

Operation & Maintenance Manual

KOMATSU

GD605A-3 GD655A-3 MOTOR GRADER

SERIAL NUMBERS


GD605A-57001

GD655A-67001

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 cords, 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 in addition to usual 250 hours service:
Change all oil and oil filter, fuel filter elements.
For replacement procedure and details, see maintenance table in the maintenance section.
- ★ 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.

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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.

- Take care not to get caught by protruding parts of the machine. Do not wear oil-stained clothing because it is likely to catch fire.
- Keep fire away from stored fuel, lubricants and anti-freeze.
- 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.
- 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.

- 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.
- When working on a road, pay attention to the safety of passing vehicles and pedestrians. If necessary, assign a signalman or provide temporary barricades.
- Before starting the machine, perform all necessary checks as stated in the Operation and Maintenance Manual.

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 tire inflation pressure is standard, that hub nuts 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 thoroughly 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.

- If a seat belt is provided, always use it. If the belt is damaged or worn, replace it with a new one.
- 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 hold position.

AFTER STARTING 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 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.
- Raise each work piece of equipment as high as possible and keep the blade within the machine width while traveling. Maintain the specified traveling posture.
- Do not control the vehicle speed by pressing the brake as it will overheat the brake disc.
- 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, scarifier (option) and ripper (option) 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.
- When operating on uneven ground, drive at as low a speed as possible and avoid sudden changes in direction.
- 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.
 - 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 wheel brake as well. Never coast down a slope with the gear shift lever in neutral or with clutch disengaged.
 - As far as possible, avoid turning the machine on a slope. It may cause the machine to roll over or slip sideways.
 - 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 using the articulation system, be particularly careful not to let the blade damage the rear tires.
- Operating the articulation system when traveling at high speed may cause the machine to overturn. Always perform this operation at a speed below 10 km/h.
- Always observe the traffic regulations and leave margin for emergencies.
- When operating in a city area, be sure to locate underground pipes and cables before starting the machine to prevent them from being broken.
- 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.
- 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:
 - Be sure to arrange an adequate lighting system.
 - At night it is very easy to make mistakes in assuming the distance and height of objects and land.
- 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 cleaning snow, remember the following points:
 - Even slight slopes can cause unexpected side slipping, so in such places, operate with extreme caution.
 - Never use the wheel brake to stop suddenly on slopes. Lowering the working equipment is a far more effective way of stopping.
- During operation, use the seat belt. (Option)

PARKING

- When parking the machine, park it in a safe place outside the working area, or in the specified place.

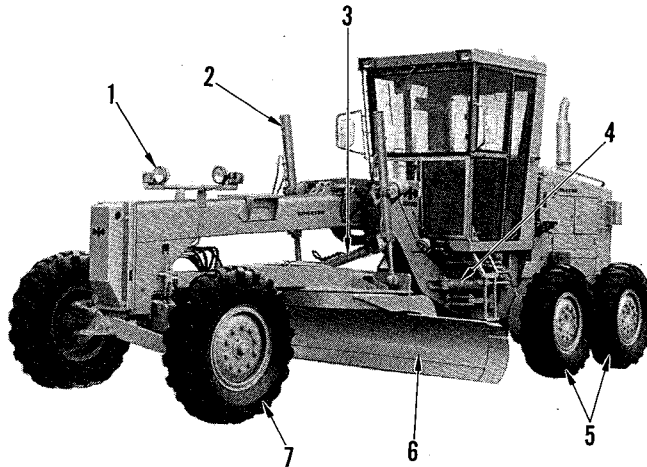
The following factors should be considered when choosing a parking place: it should be on flat, firm ground where there is no danger of rockfalls, landslides or floods. If the machine has to be parked on a slope, it should be parked facing directly up or down the slope, and chocks should be placed under the tires. 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, scarifier (option) and ripper (option) to the ground, and put all safety levers in the lock position. Switch off the engine and remove the key.

GENERAL LOCATIONS AND SPECIFICATIONS

(): GD655A-3

1. Head lamp
2. Blade lift cylinder
3. Drawbar side shift cylinder
4. Articulation cylinder
5. Rear tire
6. Blade
7. Front tire



OPERATING WEIGHT

With Full Height Rops Cab:	14840 kg (14890 kg)
With Low Profile Rops Cab:	14800 kg (14850 kg)

BLADE WIDTH

3710 mm
(4010 mm)

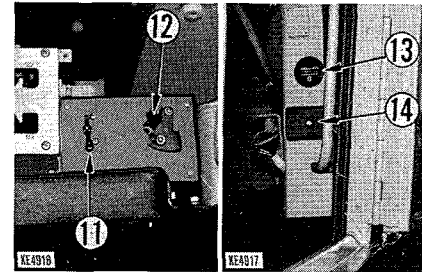
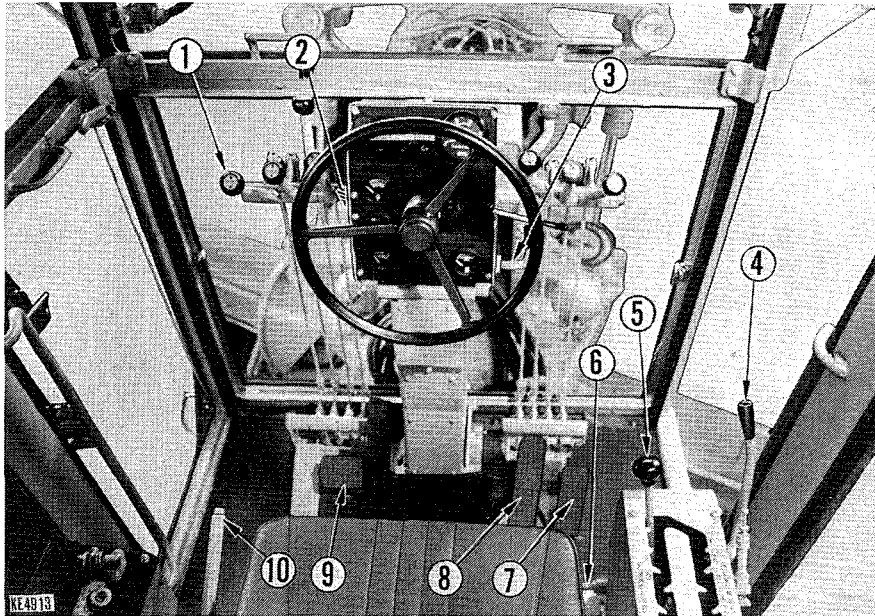
PERFORMANCE

Travel speeds	Forward	Max. 45.1 km/h
	Reverse	Max. 52.8 km/h

ENGINE

Model	Komatsu 6D125 diesel engine	
Flywheel horsepower at 1800 rpm	155 HP	(165 HP)

OPERATOR'S COMPARTMENT

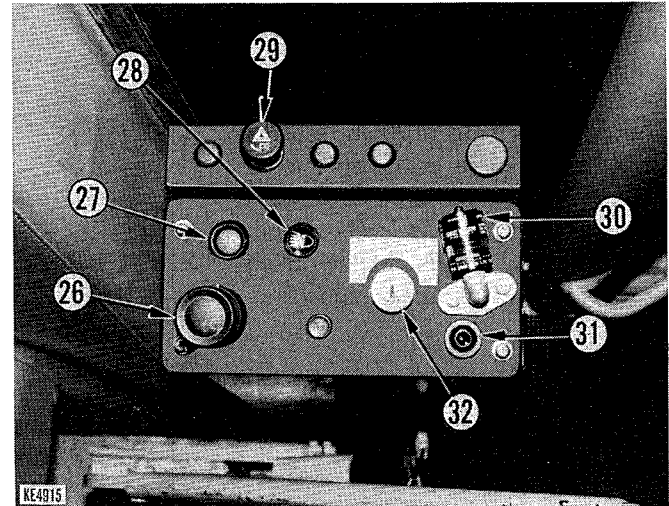
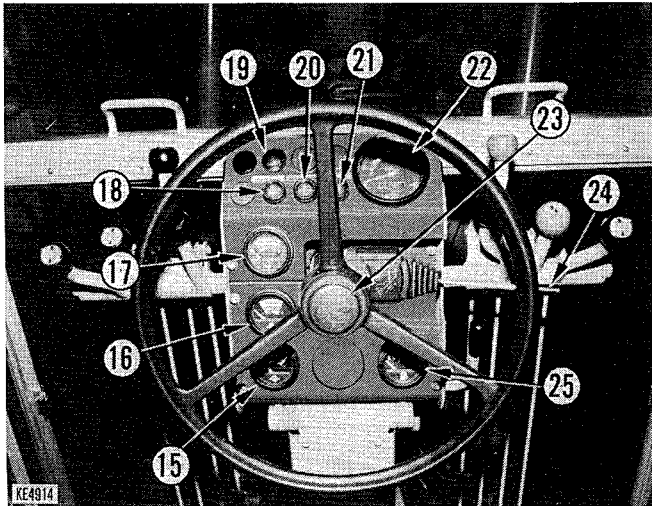


1. Work equipment control lever
2. Steering wheel tilt lever
3. Steering post tilt lever
4. Fuel control lever
5. Gear shift lever
6. Safety lock lever
(for gear shift lever)
7. Accelerator pedal
8. Brake pedal
9. Inching pedal
10. Parking brake lever
11. Differential control switch
12. Lifter lock release switch
13. Service meter
14. Fuse box

- 15. Air pressure gauge
- 16. Engine oil pressure gauge
- 17. Water temperature gauge
- 18. Parking brake pilot lamp
- 19. Differential lock pilot lamp
- 20. Battery charging lamp
- 21. Engine oil temperature warning lamp

- 22. Speedometer
- 23. Horn button
- 24. Turn signal, dimmer switch
- 25. Fuel gauge
- 26. Panel lamp
- 27. Working lamp switch
- 28. Head lamp switch
- 29. Hazard warning lamp switch

- 30. Dust indicator
- 31. Heater signal
- 32. Starting switch

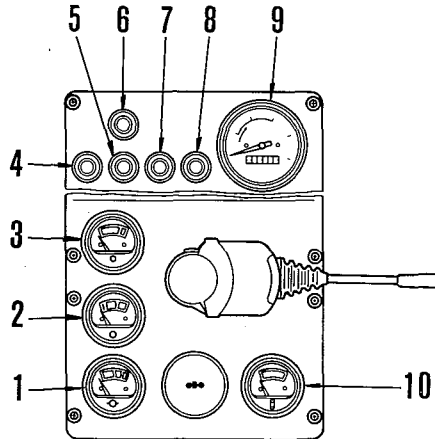


INSTRUMENTS AND CONTROLS

1. AIR PRESSURE GAUGE

The air pressure is normal as long as this gauge is in the green range during operation. When the air pressure in the air tank exceeds 4.2 kg/cm², the warning buzzer will sound. Stop the machine, raise the engine speed and wait until the pressure gauge is in the green range. If the pressure does not rise, look for the cause (air leak). If there is any abnormality, ask a Komatsu distributor to inspect it and make the repair.

★ If the pressure in the air tank is zero, the air pressure can return to the normal level (green range) in about 2 minutes at low idling or in about 1 minute at high idling.



2. ENGINE OIL PRESSURE GAUGE

Engine is normal when indicator is on green range during operation. When engine is cool, indicator is over green range. In this case warm up engine until indicator points green range.

3. WATER TEMPERATURE GAUGE

Engine is normal when indicator is on green range during operation.

After starting engine, continue to warm up engine until indicator points green range.

If indicator is over green range keep engine in low idling and wait till temperature drops.

4. ACCUMULATOR PILOT-LAMP (OP)

When the accumulator switch is turned ON, this pilot lamp lights and, at the same time, the accumulator actuates.

5. PARKING BRAKE PILOT LAMP

When the parking brake lever is pulled, this lamp lights up. Before starting the machine, release the parking brake lever and check that the lamp goes out.

6. DIFFERENTIAL LOCK PILOT LAMP

When the differential control switch lever is thrown inward, the differential lock releases and this lamp lights.

7. BATTERY CHARGING LAMP

This lamp is used to indicate the generating condition of the alternator. Normally, when the starting switch is turned ON, the lamp will light up and then go out as the engine speed rises.

8. ENGINE OIL TEMPERATURE WARNING LAMP

This lamp indicates the engine oil temperature is above 120°C. If the lamp lights, stop the machine and idle the engine at medium speed with no load until the lamp goes off.

9. SPEEDOMETER

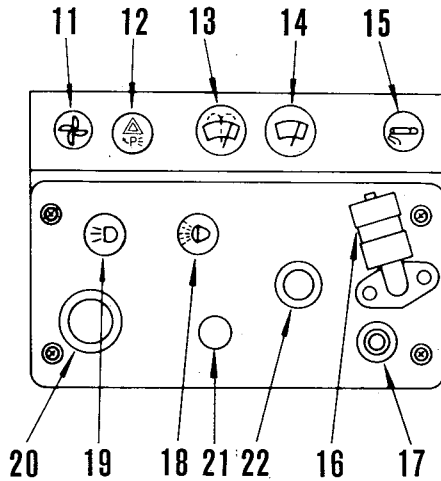
Indicates the running speed of the machine. It also contains an odometer. For details of the white range, refer to OPERATING YOUR MACHINE.

10. FUEL GAUGE

The fuel gauge indicates the amount of fuel in the fuel tank.

E: Indicates that the fuel level is low.

F: Indicates that the tank is full.



11. CAR HEATER SWITCH (OP)

After starting the engine, pull this switch to operate the heater.

The temperature can be adjusted to three levels.

12. HAZARD WARNING LAMP SWITCH

When this switch is turned clockwise, the front and rear parking lamps will light up. It gives warning to an oncoming vehicle when parking at night.

When the switch is pulled, the front and rear turn signal lamps will blink.

13. FRONT WIPER SWITCH(OP)

The wiper is actuated at low speed, when the switch is pulled as far as the first stop.

The wiper works at high speed, when it is pulled as far as the second stop.

Turn the switch clockwise to spray solvent on the glass.

14. REAR WIPER SWITCH (OP)

The wiper is actuated at low speed, when the switch is pulled as far as the first stop.

The wiper works at high speed, when it is pulled as far as the second stop.

15. CIGARETTE LIGHTER (OP)

Depress the knob and wait for several seconds until it is returned automatically to its original position. Then the lighter is ready to use.

16. DUST INDICATOR

This indicator shows if the air cleaner has been filled with the dust.

When the element is blocked, a red piston appears at the transparent section and will not disappear. This red signal is the alarm for blockage, the element must be cleaned immediately.

When the cleaning is down, push the indicator button so that the red piston is reset to the original position.

17. HEATER SIGNAL

This signal is red-heated after the starting switch is turned to HEAT, thus indicating the electrical intake air heater is heated.

★ The preheating time will vary depending upon the ambient temperature. Accordingly refer to the section COLD WEATHER OPERATION.

18. HEAD LAMP SWITCH

When the switch is pulled as far as the first stop, the side marker lamps, tail lamps, licence plate lamps and panel lamp will light up.

When it is pulled as far as the second stop, the head lamps will also light up.

19. WORKING LAMP SWITCH

When this switch is pulled, the working lamp will come on.



Use only when machine is working.

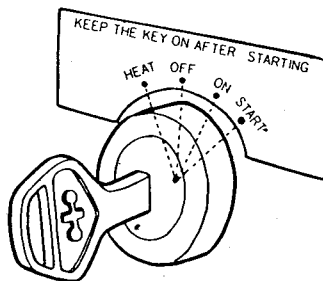
20. PANEL LAMP

When head lamp switch is ON, panel lamp will come on.

21. BLADE ACCUMULATOR SWITCH (OP)

To actuate the accumulator, turn on this switch.

22. STARTING SWITCH



OFF

Key can be inserted and pulled out at this position and the switches of all the electric systems are set to off.

The parking lamps will remain on, however, when the switch is turned OFF.

ON

When this position (ON) is reached by rotating clockwise for one step, the charging circuit and the lamp circuit are electrified.

This position (ON) shall be held after the engine is started.

START

Starting motor starts revolution by rotating the switch clockwise further for one step. And the engine is started.

The key will be automatically restored to the position ON by releasing the key. So, you shall release the key once the engine is started.

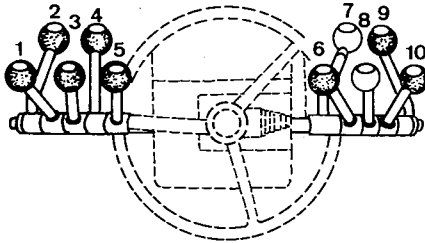
HEAT

Use this position when starting in cold weather.

Release the key to allow it to return automatically to OFF and then, without delay, turn it to START.

★ When starting, be sure to use the starting key.

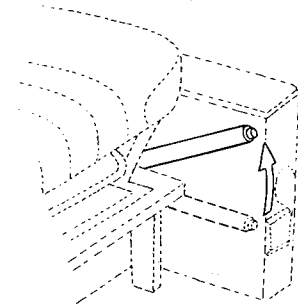
WORK EQUIPMENT CONTROL LEVER



1. Left blade lift lever
2. Ripper lift control lever (option)
3. Blade side shift lever
4. Power tilt control lever
5. Blade rotation control lever
6. Drawbar side shift lever
7. Articulation control lever
8. Leaning lever
9. Scarifier lift lever (option)
10. Right blade lift lever

For each work equipment operation, see the section **OPERATING OF WORK EQUIPMENT**.

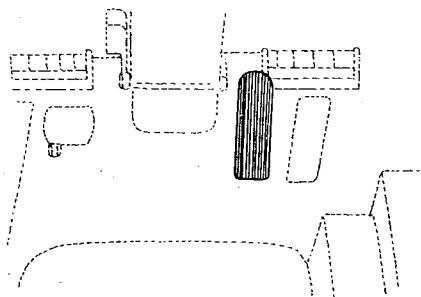
PARKING BRAKE LEVER



The brake is applied to the output shaft of the transmission by pulling this lever to the limit.

! When parking or leaving the machine, be sure to apply the parking brake.

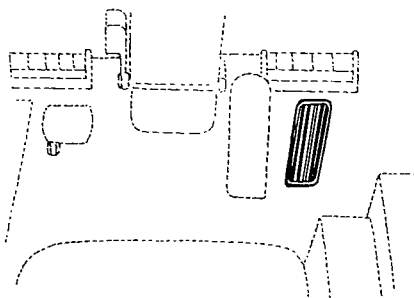
BRAKE PEDAL



The brake are applied on the four rear wheels when this pedal is depressed.

! Do not put your foot on this pedal unnecessarily.

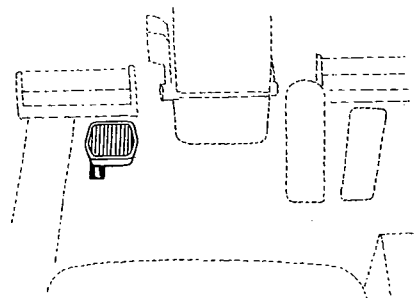
ACCELERATOR PEDAL



This pedal is interconnected with the fuel control lever. Therefore, the engine is easily controlled from low idling to high idling by means of the accelerator pedal, with the fuel control lever held at low idling position.

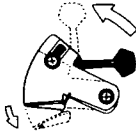
If the pedal is raised from the low idling position, the engine will stop.

INCHING PEDAL



Pressing this pedal cuts the power to the wheels.

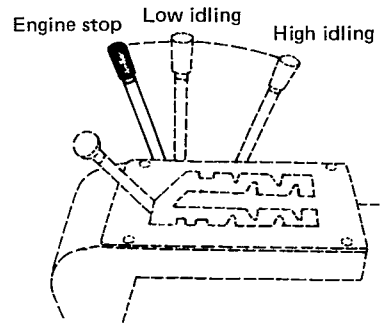
The pedal is used for smooth stopping or starting, or when changing between Forward and Reverse. When used in 1st, 2nd or 3rd speed, it enables fine control of the machine. (However only when the blade, etc. has no load and is on flat ground.)

LIFTER LOCK RELEASE LEVER

When this lever is thrown inward after removing the stopper, the pin pushing the blade lift cylinder mounting base and the frame can be extracted.

Use this lever inward except to set the above postures.

! Do not throw this lever inward except to set the above postures.

FUEL CONTROL LEVER

The low idling position is the extreme forward position in which the lever is pressed against the stopper.

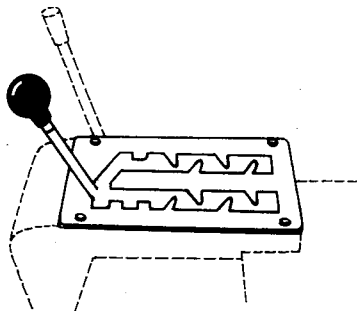
When the lever is pulled back, the engine speed will increase until it becomes a maximum when the lever is pulled back all the way.

When the gear shift lever is in the 5th or higher speed position in either forward or reverse, it becomes interconnected with the fuel control lever to prevent overrun and acts to reduce engine speed.

When stopping the engine, push the lever further forward against the stopper from the low idling position. When the engine stops, turn OFF the starting switch.

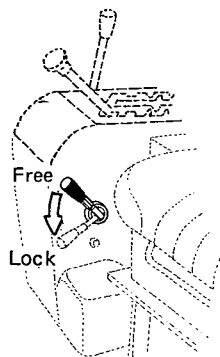
★ Use the fuel control lever only during actual work. When running the machine along a road, use the accelerator pedal.

GEAR SHIFT LEVER



6-speed forward and 6-speed reverse transmission can be performed by simply moving this lever to desired speed positions. When the lever is left placed in any position other than neutral, the engine is prevented from starting. When the lever is moved to a reverse position, the back-up buzzer sounds.

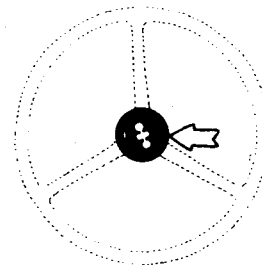
GEAR SHIFT LEVER LOCK



This is the lever for locking the gear shift lever. Push the lever down to lock the gear shift lever.

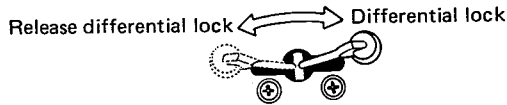
! When parking the machine, be sure to place the gear shift lever in neutral and lock with this lever.

HORN BUTTON



Push the button in the center of the steering wheel and the horn will sound.

DIFFERENTIAL CONTROL LEVER




When this lever is thrown inward, the turning performance can be improved.

Release the differential lock by throwing this lever inward to activate the differential when turning. Throw the lever outward to lock the differential when operating while traveling straight.

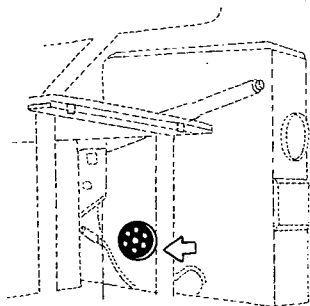
Pushing the differential control lever inward actuates the differential and causes the pilot lamp to come on. If the differential is actuated during ordinary travel or in light-duty operations, the machine turning radius will be reduced, which will, in turn, reduce the tire wear.

Pulling the control lever outward locks the differential gear and causes the lamp to go out.

In heavy-duty operations or when the wheels on one side slip in mud, lock the differential gear.

 **Operate the differential lock control lever when the machine is stationary. If the lever is operated while traveling or making turns, the internal mechanism of the differential lock may be damaged.**

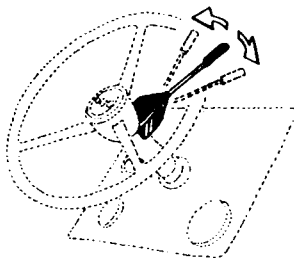
LOW AIR PRESSURE WARNING BUZZER



The air pressure is normal as long as the buzzer does not sound during operation.

- ★ When the parking brake is applied, the warning buzzer does not sound even if the air pressure drops below 4.2 kg/cm^2 .

TURN SIGNAL, DIMMER SWITCH

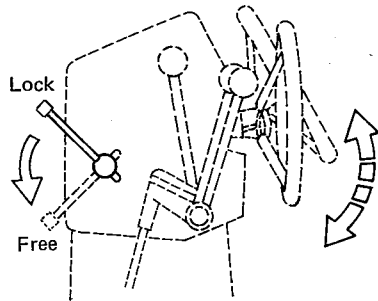


Push the switch lever downward to actuate the right-hand blinking lamps when the machine is to be turned to the right. Push the switch lever upward to actuate the left-hand blinking lamps when the machine is to be turned to the left.

Return the switch lever manually to the neutral position after the steering wheel is returned to the neutral position from right or left turning.

Dimmer is operated by the same lever for turn signal switch. The lever changes the direction of head lamps upward and downward. When it is pulled toward you, the direction of head lamps is changed upward and downward alternately.

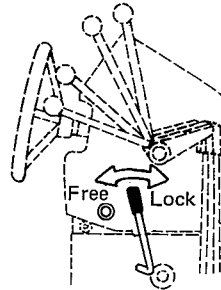
ADJUSTING STEERING WHEEL TILTING ANGLE



Turn the tilt lever to the left to release lock, set the steering wheel to the desired tilting angle, and lock the tilt lever.

- ★ Indefinite adjustment is possible within the range of 7° forward and 7° backward from the standard position.

ADJUSTING STEERING WHEEL AND WORK CONTROL LEVERS FORWARD-BACKWARD



Pull the lock lever provided on the right side of the steering post, and the steering wheel and the work equipment control levers can be moved back and forth. Select any of the five set positions, depending on operator's height and operating posture, and push the lock lever. The instrument panel is also moved back and forth, at the same time.

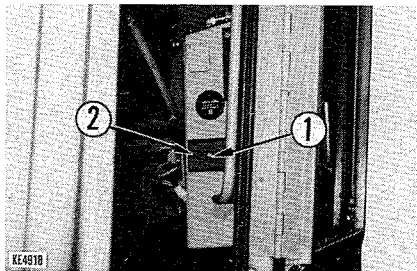
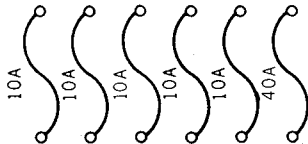
FUSE BOX

Loosen bolt (1) and remove cover (2).

★ Replace a fuse with another of the same capacity.

 **Before replacing a fuse, be sure to turn off the starting switch.**

Fuse arrangement and circuit

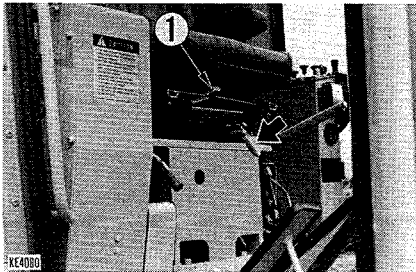


OPERATOR'S SEAT

Your are required to set the operator's seat according to the following description so that an operator may operate the machine conveniently.

Front/Rear adjustment of seat

Pull lever (1) outward. After setting the seat at the desired position, release the lever. The adjustment range in the front and rear direction is 125 mm.

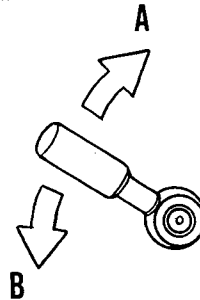


Height adjustment of whole seat

To raise the seat, move the lever from A to B.

To lower the seat, move the lever from B to A.

The height adjustment range is 137 mm.

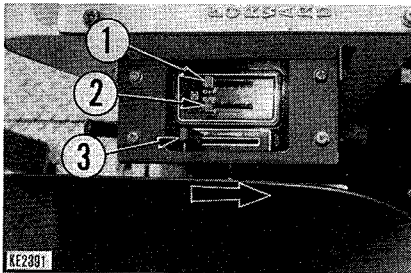


 **Stop the engine before adjusting the operator's seat.**

CAB ACCESSORIES (OPTION)

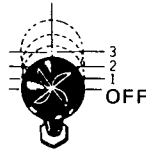
Air conditioner

1. Moving the lever adjusts the wind direction left and right and up and down.
2. Moving switch (1) in the direction of the arrow lowers the temperature.
3. Moving switch (2) in the direction of the arrow increases the air flow.
4. Moving switch (3) in the direction of the arrow raises the temperature.



Car heater

Pull the switch to operate the blower.



1. Position 1: High
2. Position 2: Medium
3. Position 3: Low

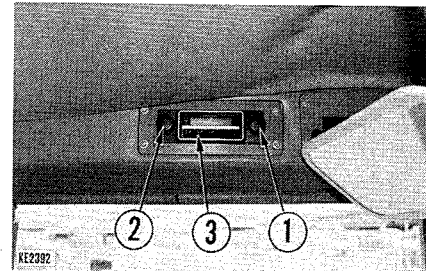
See CAR HEATER SWITCH for page 22.

Fan

Turn the switch ON to operate the fan.

AM radio

- ① Power switch, Volume control knob
Push the switch to turn the power on. Push again to turn the power off.
- ② Tuning knob
- ③ Tuning buttons



Tuning button setting

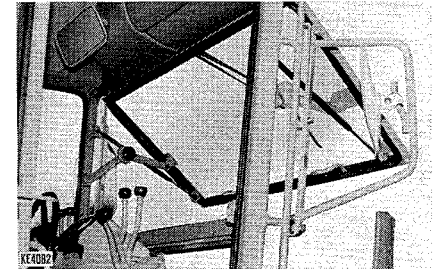
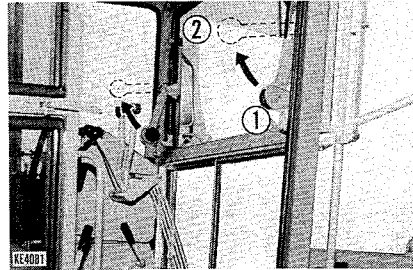
1. Pull out one of the tuning buttons.
2. Turn the tuning knob until you get the station you want.
3. Push the tuning button back in.
Two AM stations can be set.

Front window**Opening the window**

Move the adjustment arm from position 1 to 2.

Push the window open and lock it by turning the arm handle.

★ Be sure to tighten the handle firmly to prevent the window from falling.



Door lock

When working with the door open, always lock the door and cab frame. Force the door toward the cab frame to lock it automatically.

To release the lock, pull the lever in the direction of the arrow.



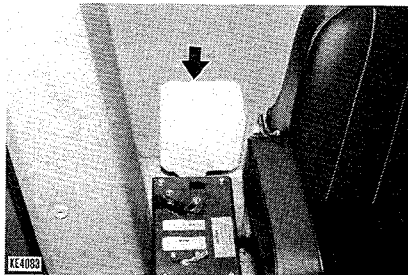
Window washer liquid tank

Always keep washer liquid in the tank.

- ★ Do not turn the switch on when the tank is empty as it may damage the pump.
- ★ Wiping with a dry cloth may scratch the glass.

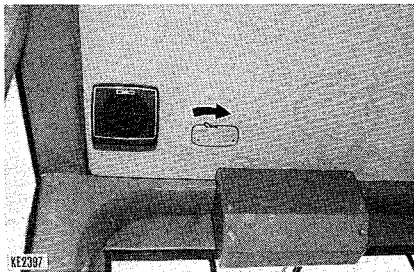
Always operate the wiper after spraying the washer liquid.

- ★ In cold weather, make sure that the wiper rubber is not frozen to the glass before operating the wiper. Operating a frozen wiper may damage the motor.

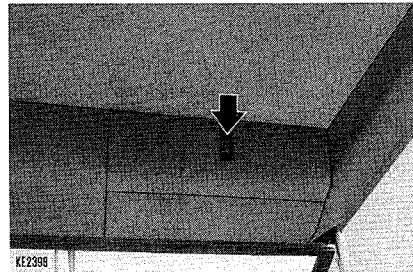


Room light

Throwing the switch in the direction of the arrow turns the room light on.

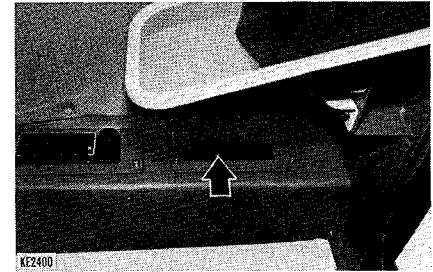
**Movable glove box**

★ Never travel with the glove box open.

**Power switch (for radio and fan)**

The power switch is at the back of the rearview mirror.

When the switch is on, the red lamp lights to indicate that power is being supplied to the radio and fan.



LOCKING CAP

A locking cap is available as a 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

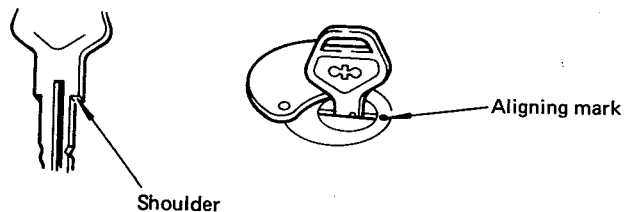
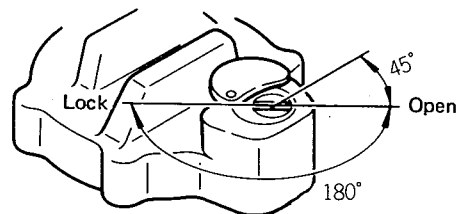
- ★ Insert the key as far as it will go. If the key is turned before it is inserted all the way, it may break.

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.

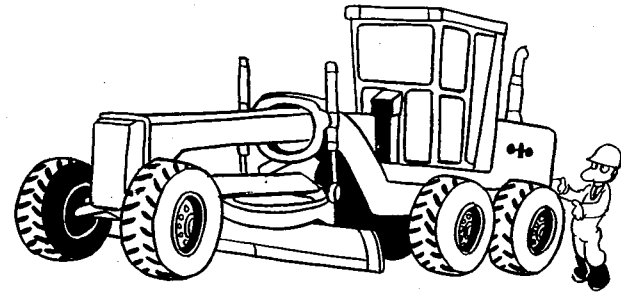
- 2) Turn the key clockwise and take the key out.



CHECK BEFORE STARTING

The check before starting shall never be neglected as troubles are prevented beforehand by the check.

- a. Walk around the machine body and check whether there is any trace of leakage of oil or water. In particular, the joint of high pressure hose and hydraulic cylinder should be paid special attention.
In case leakage is found, inspect the leaking location and stop the leakage. When leakage is not stopped, you are begged to request repair to Komatsu distributor.
- b. Inspect the tightening of bolts and nuts on every section. When loosened ones are found, apply increased tightening. In particular, attachment positions of air cleaner and muffler should be paid special attention.
- c. Inspect disconnection and shortcircuit of electric wirings, and loosened terminal connections should be paid special attention.

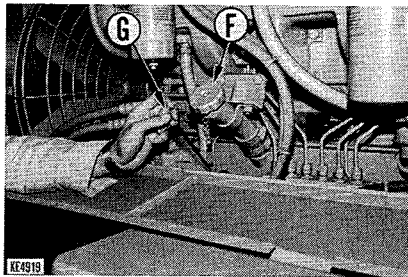


CHECK BEFORE STARTING

d. CHECK OIL LEVEL IN ENGINE OIL PAN

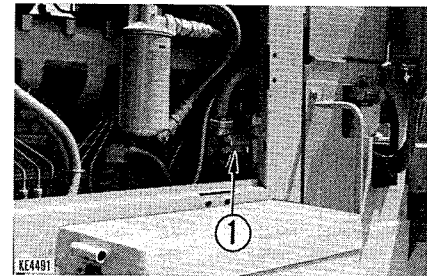
Use dipstick (G) to check the oil level. The oil level should be between mark L and H. If necessary, add oil at oil filler (F).

- ★ The type of lubricant used depends on the ambient temperature. Select according to the table "FUEL, COOLANT AND LUBRICANTS".
 - ★ Make an oil level check before starting engine or 15 minutes or more after the engine is stopped. If oil remains at various portions of the engine, the correct oil level cannot be measured.
- ★ When checking oil level, park the machine on level ground and stop the engine.
 - ★ Do not add oil above the H level mark.



e. DRAIN WATER AND SEDIMENT IN FUEL TANK

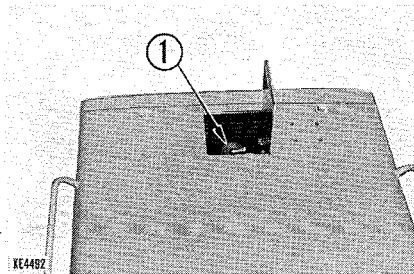
Loosen fuel tank drain valve (1) and drain sediment and water accumulated at the bottom, together with fuel.



f. CHECK COOLANT

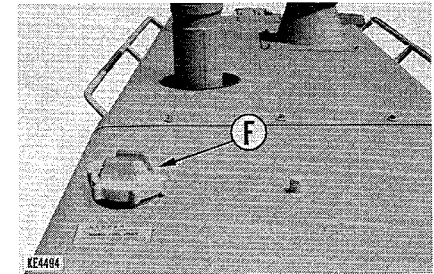
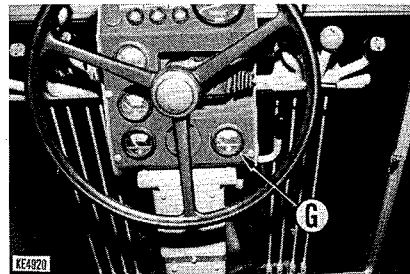
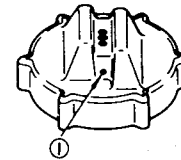
Remove radiator cap (1) on the rear machine body, and check that the coolant level reaches the vicinity of water filler. If not, add water. When water has to be added very frequently, this is usually an indication of leakage at some place. Check for a leak and take necessary measures.

! When removing the radiator cap, lift the lever to relieve inner pressure.

**g. CHECK AND REFILL FUEL TANK**

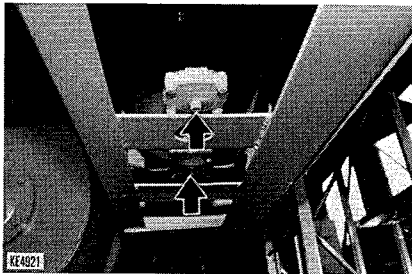
Check by fuel gauge (G). Top up the tank through filler (F) after the day's work is over.

- ★ Fuel capacity: 250 ℓ
- ★ A clogged cap breather hole (1) may stop the fuel flow to the engine. Check it from time to time and clean.



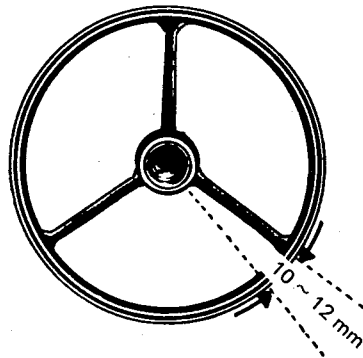
h. DRAIN WATER FROM AIR TANK

When placing the machine out of service for a long period, depress and release the brake pedal several times to drain the water from air tank.



i. CHECK AND ADJUST STEERING WHEEL

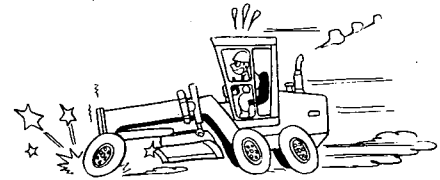
When checking steering wheel play, start engine and raise front wheels off ground. The standard steering wheel play is 10 to 12 mm. If the play is beyond standard or steering is abnormal, contact your Komatsu distributor.



j. CHECK AND ADJUST BRAKING ABILITY

The braking ability is enough if the braking distance is 14 m or below at the initial speed of 35 km/h.

For insufficient braking ability, refer to EVERY 250 HOURS SERVICE (WHEEL BRAKE.)

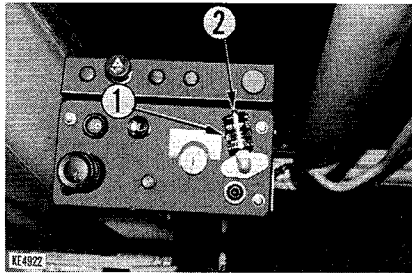


k. CHECK DUST INDICATOR

When air cleaner element is clogged, red piston (1) appears.

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

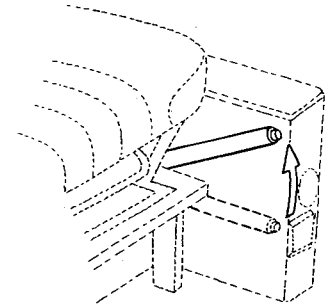
After cleaning element, push button (2) to return red piston.

**l. AIR PRESSURE AND ITS RATE OF INCREASE**

When the internal pressure in the air tank is zero, it normally takes about 3 minutes at low idling or 1.5 minutes at high idling to fill the tank with pressurized air until the air pressure gauge enters the green range.

m. CHECK PARKING BRAKE FOR NORMAL LEVER TRAVEL

The lever travel is found normal if the brake is normally applied when the lever grip is pulled until two or three ratchet clicks are felt. If six or more clicks are counted before the parking brake comes into effect, refer to the EVERY 250 HOURS SERVICE for inspection and adjustment procedures.



CHECK BEFORE STARTING

★ If the machine is started in travel with the parking brake lever left in pulled position, brake lining will be burnt and braking effect will be greatly deteriorated. Mostly, this will be accompanied with discoloration of the brake drum.

n. CHECK AND ADJUST TIRE PRESSURE

Standard pressure

(14.00-24-10PR)

Front wheel 2.45 kg/cm²

Rear wheel 2.45 kg/cm²

Make sure that tire and rim is free from wear and damage, and that hub nuts are not loose.

o. CHECK LAMPS FOR SWITCHING, DIRT AND DAMAGE.

p. CHECK REARVIEW MIRROR FOR POSITIONING, DIRT AND DAMAGE.

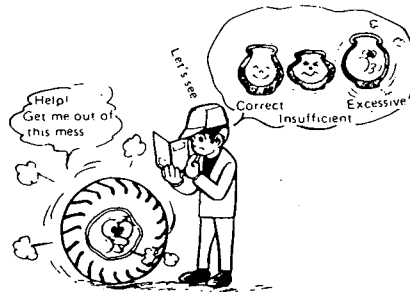
q. CHECK HORN.

r. IS THE COLOR OF EXHAUST GAS NORMAL?

s. DO THE INSTRUMENTS FUNCTION NORMALLY?

t. HAVE ANY DEFECTS WHICH WERE FOUND DURING THE PREVIOUS DAY'S OPERATION BEEN CORRECTED?

u. CHECK THE SEAT BELT FOR NORMAL FUNCTION.

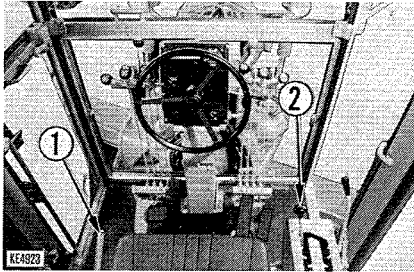


**v. CHECK THE DOOR LOCK FOR
NORMAL FUNCTION.**

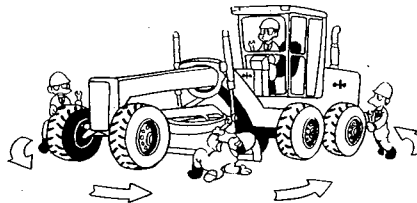
**w. CHECK THE WINDSHIELD
WIPER, WINDOW WASHER
AND DEFROSTER FOR
NORMAL FUNCTION. CHECK
FOR SUFFICIENT WASHER
FLUID LEVEL.**

OPERATING YOUR MACHINE

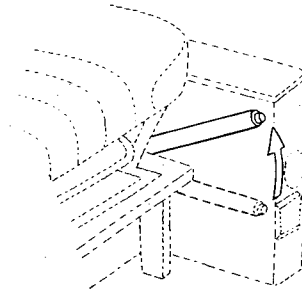
HANDLING ENGINE BEFORE STARTING



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

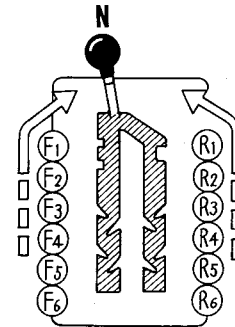


2. Is parking brake lever (1) in lock position?

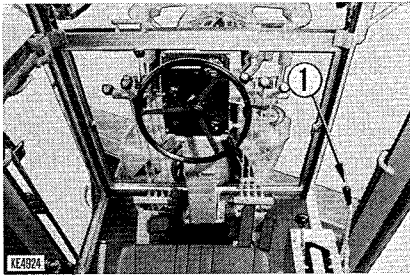


3. Is gear shift lever (2) in the N (neutral) position and locked?

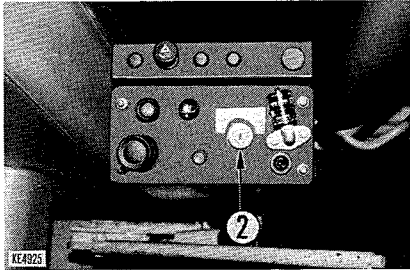
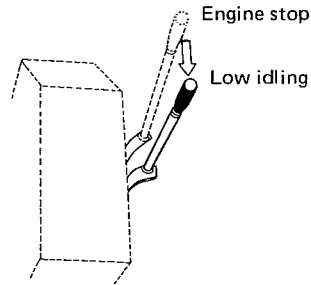
★ Engine will not start unless gear shift lever is in N (neutral) position.



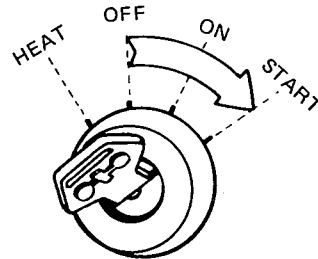
STARTING ENGINE



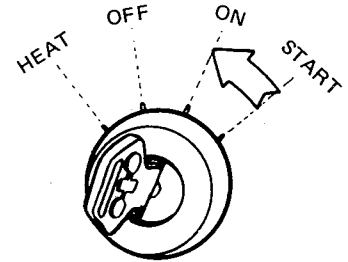
1. Put fuel control lever (1) in low idling position.



2. Turn starting key (2) to START and start engine.



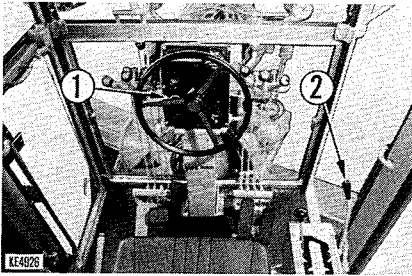
3. Release the key, and key will return automatically to ON.



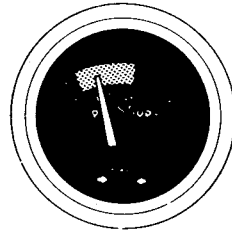
- ★ Do not leave key in START for more than 20 seconds.
- ★ If engine will not start, repeat the starting procedure after about 2 minutes.
- ★ To start engine in cold weather, refer to COLD WEATHER OPERATION.

WARM-UP RUN

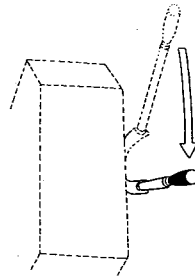
After starting the cold engine, this warm-up run should be continued as the followings.



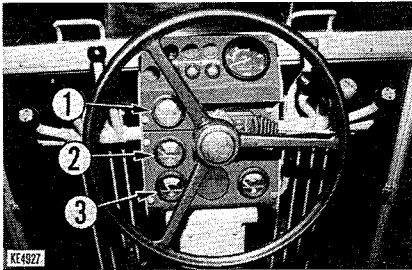
1. Run the engine at low idling speed, and check that the engine oil pressure gauge indicator (1) reaches the green range.



2. Pull the fuel control lever (2) and run the engine at medium speed for about 5 minutes with no load.



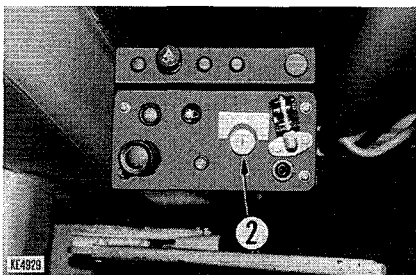
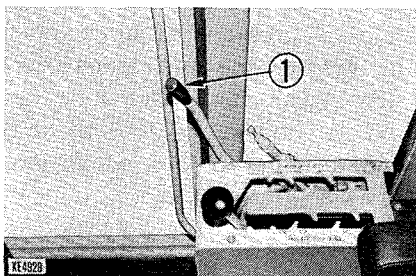
- ★ When warm-up run is continued for more than 20 minutes, the engine should be run with load from time to time. If warm-up run with load is impossible, the engine should be run at mid-range speeds.

CHECK AFTER STARTING

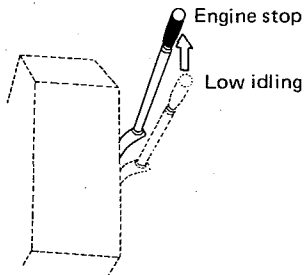
1. Run engine with light load until engine water temperature gauge indicator (1) moves into green range.
2. After warm-up run is completed, check engine water temperature gauge (1), engine oil pressure gauge (2) and air pressure gauge (3) for proper operation.
3. Check for normal coloration of exhaust, any abnormal sound or vibration.
4. Check for any leakage of oil, fuel or water.

★ During cold engine start, when the oil pressure gauge pointer moves over the green range after the engine start, wait until the pointer moves back with the green range before continuing the warm up operation.

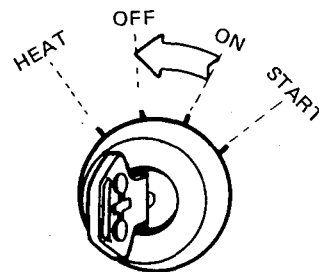
STOPPING ENGINE



1. Cool the engine by running it at low idling speed with fuel control lever (1) for about 5 minutes.
 2. Push fuel control lever (1) fully forward and stop the engine.
- ★ It is also possible to pull the accelerator pedal to "STOP" position and stop the engine.

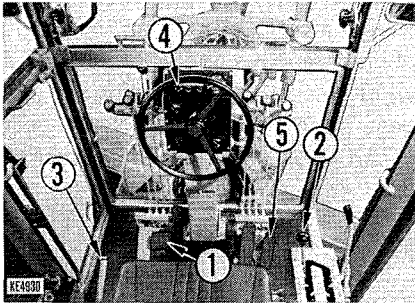


3. Return starting switch key (2) to the OFF position, and withdraw the key.



- ★ Do not attempt to stop a hot engine immediately unless it is necessary. Such unreasonable operation will cause remarkable shortage of life of the various engine parts.
- ★ Specially when stopping an overheated engine, be sure to cool the engine gradually by idling it at a middle idling speed.

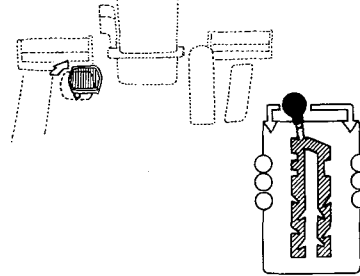
OPERATING MACHINE TRAVELING



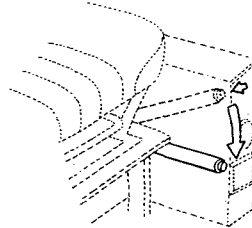
1. Bring the blade, the ripper (option) and scarifier (option) in the traveling posture.

2. Depress the inching pedal (1) and set the gear shift lever (2) to 1st, 2nd and 3rd speed.

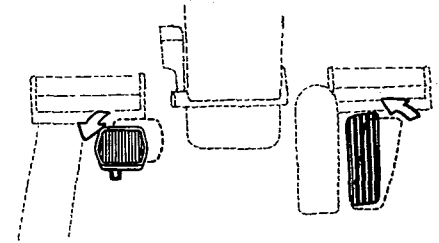
★ Do not start with the gear shift lever in 4th speed or above.



3. Free parking brake lever (3) and check that parking brake pilot lamp (4) goes off.



4. Release the inching pedal (1), depress the accelerator pedal (5) and the machine will start.

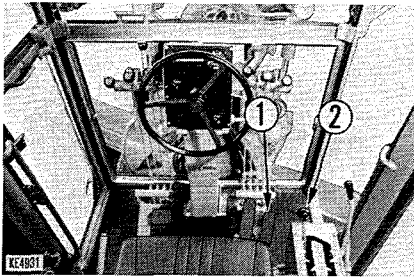


★ In this case, keep the following care in mind.

- The parking brake pilot lamp goes out.
- The air pressure warning buzzer is not sounding.

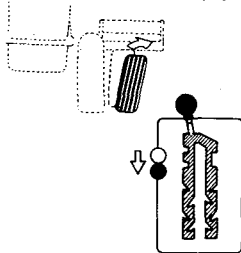
GEAR SHIFTING

Gear shifting is performed by simply moving the gear shift lever to the desired speed position.



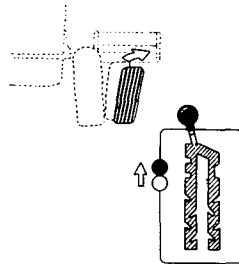
1) Acceleration

Partially release accelerator pedal (1) and shift gear shift lever (2) to the next stepped-up position.



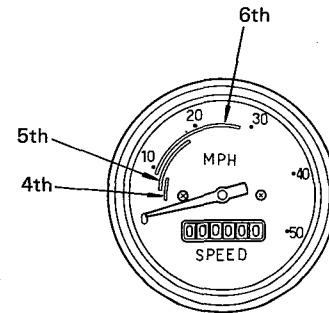
2) Deceleration

Release accelerator pedal (1) to decrease traveling speed and shift gear shift lever (2) to the next stepped-down position.



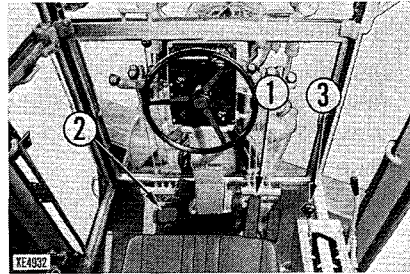
★ When shifting gear, always shift one speed at a time.

On deceleration, watch the speedometer pointer. When the pointer reaches the right end of a white range corresponding to the gear speed next the current gear speed, move the gear shift lever to the stepped-down position



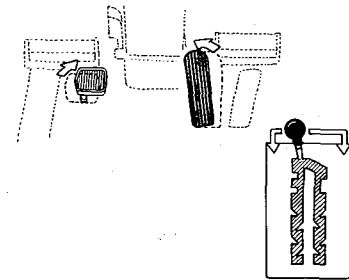
FORWARD-REVERSE SHIFTING

- ★ When loosing speed going uphill, etc., follow this method, but when changing down on downhill slopes, shift gear just before the indicator reaches the right end of the white range.
- ★ When traveling downhill, use the engine brake or wheel brake to keep the indicator within the white range for that speed.

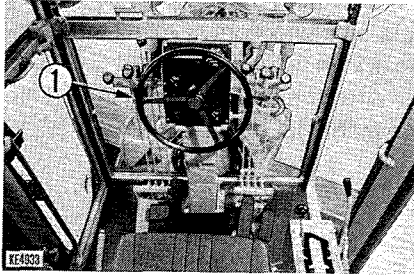


Depress brake pedal (1). Before the machine comes to a stop, depress inching pedal (2).

After machine stopping, shift gear shift lever (3).




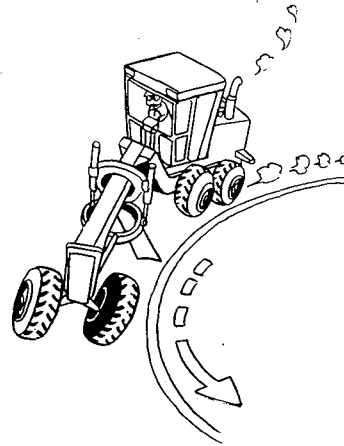
TURNING

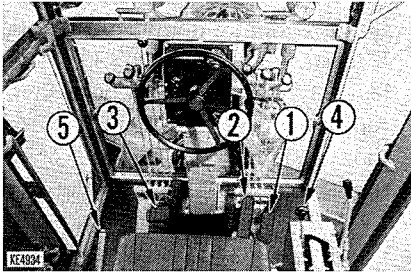


The grader turns to the desired side by turning the steering wheel (1) to that side.

- ★ Leaning to the turning side will minimize the turning radius.
- ★ In case the grader turns while reversing, leaning to the opposite of the turning side will minimize the turning radius.

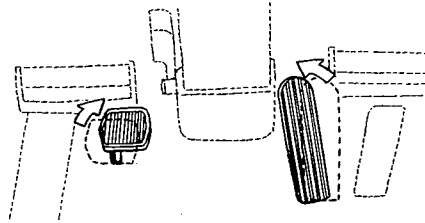
 **Avoid as much as possible turning the machine on a slope. The machine will tend to slip sideways. Particular care should be taken on soft or clay land.**



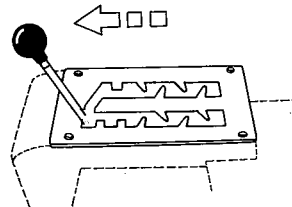
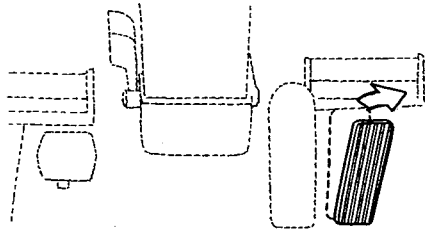
STOPPING MACHINE

1. Release the accelerator pedal (1).

2. Depress the brake pedal (2). Before the machine comes to a stop, depress the inching pedal (3).



3. Return the gear shift lever (4) to the N (neutral) position.



! When the machine is to be left stopped for a while, leave the engine in low-idling or stop the engine. Apply gear shift lever lock and the parking brake (5).

! Stop the machine on hard and even ground to prevent it from falling down or slipping.

★ When stopping the engine, follow the procedure described in STOPPING ENGINE section.

CAUTIONS FOR OPERATING

- Drive the machine straight during uphill or downhill traveling. Specially, turning the machine on the gravelly or clayey slant will cause the machine to slip easily.
- When the engine comes to a stop during uphill or downhill traveling. Depress the brake pedal to stop the machine. Return the gear shift lever to the neutral (N) position and start the engine.
- Do not attempt to shift the gear shift lever to the neutral position or depress inching pedal during downhill traveling, but always keep the lever in a forward gear position to use the engine as a brake.
- Operating the articulation system when traveling at high speed may cause the machine to overturn. Always perform this operation at a speed below 10 km/h.
- Use the parking brake as necessary to compensate insufficient effect of the wheel brake.
- This machine has two brake control systems. If one brakes down the other is still effective. However because braking capacity is reduced travel slowly when traveling.
- The brake system is operated by air. If a brake pedal is depressed and released repeatedly several times, air will be released and eventually, the air system will be short of air, deteriorating the braking effect.
- When transporting a disabled machine by towing, the transportation distance should be within 600 m at a speed of 8 km/h or less. If the distance is more than the above mentioned, or if more than one day has elapsed since the engine trouble, be sure to use the trailer for transportation.
- When tires get stuck while working in swamp or mud, travel with repeated articulation to simplify getting out of the poor ground.

COLD WEATHER OPERATION

PREPARATION FOR LOW TEMPERATURE

- Change 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 .

- 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 use.

Mixing rate of water and antifreeze

Min. atmospheric temperature ($^{\circ}\text{C}$)	-5	-10	-15	-20
Amount of antifreeze (ℓ)	12.5	16.5	20	22.5
Amount of water (ℓ)	42.5	38.5	35	32.5

Coolant capacity: 55 ℓ

★ Caution for using antifreeze

- 1) Permanent type antifreeze shall be used.
- 2) Soft water (ex: city water) shall be used as mixing water.
- 3) Liquid made of water and antifreeze shall be poured after perfectly extracting the cooling water and cleaning the slime.
- 4) When the climate becomes warmer so that antifreeze is not needed, replace by clean water (ex: city water) after perfectly cleaning the cooling system.



Take care for fire as antifreeze is inflammable.



COLD WEATHER OPERATION

- **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

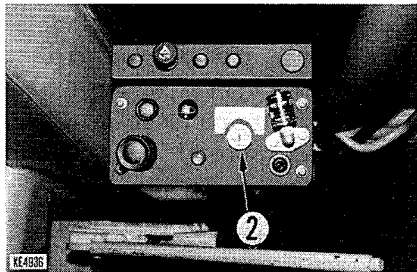
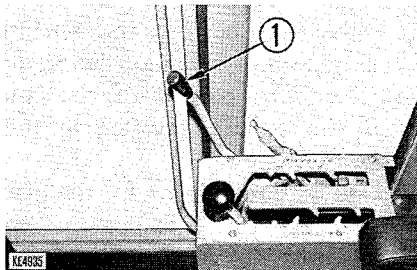
- ★ When temperature rises, change lubricating oil in each unit to that of recommended viscosity. Completely drain antifreeze from cooling system and fill with soft water (ex: city water) after thorough flushing.

- ★ 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.

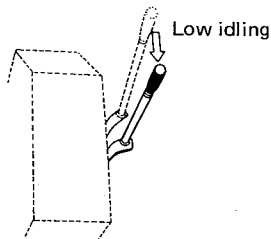
STARTING IN COLD WEATHER

For attention of engine starting, refer to section "Operating your machine".

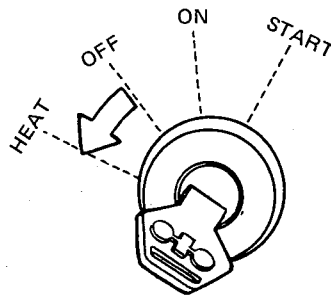
STARTING ENGINE



1. Pull fuel control lever (1) a little towards you from low idling position.



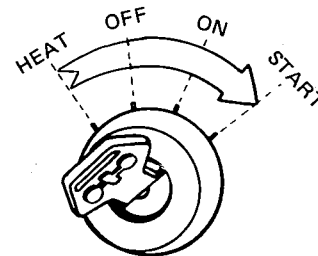
2. Place starting key (2) in HEAT position to red-hot heater signal.



Necessary preheating time is as follows.

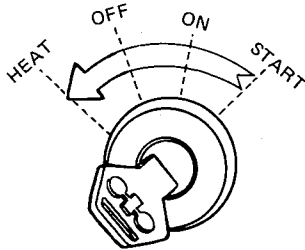
Ambient temperature	Preheat time
Above -5°C	—
Below -5°C	30 seconds

3. When heater signal becomes redhot, turn key (2) to START position to start engine.

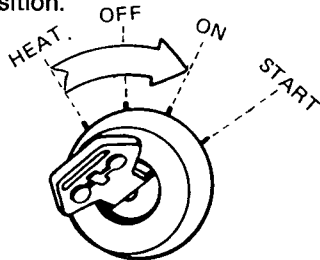


COLD WEATHER OPERATION

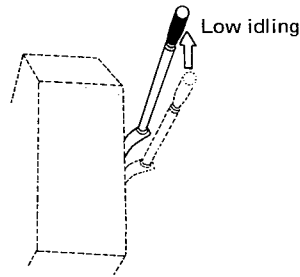
4. As soon as the engine starts, turn the key (2) to the HEAT position to expedite the attainment of smooth running conditions.



- ★ Do not post-heat more than 3 minutes.
5. Once the engine is running normally, return key (2) to the ON position.



6. Put fuel control lever (1) in low idling position.



- ★ If the engine runs smoothly as soon as it starts up, it is possible to except step 4 and go on to the next step.
- ★ Do not leave key in START for more than 20 seconds.
- ★ If the engine does not start up despite carrying out the above operations, leave it for about 2 minutes and then repeat the above procedure 2 and 3.

- ★ Once the engine starts up, thoroughly warm up the engine before putting the machine into operation. Initially, put the gear shift lever in the lowest position, and then gradually apply the load.



When starting the engine using an auxiliary starting fluid, do not on any account turn the key of the starting switch in the HEAT position.

This is because of the danger of explosion. It is possible to prevent inadvertent operation of the switch by disconnecting the wiring between the heater relay and the starting switch. After disconnecting the wires, wrap the terminals in insulating tape and anchor them to the wiring in the vicinity.

CAUTIONS AFTER COMPLETION OF WORK

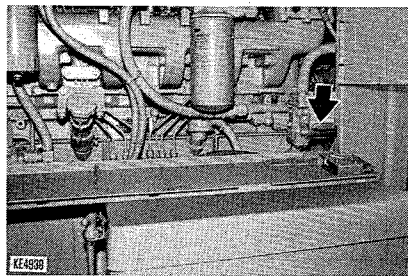
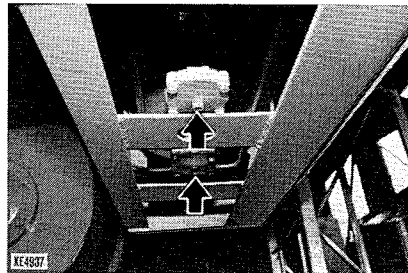
- 1) Mud and water attached on the machine.

Mud can easily be removed soon after it has adhered to the machine. Dried or frozen mud will not only become difficult to remove, but also cause various defects.

In particular, water drops collected on the surface of the piston rod of the hydraulic cylinder shall be fully wiped out. When water drops is frozen on the surface of the piston rod, the seal may be broken.

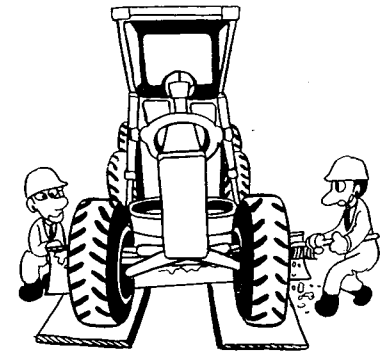
- When washing the machine, be careful not to throw water on the alternator and breathers.

- 2) Drain water collected in air tank and fuel system so that such water may be frozen at night.



(In a machine equipped with automatic drain)

Depress the brake pedal to purge the air out of the air system. The brake pedal may be depressed and released several times to completely purge the air.

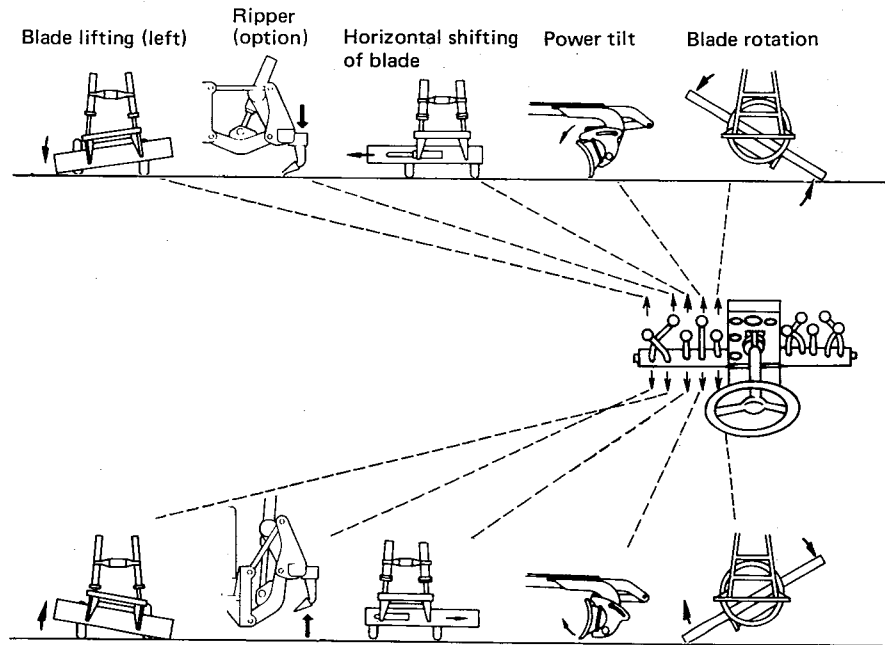


OPERATING OF WORK EQUIPMENT

OPERATION METHOD OF THE ACTUATION LEVER

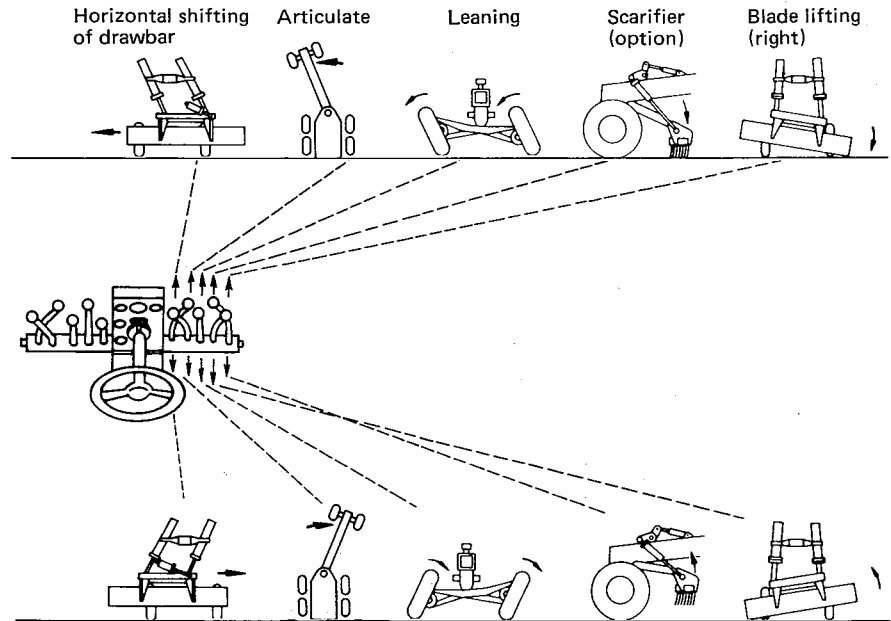
There are provided ten actuation levers, which are operated as are indicated in the following figures.

Left-side Control Lever



Right-side Control Lever

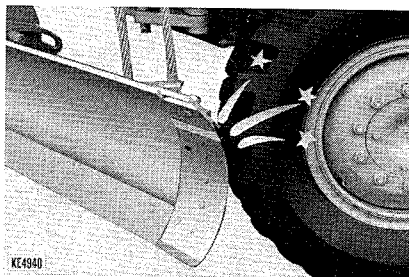
★ When operating the work equipment control lever, sufficient attention is required for the movement of the work equipment and its movement range must be limited, as the work equipment or the hydraulic cylinder possibly hit against parts, damaging them.



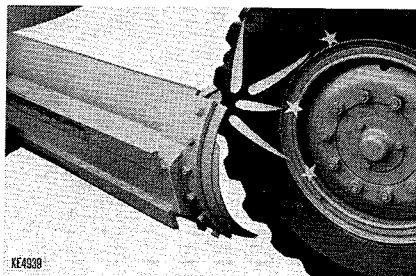
CAUTIONS IN OPERATION OF WORK EQUIPMENT

- When the work equipment is operated, special attention should be given to contacts at the following parts.

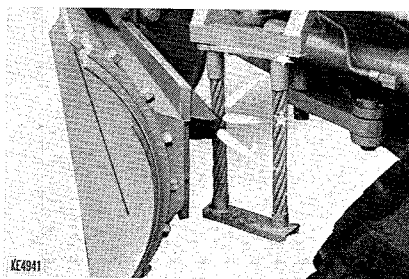
Rear wheel and blade



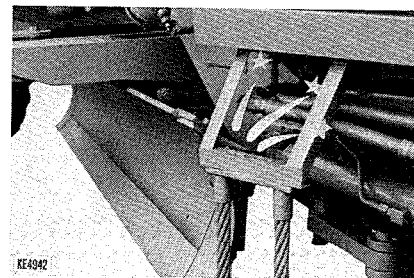
Front wheel and blade



Blade and step



Blade and frame



ARTICULATED OPERATIONS

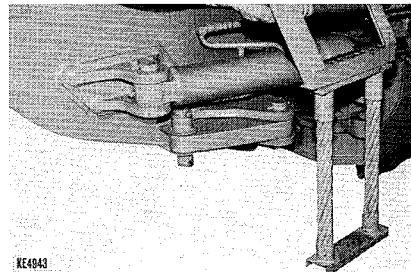
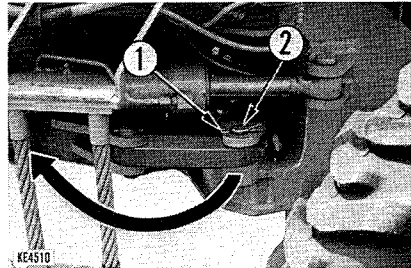
When performing operations with the machine articulated, remove the lock link on the left side of the machine. Then operate the articulation control lever to adjust the angle of articulation.

The machine can be articulated 25° to both right and left, giving a minimum turning radius of 6.7 m.

To remove the lock link pull out snap pin (1) and pin (2).

Turn link to the front and secure the lock link to the front bracket with pin (2) and snap pin (1).

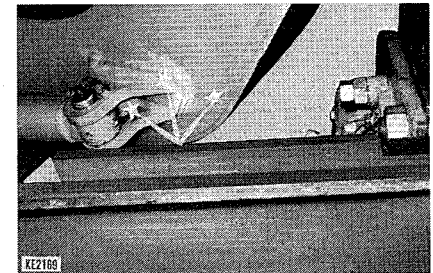
! For normal traveling operations, do not remove the lock link.



PRECAUTIONS WHEN USING ARTICULATION

If the machine is articulated when in the travel posture, the blade will interfere with rear frame.

This is dangerous, so when using the articulation, lower the blade until it goes under the rear frame, or set the blade to a suitable propulsion angle.

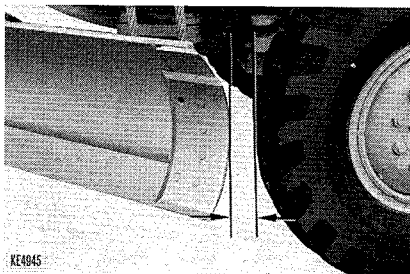
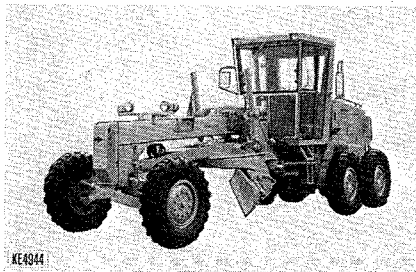


POSITION OF BLADE WHEN TRAVELING

When traveling, set the blade at the minimum propulsion angle and raise the blade fully.

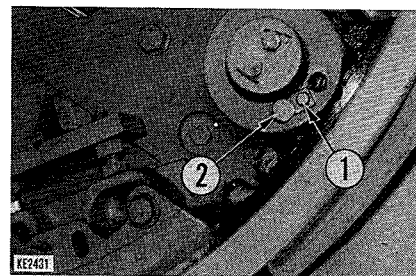
- ★ If the machine is articulated with the blade at the minimum propulsion angle, the blade will damage step.

Be particularly careful of the clearance between the blade and rear wheel when traveling on curves.



SAFETY DEVICE OF BLADE

A shear pin (2) is provided on the CIRCLE to prevent the blade from unexpected failure, because of abnormal impact load placed on the blade edge during operation. If the shear pin is broken during operation, remove the bolt (1) and lock plate and pull out the shear pin to replace by new one.



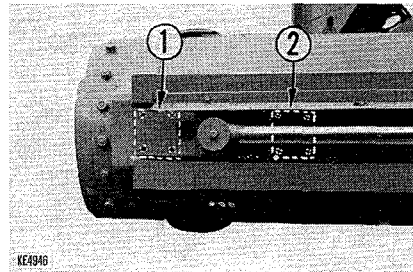
ADJUSTMENT IN SHIFTING OF WORK ATTACHMENT

It is essential to shift the work attachment to an optimum position for each work, to allow high job efficiency.

BLADE PROJECTION

The degree of projection is controllable by the control lever during operation. If further projection is needed, stop the grader for a while and change the installing position of the blade horizontal shifting cylinder piston rod, as follows.

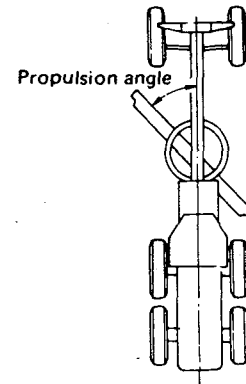
- Projection to right Position (1)
- Projection to left Position (2)
- ★ When the installing position of a piston rod is changed, relocate blade rod cover (3).



PROPULSION ANGLE OF BLADE

Angle of blade and body center line is called the blade propulsion angle.

In the normal scraping work, set the angle at 60°, more or less. Set at a lesser angle when the scraping resistance is great, or when the soil is hard, or when the soil in front of the blade is difficult to carry or throw to the side.

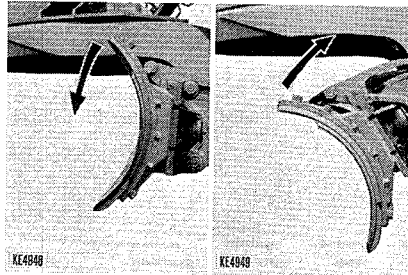
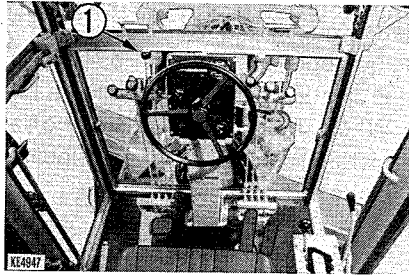


ADJUSTMENT OF BLADE CUTTING ANGLE

In hard soil cutting, it is advisable to lean the blade forward. As the soil becomes softer, lean the blade more backward. This operation will improve job efficiency.

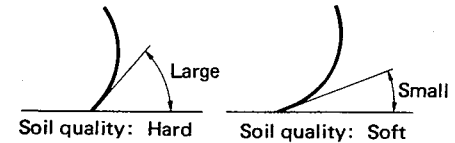
It is essential to adjust the blade cutting angle, depending on the soil condition.

By operating the control lever (1) for power tilt blade, the blade cutting angle can be changed to the desired position. The range through which the blade cutting angle can be adjusted is 24° to 71° . This range is stepless, so any angle within the range can be chosen freely.



★ Installation of this power tilt blade gives the following advantages.

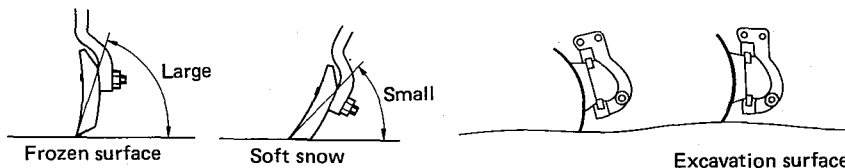
- 1) Optimum blade cutting angle can be obtained by operating the control lever for soil quality.



2) Since the cutting edge can be set to the desirable angle, a powerful breaking is available to cut the frozen surface during snow removal.

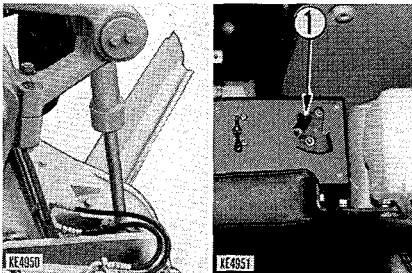
3) If the blade is operated with the hydraulic tip control, the distance between the cutting edge and the excavation surface changes. This means that fine adjustment of the excavation surface is possible.

4) In the low-banking position when raising the dirt and snow, the optimum blade cutting angle can be selected to increase operating efficiency.

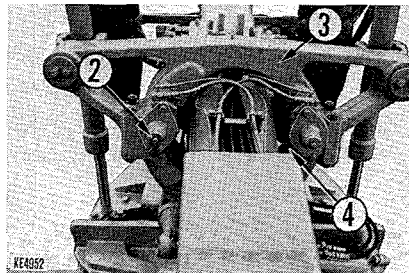


BANK-CUTTING POSTURE (RIGHT SIDE)

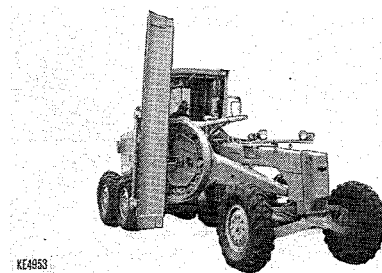
1. Set the blade at the thrust angle shown in the photo, protrude the blade and drawbar fully to the right, and bring the blade into contact with the ground.
 2. Then, throw lifter lock release lever (1) at the operator's seat inward after removing the stopper.
- ★ If the pin cannot be removed because of interference with the lifter (3), operate the blade lift cylinders as necessary.



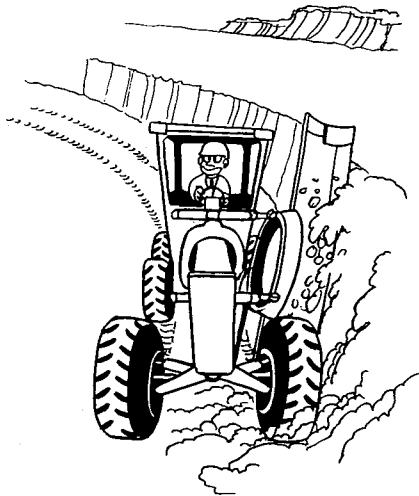
3. Extend the right blade cylinder and retract the left to turn lifter (3). When pin (2) approaches guide hole (4), return lever (1) to an intermediate position and gradually turn the lifter until pin (2) is inserted. After the pin is inserted, throw lever (1) outward.




4. Retract the right-hand lift cylinder and protrude the left-hand cylinder. Repeat this several times so that the circle is rotated with the blade raised on the right-hand side, and desired bank-cut posture can be attained.
- ★ When bringing the blade into bank-cut posture, be careful not to clash the blade against various portions of the machine.



- ★ When bringing the blade into bank-cut posture on the left-side of the machine, change every “left-hand” and “right-hand” in the above mentioned description with each other.



- ★ Cutting edge of the blade may break pavement if the blade is brought into bank-cut posture on the roadway. Cover the pavement with iron plate at the portion with which the blade cutting edge may come into collision.
- ★ Relocating the blade side-shift cylinder piston rod mounting position to the right (when right-hand bank cutting is made) or to the left (when left-hand bank cutting is made) will improve bank cutting efficiency. (See section on **BLADE PROJECTION.**)

 **Do not throw the lifter lock release lever inward unless the blade is in contact with the ground.**

SHOULDER REACH POSTURE (RIGHT SIDE)

- Rotate the lifter in a similar manner to the bank cutting posture, and lock it using the bank control lock pin.
 - Rotate the circle to the desired position.
- ★ Put the machine in the left hand side shoulder reach posture using the same procedure as the above.
 - ★ When increasing the size of the shoulder reach, change the mounting position of the piston rod of the blade horizontal feed cylinder. (See section on **BLADE PROJECTION.**)

ADJUSTMENT OF SCARIFIER (OPTION)

a. ADJUSTMENT OF CUTTING ANGLE

As the soil becomes harder, a wider cutting angle increases job efficiency.

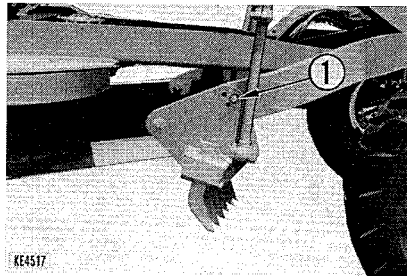
Adjustment

Remove the bolt (1) and select a bolt hole adequate to the cutting angle. The cutting angle is adjustable from 60°, 66° (standard) to 72°.

When digging angle is set to 60°, all teeth contact ground simultaneously. (This setting is useful for snow compaction work.)

When set to 66°, approx. 110 mm of digging depth is obtained.

When set to 72°, all teeth become horizontal at approx. 213 mm of digging depth.

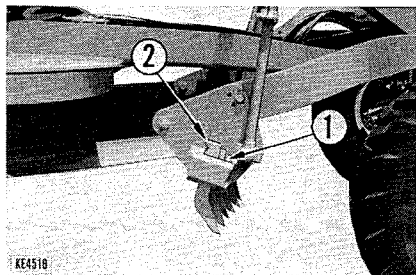


b. ADJUSTMENT OF CUTTING DEPTH

The cutting depth is adjustable with the following two portions. Select an adequate cutting depth corresponding to the job.

Adjustment with Tooth

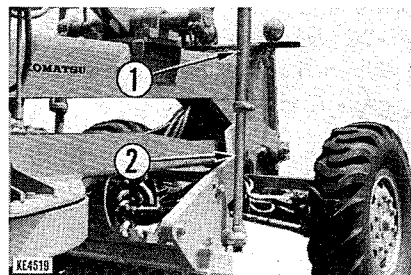
Remove the cotter pin, pull the wedge (1) and change the notch of the tooth (2).



Adjustment with Rod

Remove the lock pin (1) and shift the rod (2) to a desired hole position.

The standard digging depth can be obtained at the center hole among the three holes.



- ★ When some difficulty is found to protrude the rod, plate a thick board on the scarifier body and press the board with the drawbar. When pressing the board, keep the workers away from the scarifier body to assure safety even if falling of the scarifier body results from sudden protrusion of the rod.

To retract the rod, extend the scarifier cylinder piston rod.

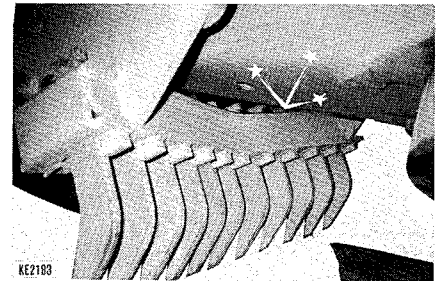
**c. ADJUSTMENT OF SCARIFIER
NECESSARY FOR ROTATING
THE BLADE**

The following adjustment of the scarifier, if equipped, permits the circle to bring the blade into a complete turn without interference with the scarifier:

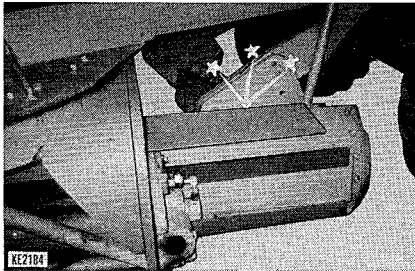
- 1) Remove wedges and teeth from the scarifier.
 - 2) Retract the rod.
 - 3) Remove cutting angle adjustment bolt and reset the bolt hole adequate to the maximum cutting angle.
 - 4) Fully raise the scarifier.
 - 5) Now, the blade can be rotated 180° degrees to meet the requirement of reverse-travel operation of the machine. When recovering the forward-travel operation of the machine, rotate the blade 180° from this position.
- ★ When digging the blade into the ground, lower the scarifier.

**d. PRECAUTIONS OF SCARIFIER
OPERATION**

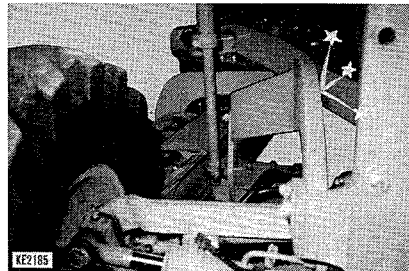
- When the machine body is raised by using the blade as a jack, while the scarifier is left lifted to the top position, the drawbar will come into collision with the scarifier. This will cause damage to the drawbar.



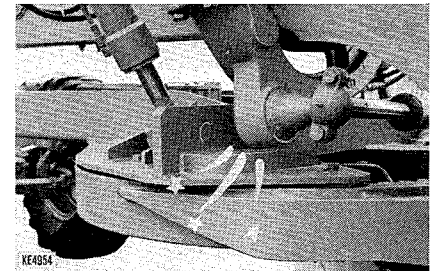
- When turning the blade, with it several cm off the ground, the blade may touch the scarifier. This may damage the upper part of the blade. If the blade is retracted within the width of the grader, the upper part of the blade will touch the scarifier, when lowering the scarifier. This may damage the upper part of the blade.



- When the blade is positioned in the bank cutting position, with the scarifier lifted, the scarifier sweeping board may touch the drawbar. This may damage the drawbar and scarifier.

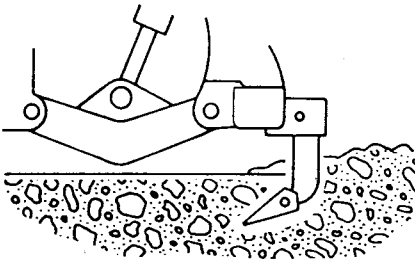


- Side-shifting of the drawbar, with the blade left lifted to the top position, will cause a collision of the drawbar stopper with the lifter bottom. This will cause damage to the lifter.



RIPPER WORK (Option)

● Ripping Hard Ground

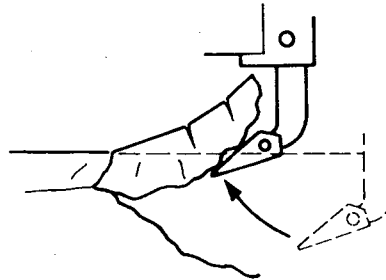


Machine speed: 2 to 5.5 km/h

Number of shanks

- Very hard ground: 1
- Ordinary ground: 3
- Soft ground: 7

● Ripping pavement



After piercing the ground with the shank, lift the ripper. Carefully prevent tires from slipping.

Ripping stones is possible in the same way.

● Heavy-duty cutting

Since the load applied at the ripper point is large, heavy-duty cutting that cannot be done by a scarifier is possible.

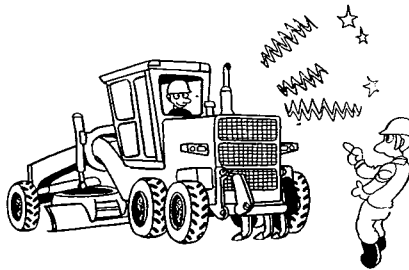
● Ripper point types and operation

Long points and short points are available. Use them selectively according to the job to be done.

- Long point:
 - For light-duty jobs
 - Wear margin is large.
- Short point:
 - For heavy-duty jobs
 - Wear margin is small.

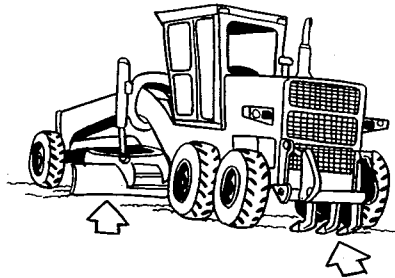
! CAUTIONS FOR RIPPER WORK

- When piercing the ground with the shank, pierce gradually while traveling forward.
- If the shank strikes directly against a stone or rock after an approach run, it may be damaged.
- Do not slip tires during operation. If tires slip, raise shanks until slipping stops.



- When lifting or lowering the ripper, sound the horn to warn people.

- Turning the machine with the shank in the ground will damage the ripper.
- Before starting the engine, make sure that there are no damaged parts and oil leakage.



- When stopping the machine, lower the ripper point to the ground.
- When repairing or disassembling the ripper, lower the ripper point to the ground.

! CAUTIONS FOR AFTER RIPPING


- Non-greased bushings are used at the pins of the top and bottom links of the ripper. Since the life of bushings is shortened if dirt gets inside, clean the dirt off the pins with water.
- Inspect if there is any oil leakage or other damage.
- When storing the ripper, place it on concrete where it can not be exposed to rainwater. Leaving the ripper on bare ground will cause corrosion and shorten the bushing life.

REVERSING AND REPLACEMENT OF CUTTING EDGE AND END BIT

Replace cutting edges and end bits before their blade's end faces wear out. When wear is extended to the mounting faces, their repair must be done prior to replacing.

TURNING AND REPLACING

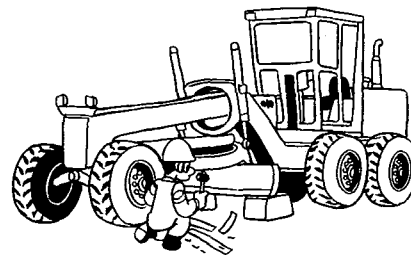
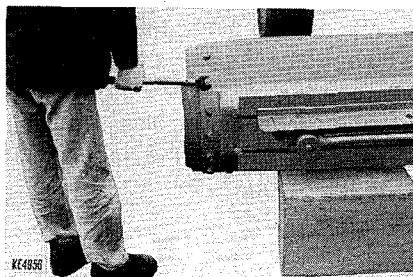
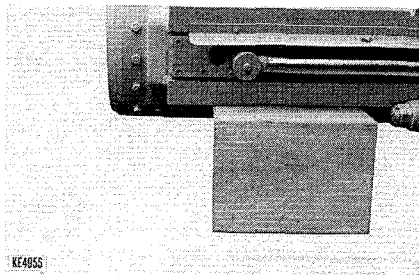
1. Lift the blade to a suitable height and put a block underneath the blade rail to prevent its falling.

 **Do not raise the blade unnecessarily high.**

Be sure not to put your body underneath the blade when blocking it.

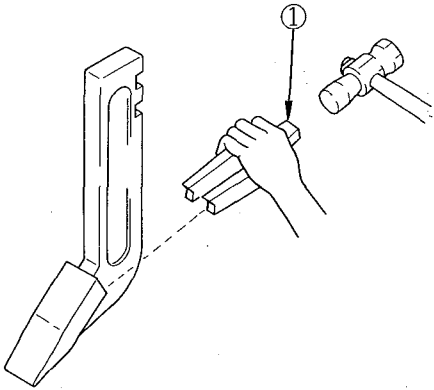
2. Clean the mounting face after detaching the cutting edge and the end bits.
3. Mount the cutting edges after inverting it, or replacing it with a new one.
4. Mount the end bits after inverting and switching right for left, or replacing with new ones.

- ★ The tightening torque for the mounting nuts is 23 to 30 kgm.
- ★ Tighten the nuts again after several hour's operation.
- ★ If both ends of the cutting edge and side edges are worn out, replace them with new ones.



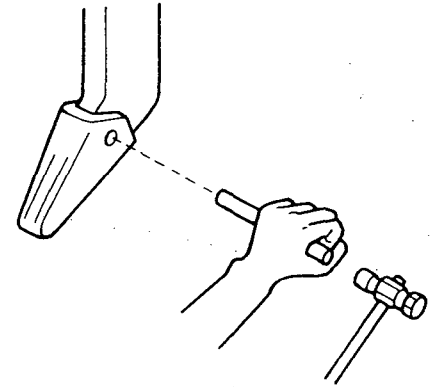
REPLACING SCARIFIER TEETH (OPTION)

1. Attach tool (1) to a corner of the tooth and take the tooth out of place by hitting it with a hammer.
2. Force a new tooth into place and lower the scarifier to the ground. The tooth will fit snugly because it is tapered.



REPLACING RIPPER POINT (OPTION)

1. Drive out the pin with a bar and hammer, and remove the point.
2. Fit a new point to the shank and drive in the pin. The pin can be reused.

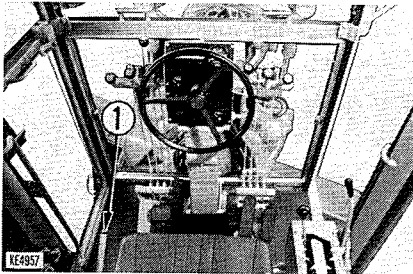


CHANGING TIRES

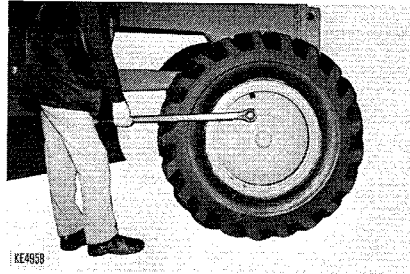
HOW TO CHANGE TIRES:

1. Front wheel

i) Place the work attachment on a ground and pull fully the parking brake lever (1).



ii) Then, attach the socket wrench (accessory machine tool) to the hub nuts and loosen all the hub nuts by 3/4 to 1 turn.

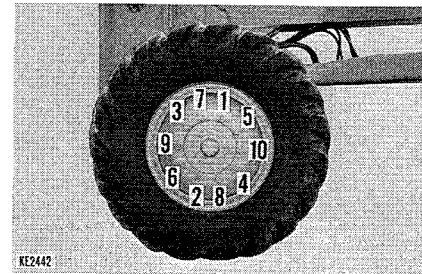


iii) Depress the lift cylinder. If the front tires are lifted, lock the control lever, remove the hub nuts and change all the tires.

iv) In installing new tires, tighten lightly with the tires lifted and tighten the tires to the specified torque in the order shown in the photos, after placing the tires on the ground. The specified tightening torque is 45 to 55 kgm.



Whenever the front tires are raised off the ground, support the front axle center frame on the stand to assure safety.



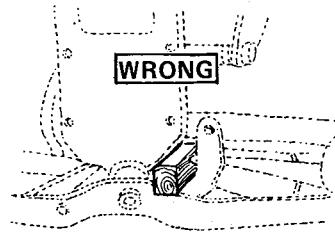
2. Rear wheel

- i) Repeat the front wheel change procedures i) and ii).
- ii) Depress fully the right and left lift cylinders and the front tires are lifted about 50 cm off ground. Retract the lift cylinder on the side where the tire is not removed, to lift the rear wheels.
- iii) Install new tires according to the procedure iv) of the front wheel tire change.

The tightening torque is 45 to 55 kgm.

! Whenever the rear wheels are raised off the ground, stably support the tandem on the block to assure safety.

! When a front tire punctures, do not attempt to travel the machine by temporarily applying a pad to the swing stopper. If it is necessary, travel the machine slowly only within the minimum necessary distance. In this case, be sure to securely keep the punctured tire off the ground with chains, etc.



Swing stopper

HOW TO USE LEANING STOPPER

When the leaning pipe is damaged, temporarily prevent the front wheels from leaning so that the machine can be successfully self-propelled to the nearest repair shop.

How to apply the leaning stopper

Fix the leaning rod to the front axle using the bolts provided in the tool box.

! If the machine is travelled with the leaning cylinder piston rod fluctuating or the front wheels leaning on one side, because of damaged leaning piping, dangerously unstable steering and excessively worn tires will result. Have the faulty leaning pipe repaired by mechanics quickly.

DRIVING ALONG ROAD

In addition to strict observance of traffic laws and rules concerned, keep the following in mind:

To relieve operator's fatigue, take a rest by 30 minutes – 1 hour – 30 minutes mode, every 80 kilometers or every 2 hours of traveling (whichever term expires earlier).

HANDLING OF BATTERY

PRECAUTIONS FOR CHARGING BATTERY

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

REMOVAL AND INSTALLATION OF BATTERY

- When removing battery, first disconnect the cable 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

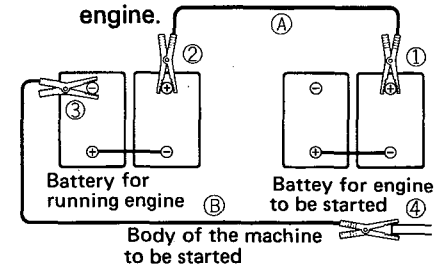
When starting up the engine with a booster cable, do as follows:

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 key 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 negative (-) terminal of the engine 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.

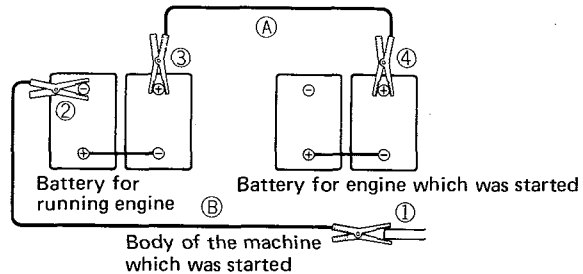
! Make sure that the booster cable connections are correct. Connect the booster cable to the body as far as possible from the battery.

3. Starting 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.




TRANSPORTATION

In addition to strict observance of traffic laws and rules concerned, it is desirable to provide a special platform for loading and unloading of the motor grader. If it is necessary to use a ramp when loading a motor grader on a trailer or unloading it from a trailer, observe the following instructions to assure safety:

1. Securely brake the trailer and chock trailer tires. Securely fix the ramp boards in place so that the center of motor grader being loaded coincides with the center line of the trailer.
- ★ Width, length and thickness of ramp boards must large enough to assure safe loading and unloading of the motor grader.
2. Slowly travel the motor grader on the ramp straight.

 **Never attempt to change the direction of travel on the ramp. If it is necessary to change the direction of travel, once return the machine to the original position.**

3. Properly load the motor grader on the trailer at the specified position. To prevent the grader on the trailer from moving back and forth during transportation, apply a chock to front and rear of each wheel and fix the motor grader with chains and wire ropes. Pay special care to prevent the motor grader from slipping sideward.
4. Rest the work equipment on the trailer deck and observe the following:
 - Pull the parking brake lever.
 - Place the gear shift lever in the neutral position and apply safety lock.

- Place work equipment control lever in hold position.
 - Pull the starting switch key out.
 - ★ Determine the optimum transportation route, taking width of road and permissible overhead clearance and weight limitation into consideration.
-  **Do not leave the front wheels raised off the trailer deck using the scarifier as a jack. The front wheels will fall gradually during transportation.**

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.
- Always stop the engine before cleaning the machine or adding fuel.
- 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, scarifier (option) and ripper (option) to the ground, and stop the engine; move the control levers to each position two or three time 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, scarifier (option) and ripper (option) to the ground and stop the engine. Return the gear shift lever to "N (neutral) position", apply the brake lock. When maintenance has to be carried out with the blade, scarifier (option) and ripper (option) 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.
- Flame should never be used instead of lamps. Never use a naked flame to check leaks or the level of oil, fuel, anti-freeze or electrolyte.
- 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.

PRECAUTIONS FOR MAINTENANCE

- When the work equipment is raised for inspection or repair, always place blocks underneath to prevent falling.
- When the machine is jacked up, always put chocks against the wheels on the opposite side. After jacking up, place blocks to prevent the machine from falling.
- Disassembly, repair and assembly of tires require special equipment and high skill. Always consult a specialized tire repair shop.
- Always lock the front and rear frames before inspecting and servicing the machine. (In articulate frame model)
- 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 it out.

MAINTENANCE TABLE

No.	ITEM	SERVICE	PAGE
CHECK BEFORE STARTING			
a	Oil and water leak	Check	33
b	Nuts and bolts	Check and retighten	33
c	Electric wiring	Check and retighten	33
d	Engine oil pan	Check and supply	34
e	Fuel tank	Drain water and sediment	34
f	Coolant	Check and supply	35
g	Fuel	Check and supply	35
h	Air tank	Drain water	36
i	Steering wheel play	Check and adjust	36
j	Braking ability	Check and adjust	36
k	Dust indicator	Check	37
l	Air pressure	Check	37
m	Parking brake lever	Check and adjust	37
n	Tire pressure	Check and adjust	38

No.	ITEM	SERVICE	PAGE
o	Lamps	Check	38
p	Rear view mirror (option)	Check	38
q	Horn	Check	38
r	Exhaust gas color	Check	38
s	Instruments	Check	38
t	Previous day's defects	Check	38
u	Seat belt (option)	Check	38
v	Door lock	Check	39
w	Wiper, window washer and defroster	Check	39
EVERY 50 HOURS SERVICE			
a	Lubricating		89
-1	Circle, pinion gear	Lubricate 2 points	89
-2	Blade guide rail	Lubricate	89

MAINTENANCE TABLE

No.	ITEM	SERVICE	PAGE
INITIAL 250 HOURS SERVICE			
a	Fuel filter	Replace cartridge	90
b	Engine oil pan and filter	Change oil and re replace cartridge	90
c	Transmission case and filter	Change oil and replace element	90
d	Final drive case	Change oil	90
e	Tandem drive case	Change oil	90
f	Circle reverse gear case	Change oil	90
g	Hydraulic tank and filter	Change oil and replace element	90
EVERY 250 HOURS SERVICE			
a	Lubricating		90
-1	Front axle center pin	Lubricate 1 point	90
-2	Leaning cylinder pin	Lubricate 2 points	90
-3	Leaning rod end	Lubricate 2 points	90
-4	Knuckle bracket king pin	Lubricate 6 points	91
-5	Tie rod	Lubricate 3 points	91
-6	Scarifier cylinder pin (option)	Lubricate 2 points	91

No.	ITEM	SERVICE	PAGE
-7	Scarifier ball joint (option)	Lubricate 4 points	91
-8	Drawbar ball joint	Lubricate 1 point	92
-9	Blade lift cylinder yoke	Lubricate 6 points	92
-10	Blade lift cylinder ball joint	Lubricate 2 points	92
-11	Bank control guide	Lubricate 3 points	92
-12	Drawbar side shift cylinder ball joint	Lubricate 2 points	92
-13	Steering cylinder pin	Lubricate 5 points	93
-14	Articulation cylinder pin	Lubricate 4 points	93
-15	Articulation center pin	Lubricate 2 points	93
-16	Articulation lock pin	Apply grease	93
b	Check oil level		94
-1	Transmission case	Check and supply	94
-2	Tandem drive case	Check and supply	94
-3	Final drive case	Check and supply	94
-4	Circle reverse gear case	Check and supply	95
-5	Hydraulic tank	Check and supply	95
c	Fuel tank bottom strainer	Clean	96

MAINTENANCE TABLE

No.	ITEM	SERVICE	PAGE
d	Fan belt tension	Check and adjust	96
e	Ball joint clearance	Check	97
f	Battery electrolyte level	Check	97
g	Parking brake lever	Check travel	98
h	Pitman arm ball joint	Check clearance	99
i	Wheel hub nut	Check and retighten	100
j	Wheel brake	Check and adjust	101
EVERY 500 HOURS SERVICE			
a	Fuel filter	Replace cartridge	102
b	Engine oil pan and filter	Change oil and replace cartridge	103
c	Corrosion resistor	Replace cartridge	104
d	Radiator fin	Check and clean	105
e	Transmission oil filter	Replace element	105
f	Circle guide	Check clearance	106

No.	ITEM	SERVICE	PAGE
EVERY 1000 HOURS SERVICE			
a	Lubricating		108
-1	Drive shaft	Lubricate 2 points	108
b	Change oil		108
-1	Final drive case	Change oil	108
-2	Circle reverse gear case	Change oil	109
c	Drawbar front ball joint	Check looseness	109
d	Hydraulic tank and filter	Change oil and replace element	110
e	Transmission case	Change oil and clean strainer	111
f	Toe-in	Check and adjust	112
g	Front wheel bearing	Check and adjust	115
EVERY 2000 HOURS SERVICE			
a	Front wheel bearing	Change grease	116
b	Tandem drive case	Change oil	119
c	Alternator and starting motor	Check	119
d	Engine valve clearance	Check and adjust	119

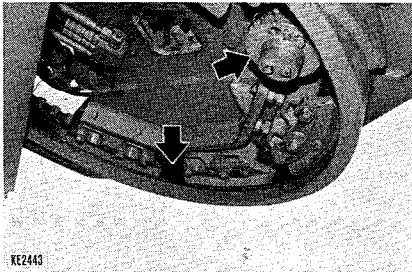
MAINTENANCE TABLE

No.	ITEM	SERVICE	PAGE
(EVERY 2000 HOURS SERVICE)			
e	Engine breather	Clean element	120
f	Engine vibration damper	Check	120
EVERY 4000 HOURS SERVICE			
a	Water pump	Check	120
WHEN REQUIRED			
a	Air cleaner element	Check, clean or re- place when required	121
b	Coolant	Change twice a year	124
c	Electrical intake air heater	Check	125
d	Engine breather hose	Clean	126

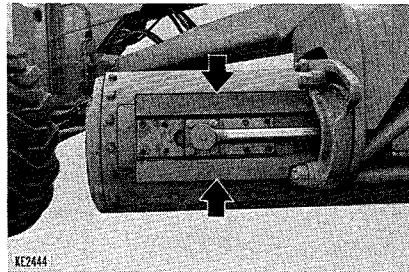
EVERY 50 HOURS SERVICE

a. LUBRICATING

1. Circle, pinion gear (2 points)
Apply grease all around the circle part.



2. Blade guide rail
Apply grease all over the guide rail.



INITIAL 250 HOURS SERVICE
EVERY 250 HOURS SERVICE

INITIAL 250 HOURS SERVICE

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

- a. FUEL FILTER
- b. ENGINE OIL PAN AND FILTER
- c. TRANSMISSION CASE AND FILTER
- d. FINAL DRIVE CASE
- e. TANDEM DRIVE CASE
- f. CIRCLE REVERSE GEAR CASE
- g. HYDRAULIC TANK AND FILTER

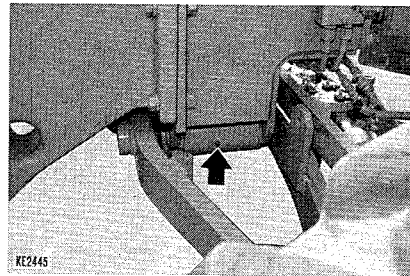
For details of the method of replacing or maintaining, see the section on EVERY 500 HOURS, 1000 HOURS AND 2000 HOURS SERVICE.

EVERY 250 HOURS SERVICE

a. LUBRICATING

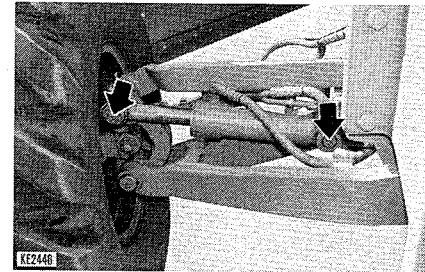
Apply grease to the grease fittings shown by arrows.

1. Front axle center pin (1 point)

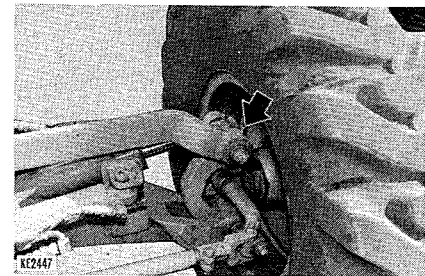


★ Maintenance for every 50 hours should be carried out at the same time.

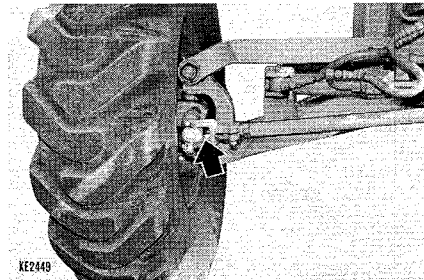
2. Leaning cylinder pin (2 points)



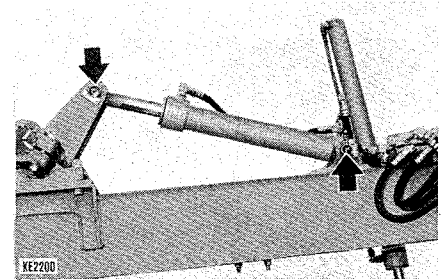
3. Leaning rod end (2 points)



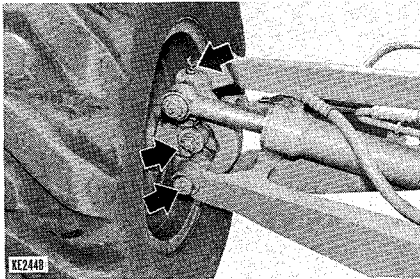
5. Tie rod (3 points)



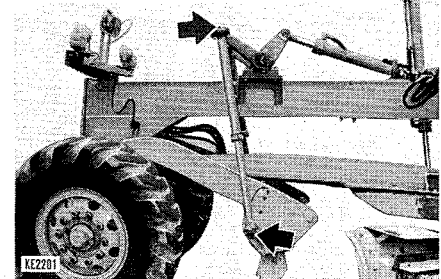
6. Scarifier cylinder pin (2 points) (option)



4. Knuckle bracket king pin (6 points)

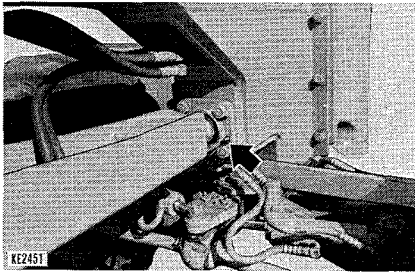


7. Scarifier ball joint (4 points) (option)

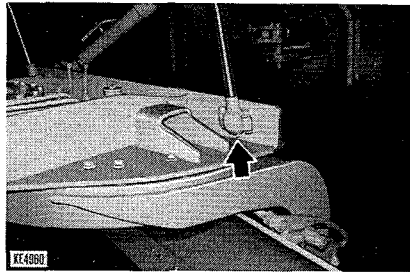


EVERY 250 HOURS SERVICE

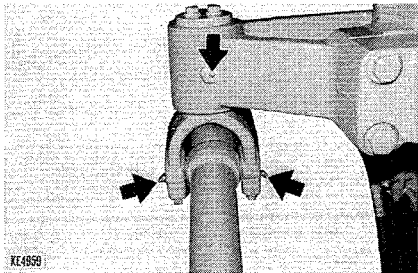
8. Drawbar ball joint (1 point)



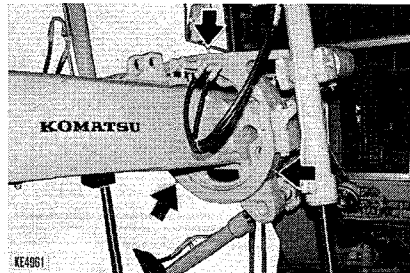
10. Blade lift cylinder ball joint (2 points)



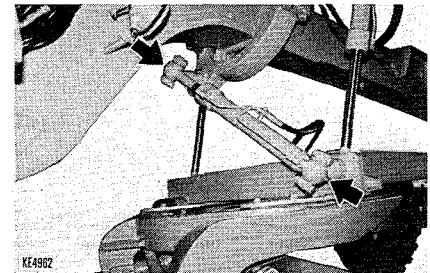
9. Blade lift cylinder yoke (6 points)



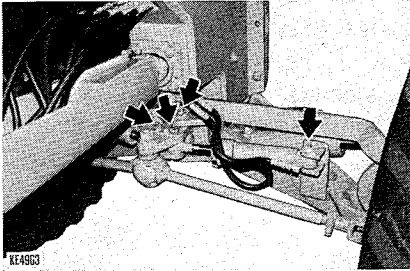
11. Bank control guide (3 points)



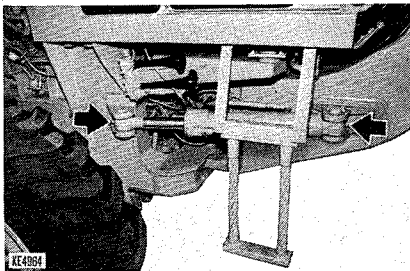
12. Drawbar side shift cylinder ball joint (2 points)



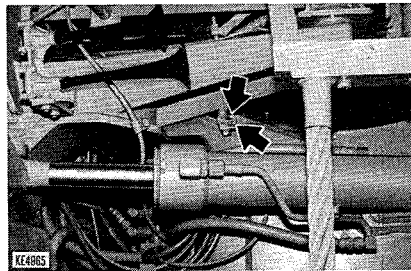
13. Steering cylinder pin
(5 points)



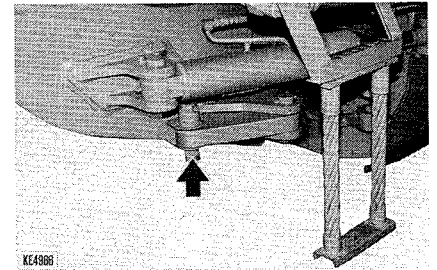
14. Articulation cylinder pin
(4 points)



15. Articulation center pin
(2 points)



16. Articulation lock pin
(Apply grease)



b. CHECK AND CORRECT OIL LEVEL

1. Transmission case

Check the oil level with the oil level gauge (G). If necessary, add oil through filler (F).

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

2. Tandem drive case

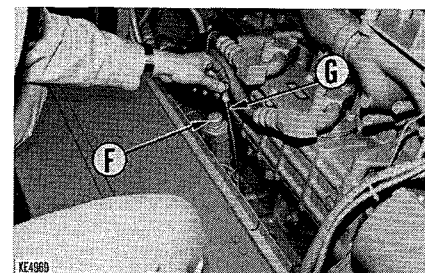
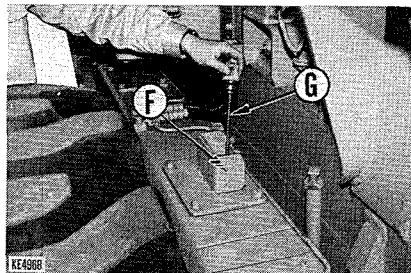
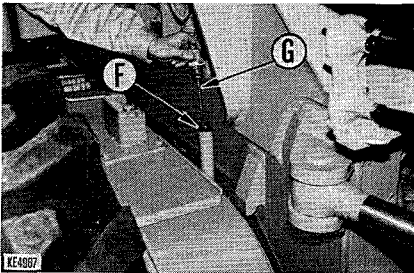
Check the oil level with the oil level gauge (G). If necessary, add oil through filler (F).

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

3. Final drive case

Check the oil level with the oil level gauge (G). If necessary, add oil through filler (F).

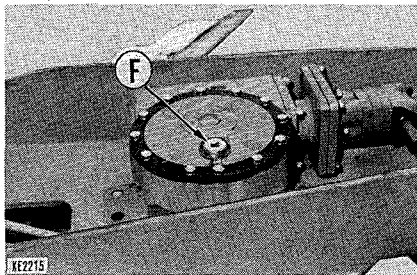
- ★ The type of lubricant used depends on the ambient temperature. Select according to the table "FUEL, COOLANT AND LUBRICANTS".



4. Circle reverse gear case

Remove plug (F). Check if the oil level is at the gear upper face. Add the gear oil through filler (F), if necessary.

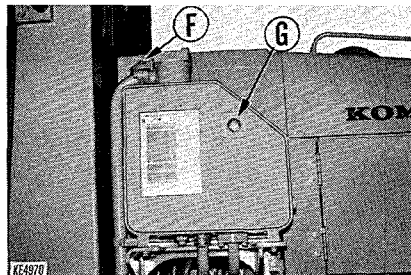
- ★ The type of lubricant used depends on the ambient temperature. Select according to the table "FUEL, COOLANT AND LUBRICANTS".



5. Hydraulic tank

Check the oil level with sight gauge (G). Add engine oil through filler (F), if necessary.

- ★ Check the oil level while the blade is on the ground.
- ★ The type of lubricant used depends on the ambient temperature. Select according to the table "FUEL, COOLANT AND LUBRICANTS".

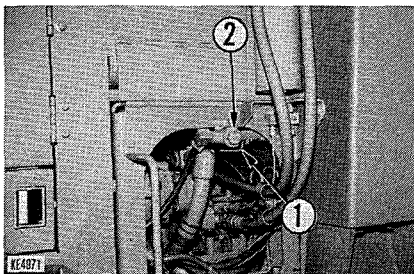


⚠ When oil temperature is high, do not remove cap. Hot oil sometimes spouts out. When removing the cap, turn it slowly to relieve inner pressure.

c. FUEL TANK BOTTOM STRAINER

Close fuel feed valve (1) to stop the fuel. After removing bolt (2), take out the strainer and clean it.

- ★ When the strainer is damaged, replace it with new one.

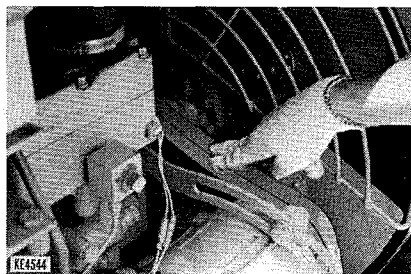


d. FAN BELT

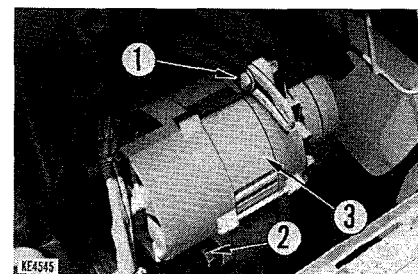
Push the belt at the middle between the fan pulley and the alternator pulley (Approx. 6 kg). If the belt slack is about 10 mm, the belt is considered to have the correct tension.

To adjust, loosen bolt (1) and nut (2) to shift alternator (3).

- ★ Check for the damage to each pulley, wear of the V-groove, and wear of V-belt. In particular, check if the V-belt contact with the bottom of the V-groove.



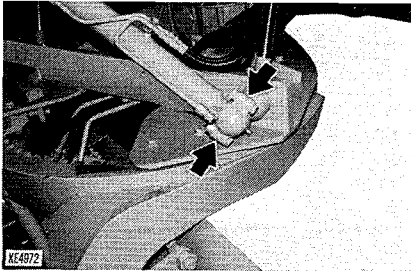
- ★ If the belt is so over-extended that no adjustment allowance exists, or if cuttings or cracks are found, replace both belts.
- ★ When adjusting the V-belt, do not attempt to push the alternator directly with a bar or the like, but use a wood pad to prevent damage to the core.



e. BALL JOINT CLEARANCE

Remove all shims. Tighten the cap in such a manner that the clearances (shown in the picture) on both sides are the same. Measure the clearance with a thickness gauge, and place the shims which are thicker than the measured clearance by one shim. Then, retighten the cap. One shim is equal to 0.2 mm thickness.

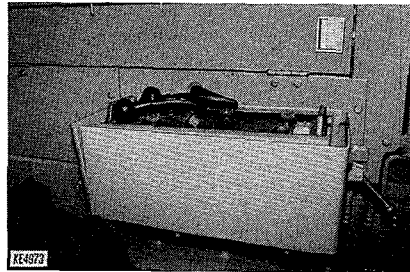
★ Take the same action described above on all ball joints in the work equipment linkage.



f. BATTERY ELECTROLYTE LEVEL

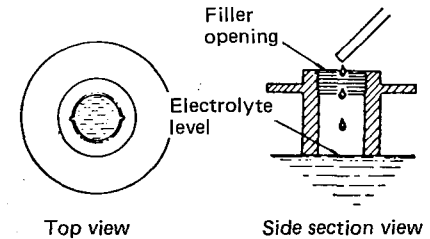
If the electrolyte level is below the prescribed level of 10 to 12 mm above the plate, add distilled water. Should any of the acid be split, have it replenished by the nearest battery shop with acid of the correct specific gravity. Clean the air hole of battery cap along with the level check.

★ Never use metal funnel for electrolyte supply.



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

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



g. PARKING BRAKE LEVER

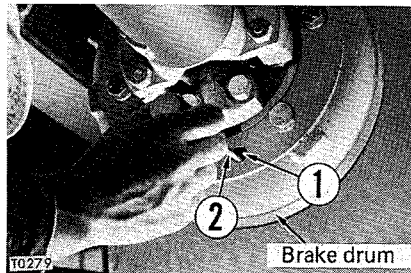
Check

If the normal braking grip is effective by pulling the brake lever 2 to 3 ratchets from the brake release position, the brake lever travel is considered normal.

If six or more ratchets are counted before the parking brake comes into effect, perform the following adjustment.

Adjustment

- 1) Move the machine as necessary until adjustment hole (1) is located to approx. 15 mm right side from the center bottom of the brake drum. The brake drum rotates one complete turn with every 29 cm of movement of the machine.
- 2) Insert screwdriver (2) into the adjustment hole. Using the driver blade, rotate the adjusting screw in the "shoe expanding" direction (lower the screwdriver grip) to bring the shoe into close contact with the drum. Then, back the adjustment screw eight clicks. (0.23 mm of shoe clearance will result.)
- 3) Then, adjust the yoke nut on each end of the cable until proper level travel (135 mm) can be obtained.



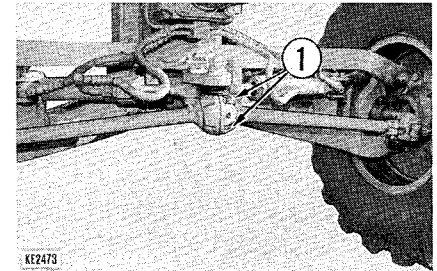
- ★ After adjustment, try traveling the machine for about 500 m and confirm that the brake drum is free from trailing. (If some trailing exists, the brake drum will become hotter than the drive shaft next to the drum.)
- ★ As the parking brake is independent of the wheel brakes and used only when the machine is at a stop, usually brake lining will not be subjected to any wear.

- ★ Wear of parking brake, if any, is caused by failure of releasing of the parking brake lever. Most of wear will be accompanied with burning of the lining and discoloration of the drum.
As burnt brake lining causes deterioration of braking effect, remove the drum and clean the burnt lining surface with sandpaper.
- ★ Keep the lining surface free from oil and grease. If soiled with oil or grease, wipe off it and polish the surface with sandpaper.

h. PITMAN ARM BALL JOINT CLEARANCE

Remove bolt (1). Adjust by reducing the shim thickness so that the tie rod can move smoothly without clearance axially.

- ★ Thickness per shim is equal to 0.1 mm and 0.2 mm.
- ★ After this adjustment, adjust the toe-in. (See the item EVERY 1000 HOURS SERVICE)



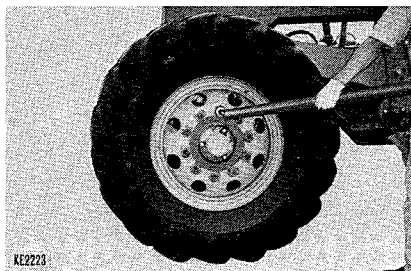
i. WHEEL HUB NUT

Loose wheel hub nuts will result in shortened life of tires or troubles. Carefully check loosening of the nuts.

Check

- i) Place the work attachment on a ground and pull the parking brake lever to its limit.
- ii) Place the accessory machine tools (socket wrench and bar) as indicated in the photo below and turn the bar in a tightening direction. The tightening torque is 45 to 55 kgm. Depress the bar end with full force.


- ★ Check all the nuts for loosening. Also, check the rim for damage. If a hub bolt is broken, replace the total unit of the wheel stud.

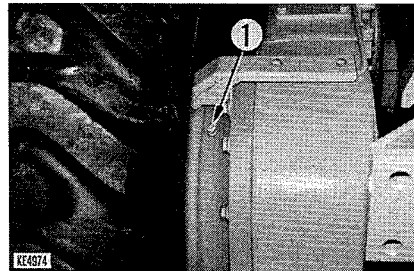


j. WHEEL BRAKE

Inspection

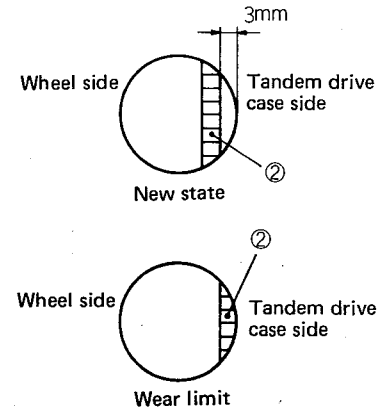
1. Remove one of the tandem wheels. If the wheel is not worn much, it is not necessary to inspect the three remaining wheels. If it is worn, inspect all the wheels.
2. Remove cage inspection plug (1).
3. Depress the brake pedal to keep the brake applied.

 **Since a small amount of oil may come out from the inspection plug hole, do not peep through the plug wheel while braking.**



4. Carry out inspection as illustrated below.

If the gap disappears between the inspection hole edge and separator plate 2, ask a Komatsu distributor to replace the disc.



EVERY 500 HOURS SERVICE

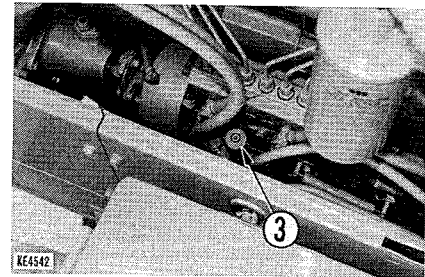
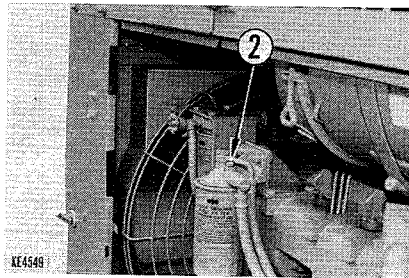
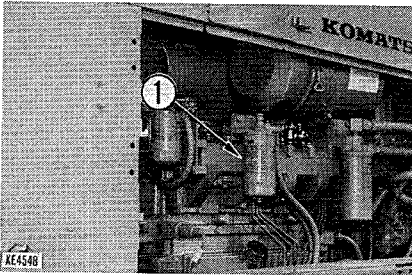
★ Maintenance for every 50 and 250 hours should be carried out at the same time.

a. FUEL FILTER

1. Using the tools provided remove cartridge (1) by turning it counterclockwise.
 2. Fill the new cartridge with fuel and refit it after applying a dab of oil to the gasket face.
- ★ To refit the cartridge, place the gasket face in contact with the seal face of the filter stand, then screw up the cartridge 1/2 to 3/4 turn (be careful not to tighten it up excessively).

3. After replacing the cartridge, slacken off air vent plug (2).
4. Loosen feed pump knob (3) and move the pump up and down to draw off fuel until air ceases to come out of plug (2).
5. Tighten air vent plug (2), push feed pump knob (3) into place, and tighten it.

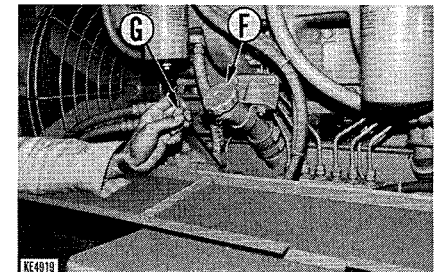
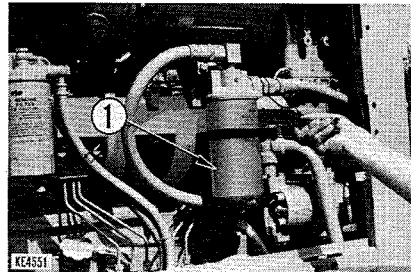
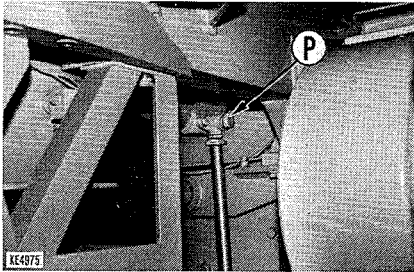
- ★ After replacing the cartridge, start up the engine and check the filter seal face for possible oil leakage.
- ★ Be sure to use a genuine Komatsu cartridge.



b. ENGINE OIL PAN AND FILTER

1. Loosen drain plug (P) to drain oil. After draining, tighten it.
2. Using a filter wrench, remove cartridge (1) of the engine oil filter by turning it counterclockwise.
3. Apply a dab of engine oil to the gasket of the new cartridge, and after the gasket contacts the seal face, tighten it up by hand 2/3 turn.
4. After replacing the cartridge, fill engine oil through oil filler (F). Then idle the engine for a while, and use dipstick (G) to check oil level.

- ★ Refill capacity: 24ℓ
- ★ The type of lubricant used depends on the ambient temperature. Select according to the table "FUEL, COOLANT AND LUBRICANTS".
- ★ Use a genuine Komatsu cartridge.
- ★ Change the engine oil every 6 months regardless of service hours.
- ★ Replace the present cartridge every 6 months, regardless of how many hours the machine has operated.



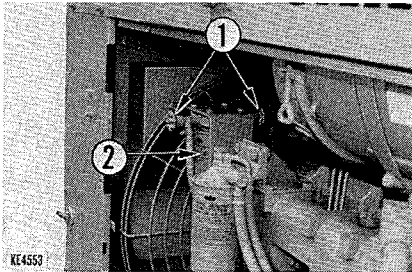
c. CORROSION RESISTOR

After screwing in the valves (1) (2 points) on the corrosion resistor (2) remove the cartridge by turning it counterclockwise and replace it with new one.

Turn the cartridge in until its sealing surface comes into contact with the head. Then, retighten the cartridge 1/2 to 3/4 turn.

After replacement, open the valves (1).

- ★ It is recommended Komatsu genuine cartridge are used.
- ★ Be careful not to screw in more than required.
- ★ When installing a new cartridge, coat the sealing surface with lubricating oil.



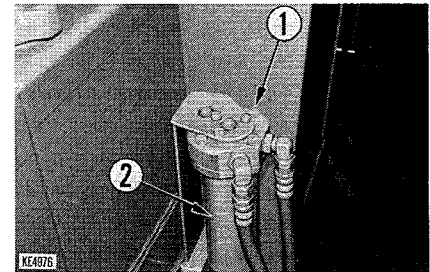
d. RADIATOR FIN

Dust, mud, or leaves sticking to, and blocking, the radiator are to be blown off by compressed air. Steam or water may be used instead of the compressed air.

- ★ Be careful not to bend the fin.
- ★ Check the rubber hose also. If any broken, or defective fixtures, or deteriorated parts are found, replace with new one. Check that the hose clamp is tight.

e. TRANSMISSION OIL FILTER

Remove bolts (1) (4 bolts on the outside) fastening the filter case; remove case. Remove the element and discard. Thoroughly clean the case (2) interior and removed parts. Install a new element.



f. CIRCLE GUIDE

Checking

With the blade raised from the ground, check the circle guide clearance at the portions (P) and (Q), using the feeler gauge.

Standard clearance at portion (P) is 1.5 ± 0.5 mm.


Standard clearance at portion (Q):

$$(Q)_F = 0 \text{ and } (Q)_C = 0.7 \text{ and } (Q)_R = 1.5 \text{ mm or } (Q)_F = (Q)_C = (Q)_R = 1 \text{ mm}$$

F: Front

C: Center

R: Rear

 Before starting the adjustment, confirm that there are gaps between the tooth crest of the circle gear and root of the circle pinion and between the tooth crest of the circle pinion and root of the circle gear. If there is no gap, replace the guide before starting the adjustment.

Adjustment

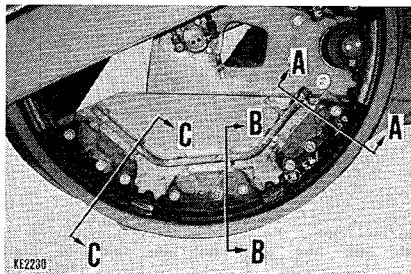
Rest the blade on the ground.

1. To adjust the clearance at portion (P), loosen bolt (1), (5) or (9) and adjust thickness of shims for circle guide (2), (6) or (10). Two kinds of shims different in thickness (1 mm and 0.5 mm) are provided.

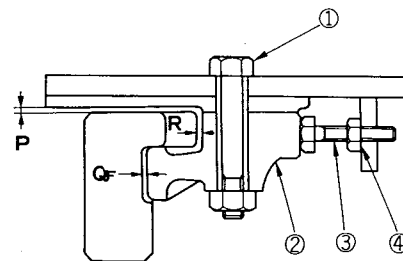
2. To adjust clearance $(Q)_F$, loosen bolt (1), and locknut (4). Turn in bolt (3) to push the circle guide (2) until clearance $(Q)_F$ becomes zero.

(Be sure to equally tighten the right and left bolts.)

3. With clearance $(Q)_F$ kept in zero tighten locknut (4) and bolt (1).



Section A – A



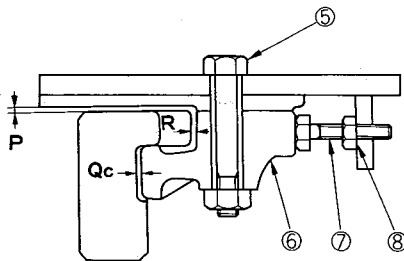
4. To adjust clearance (Q_C), loosen bolt (5) and locknut (8). Turn in bolt (7) to push circle guide (6) until the clearance (Q_C) becomes zero. (Be sure to equally tighten the right and left bolts.)
5. Back bolt (7) 1/4 rotation, and tighten locknut (8). Back circle guide (6) until it comes into contact with bolt (7) and tighten bolt (5).

6. To adjust clearance (Q_R), loosen bolt (9) and locknut (12). Turn in bolt (11) to push circle guide (10) until clearance (Q_R) becomes zero. (Be sure to equally tighten the right and left bolts.)
7. Back bolt (11) 1/2 rotation, and tighten locknut (12). Back circle guide (10) until it comes into contact with bolt (11) and tighten bolt (9).

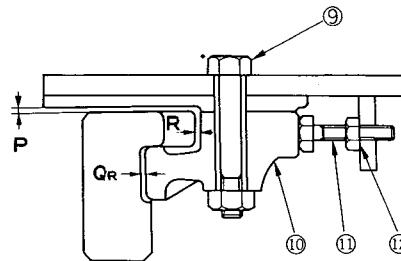
★ When either of the following conditions arises, replace the circle guide.

1. Clearance at portion (R) has decreased to zero.
2. Clearance between the circle tooth top and circle reverse pin gear tooth bottom land has decreased to zero or clearance between the circle tooth bottom land and the circle reverse pin gear tooth top has decreased to zero.

Section B – B



Section C – C



EVERY 1000 HOURS SERVICE

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

a. LUBRICATING

Apply grease to the grease fittings shown by arrows.

b. CHANGE OIL

1. Final drive case

After draining oil through drain plug holes (P), refill the gear oil through filler (F) up to the prescribed level.

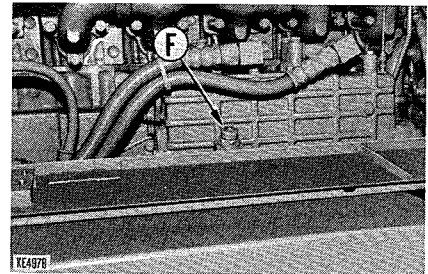
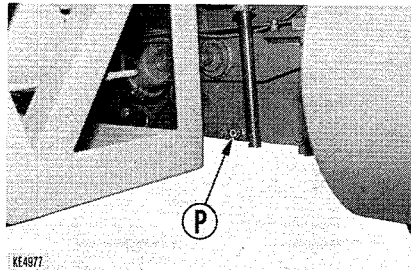
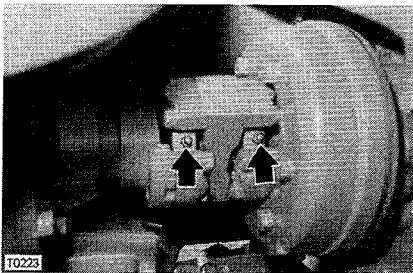
For the refilling procedure, see the item "EVERY 250 HOURS SERVICE".

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

★ Refill capacity: 29 ℓ

1. Drive shaft

(2 points)



2. Circle reverse gear case

After draining oil through drain plug holes (P), refill the gear oil through filler (F) up to the prescribed level.

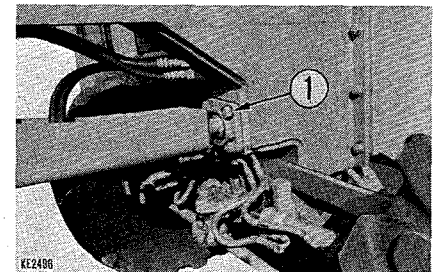
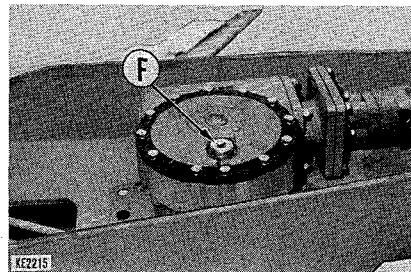
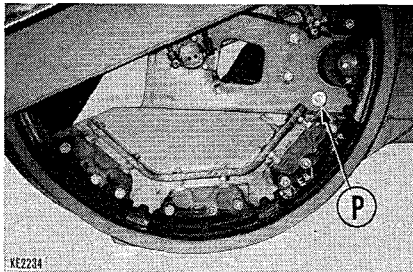
For the refilling procedure, see the item "EVERY 250 HOURS SERVICE".

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

★ Refill capacity: 4 ℓ

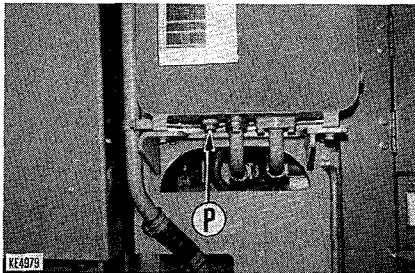
c. **DRAWBAR FRONT BALL JOINT**

Check the ball joint connecting nuts (1) at the front of the drawbar for loosening. If the connecting portions are loose, re-tighten them.

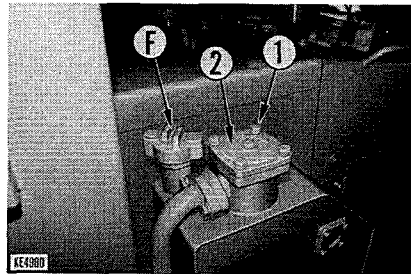


d. HYDRAULIC TANK AND FILTER

1. After relieving the work equipment from traveling posture, stop the engine.
Remove drain plug (P). After draining oil, tighten drain plug.



2. Remove bolts (1) and cover (2) and take out element.
Then, clean the inside of the filter housing together with the other removed parts and replace with a new element.



3. Refill engine oil in specified amount through filler (F).
For refilling procedure, see the item EVERY 250 HOURS SERVICE.

- ★ The type of lubricant used depends on the ambient temperature. Select according to the table "FUEL, COOLANT AND LUBRICANTS".
- ★ Refill capacity: 27 ℓ
- ★ Use genuine Komatsu elements.

e. TRANSMISSION CASE

1. Remove drain plug (P). After draining oil, tighten drain plug.

2. Remove bolt (1), tube (2), bolt (3) and cover (4).

Take out strainer and wash out dust with diesel fuel.

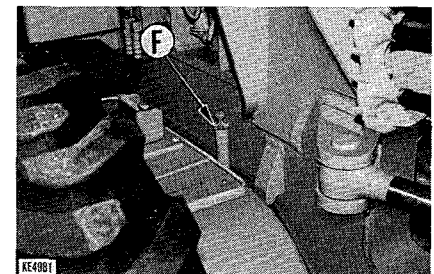
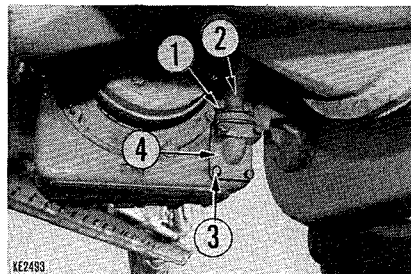
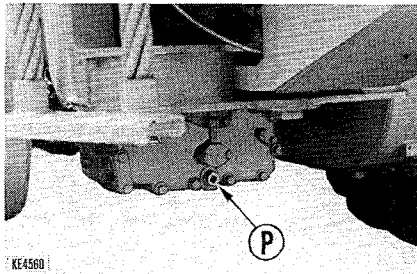
3. After cleaning it, install strainer.

4. Refill engine oil in specified amount through filler (F).

For refilling procedure see the section EVERY 250 HOURS SERVICE.

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

★ Refill capacity: 30 l

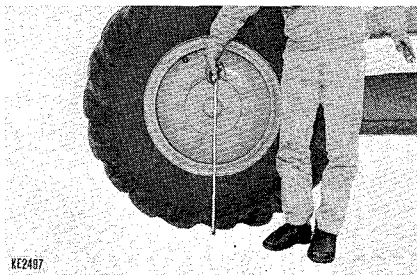


f. TOE-IN

Check toe-in and adjust it so that no side slip is caused. When no side slip tester is available, use the following procedure.

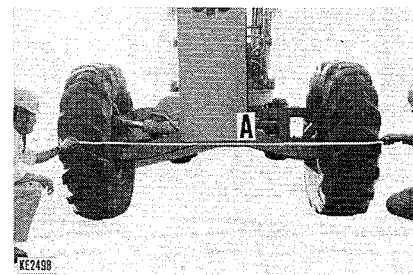
How to measure toe-in:

1. Park the grader on a level ground without steering and leaning the wheels. Be sure to travel straight at least a few meters before parking.
2. Measure the height from the ground to the center of the front wheel axle.

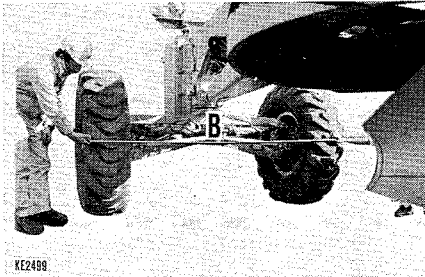


3. Make on the front tire surfaces with the same measure taken by the above procedure.

4. Measure the distance between the two marks on the right and left tires. This distance is named "A".



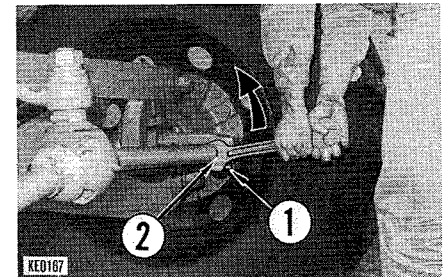
5. Drive the grader at a low speed and shift backward the mark on the tire. Stop the grader when the mark's height from the ground surface has become equal to the same value measured in the procedure 2.
6. Measure the distance between the two marks.
This distance is named "B".



How to Adjust Toe-in:

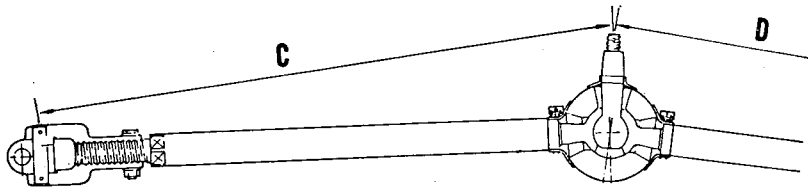
When toe-in ($B - A$) is adjusted to 6.5 ± 1.5 mm of standard range, side slip is decreased to zero. If any value other than the standard range is measured, adjust toe-in using the following procedure:

Loosen the nut (1). Turn the right and left tie rods with a wrench put on the square portion (2). Then, tighten the locknuts. Toe-in increases when the wrench is turned in the direction shown by the arrow, and vice versa. The value of toe-in varies by 11 mm when the right and left tie rods are turned $1/3$ rotation in the opposite direction to each other.



EVERY 1000 HOURS SERVICE

- ★ To keep the right and left tie rods in balanced condition, set the length C and D equal. When performing this adjustment, keep the front axle horizontally without any leaning.



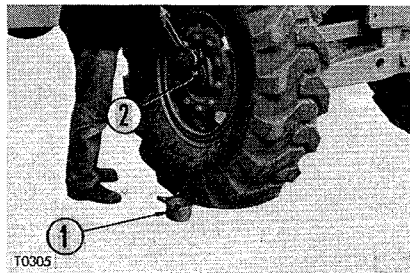
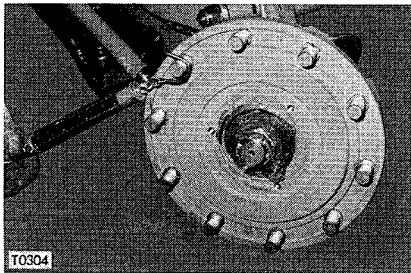
g. FRONT WHEEL BEARING PLAY

Raise the front wheels off the ground, using the blade or scarifier as a jack. Check hub turning torque with a spring balance hooked to a hub bolt.

1. The bearing play is normal if the front wheel is rotated smoothly with 8 to 12 kg of pulling force.

2. If the front wheel is loosely fitted or is rotated by a pulling force less than 8 kg, remove the cap (1). Pry the cotter pins and tighten the nuts (2) so that the wheel is rotated by a pulling force within the specified range.

- ★ Check for greasing condition, irrespective of bearing play. If emulsified grease is found, disassemble the bearing to renew grease. Also, check the various parts for emulsification of grease. (See EVERY 2000 HOURS SERVICE section.)

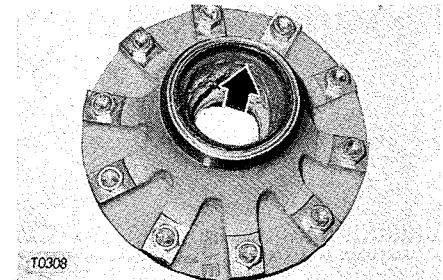
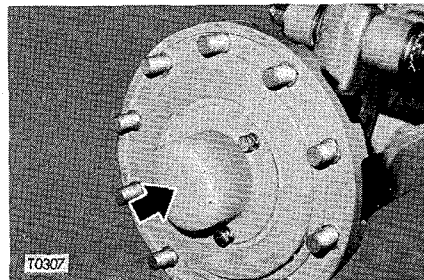
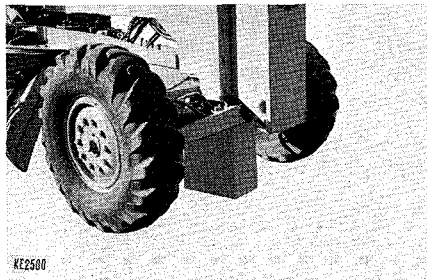


EVERY 2000 HOURS SERVICE

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

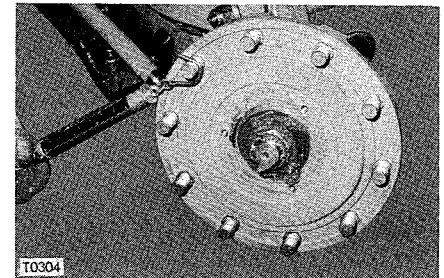
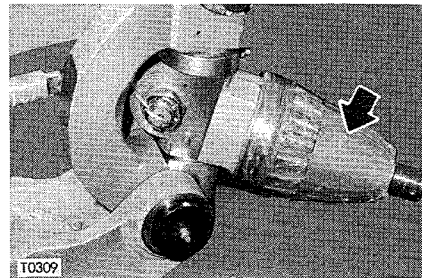
a. FRONT WHEEL BEARING GREASE (ON BOTH RIGHT AND LEFT SIDES)

1. Support the front axle on a block to raise the front wheel off the ground. Remove the wheels.
- ★ When raising the front wheels, securely apply the parking brake and rest the blade and scarifier on the ground.
2. Remove the cap. Pry the cotter pins, loosen the nuts, and remove the hub.
3. Clean the axle and bearing. Thoroughly wash out waste grease from the hub interior. Fill the half space of the cavity with fresh grease.



4. Replace the hub seal and the spacer.
 - ★ When a new spacer is installed, stake it at four positions equally spaced around the spacer to prevent it from loosening.
 - ★ Before installing the hub seal, coat the lip surfaces and sliding surfaces with grease and fill the space between lips with grease.
 - ★ Press ample quantity of grease into the axle and bearing. Heap up grease around the bearing. Install the hub.

5. Hook a spring balance to a hub bolt. Tighten the nuts to give a preload to the bearing so that the hub can be rotated by about 20 kg of pulling force given to the hub bolt through the spring balance. Loosen the nuts. Then, tighten the nuts again to give the 8 to 12 kg of specified pre-load to the bearing. Install cotter pins to prevent nuts from loosening.

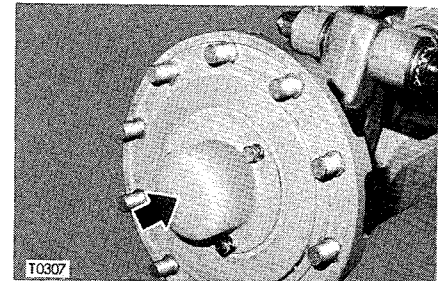
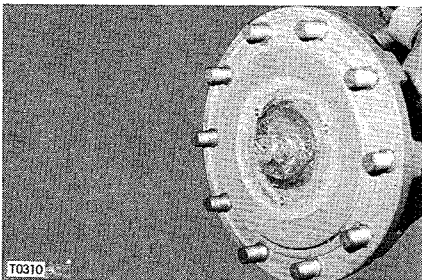


6. Replace the cap gasket. Attach a sheet of gasket to the hub, using gasket sealant.

★ Smear gasket sealant on both the gasket and mating surface. Mate them together after discoloration of partially dried gasket sealant is noticed.

7. Install the cap. Tighten cap mounting bolts to a torque of 10 to 12.5 kgm. Check the bolts for tightness after spending some lapse of time and retighten, if necessary, to compensate loosening of bolts due to fatigue of the gaskets.

It is recommended to have the above-mentioned service operation performed by your Komatsu distributor.



b. TANDEM DRIVE CASE

After draining oil through the drain plug hole (P), refill the engine oil up to the prescribed level through filler (F). For the refilling procedure, see the item EVERY 250 HOURS SERVICE.

- ★ The type of lubricant used depends on the ambient temperature. Select according to the table "FUEL, COOLANT AND LUBRICANTS".
- ★ Refill capacity: 100ℓ(each)

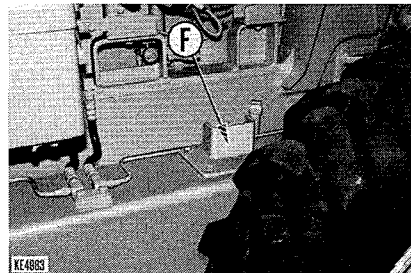
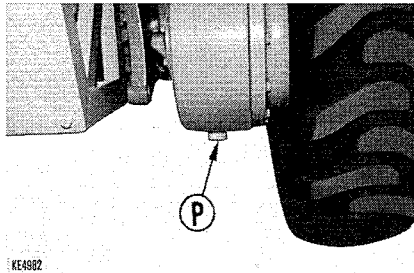
c. ALTERNATOR AND STARTING MOTOR

Since the brush is already worn out, consult Komatsu distributor for repair.

- ★ Check every 1000 hours in case of a night working where the light is used excessively.

d. ENGINE VALVE CLEARANCE

As special tool is required for removing and adjusting the parts, you shall request Komatsu distributor for service.

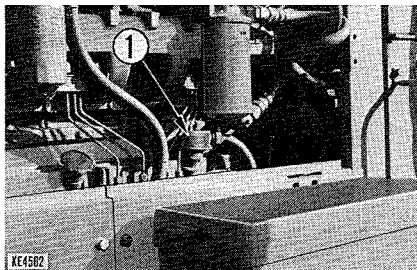


EVERY 2000 HOURS SERVICE
EVERY 4000 HOURS SERVICE

e. ENGINE BREATHER

Take breather (1) out of place and wash the inner element in clean light oil to remove dust from it.

★ Before taking the breather out of place, wipe the dust off the surrounding area. When restoring the element to its original position, be sure to coat the new O-ring with engine oil.



f. ENGINE VIBRATION DAMPER

Check the vibration damper for cracks or separation on rubber surface.

If there are cracks or separation, contact your Komatsu distributor for replacement.

EVERY 4000 HOURS SERVICE

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

a. WATER PUMP

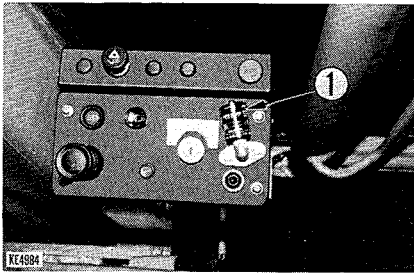
Inspect the water pump for play in the pulley, grease leakage and water leakage. If a fault is detected, ask Komatsu distributor to disassemble and repair or replace.

WHEN REQUIRED

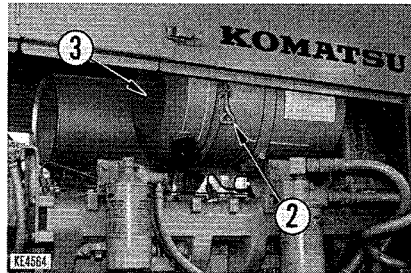
a. CHECK, CLEAN AND REPLACE AIR CLEANER ELEMENT

Check

When dust indicator (1) shows red the air cleaner element needs cleaning.

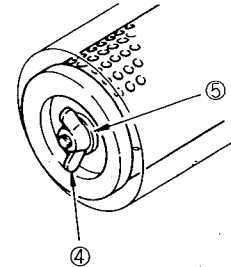


Cleaning and replacing the outer element



1. Loosen bolt (2) and remove cover (3) and outer element.
2. Clean the inner body and the cover.
3. Clean and check the outer element (cf. item "Cleaning outer element") and reattach.
4. Press the dust indicator button and return the red piston to its place.

- ★ Replace the outer element which has been cleaned 6 times repeatedly or used throughout a year. Replace the inner element at the same time.
- ★ Replace seal washer (5) or wing nut (4) if they are broken.



WHEN REQUIRED

- ★ Replace both inner and outer elements when the dust indicator red piston appears soon after installing the cleaned outer element even though it has not been cleaned 6 times.
- ★ Check inner element mounting nuts for looseness and, if necessary, retighten.

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. Install a new inner element 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 7 kg/cm^2) to element from inside along its folds, then direct it from outside along its folds and again from inside, and check element.

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



The following methods require spare parts.

With water

Dash city water (less than 3 kg/cm^2) on element from inside along folds, then from outside and again from inside. Dry and check it.

With cleaning agent

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

★ Drying can be speeded up by blowing dried compressed air (less than 7 kg/cm^2) from the inside to the outside of the element.

Never attempt to heat the element.

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

- ★ If small holes or thinner parts are found on element when it is checked with an electric bulb after cleaning and drying, replace the element.
- ★ If element is usable, wrap it and store it in dry place.
- ★ Do not use element whose folds or gasket or seal are damaged.
- ★ When cleaning element, do not hit it or beat it against something.



b. CHANGE COOLANT

Change cooling water twice a year in spring and autumn, or every 1000 hours when antifreeze is not used.

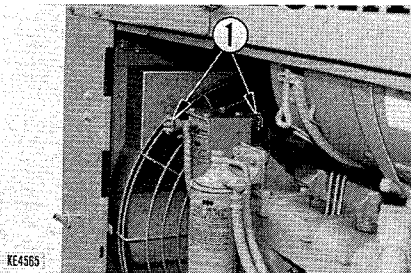
1. Stop the engine, tighten up corrosion resistor valves (1), and turn cap (2) slowly until it comes off. Open drain valve (3) at the bottom of the radiator and plug (4) on the side of oil cooler to drain off the cooling water.
2. After draining off the cooling water, wash out the cooling system using commercially available detergent. Follow the in-

structions on the detergent container.

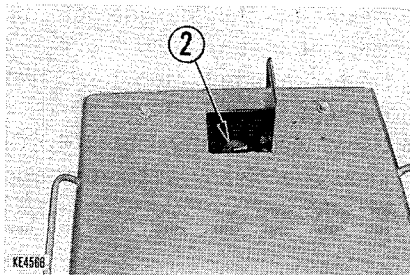
3. After washing the cooling system, drain off all the water, then close up drain valve (3) and plug (4) and pour in soft water (ex: city water) up to the vicinity of the water filler.
4. When the water reaches the vicinity of the water filler, put the engine at low idling, open drain valve (3) and plug (4), then pass water through the cooling system until clean water comes out from drain valve (3) and plug (4).

5. When the water becomes completely clean, stop the engine, close drain valve (3) and plug (4) and supply water up to vicinity of the water filler.
6. Replace the corrosion resistor cartridge (see EVERY 500 HOURS SERVICE) and open the corrosion resistor valves.

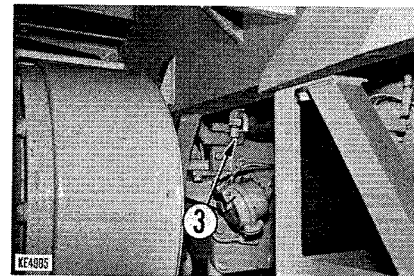
Corrosion resistor



Water filler



Drain valve (bottom of radiator)



7. After filling the cooling system with water, run the engine for 5 minutes at low idling and then for another 5 minutes at high idling to eliminate air trapped in the cooling system (leave water filler cap (2) off during this operation).
8. Stop the engine and 3 minutes later supply water again up to vicinity of the water filler and tighten water filler cap (2).

- ★ Be sure to replace the corrosion resistor cartridge.
- ★ Replace water after first parking the machine on a level surface.

! 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.

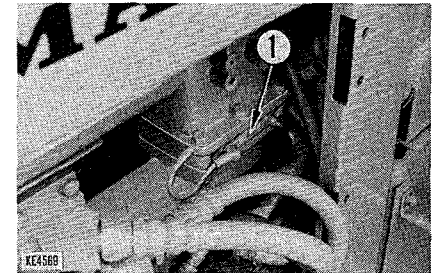
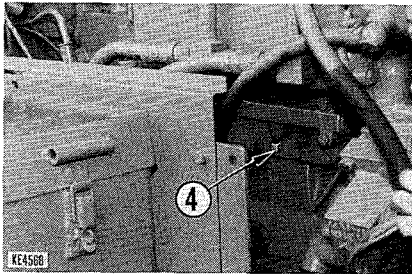
c. CHECK ELECTRICAL INTAKE AIR HEATER

Check electrical intake air heater (1) once a year before commencing work in the cold season.

Remove electrical intake air heater (1) from the engine intake connection, and check it for possible open-circuits and dirt.

When inspecting and replacing electrical intake air heater (1), replace the gasket with new one.

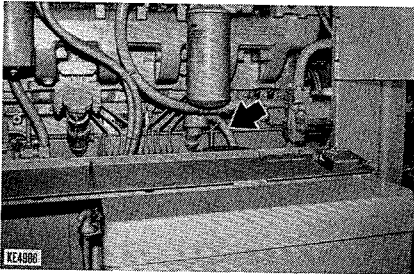
Drain plug (oil cooler)



WHEN REQUIRED

**d. CLEAN ENGINE BREATHER
HOSE**

In dusty, sandy, rough or steeping working area, the hose is sometimes clogged by the emitted oil, sand and dust. It is thus necessary to inspect the hose and clean it.



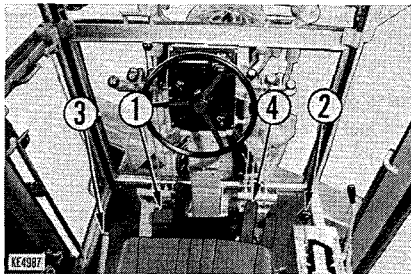
ADJUSTMENT

ADJUSTMENT OF INCHING PEDAL

When any abnormal pedal condition such as mentioned below is noticed, consult your Komatsu distributor for checking, readjustment or repair of the inching pedal system.

1. At full engine speed, the machine moves when the inching pedal (1) is depressed and the gear shift lever (2) is placed in the forward 1st speed position (The parking brake is left released.)
2. With the parking brake (3) applied, the brake pedal (4) depressed and the gear shift lever placed in the forward 6th (or reverse 6th) position, the engine does not stop within 3 seconds when the inching pedal is released from the depressed position.

★ These abnormal conditions concerning inching pedal operation are sometimes caused by transmission troubles. Therefore, careful inspection of faulty conditions must be made by your Komatsu distributor not only about the inching pedal control system, but also about the transmission.



TROUBLE SHOOTING GUIDE

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

ENGINE

The pointer of engine oil pressure gauge is in red range on left hand side of the gauge when engine speed is raised after completion of warm-up.

- Add the oil to the specified level.
- Replace the oil element.
- Check oil leakage from the pipe or the joint.
- Replace the pressure gauge.

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

The pointer of the water temperature gauge is in red range on right hand side of the gauge.

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

The pointer of the water temperature gauge is in white range on left hand side of the gauge.

- Replace the thermostat.
- Replace the water temperature gauge.

The engine does not start when the starting motor is turned over.

- Add fuel.
- Repair where air is leaking into fuel system.
- Replace the injection pump and the nozzle.
- Check the valve clearance.
- Check engine compression pressure.
- Refer to the section of electrical system.

Exhaust gas is white or blue.

- Adjust to specified oil quantity.
- Replace with specified fuel.

Exhaust gas occasionally turns black.

- Clean or replace the air cleaner element.
- Replace the nozzle.
- Check engine compression pressure.

Combustion noise occasionally changes to breathing sound.

- Replace the nozzle.

Unusual combustion noise or mechanical noise.

- Replace with specified fuel.
- Check over-heating.
- Replace the muffler.
- Adjust valve clearance.

The engine oil temperature warning lamp lights.

- Replace the thermostat.
- Replace the oil temperature sensor.

ELECTRICAL SYSTEM

Lamp does not glow brightly even when engine runs at high speed.

Lamp flickers while engine runs.

- Check for loose terminals and open-circuit wiring.
- Adjust belt tension.

Charge lamp does not go out even when engine runs at high speed.

- Replace the charge lamp.
- Replace the alternator.
- Inspect and repair wiring.

Unusual noise is emitted from the alternator.

- Replace the alternator.

Starting motor does not turn when starting switch is turned on.

- Inspect and repair the wiring.
- Charge the battery.

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

- Charge the battery.

Starting motor turns the engine sluggishly.

- Charge the battery.
- Replace the starting motor.

The starting motor disengages before the engine start up.

- Check and repair the wiring.
- Charge the battery.

The heater signal does not glow red.

- Check and repair wiring.
- Replace the heater relay.
- Replace the heater signal.

Outside the electrical intake air heater is not warm when touched with the hand.

- Check and repair wiring.
- Replace the electrical intake air heater.
- Check and repair the heater switch.

CHASSIS

Tractive force is lacking. (Insufficient travel speed)

- Refer to the section of engine.
- Check transmission.
- Release parking brake lever.

Machine falls to start at any gear shift lever position.

- Add oil to transmission case.
- Check and adjust transmission.

Loud noise in the power transmitting system

- Add oil to transmission case and tandem drive case.

Excessive wear of front wheels

- Adjust toe-in.

Heat generation at front wheel hub

- Adjust wheel bearing installation nut.
- Apply grease.

Front wheels sway while traveling

- Adjust toe-in and tie rod
- Replace steering linkage.
- Equalize tire pressure on each side
- Replace rim.
- Check wheel installation.
- Retighten front wheel bearing installation nut.

Steering wheel feels heavy

- Check front tire pressure.
- Apply grease on each bearing.
- Adjust ball joint of pitman arm.
- Adjust engagement of ball nut.
- Repair piping.

Steering wheel drags

- Equalize tire pressure on each side.
- Retighten front wheel bearing installation nut.
- Check oil circuit of steering booster.

Excessive steering wheel play

- Retighten link joint

Steering wheel noisy when turned

- Change oil.
- Repair ball joint.

Parking brake does not operate satisfactorily

- Adjust brake shoes.
- Polish lining surface with sandpaper.
- Disassemble and clean brake drum.

Excessive blade swing during work

- Adjust ball joint shim.
- Replace blade rail side bush.
- Repair blade rail.

Brake pedal does not actuate the brake satisfactorily

- Brake disc is worn.
- Air leak.

Excessive vibration of the blade when rotating during work

- Adjust radial clearance of the circle.

Excessive scarifier (Option) swing during work

- Adjust shim of ball joint.

Work equipment is slow to move by operating the control lever.

- Add the oil to the specified level.

Wear of parking brake lining

- Adjust clearance of lining.

STORAGE

BEFORE STORAGE

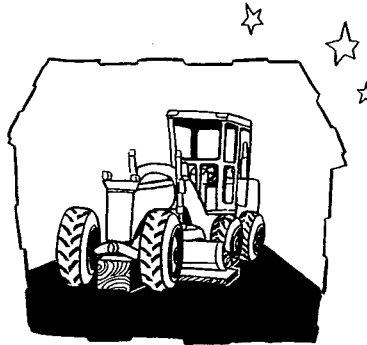
To place the machine in storage for an extended period of time, the following measures must be taken to insure that it can be returned to duty operation with minimum of service.

- After every part is washed and dried, the machine shall be housed in a dry building. Never leave it outdoors.

In case it is indispensable to leave it outdoors, search a flat ground and lay wood plates on the ground, and the machine shall be placed on the wood plates and cover with canvas etc.

- Completely fill fuel tank, lubricate and change oil before storage.
- Apply sufficient quantity of grease and oil replacement.

- Lower the air pressure in the tires to about 80% of the standard operating pressure.
- Give a thin coat of grease to metal surface (hydraulic piston rods and oil seal).
- As to batteries, remove the terminals and place cover on them, or remove them from the machine and store separately.
- In case the atmospheric temperature may drop below 0°C, add antifreeze in the cooling water.
- ★ Set the gear shift lever to neutral position, set the fuel control lever to engine stop position, and leave the steering pedal not locked.



DURING STORAGE

- Operate the engine and move the machine for a short distance once a month so that new oil film will be generated and exhaustion of oil film in a long period will be prevented.
- ★ Before using work equipment, wipe off the grease from the pressure cylinder rod.



When it is unavoidably necessary to carry out rust-preventive operation indoors, open all windows and doors to circulate the air and prevent the accumulation of poisonous gases.

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.

- Loosen the drain plugs on oil pan and other cases and drain mixed water.
- You should request Komatsu distributor for following service.
 - Remove the cylinder head cover and lubricate sufficiently valves and rocker arms. And inspect the valve operation.
- To bleed the air from the hydraulic cylinders or hydraulic piping, run the engine at low idling and do as follows.
 - 1) Operate each hydraulic cylinders 4 to 5 times, stopping 100 mm from stroke end.
 - 2) Next, operate each cylinder 3 to 4 times to the stroke end.
- ★ If the engine is run at high speed at first, or if the cylinder is moved to the end of its stroke, the air in the cylinder may damage the piston packing, etc.
- After the engine is started, operate it until it is warmed up completely.

SERVICE METER

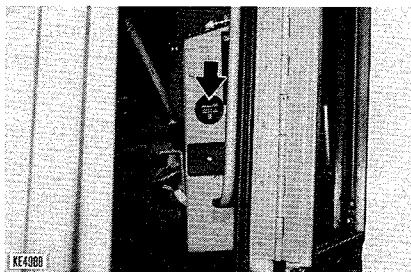
This meter indicates the integrated work hours. So, use it according to the following instructions.

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

★ How the meter progresses

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

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

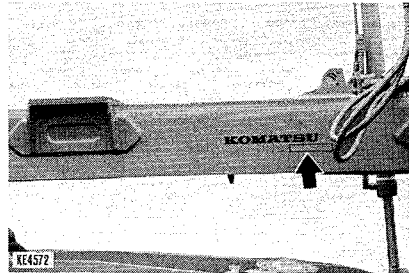


The service meter is on the left side of the operator's seat.

MACHINE AND ENGINE SERIAL NUMBERS

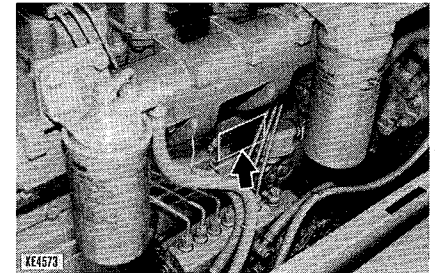
When calling for service of mechanic or when making replacement parts order, be sure to give your Komatsu distributor the machine and engine serial numbers as well as the service meter reading beforementioned. These numbers are found on the plates shown in the photos below.

- Location of the machine serial number mark



... on the left side of the frame

- Location of engine serial number mark



... on the right side of the engine cylinder block

FUEL, COOLANT AND LUBRICANTS

PROPER SELECTION OF FUEL, COOLANT AND LUBRICANTS

RESERVOIR	KIND OF FLUID	AMBIENT TEMPERATURE					CAPACITY (ℓ)	
		14 -10	32 0	50 10	68 20	86°F 30°C	Specified	Refill
Engine oil pan		SAE 30					30	24
		SAE 10W						
		SAE 10W-30						
		SAE 15W-40						
Transmission case Tandem drive case (each)	Engine oil	SAE 30					36	30
		SAE 10W					100	100
Hydraulic system		SAE 10W					60	27
		SAE 10W-30						
		SAE 15W-40						
Circle reverse gear case Final drive case	Gear oil	SAE90					4	4
							36	29
Fuel tank	Diesel fuel	※					250	-
		ASTM D975 No. 2						
Cooling system	Water	Add antifreeze					55	-

※ 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.

FUEL, COOLANT AND LUBRICANTS

SPEC. & GRADE NAME OF SUPPLIER	ENGINE OIL		GEAR OIL	GREASE
	Class CD		Class GL-4, GL-5	NLGI 2
	SAE 30	SAE 10W	SAE 90 SAE 140	
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-Motive 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	Essolube D-3		Esso Gear Oil GP	Esso Multi-Purpose Grease Nebula EP
SHELL	Shell Rimula CT		Shell Spirax BP 90	Shell Alvania Grease EP 2
MOBIL	Mobil Delvac 1330 Mobil Delvac 1310		Mobilube H.D. 80-90	Mobilplex 47 (Mobilplex 48)
PENNZOIL	Zoitdeez S-3		Penzoil M.P.P. Gear Lube 4090	Pennz 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 sever cold districts)	Gulf Dieselube Super S-3 Motor Oil 10W		Gulf Gearlube HT75	