SEAM018501

Operation & Maintenance Manual

avance LOADER

WA700-3

WHEEL LOADER

SERIAL NUMBERS **WA700-50010** 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

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.**

CALIFORNIA

Proposition 65 Warning

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

2. SAFETY INFORMATION

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

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

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

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

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

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

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

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

3. INTRODUCTION

3.1 INTENDED USE

This machine is intended mainly for the following operations.

- Digging operations
- Leveling operations
- Pushing operations
- Loading operations

For details of the operating procedure, see "12.10 WORK POSSIBLE USING WHEEL LOADER".

3.2 FEATURES

1. Easy to operate work equipment
   - By using the kick-down switch installed to the knob on the boom control lever, it is possible to shift down from 2nd to 1st, thereby providing speedy digging and loading operations.
   - Installing the bucket corner teeth and segment edge greatly increases the wear resistance of the bucket.
2. Easy to operate machine
   - The electrical transmission control provides light gear shifting, enabling finger control.
   - The length of both the directional and speed levers can be adjusted individually.
   - The PPC valve (proportional pressure type) provides good response when raising the boom and little operating force is required.
   - A wrist rest is provided by the control levers to improve the ease of control.
3. Operating comfort
   - The cab is provided with a door-open lock, large sun visor, and small storage box. It also has rubber mounts to further reduce the vibration and noise.
   - The sealed pressurized cab with air conditioner make pleasant operations possible.
   - A fabric seat is used for the operator's seat to give the operator a good ride.
4. High levels of safety
   - Safety is ensured by the good visibility from the cab, the wide area around the operator's seat, steps for getting on and off the machine, and the walk-through floor at the rear of the cab.
   - Checks before starting and checks for abnormalities during operation can be carried out using the machine monitor.
   - Maintenance free wet-type multiple disc brakes are used.

3.3 BREAKING IN THE MACHINE

Your Komatsu machine has been thoroughly adjusted and tested before shipment. However, operating the machine under severe conditions at the beginning can adversely affect the performance and shorten the machine life.

Be sure to break in the machine for the initial 100 hours (as indicated by the service meter.) During breaking in:

- Idle the engine for 5 minutes after starting it up.
- Avoid operation with heavy loads or at high speeds.
- Avoid sudden starts, sudden acceleration, sudden steering and sudden stops except in cases of emergency.

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

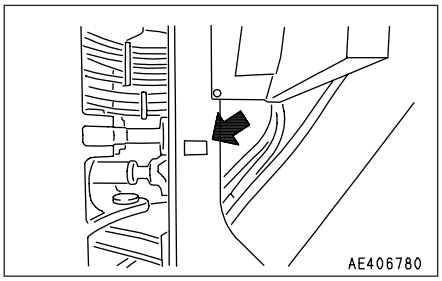
Operations that are prohibited in this manual must never be carried out under any circumstances.

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

4.1 MACHINE SERIAL NO. PLATE POSITION

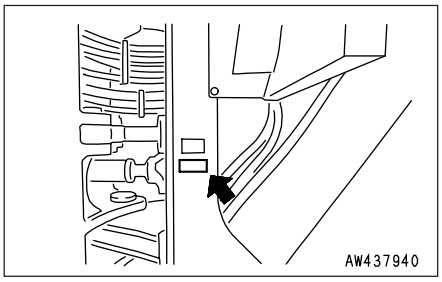
Position of plate

On the center right of the front frame.



Position of stamp

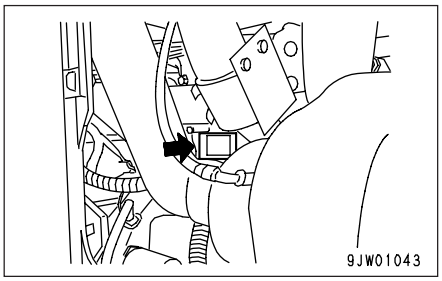
This is stamped on the center of the front frame on the right side of the machine.



4.2 ENGINE SERIAL NO. PLATE POSITION

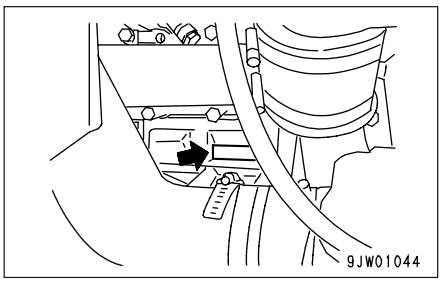
Position of plate

On the left of the cylinder block, when seen from the fan side.



Position of stamp

This is stamped on the left side of the engine cylinder block as seen from the fan.



4.3 TABLE TO ENTER SERIAL NO. AND DISTRIBUTOR

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

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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.
- Do not operate the machine if you are not feeling well, or if you are taking medicine which will make you sleepy, or if you have been drinking. Operating in such a condition will adversely affect your judgement and may lead to an accident.
- When working with another operator or with a person on worksite traffic duty, be sure that all personnel understand all hand signals that are to be used.
- Always follow all rules related to safety.

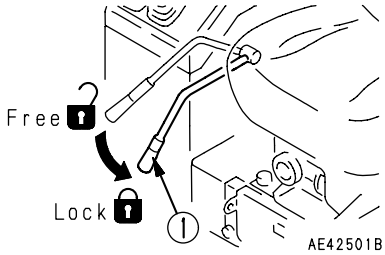
SAFETY FEATURES

- Be sure all guards and covers are installed in their proper position. Have guards and covers repaired immediately if damaged.
  Proper position → See "12.1.1 WALK-AROUND CHECK"

- Use safety features such as safety lock lever ① and seat belts properly.

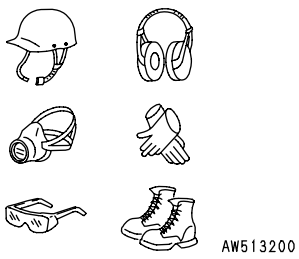
- NEVER remove any safety features. ALWAYS keep them in good operating condition.
  Safety lock lever → See "12.13 PARKING MACHINE"
  Seat belts → See "12.1.3 ADJUSTMENT BEFORE OPERATION"

- 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 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.
- Check that all protective equipment functions properly before using.

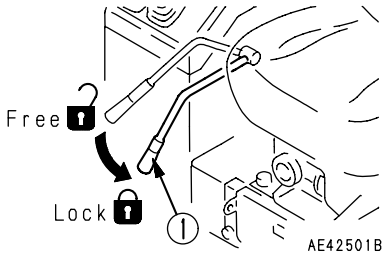


UNAUTHORIZED MODIFICATION

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

ALWAYS APPLY LOCK WHEN LEAVING OPERATOR'S SEAT

- When standing up from the operator's seat, always place safety lock lever to the LOCK position ① and parking brake switch ② to the ON position securely. If you accidentally touch the travel or swing lever when they are not locked, the work equipment may suddenly move and cause serious injury or damage.
- When leaving the machine, lower the work equipment completely to the ground, set safety lock lever ① to the LOCK position and parking brake switch ② to the ON position, then stop the engine and use the key to lock all the equipment. Always take the key with you.
  Work equipment posture → See "12.13 PARKING MACHINE".
  Locks → See "12.17 LOCKING".



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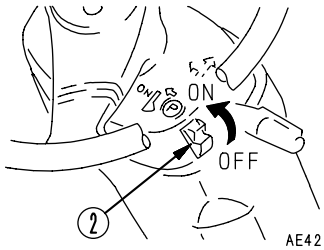

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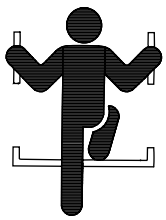
MOUNTING AND DISMOUNTING

- Before getting on or off the machine, check the handrails and steps, and if there is any oil, grease, or mud on them, wipe it off immediately. In addition, repair any damage and tighten any loose bolts.
- NEVER jump on or off the machine. NEVER get on or off a moving machine. These acts may result in unexpected injury.
- When getting on or off the machine, always face the machine and maintain three-point contact (both feet and one hand, or both hands and one foot) with the handrails and steps to ensure that you support yourself.
- Never hold any control levers or when getting on or off the machine.
- Never step down from a step at the rear of the machine or from the side of the cab to a tire.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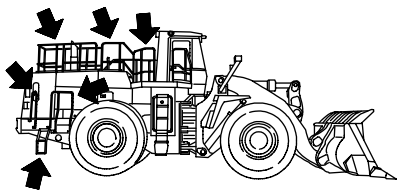
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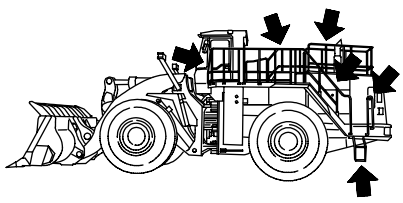
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FIRE PREVENTION FOR FUEL AND OIL

Fuel, oil, antifreeze and wind sprayed 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.

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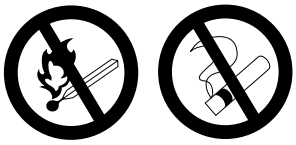

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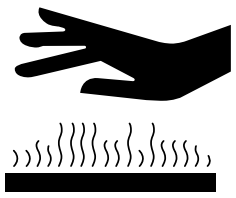
PRECAUTIONS WHEN HANDLING AT HIGH TEMPERATURE

- Immediately after operations are stopped, the engine oil and hydraulic oil are at high temperature and are still under pressure. Attempting to remove the cap, drain the oil or water, or replace the filters may lead to serious burns. Always wait for the temperature to go down, and follow the specified procedures when carrying out these operations.

- To prevent hot water from spurting out, stop the engine, wait for the water to cool, then raise the cap lever to relieve the pressure before removing the cap.
  (When checking if the water temperature has gone down, put your hand near the front face of the radiator and check the air temperature. Be careful not to touch the radiator.)

- To prevent hot oil from spurting out, stop the engine, wait for the oil to cool, then release the pressure reducing lever to relieve the pressure before removing the cap.
  (When checking if the oil temperature has gone down, put your hand near the front face of the hydraulic tank and check the air temperature. Be careful not to touch the radiator.)



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ASBESTOS DUST HAZARD PREVENTION

Asbestos dust can be HAZARDOUS to your health if it is inhaled.
Komatsu does not use asbestos in its products, but if you handle materials containing asbestos fibers, follow the guidelines given below:

- NEVER use compressed air for cleaning.
- Use water for cleaning to keep down the dust.
- If there is danger that there may be asbestos dust in the air, operate the machine from an upwind position whenever possible.
- Use an approved respirator if necessary.

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CRUSHING OR CUTTING PREVENTION

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

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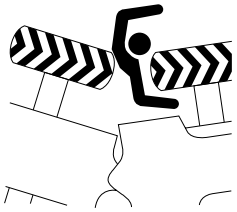

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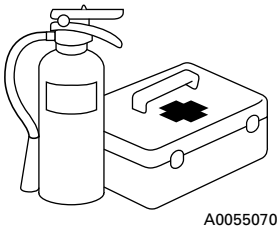
FIRE EXTINGUISHER AND FIRST AID KIT

Always follow the precautions below to prepare for action if any injury or fire should occur.

- Be sure that fire extinguishers have been provided and read the labels to ensure that you know how to use them
- Provide a first aid kit at the storage point. Carry out periodic checks and add to the contents if necessary.
- Know what to do in the event of a fire or injury.
- Decide the phone numbers of persons (doctor, ambulance, fire station, etc.) to contact in case of an emergency. Post these contact numbers in specified places and make sure that all personnel know the numbers and correct contact procedures.



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PRECAUTIONS WHEN USING ROPS

If ROPS is installed, do not operate the machine with the ROPS removed.
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 worldwide regulations and standards, but it is damaged by falling objects or by rolling over, its strength will be reduced and it will not be able to fulfill its function properly.
  In such a case, please contact your Komatsu distributor for advice on the method of repair. Even if ROPS is installed, it can only provide proper protection if the operator wears the seat belt. Always fasten the seat belt when operating the machine.
  Seat belt → See "12.1.3 ADJUSTMENT BEFORE OPERATION".

PRECAUTIONS FOR ATTACHMENTS

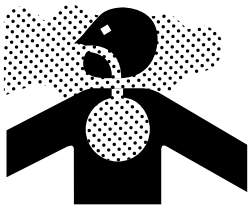
- When installing and using an optional attachment, read the instruction manual for the attachment and the information related to attachments in this manual.
- Do not use attachments that are not authorized by Komatsu or your Komatsu distributor. Use of unauthorized attachments could create a safety 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.

PRECAUTIONS WHEN HANDLING ACCUMULATOR

- If the travel damper switch is turned ON when the machine is traveling or when the work equipment is raised, the hydraulic accumulator in the travel damper will instantaneously be connected with the lift cylinder bottom circuit. Be careful when doing this, because the oil will then flow in or out in the direction to balance the oil pressure at the accumulator and lift cylinder bottom, so the work equipment will move.
- When releasing the pressure or charging with gas for the work equipment circuit of machines equipped with an accumulator, be careful to follow the instructions given for handling the accumulator.
- The accumulator is charged with high-pressure nitrogen gas, which is extremely dangerous, so read the following items and be careful to handle the accumulator properly.
- Do not make any hole or bring any flame or heat close to the accumulator.
- Do not weld any boss to the accumulator.
- The gas must be released before disposing of the accumulator, so please ask your Komatsu distributor to do this.

VENTILATION FOR ENCLOSED AREAS

- If it is necessary to start the engine or if you handle fuel, flushing oil, or paint within an enclosed area or poorly ventilated area, open the doors and windows to ensure that you provide adequate ventilation to prevent gas poisoning.
- If opening the doors and windows still does not provide adequate ventilation, set up fans.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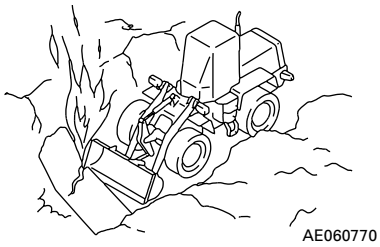
7. PRECAUTIONS DURING OPERATION

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

7.1 BEFORE STARTING ENGINE

SAFETY AT WORKSITE

- Before starting operations, thoroughly check the area for any unusual conditions that could be dangerous.
- Check the terrain and condition of the ground at the worksite, and determine the best and safest method of operation.
- Make the ground surface as hard and horizontal as possible before carrying out operations. If there is a lot of dust and sand on the jobsite, spray water before starting operations.
- If you need to operate on a street, protect pedestrians and cars by designating a person for worksite traffic duty or by erecting fences and posting "No Entry" signs around the worksite.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- In places where there are buried objects, such as water pipes, gas pipes, or pipes for high voltage cables, contact the company in charge to confirm the position of the buried object, and be careful not to damage the object during operations.
- When working in water or when crossing sand banks, first check the condition of the ground and the depth and speed of flow of the water. Be sure not to exceed the permitted water depth.
  Permissible water depth → See "12.11 PRECAUTIONS FOR OPERATION".

CHECKS BEFORE STARTING ENGINE

Carry out the following checks before starting the engine at the beginning of the day's work.
Failure to carry out these checks may lead to serious injury or damage.

- Check around the engine and battery for accumulated combustible material, fuel, leakage of lubricating oil and hydraulic oil, left fuel, stain on mirrors, handrails and steps.
- Do not leave any parts or tools around the operator's seat. They may fall and break the control levers or switches, or may move the control lever to operate the work equipment because of vibration during travel and operation, resulting in accidents.
- Before getting on the machine, remove all mud and small particles from your shoes which may accumulated in the pivots of the accelerator pedal and brake pedal to preventing the pedals from returning. If any material is accumulated, remove it immediately.
  Walk-around check → See "12.1.1 WALK-AROUND CHECK".
- Check the coolant level, fuel level, and oil level in the engine oil pan, check for clogging of the air cleaner, and check for damage to the electric wiring.
  Checks before starting → See "12.1.2 CHECK BEFORE STARTING".
- Adjust the operator's seat to a position where it is easy to carry out operations, and check for wear or damage to the seat belt and seat belt mounting equipment.
  Adjusting operator's seat → See "12.1.3 ADJUSTMENT BEFORE OPERATION".
  Handling seat belt → "12.1.3 ADJUSTMENT BEFORE OPERATION".
- Check that the gauges work properly, and check that the control levers are at the PARKING position.
  Method of checking operation of gauges → "12.1.4 OPERATION AND CHECKS BEFORE STARTING ENGINE".
- Remove all dirt from the surface of the window glass and lights to ensure good visibility.
- Adjust the side mirror to a position which gives the best view from the operator's seat, and clean the surface of the mirror. If the mirror glass is damaged, replace with a new part.
- Check that the front lamps and working lamps light up properly.
  If the results of the inspection show any abnormality, always carry out repairs.
- Before starting the engine, check that the safety lock is at the LOCK position.
- Be sure a fire extinguisher is present and check the method of using it.
- Do not operate the machine near any fire or flame.


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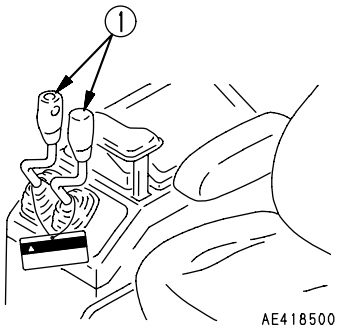
WHEN STARTING ENGINE

- Walk around your machine again just before mounting it, and check for people and objects that might be in the way.
- Never start the engine if a warning tag has been attached to control lever ①.
- When starting the engine, sound the horn as an alert.
- Start and operate the machine only while seated.
- An additional worker may ride in the machine only when sitting in the passenger seat. Do not allow anyone to ride on the machine body.
- Do not start the engine by shorting the starting motor circuit. This operation is dangerous and will damage the machine.
- If a backup alarm is installed, make sure that it works normally.

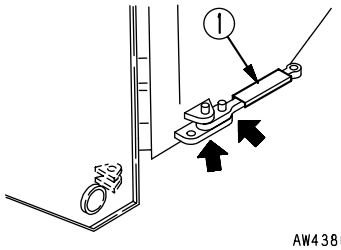


7.2 AFTER STARTING ENGINE

CHECKS AFTER STARTING ENGINE

Failure to carry out the checks properly after starting the engine will lead to delays in discovery of abnormalities, and this may lead to serious injury or damage to the machine.
When carrying out the checks, use a wide area where there are no obstructions. Do not allow anyone near the machine.

- Check the operation of the gauges and equipment, and check the operation of the bucket, lift arm, brakes, travel system, and steering system.
- Checks for any abnormality in the sound of the machine, vibration, heat, smell, or gauges; check also that there is no leakage of air, oil, or fuel.
- If any abnormality is found, carry out repairs immediately.
  If the machine is used when it is not in proper condition, it may lead to serious injury or damage to the machine.
- Before traveling or starting operations, check that safety bar ① is securely locked in the FREE position.



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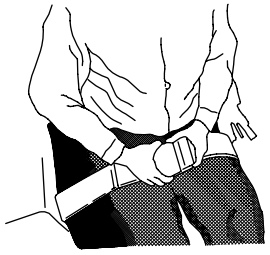
PRECAUTIONS WHEN STARTING OFF

- Before starting off, check again that there is no one in the surrounding area and that there are no obstacles.
- When starting off, sound the horn as an alert.
- Always operate the machine only when seated in the operator's seat.
- Always fasten the seat belt.
- An additional worker may ride in the machine only when sitting in the passenger seat. Do not allow anyone to ride on the machine body.
- Check that the backup alarm works properly.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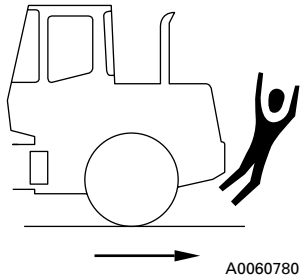
CHECK WHEN CHANGING DIRECTION

To prevent serious injury or death, always do the following before moving the machine or the work equipment.

- 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. This area cannot be seen clearly from the operator's seat.
- When operating in the areas that may be hazardous or have poor visibility, designate a person to direct worksite traffic.
- Ensure that no unauthorized person can come within the direction of turning or direction of travel.
- Do not change the travel direction at high speed.

Always be sure to carry out the above precautions even when that machine is equipped with a backup alarm and mirrors.



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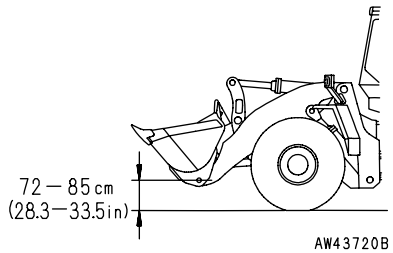
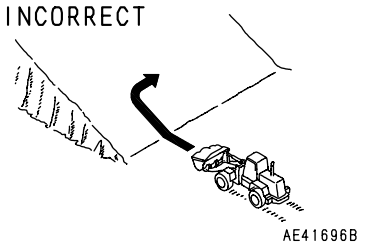
PRECAUTIONS WHEN TRAVELING

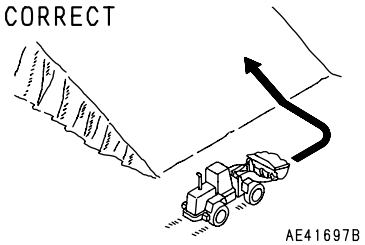
- Never turn the key in the starting switch to the OFF position when traveling.
  It is dangerous if the engine stops when the machine is traveling, because the steering becomes heavy. If the engine stops, apply the brake immediately to stop the machine.
- It is dangerous to look around you when operating. Always concentrate on your work.
- It is dangerous to drive too fast, or to start suddenly, stop suddenly, turn sharply, or zigzag.
- If you find any abnormality in the machine during operation (noise, vibration, smell, incorrect gauges, air leakage, oil leakage, etc.), move the machine immediately to a safe place and look for the cause.
- Set the work equipment to a height of 72 – 85 cm (28.3 – 33.5 in) from the ground level and travel on level ground.
- When traveling, do not operate the work equipment control levers. If the work equipment control levers have to be operated, stop the machine first, then operate the levers.
- Do not operate the steering wheel suddenly. The work equipment may hit the ground surface and cause the machine to lose its balance, or may damage the machine or structures in the area.
- When traveling on rough ground, travel at low speed, and avoid sudden changes in direction.
- Avoid traveling over obstacles as far as possible. If the machine has to travel over an obstacle, keep the work equipment as close to the ground as possible and travel at low speed.
- When traveling or carrying out operations, always keep your distance from other machines or structures to avoid coming into contact with them.
- NEVER be in water which is in excess of the permissible water depth.
  Permissible water depth → See "12.11 PRECAUTIONS FOR OPERATION".
- When passing over bridges or structures on private land, check first that the structure is strong enough to support the mass of the machine. When traveling on public roads, check first with the relevant authorities and follow their instructions.
- Always obey the traffic regulations when traveling on public roads. This machine travels at a lower speed than normal automobiles, so keep to the side of the road and be careful to leave the center of the road free for other vehicles.
- If you drive the machine at high speed continuously for a long time, the tires will overheat and the internal pressure will become abnormally high. This may cause the tires to burst. If a tire bursts, it produces an extremely large destructive force, and this may cause serious injury or accident.
- If you are going to travel continuously, please consult your Komatsu distributor.



TRAVELING ON SLOPES

- Traveling on slopes could result in the machine tipping over or slipping to the side.
- When traveling on slopes, keep the bucket approximately 72 – 85 cm (28.3 – 33.5 in) above the ground. In case of emergency, quickly lower the bucket to the ground to help the machine to stop.
- Do not turn on slopes or travel across slopes. Always go down to a flat place to perform these operations.
- Do not travel on grass, fallen leaves, or wet steel plates. Even slight slopes may cause the machine to slip to the side, so travel at low speed and make sure that the machine is always traveling directly up or down the slope.
- When traveling downhill, never shift gear or place the transmission at neutral. It is dangerous not to use the braking force of the engine. Always place the transmission in a low gear before starting to travel downhill.
- When traveling downhill, use the braking force of the engine and travel slowly. If necessary, use the braking force of the engine together with the brake pedal to control the travel speed.
- If the engine stops when the machine is on a slope, immediately depress the brake pedal fully to apply the brakes, lower the bucket to the ground, then apply the parking brake to hold the machine in position.
- When traveling up or down hills with a loaded bucket, always travel with the bucket facing uphill (travel forward when going uphill and in reverse when going downhill).
- When traveling on a slope with a loaded bucket, if the machine travels with the bucket facing downhill, there is danger that the machine may tip over.



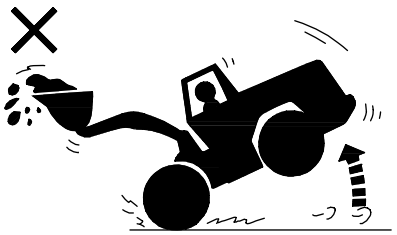


PROHIBITED OPERATIONS

To prevent the machine from turning over or the work equipment from being damaged because of overload, always keep within the maximum load specified for the machine. Never use the machine in excess of its capacity.

PRECAUTIONS WHEN OPERATING

- Be careful not to approach too close to the edge of cliffs.
  When making embankments or landfills, or when dropping soil over a cliff, dump one pile, then use the next pile of soil to push the first pile.
- The load suddenly becomes lighter when the soil is pushed over a cliff or when the machine reaches the top of a slope. When this happens, there is danger that the travel speed will suddenly increase, so be sure to reduce the speed.
- When the bucket is fully loaded, never start, turn, or stop the machine suddenly.
- When handling unstable loads, such as round or cylindrical objects, or piled sheets, if the work equipment is raised high, there is danger that the load may fall on top of the operator's compartment and cause serious injury or damage.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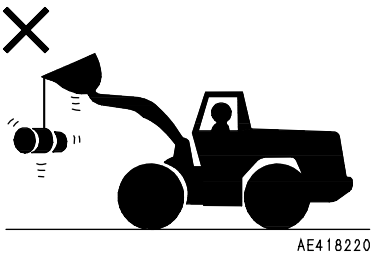
- When handling unstable loads, be careful not to raise the work equipment too high or tip the bucket back too much.
- If the work equipment is suddenly lowered or suddenly stopped, the reaction may cause the machine to tip over.
  Particularly when carrying a load, be sure to operate the work equipment carefully.
- Do not use the bucket or lift arm for crane work.
- Carry out only work that is specified as the purpose of the machine. Carrying out other operations will cause breakdowns.
  Specified operations → See "12.10 WORK POSSIBLE USING WHEEL LOADER".
- Do the following to ensure good visibility.
- When operating in dark places, turn on the working lamps and front lamps, and install lighting at the jobsite if necessary.
- Do not carry out operations in fog, mist, snow, or heavy rain, or other conditions where the visibility is poor. Wait for the weather to clear so that visibility is sufficient to carry out work.
- Always do the following to prevent the work equipment from hitting other objects.
  - When operating in tunnels, under bridges, under electric wires, or other places where the height is limited, be extremely careful not to let the bucket hit anything.
  - When loading dump trucks, check that there is no one in the area around the machine and be careful not to let the bucket hit the operator's compartment of the dump truck.
  - To prevent accidents caused by hitting other objects, always operate the machine at a speed which is safe for operation, particularly in confined spaces, indoors, and in places where there are other machines.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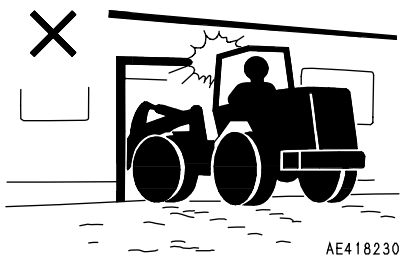
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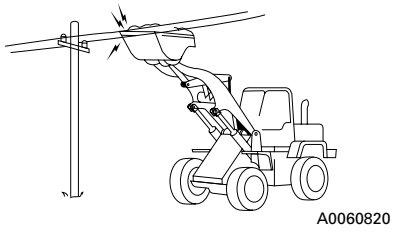
METHOD OF USING BRAKES

- Do not put your foot on the brake pedal unless necessary.
- Do not depress the brake pedal repeatedly unless necessary.
- When traveling downhill, use the engine as a brake, and always use the right brake pedal.

DO NOT GO CLOSE TO HIGH-VOLTAGE CABLES

- Do not let the machine touch overhead electric cables. Even going close to high-voltage cables can cause electric shock. Always maintain the safe distance given below between the machine and the electric cable.
- To prevent accidents, always do as follows.
  - On jobsites where there is danger that the machine may touch the electric cables, consult the electricity company before starting operations to check that the actions determined by the relevant laws and regulations have been taken.
  - Wear rubber shoes and gloves. Lay a rubber sheet on top of the operator's seat, and be careful not to touch the chassis with any exposed part of your body.
  - Use a signalman to give warning if the machine approaches too close to the electric cables.
  - 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	
Low voltage	100 • 200 V	2 m	7 ft
	6,600 V	2 m	7 ft
Very high voltage	22,000 V	3 m	10 ft
	66,000 V	4 m	14 ft
	154,000 V	5 m	17 ft
	187,000 V	6 m	20 ft
	275,000 V	7 m	23 ft
	500,000 V	11 m	36 ft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OPERATE CAREFULLY ON SNOW

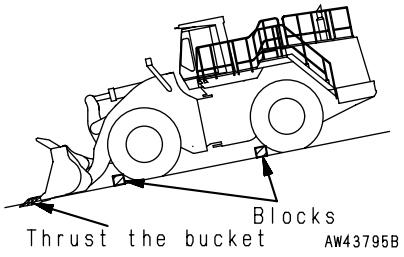
- When working on snow or icy roads, even a slight slope may cause the machine to slip to the side, so always travel at low speed and avoid sudden starting, stopping, or turning. There is danger of slipping particularly on uphill or downhill slopes.
- With frozen road surfaces, the ground becomes soft when the temperature rises, so the travel conditions become unstable. In such cases be extremely careful when traveling.
- When there has been heavy snow, the road shoulder and objects placed beside the road are buried in the snow and cannot be seen, so always carry out snow-clearing operations carefully.
- When traveling on snow-covered roads, always fit tire chains.
- When traveling on snow-covered slopes, never apply the brakes suddenly. Reduce the speed and use the engine as a brake while applying the foot brake intermittently (depress the brake intermittently several times). If necessary, lower the bucket to the ground to stop the machine.
- The load varies greatly according to the characteristics of the snow, so adjust the load accordingly and be careful not to let the machine slip.

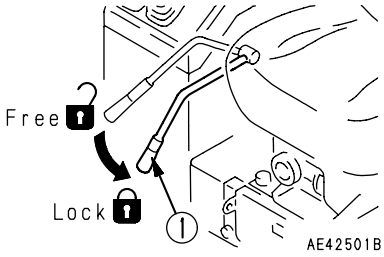
WORKING ON LOOSE GROUND

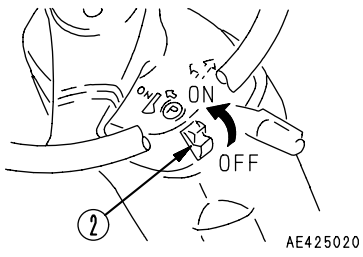
- Do not operate the machine on soft ground. It is difficult to get the machine out again.
- Avoid operating your machine too close to the edge of cliffs, overhangs, and deep ditches. If these areas collapse under the mass or vibration of your machine, the machine could fall or tip over and this could result in serious injury or death.
  Remember that the soil after heavy rain, blasting, or earthquakes is weakened in these areas.
- Earth laid on the ground and the soil near ditches is loose. It can collapse under the mass or vibration of your machine and cause your machine to tip over.
- Install the head guard (FOPS) when working in areas where there is danger of falling stones or rocks.
- Install the ROPS and wear the seat belt when working in areas where there is danger of falling rocks or of the machine turning over.

PARKING THE MACHINE

- Park the machine on level ground where there is no danger of falling rocks or landslides, or of flooding if the land is low, and lower the work equipment to the ground.
- If it is necessary to park the machine on a slope, set blocks under the wheels to prevent the machine from moving, then dig the work equipment into the ground.
- When parking on public roads, provide fences, signs, flags, or lights, and put up any other necessary signs to ensure that passing traffic can see the machine clearly, and park the machine so that the machine, flags, and fences do not obstruct traffic.
  Parking procedure → See "12.13 PARKING MACHINE".
- When leaving the machine, lower the bucket completely to the ground, set the safety lock ① to the LOCK position and parking brake switch ② to the ON position, stop the engine, and lock all the equipment. Always remove the key and take it with you.
  Work equipment posture → See "12.13 PARKING MACHINE".
  Places to lock → See "12.17 LOCKING".







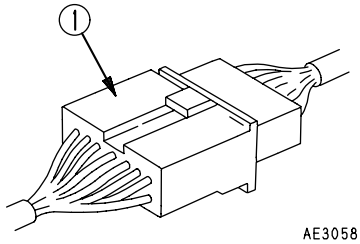
PRECAUTIONS IN COLD AREAS

- After completing operations, remove all water, snow, or mud stuck to the wiring harness, connector ①, switches, or sensors, and cover these parts.
  If the water freezes, it will cause malfunctions of the machine when it is next used, and this may lead to unexpected accidents.

- Carry out the warming-up operation thoroughly. If the machine is not thoroughly warmed up before the control levers are operated, the reaction of the machine will be slow, and this may lead to unexpected accidents.

- Operate the control levers to relieve the hydraulic pressure (raise to above the set pressure for the hydraulic circuit and release the oil to the hydraulic tank) to warm up the oil in the hydraulic circuit. This ensures good response from the machine and prevents malfunctions.

- If the battery electrolyte is frozen, do not charge the battery or start the engine with a different power source. There is danger that this will ignite the battery.
  When charging or starting the engine with a different power source, melt the battery electrolyte and check for leakage of battery electrolyte before starting.
  Battery charge rate → See "14. COLD WEATHER OPERATION."



7.3 TRANSPORTATION

LOADING AND UNLOADING

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

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

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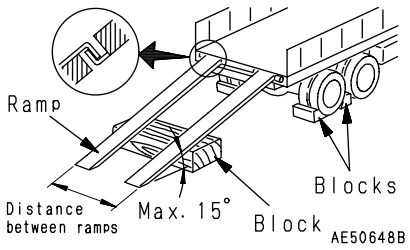


SHIPPING

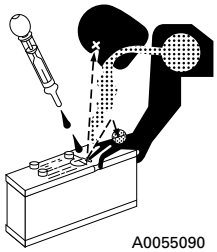
- When shipping the machine on a hauling vehicle, obey all state and local laws governing the weight, width, and length of a load. Also obey all applicable traffic regulations.
- Take into account the width, height, and weight of the load when determining the shipping route.
  Height, width, load of machine → See "13. TRANSPORTATION".
- When passing over bridges or structures on private land, check first that the structure is strong enough to support the mass of the machine. When traveling on public roads, check first with the relevant authorities and follow their instructions.
- The machine can be divided into parts for transportation, so when transporting the machine, please contact your Komatsu distributor to have the work carried out.

7.4 BATTERY

BATTERY HAZARD PREVENTION

Battery electrolyte contains sulphuric acid, and batteries generate hydrogen gas, so mistaken handling can lead to serious injury or fire. For this reason, always observe the following precautions.

- Never bring any lighted cigarette or flame near the battery.
- When working with batteries, ALWAYS wear safety glasses and rubber gloves.
- If you spill acid on your clothes or skin, immediately flush the area with large amounts of water.
- Battery acid could cause blindness if splashed into the eyes. If acid gets into your eyes, flush them immediately with large quantities of water and see a doctor at once.
- If you accidentally drink electrolyte, drink a large quantity of water or milk, beaten egg or vegetable oil. Call a doctor or poison prevention center immediately.
- Before working with batteries, stop the engine and turn the starting switch to the OFF position.
- Avoid short-circuiting the battery terminals (between the positive ⊕ terminal and negative ⊖ terminal) through accidental contact with metal objects, such as tools.
- When installing the battery, connect the positive ⊕ terminal first, and when removing the battery, disconnect the negative ⊖ terminal (ground side) first.
- When removing or installing, check which is the positive ⊕ terminal and negative ⊖ terminal, and tighten the nuts securely.
  If the battery electrolyte is near the LOWER LEVEL, add distilled water. Do not add distilled water above the UPPER LEVEL.
- When cleaning the top surface of the battery, wipe it with a cloth. Never use gasoline, thinner, or any other organic solvent or cleaning agent.
- Tighten the battery caps securely.
- If the battery electrolyte is frozen, do not charge the battery or start the engine with a different power source. There is danger that this will ignite the battery.
  When charging or starting the engine with a different power source, melt the battery electrolyte and check for leakage of battery electrolyte before starting.
- Always remove the battery from the chassis before charging it.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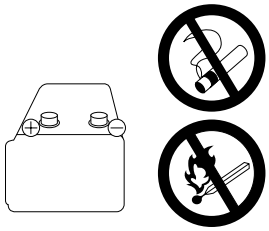
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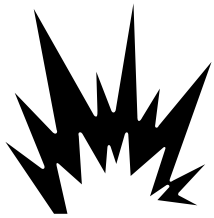
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STARTING WITH BOOSTER CABLES

If any mistake is made in the method of connecting the booster cables, it may cause a fire, so always do as follows.

- Carry out the starting operation with two workers (with one worker sitting in the operator's seat).
- When starting from another machine, do not allow the two machines to touch.
- When connecting the booster cables, turn the starting switch OFF for both the normal machine and problem machine.
- Be sure to connect the positive ⊕ cable first when installing the booster cables. Disconnect the ground or negative ⊖ cable first when removing them.
- The final ground connection is the connection of the ground to the engine block of the problem machine. However, this will cause sparks, so be sure to connect it as far as possible from the battery.
  Starting procedure when using booster cables → See "16.3 IF BATTERY IS DISCHARGED".
- When removing the booster cables, be careful not to let the booster cable clips touch each other or to let the clips touch the machine.


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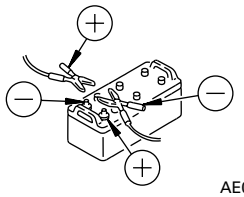
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CHARGING BATTERY

If the battery is handled incorrectly when it is being charged, there is danger that the battery may explode, so follow the instructions in HANDLING BATTERY and in the instruction manual for the charger, and always observe the following precautions.

- Carry out the charging in a well-ventilated place, and remove the battery caps. This disperses the hydrogen gas and prevents explosion.
- Set the voltage on the charger to match the voltage on the battery to be charged. If the voltage setting is wrong, it will cause the charger to overheat and catch fire, and this may lead to an explosion.
- Connect the positive ⊕ charging clip of the charger to the positive ⊕ terminal of the battery, then connect the negative ⊖ charging clip to the negative ⊖ terminal of the battery. Be sure to tighten both terminals securely.
- If the battery charge is less than 1/10 of the rated charge, and high speed charging is carried out, set to a value below the rated capacity of the battery.
  If there is an excessive flow of charging current, it may cause leakage or evaporation of the electrolyte, which may catch fire and explode.


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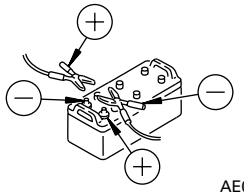
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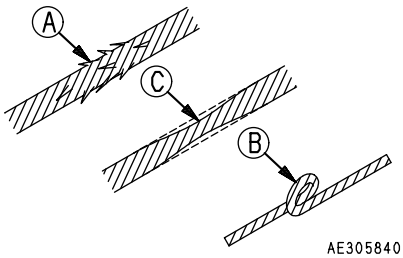
7.5 TOWING

WHEN TOWING

- Injury or death could result if a disabled machine is towed incorrectly or if there is a mistake in the selection of the wire rope, so always do as follows.
- Do not tow in a different way from the method given in the section METHOD OF TOWING.
  Method of towing → See "16.2 TOWING THE MACHINE".
- Always wear leather gloves when handling wire rope.
- When carrying out the preparation for towing with another worker, agree on signals before starting the operation.
- If the engine on the problem machine will not start or there is a failure in the brake system, please contact your Komatsu distributor for repairs.
- It is dangerous to tow a machine on a slope, so choose a place where there is a gradual slope. If there is no place with a gradual slope, carry out work to make the slope as small as possible.
- If a problem machine is towed by another machine, ALWAYS use a wire rope with a sufficient towing capacity for the weight of the problem machine.
- Do not use a wire rope which has cut strands Ⓐ, kink Ⓑ, or reduced diameter Ⓒ.
- 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.



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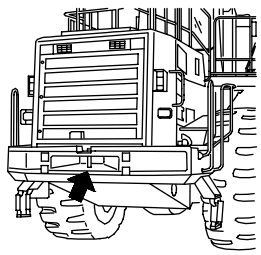
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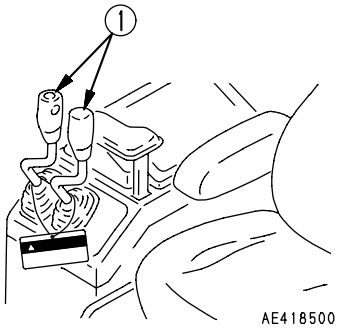
8.1 BEFORE CARRYING OUT MAINTENANCE

NOTIFICATION OF FAILURE

Carrying out maintenance not described in the Komatsu operation and maintenance manual may lead to unexpected failures.
Please contact your Komatsu distributor for repairs.

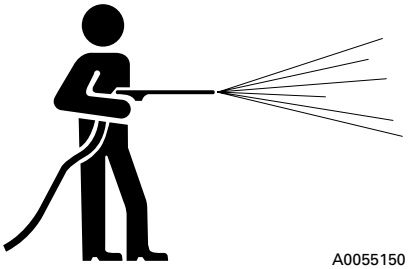
WARNING TAG

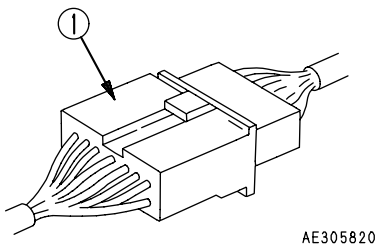
- If others start the engine or operate the controls while you are performing service or lubrication, you could suffer serious injury or death.
- ALWAYS attach the WARNING TAG to control lever ① in the operator's cab to alert others that you are working on the machine. Attach additional warning tags around the machine, if necessary.
- These tags are available from your Komatsu distributor. (Part No. 09963-03000)



CLEAN BEFORE INSPECTION AND MAINTENANCE

- Clean the machine before carrying out inspection and maintenance. This will ensure that dirt does not get into the machine and will also ensure that maintenance can be carried out safely.
- If inspection and maintenance are carried out with the machine still dirty, it will be difficult to find the location of problems, and there is also the danger that you will get dirty or mud in your eyes, and that you will slip and injure yourself.
- When washing the machine, always do as follows.
  - Wear non-slip shoes to prevent yourself from slipping on the wet surface.
  - When using high-pressure steam to wash the machine, always wear protective clothing. This will protect you from being hit by high-pressure water, and cutting your skin or getting mud or dust into your eyes.
  - Do not spray water directly on to the electrical system (sensors, connectors) ①. If water gets into the electrical system, there is danger that it will cause defective operation and malfunction.





KEEP WORK PLACE CLEAN AND TIDY

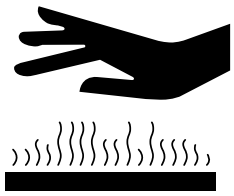
Do not leave hammers or other tools lying around in the work place. Wipe up all grease, oil, or other substances that will cause you to slip. Always keep the work place clean the tidy to enable you to carry out operations safely.
If the work place is not kept clean and tidy, there is danger that you will trip, slip, or fall over and injure yourself.

APPOINT LEADER WHEN WORKING WITH OTHERS

When repairing the machine or when removing and installing the work equipment, appoint a leader and follow his instructions during the operation.
When working with others, misunderstandings between workers can lead to serious accidents.

RADIATOR WATER LEVEL

- When inspecting the radiator water level, stop the engine, and wait for the engine and radiator to cool down. Check the water level in the sub-tank. Under normal conditions, do not open the radiator cap.
- If there is no the radiator cap must be removed, always do as follows.
- Wait for the radiator water temperature to go down before checking the water level.
  (When checking if the water temperature has gone down, put your hand near the engine or radiator and check the air temperature. Be careful not to actually touch the radiator or engine.)
- Pull out the lever on the caps to release the inside pressure of the radiator before removing the caps.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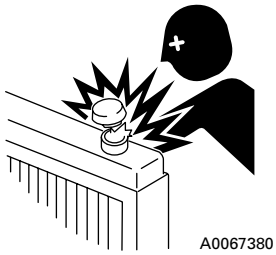
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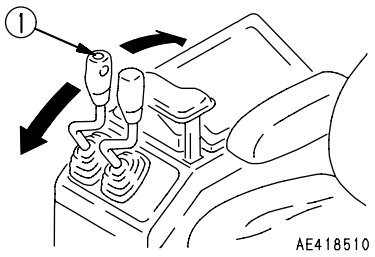
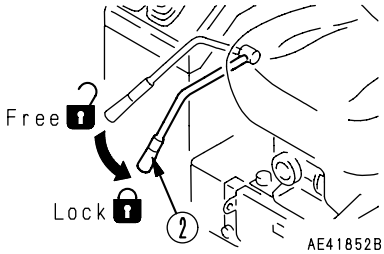
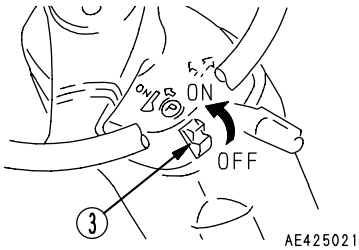
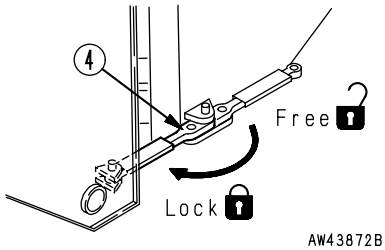
STOP ENGINE BEFORE CARRYING OUT INSPECTION AND MAINTENANCE

- When carrying out inspection and maintenance, park the machine on level ground where there is no danger of falling rocks or landslides, or of flooding if the land is low, then lower the work equipment to the ground and stop the engine.
- After stopping the engine, operate bucket control lever ① several times to the RAISE and LOWER positions to release the remaining pressure in the hydraulic circuit, then set safety lock ② to the LOCK position.
- Turn parking brake switch ③ to ON and apply the brake, then put blocks under the tires.
- Lock the front and rear frames with safety bar ④.
- The worker carrying out the maintenance should be extremely careful not to touch or get caught in the moving parts.



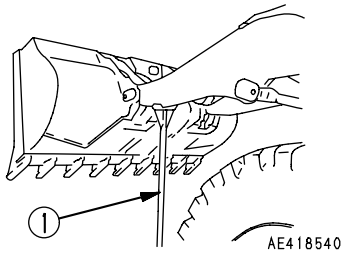


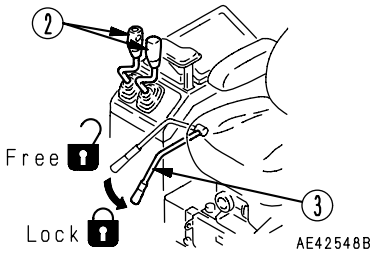




WORK EQUIPMENT SUPPORT

When carrying out inspection and maintenance with the bucket raised, fit stand ① securely under the lift arm to prevent the work equipment from coming down.
Place work equipment control lever ② at HOLD, and set safety lock lever ③ to the LOCK position.





PROPER TOOLS

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

PERIODIC REPLACEMENT OF SAFETY CRITICAL PARTS

Hoses and other parts of the fuel, engine, hydraulic, and brake system are critical parts for ensuring safety, so they must be replaced periodically.
Replacement of safety critical parts requires skill, so please ask your Komatsu distributor to carry out replacement.

- Replace these components periodically with new ones, regardless of whether or not they appear to be defective.
  These components deteriorate over time, and can cause fire because of oil leakage or failure in the work equipment system.
- Replace or repair any such components if any defect is found, even though they have not reached the time specified.

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

USE OF LIGHTING

- When checking fuel, oil, battery electrolyte, or window washer fluid, always use lighting with anti-explosion specifications. If such lighting equipment is not used, there is danger of explosion.
- If work is carried out in dark places without installing lighting, there is danger of injury, so always install proper lighting.
- Even if it is dark, do not use a lighter or flame instead of lighting. There is danger of starting a fire, and if the battery gas ignites, it may cause an explosion.
- When using the machine as the power supply for the lighting, follow the instructions in this Operation and Maintenance Manual.

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PREVENTION OF FIRE

There is danger of the fuel and battery gas catching fire during maintenance, so always follow the precautions below when carrying out maintenance.

- Store fuel, oil, grease, and other flammable materials away from flame.
- Use non-flammable materials as the flushing oil for cleaning parts. Do not use diesel oil or gasoline. There is danger that they will catch fire.
- Never smoke when carrying out inspection or maintenance. Always smoke in the prescribed place.
- When checking fuel, oil, battery electrolyte, or window washer fluid, always use lighting with anti-explosion specifications. Never use lighters or matches as lighting.
- When carrying out grinding or welding operations on the chassis, remove any flammable materials to a safe place.
- Be sure that a fire extinguisher is present at the inspection and maintenance point.

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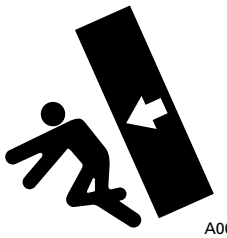
8.2 DURING MAINTENANCE

PERSONNEL

Only authorized personnel can service and repair the machine. Do not allow unauthorized personnel into the area. If necessary, employ an observer.
Extra precaution should be used when grinding, welding, and using a sledge-hammer.

ATTACHMENTS

- Appoint a leader before starting removal or installation operations for attachments.
- Do not allow anyone other than the workers close to the machine or attachment.
- Place attachments that have been removed from the machine in a safe place so that they do not fall. Put a fence around the attachments, and set up No Entry signs to prevent unauthorized persons from coming close.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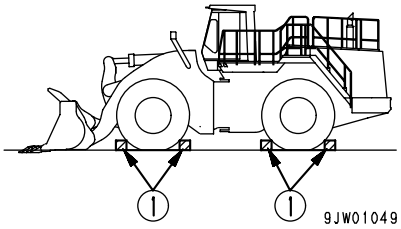
WORK UNDER THE MACHINE

- Stop the machine on firm, level ground, and lower all work equipment to the ground before performing service or repairs under the machine.
- Always block ① the tires securely.
- It is extremely dangerous to work under the machine if the tires are off the ground and the machine is supported only by the work equipment.
  Never work under the machine if the machine is poorly supported.

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MAINTENANCE WITH CHASSIS RAISED

- When carrying out operations with the work equipment or chassis raised, lock the front and rear frames with the safety bar, return the control levers to HOLD, set the control lever safety lock to the LOCK position, and block the work equipment and chassis.
- Block the wheels on the opposite side before jacking up. Set blocks under the machine after checking up.

WORK ON TOP OF MACHINE

- When carrying out maintenance on top of the machine, make sure that the footholds are clean and free of obstructions, and follow the precautions below to prevent yourself from falling.
  - Do not spill oil or grease.
  - Do not leave tools lying around.
  - Mind your step when you are walking.
- Never jump down from the machine. When getting on or off the machine, always use the steps and handrails, and maintain three-point contact (both feet and one hand or both hands and one foot) at all times.
- Use protective equipment if necessary.
- The engine hood top is slippery and dangerous. Never stand on it.
- The tire top is slippery and dangerous. Never stand on it.
- When wiping the front glass of the cab, stand on the step on the front frame. Move to the stop on the front frame from the side step by fully articulating the machine.


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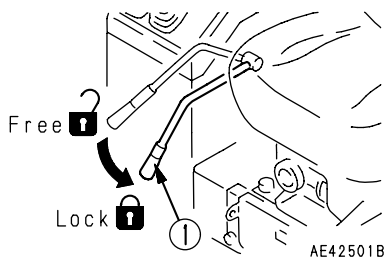
MAINTENANCE WITH ENGINE RUNNING

To prevent injury, do not carry out maintenance with the engine running. If maintenance must be carried out with the engine running, carry out the operation with at least two workers and do as follows.

- One worker must always sit in the operator's seat and be ready to stop the engine at any time. All workers must maintain contact with the other workers.
- When carrying out operations near rotating parts, there is danger of being caught in the parts, so be extremely careful.
- When cleaning inside the radiator, set safety lock ① to the LOCK position to prevent the work equipment from moving.
  In addition, turn parking brake switch ② to ON.
- Do not touch any control levers. If any control lever must be operated, always give a signal to the other workers to warn them to move to a safe place.
- Never touch the fan blade or fan belt with any tool or any part of your body. There is danger of serious injury.



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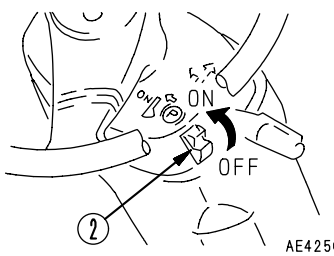

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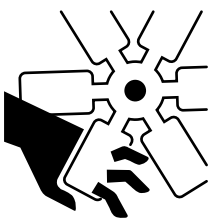
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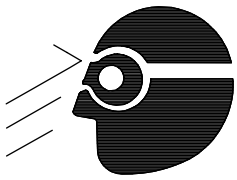
DO NOT DROP TOOLS OR PARTS INSIDE MACHINE

- When opening the inspection window or tank oil filler to carry out inspection, be careful not to drop any nuts, bolts, or tools inside the machine.
  If such parts are dropped into the machine, it will cause breakage of the machine, mistaken operation, and other failures. If you drop any part into the machine, always be sure to remove it from the machine.
- When carrying out inspection, do not carry any unnecessary tools or parts in your pocket.

PRECAUTIONS WHEN USING HAMMER

When using a hammer, always wear safety glasses, safety helmet, and other protective clothing, and put a brass bar between the hammer and the part being hammered.
If hard metal parts such as pins, edges, teeth or bearings are hit with a hammer, there is danger that broken pieces might fly into your eyes and cause injury.



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REPAIR WELDING

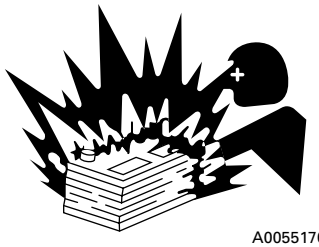
Welding operations must always be carried out by a qualified welder and in a place equipped with a proper equipment. Gas is generated, and there is danger of fire or electrocution when carrying out welding, so never allow any unqualified personnel to carry out welding.
The qualified welder must follow the precautions given below.

- Disconnect the battery terminals to prevent explosion of the battery.
- Remove the paint from the place being welded to prevent gas from being generated.
- If hydraulic equipment or piping, or places close to these are heated, flammable vapor or spray will be generated, and there is danger of this catching fire, so avoid applying heat to such places.
- If heat is applied directly to rubber hoses or piping under pressure, they may suddenly burst, so cover them with fireproof sheeting.
- Always wear protective clothing.
- Ensure that there is good ventilation.
- Clear up any flammable materials, and make sure that there is a fire extinguisher at the workplace.

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 battery → see "16.3 IF BATTERY IS DISCHARGED".



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WHEN ABNORMALITY IS LOCATED

- If any abnormality is found during inspection, always carry out repairs. In particular, if the machine is used when there is any abnormality in the brakes or work equipment systems, it may lead to serious accident.
- Depending on the type of failure, please contact your Komatsu distributor for repairs.

RULES TO FOLLOW WHEN ADDING FUEL OR OIL

Fuel, oil, antifreeze, and window washer fluid can be ignited by a flame.
Always observe the following:

- Stop the engine when adding fuel or oil.
- Do not smoke.
- Wipe up any spilled fuel, oil, antifreeze, or window washer fluid immediately.
- Tighten all fuel, oil, antifreeze, and window washer fluid caps securely.
- Use well-ventilated areas for adding or storing fuel, oil, antifreeze, and window washer fluid.

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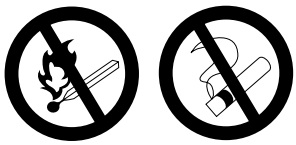

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HANDLING HIGH-PRESSURE HOSES

- If oil or fuel leaks from high-pressure hoses, it may cause fire or defective operation, which may lead to personal injury or damage. If any damaged hoses or loose bolts are found, stop work and contact your Komatsu distributor for repairs.
- Replacing high-pressure hoses requires a high level of skill, and the torque is determined according to the type of hose and size, so please do not carry out replacement yourself. Ask your Komatsu distributor to carry out replacement.

PRECAUTIONS WITH HIGH-PRESSURE OIL

When inspecting or replacing high-pressure piping or hoses, always check that the pressure in the hydraulic circuit has been released. If the circuit is still under pressure, it will lead to serious injury or damage, so always do as follows.

- For details of the method of releasing the pressure, see "8.1 BEFORE CARRYING OUT MAINTENANCE, STOP ENGINE BEFORE CARRYING OUT INSPECTION AND MAINTENANCE". Never carry out inspection or replacement before releasing the pressure completely.
- Wear safety glasses and leather gloves.
- If there is any leakage from the piping or hoses, the piping, hoses, and the surrounding area will be wet, so check for cracks in the piping and hoses and for swelling in the hoses.
  If it is difficult to locate the leakage, always please contact your Komatsu distributor for repairs.
- If you are hit by a jet of high-pressure oil, consult a doctor immediately for medical attention.

INCORRECT

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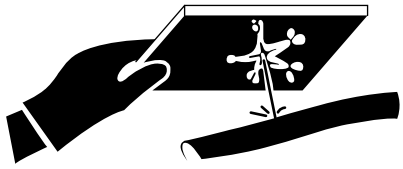
CORRECT



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PRECAUTIONS WHEN CARRYING OUT MAINTENANCE AT HIGH TEMPERATURE OR HIGH PRESSURE

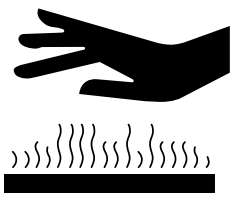
- Immediately after stopping operations, the engine cooling water and oil at all parts is at high temperature and under high pressure.
  In this condition, if the cap is removed, or the oil or water are drained, or the filters are replaced, this may result in burns or other injury. Wait for the temperature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

Clean inside or cooling system, check lubricating oil level, add oil → see "24.2 WHEN REQUIRED".

Check cooling water level, engine oil pan oil level, brake oil level, add oil or water → see "24.3 CHECK BEFORE STARTING".

Checking hydraulic oil level, adding oil → see "24.5 PERIODIC MAINTENANCE".

Changing oil, replacing filters → see "24.6 – 10 PERIODIC MAINTENANCE".



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TIRE MAINTENANCE

Disassembly, repair, and assembly of tires requires specialist equipment and skill, so please ask your specialist tire repair shop to carry out repairs.

CHECKS AFTER INSPECTION AND MAINTENANCE

Failure to carry out inspection and maintenance fully, or failure to check the function of various maintenance locations may cause unexpected problems and may even lead to personal injury or damage, so always do as follows.

- Checks when engine is stopped
  - Have all the inspection and maintenance locations been checked?
  - Have all the inspection and maintenance items been carried out correctly?
  - Have any tools or parts dropped inside the machine? It is particularly dangerous if they get caught in the lever linkage.
  - Has water and oil leakage been repaired? Have bolts been tightened?

- Checks when engine is running
  For details of checks when the engine is running, see "8.2 DURING MAINTENANCE, MAINTENANCE WITH ENGINE RUNNING", and be extremely careful to ensure safety.
  - Do the inspection and maintenance locations work normally?
  - Is there any oil leakage when the engine speed is raised and load is applied to the hydraulic system?

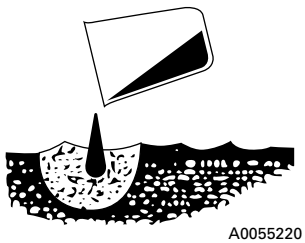
WASTE MATERIALS

To prevent pollution, particularly in places where people or animals are living, always follow the procedures given below.

- 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.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MAINTENANCE OF AIR CONDITIONER

If the air conditioner refrigerant gets into your eyes or touches your skin, it may cause blindness or frostbite.

- When handling the refrigerant, follow the precautions given on the container.

- To prevent the refrigerant from leaking into the atmosphere, use a recovery recycling system.

- Never touch the refrigerant.

8.3 TIRES

HANDLING TIRES

If a tire or a rim is handled wrongly, the tire may burst or may be damaged and the rim may be broken and scattered, and that can cause serious injury and death.

To maintain safety, always observe the following.

- Since maintenance, disassembly, repair and assembly of the tires and rims require special equipment and skill, be sure to ask a tire repair shop to carry out the work.

- Use only the specified tires and inflate them to the specified pressure.
  Selection of tires → See "27. SELECTING BUCKETS AND TIRES"
  Suitable inflation pressure → See "12.18 HANDLING THE TIRES".

- When inflating a tire, check that no one will enter the working area and use an air chuck which has a clip and which can be fixed to the air valve.

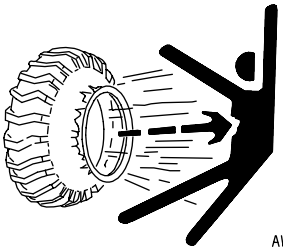
While inflating the tire, check the inflation pressure occasionally so that it will not rise too high.

If the rim is not fitted normally, it may be broken and scattered while the tire is inflated. To ensure safety, place a guard around the tire and do not work in front of the rim but work on the tread side of the tire.

- Abnormal drop in the inflation pressure and abnormal fitting of the rim indicate a trouble in the tires or rim. In such cases, be sure to ask a tire repair shop to carry out repairs.

- Do not adjust the inflation pressure of the tires just after high-speed travel or heavy-duty work.

- Do not heat or weld the rim to which the tire is installed. Do not make a fire near the tire.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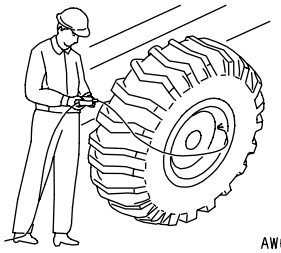
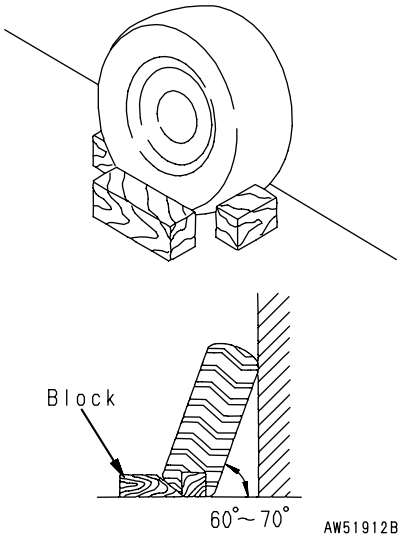

AW636380

PRECAUTIONS FOR STORAGE OF TIRES

- As a basic rule, store the tires in a warehouse which unauthorized persons cannot enter. If you must store the tires outside, always erect a fence around the tires and put up a “No Entry” sign.
- Stand the tire on level ground, and block it securely so that it will not roll or fall over even if an unauthorized person touches it. If the tire is placed on its side, it will be flattened and will deteriorate.
- If the tire should fall over, get out of the way quickly. Tires for construction equipment are extremely heavy, so trying to hold the tire may lead to serious injury.



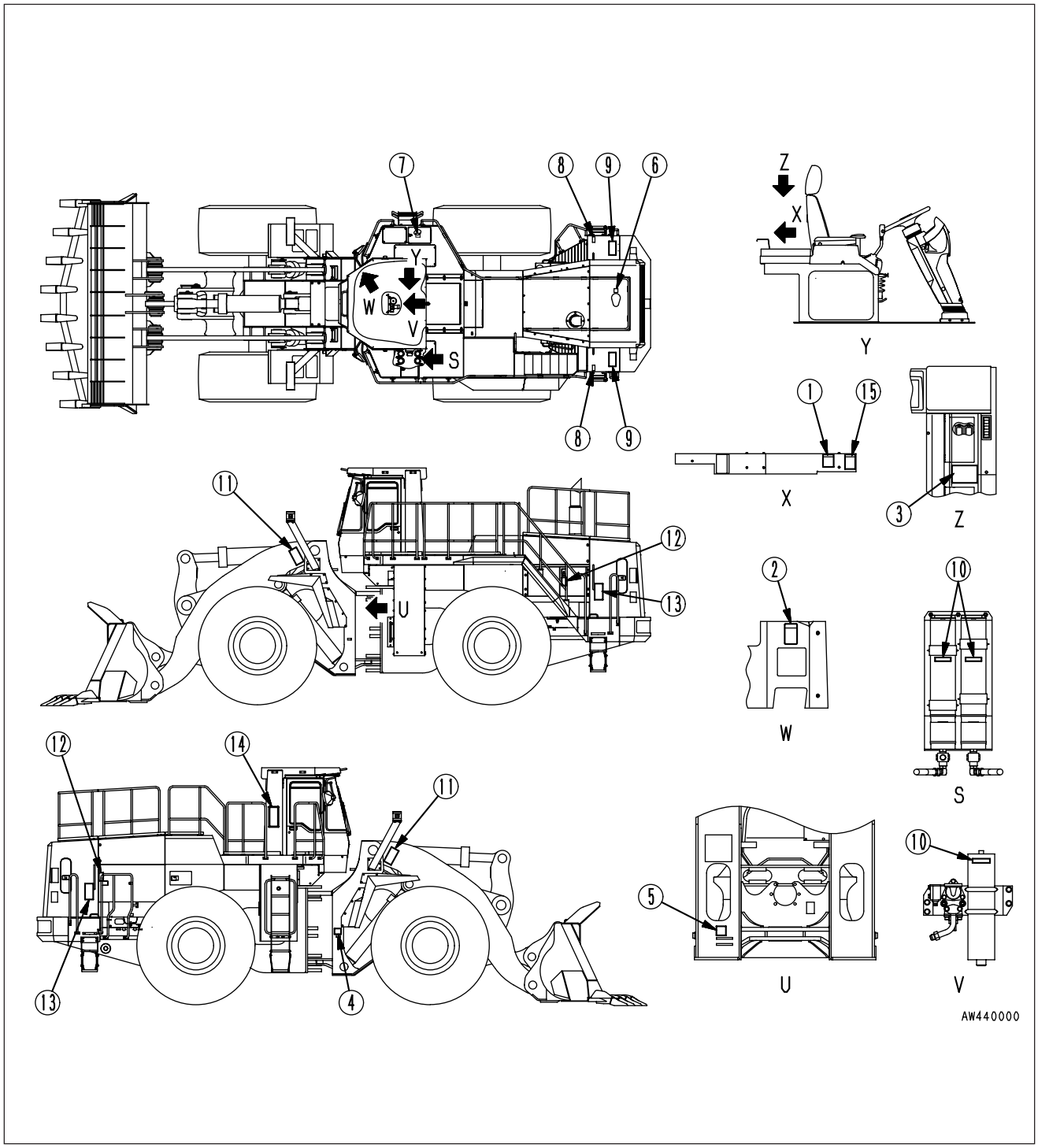
9. POSITION FOR ATTACHING SAFETY LABELS

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. Precautions before starting

WARNING

Improper operation and maintenance can cause serious injury or death.

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

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

2. Precautions for safety lock lever

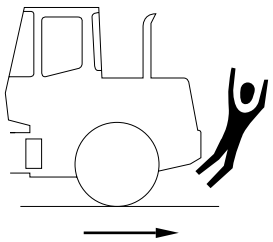
WARNING

To avoid hitting unlocked operation levers, lower equipment to ground and move SAFETY LOCK LEVER (located near seat) to LOCK position before standing up from operator's seat.

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

3. Precautions when traveling in reverse

WARNING



To prevent SEVERE INJURY or DEATH, do the following before moving machine or its attachments:

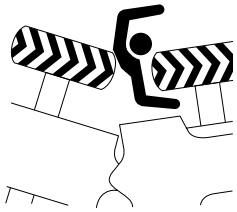
- Honk horn to alert people nearby.
- Be sure no one is on or near machine.
- Use spotter if view is obstructed.

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

Please request part number 428-93-21221 for safety labels (1 – 3).

4. Do not enter

DANGER



Crush Hazard. Can cause severe injury or death. When machine is being operated, never place yourself in articulated area of machine.

5. Precautions for safety bar

WARNING

If safety bar is unlocked, machine can jackknife unexpectedly when it is being transported or hoisted.

Jackknifing can cause serious injury or death to bystanders.

- Always lock safety bar when machine is being transported or hoisted.
- If necessary, lock safety bar during servicing or maintenance.

6. Precautions when coolant is at high temperature

WARNING

Hot water hazard.

To prevent hot water from spurting out:

- Turn engine off.
- Allow water to cool.
- Slowly loosen cap to relieve pressure before removing.

7. Precautions when oil is at high temperature

WARNING

Hot oil hazard.

To prevent hot oil from spurting out:

- Turn engine off.
- Allow water to cool.
- Slowly loosen cap to relieve pressure before removing.

8. Precautions when handling battery cable

WARNING

Improper use of booster cables and battery cables can cause an explosion resulting in serious injury or death.

Follow instructions in manual when using booster cables and battery cables.

Please request part number 421-93-21311 for safety labels (4 – 8).

9. Precautions when handling battery

(This plate is stick on the machine by the battery maker.)

10. High pressure warning (09659-53000)

11. "Do not go under work equipment" sign (09807-C1683)

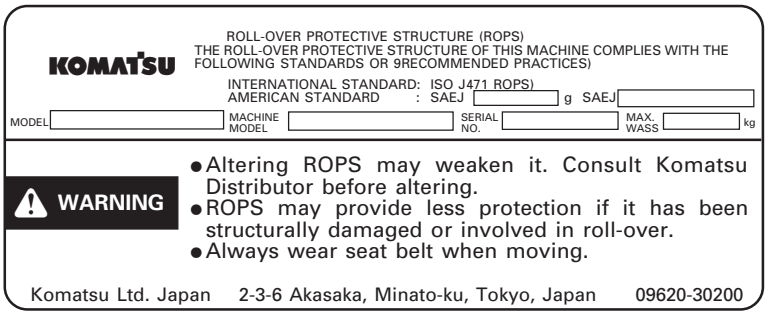
There is danger of work equipment coming down.

Do not go close when work equipment is raised.

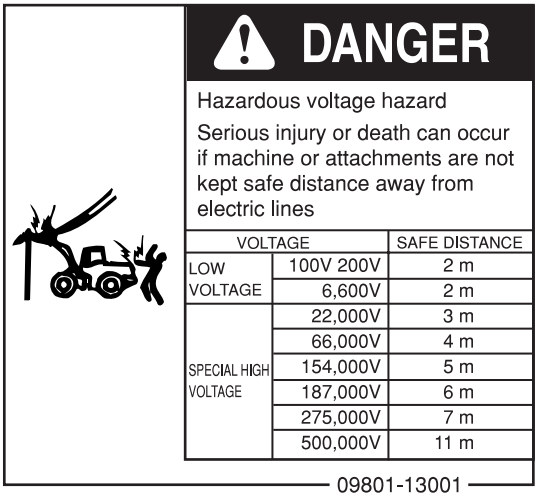
12. "Do not open when engine is running" sign (09667-03001)

13. "Do not come near machine" sign (09812-03000)

14. “Do not modify ROPS” sign



15. Precautions for going close to electric cables (09801-13001)



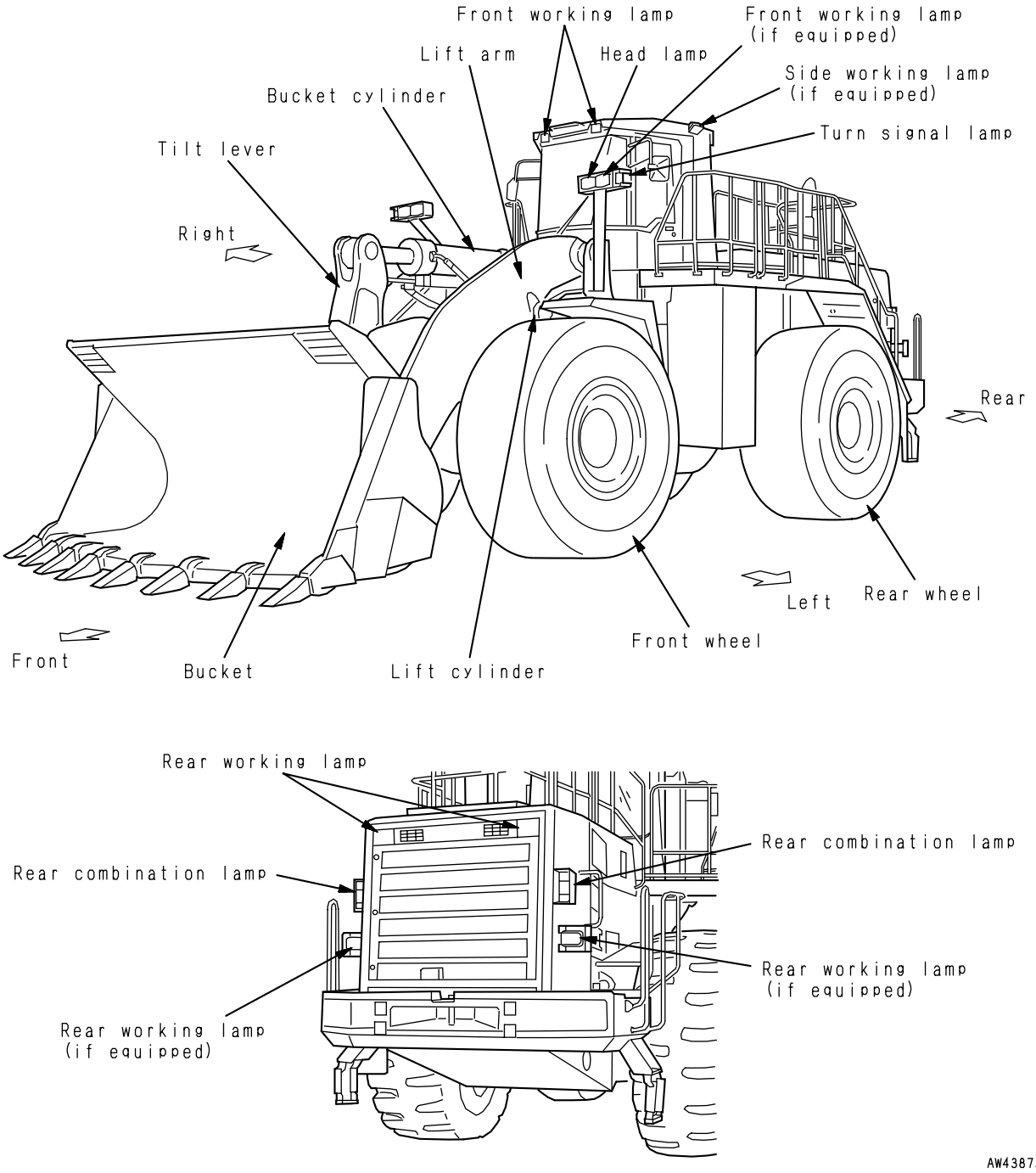
MEMO

OPERATION

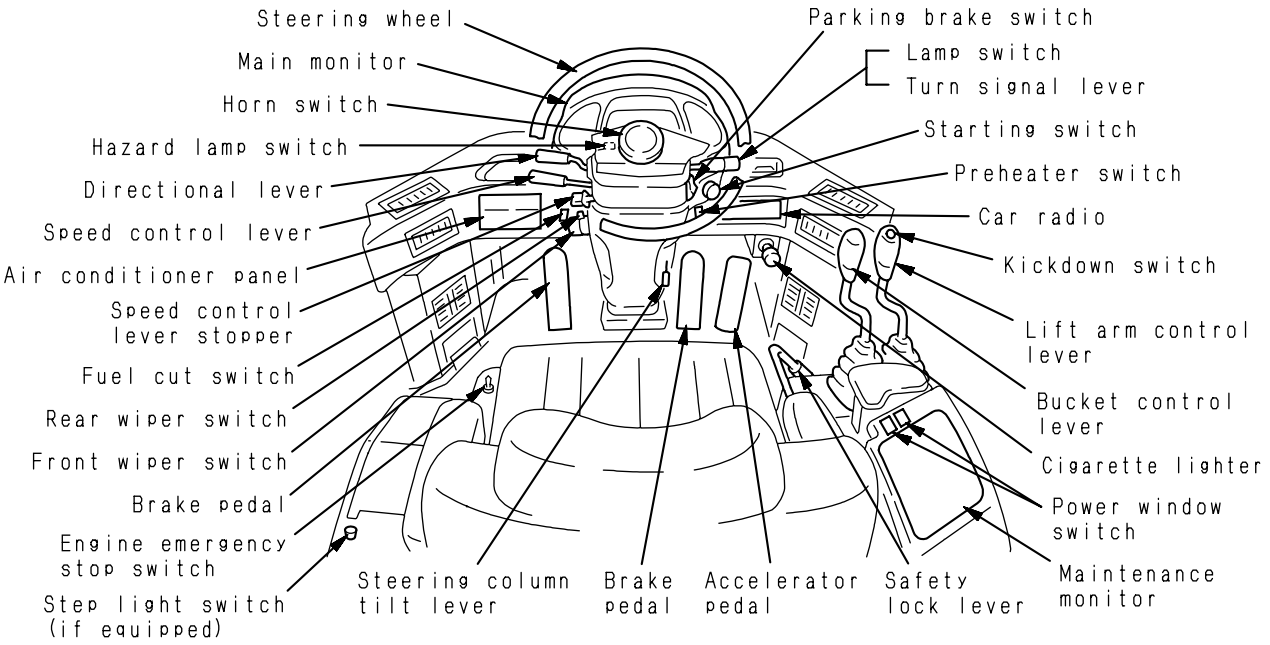
10. GENERAL VIEW

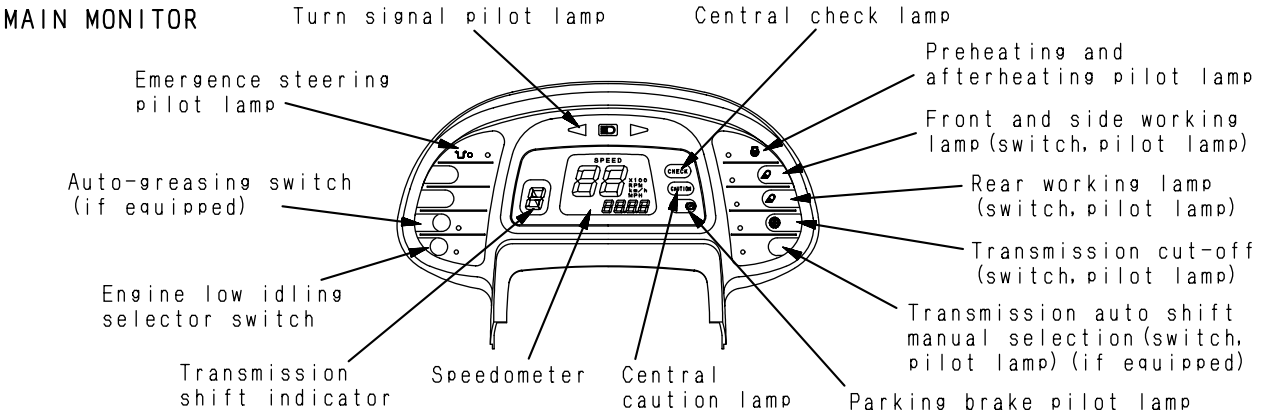
10.1 GENERAL VIEW OF MACHINE

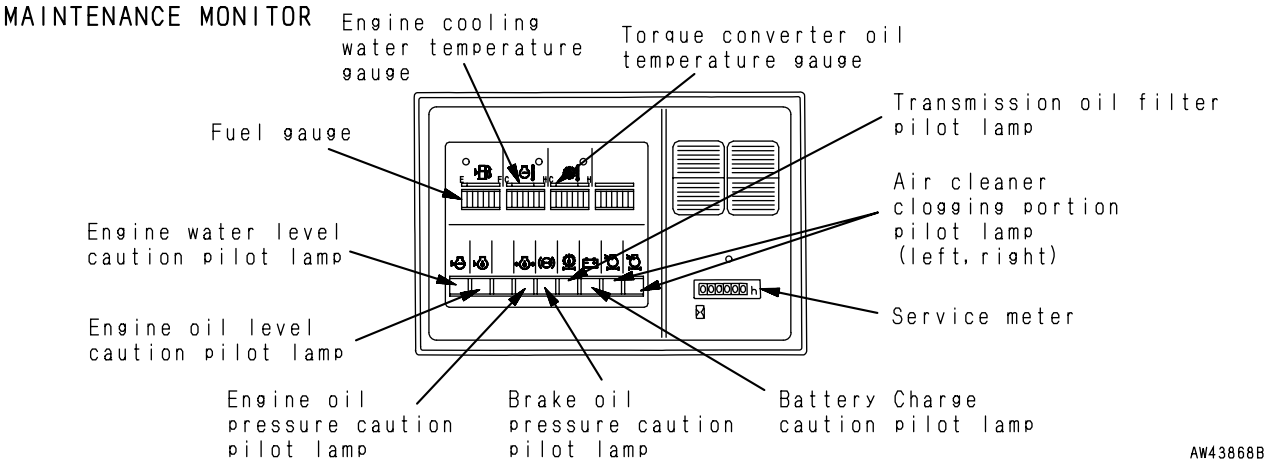
If directions are indicated in this section, they refer to the directions shown by the arrows in the diagram below.



10.2 GENERAL VIEW OF CONTROLS AND GAUGES





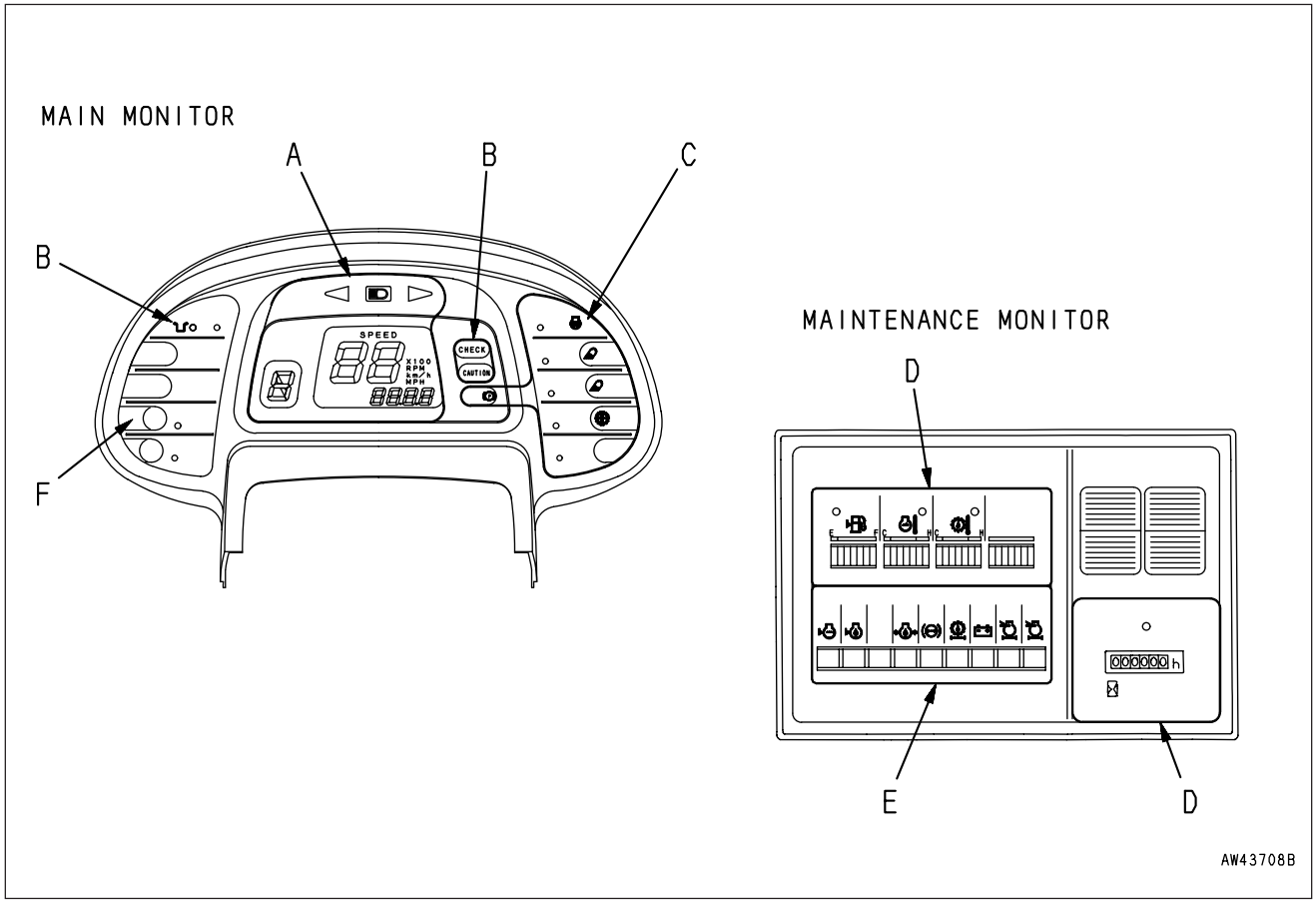


11. EXPLANATION OF COMPONENTS

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



The machine monitor system consists of the main monitor (in front of the operator' seat) and the maintenance monitor (on the right side of the operator's seat).

The monitor system can be divided functionally into the alarm display portions (B, E) and the meter display portions (A, C, D), and option display portion (F).

ALARM DISPLAY PORTIONS (B, E) (11.1.1)

These consist of the centralized check lamp (CHECK), central warning lamp (CAUTION), and warning pilot lamps (engine water level, engine oil level, brake oil pressure, engine oil pressure, battery charge, transmission oil filter, emergency steering, and air cleaner clogging).

METER DISPLAY PORTION (A, C, D) (11.1.2)

These consist of the meters (speedometer, fuel gauge, engine water temperature gauge, torque converter oil temperature gauge, service meter, transmission shift indicator) and the pilot lamps (turn signal indicator, preheating, front working lamp, rear working lamp, transmission cut-off, parking brake).

OPTION DISPLAY PORTION (F)

This consists of the monitor lamps and switches for the auto-greasing system.

For details of each system or component, see OPTIONS, ATTACHMENTS.

TESTING ACTUATION OF MACHINE MONITOR SYSTEM

When the starting switch is turned to the ON position before starting the engine, all monitor lamps, gauges, and centralized warning lamps will light up for approx. 3 seconds, and the alarm buzzer will sound for approx. 1 second.

When this happens, 88 is displayed on the speedometer, and 8 is displayed on the transmission shift indicator.

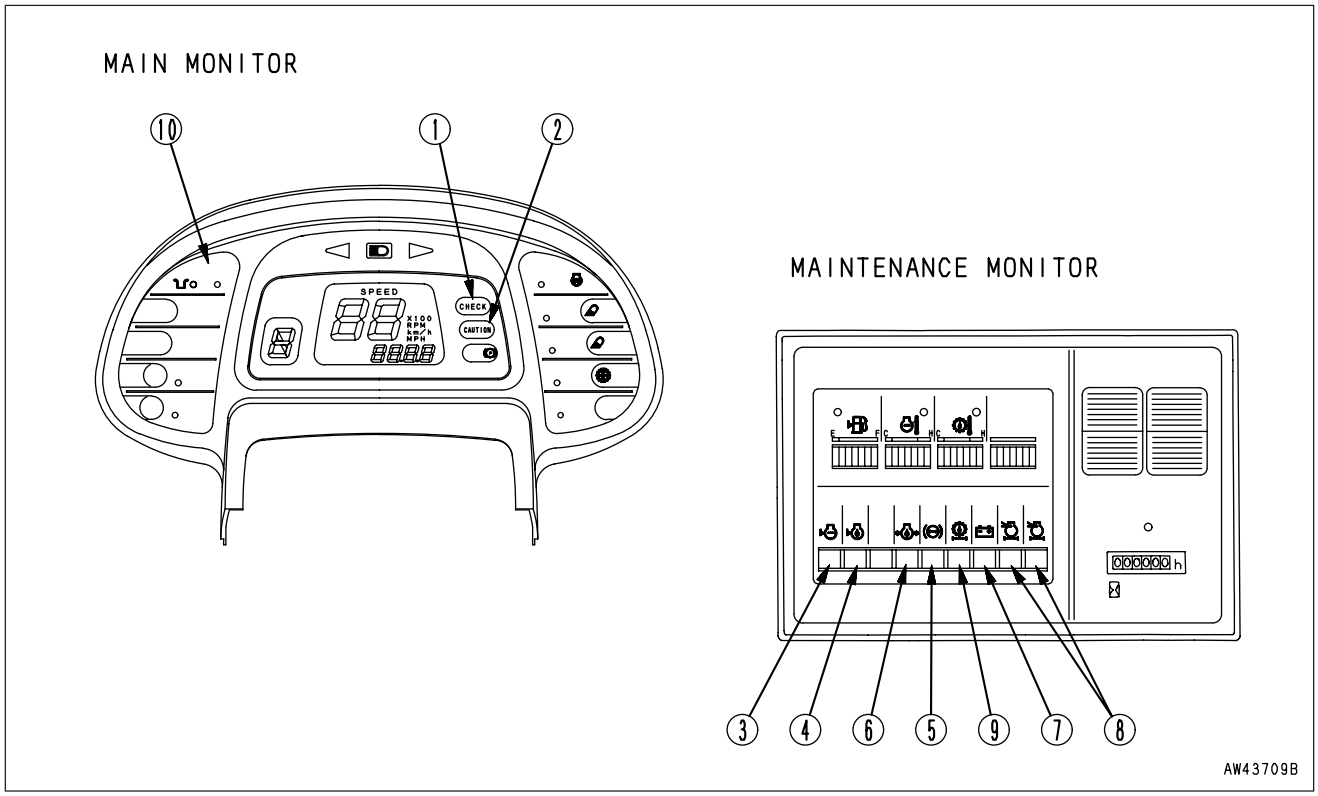
Finally, there will be two beeps to indicate that the monitor check has been completed.

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

When the starting switch is turned to the ON position, if the directional lever is not at the neutral position, the central warning lamp (CAUTION) will flash and the alarm buzzer will sound intermittently. If this happens, return the lever to the neutral position, and the lamps will go out and the buzzer will stop.

The monitor check cannot be carried out for at least 30 seconds after the engine has been stopped.

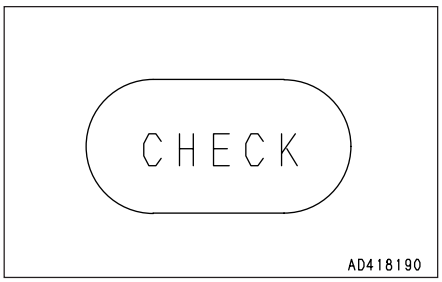
11.1.1 WARNING DISPLAYS



1. CENTRAL CHECK LAMP (CHECK)

⚠ WARNING

If this monitor flashes, carry out inspection and maintenance of the appropriate location as soon as possible.



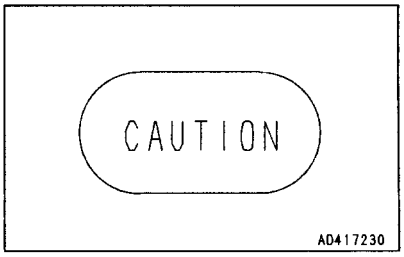
- If any abnormality is found in the CHECK items before starting the engine (engine oil level, engine water level), the monitor lamp for the abnormal location will flash and the central CHECK lamp will also flash.
  Check the location where the monitor lamp is flashing and carry out the check before starting.
  When carrying out the checks before starting, do not rely simply on the monitor. Always carry out the specified maintenance items.
  When carrying out checks before starting, if the engine oil level is abnormal, the engine oil level will change when the engine is started, so even if there is any abnormality, the central CHECK lamp and monitor lamp will stop flashing.
  If there is any abnormality in the engine water level, the central CHECK lamp will go out when the engine is started, but instead of this, the central CAUTION lamp will flash and the alarm buzzer will sound intermittently.

- If there is any abnormality in the battery charging system when the engine is running, the battery charge caution pilot lamp will flash and the central CHECK lamp will also flash at the same time. If the lamps flash, check the charging circuit.

2. CENTRAL CAUTION LAMP (CAUTION)

⚠ WARNING

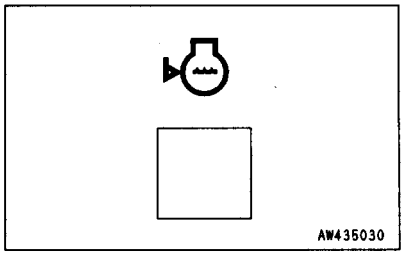
If these monitor lamps flash, stop the engine immediately or run it at low idling and do as follows.



- If there is an abnormality in any CAUTION item when the engine is running (engine water temperature, torque converter oil temperature, engine water level, engine oil level, brake oil pressure, engine oil pressure), the alarm buzzer will sound intermittently and the monitor lamp for the location of the abnormality will flash and the central CAUTION lamp will also flash.
- If the fuel gauge enters the red range when the engine is running, the fuel gauge will flash and the central CAUTION lamp will also flash. If they flash, check the fuel level and add fuel.

3. ENGINE WATER LEVEL CAUTION PILOT LAMP

This warns the operator that the coolant level in the radiator has dropped.



When carrying out the checks before starting (main switch ON, engine stopped):

If the level of the coolant in the radiator is low, the caution pilot lamp and central CHECK lamp will flash.

If the monitor lamps flash, check the coolant level in the radiator and add water.

Stop the machine on level ground before carrying out this check.

When operating (engine running):

If the condition is normal, the caution pilot lamp should be off.

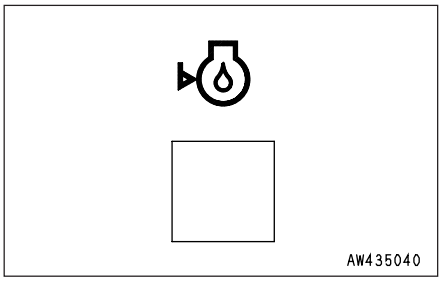
If the level of the coolant in the radiator is too low, the warning pilot lamp and central CAUTION lamp will flash, and the alarm buzzer will sound intermittently.

If the monitor lamps flash, stop the engine, check the level of the coolant in the radiator and add water.

Stop the machine on level ground before carrying out this check.

4. ENGINE OIL LEVEL CAUTION PILOT LAMP

This warns the operator that the level of the oil in the engine oil pan has dropped.



When carrying out checks before starting:

If the oil level in the engine oil pan is low, the caution pilot lamp and central CHECK lamp will flash.

If the monitor lamps flash, check the oil level in the engine oil pan and add oil.

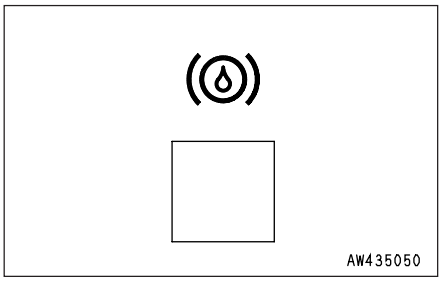
Stop the machine on level ground before carrying out this check.

When operating:

Even if the engine oil level caution pilot lamp is flashing during check before starting, it will go out when the engine is started.

5. BRAKE OIL PRESSURE CAUTION PILOT LAMP

This warns the operator that the brake oil pressure has dropped.



When carrying out checks before starting:

When the engine is stopped, the brake oil pressure circuit is not actuated, so the caution pilot lamp and central CHECK lamp are also off.

When operating:

If the brake oil pressure goes down, the caution pilot lamp and central CAUTION lamp will flash, and the alarm buzzer will sound intermittently. If the monitor lamps flash, stop the engine immediately and check the brake oil pressure circuit.

REMARK

The monitor lamp may flash and go out after approx. 10 seconds immediately after the engine is started. This is because pressure is being stored in the brake accumulator. It does not indicate any abnormality.

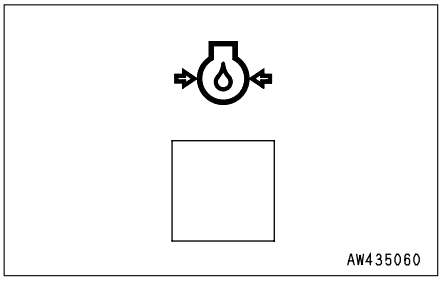
6. ENGINE OIL PRESSURE CAUTION PILOT LAMP

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

If it flashes, stop the engine and check.

Check before starting: Lights up

Engine started or running: When the engine is started, the lubrication pressure is formed and the lamps go out. If the engine lubrication pressure drops, the warning pilot lamp and central CAUTION lamp will flash, and the buzzer will sound intermittently.



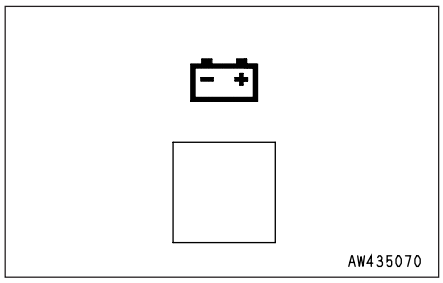
7. BATTERY CHARGE CAUTION PILOT LAMP

This warns the operator that there is an abnormality in the charging system when the engine is running.

Check before starting: Lights up

Engine started or running: When the engine is started, the alternator generates electricity and the lamp goes out.

If any abnormality occurs in the charging system, the caution pilot lamp and central CHECK lamp will flash. If they flash, check the charging circuit.



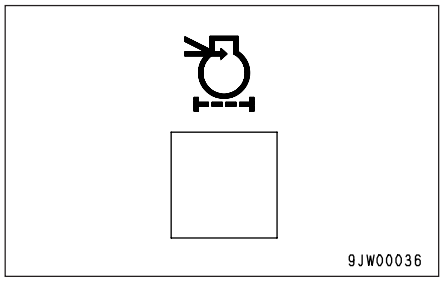
8. AIR CLEANER CLOGGING PORTION PILOT LAMP

When the engine is running, this warns the operator that the air cleaner element is clogged.

Check before starting: OFF

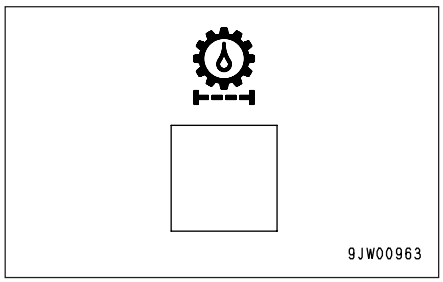
When operating: If the air cleaner becomes clogged, the caution pilot lamp and central CHECK lamp will flash.

If they flash, clean or replace the element.



9. TRANSMISSION OIL FILTER PILOT LAMP

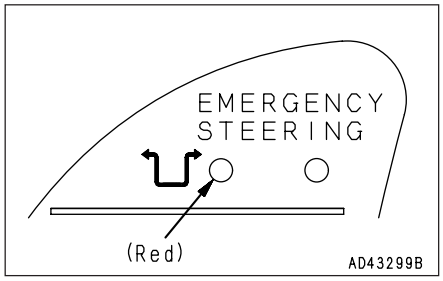
This warns the operator that the transmission oil filter is clogged. If this lamp flashes, replace the filter element.



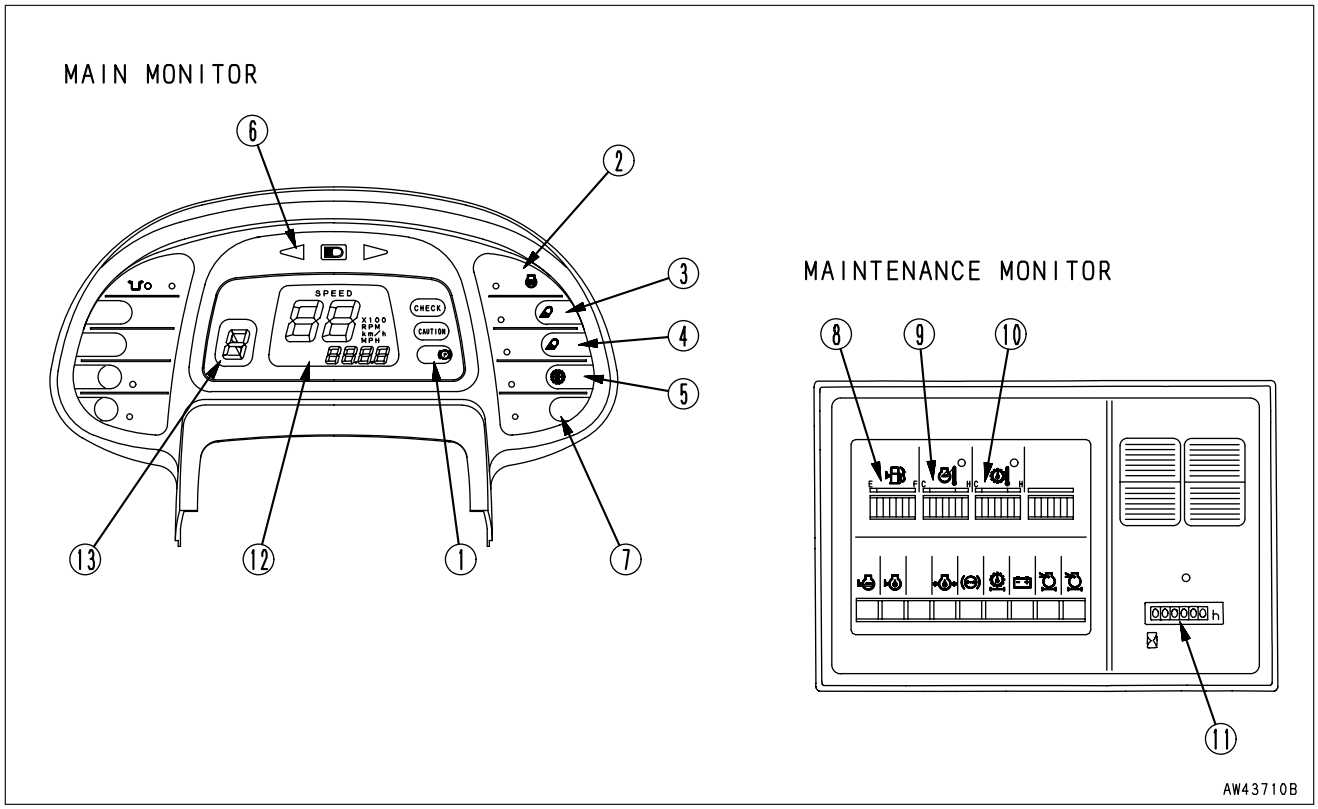
10. EMERGENCY STEERING PILOT LAMP

If the engine stops when the machine is traveling, or if there is any abnormality in the steering circuit, the monitor flashes (red) to indicate that the emergency steering system has been actuated.

If the monitor flashes, move the machine immediately to a safe place, stop the engine, and check for the cause.



11.1.2 METER DISPLAY PORTION



PILOT DISPLAY

When the starting switch is ON, the pilot display lights up when the display items are functioning.

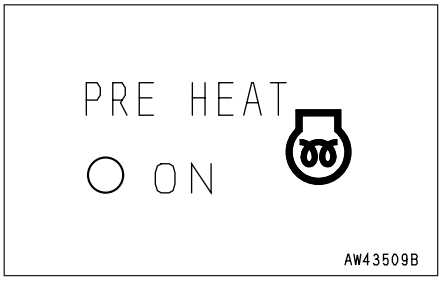
1. PARKING BRAKE PILOT LAMP

This lamp lights up when the parking brake is applied.

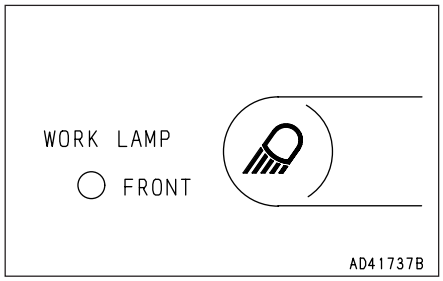
2. PREHEATING AND AFTERHEATING PILOT LAMP

When using APS (automatic priming system) and when starting, switch on lamp and you will be informed that pre-heating has started.

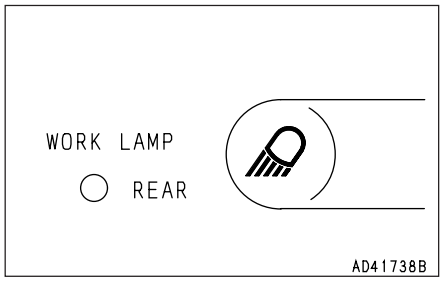
When using APS (automatic priming system) in cold weather, and when starting, after the engine starts, the lamp will flash until the water temperature reaches 20°C, informing you that afterheating has started.



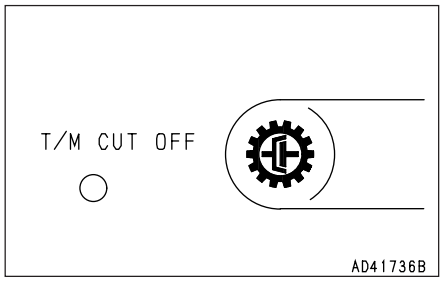
3. FRONT AND SIDE WORKING LAMP PILOT LAMP
This lamp lights up when the front working lamp is switched on.



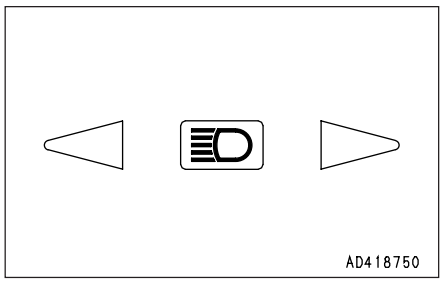
4. REAR WORKING LAMP PILOT LAMP
This lamp lights up when the rear working lamp is switched on.



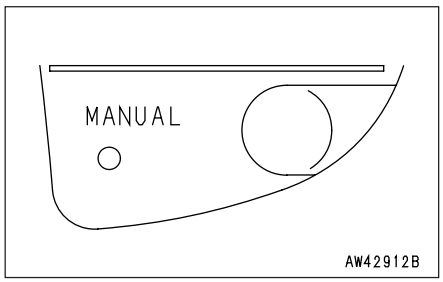
5. TRANSMISSION CUT-OFF PILOT LAMP
This lamp lights up when the transmission cut-off switch is turned to ON.
If the monitor lamp is ON and the left brake pedal is depressed, the transmission will be returned to neutral.



6. TURN SIGNAL PILOT LAMP
When the turn signal lamp flashes, the pilot lamp also flashes.

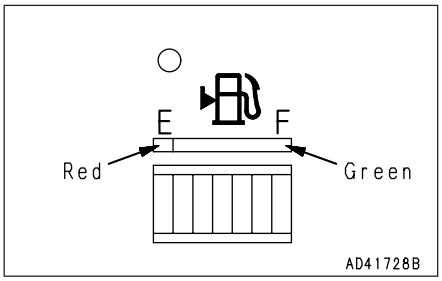


7. TRANSMISSION AUTO SHIFT MANUAL SELECTION PILOT LAMP (if equipped)
This lamp lights up when the transmission is set to manual selection. While the monitor is lighted up, it is possible to shift gear with the gear shift lever.



METERS

8. FUEL GAUGE



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

E: Tank is EMPTY

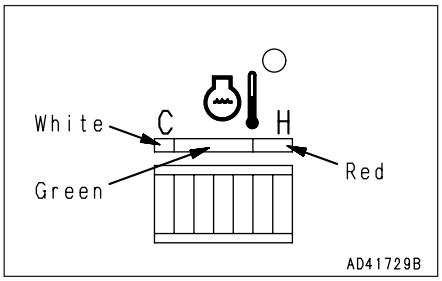
F: Tank is FULL

The lamp should light up in the green range during operation.

If it enters the red range during operation, the fuel gauge lamp and central CAUTION lamp will flash.

If only the red range lights up during operation, it means that there is less than 106 ℓ (27.98 US gal, 23.32 UK gal) of fuel left, so check and add fuel.

9. ENGINE COOLING WATER TEMPERATURE GAUGE



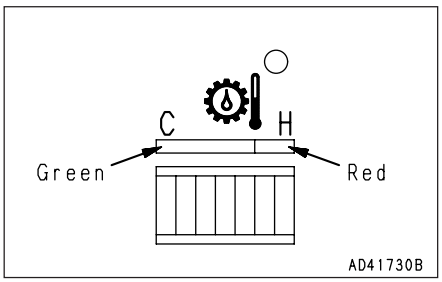
This gauge indicates the temperature of the cooling water.

If the temperature is normal during operation, the green range will light.

If the red range lights during operation, stop the machine and run the engine with no load at midrange speed until the green range lights.

If the lamps light up to the 1st red level, the engine water temperature gauge lamp and central CAUTION lamp will flash; when the lamps light up to the 2nd red level, the alarm buzzer will also sound intermittently.

10. TORQUE CONVERTER OIL TEMPERATURE GAUGE



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

If the red range lights during operation, stop the machine and run the engine with no load at midrange speed until the green range lights.

If the lamps light up to the 1st red level, the torque converter oil temperature gauge lamp and central CAUTION lamp will flash; when the lamp lights up to the 2nd red level, the alarm buzzer will also sound intermittently.

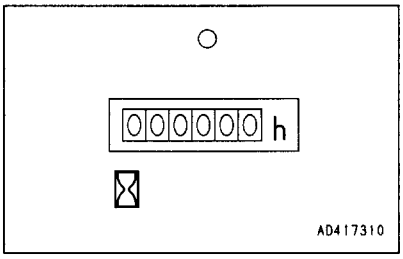
11. SERVICE METER

This meter shows the total operation hours of the machine.

The service meter advances while the engine is running - even if the machine is not traveling.

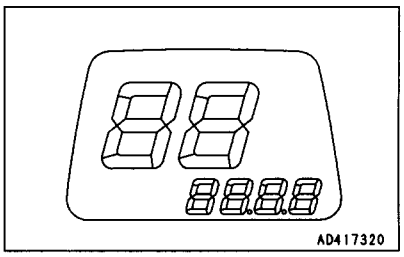
While the engine is running, green pilot lamp on the service meter flashes to show the service meter advances.

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



12. SPEEDOMETER

This meter indicates the travel speed of the machine.

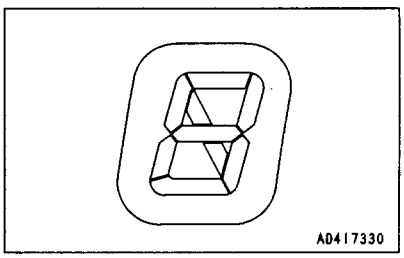


13. TRANSMISSION SHIFT INDICATOR

This indicates the present speed range of the transmission.

When the directional lever is at the N position, N is displayed on the indicator.

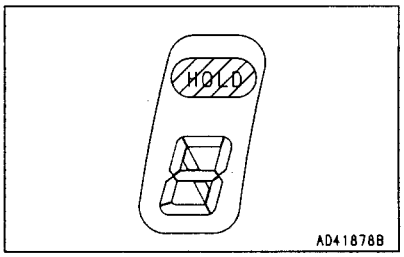
When the directional lever is at the F or R position, the shift position of the speed lever is displayed as a numeral.

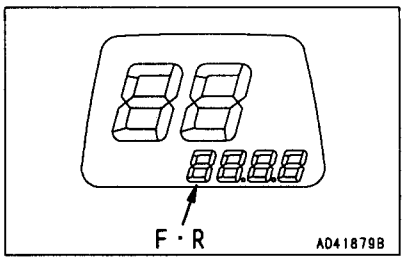


WHEN USING JOYSTICK STEERING SYSTEM (if equipped)

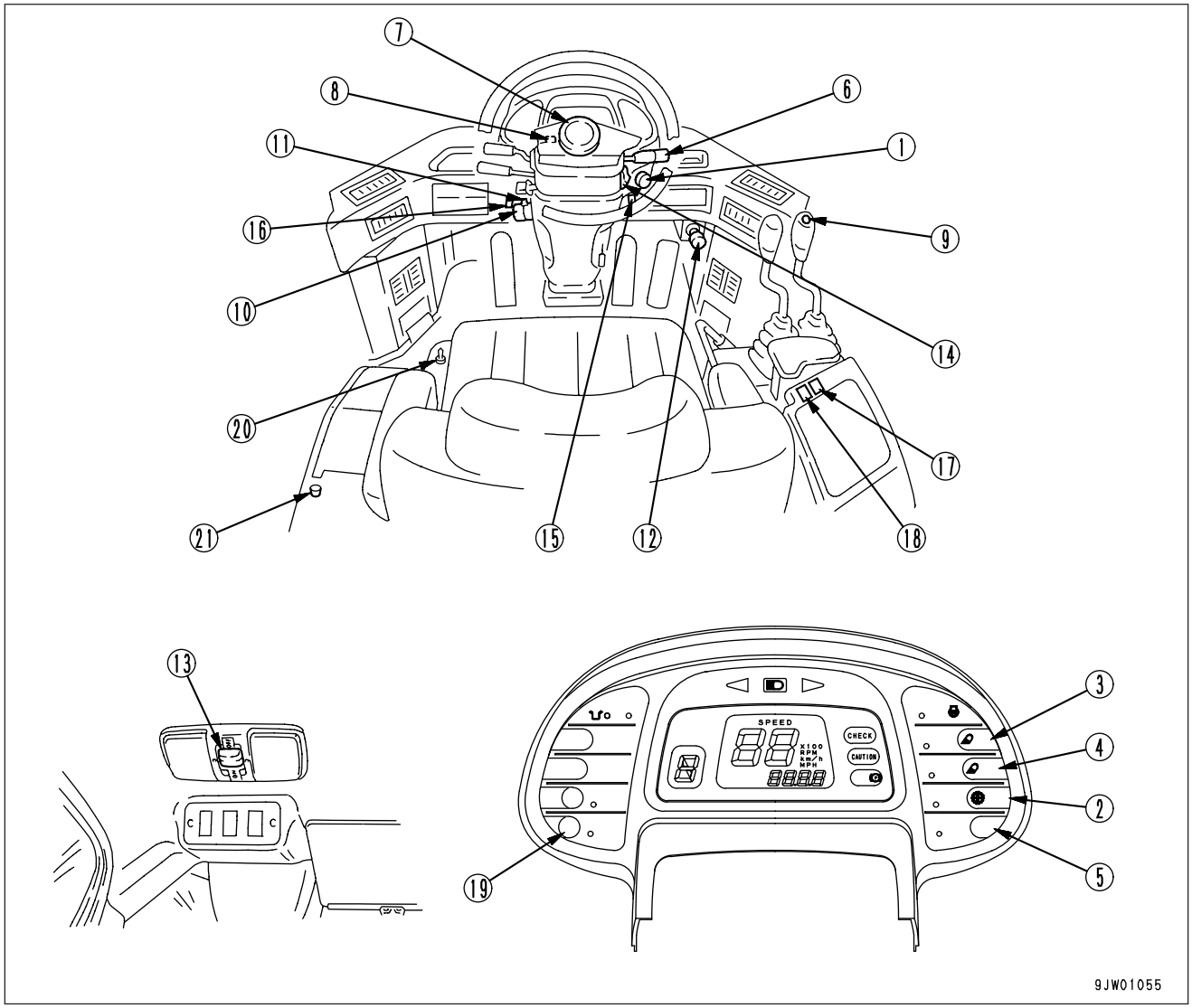
This indicates the transmission speed range. When the N button of the FNR buttons on the head of the joystick lever is pressed, the indicator displays N.

When the F (FORWARD) or R (REVERSE) buttons of the FNR buttons on the head of the joystick lever are pressed, F or R is displayed at the bottom of the speedometer and the shift indicator displays the transmission speed range and N.



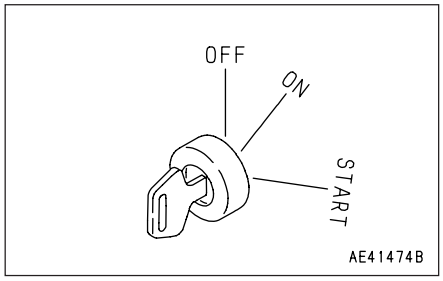


11.2 SWITCHES



1. STARTING SWITCH

This switch is used to start or stop the engine.



OFF position

The key can be inserted and removed at this position. When the key is turned to this position, the electric circuit is turned off and the engine stops.

And when the key is turned to this position, the parking brake is automatically turned on.

ON position

Electric current flows in the charging, lamp and accessary circuits.

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

START position

This is the engine-start position. Keep the key at this position during cranking. Immediately after starting the engine, release the key which will automatically return to the ON position.

2. TRANSMISSION CUT-OFF SWITCH

⚠ WARNING

If the machine has to be started on a slope, always turn the transmission cut-off switch to OFF and depress the left brake pedal. Then depress the accelerator pedal while releasing the left brake pedal to start the machine off slowly.

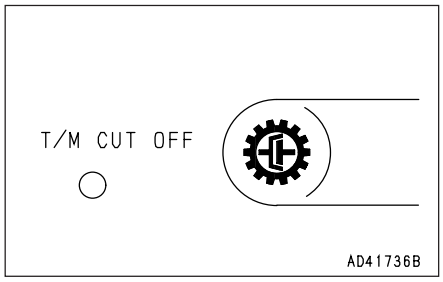
Press the push button to switch ON and OFF.

When the pilot lamp is pressed, it will light up and come ON; if it pressed again, the pilot lamp will go out and the transmission cut-off will be turned OFF.

Normally, put this switch in the ON position.

① OFF: Acts as normal brake (like right brake pedal).

② ON: Acts as normal brake, but also switches transmission to NEUTRAL.



If the switch is at ON, the transmission cut-off pilot lamp will light up.

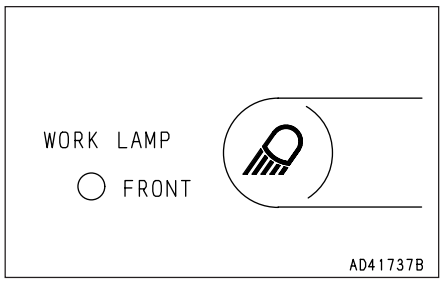
REMARK

General loading work can be carried out more smoothly if the transmission cut-off function is not used.

3. FRONT AND SIDE WORKING LAMP SWITCH

⚠ WARNING

Always turn the working lamp off before traveling on public roads.



When turning on the front working lamp, turn the lamp switch to the ON position for the side clearance lamp or ON position for the head lamp, then operate the switch.

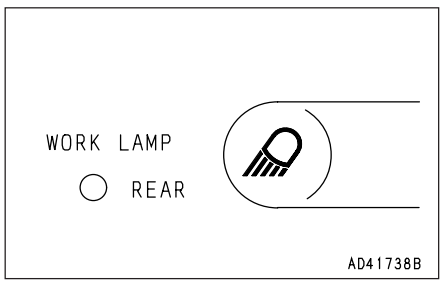
When the pilot lamp is pressed, it will light up and come ON; if it pressed again, the pilot lamp will go out and the working lamp will be turned OFF.

The working lamp will not light up if the lamp switch is not at the ON position for the side clearance lamp or ON position for the head lamp.

4. REAR WORKING LAMP SWITCH

⚠ WARNING

Always turn the working lamp off before traveling on public roads.



When turning on the rear working lamp, turn the lamp switch to the ON position for the side clearance lamp or ON position for the head lamp, then operate the switch.

When the pilot lamp is pressed, it will light up and come ON; if it pressed again, the pilot lamp will go out and the working lamp will be turned OFF.

The working lamp will not light up if the lamp switch is not at the ON position for the side clearance lamp or ON position for the head lamp.

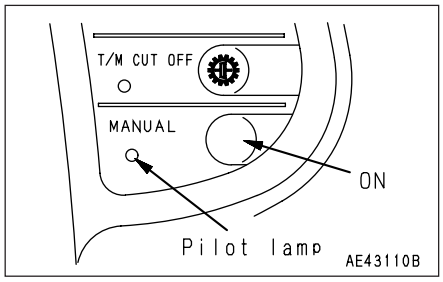
5. TRANSMISSION MANUAL SELECTION SWITCH
(Machine equipped with auto shift)

Press the push button to turn ON or OFF. If the switch is pressed once, the pilot lamp lights up and the system is switched ON. If it is pressed again, the pilot lamp goes out and the system is switched OFF.

Normally, leave this switch in the OFF position.

OFF: Automatic gear shifting
ON : Manual gear shifting

If the switch is turned ON, the transmission manual selection pilot lamp lights up.



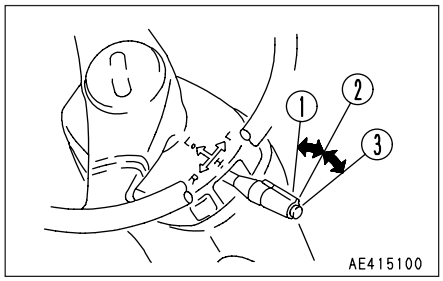
REMARK

For details of manual gear, see "11.3 CONTROL LEVERS, PEDALS". For details of automatic gear shifting (if equipped), see "28. HANDLING AUTO SHIFT SYSTEM".

6. LAMP SWITCH

This is used to light up the head lamps, side clearance lamps, tail lamps, and instrument panel lighting.

① OFF
② ≡D·◁≡ position: Side clearance lamp, tail lamps, and gauge lighting light up
③ ≡D· position: Head lamps light up in addition to lamps at ≡D·◁≡ position



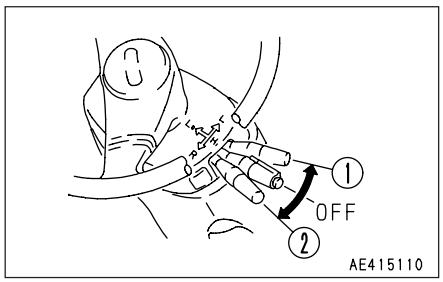
REMARK

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

6. TURN SIGNAL LEVER

This lever operates the turn signal lamps.

① LEFT TURN: Push lever FORWARD.
② RIGHT TURN: Pull lever BACK.

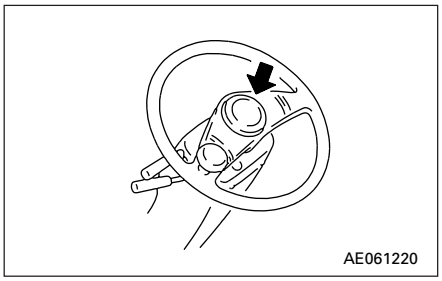


REMARK

- When the lever is operated, the turn signal pilot lamp will also light up.
- When the steering wheel is turned to the neutral position, the turn signal lever will return automatically to OFF. If not, return the lever to OFF manually.

7. HORN SWITCH

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

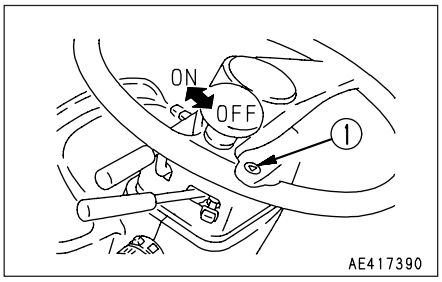


8. HAZARD LAMP SWITCH

⚠ WARNING

Use the hazard lamps only in emergencies. Using the hazard lamps when traveling will cause problems for other machines.

This switch is used in emergencies, such as when the machine breaks down.
ON: All turn signal lamps flash.



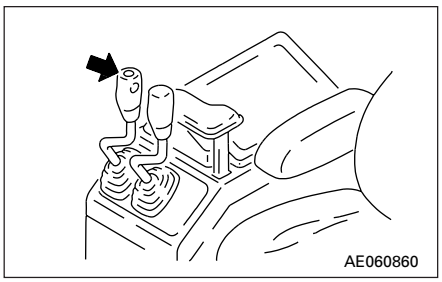
REMARK

When this switch is turned to the ON position, the turn direction indicator lamps and turn indicator pilot lamp flash, and display lamp ① lights up at the same time.

9. KICKDOWN SWITCH

When the speed control lever is in 2nd, and the switch at the top of the knob of the lift arm control lever is pressed, the gear will shift down to 1st.

This switch is used to increase the drawbar pull in digging operations.

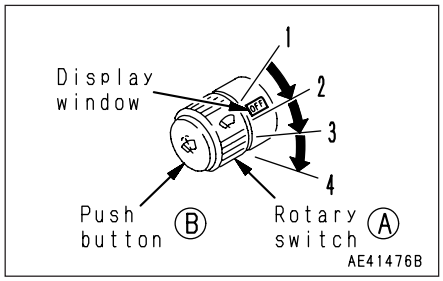


REMARK

To cancel the kickdown switch, move the directional lever to REVERSE or NEUTRAL, or move the speed control lever to any position except 2nd. It is also possible to cancel the kickdown switch by operating the parking brake switch or by turning the starting switch OFF.

10. FRONT WIPER SWITCH

- Turn switch Ⓐ to operate the front wiper.

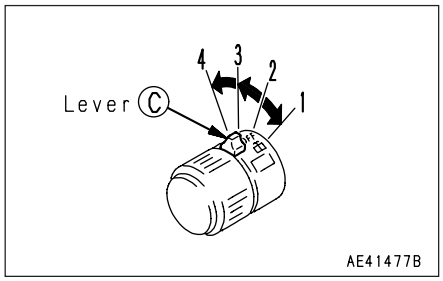


Switch position	Display window	Operation
1	OFF	OFF
2	INT	Intermittent wiper
3	1	Low-speed wiper
4	2	High-speed wiper

- If button Ⓑ is kept pressed, washer fluid will be sprayed out on to the front glass.

11. REAR WIPER SWITCH

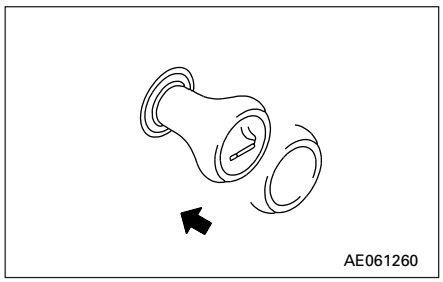
- Turn lever Ⓒ to operate the rear wiper.



Position of switch	Display	Operation
1		Washer fluid sprayed
2	OFF	OFF
3		Wiper actuated
4		Washer fluid sprayed, wiper actuated

12. CIGARETTE LIGHTER

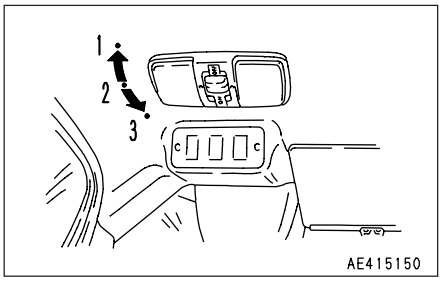
This is used to light cigarettes.
To use, push the lighter in. After the few seconds it will spring back. At that time, remove the lighter and light your cigarette.



13. ROOM LAMP SWITCH

This lights up the room lamp.

On position: Lights up



Position 1: OFF
Position 2: Lights up when cab door is opened
Position 3: Lights up

REMARK

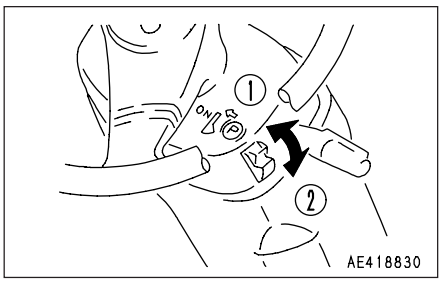
- The room lamp lights up even when the main switch is OFF, so when leaving the operator's compartment, turn the switch to position 1 or 2.
- When operating with the cab door fully open, set the switch to position 1 (OFF).

14. PARKING BRAKE SWITCH

⚠ WARNING

Always apply the parking brake when leaving the machine or parking it.
Even if the parking brake switch is turned ON, there is danger until the parking brake pilot lamp lights up, so keep the brake pedal depressed.

This switch operates the parking brake.



① ON position: The parking brake is applied, and the parking brake pilot lamp lights up.
② OFF position: The parking brake is released.

REMARK

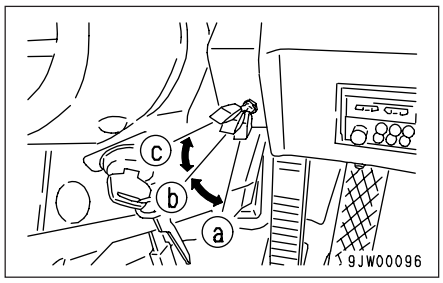
- If the directional lever is placed in F (FORWARD) or R (REVERSE) with the parking brake applied, the warning lamp will flash and the alarm buzzer will sound.
- When the starting switch is turned to OFF, the parking brake is automatically applied.
  Before starting the engine, turn the parking brake switch to ON, then turn it to OFF.
- The machine does not start when the directional lever is operated with the parking brake applied.

NOTICE

- **Never use the parking brake switch to apply the brakes when traveling, except in an emergency. Apply the parking brake only after the machine has stopped.**
- **If the parking brake has been used as an emergency brake when traveling at high speed (near the maximum speed), contact your Komatsu distributor to have the parking brake checked for any abnormality.**

15. PREHEATER SWITCH

(APS (automatic priming system) switch)



When using APS, engine intake air is heated. Usually, the switch should be in the OFF position.

ⓐ OFF position:
The pre-heat function is not working.

ⓑ AUTO position:
When engine water temperature is below 13˚C, APS starts.
After starting, maintain this position until the lamp of the afterheating monitor goes out.
Before starting APS, put the switch to ON and then put it to this position.

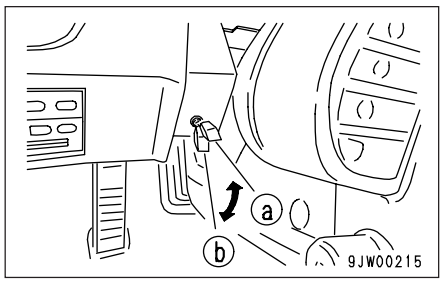
ⓒ ON position:
If the switch is moved again from AUTO position and upward to ON, APS operation will begin.

If the switch is released when at the ON position, it will automatically return to AUTO.

When the engine settle down after starting, put the preheater switch in OFF position.

Method of using preheater switch, refer to the section "12.2.2 STARTING IN COLD WEATHER".

16. FUEL CUT-OFF SWITCH



Engine fuel consumption will be cut.

When using APS (automatic priming system) in cold weather, use when starting.

ⓐ OFF: Fuel is not supplied to the engine.

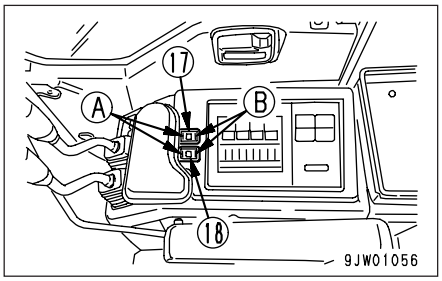
ⓑ ON: Fuel is supplied to the engine.

When hand is removed from OFF position, switch returns to ON position.

For detailed method of usage, refer to "12.2.2 STARTING IN COLD WEATHER".

17. RIGHT SIDE POWER WINDOW SWITCH
18. LEFT SIDE POWER WINDOW SWITCH

These switches can be used while the engine switch is at the ON position.



⚠ WARNING

When closing the window glass, take care not to catch anyone's hand or face in it. The window glass can cause serious injury.

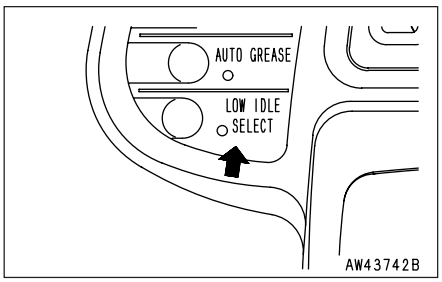
⚠ CAUTION

Do not keep operating the power window switch in the same direction after the window glass is fully opened or closed. This operation will cause trouble with the power window.

Press part Ⓐ, and the side glass will lower.
Press part Ⓑ, and the side glass will rise.

When the glass reaches the top or bottom, release the switch.

19. ENGINE LOW IDLING SELECTOR SWITCH

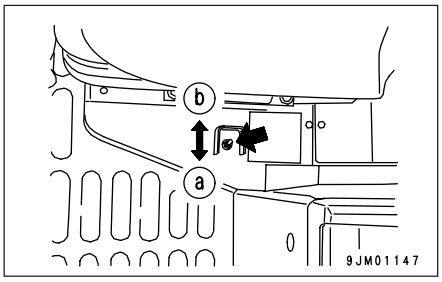


The engine low idling speed can be switched between two levels with this switch.

Press the push button to turn ON or OFF. If the switch is pressed once, the pilot lamp lights up and the system is switched ON. If it is pressed again, the pilot lamp goes out and the system is switched OFF.

OFF: This sets the engine low idling speed to approx. 650 rpm. This is used for normal operations at low idling, such as when waiting for dump trucks.
ON: The engine low idling speed is set to approx. 850 rpm. This is used on busy jobsites where it is necessary to reduce the cycle time.

20. ENGINE EMERGENCY STOP SWITCH



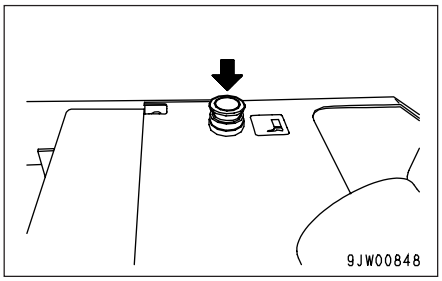
⚠ WARNING

Never use this switch when stopping the engine normally. After using it, return it to the normal position when the engine has stopped completely.

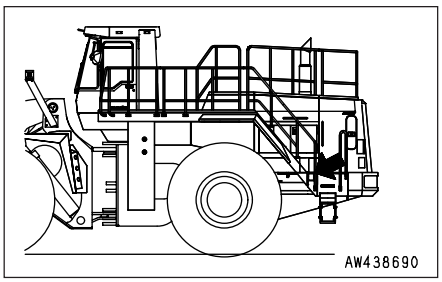
Use this switch when it is impossible to stop the engine by turning the starting switch OFF.
Position ⓐ: Normal position
Position ⓑ: Emergency stop position

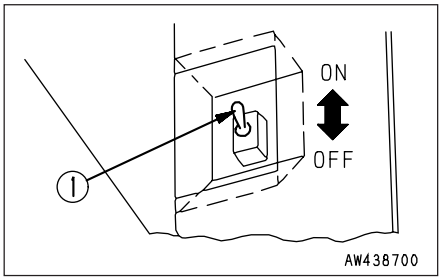
21. STEP LIGHT SWITCH (if equipped)

This is used to light the left rear step and ladder. If the operator presses this switch when getting off the machine, the lamp lights up for about 1 minute, then goes off automatically.

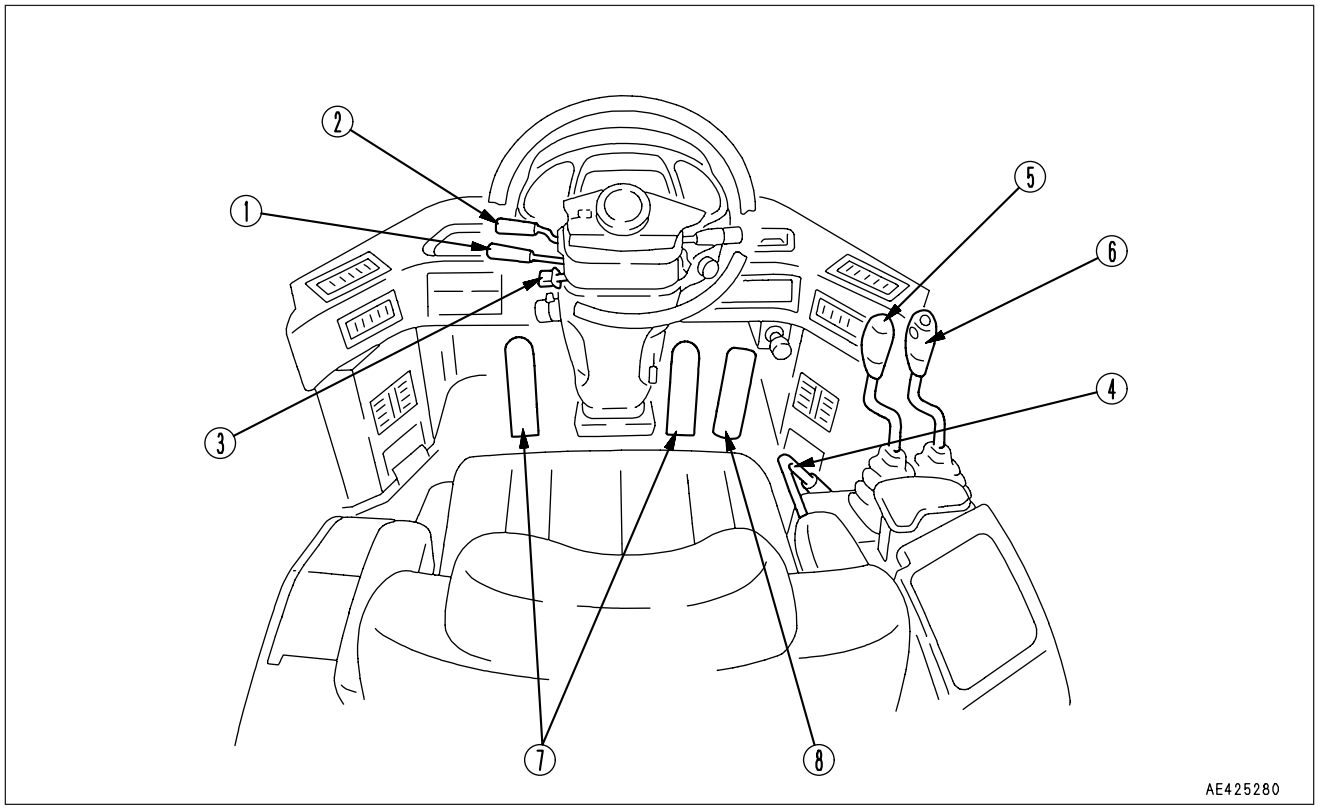


If the operator turns step light switch ① at the bottom of the rear step to the upper (ON) position when getting on the machine, the step light stays lit for about 1 minute, then goes off automatically. If the switch is released, it returns to the OFF position automatically.





11.3 CONTROL LEVERS, PEDALS



1. SPEED CONTROL LEVER

This lever controls the travel speed of machine.

MANUAL SHIFT SYSTEM

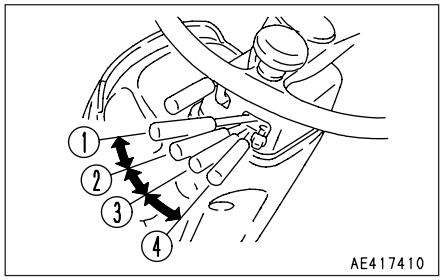
This machine has a 4-FORWARD, 4-REVERSE speed transmission.

Place the speed control lever in a suitable position to obtain the desired speed range.

1st and 2nd speeds are used for working.

3rd and 4th speeds are used for traveling.

However, when the speed control lever stopper is being used, it is impossible to shift to 3rd or 4th. Disengage the speed control lever stopper before trying to shift gear.

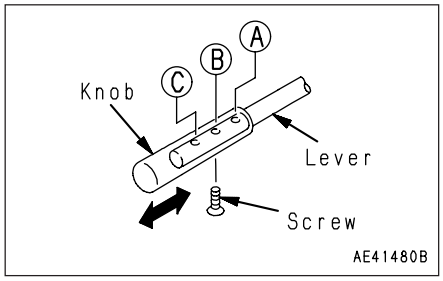


Position ①: 1st
Position ②: 2nd
Position ③: 3rd
Position ④: 4th

REMARK

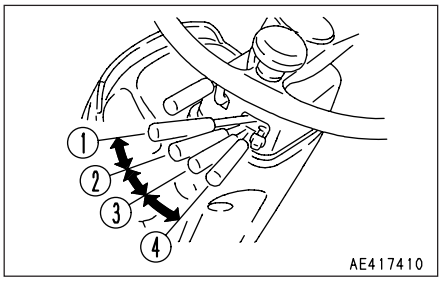
The length of the lever can be adjusted to 3 stages (positions Ⓐ, Ⓑ, Ⓒ). To adjust the length, remove the screw at the bottom of the lever knob, slide the knob to the desired position, then tighten the screw again.

(The lever is installed to position Ⓑ when it is shipped from the factory.)



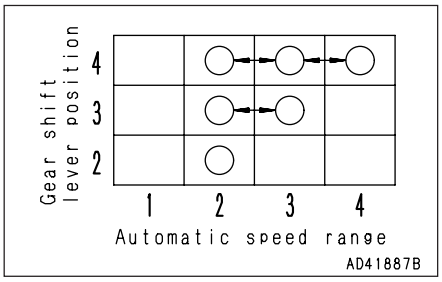
AUTOMATIC SHIFT SYSTEM (IF EQUIPPED)

Automatic gear shifting can be carried out in the 2nd to 4th speed range of the four forward and reverse speeds depending on the travel conditions.



Position ①: 1st speed
Position ②: 2nd speed
Position ③: 3rd speed
Position ④: 4th speed

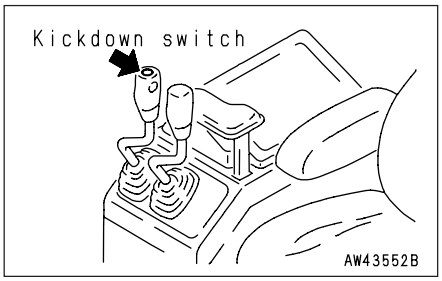
The range of speeds during automatic gear shifting is determined by the position of the gear shift lever as shown in the chart on the right.



REMARK

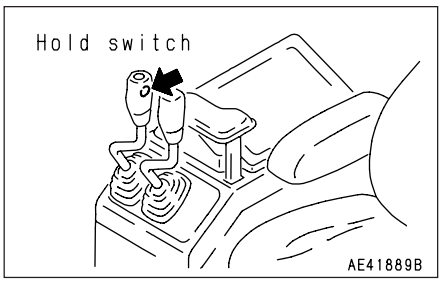
When the gear shift lever is at position ①, the speed is fixed in 1st. Automatic gear shifting is not carried out. When shifting down from 2nd to 1st, press the kickdown switch on the lift arm control lever.

When traveling in any speed range in forward or reverse, if the travel speed is less than 12 km/h (7.4 MPH), the kickdown switch can be actuated to shift down to 1st speed. In this way, it is made easy to carry out load and carry operation.



To set to the desired speed range when traveling uphill or downhill, or when carrying out grading, do as follows.

- When fixing the speed range
  Press the HOLD switch on the lift arm control lever.
  The speed range is fixed at the speed range displayed on the transmission indicator on the main monitor.
- When shifting up or down from set speed range
  Shift gear with the gear shift lever.



REMARK

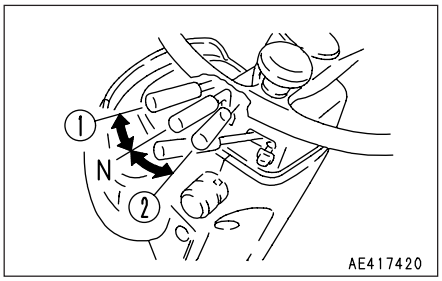
When the transmission has been shifted down from 2nd to 1st with the kickdown switch, it will shift up from 1st to 2nd when the travel speed increases.

2. DIRECTIONAL LEVER

This lever is used to change the direction of travel of the machine.

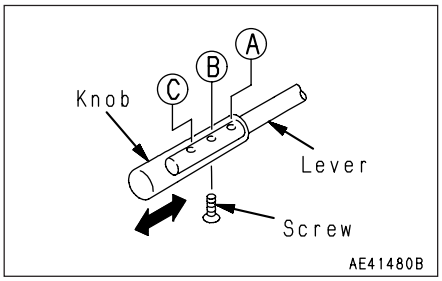
The engine cannot be started if the directional lever is not at N (neutral).

Position ① : Forward
Position N : Neutral
Position ② : Reverse



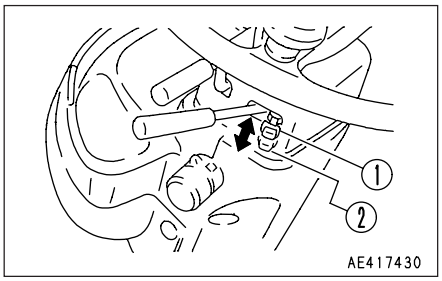
REMARK

The length of the lever can be adjusted to 3 stages (positions Ⓐ, Ⓑ, Ⓒ). To adjust the length, remove the screw at the bottom of the lever knob, slide the knob to the desired position, then tighten the screw again.
(The lever is installed to position Ⓑ when it is shipped from the factory.)



3. SPEED CONTROL LEVER STOPPER

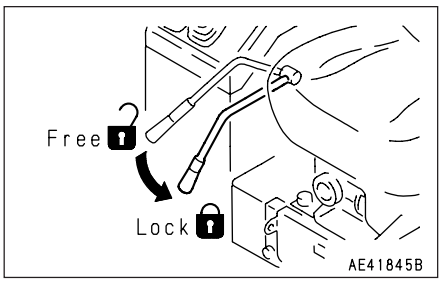
This stopper prevents the speed control lever from entering the 3rd positions when working.
Position ①: Stopper actuated.
Position ②: Stopper released.



4. SAFETY LOCK LEVER (FOR WORK EQUIPMENT LEVERS)

⚠ WARNING

- **When leaving the operator's compartment, set the safety lock lever securely to the LOCK position. If the control levers are not locked, and they are touched by mistake, this may lead to a serious accident.**
- **If the safety lock lever is not placed securely in the LOCK position, the control levers may not be properly locked. Check that the situation is as shown in the diagram.**
- **When parking the machine or carrying out maintenance, always lower the bucket to the ground and apply the lock.**



This is used to lock the work equipment levers.
Push the lever down to apply the lock.

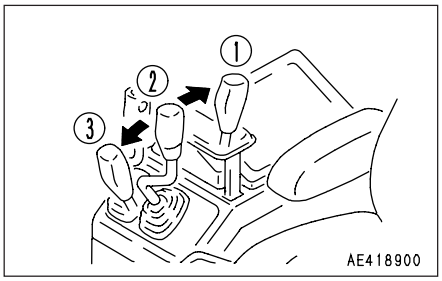
5. BUCKET CONTROL LEVER

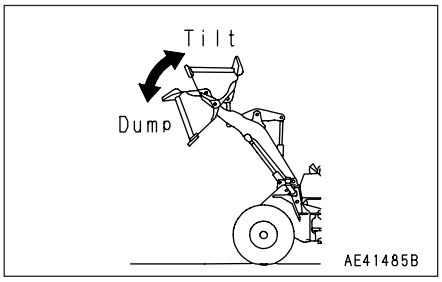
This lever operates the bucket.

① TILT ( ): When the bucket control lever is pulled further from the TILT position, the lever is stopped in this position until the bucket reaches the preset position of the positioner, and the lever is returned to the HOLD position.

② HOLD ( ): The bucket is kept in the same position.

③ DUMP ( )





6. LIFT ARM CONTROL LEVER

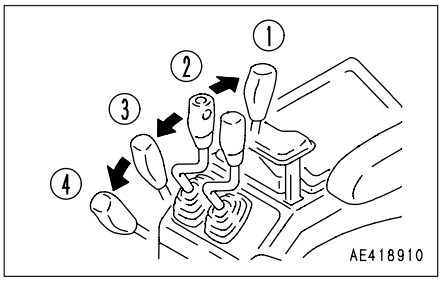
This lever is used to operate the boom.

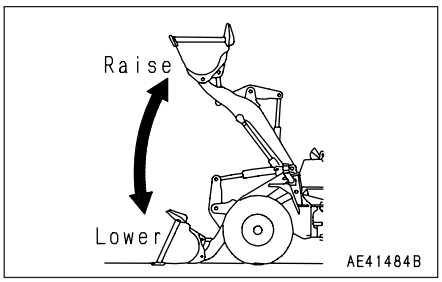
① RAISE ( ): When the lift arm control lever is pulled further from the RAISE position, the lever is stopped in this position until the lift arm reaches the preset position of the kick-out, and the lever is returned to the HOLD position.

② HOLD ( ): The lift arm is kept in the same position.

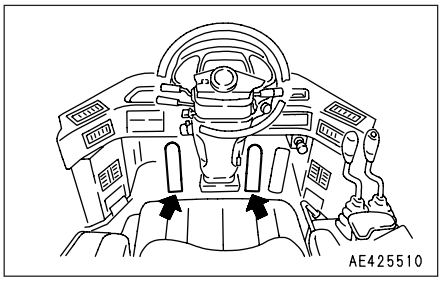
③ LOWER ( )

④ FLOAT ( ): The lift arm moves freely under external force.





7. BRAKE PEDALS



⚠ WARNING

- **When traveling downhill, use the engine as a brake, and always use the right brake pedal.**
- **Do not use the brake pedals repeatedly unless necessary.**
- **Do not put your foot on this pedal unless necessary.**

Right brake pedal

The right brake pedal operates the wheel brakes, and is used for normal braking.

Left brake pedal

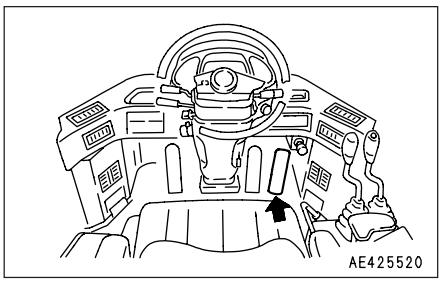
The left brake pedal operates the wheel brakes, and if the transmission cut-off switch is at ON, it also returns the transmission to neutral.

If the transmission cut-off switch is at OFF, the left brake pedal acts in the same way as the right brake pedal.

REMARK

When the accelerator is being used for operating the work equipment, always use the left brake pedal to slow or stop the machine after putting the transmission cut-off switch to the ON position.

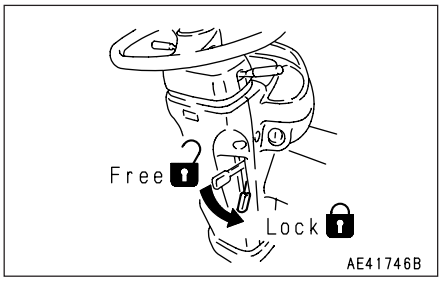
8. ACCELERATOR PEDAL



This pedal controls the engine speed and output.

The engine speed can be freely controlled between low idling and full speed.

11.4 STEERING COLUMN TILT LEVER



⚠ WARNING

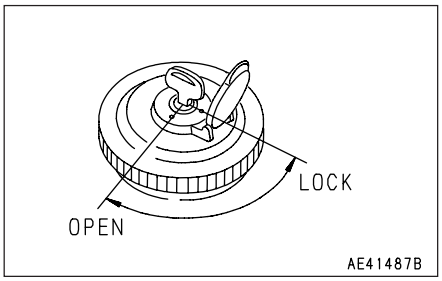
Stop the machine before adjusting the angle of the steering wheel.

This lever allows the steering column to be tilted forward or backward.

Pull the lever up and move the steering wheel to the desired position. Then push the lever down to lock the steering wheel in position.

Range of adjustment: 125 mm (4.9 in) (stepless)

11.5 CAP WITH LOCK

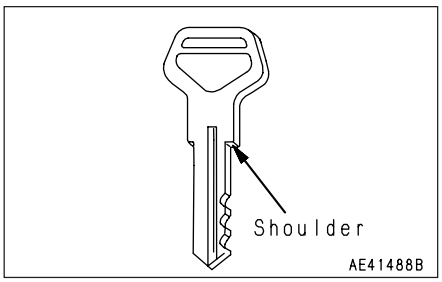


The fuel tank filler port and the hydraulic tank filler port are equipped with locks.

Open and close the cap lock as follows.

Use the starting key to open and close the cap.

11.5.1 METHOD OF OPENING AND CLOSING CAP WITH LOCK (For the fuel tank filler port)



TO OPEN THE CAP

1. Insert the key into the cap.
   Insert the key as far as it will go. If the key is turned before it is inserted all the way, it may break.

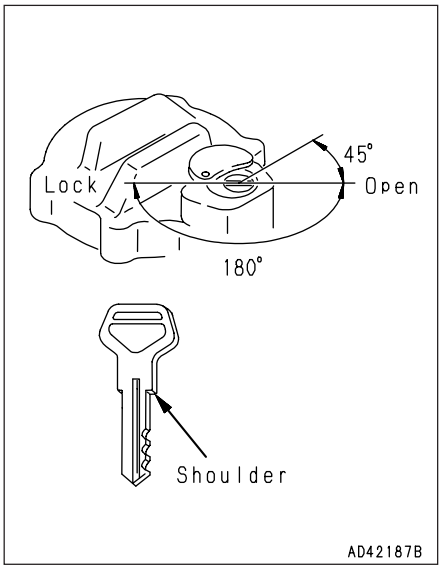
2. Turn the key clockwise, align the match mark on the cap with the rotor groove, then remove the cap.

TO LOCK THE CAP

1. Turn the cap into place.

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

11.5.2 METHOD OF OPENING AND CLOSING CAP WITH LOCK (For the hydraulic tank filler port) (IF EQUIPPED)



TO OPEN THE CAP

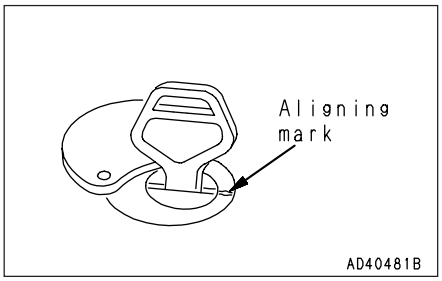
1. Insert the key into the cap.
   Insert the key as far as it will go. If the key is turned before it is inserted all the way, it may break.

2. Turn the key counterclockwise and bring the rotor groove in line with the aligning mark on the cap. Turn the cap slowly until a "clicking" sound is made. This releases the lock and allows the cap to be opened.

TO LOCK THE CAP

1. Turn the cap into place.

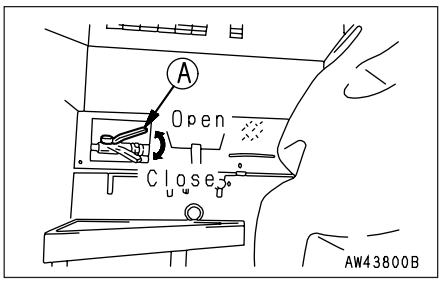
2. Turn the key clockwise and take the key out.



11.6 ENGINE EMERGENCY STOP SWITCH AND FUEL STOP LEVER

⚠ WARNING

Never use these when stopping the engine normally. After using them, return the switch to the normal position and the fuel stop lever to the fully open position when the engine has stopped completely.



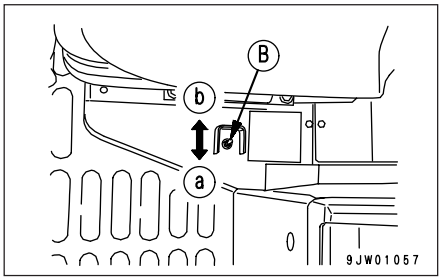
Use these if any abnormality occurs and the engine does not stop even when the starting switch is turned to the OFF position. For normal operations, keep engine emergency stop switch Ⓑ at normal position ⓐ and fuel stop lever Ⓐ at the fully open position.

If any abnormality occurs, operate engine emergency stop switch Ⓑ to the emergency stop position ⓑ or turn fuel stop lever Ⓐ to the front to stop the supply of fuel.

If any abnormality occurs which needs the fuel stop lever to be used, please contact your Komatsu distributor.

If the engine is stopped using the fuel stop lever, bleed the air from the circuit before starting the engine again.

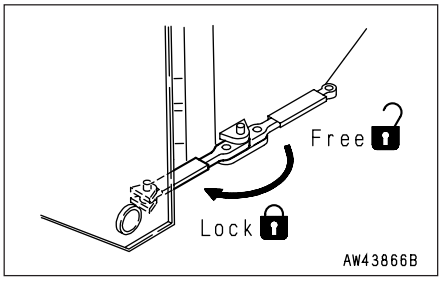
For details, see "24.7.1 REPLACE FUEL FILTER CARTRIDGE."



11.7 SAFETY BAR

⚠ WARNING

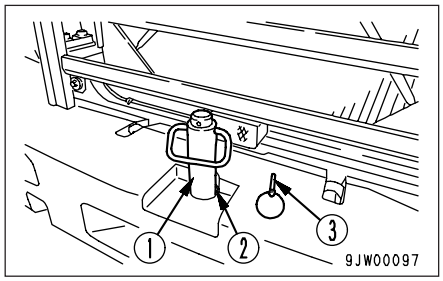
- **Always use the safety bar for maintenance or when transporting the machine.**
- **Always remove the safety bar during normal travel operations.**



The safety bar is used during maintenance or when transporting the machine. It locks the front frame and rear frame, and prevents the front and rear frames from bending.

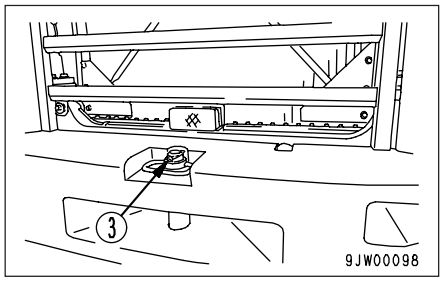
11.8 TOWING PIN

1. Insert towing pin ① into hole ② in the counterweight.



2. Use linch pin ③ to set so that the towing pin does not come out.

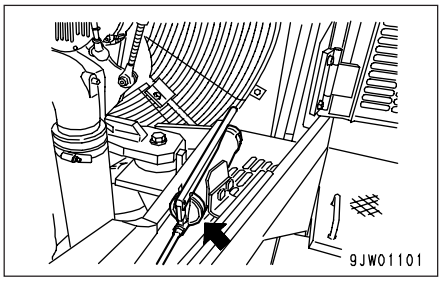
   Carry out this operation in reverse to remove the pin.



11.9 GREASE PUMP

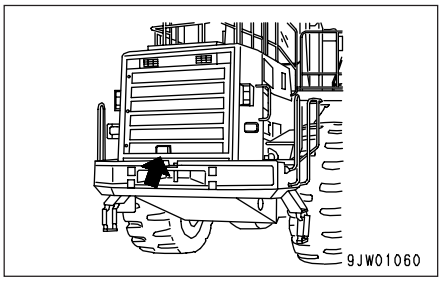
The grease pump is stored in the engine hood on the left side of the machine.

After using it, wipe off all grease stuck to its outside of the pump, then store it.



11.10 BACKUP ALARM

This sounds an alarm when the directional lever is set to the R position. It is used to warn people behind the machine that the machine will travel in reverse.



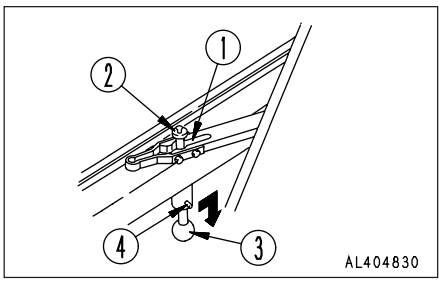
11.11 DOOR-OPEN LOCK

This can be used to hold the door open.

Open the door so that tip ② of the lever is aligned with groove ① for the lock, then pull down knob ③ as shown in the diagram.

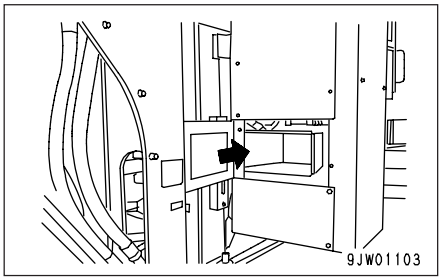
When using the door-open lock, be sure to apply the lock securely.

When releasing the lock and closing the door, push up knob ③ and insert pin ④ securely the groove.



11.12 TOOL BOX

The tool box is installed in the brake component box of the left side of the machine. Use it to store tools, etc.



11.13 FUSE

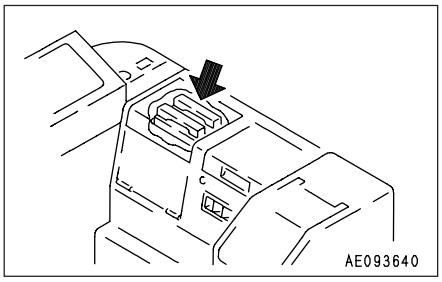
NOTICE

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

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

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

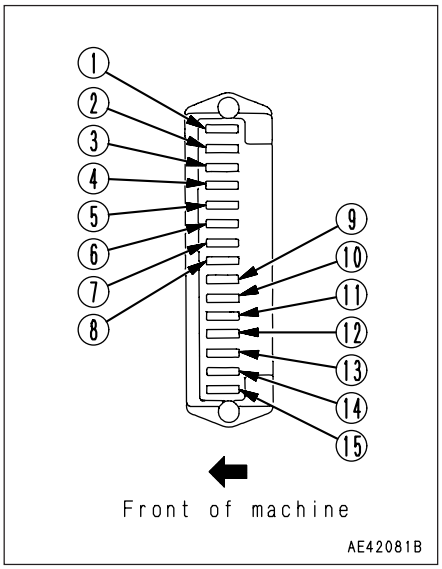
Replace a fuse with another of the same capacity.



11.13.1 FUSE CAPACITY AND NAME OF CIRCUIT

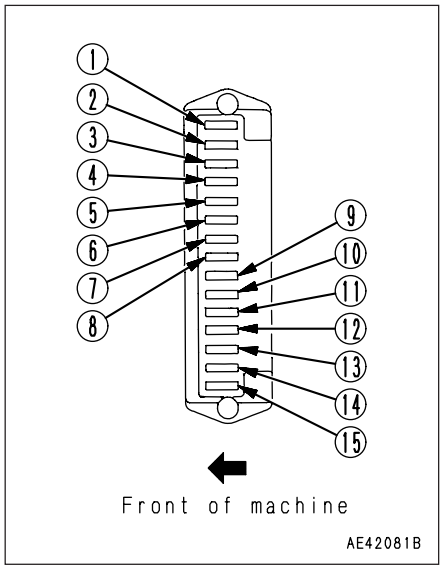
Fuse box I

No.	Fuse capacity	Name of circuit
①	20A	Main lamp circuit
②	20A	Backup lamp, brake lamp
③	10A	Turn signal indicator lamp
④	10A	R.H. head lamp
⑤	10A	L.H. head lamp
⑥	10A	R.H. side clearance lamp
⑦	10A	L.H. side clearance lamp
⑧	10A	Parking brake
⑨	10A	Transmission control
⑩	10A	Instrument panel
⑪	10A	Work equipment positioner
⑫	10A	Starting switch
⑬	20A	Hazard lamp
⑭	10A	Engine controller
⑮	10A	Auto-greasing (if equipped)



Fuse box II

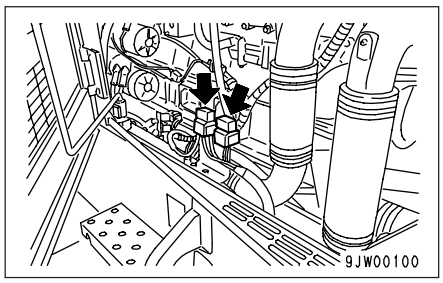
No.	Fuse capacity	Name of circuit
①	20A	Front working lamp
②	20A	Rear working lamp
③	30A	Air conditioner 1 (if equipped)
④	20A	Air conditioner 2 (if equipped)
⑤	20A	Wiper, washer
⑥	20A	Side working lamp
⑦	10A	Cigarette lighter, radio (if equipped)
⑧	10A	Rotating lamp (if equipped)
⑨	30A	APS
⑩	10A	Auto-greasing (if equipped)
⑪	20A	L.H. power window
⑫	20A	R.H. power window
⑬	10A	Air suspension seat
⑭	10A	Spare
⑮	10A	Engine controller



11.14 SLOW-BLOW FUSE

If the power does not come on when the starting switch is turned ON, the slow-blow fuse may be blown, so check and replace it.

The slow blow fuse is beside the engine on the right side of the machine.

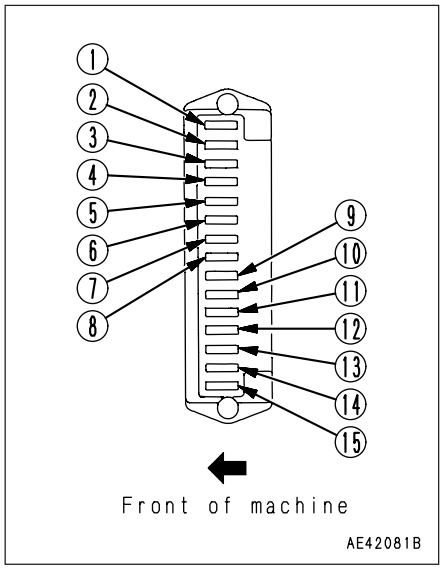


SLOW-BLOW FUSE

① 80A: Main power
② 30A: Battery power (starting switch, hazard)

Fuse box II

No.	Fuse capacity	Name of circuit
①	20A	Front working lamp
②	20A	Rear working lamp
③	30A	Air conditioner 1 (if equipped)
④	20A	Air conditioner 2 (if equipped)
⑤	20A	Wiper, washer
⑥	20A	Side working lamp
⑦	10A	Cigarette lighter, radio (if equipped)
⑧	10A	Rotating lamp (if equipped)
⑨	30A	APS
⑩	10A	Auto-greasing (if equipped)
⑪	20A	L.H. power window
⑫	20A	R.H. power window
⑬	10A	Air suspension seat
⑭	10A	Spare
⑮	10A	Engine controller



11.14 SLOW-BLOW FUSE

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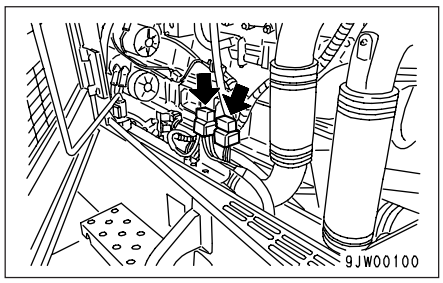
The slow blow fuse is beside the engine on the right side of the machine.

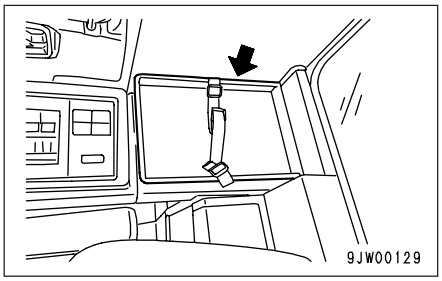


SLOW-BLOW FUSE

① 80A: Main power
② 30A: Battery power (starting switch, hazard)

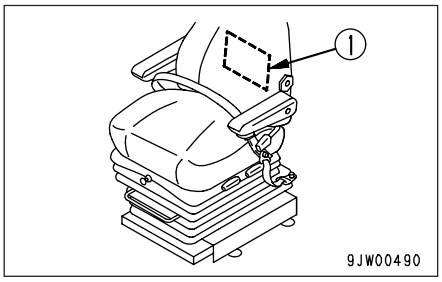
11.15 LUNCH BOX TRAY

There is a space for a lunch box at the right rear of the cab. Even a large lunch box 35 cm (13.8 in) long, 22 cm (8.7 in) wide and 18 cm (7.1 in) high can be placed easily and fixed with a band.



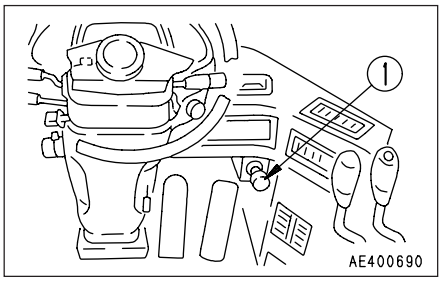
11.16 STORAGING PLACE OF THIS MANUAL

Keep this manual into the operator's seat rear pocket ① so as to take it out immediately when needed.

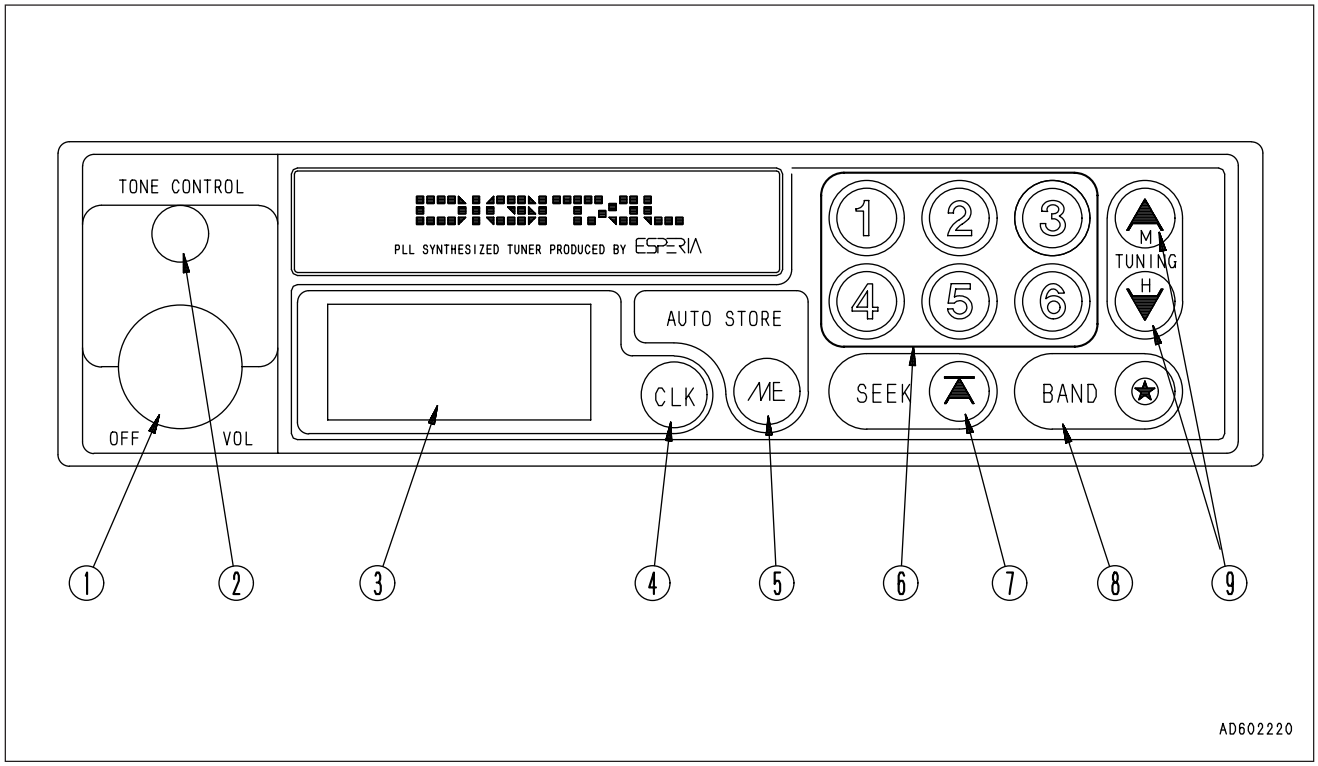


11.17 TAKING OFF POWER

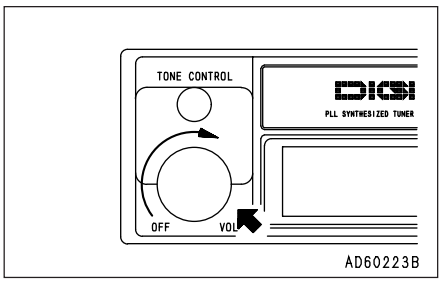
Removing the cigarette lighter ① allows to use it power. The maximum electric current is 10 A (240 W).



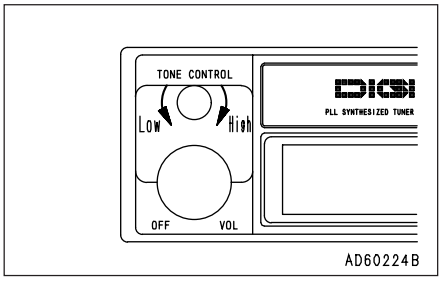
11.18 AM/FM CAR RADIO (IF EQUIPPED)
11.18.1 EXPLANATION OF COMPONENTS



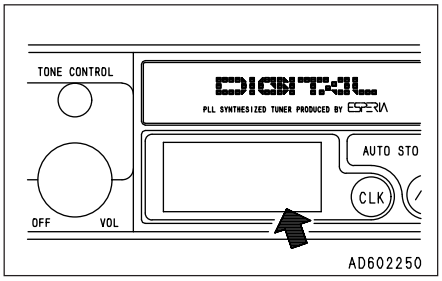
1. POWER SWITCH/VOLUME CONTROL KNOB
Push this knob to switch the radio on.
Turn the knob clockwise to increase the sound, and counterclockwise to reduce it.



2. TONE CONTROL KNOB (TONE)
Turn this knob clockwise from the center position to emphasize the high sounds, and counterclockwise to emphasize the low sounds.

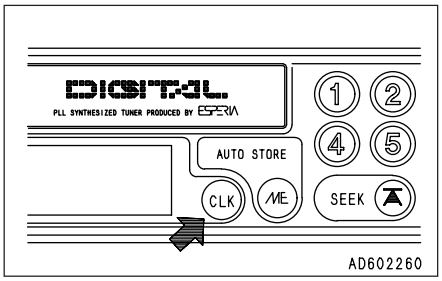


3. DISPLAY
This displays the frequency, time, and operation modes.



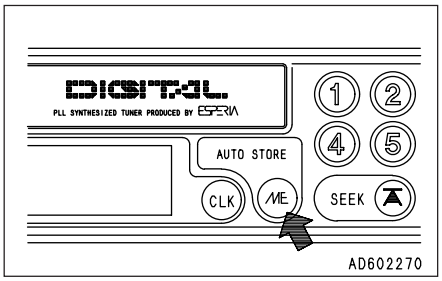
4. CLK(clock button)/(displaying frequency)

When this button is pressed, the display changes to clock. When pressed again, frequency is displayed.



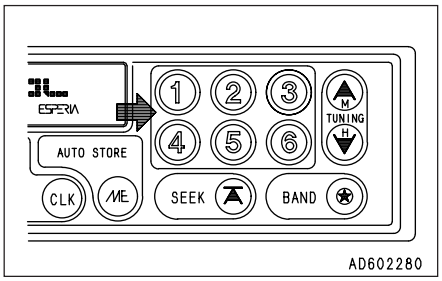
5. ME

The preset stations are called in turn by pressing this button. When the desired broadcasting station is reached, press this button again, and it stops at that station. Pressing the button for 2 seconds changes to automatic memory.



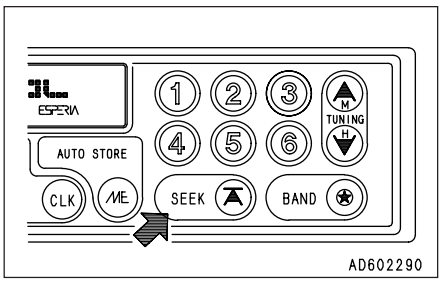
6. PRESET BUTTON (1, 2, 3, 4, 5, 6)

These buttons can be used to preset FM or MW(AM) to each button. (For the method of presetting, see "11.18.2 METHOD OF USE".



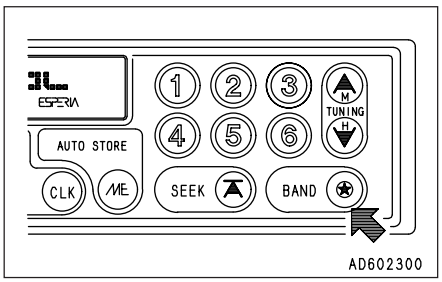
7. SEEK

The receivable station is picked up by pressing the "SEEK" switch, then the selector will automatically stop at that position.



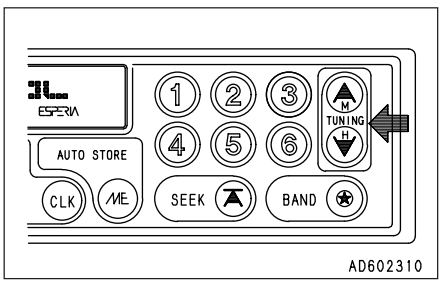
8. BAND SELECTOR SWITCH

The band between FM and MW(AM) switches by pressing the "BAND" switch. The reception band and the reception frequency are displayed on the display.



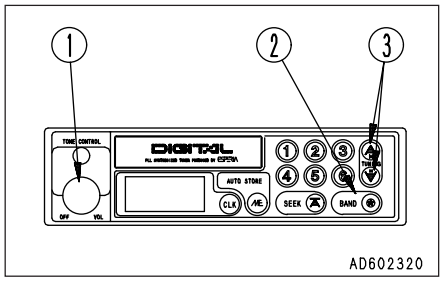
9. TUNING SWITCH

The frequency becomes higher by the "TUNING" button and decrease when pressing the button. When keeping the switch pressed, the frequency changes sequentially.



11.18.2 METHOD OF USE

1. Turn the ignition key to ACC or ON, and then turn the power ① of the radio to ON.
2. Set the "BAND" switch ② to MW(AM) or FM.
3. Select the broadcasting station using the preset switch or the tuning switch ③.
4. Adjust the volume and tone quality as desired.
5. When turning off the radio, turn the ●VOL knob to the left until a click sounds.

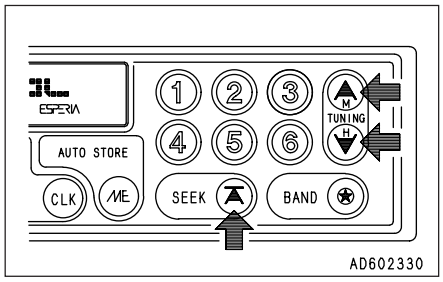


METHOD OF AUTOMATIC TUNING

The frequency becomes higher and the receiptable station is picked up, then the selector will automatically stop.

METHOD OF MANUAL TUNING

The frequency becomes higher by pressing , and becomes lower by pressing of the "TUNING" button. When keeping the button pressed, the frequency changes sequentially.

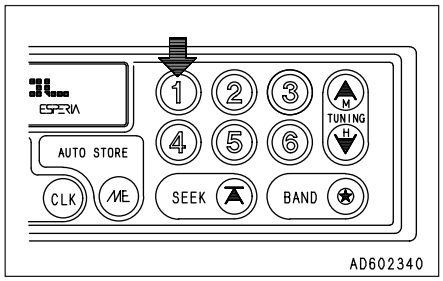


METHOD OF SETTING PRESET BUTTONS

(1) Select the desired station to preset. Select MW (AM) using the "BAND" button, and select FM using "TUNING" button, then select the frequency of the broadcasting.

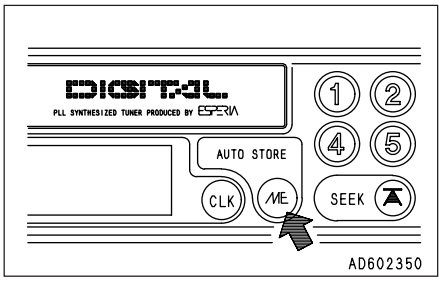
(2) Keep the button at the desired number pressed for 2 seconds. The same number as the button is displayed on the display, and the preset is completed.

(3) Repeat the step (1) and (2), and preset the other stations.
- Similarly, when you want to memory the other station to already preset switch, repeat the steps (1) and (2).
- If the power supply cuts because of replacing the battery or other reasons, the preset setting is cleared. Preset the stations again.
- It is possible to preset 6 stations for AM (MW) and 6 stations for FM.



METHOD OF AUTOMATIC MEMORY

The receiptable broadcasting station at your site are called in turn by pressing "ME" button for 2 seconds and they are automatically memorized in the preset memory.



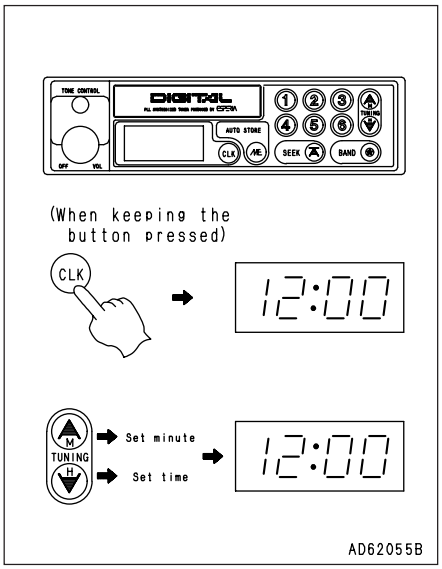
AUTOMATIC SWITCHING RECEPTION OF MONAURAL/STEREO

When the radio wave of receiving FM stereo signal is weak (such as when receiving at the area or the mountainous region that are far from the broadcasting stations), stereo is switched to monaural automatically to decrease the noise. If the stereo broadcasting becomes strong, monaural switches to stereo broadcasting automatically.

ADJUSTING TIME

(1) Turn the ignition key to ACC or ON and the power supply of the radio to ON. If the frequency is displayed on the display, change the display to the clock using the CLK button.

(2) When keeping the "CLK" button pressed and pressing button allows ▽ to set time or pressing button allows △ to set minute.

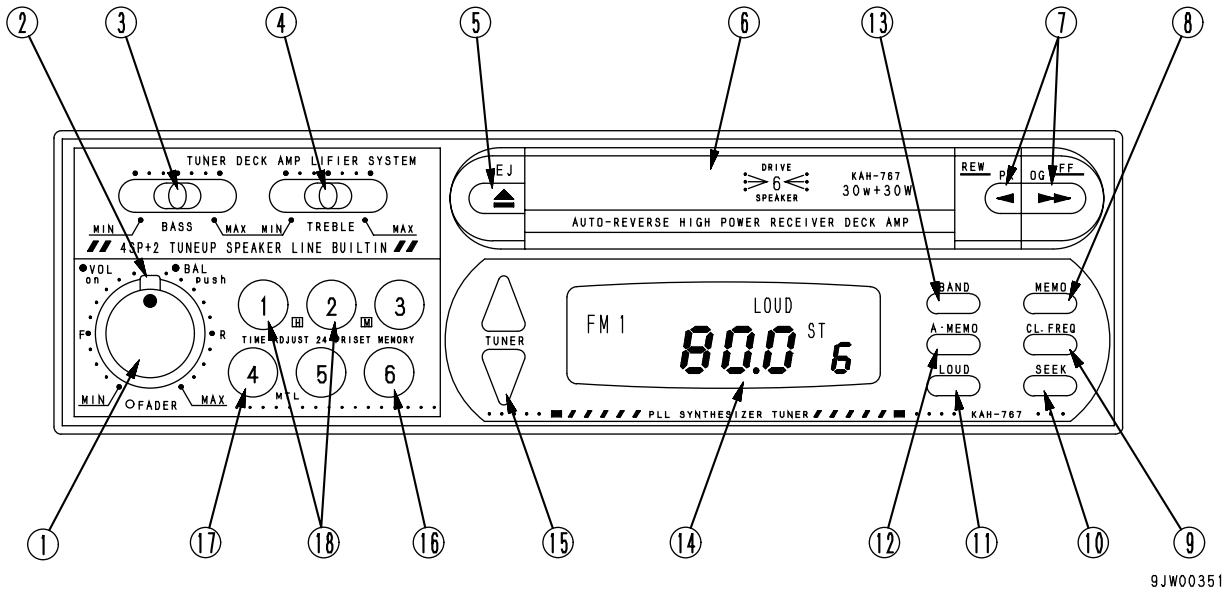


11.18.3 PRECAUTIONS WHEN USING

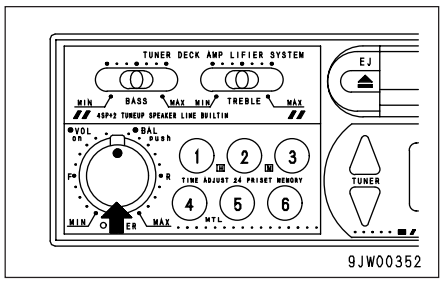
- Retract the antenna when traveling in places with a low overhead height.
- For safety reasons, when operating, keep the sound to a level where you can enjoy the sound but still hear the sound from outside vehicles.
- If water gets inside the speaker case or car radio (auto tuning), it may cause a serious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

11.19 AM/FM RADIO-CASSETTE STEREO (IF EQUIPPED)

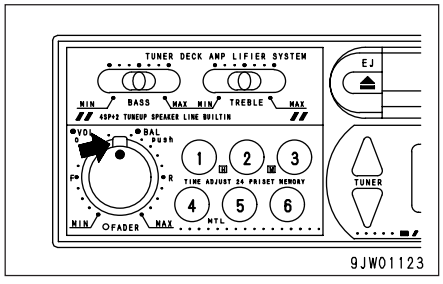
11.19.1 EXPLANATION OF COMPONENTS



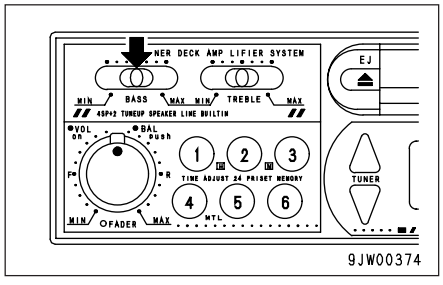
1. POWER SWITCH/VOLUME CONTROL KNOB
Turn this knob clockwise until it clicks, and the power is turned on. Turn it further to increase the sound.



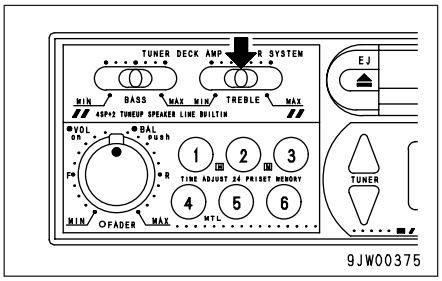
2. TONE CONTROL KNOB
Adjust the tone of the sound by turning this knob.



3. BASE CONTROL SLIDE-KNOB
Slide this knob to the right to increase the bass sound and to the left to decrease the bass.

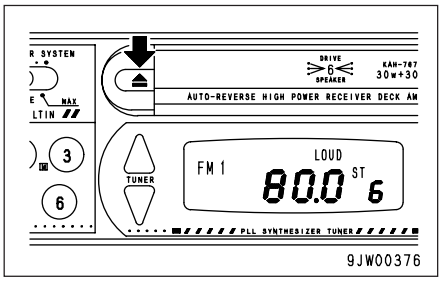


4. TREBLE CONTROL KNOB
Slide this knob to the right to enhance high frequency sound and to the left to suppress high frequency sound.



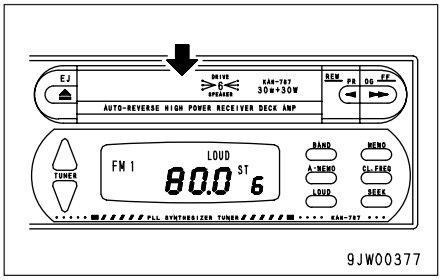
9JW00375

5. EJECT BUTTON
Press this button to eject the cassette tape.



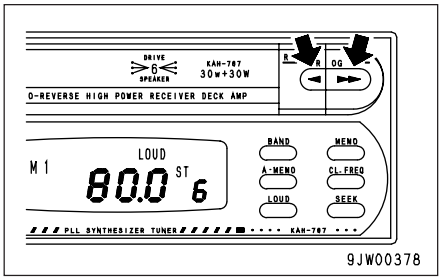
9JW00376

6. CASSETTE DOOR
Insert a cassette tape with the exposed magnetic tape side facing to the right.



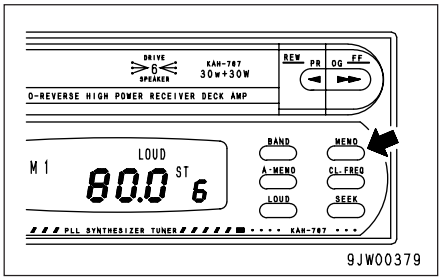
9JW00377

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



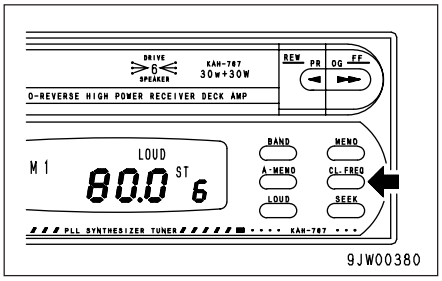
9JW00378

8. MEMORY SWITCH
Press this "MEMO" switch to preset the frequencies of the desired stations (ME flashes) or correct the clock.



9JW00379

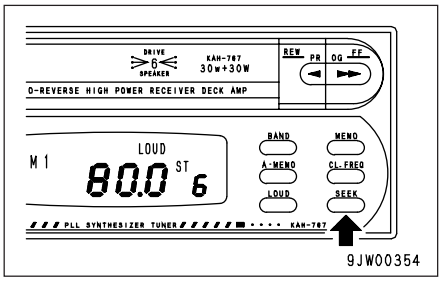
9. DISPLAY CHANGEOVER SWITCH
Press this "CL.FREQ" switch to indicate the clock on the display. The frequency is indicated again automatically about 5 seconds later, however. The display always indicates the clock in the tape mode.



9JW00380

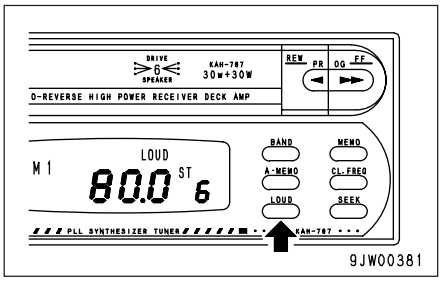
10. SEEK SWITCH

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



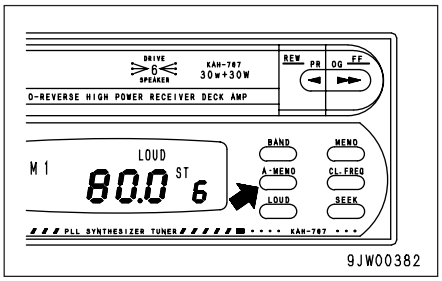
11. LOUD BUTTON

This button is used to operate the system at a lower sound volume but with enhanced bass and treble sound. "LOUD" indication appears on the display at this time.



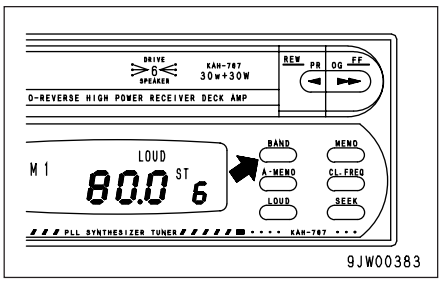
12. AUTO-MEMORY SWITCH

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



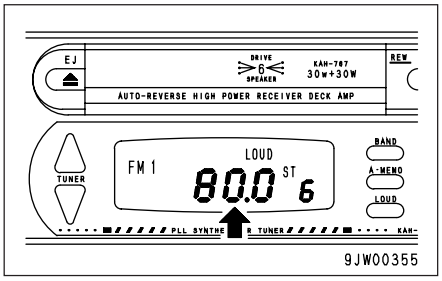
13. FM/MW(AM) BAND SELECT SWITCH

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



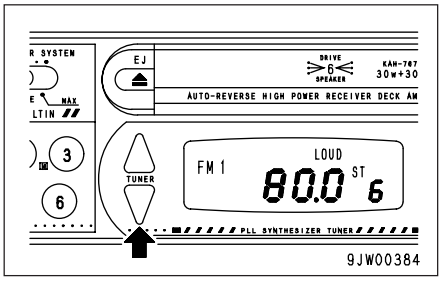
14. DISPLAY

The display indicates the clock, currently received frequency of a radio broadcast and the current operation mode.



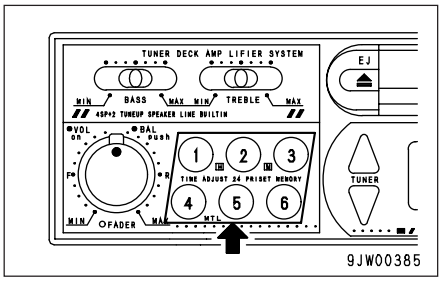
15. TUNER SWITCH (MANUAL TUNING)

Pressing the ▼-shaped tuner button raises the receiving frequency by 9kHz in AM and by 0.1MHz in FM for each press. Pressing the ▲-shaped tuner button lowers the receiving frequency similarly. Pressing either of these buttons continuously shifts the receiving frequency continuously.



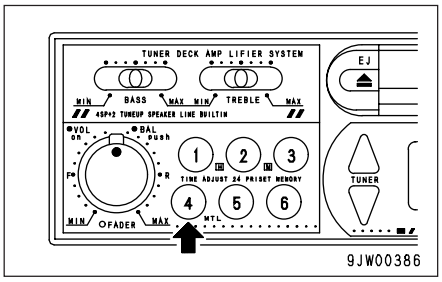
16. PRESET SWITCH (IN RADIO MODE)

One station each in the FM1, FM2, FM3 and MW (AM) bands, respectively, can be preset for buttons 1 to 6 shown at right. (Refer to the section “Presetting to selected stations”.)



17. METAL BUTTON (IN TAPE MODE)

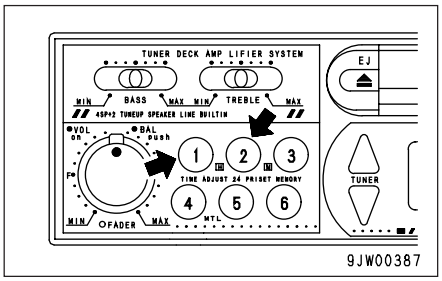
Press the “MTL” button indicated with an arrow in the figure at right before playing a metallic tape. At this time, “MTL” indication appears on the display.



18. HOUR AND MINUTE CORRECTION BUTTON

Use this button to correct the hour and minute on the clock.

See “ADJUSTING TIME”.

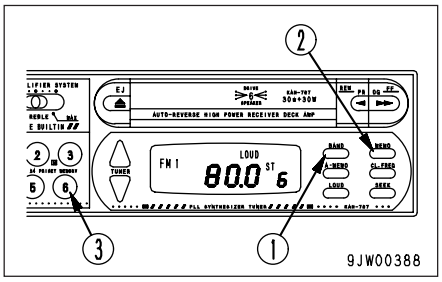


11.19.2 OPERATION METHOD

PRESETTING TO SELECTED STATIONS

When listening to a preset station, select one of the AM, FM1, FM2 and FM3 bands using band select switch ①, then simply press the number key corresponding to the preset selected station.

The system can memorize 6 stations in AM band and 18 stations in FM bands (FM1: 6 stations, FM2: 6 stations and FM3: 6 stations).



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

2. Tune to the desired station for presetting:
   First, select one of the MW (AM), FM1, FM2 and FM3 bands with band select switch ①, then tune to the frequency of the desired station using the TUNING buttons.

3. Press memory switch ②.

4. While memory switch ② is flashing, press the preset switch ③ of the number to be preset. (The preset channel and frequency will be indicated. This concludes presetting.)

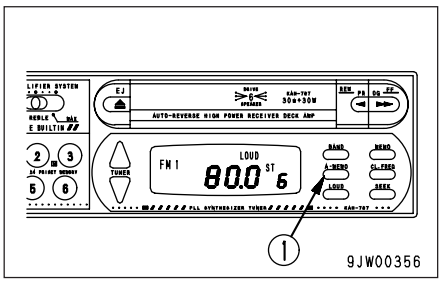
5. Repeat the above procedure Steps 2 to 4 to preset to other desired stations.

REMARK

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

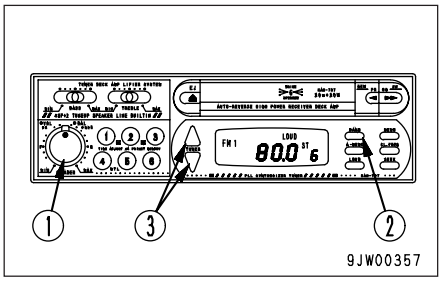
AUTO-MEMORY

When the auto-memory switch ① is pressed, the system tunes itself to stations receivable in the area where the machine is currently located, one after another, and memorizes the frequencies in its preset-memory, all automatically.



RECEIVING RADIO BROADCASTS

1. Turn ON the ignition key, then turn on power switch ① of the car stereo.
2. Select either AM or FM band with the band select switch ②.
3. Tune to the desired station using the preset switch or tuner switch ③.
4. Adjust the volume, the balance between left and right speakers and the sound quality to your choice using the respective buttons.
5. When turning off the radio, turn power switch ① counterclockwise until it clicks.

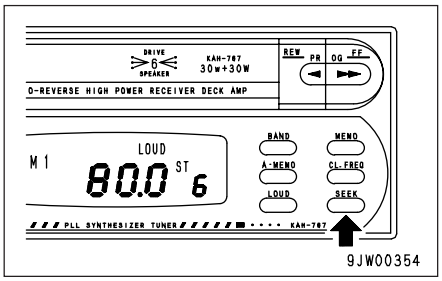


REMARK

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

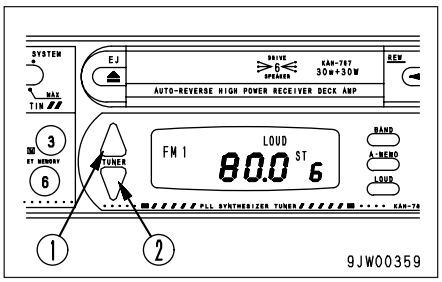
AUTOMATIC TUNING

Pressing the "SEEK" switch shifts the receiving frequency in the higher frequency direction, then stops shifting automatically at a position where a station is picked up.



MANUAL TUNING

Pressing ▲-shaped tuner button ① raises the receiving frequency by 9 kHz in AM and by 0.1MHz in FM for each press. Pressing the ▼-shaped tuner button ② lowers the receiving frequency similarly. Pressing either of these buttons continuously shifts the receiving frequency continuously.



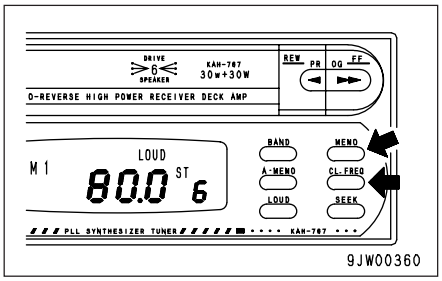
AUTOMATIC SELECTION BETWEEN MONAURAL AND STEREO RECEIVING MODES

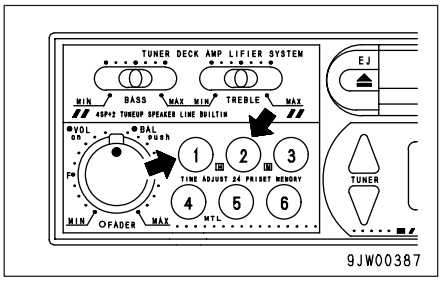
When the FM stereo broadcasting waves currently being received are too weak for normal receiving (such as receiving a long distance from the broadcasting station or in the mountains), the system automatically shifts from stereo to monaural mode to suppress disturbing noise. It automatically returns to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

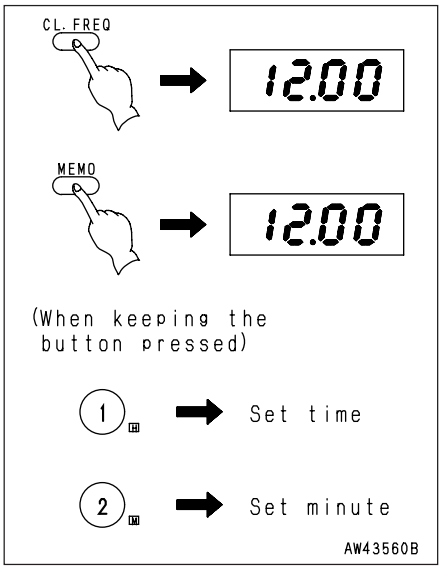
ADJUSTING TIME

1. Turn on the ignition key, then turn on the power switch of the car stereo. If the frequency is displayed on the display, change the display to the clock using the display changeover switch.

2. Pressing and holding the memory switch, press H button ① to set the hour and M button ② to set the minute. About 5 seconds after setting the time, the display returns to the frequency automatically.





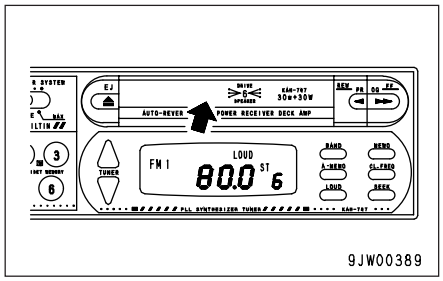


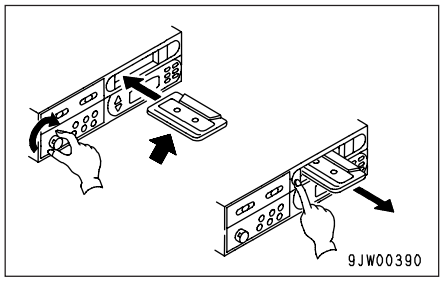
WHEN PLAYING A CASSETTE TAPE

1. Turn on the ignition key, then turn on the power switch of the car stereo.

2. Insert your cassette tape in the cassette door with the exposed tape on the right side. The tape will start playing automatically. If the tape running direction indication is >, the upper channel of the tape is being played and if < is indicated, the lower channel is being played. When the tape ends in one direction, the system automatically reverses the tape and plays the other side.

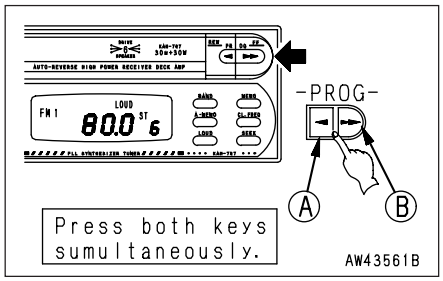
3. To stop the tape, press the eject button to eject it and the system will automatically change over to radio.





WHEN CHANGING TAPE CHANNELS

Lightly press both program changeover buttons Ⓐ and Ⓑ simultaneously while the tape is being played.



FAST-FORWARDING AND REWINDING

To fast-forward a tape during playing, fully press either the Ⓐ or Ⓑ buttons according to the current tape-feed direction to lock it.

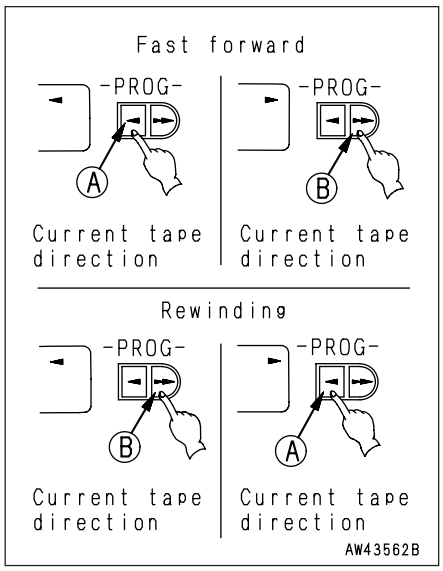
- When tape-feed direction is <: Press button Ⓐ to lock it.
- When tape-feed direction is >: Press button Ⓑ to lock it.

To rewind the tape, press the button in the opposite direction to the current tape-feed direction to lock it.

- When tape-feed direction is <: Press button Ⓑ to lock it.
- When tape-feed direction is >: Press button Ⓐ to lock it.

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

If the tape is wound to the end in the fast-forward or rewind mode, normal playing resumes.



11.19.3 PRECAUTIONS WHEN USING

- Retract the antenna when traveling in places with low overhead height.

- For safety reasons, when operating, keep the sound to a level where you can enjoy the sound but still hear the sound from outside the vehicle.

- If water gets in the speaker case or car radio (auto tuning), it may cause a serious problem, so do not let water get on these parts.

- Do not wipe the knobs or buttons or any other parts with solvents such as benzene or thinner. Always wipe with a soft dry cloth (in case of extreme dirt, use alcohol on the cloth).

NOTICE

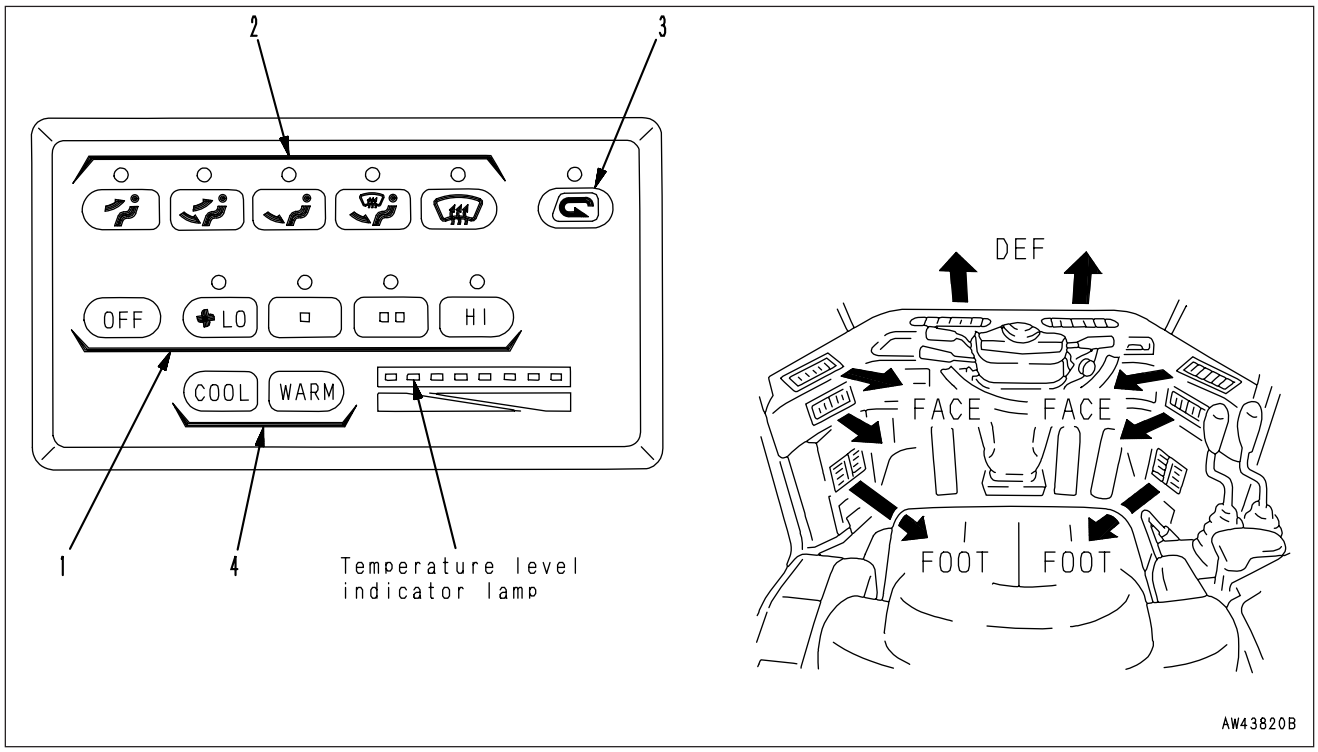
Handling of cassette tape

- **Clean the tape head once a month with a cleaning tape on the market.**
- **Do not place a cassette tape on a place where it will be exposed to the direct sunlight, dust or magnetism.**
- **Do not use a 120-minute tape since it is thin and may be wound in the mechanism.**
- **If a tape is slack, it may be wound in the mechanism. Eliminate any slack before using.**

If the label of a tape is peeled halfway, it can cause a rotation trouble and the cassette may not be ejected.

11.20 CAR HEATER

11.20.1 GENERAL LOCATIONS AND FUNCTION OF CONTROL PANEL

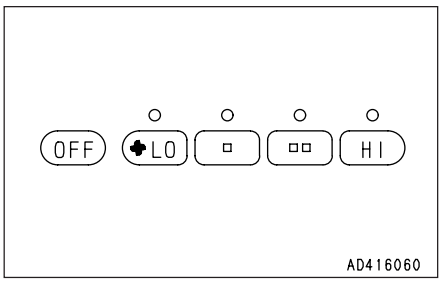


1. FAN SWITCH

This can be used to adjust the air flow to four stages.

This switch also acts as the main switch for the car heater.

When the switch is pressed, the indicator lamp above the switch lights up to indicate the air flow.

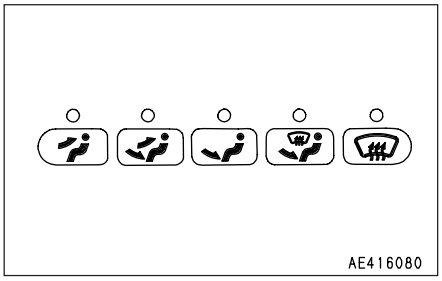


2. MODE SELECTOR SWITCH

This is used to select the vents.

The following five vent modes are available: FACE, FACE/FOOT, FOOT, FOOT/DEF, DEF.

When the switch is pressed, the indicator lamp above the switch lights up to display the vent mode.

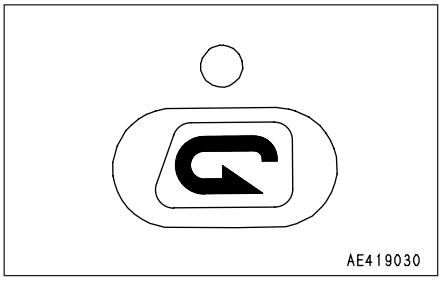


3. FRESH/RECIRC SELECTOR SWITCH

This switch is used to select between recirculating the air inside the cab or taking in fresh air from outside.

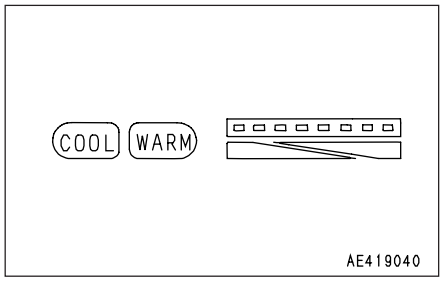
When the RECIRC position is selected, the indicator lamp above the switch lights up.

When the switch is pressed again, the indicator lamp goes out, and fresh air is taken in.



4. TEMPERATURE CONTROL SWITCH

The temperature can be adjusted steplessly from low temperature to high temperature.



The temperature level indicator lamps light up to display the temperature of the air coming from the vents.

The more the blue lamps light up, the lower the temperature is.

The color of the indicator lamp changes while the switch is being pressed.

When the temperature reaches the desired level, release the switch to set the temperature.

The settings for each mode are retained in memory even when the starting switch is turned OFF.

However, in the following cases, the settings must be made again.

- When the machine has been out of use for more than 7 days
- When the battery voltage is extremely low
- When there has been abnormal interference from outside

If the car heater is used at the FRESH position, the inside of the cab will be pressurized and this will prevent the entry of dust.

The higher the position of the fan switch, the more effective the pressurizing becomes.

11.20.2 METHOD OF OPERATION

Condition of use \ Switch		Fan switch	Temperature control switch	FRESH/RECIRC switch	Vent mode selector switch
Heating	Rapid	HI	All red	RECIRC	FOOT
	Normal	HI-LO	More than half are red	FRESH	FOOT
Defroster		HI	More than half are red	FRESH	DEF
Ventilation or pressurizing		HI-LO	All blue	FRESH	FACE

When carrying out the defrosting, if the temperature control switch is set so that all lamps are red, this will improve the performance for defrosting and demisting.

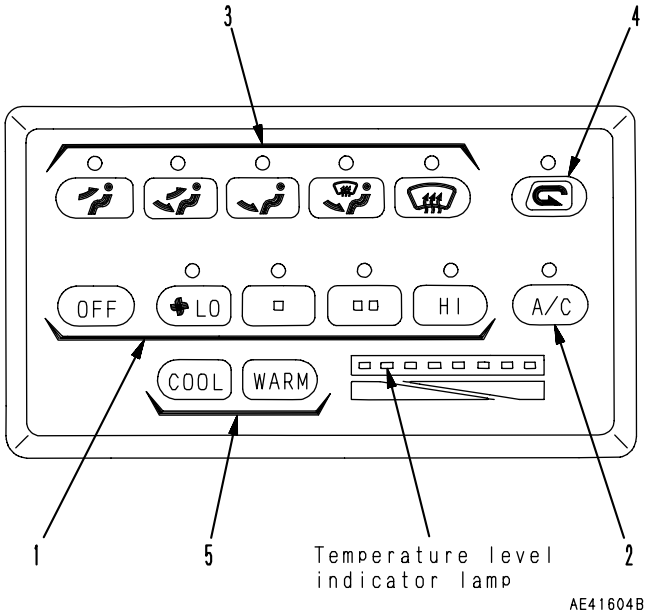
Set the vent mode selector switch to the intermediate position to give the desired condition.

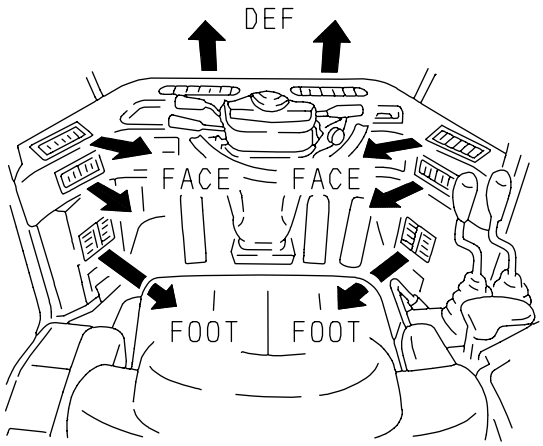
With the FACE vents, it is possible to adjust the direction of the air flow and to turn it on or off.

However, do not set to the FACE mode with the vents closed.

11.21 AIR CONDITIONER (IF EQUIPPED)

11.21.1 GENERAL LOCATIONS AND FUNCTION OF CONTROL PANEL



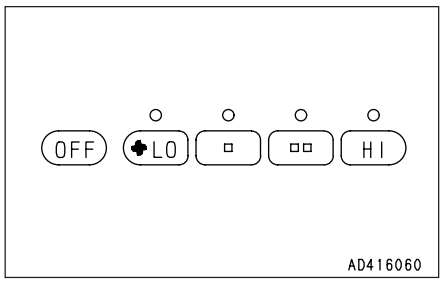


1. FAN SWITCH

This can be used to adjust the air flow to four stages.

This switch also acts as the main switch for the air conditioner.

When the switch is pressed, the indicator lamp above the switch lights up to indicate the air flow.

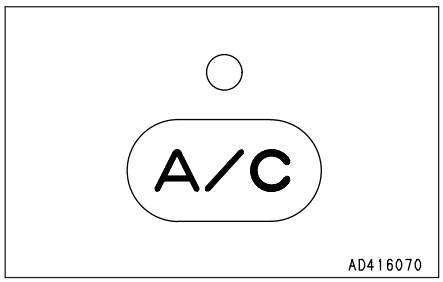


2. AIR CONDITIONER SWITCH

This is used to start or stop the cooling or dehumidifying function.

When the fan switch is turned ON and the air conditioner switch is pressed, the indicator lamp above the switch lights up.

When the switch is pressed again, the switch is turned OFF and the indicator lamp goes out.

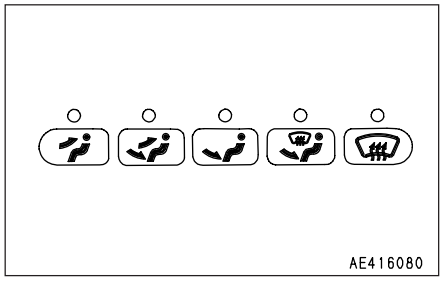


3. MODE SELECTOR SWITCH

This is used to select the vents.

The following five vent modes are available: FACE, FACE/FOOT, FOOT, FOOT/DEF, DEF.

When the switch is pressed, the indicator lamp above the switch lights up to display the vent mode.

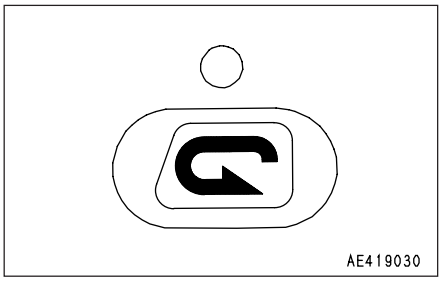


4. FRESH/RECIRC SELECTOR SWITCH

This switch is used to select between recirculating the air inside the cab or taking in fresh air from outside.

When the RECIRC position is selected, the indicator lamp above the switch lights up.

When the switch is pressed again, the indicator lamp goes out, and fresh air is taken in.



5. TEMPERATURE CONTROL SWITCH

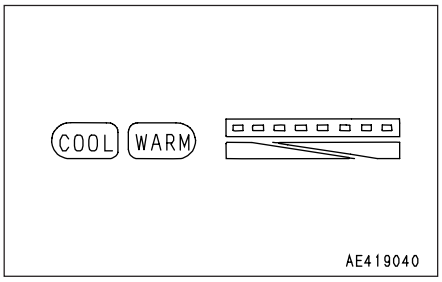
The temperature can be adjusted steplessly from low temperature to high temperature.

The temperature level indicator lamps light up to display the temperature of the air coming from the vents.

The more the blue lamps light up, the lower the temperature is.

The color of the indicator lamp changes while the switch is being pressed.

When the temperature reaches the desired level, release the switch to set the temperature.



The settings for each mode are retained in memory even when the starting switch is turned OFF.

However, in the following cases, the settings must be made again.

- When the machine has been out of use for more than 7 days
- When the battery voltage is extremely low
- When there has been abnormal interference from outside
- When the fan switch is turned OFF (the setting is not kept in memory with only the air conditioner switch)

If the air conditioner is used at the FRESH position, the inside of the cab will be pressurized and this will prevent the entry of dust.

The higher the position of the fan switch, the more effective the pressurizing becomes.

11.21.2 METHOD OF OPERATION

Condition of use \ Switch		Fan switch	Air conditioner switch	Temperature control switch	FRESH/RECIRC switch	Vent mode selector switch
Cooling	Rapid	HI	ON	All blue	RECIRC	FACE
	Normal	HI-LO	ON	More than half are blue	FRESH	FACE
Dehumidifying, heating		HI-LO	ON	More than half are red	FRESH	FOOT
Heating	Rapid	HI	OFF	All red	RECIRC	FOOT
	Normal	HI-LO	OFF	More than half are red	FRESH	FOOT
Defroster		HI	ON	More than half are red	FRESH	DEF
Ventilation or pressurizing		HI-LO	OFF	All blue	FRESH	FACE

When carrying out the defrosting, if the temperature control switch is set so that all lamps are red, this will improve the performance for defrosting and demisting.

Set the vent mode selector switch to the intermediate position to give the desired condition.

With the FACE vents, it is possible to adjust the direction of the air flow and to turn it on or off.

However, do not set to the FACE mode with the vents closed.

WHEN NOT USING THE AIR CONDITIONER REGULARLY

To lubricate each part of the compressor, occasionally operate cooling dehumidifying and heating for a few minutes.

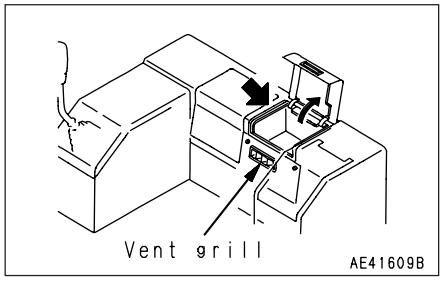
REMARK

When temperature in the cab is low, the air conditioner may not operate. In such cases, warm the air inside the cab by recirculating, and then turn on the air conditioner.

11.21.3 COOL BOX

When the cooling is being used, this can be used for keeping drinks and other things cool.

When the heating is being used, it can be used to keep things warm.



When using the box, open the vent grill. When not using the box, close the grill.

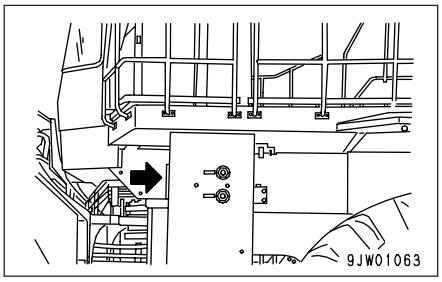
Do not use the cool box for things which smell or leak water or break easily.

Do not use it as a holder for tools or other small objects.

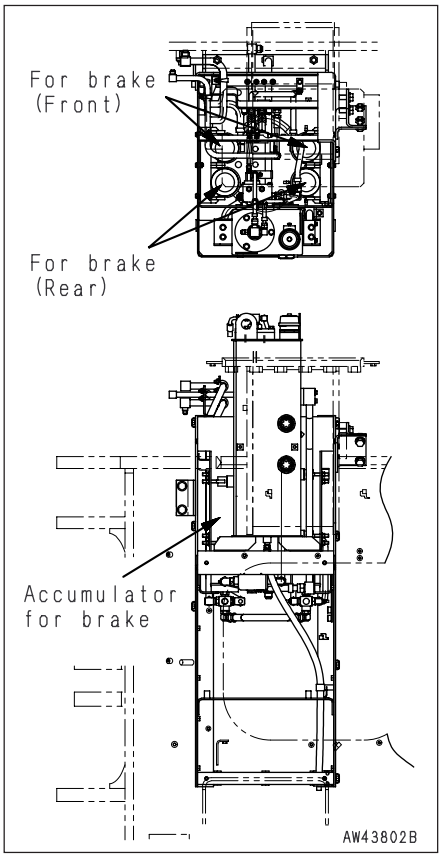
11.22 PRECAUTIONS WHEN HANDLING ACCUMULATOR

⚠ WARNING

The accumulator is charged with high-pressure nitrogen gas, which is extremely dangerous, so read the following items and be careful to handle the accumulator properly.



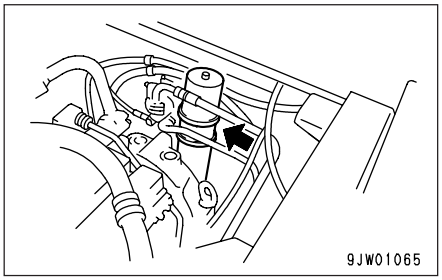
- If any problem or failure occurs with the accumulator, please contact your Komatsu distributor immediately.
- The gas must be charged only by a serviceman from your Komatsu distributor or by a person licensed to handle high-pressure gas.
- Do not strike or bring any flame or heat close to the accumulator when it is charged with gas.
- Do not make any hole or weld any boss to the accumulator.
- Always release the gas before disposing of the accumulator or disassembling it for maintenance.
- Use the air bleed valve to release the gas.
- Every 2000 hours or once a year, please contact your Komatsu distributor to have the gas pressure checked.



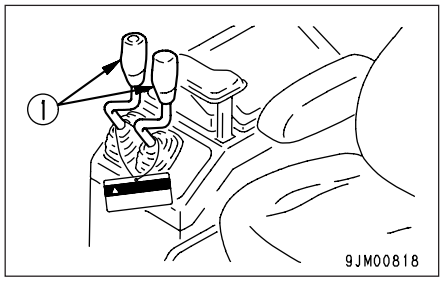
The accumulator for the brake is installed on the side of the brake component box on the left side of the rear frame.

The accumulator for the PPC valve is installed to the inside under the center platform.

When handling the accumulators, be extremely careful.



12.1 CHECK BEFORE STARTING ENGINE



12.1.1 WALK-AROUND CHECK

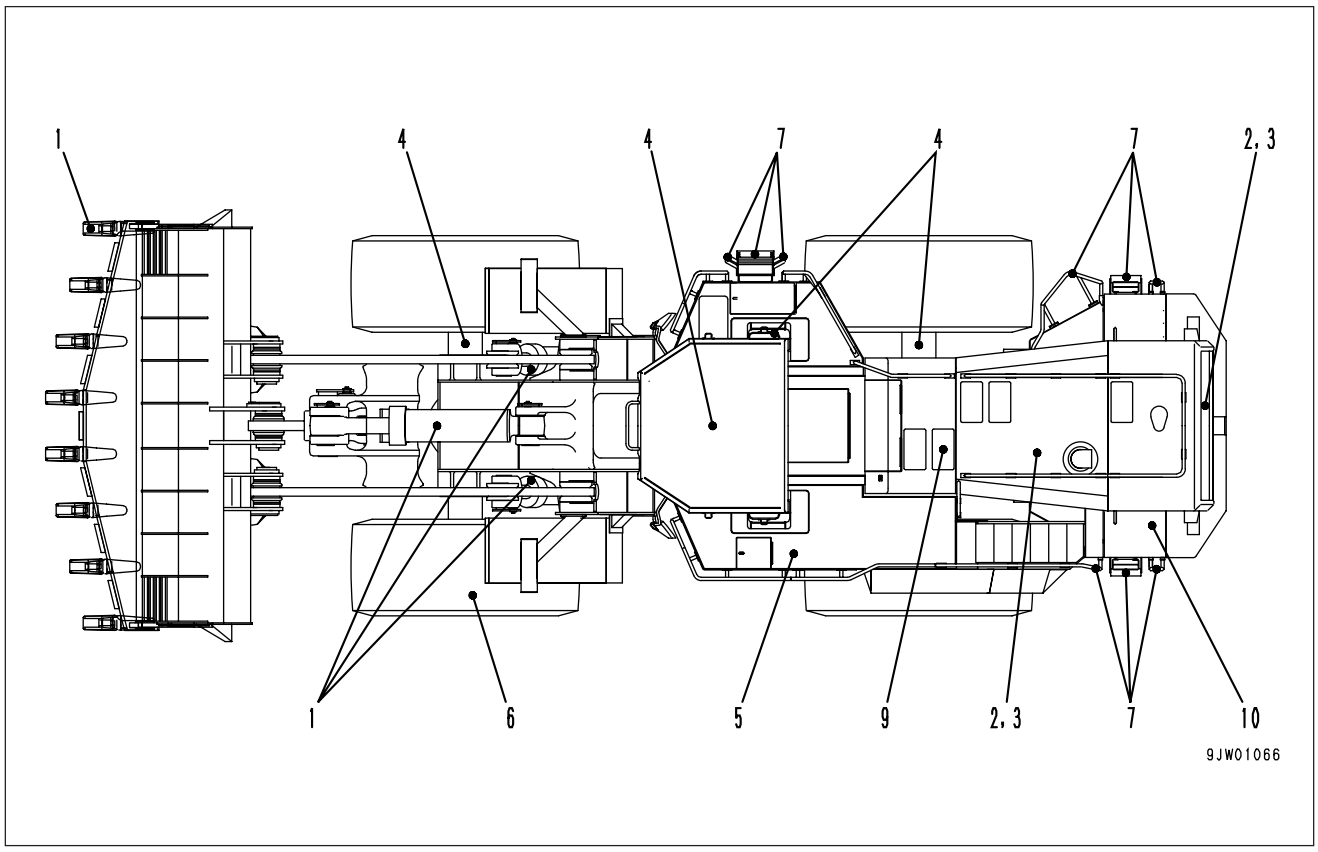
⚠ WARNING

- **Be sure to put a warning tag on work equipment control levers ①.**
- **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 for damage, wear, play in work equipment, cylinders, linkage, hoses**
   Check that there are no cracks, excessive wear, or play in the work equipment, cylinders, linkage, or hoses. If any abnormality is found, repair it.

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

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

4. **Check for leakage of oil from transmission case, axle, hydraulic tank, hoses, joints**
   Check that there is no leakage of oil. If any abnormality is found, repair it.

5. **Check for leakage of oil from brake line**
   Check that there is no leakage of oil. If any abnormality is found, repair it.

6. **Check for damage or wear to tires, loose mounting bolts**
   Check for cracks or peeling of the tires and for cracks or wear to the wheels (side rim, rim base, lock ring). Tighten any loose wheel nuts. If any abnormality is found, repair or replace the part.
   If any valve caps are missing, install new caps.

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

8. **Check for damage to gauges, monitor, loose bolts**
   Check that there is no damage to the gauges and monitor in the operator's cab. If any abnormality is found, replace the parts. Clean off any dirt on the surface.

9. **Check for loose air cleaner mounting bolts**
   Check for any loose mounting bolts, and tighten if necessary.

10. **Check for loose battery terminals**
    Tighten any loose terminal.

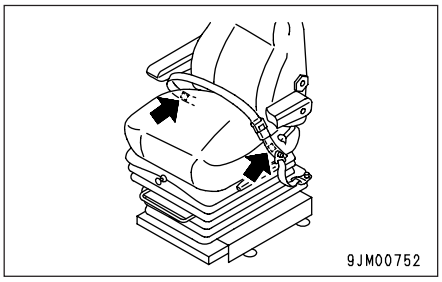
11. Check seat belt and equipment (if equipped)

⚠ WARNING

Even if there appears to be no abnormality with the seat belt, always replace it once every three years.

REMARK

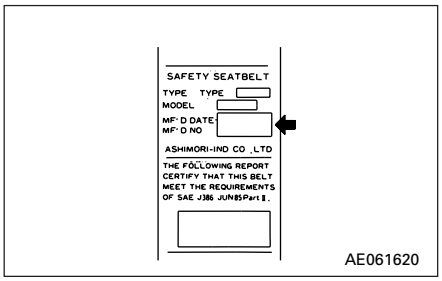
The date of manufacture of the seat belt is marked on the belt at the place indicated by the arrow in the diagram on the right.



Check that there are no loose bolts on the equipment mounting the seat belt to the machine, and tighten if necessary.

Tightening torque: 24.5 ± 4.9 N·m (2.5 ± 0.5 kgf·m, 18.1 ± 3.6 lbft)

If the belt is damaged or fluff is starting to form, or if there is any damage or deformation of the seat belt holders, replace the seat belt with a new part.



12. Check for loose bolts on ROPS (If equipped)

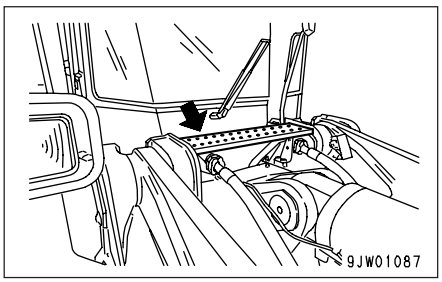
Check for any loose or damaged bolts. If any loose bolts are found tighten them to 1715 ± 195 N·m (175 ± 20 kgf·m, 1266 ± 145 lbft).

If any bolts are damaged, replace them with genuine Komatsu bolts.

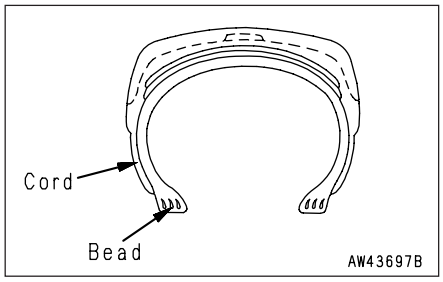
13. Clean cab window

Clean the cab window to ensure good visibility when operating the machine.

When cleaning the front window glass, stand on the central step of the front frame. To move the central step of the front frame, articulate the machine and stand on the floor step of the cab, and move to the central step, supporting yourself by grasping the handrails of the cab, etc.



14. Inspection of tires



⚠ WARNING

If worn or damaged tires are used, they may burst and cause serious injury or death.
To ensure safety, do not use the following tires.

Wear:
- **Tires with a tread groove of less than 15% of that of a new tire**
- **Tires with extreme uneven wear or with stepped-type wear**

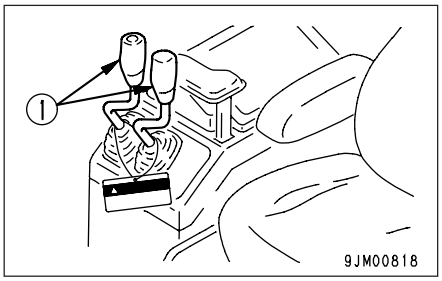
Damage:
- **Tires with damage which has reached the cords, or with cracks in the rubber**
- **Tires with cut or pulled cords**
- **Tires with peeled (separated) surface**
- **Tires with damaged bead**
- **Leaking or improperly repaired tubeless tires**
- **Deteriorated, deformed or abnormally damaged tires which do not seem usable**

15. Inspection of rims

⚠ WARNING

Check the rims (wheels) and rings for deformation, corrosion and cracks.
In particular, check the side rings, lock rings and rim flanges thoroughly.

12.1.2 CHECK BEFORE STARTING



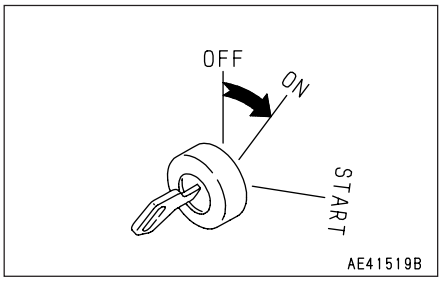
⚠ WARNING

Be sure to put a warning tag on work equipment control levers ①.

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

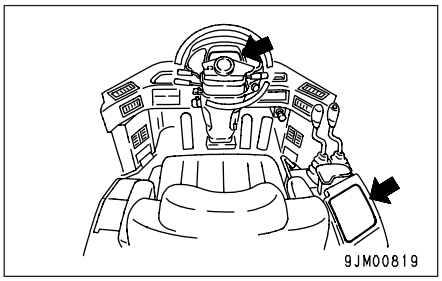
CHECK MONITOR PANEL

1. Turn the starting switch to ON.



2. Check that all the monitor lamps, the gauges and the warning lamp light up for about 3 seconds and the alarm buzzer sounds for about 1 second.

If any monitor lamp does not light up, ask your Komatsu distributor to inspect that monitor lamp.



Do not carry out the checks before starting using only the monitor; always carry out also the items specified for the periodic maintenance.

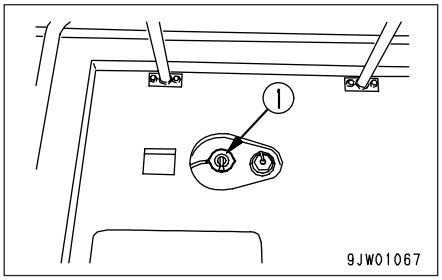
CHECK COOLANT LEVEL, ADD WATER

⚠ WARNING

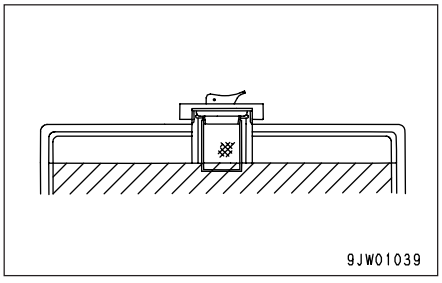
Do not remove the cap while cooling water is hot. Hot water may spout out.
When removing the radiator cap, lift the lever to relieve the internal pressure.

⚠ CAUTION

When adding water, use the step and handrail to support yourself securely.



1. When the starting switch is turned on, if the coolant warning lamp and monitor lamp flash, remove radiator cap ① at the rear of the machine and check that the coolant is above the hatched portion marked in the diagram on the right. If the coolant level is low, add more water.



2. After adding water, tighten the cap securely.

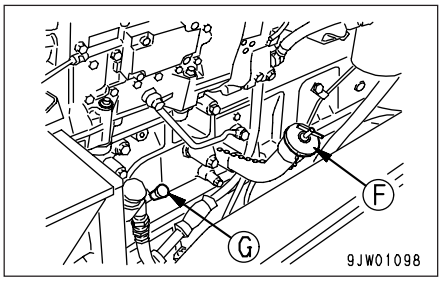
If the volume of coolant added is more than usual, check for possible water leakage.
Confirm that there is no oil in the coolant.

CHECK OIL LEVEL IN ENGINE OIL PAN, ADD OIL

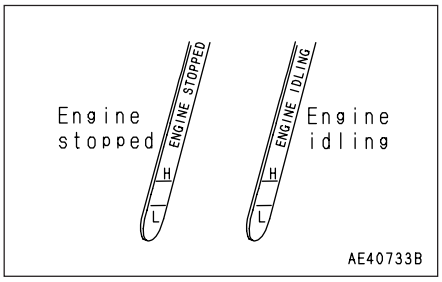
1. Open the inspection window at the rear right side of the machine.

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

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



4. The oil level should be between the H and L marks on dipstick Ⓖ.
   If the oil level is below the L mark, add engine oil through oil filler Ⓕ.

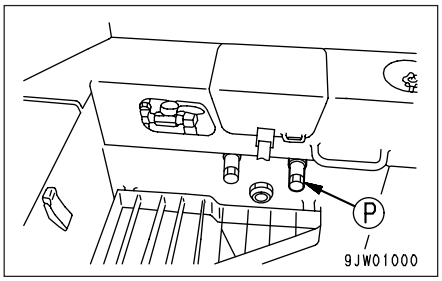


For details of the oil to use, see "20. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".

The dipstick has level markings on both sides. One side gives the levels for measuring when the engine is stopped (ENGINE STOPPED) and the other side gives the levels for when the engine is idling (ENGINE IDLING).

When measuring the oil level, measure with the engine stopped and use the side of the dipstick marked ENGINE STOPPED.

5. If the oil is above the H mark, drain the excess engine oil from drain plug Ⓟ, and check the oil level again.



6. If the oil level is correct, tighten the oil filler cap securely, then close the inspection window.

REMARK

- When checking the oil level after the engine has been operated, wait for at least 15 minutes after stopping the engine before checking.
  Checking the oil level with the engine idling may be allowed, if the following precautions are thoroughly satisfied:
  - ○ Check that the engine water temperature gauge shows green range.
  - ○ Use the side of the dipstick marked ENGINE IDLING.
  - ○ Remove the oil filler cap.
- If the machine is at an angle, make it horizontal before checking.

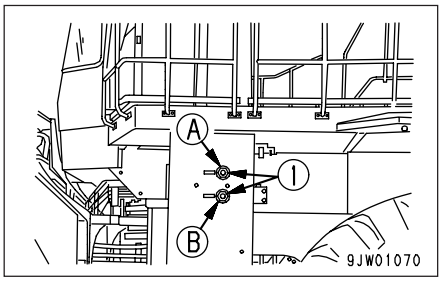
CHECK BRAKE OIL TANK LEVEL, ADD OIL

⚠ WARNING

Always use engine oil to refill the brake oil tank.

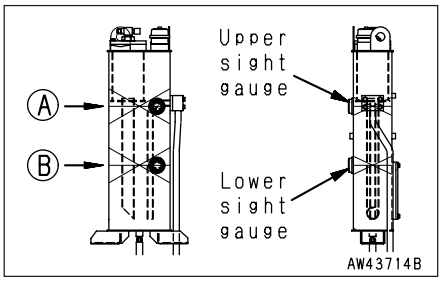
1. Check from the ground that the brake oil level in the brake oil tank on the left side of the machine is within sight gauge ① installed to the side of the brake tank.

   There are two sight gauges (top and bottom).



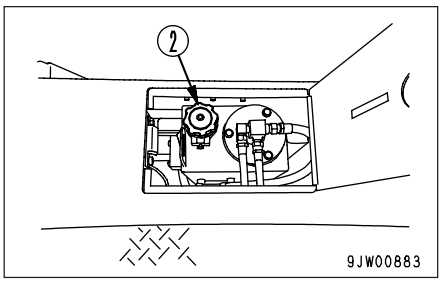
   Ⓐ: When checking 10 hours or more after the engine is stopped, use the upper level gauge in the figure at right.

   Ⓑ: When checking 5 minutes or more after the engine is started, use the lower level gauge in the figure at right.



2. If the oil level is low, open the cover at the top of the platform, then open cap ② and add engine oil.

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

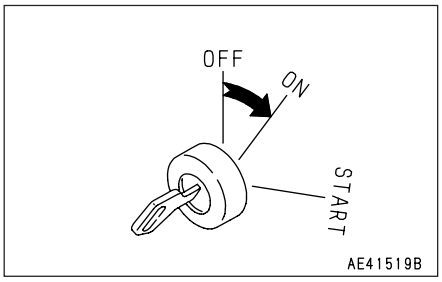


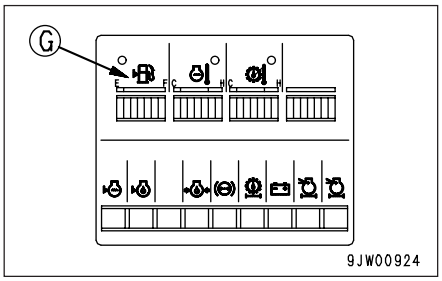
CHECK FUEL LEVEL, ADD FUEL

⚠ WARNING

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

1. Turn the engine starting switch to the ON position, then check the fuel level with fuel gauge Ⓖ.
   After checking, return the starting switch to the OFF position.

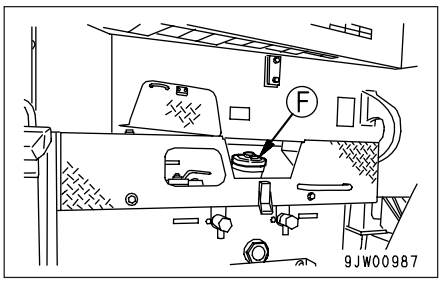




2. Upon completion of work, remove the mud guard cover and add fuel through filler Ⓕ until the fuel tank is full.

   For details of the method for opening and closing the cap, see "11.5 CAP WITH LOCK".

   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.

   Fuel capacity: 1100 ℓ (290.4 US gal, 242.0 UK gal)

CHECK ELECTRIC WIRING

⚠ WARNING

- **If fuses are frequently blown or if there are traces of short circuit on the electrical wiring, locate the cause and carry out repair.**
- **Accumulation of flammable material (dead leaves, twigs, grass, etc.) around the battery may cause fire, so always check and remove such material.**
- **Keep the top surface of the battery clean and check the breather hole in the battery cap. If it is clogged with dirt or dust, wash the battery cap to clear the breather hole.**

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

Check the wiring of the “battery”, “starting motor” and “alternator” carefully in particular.

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

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

CHECK INFLATION PRESSURE OF TIRES

Measure the inflation pressure with a tire pressure gauge while the tires are cool before starting work.

Check for damage or wear to the tires and the rims.

Check for loose wheel hub nuts (bolts).

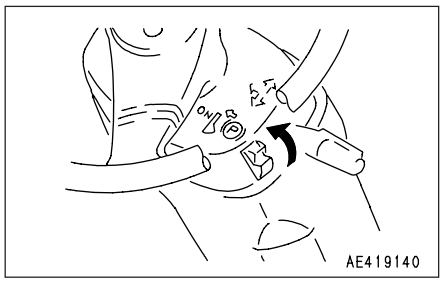
The proper inflation pressure is shown below.

Tire size	Inflation pressure
40/65-39-36PR (L5) (standard)	0.44 MPa (4.5 kgf/cm^2, 63.9 PSI)
41.25/70-39-34PR(L5) (if equipped)	0.44 MPa (4.5 kgf/cm^2, 63.9 PSI)

NOTICE

The appropriate tire inflation pressure differs according to the type of work, so see “12.18 HANDLING THE TIRES”.

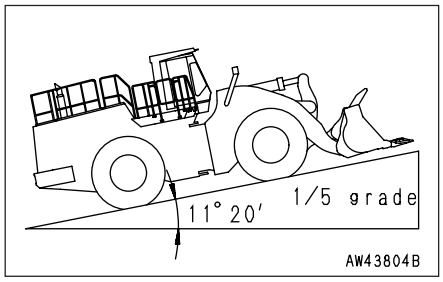
CHECK EFFECT OF PARKING BRAKE



⚠ WARNING

Even if the parking brake switch is turned ON, there is danger until the parking brake pilot lamp lights up, so keep the brake pedal depressed.

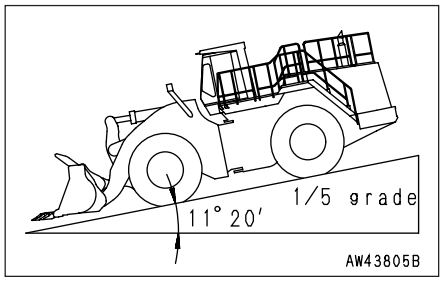
Measurement conditions
- Tire inflation pressure: Specified pressure
- Road surface: Dry paved surface with 1/5 (11°20′) grade
- Machine: Operating condition



Method of measurement
1. Turn the key in the starting switch to the ON position and start the engine, set the machine facing straight to the front, then drive the machine up a 1/5 grade with the bucket empty.

2. Depress the brake pedal, stop the machine, return the directional lever to the neutral position, then stop the engine.

3. Press the parking brake switch to the ON position, release the brake pedal slowly, and check that the machine is held in position.



CHECK EFFECT OF BRAKE

Drive the machine at a speed of 20 km/h (12.4 MPH) on a dry flat concrete road surface, and check that the stopping distance is less than 6.5 m (21 ft 4 in).

CHECK SOUND OF HORN AND BACKUP BUZZER

CHECK FLASHING OF LAMPS, CHECK FOR DIRT OR DAMAGE

CHECK DIRECTION OF REAR VIEW MIRROR, CHECK FOR DIRT OR DAMAGE

CHECK ENGINE EXHAUST COLOR AND SOUND

CHECK OPERATION OF GAUGES

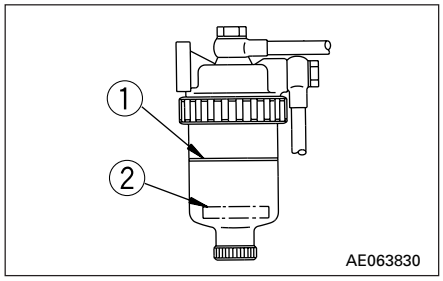
CHECK PLAY OF STEERING WHEEL, CHECK OPERATION OF STEERING

CHECK FOR WATER AND SEDIMENT IN WATER SEPARATOR, DRAIN WATER (IF EQUIPPED)

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

For the draining procedure, see section "24.2 WHEN REQUIRED".

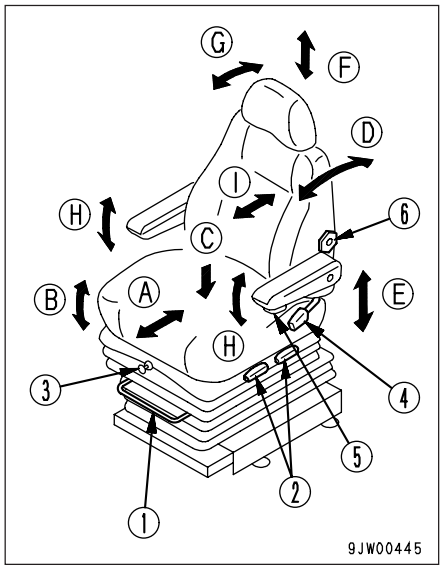
Even if a water separator is installed, be sure to check the fuel tank to remove water and sediment in the fuel.



12.1.3 ADJUSTMENT BEFORE OPERATION
AIR SUSPENSION SEAT

⚠ WARNING

- **Park the machine in a safe place and stop the engine when carrying out adjustment of the operator's seat.**
- **Adjust the seat before starting operations or when changing operators.**
- **Check that you can depress the brake pedal fully with your back against the seat backrest.**



Ⓐ: **Forward-backward adjustment of seat**

Move lever ① up and move the seat to the desired position, then release the lever.

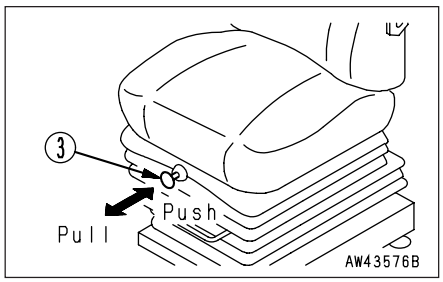
Fore-and-aft adjustment distance is 180 mm (7.1 in) (10 mm (0.4 in) x 18 stages).

Ⓑ: **Adjusting seat angle**

Move lever ② up and push down on the rear of the seat to tilt it backward.

Move lever ② down and push down on the front of the seat to tilt it forward.

The adjustment range is 13° (Front tilt, rear tilt: 4 stages each).



Ⓒ: **Adjusting seat weight**

Sit on the seat and adjust the strength of the suspension with valve ③. The adjustment range is 50 kg (110 lb) (Target) to 120 kg (265 lb).

Push: Suspension is strengthened.

Pull: Suspension is weakened.

Ⓓ: **Adjustment of backrest angle**

Move lever ④ up and move the backrest to the front or rear.

When performing this, fit your back to the seat back. If the seat back is apart from your back, it may return suddenly.

The adjustment range is 66° to the front (3° x 22 stages) and 72° to the rear (3° x 24 stages).

NOTICE

If the seat back is reclined too far, the seat back may hit the rear glass, so use it in a position where it does not contact the glass.

Ⓔ: **Seat height adjustment**

Move lever ② up/down, then move the seat up or down as desired. Since lever ② is also used for adjustment seat angle, set the seat to the desired height while adjusting the angle.

The adjustment range is 60 mm (2.4 in).

Ⓕ: **Adjusting height of headrest**
Move the headrest up and down to the desired height.
The adjustment range is 50 mm (2.0 in).

Ⓖ: **Adjusting headrest angle**
Rotate the headrest to the front or rear.

Ⓗ: **Adjusting angle of armrest**
Adjust the angle of the armrest by rotating knob ⑤.
The adjusting range is 30° (Forward tilt: 25°, Backward tilt: 5°).
Also, when the armrest is turned, it will spring up.

Ⓘ: **Lumbar support**
The tension of the waist part can be adjusted by turning grip ⑥.

ADJUST SEAT BELT

Always install a seat belt on machines equipped with ROPS.

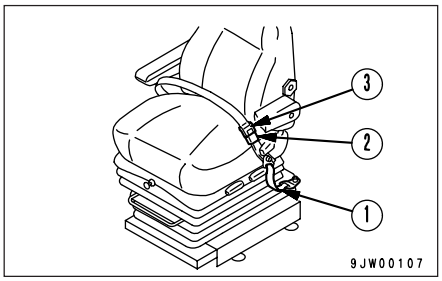
⚠ WARNING

- **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 use the seat belt during operations.**
- **Do not twist the left or right side of the seat belt when fastening it.**

FASTEN AND REMOVING SEAT BELT

Fasten the seat belt so that it is tight without being too tight.

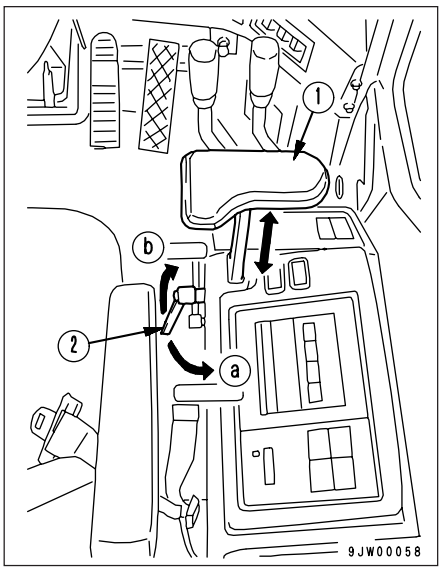
1. Sit on the seat, depress the brake pedal fully, and adjust the seat so that your back is fit to the backrest.
2. After adjusting the seat position, adjust teaser belt ①. Tense the teaser belt and install it when there is no one sitting on the seat.
3. Sit on the seat, pull the belt of your right hand, and insert tongue ③ into buckle ② securely until it clicks.
4. When removing the belt, press the red button on the buckle ②. Fasten the seat belt along your body without twisting it.



LIFT REST HEIGHT ADJUSTMENT LEVER

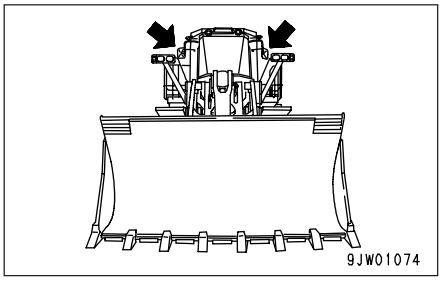
The height of lift rest ① can be adjusted easily with adjustment lever ②. Turn adjustment lever ② in the loosening direction and adjust the height of lift rest ① properly, then turn adjustment lever ② to the fixing direction.

Position ⓐ: Loosening direction
Position ⓑ: Fixing direction

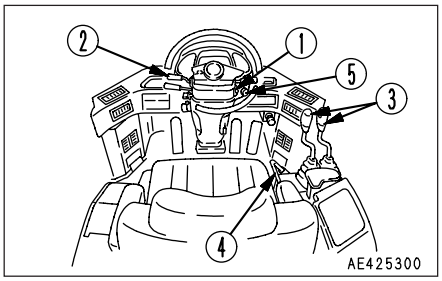


ADJUST REAR VIEW MIRROR

Sit in the operator's seat and adjust the rear view mirror so that you can see properly to the rear.



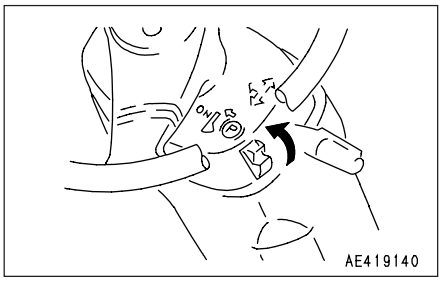
12.1.4 OPERATIONS AND CHECKS BEFORE STARTING ENGINE



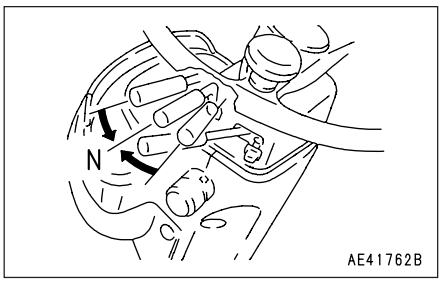
⚠ WARNING

- **If the control levers are touched by accident, the work equipment may move suddenly. When leaving the operator's compartment, always set the safety lever securely to the LOCK position.**
- **Before starting the engine, use a damp cloth to wipe off the dust accumulated on the top surface of the battery or on the starting motor and the alternator.**

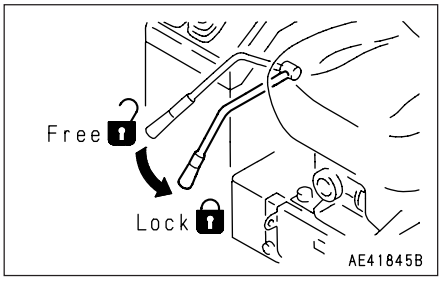
1. Check that parking brake switch ① is at the ON position.



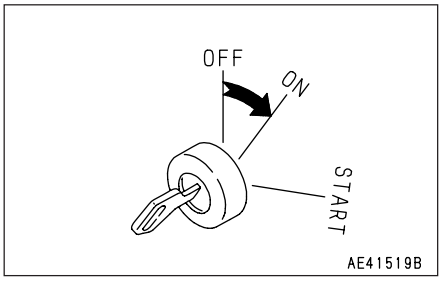
2. Check that directional lever ② is at the N position.
   When starting the engine, if directional lever ② is not at the N position, the engine will not start.



3. Lower the bucket to the ground, then check that work equipment control lever ③ is locked by safety lock ④.



4. Insert the key in starting switch ⑤, turn the key to the ON position, and check that the pilot lamp lights up.



When the starting switch is turned to the ON position before starting the engine, all monitor lamps, gauges, and centralized warning lamps will light up for approx. 3 seconds, and the alarm buzzer will sound for approx. 1 second.

When this happens, 88 is displayed on the speedometer, and 8 is displayed on the transmission shift indicator.

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

12.2 STARTING ENGINE
12.2.1 NORMAL STARTING

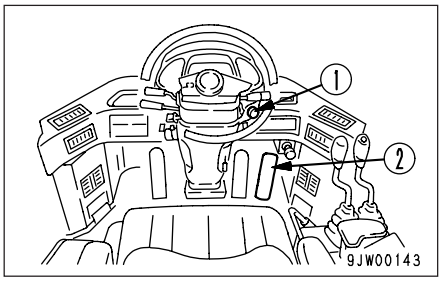
⚠ WARNING

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

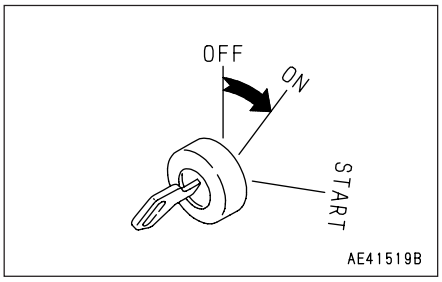
NOTICE

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

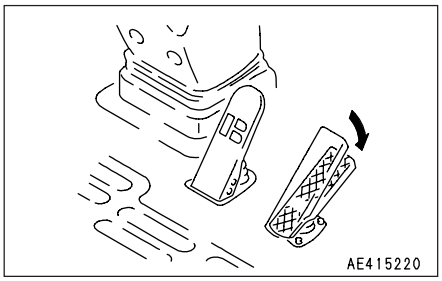
If the engine will not start, wait for at least 2 minutes before trying to start the engine again.



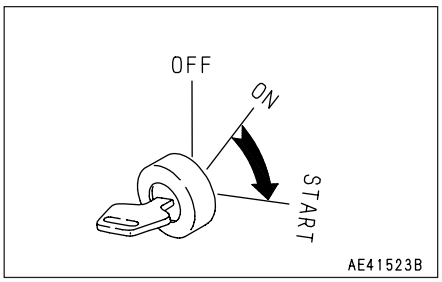
1. Turn the key in starting switch ① to the ON position.



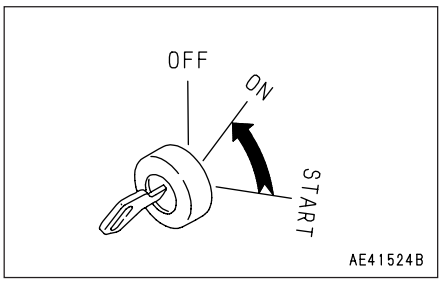
2. Depress accelerator pedal ② lightly.



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



4. When engine is started, release the key of starting switch ① and the key will return automatically to ON.



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 aid fluids as they may cause explosions.**

NOTICE

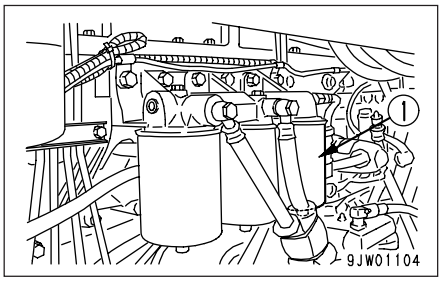
Do not keep the starting motor rotating continuously for more than 20 seconds.

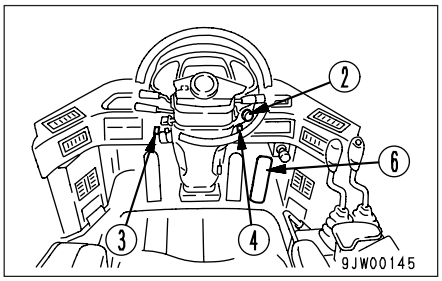
If the engine will not start, wait for at least 2 minutes before trying to start the engine again.

When starting in low temperatures, do as follows.

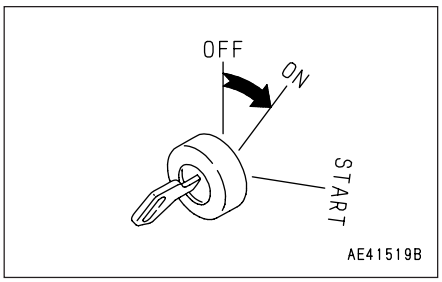
Starting by automatic priming system (APS)

1. Open fuel valve ① of the automatic priming system.
   Keep fuel valve ① open when the temperature drops during the season the APS is used.

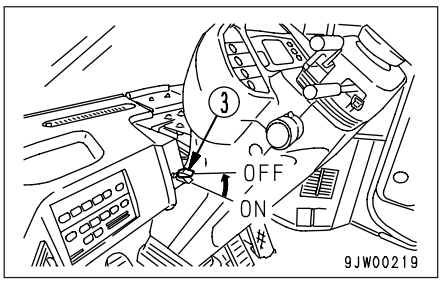


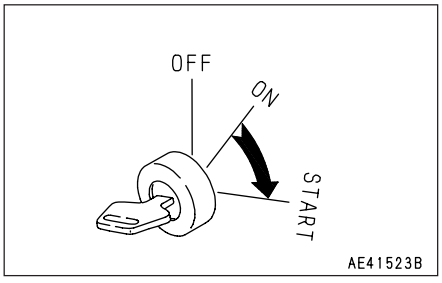


2. Turn the key of starting switch ② to ON.

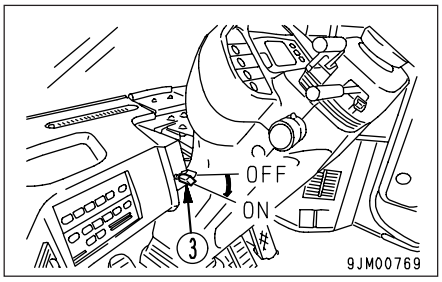


3. Keep fuel cut-off switch ③ in OFF position (pull up). Put starting switch ② in START position and engine will start in about 10 seconds.

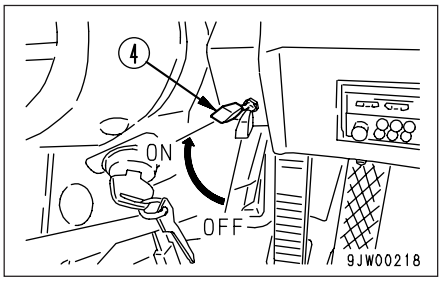




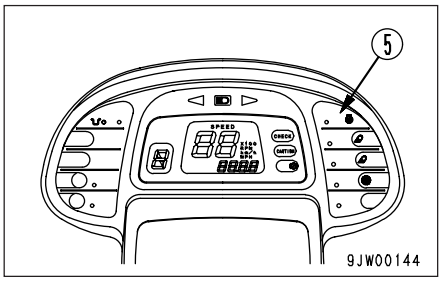
4. Put fuel cut-off switch ③ in ON position.
   When releasing the switch, it will return to ON position.

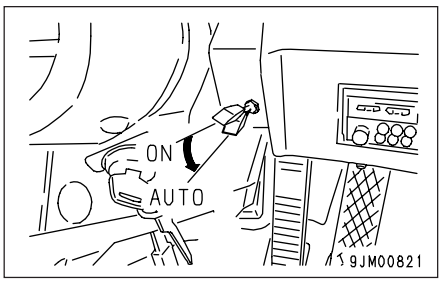


5. When preheater switch ④ is put in the ON position, pre-heating monitor ⑤ will light and automatic pre-heating will start.

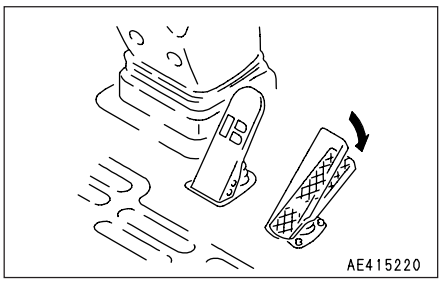


If pre-heating monitor ⑤ lights, return preheater switch ④ to AUTO position. When releasing the switch, it will return to AUTO position.



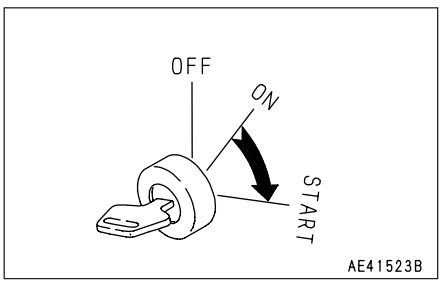


6. Depress accelerator pedal ⑥ halfway.



7. Pre-heating finishes in about 12 seconds. The pre-heating monitor lamp will go out so turn starting switch key ② to the START position to start the engine.

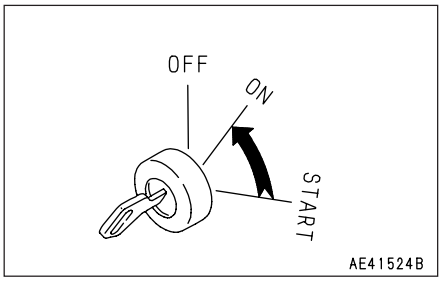
While the pre-heating monitor is still illuminated, if the starting switch is put in the START position, the glow plug will get wet and thre will be no ignition, so be careful of sarting problems.



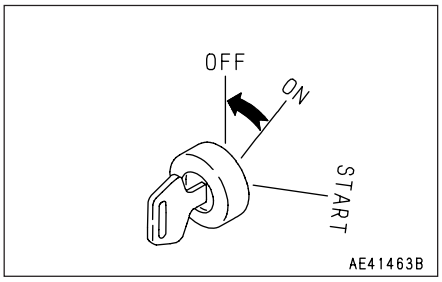
REMARK

When the starting motor runs, the monitor may flash. If this flashing stops after the engine is started, however, there is no abnormality.

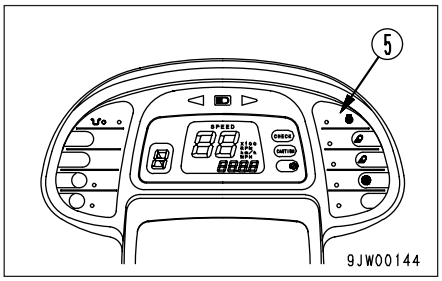
8. When the engine is started, release the key of starting switch ② and the key will return automatically to ON.



If the engine does not start through the steps specified above, turn key of starting switch ② to OFF position and repeat Steps 2 to 8 at an interval of approx. 2 minutes.



9. After the engine is started, when the engine is running smoothly, and the exhaust gas color becomes normal, turn OFF pre-heating switch ④.

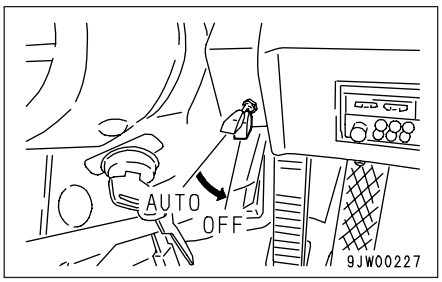


REMARK

After the engine is started, when the water temperature reaches about 20°C, pre-heating monitor ⑤ flashes to signal that after-heating is finished and after-heating is canceled automatically.

If pre-heating switch ④ is not turned OFF, however, pre-heating monitor ⑤ does not go off. Accordingly, turn off pre-heating switch ④ to put out pre-heating monitor ⑤ after the following elapsed time.

The time which should elapse before turning pre-heating switch ④ off varies with the ambient temperature. Check the time with the following table.

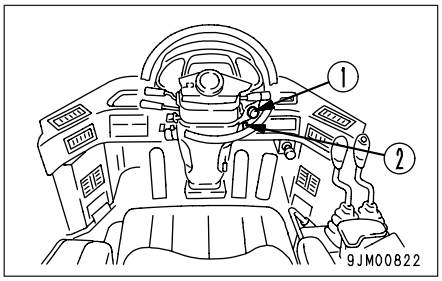


Ambient temperature	Time from the start of engine until turn-off of preheater switch
15 – 0°C	1 – 2 minutes
Below 0°C	3 – 5 minutes

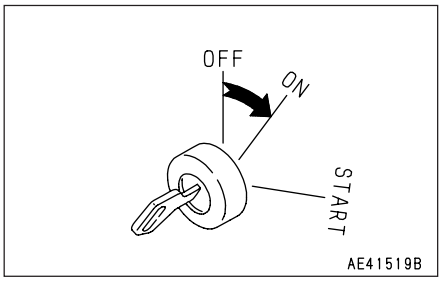
Do not raise the engine speed higher than the middle level during the time from the start of the engine until turn-off of pre-heating switch shown in the above table.

Starting using manual preheating

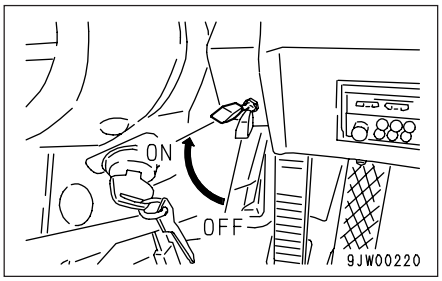
When the engine water temperature is above 13˚C even if the ambient temperature is below 15˚C, automatic preheating cannot be carried out. If it is difficult to start the engine, use the following procedure.

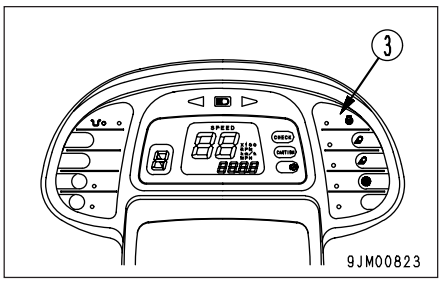


1. Put starting switch key ① to ON position.

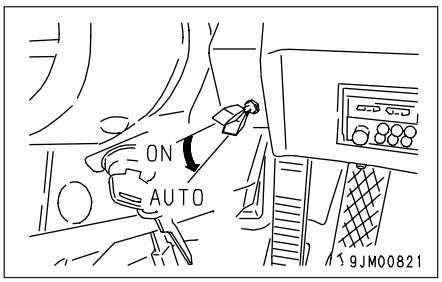


2. Keep the preheater switch ② in ON position with hand until preheating monitor ③ goes off.

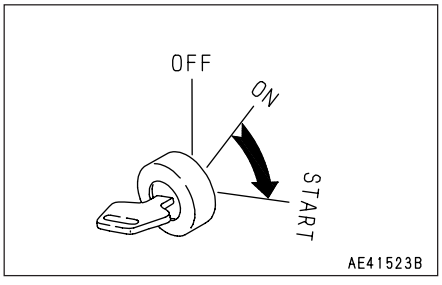




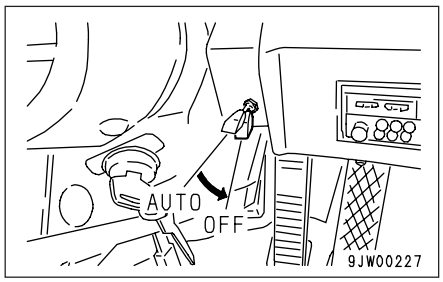
3. Release pre-heating switch ②, and it returns to AUTO position automatically and pre-heating monitor ③ starts flashing.



4. Then, quickly return starting switch ① to START position to start the engine.



5. After starting, put preheater switch ② in OFF position.



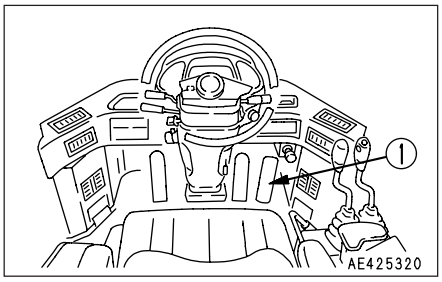
The standard specification machine is designed to work in ambient temperature from –20 to 40˚C.

When operating the machine at temperatues below –20˚C, special equipment is needed. Contact your Komatsu distributor for details.

For machines where the air dryer is installed as an option, in cold temperatures below –10˚C, when operating the machine after it has been stopped for several hours, run the engine for at least 10 minutes after starting before moving the machine.

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.

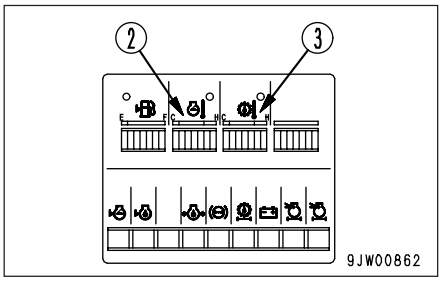


NOTICE

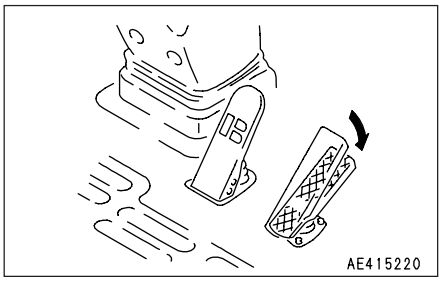
Do not suddenly accelerate the engine before the warming-up operation is completed.

Do not run the engine at low idling or high idling continuously for more than 20 minutes.

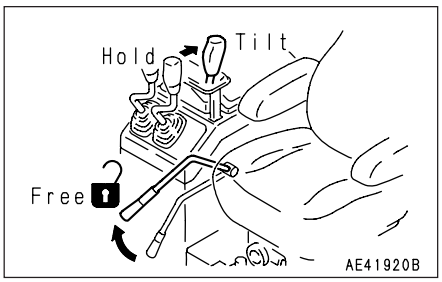
If it is necessary to run the engine at idling, apply a load from time to time or run the engine at a mid-range speed.



1. Depress accelerator pedal ① lightly and run the engine with no load at midrange speed for about 5 minutes.



2. To warm up the hydraulic oil only in cold areas, do as follows.
   During the warming-up operation, check that the engine rotation is smooth, then set the safety lock of the work equipment control lever to the FREE position and move the bucket control lever in and out of the TILT position to warm up the hydraulic oil.
   The relief time at the tilt position should be a maximum of 10 seconds.
   With this operation, the oil will reach the relief pressure and this will warm up the hydraulic oil more quickly.



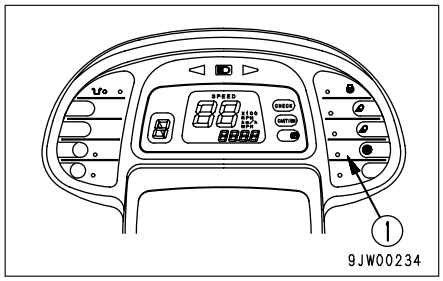
3. After carrying out the warming-up operation, check that the gauges and caution lamps are normal.
   If there is any abnormality, carry out maintenance or repair.
   Run the engine under a light load until engine water temperature gauge ② and torque converter oil gauge ③ are in the green range.

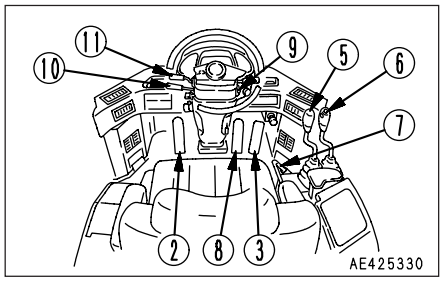
4. Check that there is no abnormality in the exhaust color, sound, or vibration.
   If there is any abnormality, carry out repairs.

12.4 MOVING MACHINE OFF

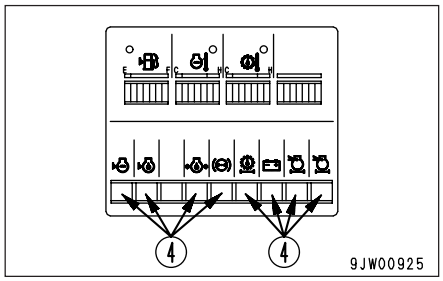
⚠ WARNING

- **When moving the machine off, check that the area around the machine is safe, then sound the horn before starting.**
  Do not allow people near the machine.
  There is a blind spot behind the machine, so be particularly careful when traveling in reverse.
- **When starting the machine on slopes, set transmission cut-off switch ① to the OFF position, depress left brake pedal ② while depressing accelerator pedal ③, then gradually release left brake pedal ② to allow the machine to start.**

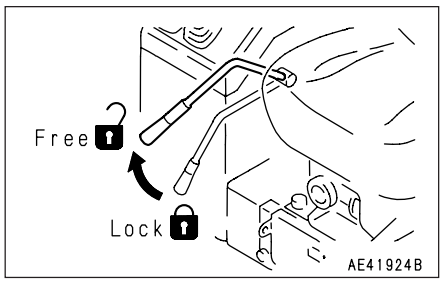




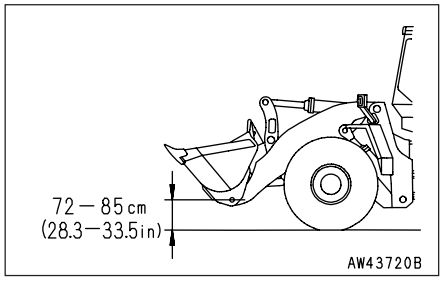
1. Check that caution pilot lamp ④ is not lighted up.



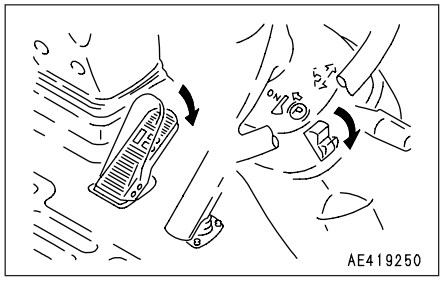
2. Set safety lock ⑦ of bucket control lever ⑤ and lift arm control lever ⑥ to the FREE position.



3. Operate lift arm control lever ⑥ to set the work equipment to the travel posture shown in the diagram on the right.



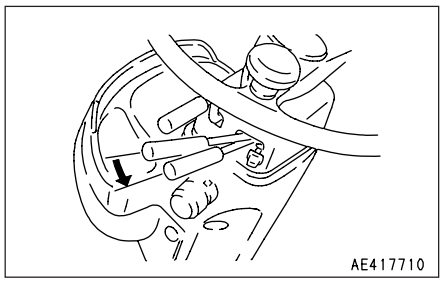
4. Depress right brake pedal ⑧ and turn parking brake switch ⑨ to the OFF (RELEASE) position to release the parking brake.
   Keep right brake pedal ⑧ depressed.



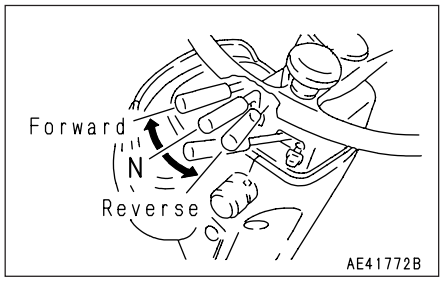
REMARK

If the parking brake is still actuated when parking brake switch ⑨ is at the OFF (RELEASE) position, turn the parking brake switch ON, then turn it OFF again.

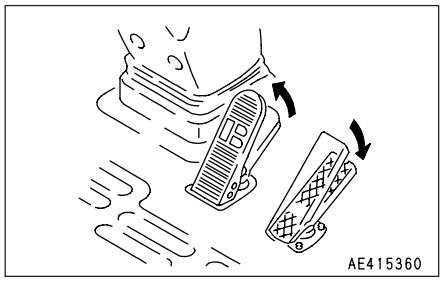
5. Set speed control lever ⑩ to the desired position.



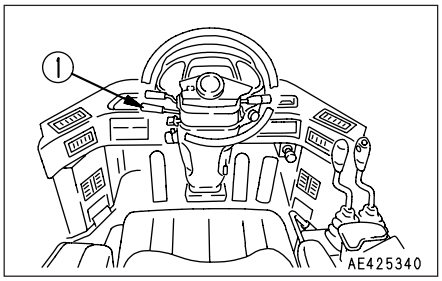
6. Set directional lever ⑪ to the desired position.



7. Release right brake pedal ⑧, then depress accelerator pedal ③ to move the machine off.



12.5 CHANGING GEAR SPEED



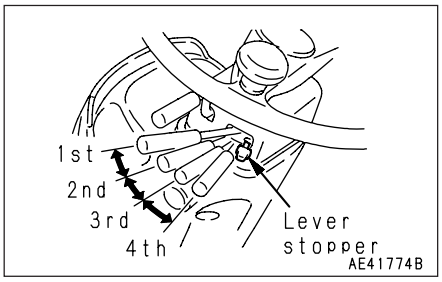
⚠ WARNING

When traveling at high speed, do not change the gear speed suddenly. When shifting gear, use the brakes to reduce the travel speed, then shift gear.

Shift the gear as follows.

Move speed control lever ① to the desired position.

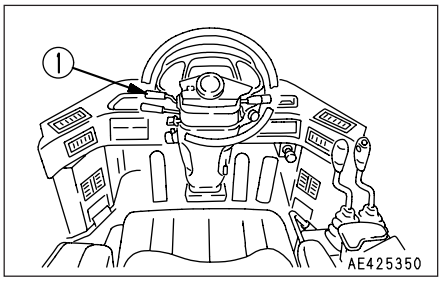
Only 1st or 2nd speeds are used for digging and loading operations, so actuate speed control lever stopper.

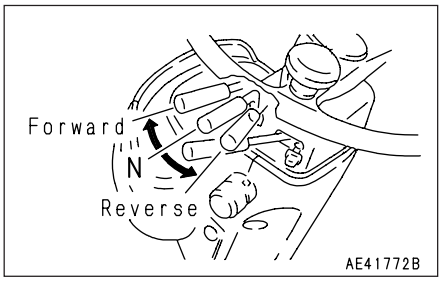


REMARK

- This machine is equipped with a kickdown switch that shifts the gear down to 1st if the button at the tip of the lift arm control lever is pushed when the machine is traveling in 2nd gear.
  We recommend the use of the kickdown switch when carrying out digging or loading operations in 1st or 2nd gear.
  For details of use, see “11.2 SWITCHES”.
- If the gear shift lever is operated slowly or it is stopped between speed ranges, error code “CALL” may be displayed. This is not a failure: the gear shift lever must be operated to complete the gear shifting within 2 seconds.

12.6 CHANGING DIRECTION





⚠ WARNING

- **When changing direction between FORWARD and REVERSE, check that the new direction of travel is safe. There is a blind spot behind the machine, so be particularly careful when changing direction to travel in reverse.**
- **Do not switch between FORWARD and REVERSE when traveling at high speed.**
  When switching between FORWARD and REVERSE, depress the brake to reduce the travel speed sufficiently, then change the direction of travel. (Max. speed for changing direction: 12 km/h (7.5 MPH))

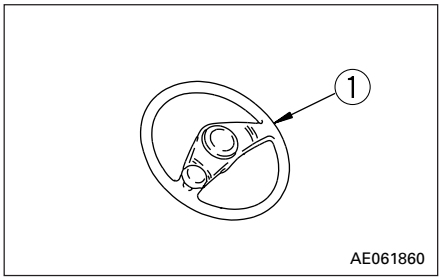
There is no need to stop the machine even when switching between FORWARD and REVERSE.

Place directional lever ① in the desired position.

REMARK

If the gear shift lever is operated slowly or it is stopped between speed ranges, error code "CALL" may be displayed.
This is not a failure: the gear shift lever must be operated to complete the gear shifting within 2 seconds.

12.7 TURNING



⚠ WARNING

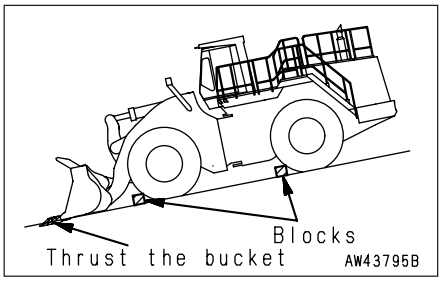
- **It is dangerous to turn the machine suddenly at high speed, or to turn on steep hills.**
- **If the engine stops when the machine is traveling, the emergency steering is actuated. However, the emergency steering only works while the machine is traveling, so if the machine stops, the emergency steering can no longer be used.**
  This is particularly dangerous on hills, so never stop the engine when the machine is traveling.
  If the engine stops, stop the machine immediately at a safe place.

When traveling, use steering wheel ① to turn the machine.

With this machine, the front frame is joined to the rear frame at the center of the machine by the center pin. The front and rear frames bend at this point, and the rear wheels follow in the same track as the front wheels when turning.

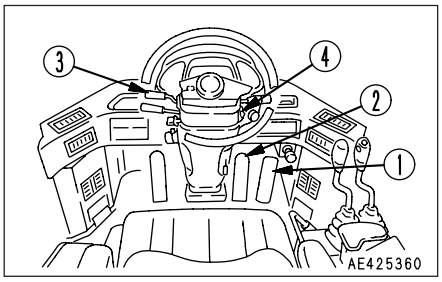
Turn the steering wheel lightly to follow the machine as it turns. When turning the steering wheel fully, do not turn it beyond the end of the stroke.

12.8 STOPPING MACHINE



⚠ WARNING

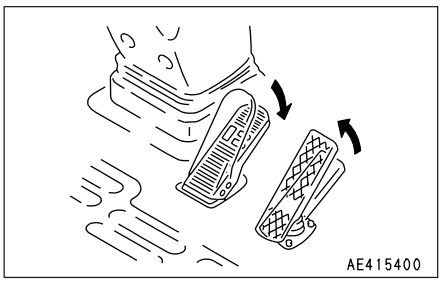
- **Avoid stopping suddenly. Give yourself ample room when stopping.**
- **Do not park the machine on slopes.**
  If the machine has to be parked on a slope, set it facing directly down the slope, then dig the bucket into the ground and put blocks under the tires to prevent the machine from moving.
- **If the control lever is touched by accident, the work equipment or the machine may move suddenly, and this may lead to a serious accident. Before leaving the operator's compartment, always set the safety lock lever securely to the LOCK position.**
- **Even if the parking brake switch is turned ON, there is danger until the parking brake pilot lamp lights up, so keep the brake pedal depressed.**



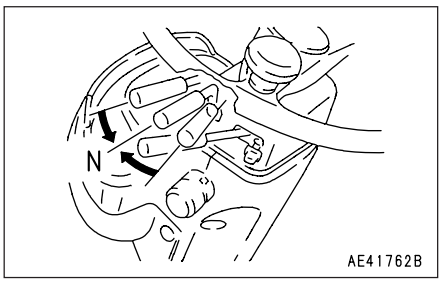
NOTICE

Never use the parking brake switch to brake the machine when traveling except in an emergency. Apply the parking brake only after the machine has stopped.

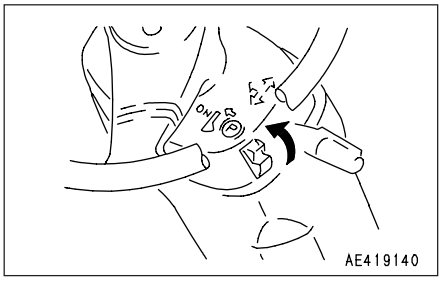
1. Release accelerator pedal ①, and depress brake pedal ② to stop the machine.



2. Place directional lever ③ in N (neutral).



3. Turn parking brake switch ④ to ON to apply the parking brake.

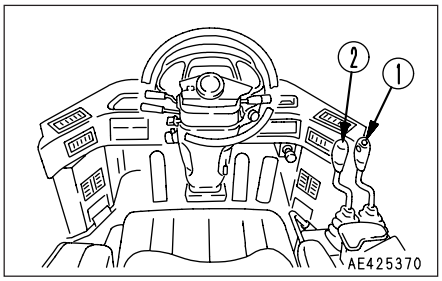


REMARK

When the parking brake is applied, the transmission is automatically returned to neutral.

12.9 OPERATION OF WORK EQUIPMENT

Lift arm control lever ① and bucket control lever ② can be used to operate the lift arm and bucket as follows.



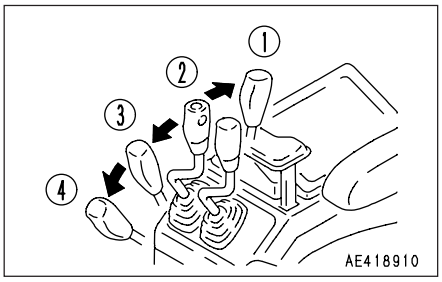
LIFT ARM OPERATION (LEVER ①)

① Raise ( )

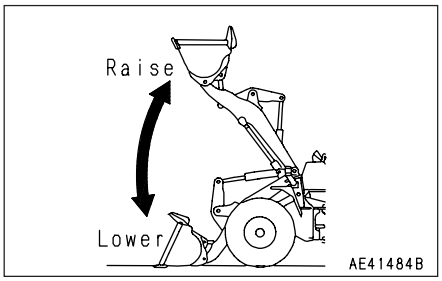
② Hold ( ) The lift arm is kept in the same position.

③ Lower ( )

④ Float ( ): The lift arm moves freely under external force.



When the lift arm control lever is pulled further from the raise position, the lever is stopped in this position until the lift arm reaches the preset kick-out position, and the lever is return to the hold position.



NOTICE

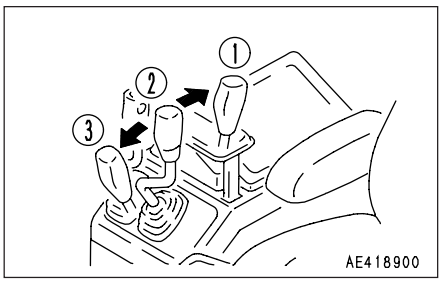
Do not use the FLOAT position when lowering the bucket.

BUCKET OPERATION (LEVER ②)

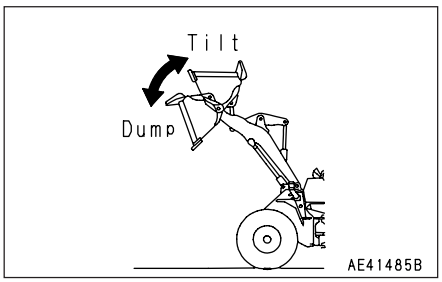
① Tilt ( )

② Hold ( ): The bucket is kept in the same position.

③ Dump ( )



When the bucket control lever is pulled further from the tilt position, the lever is stopped in this position until the bucket reaches the preset position of the positioner, and the lever is return to the hold position.



12.10 WORK POSSIBLE USING WHEEL LOADER

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

12.10.1 DIGGING OPERATIONS

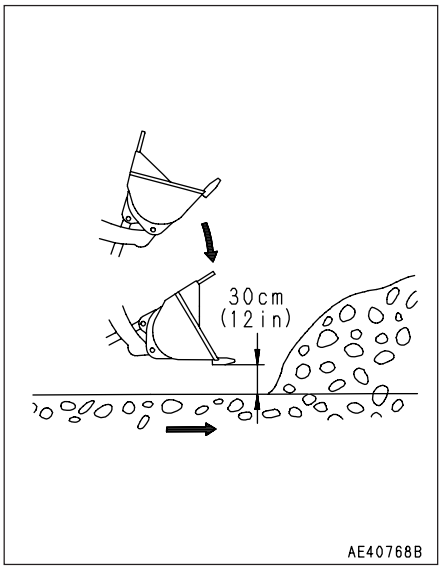
⚠ WARNING

Always set the machine facing directly to the front when carrying out digging or scooping operations. Never carry out these operations with the machine articulated.

NOTICE

If the tires slip, the tire life will be reduced, so do not allow the tires to slip during operation.

- When loading piled soil or blasted rock, drive the machine forward as follows to load. To prevent cutting of the tires caused by the tires slipping, be careful of the following points during the operation.
  - ○ Always keep the operating jobsite flat, and remove any fallen rocks.
  - ○ When working with stockpiles, operate the machine in 1st or 2nd; when loading blasted rock operate the machine in 1st.



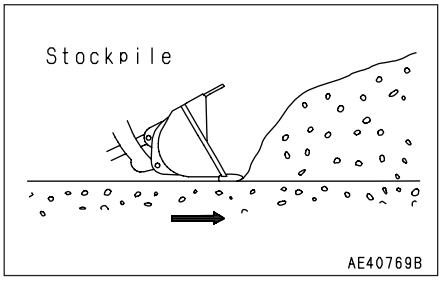
1. When driving the machine forward and lowering the bucket, stop the bucket about 30 cm (12 in) from the ground, then lower it slowly.

REMARK

If the bucket hits the ground, the front tires will come off the ground, and the tires will slip.

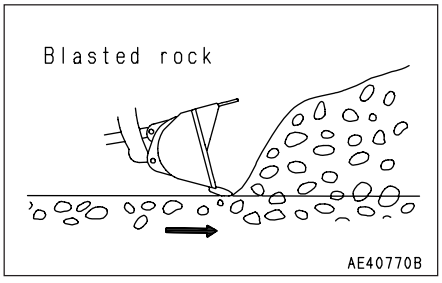
2. Shift down immediately in front of the material to be loaded. When completing the shift down, depress the accelerator pedal at the same time and thrust the bucket into the load.

3. When the material is in a stockpile, keep the cutting edge of the bucket horizontal; when loading blasted rock, have the bucket tilting slightly down.

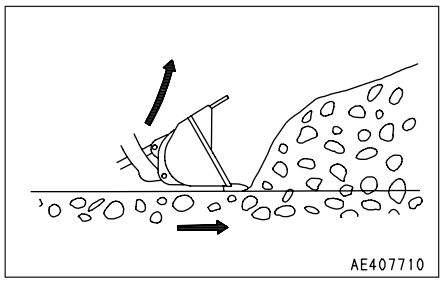


Be careful not to get blasted rock under the bucket. This will make the front tires come off the ground and slip.

Try to keep the load in the center of the bucket; if the load is on one side of the bucket, the load will be unbalanced.



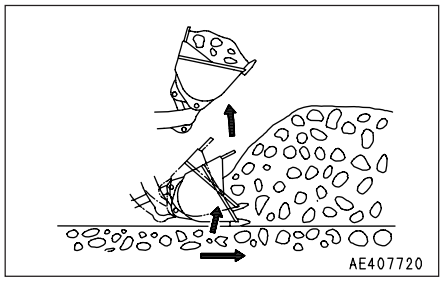
4. At the same time as thrusting the bucket into the material, raise the lift arm to prevent the bucket from going in too far. By raising the lift arm, ample traction will be produced by the front tires.



REMARK

If the bucket is thrust too much and the lift arm stops rising or the machine stops moving forward, release the accelerator pedal a little. Proper operation of the accelerator pedal for each type of the soil is effective for saving of fuel and prevention of wear of the tires.

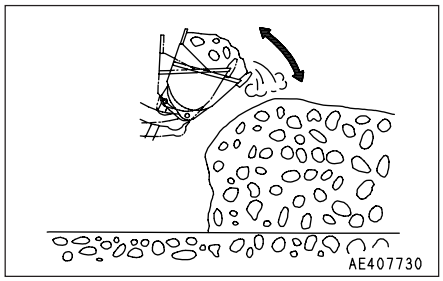
5. Check that there is enough material loaded into the bucket, then operate the bucket control lever to tilt the bucket and load the bucket fully.



REMARK

If the bucket edge is moved up and down while pushing in the bucket and digging, the front tires will come off the ground and this will cause the tires to slip.

6. If there is too much material loaded in the bucket, dump and tilt the bucket quickly to remove the excessive load.
   This prevents spillage of the load during hauling.

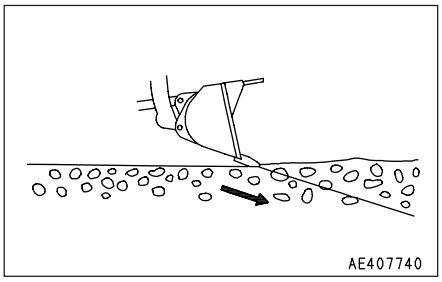


- When digging and loading on level ground, set the bucket edge facing down slightly as follows and drive the machine forward. Always be careful not to load the bucket on one side and cause an unbalanced load.
  This operation should be carried out in 1st gear.

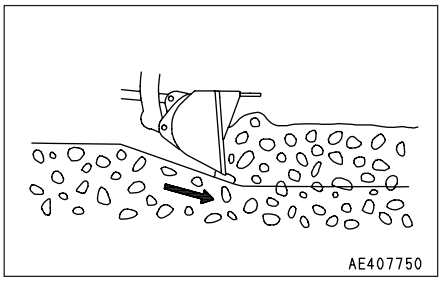
⚠ WARNING

Do not set the bucket facing down more than 20°.

1. Set the edge of the bucket facing slightly down.

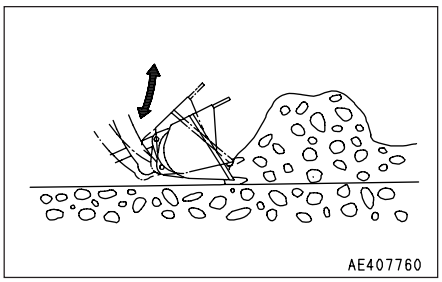


2. Drive the machine forward and operate the lift arm control lever forward to cut a thin layer of the surface each time when excavating the soil.

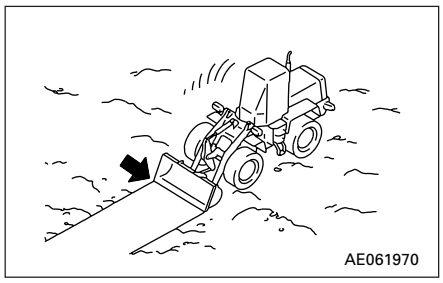


3. Operate the lift arm control lever slightly up and down to reduce the resistance when driving the machine forward.

When digging with the bucket, avoid imposing the digging force onto only one side of the bucket.



12.10.2 LEVELING OPERATIONS



NOTICE

Always operate the machine in reverse when carrying out leveling operations.

If it is necessary to carry out leveling operations when traveling forward, do not set the bucket dumping angle to more than 20°.

1. Scoop soil into the bucket. Move the machine backward while spreading soil from the bucket little by little.

2. Go over the spread soil with the bucket teeth touching the ground and level the ground by back-dragging.

3. If the pushing force is insufficient, perform "LOWER" operation to increase the pushing force.

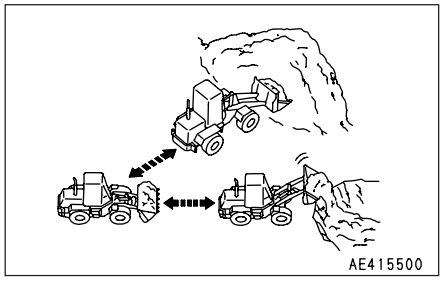
12.10.3 PUSHING OPERATION

NOTICE

Never set the bucket to the DUMP position when carrying out pushing operation.

1. When carrying out pushing operations, set the bottom of the bucket parallel to the ground surface.

12.10.4 LOAD AND CARRY OPERATIONS



⚠ WARNING

When carrying a load, lower the bucket to lower the center of gravity when traveling.

The load and carry method for wheel loaders consists of a cycle of scooping → hauling → loading (into a hopper, glory hole, etc.)

Always keep the travel path properly maintained.

When using the load and carry method, see "12.18 HANDLING THE TIRES".

12.10.5 LOADING OPERATIONS

Select the method of operation which will give the minimum amount of turning and travel in order to provide the most efficient method for the jobsite.

⚠ WARNING

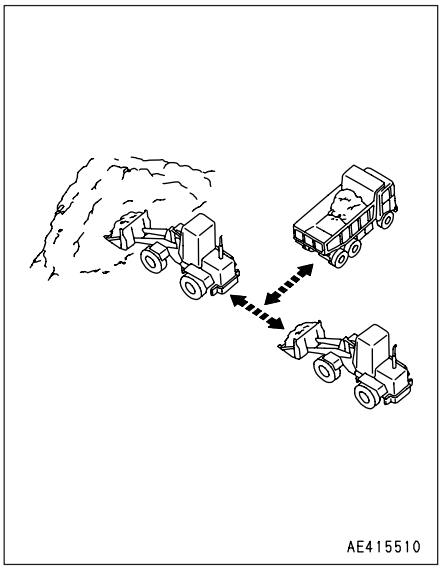
- **Always keep the working area flat. Do not turn suddenly or apply the brake suddenly when traveling with a raised load. These actions are dangerous.**
- **It is also dangerous to drive the bucket at high speed into a stockpile or pile of rocks.**

NOTICE

- **If the tires slip, the tire life will be reduced, so do not allow the tires to slip during operation.**
- **Avoid excessive shaking of the bucket.**

CROSS DRIVE LOADING

Always set the wheel loader facing at a right angle to the stockpile. After digging in and scooping up the load, drive the machine straight back in reverse, then bring the dump truck in between the stock pile and the wheel loader.
This method requires the least time for loading, and is extremely effective in reducing the cycle time.

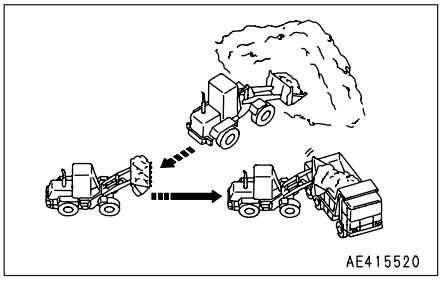


V-SHAPE LOADING

Position the dump truck so that the direction of approach of the wheel loader is approx. 60° from the direction of approach to the stockpile. After loading the bucket, drive the wheel loader in reverse, then turn it to face the dump truck and travel forward to load the dump truck.

The smaller the turning angle of the wheel loader is, the more efficient the operation becomes.

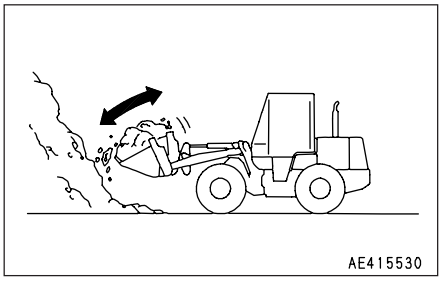
When loading a full bucket and raising it to the maximum height, first shake the bucket to stabilize the load before raising the bucket. This will prevent the load from spilling to the rear.



Precautions when piling up loads

When forming products into a pile, be careful not to let the rear counterweight come into contact with the ground.

Do not set the bucket to the DUMP position when carrying out piling-up operations.

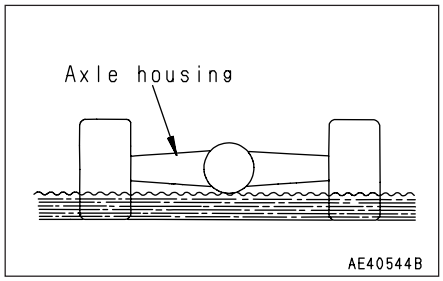


REMARK

Avoid using the transmission cut-off function during scooping-up operations. It prevents the machine from traveling in reverse.

12.11 PRECAUTIONS FOR OPERATION

12.11.1 PERMISSIBLE WATER DEPTH



When working in water or on swampy ground, do not let the water come above the bottom of the axle housing.

After finishing the operation, wash and check the lubricating points.

12.11.2 IF WHEEL BRAKE DOES NOT WORK

If the machine is not stopped by depressing the brake pedal, use the parking brake to stop the machine.

NOTICE

If the parking brake has been used as an emergency brake, contact your Komatsu distributor to have the parking brake checked for any abnormality.

12.11.3 PRECAUTIONS WHEN DRIVING UP OR DOWN SLOPES

LOWER THE CENTER OF GRAVITY WHEN TURNING.

When turning on slopes, lower the work equipment to lower the center of gravity before turning. It is dangerous to turn the machine with the work equipment raised.

BRAKING ON DOWNHILL SLOPES

If the service brake is used too frequently when traveling downhill, the brake may overheat and be damaged. To avoid this problem, shift down to a low range and make full use of the braking force of the engine.

When braking, use the right brake pedal.

If the speed control lever is not placed in a proper speed position, the torque converter oil may overheat. If it overheats, place the speed control lever in the next lower gear speed to lower the oil temperature.

If the temperature gauge does not indicate the green range of the scale even with the lever in the 1st speed position, stop the machine, place the lever in neutral, and run the engine at medium speed until the gauge indicates the green range.

IF ENGINE STOPS

If the engine stops on a slope, depress the right brake pedal fully. Next, lower the work equipment to the ground and apply the parking brake. Then put the directional and speed control levers in neutral, and start the engine again. (If the directional lever is not in neutral, the engine will not start.)

12.11.4 PRECAUTIONS WHEN DRIVING MACHINE

When the machine travels at high speed for a long distance, the tires become extremely hot. This causes early wear of the tires, so it should be avoided as far as possible. If the machine must be driven for a long distance, take the following precautions.

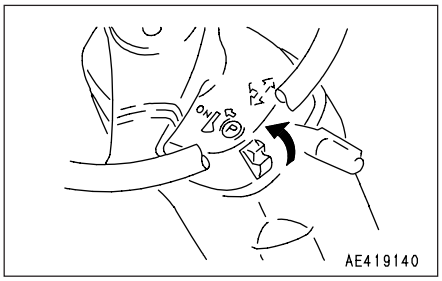
- Follow the regulations related to this machine, and drive carefully.
- Before driving the machine, carry out the checks before starting.
- The most suitable tire pressure, travel speed, or tire type differ according to the condition of the travel surface. Contact your Komatsu distributor or tire dealer for information.
- When traveling with standard tires L-5 on a paved road surface, use the table as a guide.

Ambient temperature(°C)	Max. travel speed (km/h)	Traveling time and breaking time
50	20	Travel → 16 km or 50′ | Break ≈ (3H) | Repeat →
	25	Travel → 16 km or 40′ | Break ≈ (3H15′) | Repeat →
	30	Travel → 15 km or 30′ | Break ≈ (3H) | Repeat →
30	25	Travel → 25 km or 1H | Break ≈ (3H) | Repeat →
	30	Travel → 22 km or 45′ | Break ≈ (3H) | Repeat →
0	30	Travel → 30 km or 1H | Break ≈ (2H30′) | Repeat →

(Air pressure: 0.44 MPa (4.5 kgf/cm^2, 63.9 PSI)

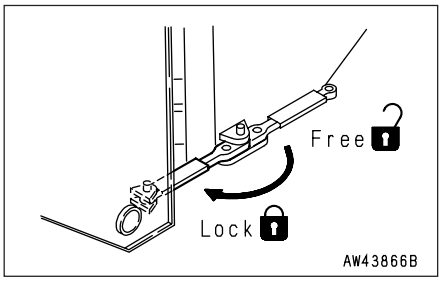
- Check the tire pressure before starting, when the tire is cool.
- After traveling for 1 hour, stop for 30 minutes. Check the tires and other parts for damage; also check the oil and coolant levels.
- Always travel with the bucket empty.
- Never put calcium chloride or dry ballast in the tires when traveling.

12.12 ADJUSTING WORK EQUIPMENT POSTURE

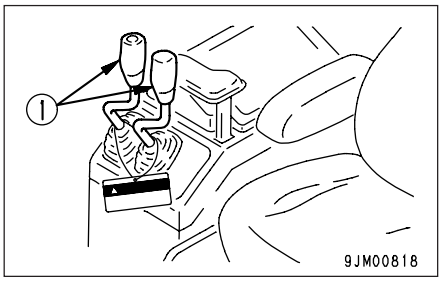


⚠ WARNING

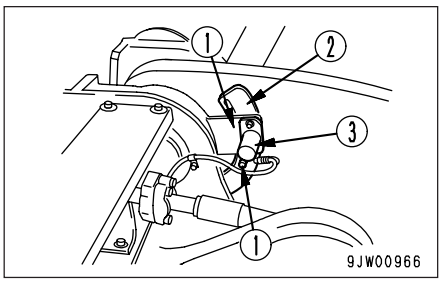
- **Stop the machine on flat ground and put blocks in front and behind the wheels.**
- **Apply the parking brake.**
- **Secure the front and rear frames with the safety bar.**
- **Be sure to put a warning tag on work equipment control levers ①.**
- **Do not go under the work equipment when the arm is raised.**



The boom kickout makes it possible to set the bucket so that it automatically stops at the desired lifting height (lift arm higher than horizontal) and the bucket positioner makes it possible to set the bucket so that it automatically stops at the desired digging angle. The setting can be adjusted to match the working conditions.



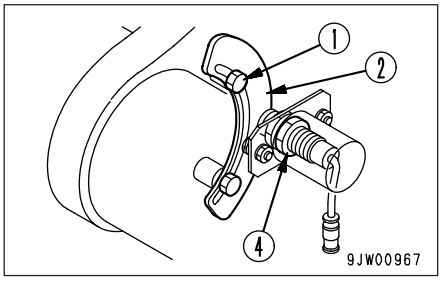
12.12.1 ADJUSTING BOOM KICKOUT



1. Raise the bucket to the desired height, set the lift arm control lever at HOLD and lock the lever in position. Then stop the engine and adjust as follows.

2. Loosen two bolts ①, and adjust plate ② so that the bottom edge is in line with the center of the sensing surface of proximity switch ③. Then tighten the bolts to hold the plate in position.

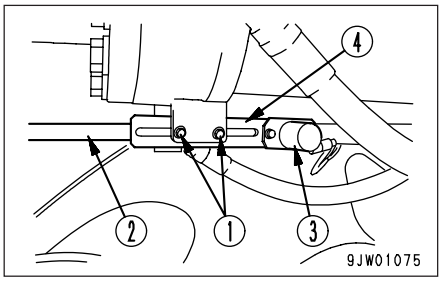
3. Loosen two nuts ④ to make a clearance of 3 to 5 mm (0.12 to 0.20 in) between plate ② and the sensing surface of proximity switch ③. Then tighten the nuts to hold in position.



Tightening torque: 17.2 ± 2.5 N·m (1.75 ± 0.25 kgf·m, 12.7 ± 1.8 lbft)

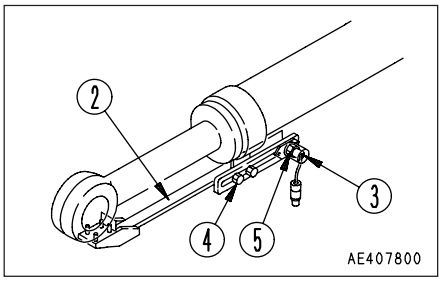
4. After adjusting, start the engine and operate the lift arm control lever. Check that the lever is automatically returned to HOLD when the bucket reaches the desired height.

12.12.2 ADJUSTING BUCKET POSITIONER



1. Lower the bucket to the ground and adjust the bucket to the desired digging angle. Set the bucket control lever at HOLD, stop the engine and adjust as follows.

2. Loosen two bolts ① and adjust mounting bracket ④ of the proximity switch so that the rear tip of angle ② is in line with the center of the sensing surface of proximity switch ③. Then tighten the bolts to hold the bracket in position.

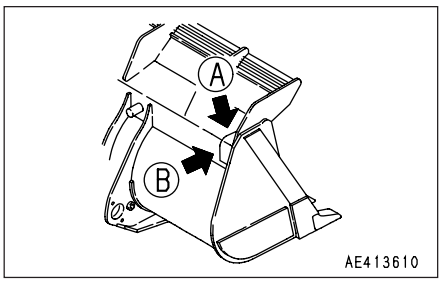


3. Loosen two nuts ⑤ and adjust to make a clearance of 3 to 5 mm (0.12 to 0.20 in) between angle ② and the sensing surface of proximity switch ③. Then tighten the nuts to hold in position.

Tightening torque: 17.2 ± 2.5 N·m (1.75 ± 0.25 kgf·m, 12.7 ± 1.8 lbft)

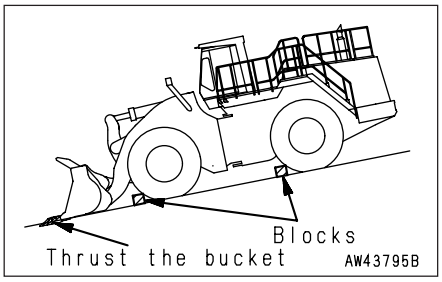
4. After adjusting, start the engine and raise the lift arm. Operate the bucket control lever to the DUMP position, then operate it to the TILT position and check that the bucket control lever is automatically returned to HOLD when the bucket reaches the desired angle.

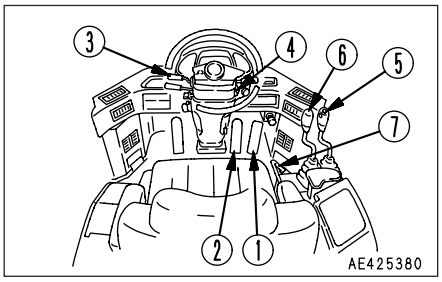
12.12.3 BUCKET LEVEL INDICATOR



Ⓐ and Ⓑ at the top rear of the bucket are the level indicators, so the bucket angle can be checked during operations.
Ⓐ: Parallel with cutting edge
Ⓑ: 90° to cutting edge

12.13 PARKING MACHINE





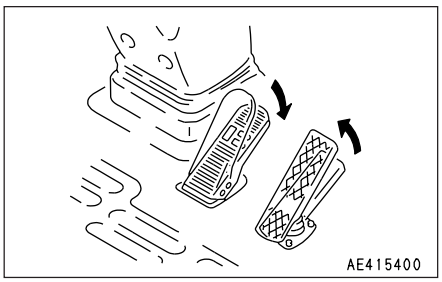
⚠ WARNING

- **Avoid stopping suddenly. Give yourself ample room when stopping.**
- **Do not park the machine on slopes.**
  If the machine has to be parked on a slope, set it facing directly down the slope, then dig the bucket into the ground and put blocks under the tires to prevent the machine from moving.
- **If the control lever is touched by accident, the work equipment or the machine may move suddenly, and this may lead to a serious accident. Before leaving the operator's compartment, always set the safety lock lever securely to the LOCK position.**
- **Even if the parking brake switch is turned ON, there is danger until the parking brake pilot lamp lights up, so keep the brake pedal depressed.**

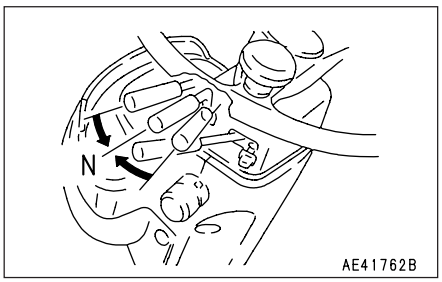
NOTICE

Never use the parking brake switch to brake the machine when traveling except in an emergency. Apply the parking brake only after the machine has stopped.

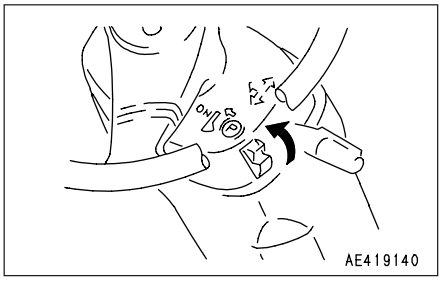
1. Release accelerator pedal ①, and depress brake pedal ② to stop the machine.



2. Place directional lever ③ in N (neutral).



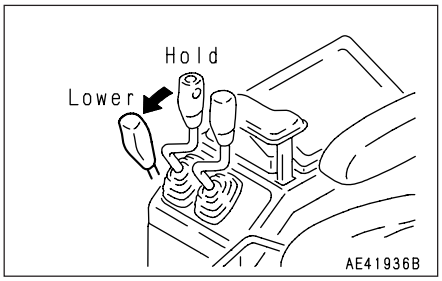
3. Turn parking brake switch ④ to ON to apply the parking brake.



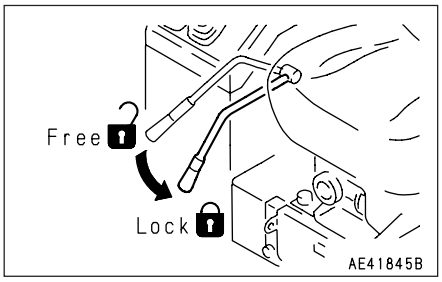
REMARK

When the parking brake is applied, the transmission is automatically returned to neutral.

4. Operate lift arm control lever ⑤ to lower the bucket to the ground.



5. Lock lift arm control lever ⑤ and bucket control lever ⑥ with safety lock ⑦.



12.14 CHECKS AFTER COMPLETION OF OPERATION

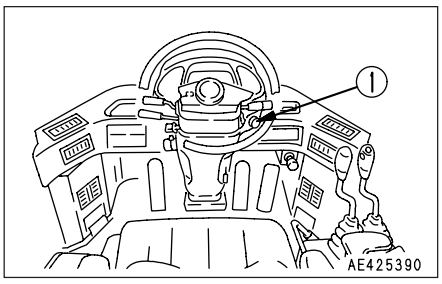
Check the engine water temperature, engine oil pressure, torque converter oil temperature, and fuel level with the meter and lamps. If the engine has overheated, do not stop it suddenly. Run the engine at a midrange speed to allow the engine to cool down before stopping it.

12.15 STOPPING ENGINE

NOTICE

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

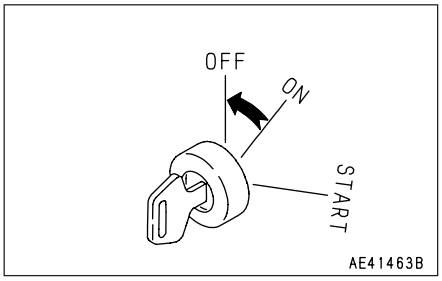
In particular, if the engine has overheated, do not abruptly stop it but run it at medium speed to allow it to cool gradually, then stop it.



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

2. Turn the key in starting switch ① to the OFF position and stop the engine.

3. Remove the key from starting switch ①.



12.16 CHECK AFTER STOPPING ENGINE

1. Walk around the machine and check the work equipment, body work, and undercarriage, and check also for leakage of oil and water. If any leakage or abnormality is found, carry out repairs.

2. Fill the fuel tank.

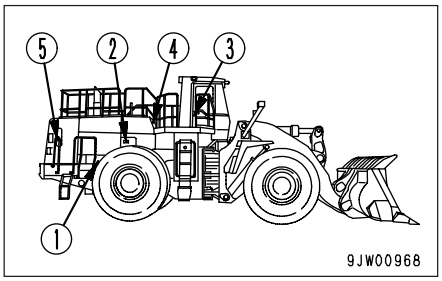
3. Remove any waste paper or dead leaves from inside the engine room. These may cause a fire.

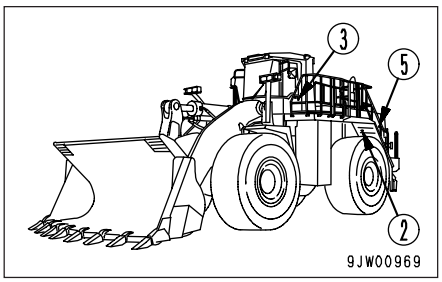
4. Remove any mud stuck to the undercarriage.

12.17 LOCKING

Always lock the following places.

① Fuel tank filler cap
② Engine side panel (2 points)
③ Cab door (2 points)
④ Engine hood (1 point) (Bulkhead cover)
⑤ Radiator guard inspection door (2 points)

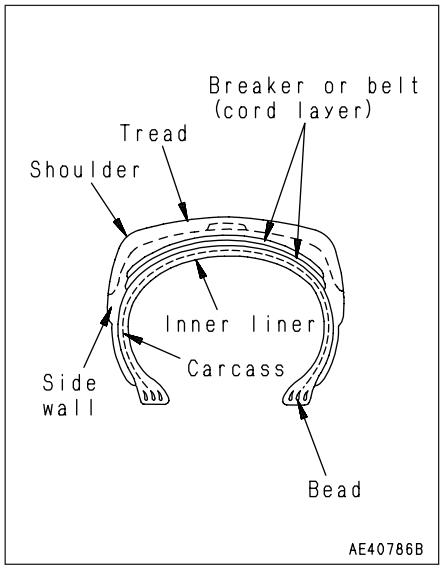




REMARK

The starting switch key is used also for locks ①, ②, ③, ④ and ⑤.

12.18 HANDLING THE TIRES
12.18.1 PRECAUTIONS WHEN HANDLING TIRES



⚠ CAUTION

If a tire has reached any of the following service limits, there is danger that the tire may burst or cause an accident, so to ensure safety, replace it with a new tire.

- **Service limits for wear**
  - **When the remaining depth of the groove on construction equipment tires (at a point approx. 1/4 of the tread width) is 15% of the groove depth on a new tire.**
  - **When the tire shows marked uneven wear, stepped wear or other abnormal wear, or when the cord layer is exposed.**
- **Service limits for damage**
  - **When there is external damage extending to the cord or when the cord is broken**
  - **When the cord is cut or there is dragging**
  - **When the tire is peeling (there is separation)**
  - **When the bead is damaged**
  - **For tubeless tires, when there is air leakage or improper repair**

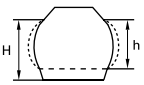
Please contact your Komatsu distributor when replacing the tires. It is dangerous to jack up the machine without taking due care.

12.18.2 TIRE PRESSURE

Measure the tire pressure before starting operations, when the tires are cool.

If the tire inflation pressure is too low, there will be overload; if it is too high, it will cause tire cuts and shock burst. To prevent these problems, adjust the tire inflation pressure according to the table on the next page.

$$\text{Deflection ratio} = \frac{H - h}{H} \times 100$$



As a guideline that can be checked visibly, the deflection ratio of the front tire (deflection/free height) is as follows.
When carrying normal load (lift arm horizontal): Approx. 10 – 15%
When digging (rear wheels off ground): Approx. 15 – 20%

When checking the tire inflation pressure, check also for small scratches or peeling of the tire, for nails or pieces of metal which may cause punctures, and for any abnormal wear.

Clearing fallen stones and rocks from the operating area and maintaining the surface will extend the tire life and give improved economy.

- For operations on normal road surfaces,
  rock digging operations:
  ..... High end of range in air pressure chart

- Stockpile operations on soft ground:
  ..... Average pressure in air pressure chart

- Operations on sand (operations not using much digging force)
  ..... Low end of range in air pressure chart

12.19 REMOVAL AND INSTALLATION OF THE BUCKET

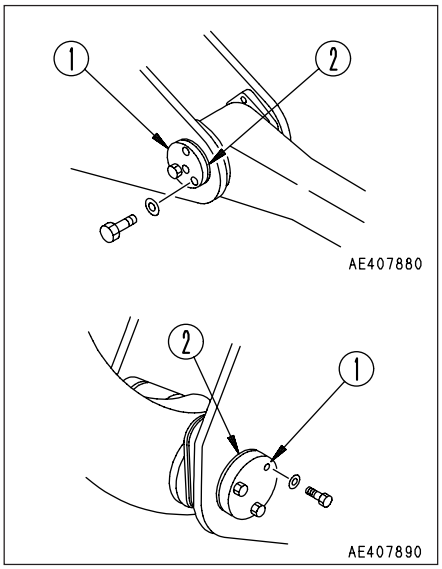
⚠ WARNING

Park the machine on level ground, set the safety bar on the frame, ground the bucket, shut down the engine, apply the parking brake and place blocks under the tires.

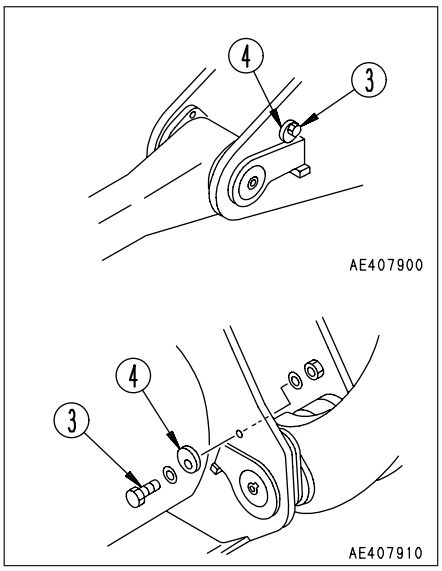
Remove or install the bucket in the following manner, if so required for the convenience of transportation.

REMOVING THE BUCKET

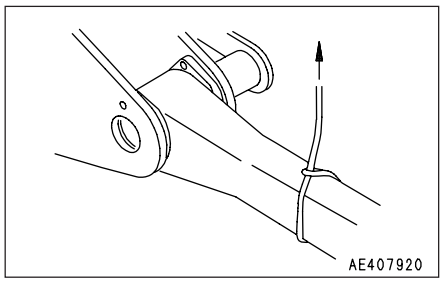
1. Loosen retainer mounting bolts on the bucket link pin part and the bucket pin part, then remove retainer ① and shim ②.



2. Loosen lock bolt ③ and remove cam ④.

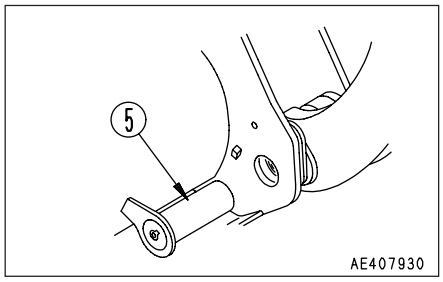


3. Sling the bucket link, then pull out the bucket link pin. Secure the bucket link to the tilt lever with wires.



4. Pull out and remove bucket hinge pin ⑤ on both sides of the bucket.

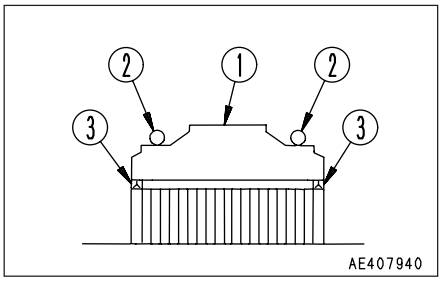
5. Disconnect lift arm and bucket.



INSTALLING THE BUCKET

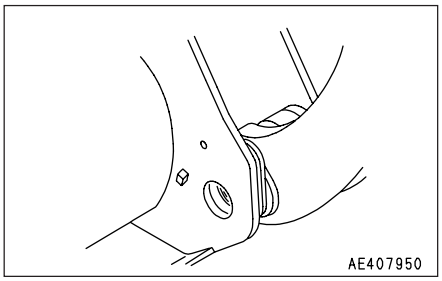
1. Set cord ring ② on top of lift arm boss ① as shown in the diagram.

   After completions of assembly of the bucket and adjustment with shims in step 8, move the cord ring down to the groove.

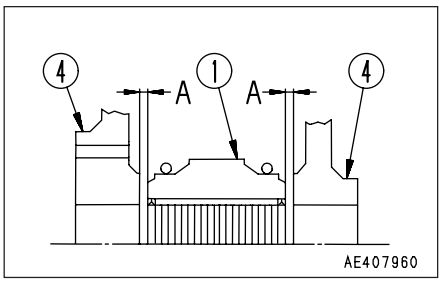


2. Coat dust seal lip portion ③ with grease.

3. Align the left and right bucket pin holes.

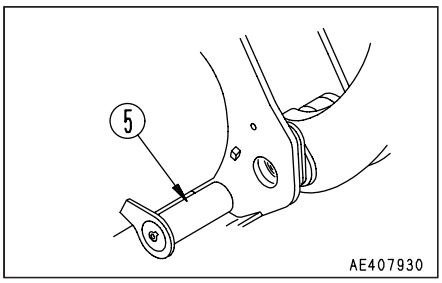


4. Select the number of shims so that clearance A between bucket hinge boss ④ and lift arm boss ① are less than 1.0 – 1.5 mm (0.04 – 0.06 in).

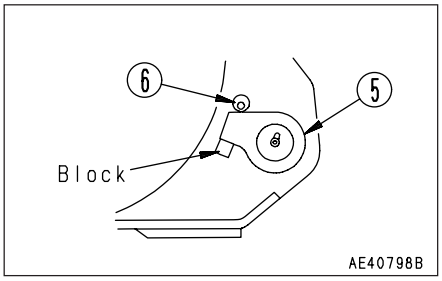


5. Assemble the shims the selected in Step 4, align the pin holes, then insert bucket hinge pin ⑤.
   Coat with grease to prevent damage to the dust seal when inserting the bucket hinge pin.

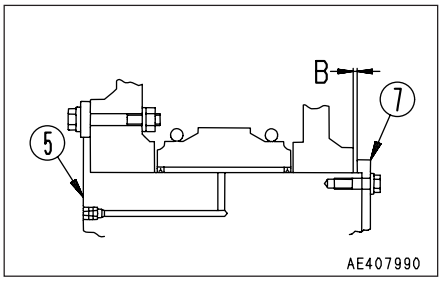
   Use a bucket hinge pin that has a grease hole.



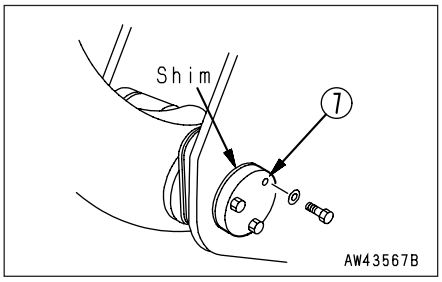
6. Put the stopper plate of bucket hinge pin ⑤ in contact with the hinge plate block, and secure it with cam ⑥.



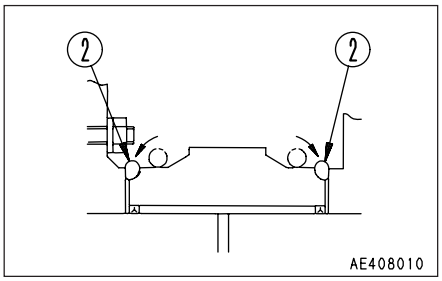
7. Install retainer ⑦ to bucket hinge pin ⑤, then measure clearance B between the end face of the retainer and the bucket hinge boss.



8. Select the number of shims so that clearance B is 0.2 mm (0.008 in) or loss, then add one 0.2 mm (0.008 in) shim, and assemble.



9. Move cord ring ② down to the groove.



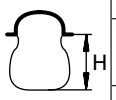
10. Use the same procedure as in steps 1 – 9 to install the bucket link pin.

    Assemble a pin that has no grease hole at the bucket link.

11. Coat the bucket hinge pin and bucket link pin with grease. For details, see “24.5 EVERY 100 HOURS SERVICE”.

For details of removing and installing the bucket, please contact your Komatsu distributor.

If the deflection of the tire is excessive, raise the inflation pressure within the limits given in the table to give a suitable deflection (see deflection ratio).

Tire size (pattern)	Ply rating	 Free height (mm)	Inflation pressure				
			Soft ground (sandy ground)		Normal road		When shipped from factory
			Stockpile	Digging	Stockpile	Digging	
40/65-39 (L5 Rock) (Standard)	36	610	0.44 – 0.49 MPa (4.5 – 5.0 kgf/cm^2, 63.9 – 71 PSI)	0.44 – 0.54 MPa (4.5 – 5.5 kgf/cm^2, 63.9 – 78.1 PSI)	0.44 – 0.54 MPa (4.5 – 5.5 kgf/cm^2, 63.9 – 78.1 PSI)	0.44 – 0.54 MPa (4.5 – 5.5 kgf/cm^2, 63.9 – 78.1 PSI)	Front tire: 0.44 MPa (4.5 kgf/cm^2, 63.9 PSI) Rear tire: 0.44 MPa (4.5 kgf/cm^2, 63.9 PSI)

Stockpile operations mean the loading of sand and other loose materials.

PRECAUTIONS WITH LOAD AND CARRY METHOD

When traveling continuously with load and carry operations, choose the correct tires to match the operating conditions, or choose the operating conditions to match the tires. If this is not done, the tires will be damaged, so contact your Komatsu distributor or tire dealer when selecting tires.

13. TRANSPORTATION

When transporting the machine, please contact your Komatsu distributor, and be sure to observe all related laws and regulations, and to ensure safety during the operation.

13.1 LIFTING MACHINE

The machine must be disassembled before the chassis can be lifted, so please contact your Komatsu distributor to have the machine disassembled.

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	–30°C
100%	1.28	1.29	1.30	1.31	1.32
90%	1.26	1.27	1.28	1.29	1.30
80%	1.24	1.25	1.26	1.27	1.28
75%	1.23	1.24	1.25	1.26	1.27

When adding distilled water, add it before starting work on the next day to prevent the electrolyte from freezing.

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.

- Open the drain valve and drain any water collected in the fuel system to prevent it from freezing.

- As the battery capacity drops markedly in low temperatures, cover the battery or remove it from the machine, keep it in a warm place, and install it again the next morning.

14.3 AFTER COLD WEATHER

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

- Replace the fuel and oil for all parts with oil of the viscosity specified.
  For details, see “20. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE”.

- If for any reason permanent antifreeze cannot be used, and an ethyl glycol base antifreeze (winter, one season type) is used instead, or if no antifreeze is used, drain the cooling system completely, then clean out the inside of the cooling system thoroughly, and fill with fresh water.

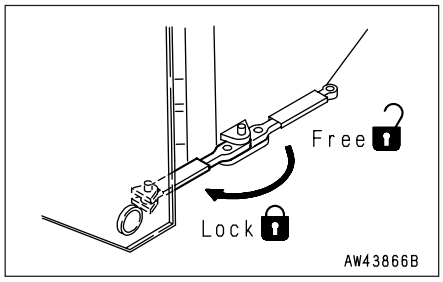
- As the APS (Automatic Priming System) becomes useless (at 15°C or above), be sure to close the fuel valve for the APS.

14.4 WARMING-UP OPERATION FOR STEERING HYDRAULIC CIRCUIT IN COLD WEATHER

⚠ WARNING

If the steering wheel is turned and stopped while the oil temperature is low, it may take some time for the vehicle to stop turning. In this case, perform the warm-up operation in a wider place, secure safety with the safety bar. Do not relieve the hydraulic oil in the circuit continuously for more than 5 seconds.

When the temperature is low, do not start the operation of the vehicle soon after starting the engine.



Warming up the steering hydraulic circuit

Slowly turn the steering wheel to the right and left to warm up the oil in the steering valve. (Repeat this operation for about 10 minutes to warm up the oil.)

NOTICE

Turn the steering wheel a little and stop there. Then, confirm that the vehicle is steered by the angle equivalent to the turning angle of the steering wheel.

- **Recommended oil**
  Select the oil depending on the temperature as shown in the following table.

	Type of oil	Temperature –30 –20 –10 0 10 20 30°C
Hydraulic oil	Engine oil	SAE10WCD SAE5W-20CD

Even if SAE5W-20CD is used in low-temperature areas, always carry out the warming-up operation without fail.

If SAE5W-20CD is used in a cold season, replace it with SAE10WCD after the cold season.

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.

- Apply the safety locks to the bucket control lever, lift arm control lever, and directional lever, then apply the parking brake.

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.

If the machine is equipped with an airconditioner, operate it for 3 – 5 minutes once a month to lubricate each portion of its compressor.

Be sure to idle the engine at low speed for this purpose. Also, check the quantity of refrigerant twice a year.

15.3 AFTER STORAGE

NOTICE

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

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

- Wipe off the grease from the hydraulic cylinder rods.

- Add oil and grease to all places.

16. TROUBLESHOOTING

16.1 WHEN MACHINE RUNS OUT OF FUEL

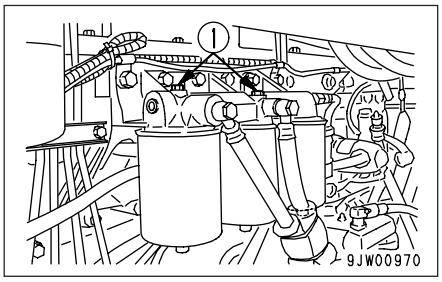
⚠ WARNING

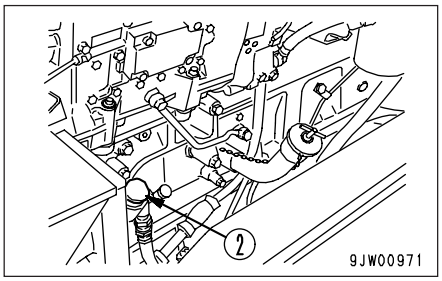
The engine will start, so check carefully that the area around the engine is safe before cranking the engine.

If the machine has run out of fuel, add fuel and then bleed the air from the fuel system before starting the engine.

PROCEDURE FOR BLEEDING AIR

1. Loosen air bleeding plug ①.
2. Loosen feed pump knob ② and move the pump up and down to draw off fuel until air ceases to come out of air bleeding plug ①.
3. After bleeding the air, tighten air bleeding plug ①, then push in the knob of feed pump ② and tighten it.





16.1.2 MAINTENANCE OF AIR CONDITIONER COMPRESSOR

- When storing the machine for long time (1 month or longer)

NOTICE

When using the compressor after storing the machine or leaving the air conditioner unused for long time (1 month or longer), warm the inside of the cab to at least 10°C by running the engine idle, then operate the air conditioner at the MAX COOL mode.

The following seizure caused by insufficient lubrication in the compressor can be prevented by this operation.

- If the machine is stored for long time, oil in the compressor is reduced (it flows to another components).

16.2 TOWING THE MACHINE

⚠ WARNING

- **If the machine that has broken down is towed in the wrong way, it may lead to serious injury or damage.**
- **If there is a failure in the brake line, the brakes cannot be used, so be extremely careful when towing.**
- **When using the counterweight towing pin for towing operations, tow a load of less than the pin strength of 24 tons.**

NOTICE

- **Towing is for moving the machine to a place where inspection and maintenance can be carried out, and not for moving it long distances.**
  The machine must not be towed for long distances.
- **For details of the procedure for towing a machine when it has broken down, please contact your Komatsu distributor.**

This machine must not be towed except in emergencies. When towing the machine, take the following precautions.

- When releasing the brakes, put blocks under the wheels to prevent the machine from moving. If the wheels are not blocked, the machine may suddenly move.

- When towing a machine, tow it at a low speed of less than 2 km/h (1.24 MPH), and for a distance of a few meters to a place where repairs can be carried out. The machine should be towed only in emergencies.
  If the machine must be moved long distances, use a transporter.

- Fit a guard plate to the machine being towed to protect the operator if the tow rope or bar should break.

- If the steering and brake of the machine being towed cannot be operated, do not let anyone sit on the machine.

- Check that the tow rope or bar is of ample strength for the weight of the machine being towed. Since the machine being towed may need to travel through mud or up hills, use a tow rope or bar of sufficient strength.

- Keep the angle of the tow rope as small as possible. Keep the angle between the center lines of the two machines to within 30°.

- If the machine is moved suddenly, an excessive load will be applied to the tow rope or bar, and it may break. Always move the machine slowly at a fixed speed.

- The towing machine should normally be of the same class as the machine being towed. Check that the towing machine has ample braking power, weight, and rimpull to allow it to control both machine on slopes or on the tow road.

- When towing a machine downhill, use a larger machine for towing to provide ample rimpull and braking power, or connect another machine to the rear of the machine being towed. In this way it is possible to prevent the machine from losing control and turning over.

- Towing may be carried out under various differing conditions, so it is impossible to determine beforehand the requirements for towing. Towing on flat horizontal roads will require the minimum rimpull, while towing on slopes or on uneven road surfaces will require the maximum rimpull.

16.2.1 WHEN ENGINE CAN BE USED

- If the transmission and steering wheel can be operated, and the engine is running, it is possible to tow the machine out of mud or to move it for a short distance to the edge of the road.

- The operator should sit on the machine being towed and operate the steering in the direction that the machine is towed.

16.2.2 WHEN ENGINE CANNOT BE USED

When towing a machine with the engine stopped, use the following procedure.

If leakage in the air circuit has caused the pressure inside the air tank to drop, the parking brake will be applied. When towing the machine, release the parking brake.

1. The transmission oil does not lubricate the system, so remove the front and rear drive shafts. If necessary, block the tires to prevent the machine from moving.

2. The steering cannot be operated, so remove the steering cylinder and steering linkage.
   Even if the brakes are in good condition, the brakes can only be used a limited number of times. There is no change in the operating force for the brake pedal, but the braking force is reduced each time the pedal is depressed.

3. Connect the towing equipment securely. When carrying out towing operations, use two machines of at least the same class as the machine being towed. Connect one machine each to the front and rear of the machine being towed, then remove the blocks from the tires and tow the machine.

16.2.3 RELEASING PARKING BRAKE

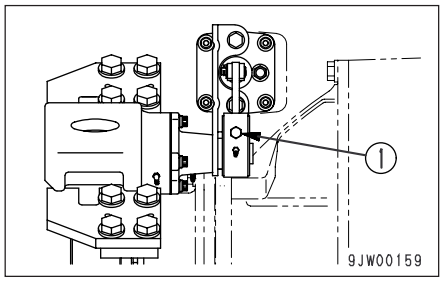
⚠ WARNING

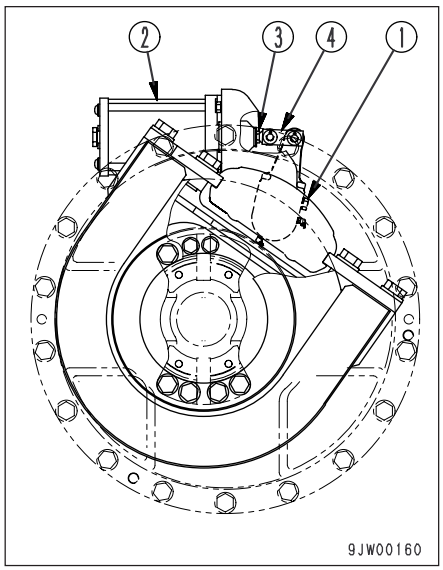
- **Stop the machine on a flat surface when releasing the parking brake, and check that the surroundings are safe. In emergencies or when the parking brake must be released on a hill, block the tires carefully before releasing the brake.**
- **When the parking brake is released, no braking force can be applied, so check carefully that the situation is safe when moving the machine.**

The parking brake is released by the accumulator oil pressure of the brake.
If the accumulator pressure is lowered for some trouble, however, release the parking brake mechanically, then tow the machine.

1. Turn adjustment screw ① at the end of the hydraulic cylinder linkage for the parking brake clockwise to retract rod ③ of spring cylinder ② fully into spring cylinder ② to loosen plate ④.

2. Turn adjustment screw ① further by 1/2 turn. This release the parking brake.





16.2.4 EMERGENCY TRAVEL OPERATION

The normal gear shifting operation is carried out by electric signals. If there should be a failure in the electrical system and the machine does not move, it is possible to move the machine by using the following procedure.

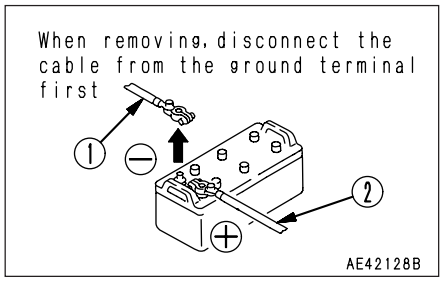
NOTICE

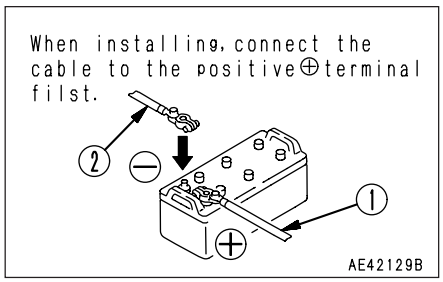
Always request your Komatsu distributor to carry out the emergency travel operation, or consult your Komatsu distributor before carrying it out yourself.

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 and rubber gloves.**
- **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.**
- **If any cracks are found in the cable terminals, replace the cable immediately.**





16.3.1 REMOVAL AND INSTALLATION OF BATTERY

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

- 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.

16.3.2 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.

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.

16.3.3 STARTING ENGINE WITH BOOSTER CABLE

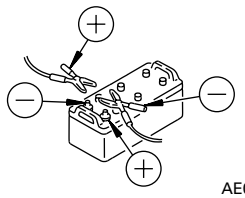
When starting the engine with a booster cable, do as follows:

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 and rubber gloves.**
- **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.**

INCORRECT



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NOTICE

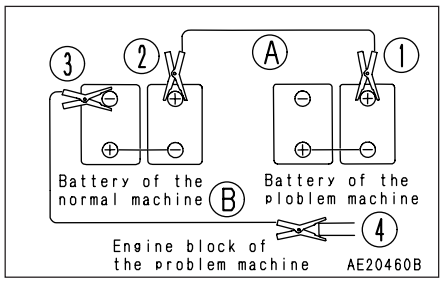
- **The size of the booster cable and clip should be suitable for the battery size.**
- **The battery of the normal machine must be the same capacity as that of the engine to be started.**
- **Check the cables and clips for damage or corrosion.**
- **Make sure that the cables and clips are firmly connected.**

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.



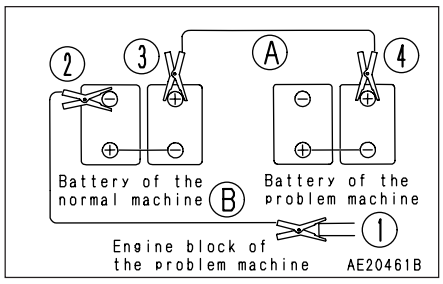
1. Make sure that the starting switches of the normal machine and problem machine are both at the OFF position.
2. Connect one clip of booster cable Ⓐ to the positive ⊕ terminal of the problem machine.
3. Connect the other clip of booster cable Ⓐ to the positive ⊕ terminal of the normal machine.
4. Connect 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 the engine runs at hight speed	● Defective wiring ● Defective adjustment of alternator belt tension	(● Check, repair loose terminals, disconnections) ● Adjust alternator belt tension For details, see EVERY 250 HOURS SERVICE
Lamp flickers while engine is running		
Even when the engine is rotating, the charge caution pilot lamp does not go out	● Defective alternator ● Defective wiring	(● Replace) (● Check, repair)
Abnormal noise is generated from alternator	● Defective alternator	(● Replace)
Starting motor does not turn when starting switch is turned to ON	● Defective wiring ● Insufficient battery charge ● Defective starting motor	(● Check, repair) ● Charge (● Replace)
Pinion of starting motor keeps going in and out	● Insufficient battery charge	● Charge
Starting motor turns engine sluggishly	● Insufficient battery charge ● Defective starting motor	● Charge (● Replace)
Starting motor disengages before engine starts	● Defective wiring ● Insufficient battery charge	(● Check, repair) ● Charge
Preheating pilot lamp does not light up	● Defective wiring ● Defective controller ● Defective monitor	(● Check, repair) (● Replace) (● Replace)
Even when engine is stopped, charge caution pilot lamp does not light up (starting switch at ON position)	● Defective wiring ● Defective monitor	(● Check, repair) (● Replace)
Outside of glow plug is not warm when touched by hand	● Defective wiring ● Disconnection in glow plug ● Defective operation of heater relay switch	(● Check, repair) (● Replace) (● Replace)

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
Transmission		
Engine is running but machine does not move	● Parking brake is applied ● Directional lever is not shifted properly ● Lack of oil in transmission case	● Release parking brake ● Shift lever properly ● Add oil to specified level. See WHEN REQUIRED
Even when engine is run at full throttle, machine only move slowly and lacks power	● Lack of oil in transmission case ● Transmission strainer is clogged	● Add oil to specified level. See WHEN REQUIRED (● Disassemble, clean)
Oil overheats	● Too much oil or too little oil ● Machine is not traveling in correct speed range ● Torque converter is stalled for long periods ● Engine is overheating	● Add or drain oil to specified level. See WHEN REQUIRED ● Place in correct speed range ● Reduce stall time (● Check engine)
Noise generated	● Lack of oil	● Add oil to specified level. See WHEN REQUIRED
Axle		
Noise generated	● Lack of oil	● Add oil to specified level. See WHEN REQUIRED

CHASSIS continued (16.4.2)

Problem	Main causes	Remedy
Brake		
Brake is not applied when pedal is depressed	● Disc has reached wear limit ● Defective hydraulic system ○ Lack of oil ● Air in brake line	(● Replace disc) ○ Add oil to specified level. See CHECK BEFORE STARTING ● Bleed air See WHEN REQUIRED
Brake drags or remains applied	● Vent hole of brake valve is clogged ● Defective operation of slack adjuster	● Clean (● Check repair)
Brakes squeal	● Disc is worn ● Large amount of water in axle oil ● Deteriorated axle oil due to overuse of brake ● Defective operation of slack adjuster	(● Replace disc) ● Change axle oil ● Change axle oil (● Check, repair)
Parking brake		
Braking effect is poor	● Linkage is loose ● Pad is wet ● Deteriorated air cylinder spring ● Worn pad	● Adjust ● Clean (● Replace spring) ● Adjust or replace
Steering		
Steering wheel is heavy	● Defective hydraulic system ○ Lack of oil	○ Add oil to specified level. See EVERY 100 HOURS SERVICE
Steering wheel is loose	● Play in steering cylinder pin ● Defective hydraulic system ○ Lack of oil	● Grease bearing or replace pin and bushing where there is play ○ Add oil to specified level. See EVERY 100 HOURS SERVICE

CHASSIS continued (16.4.2)

Problem	Main causes	Remedy
Hydraulic system		
Lack of lifting power for bucket Bucket takes time to rise	● Lack of oil ● Clogged hydraulic tank filter	● Add oil to specified level. See EVERY 100 HOURS SERVICE ● Replace filter. See EVERY 2000 HOURS SERVICE
Excessive bubbles in oil	● Low quality oil being used ● Oil level is low ● Air in oil line	● Replace with good quality oil ● Add oil to specified level. See EVERY 100 HOURS SERVICE ● Bleed air. See WHEN REQUIRD
Hydraulic pressure is low	● Oil level is low and pump is sucking in air	● Add oil to specified level. See EVERY 100 HOURS SERVICE Then bleed air. See WHEN REQUIRD
Movement of cylinder is irregular	● Oil level is low ● Oil leakage the inside cylinder	● Add oil to specified level. See EVERY 100 HOURS SERVICE (● Check, repair)

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 pressure caution pilot lamp lights up	● Engine oil pan oil level is low (sucking in air) ● Clogged oil filter cartridge ● Defective tightening of oil pipe joint, oil leakage from damaged part ● Defective monitor	● Add oil to specified level, see CHECK BEFORE STARTING ● Replace cartridge, see EVERY 250 HOURS SERVICE (● Check, repair) (● Replace)
Steam is emitted from top part of radiator (pressure valve) Water temperature gauge is in red range Coolant temperature monitor lights up	● Cooling water level low, water leakage ● Loosen fan belt ● Dirt or scale accumulated in cooling system ● Clogged radiator fin or damaged fin ● Defective thermostat ● Loose radiator filler cap (high altitude operation) ● Defective monitor	● Add cooling water, repair, see WHEN REQUIRED ● Adjust fan belt tension, see EVERY 500 HOURS SERVICE ● Change cooling water, clean inside of cooling system, see WHEN REQUIRED ● Clean or repair, see WHEN REQUIRED (● Replace thermostat) ● Tighten cap or replace packing (● Replace)
Water temperature gauge is in white range on left	● Defective thermostat ● Defective monitor	(● Replace thermostat) (● Replace)
Engine does not start when starting motor is turned	● Lack of fuel ● Air in fuel system ● Defective fuel injection pump or nozzle ● Starting motor cranks engine sluggishly ● Preheating pilot lamp does not light up ● Defective compression ○ Defective valve clearance	● Add fuel, see CHECK BEFORE STARTING ● Repair place where air is sucked in (● Replace pump or nozzle) See ELECTRICAL SYSTEM (○ Adjust valve clearance)
Exhaust gas is white or blue	● Too much oil in oil pan ● Improper fuel	● Add oil to specified level, see CHECK BEFORE STARTING ● Change to specified fuel

ENGINE continued (16.4.3)

Problem	Main causes	Remedy
Exhaust gas occasionally turns black	● Clogged air cleaner element ● Defective nozzle ● Defective compression ● Defective turbocharger	● Clean or replace, see WHEN REQUIRED (● Replace nozzle) (● See defective compression above) (● Clean or replace turbocharger)
Combustion noise occasionally makes breathing sound	● Defective nozzle	(● Replace nozzle)
Abnormal noise generated (combustion or mechanical)	● Low grade fuel being used ● Overheating ● Damage inside muffler ● Excessive valve clearance	● Change to specified fuel ● Refer to "Water temperature gauge is in red range" as above (● Replace muffler) (● Adjust valve clearance)

16.4.4 APS (automatic priming 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
Engine does not start at all	● Clogged nozzle (dirt, precipitation of paraffin, defective nozzle) ● Defective glow plug ● Crushed, clogged fuel piping, fuel leakage ● Defective wiring ● Blown fuse ● Defective APS controller	(● Clean, change to specified fuel, replace nozzle) (● Replace) (● Check, repair) (● Check, repair) (● Replace) (● Replace)
Engine starts at once, but there is excessive white smoke or engine stops again	● Clogged nozzle (dirt, precipitation of paraffin, defective nozzle) ● Defective glow plug ● Blown fuse ● Defective alternator function (alternator output is too low) ● Defective APS water temperature sensor ● Defective APS controller	(● Clean, change to specified fuel, replace nozzle) (● Replace) (● Replace) (● Check, repair or replace) (● Replace temperature sensor) (● Replace)
When load is applied, black smoke comes out and engine stops	● Defective APS water temperature sensor	(● Replace temperature sensor)
Preheating monitor lamp stays lighted up and burner burns	● Melting of heater relay contacts	(● Replace heater relay)
Preheating monitor lamp does not light up (this is normal when engine water temperature is 20°C or above)	● Disconnection in preheating monitor, glow plug wiring ● Defective wiring ● Defective timer	(● Replace) (● Check, repair) (● Replace)
Burner does not burn	● Glow plug is not red hot	● See above “Preheating monitor lamp does not light up”
	● Fuel is not being sprayed out from nozzle, or spray amount is too small ○ Clogged nozzle (dirt, precipitation of paraffin, defective nozzle) ○ Defective APS controller	(○ Clean, change to specified fuel, replace nozzle) (○ Replace)

MEMO

MAINTENANCE

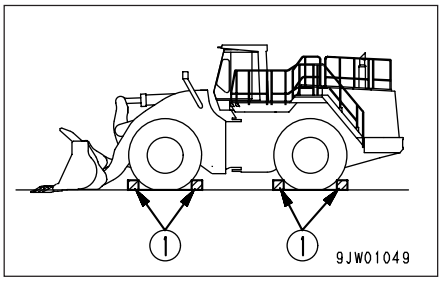
17. GUIDES TO MAINTENANCE

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

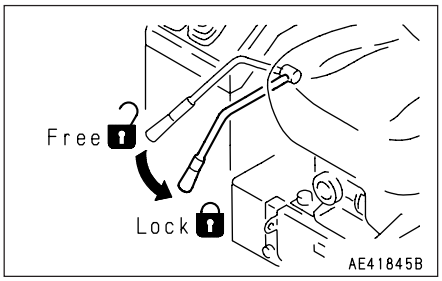
Perform maintenance work on hard, flat ground.

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

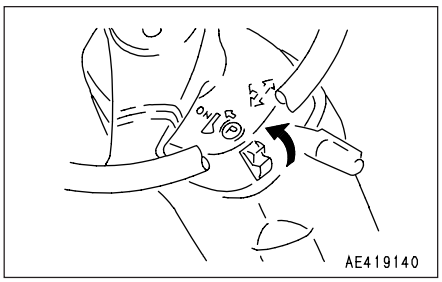
- Lower the work equipment to the ground, set in the posture shown in the diagram on the right, then put blocks ① in front and behind the tires.
- Place all control levers at the neutral or HOLD position.



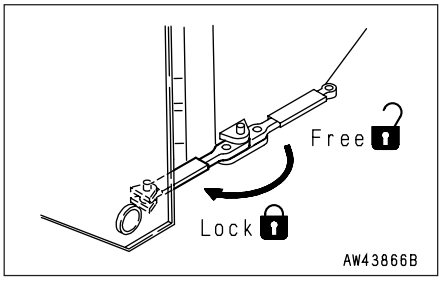
- Set the safety lever to the LOCK position.



- Press the parking brake switch to apply the parking brake.



- 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. After disconnecting the connector, cover it with a vinyl bag to prevent oil or dust from sticking to its contact section.

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:
- 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.

Greasing the rod end:
Because the rod end is of the oilless type, no greasing is required, although a grease nipple is fit to the rod end on the lever linkage.
The rod end should be greased only when it becomes stiff after using it for long span of time.

Controller:
The controller for the machine monitor may be mistakenly actuated by interference from external electric waves. For this reason, when installing a radio or other such device, please consult your Komatsu distributor.

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	SAE 30 API classification CD
Axle (Front and rear)	AXO 75
Hydraulic tank	SAE 10W API classification CD
Pins	Lithium base grease No. 2
Fuel	ASTM D975 No. 2 (However, ASTM D975 No. 1 is used for the winter season (October to March)
Radiator	Komatsu Super Coolant (AF-ACL) 30% added to water

18.1 OUTLINE OF OIL, FUEL, COOLANT

18.1.1 OIL

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

18.1.2 FUEL

- The fuel pump is a precision instrument, and if fuel containing water or dirt is used, it cannot work properly.

- Be extremely careful not to let impurities get in when storing or adding fuel.

- Always use the fuel specified in the Operation and Maintenance Manual.
  Fuel may congeal depending on the temperature when it is used (particularly in low temperature below –15°C), so it is necessary to change to a fuel that matches the temperature.

- To prevent the moisture in the air from condensing and forming water inside the fuel tank, always fill the fuel tank after completing the day's work.

- Before starting the engine, or when 10 minutes have passed after adding fuel, drain the sediment and water from the fuel tank.

- If the engine runs out of fuel, or if the filters have been replaced, it is necessary to bleed the air from the circuit.

18.1.3 COOLANT

- River water contains large amounts of calcium and other impurities, so if it is used, scale will stick to the engine and radiator, and this will cause defective heat exchange and overheating.
  Do not use water that is not suitable for drinking.

- When using anti-freeze, always observe the precautions given in the Operation and Maintenance Manual.

- Komatsu machines are supplied with Komatsu original anti-freeze in the coolant when the machine is shipped.
  This anti-freeze is effective in preventing corrosion of the cooling system.
  The anti-freeze can be used continuously for two years or 4000 hours. Therefore, it can be used as it is even in hot areas.

- Anti-freeze is 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, bucket tooth, 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			600-211-1231	Cartridge	2	EVERY 250 HOURS
By-pass filter			600-212-1511	Cartridge	1	EVERY 250 HOURS
Fuel filter			600-311-8293	Cartridge	3	EVERY 500 HOURS
Transmission oil filter			424-16-11140 (07000-12125) (07000-12014)	Element (O-ring) (O-ring)	4 (4) (4)	EVERY 500 HOURS
Corrosion resistor			600-411-1171	Cartridge	1	EVERY 1000 HOURS
Hydraulic filter			208-60-61180 (07000-15210)	Element (O-ring)	2 (2)	EVERY 2000 HOURS
Air cleaner			6128-81-7042	Element ass'y	2	—
			600-181-4400	Outer element ass'y	(2)	
Air conditioner air filter			421-07-12312	Element	2	—
Tip tooth (For 8.7m³ (11.3 cu.yd) bucket)	General rock	Long life	427-70-13780 (427-70-13791)	Tooth (Pin)	8 (8)	—
		Wide	427-70-13810 (427-70-13791)	Tooth (Pin)	8 (8)	
		Semi-long life	427-70-13820 (427-70-13791)	Tooth (Pin)	8 (8)	
		Sharp	427-70-13731 (427-70-13771)	Tooth (Pin)	8 (8)	
	Soft rock	Sharp	427-842-1210 (428-72-13791)	Tooth (Pin)	8 (8)	
	Lime-stone	Long life	427-842-1111 (427-70-13791)	Tooth (Pin)	8 (8)	
		Sharp	427-842-1120 (427-70-13791)	Tooth (Pin)	8 (8)	

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

PROPER SELECTION OF FUEL, COOLANT AND LUBRICANTS

RESERVOIR	KIND OF FLUID	AMBIENT TEMPERATURE	CAPACITY	
		–22 –4 14 32 50 68 86 104 122°F –30 –20 –10 0 10 20 30 40 50°C	Specified	Refill
Engine oil pan	Engine oil	SAE 30 SAE 10W SAE 10W-30 SAE 15W-40	63 ℓ 16.63 US gal 13.86 UK gal	54 ℓ 14.26 US gal 11.88 UK gal
Transmission case	Engine oil	SAE 30 SAE 10W	120 ℓ 31.7 US gal 26.4 UK gal	105 ℓ 27.7 US gal 23.1 UK gal
Hydraulic system	Engine oil	SAE 10W	780 ℓ 206 US gal 172 UK gal	490 ℓ 129 US gal 108 UK gal
Brake	Engine oil	SAE 10W	38 ℓ 10.03 US gal 8.36 UK gal	27 ℓ 7.13 US gal 5.94 UK gal
Axle (Front and rear) (each)		See Note 1	245 ℓ 64.7 US gal 53.9 UK gal	245 ℓ 64.7 US gal 53.9 UK gal
Pins	Grease	NLGI No. 2	–	–
Fuel tank	Diesel fuel	ASTM D975 No.2 ※	1100 ℓ 290 US gal 242 UK gal	–
Cooling system	Water	Add antifreeze	200 ℓ 52.8 US gal 44.0 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 engine oil pan
0.5 to 1.0%	1/2 of regular interval
Above 1.0%	1/4 of regular interval

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

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

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

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

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

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

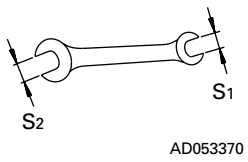
No.	Supplier	**Engine Oil [CD or CE]** SAE10W, 30, 40 10W30, 15W40 (The 15W40 oil marked * is CE.)	**Gear Oil [GL-4 or GL-5]** SAE80, 90, 140	**Grease [Lithium-Base]** NLGI No. 2	**Anti-freeze Coolant [Ethylene Glycol Base] Permanent Type**
1	KOMATSU	EO10-CD EO30-CD EO10-30CD EO15-40CD	GO90 GO140	G2-LI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

No.	Supplier	**Engine Oil [CD or CE]** SAE10W, 30, 40 10W30, 15W40 (The 15W40 oil marked * is CE.)	**Gear Oil [GL-4 or GL-5]** SAE80, 90, 140	**Grease [Lithium-Base]** NLGI No. 2	**Anti-freeze Coolant [Ethylene Glycol Base] Permanent Type**
14	PENNZOIL	*Supreme duty fleet motor oil	Multi-purpose 4092 Multi-purpose 4140	Multi-purpose white grease 705 707L White – bearing grease	Anti-freeze and summer coolant
15	PETROFINA	FINA kappa TD	FINA potonic N FINA potonic NE	FINA marson EPL2	FINA tamidor
16	SHELL	Rimula X	Spirax EP Spirax heavy duty	Alvania EP grease	–
17	SUN	–	Sunoco GL5 gear oil	Sunoco ultra prestige 2EP Sun prestige 742	Sunoco antifreeze and summer coolant
18	TEXACO	*Ursa super plus Ursa premium	Multigear	Multifak EP2 Starplex 2	Code 2055 startex antifreeze coolant
19	TOTAL	Rubia S *Rubia X	Total EP Total transmission TM	Multis EP2	Antigel/antifreeze
20	UNION	*Guardol	MP gear lube LS	Unoba EP	–
21	VEEDOL	*Turbostar *Diesel star MDC	Multigear Multigear B Multigear C	–	Antifreeze

21. STANDARD TIGHTENING TORQUES FOR BOLTS AND NUTS

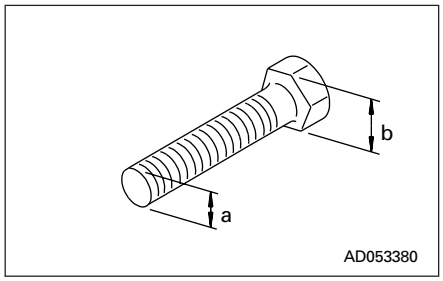
21.1 INTRODUCTION OF NECESSARY TOOLS

The following tools are 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  AD053370
2	Socket wrench set	09020-10284	
3	Screwdriver	09033-00190	Crosshead/flat head interchangeable type
4	Wrench	09014-10200	
5	Pliers	09036-00150	
6	Wrench	09001-03600	36 jaw
7	Filter wrench	09019-08035	For filter cartridge
8	Bar	424-98-11130	Extension bar
9	Gauge	09289-10000	
10	Thickness gauge	09054-00009	
11	Grease pump	07952-80003	For greasing work
12	Nozzle	07951-31400	Hose nozzle for grease pump
13	Grease cartridge	07950-90403	(Lithium base grease: 400 g)
14	Nipple	424-98-11110	For hydraulic oil drain
15	Hose	424-98-11120	
16	Hammer	09039-00150	
17	Plate	09963-03000	Warning tag

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

21.2 TORQUE LIST



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

The tightening torque is determined by the width across the flats ⓑ of the nut and bolt.

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

N·m (newton meter): 1N·m ≒ 0.1 kgf·m
≒ 0.74 lbft

Thread diameter of bolt (mm) (a)	Width across flat (mm) (b)	 AD054300		
		N·m	kgf·m	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 ± 4	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	Q'ty	Replacement interval
1	Fuel spill hose (between nozzles)	5	Every 2 years or every 4000 hours, whichever comes first
2	Turbocharger lubricating hose	1	
3	Fuel hose (nozzle – fuel return hose)	1	
4	Fuel hose (for APS)	3	
5	Fuel hose (fuel tank – strainer)	1	
6	Fuel hose (strainer – priming pump)	1	
7	Fuel hose (priming pump – injection pump)	1	
8	Fuel hose (injection pump – fuel filter)	1	
9	Fuel hose (fuel filter-solenoid valve)	1	
10	Fuel hose (solenoid valve-injection pump)	1	
11	Fuel hose (overflow valve of injection pump – connector)	1	
12	Fuel hose (solenoid valve – connector)	1	
13	Fuel hose (connector – fuel tank)	1	
14	Work equipment hose (work equipment pump – work equipment valve)	2	
15	Steering hose (steering pump – steering valve)	2	
16	Steering hose (steering valve – steering cylinder)	4	
17	Steering hose (switch pump – steering valve)	2	
18	Brake hose (pump – accumulator charge valve)	3	
19	Brake hose (accumulator charge valve – accumulator)	2	
20	Brake hose (accumulator – tandem valve)	2	
21	Brake hose (accumulator – single valve)	2	
22	Brake hose (check valve – accumulator P.P port)	1	
23	Brake hose (tandem valve – front brake)	4	
24	Brake hose (tandem valve – rear brake)	3	
25	Brake hose (single valve – tandem valve)	1	
26	Brake hose (tandem valve – drain block)	1	
27	Brake hose (single valve – drain block)	1	
28	Brake hose (brake oil tank – brake pump)	2	
29	Brake hose (brake accumulator – parking solenoid valve)	1	
30	Brake hose (parking solenoid valve – parking brake cylinder)	1	
31	Brake hose (parking solenoid valve – brake tank)	1	
32	Seat belt	1	Every 3 years

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	3-22
Replace transmission oil filter element	3-22
Check engine valve clearance, adjust	3-22
WHEN REQUIRED	
Check, clean, or replace air cleaner element	3-23
Clean inside of cooling system	3-25
Check transmission oil level, add oil	3-29
Check axle oil level, add oil	3-30
Clean axle case breather	3-31
Clean condenser of air conditioner	3-31
Check window washing fluid level, add fluid	3-32
Clean radiator fins and oil cooler fins	3-32
Check APS	3-33
Replace bucket teeth	3-34
Lubricating	3-35
• Work equipment control valve linkage (2 points)	3-35
Check air conditioner (if equipped)	3-36
Adjust parking brake	3-37
Bleeding air from brake hydraulic circuit	3-38
Bleeding air from PPC circuit	3-38
Replace slow blow fuse	3-39
Bleeding air from hydraulic tank	3-40
Replace fan belt, adjust auto-tensioner	3-42
Selection and inspection of tires	3-43
Drain water from water separator (if equipped)	3-44

SERVICE ITEM	PAGE
CHECK BEFORE STARTING	
Check monitor panel	3-45
Check coolant level, add water	3-45
Check oil level in engine oil pan, add oil	3-46
Check brake oil tank level, add oil	3-47
Check fuel level, add fuel	3-48
Check electric wiring	3-49
Check inflation pressure of tires	3-49
Check effect of parking brake	3-50
Check effect of brake	3-50
Check sound of horn and backup buzzer	3-50
Check flashing of lamps, check for dirt or damage	3-50
Check direction of rear view mirror, check for dirt or damage	3-50
Check engine exhaust color and sound	3-50
Check operation of gauges	3-50
Check play of steering wheel, check operation of steering	3-50
Check for water and sediment in water separator, drain water (if equipped)	3-51
EVERY 50 HOURS SERVICE	
Drain water, sediment from fuel tank	3-52
EVERY 100 HOURS SERVICE	
Lubricating	3-53
● Bucket cylinder bottom pin (1 point)	3-54
● Lift arm hinge pin (2 points)	3-54
● Steering cylinder pin (4 points)	3-54
● Lift cylinder pin (4 points)	3-54
● Bucket hinge pin (2 points)	3-55
● Bucket link pin (2 points)	3-55
● Bucket cylinder rod end (1 point)	3-55

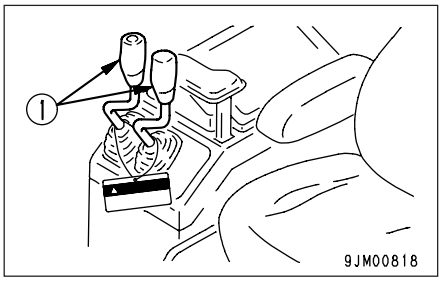
SERVICE ITEM	PAGE
EVERY 100 HOURS SERVICE (continued)	
● Tilt lever pin (1 point)	3-55
● Front axle support pin (1 point)	3-55
● Rear axle support pin (1 point)	3-55
● Rear axle support pin cover (1 point)	3-55
Check oil level in hydraulic tank, add oil	3-56
Clean element in air conditioner fresh air filter (if equipped)	3-56
EVERY 250 HOURS SERVICE	
Change oil in engine oil pan, replace engine oil filter cartridge	3-57
Check battery electrolyte level	3-59
Check alternator belt tension, adjust	3-60
Check air conditioner compressor belt tension, adjust (if equipped)	3-61
Check for loose wheel hub nuts, tighten	3-62
Clean element in air conditioner recirculation filter (if equipped)	3-62
Check frame and boom	3-62
EVERY 500 HOURS SERVICE	
Replace fuel filter cartridge	3-63
Replace transmission oil filter element	3-65
Lubricate center drive shaft (3 points)	3-66
Check fan belt for wear	3-67
EVERY 1000 HOURS SERVICE	
Change oil in transmission case, clean strainer	3-68
Clean transmission case breather	3-69
Lubricating	3-70
● Center hinge pin (2 points)	3-70
● Drive shaft center support (1 point)	3-70
● Rear drive shaft (2 points)	3-71
● Upper drive shaft (3 points)	3-71
● Front drive shaft (3 points)	3-71
● Transmission mount trunnion (1 point)	3-71

SERVICE ITEM	PAGE
EVERY 1000 HOURS SERVICE (continued)	
• Parking brake linkage (6 points)	3-71
• Fan pulley (1 point)	3-71
• Tension pulley (2 points)	3-71
Check tightening parts of turbocharger	3-72
Clean fuel strainer	3-72
Tighten ROPS canopy	3-72
Replace corrosion resistor cartridge	3-73
EVERY 2000 HOURS SERVICE	
Change oil in hydraulic tank, replace hydraulic filter element	3-74
Clean hydraulic tank strainer	3-77
Replace hydraulic tank breather element	3-78
Change axle oil ★	3-79
Replace air conditioner filter (if equipped)	3-80
Clean PPC circuit strainer	3-81
Clean engine breather element	3-81
Check alternator, starting motor	3-82
Check engine valve clearance, adjust	3-82
Check brake disk wear	3-82
Clean and check turbocharger	3-82
Check play of turbocharger rotor	3-82
Check accumulator	3-82
Check accumulator gas pressure	3-82
EVERY 4000 HOURS SERVICE	
Check water pump	3-83
Check engine vibration damper	3-83
Check fan pulley and tension pulley	3-83
Replace injection pump screen filter	3-83
Clean injection pump oil inlet strainer	3-83

★ The interval of 2000 hours for changing the axle oil is for standard operations. If the brake is used frequently or the brakes make a sound, change the oil after a shorter interval.

24. SERVICE PROCEDURE

24.1 INITIAL 250 HOURS SERVICE



⚠WARNING

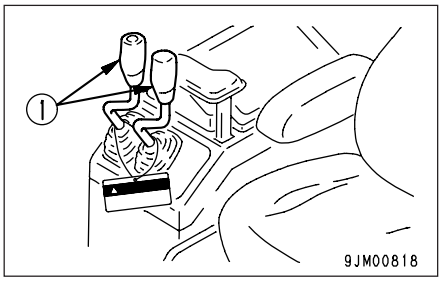
Be sure to put a warning tag on work equipment control levers ①.

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

- **REPLACE FUEL FILTER CARTRIDGE**
- **REPLACE TRANSMISSION OIL FILTER ELEMENT**
- **CHECK ENGINE VALVE CLEARANCE, ADJUST**

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

24.2 WHEN REQUIRED



⚠ WARNING

Be sure to put a warning tag on work equipment control levers ①.

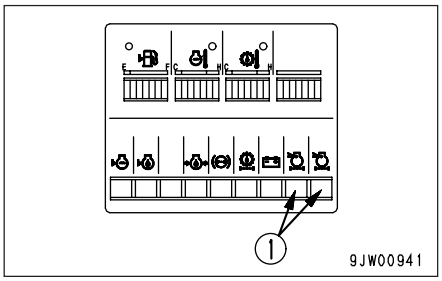
24.2.1 CHECK, CLEAN, OR REPLACE AIR CLEANER ELEMENT

⚠ WARNING

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

CHECKING

If air cleaner clogging caution lamps (Right and left) ① on the maintenance monitor flashes, clean the air cleaner element.

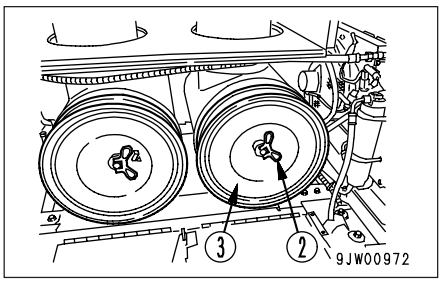


NOTICE

Do not clean the air cleaner element before the air cleaner clogging caution lamps (Right and left) flash.

If the air cleaner element is cleaned frequently before the air cleaner clogging caution lamps (Right and left) flash, the proper performance of the air cleaner is not provided and the cleaning efficiency is lowered.

In addition, dust sticking to the cleaner element falls on the inner element side while cleaning the element.

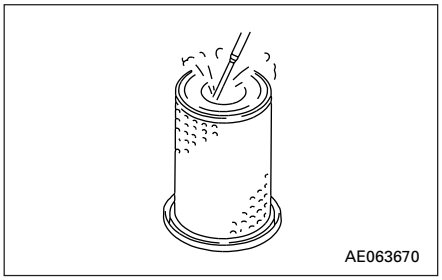


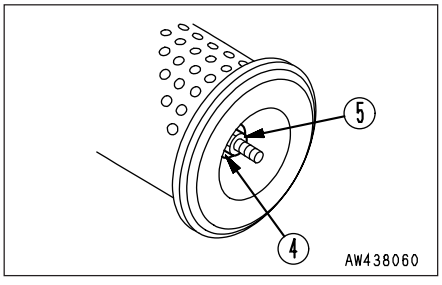
CLEANING OR REPLACING OUTER ELEMENT

1. Remove wing nut ② and cover ③, take out outer element.

2. Clean the inside of the air cleaner body.

3. Direct dry compressed air (less than 0.69 MPa (7 kgf/cm^2, 99.4 PSI)), to the element from inside along its folds, then direct it from outside along its folds and again from inside.
   1) Remove one seal from the outer element whenever the outer element has been cleaned.
   2) Replace the outer element which has been cleaned 6 times repeatedly or used throughout a year.
      Replace the inner element at the same time.
   3) If the dust indicator flashes immediately after the outer element has been cleaned, replace both inner and outer elements, even if the outer element has not been cleaned 6 times.
   4) Check inner element mounting nut ⑤ for looseness and, if necessary, retighten.
   5) Replace seal washer ④ or mounting nut ⑤ with new parts if they are broken.



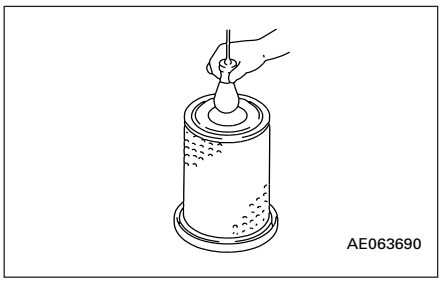


NOTICE

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

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

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



4. Install the cleaned element.

REPLACING INNER ELEMENT

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

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

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

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

5. Install the outer element.

REMARK

When installing both the inner element and outer element, move the elements lightly while tightening the nut to bring the seal rubber at the tip of the element into tight contact with the inside of the body.

24.2.2 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, lift the lever to relieve the internal pressure.**

- 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

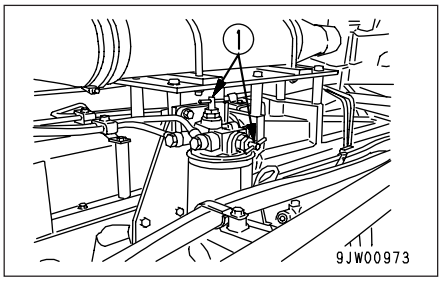
Min. atmospheric temperature	°C	–10	–15	–20	–25	–30
	°F	14	5	–4	–13	–22
Amount of antifreeze	ℓ	60	72	82	92	100
	US gal	15.84	19.01	21.65	24.29	26.40
	UK gal	13.20	15.84	18.04	20.24	22.00
Amount of water	ℓ	140	128	118	108	100
	US gal	36.96	33.79	31.15	28.51	26.40
	UK gal	30.80	26.16	25.96	23.76	22.00

⚠WARNING

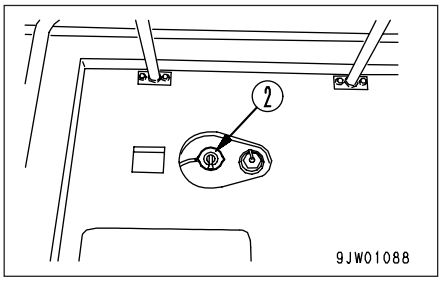
Antifreeze is flammable, so keep it away from any flame.

- 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.

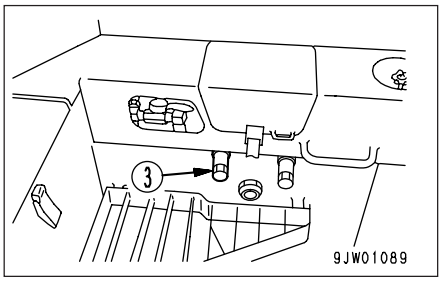


2. When removing radiator cap ②, lift the lever to relieve the internal pressure.
   Turn radiator cap ② slowly to remove it.

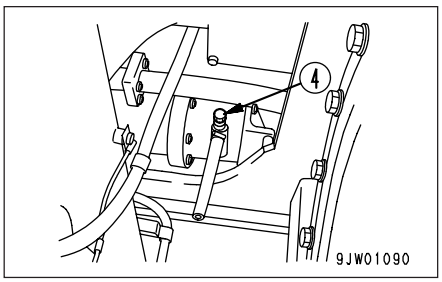


3. Prepare a container to catch the coolant, then open drain valve ③ of the radiator and drain plug ④ at the side of the cylinder block and plug ⑤ on the side of torque converter cooler to drain the coolant.

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



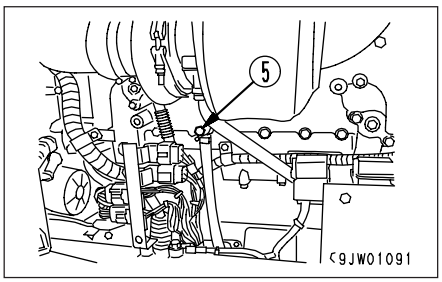
5. When the radiator is full of water, start the engine and run it at low idling.
   Open drain valve ③, drain plugs ④ and ⑤, run the engine at low idling, and flush water through the system for 10 minutes.
   When doing this, adjust the speed of filling and draining the water so that the radiator is always full.
   While flushing water through the system, watch carefully that the water inlet hose does not come out of the radiator water filler.



6. After flushing, stop the engine, open drain valve ③, drain plugs ④ and ⑤, then close it again after all the water has drained out.

7. After draining the water, clean with a flushing agent.
   For details of the cleaning method, see the instructions given with the cleaning agent.

8. After cleaning, open drain valve ③, drain plugs ④ and ⑤ to drain all the cooling water, then close them and fill slowly with clean water.



9. When the water comes up to near the water filler port, open drain valve ③, drain plugs ④ and ⑤, run the engine at low idling, and continue to run water through the system until clean colorless water comes out.

When doing this, adjust the speed of filling and draining the water so that the radiator is always full.

10. When the water is completely clean, stop the engine, close drain valve ③, drain plugs ④ and ⑤.

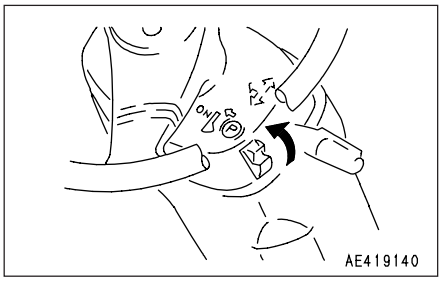
11. Replace the corrosion resistor cartridge and open valve ①.
    For details of replacement of the corrosion resistor, see "24.8 EVERY 1000 HOURS SERVICE".

12. Supply the antifreeze and city water until it overflows from the water filler. For mixing ratio of the untifreeze and city water, decide by using the "Mixing rate of water and antifreeze".

13. To remove the air in the cooling water, run for five minutes at low idling, then for another five minutes at high idling.
    When doing this, leave radiator cap ② off.

14. Stop the engine, wait for about three minutes, add cooling water up to near the radiator water filler port, then tighten the cap.

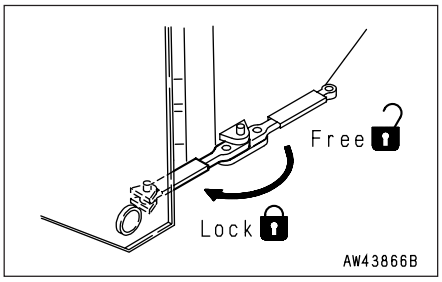
24.2.3 CHECK TRANSMISSION OIL LEVEL, ADD OIL



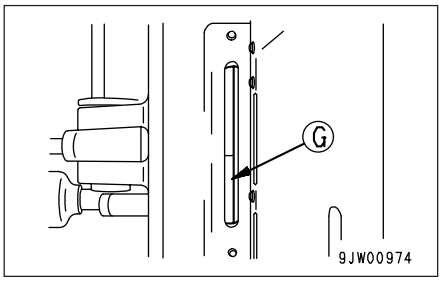
⚠ WARNING

- **When checking the oil level, apply the parking brake, and lock the front and rear frames with the safety bar and pin.**
- **The oil is at high temperature after the machine has been operated. Always wait for the temperature to go down before starting this operation.**

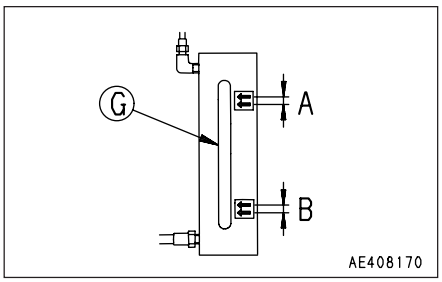
Carry out this procedure if there is any sign of oil on the transmission case, or if there is oil mixed with the cooling water.



1. Stop the engine.

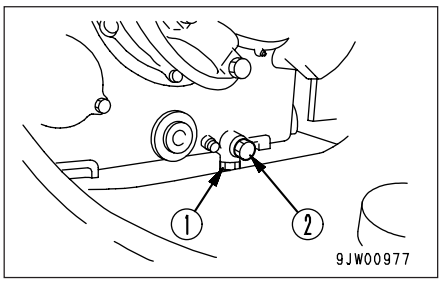


2. Use sight gauge Ⓖ to check the oil level.



3. If the oil level is not within the range at upper area A of the sight gauge, add engine oil through oil filler Ⓕ.
   The safety bar may be used as a step to pour oil.

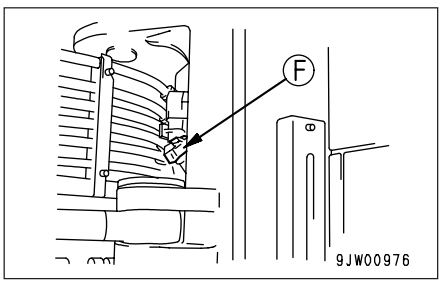
For details of the oil to use, see "20. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE."



4. If the oil is above the A, remove drain plug ① and loosen plug ② to drain the excessive engine oil, then check the oil level again.

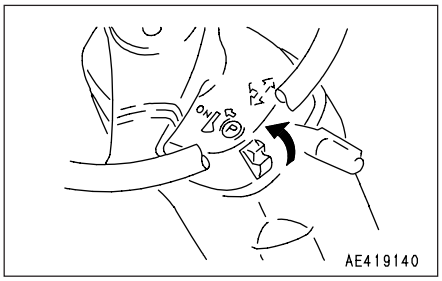
5. If the oil level is correct, then tighten cap Ⓕ.

Make an oil level check before starting engine or 60 minutes or more after the engine is stopped. If oil remains at various portions, the correct oil level cannot be measured.



The oil level can also be checked at low idling. In this case, the oil should be within the range at bottom area B of the sight gauge. However, the time taken for the oil level to become steady will differ according to the idling speed and the oil temperature.

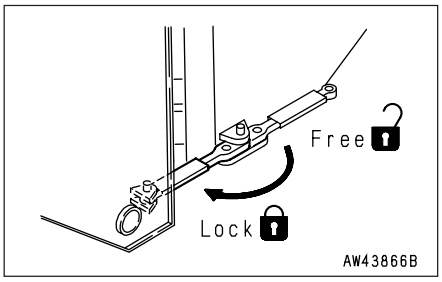
24.2.4 CHECK AXLE OIL LEVEL, ADD OIL



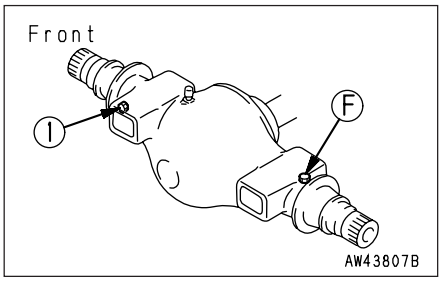
⚠ WARNING

- **When checking the oil level, apply the parking brake, and lock the front and rear frames with the safety bar and pin.**
- **The oil is at high temperature after the machine has been operated. Always wait for the temperature to go down before starting this operation.**

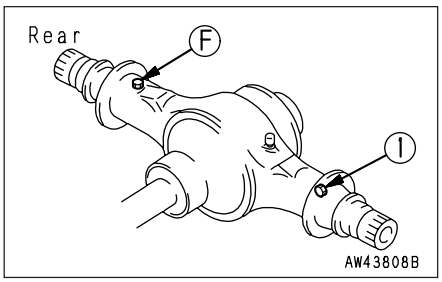
Carry out this procedure if there is any sign of oil on the axle case.



Carry out the inspection with the machine on a horizontal road surface.
(If the road surface is at an angle, the oil level cannot be checked correctly.)



1. Stop the engine and remove oil level plug ①.
2. Check that the oil level reaches the bottom of the plug hole.
3. If the oil is not close to the bottom edge, add axle oil through filler port Ⓕ.



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

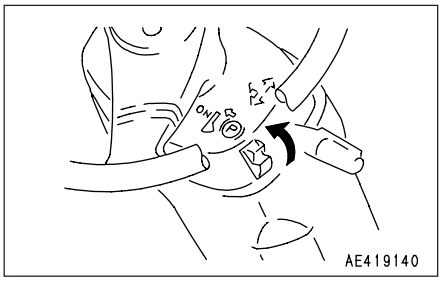
4. If the oil level is correct, install plug ①.

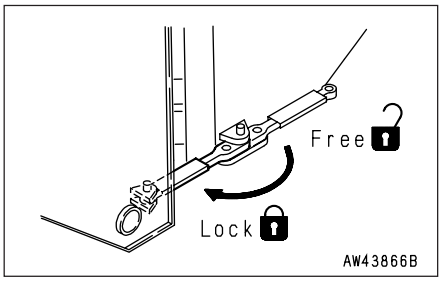
Tightening torque: 152 ± 24 N·m (15.5 ± 2.5 kgf·m, 112 ± 18 lbft)

24.2.5 CHECK AXLE CASE BREATHER

WARNING

When cleaning, apply the parking brake, and lock the front and rear frames with the safety bar and pin.



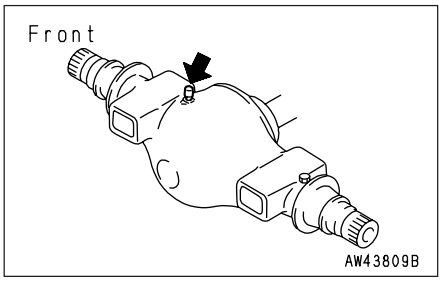


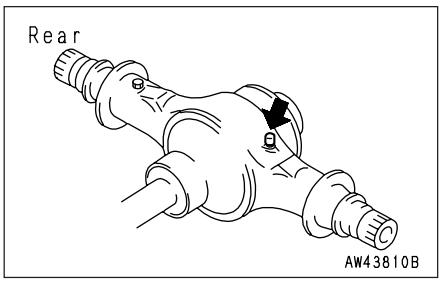
Remove any mud or dust that is stuck to the area around the breather.

Then, remove breather, immerse in cleaning fluid and clean.

When cleaning the breather, clean the breathers at two places (front and rear).

Do not let dirt get into the port while breather is removed.

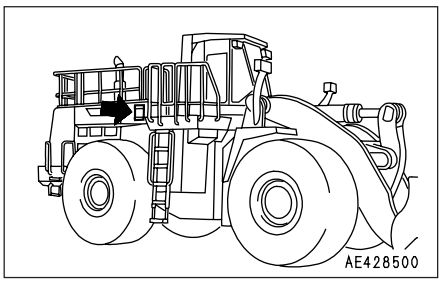




24.2.6 CLEAN CONDENSER OF AIR CONDITIONER

WARNING

Do not wash the condenser with a steam cleaner. Otherwise, the condenser will get hot and may break down.



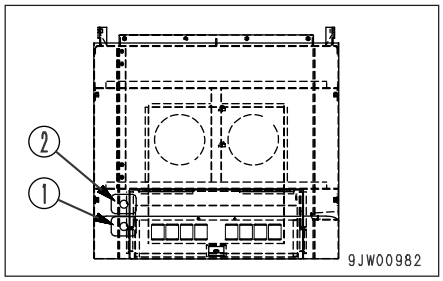
If there is mud or dust on the air conditioner condenser, clean it with water.

Check the fins for clogging or damage.

If the water pressure is too high, the fins may get deformed. When washing with a high pressure washing machine, apply the water from a reasonable distance.

Use water to wash off any mud stuck to the condenser. If necessary, use a soft brush. Do not use a hard brush, as this will damage the fins.

24.2.7 CHECK WINDOW WASHING FLUID LEVEL, ADD FLUID



Do this when there is air in the window washing fluid.

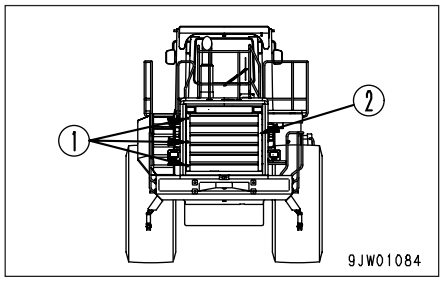
Check the washing fluid levels in washer tanks ① and ②. When the fluid has run short, add automotive window washing fluid.

①: Front window washing fluid tank

②: Rear window washing fluid tank

To prevent the nozzles from clogging, be careful not to let dust get into the fluid.

24.2.8 CLEAN RADIATOR FINS AND OIL COOLER FINS



Radiator fins, oil cooler fins and outer cooler fins.

Carry out this procedure if there is any mud or dirt seen stuck to the radiator.

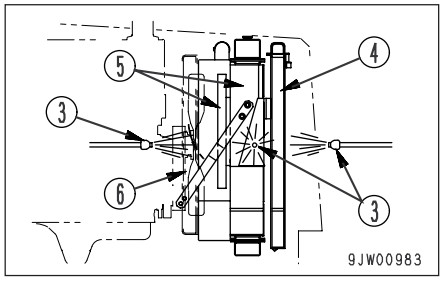
1. Loosen bolt ① and remove radiator grille ②.

2. Use compressed air to clean the mud dust, and leaves from the radiator fins. Steam or water may be used instead of compressed air.

NOTICE

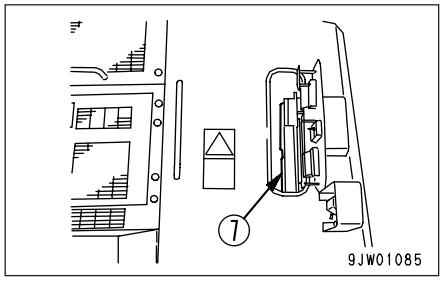
If the steam nozzle is brought too near the radiator fins, the fins may be damaged. Accordingly, keep the nozzle away from the fins.

3. The rubber hose should be checked at the same time. If the hose is found to have cracks or to be hardened by ageing, it should be replaced with a new one. Further, loosen hose clamps should also be tightened.



4. When washing, use nozzle ③ with an opening of diameter ø 2 mm (0.079 in), and keep the water pressure to a maximum of 4 MPa (40 kgf/cm^2, 568 PSI).

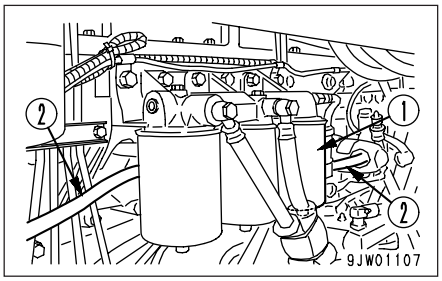
5. Only when cleaning from oil cooler ④ side, if the mud or dirt cannot be removed, remove fan guard ⑥ and clean from radiator ⑤ side or open cover ⑦ at the side face of the radiator guard and insert the nozzle between the radiator and oil cooler to carry out cleaning.



24.2.9 CHECK APS

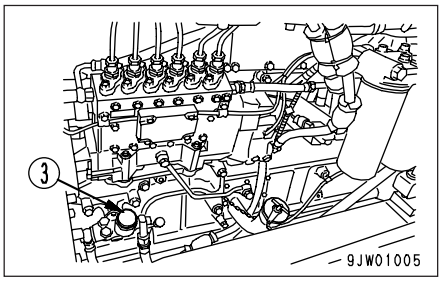
(automatic priming system)

Check APS when the ambient temperature drops to 15°C.



1. Open fuel valve ① of automatic priming system, and remove hose ② at entrance of nozzle.

2. Move feed pump ③ up and down, and bleed air until air bubbles stop coming out of opening of hose ②.
   Perform the next test the same way.
   - Is there a fuel leak?
   - Is the fuel piping plugged?



3. After putting preheater switch in ON position and after returning to auto, check the following items:
   - Does the pre-heat monitor lamp turn off after about 80 seconds?
   - When the pre-heat monitor lamp goes off, are the outside of the glow plugs (2 pieces) warm?

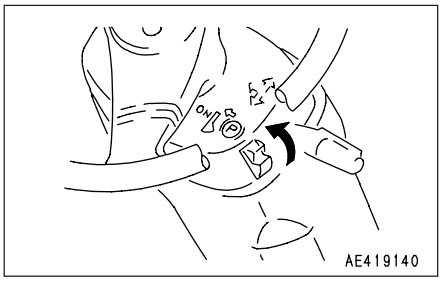
When hand is removed from pre-heater switch when in ON position, switch will return to AUTO position automatically.

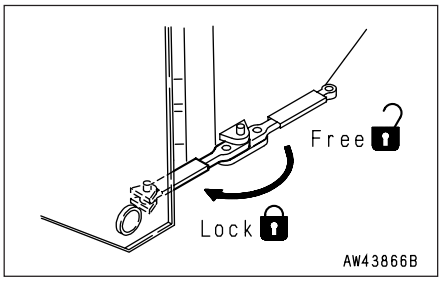
4. The fuel hose should be checked at the same time. If the hose is found to have cracks or to be hardened by ageing, it should be replaced with a new one. Further, loosen hose clamps should also be tightened.

24.2.10 REPLACE BUCKET TEETH

WARNING

It is dangerous if the work equipment moves by mistake when the teeth are being replaced. Set the work equipment in a stable condition, then stop the engine, apply the parking brake and locks securely to the work equipment control levers.





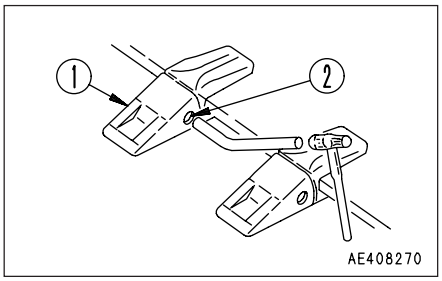
If the bucket equipped with tip tooth.

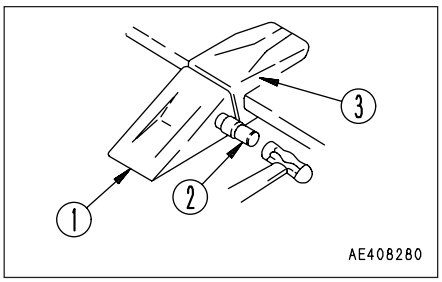
Replace the teeth before they wear down as far as the adaptor.

1. Extract pin ② fitted to the bucket and then remove tooth ①. When extracting pin ②, strike the part (either the left or right part) with a sharp object. This will enable the pin to be extracted from the opposite side.

2. Insert the new tooth ① into the adaptor ③, and insert pin ② partway as shown in the diagram. Then drive it home by means of a hammer.

3. After operating the machine for a few hours, check that the pin does not come out.

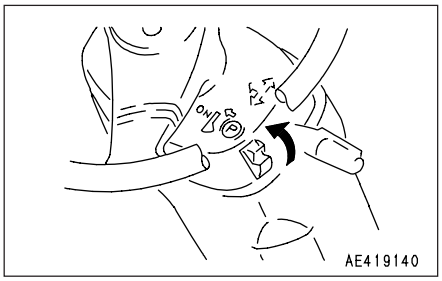




24.2.11 LUBRICATING

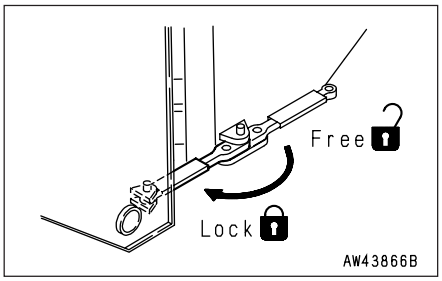
WARNING

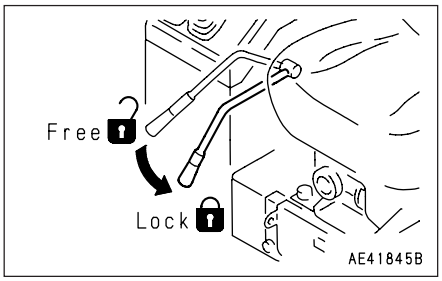
- **Apply the parking brake switch, and lock the front and rear frames with the safety bar and pin.**
- **Set the work equipment in a stable condition, then stop the engine and locks the work equipment control levers with the safety lock lever.**



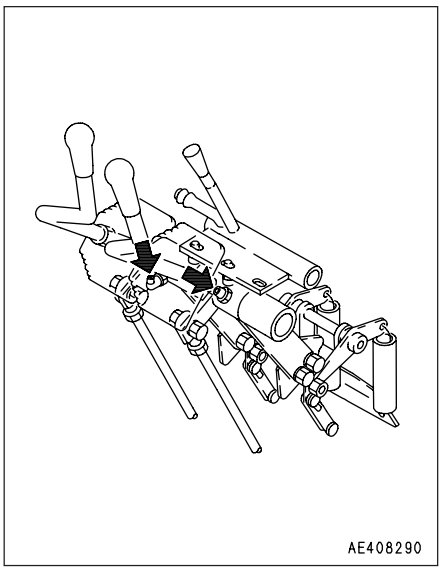
1. Using a grease pump, pump in grease through the grease fittings shown by arrows.

2. After greasing, wipe off any old grease that was pushed out.





1. Work equipment control valve linkage (2 points)
   If the work equipment control lever is heavy or does not move smoothly, apply grease.



24.2.12 CHECK AIR CONDITIONER (IF EQUIPPED)

Check levels of refrigerant (gas)

Check twice a year, in spring and autumn.

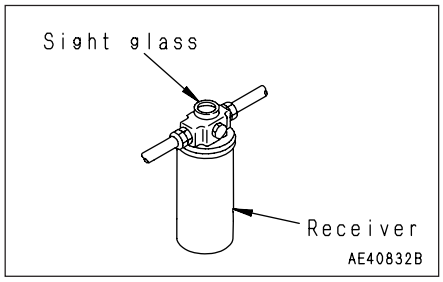
⚠WARNING

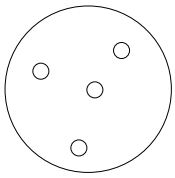
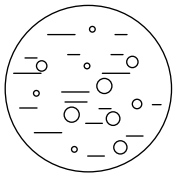
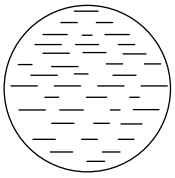
If the liquid gets into your eyes or on your hands, it may cause loss of sight or frostbite, so never loosen any part of the refrigerant circuit.

Operate the cooler of the air conditioner for 5 – 10 minutes, then touch the high pressure portion and low pressure portion of the compressor (or high pressure hose and low pressure hose joint) by hand. At the same time, inspect the flow of refrigerant gas (R134a) through the sight glass to check the gas level.

Please contact your Komatsu distributor for this inspection.

The sight glass is installed to the receiver on the right side of the air cleaner.



Cooler condition	Normal	Abnormal	
Temp. of high and low pressure pipes.	High pressure pipe is hot. Low pressure pipe is cold. Clear difference in temperature	High pressure pipe is warm. Low pressure pipe is cold. Little difference in temperature	Almost no difference in temperature between high and low pressure pipes.
Sight glass	Almost transparent. Any bubbles disappear if the engine speed is raised or lowered. 	Bubbles are always flowing. Sometimes becomes transparent, or white bubbles appear. 	Misty substance is flowing. 
Connections of pipes	Properly connected	Some parts dirty with oil.	Some parts very dirty with oil.
General condition of cooler	Coolant level correct, no abnormalities. Ready for use.	May be a leak somewhere. Call service repair shop for inspection.	Almost all coolant has leaked out. Contact service repair shop immediately.

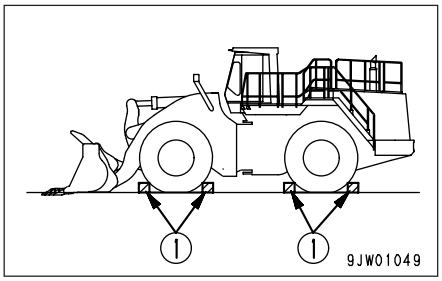
Operating the air conditioner off season

During the off-season, run the engine at low idling and operate the air conditioner once a month to heat up the cabin to at least 10°C, then run the cooler for at least 5 minutes at the MAX cooling position.

24.2.13 ADJUST PARKING BRAKE

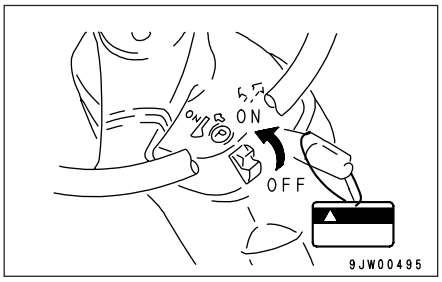
⚠WARNING

- **When adjusting the parking brake, be sure to put blocks ① 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 be sure to hang a caution tag on the turn signal lever to prevent any other person from operating it.**
- **Take care not to get oil or grease on the brake pad and the disc surface.**

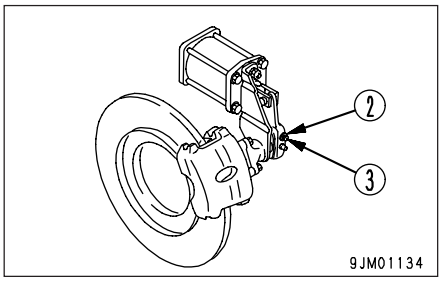


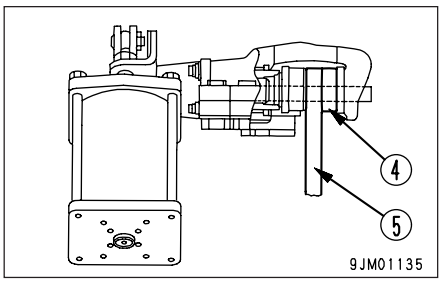
If the parking brake fails to work properly, adjust as follows.

1. Release the parking brake.

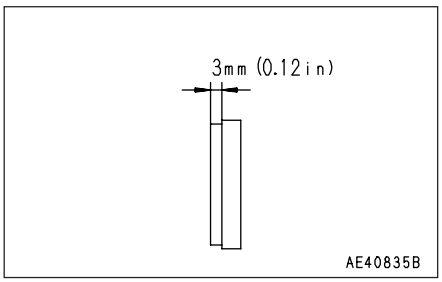


2. Turn bolt ③ counterclockwise while pressing bolt retainer ② and let pads ④ on both sides come into close contact with disc ⑤.
3. Turn back bolt ③ a half turn clockwise while pressing bolt retainer ②.
4. Restore bolt retainer ② to the original position and confirm that the retainer is in the locking position for bolt ③.





Check the lining for wear and replace the pad if the thickness of the lining is reduced to less than 3 mm (0.12 in).
Ask your Komatsu distributor for replacement of the pad.



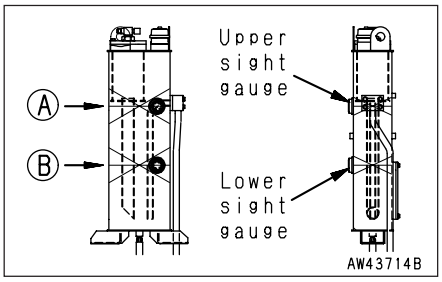
24.2.14 BLEEDING AIR FROM BRAKE HYDRAULIC CIRCUIT

After removing the piping of brake hydraulic circuit, bleed the air from inside of the circuit as follows:

1. After assembling the piping, be sure to check that the connectors are not loose.

2. Put blocks under the wheels.

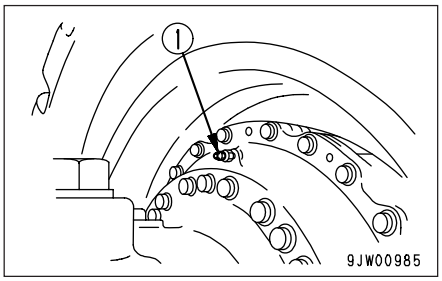
3. Check that the brake oil level is within the sight gauge on the side of the brake oil tank.
   - While the engine is stopped, the oil must be at level Ⓐ (10 hours or more after the engine is stopped).
   - While the engine is running, the oil must be at level Ⓑ (5 minutes or more after the engine is started).



4. Stop the engine.

5. Remove the air bleeder cap from the brake housing and insert one end of a vinyl hose in the brake housing and put the other end in a container.

6. Depress the brake pedal and loosen bleeder screw ① to bleed air. After tightening bleeder screw, release the brake pedal slowly.
   - This work are to be performed by two persons. One depresses the brake pedal, and the other bleeds air through the bleeder screw ①.
   - Use the left-hand brake pedal.
   - Supply brake oil periodically to keep the level sufficiently high.



7. Repeat this operation until air bubbles stop coming out of the hose. Then, depress the pedal to the end and tighten bleeder screw ① while the oil is flowing out.

NOTICE

Bleed the air at all 4 locations. After bleeding the air, check the oil level in the brake oil tank.

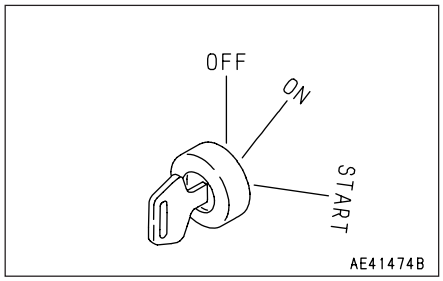
For details, contact your Komatsu distributor.

24.2.15 BLEEDING AIR FROM PPC CIRCUIT

When removing piping of PPC circuit, or removing strainer, after assembling, bleed air from inside of the circuit as follows:

1) Put bucket control lever in TILT position and boom control lever in FLOAT position, and after cylinder reaches stroke end, keep in that position for one minute.
2) Put bucket control lever in DUMP position an d boom control lever in RAISE position, and after cylinder reaches stroke end, keep in that position for one minute.
   For details, contact your Komatsu distributor.

24.2.16 REPLACE SLOW BLOW FUSE



NOTICE

- **Always turn the power OFF when replacing the slow blow fuse (turn the starting switch to the OFF position).**
- **Always replace the slow blow fuse with a fuse of the same capacity.**

1. Turn the starting switch to the OFF position.

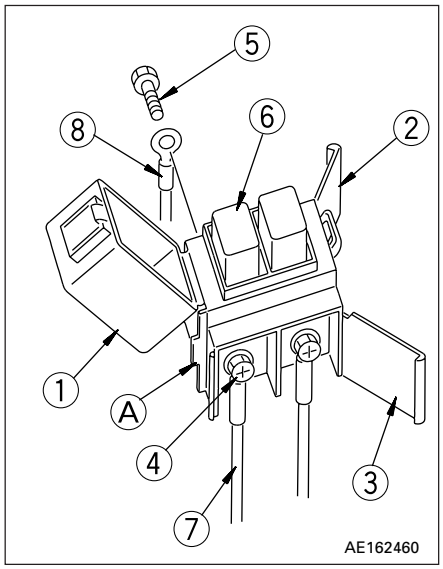
2. Remove the slow blow fuse box from the chassis.

3. Open covers ①, ②, and ③ of the slow blow fuse box.
   Covers ② and ③ can be removed easily by using protrusion Ⓐ on the body as a fulcrum and levering the catch of the cover with a flat-headed screwdriver to release it.

4. Loosen screws ④ and ⑤, and remove.
   When screws ④ and ⑤ are removed, slow blow fuse ⑥ will also come off together with electric wiring ⑦ and ⑧.

5. Using screws ④ and ⑤, install a new slow blow fuse together with electric wiring ⑦ and ⑧ to the slow blow fuse box, then close covers ①, ②, and ③.

6. Install the slow blow fuse box to the chassis.



24.2.17 BLEEDING AIR FROM HYDRAULIC TANK

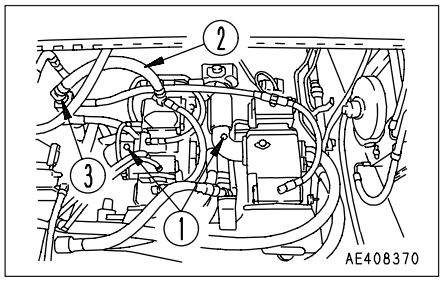
- After replacing oil and filter element or cleaning strainer, bleed the air from the circuit.
- After changing the oil and replacing the element in the hydraulic tank, or when the hydraulic cylinder or work equipment piping has been removed, do as follows to bleed the air after completion of assembly of the equipment.
  After bleeding air from piston pump, bleed air from hydraulic circuit.

Bleeding air from piston pump

NOTICE

If the air is not bleed completely, the piston pump may be damaged, so always carry out the air bleeding operation correctly.

Before bleeding the air from the piston pump, check that the hydraulic tank is filled with oil up to the top of the sight gauge. (If the oil level is low, add oil.)



1. Loosen plug ① on top of the tube at the suction side of the piston pump. There is one plug for each pump, so loosen all plugs (2 places).

2. Loosen the connector at block ③ side of case drain hose ② of the piston pump.
   The case drain hoses (x 2) for each pump are connected to block ③, but loosen only the connector of case drain hose ② connected to the top of the block. There is no need to loosen the connectors of the other two case drain hoses.

3. Continue until oil flows out from plug ① (2 places) and the connector of hose ②. After the air has been completely bled, tighten plug ① (2 places) and the connector of hose ②.

4. Check the oil level and add oil if necessary.

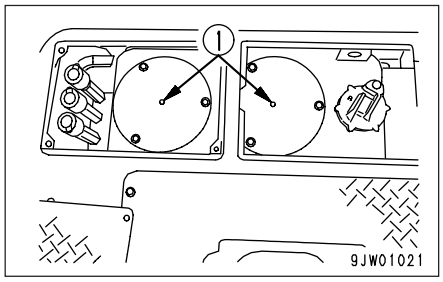
   For details, contact your Komatsu distributor.

Bleeding air from hydraulic circuit.

1. Check that the oil reaches the specified level in the hydraulic tank.

2. Run the engine at low idling and operate each hydraulic cylinders (of steering, bucket and lift arm) 4 to 5 times, stopping 100 mm (3.94 in) from stroke end.

3. Next, operate each cylinder 3 to 4 times to the end of its stroke, then stop the engine and loosen air bleeding plug ① of the hydraulic tank to bleed the air.
   After bleeding the air, tighten the plug.



4. Check the hydraulic oil level and add oil if necessary, Refer to "24.5 EVERY 100 HOURS SERVICE".

5. Increase the engine speed, and repeat step 3 to bleed the air until no more bubbles come out from plug ①.
   If the engine is run at high speed at first, or if the cylinder is moved to the end of its stroke, the air in the cylinder may damage the piston packing, etc.

6. After bleeding the air, tighten the air bleeding plug ①.
   Tightening torque of the plug:
   11.3 ± 1.47 N·m (1.15 ± 0.15 kgf·m, 8.3 ± 1.1 lbft)

7. Check the oil level in the hydraulic tank, and add oil if necessary.
   After adding oil, tighten the oil filler cap securely.

8. Check the hydraulic oil level and ensure that is correct, Refer to "24.5 EVERY 100 HOURS SERVICE".

24.2.18 REPLACE FAN BELT, ADJUST AUTO-TENSIONER

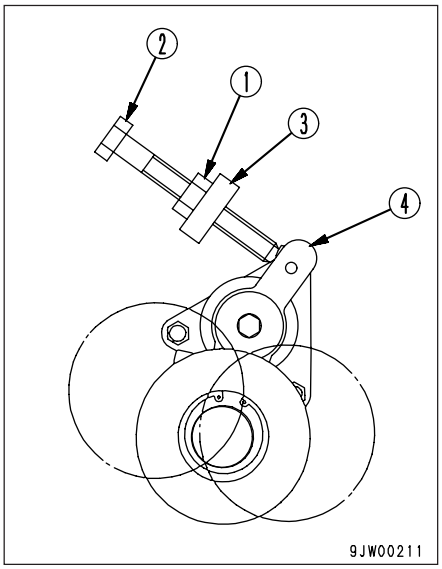
Replace the V-belts if they contact the bottom of the pulley grooves or if they are lower than the outside diameter of the pulleys or if they are cracked or flaked.

Replacement

1. Loosen locknut ①, then loosen adjustment screw ② and move them to bracket ③.

2. Insert a bar of a length of about 50 cm (20 in) in the dent of the tension pulley, and pull toward you strongly.

3. The spring extends and the tension pulley moves inwards, so remove the old belts and install new ones. Always replace the belts as a set (3 belts).



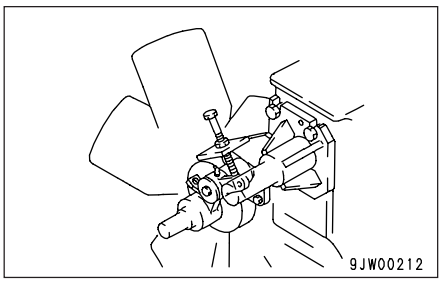
Adjustment

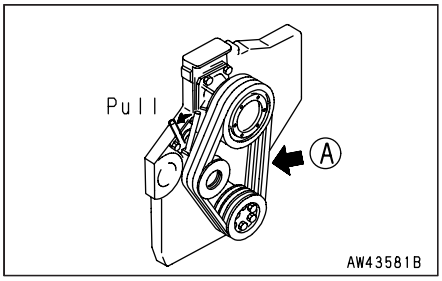
Press point midway Ⓐ of a belt between the fan pulley and crack pulley with a force of about 98.1N (10 kgf). The standard deflection at this time is about 9 – 11 mm (0.355 – 0.4 in).

If the deflection is larger, adjust the belt tension.

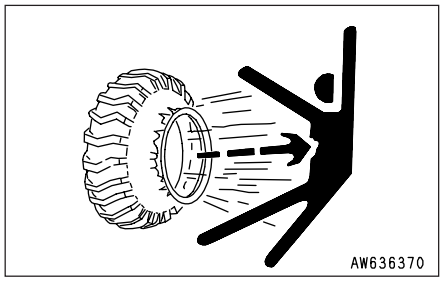
1. Tighten adjustment screw ②, and when the tip of the adjustment screw contacts tension pulley lever ④, tighten the adjustment screw further 2 turns, then lock it in position with locknut ①.

2. If a gap is made between tension pulley lever ④ and adjustment screw ② during operation, repeat Step 1 to adjust again.
   If the fan belts make any abnormal noise, adjust in the same way.





24.2.19 SELECTION AND INSPECTION OF TIRES



⚠WARNING

If a tire or a rim is handled wrongly, the tire may burst or may be damaged and the rim may be broken and scattered, and that can cause serious injury and death.

- **Since maintenance, disassembly, repair and assembly of the tires and rims require special equipment and skill, be sure to ask a tire repair shop to carry out the work.**
- **Do not heat or weld the rim to which the tire is installed. Do not make a fire near the tire.**

SELECTION OF TIRES

⚠WARNING

Select the tires according to the conditions of use and attachments on the machine. Use only specified tires and inflate them to the specified pressure.

Select the tires according to the conditions of use and attachments of the machine. Use the following table. Since the indicated speed varies with the tire size, consult your Komatsu distributor when using optional tires.

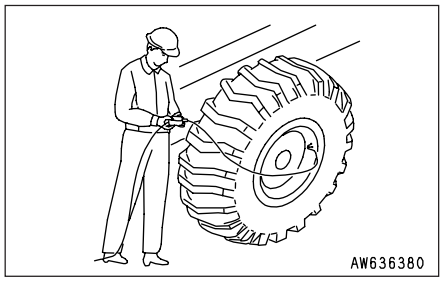
	Maximum load	Tire size	Remarks
Front wheel	29870 kg (65863 lb) 37500 kg (82688 lb)	40/65-39-36PR (L5) (standard) 41.25/70-39-34PR (L5) (if equipped)	Type 3 for construction equipment
Rear wheel	29870 kg (65863 lb) 37500 kg (82688 lb)	40/65-39-36PR (L5) (standard) 41.25/70-39-34PR (L5) (if equipped)	

CHECK OF INFLATION PRESSURE OF TIRES AND INFLATION OF THEM

⚠WARNING

When inflating a tire, check that no one will enter the working area and use an air chuck which has a clip and which can be fixed to the air valve.

- **While inflating the tire, check the inflation pressure occasionally so that it will not rise too high.**
- **If the rim is not fitted normally, it may be broken and scattered while the tire is inflated. To ensure safety, place a guard around the tire and do not work in front of the rim but work on the tread side of the tire.**
- **Abnormal drop of inflation pressure and abnormal fitting of the rim indicate a trouble in the tire or rim. In this case, be sure to ask a tire repair shop to carry out repairs.**
- **Be sure to observe the specified inflation pressure.**
- **Do not adjust the inflation pressure of the tires just after high-speed travel or heavy-duty work.**



Check

Measure the inflation pressure with a tire pressure gauge while the tires are cool before starting work.

Inflation of tires

Adjust the inflation pressure properly.

When inflating a tire, use an air chuck which can be fixed to the air valve of the tire as shown in the figure. Do not work in front of the rim but work on the tread side of the tire.

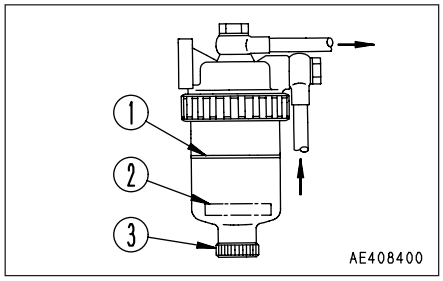
The proper inflation pressure is shown below.

Tire size	Inflation pressure
40/65-39-36PR (L5) (standard)	0.44 MPa (4.5 kgf/cm^2, 63.9 PSI)
41.25/70-39-34PR(L5)(if equipped)	0.44 MPa (4.5 kgf/cm^2, 63.9 PSI)

NOTICE

The appropriate tire inflation pressure differs according to the type of work, so see "12.18 HANDLING THE TIRES".

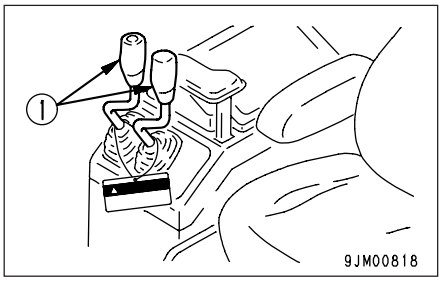
24.2.20 DRAIN WATER FROM WATER SEPARATOR (IF EQUIPPED)



When float ② is at or above red line ①, drain the water according to the following procedure:

1. Loosen drain plug ③ and drain the accumulated water until the float reaches the bottom.
2. Tighten drain plug ③.
3. If the air is sucked into fuel line when drain the water, be sure to bleed air in the same manner as for the fuel filter.
   See Fuel Filter Cartridge in "24.7 EVERY 500 HOURS SERVICE" section.

24.3 CHECK BEFORE STARTING



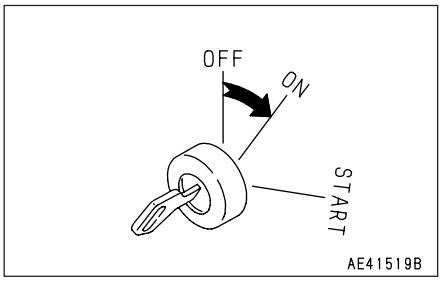
⚠WARNING

Be sure to put a warning tag on work equipment control levers ①.

24.3.1 CHECK MONITOR PANEL

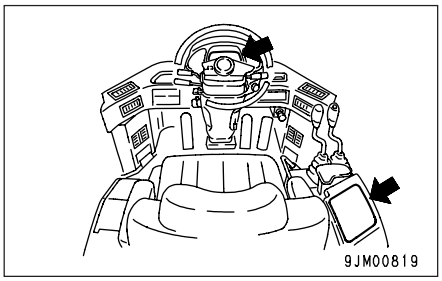
1. Turn the starting switch to ON.

2. Check that all the monitor lamps, the gauges and the warning lamp light up for about 3 seconds and the alarm buzzer sounds for about 1 second.



If any monitor lamp does not light up, ask your Komatsu distributor to inspect that monitor lamp.

Do not carry out the checks before starting using only the monitor; always carry out also the items specified for the periodic maintenance.



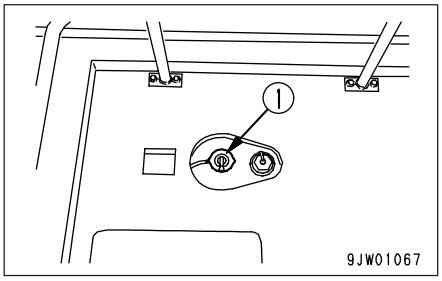
24.3.2 CHECK COOLANT LEVEL, ADD WATER

⚠WARNING

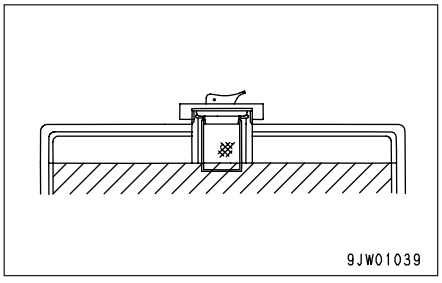
Do not remove the cap while cooling water is hot. Hot water may spout out.
When removing the radiator cap, lift the lever to relieve the internal pressure.

⚠CAUTION

When adding water, use the step and handrail to support yourself securely.



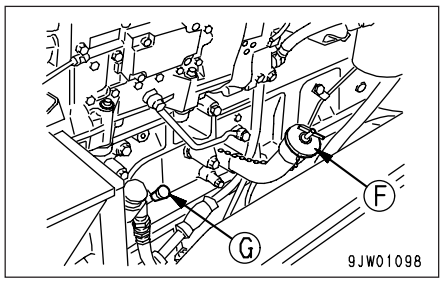
1. When the starting switch is turned on, if the coolant warning lamp and monitor lamp flash, remove radiator cap ① at the rear of the machine and check that the coolant is above the hatched portion marked in the diagram on the right. If the coolant level is low, add more water.



2. After adding water, tighten the cap securely.

If the volume of coolant added is more than usual, check for possible water leakage.
Confirm that there is no oil in the coolant.

24.3.3 CHECK OIL LEVEL IN ENGINE OIL PAN, ADD OIL

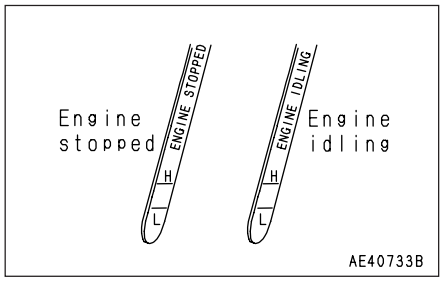


1. Open the inspection window at the rear right side of the machine.

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

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

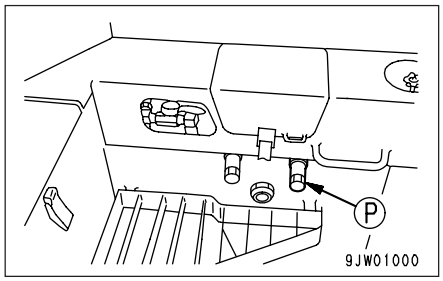
4. The oil level should be between the H and L marks on dipstick Ⓖ.
   If the oil level is below the L mark, add engine oil through oil filler Ⓕ.



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

The dipstick has level markings on both sides. One side gives the levels for measuring when the engine is stopped (ENGINE STOPPED) and the other side gives the levels for when the engine is idling (ENGINE IDLING).

When measuring the oil level, measure with the engine stopped and use the side of the dipstick marked ENGINE STOPPED.



5. If the oil is above the H mark, drain the excess engine oil from drain plug Ⓟ, and check the oil level again.

6. If the oil level is correct, tighten the oil filler cap securely and close the inspection window.

REMARK

- When checking the oil level after the engine has been operated, for at least 15 minutes after stopping the engine before checking. Checking the oil level with the engine idling may be allowed, if the following precautions are thoroughly satisfied:
  - ○ Check that the engine water temperature gauge shows green range.
  - ○ Use the side of the dipstick marked ENGINE IDLING.
  - ○ Remove the oil filler cap.
- If the machine is at an angle, make it horizontal before checking.

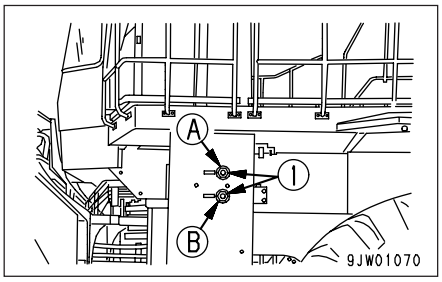
24.3.4 CHECK BRAKE OIL TANK LEVEL, ADD OIL

⚠WARNING

Always use engine oil to refill the brake oil tank.

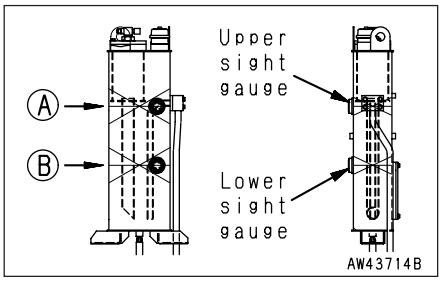
1. Check from the ground that the brake oil level in the brake oil tank on the left side of the machine is within sight gauge ① installed to the side of the brake tank.

   There are two sight gauges (top and bottom).



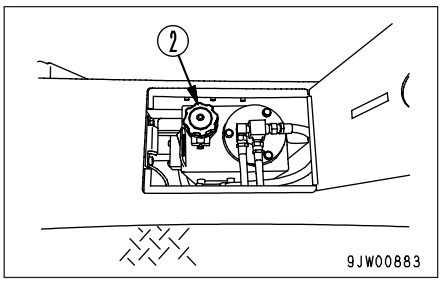
   Ⓐ: When checking 10 hours or more after the engine is stopped, use the upper level gauge in the figure at right.

   Ⓑ: When checking 5 minutes or more after the engine is started, use the lower level gauge in the figure at right.



2. If the oil level is low, open the cover at the top of the platform, then open cap ② and add engine oil.

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

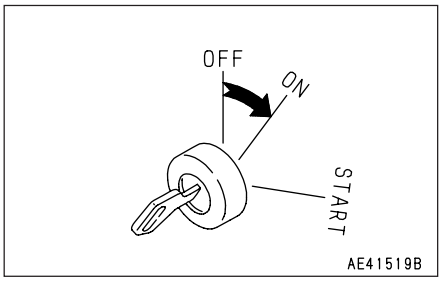


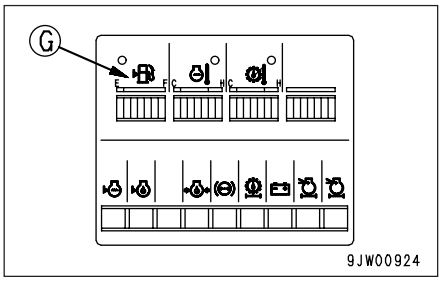
24.3.5 CHECK FUEL LEVEL, ADD FUEL

⚠WARNING

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

1. Turn the engine starting switch to the ON position, then check the fuel level with fuel gauge Ⓖ.
   After checking, return the starting switch to the OFF position.

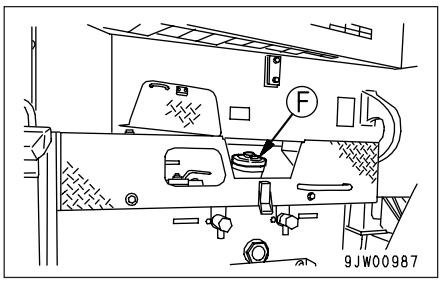




2. Upon completion of work, remove the mud guard cover and add fuel through filler Ⓕ until the fuel tank is full.

   For details of the method for opening and closing the cap, see "11.5 CAP WITH LOCK".

   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.

   Fuel capacity: 1100 ℓ (290.4 US gal, 242.0 UK gal)

24.3.6 CHECK ELECTRIC WIRING

⚠WARNING

- **If the fuse blows frequently, or there are traces of shortcircuiting in the electric wiring, always locate and repair the cause.**
- **Accumulation of flammable material (dead leaves, twigs, grass, etc.) around the battery may cause fire, so always check and remove such material.**
- **Keep the top surface of the battery clean and check the breather hole in the battery cap. If it is clogged with dirt or dust, wash the battery cap to clear the breather hole.**

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

Check the wiring of the “battery”, “starting motor” and “alternator” carefully in particular.

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

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

24.3.7 CHECK INFLATION PRESSURE OF TIRES

Measure the inflation pressure with a tire pressure gauge while the tires are cool before starting work.

Check for damage or wear to the tires and the rims.

Check for loose wheel hub nuts (bolts).

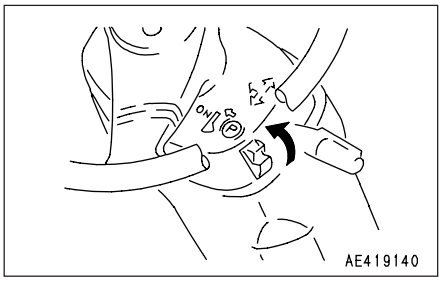
The proper inflation pressure is shown below.

Tire size	Inflation pressure
40/65-39-36PR (L5) (standard)	0.44 MPa (4.5 kgf/cm^2, 63.9 PSI)
41.25/70-39-34PR(L5)(if equipped)	0.44 MPa (4.5 kgf/cm^2, 63.9 PSI)

NOTICE

The appropriate tire inflation pressure differs according to the type of work, so see ”12.18 HANDLING THE TIRES”.

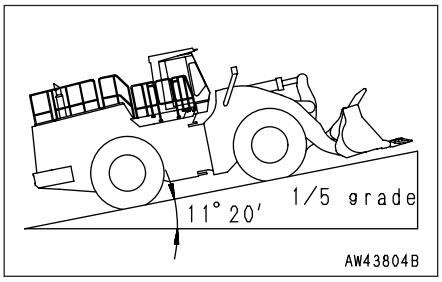
24.3.8 CHECK EFFECT OF PARKING BRAKE



⚠WARNING

Even if the parking brake switch is turned ON, there is danger until the parking brake pilot lamp lights up, so keep the brake pedal depressed.

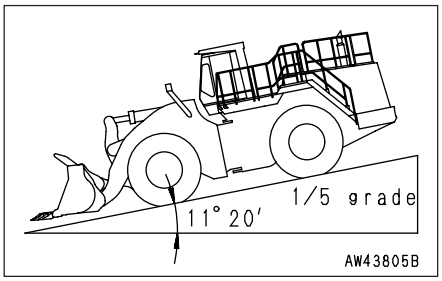
Measurement conditions
- Tire inflation pressure: Specified pressure
- Road surface: Dry paved surface with 1/5 (11°20′) grade
- Machine: Operating condition



Method of measurement
1. Turn the key in the starting switch to the ON position and start the engine, set the machine facing straight to the front, then drive the machine up a 1/5 grade with the bucket empty.

2. Depress the brake pedal, stop the machine, return the directional lever to the neutral position, then stop the engine.

3. Press the parking brake switch to the ON position, release the brake pedal slowly, and check that the machine is held in position.



24.3.9 CHECK EFFECT OF BRAKE

Drive the machine at a speed of 20 km/h (12.4 MPH) on a dry flat concrete road surface, and check that the stopping distance is less than 6.5 m (21 ft 4 in).

24.3.10 CHECK SOUND OF HORN AND BACKUP BUZZER

24.3.11 CHECK FLASHING OF LAMPS, CHECK FOR DIRT OR DAMAGE

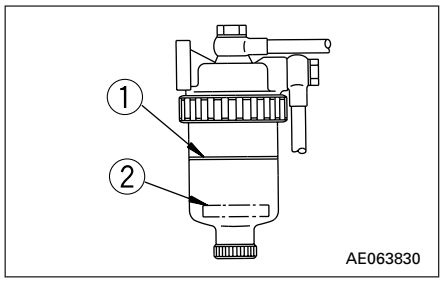
24.3.12 CHECK DIRECTION OF REAR VIEW MIRROR, CHECK FOR DIRT OR DAMAGE

24.3.13 CHECK ENGINE EXHAUST COLOR AND SOUND

24.3.14 CHECK OPERATION OF GAUGES

24.3.15 CHECK PLAY OF STEERING WHEEL, CHECK OPERATION OF STEERING

24.3.16 CHECK FOR WATER AND SEDIMENT IN WATER SEPARATOR, DRAIN WATER (IF EQUIPPED)

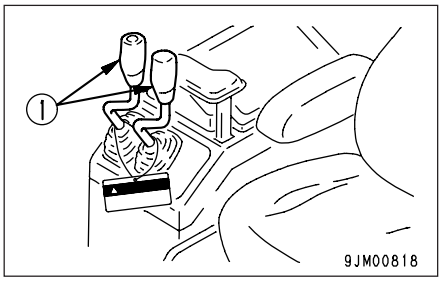


The water separator separates water mixed in the fuel. If float ② is at or above red line ①, drain the water.

For the draining procedure, see section "24.2 WHEN REQUIRED".

Even if a water separator is installed, be sure to check the fuel tank to remove water and sediment in the fuel.

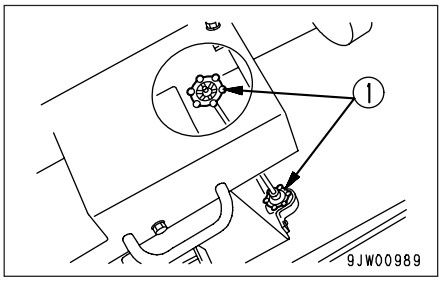
24.4 EVERY 50 HOURS SERVICE



⚠WARNING

Be sure to put a warning tag on work equipment control levers ①.

24.4.1 DRAIN WATER, SEDIMENT FROM FUEL TANK



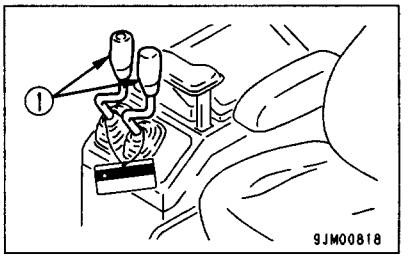
Loosen valve ① on the right side of the tank so that the sediment and water will be drained together with fuel.

24.5 EVERY 100 HOURS SERVICE

⚠WARNING

Be sure to put a warning tag on work equipment control levers ①.

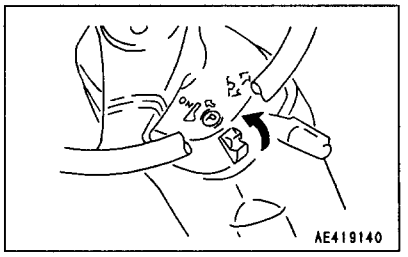
Maintenance for every 50 hours should be carried out at the same time.

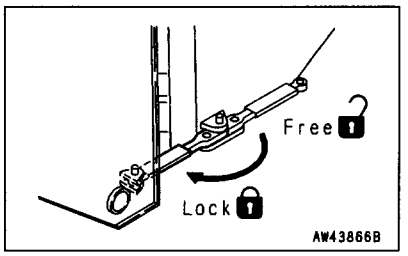


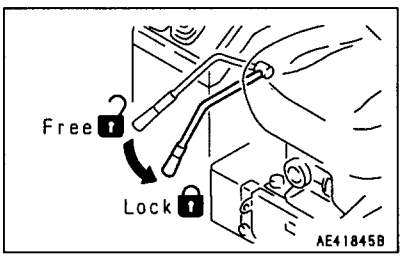
24.5.1 LUBRICATING

⚠WARNING

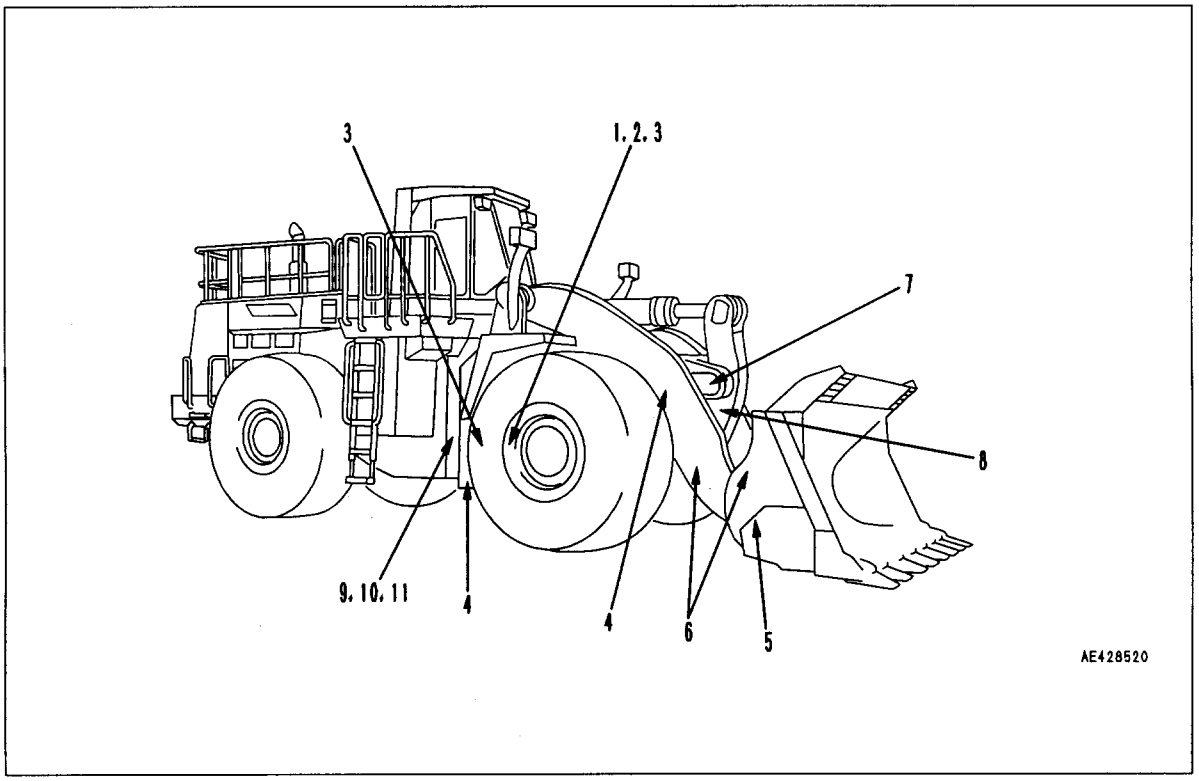
- **Apply the parking brake, and lock the front and rear frames with the safety bar and pin.**
- **Set the work equipment in a stable condition, then stop the engine and apply the locks securely to the work equipment control levers.**



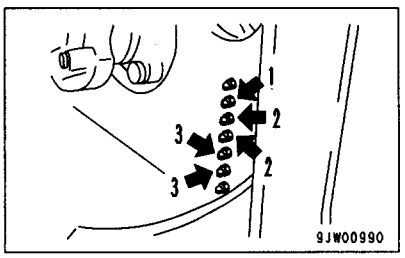




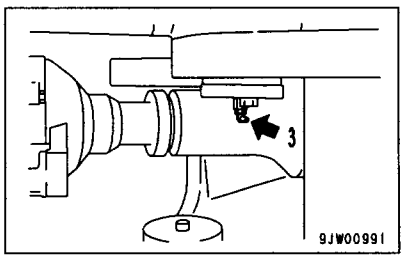
1. Using a grease pump, pump in grease through the grease fittings marked by the arrows.
2. After greasing, wipe off any old grease that is pushed out.



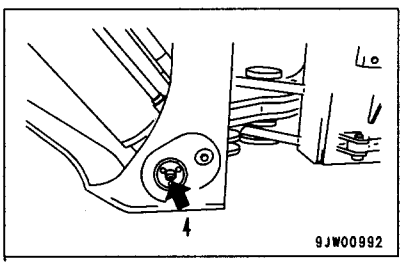
1. Bucket cylinder bottom pin (1 point)
2. Lift arm hinge pin (2 points)

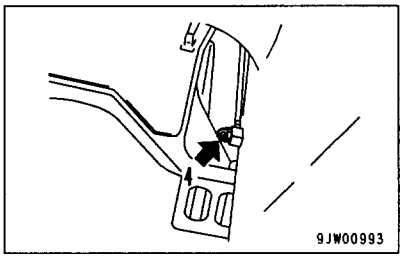


3. Steering cylinder pin (4 points)

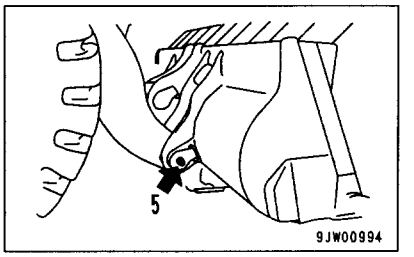


4. Lift cylinder pin (4 points)

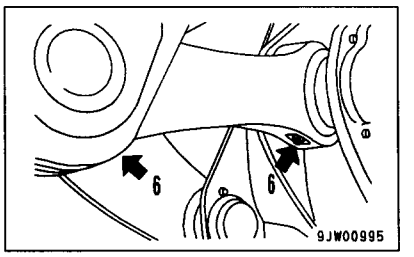




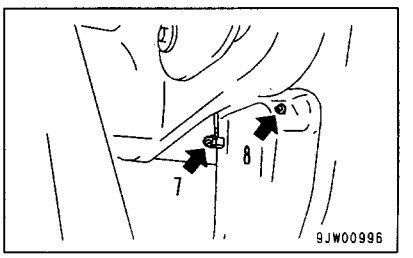
5. Bucket hinge pin (2 points)



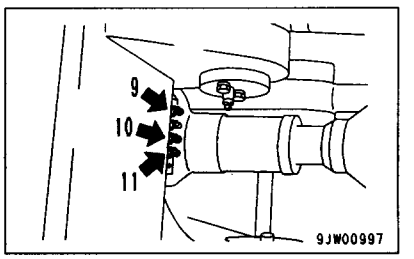
6. Bucket link pin (2 points)



7. Bucket cylinder rod end (1 point)
8. Tilt lever pin (1 point)



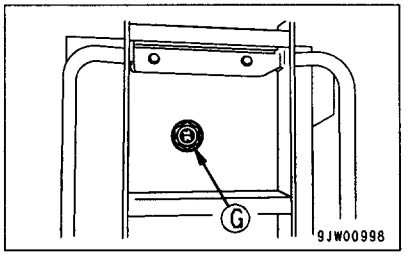
9. Front axle support pin (1 point)
10. Rear axle support pin (1 point)
11. Rear axle support pin cover (1 point)



24.5.2 CHECK OIL LEVEL IN HYDRAULIC TANK, ADD OIL

⚠WARNING

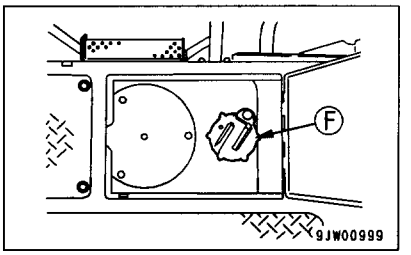
- **When the oil filler cap is removed, oil may spurt out, so stop the engine and wait for the oil temperature to go down, then turn the cap slowly to release the internal pressure before removing the cap.**
- **If oil has been added to above the H mark, stop the engine and wait for the hydraulic oil to cool down, then drain the excess oil from the drain plug.**



1. Lower the bucket horizontally to the ground and stop the engine. Wait for 5 minutes, then check sight gauge Ⓖ. The oil level should be between the H and L marks.

NOTICE

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



2. If the oil is below the L level, open the inspection cover above the step and add oil through oil filler port Ⓕ.

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

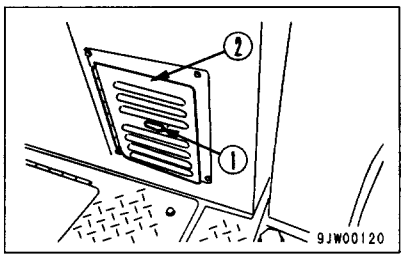
24.5.3 CLEAN ELEMENT IN AIR CONDITIONER FRESH AIR FILTER (IF EQUIPPED)

⚠WARNING

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

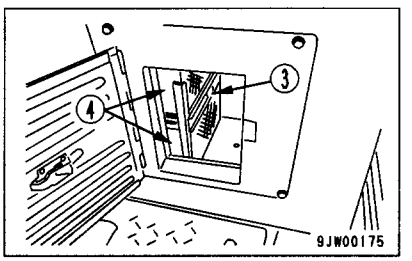
If the air conditioner has been used, the air filter should be cleaned.

Stop the air conditioner before cleaning the element.



1. Hold knob ① and open cover ②.

2. Loosen screw ③, then take out element ④ and clean it.

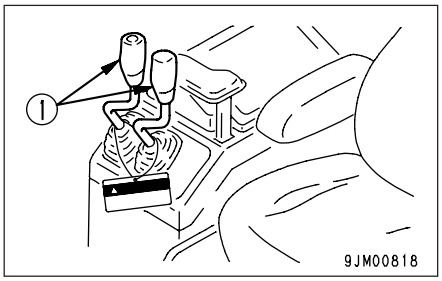


3. Blow dry compressed air (max. 0.69 MPa (7 kgf/cm², 99.4 PSI)) along the folds from the inside of the element. Next, blow air along the folds from the outside, then blow from the inside again.

REMARK

When assembling the element again, install so that the arrow on top of the element is facing the inside of the cab.

24.6 EVERY 250 HOURS SERVICE



⚠WARNING

Be sure to put a warning tag on work equipment control levers ①.

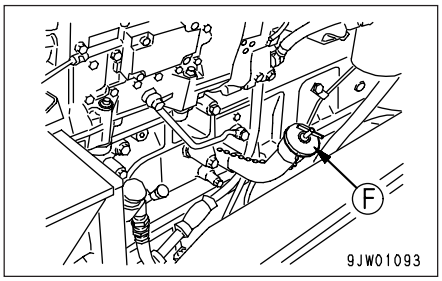
Maintenance for every 50 hours should be carried out at the same time.

24.6.1 CHANGE OIL IN ENGINE OIL PAN, REPLACE ENGINE OIL FILTER CARTRIDGE

⚠WARNING

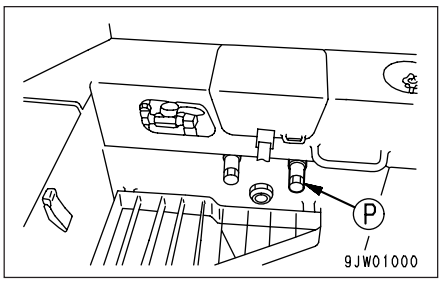
The oil is at high temperature after the engine has been operated, so never change the oil immediately after finishing operations. Wait for the oil to cool down before changing it.

Prepare the following
- Container to catch drained oil: Min 54 ℓ capacity
- Refill capacity: 54 ℓ (14.26 US gal, 11.88 UK gal)
- Filter wrench



1. Open the engine side cover located on the right of machine.

2. Open oil filler Ⓕ.

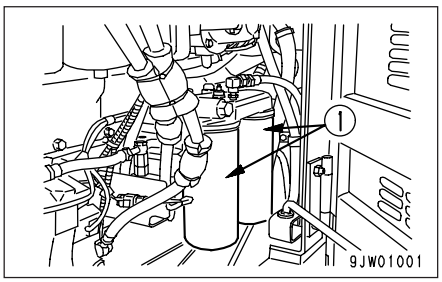


3. Place a container to catch the oil under drain valve Ⓟ.

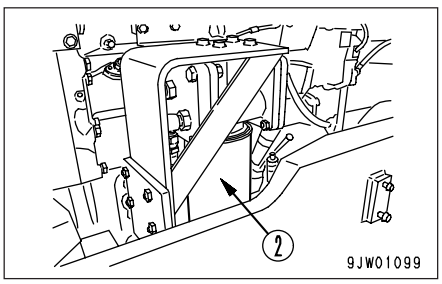
4. Loosen drain valve Ⓟ, and drain the oil.

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

6. Install drain valve Ⓟ.



7. Using the filter wrench, turn 2 filter cartridges ① and bypass filter cartridge ② to the counterclockwise to remove it.
   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.

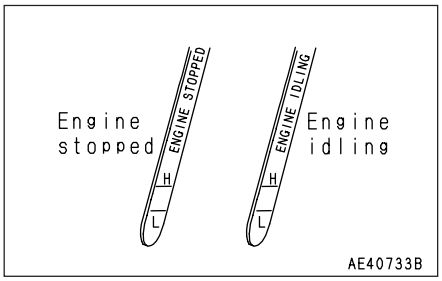


8. Clean the filter holder, fill the new filter cartridge with engine oil, then coat the seal and thread of the filter cartridge with engine oil (or coat thinly with grease) and install.

9. When installing, bring the seal surface into contact with the filter holder, then tighten a further 3/4 – 1 turns.

10. After replacing the filter cartridge, add engine oil through oil filler Ⓕ until the oil level is between the H and L marks on dipstick Ⓖ.

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



11. Run the engine at idling for a short time, then stop the engine, and check that the oil level is between the H and L marks on the dipstick. For details, see "24.3 CHECK BEFORE STARTING".

Even if the machine has not been operated for 250 hours, the oil and filter cartridge must be replaced when the machine has been operated for 6 months.

In the same way, even if the machine has not been operated for 6 months, the oil and filter cartridge must be replaced when the machine has been operated for 250 hours.

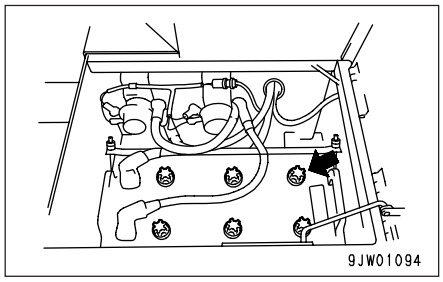
Use API category CD class oil. If CC class oil must be used, change the oil and replace the oil filter at half the usual interval (125 hours).

24.6.2 CHECK BATTERY ELECTROLYTE LEVEL

⚠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. Open the cover of the battery box.
   There are two battery boxes: One on each side at the rear of the machine.

2. Remove the cap and check the battery electrolyte is up to the UPPER LEVEL line. If the level is low, add distilled water.
   Do not add water above the UPPER LEVEL line. This may cause leakage of the electrolyte, which may cause fire.
   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.
   Wipe the top surface of the battery with a damp cloth to keep it clean.

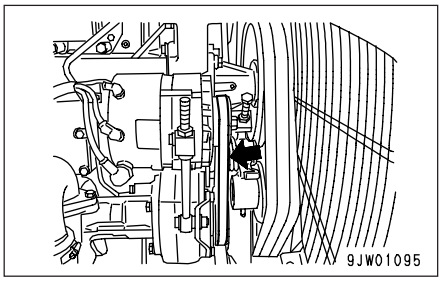
NOTICE

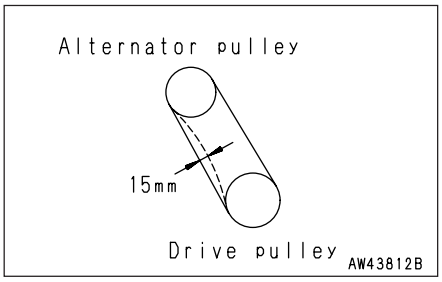
When adding distilled water in cold weather, add it before starting operations in the morning to prevent the electrolyte from freezing.

24.6.3 CHECK ALTERNATOR BELT TENSION, ADJUST

Checking

The standard deflection for the drive belt is about 15 mm (0.6 in) when pressed by thumb 58.8N (about 6 kgf) at a point midway between the drive pulley and alternator pulley.





Adjusting

1. Insert a lever between alternator ⑤ and the cylinder block to secure the former. When securing alternator ⑤, insert a wood plate between it and the lever so that it will not be damaged.

2. Loosen bolts and nuts ①, ② and ③.

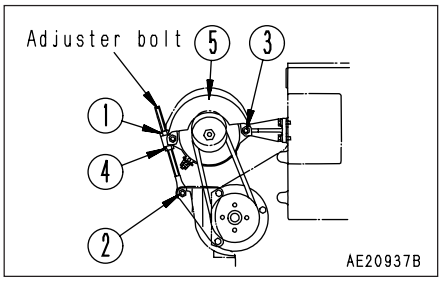
3. Turn nut ④ to the right to move alternator ⑤ until the belt is deflected by about 15 mm (0.6 in) (when pressed with 58.8 N (about 6 kgf)).
   If nut ④ is tightened, the bolt is tensed. If the former is loosened, the latter is loosened.

4. Tighten bolts and nuts ①, ② and ③ to secure alternator ⑤.

5. Check for damage to each pulley, wear of V-groove and wear of V-belt. Check in particular that the v-belt does not contact the bottom of the V-groove.

6. If the V-belt is elongated and there is no more allowance for adjustment, or if the belt is cracked or cut, replace the belt.

7. After replacing the V-belt, operate the machine for one hour, then check and adjust again.



24.6.4 CHECK AIR CONDITIONER COMPRESSOR BELT TENSION, ADJUST (if equipped)

Checking

The belt should normally deflect by about 10 mm (0.4 in) when pressed with the finger (with a force of approx. 58.8 N (6 kgf)) at a point midway between the drive pulley and compressor pulley.

When belt tension gauge is used, it is considered normal for tension to remain in the range of 353 – 530 N (36 – 54 kgf).

Adjusting

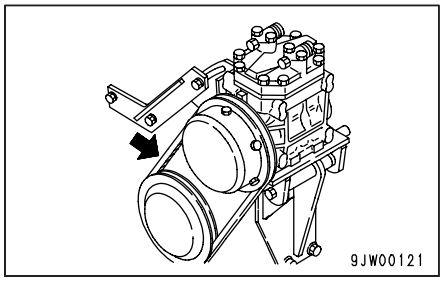
1. Loosen bolts ① and ②.

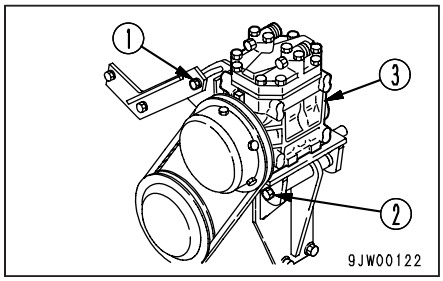
2. Move compressor ③ so that so that the deflection is approx. 10 mm (0.4 in) (at a force of approx. 58.8 N (6 kgf)).
   Do not push compressor ③ directly with a bar; insert a wooden block and push the block with the bar.

3. Tighten bolts ① and ② to fix compressor ③ in position.

4. 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.

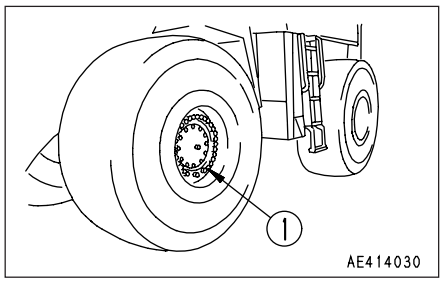
5. Replace the V-belt if it has stretched, leaving no allowance for adjustment, or if there is any cut or crack on belt.





After operating the machine for one hour with a newly exchanged V-belt, test and adjust the V-belt again.

24.6.5 CHECK FOR LOOSE WHEEL HUB NUTS, TIGHTEN



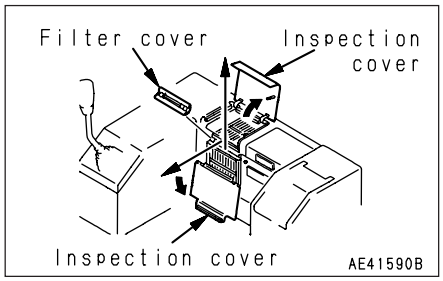
If wheel hub nuts ① are loose, tire wear will be increased and accidents may be caused.

1. Check for loose nuts, and tighten if necessary.
   When checking for loose nuts, always turn the nuts in the direction of tightening to check.

Tightening torque: 824 ± 88 N·m (84 ± 9 kgf·m, 607.6 ± 65.1 lbft)

2. If any wheel bolt is broken, replace all bolts for that wheel.

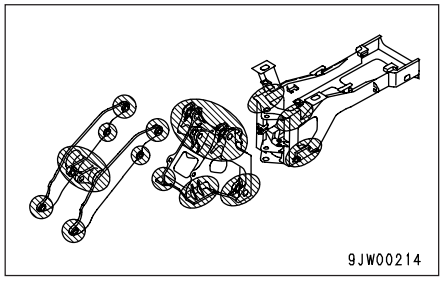
24.6.6 CLEAN ELEMENT IN AIR CONDITIONER RECIRCULATION FILTER (IF EQUIPPED)



1. Open the filter inspection cover, remove the filter cover, then remove the filter in the direction of the arrow.
   When removing the filter to the side, put your weight on the seat, and push down.

2. Clean with compressed air in the same way as for the fresh air filter.
   If the filter is extremely dirty, rinse it in water. After rinsing the filter, dry it completely before installing it again.

24.6.7 CHECK FRAME AND BOOM

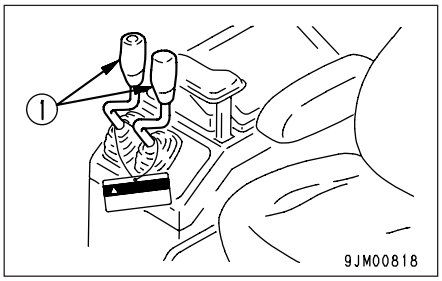


1. Wash the frame and boom so that the check can be carried out easily.

2. Check all parts of the frame and boom for damage.

In particular, check the colored part in the diagram, and repair if any cracks or other damage are found. For details of the method of repair, please contact your Komatsu distributor.

24.7 EVERY 500 HOURS SERVICE



⚠WARNING

Be sure to put a warning tag on work equipment control levers ①.

Maintenance for every 50, 100 and 250 hours should be carried out at the same time.

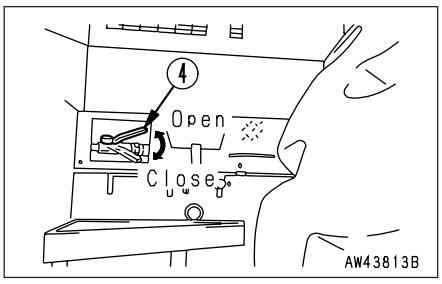
24.7.1 REPLACE FUEL FILTER CARTRIDGE

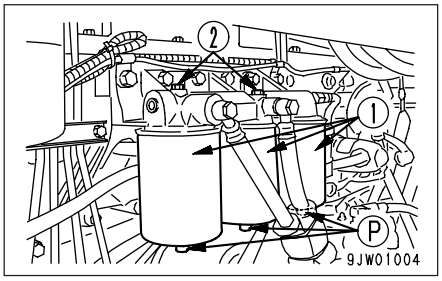
⚠WARNING

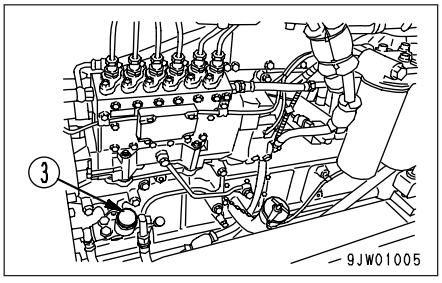
- **Engine is at high temperature immediately after the machine has been operated. Wait for engine to cool down before replacing the filter.**
- **Do not bring fire or sparks near the fuel.**

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

1. Open the side panel located on the right of the machine and lock the open lock.
2. Set the container to catch the fuel under the filter cartridge.
3. Turn fuel stop lever ④ toward you to prevent the fuel from dripping.
4. Remove drain plug Ⓟ on the bottom of the filter to drain oil.
5. Using a filter wrench, turn filter cartridge ① counterclockwise to remove it.
6. Clean the filter holder, fill a new filter cartridge with clean fuel, coat the packing surface with engine oil, then install it to the filter holder.
7. When installing, tighten until the packing surface contacts the seal surface of the filter holder, then tighten it 1/2 to 3/4 of a turn. If the filter cartridge is tightened too far, the packing will be damaged and this will lead to leakage of fuel. If the filter cartridge is too loose, fuel will also leak from the packing, so always tighten to the correct amount.
8. After replacing filter cartridge ①, fully open fuel stop lever ④, then loosen air bleed plug ②.
9. Loosen feed pump knob ③ and move the pump up and down to draw off fuel until air ceases to come out of air bleed plug ②.
10. After bleeding air, tighten air bleed plug ②, then push in the knob of feed pump ③ and tighten it.







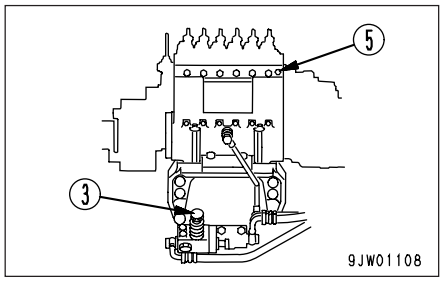
⚠WARNING

When cranking the engine, confirm the safety around the engine, as the engine may start.

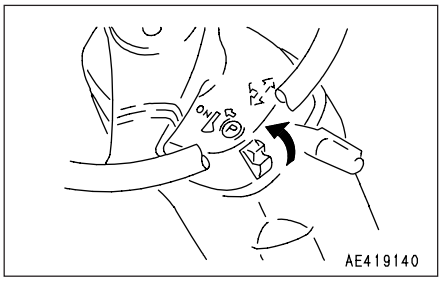
11. After replacing the filter cartridge, turn the key in the starting switch to the START position. When the engine starts, check for any leakage from the filter seal surface. If there is any leakage, check the tightening of the filter cartridge. If there is still any leakage, follow the procedure in Steps 2 and 5 to remove the filter cartridge, and check the packing surface. If there is any damage or any dirt or dust caught in the surface, replace the packing with a new part, then repeat Steps 6 to 10 to install again.

When the engine is started after it has run out of fuel, if the engine misfires or black smokes comes out, bleed the air from the fuel line as follows.

12. Loosen air bleed plug ⑤ of the injection pump, then repeat Steps 8 to 10 and operate the priming pump to bleed the air.



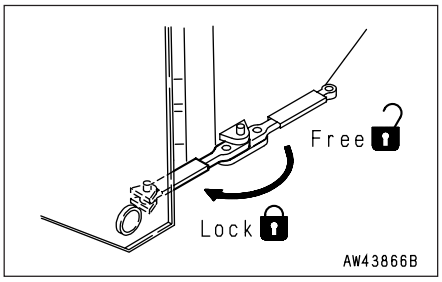
24.7.2 REPLACE TRANSMISSION OIL FILTER ELEMENT



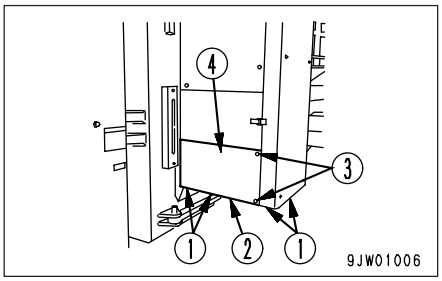
⚠WARNING

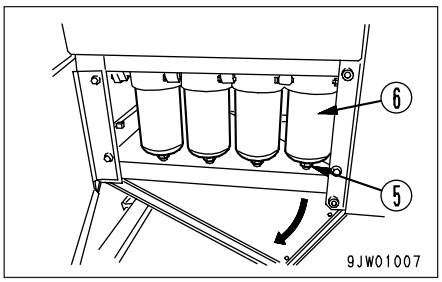
- **Apply the parking brake, and lock the front and rear frames with the safety bar and pin.**
- **The oil is at high temperature immediately after the machine has been operated. Wait for the oil to cool down before carrying out maintenance.**

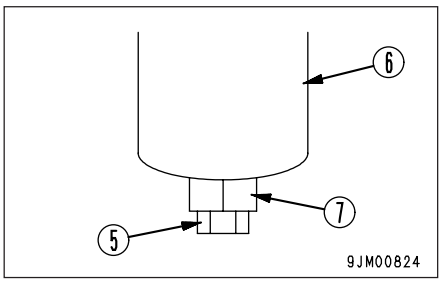
- Prepare a container to catch the drained oil



1. Remove bolts ① and open under cover ②. Remove bolts ③, then open cover ④.
2. Set the container to catch the oil under the filter case.
3. Remove drain plug ⑤ at the bottom of the filter case, and drain the oil. After draining the oil, tighten the plug.
4. Loosen hexagon part ⑦ of case ⑥, then remove case ⑥.
5. Remove the element, and clean the inside of the case.
6. Replace the filter gasket and O-rings with new parts. Coat the gasket and O-rings with clean engine oil before installing.
7. Fit a new element and tighten hexagon part ⑦, then install case ⑥.
   Tightening torque for drain plug: 49 – 58.8 N·m
   (5 – 6 kgf·m, 36.2 – 43.4 lbft)
   Tightening torque for case: 58.8 – 78.5 N·m
   (6 – 8 kgf·m, 43.4 – 57.3 lbft)
8. Run the engine at idling for a short time, then check that the oil is at the correct level. For details, see “24.2.3 CHECK TRANSMISSION OIL LEVEL, ADD OIL”.



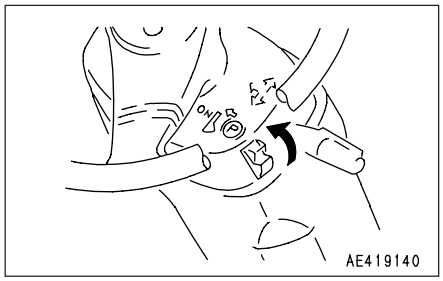


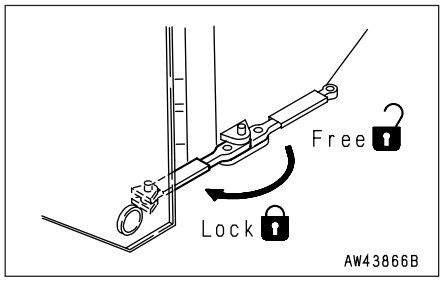


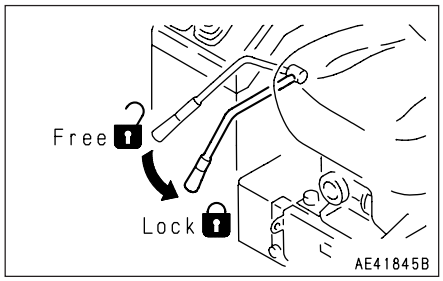
24.7.3 LUBRICATE CENTER DRIVE SHAFT (3 points)

⚠ WARNING

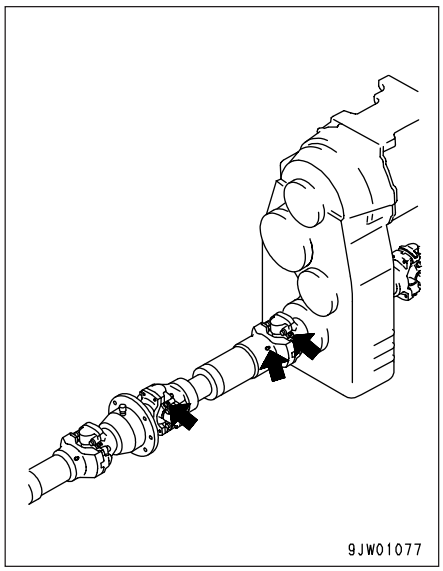
- **Apply the parking brake, and lock the front and rear frames with the safety bar and pin.**
- **Set the work equipment in a stable condition, then stop the engine and apply the locks securely to the work equipment control levers.**







1. Using a grease pump, pump in grease through the grease fittings marked by the arrows.
2. After greasing, wipe off any old grease that is pushed out.



24.7.4 CHECK FAN BELT FOR WEAR

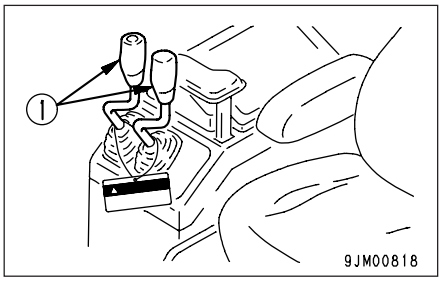
Check the V-belt and when the following conditions exist, replace or adjust the V-belt.

- When there is a gap between the tension pulley lever and tip of the adjustment screw.
- When the V-belt makes contact with the bottom of the groove in each pulley.
- When the V-belt is worn, and its surface is lower than the outer diameter of the pulley.
- When the V-belt is cracked or flaked.
- When the V-belt makes an abnormal noise.

Since an auto-tensioner is installed, the V-belt does not need to be replaced until it is replaced.

For details of the replacement procedure, refer to “24.2 WHEN REQUIRED”.

24.8 EVERY 1000 HOURS SERVICE

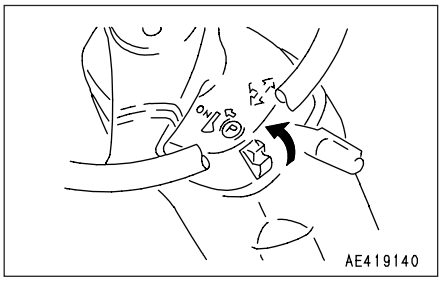


⚠WARNING

Be sure to put a warning tag on work equipment control levers ①.

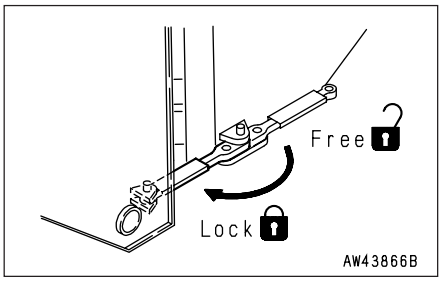
Maintenance for every 50, 100, 250 and 500 hours should be carried out at the same time.

24.8.1 CHANGE OIL IN TRANSMISSION CASE, CLEAN STRAINER

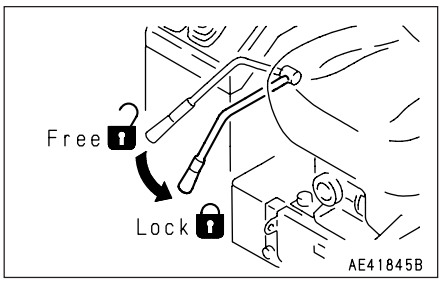


⚠WARNING

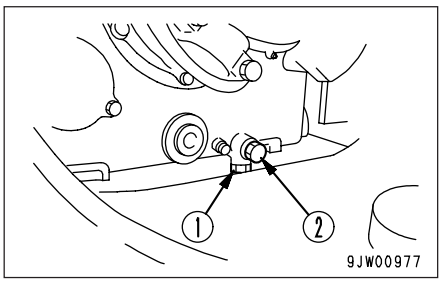
- **Apply the parking brake, and lock the front and rear frames with the safety bar and pin.**
- **Set the work equipment in a stable condition, then stop the engine and apply the locks securely to the work equipment control levers.**
- **The oil is at high temperature immediately after the machine has been operated. Wait for the oil to cool down before carrying out maintenance.**



- Container to catch drained oil: Min. 105 ℓ capacity
- Refill capacity: 105 ℓ (27.7 US gal, 23.1 UK gal)

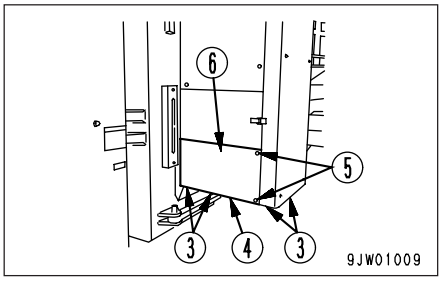


1. Set a container to catch the oil under drain plugs ① and ②, then remove drain plug ① and loosen plug ② to drain the oil.
   To prevent the oil from pouring out suddenly, loosen drain plug ② and remove it gradually.



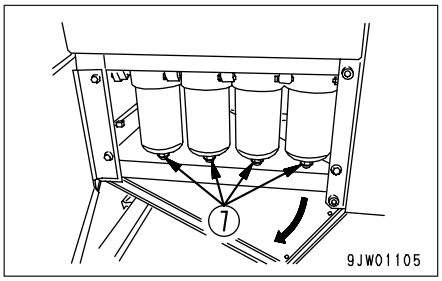
2. After draining the oil, install drain plugs ① and ②.

3. Remove bolts ③ and open under cover ②.
   Remove bolts ⑤, then open cover ⑥.



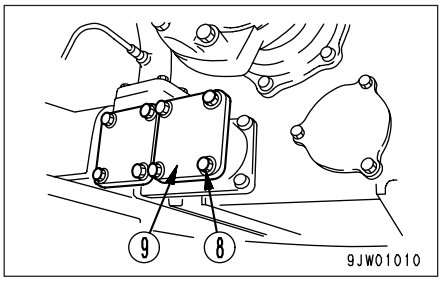
4. Set a container to catch the oil under the transmission filter case.

5. Remove drain plug ⑦ (4 pieces) at the bottom of the filter case, and drain the oil. After draining the oil, tighten the plug.

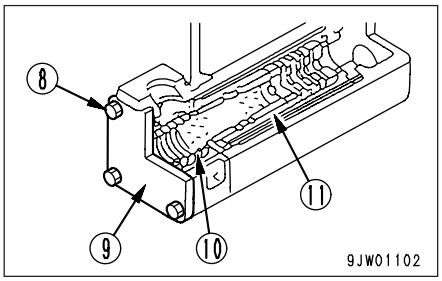


6. Remove bolt ⑧, then remove cover ⑨ and take out strainer ⑪ together with spring ⑩.

7. Remove any dirt stuck to strainer ⑪, then wash it in clean diesel oil or flushing oil. If strainer ⑪ is damaged, replace it with a new part.

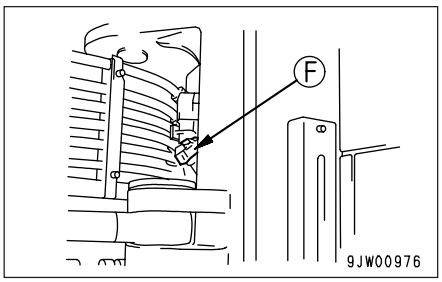


8. Install spring ⑩ and strainer ⑪ to cover ⑨.
Replace the O-ring on the cover with a new part, then install the cover.



9. Pour in the specified amount of engine oil from oil filler Ⓕ.
The safety bar may be used as a step to pour oil.

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



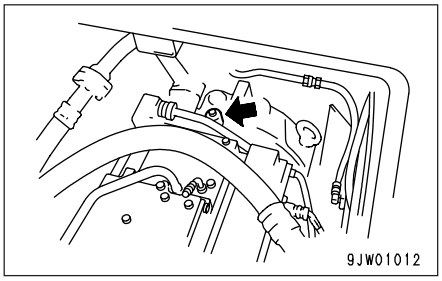
10. After filling with oil, check that the oil is at the specified level. For details, see "24.2 WHEN REQUIRED".

11. Check for oil leakage from the transmission case and filter.

Make an oil level check before starting engine or 60 minutes or more after the engine is stopped.
If oil remains at various portions, the correct oil level cannot be measured.

24.8.2 CLEAN TRANSMISSION CASE BREATHER

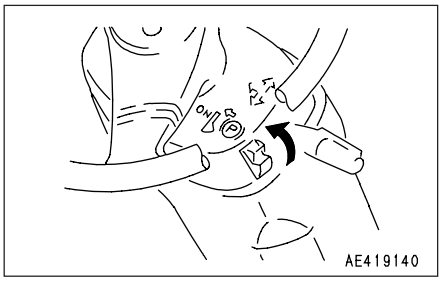
Remove all mud and dirt from around the breather, then remove the breather. Put in cleaning fluid and clean the breather.
Take care not to allow dust and dirt to enter the transmission case through the port while the breather is removed.



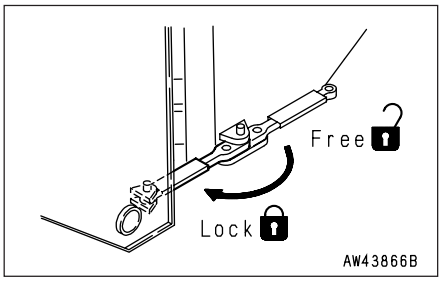
24.8.3 LUBRICATING

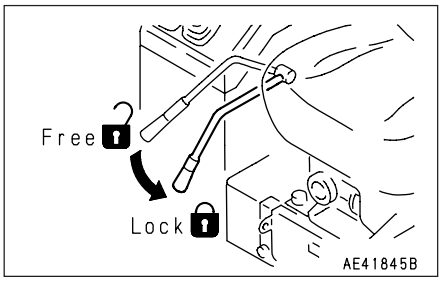
⚠WARNING

- **Apply the parking brake, and lock the front and rear frames with the safety bar and pin.**
- **Set the work equipment in a stable condition, then stop the engine and apply the locks securely to the work equipment control levers.**

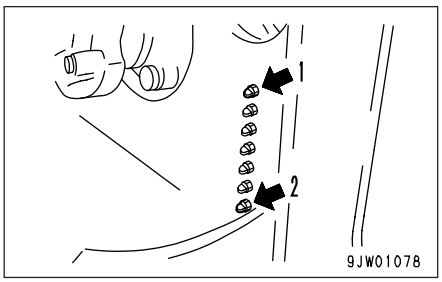


1. Using a grease pump, pump in grease through the grease fittings marked by the arrows.
2. After greasing, wipe off any old grease that is pushed out.

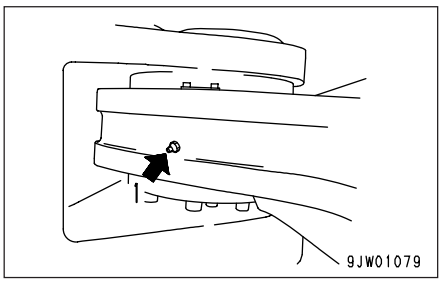




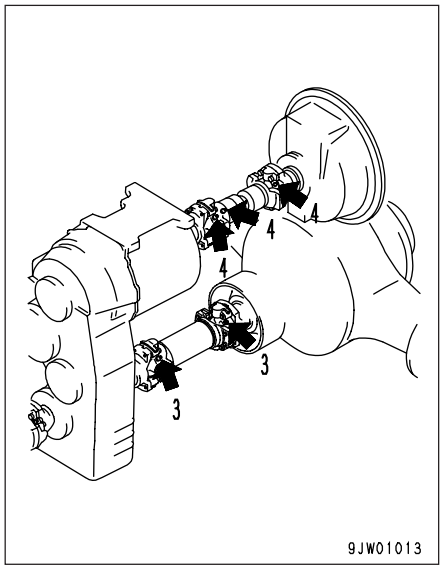
1. Center hinge pin (2 points)



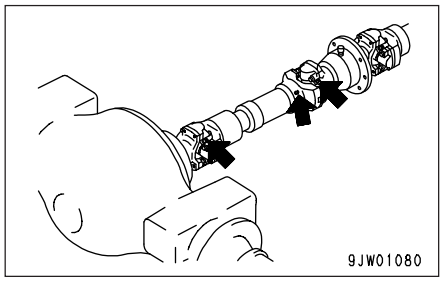
2. Drive shaft center support (1 point)



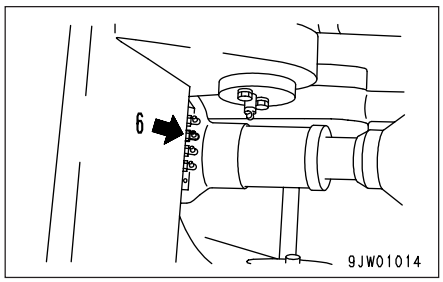
3. Rear drive shaft (2 points)
4. Upper drive shaft (3 points)



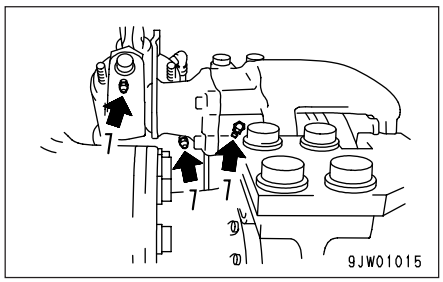
5. Front drive shaft (3 points)



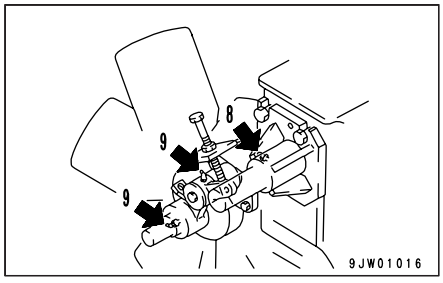
6. Transmission mount trunnion (1 point)



7. Parking brake linkage (6 points)



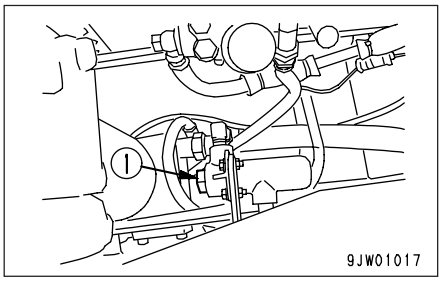
8. Fan pulley (1 point)
9. Tension pulley (2 points)



24.8.4 CHECK TIGHTENING PARTS OF TURBOCHARGER

Contact your Komatsu distributor to have the tightening portions checked.

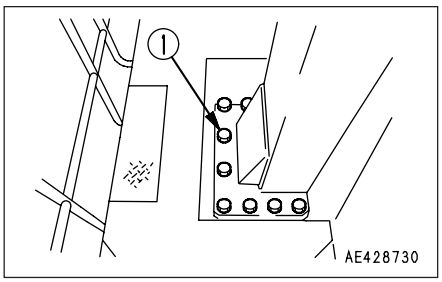
24.8.5 CLEAN FUEL STRAINER



1. Remove plug ①, then remove spring together with strainer.
2. Remove all dirt from the surface of the strainer, then wash in clean light oil. If strainer is damaged, replace with a new part.
3. Install strainer and spring, then install plug ①.

   If O-ring of the plug is damaged, replace with a new part.

24.8.6 TIGHTEN ROPS CANOPY



1. Loosen the bolt, then remove the cover.
2. Check that there is no looseness in mounting bolts ① of the ROPS canopy. If any bolt is loose, tighten it.

Tightening torque: 1715 ± 195 N·m
(175 ± 20 kgf·m, 1266 ± 145 lbft)

3. Install the cover.

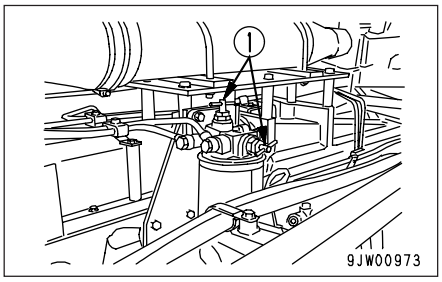
The tightening torque is large, so a power wrench is needed when tightening. Please request your Komatsu distributor to carry out this work.

24.8.7 REPLACE CORROSION RESISTOR CARTRIDGE

⚠WARNING

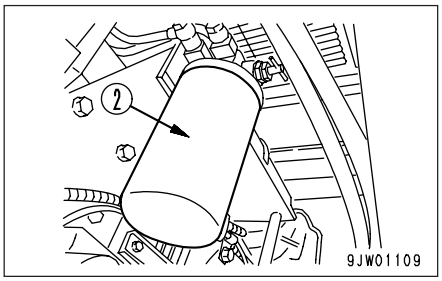
If the engine has been operated, all parts will be at a high temperature, so never try to replace the cartridge immediately after stopping the engine.
Always wait for the engine and other parts to cool down.

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



1. Close valve ① (2 places).

2. Set a container to catch the coolant under the cartridges.



3. Using a filter wrench, remove cartridge ②.

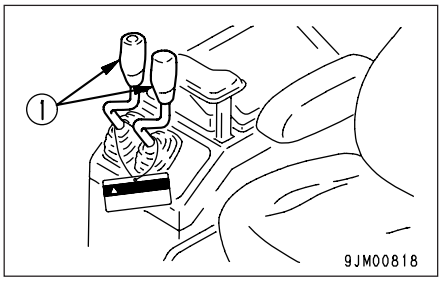
4. Clean the filter holder, coat the packing surface and thread of the new cartridge with engine oil, then install it to the filter holder.

5. When installing, tighten until the packing surface contacts the seal surface of the filter holder, then tighten it up 2/3 of a turn. If the filter cartridge is tightened too far, the packing will be damaged and this will lead to leakage of coolant. If the filter cartridge is too loose, coolant will also leak from the packing, so always tighten to the correct amount.

6. Open valves ① (2 places)

7. After replacing the cartridge, start the engine and check for any leakage of water from the filter seal surface. If there is any water leakage, check if the cartridge is tightened properly.

24.9 EVERY 2000 HOURS SERVICE



⚠WARNING

Be sure to put a warning tag on work equipment control levers ①.

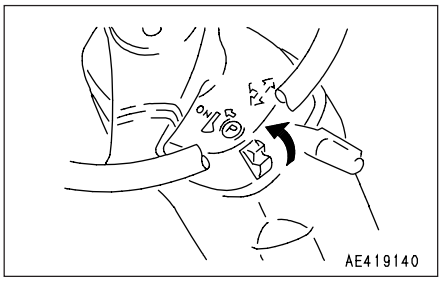
Maintenance for every 50, 100, 250, 500 and 1000 hours should be carried out at the same time.

24.9.1 CHANGE OIL IN HYDRAULIC TANK, REPLACE HYDRAULIC FILTER ELEMENT

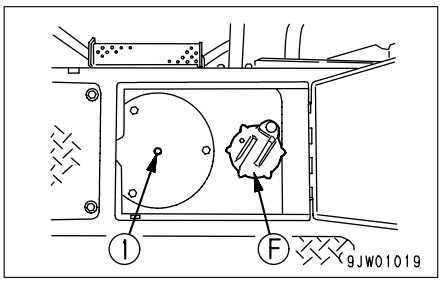
⚠WARNING

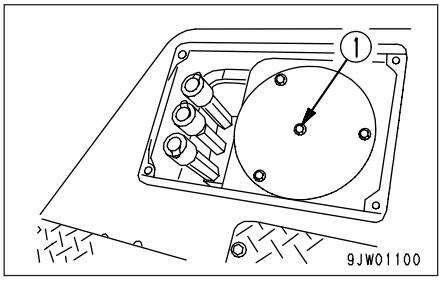
The oil is at high temperature immediately after the machine has been operated. Wait for the oil to cool down before changing the oil. When removing the oil filler cap, turn it slowly to release the internal pressure, then remove it carefully.

Prepare the following.
- Container to catch drained oil: min. 490 ℓ capacity
- Refill capacity: 490 ℓ (129 US gal, 108 UK gal)

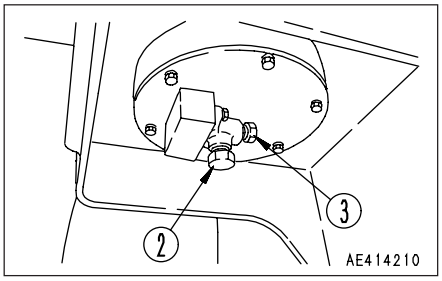


1. Lower the bucket horizontally to the ground and apply the parking brake, then stop the engine.
2. Remove the bolt, then remove the cover.
3. Remove the cap of oil filler Ⓕ and air bleed plug ① on filter case.

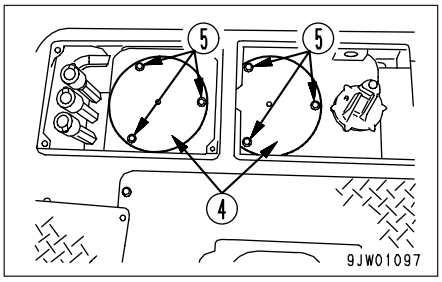




4. Set a container to catch the oil under drain plug ②.
5. Remove drain plug ②.
6. Loosen drain valve ③, then gradually pull it out to drain the oil.
7. After draining the oil, close drain valve ③, then tighten drain plug ②.



8. Remove mounting bolts ⑤ of the 2 filter covers ④ at the top of the tank, then remove the covers.
   When doing this, the cover may fly off because of the force of spring ⑥, so keep the cover pushed down while removing the bolts.

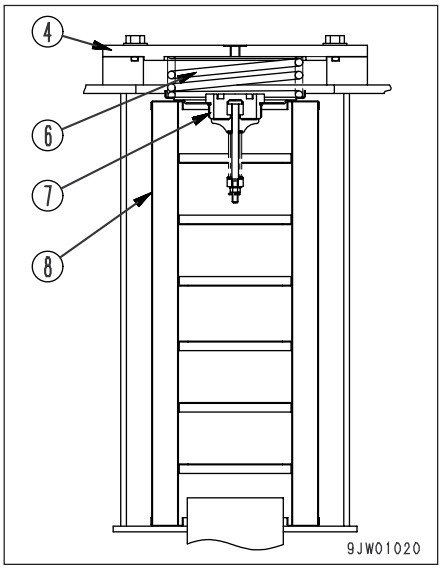


9. Remove spring ⑥ and bypass valve ⑦, then remove element ⑧.

10. Check that there is no foreign matter inside the tank before cleaning it.

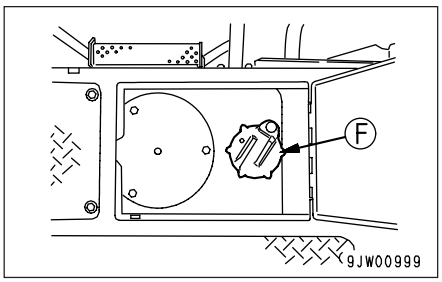
11. Install a new element, then install bypass valve ⑦, spring ⑥, and cover ④.
    If the O-ring of the cover is damaged or deteriorated, replace it with a new part.

12. When installing the cover bolts, push down the cover and tighten the bolts evenly.



13. Add engine oil through oil filler port Ⓕ to the specified level, then install cap Ⓕ and air bleed plug ① on filter case.

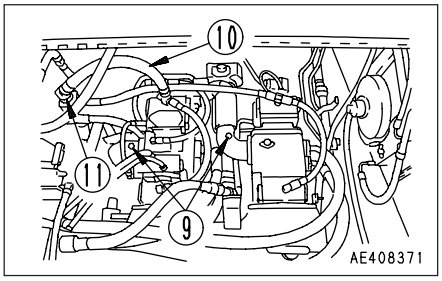
    For details of the oil to use, see "20. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".



14. Check that the hydraulic oil is at the standard level. For details, see "24.5 EVERY 100 HOUR SERVICE".

15. Loosen plug ⑨ on top of the tube at the suction side of the piston pump. There is one plug for each pump, so loosen all plugs (2 places).

16. Loosen the connector at block ⑪ side of case drain hose ⑩ of the piston pump.
    The case drain hoses (x 3) for each pump are connected to block ⑪, but loosen only the connector of case drain hose ⑩ connected to the top of the block. There is no need to loosen the connectors of the other two case drain hoses.



17. Continue until oil flows out from plug ⑨ (2 places) and the connector of hose ⑩. After the air has been completely bled, tighten plug ⑨ (3 places) and the connector of the hose.

NOTICE

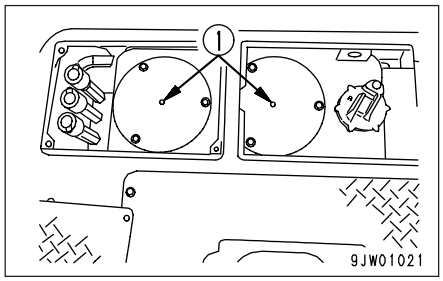
Never start the engine before the air has been completely bled from the piston pump. If the engine is started without the air being bled from the piston pump, the piston pump may be broken.

18. Check the oil level and add oil through oil filler port Ⓕ if necessary.

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

19. Check that the hydraulic oil is at the standard level. For details, see "24.5 EVERY 100 HOUR SERVICE".

20. Run the engine at low idling, and extend and retract the steering, bucket, and lift arm cylinders 4 – 5 times. Be careful not to operate the cylinder to the end of its stroke (stop approx. 100 mm (3.94 in) before the end of stroke).



NOTICE

If the engine is run immediately at high speed or the cylinder is operated to the end of its stroke, the air inside the cylinder will cause damage to the piston packing.

21. Next, operate the steering, bucket, and lift arm cylinders to the end of their stroke 3 – 4 times, then stop the engine and loosen air bleed plug ① to bleed the air from the hydraulic tank. After bleeding the air, tighten plug ① again.

22. Check the hydraulic oil level and add oil to the specified level. For details, see "24.5 EVERY 100 HOURS SERVICE".

23. Next, increase the engine speed and repeat the procedure in Step 21 to bleed the air. Continue this operation until no more air comes out from plug ①.

24. After completing the air bleed operation, tighten plug ①.

Tightening torque: 11.3 ± 1.47 N·m (1.15 ± 0.15 kgf·m, 8.3 ± 1.1 lbft)

25. After completing air bleeding, lower the bucket horizontally to the ground and stop the engine.

26. Check that the hydraulic oil is at the standard level. For details, see "24.5 EVERY 100 HOUR SERVICE".

27. Check that there is no leakage of oil from the filter cover mount.

24.9.2 CLEAN HYDRAULIC TANK STRAINER

When changing the oil in the hydraulic tank, drain the oil from the tank and clean the strainer.

1. Loosen bolts ① and ③, then remove covers ② and ④.

2. Loosen bolt ⑤, remove strainer cover ⑥, then remove strainer ⑧ together with spring ⑦.

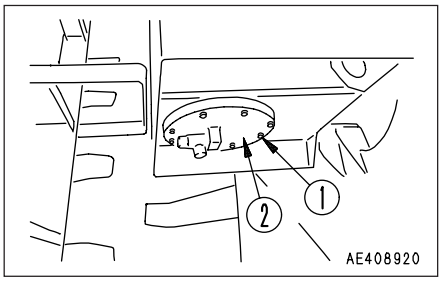
3. Remove any dirt from strainer ⑧, then wash in clean light oil or flushing oil.

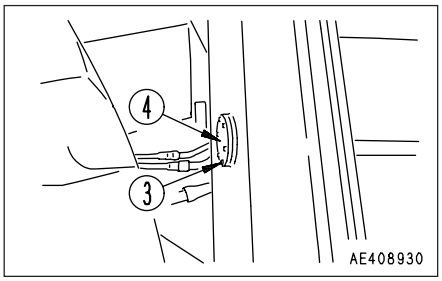
If strainer ⑧ is broken, replace it with a new part.

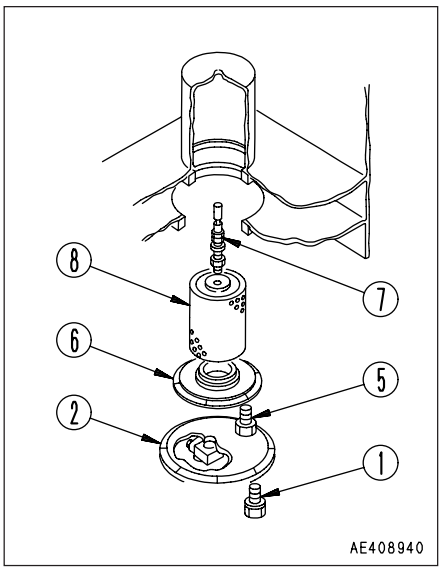
4. Install spring ⑦, strainer ⑧, and cover ⑥. When doing this, look through the mounting hole of cover ④ to check that the strainer guide pin is fitted in the guide hole.

When installing cover ⑥, coat the thread of bolt ⑤ with thread tightener (LT-2) to prevent it from coming loose. If bolt ⑤ becomes loose and drops out, it will be sucked into the piston pump and will damage the pump.
Tightening torque of bolt ⑤:
88 ± 34.3 N·m (9 ± 3.5 kgf·m, 65 ± 25.3 lbft)

5. Install covers ② and ④.
Replace the O-rings of the covers with new parts.





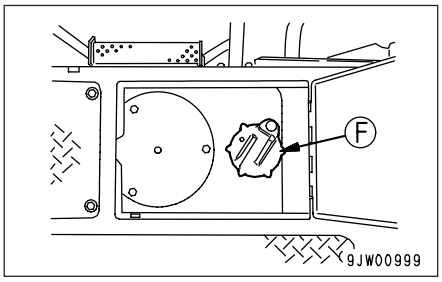


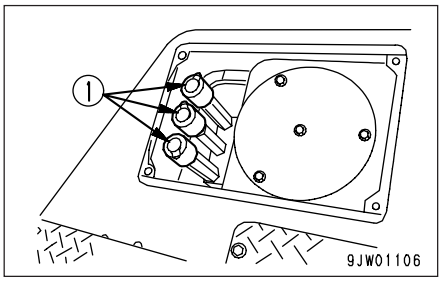
24.9.3 REPLACE HYDRAULIC TANK BREATHER ELEMENT

⚠WARNING

The oil is at high temperature immediately after the machine has been operated. Wait for the oil to cool down before changing the oil. When removing the oil filler cap, turn it slowly to release the internal pressure, then remove it carefully.

1. Remove the cap of oil filler Ⓕ.
2. Remove the snap ring on breather ①, then remove the breather cap.
3. Replace the filter element with a new part, then install the cap and snap ring.
4. Tighten the cap of oil filler Ⓕ.





REMARK

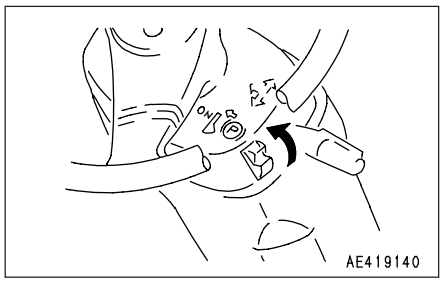
It is possible to replace the element with the breather installed in the tank. However, if the breather is removed, do not wrap the taper thread of the breather with seal tape when assembling again, and be careful not to tighten too much.

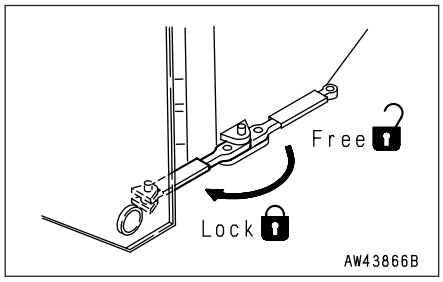
24.9.4 CHANGE AXLE OIL

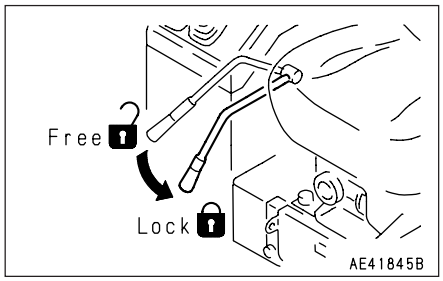
⚠WARNING

- **Apply the parking brake, and lock the front and rear frames with the safety bar and pin.**
- **Set the work equipment in a stable condition, then stop the engine and apply the locks securely to the work equipment control levers.**
- **The oil is at high temperature after the machine has been operated. Always wait for the temperature to go down before starting this operation.**

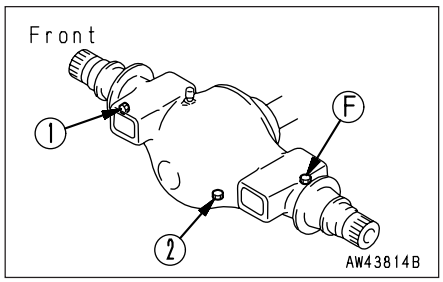
Prepare the following.
- Container to catch drained oil: min. 490 ℓ capacity
- Refill, capacity (front and rear, each):
  245 ℓ (65 US gal, 54 UK gal)

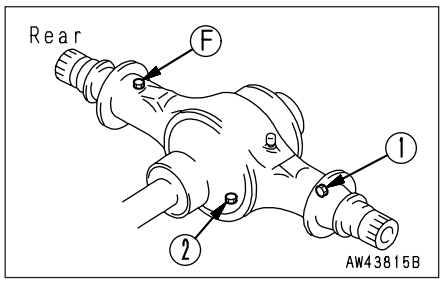




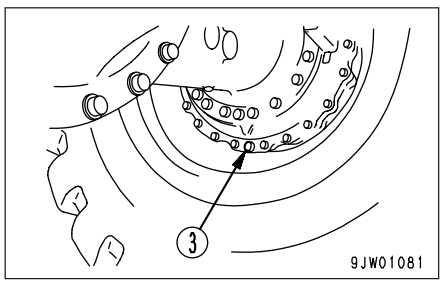


1. Remove front and rear oil filler plugs Ⓕ, then remove level plugs ① and drain plugs ② to drain the oil.

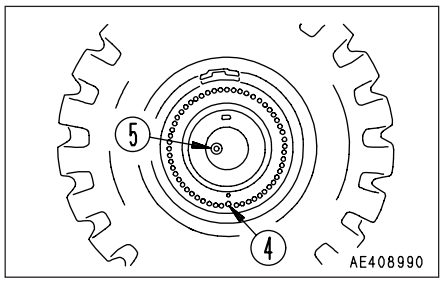




2. Remove drain plug ③ to drain the oil.



3. Stop the machine so that drain plug ④ of the final drive is at the bottom. Remove oil filler plug ⑤ and drain plug ④, and fit the tube of attached tool in hole of plug ④ and drain the oil.



4. After draining the oil, clean drain plugs ②, ③ and ④, then install them.

5. Add oil to the specified level through the oil filler ports ① and ⑤ of the axle housing and left and right final drives.

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

6. After adding oil, check that the oil is at the specified level. For details, see “24.2 WHEN REQUIRED”.

REMARK

For operations where the brake is used frequently, change the axle oil at shorter intervals.

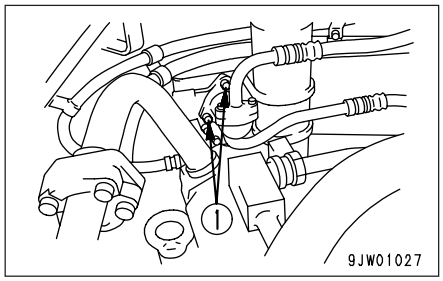
24.9.5 REPLACE AIR CONDITIONER FILTER (IF EQUIPPED)

Remove both the recirculation air filter and fresh air filter in the same way as when cleaning, and replace them with new parts.

For details of cleaning the recirculation air filter, see “24.6.6 CLEAN ELEMENT IN AIR CONDITIONER RECIRCULATION FILTER”.

For details of cleaning the fresh air filter, see “24.5.3 CLEAN ELEMENT IN AIR CONDITIONER FRESH AIR FILTER”.

24.9.6 CLEAN PPC CIRCUIT STRAINER



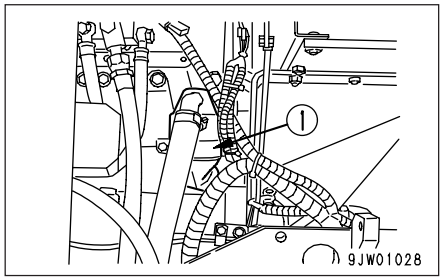
1. Remove 3 bolts ① of the PPC circuit strainer.
2. Remove the strainer case and pull out the strainer, then wash the strainer with clean diesel fuel.
3. Install the strainer in the strainer case, and install it with bolts ①.
4. Operate the bucket control lever to the TILT position and the lift arm control lever to the FLOAT position, and when the cylinder reaches the end of its stroke, hold it there for one minute.
5. Operate the bucket control lever to the DUMP position and the lift arm control lever to the RAISE position, and when the cylinder reaches the end of its stroke, hold it there for one minute.
6. Bleed the air from the hydraulic circuit. For details, see “24.2.15 BLEEDING AIR FROM PPC CIRCUIT”.

For details of the procedure for bleeding air from the hydraulic circuit, please contact your Komatsu distributor.

24.9.7 CLEAN ENGINE BREATHER ELEMENT

⚠WARNING

Always wear safety glasses when using compressed air.



1. Remove the bolt, take breather ① out of place.
   Wash element in clean light oil to remove dust from it.
2. After cleaning, dry fuel with air.
3. Install breather ①.

Before removing the breather, clean around the breather to remove the dirt.

Replace the O-rings with new parts. Coat the O-rings with clean engine oil before installing.

24.9.8 CHECK ALTERNATOR, STARTING MOTOR

The brush may be worn, or the bearing may have run out of grease, so contact your Komatsu distributor for inspection or repair. If the engine is started frequently, carry out inspection every 1000 hours.

24.9.9 CHECK ENGINE VALVE CLEARANCE, ADJUST

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

24.9.10 CHECK BRAKE DISC WEAR

Ask Komatsu distributor to check and repair brake disc.

24.9.11 CLEAN AND CHECK TURBOCHARGER

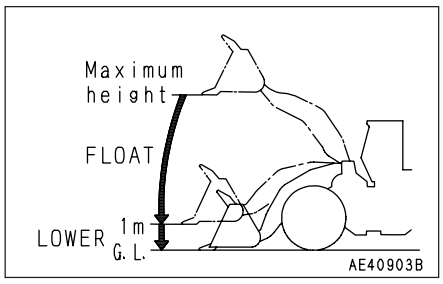
If there is carbon or oil sludge stuck to the blower impeller, it will lower the performance of the turbocharger or cause it to break, so ask your Komatsu distributor to carry out the cleaning.

24.9.12 CHECK PLAY OF TURBOCHARGER ROTOR

Ask your Komatsu distributor to check the play of theturbocharger rotor.

24.9.13 CHECK ACCUMULATOR

Check the gas pressure of the accumulator as follows.



Checking

1. Stop the machine on level ground and apply the parking brake.
2. Raise the work equipment to the maximum height, then place the lift arm control lever at HOLD.
3. Leave the work equipment in this position, and stop the engine.
4. Confirm that it is safe around the machine, then set the lift arm at FLOAT and lower the work equipment to a position 1 m (3.28 ft) from the ground.
5. When the work equipment reaches a position 1 m (3.28 ft) from the ground, move the lift arm control lever to LOWER, and lower the work equipment slowly to the ground.

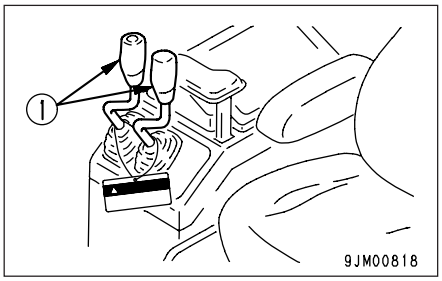
If the work equipment stops moving during checking, the gas pressure may be below the service limit (0.69 MPa (7 kgf/cm^2, 99.4 PSI)), so contact your Komatsu distributor to have the gas pressure measured or gas charged.

Carry out the checks within five minutes of stopping the engine. If the machine is left with the engine stopped, the accumulator pressure will drop and it will be impossible to carry out the check.

24.9.14 CHECK ACCUMULATOR GAS PRESSURE

When carrying out the EVERY 2000 HOURS SERVICE or EVERY YEAR SERVICE or when making periodic replacement of the critical safety parts, please ask your Komatsu distributor to check the accumulator gas pressure.

24.10 EVERY 4000 HOURS SERVICE



⚠WARNING

Be sure to put a warning tag on work equipment control levers ①.

Maintenance for every 50, 100, 250, 500, 1000 and 2000 hours should be carried out at the same time.

24.10.1 CHECK WATER PUMP

Check that there is no play in the pulley, oil leakage, water leakage, or clogging of the drain hole. If any abnormality is found, please contact your Komatsu distributor for disassembly and repair or replacement.

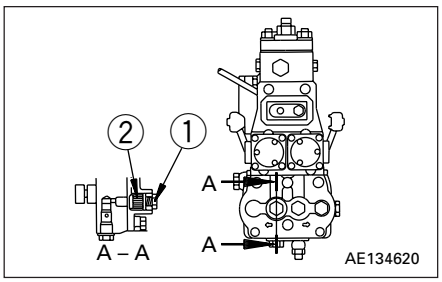
24.10.2 CHECK ENGINE VIBRATION DAMPER

Check decrease of damper fluid, dent or out-of-flat. If there is any abnormality, contact your Komatsu distributor for repair.

24.10.3 CHECK FAN PULLEY AND TENSION PULLEY

Check the pulley to see if there is any leaking grease. If any abnormality is found, ask your Komatsu distributor to repair or replace it.

24.10.4 REPLACE INJECTION PUMP SCREEN FILTER

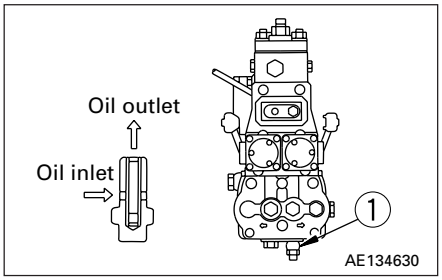


Remove injection pump cap 1, then replace screen filter 2 with a new part.

The side of the screen filter with the holes is assembled facing the inside.

Tightening torque of cap ①: 22.1 ± 2.5 N·m
(2.25 ± 0.25 kgf·m, 16.3 ± 1.8 lbft)

24.10.5 CLEAN INJECTION PUMP OIL INLET STRAINER



1. Remove oil inlet strainer ①, soak the whole strainter in diesel oil, then rinse it clean.

2. Blow compressed air in through the oil discharge port at the tip of the strainer.
   Repeat Steps 1 and 2 two or three times to clean the strainer.
   Tightening torque of strainer ①: 11.3 ± 1.5 N·m
   (1.15 ± 0.15 kgf·m, 18.3 ± 1.1 lbft)

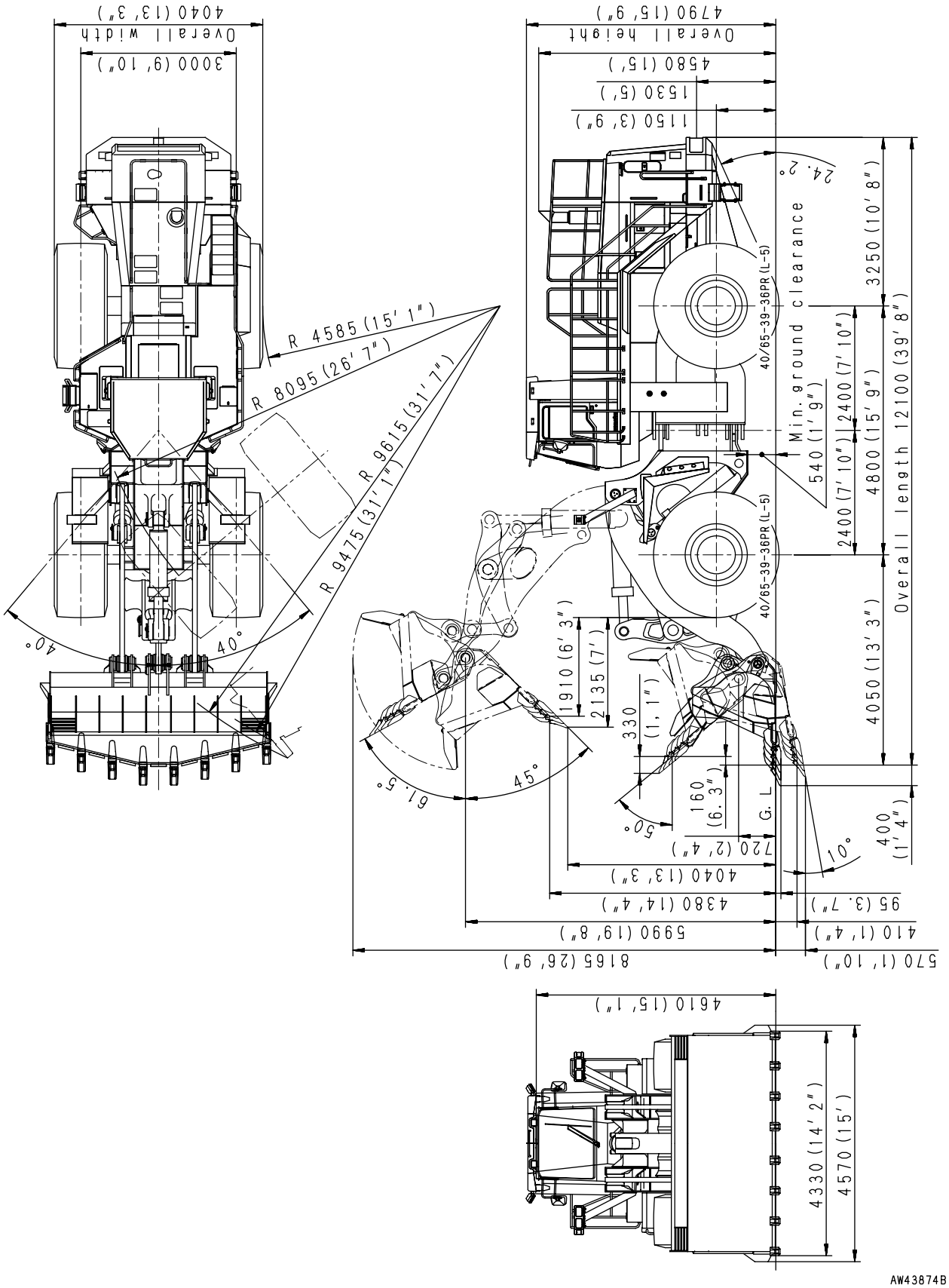
MEMO

SPECIFICATIONS

25. SPECIFICATIONS

WA700-3

PERFORMANCE			
● Bucket capacity (Heaped) (Spade nose with teeth)			8.7 m^3 (11.3 cu.yd)
● Normal load			15660 kg (34530 lb)
● Travel speed	Forward	1st	6.4 km/h (4.0 MPH)
		2nd	11.1 km/h (6.9 MPH)
		3rd	18.7 km/h (11.6 MPH)
		4th	30.0 km/h (18.6 MPH)
	Reverse	1st	7.1 km/h (4.4 MPH)
		2nd	12.3 km/h (7.6 MPH)
		3rd	20.5 km/h (12.7 MPH)
		4th	32.3 km/h (20.1 MPH)
● Max. rimpull			470720 N (48000 kgf)
● Min. turning radius	Outside of chassis		9615 mm (31 ft 7 in)
	Center of outside tire		8095 mm (26 ft 7 in)
WEIGHT			
● Operating weight (including 1 operator: 80 kg (176 lb))			70800 kg (156090 lb)
ENGINE			
● Model			Komatsu SAA6D170-E diesel engine
● Flywheel horsepower			478 kW (641 HP)/2000 rpm
● Max. torque			2810 N·m (286.5 kgf·m)/1400 rpm
● Starting motor			24 V 7.5 kW x 2 pieces
● Alternator			24 V 50 A
● Battery			12 V 200 Ah x 2 pieces (C200)


Overall width
4040 (13′ 3″)
3000 (9′ 10″)
R 4585 (15′ 1″)
R 8095 (26′ 7″)
R 9615 (31′ 7″)
R 9475 (31′ 1″)
40°
40°
Overall height
4790 (15′ 9″)
4580 (15′)
1530 (5′)
1150 (3′ 9″)
24.2°
40/65-39-36PR (L-5)
Min. ground clearance
540 (1′ 9″)
2400 (7′ 10″)
2400 (7′ 10″)
4800 (15′ 9″)
3250 (10′ 8″)
Overall length 12100 (39′ 8″)
4050 (13′ 3″)
1910 (6′ 3″)
2135 (7′)
330 (1′ 1″)
61.5°
45°
50°
160 (6.3″)
G. L
720 (2′ 4″)
4040 (13′ 3″)
4380 (14′ 4″)
5990 (19′ 8″)
8165 (26′ 9″)
95 (3.7″)
410 (1′ 4″)
570 (1′ 10″)
400 (1′ 4″)
10°
4610 (15′ 1″)
4330 (14′ 2″)
4570 (15′)

AW43874B

MEMO

OPTIONS, ATTACHMENTS

26. OPTIONAL PARTS AND ATTACHMENTS

Name	Specification, use
Bucket	Capacity 8.7 m^3 (11.3 cu.yd) (straight edge, for rock) (spade nose, for rock)
Bucket tooth	● Tip type tooth for rock ● Tip type tooth for limestone
Mesh chain	Tire protector

- Air conditioner
- Car radio
- Auto grease system
- Auto shift
- Joy stick steering system
- Tires

These and various other parts and attachments are available, so please contact your Komatsu distributor.

27. SELECTING BUCKETS AND TIRES

Select the most suitable bucket and tires for the type of work and the ground conditions on the jobsite.

Type of work	Bucket	Ground conditions	Tire
• Loading materials and blasted rock	Straight edge rock bucket (8.7 m^3 (11.3 cu.yd))	General ground conditions	40/65-39-36PR (L5) 41.25/70-39-34PR (L5)
		Hard ground	
• Loading blasted rock	Spade nose bucket (8.7 m^3 (11.3 cu.yd))	General ground conditions	40/65-39-36PR (L5) 41.25/70-39-34PR (L5)
		Hard ground	
		Ground with many boulders	40/65-39-36PR (L5) 41.25/70-39-34PR (L5) Use tire chains as a tire protector
		Soft ground with many boulders	
• Loading and carrying blasted rock	Spade nose bucket (8.7 m^3 (11.3 cu.yd))	General ground condition	40/65-39-36PR (L5) 41.25/70-39-34PR (L5)
		Hard ground	
		Ground with many rocks	40/65-39-36PR (L5) 41.25/70-39-34PR (L5) Use tire chains as a tire protector
		Soft ground with many rocks	
		Soft ground	

The speed display differs according to the tire size, so when changing to optional tires, please contact your Komatsu distributor.

On jobistes where there are many boulders or sharp rocks, please install tire protectors (mesh chain).

Check the chain for cuts or slack before starting operations.

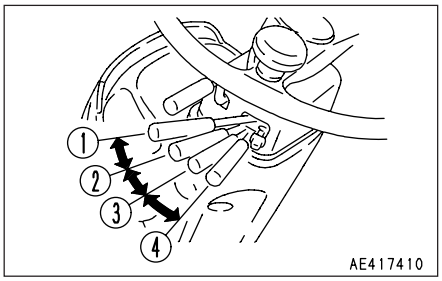
Be careful not to let the tires or chains slip during operations.

28. HANDLING AUTO SHIFT SYSTEM

28.1 AUTOMATIC SHIFT SYSTEM

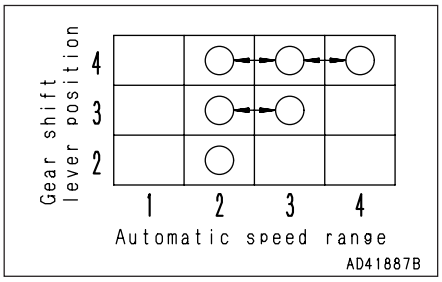
28.1.1 METHOD OF OPERATING

Automatic gear shifting can be carried out in the 2nd to 4th speed range of the four forward and reverse speeds depending on the travel conditions.



Position ①: 1st speed
Position ②: 2nd speed
Position ③: 3rd speed
Position ④: 4th speed

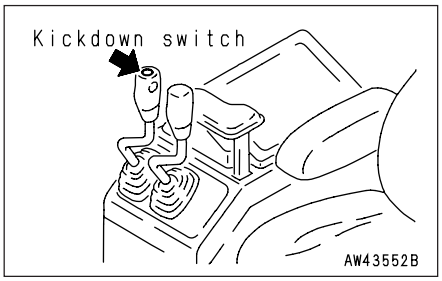
The range of speeds during automatic gear shifting is determined by the position of the gear shift lever as shown in the chart on the right.



REMARK

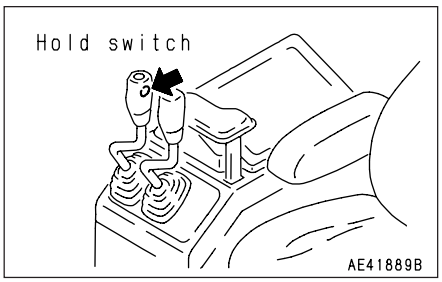
When the gear shift lever is at position ①, the speed is fixed in 1st. Automatic gear shifting is not carried out. When shifting down from 2nd to 1st, press the kickdown switch on the lift arm control lever.

When traveling in any speed range in forward or reverse, if the travel speed is less than 12 km/h (7.4 MPH), the kickdown switch can be actuated to shift down to 1st speed. In this way, it is made easy to carry out load and carry operation.



To set to the desired speed range when traveling uphill or downhill, or when carrying out grading, do as follows.

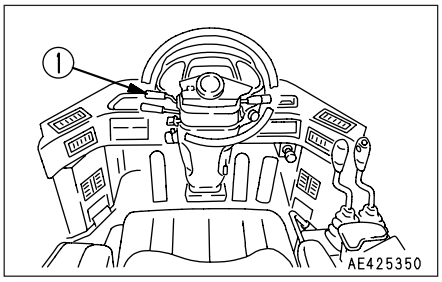
- When fixing the speed range
  Press the HOLD switch on the lift arm control lever.
  The speed range is fixed at the speed range displayed on the transmission indicator on the main monitor.
- When shifting up or down from set speed range
  Shift gear with the gear shift lever.

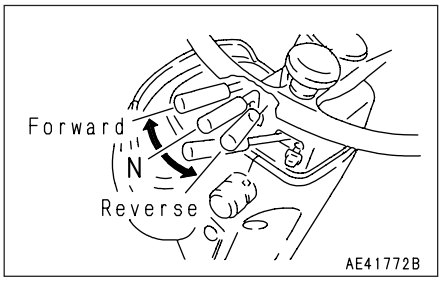


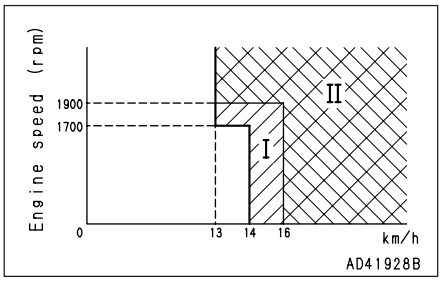
REMARK

When the transmission has been shifted down from 2nd to 1st with the kickdown switch, it will shift up from 1st to 2nd when the travel speed increases.

28.2 PRECAUTIONS WHEN CHANGING DIRECTION







⚠ WARNING

- **When changing direction between FORWARD and REVERSE, check that the new direction of travel is safe. There is a blind spot behind the machine, so be particularly careful when changing direction to travel in reverse.**
- **Do not switch between FORWARD and REVERSE when traveling at high speed.**
  When switching between FORWARD and REVERSE, depress the brake to reduce the travel speed sufficiently, then change the direction of travel. (Max. speed for changing direction: 12 km/h (7.5 MPH))

There is no need to stop the machine even when switching between FORWARD and REVERSE.

Place directional lever ① in the desired position.

When changing direction between FORWARD and REVERSE on a machine equipped with automatic shift, the transmission automatically starts from 2nd speed.

Automatic shift

If it is attempted to change direction between FORWARD and REVERSE when the machine is traveling in automatic gear shifting, the alarm buzzer will sound for 3 seconds (rapid intermittent sound) if the travel speed and engine speed are in area I in the diagram on the right.

If the alarm buzzer sounds, depress the brake immediately to reduce the speed sufficiently, then change direction between FORWARD and REVERSE.

If it is attempted to change direction between FORWARD and REVERSE in area II in the diagram on the right, the alarm buzzer will sound, and at the same time, the transmission will shift to the speed ranges shown in the table below, and the travel speed will be reduced in comparison to area I in order to decelerate the machine.

Gear speed before charging between FORWARD and REVERSE	Gear speed after charging between FORWARD and REVERSE
F2	R2
F3	R3
F4	R4
R2	F2
R3	F3
R4	F4

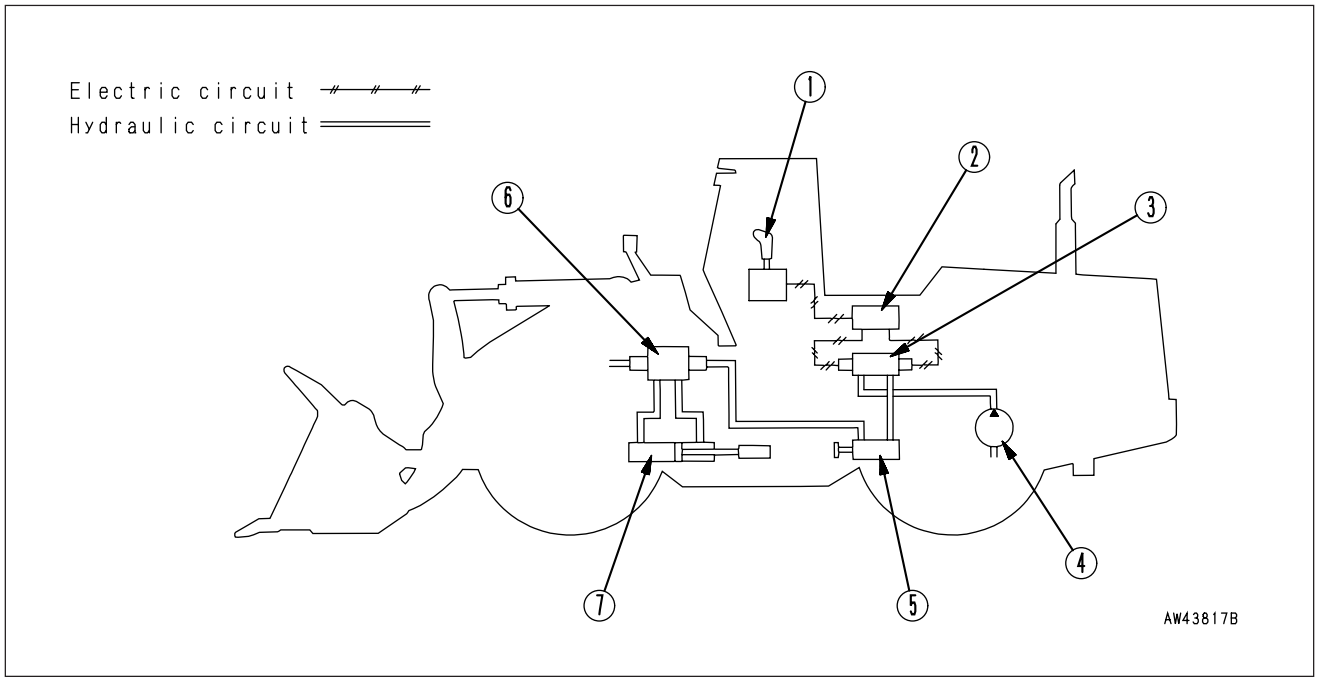
REMARK

If the gear shift lever is operated slowly or it is stopped between speed ranges, error code “CALL” may be displayed.
This is not a failure: the gear shift lever must be operated to complete the gear shifting within 2 seconds.

29. HANDLING JOYSTICK STEERING SYSTEM

To ensure that you operate the joystick steering safely and efficiently, please read this section before using it.

29.1 EXPLANATION OF COMPONENTS

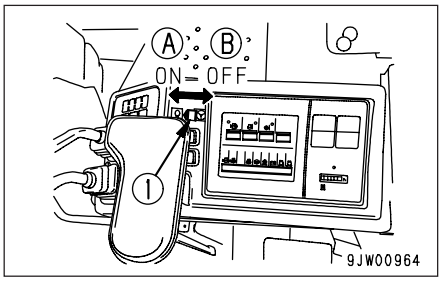


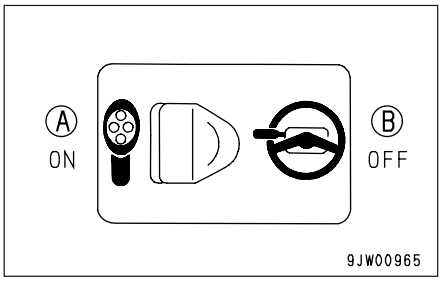
1. Joystick: Converts the displacement of the steering lever into voltage and controls steering according to the operation of the F-N-R button.
2. Controller: Controls steering according to the electric signals received from the joystick and outputs the control signals.
3. Electromagnetic proportional valve: Converts the output of the controller.
4. Pilot pump: Supplies oil to the steering pilot circuit.
5. Stop valve: Cuts out the pilot oil pressure to reduce the end shock and prevents the steering valve from relieving at each steering end.
6. Steering valve: Controls the operation of the steering cylinder with the pilot oil pressure.
7. Steering cylinder: Articulates the vehicle to the right and left.

- The joystick steering system is a system to the wheel loader by operating the joystick instead of the steering wheel.
  The joystick is designed to reduce operator fatigue by allowing light-touch steering operation with short movement of the joystick.

- The joystick steering system consists of the electrical circuit (joystick, controller, joystick ON/OFF switch), hydraulic circuit (solenoid proportional valve, stop valve, steering valve), and joystick console (joystick position adjustment, armrest position adjustment).

29.2 STRUCTURE AND FUNCTION OF JOYSTICK STEERING





If the joystick ON/OFF switch is turned ON, electric current flows to the joystick controller and makes it possible to operate the steering with the joystick.

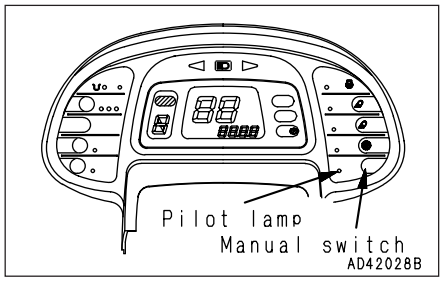
In addition, the directional (forward or reverse) operation of the transmission can also be carried out from the directional lever by operating the F-N-R button on the top of the joystick.

1. If the joystick steering system is installed, the steering and transmission control methods can be selected with joystick ON/OFF switch ① as shown below.
   The auto-shift position can be selected only when the vehicle is equipped with the automatic shift function (if equipped).
   The functional difference between steering with the joystick steering system and that with the steering wheel is as follows:

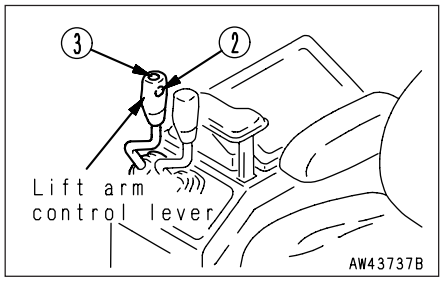
Selection		Ⓐ			Ⓑ		
Joystick steering ON/OFF switch		ON (Steering with joy stick)			OFF (Steering with steering wheel)		
Steering		● Steering with joystick (●Steering with steering wheel is also possible)			● Steering with steering wheel		
Transmission	F/N/R	Operated with F/N/R button on joystick head			Operated with transmission control lever		
	Type of transmission	Manual	Auto		Manual	Auto	
	Manual switch	—	Manual ON	Manual OFF	—	Manual ON	Manual OFF
	Selection of gear speed	Speed range changing operation with shift up switch and shift down switch on lift arm control lever	Speed range changing operation with shift up switch and shift down switch on lift arm control lever	Automatic change of speed range in accordance with travel speed	Operation with transmission control lever	Operation with transmission control lever	Automatic change of speed range in accordance with travel speed

1) Change the transmission to the manual mode (ON/OFF) with the manual switch (push-button switch).
When the switch is pressed once, the pilot lamp lights up and the system is turned ON; when the switch is pressed again, the pilot lamp goes out and the system is switched OFF.

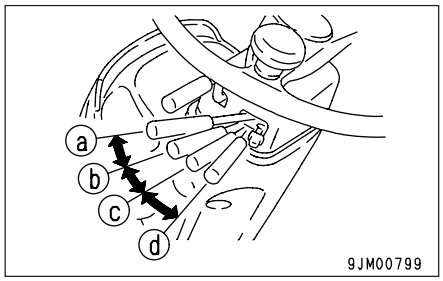
OFF: Automatic gear shifting
ON: Gear shifting using transmission control lever, or shift up or shift down switch (joystick steering machine only)



2) When the joystick steering is ON (operated with joystick lever), if the manual switch is turned ON, it is possible to shift the speed range between 1 and 4 with shift up switch ② or shift down switch ③ as shown in the table below.



Gear shift lever position	Shift range			
	1	2	3	4
ⓐ 1st	○			
ⓑ 2nd	○ ⇄	○		
ⓒ 3rd	○ ⇄	○ ⇄	○	
ⓓ 4th	○ ⇄	○ ⇄	○ ⇄	○



When the gear shift lever is at the 2nd or 3rd position, if the speed range is shifted from the 2nd to the 1st with shift down switch and the travel direction is changed between FORWARD and REVERSE, the speed range is shifted up from the 1st to the 2nd automatically.

- The combination of functions for switches ② and ③ is as shown in the table below.

	Steering	Steering wheel		Joystick		
	Trans-mission	Auto-matic	Manual	Automatic		Manual
	Lift arm control lever switch			Manual switch OFF	Manual switch ON	
Function	②	Hold	–	Hold	Shift up	Shift up
	③	Kick down	Kick down (Only from 2nd)	Kick down	Shift down	Shift down

The auto mode of the transmission is effective only when the vehicle is equipped with the automatic shift function (if equipped).

2. Work with joystick and steering wheel

⚠ CAUTION

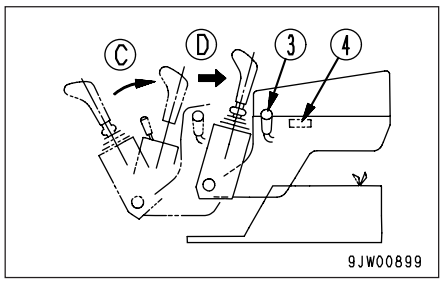
Because of the neutral interlock circuit, the forward and reverse directions of the transmission cannot be changed over (from forward/reverse lever to F/N/R button of the joystick when the joystick ON/OFF switch is on, and from F/N/R button of the joystick to forward/reverse lever when the joystick ON/OFF switch is off) if the forward/reverse lever and F/N/R button of the joystick are not in the neutral positions respectively.

Use the joystick or steering wheel according to the type of work.

1) Steering with joystick
   Joystick is suitable for continuous loading work in a wide job site with a relatively long cycle time.
   Since the stroke of the joystick is short and the resistance is low, the operator is less fatigued even if he operates the machine continuously.

2) Steering with steering wheel
   Since the operator can drive fast on a straight course and can control finely with the steering wheel, he can work efficiently with it when moving among job sites and in load-and-carry operations. The steering wheel is also suitable for works of short cycle time since the operator can hold the upper part of his body when changing the moving direction.

3. The joystick console can be slid for the ease of riding and getting off the vehicle.
   It is possible to tilt the console box to position Ⓒ (→) and to slide the console to position Ⓓ (⇨) by operating lever ③.



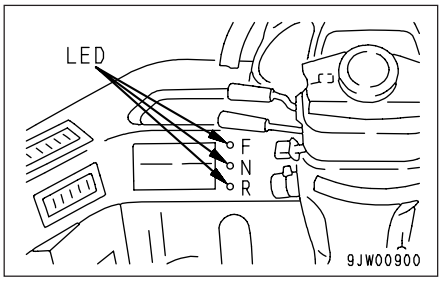
For details of adjusting the joystick console, see "29.5 ADJUSTMENT OF JOYSTICK CONSOLE".

⚠ WARNING

When riding and getting off the cab, be sure to slide the joystick console backward. If the console is slid backward, safety switch ④ is turned off and operation of the joystick is automatically turned off.

To prevent unexpected turning of the vehicle by misoperation of the joystick while the engine is running, be sure to slide the joystick console backward.

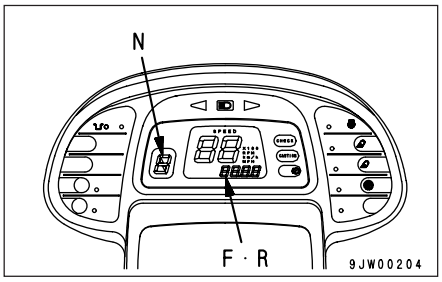
29.3 OPERATION METHOD OF JOYSTICK STEERING SYSTEM



⚠ CAUTION

When operation with joystick lever ①, always adjust the angle of the steering wheel so that it is possible to see the F-N-R display (LED) on the left of the machine monitor.
The illuminance of the LED changes as the small lamp is turned ON and OFF.

- F-N-R is also displayed on the two locations of the main monitor shown at right, synchronized with the F-N-R display of the LED. While F or R is displayed, the speed range is indicated on the N-portion



1. Adjustment of steering wheel

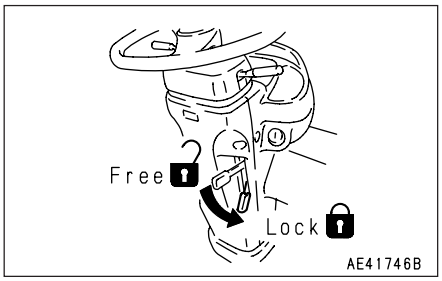
⚠ WARNING

Stop the machine before adjusting the angle of the steering wheel.

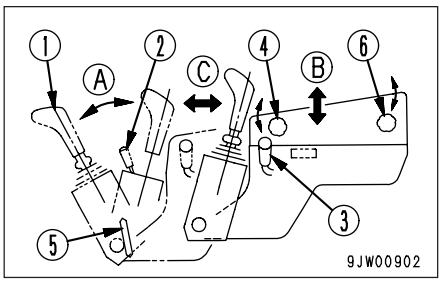
This lever allows the steering column to be tilted forward or backward.

Pull the lever up and move the steering wheel to the desired position. Then push the lever down to lock the steering wheel in position.

Range of adjustment: 125 mm (4.9 in) (stepless)

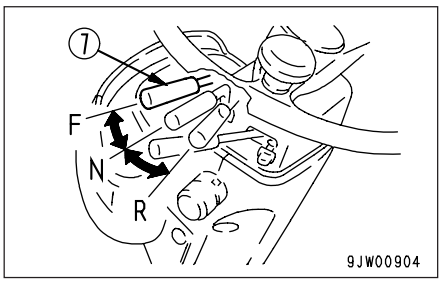


2. Sit on the operator's seat and pull up lever ③ to unlock the joystick console, then slide the latter from the rear position to the forward stroke end, then lock it securely.
   Under this condition, safety switch ④ is turned on. Adjust joystick ① to the angle for easy operation with console box adjustment lever ②. (See "29.5 ADJUSTMENT OF JOYSTICK CONSOLE".)

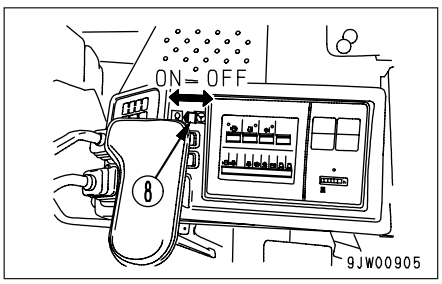


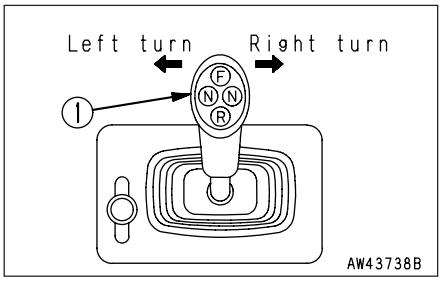
3. Fasten the seat belt.

4. Confirm that joystick ① operates normally and forward/reverse lever ⑦ of the transmission is a the neutral position and the periphery of the vehicle is safe. Then, start the engine.



5. Turn on joystick ON/OFF switch ⑧.
   If the directional lever ⑦ of the transmission has been at F or R position, the transmission is set to N (Neutral) by the neutral interlock mechanism.
   In this case, return the directional lever ⑦ of the transmission to the N (Neutral) position, then start travel forward or in reverse.

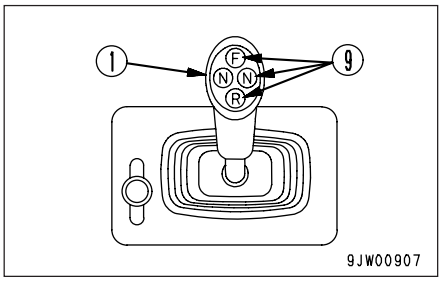




6. If joystick lever ① is turned to the right, the vehicle turns to the right, and if the joystick lever is turned to the left, the vehicle turns to the left.
   The more sharply the joystick is turned, the more quickly the vehicle turns.

7. After the vehicle turns to the desired angle, return joystick lever ① to the N (Neutral) position.
   The joystick lever returns to the N (Neutral) position automatically.

8. When returning the vehicle in the straight position, turn joystick lever ① in the opposite direction from the N (Neutral) position (If it was turned to the right, turn it to the left).

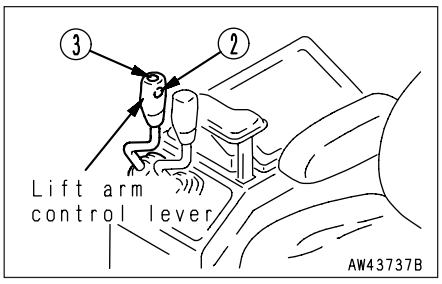


9. Select the forward or reverse direction of the transmission with F/N/R button ⑨ on joystick head ①.

   Button N: Neutral
   (Transmission is set to the neutral position at the moment when this button is pushed.)

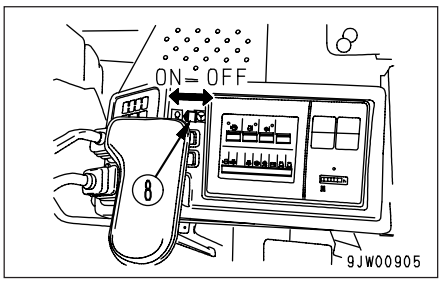
   Button F: Forward
   (Transmission is set to the forward position at the moment when this button is pushed and released.)

   Button R: Reverse
   (Transmission is set to the reverse position at the moment when this button is pushed and released.)



To change the speed range, use shift up switch ② and shift down switch ③ on the lift arm control lever.

10. Turn off joystick ON/OFF switch ⑧. The operation of the joystick is turned off.

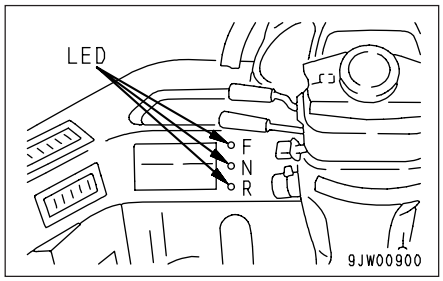


29.4 PRECAUTIONS FOR STEERING WITH JOYSTICK

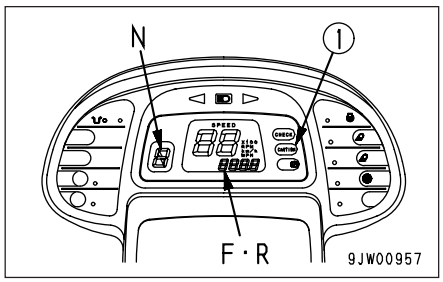
⚠ WARNING

- **If the vehicle and transmission cannot be operated normally with the joystick, or if the warning lamp lights up, stop the vehicle with the brake first. Then, turn off the joystick ON/OFF switch and move to a safe place by using the steering wheel and forward/reverse control lever.**
- **Before starting the operation of the vehicle again, find out and repair the troubled part and confirm that the function is normal. For the troubleshooting and repair, please contact your Komatsu distributor.**
- **Never operate the vehicle before it is repaired completely.**

- Do not move the joystick to the left or right until the N display on the machine monitor F/N/R display lights up to indicate that the joystick is ready.
  The joystick controller senses the neutral position of the joystick. If the joystick is moved before the neutral position is sensed, an error is detected and caution lamp ① flashes and the joystick steering system does not work.
  If an error is indicated, turn off the joystick ON/OFF switch, then turn it on again.



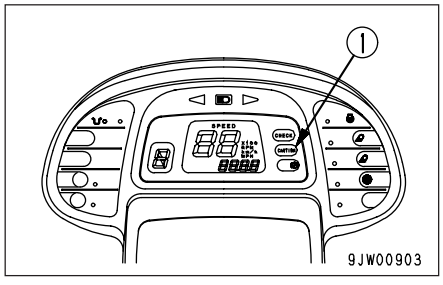
- If the vehicle is steered with the steering wheel, its turning angle is fixed when turning of the latter is stopped. If the vehicle is steered with the joystick and the latter is held turned, however, the vehicle is steered to the articulate end.
  Since the feel of steering of the joystick is different from the steering wheel, take care sufficiently until you are get accustomed to the joystick.



- If the F or R button at the joystick head is pushed and held more than 30 seconds, a short circuit is sensed and an error is indicated. Touch these buttons only when required.

- If the forward/reverse lever is not at the neutral position, when the joy stick ON/OFF switch is turned off, the neutral interlock circuit prevents it from turning to the forward/reverse lever side. Since the transmission is kept at the neutral position, the vehicle cannot move either forward or in reverse. In this case, turn the forward/reverse lever to the N (Neutral) position, then turn off the joy stick ON/OFF switch.

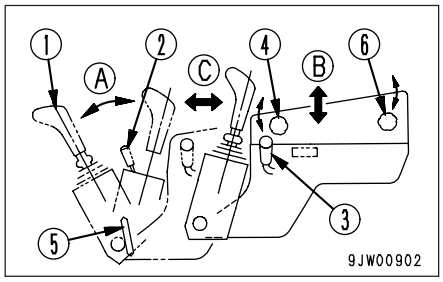
- If the electric circuit of the joystick steering system or transmission control system has trouble, centralized warning lamp ① (Red) on the right side of the main monitor flashes to notify the trouble to the operator.
  Since both steering system and transmission are set in the respective neutral positions, turn off the joystick ON/OFF switch, then drive the vehicle with the steering wheel and the forward/reverse lever.



29.5 ADJUSTMENT OF JOYSTICK CONSOLE

⚠ WARNING

- **When adjusting, park the vehicle on a level and safe place.**
- **Adjust before starting operation or when the operator changed.**
- **Before adjusting the console, adjust the operator's seat so that the operator can press the brake pedal fully with his back fitted to the seat back.**



Ⓐ **Adjustment of joystick**
Loosen lever ⑤ and move it to the forward end, then tighten it. Turn lever ② forward and set joystick lever ① to a desired position.
After setting, release lever ②.
Forward/Backward adjustment: 130 mm (5.1 in) (At knob top)

Loosen lever ⑤ and move it backward until joystick lever ① contacts the stopper, then tighten lever ⑤. In this way, joystick lever ① can be set to the desired position, and there will be no need to adjust its position in future.

Ⓑ **Adjustment of height of armrest (Left-hand)**
Turn grip ⑥ to unlock the armrest, then set the armrest to a desired position. After setting, tighten the grip securely.
Vertical adjustment range: 35 mm (1.38 in)

Ⓒ **Sliding of console**

⚠ WARNING

When traveling or operating the work equipment, be sure to lock the console at the forward stroke end.

- When riding and getting off the vehicle, raise lever ③ and slide the console backward. At this time, do not stop the console halfway, but slide to the stroke end.

- After riding the vehicle, be sure to slide the console to the forward stroke end and lock it there.

29.6 ADJUSTMENT OPERATOR'S SEAT
29.6.1 ADJUSTMENT OF SEAT

⚠ WARNING

- **Park the machine in a safe place and stop the engine when carrying out adjustment of the operator's seat.**
- **Adjust the seat before starting operations or when changing operators.**
- **Check that you can depress the brake pedal fully with your back against the seat backrest.**

Ⓐ: **Forward-backward adjustment of seat**

Move lever ① up and move the seat to the desired position, then release the lever.

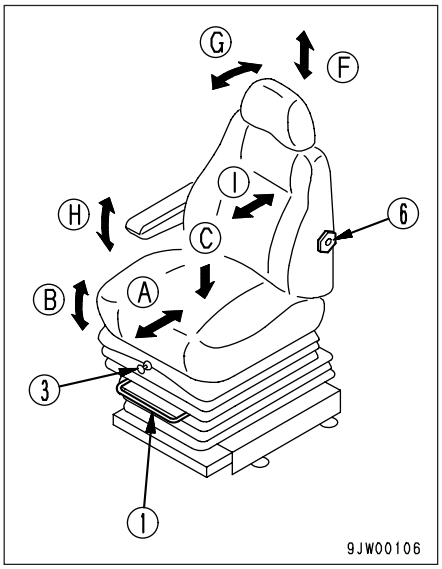
Fore-and-aft adjustment distance is 180 mm (7.1 in) (10 mm (0.4 in) x 18 stages).

Ⓑ: **Adjusting seat angle**

Move lever ② up and push down on the rear of the seat to tilt it backward.

Move lever ② down and push down on the front of the seat to tilt it forward.

The adjustment range is 13° (Front tilt, rear tilt: 4 stages each).



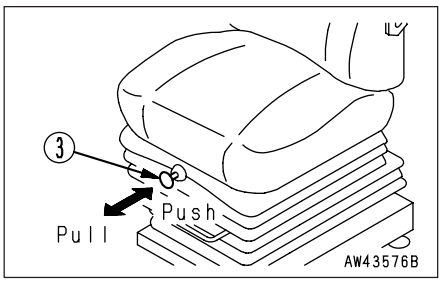
Ⓒ: **Adjusting seat weight**

Sit on the seat and adjust the strength of the suspension with valve ③.

The adjustment range is 50 kg (110 lb) (Target) to 120 kg (265 lb).

Push: Suspension is strengthened.

Pull: Suspension is weakened.



Ⓓ: **Adjustment of backrest angle**

Move lever ④ up and move the backrest to the front or rear.

When performing this, fit your back to the seat back. If the seat back is apart from your back, it may return suddenly.

The adjustment range is 66° to the front (3° x 22 stages) and 72° to the rear (3° x 24 stages).

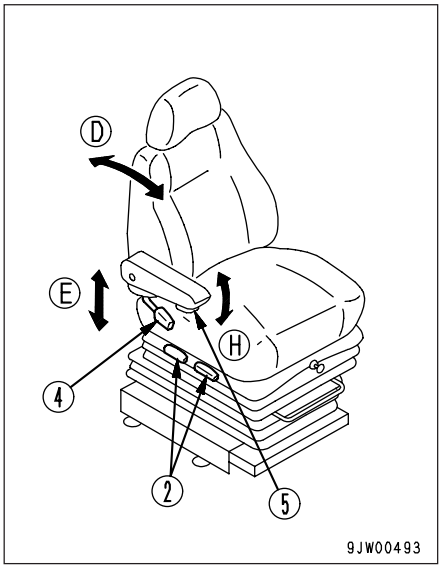
NOTICE

If the seat back is reclined too far, the seat back may hit the rear glass, so use it in a position where it does not contact the glass.

Ⓔ: **Seat height adjustment**

Move lever ② up/down, then move the seat up or down as desired. Since lever ② is also used for adjustment seat angle, set the seat to the desired height while adjusting the angle.

The adjustment range is 60 mm (2.4 in).



Ⓕ: **Adjusting height of headrest**
Move the headrest up and down to the desired height.
The adjustment range is 50 mm (2.0 in).

Ⓖ: **Adjusting headrest angle**
Rotate the headrest to the front or rear.

Ⓗ: **Adjusting angle of armrest**
Adjust the angle of the armrest by rotating knob ⑤.
The adjusting range is 30° (Forward tilt: 25°, Backward tilt: 5°).
Also, when the armrest is turned, it will spring up.

Ⓘ: **Lumbar support**
The tension of the waist part can be adjusted by turning grip ⑥.

30. MAIN MONITOR FAILURE DISPLAY

If an error code is displayed on the main monitor portion (normally the speedometer display) of the machine monitor, follow the corresponding table when carrying out the selfdiagnostic troubleshooting below.

30.1 MAIN MONITOR FAILURE DISPLAY

(Contents of operator's actions against each error code)

Error code	Transion control system		Option: Joystick control system		Alarm buzzer	Action by operator
	Problem system	Condition of machine	Problem system	Condition of machine		
E00	Disconnection in travel speed sensor system	Does not shift gear auto-matically (switches to manual gear shifting)	Disconnection, short circuit, or short circuit with ground in joystick FNR signal system (or L, R signal system)	Returns to neutral (Steering with steering wheel can be selected.)	No	Normal work possible with manual operation
	Disconnection in engine speed sensor system	Engine speed taken as 2100 rpm (there is gear shifting shock. Gear does not shift in auto-shift mode, however.)	–	–		Normal work is possible in manual mode. (If joystick is installed, normal work is possible with steering wheel in manu-al shift mode.
CALL	Disconnection, short circuit with ground, or short circuit in shift lever system	Becomes neutral, travel impossible (judges controller input as N)	–	–	Yes	Stop machine, turn starting switch OFF, do same as above, then call service
	Disconnection, short circuit with ground, or short circuit in F, R solenoid signal system	Becomes neutral, travel impos-sible (solenoid signal output OFF)	–	–		
	Disconnection, short circuit with ground, or short circuit with speed range solenoid signal system	Becomes neutral, travel impos-sible (solenoid signal output OFF)	—	–		

30.2 ERROR CODES LIST INDICATED ON MAIN MONITOR

TRANSMISSION CONTROL SYSTEM
Auto/manual transmission control system

Error Code	Item	Problem system	
		Short circuit	Disconnection
10	Back-up lamp relay	○	○
11	None	–	–
12	F Sol.	○	○
13	R Sol.	○	○
14	1st Sol.	○	○
15	2nd Sol.	○	○
16	3rd Sol.	○	○
17	4th Sol.	○	○
18	None	–	–
19 in	Joystick direction switch	○	○
20 in	Direction switch signal	○	○
21 in	Range switch signal	○	○
22 in	Travel speed sensor	X	○
23 in	Engine speed sensor	X	○

JOYSTICK CONTROL SYSTEM
(Including joystick unit and machine body harness system)

Error Code	Item	Problem system	
		Short circuit	Disconnection
56	Joystick caution relay	○	(*1)
57	Steering R (right) Sol (Detected when power is output)	○	○
58	Steering L (left) Sol (Detected when power is output)	○	○
59	Steering R (right) short circuit at Sol HOT end	○	X
60	Steering L (left) short circuit at Sol HOT end	○	X
61	Steering Sol cut relay	○	○
62 in	Abnormality in joystick neutral switch	○	○
63 in	Abnormality in joystick potentiometer	○	○

If a trouble is detected, the joystick caution system operates.
(*1) : Since E56 is kept turned ON, breakage of its wire cannot be judged actually.

- Since E59 and E60 cannot be distinguished from each other for the reason of design of the hardware, the alarms for them are turned on simultaneously.

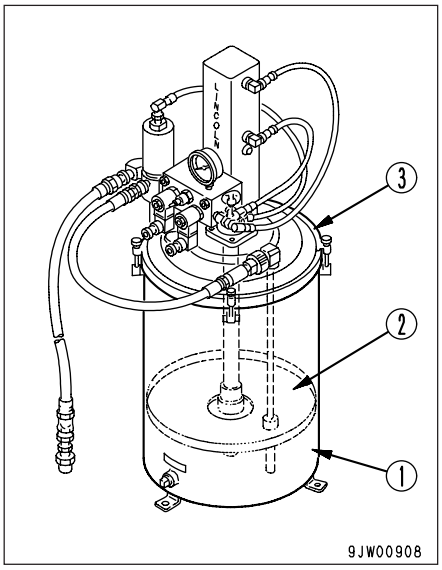
ELECTRONIC GOVERNOR CONTROL SYSTEM

Error Code	Item
90	Abnormality inside controller
91	Abnormality governor servo system
92	Abnormality rack sensor system
93	Abnormality No. 1 Ne sensor system
94	Abnormality No. 2 Ne sensor system
95	Abnormality water temperature sensor system
97	Abnormality acceleration sensor system
99	Abnormality engine overrun

31. HANDLING AUTO-GREASING SYSTEM

1. Check that a pail or grease is in the grease pump case. If there is not sufficient grease in it, supply new grease.

2. Check that grease does not leak from the piping between the pail or grease pump case ① and follower plate ②.



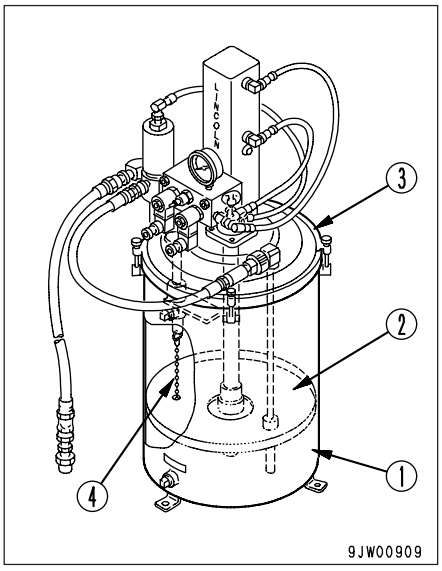
NOTICE

If follower plate ② is not used, pump ③ cannot suck up the grease even if there is sufficient grease in the pail. Accordingly, do not remove follower plate ②.

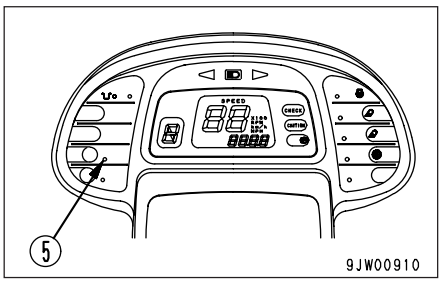
The pails of the following sizes are available. Use follower plate ② of the proper size for each size of the pail.

Part No. of follower plate	Applicable pail	Level gauge
427-S95-2510	Inside diameter of pail ø275 – ø290 mm	427-S95-2570
427-S95-2520	When pail is not used	

For applicable combinations of pails, follower plates ② and level gauges ④, see the above table.



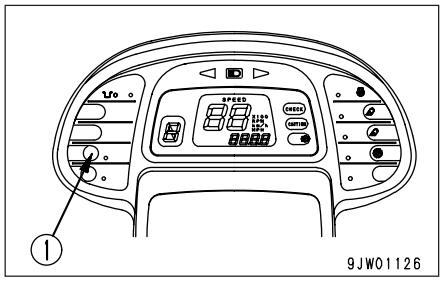
3. Turn the starting switch ON and check that lamp ⑤ on the monitor panel lights up.



Lighting: Normal
When the auto-greasing system is turned on and it has no abnormalities, or when the grease pump operates to supply grease and the grease supply line pressure reaches the specified level, the indicator lamp lights up.

Flashing: When any wire in the electric circuit is broken or when the supply line pressure drops below the specified level while the grease pump is operating, the indicator lamp flashes.
The lamp flashes after the pump starts operation until the supply line pressure reaches the specified level, but it lights up when the pressure reaches the specified level. This does not indicate trouble.
If the lamp does not stop flashing (does not light up), there is trouble with the machine. In such cases, stop the machine immediately and consult your Komatsu distributor.

31.1 METHOD OF OPERATING AUTO-GREASING SYSTEM

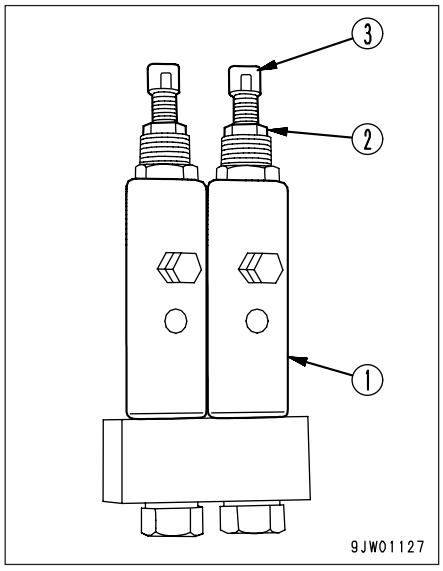


1. If the starting switch of the vehicle is turned ON, this system automatically starts the operation.

2. Auto-greasing switch ①

   If the auto-greasing switch ① is pressed, the grease pump is operated, regardless of the time count. The grease pump operates only while the auto-greasing switch is pressed and held. The grease pump stops immediately when the auto-greasing switch is released. This switch is mainly used to check the operation of the grease pump or supply additional grease.

31.2 PRECAUTIONS WHEN HANDLING AUTO-GREASING SYSTEM



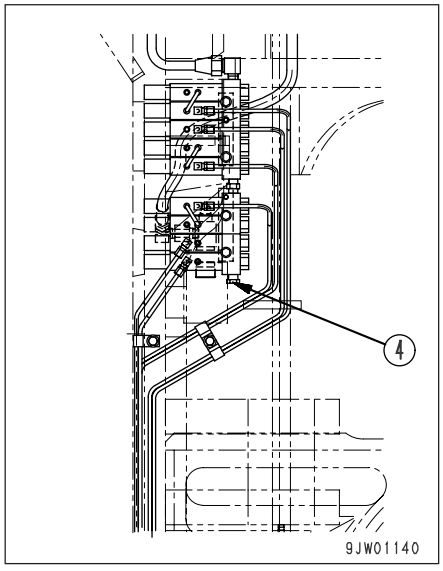
1. Adjustment of discharge from injector ①

   Set the all injectors to the maximum discharge.
   Loosen lock nut ② and turn adjustment screw ③ counterclockwise.

2. Method of bleeding air from main line

   Loosen the plug installed to each injector to bleed air from the main piping. This work shall be carry out by two persons. Start bleeding at the injector nearest the grease pump, then bleed at the other injectors in order (Rear frame → Front frame → Boom → Bell crank).

   1) One person removes plug ④ from one injector, then stays there.



This plug ④ is installed to the manifold end of each end injector. If air must be bled from the main piping, remove this plug.

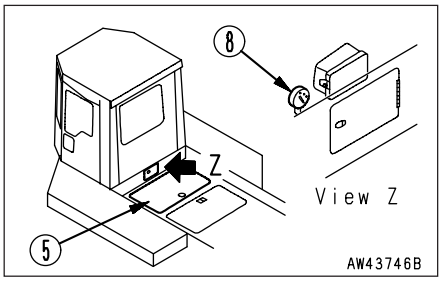
   2) The other person presses the auto-greasing switch to start the grease pump.

   3) Discharge the grease containing air (milky white in many cases) from the injector. If normal grease comes out, stop the grease pump.

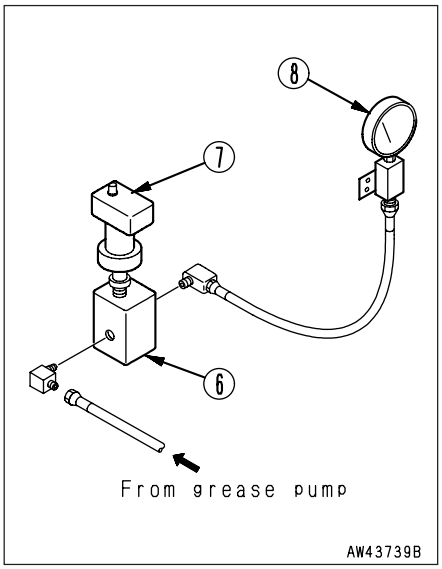
   4) Tighten plug ④ of the injector to prevent the grease from leaking.

      It is impossible to see if the air has been bled by simply checking the pressure gauge. Even if air is mixed in the grease, the auto-grease system operates since the discharge pressure of the grease pump is high. To see if the greasing system is working normally, check that the grease pump is balanced and stopped in the specified (operating) time (60 seconds).

3. Method of bleeding air from pressure switch
   This work shall be performed by two persons.
   1) Open transmission inspection cover ⑤ at the rear of the cab. One person removes pressure switch ⑦ from block ⑥, then stays there.
   2) The other person presses the auto-greasing switch to start the grease pump.
   3) Discharge the grease containing air (milky white in many cases) from the block ⑥. If normal grease comes out, stop the grease pump.
   4) Install pressure switch ⑦ to block ⑥. (Check that grease is not leaking.)



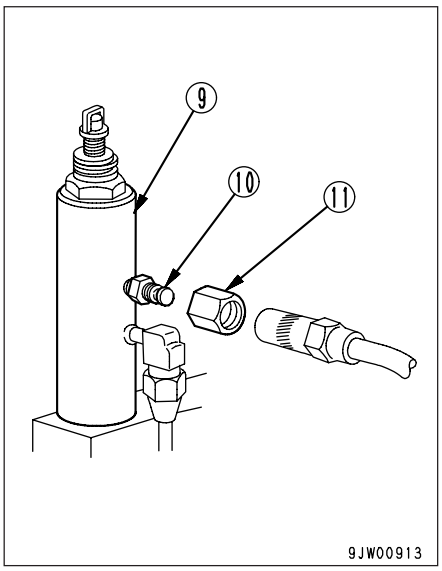
4. Method of bleeding air from supply line
   This work shall be performed by two persons.
   1) One person removes supply line pressure gauge ⑧ from block ⑥, then stays there.
   2) The other person presses the auto-greasing switch to start the grease pump.
   3) Discharge the grease containing air (milky white in many cases) from the block ⑥. If normal grease comes out, stop the grease pump.
   4) Install pressure gauge ⑧ to block ⑥. (Check that grease is not leaking.)



NOTICE

If air is left in the circuit, the grease pressure will not rise to the specified level or will take a long time to rise to the specified level, and the injector will not work normally.

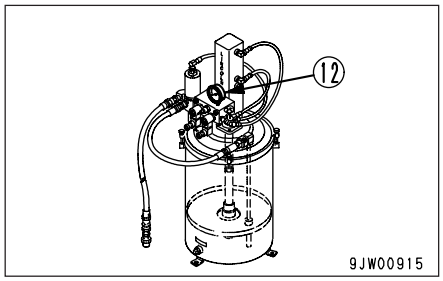
5. Filling branch lines (Injector - Pin) with grease
   Remove cap ⑪ of filler fitting ⑩ of injector ⑨, then fill the all branch lines with grease by using a hand grease gun.

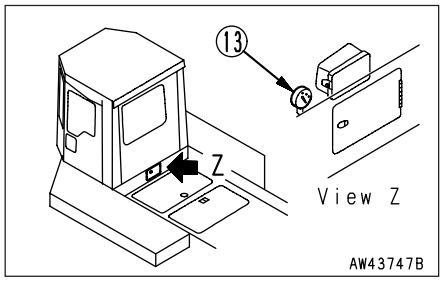


6. Check of supply line pressure
   Check grease pump pressure gauge ⑫ and supply grease line pressure gauge ⑬.

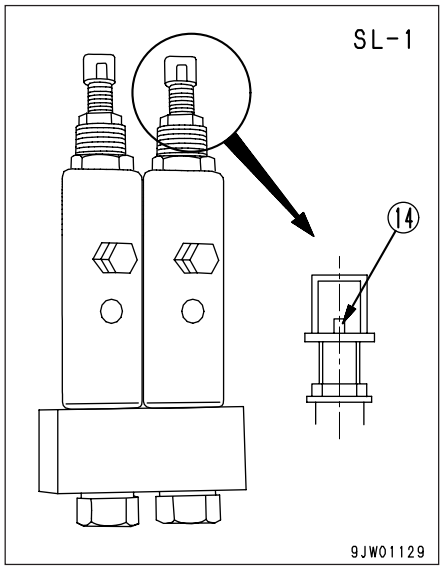
   Supply grease line pressure gauge
   Normal value: 20.6 MPa (210 kgf/cm^2, 2982 PSI)

   Grease pump pressure gauge
   Normal value: 2.06 MPa (21 kgf/cm^2, 298.2 PSI)





7. Check of operation of injector
   Turn ON the auto-greasing switch, and check that indicator pin ⑭ of injector (SL-1) is operating normally.

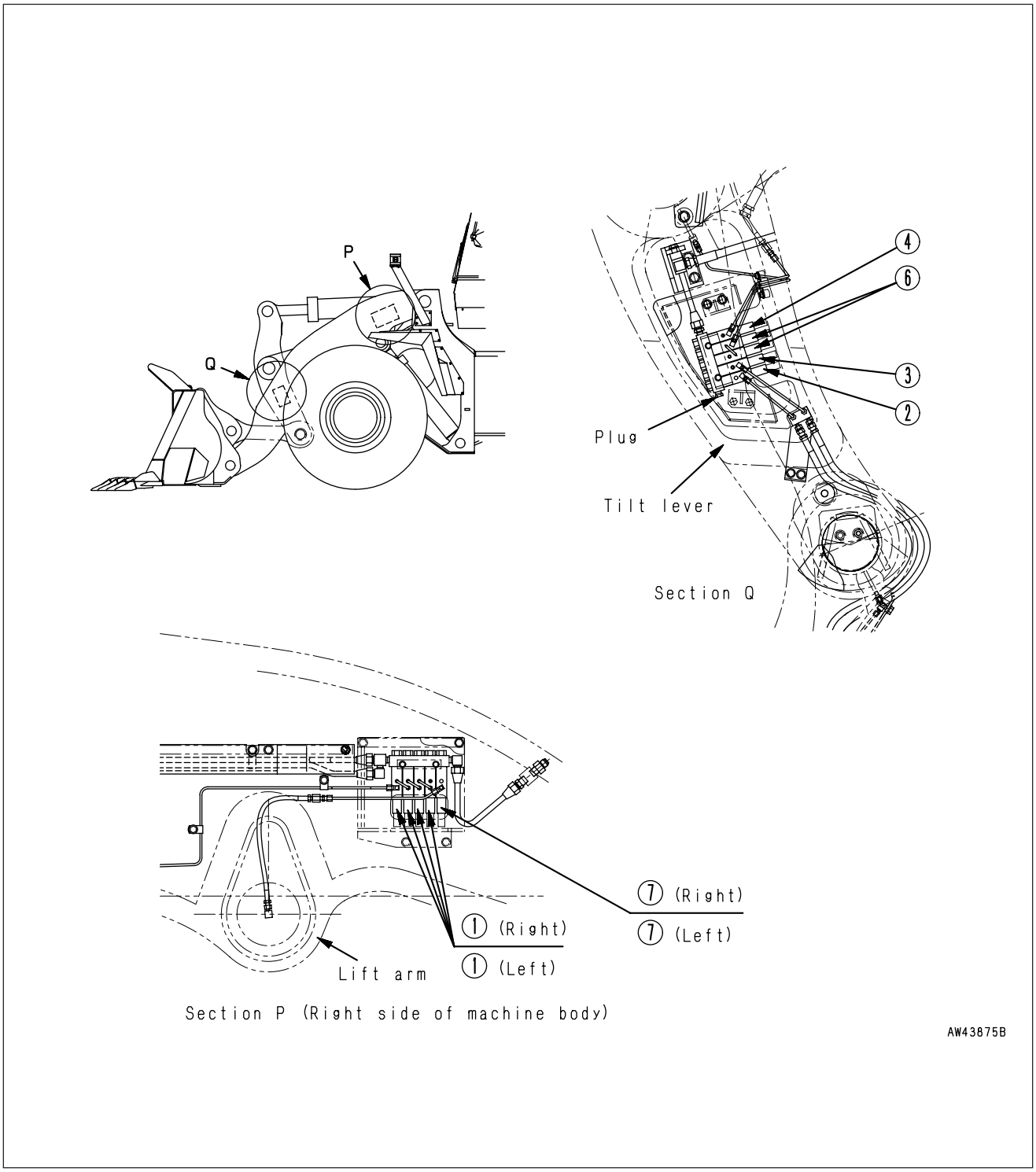


8. Adjustment of greasing rate and injector
   - Adjust the injector to change the greasing rate for 0 – 30 hours (First step), 30 – 150 hours (Second step) and after 150 hours after the auto-greasing system installed.
   - For the first 30 hours of operation (first step), make the interval 11.25 minutes. Following the first 30 hours, make the interval 18.75 minutes. (When the machine is shipped from the factory, it is set to the first step.)

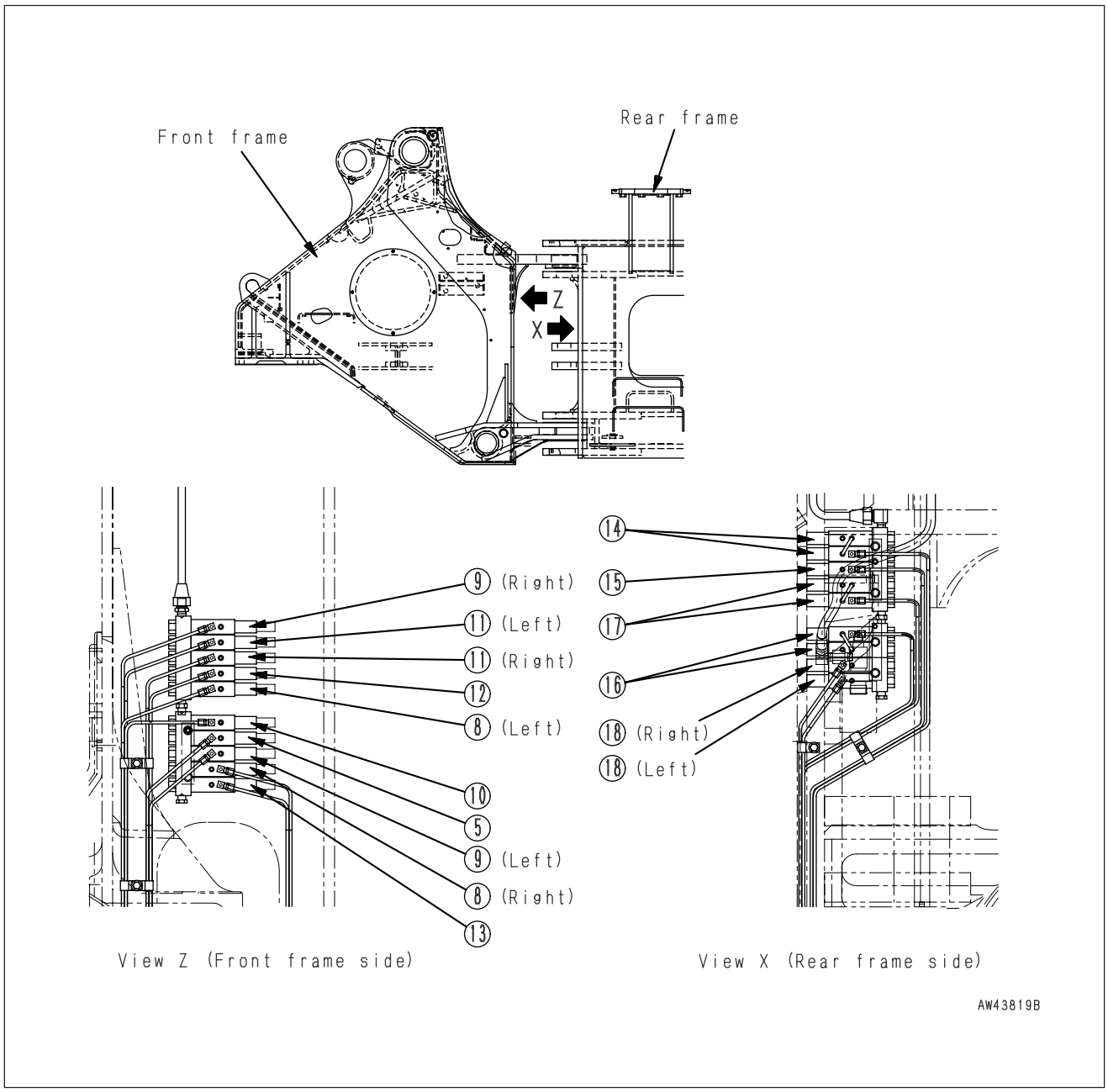
		Up to 30Hr		Up to 150Hr		After 150Hr	
		First step		Second step		Third step	
Interval		11.25 min		18.75 min		18.75 min	
Greasing point		cc/Hr	Adjustment of injector	cc/Hr	Adjustment of injector	cc/Hr	Adjustment of injector
①	Bucket hinge (Right and left)	31.2	Open fully	15.6	Keep at position for first step.	7.8	Open two fully. for first step.
②	Bucket link (Front)	7.8	Open fully	3.9	Keep at position for first step	3.9	Keep at position for first step.
③	Bucket link (Rear)	7.8	Open fully	3.9	Keep at position for first step.	3.9	Keep at position for first step.
④	Bucket cylinder rod	7.8	Open fully	3.9	Keep at position for first step.	1.95	Close by 5 turns from full.
⑤	Bucket cylinder bottom	7.8	Open fully	3.9	Keep at position for first step.	1.95	Close by 5 turns from full.
⑥	Tilt lever (Center)	15.6	Open fully	7.8	Keep at position for first step.	3.9	Open one fully. Close one to minimum.
⑦	Boom cylinder rod (Right and left)	7.8	Open fully	3.9	Keep at position for first step.	1.95	Close by 5 turns from full.
⑧	Boom cylinder bottom (Right and left)	7.8	Open fully	3.9	Keep at position for first step.	1.95	Close by 5 turns from full.
⑨	Boom pivot (Right and left)	7.8	Open fully	15.6	Keep at position for first step.	3.9	Keep at position for first step.
⑩	Center hinge pin (Upper)	7.8	Open fully	3.9	Keep at position for first step.	1.95	Close by 5 turns from full.
⑪	Steering cylinder bottom (Right and left)	7.8	Open fully	3.9	Keep at position for first step.	1.95	Close by 5 turns from full.
⑫	Center support	7.8	Open fully	3.9	Keep at position for first step.	1.95	Close by 5 turns from full.
⑬	Center hinge pin (Lower)	7.8	Open fully	3.9	Keep at position for first step.	1.95	Close by 5 turns from full.
⑭	Rear axle support (Front)	15.6	Open fully	7.8	Keep at position for first step.	3.9	Open one fully. Close one to minimum.
⑮	Transmission mount support	7.8	Open fully	3.9	Keep at position for first step.	1.56	Close by 6 turns from full.
⑯	Rear axle support (Cover)	15.6	Open fully	7.8	Keep at position for first step.	3.9	Open one fully. Close one to minimum.
⑰	Rear axle support (Top)	15.6	Open fully	7.8	Keep at position for first step.	3.9	Open one fully. Close one to minimum.
⑱	Steering cylinder rod (Right and left)	7.8	Open fully	3.9	Keep at position for first step.	1.95	Close by 5 turns from full.

The injector turns by 10 turns between the full minimum opening positions.

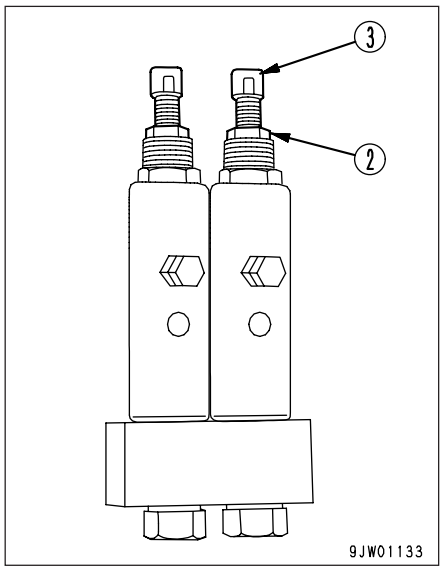
Greasing points (Front frame and loader linkage)
1. Bucket hinge
2. Bucket link (front)
3. Bucket link (rear)
4. Bucket cylinder rod
6. Tilt lever (center)
7. Lift arm cylinder rod

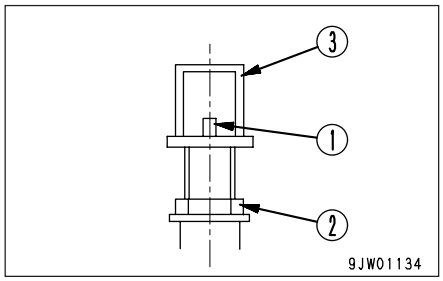


Greasing points (Rear frame)
5. Bucket cylinder bottom
8. Lift arm cylinder bottom
9. Lift arm pivot
10. Center hinge pin (upper)
11. Steering cylinder bottom
12. Center support
13. Center hinge pin (lower)
14. Rear axle support (front)
15. Transmission mount support
16. Rear axle support (cover)
17. Rear axle support (top)
18. Steering cylinder rod



31.3 METHOD OF ADJUSTING DISCHARGE FROM INJECTOR





1. Injector (SL1)
   1) The injector is operated by the pressure from the pump, and it feeds grease of the specified quantity to the bearing.

   2) To see if the injector works normally, check the operation of indicator pin ① on its head. If the injector is normal, the pin is retracted first. If the pump stops and the pressure is lost, the pin returns and it is reset for the next greasing.

   3) Adjust the discharge from the injector with adjustment screw ③ on its head.
      1) To reduce the discharge, loosen lock nut ② and turn adjustment screw ③ clockwise. If the adjustment screw stops (at the stopper), the discharge is minimized.

      2) If the adjustment screw is returned by 10 turns from the fully tightened position (minimum discharge) in 1) above, the discharge is maximized (1.3 cc/st).
      After adjusting the discharge from the injector, be sure to tighten lock nut ②.

   4) Although the injector can be overhauled and repaired, replace it with a spare one, if possible, when it has any trouble.

   - Loosen lock nut ② and turn adjustment screw ③ to adjust the discharge of grease made each time.

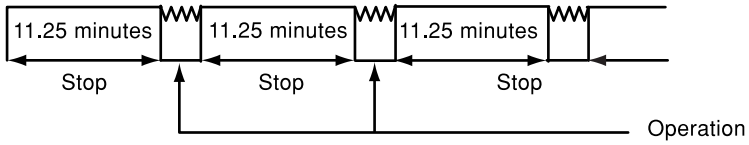
	Discharge/time
Turn clockwise to stopper	0.13 cc (Min)
Turn counterclockwise by 10 turns from above position	1.30 cc (Max)

One turn between the maximum and minimum positions change the discharge by 0.13 cc. After adjusting the discharge, be sure to tighten the lock nut.

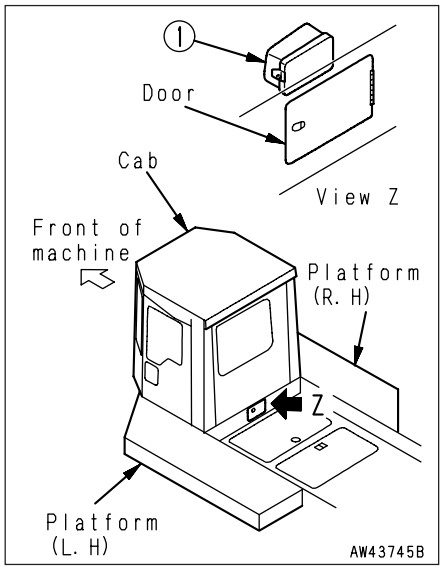
31.4 METHOD OF SETTING TIMER

- The timer is installed to control the greasing interval of the auto-grease system.
- The timer is installed in box ① at the rear of the operator's seat.
- The greasing interval can be changed freely according to the following table with the blue dial of the timer. The set interval has an error of about ±15%, however (for both stopping and starting).

  Examine: When timer is set to 11.25 minutes

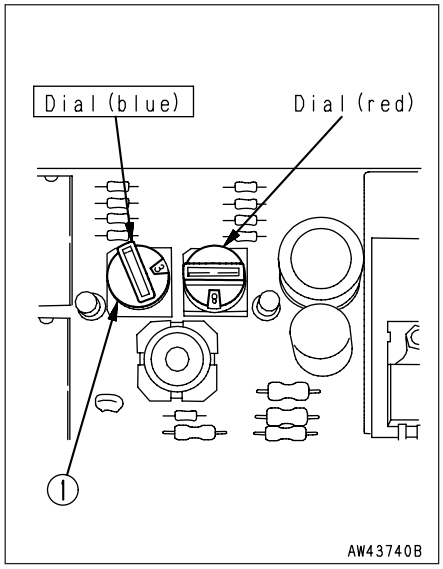


1. Adjustment of greasing interval
   Timer box ① is in the position shown at right.



- Power supply for timer
  Even after the starting switch is turned off, both interval time and operating time are stored in this circuit board by the capacitor (Super Cap) for about five days, and the next operation starts under the condition when the power was turned off previous time. If the power is kept turned off for more than five days, however, the memory is canceled.

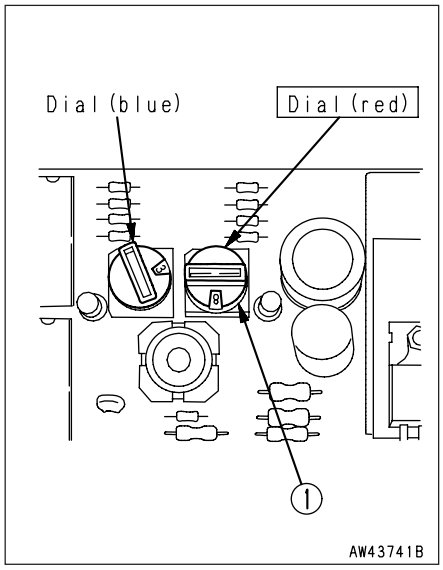
2. Method of adjusting interval time (Blue dial)
   Open the door at the rear lower of the cab, then open the timer box. Turn the dial shown at right to adjust the interval time and operating time.
   To adjust the interval time, turn blue rotary switch ① in the figure at right according to the following table.



Position of switch	1	2	3	4	5	6	7	8	9
Greasing interval (min)	3.75	7.5	11.25	15	18.75	22.5	28.25	30	33.75
Position of switch	A	B	C	D	E	F			
Greasing interval (min)	37.5	41.25	45	48.75	52.5	56.25			

   1) Set the blue dial to No. 3 after the auto-grease system is installed and keep it at this position for the first 30 hours of operation.
   2) After operating for 30 hours, set the dial to No. 5. (For normal operations)

3. Method of adjusting operating time (Red dial)
To adjust the operating time, turn red rotary switch ① in the figure at right according to the following table. (Normally, fix this dial to position 8 (60 seconds).)



Position of switch	1	2	3	4	5	6	7	8	9
Operating time of pump (sec)	7.5	15	22.5	30	37.5	45	52.5	60	67.5
Position of switch	A	B	C	D	E	F			
Operating time of pump (sec)	75	82.5	90	97.5	105	112.5			

1) Set the red dial to division 8 (For normal operation).

2) When greasing is finished and the greasing pump is balanced, the greasing pump stops even if within the specified operating time (60 sec).

WA700-3 WHEEL LOADER

Form No. SEAM018501