never use the steering brake to stop suddenly on slopes. Lowering the working equipment is a far more effective way of stopping.
- During operation, use the seat belt. (If equipped)

PARKING

- 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 tracks. When the machine is facing downhill, lower the blade so that it cuts slightly into the ground to further increase the safety.
- When parking the machine, return the gear shift lever to "NEUTRAL", apply the brake lock, lower the blade and ripper to the ground, and put all safety levers in the "LOCK" position. Switch off the engine and remove the key.

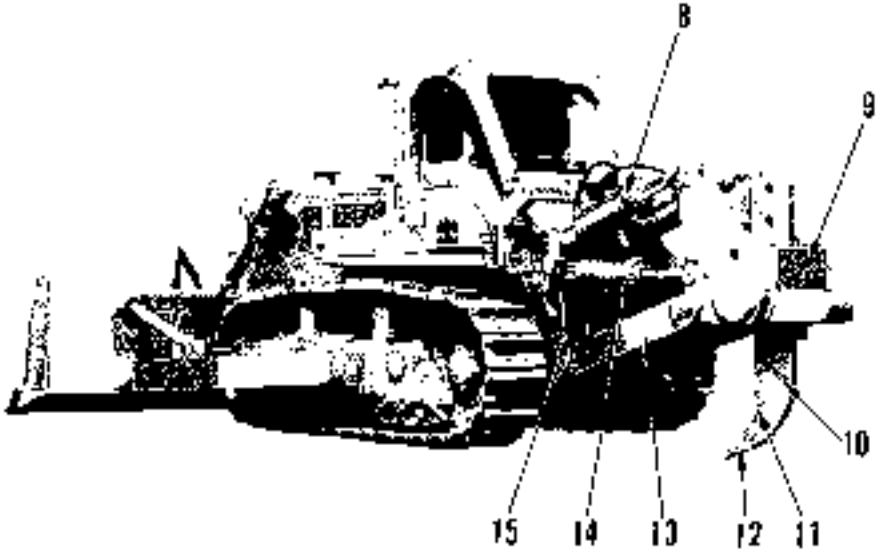
GENERAL LOCATIONS



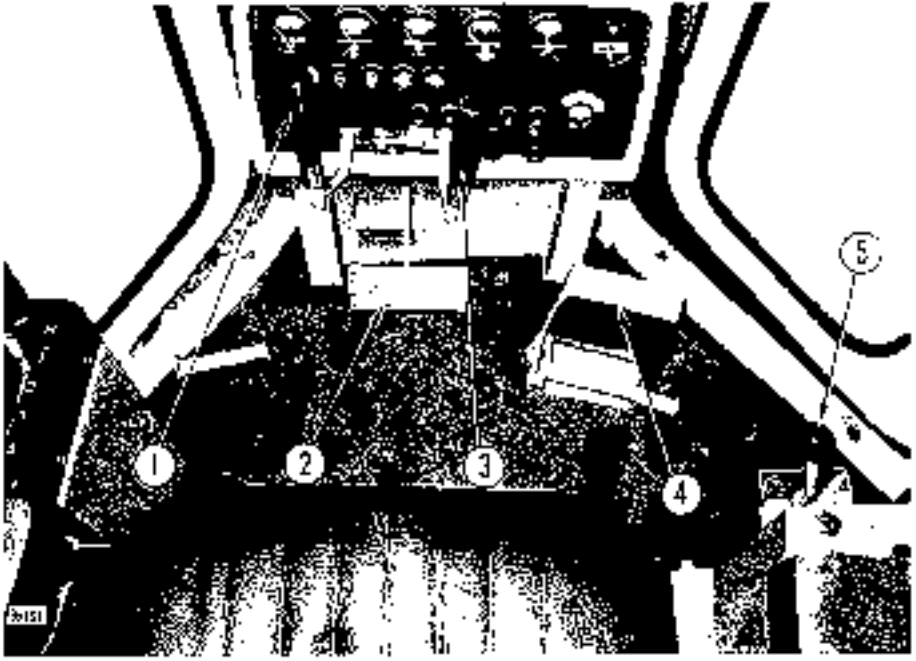
1. Blade lift cylinder
2. Fuel tank
3. Track shoe
4. Sprocket
5. Track frame
6. Frame
7. Blade

A full-U-dozer with variable giant ripper.

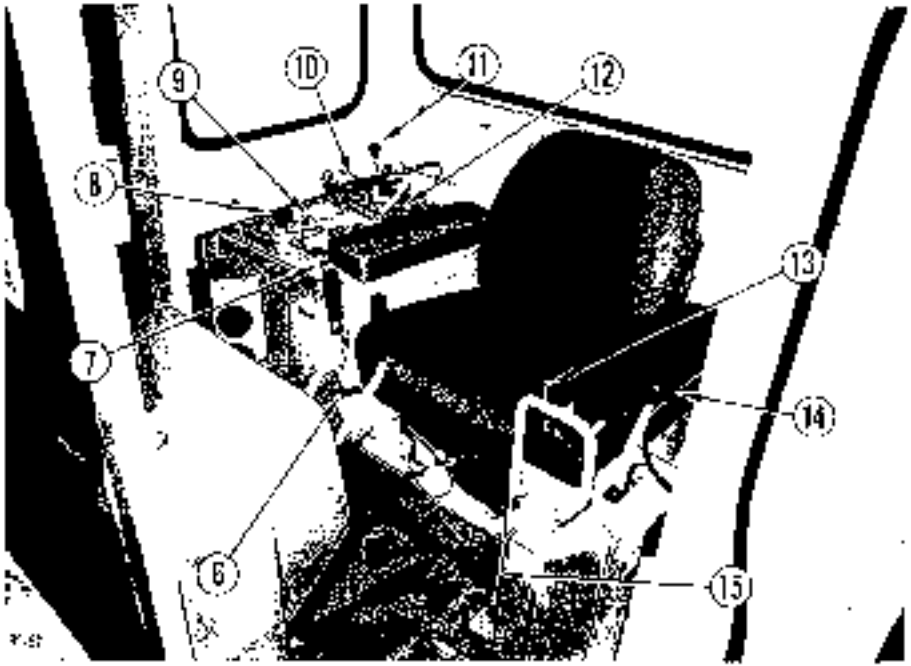
8. Ripper tilt cylinder
9. Beam
10. Shank
11. Protector
12. Point
13. Arm
14. Ripper lift cylinder
15. Bracket



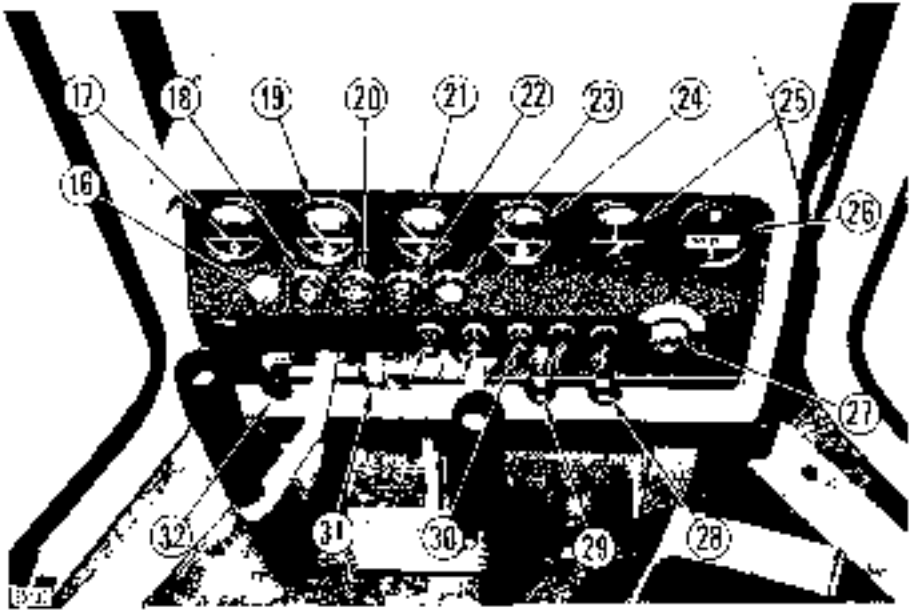
OPERATOR'S COMPARTMENT



1. Steering lever (left)
2. Brake pedal
3. Steering lever (right)
4. Decelerator pedal
5. Counter rotation lever

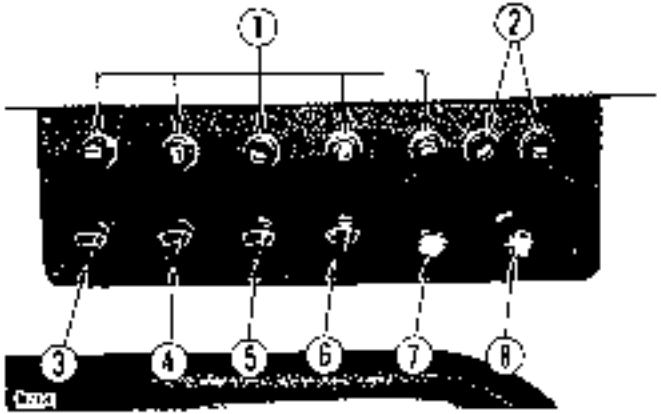


6. Brake lock lever
7. Horn button
8. Blade control lever
9. Safety lock
   (For Blade control lever)
10. Ripper control lever
11. Pin-puller control lever
12. Safety lock
    (For ripper control lever)
13. Gear shift lever
14. Fuel control lever
15. Safety lever
    (For gear shift lever)



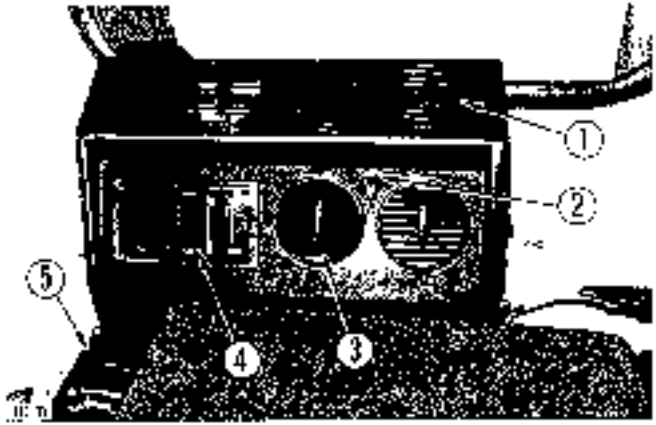
16. Warning check switch
17. Engine water temperature gauge
18. Engine water temperature warning lamp
19. Engine oil pressure gauge
20. Engine oil pressure warning lamp
21. Torque converter oil temperature gauge
22. Radiator water level warning lamp
23. Brake oil pressure warning lamp
24. Fuel gauge
25. Ammeter
26. Service meter
27. Starting switch
28. Lamp switch (for rear lamp)
29. Lamp switch (for head lamp)
30. Fuse holder
31. Dust indicator
32. Quick start knob

SWITCH PANEL FOR CAB



1. Fuse (30A)
2. Fuse (10A) (for head lamp)
3. Wiper switch (for rear window)
4. Wiper switch (for left door window)
5. Wiper switch (for right door window)
6. Wiper switch (for front windshield)
7. Room lamp switch
8. Head lamp switch

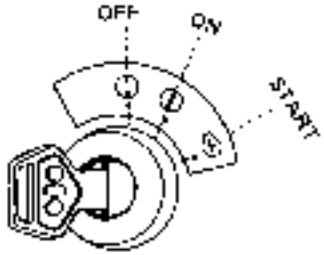
CONTROL PANEL FOR AIR CONDITIONER



1. Overhead air outlet
2. ON-OFF lever (for side air outlet)
3. Side air outlet
4. Control panel
5. Fuse panel

INSTRUMENTS AND CONTROLS

STARTING SWITCH



(OFF)
Key insertion-withdrawal position.

(ON)
Charging and lamp circuits activate. Keep key at (ON) after starting.

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

- ★ Be sure to use the starting key to start the engine.
- ★ The engine will not start unless the gear shift lever is in NEUTRAL position.

ENGINE OIL PRESSURE GAUGE

- When the indicator is in the green range during operation, oil pressure is normal.
- When engine temperature goes down, the indicator may move outside the green range. If so, warm up engine.

ENGINE WATER TEMPERATURE GAUGE

- When indicator is in the green range during operation, water temperature is normal.
- After engine start-up, warm up the engine until indicator moves into green range.
- If indicator moves from green into red range during operation, run the engine at low idling speed until water temperature goes down.

AMMETER

- The green range and center range indicate the battery is being charged; the red range indicates discharging.
- When pointer registers in the center of the scale or in green range, the alternator is in good condition.

FUEL GAUGE

The fuel level is shown when the starting switch is at (I) ION.

E: Fuel tank is empty.

F: Fuel tank is full.

After each operation be sure to fill up the fuel tank.

TORQUE CONVERTER OIL TEMPERATURE GAUGE

- When the indicator is in green range during operation, the oil temperature is normal.
- If the indicator moves from green range into red range, reduce the work load until the oil temperature goes down.

DUST INDICATOR

This device indicates clogging of the air cleaner element. When the red piston appears in the transparent part of this indicator, the element is clogged. Immediately clean element. After cleaning, push indicator button to return red piston to original position.

WARNING LAMPS AND WARNING BUZZER

1. Warning check switch
2. Engine water temperature warning lamp.
3. Engine oil pressure warning lamp
4. Radiator water level warning lamp
5. Brake lube oil pressure warning lamp

If any of the following conditions occur while the machine is in operation, the applicable warning lamp flashes and the warning buzzer sounds. Stop the machine and engine at once.

- The engine water temperature is above the specified level.
- The engine oil pressure is less than the specified level.
- The radiator water level is below the specified level mark.
- The brake lubricating oil pressure is over the specified level.

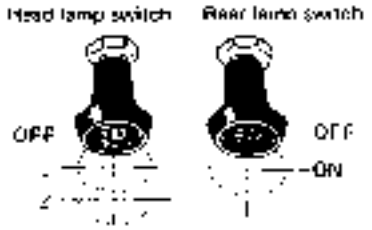
The normal functions of the warning lamps and warning buzzer are as follows:

Switches		Warning lamps				
Starting switch	1 Warning switch	2 Engine water temperature	3 Engine oil pressure	4 Radiator water level	5 Brake lube oil pressure	Warning buzzer
(ON)	OFF	ON	ON	ON	ON	——
(START)	OFF	ON	ON	ON	ON	Sounds for a while and stops
(ON) (Normal operating condition)	OFF	*OUT	*OUT	*OUT	*OUT	**
(ON) (Check before starting operating)	ON	ON	ON	ON	ON	Sounds intermittently

* When any of the above abnormal conditions occurs while the machine is in operation, the applicable lamp flashes.

** When any of the above abnormal conditions occurs while the machine is in operation, the buzzer sounds intermittently. Refer to the Trouble Shooting Guide.

LAMP SWITCHES



Head lamp switch

At position 1, outer two head lamps and two lamps on the cabin of the cabin-loaded machine are lit.

At position 2, all the four head lamps and two on the cabin of the cabin-loaded machine are lit.

Rear lamp switch

When this switch is turned on, rear three work lamps and a lamp (option) on the cabin of the cabin-loaded machine are lit.

QUICK START KNOB

This knob is to assist in starting of the engine in cold weather. Pull the knob and then push it back, ether will be sprayed into the intake manifold. The travel of knob is approx. 19mm. (For the details of ether starting aid, refer to the section COLD WEATHER ENGINE STARTING PROCEDURE).

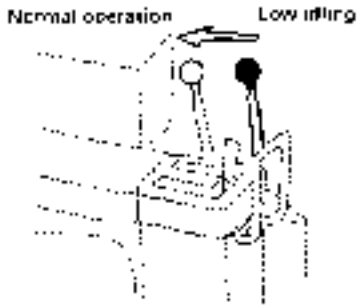
STEERING LEVER

When the left steering lever is pulled, the center clutch disengages and the left side transmission goes into NEUTRAL.

When the lever is pulled further, the left brake operates and the machine turns to the left.

Similarly, the right steering lever can be operated for right turns.

FUEL CONTROL LEVER

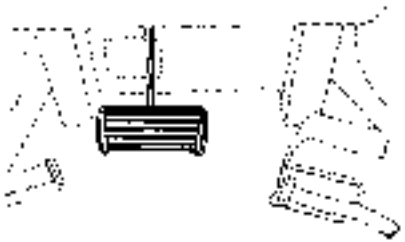


The low idling position is reached by pushing the lever forward to the position of stoppage thereof.

When you pull the lever, the engine revolution increases.

When you stop the engine, use the starting switch.

BRAKE PEDAL



The brake is a hydraulic brake and the braking power can be regulated by the pedal travel. Normal operations can be carried out satisfactorily within the partially applied braking sphere (travel approximately 35 to 80 mm), but for emergency braking depress the brake pedal further.
(It is linked with the decelerator when the pedal travel is about 80mm and the engine rpm is decelerated to approx. 1500 rpm.) Also, note that the pedal travel is fixed (approximately 120 mm) regardless of the disc brake wear.

BRAKE LOCK LEVER

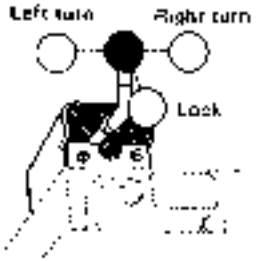
This is the locking device of the brake pedal. When locking or releasing the brake, depress the brake pedal upto the extent of emergency braking activity.

⚠ **When locking brakes, be sure to keep the engine running.**

HORN BUTTON

The horn button is on the upper side of the work equipment control box.

COUNTER ROTATION LEVER



When you shift the gear shift lever to the NEUTRAL position and then depress the counter rotation lever to the left or right, the machine will turn on the present spot. The counter rotation referred to here is the turning of the machine operated in such a manner that right and left tracks rotate in opposite directions each other.

When you move the lever to the left, machine turns counterclockwise, and when you do to the right, it turns clockwise. When you release the hand, the lever returns back to LOCK position.

DECELERATOR PEDAL

This pedal is used to decelerate engine speed.

To quickly restore normal engine power during ripper operation, this pedal is designed to be operated in two stages. Normally, the pedal is used at the first stage (800 to 900 rpm). When required, the pedal can be further depressed so the engine runs at low idling speed.

⚠ **When arriving at the top of a slope, or when dumping earth from a cliff, the machine will increase its speed with the sudden loss of load. Slow the machine by depressing the decelerator pedal.**

GEAR SHIFT LEVER

Four-speed forward and four-speed reverse travel can selected by simply shifting the gear shift lever to any desired position.

When starting the engine, be sure to place the gear shift lever in NEUTRAL position.

SAFETY LEVER
(For gear shift lever)

This is the locking device of the gear shift lever.

⚠ **When parking machine, be sure to place gear shift lever to NEUTRAL and set safety lever to LOCK position without fail.**

BLADE CONTROL LEVER

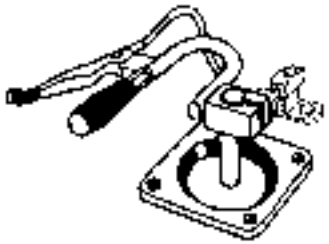
This lever is used to operate the blade. Refer to the section BLADE OPERATION for detail.

SAFETY LOCK
(For blade control lever)

This device is used to lock the blade control lever.

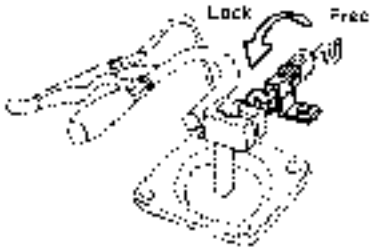
⚠ When parking or servicing the machine, be sure to turn the safety lock in the direction of the arrow, so the blade control lever is locked.

RIPPER CONTROL LEVER



This lever is used to operate the ripper. Refer to the section RIPPER OPERATION for detail.

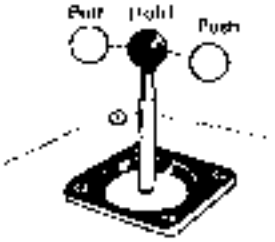
SAFETY LOCK
(For ripper control lever)



This device is used to lock the ripper control lever.

⚠ When parking or servicing the machine, be sure to turn the safety lock in the direction of arrow, so the ripper control lever is locked.

PIN-PULLER CONTROL LEVER



The ripper shank has five holes in which pin is to be inserted, so that the digging depth may be controlled. The pin-puller control lever serves to enable the pin to be inserted in the holes or pulled out therefrom.

PUSH:	The pin is inserted in the optional hole on the shank.
HOLD:	Pin puller is held at this position.
PULL:	The pin is drawn out from the hole.

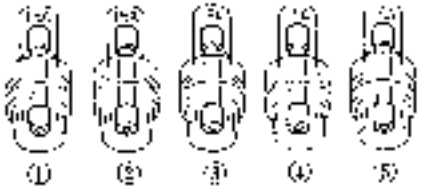
FUSE HOLDER

Remove any one of caps (1), and its fuse can be taken out of place.

★ Replace a fuse, whenever necessary, with a new one of the same capacity.

⚠ **Before replacing a fuse, turn off the power.**

Name of circuits



① Instrument circuits (16A)
② Circuit (15A) for emergency warning device, horn and backup alarm
③ Inner head lamp circuit (15A)
④ Outer head lamp circuit (15A)
⑤ Rear lamp circuit (15A)

OPERATOR'S SEAT

You are required to set the operator's seat according the following description so that an operator may operate the machine without trouble.

Forward and backward adjustment

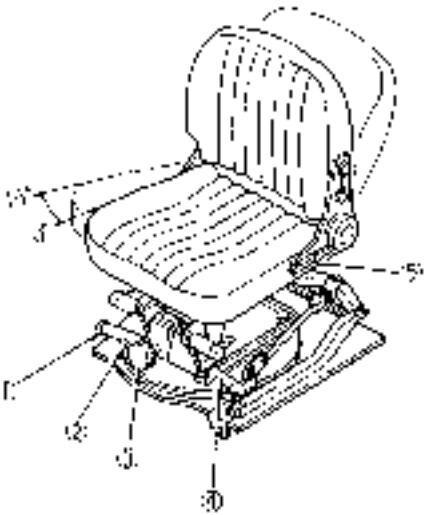
Shift the lever (2) to the left and set the seat at the optional position. Then, release the lever.

The amount of forward and backward adjustment (160mm) is available in 9 steps.

Height adjustment

Turn the knob (3) clockwise, and the seat is lowered. Turn it counter clockwise, and the seat is raised.

The amount of vertical adjustment is 50mm.



Tilting adjustment

Move the lever (5) to the above and set the back seat to the optional position. Then, release the lever.

Seat adjustment according to operator's weight

Pull out the grip of the handle (1) in the direction of the shaft and rotate in the direction of either + or −. Next, set the body weight indication scale to the weight of the operator by moving the handle (1) in the vertical direction. Then, the best position will be obtained.

Directional control of the seat

Push down lever (4) and turn the seat by hand all the way to the right. The seat will be at a 15° angle from the center line.

SEAT BELT (If equipped)

⚠ **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 top 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.

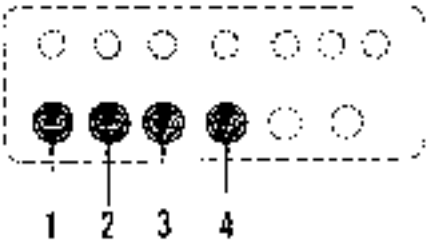
5. When operating a machine equipped with ROPS, be sure to use the seat belt.

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

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

SWITCH PANEL FOR CAB
(If equipped)

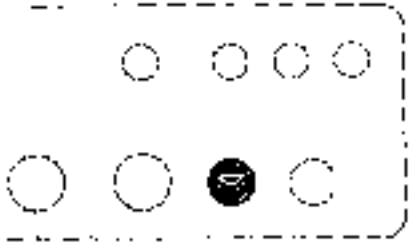
WIPER SWITCH



Pull the wiper switch toward you with the starting switch key in (I) ION to turn on the wipers.

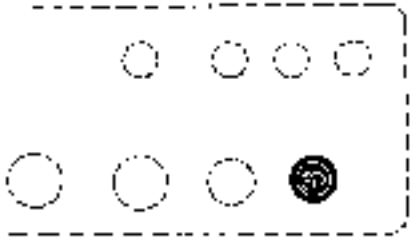
1. Wiper switch (for rear window)
2. Wiper switch (for left door window)
3. Wiper switch (for right door window)
4. Wiper switch (for front windshield)

ROOM LAMP SWITCH



Pull the room lamp switch toward you with the starting switch key in (I) ION to turn on the room lamp.

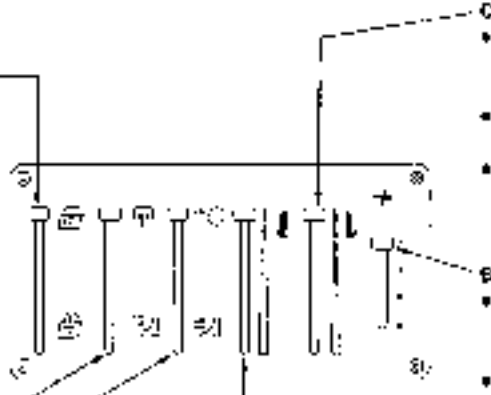
HEAD LAMP SWITCH



Pull the head lamp switch toward you with the starting switch key in (I) ION to turn on the head lamp.

AIR CONDITIONER (If equipped)

CONTROL PANEL



Recirculated/Outside air change-over knob
- Switches over air to be circulated inside cab at cooling or heating
- RECIRC. — Recirculated air is drawn into air conditioner. (Usually for cooling)
- RECIRC. + OUTSIDE — Outside air is added to recirculating air. (Usually for heating and pressurizing)

A. (RECIRC.)
B. (RECIRC. + OUTSIDE)
C. (MILD HEAT)
D. (STRONG HEAT)
E. (MILD COOL)
F. (STRONG COOL)

Cooler temperature knob
- The temperature is controlled with this knob for cooling.
  It is also the cooler switch.
- Turn the knob towards STRONG to decrease the output air temperature.
- When the knob is turned to OFF, the cooler switch is turned off and the cooling stops.

Blower switch
- Used for both controlling the air flow in cooling and heating and as the main switch.
- Changeable at three steps, low, medium and high.
- Placing knob in OFF cuts off the power supply and stops the air conditioner.

Heater temperature knob
- Controls heating temperature
- The nearer to STRONG HEAT the knob goes, the higher heater outlet air temperature will be.
- At OFF position, water valve will be closed and heating function will stop.

Defroster/Foot outlet change-over knob

Knob position	Air outlet
DEF	Left, rear defroster
FOOT	Floor, Right defroster

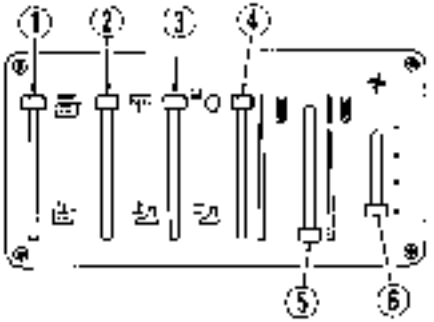
Outlet change-over knob
- Switches over air outlets

Knob position	Air outlet	Purpose
FOOT	Floor/Defroster	Heating, Dehumidify
Midway between FOOT and FACE	Floor Overhead	Heating, Cooling (Air flow from each outlet depends on knob position.)
FACE	Overhead	Cooling, Ventilation

OPERATION

Cooling

Set the knobs to the following positions and a cool breeze will be flowed in from the overhead outlet.

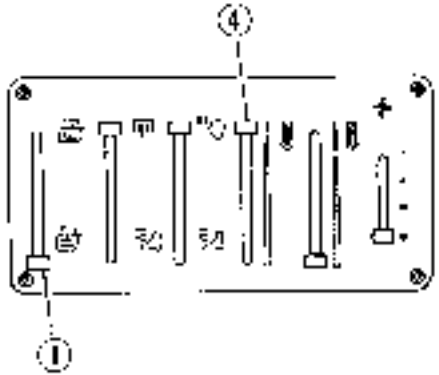


- Heater temperature knob (4): OFF
- Recir./Outside air change-over knob (1): RECIRC.
- Outlet change-over knob (3): FACE
- Def./Font outlet change-over knob (2): DEF.
- Cooler temperature knob (5): See table below.
- Blower switch (6): See table below.

Purpose \ Control knob	Cooler temperature knob (5)	Blower switch (6)
Quick cooling	STRONG	HIGH
Normal cooling	MEDIUM	MEDIUM-LOW
Gradual cooling	MILD	LOW

Cooling at FRESH

When using the cooler for a long time, the air in the cab becomes stable. To bring in fresh air, set the air source selector knob (1) to RECIRC. + OUTSIDE for a short time. The other knobs should be left in the same position.

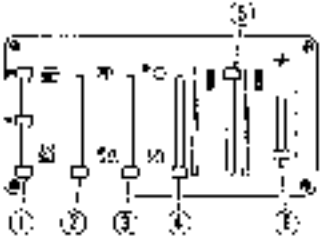


★ If cooling is continued for a long time at RECIRC. + OUTSIDE, the cooling may stop being effective. After changing the air, return knob (1) to the RECIRC. position.

★ If the heater temperature regulator knob (4) is not in the OFF position, hot water will be circulating, so it will be impossible to cool the cab properly. Always make sure the heater temperature regulator knob is at OFF when using the cooler.

Heating

Set the knobs to the following positions, then warm air will be blow in from the floor and right defroster outlets.



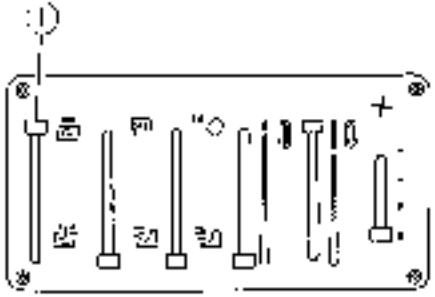
- Cooler temperature knob (5): OFF
- Recirc./Outside air change-over knob (1): RECIRC. + OUTSIDE
- Outlet change-over knob (3): FOOT
- Def./Foot outlet change-over knob (2): FOOT
- Heater temperature knob (4): See table below
- Blower switch (6): See table below

Purpose \ Control knob	Heater temperature knob (4)	Blower switch (6)
Quick heating	STRONG	HIGH
Normal heating	MEDIUM	MEDIUM or LOW
Mild heating	MILD	LOW

※ This position is used for heating the entire cab quickly. (Do not keep the switch knob in this position for a long time.)

Heating at RECIRC.

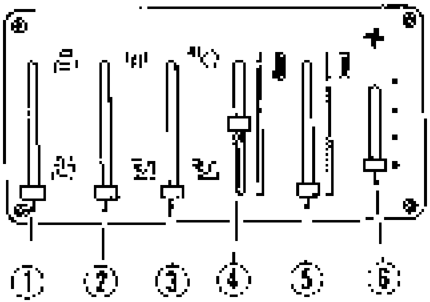
When the outside air is dusty or smelly, set the Recirc./Outlet air change-over knob (1) to RECIRC. for a short time.



★ If heating is continued for a long time at RECIRC., the air in the cab will become stale, so under normal conditions, always set knob (1) at RECIRC. + OUTSIDE when using the heater.

Dehumidity and heating

Set the knobs to the following positions and a dry, fresh, warm breeze will be flowed from the floor and right defroster outlets.



- Recirc./Outside air change-over knob (1): RECIRC. + OUTSIDE
- Outlet change-over knob (3): FOOT
- Def./Foot outlet change-over knob (2): FOOT
- Cooler temperature knob (5): STRONG
- Heater temperature knob (4): See table below.
- Blower switch (6). See table below.

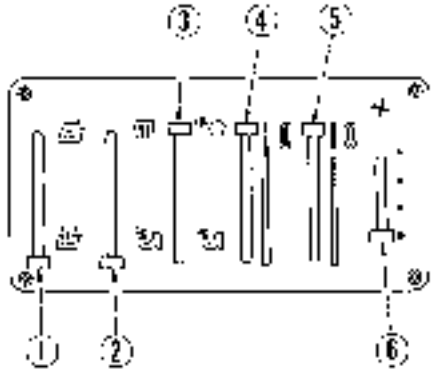
Control knob / Purpose	Heater temperature knob (4)	Blower switch (6)
Dehumidifying + heating		
Winter	STRONG	HIGH
Spring & Autumn	MEDIUM or MILD	MEDIUM-LOW

★ If the air conditioner is used when the humidity in the cab is high, a comfortable heating can be provided without fogging the window glass.

★ At an ambient temperature of 2° to 6.5°C or below, the compressor automatically turns off, making heating and dehumidifying impossible.

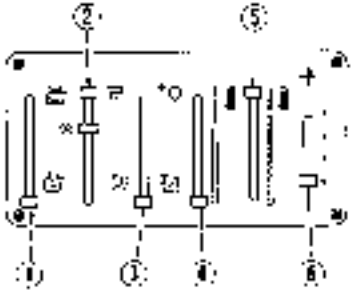
Ventilation

Set the knobs to the following positions and fresh outside air will be supplied from the over-head outlet.



- Cooler temperature knob (5): OFF
- Heater temperature knob (4): OFF
- Recirc./Outside air change-over knob (1): RECIRC + OUTSIDE
- Outlet change-over knob (3): FACE
- Def./Foot outlet change-over knob (2): FOOT
- Blower switch (6): as desired (HIGH, MEDIUM or LOW)

When actuating the defroster:



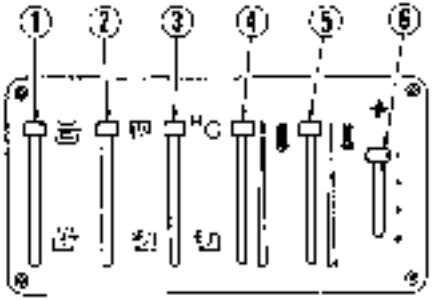
- Def./Foot outlet change-over knob (2): DEF.
- Cooler temperature knob (5): OFF
- Recirc./Outside air change-over knob (1): RECIRC – OUTSIDE
- Outlet change-over knob (3): FOOT
- Heater temperature knob (4): STRONG
- Blower switch: See table below.

Control knob / Purpose	Blower switch (6)
Quick heating	HIGH
Normal heating	MEDIUM or LOW
Mild heating	LOW

★ If the blower switch knob is placed in any position marked ★, compressed air will flow to all defrosters and under outlet ports.

When not using the air conditioner

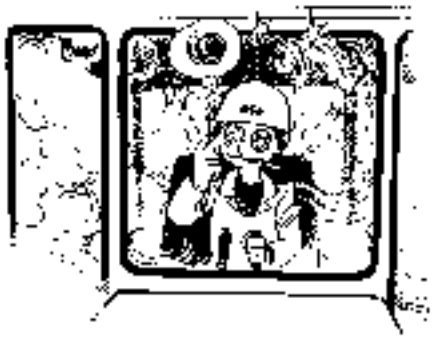
When not using the air conditioner, set the knobs in the following positions.



- Blower switch (6): OFF
- Cooler temperature knob (5): OFF
- Heater temperature knob (4): OFF
- Recirc./Outside air change-over knob (1): RECIRC.
- Outlet change-over knob (3): FACE
- Def./Foot outlet change-over knob (2): DEF.

Precautions for using air conditioner

When cooling, change the air occasionally.



- When smoking and using the cooler, the eyes may begin to hurt.
  If this happens, use cooling at "OUTSIDE" for a short time to clear out smoke in the cab.
- When using the air conditioner for a long period, move the knob to RECIRC. + OUTSIDE once every hour to change the air.

When using the cooler, make sure the hot water circuit is completely stopped.

- If hot water is circulating in the heater, it is like having a hot water bottle in the cab. Always make sure the heater temperature knob is at the OFF position.
- When not using the heater for a long period, fully close the hot water outlet and inlet valves under the engine water manifold and radiator.

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.

INSPECTION AND MAINTENANCE

Clean air filter

If the air filter in the FRESH or RECIRC. inlets is clogged, the heating or cooling capacity will drop.

Clean the air filter with compressed air once a week.

Check tension of compressor belt.

If the belt is loose, it will slip and the air conditioner will not be able to cool properly.

Periodically press the mid-point of the belt with the finger and check that the deflection is 15 to 18 mm.

When the belt is new, it is particularly liable to stretch, so always adjust it after 2 to 3 days.

Check volume of refrigerant (gas).

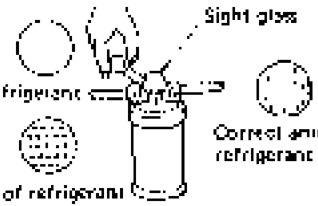
If there is a lack of refrigerant, the cooling performance will be poor.

When operating the cooler at high speed, there should be no bubbles in the sight glass (inspection window) mounted on the condenser unit receiver in front of oil cooler.

If there are any bubbles, there is a lack of gas, so have to add refrigerant at a shop.

In-season checks

From time to time, check the quantity of refrigerant, the piping for looseness or cracks, and the tension of V-belts, so that the air conditioner will function properly.

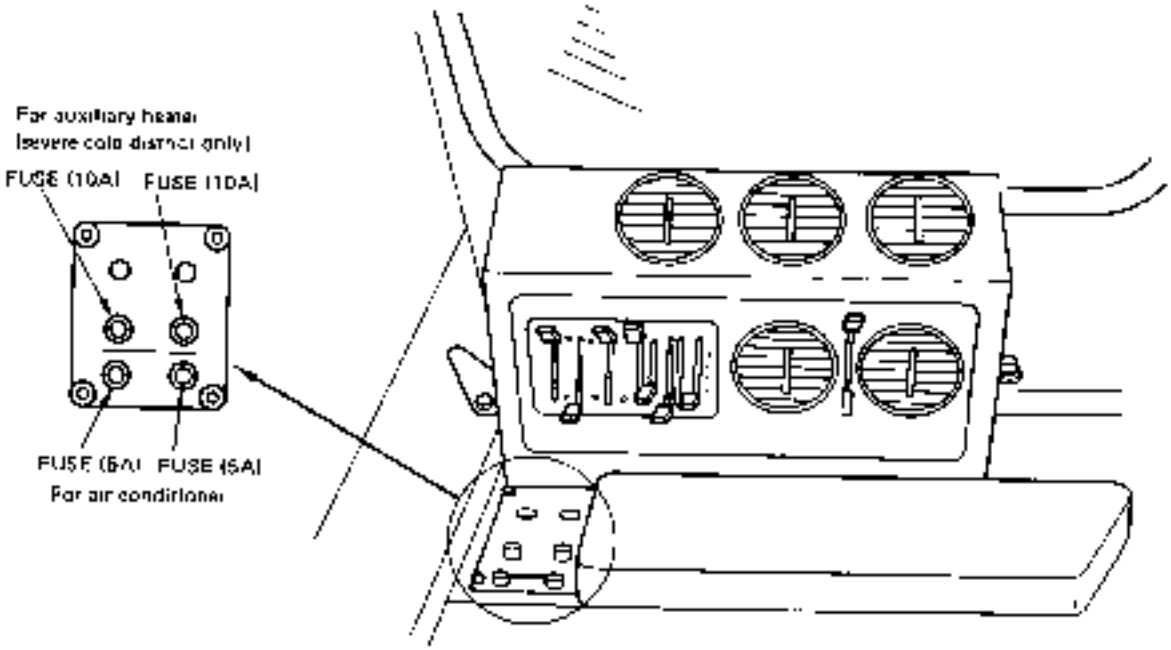


Check during off-season

When the air conditioner is not being used, run the compressor at low speed for a few minutes every week to avoid loss of oil. (Run the engine at low speed with the cooler temperature regulator knob at LOW COOL.)

★ In cold weather, do not run the compressor suddenly at high speed. This may cause failure in the compressor. When the temperature is below 2°C, the low pressure cut-off switch functions to stop the compressor from running even when the air conditioner switch is pressed.

LOCATIONS OF FUSES FOR AIR CONDITIONER



TROUBLE SHOOTING GUIDE

If any of the troubles described below occur, contact your Komatsu distributor to inspect and repair the air conditioner.

Hardly any cooling

1. No air comes out
   - The blower switch is out of order.
   - Resistor is disconnected.
   - Fuse is burnt out. (For checkpoints of fuses, refer to the next page.)
   - Harness is disconnected or connector is out of place.
   - Blower motor is out of order.
2. Compressor does not run.
   - Thermistor is faulty.
   - Compressor is faulty.
   - Magnetic clutch is out of order.
   - Harness is disconnected or connector is out of place.
   - V-belt is torn off or slipping.
3. Condenser is not cooled.
   - Relay is faulty.
   - Wiring is out of order.
4. Others
   - Not enough refrigerant
   - Expansion valve is faulty.
   - Battery is overlow.

Unsatisfactory cooling

1. Not enough air comes out
   - Blower switch is set in LOW.
   - Air filter is clogged.
   - Evaporator is frosted.
   - Battery voltage is low.
   - Blower or blower motor is out of order.
2. Heater core is hot.
   - The heater knob is not in OFF. (Warm water is circulating.)
   - Water valve is out of order.
3. Condenser is not fully cooled.
   - The condenser core is clogged.
4. Temperature control is malfunctioning.
   - The temperature control thermostat is out of order.
5. Others
   - Too little or too much refrigerant
   - V-belt is loose.
   - Expansion valve is closed or opened too wide.
   - Air is in the refrigerating cycle.
   - The ambient temperature is too high.

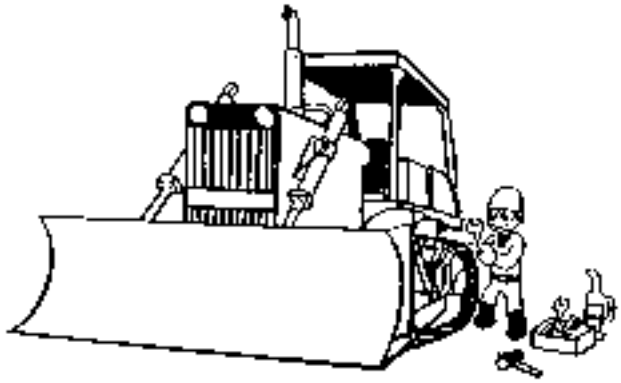
Unsatisfactory heating

1. Little or no air comes out.
   - The air duct is disconnected or clogged.
   - Blower motor is out of order as in unsatisfactory cooling.
2. Temperature of hot water is too low
   - Engine thermostat is faulty.
3. Hot water is not circulating.
   - Water valve is clogged.
   - Piping is clogged, bent or curved.
4. Others
   - Air is in the warm water circuit.
   - The cooling water is low.
   - The ambient temperature is too low.

CHECK BEFORE STARTING

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

a. Walk around the machine and check for any trace of oil or water leakage. Examine connections of high pressure hoses, hydraulic cylinders, final drive, radiator and floating seals with special attention.
   If any leakage is evident, check for the cause and repair. If difficulty is encountered, consult your Komatsu distributor.
b. Check tightness of bolts and nuts, and retighten if required. Particular checks are required for mounting of air cleaner, muffler, track roller supports and shoe bolts.
c. Check for broken electric wirings, short circuits and loose terminals.



d. CHECK AND REFILL COOLANT

Remove radiator cap and check that coolant is in contact with bottom of strainer as shown in fig. below.

If coolant is not in contact, add coolant through water filler until it overflows. If more water than normal is required to fill up to the specified level, coolant is considered to be leaking somewhere. Immediately locate the leak and plug it.

* When filling tank with cooling water, fill according to the following ratio:

  One pack of DCA-4:

  15ℓ of cooling water

* Stop the engine and refill coolant. Then idle the engine for 5 minutes and recheck coolant level. If insufficient, refill coolant.

⚠ **Do not remove the cap while cooling water is hot. Hot water may spout out.**

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

e. CHECK FUEL LEVEL

Remove cap (1) and use the dipstick to check the fuel level.

After each operation, fill up fuel from the filler. A clogged cap breather hole (2) may stop the fuel flow to the engine. Check it from time to time and clean.

* Cap breather hole is bored in cap.

f. **CHECK AND REFILL OIL IN ENGINE OIL PAN**

Use the dipstick (G) to check the oil level. 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".
* When checking the oil level, wait 15 minutes or more after the engine has stopped.

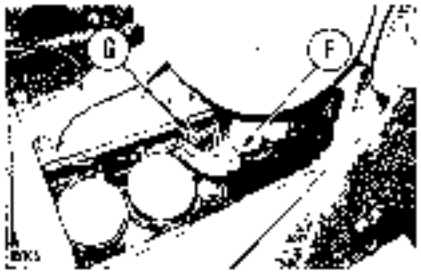
g. **CHECK AND REFILL OIL IN STEERING CASE (INCL. TRANSMISSION, BEVEL GEAR, TORQUE CONVERTER CASES)**

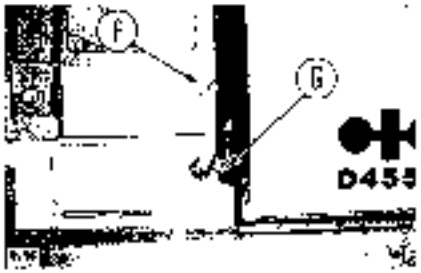
Use the dipstick (G) to check the oil level. If necessary add oil at the oil filler (F).

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

h. **DRAIN WATER AND PRECIPITATION IN THE FUEL TANK**

Loosen the cock at the bottom of the tank and drain precipitation accumulated on the bottom together with mixed water and fuel.

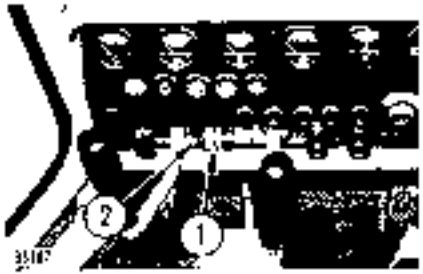




I. CHECK DUST INDICATOR

When the red piston of dust indicator (1) appears, the air cleaner element is clogged. Immediately clean element, refer to the section WHEN REQUIRED for detail

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



OPERATING YOUR MACHINE

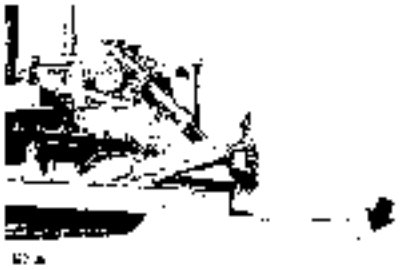
ENGINE HANDLING

BEFORE STARTING

Perform the pre-operation checks referring to the section CHECK BEFORE STARTING.

- Is gear shift lever placed in NEUTRAL and locked?

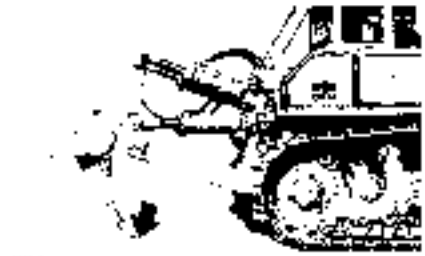
- Is blade lowered to the ground?



- Is brake pedal locked?

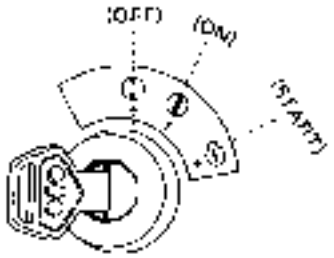
- Are blade control lever and ripper control lever locked?

- Is ripper lowered to the ground?



- Move the fuel control lever into engine low-idling position.

ENGINE STARTING



1. Turn starting key to (START) and start engine.

2. Release the key, and key will return automatically to (ON).

* Do not leave key in (START) for more than 20 seconds.
* If engine will not start, repeat the starting procedure after an interval of about 2 minutes.
* When using low cetane fuel, starting ability at normal temperatures will be reduced. In such cases, starting will be facilitated by adopting the procedure for low-temperature starting.
* To start engine in cold weather, refer to COLD WEATHER OPERATION.

CHECKS AFTER START-UP

After starting the engine, carry out the following checks prior to machine operation.

1. Run engine at low idling speeds and make sure the engine oil pressure gauge shows green range.
2. Pull fuel control lever halfway to run engine at midrange speeds for about 5 minutes with no load.
3. Run engine with light load until engine water temperature gauge indicator moves into green range.
4. After warm-up run, check all gauges and warning lamps for proper operation.

5. Check for normal coloration of exhaust, and any abnormal noise or vibration.
6. Check for any leakage of oil, fuel or water.

* Avoid abrupt acceleration until warm-up run is completed.
* The procedure in 1, 2 and 3 above is called "warm-up run".
* When warm-up run is continued for more than 20 minutes, the engine should be run with load from time to time. If warm-up run with load is impossible, the engine should be run at mid-range speeds.

STOPPING ENGINE

1. Cool the engine by running it at low idling speed for about 5 minutes.

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

* If engine is stopped abruptly before it cools down, engine life may be greatly shortened.
  Never stop engine abruptly except in case of emergency.
* Especially when the engine is overheated, allow the engine to idle without immediate stoppage so that the engine is gradually cooled down to be ready for proper stoppage.

STARTING ON SPECIAL CONDITIONS

- **Starting with electrical trouble in shut-off valve**
  Screw in knob (1) of shut-off valve and open valve to start engine. When engine has been started, screw out knob (1) to stop engine.

- **Restarting after starting switch has been shut off**
  In case starting switch has been mistakenly shut off during operation, turn on switch after engine has come to a complete stop.

- **Starting after empty fuel tank has been refilled.**
  After the empty fuel tank has been refilled, remove the fuel filter cartridge (2) to refill fuel in it. Then reinstall the cartridge (2).

OPERATION OF MACHINE

STARTING MACHINE TRAVEL

1. Increase the engine speed by pulling the fuel control lever.

2. Release the lock of blade control lever and raise the blade 40 or 50 cm off ground.

3. Release the lock of ripper control lever and raise the ripper up to the highest position.

4. Depress the brake pedal, place brake lock lever in FREE, and return the brake pedal to home position.

5. Unlock the gear shift safety lever.

6. Place the gear shift lever in a desired position and initiate machine travel.

★ To begin traveling the machine, push the decelerator pedal to decrease engine speed so the machine can start off without jerking.

⚠ **When starting the machine on a steep uphill grade, run engine at full-throttle and shift gear shift lever into 1st with brake pedal depressed. When machine has started slowly (or track shoes are slipping), propel the machine by slowly releasing brake pedal.**

GEAR SHIFTING

Gears can be shifted into any position by the gear shift lever. There is no need to stop machine to shift gears.

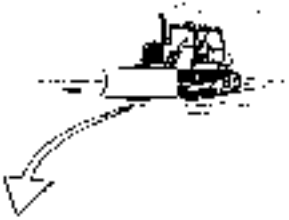
FORWARD-REVERSE SHIFTING

1. Depress the decelerator pedal.

2. Shift gear shift lever to desired position.

TURNING

To turn the machine to one direction, pull the steering lever on the same side halfway. This disengages the center clutch, then the transmission on the side goes into neutral and the machine turns gently.



When the steering lever is further pulled all the way out, and the hydraulic brake operates and the machine turns on the spot (makes a pivot turn).

When the counter rotation lever is operated while the gear shift lever is in NEUTRAL, center clutch is disengaged and the track shoes on both sides move in the opposite direction each other. So the machine makes a counter rotation on the present spot

TURNING WHILE DESCENDING A SLOPE

When descending such a sharp slope that the machine will go down of its own weight or when going down a slope with a scraper or the like, you should exercise great care. The machine will turn to the opposite side to that of the pulled lever.

Avoid as much as possible turning the machine on a slope. The machine will tend to slip sideways. Particular care should be taken on soft or clay land.

When making a gradual turn to the left

Pull the R.H. steering lever halfway, and the machine will make a gradual turn to the left. (The machine turns in the opposite direction.)

When making a pivot turn to the left

Pull the L.H. steering lever fully, and the machine will make a pivot turn to the left. (The machine turns in the same direction.)

★ When turning a machine to the right, pull the steering lever opposite to that described above for left turn.

STOPPING MACHINE

1. Lower engine speed by operating the fuel control lever.

2. Place the gear shift lever in N (neutral).

3. Depress the brake pedal and lock with the brake lock lever.

4. Lock the gear shift lever with safety lever.

5. Lower the blade and ripper to ground.

6. Lock the blade control lever with safety lock.

7. Lock the ripper control lever with safety lock.

★ For stopping engine, refer to Stopping the Engine in Engine Handling section.

Lock the brake lock lever only when the engine is running.

Always stop the machine on flat, stable ground. Avoid parking in a dangerous place.

PRECAUTIONS FOR MACHINE OPERATION

- When torque converter oil temperature gauge indicator exceeds green range while operating, reduce load and wait for lowering of temperature.
- When stepping on decelerator pedal while going uphill, climbing ability will be reduced and machine will stop. Furthermore, engine sometimes will stall.
  Be careful not to depress decelerator pedal until engine stops.
  When decelerator pedal is depressed by mistake and machine is stopped, immediately depress brake pedal before engine stops.
- If the fuel level is too low on sloped areas, the engine may draw excess air due to sloped grade or machine vibration and stop. Be careful for fuel left in fuel tank.
- When operating machine on sloped areas of more than 20°, fill every place with oil to H level.
- Failure to brake may result in overrunning, causing engine trouble.
  Use care, not to shift gears while descending down, for the engine tends to overrun.
- Do not operate machine in such a depth that carrier rollers are submerged. Further, be careful so that the cooling fan will not come in contact with the water.

COLD WEATHER OPERATION

PREPARATION FOR LOW TEPERATURE

- Replace lubrication oil by that with prescribed viscosity.
- Fuel of low pour point shall be used. ASTM D975 No. 1 diesel fuel should be used at atmospheric temperature lower than −10°C.
- Lubrication oil slowly deteriorates with use; at the same time its viscosity increases.
  When viscosity of oil increases starting becomes more difficult in cold weather, so always change oil at specified interval.
- Add antifreeze in the cooling water. When the atmospheric temperature drops lower than 0°C while the machine is stopped, prevent freezing by adding antifreeze to the cooling water. The mixing rate of antifreeze is determined according to the expected minimum temperature. The following table shall be used.

Mixing rate of water and antifreeze

Min. atmospheric temp. (°C)	−5	−10	−15	−20
Amount of antifreeze (L)	47.5	67	74	84.5
Amount of water (L)	156.6	144	132	121.5

★ Cautions for using antifreeze

1) Permanent type antifreeze shall be used.
2) Soft water (ex. city water) shall be used as mixing water.
3) Cooling systems must be thoroughly flushed before filling with antifreeze mixture.
4) When the climate becomes warmer and antifreeze is not needed, replace with soft water (ex. city water) after thoroughly cleaning the cooling system.

Take care of fire as antifreeze is inflammable.

- 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
100%	1.28	1.29	1.30	1.31
90%	1.26	1.27	1.28	1.29
80%	1.24	1.25	1.26	1.27
75%	1.23	1.24	1.25	1.26

★ 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.

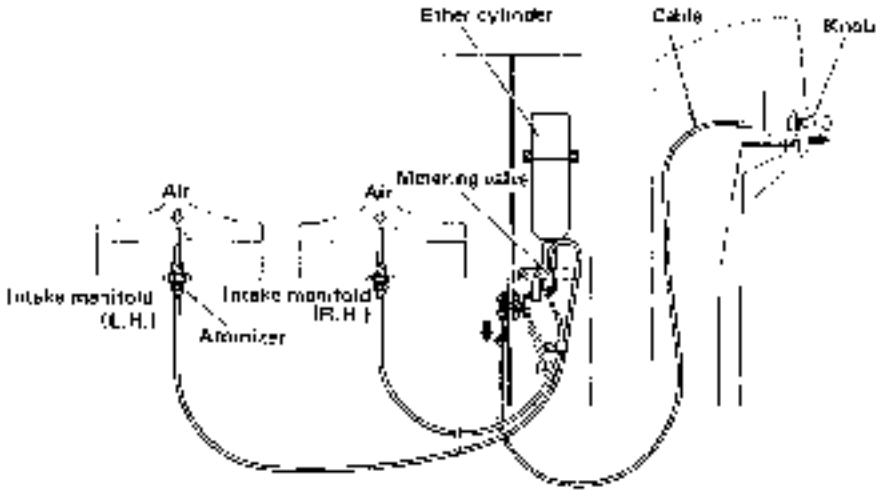
★ When temperature rises, change lubricating oil in each unit to that of recommended viscosity.
Completely drain antifreeze from cooling system and fill with soft water (for example, city water) after thorough flushing.

STARTING THE ENGINE IN COLD WEATHER

Refer to the section ENGINE HANDLING in OPERATING YOUR MACHINE for engine starting precautions.

⚠ Never place the ether cylinder in the operator's compartment.

⚠ Avoid spraying excessive ether, which causes abnormal firing.



STARTING THE ENGINE

1. Pull the fuel control lever half-way.

2. Pull the knob and wait for a several seconds before turning the starting key.

3. Turn the starting switch key to (START) position and depress the knob for ether spray while cranking and start the engine.

★ If the engine does not run fast enough, repeat the knob operation a few times while cranking.

★ If the engine fails to start, 2 minutes later repeat the procedures 2 through 3.

4. When the engine starts, return key to (ON). (key returns automatically when unhanded.)

5. If engine speed is about to decrease after starting, spray ether. However don't increase engine speed more than 1,000 rpm while operating work equipment.

★ Press the quick start knob completely after engine started.

★ Refer to "CHECK AFTER ENGINE STARTS" section.

⚠ Carefully handle ether cylinder

- Never give the cylinder access to fire.
- After used, don't throw it in fire nor drill a hole.
- Don't store it places where the temperature may rise over 40°C.
- Don't put ether gas on the skin nor breath it in.
- Don't leave it on operator's seat.
- Don't leave it at places where children can reach.

★ Remove ether cylinder when it is unnecessary in summer.

★ Never use ether together with preheating device for intake air.

★ When ambient temperature is below minus 25°C, keep ether cylinder at the place where the temperature is normal.

CAUTIONS AFTER COMPLETION OF WORK

1) Mud and water attached to the machine body shall be completely removed. Park the machine on concrete or rigidly dried ground (when such place is not available, park the machine on wood laid on the ground) for the purpose of preventing the accessories from freezing or the undercarriage from freezing to the ground preventing its operation the next morning. In particular, water drops collected on the surface of the piston rod of the hydraulic cylinder shall be fully wiped off. When water drops are frozen on the surface of the piston rod, the seal may be broken.
2) As battery capacity drops greatly when temperature is low, put cover on battery or keep it at warm place after removing from machine. Put battery back on machine next morning. Keep battery warm.
3) Drain water collected in fuel system so that such water may be frozen 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.
- Drain anti-freeze coolant, flush the inside of cooling system completely, and fill with clean soft water (such as city water).

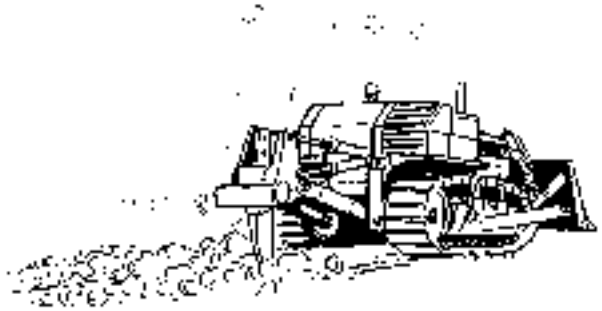
BULLDOZER'S WORK

CUTTING INTO HARD OR FROZEN GROUND OR DITCHING

For digging and ditch excavation of hard or frozen ground, tilt the blade. Even hard ground can be dug effectively by a tilted or angled blade. If the ground is harder, use a ripper attachment for better efficiency.

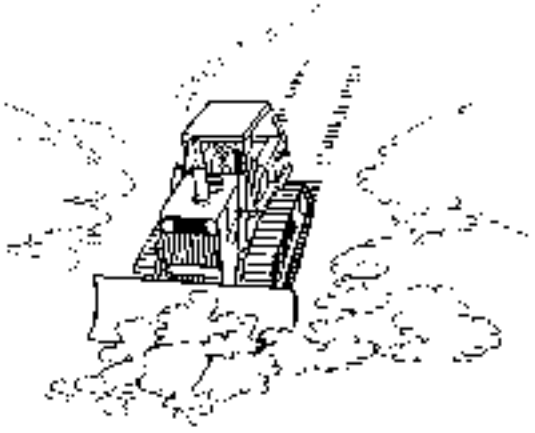
RIPPER WORK

To ditch and excavate extra hard ground and rocky places where the blade digging is impossible, a ripper should be used. Further, for the harder rocks and fallen stones, a more heavy digging operation will be effected by adjusting the digging angle or depth of the shank or additional employment of the pusher.



DOZING

A bulldozer digs and transports dirt in a forward direction. Distance per trip should preferably be 70 meters at maximum. If longer, use of a scraper is economical. Slope excavation can always be most effectively carried out by proceeding from the top downward.



FELLING AND UPROOTING

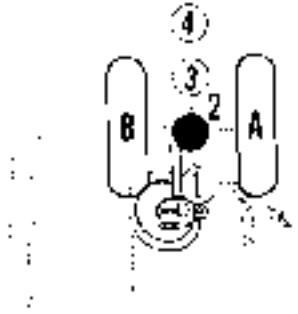
A tree, 10 to 30cm in diameter, can be felled by giving 2 or 3 pushes with the blade held off the ground. Next, back the machine and lower the blade to cut into the earth. Break the roots and push them forward while digging.

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

BLADE OPERATION

OPERATION OF TILTDOZER

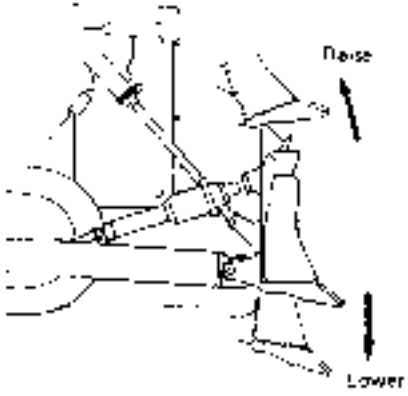
LEVER OPERATION

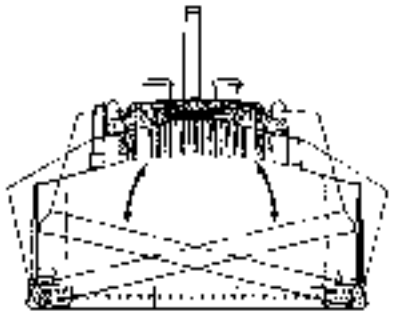


Lever Position

1. RAISE
2. HOLD
   Blade is stopped and held in this position.
3. LOWER
4. FLOAT
   Blade can be freely raised and lowered. When released, it will not return to HOLD position, so it must be moved back by hand.

A. RIGHT TILT
B. LEFT TILT
   Blade can be tilted at any position of 1 to 3 above.
   * Lever should be returned quickly to HOLD position at the end of tilt cylinder stroke.
   * Do not operate lever when blade is at top or bottom position.



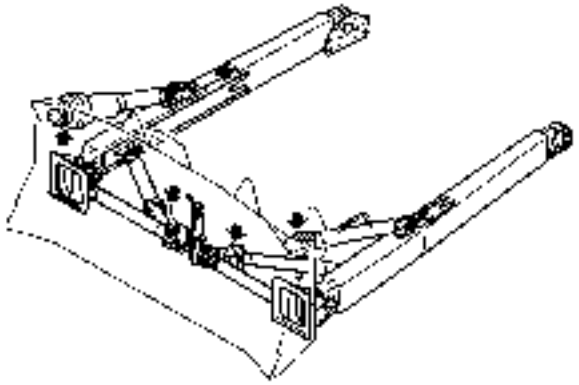


CHECKING END PLAY

Adjust the ball joints (at 4 places) with shims so that play of each ball becomes within 1mm in axial direction (shown by an arrow in the figure).

1. Remove shim (1) and tighten bolts (2) until play of the ball joint is eliminated.
2. Measure clearance "A" and remove bolts (2).
3. Install shim (1) having its thickness of (A + 0 ~ 1)mm and tighten bolts (2).

★ Confirm that ball joint can move smoothly after tightening bolts



ADJUSTMENT OF TILT AMOUNT

Approximate 680 mm tilt distance is obtainable by means of the blade control lever. But when more tilt is required, a length (S) of the brace (1) on the left making the connection between the blade and the frame should be altered and thereby the blade can be tilted by a max. of 1,100 mm (1406 mm for the Full-U dozer) by adjusting the amount of tilt on both sides.

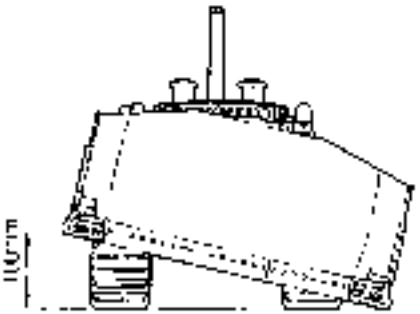
If distance between joints is lengthened by turning the brace using adjustment rod (2):

Left tilting — Decrease
Right tilting — Increase

If distance is shortened:

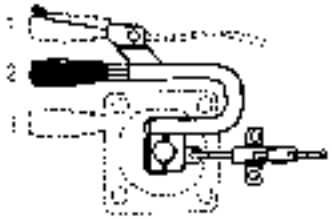
Left tilting — Increase
Right tilting — Decrease

★ The length of brace (1) is 1670 mm normally and the blade can be tilted up to 1100 mm.
Do not attempt to extend the brace over 1100 mm of maximum tilt to prevent arising of an undue condition.



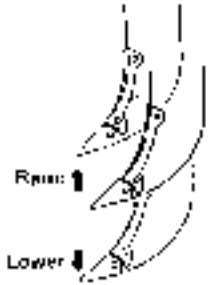
★ When turning brace by using the adjustment rod, keep blade off the ground and tilt it (as required).

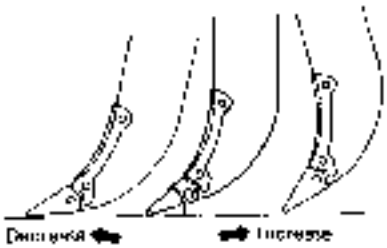
RIPPER OPERATION



Lever position

1. Raise. The ripper raises. (Decrease)
   Grasp the grip and place the lever in this position, the digging angle (α) decreases
2. Hold: The ripper is stopped and holds its position.
3. Lower: The ripper lowers. (Increase).
   Grasp the grip and place the lever in this position, the digging angle (α) increases.





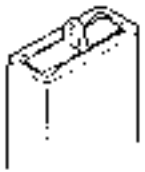
OPERATION OF PIN-PULLER

When it is required to change the shank setting position do so according to the following procedures.

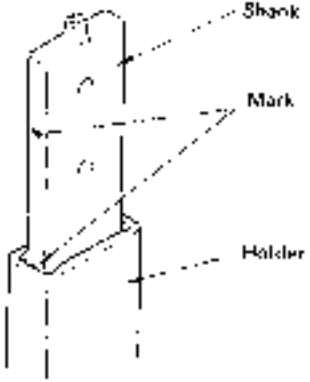
1) Park the machine on a safe place, and then let the shank come in contact to the ground.
2) Remove the set pin by operating the pin puller control lever.
3) Operate the ripper up and down, and set it to an optional position. As a guide to setting the shank position, you are required to let the upper surface of the shank be flush with that of the holder in the case of the maximum digging depth. (See Figure A.)

In other cases, the mark impressed on the front side of the shank should be aligned with the upper surface of the holder. (See Figure B.)

4) The set pin is inserted by operating the pin-puller control lever. If the pin fails to fit in a selected hole of the shank, correct with the pin-puller control lever set to the position PUSH, while operating the ripper up and down slowly.



(Figure A)



(Figure B)

REPLACING OF POINT AND PROTECTOR

The point and protector are provided on the extreme end of the shank for the purpose of protection. When replacement is required due to wear, hammering shall be applied at the places marked by arrows in the figure (either on the left or right side) by using some sharpened tool.

The pins are of the integral type. When they are used, insert them halfway manually, and subsequently knock them with a hammer.

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REVERSING OF POINT

To improve the sharpness of the point and make the most effective use of it, you are required to reverse the point every 30 mm of wear and use it repeatedly.

EFFECTIVE USE OF RIPPER

It is most preferable if the shank substantially forms a right angle to the ground (this corresponds to a 45 to 50 degree digging angle). (See Fig A)

- On softer rocks (having an elastic wave propagation speed of less than 1,500 m/s), you will be able to ditch with the shank tilted backward (as shown in Figure B).
- On harder rocky ground (having an elastic wave propagation speed of between 1,500 to 2,500 m/s), any ditching operation with the shank tilted backward will cause the point end portion to be worn excessively and destroying, resulting in the self sharpening function.
- When the track shoes begin to slip during the ripper operation due to the rolling stones and rigid rocky ground, the tilt cylinder should be employed. (See the section on ditching operation of rolling stones and rigid rocky ground.)
  At this time you are required to continue the forward operation (F1 or F2) without operating the gear shift lever.
- If the gear shift lever is in the neutral position during the ditching operation of rolling stones and rocky ground, the machine body will go backward due to the reacting force from the tilt cylinder. So, be sure and operate the machine in a state of forward movement.

Fig. A

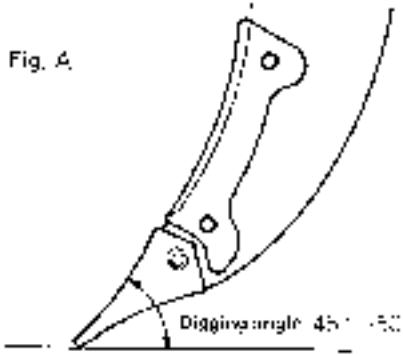
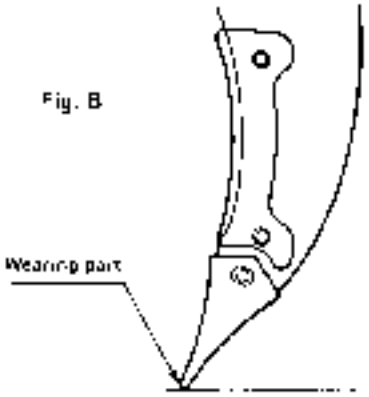
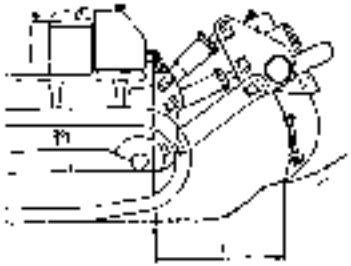


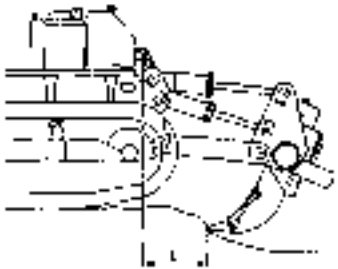
Fig. B



SLOPE OPERATION

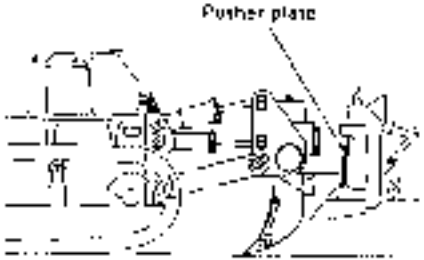
The shank angle of the ripper is designed to be adjustable in this machine, while a conventional one is not. This will allow the length L in the front area to be extended, and substantially assist in the slope operation.





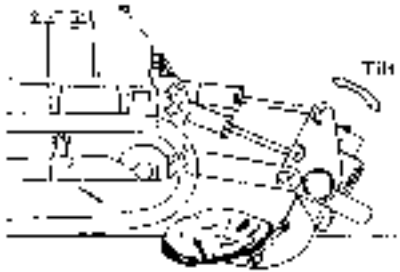
TANDEM OPERATION

In case that the ripper operation can't be carried out only the individual ripper, tandem ripping shall be used.



DIGGING OPERATION OF BOULDERS OR BEDROCK

When the travel speed is decreased due to a fixed boulder or bedrock during the ripping operation, these boulders or bedrock can be dug out by using the tilt cylinder operation.



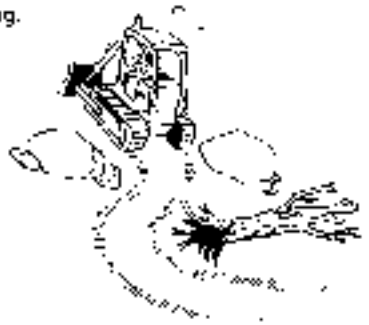
TIPS FOR LONGER UNDERCARRIAGE LIFE

Undercarriage life greatly varies depending on operation method, inspection and maintenance. For most efficient operation, keep the following points in mind. (For inspection and adjustment procedures, refer to the section ADJUSTMENT)

OPERATION METHOD

- Select the track shoe that best suits the type of soil to be encountered in service.
- Avoid sudden starts, acceleration or stops, unnecessarily high speeds and sharp turns.
- Do not slip shoe during operation. If shoe slips, reduce load until slipping stops.

- When idlers or sprockets are lifted due to obstacles during dozing and ripping, do not attempt to force the machine to perform. Because work at this time exceeds machine working capability.
- When ground inclines to left or right during digging operation, do not continue to dig with machine inclined. Move machine back to level ground and start to dig again.
- On a slope, operate the machine parallel to the inclination of the slope. Do not operate across the slope. Also when on a slope, the machine should face toward the top of the slope.
- Always operate machine in a straight line whenever possible. When making turns, be careful not to allow the machine to stay to one side, so operation in both turning directions can be done properly. Make turns with the largest possible radius.
- Prior to operation, clear boulders and obstacles to prevent machine from riding over them while operating.



HANDLING OF BATTERY

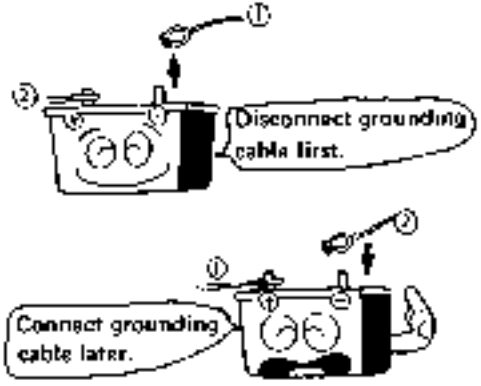
PRECAUTIONS FOR CHARGING BATTERY

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 explusions, 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 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 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.

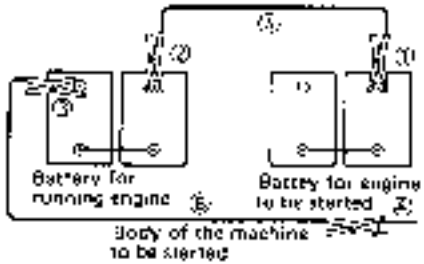


STARTING ENGINE WITH A BOOSTER CABLE

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 body of the machine to be started.

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



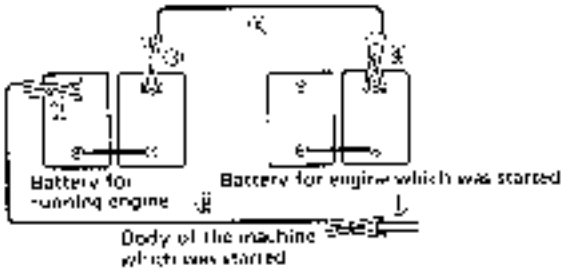
⚠ When connecting the cables, never contact the positive (+) and negative (—) terminals.

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

3. Starting the 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.

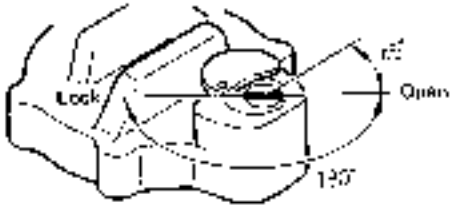
1. Disconnecting the booster cables
   1) Disconnect the clip of booster cable B from the body of the machine which was started.
   2) Disconnect the other clip from the negative (—) terminal of the running engine.
   3) Disconnect the clip of booster cable A from the positive (+) terminal of the running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



OPENING AND CLOSING OF A LOCKING CAP (If equipped)

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.



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.

- Fuel or oil are dangerous substances.
  Never handle fuel, oil, grease or oily clothes in places where there is any fire or flame.
  As preparation in case of fire, always know the location and directions for use of fire extinguishers and other fire-fighting equipment.

- When working with others, choose a group leader and work according to his instructions. Do not perform any maintenance beyond the agreed work.

- Do not handle electrical equipment while wearing wet gloves, or in wet places, as this can cause electric shock.
- During maintenance do not allow any unauthorized person to stand near the machine.

- Exhaust gas is dangerous. When working inside, be particularly careful to have good ventilation.

- Unless you have special instructions to the contrary, maintenance should always be carried out with the engine stopped. If maintenance is carried out with the engine running, there must be two men present: one sitting in the operator's seat and the other one performing the maintenance. In such a case, never touch any moving part.

- Always remember that the hydraulic oil circuit is under pressure. When feeding or draining the oil or carrying out inspection and maintenance, release the pressure first.
  The procedure for releasing the hydraulic pressure is as follows: lower the blade and ripper to the ground, and stop the engine; move the control levers to each position two or three times and then slowly loosen the oil filler cap.
- Always use Komatsu genuine parts for replacement.
- Always use the grades of grease and oil recommended by Komatsu. Choose the viscosity specified for the ambient temperature.
- Always use pure oil or grease, and be sure to use clean containers.
- When checking or changing the oil, do it in a place free of dust, and prevent any dirt from getting into the oil.

DURING MAINTENANCE

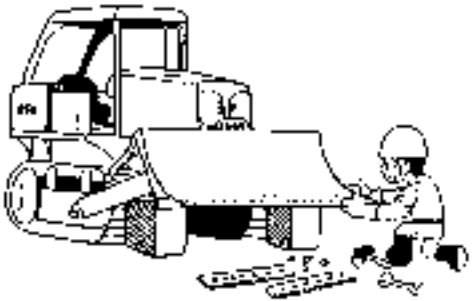
- Park the machine on firm, flat ground. Lower the blade and ripper to the ground and stop the engine. Return the gear shift lever to "NEUTRAL", apply the brake lock and set each control lever to "LOCK". When maintenance has to be carried out with the blade and ripper raised, they must be securely supported by blocks.
- 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.

- Hang 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.

- Flames 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.
- Immediately remove any oil or grease on the floor of the operator's compartment, or on the handrail. It is very dangerous if someone slips while on the machine.

- When check an open gear case there is a risk of dropping things in. Before removing the covers to inspect such cases, empty everything from your pockets. Be particularly careful to remove wrenches and nuts.
- Before draining the oil, warm up it to a temperature of 30 to 40° C.

- 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.
- 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.
- 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 the tracks are removed, never put your fingers between the shoes.



- When handling the cutting edges, always wear gloves.

- Special measuring apparatus is needed for testing hydraulic pressure.

When carrying out other difficult maintenance works, carrying them out carelessly can cause unexpected accidents. If you consider the maintenance is too difficult, always request the Komatsu distributor to carry out it.

MAINTENANCE TABLE

No.	ITEM	SERVICE	PAGE
	CHECK BEFORE STARTING		
a	Oil and water leak	Check	46
b	Nuts and bolts	Check and retighten	46
c	Electric wiring	Check and retighten	46
d	Coolant	Check and supply	49
e	Fuel	Check and supply	49
f	Engine oil pan	Check and supply	50
g	Transmission, steering clutch and torque converter	Check and supply	50
h	Fuel tank	Drain sediment	50
i	Dust indicator	Check	51

No.	ITEM	SERVICE	PAGE
	INITIAL 250 HOURS SERVICE		
a	Oil cooler for driving filter	Replace element	95
b	Steering clutch case	Change oil	95
c	Hydraulic tank and filter	Change oil and replace filter element	96
d	Final drive case	Change oil	96
	EVERY 250 HOURS SERVICE		
a	Lubricating		97
1	Radiator fan pulley	Lubricate 1 point	97
2	Engine front support	Lubricate 1 point	97
3	Radiator tension pulley	Lubricate 1 point	97
4	Radiator tension pulley bracket	Lubricate 1 point	97
5	Cylinder support shaft and yoke	Lubricate 2 points	97
6	Brace screw	Lubricate 2 points	98
7	Cylinder ball joint	Lubricate 2 points	98

No.	ITEM	SERVICE	PAGE
-8	Arm ball joint	Lubricate 2 points	98
-9	Tilt cylinder ball joint	Lubricate 1 point	98
-10	Diagonal brace	Lubricate 2 points	98
-11	Pivot shaft	Lubricate 2 points	98
-12	Tilt cylinder pin (For ripper)	Lubricate 2 points	99
-13	Lift cylinder pin (For ripper)	Lubricate 2 points	99
-14	Arm pin (front) (For ripper)	Lubricate 2 points	99
-15	Arm pin (rear) (For ripper)	Lubricate 2 points	99
-16	Lift cylinder cap pin (For ripper)	Lubricate 2 points	99
-17	Tilt cylinder rod pin (For ripper)	Lubricate 2 points	99
h	Check and correct oil level		99
-1	Final drive case	Check and supply	99
-2	Hydraulic tank	Check and supply	99
-3	Pivot shaft	Check and supply	100
c	Fuel filter	Replace cartridge	101
d	Steering oil filter	Replace element	101
e	Engine oil pan, full flow filter and by-pass filter	Change oil and replace element	102

No.	ITEM	SERVICE	PAGE
f	Corrosion resistor	Replace cartridge	104
g	Transmission oil filter	Replace element	105
h	Fuel strainer	Check and clean	105
i	Battery electrolyte level	Check	106
j	Radiator fins and oil cooler fins	Check and clean	106
k	Belt		107
-1	Radiator fan belt	Check tension	107
-2	Water pump belt	Check cracks	107
-3	Alternator pulley belt	Check tension	108
l	Track shoe bolt and master link connecting bolt	Check and retighten	109
m	Engine breather	Clean element	109
n	Piping through air cleaner to suction pipe of turbocharger	Replace or tighten	110
o	Steering levers	Check travel	110
p	Brake pedal	Check	110
q	Counter rotation lever	Check	110

No.	ITEM	SERVICE	PAGE
	EVERY 500 HOURS SERVICE		
a	Breather		111
-1	Final drive case	Clean	111
-2	Steering clutch case	Clean	111
b	Ether starting aid	Check	112
	EVERY 1000 HOURS SERVICE		
a	Lubricating		113
-1	Universal joint	Lubricate 4 points	113
-2	Torque converter main shaft	Lubricate 2 points	113
-3	Idler adjusting rod	Lubricate 2 points	113
-4	Equalizer bar shaft	Lubricate 1 point	113
b	Oil cooler fan driving fitter	Replace element	113
c	Steering clutch case (incl. transmission case, bevel gear case, torque converter)	Change oil and clean strainer	114
d	Hydraulic tank end filter	Change oil and replace filter element	115

No.	ITEM	SERVICE	PAGE
e	Final drive case	Change oil	116
f	Undercarriage components	Check lubricating condition	116
g	Brake disc	Check wear	117
	EVERY 1500 HOURS SERVICE		
a	Injector plunger travel	Check and adjust	117
b	Engine valve clearance	Check and adjust	117
	EVERY 2000 HOURS SERVICE		
a	Lubricating		118
-1	Brake control lever shaft	Lubricate 2 points	118
-2	Gear shift lever shaft	Lubricate 3 points	118
b	Alternator and starting motor	Check	119
c	Vibration damper	Check	119
d	Fuel manifold pressure	Check	119

No.	ITEM	SERVICE	PAGE
	EVERY 4000 HOURS SERVICE		
a	PT pump APC	Replace bellows	120
b	PT pump APC	Replace breather	120
c	Intake and exhaust manifold	Retighten mounting bolts and nuts	121
d	Injector	Clean and calibrate	121
e	Turbocharger	Clean	121
f	Turbocharger	Check rotor play	121
g	PT pump	Clean and calibrate	121
h	PT pump	Replace filter screen and magnet	121
i	Crankshaft	Check end play	121
j	Water pump	Check	121
	WHEN REQUIRED		
a	Cooling water	Change twice a year	122
b	Air cleaner element	Check, clean or replace when required	125
c	Track	Check tension	127

INITIAL 250 HOURS SERVICE

Perform the following maintenance after running the machine for the first 250 hours.

a. OIL COOLER FAN DRIVING FILTER
b. STEERING CLUTCH CASE
c. HYDRAULIC TANK AND FILTER
d. FINAL DRIVE CASE

For details of the method of replacing or maintaining, see the section on EVERY 1000 HOURS SERVICE.

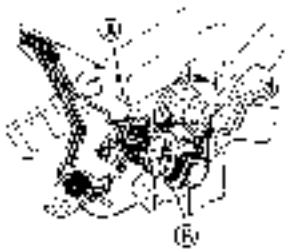
EVERY 250 HOURS SERVICE

a. **LUBRICATE THE FOLLOWING PARTS**

Grease each point indicated by arrow.

1. Radiator fan pulley (1 point)
2. Engine front support (1 point)
3. Radiator tension pulley (1 point)
4. Radiator tension pulley bracket (1 point)

Supply grease from the grease fitting, and stop supplying when grease ooves out from valve (A) and seal (B).



5. Cylinder support shaft and yoke (8 points)

When greasing is carried out through the grease fitting (1), continue the greasing until grease flows out of the plug (2).

6. Brace screw (2 points)

8. Arm ball joint (2 points)

10. Diagonal brace (2 points)

7. Cylinder ball joint (2 points)

9. Tilt cylinder ball joint (1 point)

11. Pivot shaft (2 points)

For Ripper

12. Tilt cylinder pin (2 points)
13. Lift cylinder pin (2 points)
14. Arm pin (front) (2 points)
15. Arm pin (rear) (2 points)
16. Lift cylinder rod pin (2 points)
17. Tilt cylinder rod pin (2 points)

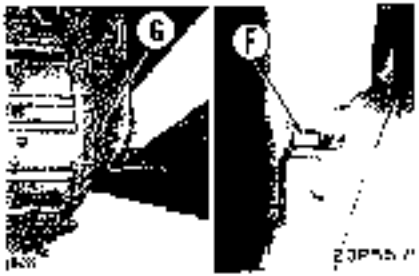
6. CHECK AND CORRECT OIL LEVEL

1. Final drive case

   Remove the plug (G) and add oil up to the lower edge of the plug hole through oil filler (F) if necessary.

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

* The maintenance shall be made with the machine on horizontal ground.



2. Hydraulic tank

   Lower the blade on the ground and stop the engine. When the oil level is not between the upper and lower lines of the sight gauge (G) after about five minutes from the engine stoppage, replenish with engine oil through the oil filler (F).

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

Note that the shank should be held vertically, while the point should be placed on the ground if the machine is equipped with a ripper.

Detailed view of the site gauge

3 Pivot shaft

Remove the plug (G) and replenish with engine oil through the plug hole up to the bottom of the plug hole.

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

⚠ Do not take off the cap when the oil temperature is high, because the oil may spurt out.

* Inspect oil before operation.

c. FUEL FILTER CARTRIDGES

1. Close the fuel valve (1).
2. Remove the cartridges (2) by turning them counterclockwise with the filter wrench. Fill new elements with fuel and install them.
3. After the sealing surface touches the head, turn the element 1/2 to 3/4 turn by hand

* Be careful not to over-tighten the cartridges.

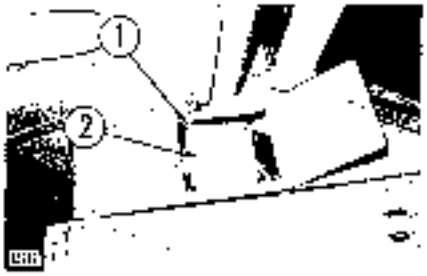
* Use genuine Komatsu cartridges.

d. STEERING OIL FILTER ELEMENT

Remove the bolt (1), cover (2), take out the element, and wash the inside of the case as well as the removed parts.

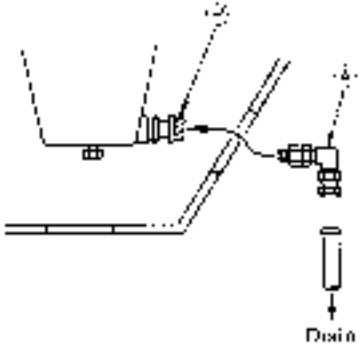
Then install a new element.

* Use genuine Komatsu element.



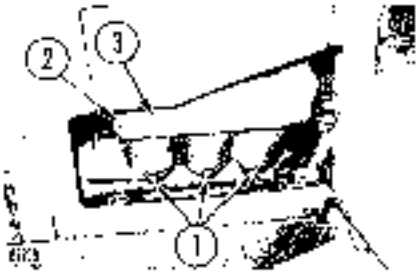
e. ENGINE OIL PAN, FULL-FLOW FILTER AND BY-PASS FILTER

1. Remove cap (P) and connect adapter (A) to the drain port. Then, drain the oil pan.
2. After draining, remove adapter (A) and restore cap (P) to its original position. (Store the removed adapter in a tool box.)



3. Remove the drain plug (1) of full-flow filter.
   After draining oil, retighten it.

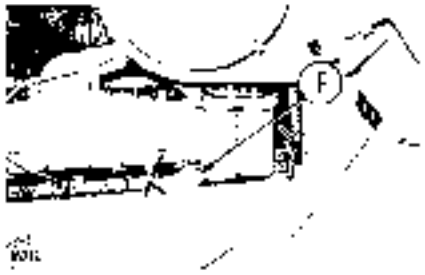
4. Loosen 9 bolts (2) and remove the cover (3) to take out the elements. After cleaning insids of the case, install the new elements with its arrow mark (↑) therenn indicating the upward direction.



5. After replacing the elements, fill up with engine oil and install the cover.

6. Remove the drain plug of by-pass filter. After draining oil, retighten it.
7. Loosen the bolt (4) and take the cover (6) off by removing the band (5).
8. Loosen the handle by which the elements are retained, take out the used elements and clean the inside of case.
   Then install the new elements.
9. After replacing the elements, fill up with engine oil and install the cover. At the same time, replace the O-ring on the cover.
10. After replacing the full-flow and by-pass filter elements, refill engine oil from the oil filler (F). Then run the engine for a few minutes and recheck the oil level.

★ Refill oil capacity: 68ℓ
★ The type of lubricant used depends on the ambient temperature. Select according to the table "FUEL, COOLANT AND LUBRICANTS".
★ Use genuine Komatsu elements.
★ Tightening torque of the engine oil pan drain plug: 4.1 ~ 4.8kgm
★ Engine oil should be changed every 6 months, regardless of the working hours.
★ If any metal grit is found on the used element, contact Komatsu distributor to check the main bearing, and connecting rod bearing, etc.
★ The orifice plug in the oil outlet (or the lower side of the case) should be cleaned by blowing compressed air.



f. CORROSION RESISTOR

Tighten the two valves (1) and (2) (one on the upper portion of the corrosion resistor and the other on the engine cylinder Block). Then remove the cartridge (3) by turning them counterclockwise with the filter wrench.

Install new cartridges and tighten them until their seal come into contact with the filter head. Then, retighten the elements 1/2 to 3/4 turn.

* Before installing new cartridges, coat the sealing surface with lubricants.
* When the coolant is changed together with the cartridges, use cartridges for precharging.

g. TRANSMISSION FILTER

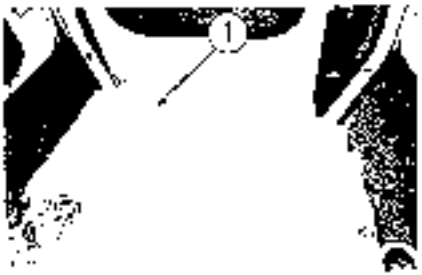
Remove the bolt (2) prior to disengaging the cover (1) on the hood, take off the cover (3), take out the used element and clean up the interior of the case and removed parts, then install a new element.

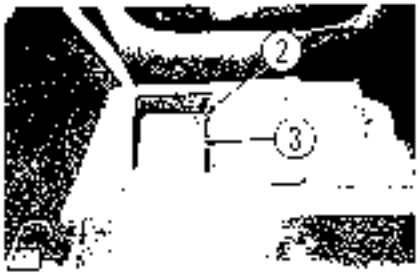
* Use genuine Komatsu elements.

h. FUEL STRAINER

Shut the valve (2), remove the cap (1), take out the strainer and wash the strainer and strainer case.

* Note that the element is secured to the cap (1) by soldering.





i. ELECTROLYTE LEVEL IN BATTERY

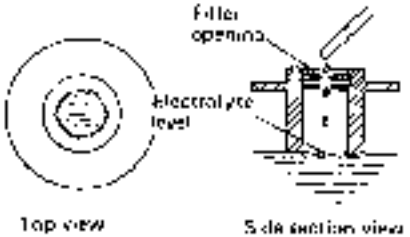
If the electrolyte level is lower than the prescribed level (10 to 12mm above the plate), add distilled water. Should any of the acid be spilt, have it replenished by the nearest battery shop with acid of the correct specific gravity.

Clean the air hole of the battery level cap during inspection.

* Never use a metal funnel for adding the electrolyte.

Do not smoke when observing battery electrolyte level. Batteries give off fumes that can explode.

Electrolyte is an acid and can cause personal injury if it contacts skin or eyes.



j. RADIATOR FINS AND OIL COOLER FINS

Mud, dust or leaves stuffed in the radiator fins and oil cooler fins should be removed by blowing with compressed air.

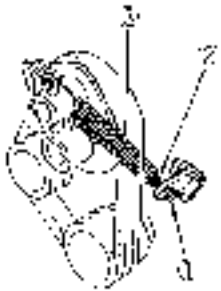
In place of the compressed air, steam or pressurized water may be employed.

* Also, rubber hoses should be checked for cracks and replaced if necessary.

  Also, check and tighten any loose hose clamps.

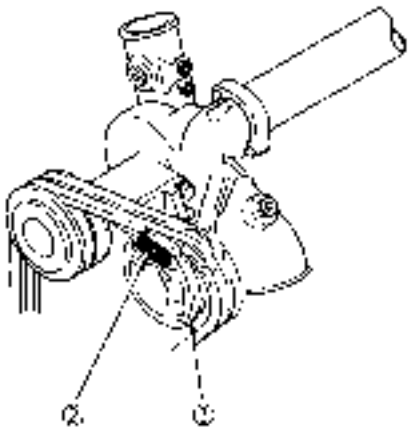
k. **BELT TENSION**

1. Radiator fan belt
   No adjustment is required, due to the autotensioner, till the radiator fan belt needs replacement.
   To replace the belt, loosen the nut (2) and rotate the bolt (1) so that the spring (3) is released to be in a free state and then replace the belt. After replacing the belt, tighten the bolt till the A dimension reaches 30 to 34 mm.



2. Water pump belt
   No adjustment is required, due to the autotensioner, but check the belt for cracks, etc.
   To replace the belt, push the idler arm (1) with wrench.

* When the belt is removed, take care not to release the idler arm (1) abruptly. The spring (2) may fly out.



3 Alternator pulley belt

Depress the belt span between the alternator pulley and accessory pulley at its center by means of your thumb (this will be equal to about 6kg of weight). If the deflection of the belt is about 9.0mm, the belt tension is normal.

Tension adjustment is carried out by unscrewing the bolts (1) & (2) and displacing the alternator (3).

- Inspect any damage on each pulley and wear of V-grooves as well as V-pulley. Inspect in particular to see if the V-belt contacts the bottom of the V-groove.
- When the belt has stretched so no adjustment is possible or it is cut or has cracks, replace with a new one.
- All three of the fan belts should be replaced by new ones at the same time, while the water pump belt should also be replaced as a set.
- After replacement of the belt, the engine is required to run for an hour and then readjust.
- When adjusting the V-belt tension, do not push the stator core of the alternator directly with a bar, etc. Place a piece of wood between the alternator and the bar.

l. TRACK SHOE BOLTS

If a shoe bolt by which the track shoes are fastened to the link members used while it is loose, it may brake. Tighten any slack bolt immediately after it is discovered.

* Tightening procedure

  Shoe bolt:

  First, 60 kgm, 2nd, tighten another 120 degrees.

  Master link connecting bolt:

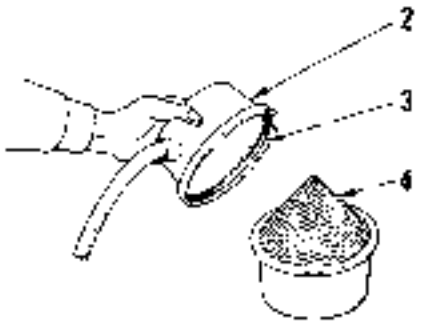
  First, 70 kgm, 2nd tighten another 180 degrees.

m. ENGINE BREATHER (2 PLACES)

Disengage the wing nut (1) for the breather mounted on the cylinder head on each side, remove the cover (1) and gasket (3), take out the element (4) and clean it. Be sure to wash the removed parts and case at the same time.

After the washed element is dried by blowing compressed air on it, immersed it in engine oil and then mount it.

* If the gasket is damaged, it should be replaced by a new one.

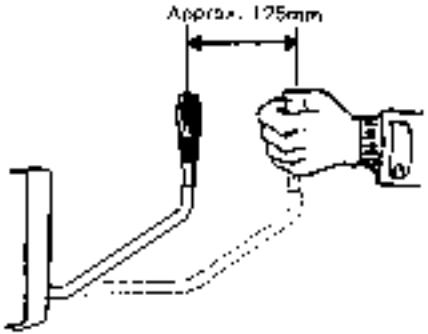


n. PIPING THROUGH AIR CLEANER TO SUCTION PIPE OF TURBOCHARGER

If the hose is damaged or the clamps are loose, replace or tighten them.

o. IS THE TRAVEL OF STEERING LEVERS ADEQUATE?

The standard travel is approx. 125mm at the center of grip (while the engine is stopped). If not, adjust it according to the section ADJUSTMENT.



p. DOES BRAKE WORK NORMALLY?

Note that the brake is the hydraulic oil type and so any interior wear isn't indicated by the brake pedal travel. So, you are required to make sure that the brake works normally by making a sharp turn of the machine, prior to starting regular works after the warming-up operation.

q. DOES COUNTER ROTATION LEVER WORK NORMALLY?

Make sure that the counter rotation lever works normally by making a counter rotation of the machine, prior to starting regular works after the warm-up run.

EVERY 500 HOURS SERVICE

* Maintenance for every 250 hours should be carried out at the same time.

a. BREATHER

Remove the breather and clean the inside thereof together with the casing with clean light oil.

Then assemble it.

1. Final drive case (each side)

2. Steering clutch case

b. ETHER STARTING AID

1. Remove the ether cylinder and check the valve and control wire.
   i) When removing the cylinder (1), wipe the valve inlet port clean to prevent dust from entering the valve.
   ii) Check the valve gasket for damage. If necessary, replace the gasket.
   iii) Check the control wire, from which the cylinder is removed, for smooth movement.
2. The step 1 above-mentioned should be followed also when replacing the exhausted ether cylinder.
3. Every 500 hours of operation, check the pipe joints for leakage. Also, check the mounting bolts for loosening.

4. Check the ether starting aid for normal operation, using the following procedure:
   i) Disconnect the nylon tube from the atomizer.
   ii) Remove the atomizer.
   iii) Re-connect the atomizer to the tube.
   iv) Keep the control wire in ON position for approx. 2 seconds. Then, shift the control linkage to OFF position.

   Confirm that each orifice of atomizer sprays fine mist.

EVERY 1000 HOURS SERVICE

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

a. LUBRICATE THE FOLLOWING PARTS

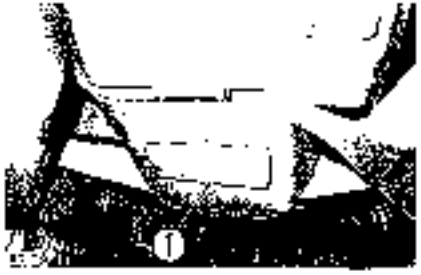
Grease each point indicated by arrow.

1. Universal joint (4 points)

2. Torque converter main shaft (2 points)

3. Idler adjustment rod (2 points)

4. Equalizer bar shaft (1 point)
Remove the plate (1) and grease.

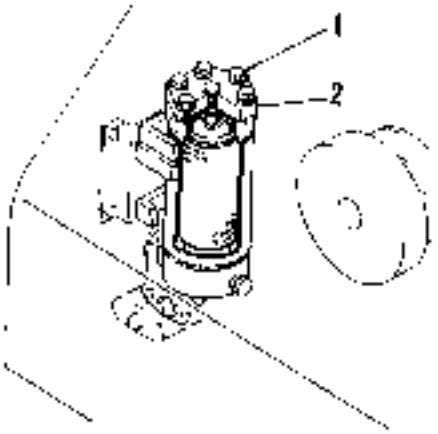


b. OIL COOLER FAN DRIVING FILTER ELEMENT

Remove the cover on the oil cooler guard rear grille. Loosen the bolt (1) and remove the cover (2) to take out the element.

Clean inside of the case and the removed parts and install a new element.

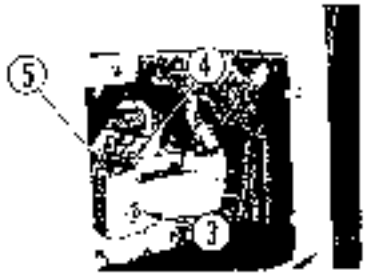
* Use genuine Komatsu element.



c. **STEERING CASE (INCL. TORQUE CONVERTER, TRANSMISSION AND BEVEL GEAR CASES)**

1. Remove the drain plug (P) on the bottom of the machine body. After draining oil, tighten it.
2. Remove the right-side floor plate. Remove the bolts (1) and the cover (2). Remove the bolt to take out the steering case strainer and magnet.

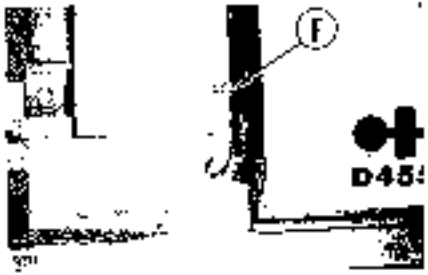
3. Remove the plate from the under cover. Drain oil from drain plug (3), loosen bolt (4) and take out the torque converter case strainer together with the cover (5).



4. Thoroughly clean the case interior, the removed parts, strainers and magnets with clean light oil.
   If any damage to strainer or magnet is found, replace.
5. After replacing the transmission and steering oil filter elements, refill the engine oil from oil filler (F).

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

* Refill capacity 28L



d. **HYDRAULIC TANK**

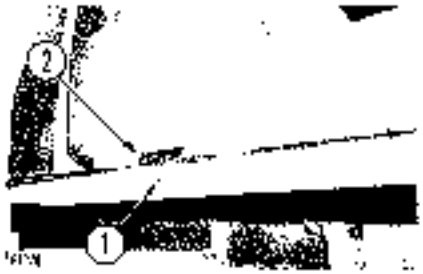
1. Remove the drain plug (1) on the hydraulic tank bottom and loosen the drain valve (2) to drain oil. After draining, retighten the plug (1) and valve (2).
2. Remove the bolt (3) and cover (4) to take out the element.
3. Clean the removed parts and filter case interior. Install a new element.

★ Use a genuine Komatsu element

4. After replacing the element, refill engine oil from the oil filler (F).

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

★ Refill capacity: 190ℓ



e. FINAL DRIVE CASE

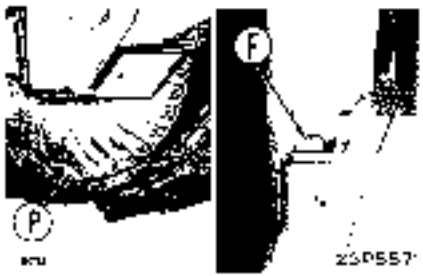
1. Remove the drain plugs (F) on the both side of the machine body to drain oil.
   After draining, tighten plugs (F).
2. Refill oil from each plug hole (F).

* The type of lubricant used depends on the ambient temperature. Select according to the table "FUEL, COOLANT AND LUBRICANTS".
* Refill capacity: 59ℓ (each side)

f. UNDERCARRIAGE COMPONENTS FOR LUBRICATION

Park the machine on flat ground, and check the lowered oil level of the track roller, carrier roller and idler (gear oil SAE 140) according to the following procedure.

- Loosen gradually the seal bolt. If some oil comes out through the screw thread, this indicates that oil is not low, so, retighten the bolt immediately.
- When oil doesn't ooze out after disengaging the bolt, this is an indication that oil level is low. Consult your Komatsu distributor for repair.



EVERY 1500 HOURS SERVICE

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

a. **CHECK AND ADJUST INJECTOR PLUNGER TRAVEL**

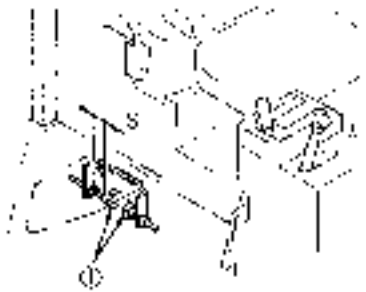
b. **CHECK AND ADJUST ENGINE VALVE CLEARANCE**

Since both works in items a. and b require special tools designed for exclusive use, contact your Komatsu distributor for servicing.

9. **BRAKE DISC**

First, remove the plates from the frame in front of the servo-control box. Then, inspect as follows:

1. Push in the knob (1) of the cable with the brake disengaged. Leave the knob (1) as it is (Measure travel "S").



2. Push in the knob (1) further with brake engaged. Then, measure the travel "S". When the travel "S" is 29 to 40mm, the brake disc can be still used. But when the travel "S" exceeds 40mm, the brake disc wears abnormally. So contact your Komatsu distributor for inspection and adjustment.

* Inspect both right and left side cables.
* After inspection be sure to pull out the cable fully.

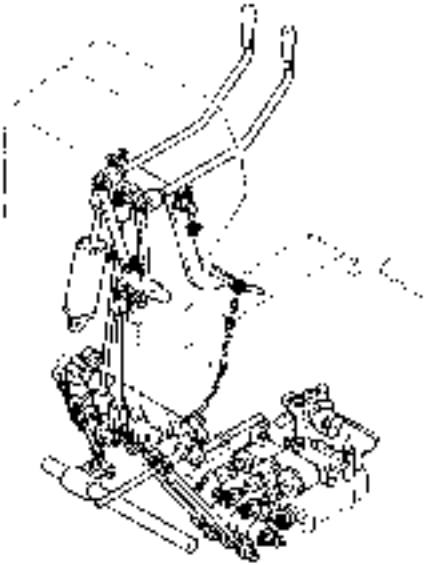
EVERY 2000 HOURS SERVICE

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

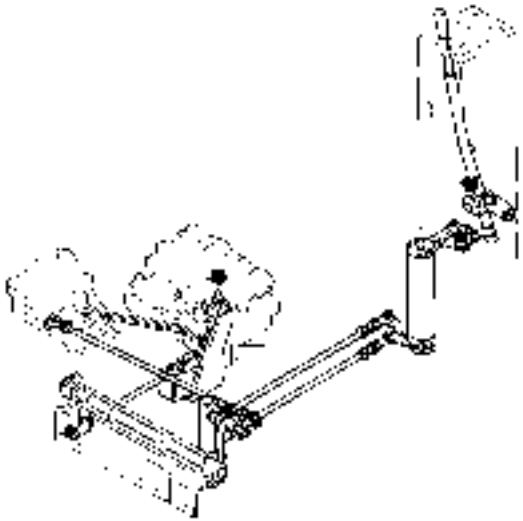
a. LUBRICATE THE FOLLOWING PARTS

Grease each point indicated by arrow.

1. Brake control lever shaft (3 points)



2. Gear shift lever shaft (2 points)



b. ALTERNATOR AND STARTING MOTOR

After approximately 2000 hours of operation, the brushes of the alternator and starting motor may become worn. Have them repaired by your Komatsu distributor or follow the procedure described in the Shop Manual ELECTRICAL EQUIPMENT. Be careful not to damage their drip proof characteristics by incorrectly disassembling them.

* Check the alternator and starting motor every 1000 hours of operation when the machine is frequently operated at night with increased electric load such as lamps.

c. VIBRATION DAMPER

The hub (1) and the inertia member (2) are provided with stamped match mark (3). When two marks are out of alignment with each other, thus causing deformation of the rubber insertion between the hub and inertia member, consult your Komatsu distributor for service or replace the damper.

d. CHECK FUEL MANIFOLD PRESSURE

Consult your Komatsu distributor for service.

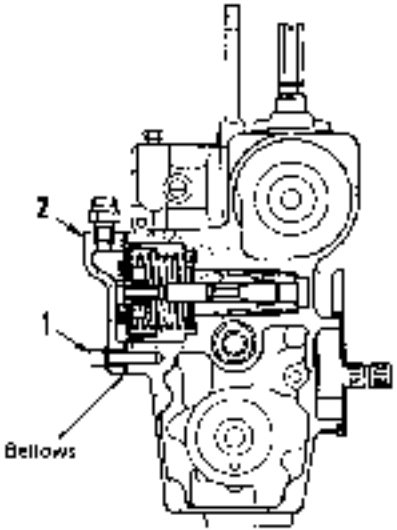
EVERY 4000 HOURS SERVICE

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

a. PT PUMP AFC BELLOWS

After removing the tube connecting the intake manifold, remove bolt (1) and cover (2) and replace the bellows together with the plunger assembly with a new bellows and plunger assembly

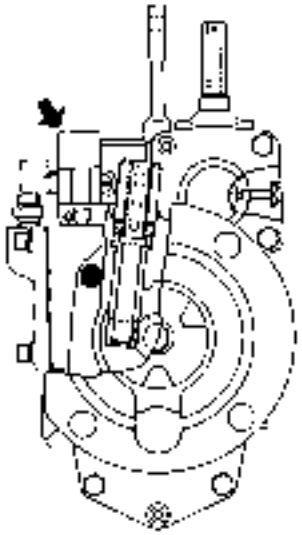
* Clean the contact surface of the bellows before reinstalling a new one.



b. PT PUMP AFC BREATHER

Remove the AFC breather and replace to a new one.

* Tightening torque. 0.7 ~ 1.0 kgm



c. **RETIGHTEN BOLTS AND NUTS THAT FIT INTAKE AND EXHAUST MANIFOLDS.**
d. **CLEAN AND CALIBRATE INJECTOR.**
e. **CLEAN TURBOCHARGER'S BLOWER IMPELLER.**
f. **CHECK PLAY OF TURBOCHARGER ROTOR.**
g. **CLEAN AND CALIBRATE PT PUMP.**
h. **REPLACE FILTER SCREEN OF PT PUMP**
i. **CHECK END CLEARANCE OF CRANKSHAFT.**

Request check and adjustments to your Komatsu distributor because special tools are required.

j. **WATER PUMP**

Check for the pulley looseness and grease or water leakage. If found, request check and adjustments to your Komatsu distributor.

WHEN REQUIRED

a. CHANGING COOLANT

Perform twice a year in spring and autumn (when changing antifreeze solution).
In case antifreeze solution is not used, perform every 1000 hours.

Change

1. Stop the engine, tighten 2 corrosion resistor valves and remove feed water cap from radiator.
2. Drain coolant from radiator completely by opening 2 drain valves.
3. Then clean, using a wash sold on the market. Follow the maker's instructions.
4. Drain all water, close drain valves and feed clean water (For example, city water) through water filler.
5. When water is filled up to the filler, open drain valves while keeping engine at low idling and keep feeding water until clear water comes out from drain valves.
6. When water becomes clear, close drain valves. Stop feeding water temporarily when water overflows from filler.
7. Replace corrosion resistor element and open the two valves.

Corrosion resistor (valve)

Water filler

3. After opening valves, in order to let out air mixing in cooling water, run the engine for five minutes at low idling, then another five minutes at high idling. (During this time, the water filler cap is removed.)
8. Stop engine, and after three minutes, again feed water until it overflows from filler and tighten cap.

* Always replace the corrosion resistor element (cartridge).
* Change while parking the machine on level ground.

⚠ **When removing cap, turn cap slowly to allow pressure to be relieved.**

Drain valve (oil cooler)

Drain valve (radiator)

Drain valve (water pump)

Drain valve
(after cooler, L.H. and R.H.)

Drain valves (cylinder block 4 points)

above the starting motor

behind the PT pump

below the oil cooler

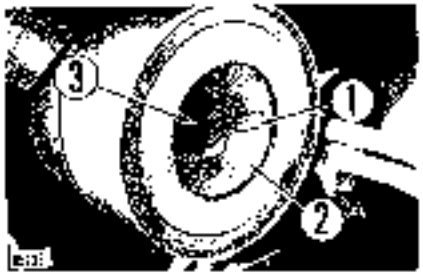
above the alternator

b. CHECKING, CLEANING AND REPLACING AIR CLEANER ELEMENT

Checking

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

Cleaning or replacing outer element



1. Remove the wing nut (1) and remove the outer element (2).
2. Clean the air cleaner body interior and the removed cover.
3. Clean and inspect the element. (See the next page for cleaning procedure.) Install the cleaned element.
4. Push the dust indicator reset button to return the red piston to the original position.
   - ★ When the dust indicator red piston appears soon even after installing the cleaned outer element, replace both the inner and outer elements.
   - ★ Replace the outer element which has been cleaned 6 times repeatedly. Replace the inner element at the same time.

★ Replace seal washer (3) or wing nut (1) if they are broken.

Replacing inner element

1. First remove the cover and the outer element, and then remove the inner element.
2. Cover the air inlet port.
3. Clean the air cleaner body interior. Remove the cover from the air inlet port.
4. Fit a new inner element to the connector and tighten it with nuts.
5. Install the outer element and the cover. Push the dust indicator reset button.

NOTE: 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 7kg/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.

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

* If element is usable, wrap it and store it in dry place.
* When cleaning element, do not hit it or beat it against something.

c. TRACK TENSION

Inspection

Stop the machine on a flat land, and put a straight rod on the carrier roller and the idler as shown on the Photo. When the distance between the rod and the shoe grouser is 20 to 30 mm at the center, the tension is the standard one.

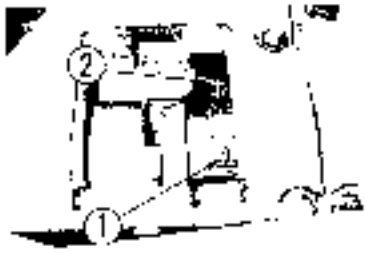
Adjustment

For tightening the tension, pressurize grease through grease fitting (1). On the other hand, for loosening the tension, extract grease by reversely rotating the plug (2) for "1 rotation".

Grease may be pressurized till S will be 30mm. In case the tension is yet loose after applying pressurized injection of grease till the abovementioned limit, it indicates that the pin bush is reduced by too much abrasion. So it is necessary either to turn or replace the pin and bushings. Consult your Komatsu distributor for repair.

⚠ **Do not loosen the plug (2) over one complete rotation. Also, be careful not to loose any part other than the plug (2).**

If the plug (2) or any other part should be loosened excessively, it will be liable to fly out under the high pressure of jammed grease. If grease does not ooze smoothly, try moving the machine back and forth for a short distance.

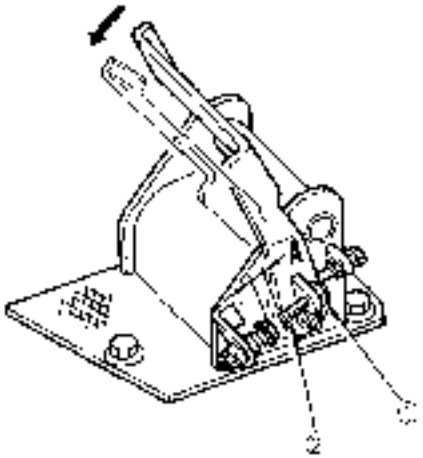


ADJUSTMENT

ADJUSTMENT OF DECELERATOR PEDAL

Set the fuel control lever at the midpoint of the lever travel and depress the decelerator pedal (when clearance A is zero). If the engine is not revolving between 800 and 900 rpm, make the following adjustment.

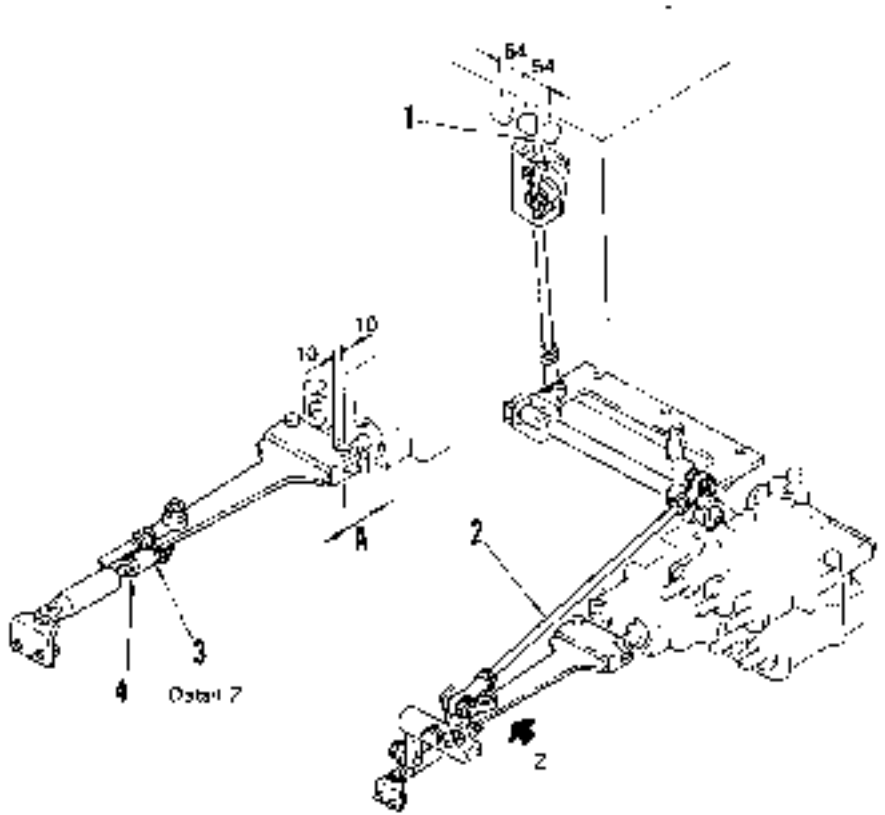
1) Loosen lock nut (1) and turn screw (2) in or out until the engine runs at 800 to 900 rpm with the pedal kept down (when clearance A is zero)
2) After completing the above adjustment, tighten lock nut (1).



* Depress the decelerator pedal all the way down, and the engine will slow down to a low idling speed.
* A tachometer is required to set the engine speed correctly in the desired range. If necessary, contact a Komatsu distributor.

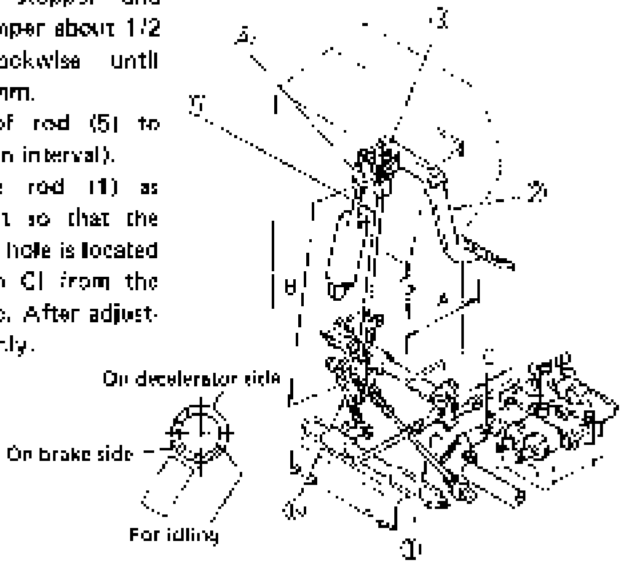
ADJUSTMENT OF COUNTER ROTATION LEVER

1. Remove rod (2).
2. Adjust joint (3) so that the pin hole for securing the counter-rotation control valve spool is located 35 mm (A) from the end face of the valve. Fix the joint with lock nut (4).
3. Place counter rotation lever (1) in neutral and restore rod (2) to its original position.
4. Adjust rod (2) so that dimension (A) is 35 mm. Fix it firmly.
5. After fixing rod (2) firmly, make sure of the following.
   1) When the counter rotation lever is in neutral, dimension (A) is 35 mm.
   2) When operating the counter rotation lever, the control valve (spool) stroke is 10 mm.



ADJUSTMENT OF BRAKE PEDAL

1. Remove rod (1).
2. Adjust yoke (4) so that distance A from brake pedal (2) to the dashboard reference plane is 247 mm.
3. Turn damper (3) until it comes into contact with the stopper and further turn the damper about 1/2 rotation counterclockwise until dimension A is 242 mm.
4. Adjust length B of rod (5) to 592 mm (standard pin interval).
5. Connect turnbuckle rod (1) as shown and adjust it so that the brake valve spool pin hole is located 40.5 mm (dimension C) from the end face of the valve. After adjustment, fix rod (1) firmly.
6. After fixing rod (1) firmly, make sure dimension C is 40.5 mm.

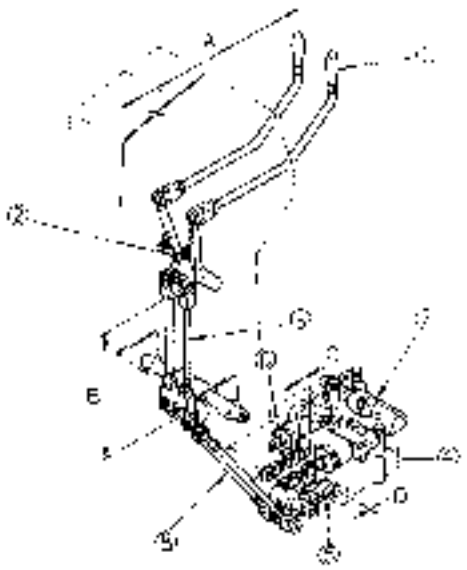


ADJUSTMENT OF THE BRAKE INTERLOCK

1. Set up the engine control and the steering control mechanisms in the normal operating condition.
2. Place the fuel control lever in low idle.
3. Align the cam in the brake and decelerator interlock mechanism by means of rod (6).

ADJUSTMENT OF THE STEERING LEVER

1. Remove turnbuckle rod (8).
2. Adjust distance A from the knob of steering lever (1) to the rear of the dashboard to 448 mm by means of stopper (2).
3. Adjust length B of rod (3) to 402 mm (standard pin interval).
4. Adjust clearance D between transmission valve (4) and loose spring ass'y (5) to zero by means of rod (6).
   Adjust dimension C between the end face of interlock valve (7) and the pin hole in rod (6) to 27 mm.



5. Restore rod (8) to its original position and adjust it so that stopper (2) comes into contact with the bracket and clearance D is zero. Then, fix the rod firmly.
6. After fixing the rod firmly, make sure dimension D is zero and stopper (2) is in contact with the bracket.

7. Start up the engine and make the following functional checks on the steering lever.
   1) Raise the machine off the ground with the blade or the ripper and rotate the tracks.
   2) Make sure that the L.H. track begins deceleration when the L.H. steering lever is pulled 45 to 55 mm. (The center clutch is disengaged and the transmission is out of the power flow.)
   3) Make sure that the L.H. track stops rotating when the L.H. steering lever is pulled 85 to 95 mm.
   (Brake is applied)

   Apply the above procedure to the R.H. steering lever, too. Make sure that there is no difference in travel between the L.H. and R.H. steering levers.

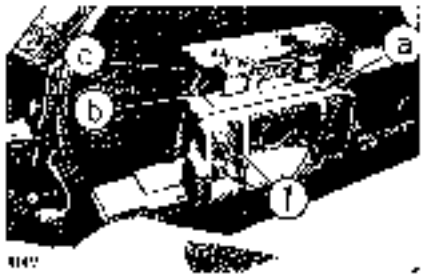
RELEASING THE EMERGENCY BRAKES

The emergency brakes are normally released hydraulically. If they cannot be released hydraulically due to engine troubles, etc., contact your Komatsu distributor.

ADJUSTMENT OF THE IDLER

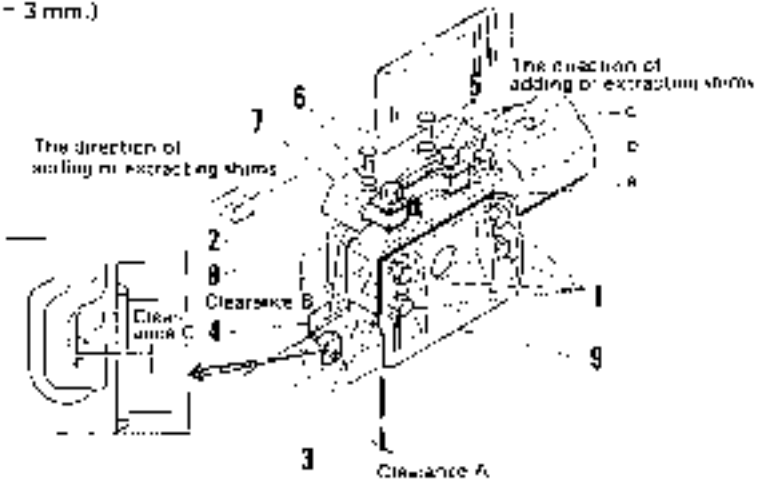
Since the idlers are forced to move forward and backward as long as the machine is in operation, the side guides (9), up-and-down guides (4), and guide plates (3) will be worn out gradually. Excessive wear of these guides, if left unattended, will cause the vibration of idlers from side to side or inclination of the idlers, and running off of track links from the idlers or unevenly worn track shoes may result. Therefore, it is necessary to adjust the idlers from time to time according to the following procedure so that they are always maintained in good running condition:

i) Adjustment of the side guides
Run the machine 1 or 2 meters on level ground to give its tracks even tension and then stop the machine. Check the clearance "A" between the track frame and side guide (9) (there are a total of 4 clearances: left, right, top, and bottom for each side guide).
If any clearance exceeds 4 mm, loosen the bolts (1) and remove the required number of shims (a) to adjust the clearance to the standard value of 0.8 to 1.4 mm. The thickness of a shim is 0.6 mm.
When loosening the bolts (1), be careful not to turn them more than 3 turns. Otherwise, sheet (8) may fall down out of place, causing the troublesome reassembly of it.



iii) Adjustment of the guide plates and the up-and-down guides
Measure the clearance "B" between the support (2) and guide plate (3) and the clearance "C" between the up-and-down guide and track frame wear plate (10). If the sum of two clearances "B" and "C" exceeds 6 mm, reduce it to 2 mm by deducting the necessary thickness in shims from the extracting shims (a) and adding the same thickness in shims to the extracting shims (b). This adjustment should be performed according to the following procedure.

1) Measure the clearance "B" and subtract 2 mm from the value "B". The result corresponds to the thickness in shims to be adjusted. (In the case of B = 5 mm, for instance, the thickness in shims to be adjusted is 5 − 2 = 3 mm.)



* The succeeding steps 2) and 3) are to release the up-and-down guides (4), which is necessary to remove a required thickness in shims from the extracting shims (c) and add it to the extracting shims (b).

2) Loosen the bolts (5) (there are a total of six inside and outside bolts) until no spring force is left.

3) Loosen the bolts (1), taking care not to loosen them more than 3 turns.

4) Pull the up-and-down guide (4) upward with a bar or bolt (5) so that the clearance "C" becomes zero (0 mm). Remove the necessary thickness in shims determined by step 1) from the extracting shims (c).

5) Add the removed shims to the extracting shims (b). (This procedure must be performed at a total of 8 positions, inside and outside for each of the left-hand and right-hand sides.)

* The total number of shims obtained as the sum of
  shim (c) — standard shims thickness: 10 mm and
  shim (b) — standard shims thickness: 5 mm
  should not be varied before and after the adjustment. Careless reduction or addition of the total number of shims would be the cause of the insufficient function of springs built in the guide.
  (Both the shims (b) and (c) are composed of several of two kinds of shims, 2mm and 1mm thick.)

6) Tighten the spring set bolts (5).

7) Tighten the bolts (1) to a torque of 120 to 150 kgm.

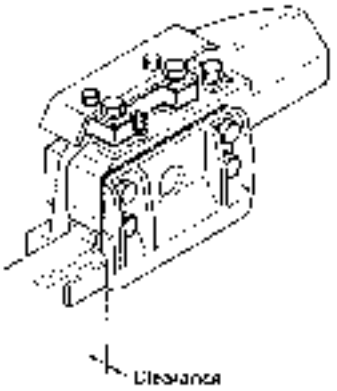
8) Install the cover (7) as before disassembly.

INSPECTION AND ADJUSTMENT OF UNDERCARRIAGE

- Properly adjust track tension. Tension should be measured at clearance shown in photograph – usually 20 to 30 mm at this point. For rocky terrain, tighten tracks slightly. In clay or sandy areas, slightly loosen them. (For inspection and adjustment procedures, refer to section WHEN REQUIRED.)

- Check for oil leakage from idler and roller, and looseness of nuts and bolts. If necessary, repair them.

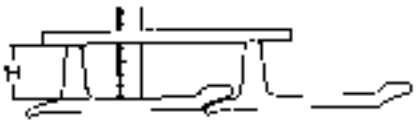
- Check clearance of idler guide plate. If the clearance exceeds the limit, immediately repair it.



INSPECTION AND REPAIR

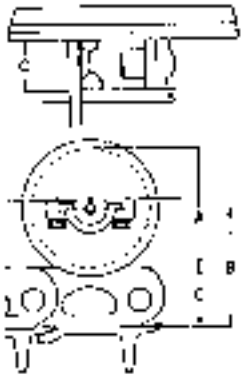
Frequent inspection and prompt repair will reduce repair costs. Inspection of the following items will serve as a guide for maintenance service of each undercarriage part. Perform periodical inspection and contact the Komatsu distributor in your area when machine has approached repairable limits and reversing limits

- Measuring Height of grouser
  After taking up slack in track, measure height at center of shoe as shown below.
- ★ Standard height H: 106mm
- ★ Repair limits: 36mm



- Measuring Outside Diameter of Track Roller
  1. Measure height (size C) of link tread as shown.
  2. Stop machine at position where link tread, whose size C has been measured completely, contacts roller tread. Then measure size B.
  3. Calculate outside diameter of tread (size A):
     A=(B-C) x 2
- ★ Standard size A: 300mm
- ★ Repair limits 275mm

★ Instead of the above-mentioned method, the "multiscale" can be used for measuring grouser height and track roller outer diameter.



TROUBLE SHOOTING GUIDE

In case of any abnormality other than indicated below will occur it is recommended that you contact a KOMATSU distributor for repair or adjustment service.

ELECTRICAL SYSTEM

Ammeter pointer swings excessively, while engine runs constantly.
Lamps light dimly, as engine runs at high speed.
Lamps flicker during engine running.
- Incomplete and defective wiring.

Ammeter indicator doesn't fluctuate, even when engine runs normally.
- Defective ammeter
- Defective wiring

Alternator makes an abnormal noise.
- Defective alternator

Pinion clicks when the starting switch is turned on while the engine is running.
- Defective wiring

Starting motor doesn't rotate, when starting switch is switched on.
- Defective wiring
- Defective starting switch
- Battery isn't fully charged
- Defective battery relay switch
- Defective safety switch
- Defective magnetic switch

Crank up of engine by starting motor is slow.
- Defective wiring
- Battery isn't fully charged.

Starting motor disengages from engine prior to engine start.
- Defective wiring
- Battery isn't fully charged

ENGINE

Oil pressure gauge pointer doesn't return to zero when the engine is shut down.
- Defective oil pressure gauge

Oil pressure gauge pointer swings excessively.
- Insufficient oil in the oil pan (due to suction of air)

Oil pressure gauge pointer stays within the red range on the left on the dial.
Engine oil pressure warning lamp flashes.
- Insufficient oil in the oil pan
- Oil leakage due to insufficient clamping or tightening and damage of oil pipes and pipe joints
- Defective oil pressure gauge.

Oil pressure gauge pointer stays within the red range on the right on the dial.
- Too high viscosity of oil
- Defective oil pressure gauge

Steam sprays out from the upper portion of the radiator (through pressure valve).
Water temperature gauge pointer stays within the red range on the right on the dial.
Engine water temperature warning lamp flashes
- Insufficient coolant, coolant leakage
- Loose fan belt
- Accumulated dust or materials in the cooling system
- Clogged radiator fins, or collapsed fins
- Defective water temperature gauge
- Defective thermostat
- Leaky thermostat seal
- Loose radiator filler cap (When operating in high altitude.)

Water temperature gauge pointer stays within white range on the left on the dial.
- Defective water temperature gauge
- Defective thermostat
- Too cool engine due to cold weather

Engine fails to start even by rotating the starting motor.
- Ingulf clear fuel
- Air in fuel line.
- The starting motor cranks the engine too slow

Engine fails to start by rotating the starting motor.
- Entrained water in fuel system
- Wrong fuel injection period.

Fuel fails to flow sometimes.
- Clogged breather in fuel tank cap.

Exhaust gas tends to become white or blue-white.
- Excessive oil in oil pan
- Improper fuel
- Oil leakage out of turbocharger piping.

Exhaust gas becomes black.
- Clogged air cleaner element.
- Defective nozzle
- Defective muffler

Throttle hunting occurs.
- Defective nozzle
- Air leaking in the suction side of fuel line

Engine knocks (from combustion or mechanical causes).
- Use of improper fuel.
- Overheated.
- Internal breakage of muffler.

CHASSIS

Oil pressure of torque converter doesn't rise.
- Intrusion of air or oil leakage due to insufficient tightening or breakage of oil piping and pipe joint.
- Abrasion or spalling of gear pump
- Insufficient oil in transmission case.
- Blockage of transmission case oil filter element and strainer

Torque converter overheats.
- Clogged oil cooler.
- Too low oil pressure.
- Insufficient circulating flow due to worn gear pump.

Insufficient tractive force.
(The speed of the machine doesn't increase.)
- Insufficient engine horsepower.
- Too low oil pressure in the torque converter.

Machine doesn't start by engaging the gear shift lever.
- Insufficient oil in steering case.
- Hydraulic pressure in transmission doesn't rise.
- Braking action takes place.
- Worn or spalling of gear pump.
- Clogged oil strainer element in steering case.

Brake lubricating oil warning lamp flashes
- The flow divider valve in the center clutch valve is stuck.
- The lubrication circuit is clogged.

Machine moves straight instead of making a turn, when steering lever on either side is pulled.
- Center clutch fails to be disengaged (due to insufficient oil pressure etc.).
- Gears on the turn side in the transmission fails to be disengaged.

Machine doesn't stop when brake pedals are depressed.
- Defective brakes.
- Oil leakage.

Track gets out of place.
- Too loose track

Abnormal wear occurs on sprocket.
- Too tight track.

Blade rises too slow or it doesn't rise (or it tilts too slow).
- Insufficient hydraulic oil.

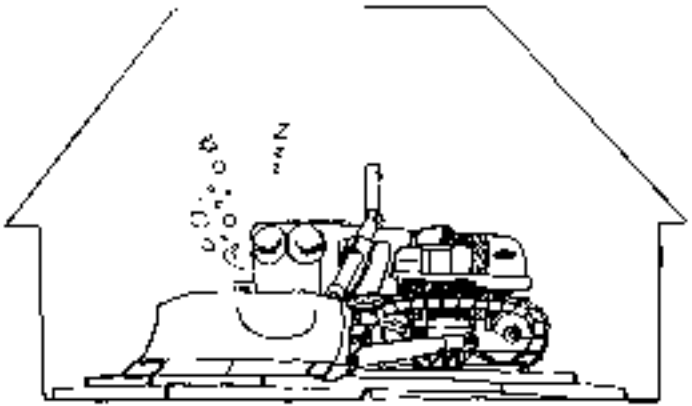
Ripper
Tilt cylinder actuate or works too slow.
Insufficient power thereof. Insufficient holding power ripper raises or moves too slow.
Insufficient depressing power or holding power.
- Insufficient hydraulic oil,
- Leakage from pipings.

STORAGE

BEFORE STORAGE

To place the machine in storage for an extended period of time, the following measures should be taken.

- After every part of the machine is cleaned, washed and dried, it should be housed in a dry building. Never leave it outdoors. In case it cannot be helped, the machine should be placed on wood blocks laid on the flat ground and covered completely by canvas, etc.
- Completely fill fuel tank, lubricate and change oil before storage.
- As to batteries, remove the terminals and cover them, or remove them from the machine and store separately.
- When the temperature goes down below 0°C add antifreeze solution to the cooling water. (For the amount of antifreeze solution to be added, see the page on "COLD WEATHER OPERATION".)
- Put the fuel control lever to the low-idling position, and put other control levers into NEUTRAL or HOLD. Do not lock the brake pedal.



DURING STORAGE

Once a month, start the engine and operate the machine a short distance. This is necessary to reproduce oil films on the surface of various engine and machine parts, and to recharge the battery.

* When operating the work equipment, wipe off grease from the hydraulic cylinder rods.

⚠ If it is necessary to perform rust-preventing operation of the engine indoors, be sure to provide sufficient ventilation to prevent the possibility of gas poisoning.

AFTER STORAGE

After storage (when it is kept without cover or the rust-preventive operation once a month is not made), you shall apply the following treatment before operation.

- Remove the drain plugs on oil pan and other cases and drain mixed water.
- Remove the rocker housing cover and lubricate suff cient y valves and rocker lever. And inspect the valve operation.
- Disengage the plug on the top of the injection pump governor chamber, loosen the drain pipe joint, and feed the engine oil (approximately 10) till the oil overflows from the drain pipe.
- Prior to starting the engine, disengage the elbow of the oil supply pipe for the turbocharger and refill with clean oil, remove connector, hose, etc., and rotate the blower fan manually to feed the new oil to each section. Then start the engine.
- After the engine is started, operate it until it is warmed up completely.

SERVICE METER

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

- Record the readings of the meter at start and after work in the daily work diary, which will serve as a work record of the machine.
- Time for periodical maintenance is displayed.
- It indicates the number of working hours which must be discussed many times, during trouble shooting.

★ How the meter operates
The service meter increases by 1 when the engine is operated for one hour.

Therefore, the service meter operates when the engine is rotated even though the machine doesn't travel. The service meter is installed in the engine rotation meter on the instrument board.

MACHINE AND ENGINE SERIAL NUMBERS

When you order parts to be replaced or inform anyone of trouble of the engine or machine, you should inform also the machine number, engine number and hours on the service meter.

The machine number and engine number are written in the warranty card and name plate.

Note that the plate is put on the place as shown by the photo.

* What's more, impression of the engine number will be seen on the right surface of the engine cylinder block.

• Place of impression of the machine number

This will be seen on the left surface of battery case.

• Place of impression of the engine number

This will be seen on the right surface of the engine cylinder block.

WEAR PARTS

Change wear parts such as filter elements and cutting edges at the time of periodic maintenance or before the wear limit is reached. Change wear parts without fail to utilize the machine more effectively.
Use only genuine Komatsu parts.

Parts in parentheses are to be replaced at same time.

List of wear parts

Item	Product	Unit	Change interval
Full flow filter	Cartridge ass'y (O-ring)	3 (3)	Every 250 Hrs.
Transmission oil filter	Element (O-ring)	1 (1)	Every 250 Hrs.
Steering oil filter	Element (O-ring)	1 (1)	Every 250 Hrs.
By-pass filter	Element ass'y	2	Every 250 Hrs.
Corrosion resistor	Cartridge Cartridge for pre-charge	2 2	Every 250 Hrs.
Fuel filter	Cartridge ass'y	2	Every 500 Hrs.

Item	Product	Unit	Change interval
Oil cooler fan driving filter	Element	1	Every 1000 Hrs.
Hydraulic oil filter	Element (O-ring)	1 (1)	Every 1000 Hrs.
Air cleaner	Element ass'y	2	When required
Blade (Straight-tiltdozer)	Cutting edge End bit (left) End bit (right) (Bolt) (Nut) (Washer)	3 1 1 (32) (32) (32)	
Ripper	Point Pin ass'y Protector	1 3 1	

SPECIFICATIONS

D455A-1

WEIGHT

Operating weight

Straight Tiltdozer with Variable Giant Ripper

78100 kg

Full Udozer with Variable Giant Ripper

80000 kg

PERFORMANCE

- Traveling speed

Forward	1st	0 ~ 3.5 km/h
	2nd	0 ~ 5.4 km/h
	3rd	0 ~ 9.3 km/h
	4th	0 ~ 14.6 km/h
Reverse	1st	0 ~ 3.4 km/h
	2nd	0 ~ 5.4 km/h
	3rd	0 ~ 9.2 km/h
	4th	0 ~ 14.4 km/h

RIPPER (variable giant ripper)

- Equipment weight 8450 kg
  (total additional weight as a ripper, excluding lift and tilt cylinder and pin)
- Digging angle (adjustable in cutting angle at the cutter edge) 45°, standard and stepless adjustable (in case that the shank length on the ground is set to standard one)

BLADE

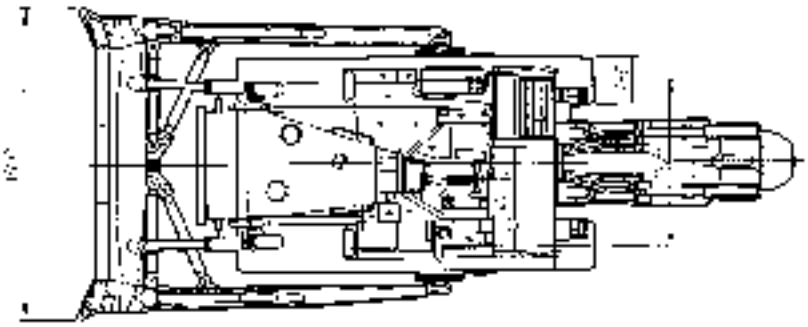
- Equipment weight (Straight-Tiltdozer) 10400 kg
  (Full-Udozer) 12300 kg
  (including tilt cylinder and cylinder support)
- Maximum tilt (Straight-Tiltdozer) 1100 mm
  (Full-Udozer) 1405 mm

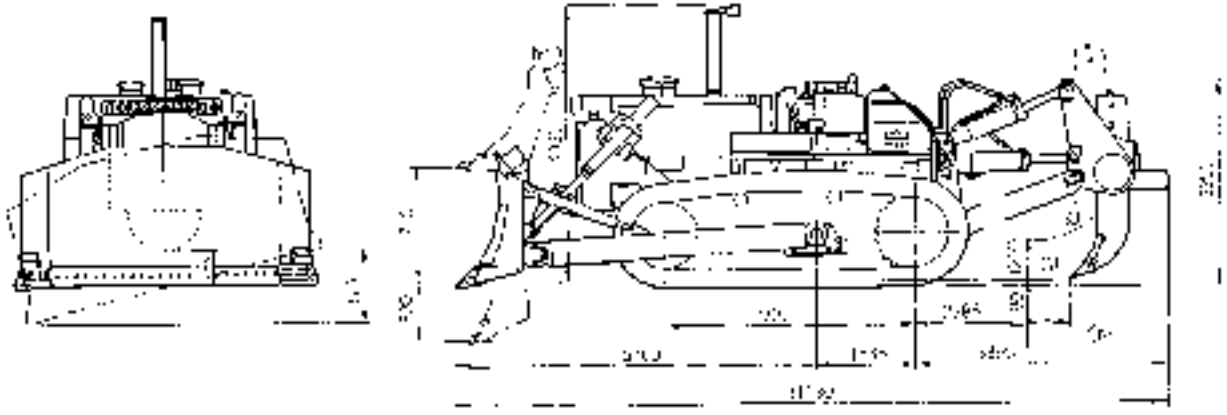
ENGINE

- Model
  Cummins V I A 1710-C800 diesel engine
- Rated rpm 2000 rpm
- Flywheel horsepower 650 HP
- Maximum torque (at about 1600 rpm) 276 kgm
- Start system: starting motor 24V 18 kw
- Alternator 24V 50A
- Battery 24V 200 Ah x 4

Unit: mm

Straight-Tilldozer with a Variable Giant Ripper mounted.





FUEL, COOLANT AND LUBRICANTS

PROPER SELECTION OF FUEL, COOLANT AND LUBRICANTS

RESERVOIR	KIND OF FLUID	AMBIENT TEMPERATURE 14 -10 / 32 0 / 50 10 / 68 20 / 86°F 30°C	CAPACITY (l) Specified amount	CAPACITY (l) Refill capacity
Engine oil pan	Engine oil	SAE 30 / SAE 10W / SAE 10W-30 / SAE 15W-40	11.0	6.8
Steering clutch case, transmission, torque converter and bevel gear case	Engine oil	SAE 30 / SAE 10W	44.0	25.0
Hydraulic system	Engine oil	SAE 10W / SAE 10W-30 / SAE 15W-40	33.0	18.0
Reduction gear case Pivot shaft	Engine oil	SAE 30	6.0 (each side) 1.5 (each side)	–
Final drive case	Gear oil	SAE 90	9.3 (each side)	8.8 (each side)
	Engine oil	SAE 30		
Fuel tank	Diesel fuel	ASTM D975 No. 2	129.0	–
Cooling system	Water	Add antifreeze	20.6	–

5: ASTM D975 No. 1

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

(2) When starting the engine in an atmospheric temperature of lower than 0°C, be sure to use engine oil of SAE10W, 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

SPEC. & GRADE / NAME OF SUPPLIER	ENGINE OIL		GEAR OIL	GREASE
	Class CD		Class GL-4, GL-5	
	SAE 30	SAE 10W	SAE 90 SAE 140	NLGI 2
CALTEX	RPM DELO 300 RPM DELO 400		Universal Thuban 90	Marfak All Purpose Marfak Multi-Purpose 2
CHEVRON	RPM DELO Super 3		RPM Multi-Service Gear Lubricant 90	RPM Multi-Purpose Grease 2 RPM Automotive Grease Medium
TEXACO	Ursa Oil S-3 Ursa Oil LA-3		Universal Gear Lubricant EP 90	Marfak All Purpose Marfak Multi-Purpose 2
ESSO WORLD WIDE ESSO AFFILIATES	Essotage D-3		Esso Gear Oil GP	Esso Multi-Purpose Grease Nebula EP
SHELL	Shell Rimula CT		Shell Spirax HP 90	Shell Alvania Grease HP 2
MOBIL	Mobil Delvac 1330	Mobil Delvac 1310	Mobilube H.D. 80-90	Mobilplex 47 Mobilplex 48
PENNZOIL	Zoildeez S-3		Pennzoil M.P.P. Gear Lubr 4090	Penrez Lube 310 Cha-Z-Lube 315 M.P. Lube 705
CASTROL	CRD 10, 30		Hypoy 90	
BP	BP Vanellus C-3		BP Hypo gear oil 80EP, 90EP, 140 EP	BP Energrease L2 BP Energrease LS-EP2
GULF (for severe cold districts)	Gulf Dieselube Super S-3 Motor Oil 10W		Gulf Gearcube H.D.	