Operation & Maintenance Manual

SEAM000803

HD325-6

DUMP TRUCK

SERIAL NUMBERS HD325-5292 and up

⚠ 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 will come into contact with it.

NOTICE

Komatsu has Operation & Maintenance Manuals written in some other languages. If a foreign language manual is necessary, contact your local distributor for availability.

KOMATSU

1. FOREWORD

SEAM000803

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

2. SAFETY INFORMATION

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

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

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

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

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

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

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

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

3. INTRODUCTION

3.1 FEATURES

3.1.1 A HARD-WORKING MACHINE

- This machine mounts the highly evaluated SA6D140 engine with an output of 495PS/2100rpm for more powerful travel performance.
- The retarder performance when traveling downhill has been improved by using an exhaust brake (optional for overseas specification) in addition to the conventional wet-type multiple-disc retarder to give an improvement of 30% in the absorption torque.

3.1.2 The machine that anyone can drive and everyone wants to drive

- Every effort has been made to improve operator comfort and ease of operation, and the latest mechatronics controls are used to provide a smooth, powerful drive, excellent travel stability, and superb driving comfort.
  All-range electronic modulation and auto suspension (auto suspension is optional for overseas specification machines), etc.
- A spacious, quiet, comfortable cab with composed coloring is used to reduce operator fatigue.

3.1.3 Trouble-free machine

- Even if any failure should occur, all the mechatronics systems are equipped with self-diagnostic functions.
- For example, the transmission control writes the failure codes to memory in the order that they occur, so troubleshooting is made much easier.

3.2 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.

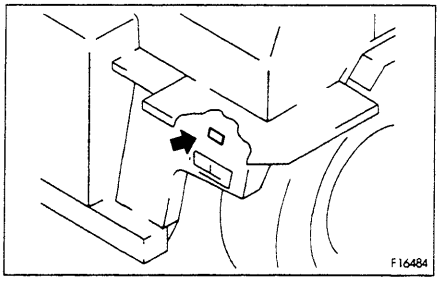
The precautions given in this manual for operating, maintenance, and safety procedures are only those that apply when this product is used for the specified purpose. If the machine is used for a purpose that is not listed in this manual, Komatsu cannot bear any responsibility for safety. All consideration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

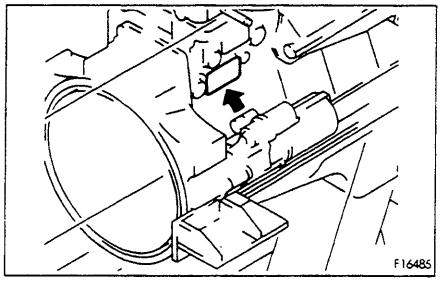
4.1 MACHINE SERIAL NO. PLATE POSITION

The machine serial number plate is on the left front end of the frame.



4.2 ENGINE SERIAL NO. PLATE POSITION

The engine serial number plate is on the upper right side of the cylinder block.



4.3 TABLE TO ENTER SERIAL NO. AND DISTRIBUTOR

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

REMARKS

5. CONTENTS

SAFETY

OPERATION

MAINTENANCE

SPECIFICATIONS

OPTIONS, ATTACHMENTS

SAFETY

⚠ WARNING

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

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

6. GENERAL PRECAUTIONS

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

SAFETY RULES

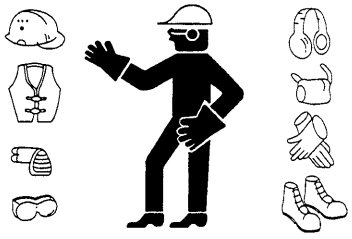
- ONLY trained and authorized personnel can operate and maintain the machine.
- Follow all safety rules, precautions and instructions when operating or performing maintenance on the machine.
- When working with another operator or a person on worksite traffic duty, be sure all personnel understand all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

SAFETY FEATURES

- Be sure all guards and covers are in their proper position. Have guards and covers repaired if damaged.
  Proper position → "See CHECKING AROUND MACHINE".
- Learn the proper use of safety features such as safety locks, safety pins, and seat belts, and use these safety features properly.
- NEVER remove any safety features. ALWAYS keep them in good operating condition.
  Safety lock, safety pin → See "11. EXPLANATION OF EQUIPMENT".
  Seat belt → See "12.1.3 ADJUSTMENT BEFORE OPERATION".
- Improper use of safety features could result in serious bodily injury or death.

CLOTHING AND PERSONAL PROTECTIVE ITEMS

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



UNAUTHORIZED MODIFICATION

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

STANDING UP FROM THE SEAT

- To prevent any accident occurring if you should touch any control lever that is not locked, always carry out the following before standing up from the operator's seat.
- Place the gear shift lever at neutral and set the parking lever to the PARKING position.
- Lower the dump body, set the dump lever to the HOLD position, then apply the lock.
- Stop the engine. When leaving the machine, always lock everything. Always remember to take the key with you.
  If the machine should suddenly move or move in an unexpected way, this may result in serious bodily injury or death.

MOUNTING AND DISMOUNTING

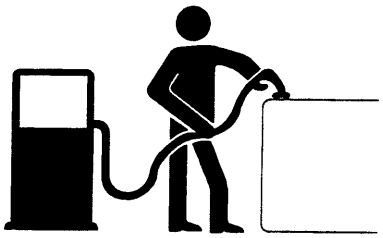
- NEVER jump on or off the machine. NEVER get on or off a moving machine.
- When getting on or off the machine, face the machine and use the handhold and steps.
- Never hold any control levers when getting on or off the machine.
- Always maintain three-point contact with the handholds and steps to ensure that you support yourself.
- When bringing tools to the operator's compartment, always pass them by hand or pull them up by rope.
- If there is any oil, grease, or mud on the handholds or steps, wipe it off immediately. Always keep these parts clean. Repair any damage and tighten any loose bolts.
- Use the handrails and steps marked by arrows in the diagram below when getting on or off the machine.

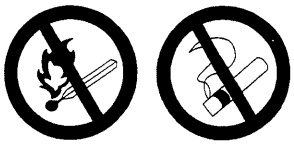
  A: For use when getting on or off the machine from the left door
  B: For use when getting on or off the machine from the engine hood or right door

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 flame away from flammable fluids.
- Stop the engine and do not smoke when refueling.
- Tighten all fuel and oil tank 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.





PRECAUTIONS WHEN HANDLING AT HIGH TEMPERATURES

- Immediately after operations, the engine cooling water, engine oil, differential and final drive case oil, and hydraulic oil are at high temperature and are under pressure. If the cap is removed or the oil or water is drained or the filters are replaced, there is danger of serious burns. Always wait for the temperature to go down, and carry out the operation according to the specified proce dure.

- To prevent hot water from spurting out
  1) Stop the engine.
  2) Wait for the water temperature to go down.
  3) Turn the cap slowly to release the pressure before removing the cap.

- To prevent hot oil from spurting out
  1) Stop the engine.
  2) Wait for the oil temperature to go down.
  3) Turn the cap slowly to release the pressure before removing the cap.

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:

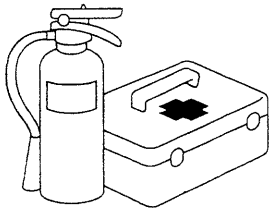
- NEVER use compressed air for cleaning.
- Use water for cleaning to keep down the dust.
- Operate the machine with the wind to your back, whenever possible.
- Use an approved respirator if necessary.

PREVENTION OF INJURY BY WORK EQUIPMENT

Never enter or put your hand or arm or any other part of your body between movable parts such as the dump body and chassis or cylinders. If the work equipment is operated, the clearance will change and this may lead to serious bodily injury or death.

FIRE EXTINGUISHER AND FIRST AID KIT

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



PRECAUTIONS WHEN USING ROPS

If ROPS is installed, the ROPS must never be removed when operating the machine.

The ROPS is installed to protect the operator if the machine should roll over. It is designed not only to support the load if the machine should roll over, but also to absorb the impact energy.

The Komatsu ROPS fulfills all of the regulations and standards for all countries, but if it is rebuilt without authorization or is damaged when the machine rolls over, the strength will drop and it will not be able to fulfill its function properly. It can only display its performance if it is repaired or modified in the specified way.

When modifying or repairing the ROPS, always contact your Komatsu distributor.

Even if the ROPS is installed, it cannot show its full effect if the operator does not fasten the seat belt properly. Always fasten the seat belt when operating.

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. PRECAUTIONS DURING OPERATION

⚠ WARNING: Failure to follow these safety precautions may lead to a serious accident.

7.1 BEFORE STARTING ENGINE

SAFETY AT WORKSITE

- Before starting the engine, thoroughly check the area for any unusual conditions that could be dangerous.
- Examine the road surface in the jobsite and determine the best and safest method of operation.
- Choose an area where the ground is as horizontal and firm as possible before carrying out the operation.
- If you need to operate on a road, protect pedestrians and cars by designating a person for worksite traffic duty or by installing fences around the worksite.
- Check the river bed condition, and depth and flow of water before crossing shallow parts of rivers. NEVER be in water which is in excess of the permissible water depth.
- The operator must check personally the work position, roads to be used, and existence of obstacles before starting operations.
- Always determine the travel roads in the worksite and maintain them so that it is always safe for the machines to travel.
  Travel road → See "13. DETERMINING AND MAINTAINING TRAVEL ROAD".

FIRE PREVENTION

- Thoroughly remove wood chips, leaves, paper and other flammable things accumulated in 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.
- Do not operate the machine near any flame.

IN OPERATOR'S CAB

- Do not leave tools or spare parts lying around in the operator's compartment. They may damage or break the control levers or switches. Always put them in the tool box on the right side of the machine.
- Keep the cab floor, controls, steps and handrails 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 "12.1.3 ADJUSTING BEFORE OPERATION".

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.

KEEP MIRRORS, WINDOWS, AND LIGHTS CLEAN

- Remove any dirt from the surface of the windows or lights to ensure good visibility.
- Adjust the rear view mirror to a position where the operator can see best from the operator's seat, and keep the surface of the mirror clean. If any glass should break, replace it with a new part.
- Check that the machine is equipped with the head lamps and working lamps needed for the operating conditions. Check that all the lamps light up properly.

7.2 OPERATING MACHINE

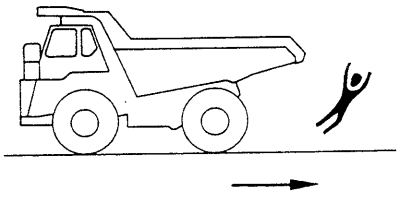
WHEN STARTING ENGINE

- 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 any person other than the operator in the operator's compartment or any other place on the machine.
- For machines equipped with a back-up alarm buzzer, check that the alarm buzzer works properly.

CHECK WHEN TRAVELING IN REVERSE

Before operating the machine or work equipment, do as follows.

- Sound the horn to warn people in the area.
- Check that there is no one near the machine. Be particularly careful to check behind the machine.
- If necessary, designate a person to check the safety. This is particularly necessary when traveling in reverse.
- When operating in areas that may be hazardous or have poor visibility, designate a person to direct worksite traffic.
- Do not allow any one to enter the line of travel of the machine. This rule must be strictly observed even on machines equipped with a back-up alarm or rear view mirror.



TRAVELING

- When traveling on rough ground, travel at low speed. When changing direction, avoid turning suddenly.
- Lower the dump body and set the dump lever to the FLOAT position when traveling.
- If the engine should stop when the machine is traveling, the steering wheel will not work, and it will be dangerous to drive the machine. Apply the brakes immediately and stop the machine.

TRAVELING ON SLOPES

- Traveling on slopes could result in the machine tipping over or slipping.
- Do not change direction on slopes. To ensure safety, go down to level ground before turning.
- Do not travel up and down on grass, fallen leaves, or wet steel plates. These materials may make the machine slip on even the slightest slope. Take all possible steps to avoid traveling sideways, and always keep the travel speed low.
- When traveling downhill, use the retarder brake to reduce speed. Do not turn the steering wheel suddenly.
  When traveling downhill, do not use the foot brake except in an emergency.
  Retarder brake → See "12.9.2 BRAKE PERFORMANCE GRAPH".
- If the engine should stop on a slope, apply the brakes fully and apply the parking brake also to stop the machine.

ENSURE GOOD VISIBILITY

- When working in dark places, install working lamps and head lamps, and set up lighting in the work area if necessary.
- Stop operations if the visibility is poor, such as in mist, snow, or rain, and wait for the weather to improve to a condition that allows the operation to be carried out safely.

OPERATE CAREFULLY ON SNOW

- When working on snow or icy roads, there is danger that the machine may slip to the side on even the slightest slope, so always travel slowly and avoid sudden starting, turning, or stopping.
- Be extremely careful when carrying out snow-clearing operations. The road shoulder and other objects are buried in the snow and cannot be seen.
- When traveling on snow-covered roads, always install tire chains.

AVOID DAMAGE TO DUMP BODY

- When working in tunnels, on bridges, under electric cables, or when entering a parking place or any other place where there are height limits, always drive extremely carefully and lower the dump body completely before driving the machine.

DO NOT GO CLOSE TO HIGH-VOLTAGE CABLES

- Going close to high-voltage cables can cause electric shock. Always maintain the safe distance given below between the machine and the electric cable.
- The following actions are effective in preventing accidents.
  1) Wear shoes with rubber or leather soles.
  2) Use a signalman to give warning if the machine approaches too close to the electric cable.
- If the work equipment should touch the electric cable, the operator should not leave the operator's compartment.
- When carrying out operations near high voltage cables, do not let anyone come close to the machine.
- Check with the electricity company about the voltage of the cables before starting operations.

Voltage	Min. safety distance	
6.6 kV	3 m	10ft
33.0 kV	4 m	14ft
66.0 kV	5 m	17ft
154.0 kV	8 m	27ft
275.0 kV	10 m	33ft

WHEN DUMPING

- Before starting the dumping operation, check that there is no person or object behind the machine.
- Stop the machine in the correct position, and check again that there is no person or object behind the machine. Give the determined signal, then slowly operate the dump body. If necessary, use blocks for the wheels or position a flagman.
- When carrying out dumping operations on slopes, the machine stability will become poor and there is danger that it may tip over. Always carry out such operations extremely carefully.
- Do not travel with the dump body raised.

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.
- When operating in places where there is danger of falling rocks or danger of the machine turning over, always install ROPS and a seat belt.

WHEN LOADING

- Check that the surrounding area is safe, stop the machine in the correct loading position, then load the body uniformly.
- Do not leave the operator's seat during the loading operation

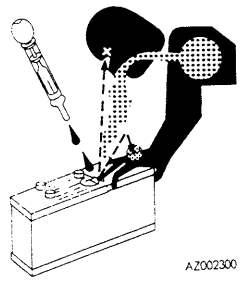
PARKING THE MACHINE

- Choose a horizontal road surface to park the machine. If the machine has to be parked on a slope, always put blocks under all the wheels to prevent the machine from moving.
- When parking on public roads, provide fences and signs, such as flags or lights, on the machine to warn pedestrians and other vehicles. Be sure that the machine, flags, or lights do not obstruct the traffic.
- Before leaving the machine, lower the dump body fully, set the parking lever to the PARKING position, stop the engine, then lock everything. Always take the key with you.
  Parking procedure → See "12.13 PARKING MACHINE".
  Places to lock → See "12.17 LOCKING".

7.3 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.
- When removing or installing, check which is the positive (+) terminal and negative (–) terminal.
- Tighten the battery cap securely.
- Tighten the battery terminals securely. Loosened terminals can generate sparks and lead to an explosion.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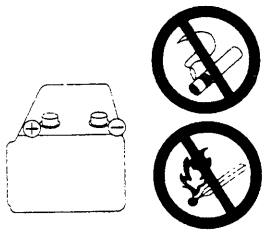
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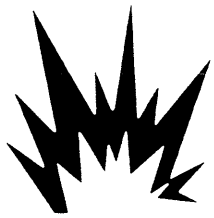
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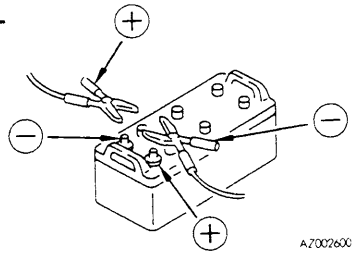
STARTING WITH BOOSTER CABLES

- 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.
- If any tool touches between the positive (+) terminal and the chassis, it will cause sparks. This is dangerous, so be sure to work carefully.
- 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 "16.3 IF BATTERY IS DISCHARGED".

INCORRECT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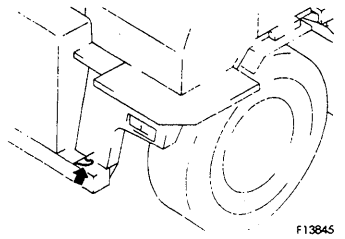
7.4 TOWING

WHEN TOWING, FIX WIRE TO HITCH PIN

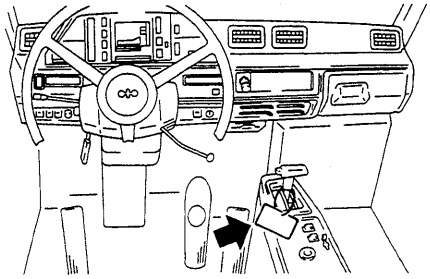
- Towing in the wrong way may lead to serious personal injury or damage.
- When using another machine to tow this machine, use a wire rope with ample strength for the weight of this machine.
- Never tow a machine on a slope.
- Do not use any towing rope that has kinks or is twisted.
- Do not stand astride the towing cable or wire rope.
- When connecting a machine that is to be towed, do not let any one come between the towing machine and the machine that is being towed.
- Set the coupling of the machine being towed in a straight line with the towing portion of the machine, and secure it in position.
  Towing method → See "16. TROUBLESHOOTING".



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 CRITICAL PARTS

- Periodically replace parts used to insure safety or prevent accident.
  Replacement of critical parts → See "22. PERIODIC REPLACEMENT OF CRITICAL PARTS".
- 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.

STOPPING THE ENGINE BEFORE SERVICE

- When carrying out inspection or maintenance, always stop the machine on firm flat ground, lower the dump body, then stop the engine.
- If the engine must be run during service, such as when cleaning the radiator, always set the transmission lever to the neutral position and the parking brake lever to the PARKING position. Always carry out the work with two people. One person should sit on the operator's seat so that he can stop the engine if necessary. NEVER move any controls you do not need to operate.
- When servicing the machine, be careful not to touch any moving part or get your clothes caught.
- Put blocks under the wheels.
- When carrying out service with the dump body raised, always place the dump lever at the HOLD position, apply the lock, and insert the safety pins securely.

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

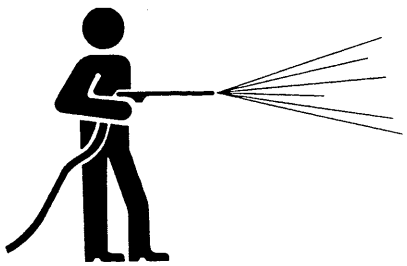
- Place attachments that have been removed from the machine in a safe place so that they do not fall. If they fall on you or others, serious injury could result.

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 tires of the machine securely.
- Never work under the machine if the machine is poorly supported.

KEEP THE MACHINE CLEAN

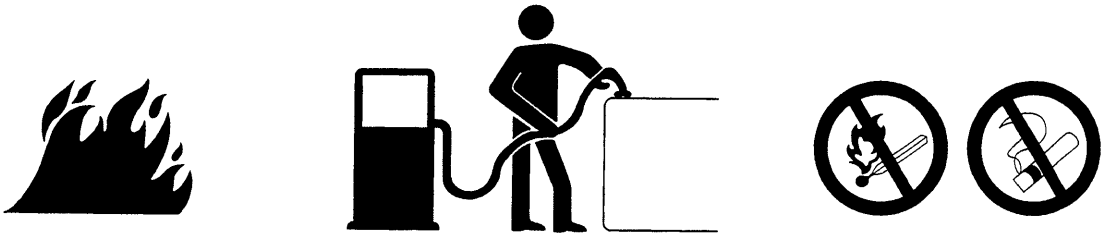
- Spilled oil or grease, or scattered tools or broken pieces are dangerous because they may cause you to slip or trip.
  Always keep your machine clean and tidy.
- If water gets into the electrical system, there is danger that the machine may not move or may move unexpectedly.
  Do not use water or steam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



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

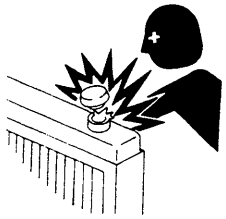
RULES TO FOLLOW WHEN ADDING FUEL OR OIL

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



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.
- Slowly loosen the caps to relieve pressure before removing the caps.

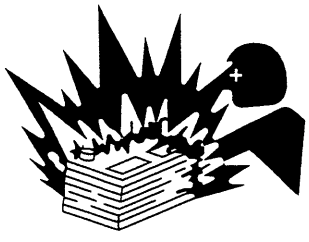


USE OF LIGHTING

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

PRECAUTIONS WITH BATTERY

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

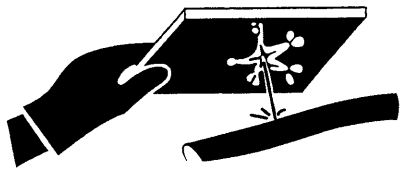


HANDLING HIGH-PRESSURE HOSES

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

PRECAUTIONS WITH HIGH PRESSURE OIL

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



PRECAUTIONS WHEN CARRYING OUT MAINTENANCE AT HIGH TEMPERATURE OR HIGH PRESSURE

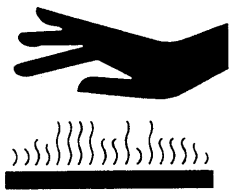
- Immediately after stopping operations, the engine cooling water and oil at all parts are at high temperature and under high pressure.
  In this condition, if the cap is removed, or the oil or water are drained, or the filters are replaced, it may result in burns or other injury. Wait for the temperature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

  Cleaning inside cooling system → see "24.2 WHEN REQUIRED".

  Checking cooling water level, hydraulic oil level, lubricating oil, adding oil → see "24.3 CHECK BEFORE STARTING".

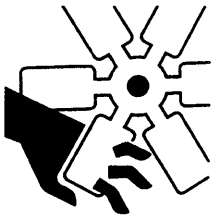
  Checking oil level in differential case, final drive case, adding oil → see "24.4 – 5 PERIODIC MAINTENANCE".

  Changing oil, replacing filters → see "24.4 – 8 PERIODIC MAINTENANCE".



ROTATING FAN AND BELT

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



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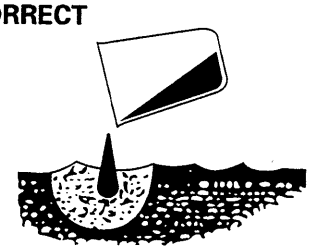
WASTE MATERIALS

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

INCORRECT



8.3 TIRES

HANDLING TIRES

If tires are not used under the specified conditions, they may overheat and burst or be cut and burst by sharp stones on rough road surfaces. This may lead to serious injury or damage.
To maintain safety, always keep to the following conditions.

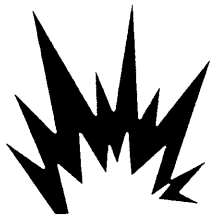
- Inflate the tires to the specified pressure. Abnormal heat is generated particularly when the inflation pressure is too low.
  Suitable inflation pressure → See "12.18 HANDLING THE TIRES".

- Use the specified tires.

The values given in this manual for the tire inflation pressure and permissible speed are general values. The actual values may differ depending on the type of tire and the condition under which they are used. For details, please contact your Komatsu distributor or tire maker.

If the tires become hot, a flammable gas is produced, and this may ignite. It is particularly dangerous if the tires become overheated when the tires are under pressure. If the gas generated inside the tire ignites, the internal pressure will suddenly rise, and the tire will explode, and this may lead to serious personal injury. Explosions differ from punctures or tire bursts, because the destructive force is extremely large. Therefore, the following operations are strictly prohibited when the tire is under high internal pressure.

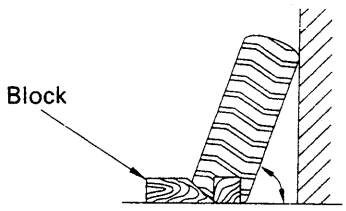
- Welding the rim
- Building fires or carrying out welding near the wheel or tire.



If you do not understand the proper procedure for carrying out maintenance or replacement of the wheel or tire, and you use the wrong method, the wheel or tire may burst and cause serious injury or damage. When carrying out such maintenance, please consult your Komatsu distributor or tire maker.

STORING TIRES AFTER REMOVAL

- As a basic rule, store the tires in a warehouse which unauthorized persons cannot enter. If the tires are stored outside, always erect a fence around the tires and put up "No Entry" and other warning signs that even young children can understand.
- Stand the tire on level ground, and block it securely so that it cannot roll or fall over.
- If the tire should fall over, get out of the way quickly. The tires for construction equipment are extremely heavy, so trying to hold the tire may lead to serious injury.



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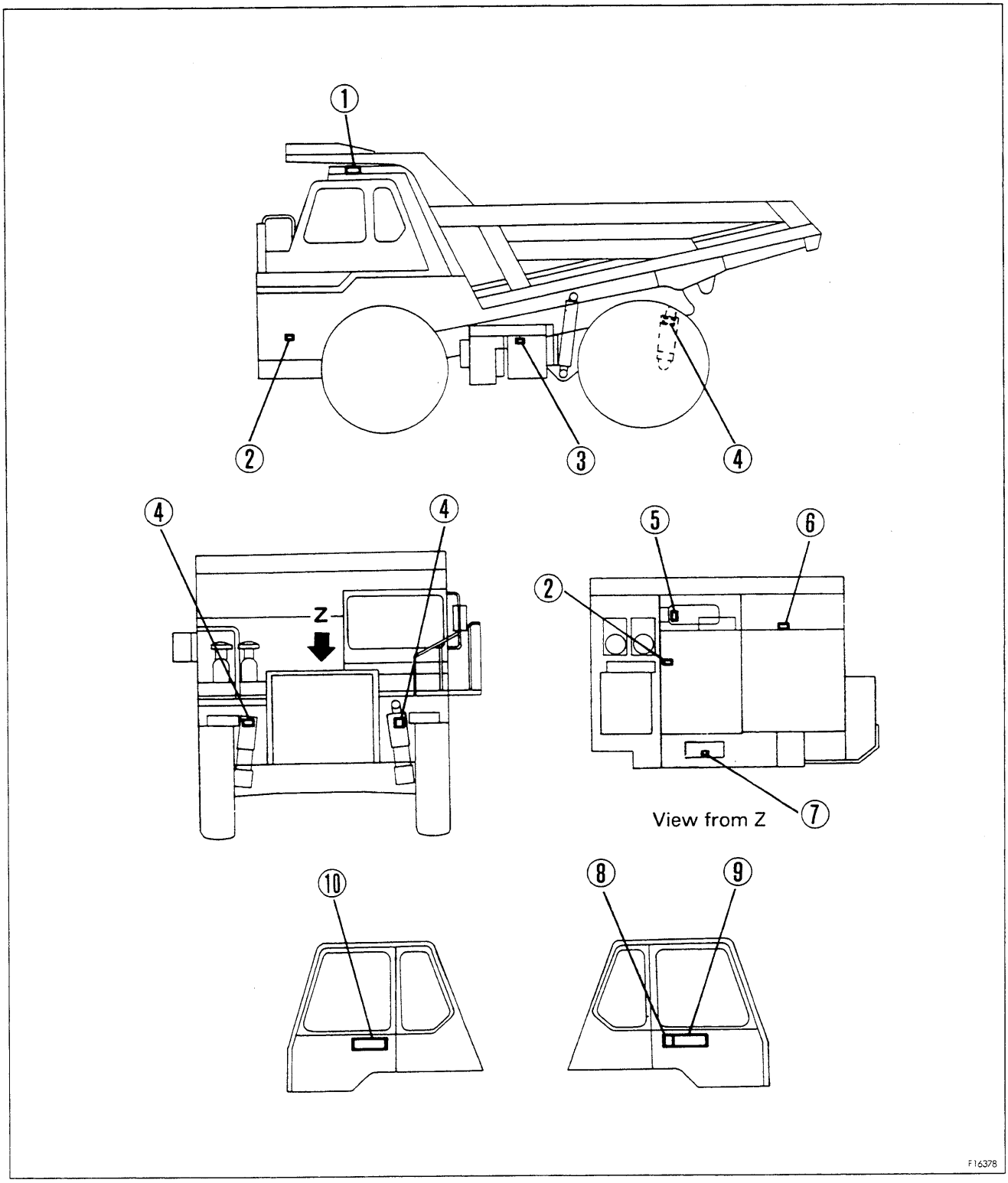
9. POSITION FOR ATTACHING SAFETY LABELS

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

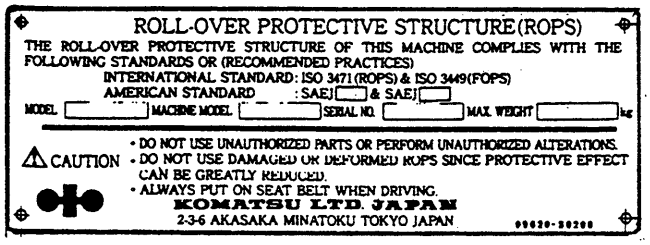
There are other labels in addition to the safety labels listed as follows, so handle them in the same way.

Safety labels may be available in languages other than English. To find out what labels are available, contact your Komatsu distributor.

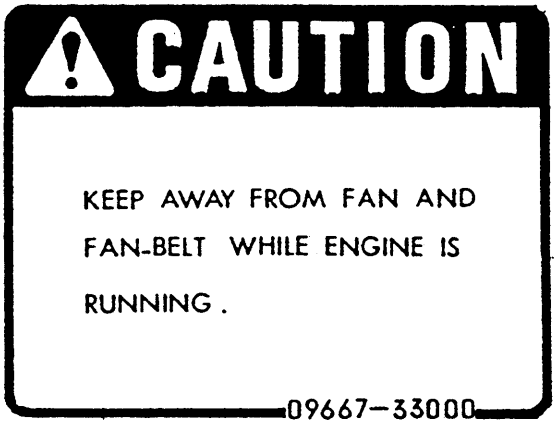
9.1 POSITION FOR ATTACHING SAFETY LABELS



1. Roll-over protective structure (ROPS) (09620-30200)

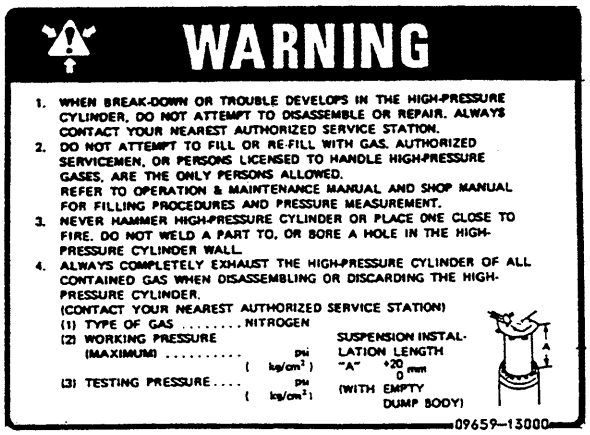


2. Cautions for checking engine room (09667-33000)

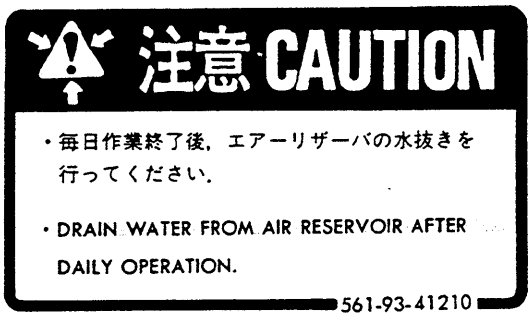


3. Cautions for opening hydraulic tank cap (09653-13000)

4. Cautions for handling suspension (09659-13000)

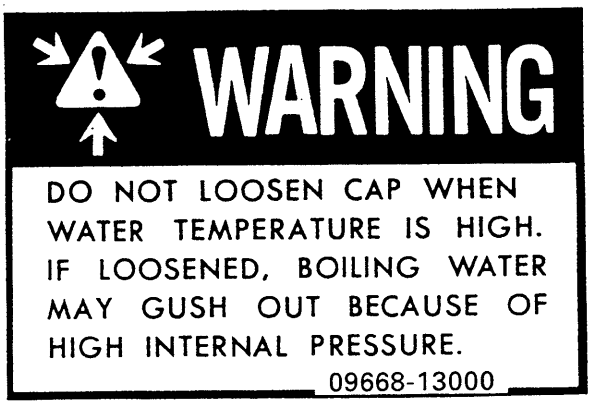


5. Cautions for draining water from air reservoir (561-93-41210)

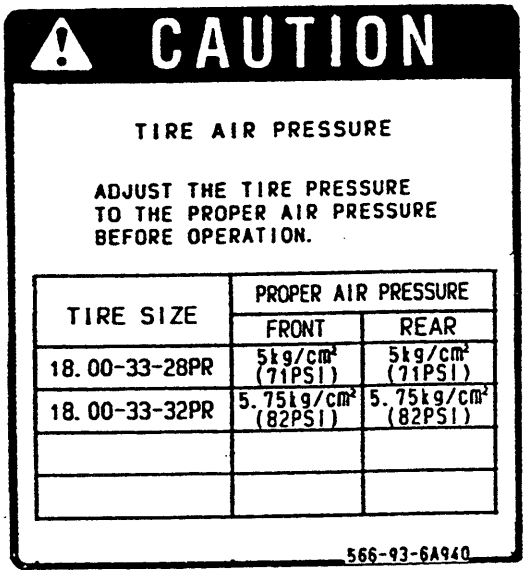


6. Cautions for engine emergency stop (If equipped with engine emergency stop switch)

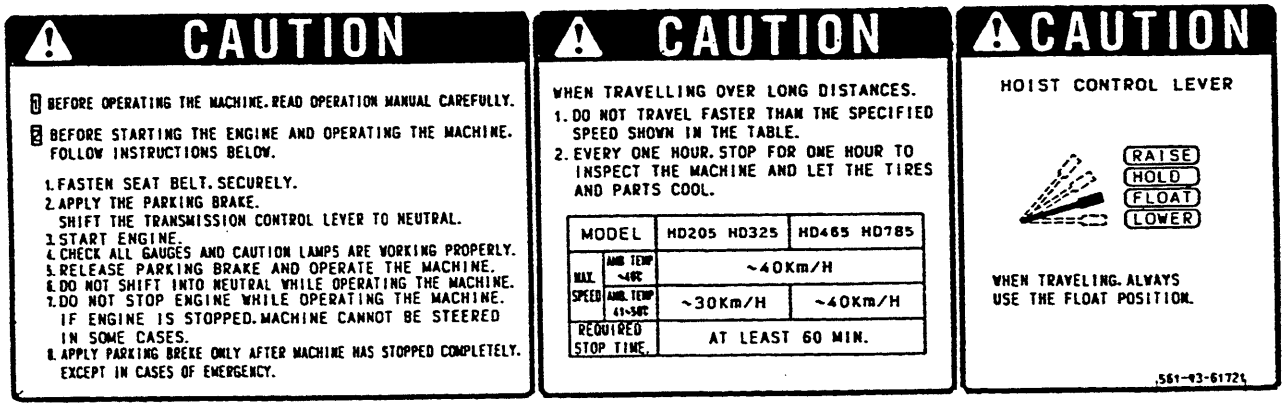
7. Warning for opening radiator cap
(09668-13000)



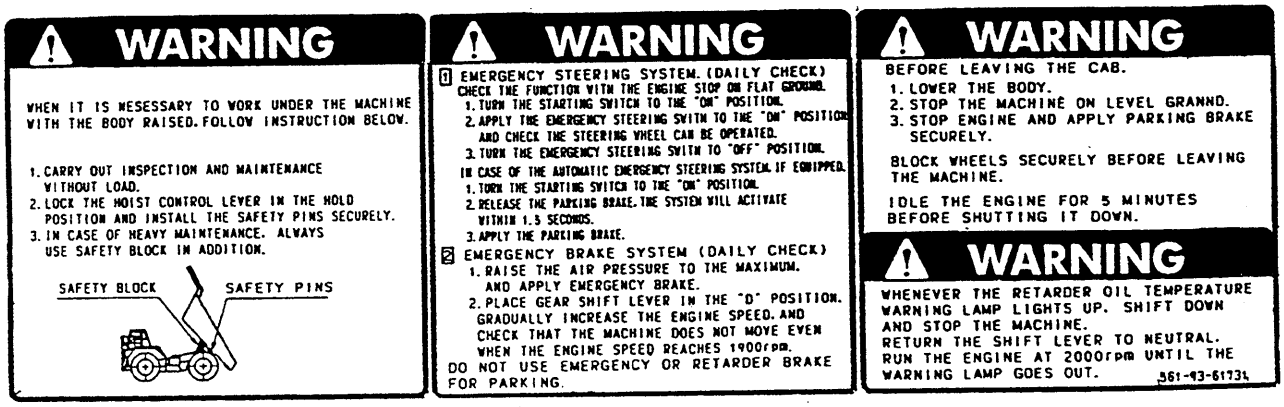
8. Cautions for tire air pressure
(566-93-6A940)



9. Cautions before starting, after stopping
Cautions when traveling over long distance
Cautions for operating hoist control lever
(561-93-61721)



10. Warnings for inspection and maintenance
Warnings for inspection of emergency steering system, emergency brake system
Warning for leaving operator's seat, stopping engine
Warning for retarder oil temperature
(561-93-61731)

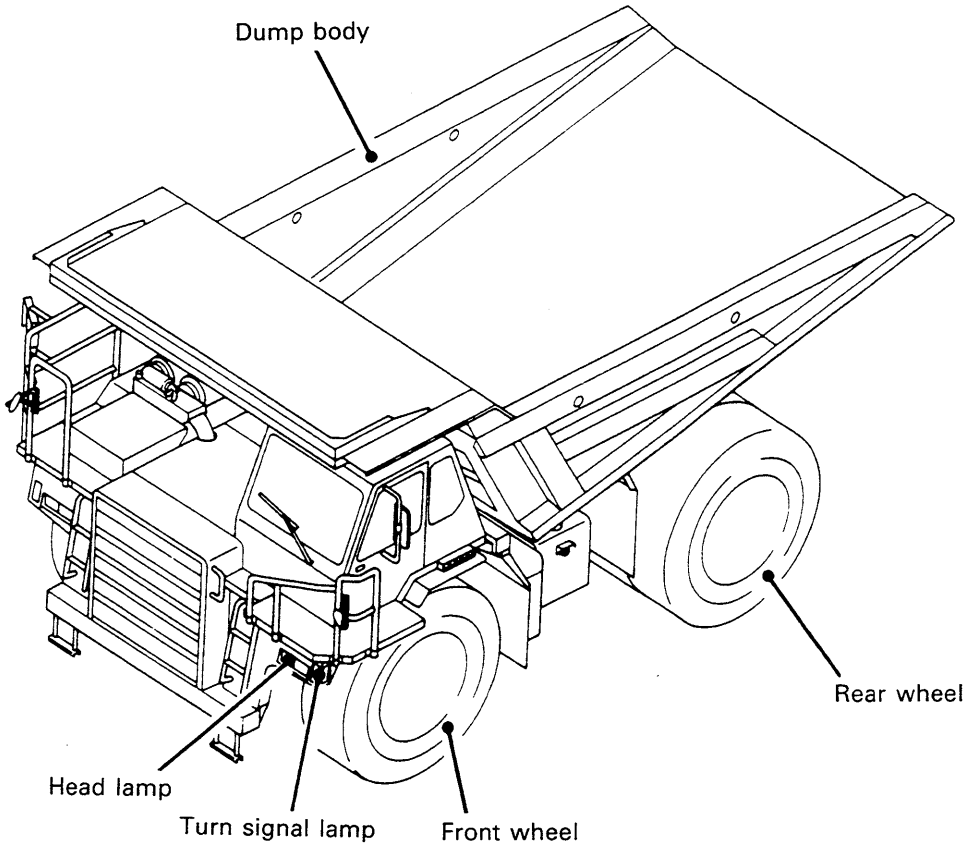


OPERATION

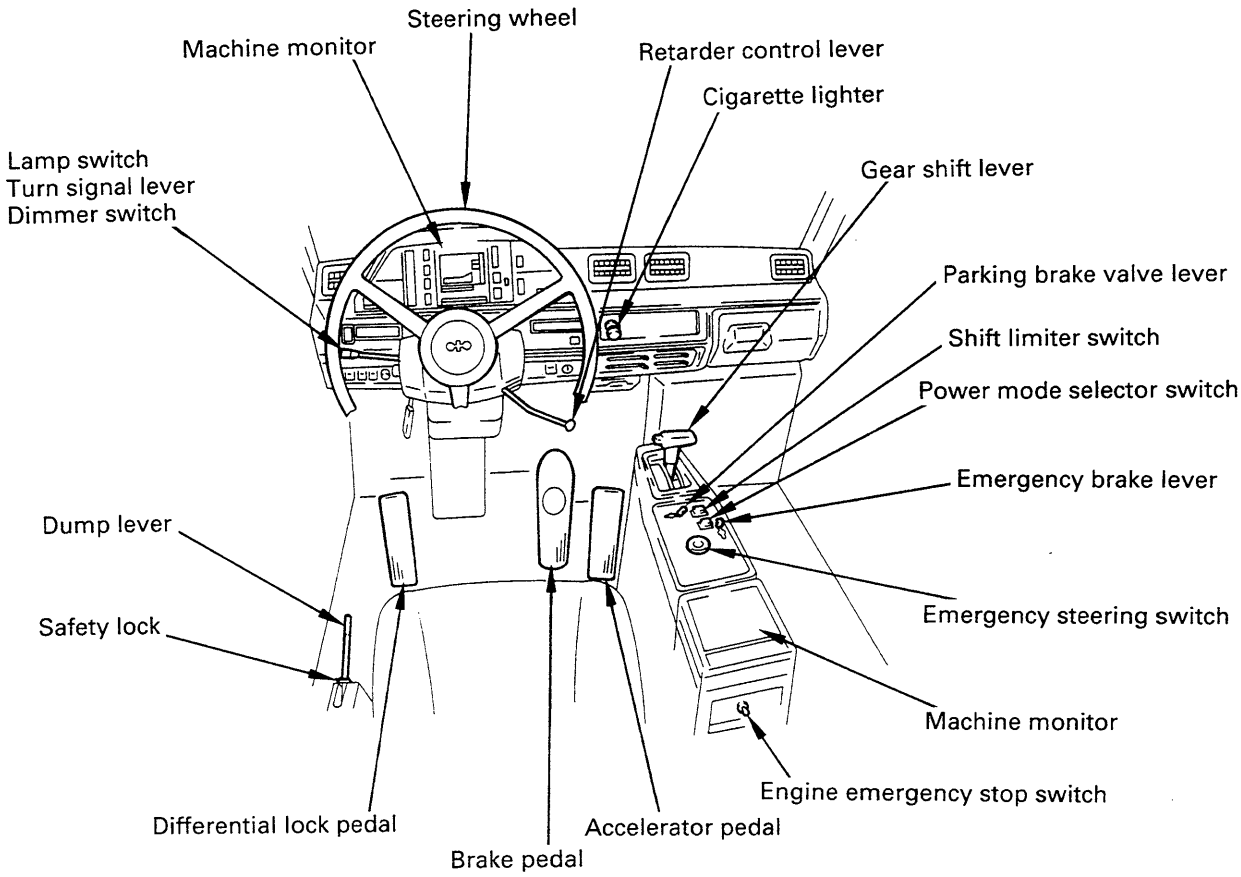
10. GENERAL VIEW

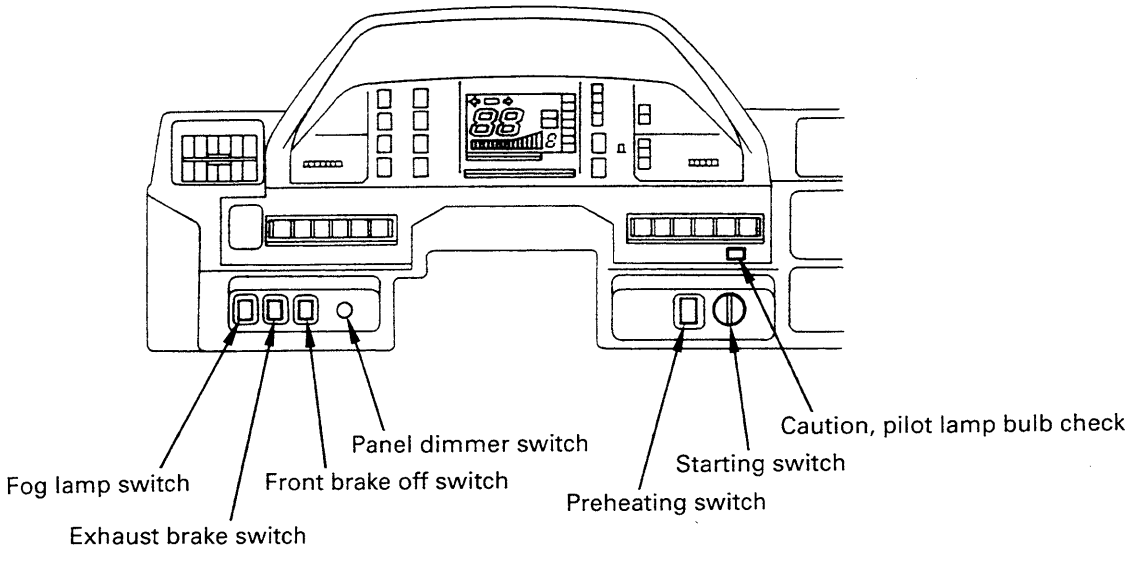
10.1 GENERAL VIEW OF MACHINE

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



10.2 GENERAL VIEW OF CONTROLS AND GAUGES





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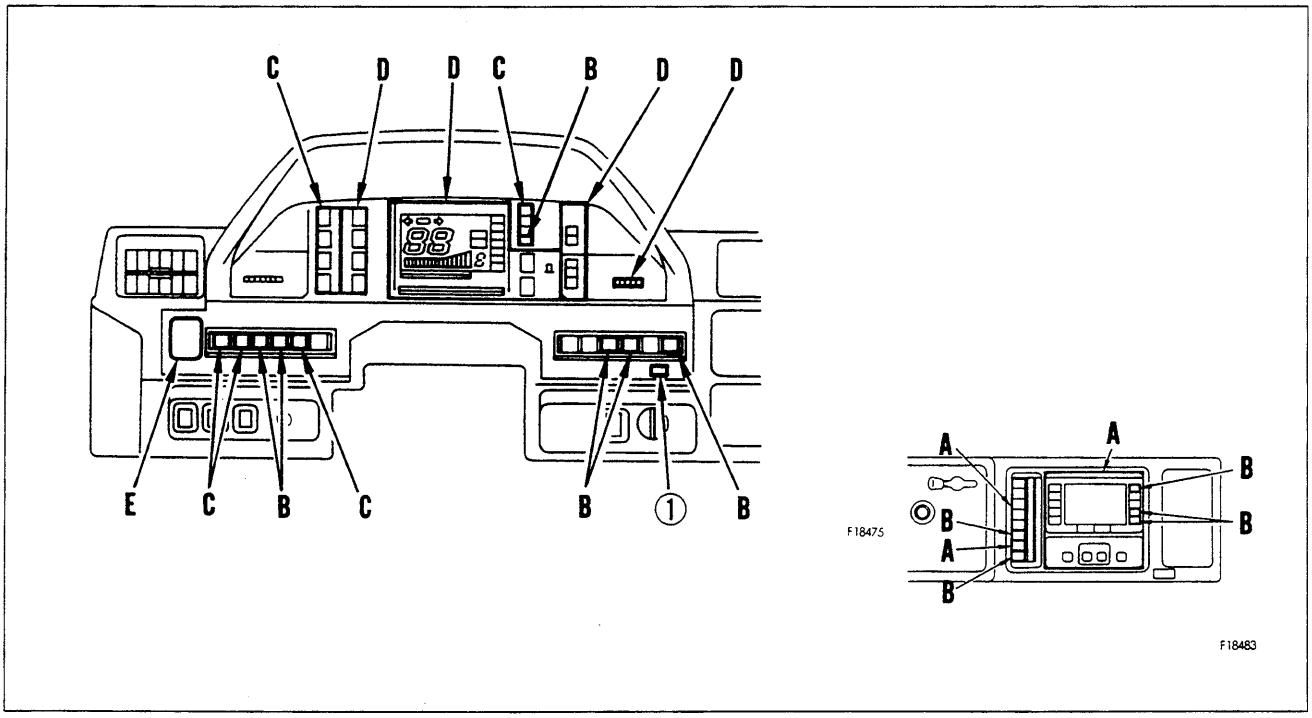
11. EXPLANATION OF COMPONENTS

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 MACHINE MONITOR



A. BASIC CHECK ITEMS (11.1.1)

When the starting switch is turned ON, if there is an abnormality in any CHECK BEFORE STARTING item, the monitor for the location for the abnormality flashes. Check the location of the flashing monitor and carry out the check before starting. When the engine is started, the monitor will go out even if there is an abnormality.

NOTICE

When carrying out the check before starting, do not rely simply on this monitor. Always carry out the checks according to the MAINTENANCE section or 12. OPERATION.

B. CAUTION ITEMS (11.1.2)

⚠ CAUTION

If any of these monitors flash, carry out inspection and maintenance of the appropriate item as soon as possible.

When the engine is running, if there is an abnormality in any CAUTION item, the monitor for the location of the abnormality will flash or light up.

C. EMERGENCY STOP ITEMS (11.1.3)

⚠ CAUTION

If any of these monitors flash, stop operations immediately and carry out inspection and maintenance of the appropriate item.

When the engine is running, if there is an abnormality in any emergency stop item, the alarm buzzer will sound intermittently and the central warning lamp and monitor for the location of the abnormal ity will flash.

D. METER DISPLAY PORTION (11.1.4)

This consists of the air pressure gauge, engine water temperature gauge, torque converter oil temperature gauge, retarder oil temperature gauge, speedometer, turn signal pilot lamps, service meter, engine tachometer, odometer, shift indicator (with lockup display), transmission shift lever position pilot lamp, shift limiter pilot lamp, fuel gauge, working mode display lamp (opt), suspension mode display lamp, cold start monitor, exhaust brake pilot lamp, rear brake pilot lamp, and differential lock pilot lamp (opt).

E. CENTRAL WARNING LAMP

If the machine is in the following condition, this lamp will flash, and at the same time, the alarm buzzer will sound intermittently.

- When an abnormality has occurred in any of C. Emergency stop items.
- If the parking brake is applied, but the shift lever is not at neutral.

Operating check for machine monitor system

When the starting switch is turned to the ON position before the engine is started, all the monitors, gauges, and central warning lamp will light up for approx. 3 seconds, and the alarm buzzer will sound for approx. 2 seconds.

When this happens, the speedometer will display 88.

If any monitor does not light up, there is probably a failure or disconnection in that circuit, so please contact your Komatsu distributor to have the circuit checked.

When the starting switch is at the ON position, if the lever is not at the neutral position, the central warning lamp will flash and the alarm buzzer will continue to sound intermittently. When the lever is placed at neutral, the lamp will go out and the buzzer will stop.

Checking for blown caution lamp or pilot lamp bulbs

Turn the starting switch to the ON position before starting the engine, press bulb check switch ①, and check that no caution lamp or pilot lamp bulbs are blown.

If any lamp does not light up, the bulb is probably blown, so replace the bulb.

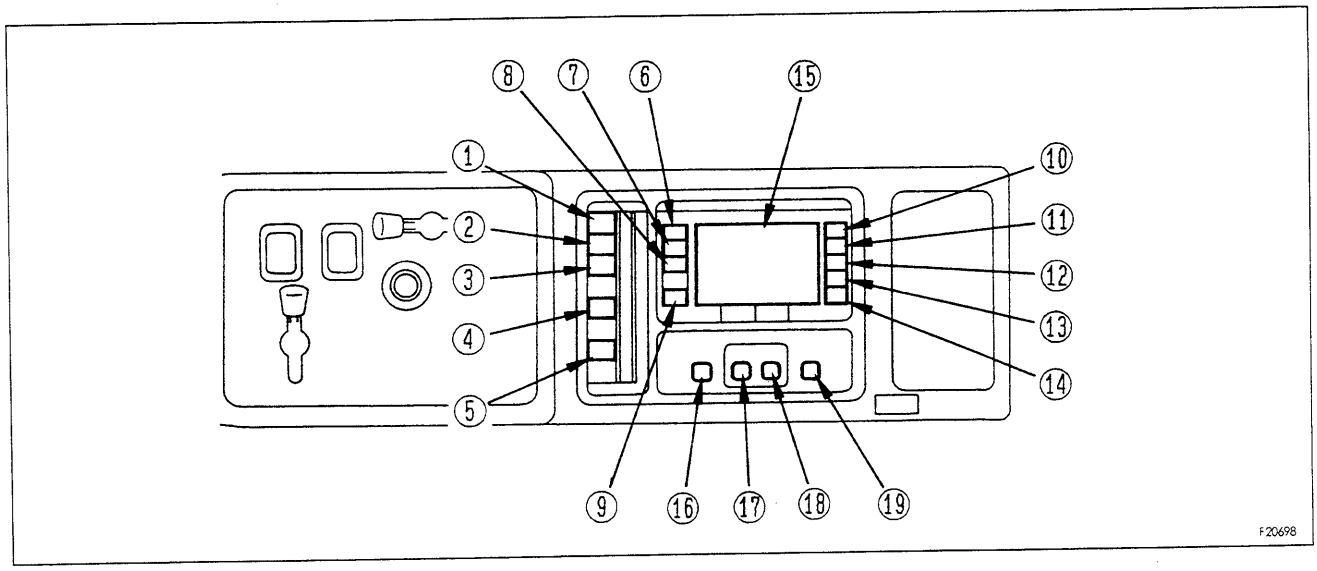
If the lamp does not light up even when the bulb is replaced, there is probably a failure or disconnection, so please contact your Komatsu distributor to have the circuit checked.

11.1.1 A. BASIC CHECK ITEMS (opt)

All the devices for A. Basic check items (1- 19) are optional.

NOTICE

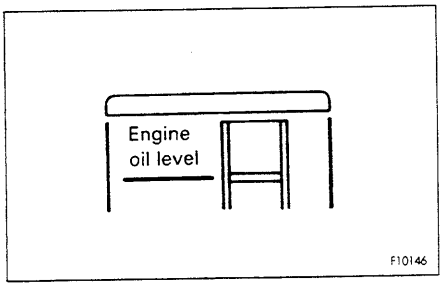
- **The monitor check of the basic check items must not be used instead of the check before starting. Always carry out the checks according to the MAINTENANCE section or 12. OPERATION.**
- **Stop the machine in a flat place before checking the monitor.**



1. ENGINE OIL LEVEL

This informs the operator if the oil level in the engine oil pan is low.

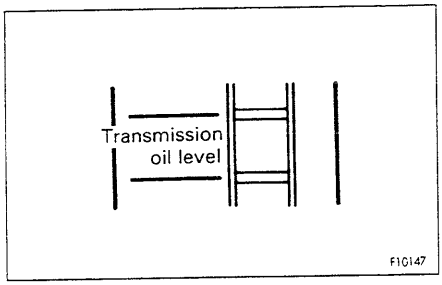
If it flashes, check the oil level in the engine oil pan and add oil.



2. TRANSMISSION OIL LEVEL

This informs the operator if the oil level in the transmission oil pan is low.

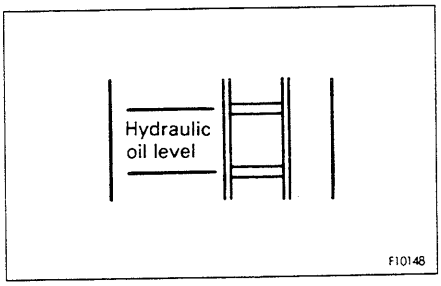
If it flashes, check the oil level in the transmission oil pan and add oil.



3. HYDRAULIC OIL LEVEL

This informs the operator if the oil level in the hydraulic tank is low.

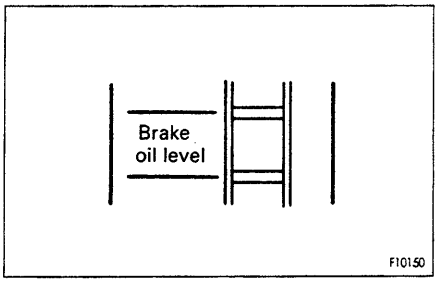
If it flashes, check the oil level in the hydraulic tank and add oil. Lower the dump body completely before checking the hydraulic oil level.



4. BRAKE OIL LEVEL

This informs the operator if the oil level in the front brake oil tank is low.

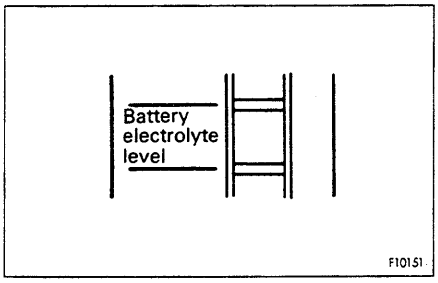
If it flashes, check the oil level in the front brake oil tank and add oil.



5. BATTERY ELECTROLYTE LEVEL

This informs the operator that the battery electrolyte level is low.

If it flashes, check the battery electrolyte level, and add distilled water.



- **Oil filter replacement interval display items**
  - **6. ENGINE OIL**
  - **7. TRANSMISSION OIL**
  - **8. HYDRAULIC OIL**
  - **9. FINAL DRIVE CASE OIL**
  - **10. DIFFERENTIAL CASE OIL**
  - **11. FULL FLOW FILTER**
  - **11. FUEL FILTER**
  - **12. CORROSION RESISTOR**
  - **13. TRANSMISSION FILTER (TRANSMISSION FILTER AT BOTH VALVE END AND TANK END)**
  - **14. HYDRAULIC FILTER**

- **Timer switch related item**
  - **15. MAINTENANCE TIMER**
  - **16. REPLACEMENT INTERVAL CHECK SWITCH (OIL)**
  - **17. REPLACEMENT SWITCH**
  - **18. CANCEL SWITCH**
  - **19. REPLACEMENT INTERVAL CHECK SWITCH (FILTER)**

For details of the above monitor checks 6 - 19, see HANDLING MAINTENANCE MONITOR on the next page.

HANDLING MAINTENANCE MONITOR (opt)

- **When carrying out check before starting**

1. When the starting switch is turned ON, all the monitor lamps light up, and after 3 seconds, only the items requiring maintenance stay lighted up or flash.

2. After the engine is started, when the air pressure gauge gives the normal display (the green range lights up), place the shift lever at the N position and pull the retarder lever fully for 10 seconds to check that the brake has not exceeded the wear limit. If it has exceeded the wear limit, the lamp lights up.

3. After starting the engine, place the shift lever at the N position, and move the retarder lever to the ON position to check that the brake has not exceeded the wear limit. If it has exceeded the wear limit, the lamp lights up.

After the engine is stopped, if 15 minutes has not passed for the engine oil level or 20 minutes for the transmission oil level, the caution lamp may flash even when the oil level is normal.

If the caution lamp flashes, carry out inspection and maintenance. For details, see EVERY 1000 HOURS SERVICE.

- **Abnormality display when operating**

If any abnormality occurs during operations, the monitor will flash.

However, if any filter is clogged the lamp will flash, and if the replacement interval has passed, it will light up.

- **To see replacement interval for oil and filters**

1. When the starting switch is turned ON, all the lamps will light up, and after 3 seconds, the engine oil change interval is displayed.

2. To see the oil change interval, press the left replacement interval check switch. To see the filter replacement interval, place the right replacement interval check switch. The display will appear in turn from the top.

3. When the display time lights up, it shows the time remaining to replacement. When the display time flashes, it shows the time that has passed since the replacement interval was reached.

- **Operating switch when oil or filters have been replaced**

1. After changing the oil or replacing the filters, use the procedure for checking the replacement interval to set the display for the item that has been replaced.

2. Keep the replacement switch pressed for at least 2 seconds. When the display changes to the display for the next replacement interval, the switch operation is completed.

3. After completing the switch operation, start the engine.

If the switch is operated for the wrong replacement item, press the cancel switch to return to the condition before the switch was operated, then operate the switch correctly.

Always stop the engine before operating the switch.

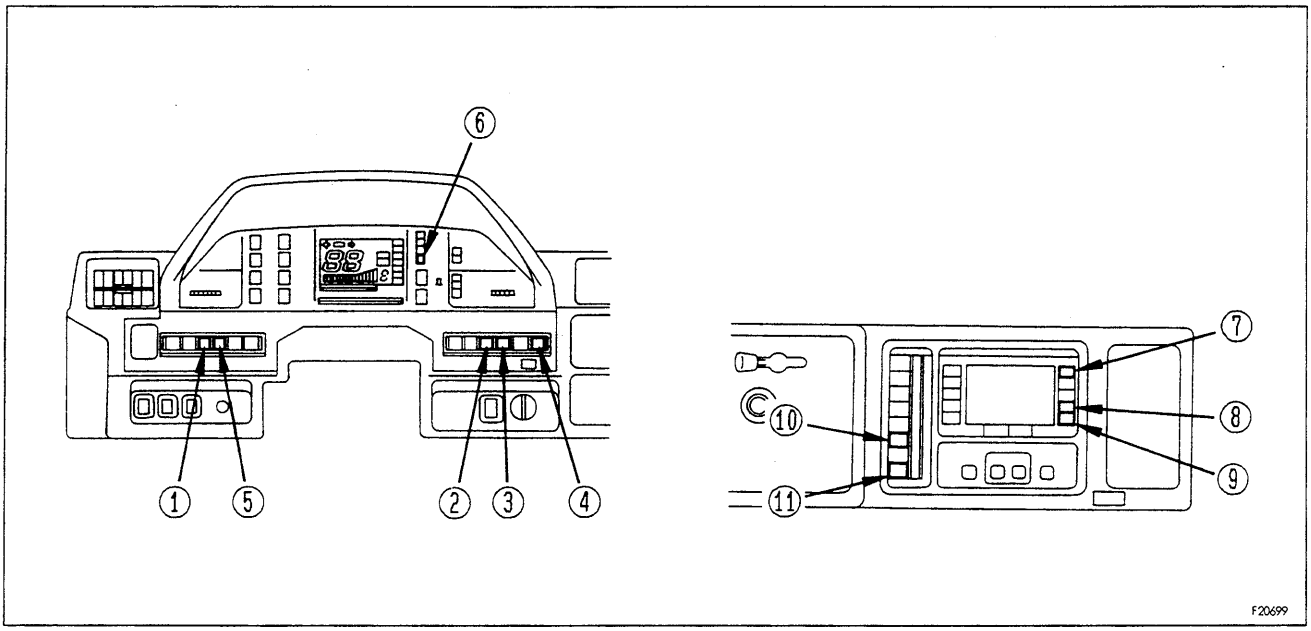
The initial set times are as follows.

Item	Time
Engine oil	250
Transmission oil	1000
Hydraulic oil	2000
Final drive oil	2000
Differential case oil	2000
Full flow filter (engine oil filter)	250
Fuel filter	500
Corrosion resistor	1000
Transmission filter at both valve end and tank end	500
Hydraulic filter	1000

12.1.2 B. CAUTION ITEMS

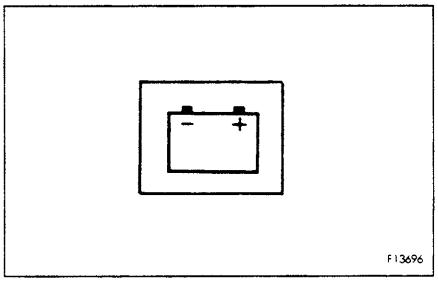
⚠ CAUTION

If any of these monitors flash, carry out inspection and maintenance of the appropriate item as soon as possible.



1. BATTERY CHARGE

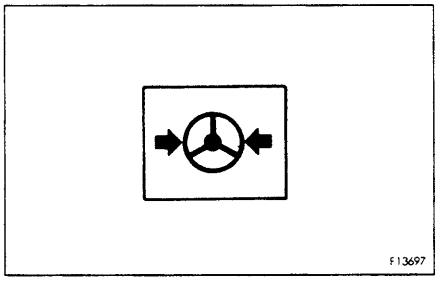
This informs the operator of any abnormality in the charging system when the engine is running. If it flashes, check the charging circuit.



2. EMERGENCY STEERING

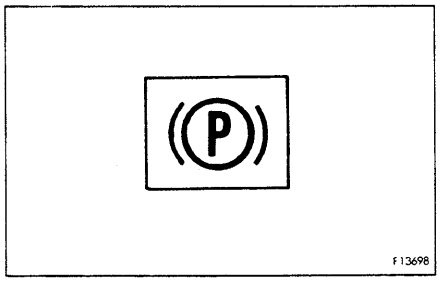
This lights up when the emergency steering is actuated.

If any abnormality should occur in the steering oil pressure circuit when the machine is traveling, the auto emergency steering is actuated and the lamp lights up.



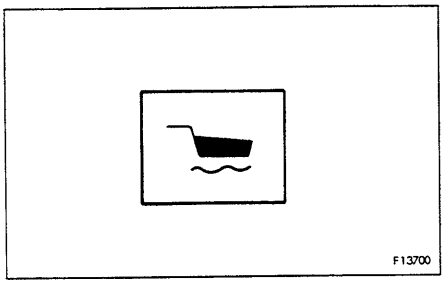
3. PARKING BRAKE

This lights up when the parking brake is applied.



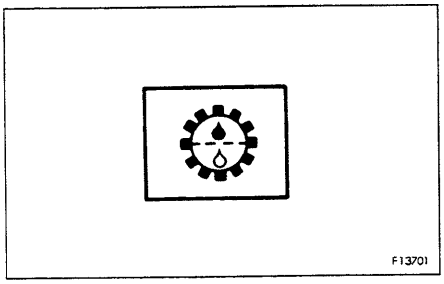
4. DUMP BODY FLOAT CAUTION

This lights up when the dump body control lever is at any position other than FLOAT. Always set the lever to the FLOAT position when traveling.



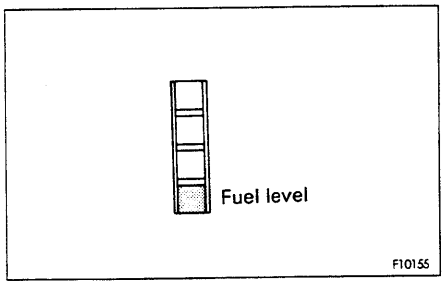
5. TRANSMISSION FILTER CLOGGING (VALVE END)

This informs the operator that the transmission filter at the valve end is clogged. If it lights up, replace the transmission filter at the valve end.



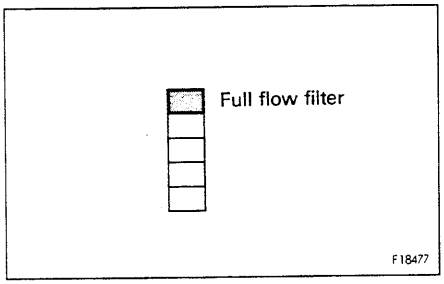
6. FUEL LEVEL

This flashes when the level of the fuel in the fuel tank goes below 60 ℓ (15.8 US gal, 13.2 UK gal).
If it flashes, check the fuel level and add fuel.



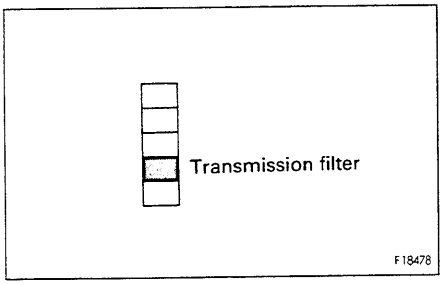
7. FULL FLOW FILTER CLOGGING

This informs the operator that the engine oil filter is clogged. If it lights up, replace the engine oil filter.



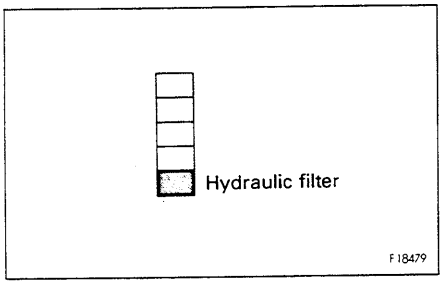
8. TRANSMISSION FILTER CLOGGING (TANK END)

This informs the operator that the transmission filter at the tank end is clogged. If it lights up, replace the transmission filter at the tank end.



9. HYDRAULIC FILTER CLOGGING

This informs the operator that the hydraulic filter is clogged. If it lights up, replace the hydraulic filter.

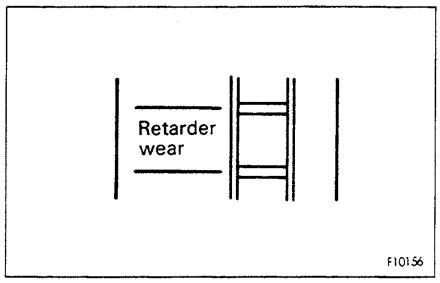


10. RETARDER WEAR

With the machine stopped and the air pressure gauge giving the normal display (the green range lights up), place the shift lever at the N position and pull the retarder lever fully for 10 seconds to check.

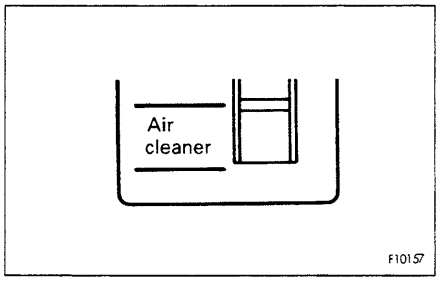
For details, see EVERY 1000 HOURS SERVICE.

Even if the retarder wear monitor flashes, the central warning lamp does not flash.



11. AIR CLEANER

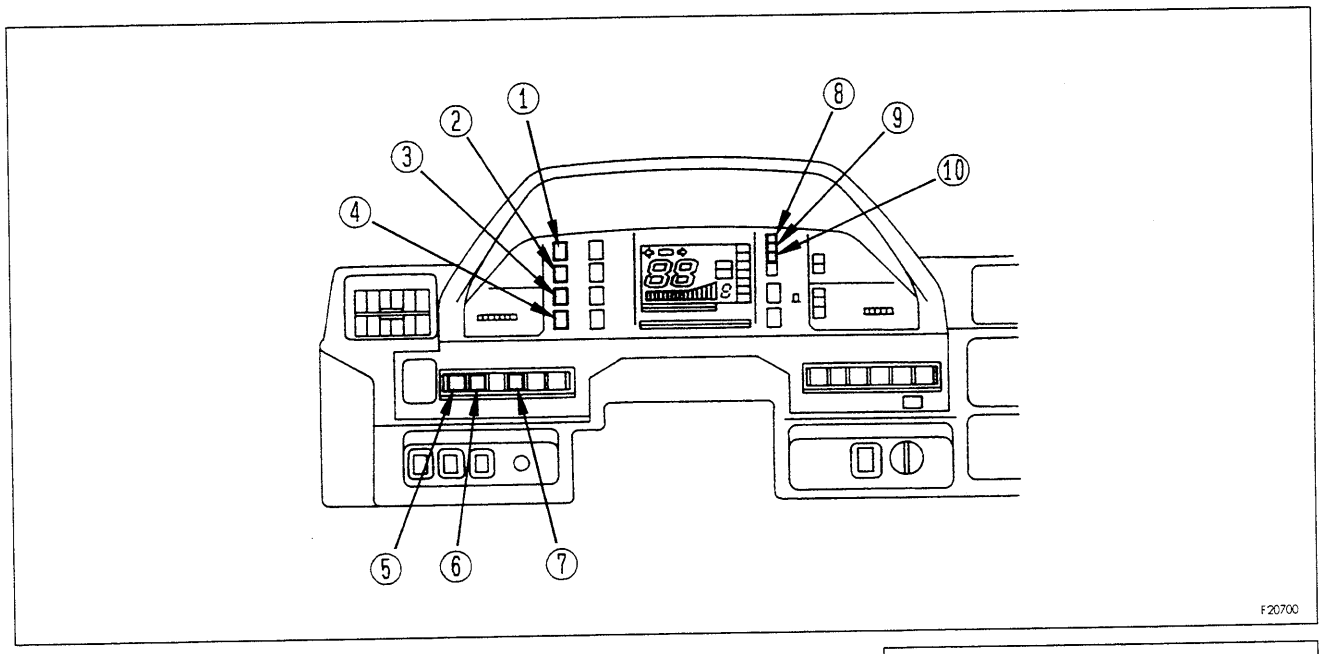
This informs the operator that the air cleaner is clogged. If it flashes, check the dust indicator and clean the air element.



11.1.3 C. EMERGENCY STOP ITEMS

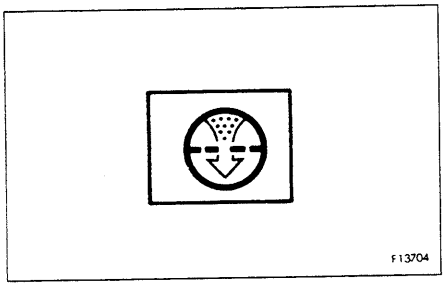
⚠ CAUTION

If any of these monitors flash, stop operations immediately and carry out the following action.



1. AIR PRESSURE

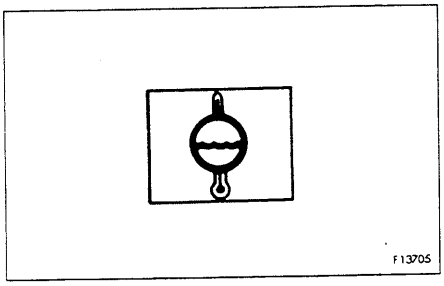
This warns the operator that the air pressure inside the air tank has dropped. If it flashes, stop the machine, raise the engine speed, and wait until the lamp goes out.



2. ENGINE WATER TEMPERATURE

This warns the operator that the engine cooling water temperature has risen.

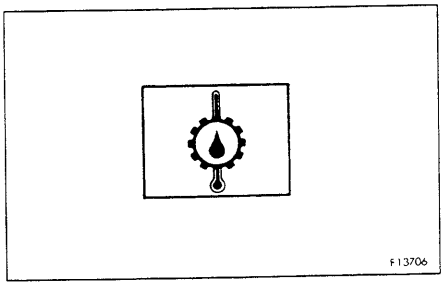
If it flashes, stop the machine and run the engine under no load at a mid-range speed until the engine water temperature gauge enters the green range.



3. TORQUE CONVERTER OIL TEMPERATURE

This warns the operator that the torque converter oil temperature has risen.

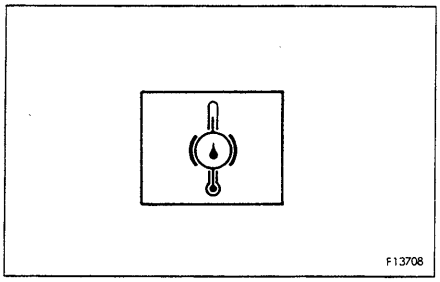
If it flashes, stop the machine, and run the engine under no load at a mid-range speed until the torque converter oil temperature gauges enters the green range.



4. RETARDER OIL TEMPERATURE

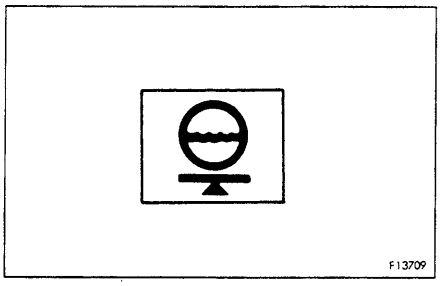
This warns the operator that the retarder oil temperature has risen.

If it flashes, stop the machine, place the shift lever at the N position, then run the engine under no load at a mid- range speed until the warning lamp goes out.



5. RADIATOR WATER LEVEL

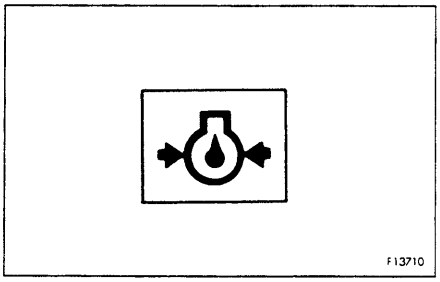
This warns the operator that the radiator water level has dropped. If it flashes, stop the engine, check the level of the cooling water in the radiator, and add water.



6. ENGINE OIL PRESSURE

This warns the operator that the engine lubricating oil pressure has dropped.

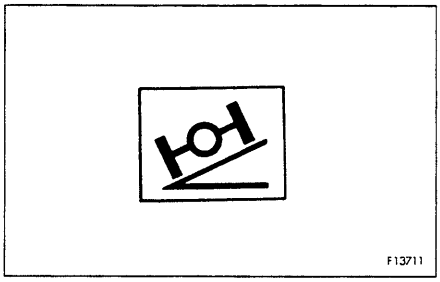
If it flashes, stop the engine and carry out inspection.



7. ANGLE WARNING

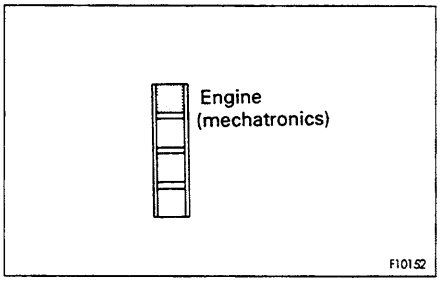
When the dump body is raised, this warns the operator that the machine has tilted beyond the safety range to the left or right.

If it flashes, lower the body, and move the machine to a safe, stable place.



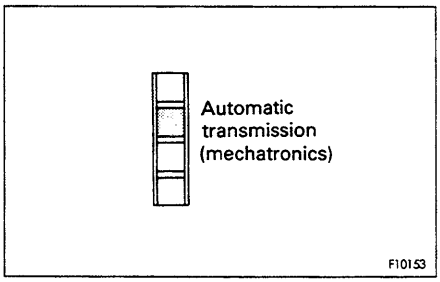
8. ENGINE (MECHATRONICS RELATED)

If an abnormality occurs in the mechatronics related parts of the engine control system, this lamp flashes to warn of the abnormality.



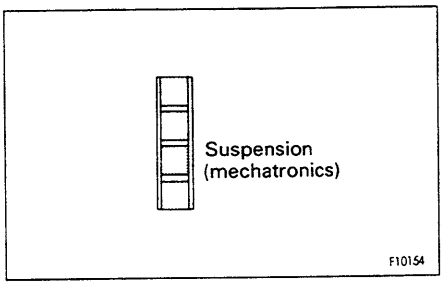
9. AUTOMATIC TRANSMISSION (MECHATRONICS RELATED)

If an abnormality occurs in the mechatronics related parts of the transmission control system, this lamp flashes to warn of the abnormality.



10. SUSPENSION (MECHATRONICS RELATED)

If an abnormality occurs in the mechatronics related parts of the suspension control system, this lamp flashes to warn of the abnormality.

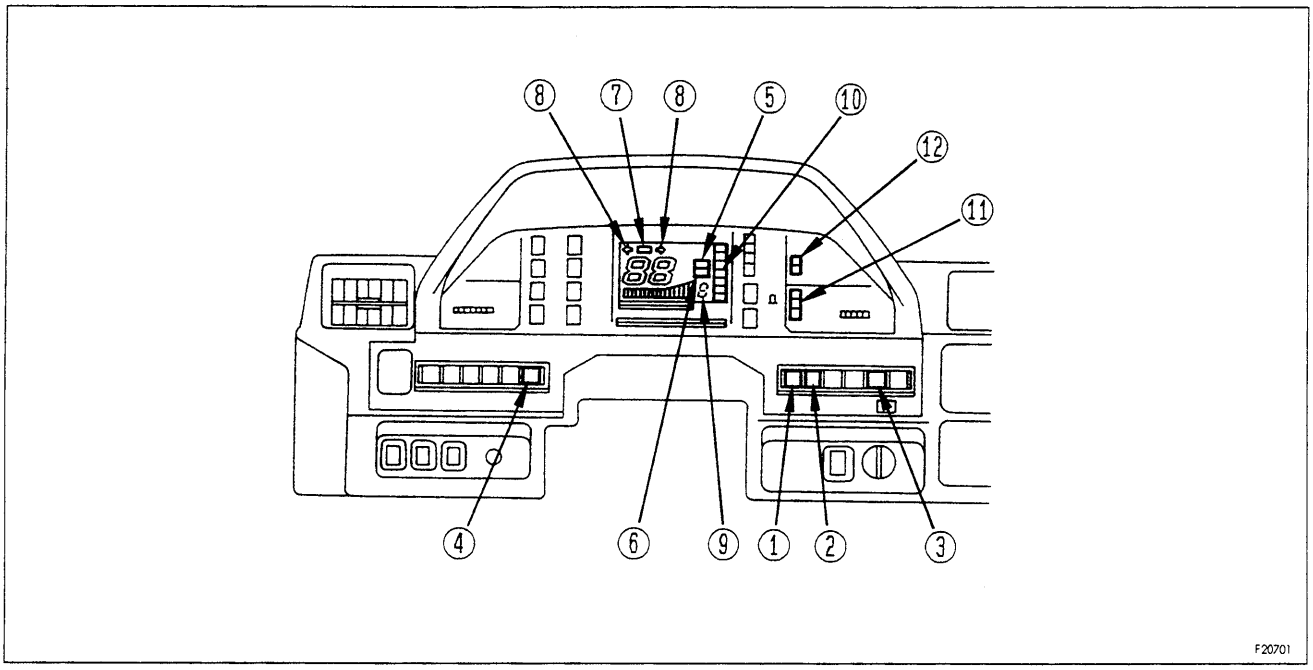


If lamps (8), (9), or (10) light up and the alarm buzzer sounds intermittently, open the rear cover inside the cab and check the controller abnormality display, then contact your Komatsu distributor for inspection.

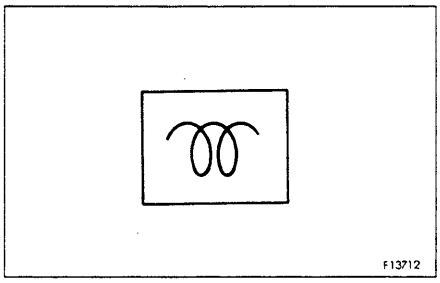
11.1.4 D METER DISPLAY PORTION

PILOT DISPLAY PORTION

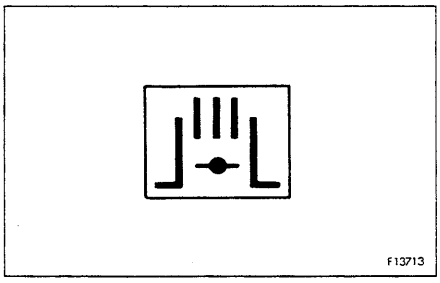
When the starting switch is at the ON position, this lights up when the display items are functioning.



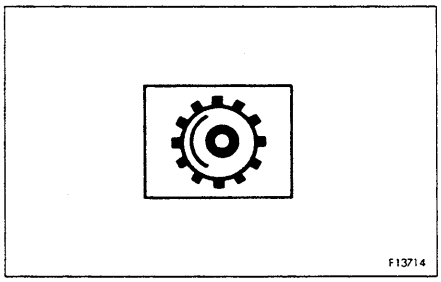
1. **COLD START PILOT**
   This lights up when the quick start switch is turned ON.



2. **EXHAUST BRAKE PILOT**
   This pilot lamp lights up when the exhaust brake is actuated.

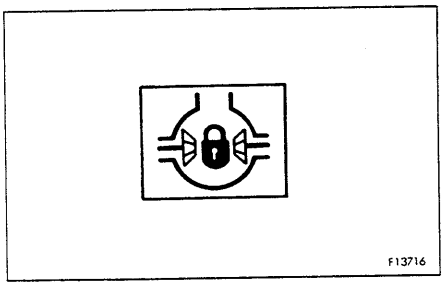


3. **REAR BRAKE PILOT (RETARDER)**
   This lamp lights up when the foot brake is depressed or the retarder control lever is pulled, and the rear brake is applied.



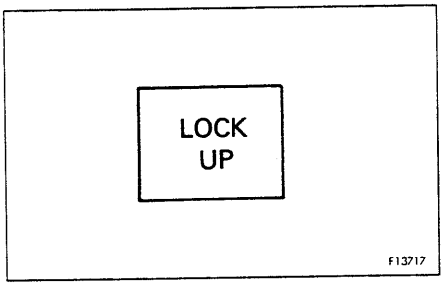
4. DIFFERENTIAL LOCK PILOT

This lamp lights up when the differential lock pedal (opt) is depressed and the differential lock is actuated.



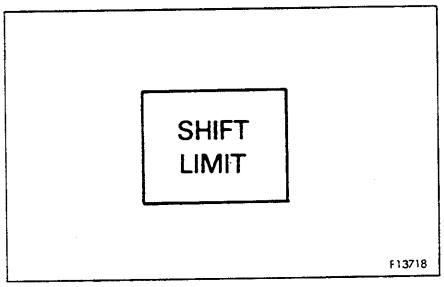
5. LOCKUP PILOT LAMP

This lamp lights up when the torque converter lockup is engaged and the transmission is shifted to direct drive.



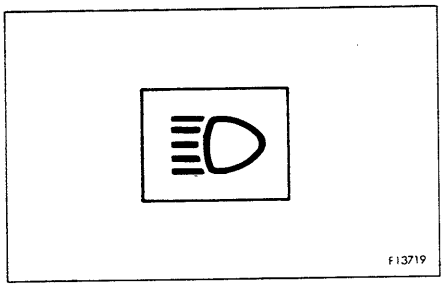
6. SHIFT LIMITER PILOT LAMP

This lights up when the shift limiter switch is actuated.



7. HIGH BEAM

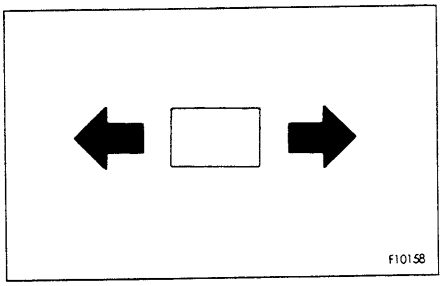
This lights up when the head lamps are set to high beam.



8. TURN SIGNAL PILOT LAMP

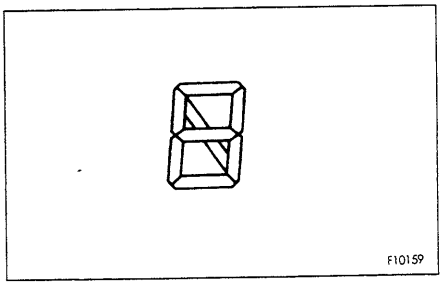
This lamp flashes at the same time as the turn signal lamp flashes.

If there is any disconnection in the turn signal lamp, the flashing interval becomes shorter.



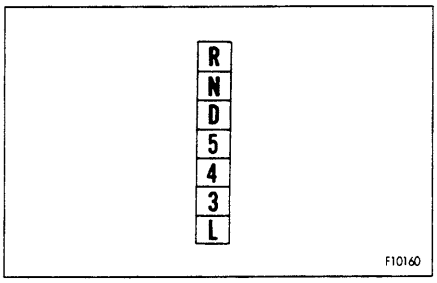
9. SHIFT INDICATOR

This displays the transmission shift range (speed range). When the key is turned ON, if the engine is not running, it will display N even if the shift lever is operated.



10. TRANSMISSION SHIFT LEVER POSITION PILOT LAMP

This indicates the position of the transmission shift lever.

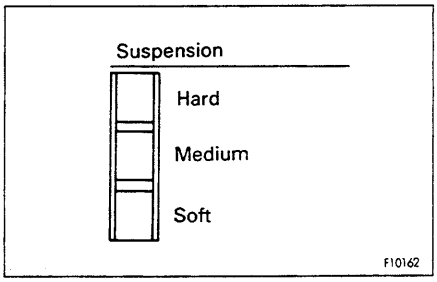


11. SUSPENSION MODE DISPLAY LAMP

This displays the suspension mode.

An automatic suspension system is mounted which automatically switches the damping characteristics of the suspension according to the size of the load, use of the brake, operation of the steering, and operation of the dump control.

Normally it is set to the soft mode when the dump truck is traveling empty and to the medium mode when it is traveling loaded. When the foot brake is operated or the machine is suddenly turned, or the dump control is operated, the suspension mode is switched to insure the stability of the machine to the front and rear, and left and right.

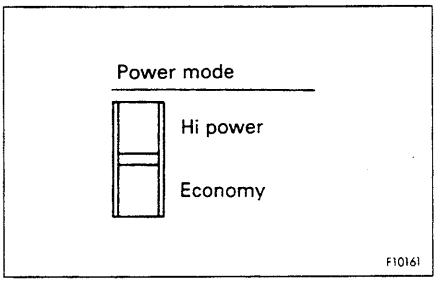


12. POWER MODE DISPLAY LAMP

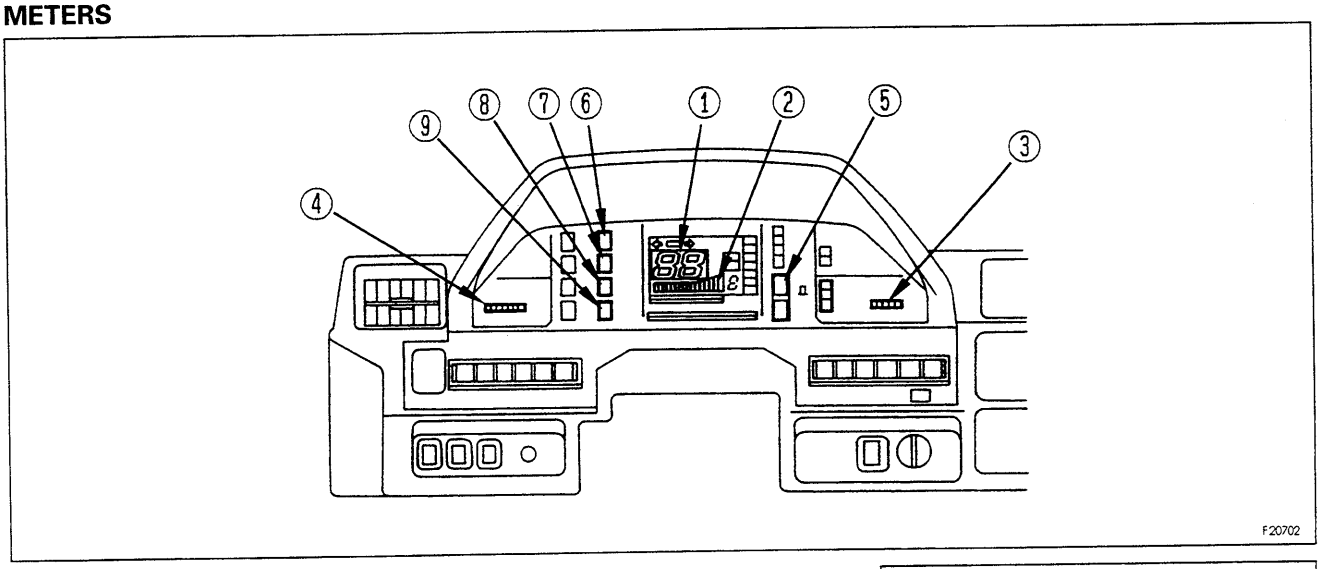
(If equipped with electrical governer)

This displays the power mode when the electronic governor is installed.

The mode can be selected with the power mode selector switch.

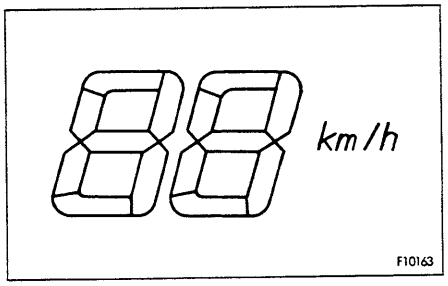


METERS



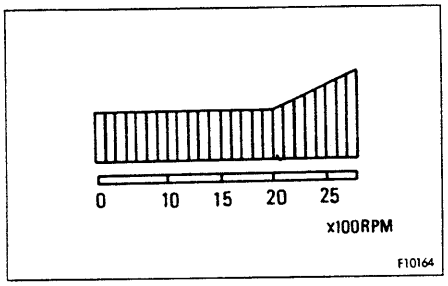
1. SPEEDOMETER

This indicates the travel speed of the machine.
A speedometer for MPH is also available.



2. ENGINE TACHOMETER

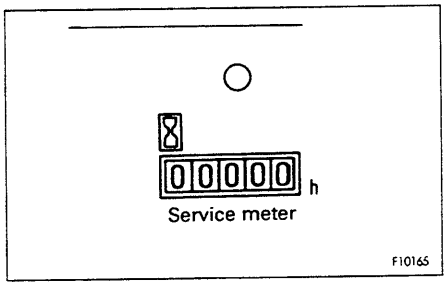
This indicates the speed of the engine.



3. SERVICE METER

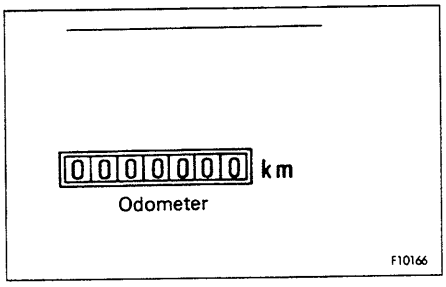
This shows the total hours of operation of the machine.
If the engine is running, the service meter will advance even if the machine is not moving.

The meter advances by 1 for every one hour of operation, regardless of the engine speed.



4. ODOMETER

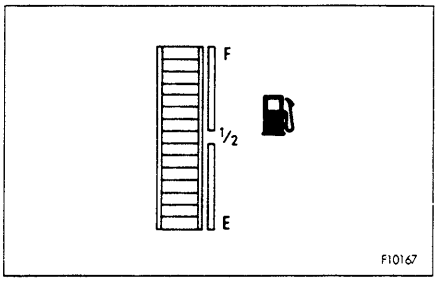
This indicates the distance traveled in kilometers.
An odometer for MILES is also available.
This unit is included in the speedometer.



5. FUEL GAUGE

This gauge indicates the amount of fuel in the fuel tank. The green range should be lighted up during operation.

If only the red range remains lighted during operation, it indicates that there is less than 60 ℓ (15.8 US gal, 13.2 UK gal) of fuel remaining in the tank, so check and add fuel.

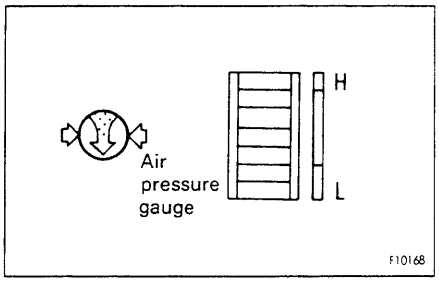


6. AIR PRESSURE GAUGE

This indicates the air pressure inside the air tank. The green range should be lighted up during operation.

If the red range lights up during operation, the alarm buzzer will sound, the central warning lamp will flash, and the air pressure monitor lamp will also flash at the same time.

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



REMARK

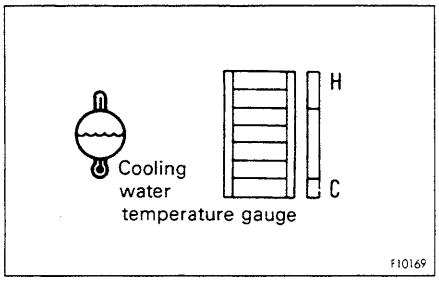
If the air pressure drops further, the parking brake is automatically applied.

7. ENGINE WATER TEMPERATURE GAUGE

This gauge indicates the engine cooling water temperature. The green range should be lighted up during operation.

If the red range lights up during operation, the alarm buzzer will sound, the central warning lamp will flash, and the engine water temperature monitor lamp will flash at the same time.

If this happens, stop the machine, run the engine under no load at a mid-range speed, and wait until the green range lights up.

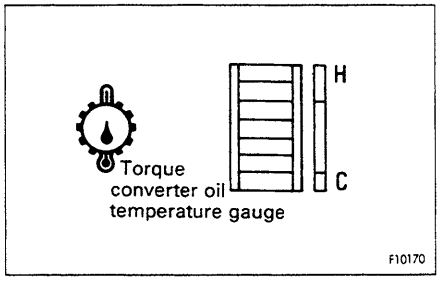


8. TORQUE CONVERTER OIL TEMPERATURE GAUGE

This gauge indicates the torque converter oil temperature. The green range should be lighted up during operation.

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

If this happens, stop the machine, run the engine under no load at a mid-range speed, and wait until the green range lights up.

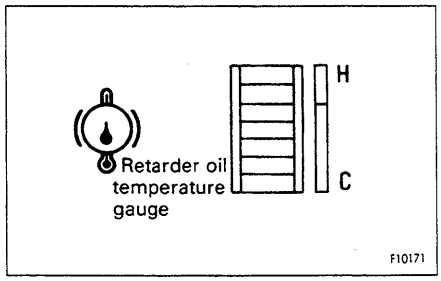


9. RETARDER OIL TEMPERATURE GAUGE

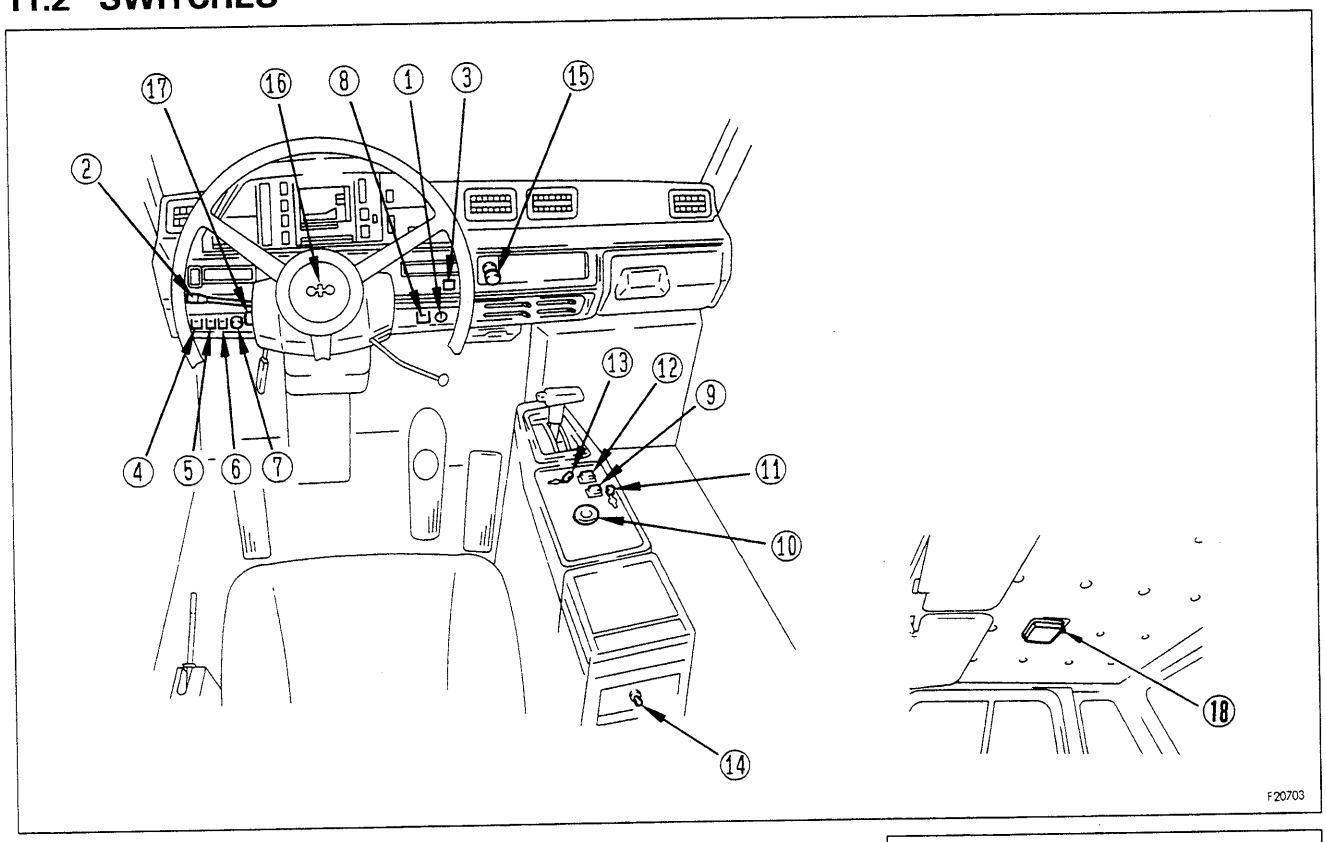
This gauge indicates the retarder cooling oil temperature. The green range should be lighted up during operation.

If the red range lights up during operation, the alarm buzzer will sound, the central warning lamp will flash, and the retarder oil temperature monitor lamp will flash at the same time.

If this happens, stop the machine, run the engine under no load at a mid-range speed, and wait until the green range lights up.

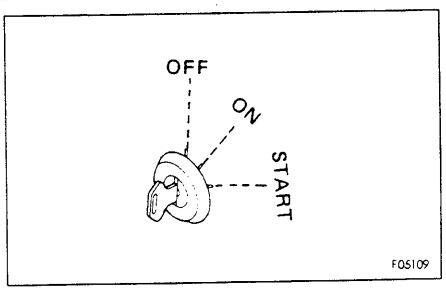


11.2 SWITCHES



1. STARTING SWITCH

This switch is used to start or stop the engine.



OFF position

At this position, the starting switch key can be inserted or removed. When the key is turned to this position, all the electric circuits are switched off and the engine stops.

ON position

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

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

START position

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

2. LAMP SWITCH

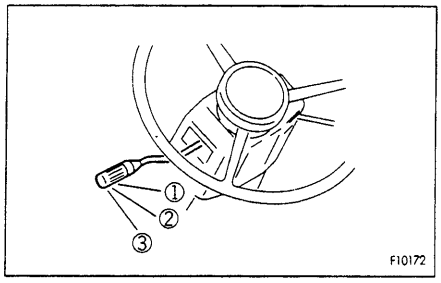
This lights up the head lamps, side clearance lamps, tail lamps, machine monitor lighting, and rear lamps.

① OFF

② ≡D•◁≡ position: Side clearance lamps, tail lamps, rear lamps, machine monitor lighting light up

③ ≡D• position: The head lamps light up in addition to the lamps in the ≡D•◁≡ position

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



2. TURN SIGNAL LEVER

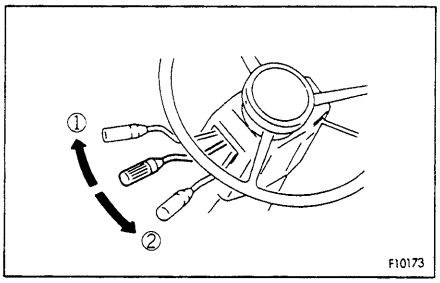
This lever operates the turn signal lamp.

① Right turn: Push the lever forward

② Left turn: Push the lever back

When the lever is operated, the turn signal pilot lamp also flashes.

The lever is automatically returned when the steering wheel is turned back. If the lever does not return, move it by hand.

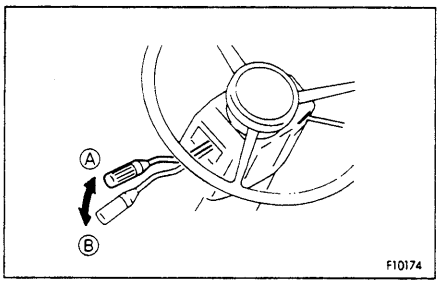


2. DIMMER SWITCH

This is used to switch the head lamps between high beam and low beam.

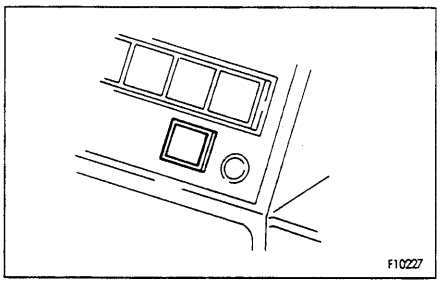
Ⓐ Low beam

Ⓑ High beam



3. CAUTION, PILOT LAMP BULB CHECK SWITCH

Press this switch when the starting switch is at the ON position to check for any blown bulbs.

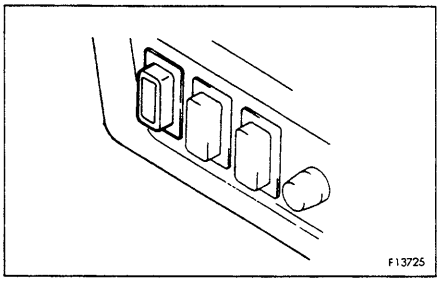


4. FOG LAMP SWITCH

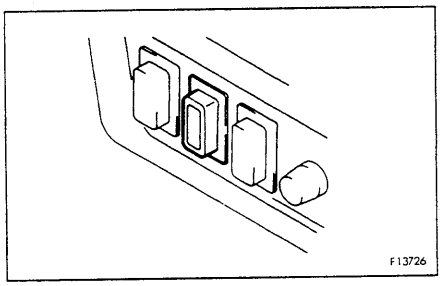
This switch turns on the fog lamp. (for machines equipped with fog lamp.)

position: OFF

position: ON



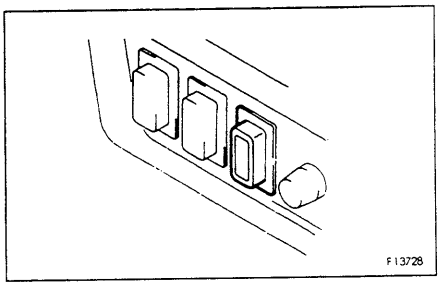
5. EXHAUST BRAKE SWITCH



▬ position (OFF): The exhaust brake is actuated when the foot brake is depressed or the retarder control lever is operated and the torque converter is in the lockup condition.

▬ position (ON): The exhaust brake is actuated when the accelerator pedal is released and the torque converter is in the lockup condition.

6. FRONT BRAKE OFF SWITCH



⚠ WARNING

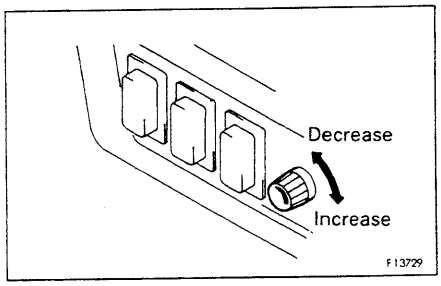
When traveling on icy roads, on snow, or on other slippery road surfaces, it is necessary to control the steering, so set the front brake switch to the ▬ position (ON) and travel slowly at a safe speed.

The braking method can be selected according to the road surface conditions.

▬ position (OFF): When the brake pedal is depressed, the brakes are applied to both the front and rear wheels.

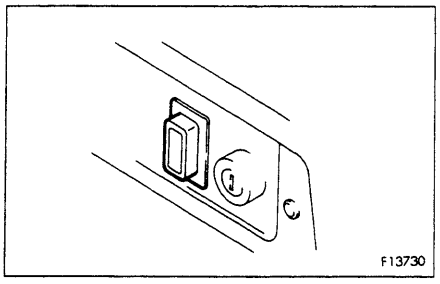
▬ position (ON): When the brake pedal is depressed, the front brakes are not applied. The brakes are applied only to the rear wheels.

7. NIGHT LIGHTING DIMMER SWITCH



This is used to adjust the brightness of the monitor panel lighting and pilot lamps. Turn to the right to make the lighting brighter and turn it to the left to make the lighting dimmer.

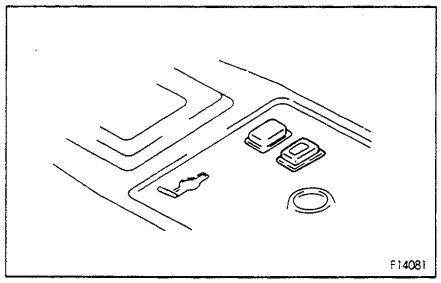
8. PREHEATING SWITCH



An electric heater is switched on to heat the intake air for the engine.

- position: If the ambient temperature is below approx. – 5°C, preheating is carried out automatically according to the ambient temperature.
- position: Preheating is carried out.
  Press this switch if the engine does not start when only automatic preheating is carried out or when post-heating is required after the engine is started.
  When the switch is released, it will return automatically to the automatic preheating position.

9. POWER MODE SELECTOR SWITCH



The power mode switch can be switched to allow the machine to travel economically in a way suited to the operating conditions.

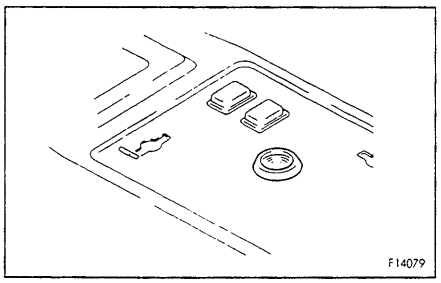
A. Economy (traveling in flat areas)

This position is used when the emphasis is on reducing fuel consumption, such as when traveling on flat ground where the maximum output is not needed.

B. High power (general operations)

This is used for general operating conditions.

10. EMERGENCY STEERING SWITCH



This switch is used to actuate the emergency steering pump. When the switch is pressed, the emergency pump is actuated to make it possible to operate the steering.

When the switch is ON, the pilot lamp (red) inside the switch lights up.

The emergency steering pump can be used for a maximum of 90 seconds.

When the emergency steering is being used, keep the travel speed to a maximum of 5 km/h.

When the emergency steering is actuated, it is possible to use the dump lever to raise the dump body.

This system is equipped with an automatic emergency steering mechanism which is actuated if the oil pressure in the steering circuit drops.

If the auto emergency steering is actuated, stop the machine swiftly and carry out inspection.

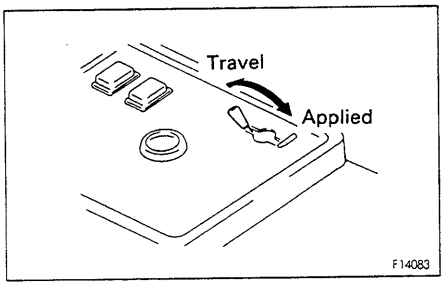
If the key switch is turned ON when the machine is stopped and the parking brake switch is OFF, the auto emergency steering is actuated after 1 second, so turn the parking brake switch to the ON (PARKING) position.

11. EMERGENCY BRAKE LEVER

This lever is used to actuate the emergency brake.

ON: Emergency brake actuated

TRAVEL: Emergency brake released



If the pressure in the air tank drops below 2.2 kg/cm^2, the emergency brake is automatically applied.

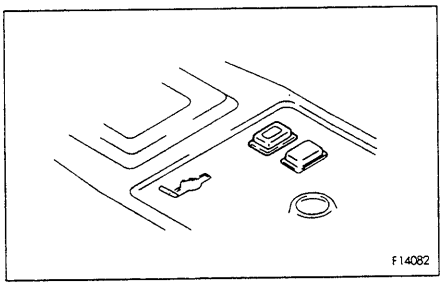
If the emergency brake is applied because of a failure in the air system, the central warning lamp will flash and the alarm buzzer will sound.

For details of the method of releasing the brake if this happens, see METHOD OF RELEASING EMERGENCY BRAKE AFTER IT IS ACTUATED.

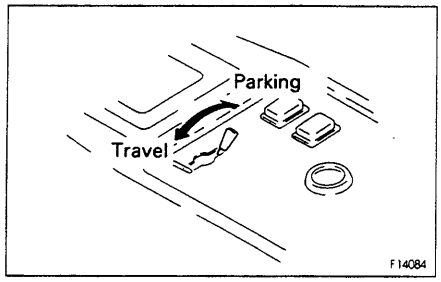
12. SHIFT LIMITER SWITCH

This is used to limit the maximum speed range when the transmission shift lever is in the D or L range.

- ■ position: D range – F2 - F7
  L range – F1 - F2
- ▬ position: D range – F2 - F6
  L range – F1



13. PARKING BRAKE VALVE LEVER



⚠ WARNING

- **When parking or leaving the machine, always apply the parking brake.**
- **During loading operations, do not apply the parking brake. Pull the retarder lever to apply the brake.**

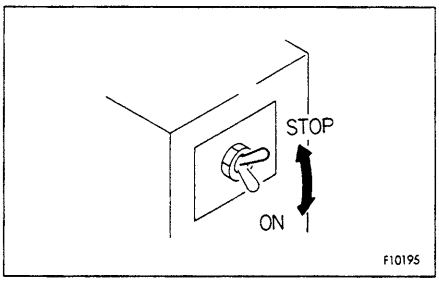
This lever is used to actuate the parking brake valve.
PARKING: Parking brake actuated
TRAVEL: Parking brake is released

When the lever is set to the PARKING position, the parking brake pilot lamp lights up.

When the lever is set to the PARKING position, if the transmission shift lever is at any position other than N, the central warning lamp will flash and the alarm buzzer will sound.

If the air pressure drops below 215.7 kPa (2.2 kg/cm^2, 31.2 psi), the emergency brake and parking brake are automatically applied.
For details of the method of releasing the brake when it is applied because of failure in the air system, see METHOD OF RELEASING PARKING BRAKE WHEN IT IS APPLIED.

14. ENGINE EMERGENCY BRAKE STOP SWITCH
(If equipped with electrical governor)



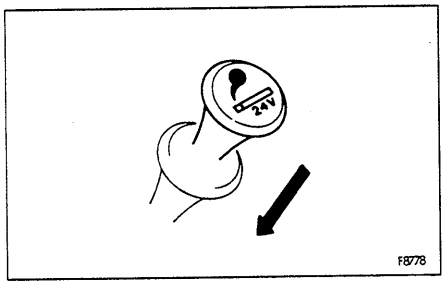
⚠ WARNING

This switch must not be used for stopping the engine under normal conditions. When the engine has completely stopped, return the switch to the ON (TRAVEL) position.

Use this switch if the engine will not stop even when the starting switch is turned to the OFF position.

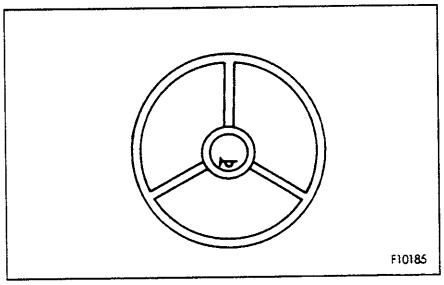
15. CIGAR LIGHTER

This is used to light cigarettes.
When the cigar lighter is pushed in, it will return to its original position after several seconds, so pull it out and use it to light your cigarette.



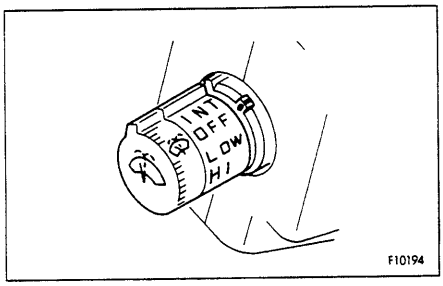
16. HORN BUTTON

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



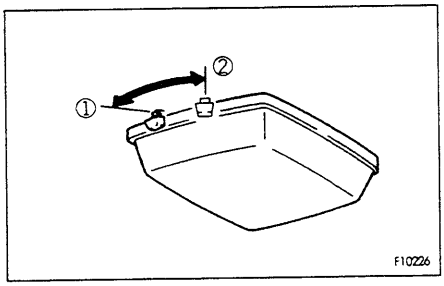
17. WIPER SWITCH

This switch is used to operate the wiper.
INT position: Wiper moves intermittently
OFF
LOW position: Wiper moves at low speed
HI position: Wiper moves at high speed
When the switch is pressed, washer fluid is sprayed out.

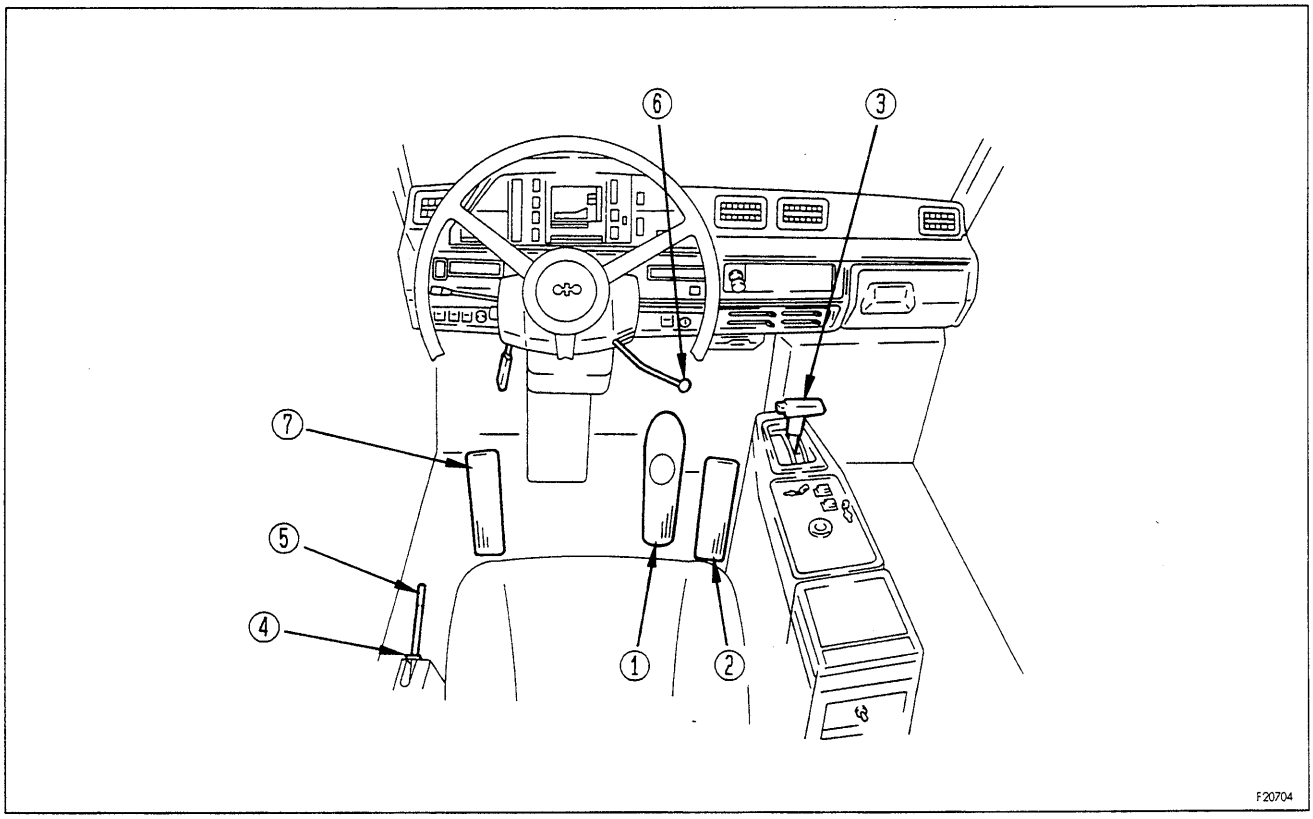


18. ROOM LAMP SWITCH

This is used to switch the room lamp on or off.
① OFF
② ON

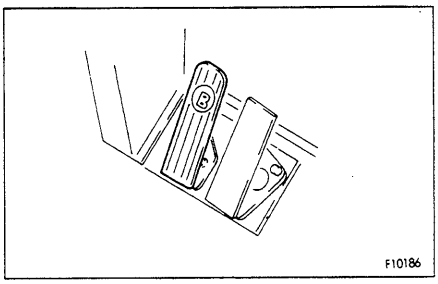


11.3 CONTROL LEVERS AND PEDALS



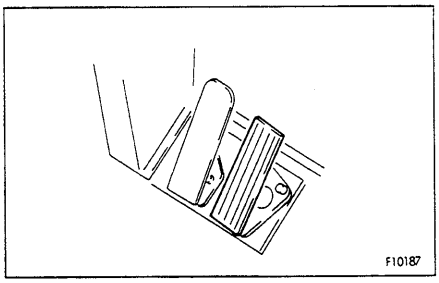
1. BRAKE PEDAL

This is used to apply the wheel brakes.



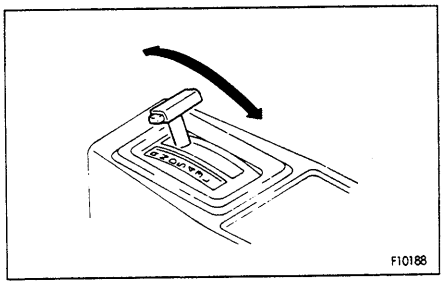
2. ACCELERATOR PEDAL

This is used to adjust the engine speed.
It can be operated freely between the engine low idling position and the full throttle position.



3. SHIFT LEVER

The shift range can be selected to match the travel conditions.



D position

This is used for normal travel.

If the lever is placed in this position, the transmission is shifted automatically from 2nd torque converter drive to 7th speed to match the travel speed of the machine.

The maximum speed in this position is 70 km/h (43.5 MPH).

R position

This is used when traveling in reverse.
This position uses the torque converter drive.

The machine cannot travel in reverse if the dump lever is not at the FLOAT position. Set the dump lever to the FLOAT position before moving the shift lever to the R position.

5 - L position

These positions are used in places where it is difficult to travel at high speed, or when traveling on soft ground, or when starting the machine off on a slope when it is loaded. They are also used when going downhill if it is needed to use the braking force of the engine.

- The speed ranges for each position are as follows.

Position	Speed range	Max. speed
5	1st torque converter – 5th direct	40 km/h (24.8 MPH)
4	1st torque converter – 4th direct	30 km/h (18.6 MPH)
3	1st torque converter – 3rd direct	22 km/h (13.7 MPH)
L	1st torque converter – 2nd direct	16.5 km/h (10.2 MPH)

When operating the shift lever, be sure to set it in position securely.

If the lever is not placed in position properly, the shift position display on the panel may go out and the transmission warning monitor lamp may light up.

Always stop the machine completely before shifting between forward and reverse.

When starting the engine, if the shift lever is not at the N position, the engine will not start.

When the starting switch is turned to the ON position, if the shift lever is not at the N position, the central warning lamp will flash and the alarm buzzer will sound.

When the parking brake is applied, if the shift lever is not at the N position, the central warning lamp will flash and the alarm buzzer will sound.

When the dump lever is not at the FLOAT position, if the shift lever is not at the N position, the central warning lamp will flash and the alarm buzzer will sound.

The shift lever must not be returned to the N position when the machine is traveling.

Release the accelerator pedal when moving the shift lever from the N position to the forward or reverse positions.

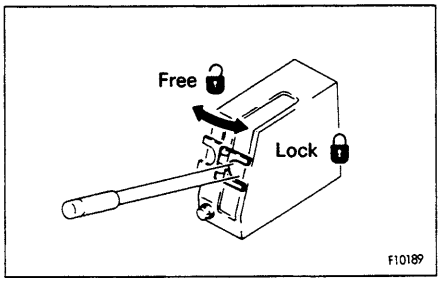
When moving the shift lever from the N position to the R position or from the D position to position 5, press the lock button on the shift lever before moving it.

4. SAFETY LOCK

⚠ WARNING

When raising the dump body to inspect the machine, always place the dump lever at the HOLD position, apply the lock, and then use the safety pins.

This device is used to lock the dump lever.

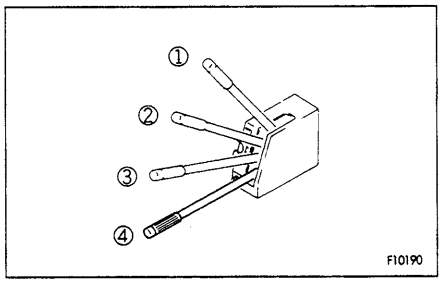


5. DUMP LEVER

⚠ CAUTION

To prevent damage to the dump body through vibration from the road surface, always lower the dump body completely before traveling.

This lever is used to operate the dump body.



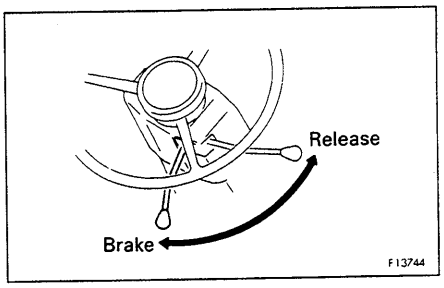
① RAISE
② HOLD: The dump body stops and is held in position.
③ FLOAT: The dump body moves freely under external force.
④ LOWER

When traveling, always set the dump lever to the FLOAT position.
For details, see OPERATING DUMP BODY.

6. RETARDER CONTROL LEVER

⚠ CAUTION

The retarder must not be used as a parking brake.



This lever is used to operate the retarder, which applies the rear brake when going downhill.

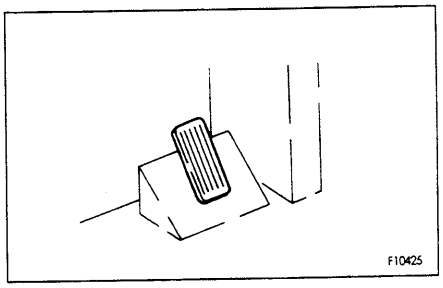
The more the lever is pulled, the greater the braking force becomes.

When the retarder is actuated, the rear brake pilot lamp lights up.

For details, see TRAVELING DOWNHILL.

When leaving the operator's seat, always apply the parking brake.

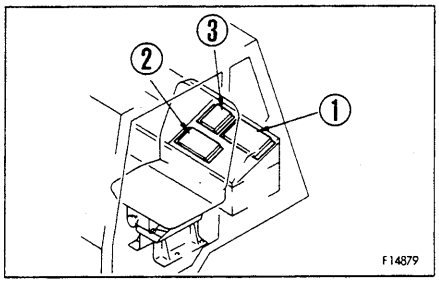
7. DIFFERENTIAL LOCK PEDAL (OPT)



This is used to actuate the differential lock control.

When the pedal is depressed, the differential lock is actuated, and when it is released, the differential lock is canceled.

11.4 MECHATRONICS EQUIPMENT CONTROLLER



This informs the operator of the location of any abnormality in the mechatronics equipment system.

1. SHIFT CONTROLLER

A two-digit failure code is displayed in the inspection window to inform of the location of the abnormality. When the condition is normal, 0.0 or 0.C is displayed.

2. ENGINE CONTROLLER
(If equipped with electrical governor)

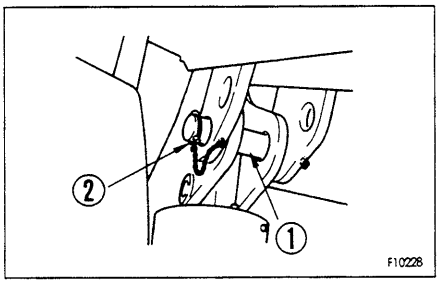
3. SUSPENSION CONTROLLER

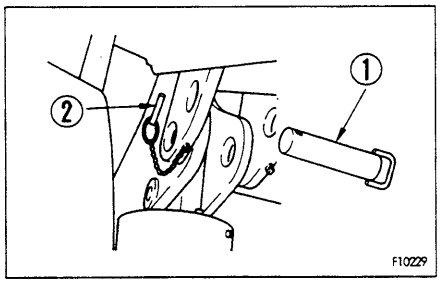
A green and red LED (Light Emitting Diode) are installed inside the inspection window. These go out, flash, or light up in combination to indicate the location of the failure.

When the condition is normal, the green LED is lighted up.

For details of the display when an abnormality occurs, see 16. TROUBLESHOOTING.

11.5 SAFETY PIN





⚠ WARNING

When raising the dump body to inspect the machine, always place the dump lever at the HOLD position, apply the lock, and then use the safety pins.

This is a safety device for the dump body, and is used when carrying out inspection and maintenance or when operating with the dump body raised.

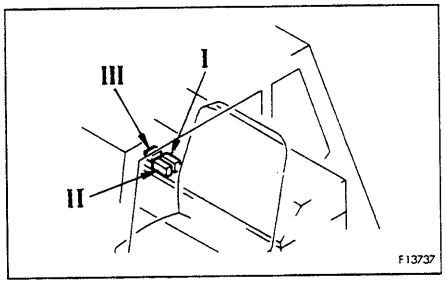
Raise the dump body fully, insert safety pins ①, then insert lock pins ②.

Always insert the safety pins on both sides.

STOWING SAFETY PIN

The safety pins are stowed at the bottom rear of the dump body. Insert safety pins ①, then insert lock pins ② to stow in position.

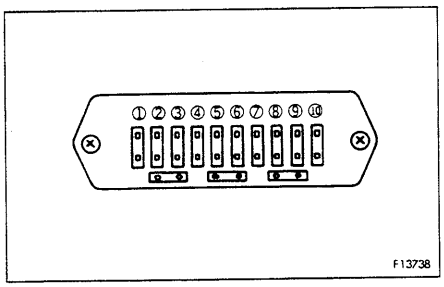
11.6 FUSES



⚠ WARNING

- **When replacing any fuse, always turn the power off (turn the starting switch to OFF).**
- **When replacing the fuse, always use a fuse of the same capacity and type.**

The fuses are used to protect the electrical equipment and wiring from burning out.If the fuse is corroded and covered with white powder, or if the fuse is loose in the fuse holder, replace the fuse.

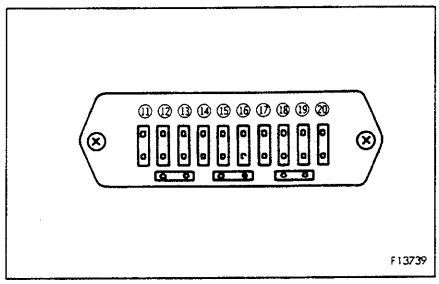


Fuse capacity and circuit name

Fuse box I

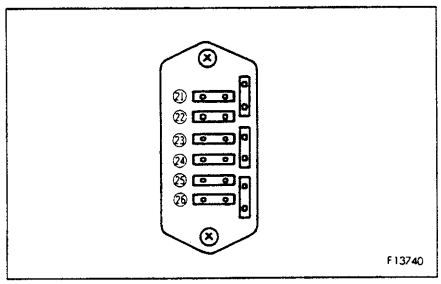
No.	Fuse capacity	Circuit name
1	10A	Car radio, car stereo, converter
2	10A	Horn switch, backup lamp, backup buzzer
3	10A	Cigar lighter
4	20A	Turn signal indicator lamp, fog lamp
5	10A	Engine start relay, neutral relay
6	10A	BVC relay solenoid, front brake cut solenoid, stop lamp, room lamp
7	20A	Head lamp (high beam), side clearance lamp, tail lamp, night lighting
8	10A	Head lamp (low beam)
9	10A	Ether spray
10	10A	Emergency steering switch

Fuse box II



No.	Fuse capacity	Circuit name
11	10A	Spare
12	5A	Electronic display panel, monitor lamps, central warning lamp, buzzer
13	5A	Suspension control solenoid, suspension controller
14	5A	Maintenance monitor
15	5A	Payload meter
16	20A	Payload indicator lamp
17	10A	Start switch, radio back-up
18	10A	Engine stop motor
19	10A	Emergency steering
20	10A	Spare (Direct from battery)

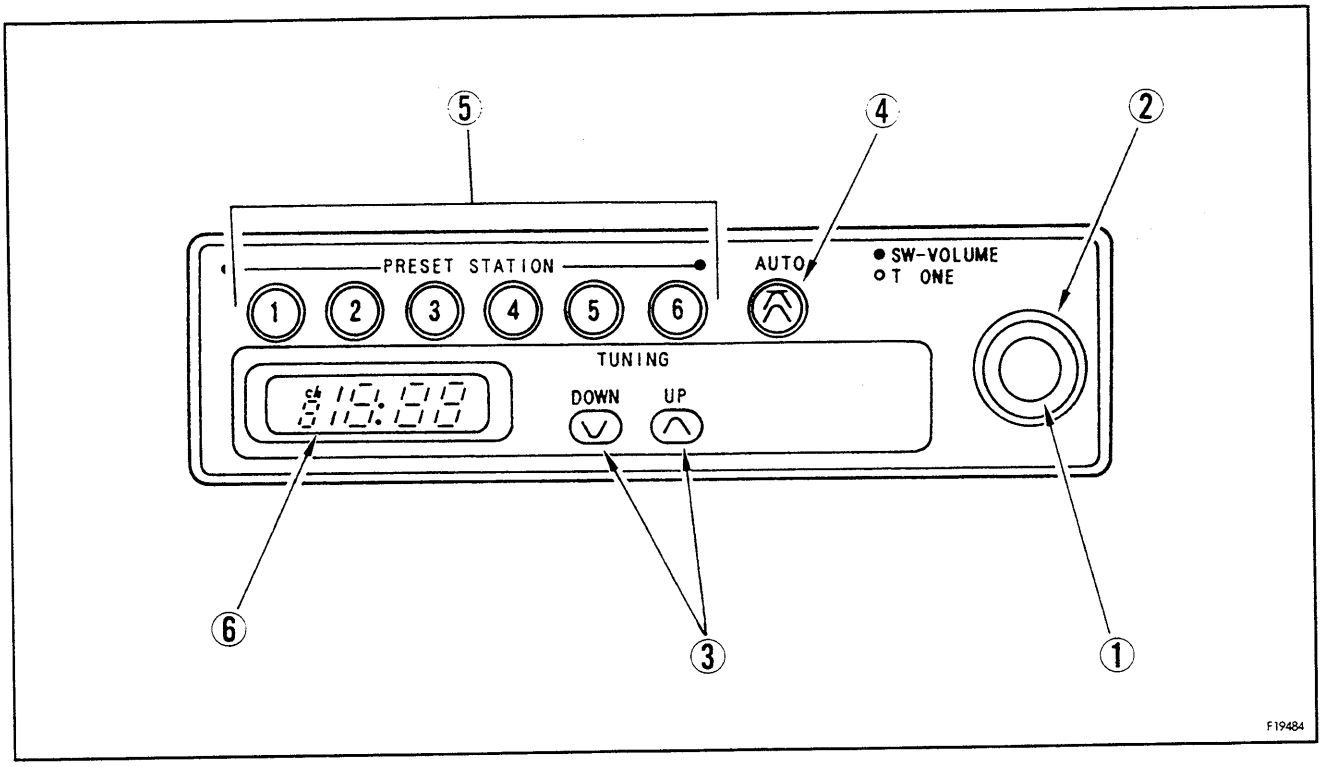
Fuse box III



No.	Fuse capacity	Circuit name
21	10A	AISS motor
22	20A	Wiper motor, washer motor
23	10A	Air conditioner blower motor
24	10A	Air conditioner compressor
25	10A	Spare
26	10A	Spare

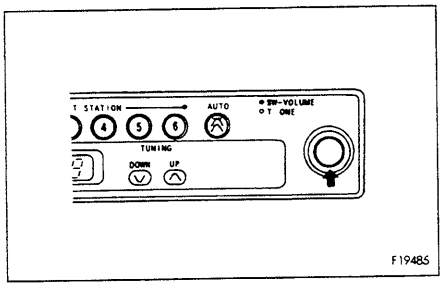
Please contact your Komatsu distributor before using any spare fuse terminal.

11.7 CAR RADIO
11.7.1 EXPLANATION OF COMPONENTS



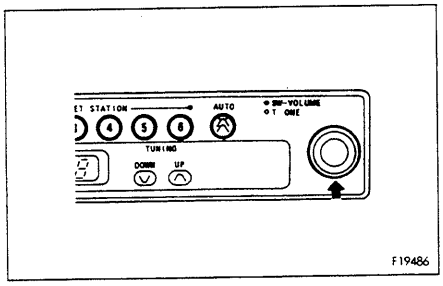
1. Power switch/volume control knob (● SW-VOLUME)

When this switch is depressed, the radio is turned on and the selected frequency appears on the display ⑥. When the switch is pressed again, the power is turned off. When the knob is turned clockwise, the sound volume increases. Counterclockwise turning lowers the volume.



2. Tone control (○ TONE)

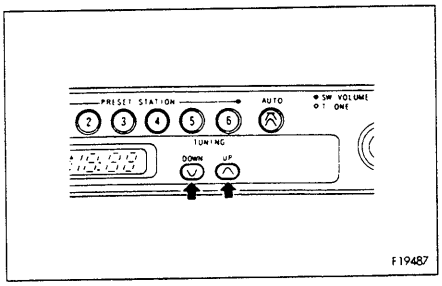
When the control switch is turned clockwise from the intermediate position, treble tone is emphasized. Counterclockwise turning reduces the treble and emphasizes the bass.



3. Manual tuning button (TUNING)

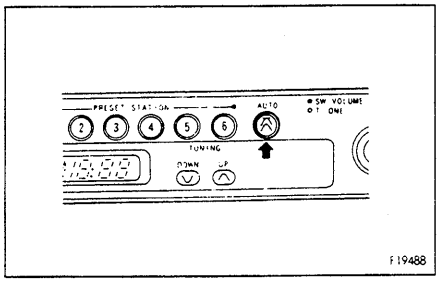
Frequency is changed using this button.

Each time the up-button ∧ is pressed, the frequency increases by 9 kHz, and each time the down button ∨ is pressed, the frequency decreases by 9 kHz. If either button is continuously pressed for about 0.5 seconds or more, the frequency also increases/decreases until the button is released.



4. Auto tuning button (AUTO)

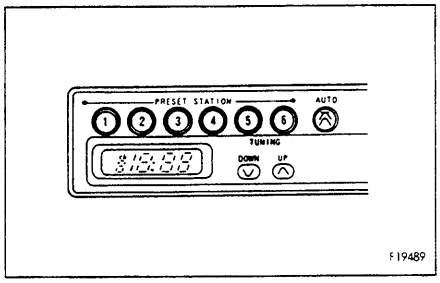
In frequency selection, when this button is pressed, the frequency automatically moves to high frequency.



F19488

2. Preset button (1, 2, 3, 4, 5, 6) (PRESET STATION)

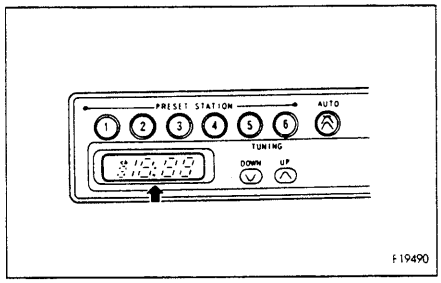
If a desired station is preset using this button, the station can be selected by one-touch action.



F19489

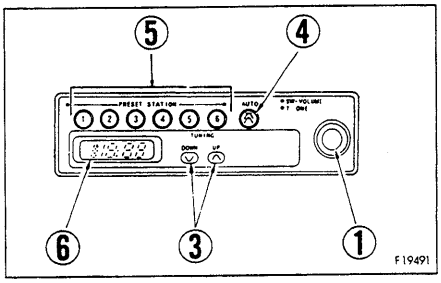
3. Display

The frequency and preset No. are displayed.



F19490

11.7.2 SETTING METHOD



Presetting

1. Press the power switch ①. A frequency will appear on the display ⑥.

2. Select a desired frequency using the auto-tuning button ④ or manual-tuning button ③.

3. Press the preset button for 1.5 sec or longer to store the number into the memory. The display ⑥ will show the preset number when storing is completed. Then, when preset button ⑤ is released after being pressed for less than 1.5 seconds, the stations stored in the memory can be selected. One station per button can be stored.

Manual tuning

Select a desired frequency by pressing the manual tuning button ③. Each time the switch is pressed, the frequency is changed by 9 kHz. If the button is continuously pressed for about 0.5 seconds or more, the frequency also increases or decreases until the button is released.

∧ button: selects higher frequency.
∨ button: selects lower frequency.

- When the frequency reaches the upper or lower limit, it is automatically changed to the opposite limit as the case may be.

Auto tuning

When the auto tuning button ④ is pressed, the frequency increases and once the desired station is selected, auto tuning will stop.
If wishing to select another station, press the auto tuning button again.
During auto tuning, when this button is pressed, auto tuning is released and the frequency prior to auto tuning is selected.

- When the frequency reaches the upper or lower limit, it is automatically changed to the opposite limit as the case may be. If the receiving wave is too weak to receive, select the desired frequency using the manual tuning button.

Antenna

If the receiving wave is weak or generates noise, extend the antenna. If the wave is too strong, adjust the sensitivity by retracting the antenna.

NOTICE

When transporting the machine or parking it in a garape, always fully retract the antenna to avoid the possibility of breakage.

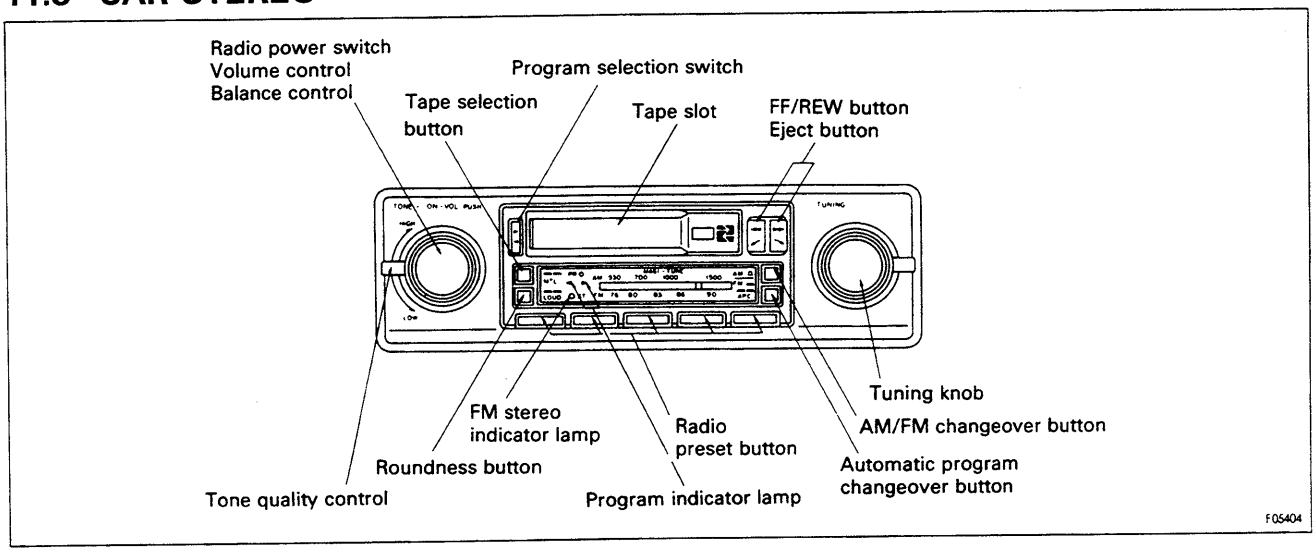
11.7.3 PRECAUTIONS FOR USE

- To assure safe operation, adjust the volume level so that external noise is still audible.
- Ensure no water is splashed over the speaker case or car radio (auto tuning) to prevent unexpected malfunction.
- Never use solutions such as benzine or thinners to clean the dial or buttons. These should be wiped with a dry, soft cloth. (Use a cloth dipped in alcohol for very dirty surfaces.)
- At battery replacement, all the memory preset with the preset buttons will be cleared. Perform presetting again.

11.7.4 SPECIFICATIONS

Tuning system	:	PLL synthesizer system
Receiving frequency	:	522 kHz to 1629 kHz (in 9 kHz steps)
Actual max. sensitivity	:	30 dB
Actual max. output	:	8 W
Current consumption	:	0.35 A (at 0.5 W output)
External dimensions	:	W 184 mm x H 58 mm x D 116 mm (7.25 in x 2.21 in x 4.57 in)
Weight	:	0.45 kg (1 lb)

11.8 CAR STEREO



11.8.1 METHOD OF USE

When listening to the cassette tape

1. POWER

Turn the power switch clockwise to turn the power on.

2. INSERTING TAPE

Insert the cassette tape vertically into the cassette player. The tape is set in position and the program indicator lights up.

3. STOPPING

Press the FF and REW buttons at the same times. The tape is stopped and is ejected.

4. SELECTING PROGRAM

1. Automatic selection
   When one side of the tape finishes, the direction of the tape is automatically reversed to provide continuous play.
2. Manual reverse
   If the program selection button is pressed before the tape finishes, the direction of the tape can be reversed.

5. PROGRAM INDICATOR

Two indicators show the direction of play for the program.

6. FF (FAST FORWARD), REW (REWIND)

If the FF or REW buttons are pressed, the button is locked and the tape can be fast forwarded or rewound.

To release the lock

- Press the button for the other direction.
- Press the FF and REW buttons at the same time. If this is done, the tape will be ejected.
- When the tape comes to the end (the lock is automatically canceled and the tape starts to play).
- Press the program selector button. (After the lock is canceled, the tape will play in the reverse direction.)

7. VOLUME CONTROL

Turn the knob clockwise to increase the sound.

8. BALANCE CONTROL

Pull the knob out and turn clockwise to increase the volume from the right speaker; turn counterclockwise to increase the volume from the left speaker.

9. TONE CONTROL

Turn the knob clockwise to emphasize the high sound, and turn counterclockwise to emphasize the low sound.

10. ROUNDNESS CONTROL

If the switch is pressed, the low sounds and high sounds are emphasized when the volume is low.

11. APC (AUTOMATIC SELECTION BUTTON)

This button can be used to return to the beginning of the piece of music being played or to go on to the beginning of the next piece of music.

WHEN LISTENING TO RADIO (AM/FM)

1. AM/FM SELECTION

When the push button is pressed in, the radio receives FM (▬), and when it is pressed again the radio receives AM (▬).

2. PUSH BUTTON SELECTION

If the push button is pressed, the radio is tuned in to the preset station.

3. MANUAL TUNING

Turn the tuning button to select the desired station.

4. METHOD OF PRESETTING

1. Pull the desired button out strongly.
2. Turn the tuning knob to set to the desired station.
3. Push the button in again strongly.

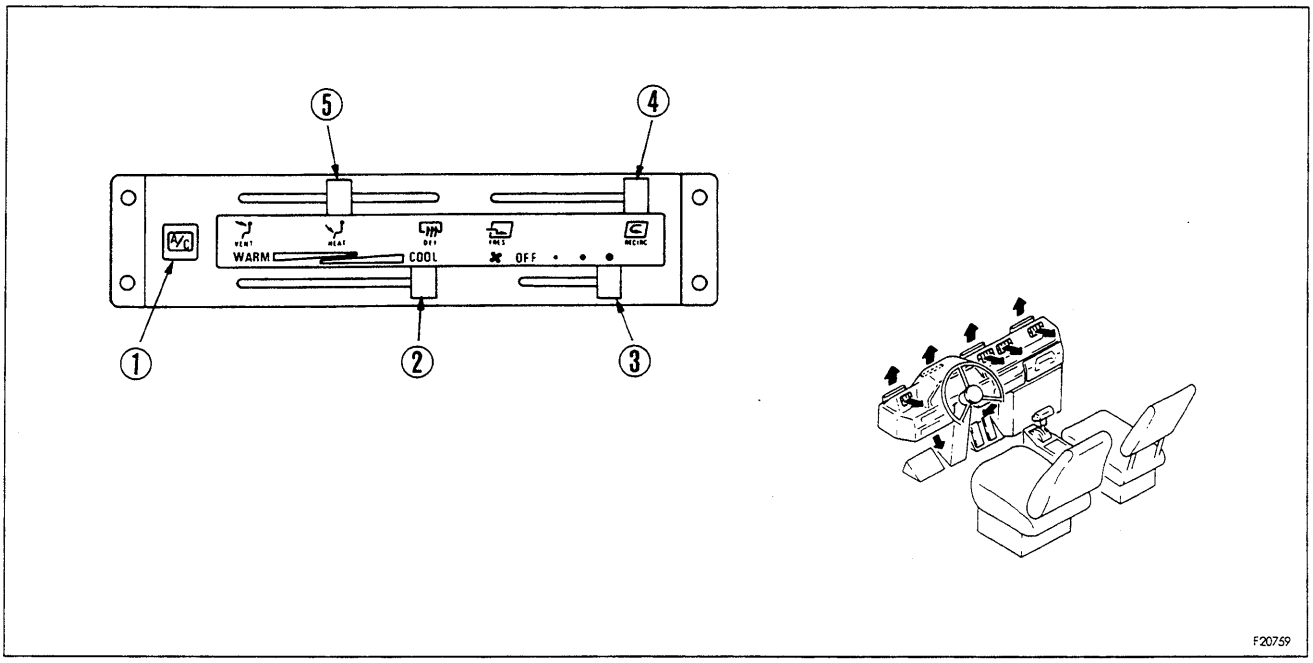
11.8.2 PRECAUTIONS WHEN HANDLING

- If the head is dirty, clean it with a head cleaning tape.
- Never touch the head with a magnet, screwdriver, or any other hard object.
- Use a pencil to wind in the slack on the tape before using it.
- When not using the tape, put it in its case and keep it away from direct sun light or dust.
- Never use any C-120 type tape.
- If you are not using the tape for a long time, do not leave it inside the cassette recorder. Always remove it and put it in its case.
- This stereo cassette player is a 12V specification, so do not remove the converter that is installed.

11.9 AIR CONDITIONER

By taking fresh air into the cab through a filter, it is possible to raise the pressure inside the cab. This makes it possible to provide a pleasant working environment even on dusty jobsites.

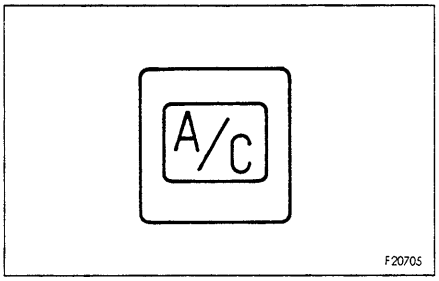
11.9.1 GENERAL LOCATIONS ON CONTROL PANEL



F20759

1. AIR CONDITIONER SWITCH

When the switch is pressed, the blue lamp inside the button lights up, and the air conditioner is actuated to carry out cooling or dehumidifying.
Turn the blower switch on before operating the air conditioner switch.

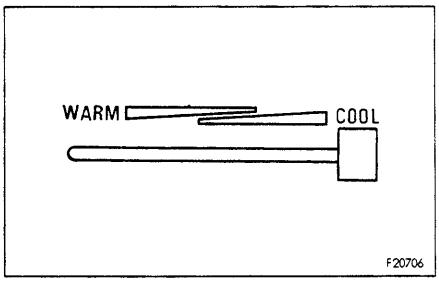


F20705

2. TEMPERATURE CONTROL LEVER

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

COOL : Low temperature
WARM: High temperature



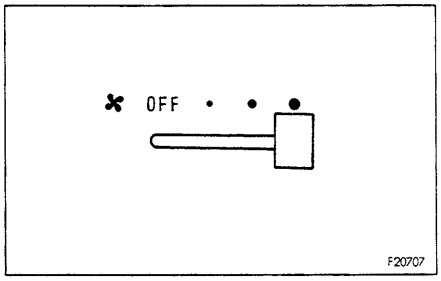
F20706

3. BLOWER SWITCH

This is used as the blower control switch and the air conditioner power switch.

OFF: OFF
• : Low speed
● : Medium speed
● : High speed

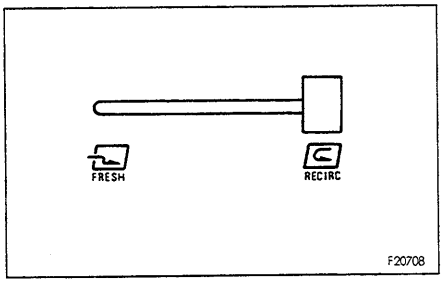
When the switch is turned to the OFF position, the power is cut and the air conditioner stops.



F20707

4. FRESH/RECIRC SELECTOR LEVER

This selects the source of the intake air.



RECIRC

This recirculates the air inside the cab. (This is normally used for quick cooling.)

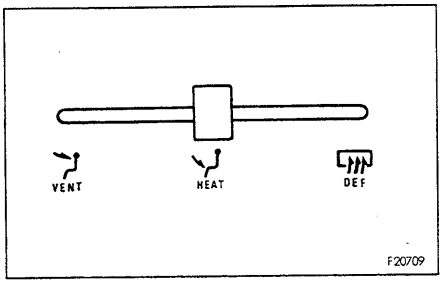
FRESH

This takes in fresh air from outside in addition to the air inside the cab.

5. VENT SELECTOR LEVER

This selects the vent for cooling or heating.

Lever position	Vent	Use
VENT	Front vent	Cooling, heating
HEAT	Foot vent	Heating, dehumidifying and heating
DEF	Defroster vent	Demisting, defrosting window glass



11.9.2 METHOD OF OPERATION

Operating control panel

Lever, switch / Condition of use		Blower switch	Air conditioner switch	Temperature control lever	FRESH/RECIRC selector lever	Vent selector lever
Cooling	Rapid	High	ON	COOL (pushed fully to COOL position)	RECIRC	VENT (front vent)
	Normal	High - low	ON		FRESH	
Dehumidifying and heating		High - low	ON	WARM - medium position	FRESH	HEAT (Foot vent)
Heating	Rapid	High	OFF	WARM (pushed fully to WARM position)	RECIRC	
	Normal	High - low	OFF	WARM – medium position	FREESH	
Defroster		High	ON	WARM - medium position (to carry out rapid defrosting and demisting, push fully to the WARM position)	FRESH	DEF (defroster vent)
Ventilation or pressurizing		High - low	OFF	COOL (pushed fully to COOL position)	FRESH	VENT (Front vent)

11.9.3 PRECAUTIONS WHEN USING AIR CONDITIONER

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

- If you smoke when using the cooling, your eyes may start to sting, so in such a case, carry out ventilation and cooling for a short time to remove the smoke.
- When using the air conditioner for a long time, carry out ventilation and cooling once every hour.

Be careful not to cool the cab too much.

When cooling, it is said to be best for the health if it feels slightly cool (5 or 6°C lower than the outside temperature) when you enter the cab.

Be careful to adjust the temperature to a suitable level.

11.9.4 INSPECTION AND MAINTENANCE

When the air conditioner is not being used, run the compressor at low speed for several minutes once a week to ensure that the oil film at various parts of the compressor is not lost. (Run the engine at low speed and set the temperature control lever to the medium position.)

Clean the air filter and check the refrigerant. For details, see WHEN REQUIRED.

To allow the air conditioner to display its full ability and provide a pleasant environment, always contact your Komatsu distributor to carry out refilling of the refrigerant and other inspection and maintenance.

12. OPERATION

12.1 CHECK BEFORE STARTING ENGINE

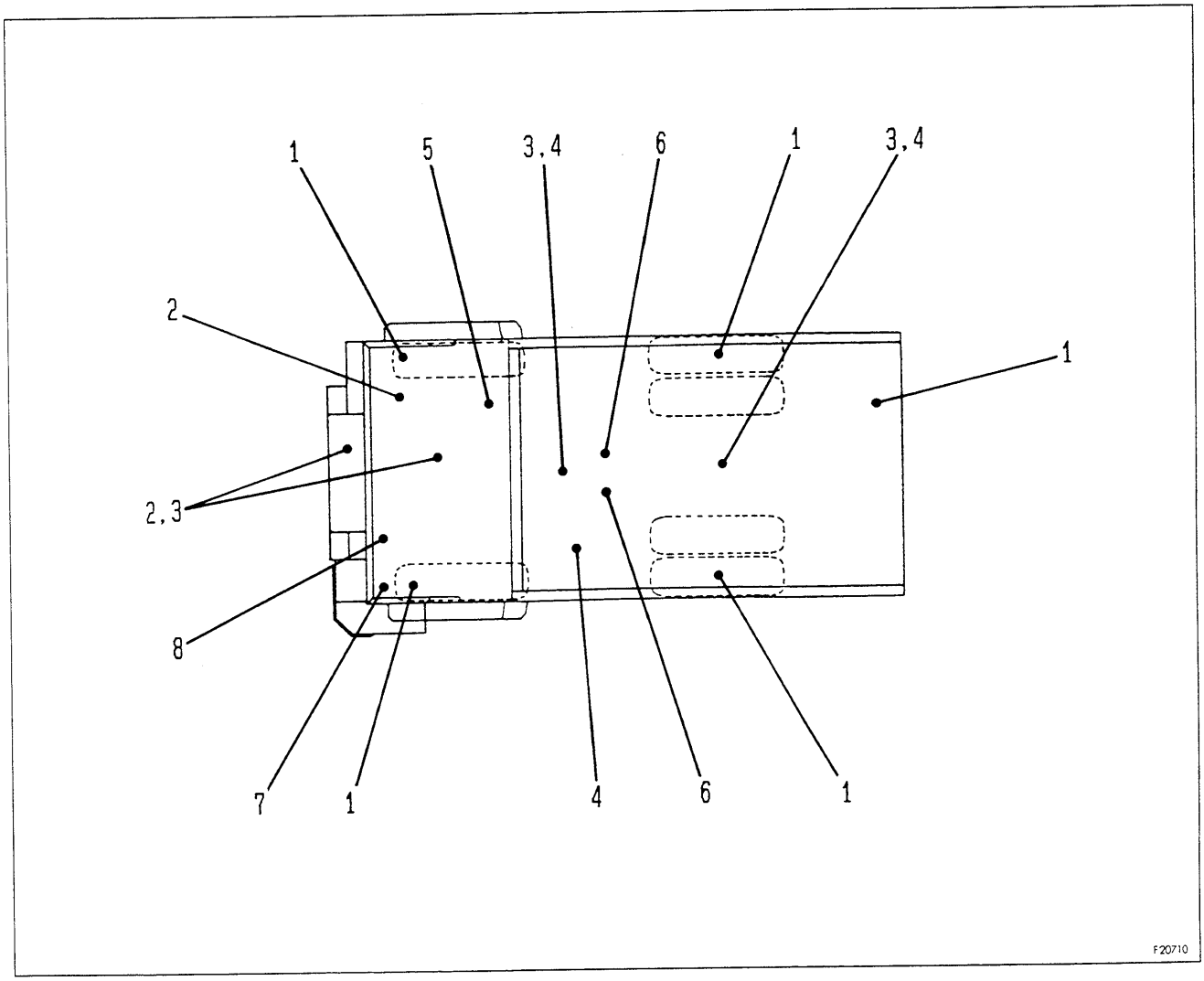
12.1.1 WALK-AROUND CHECK

⚠ 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 nuts or bolts, or leakage of oil, fuel, or coolant, and check the condition of the work equipment and hydraulic system. Check also for loose wiring, play, and collection of dust at places which reach high temperatures.

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



1. CHECK DUMP BODY, FRAME, TIRES, CYLINDERS, LINKAGE, HOSES FOR DAMAGE, WEAR, PLAY

Check the dump body, frame, tires, cylinders, linkage, and hoses for cracks or excessive wear or play, and carry out repairs if any abnormality is found.

2. REMOVE DIRT FROM AROUND ENGINE, AROUND BATTERY, RADIATOR

Check that there is no dirt or dust accumulated around the engine or radiator. Check also that there is no flammable material (dry leaves, twigs, etc.) accumulated around the battery, or engine, muffler, turbocharger, or other high temperature parts of the engine. Remove any dirt or flammable materials that are found.

3. CHECK FOR LEAKAGE OF WATER, OIL FROM 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 FROM TRANSMISSION CASE, DIFFERENTIAL CASE, FINAL DRIVE CASE, HYDRAULIC TANK, HOSES, JOINTS

Check for any oil leakage, and if any abnormality is found, repair the location of the leakage.

When checking for oil leakage, check for signs of oil leaking from the undercover or signs of oil dripping on the ground.

5. CHECK FOR LOOSE AIR CLEANER MOUNTING BOLTS

Check that there are no loose mounting bolts. If any loose bolts are found, tighten them.

6. CHECK DUMP BODY MOUNT RUBBER

Check for any cracks, embedded foreign objects, or loose bolts.

7. CHECK HANDRAIL FOR DAMAGE, LOOSE BOLTS

If any damage is found, repair it. Tighten any loose bolts.

8. CHECK FOR DAMAGE TO GAUGES, LAMPS, LOOSE BOLTS

Check that there is no damage to the panel, gauges, or lamps, and if any abnormality is found replace the part.

Clean any dirt from the surface.

9. CHECK REAR VIEW MIRROR, UNDER VIEW MIRROR

Check for any damage to the mirrors, and if any damage is found, replace the mirror. Clean all dirt from the surface of the mirror and adjust the angle so that the view to the rear and below the machine can be seen from the operator's seat.

10. CHECK SEAT BELT AND CLAMPS

Check that there is no abnormality in the seat belt or clamps. If any damage is found, replace with new parts.

- Check for any loose bolts of the clamps mounting the equipment to the machine. Tighten any loose bolts.

- When the belt has been used for a long time, if any external damage or fraying of the belt can be seen, or if the clamps are broken or deformed, replace the seat belt.

12.1.2 CHECK BEFORE STARTING

Always carry out the checks in this section before starting the engine.

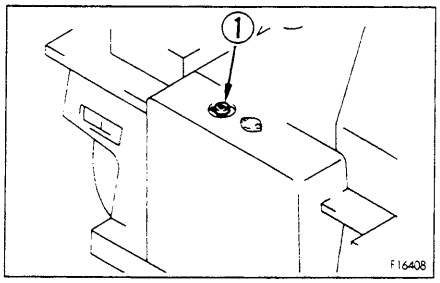
CHECK COOLANT LEVEL, ADD WATER

⚠ WARNING

Do not remove the cap while the radiator water is hot. Hot water may spurt out.
When removing the cap, press the cap knob to release the internal pressure before removing the cap.

⚠ CAUTION

Before starting operations each day, check that the cooling water level is between the FULL and LOW marks in the diagram.



1. Remove cap ① and check that the cooling water is between the FULL and LOW marks. Add water if the level is low.
2. Check that there is no oil in the water or any other abnormality.
3. After adding water, tighten the cap securely.
4. If more water is added than normal, check for water leakage.

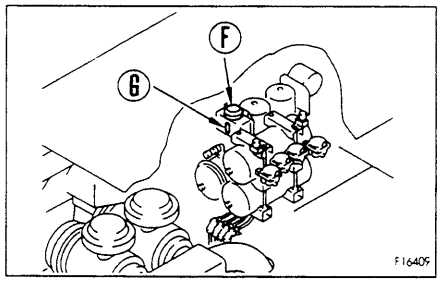
CHECK OIL LEVEL IN FRONT BRAKE OIL TANK, ADD OIL

⚠ WARNING

When adding oil to the front brake oil tank, always use engine oil.

1. Check that the oil is between the FULL and LOW marks on sight gauge Ⓖ.

   If the oil level is low, 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.



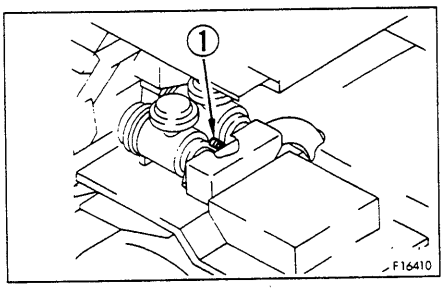
2. After adding the oil, tighten the cap securely.
3. If the oil level goes down even when oil is added, check for leakage from the oil line.

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.

3. After checking, cleaning, or replacing, press dust indicator ① to return the red piston to its original position.



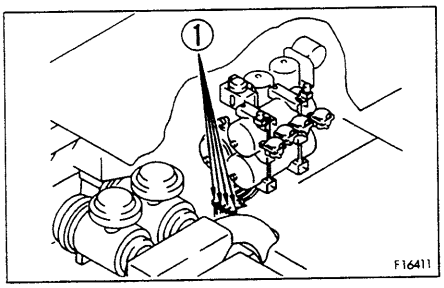
DRAIN WATER FROM AIR TANK

1. After starting the engine, pull ring ① of the tank drain valve to drain the water from the tank.

2. Carry out the same operation after completing work.

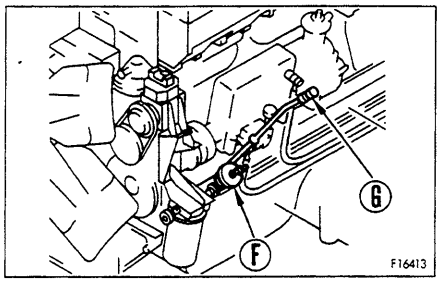
NOTICE

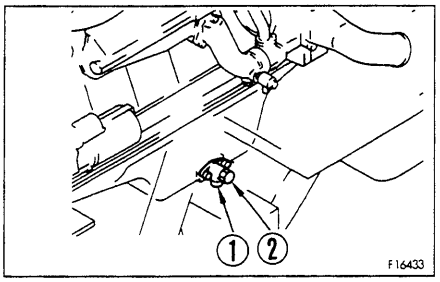
In cold areas, there is danger of the water freezing, so drain the water from the air tank after operations when it is still warm.

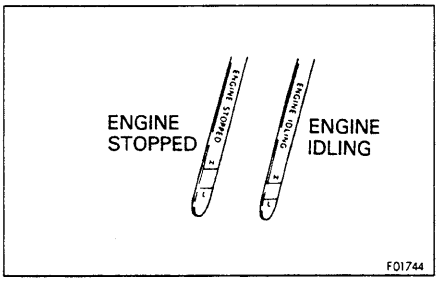


CHECK OIL LEVEL IN ENGINE OIL PAN, ADD OIL

1. Check the oil level with dipstick Ⓖ.
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 the ENGINE STOPPED side of dipstick Ⓖ.
   If the oil 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, remove drain plug ①, and loosen drain valve ② to drain the excess engine oil, then check the engine oil level again.
6. If the oil level is correct, tighten the handle of the oil filler cap securely.



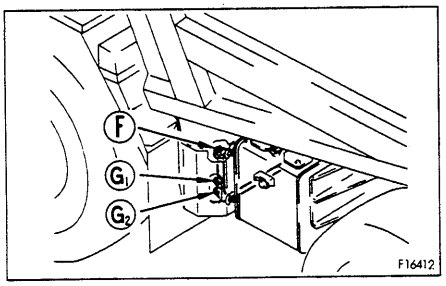




REMARKS

- When checking the oil level after the engine has been operated, wait for at least 15 minutes after stopping the engine.
- If the machine is at an angle, set it horizontal before checking the oil level.
- The dipstick has the oil level marked on both sides: ENGINE STOPPED for measuring when the engine is stopped, and ENGINE IDLING for measuring when the engine is idling.
- When checking the oil level, stop the engine and check with the ENGINE STOPPED side of the dipstick.
  It is also possible to check when the engine is idling, but the following procedure must be used.
  - ○ Check that the engine water temperature is in the green range.
  - ○ Use the ENGINE IDLING side of the dipstick.
  - ○ Remove the oil filler cap.

CHECK OIL LEVEL IN TRANSMISSION CASE, ADD OIL



1. After starting the engine, run the engine at low idling and check the oil level with sight gauge Ⓖ2.

2. If the oil level is low, 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.

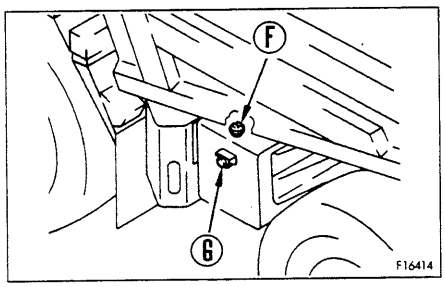
NOTICE

- **The oil level changes according to the oil temperature, so carry out the check after completing the warming-up operation.**
- **During operations, or when the engine is running at idling after operations, the oil level be above Ⓖ2.**
- **When checking the oil level with the engine stopped, check with sight gauge Ⓖ1 as a guide line, and make the final check with Ⓖ2.**
- **When checking the oil level with the engine stopped, wait for 20 minutes after stopping the engine and check with sight gauge Ⓖ1.**

CHECK OIL LEVEL IN HYDRAULIC TANK, ADD OIL

⚠ WARNING

When the oil filler cap is removed, oil may spurt out, so turn it slowly to release the internal pressure, then remove it carefully.



1. Check with sight gauge Ⓖ.

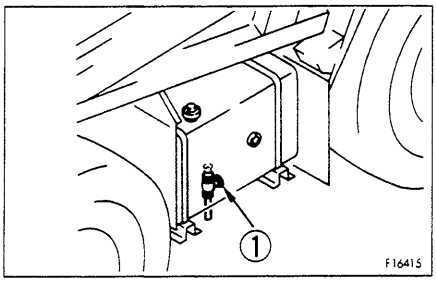
2. If the oil level is not up to the window of sight gauge Ⓖ, add engine oil through oil filler Ⓕ.

When checking the oil level, stop the machine on horizontal ground, lower the dump body, then stop the engine before checking.

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

DRAIN WATER, SEDIMENT FROM FUEL TANK

Loosen valve ① at the bottom of the fuel tank, and drain the water and sediment collected at the bottom of the tank together with the fuel.



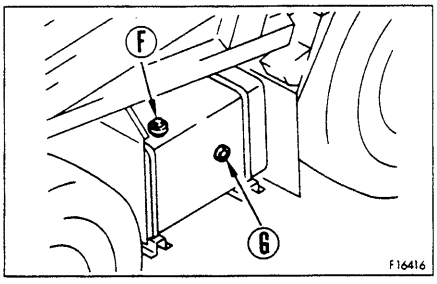
CHECK FUEL LEVEL

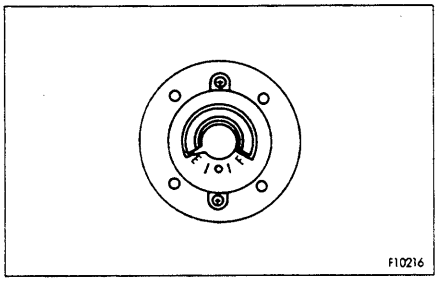
⚠ WARNING

When adding fuel, do not let the fuel overflow. This may cause fire. If any oil spills, wipe it up completely.

1. Check the fuel level with fuel gauge Ⓖ installed to the fuel tank.
2. After completing operations, add fuel through fuel filler Ⓕ to fill the tank.

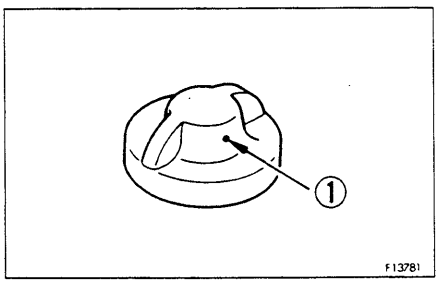
   Fuel tank capacity: 500 ℓ (132 US gal, 110 UK gal)
   For details of the fuel to use, see 20. USE OF FUEL, COOLANT, AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE.
3. After adding fuel, tighten the cap securely.





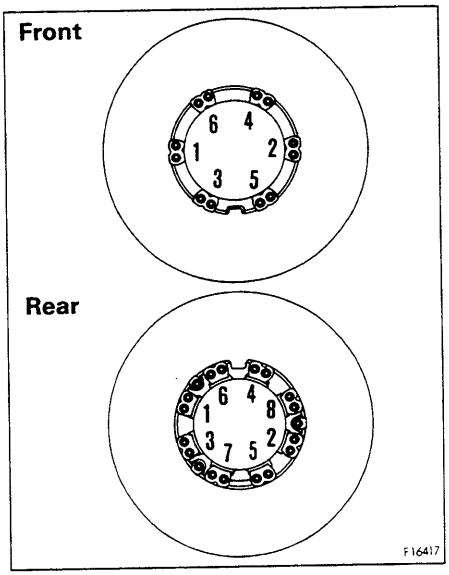
REMARK

If breather hole ① in the cap becomes clogged, the pressure inside the tank will go down and the fuel may not flow, so clean the breather hole from time to time.



CHECK WHEEL HUB NUTS, TIGHTEN

Check for loose hub nuts, and if any are loose, tighten 2 or 3 times to the specified torque in the order given in the diagram.



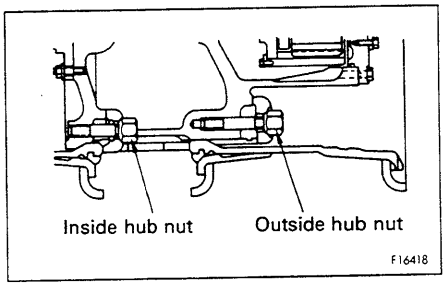
Tightening torque:

- 1206.2 ± 117.7 Nm (123 ± 12 kgm, 889.7 ± 86.8 lbft)
  (When thread and nut seat are not coated with grease)
- 926.7 ± 102.0 Nm (94.5 ± 10.5 kgm, 683.5 ± 75.9 lbft)
  (When thread and nut seat are coated with molybdenum disulphide grease)

Insert a socket wrench in a pipe, and apply a force of 123 kg at a point 1 m from the fulcrum to give a tightening torque of 123 kgm. If the hub nuts have been tightened again after replacing the tire, travel for 5 to 6 km, then tighten again to settle all the contacting parts.

In particular, there are more contacting parts on the rear wheels than on the front wheels, so it will take time for the parts to settle.

For this reason, repeat the tightening process for the first 50 hours after installation. However, on the rear wheels, there are hub nuts at 3 places on the inside, but these are for temporary assembly, so there is no need to tighten the inside hub nuts after the outside hub nuts are tightened.



CHECK TIRE INFLATION PRESSURE, CHECK FOR DAMAGE

Check the tire inflation pressure before starting operations when the tires are cold.

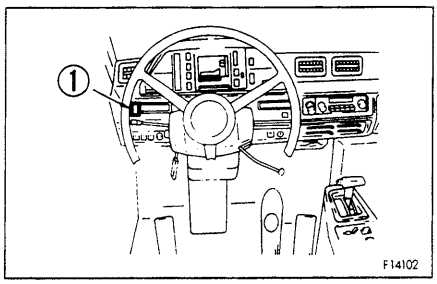
At the same time as checking the tire inflation pressure, check carefully for any small scratches or other damage, and check also that there are no nails or pieces of metal embedded in the tire which may cause a puncture.

Standard tire inflation pressure (front and rear wheels)

- 18.00 – 33 – 32PR(STD) 563.9 kPa (5.75 kg/cm^2, 81.7 psi)
- 18.00 – 33 – 28PR(OP) 490.3 kPa (5.00 kg/cm^2, 81.7 psi)
- 18.00 – R33 – ★★(OP) 686.5 kPa (7.00 kg/cm^2, 99.4 psi)

CHECK CENTRAL WARNING LAMP

Carry out the following checks to prevent failure by the warning system due to defective operation of the buzzer or blown lamp bulb in central warning lamp ①.

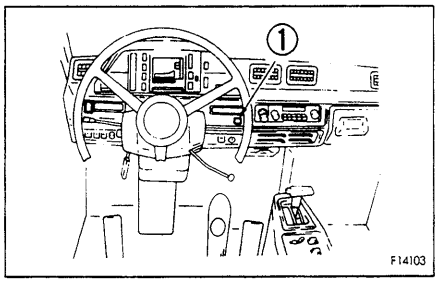


- Stop the engine, turn the starting switch to the ON position, set the parking brake valve lever to the PARKING position, move the shift lever to any position other than N, and check that the lamp flashes.
- If the air pressure is below the specified pressure, the lamp should flash and the buzzer should sound when the starting switch is turned ON.

CHECK MACHINE MONITOR SYSTEM

1. Before starting the engine, turn the starting switch to the ON position.

2. Check that all monitor lamps, gauges, and the central warning lamp light up for approx. 3 seconds and that the alarm buzzer sounds for approx. 2 seconds.



REMARK

- ○ When this is done, the speedometer should display 88.
- ○ When the starting switch is turned to the ON position, the central warning lamp will flash and the alarm buzzer will sound intermittently if the shift lever is not at the N position. When the shift lever is moved to the N position, the lamp will go out and the buzzer will stop.
- ○ After the engine is stopped, the monitor cannot be checked until at least 30 seconds have passed.

3. When checking the monitor, check for blown bulbs in the the caution lamps and pilot lamps at the same time. Before starting the engine, turn the starting switch to the ON position, press bulb check switch ①, and check that no caution lamp or pilot lamp bulb is blown.

If the monitor lamp, caution lamp, or pilot lamp do not light up, there is probably a failure or disconnection, so please contact your Komatsu distributor for inspection.

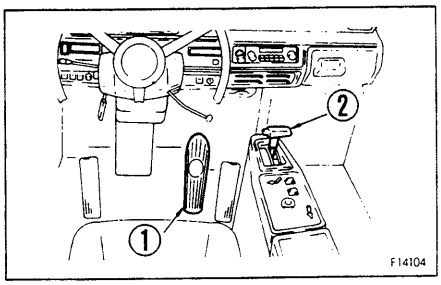
CHECK FOR NORMAL ACTUATION OF FOOT BRAKE

Check when starting operations, and if the braking effect is poor, check and adjust. For details, see CHECK WEAR OF FRONT BRAKE DISC.

CHECK BRAKING CAPACITY OF FOOT BRAKE

Check the braking capacity of the foot brake as follows.

1. Set the air pressure to the maximum with the machine on flat ground, and depress foot brake ①.
2. Set shift lever ② to the D position, gradually raise the engine speed, and check that the machine does not move even when the engine speed reaches 1550 rpm.



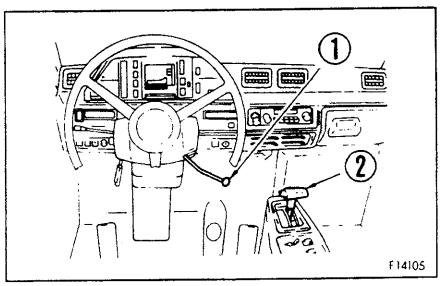
CHECK FOR NORMAL ACTUATION OF RETARDER BRAKE

Check when starting operations, and if the braking effect is poor, check and adjust. For details, see CHECK WEAR OF REAR BRAKE DISC.

CHECK BRAKING CAPACITY OF RETARDER BRAKE

Check the braking capacity of the retarder brake as follows.

1. Set the air pressure to the maximum with the machine on flat ground, and pull retarder lever ① fully.
2. Set shift lever ② to the D position, gradually raise the engine speed, and check that the machine does not move even when the engine speed reaches 1200 rpm.



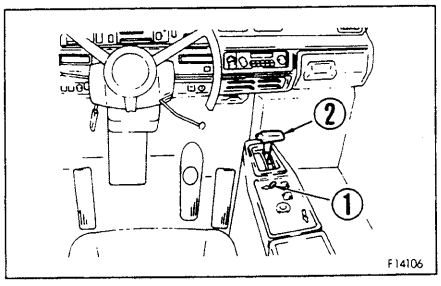
CHECK FOR NORMAL ACTUATION OF PARKING BRAKE

Check when starting operations, and if the braking effect is poor, adjust the parking brake. For details, see ADJUSTMENT OF PARKING BRAKE.

CHECK BRAKING CAPACITY OF PARKING BRAKE

Check the braking capacity of the parking brake as follows.

1. Set the air pressure to the maximum with the machine on flat ground, and set parking brake lever ① to the PARKING position.
2. Set shift lever ② to the D position, gradually raise the engine speed, and check that the machine does not move even when the engine speed reaches 1600 rpm.

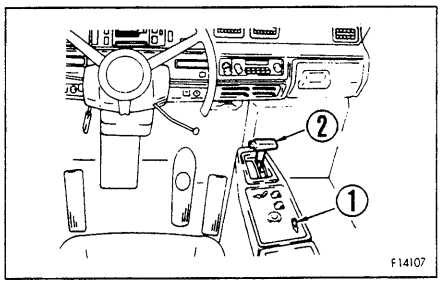


CHECK FOR NORMAL ACTUATION OF EMERGENCY BRAKE

Check when starting operations.

CHECK BRAKING CAPACITY OF EMERGENCY BRAKE

Check the braking capacity of the emergency brake as follows.



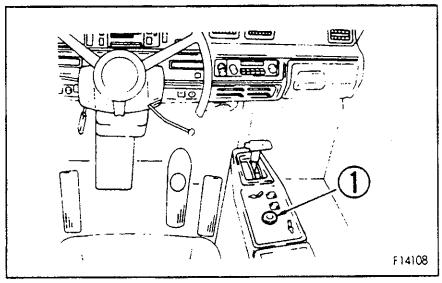
1. Set the air pressure to the maximum with the machine on flat ground, and move emergency brake lever ① to the BRAKE position.

2. Set shift lever ② to the D position, gradually raise the engine speed, and check that the machine does not move even when the engine reaches full speed.

CHECK EMERGENCY STEERING

- **Checking manual emergency steering**

1. Turn the starting switch key to the ON position.

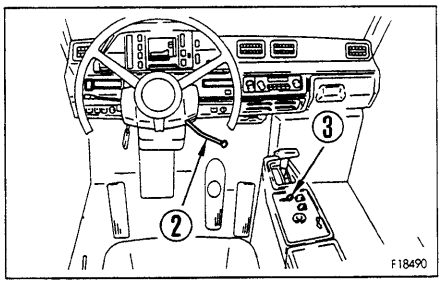


2. Turn emergency steering switch ① ON, and check that the steering wheel can be operated for 20 seconds.

   If the steering wheel cannot be operated, please contact your Komatsu distributor.

- **Checking auto emergency steering**

3. Turn the starting switch key to the START position and start the engine.



4. Check that the air pressure gauge is in the green range, then pull retarder lever ② fully and stop the engine.

5. Turn the starting switch key to the ON position.

6. Check that the emergency motor is actuated and the steering can be operated one second after parking brake lever ③ is set to the TRAVEL position.

CHECK ACTUATION OF STEERING

CHECK FLASHING OF LAMPS

CHECK SOUND OF HORN

CHECK MOVEMENT OF GAUGES DURING OPERATION

CHECK EXHAUST COLOR AND SOUND

CHECK ELECTRICAL WIRING

⚠ WARNING

If the fuse frequently blows or there are signs of short circuits in the electrical wiring, always locate the cause and repair it.

Check that there is no damage to the fuse and that there is no sign of any disconnection or short circuit in the electrical wiring. Check also for loose terminals, and tighten if necessary.

In particular, check the wiring of the following components.

- Battery
- Starting motor
- Alternator

Please contact your Komatsu distributor when looking for and repairing the cause.

⚠ WARNING

If dead leaves, twigs, dry grass, or other flammable materials accumulate around the battery it may cause a fire, so always remove such flammable materials.

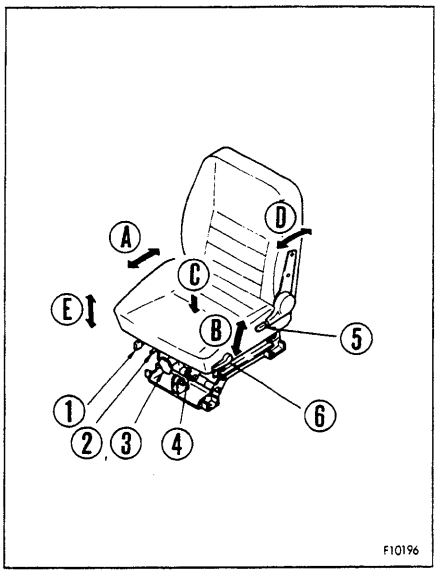
When carrying out the walk-around check and check before starting, always check that there are no flammable materials accumulated around the battery, and remove any that are found.

12.1.3 ADJUSTMENT BEFORE OPERATION

ADJUSTING OPERATOR'S SEAT

⚠ WARNING

- **Adjust the seat before starting operations or when changing operators.**
- **Adjust the seat so that you can depress the brake pedal fully with your back against the seat backrest.**



Ⓐ **Adjusting fore-and-aft position**

Move lever ① to the right, set the seat to the desired position, then release the lever.

Adjustment range: 140 mm (5.5 in) (7 stages)

Ⓑ **Adjusting seat angle**

Pull lever ② up, set the seat angle to the desired position, then release the lever.

Adjustment range: Seat surface approx. 2.7° up and down

Ⓒ **Adjusting seat weight**

Turn grip ③ under the seat to adjust weight adjustment scale ④ to your own weight.

Adjustment range: 50 kg - 120 kg (110 - 265 lb)

REMARK

To make the seat softer, adjust the weight to make it lighter; to make the seat harder, adjust the weight to make it heavier.

When traveling on rough road surfaces, make the seat harder before starting operations.

Ⓓ **Adjusting backrest angle**

Pull lever ⑤, set the backrest to the desired position, then release the lever.

Adjustment range: 28 stages (56°)

Ⓔ **Adjusting seat height**

Move lever ⑥, set the seat to the desired position, then release the lever.

Adjustment range: 50 mm (2.0 in)

ADJUST SEAT BELT

⚠ WARNING

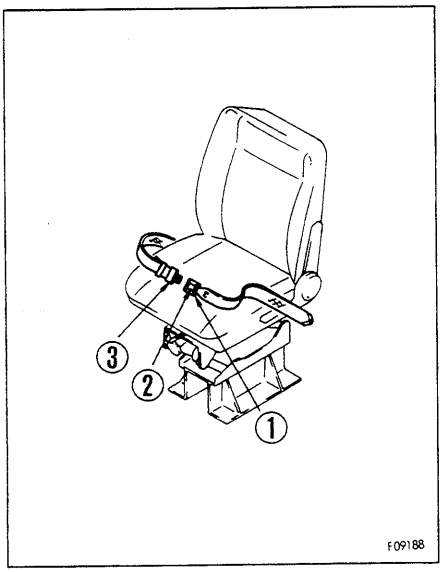
- **Before fitting the seat belt, check that there is no abnormality in the mounting bracket and mounting belt of the belt. If the belt is worn or damaged, replace it.**
- **Always fasten the seat belt before starting operations.**
- **Always wear the seat belt during operations.**
- **Do not twist the left or right side of the seat belt when fastening it.**
- **It is dangerous to fit or adjust the seat belt when you are traveling. Always fit the seat belt and adjust it properly before starting. NEVER adjust it while traveling.**
- **Always fit the lap belt so it fits across your lap. It is dangerous to fit it across your waist. You may be subjected to strong pressure if the machine should meet with an emergency.**

- **Fastening and removing belt**

1. Sit on the seat, depress the brake pedal fully, and adjust the seat so that your back is pressed against the backrest.

2. Sit on the seat, take buckle ① and tongue ③ in your left and right hands, insert tongue ③ into buckle ①, and pull the belt to check that it is securely locked.

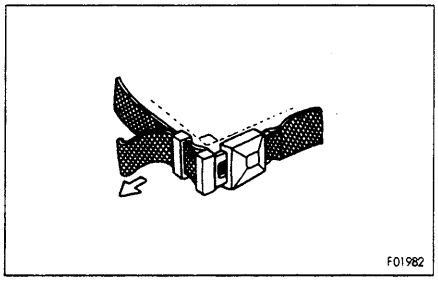
3. When removing the belt, press button ② to release the belt. Adjust the length of the buckle and tongue so that the belt follows your body without twisting, and adjust so that the buckle is in the middle at the front of your body.



- **Adjust belt length**

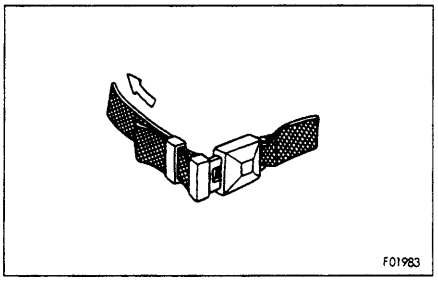
To make belt shorter:

Pull the free end of the belt at the buckle end or tongue end.



To make belt longer:

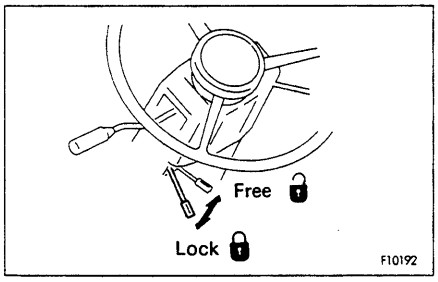
Set the belt holding the buckle or tongue end at right angles to the buckle or tongue, and pull.



ADJUST STEERING WHEEL TILT

⚠ WARNING

Always stop the machine before adjusting the tilt of the steering wheel.



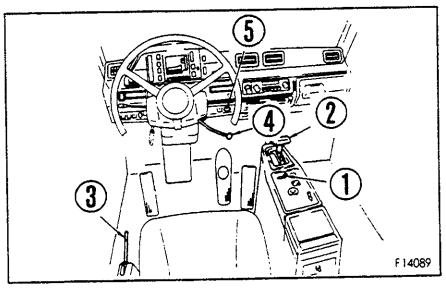
It is possible to adjust the tilt of the steering wheel to the front and rear, and up and down. Pull the lever up and set the steering wheel to the desired position, then push the lever down to lock the steering wheel securely in position.

Adjustment range: Front-rear: 5°
Up: 30 mm (1.2 in)
Down: 20 mm (0.8 in)

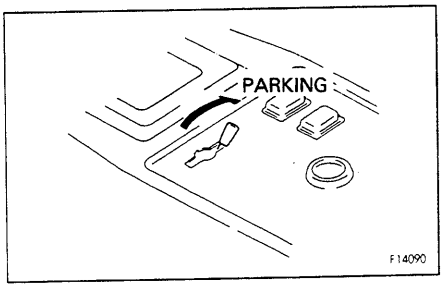
12.1.4 OPERATIONS, CHECKS BEFORE STARTING ENGINE

⚠ WARNING

If the shift lever is touched by mistake, the machine may suddenly move. Before standing up from the operator's seat, place the gear shift lever at neutral, and set the parking brake lever to the PARKING position.



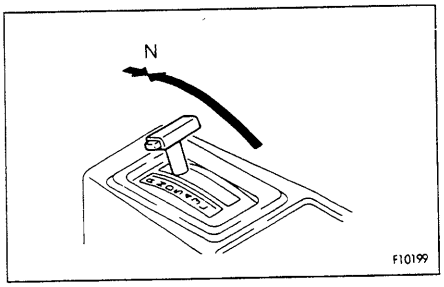
1. Check that parking brake lever ① is at the PARKING position.



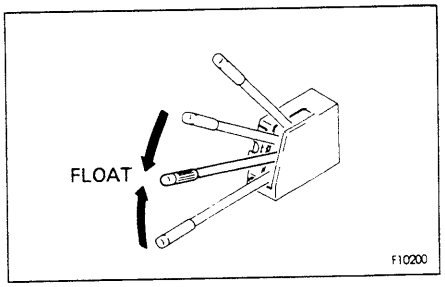
2. Check that shift lever ② is at the N position.

REMARK

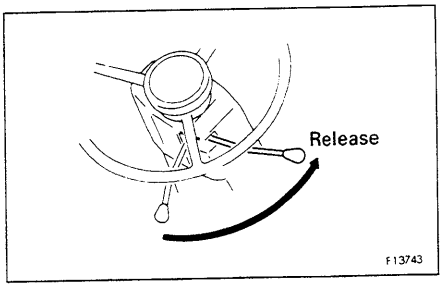
If the shift lever is not at the N position, the engine will not start. If the starting switch is turned to the ON position when the shift lever is not at N, the central warning lamp will flash and the alarm buzzer will sound.



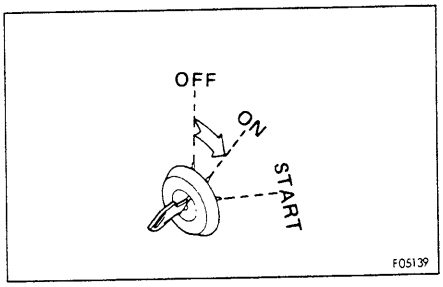
3. Check that dump lever ③ is at the FLOAT position.



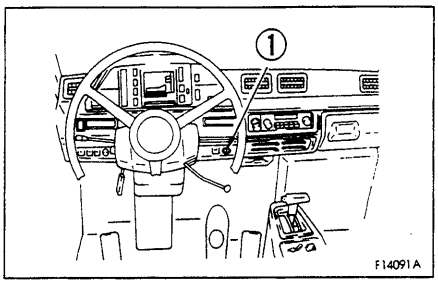
4. Check that retarder control lever ④ is at the RELEASED position.



5. Check that there is no abnormality on the machine monitor or maintenance monitor (opt) when the key in starting switch ⑤ is turned to the ON position.



12.2 STARTING ENGINE
12.2.1 NORMAL STARTING



⚠ WARNING

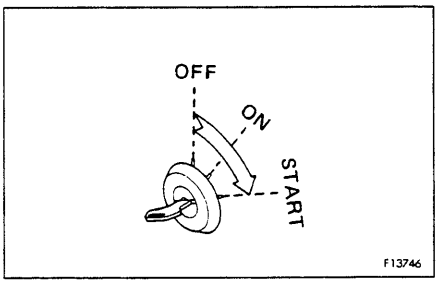
Check that there are no persons or obstacles in the surrounding area, then sound the horn and start the engine.

NOTICE

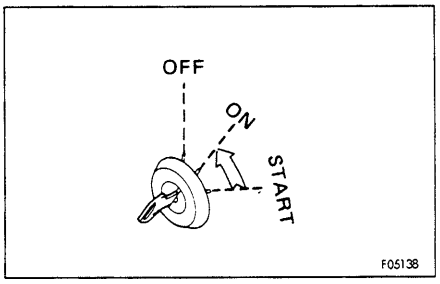
Do not keep the starting motor rotating continuously for more than 20 seconds.

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

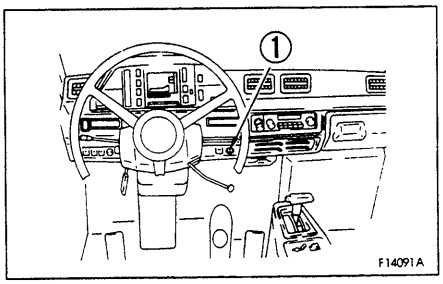
1. Turn the key of starting switch ① to the START position to start the engine.



2. When the engine starts, release the key in starting switch ①. The key will return automatically to the ON position.



12.2.2 STARTING IN COLD WEATHER



⚠ WARNING

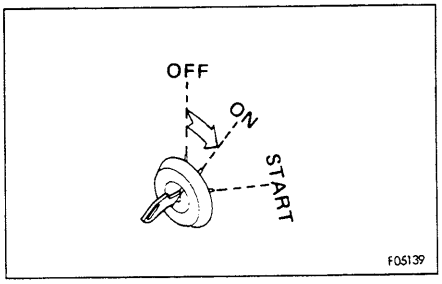
- **Check that there are no persons or obstacles in the surrounding area, then sound the horn and start the engine.**
- **Never use starting fluids as they may cause explosions.**

NOTICE

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

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

1. Turn the key of starting switch ① to the ON position.

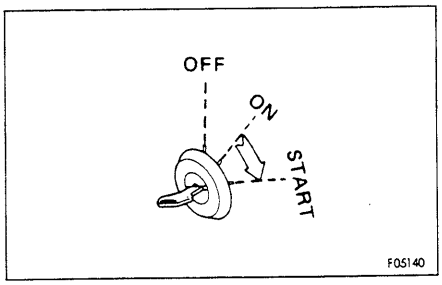


2. The preheating will start automatically and the preheating pilot lamp will light up.

   The following is a guideline for the preheating time.

Ambient temperature	Preheating time
0°C to -5°C	-
-5°C to -10°C	30 to 40 sec
-10°C to -20°C	60 sec
-20°C to -30°C	90 sec

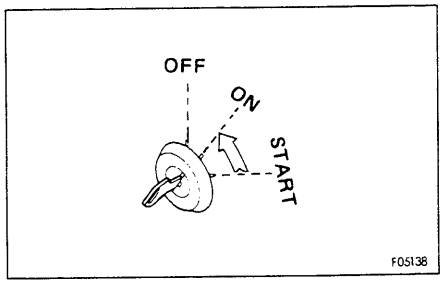
3. When the preheating is completed, the preheating pilot lamp will go out. Turn the key in starting switch ① to the START position to start the engine.



REMARK

When starting the engine, the monitor may flash while the starting motor is turning, but if the monitor lamp goes out after the engine is started, there is no abnormality.

4. When the engine starts, release the key in starting switch ①. 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 the warming-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.

1. After the warming-up operation, check that the machine monitor is normal.

If there is any abnormality, carry out maintenance or repair. Run the engine under a light load until the engine water temperature gauge and air pressure gauge enter the green range.

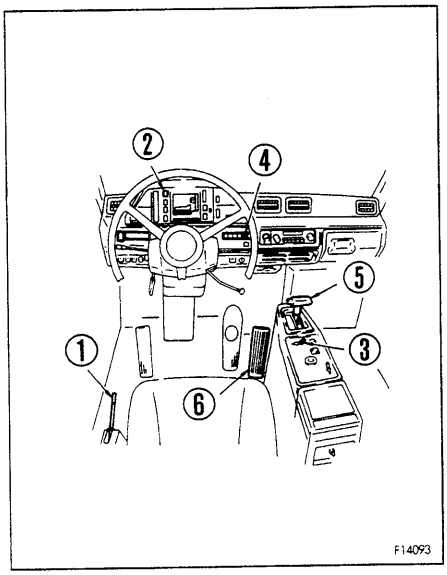
If the engine water temperature is low, run the engine at a higher idling speed. (opt, electronic governor specification)

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

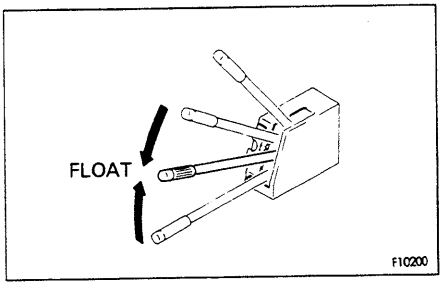
12.4 MOVING MACHINE OFF

⚠ WARNING

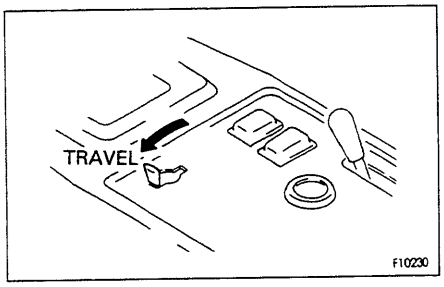
- **When moving off, check that the area around the machine is safe, and sound the horn before moving.**
  Do not allow anyone in the area around the machine.
  There is a blind spot behind the machine, so use extreme care when reversing the machine.



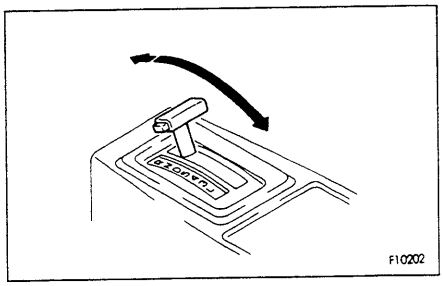
1. Check that there is no warning display on the machine monitor.



2. Check that your seat belt is fastened and that dump lever ① is at the FLOAT position.



3. Depress the brake pedal fully. Check that air pressure gauge ② is in the green range, then set parking brake lever ③ to the TRAVEL position to release the parking brake.

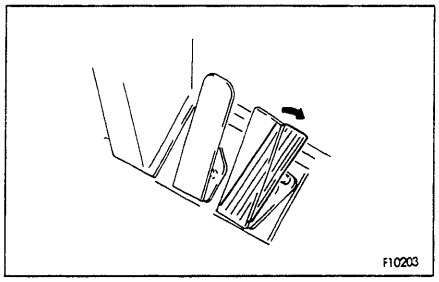


4. Check that retarder pilot lamp ④ has gone out, then set shift lever ⑤ to the desired position.

NOTICE

- **When operating the shift lever, be sure to set it in position securely.**
  If the lever is not placed in position properly, the shift position display on the panel may go out and the transmission warning monitor lamp may light up.
- **Always release the accelerator pedal before shifting from to R or F.**

5. Depress accelerator pedal ⑥ to move the machine off.
If the parking brake is not released, and the shift lever is shifted to a position other than N, the central warning lamp will flash and the alarm buzzer will sound.

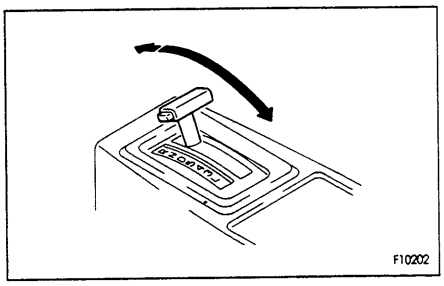


If the dump lever is not at the FLOAT position, and the shift lever is shifted to a position other than N, the central warning lamp will light up and the alarm buzzer will sound.

Do not operate the shift lever with the accelerator pedal depressed. This will cause a big shock, and will also reduce the life of the machine.

12.5 SHIFTING GEAR

Shift gear as follows.



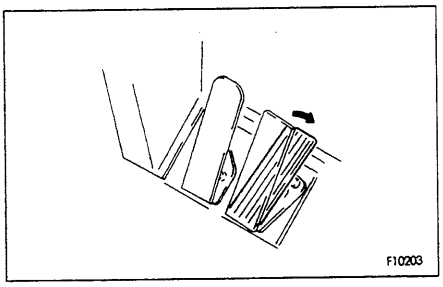
This machine has an automatic transmission, so set the shift lever to the desired position, and the transmission will automatically shift to a position to match the travel speed.

- When shifting between FORWARD and REVERSE, stop the machine completely, and run the engine at low idling when shifting the lever.
  After moving the shift lever, do not depress the accelerator until you detect that the transmission clutch has engaged.

- Do not operate the shift lever with the accelerator pedal depressed.
  This will cause a big shock, and will also reduce the life of the machine.

SHIFTING UP

1. When the accelerator pedal is depressed to accelerate the machine, the lockup clutch is engaged to shift the transmission to direct drive.
2. If the machine is accelerated further, the transmission will automatically shift up.

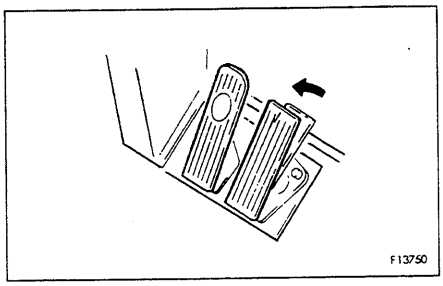


SHIFTING DOWN

If the accelerator pedal is released, the machine speed will be reduced, and the transmission will automatically shift down.

DOWN SHIFT INHIBIT

This prevents the engine from overrunning if the shift lever is operated mistakenly.



OVERRUN PREVENTION DEVICE

When the machine is traveling downhill, if the travel speed goes above the maximum speed for the range of the shift lever, the overrun prevention device is actuated to actuate the retarder and reduce the travel speed.

12.6 TRAVELING DOWNHILL

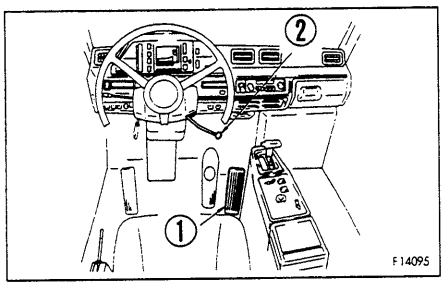
When traveling downhill, travel at a safe speed which matches the width of the road, the condition of the road surface, and other conditions of the jobsite.

⚠ WARNING

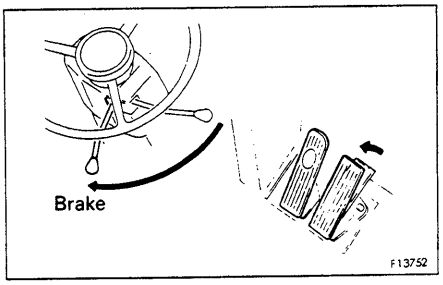
- **If the machine is stopped, put blocks under the wheel immediately.**
- **For the maximum permissible speed when traveling downhill using the retarder, see the brake performance graph for the downhill distance and grade.**
  Traveling continuously downhill at a speed greater than the maximum permitted speed on the brake performance graph is dangerous as the retarder brake may be damaged.
- **If the retarder oil temperature monitor on the machine monitor flashes when using the retarder, shift down to travel downhill.**
  (When this happens, the central warning lamp flashes and the alarm buzzer sounds.)
  If the monitor lamp does not go out even when the transmission is shifted down, stop the machine immediately, set the shift lever to the N position, run the engine at the 2000 rpm, and wait for the monitor to go out.
- **If the retarder loses its effect when it is used for traveling downhill, do as follows.**
  1. **Release the retarder brake completely, then operate the retarder lever again.**
  2. **If the retarder still has no effect even when the retarder lever is operated again, return the retarder lever completely to the released position, then depress the brake pedal to stop the machine, and contact your Komatsu distributor for repairs.**
- **Operate the retarder slowly. If the brakes are applied suddenly, there is danger that the tire will slip.**

NOTICE

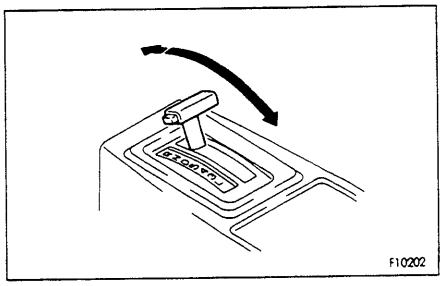
- **If the retarder lever is operated when traveling downhill, the transmission can be shifted down sooner than with normal deceleration. It is also possible to travel without shifting up.**
- **When traveling downhill, do not use the foot brake except in an emergency. Using the foot brake will cause overheating of the front brake and reduce the life.**



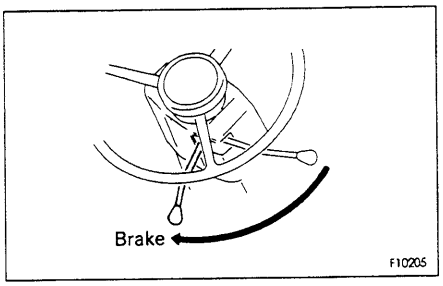
1. Before starting to travel downhill, release accelerator pedal ① and operate retarder lever ② to slow the machine down.



2. Move the shift lever to a position (5, 4, 3, L) that matches the maximum permissible speed for the retarder brake performance.



3. When traveling downhill, operate retarder lever ②, run the engine at a speed of at least 1800 rpm, and travel so that the retarder brake oil temperature gauge is in the green range.



For machines equipped with an exhaust brake, using the exhaust brake can provide more secure braking force for increased safety, and will also improve the durability of the brake.

For details of handling the exhaust brake, see 11. EXPLANATION OF COMPONENTS, EXHAUST BRAKE SWITCH.

12.6.1 BRAKE PERFORMANCE CURVE

- Method of using graph
  Example: Downhill distance: 1500 m (4920 ft)
  Travel resistance – 11% [grade resistance – 13%]
  [rolling resistance – 2%]
  Load: 32 tons

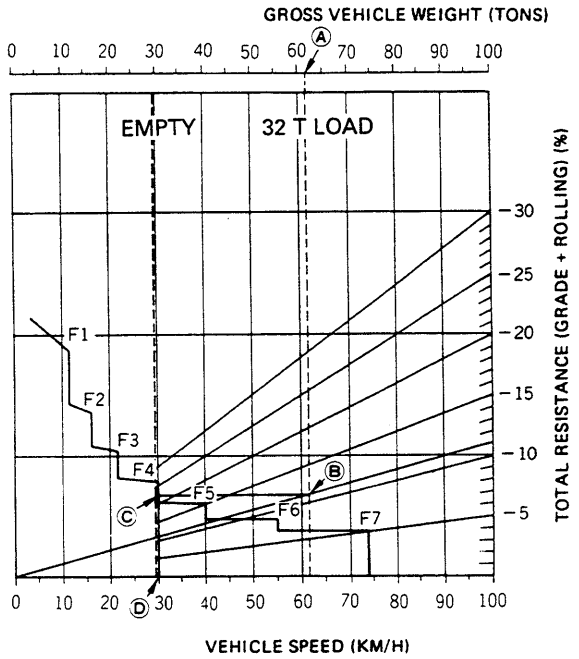
Obtain the maximum permissible speed and the speed range from the graph when traveling downhill under the above conditions.

1. Use the brake performance graph for the downhill distance of 1500 m (4920 ft).

2. Starting from point Ⓐ which corresponds to the overall weight of the machine, draw a perpendicular line down.

3. Take the point where it crosses the line for travel resistance – 11% as Ⓑ and draw a horizontal line.

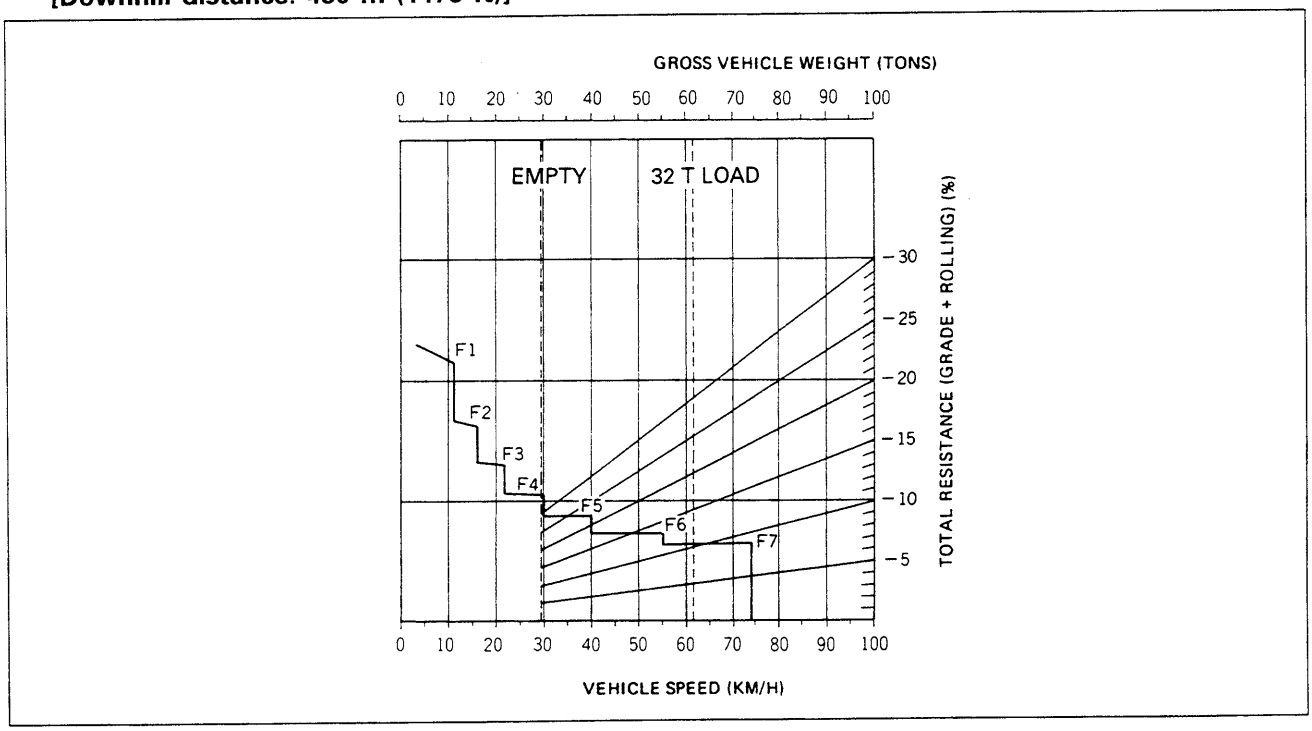
Example



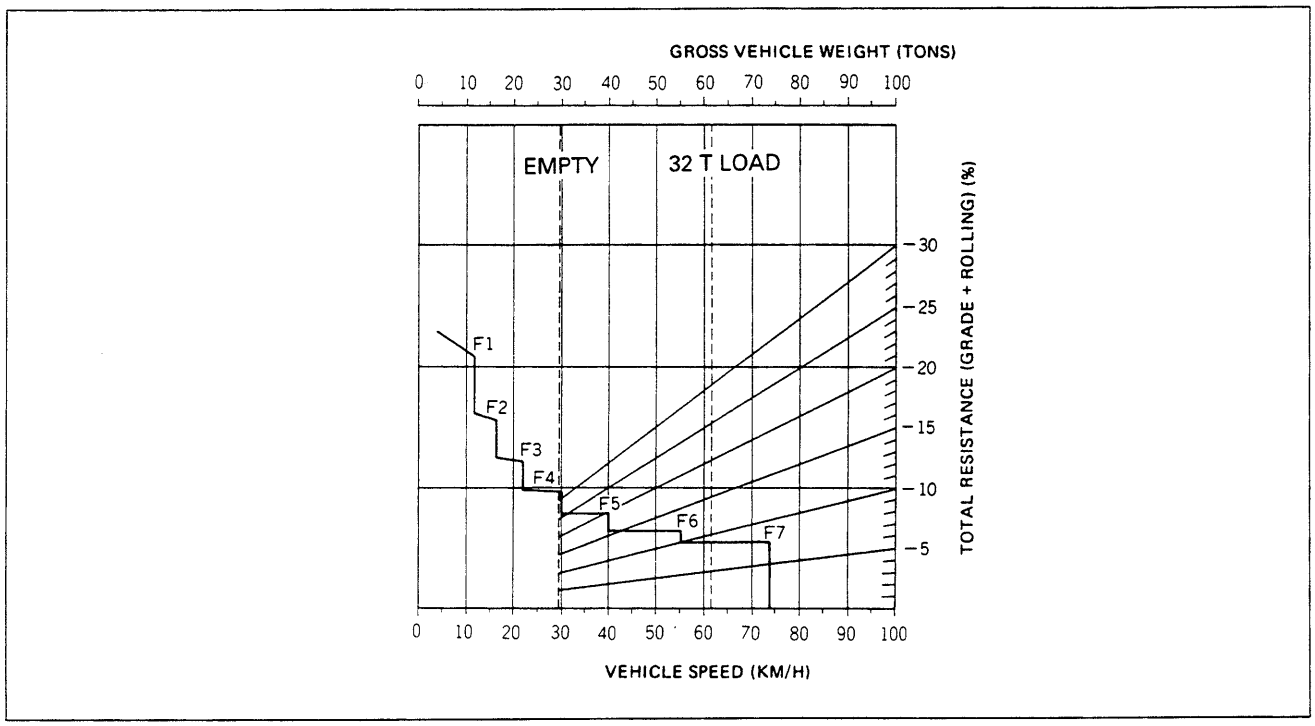
4. Take the point where it crosses the performance curve as Ⓒ, and draw a perpendicular line down. Take the point where this line crosses the travel speed scale as Ⓓ.
5. The following information can be obtained from this procedure.
   From point Ⓓ : Maximum permissible speed = 40 km/h (24.8 MPH)
   From point Ⓒ : Speed range = F5

This maximum permissible speed is one guideline determined from the retarder brake performance, so on an actual jobsite, determine a safe travel speed to match the conditions of the jobsite so that the retarder brake oil temperature gauge is always in the green range when traveling below the maximum permissible speed.

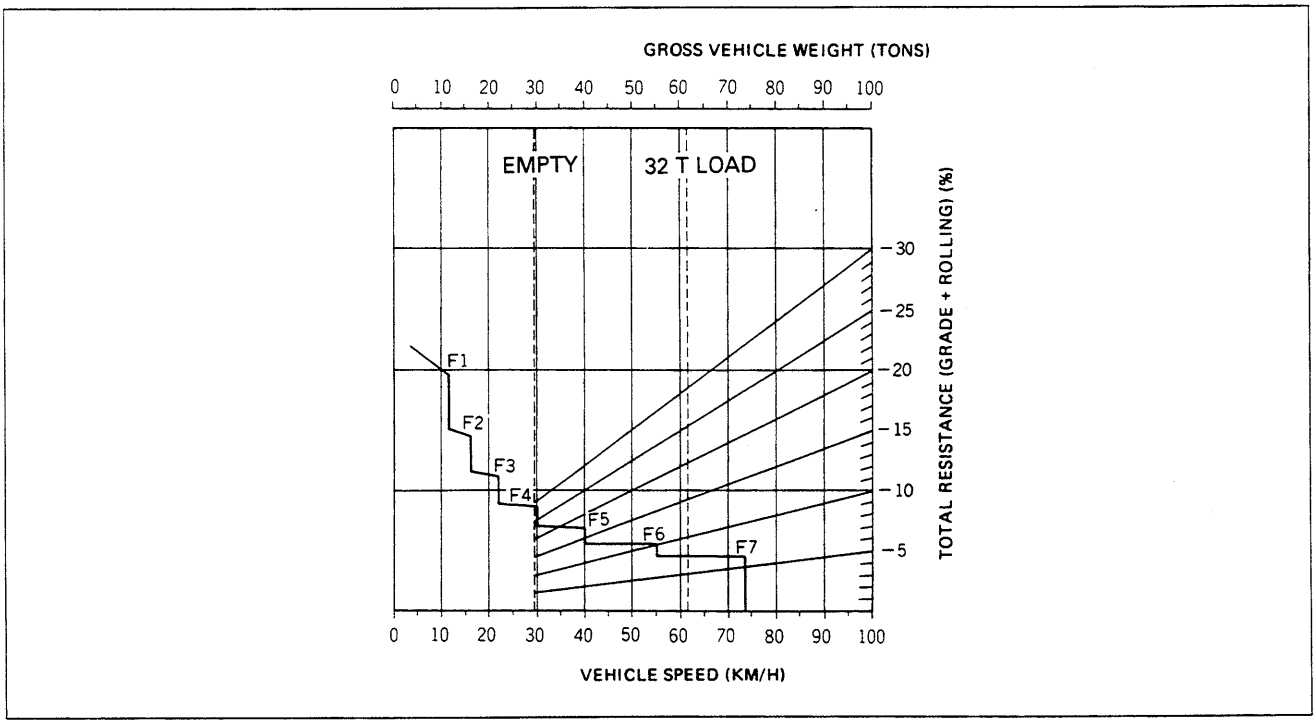
- **Brake performance**
  [Downhill distance: 450 m (1476 ft)]



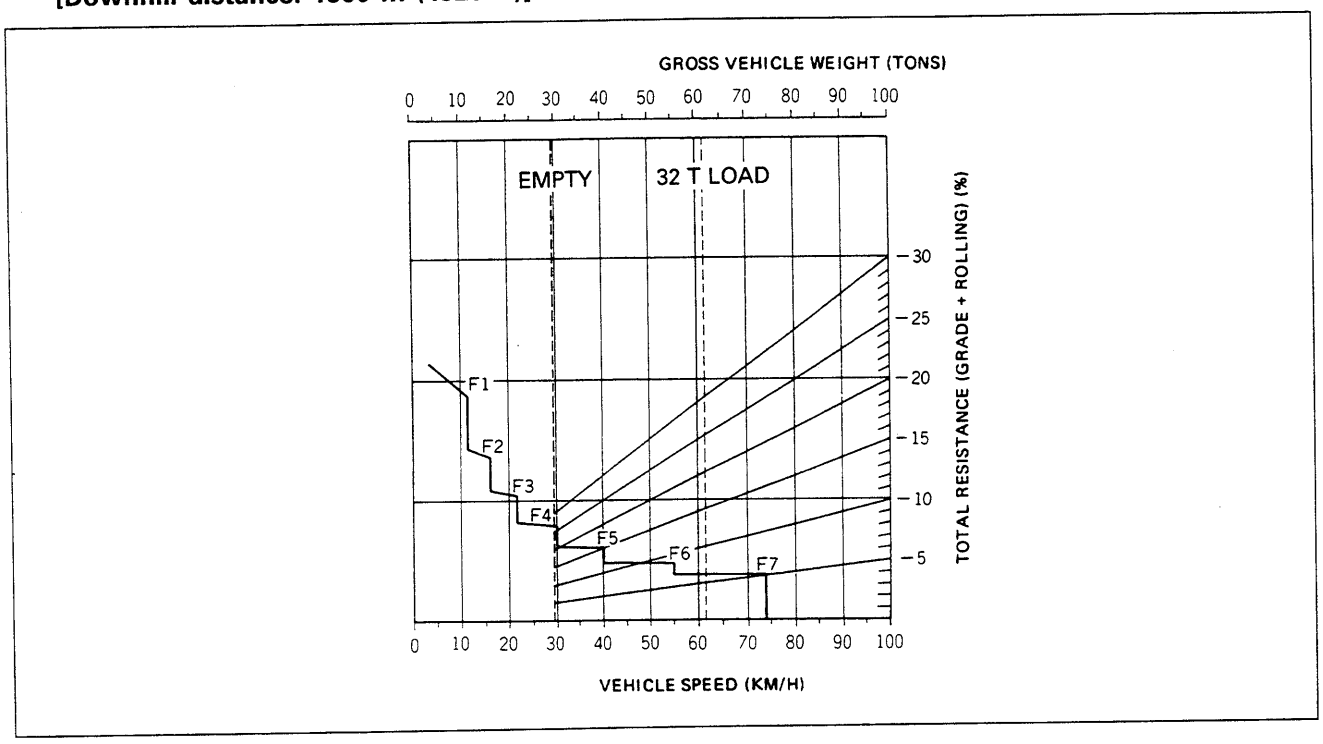
- **Brake performance**
  [Downhill distance: 600 m (1968 ft)]



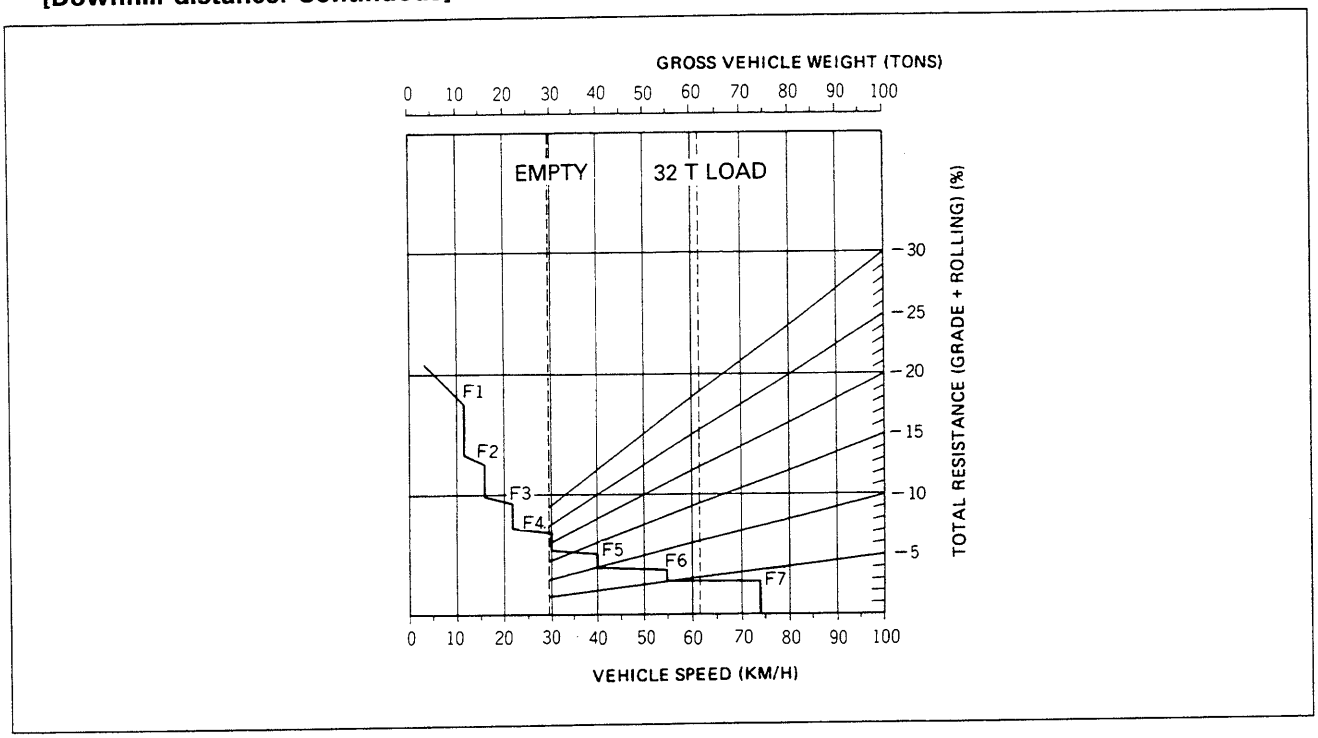
- **Brake performance**
  [Downhill distance: 900 m (2952 ft)]



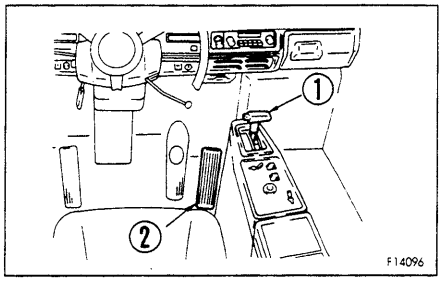
- **Brake performance**
  [Downhill distance: 1500 m (4920 ft)]

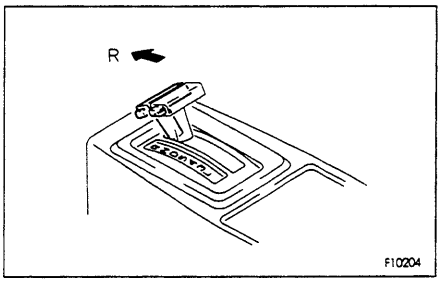


- **Brake performance**
  [Downhill distance: Continuous]



12.7 TRAVELING IN REVERSE





⚠ WARNING

- **When switching between FORWARD and REVERSE, check that the new direction of travel is safe.**
  There is a blind spot behind the machine, so use extreme care when reversing the machine.
- **Always stop the machine completely before shifting between FORWARD and REVERSE.**

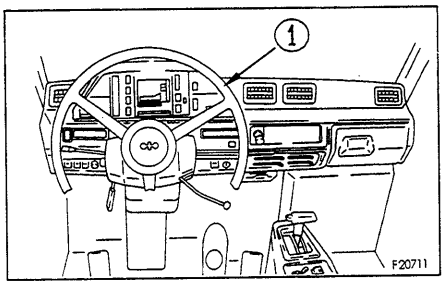
Place shift lever ① in the R position, then gradually depress accelerator pedal ② to move the machine off.

The machine cannot travel in reverse if the dump lever is not at the FLOAT position. Place the dump lever at the FLOAT position before operating to the R position.

- When shifting between FORWARD and REVERSE, stop the machine completely, and run the engine at low idling when shifting the lever.
  After moving the shift lever, do not depress the accelerator until you detect that the transmission clutch has engaged.

Do not operate the shift lever with the accelerator pedal depressed. This will cause a big shock, and will also reduce the life of the machine.

12.8 STEERING THE MACHINE



⚠ WARNING

If the machine is turned at high speed or on a steep slope, there is danger that it will turn over, so do not operate the steering in such conditions.

⚠ CAUTION

Do not continue to apply force to the steering wheel when it has been turned fully to the left or right. This will make the oil temperature in the circuit rise and will cause overheating.

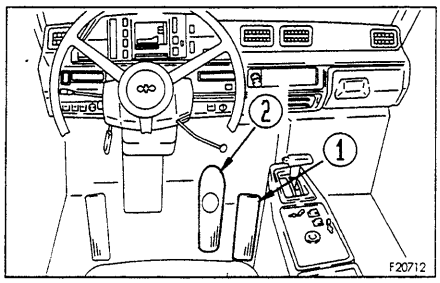
When traveling, turn steering wheel ① in the direction of turning.

When traveling around a curve, release the accelerator pedal before entering the curve, shift down to a lower speed range, then depress the accelerator pedal to travel around the curve. Never coast around the curves at high speed.

REMARK

- The angle of the steering wheel may change (the position of the spoke may change slightly) when the machine is traveling, but this is not a failure.
- If force is applied to the steering wheel when the tires have been turned fully to the left or right, the steering wheel will turn a little at a time, but this is not a failure.

12.9 STOPPING THE MACHINE



⚠ WARNING

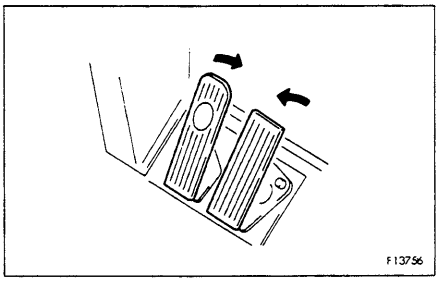
- **Avoid stopping suddenly. Give yourself ample room when stopping**
- **Do not park the machine on a slope.**
  If it is unavoidably necessary to park the machine on a slope, put blocks under the tires to prevent the machine from moving.
- **If the shift lever is touched by mistake, the machine may move suddenly, and this may lead to a serious accident. Before leaving the operator's compartment, always set the parking brake lever securely to the PARKING position.**

⚠ CAUTION

- **If the foot brake is used repeatedly or is kept depressed for a long time, the front brake may overheat and its life will be shortened.**
- **If the parking brake is used to stop the machine, the brake will be damaged. Do not use the parking brake except when stopping in emergencies or when parking the machine after stopping it.**

12.9.1 NORMAL STOPPING

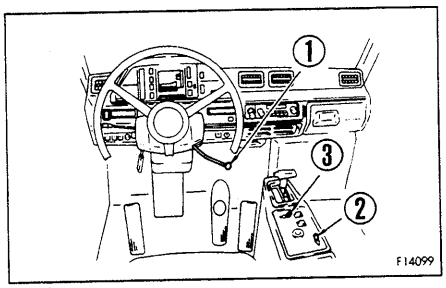
Release accelerator pedal ①, and depress brake pedal ② to stop the machine.



12.9.2 STOPPING IN EMERGENCY

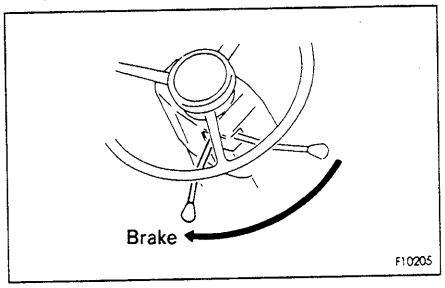
⚠ WARNING

- **When the machine stops, put blocks under the tires immediately.**
- **Immediately after making an emergency stop, the parking brake disc will be at high temperature, so wait for it to cool before carrying out repair or adjustment.**

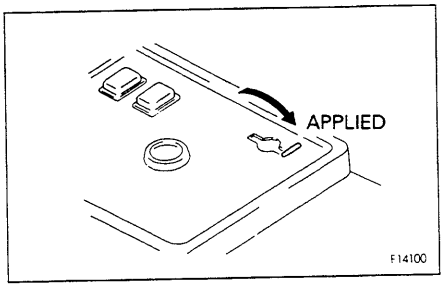


If there should be a failure in the foot brake, stop the machine as follows.

1. Pull retarder control lever ① fully to apply the retarder.



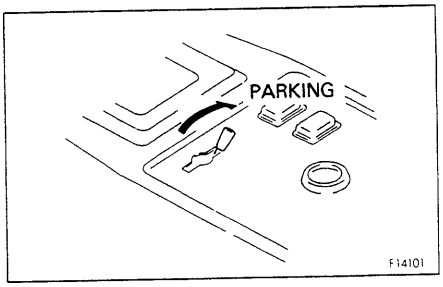
2. If operating the retarder control lever dose not give enough braking force, set emergency brake lever ② to the actuation position to apply the emergency brake.
   When emergency brake lever ② is placed at the actuation position, the parking brake is automatically applied.



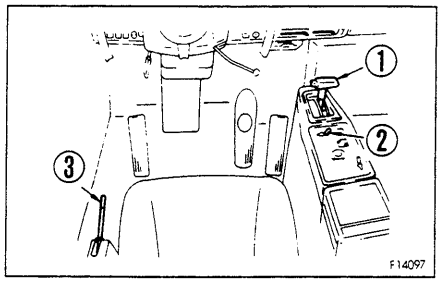
3. Move parking brake lever ③ to the right to the PARKING position.

4. When the machine stops, put blocks under the tires immediately, then try to find the cause, and repair it.

5. If an emergency stop has been made, adjust the parking brake again.



12.10 OPERATING DUMP BODY

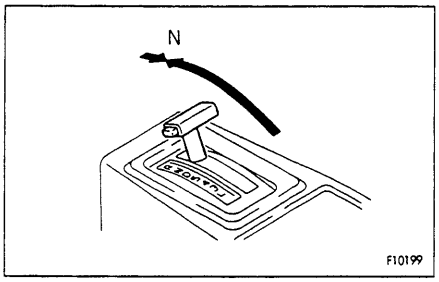


⚠ WARNING

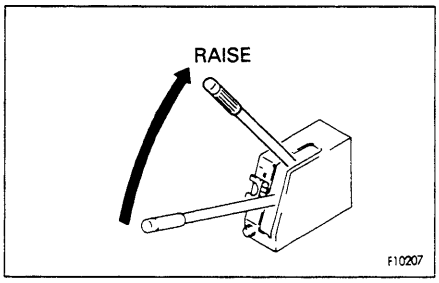
- **When dumping a load, always carry out the dumping operation in accordance with the signals from the flagman.**
- **When dumping large rocks, operate the dump body slowly.**
- **Do not load the dump body while it is still raised.**
- **When carrying out inspection with the dump body raised, always use the safety pins, set the dump lever to the HOLD position and lock it securely.**
  For details, see 11.5 SAFETY PIN.

Operate the dump body as follows.

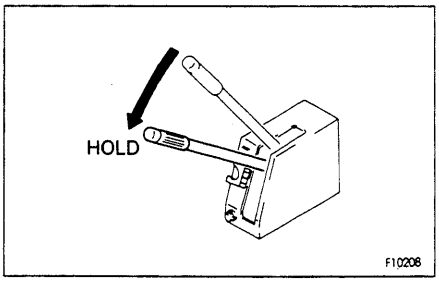
1. Place shift lever ① at the N position, and set parking brake lever ② to the PARKING position.



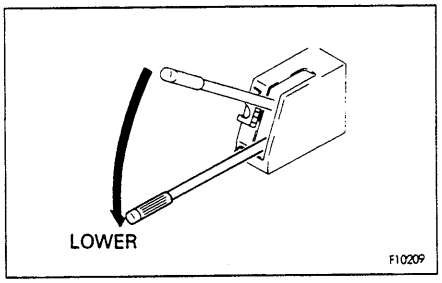
2. Move dump lever ③ to the RAISE position, then depress the accelerator pedal to raise the dump body.
   If the dump lever is released when it is at the RAISE position, it is held at the RAISE position and the dump body will continue to rise.
   The dumping speed increases in proportion to the engine speed.



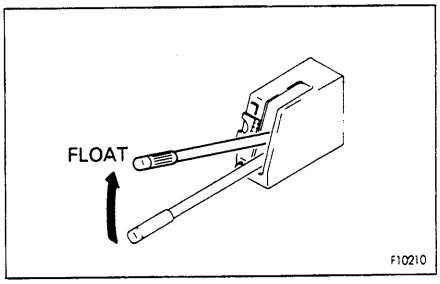
3. When the dump body rises to the previously set position (dump body positioner adjustment position), dump lever ③ is returned to the HOLD position. The dump body is then held at that position.
   If it is necessary to raise the dump body further, move dump lever ③ back to the RAISE position and the dump body will rise.
   If dump lever ③ is released when doing this, it will return to the HOLD position and the dump body will stop at that position.



4. When dump lever ③ is moved to the LOWER position, the dump body will start to move down.



5. When the dump body has moved down a certain distance, move dump lever ③ to the FLOAT position. (When the lever is released, it will return to the FLOAT position.) The dump body will then move down under its own weight.



When traveling, always set the dump lever to the FLOAT position regardless of whether the dump body is empty or loaded.
If the dump lever is not at the FLOAT position and the shift lever is not at the N position, the central warning lamp will light up and the alarm buzzer will sound.

When raising the dump body, let the accelerator pedal back to the near the maximum angle to avoid any impact load on the hydraulic circuit or hoist cylinders.

PRECAUTIONS REGARDING LOAD

When using a large wheel loader to load large rocks, if the rocks are loaded directly into the dump body parts of the dump body may be deformed. To prevent this, when loading large rocks, first load sand or soil to act as a cushion, then load the rocks on top of this to reduce the impact on the dump body.

In addition, when loading rocks that exceed the following conditions, install the optional dump body reinforcement plate.

- Rocks with one side over 0.5 m (1.6 ft)
- Rocks of Mohs hardness of more than 4.5
- Rocks with a weight of more than 300 kg (662 lb)
- When transporting steel ingots

For details of the types of dump body and the procedure for selection, see 27. SELECTING DUMP BODY.

12.11 PRECAUTIONS FOR OPERATION

- When traveling on roads in rain or snow, or when traveling on muddy or soft ground, consider the loaded condition of the dump truck and be extremely careful not to let the tires slip or spin and sink into the ground.

- If the engine should stop when the machine is traveling, stop the machine immediately, then move the speed lever to the N position, and start the engine again.

- If the central warning lamp and pilot lamp for any EMERGENCY item on the machine monitor should flash and the buzzer sounds during operation, stop the machine immediately and invest the cause.
  For details, see "16. TROUBLESHOOTING".

- When loading, be careful to load the dump body uniformly, and be particularly careful to avoid loading too much at the front.

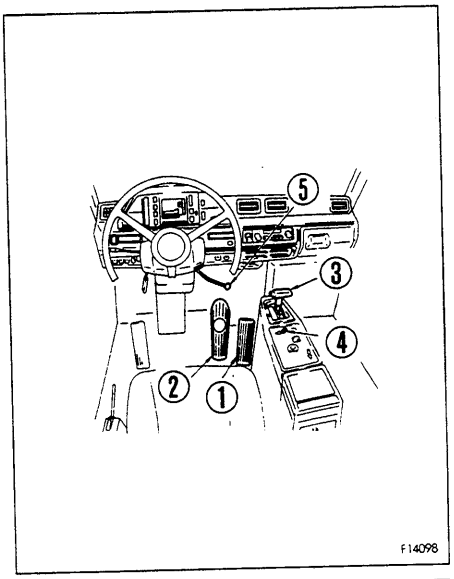
- On slippery road surfaces, apply the retarder control lever slowly and shift the transmission down to prevent the rear wheels from locking.

- When traveling through pools of water, water may get inside the front brakes and cause a big drop in the braking force, so drive carefully in such areas. If water should get into the brakes, apply the brakes several times while traveling to produce friction heat between the pad and disc to remove the water.

12.12 PARKING MACHINE

⚠ WARNING

- **Avoid stopping suddenly. Give yourself ample room when stopping.**
- **Park the machine on firm, horizontal ground.**
  Do not park the machine on a slope.
  If it is unavoidably necessary to park the machine on a slope, put blocks under the tires to prevent the machine from moving.
- **If the shift lever is touched by mistake, the machine may move suddenly, and this may lead to a serious accident. Before leaving the operator's compartment, always set the parking brake lever securely to the PARKING position.**



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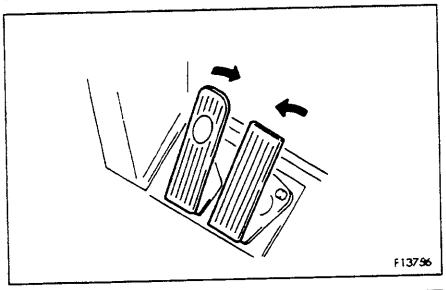
⚠ CAUTION

To prevent damage to the parking brake, apply the parking brake only when parking the machine.

1. Release accelerator pedal ①, then depress brake pedal ② to stop the machine.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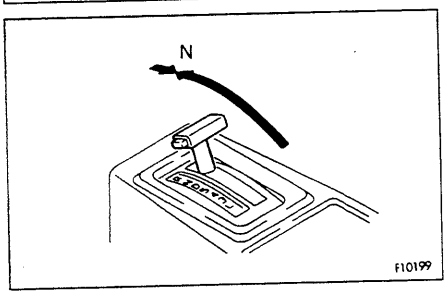
2. Move shift lever ③ to the N position, then move parking brake lever ④ to the PARKING position to apply the parking brake.



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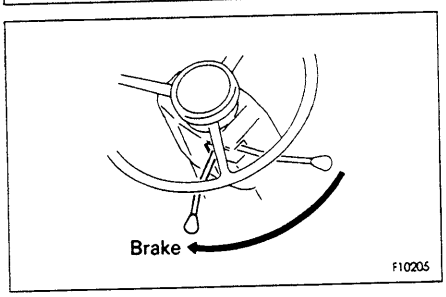
3. When in the operator's compartment, pull retarder control lever ⑤ fully to apply the retarder.

NOTICE

- **The retarder must not be used as a parking brake.**
- **Do not use the parking brake for long-term parking, regardless of the engine speed.**



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12.13 CHECKS AFTER COMPLETION OF WORK

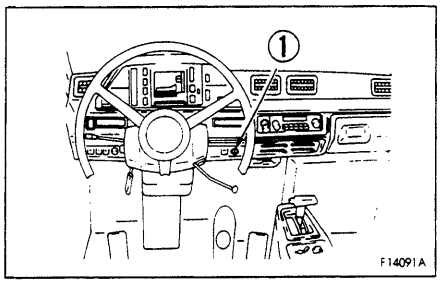
Use the machine monitor to check the engine water temperature, engine oil pressure, and fuel level.

If the engine has overheated, do not stop the engine suddenly. Run it at a mid-range speed to cool it gradually before stopping.

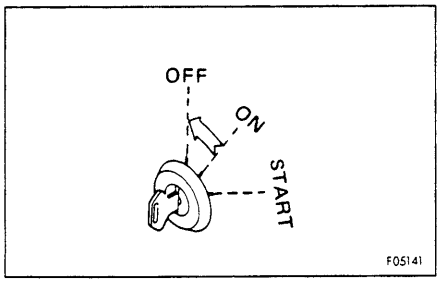
12.14 STOPPING ENGINE

NOTICE

If the engine is suddenly stopped without allowing it to cool down, there is danger that the life of the engine parts will be shortened, so never stop the engine suddenly except in emergency. Allow the engine to cool down gradually before stopping it.



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



2. Turn the key in starting switch ① to the OFF position to stop the engine.
3. Remove the key from starting switch ①.

12.15 CHECKS AFTER STOPPING ENGINE

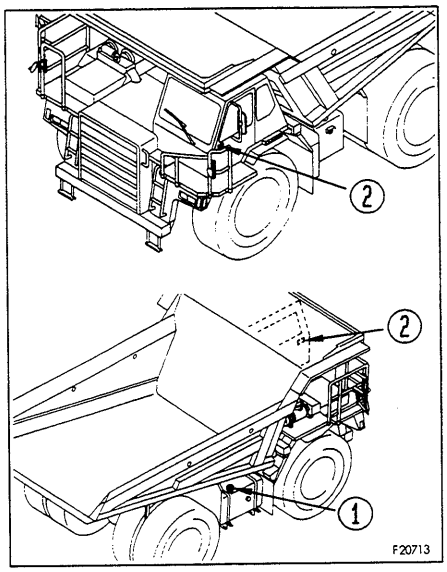
1. Look around the work equipment, bodywork, and undercarriage to check for leakage of oil or water.
2. Fill the fuel tank.
3. Remove any waste paper or other flammable material which may cause fire from the engine room.
4. Remove any mud stuck to the undercarriage.

12.16 LOCKING

Always lock the following places.

① Fuel filler cap of fuel tank

② Cab doors (left and right)



REMARK

The starting switch key is used for locking places ① and ②.

12.17 HANDLING TIRES
12.17.1 PRECAUTIONS WHEN HANDLING TIRES

⚠ WARNING

To ensure safety, the defective tires given below in items (1) to (6) must be replaced with new tires.

(1) Tires where the bead wire has been cut, broken, or greatly deformed

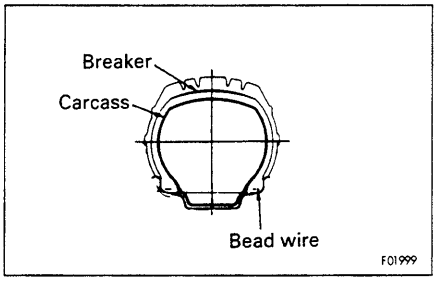
(2) Excessively worn tires where more than 1/4 of the circumference of the carcass ply (excluding the breaker) is exposed

(3) Tires where damage to the carcass exceeds 1/3 of the tire width

(4) Tires where ply separation has occurred

(5) Tires where radial cracks extend to the carcass

(6) Tires where there is abnormal deterioration, deformation, and damage, and the tire cannot withstand use



When replacing the tires, please contact your Komatsu distributor. It is dangerous to jack up the machine without taking adequate precaution.

12.17.2 T.Km.P.H (Ton-Km-Per-Hour Rating)

Tires for construction equipment are used under severe conditions that bear no comparison with the tires used on cars, buses, or ordinary trucks, so they are specially designed to withstand these conditions.

Compared with ordinary tires, far greater heat is produced in the rubber internal parts of off-road tires when the machine is traveling. If they are used continuously under conditions which exceed the permitted load and speed of the tire, the internal temperature will exceed the limit, and the rubber may become soft and heat separation occur.

To prevent such problems from occurring, the T.Km.P.H. is used as a standard to allow the machine to travel safely.
If operations are carried out which exceed the T.Km.P.H. of the tire (when the T.Km.P.H. of the work exceeds the T.Km.P.H. of the tires), tire trouble will occur more frequently.

In such cases, do as follows.

- Make the operating conditions easier so that the operation T.Km.P.H. is lowered.
- Increase the size of the tires to a tire with a high T.Km.P.H.

12.17.3 TIRE T.Km.P.H. AND MAXIMUM SPEED FOR CONTINUOUS TRAVEL (REFERENCE)

	Tire T.Km.P.H. for ambient temperature				Max. speed for continuous travel for ambient temperature (km/h)				
	16°C	27°C	38°C	49°C		16°C	27°C	38°C	49°C
Size 18.00-33-32 PR (standard), structure CR(BS ELS2) Code No. E4 (TRA)	182	171	161	150	When empty (front wheel standard)	26	24	23	21
					When loaded (rear wheel standard)	17	16	15	14
Size 18.00-33-32 PR (option), structure CR(BS RL) Code No. E3 (TRA)	215	202	190	177	When empty (front wheel standard)	30	28	27	25
					When loaded (rear wheel standard)	20	19	18	17

12.17.4 METHOD OF CALCULATING WORK T.Km.P.H.

Work T.Km.P.H. = average load per tire x average travel speed for one day

Average travel speed = round trip distance x number of round trips per day/total operating hours per day

Average load = (load when empty + load when loaded) /2

The total operating hours per day includes the stopping time and rest periods.

★ The T.Km.P.H. in the table may differ slightly according to the tire maker, so for operations which require travel near the travel speed given in the table, please contact your Komatsu distributor.

12.17.5 PRECAUTIONS FOR LONG DISTANCE TRAVEL

If the machine travels continuously at high speed for a long distance, there will be a marked increase in the generation of heat in the tire. This may cause premature damage to the tire, so be careful of the following points.

- Travel at high speed for long distances only when traveling empty.
- Check the tire inflation pressure before starting for the day when the tires are cold, and adjust to the following inflation pressure.

Tire size	Inflation pressure
18.00–33–32PR	563.9 kPa (5.75 kg/cm^2, 81.7 psi)
18.00–33–28PR(OP)	490.3 kPa (5.0 kg/cm^2, 71 psi)
18.00-R33★★(OP)	686.5 kPa (7.0 kg/cm^2, 99.4 psi)

- Do not reduce the tire inflation pressure while traveling.
- The maximum travel speed must be kept to less than 40 km/h (24.8 MPH). Stop for at least one hour for every one hour of travel to allow the tires and other components to cool down.
- Never travel with water or dry ballast in the tires.

13. DETERMINING AND MAINTAINING TRAVEL ROAD

Determining and traveling the road in the jobsite is an extremely important factor both for reasons of safety and for reducing the cycle time.

To ensure safety in operations, do as follows.

13.1 DETERMINING TRAVEL ROAD

- As far as possible, restrict the travel road to one-way travel.
- If it is impossible to keep to one-way traffic, make the road with ample width to enable trucks traveling in opposite directions to pass each other. If it is impossible to provide a sufficient road width, provide passing places at various points along the road.
- Always design the road so that the loaded truck passes on the side closest to the hill face.
- If there are curves with poor visibility along the road, set up mirrors.
- In places where the road should is weak or likely to collapse, set up a sign at a point at least 1.5 m from the road shoulder to warn of the danger.
- It is important to set up lighting or reflectors to enable the road to be traveled at night.
- The grade of slope should be kept within 10% (approx. 6°) as far as possible, and emergency escape points should be set up on downhill slopes in case of any brake failure.
- Make the road as straight as possible, and particularly in intermediate areas with curves, where the machine is traveling at high speed, make the radius of the curve as large as possible.
- Small S curves are particularly dangerous, so avoid such curves. The radius of the curve must be a minimum of 12 to 15 m.
- Make the radius of curves as large as possible.
- Make the road wider at curves than it is in straight areas.
- Make the outside of the curve slightly higher.
- Be particularly careful to strengthen the road shoulder on the outside of curve.
- As far as possible, design the road so that no other roads cross it. In particular, if roads cross at an angle on slopes, a stepped difference is formed in the road. This is extremely dangerous, as it causes the machine to roll when traveling at high speed.
- Cut the slope face to provide a special road for the trucks.

13.2 MAINTAINING TRAVEL ROAD

Carry out the necessary action according to the conditions to insure that the road can always be traveled in safety.

- Remove any unevenness in the travel surface, sloping to the left or right, or drooping of the road shoulder. Make the road of ample strength and remove such obstacles as rocks and tree stumps.
- Maintain the road from time to time with a bulldozer or motor grader.
- Spray the road with water at suitable intervals to prevent dust from rising and reducing the visibility.

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.**
- **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

REMARK

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.

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.

REMARK

Measure the specific gravity and calculate the rate of charge from the following conversion table.

Rate of charge \ Temp. of fluid	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

14.1.4 INSTALLATION OF RADIATOR CURTAIN

If the engine water temperature gauge does not enter the green range, install a radiator curtain. The amount that the radiator curtain is opened can be adjusted from fully closed, to one window open or two windows open. Adjust the amount of opening according to the ambient temperature so that the engine water temperature gauge enters the green range.

14.2 PRECAUTIONS 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 water in mud or dirt getting inside the seal and freezing.

- Park the machine on hard, dry ground. If this is impossible, park the machine on wooden boards. The boards help protect the tracks from being frozen in the soil and the machine can start next morning.

- Bleed the air from the tank to prevent moisture from collecting inside the tank.

- 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.

- If the battery electrolyte level is low, add distilled water before starting operations on the next morning. To prevent the electrolyte from freezing at night, do not add distilled water after finishing operations.

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 a long time, do as follows.

- After every part is washed and dried, house the machine in a dry building. Never leave it outdoors.
  If the machine must be left outdoors, park it on well-drained concrete 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 the metal surface of the hydraulic piston 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.

- Lock each work equipment control lever with the safety lock, and apply the parking brake.

- Set the tire inflation pressure for each tire to within the range of the specified inflation pressure for the type of tire.

- Open the drain valve of the air tank, release the air, then tighten the drain valve again.

- Push the retarder control lever forward to the OFF position.

- Place the shift lever at the N position and turn the starting switch OFF.

15.2 DURING STORAGE

⚠ WARNING

If it is unavoidably necessary to carry out the rust-prevention 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.

15.4 PRECAUTIONS BEFORE TRAVELING AFTER LONG-TERM STORAGE

1. Check all the oil and water levels before traveling.
2. When traveling after long-term storage, travel forward at a speed of 10 - 15 km/h (6.2 - 9.3 MPH) for 5 minutes or 1 km to run the machine in, then change to normal travel.

16. TROUBLESHOOTING

16.1 AFTER RUNNING OUT OF FUEL

When starting the engine after it has run out of fuel, first fill with fuel, then fill the fuel filter cartridge with fuel and bleed the air from the fuel line before starting the engine.

For details of the method of bleeding the air, see 24.6 EVERY 500 HOURS SERVICE.

16.2 TOWING MACHINE

⚠ WARNING

- **If any failure should occur in the brake system, the brakes will not work, so be extremely careful.**
- **If the machine is towed in the wrong way, there is danger that it may lead to death or injury.**
- **Before releasing the brake, always put blocks under the wheels.**

The driver of the machine being towed should turn the steering wheel in the direction of the towing line.

This machine must not be towed except in cases of emergency. If it has to be towed, pay careful attention to the following points.

16.2.1 WHEN ENGINE RUNS

- Always run the engine to allow the steering and brakes to be used.

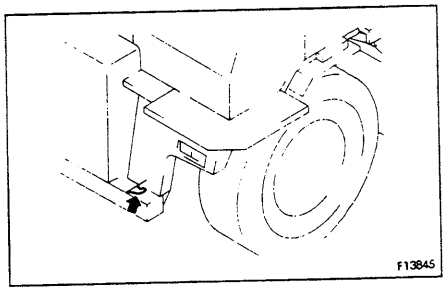
16.2.2 WHEN ENGINE DOES NOT RUN

NOTICE

Towing the machine is for moving it to a place where inspection and maintenance can be carried out. It is not for towing the machine long distances.

Do not tow the machine for long distances.

- The machine must not be moved more than 800 m (2624 ft).
  If the machine must be moved more than 800 m (2624 ft), remove the drive shaft between the transmission and differential case before moving the machine.
  When towing, keep the travel speed to less than 8 km/h (5.0 MPH).
- The towing hook is under the front frame.
- If the pressure in the air tank has dropped abnormally because of leakage of air from the air circuit, the parking brake and emergency brake are applied, so release both brakes before towing the machine.
- If the engine does not run, it is possible to steer the machine with the emergency steering, but this can only be used for a maximum of 90 seconds and at a maximum travel speed of 5 km/h (3.1 MPH), so be extremely careful when operating.



16.2.3 RELEASE METHOD WHEN PARKING BRAKE AND EMERGENCY BRAKE HAVE BEEN ACTUATED IN EMERGENCY

If the pressure in the air tank has dropped abnormally because of leakage of air from the air circuit, the parking brake and emergency brake are applied automatically.

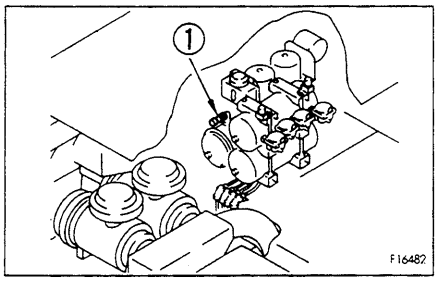
METHOD OF RELEASING PARKING BRAKE

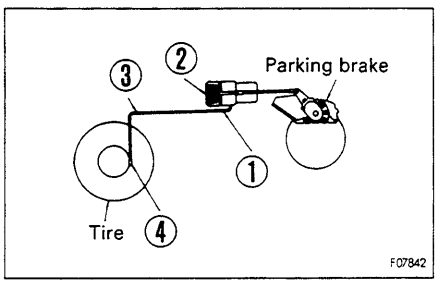
⚠ WARNING

- **If there is a failure in the air circuit, the brakes will not work. It is dangerous to drive the machine in this condition, so always tow the machine at low speed. When towing, run the engine so that it is possible to steer the machine.**
- **When releasing the parking brake, carry out the operation on flat ground and check that the surrounding area is safe. If the parking brake must be released on a slope because of an emergency or some other unavoidable reason, put blocks under the wheels before releasing the brake.**

After emergency actuation of the parking brake, the parking brake is not released even when the parking brake lever is placed at the TRAVEL position, so release the parking brake as follows.

1. Remove air charge socket ① installed to the front air tank.
2. Remove the air hose from parking brake chamber ②, then install removed socket ① to chamber ②.
3. Install one end of air charge hose ③ (supplied with the machine) to air charge socket ①. (The hose and socket can be installed at a touch.)
4. Push the other end of air charge hose ③ into valve ④ of the tire. Air is supplied to the parking brake chamber, and the parking brake is released.
5. When the parking brake is released, tow the machine quickly to a safe place.
   For details of towing, see 16.2 TOWING MACHINE.





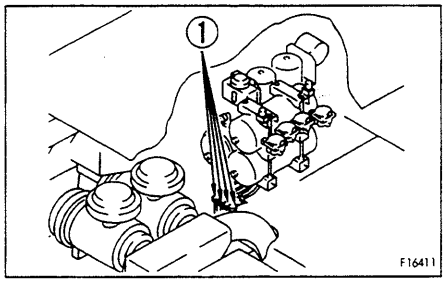
METHOD OF RELEASING EMERGENCY BRAKE

⚠ WARNING

- **When the emergency brake has been actuated, never drive the machine.**
  This will cause burning out of the brake disc or lining, or failure of the torque converter or transmission.
- **When releasing the air pressure from the emergency brake tank, check that the surrounding area is safe, and always put blocks under the tires before starting the operation.**

After actuation of the emergency brake, if the emergency brake is not released when the emergency brake valve lever is placed at the TRAVEL position, release the emergency brake as follows.

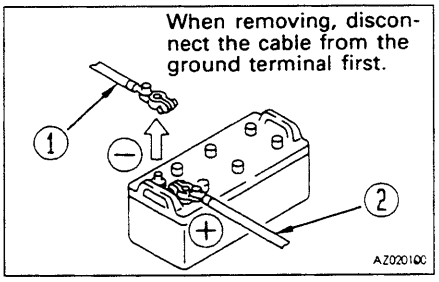
1. When the preparations for towing the machine are completed, pull rings ① of the air tank drain valve (4 places), and release the air pressure to release the emergency brake.
2. After releasing the emergency brake, release rings ①.

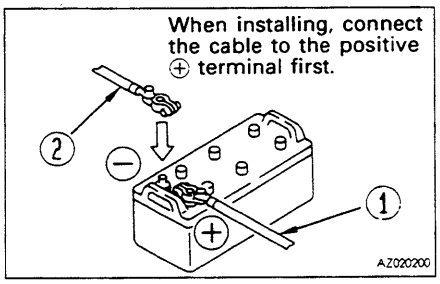


16.3 IF BATTERY IS DISCHARGED

⚠ WARNING

- **When checking or handling the battery, stop the engine and turn the starting switch key to the OFF position before starting.**
- **Before starting the engine, use a damp cloth to wipe off the dust accumulated on the top surface of the battery.**
- **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 handling battery, always wear protective goggles.**
- **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.**
- **When removing or installing, check which is the positive ⊕ terminal and negative ⊖ terminal.**





REMOVAL AND INSTALLATION OF BATTERY

- When removing battery, first disconnect the cable from the ground (normally, from the negative ⊖ terminal). If a tool touches a cable connecting the positive terminal and the chassis, there is danger of sparks being emitted.
- When installing battery, the ground cable should be connected to the ground terminal as the last step.

REMARK

The batteries are on both sides at the rear of the machine. The battery used for the ground is on the right side of the machine.

PRECAUTIONS FOR CHARGING BATTERY

Charging battery when mounted on machine

- Before charging, disconnect the cable from the negative ⊖ terminal of the battery. Otherwise, an unusually high voltage will damage the alternator.

- While charging the battery, remove all battery plugs for satisfactory ventilation.
  To avoid gas explosions, do not bring fire or sparks near the battery.

- If the electrolyte temperature exceeds 45°C, stop charging for a while.

- Turn off the charger as soon as the battery is charged.
  Overcharging the battery may cause the following:
  1) Overheating the battery
  2) Decreasing the quantity of electrolyte.
  3) Damaging the electrode plate.

- Do not mix the cables (positive ⊕ to negative ⊖ or negative ⊖ to positive ⊕), as it will damage the alternator.

- When performing any service to the battery besides checking the electrolyte lever or measuring the specific gravity, disconnect cables from the battery.

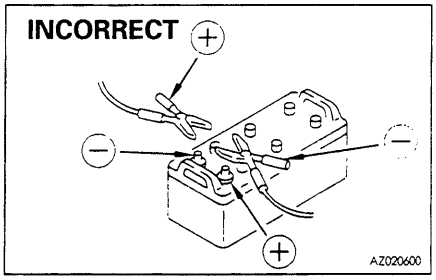
16.3.1 STARTING ENGINE WITH BOOSTER CABLE

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

PRECAUTIONS WHEN CONNECTING AND DISCONNECTING BOOSTER CABLE

⚠ WARNING

- **When 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.**

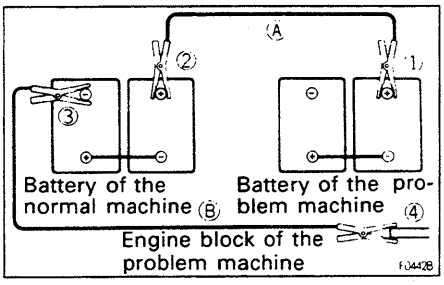


NOTICE

- **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.**

The batteries are on both sides at the rear of the machine. The battery used for the ground is on the right side of the machine.

CONNECTING THE BOOSTER CABLES



Keep the starting switch at the OFF position.

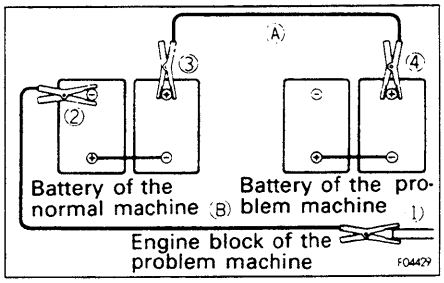
Connect the booster cable as follows, in the order of the numbers marked in the diagram.

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. Turn the starting switch of the problem machine to the START position and start the engine. If the engine doesn't start at first, wait for at least 2 minutes before trying again.

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

16.4.1 ELECTRICAL SYSTEM

- ( ): 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.

Problem	Main causes	Remedy
Lamp does not glow brightly even when engine runs at high speed	• Defective wiring	(• Check, repair loose terminals, disconnections) • Charge • Add distilled water • See EVERY 250 HOURS SERVICE.
Lamp flickers while engine is running	• Insufficient battery charge • Defective adjustment of belt tension	
Charge monitor lamp does not go out even when engine is running	• Defective alternator • Defective wiring	(• Replace) (• Check, repair)
Abnormal noise is generated from alternator	• Defective alternator	(• Replace)
Starting motor does not turn when starting switch is turned to ON	• Defective wiring • Defective starting switch • Insufficient battery charge • Defective battery switch	(• Check, repair) (• Replace switch) • Charge (• Replace switch)
Starting motor turns engine sluggishly	• Defective wiring • Insufficient battery charge	(• Check, repair) • Charge
Starting motor disengages before engine starts	• Defective wiring • Insufficient battery charge	(• Check, repair) • Charge

16.4.2 CHASSIS

- ( ): 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.

Problem	Main causes	Remedy
Torque converter oil temperature monitor lamp flashes	• Leakage of oil or entry of air due to damage or defective tightening of oil pipe, pipe joint • Wear, scuffing of gear pump • Insufficient oil in transmission case • Loose fan belt • Clogged oil cooler • Long distance traveled in torque converter range • Disconnected, broken wiring to sensor	(• Check, repair) (• Check, replace) • Add oil to specified level. See CHECK BEFORE STARTING. • Replace belt. See EVERY 500 HOURS SERVICE. (• Clean or replace) • Drive in direct range (• Repair, connect wiring)
Steering wheel is heavy	• Lack of grease at link • Internal leakage inside steering cylinder	• Add grease (• Replace cylinder seal)
Steering wheel pulls	• Tire inflation pressure not uniform on left and right • Dragging, pulling of front brake	• Make tire inflation pressure uniform. See CHECK BEFORE STARTING. • Check wear of front brake pad. For details, see EVERY 500 HOURS SERVICE.
Braking effect is poor when brake pedal is depressed	• Pad has reached wear limit • Rear disc has reached wear limit • Insufficient air pressure • Insufficient brake oil	(• Replace pad) (• Replace disc) • Charge to specified pressure • Add brake oil. See CHECK BEFORE STARTING.
Brake pulls to one side	• Air in brake circuit	• Bleed air. See WHEN REQUIRED.

Problem	Main causes	Remedy
Work equipment speed is slow	• Defective gear pump • Insufficient oil	(• Replace gear pump) • Add oil to specified level. See CHECK BEFORE STARTING.
Suspension is hard	• Entry of soil or sand due to breakage of dust seal, gas leakage due to breakage of U-packing • Gas leaking from valve core	(• Replace U-packing) (• Replace valve core)
Rear wheel on one side tends to slip	• Air in rear brake circuit (between slack adjuster and rear brake) • Excessive difference in wear between left and right tires • Excessive difference in division of load between left and right wheels (unbalanced load) • Excessive deformation of disc	• Bleed air from rear brakes (left, right). See WHEN REQUIRED. (• Replace tires) • Make load uniform (• Disassemble and adjust brake)

16.4.3 ENGINE

- ( ): 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.

Problem	Main causes	Remedy
Engine oil level monitor (opt) flashes	• Insufficient oil in oil pan	• Add oil to specified level. See CHECK BEFORE STARTING.
	• Oil leakage due to damage caused by defective tightening of oil pan, pipe joint	(• Check, repair)
	• Disconnection, broken wiring to sensor	(• Repair, connect wiring)
Steam spurts out from top of radiator (pressure valve)	• Insufficient coolant, water leakage	• Check, add cooling water. See CHECK BEFORE STARTING.
	• Loose fan belt	• Replace belt. See EVERY 500 HOURS SERVICE.
Radiator cooling water level monitor flashes	• Dirt or scale accumulated in cooling system	• Change coolant, clean inside of cooling system. See WHEN REQUIRED.
Water temperature gauge is in red range	• Radiator fins clogged or damaged	• Clean or repair. See EVERY 500 HOURS SERVICE.
	• Defective water temperature gauge	(• Replace water temperature gauge)
Engine water temperature monitor flashes	• Defective thermostat	(• Replace thermostat)
	• Defective thermostat seal	(• Replace thermostat seal)
	• Loose radiator filler cap (operations at high altitude)	• Tighten or replace cap.
	• Disconnection, broken wiring to sensor	(• Repair, connect wiring)
Water temperature gauge display stays at lowest level and does not rise	• Defective water temperature gauge monitor	(• Replace water temperature gauge monitor)
	• Defective thermostat	• Replace thermostat
	• In cold weather, cold wind is blowing strongly against engine	(• Install radiator curtain)
Engine does not start even when starting motor is cranked	• Insufficient fuel	• Add fuel. See CHECK BEFORE STARTING.
	• Air in fuel system	(• Repair place where air is leaking in)
	• No fuel in fuel filter	• Fill filter with fuel. See EVERY 500 HOURS SERVICE.
	• Starting motor cranks engine too slowly	See electrical components
	• Starting motor does not turn	
	• Defective valve clearance (defective compression)	(• Adjust valve clearance)

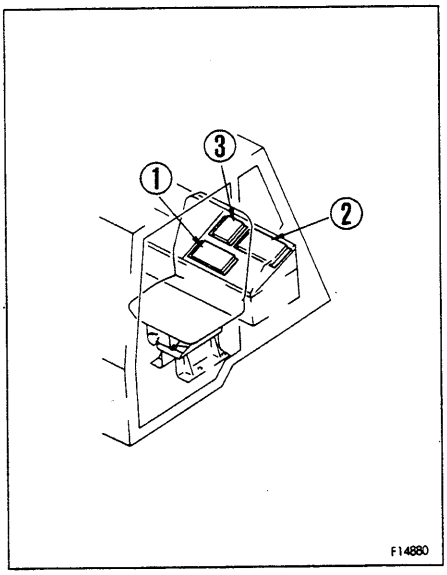
ENGINE (continued) (16.4.3)

Problem	Main causes	Remedy
Fuel stops from time to time	• Crushed fuel tank breather tube	(• Replace breather tube)
Excessive oil consumption Exhaust gas is white or bluish	• Oil leakage • Excessive oil in oil pan • Worn piston, ring, cylinder liner • Improper fuel • Defective turbocharger seal	(• Check, repair) • Add oil to specified level. See CHECK BEFORE STARTING. (• Replace) • Replace with specified fuel (• Check, replace)
Exhaust gas is black	• Clogged air cleaner element • Worn piston, ring, cylinder liner • Defective compression • Defective turbocharger	• Clean or replace. See WHEN REQUIRED. (• Check, repair) • See adjustment of clearance above (• Check, replace)
Engine hunts	• Air entering suction side of fuel line	(• Repair place where air is leaking in)
There is knocking (combustion or mechanical)	• Poor quality fuel being used • Overheating	• Replace with specified fuel • See "Water temperature gauge is in red range" above.

MECHATRONICS

If any abnormality occurs, stop the machine, apply the parking brake, then check the LED display on the controller and contact your Komatsu distributor for repairs.

① Engine controller (opt)
② Shift controller
③ Suspension controller



- Engine controller
  (If equipped with electrical governor)

When normal: Red ○ (OFF), green ● (ON)

No.	LED (Light Emitting Diode)				Abnormal system
	Red		Green		
1	○	OFF		○	Defective electrical system
2	●	ON	ON	●	Defective controller system
3	●		Slow flashing	◐	Defective rack sensor system
4	●	ON	Rapid flashing	$◐_F$	Defective governor solenoid system
5	●	ON	OFF	○	Defective governor cut relay system
6	◐	Slow flashing	Rapid flashing	$◐_F$	Defective rack sensor power source system (LVDT5V)
7	$◐_F$	Rapid flashing in turn		$◑_F$	Defective governor servo system
8	◐	Slow simultaneous flashing		◐	Defective engine speed sensor A system
9	◐	Slow flashing in turn		◑	Defective engine speed sensor B system
10	○	OFF	Rapid flashing	$◐_F$	Defective pre-stroke solenoid system
11	◐	Slow flashing	ON	●	Defective accelerator sensor system
12	$◐_F$	Rapid flashing		●	Defective model selection signal system

○: OFF, ●: ON, ◐ slow flashing (4 sec cycle), $◐_F$ rapid flashing (0.5 sec cycle)

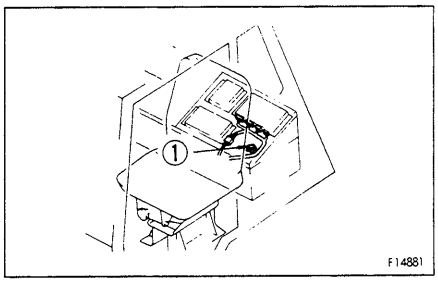
- **Shift controller**

If the central warning lamp flashes when the machine is traveling and the alarm buzzer sounds at the same time, keep calm and do as follows.

1. Use the brake to reduce speed and stop the machine in a safe place.

2. Open the cover at the rear of the operator's compartment and check the numerals on the self-diagnostic display at the top of the shift controller.

3. If necessary, move the shift lever to the N position, remove emergency escape connector ① (connector No. A-1, A- 2, black 1-pin connector) and insert it again, then operate the shift lever to move the machine without depressing the accelerator pedal.



If the shift lever is operated with the accelerator pedal depressed, the emergency escape function will not work. Furthermore, the emergency escape function may also not work for some failure modes.

When normal: 0.0 (normal temperature)
0.C (low temperature below 10°C)

Abnormal system	Display code
Defective controller power source system	b.b 0.1 0.2
Neutral safety	0.3
Defective controller system	b.b 0.4 0.5
Defective transmission cut relay system	0.6
Defective rear brake solenoid system	0.8
Defective exhaust brake solenoid system	0.9
Defective engine speed sensor system	1.0
Defective speed sensor system for transmission intermediate shaft	1.2
Defective speed sensor system for transmission output shaft	1.3
Defective speed sensor system or clutch slipping	2.□←2-8
Defective model selection signal system	1.4
Defective shift lever system	0.7 1.5 1.6
Defective accelerator sensor system	1.7
Defective oil temperature sensor system for transmission valve	1.9
Defective pressure control valve system	3.□←2-8 4.□←2-8
Defective flow control valve system	5.□←2-8
Defective pressure control solenoid system	7.□←1-8 9.□←1-8

Key: □ indicates that the display is a number from 1 to 8.
b: Blank,
1: Lockup clutch related,
2: H clutch related,
3: L clutch related,
4: 1st clutch related,
5: 2nd clutch related,
6: 3rd clutch related,
7: 4th clutch related,
8: R clutch related

- Suspension controller

When normal: Red ○ (OFF), green ● (ON)

No.	LED (Light Emitting Diode)				Abnormal system
	Red		Green		
1	○	OFF		○	Defective electrical system
2	◐	Slow simultaneous flashing		◐	Defective pressure sensor (left) system
3	$◐_F$	Rapid simultaneous flashing		$◐_F$	Defective pressure sensor (right) system
4	$◐_F$	Rapid flashing	OFF	○	Defective travel speed sensor system
5	◐	Slow flashing	ON	●	Defective steering sensor system
6	$◐_F$	Rapid flashing	Slow flashing	◐	Defective model selection signal system
7	●	ON	OFF	○	Defective solenoid 1 system
8	●		Slow flashing	◐	Defective solenoid 2 system
9	●		Rapid flashing	$◐_F$	Defective solenoid 3 system
10	●	ON		●	Defective controller

○: OFF
●: ON
◐: Slow flashing (4 sec cycle)
$◐_F$: Rapid flashing (0.5 sec cycle)

- Solenoids 1, 2, and 3 are distinguished by the solenoid connector number.
  Solenoid 1: CNSL1
  Solenoid 2: CNSL2
  Solenoid 3: CNSL3

- Payload meter (opt)

Order of priority	Display	Content	
1	– –8	Internal CPU stopped (CPU reset) (Controller power source, etc. is normal)	
2	E–31	Sensor power source (18V) abnormal	
	E–32	Relay short circuit	
	E–33	Drop in voltage of backup battery	
3	E–01	Rear right wheel	• Disconnection in pressure sensor signal line • Signal line in contact with chassis • Defect inside sensor
	E–02	Rear left wheel	
	E–03	Front right wheel	
	E–04	Front left wheel	
4	E–11	Rear right wheel	• Pressure sensor signal line in contact with power source line
	E–12	Rear left wheel	
	E–13	Front right wheel	
	E–14	Front left wheel	
5	E–41	Disconnection in clinometer signal line or contact with chassis	
	E–42	Clinometer signal line in contact with power source line	
6	PAPE	Printer READY signal not given (paper jam)	
7	FULL	Data in memory have reached 200 cycles (overflow)	
8	CAL	Calibration needed	
9	E–21	Rear right wheel	• Abnormality detected in sensor system when sensor check is carried out
	E–22	Rear left wheel	
	E–33	Front right wheel	
	E–24	Front left wheel	

Once an error has been displayed, it continues to be displayed until the CAL switch is pressed. If the controller detects one of the abnormalities in the above table, all the external display lamps light up.

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.

Set to the inspection and maintenance posture.
Always carry out operations with the machine in the following posture unless otherwise specified.

- Lower the work equipment to the ground and set in the posture shown in the diagram on the right.
- Set all control levers to the neutral or HOLD position.
- Set the safety lever to the LOCK position.
- Press the parking brake switch to apply the parking brake.
- Put blocks in front and behind the tires.
- Lock the front and rear frames with the safety bar.

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 Book 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.

Always use 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. In particular, keep grease fittings, breathers and oil level gauges clean and avoid foreign materials 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 and on filters:
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 prevent anyone from starting the engine during maintenance.

Obey precautions:
During the operation, always obey the precautions on the safety label attached 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 (3.28 ft) from the area to be welded.
- Avoid seals or bearings from being between the area to be welded and the position of the grounding point.
- Never weld any pipe or tube containing fuel or oil.

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.

Precautions when washing machine:
- Never spray steam or water directly at the radiator.
- Do not allow water to get on any electrical component.

Pre-and post-work checks:
Before starting work in mud, rain, snow or at the 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.
On jobsites where heavy-duty operations are common, reduce the maintenance intervals and carry out greasing more frequently.

Dusty worksites:
When working at dusty worksites, do as follows:
- Inspect the dust indicator to see whether the air cleaner is blocked up. 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 Differential case Final drive case	SAE 30 API classification CD
Front brake oil tank Hydraulic tank Front suspension Rear suspension	SAE 10W API classification CD
Fuel	ASTM D975 No. 2 (However, ASTM D975 No. 1 is used for the winter season (October to March)

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 flammable, so be extremely careful not to expose it to flame or fire.
- The proportion of anti-freeze to water differs according to the ambient temperature.
  For details of the mixing proportions, see "24.2.2 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

- 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 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 OUTLINE OF 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 those 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.
- The optional power source must never be connected to the fuse, starting switch, or battery relay.

19. WEAR PARTS LIST

Wear parts such as the filter element, air cleaner element, bolt on 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.
When ordering parts, please check the part number in the parts book.

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

Item	Part No.	Part Name	Q'ty	Replacement frequency
Engine oil filter	600-211-1230	Cartridge	1	EVERY 250 HOURS
Fuel filter	600-311-7131	Cartridge	1	EVERY 500 HOURS
Transmission oil filter (Valve side)	424-16-11140 (424-16-11130) (424-16-11630)	Element (O-ring) (O-ring)	1 (1) (2)	EVERY 500 HOURS
Transmission oil filter (Tank side)	195-60-16320 (07000-25175)	Element (O-ring)	2 (2)	
Hydraulic filter	195-60-16320 (07000-25175)	Element (O-ring)	1 (1)	Every 1000 HOURS
Corrosion resistor	600--411-1170	Cartridge	1	EVERY 1000 HOURS
Air cleaner	625-81-7032	Element Ass'y	2	–
	600-181-4300	Outer element Ass'y	2	
Payload meter paper (option)	7818-27-2910	Paper	1	–
Battery for Payload meter (Option)	7818-27-2860	Battery	1	–

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 86 104 122°F -30 -20 -10 0 10 20 30 40 50°C	CAPACITY Specified	CAPACITY Refill
Engine oil pan	Engine oil	SAE 30 SAE 10W SAE 15W-40 SAE 10W-30	42ℓ 11.1 US gal 9.2 UK gal	37ℓ 9.8 US gal 8.1 UK gal
Tsmission case		SAE 30 SAE 10W	195ℓ 51.5 US gal 42.9 UK gal	90ℓ 23.8 US gal 19.8 UK gal
Front brake oil tank			2ℓ 0.53 US gal 0.44 UK gal	-
Hydraulic tank			165ℓ 43.6 US gal 36.3 UK gal	129ℓ 34.1 US gal 28.4 UK gal
Front suspension		SAE 10W	13.8ℓ(each) 3.6 US gal(each) 3.0 UK gal(each)	-
Rear suspension			9.2ℓ(each) 2.4 US gal(each) 2.0 UK gal(each)	-
Differential case Final drive case		SAE 30	50ℓ 6 US gal 11 UK gal 17ℓ(each) 4.5 US gal(each) 3.7 UK gal(each)	45ℓ 11.9 US gal 9 UK gal 13ℓ(each) 3.4 US gal (each) 2.9 UK gal(each)
Fuel tank	Diesel fuel	ASTM D975 No.2 ※	500ℓ 132 US gal 110 UK gal	-
Cooling system	Water	Add antifreeze	126ℓ 33.3 US gal 27.7 UK gal	-

※ **ASTM D975 No. 1**

When operating the machine at temperatures below –20°C, other equipment is needed, so please consult your Komatsu distributor.

Note 1:
For axle oil, use only recommended oil as follows.
SHELL: DONAX TT or TD
CALTEX: RPM TRACTOR HYDRAULIC FLUID
CHEVRON: TRACTOR HYDRAULIC FLUID
TEXACO: TDH OIL
MOBIL: MOBILAND SUPER UNIVERSAL
It is possible to substitute engine oil CLASS-CD SAE30 for axle oil.
If noise comes from the brake, it is no problem of durability.

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 engin 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

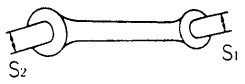
No.	Supplier	**Engine Oil [CD or CE]** SAE10W, 30, 40 10W30, 15W40 (The 15W40 oil marked * is CE.)	**Gear Oil [GL-4 or GL-5]** SAE80, 90, 140	**Grease [Lithium-Base]** NLGI No. 2	**Anti-freeze Coolant [Ethylene Glycol Base] Permanent Type**
1	KOMATSU	EO10-CD EO30-CD EO10-30CD EO15-40CD	GO90 GO140	G2-LI 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

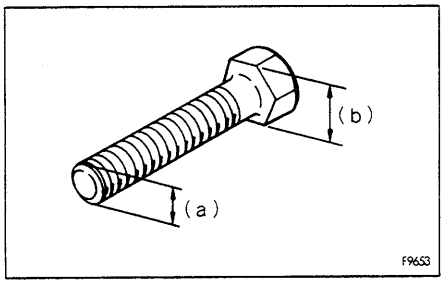
21. STANDARD TIGHTENING TORQUES FOR BOLTS AND NUTS

21.1 INTRODUCTION OF NECESSARY TOOLS

The following tools are provided with the machine.

No.	Name of tool	Part No.	Remarks
1	Wrench set	09000-30006	Applicable width across flats (S_1 – S_2) 8mm – 10mm, 12mm – 14mm 13mm – 17mm, 19mm – 22mm 24mm – 27mm, 30mm – 32mm 
2	Socket wrench	195-98-11590	
3	Wrench	09014-10200	
4	Filter wrench	09019-18040	
5	Socket wrench set	09020-10284	
6	Handle	09023-00380	
7	Screwdriver	09033-00190	Interchangeable flat-head and cross-head type
8	Pliers	09036-00150	
9	Hammer	09039-00150	
10	Thickness gauge	09054-00009	
11	Bar	09055-10390	
12	Tool bag	09056-05513	
13	Tire air pressure gauge	09289-10000	
14	Grease cartridge	07950-90403	(Lithium base grease, 400 g)
15	Nozzle	07951-11400	
16	Grease pump ass'y	07952-80002	
17	Hose	568-35-11210	
18	Disc gauge ass'y	567-98-41301	
19	Calliper disc gauge	566-98-41410	
20	Extension	566-98-11170	

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)	Ⓣ 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 safety critical parts.

SAFETY CRITICAL PARTS

No.	Safety critical parts for periodic replacement	Replacement interval	Remarks
1	Fuel hose (tank - injection pump)	Every 4000 hours or 2 years, whichever comes sooner	
2	Fuel hose (injection pump - filter)		
3	Fuel hose (injection pump - adapter)		
4	Fuel hose (adapter - tank)		
5	Spill hose (nozzle - tank)		
6	Spill hose (between nozzles)		
7	Fuel hose (cold starting end - intake manifold)		
8	Turbocharger lubrication hose		
9	Rubber hose for brake piping		Replace as assembly
10	High-pressure hose in steering oil pressure circuit (pump ← → demand valve ← → steering valve ← → steering cylinder)		
11	Hose at discharge side of retarder cooling pump		
12	Hose at discharge side of transmission pump		
13	Brake valve parts	Every 2000 hours or 1 year, whichever comes sooner	Replace as service kit
14	Parking brake valve parts		
15	Relay valve parts		
16	Air governor parts		
17	Retarder control valve parts		
18	Emergency relay valve parts		
19	Emergency brake valve parts		
20	Quick release parts		
21	Parking brake chamber parts		
22	Brake chamber parts (front and rear)		
23	Front caliper brake parts		
24	Slack adjuster parts		
25	Seat belt	Every 3 years	Replace

23. MAINTENANCE SCHEDULE CHART

23.1 MAINTENANCE SCHEDULE CHART

SERVICE ITEM	PAGE
INITIAL 250 HOURS SERVICE (only after the first 250 hours)	
Replace fuel filter cartridge	3-56
Replace transmission filter element (valve end, tank end)	3-58
Change oil in transmission case	3-64
Replace hydraulic filter element	3-65
Change oil in hydraulic tank	3-69
Change oil in final drive case	3-70
Change oil in differential case	3-70
WHEN REQUIRED	
Clean inside of cooling system	3-24
Check, clean and replace air cleaner	3-28
Check level of window washer fluid, add fluid	3-30
Clean air conditioner air filter	3-30
Check refrigerant (gas) level	3-31
Check dump body	3-31
Check electric intake air heater	3-31
Check length of suspension cylinder, check oil level	3-32
Bleed air from rear brake	3-32
Bleed air from front brake	3-33
Adjust parking brake	3-34
Adjust body positioner	3-35
CHECK BEFORE STARTING	
Check coolant level, add water	3-36
Check oil level in front brake oil tank, add oil	3-36
Check dust indicator	3-37

SERVICE ITEM	PAGE
CHECK BEFORE STARTING (continued)	
Drain water from air tank	3-37
Check oil level in engine oil pan, add oil	3-38
Check oil level in transmission case, add oil	3-39
Check oil level in hydraulic tank, add oil	3-39
Drain water, sediment from fuel tank	3-40
Check fuel level	3-40
Check wheel hub nuts, tighten	3-41
Check tire inflation pressure, check for damage	3-41
Check central warning lamp	3-42
Check machine monitor system	3-42
Check for normal actuation of foot brake	3-43
Check braking capacity of foot brake	3-43
Check for normal actuation of retarder brake	3-43
Check braking capacity of retarder brake	3-43
Check for normal actuation of parking brake	3-43
Check braking capacity of parking brake	3-43
Check for normal actuation of emergency brake	3-44
Check braking capacity of emergency brake	3-44
Check emergency steering	3-44
Check actuation of steering	3-45
Check flashing of lamps	3-45
Check sound of horn	3-45
Check movement of gauges during operation	3-45
Check exhaust color and sound	3-45
Check electrical wiring	3-45

SERVICE ITEM	PAGE
EVERY 4000 HOURS SERVICE	
Check water pump	3-73
Replace critical parts for periodical replacement for service kit	3-73
Check, adjust air compressor	3-73
Check fan pulley and tension pulley	3-73
Check vibration damper	3-73
EVERY 3 YEARS SERVICE	
Replace seat belt	3-73

24. SERVICE PROCEDURE

24.1 INITIAL 250 HOURS SERVICE

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

- **REPLACE FUEL FILTER CARTRIDGE**
- **REPLACE TRANSMISSION FILTER ELEMENT (VALVE END, TANK END)**
- **CHANGE OIL IN TRANSMISSION CASE**
- **REPLACE HYDRAULIC FILTER ELEMENT**
- **CHANGE OIL IN HYDRAULIC TANK**
- **CHANGE OIL IN FINAL DRIVE CASE**
- **CHANGE OIL IN DIFFERENTIAL CASE**

For details of the method of replacing or maintaining, see EVERY 500 HOURS, EVERY 1000 HOURS and EVERY 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.**
- **Since cleaning is performed while the engine is running, it is very dangerous to go under the machine as the machine may suddenly start moving. While the engine is running, never go under the machine.**
- **Never remove the radiator cap when the engine is at operating temperature. At operating temperature, the coolant is under pressure. Boiling water and steam spurting out 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 allow pressure to be relieved.**

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

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

Mixing rate of water and antifreeze

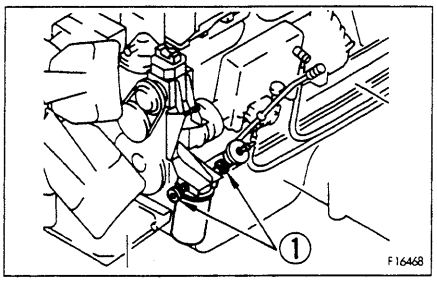
Min. atmospheric temperature	°C	−10	−15	−20	−25	−30
	°F	14	5	−4	−13	−22
Amount of antifreeze	ℓ	33	40	46	50	55
	US gal	8.71	10.56	12.14	13.2	14.52
	UK gal	7.3	8.8	10.1	11.0	12.1
Amount of water	ℓ	77	70	64	60	55
	US gal	20.33	18.48	16.9	15.84	14.52
	UK gal	14.7	13.2	11.9	11.0	9.9

⚠WARNING

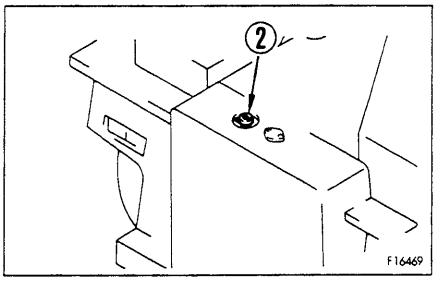
Antifreeze is flammable, so keep it away from any flame.

- Use city water for the cooling water.
  If river water, well water or other such water supply must be used, contact your Komatsu distributor.
- We recommend use of an antifreeze density gauge to control the mixing proportions.

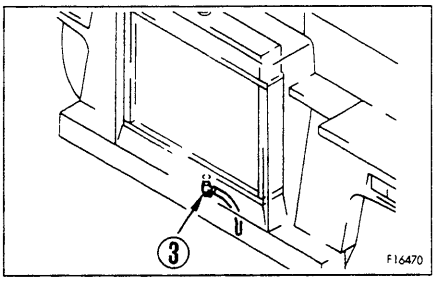
1. Stop the engine and tighten corrosion resistor valve ①.



2. Turn radiator cap ② slowly, and remove it.



3. Open drain valve ③ at the bottom of the radiator, drain plug ④ at the side of the oil cooler, and drain plug ⑤ of the air compressor, and drain the water.



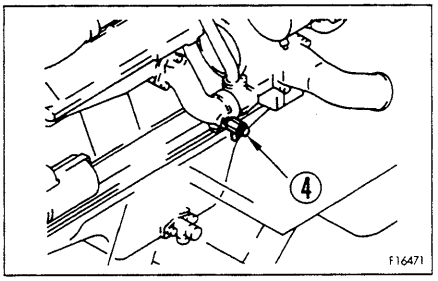
4. After draining the water, close drain valve ③ and drain plugs ④ and ⑤, and fill with city water.

5. When the radiator is full, open drain valve ③ and drain plug ④, start the engine, and run it at low idling.
   Keep the engine running 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 ③ and drain plug ④, then close them after all the water has drained out.

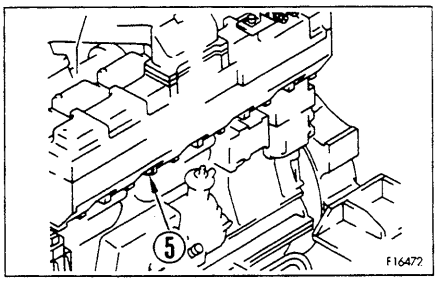
7. After draining the water, clean with a flushing agent.

   When flushing, follow the instructions given with the flushing agent.



8. After flushing, open drain valve ③ and drain plug ④, drain all the water out, then close drain valve ③ and drain plug ④ and add city water until the water level is near the opening of the water filler.

9. After filling with water, open drain valve ③ and drain plug ④, start the engine, and run the engine at low idling to flush the system until clean water comes out.
   When doing this, adjust the speed of filling and draining the water so that the radiator is always full.



10. When clean water comes out, stop the engine, then close drain valve ③ and drain plug ④.

11. Replace the corrosion resistor, and open valve ①.
    For details of the procedure for replacing the corrosion resistor, see 24.7 EVERY 1000 HOURS SERVICE.

12. Add city water until it overflows from water filler.

13. To remove the air contained in the coolant, run the engine at low idling for 5 minutes, then run for a further 5 minutes at high idling.
    (When doing this, leave the water filler cap OFF.)

14. Stop the engine, wait for approx. 3 minutes, then add city water until the water level is near the opening of the water filler, and tighten the cap.

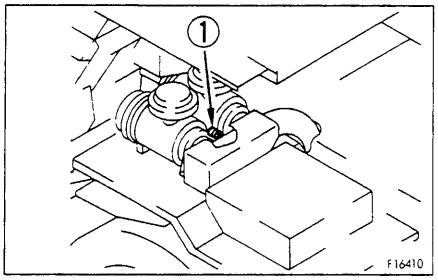
24.2.2 CHECK, CLEAN AND REPLACE AIR CLEANER

⚠WARNING

- **Never clean or replace the air cleaner with the engine running.**
- **When using compressed air to clean the element, there is danger that dust will fly and get into your eyes, so always wear safety glasses.**

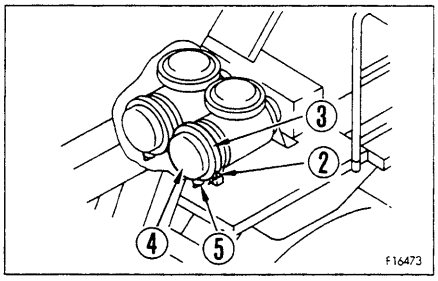
Checking

If dust indicator ① shows red, clean the air cleaner element.

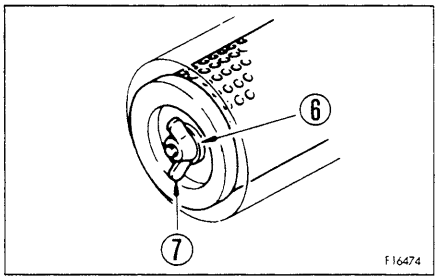


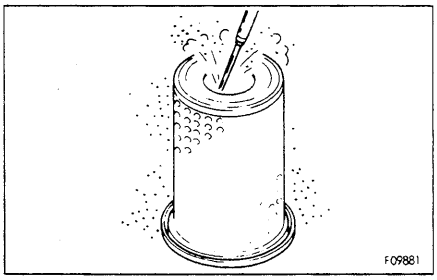
Cleaning or replacing outer element

1. Loosen bolt ②, remove band ③, then remove cover ④.
2. Remove the wing nut, then remove the outer element.
3. Clean the cover and inside the body.
4. Direct dry compressed air (less then 7 kg/cm²) along the folds of the element from the inside. Next, blow with air along the folds from the outside, then blow with air again from the inside.

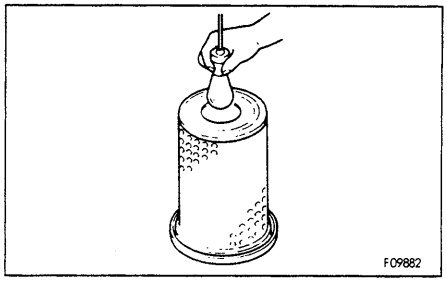


(1) Remove one seal every time the element is clean.
(2) Replace the outer element if it has been cleaned 6 times or if it has been used for one year. When replacing the outer element, replace the inner element at the same time.
(3) If the dust indicator shows red immediately after the outer element has been cleaned, replace both the inner and outer elements even if the outer element has not been cleaned 6 times.
(4) Check for looseness of the inner element mounting nut, and tighten it if necessary.
(5) If seal washer ⑥ is damaged or the thread of wing nut ⑦ is broken, replace with new parts.
(6) Remove evacuator valve ⑤ and clean it with compressed air. After cleaning, install it again.





5. After cleaning, put a light bulb inside the element, and if small holes or thinner parts are found, replace the element.



NOTICE

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

Do not use any element if the element folds or gasket or seal are damaged.

6. Install the cleaned element.

7. Press the button of dust indicator ① to return the red piston to its original position.

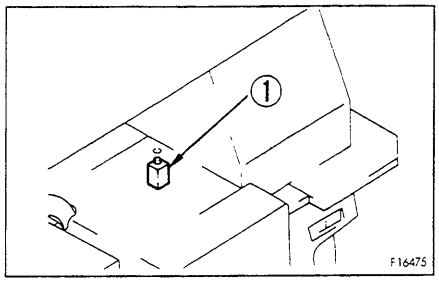
24.2.3 CHECK LEVEL OF WINDOW WASHER FLUID, ADD FLUID

Carry out this check if there is air in the window washer fluid.

Check the level of the fluid in window washer tank ①, and if it is low, fill with automobile window washer fluid.

Be careful not to let dirt or dust get in when adding fluid.

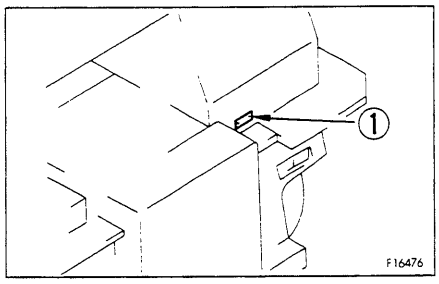
When operating at below freezing point, use fluid with anti-freeze.

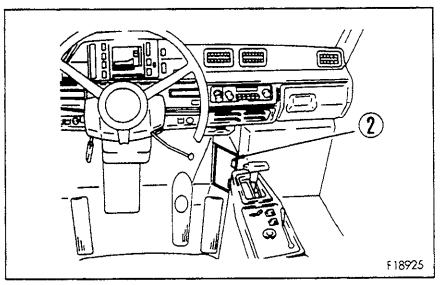


24.2.4 CLEAN AIR CONDITIONER AIR FILTER

If the air filter at the suction port of the air conditioner unit or the air filter at the fresh air intake port become clogged, the cooling or heating capacity will drop, so clean the filters once a week.

1. Remove cover ① at the front of the cab.
2. Pull out the air filter and clean it with compressed air.
3. Pull the magnet lock of cover ② on the right side of the accelerator pedal to open it.
4. Pull out the air filter (recirculated air filter) in the air conditioner unit suction port at the end of the duct, and blow off the dust with a weak flow of compressed air or with a soft brush.

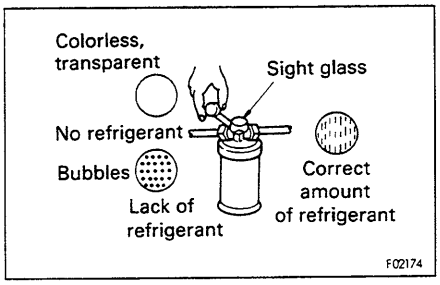




24.2.5 CHECK REFRIGERANT (GAS) LEVEL

⚠WARNING

If the cooler refrigerant liquid gets into eyes or on your hands it may cause loss if sight or frost bite, so never loosen any part of the refrigerant circuit.



If the cooling effect is poor, the level of the refrigerant (gas) is probably low.
Check the sight glass of the receiver dryer on the inside left of the radiator guard.

REMARK

Run the engine at idling and set the air conditioner to cooling. If bubbles can be seen in the sight glass, the refrigerant level is low, so contact your Komatsu distributor to have the system re filled.

24.2.6 CHECK DUMP BODY

Check that there are no cracks in the dump body.

1. Clean the dump body to make it easier to check.

2. Check all parts of the dump body for damage.
   If any cracks or abnormal wear are found, carry out repairs.
   Contact your Komatsu distributor for details of the repair procedure.

24.2.7 CHECK ELECTRIC INTAKE AIR HEATER

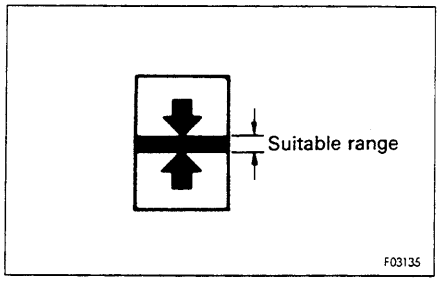
Please contact your Komatsu distributor to have the electrical intake air heater repaired and checked for disconnections or dirt once a year before the start of the cold season.

24.2.8 CHECK LENGTH OF SUSPENSION CYLINDER, CHECK OIL LEVEL

When traveling, if the unevenness of the road surface is transmitted directly to the chassis (the machine bounces or the cylinders retract and hit the stopper), carry out the following checks.

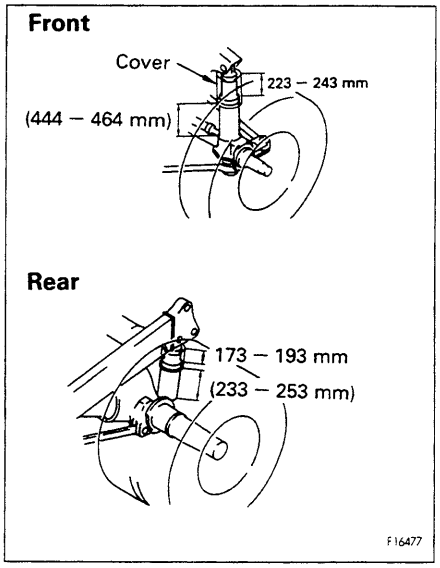
Check length of cylinder

Check that the bottom of the suspension cylinder cover is within the proper range on the label when the machine is unloaded and on flat ground.



At the same time, measure the distance from the shoulder at the head of the suspension cylinder rod to the top of the flange with the machine unloaded.

After checking the front and rear suspension cylinders, contact your Komatsu distributor if any abnormality is found.



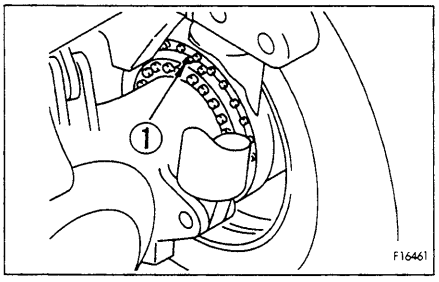
24.2.9 BLEED AIR FROM REAR BRAKE

⚠WARNING

Stop the machine on level ground and put blocks under the wheels before bleeding the air.

1. Pull the retarder brake lever, loosen air bleed plug ① to bleed the air from the circuit, then tighten plug ① and release the retarder brake lever.
2. Repeat this procedure until no more bubbles come out from air bleed plug ①. After completely bleeding the air, tighten plug ① securely.

To make it easier to bleed the air, warm the oil up to a temperature of at least 40°C before bleeding the air.



24.2.10 BLEED AIR FROM FRONT BRAKE

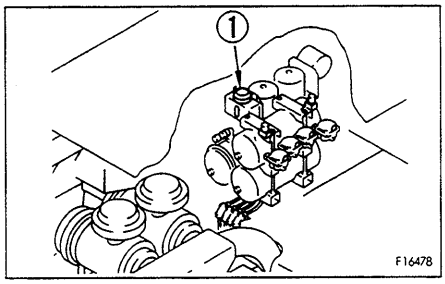
⚠WARNING

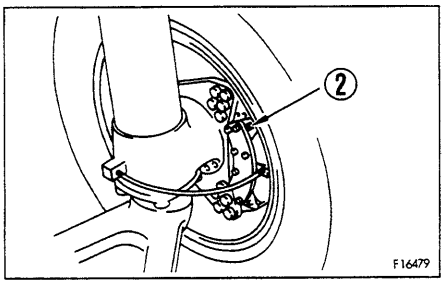
Stop the machine on level ground and put blocks under the wheels before bleeding the air.

1. Start the engine and raise the pressure to the maximum position in the green range on the air pressure gauge.

2. Fill oil reservoir ① with engine oil (CD class SAE10W).

3. Remove the cap of bleeder screw ②, insert a vinyl hose (inside diameter: 8 mm), then loosen the bleeder screw approx. 3/4 turns and depress the brake pedal slowly. After tightening the bleeder screw, release the brake pedal. Repeat this procedure until no more bubbles come out from the vinyl hose.





Do not keep the brake pedal depressed continuously. Depress it each time slowly to bleed the air.

After completely bleeding the air, tighten bleeder screw ② securely and fit the cap.

4. After completion of the air bleeding procedure, fill the oil reservoir to the specified level (MAX).

Repeat the same procedure on the left and right sides.
When bleeding the air from the front brakes and rear brakes at the same time, bleed the air from the rear brakes first.

24.2.11 ADJUST PARKING BRAKE

⚠WARNING

- **When adjusting, always put block under the tires to prevent the machine from moving.**
- **When carrying out the adjustment, raise the air pressure high enough to prevent the parking brake from being applied automatically, and hang a warning sign on the parking brake switch to prevent any other person from operating it.**
- **Never put any oil or grease on the surface of the pad or disc.**

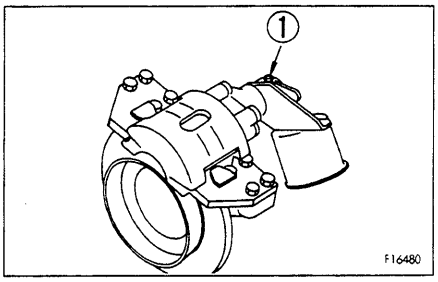
If the parking brake effect is poor, adjust as follows.

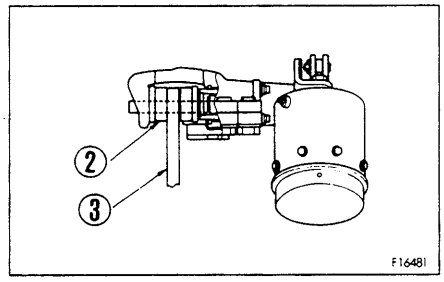
1. Check that the air pressure gauge is in the green range, then release the parking brake.
2. Turn bolt ① clockwise to bring pad ② into tight contact with disc ③.
3. Turn bolt ① back 2/3 turns (4 clicks) in the counterclockwise direction.

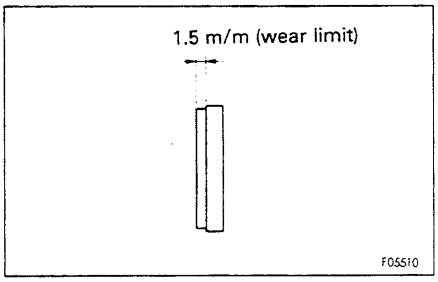
Measure the thickness of the pad, and if it is less than 1.5 mm (0.06 in), contact your Komatsu distributor to have it replaced.

When making the first adjustment after replacing the pad, turn bolt ①one turn (6 clicks) in the counterclockwise direction.

After adjusting, if the machine moves when the braking capacity of the parking brake is checked (see 24.3 CHECK BEFORE STARTING), contact your Komatsu distributor for inspection.







24.2.12 ADJUST BODY POSITIONER

With the positioner device, it is possible to automatically stop the dump body when it rises to the desired position (dump body turning angle) without any shock.

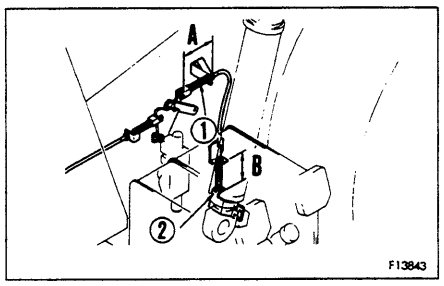
Adjusting

1. Set the dump lever to the HOLD position.

2. Adjust push cable ① to the standard length.
   Standard length A: 183 mm (7.2 in)

3. Raise the dump body until the hoist cylinder is 15 mm before the end of its stroke, and adjust plate ② so that the hoist valve lever is released from the detent.

   Reference dimension B: 136 mm (5.4 in)



24.3 CHECK BEFORE STARTING

Always carry out the checks in this section before starting the engine.

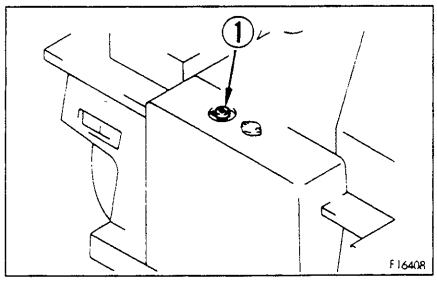
24.3.1 CHECK COOLANT LEVEL, ADD WATER

⚠ WARNING

Do not remove the cap while the radiator water is hot. Hot water may spurt out.
When removing the cap, press the cap knob to release the internal pressure before removing the cap.

⚠ CAUTION

Before starting operations each day, check that the cooling water level is between the FULL and LOW marks in the diagram.



1. Remove cap ① and check that the cooling water is between the FULL and LOW marks. Add water if the level is low.
2. Check that there is no oil in the water or any other abnormality.
3. After adding water, tighten the cap securely.
4. If more water is added than normal, check for water leakage.

24.3.2 CHECK OIL LEVEL IN FRONT BRAKE OIL TANK, ADD OIL

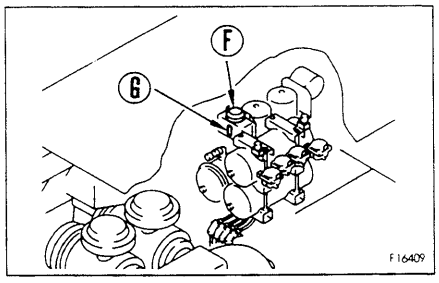
⚠ WARNING

When adding oil to the front brake oil tank, always use engine oil.

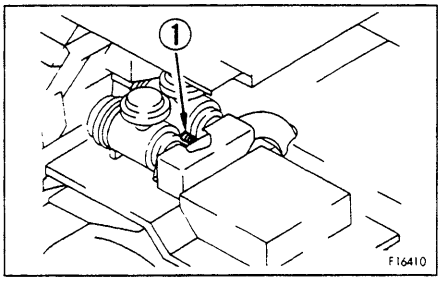
1. Check that the oil is between the FULL and LOW marks on sight gauge Ⓖ.

   If the oil level is low, 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.

2. After adding the oil, tighten the cap securely.
3. If the oil level goes down even when oil is added, check for leakage from the oil line.



24.3.3 CHECK DUST INDICATOR

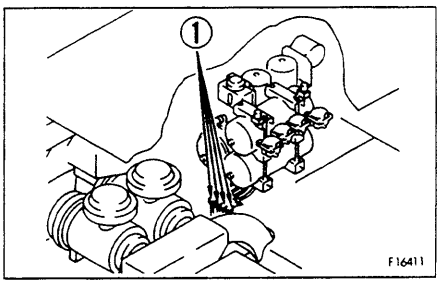


1. Check that the red piston has not appeared in the transparent portion of dust indicator ①.

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.

3. After checking, cleaning, or replacing, press dust indicator ① to return the red piston to its original position.

24.3.4 DRAIN WATER FROM AIR TANK



1. After starting the engine, pull ring ① of the tank drain valve to drain the water from the tank.

2. Carry out the same operation after completing work.

NOTICE

In cold areas, there is danger of the water freezing, so drain the water from the air tank after operations when it is still warm.

24.3.5 CHECK OIL LEVEL IN ENGINE OIL PAN, ADD OIL

1. Check the oil level with dipstick Ⓖ.

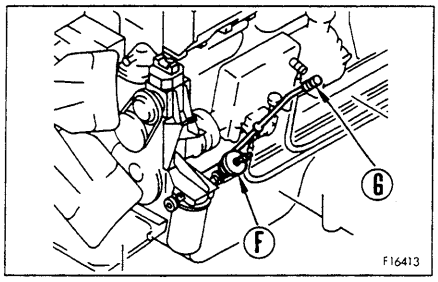
2. Remove dipstick Ⓖ, and wipe the oil off with a cloth.

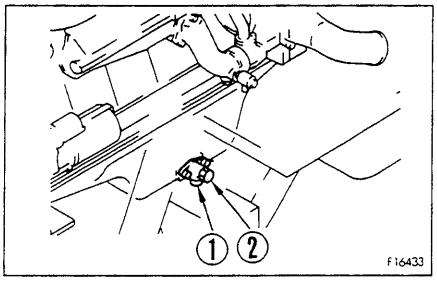
3. Insert dipstick Ⓖ fully in the oil filler pipe, then take it out again.

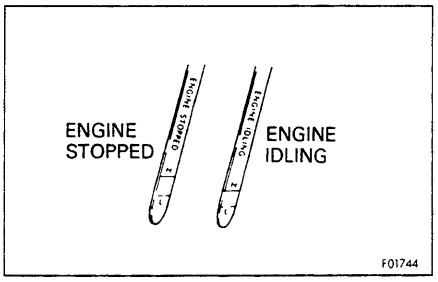
4. The oil level should be between the H and L marks on the ENGINE STOPPED side of dipstick Ⓖ.
   If the oil is below the L mark, add engine oil through oil filler Ⓕ.
   For details of the oil to use, see 20. USE OF FUEL, COOLANT, AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE.

5. If the oil is above the H mark, remove drain plug ①, and loosen drain valve ② to drain the excess engine oil, then check the engine oil level again.

6. If the oil level is correct, tighten the handle of the oil filler cap securely.



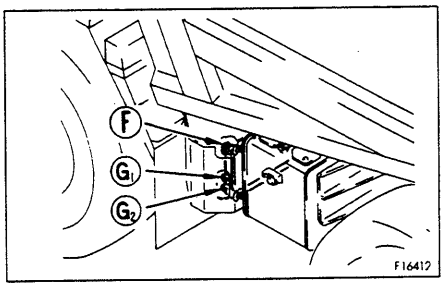




REMARKS

- When checking the oil level after the engine has been operated, wait for at least 15 minutes after stopping the engine.
- If the machine is at an angle, set it horizontal before checking the oil level.
- The dipstick has the oil level marked on both sides: ENGINE STOPPED for measuring when the engine is stopped, and ENGINE IDLING for measuring when the engine is idling.
- When checking the oil level, stop the engine and check with the ENGINE STOPPED side of the dipstick.
  It is also possible to check when the engine is idling, but the following procedure must be used.
  - Check that the engine water temperature is in the green range.
  - Use the ENGINE IDLING side of the dipstick.
  - Remove the oil filler cap.

24.3.6 CHECK OIL LEVEL IN TRANSMISSION CASE, ADD OIL



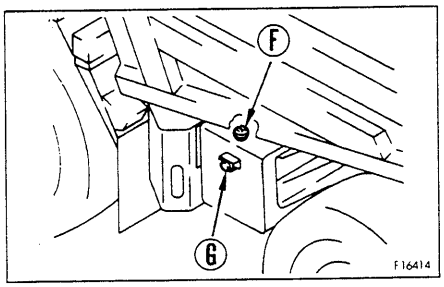
1. After starting the engine, run the engine at low idling and check the oil level with sight gauge Ⓖ2.

2. If the oil level is low, 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.

NOTICE

- **The oil level changes according to the oil temperature, so carry out the check after completing the warming-up operation.**
- **During operations, or when the engine is running at idling after operations, the oil level be above $Ⓖ_2$.**
- **When checking the oil level with the engine stopped, check with sight gauge $Ⓖ_1$ as a guide line, and make the final check with $Ⓖ_2$.**
- **When checking the oil level with the engine stopped, wait for 20 minutes after stopping the engine and check with sight gauge $Ⓖ_1$.**

24.3.7 CHECK OIL LEVEL IN HYDRAULIC TANK, ADD OIL



⚠ WARNING

When the oil filler cap is removed, oil may spurt out, so turn it slowly to release the internal pressure, then remove it carefully.

1. Check with sight gauge Ⓖ.

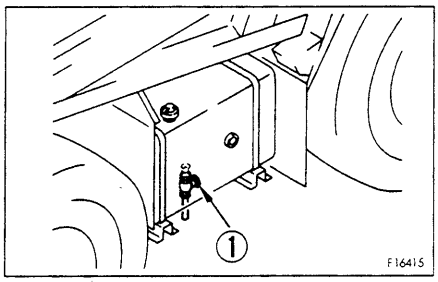
2. If the oil level is not up to the window of sight gauge Ⓖ, add engine oil through oil filler Ⓕ.

When checking the oil level, stop the machine on horizontal ground, lower the dump body, then stop the engine before checking.

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

24.3.8 DRAIN WATER, SEDIMENT FROM FUEL TANK

Loosen valve ① at the bottom of the fuel tank, and drain the water and sediment collected at the bottom of the tank together with the fuel.

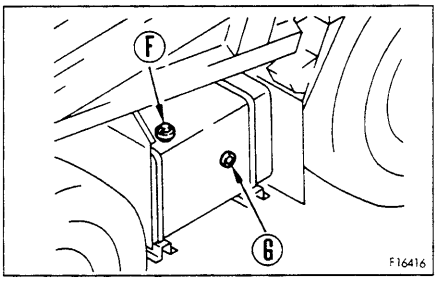


24.3.9 CHECK FUEL LEVEL

⚠ WARNING

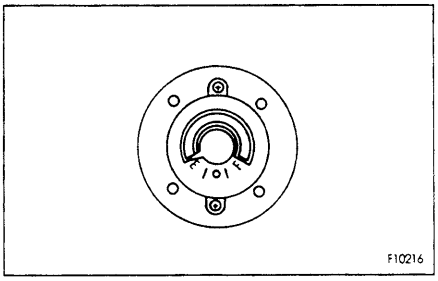
When adding fuel, do not let the fuel overflow. This may cause fire. If any oil spills, wipe it up completely.

1. Check the fuel level with fuel gauge Ⓖ installed to the fuel tank.



2. After completing operations, add fuel through fuel filler Ⓕ to fill the tank.

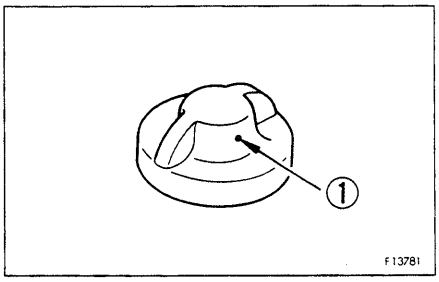
   Fuel tank capacity: 500 ℓ (132 US gal, 110 UK gal)
   For details of the fuel to use, see 20. USE OF FUEL, COOLANT, AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE.



3. After adding fuel, tighten the cap securely.

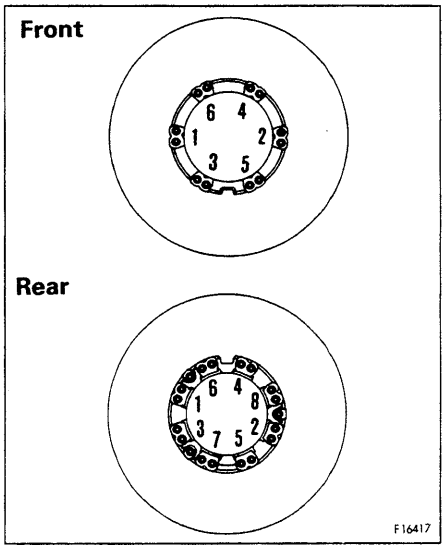
REMARK

If breather hole ① in the cap becomes clogged, the pressure inside the tank will go down and the fuel may not flow, so clean the breather hole from time to time.



24.3.10 CHECK WHEEL HUB NUTS, TIGHTEN

Check for loose hub nuts, and if any are loose, tighten 2 or 3 times to the specified torque in the order given in the diagram.



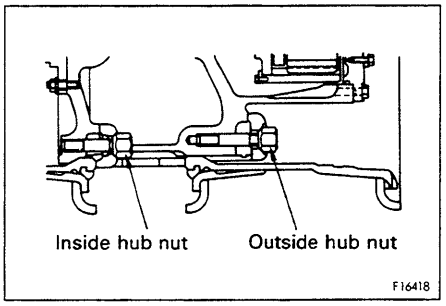
Tightening torque:

- 1206.2 ± 117.7 Nm (123 ± 12 kgm, 889.7 ± 86.8 lbft)
  (When thread and nut seat are not coated with grease)
- 926.7 ± 102.0 Nm (94.5 ± 10.5 kgm, 683.5 ± 75.9 lbft)
  (When thread and nut seat are coated with molybdenum disulphide grease)

Insert a socket wrench in a pipe, and apply a force of 123 kg at a point 1 m from the fulcrum to give a tightening torque of 123 kgm. If the hub nuts have been tightened again after replacing the tire, travel for 5 to 6 km, then tighten again to settle all the contacting parts.

In particular, there are more contacting parts on the rear wheels than on the front wheels, so it will take time for the parts to settle.

For this reason, repeat the tightening process for the first 50 hours after installation. However, on the rear wheels, there are hub nuts at 3 places on the inside, but these are for temporary assembly, so there is no need to tighten the inside hub nuts after the outside hub nuts are tightened.



24.3.11 CHECK TIRE INFLATION PRESSURE, CHECK FOR DAMAGE

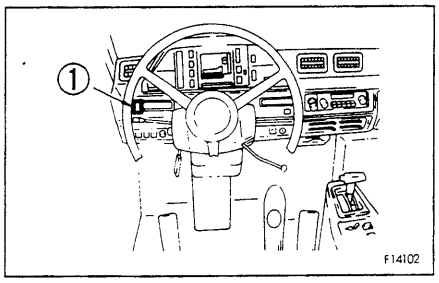
Check the tire inflation pressure before starting operations when the tires are cold.

At the same time as checking the tire inflation pressure, check carefully for any small scratches or other damage, and check also that there are no nails or pieces of metal embedded in the tire which may cause a puncture.

Standard tire inflation pressure (front and rear wheels)

- 18.00 – 33 – 32PR(STD) 563.9 kPa (5.75 kg/cm^2, 81.7 psi)
- 18.00 – 33 – 28PR(OP) 490.3 kPa (5.00 kg/cm^2, 81.7 psi)
- 18.00 – R33 – ★★(OP) 686.5 kPa (7.00 kg/cm^2, 99.4 psi)

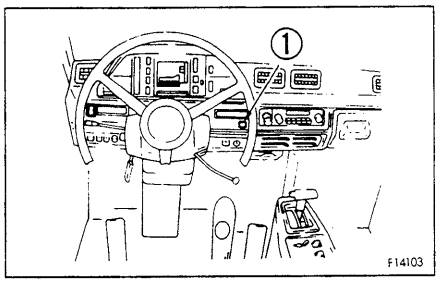
24.3.12 CHECK CENTRAL WARNING LAMP



Carry out the following checks to prevent failure by the warning system due to defective operation of the buzzer or blown lamp bulb in central warning lamp ①.

- Stop the engine, turn the starting switch to the ON position, set the parking brake valve lever to the PARKING position, move the shift lever to any position other than N, and check that the lamp flashes.
- If the air pressure is below the specified pressure, the lamp should flash and the buzzer should sound when the starting switch is turned ON.

24.3.13 CHECK MACHINE MONITOR SYSTEM



1. Before starting the engine, turn the starting switch to the ON position.

2. Check that all monitor lamps, gauges, and the central warning lamp light up for approx. 3 seconds and that the alarm buzzer sounds for approx. 2 seconds.

REMARK

- When this is done, the speedometer should display 88.
- When the starting switch is turned to the ON position, the central warning lamp will flash and the alarm buzzer will sound intermittently if the shift lever is not at the N position. When the shift lever is moved to the N position, the lamp will go out and the buzzer will stop.
- After the engine is stopped, the monitor cannot be checked until at least 30 seconds have passed.

3. When checking the monitor, check for blown bulbs in the the caution lamps and pilot lamps at the same time. Before starting the engine, turn the starting switch to the ON position, press bulb check switch ①, and check that no caution lamp or pilot lamp bulb is blown.

If the monitor lamp, caution lamp, or pilot lamp do not light up, there is probably a failure or disconnection, so please contact your Komatsu distributor for inspection.

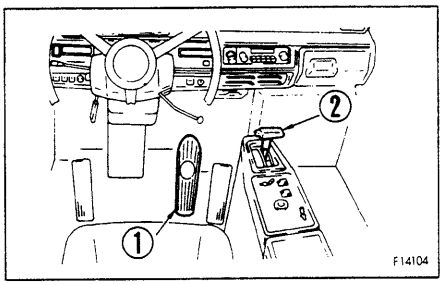
24.3.14 CHECK FOR NORMAL ACTUATION OF FOOT BRAKE

Check when starting operations, and if the braking effect is poor, check and adjust. For details, see CHECK WEAR OF FRONT BRAKE DISC.

24.3.15 CHECK BRAKING CAPACITY OF FOOT BRAKE

Check the braking capacity of the foot brake as follows.

1. Set the air pressure to the maximum with the machine on flat ground, and depress foot brake ①.
2. Set shift lever ② to the D position, gradually raise the engine speed, and check that the machine does not move even when the engine speed reaches 1550 rpm.



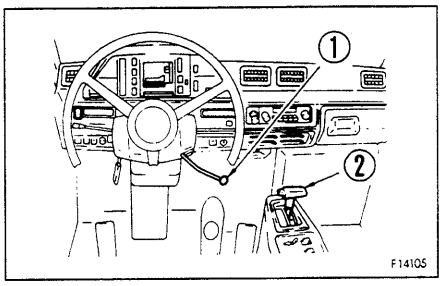
24.3.16 CHECK FOR NORMAL ACTUATION OF RETARDER BRAKE

Check when starting operations, and if the braking effect is poor, check and adjust. For details, see CHECK WEAR OF REAR BRAKE DISC.

24.3.17 CHECK BRAKING CAPACITY OF RETARDER BRAKE

Check the braking capacity of the retarder brake as follows.

1. Set the air pressure to the maximum with the machine on flat ground, and pull retarder lever ① fully.
2. Set shift lever ② to the D position, gradually raise the engine speed, and check that the machine does not move even when the engine speed reaches 1200 rpm.



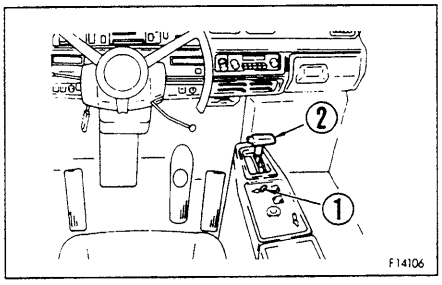
24.3.18 CHECK FOR NORMAL ACTUATION OF PARKING BRAKE

Check when starting operations, and if the braking effect is poor, adjust the parking brake. For details, see ADJUSTMENT OF PARKING BRAKE.

24.3.19 CHECK BRAKING CAPACITY OF PARKING BRAKE

Check the braking capacity of the parking brake as follows.

1. Set the air pressure to the maximum with the machine on flat ground, and set parking brake lever ① to the PARKING position.
2. Set shift lever ② to the D position, gradually raise the engine speed, and check that the machine does not move even when the engine speed reaches 1600 rpm.



24.3.20 CHECK FOR NORMAL ACTUATION OF EMERGENCY BRAKE

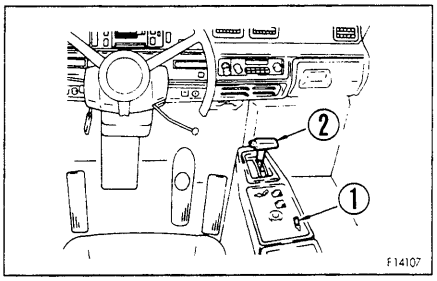
Check when starting operations.

24.3.21 CHECK BRAKING CAPACITY OF EMERGENCY BRAKE

Check the braking capacity of the emergency brake as follows.

1. Set the air pressure to the maximum with the machine on flat ground, and move emergency brake lever ① to the BRAKE position.

2. Set shift lever ② to the D position, gradually raise the engine speed, and check that the machine does not move even when the engine reaches full speed.



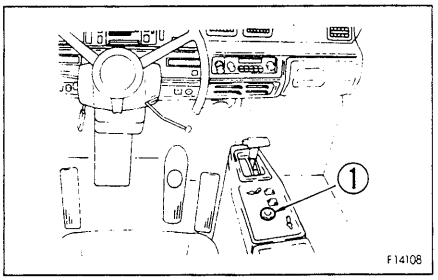
24.3.22 CHECK EMERGENCY STEERING

- **Checking manual emergency steering**

1. Turn the starting switch key to the ON position.

2. Turn emergency steering switch ① ON, and check that the steering wheel can be operated for 20 seconds.

   If the steering wheel cannot be operated, please contact your Komatsu distributor.



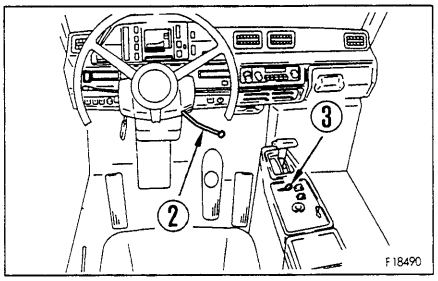
- **Checking auto emergency steering**

3. Turn the starting switch key to the START position and start the engine.

4. Check that the air pressure gauge is in the green range, then pull retarder lever ② fully and stop the engine.

5. Turn the starting switch key to the ON position.

6. Check that the emergency motor is actuated and the steering can be operated one second after parking brake lever ③ is set to the TRAVEL position.



24.3.23 CHECK ACTUATION OF STEERING

24.3.24 CHECK FLASHING OF LAMPS

24.3.25 CHECK SOUND OF HORN

24.3.26 CHECK MOVEMENT OF GAUGES DURING OPERATION

24.3.27 CHECK EXHAUST COLOR AND SOUND

24.3.28 CHECK ELECTRICAL WIRING

⚠ WARNING

If the fuse frequently blows or there are signs of short circuits in the electrical wiring, always locate the cause and repair it.

Check that there is no damage to the fuse and that there is no sign of any disconnection or short circuit in the electrical wiring. Check also for loose terminals, and tighten if necessary.

In particular, check the wiring of the following components.

- Battery
- Starting motor
- Alternator

Please contact your Komatsu distributor when looking for and repairing the cause.

⚠ WARNING

If dead leaves, twigs, dry grass, or other flammable materials accumulate around the battery it may cause a fire, so always remove such flammable materials.

When carrying out the walk-around check and check before starting, always check that there are no flammable materials accumulated around the battery, and remove any that are found.

24.4 EVERY 50 HOURS SERVICE

24.4.1 LUBRICATION

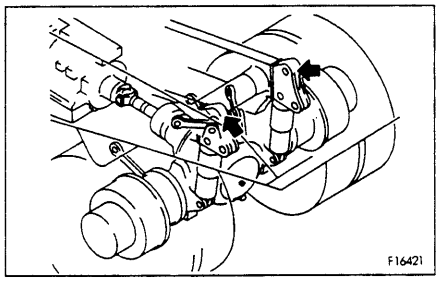
1. Stop the engine.

2. Use the grease pump to pump in grease through the grease fitting marked by the arrow.

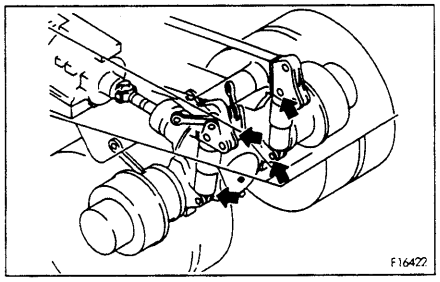
3. After greasing, wipe off all the old grease that is pushed out.

Carry out the greasing operation every day when operating in places where the grease flows out easily, such as when traveling through mud or water.

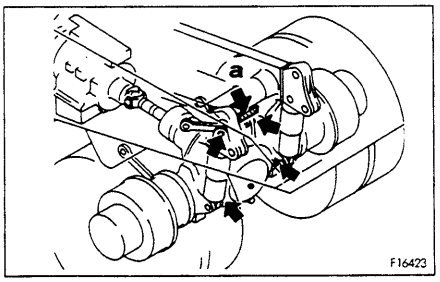
1. Dump body hinge pin (left and right: 1 point each)



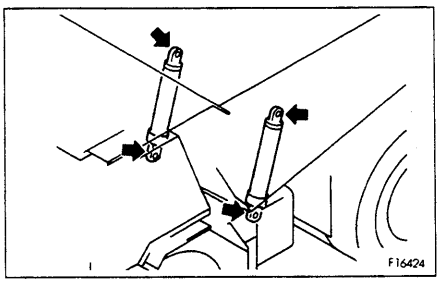
2. Rear suspension (left and right: 2 points each)



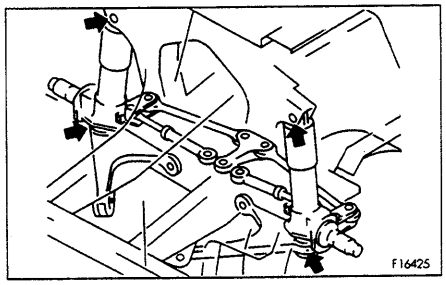
3. Rear axle support (left and right: 4 points each)
   Portion a is for centralized greasing (4 points)



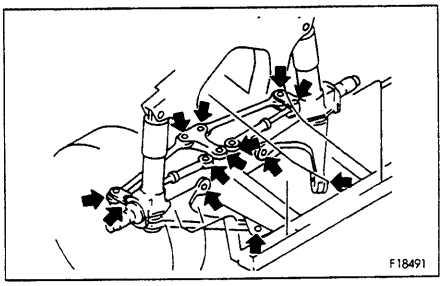
4. Hoist cylinder pin (left and right: 2 points each)



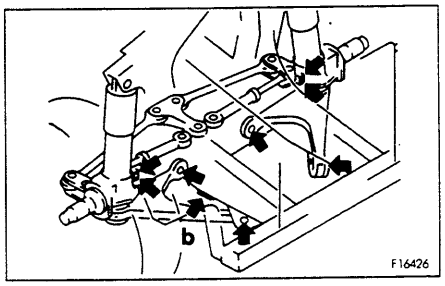
5. Front suspension (left and right: 2 points each)



6. Grease steering cage (13 points)



Portion b is for centralized greasing (5 points)



24.5 EVERY 250 HOURS SERVICE

Carry out maintenance for EVERY 50 HOURS SERVICE at the same time.

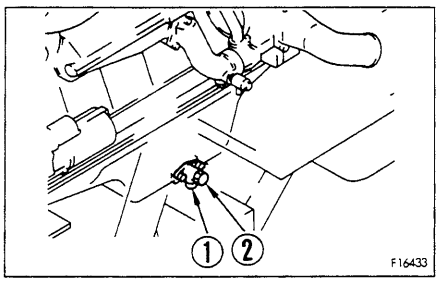
24.5.1 CHANGE OIL IN ENGINE OIL PAN, REPLACE ENGINE OIL FILTER CARTRIDGE

⚠WARNING

The oil is at high temperature after the engine has been operated, so never change the oil immediately after finishing operations. Wait for the oil to cool down before changing it.

Prepare the following.
- Container to catch drained oil: Min. 36 ℓ capacity
- Refill capacity: 37 ℓ (9.8 US gal, 8.1 UK gal)
- Filter wrench

1. Set a container to catch the oil immediately under the drain valve under the chassis



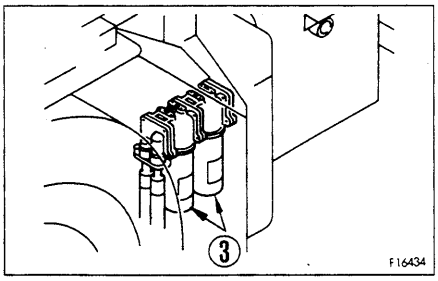
2. Remove drain plug ①, then loosen drain valve ② slowly to avoid getting oil on yourself, and drain the oil. Be careful not to loosen the drain valve too far and deform the stopper pin inside the valve.

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

4. Tighten drain valve ② and drain plug ①.

Tightening torque
Drain plug ①, drain plug ②: 68.6 ± 9.8 Nm (7 ± 1 kgm 50.6 ± 7.2 lbft)

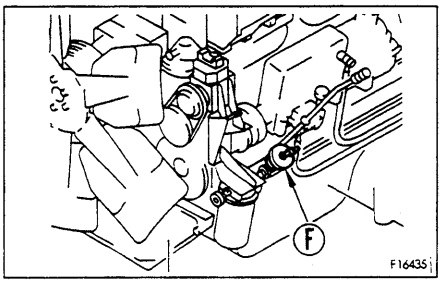
5. Using the filter wrench, turn filter cartridge ③ to the left to remove it.
When doing this, to prevent getting oil on yourself, do not carry out this operation from immediately under the cartridge.
In particular, if this operation is carried out immediately after stopping the engine, a large amount of oil will come out, so wait for 10 minutes before starting the operation.



6. Clean the filter holder, fill the new filter cartridge with engine oil, coat the packing face and thread with engine oil (or coat thinly with grease), then install the filter cartridge.

7. When installing the filter cartridge, tighten until the packing face is in contact with the filter holder, then tighten a further 3/4 – 1 turn.
8. Add engine oil through oil filler Ⓕ to fill to the specified level.

9. Run the engine for a short time at idling, then check the oil level. For details, see 24.3 CHECK BEFORE STARTING.



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

Replace once every 6 months, regardless of the number of hours operated.

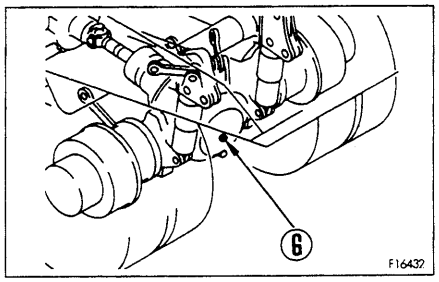
24.5.2 CHECK OIL LEVEL IN DIFFERENTIAL CASE, ADD OIL

⚠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 that the oil level is near the bottom of the plug hole.
2. If the oil level is low, add engine oil until the oil overflows from the plug hole.

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



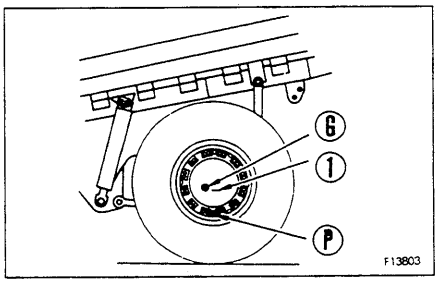
24.5.3 CHECK OIL LEVEL IN FINAL DRIVE CASE, ADD OIL

⚠WARNING

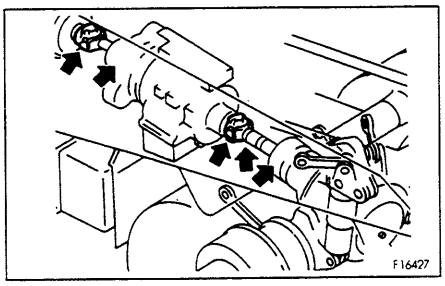
The oil is at high temperature immediately after the machine has been operated. Wait for the oil to cool down before starting the operation.

1. Stop the machine so that casting line ① is horizontal and drain plug Ⓟ is immediately at the bottom.
2. Remove plug Ⓖ and check that the oil level is near the bottom of the plug hole.
3. If the oil level is low, add engine oil until the oil overflows from the plug hole.

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



24.5.4 GREASE DRIVE SHAFT (5 POINTS)



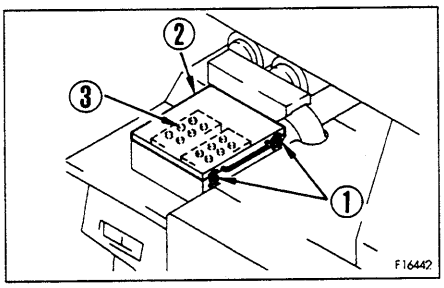
1. Using a grease pump, pump in grease through the grease fittings marked by the arrows.
2. Add grease to the spider portion until grease comes out from the cap seals (5 points).
3. After greasing, wipe off all the old grease that is pushed out.

   Carry out the greasing operation every day when operating in places where the grease flows out easily, such as when traveling through mud or water.

24.5.5 CHECK LEVEL OF BATTERY ELECTROLYTE

⚠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.**



Carry out this check before operating the machine.

1. Remove hook ①, then open inspection cover ②.
2. Remove cap ③ and check that the electrolyte is at the specified level (10 to 12 mm 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.

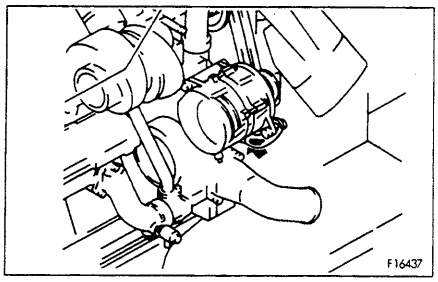
NOTICE

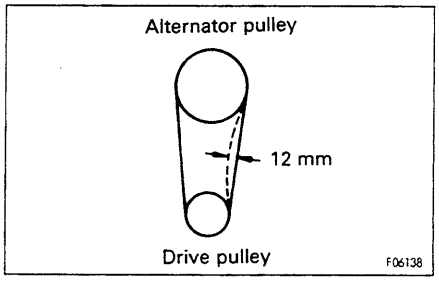
When adding distilled water in cold weather, add it before starting operations in the morning to prevent the electrolyte from freezing.

24.5.6 CHECK ALTERNATOR BELT, ADJUST

Checking

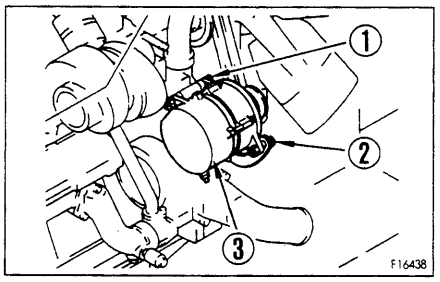
The belt should normally deflect by above 12 mm (0.5 in) when pressed with the thumb (with a force of approx. 6 kg (13.2 lb)) at a point midway between the drive pulley and alternator pulley.





Adjusting

1. Insert a bar between alternator ③ and the cylinder block to fix alternator ③ in position.
   When fixing alternator ③ in position, insert a wooden block between the bar and alternator ③ to prevent damage to the alternator.



2. Loosen bolts and nuts ① and ②.

3. Move alternator ③ with the bar so that the deflection of the belt is approx. 12 mm (0.5 in) (when pressed with a force of approx. 6 kg (13.2 lb)).

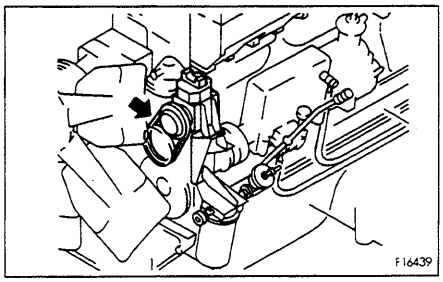
4. Tighten bolts and nuts ① and ② to fix alternator ③ in position.

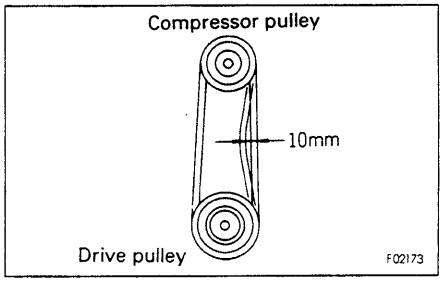
5. Check each pulley for damage, wear of the V-groove, and wear of the V-belt. In particular, be sure to check that the V-belt is not touching the bottom of the V-groove.

6. Replace the V-belt if it has stretched, leaving no allowance for adjustment, or if the belt is cut or cracked.

7. When the V-belt has been replaced, adjust it again after operating for one hour.

24.5.7 CHECK TENSION OF AIR CONDITIONER COMPRESSOR BELT, ADJUST

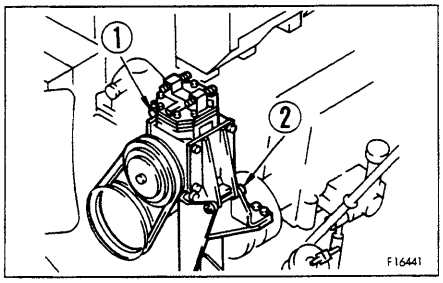




Checking

The belt should normally deflect by above 10 mm (0.39 in) when pressed with the thumb (with a force of approx. 6 kg (13.2 lb)) at a point midway between the air compressor pulley and drive pulley.

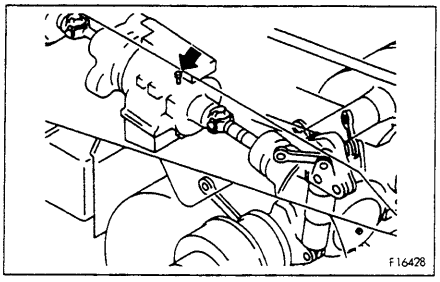
Adjusting



1. Insert a bar between compressor ① and the cylinder block to fix compressor ① in position.
   When fixing compressor ① in position, insert a wooden block between bar and compressor ① to prevent damage to the compressor.
2. Loosen bolts and nuts ②.
3. Move compressor ① with the bar so that the deflection of the belt is approx. 10 mm (0.39 in) (with a force of approx. 6 kg (13.2 lb)).
4. Tighten bolts and nuts ② to fix compressor ① in position.
5. 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.
6. Replace the V-belt if it has stretched, leaving no allowance for adjustment, or if the belt is cut or cracked.
7. If the V-belt has been replaced with a new part, there will be initial elongation, so adjust the belt again after operating for 2 to 3 days.

24.5.8 CLEAN BREATHERS

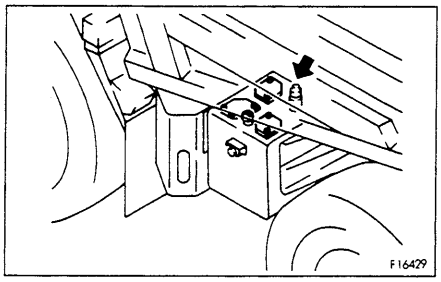
Remove the mud and dirt from around the breathers, then remove the breathers and wash out the dirt with clean diesel oil or flushing oil.

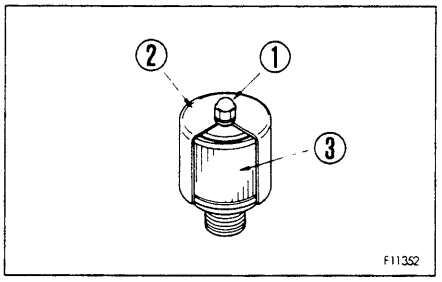


- Transmission case

- Hydraulic tank

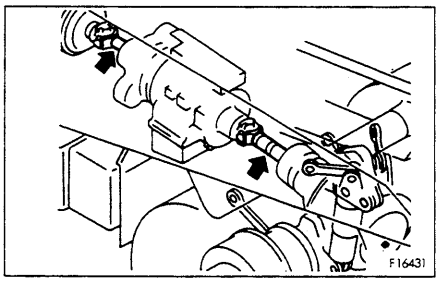
1. Remove nut ①, then remove cover ② and wash element ③.
2. Install element ③, then install cover ② and nut ①.





24.5.9 CHECK DRIVE SHAFT

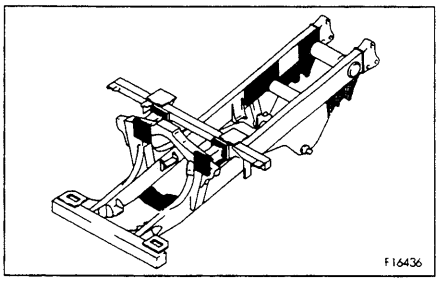
If there is any abnormality, such as looseness of the drive shaft connection, play in the spline or bearing portion, or runout of the shaft, please contact your Komatsu distributor for repair.



24.5.10 CHECK FRAME

1. Wash the frame to make it easier to check.

2. Check all parts of the frame for damage.
   In particular, check the colored portions in the diagram and if any cracks or damage are found, repair the damage. Please contact your Komatsu distributor for details of the repair procedure.

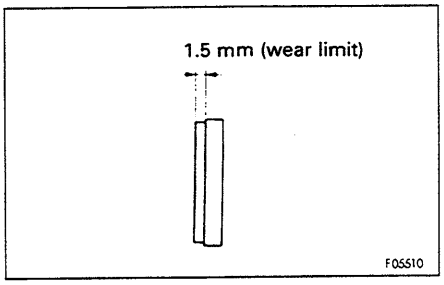


24.5.11 CHECK WEAR OF PARKING BRAKE PADS

⚠WARNING

Never put any oil or grease on the surface of the pad or disc.

Measure the thickness of the pad, and if it is less than 1.5 mm (0.06 in), contact your Komatsu distributor.



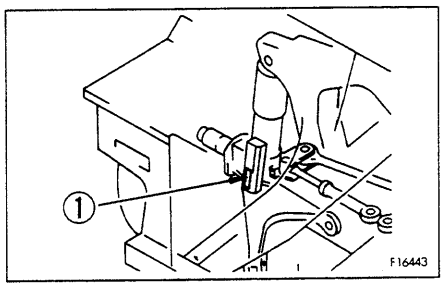
24.5.12 CHECK, CLEAN AUTOMATIC SUSPENSION

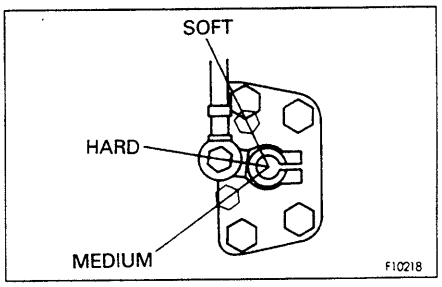
1. When bolts of inspection cover ① are loosened and the cover is moved to the side, the inspection hole can be seen.

2. Check the positions of the link. Check that it moves to the following positions:
   For normal travel when empty: soft;
   When the brake is depressed: medium
   When the dump lever is at any position other than FLOAT: hard.

If any abnormality is found, please contact your Komatsu distributor for inspection and adjustment.

If operations are carried out on muddy or wet ground, mud will stick to the link, and the movement may become slow, so check and clean.





24.6 EVERY 500 HOURS SERVICE

Carry out maintenance for EVERY 50 HOURS and EVERY 250 HOURS SERVICE at the same time.

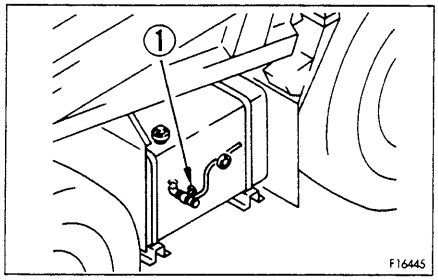
24.6.1 REPLACE FUEL FILTER CARTRIDGE

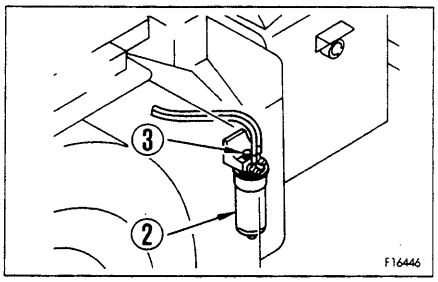
⚠WARNING

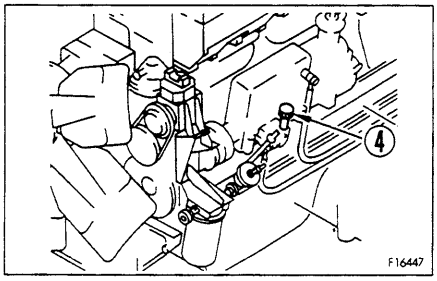
- **The oil is at high temperature after the engine has been operated, so never change the oil immediately after finishing operations. Wait for the oil to cool down before changing it.**
- **Do not bring fire or sparks near the fuel.**

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

1. Close supply valve ① of the fuel tank.
2. Set the container to catch the fuel under the filter cartridge.
3. Using a filter wrench, turn filter cartridge ② to the left and remove it.
4. Clean the filter head, fill a new filter cartridge with clean fuel, coat the packing surface thinly 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 a further 1/2 to 3/4 turns.
   If the filter cartridge is tightened too far, the packing will be damaged and this will lead to leakage of fuel. If the filter is too loose, fuel will also leak from the packing, so always tighten the correct amount.
6. After replacing filter cartridge ②, loosen air bleed plug ③, and open supply valve ①.
7. Loosen the knob of feed pump ④, and move it up and down to make the fuel overflow until no more bubbles come out from air bleed plug ③.







8. Tighten air bleed plug ③, then push in knob ④ of the feed pump, 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. If there is still leakage of fuel, follow Step 2 and 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.

24.6.2 REPLACE TRANSMISSION FILTER ELEMENT

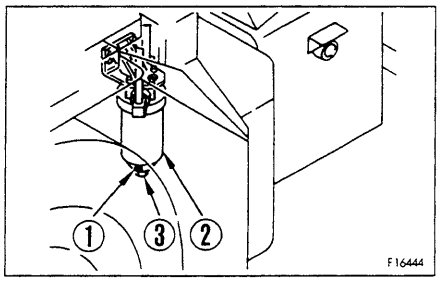
- **Prepare a container to catch the oil.**

Valve end

1. Set the container to catch the oil under the filter case.

2. Remove drain plug ① at the bottom of the filter case, drain the oil, then tighten the plug again.

3. Hold down case ②, loosen center bolt ③, then remove case ②.



4. Remove the element and clean the inside of the case.

5. Replace the filter gasket and O-ring with new parts. Coat the gasket and O-ring thinly with clean engine oil before installing.

6. Assemble the new element to the case, set the case in position, and install with center bolt ③.
   Be careful not to tighten center bolt ③ too far.

   Tightening torque: 152 ± 14.7 Nm (15.5 ± 1.5 kgm, 112.1 ± 10.8 lbft)

7. Run the engine for a short time at idling, then stop the engine, and check that the oil is up to the specified level. For details, see 24.3 CHECK BEFORE STARTING.

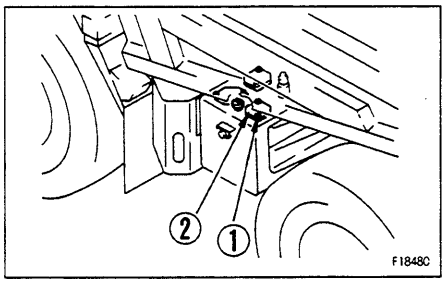
Run the engine at high idling, and when the oil is warmed up, if the transmission filter (valve end) clogging monitor lamp flashes, replace the element immediately.

Tank end

1. Remove bolt ①, then remove cover ②.

2. Take out the element, then clean the inside of the case and removed parts.

3. Install the new element, then install cover ② with bolt ①.



Run the engine at high idling, and when the oil is warmed up, if the transmission filter (tank end) clogging monitor lamp on the maintenance monitor (opt) flashes, replace the element immediately.

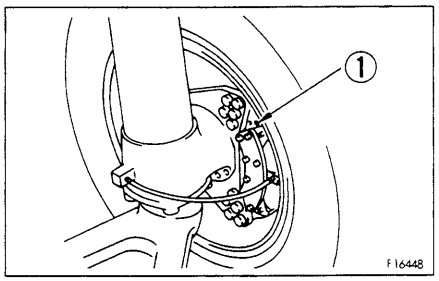
24.6.3 CHECK WEAR OF FRONT DISC BRAKE PADS

⚠WARNING

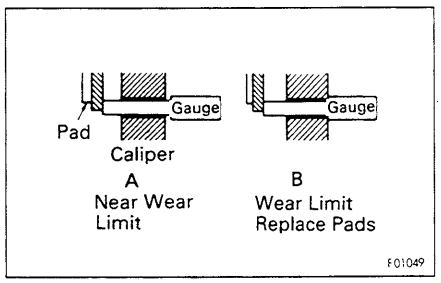
- **If the brakes are used after the wear limit is reached, there will be damaged to the discs, and there is also danger that the brakes will not work. For this reason, when the brake pads are near the wear limit, check more frequently, and replace the pads at the proper time.**
- **When working on sandy jobsites or jobsites where the foot brake is frequently used, check every 250 hours.**

1. Insert an inspection gauge through wear inspection hole ① of the calipers, and check the wear.

2. If the stepped portion of the gauge contacts the caliper, the wear limit (remaining pad thickness: 3 mm (0.12 in)) has been reached, so replace the pads.



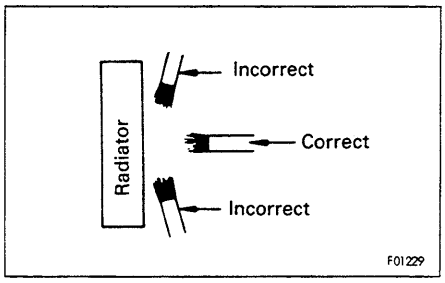
If the result of the inspection shows that the pad must be replaced, please contact your Komatsu distributor.



The wear of the pads is not always necessarily the same for the left and right wheels, so carry out the inspection for both the left and right sides. If one of the pads has reached the wear limit, always replace all eight pads at the same time.

When working on muddy or wet ground, if mud sticks to the calipers or discs, and the brakes are left in this condition, the wear of the pad will advance, so always wash the area well with water after operations.

24.6.4 CLEAN, CHECK RADIATOR FINS



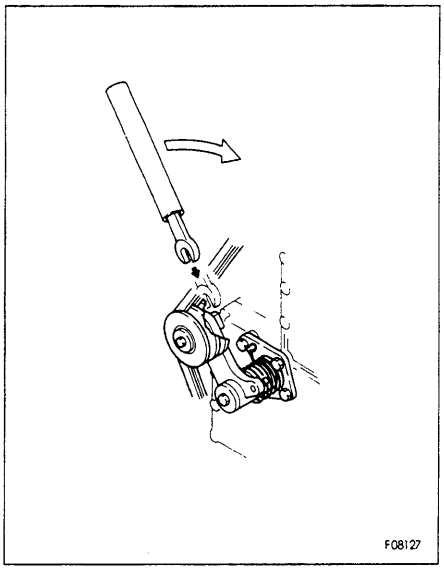
If the radiator fins become clogged or bent, this may cause overheating of the engine, so always clean or carry out inspection and take the necessary actions.

- Cleaning can be carried out by using jets of air, steam, or water, but be careful not to let the nozzle contact the fin.

  Air pressure: Max. 98 Nm (10 kg/cm^2, 72 lbft)
  Steam pressure: Max. 39 Nm (4 kg/cm^2, 29 lbft)

- When using compressed air or steam, keep the nozzle at a right angle to the radiator.
- Examine the rubber hose, and if any cracks or brittle places are found, replace the hose. In addition, check also for loose hose clamps.

24.6.5 CHECK FAN BELT



Inspect the V-belt and if it is in the following condition, replace the V-belt.

- The V-belt is in contact with the bottom of the groove of each pulley
- The V-belt is worn and has sunk below the outside diameter of the pulley
- The V-belt is cracked or peeling

Replacing

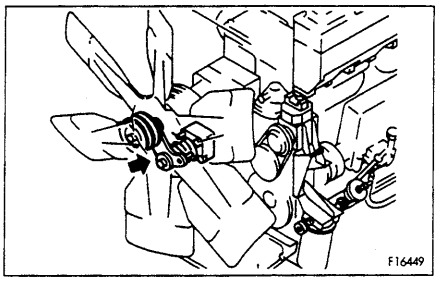
When replacing the V-belt, do as follows.

Fit a wrench to the tension pulley, push in the direction of the arrow until the V-belt comes off, then replace the V- belt.

Replace the V-belts as a set.

The machine is equipped with an auto-tensioner, so there is no need to carry out any adjustment until the belt is replaced.

24.6.6 GREASE TENSION PULLEY (1 POINT)



1. Using a grease pump, pump in grease through the grease fitting marked by the arrow until the grease is pushed out from the seal portion.

2. After greasing, wipe off all the old grease that is pushed out.

24.7 EVERY 1000 HOURS SERVICE

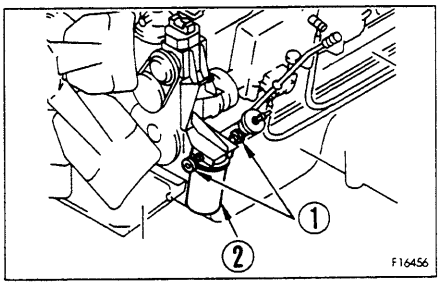
Carry out maintenance for EVERY 50 HOURS, EVERY 250 HOURS, and EVERY 500 HOURS SERVICE at the same time.

24.7.1 REPLACE CORROSION RESISTOR CARTRIDGE

⚠WARNING

The oil is at high temperature after the engine has been operated, so never replace the cartridge immediately after finishing operations.
Wait for the oil to cool down before replacing the cartridge.

- Prepare a filter wrench and a container to catch the water.



1. Screw in valve ① at the top of the corrosion resistor.
2. Set the container to catch the water under the cartridge.
3. Using a filter wrench, remove cartridge ②.
4. Clean the filter holder, coat the seal surface of the new cartridge thinly with engine oil, then install the cartridge.
5. When installing, tighten until the gasket contacts the seal surface of the filter holder, then tighten a further 2/3 turns.
   If the filter cartridge is tightened too far, the gasket will be damaged and this will lead to leakage of water. If the filter is too loose, water will also leak from the gap at the gasket, so always tighten the correct amount.
6. Open valve ①.
7. After replacing the cartridge, start the engine and check that there is no leakage of water from the filter seal surface. If there is any leakage of water, check the tightening of the filter cartridge.

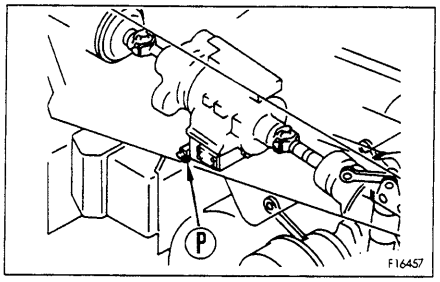
24.7.2 CHANGE OIL IN TRANSMISSION CASE, CLEAN TRANSMISSION CASE STRAINER

⚠WARNING

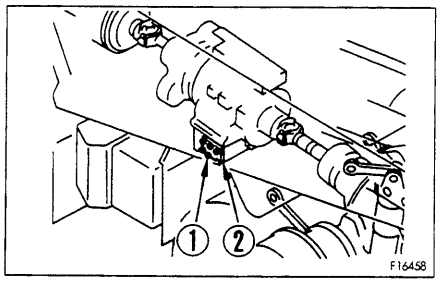
The oil is at high temperature after the engine has been operated, so never change the oil immediately after finishing operations.
Wait for the oil to cool down before starting the operation.

- Container to catch drained oil: Min. 90 ℓ capacity
- Refill capacity: 90 ℓ (23.8 US gal, 19.8 UK gal)

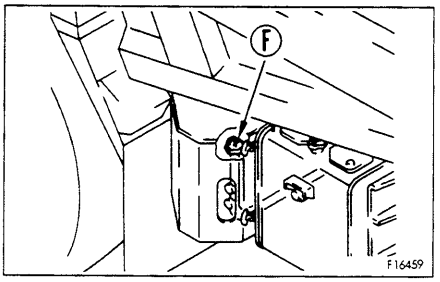
1. Set the container to catch the oil directly under the drain plug. Remove drain plug Ⓟ, drain the oil, then tighten the plug again.



2. Remove bolt ①, then remove cover ② and take out the strainer.
3. Remove any dirt stuck to the strainer, then wash in clean diesel oil or flushing oil. If the strainer is damaged, replace it.



4. After installing the strainer, add engine oil through oil filler Ⓕ to the specified level.



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

5. After adding oil, check that the oil is at the specified level. See 24.3 CHECK BEFORE STARTING.

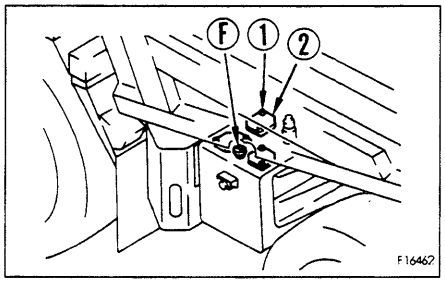
Change the oil every 1000 hours or 10000 km of travel, whichever comes sooner.

24.7.3 REPLACE HYDRAULIC FILTER ELEMENT

⚠WARNING

When removing the oil filler cap, turn it slowly to release the internal pressure before removing it.

1. Turn the cap of oil filler Ⓕ slowly to release the internal pressure, then remove the cap.
2. Remove bolt ①, then remove cover②.
3. Take out the element, then wash the inside of the case and the removed parts.
4. Install the new element, then install cover ② with bolt ①.



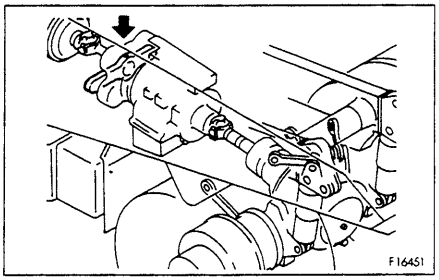
Run the engine at high idling, and when the oil is warmed up, if the hydraulic filter clogging monitor lamp flashes, replace the element immediately.

24.7.4 LUBRICATION

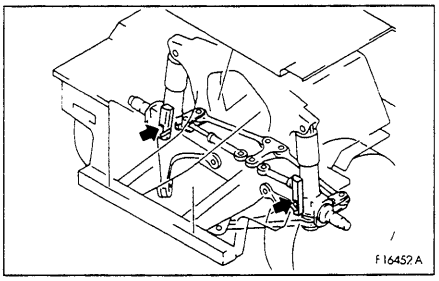
1. Using a grease pump, pump in grease through grease fittings marked by arrows.

2. After greasing, wipe off all the old grease that is pushed out.

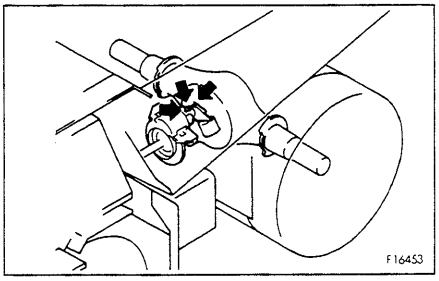
1. Transmission mount (1 point)



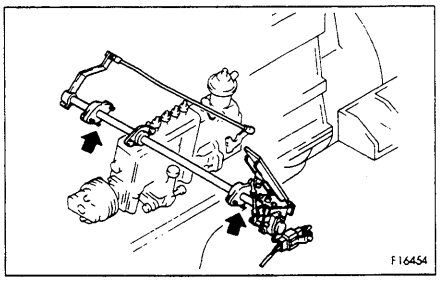
2. Automatic suspension link (left and right: 1 point each)



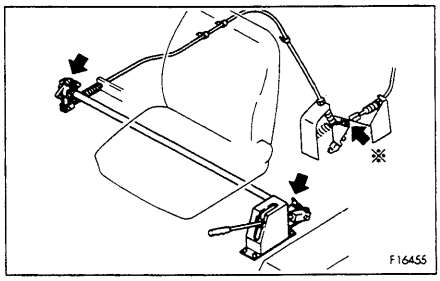
3. Parking brake linkage (3 points)



4. Accent control link (2 points)



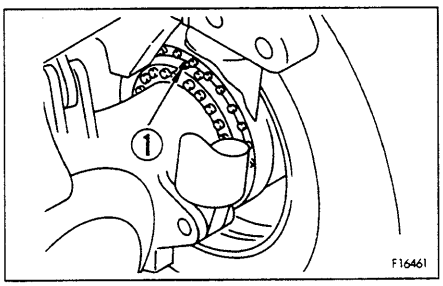
5. Dump control link (3 points)



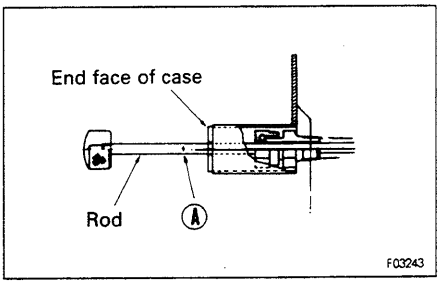
24.7.5 CHECK WEAR OF REAR BRAKE DISCS

⚠WARNING

- **Carry out this check when the brake oil temperature is below 60°C.**
- **If the retarder lever is pulled suddenly, the rod will shoot out strongly, and this is extremely dangerous. Hold the rod firmly with your hand, and slowly pull the retarder lever over a period of 10 seconds.**
- **If the disc wear approaches the wear limit, check the condition frequently, regardless of the maintenance interval. In addition, check the retarder capacity carefully.**



1. Set the parking lever to the PARKING position, and make sure that the other brakes are not applied before starting the inspection.
2. Remove air bleed plug ① from the rear brake, and install the gauge for measuring the disc wear.
3. Turn the starting switch to the ON position and check that the air pressure gauge is in the green range.
4. If the air pressure is low, start the engine and run the engine at 2000 rpm until the air pressure gauge enters the green range. When it enters the green range, turn the starting switch OFF.
5. Pull the retarder control lever, and in this condition, push in the gauge rod until it contacts the piston.
   When the retarder control lever is pulled, the rod may fly out under hydraulic pressure, so hold it with your hand.
6. If mark Ⓐ on the wear gauge goes in beyond the end face of the case, this means that the disc has reached the wear limit.
   If this happens, please contact your Komatsu distributor for inspection and maintenance.
7. Install air bleed plug ①.
8. Bleed all the air from the circuit. For details, see BLEED AIR FROM REAR BRAKE.



24.7.6 CHECK TIGHTENING OF TURBOCHARGER

Please contact your Komatsu distributor to have the tightening portions checked.

24.8 EVERY 2000 HOURS SERVICE

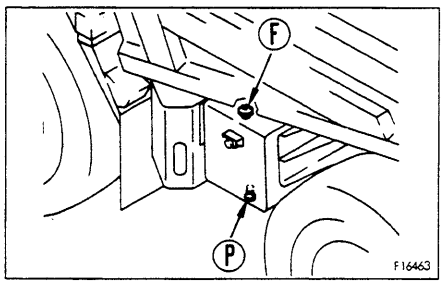
Carry out maintenance for EVERY 50 HOURS, EVERY 250 HOURS, EVERY 500 HOURS, and EVERY 1000 HOURS SERVICE at the same time.

24.8.1 CHANGE OIL IN HYDRAULIC TANK

⚠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 starting the operation.
When removing the oil filler cap, turn it slowly to release

- Container to catch drained oil: Min. 129 ℓ capacity
- Refill capacity: 129 ℓ (34.1 US gal, 28.4 UK gal)



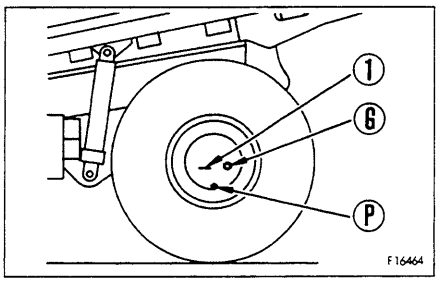
1. Lower the dump body and stop the engine.
2. Turn the cap of oil filler Ⓕ to release the internal pressure before removing the cap.
3. Taking care not to get any oil on you, remove drain plug Ⓟ, drain the oil, then tighten the plug again.
4. Add engine oil through oil filler Ⓕ to the specified level.
   For details of the oil to use, see 20. USE OF FUEL, COOLANT, AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE.
5. After adding oil, check that the oil is at the specified level. See 24.3 CHECK BEFORE STARTING.

24.8.2 CHANGE OIL IN FINAL DRIVE CASE

⚠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 starting the operation.

- Container to catch drained oil: Min. 13 ℓ capacity
- Refill capacity: 13 ℓ (3.4 US gal, 2.9 UK gal)



1. Stop the machine so that casting line ① is horizontal and drain plug Ⓟ is at the bottom.
2. Remove drain plug Ⓟ, drain the oil, then tighten the plug again.
3. Add engine oil through the hole for plug Ⓖ to the specified level.

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

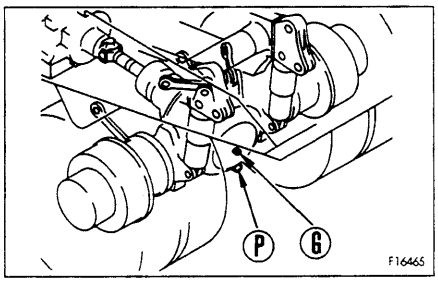
4. After adding oil, check that the oil is at the specified level. See 24.5 EVERY 250 HOURS SERVICE.

24.8.3 CHANGE OIL IN DIFFERENTIAL CASE

⚠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 starting the operation.

- Container to catch drained oil: Min. 45 ℓ capacity
- Refill capacity: 45 ℓ (11.9 US gal, 9.9 UK gal)



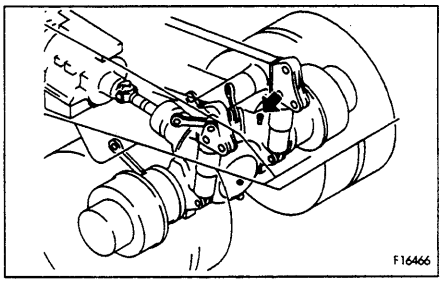
1. Remove drain plug Ⓟ, drain the oil, then tighten the plug again.
2. Add engine oil through the hole in plug Ⓖ to the specified level.

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

3. After adding oil, check that the oil is at the specified level. See 24.5 EVERY 250 HOURS SERVICE.

24.8.4 CLEAN DIFFERENTIAL CASE BREATHER

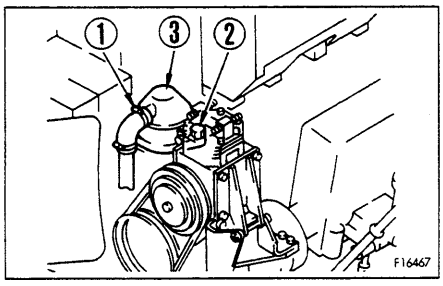
Remove the mud and dirt from around the breather, then remove the breather and wash out the dirt from inside with clean diesel oil or flushing oil.

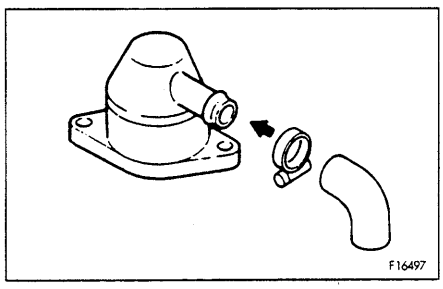


24.8.5 CLEAN ENGINE BREATHER ELEMENT

1. Wipe off the dirt from around the breather.
2. Loosen plug ①, then remove the hose.
3. Remove bolt ②, then remove breather ③.
4. Rinse the whole breather in diesel oil or flushing oil.
5. After washing, pass diesel oil through in the direction of the arrow.
6. Dry with compressed air, then coat the O-ring with engine oil, and install.

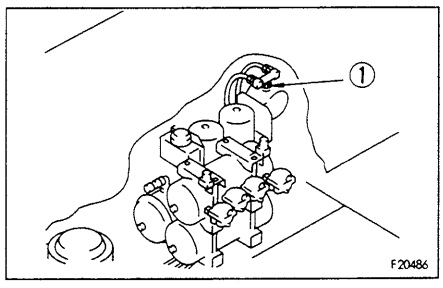
   Check the element and O-ring, and replace them with new parts if necessary.
7. Check the breather hose, and if any deteriorated oil is stuck to the inside, replace the hose with a new hose.





24.8.6 REPLACE PLUG WITH STRAINER FROM MAKE-UP TANK OF REAR BRAKE CHAMBER

1. Change the oil in the rear brake cooling oil tank, and at the same time remove the hose and tee installed to the top of the make-up tank, then remove plug ① and replace it with a new plug.
2. Install the hose and tee to the top of the plug.
   Replace this part every 2000 hours or every year, whichever comes sooner.
   When replacing the plug, change the oil in the tank, then add the same type of oil as the brake cooling oil to fill to the top of the tank.



24.8.7 CLEAN EMERGENCY RELAY VALVE

Please contact your Komatsu distributor to have the valve disassembled and cleaned.

24.8.8 CHECK ALTERNATOR, STARTING MOTOR

The brush may be worn or there may be no grease on the bearing, so please contact your Komatsu distributor for inspection and repair.

If the engine is started frequently, have this inspection carried out every 1000 hours.

24.8.9 CHECK, ADJUST ENGINE VALVE CLEARANCE

Special tools are needed for the inspection and maintenance, so please contact your Komatsu distributor to have this work carried out.

24.8.10 CLEAN, CHECK TURBOCHARGER

Please contact your Komatsu distributor for cleaning and inspection.

24.8.11 CHECK PLAY OF TURBOCHARGER ROTOR

Please contact your Komatsu distributor for inspection of the rotor play.

24.8.12 REPLACE CRITICAL PARTS FOR PERIODICAL REPLACEMENT FROM SERVICE KIT

For details, see 22. PERIODIC REPLACEMENT OF CRITICAL PARTS. Please contact your Komatsu distributor for replacement of critical parts.

24.9 EVERY 4000 HOURS SERVICE

Carry out maintenance for EVERY 50 HOURS, EVERY 250 HOURS, EVERY 500 HOURS, EVERY 1000 HOURS, and EVERY 2000 HOURS SERVICE at the same time.

24.9.1 CHECK WATER PUMP

Check for play in the pulley, leakage of grease or water, or clogging of the drain hole. If any abnormality is found, contact your Komatsu distributor for disassembly and repair or replacement

24.9.2 REPLACE CRITICAL PARTS FOR PERIODICAL REPLACEMENT FROM SERVICE KIT

For details, see 22. PERIODIC REPLACEMENT OF CRITICAL PARTS. Please contact your Komatsu distributor for replacement of critical parts.

24.9.3 CHECK, ADJUST AIR COMPRESSOR

Ask your Komatsu distributor to carry out this work.

24.9.4 CHECK FAN PULLEY AND TENSION PULLEY

Check for play of the pulley and leakage of grease. If any abnormality is found, please contact your Komatsu distributor.

24.9.5 CHECK VIBRATION DAMPER

Check for any drop in the level of the damper fluid and for runout of the concave surface.

If there is any leakage of the damper fluid or dents, please contact your Komatsu distributor for repair.

24.10 EVERY 3 YEARS SERVICE

24.10.1 REPLACE SEAT BELT

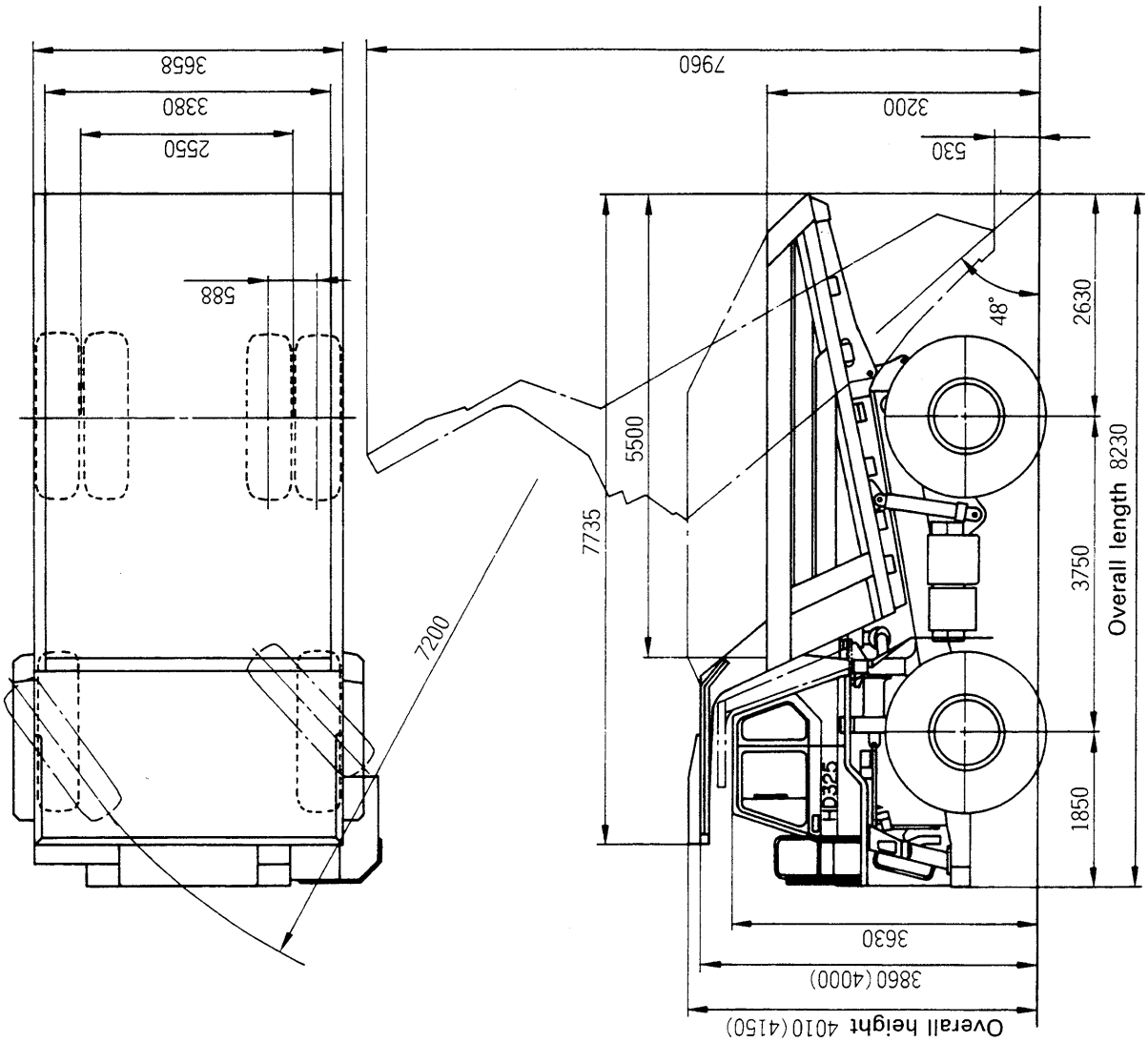
Replace the seat belt once every 3 years.

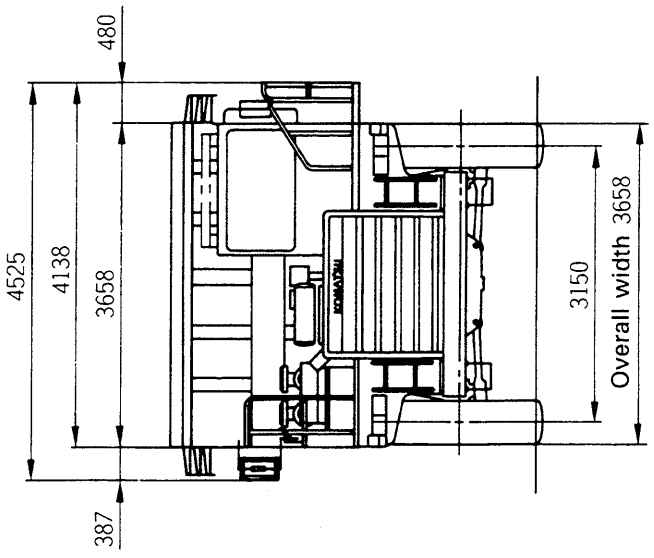
SPECIFICATIONS

25. SPECIFICATIONS

HD325-6

Weight			
• Overall weight (unladen weight + max. payload + 1 operator)			65200 kg (143740 lb)
• Unladen weight			28700 kg (63270 lb)
• Operator			x 1 55 kg (121 lb)
Performance			
• Travel speed	FORWARD	1st	11.0 km/h (6.8 MPH)
		2nd	15.5 km/h (9.6 MPH)
		3rd	20.7 km/h (12.9 MPH)
		4th	28.1 km/h (17.5 MPH)
		5th	37.8 km/h (23.5 MPH)
		6th	51.3 km/h (31.9 MPH)
		7th	70 km/h (43.5 MPH)
	REVERSE	1st	11.9 km/h (7.4 MPH)
• Max. payload			32000 kg (70560 lb)
• Dump body capacity	Struck		18 m^3
	(At 2100 rpm) (raised)		24 m^3
• Dumping speed	(At 2100 rpm) (raised)		10 sec
• Min. turning radius			7200 mm (284 in)
• Min. ground clearance (bottom of rear axle)			500 mm (19.7 in)
Engine			
• Type			Komatsu SA6D140 diesel engine
• Flywheel horsepower			364 kw (508 HP)/2100 rpm
• Max. torque			2059 Nm (210 kgm, 1519 lbft)/1500 rpm
• Starting motor			24V11kW
• Alternator			24V50A
• Battery			12V170Ah x 2


3658
3380
2550
588
7960
3200
530
48°
2630
5500
7735
3750
Overall length 8230
1850
7200
HD325
3630
3860 (4000)
Overall height 4010 (4150)


480
4525
4138
3658
387
3150
Overall width 3658

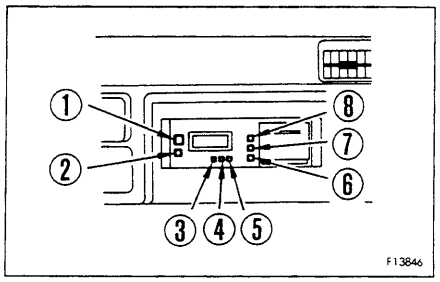
OPTIONS, ATTACHMENTS

26. HANDLING PAYLOAD METER

The payload meter inputs the signals from the pressure sensors, clinometer, body float detection, neutral detection, and other signals, and calculates the weight of the load using its built-in micro computer. It displays the results on the panel and also uses the external display lamps to show the condition of the load.

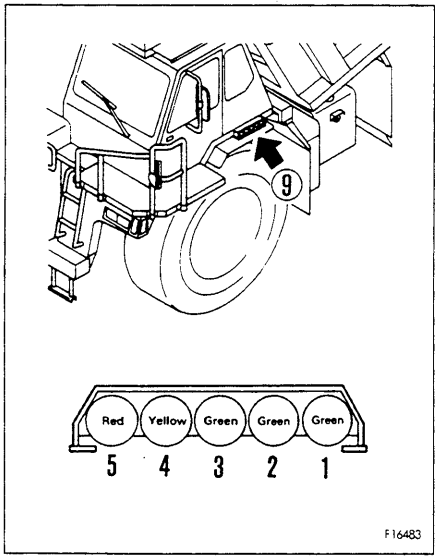
In addition, the data saved in memory can be printed out together with the date the load was dumped and the number of loads.

26.1 NAME OF PARTS



1. Calibration switch
2. Night lighting dimmer switch
3. Clock setting adjustment switch
4. Clock adjustment shift switch
5. Clock adjustment increase switch
6. Memory data clear switch
7. Printer feed switch
8. Print switch
9. External display lamps

26.2 EXTERNAL DISPLAY LAMPS



- When the actual load is displayed, the lamps light up as follows.
  Lamp 1 (green): Displays load between 10 tons and 14 tons
  Lamp 2 (green): Displays load between 14 tons and 39 tons
  Lamp 3 (green): Displays load between 29 tons and 35 tons
  Lamp 4 (yellow): Displays load between 35 tons and 38 tons
  Lamp 5 (red): Displays load over 38 tons

- If the gear shift lever is not at neutral and the dump lever is not at the FLOAT position, none of the display lamps light up.
- All the lamps light up for 10 seconds after the power is turned ON.
- To prevent overloading, use the lamps for loading up to the point where the 3 green lamps light up.

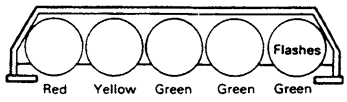
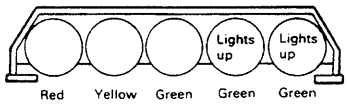
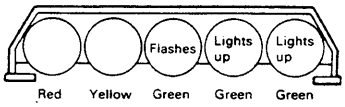
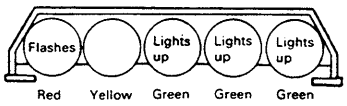
26.2.1 PREDICTION DISPLAY

- The weight of the load changes in stages as each bucket is emptied into the dump body. The average weight of the load up to that point is calculated to predict what the weight of the load will be
  if one more bucket is loaded. The appropriate lamp flashes, so it is possible to adjust the weight of the next load when operating the loader.

The prediction display for the load level and the actual load display are shown at the same time.

Example:
1st bucket: 6.5 tons
2nd bucket: 8 tons (14.5 tons)
3rd bucket: 8 tons (22.5 tons)
4th bucket: 8 tons (30.5 tons)

If the load changes as above, the external display lamps will give the display in the table below.

No. of loads	External display lamp	Remarks
1st bucket		• The weight actually loaded is 6.5 tons, so no lamp lights up. • The predicted load is 13 tons (6.5 tons x 2), so the first green lamp flashes
2nd bucket		• The weight actually loaded is 14.5 tons (6.5 tons + 8 tons), so two green lamps light up. • The predicted load is 21.8 tons (14.5 tons + 14.5/2 tons), so no lamp flashes.
3rd bucket		• The weight actually loaded is 22.5 tons (14.5 tons + 8 tons), so two green lamps stay lighted up. • The predicted load is 30 tons (22.5 tons + 22.5/3 tons), so the 3rd lamp flashes.
4th bucket		• The weight actually loaded is 30.5 tons (22.5 tons + 8 tons), so three green lamps light up. • The predicted load is 31.8 tons (30.5 tons + 30.5/4 tons), so the red lamp flashes.

26.3 OPERATING PAYLOAD METER

Resetting power (the power can be reset by turning the power ON.)

- The display for the first 3 seconds is 88:88, and after that, the time is displayed for 7 seconds.
- After 10 seconds, the normal display is given.
- The printer feeds one line of paper and stops at the home position.

26.3.1 CONTENT OF DISPLAY

- When the dump lever is at FLOAT and the shift lever is at neutral, the actual load is displayed.
- When the load is less than 2.0 tons, or if the dump lever is not at FLOAT, the display is 0.
- If the dump lever is at FLOAT but the shift lever is not at neutral, the time display is given.
  A maximum of 200 cycles of data can be written to memory. If this level is exceeded, FULL is displayed. If FULL is displayed, print out the data and clear the data from the memory. For details, see DELETING DATA FROM MEMORY.
- After completion of operations, we recommend that you stop the machine, print out the data, and clear the data from memory.
- There may be a slight change between the load displayed at the loading point and the load displayed at the dumping point.
- Save the data to memory when the dump lever is raised.
  When the machine is completely stopped, it is possible to carry out accurate calculation if the load is dumped when the swaying of the machine has completely stopped. We recommend that the slope at the dumping point be kept to within±5°.
- When the value displayed by the payload meter becomes stable, move the dump lever to the RAISE position. If the machine is still swaying violently when the dump lever is moved to the RAISE posi tion, ***** is printed when the print out is made.
- When the dump lever is returned from LOWER to FLOAT, wait for at least 5 seconds before turning the starting switch OFF.

26.3.2 OPERATION OF SWITCHES

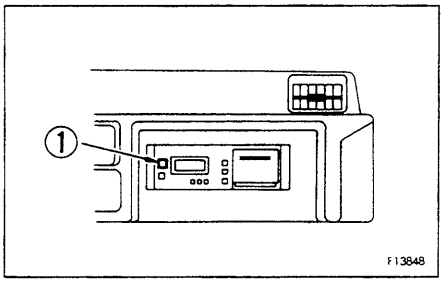
When carrying out calibration

Carry out calibration at the following times.

- When the machine is delivered, and once every month after that.
- When the gas pressure and oil have been adjusted in the suspension cylinder.
  (When the suspension has been adjusted.)
- When the machine has been modified and the unladen weight has changed more than 100 kg.
- When the suspension pressure sensor has been replaced.
- When other modifications have been made around the suspension.
- When the built-in battery has been replaced.
- When CAL is displayed.

Method of carrying out calibration

1. Set the machine with the dump body empty.
2. Place the shift lever at the N position, and press calibration switch ① for at least 2 seconds. (The letters CAL flash)
3. Drive the machine slowly and when the travel speed reaches approx. 10 km/h (6.2 MPH), press calibration switch ① again. (The letters CAL light up) The display returns to the time display to show that the operation is completed.



Carry out calibration on a flat even road surface.
Travel in a straight line. (Distance: Approx. 100 m (328 ft))
Keep the machine traveling at a constant travel speed.
The calibration data are written to the internal RAM, and are retained even when the power is turned off.

To stop the calibration operation (when in neutral), press calibration switch ① again. The display will change from a flashing CAL to a flashing SCH. When calibration switch ① is pressed again, the display will return to the normal display.

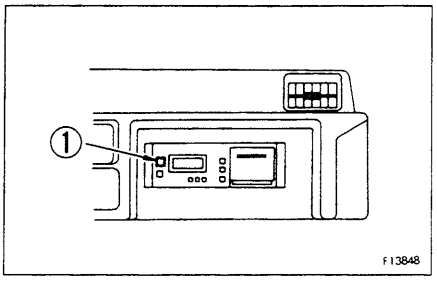
Carrying out sensor check

1. Drive the machine unloaded on flat ground.

2. Set the shift lever to N and press calibration switch ① for at least 2 seconds, then press calibration switch ① again for at least 2 seconds. (The letters SCH will flash)

3. When traveling at a speed of approx. 10 km/h (6.2 MPH), press calibration switch ① again. (The letters SCH will light up) If the display returns to the time display, the operation is completed. If there is an abnormality in any sensor, the error code is displayed.

   Carry out the sensor check at least once every month.

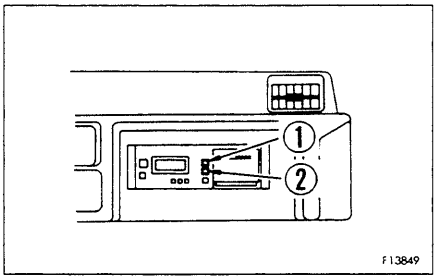


Printing out

1. When print out switch ① is pressed for at least 2 seconds, the data are printed out.

   To stop the print during the printout, press the print switch again for at least 2 seconds.
   Do not hold the paper coming out from the printer during the printout. This will cause the print to overlap.

2. When print feed switch ② is pressed for at least 2 seconds, the paper is fed.



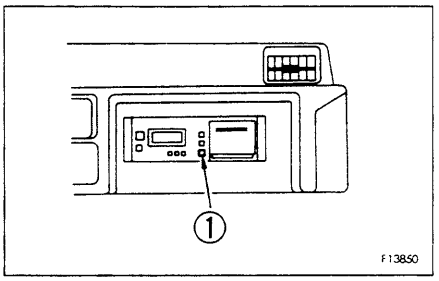
Deleting data from memory

1. Print out the necessary data before clearing the memory.

2. Press memory data clear switch ① for at least 2 seconds. (The letters CLEA will flash)

3. Press memory data clear switch ① again for at least 2 seconds to completely clear the memory.

   After completion of operations, we recommend that you stop the machine, print out the data, and clear the data from memory.



Resetting time

⚠WARNING

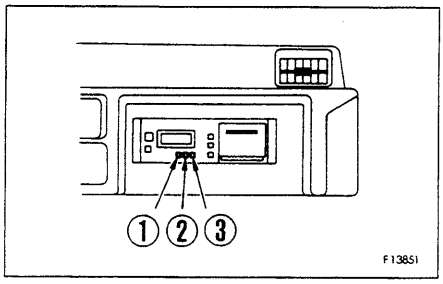
Never try to reset the time when traveling.

1. When time set adjustment switch ① is pressed for at least 2 seconds, the minute display will flash. Press time adjustment increase switch ③ to set the minute display correctly.

2. When time adjustment switch ② is pressed for at least 2 seconds, the hour display will flash. Press time adjustment increase switch ③ to set the hour display correctly.

3. Following this, each time that time adjustment switch ② is pressed, the flashing point changes to day, month, and year. Press time adjustment increase switch ③ to correct any item that needs correcting.

4. After setting the time correctly, press time set adjustment switch ①.



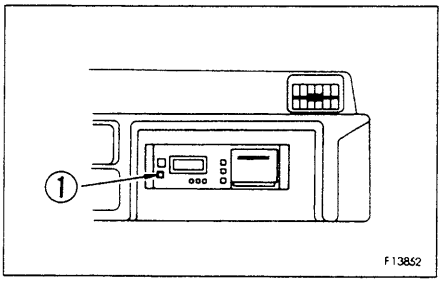
Operating lighting dimmer switch

To change the brightness of the display, do as follows.

1. Each time dimmer switch ① is pressed, the lighting becomes one stage dimmer. If the switch is pressed again after it reaches the dimmest level, it will change to the brightest level.

   The brightness can be changed in 10 stages.

   If it is pressed continuously, the brightness will change continuously.



Setting paper in printer

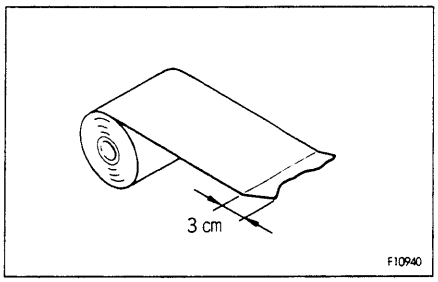
When there is only 30 cm of paper remaining in the printer, a red line will appear on the left edge to show that it is time to replace the paper.

Press the FEED switch to feed out the remaining paper.

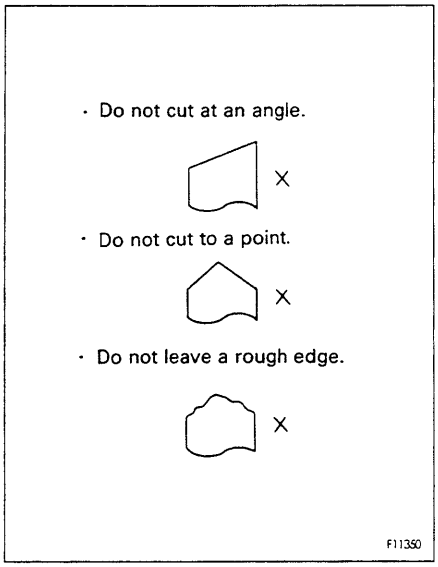
Never try to pull the paper out forcibly.

Always use Komatsu genuine printer paper (7818-27-2910).

1. Open the roll of printer paper, fold the paper at a point approx. 3 cm from the end of the paper, then cut the paper straight along the fold.

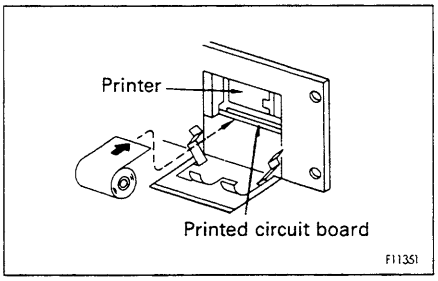


Never cut the paper in the way shown on the right. It will cause the paper to jam.



2. Set the print paper with the printing side facing up, and insert it straight into the paper feed hole. If the FEED switch is pressed while feeding in the paper, the paper will feed automatically.

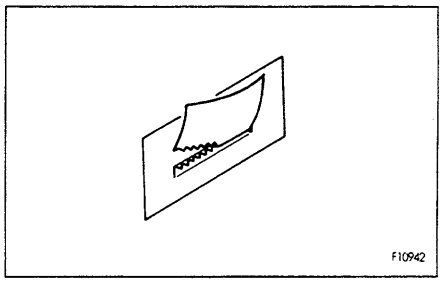
3. When the paper comes out from the printer, pass it through the slit in the lid of the printer, then close the lid.



Method of cutting printer paper

1. Press the FEED switch to feed the paper out to the necessary position.

2. Put the paper in contact with the cutter on the lid, then pull up to cut the paper from one side to the other.



Do not pull the paper out and cut it without using the paper cutter.

Storing printer paper

The printer paper is thermal paper, so store it in a place where the temperature range is between 0°C and 40°C.

Do not keep it in a place exposed to direct sun light.

If error message E-33 is displayed

When the starting switch key is turned to the OFF position, the payload meter uses the internal battery to prevent the load data from being deleted.

If the battery voltage drops, error message E-33 is displayed, so replace the battery as follows.

Replacing battery

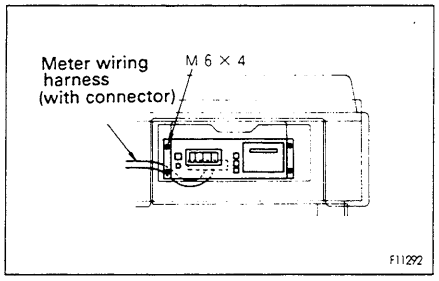
Move the machine to a place where it is safe to carry out the replacement operation.

. Parts to prepare
  Crosshead screwdriver
  Socket wrench (for M4 nut)
  New battery (7818-27-2860)

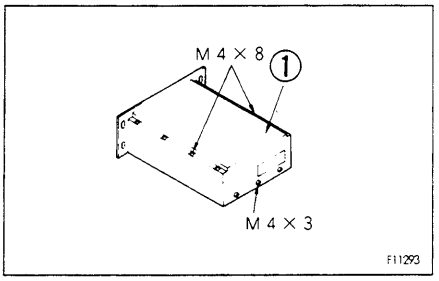
1. Turn the starting switch key to the ON position, press the PRINT switch for at least 2 seconds, and print out the load data from memory.
   Do not start the engine when doing this.

2. Turn the starting switch back to the OFF position.

3. Remove the screws (M6 x 4) holding the payload meter, then pull the payload meter out to the front.



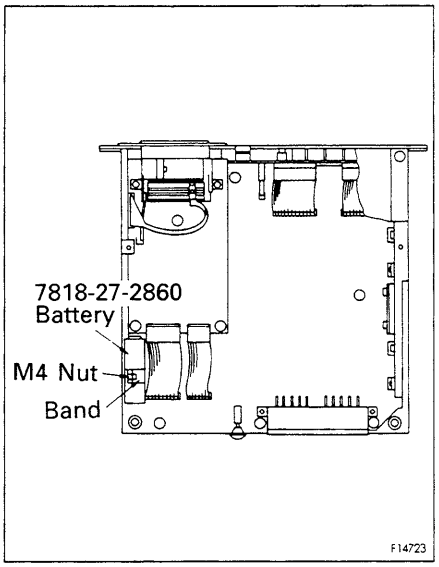
4. Remove the connectors, remove the screws (top: M4 x 8, rear: M4 x 3) of top cover ① of the payload meter, then remove top cover ①.



5. Remove the nut (M4) and the band holding the battery.

   Do not wear gloves when carrying out this operation.

   Be careful not to let dirt, dust, or metal particles get inside the controller. Be careful not to drop any nuts or washers inside the controller.

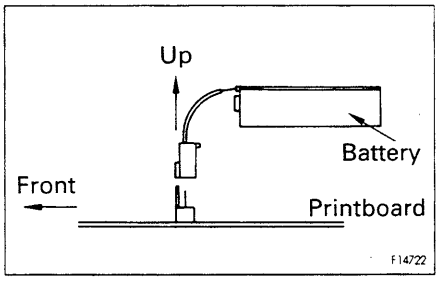


6. Pull the battery connectors up directly from the printboard to remove them.

7. Push the connectors of the new battery down straight to connect them to the printboard.

8. Fit the battery band, then fix the battery to the payload meter with the nut (M4) and washer (flat spring).

   Check that the battery has not moved out of position.



9. Install the top cover.
   Tightening torque: 88.2 ± 9.8 Nm (9 ± 1 kgm, 65 ± 7.2 lbft)

10. Install the payload meter to its original position on the panel.

After replacing the battery, do as follows.
1) Turn the starting switch to the ON position.
2) Press the memory data clear switch twice to delete the data from memory. (The first time, it will flash; the second time, it will light up and then display the load.)
3) Carry out calibration.
4) After carrying out calibration, operate the dump lever once FLOAT → LOWER → FLOAT with the dump body empty.

Replace the battery within 48 hours.

The life of the battery is approx. 2 years.

Operation after replacing controller

After replacing the controller, always carry out calibration, and operate the dump lever FLOAT→ LOWER → FLOAT with the dump body empty.

If error message PAPE flashes (paper jam)

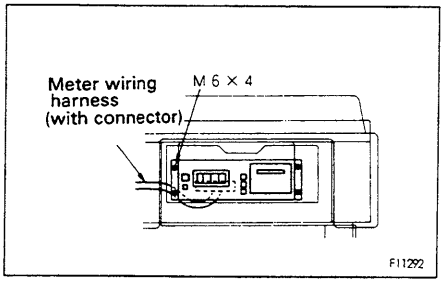
NOTICE

- **Never touch the printer head (white). If the printer head is removed, it is impossible to install it again.**
- **Always be extremely careful not to let any dust or metal particles inside the controller.**

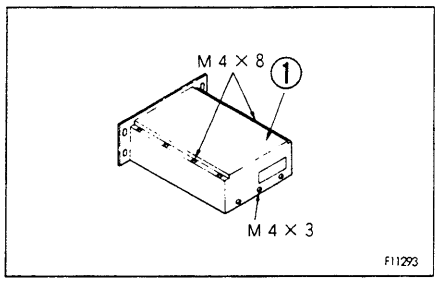
If the paper jams, PAPE is displayed on the payload meter load display, so move the machine to a safe place and clear the paper jam as follows.

1. Turn the starting switch key to the OFF position.

2. Remove the screws (M6 x 4) holding the payload meter, then pull the payload meter out to the front.



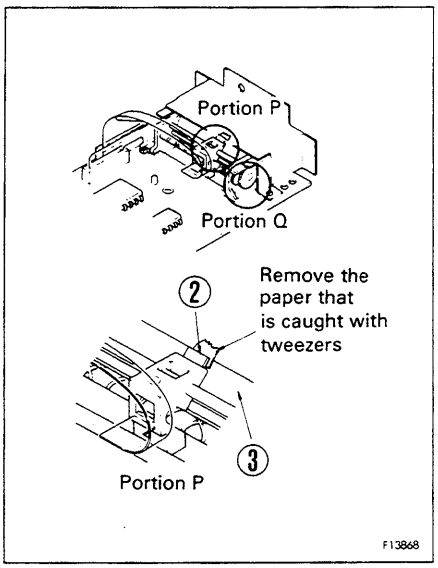
3. Remove the connectors, remove the screws (top: M4 x 8, rear: M4 x 3) of top cover ① of the payload meter, then remove top cover ①.



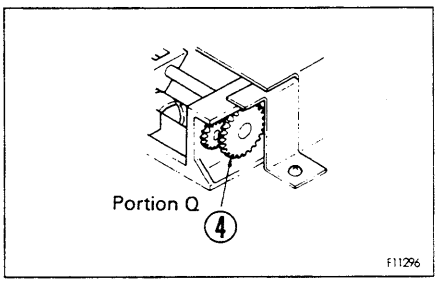
4. Use tweezers to remove the paper caught between printer head ② and guide ③.

   Do not wear gloves when carrying out this operation.

   When using tweezers to remove the jammed paper, press the guide with your finger to make a clearance between the printer head and guide to make it easier to remove the paper.



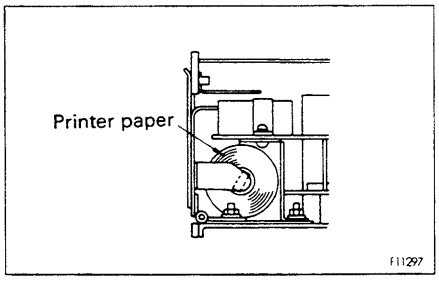
   If there is any paper remaining immediately under the printer head, turn gear ④ with the flat of your fingers to move the head. If gear ④ is turned counterclockwise, the head will move to the right.



5. After removing the paper, install the connectors before installing the top cover.

6. Remove the printer paper remaining inside the printer, and cut the leading end of the paper.

   For details of the method of cutting the end of the paper, see "Method of cutting printer paper".



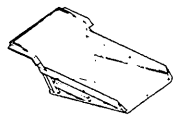
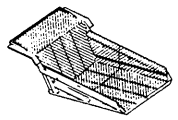
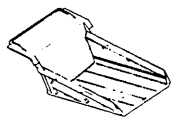
7. Turn the starting switch key to the ON position, and press the FEED switch.

   For details of the method of inserting the paper, see "Setting paper in printer".

8. Turn the starting switch key to the OFF position, remove the connectors, then assemble to the original condition.

27. SELECTING DUMP BODY

Select the dump body from the following table.

Purpose	Body type	Features	Body shape
Transporting rocks	Rock body	• A liner is installed to the whole inside surface of the dump body to allow the loading of crushed rock, coal, or timber. Example: Coal mine	 ※
Transporting soil or sand	Linerless body	• This is suitable for jobsites where soil or sand is loaded. No liner is installed. Example: Loading loose soil for landfills	 ※
(Special specification) Transporting rubble	Rubber liner body	• This is suitable for jobsites where rubble or large rocks are loaded. A rubber liner is installed. • This is also effective in reducing noise when loading. Example: Jobsites handling rubble	 ※

※: It is possible to install a side extension (option) to these dump bodies.

28. OPTIONS AND ATTACHMENTS

High speed fuel supply system
This can be installed directly to the fuel tank and reduces the time taken to charge the fuel supply hose with fuel.

Tire chain
This is used to prevent the tires from slipping on snow or ice.

Radiator curtain
This is used to control the wind flow to the radiator to prevent overcooling when working in cold weather.

Body liner
This is a plate used to reinforce the inside surface of the dump body when loading large rocks or steel.
(A steel liner and rubber liner are available.)

Differential lock
This is used to prevent the wheels from slipping on snow or soft ground, and to improve the travel performance.

The following optional parts are also available.

- Tachograph
- Spare rim
- Spare time
- Fuel tank cap lock
- Body extension
- Fog lamp
- Rev graph

Please contact your Komatsu distributor for details.