SEAM010500

Operation & Maintenance Manual

D85A,E,P-21

BULLDOZER

SERIAL NUMBERS D85A - 35001
D85E - 35001 and up
D85P - 3001

It is our policy to improve our products whenever it is possible and practical to do so. We reserve the right to make changes or add improvements at any time without incurring any obligation to install such changes on products sold previously.

Due to this continuous program of research and development, periodic revisions may be made to this publication. It is recommended that customers contact their distributor for information on the latest revision.

October 1995

⚠ WARNING

Unsafe use of this machine may cause serious injury or death. Operators and maintenance personnel must read this manual before operating or maintaining this machine. This manual should be kept near the machine for reference and periodically reviewed by all personnel who come in contact with it.

CALIFORNIA

Proposition 65 Warning

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects and other reproductive harm.

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.**

CALIFORNIA
Proposition 65 Warning

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

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
- Smoothing
- Cutting into hard or frozen ground or ditching.

See the section "12.10 WORK POSSIBLE USING BULLDOZER" for further details.

3.2 FEATURES

- Simplification of inspection and maintenance through use of monitoring system and centralization of maintenance on one side.
- Improvement in operator comfort through use of large cab.

3.3 BREAKING IN THE MACHINE

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.

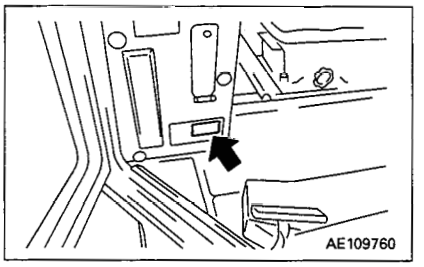
The precautions given in this manual for operating, maintenance, and safety procedures are only those that apply when this product is used for the specified purpose. If the machine is used for a purpose that is not listed in this manual, Komatsu cannot bear any responsibility for safety. All consideration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

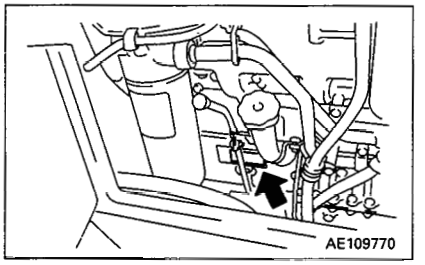
4.1 MACHINE SERIAL NO. PLATE POSITION

Under the front of the console box on the right side of the operator's seat.



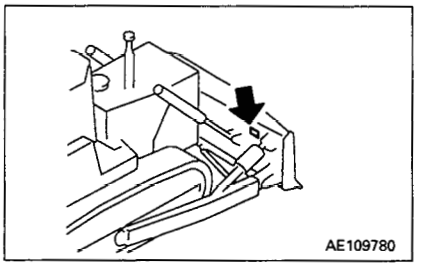
4.2 ENGINE SERIAL NO. PLATE POSITION

On the right cam follower cover when seen from the fan.



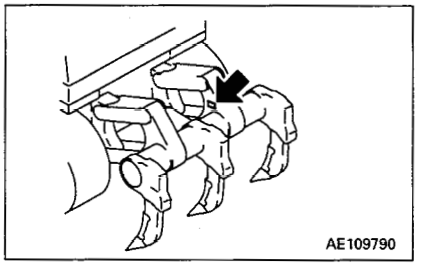
4.3 BLADE SERIAL NO. PLATE POSITION

This is located at the right side of blade back surface.



4.4 RIPPER SERIAL NO. PLATE POSITION

This is located on the center link of the ripper.



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

MEMO

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 "12.11 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.

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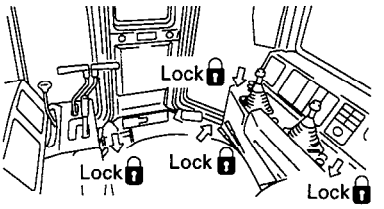
UNAUTHORIZED MODIFICATION

- 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

- ALWAYS move the SAFETY LEVER to the LOCK position before standing up from the operator's seat. If you don't, you could unintentionally hit the control levers, resulting in sudden machine movement and the possibility of damage, injury or death.
- Before leaving your machine, lower the blade to the ground, move the SAFETY LEVER to LOCK, and stop the engine.
  Machine posture → See "12.11 PARKING MACHINE".



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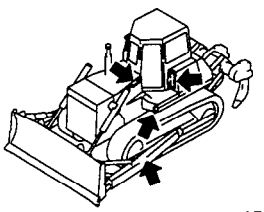
MOUNTING AND DISMOUNTING

- 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.
- When mounting or dismounting, use the points marked with arrows in the diagram below.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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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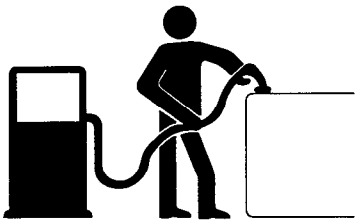

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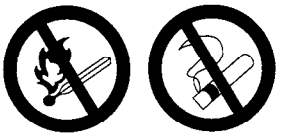

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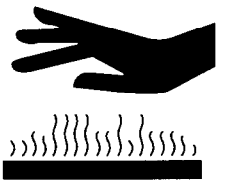
BURN HAZARD PREVENTION

- If the coolant, engine 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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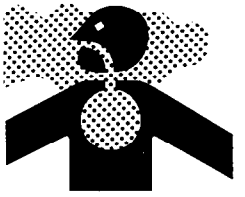
ASBESTOS DUST HAZARD PREVENTION

- 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.



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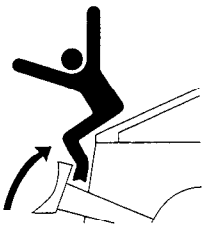
CRUSHING OR CUTTING PREVENTION

- Do not enter, or put your hand or arm or any other part of your body between movable 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.



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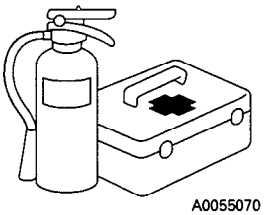
FIRE EXTINGUISHER AND FIRST AID KIT

- Be sure fire extinguishers have been provided and know how to use them.
  Equipping the fire extinguisher → See "11.10 EQUIPPING THE FIRE EXTINGUISHER".
- 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.



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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."

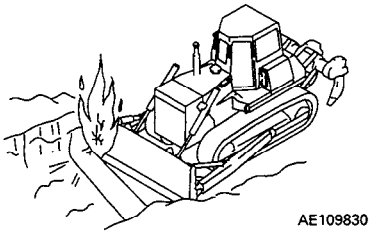
PRECAUTIONS FOR ATTACHMENTS

- 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.

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 "12.9.3 PERMISSIBLE WATER DEPTH".



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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.

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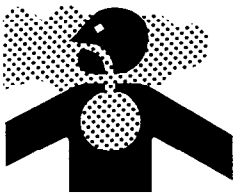
IN OPERATOR'S CAB

- 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.
- 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.



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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.

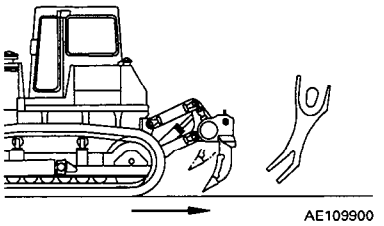
7.2 OPERATING MACHINE

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.

PRECAUTIONS WHEN MOVING FORWARD OR BACKWARD

- When operating in areas that may be hazardous or have poor visibility, designate a person to direct worksite traffic.
- Be sure no one is around machine, particularly behind machine.
- Before starting machine motion, sound the horn to alert people.
- There is a blind spot behind the machine. Make sure that nobody is present behind it before driving the machine backward.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TRAVELING

- If any control lever must be operated during travel, avoid rapid operation.
- When traveling on uneven ground, slow down the machine and avoid quick movement of the steering lever.
- Avoid riding over obstacles as much as possible. If you must ride over obstacles, keep the work equipment close to the ground surface, and travel at a very slow speed. Riding over large obstacles could cause the machine to tip over on its side.

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
- When traveling downhill with the machine being pushed by its own weight, the machine may steer in the opposite direction, so be careful when steering.
  Reverse steering when traveling downhill → See "12.7.2 TURNING WHILE DESCENDING A SLOPE".

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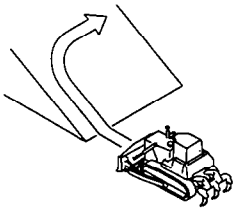

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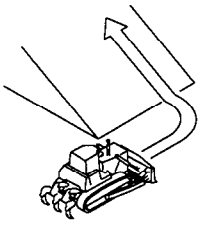

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VISIBILITY

- 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

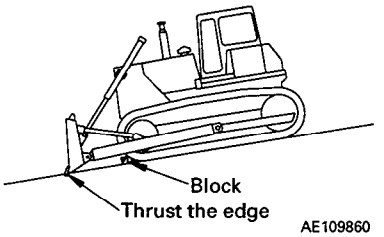
- Snow-covered and frozen ground may allow the machine to slip sideways, even if the grade is not steep. Slow down the machine when traveling on such ground. Avoid rapid starts, stops, and steering.
- In snow removal work, pay special attention to the edge of the road and to objects under the snow.

WORKING ON LOOSE GROUND

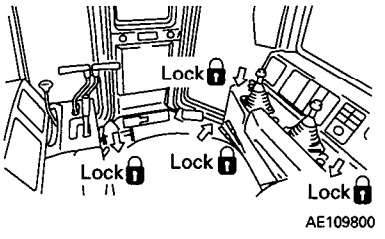
- Avoid operating your machine too close to the edge of cliffs, overhangs, and deep ditches. If these areas collapse, your machine could fall or tip over and result in serious injury or death. Remember that the soil after heavy rain or blasting is weakened in these areas.
- Earth laid on the ground and 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 "12.11 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 "12.11 PARKING MACHINE".
  Locks → See "12.15 LOCKING".



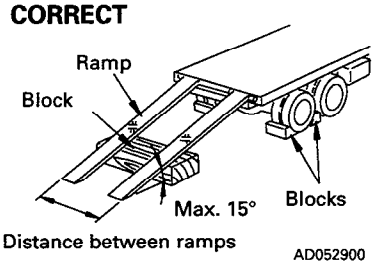
7.3 TRANSPORTATION

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



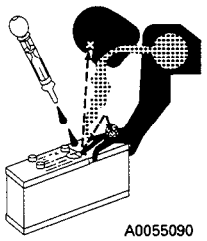
SHIPPING

- 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.
- When removing or installing, check which is the positive (+) terminal and negative (–) terminal.
- Tighten the battery cap.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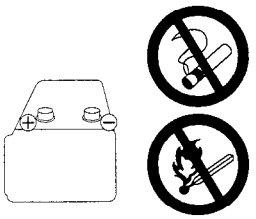
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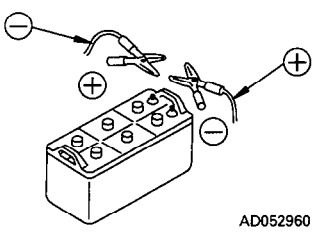
A0055110

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 "16.2 IF BATTERY IS DISCHARGED".

INCORRECT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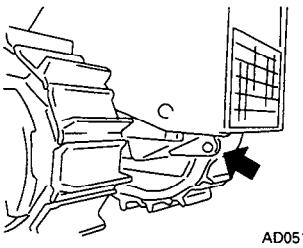
A0055110

7.5 TOWING

WHEN TOWING THE MACHINE, FIX THE WIRE TO THE REAR HITCH PIN OR RIPPER

- 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 release.
- 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.



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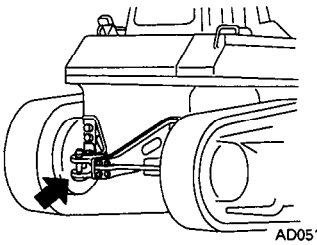
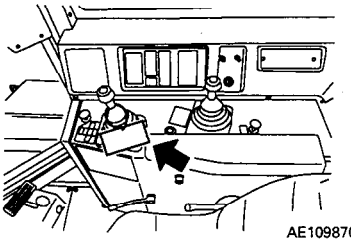


AD051720

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. (Part No. 09963-03000)



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".

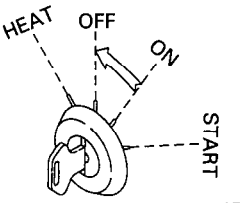
PERIODIC REPLACEMENT OF SAFETY CRITICAL PARTS

- 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.



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8.2 DURING MAINTENANCE

PERSONNEL

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

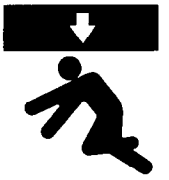
ATTACHMENTS

- 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.

A0055130

WORK UNDER THE MACHINE

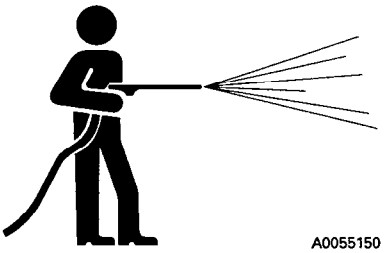
- Always lower all movable work equipment to the ground or to their lowest position before performing service or repairs under the machine.
- Always block the tracks of the machine securely.
- Never work under the machine if the machine is poorly supported.



A0055140

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, connectors, or the inside of the operator's compartment.

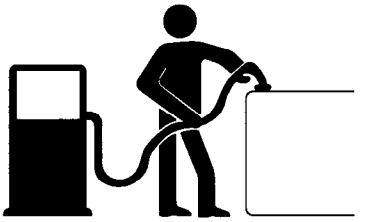


A0055150

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 fillers securely.
- Never use fuel for washing any parts.
- Always add fuel and oil in a well-ventilated place.

A0055020



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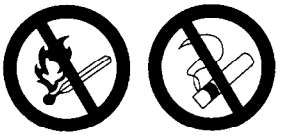
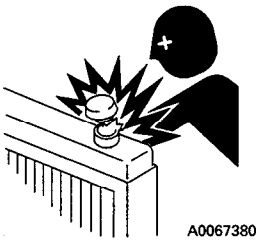


A0055040

RADIATOR WATER LEVEL

- If it is necessary to add water to the radiator, stop the engine and allow the engine and radiator to cool down before adding the water.
- If removing the radiator cap, turn it slowly to release the internal pressure.



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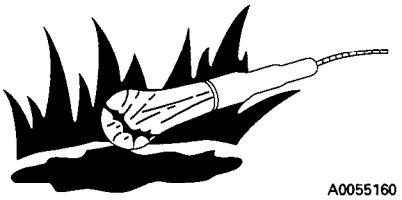
USE OF LIGHTING

- 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.



A0055160

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.

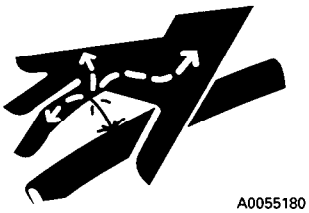
A0055170

HANDLING HIGH-PRESSURE HOSES

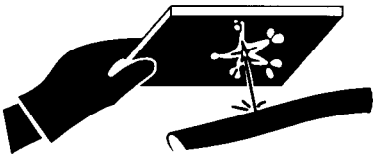
- Do not bend high-pressure hoses or hit them with hard objects. Do not use any bent or cracked piping, tubes or hoses. They may burst during use.
- Always repair any loose or broken fuel hoses or oil hoses. If fuel or oil leaks, it may cause a fire.
- Avoid torching, soldering, or welding on pipes, 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.



A0055180



A0055190

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 → See "24.3 CHECK BEFORE STARTING".

Checking oil level in hydraulic tank, final drive case → See "24.5 PERIODIC MAINTENANCE".

Changing oil, replacing filters → See "24.5 – 8 PERIODIC MAINTENANCE".

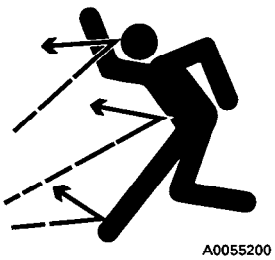
A0055050

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".



A0055200

ROTATING FAN AND BELT

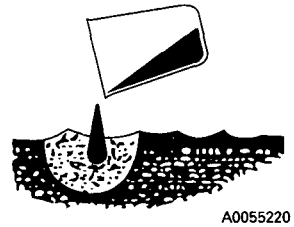
- Keep away from rotating parts and be careful not to let anything get caught in them.
- If your body or tools touch the fan blades or fan belt, they may be cut off or sent flying, so never touch any rotating parts.

A0055210

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



A0055220

9. POSITION FOR ATTACHING SAFETY LABELS

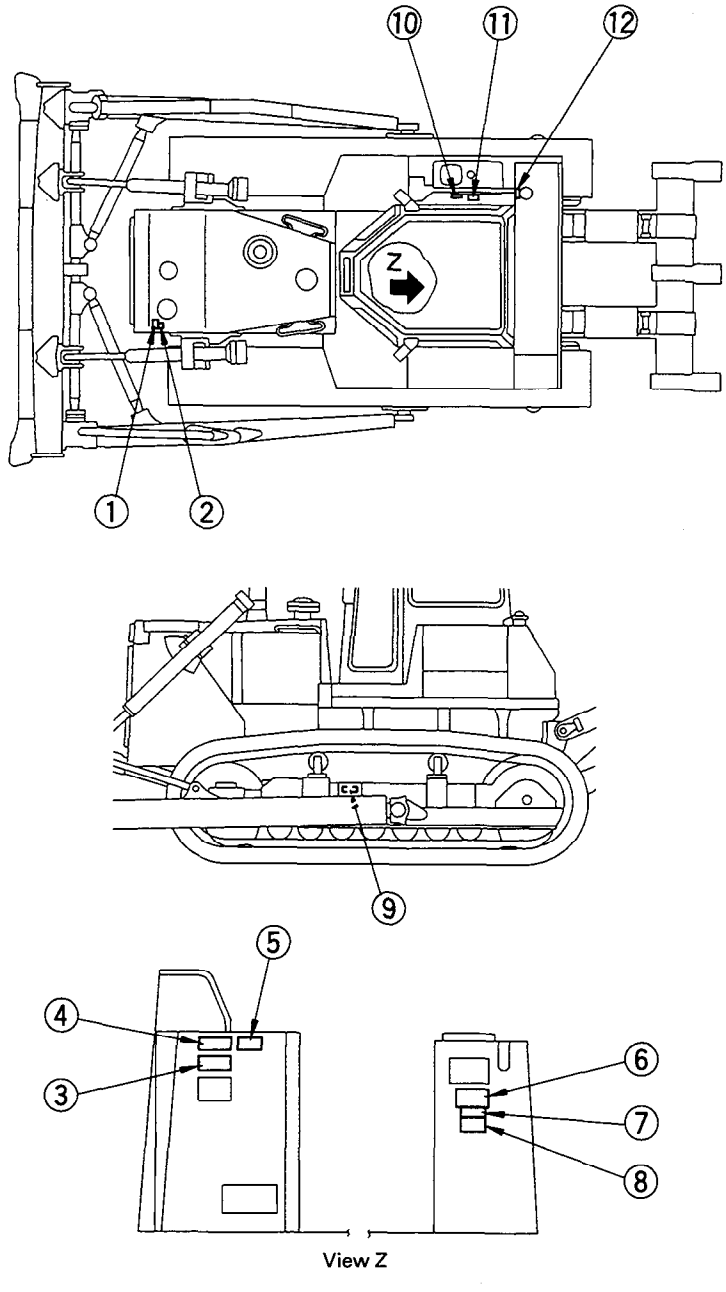
Always keep these labels clean. If they are lost or damage, attaching them again or replace them with a new label.

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. Cautions for coolant level
(09650-30101)

CAUTION
- BEFORE DAILY OPERATION, CHECK TO SEE IF WATER LEVEL IS HIGH ENOUGH TO STEEP STRAINER IN FILLER OPENING.
- AFTER DRAINING AND REFILLING RADIATOR AND BEFORE DRIVING THE MACHINE, BE SURE TO IDLE THE ENGINE FOR 5 – 10 MINUTES TO MAKE WATER FILL IN COOLING SYSTEM.
  AT THE END OF IDLING, CHECK TO SEE IF WATER LEVEL IS HIGH ENOUGH TO STEEP STRAINER IN FILLER OPENING.
- NEVER ATTEMPT TO REMOVE STRAINER FROM RADIATOR FILLER WHEN POURING IN WATER OR ANTI-FREEZE.

09650-30101

2. Warning for checking radiator
(09668-03000)

WARNING

DO NOT LOOSEN CAP WHEN WATER TEMPERATURE IS HIGH. IF LOOSENED, BOILING WATER MAY GUSH OUT BECAUSE OF HIGH INTERNAL PRESSURE.

09668-03000

3. Cautions for stopping engine
(09649-03001)

CAUTION
- TO SHUT-DOWN ENGINE OPERATION IDLE FOR 5 MINUTES THEN PLACE FUEL CONTROL LEVER IN "OFF" POSITION AND STOP THE ENGINE.

09649-03001

4. Cautions for preventing machine fire
(09666-03000)

CAUTION

CHECK REGULARLY ENGINE AND AREAS LIABLE TO BE A SOURCE OF FIRE.
REMOVE ACCUMULATED INFLAMMABLES SUCH AS LEAVES, TWIGS, ETC.
THESE MAY OBSTRUCT CONTROL AND CAUSE FIRE.

09666-03000

5. Cautions for inspection and maintenance
(09173-03000)

CAUTION

WHEN CARRYING OUT MAINTENANCE,
1. PARK THE MACHINE ON LEVEL GROUND.
2. LOWER WORK EQUIPMENT TO THE GROUND AND LOCK THE LEVER.
3. DO NOT GO UNDER MACHINE WHEN IT IS RAISED BY THE WORK EQUIPMENT.

09173-03000

6. Warnings for starting engine and parking machine
(09654-03000)

WARNING

OBSERVE THE FOLLOWING CAUTIONS WHEN STARTING THE MACHINE OR WHEN YOU LEAVE OPERATOR'S SEAT AFTER PARKING THE MACHINE:
1. SET THE GEARSHIFT LEVER INTO NEUTRAL POSITION AND LOCK IT WITH THE SAFETY LEVER WHEN APPLICABLE.
2. LOCK THE BRAKES.
3. LOWER THE WORKING EQUIPMENT TO THE GROUND AND LOCK THE LEVER.

09654-03000

7. Cautions for checking engine room
(09667-03000)

CAUTION

WHILE ENGINE IS RUNNING:
1. DO NOT OPEN COVER.
2. KEEP AWAY FROM FAN AND FAN-BELT.

09667-03000

8. Cautions before operating machine
(09651-03000)

CAUTION

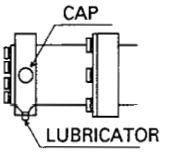
BEFORE OPERATING MACHINE, READ OPERATION MANUAL CAREFULLY.

09651-03000

9. Warnings for adjusting track tension
(09657-03000)

WARNING

1. TO INCREASE TRACK TENSION, PUMP IN GREASE THROUGH LUBRICATOR.
2. TO SLACKEN IT, RELEASE GREASE BY ROTATING CAP ONE TURN. (FOR TRACK ADJUSTMENT PROCEDURE, READ OPERATION AND MAINTENANCE MANUAL.)
3. DO NOT LOOSEN CAP MORE THAN ONE FULL TURN. ALSO BE CAREFUL NOT TO LOOSEN ANY OTHER PARTS THAN CAP. SINCE THE GREASE IS UNDER HIGH PRESSURE EXCESS LOOSENING IS HIGHLY DANGEROUS.
4. RETIGHTEN CAP SECURELY AFTER ADJUSTMENT.



09657-03000

10. Cautions for replacing hydraulic oil filter element
(09655-30120)

CAUTION

- AFTER THE FIRST 250 OPERATING HOURS, AND THEREAFTER EVERY 1000 OPERATING HOURS, RENEW THE OIL IN THE HYDRAULIC TANK AND THE ELEMENT IN THIS FILTER. (SEE YOUR OPERATION AND MAINTENANCE MANUAL FOR DETAILS.)

WHEN RENEWING THE ELEMENT:
- REST THE WORK ATTACHMENT ON THE GROUND AND STOP THE ENGINE.

09655-30120

11. Cautions for opening cap of hydraulic tank
(09653-03000)

CAUTION

1. ALWAYS STOP ENGINE WHEN REMOVING CAP.
2. DO NOT LOOSEN CAP WHEN OIL TEMPERATURE IS HIGH. IF LOOSENED, OIL MAY GUSH OUT.
3. SLOWLY OPEN HYDRAULIC OIL TANK CAP AND RELEASE INTERNAL PRESSURE COMPLETELY.
4. DO NOT OPEN DRAIN PLUG WHEN OIL TEMPERATURE IS HIGH.

09653-03000

12. Cautions for washing fuel strainer
(09656-30080)

CAUTION

- EVERY 250 OPERATING HOURS, REMOVE AND CLEAN THE STRAINER. (SEE YOUR OPERATION AND MAINTENANCE MANUAL FOR DETAILS.)

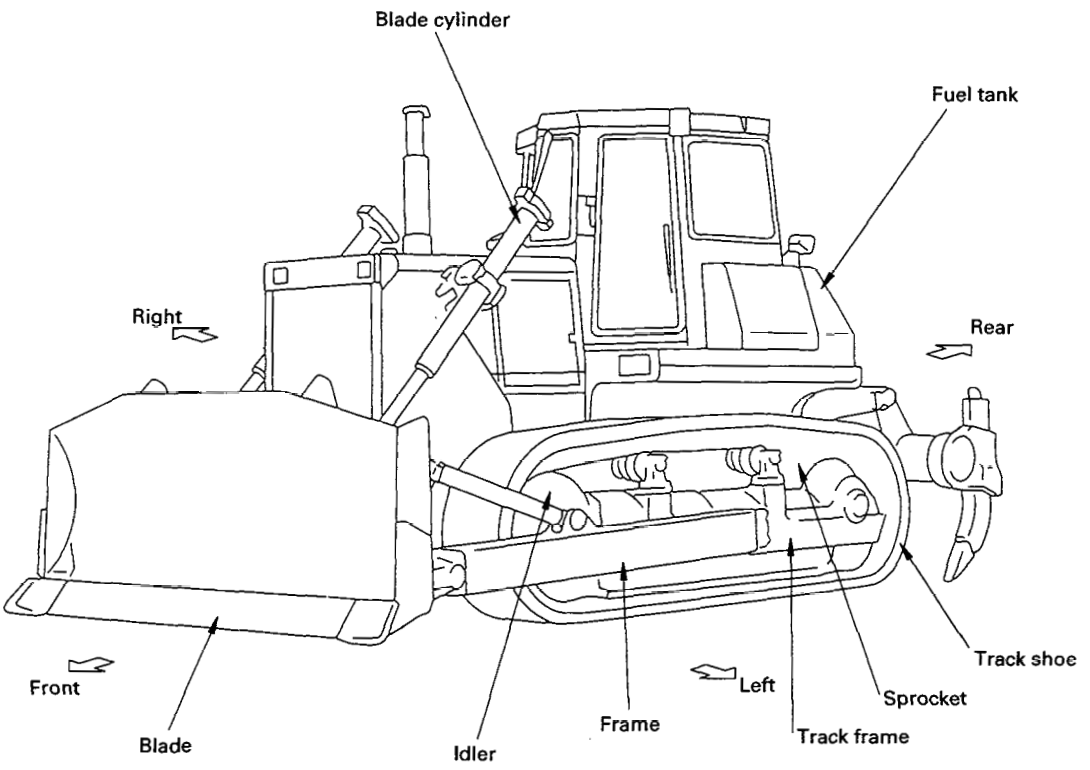
09656-30080

OPERATION

10. GENERAL VIEW

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.



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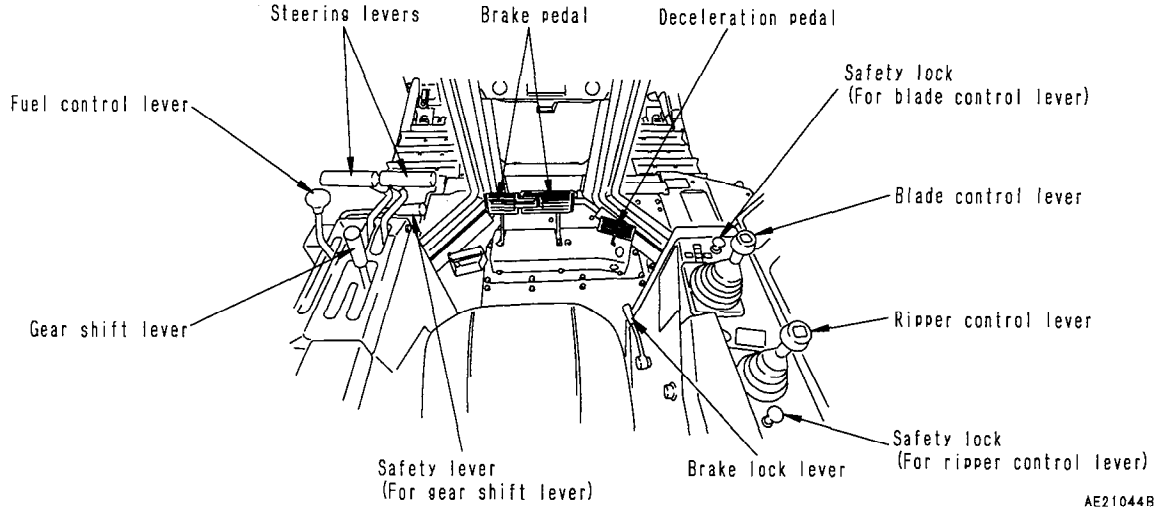
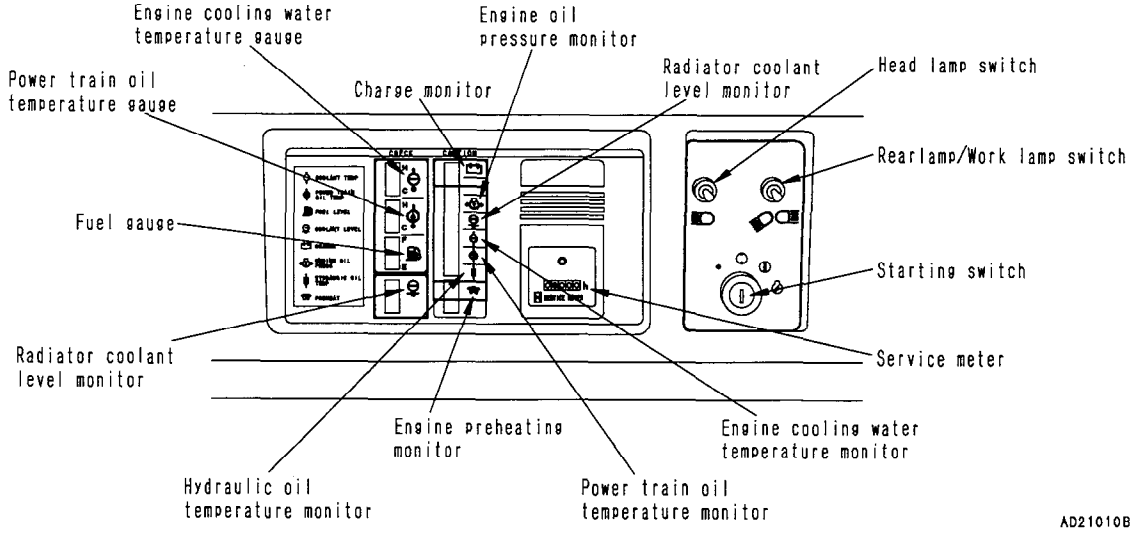
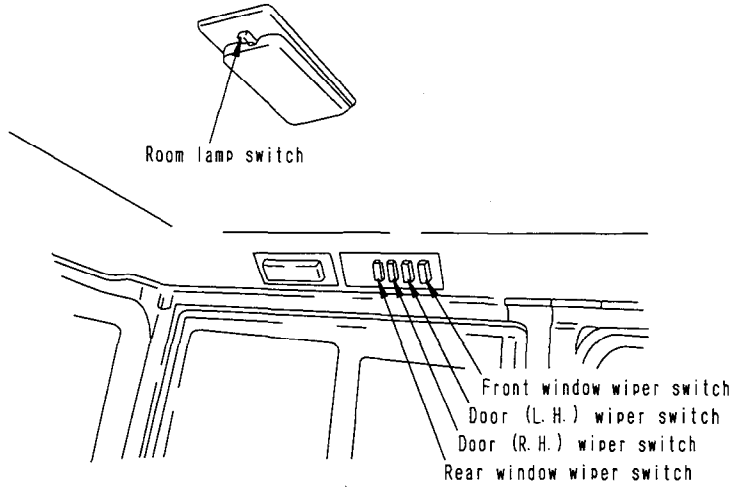
10.2 GENERAL VIEW OF CONTROLS AND GAUGES





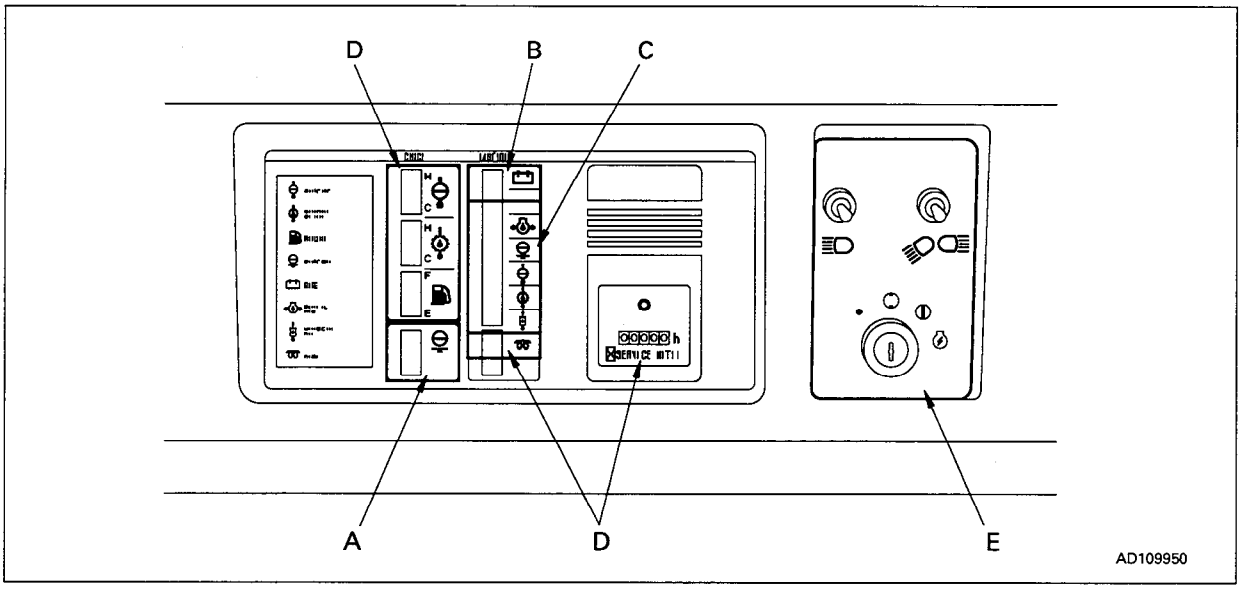


11. EXPLANATION OF COMPONENTS

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.

11.1 MONITOR PANEL



Ⓐ **CHECK MONITOR GROUP (11.1.1)**
(Check items before starting)

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

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

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

NOTICE

When carrying out checks before starting, do not simply rely on the monitor. Always refer to the periodic maintenance items or "12. OPERATION" to carry out the checks.

Ⓑ CAUTION MONITOR GROUP (11.1.2)
(Caution items)

⚠ WARNING

If any monitor lamp flashes, repair it immediately.

If the abnormality occurs while the engine is running, the appropriate monitor lamp will flash to indicate the abnormality.

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

Ⓒ CAUTION MONITOR GROUP (11.1.3)
(Emergency caution items)

⚠ WARNING

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

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

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

Ⓓ METER GROUP (11.1.4)
This group consists of engine water temperature gauge, power train oil temperature gauge, fuel gauge and service meter.

Ⓔ SWITCH GROUP (11.1.5)
This group consists of starting switch and lamp switches.

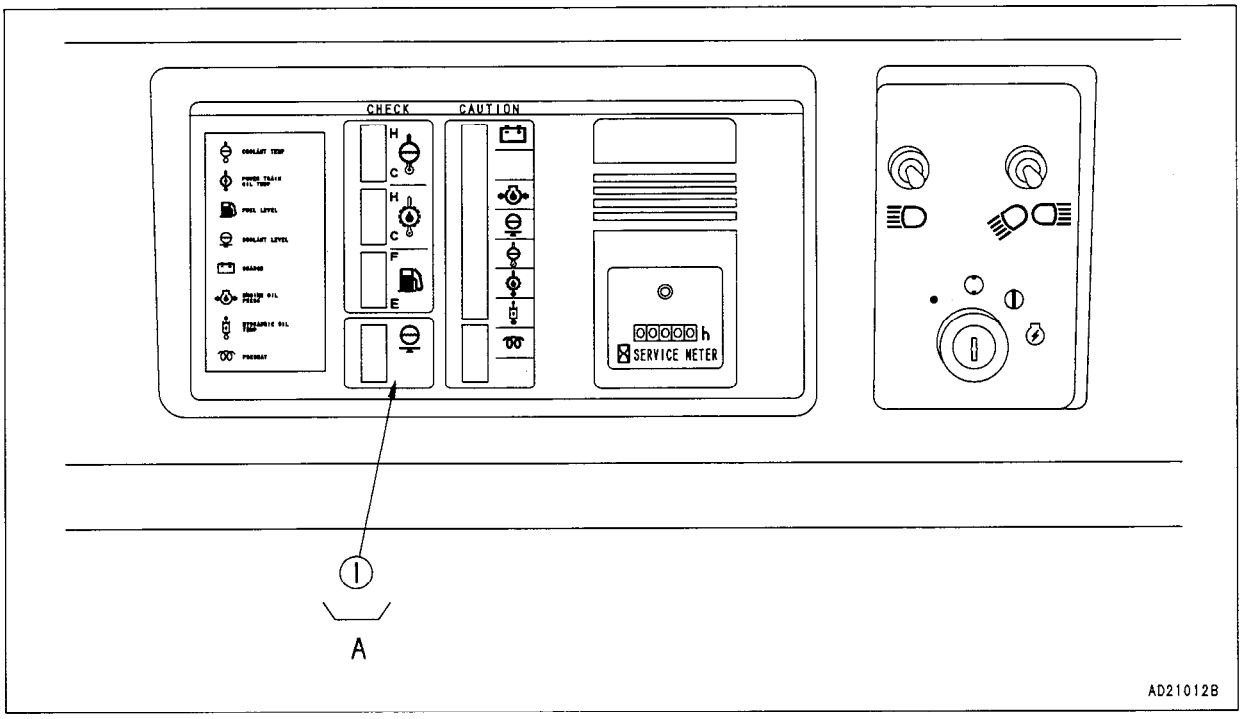
11.1.1 A: CHECK MONITOR GROUP (Check items before starting)

NOTICE

When carrying out checks before starting, do not simply rely on the monitor. Always refer to the periodic maintenance items or "12. OPERATION" to carry out the checks.

Park the machine on level ground and check the monitor lamps.

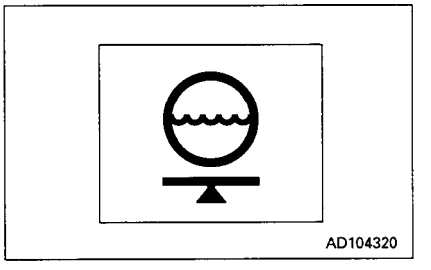
Confirm that these monitor lamps light for about 3 seconds after the starting switch is turned to ON. If any monitor lamp does not light, ask your Komatsu distributor to inspect it.



1. RADIATOR COOLANT LEVEL MONITOR

This monitor indicates a low radiator coolant level.

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



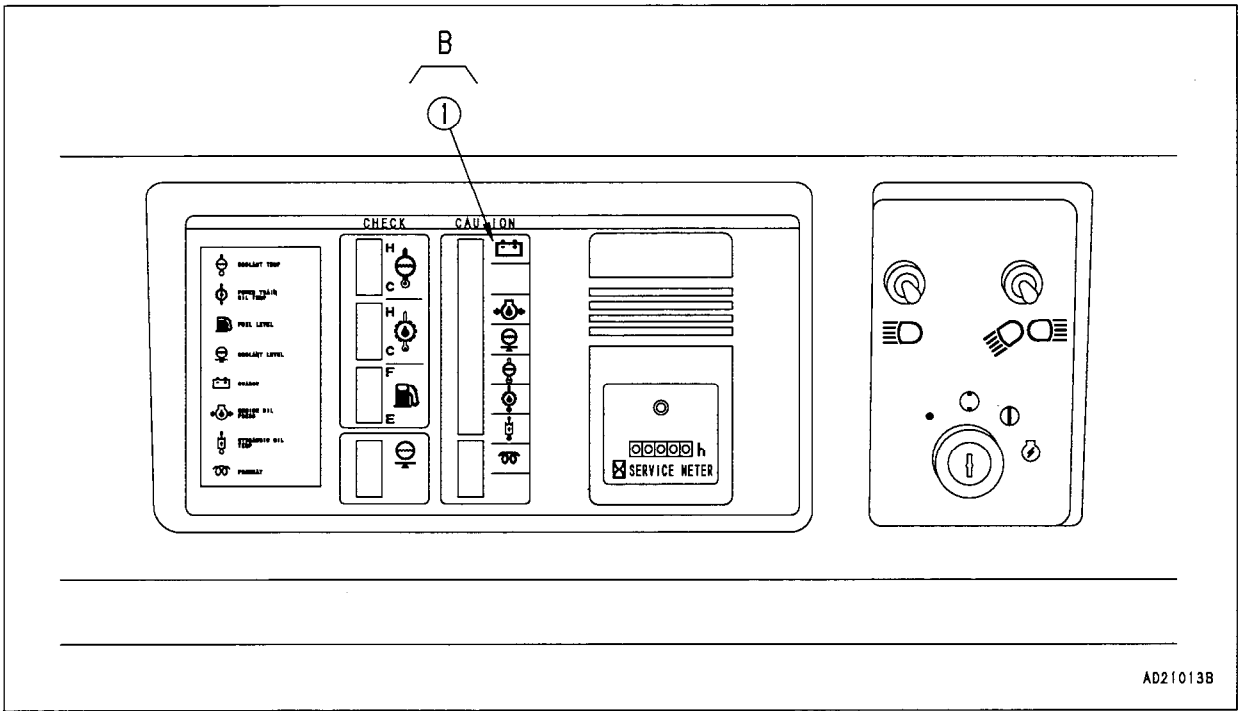
11.1.2 B: CAUTION MONITOR GROUP (Caution items)

⚠ WARNING

If this monitor lamp flashes, repair it immediately.

NOTICE

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

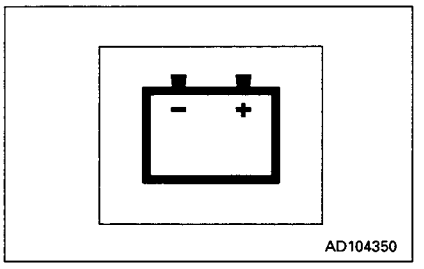


1. CHARGE MONITOR

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

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

If the monitor lamp flashes, stop the engine and check the V-belt tension. If any abnormality is found, see "16. TROUBLESHOOTING."



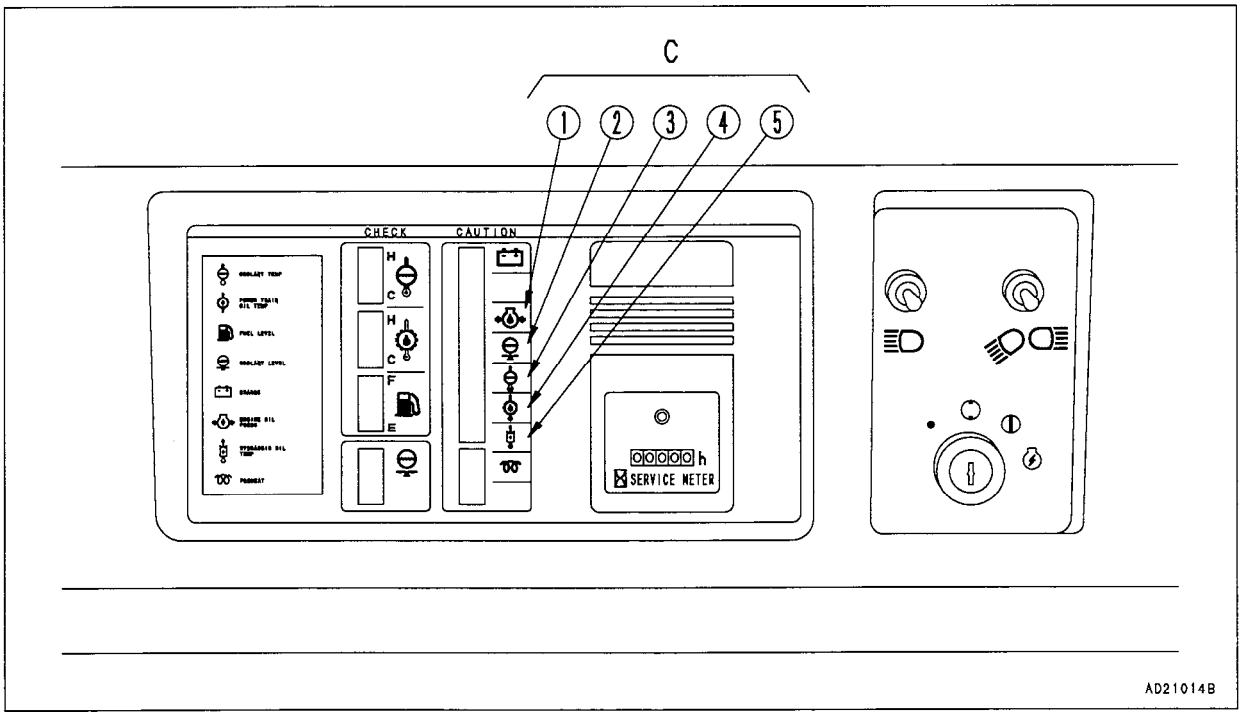
11.1.3 C: CAUTION MONITOR GROUP (Emergency caution items)

⚠ WARNING

If any monitor lamp flashes, stop the engine or run it at a low idling speed, and repair it immediately.

NOTICE

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



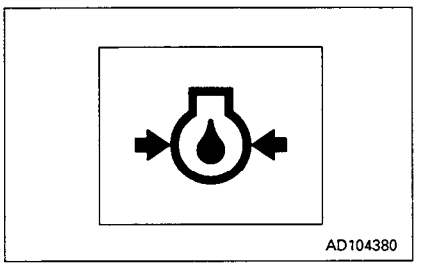
1. ENGINE OIL PRESSURE MONITOR

This monitor warns that the engine lubricating oil pressure has dropped. When the starting switch is turned ON (I), 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.

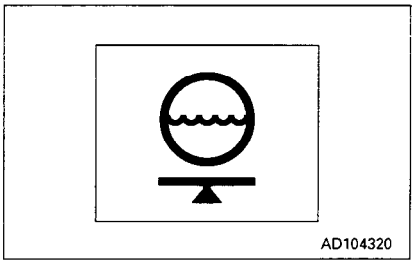
Immediately stop the engine and look for the cause. For details, see "16. TROUBLESHOOTING".



2. RADIATOR COOLANT LEVEL MONITOR

This monitor indicates a low radiator coolant level.

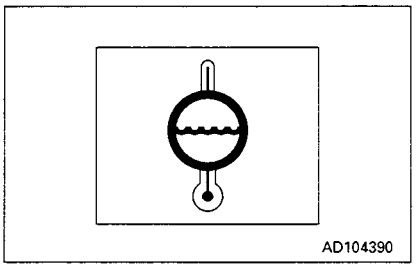
If the monitor lamp flashes, stop the engine, check the coolant level and add water as required.


AD104320

3. ENGINE COOLING WATER TEMPERATURE MONITOR

This monitor indicates a rise in the cooling water temperature.

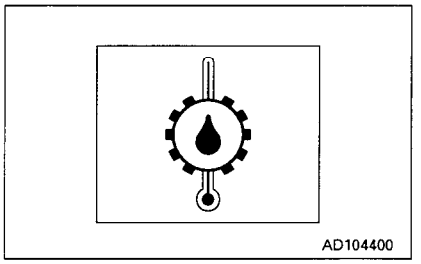
When the monitor lamp flashes, stop the machine and run the engine at the low idling speed until the green range of the engine water temperature gauge lights.


AD104390

4. POWER TRAIN OIL TEMPERATURE MONITOR

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

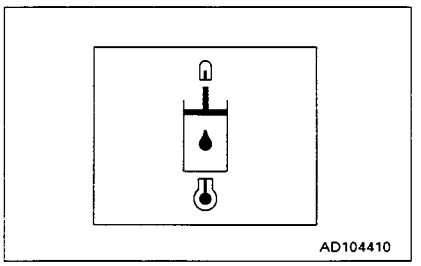
When the monitor lamp flashes, stop the machine and run the engine at the low idling speed until the green range of the power train oil temperature gauge lights.


AD104400

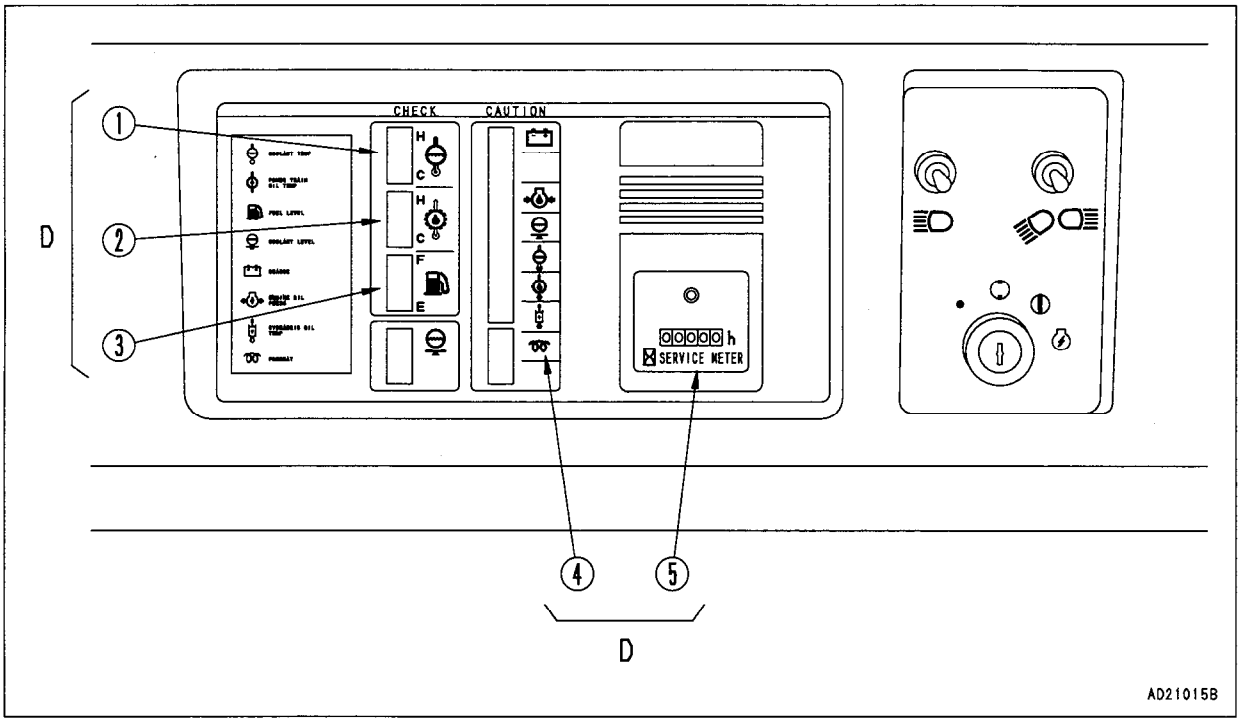
5. HYDRAULIC OIL TEMPERATURE MONITOR

This monitor indicates a rise in the hydraulic oil temperature.

When the monitor lamp flashes, stop the machine and run the engine at the low idling speed until oil temperature falls.


AD104410

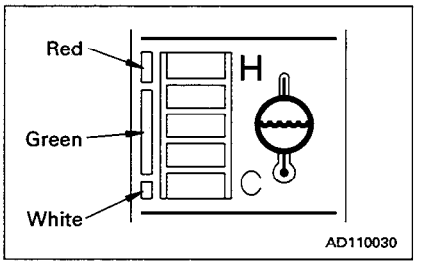
11.1.4 D: METER GROUP



1. ENGINE COOLING WATER TEMPERATURE GAUGE

This gauge indicates the temperature of the cooling water. If the temperature is normal during operation, the green range will light.

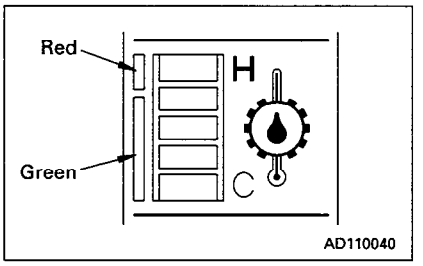
If the red range lights up during operation, the alarm buzzer will sound and the engine water temperature monitor lamp will flash at the same time. If this occurs, stop the machine and run the engine at a low idling speed until the green range lights.



2. POWER TRAIN OIL TEMPERATURE GAUGE

This gauge indicates the oil temperature of the torque converter outlet. If the temperature is normal during operation, the green range will light.

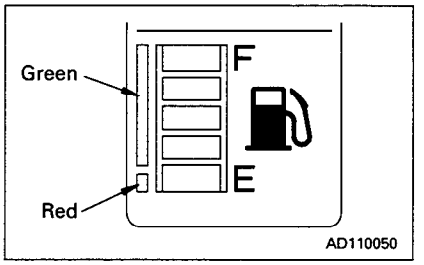
If the red range lights during operation, the alarm buzzer will sound and the power train oil temperature monitor lamp will flash at the same time. If this occurs, stop the machine and run the engine at a low idling speed until the green range lights.



3. FUEL GAUGE

This gauge indicates the amount of fuel in the fuel tank. If there is enough fuel in the tank while the engine is running, the green range lights. If the red range lights, there is less than 80 ℓ (21.12 US gal, 17.6 UK gal) of fuel in the tank.

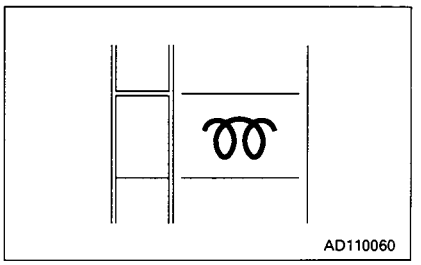
When the red range lights, add fuel.



4. PREHEATING MONITOR

This monitor lamp indicates the pre-heating time required when starting the engine at an ambient temperature below 5°C.

The monitor lamp lights when the starting switch is turned to HEAT (●) position and flashes after about 36 seconds to show that the pre-heating is completed. (The monitor lamp will go off after about 16 seconds.)



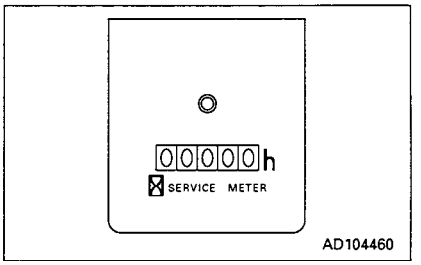
5. SERVICE METER

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

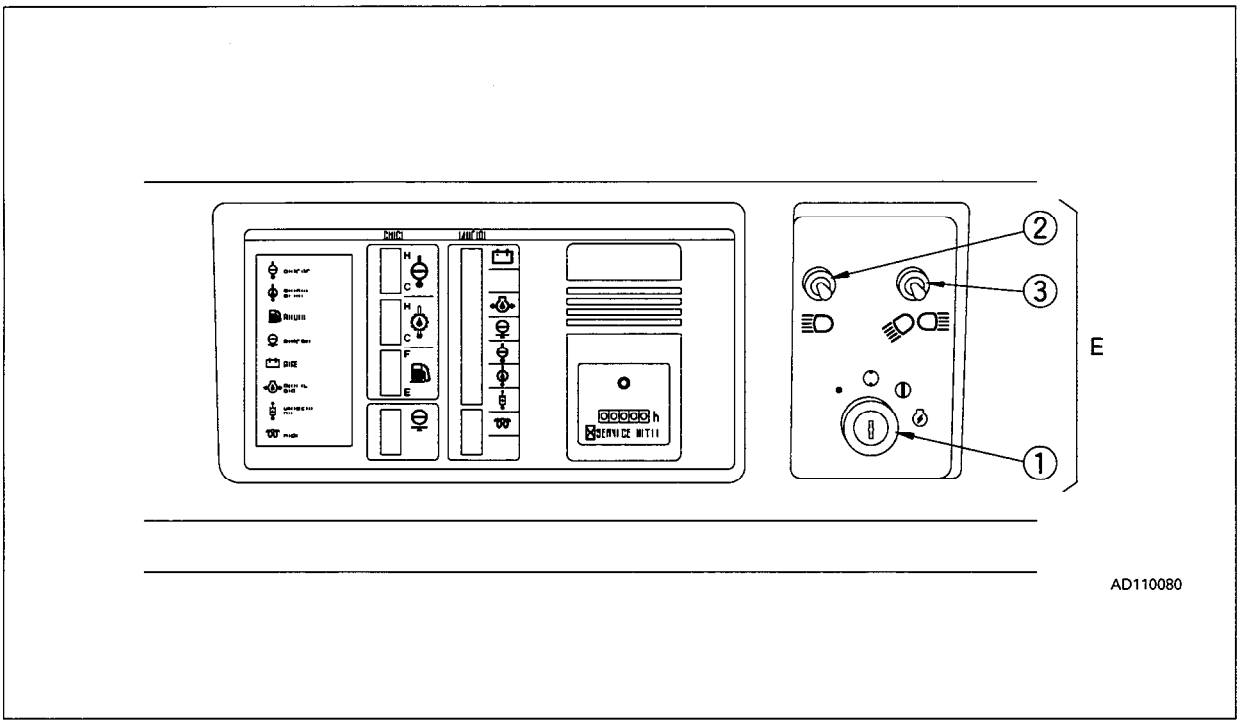
Set the periodic maintenance intervals using this display.

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

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

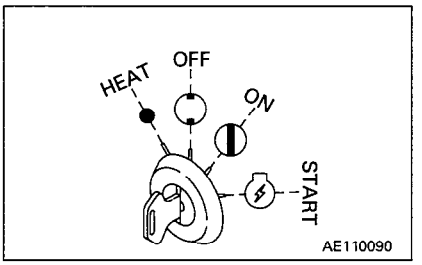


11.1.5 E: SWITCHES



1. STARTING SWITCH

This switch is used to start the engine.



OFF (○)

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

ON (◑)

Charging and electric device circuits activate. Keep key at ON after starting.

START (ϟ)

At this key position, the starting motor will crank the engine. Release key immediately after starting.

HEAT (●)

Use this position when starting in cold weather.

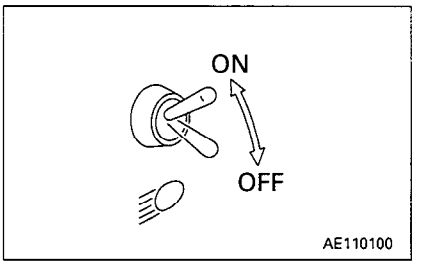
If the key is kept at the HEAT position, the electrical heater will become hot and the preheating monitor will light up.

When the preheating monitor flashes, release the key immediately.

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

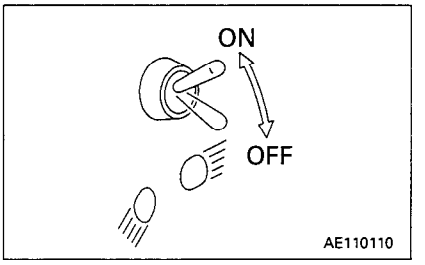
2. **HEAD LAMP SWITCH**
This switches on the head lamps and the panel lamp.

ON position: Lamp lights up
OFF position: Lamp is out

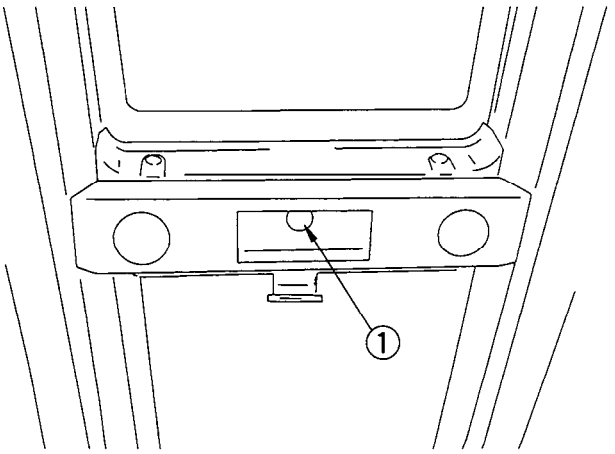


3. **WORKING LAMP/REAR LAMP SWITCH**
This switches on the right and left fender lamp and the rear lamp.

ON position: Lamp lights up
OFF position: Lamp is out



11.2 LAMP



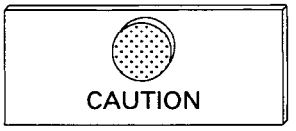
AE110120

1. WARNING LAMP

When the monitor lamps of the B CAUTION and C CAUTION groups on the machine monitor system flashes, this warning lamp flashes at the same time.

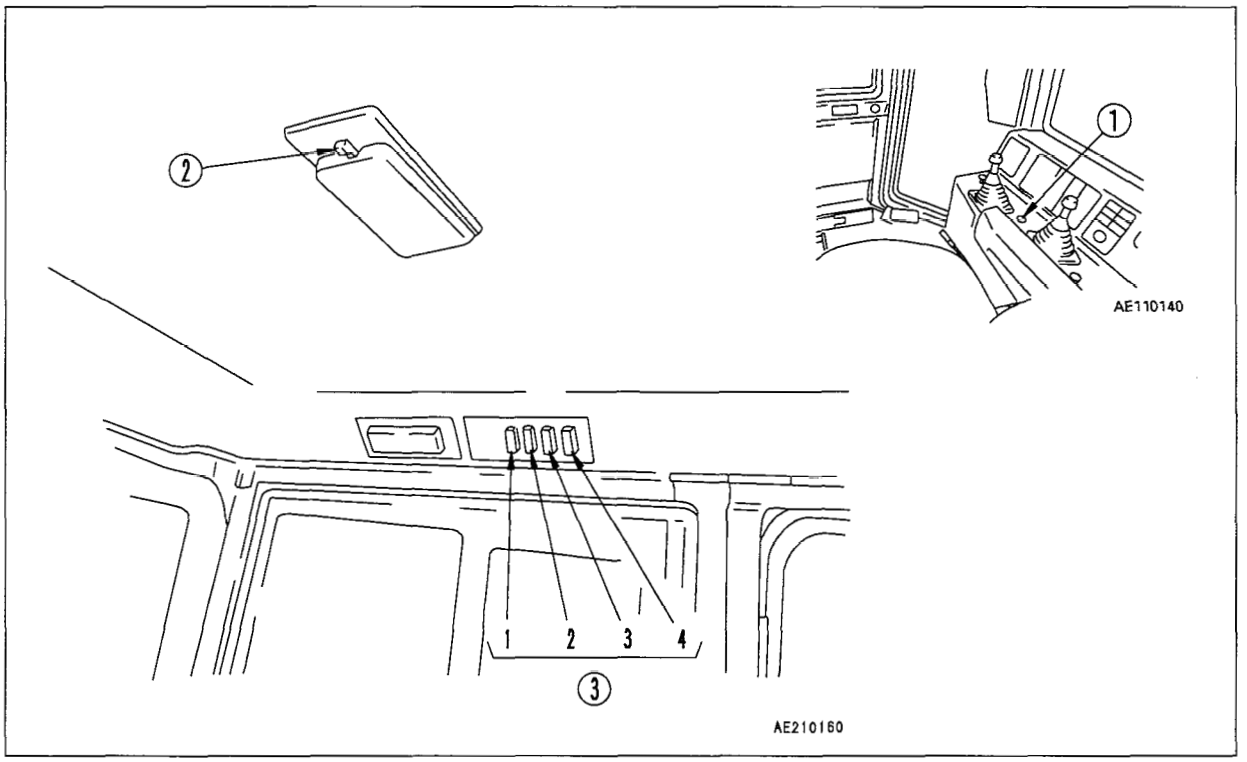
If the lamp flashes, check the monitor panel to locate the problem.

When the monitor lamp in the C CAUTION group flashes, the alarm buzzer sounds intermittenly.

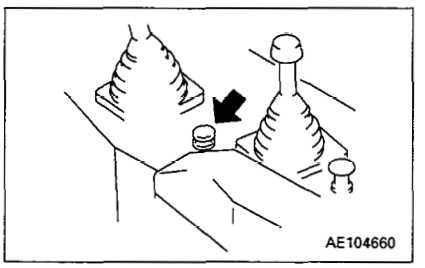


AE110130

11.3 SWITCHES

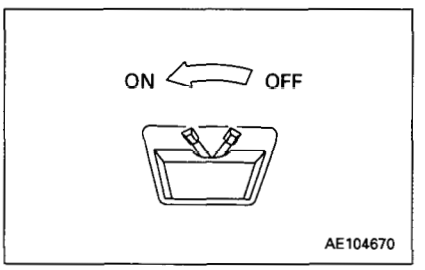


1. **HORN SWITCH**
   When this switch is pressed, the horn will sound.



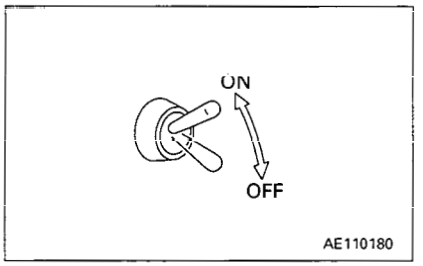
2. **ROOM LAMP SWITCH**
   This lights up the room lamp.

ON position: Lamp lights up
OFF position: Lamp is out



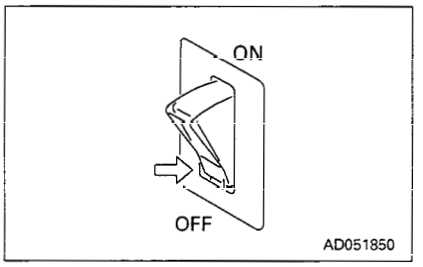
3. WIPER SWITCH (MACHINES EQUIPPED WITH CAB)

This activates the wipers.
The wiper switches are as follows.
① Rear window
② Right door
③ Left door
④ Front window

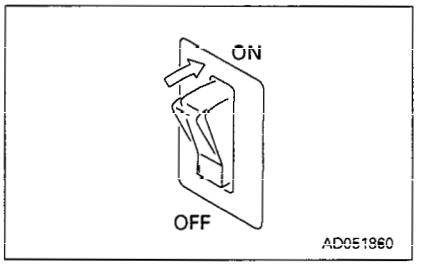


This is also used as the window washer switch.
The switch is operated as follows.

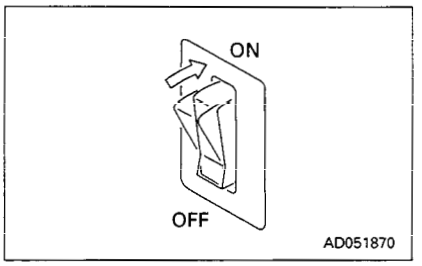
- Window washer only
  Keep the switch pressed to the OFF position to spray out water.



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

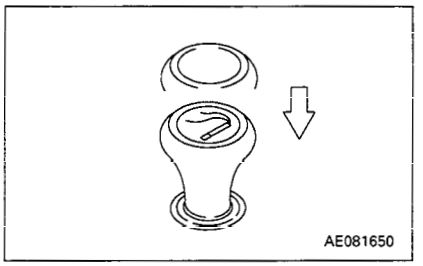


- Wiper and window washer
  If this is kept pressed to the ON position while the wiper is working, water will be sprayed out.



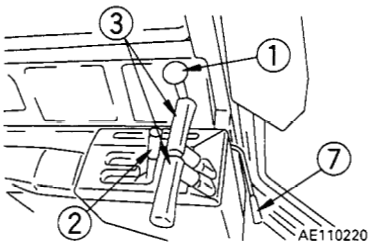
4. CIGARETTE LIGHTER (MACHINES EQUIPPED WITH CAB)

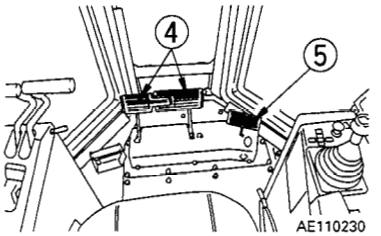
This is used to light cigarettes.
When the cigarette lighter is pushed in, it will return to its original position after a few seconds, so take it out to light your cigarette.

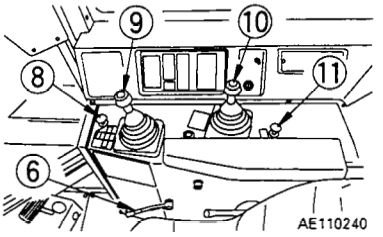


NOTICE
This cigarette lighter is 24V. Do not use it as the power source for 12 V equipment.

11.4 CONTROL LEVERS, PEDALS



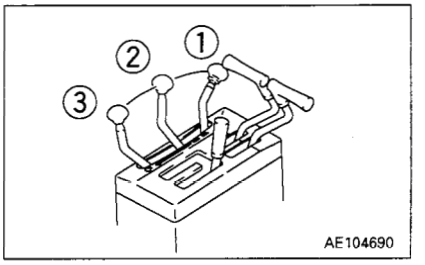




1. FUEL CONTROL LEVER

This lever is used to control the engine speed and output.
It is also used to stop the engine.

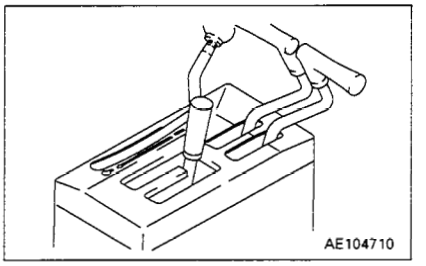
① Engine stop position: Push the lever forward fully.
② Low idling position: Pull the lever from engine stop position ① until you feel the operating force falls off.
③ High idling position: Pull the lever fully from low idling position



2. GEAR SHIFT LEVER

This lever changes the transmission gear range. Three-speed forward and three-speed reverse travel can easily be selected by simply shifting the gear shift lever to any desired speed position.

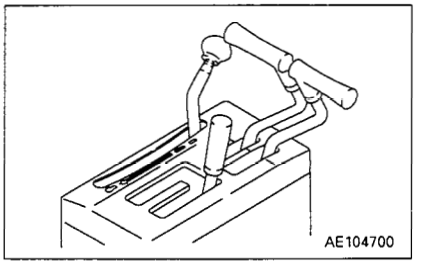
Place the gear shift lever in the neutral position before starting the engine.



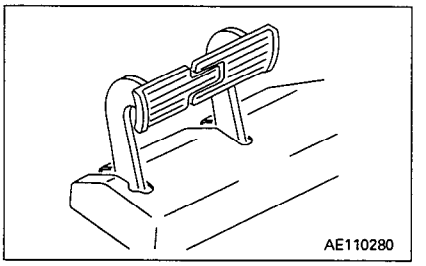
3. STEERING LEVER

This lever is use to steer the machine. If the lever is moved partially in the direction of turn, the machine, the steering clutch is disengaged and the machine turns gradually.

If the lever is moved more, the steering brake is applied and the machine will turn on the spot.



4. BRAKE PEDAL



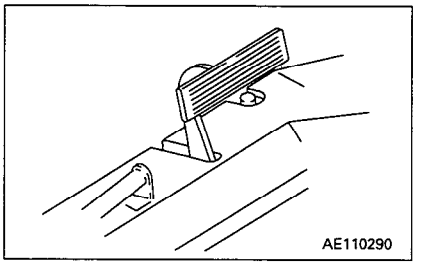
⚠ WARNING

Do not place your foot on this pedal unnecessarily.

Depress the pedal to apply the right and left brakes.

If the steering lever is pulled out half-way and the brake pedal on the same side as the lever is depressed at the same time, the machine will make a pivot turn.

5. DECELERATION PEDAL



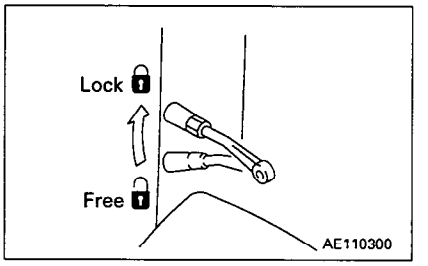
⚠ WARNING

- **Do not place your foot on this pedal unnecessarily.**
- **When arriving at the top of a slope, or when dumping earth from a cliff, the machine will increase its speed with the sudden loss of load. Slow the machine by depressing the decelerator pedal.**

This pedal is used to decelerate engine speed.

To quickly restore normal engine power during ripper operation, this pedal is designed to be operated in two stages. Normally, the pedal is used at the first stage (800 to 850 rpm). When required, the pedal can be further depressed so the engine runs at low idling speed.

6. BRAKE LOCK LEVER



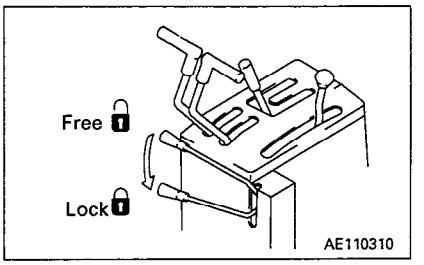
⚠ WARNING

When the machine is parked, lock brake pedals without fail.

This device is used to lock the brake pedal when parking. When the pedals are depressed and the lock lever is placed in LOCK, the brake is locked.

To release brakes, depress the brake pedals and set the lever in FREE.

7. SAFETY LEVER (FOR GEAR SHIFT LEVER)



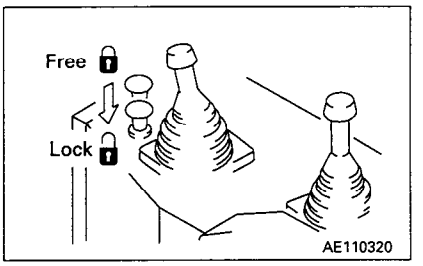
⚠ WARNING

- **When leaving the operator's compartment, set the safety lever securely to the LOCK position. If the gear shift lever is not locked, and it is touched by mistake, this may lead to a serious accident.**
- **When the machine is stopped for a while, be sure to set the gear shift lever in neutral and set the safety lever to LOCK.**
- **If the safety lever is not placed securely in the LOCK position, the control lever may not be properly locked.**

This is the locking device of the gear shift lever.

Set the gear shift lever in neutral and set the safety lever to LOCK.

8. SAFETY LEVER (FOR BLADE CONTROL LEVER)



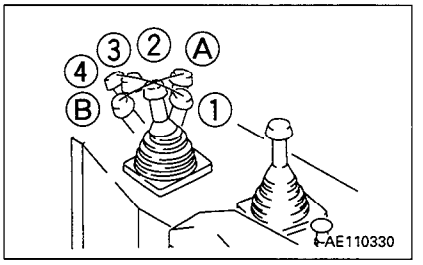
⚠ WARNING

- **When leaving the operator's compartment, 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 to the ground, then set the safety lever to the LOCK position.**

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

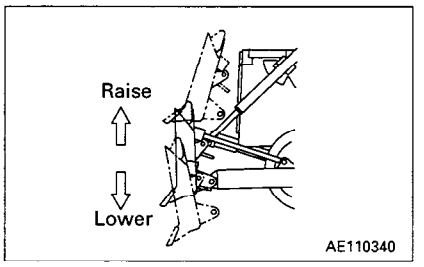
9. BLADE CONTROL LEVER

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.

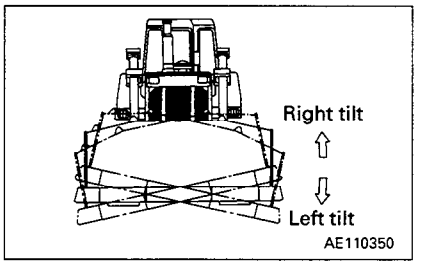


REMARK

When released from FLOAT position, this lever will not return to HOLD position, so it must be moved back by hand.

Tilting control

Ⓐ LEFT TILT : ( )
Ⓑ RIGHT TILT : ( )

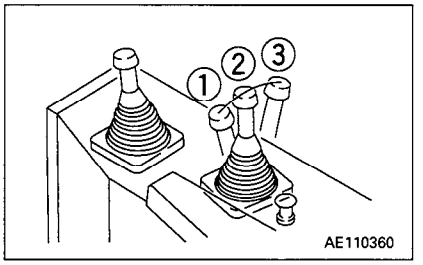


NOTICE

- The lever should be returned quickly to HOLD position at the end of tilt cylinder stroke.
- Do not operate tilting when blade is at top or bottom position.
- After stopping the engine, if the blade control lever is operated to the LOWER position, the work equipment will go down under its own weight.

10. RIPPER CONTROL LEVER (FOR D85A, E)

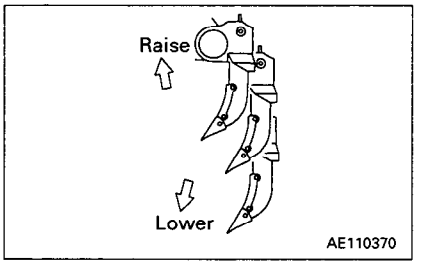
This is used to operate the ripper.



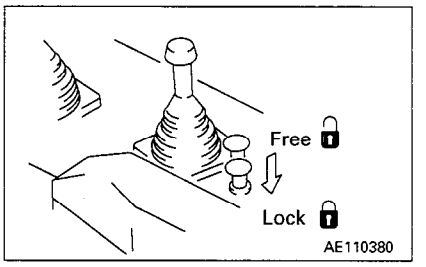
① RAISE ( )
② HOLD ( ): Ripper is stopped and held in the same position.
③ LOWER( )

NOTICE

After stopping the engine if the ripper control lever is operated to the LOWER position, the work equipment will go down under its own weight.



11. SAFETY LOCK (FOR RIPPER CONTROL LEVER)(FOR D85A, E)



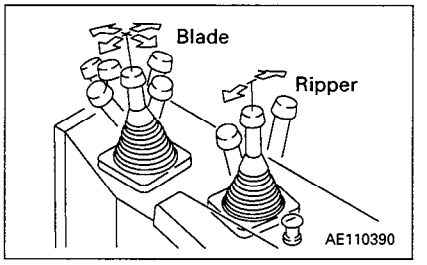
⚠ WARNING

- **When leaving the operator's compartment, set the safety lock securely to the LOCK position. If the control lever is not locked, and it is touched by mistake, this may lead to a serious accident.**
- **If the safety lock is not placed securely in the LOCK position, the control lever may not be properly locked. Check that the situation is as shown in the diagram.**
- **When parking or servicing the machine, be sure to lower the ripper and set the safety lock in the LOCK position.**

This device is used to lock the ripper control lever.

- Method of releasing pressure in work equipment circuit

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



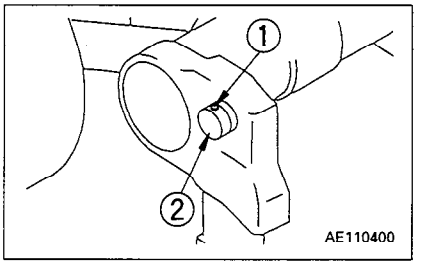
Adjusting digging depth

There are two mounting pin holes in the shank and these are used according to the digging depth. For normal use, use the bottom hole; when deep dipping is required, use the top hole.

When changing the digging depth, use a hammer and punch at pin ① on either the left or right, knock out and remove from the opposite side.

Next, remove pin ②, then change the shank hole position (top or bottom).

The pin is a unitized type, so insert the pin partially by hand, then knock it in fully with a hammer.

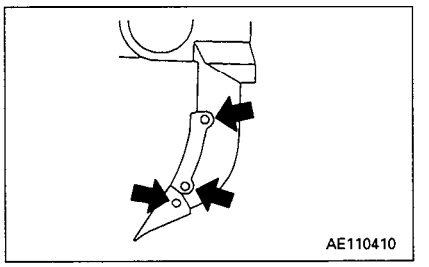


Replacing point and protector

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

Using a hammer and punch against the point marked by the arrow, knock out and remove from the opposite side.

The pin is a unitized type, so insert the pin partially by hand, then knock it in fully with a hammer.



Reversing point

To improve the cutting power of the point and to use it effectively, turn the point every time the wear reaches approx. 30 mm (1.18 in).

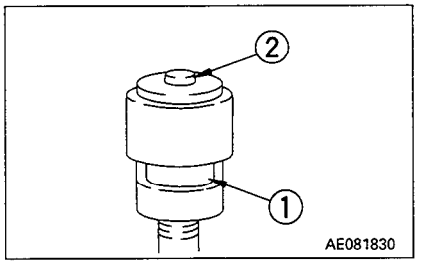
11.5 DUST INDICATOR

This device indicates clogging of the air cleaner element.

When the red piston appears in transparent part ① of this indicator, the element is clogged. Clean the element immediately.

After cleaning, push indicator button ② to return the red piston to its original position.

The dust indicator is on the air cleaner bracket inside the engine room.

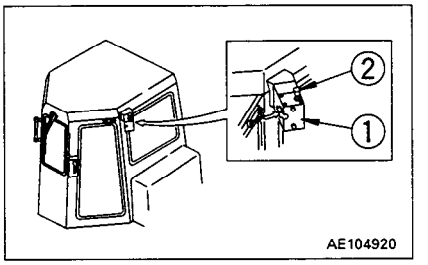


11.6 DOOR LOCK

This lock is used to lock the door in position when it is opened.

1. When the door is forced against catcher ①, the door will be locked in position.

2. To release the door, push knob ② above the catcher. The catcher will unlock the door.



NOTICE

When locking the door in positon, be sure to force it firmly against the catcher.

11.7 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.

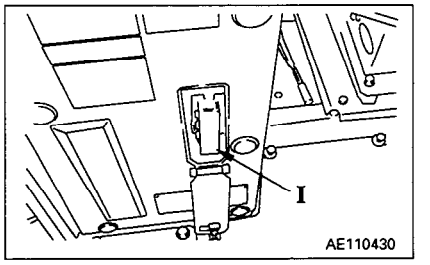
If the fuse becomes corroded, or white powder can be seen, or the fuse is loose in the fuse holder, replace the fuse.

Replace a fuse with another of the same capacity.

11.7.1 FUSE CAPACITY AND CIRCUIT NAME

Fuse box I

No.	Fuse capacity	Circuit
①	15 A	Starting switch
②	15 A	Head lamp
③	15 A	Work lamp
④	15 A	Rear lamp
⑤	15 A	Monitor, backup alarm
⑥	15 A	Cab 1
⑦	15 A	Cab 2
⑧	15 A	Air conditioner
⑨	15 A	Horn



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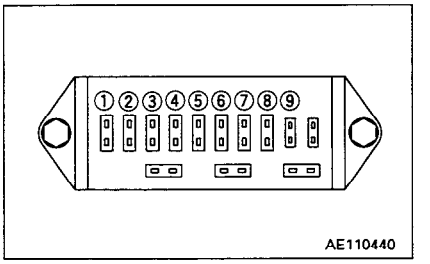

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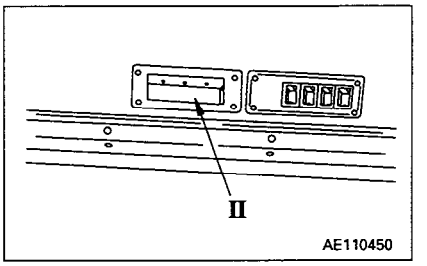
Fuse box II

No.	Fuse capacity	Circuit
①	10 A	Front window wiper
②	10 A	Rear window wiper
③	10 A	Left door wiper
④	10 A	Right door wiper
⑤	-	-
⑥	10 A	Room lamp
⑦	10 A	Cigarette lighter
⑧	10 A	Car stereo



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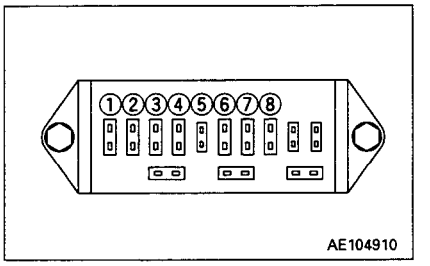

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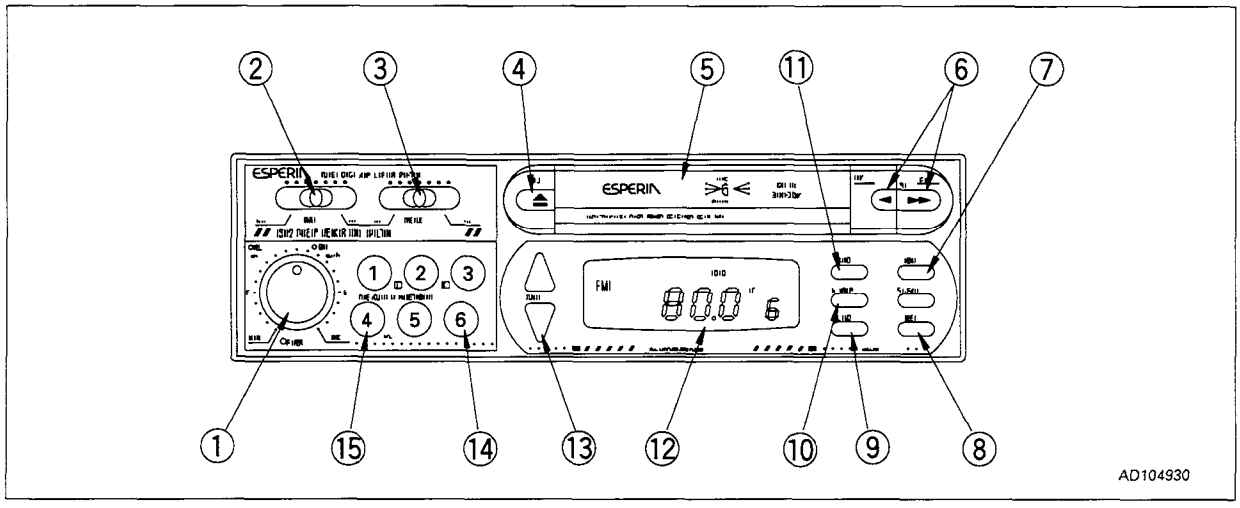
11.8 CAR STEREO



11.8.1 EXPLANATION OF COMPONENTS

1. **POWER SWITCH/VOLUME CONTROL/BALANCE CONTROL KNOB**
   Turn this knob clockwise. The "click" sound indicates that the power supply is turned on. Further turning increases the speaker volume.
   For balance control, depress the knob while turning it to left or right and regulate the sound balance between the left and right speakers.

2. **BASS CONTROL SLIDE-KNOB**
   Slide this knob to the right to increases the bass sound and to the left to decrease the base.

3. **TREBLE CONTROL SLIDE-KNOB**
   Slide this knob to the right to enhance high frequency sound and to the left to suppress high frequency sound.

4. **EJECT BUTTON**
   Push this button to eject the cassette tape.

5. **CASSETTE DOOR**
   Insert cassette tape with the exposed magnetic tape side facing to the right.

6. **FAST-FORWARD/REWIND/PROGRAM CHANGEOVER KNOB**
   To fast-forward the tape, push the button matching the direction of program indication and to rewind, push the other button. To stop fast-forwarding or rewinding, lightly press the button which is not locked to cancel the operation. The system will then start playing the tape again normally. To change the program, press the fast-forward and rewind buttons simultaneously. The direction of tape feed will reverse.

7. **MEMORY SWITCH**
   Press this button to preset the frequencies of desired stations. (ME flashes.)

8. SEEK
When the SEEK button is pressed, the system automatically searches for a receivable station, and automatically stops searching once a station is picked up.

9. LOUD BUTTON
This switch is used to operate the system at a lower sound volume but with enhanced bass and treble sound. ("LOUD" indication appears on the display.)

10. AUTO-MEMORY
When the "A.MEMO" button is pressed, the system tunes itself to stations receivable in the area in which the machine is currently located, one after another, and memorizes the frequencies in its preset memory, all automatically.

11. FM/MW(AM) BAND SELECT SWITCH
Pressing the "BAND" switch changes over between FM1, FM2, FM3 and MW(AM) bands. The display indicates the receiving band name and frequency.

12. DISPLAY
The display indicates the receiving frequency when receiving a radio broadcast or the current operation mode.

13. TURN SWITCH (MANUAL TURNING)
Pressing the ▲-shaped TUNER button raises the receiving frequency by 9 KHz in AM an by 0.1 MHz in FM for each press. Pressing the ▼-shaped TUNER button lowers the receiving frequency similarly. Pressing either of these buttons continuously shifts the receiving frequency continuously.

14. PRESET SWITCH KEYS
One station each in the FM1, FM2, FM3 and MW(AM) bands, respectively, can be preset for each of these preset keys. (Refer to the section "Presetting to selected stations".)

15. METAL SWTICH
Press the "MTL" ④ button before playing a metallic tape.
"MTL" indication appears on the display.

11.8.2 WHEN RECEIVING RADIO BROADCASTS

1. Turn ON the ignition key or turn it to the ACC position before turning on the system power switch.

2. Select either AM or FM band with the FM/AM selector switch.

3. Tune to the desired station using the presetting or manual tuner switches.

4. Adjust the volume, the balance between left and right speakers and the sound quality to your choice using the respective buttons.

5. When turning off the radio, turn the VOL knob counter-clockwise until a click is heard.

REMARK

- When changing over to radio while listening to a cassette tape, press the EJECT button to stop the tape and the system will automatically change over to radio.
- Simply insert a tape to change over to cassette tape mode while listening to the radio.

Automatic tuning with SEEK button

Pressing the "SEEK" button shifts the receiving frequency in the higher frequency direction before automatically stopping at a position where a station is picked up.

Manual tuning

Pressing either the ▲ or ▼-shaped "TUNER" buttons shifts the receiving frequency in the steps given below. Pressing either of these buttons continuously, allows continuous shifting of the receiving frequency.

Areas	AM	FM
North, Central or South America	10 KHz	0.1 MHz
Other areas	9 KHz	0.025 MHz

Automatic selection between monaural and stereo receiving modes

When the FM stereo broadcasting waves currently being received are too weak for normal receiving (such as receiving a long distance from the broadcasting station or in mountain areas) the system automatically shifts from stereo to monaural mode to suppress disturbing noise. It automatically returns to stereo mode when the intensity of the radio wave being received recovers.

Presetting to selected stations
When listening to a preset station, select either of the AM, FM1, FM2, FM3 bands using the FM/AM select switch, then simply press the number key corresponding to the preset selected station.
The system can memorize 6 stations in AM band and 18 stations in FM bands (FM1: 6 stations, FM2: 6 stations and FM3: 6 stations).

Presetting procedures:
1. If the system is playing a cassette tape, press the eject button to stop the tape.

2. Tune to the desired station for presetting:
   First, select either of the MW(AM), FM1, FM2 or FM3 bands before tuning to the frequency of the desired station using the TUNING buttons.

3. Press the MEMO switch.

4. While "MEMO" is flashing, press the preset key of the channel number into which you want to memorize the preset station. (The preset channel and frequency will be indicated. This concludes presetting.)

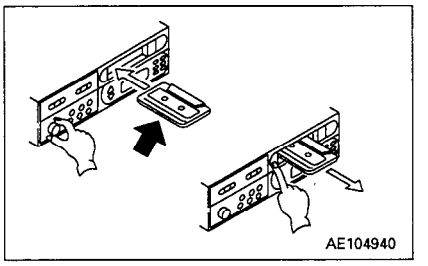
5. Repeat the above procedure Steps 2 to 4 to preset to other desired stations.

REMARK
- To change the station in a preset key number, repeat above procedure Steps 2 to 4, as well.
- If the main power supply is interrupted, such as when exchanging machine battery, all presettings will be erased. Repeat the presetting procedure in such case.

Auto memory
When the "A.MEMO" button is pressed, the system tunes itself to stations receivable in the area where the machine is currently located, one after another, and memorizes the frequencies in its preset-memory, all automatically.

Memory backup battery
When pressing a preset key fails to tune into the programmed station, repeat the presetting procedure after operating the vehicle for a day. If, however, the memory is still defective the next day, the service life of the backup battery is likely over, unless an imperfect contact or wire breakage is found. In this case, replace with a new backup battery.

11.8.3 WHEN PLAYING A CASSETTE TAPE



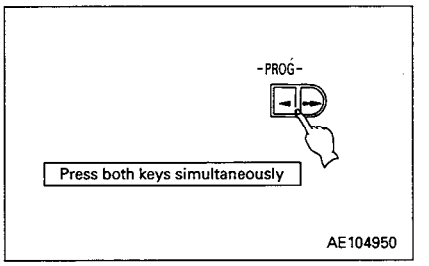
1. Turn ON the ignition key or turn it to the ACC position before turning on the power switch of the stereo system.

2. Insert your cassette tape through the cassette opening in the direction with the exposed tape to the right. The tape will start playing automatically. When the tape running direction indication is ▶, the upper channel of the tape is being played and when ◀ is indicated, the lower channel is being played.
   When the tape ends in one direction, the system automatically reverses the tape and plays the other side.

3. To stop the tape, press the eject button to eject it and the system will automatically change over to radio.

When changing tape channels

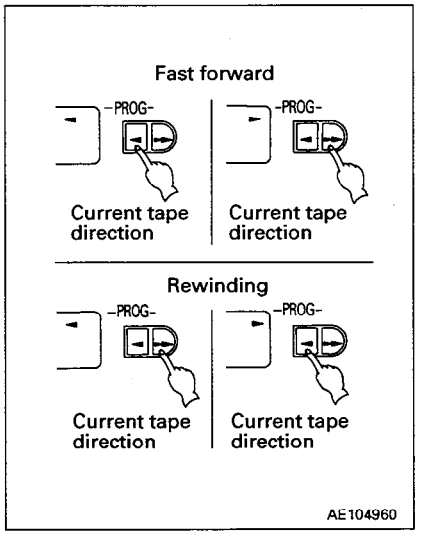
Lightly press both the PROG ◀□ and □▶▶ keys simultaneously while the tape is being played.



Fast-forwarding and rewinding

To fast-forward a tape during playing, fully press either the ◀□ or □▶▶ keys according to the current tape-feed direction to lock the key. To reverse the tape direction, fully press the opposite-direction key to lock it.

To stop fast-forwarding or rewinding, lightly touch the unlocked key. This frees the locked key and normal playing resumes.



11.8.4 SPECIFICATIONS

Tape

Applicable cassette tape:	Phillips-tape
Track system:	4 track, 2-channel stereo
Tape speed:	4.75 cm/sec
Fast-forwarding and rewinding time:	185 sec (for a C-60 cassette)
Wow and flutter:	0.15% (WEMS)
S/N ratio:	55 dB

Radio

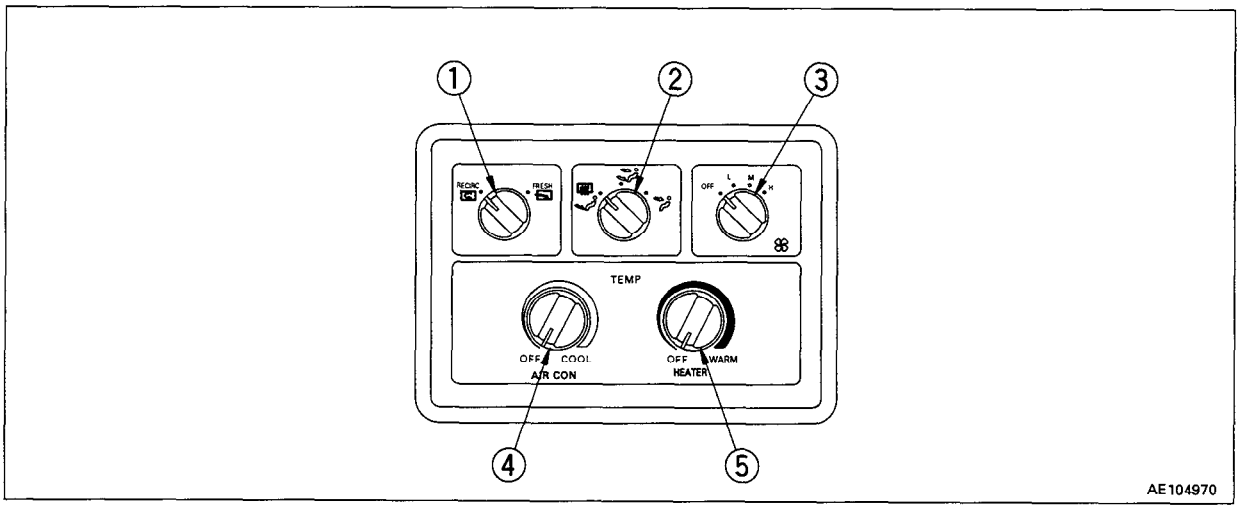
Receivable frequencies:	FM : 76.1 – 89.9 MHz, AM: 522 – 1,629 KHz.
Receiving sensitivity:	FM : 3 μv (30 dB S/N) AM: 10 μv (max.)
S/N ratio:	FM : 62 dB AM: 45 dB

Common to tape and radio

Frequency response:	(40 – 12,500 Hz.)
Max. output:	30 W + 30 W
Output impedance:	(4 ohms x 2) or (8 ohms x 4)
Current consumption:	5 A
Power source:	DC 12 V – 24 V
Polarity:	Negative grounding
Dimensions:	178(W) x 50(H) x 150(D) mm.
Weight:	1.4 kg.

- The appearance and specifications are subject to change without prior notice for improvement purposes.

11.9 OPERATING THE AIR CONDITIONER



11.9.1 CONTROL PANEL

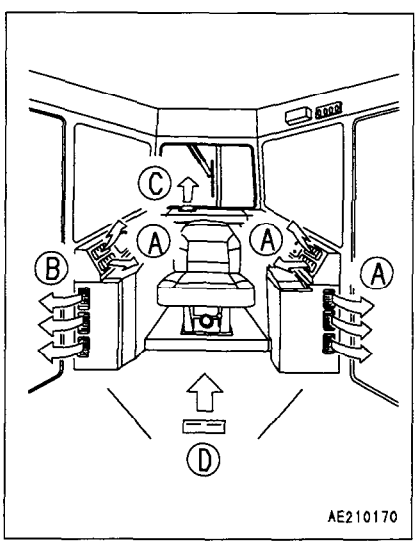
1. INSIDE – OUTSIDE AIR SELECTOR SWITCH

Use this switch to change over the intake vents when heating or cooling the cab.

- *Inside air* (RECIRC ⊏)
  Air is inhaled from inside the cab.
  (Generally used for cooling the inside of the cab.)
- Outside air (FRESH ⊐)
  Air is inhaled from outside the cab.
  (Generally used for ventilating and heating the inside of the cab.)

2. VENT SELECTOR SWITCH

Position of knob	Air outlet	*Application*
	DEF FOOT Ⓑ Ⓒ Ⓓ	Mainly for heating
	FACE FOOT Ⓐ Ⓑ Ⓒ Ⓓ	Mainly for ventilation
	FACE Ⓐ	Mainly for cooling



3. BLOWER SWITCH

This switch is used not only to control the flow of air in cooling and heating, but also as the main switch.

- The air flow is controlled in three ranges, High, Medium, and Low.
- When the switch is turned OFF, the power line is disconnected and the air conditioner stops.

4. COOLER TEMPERATURE CONTROL SWITCH

This switch controls the air temperature in the cooling operation and is also used as the cooler switch.

- The farther this switch is turned clockwise, the lower the temperature of the air coming out of the vent.
- When the switch is OFF, the cooler switch will go off and the cooling function will stop.

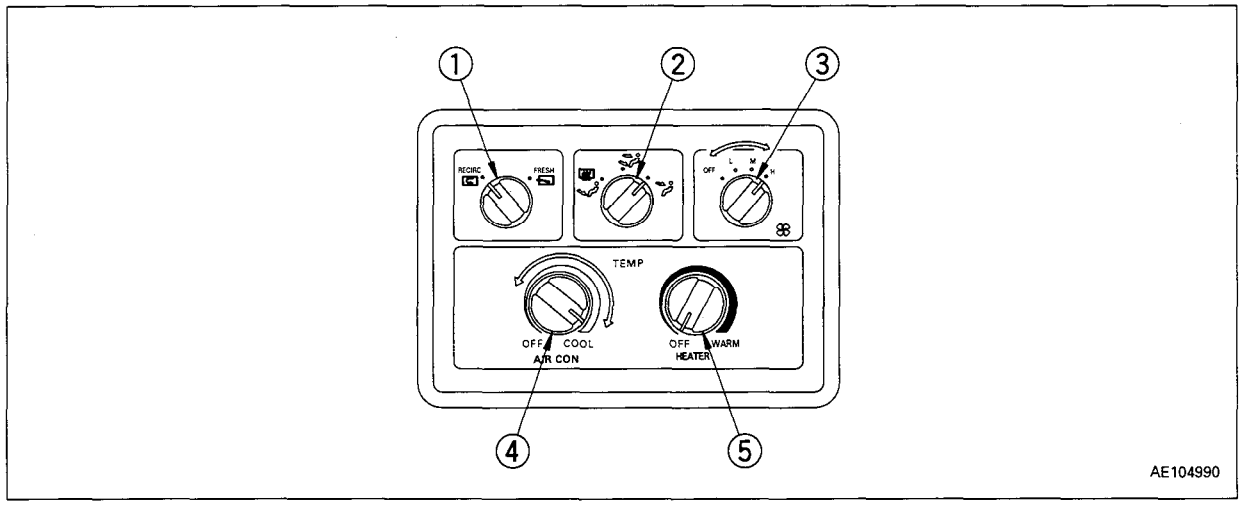
5. HEATER TEMPERATURE CONTROL SWITCH

This switch controls the air temperature in the heating operation.

- The farther this switch is turned clockwise, the higher the temperature of the air coming out of the vent.
- When the switch is in OFF, the water valve will be closed and the heating function will stop.

11.9.2 COOLING OPERATION

- **Control switches**



Ordinary cooling

When control switches are used as shown, fresh cool air will be supplied into the cab.

- Set switches ①, ②, and ⑤ in the positions shown.
- Set switches ③ and ④ in the desired positions.

Ventilation and cooling

When the air in the cab gets dirty, move Inside-Outside air changeover switch ① to the outside air (FRESH ⊏) position to let outside air into the cab.

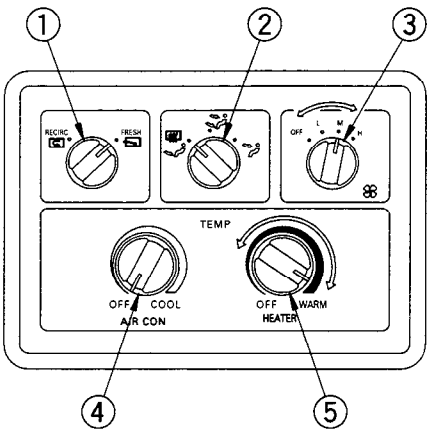
The other switches are used in the same manner as in ordinary cooling.

REMARK

If ventilation cooling is used for many hours, the cooling effect may not be sufficient. When the cab has been sufficiently ventilated, move Inside-Outside air selector switch ① back to the inside air (RECIRC ⊏) position.

11.9.3 HEATING OPERATION

- **Control panel**



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Ordinary heating

When control switches are used as shown, warm air is supplied into the cab.

- Set switches ①, ②, and ④ in the positions shown.
- Set switches ③ and ⑤ in the desired positions.

Dehumidifying heating

When cooler temperature control knob ④ is placed in "COOL", dehumidified air will be supplied. The other switches are used in the same manner as in ordinary heating.

REMARK

When dehumidifying heating is used when the air in the cab is humid (in spring, autumn, or rainy weather, for example), the cab will be heated comfortably without clouding up the windows.

11.9.4 PRECAUTIONS FOR USING AIR CONDITIONER

When cooling, change the air occasionally.

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

Be careful not to overcool the cab.

- The cab should feel cool when entering there from outside (5°C or 6°C (9°F or 11°F) lower than the outside temperature). It is not good for the health to have the temperature in the cab too low. Always give careful consideration to temperature regulation.

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

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

11.9.5 CHECK DURING OFF-SEASON

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

REMARK

In cold weather, do not run the compressor suddenly at high speed. This may cause failure in the compressor. When the temperature is below 2 to 6.5°C (36 to 44°F), the low pressure cut-off switch functions to stop the compressor from running even when the cooler temperature control switch is turned on.

11.9.6 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".

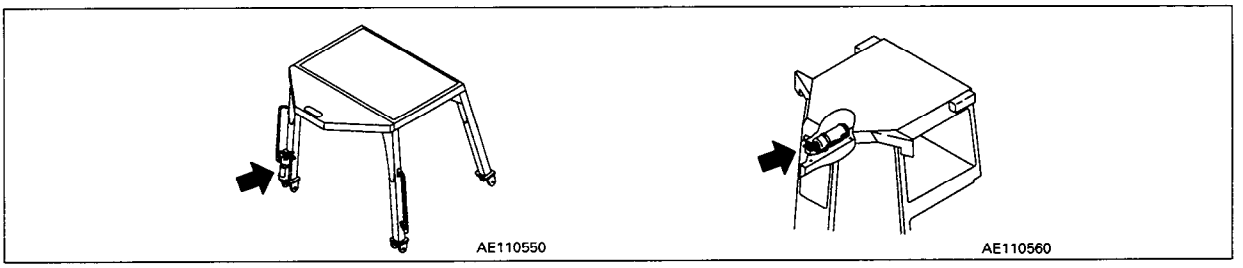
11.9.7 CHECK TENSION OF COMPRESSOR BELT AND VOLUME OF REFRIGERANT (GAS)

If the compressor belt is loose or there is a lack of refrigerant, the cooling performance will be poor.

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

11.10 EQUIPPING THE FIRE EXTINGUISHER

Equip the fire extinguisher at the illustrated position, if applicable.



12. OPERATION

12.1 CHECK BEFORE STARTING ENGINE

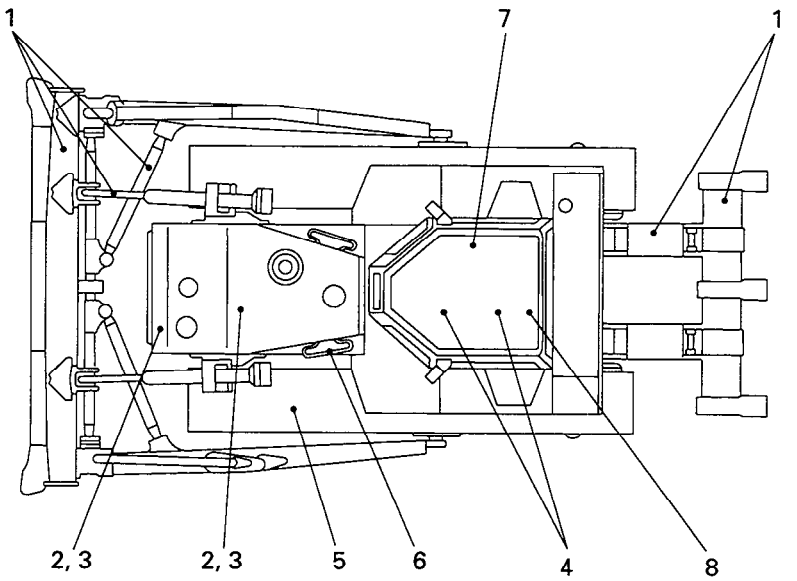
12.1.1 WALK-AROUND CHECK

⚠ 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.

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.



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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 transmission case, transfer case (incl. bevel gear case), steering clutch 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.

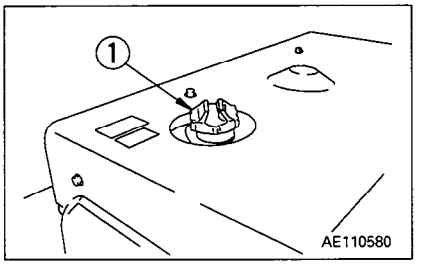
12.1.2 CHECK BEFORE STARTING

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

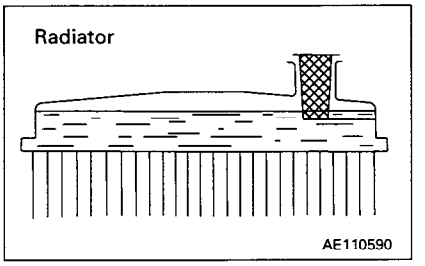
CHECK COOLANT LEVEL, ADD WATER

⚠ WARNING

Do not open the radiator cap while cooling water is hot. Hot water may spout out.
When removing cap, wait until the water temperature goes down and release radiator pressure little by little by loosening cap slowly, then remove the cap.



1. Remove radiator cap ① and check that coolant is above the bottom of the strainer as shown in the diagram. If necessary, add water through filler of radiator cap ①.
2. After adding water, start the engine, check the water level again after a five-minute idling, and add water if necessary.
3. Tighten cap ① securely.



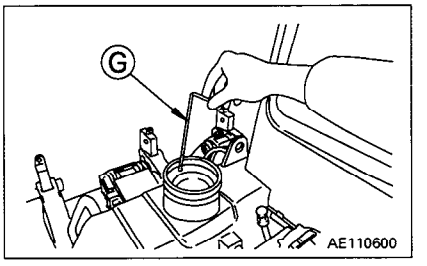
NOTICE

Do not rely only on the radiator water level monitor to check the coolant level.

CHECK FUEL LEVEL, ADD FUEL

⚠ WARNING

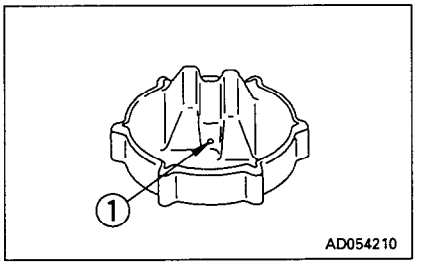
When adding fuel, never let the fuel overflow. This may cause a fire. If you spill fuel, thoroughly clean up any spillage.



1. Remove dipstick Ⓖ and wipe the oil off with a cloth.
2. Insert dipstick Ⓖ fully in the oil filler pipe, then take it out again.
3. After completing work, fill the fuel tank through oil filler port Ⓟ. For details of the fuel to use, see "20. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".
4. After adding fuel, tighten the cap securely.
   Fuel capacity: 480 ℓ (127 US gal, 106 UK gal)

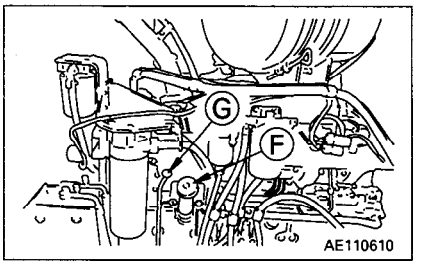
NOTICE

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.



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.



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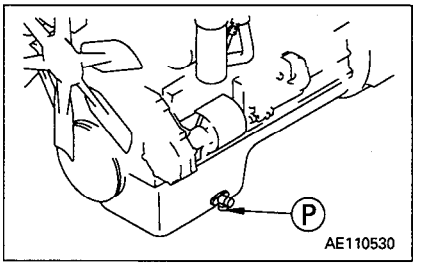

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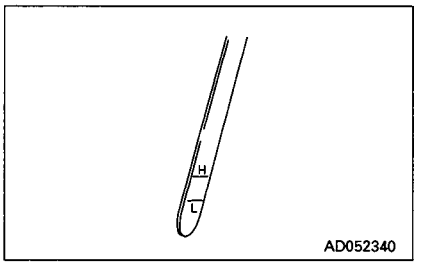


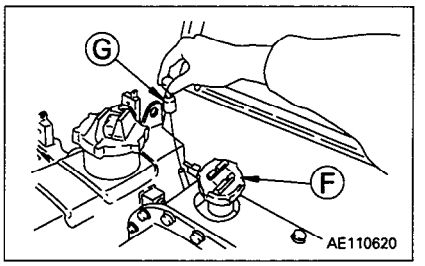
AD052340

REMARK

- When stopping the engine, check the oil level.
- 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.
- While adding oil, take out the oil level gauge through the gauge guide to bleed the air from the crankcase.

CHECK OIL LEVEL IN STEERING CLUTCH CASE (INCL. TRANSMISSION CASE, TORQUE CONVERTER CASE), ADD OIL

1. Remove dipstick Ⓖ and wipe the oil off with a cloth.
2. Insert dipstick Ⓖ 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 Ⓖ.
   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".
4. If the oil is above the H mark, drain the excess engine oil from the drain pulg, and theck the oil level again.
5. If the oil level is correct, tighten the oil filler cap securely and cloth the engine side cover.



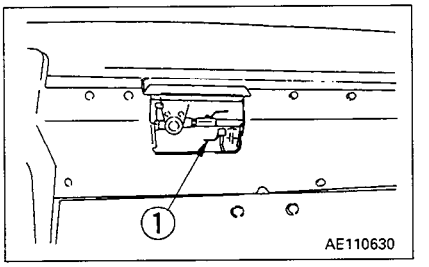
AE110620

REMARK

- When check 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.
- In case the work is carried out on sloped land of more than 20° declination, supply oil up to H level.

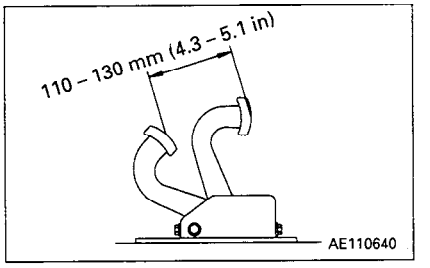
DRAIN WATER, SEDIMENT FROM FUEL TANK

1. Open the cover at the bottom of the fuel tank.
2. Loosen valve ①, and drain the fuel together with the water and sediment accumulated at the bottom of the tank.
3. When only clean fuel comes out, close drain valve ①.



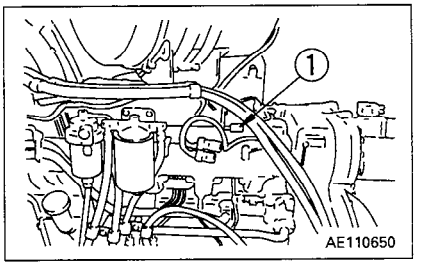
CHECK BRAKE PEDAL TRAVEL

1. Run the engine at low idling
2. Depress the brake pedal all the way until it stops.
   The distance of travel at the center of the pedal 110 – 130 mm (4.3 – 5.1 in).
3. The brake fails to work, please contact your Komatsu distributor for adjustment.



CHECK DUST INDICATOR

1. 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".



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.

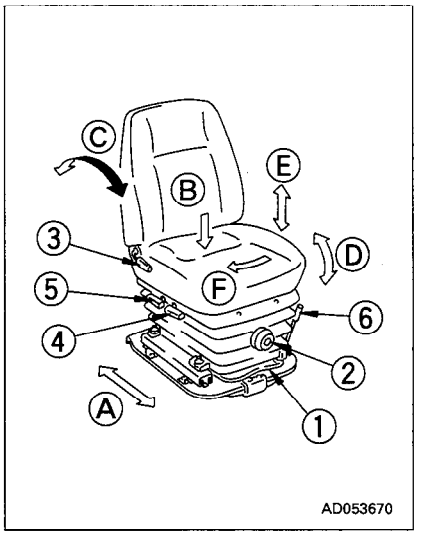
12.1.3 ADJUST OPERATOR'S SEAT

⚠ 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
Pull up handle ①, set the seat to the desired position, then release the handle.
Fore-aft adjustment: 160 mm (6.3 in) (17 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.

Ⓒ ADJUSTMENT 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.

Ⓓ SEAT ANGLE

1. When lever ④ 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.

Ⓔ ADJUSTING VERTICAL HEIGHT OF SEAT

Pull up levers ④ and ⑤ in turn and adjust the angle. After adjusting, release the levers and lock them.
(Vertical adjustment amount: 5 stages, 60 mm (2.36 in))

Ⓕ SEAT ADJUSTING DIRECTION

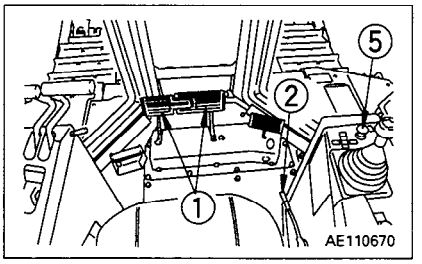
Move lever ⑥ back to release the lock, then turn the seat to the right by hand. It is possible to change the direction of the seat to the 15° position.
After changing the angle of the seat, return the lever securely and lock it in position.

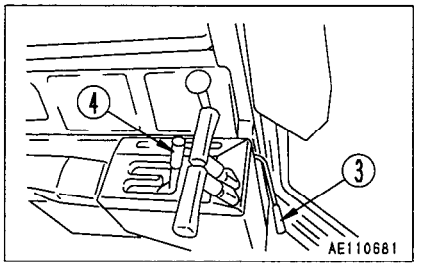
- Adjusting the seat angle to the right is done to make it easier to carry out ripper operations or scraper towing operations.

12.1.4 OPERATIONS AND CHECKS BEFORE STARTING ENGINE

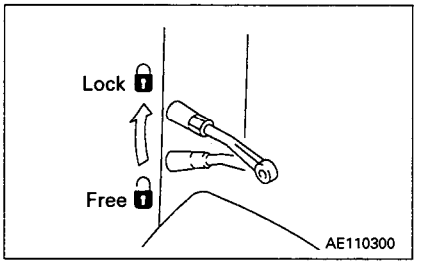
⚠ WARNING

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.

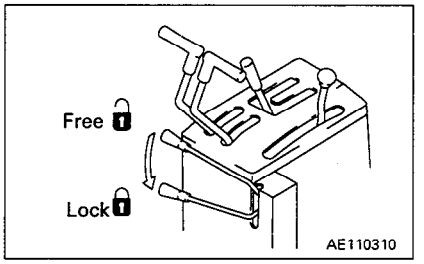




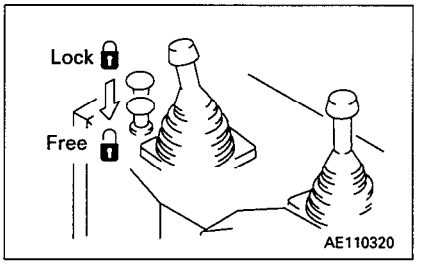
1. Check that brake pedal ① is locked with brake lock lever ②.



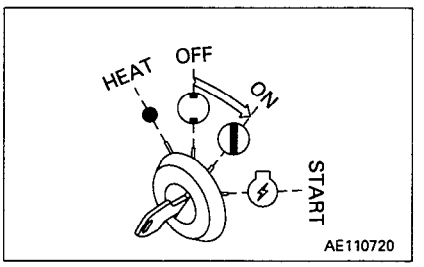
2. Check that steering lever ④ is the N (neutral) position and is locked with safety lever ③.



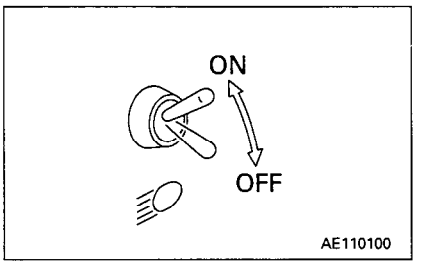
3. Check that the blade is lowered on the ground and the blade control lever is locked with safety lock ⑤.

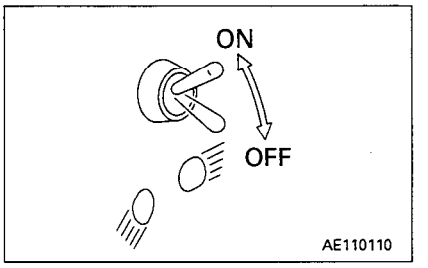


4. Insert the key in starting switch, turn the key to the ON position, then check the fuel level using fuel gauge.



5. Turn head lamp switch to turn on the head lamp.
   Turn work lamp switch and rear lamp switch to turn on the left and right fender work lamp and rear lamp.
   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.





12.2 STARTING ENGINE

12.2.1 NORMAL STARTING

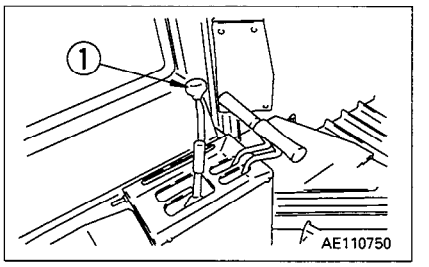
⚠ WARNING

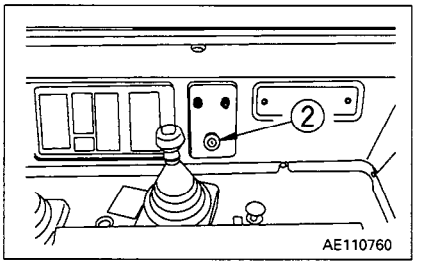
Check that there are no persons or obstacles in the surrounding area, then sound the horn and start the engine.

NOTICE

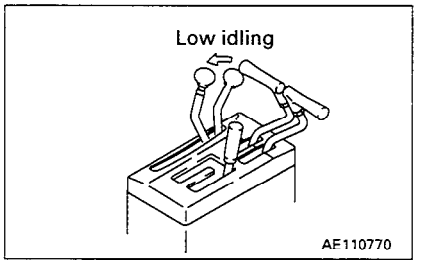
Do not keep the starting motor rotating continuously for more than 20 seconds.

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

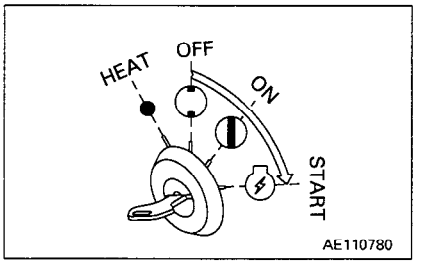




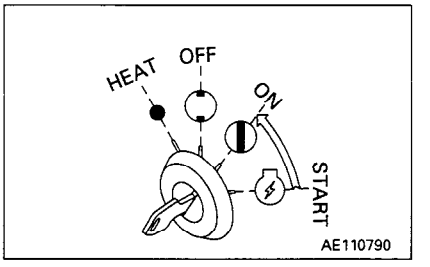
1. Pull fuel control lever ① to the low idling position.



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.

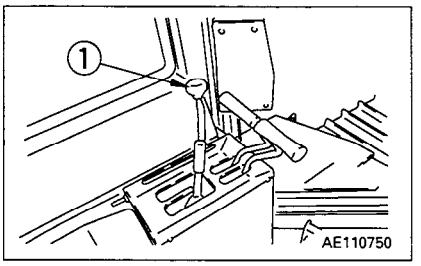


12.2.2 STARTING IN COLD WEATHER

When starting in low temperatures, do as follows.

⚠ WARNING

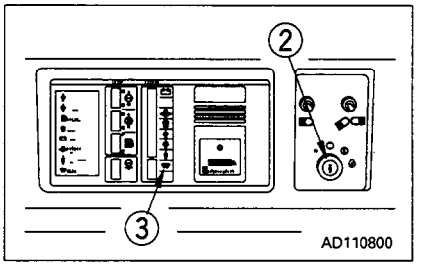
Never use starting aid fluids as they may cause explosions.



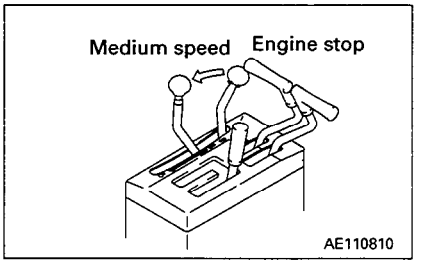
NOTICE

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

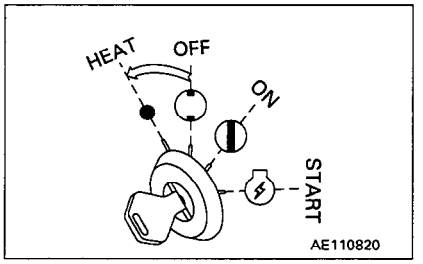
If the engine fails to start, repeat steps 2 and 3 after waiting for about 2 minutes.



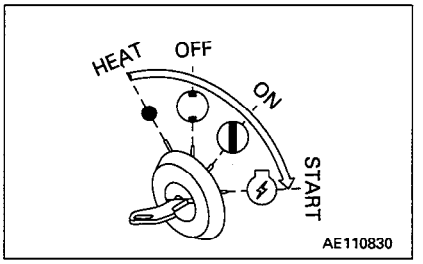
1. Pull fuel control lever ① to a position midway between the low idling and full speed positions.



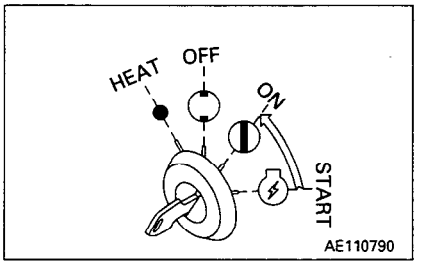
2. Turn the key in starting switch ② to the HEAT position, check that preheating monitor ③ lights up, and hold in this position. After approx. 36 seconds, preheating monitor ③ will flash to indicate that preheating is completed.



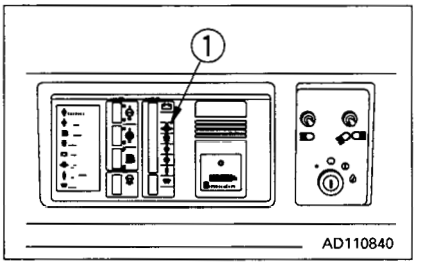
3. When preheating monitor ③ flashes, turn the key in starting switch ② to the START position to start the engine.



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



12.3 OPERATIONS AND CHECKS AFTER STARTING ENGINE



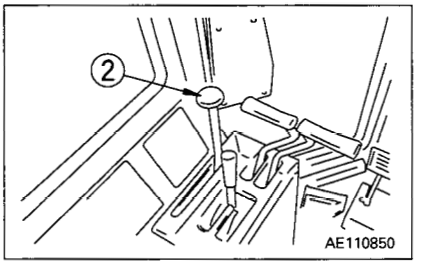
After starting the engine, do not immediately start operations. First, carry out the following operations and checks.

NOTICE

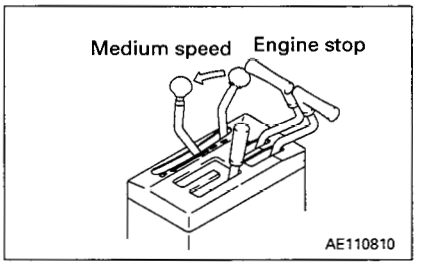
Avoid abrupt acceleration until warm-up run is completed.

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.

If engine oil pressure monitor ① flashes and the buzzer sounds intermittently, stop the engine and check the cause of the problem.



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



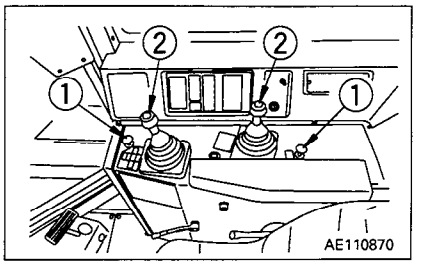
2. After warm-up run is completed, check gauges and caution lamps for proper operation. If any abnormality is found, repair it.
   Continue to run the engine at light load until engine water temperature gauge indicator ② falls within the green range.

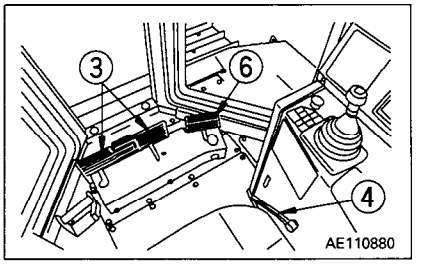
3. Check that there is no abnormal exhaust gas color, noise, or vibration. If any abnormality is found, repair it.

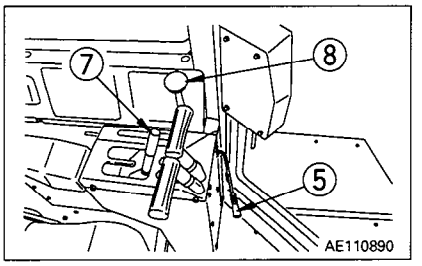
12.4 MOVING MACHINE

⚠ WARNING

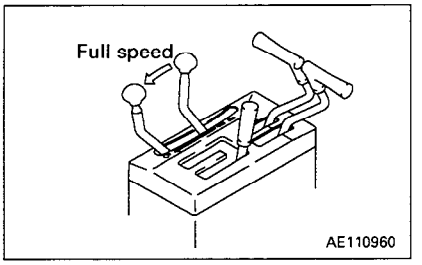
- **When moving machine, check that the area around the machine is safe, and sound the horn before moving.**
  Clear all personnel from the machine and the area.
  Clear all obstacles from the path of the machine.
  Use extreme care when reversing the machine. Note there is an blind spot behind the machine.
- **When starting on slopes, always keep brake pedal ③ depressed even after releasing brake lock lever ④.**
- **When starting up a steep slope, run the engine at full throttle, keep brake pedal ③ depressed, then move gear shift lever ⑦ to the F1 or R1 position. When the machine starts to move (or the shoes slip), release brake pedal ③ gradually and allow the machine to move off.**



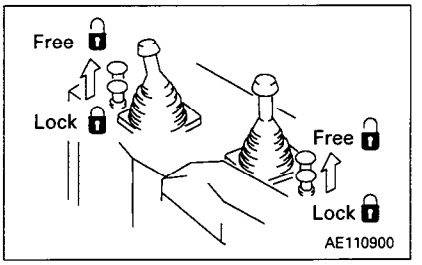




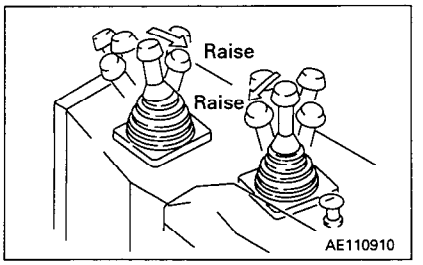
1. Pull fuel control lever ⑧ to increase engine speed.



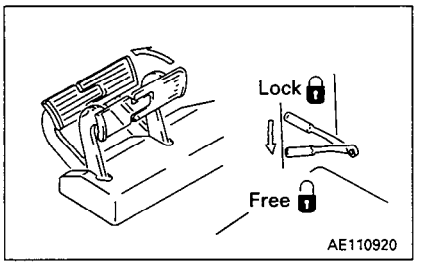
2. Set safety lock ① for blade control lever ② and ripper control lever ② to the FREE position.



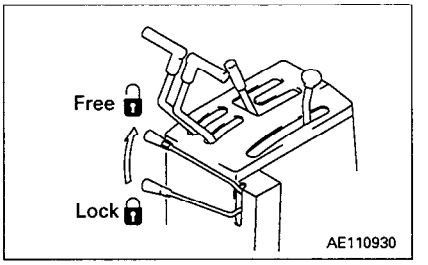
3. Operate blade control lever ② and ripper control lever ② to the RAISE position, raise the blade and ripper 40 – 50 cm (15.8 – 19.7 in) from the ground.



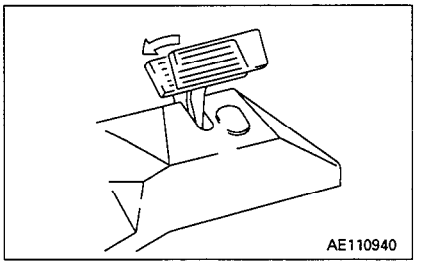
4. Depress brake pedal ③, then push brake lock lever ④ to set to the FREE position.
   Keep brake pedal ③ depressed.



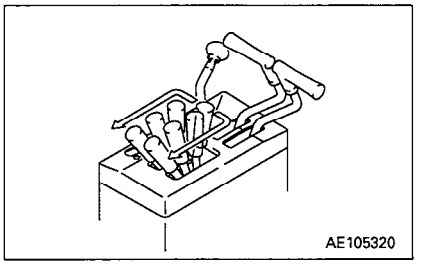
5. Set safety lever ⑤ for the gear shift lever to the FREE position.



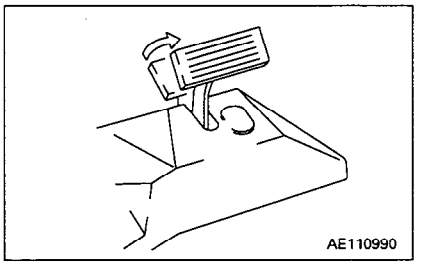
6. Depress decelerator pedal ⑥.



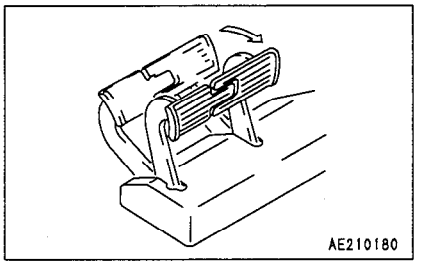
7. Shift gear shift lever ⑦ to the desired position.



8. Release decelerator pedal ⑥ to raise the engine speed.

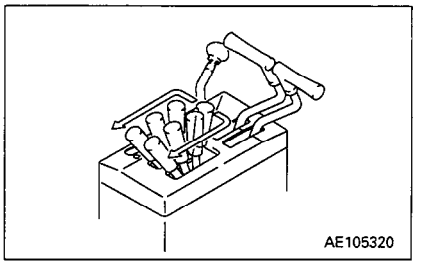


9. Release brake pedal ③ and the machine will start.



12.5 SHIFTING GEAR

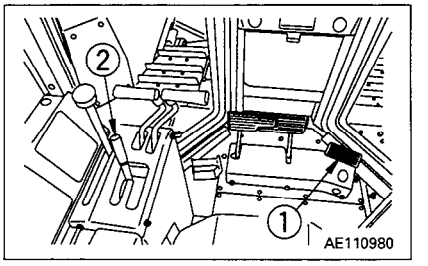
There is no need to stop machine to shift gears.
Set the gear shift lever in the desired position to shift gear.



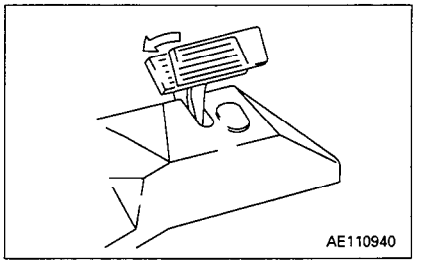
12.6 SHIFTING BETWEEN FORWARD AND REVERSE

⚠ WARNING

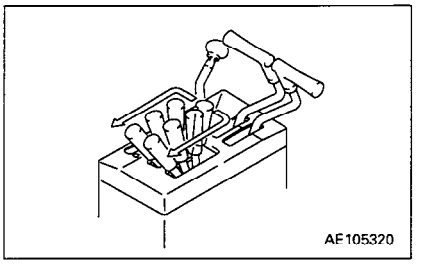
When shifting between forward and reverse, for safety reasons and to reduce shock, stop the machine first, then change the direction of travel.



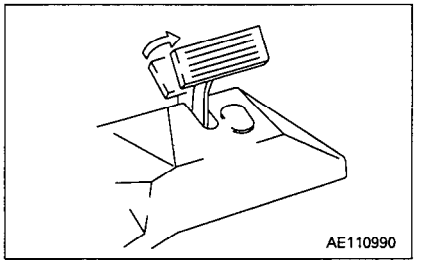
1. Depress decelerator pedal ① to reduce the engine speed.



2. Shift gear shift lever ② to the desired position.



3. Release decelerator pedal ① to raise the engine speed.



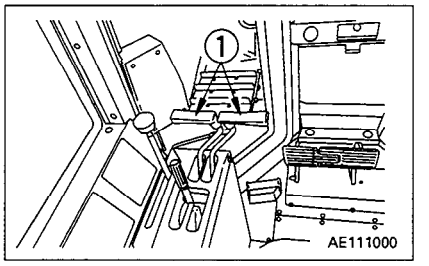
12.7 STEERING MACHINE

⚠ 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

To turn the machine while traveling, pull steering lever ① on the side to turn.

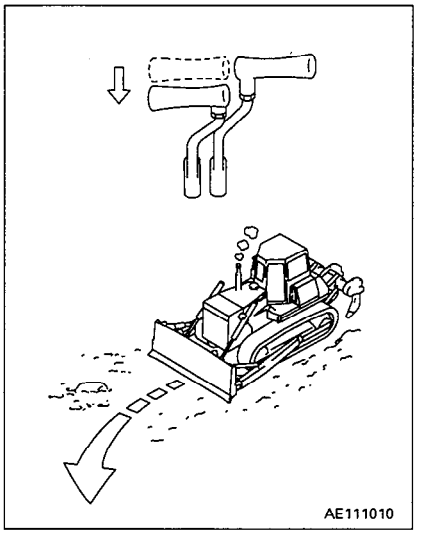


- Turning gradually to left while traveling forward

Pull the L.H. steering lever halfway (to the detent). The steering clutch will be disengaged, allowing the machine to make a gradual left turn.

REMARK

To make a gradual right turn, manipulate the R.H. steering lever in the same manner as described above.

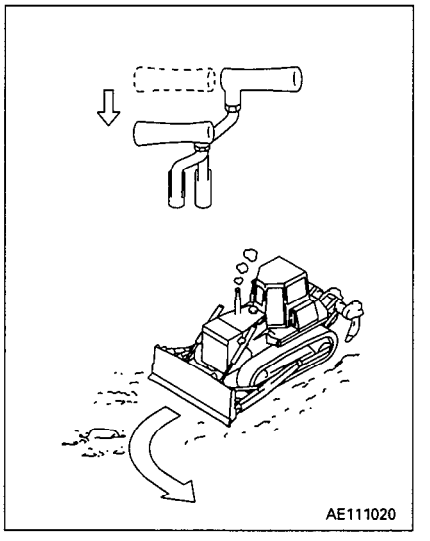


- Making sharp turns to left while traveling forward

Pull the L.H. steering lever all the way backward. The steering clutch will be disengaged and the steering brake will be applied.

REMARK

To make a pivot right turn, manipulate the R.H. steering lever in the same manner as described above.



12.7.2 TURNING WHILE DESCENDING A SLOPE

⚠ WARNING

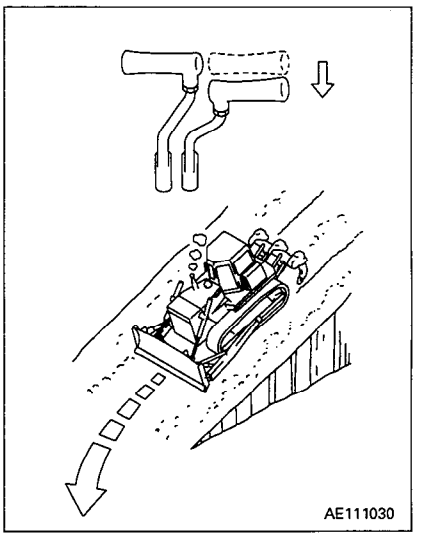
On steep downhill slopes where the machine may travel under its own weight, or on downhill slopes where it is being pushed by a towed machine, the machine will steer in the opposite direction, so do as follows.

- **Making gradual turns to left while traveling forward**

Pull the R.H. steering lever halfway to its stroke end. The machine will make a gradual left turn (compensation steering).

REMARK

To make a gradual right turn, manipulate the L.H. steering lever in the same manner as described above. (compensation steering)

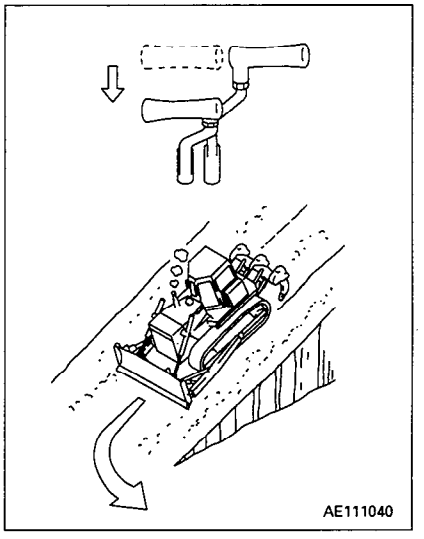


- **Making sharp turns to left while traveling forward**

Pull the L.H. steering lever all the way backward. Then, the machine will make a pivot left turn (no compensation steering).

REMARK

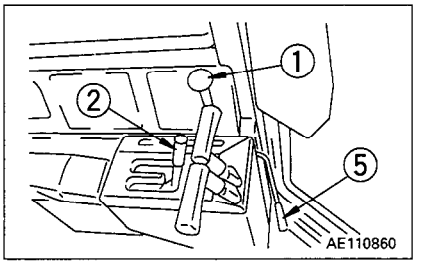
To make a pivot right turn, manipulate the R.H. steering lever in the same manner as described above. (no compensation steering)

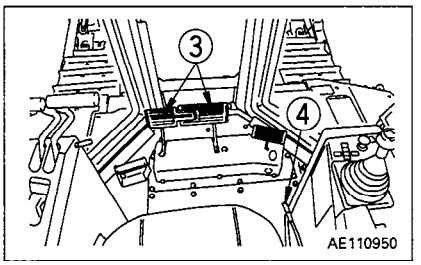


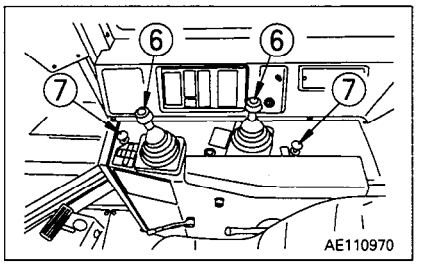
12.8 STOPPING MACHINE

⚠ WARNING

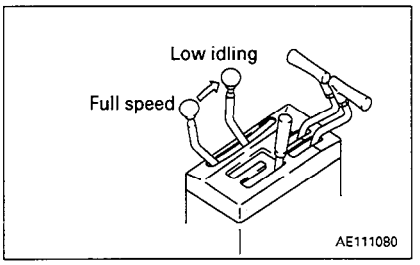
- **Avoid stopping suddenly. Give yourself ample room when stopping.**
- **When stopping the machine, select flat hard ground and avoid dangerous places. If it is unavoidably necessary to park the machine on a slope, place the parking lever in the LOCK position and insert blocks underneath the track 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.**



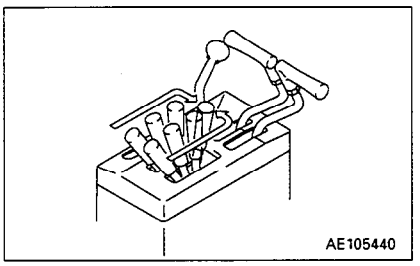




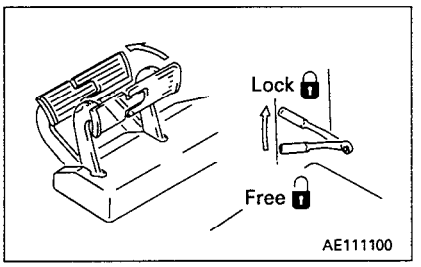
1. Lower engine speed by operating fuel control lever ①.



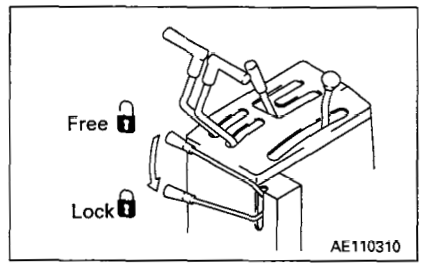
2. Place gear shift lever ② in the N (neutral) position.



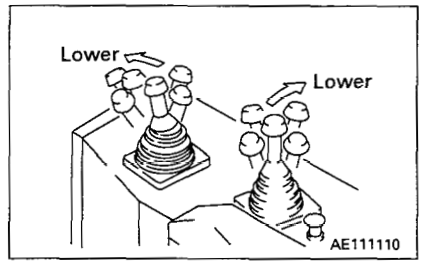
3. Depress the center of brake pedal ③ to apply the brake, then lock securely with brake lock lever ④.



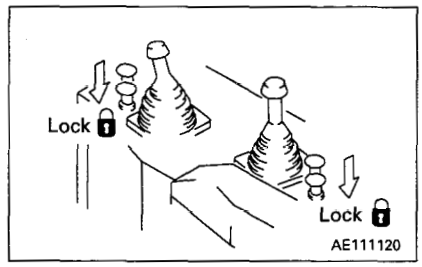
4. Lock gear shift lever ② with safety lever ⑤.



5. Put blade control lever ⑥ and ripper control lever ⑥ in the LOWER positions to lower the blade and the ripper to the ground.



6. Lock blade control lever ⑥ and ripper control lever ⑥ with safety locks ⑦.



12.9 PRECAUTIONS FOR OPERATION

12.9.1 PAY ATTENTION TO GAUGES

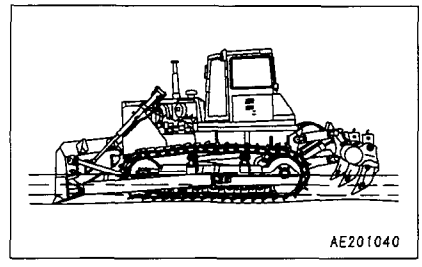
When the red range lights on the power train oil temperature gauge while operating, reduce load and wait for lowering of temperature.

12.9.2 METHOD OF USING STEERING CLUTCH

If the steering clutch one side is used frequently or if many gradual turns are made with steering clutch half-engaged, the steering clutch will wear out in a short time. Design the travel road well and steer the machine properly.

12.9.3 PERMISSIBLE WATER DEPTH

When working in water, operate the machine only within a depth where the center of the idler remains above the water surface. If the cooling fan goes into the water, the fan may break.



12.9.4 PRECAUTIONS WHEN TRAVELING UP OR DOWN HILLS

METHOD OF USING DECELERATOR PEDAL

If the decelerator pedal is depressed when traveling uphill, the engine speed will drop and the gradeability will be reduced. For this reason, the machine may stop and the engine may also stall.
If the engine stops, the braking effect will be reduced, so be careful not to let the engine stop when the decelerator pedal is depressed.
If the decelerator pedal is depressed too much and the machine stops, depress the brake pedal before the engine stops in order to apply the brake securely and hold the machine.

USE ENGINE AS A BRAKE

When traveling downhill, set the gear shift lever to low speed, run the engine at low speed, and use the engine as a brake.

Never go down hills with the gear shift lever at Neutral.

BRAKING WHEN TRAVELING DOWNHILL

When using the engine as a brake during downhill travel, use the service brake also. Using only the braking force of the engine may cause the engine to overrun.

In particular, when traveling downhill towing a scraper, if the transmission is shifted down, the engine will tend to overrun, so do not shift down while traveling downhill.

12.9.5 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.

Be careful of oil level

When operating machine on sloped areas of more than 20°, fill every place with oil to H level.

Precautions when engine stops on slopes

If the engine stops when working on traveling on a slope, depress the brake pedal immediately, lower the work equipment, and stop the machine. Then pull the brake lock lever to lock the brake pedal.
Next, return the gear shift lever to neutral, lock it in position, then start the engine again.

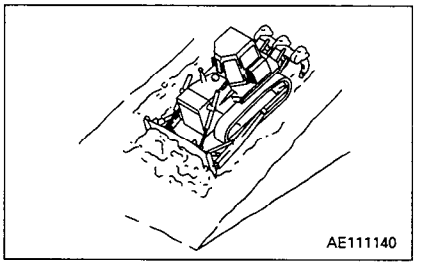
Precautions when stopping temporarily on slopes

When stopping the machine temporarily on slope, depress the brake pedal, stop the machine, then lock the brake pedal securely with the brake lock lever.

Never operate the fuel control lever or decelerator pedal to stop the machine on slopes.

12.10 WORK POSSIBLE USING BULLDOZER

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

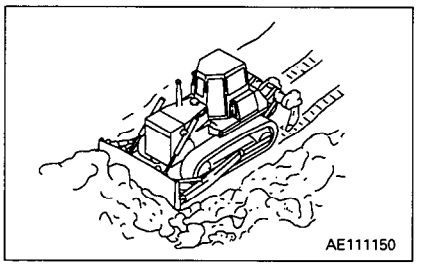

AE111140

12.10.1 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.

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

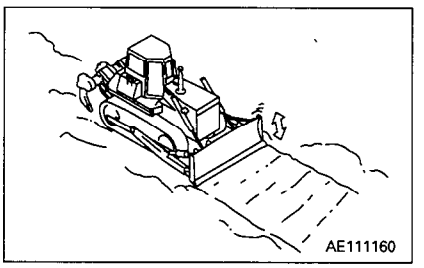

AE111150

12.10.2 SMOOTHING

NOTICE

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

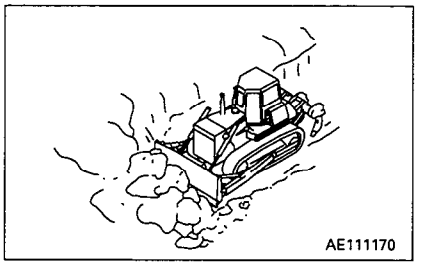
To finish the ground to a flat surface after digging or leveling, put a full load of soil in front of the blade and operate the blade up and down in small movements while traveling forward. Finally, place the blade at FLOAT and travel at low speed in reverse while pulling the blade over the ground surface. When doing this, to prevent damage to the blade, be careful not to travel over any stones or rocks.


AE111160

12.10.3 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.

If the ground is harder, use a ripper attachment for better efficiency.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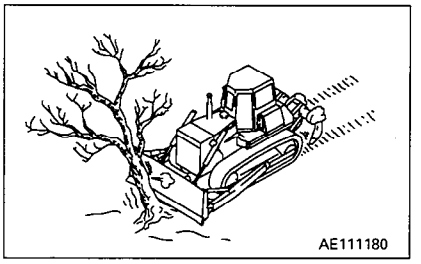
12.10.4 FELLING TREES, REMOVING STUMPS



NOTICE

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

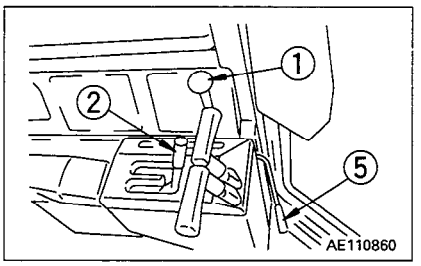
For trees with a diameter of 10 – 30 cm (3.9 – 11.8 in), raise the blade high and push 2 or 3 times to fell the tree.
Next, travel in reverse, and dig the corner of the blade into the ground to cut and dig up the roots.

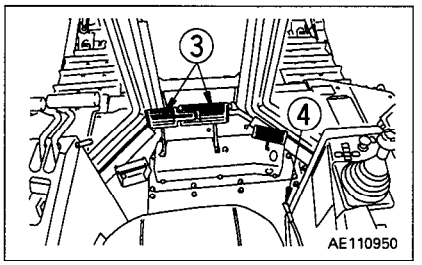
When doing this, never hit the tree at high speed or apply shock to fell the tree.

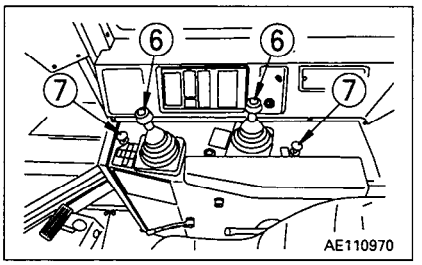
12.11 PARKING MACHINE

⚠ WARNING

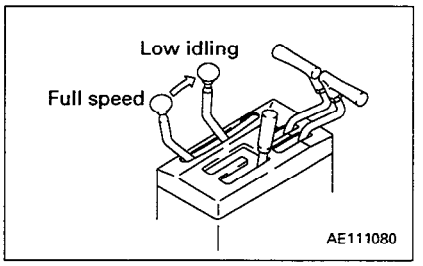
- **Avoid stopping suddenly. Give yourself ample room when stopping.**
- **When stopping the machine, select flat hard ground and avoid dangerous places. If it is unavoidably necessary to park the machine on a slope, place the parking lever in the LOCK position and insert blocks underneath the track 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.**



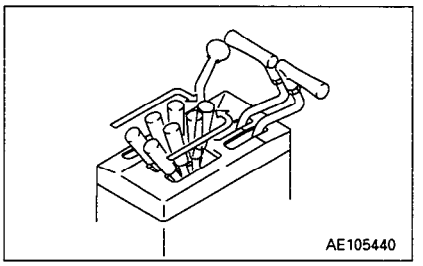




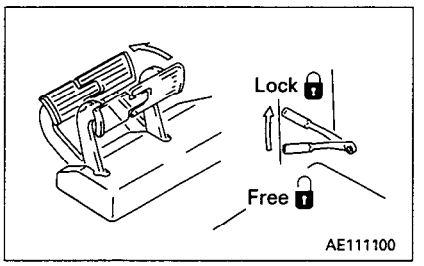
1. Lower engine speed by operating fuel control lever ①.



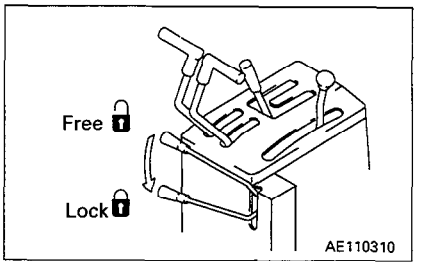
2. Place gear shift lever ② in the N (neutral) position.



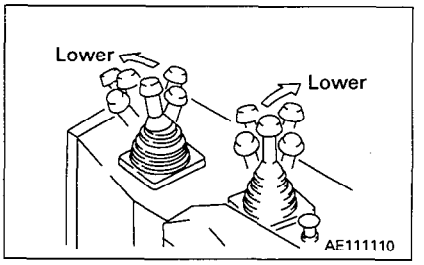
3. Depress the center of brake pedals ③ to apply the brake, then lock securely with brake lock lever ④.



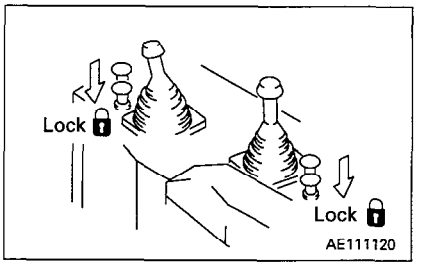
4. Lock gear shift lever ② with safety lever ⑤.



5. Put blade control lever ⑥ and ripper control lever ⑥ in the LOWER positions to lower the blade and the ripper to the ground.

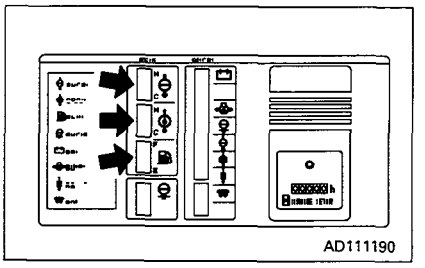


6. Lock blade control lever ⑥ and ripper control lever ⑥ with safety locks ⑦.

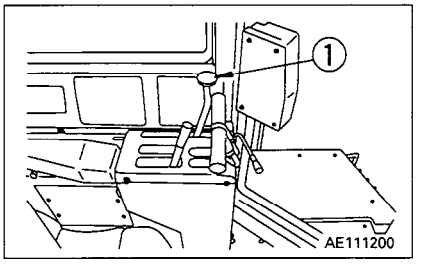


12.12 CHECK AFTER FINISHING WORK

1. Use the meters and caution lamps to check the engine water temperature, engine oil pressure, and fuel level.



12.13 STOPPING ENGINE

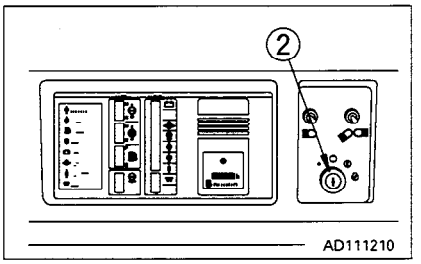


NOTICE

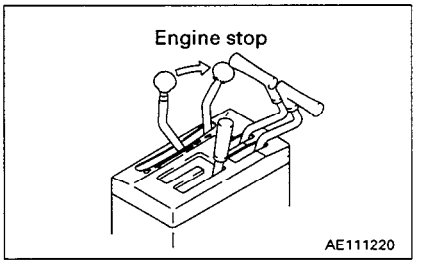
If the engine is abruptly stopped before it has cooled down, engine life may be greatly shortened. Consequently, do not abruptly stop the engine apart from an emergency.

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

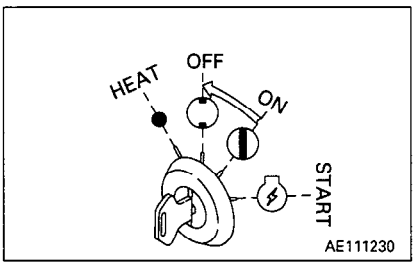
1. Run the engine at low idling speed for about 5 minutes to allow it to gradually cool down.



2. Place fuel control lever ① in the engine stop position and stop the engine.



3. Turn the key in starting switch ② to the OFF position and remove the key from starting switch ②.



12.14 CHECK AFTER STOPPING ENGINE

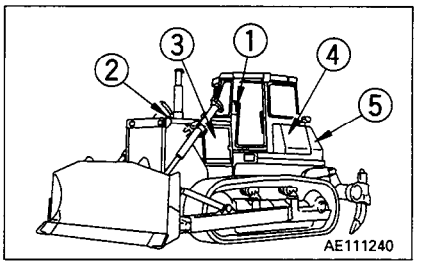
1. Walk around the machine and check the work equipment, paintwork, and undercarriage, and check also for leakage of oil or water. If any abnormalities are found, repair them.

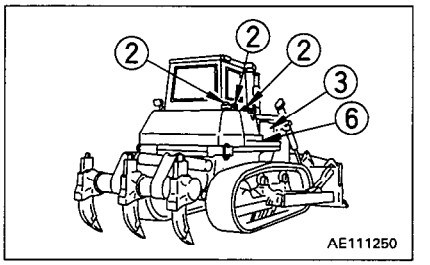
2. Fill the fuel tank.

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.

12.15 LOCKING





To prevent vandalism, there are locks at the following places. Places that can be locked with the starting switch key.

- Cab door opener ① (machines equipped with cab)
- Cap with lock ②
  - Radiator cap
  - Fuel tank cap
  - Hydraulic oil tank cap
  - Power train oil filler cap

Commercially available locks can be fitted to the following places.

- Right and left engine side cover ③
- Battery and air conditioner filter inspection cover ④
- Inspection cover for fuel tank drain valve ⑤
- Tool box ⑥

12.16 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.

12.16.1 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.

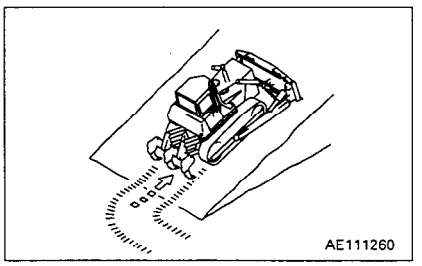
- Do not allow shoe slipping to occur during operation. If shoe slipping occurs, reduce load to the blade until slipping stops.

- 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.

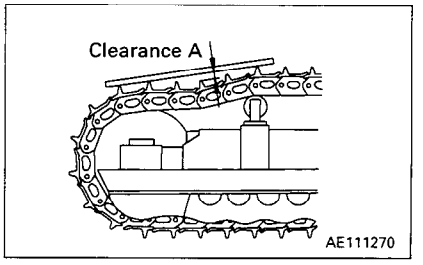
- On a slope, operate the machine parallel to the inclination of the slope. Do not operate across the slope. Also when stopping the machine on a slope, the machine should face toward the top of the slope.



- 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.

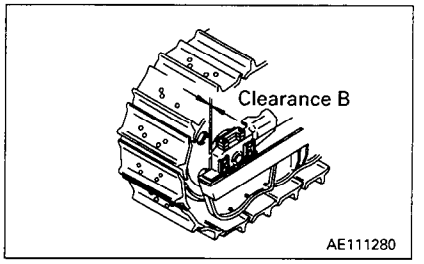
- Do not force the machine to carry out work that exceeds its working capability. Such work includes cases where the idler or sprocket come off the ground when the machine meets obstacles that resist the power of the machine during dozing or ripping operations.

12.16.2 INSPECTION AND ADJUSTMENT



- Properly adjust track tension.
  Tension should be measured at clearance Ⓐ 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 Ⓑ increases, idler may develop side motion and tracks may come off. (For inspection and adjustment procedures, refer to "24.2 WHEN REQUIRED".)

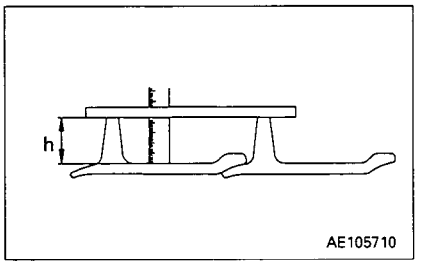
12.16.3 INSPECTION AND REPAIR

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.

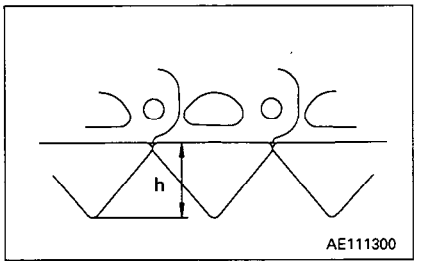
MEASURING HEIGHT OF GROUSER

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



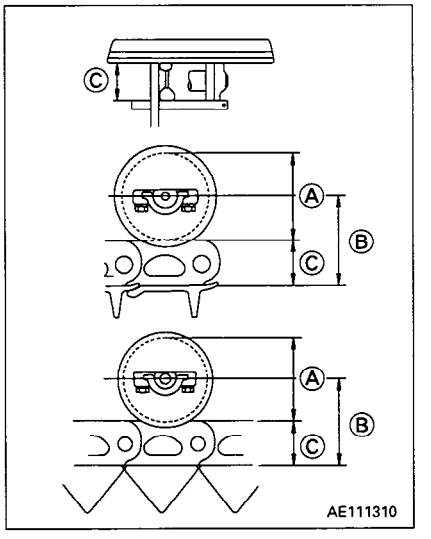
D85A, E
Standard height (h): 72 mm (2.8 in)
Repair limits : 25 mm (1.0 in)

D85P
Standard height (h): 123 mm (4.8 in)
Repair limits : 101 mm (4.0 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



D85A, E
Standard size (A): 222 mm (8.7 in)
Repair limits : 198 mm (7.8 in)

D85P
Standard size (A): 222 mm (8.7 in)
Repair limits : 198 mm (7.8 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

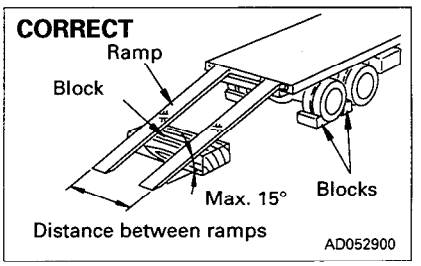
- **Make sure the ramp has sufficient width, length and thickness to enable the machine to be safely loaded and unloaded. If the ramp sags appreciably, reinforce it with blocks, etc.**
- **When loading and unloading the machine, park the trailer on a flat firm roadbed. Keep a fairly long distance between 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.**

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. Be sure that the two sides are at the same level as one another.

2. Determine the direction of the ramps, then slowly load or unload the machine by driving at 1st speed.

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



13.2 PRECAUTIONS FOR LOADING, AND SECURING THE MACHINE

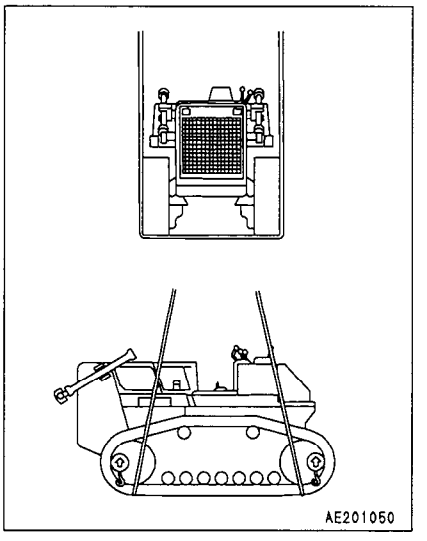
After loading to the specified position, secure the machine as follows.

1. Lower the work equipment slowly.
2. Lock all the control levers securely with the safety lever.
3. Set the parking lever to the LOCK position.
4. Set the fuel control lever to the engine STOP position and stop the engine. Then turn the starting switch to the OFF position and remove the key.
5. Lock the cab door, left and right engine side covers, and battery inspection cover.
6. Put blocks under the front and rear of the tracks, and secure with chains or wire rope of a suitable strength to prevent the machine from moving during transportation. Be particularly careful to prevent the machine from slipping to the side.

13.3 LIFTING POSITIONS

When lifting the machine, use the positions shown in the diagram on the right.

Always stop the engine and set the parking brake lever to the LOCK position.



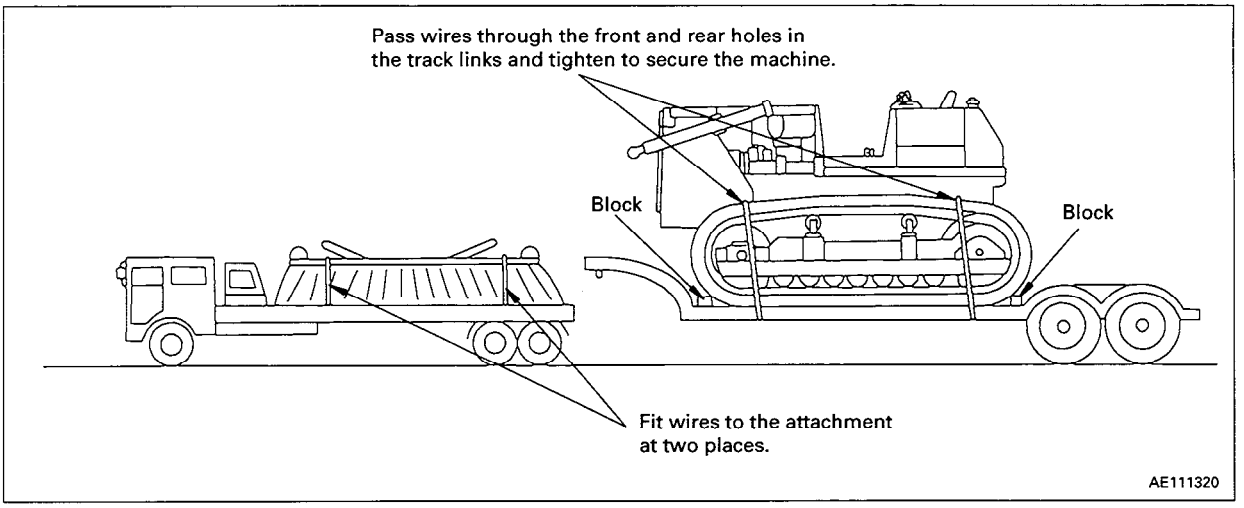
13.4 PRECAUTIONS FOR TRANSPORTATION

⚠ 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



For details of disassembly of the blade and ripper, please contact your Komatsu distributor.

13.5 REMOVING AND INSTALLING CAB

If it is necessary to remove the cab for transportation, do as follows.

⚠ WARNING

Always use lifting equipment of ample strength.

REMOVING AND INSTALLING CAB

If it is necessary to remove the cab when moving to a new job site, do as follows.

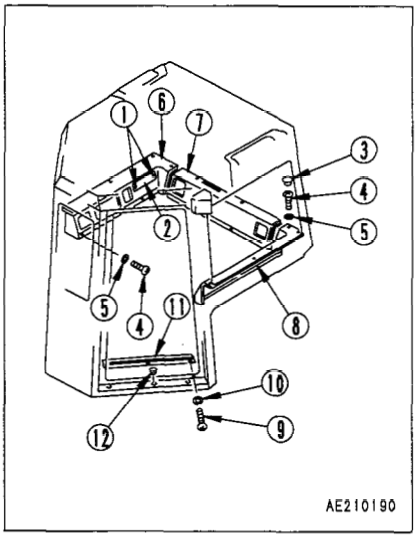
REMOVING CAB

Removing panels inside cab

1. Remove (pull out) left and right knobs ① of the car stereo, then loosen the nuts, and remove holder plate ②.
2. Remove 10 caps ③ installed to the top surface of the panel.
3. Remove 18 panel mounting screws ④ and washers ⑤, then remove panels ⑥ and ⑧.

Removing left and right door bottom plates

4. Remove mounting screws ⑨ and washers ⑩ (left and right: 6 places), then remove plates (11) (left and right: 2 places). *Plate ⑪ is the door seal protector plate.*



Removing blind caps for cab mounting bolts

5. Remove 7 blind caps ⑫ installed at the front under the cab and under the left and right doors.

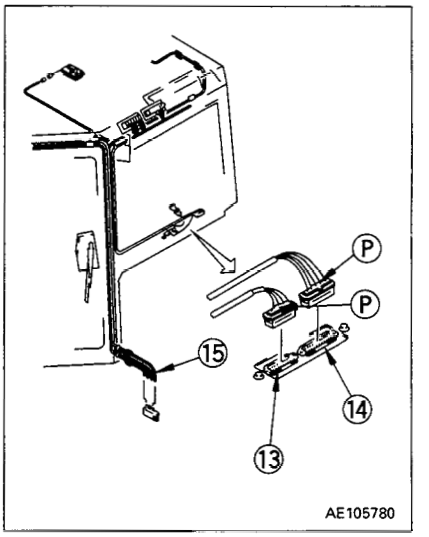
   After removing the cab, install blind caps ⑫ again.

Disconnecting connectors

6. Disconnect wiring harness connectors ⑬ and ⑭ (protruding from the left side of the cab).

Hold down protruding part Ⓟ of the connector with your finger, then pull up to remove.

Connector ⑬: Air conditioner power source, 17 pins
Connector ⑭: Cab, display power source, 21 pins



Disconnecting window washer hoses

7. Disconnect 4 hoses ⑮ (protruding from the left side of the cab).

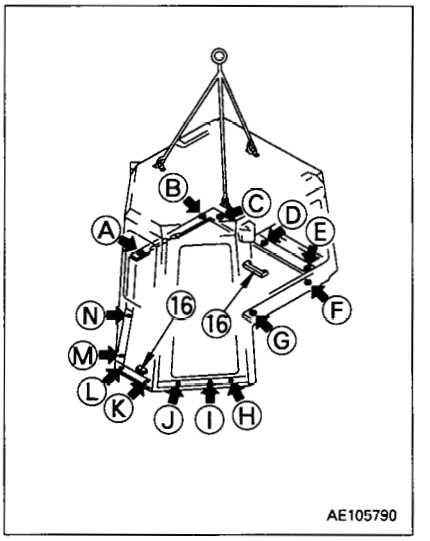
Pull hoses ⑮ up to remove.

Removing cab

8. Remove 14 cab mounting bolts Ⓐ to Ⓝ.

Remove 2 seal rubbers ⑯ (for blocking clearance) and keep in a safe place for use when installing the cab again.

Cab weight: Approx. 450 kg (992.3 lb)



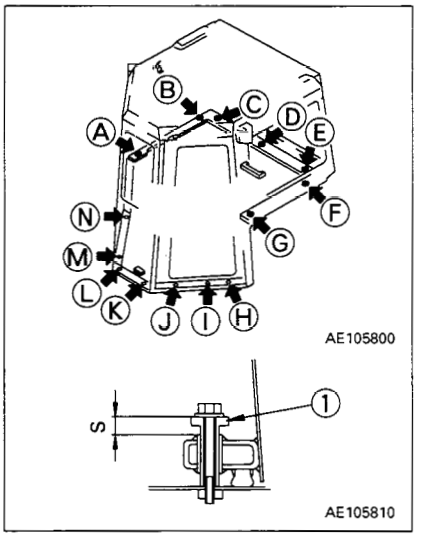
INSTALLING CAB

Connect and install all parts in the reverse order to removal.
For the following parts, do as follows.

- Installing cab
- Connecting control panel and control cables.

Installing cab

1. Install height adjustment joint ① (installed to the cab) so that dimension S in the diagram is less than 8 mm (0.32 in).



2. Lower the cab slowly from above the floor.

3. Align the cab with the floor frame, then install bolts and washers Ⓐ to Ⓝ.

   Do not tighten the bolts completely. Screw them in 3 or 4 turns.

4. Tighten bolts Ⓗ to Ⓝ fully.

⚠ CAUTION

Do not use a wrench to tighten after the tip of the adjustment joint contacts the surface of the floor frame. This will cause the cab or floor frame to deform and will generate initial stress.

- When tightening bolts Ⓗ to Ⓝ, check that adjustment joint ① installed to Ⓐ to Ⓖ is not in contact with the floor frame mounting surface.

5. Tighten adjustment joints ① at Ⓐ to Ⓖ until they contact the floor frame mounting surface.

6. After adjusting the joint, tighten cab mounting bolts Ⓐ to Ⓖ.

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 do 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%	1.26	1.27	1.28	1.29
80%	1.24	1.25	1.26	1.27
75%	1.23	1.24	1.25	1.26

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 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".

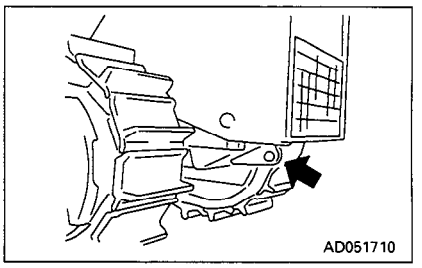
16.2 METHOD OF TOWING MACHINE

⚠ 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.

Permissible load for towing hook: 19500 kg (191230 N)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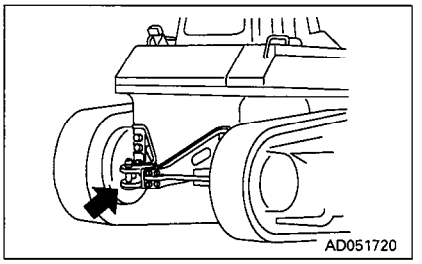
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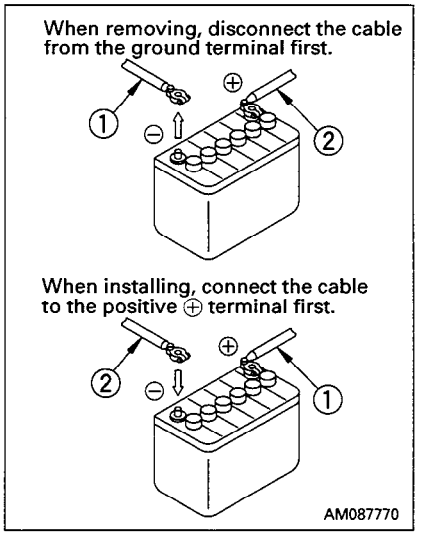
16.3 IF BATTERY IS DISCHARGED

⚠ 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.**



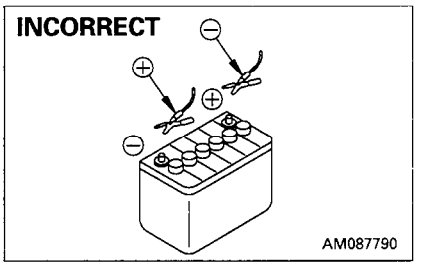
16.3.1 STARTING ENGINE WITH BOOSTER CABLE

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

PRECAUTIONS WHEN CONNECTING AND DISCONNECTING BOOSTER CABLE

⚠ WARNING

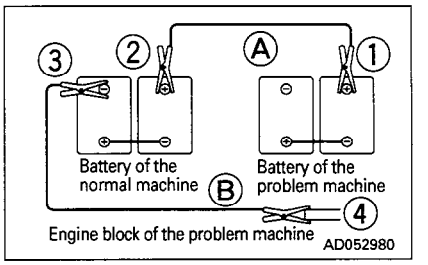
- **When starting the engine from another machine, connect the batteries in parallel.**
- **When connecting the cables, never contact the positive ⊕ and negative ⊖ terminals.**
- **When starting the engine with a booster cable, always wear safety glasses.**
- **Be careful not to let the normal machine 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 OFF position.

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

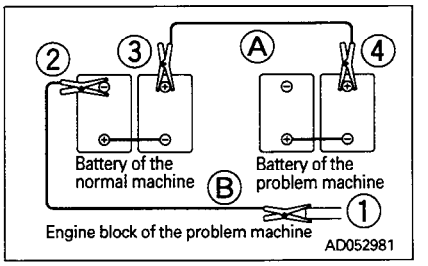
1. Make sure that the starting switches of the normal machine and problem machine are both at the OFF position.
2. Connect one clip of booster cable Ⓐ to the positive ⊕ terminal of the problem machine.
3. Connect the other clip of booster cable Ⓐ to the positive ⊕ terminal of the normal machine.
4. Connect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

   If the engine doesn't start at first, try again after 2 minutes or so.

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 Ⓑ 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 Ⓐ from the positive ⊕ terminal of the problem machine.

16.4 OTHER TROUBLE

- ( ): 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.

16.4.1 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 level monitor 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	(• Check, repair) • Charge
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
Pre-heating monitor does not light	• Defective wiring • Defective heater relay • Defective heater signal	(• Check, repair) (• Replace) (• 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 level monitor 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)

16.4.2 CHASSIS

Problem	Main causes	Remedy
Torque converter oil pressure does not rise	• Entry of air or leakage of oil caused by damage or improper tightening of oil pipe, pipe joint • Wear, scuffing of gear pump • Lack of oil in transmission case • Clogged oil filter element strainer in transmission case	• Check, repair (• Check, replace) • Add oil to specified level. • Clean
Torque converter overheats	• Loose fan belt • Engine water temperature is high • Clogged oil cooler • Oil pressure is too low • Insufficient flow of oil due to worn gear pump	• Replace belt • See section related to engine (• Clean or replace) • See above (• Replace gear pump)
Torque converter oil temperature gauge does not work	• Defective oil temperature gauge • Defective contact in wiring	(• Replace oil temperature gauge) (• Check, repair)
Lack of drawbar pull (travel speed does not rise)	• Lack of engine horsepower • Torque converter oil pressure is too low • Steering clutch is slipping	• See section related to engine • See above (• Check, repair)
Machine does not move off even when gear shift lever is placed in position	• Lack of oil in steering clutch case • Transmission oil pressure does not rise • Steering clutch is slipping ○ Wear, scuffing of gear pump ○ Clogged oil strainer element in steering clutch case	• Add oil to specified level (• See "Torque converter oil pressure does not rise") (○ Check, replace) ○ Clean
When steering lever is pulled on one side, machine does not turn and travels straight	• Brake on side which is pulled has no effect	• Adjust
When brake pedal is depressed, machine does not stop	• Defective brake adjustment • Defective brake band	• Adjust • Check, repair
Track comes off	• Track too loose or too tight	• Adjust tension
Abnormal wear of sprocket	• Track too loose or too tight	• Adjust tension
Blade rises slowly or does not rise at all (or blade tilt speed is slow)	• Lack of hydraulic oil	• Add oil to specified level
Steering lever is heavy	• Defective adjustment of play • Defective actuation of control valve ○ Lack of oil	• Adjust ○ Add oil to specified level
Ripper operation is slow (D85A,E only)	• Lack of hydraulic oil	• Add oil to specified level
Ripper lacks power (D85A, E only)	• Leakage of oil from piping	• Tighten

16.4.3 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 (sucking in 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	• 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	• 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 o Defective valve clearance	• Add fuel, see CHECK BEFORE STARTING • Repair place where air is sucked in (• Replace pump or nozzle) See ELECTRICAL SYSTEM (o 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 breathing 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

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.

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
Transmission case Transfer case (incl. bevel gear) Steering clutch 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-ACL) 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 "24.1.1 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	Q'ty	Replacement frequency
Transmission filter	175-49-11580 (07000-02115)	Element (O-ring)	1 (1)	Every 250 hours sevice
Steering oil filter	175-49-11580 (07000-02115)	Element (O-ring)	1 (1)	
Engine oil filter	600-211-1230	Cartridge	1	Every 500 hours service
Bypass oil filter	600-212-1510	Cartridge	1	
Fuel filter	600-311-8292	Cartridge	1	
Hydraulic oil filter	07063-01100 (07000-05150)	Element (O-ring)	1 (1)	Every 1000 hours service
Corrosion resistor	600-411-1150	Cartridge	1	
Air cleaner	6125-81-7032	Element ass'y	1	–
	600-181-4300	Outer element ass'y	1	
Blade (D85A,E • Tiltdozer)	154-70-11314 154-81-11191 150-70-21356 150-70-21346 (154-71-41270) (154-70-22270) (01643-21845)	Cutting edge Cutting edge End bit (left) End bit (right) (Bolt) (Nut) (Washer)	1 2 1 1 (32) (32) (32)	–
Blade (D85A,E • Angledozer D85P • Tiltdozer)	154-70-11314 150-70-21356 150-70-21346 (154-71-41270) (154-70-22270) (01643-21845)	Cutting edge End bit (left) End bit (right) (Bolt) (Nut) (Washer)	3 1 1 (36) (36) (36)	–

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	30 ℓ 7.9 US gal 6.6 UK gal	27 ℓ 7.1 US gal 5.9 UK gal
Steering clutch case (incl. transmission, torque converter)		SAE 30 SAE 10W	122 ℓ 32.2 US gal 26.8 UK gal	90 ℓ 23.8 US gal 19.8 UK gal
Final drive case (each)		SAE 30	(D85A, E) 41 ℓ 10.8 US gal 9.0 UK gal (D85P) 51 ℓ 13.5 US gal 11.2 UK gal	(D85A, E) 41 ℓ 10.8 US gal 9.0 UK gal (D85P) 51 ℓ 13.5 US gal 11.2 UK gal
Hydraulic system		SAE 10W	(D85A, E Tiltdozer) 122 ℓ 32.2 US gal 26.8 UK gal (D85A, E Angledozer) 116 ℓ 30.6 US gal 25.5 UK gal (D85P Tiltdozer) 102 ℓ 26.9 US gal 22.4 UK gal	–
Fuel tank	Diesel fuel	ASTM D975 No.2 ※	480 ℓ 126.7 US gal 105.6 UK gal	–
Cooling system (incl. sub-tank)	Water	Add antifreeze	79 ℓ 20.9 US gal 17.4 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

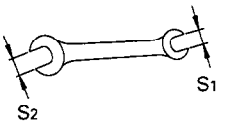
No.	Supplier	**Engine Oil [CD or CE]** SAE10W, 30, 40 10W30, 15W40 (The 15W40 oil marked * is CE.)	**Gear Oil [GL-4 or GL-5]** SAE80, 90, 140	**Grease [Lithium-Base]** NLGI No. 2	**Anti-freeze Coolant [Ethylene Glycol Base] Permanent Type**
1	KOMATSU	EO10-CD EO30-CD EO10-30CD EO15-40CD	GO90 GO140	G2-LI G2-LI-S	AF-ACL AF-PTL AF-PT (Winter, one season type)
2	AGIP	Diesel sigma S Super dieselmulti-grade *Sigma turbo	Rotra MP	GR MU/EP	–
3	AMOCO	*Amoco 300	Multi-purpose gear oil	RYKON prenium grease	–
4	ARCO	*Arcofleet S3 plus	Arco HD gear oil	Litholine HEP 2 Arco EP moly D	–
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	Glacelf
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]** 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**
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 NE	FINA marson EPL2	FINA tamidor
16	SHELL	Rimula 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 startex antifreeze coolant
19	TOTAL	Rubia S *Rubia X	Total EP Total transmission TM	Multis EP2	Antigel/antifreeze
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	09000-30006	Applicable width across flats (S_1 – S_2) 8 mm – 10 mm, 12 mm – 14 mm 13 mm – 17 mm, 19 mm – 22 mm 24 mm – 27 mm, 30 mm – 32 mm  AD053370
2	Screwdriver	09033-00190	Interchangeable flat-head and cross-head type
3	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
4	Wrench	09002-03641	Applicable width across flats 36 mm – 41 mm
5	Wrench	09002-04146	Applicable width across flats 41 mm – 46 mm
6	Wrench	09001-04600	
7	Hammer	09039-00150	
8	Plier	09036-00150	
9	Bar	09055-10390	
10	Filter wrench	09019-08035	For filter cartridges
11	Grease pump	07952-80002	For greasing work
12	Nozzle	07951-11400	For grease pump
13	Grease cartridge	07950-90403	(Lithium base grease, 400 g)
14	Gauge	09054-00009	

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

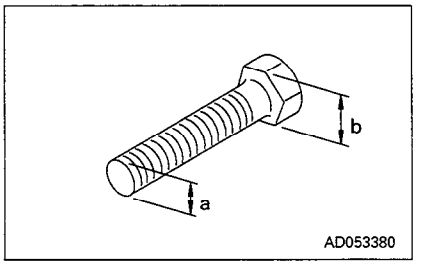
21.2 TORQUE LIST

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 ⓑ 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



Thread diameter of bolt (mm) (a)	Width across flat (mm) (b)	Ⓣ Ⓗ AD054300		
		Nm	kgm	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.

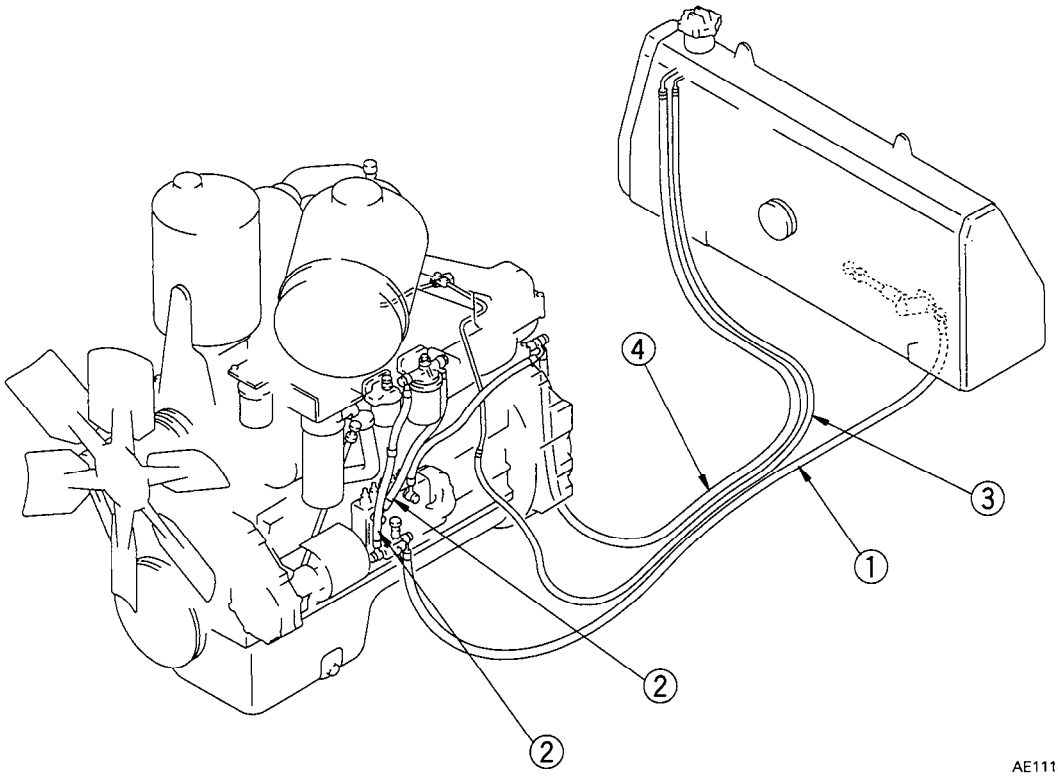
However, if these parts show any abnormality before the replacement interval has passed, they should be repaired or replaced immediately.

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.

No.	Safety critical parts for periodic replacement	Q'ty	Replacement interval
1	Fuel hose (fuel tank – injection pump)	1	Every 2 years or 4000 hours, whichever comes sooner
2	Fuel hose (injection pump – fuel filter)	2	
3	Fuel return hose (injection pump – fuel tank)	1	
4	Fuel return hose (injection nozzle – fuel tank)	1	
5	Hose (blade valve – blade lift cylinder)	10	
6	Transmission filter outlet hose	1	
7	Hose (transmission pump – transmision filter)	1	
8	Steering filter outlet hose	1	
9	Hose (steering pump – steering filter)	1	
10	Hose (oil cooler – transmission)	1	
11	Hose (torque converter – oil cooler)	1	
12	Seat belt	1	Replace every 3 years



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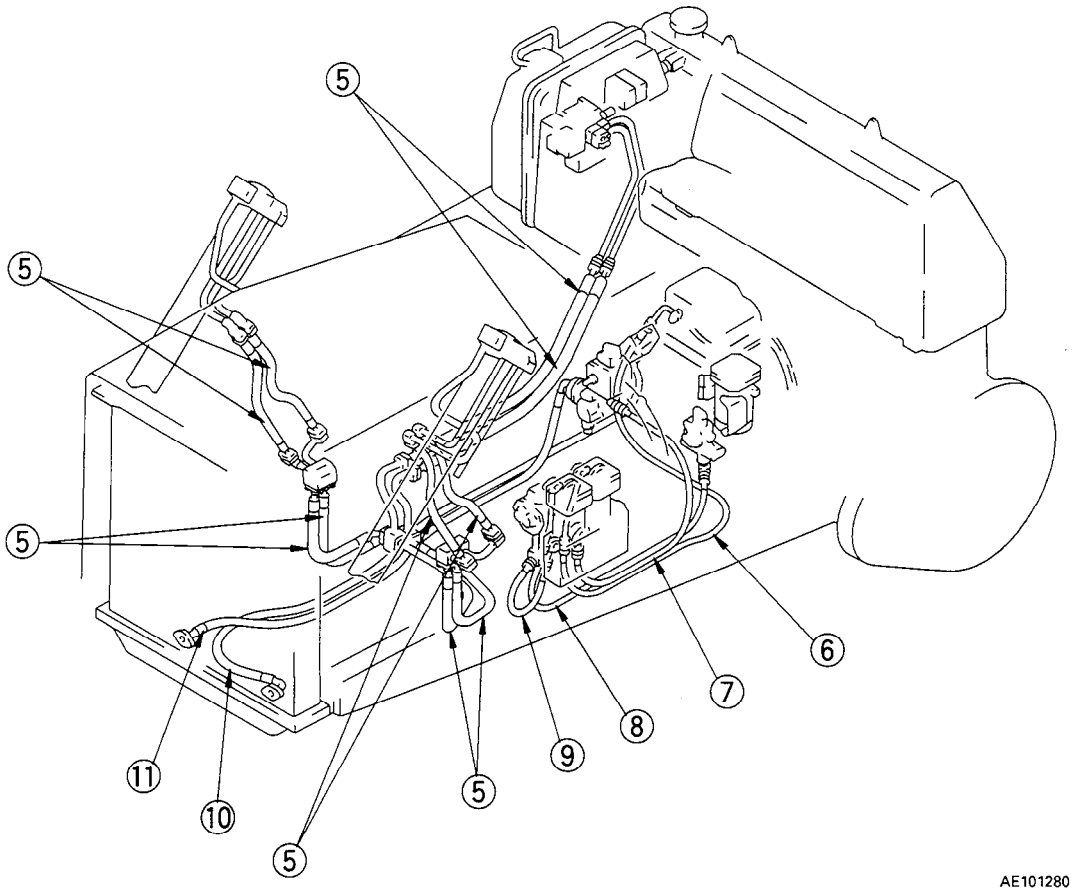

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23. MAINTENANCE SCHEDULE CHART

23.1 MAINTENANCE SCHEDULE CHART

24. SERVICE PROCEDURE

24.1 INITIAL 250 HOURS SERVICE

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

- **REPLACE FUEL FILTER CARTRIDGE**
- **CHANGE OIL AND CLEAN STRAINER STEERING CLUTCH CASE (INCL. TRANSMISSION CASE AND TORQUE CONVERTER CASE)**
- **CHANGE OIL IN FINAL DRIVE CASE**
- **CHANGE OIL IN HYDRAULIC TANK, REPLACE HYDRAULIC 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 coolant 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.

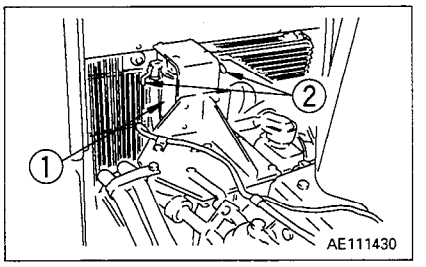
Mixing rate of water and antifreeze

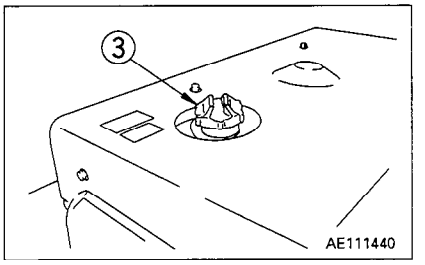
Min. atmospheric temperature	°C	–5	–10	–15	–20	–25	–30
	°F	23	14	5	–4	–13	–22
Amount of antifreeze	ℓ	18.2	23.7	28.4	32.4	36.3	39.5
	US gal	4.8	6.3	7.5	8.6	9.6	10.5
	UK gal	4.0	5.2	6.3	7.1	8.0	8.7
Amount of water	ℓ	60.8	55.3	50.6	46.6	42.7	39.5
	US gal	16.1	14.6	13.4	12.3	11.3	10.4
	UK gal	13.4	12.2	11.1	10.3	9.4	8.7

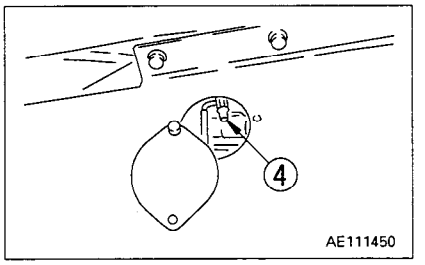
- We recommend use of an antifreeze density gauge to control the mixing proportions.

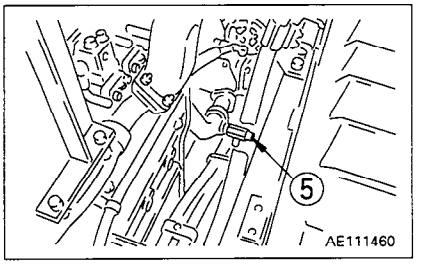
- Use city water for the cooling water.
  If river water, well water or other such water supply must be used, contact your Komatsu distributor.

1. Stop the engine and close valves ② of corrosion resistor ①.
2. Turn radiator cap ③ slowly to remove it.
3. Set a container to catch the coolant under drain valve ④ and drain plug ⑤. Open drain valve ④ at the bottom of the radiator and drain plug ⑤ on the side face of the oil cooler to drain the water.
4. After draining the water, close drain valve ④ and drain plug ⑤, and fill with city water.
5. Open drain valve ④ and drain plug ⑤, run the engine at low idling, and flush water through the system for 10 minutes. When doing this, adjust the speed of filling and draining the water so that the radiator is always full.
   While flushing water through the system, watch carefully that the water inlet hose does not come out of the radiator water filler.
6. After flushing, stop the engine, open drain valve ④ and drain plug ⑤, then close it again after all the water has drained out.
7. After draining the water, clean with a flushing agent.
   When washing, follow the instructions given with the detergent.
8. After flushing, open drain valve ④ and drain plug ⑤, completely drain all the water, then close the drain valve and drain plug, and fill with city water up to near the filler port.
9. When the tank is filled to near the water filler port, open drain valve ④ and drain plug ⑤, start the engine, run at low idling, and continue the flushing operation until clean water comes out.
   Adjust the amount of water flowing in and out to ensure that the radiator is always full during the flushing operation.
10. When clean water comes out, stop the engine, and close drain valve ④ and drain plug ⑤.
11. Replace corrosion resistor ① and open valves ②.
    For details on the corrosion resistor replacement method, see "24.6.7 REPLACE CORROSION RESISTOR CARTRIDGE".
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. Stop the engine, wait for 3 minutes, and city water until the water level reaches near the water filler port, then tighten the cap.









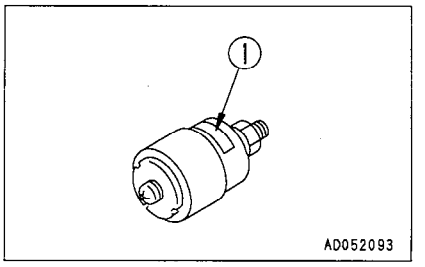
24.2.2 CHECK, CLEAN AND REPLACE AIR CLEANER ELEMENT

⚠ 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.**

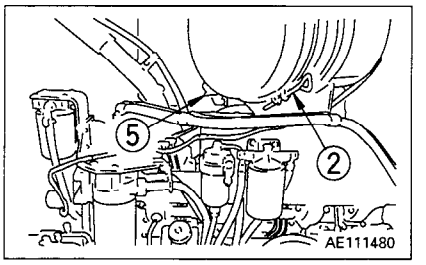
Checking

Whenever the red piston in dust indicator ① appears, clean the air cleaner element.

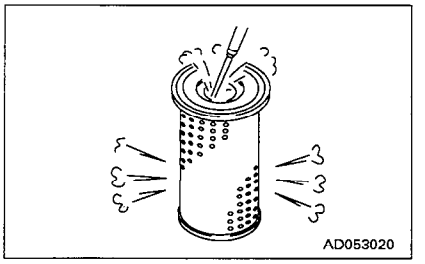


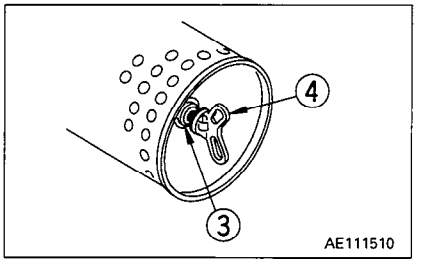
Cleaning or replacing outer element

1. Loosen bolt ②, remove the cover and the outer element.
2. Clean the air cleaner body interior and the dust cup.



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 dust indicator red piston appears 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 ③ or wing nut ④ with new parts if they are broken.
   6) Remove evacuator valve ⑤ and clean with compressed air. After cleaning, install it.



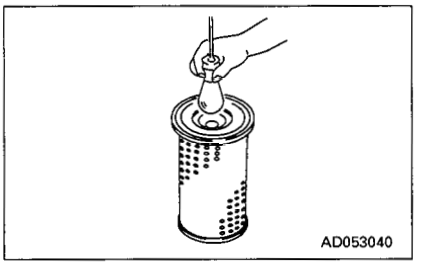


NOTICE

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.

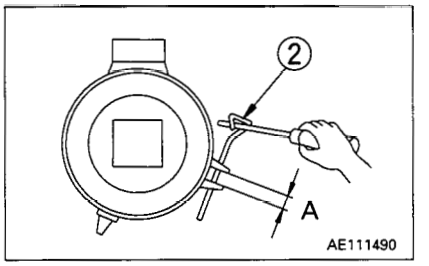
Do not use an element whose folds or gasket or seal are damaged.

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



4. Set the cleaned element and the cover.

Tighten wing nut ② so that distance A at the inside face of the clamp is 17 ± 2 mm (0.67 ± 0.08 in).



Replacing inner element

1. First remove the cover and 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 and the cover.
6. After replacing the element, return the red piston in the dust indicator to its original position.

24.2.3 CHECK TRACK TENSION

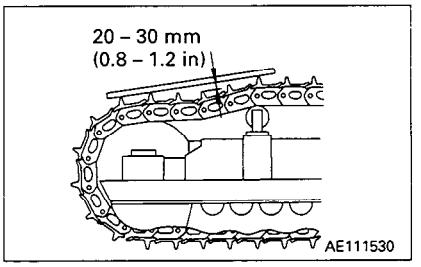
The wear of pins and bushings on the undercarriage will vary with the working conditions and soil properties. It is thus necessary to continually inspect the track tension so as to maintain the standard tension.

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.

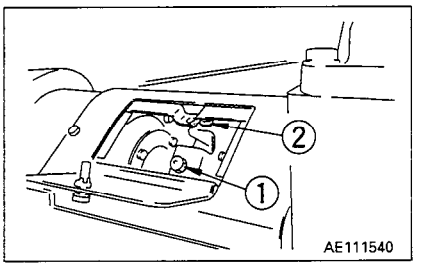
If the track tension is not at the standard value, adjust it in the following manner.



ADJUSTMENT

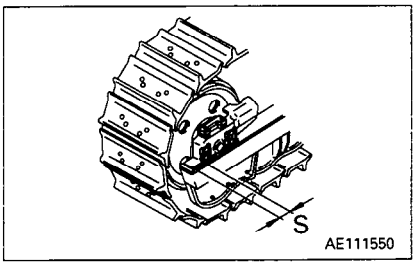
⚠ WARNING

Grease inside the adjusting mechanism is under high pressure. Grease coming from lubricator ② under pressure can penetrate the body causing injury or death. For this reason, do not loosen lubricator ② more than one turn. Do not loosen any part other than lubricator ②. Furthermore, do not bring your face in front of grease fitting ①.
If the track tension is not relieved by this procedure, please contact your Komatsu distributor.



- **When increasing tension**

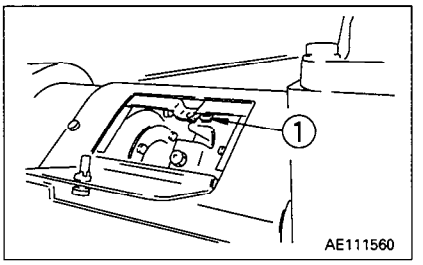
1. Pump in grease through grease fitting ① with a grease pump.
2. To check that the correct tension has been achieved, move the machine backwards and forwards.
3. Check the track tension again, and if the tension is not correct, adjust it again.
4. Continue to pump in grease until S becomes 0 mm. If 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.



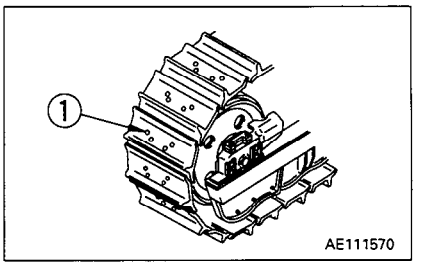
1. Loosen lubricator ① gradually to release the grease.
2. Turn lubricator ① a maximum of one turn.
3. If the grease does not come out smoothly, move the machine backwards and forwards a short distance.
4. Tighten lubricator ①.
5. To check that the correct tension has been achieved, move the machine 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 392 ± 39 Nm (40 ± 4 kgm, 289 ± 29 lbft)) then check that the nut and shoe are in close contact with the link contact surface.

2. After checking, tighten a further 130 ± 10°.

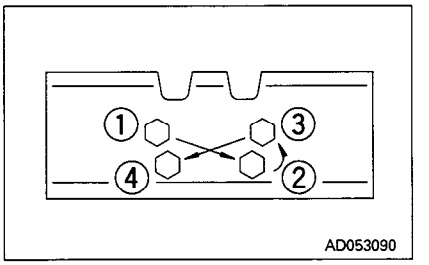
- **Method for tightening (master link connecting bolt)**

1. First tighten to a tightening torque of 392 ± 39 Nm (40 ± 4 kgm, 253 ± 29 lbft) then check that the link contact surfaces are in close contact.

2. After checking, tighten a further 120 ± 10°.

Order for tightening

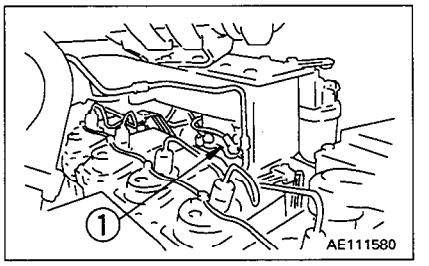
Tighten the bolts in the order shown in the diagram on the right.



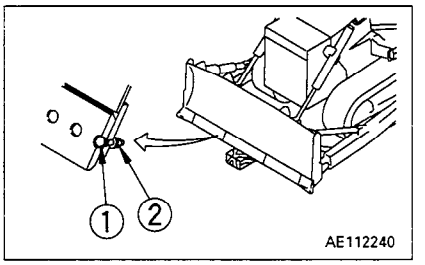
24.2.5 CHECK ELECTRICAL INTAKE AIR HEATER

Before the start of the cold season (once a year), contact your Komatsu distributor to have electrical intake air heater ① repaired or checked for dirt or disconnections.

When inspecting and replacing electrical air heater ①, replace the gaskets with new ones.



24.2.6 REVERSE AND REPLACE THE END BITS AND CUTTING EDGES



⚠ WARNING

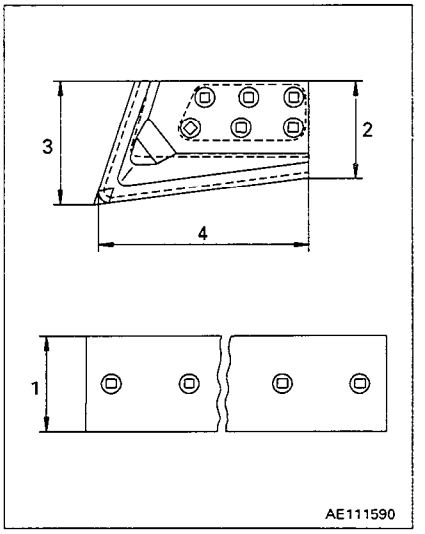
It is dangerous if the work equipment moves by mistake when the cutting edges and end bits are being reversed or replaced. Set the work equipment in a stable condition, then stop the engine and lock the blade control lever securely with the safety lever.

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	Standard dimension	Repair limit
1	Height of cutting edge	254(10.0)	213 (8.4) (To 140 (5.5) after after turning)
2	Height of outside of end bit	292(11.5)	211 (8.3)
3	Height of inside of end bit	254(10.0)	211 (8.3)
4	Width of end bit	435(17.1)	360(14.2)

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: 628 ± 78 Nm (64 ± 8 kgm, 463 ± 58 lbft)

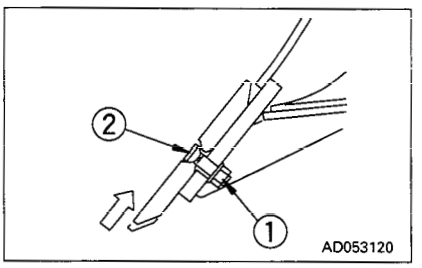
If bolt ① and nut ② are damaged, replace them with new ones at the same time.

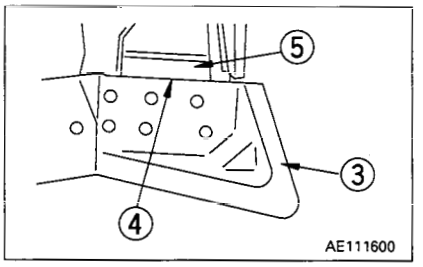
Loosen nut ① and remove bolt ②, then replace or turn over.

1) Install the edge to the blade and tighten temporarily, then push the blade against the ground surface to remove any play in bolt ②, and tighten to the specified tightening torque.

2) When installing end bit ③, bring top surface 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 REPLACING RIPPER POINT, PROTECTOR

⚠ WARNING

It is extremely dangerous if the work equipment moves during the replacement operation.
Set the work equipment in a stable condition, stop the engine, then lock the ripper controller lever securely with the safety lock.

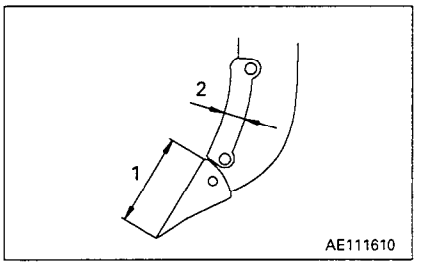
Replace the ripper point and protector before they exceed the wear limit.

1. Raise the ripper to a suitable height, then put a block under the ripper to prevent it from coming down.
   Push the safety lock to set to the LOCK position.

2. Measure the wear of the ripper point and protector according to the following wear standards.

Wear standards Unit: mm (in)

Item		Judgement standard	
No.	Measurement point	Standard dimension	Repair limit
1	Point	335 (13.2)	225 (8.9)
2	Protector	113 (4.5)	93 (3.7)



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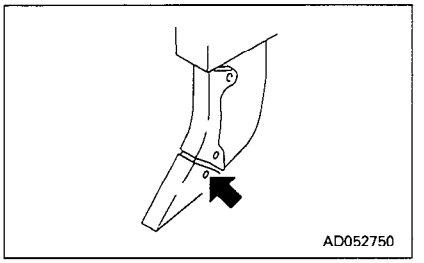
If the part is worn, replace it with a new part.

3. Using a hammer, remove the point or protector mounting pin in the direction shown by the arrow, then clean the mounting surface.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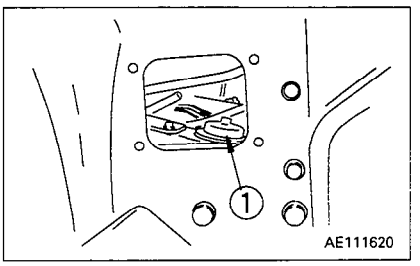
4. Install the new point or protector.
   If the mounting pin is damaged, replace it at the same time.

24.2.8 ADJUSTING BRAKE PEDAL

If the travel of the brake pedal is too large, the brake lining is probably worn, so adjust as follows.

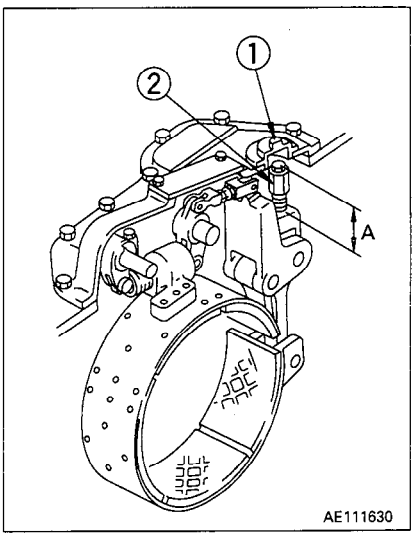


ADJUSTMENT METHOD

Adjust both the left and right brakes.

1. Remove the cover at the rear of the fender, then remove brake inspection cover ①.
2. Tighten adjustment bolt ② (tightening torque: 49 Nm (5 kgm, 36 lbft)) to bring the lining into tight contact with the drum.
3. Turn adjustment bolt ② back approx. 1 – 1/6 turn.
4. Depress the brake pedal and check that the brake travel is within the standard value.

   Engine stopped: 75 mm (2.96 in)
   Engine at idling: 110 – 130 mm (4.33 – 5.12 in)

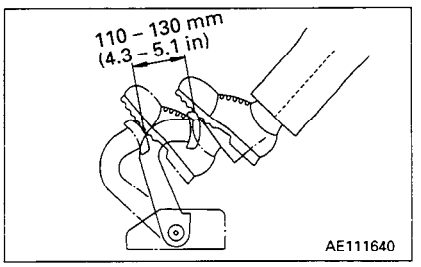


NOTICE

Adjust so the travel of the left and right pedals is the same. If there is a difference, the brakes will pull to one side.

5. Measure dimension A of the brake adjustment bolt, and if it is less than 71 mm (2.80 in), replace the lining.

If the braking effect is still poor even after adjusting, please contact your Komatsu distributor for repairs.



24.2.9 ADJUSTING IDLER CLEARANCE

The idler moves forward and backwards under external force. When this happens, the side guide and top and bottom guide plates will wear.

If these parts are worn too much, the idler will move to the side or be at an angle, and the track may come off or wear unevenly. To prevent this, adjust as follows.

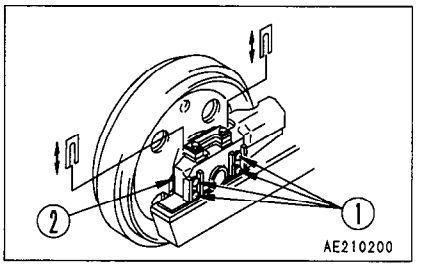
ADJUSTING IN SIDEWAYS DIRECTIONS

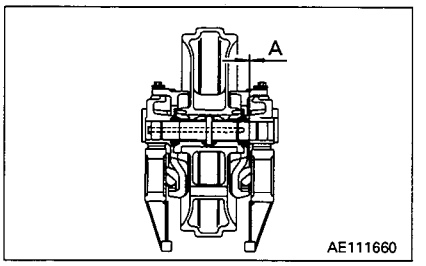
1. Drive the machine for 1 – 2 m on flat ground, then measure clearance A (left, right, inside, and outside: 4 places) between the track frame and guide plates.

2. If clearance A is more than 4 mm (0.16 in), loosen bolt ① and remove shim ② to adjust the clearance on one side to 0.5 – 1 mm (0.02 – 0.04 in).

   There are two thicknesses of shim: 0.5 mm (0.02 in), 1.0 mm (0.04 in).

   When loosening bolt ①, do not loosen it more than 3 turns.

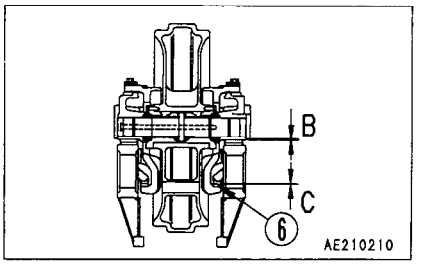


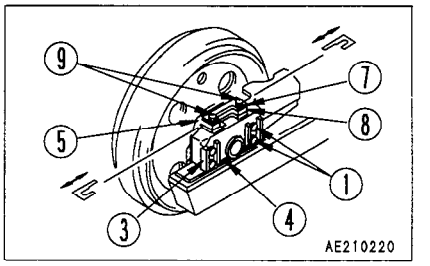


ADJUSTING IN VERTICAL DIRECTION

If the total (B + C) of clearance B (clearance between support ③ and guide plate ④) and clearance C (clearance between top and bottom guide ⑤ and wear plate ⑥ of track frame) is more than 5 mm (0.20 in), remove the necessary amount of shim ⑥ as follows, and add to shim ⑧ to adjust clearance B + C to 2 mm (0.08 in).

When the condition is normal, C = 0 mm (0 in).





1. To calculate the amount of adjustment, measure clearance B, then subtract 2 mm (0.08 in) from that value to obtain the adjustment amount.
   Example: Clearance B = 5 mm (0.20 in)
   Adjustment amount = 5 – 2 = 3 mm (0.12 in)

2. Loosen bolts ⑨ (inside, outside: x 4) until there is no response to the spring.

3. Loosen bolt ①. When doing this, do not loosen it more than 3 turns.

4. Using a bar, pull up top and bottom guides ⑤, set clearance C to 0, then remove the amount of shims measured in Step 1.

5. Add removed shims ⑦ on top of shim ⑧.
   (left, right, inside, and outside: total 8 places)

When doing this, check that the total shim thickness for shim ⑦ and shim ⑧ is the same before adjustment and after adjustment at all places.

If any shims are discarded or added, the built-in spring will not function properly.

There are two thicknesses of shim: 2 mm (0.08 in), 1 mm (0.04 in)

6. Tighten spring holder bolt ⑨.

7. Tighten bolt ① to the specified tightening torque.
   Tightening torque: 549 ± 59 Nm (56 ± 6 kgm, 405 ± 43 lbft)

The possible amount of adjustment at this part is a maximum of 6 mm (0.24 in).

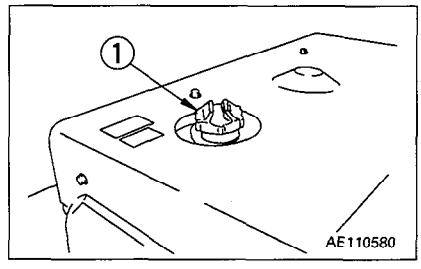
24.3 CHECK BEFORE STARTING

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

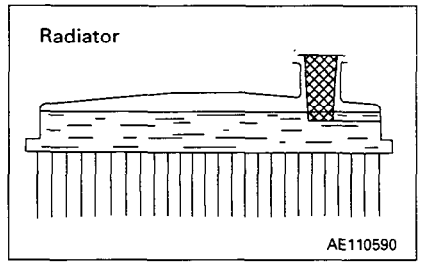
24.3.1 CHECK COOLANT LEVEL, ADD WATER

⚠ WARNING

Do not open the radiator cap while cooling water is hot. Hot water may spout out.
When removing cap, wait until the water temperature goes down and release radiator pressure little by little by loosening cap slowly, then remove the cap.



1. Remove radiator cap ① and check that coolant is above the bottom of the strainer as shown in the diagram. If necessary, add water through filler of radiator cap ①.
2. After adding water, start the engine, check the water level again after a five-minute idling, and add water if necessary.
3. Tighten cap ① securely.



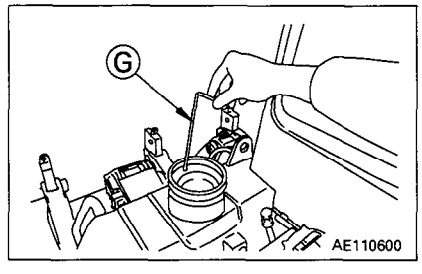
NOTICE

Do not rely only on the radiator water level monitor to check the coolant level.

24.3.2 CHECK FUEL LEVEL, ADD FUEL

⚠ WARNING

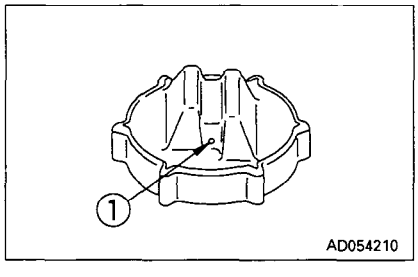
When adding fuel, never let the fuel overflow. This may cause a fire. If you spill fuel, thoroughly clean up any spillage.



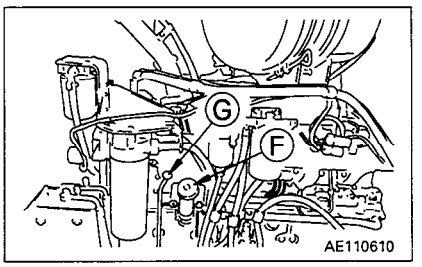
1. Remove dipstick Ⓖ and wipe the oil off with a cloth.
2. Insert dipstick Ⓖ fully in the oil filler pipe, then take it out again.
3. After completing work, fill the fuel tank through oil filler port. For details of the fuel to use, see "20. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".
4. After adding fuel, tighten the cap securely.
   Fuel capacity: 480 ℓ (127 US gal, 106 UK gal)

NOTICE

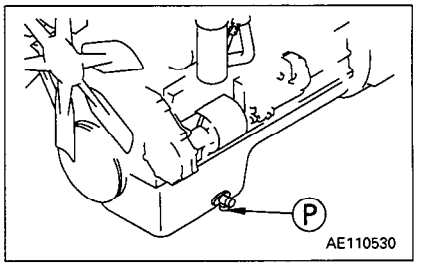
If breather hole ① on the cap is clogged, the pressure in the tank will drop and fuel will not flow. Clean the hole from time to time.

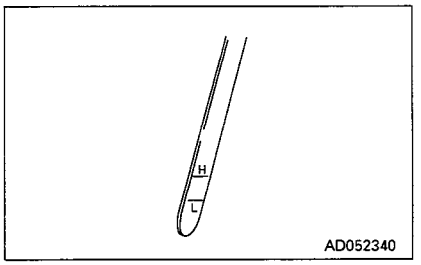


24.3.3 CHECK OIL LEVEL IN ENGINE OIL PAN, ADD OIL



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.

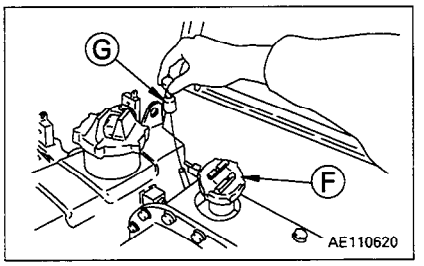




REMARK
- When stopping the engine, check the oil level.
- When checking the oil level after the engine has been operated, wait for at least 15 minutes after stopping the engine before checking.
- If the machine is at an angle, make it horizontal before checking.
- While adding oil, take out the oil level gauge through the gauge guide to bleed the air from the crankcase.

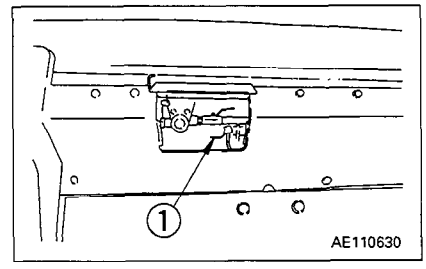
24.3.4 CHECK OIL LEVEL IN STEERING CLUTCH CASE (INCL. TRANSMISSION CASE, TORQUE CONVERTER CASE), ADD OIL

1. Remove dipstick Ⓖ and wipe the oil off with a cloth.
2. Insert dipstick Ⓖ 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 Ⓖ.
   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".
4. If the oil is above the H mark, drain the excess engine oil from the drain pulg, and theck the oil level again.
5. If the oil level is correct, tighten the oil filler cap securely and cloth the engine side cover.



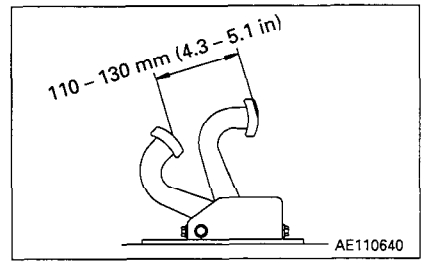
REMARK
- When check the oil level after the engine has been operated, wait for at least 15 minutes after stopping the engine before checking.
- If the machine is at an angle, make it horizontal before checking.
- In case the work is carried out on sloped land of more than 20° declination, supply oil up to H level.

24.3.5 DRAIN WATER, SEDIMENT FROM FUEL TANK



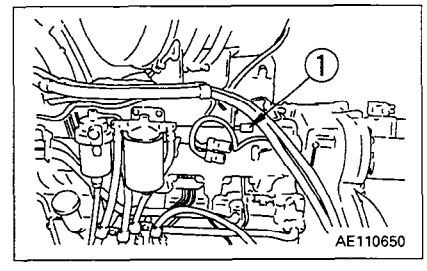
1. Open the cover at the bottom of the fuel tank.
2. Loosen valve ①, and drain the fuel together with the water and sediment accumulated at the bottom of the tank.
3. When only clean fuel comes out, close drain valve ①.

24.3.6 CHECK BRAKE PEDAL TRAVEL



1. Run the engine at low idling
2. Depress the brake pedal all the way until it stops.
   The distance of travel at the center of the pedal 110 – 130 mm (4.3 – 5.1 in).
3. The brake fails to work, please contact your Komatsu distributor for adjustment.

24.3.7 CHECK DUST INDICATOR



1. 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".

24.3.8 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.

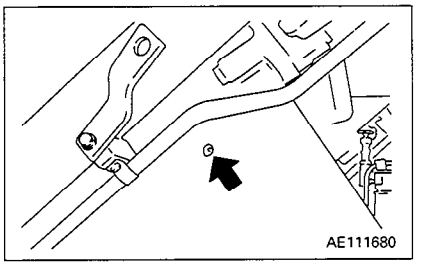
When carrying walk-around checks or checks before starting, always check if there is any accumulation of flammable material around the battery, and remove such flammable material.

24.4 EVERY 250 HOURS SERVICE

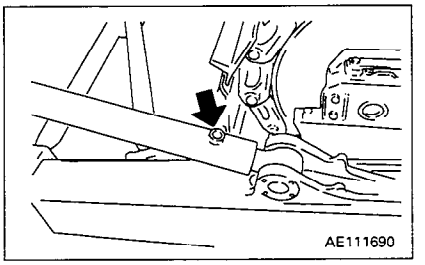
24.4.1 LUBRICATING

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.

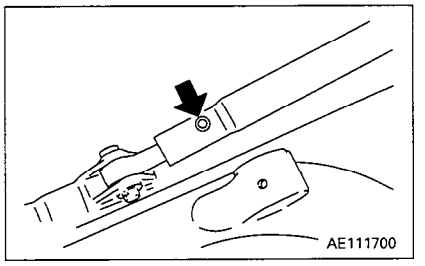
1. Fan pulley (1 place)



2. Brace screw
   - Tiltdozer (1 place)

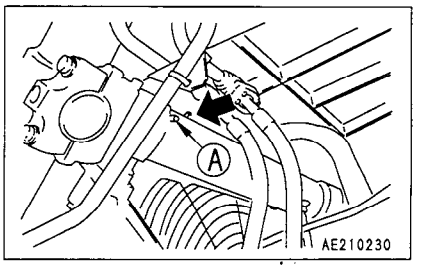


   - Angledozer (2 places)

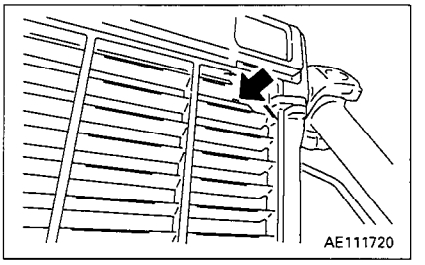


3. Cylinder support shaft (2 places)

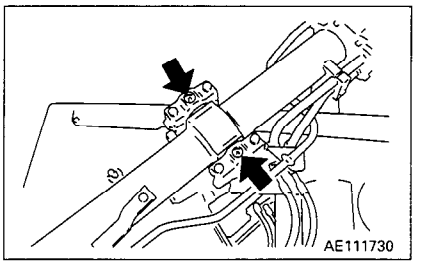
- D85A, E
  Replenish grease till it flows out of valve Ⓐ and the rotating section.



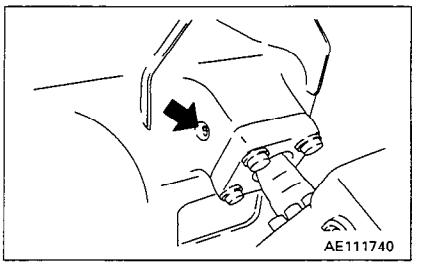
- D85P
  Replenish grease till it flows out the dust seal of the rotating section.



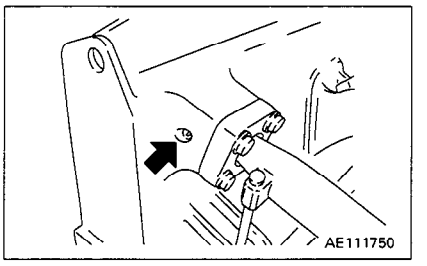
4. Cylinder support yoke (4 places)



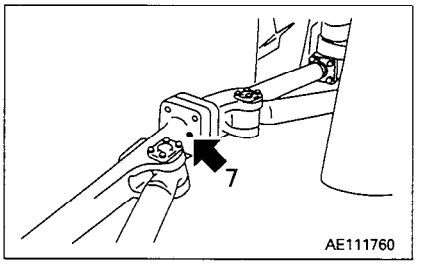
5. Tilt cylinder ball joint (1 place)

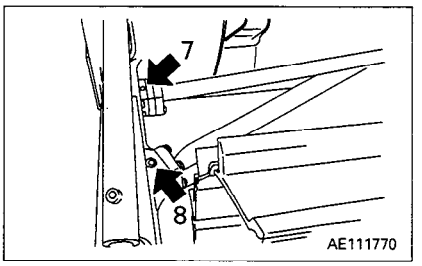


6. Brace ball joint (1 place) (only tiltdozer)

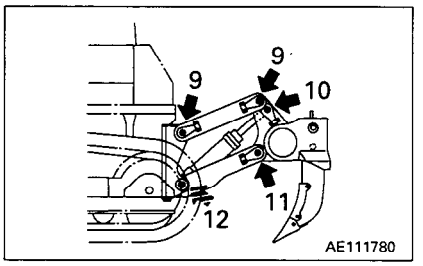


7. Arm ball joint (3 places) (only tiltdozer)
8. Oblique arm ball joint (2 places) (only tiltdozer)

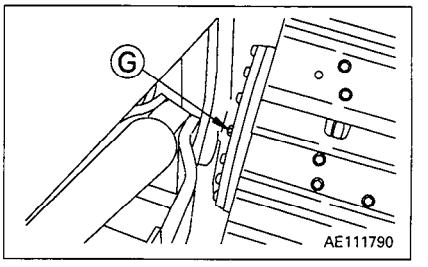




9. Ripper top link (8 places)
10. Ripper cylinder rod end (2 places)
11. Ripper bottom link pin (boom end) (4 places)
12. Ripper bottom link (bracket end) (6 places)



24.4.2 CHECK OIL LEVEL IN FINAL DRIVE CASE, ADD OIL



⚠ WARNING

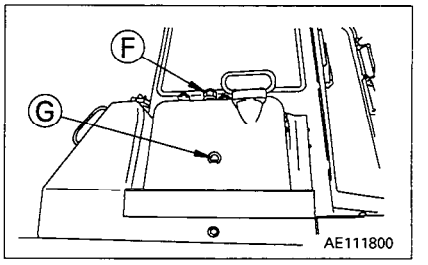
The oil is at high temperature immediately after the machine has been operated. Wait for the oil to cool down before starting the operation.

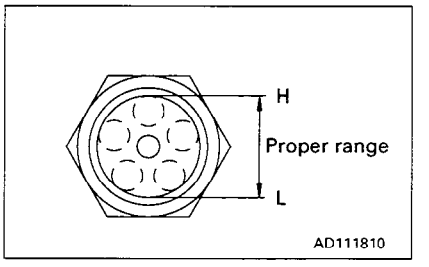
1. Remove plug Ⓖ and check whether the final drive case is filled with oil to lower edge of the plug hole.

2. If the oil level is still too low, add engine oil through the plug hole until the oil overflows.

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

24.4.3 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.**
- **If oil has been added to above the H mark, stop the engine and wait for the hydraulic oil to cool down, then drain the excess oil from the drain plug.**

NOTICE

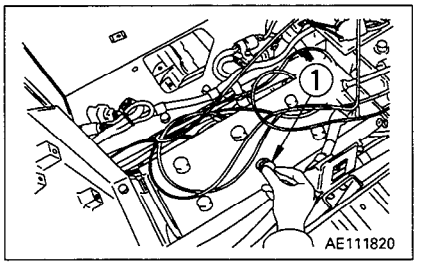
Do not add oil if the level is above the H line. This will damage the hydraulic equipment and cause the oil to spurt out.

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 Ⓖ.

2. If the 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".

24.4.4 CHECK LEVEL OF BATTERY ELECTROLYTE

Carry out this check before operating the machine.



⚠ WARNING

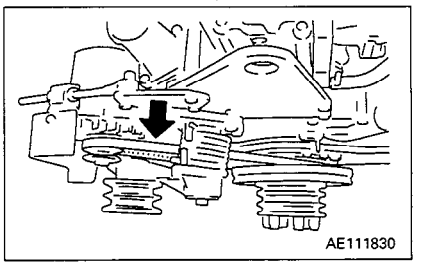
- **To avoid gas explosions, do not bring fire or sparks near the battery.**
- **Battery electrolyte is dangerous. If it gets in your eyes or on your skin, wash it off with large amounts of water, and consult a doctor.**

1. Open the cover at the rear of the operator's compartment.
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. Clean the air hole in the battery cap, then tighten the cap securely.

NOTICE

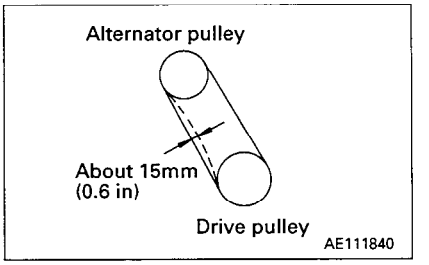
When adding distilled water in cold weather, add it before starting operations in the morning to prevent the electrolyte from freezing.

24.4.5 CHECK ALTERNATOR DRIVE BELT TENSION, ADJUST



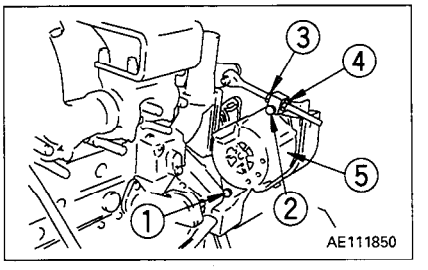
Checking

The belt should normally deflect by 15 mm (0.59 in) when pressed with the finger (with a force of approx. 6 kg (13.2 lb)) at a point midway between the alternator pulley and drive pulley.



Adjusting

1. Loosen bolts nuts ① and ②.



2. Measure the deflection at the center of the belt when it is pushed with a force of approx. 6 kg (13.2 lb).
   Deflection more than 15 mm (0.59 in) → increase belt tension
   Deflection less than 15 mm (0.59 in) → loosen belt tension

3. When loosening the belt, loosen nut ③ and adjust so that the deflection of the belt is approx. 15 mm (0.59 in) (at approx. 6 kg (13.2 lb)).
   After adjusting, tighten nut ④.

4. When increasing the belt tension, loosen nut ④, and adjust with nut ③ so that the belt deflection is approx. 15 mm (0.59 in) (at approx. 6 kg (13.2 lb)).
   After adjusting, tighten nut ④.

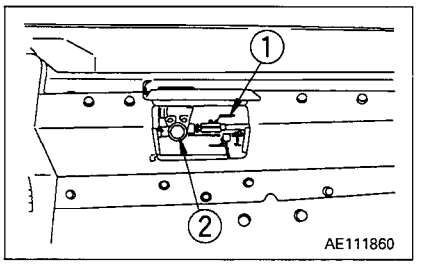
5. Tighten the bolts ① and ② to fix alternator ⑤ in position.

6. Check each pulley for damage, wear of the V-groove, and wear of the V-belt. In particular, be sure to check that the V-belt is not touching the bottom of the V-groove.

7. If the V-belt is elongated and cannot be adjusted any further, or if there are any cuts or cracks, replace the V-belt.

8. When the new belt is set, readjust it after operation for an hour.

24.4.6 CLEAN STRAINER AT BOTTOM OF FUEL TANK

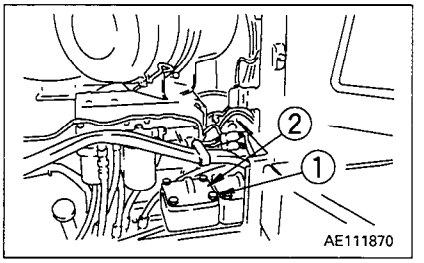


1. Tighten valve ① at the bottom of the fuel tank.
2. Remove cap ②.

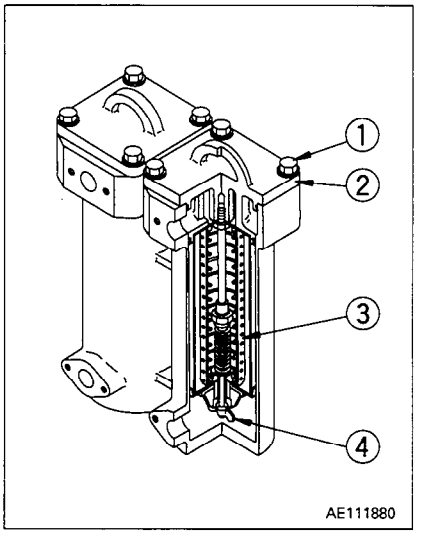
REMARK
Cap ② is brazed, so remove the strainer together with cap ②.

3. Wash the strainer and strainer case.
4. Install cap ② securely.

24.4.7 REPLACE TRANSMISSION FILTER ELEMENT AND STEERING OIL FILTER ELEMENT (2 PLACES)



1. Remove bolt ①, then pull up cover ②.
   The element and valve can be removed together with cover ②.
2. Remove wing nut ④ of the valve, then clean the inside of the case and the removed parts.
3. Replace element ③ with a new element, then install with wing nut ④.
4. Install cover ② with bolt ①.



24.5 EVERY 500 HOURS SERVICE

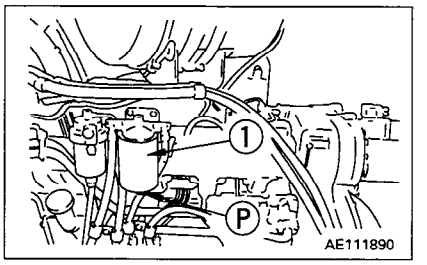
Maintenance for every 250 hours service should be carried out at the same time.

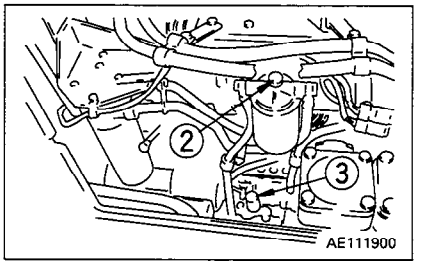
24.5.1 REPLACE FUEL FILTER CARTRIDGE

⚠ 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.**

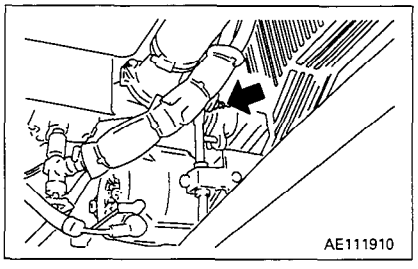
Prepare a filter wrench and a container to catch the fuel.





1. Set the container to catch the fuel under the filter cartridge.
2. Remove drain plug Ⓟ at the bottom of the filter, and drain the oil.
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. After replacing filter cartridge ①, loosen air bleed plug ②.
7. Loosen the knob of feed pump ③, then operate it up and down until no more bubbles come out with the fuel from air bleed plug ②.
8. Tighten air bleed plug ②, then push in the knob of feed pump ③ and tighten it.
9. 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 – 3 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 4 – 9 to install the filter cartridge.

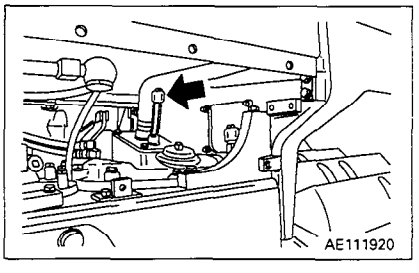
24.5.2 GREASE TENSION PULLEY



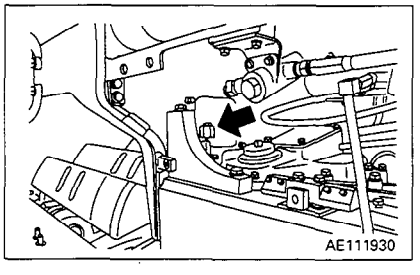
1. Lower the work equipment to the ground, then stop the engine.
2. Using a grease gun, pump in grease through the grease fitting until grease comes out from the relief valve.
3. After greasing, wipe off any old grease that was pushed out.

24.5.3 CLEAN BREATHER

Remove the breather and wash out dust remaining inside with diesel oil and flushing oil.



1. Steering clutch case (1 place)



2. Final drive case (2 places)

24.5.4 CHANGE OIL IN ENGINE OIL PAN, REPLACE ENGINE OIL FILTER CARTRIDGE AND BYPASS FILTER CARTRIDGE

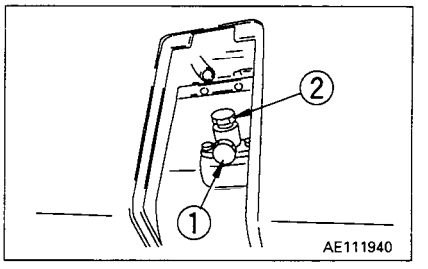
⚠ WARNING

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.

Prepare the following.
- Container to catch drained oil: Min 27 ℓ capacity
- Refill capacity: 27 ℓ (7.1 US gal, 5.9 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 drain plug ①.

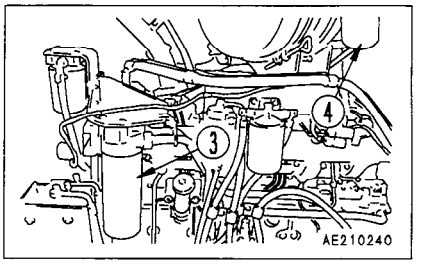
2. To prevent getting oil on yourself, remove drain plug ① slowly, then loosen drain valve ② to drain the oil.



3. Check the drained oil, and if there are excessive metal particles or foreign material, please contact your Komatsu distributor.

4. Install drain plug ① and tighten drain valve ②.

   Tightening torque
   Drain plug ①: 68.6 ± 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 ③ and bypass filter cartridge ④ 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 seal 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 seal surface of the filter holder, then tighten a further 3/4 – 1 turn.

8. Clean the bypass filter holder. Fill a new bypass filter cartridge ② with clean engine oil.
   Coat the packing surface and thread of a new filter cartridge with engine oil (or coat it thinly with grease), then install it to the filter holder.

9. When installing, tighten until the packing surface contacts the seal surface of the filter holder, then tighten it up 3/4 to 1 of a turn.

10. After replacing the filter cartridge, refill engine oil from oil filler Ⓕ up to the range 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". When adding oil, be careful not to get oil on the alternator.

11. 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 500 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 500 hours.

Do not loosen drain valve ② too far, otherwise, the stopper pin inside the valve may be deformed.

24.4.5 CHECK FAN BELT

An auto tensioner is installed to maintain a constant belt tension regardless of any elongation of the V-belt, so there is no need to carry out any adjustment until the belt is replaced. Check the V-belt, and replace it with a new part if any of the following abnormality are found.

CHECK

- Is the V-belt in contact with the bottom of the pulley groove?
- Is the V-belt worn and below the outside circumference of the pulley?
- Is the V-belt cracked or peeled?

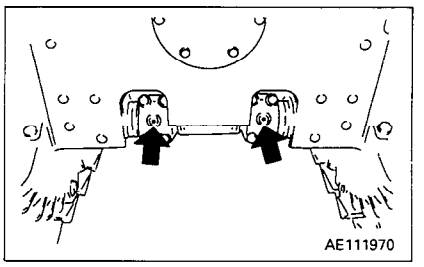
24.6 EVERY 1000 HOURS SERVICE

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

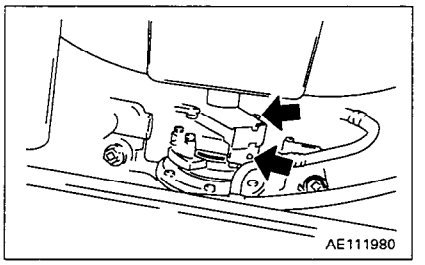
24.6.1 LUBRICATING

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.

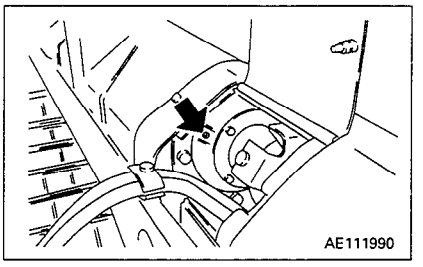
1. Diagonal brace (2 places)



2. Universal joint (8 places)



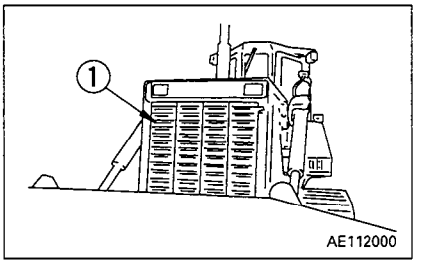
3. Idler adjusting rod (2 places)



24.6.2 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.



1. Loosen the bolts and open radiator grille ①.
2. Clean the radiator fins clogged with mud, dust and leaves with compressed air. Steam or water may be used instead of compressed air.
3. Check the rubber hose. If the hose is found to have cracks to be hardened by ageing, replace such hose with new one. Further, loosen hose clamp should also be checked.

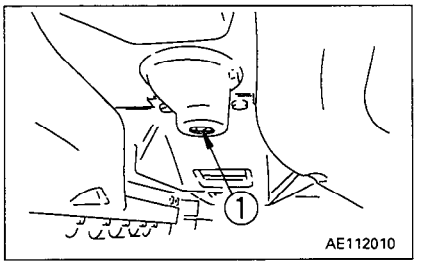
24.6.3 CHANGE OIL IN STEERING CLUTCH CASE (INCLUDING TRANSMISSION CASE AND TORQUE CONVERTER CASE), WASH STRAINER

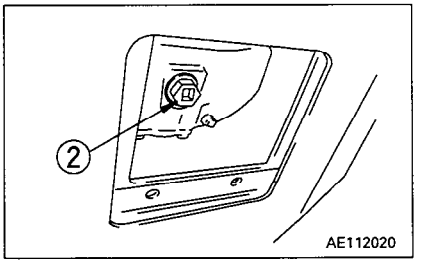
⚠ WARNING

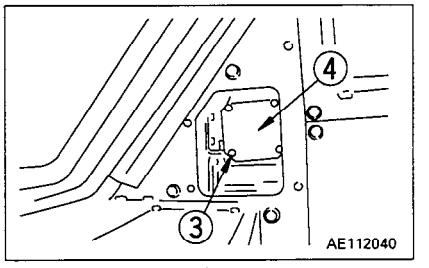
The oil is at high temperature immediately after the machine has been operated. Wait for the oil to cool down before starting the operation.

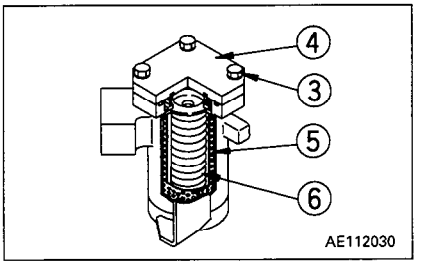
Prepare the following.
- Container to catch drained oil: Min. 90 ℓ capacity
- Refill capacity: each 90 ℓ (23.76 US gal, 19.8 UK gal)
- Socket wrench

1. Remove the cover under the chassis, then set a container under drain plug ① to catch the oil.
2. Taking care not to get oil on yourself, remove drain plug ① slowly, drain the oil, then tighten drain plug ① again.
3. Remove the guard inspection cover under the chassis, then set a container under drain plug ② to catch the oil.
4. Taking care not to get oil on yourself, remove drain plug ② slowly, drain the oil, then tighten drain plug ② again.
5. Remove mounting bolts ③ from the strainer cover, then remove cover ④.
6. Take out strainer ⑤ and magnet ⑥ from the steering clutch case.
7. Remove the dirt from strainer ⑤ and magnet ⑥, and wash in clean diesel oil or flushing oil. Wash the inside of the case also, then install strainer ⑤ and magnet ⑥.

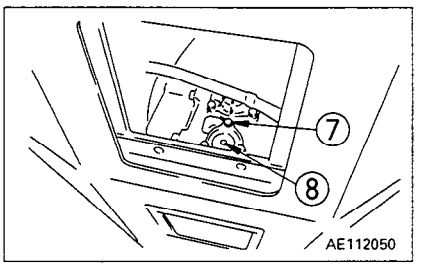






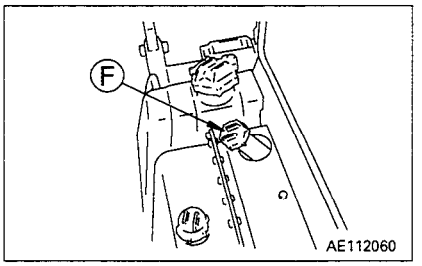


8. Remove mounting bolt ⑦, then remove the torque converter strainer together with cover ⑧.



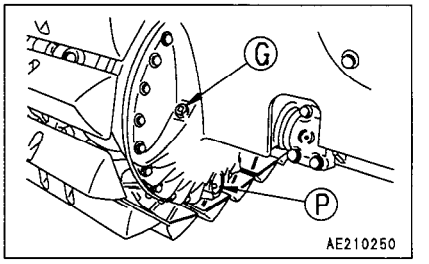
9. Remove the dirt from the strainer, and wash in clean diesel oil or flushing oil. Wash the inside of the case also, then install the strainer.

10. Replace the transmission steering oil filter element (For details, see "24.4 EVERY 250 HOURS SERVICE"), then add engine oil through oil filler port Ⓕ to the specified level.
    For details of the oil to use, see "20. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".



11. Check that the oil is at the specified level.
    For details, see "24.3 CHECK BEFORE STARTING".

24.6.4 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. 51 ℓ capacity
- Refill capacity:
  D85A, E : (each) 41 ℓ (10.82 US gal, 9.02 UK gal)
  D85P : (each) 51 ℓ (13.46 US gal, 11.22 UK gal)

1. Set an oil container under drain plug Ⓟ to catch the oil.

2. Remove drain plug Ⓟ, drain the oil, then tighten drain plug Ⓟ again.

3. Add engine oil to the specified level through plug Ⓖ.
   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".

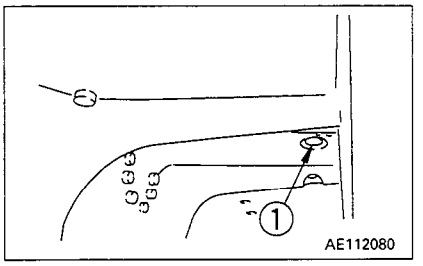
24.6.5 CHANGE OIL IN HYDRAULIC TANK, REPLACE HYDRAULIC OIL FILTER ELEMENT

⚠ 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.

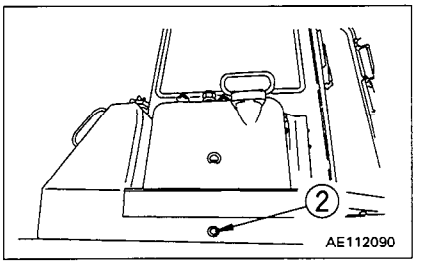
Prepare the following.
- Container to catch drained oil: Min. 58 ℓ capacity
- Refill capacity: 58 ℓ (15.31 US gal, 12.76 UK gal)
- Socket wrench, filter wrench

1. Lower the blade to the ground, stop the engine, move the blade control lever backwards and forward (left and right), then turn the cap of oil filler port Ⓕ slowly to release the pressure, and remove the cap.



2. Set a container under drain plug ① to catch the oil.

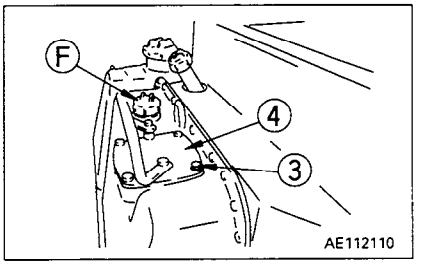
3. Remove drain plug ①, then loosen drain valve ②, drain the oil, then tighten plug ① and valve ② again.
   When loosening drain valve ②, be careful not to get oil on yourself.



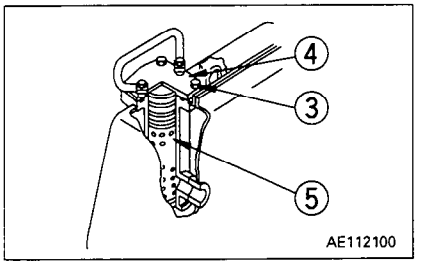
4. Remove bolt ③, then pull up cover ④, and remove element ⑤ and the valve together with the cover.

5. Wash the inside of the case with clean diesel oil or flushing oil, then install a new element.

6. After replacing the element, add the specified amount 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".



7. Check that the oil is at the specified level. For details, see "24.4 EVERY 250 HOURS SERVICE".



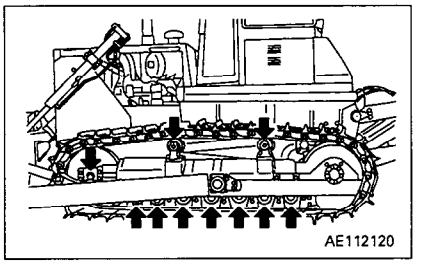
24.6.6 CHECK UNDERCARRIAGE OIL

Do as follows to check if the oil level in the track roller, carrier roller, and idler has gone down.

1. Stop the machine on level ground.

2. Loosen seal bolt ① slowly, and if oil oozes out from the thread, the oil level has not gone down, so tighten the bolt again immediately.

3. If no oil comes out even when seal bolt ① is removed, there is a lack of oil, so please contact your Komatsu distributor for repair.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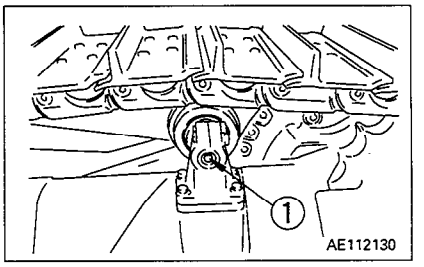

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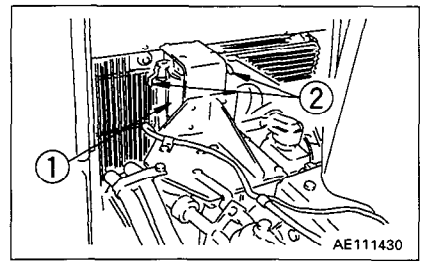
24.6.7 REPLACE CORROSION RESISTOR CARTRIDGE

⚠ WARNING

If the engine has been operated, all parts will be at a high temperature, so never try to replace the cartridge immediately after stopping the engine.
Always wait for the engine and other parts to cool down.

Prepare the following.
- Container to catch drained coolant
- Filter wrench



1. Close levers ② (2 places).
2. Set a container under the cartridge to catch the drained coolant.
3. Using a filter wrench, remove cartridge ①.
4. Clean the filter holder, coat the thread and the seal surface of the new cartridge thinly with engine oil, then install the cartridge.
5. When installing the cartridge, bring the packing surface into contact with the seal surface of the filter holder, then tighten a further approx. 2/3 turns.
   If the filter cartridge is tightened too far, the packing will be damaged and this will cause leakage of water; if it is not tightened enough, water will leak through the gap in the packing. To prevent these problems, always tighten to the specified tightening angle.
6. Open levers ② (2 places).
7. After replacing the cartridge, start the engine and check that there is no leakage of water from the filter seal surface.
   If any water leakage is found, check the tightening of the cartridge.

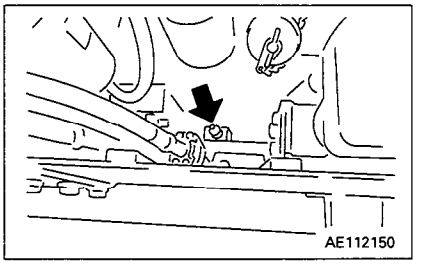
24.7 EVERY 2000 HOURS SERVICE

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

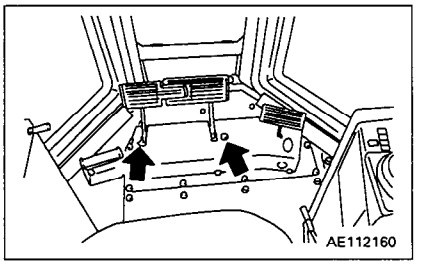
24.7.1 LUBRICATING

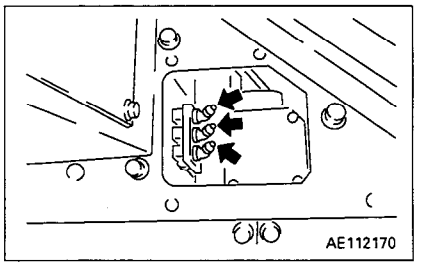
1. Lower the work equipment to the ground, then stop the engine.
2. Using a grease pump, pump in grease through the grease fittings shown by arrows.
3. After greasing, wipe off any old grease that was pushed out.

1. Equalizer bar shaft (1 place)

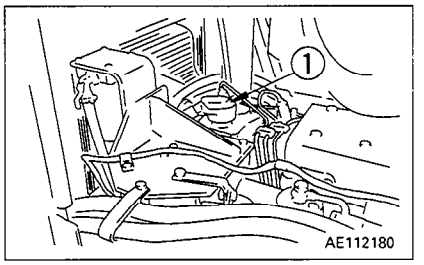


2. Brake pedal lever shaft (5 places)





24.7.2 CLEAN ENGINE BREATHER ELEMENT



1. Wipe off all the dirt around the breather.
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.

24.7.3 CLEAN, CHECK TURBOCHARGER

Contact your Komatsu distributor for cleaning or inspection.

24.7.4 CHECK PLAY OF TURBOCHARGER ROTOR

Contact your Komatsu distributor to have the play checked.

24.7.5 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.

24.7.6 CHECK ENGINE VALVE CLEARANCE, ADJUST

Contact your Komatsu distributor for inspection or adjustment.

24.7.7 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.

24.8 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

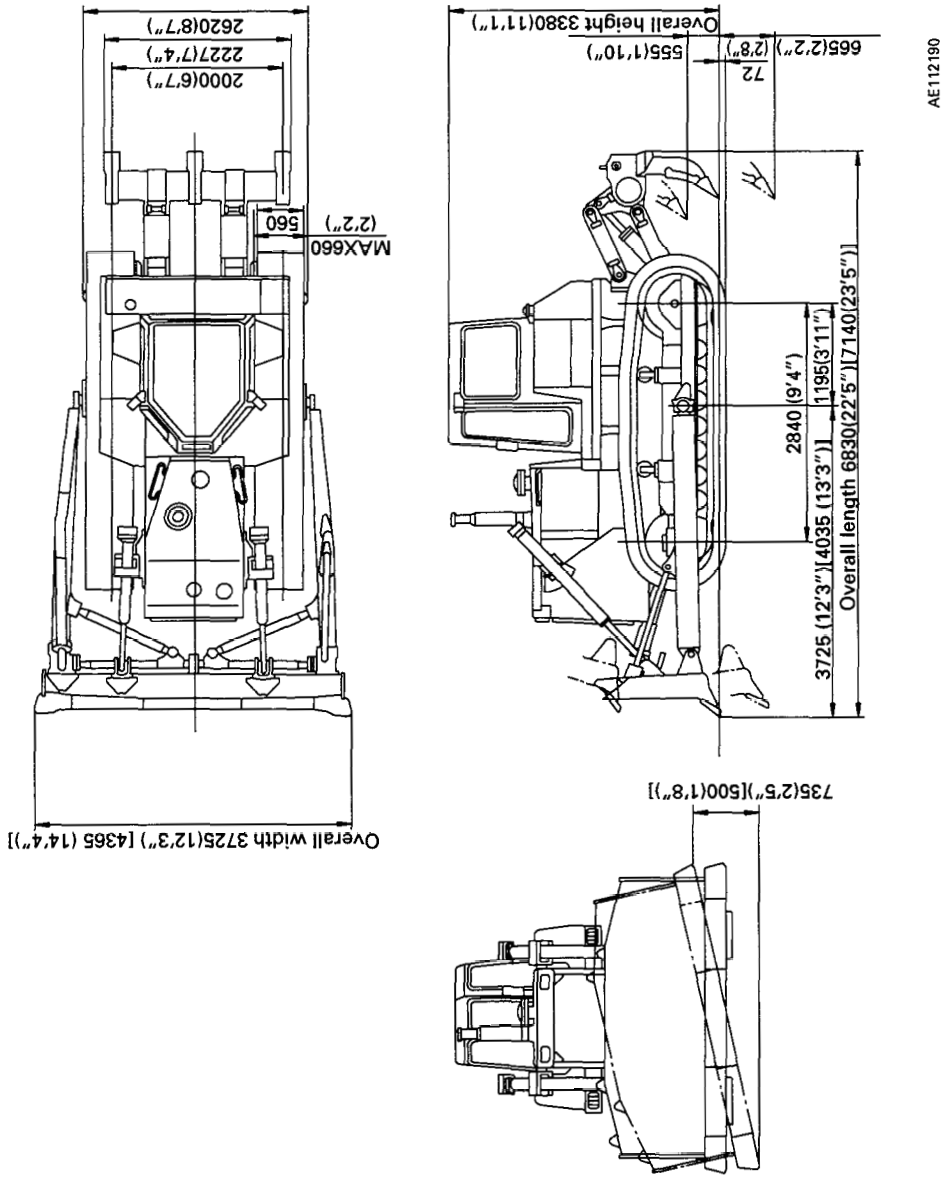
SPECIFICATIONS

25. SPECIFICATIONS

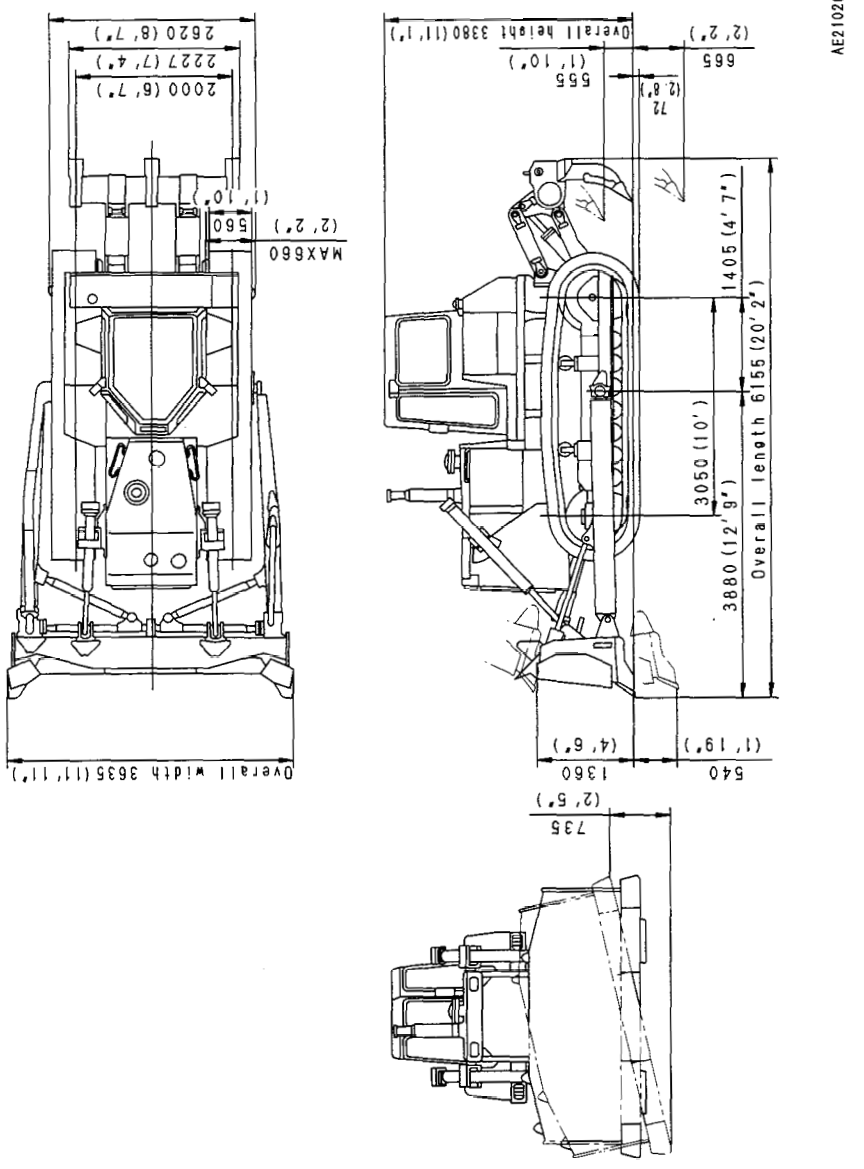
			D85A-21	D85E-21	D85P-21
WEIGHT					
• Operating weight (without operator)			26990 kg (59513 lb)	27050 kg (59645 lb)	26690 kg (58851 lb)
BLADE					
• Weight of attachment (incl. cylinder)			3710 kg (8181 lb)		3480 kg (7673 lb)
RIPPER (variable multi ripper)					
• Weight of attachment			2700 kg (5954 lb)		–
PERFORMANCE					
• Travel speed	Forward	1st	3.8 km/h (2.4 MPH)		3.5 km/h (2.2 MPH)
		2nd	6.8 km/h (4.2 MPH)		6.5 km/h (4.0 MPH)
		3rd	11.8 km/h (7.3 MPH)		10.7 km/h (6.6 MPH)
	Reverse	1st	4.9 km/h (3.0 MPH)		4.7 km/h (2.9 MPH)
		2nd	8.5 km/h (5.3 MPH)		8.3 km/h (5.2 MPH)
		3rd	14.3 km/h (8.9 MPH)		13.3 km/h (8.3 MPH)
ENGINE					
• Model			Komatsu S6D125E-2 diesel engine		
• Flywheel horsepower			225 HP/2000 rpm		
• Max. torque			1000 Nm (102 kgm)/1400 rpm		
• Starting motor			24 V 7.5 kW		
• Alternator			24 V 35 A		
• Battery			12 V 170 Ah x 2 pieces		

D85A-21

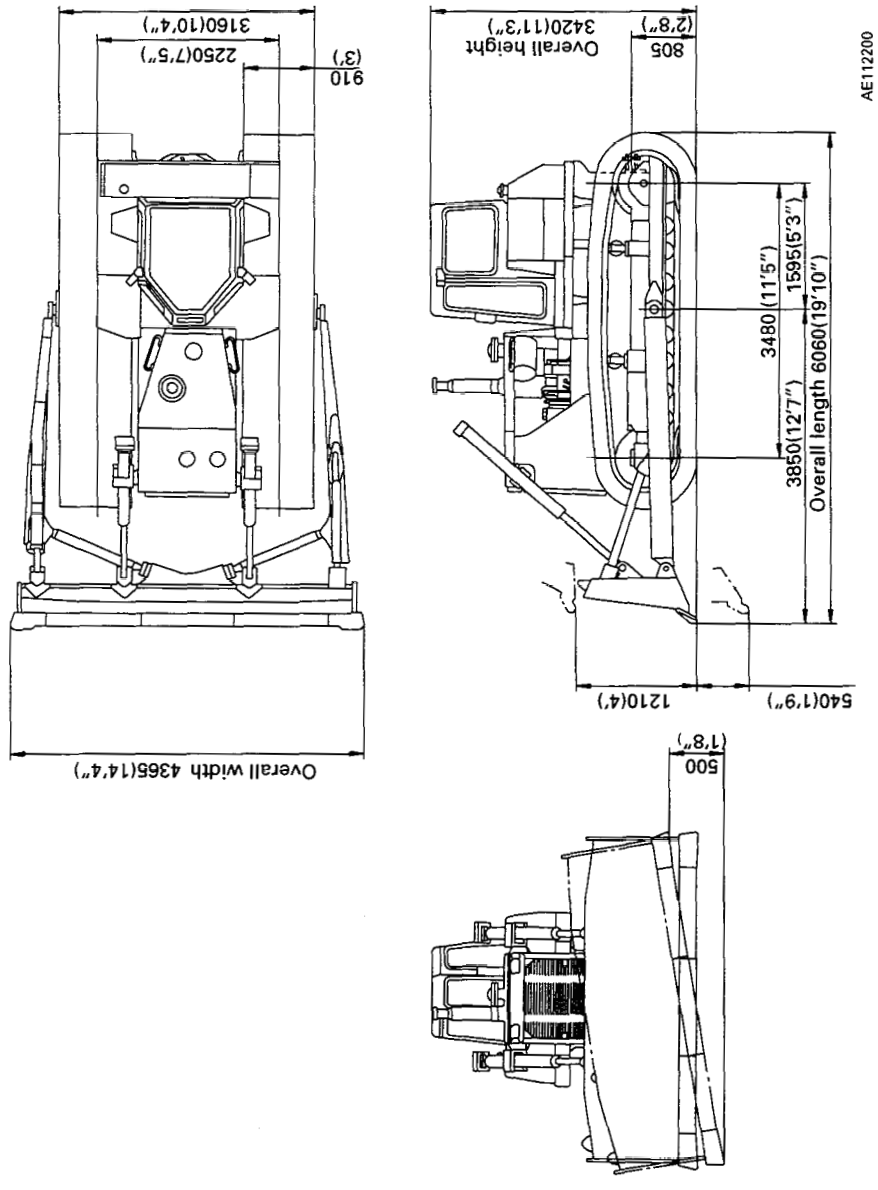
The values without [ ] are the values when the tiltdozer is installed.
The values with [ ] are the values when the angledozer is installed.



D85E-21


2620 (8' 7")
2227 (7' 4")
2000 (6' 7")
(1' 10")
560
(2' 2")
MAX560
Overall width 3635 (11' 11")
Overall height 3380 (11' 1")
(2' 2")
665
(1' 10")
555
(2' 8")
72
1405 (4' 7")
3050 (10')
3880 (12' 9")
Overall length 6155 (20' 2")
540
(1' 19")
1360
(4' 6")
(2' 5")
735
AE210268

D85P-21


Overall width 4365(14'4")
3160(10'4")
2250(7'5")
910
(3')
Overall height
3420(11'3")
805
(2'8")
3480(11'5")
1595(5'3")
3850(12'7")
Overall length 6060(19'10")
1210(4')
540(1'9")
500
(1'8")
AE112200

MEMO

OPTIONS, ATTACHMENTS

26. GENERAL PRECAUTIONS

26.1 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.

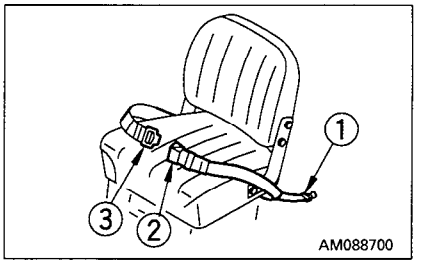
27. USING SEAT BELT

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 brakets.
- **Adjust and fasten the seat belt before operating the machine.**
- **Always use seat belt when operating the machine.**
- **Do not use seat belt with either half of the belt kinked.**

27.1 FASTEN THE BELT AND REMOVE IT IN THE FOLLOWING MANNER



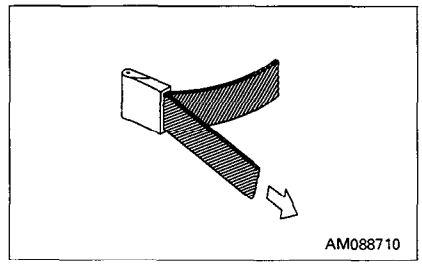
1. Adjust the seat so that the brake pedal can be depressed all the way with the operator's back against the backrest.

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 buckle ② with your left hand and tonque ③ with your right hand, put the tongue into the buckle. Check that the belt has locked by pulling it.

4. When removing the belt, raise the tip of the buckle lever to release it.
   Fasten belt along your body without kinking it. Adjust the lengths of the belt on both the buckle and the tongue sides so that the buckle is located at the mid-point of your body front.

27.2 ADJUST THE BELT LENGTH IN THE FOLLOWING MANNER

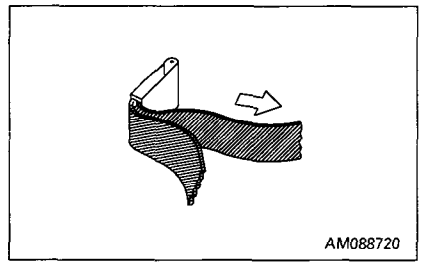

AM088710

27.2.1 TO SHORTEN THE BELT

Pull the free end of the belt on either the buckle body or tongue side.

27.2.2 TO LENGTHEN THE BELT

Pull the belt while holding it at a right angle to buckle or tongue.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Inspect bolts and fittings on the chassis for tightness. Retighten any loose bolts to 25 ± 5 Nm (2.5 ± 0.5 kgm, 18 ± 3.6 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 CAP WITH LOCK

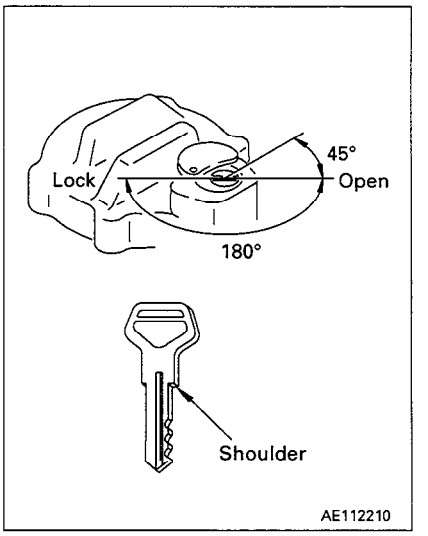
28.1 OPENING AND CLOSING LOCKABLE CAP

Lock-type caps are available for the radiator water filler cap, fuel tank filler cap, power train case oil filler cap and hydraulic tank oil filler 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.



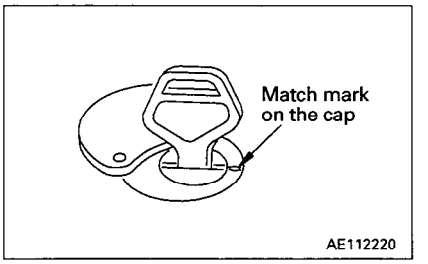
TO LOCK THE CAP

1. Turn the cap into place.

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

REMARK

When the cap is locked, it can be turned freely, but it will not open.



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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:

Komatsu America International Company