SEAM005201

Operation & Maintenance Manual

Super

D155AX-3

BULLDOZER

SERIAL NUMBERS **D155AX-3 -60001** and up

December 1995

1. FOREWORD

This manual provides rules and guidelines which will help you use this machine safely and effectively. Keep this manual handy and have all personnel read it periodically. If this manual has been lost or has become dirty and can not be read, request a replacement manual from Komatsu or your Komatsu distributor.

If you sell the machine, be sure to give this manual to the new owners.

Continuing improvements in the design of this machine can lead to changes in detail which may not be reflected in this manual. Consult Komatsu or your Komatsu distributor for the latest available information of your machine or for questions regarding information in this manual.

This manual may contain attachments and optional equipment that are not available in your area. Consult Komatsu or your Komatsu distributor for those items you may require.

⚠ WARNING

- **Improper operation and maintenance of this machine can be hazardous and could result in serious injury or death.**
- **Operators and maintenance personnel should read this manual thoroughly before beginning operation or maintenance.**
  Keep this manual in a readily available place near the machine (on machines with cab, there is a door pocket to hold the manual), and have all personnel involved in working on the machine read the manual periodically.
- **Some actions involved in operation and maintenance of the machine can cause a serious accident, if they are not done in a manner described in this manual.**
- **The procedures and precautions given in this manual apply only to intended uses of the machine. If you use your machine for any unintended uses that are not specifically prohibited, you must be sure that it is safe for you and others. In no event should you or others engage in prohibited uses or actions as described in this manual.**
- **Komatsu delivers machines that comply with all applicable regulations and standards of the country to which it has been shipped. If this machine has been purchased in another country or purchased from someone in another country, it may lack certain safety devices and specifications that are necessary for use in your country. If there is any question about whether your product complies with the applicable standards and regulations of your country, consult Komatsu or your Komatsu distributor before operating the machine.**
- **The description of safety is given in SAFETY INFORMATION on page 0-2 and in SAFETY from page 1-1.**

2. SAFETY INFORMATION

Most accidents are caused by the failure to follow fundamental safety rules for the operation and maintenance of machines. To avoid accidents, read, understand and follow all precautions and warnings in this manual and on the machine before performing operation and maintenance.

To identify safety messages in this manual and on machine labels, the following signal words are used

DANGER – **This word is used on safety messages and safety labels where there is a high probability of serious injury or death if the hazard is not avoided. These safety messages or labels usually describe precautions that must be taken to avoid the hazard. Failure to avoid this hazard may also result in serious damage to the machine.**

WARNING – **This word is used on safety messages and safety labels where there is a potentially dangerous situation which could result in serious injury or death if the hazard is not avoided. These safety messages or labels usually describe precautions that must be taken to avoid the hazard. Failure to avoid this hazard may also result in serious damage to the machine.**

CAUTION – **This word is used on safety messages and safety labels for hazards which could result in minor or moderate injury if the hazard is not avoided. This word might also be word for hazards where the only result could be damage to the machine.**

NOTICE – **This word is used for precautions that must be taken to avoid actions which could shorten the life of the machine.**

Safety precautions are described in SAFETY from page 1-1.

Komatsu cannot predict every circumstance that might involve a potential hazard in operation and maintenance. Therefore the safety messages in this manual and on the machine may not include all possible safety precautions. If any procedures or actions not specifically recommended or allowed in this manual are used, you must be sure that you and others can do such procedures and actions safely and without damaging the machine. If you are unsure about the safety of some procedures, contact your Komatsu distributor.

3. INTRODUCTION

3.1 INTENDED USE

This Komatsu BULLDOZER is designed to be used mainly for the following work.
- Dozing
- Ripping
- Smoothing
- Cutting into hard or frozen ground or ditching.
- Felling trees, removing stumps

See the section "12.16 WORK POSSIBLE USING BULL DOZER" for further details.

3.2 FEATURES

- Simple lever operation with directional and steering joystick (with speed max. button)
- Pressurized, sealed cab with air conditioner for pleasant operations
- Simple check operations using monitor panel
- High power engine with turbocharger
- Improved ride for operator with flexible undercarriage mechanism and cab suspension damper
- High operating capacity with automatic gear shifting and power turn
- Low noise, high visibility design to ensure simple and safe operations

3.3 BREAKING IN THE MACHINE

NOTICE

Before operating the machine for the first time, check that there is coolant in the radiator. If the machine is delivered with no coolant in the radiator, flush the inside of the radiator thoroughly with tap water, then fill the radiator with coolant.

Your Komatsu machine has been thoroughly adjusted and tested before shipment.

However, operating the machine under severe conditions at the beginning can adversely affect the performance and shorten the machine life.

Be sure to break in the machine for the initial 100 hours (as indicated by the service meter.) During breaking in:
- Idle the engine for 5 minutes after starting it up.
- Avoid operation with heavy loads or at high speeds.
- Avoid sudden starts, sudden acceleration, sudden steering and sudden stops except in cases of emergency.

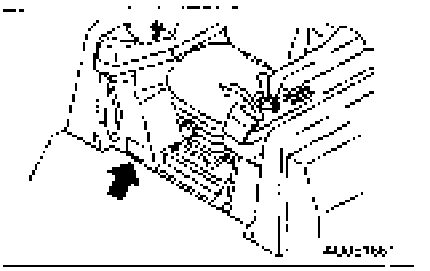
The precautions given in this manual for operating, maintenance, and safety procedures are only those that apply when this product is used for the specified purpose. If the machine is used for a purpose that is not listed in this manual, Komatsu cannot bear any responsibility for safety. All consideration of safety in such operations is the responsibility of the user.

Operations that are prohibited in this manual must never be carried out under any circumstances.

4. LOCATION OF PLATES, TABLE TO ENTER SERIAL NO. AND DISTRIBUTOR

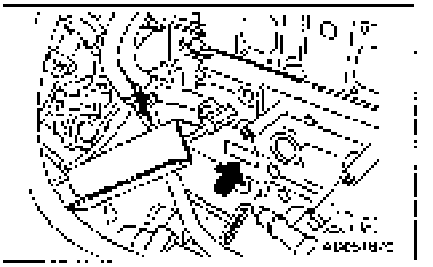
4.1 MACHINE SERIAL NO. PLATE POSITION

This is at the front bottom right of the operator's seat.



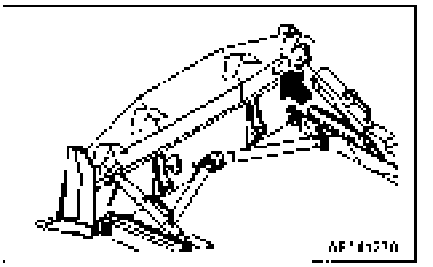
4.2 ENGINE SERIAL NO. PLATE POSITION

This is above the starting motor at the right side of the machine.

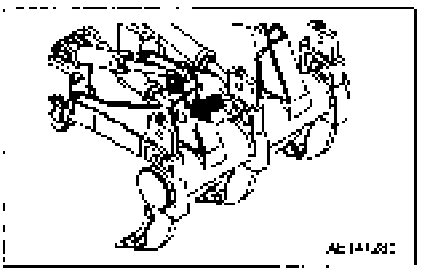


4.3 BLADE SERIAL NO. PLATE POSITION

This is at the top right on the back of the blade.



4.4 RIPPER SERIAL NO. PLATE POSITION



4.5 TABLE TO ENTER SERIAL NO. AND DISTRIBUTOR

Machine serial No.:
Engine serial No.:
Distributor name:
Address: Phone:
Service personnel for your machine.

5. CONTENTS

SAFETY

OPERATION

MAINTENANCE

SPECIFICATIONS

OPTIONS, ATTACHMENTS

SAFETY

⚠ WARNING

Read and follow all safety precautions. Failure to do so may result in serious injury or death.

This safety section also contains precautions for optional equipment and attachments.

6. GENERAL PRECAUTIONS

⚠ WARNING: For reasons of safety, always follow these safety precautions.

SAFETY RULES

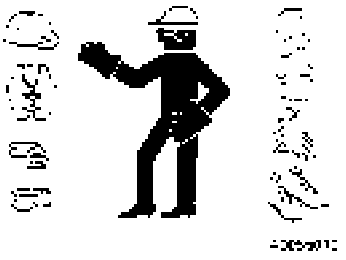
- ONLY trained and authorized personnel can operate and maintain the machine.
- Follow all safety rules, precautions and instructions when operating or performing maintenance on the machine.
- When working with another operator or a person on worksite traffic duty, be sure all personnel understand all hand signals that are to be used

SAFETY FEATURES

- Be sure all guards and covers are in their proper position. Have guards and covers repaired if damaged.
  Proper position → See "12.1.1 WALK-AROUND CHECK".
- Use safety features such as the safety lock and seat belts properly.
- NEVER remove any safety features. ALWAYS keep them in good operating condition.
  Safety lever → See "12.10 PARKING MACHINE".
  Seat belts → See "27. USING SEAT BELT".
- Improper use of safety features could result in serious bodily injury or death.

CLOTHING AND PERSONAL PROTECTIVE ITEMS

- Avoid loose clothing, jewelry, and loose long hair. They can catch on controls or in moving parts and cause serious injury or death. Also, do not wear oily clothes because they are flammable.
- Wear a hard hat, safety glasses, safety shoes, mask or gloves when operating or maintaining the machine. Always wear safety goggles, hard hat and heavy gloves if your job involves scattering metal chips or minute materials - this is so particularly when driving pins with a hammer and when cleaning the air cleaner element with compressed air.
  Check also that there is no one near the machine.
  Cleaning of air cleaner element → See "24.2 WHEN REQUIRED" in service procedure.



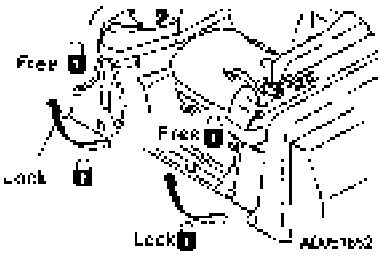
UNAUTHORIZED MODIFICATION

- Any modification made without authorization from Komatsu can create hazards.
- Before making a modification, consult your Komatsu distributor. Komatsu will not be responsible for any injury or damage caused by any unauthorized modification.

STANDING UP FROM THE SEAT

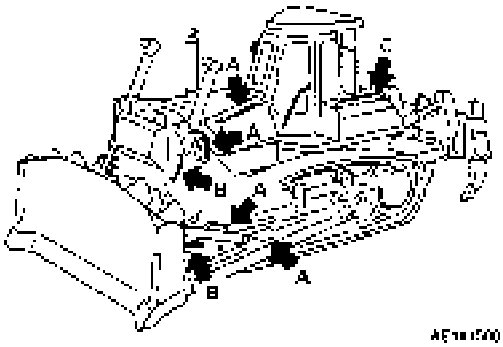
To avoid hitting unlocked control levers, before standing up from operator's seat, do the follwing:

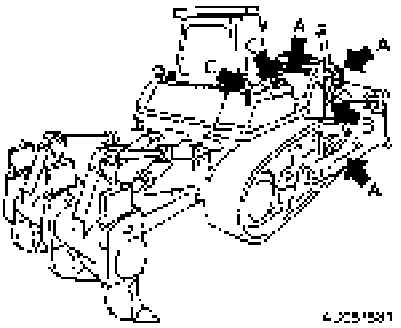
- Move steering and directional lever to neutral and move PARKING LEVER (located left of seat) to LOCK position.
- Lower work equipment to ground and move SAFETY LEVER (located right of seat) to LOCK position.
  Sudden and unwanted machine movement can cause serious injury or death.



MOUNTING AND DISMOUNTING

- NEVER jump on or off the machine. NEVER get on or off a moving machine.
- When mounting and dismounting, face the machine and use the handholds and steps. Maintain three-point contact to be sure that you do not fall from the machine.
- Do not hold any control levers when getting on or off the machine.
- Repair any damaged handhold or step, and tighten any loose bolts. Handholds and steps must be free of oil, grease and excessive dirt.
- When mounting or dismounting, or when moving along the top of the track, if you hold the door handle and the door is not properly closed, the door may move and cause you to fall. Always make sure that the door is properly closed.
- Use the parts marked by arrow A in the diagram below when getting on or off the machine. Use the parts marked by arrow B when getting on or off machines with the scraper specification. Never use the parts marked by arrow C when getting on or off the machine. Use them only when moving along the top of the track or when checking or carrying out maintenance inside the side cover, or when filling the tank with oil.





FIRE PREVENTION FOR FUEL AND OIL

Fuel, oil, and antifreeze can be ignited by a flame. Fuel is particularly FLAMMABLE and can be HAZARDOUS.

- Keep a flame away from flammable fluids.
- Stop the engine and do not smoke when refueling.
- Tighten all fuel and oil caps securely.
- Refueling and oiling should be made in well ventilated areas.
- Keep oil and fuel in the determined place and do not allow unauthorized persons to enter.

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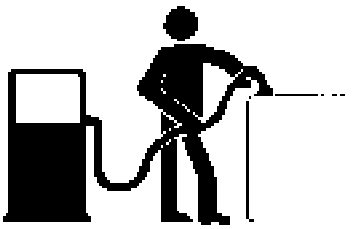

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BURN HAZARD PREVENTION

- If the coolant, engine oil, power train oil or hydraulic oil is hot, use a heavy cloth, gloves, heavy clothing and safety glasses or goggles before checking or touching.

- To prevent hot water from spurting out:
  1) Turn engine off.
  2) Allow water to cool
  3) Slowly loosen cap to relieve pressure before removing.

- To prevent hot oil from spurting out:
  1) Turn engine off.
  2) Allow oil to cool.
  3) Slowly loosen cap to relieve pressure before removing.

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ASBESTOS DUST HAZARD PREVENTION

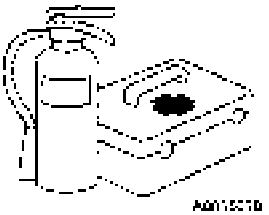
- Asbestos dust can be HAZARDOUS to your health if it is inhaled.
- If you handle materials containing asbestos fibers, follow these guidelines as given below:
  1) NEVER use compressed air for cleaning.
  2) Use water for cleaning to minimize dust cloud.
  3) Operate the machine with the wind to your back, whenever possible.
  4) Use an Approved respirator if necessary.

CRUSHING OR CUTTING PREVENTION

- Do not enter, or put your hand or arm or any other part of your body between moveble parts such as between the work equipment and cylinders, or between the machine and the blade or ripper or any other attachment.
  If the work equipment is operated, the clearance will change and this may lead to serious damage or personal injury.

FIRE EXTINGUISHER AND FIRST AID KIT

- Be sure fire extinguishers have been provided and know how to use them.
- Know where a first aid kit is located.
- Know what to do in the event of a fire.
- Be sure you know the phone numbers of persons you should contact in case of an emergency.



PRECAUTIONS FOR ROPS

- Do not operate machine with ROPS removed if equipped.
- The ROPS is installed to protect the operator if the machine should overturn. It is designed not only to take the load when the machine overturns, but also to absorb the impact energy.
- The Komatsu ROPS fulfills all worldwide regulations and standards, but if any unauthorized modification is carried out on it, or if it is damaged when the machine overturns, its strength will be reduced and it will not be able to provide its original capacity. It will be able to provide this capacity only if modifications and repairs are carried out in the specified way.
- When carrying out modification or repairs, always consult your Komatsu distributor first.
- Even when the ROPS is installed, if you do not fasten your seat belt securely, it cannot protect your properly. Always fasten your seat belt when operating the machine.
  Seat belts → See "27. USING SEAT BELT."

PRECAUTIONS FOR ATTACHMENTS

- When installing and using an optional attachment, read the instruction manual for the attachment and the information related to attachments in this manual.
- Do not use attachments that are not authorized by Komatsu or your Komatsu distributor. Use of unauthorized attachments could create a safety problem and adversely affect the proper operation and useful life of the machine.
- Any injuries, accidents, product failures resulting from the use of unauthorized attachments will not be the responsibility of Komatsu.

MACHINES WITH ACCUMULATOR

On machines equipped with an accumulator, for a short time after the engine is stopped, if the work equipment control lever is moved to the LOWER position, the work equipment will move down under its own weight.
After stopping the engine, always place the safety lock lever in the LOCK position.

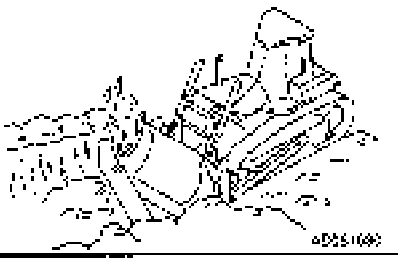
When releasing the pressure inside the work equipment circuit on machines equipped with an accumulator, follow the procedure given in the inspection and maintenance section.
Method of releasing pressure → See "11.16 HANDLING ACCUMULATOR."

The accumulator is filled with high-pressure nitrogen gas, and it is extremely dangerous if it is handled in the wrong way. Always observe the following precautions.
- Never make any hole in the accumulator or expose it to flame or fire.
- Do not weld any boss to the accumulator.
- When carrying out disassembly or maintenance of the accumulator, or when disposing of the accumulator, it is necessary to release the gas from the accumulator. A special air bleed valve is necessary for this operation, so please contact your Komatsu distributor.
  Gas in accumulator → See "11.16 HANDLING ACCUMULATOR."

7.1 BEFORE STARTING ENGINE

SAFETY AT WORKSITE

- Before starting the engine, thoroughly check the area for any unusual conditions that could be dangerous.
- Before starting the engine, examine the terrain and soil conditions of the worksite. Determine the best and safest method of operation.
- If you need to operate on a street, protect pedestrians and cars by designating a person for worksite traffic duty or by installing fences around the worksite.
- If water lines, gas lines, and high-voltage electrical lines may be buried under the worksite, contact each utility and identify their locations. Be careful not to sever or cut any of these lines.
- Check the depth and flow of water before operating in water or crossing a river. NEVER be in water which is in excess of the permissible water depth.
  Permissible water depth → See "12.9.1 PERMISSIBLE WATER DEPTH".



FIRE PREVENTION

- Thoroughly remove wood chips, leaves, paper and other flammable things accumulated on the engine compartment. They could cause a fire.
- Check fuel, lubrication, and hydraulic systems for leaks. Have any leaks repaired. Wipe up any excess oil, fuel or other flammable fluids.
  Check point → See "12.1.1 WALK-AROUND CHECK".
- Be sure a fire extinguisher is present and working.

IN OPERATOR'S CAB

- Do not leave tools or machine parts around the operator's compartment. They may damage the control levers or switches and may even cause accidents. Always use the tool box inside the engine compartment (right side).
- Keep the cab floor, controls, steps and handholds free of oil, grease, snow, and excess dirt.
- Check the seat belt, buckle and hardware for damage or wear. Replace any worn or damaged parts. Always use seat belts when operating your machine.
  Seat belts → See "27. USING SEAT BELT".

VENTILATION FOR ENCLOSED AREAS

- If it is necessary to start the engine within an enclosed area, provide adequate ventilation. Exhaust fumes from the engine can KILL.

PRECAUTIONS FOR MIRRORS, WINDOWS AND LIGHTS

- Remove all dirt from the surface of the windows and lights to ensure that you can see well.
- Adjust the rear view mirror so that you can see clearly from the operator's seat, and always keep the surface of the mirror clean. If any glass is broken, replace it with a new part.
- Check that the head lamps and rear lamps are installed to match the operating conditions. Check also that they light up properly.

PRECAUTIONS FOR SLIDING GLASS INTERMEDIATE LOCK

The sliding glass intermediate lock is to prevent rattling of the glass.
Even when the lock is used, the glass may move because of the shock when starting or stopping suddenly.
Do not put your head or hands out of the window during operations.

CHECK THOROUGHLY BEFORE STARTING

Always carry out all checks before starting.

7.2 OPERATING MACHINE

WHEN STARTING ENGINE

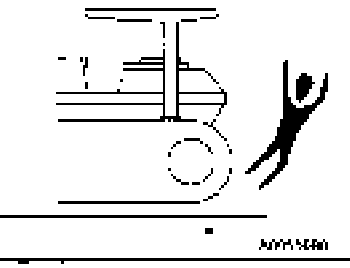
- Walk around your machine again just before mounting it, checking for people and objects that might be in the way.
- NEVER start the engine if a warning tag has been attached to the control.
- When starting the engine, sound the horn as an alert.
- Start and operate the machine only while seated.
- Do not allow anyone other than the operator to ride in the cab or on the machine body.
- Check that the backup alarm is working properly.
- Do not add grease or oil after starting the engine.

PRECAUTIONS WHEN MOVING FORWARD OR BACKWARD

Before moving machine or its attachments:

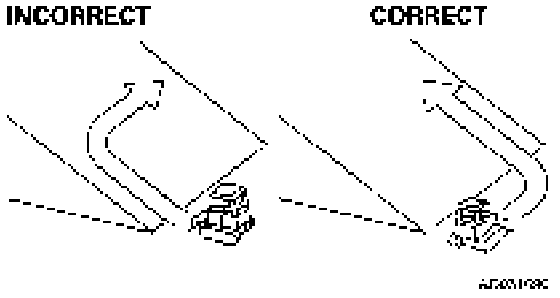
- Honk horn to alert people nearby.
- Be sure no one is around machine, particularly behind machine.
- Use spotter if necessary, particularly if you are moving in reverse.
- When operating in areas that may be hazardous or have poor visibility, designate a person to direct worksite traffic.
- Prevent people from entering the line of travel of the machine.

Follow above even if equipped with back-up alarm and mirrors.



TRAVELING ON SLOPES

- Traveling on hills, banks or slopes that are steep could result in the machine tipping over or slipping.
- On hills, banks or slopes, carry the work equipment closer to the ground, approximately 20 to 30 cm (8 to 12 in) above the ground. In case of emergency, quickly lower the work equipment to the ground to help the machine stop and prevent it from tipping over.
- Do not change direction on slopes. Avoid sideways travel whenever possible; rather travel up and down the slopes.
- Do not travel up and down on grass, fallen leaves, and wet steel plates. These materials may allow the machine to slip, if it is traveling sideways. Keep travel speed very low.
- When traveling downhill, drive slowly and use the engine as a brake
  Reverse steering when traveling downhill — See "12.7.2 TURNING WHILE DESCENDING A SLOPE".



VISIBILITY

- Turn ON the head lamps and rear lamp, when working at night or at dark sites. Provide additional lights for the worksite if necessary.
- If visibility is diminished by fog, snow or rain, stop operation. Wait until there is adequate visibility for safe operation.

WORKING ON SNOWY SITE

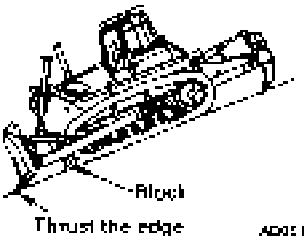
- Snow-covered and frozen ground may allow the machine to slip sideways, even if the grade is not steep. Slow down the machine when traveling on such ground. Avoid rapid starts, stops, and steering.
- In snow removal work, pay special attention to the edge of the road and to objects under the snow.

WORKING ON LOOSE GROUND

- Avoid operating your machine too close to the edge of cliffs, overhangs, and deep ditches. If these areas collapse, your machine could fall or tip over and result in serious injury or death. Remember that the soil after heavy rain or blasting is weakened in these areas.
- Earth laid on the ground and the soil near ditches are loose. They can collapse under the weight or vibration of your machine.
- Install the HEAD GUARD or FOPS if working in areas where there is danger of falling rocks and dirt.
- When working in places where there is danger of falling rocks or danger of the machine turning over, install ROPS and a seat belt.

PARKING THE MACHINE

- Park on level ground whenever possible. If not possible, block the tracks, lower the blade to the ground and thrust the edge of the blade in the ground.



- When parking on public roads, provide fences and signs, such as flags or lights, on the machine to warn passersby to be careful. Be sure that the machine, flags or lights do not obstruct traffic.
  Parking procedure → See "12.10 PARKING MACHINE".
- Before leaving the machine, lower the work equipment to the ground, move the SAFETY LEVER to LOCK position, stop the engine, and lock all the doors, windows, and covers and remove the key(s).
  Work equipment posture → See "12.10 PARKING MACHINE".
  Locks → See "12.14 LOCKING".

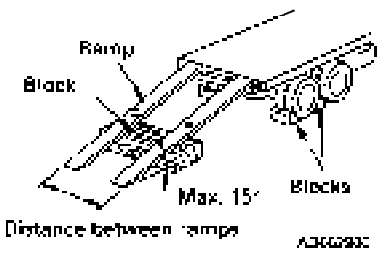
7.3 TRANSPORTATION

LOADING AND UNLOADING

- Loading and unloading the machine always involves potential hazards. EXTREME CAUTION SHOULD BE USED.
- Perform loading and unloading on firm, level ground only. Maintain a safe distance from the edge of a road.
- ALWAYS block the wheels of the hauling vehicle and place blocks under both ramps before loading and unloading.
- ALWAYS use ramps of adequate strength. Be sure the ramps are wide and long enough to provide a safe loading slope.
- Be sure that the ramps are securely positioned and fastened, and that the two sides are at the same level as one another.
- Be sure the ramp surface is clean and free of grease, oil, ice and loose materials. Remove dirt from the machine tracks.
- NEVER correct your steering on the ramps. If necessary, drive away from the ramps and climb again.
- After loading, block the machine tracks and secure the machine with tie-downs.

Loading and unloading → See "13. TANSPORTATION".
Tie-downs → See "13. TRANSPORTATION".

CORRECT



SHIPPING

- When shipping the machine on a hauling vehicle, obey all state and local laws governing the weight, width, and length of a load. Also obey all applicable traffic regulations.
- Determine the shipping route while taking into account the width, height and weight of the load.

7.4 BATTERY

BATTERY HAZARD PREVENTION

- Battery electrolyte contains sulfuric acid and can quickly burn the skin and eat holes in clothing. If you spill acid on yourself, immediately flush the area with water.
- Battery acid could cause blindness if splashed into the eyes. If acid gets into the eyes, flush them immediately with large quantities of water and see a doctor at once.
- If you accidentally drink acid, drink a large quantity of water or milk, beaten egg or vegetable oil. Call a doctor or poison prevention center immediately
- When working with batteries, ALWAYS wear safety glasses or goggles.
- Batteries generate hydrogen gas. Hydrogen gas is very EXPLOSIVE, and is easily ignited with a small spark or flame.
- Before working with batteries, stop the engine and turn the starting switch to the OFF position.
- Avoid short-circuiting the battery terminals through accidental contact with metallic objects, such as tools, across the terminals
- Tighten the battery terminals securely. Loosened terminals can generate sparks and lead to an explosion.
- Tighten the battery cap.

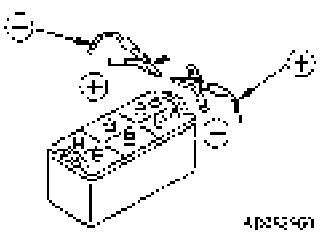


STARTING WITH BOOSTER CABLES

- ALWAYS wear safety glasses or goggles when starting the machine with booster cables.
- When starting from another machine, do not allow the two machines to touch.
- Be sure to connect the positive (+) cable first when installing the booster cables. Disconnect the ground or negative (–) cable first when removing them
- Connect the batteries in parallel: positive to positive and negative to negative.
- When connecting the ground cable to the frame of the machine to be started, be sure to connect it as far as possible from the battery

Starting with booster cables → See "16.4 IF BATTERY IS DISCHARGED".

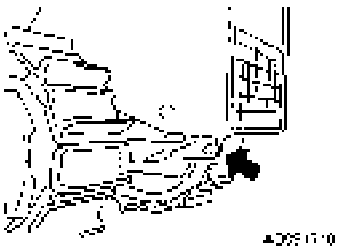
INCORRECT

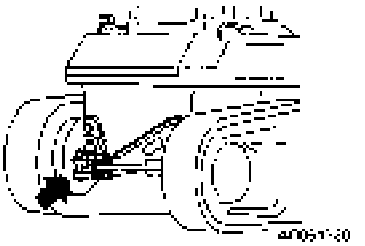



7.5 TOWING

FIT WIRE TO HOOK OR DRAWBAR PIN WHEN TOWING

- Injury or death could result if a disabled machine is towed incorrectly.
- If your machine is towed by another machine, ALWAYS use a wire rope with a sufficient towing capacity.
- If your machine is towed by another machine, stop the engine and release the brake. Please contact your Komatsu distributor to have the brake released.
- NEVER allow a disabled machine to be towed on a slope.
- Do not use a kinked or frayed wire rope.
- Do not straddle the towing cable or wire rope.
- When connecting up a towing machine, do not let anyone enter the area between the towing machine and the equipment being towed.
- Set the towing machine and the towing connection of the equipment being towed in a straight line when connecting it.
- Take up the slack in the wire rope and tow the machine.
- The maximum towing capacity for this machine is 287,000 N.
  Always carry out towing operations within the maximum towing capacity.

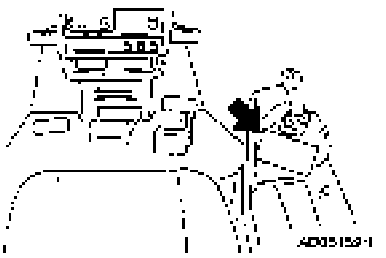




8.1 BEFORE CARRYING OUT MAINTENANCE

WARNING TAG

- If others start the engine or operate the controls while you are performing service or lubrication, you could suffer serious injury or death.
- ALWAYS attach the WARNING TAG to the control lever in the operator's cab to alert others that you are working on the machine. Attach additional warning tags around the machine, if necessary.
- These tags are available from your Komatsu distributor.



PROPER TOOLS

- Use only tools suited to the task. Using damaged, low quality, faulty, or makeshift tools could cause personal injury.
  Tools → See "21.1 INTRODUCTION OF NECESSARY TOOLS".

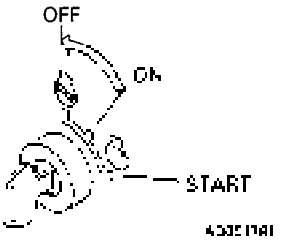
PERIODIC REPLACEMENT OF SAFETY CRITICAL PARTS

- Replace the following fire-related components periodically:
  Fuel system: Fuel hose, spilling hose, and fuel tube cap
  Hydraulic system: Pump outlet hoses
- Replace these components periodically with new ones, regardless of whether or not they appear to be defective. These components deteriorate over time.
- Replace or repair any such components if any defect is found, even though they have not reached the time specified.

Replacement of safety critical components → See "22 PERIODIC REPLACEMENT OF SAFETY CRITICAL PARTS".

STOP THE ENGINE BEFORE CARRYING OUT INSPECTION AND MAINTENANCE

- Always stop the machine on firm flat ground and stop the engine before carrying out inspection and maintenance.
- If it is necessary to run the engine when carrying out maintenance, such as when cleaning the inside of the radiator, place the safety lock lever at the LOCK position and carry out the operation with two workers.
- One worker should sit in the operator's seat so that he can stop the engine immediately if necessary. He should also be extremely careful not to touch any lever by mistake. Touch the levers only when they have to be operated.
- The worker carrying out the maintenance should be extremely careful not to touch or get caught in the moving parts.
- If maintenance is carried out with the work equipment raised, always support it securely with blocks.



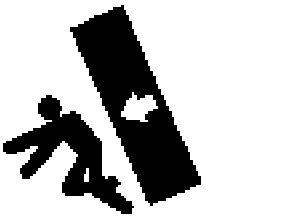
8.2 DURING MAINTENANCE

PERSONNEL

- Only authorized personnel can service and repair the machine. Extra precautions should be used when grinding, welding, and using a sledge-hammer.

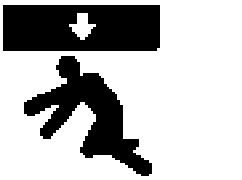
ATTACHMENTS

- Place attachments that have been removed from the machine in a safe place so that they do not fall. If they fall on you or others, serious injury could result.



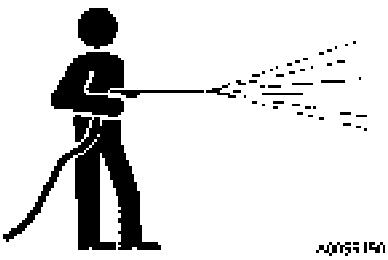
WORK UNDER THE MACHINE

- Always lower all movable work equipment to the ground or to their lowest position before performing service or repairs under the machine.
- Always block the tracks of the machine securely.
- Never work under the machine if the machine is poorly supported.



KEEP THE MACHINE CLEAN

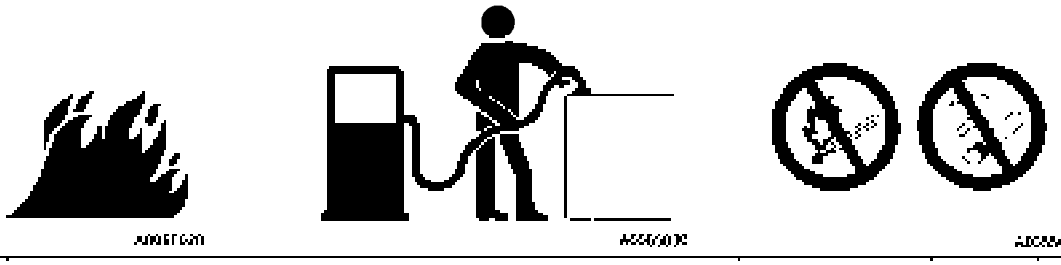
- Spilled oil or grease, or scattered tools or broken pieces are dangerous because they may cause you to slip or trip. Always keep your machine clean and tidy.
- If water gets into the electrical system, there is danger that the machine may not move or may move unexpectedly. Do not use water or steam to clean the sensors, monitors, controllers, connectors, or the inside of the operator's compartment.



⚠ WARNING: For reasons of safety, always follow these safety precautions.

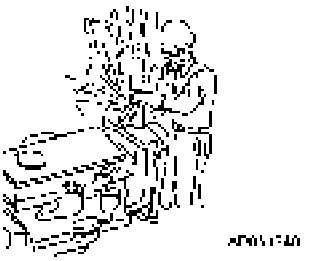
RULES TO FOLLOW WHEN ADDING FUEL OR OIL

- Spilled fuel and oil may cause you to slip, so always wipe it up immediately.
- Always tighten the cap of the fuel and oil filters securely.
- Never use fuel for washing any parts.
- Always add fuel and oil in a well-ventilated place.



RADIATOR WATER LEVEL

- When checking the water level, stop the engine and wait for the engine and radiator to cool down, then check the water level in the sub-tank. Normally, do not remove the radiator cap.
- If removing the radiator cap, turn it slowly to release the internal pressure.

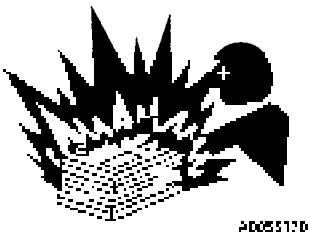


USE OF LIGHTING

- When checking fuel, oil, coolant, or battery electrolyte, always use lighting with antiexplosion specifications.
  If such lighting equipment is not used, there is danger of explosion.

PRECAUTIONS WITH BATTERY

- When repairing the electrical system or when carrying out electrical welding, remove the negative (–) terminal of the battery to stop the flow of current.

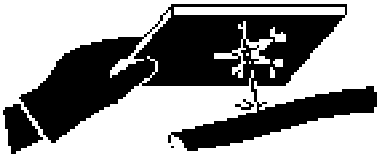


HANDLING HIGH-PRESSURE HOSES

- Do not bend high-pressure hoses or hit them with hard objects. Do not use any bent or cracked piping, tubes or hoses. They may burst during use.
- Always repair any loose or broken fuel hoses or oil hoses. If fuel or oil leaks, it may cause a fire.
- Avoid torching, soldering, or welding on pipes, tubes and equipment that contain fuel or oils. If heated, they can generate flammable fumes or mist and could cause a fire or explosion.

PRECAUTIONS WITH HIGH PRESSURE OIL

- Do not forget that the work equipment circuits are always under pressure.
- Do not add oil, drain oil, or carry out maintenance or inspection before completely releasing the internal pressure.
- If oil is leaking under high pressure from small holes, it is dangerous if the jet of high-pressure oil hits your skin or enters your eyes. Always wear safety glasses and thick gloves, and use a piece of cardboard or a sheet of wood to check for oil leakage.
- If you are hit by a jet of high-pressure oil, consult a doctor immediately for medical attention.



PRECAUTIONS WHEN CARRYING OUT MAINTENANCE AT HIGH TEMPERATURE OR HIGH PRESSURE

- Immediately after stopping operations, the engine cooling water and oil at all parts is at high temperature and under high pressure.
  In this condition, if the cap is removed, or the oil or water are drained, or the filters are replaced, this may result in burns or other injury. Wait for the temperature to go down, then carry out the inspection and maintenance in accordance with the procedures given in this manual.

Clean inside or cooling system — See "24.2 WHEN REQUIRED".

Check cooling water level, lubricating oil level, hydraulic oil level
→ See "24.3 CHECK BEFORE STARTING".

Checking final drive case → See "24.4 PERIODIC MAINTENANCE".

Changing oil, replacing filters — See "24.5 – 7 PERIODIC MAINTENANCE".

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PRECAUTIONS WHEN USING HIGH PRESSURE GREASE TO ADJUST TRACK TENSION

Grease is pumped into the track tension adjustment system under high pressure.
If the specified procedure for maintenance is not followed when making adjustments, the plug or grease fitting may fly out and cause damage or personal injury.

- When loosening the grease drain plug, never loosen it more than one turn.
- Never put your face, hands, feet, or any other part of your body directly in front of any grease drain plug or valve.

Adjusting track tension → See "24.2 WHEN REQUIRED".

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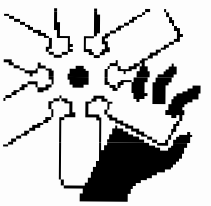
ROTATING FAN AND BELT

- Keep away from rotating parts and be careful not to let anything get caught in them.
- If your body or tools touch the fan blades or fan belt, they may be cut off or sent flying, so never touch any rotating parts.



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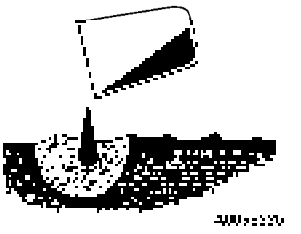
WASTE MATERIALS

- Never dump waste oil in a sewer system, rivers, etc.
- Always put oil drained from your machine in containers. Never drain oil directly on the ground.
- Obey appropriate laws and regulations when disposing of harmful objects such as oil, fuel, coolant, solvent, filters, batteries, and others.

INCORRECT



9. POSITION FOR ATTACHING SAFETY LABELS AND STORAGE OF OPERATION & MAINTENANCE MANUAL

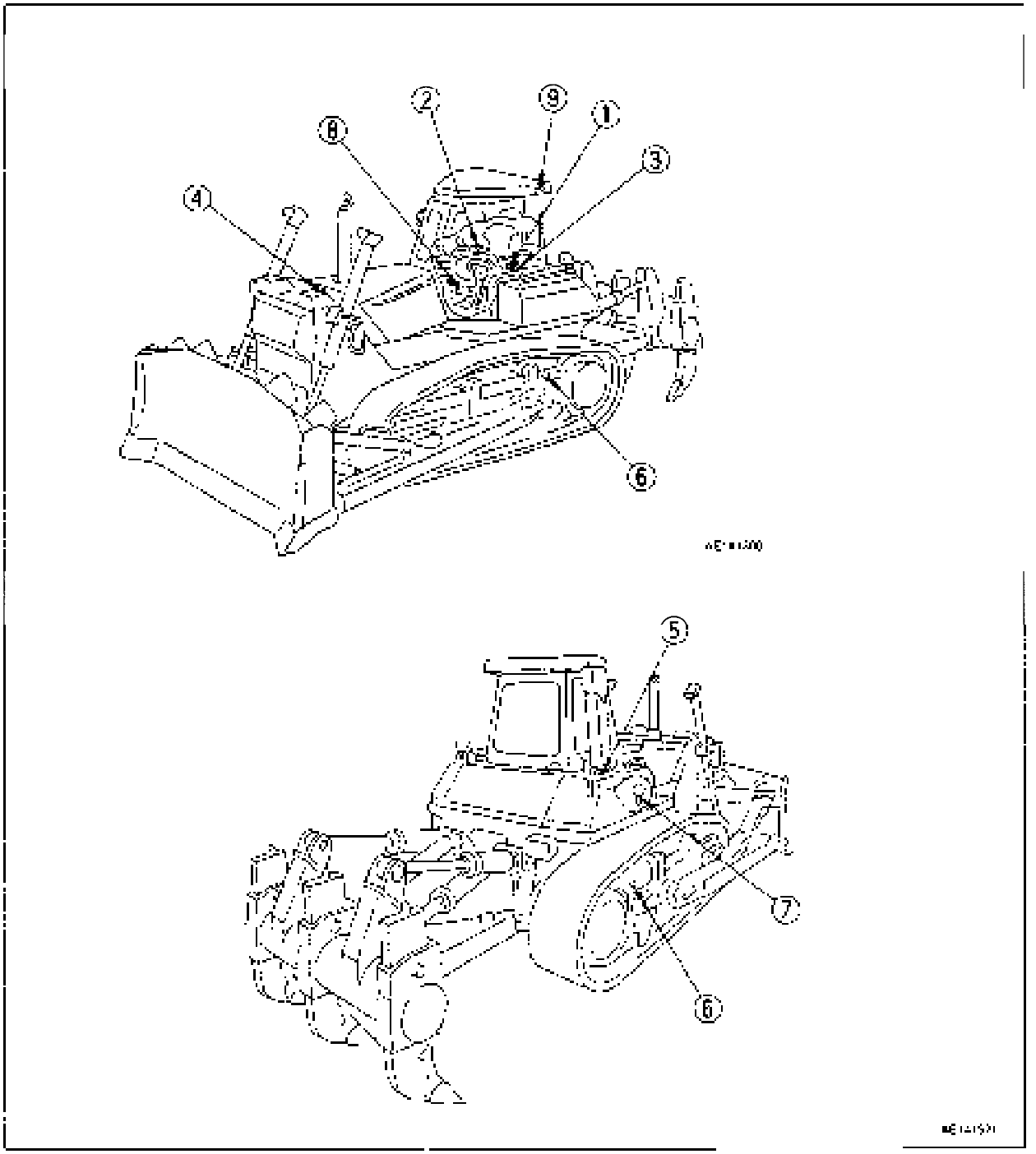
Always keep these labels clean. If they are lost or damage, attaching them again or replace them with a new label.

There are other labels in addition to the safety labels listed as follows, so handle them in the same way.

Safety labels may be available in languages other than English.

To find out what labels are available, contact your Komatsu distributor.

9.1 POSITION FOR ATTACHING SAFETY LABELS



1. Warnings before operating machine (14X-98-11580)

⚠ WARNING

Improper operation and maintenance can cause serious injury or death.

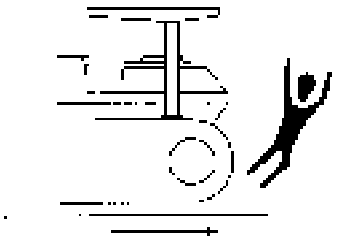
Read manual and labels before operation and maintenance. Follow instructions and warnings in manual and in labels on machine.

Keep manual in machine cab near operator. Contact Komatsu distributor for a replacement manual.

14X-98-11580

2. Warnings before moving in reverse (14X-98-11590)

⚠ WARNING



Before moving machine or its attachments:
- **Honk horn to alert people nearby.**
- **Be sure no one is on machine area.**
- **Use spotter if necessary, particularly if you are moving in reverse.**

Follow above even if equipped with back-up alarm and mirrors.

14X-98-11590

3. Warnings for leaving operator's seat (14X-98-11541)

⚠ WARNING

To avoid hitting unlocked operation levers, before standing up from operator's seat, do the following:
- **Move steering and directional lever neutral and move SAFETY LOCK LEVER (located left of seat) to LOCK position.**
- **Lower equipment to ground and move SAFETY LOCK LEVER (located right of seat) to LOCK position.**

Sudden and unwanted machine movement can cause serious injury or death.

14X-98-11541

4. Warnings for hot water hazard (14X-98-11531)

⚠ WARNING

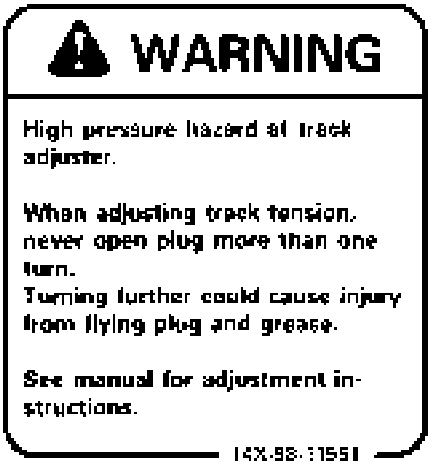
Hot water hazard.

To prevent hot water from spurting out:
- **Turn engine off.**
- **Allow water to cool.**
- **Slowly loosen cap to relieve pressure before removing.**

14X-98-11531

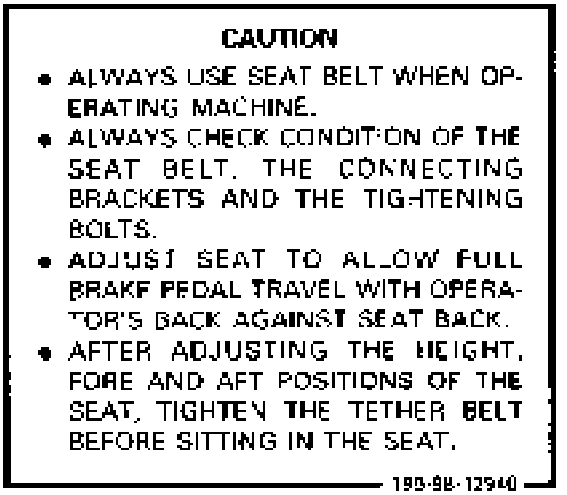
5. Warnings for hot oil hazard
(14X-98-11521)

6. Warnings for adjusting track tension
(14X-98-11551)

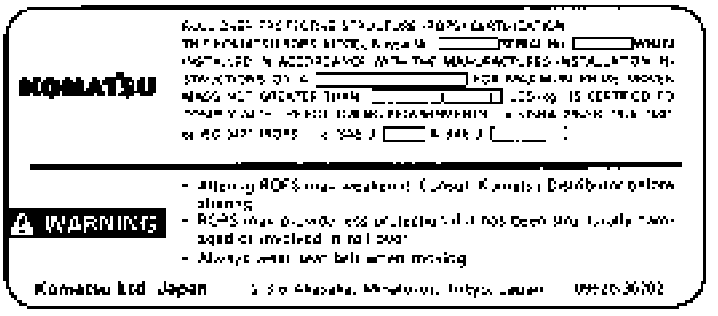


7. Warning for handling accumulator
(14X-98-11390)

8. Warning for use of seat belt
(195-98-12940)

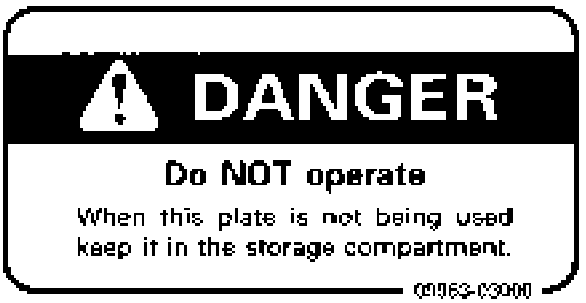


9. Warning for ROPS
(09620-30202)



9.2 Content and use of warning plates

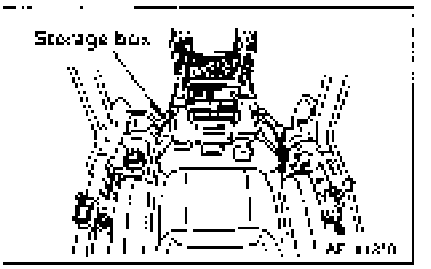
1. Warning to prevent operation during maintenance
(09963-03000)
Hang this warning plate on the controls in the operator's compartment.



2. Warning to prevent entry during maintenance
Display this sign around the bulldozer.

9.3 PLACE FOR STORING MANUAL

To make it possible to read the Operation and Maintenance Manual at any time and to prevent loss of the manual, keep the manual in the storage box provided in the door pocket inside cab.

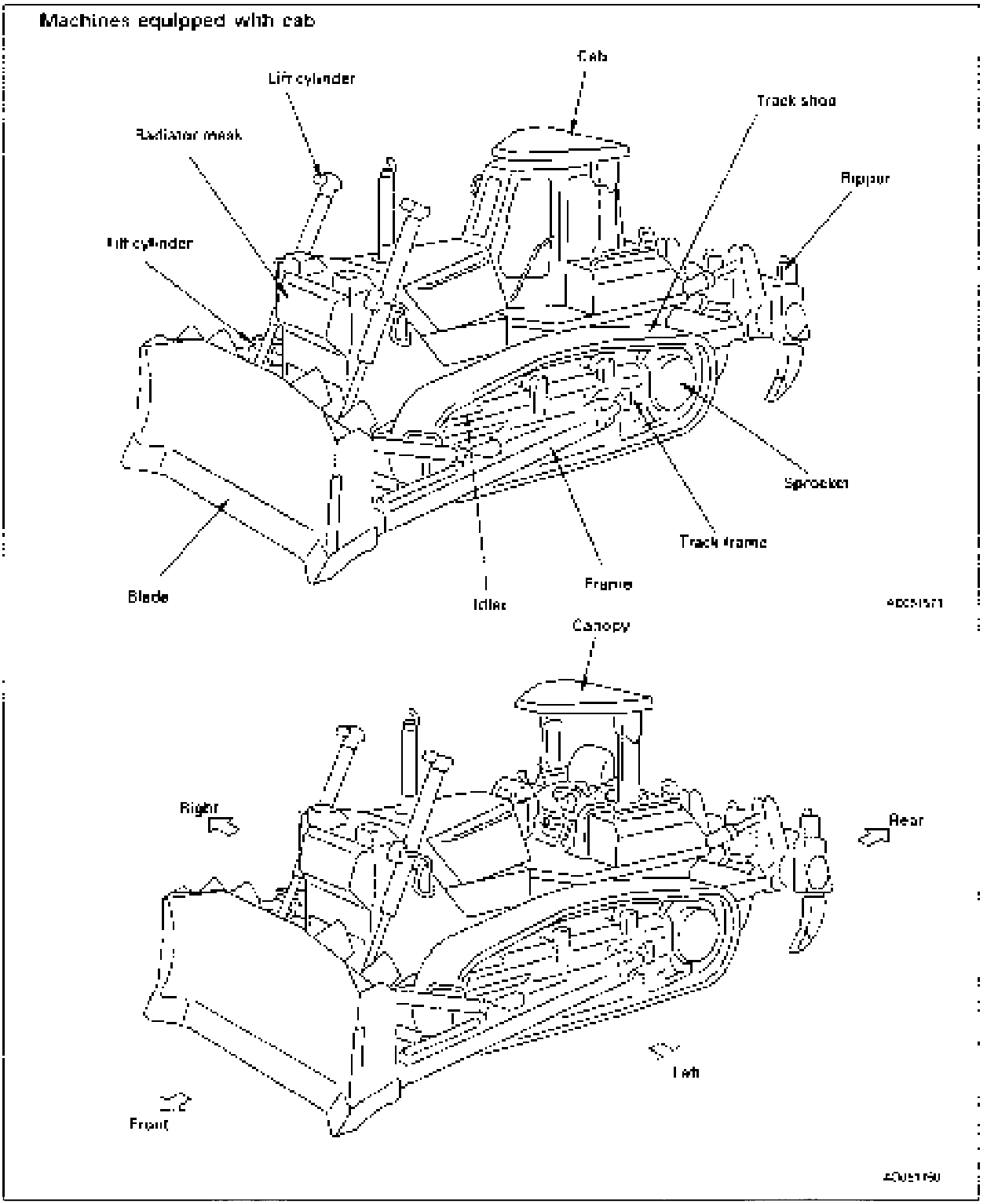


MEMO

OPERATION

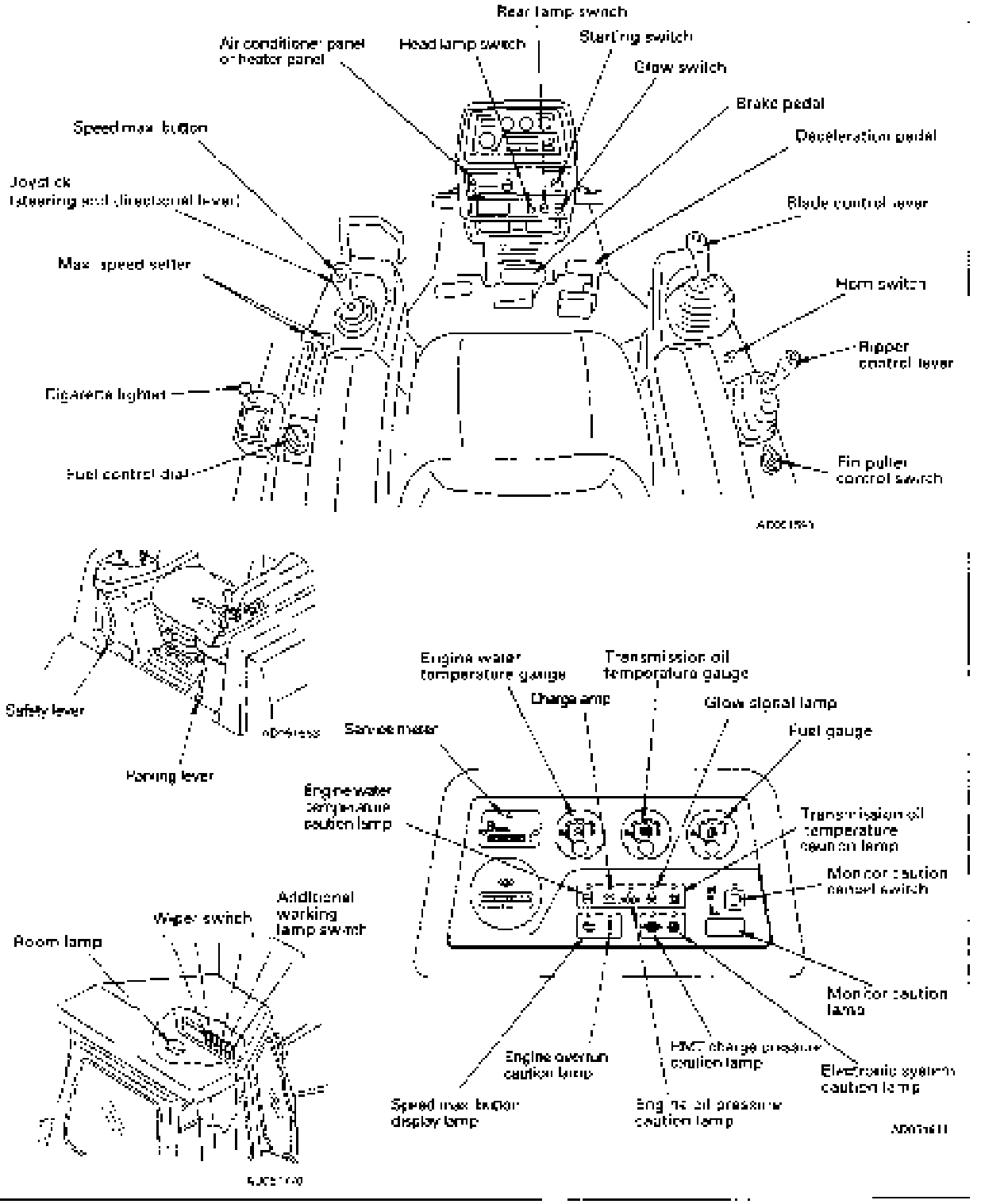
10.1 GENERAL VIEW OF MACHINE

If directions are indicated in this section, they refer to the directions shown by the arrows in the diagram below.

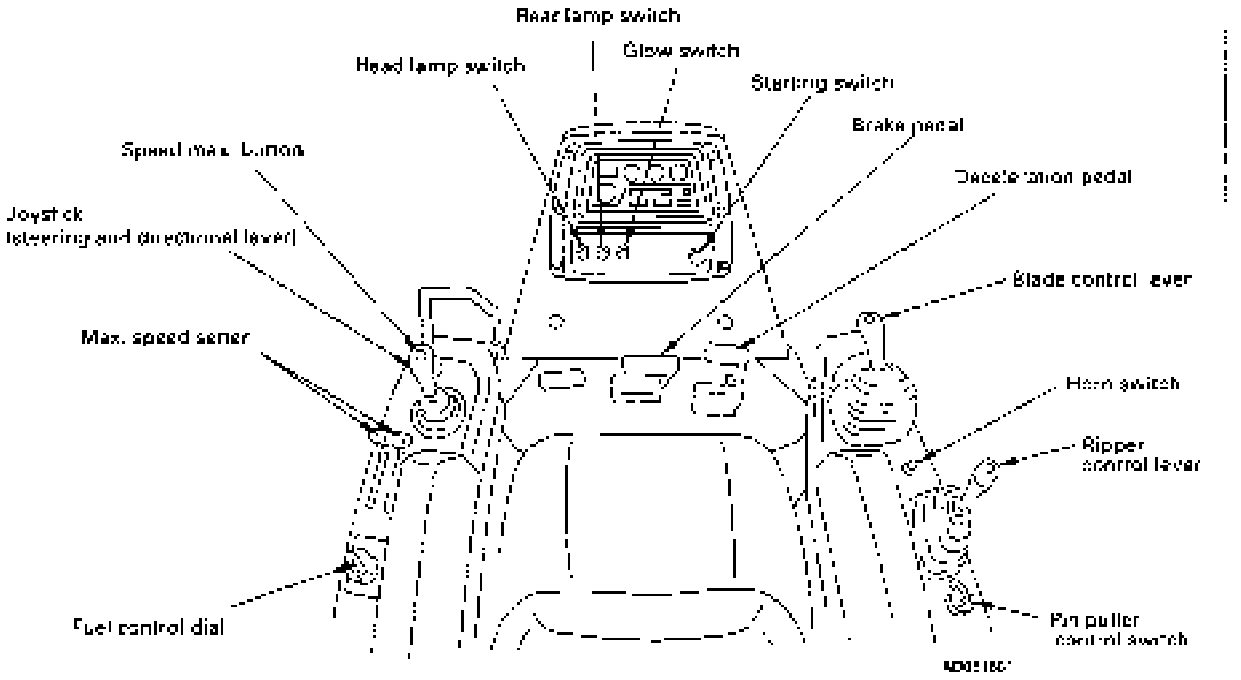


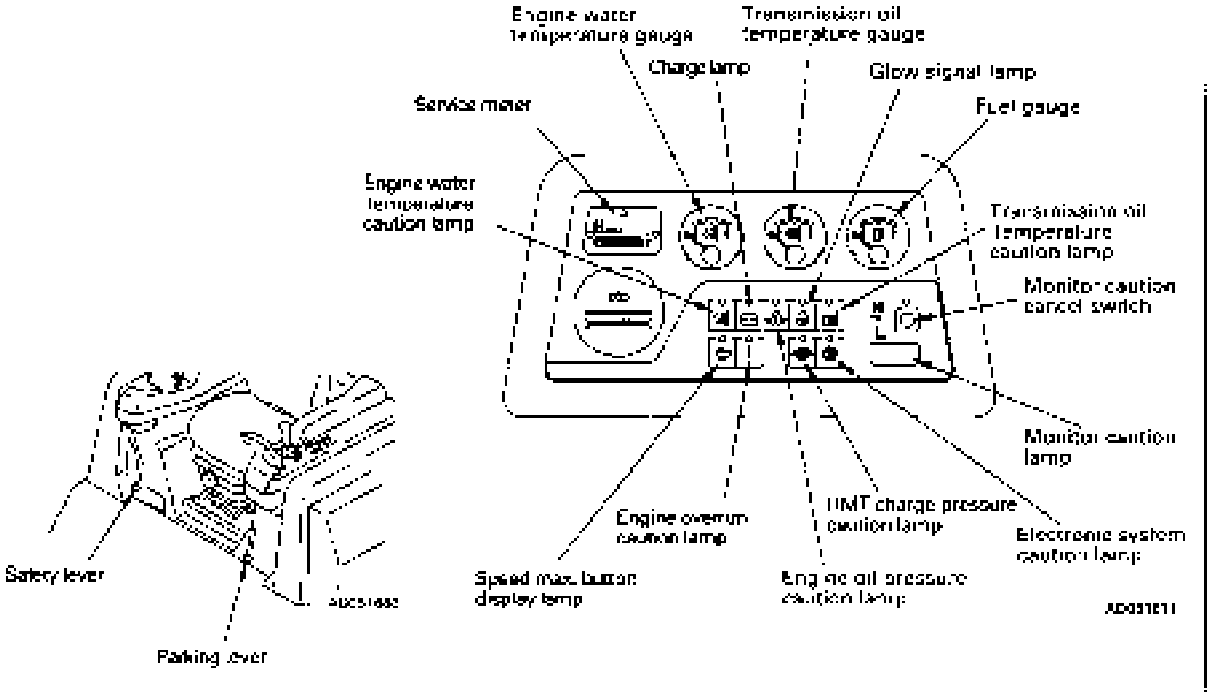
10.2 GENERAL VIEW OF CONTROLS AND GAUGES

Machines equipped with cab
Monitor panel specification



Machines equipped with canopy
Monitor panel specification





11. EXPLANATION OF COMPONENTS

The following is an explanation of the devices needed for operating the machine.

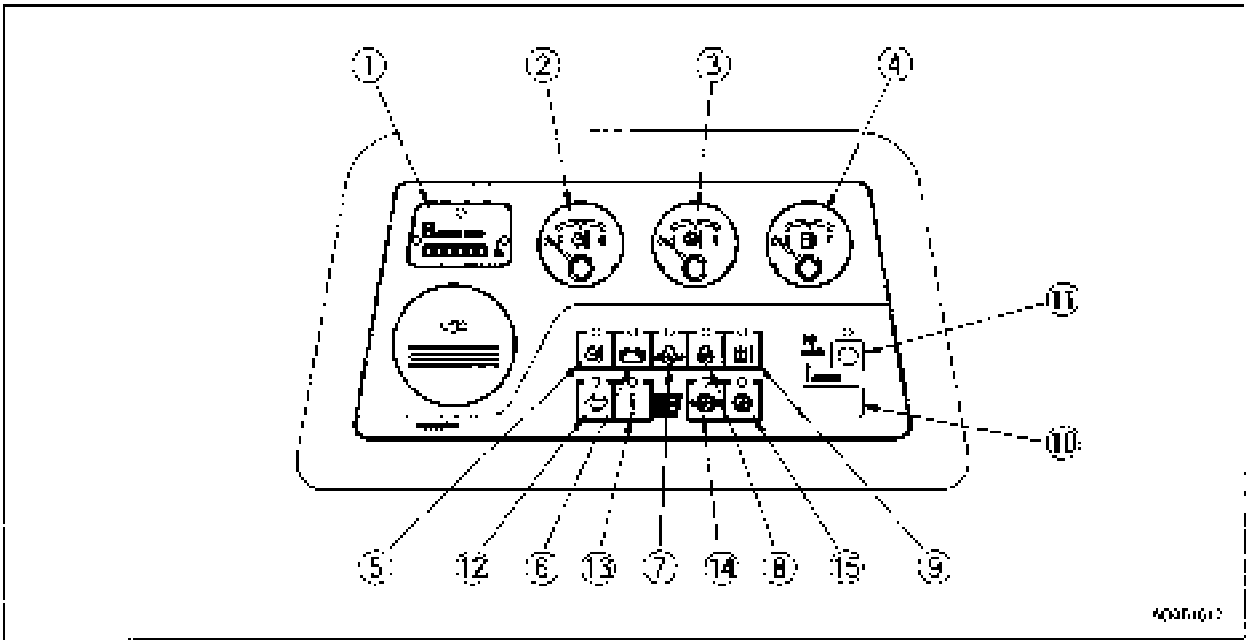
To carry out suitable operations correctly and safely, it is important to understand fully the methods of operating the equipment and the meanings of the displays.

Before reading the explanation of components, please read the table below to check what equipment is installed to your machine.

Equipment	Section No.	D155AX-3	
		Canopy	Cab
Front panel			
Monitor panel	11.1.1	○	○
Gauge panel		–	–
Air conditioner panel	11.1.2	–	○
Heater panel	11.1.3	–	○
Switch panel (cab)	11.1.4	–	○
Switch panel (canopy)	11.1.5	○	–
Switches			
Horn switch	11.2 1	○	○
Room lamp switch	11.2 2	–	○
Cigarette lighter	11.2 3	–	○
Wiper switch	11.2 4	–	○
Additional working lamp switch	11.2 5	–	○
Dial, control levers, pedals, switches			
Fuel control dial	11.3 1	○	○
Joystick (with speed max. button) (Counterrotation turning possible)	11.3 2	○	○
Max. speed setter	11.3 3	○	○
Brake pedal	11.3 4	○	○
Decelerator pedal	11.3 5	○	○
Parking lever	11.3 6	○	○
Safety lever (for blade control lever, ripper control lever)	11.3 7	○	○
Blade control lever	11.3 8		
Power tiltdozer specification		○	○
Power tilt, power pitch dozer specification		○	○
Angle dozer specification			○
Engine			
Dust indicator	11.4	○	○

11.1 FRONT PANEL (METERS, LAMPS, SWITCHES)

11.1.1 MONITOR PANEL (MONITOR PANEL SPECIFICATION)



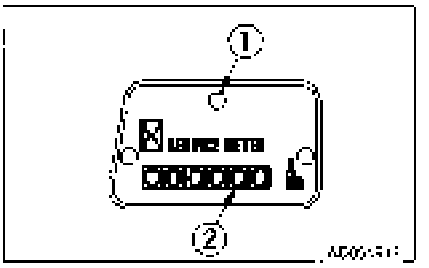
1. SERVICE METER

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

Set the periodic maintenance intervals using this display.

When the engine is running, the green pilot lamp ① at the top of the meters flashes to indicate that the meter is advancing.

Meter ② will advance by 1 for each hour of operation regardless of the engine speed.



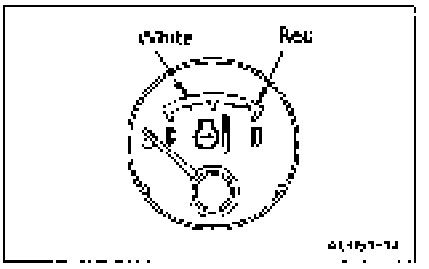
2. ENGINE WATER TEMPERATURE GAUGE

This gauge indicates the cooling water temperature.

When the indicator is in the white range during operation, the water temperature is normal.

If the indicator moves from the white range into the red range during operation, stop the machine immediately, run the engine under no load at a mildrange speed, and wait for the indicator to go down to the white range.

After starting the engine, warm up it until the indicator moves into the white range.

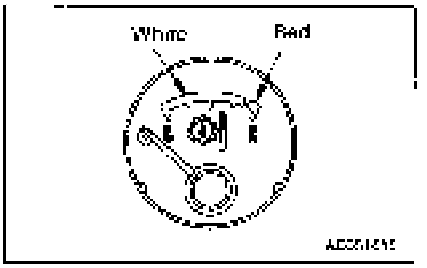


3. TRANSMISSION OIL TEMPERATURE GAUGE

This indicates the temperature of the transmission lubricating oil.

When the indicator is in the white range during operation, the oil temperature is normal.

If the indicator moves from the white range into the red range during operation, stop the machine, run the engine under no load at a midrange speed, and wait for the indicator to go down to the white range.



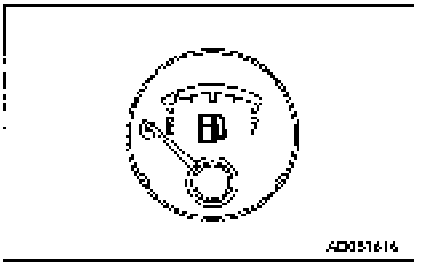
4. FUEL GAUGE

When the starting switch is turned ON, this displays the amount of fuel remaining in the fuel tank.

F indicates a full tank.

When the indicator points to E, it indicates that there is less than 60 ℓ (15.84 US gal, 13.20 UK gal) remaining, so add fuel.

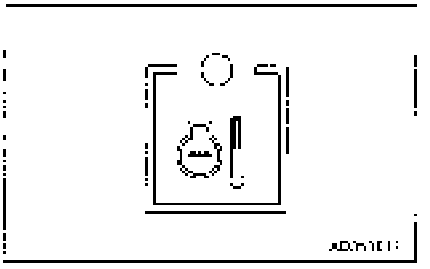
Always fill the tank after finishing operations.



5. ENGINE WATER TEMPERATURE CAUTION LAMP

This warns of a rise in the temperature of the engine cooling water.

If the lamp lights up, stop the machine, run the engine under no load at a midrange speed, and wait for the indicator of the engine water temperature gauge to go down to the white range.

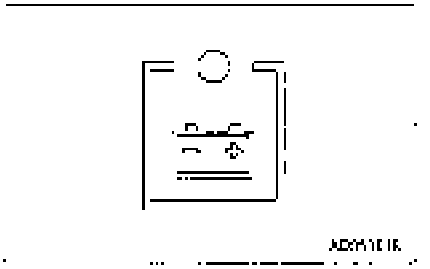


6. CHARGE LAMP

This lamp indicates malfunction of the alternator.

When the starting switch is turned ON, it will light up, but it should go out when the engine speed rises.

If the lamp lights up during operation, stop the engine and check the V-belt tension. If any abnormality is found, see "16. TROUBLESHOOTING".



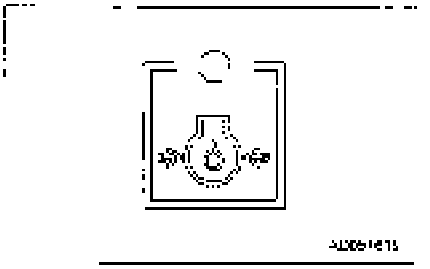
7. ENGINE OIL PRESSURE CAUTION LAMP

This lamp warns that the engine lubricating oil pressure has dropped. When the starting switch is turned ON, it will light up.

When the lamp goes off after the engine is started, the oil pressure is normal.

When the lamp lights up during operation, the oil pressure is lower.

Immediately stop the engine and look for the cause. For details, see "16. TROUBLESHOOTING".



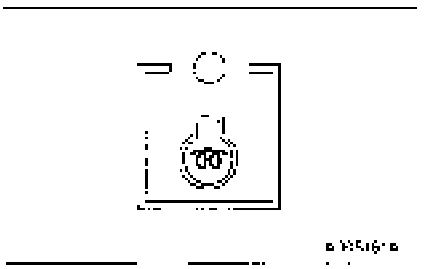
8. GLOW SIGNAL LAMP

This indicates the electrical intake air heater is red-heated.

While preheating is being carried out with the glow switch, the lamp lights up.

In the case of automatic preheating, the lamp goes out when the preheating is completed.

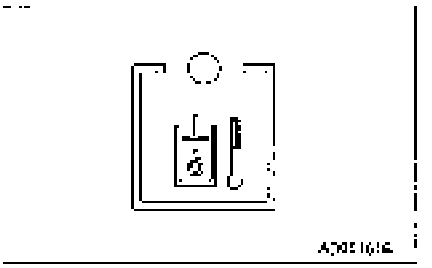
In the case of manual preheating, the lamp goes out when the glow switch is released.



9. HMT HYDRAULIC OIL TEMPERATURE CAUTION LAMP

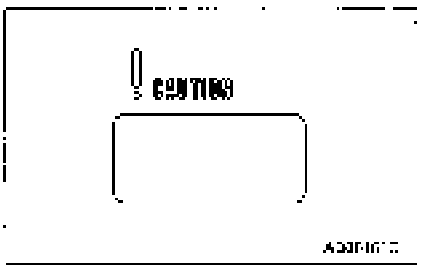
This warns the operator that the oil temperature at the transmission outlet port has risen

If the lamp lights up, stop the machine, run the engine under no load at a mid-range speed, and wait for the transmission oil temperature gauge to go down to the white range.



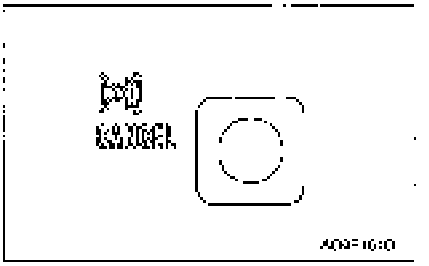
10. MONITOR CAUTION LAMP

If any of caution lamps 5, 6, 7, 9, 13, 14 or 15 light up or flash, the monitor caution lamp lights up. In addition, the alarm buzzer sounds at the same time.



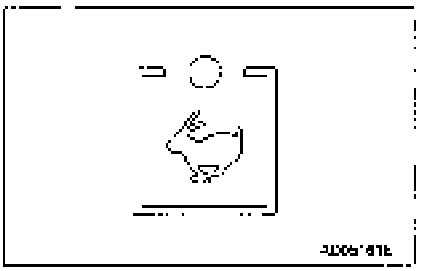
11. MONITOR CAUTION CANCEL SWITCH

This switch is used to cancel monitor caution lamp . Press the switch to turn the monitor caution lamp out and to stop the alarm buzzer.



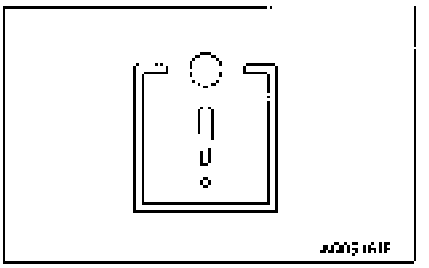
12. SPEED MAX. BUTTON DISPLAY LAMP

If the button at the top of the joystick knob is pressed, the transmission is switched to the maximum travel speed and the lamp lights up. If the button is pressed again, the travel speed returns to the speed set by the max. speed setter and the lamp goes out. (The lamp lights up only when the joystick is set to FORWARD or REVERSE.)



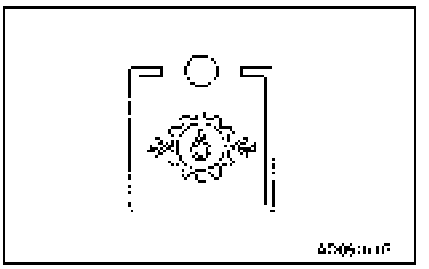
13. ENGINE OVERRUN CAUTION LAMP

If the engine speed goes above 2700 rpm, the lamp flashes and the alarm buzzer sounds at the same time to warn the operator of the abnormality. When the speed goes below 2600 rpm, the lamp goes out and the alarm buzzer stops. If there is any abnormality, apply the brakes, lower the work equipment to the ground and set the max. speed setter to the low speed position to reduce the travel speed and engine speed.

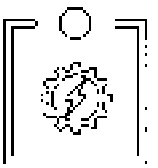


14. HMT CHARGE PRESSURE CAUTION LAMP

If any drop in the HMT charge pressure is detected by the pressure detector, the lamp flashes and the alarm buzzer sounds at the same time to warn the operator. If there is any abnormality, stop the engine immediately and contact your Komatsu distributor.



15. ELECTRONIC SYSTEM CAUTION LAMP (HMT GOVERNOR CONTROLLER)



⚠ WARNING

If this caution lamp flashes, the machine may move in a different way from that intended by the operator. If such a problem occurs, use the foot brake to stop the machine.

If HMT controller detects any abnormality in the machine or HMT controller itself, this lamp flashes to warn the operator. In such case, stop the engine and contact your Komatsu distributor.

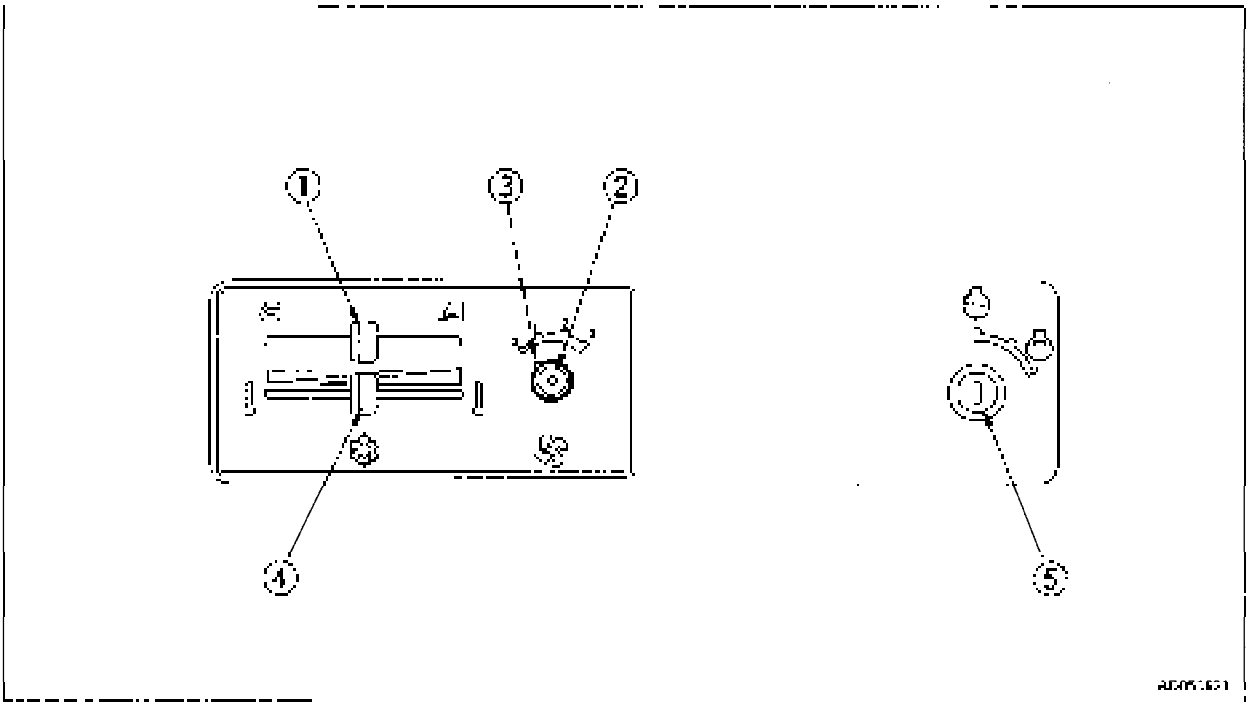
REMARK

The alarm buzzer sounds in the following cases.

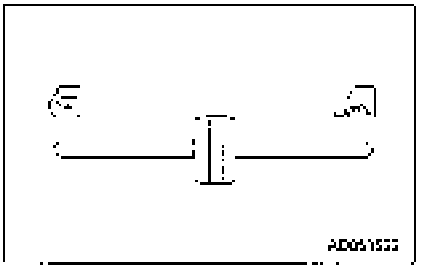
1. When the engine water temperature is abnormally high
2. When the engine oil pressure is abnormally low
3. When the HMT hydraulic oil temperature is abnormally high
4. When the engine overruns
5. When the HMT charge pressure is abnormally low
6. When there is any abnormality in the HMT controller itself

When the starting switch is turned to the ON position, the buzzer sounds for approx. 1 second, but this is to check the function of the buzzer. It does not indicate any abnormality.

11.1.2 AIR CONDITIONER PANEL [MACHINES EQUIPPED WITH CAB, AIR CONDITIONER]

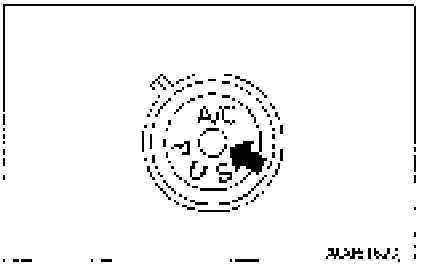


For details of handling switches ① to ⑤ below, see "11.14 HANDLING AIR CONDITIONER".



1. **FRESH/RECIRC SELECTOR LEVER**
   This changes the air intake port used when cooling or heating.
   * RECIRC ( ) uses the air inside the cab.
   Turn the switch normally to this position when strong cooling is needed. In this position, no ventilation or pressurizing is carried out.
   * FRESH ( ) takes in outside air.
   This is the standard position for cooling and heating.
   In this position, fresh air is brought in from outside to carry out ventilation. In addition, the inside of the cab is pressurized to prevent the entry of dust.

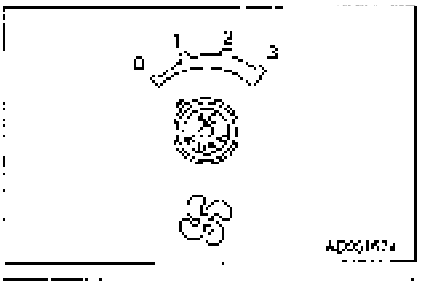
2. **AIR CONDITION SWITCH**
   When the switch is pressed and the blue lamp lights up, the cooling function is actuated. Use this switch for cooling or dehumidifying.



3. BLOWER SWITCH

This acts as the wind flow control switch and main switch when cooling or heating.

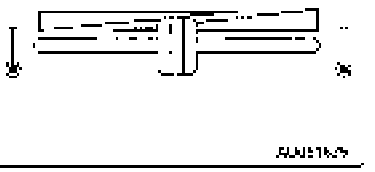
- The air flow can be set to three stages: 1 (LOW) → 2 (MEDIUM) → 3 (HIGH).
- If the switch is set to 0, the power is switched off and the air conditioner stops.



4. TEMPERATURE CONTROL LEVER

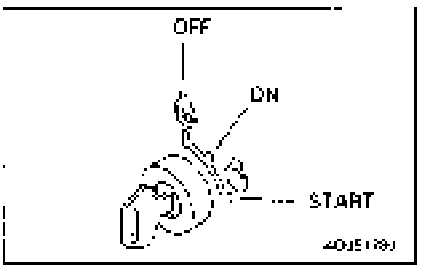
This is used to control the temperature for cooling or heating.

- When the temperature control lever is moved to the right, the temperature of the air coming from the vents becomes lower. (The water valve is closed and the heating function is stopped.)
- When the temperature control lever is moved to the left, the temperature of the air coming from the vents becomes higher. (The water valve is opened and the heating function is started.)



5. STARTING SWITCH

This switch is used to start the engine.



OFF ( ) position:

At this position, the starting switch key can be inserted or removed. When the switch is turned to this position, the electrical circuits are switched off.

Do not the starting switch key at the OFF position while the engine is running.

ON position:

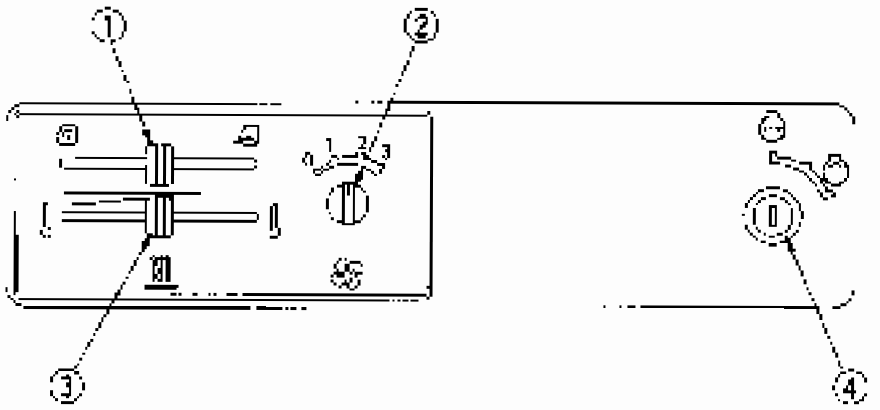
In this position, electric current flows in the charging and lamp circuits.

Keep the starting switch key at the ON position while the engine is running.

START ( ) position:

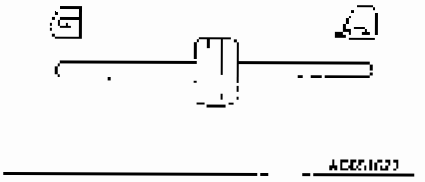
This is the position to start the engine. Hold the key at this position while cranking. Release the key immediately after the engine has been started. The key will return to ON position when released.

11.1.3 HEATER PANEL (MACHINES EQUIPPED WITH CAB, HEATER)



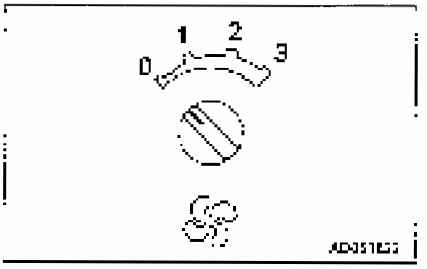
AD051631

For details of handling switches 1 to 4 below, see "11.15 HANDLING HEATER".



AD051623

1. **FRESH/RECIRC SELECTOR LEVER**
   This changes the air intake port used when cooling or heating.
   - RECIRC ( ) uses the air inside the cab.
     Turn the switch normally to this position when strong cooling is needed. In this position, no ventilation or pressurizing is carried out.
   - FRESH ( ) takes in outside air.
     This is the standard position for cooling and heating.
     In this position, fresh air is brought in from outside to carry out ventilation. In addition, the inside of the cab is pressurized to prevent the entry of dust.



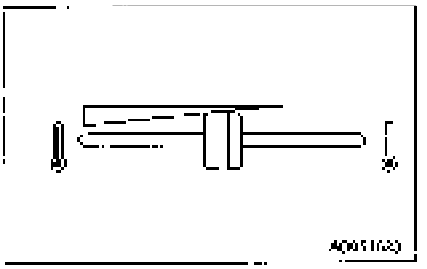
AD051632

2. **BLOWER SWITCH**
   This acts as the wind flow control switch and main switch when cooling or heating.
   - The air flow can be set to three stages: 1 (LOW) → 2 (MEDIUM) → 3 (HIGH).
   - If the switch is set to 0, the power is switched off and the heater stops.

3. TEMPERATURE CONTROL LEVER

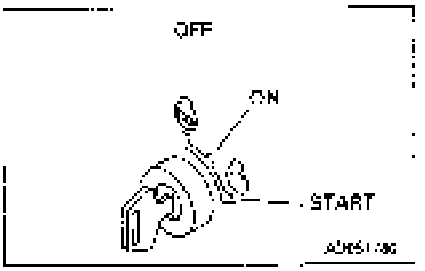
This is used to control the temperature for heating.

- When the temperature control lever is moved to the right, the temperature of the air coming from the vents becomes lower.
- When the temperature control lever is moved to the left, the temperature of the air coming from the vents becomes higher.



4. STARTING SWITCH

This switch is used to start the engine.



OFF ( ) position:

At this position, the starting switch key can be inserted or removed. When the switch is turned to this position, the electrical circuits are switched off.

Do not the starting switch key at the OFF position while the engine is running.

ON position:

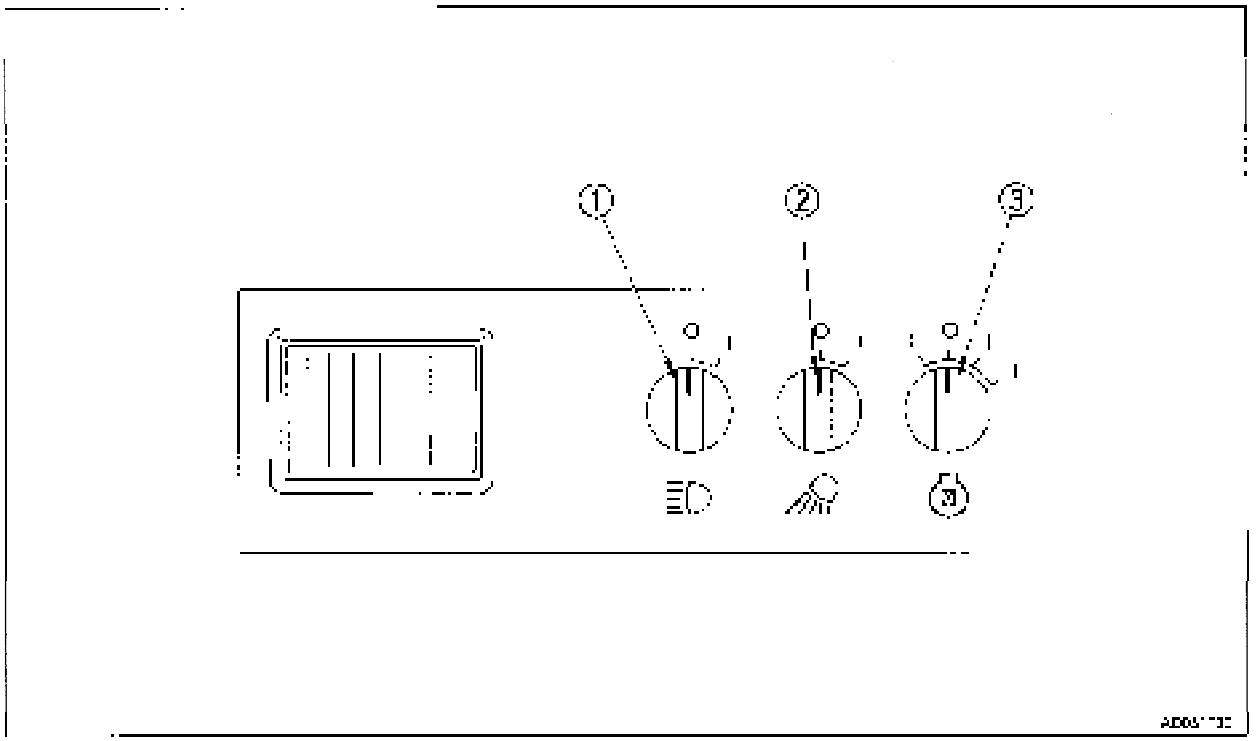
In this position, electric current flows in the charging and lamp circuits.

Keep the starting switch key at the ON position while the engine is running.

START ( ) position:

This is the position to start the engine. Hold the key at this position while cranking. Release the key immediately after the engine has been started. The key will return to ON position when released.

11.1.4 SWITCH PANEL (MACHINES EQUIPPED WITH CAB)

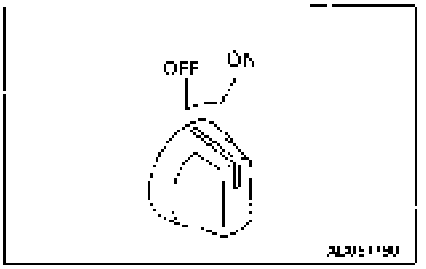


1. HEAD LAMP SWITCH

This lights up the head lamps.

OFF position: Lamps are out

ON position: Lamps light up

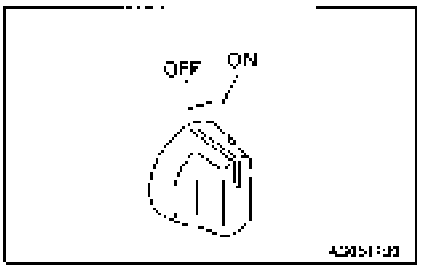


2. REAR LAMP SWITCH

This lights up the rear lamps.

OFF position: Lamps are out

ON position: Lamps light up



8. GLOW SWITCH

This actuates the electrical heater to warm up the engine intake air.

A00519

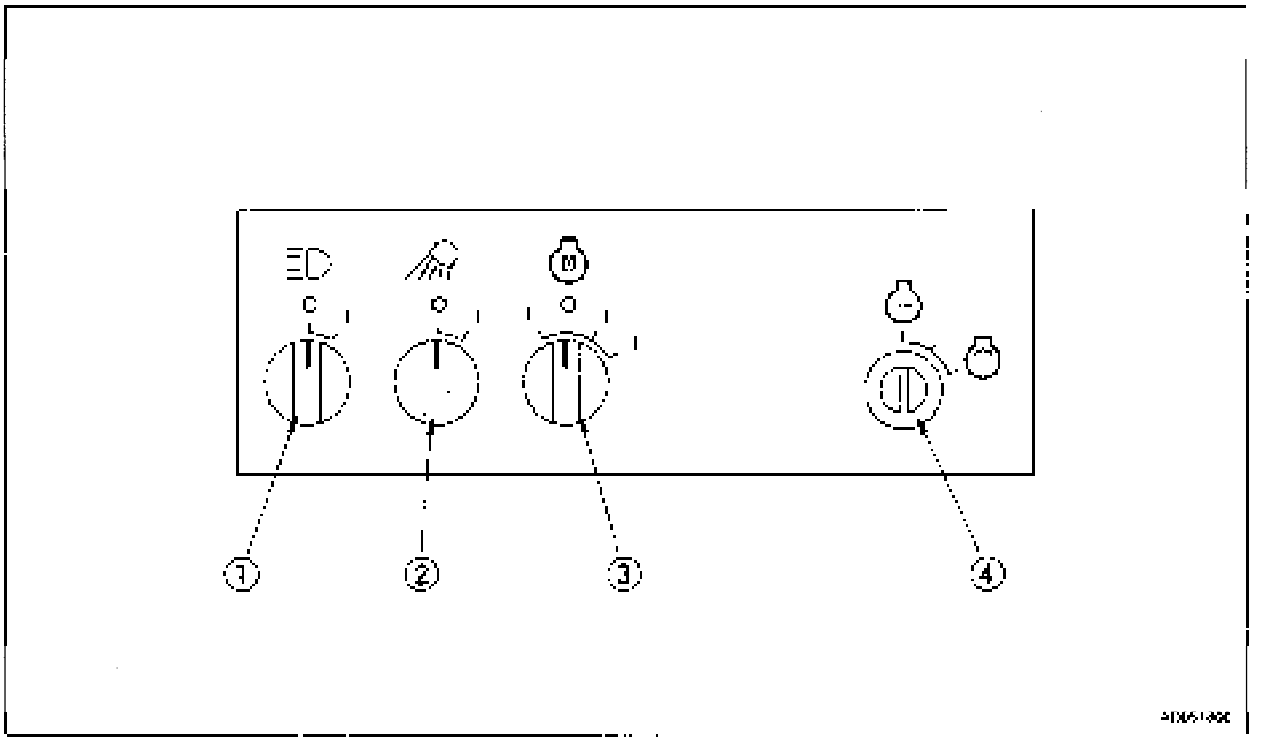
OFF position: The preheating is not actuated.

AUTO position: AUTO preheating is actuated. The length of the preheating time varies according to the ambient temperature when the ambient temperature is below approx. –5°C.

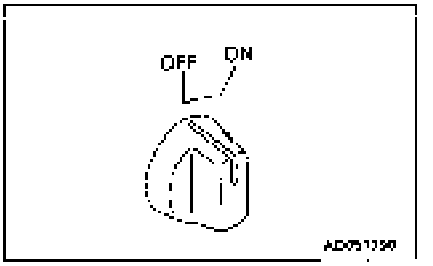
I position: This is used when AUTO preheating is not enough to start the engine in cold weather simply with the glows witch at the AUTO position.
When the switch is released, it will return to the AUTO position.

II position: This is used when carrying out preheating manually without using AUTO preheating.
When the switch is released, it will return to the OFF position.

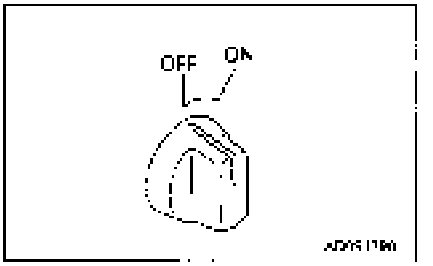
11.1.5 SWITCH PANEL (MACHINES EQUIPPED WITH CANOPY)



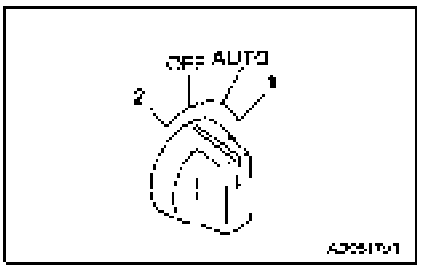
1. **HEAD LAMP SWITCH**
   This lights up the head lamps.
OFF position: Lamps are out
ON position: Lamps light up



2. **REAR LAMP SWITCH**
   This lights up the rear lamps.
OFF position: Lamps are out
ON position: Lamps light up



3. GLOW SWITCH (MONITOR PANEL SPECIFICATION)



This actuates the electrical heater to warm up the engine intake air.

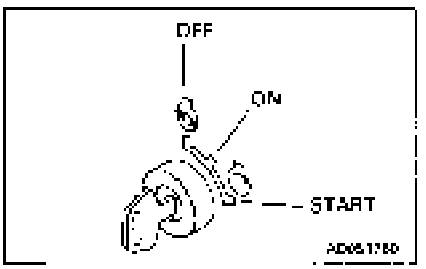
OFF position: The preheating is not actuated.

AUTO position: AUTO preheating is actuated. The length of the preheating time varies according to the ambient temperature when the ambient temperature is below approx. –5°C.

I position: This is used when AUTO preheating is not enough to start the engine in cold weather simply with the glow switch at the AUTO position.
When the switch is released, it will return to the AUTO position.

II position: This is used when carrying out preheating manually without using AUTO preheating.
When the switch is released, it will return to the OFF position.

4. STARTING SWITCH



This switch is used to start the engine.

OFF ( ) position:

At this position, the starting switch key can be inserted or removed. When the switch is turned to this position, the electrical circuits are switched off.

Do not the starting switch key at the OFF position while the engine is running.

ON position:

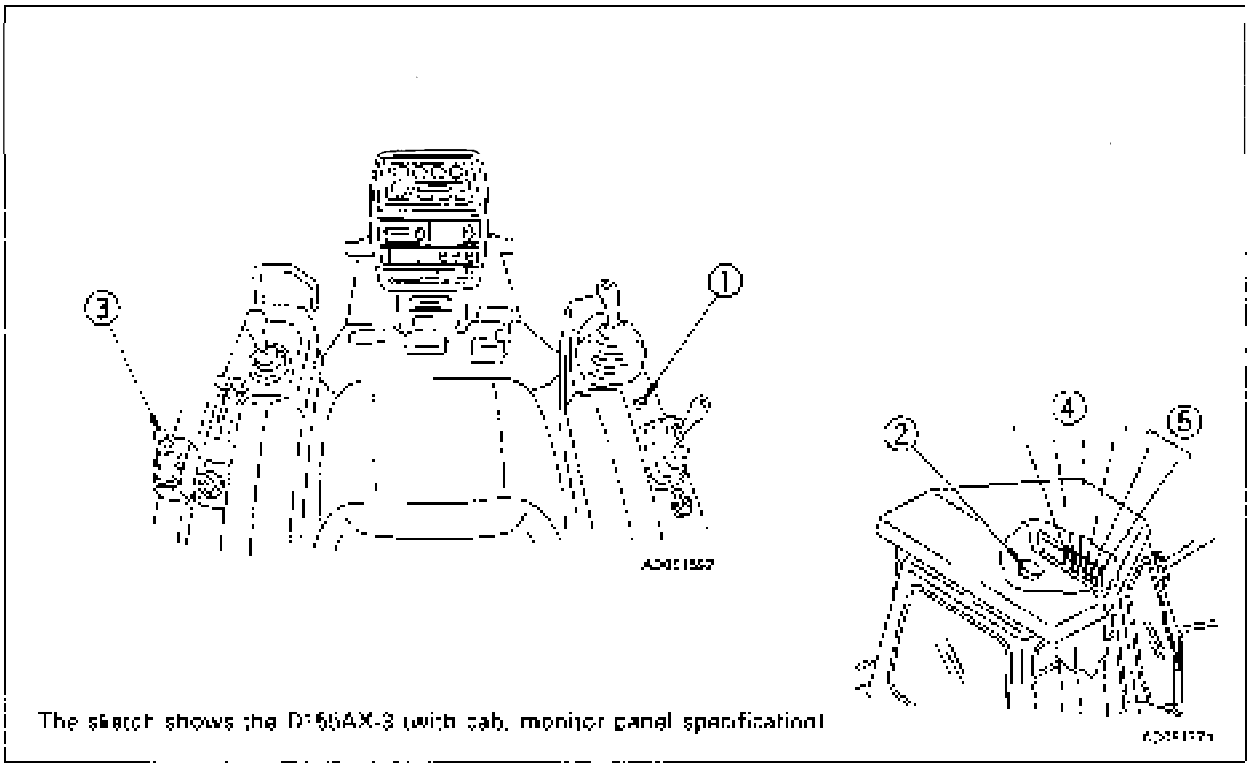
In this position, electric current flows in the charging and lamp circuits.

Keep the starting switch key at the ON position while the engine is running.

START ( ) position

This is the position to start the engine. Hold the key at this position while cranking. Release the key immediately after the engine has been started. The key will return to ON position when released.

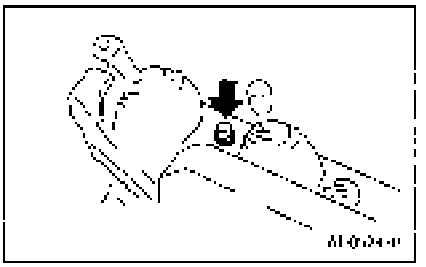
11.2 SWITCHES



The sketch shows the D16AX-3 (with cab, monitor panel specification)

1. HORN SWITCH

The horn sounds when the button at the rear of the blade control lever at the right side of the operator's seat is pressed.

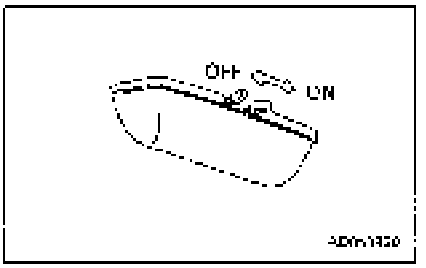


2. ROOM LAMP SWITCH (MACHINES EQUIPPED WITH CAB)

This lights up the room lamp.

ON position: Lamp lights up

OFF position: Lamp is out



3. CIGARETTE LIGHTER (MACHINES EQUIPPED WITH CAB)

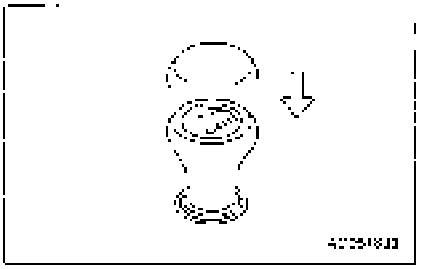
This is used to light cigarettes

When the cigarette lighter is pushed in, it will return to its original position after a few seconds, so take it out to light your cigarette.

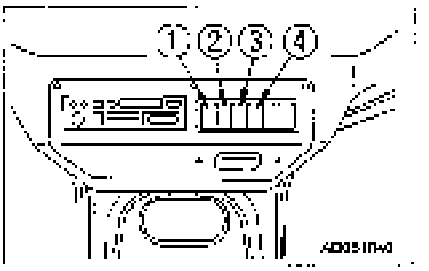
NOTICE

This cigarette lighter is 24V. Do not use it as the power source for 12 V equipment.

The capacity of the cigarette lighter is 120 W.

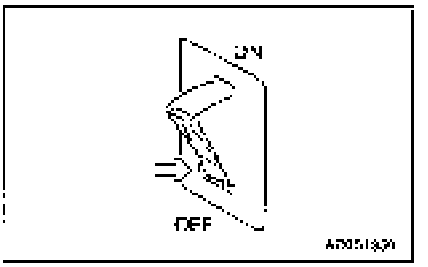


4. WIPER SWITCH (MACHINES EQUIPPED WITH CAB)
This activates the wipers.
The wiper switches are as follows.
① Left door
② Front window
③ Right door
④ Rear window

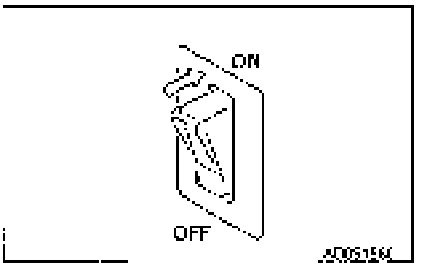


This is also used as the window washer switch.
The switch is operated as follows.

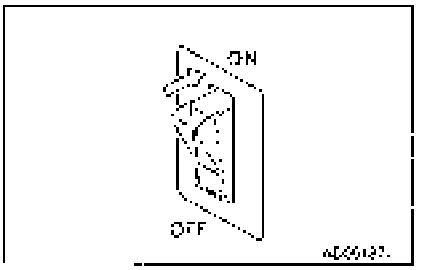
- Window washer only
  Keep the switch pressed to the OFF position to spray out water.



- Wiper only
  If this is switched on, the wiper will start.



- Wiper and window washer
  If this is kept pressed to the ON position while the wiper is working, water will be sprayed out.

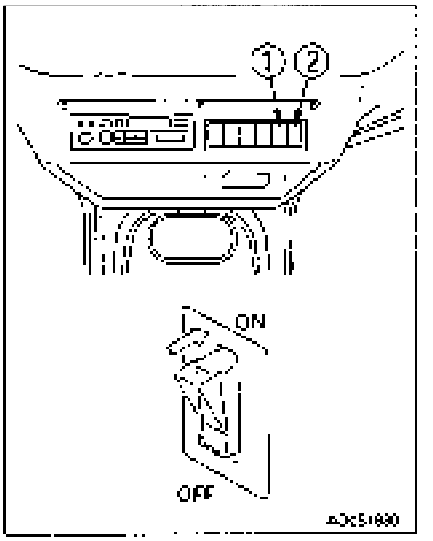


5. ADDITIONAL WORKING LAMP SWITCH (MACHINES EQUIPPED WITH CAB)

This is used to turn on the additional working lamp.

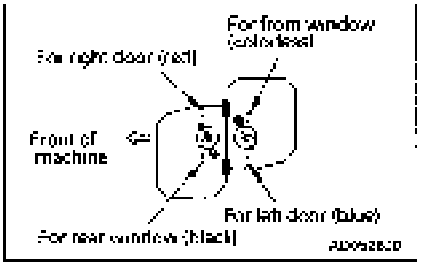
① Head lamp switch
② Rear lamp switch

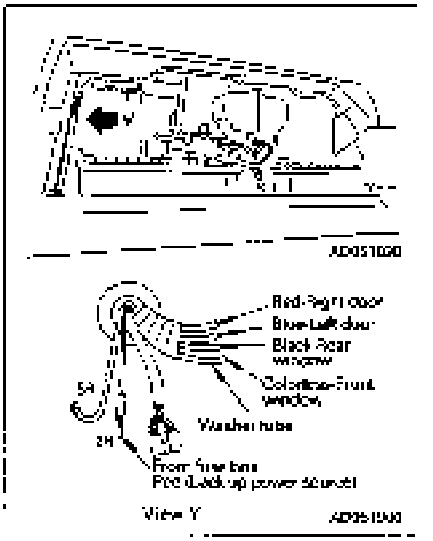
Push in the direction of the arrow to turn on the lamps.



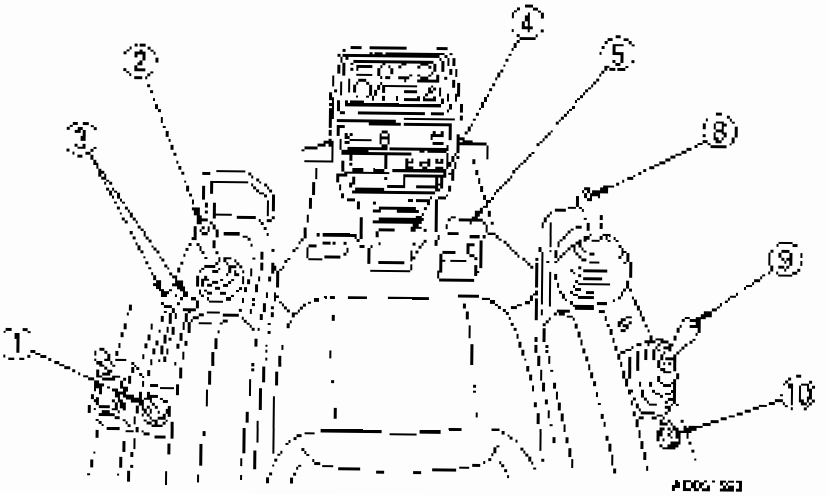
REMARK

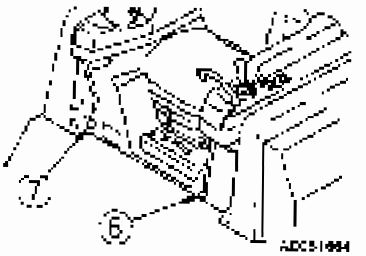
When installing the cab, check the colors of the washer tank and window washer hoses, and be sure to connect correctly.





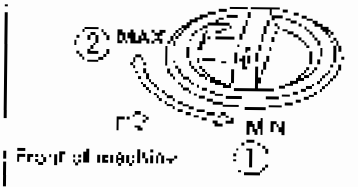
11.3 CONTROL LEVERS, PEDALS, DIAL





1. **FUEL CONTROL DIAL**
   This is used to adjust the engine speed and output.

1. Low idling (MIN): Position when dial is turned fully to the left
2. Full speed (MAX): Position when dial is turned fully to the right



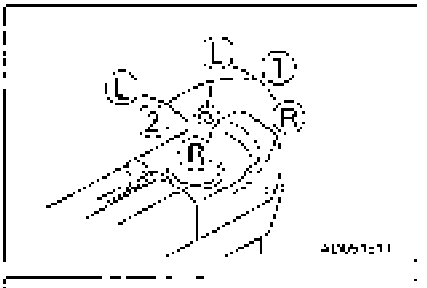
REMARK

When the engine speed is at the low idling position, the machine will not move off.

2. JOYSTICK (STEERING AND DIRECTIONAL LEVER) (WITH SPEED MAX. BUTTON)

⚠ WARNING

- **When turning while traveling at the maximum speed, it will take 5 to 10 seconds before the machine turns in a pivot turn. The slower the travel speed, the shorter this time becomes. Be careful not to hit any obstacle when operating.**
- **When switching between forward and reverse, change of actual machine travel direction will take slightly longer than on the conventional TOROFLOW machine. When operating in dangerous places, such as the edge of a cliff, carry out direction change between forward and reverse earlier.**



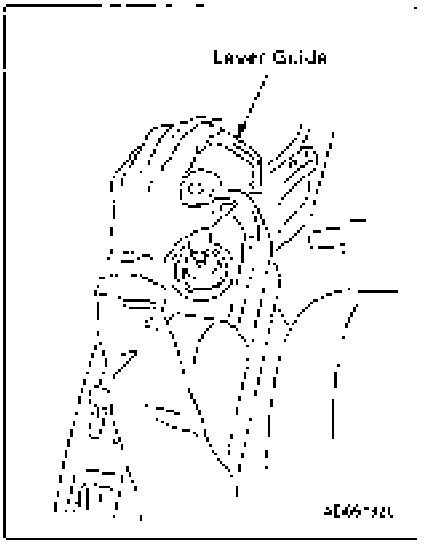
This lever is used to switch between forward and reverse and to steer the machine or carry out counterrotation turns. In addition, the button at the top of the lever can be used to switch at a touch between the set travel speed and the maximum travel speed.

- Switching between forward and reverse

Position ① : FORWARD
Position ② : REVERSE
Position N : Neutral

- Steering operations

Position Ⓛ: Left turn
Position Ⓡ: Right turn



When the lever is pushed forward, the machine will travel forward, and when it is moved back, the machine will travel in reverse.

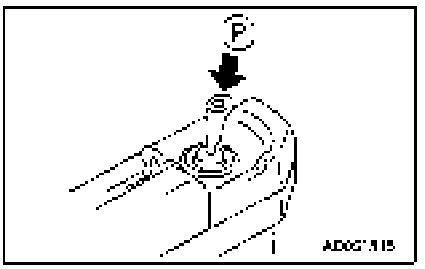
When the lever is being set to the FORWARD or REVERSE position, if it is moved to the left or right to steer the machine, the machine will turn smoothly in the direction of the lever with a turning angle that matches the amount the lever is moved.

If this lever is continuously operated fully to the left or right, the turning radius will gradually become smaller, and finally it will become possible to carry out a pivot turn.

REMARK

- When carrying out turning operations, if the lever is released, it will return to position ① or ② and the machine will travel in a straight line.
- During steering operations, if you use the lever guide to support your hand, the turning performance will be improved.

SPEED MAX. BUTTON



⚠ WARNING

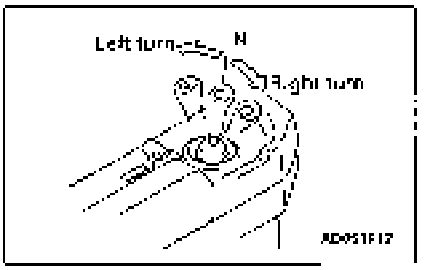
It is extremely dangerous to use this button to change the travel speed when working in dangerous places such as at the edges of cliffs. Do not use this button in such locations.

Position P: When the button at the top of the knob is pressed, the set speed is canceled and the travel speed is switched to the maximum speed. When this happens, the speed max. button display lamp on the monitor panel lights up. When the button is pressed again, the maximum speed is canceled and the travel speed returns to the set speed.

REMARK

- Max. travel speed: This speed is equivalent to 3rd on a TORQFLOW machine.
- Set speed: This is the travel speed set by the max. speed setter.
- The travel speed can be changed using this button only when the lever is at the FORWARD or REVERSE position.
- If the lever is returned to the neutral position, this button cancels the maximum speed and returns the travel speed to the set speed. To set again to the maximum speed, place the lever at the FORWARD or REVERSE position and press the button again.

- Counterrotation turn



⚠ WARNING

When carrying out a counterrotation turn, if the load is not equal on the left and right sides, the machine may carry out a pivot turn, so check the ground conditions and be careful not to hit any obstacles.

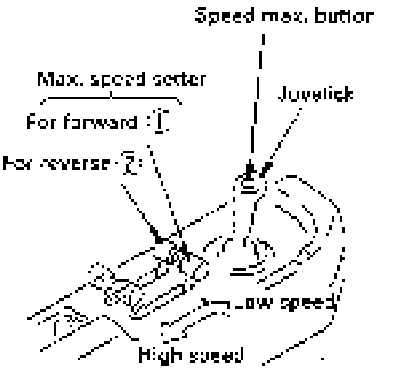
If the steering and directional lever is operated partially in the direction of turn with the lever at the N position, the left and right tracks will rotate in opposite directions and the machine will turn smoothly on the spot. If the steering lever is operated fully, the speed of the counterrotation turn will increase.

3. MAX SPEED SETTER

These levers are for setting the maximum travel speed to the desired speed. There are two levers: FORWARD (1) and REVERSE (2).

They can each set the maximum speed for the respective travel direction between the minimum speed (travel speed: 0) and the maximum speed (equivalent to 3rd on a TOROFLOW machine).

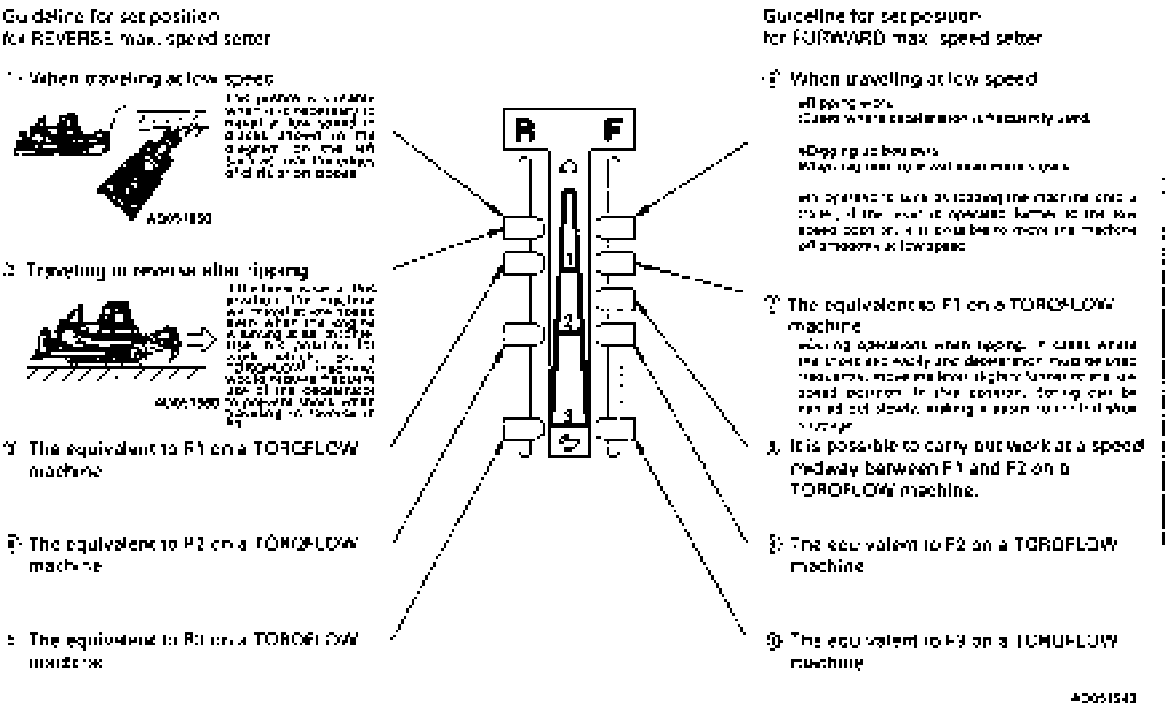
After the maximum travel speeds are set, gear shifting is carried out automatically up to the set travel speed simply by operating the joystick. Gear shifting is also carried out automatically to cope with any changes in load.



AD031939

REMARK

- At the minimum travel speed position, the machine is stopped.
- If the speed max. button is pressed, the machine will travel at the maximum travel speed regardless of the position of the max. speed setter. When the button is pressed again, the machine travel speed will return to the set speed.
- The following is a guideline for the set position of the max. speed setter.
  Set the position to match the type of work.



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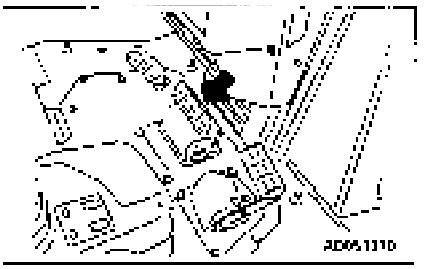
4. BRAKE PEDAL

⚠ WARNING

Do not place your foot on this pedal unnecessarily.

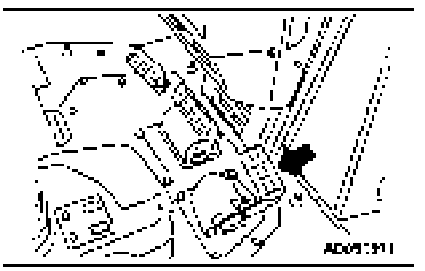
Depress the pedal to apply the right and left brakes.



5. DECELERATION PEDAL

⚠ WARNING

- **Do not place your foot on this pedal unnecessarily.**
- **When passing over the top of a hill or when a load is dumped over a cliff, the load is suddenly reduced, so there is danger that the travel speed will also increase suddenly. To prevent this, depress the decelerator pedal to reduce the travel speed.**
- **If the pedal is fully depressed on a level surface or gradual slope, the machine will stop (brake is not applied), but on steep slopes, if it is necessary to stop the machine completely, always depress the brake pedal.**



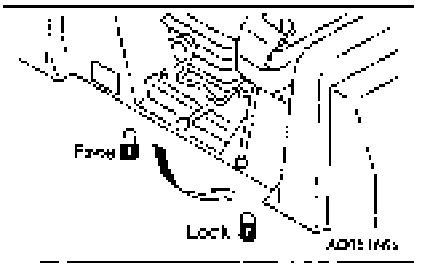
This pedal is used for reducing the engine speed or stopping the machine.

Depress this pedal to reduce the speed when shifting between forward and reverse or when stopping the machine.

REMARK

If the pedal is depressed, the machine will not start. (It functions to stop the machine.) In addition, on gradual slopes, if this pedal is depressed fully, it is possible to slow the machine down and stop it.

6. PARKING LEVER



⚠ WARNING

When the machine is parked, always set the parking lever to the LOCK position.

This lever is used to apply the parking brake.

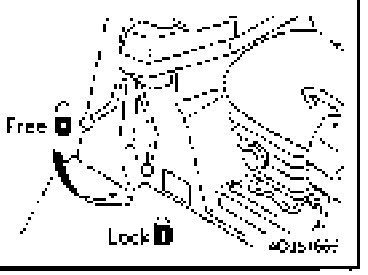
REMARK

- When the machine is stopped, if the parking brake is in the FREE position or if the joystick is at the FORWARD or REVERSE position, the engine will not start even when the starting key is turned. (A safety control system is actuated.) To start the engine, return the joystick to neutral before turning the starting key.
- When the engine is running, if the joystick is at the FORWARD or REVERSE position and the parking brake is at the LOCK position, the machine will not move even if the lever is set to the FREE position in order to move the machine. (Safety control system is actuated.) To start the machine, return the joystick to neutral or set the parking lever to the FREE position when the joystick is already at neutral, then operate the joystick.

7. SAFETY LEVER (FOR BLADE CONTROL LEVER, RIPPER CONTROL LEVER)

⚠ WARNING

- **When standing up from the operator's seat, always set the safety lever securely to the LOCK position.**
  If the blade control and ripper control levers are not locked and are touched by accident, it may lead to serious injury or damage.
- **If the safety lever is not set securely to the LOCK position, the lock may not be applied.**
  Check that it is in the position shown in the diagram.
- **When parking the machine or when carrying out maintenance, always lower the blade and ripper to the ground, then set the safety lever to the LOCK position.**



This safety lever is a device to lock the blade control and ripper control levers.

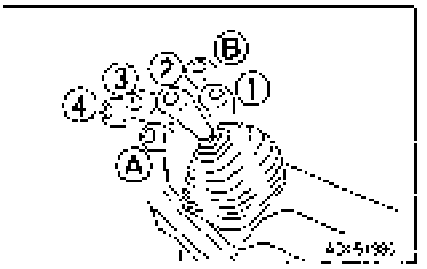
When it is set to the LOCK position, the TILT, RAISE, LOWER, and FLOAT operations are locked.

If the blade control lever is at the FLOAT position and the safety lever is set to the LOCK position, the blade control lever is automatically returned to the HOLD position.

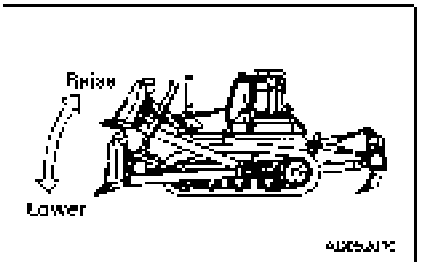
REMARK

If the blade control lever is at the FLOAT position, the engine will not start. To start the engine, first set the safety lever to the LOCK position.

8. **BLADE CONTROL LEVER (POWER TILTDOZER)**
This lever is used to raise or tilt the blade.

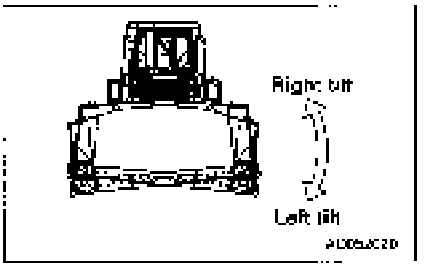


Lifting control
1. RAISE : ( )
2. HOLD : ( )
Blade is stopped and held in this position.
3. LOWER : ( )
4. FLOAT : ( )
Blade will move freely according to external force.



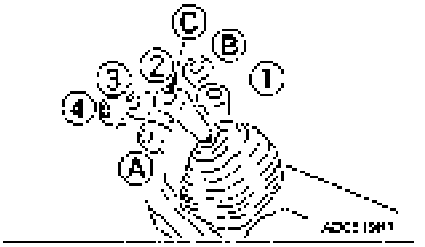
REMARK
- When released from FLOAT position, this lever will not return to HOLD position, so it must be moved back by hand.
- When starting the engine, set the blade control lever to the HOLD position.
If it is at the FLOAT position, the engine will not start.

Tilting control
A. LEFT TILT : ( )
B. RIGHT TILT : ( )



8. BLADE CONTROL LEVER
(FOR POWER TILT, POWER PITCH DOZER)

This carries out the blade lift, tilt, and pitch operations.



Lifting control

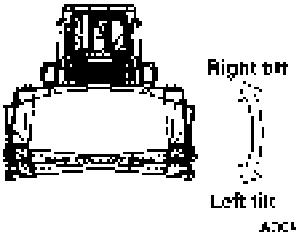
① RAISE : ( )
② HOLD : ( )
Blade is stopped and held in this position.
③ LOWER : ( )
④ FLOAT : ( )
Blade will move freely according to external force.

REMARK

- When released from FLOAT position, this lever will not return to HOLD position, so it must be moved back by hand.
- When starting the engine, set the blade control lever to the HOLD position.
  If it is at the FLOAT position, the engine will not start.

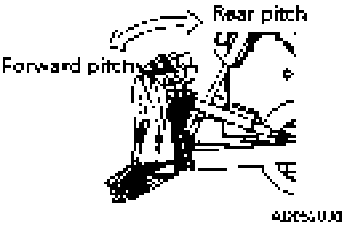
Tilting control

⑤ LEFT TILT : ( )
⑥ RIGHT TILT : ( )



Pitch control

⑦ + ⑤ REAR PITCH: Min. digging angle (press switch ⑦, then operate ⑤)
⑦ + ⑥ FORWARD PITCH: Max. digging angle (press switch ⑦, then operate ⑥)



First set the lever to the neutral position, then keep switch ⑦ in the center of the knob pushed down and carry out the tilt operation to change the cutting angle of the blade.

Precautions when using pitch control

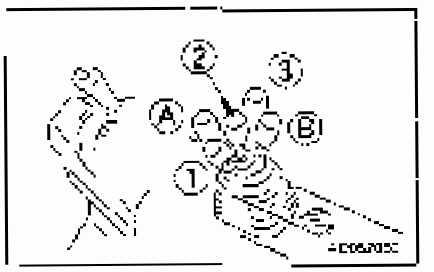
When using the pitch operation, the tilt operation changes as follows.

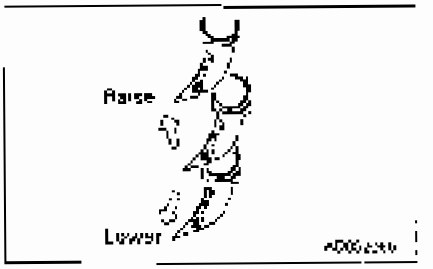
Pitch condition	Tilt operation	Amount of tilt
Max. forward pitch	Only left tilt operation is possible	Max. 1000 mm (39.4 in)
Forward pitch	Both left and right tilt operations are possible	Compared with standard: LEFT tilt is LARGER RIGHT tilt is SMALLER
Standard pitch		600 mm (119.7 in) both left and right
Rear pitch		Compared with standard: LEFT tilt is SMALLER RIGHT tilt is LARGER
Max. rear pitch	Only right tilt operation is possible	Max. 1000 mm (39.4 in)

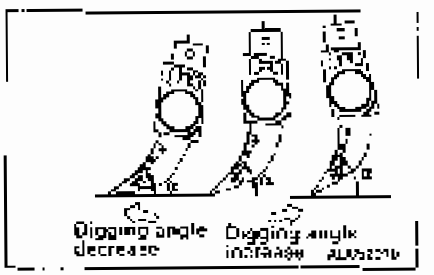
9. RIPPER CONTROL LEVER (FOR VARIABLE RIPPER)
This is used to operate the ripper.

1. RAISE ( )
2. HOLD ( ): Ripper is stopped and held in the same position.
3. LOWER( )

A. Digging angle reduced ( ): Cutting angle (α) becomes smaller.
B. Digging angle increased ( ): Cutting angle (α) becomes larger.

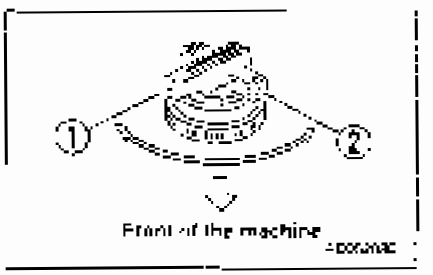






10. PIN PULLER CONTROL SWITCH (FOR GIANT RIPPER)
This is used to operate the pin puller.

1. PULL OUT: Pin is pulled out.
2. PUSH IN: Pin is pushed in.



11.4 DUST INDICATOR

This device indicates that the air cleaner element is clogged. For details on how to clean the element, see "24.2 WHEN REQUIRED."

11.5 FUSE BOX

NOTICE

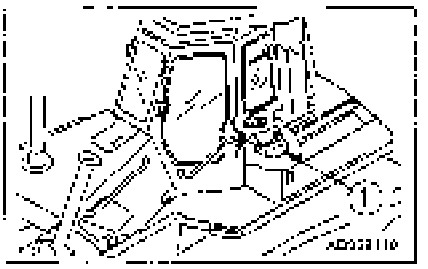
Before replacing a fuse, be sure to turn off the starting switch.

The fuses protect the electrical equipment and wiring from burning out.

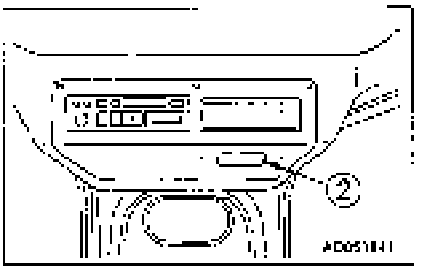
If the fuse becomes corroded, or white powder can be seen, or the fuse is loose in the fuse holder, replace the fuse.

Replace a fuse with another of the same capacity.

* Chassis
  When the battery cover is opened, fuse box ① can be found inside.

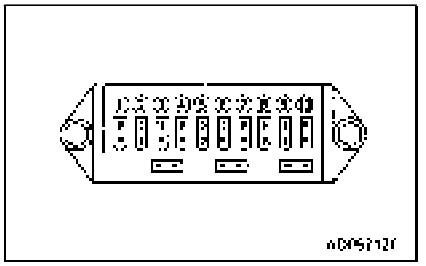


* Cab (machines equipped with cab)
  Fuse box ② is installed at the bottom of the overhead panel.



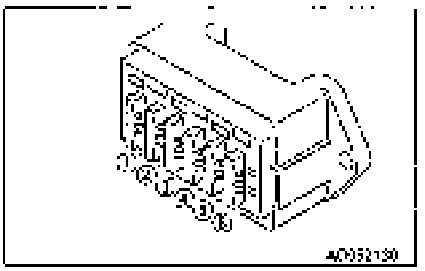
11.5.1 FUSE CAPACITY AND NAME OF CIRCUIT

Fuse box (1)



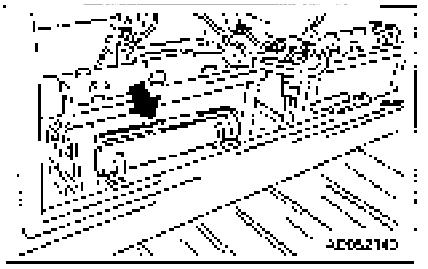
No.	Fuse capacity	Circuit	Remarks
1	15 A	Horn	
2	15 A	Governor motor	
3	20 A	Rear lamp	
4	20 A	Front lamp	
5	10 A	Controller, HMT	
6	15 A	2nd, 3rd solenoid	
7	15 A	1st solenoid	
8	20 A	Pin puller, air conditioner	
9	20 A	Backup alarm	
10	10 A	Cab, key switch	Power circuit

Fuse box (2) (machine equipped with cab)



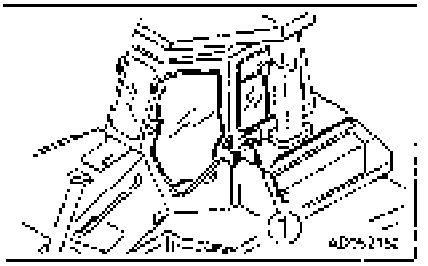
No	Fuse capacity	Circuit
1	10 A	Radio memory
2	20 A	Radio, lamp, cigarette lighter
3	10 A	Rear wiper
4	10 A	Right door wiper
5	10 A	Front wiper
6	10 A	Left door wiper

11.6 GREASE PUMP HOLDER

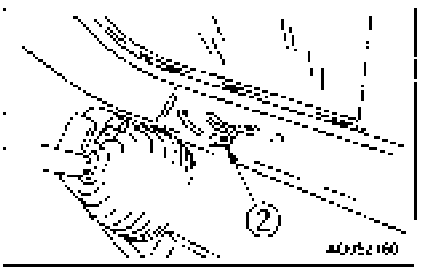


This is inside the left engine side cover.
Fit the grease pump to the holder when it is not being used.

11.7 DOOR-OPEN LOCK (MACHINES EQUIPPED WITH CAB)

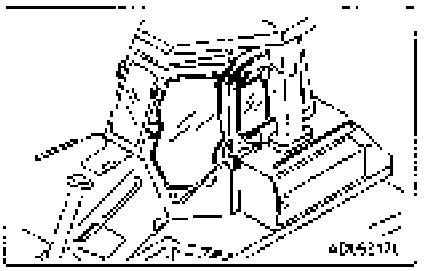


Use this when your want to keep the door held open.
1. Push the door against door catch ①. The door will be held by the door catch.
2. To release the door, move lever ② inside the cab to the front of the cab. This will release the catch.

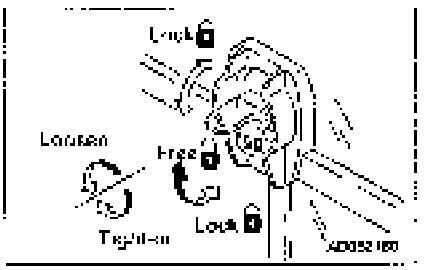


NOTICE
- **When keeping the door open, fix it securely to the catch.**
- **Always close the door when traveling or carrying out operations. Leaving the door open will cause the door to break**
- **Keep the door locked open securely.**
  The door may swing closed because of the vibration.

11.8 SASH GLASS INTERMEDIATE LOCK (MACHINES EQUIPPED WITH CAB)

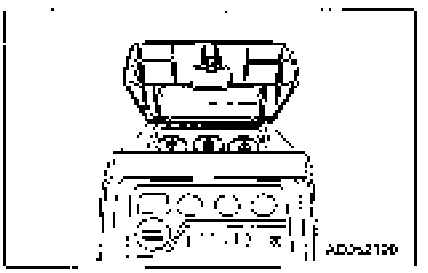


When carrying out operations with the cab sash glass open, use this block to prevent the glass from moving.
- When the lever is at the FREE position, the glass can be opened or closed.
- When the lever is moved to the LOCK (up or down) position, the glass is fixed in position.
- If the glass is not held securely, set the lever in the FREE position and rotate clockwise to strengthen the holding power.
- To reduce the holding power, turn counterclockwise.



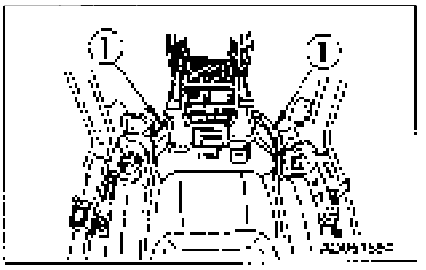
NOTICE
Always close the window when traveling or carrying out operations. Leaving the window open will cause the window to break.

11.9 HOT AND COOL BOX (MACHINES EQUIPPED WITH CAB)



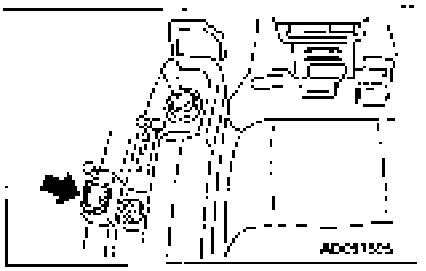
This is at the top of the front panel. It can be used to warm or cool three canned drinks.
This is interconnected with the air conditioner; During heating, it warms up the drinks; during cooling, it cools to the drinks.

11.10 DOOR POCKET (MACHINES EQUIPPED WITH CAB)



These are on the inside of the left and right doors, and can be used for keeping things. However, do not put tools or other heavy objects in the pocket. If the pocket becomes dirty, turn three clips "1", remove the pocket and wash it.

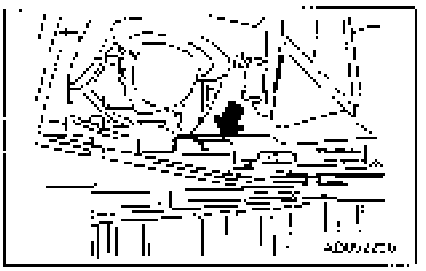
11.11 ASHTRAY (MACHINES EQUIPPED WITH CAB)



This is on the left side of the operator's seat.

Always make sure that you extinguish the cigarette before closing the lid.

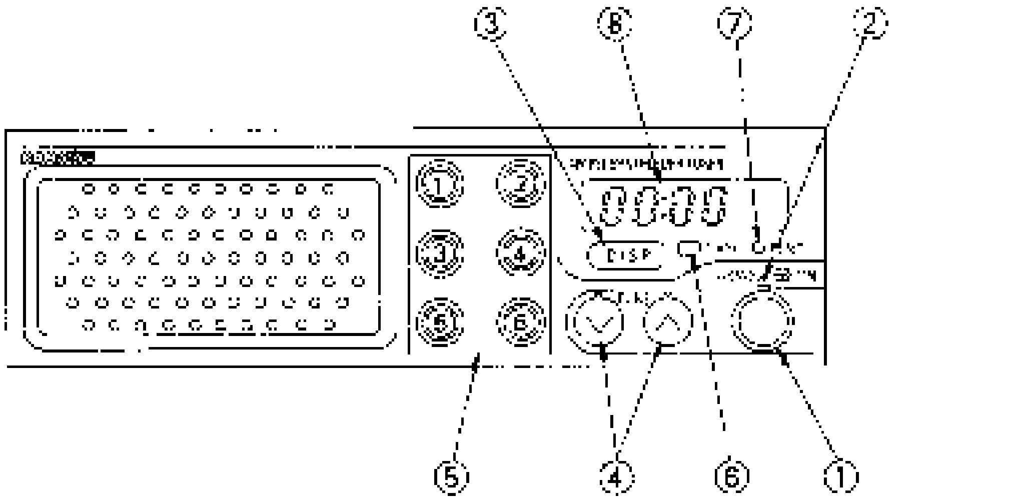
11.12 TOOL BOX



This is inside the right engine side cover.
It is used for storing tools.

11.13 USING CAR RADIO (MACHINES EQUIPPED WITH CAB, CAR RADIO)

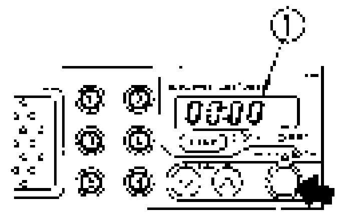
11.13.1 EXPLANATION OF PARTS



1. POWER SWITCH/VOLUME CONTROL KNOB (PUSH ON/VOL)

Push this knob to switch the radio on. The lighting in display area ① will light up and the frequency will be displayed. Press again to switch the power off.

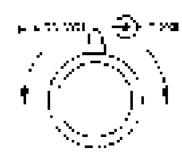
Turn the knob clockwise to increase the sound, and counterclockwise to reduce it.



AD051842

2. TONE CONTROL KNOB (TONE)

Turn this knob clockwise from the center position to emphasize the high sounds, and counterclockwise to emphasize the low sounds.



3. DISPLAY BUTTON (DISP)

If the display button is pressed when the radio is being used, the frequency of the station being listened to is displayed for 5 seconds.

AD051844

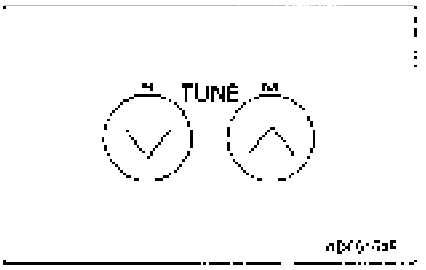
4. TUNING/HOUR, MIN ADJUSTMENT BUTTON (TUNE)

This is used to select the station or change the frequency.

If the station UP button ∧ is pressed, the frequency will go up by 9 kHz each time it is pressed; if the station DOWN button ∨ is pressed, the frequency will go down 9 kHz each time it is pressed.

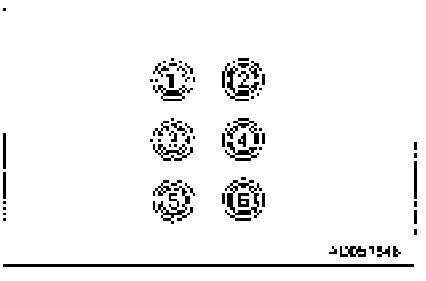
If these buttons are kept pressed for more than 2 seconds, the station will be selected automatically.

When adjusting the time, these change the hour display and minute display



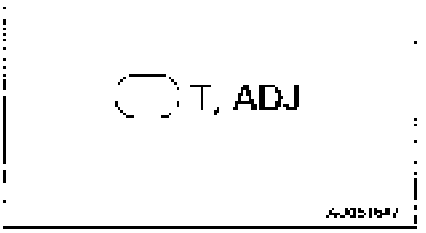
5. PRESET BUTTON (1, 2, 3, 4, 5, 6)

These buttons can be used to program the desired broadcasting stations. It is then possible to select the station at a touch.



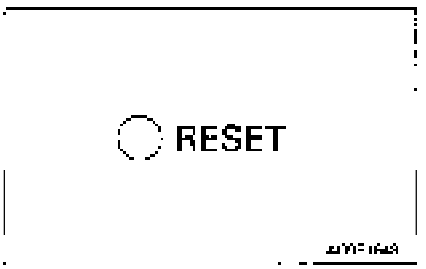
6. TIME ADJUSTMENT BUTTON (T.ADJ)

Press this button to adjust the time.



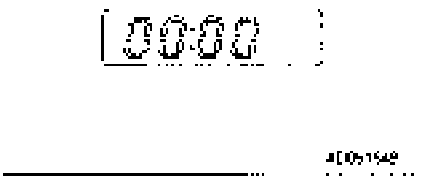
7. TIME RESET BUTTON (RESET)

Press this button to reset to the exact hour

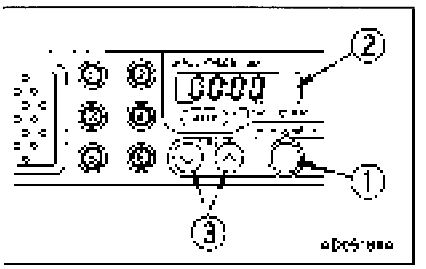


8. DISPLAY

This displays the frequency, time, and preset symbols.

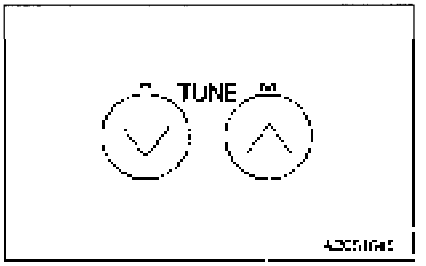


11.13.2 METHOD OF USE



Method of setting preset buttons

1. Press power switch ①. The frequency is displayed in display area ②.
2. Use selector button ③ (∧ or ∨) to adjust to the desired frequency.
3. Choose a preset button to use for this station, and keep it pressed for at least 2 seconds to program the button to that frequency.
   When the sound suddenly disappears and appears again, the button is programmed, and the preset number is shown in display area ②.
   After programming the button, press the preset button and release it within approx. 2 sec. The station programmed to that button will be selected for reception.
   It is possible to program one station for each preset button.

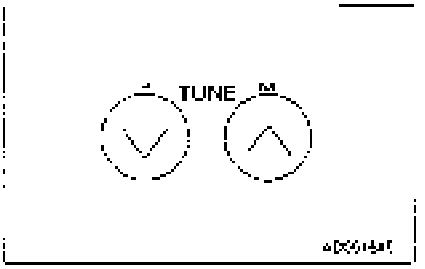


Method of manual tuning

Press the tuning button lightly to adjust to the desired frequency. Each time the button is pressed, the frequency will change by 9 kHz.

∧ button: Select station at higher frequency

∨ button: Select station at lower frequency



Method of automatic tuning

Keep the tuning button pressed for at least 2 seconds and then release it. When reception from a broadcasting station is picked up, the selector will automatically stop at that position.

When searching for the next station, keep the selector button pressed again for at least 2 seconds.

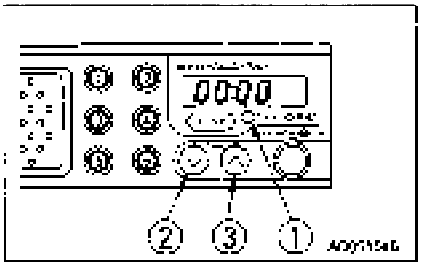
∧ button: Select station at higher frequency

∨ button: Select station at lower frequency

If the reception is weak, and stations are not found, adjust the frequency manually to select the desired station.

Adjusting time

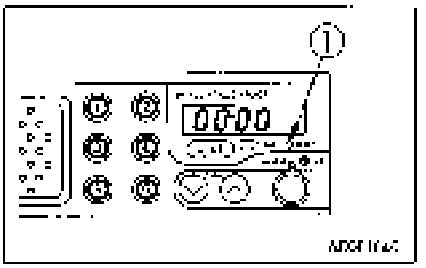
1. Keep T.ADJ button ② pressed, and press H button ③.
   The hour display will change, so when it reaches the correct hour, release the button.
2. Keep T.ADJ button ② pressed and press M button ①.
   The minute display will change, so when it reaches the correct time, release the button.



Method of using RESET button

If RESET button ① is pressed at the same time as the time signal or standard time, the display will return immediately to the exact hour (ex. hour 00 min).

If the display is 01 – 29 min, the display will go back to 0 min.
If the display is 30 – 59 min, the display will advance to 0 min.



[Example]
10:29 → 10:00 (return to exact hour)
10:30 → 11:00 (advances to exact hour)

11.13.3 PRECAUTIONS WHEN USING

- For safety reasons, when operating keep the sound to a level where you can enjoy the sound but still hear the sound from outside vehicles.
- If water gets inside the speaker case or car radio (auto tuning), it may cause a serious problem, so do not let water get on these parts.
- Do not wipe the knobs or buttons or any other parts with any solvent such as benzene or thinner. Always wipe with a soft dry cloth (In cases of extreme dirt, use alcohol on the cloth).

11.13.4 SPECIFICATION

Tuning method: PLL synthesizer method
Reception frequency: 522 kHz – 1629 kHz
Intermediate frequency: 450 kHz
Rated output: 3 W
Max. output: 5 W
Voltage: DC26.4V (21.6V, 31.2V) (–) ground
Current: Max. 2A
Outside dimensions: Width 178 mm (7.01 in), height 50 mm (1.97 in), depth 110 mm (4.33 in)
Weight: 640 g (1.41 lb)

11.14 HANDLING AIR CONDITIONER (MACHINES EQUIPPED WITH CAB)

11.14.1 COOLING OPERATION

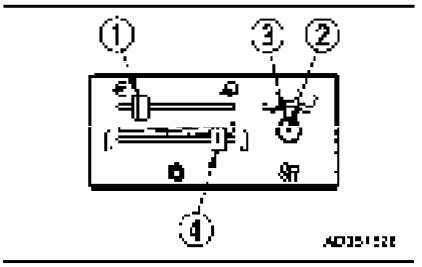
When the cooling operation is carried out, the inside of the cab is cooled, and at the same time the drinks inside the hot and cool box can be cooled.

Cooling (RECIRC)

When the control switch and lever are operated as shown in the diagram, a cool breeze is sent out.

Use this position when strong cooling is needed.

- Press switch ②.
- Place levers ① and ③ in the position shown in the diagram.
- Set switch ④ to the desired position.

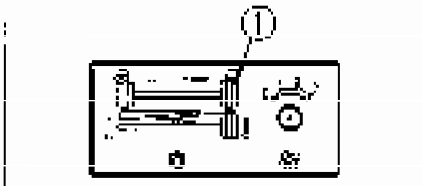


AD351528

Cooling (FRESH)

If the air inside the cab is no longer fresh, set FRESH/RECIRC selector lever ① to FRESH to bring in fresh air. Keep the other switches at the same positions as for cooling (RECIRC).

In this position, the inside of the cab is pressurized to prevent the entry of dust.



AD351527

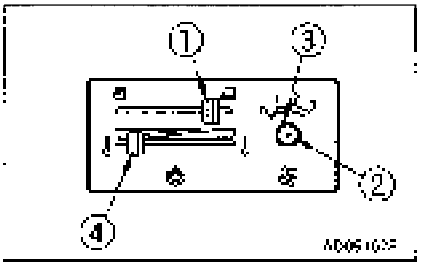
REMARK

- If the cooling effect is reduced, set FRESH/RECIRC selector lever ① to RECIRC again. This increases the cooling effect.
- New Freon R134a is used as the refrigerant.
- The tightening torque for the air conditioner gas piping thread is as follows.

Thread size	Tightening torque Nm (kgm)
Discharge 22 x 1.5	19.6 – 24.5 (2 – 2.5)
Liquid 16 x 1.5	11.8 – 14.7 (1.2 – 1.5)
Suction 24 x 1.5	29.4 – 24.3 (3 – 3.5)

11.14.2 HEATING OPERATION

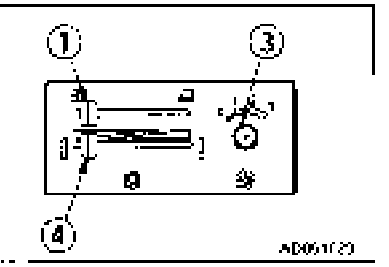
When the heating operation is carried out, the inside of the cab is heated, and at the same time the drinks inside the hot and cool box can be heated.



Heating (RECIRC)

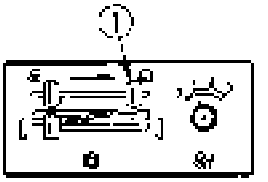
When the control switch and lever are operated as shown in the diagram, warm air is sent out. Use this position when strong cooling is needed.

- Place levers ① and ③ in the position shown in the diagram.
- Set switch ② to the desired position.



Heating (FRESH)

If the air inside the cab is no longer fresh, set FRESH/RECIRC selector lever ① to FRESH to bring in fresh air. Keep the other switches at the same positions as for heating (RECIRC). In this position, the inside of the cab is pressurized to prevent the entry of dust.



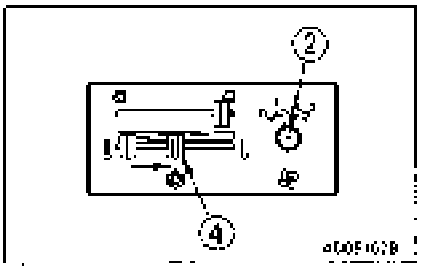
REMARK

If the cab is not heated up sufficiently, turn FRESH/RECIRC selector lever ① back to RECIRC. This increases the heating effect.

Dehumidifying and heating

Push switch ②. When temperature control lever ④ is placed at the central position, dry warm air blows out.

Keep the other switches at the same positions as for heating (FRESH).



REMARK

If this is used in spring and fall on rainy days when the air inside the cab is damp, there is no problem of the windows misting up, and the cab be warmed up to a comfortable temperature.

11.14.3 PRECAUTIONS WHEN USING AIR CONDITIONER

Carry out ventilation from time to time when using the cooler.

- If you smoke when the cooler is on, the smoke may start to hurt your eyes, so turn the lever to FRESH to remove the smoke while continuing the cooling.
- When running the air conditioner for a long time, turn the lever to the FRESH position once an hour to carry out ventilation and cooling.

Be careful not to make the temperature in the cab too low.

- When the cooler is on, set the temperature so that it feels slightly cool when entering the cab (5 – 6°C lower than the outside temperature). This temperature difference is considered to the most suitable for your health, so always be careful to adjust the temperature properly.

Direction of vents when cooling

- If the vents (left and right) in the middle of the dashboard are turned so that cold air plays directly on the cab door glass, moisture may condense on the outside of the cab door glass and reduce the visibility. (This occurs particularly in high temperatures.)
  If this happens, turn the vent fully to the rear and raise the air conditioner temperature setting slightly.

11.14.4 INSPECTION DURING OFF-SEASON

Even during the off-season, run the compressor at low speed for several minutes once a week to prevent the loss of the oil film at the lubricated parts of the compressor. (Run the engine at low speed and set the temperature control lever at the central position.)

REMARK

When the ambient temperature is low, if the compressor is suddenly run at high speed, it may cause failure of the compressor.

Note that the system is set so that the compressor will not run when the cooler switch is turned on if the ambient temperature is less than 2 – 6.5°C.

11.14.5 PROCEDURE FOR REPLACING RECEIVER

Replace the receiver once every two years.

After replacing the receiver, add compressor oil. Turn the receiver at an angle and measure the oil remaining inside the receiver, then add the same amount of oil (Denso Oil 6) to fill the receiver.

REMARK

Depending on the condition of use, the replacement interval may be shorter.

REMARK

If the receiver is used when the desiccant has exceeded the water absorption limit, the refrigerant circuit may become clogged and cause failure of the compressor.

Precautions when replacing receiver

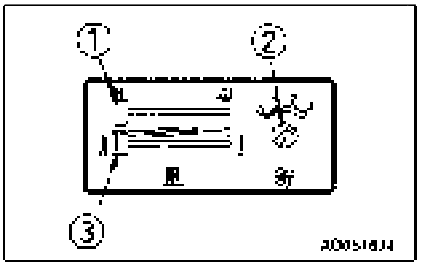
- If the receiver is left for more than 15 minutes with the blind cover removed, the moisture in the air will be absorbed, and this will reduce the life of the desiccant. If you remove the blind cover, connect the piping quickly, evacuate the system and fill with refrigerant.
- When removing the refrigerant from the refrigerant circuit, release it gradually from the low pressure side to prevent oil from flowing out.

11.14.6 CLEANING AIR FILTER

If the air filter for the FRESH or RECIRC air intake becomes clogged, the cooling or heating capacity will drop. To prevent this, clean the air filter with compressed air once a week.

For details of the cleaning method, see "24.2 WHEN REQUIRED"

11.15 HANDLING HEATER (MACHINES EQUIPPED WITH CAB)



11.15.1 METHOD OF OPERATION

To heat quickly

Set the switches to the position shown in the diagram on the right to carry out heating quickly.

- Set FRESH/RECIRC selector lever ① and temperature control lever ② to the position in the diagram on the right.
- Set blower switch ③ to position 3 (HIGH).

NOTICE

If heating is carried out continuously for a long period with the lever at the RECIRC position, the air inside the cab will become stale, so when the cab is warmed up, always set the FRESH/RECIRC selector lever ① to the FRESH position.

In this position, the inside of the cab is pressurized to prevent the entry of dust.

Normal use

Set each switch to the desired position.

11.15.2 CLEANING AIR FILTER

If the air filter for the FRESH or RECIRC air intake becomes clogged, the heating capacity will drop. To prevent this, clean the air filter with compressed air once a week.

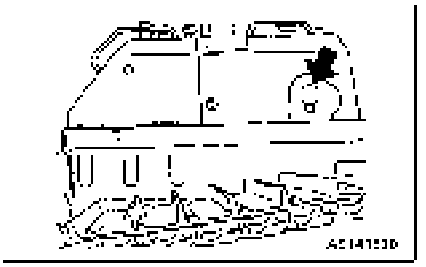
For details of the cleaning method, see "24.2 WHEN REQUIRED".

11.16 HANDLING ACCUMULATOR

⚠ WARNING

On machines equipped with an accumulator, for a short time after the engine is stopped, if the work equipment control lever is moved to the LOWER position, the work equipment will move down under its own weight.
After stopping the engine, always place the safety lever in the LOCK position.

The accumulator is filled with high-pressure nitrogen gas, and it is extremely dangerous if it is handled in the wrong way. Always observe the following precautions.
- **Never make any hole in the accumulator or expose it to flame or fire.**
- **Do not weld any boss to the accumulator.**
- **When disposing of the accumulator, it is necessary to release the gas from the accumulator, so please contact your Komatsu distributor.**



The accumulator is a device to store the pressure in the control circuit, and when it is installed, the control circuit can be operated for a short time even after the engine is stopped. Therefore, if the control lever is moved in the direction to lower the work equipment, it is possible for the work equipment to move under its own weight.

The accumulator is installed to the position shown in the diagram on the right.

11.16.1 METHOD OF RELEASING PRESSURE IN OPERATING CIRCUIT ON MACHINE EQUIPPED WITH ACCUMULATOR

1. Lower the work equipment and stop the engine.

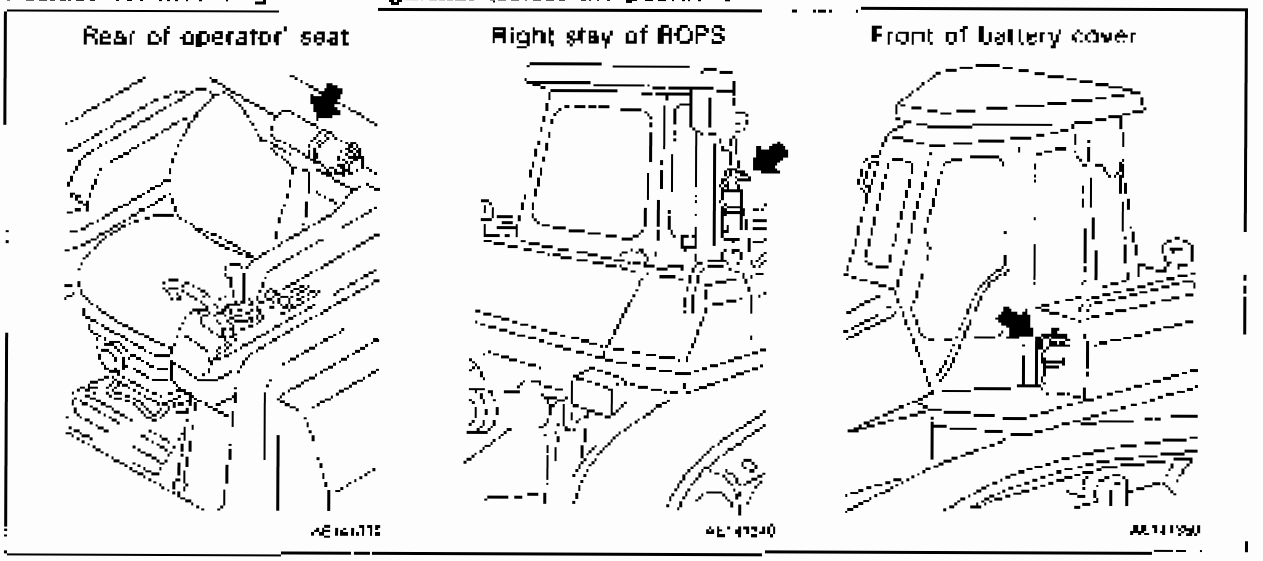
2. After stopping the engine, operate the control lever fully to the front, rear, left, and right to release the pressure inside the work equipment circuit.

However, the pressure cannot be completely removed, so when removing the work equipment circuit, loosen the screw slowly, and never stand in the direction where the oil spurts out.

11.17 LOCATION OF FIRE EXTINGUISHER

When providing a fire extinguisher, install it in the position shown below.

Position for installing fire extinguisher (select the position)



12.1 CHECK BEFORE STARTING ENGINE

12.1.1 WALK-AROUND CHECK

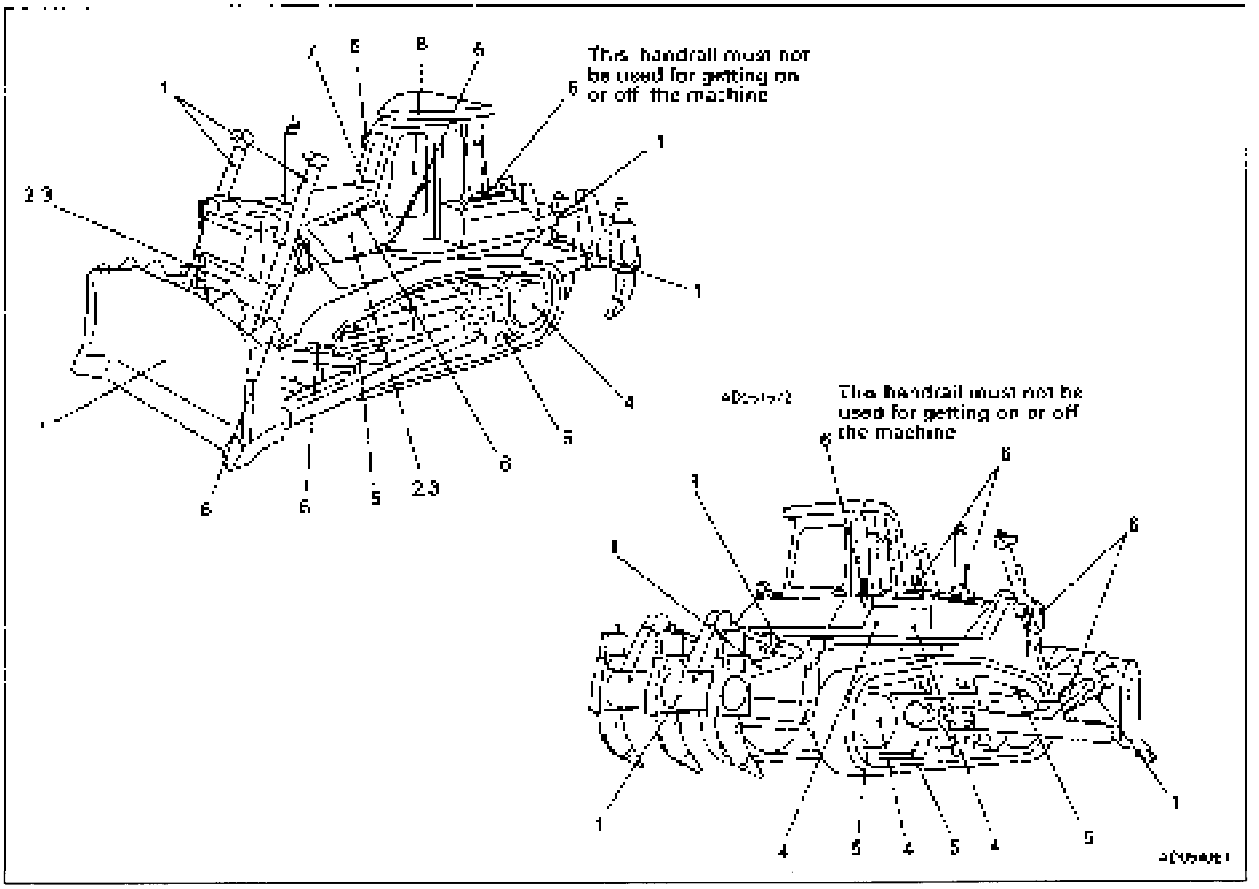
⚠ WARNING

- **Leakage of oil or fuel, or accumulation of flammable material around high temperature parts, such as the engine muffler or turbocharger, may cause fire.**
  Check carefully, and if any abnormality is found, repair it or contact your Komatsu distributor.
- **Do not get on or off the machine from the rear. Using this position is dangerous because it is easy to slip and you cannot be seen from the operator's compartment. Always use the handrail and step at the side when getting on or off the machine.**

When inspecting, if the machine is at an angle, move it to a horizontal place to carry out the check.

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

Always carry out the items in this section before starting the engine each day.



1. **Check for damage, wear, play in work equipment, cylinders, linkage, hoses**
   Check that there are no cracks, excessive wear, or play in the work equipment, cylinders, linkage, or hoses. If any abnormality is found, repair it.

2. **Remove dirt and dust from around engine, battery radiator**
   Check if there is any dirt or dust accumulated around the engine or radiator. Check also if there is any flammable material (dead leaves, twigs, grass, etc.) accumulated around the battery or high temperature engine parts, such as the engine muffler or turbocharger. Remove all such dirt or flammable material.

3. **Check for leakage of water or oil around engine**
   Check that there is no leakage of oil from the engine or leakage of water from the cooling system. If any abnormality is found, repair it.

4. **Check for oil leakage of oil from power train case, final drive case, hydraulic tank, hose, joints**
   Check that there is no oil leakage. If any abnormality is found, repair the place where the oil is leaking.
   Check for leakage of oil from the undercover. Check the ground for traces of oil leakage.

5. **Check the undercarriage (track, sprocket, idler, guard) for damage, wear, loose bolts, or leakage of oil from rollers**
   If any damage, wear, or oil leakage is found, repair the problem and tighten the bolts.

6. **Check for damage to handrail, loose bolts**
   Repair any damage and tighten any loose.

7. **Check for damage to gauges, lamps on instrument panel, loose bolts**
   Check that there is no damage to the panel, gauges and lamps. If any abnormality is found, replace the parts. Clean off any dirt on the surface.

8. **Check for damage to seat belt and mounting clamps**
   Check that there is no abnormality in the seat belt or mounting clamps. If there is any damage, replace with new parts.

12.1.2 CHECK BEFORE STARTING

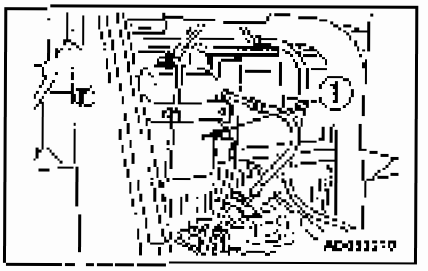
Always carry out the items in this section before starting the engine each day.

CHECK COOLANT LEVEL, ADD WATER

⚠ WARNING

Normally, do not open the radiator cap. When checking the cooling water level, check the sub-tank when the engine is cold.

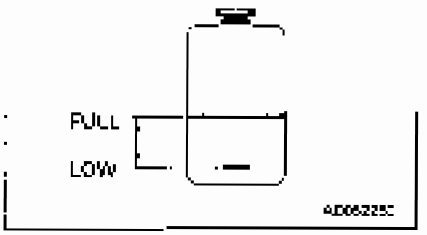
1. Open the engine side cover on the left side of the chassis, and check that the cooling water is between the FULL and LOW marks on sub-tank ①. If the water level is low, add water to the FULL level through the water filler port in sub-tank ①.



REMARK

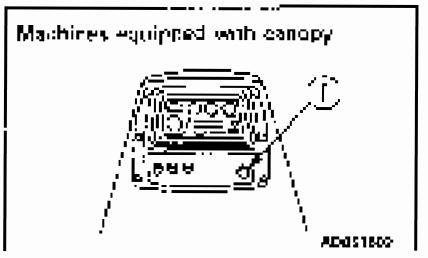
In summer, the coolant may overflow from the sub-tank drain hose. This is no problem. It occurs because too much coolant has been added.

2. After adding water, tighten the cap securely.
3. If the sub-tank is empty, check for leakage of water, then add water to the radiator and sub tank.
4. After adding water, close the engine side cover.



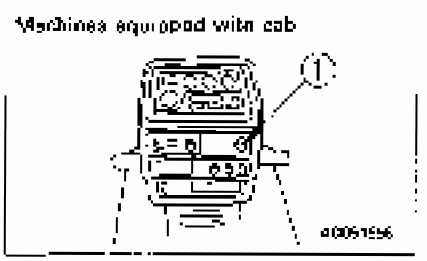
CHECKING WITH MACHINE MONITOR (MONITOR PANEL SPECIFICATION)

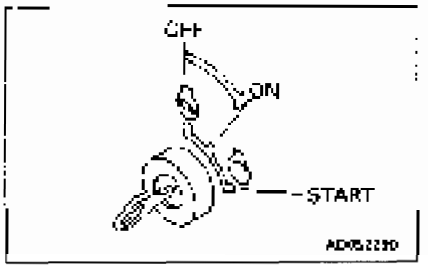
1. Turn starting switch ① to the ON position.
2. Check that all monitor lamps light up for 3 seconds, the warning lamp lights up for 2 seconds, and the alarm buzzer sounds for 1 second.



REMARK

- If the lamps do not light up, there may be a failure or disconnection in the monitor, so please contact your Komatsu distributor.
- When carrying out the checks before starting, do not relay only on the monitor. Always carry out all the items listed for periodic maintenance.



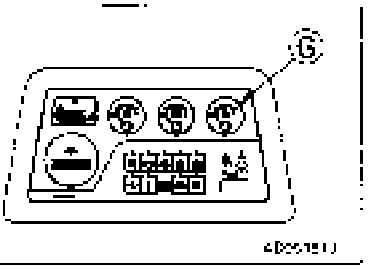


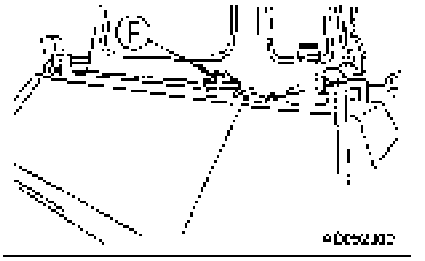
CHECK FUEL LEVEL, ADD FUEL

⚠ WARNING

When adding fuel, never let the fuel overflow. This may cause a fire. If you spill fuel, thoroughly clean up any spillage.

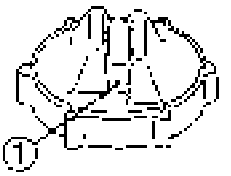
1. Turn the engine starting switch to the ON position and check the fuel level with fuel level gauge (G) on the monitor panel. After checking, turn the switch back to the OFF position.
2. After completing work, fill the fuel tank through oil filler port (F). For details of the oil to use, see "20. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".
3. After adding fuel, tighten the cap securely.
   Fuel capacity: 500 ℓ 1132 US gal, 110 UK gal





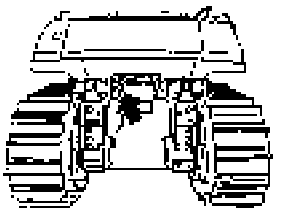
REMARK

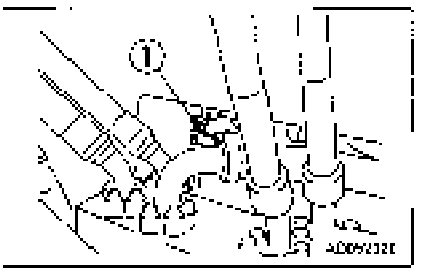
If breather hole (1) on the cap is clogged, the pressure in the tank will drop and fuel will not flow.
Clean the hole from time to time.



DRAIN WATER, SEDIMENT FROM FUEL TANK

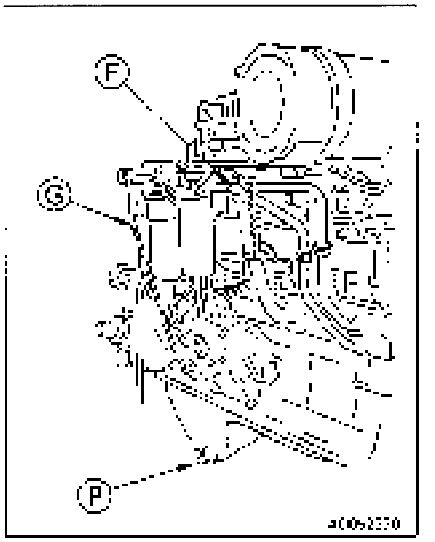
Loosen drain valve (1) at the bottom of the fuel tank and drain the sediment and water accumulated at the bottom of the tank together with the fuel.

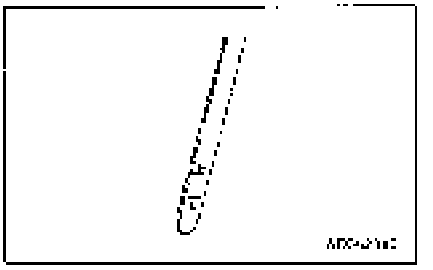




CHECK OIL LEVEL IN ENGINE OIL PAN. ADD OIL

1. Open the engine side cover on the left side of the chassis.
2. Remove dipstick G and wipe the oil off with a cloth.
3. Insert dipstick G fully in the oil filler pipe, then take it out again.





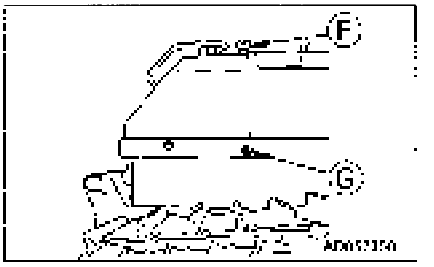
4. The oil level should be between the H and L marks on dipstick G.
   If the oil level is below the L mark, add engine oil through oil filler F.
   For details of the oil to use, see "20. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".
5. If the oil is above the H mark, drain the excess engine oil from drain plug E, and check the oil level again.
6. If the oil level is correct, tighten the oil filler cap securely and close the engine side cover.

REMARK

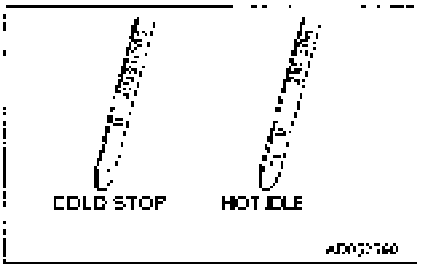
- Check the oil level with the engine stopped.
- When checking the oil level after the engine has been operated, wait for at least 15 minutes after stopping the engine before checking.
- If the machine is at an angle, make it horizontal before checking.
- When adding oil, remove the dipstick from the holder to release the air inside the crankcase.

CHECK OIL LEVEL IN POWER TRAIN CASE, ADD OIL

1. Remove dipstick ⑤, and wipe the oil off with a cloth.
2. Insert dipstick ⑤ fully in the oil filler pipe, then take it out again.



3. The oil level should be between the H and L marks on dipstick ⑤.
   If the oil level is below the L mark, add engine oil through oil filler ⑥.
   The oil level is stamped on both sides of the dipstick. One side is used when the engine is stopped and the oil temperature is low (COLD STOP). The other side is used when the engine is idling and the oil temperature is high (HOT IDLING).

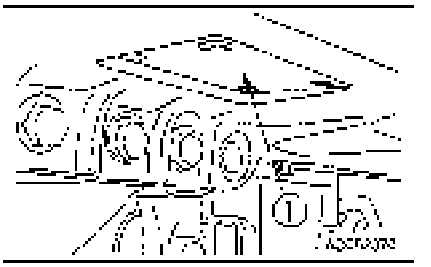


REMARK

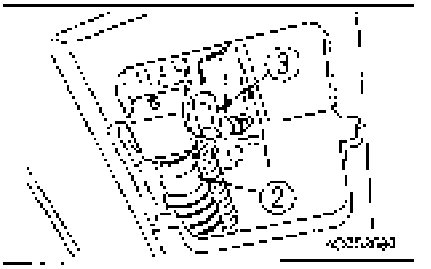
When checking the oil level before starting operations, check with the engine stopped and use the dipstick COLD STOP side. It is also possible to check the oil level after the engine has been run and the power train oil temperature is high, but in this case, run the engine at idling and use the dipstick HOT IDLING side.

For details of the oil to use, see "20. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".

4. If the oil is above the H mark, remove drain cover ① at the bottom left of the power train case, pull drain hose ② out from the pickup port, then loosen drain plug ③ and drain the excess oil. After draining the oil, check the oil level again.



5. If the oil level is correct, tighten the oil filler cap securely.

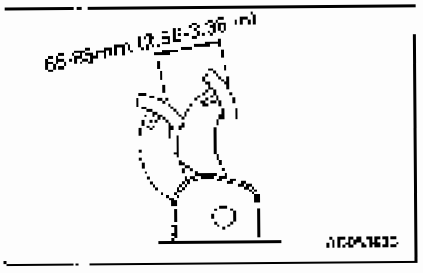


REMARKS

When checking the oil level, if the machine is at an angle, move it to a horizontal position before carrying out the check.

CHECK BRAKE PEDAL TRAVEL

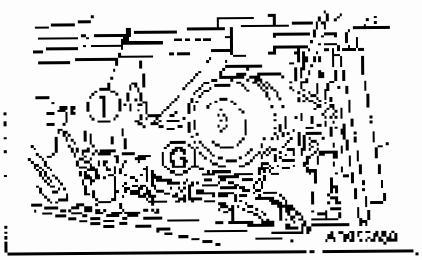
1. Depress the brake pedal all the way until it stops.
2. The distance of travel at the center of the pedal (position in the diagram on the right) should be 65 – 85 mm (2.56 – 3.35 in).
3. When this value exceeds 85 mm (3.35 in), or the brake fails to work, please contact your Komatsu distributor for adjustment.



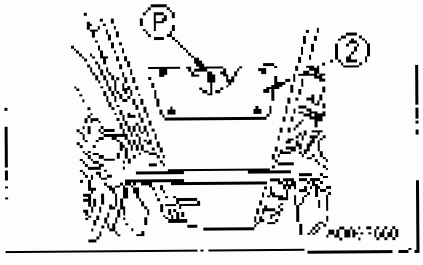
CHECK DAMPER CASE OIL LEVEL, ADD OIL

1. Open engine side cover (1) on the left side of the machine.
2. Remove dipstick (G), and wipe the oil off with a cloth.
3. Insert dipstick (G) fully into the dipstick holder, then pull it out again.
4. The oil level should be between the H and L marks on dipstick (G).
   If the oil is below the L mark, add engine oil through the dipstick holder.

   For details of the oil to use, see "20. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".



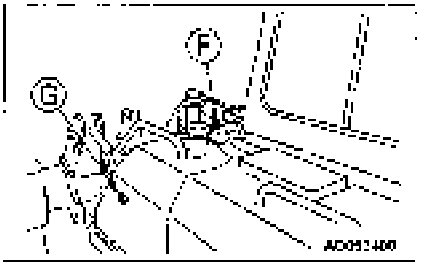
5. If the oil is above the L mark, open inspection cover (2) at the bottom center of the power train case, and drain the excess oil from drain plug (P) of the engine damper (this can be seen to the front of the machine through the inspection window). After draining the oil, check the oil level again.



REMARKS

- Check the oil level with the engine stopped.
- When checking the oil level, if the machine is at an angle, move it to a horizontal position before carrying out the check.

CHECK OIL LEVEL IN HYDRAULIC TANK, ADD OIL

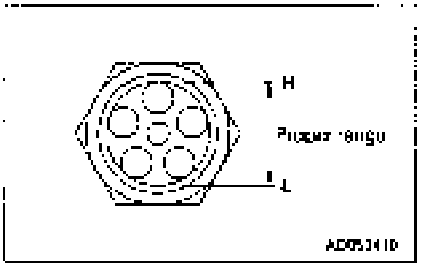


⚠ WARNING

When removing the oil filler cap, oil may spurt out, so stop the engine and wait for the oil temperature to go down, then turn the cap slowly to release the internal pressure before removing the cap.

NOTICE

Do not add oil if the level is above the H line. This will damage the hydraulic equipment and cause the oil to spurt out.



1. Lower the blade to the ground, stop the engine and wait for about 5 minutes before checking oil level. If oil level is between H and L in sight gauge ⑤.
2. If the level is below the L mark, add engine oil through oil filler ⑥.

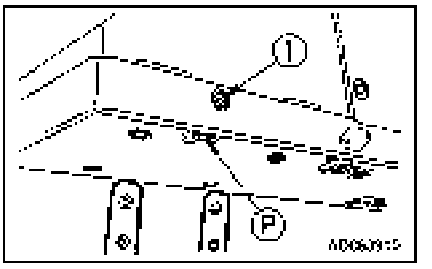
For details of the oil to use, see "20. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".

REMARK

When inspecting, if the machine is at an angle, move it to a horizontal place to carry out the check.

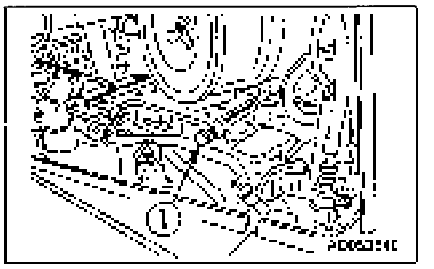
⚠ WARNING

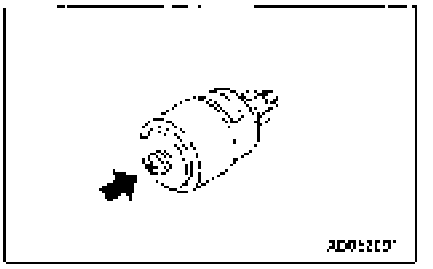
If oil has been added to above the H mark, stop the engine and wait for the hydraulic oil to cool down. Then remove drain plug ⑨, loosen drain valve ⑩, and drain the excess oil.



CHECK DUST INDICATOR

1. Open the engine side cover on the left side of the chassis, and check that the red piston has not appeared in the transparent portion of dust indicator ①.
2. If the red piston has appeared, clean or replace the element immediately.
   For details of the method of cleaning the element, see "24.2 WHEN REQUIRED".
3. After checking, cleaning, and replacing, press the knob of dust indicator ① to return the red piston to its original position.





CHECK ELECTRIC WIRINGS

⚠ WARNING

If the fuse blows frequently, or there are traces of shortcircuiting in the electric wiring, always locate and repair the cause.

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

- Battery
- Starting motor
- Alternator

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

⚠ WARNING

Accumulation of flammable material (dead leaves, twigs, grass, etc.) around the battery may cause fire, so always check and remove such material.

When carrying walk-around checks or checks before starting, always check if there is any accumulation of flammable material around the battery, and remove such flammable material.

CHECK THAT LAMPS LIGHT UP

Turn the head lamp switch and the rear lamp switch to the ON position and check that the head lamps and rear lamps light up.

If the lamps do not light up, there is probably a broken bulb or disconnection in the wiring, so contact your Komatsu distributor for repairs.

CHECK HORN SOUND

CHECK BACKUP ALARM SOUND

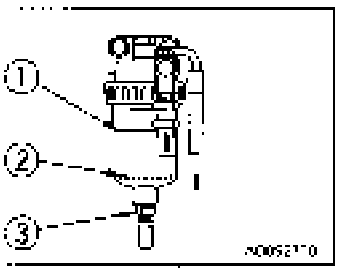
CHECK SEAT BELT FOR WEAR OR DAMAGE

Check the belt and mounting clamps, and if they are worn or damaged, replace the seat belt.

CHECK FOR WATER AND SEDIMENT IN WATER SEPARATOR, DRAIN WATER

The water separator separates water mixed in the fuel. If float ② is at or above red line ①, drain the water according to the following procedure.

1. Loosen drain plug ③ and drain the accumulated water until the float reaches the bottom.
2. Tighten drain plug ③.
3. If the air is sucked into fuel line when draining and water, be sure to bleed air in the same manner as for the fuel filter. See "24.5 EVERY 500 HOURS SERVICE".



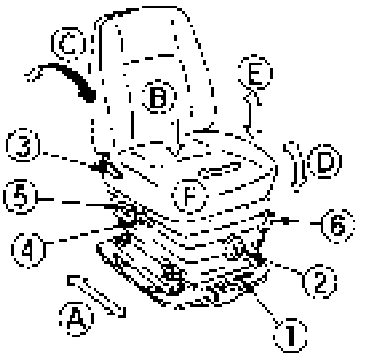
12.1.3 ADJUST OPERATOR'S SEAT

⚠ WARNING

- **Adjust the seat position at the beginning of each shift or when operators change.**
- **Adjust the seat so that the brake pedal can be depressed all the way with the operator's back against the backrest.**

Ⓐ Fore-aft adjustment of seat
Move lever ① to the right set the seat to a position where it is easy to operate, then release the lever.
Fore-aft adjustment: 160 mm (6.3 in) (8 stages)

Ⓑ Weight adjustment of seat
Turn knob ② under the seat to match the weight adjustment scale with your own weight.
The weight can be adjusted within a range of 50 – 120 kg (110.3 – 117.8 lb).



REMARK

If you want to make the seat softer, turn the weight adjustment to a lower weight; if you want to make the seat harder, adjust to a higher weight.

When operating on uneven surfaces, adjust the seat to a harder setting.

Ⓒ Adjusting reclining angle

NOTICE

When reclining the seat back to the rear, check the space behind, and adjust to a suitable position.

Pull lever ③, set the seatback to a position where it is easy to operate, then release the lever.

(D) SEAT ANGLE

1. When lever (3) is pulled up, it is possible to adjust the angle of the seat front. (5 stages)
   1. To raise the seat front, keep the lever pulled up and apply your weight to the seat backrest.
   2. To lower the seat front, keep the lever pulled up and apply your weight to the seat front.

2. When lever (5) is pulled up, it is possible to adjust the angle of the seat back. (5 stages)
   1. To raise the seat back, keep the lever pulled up and stand up slightly.
   2. To lower the seat back, keep the lever pulled up and apply your weight to the seat back.

(E) ADJUSTING VERTICAL HEIGHT OF SEAT

Pull up levers (2) and (4) in turn and adjust the angle. After adjusting, release the levers and lock them.
(Vertical adjustment amount: 5 stages, 60 mm)

(F) SEAT ADJUSTING DIRECTION

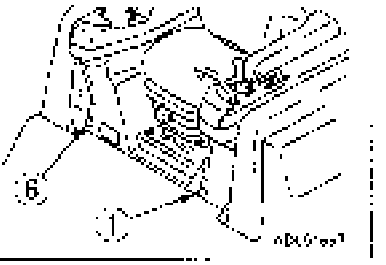
Move lever (6) back to release the lock, then turn the seat to the right by hand. It is possible to change the direction of the seat to the 15° position.
After changing the angle of the seat, return the lever securely and lock it in position.

- Adjusting the seat angle to the right is done to make it easier to carry out ripper operations or scraper towing operations

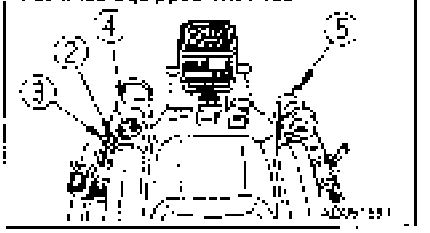
12.1.4 OPERATIONS AND CHECKS BEFORE STARTING ENGINE

⚠ WARNING

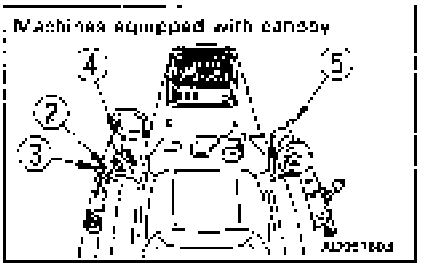
If the work equipment control levers are touched by accident, the work equipment may move suddenly. When leaving the operator's compartment, always set the safety lever securely to the LOCK position.



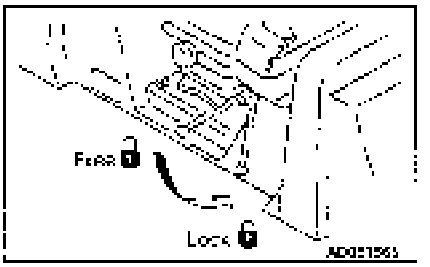
Machines equipped with cab



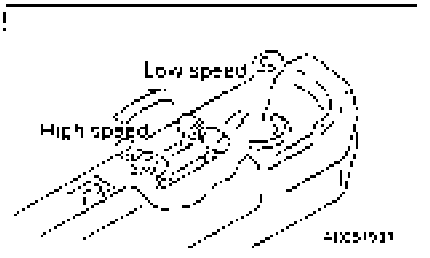
Machines equipped with canopy



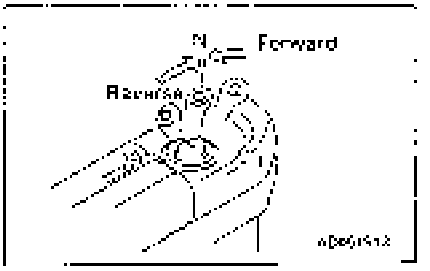
1. Check that the brake pedal is locked with parking lever ①. If this lever is not at the LOCK position, the engine will not start.



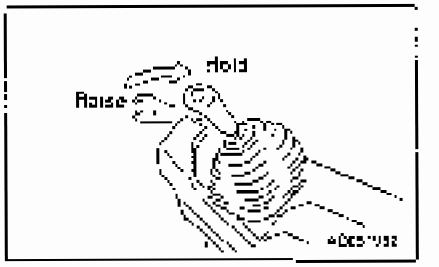
2. Check that FORWARD max. speed setter ② or REVERSE max. speed setter ③ are at the low speed position.



3. Check that joystick ④ is at the neutral position. If not, the engine will not start.

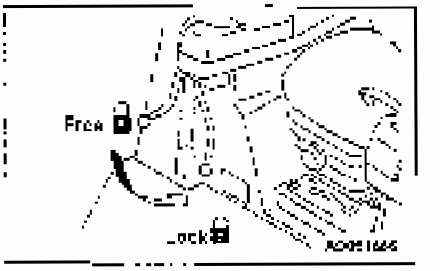


4. Check that the blade is lowered to the ground and that blade control lever is at the HOLD position. If it is at the FLOAT position, the engine will not start.



5. Check that the ripper is lowered to the ground.

6. Check that the safety lever is locked.
If safety lever is locked, the blade control lever is returned to the HOLD position even if it is at the FLOAT position.



12.2 STARTING ENGINE

12.2.1 NORMAL STARTING

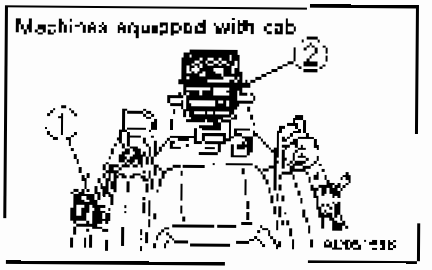
⚠ WARNING

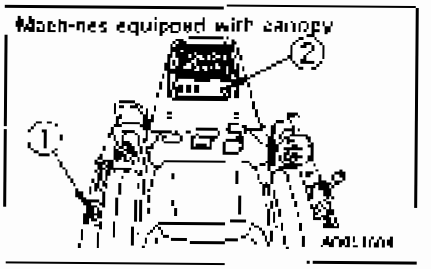
Check that there are no persons or obstacles in the surrounding area, then sound the horn and start the engine.

NOTICE

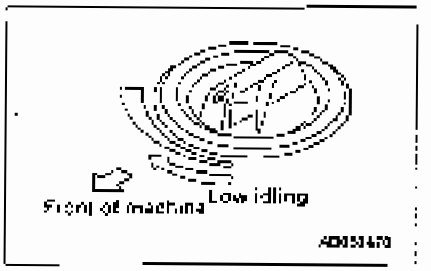
Do not keep the starting motor rotating continuously for more than 20 seconds.

If the engine will not start, wait for at least 2 minutes before trying to start the engine again.

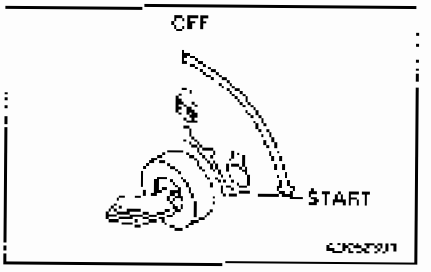




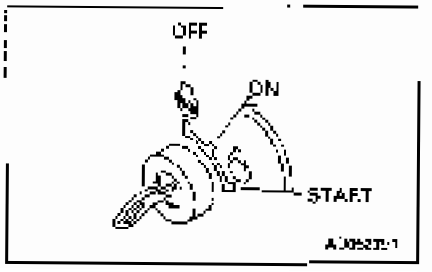
1. Turn fuel control dial (1) to a position midway between the low idling and full speed positions.



2. Insert the key into starting switch (2) and turn the key to the START position. The engine will start.



3. When the engine starts, release the key in starting switch (2). The key will return automatically to the ON position.



12.2.2 STARTING IN COLD WEATHER (MONITOR PANEL SPECIFICATION)

When starting in low temperatures, do as follows

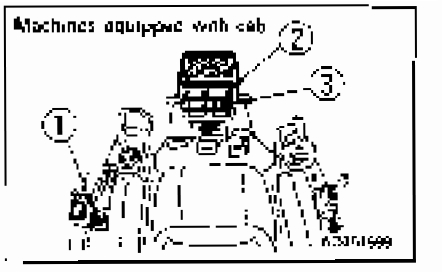
⚠ WARNING

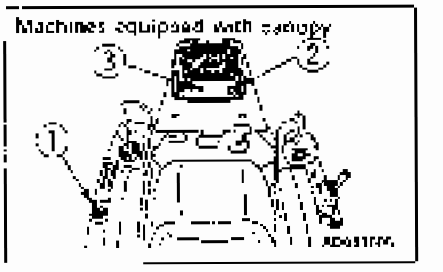
Never use starting aid fluids as they may cause explosions.

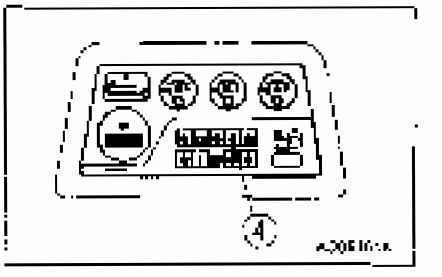
NOTICE

Do not keep the starting motor rotating continuously for more than 20 seconds.

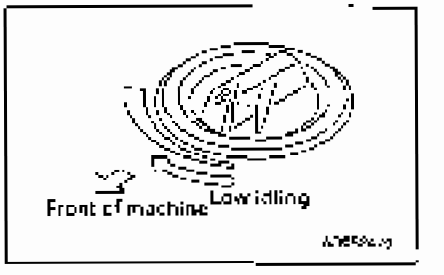
If the engine fails to start, repeat steps 2 and 3 after waiting for about 2 minutes.



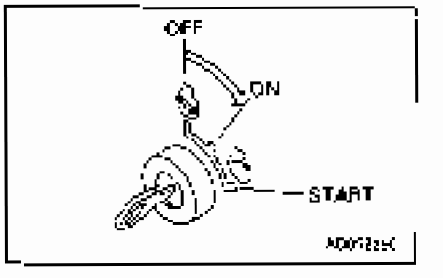




1. Turn fuel control dial ① to a position midway between the low idling and full speed positions.



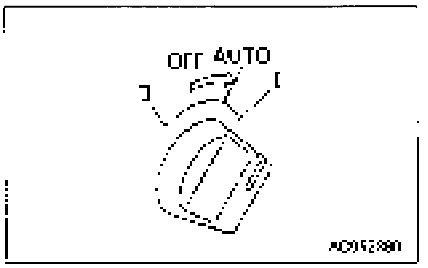
2. Insert the key into starting switch ② and turn the key to the ON position



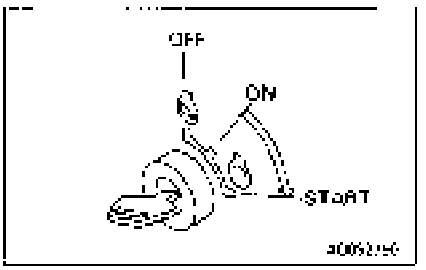
3. Carry out preheating.
   There are the following two ways of carrying out preheating.
   First use the convenient automatic preheating system.

* **Automatic preheating**

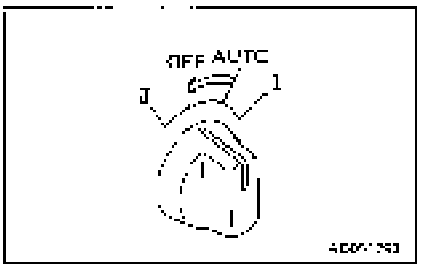
(1) Turn glow switch ⑤ to the AUTO position.
When it is turned to the AUTO position, preheating is automatically carried out according to the ambient temperature. Lamp ① lights up during the preheating operation. When the preheating is completed, lamp ① will go out.



(2) When the preheating is completed, turn the key in starting switch ⑥ to the START position to start the engine.



(3) After starting the engine, return glow switch ⑤ to the OFF position.

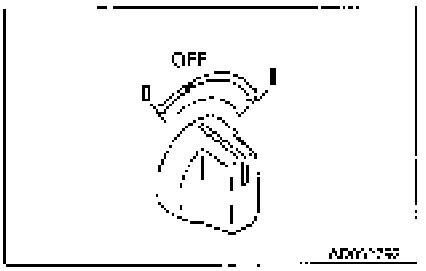


REMARK

If the engine can not start after automatic preheating, start it using manual preheating.

* **Manual preheating**

(1) Turn glow switch ⑤ to position I or II.
Lamp ① lights up during the preheating operation.
When the preheating is completed, release the switch. The key will then return automatically to the following position.
From position I, it will return to AUTO
From position II , it will return to OFF

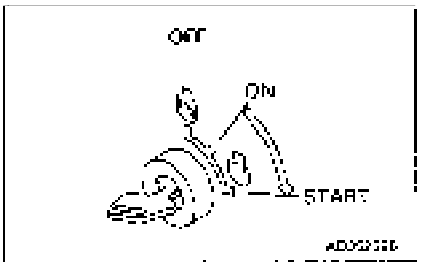


The preheating times are as shown below

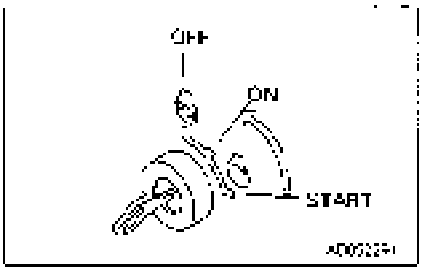
Ambient temperature	Preheat time
0°C to –5°C	–
–5°C to –10°C	15 seconds
–10°C to –20°C	30 seconds
–20°C to –30°C	45 seconds

If the preheating time is too long or too short, the engine will not start easily. Observe the correct preheating time.

(2) When the preheating is completed, turn the key in starting switch to the START position to start the engine.



4. When the engine starts, release the key in starting switch. The key will return automatically to the ON position.



12.2.3 SPECIAL STARTING (AFTER RUNNING OUT OF FUEL)

When starting the engine after it has run out of fuel, first add fuel, then bleed the air from the fuel system before starting.

For details on how to bleed the air, see "24.5 500 HOURS SERVICE".

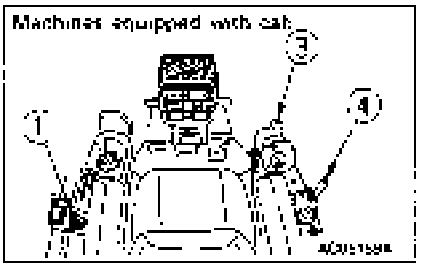
12.3 OPERATIONS AND CHECKS AFTER STARTING ENGINE

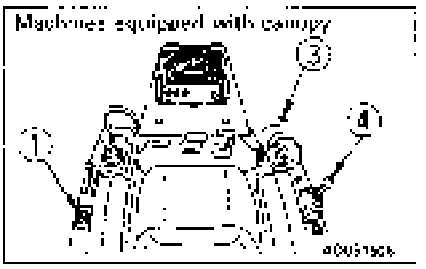
After starting the engine, do not immediately start operations. First, carry out the following operations and checks.

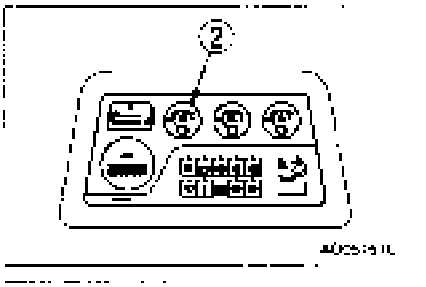
NOTICE

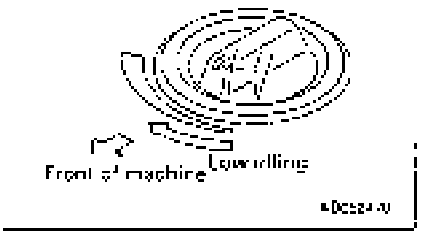
Avoid abrupt acceleration until warm-up run is completed.

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









12.3.1 NORMAL OPERATION

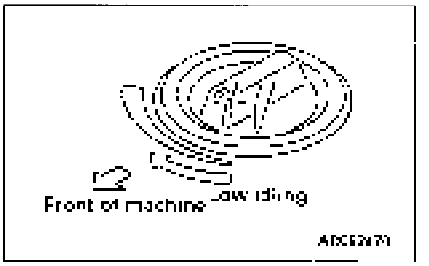
1. Turn fuel control dial ⓒ to the center position between LOW IDLING and HIGH IDLING and run the engine at medium speed for about 5 minutes with no load.

2. After warm-up run is completed, check gauges and caution lamps for proper operation. If any abnormality is found, repair it.
   Continue to run the engine at light load until engine water temperature gauge indicator ⓖ falls within the white range (monitor panel specification).

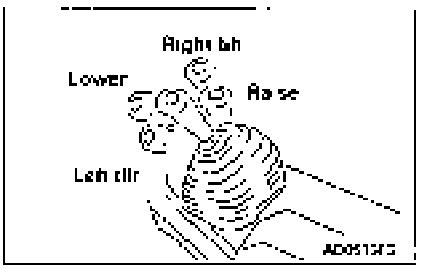
3. Check that there is no abnormal exhaust gas color, noise, or vibration. If any abnormality is found, repair it.

12.3.2 IN COLD AREAS

1. Turn fuel control dial ① to a position midway between the low idling and full speed positions, run the engine at a mid-range speed, and continue to run under no load for approx. 10 minutes.



2. Operate blade control lever ③ to the RAISE position, then keep the blade raised to the maximum height and continue to relieve the circuit for 10 minutes.



3. Finally, operate blade control lever ③ and ripper control lever ④ to operate all the blade and ripper cylinders several times.
   If the oil temperature in the work equipment is not properly raised, there will be a time lag in the response of the work equipment and steering.

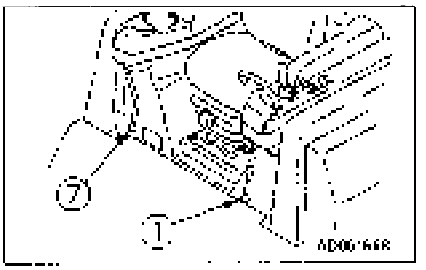
4. After warm up run is completed, check gauges and caution lamps for proper operation. If any abnormality is found, repair it.
   Continue to run the engine at light load until engine water temperature gauge indicator ⑦ falls within the white range (monitor panel specification).

REMARK

If the oil temperature in the power train is not raised properly, it will take longer to accelerate to the maximum speed.

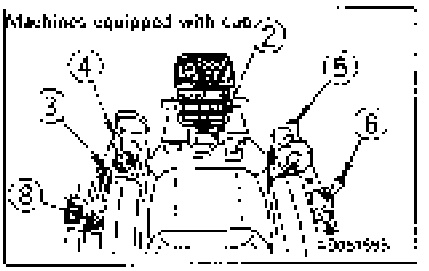
5. Check that there is no abnormal exhaust gas color, noise, or vibration. If any abnormality is found, repair it.

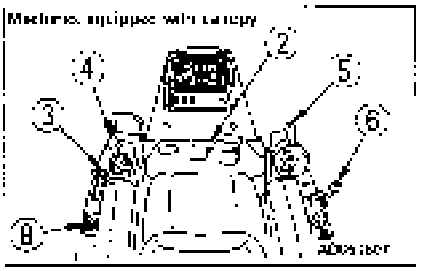
12.4 MOVING MACHINE



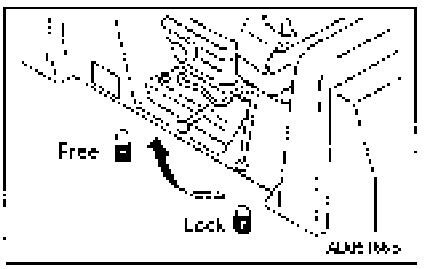
⚠ WARNING

- **When moving machine, check that the area around the machine is safe, and sound the horn before moving. Clear all personnel from the machine and the area. Clear all obstacles from the path of the machine. Use extreme care when reversing the machine. Note there is an blind spot behind the machine.**
- **When starting on slopes, always keep brake pedal ⑦ depressed even after releasing parking lever ①.**
- **When starting the machine up a steep slope, turn fuel control dial ⑧ fully to set the engine to full speed. Then keep brake pedal ⑦ depressed, place max. speed setter ④ to the low speed position, operate joystick ③ in the direction of travel, then release brake pedal ⑦ slowly to allow the machine to start gradually. When the machine starts, release the brake pedal completely.**

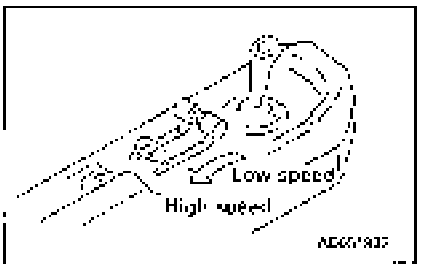




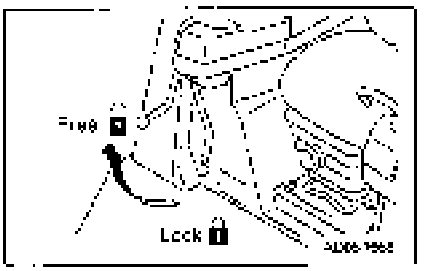
1. Set parking lever ① to the FREE position.



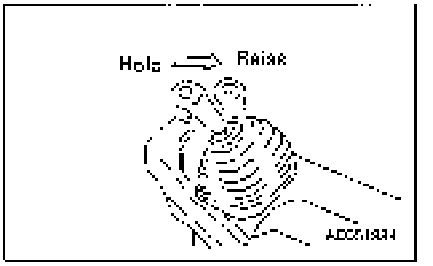
2. Set max. speed setter ④ to the desired position. If the lever is at the minimum speed position, the machine will not start.



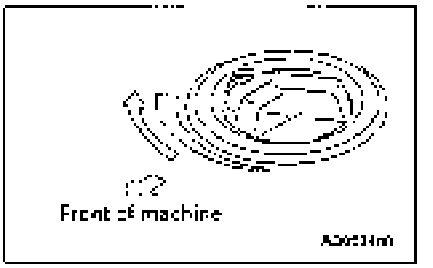
3. Set safety lever ⑦ for blade control lever ⑤ and ripper control lever ⑥ to the FREE position.



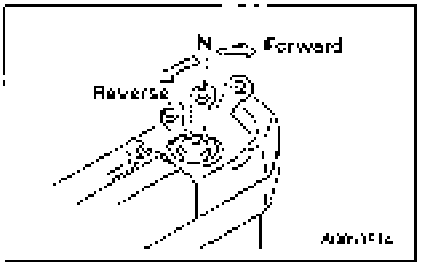
4. Operate blade control lever (5) and ripper control lever (6) to the RAISE position, raise the blade 40 – 50 cm (15.8 – 19.7 in) from the ground, and raise the ripper to the maximum height.



5. Turn fuel control dial (9), raise the engine speed, and fully depress the decelerator pedal.
The mechanism makes it possible to stop the machine when the decelerator pedal is fully depressed.



6. Move joystick (3) to the F (FORWARD) or R (REVERSE) position, gradually release the decelerator pedal and allow the machine to move off.



REMARK

If the speed max. button is pressed, the maximum travel speed is set to the speed set by fuel control dial (9), regardless of the speed setting of max. speed setters (2).

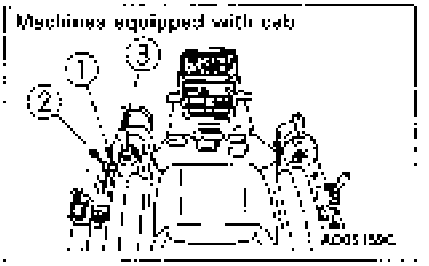
- If the speed max. button is pressed again, the travel speed will return to the speed set by the max. speed setter.
- If the joystick is returned to the neutral position, the speed will also return to the travel speed set by the max. speed setter.

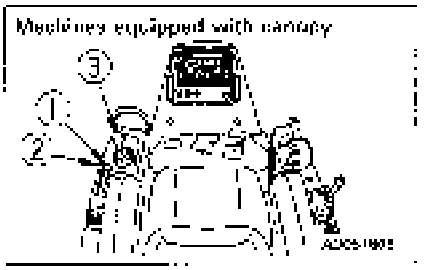
12.5 SHIFTING GEARS

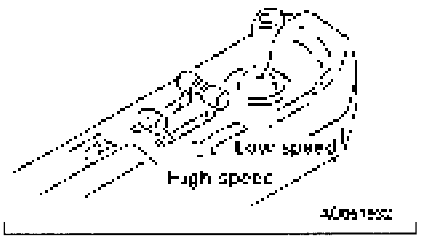
This machine has an automatic transmission, so there is no need for any gear shifting operations.

Set FORWARD max. speed setter ① and REVERSE max. speed setter ② to the desired positions. This enables automatic shifting to the set travel speed simply by operating joystick ③.

It is also possible to adjust the travel speed with the max. speed setter while traveling.







REMARK

- An automatic transmission is used, so if the load on the engine increases during operations or when traveling uphill, the transmission automatically shifts down. When the load is removed, it shifts up again to the set travel speed.
- When traveling in automatic transmission, there may be times when the gear shifting noise is louder, but this is not an abnormality.

12.6 SHIFTING BETWEEN FORWARD AND REVERSE

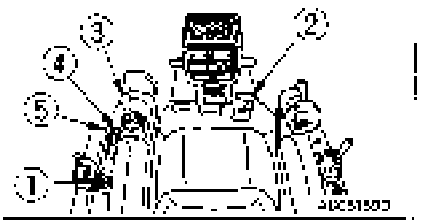
⚠ WARNING

When shifting between FORWARD and REVERSE, it takes slightly longer for the machine to stop than on conventional TORQFLOW machines. (To allow the transmission to shift down properly in order.) Therefore, when switching between FORWARD and REVERSE, start the operation slightly earlier than normal.

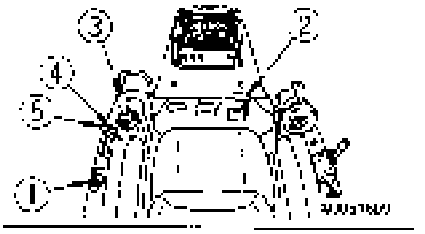
⚠ CAUTION

To ensure safety and to reduce the shock when shifting between FORWARD and REVERSE, depress the decelerator pedal to reduce the speed and stop the machine before shifting.

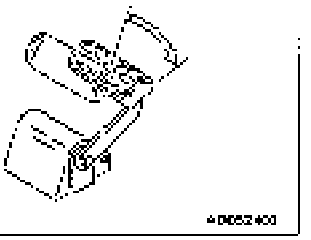
Machines equipped with cab



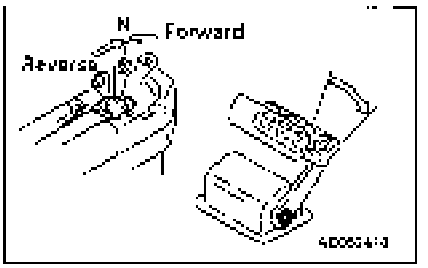
Machines equipped with canopy



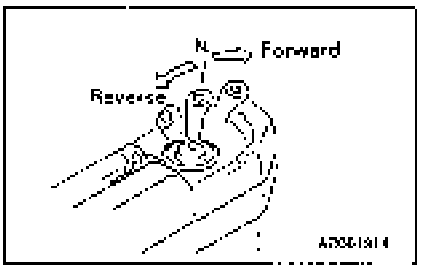
1. Depress decelerator pedal ② and reduce the engine speed.



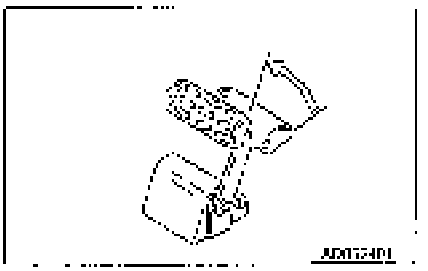
2. Return joystick ① to the neutral position, reduce the speed, then depress the brake and stop the machine.



3. Set joystick ① to the desired position.
   After setting joystick ① to the desired position, if the speed max. button at the top of the joystick knob is depressed, the travel speed is set to the maximum speed. (The maximum speed is set to the speed set by fuel control dial ⑤, regardless of the speed set by max. speed setters ④ and ⑤.)



4. Release decelerator pedal ② to raise the engine speed.



12.7 STEERING MACHINE

⚠ WARNING

- **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.**
- **Never make a pivot turn at high speed.**

12.7.1 NORMAL TURNING

⚠ WARNING

The feeling of the operation If the operator carries out a counterrotation turn when your head is facing the rear is different from the feeling when facing the front, so never carry out counterrotation turns when facing the rear.

To turn the machine while traveling, incline steering and directional lever ① in the direction to turn

- **Turnig to left while traveling forward**

NOTICE

If the lever is operated partially to the forward or reverse position and then is operated in the direction of turn, the machine may carry out a counterrotation turn, so operate the lever fully to the forward or reverse position.

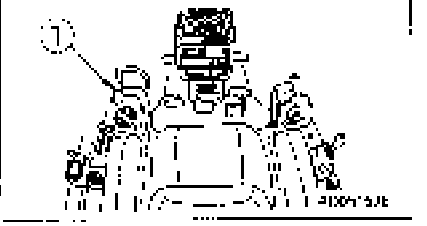
If the steering and directional lever is pushed forward and moved partially to the left (L), the machine will start to turn gradually. After that, the lever can be moved further toward the end of its stroke to give the desired turning radius.

REMARK

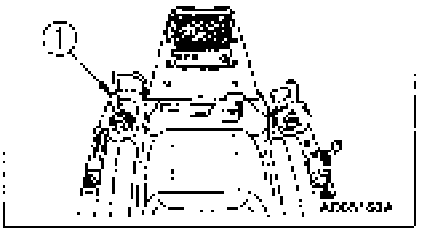
If the steering and directional lever is pushed forward and moved partially to the right, the machine will start to turn gradually to the right. After that, the lever can be moved further toward the end of its stroke to give the desired turning radius.

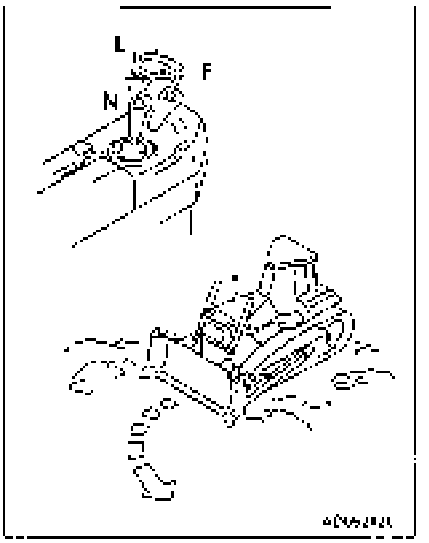
If the lever is operated to the end of its stroke when traveling at high speed, the machine will slowly decelerate and the turning radius will gradually become smaller. Finally, it will become the same as a pivot turn.

Machines equipped with cab

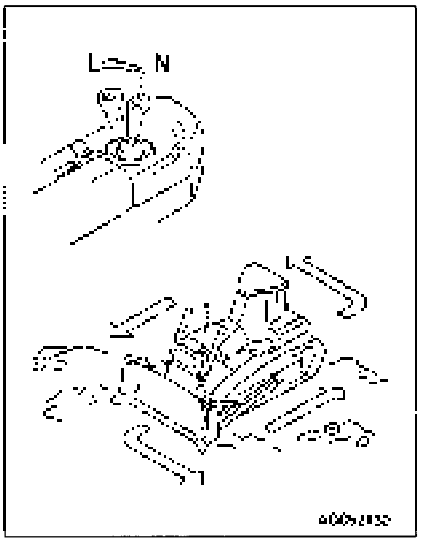


Machines equipped with canopy





■ **Carrying out counterrotation turn to left**



NOTICE

When carrying out a counterrotation turn, if the load is not equal on the left and right sides, the machine may carry out a pivot, so check the ground conditions and be careful not to hit any obstacles.

If the steering and directional lever is placed at the N position and is operated partially to the left, the left and right tracks will rotate in opposite directions and the machine will carry out a counterrotation turn smoothly. If the lever is operated fully, the speed of the counterrotation turn will increase.

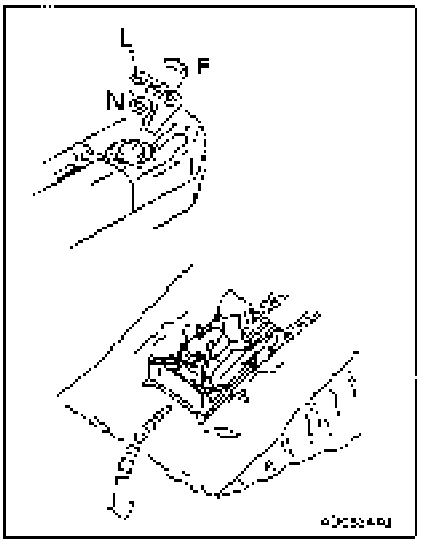
REMARK

When carrying out a counterrotation turn to the right, move the steering and directional lever to the right in the same way.

12.7.2 TURNING WHILE DESCENDING A SLOPE

With machines that can carry out counterrotation turns, on steep downhill slopes where the machine may travel under its own weight, or on downhill slopes where it is being pushed by a towed machine, the machine will not steer in the opposite direction, so do as follows.

- **Making gradual turns to left while traveling forward**
  If the steering and directional lever is pushed forward and moved partially to the left (L), the machine turns gradually to the left. (Does not become reverse steering)

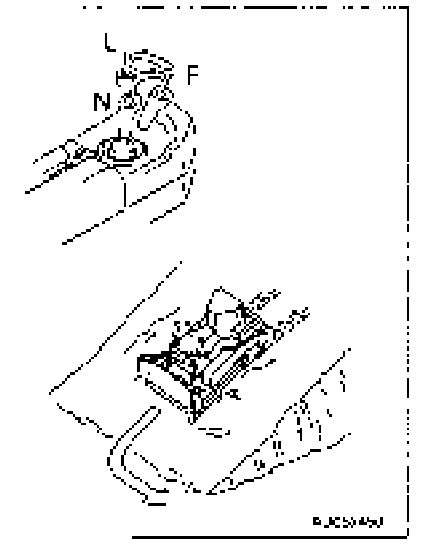


REMARK

When making gradual turns to the right, push the steering and directional lever forward, and move it partially to the right. (Does not become reverse steering)

Do the same when traveling in reverse.

- **Making sharp turns to left while traveling forward**
  If the steering and directional lever is pushed forward and moved fully to the left (L), the machine turns sharply to the left. (Does not become reverse steering)



REMARK

When making sharp turns to the right, push the steering and directional lever forward, and move it fully to the right. (Does not become reverse steering)

Do the same when traveling in reverse.

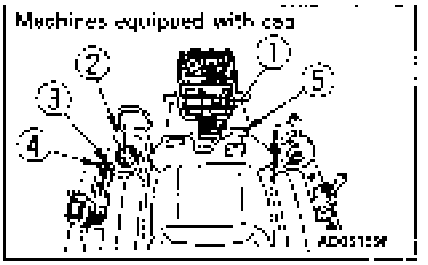
NOTICE

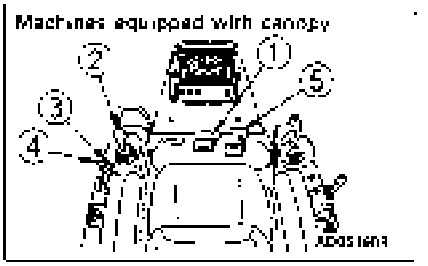
Do not use the counterrotation turn on slopes. The load on the left and right sides will not be uniform, and the machine may turn sharply to one side.

12.8 STOPPING MACHINE

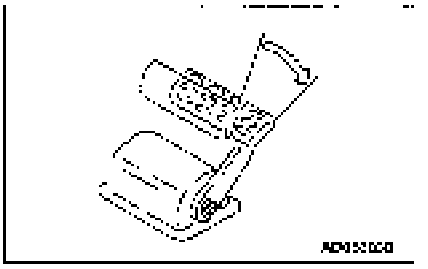
⚠ WARNING

- **Avoid stopping suddenly. Give yourself ample room when stopping.**
- **When stopping the machine, select flat hard ground and avoid dangerous places. If it is unavoidably necessary to park the machine on a slope, place the parking lever in the LOCK position and insert blocks underneath the track shoes. As an additional safety measure, thrust the blade into the ground.**
- **If the work equipment control lever is touched by accident, the work equipment may move suddenly, and this may lead to a serious accident. Before leaving the operator's seat, always operate the safety lever to place it securely at the LOCK position.**





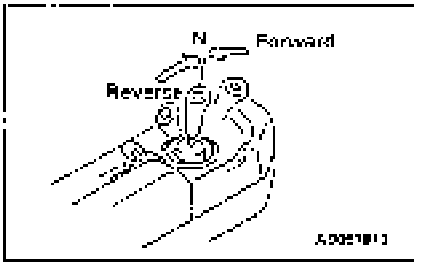
1. Depress brake pedal ① to stop the machine.



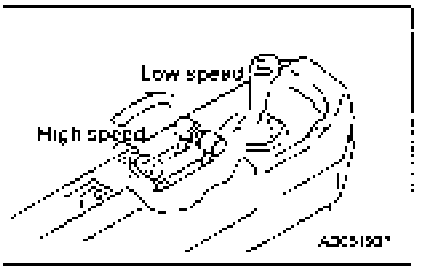
NOTICE

If the brake is depressed when the engine speed or travel speed is high, the brake disc may make a slipping sound. Normally, depress decelerator pedal ⑤ to reduce the engine speed and travel speed before depressing the brake.

2. Place steering and directional lever ② in the N (neutral) position.



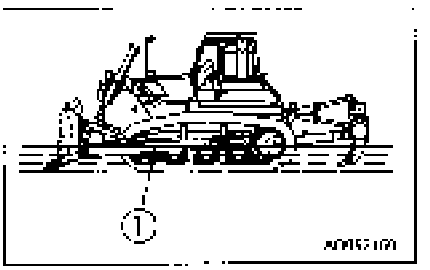
3. Set max. speed setters ③ and ④ to the minimum speed position.



12.9 PRECAUTIONS FOR OPERATION

12.9.1 PERMISSIBLE WATER DEPTH

When working in water, operate the machine only within a depth where the center of idler ① remains above the water surface. If the cooling fan is submerged, the fan may be damaged.



12.9.2 PRECAUTIONS WHEN TRAVELING UP/DOWNHILL

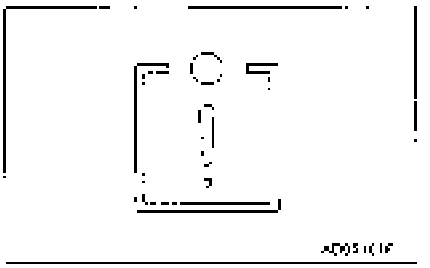
USE ENGINE AS A BRAKE

When traveling downhill, set the max. speed setter to low speed and use the engine as a brake.

BRAKING WHEN TRAVELING DOWNHILL

While descending a slope using the engine as a brake, also apply the brakes.

Failure to brake may result in overrunning, causing engine trouble



NOTICE

The engine overrun caution lamp on the front monitor panel will flash and the buzzer will sound to warn of an abnormality. Apply the brakes, lower the work equipment to the ground, and set the max. speed setter to low speed to reduce the travel and engine speeds. When the condition returns to normal, the lamp will go out.

12.9.3 PRECAUTIONS ON SLOPES

BE CAREFUL OF FUEL LEVEL

If the fuel level in the fuel tank becomes low when working on slopes, the engine may suck in air because of the angle of the machine or the swaying of the machine. If this makes the engine stop, so be careful not to let the fuel level in the fuel tank become too low.

PRECAUTIONS WHEN ENGINE STOPS ON SLOPES

If the engine stops while working or traveling on a hill, the brake is automatically applied, move the parking lever to the LOCK position to apply the parking brake.

12.9.4 IT IS PROHIBITED TO KEEP THE DOOR OPEN DURING OPERATIONS (MACHINES EQUIPPED WITH CAB)

Always keep the door closed when traveling or carrying out operations. If the door is left open, there is danger of damage from obstacles or strong vibration

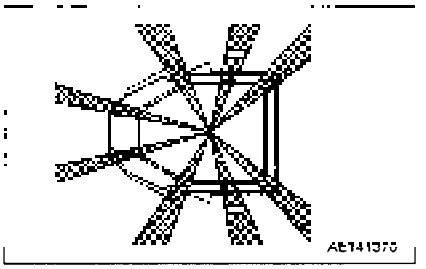
12.9.5 IT IS PROHIBITED TO MODIFY THE CAB GLASS IN ANY WAY THAT WILL OBSTRUCT THE VIEW (MACHINES EQUIPPED WITH CAB)

- For safety reasons, do not install anything to the cab glass that will obstruct the view.
- Always keep the glass clean to ensure safety during operations.

12.9.6 PRECAUTIONS FOR BLIND SPOTS CAUSED BY CAB STAY AND ROPS STAY

⚠ WARNING

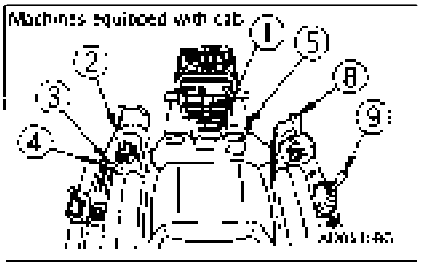
The cab stay and ROPS stay cause blind spots
When operating, always be sure to check carefully that there is no obstacle or worker in the surrounding area.

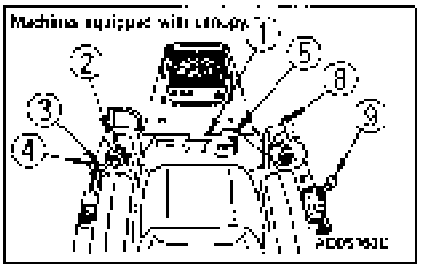


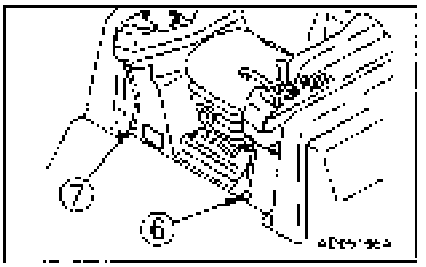
12.10 PARKING MACHINE

⚠ WARNING

- **Avoid stopping suddenly. Give yourself ample room when stopping.**
- **When stopping the machine, select flat hard ground and avoid dangerous places. If it is unavoidably necessary to park the machine on a slope, place the parking lever in the LOCK position and insert blocks underneath the track shoes. As an additional safety measure, thrust the blade into the ground.**
- **If the work equipment control lever is touched by accident, the work equipment may move suddenly, and this may lead to a serious accident. Before leaving the operator's seat, always operate the safety lever to place it securely at the LOCK position.**



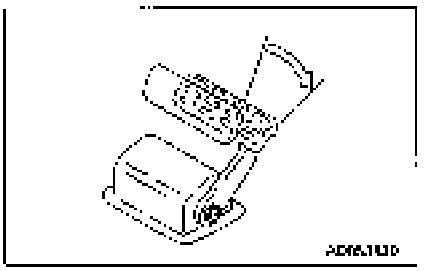




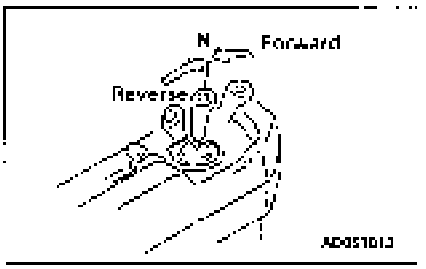
1. Depress brake pedal (1) to stop the machine.

NOTICE

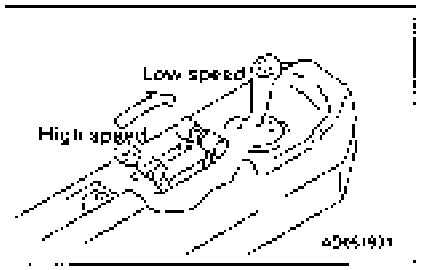
If the brake is depressed when the engine speed or travel speed is high, the brake disc may make a slipping sound. Normally, depress decelerator pedal (5) to reduce the engine speed and travel speed before depressing the brake.



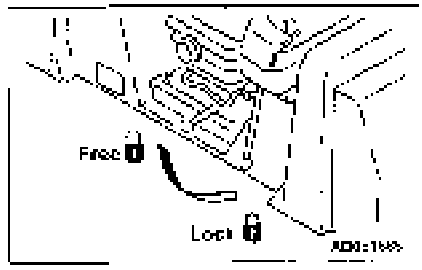
2. Place steering and directional lever (2) in NEUTRAL position.



3. Set max. speed setters (3) and (4) to the minimum speed position.

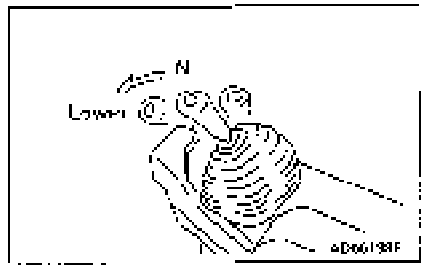


4. Operate parking lever ⑥ to lock the brakes.

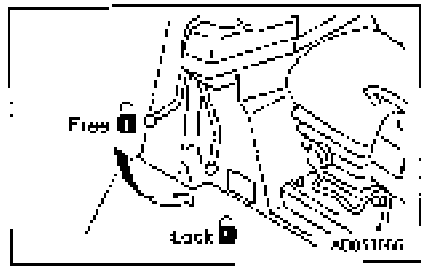


5. Operate blade control lever ⑤ and ripper control lever ⑨ to the LOWER position, and lower the blade and ripper to the ground.

6. Set blade control lever ④ and ripper control lever ⑧ to the HOLD position.

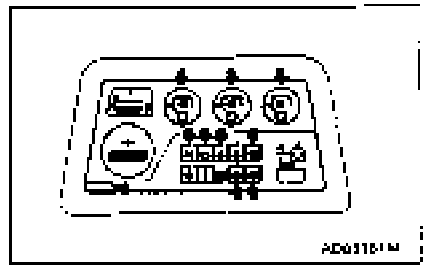


7. Lock blade control lever ④ and ripper control lever ⑧ with safety lever ⑦.

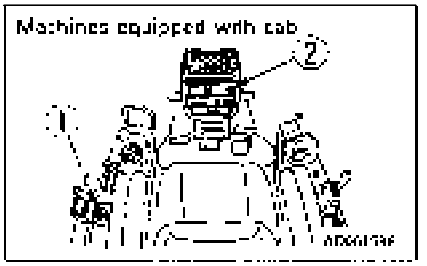


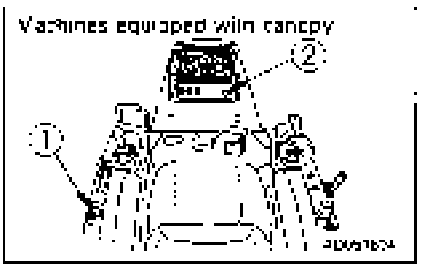
12.11 CHECK AFTER FINISHING WORK

Use the meters and caution lamps to check the engine water temperature, engine oil pressure, fuel level, transmission oil temperature, charge lamp, HMT charge oil pressure, and HMT controller.



12.12 STOPPING ENGINE



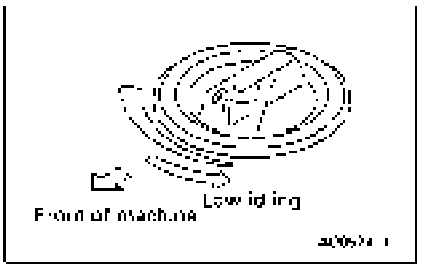


NOTICE

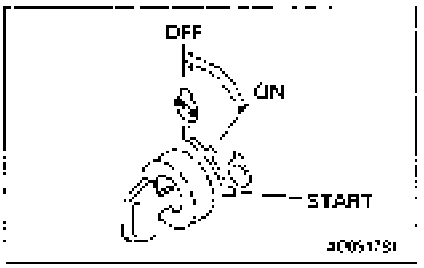
If the engine is abruptly stopped before it has cooled down, engine life may be greatly shortened. Consequently, do not abruptly stop the engine apart from an emergency.

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

1. Place fuel control dial in the low idling position and run the engine at low idling speed for about 5 minutes to allow it to gradually cool down.



2. Turn the key in starting switch ② to the OFF position and stop the engine.
3. Remove the key from starting switch ②.



12.13 CHECK AFTER STOPPING ENGINE

1. Walk around the machine and check the work equipment, paintwork, and undercarriage, and check also for leakage of oil or water. If any abnormalities are found, repair them.

2. Fill the fuel tank.

3. Check the engine compartment for paper and debris. Clean out any paper and debris to avoid a fire hazard.

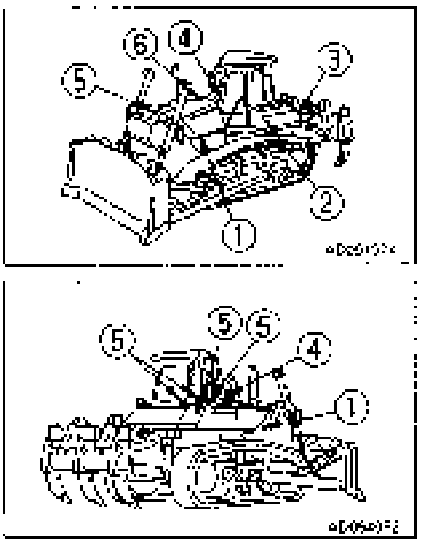
4. Remove any mud stuck to the undercarriage.

12.14 LOCKING

To prevent vandalism, there are locks at the following places.

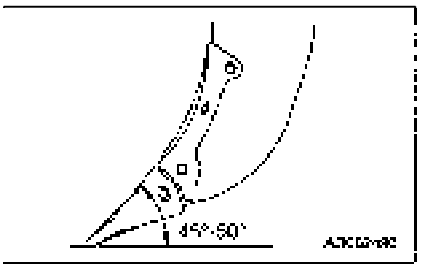
Places that can be locked with the starting switch key.

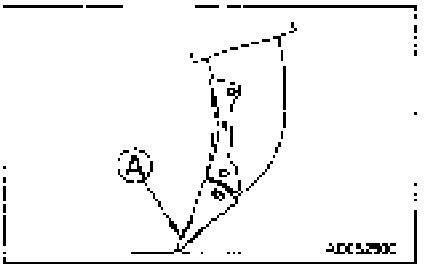
- Right and left engine side cover ①
- Battery inspection cover ②
- Inspection cover for fuel tank drain valve ③
- Cab door opener ④ (machines equipped with cab)
- Cap with lock ⑤
  - Radiator cap
  - Fuel tank cap
  - Hydraulic oil tank cap
  - Hydraulic oil tank breather
  - Power train oil filler cap
- Top cover of hood at cab front (air conditioner filter cover) ⑥

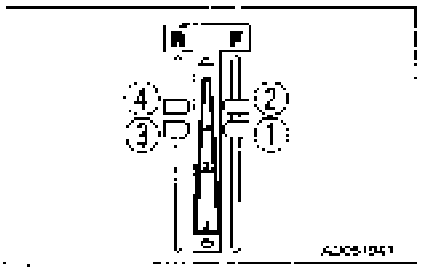


12.15 RIPPER OPERATION

12.15.1 EFFECTIVE METHOD OF USE







- The optimum digging angle for the shank is when the shank is perpendicular to the ground (ripping angle: 45° – 50°).

- In comparatively soft rock (seismic velocity: 1200 m/s or below), it is also possible to carry out ripping with the shank tilted to the rear (max. ripping angle).

- On comparatively hard rock, if ripping is carried out with the shank tilted to the rear, there will be excessive wear of the point of tip (A) , and the self-sharpening ability will be lost.

- During ripping operations, if the shoes slip because of boulders or resistance from the bedrock, use the tilt cylinder.

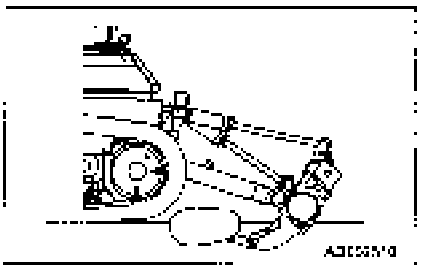
- As a guideline, the setting for the max. speed setter during ripping operations is close to position ① in the diagram on the right (equivalent to F1 for TORQFLOW machines). If there is frequent shoe slippage as on conventional machines and the deceleration must be operated, set the speed slightly towards low speed position ②.
  Even when the engine is running at full throttle, it is extremely easy to control shoe slippage, and the machine can display powerful traction.

- As a guideline, set the max. speed setter for traveling in reverse after ripping to the near position ③ (equivalent to R1 on TORQFLOW machines). However, if the deceleration is used frequently to reduce shock as on conventional machines, set the speed slightly towards low speed position ④.
  Even when the engine is rotating at full throttle it is possible to travel slowly.

- Choosing a suitable ripper point to match the type of rock is one of the most important elements in using the ripper effectively. Ripper points are available for different types of rock, so select the most suitable ripper point from the list. For details, see "30. PROCEDURE FOR SELECTING RIPPER POINT."

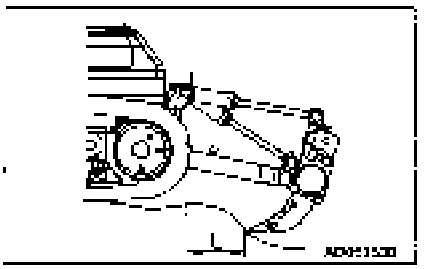
12.15.2 DIGGING UP BOULDERS OR ROCKBED

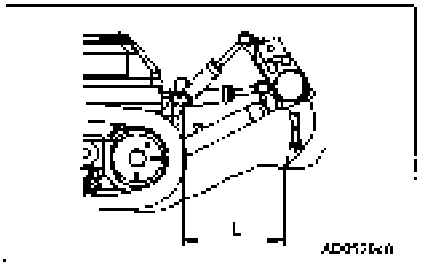
During ripper operations, if stubborn boulders or rockbed cause the tracks to slip or the travel speed to become slower, operate the tilt cylinder to dig up the boulder/rockbed.



12.15.3 OPERATING ON SLOPES

When using the variable ripper, adjust the length of the tilt cylinder to select dimension L.





12.15.4 METHOD OF OPERATING PIN PULLER

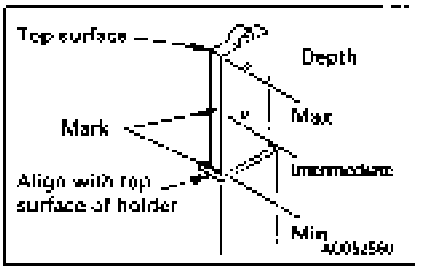
This is used only on machines equipped with a giant ripper.

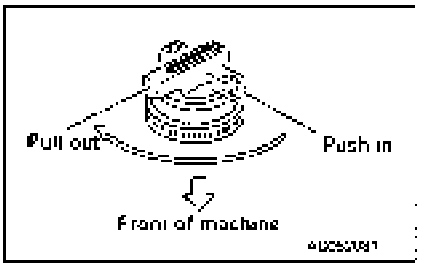
1. Stop the machine in a safe place and lower the shank to the ground.

2. Operate the pin puller controller switch and remove the mounting pin.

3. Move the ripper up or down to set to the desired shank position.

4. Operate the pin puller control switch to insert the mounting pin. If the pin does not match the position of the hole in the shank, set the pin puller control switch to the PUSH IN position and slowly move the ripper up or down.
   - When raising the pin position to increase the digging depth, use a long protector to prevent wear of the shank.





12.16 WORK POSSIBLE USING BULLDOZER

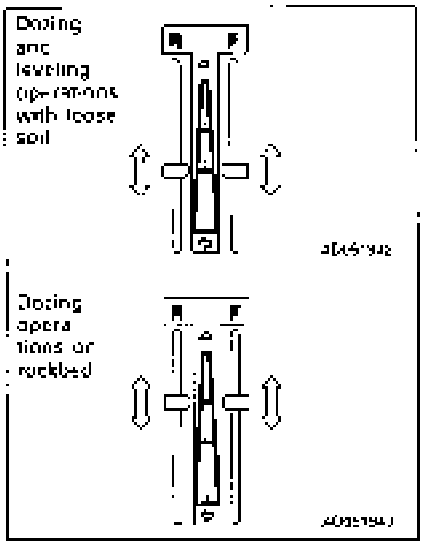
In addition to the following, it is possible to further increase the range of applications by using various attachments.

12.16.1 DOZING

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

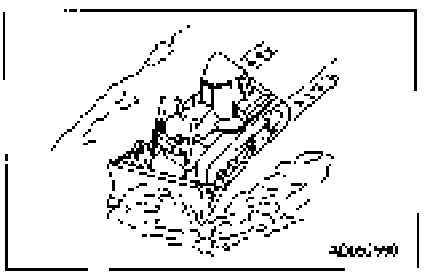
As a guideline, two typical operations for setting the max. speed setter for dozing operations are shown on the right. (The range within the arrows is the suitable range.)

If frequent shoe slippage is noted during dozing operations, move the max. speed setter slightly towards the low speed position. This will facilitate shoe slippage control.



With the power pitch dozer, it is possible to change the blade digging angle. This makes it possible to increase the operating efficiency by adjusting the digging angle during digging operations.

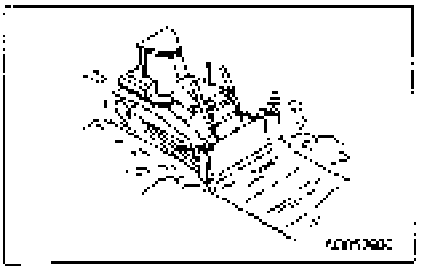
When dozing toward one side only, operate with angled blade (angledozer only)



12.16.2 SMOOTHING

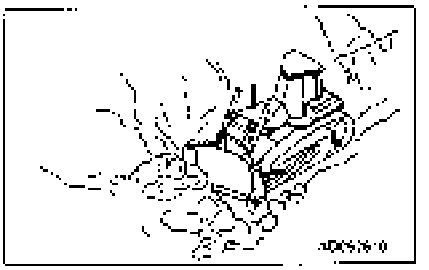
NOTICE

Avoid smoothing on rocky or stony ground. It can damage the blade.



When finishing the ground surface to a smooth finish after digging or filling operations, keep a full load of soil in the blade and operate the blade up or down in small movements while traveling forward. When leveling windrows or ruts left by the tracks, set the blade to the FLOAT position, travel at low speed in reverse and drag the blade over the ground surface.

12.16.3 CUTTING INTO HARD OR FROZEN GROUND OR DITCHING

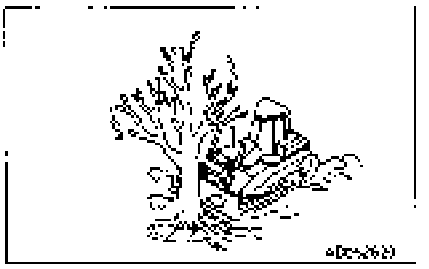


For digging and ditch excavation of hard or frozen ground, tilt the blade. Even hard ground can be dug effectively by a tilted or angled blade.

12.16.4 FELLING TREES, REMOVING STUMPS

NOTICE

Do not up root trees or stumps or fell trees by angling or tilting the blade.



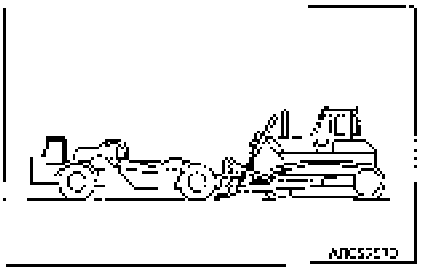
For trees with a diameter of 10 – 30 cm (3.9 – 11.8 in), raise the blade high and push 2 or 3 times to fell the tree.

Next, travel in reverse, and dig the corner of the blade into the ground to cut and dig up the roots.

When doing this, never hit the tree at high speed or apply shock to fell the tree.

12.16.5 PUSHER OPERATIONS

NOTICE



- **When carrying out pusher operations, always install a pusher plate.**
- **When approaching other machine, depress the decelerator pedal or reduce the travel speed with the max. speed setter and bring the machines gently into contact. When in contact, raise the engine speed gradually and push with full power.**

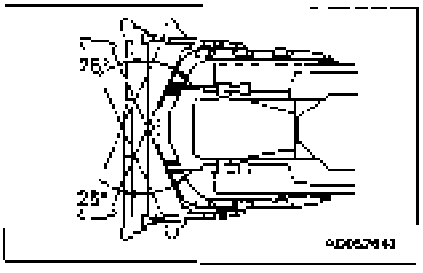
12.17 ADJUSTING POSTURE OF WORK EQUIPMENT

12.17.1 METHOD OF ANGLING BLADE (ANGLEDOZER ONLY)

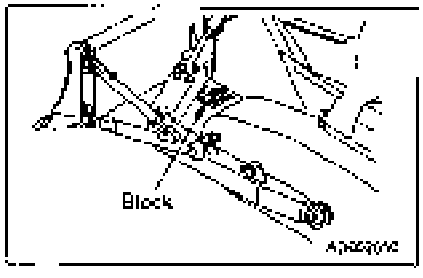
Angle the blade when it is needed to dump the soil on one side.

⚠ WARNING

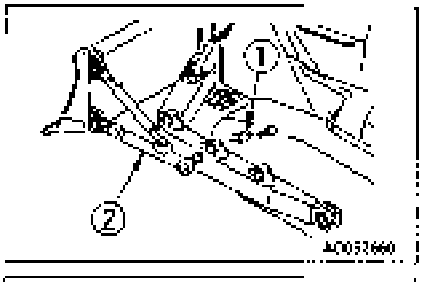
- **When adjusting the amount of angling, it is dangerous if the work equipment is moved by mistake. Set the work equipment in a safe condition, then stop the engine and lock the work equipment securely with the safety lever.**
- **Be careful when removing arm ②. After arm ② is removed the blade can move freely.**



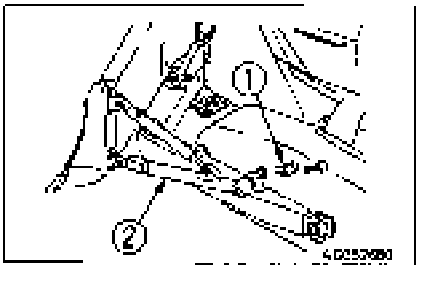
1. Raise the blade 300 – 400 mm (11.8 – 15.8 in) above the ground, then put blocks under the frame so that the blade does not come down.



2. Remove pins ① on the left and right sides, then remove arm ② from the frame.

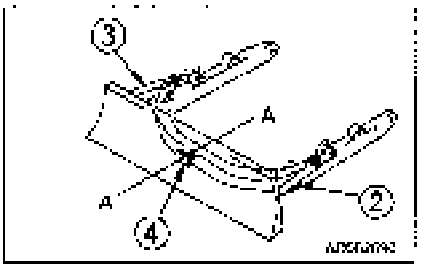


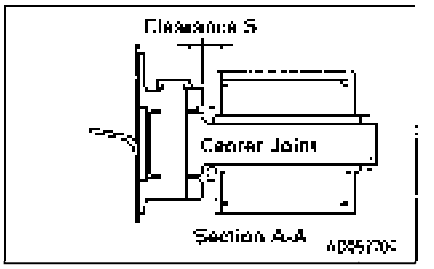
3. Insert arm ② into the desired position on the bracket on top of the frame (3 places on each side), and insert pin ①.



REMARK

When assembling an angle dozer to the C-frame, adjust the clearance of the center joint by adjusting the length of arm ②: and brace ④: so that dimension S of center joint ③: is 20 mm (0.8 in).





12.17.2 ADJUSTING TILT AMOUNT (ANGLEDOZER, POWER TILTDOZER, POWER TILT POWER PITCHDOZER)

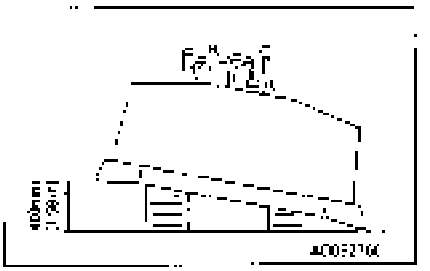
⚠ WARNING

When adjusting the amount of tilt, it is dangerous if the work equipment is moved by mistake. Set the work equipment in a safe condition, then stop the engine and lock the work equipment securely with the safety lever.

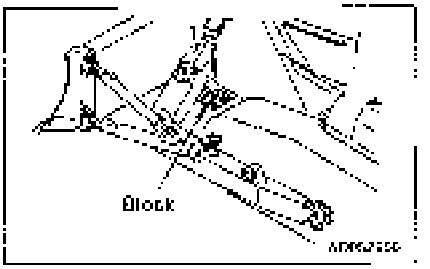
1. **Angledozer**

NOTICE

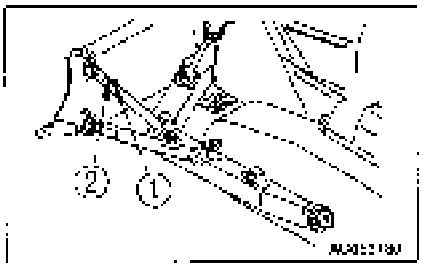
The maximum amount of tilt is 400 mm (15.8 in). Be sure not to exceed 400 mm (15.8 in) for the tilt.



1. Raise the blade 300 – 400 mm (11.8 – 15.8 in) above the ground, then put blocks under the frame so that the blade does not come down.



2. Loosen set bolt ② of the brace, insert a suitable bar into hole ① of the brace, and turn it.

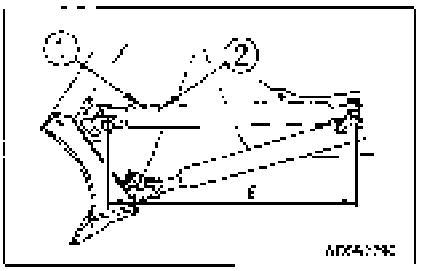


REMARK

When rotating the brace with the adjustment bar, carry out the operation with the blade raised from the ground.

Right tilt: Make right side shorter, left side longer
Left tilt: Make left side shorter, right side longer

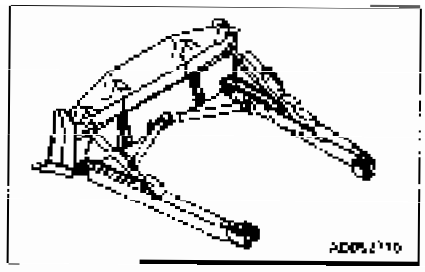
3. Tighten set bolt ①.



NOTICE

The standard value for distance L between the brace joints is 1493 mm (58.8 in), but adjust so that the maximum tilt does not exceed 400 mm (15.8 in). Do not use if the tilt exceeds 400 mm (15.8 in) as this will cause strain on various parts.

2. Power tiltdozer

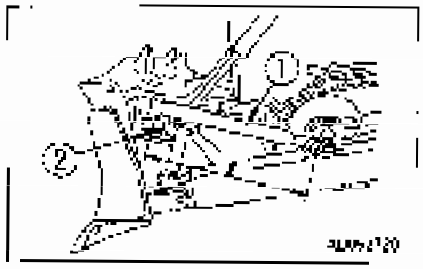


NOTICE

The maximum tilt amount is 1000 mm (39.4 in). Be sure not to exceed this value.

1. A tilt of approx. 500 mm (19.7 in) can be obtained by operating the blade control lever.

2. If a greater tilt amount is needed, use adjustment bar ③ installed to left brace ① to rotate brace ② and change the brace length. It is possible to tilt to a maximum of 1000 mm (39.4 in).



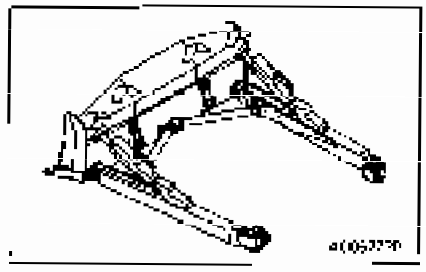
REMARK

When adjusting the tilt in Steps 1 and 2, carry out the operation with the blade raised from the ground.

NOTICE

The standard value for distance L between the joints is 1389 mm (54.7 in), but adjust the brace length so that the maximum tilt does not exceed 1000 mm (39.4 in). Do not use if the tilt exceeds 1000 mm (39.4 in) as this will cause strain on various parts.

3. Power tilt power pitchdozer



NOTICE

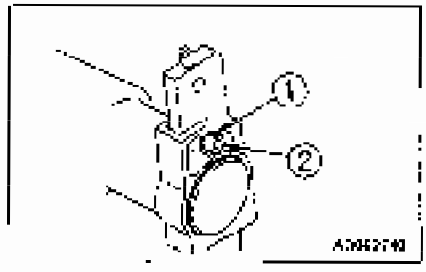
The maximum tilt amount is 1000 mm (39.4 in). Be sure not to exceed this value.

It is possible to tilt to a maximum of 1000 mm (39.4 in) by operating the blade control lever.

12.17.3 ADJUSTING RIPPER

ADJUSTING DIGGING DEPTH

Mounting pin holes are provided in the shank and these are used according to the desired digging depth. For normal use, use the bottom hole, and when particularly deep digging is needed, use the top hole.



To change the digging depth, do as follows.

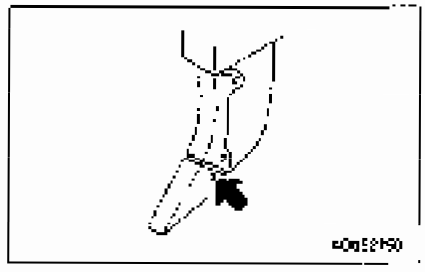
1. Place a pointed object on the tip of pin ①, then hit with a hammer to remove from the opposite side.
2. Remove pin ② and change the position of the shank hole.
3. Insert pin ① partially by hand then knock it in with a hammer.

- The pin is made of one piece, so insert it partially by hand then knock it in with a hammer.
- When a giant ripper is installed, use the pin puller.
  For details, see "12.15.4 METHOD OF OPERATING PIN PULLER".

REPLACING POINT AND PROTECTOR

To protect the shank, if the protector and point installed to the tip are worn, replace them.

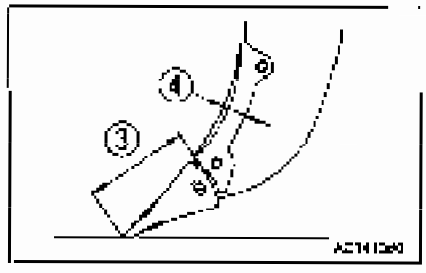
Place a pin remover on the pin marked by the arrow, then hit with a hammer to remove from the opposite side.



If the wear exceeds the wear limit in the table below, replace the worn parts.

Unit: mm

	Basic dimension	Wear limit
③ Point	335	225
④ Protect	115	90



12.17.3 ADJUST ANGLE OF BLADE EDGE [ANGLEDOZER, POWER TILTDOZER, POWER TILT POWER PITCHDOZER]

⚠ WARNING

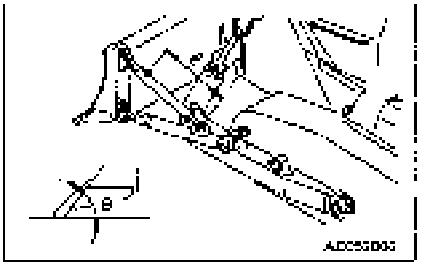
It is dangerous if the work equipment moves by mistake when adjusting angle of the blade edge. Set the work equipment in a stable condition, then stop the engine and apply the locks securely to the safety lever.

Adjust the angle (θ) of the blade edge to march the type of soil.

1. **Angledozer**

Adjust the cutting angle by changing the distance (ℓ) between the joints so that the length of the brace is the same on the left and right sides.

INCREASE distance (ℓ) to INCREASE angle (θ)
DECREASE distance (ℓ) to DECREASE angle (θ).



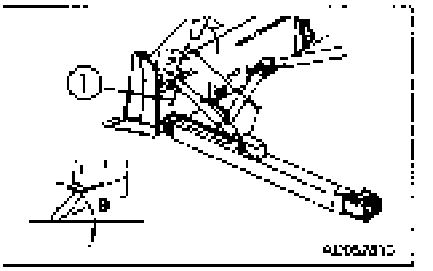
The standard for the cutting angle (θ) is 54°.

The standard for the distance (ℓ) between the joints is 1493 mm (58.8 in).

2. **Power tiltdozer**

Turn the brace with bar handle ① and the distance (ℓ) between the joints to change the cutting angle (θ) as follows.

INCREASE distance (ℓ) to INCREASE angle (θ)
DECREASE distance (ℓ) to DECREASE angle (θ)

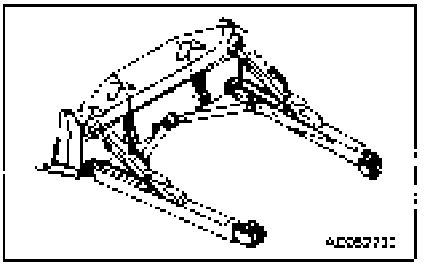


The standard for the cutting angle (θ) is 52°.

The standard for the distance (ℓ) between the joints is 1389 mm (54.7 in).

3. **Power tilt powr pitchdozer**

By operating the left and right cylinders, it is possible to change the digging angle by 52±5°.



12.18 TIPS FOR LONGER UNDERCARRIAGE LIFE

Undercarriage life greatly varies depending on operation method, inspection and maintenance. For most efficient operation, keep the following point in mind.

12.18.1 OPERATION METHOD

- Select the track shoe that best suits the type of soil to be encountered in service.
  Please consult your Komatsu distributor when selecting track shoes.

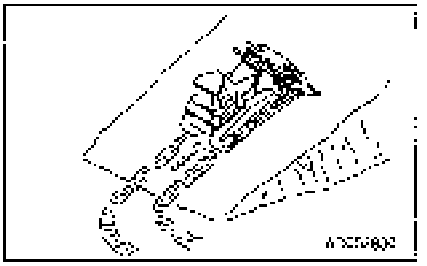
- Do not allow shoe slipping to occur during operation. If shoe slipping occurs, reduce load to the blade until slipping stops, or set the max. speed selector to a low speed to prevent slipping.

- Avoid sudden starts, acceleration or stops, unnecessarily high speeds and sharp turns.

- Always operate machine in a straight line whenever possible. When making turns, be careful not to allow the machine to stay to one side, so operation in both turning directions can be done properly. Make turns with the largest possible radius.

- Prior to operation, clear boulders and obstacles to prevent machine from riding over them while operating.

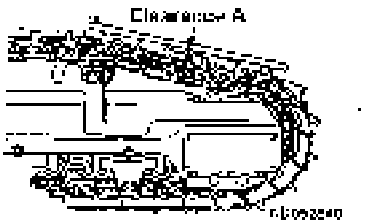
- On a slope, operate the machine parallel to the inclination of the slope. Do not operate across the slope. Also when stopping the machine on a slope, the machine should face toward the top of the slope.



- When ground inclines to left or right during digging operation, do not continue to dig with machine inclined. Move machine back to level ground and start to dig again.

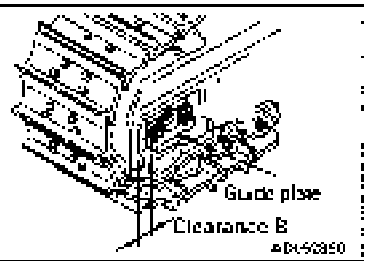
- Do not force the machine to carry out work that exceeds its working capability. Such work includes cases where the idler or sprocket come off the ground when the machine meets obstacles that resist the power of the machine during dozing or ripping operations.

12.18.2 INSPECTION AND ADJUSTMENT



- Properly adjust track tension.
  Tension should be measured at clearance (A) shown in the diagram – usually 20 to 30 mm (0.8 to 1.2 in) at this point. For rocky terrain, tighten tracks slightly. In clay or sandy areas, slightly loosen them. (For inspection and adjustment procedures, refer to "24.2 WHEN REQUIRED".)

- Check idler rollers for oil leakage as well as for loose bolts and nuts. If any trouble is detected, repair immediately.



- Check the clearance between the idler guide plate and the track frame. If clearance (B) increases, idler may develop side motion and tracks may come off. (For inspection and adjustment procedures, refer to "24.2 WHEN REQUIRED".)

12.18.3 INSPECTION AND REPAIR

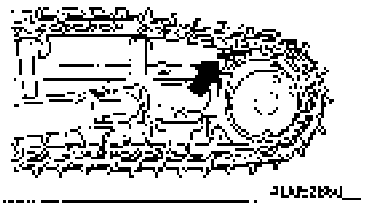
Frequent inspection and prompt repair will reduce repair costs.

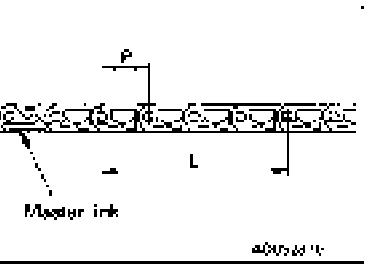
The following items for inspection will serve as a guide to maintenance service of each undercarriage part. Perform periodical inspection and contact the Komatsu distributor in your area when machine has approached repairable limits and reversing limits.

MEASURING LINK PITCH

1. Insert a wooden block between track shoe and sprocket to take up the slack in track shoes.

2. Measure pitch length of 4 links in stretched portion at more than 2 links away from master pin. Of length obtained, 1/4 is the link pitch.





REMARK

Basic link pitch (P): 228.85 mm (9 in)
Link pitch limit for turning bushing
Heavy-duty: 231.85 mm (9.1 in)
Standard: 233.85 mm (9.2 in)

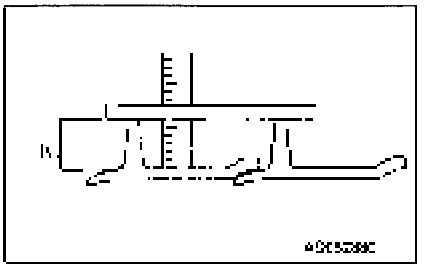
There is no link window on the master link.

MEASURING HEIGHT OF GROUSER

After taking up slack in track shoes, measure height at center of shoe as shown below.

Standard height (h): 80 mm (3.2 in)

Repair limits: 25 mm (1 in)



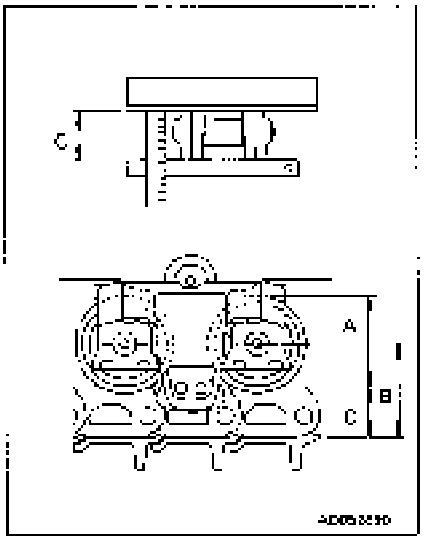
MEASURING OUTSIDE DIAMETER OF TRACK ROLLER

1. Measure height (size C) of link tread as shown.
2. Stop machine at position where link tread, whose size C has been measured completely, contacts roller tread. Then measure size B.
3. Calculate outside diameter of tread (size A):

   A = (B − C) x 2

   Standard size (A): 250 mm (9.9 in)

   Repair limits: 210 mm (8.3 in)



13. TRANSPORTATION

When transporting the machine, observe all related laws and regulations, and be careful to assure safety.

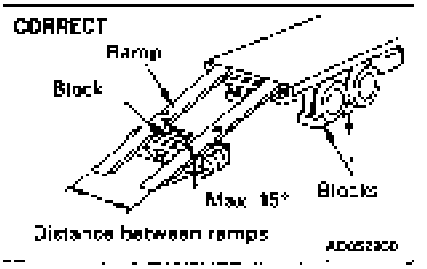
13.1 LOADING, UNLOADING WORK

⚠ WARNING

- **Make sure the ramp has sufficient width, length and thickness to enable the machine to be safely loaded and unloaded. If the ramp sags appreciably, reinforce it with blocks, etc.**
- **When loading and unloading the machine, park the trailer on a flat firm roadbed. Keep a fairly long distance between the road shoulder and the machine.**
- **Remove the mud from the undercarriage to prevent the machine from slipping to the side on slopes. Be sure the ramp surface is clean and free of grease, oil, ice and loose materials.**
- **Never change the direction of travel when on the ramps. If it is necessary to change direction, drive off the ramps and correct the direction, then drive on to the ramps again.**
- **Do not use the counterrotation turn.**

When loading or unloading, always use ramps or a platform and carry out the operations as follows.

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

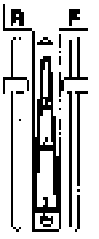


2. Set the machine in line with the ramps, set the max. speed setter to low speed, then load or unload the machine at slow travel.

REMARK

With conventional TORQFLOW machines, the transmission is set to F1 and the engine speed is adjusted to travel at ultra-low speed in order to load the machine slowly. However, with this machine, it can be done easily as follows.

(1) Set the engine speed between mid range speed and full throttle.
(2) Set the FORWARD and REVERSE max. speed setters to the minimum speed position (travel speed 0).
(3) Place the joystick at the FORWARD position.
(4) Move the FORWARD max. speed setter a little at a time from the minimum speed position towards high speed and travel at ultra-low speed. The guideline for the travel speed setting is shown in the diagram on the right.



3. Load the machine correctly in the specified position on the trailer.

13.2 PRECAUTIONS FOR LOADING

After loading to the specified position, secure the machine as follows.

1. Lower the blade slowly.

2. Lock all the control levers securely with the safety lever.

3. Set the parking lever to the LOCK position.

4. Set both the FORWARD and REVERSE max. speed setters to the minumum speed position. Turn the starting switch to the OFF position, stop the engine, then remove the key.

5. Lock the cab door, left and right engine side covers, and the battery inspection cover.

6. Put blocks under the front and rear of both tracks and secure the machine in position with chains or wire rope of appropriate strength to prevent the machine from moving during transportation. Be particularly careful to tie the machine down securely so that it does not slip to the side.

13.3 METHOD OF LIFTING MACHINE

⚠ WARNING

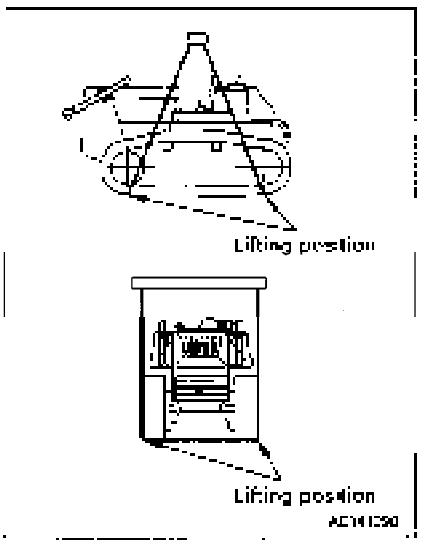
- **Never raise the machine with any worker on it.**
- **Always make sure that the wire rope used for lifting the machine is of ample strength for the weight of the machine.**
- **Never try to lift the machine in any posture other than the posture given in the procedure below. There is danger that the machine may lose its balance.**

When lifting the machine, carry out the operation as follows on flat ground.

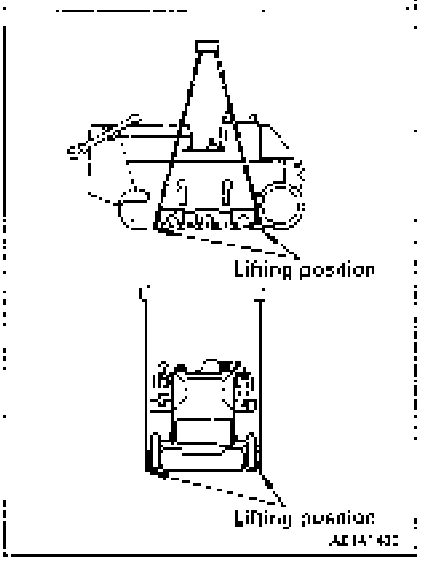
1. Stop the engine and lock the brakes.

2. Fit the wire rope to the specified positions.
   The external shape of the machine differs according to the type of work equipment installed.

   1. When track is installed



   2. When track is not installed



3. When the machine leaves the ground, stop for a moment and wait for the machine to stabilize, then continue the lifting operation slowly. If the balance is poor, lower the machine to the ground and fit the wire ropes again.

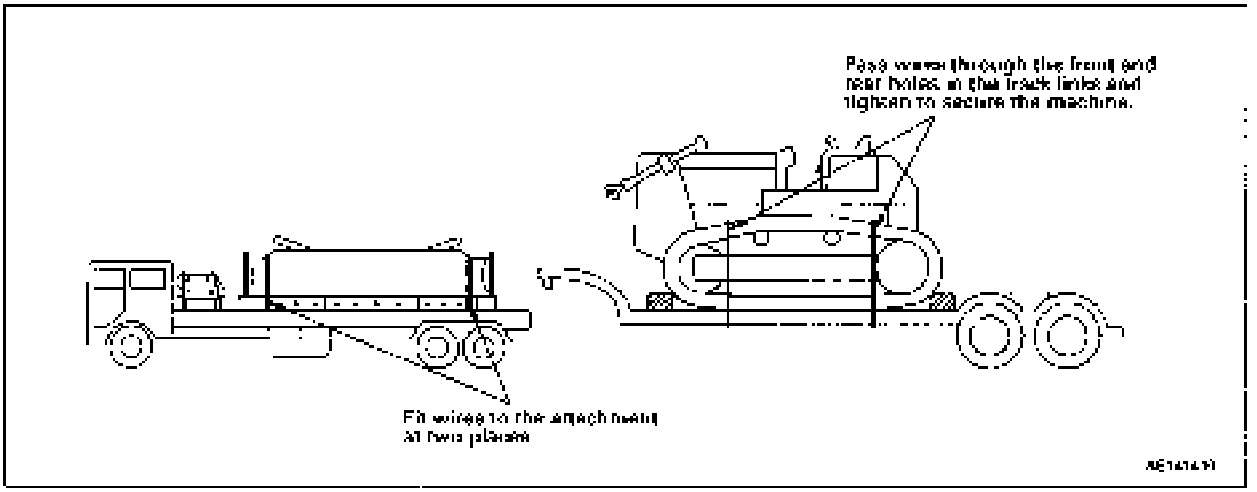
13.4 PRECAUTIONS FOR TRANSPORTATION

⚠ WARNING

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

Obey all state and local laws governing the weight, width and length of a load. Observe all regulations governing wide loads.

Method of transportation

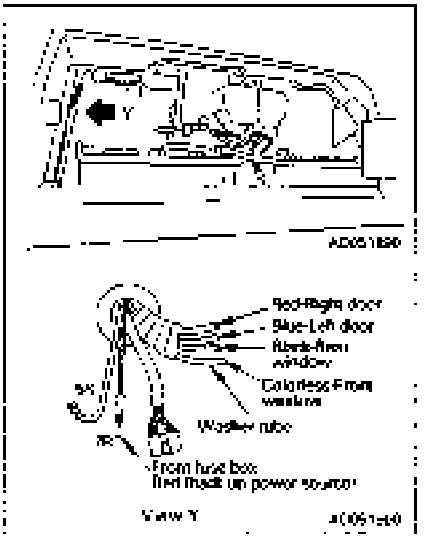


13.5 REMOVAL OF CAB (MACHINES EQUIPPED WITH CAB)

If it is necessary to remove the cab for transportation, disconnect the washer hoses, cab wiring, and washer motor wiring before removing the cab.

1. Push the grommet portion from the hole in the machine cover towards the cab, then remove.

2. Disconnect 4 washer hoses and the wiring (single wires x 2, 4-pin plug x 1).



REMARK

- After removing, cover the washer hoses with a vinyl bag to prevent any dirt or dust from entering.
- Before removing the cab, measure the clearance between the cab and each lever. Note the measurements to use as a standard when installing the cab again.

14. COLD WEATHER OPERATION

14.1 PRECAUTIONS FOR LOW TEMPERATURE

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

14.1.1 FUEL AND LUBRICANTS

Change to fuel and oil with low viscosity for all components.

For details of the specified viscosity, see "20. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".

14.1.2 COOLANT

⚠ WARNING

Keep antifreeze fluid away from an open flame. Never smoke when using antifreeze.

NOTICE

Never use methanol, ethanol or propanol based antifreeze.

Where no permanent antifreeze is available, an ethylene glycol antifreeze without corrosion inhibitor may be used only for the cold season. In this case, clean the cooling system twice a year (in spring and autumn). When refilling the cooling system, add antifreeze in autumn, but do not add any in spring.

Absolutely avoid using any water leak preventing agent irrespective of whether it is used independently or mixed with an antifreeze.

Do not mix one antifreeze with a different brand.

For details of the antifreeze mixture when changing the coolant, see "24.2 WHEN REQUIRED".

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

Standard requirements for permanent antifreeze.

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

14.1.3 BATTERY

⚠ WARNING

- **To avoid gas explosions, do not bring fire or sparks near the battery.**
- **Battery electrolyte is dangerous. If it gets in your eyes or on your skin, wash it off with large amounts of water, and consult a doctor.**

When the ambient temperature drops, the capacity of the battery will also drop. If the battery charge ratio is low, the battery electrolyte may freeze. Maintain the battery charge as close as possible to 100%, and insulate it against cold temperature so that the machine can be started easily the next morning.

Measure the specific gravity and calculate the 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%	1.28	1.27	1.28	1.29
80%	1.24	1.25	1.26	1.27
75%	1.23	1.24	1.25	1.26

14.2 AFTER COMPLETION OF WORK

To prevent mud, water, or the undercarriage from freezing and making it impossible for the machine to move on the following morning, always observe the following precautions.

- Mud and water on the machine body should be completely removed. This is to prevent damage to the seal caused by mud or dirt getting inside the seal with frozen drops of water.
- Park the machine on concrete or hard ground. If this is impossible, park the machine on wooden boards.
- Open the drain valve and drain any water collected in the fuel system to prevent it from freezing.
- As the battery capacity drops markedly in low temperatures, cover the battery or remove it from the machine, keep it in a warm place, and install it again the next morning.

14.3 AFTER COLD WEATHER

When season changes and the weather becomes warmer, do as follows.

- Replace the fuel and oil for all parts with oil of the viscosity specified.
  For details, see "20. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".
- If for any reason permanent antifreeze cannot be used, and an ethyl glycol base antifreeze (winter, one season type) is used instead, or if no antifreeze is used, drain the cooling system completely, then clean out the inside of the cooling system thoroughly, and fill with fresh water.

15. LONG-TERM STORAGE

15.1 BEFORE STORAGE

When putting the machine in storage for more than one month, do as follows.

- 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, park the machine on the flat ground and cover it with canvas etc.

- Completely fill the fuel tank, lubricate and change the oil before storage.

- Apply a thin coat of grease to metal surface of the hydraulic piston rods and the idler adjusting rods.

- Disconnect the negative terminals of the battery and cover it, or remove it from the machine and store it separately.

- If the ambient temperature is expected to drop below 0°C, always add antifreeze to the cooling water.

- Place all control levers at the neutral position, operate the safety lever and parking lever to the LOCK position, then move the fuel control dial to the low idling position.

15.2 DURING STORAGE

⚠ WARNING

If it is unavoidably necessary to carry out the rustpreventive operation while the machine is indoors, open the doors and windows to improve ventilation and prevent gas poisoning.

- Operate the engine and move the machine for a short distance once a month so that a new film of oil will be coated over movable parts and component surfaces. At the same time, also charge the battery.

- Before operating the work equipment, wipe off the grease on the hydraulic piston rod.

15.3 AFTER STORAGE

NOTICE

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

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

- Wipe off the grease from the hydraulic cylinder rods.
- Add oil and grease to all places

16. TROUBLESHOOTING

16.1 PHENOMENA THAT ARE NOT FAILURES

This machine features a power train with a new structure, so the following phenomena are not failures. The machine can be used without problem in these cases.

1) Even when load is applied, there is little change in engine speed.

REMARK

The engine horsepower on this machine is controlled so that it is always the maximum.

2) The machine stops when the decelerator pedal is fully depressed (on level ground).

REMARK

On this machine, to make it easier to align the position of the ripper point, the decelerator pedal is operated to control the machine so that it stops.

3) The machine stops when the max. speed setter is at the minimum speed position (on level ground).

REMARK

To make it possible to load this machine on a trailer using fine speed control, the machine is controlled so that it stops when the max. speed setter is at the minimum speed position.

4) When the automatic transmission is used, the sound of the clutches being shifted is heard when changing gear.

REMARK

With this machine, the transmission clutches are automatically shifted by the automatic shifting structure. When this happens, a noise may be generated.

5) The rise in travel speed is sometimes slow when the power train oil temperature is low.

REMARK

With this machine, the power is partly transmitted hydraulically, so when the oil is at low temperature, the viscosity increases and this makes the transmission of power slower.

6) If the brake is applied suddenly when traveling, a slipping noise may be heard from the brake disc.

REMARK

With the power train on this machine, the machine travels in a condition close to direct transmission, so a slipping noise may be generated in the same way as when the brake is applied on a direct transmission machine.
When applying the brake, reduce the engine speed and travel speed with the decelerator pedal before depressing the brake pedal.

7) Hydraulic noise is heard when the shoes stall during stumping operations or when digging up boulders.

REMARK

To enable this machine to produce greater traction, the system is controlled to make the swash plate angle of the hydraulic pump and motor larger, and it is this control noise that can be heard.

8) When the steering and work equipment are operated at the same time, the work equipment speed sometimes becomes slower than when operating the work equipment alone.

REMARK

On this machine, the steering and work equipment take their hydraulic power from the same pump.

16.2 AFTER RUNNING OUT OF FUEL

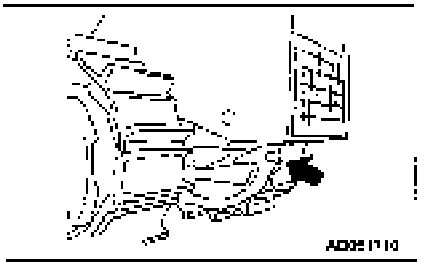
When starting after running out of fuel, fill with fuel and bleed the air from the fuel system before starting.

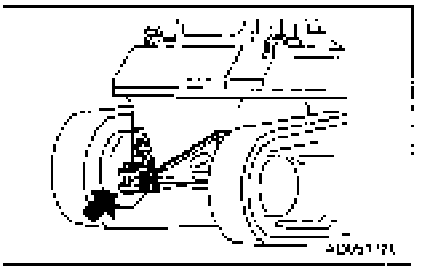
For details of bleeding the air, see "24.5 EVERY 500 HOURS SERVICE".

16.3 METHOD OF TOWING MACHINE

⚠ WARNING

- **When towing the machine, use a wire rope that has ample strength for the weight of the machine being towed.**
- **A shackle must always be used when using a towing hook.**
- **The wire rope should be horizontal and at a right angle to the track frame.**
- **Move the machine slowly.**





If the machine sinks in mud and cannot get out under its own power, or if being used to tow a heavy object, fit the wire to the towing hook as shown in the diagram on the right, or in the case of machines with a drawbar, fit the wire to the drawbar pin when towing.

NOTICE

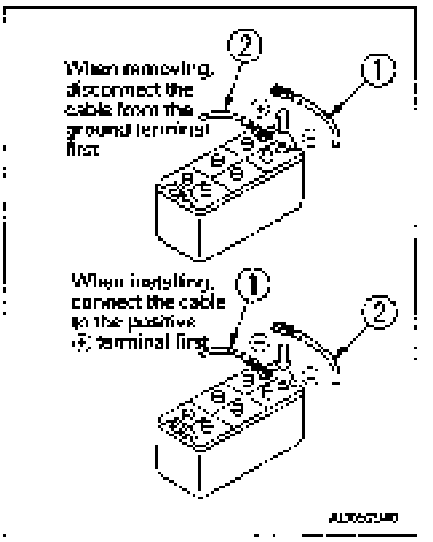
The maximum towing capacity for this machine is 287,000 N.

Always carry out towing operations within the maximum towing capacity.

16.4 IF BATTERY IS DISCHARGED

⚠ WARNING

- **When checking or handling the battery, stop the engine and turn the starting key to the OFF position before starting.**
- **The battery generates hydrogen gas, so there is danger of explosion. Do not bring lighted cigarettes near the battery, or do anything that will cause sparks.**
- **Battery electrolyte is dilute sulphuric acid, and it will attack your clothes and skin. If it gets on your clothes or on your skin, wash it immediately off with large amounts of water. If it gets in your eyes, wash it out with fresh water, and consult a doctor.**
- **When removing the battery, first disconnect the cable from the ground (normally, from the negative ⊖ terminal). When installing, install the positive ⊕ terminal first. If a tool touches the cable connecting the positive terminal and the chassis, there is danger that it will cause sparks.**
- **If the terminals are loose, there is danger that the defective contact may generate sparks that will cause an explosion. When installing the terminals, install them tightly.**

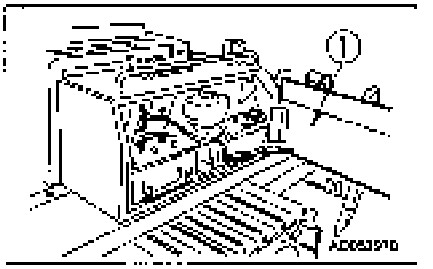


16.4.1 STARTING ENGINE WITH BOOSTER CABLE

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

REMOVAL, INSTALLATION OF BATTERY CABLE

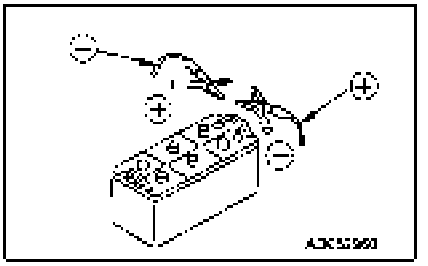
1. Open battery cover ①.
2. Before removing the battery, remove the ground cable (normally connected to the negative ⊖ terminal). If any tool touches between the positive terminal and the chassis, there is danger of sparks being generated. Loosen the nut of the terminal and remove the wires from the battery.
3. When installing the battery, connect the ground cable last. Insert the hole of the terminal on the battery and tighten the nut. Tightening torque: 5.9 – 9.8 Nm (0.6 – 1.0 kgm, 4.3 – 7.2 lbft)
4. Install battery cover ①.



PRECAUTIONS WHEN CONNECTING AND DISCONNECTING BOOSTER CABLE

⚠ WARNING

- When starting the engine from another machine, connect the batteries in parallel.
- When connecting the cables, never contact the positive ⊕ and negative ⊖ terminals.
- When starting the engine with a booster cable, always wear safety glasses.
- Be careful not to let the normal machine and problem machine contact each other. This prevents sparks from generating near the battery which could ignite the hydrogen gas given off by the battery. If hydrogen gas explodes, it could cause serious injury.
- Make sure that there is no mistake in the booster cable connections. The final connection is to the engine block of the problem machine, but sparks will be generated when this is done, so connect to a place as far as possible from the battery.
- Use care when removing the cables from the machine that has been started. Do not allow the cable ends to contact each other or the machine, to avoid hydrogen explosion.

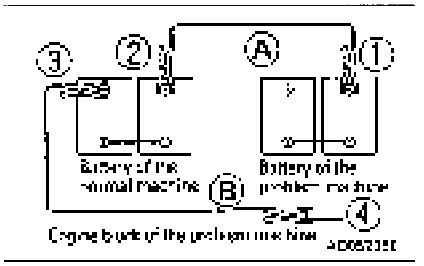


NOTICE

- The size of the booster cable and clip should be suitable for the battery size.
- The battery of the normal machine must be the same capacity as that of the engine to be started.
- Check the cables and clips for damage or corrosion.
- Make sure that the cables and clips are firmly connected.

CONNECTING THE BOOSTER CABLES

Keep the starting switch at the STOP position.



Connect the booster cable as follows, in the order of the numbers marked in the diagram.

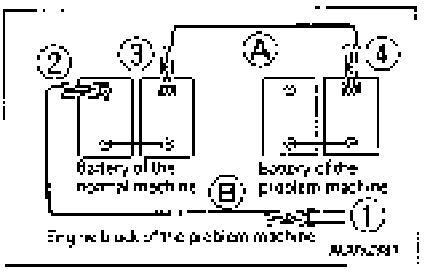
1. Make sure that the starting switches of the normal machine and problem machine are both at the OFF position.
2. Connect one clip of booster cable ③ to the positive ⊕ terminal of the problem machine.
3. Connect the other clip of booster cable Ⓐ to the positive ⊕ terminal of the normal machine.
4. Connect one clip of booster cable Ⓑ to the negative ⊖ terminal of the normal machine.
5. Connect the other clip of booster cable ④ to the engine block of the problem machine.

STARTING THE ENGINE

1. Make sure the clips are firmly connected to the battery terminals.
2. Start the engine of the normal machine and keep it to run at high idling speed.
3. Turn the starting switch of the problem machine to the **START** position and start the engine. Refer to "12.2 STARTING ENGINE".

DISCONNECTING THE BOOSTER CABLES

After the engine has started, disconnect the booster cables in the reverse of the order in which they were connected.



1. Remove one clip of booster cable ③ from the engine block of the problem machine.
2. Remove the other clip of booster cable Ⓑ from the negative ⊖ terminal of the normal machine.
3. Remove one clip of booster cable Ⓐ from the positive ⊕ terminal of the normal machine.
4. Remove the other clip of booster cable ④ from the positive ⊕ terminal of the problem machine.

16.5 OTHER TROUBLE

- (k: Always contact your Komatsu distributor when dealing with these items.
- In cases of abnormalities or causes which are not listed below, please contact your Komatsu distributor for repairs

16.5.1 ELECTRICAL SYSTEM

Problem	Main causes	Remedy
Lamp does not glow brightly even when the engine runs at high speed	• Defective wiring • Defective adjustment of fan belt tension	(• Check, repair loose terminals, disconnections) • Adjust fan belt tension For details, see EVERY 250 HOURS SERVICE
Lamp flickers while engine is running		
Charge lamp does not go out even when engine is running	• Defective alternator • Defective wiring	(• Replace) (• Check, repair)
Abnormal noise is generated from alternator	• Defective alternator	(• Replace)
Starting motor does not turn when starting switch is turned to ON	• Defective wiring • Insufficient battery charge • Safety switch out of adjust	(• Check, repair) • Charge (• Adjust safety switch)
Pinion of starting motor keeps going in and out	• Insufficient battery charge	• Charge
Starting motor turns engine sluggishly	• Insufficient battery charge • Defective starting motor	• Charge (• Replace)
Starting motor disengages before engine starts	• Defective wiring • Insufficient battery charge	• (Check, repair) • Charge
Automatic preheating is not actuated	• Defective wiring • Defective glow heater • Defective timer	(• Check, repair) (• Replace) (• Replace)
Glow signal lamp does not go out	• Defective wiring • Defective heater relay	(• Check, repair) (• Replace)
Oil pressure caution lamp does not light up when engine is stopped (starting switch at ON position)	• Defective caution lamp • Defective caution lamp switch • Defective wiring	(• Replace) (• Replace) (• Check, repair)
Charge lamp does not light up when engine is stopped (starting switch at ON position)	• Defective charge lamp • Defective wiring	(• Replace) (• Check, repair)
Outside of electrical intake air heater is not warm when touched by hand	• Defective wiring • Disconnection in electrical intake air heater • Defective operation of heater relay switch	(• Check, repair) (• Replace) (• Check, repair heater relay switch)

Problem	Main causes	Remedy
Air conditioner does not work properly	• Blown fuse • Insufficient battery charge • Defective air conditioner switch • Defective blower switch • Defective compressor	(• Check, repair) • Charge (• Replace air conditioner switch) (• Replace blower switch) (• Replace)
Blade pitch does not change even when pitch operation is carried out (pitch specification machines only)	• Defective wiring • Defective switch • Defective solenoid valve	(• Check, repair) (• Replace) (• Replace)
HMT charge pressure caution lamp does not light up when starting switch is turned ON.	• Defective caution lamp • Defective wiring • Defective charge pressure sensor	(• Replace) (• Check, repair) (• Replace)
Electronic system caution lamp does not light up when starting switch is turned ON	• Defective caution lamp • Defective wiring	(• Replace) (• Check, repair)
Speed is not switched when speed max. button is pressed	• Defective wiring • Defective selector switch • Defective battery charge • Joystick is at neutral position • Max. speed setter is already at max. speed position	(• Check, repair) (• Replace) (• Charge) (• Move joystick to FORWARD or REVERSE position, then press button) (• Move max. speed setter to lower speed)

16.5.2 CHASSIS

Problem	Main causes	Remedy
When brake pedal is depressed, machine does not stop	• Brakes out of adjust, defective brake oil pressure	• Check, adjust
Track comes off	• Track too loose	• Adjust track tension, see WHEN REQUIRED
Abnormal wear of sprocket	• Track too loose or too tightened	
Blade, ripper lifting speed is slow or they do not move	• Lack of hydraulic oil	• Add oil to specified level. See EVERY 250 HOURS SERVICE.
	• Work equipment lock lever is at LOCK position	• Set to FREE position
Machine does not turn when steering is operated	• Defective operation of PPC valve	• Check, replace
	• Parking brake is at LOCK position	• Set to FREE position
	• Defective lever wiring	• Check, repair
	• Abnormality in steering motor	• Check, replace
Transmission oil pressure does not rise	• Wear, scuffing of gear pump	• Check, replace
	• Lack of oil in power train case	• Add oil to specified level. For details, see CHECKS BEFORE STARTING.
	• Element strainer of oil filter in power train case clogged	• Clean. For details, see EVERY 1000 HOURS SERVICE.
Lack of drawbar pull (travel speed does not rise)	• Abnormality in electronic system	• Check, repair according to error code
	• Lack of engine horsepower	• See ENGINE
	• Wear of HMT pump	• Check, replace
Pickup of travel speed is slow	• Power train oil temperature is low	• Carry out warming-up operation
	• Lack of engine horsepower	• See ENGINE
	• Wear of HMT pump	• Check, replace
Machine does not move when joystick is operated to travel position	• Lack of oil in power train case	• Add oil to specified level. See CHECK BEFORE STARTING.
	• Transmission oil pressure does not rise	• See "Transmission oil pressure does not rise" above
	• HMT pump oil pressure does not rise	• Check, replace
	• Lack of hydraulic oil	• Add oil to specified level. See EVERY 250 HOURS SERVICE
	• Defective lever wiring	• Check, repair
	• Parking brake is at LOCK position	• Set to FREE position
	• Speed lever is at min. speed position	• Set to high speed position
	• Defective controller wiring	• Check, repair

16.5.3 ENGINE

Problem	Main causes	Remedy
Engine oil pressure caution lamp remains alight when engine speed is raised after completion of warm-up	• Engine oil pan oil level is low (causing oil air) • Clogged oil filter cartridge • Defective tightening of oil pipe joint, oil leakage from damaged part • Defective caution lamp	• Add oil to specified level, see CHECK BEFORE STARTING • Replace cartridge, see EVERY 250 HOURS SERVICE (• Check, repair) (• Replace lamp)
Steam is emitted from top part of radiator (pressure valve)	• Cooling water level low, water leakage • Loose fan belt • Dirt or scale accumulated in cooling system • Clogged radiator fin or damaged fin • Defective thermostat	• Add cooling water, repair, see CHECK BEFORE STARTING • Adjust fan belt tension, see EVERY 250 HOURS SERVICE • Change cooling water, clean inside of cooling system, see WHEN REQUIRED • Clean or repair, see WHEN REQUIRED (• Replace thermostat)
Indicator of water temperature gauge is in red range on right side of gauge	• Loose radiator filler cap (high altitude operation) • Defective water temperature gauge	• Tighten cap or replace packing (• Replace water temperature gauge)
Indicator of water temperature gauge is in white range on left side of gauge	• Defective thermostat • Defective water temperature gauge	(• Replace thermostat) (• Replace water temperature gauge)
Engine does not start when starting motor is turned	• Lack of fuel • Air in fuel system • Defective fuel injection pump or nozzle • Starting motor cranks engine sluggishly • Glow signal does not glow red • Defective compression (• Defective valve clearance	• Add fuel, see CHECK BEFORE STARTING • Repair place where air is sucked in (• Replace pump or nozzle) (• See ELECTRICAL SYSTEM) (• Adjust valve clearance)
Exhaust gas is white or blue	• Too much oil in oil pan • Improper fuel	• Add oil to specified level, see CHECK BEFORE STARTING • Change to specified fuel
Exhaust gas occasionally turns black	• Clogged air cleaner element • Defective nozzle • Defective compression	• Clean or replace, see WHEN REQUIRED (• Replace nozzle) (• Adjust valve clearance)
Combustion noise occasionally makes sneezing sound	• Defective nozzle	(• Replace nozzle)
Abnormal noise generated (combustion or mechanical)	• Low grade fuel being used • Overheating • Damage inside muffler • Excessive valve clearance	• Change to specified fuel • See item "Indicator of water temperature gauge is in red range on right side of gauge". (• Replace muffler) (• Adjust valve clearance)

MAINTENANCE

⚠ WARNING

Always hang the DANGER. DO NOT OPERATE! sign in the operator's compartment when carrying out maintenance.

17. GUIDES TO MAINTENANCE

Do not carry out any inspection and maintenance operation that is not given in this manual.

Perform maintenance work on hard, flat ground.

Check service meter
Check the service meter reading every day to see if the time has come for any necessary maintenance to be carried out.

Komatsu genuine replacement parts:
Use Komatsu genuine parts specified in the parts list as replacement parts.

Komatsu genuine oils:
Use Komatsu genuine oils and grease. Choose oils and grease with proper viscosities specified for ambient temperature.

Always use clean washer fluid:
Use automobile window washer fluid and be careful not to let any dirt get into it.

Clean oil and grease:
Use clean oil and grease. Also, keep containers of the oil and grease clean. Keep foreign materials away from oil and grease.

Keeping the machine clean:
Always keep the machine clean. This makes is easier to find parts causing problems. Keep in particular grease fittings, breathers and oil level gauges clean and avoid foreign matters from getting in them.

Be careful of hot water and oil:
Draining hot oils and coolants and removing their filters immediately after the engine stops are hazardous. Allow the engine to cool.
If the oil has to be drained when it is cold, warm up the oil to a suitable temperature (approx. 20 – 40°C) before draining it.

Checking foreign materials in drained oil:
After oil is changed or filters are replaced, check the oil and filters for metallic particles and foreign materials. If large quantities of metallic particles or foreign materials are found, consult your Komatsu distributor.

Fuel strainer:
If your machine is equipped with a fuel strainer, do not remove it while fueling.

Oil change:
Check or change oils in the places where dust is scarce to keep foreign materials away from oils.

Warning tag:
Attach the warning tag to the starting switch or other appropriate control lever to avoid someone who is not aware of the circumstances from starting the engine.

Obey precautions:
During the operation, always obey the precautions on the safety label stuck to the machine.

Welding instructions:
- Turn off the engine starting switch.
- Do not apply more than 200 V continuously.
- Connect grounding the cable within 1 m from the area to be welded.
- Avoid seals or bearings from being between the area to be welded and the position of grounding point.

Fire prevention:
Use nonflammable cleaner or light oil for cleaning parts. Keep flame or cigarette light away from light oil.

Clamp faces:
When O-rings or gaskets are removed, clean the clamp faces and replace the O-rings and gaskets with new ones. Be sure to fit O-rings and gaskets when assembling.

Objects in your pockets:
Keep your pockets free of loose objects which can fall out and drop into the machinery; especially when you work on the machinery while bending over it.

Checking undercarriage:
When working in rocky areas, check for damage to the undercarriage and for looseness, flaws, wear and damage in bolts and nuts. Loosen the track tension a little when working in such areas.

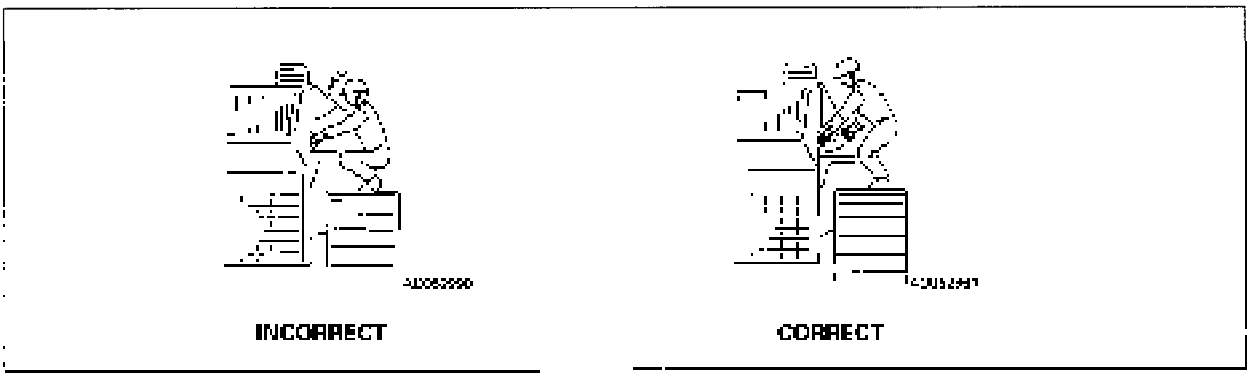
Cleaning machine:
- Do not direct a high-pressure jet directly at the radiator.
- Do not splash water over the electrical equipment.

Pre- and post-work checks:
Before starting work in mud, rain, snow or at seashore, check plugs and valves for tightness. Wash the machine immediately after the work to protect components from rusting.
Lubricate components more frequently than usual. Be sure to lubricate work equipment pins daily if they are submerged in water.

Dusty worksites:
When working at dusty worksites, do as follows:
- Check the air cleaner for clogging more frequently. Clean the air cleaner at shorter intervals than specified.
- Clean the radiator core frequently to avoid clogging.
- Clean and replace the fuel filter frequently.
- Clean electrical components, especially the starting motor and alternator, to avoid accumulation of dust.

Avoid mixing oils:
Never mix oils of different brands. If you have only oil which is a different brand from the one that is used in the machine, do not add it but replace all the oil.

Precautions when opening and closing engine side cover:
- When standing on the track to open the engine side cover, adopt a standing position, hold the side cover with both thumbs, and open it slowly with your other fingers.
- When the engine side cover is open, do not open or close the cab
  Before opening or closing the cab, always close the engine side cover first.



18. OUTLINES OF SERVICE

- Use Komatsu genuine parts for replacement
- When changing or adding oil, do not use a different type of oil.
- Unless otherwise specified, the oil and coolant used at the time of shipment from the factory are as shown in the table below.

Item	Kind of fluid
Engine oil pan	SAE 15W-40 API classification CD
Damper case Power train case Final drive case	SAE 30 API classification CD
Hydraulic tank	SAE 10W API classification CD
Fuel tank	ASTM D975 No. 2 (However, ASTM D975 No. 1 is used for the winter season (October to March))
Radiator	Komatsu Super Coolant (AF-ACLI 41% added to water)

18.1 OUTLINE OF OIL, FUEL, COOLANT

18.1.1 OIL

- Oil is used in the engine and work equipment under extremely severe conditions (high temperature, high pressure), and it deteriorates with use
  Always use oil that matches the grade and temperature for use given in the Operation and Maintenance Manual. Even if the oil is not dirty, always replace the oil after the specified interval.
- Oil corresponds to blood in the human body, so always be careful when handling it to prevent any impurities (water, metal particles, dirt, etc.) from getting in.
  The majority of problems with machine are caused by the entry of such impurities.
  Take particular care not to let any impurities get in when storing or adding oil.
- Never mix oils of different grades or brands
- Always add the specified amount of oil.
  Having too much oil or too little oil are both causes of problems.
- If the oil in the work equipment is not clear, there is probably water or air getting into the circuit. In such cases, please contact your Komatsu distributor.
- When changing the oil, always replace the related filters at the same time.
- We recommend you to have an analysis made of the oil periodically to check the condition of the machine. For those who wish to use this service, please contact your Komatsu distributor.

18.1.2 FUEL

- The fuel pump is a precision instrument, and if fuel containing water or dirt is used, it cannot work properly.
- Be extremely careful not to let impurities get in when storing or adding fuel.
- Always use the fuel specified in the Operation and Maintenance Manual.
  Fuel may congeal depending on the temperature when it is used (particularly in low temperature below −15°C), so it is necessary to change to a fuel that matches the temperature.
- To prevent the moisture in the air from condensing and forming water inside the fuel tank, always fill the fuel tank after completing the day's work.
- Before starting the engine, or when 10 minutes have passed after adding fuel, drain the sediment and water from the fuel tank.
- If the engine runs out of fuel, or if the filters have been replaced, it is necessary to bleed the air from the circuit.

18.1.3 COOLANT

- River water contains large amounts of calcium and other impurities, so if it is used, scale will stick to the engine and radiator, and this will cause defective heat exchange and overheating.
  Do not use water that is not suitable for drinking.
- When using anti-freeze, always observe the precautions given in the Operation and Maintenance Manual.
- Komatsu machines are supplied with Komatsu original anti-freeze in the coolant when the machine is shipped.
  This anti-freeze is effective in preventing corrosion of the cooling system.
  The anti-freeze can be used continuously for two years or 4000 hours. Therefore, it can be used as it is even in hot areas.
- Anti-freeze is inflammable, so be extremely careful not to expose it to flame or fire.
- The proportion of anti-freeze to water differs according to the ambient temperature.
  For details of the mixing proportions, see "24.2.1 CLEAN INSIDE OF COOLING SYSTEM".
- If the engine overheats, wait for the engine to cool before adding coolant.
- If the coolant level is low, it will cause overheating and will also cause problems with corrosion from the air in the coolant.

18.1.4 GREASE

⚠ WARNING

Do not carry out greasing when the engine is running.

- Grease is used to prevent twisting and noise at the joints.
- The nipples not included in the maintenance section are nipples for overhaul, so they do not need grease.
  If any part becomes stiff after being used for a long time, add grease.
- Always wipe off all of the old grease that is pushed out when greasing. Be particularly careful to wipe off the old grease in places where sand or dirt sticking in the grease would cause wear of the rotating parts.

18.1.5 STORING OIL AND FUEL

- Keep indoors to prevent any water, dirt, or other impurities from getting in.
- When keeping drum cans for a long period, put the drum on its side so that the filler port of the drum can is at the side. (To prevent moisture from being sucked in)
  If drum cans have to be stored outside, cover them with a waterproof sheet or take other measures to protect them.
- To prevent any change in quality during long-term storage, be sure to use in the order of first in _ first out (use the oldest oil or fuel first).

18.1.6 FILTERS

- Filters are extremely important safety parts. They prevent impurities in the fuel and air circuits from entering important equipment and causing problems.
  Replace all filters periodically. For details, see the Operation and Maintenance Manual.
  However, when working in severe conditions, it is necessary to consider replacing the filters at shorter intervals according to the oil and fuel (sulfur content) being used.
- Never try to clean the filters (cartridge type) and use them again. Always replace with new filters.
- When replacing oil filters, check if any metal particles are stuck to the old filter. If any metal particles are found, please contact your Komatsu distributor.
- Do not open packs of spare filters until just before they are to be used.
- Always use Komatsu genuine filters.

18.2 RELATING TO ELECTRIC SYSTEM

- If the wiring gets wet or the insulation is damaged, the electric system leaks and this could result in hazardous malfunction of the machine.

- Services relating to the electric system are (1) check of fan belt tension, (2) check of damage or wear in the fan belt and (3) check of battery fluid level.

- Never remove or disassemble any electric components installed in the machine.

- Never install any electric components other than these specified by Komatsu.

- Be careful to keep the electric system free of water when washing the machine or when it rains.

- When working on the seashore, carefully clean the electric system to prevent corrosion.

- Never connect any optional power source to the fuse, starting switch, battery relay, etc.

19. WEAR PARTS LIST

Wear parts such as the filter element, cutting edge, etc. Are to be replaced at the time of periodic maintenance or before their abrasion limits.

The wear parts should be changed correctly in order to use the machine economically.

For part change, Komatsu genuine parts of excellent quality should be used.

The parts in parentheses are to be replaced at the same time.

Item		Part No.	Part Name	Weight (kg)	Q'ty	Replacement frequency
Power train filter		07063-01100 (07000-72100)	Element (O-ring)	– –	1 (1)	Every 250 hours service
Engine oil filter		600-211-1250	Cartridge	–	1	
Fuel filter		600-311-7131	Cartridge	–	1	Every 500 hours service
Corrosion resistor		600-411-1150	Cartridge	–	1	
Hydraulic oil filter		07063-01100 (07000-02135)	Element (O-ring)	– –	1 (1)	Every 1000 hours service
Charge filter		07063-01054 (07000-02140)	Element (O-ring)	– –	1 (1)	
Air cleaner		6128-81-7042	Element ass'y	–	1	–
		600-181-4400	Outer element ass'y		1	
Air conditioner	Fresh filter	14X-811-7750	Filter	–	2	–
	Recirc filter	14X-811-7741	Filter	–	1	
Blade	Semi U-blade	195-70-12492	Cutting edge	103.4	1	–
		17A-71-11361	Cutting edge	57	2	
		17M-71-21330	End bit (left)	63	1	
		17M-71-21340	End bit (right)	63	1	
		17A-71-12451	(Bolt)	–	(30)	
		17M-71-21530	(Nut)	–	(30)	
	U-blade	17A-72-12221	Cutting edge	69	2	
		17M-72-21160	Cutting edge	58	2	
		17M-71-21330	End bit (left)	63	1	
		17M-71-21340	End bit (right)	63	1	
		17A-71-12451	(Bolt)	–	(36)	
		17A-71-21530	(Nut)	–	(36)	

Item		Part No.	Part Name	Weight (kg)	Q'ty	Replacement frequency
Blade	Angledozer	*175-70-26310	Cutting edge	48.8	1	–
		*175-70-21115	Cutting edge	64.1	2	
		*175-71-11454	(Bolt)	–	(25)	
		*175-71-11530	(Nut)	–	(25)	
		*175-70-21126	End bit (left)	37	1	
		*175-70-21136	End bit (right)	37	1	
		*175-71-11483	(Bolt)	–	(14)	
		*175-71-11530	(Nut)	–	(14)	
Ripper	Multi	*175-78-31230	Point	15	3	–
		*195-78-21320	Protector	13	3	
		09244-02508	(Pin)	–	(9)	
	Giant	*175-78-31230	Point	15	1	–
		*195-78-21320	Protector	13	1	
		09244-02508	(Pin)	–	3	

NOTICE

When handling parts that weigh more than 25 kg, remember that they are heavy objects, and take the necessary care.

20. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE

PROPER SELECTION OF FUEL, COOLANT AND LUBRICANTS

RESERVOIR	KIND OF FLUID	AMBIENT TEMPERATURE -22 -4 14 32 50 68 86 104°F -30 -20 -10 0 10 20 30 40°C	CAPACITY	
			Specified	Refill
Engine oil pan	Engine oil	SAE 30 SAE 10W SAE 10W-30 SAE 15W-40	42 ℓ 11.09 US gal 9.24 UK gal	37 ℓ 9.77 US gal 8.14 UK gal
Damper case		SAE 30	1.5 ℓ 0.40 US gal 0.33 UK gal	1.5 ℓ 0.40 US gal 0.33 UK gal
Power train case		SAE 30	105 ℓ 27.72 US gal 23.1 UK gal	60 ℓ 15.84 US gal 13.20 UK gal
Final drive case (each)		SAE 10W	58 ℓ 15.31 US gal 12.76 UK gal	58 ℓ 15.31 US gal 12.76 UK gal
Hydraulic system		SAE 10W SAE 10W-30 SAE 15W-40	124 ℓ 32.26 US gal 27.72 UK gal	97 ℓ 25.61 US gal 21.34 UK gal
Fuel tank	Diesel fuel	ASTM D975 No.2 ※	500 ℓ 132 US gal 110 UK gal	-
Cooling system (incl. sub-tank)	Water	Add antifreeze	97 ℓ 25.61 US gal 21.34 UK gal	-

※ ASTM D975 No. 1

REMARK

* 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

* When starting the engine in an atmospheric temperature of lower than 0°C, be sure to use engine oil of SAE10W, SAE10W-30 and SAE15W-40, even though an atmospheric temperature goes up to 10°C more or less in the day time.

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

* There is no problem if single grade oil is mixed with multigrade oil (SAE10W-30, 15W-40), but be sure to add single grade oil that matches the temperature in the table.

* We recommend Komatsu genuine oil which has been specifically formulated and approved for use in engine and hydraulic work equipment applications

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

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

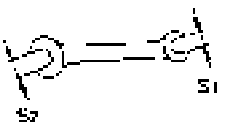
No.	Supplier	Engine Oil (CD or CE) SAE10W, 30, 40 10W30, 15W40 (The 15W40 oil marked * is CE.)	Gear Oil (GL-4 or GL-5) SAE80, 90, 140	Grease (Lithium-Base) NLGI No. 2	Anti-freeze Coolant (Ethylene Glycol Base) Permanent Type
1	KOMATSU	EO10-CD EO30-CD EO10-30CD EO15-40CD	GO90 GO140	GZ-LI G2-LI-S	AF-ACL AF-PTL AF-PT (Winter, one season type)
2	AGIP	Diesel sigma S Super diesel multi grade *Sigma turbo	Roura MP	GR MU-EP	–
3	AMOCO	*Amoco 300	Multi-purpose gear oil	RYKON premium grease	–
4	ARCO	*Arcoflert S3 plus	Arco HD gear oil	Litholine HEP 2 Arco EP moly 0	–
5	BP	Vanellus C3	Gear oil EP Hypogear EP	Energrease LS-EP2	Antifreeze
6	CALTEX	*RPM delo 400 RPM delo 450	Universal thuban Universal thuban EP	Marfak all purpose 2 Ultra-duty grease 2	AF engine coolant
7	CASTROL	*Turbomax *RX super CRD	EP EPX Hypoy Hypoy B Hypoy C	MS3 Spheerol EPL2	Anti-freeze
8	CHEVRON	*Delo 400	Universal gear	Ultra duty grease 2	
9	CONOCO	*Fleet motor oil	Universal gear lubricant	Super-sta grease	–
10	ELF	Multiperformance 3C Performance 3C	–	Tranself EP Tranself EP type 2	Glycelf
11	EXXON (ESSO)	Essolube D3 *Essolube XD-3 *Essolube XD-3 Extra *Esso heavy duty Exxon heavy duty	Gear oil GP Gear oil GX	Beacon EP2	All season coolant
12	GULF	Super duty motor oil *Super duty plus	Multi-purpose gear lubricant	Gulfcrown EP2 Gulfcrown EP special	Antifreeze and coolant
13	MOBIL	Delvac 1300 *Delvac super 10W-30, 15W-40	Mobilube GX Mobilube HD	Mobilux EP2 Mobilgrease 77 Mobilgrease special	–

No	Supplier	Engine Oil (CD or CE) SAE 10W, 30, 40 10W30, 15W40 (The 15W40 oil marked * is C.E.)	Gear Oil (GL-4 or GL-5) SAE80, 90, 140	Grease (Lithium-Base) NLGI No. 2	Anti-freeze Coolant (Ethylene Glycol Base) Permanent Type
14	PENNZOIL	*Supreme duty fleet motor oil	Multi-purpose 4092 Multi-purpose 4140	Multi purpose white grease 705 707L White – bearing grease	Anti-freeze and summer coolant
15	PETROFINA	FINA kappa TD	FINA potonic N FINA potonic NF	FINA marson EPL2	FINA tamidor
16	SHELL	R mula X	Spirax EP Spirax heavy duty	Alvania EP grease	
17	SUN	–	Sunoco GL5 gear oil	Sunoco ultra prestige 2EP Sun prestige 742	Sunoco antifreeze and summer coolant
18	TEXACO	*Ursa super plus Ursa premium	Multigear	Multifak EP2 Starplex 2	Code 2055 starlex antifreeze coolant
19	TOTAL	Rubia S *Rubia X	Total EP Total transmission TM	Multi s EP2	Antigelantifreeze
20	UNION	*Guardol	MP gear lube LS	Unoba EP	–
21	VEEDOL	*Turbostar *Diesel star MDC	Multigear Multigear B Multigear C	–	Antifreeze

21. STANDARD TIGHTENING TORQUES FOR BOLTS AND NUTS

21.1 INTRODUCTION OF NECESSARY TOOLS

The following tools are needed when carrying out maintenance.

No.	Name of tool	Part No.	Remarks
1	Wrench set	09000-30008	Applicable width across flats (S_1 – S_2) 6 mm – 10 mm, 12 mm – 14 mm 16 mm – 17 mm, 19 mm – 22 mm 24 mm – 27 mm, 30 mm – 32 mm  AD063830
2	Wrench	09002-03611	36 mm – 41 mm
3	Wrench	09001-04600	Applicable width across flats 46 mm
4	Screwdriver	09033-00190	Interchangeable flat-head and cross-head type
5	Socket wrench set	09020-10284	Applicable width across flats 10 mm, 13 mm 14 mm, 17 mm 19 mm, 22 mm, 24 mm, 27 mm, 30 mm, 32 mm, 36 mm Extension, Handle
6	Filter wrench	09019-09035	For filter cartridges
7	Plier	09036-00150	
8	Hammer	09039-00160	
9	Bar	09055-10390	
10	Gauge	09054-00009	
11	Grease pump	07952-30002	For greasing work
12	Nozzle	07951-11400	For greasing work
13	Grease cartridge	07950-90403	(Lithium base grease 400 g)

If any of the above tools are broken, please order them from your Komatsu distributor.

When not using the tools, always put them in the tool box on the inside of the battery inspection cover on the left side of the machine.

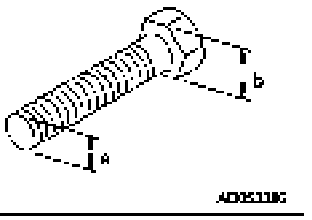
21.2 TORQUE LIST

Unless otherwise specified, tighten the metric bolts and nuts to the torque shown in the table.

The tightening torque is determined by the width across the flats (s) of the nut and bolt.

If it is necessary to replace any nut or bolt, always use a Komatsu genuine part of the same size as the part that was replaced.

Nm (newton meter): 1Nm = 0.1 kgm
= 0.74 lbft



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Thread diameter of bolt (mm) (a)	Width across flat (mm) (b)	(T) Nm	(T) kgm	(T) lbft
6	10	13.2 ± 1.4	1.35 ± 0.15	9.73 ± 1.03
8	13	31.4 ± 2.9	3.2 ± 0.3	23.2 ± 2.1
10	17	65.7 ± 6.8	6.7 ± 0.7	48.5 ± 5.0
12	19	112 ± 9.8	11.5 ± 1.0	82.6 ± 7.2
14	22	177 ± 19	18.0 ± 2.0	131 ± 14
16	24	279 ± 29	28.5 ± 3	206 ± 21
18	27	383 ± 39	39 ± 3	282 ± 29
20	30	549 ± 58	56 ± 6	405 ± 43
22	32	745 ± 78	76 ± 8	549 ± 58
24	36	927 ± 98	94.5 ± 10	684 ± 72
27	41	1320 ± 140	135 ± 15	973 ± 100
30	46	1720 ± 190	175 ± 20	1270 ± 140
33	50	2210 ± 240	225 ± 25	1630 ± 180
36	55	2750 ± 290	280 ± 30	2030 ± 210
39	60	3280 ± 340	335 ± 35	2420 ± 250

NOTICE

When tightening panels or other parts having tightening fixtures made of plastic, be careful not to use excessive tightening torque: doing so will damage the plastic parts.

22. PERIODIC REPLACEMENT OF SAFETY CRITICAL PARTS

To ensure safety at all times when operating or driving the machine, the user of the machine must always carry out periodic maintenance. In addition, to further improve safety, the user should also carry out periodic replacement of the parts given in the table. These parts are particularly closely connected to safety and fire prevention.

With these parts, the material changes as time passed, or they easily wear or deteriorate. However, it is difficult to judge the condition of the parts simply by periodic maintenance, so they should always be replaced after a fixed time has passed, regardless of their condition. This is necessary to ensure that they always maintain their function completely.

However, if these parts show any abnormality before the replacement interval has passed, they should be repaired or replaced immediately.

If the hose clamps show any deterioration, such as deformation or cracking, replace the clamps at the same as the hoses.

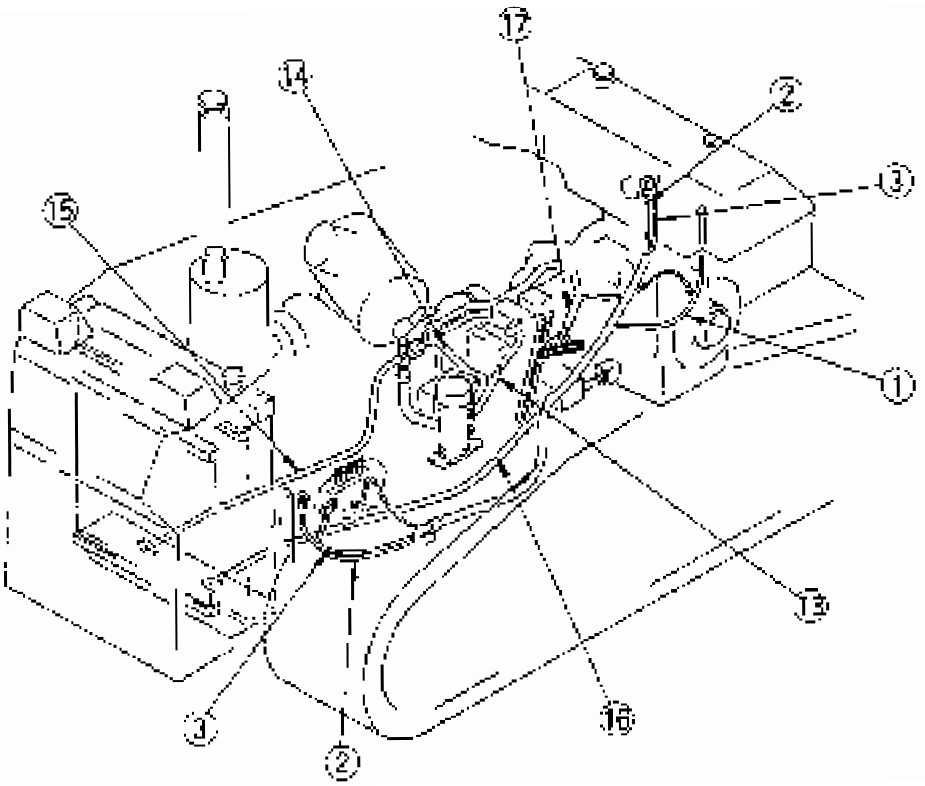
When replacing the hoses, always replace the O-rings, gaskets, and other such parts at the same time.

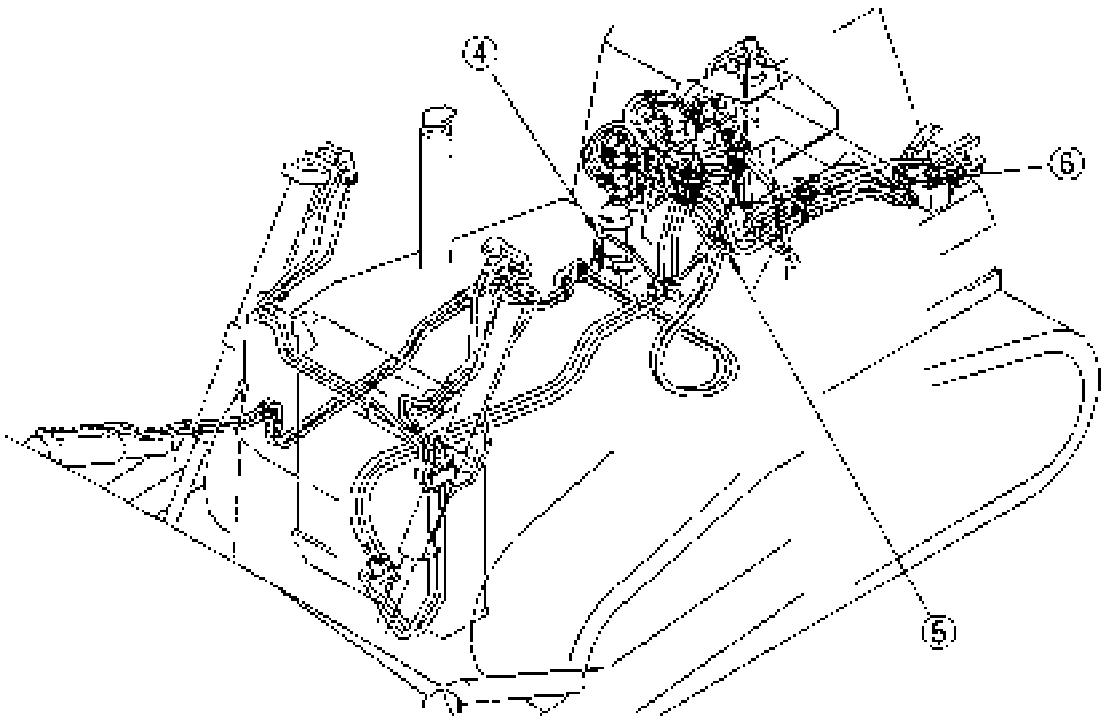
Ask your Komatsu distributor to replace the critical parts.

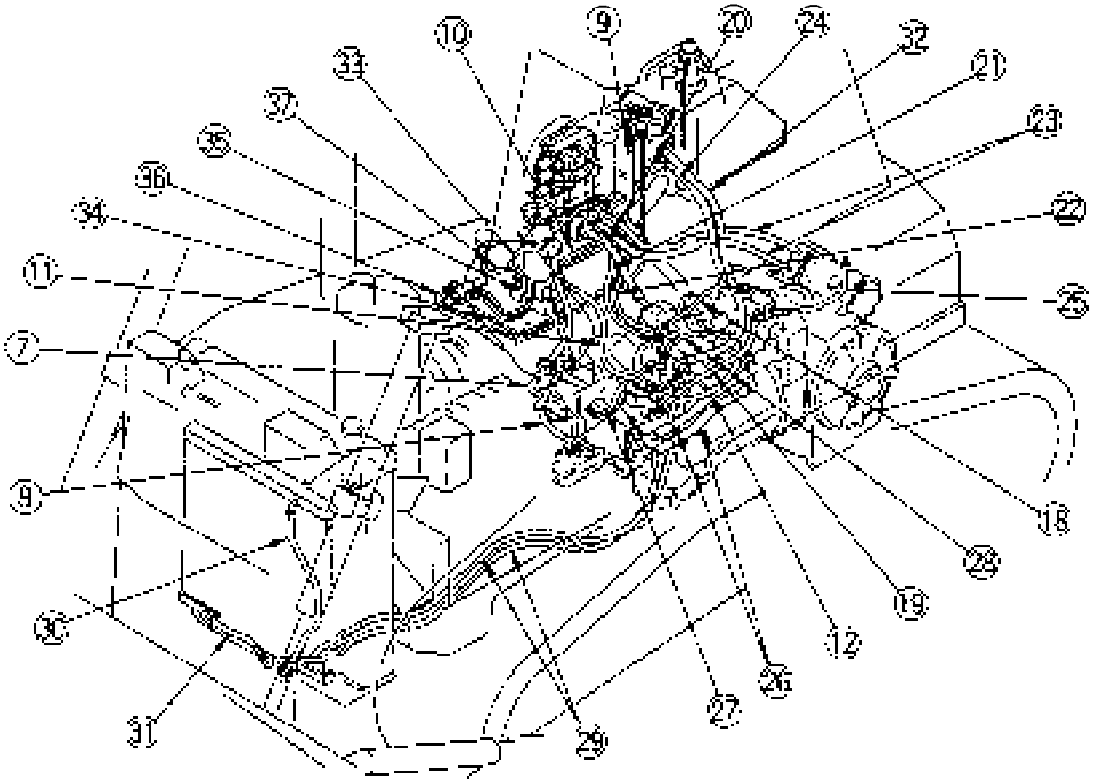
SAFETY CRITICAL PARTS

No.	Safety critical parts for periodic replacement	Q'ty	Replacement interval
1	Fuel hose (fuel tank – injection pump)	1	
2	Fuel return hose (injection pump – fuel tank)	1	
3	Fuel return hose (injection nozzle – fuel tank)	1	
4	Hose (PPC charge valve – PPC lock valve)	1	
5	Hose (PPC lock valve – blade PPC valve)	1	
6	Hose (PPC lock valve – ripper PPC valve)	1	
7	Hose (charge pump – PPC charge valve)	1	
8	Hose (PPC charge valve – HMT pump charge port)	1	
9	Hose (PPC charge valve – hydraulic tank)	1	
10	Hose (PPC charge valve – main valve preset port)	1	
11	Hose (PPC charge valve – HMT pump servo port)	1	
12	Hose (HMT pump servo port – HMT motor servo port)	1	
13	Hose (power train pump – power train filter)	1	Every 2 years or 4000 hours, whichever comes sooner
14	Hose (power train filter – transmission valve)	1	
15	Hose (transmission valve – transmission oil cooler)	1	
16	Hose (transmission oil cooler – transmission case)	1	
17	Centralized pressure pickup hose	1 set	
18	Hose (HSS pump – centralized drain block)	1	
19	Hose (HMT pump – centralized drain block)	1	
20	Hose (HSS pump – main valve)	1	
21	Hose (main valve P port – HSS pump servo P port)	1	
22	Hose (main valve LS port – HSS pump servo LS port)	1	
23	Hose (HSS motor – main valve)	2	
24	Hose (centralized drain block – hydraulic tank)	1	
25	Hose (HSS motor – centralized drain block)	1	

No.	Safety critical parts for periodic replacement	Q'ty	Replacement interval
26	Hose (HMT pump - HMT motor)	2	Every 2 years or 4000 hours, whichever comes sooner
27	Hose (HMT pump - hydraulic cooler bypass valve)	1	
28	Hose (HMT motor - hydraulic cooler bypass valve)	1	
29	Hose (hydraulic cooler bypass valve - relay tube)	2	
30	Hose (relay tube - hydraulic cooler inlet port)	1	
31	Hose (relay tube - hydraulic cooler outlet port)	1	
32	Hose (hydraulic cooler bypass valve - hydraulic tank)	1	
33	Hose (EPC valve - main valve A port)	1	
34	Hose (EPC valve - main valve B port)	1	
35	Hose (PPC charge valve - EPC valve)	1	
36	Hose (EPC valve - hydraulic tank)	1	
37	Hose (PPC charge valve - accumulator)	1	







23. MAINTENANCE SCHEDULE CHART

23.1 MAINTENANCE SCHEDULE CHART

SERVICE ITEM	PAGE
(EVERY 250 HOURS SERVICE)	
(Power tilt – power pitch dozer)	
• Lift cylinder support yoke (4 places)	3-58
• Lift cylinder support shaft (2 places)	3-58
• Blade arm (2 places)	3-58
• Tilt cylinder ball joint (1 place)	3-58
• Pitch cylinder ball joint (1 place)	3-58
• Blade center link (1 place)	3-58
(Angledozer)	
• Lift cylinder support yoke (4 places)	3-59
• Lift cylinder support shaft (2 places)	3-59
• Tilt brace thread (2 places)	3-59
(Ripper)	
• Tilt cylinder bottom pin (2 places)	3-59
• Lift cylinder bottom pin (2 places)	3-59
• Tilt cylinder rod end pin (2 places)	3-59
• Lift cylinder rod end pin (2 places)	3-59
• Arm pin (front) (2 places)	3-59
• Arm pin (rear) (2 places)	3-59
Check oil level in final drive case, add oil	3-60
Check level of battery electrolyte	3-61
Check, adjust alternator drive belt tension	3-62
Change oil in engine oil pan, replace engine oil filter cartridge	3-63
Check brake performance	3-65
EVERY 500 HOURS SERVICE	
Replace fuel filter cartridge	3-66
Replace power train oil filter element	3-67
Replace hydraulic tank breather element	3-67

SERVICE ITEM	PAGE
EVERY 1000 HOURS SERVICE	
Change oil in power train case	3-68
Change oil in final drive case	3-69
Check cab suspension cylinder	3-69
Clean power train case breather (1 place)	3-70
Clean hydraulic tank breather (1 place)	3-70
Grease universal joint (2 places)	3-70
Replace corrosion resistor cartridge	3-71
Check all tightening parts of turbocharger	3-71
Grease tension pulley assembly (1 place)	3-71
Check, clean fuel strainer	3-71
Replace charge filter element	3-72
Grease idler adjustment rod (left, right: 1 place each)	3-72
Check for loose ROPS mount bolts	3-72
EVERY 2000 HOURS SERVICE	
Change oil in hydraulic tank, replace hydraulic oil filter element	3-73
Check play of turbocharger rotor	3-74
Clean, check turbocharger	3-74
Clean engine breather element	3-74
Check vibration damper	3-74
Check alternator, starting motor	3-74
Check engine valve clearance, adjust	3-74
Change oil in damper case, wash dampr breather	3-75
Check pivot bearing oil level, add oil	3-76
EVERY 4000 HOURS SERVICE	
Check water pump	3-77
Check fan pulley and tension pulley	3-77

24. SERVICE PROCEDURE

24.1 INITIAL 250 HOURS SERVICE

Carry out the following maintenance only after the first 250 hours

- **REPLAC FUEL FILTER CARTRIDGE**
- **REPLACE POWER TRAIN OIL FILTER ELEMENT**
- **CHANGE OIL IN POWER TRAIN CASE, CLEAN STRAINERS**
- **CHANGE OIL IN FINAL DRIVE CASE**
- **REPLACE CHARGE FILTER ELEMENT**
- **CHANGE OIL IN HYDRAULIC TANK, REPLACE HYDRAULIC OIL FILTER ELEMENT**
- **CHECK ENGINE VALVE CLEARANCE, ADJUST**

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

24.2 WHEN REQUIRED

24.2.1 CLEAN INSIDE OF COOLING SYSTEM

⚠ WARNING

- **Soon after the engine has been stopped, the coolant is hot and can cause personal injury. Allow the engine to cool before draining water.**
- **Never be under the machine with the engine running. To avoid serious injury, always stop the engine before being under the machine to open the drain valve.**
- **Never remove the radiator cap when the engine is at operating temperature. At operating temperature, the coolent is under pressure. Steam blowing up from the radiator could cause personal injury. Allow the engine to cool until the radiator filler cap is cool enough to touch with your hand. Remove the filler cap slowly to relieve pressure.**
- **When removing drain plug, avoid pouring coolant on yourself.**
- **Antifreeze is flammable, so keep it away from any flame.**

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

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

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

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

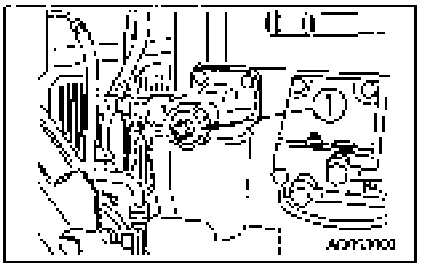
- When deciding the ratio of antifreeze to water, check the lowest temperature in the past, and decide from the mixing rate table given below.
  It is actually better to estimate a temperature about 10°C (50°F) lower when deciding the mixing rate.

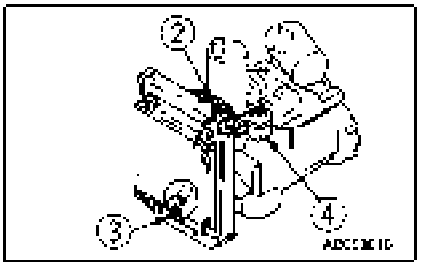
Mixing rate of water and antifreeze

Min. atmospheric temperature	°C	-5	-10	-15	-20	-25	-30
	°F	23	14	5	-4	-13	-22
Amount of antifreeze	ℓ	22	30	35	40	45	49
	US gal	5.81	7.92	9.24	10.56	11.88	12.94
	UK gal	4.84	6.60	7.70	8.80	9.90	10.78
Amount of water	ℓ	75	67	62	57	52	49
	US gal	19.80	17.69	16.37	15.05	13.73	12.87
	UK gal	16.50	14.74	13.64	12.54	11.44	10.66

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

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





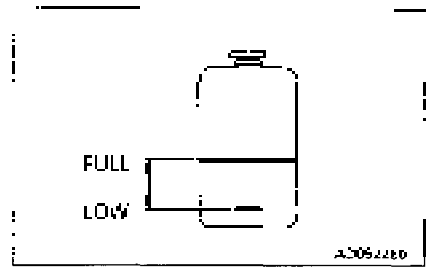
1. Tighten valve ①, of the corrosion resistor.
2. Turn radiator cap ② slowly and remove it.
3. Prepare a container to catch the coolant, then open drain valve ③ at the bottom of the radiator on the right side of the machine and drain the coolant.
4. After draining the coolant, close drain valve ③, and fill the radiator with tap water.
5. When the radiator is filled with water, open drain valve ③, start the engine, and run at low idling.
   Keep the engine running at low idling and flush the radiator for 10 minutes.
   While flushing the radiator, adjust the incoming flow of water to match the drain flow so that the radiator is always kept full during the flushing operation. Also, be sure that the water supply hose does not slip out of the radiator water filler when flushing.
6. After flushing, stop the engine, allow all the water to drain out from drain valve ③, then close drain valve ③.
7. After draining the water, flush the system with a flushing agent. For details of the flushing method, see the instructions on the flushing agent.
8. After flushing, open drain valve ③, drain out all the water, close drain valve ③ and add tap water so that the water level is near the mouth of the water filler.
9. When the water reaches the water filler port, open drain valve ③, start the engine, run at low idling and continue to flush the system until clean water comes out.

   While flushing the radiator, adjust the incoming flow of water to match the drain flow so that the radiator is always kept full during the flushing operation. Be sure that the water supply hose does not slip out of the radiator water filler when flushing.

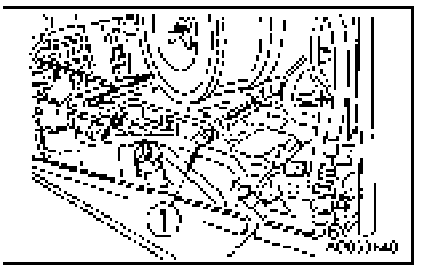
10. When clean water comes out, stop the engine and close drain valve ③.
11. Replace the corrosion resistor and open valve ①.
    For details on the corrosion resistor replacement method, see "24.6 EVERY 1000 HOURS SERVICE".
12. Add city water until the water overflows from the water filler port.
13. To remove the air in the cooling water, run for five minutes at low idling, then for another five minutes at high idling.
    (When doing this, leave the radiator cap off.)

14. Drain the cooling water inside sub-tank ⑤, clean the inside of the sub-tank, then fill again with cooling water to a point midway between the FULL and LOW marks.

15. Stop the engine, wait for 3 minutes, add city water until the water level reaches near the water filler port, then tighten the cap.



24.2.2 CHECK, CLEAN AND REPLACE AIR CLEANER ELEMENT

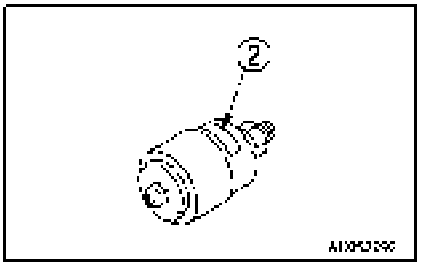


⚠ WARNING

- **Never clean or replace the air cleaner element with the engine running.**
- **When using pressure air to clean the element wear safety glasses or goggles to protect the eyes.**

CHECK

If the red piston can be seen in transparent portion ② of dust indicator ①, clean the air cleaner element.

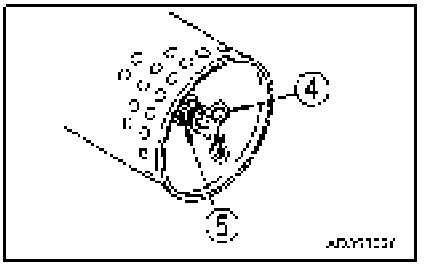


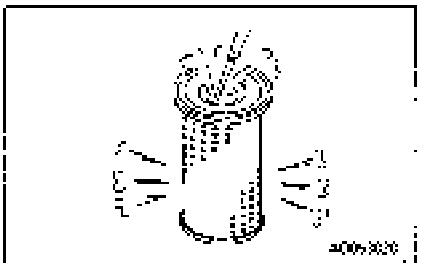
CLEAN, REPLACE OUTER ELEMENT

1. Loosen wing nut ③, then remove the outer element.

2. Clean the air cleaner body interior.

3. Direct dry compressed air (less than 700 kPa (7 kg/cm², 100 psi)) to the element from inside along its folds, then direct it from outside along its folds and again from inside.
   1) Remove one seal from the outer element. The number of times the outer element has been cleaned can be seen by the number of removed seals.
   2) Replace the outer element which has been cleaned 6 times repeatedly or used throughout a year. Replace the inner element at the same time.
   3) Replace the element when the air cleaner clogged warning lamp lights up soon after installing the cleaned element even though it has not been cleaned 6 times.
   4) Check inner element mounting nuts for looseness and, if necessary, retighten.
   5) Replace seal washer ④ or wing nut ⑤ with new parts if they are broken.



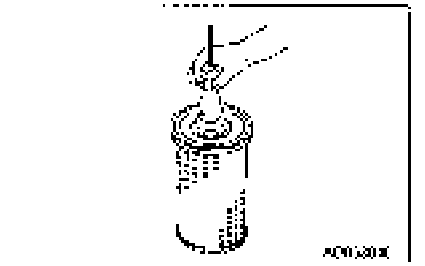


NOTICE

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

Do not use an element whose folds or gasket or seal are damaged

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



4. Set the cleaned element.

REPLACING INNER ELEMENT

1. First remove the outer element, and then remove the inner element.

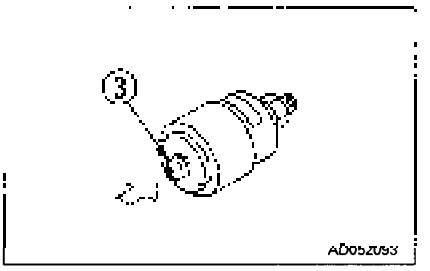
2. To prevent dust from getting in, use a clean cloth or tape to cover the air connector (outlet side).

3. Clean the air cleaner body interior, then remove the cover installed in Step 2.

4. Fit a new inner element to the connector and tighten it with nuts. Do not clean and reinstall a inner element.

5. Install the outer element.

6. After replacing the element, press button ③ of the dust indicator to return the red piston to its original position.



24.2.3 CHECK TRACK TENSION

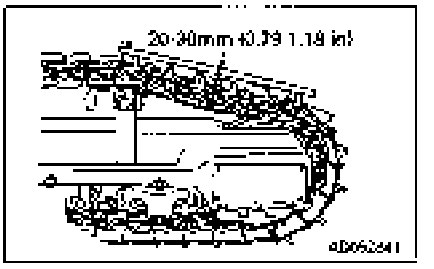
The wear of pins and bushings on the undercarriage will vary with the working conditions and soil properties. It is thus necessary to continuously inspect the track tension so as to maintain the standard tension.

Carry out the check and adjustment under the same conditions as when operating on jobsites where the track becomes clogged with mud, measure with the track clogged with mud).

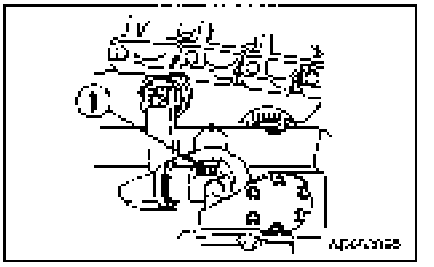
INSPECTION

Stop the machine on level ground (stop with the transmission in FORWARD without applying the brake). Then place a straight bar on the track shoes between the carrier roller and the idler as shown in the figure, and measure the clearance between the bar and the grouser at the midpoint. If the clearance is 20 – 30 mm (0.79 – 1.18 in), the tension is standard.

If the track tension is not at the standard value, adjust it in the following manner.



ADJUSTMENT

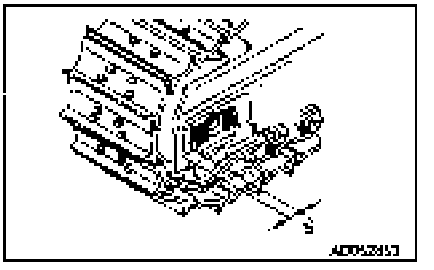


⚠ WARNING

Grease inside the adjusting mechanism is under high pressure. Grease coming from lubricator ① under pressure can penetrate the body causing injury or death. For this reason, do not loosen lubricator ① more than one turn. Do not loosen any part other than lubricator ①. Furthermore, do not bring your face in front of the grease fitting.
If the track tension is not relieved by this procedure, please contact your Komatsu distributor.

• When increasing tension

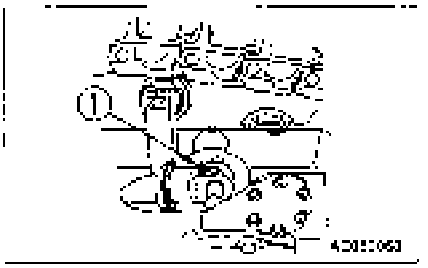
1. Pump in grease through the grease fitting with a grease pump.
2. To check that the correct tension has been achieved, move the machine backwards and forwards.
3. Check the track tension again, and if the tension is not correct, adjust it again.
4. Continue to pump in grease until S becomes 0 mm. If the tension is still loose, the pin and bushing are excessively worn, so they must be either turned or replaced. Please contact your Komatsu distributor.



- **When loosening tension**

⚠ WARNING

It is extremely dangerous to release the grease by any method except the procedure given below. If the track tension is not relieved by this procedure, please contact your Komatsu distributor.



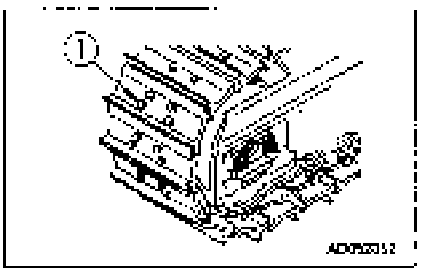
1. Loosen lubricator (1) gradually to release the grease.
2. Turn lubricator (1) a maximum of one turn.
3. If the grease does not come out smoothly, move the machine backwards and forwards a short distance.
4. Tighten lubricator (1).
5. To check that the correct tension has been achieved, move the machine backwards and forwards.
6. Check the track tension again, and if the tension is not correct, adjust it again.

- **When removing track**

⚠ WARNING

Depending on the situation, the operation to remove the track may be extremely dangerous.
Before removing the track, if the procedure above "When loosening tension" does not loosen the track tension, please contact your Komatsu distributor for repair.

24.2.4 CHECK AND TIGHTEN TRACK SHOE BOLTS



If the machine is used with track shoe bolts (1) loose, they will break, so tighten any loose bolts immediately.

- **Method for tightening (shoe bolt)**

1. First tighten to a tightening torque of 588 ± 59 Nm (60 ± 6 kgm, 434 ± 43 lbft)) then check that the nut and shoe are in close contact with the link contact surface.

2. After checking, tighten a further 120 ± 10°.

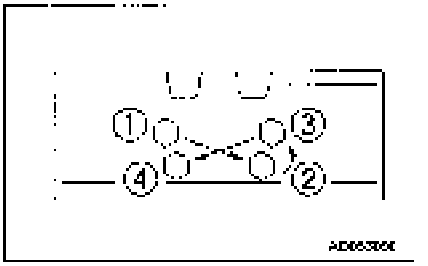
- **Method for tightening (master link connecting bolt)**

1. First tighten to a tightening torque of 588 ± 59 Nm (60 ± 6 kgm, 434 ± 43 lbft) then check that the link contact surfaces are in close contact.

2. After checking, tighten a further 180 ± 10°.

Order for tightening

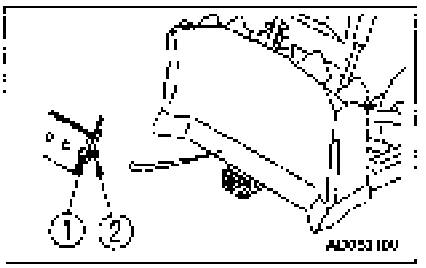
Tighten the bolts in the order shown in the diagram on the right.



24.2.5 CHECK ELECTRICAL INTAKE AIR HEATER

Before the start of the cold season (once a year), contact your Komatsu distributor to have the electrical intake air heater repaired or checked for dirt or disconnections.

24.2.6 REVERSE AND REPLACE THE END BITS AND CUTTING EDGES



⚠ WARNING

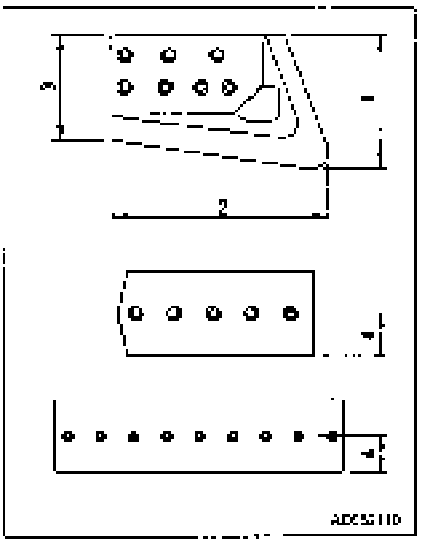
It is dangerous if the work equipment moves by mistake when the cutting edges and end bits are being reversed or replaced. Set the work equipment in a stable condition, then stop the engine and lock the blade control lever securely with the safety lever.

Reverse or replace the end bits and cutting edges before it is worn out to the blade end.

1. Raise the blade to a proper height and apply a block to the frame so as to prevent fall of the blade.
2. Operate the safety lever to the LOCK position.
3. Measure the wear of the end bit and cutting edge in accordance with the wear standards given below.

Wear standards Unit: mm (in)

Item			Judgement standard	
No.	Measurement point	Work equipment	Standard dimension	Repair limit
1	Height of outside of end bit	A	415 (16.35)	300 (11.82)
		B	292 (11.50)	219 (8.31)
2	Width of end bit	A	562 (26.69)	500 (19.70)
		B	436 (17.14)	360 (14.18)
3	Height of inside of end bit	A	330 (13.00)	260 (10.24)
		B	254 (10.01)	211 (8.31)
4	Height of cutting edge (from center of bolt mounting hole to end face)	A	330 (13.00)	260 (10.24) (To 215 (8.47) after turning)
		B	254 (10.01)	213 (8.39) (To 140 (5.52) after turning)



The symbols in the work equipment column have the following meaning.

A: Semi-U blade, U blade

B: Angledozer

If the cutting edge and the end bit on both sides are worn out, replace with new one.

If it has been worn out up to the fitting surface, repair the fitting surface and then reverse or replace.

4. Remove the cutting edge and the end bit and clean the mounting surface.

5. Reverse or replace the cutting edge and the end bit when worn out.

Nut tightening torque:

Semi-U blade	1496 ± 162 Nm (152.5 ± 16.5 kgm, 1103 ± 119 lbft)
Angledozer	869 ± 130 Nm (88.6 ± 13.3 kgm, 641 ± 96 lbft)

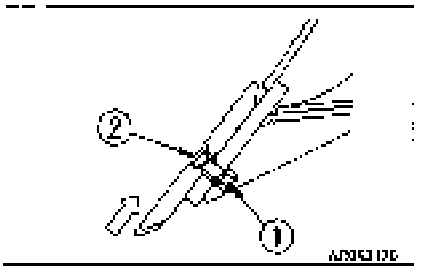
If bolt ① and nut ② are damaged, replace them with new ones at the same time.

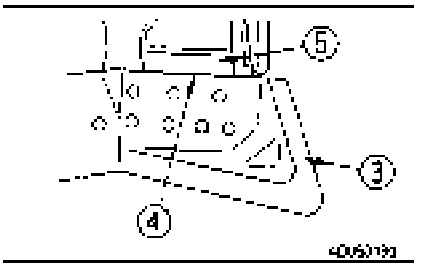
Loosen nuts ①, remove bolts ②, then replace or reverse the cutting edge.

1) Install the edge to the blade and tighten temporarily. Lower the blade and push it against the ground to remove the play in bolt ②, then tighten to the correct tightening torque.

2) When installing end bit ③, bring top edge ④ of the end bit into tight contact with stopper ⑤, then tighten the bolts.

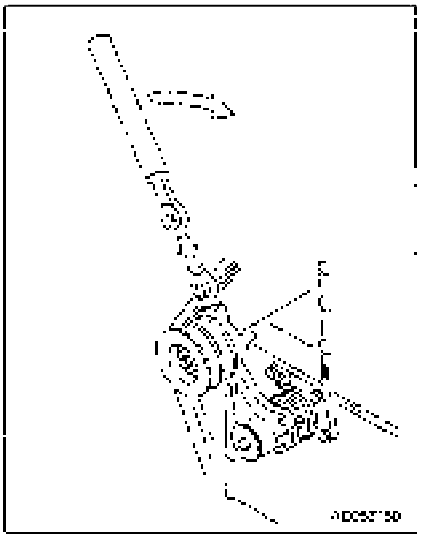
6. After several hours of running, retighten the nuts.





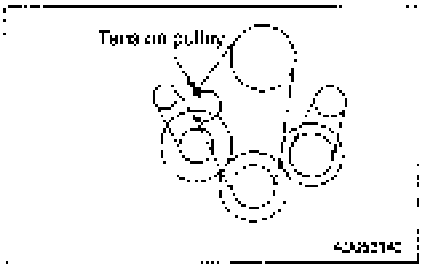
24.2.7 REPLACE FAN BELT

Fit a wrench to the tension pulley, push in the direction of the arrow to remove the V-belt, then replace the V-belt.



REMARK

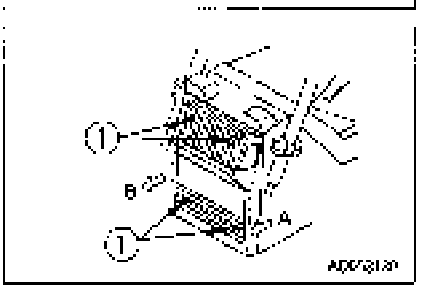
- An auto-tensioner is installed, so there is no need to carry out any adjustment until the belt is replaced.
- Replace the V-belts as a set.



24.2.8 CLEAN, CHECK RADIATOR FINS

⚠ WARNING

If compressed air, steam, or water hit your body directly, there is danger of injury. Always wear protective glasses, mask, and safety shoes



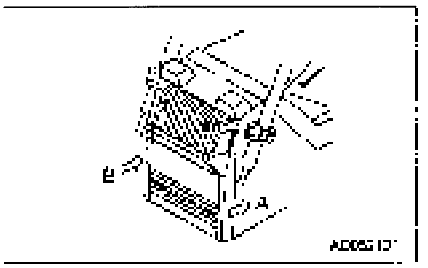
If the radiator fins are clogged or dirty, clean and inspect them.

1. Remove bolts (4 bolts).
2. Open the A side (hinge side) of the radiator mask.
   It opens approx. 30 mm (1.18 in).
3. Leave the B side of the radiator mask open.
4. Open the hydraulic cooler. For details of the opening method, see "24.2.9 CLEAN, CHECK HYDRAULIC COOLER FINS".
5. Clean the radiator fins clogged with mud, dust and leaves with compressed air. Steam or water may be used instead of compressed air.

REMARK

Check the rubber hose. If the hose is found to have cracks to be hardened by ageing, replace such hose with new one. Further, looser hose clamp should also be checked

6. When closing the radiator mask, always push in the A side first, then push in the B side, align the bolt holes, and tighten bolt (1).



24.2.9 REPLACE AIR CONDITIONER BELT

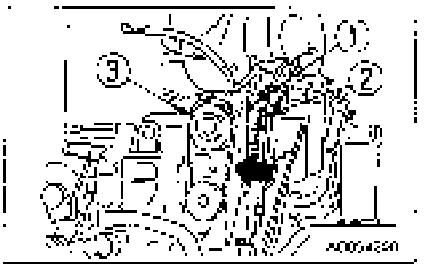
1. Loosen 4 bolts (1), and jack bolt (2), then move compressor (3) to the side.

2. Replace the V-belt.

REMARK

When adjusting the V belt, do not push the compressor directly with a bar. Use jack bolt (2).

3. Tighten jack bolt (2) and bolts (1), and apply tension to the V-belt. The standard deflection for the V-belt is approx. 10 mm (0.39 in) when the belt is pushed by thumb (approx. 6 kg (13 lb)) at a point midway between the air compressor pulley and fan pulley.



24.2.10 CLEAN, CHECK HYDRAULIC COOLER FINS

If the hydraulic cooler fins are clogged or there is dirt caught in the fins, clean and check the fins.

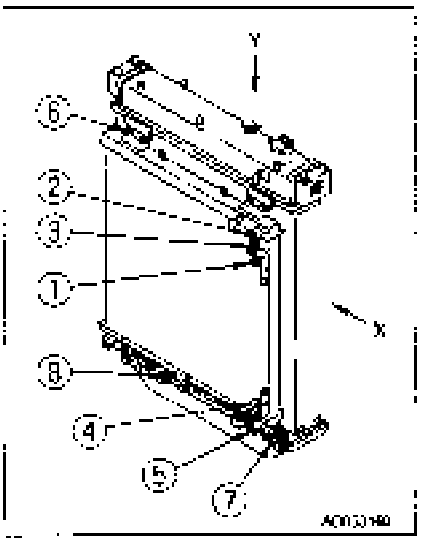
1. Open the radiator mask. For details on how to open the radiator mask, see "24.2.8 CLEAN, CHECK RADIATOR FINS".

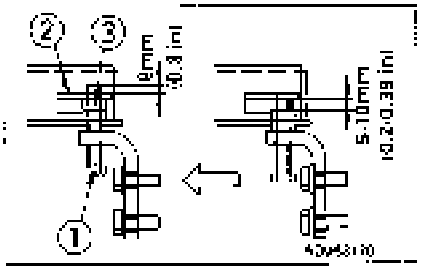
2. Set the hinge pin in position.
   1. Top
   - Extend pin bolt ①, and bring double nut ③ into contact with plate ②, which is welded to the hydraulic cooler.
   - After bringing double nut ③ into contact, set bolt ① so that it penetrates plate ② by 8 mm (0.3 in).
   2. Bottom
   Extend pin bolt ④ and set so that it penetrates plate ⑤ by 8 mm.

3. Remove cooler mounting bolts ⑥ (x 4) and ⑦ (x 4), and hose clips ⑧.

4. Open the hydraulic cooler to the hinge side, then clean and check the fins. The hydraulic cooler can be opened approx. 40°.

5. Use compressed air to remove the mud, dirt, and leaves clogging the hydraulic cooler fins. Steam or water may be used instead of compressed air.

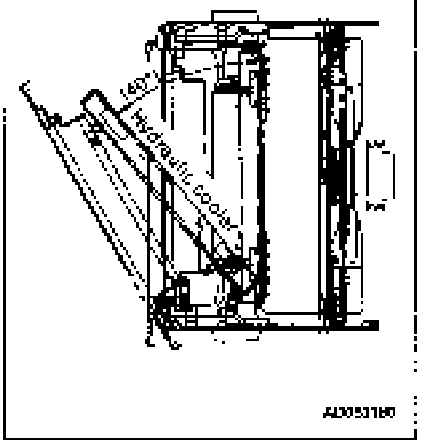




REMARK

Inspect the rubber hoses, and replace them if they are cracked or brittle. Check also for loose hose clamps.

6. When fixing the hydraulic cooler in position again:
   1. Tighten to the radiator with bolts ⑥ and ⑦, and secure the hose with clamps ⑧.
   2. Tighten pin bolts ① and ④, and set so that there is a clearance of 5 – 10 mm (0.2 – 0.39 in) at the top between the bottom surface and plates ② and ⑤.

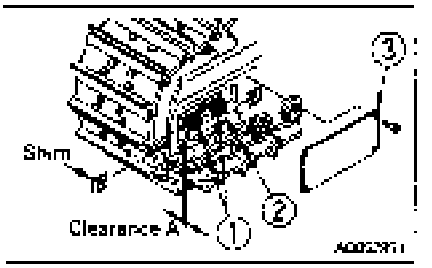


24.2.11 ADJUST IDLER CLEARANCE

Since the idlers are forced to move forward and backward by an external force guide plates (2) will be worn out.

Wear of these plates will cause the vibration of idlers from side to side or inclination of the idlers, and running off of track links from the idlers or unevenly worn idler and links may result.

Therefore, adjust the idlers according to the following procedure.



ADJUSTMENT

1. Drive the machine on level ground for 1 – 2 m (3.28 – 6.56 ft), then remove covers (3) (both inside and outside) at the side face of the idler.

2. Measure the clearance A (4 locations: left, right, inside and outside) between the track frame and the guide plate.

3. If the clearance A exceeds 4.0 mm (0.16 in), loosen bolt (1), and pull out the shim to adjust the clearance at one end to 0.5 – 1.0 mm (0.02 – 0.04 in).

REMARK

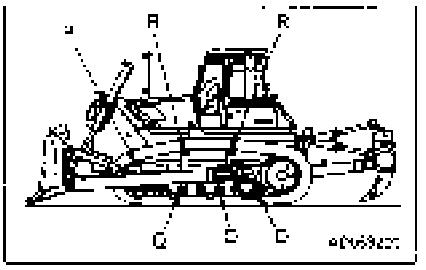
Thickness of one shim is 1.0 mm (0.04 in).

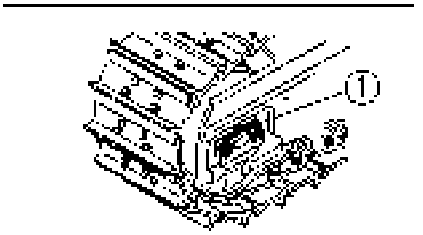
24.2.12 CHECK UNDERCARRIAGE OIL

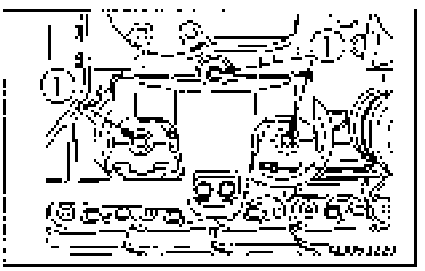
Stop the machine on level ground, and check for any reduction in the oil at the idler (portion P), track roller (portion Q), bogie shaft (portion Q), and carrier roller (portion R).

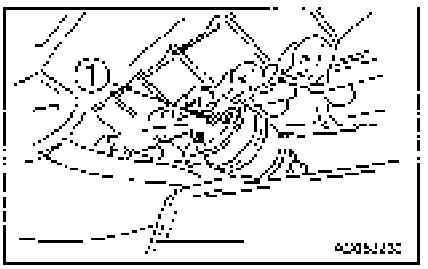
1. Loosen seal bolt (1) slowly and check if oil oozes out from the thread. If oil oozes out, the oil level has not gone down, so tighten the bolt.

2. If no oil comes out even when seal bolt (1) is removed, the oil level is low, so please contact your Komatsu distributor for repair.









REMARK

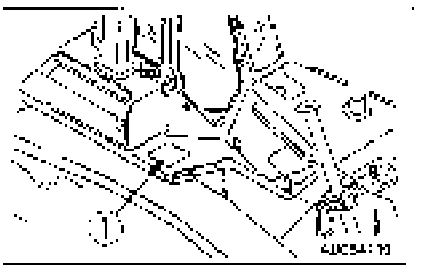
- On the idler, seal bolt (1) cannot be seen unless outside cover (2) is removed.
- There is one bogie shaft seal bolt (1) each on the inside and outside.

24.2.13 CLEAN EPC VALVE LINE FILTER

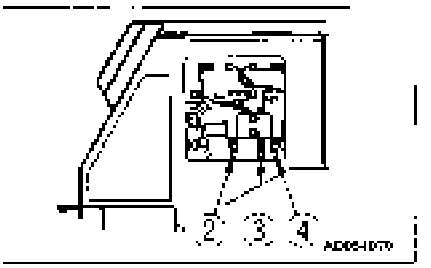
⚠ CAUTION

When connecting hoses ②, ③, and ④, be careful not to mistake their positions.

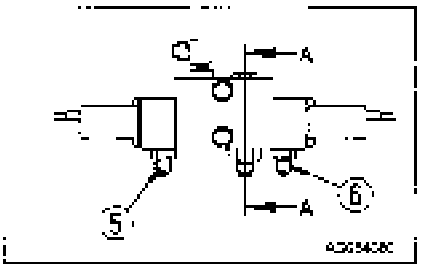
1. Open cover ① at the top of the right fender.



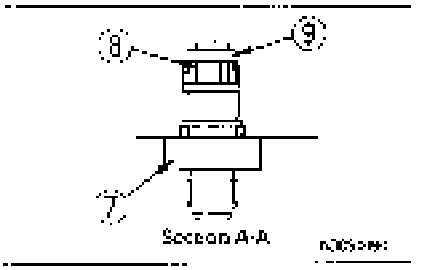
2. Remove hoses ②, ③, and ④.



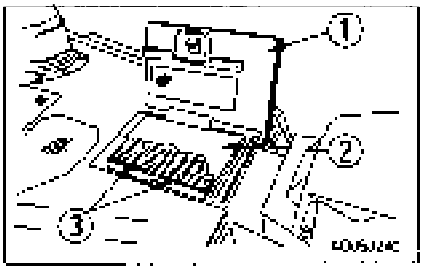
3. Remove connectors ⑤ and ⑥, then wash and clean the screens assembled to them.

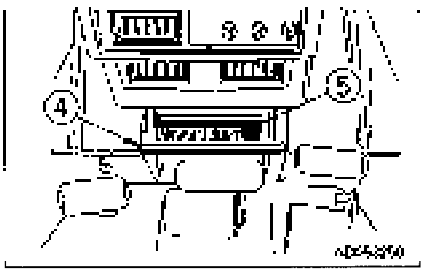


4. Remove connector ⑦ and plug ⑧, take out screen ⑨, then wash and clean it.



24.2.14 CLEAN AIR CONDITIONER AIR FILTER (FRESH/RECIRC FILTER) (MACHINES EQUIPPED WITH CAB)

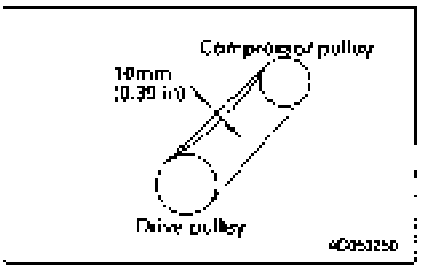




If the air conditioner air filter is clogged or there is dirt or dust in it, clean the filter.

1. Open inspection cover ①, open cover ②, then remove FRESH filter ③.
2. Open inspection cover ④ under the front panel, pull up RECIRC filter ⑤, and remove it.
3. Clean filters ③ and ⑤ with compressed air. If there is oil stuck to the filter, or it is extremely dirty, wash it in a neutral agent. After washing it, dry it completely before installing it again. If the clogging of the filter cannot be removed by washing or using compressed air, replace the filter with a new part.

24.2.15 CHECK, ADJUST AIR CONDITIONER (MACHINES EQUIPPED WITH CAB)



CHECKING TENSION OF COMPRESSOR BELT

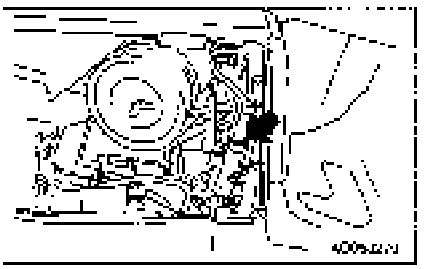
If the belt is loose, it will slip and the cooling effect will be reduced. From time to time, press a point midway between the drive pulley and compressor pulley with your finger (approx. 6 kg (13 lb)) and check that the tension is 10 mm (0.39 in).

When the belt is new, there will be initial elongation, so always adjust again after 2 or 3 days.

CHECK LEVEL OF REFRIGERANT (GAS)

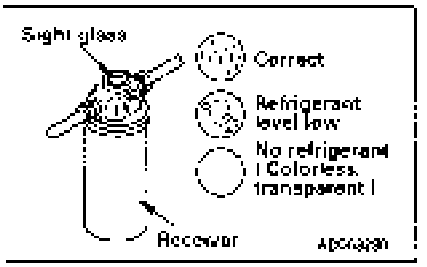
⚠ WARNING

The refrigerant used in the cooler is colorless and odorless and does not harm the atmosphere, but if the liquid gets into your eyes or on your hands, it may cause loss of sight or frostbite, so never loosen any part of the refrigerant circuit.



If the level of the refrigerant (gas) is low, the cooling effect will be reduced. Run the engine at high idling, and check the flow of the refrigerant in the refrigerant circuit through the sight glass of the receiver when the cooler is running at high speed.

- No bubbles in refrigerant flow: Correct
- Bubbles in refrigerant flow (bubbles continuously pass through): Refrigerant level low
- Colorless, transparent: No refrigerant

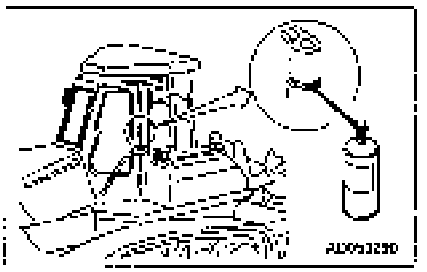


REMARK

When there are bubbles, the refrigerant gas level is low, so contact your refrigerant dealer to have refrigerant added. If the air conditioner is run with the refrigerant gas level low, it will cause damage to the compressor.

New Freon R-134a is used as refrigerant.

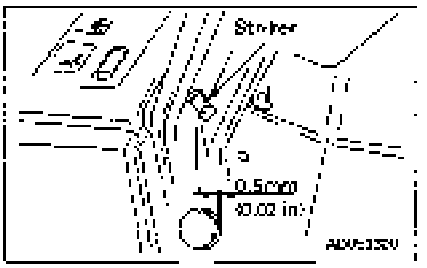
24.2.16 GREASE DOOR HINGE (MACHINES EQUIPPED WITH CAB)



If the door makes a squeaking noise when it is opened or closed, spray lubricant in through the split in the hinge bushing.

If the bushing is worn, replace the hinge.

24.2.17 CHECK DOOR LOCK STRIKER (MACHINES EQUIPPED WITH CAB)

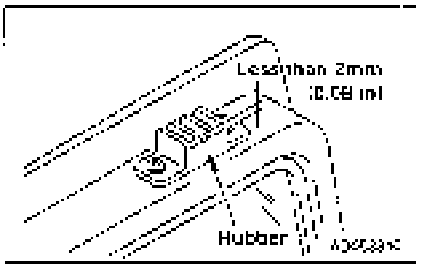


If the wear of the doors lock striker exceeds 0.5 mm (0.02 in), replace the striker. If it is used as it is, the play will increase and this may result in breakage of the hinge or door lock.

24.2.18 REPLACE DOOR DAMPER (MACHINES EQUIPPED WITH CAB)

If the depth of the door damper rubber groove is less than 2 mm (0.08 in), replace the damper.

There are two dampers each at the top and bottom on the left and right doors.

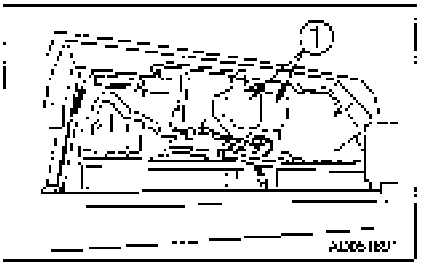


24.2.19 CHECK WINDOW WASHER FLUID LEVEL, ADD FLUID (MACHINES EQUIPPED WITH CAB)

If there is air in the window washer fluid, check the level and add fluid.

Open the battery cover, check the level of the fluid in window washer tank (1), and if it is low, add automobile window washer fluid.

When adding fluid, be careful not to let dirt or dust get in.



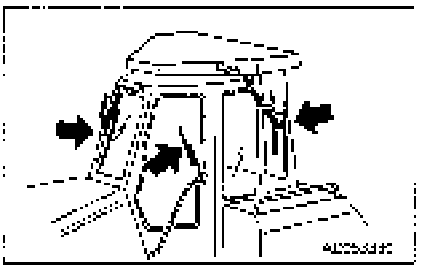
24.2.20 BLEED AIR FROM HEAD END OF RIGHT PITCH CYLINDER (POWER TILT, POWER PITCH DOZER ONLY)

Bleed the air if the work equipment has been removed or repaired.

1. Raise the blade and run the engine at low idling.
2. Operate the left and right tilt 5 – 10 times to bleed the air from the tilt circuit.
3. Operate the forward and rear pitch 5 – 10 times to bleed the air from the bottom end of the right cylinder.
4. Set the left and right cylinders at the neutral position, then carry out the following operations 5 – 10 times to bleed the air from the head end of the right pitch cylinder.
   - (1) Forward pitch
   - (2) Left tilt
   - (3) Right tilt
   - (4) Rear pitch

24.2.21 REPLACE WIPER BLADE [MACHINES EQUIPPED WITH CAB]

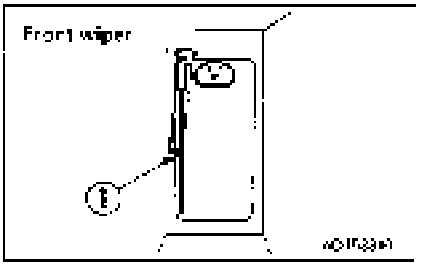
If the blade is damaged, it will not wipe the window clean, so replace the blade.

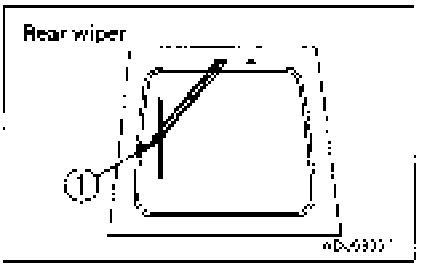


Method of replacement

- Front, rear wiper

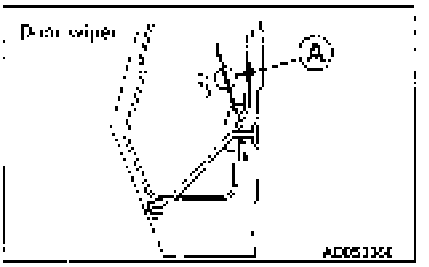
1. Remove screw (1), then remove the blade.
2. Install a new blade, then tighten screw (1) securely.





- Door wiper

1. It is hooked at portion A, so move the blade in the direction of the arrow to remove it.
2. Install the new blade and hook it securely.



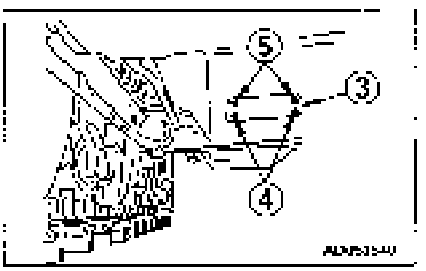
24.2.22 CLEAN STRAINERS (POWER TRAIN PUMP STRAINER, SCAVENGING PUMP STRAINER)

⚠ WARNING

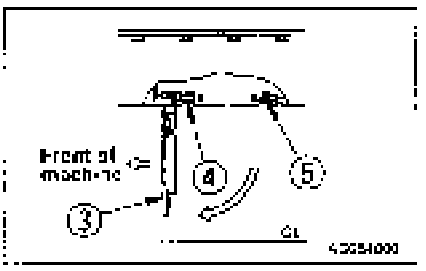
- **The oil is at high temperature immediately after the machine has been operated. Wait for the oil to cool down before starting the operation.**
- **The undercover is heavy.**
  Never try to open or close the cover when directly beneath it. When removing bolts ②, carry out the work from the rear below the cover so that you can easily get out of the way.

Prepare the following.
- Container to catch drained oil: Min. 10 ℓ capacity
- Refill capacity: 10 ℓ (2.64 US gal, 2.20 UK gal)

1. Remove inspection cover ① of the undercover at the bottom rear of the chassis as follows.
   (1) Remove 2 bolts ② at the front of the chassis.
   (2) Hold cover ① and gradually remove 2 bolts ③ at the rear of the chassis. (Be careful when doing this as rain water may run out.)
   (3) Lower cover ① slowly and open it. (There is a hinge at the front of the cover.)
   The strainer at portion P can be seen at the top.



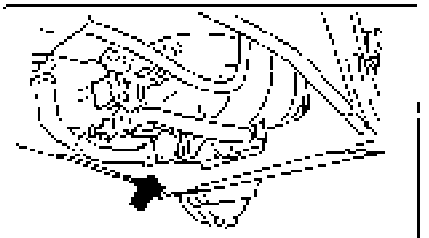
2. Remove drain plug P₂ in the strainer cover and drain the oil (approx. 4 ℓ (1.06 US gal, 0.88 UK gal)) collected inside the piping.



3. Loosen mounting bolt ④ of the power train strainer, then remove cover ⑤.

4. Remove spring ⑥, then take out strainer ⑦.

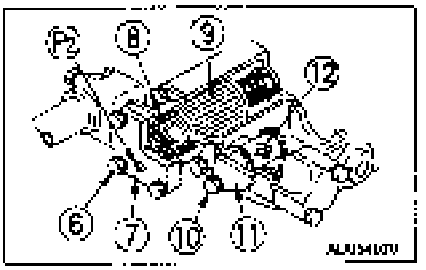
5. Remove all dirt from strainer ⑦, then wash in clean diesel oil or flushing oil.
   Clean the case interior and the removed parts.



6. Loosen mounting bolt ⑧ of the scavenging pump strainer, then remove cover ⑨.

7. Take out strainer ⑩.

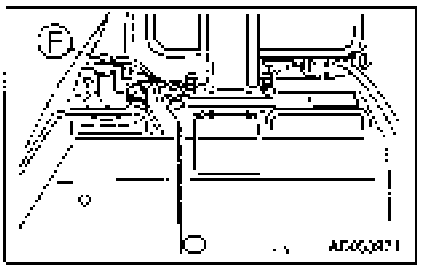
8. Remove all dirt from strainer ⑩, then wash in clean diesel oil or flushing oil.
   Clean the case interior and the removed parts.



9. Install the strainers to their original position.

10. Refill the engine oil through oil filler (F).
For details of the oil to use, see "20. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".

If the spring or strainer are damaged, replace them.



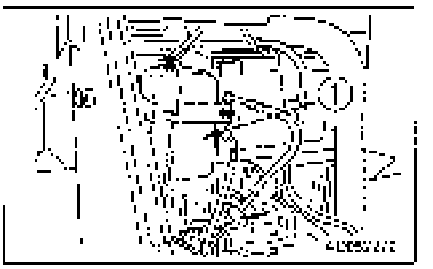
24.3 CHECK BEFORE STARTING

24.3.1 CHECK COOLANT LEVEL, ADD WATER

⚠ WARNING

Normally, do not open the radiator cap. When checking the cooling water level, check the sub-tank when the engine is cold.

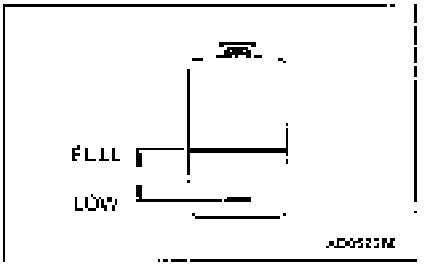
1. Open the engine side cover on the left side of the chassis, and check that the cooling water is between the FULL and LOW marks on sub-tank ①. If the water level is low, add water to the FULL level through the water filler port in sub-tank ①.



REMARK

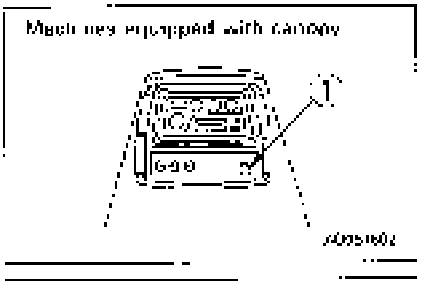
In summer, the coolant may overflow from the subtank drain hose. This is no problem. It occurs because too much coolant has been added.

2. After adding water, tighten the cap securely.
3. If the sub-tank is empty, check for leakage of water, then add water to the radiator and sub-tank.
4. After adding water, close the engine side cover.



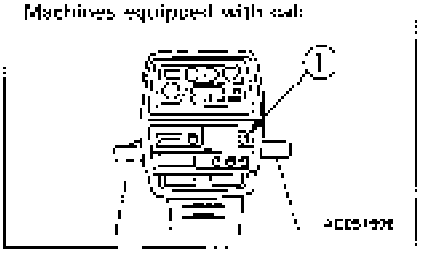
24.3.2 CHECKING WITH MACHINE MONITOR (MONITOR PANEL SPECIFICATION)

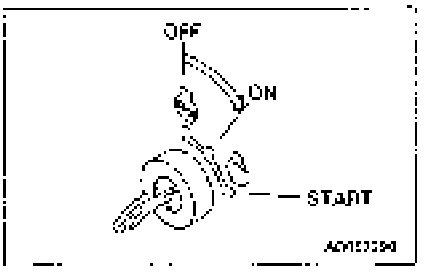
1. Turn starting switch ① to the ON position.
2. Check that all monitor lamps light up for 3 seconds, the warning lamp lights up for 2 seconds, and the alarm buzzer sounds for 1 second.



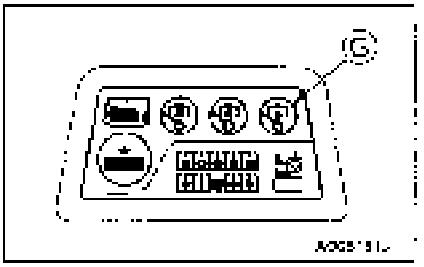
REMARK

- If the lamps do not light up, there may be a failure or disconnection in the monitor, so please contact your Komatsu distributor.
- When carrying out the checks before starting, do not rely only on the monitor. Always carry out all the items listed for periodic maintenance.





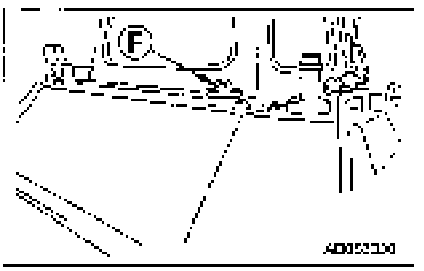
24.3.3 CHECK FUEL LEVEL, ADD FUEL (MONITOR PANEL SPECIFICATION)



⚠ WARNING

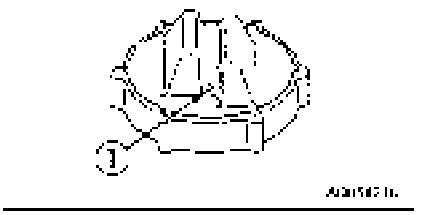
When adding fuel, never let the fuel overflow. This may cause a fire. If you spill fuel, thoroughly clean up any spillage.

1. Turn the engine starting switch to the ON position and check the fuel level with fuel level gauge G on the monitor panel. After checking, turn the switch back to the OFF position.
2. After completing work, fill the fuel tank through oil filler port F. For details of the oil to use, see "20. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".
3. After adding fuel, tighten the cap securely.
   Fuel capacity: 500 ℓ (132 US gal, 110 UK gal)



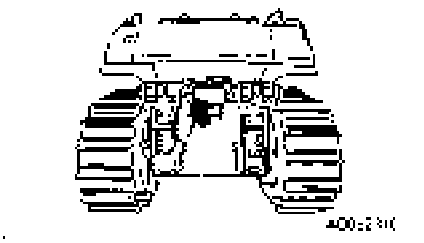
REMARK

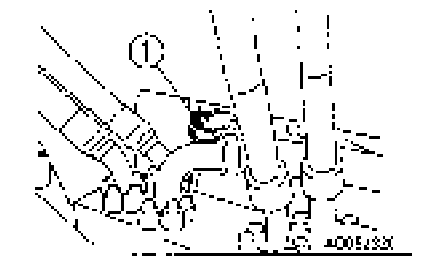
If breather hole 1 on the cap is clogged, the pressure in the tank will drop and fuel will not flow.
Clean the hole from time to time.



24.3.4 DRAIN WATER, SEDIMENT FROM FUEL TANK

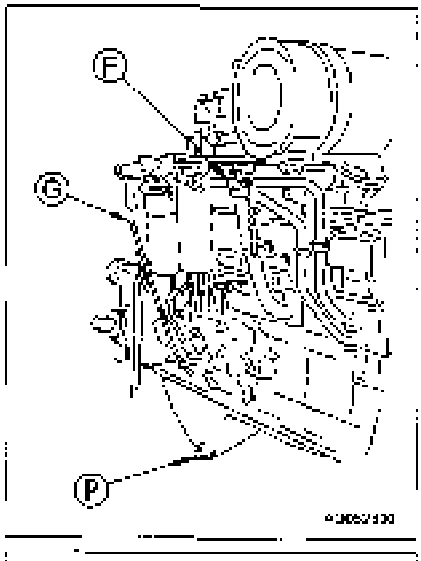
Loosen drain valve 1 at the bottom of the fuel tank and drain the sediment and water accumulated at the bottom of the tank together with the fuel.



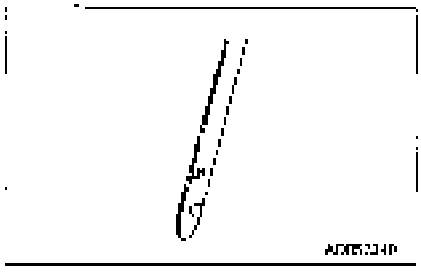


24.3.5 CHECK OIL LEVEL IN ENGINE OIL PAN, ADD OIL

1. Open the engine side cover on the left side of the chassis.
2. Remove dipstick ⓖ and wipe the oil off with a cloth.
3. Insert dipstick ⓖ fully in the oil filler pipe, then take it out again.



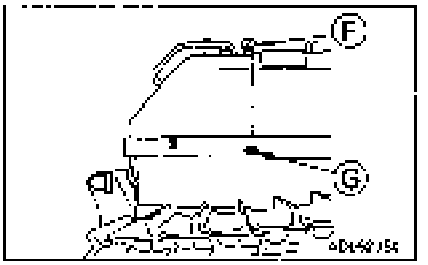
4. The oil level should be between the H and L marks on dipstick ⓖ.
   If the oil level is below the L mark, add engine oil through oil filler ⓕ.
   For details of the oil to use, see "20. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE"
5. If the oil is above the H mark, drain the excess engine oil from drain plug Ⓟ, and check the oil level again.
6. If the oil level is correct, tighten the oil filler cap securely and close the engine side cover.



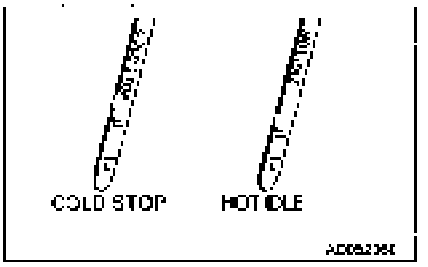
REMARK

- Check the oil level with the engine stopped.
- When checking the oil level after the engine has been operated, wait for at least 15 minutes after stopping the engine before checking.
- If the machine is at an angle, make it horizontal before checking.
- When adding oil, remove the dipstick from the holder to release the air inside the crankcase.

24.3.5 CHECK OIL LEVEL IN POWER TRAIN CASE, ADD OIL



1. Remove dipstick ⑥, and wipe the oil off with a cloth.
2. Insert dipstick ⑥ fully in the oil filler pipe, then take it out again.

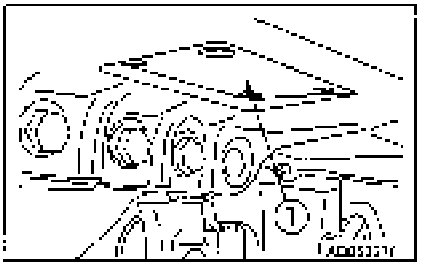


3. The oil level should be between the H and L marks on dipstick ⑥.
   If the oil level is below the L mark, add engine oil through oil filler ⑦.
   The oil level is stamped on both sides of the dipstick. One side is used when the engine is stopped and the oil temperature is low (COLD STOP). The other side is used when the engine is idling and the oil temperature is high (HOT IDLING).

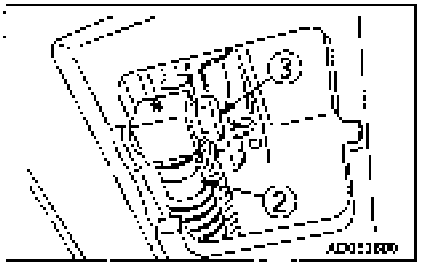
REMARK

When checking the oil level before starting operations, check with the engine stopped and use the dipstick COLD STOP side. It is also possible to check the oil level after the engine has been run and the power train oil temperature is high, but in this case, run the engine at idling and use the dipstick HOT IDLING side.

For details of the oil to use, see "20. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".



4. If the oil is above the H mark, remove drain cover ① at the bottom left of the power train case, pull drain hose ② out from the pickup port, then loosen drain plug ③ and drain the excess oil. After draining the oil, check the oil level again.



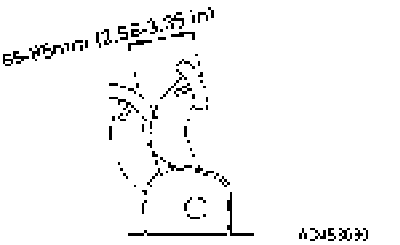
5. If the oil level is correct, tighten the oil filler cap securely.

REMARKS

When checking the oil level, if the machine is at an angle, move it to a horizontal position before carrying out the check.

24.3.7 CHECK BRAKE PEDAL TRAVEL

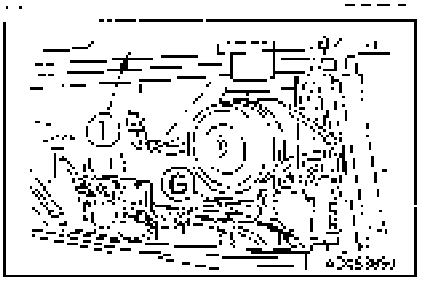
1. Depress the brake pedal all the way until it stops.
2. The distance of travel at the center of the pedal (position in the diagram on the right) should be 65 – 85 mm (2.56 – 3.35 in).
3. When this value exceeds 85 mm (3.35 in), or the brake fails to work, please contact your Komatsu distributor for adjustment.

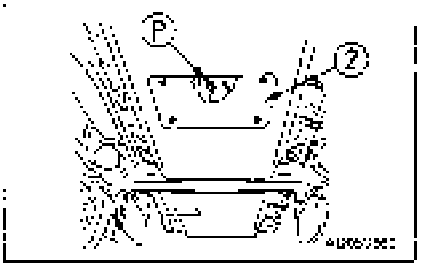


24.3.8 CHECK DAMPER CASE OIL LEVEL, ADD OIL

1. Open engine side cover (1) on the left side of the machine.
2. Remove dipstick (G), and wipe the oil off with a cloth.
3. Insert dipstick (G) fully into the dipstick holder, then pull it out again.
4. The oil level should be between the H and L marks on dipstick (G).
   If the oil is below the L mark, add engine oil through the dipstick holder.

   For details of the oil to use, see "20. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".
5. If the oil is above the L mark, open inspection cover (2) at the bottom center of the power train case, and drain the excess oil from drain plug (P) of the engine damper (this can be seen to the front of the machine through the inspection window). After draining the oil, check the oil level again.

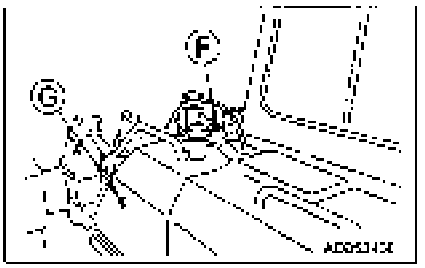




REMARKS

- Check the oil level with the engine stopped.
- When checking the oil level, if the machine is at an angle, move it to a horizontal position before carrying out the check.

24.3.9 CHECK OIL LEVEL IN HYDRAULIC TANK, ADD OIL



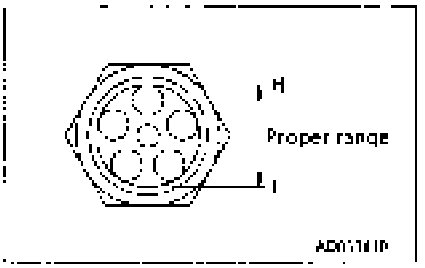
⚠ WARNING

When removing the oil filler cap, oil may spurt out, so stop the engine and wait for the oil temperature to go down, then turn the cap slowly to release the internal pressure before removing the cap.

NOTICE

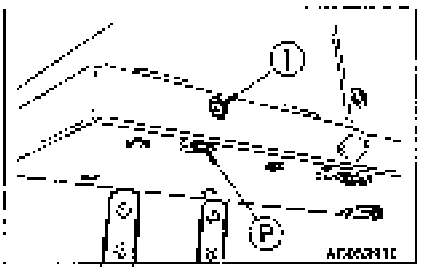
Do not add oil if the level is above the H line. This will damage the hydraulic equipment and cause the oil to spurt out.

1. Lower the blade to the ground, stop the engine and wait for about 5 minutes before checking oil level. If oil level is between H and L in sight gauge G.
2. If the level is below the L mark, add engine oil through oil filler F.
   For details of the oil to use, see "20. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".

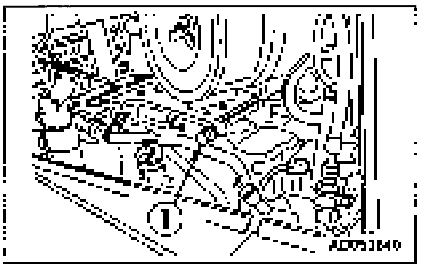


⚠ WARNING

If oil has been added to above the H mark, stop the engine and wait for the hydraulic oil to cool down. Then remove drain plug P, loosen drain valve I, and drain the excess oil.



24.3.10 CHECK DUST INDICATOR



1. Open the engine side cover on the left side of the chassis, and check that the red piston has not appeared in the transparent portion of dust indicator ①.
2. If the red piston has appeared, clean or replace the element immediately.
   For details of the method of cleaning the element, see "24.2 WHEN REQUIRED".
3. After checking, cleaning, and replacing, press the knob of dust indicator ① to return the red piston to its original position.

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24.3.11 CHECK ELECTRIC WIRINGS

⚠ WARNING

If the fuse blows frequently, or there are traces of shortcircuiting in the electric wiring, always locate and repair the cause.

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

- Battery
- Starting motor
- Alternator

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

⚠ WARNING

Accumulation of flammable material (dead leaves, twigs, grass, etc.) around the battery may cause fire, so always check and remove such material.

When carrying walk-around checks or checks before starting, always check if there is any accumulation of flammable material around the battery, and remove such flammable material

24.3.12 CHECK THAT LAMPS LIGHT UP

Turn the head lamp switch and the rear lamp switch to the ON position and check that the head lamps and rear lamps light up.

If the lamps do not light up, there is probably a broken bulb or disconnection in the wiring, so contact your Komatsu distributor for repairs.

24.3.13 CHECK HORN SOUND

24.3.14 CHECK BACKUP ALARM SOUND

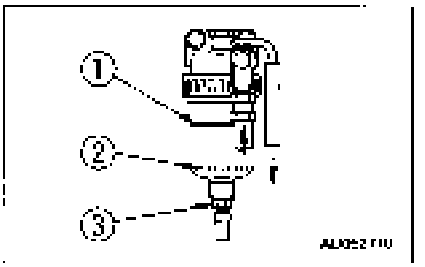
24.3.15 CHECK SEAT BELT FOR WEAR OR DAMAGE

Check the belt and mounting clamps, and if they are worn or damaged, replace the seat belt.

24.3.16 CHECK FOR WATER AND SEDIMENT IN WATER SEPARATOR, DRAIN WATER

The water separator separates water mixed in the fuel. If float ② is at or above red line Ⓣ, drain the water according to the following procedure:

1. Loosen drain plug ③ and drain the accumulated water until the float reaches the bottom.
2. Tighten drain plug ③.
3. If the air is sucked into fuel line when draining and water, be sure to bleed air in the same manner as for the fuel filter. See "24.5 EVERY 500 HOURS SERVICE".

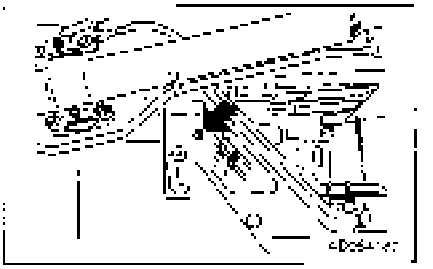


24.4 EVERY 250 HOURS SERVICE

24.4.1 LUBRICATING

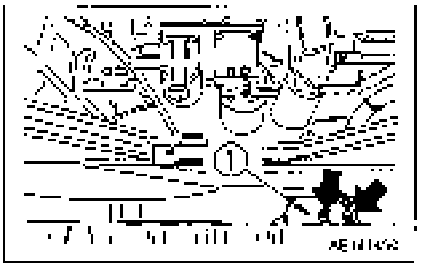
1. Lower the work equipment to the ground, then stop the engine.
2. Using a grease pump, pump in grease through the grease fittings shown by arrows.
3. After greasing, wipe off any old grease that was pushed out.

- Grease fan pulley (1 place)
  Front of engine side cover (left)

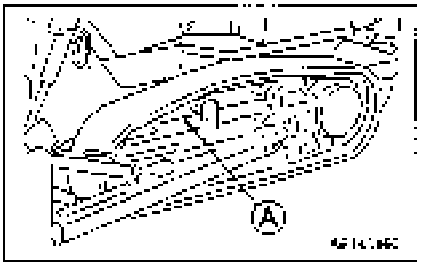


- Grease equalizer bar side pin (4 places)
  Two each on the left and right sides of the machine

1. Remove all the sand and soil from the top of the track frame and cover ①.



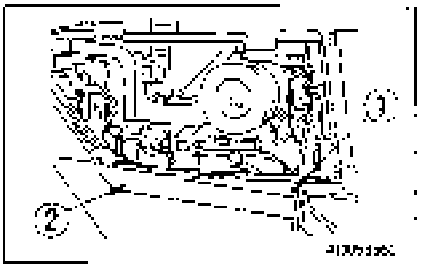
2. Mount the straight frame and remove the red plug from Ⓐ between the track frame and track.
3. Add grease from the top of the track.

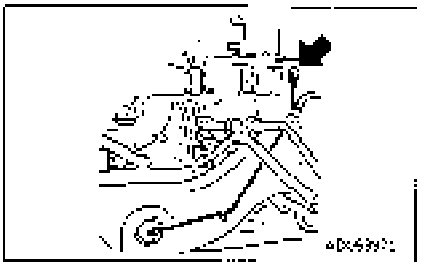


Tools to use
Grease pump assembly (07952-80002)
Nozzle (07951-41043) tube type

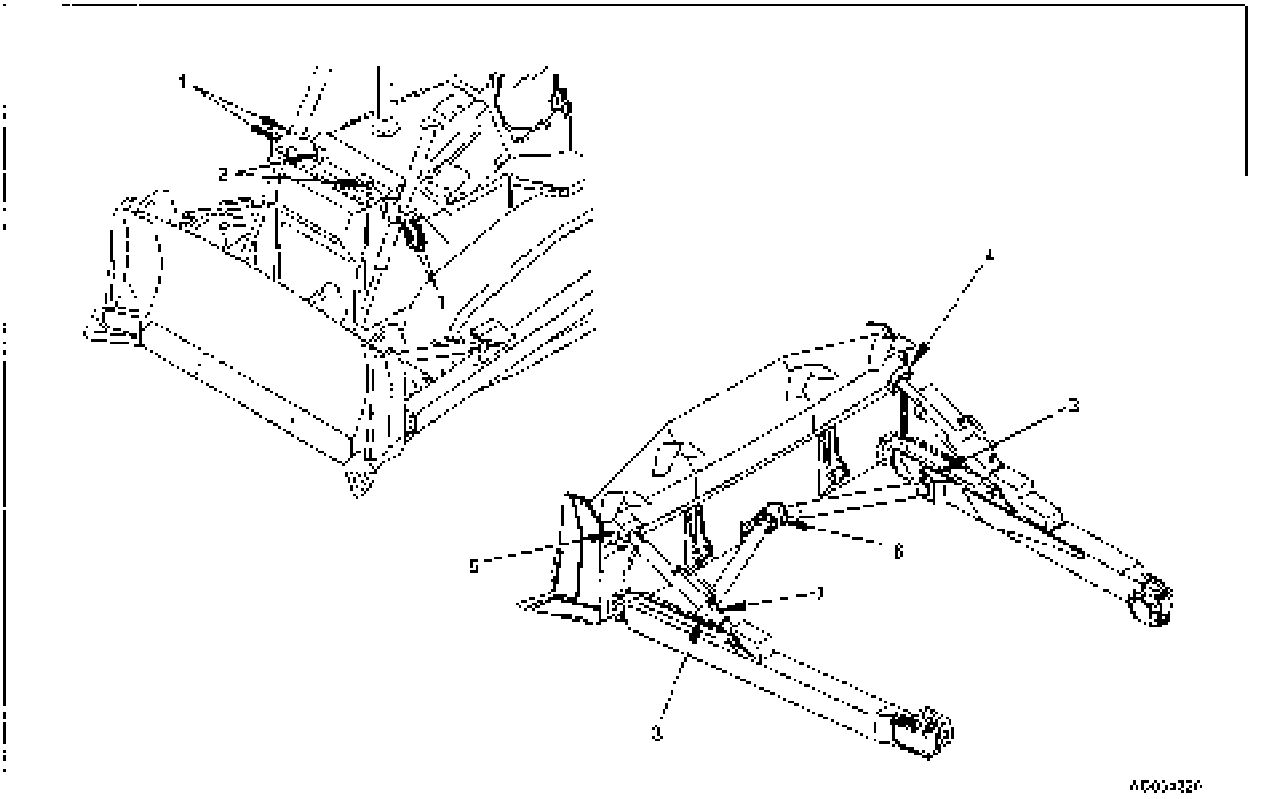
- Grease equalizer bar center pin (1 place)

1. Open the engine side cover at the left side of the machine, then remove 2 bolts (1).
2. Pull hinged cover (2) out and open it.
3. Add grease through the grease fitting marked by the arrow.
4. Return hinged cover (2) to its original position, install bolt (3) to hold it in position, then close the engine side cover.



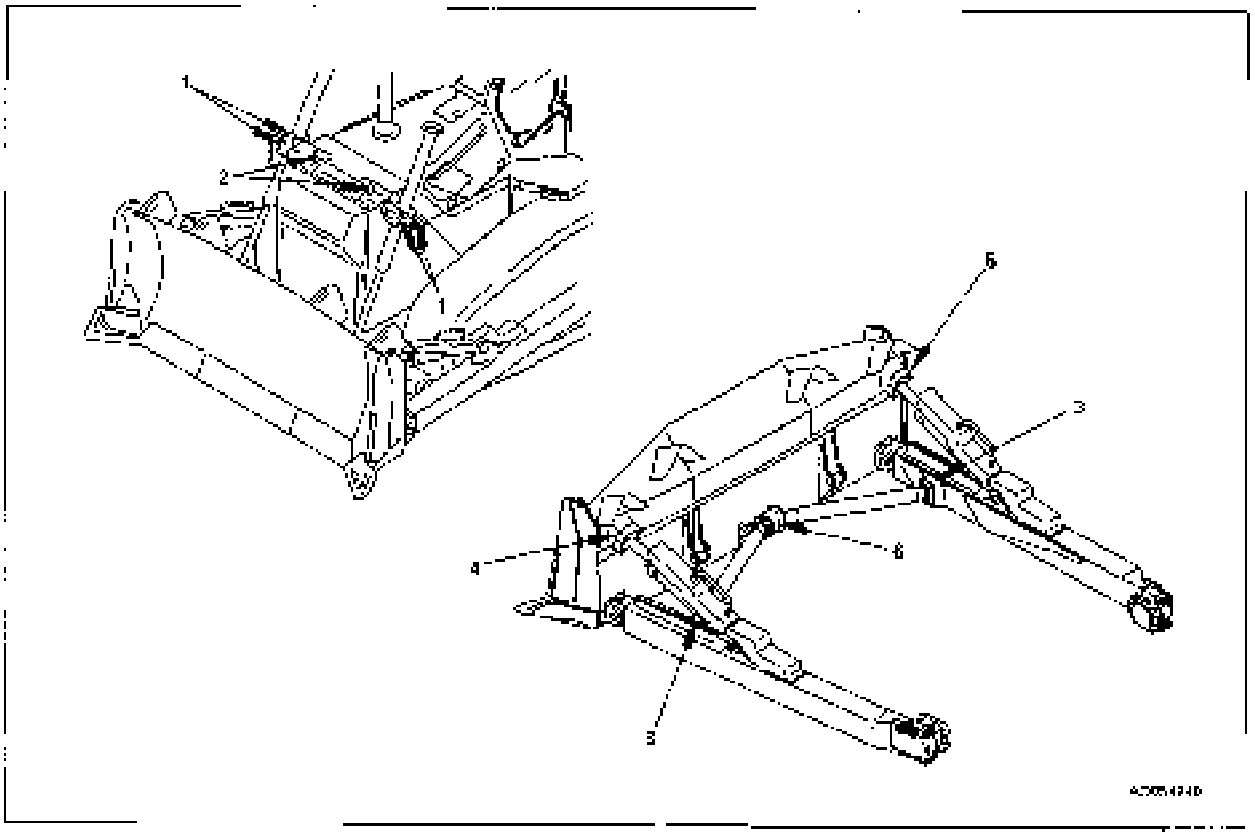


- **Power tilt dozer**



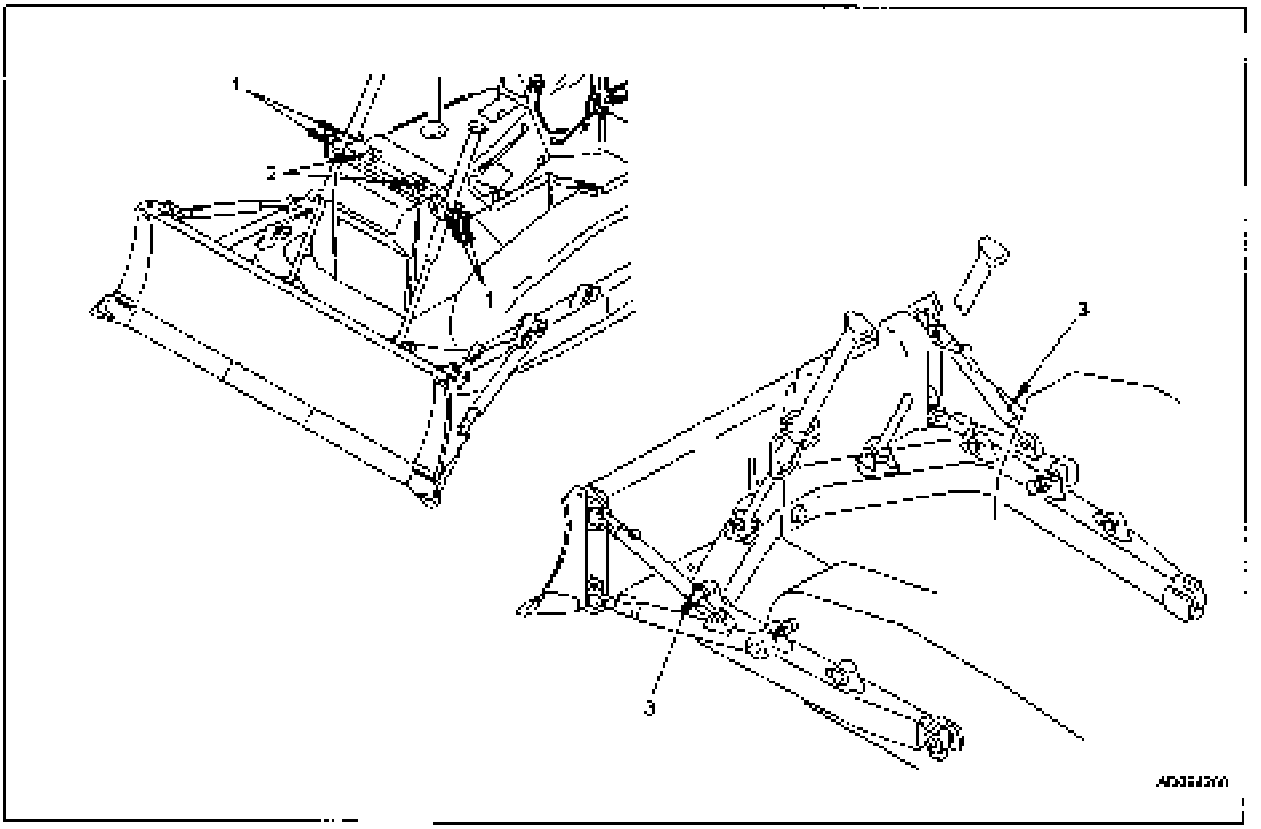
1. Lift cylinder support yoke (4 places)
2. Lift cylinder support shaft (2 places)
3. Blade arm (2 places)
4. Tilt cylinder ball joint (1 place)
5. Tilt brace ball joint (1 place)
6. Blade center link (1 place)
7. Tilt brace thread (1 place)

* **Power tilt – Power pitch dozer**



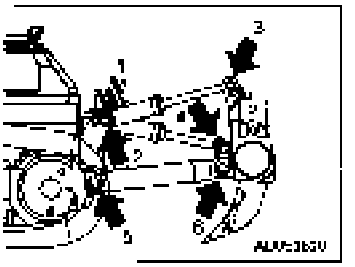
1. Lift cylinder support yoke (4 places)
2. Lift cylinder support shaft (2 places)
3. Blade arm (2 places)
4. Tilt cylinder ball joint (1 place)
5. Pitch cylinder ball joint (1 place)
6. Blade center link (1 place)

- **Angledozer**



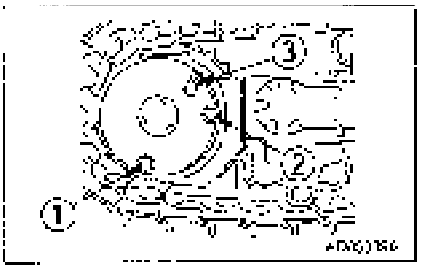
1. Lift cylinder support yoke (4 places)
2. Lift cylinder support shaft (2 places)
3. Tilt brace thread (2 places)

- **Ripper**



1. Tilt cylinder bottom pin (2 places)
2. Lift cylinder bottom pin (2 places)
3. Tilt cylinder rod end pin (2 places)
4. Lift cylinder rod end pin (2 places)
5. Arm pin (front) (2 places)
6. Arm pin (rear) (2 places)

24.4.2 CHECK OIL LEVEL IN FINAL DRIVE CASE, ADD OIL



⚠ WARNING

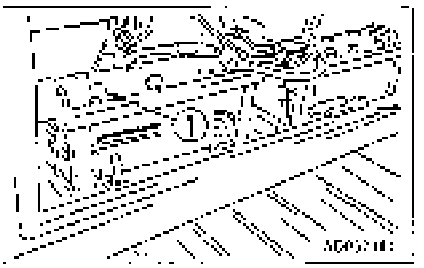
The oil is at high temperature immediately after the machine has been operated. Wait for the oil to cool down before starting the operation.

1. Stop the machine so that drain plug ① is directly at the bottom.
2. Remove oil level plug ② and check whether the final drive case is filled with oil to lower edge of the plug hole.
3. If the oil level is low, remove plug ② and add engine oil until it overflows from oil level plug ③.

For details of the oil to use, see "20. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".

24.4.3 CHECK LEVEL OF BATTERY ELECTROLYTE

Carry out this check before operating the machine.



⚠ WARNING

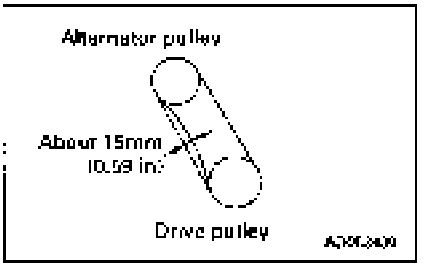
- **To avoid gas explosions, do not bring fire or sparks near the battery.**
- **Battery electrolyte is dangerous. If it gets in your eyes or on your skin, wash it off with large amounts of water, and consult a doctor.**

1. Open the battery cover.
2. Remove cap (1), and check that the electrolyte is at the specified level (10 to 12 mm (0.39 to 0.47 in) above the plate). If the electrolyte level is low, add distilled water to the specified level. If the battery electrolyte is spilled, have dilute sulphuric acid added.
3. When adding distilled water to any cell at cap (1), add distilled water also to the other cells.
4. Clean the air hole in the battery cap, then tighten the cap securely.

NOTICE

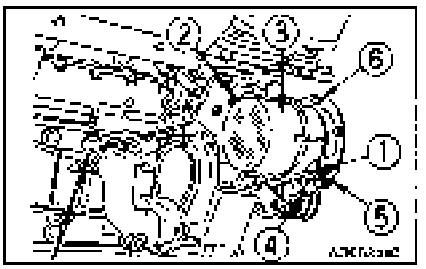
When adding distilled water in cold weather, add it before starting operations in the morning to prevent the electrolyte from freezing.

24.4.4 CHECK, ADJUST ALTERNATOR DRIVE BELT TENSION



CHECK

The standard deflection for the drive belt is approx. 15 mm (0.59 in) when pressed by thumb (approx. 8 kg (13.23 lbf) at a point midway between the drive pulley and alternator pulley.



ADJUSTING

1. Loosen 2 cover mounting bolts ⑥ and remove the cover.
2. Loosen bolts and nuts ①, ③, and ⑤, then turn nut ④ and adjust the belt tension.
3. After adjusting, tighten bolts and nuts ①, ②, and ⑤ to secure alternator ③ in position.
4. Install the cover and tighten cover mounting bolts ⑥.
   Check that the covers do not contact the rotating portion of the alternator.

REMARK

- Check for damage to each pulley, wear of the V-groove, and wear of the V-belt. Check in particular that the V-belt does not contact the bottom of the V-groove.
- If the V-belt is elongated and there is no more allowance for adjustment, or if the belt is cracked or cut, replace the belt.
- When adjusting the V-belt, do not push the alternator directly with a bar. Insert a wooden block and push the block with a bar.
- After replacing the V-belt, operate the machine for one hour, then check and adjust again.

24.4.5 CHANGE OIL IN ENGINE OIL PAN, REPLACE ENGINE OIL FILTER CARTRIDGE

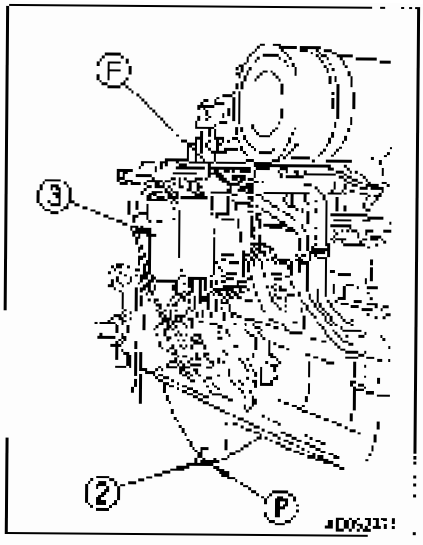
⚠ WARNING

The oil is at high temperature after the engine has been operated, so never change the oil immediately after finishing operations. Wait for the oil to cool down before changing it.

⚠ CAUTION

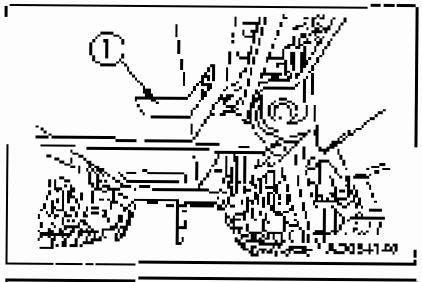
When draining the oil, do not remove drain plug (P).

Prepare the following.
- Container to catch drained oil: Min 37 ℓ capacity
- Refill capacity: 37 ℓ (9.77 US gal, 8.14 UK gal)
- Socket wrench, filter wrench.



1. Remove the cover at the bottom of the machine and set a container to catch the oil under the drain plug.

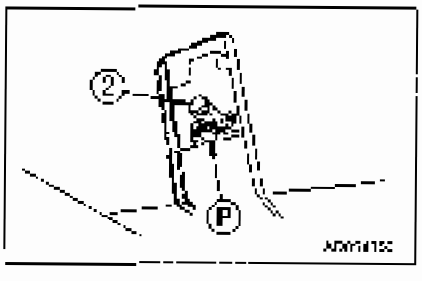
2. To prevent getting oil on yourself, remove drain plug (P) slowly, then loosen drain valve (2) to drain the oil. Do not loosen the drain valve too far, otherwise, the stopper pin inside the valve may be deformed.



3. Check the drained oil, and if there are excessive metal particles or foreign material, please contact your Komatsu distributor.

4. Install drain plug (P) and drain valve (2).

   Tightening torque
   Drain plug (P): 58.8 ± 9.8 Nm (7 ± 1 kgm, 50.6 ± 7.2 lbft)
   Drain valve (2): 63.7 ± 14.7 Nm (6.5 ± 1.5 kgm, 47.0 ± 10.8 lbft)



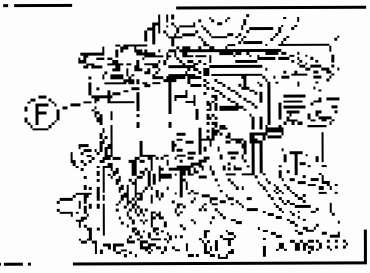
5. Using a filter wrench, turn filter cartridge (1) counterclockwise to remove it. When doing this, to prevent getting oil on yourself, do not carry out this operation from immediately under the cartridge.
   In particular, if this operation is carried out immediately after stopping the engine, a large amount of oil will come out, so wait for 10 minutes before starting the operation.

6. Clean the filter holder, fill the new filter cartridge with engine oil, coat the packing surface and thread with engine oil (or coat it thinly with grease), then install the filter cartridge.

7. When installing the filter cartridge, bring the packing surface into contact with the filter holder, then tighten a further 3/4 – 1 turn.

8. After replacing the filter cartridge, add engine oil through oil filler (F) until the oil level is between the H and L marks on the dipstick.
   For details of the oil to use, see "20. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".

9. Run the engine at idling for a short time, then stop the engine, and check that the oil level is between the H and L marks on the dipstick. For details, see "24.3 CHECK BEFORE STARTING".



NOTICE

Even if the machine has not been operated for 250 hours, the oil and filter cartridge must be replaced when the machine has been operated for 6 months.

In the same way, even if the machine has not been operated for 6 months, the oil and filter cartridge must be replaced when the machine has been operated for 250 hours.

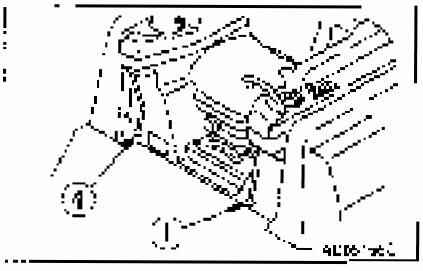
24.4.6 CHECK BRAKE PERFORMANCE

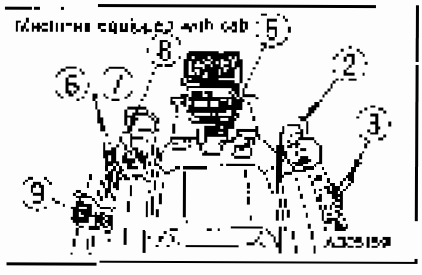
⚠ WARNING

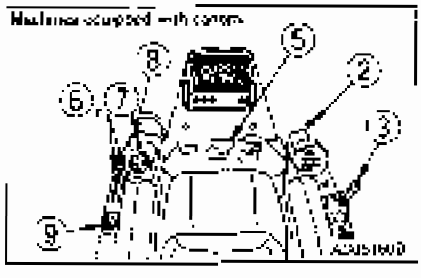
If the machine moves during the following operation, please contact your Komatsu distributor for repairs immediately.

Before starting the engine, check that the area around the machine is safe, then do as follows.

1. Start the engine.
2. Set safety lever ① to the FREE position then operate blade control lever ② and ripper control lever ③ to raise the blade and ripper.
   Leave the safety lever to the FREE position.
3. Set parking lever ④ to the FREE position.
4. Set max. speed setters ⑤ and ⑥ to a midrange speed.
5. Depress brake pedal ⑦ and move joystick ⑧ to the FORWARD position.
6. Operate fuel control dial ⑨ to raise the engine speed gradually to full throttle.
7. Check that the machine does not move. This indicates that brake performance is normal.







24.5 EVERY 500 HOURS SERVICE

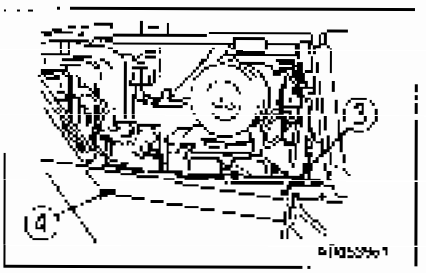
Maintenance for every 250 hours service should be carried out at the same time.

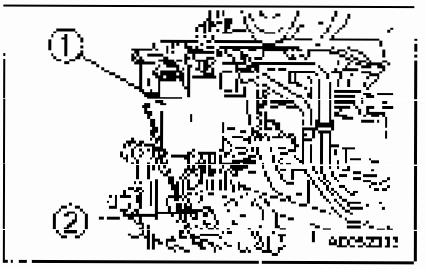
24.5.1 REPLACE FUEL FILTER CARTRIDGE

⚠ WARNING

- **Engine is at high temperature immediately after the machine has been operated. Wait for engine to cool down before replacing the filter.**
- **Do not bring fire or sparks near the fuel.**

Prepare a filter wrench and a container to catch the fuel.





1. Open the engine side cover at the left side of the machine, remove bolt ③, then open cover ④ to the outside using the hinge at the bottom as the fulcrum.

2. Set the container to catch the fuel under the filter cartridge.

3. Using a filter wrench, turn filter cartridge ① counterclockwise to remove it.

4. Clean the filter holder, fill a new filter cartridge with clean fuel, coat the packing surface with engine oil, then install it to the filter holder.

5. When installing, tighten until the packing surface contacts the seal surface of the filter holder, then tighten it up 1/2 to 3/4 of a turn.
   If the filter cartridge is tightened too far, the packing will be damaged and this will lead to leakage of fuel. If the filter cartridge is too loose, fuel will also leak from the packing, so always tighten to the correct amount.

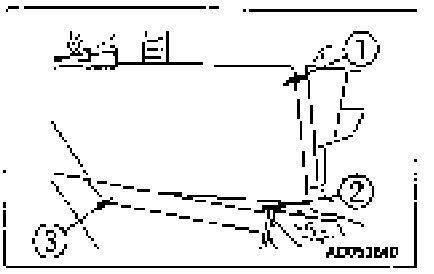
6. Loosen the knob of feed pump ② and operate it 50 - 60 times up and down. This will bleed the air.

7. Push in the knob of feed pump ② and tighten it.

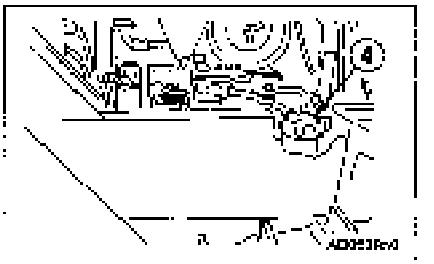
8. After replacing the filter cartridge, start the engine and check that there is no leakage of fuel from the filter seal surface. If there is any leakage of fuel, check the tightening of the filter cartridge. Whenever there is leakage of fuel, follow Steps 1 and 2 to remove the filter cartridge, then check the packing surface for damage or foreign material. If any damage or foreign material is found in the packing, replace the packing with a new part, then repeat Steps 3 – 6 to install the filter cartridge.

24.5.2 REPLACE POWER TRAIN OIL FILTER ELEMENT

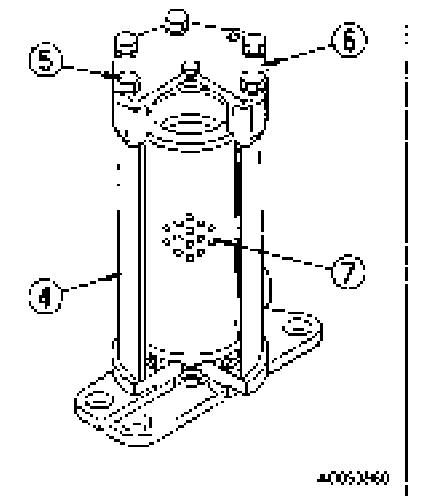
1. Open engine side cover ① at the left side of the machine, remove bolt ②, then open cover ③ to the outside using the hinge at the bottom as the fulcrum.



2. Remove mounting bolt ⑤ of filter ④, then remove cover ⑥.
3. Take out element ⑦.



4. Clean the removed parts and the inside of the case, then install a new element.
   Always use a genuine Komatsu element.
5. Close cover ③, tighten bolt ②, then close engine side cover ① on the left side of the machine.

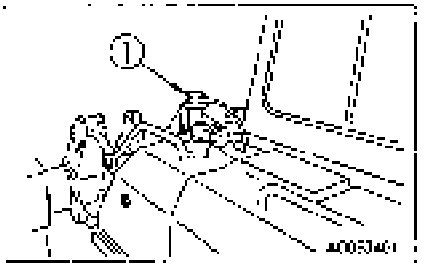


24.5.3 REPLACE HYDRAULIC TANK BREATHER ELEMENT

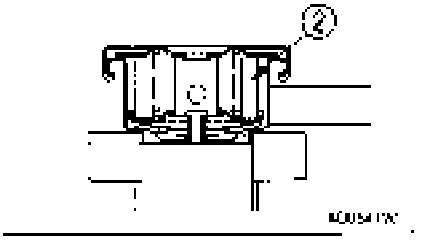
⚠ WARNING

Replace the element when the oil is cold.
When removing breather cap ①, turn it slowly to release the internal pressure before removing it.

1. Remove breather cap ① at the top of the hydraulic tank.



2. Replace element ② inside the cap.



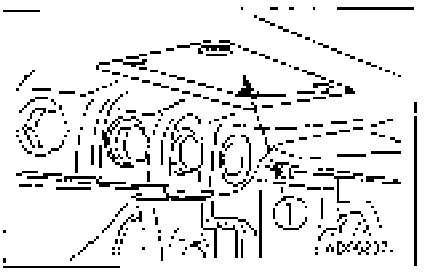
24.6 EVERY 1000 HOURS SERVICE

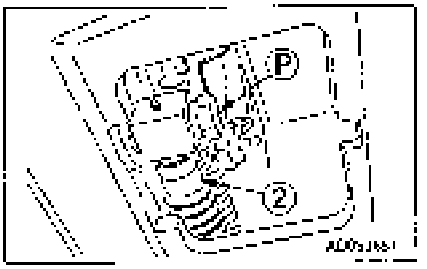
Maintenance for every 250 and 500 hours service should be carried out at the same time.

24.6.1 CHANGE OIL IN POWER TRAIN CASE

⚠ WARNING

The oil is at high temperature immediately after the machine has been operated. Wait for the oil to cool down before starting the operation.



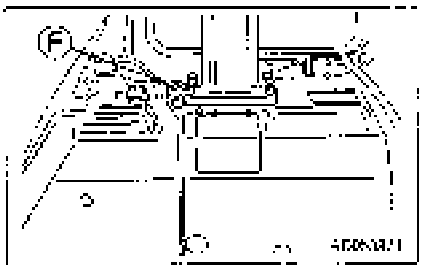


Prepare the following.
- Container to catch drained oil: Min 60 ℓ capacity
- Refill capacity: 60 ℓ (15.84 US gal, 13.2 UK gal)

1. Remove drain cover ① at the left side of the bottom face of the power train case, pull out drain hose ②, from the pickup port, then loosen drain plug Ⓟ and drain the oil.
   After draining the oil, tighten drain plug Ⓟ.
   Do not remove drain plug Ⓟ.

2. After installing, replace the element in the power train oil filter.

   For details, see "24.5 EVERY 500 HOURS SERVICE".



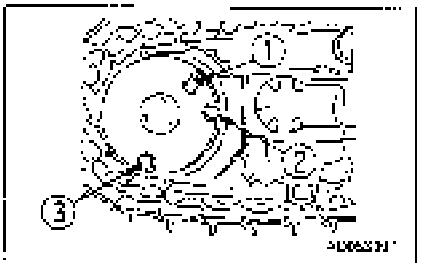
3. Refill the specified quantity of engine oil through oil filler Ⓕ.

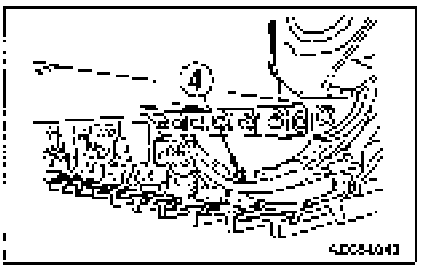
   For details of the oil to use, see "20 USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".

4. Check that the oil is at the specified level.

   For details, see "24.3 CHECK BEFORE STARTING".

24.6.2 CHANGE OIL IN FINAL DRIVE CASE





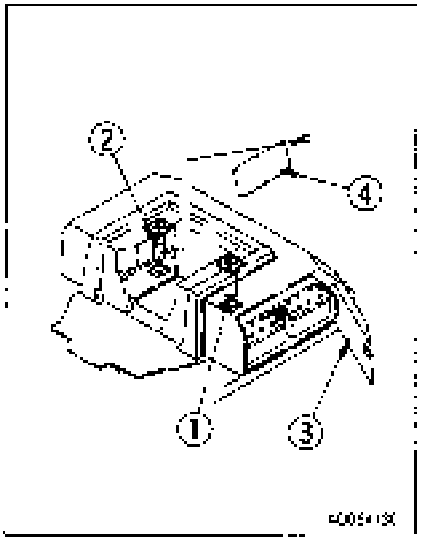
⚠ WARNING

The oil is at high temperature immediately after the machine has been operated. Wait for the oil to cool down before starting the operation.

Prepare the following.
- Container to catch drained oil: Min. 58 ℓ capacity
- Refill capacity: each 58 ℓ (15.31 US gal, 12.76 UK gal)

1. Stop the machine so that drain plug (3) is directly at the bottom.
2. Remove oil level plug (2) and oil filler plug (1), then remove drain plugs (3) and (4), and drain the oil. After draining the oil, tighten the plugs.
3. Add engine oil to the specified level through the hole in oil filler plug (1).
   For details of the oil to use, see "20. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".
4. Check that the oil is at the specified level.
   For details, see "24.4 EVERY 250 HOURS SERVICE".

24.6.3 CHECK CAB SUSPENSION CYLINDER

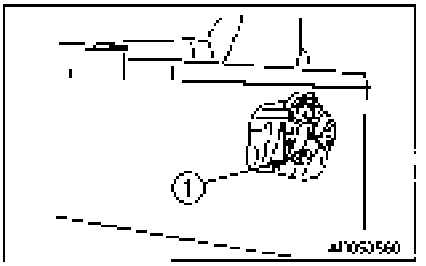


1. Left cylinder (1): Open battery cover (3).
   Right cylinder (2): Open inspection cover (4) at bottom right of operator's seat
2. Check that there is no oil leakage from the cylinder rod packing.
   If there is any oil leakage, please contact your Komatsu distributor.

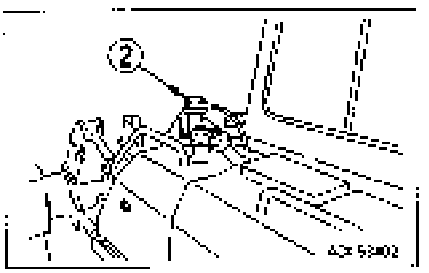
24.6.4 CLEAN BREATHER

Remove the breather and wash out dust remaining inside with diesel oil and flushing oil.

1. Power train case breather (1 place)
   Remove the inspection cover at the rear of the operator's seat. Breather ① is installed to the left side of the window (right side of chassis).

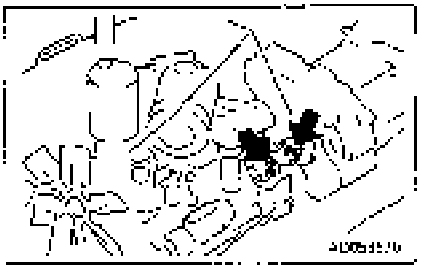


2. Hydraulic tank breather (1 place)
   Breather cap ② is installed to the top of the hydraulic tank.



24.6.5 GREASE UNIVERSAL JOINT

Apply grease to the grease fittings (2 places) shown by arrows.

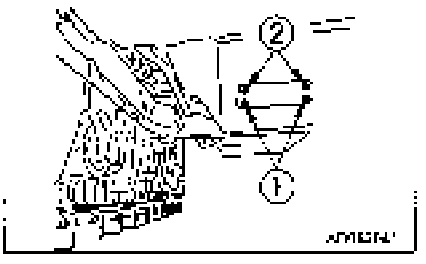


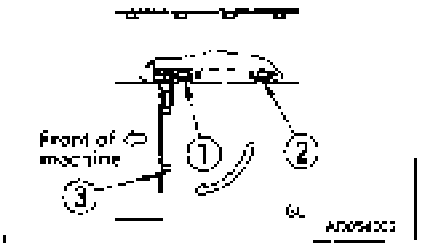
⚠ WARNING

The undercover is heavy.
Never try to open or close the cover when directly beneath it.
When removing bolts ②, carry out the work from the rear below the cover so that you can easily get out of the way.

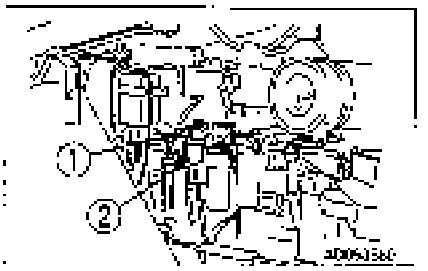
Remove inspection cover ③ of the undercover at the rear bottom of the chassis as follows.

(1) Remove 2 bolts ① at the front of the machine.
(2) Support the cover with your elbow while gradually removing 2 bolts ② at the rear of the machine.
(3) Lower the cover gradually to open it.





24.6.6 REPLACE CORROSION RESISTOR CARTRIDGE

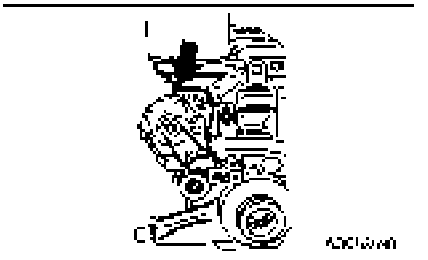


1. Screw in valve ① at the top of the corrosion resistor.
2. Using a filter wrench, turn cartridge ② to the left, and remove it.
3. Coat the seal surface of the new cartridge with engine oil, then install it to the filter holder.
4. When installing, bring the packing surface into contact with the seal surface of the filter holder, then tighten approx. 2/3 turns.
5. Open valve ①.
   Always use a genuine Komatsu cartridge

24.6.7 CHECK ALL TIGHTENING PARTS OF TURBOCHARGER

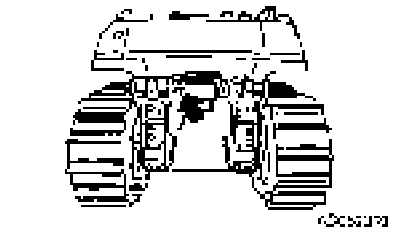
Contact your Komatsu distributor to have the tightening portions checked.

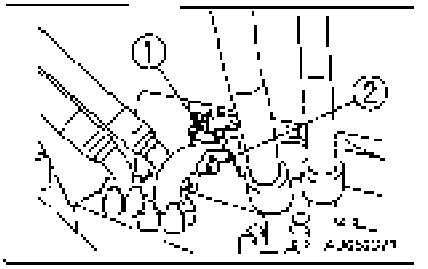
24.6.8 GREASE TENSION PULLEY ASSEMBLY (1 PLACE)



Add grease through the grease fitting until grease comes out from the relief valve.

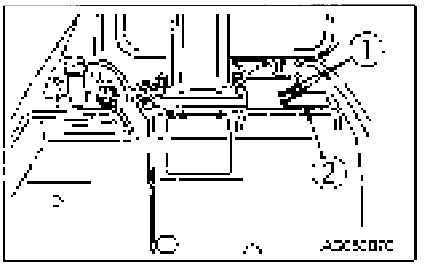
24.6.9 CHECK, CLEAN FUEL STRAINER



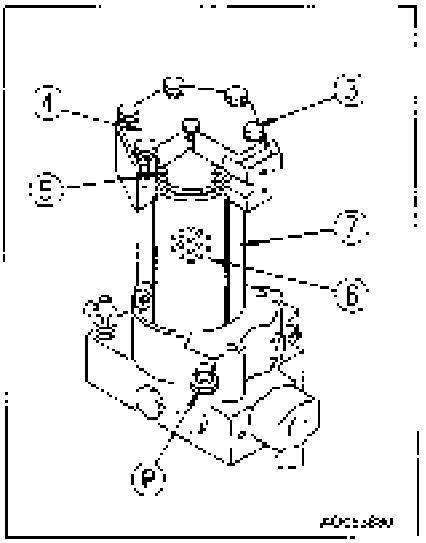


1. Tighten fuel supply valve ① at the bottom of the fuel tank, remove cap ②, and wash the strainer and strainer case.
   The strainer forms one unit with the cap.
2. After checking and cleaning, set the strainer in the case, then tighten cap ②.
3. After installing, open fuel supply valve ①.

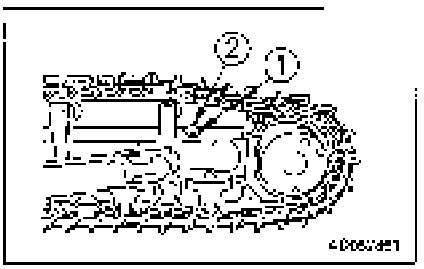
24.6.10 REPLACE CHARGE FILTER ELEMENT



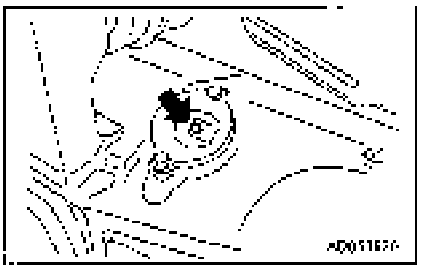
1. Loosen mounting bolt (1) and remove inspection cover (2).
2. Loosen mounting bolt (3) and remove filter cover (4).
3. Remove drain plug (P) (which can be seen from under the fender) and drain the oil.
4. Remove spring (5), then take out element (6).
5. Clean the removed parts and the inside of filter case (7), then install a new element.
   Use a genuine Komatsu element.
6. Install inspection cover (2) with bolt (1).



24.6.11 GREASE IDLER ADJUSTMENT ROD (LEFT, RIGHT: 1 PLACE EACH)



1. Remove bolt (2), then remove cover (1).
2. Add grease through the grease fitting marked by the arrow.



24.6.12 CHECK FOR LOOSE ROPS MOUNT BOLTS

Check for any loose or damaged bolts. If any bolt is loose, tighten to a torque of 976.7 ± 103.0 Nm (94.5 ± 10.5 kgm, 683.5 ± 75.5 lbft). If any bolt is damaged, replace it with a genuine Komatsu bolt.

24.7 EVERY 2000 HOURS SERVICE

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

24.7.1 CHANGE OIL IN HYDRAULIC TANK, REPLACE HYDRAULIC OIL FILTER ELEMENT

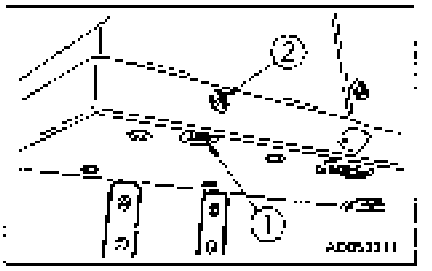
⚠ WARNING

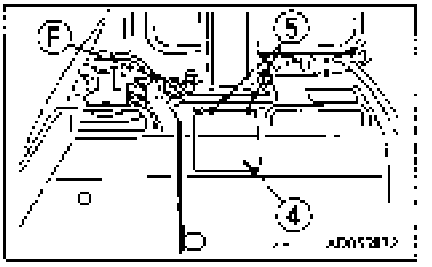
The oil is at high temperature immediately after the machine has been operated. Wait for the oil to cool down before changing the oil. When removing the oil filler cap, turn it slowly to release the internal pressure, then remove it carefully.

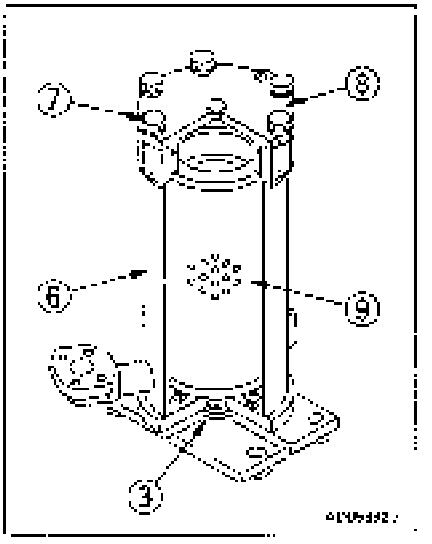
Prepare the following.
- Container to catch drained oil: Min. 97 ℓ capacity
- Refill capacity: 97 ℓ (25.61 US gal, 21.34 UK gal)

1. Lower the blade and ripper on the ground securely, stop the engine and slowly turn the cap of oil filler (F) to release the internal pressure. Then, remove the cap.
2. Remove plug (1) at the bottom of the hydraulic tank, loosen drain valve (2), then drain the oil. After draining the oil, tighten drain valve (2) and plug (1). When loosening drain valve (2), be careful not to get oil on yourself.
3. Loosen mounting bolt (5) of inspection cover (4) of the fuel tank front cover, then remove the inspection cover.
4. Remove mounting bolt (7) of hydraulic filter (6), then remove cover (8).
5. Remove drain plug (3) (which can be seen from under the fender) and drain the oil from the hydraulic filter case. When loosening drain plug (3), be careful not to get oil on yourself.
6. Remove element (9).
7. Clean the removed parts and the inside of the case, then install the new element.
   Use a genuine Komatsu element.
8. Install drain plug (3).
9. Close filter cover (8), then tighten bolt (7).
10. Add engine oil through oil filler port (F) to the specified level.

    For details of the oil to use, see "20. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".
11. After adding oil, check that the oil is at the specified level. For details, see "25.4 EVERY 250 HOURS SERVICE".

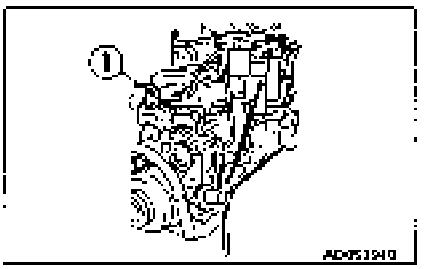






24.7.2 CHECK PLAY OF TURBOCHARGER ROTOR
Contact your Komatsu distributor to have the play checked.

24.7.3 CLEAN, CHECK TURBOCHARGER
Contact your Komatsu distributor for cleaning or inspection.

24.7.4 CLEAN ENGINE BREATHER ELEMENT


1. Wipe off all the dirt around breather ①.
2. Remove breather ①.
3. Wash the whole breather in diesel oil or flushing oil, then blow it dry with compressed air.
4. Replace the breather O-ring with a new part, coat with engine oil, and install it.

24.7.5 CHECK VIBRATION DAMPER
Check that there are no cracks or peeling in the outside surface of the rubber.

If any cracks or peeling are found, contact your Komatsu distributor to have the parts replaced.

24.7.6 CHECK ALTERNATOR, STARTING MOTOR
The brush may be worn, or the bearing may have run out of grease, so contact your Komatsu distributor for inspection or repair.

If the engine is started frequently, carry out inspection every 1000 hours.

24.7.7 CHECK ENGINE VALVE CLEARANCE, ADJUST
Contact your Komatsu distributor for inspection or adjustment.

24.7.8 CHANGE OIL IN DAMPER CASE, WASH DAMPER BREATHER

⚠ WARNING

- **The oil is at high temperature immediately after the machine has been operated. Wait for the oil to cool down before carrying out maintenance.**
- **The undercover is heavy. Never open or close the cover when directly underneath it. When removing bolt ④, carry out the operation at the rear of the point immediately under the cover so that it is always possible to escape.**

- Container to catch drained oil: Min. 1.5 ℓ capacity
- Refill capacity 1.5 ℓ (0.40 US gal, 0.33 UK gal)

1. Open engine side cover ① at the left side of the machine.

2. Remove inspection cover ③ of the undercover at the bottom rear of the chassis as follows.
   (1) Remove 2 bolts ⑤ at the front of the chassis.
   (2) Hold cover ② and gradually remove 2 bolts ④ at the rear of the chassis. (Be careful when doing this. Rain water may run out.)
   (3) Lower cover ② slowly and open it. Drain plug ⓟ can be seen at the top.

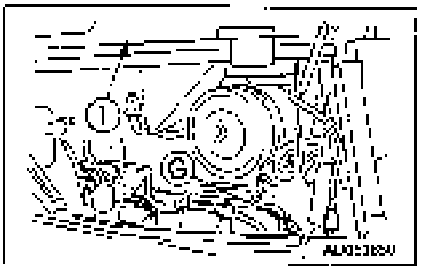
3. Remove dipstick ⑥, then remove drain plug ⓟ and drain the oil. After draining the oil, tighten drain plug ⓟ.

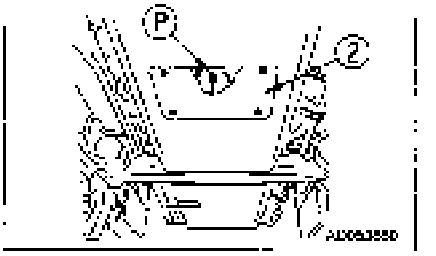
4. Add engine oil through the holder of dipstick ⑥. After adding the oil, insert dipstick ⑥.

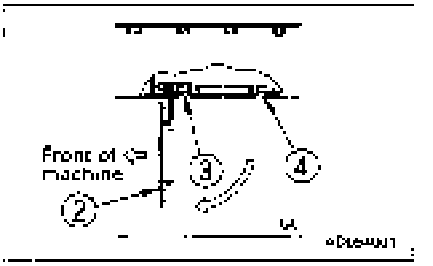
   For details of the oil to use, see "20. USE OF FUEL, COOLANT, LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".

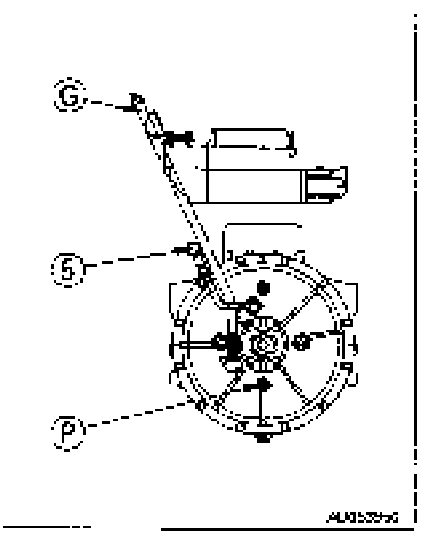
5. Remove any dirt or dust stuck to breather ⑦, then wash with clean diesel oil or flushing oil. If it cannot be cleaned completely, replace with a new part.

6. Install undercover ②, then close engine side cover ① at the left side of the machine.

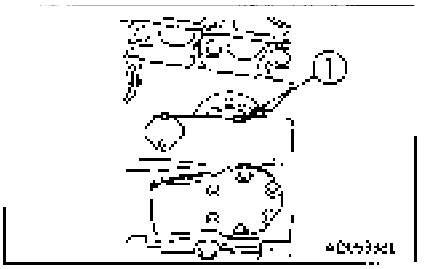


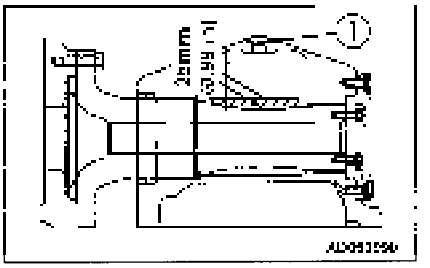






24.7.9 CHECK PIVOT BEARING OIL LEVEL, ADD OIL





1 Remove plug 1.

2. Check that the oil is at the level (25 mm (0.99 in)) in the diagram. If the oil level is low, add engine oil through the hole of plug 1.

For details of the fuel to use, see "20. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".

3. Install plug 1.

24.8 EVERY 4000 HOURS SERVICE

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

24.8.1 CHECK WATER PUMP

Check that there is oil leakage, water leakage, or clogging of the drain hole. If any abnormality is found, contact your Komatsu distributor for disassembly and repair or replacement.

24.8.2 CHECK FAN PULLEY AND TENSION PULLEY

Check the pulley for play or leakage of grease. If any abnormality is found, please contact your Komatsu distributor.

MEMO

SPECIFICATIONS

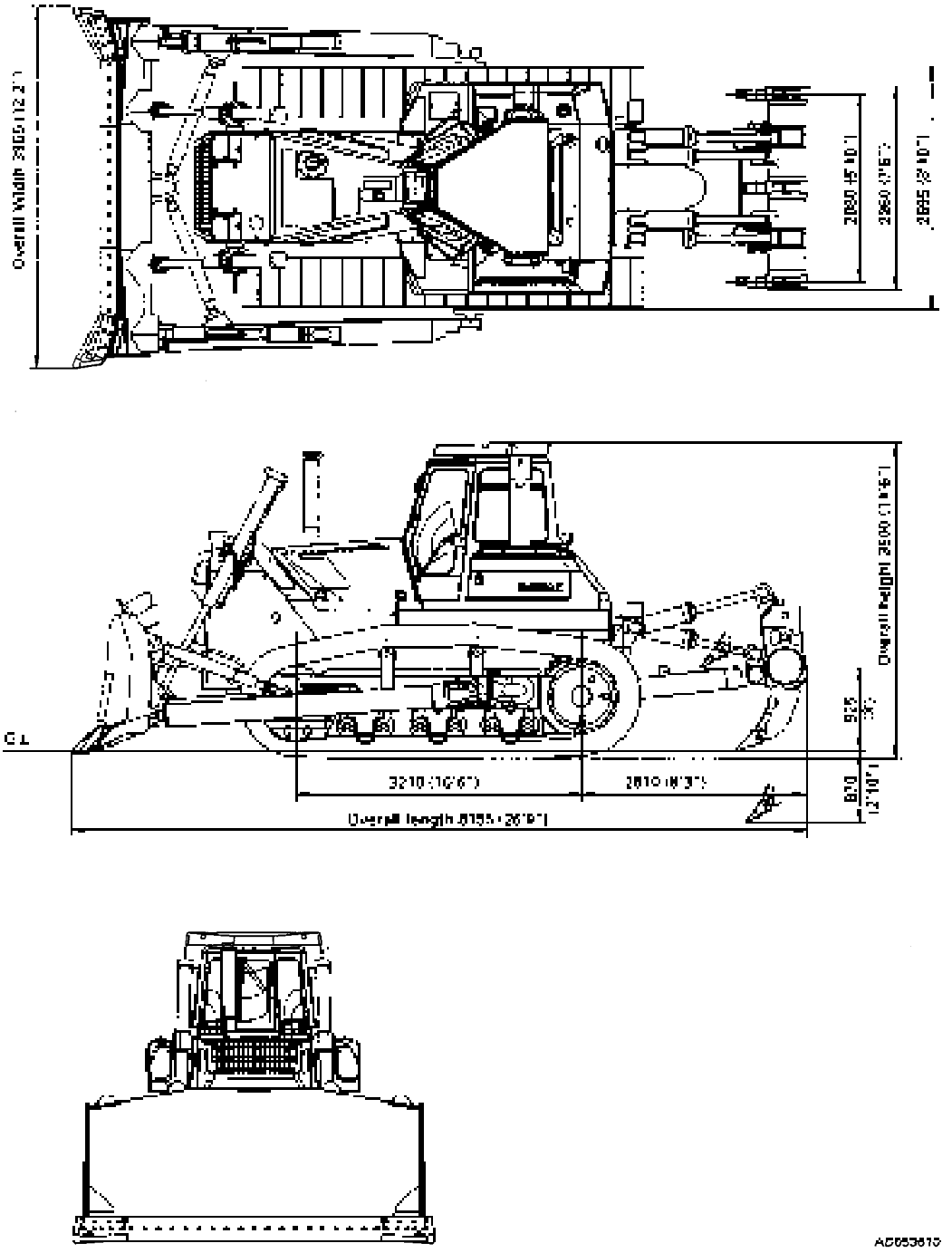
25. SPECIFICATIONS

Hydraulic tiltdozer (semi U-dozer)
With hydraulic variable multi-shank ripper, ROPS, cab, 560 mm single shoe, side cover

WEIGHT		
• Operating weight (without operator)		37930 kg (83640 lb)
PERFORMANCE		
• Travel speed	Forward	11.2 km/h (7.0 MPH)
	Reverse	13.9 km/h (8.6 MPH)
ENGINE		
• Model		Komatsu S6D140 diesel engine
• Flywheel horsepower		302 HP
• Max. torque		1432 Nm (146 kgm)/1250 rpm
• Starting motor		24 V 11 kW
• Alternator		24 V 35 A
• Battery		12 V 170 Ah x 2 pieces
TOWING		
• Towing force		287,000 N
SOUND LEVEL		
• Surrounding (sound power level L WA)	dB(A)	113
• Operator's (sound pressure level L PA) measurement procedure described in ISO 6394 or 86/622/EEC	dB(A)	85
VIBRATION LEVEL		
• Hands/Arms	The weighted root mean square acceleration Measurement standard: ISO 7096	Less than 2.5 m/S^2
• Whole body		Less than 1.25 m/S^2

Hydraulic tiltdozer (semi U-dozer)

With hydraulic variable multi-shank ripper, ROPS, cab, 560 mm single shoe, side cover



MEMO

OPTIONS, ATTACHMENTS

26. INTRODUCTION OF OPTIONAL PARTS AND ATTACHMENTS

26.1 INTRODUCTION OF OPTIONAL PARTS AND ATTACHMENTS

Name	Specifications, use	
Track shoes	Wide shoe width	610 mm (24")
	Wide shoe width	660 mm (26")
	Wide shoe width	710 mm (28")
	Heavy-duty shoe width	610 mm (24")
	Heavy-duty shoe width	660 mm (26")
Ripper point		
Reversible fan		
Cap with lock		

Various other optional parts are available, so please contact your Komatsu distributor.

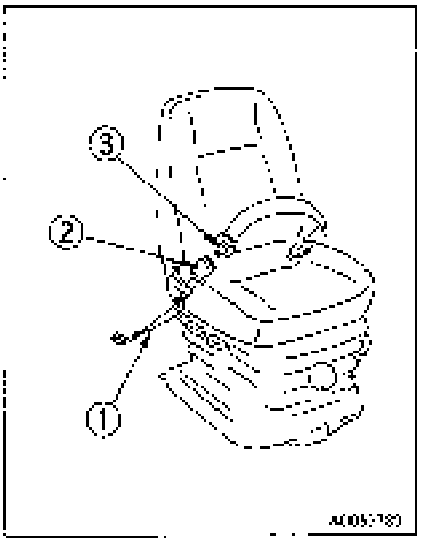
27. USING SEAT BELT

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

⚠ WARNING

- **Before fastening the seat belt, inspect the securing brackets and belt for abnormal conditions.**
  Replace any worn or damaged seat belt or the securing brackets.
- **Adjust and fasten the seat belt before operating the machine.**
- **Always use seat belt when operating the machine.**
- **Fit the seat belt across your lap without twisting.**

27.1 FASTEN THE BELT AND REMOVE IT IN THE FOLLOWING MANNER



1. Adjust the seat so that the brake pedal can be depressed all the way with the operator's back against the backrest.

2. After positioning the seat, adjust the tether belt ①. With the seat unoccupied, tense the belt slightly across the seat and install

3. Sit in the seat, hold the tongue of reel ②, and pull the belt out slowly to a length which fully covers your lap.

4. Insert the tongue into buckle ③ and push until there is a click. Pull back reel ② until the belt fits securely across your lap. In this condition, the lock is applied to prevent the belt from extending any further.
   Fit the seat belt across your lap without twisting.

REMARK

If the lock is applied before the tongue is installed into the buckle, return the belt to the reel, then carry out the operation again from the beginning.

5. Tense the belt and check that the lock is applied.

6. To remove the belt, press the red button on buckle ③. The belt will automatically wind in.

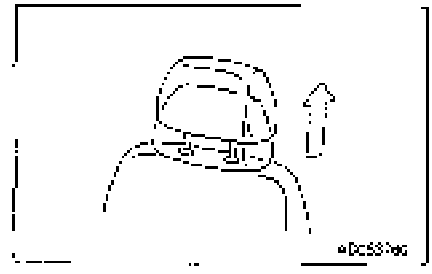
Inspect bolts and fittings on the chassis for tightness. Retighten any loose bolts to 19.6 to 29.4 Nm (2 to 3 kgm, 14.5 to 21.7 lbft) torque.

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

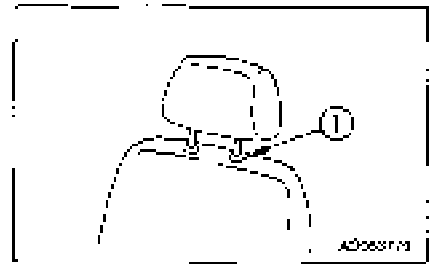
28. HANDLING HEADREST

28.1 ADJUSTING HEIGHT OF HEADREST

- To make it higher
  Hold the headrest and pull it up



- To make it lower
  Keep knob ·1· pushed down, and push the headrest down to the desired position.
  Height adjustment: 60 mm (2.36 in) 12 stages



29. HANDLING REVERSIBLE FAN

29.1 REVERSING REVERSIBLE FAN

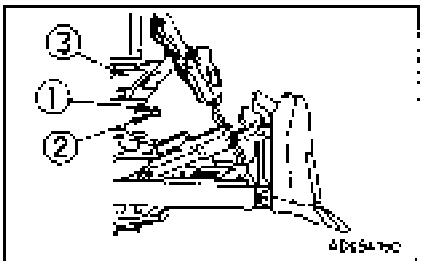
When reversing the reversible fan in cold weather, do as follows.

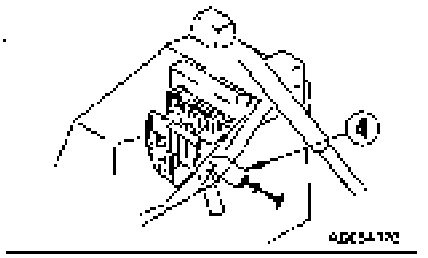
1. Loosen bolt ②, then remove cover ① on the right side of the radiator guard. A hole for inserting the tool can be seen.
2. Open engine side cover ③ on the right side of the machine so that the reversing operation can be seen.
3. Insert the tip of the tool into fan blade ④.
4. Push towards the center of the fan, and turn the handle of the tool to reverse the fan blades.
5. Reverse 6 fan blades, but rotate the fan as follows.

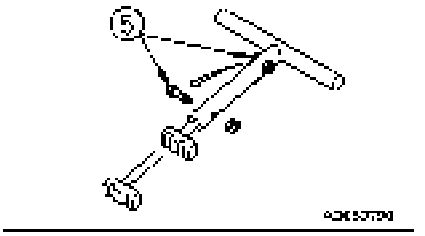
- Use the starting motor to rotate the fan.
- Loosen the nut of the spring which applies tension to the tension pulley, reduce the belt tension, and rotate by hand.
  Do not loosen the nut too far or remove it.
- After completely reversing all the fan blades, tighten the nut to its original position

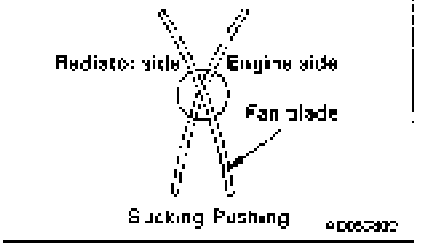
REMARK

- When inserting the tool, if the work equipment or any other part is in the way, change the position of bolt ⑤ to extend the tool when using it.
- If the fan is used in the suction direction in temperatures below –30°C, it has the effect of heating or maintaining the battery temperature.
- Use part number 175-900-3910 for the tool.









30. HANDLING CAP WITH LOCK

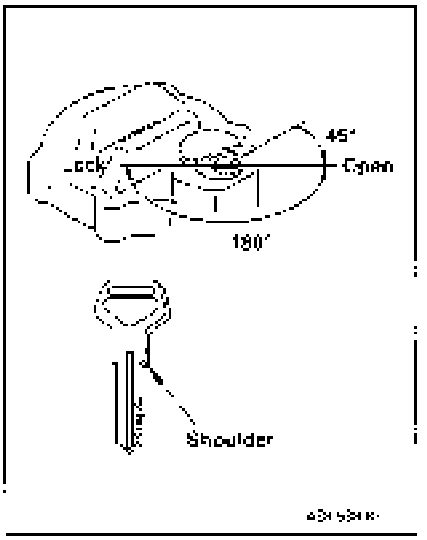
30.1 OPENING AND CLOSING LOCKABLE CAP

Lock-type caps are available for the radiator water filler cap, fuel tank filler cap, power train case oil filler cap, hydraulic tank oil filter cap, and hydraulic tank breather cap. The cap opening and closing method is as follows.

WHEN OPENING CAP

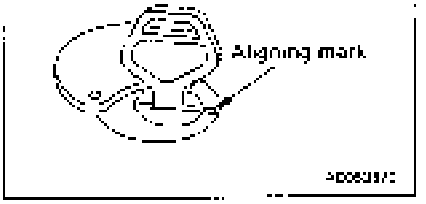
1. Insert the key. Make sure that you have inserted the key fully before turning it. If the key is turned when only partially inserted, it may break.

2. Turn the key counterclockwise to align the match mark on the cap with the rotor groove, then turn the cap slowly. When a click is heard, the lock is released, enabling the cap to be opened



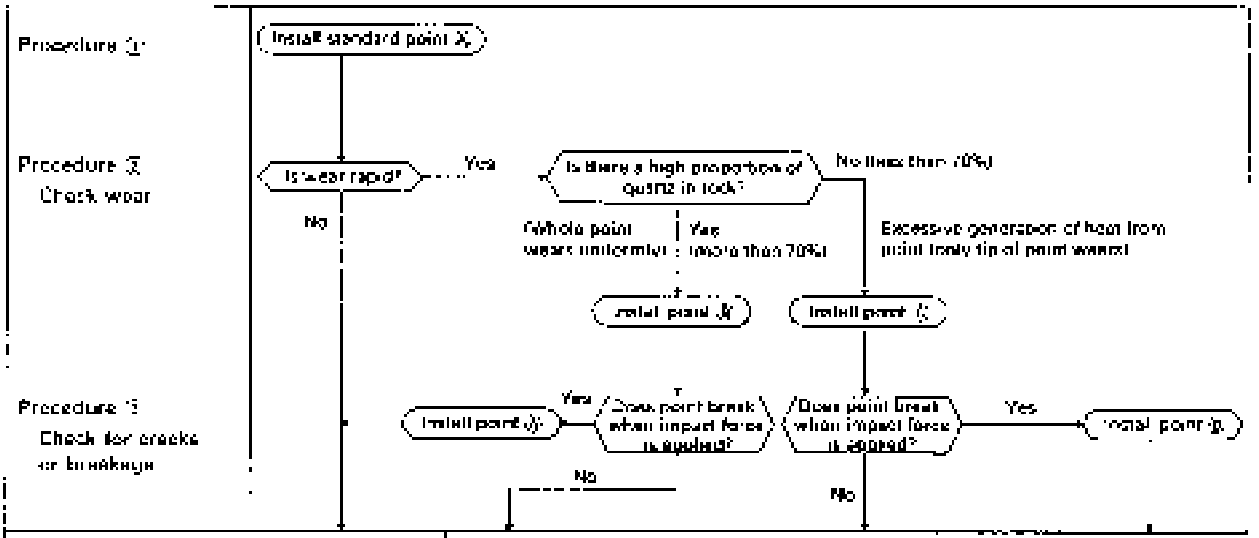
TO LOCK THE CAP

1. Turn the cap into place.
2. Turn the key clockwise and take the key out.



31. PROCEDURE FOR SELECTING RIPPER POINT

31.1 PROCEDURE FOR SELECTING RIPPER POINT



Typical rock	Hardness	Soft ↔ Hard	Soft ↔ Medium hard	Soft ↔ Medium hard ↔ Hard		
	Type of rock	General rock	Sandstone	Basalt, andesite, granite, chert		
	Features	–	• Very high proportion of quartz (70 – 95%), point wears rapidly	• Fairly high proportion of quartz (40 – 70%) • Does not form seams or layers, so there is excessive generation of heat from the point, the tip wears rapidly, and ripping is difficult		
Suitable point	Features	Point Ⓐ • Symmetrical shape • Yellow • Short (can be turned and used)	Point Ⓑ • Non-symmetrical shape • Yellow • Long	Point Ⓒ • Non-symmetrical shape • Red • Long	Point Ⓓ • Symmetrical shape • Red • Long (can be turned and used)	Point Ⓔ • Symmetrical shape • Red • Short (can be turned and used)
	Shape					
	Part No.	175-78-31250	175-78-34631	175-78-34141	175-78-31293	175-78-31232

32. GENERAL PRECAUTIONS

32.1 PRECAUTIONS RELATED TO SAFETY

If attachments or options other than those authorized by Komatsu are installed, this will not only affect the life of the machine, but will also cause problems with safety.
When installing attachments not listed in this Operation and Maintenance Manual, please contact your Komatsu distributor first.
If you do not contact Komatsu, we cannot accept any responsibility for any accident or failure.

⚠ WARNING

Precautions for removal and installation operations

- **When removing or installing attachments, obey the following precautions and take care to ensure safety during the operation.**
- **Carry out the removal and installation operations on a flat, firm ground surface.**
- **When the operation is carried out by two or more workers, determine signals and follow these during the operation.**
- **When carrying heavy objects (more than 25 kg (55 lb)), use a crane.**
- **When removing heavy parts, always support the part before removing it.**
  When lifting such heavy parts with a crane, always pay careful attention to the position of the center of gravity.
- **It is dangerous to carry out operations with the load kept suspended. Always set the load on a stand, and check that it is safe.**
- **When removing or installing attachments, make sure that they are in a stable condition and will not fall over.**
- **Never go under a load suspended from a crane.**
  Always stand in a position that is safe even if the load should fall.

NOTICE

Qualifications are required to operate a crane. Never allow the crane to be operated by an unqualified person.

For details of the removal and installation operations, please contact your Komatsu distributor.

Komatsu America International Company
440 North Fairway Drive
Vernon Hills, IL 60061-8112 U.S.A.
Attn: Technical Publications
Fax No. (847) 970-4198

PROPOSAL FOR MANUAL REVISION

FOR INTERNAL USE ONLY – No. PMR

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

MANUAL NAME:

MANUAL NO:

MACHINE MODEL:
S/N IF APPLICABLE:

PAGE NO.

PROBLEM:

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

FOR INTERNAL USE ONLY

CORRECTIVE ACTION:

PFMD1 09-696