SEAM038301T

Operation & Maintenance Manual

avance LOADER

WA120L-3MC

WHEEL LOADER

SERIAL NUMBERS WA120L-3MC 54104 and up

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

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

February 2002

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 0-4 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.

CALIFORNIA

Proposition 65 Warning

Battery posts, terminals and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

Wash hands after handling.

EMISSION CONTROL WARRANTY

EMISSION CONTROL WARRANTY STATEMENT (APPLIES TO CANADA ONLY)

1. Products Warranted

Komatsu America International Company, Komatsu Mining Systems Inc. and Komatsu Utility Corporation (collectively "Komatsu") produce and/or market products under brand names of Komatsu, Dresser, Dressta, Haulpak and Galion. This emissions warranty applies to new engines bearing the Komatsu name installed in these products and used in Canada in machines designed for industrial off-highway use. This warranty applies only to these engines produced on or after January 1, 2000. This warranty will be administered by Komatsu distribution in Canada.

2. Coverage

Komatsu warrants to the ultimate purchaser and each subsequent purchaser that the engine is designed, built and equipped so as to conform, at the time of sale by Komatsu, with all U.S. Federal emission regulations applicable at the time of manufacture and that it is free from defects in workmanship or material which would cause it not to meet these regulations within five years or 3,000 hours of operation, whichever occurs first, as measured from the date of delivery of the engine to the ultimate purchaser.

3. Limitations

Failures, other than those resulting from defects in materials or workmanship, are not covered by this warranty. Komatsu is not responsible for failures or damage resulting from what Komatsu determines to be abuse or neglect, including, but not limited to: operation without adequate coolant or lubricants; over fueling; over speeding; lack of maintenance of lubricating, cooling or intake systems; improper storage, starting, warm-up, run-in or shutdown practices; unauthorized modifications of the engine. Komatsu is also not responsible for failures caused by incorrect fuel or by water, dirt or other contaminants in the fuel. Komatsu is not responsible for non-engine repairs, "downtime" expense, related damage, fines, all business costs or other losses resulting from a warrantable failure.

KOMATSU IS NOT RESPONSIBLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

This warranty, together with the express commercial warranties, are the sole warranties of Komatsu. **THERE ARE NO OTHER WARRANTIES, EXPRESS OR IMPLIED, OR OF MERCHANTABILITY OR FITNESS FOR A PARTICUALR PURPOSE.**

GARANTIE SUR LE CONTRÔLE DES ÉMISSIONS

ÉNONCÉ DE GARANTIE SUR LE CONTRÔLE DES ÉMISSIONS (APPLICABLE AU CANADA SEULEMENT):

1. Produits garantis:

Komatsu America International Company, Komatsu Mining Systems Inc. et Komatsu Utility Corporation (collectivement Komatsu) produisent et/ou font la mise en marché de produits portant les noms de marque Komatsu, Dresser, Dressta, Haulpak et Galion. Cette garantie sur les émissions s'applique à tous les nouveaux moteurs portant le nom Komatsu, installés dans ces produits et utilisés au Canada dans des machines conçues pour utilisation industrielle non-routière. Cette garantie s'applique seulement sur les moteurs produits à partir du 1er Janvier 2000. Cette garantie sera administrée par la distribution de Komatsu au Canada.

2. Couverture:

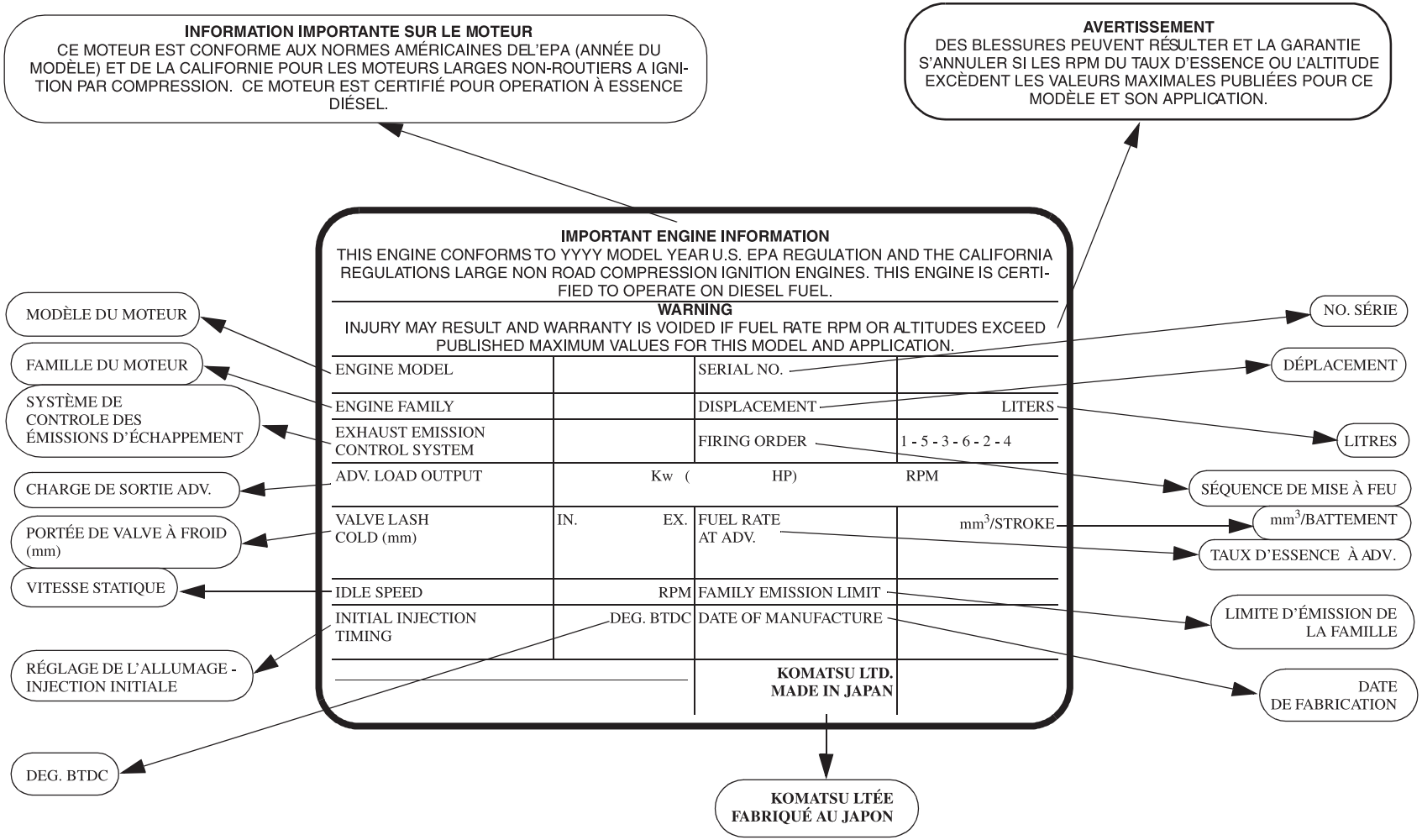
Komatsu garantit à l'acheteur ultime et chaque acheteur subséquent que le moteur est conçu, construit et équipé en toute conformité, au moment de la vente par Komatsu, avec toutes les Réglementations fédérales américaines sur les émissions applicables au moment de la fabrication et qu'il est exempt de défauts de construction ou de matériaux qui auraient pour effet de contrevenir à ces réglementations en dedans de 5 ans ou 3000 heures d'opération, mesuré à partir de la date de livraison du moteur au client ultime.

3. Limitations:

Les bris, autres que ceux résultant de défauts de matériaux ou de construction, ne sont pas couverts par cette Garantie. Komatsu n'est pas responsable pour bris ou dommages résultant de ce que Komatsu détermine comme étant de l'abus ou négligence, incluant mais ne se limitant pas à: l'opération sans lubrifiants ou agent refroidissants adéquats; la suralimentation d'essence; la survitesse; le manque d'entretien des systèmes de lubrification, de refroidissement ou d'entrée; de pratiques non-propices d'entreposage, de mise en marche, de réchauffement, de conditionnement ou d'arrêt; les modifications non-autorisées du moteur. De plus, Komatsu n'est pas responsable de bris causés par de l'essence inadéquate ou de l'eau, des saletés ou autres contaminants dans l'essence. Komatsu n'est pas responsable des réparations non-reliées au moteur, des dépenses encourues suite aux temps d'arrêts, des dommages relatifs, amendes, et de tout autre coût d'affaires ou autres pertes résultant d'un bris couvert par la garantie.

KOMATSU N'EST PAS RESPONSABLE DES INCIDENTS OU DOMMAGES CONSÉQUENTS.

Cette garantie, ainsi que les garanties expresses commerciales, sont les seules garanties de Komatsu. **IL N'Y A AUCUNE AUTRE GARANTIE, EXPRESSE OU SOUS-ENTENDUE, MARCHANDABLE OU PROPICE A UNE UTILISATION PARTICULIÈRE.**



ENGINE DATAPLATE - ENGLISH / FRENCH

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

- Pleasant operator's compartment with low vibration.
- Large gull-wing side panel and fully opening rear grill for ease of maintenance.
- Larger safety lock lever for work equipment to ensure that operator does not forget to apply safety lock

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.

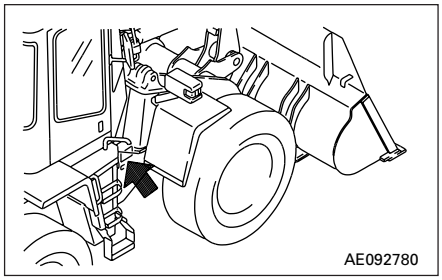
Operations that are prohibited in this manual must never be carried out under any circumstances.

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

4.1 MACHINE SERIAL NO. PLATE POSITION

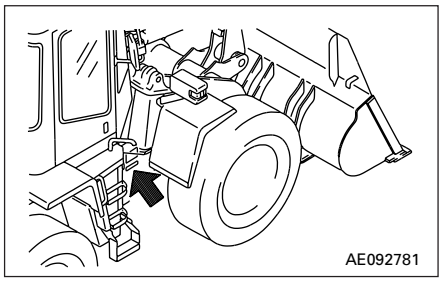
Position of plate

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



Position of stamp

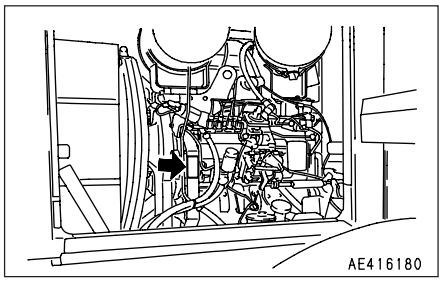
This is stamped on the center of the front frame on the right side of the machine.



4.2 ENGINE SERIAL NO. PLATE POSITION

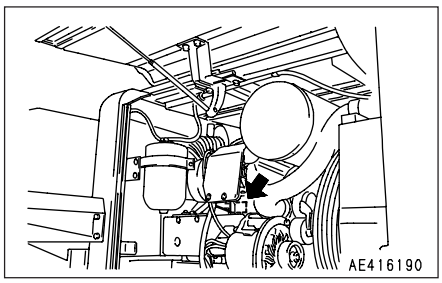
Position of plate

This plate is on top of the engine cylinder head cover.



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:

REMARKS

5. CONTENTS

SAFETY

OPERATION

MAINTENANCE

SPECIFICATIONS

OPTIONS, ATTACHMENTS

SAFETY

⚠ WARNING

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

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

6. GENERAL PRECAUTIONS

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

SAFETY RULES

- Only trained and authorized personnel can operate and maintain the machine.
- Follow all safety rules, precautions and instructions when operating or performing maintenance on the machine.
- 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.

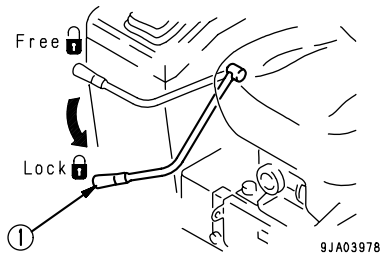
SAFETY FEATURES

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

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

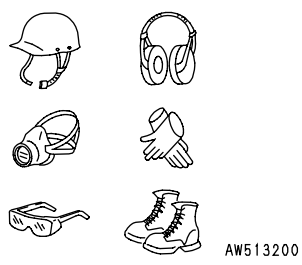
- NEVER remove any safety features. ALWAYS keep them in good operating condition.
  Safety lock lever → See "12.13 PARKING MACHINE"
  Seat belts → See "12.1.3 ADJUSTMENT BEFORE OPERATION"

- 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.

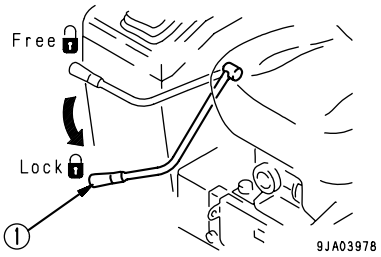


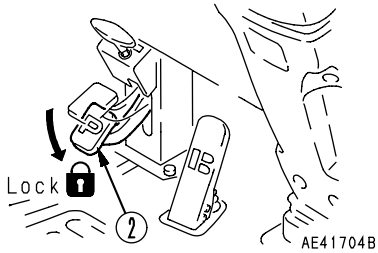
UNAUTHORIZED MODIFICATION

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 ① to the LOCK position and parking brake pedal ② to the LOCK 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 the safety lock lever to the LOCK position and parking brake pedal to the LOCK 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".





MOUNTING AND DISMOUNTING

- 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.
- Do not take hold of the outer handle of the cab door when getting on or off the machine.
- 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.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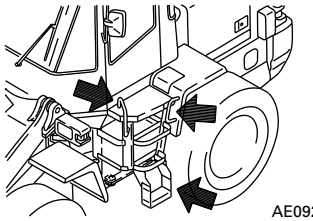
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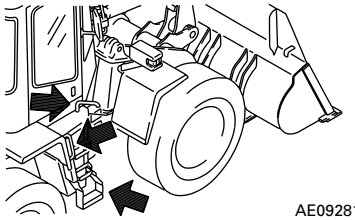
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FIRE PREVENTION FOR FUEL AND OIL

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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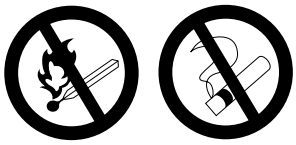

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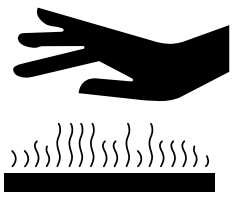
PRECAUTIONS WHEN HANDLING AT HIGH TEMPERATURE

- 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 loosen the cap slowly 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 loosen the cap slowly 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 hydraulic tank.)



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ASBESTOS DUST HAZARD PREVENTION

Asbestos dust can be HAZARDOUS to your health if it is inhaled.
If you handle materials containing asbestos fibers, follow these guidelines as given below:

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

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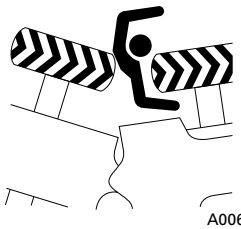
CRUSHING OR CUTTING PREVENTION

- 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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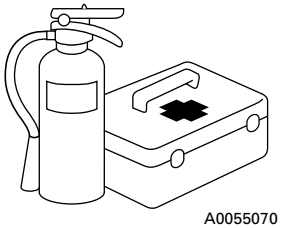
FIRE EXTINGUISHER AND FIRST AID KIT

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



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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.
  Method of releasing pressure, charging gas → See "31.4 PRECAUTIONS WHEN HANDLING 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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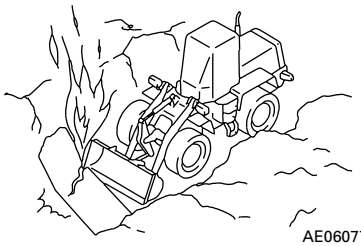
7. PRECAUTIONS DURING OPERATION

⚠ 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.
- Examine the shape of the ground and the quality of the soil at the jobsite, and determine the optimum method of operation.
- When working on public roads, position flagmen and erect barriers to ensure the safety of passing traffic and pedestrians.
- 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".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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.

- Completely remove all wood chips, leaves, grass, paper and other flammable materials accumulated in the engine compartment and around the battery. Check fuel, lubrication, and hydraulic systems for leaks, and have any leaks repaired. Wipe up any excess oil, fuel or other flammable fluids. Return all fuel containers to their proper place, remove all parts and tools from the operator's compartment, and remove any dirt from the mirrors, handrails, and steps.
  Check points → 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.
  Adjusting operator's seat → See "12.1.3 ADJUSTMENT BEFORE OPERATION".
  Seat belt → See "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 → See "12.1.4 OPERATIONS AND CHECKS BEFORE STARTING ENGINE".
- Remove all dirt from the surface of the 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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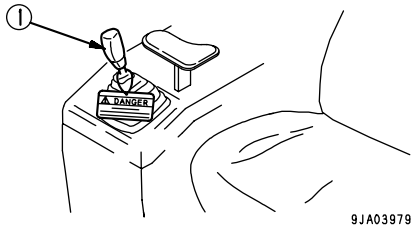
WHEN STARTING ENGINE

- 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 short circuit the starting motor to start the engine. This is not only dangerous, but may also damage the machine.
- For machines equipped with the backup alarm, check that the alarm works properly.



IN OPERATOR'S CAB

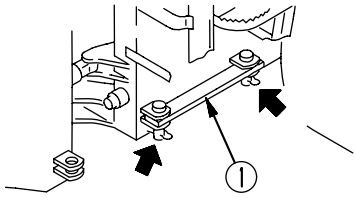
- Do not leave tools or spare parts lying around in the operator's compartment. They may damage or break the control levers or switches. Always put them in the tool box on the right side of the machine.
- Keep the cab floor, controls, steps and handrails free of oil, grease, snow, and excess dirt.
- Check the seat belt, buckle and hardware for damage or wear. Replace any worn or damaged parts. Always use seat belts when operating your machine.
  Seat belt → See "12.1.3 ADJUSTMENT BEFORE OPERATION".

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 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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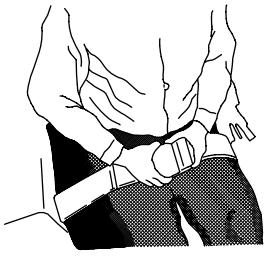
PRECAUTIONS WHEN STARTING OFF

- 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 fasten the seat belt.
- Always operate the machine only when seated in the operator's seat.
- An additional worker may ride in the machine only when sitting in the operator's seat. Do not allow anyone to ride on the machine body.
- Check that the backup alarm works properly.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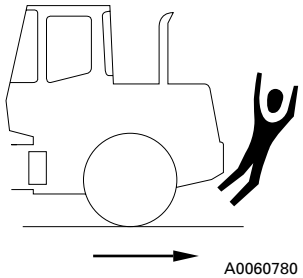
CHECK WHEN CHANGING DIRECTION

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.
- Do not change the travel direction at high speed.
- Ensure that no unauthorized person can come within the direction of turning or direction of travel.

This rule must be strictly observed even on machines equipped with a back-up alarm or rear view mirror.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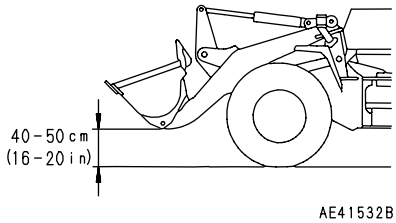
PRECAUTIONS WHEN TRAVELING

- 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, oil leakage, etc.), move the machine immediately to a safe place and look for the cause.
- Set the work equipment to a height of 40 – 50 cm (16 – 20 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.



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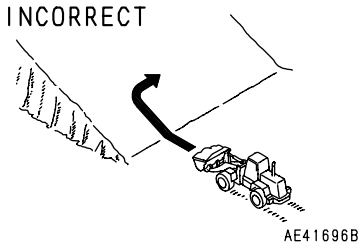
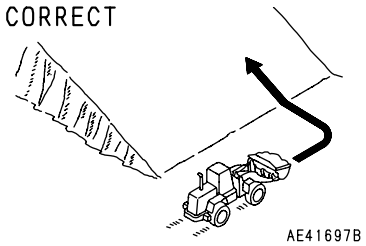
TRAVELING ON SLOPES

- Traveling on slopes could result in the machine tipping over or slipping to the side.
- When traveling on slopes, keep the bucket approximately 20 – 30 cm (8 – 12 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.



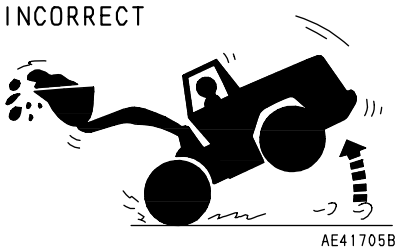


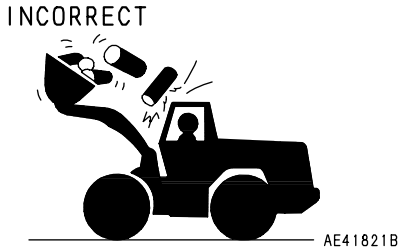
PROHIBITED OPERATIONS

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.

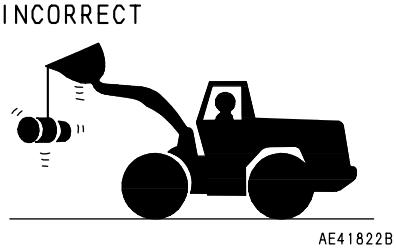
PRECAUTIONS WHEN OPERATING

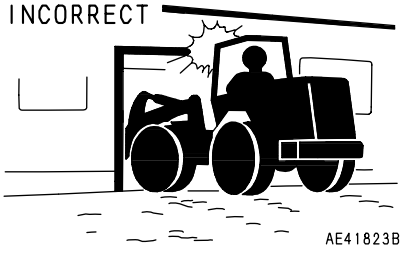
- Be careful not to approach too close to the edge of cliffs.
  When making embankments or landfills, or when dropping soil over a cliff, dump one pile, then use the next pile of soil to push the first pile.
- The load suddenly becomes lighter when the soil is pushed over a cliff or when the machine 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.





- 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.

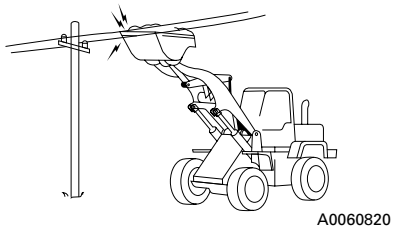




DO NOT GO CLOSE TO HIGH-VOLTAGE CABLES

- 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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ENSURE GOOD VISIBILITY

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

DO NOT HIT WORK EQUIPMENT

- When working in places where there are height limits, such as in tunnels, under bridges, under electric cables, or in garages, be extremely careful not to hit the work equipment.

METHOD OF USING BRAKES

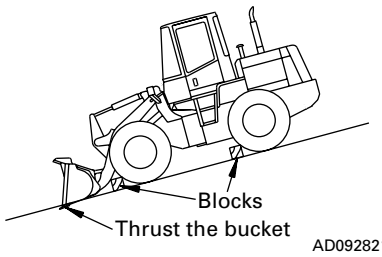
- Do not put your foot on the brake pedal unless necessary.
- Do not depress the brake pedal repeatedly unless necessary.
- When traveling downhill, use the engine as a brake, and always use the right brake pedal.
- Note that when the engine of a machine with booster stops, the brake pedal becomes 3.5 times heavier.

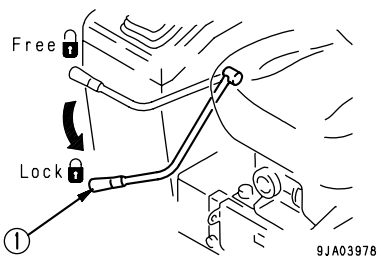
WORKING ON LOOSE GROUND

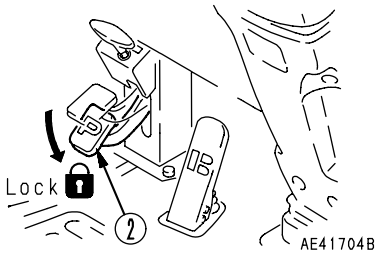
- Do not operate the machine on soft ground. It is difficult to get the machine out again.
- Avoid operating your machine too close to the edge of cliffs, overhangs, and deep ditches. If these areas collapse under the mass or vibration of your machine, the machine could fall or tip over and this could 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 safety lock lever ① to the LOCK position and parking brake pedal ② to the LOCK 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".







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.

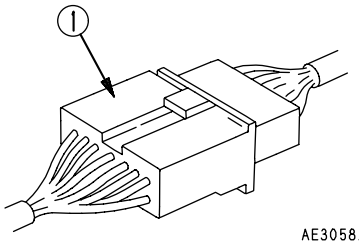
PRECAUTIONS IN COLD AREAS

- 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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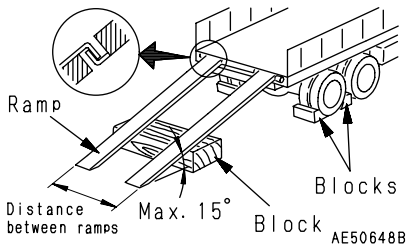


SHIPPING

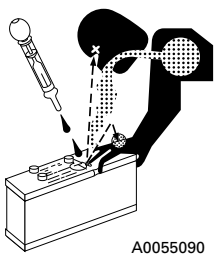
- When shipping the machine on a hauling vehicle, obey all state and local laws governing the weight, width, and length of a load. Also obey all applicable traffic regulations.
- Take into account the width, height, and weight of the load when determining the shipping route. **Height, width, load of machine → See "13.4 PRECAUTIONS FOR 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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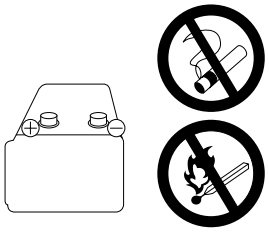
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STARTING WITH BOOSTER CABLES

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.
- If a tool touches the cable connecting the positive terminal and the chassis, there is danger that it will cause sparks.
- When connecting the cables, never contact the positive ⊕ and negative ⊖ terminals.
- When starting the engine with a booster cable, always wear safety glasses.

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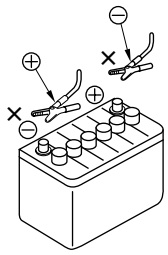

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CHARGING BATTERY

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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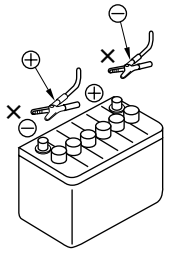
INCORRECT



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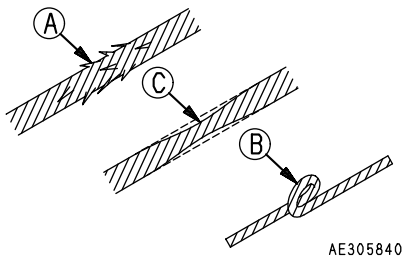
7.5 TOWING

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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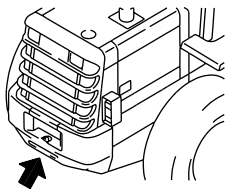
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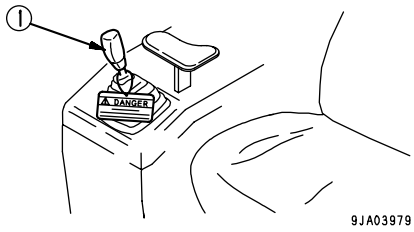
8.1 BEFORE CARRYING OUT MAINTENANCE

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.

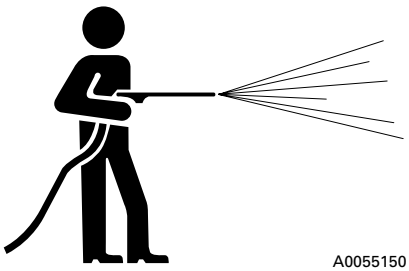
WARNING TAG

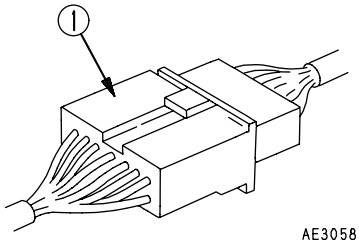
- If others start the engine or operate the controls while you are performing service or lubrication, you could suffer serious injury or death.
- ALWAYS attach the WARNING TAG to work equipment control lever ① in the operator's cab to alert others that you are working on the machine. Attach additional 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 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

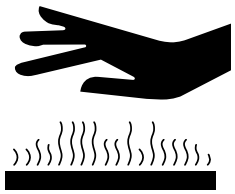
Do not leave hammers or other tools lying around in the work place. Wipe up all grease, oil, or other substances that will cause you to slip. Always keep the work place clean the tidy to enable you to carry out operations safely.
If the work place is not kept clean and tidy, there is danger that you 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 sub-tank, or 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.)
- Release the internal pressure before removing the radiator cap, and remove the radiator cap slowly.
- When adding coolant, add it to the sub-tank.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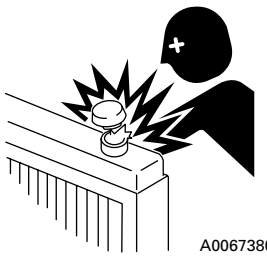
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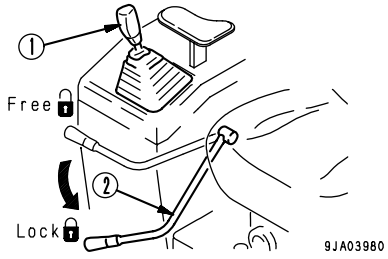
STOP ENGINE BEFORE CARRYING OUT INSPECTION AND MAINTENANCE

- 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 work equipment 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.
- Lock parking brake pedal ③ 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.



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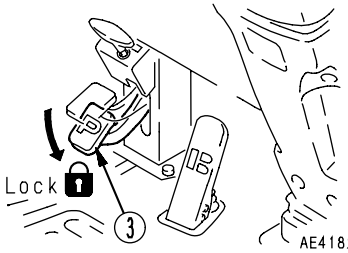

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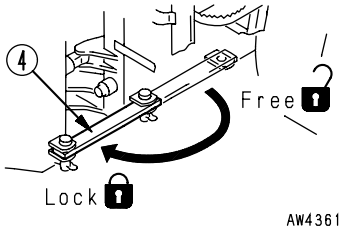

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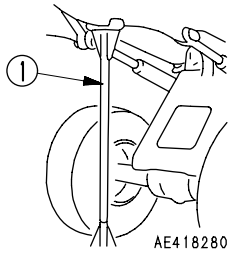
TURN E.C.S.S. SWITCH OFF

For machines equipped with a E.C.S.S., lower the bucket to the ground and turn the E.C.S.S. switch OFF before starting inspection or maintenance. NEVER turn the switch ON during inspection or maintenance.
If the E.C.S.S. switch is turned ON, the hydraulic accumulator of the E.C.S.S. is connected to the bottom circuit of the lift cylinder. This will cause danger because the hydraulic oil from the accumulator will flow in or out to balance the pressure, and the lift arm will move.
If the starting switch is at the OFF position, the E.C.S.S. is not actuated even if the E.C.S.S. switch is ON, but if the starting switch is ON, the E.C.S.S. can be actuated, and it will be switched to the actuation condition when the E.C.S.S. switch is turned ON.

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.



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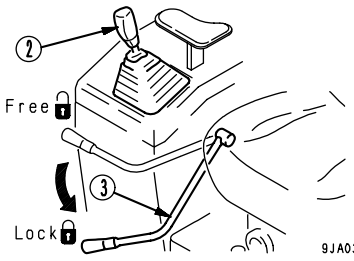

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PROPER TOOLS

- 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".

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PERIODIC REPLACEMENT OF SAFETY CRITICAL PARTS

Hoses and other parts of the fuel, 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, or battery electrolyte, 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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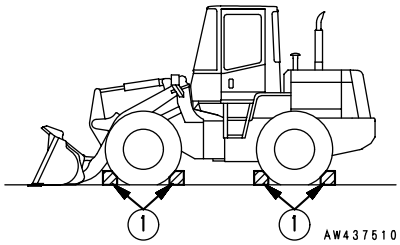
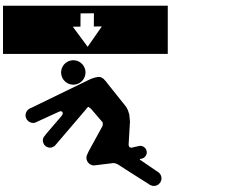
WORK UNDER THE MACHINE

- 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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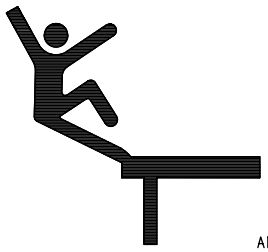
MAINTENANCE WITH CHASSIS RAISED

- 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 jacking 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 top of the hood is slippery, so it is dangerous. Never stand on top of the engine hood.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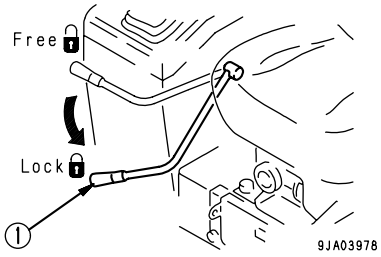
MAINTENANCE WITH ENGINE RUNNING

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 lever ① to the LOCK position to prevent the work equipment from moving.
  In addition, lock parking brake pedal ②.
- 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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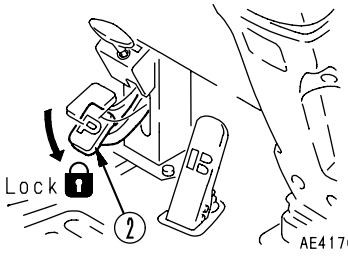

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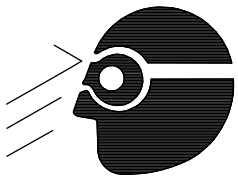
DO NOT DROP TOOLS OR PARTS INSIDE MACHINE

- 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, 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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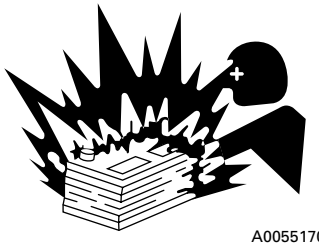
REPAIR WELDING

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 leave the work place 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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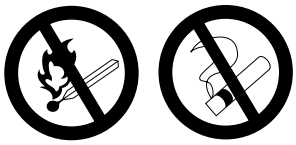

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HANDLING HIGH-PRESSURE HOSES

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

PRECAUTIONS WITH HIGH-PRESSURE OIL

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.

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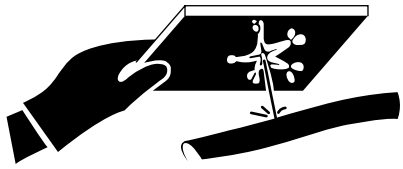

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PRECAUTIONS WHEN CARRYING OUT MAINTENANCE AT HIGH TEMPERATURE OR HIGH PRESSURE

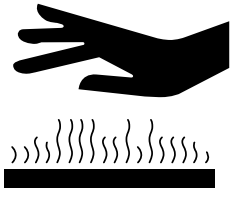
- Immediately after stopping operations, the engine cooling water and oil at all parts is at high temperature and under high pressure.
  In this condition, if the cap is removed, or the oil or water are drained, or the filters are replaced, this may result in burns or other injury. Wait for the temperature 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 "12.1.2 CHECK BEFORE STARTING".

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

Changing oil, replacing filters → see "24.6 – 9 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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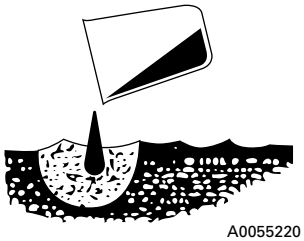

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8.3 TIRES

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.

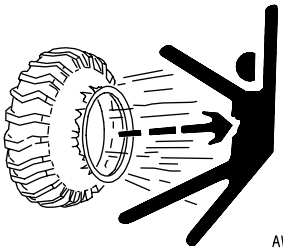
While inflating the tire, check the inflation pressure occasionally so that it will not rise too high.

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 trouble 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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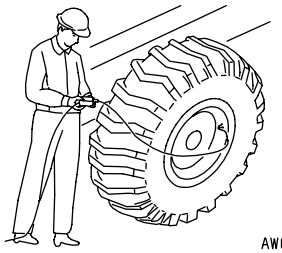
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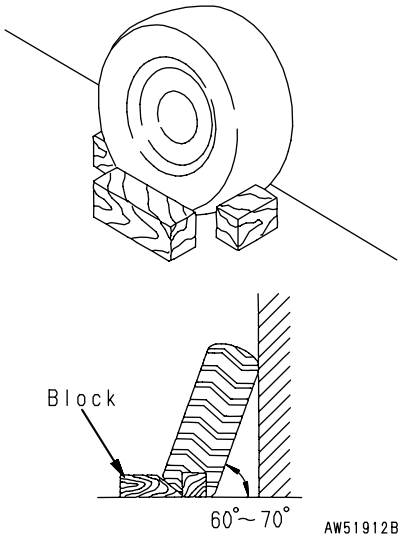
PRECAUTIONS FOR STORAGE OF TIRES

- 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.



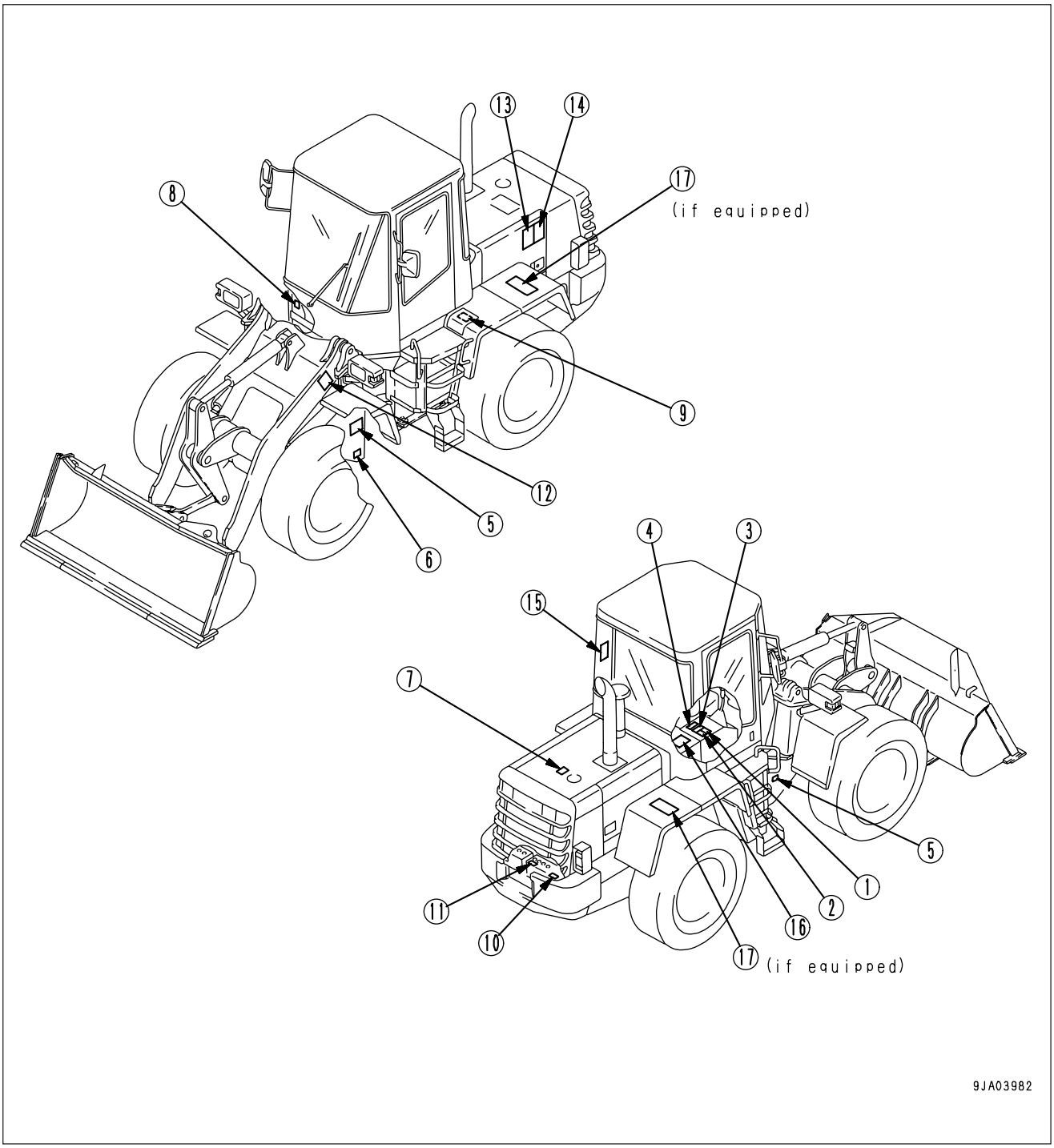
9. POSITION FOR ATTACHING SAFETY LABELS

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

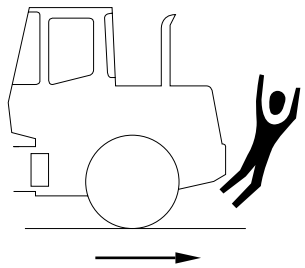
Improper operation and maintenance can cause serious injury or death.
Read manual and labels before operation and maintenance.
Follow instructions and warnings in manual and in labels on machine.
Keep manual in machine cab near operator.
Contact Komatsu distributor for a replacement manual.

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.

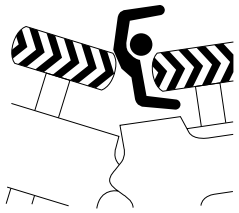
4. Precautions for parking brake

WARNING

Hydraulically-boosted brake system is used for this machine. If the engine is stopped, the required braking effort increases considerably. This in turn causes the braking distance to be extended and may lead to an accident. Never stop the engine while traveling.

5. 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.

6. 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.

7. 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.

8. 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.

9. Precautions for brake oil

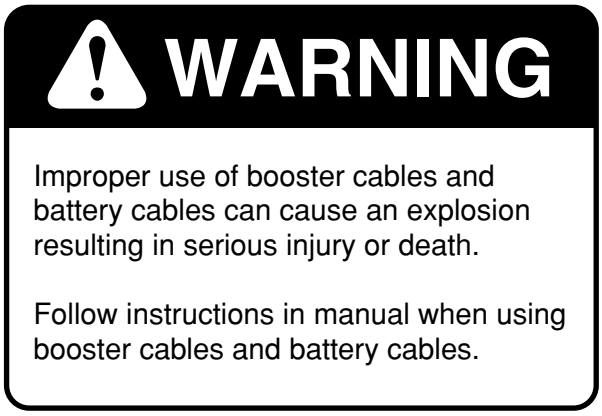
WARNING

ALWAYS use Komatsu engine oil (mineral oil) in brake system.

Do not use automobile brake fluid which could damage rubber components in the brake system and result in brake failure.

See manual for engine oil specifications.

10. Precautions when handling battery cable



Please request part number 417-93-21360 for safety labels (1 – 4).
Please request part number 417-93-21310 for safety labels (5 – 10).

11. Precautions when handling battery

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

12. “Do not go under work equipment” sign (09807-C0883)

There is danger of work equipment coming down.

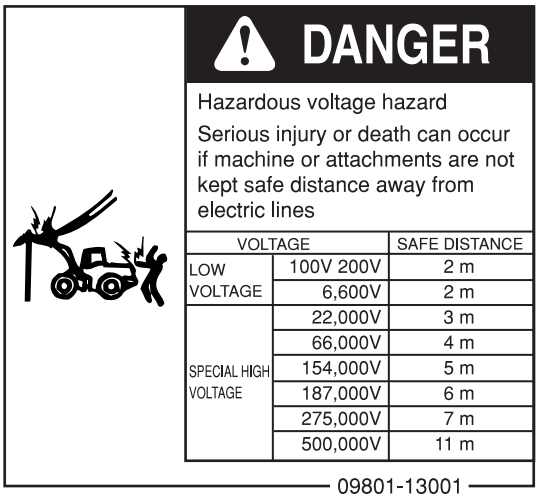
Do not go close when work equipment is raised.

13. “Do not open when engine is running” sign. (09667-03001)

14. “Do not come near machine” sign (09812-13000)

15. “Do not modify ROPS” sign (if equipped)

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



17. Do not climb on fender (if equipped) (Machines with equipped with rear full fender) (09805-03000)

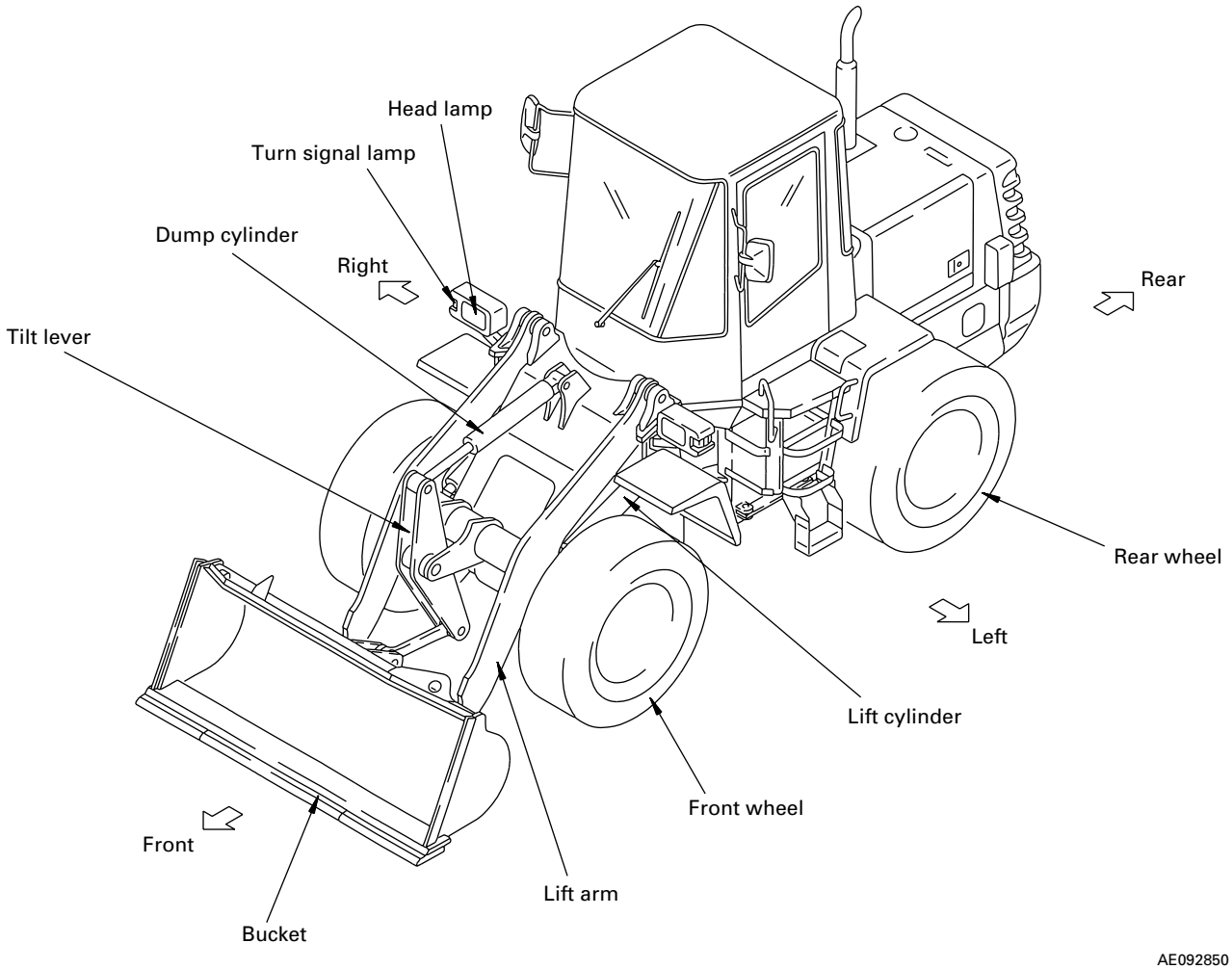
MEMO

OPERATION

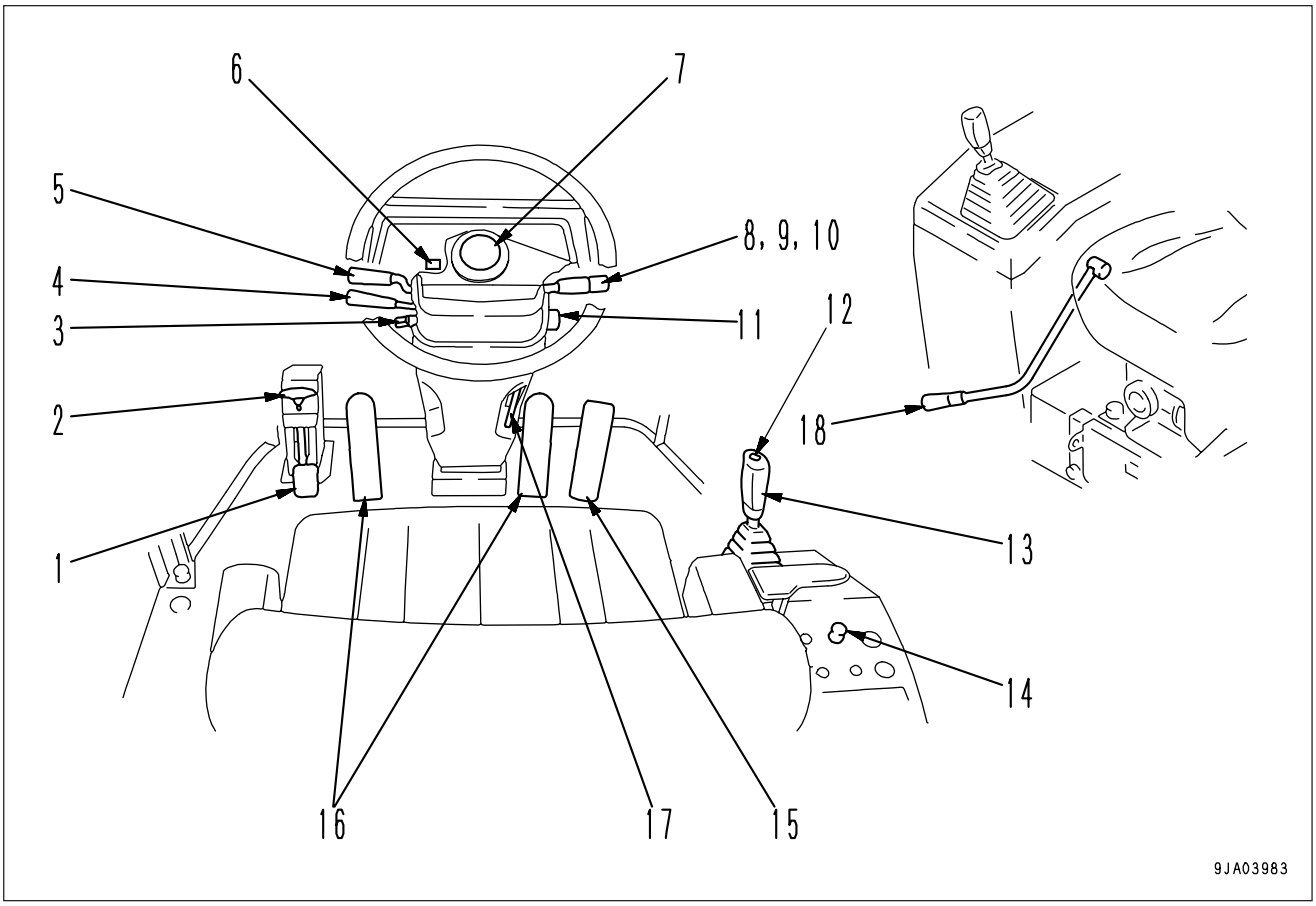
10. GENERAL VIEW

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.

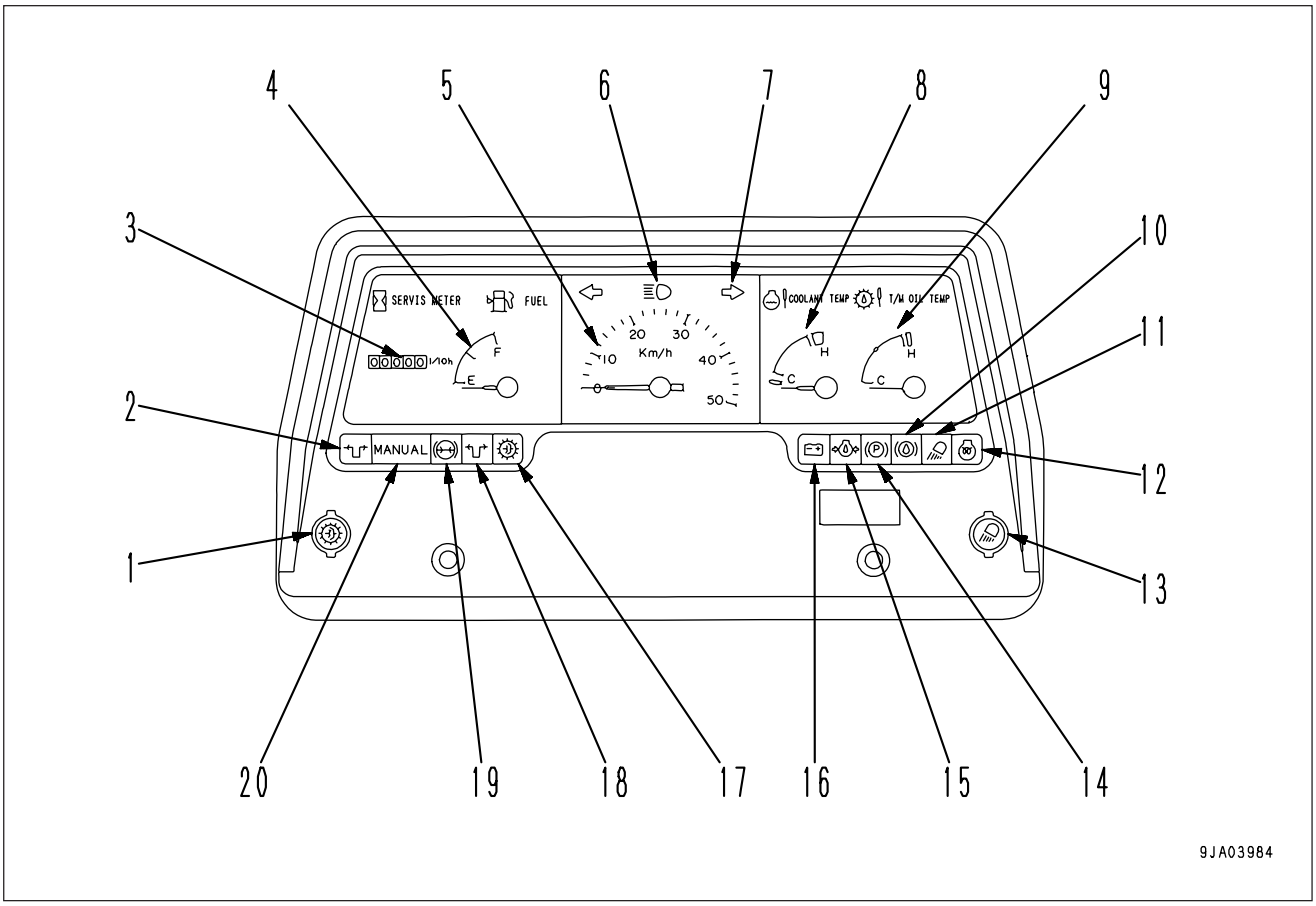


10.2 GENERAL VIEW OF CONTROLS AND GAUGES



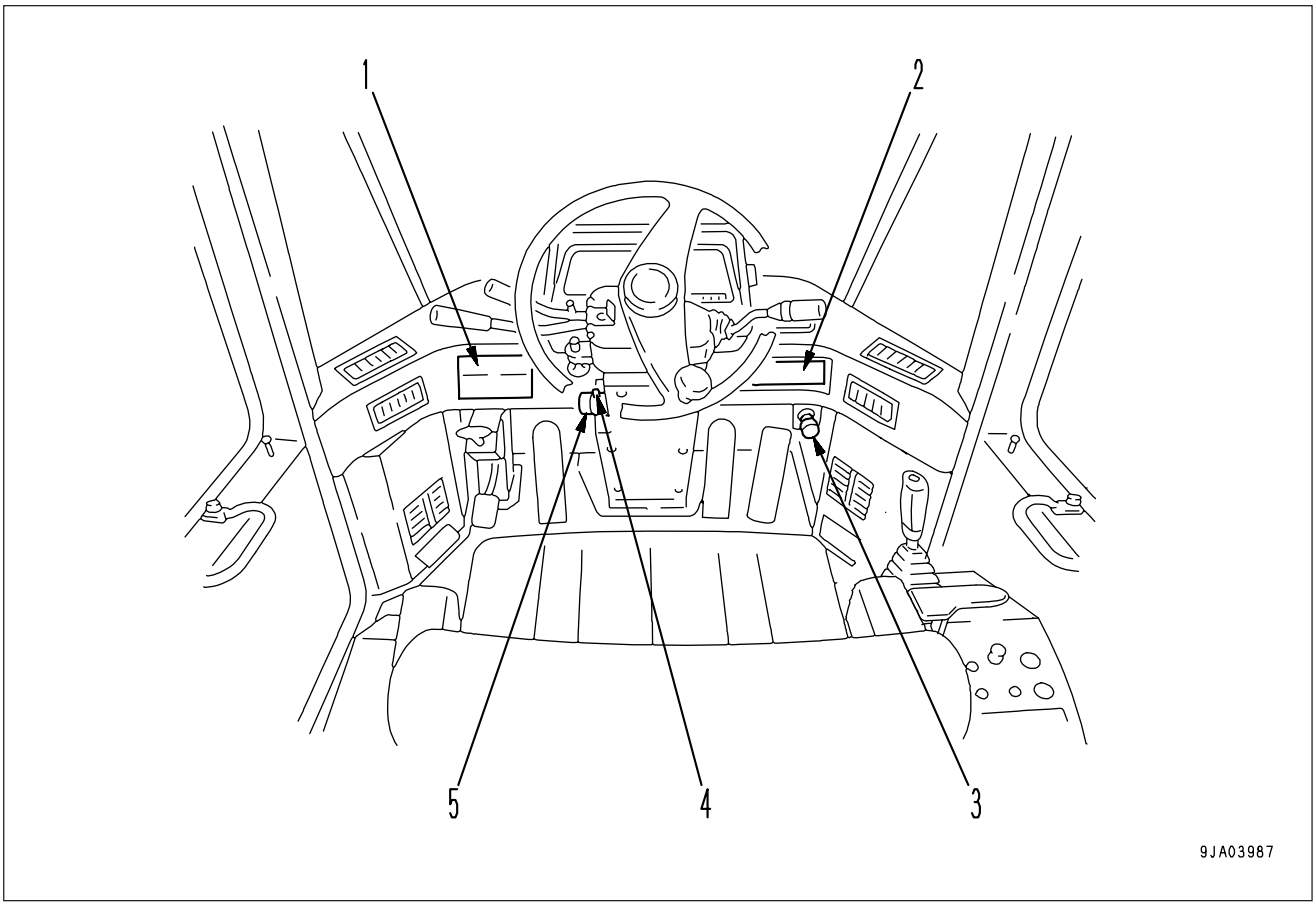
1. Parking brake pedal
2. Parking brake release lever
3. Speed control lever stopper
4. Speed control lever
5. Directional lever
6. Hazard lamp switch
7. Horn button
8. Lamp switch
9. Turn signal lever
10. Dimmer switch
11. Starting switch
12. Kickdown switch
13. Work equipment control lever
14. Transmission Auto shift/Manual selector switch
15. Accelelator pedal
16. Brake pedal
17. Steering column tilt lever
18. Safety lock lever

MACHINE MONITOR



1. Transmission cut-off switch
2. Emergency steering pilot lamp (red)
3. Service meter
4. Fuel gauge
5. Speedometer
6. High beam pilot lamp
7. Turn signal pilot lamp
8. Engine water temperature gauge
9. Torque converter oil temperature gauge
10. Brake oil level caution lamp
11. Working lamp pilot lamp
12. Preheating pilot lamp
13. Working lamp switch
14. Parking brake pilot lamp
15. Engine oil pressure caution pilot lamp
16. Battery charge caution pilot lamp
17. Transmission cut-off pilot lamp
18. Emergency steering normal pilot lamp (blue)
19. Brake boost pressure caution pilot lamp
20. Transmission Auto-shift/Manual-shift pilot lamp

MACHINE EQUIPPED WITH CAB



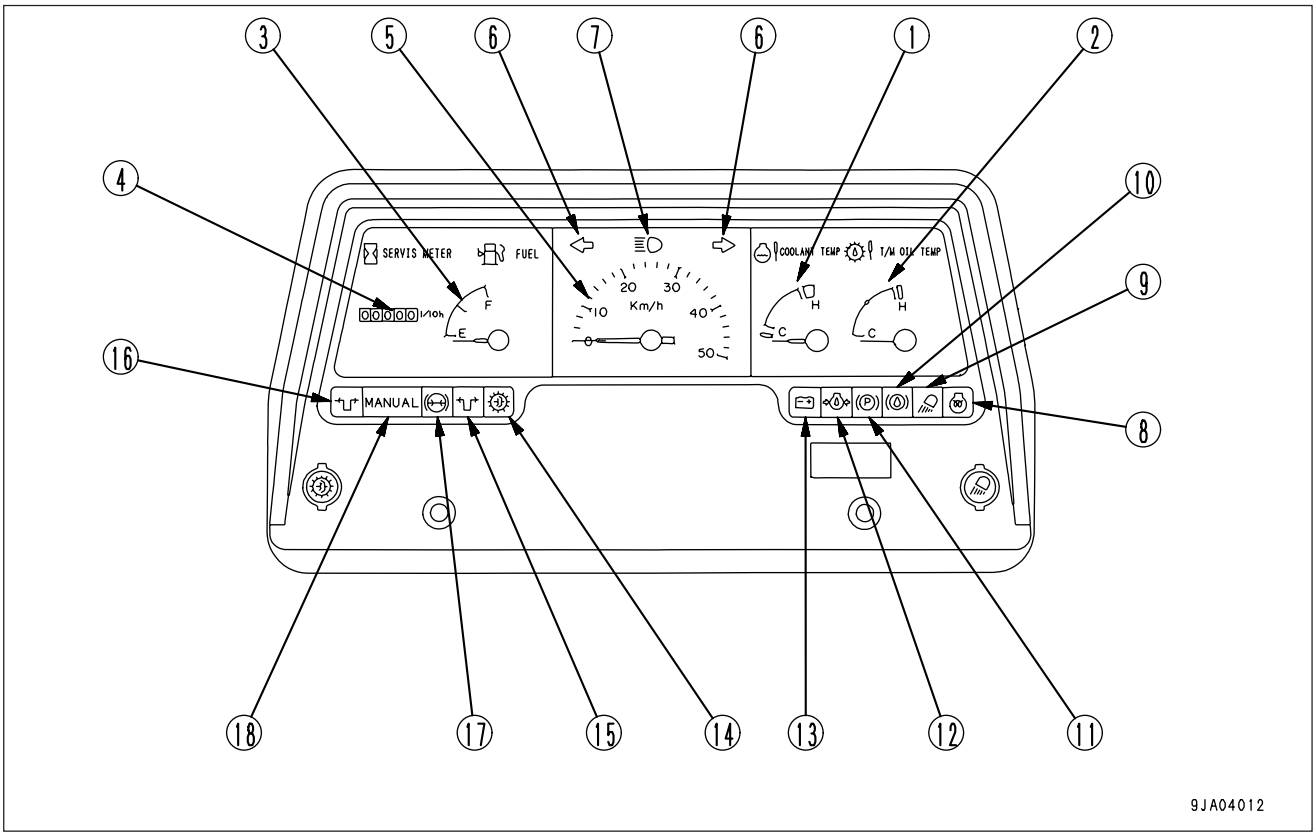
1. Air conditioner (if equipped)
2. Cab radio (if equipped)
3. Cigarette lighter
4. Rear wiper switch
5. Front wiper switch

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 METER, LAMPS

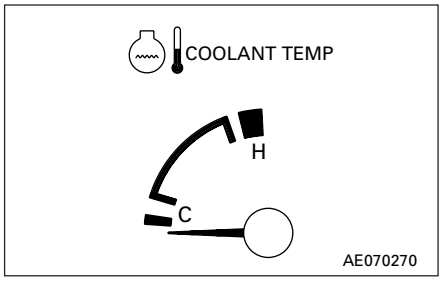


1. ENGINE WATER TEMPERATURE GAUGE

This gauge indicates the engine cooling water temperature.

When the pointer of the temperature gauge shows the white range, the oil temperature is normal.

When the pointer enters the red range, stop the machine immediately, and run the engine with no load at midrange speed until the oil temperature drops to the normal value.



NOTICE

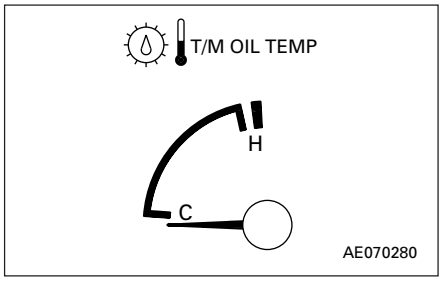
If the engine water temperature gauge enters the red range frequently, check and clean the radiator fins.

2. TORQUE CONVERTER OIL TEMPERATURE GAUGE

This gauge indicates the torque converter oil temperature.

When the pointer of the temperature gauge shows the white range, the oil temperature is normal.

When the pointer enters the red range, stop the machine immediately, and run the engine with no load at midrange speed until the oil temperature drops to the normal value.



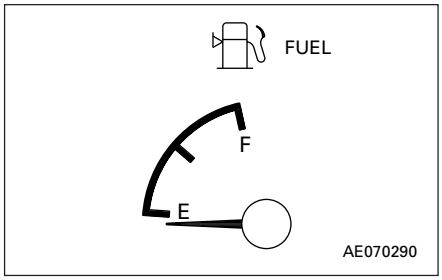
3. FUEL GAUGE

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

E: Tank is EMPTY

F: Tank is FULL

If the fuel gauge indicates E during operation, check and supply fuel.



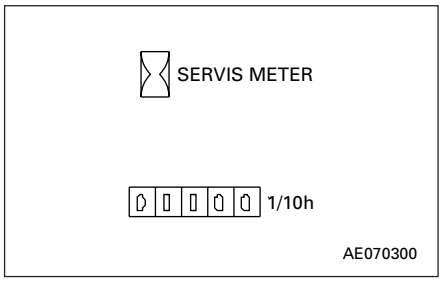
4. SERVICE METER

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.

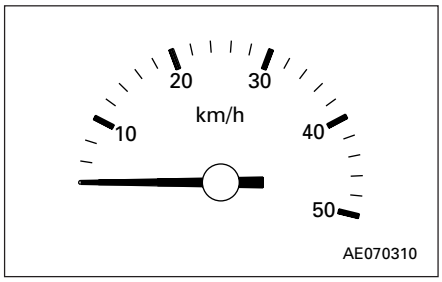
While the engine is running, green pilot lamp on the service meter flashes to show the service meter advances.

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



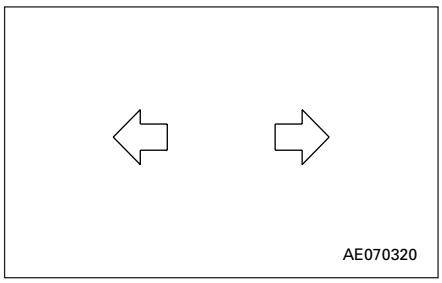
5. SPEEDOMETER

This meter indicates the travel speed of the machine.



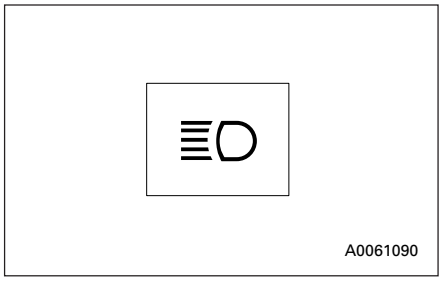
6. TURN SIGNAL PILOT LAMP

When the turn signal lamp flashes, the pilot lamp also flashes.



7. HIGH BEAM PILOT LAMP

This lamp lights up when the head lamp is at high beam.

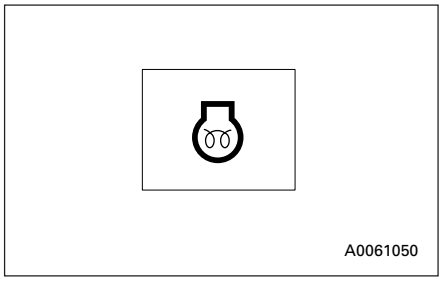


8. PREHEATING PILOT LAMP

This informs the operator that the glow plug is heated.

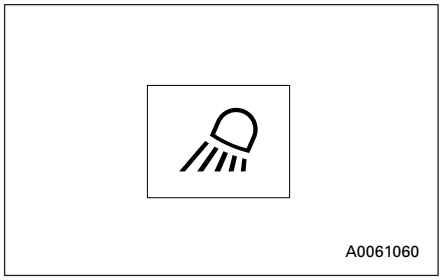
This lamp lights up when the starting switch is turned to the ON position, and goes out when the preheating is completed.

The time that it remains lighted up differs according to the water temperature when the engine is started.



9. WORKING LAMP PILOT LAMP

Thils lamp lights up when the working lamp is switched on.

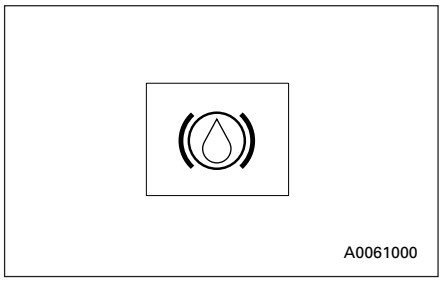


10. BRAKE OIL LEVEL CAUTION PILOT LAMP

This lamp indicates a low brake oil level.

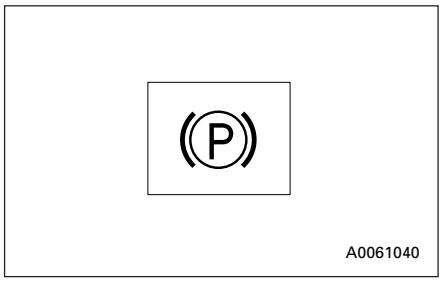
It is kept turned off if the brake oil level is normal.

If the lamp lights, check the oil level and add brake oil as required.



11. PARKING BRAKE PILOT LAMP

This lamp lights up when the parking brake is applied.



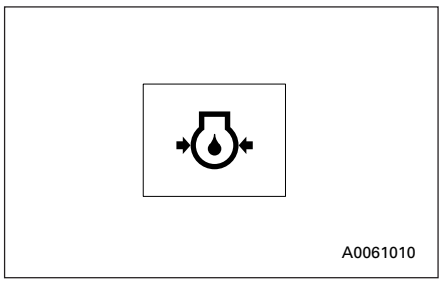
12. ENGINE OIL PRESSURE CAUTION PILOT LAMP

This lamp indicates lowering of the engine lubricating oil pressure.

It is kept turned off during operation if the oil pressure is normal.

If the engine oil pressure lowers during operation, this lamp lights up. In this case, stop the engine immediately and check the engine oil level.

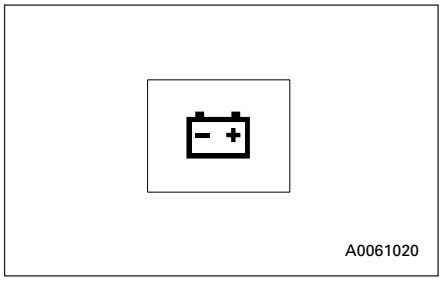
If this lamp does not light up when the starting switch is turned on, the bulb is broken. Replace the bulb in this case.



13. BATTERY CHARGE CAUTION PILOT LAMP

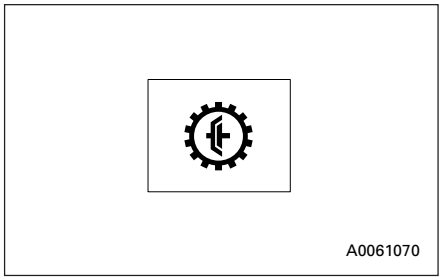
This warns the operator that there is an abnormality in the charging system when the engine is running.

If it lights up, check the charging circuit.



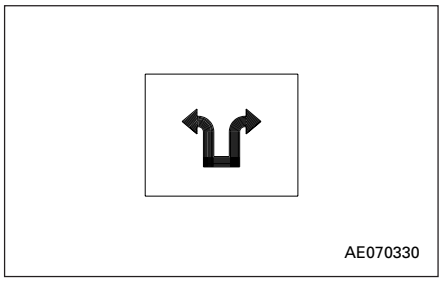
14. TRANSMISSION CUT-OFF PILOT LAMP

This lamp lights up when the transmission cut-off switch is turned to ON.



15. EMERGENCY STEERING NORMAL PILOT LAMP (BLUE) (if equipped)

When the machine is traveling, this lamp is on to show that the emergency steering system pump is operating normally.

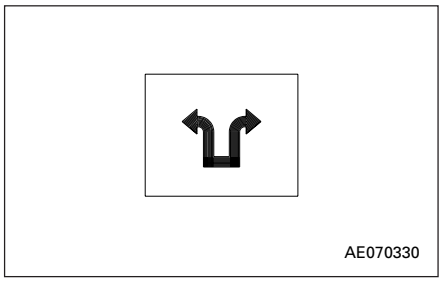


16. EMERGENCY STEERING PILOT LAMP (RED) (if equipped)

WARNING

If the lamp lights up, move the machine immediately to a safe place and stop the machine.

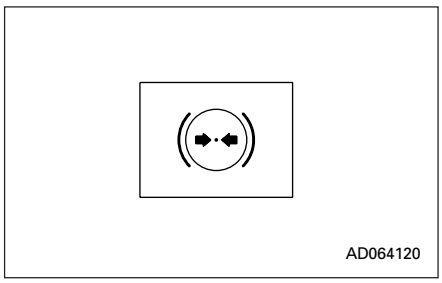
If the engine stops when the machine is traveling, or if the oil pressure in the steering pump drops, the lamp will light up.



17. BRAKE BOOST PRESSURE WARNING PILOT LAMP

This lamp indicates a drop in the boost pressure of the brake booster.

If the lamp lights up, stop the machine immediately and check the brake booster system.

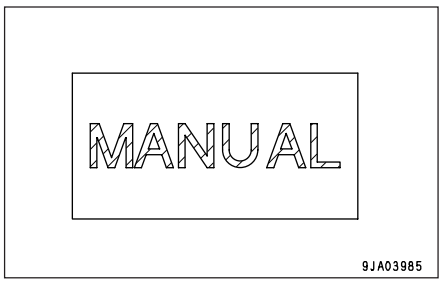


18. TRANSMISSION AUTO-SHIFT/MANUAL-SHIFT PILOT LAMP

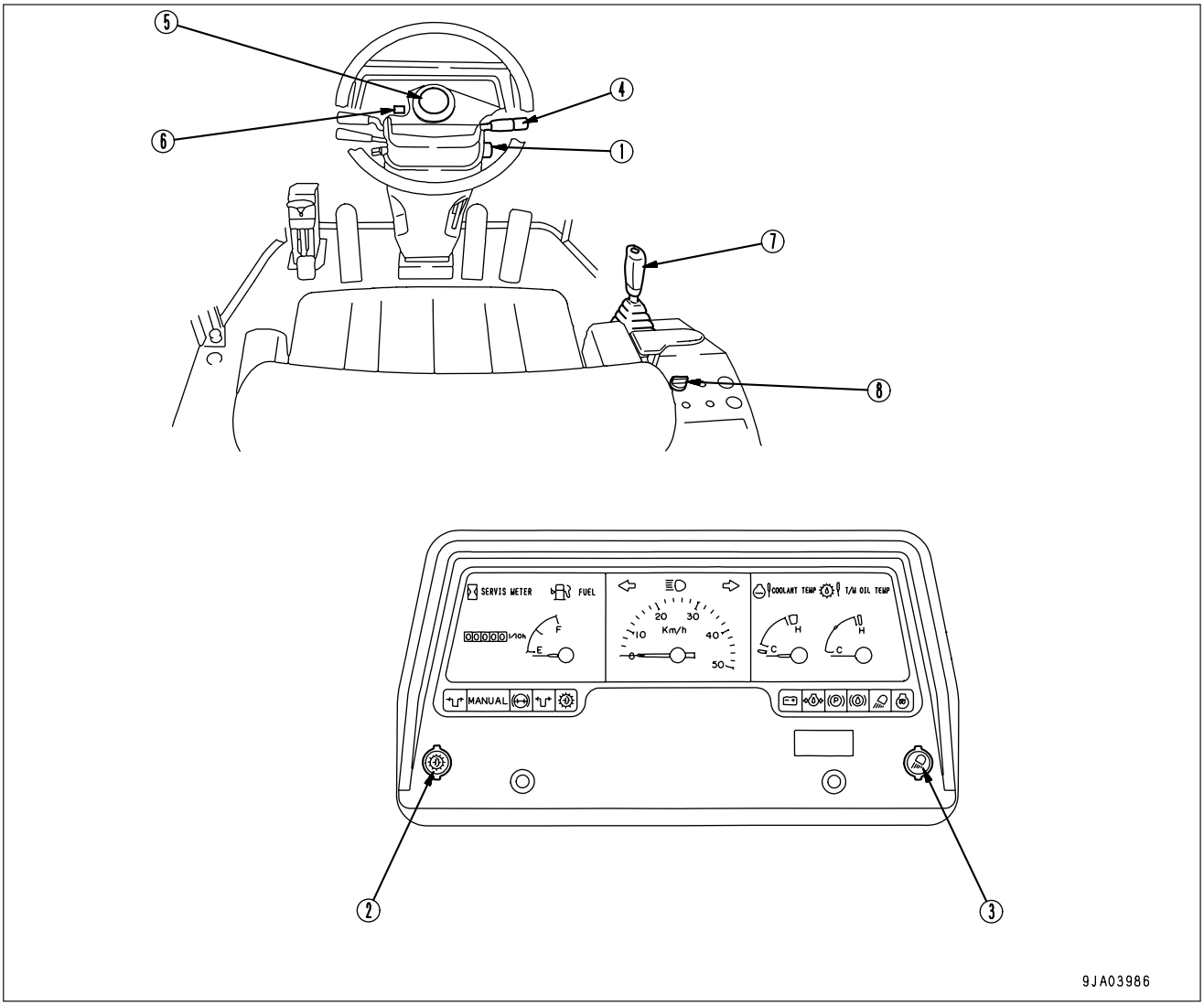
WARNING

If the lamp lights up, move the machine to a safe place immediately and stop the machine.

This lamp remains on while the transmission is set to MANUAL selection. The gear shift lever can be used to shift the transmission as long as this pilot lamp is lit.

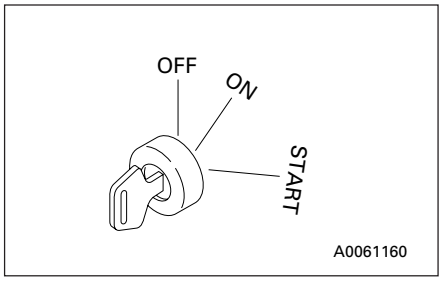


11.2 SWITCHES



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.

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

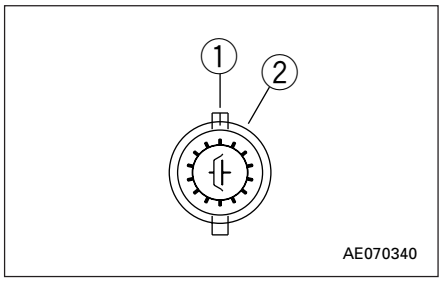
This is the engine-start position. Keep the key at this position during cranking. Immediately after starting the engine, release the key which will automatically return to the ON position.

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.

Normally, put this switch in ON position.
Position ① (OFF): Acts as normal brake (like right brake pedal).
Position 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.

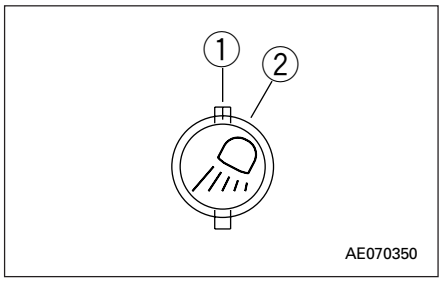


3. WORKING LAMP SWITCH

⚠ WARNING

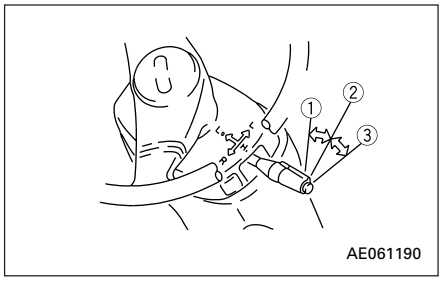
Always turn the working lamp off before traveling on public roads.

When the front and rear working lamps are turned ON, the pilot lamp lights up.
Position ① : OFF
Position ② : Lights up



4. 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

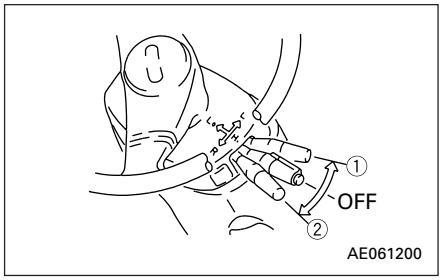
The lamp switch can be operated regardless of the position of the lever.

4. TURN SIGNAL LEVER

This lever operates the turn signal lamps.

① LEFT TURN: Push lever FORWARD.

② RIGHT TURN: Pull lever BACK.



REMARK

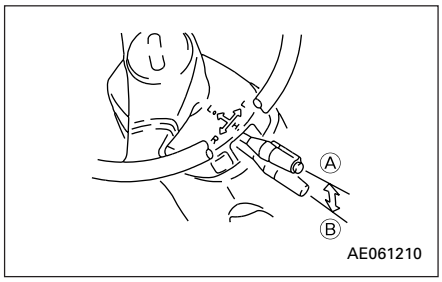
- When the lever is operated, the turn signal pilot lamp will also light up.
- When the steering wheel is turned to the neutral position, the turn signal lever will return automatically to OFF. If not, return the lever to OFF manually.

4. DIMMER SWITCH

This switches the head lamp between high beam and low beam.

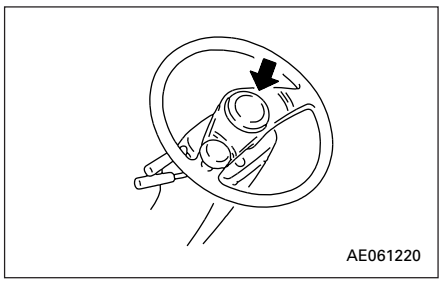
Ⓐ Low beam

Ⓑ High beam



5. HORN BUTTON

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



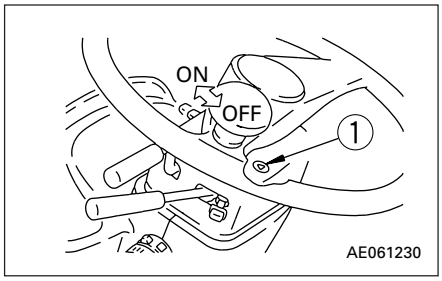
6. HAZARD LAMP SWITCH

⚠ 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.

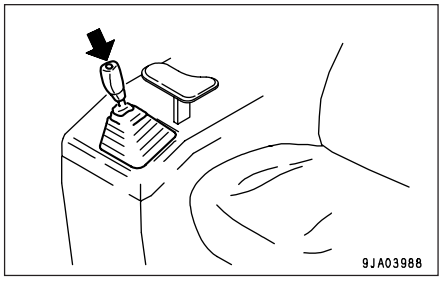


REMARK

Whe 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.

7. KICKDOWN SWITCH

When the speed control lever is in 2nd, and the switch is pressed, the gear will shift down to 1st.



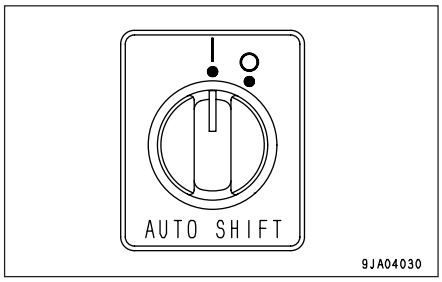
This switch is used to increase the drawbar pull in digging operations.

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.

8. TRANSMISSION AUTO SHIFT/MANUAL SELECTOR SWITCH

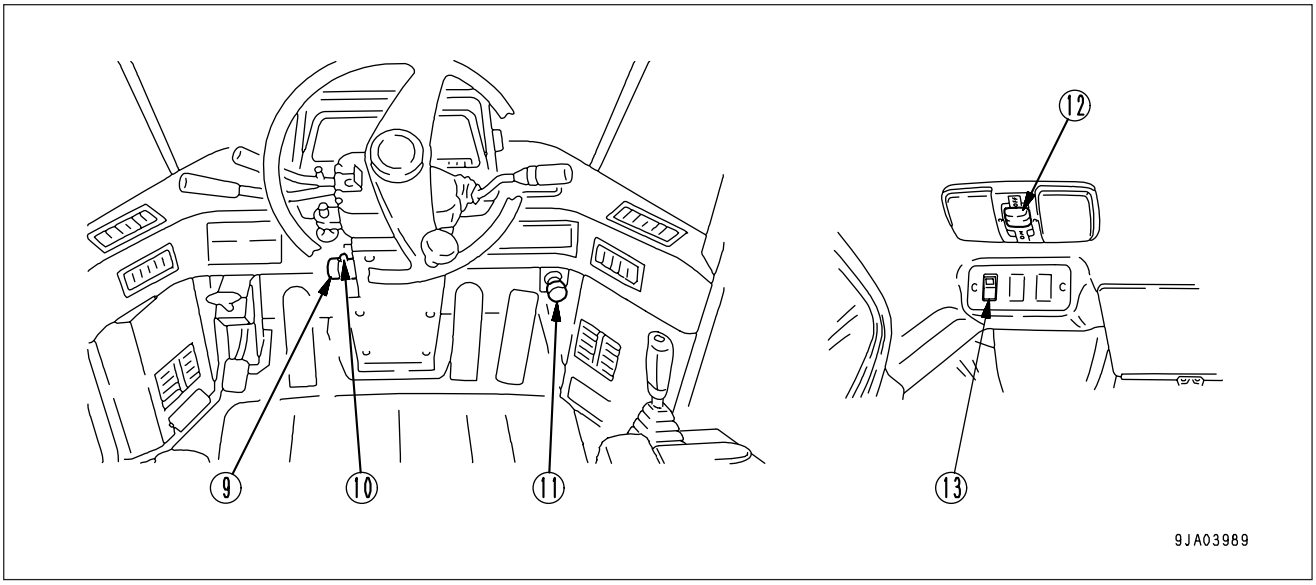
Setting this switch to the "I" position places the transmission in the auto-shift mode and the auto-shift/manual-shift pilot lamp stays off.



Setting this switch to the "O" position places the transmission in the manual shift mode and the auto-shift/manual-shift pilot lamp lights up.

MACHINE EQUIPPED WITH CAB

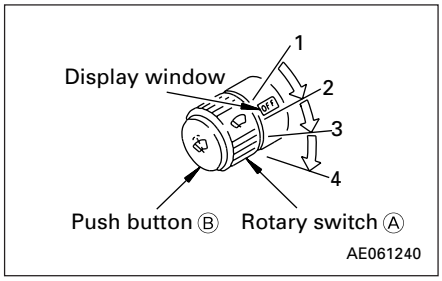
(The following items 9 – 13 are added when the cab is installed as standard.)



9. FRONT WIPER SWITCH

- Turn switch Ⓐ to operate the front wiper.

Switch position	Window display	Operation
1	OFF	OFF
2	INT	Intermittent wiper
3	1	Low-speed wiper
4	2	High-speed wiper

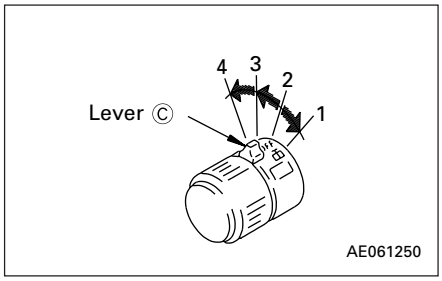


- If button Ⓑ is kept pressed, washer fluid will be sprayed out on to the front glass.

10. REAR WIPER SWITCH

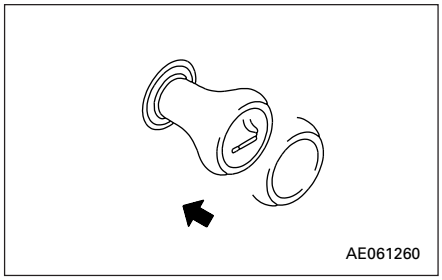
- Turn lever Ⓒ to operate the rear wiper.

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



11. CIGARETTE LIGHTER

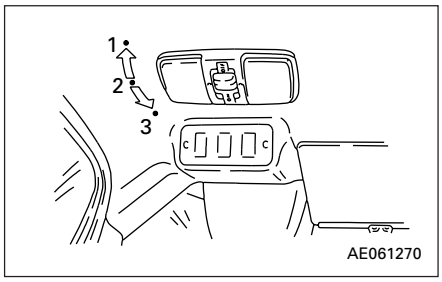
This is used to light cigarettes.
To use, push the lighter in. After the few seconds it will spring back. At that time, remove the lighter and light your cigarette.



12. 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



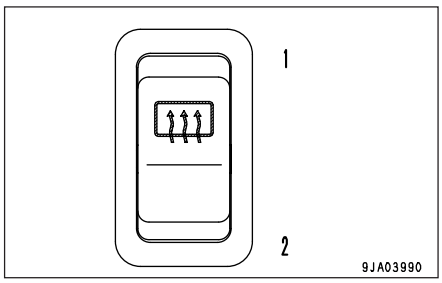
REMARK

- 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).

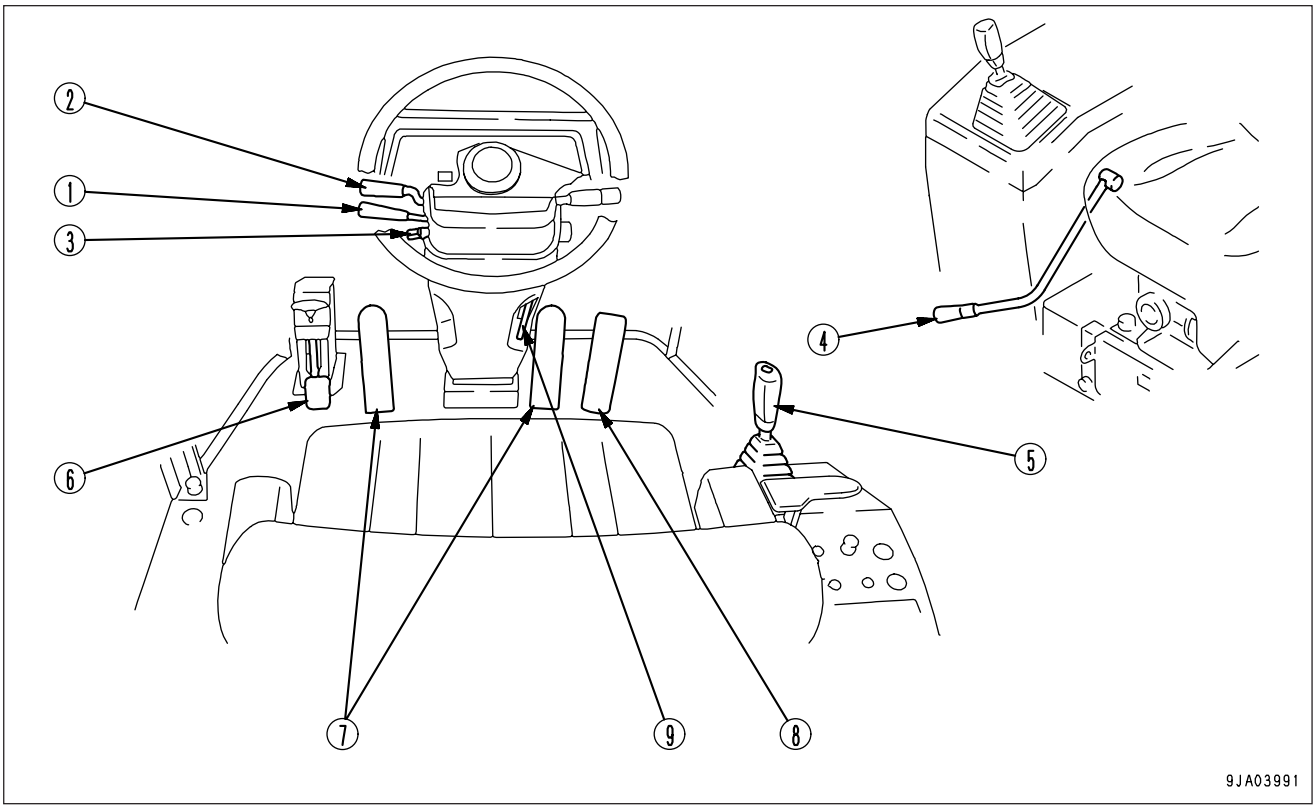
13. REAR HEATED WIRE GLASS SWITCH

When this switch is pressed, electric current flows through the heated wire glass at the rear and the mist is removed from the glass.

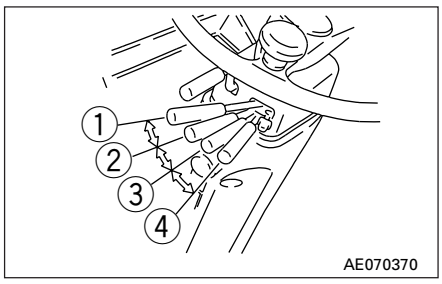
Position 1: ON (removes mist from glass)
Position 2: OFF



11.3 CONTROL LEVERS, PEDALS



1. SPEED CONTROL LEVER



A. MANUAL SHIFT

This lever controls the travel speed of machine.

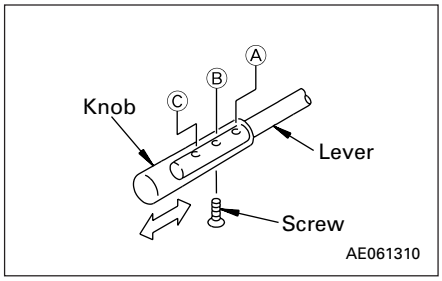
This machine has a 4-FORWARD, 4-REVERSE speed transmission.

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

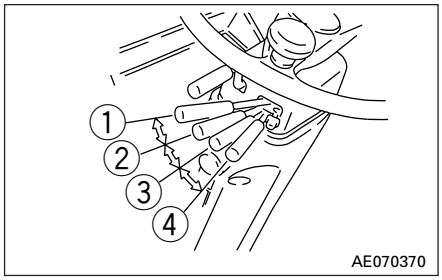
REMARK

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.)

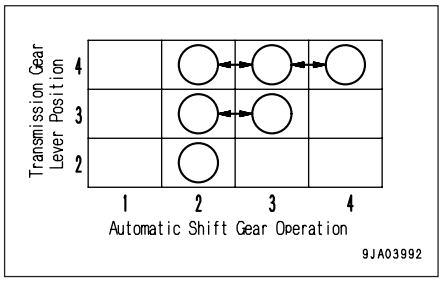
B. AUTO-SHIFT FUNCTION

The Auto-Shift transmission can change from second to fourth gear to cope with operating conditions.

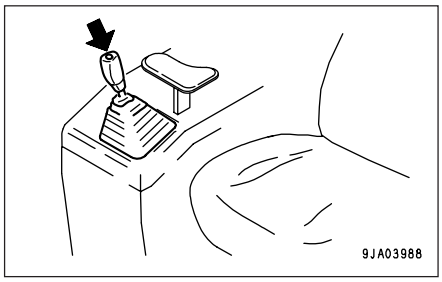


Position ①: 1st
Position ②: 2nd
Position ③: 3rd
Position ④: 4th

This chart illustrates the auto-shift gear ranges available according to the shift lever position.



- When first gear is selected on transmission gear lever, the auto-shift function does not operate. First gear is maintained.
- When downshifting from second to first gear, use the kick down switch on top of the lift lever.
- The kick down switch can operate from any gear or direciton, but its use should be limited to speeds less than 12 km/h (7.5 MPH).
- Kick down feature is recommended for use during load and carry operations.
- The manual speed control lever can be used to shift up or down to change travel speed.
- When kick down switch is depressed and transmission is changed from second gear to first gear and then travel speed is increased, transmission will change automatically to second gear.



C. FORCED DOWN-SHIFTING OPERATIONS

If the machine exceeds the prescribed travel speed while traveling downhill, the buzzer sounds and the speed stage will be automatically shifted down from the F4 position to the F3 position, to slow the machine by using the engine as a brake.

Function of the controller:

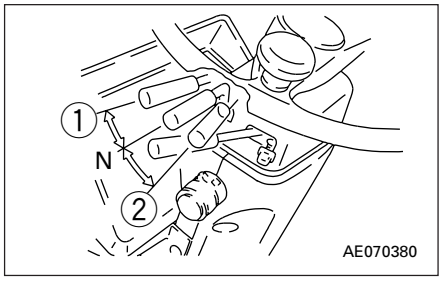
- The buzzer sounds when the travel speed reaches 38 km/h (23.75 MPH).
- When the travel speed reaches 40 km/h (25 MPH), the speed stage will be automatically shifted down from the F4 position to the F3 position.
- After the above automatic speed shift down is effected, when the travel speed drops to 17.5 km/h (10.9 MPH), the speed stage will be automatically restored from F3 position to the F4 position.
- The operations according to the above “Function of the controller” explanations are common with the auto-shift and the manual-shift mode.

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).

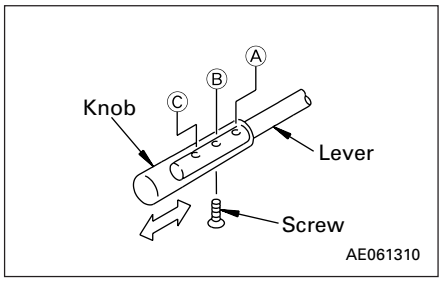
Position ① : Forward
Position N : Neutral
Position ② : Reverse



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.

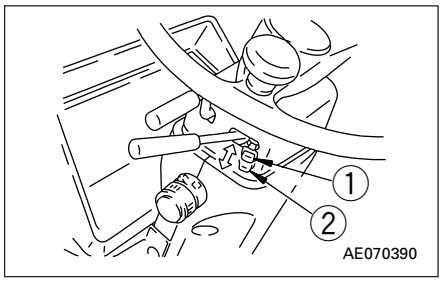
(The lever is installed to position Ⓑ when it is shipped from the factory.)



3. SPEED CONTROL LEVER STOPPER

This stopper prevents the speed control lever from entering the 3rd positions when working.

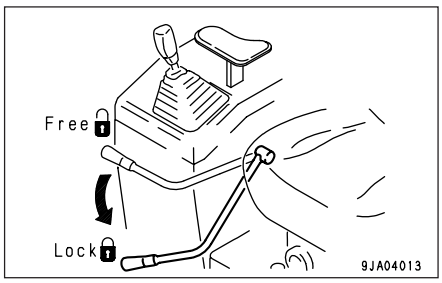
Position ①: Stopper actuated.
Position ②: Stopper released.



4. SAFETY LOCK LEVER (for work equipment control lever)

⚠ 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.**



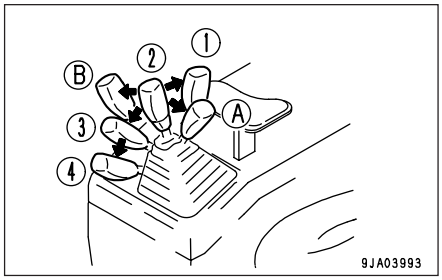
This is used to lock the work equipment levers.

Pull the lever up to apply the lock.

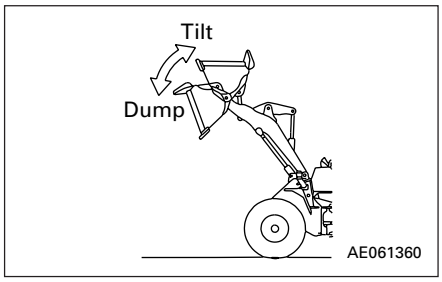
5. WORK EQUIPMENT CONTROL LEVER

This lever is used to operate the lift arm and the bucket.

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.
Ⓐ TILT ( )
Ⓑ DUMP ( )



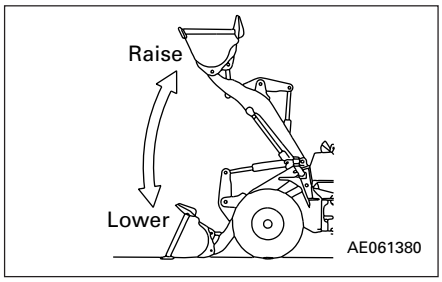
When the work equipment control lever is pulled further from the RAISE position, the lever is stopped in this position until the lift arm reaches the preset position of the kick-out, and the lever is returned to the HOLD position.



When the work equipment 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.

NOTICE

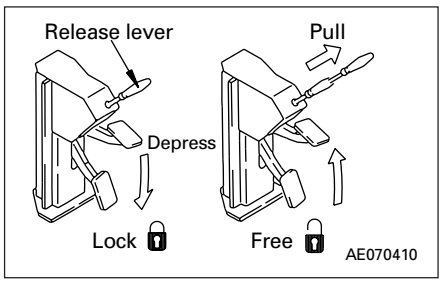
Do not use the FLOAT position when lowering the bucket.



6. PARKING BRAKE PEDAL AND RELEASE LEVER

⚠ WARNING

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



This lever operates the parking brake.

The brake is applied by depressing this pedal, and the parking brake pilot lamp lights up.

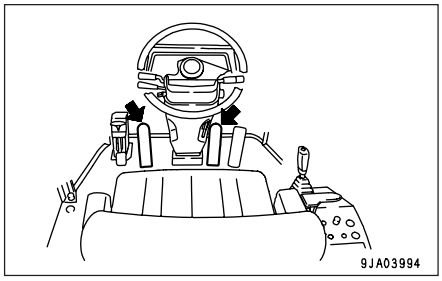
Pull the release lever to release the parking brake.

The machine does not start when the directional lever is operated with parking brake applied.

NOTICE

- **Never use the parking brake lever 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, contact your Komatsu distributor to have the parking brake checked for any abnormality.**

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.**
- **Note that when the engine of a machine with booster stops, the brake pedal becomes 3.5 times heavier.**

Right brake pedal

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

Left brake pedal

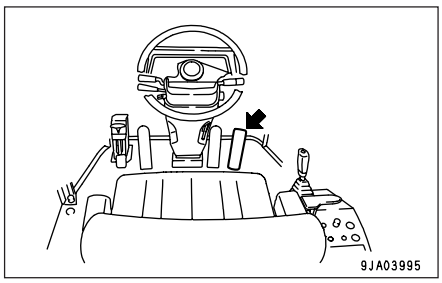
The left brake pedal operates the wheel brakes, and if the transmission cut-off switch is at ON, it also returns the transmission to neutral.

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 selector switch to the ON position.

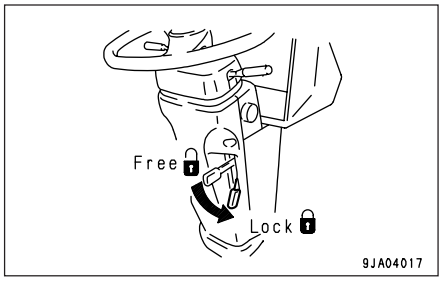
8. ACCELERATOR PEDAL



This pedal controls the engine speed and output.

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

9. STEERING COLUMN TILT LEVER



⚠ WARNING

Stop the machine before adjusting the tilt of the steering wheel. If this operation (adjustment) is carried out while the machine is moving, it may lead to a serious accident or personal injury.

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)

11.4 CAP WITH LOCK

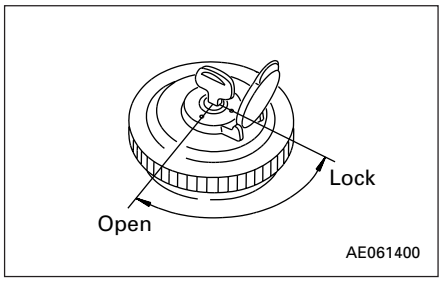
The fuel tank filler port is equipped with locks.
Open and close the cap lock as follows.
Use the starting key to open and close the cap.

11.4.1 METHOD OF OPENING AND CLOSING CAP WITH LOCK

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.

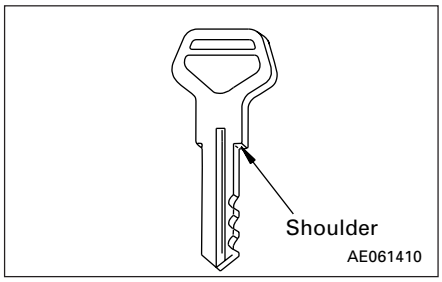
2. Turn the key clockwise, align the match mark on the cap with the rotor groove, then remove the cap.



TO LOCK THE CAP

1. Turn the cap into place.

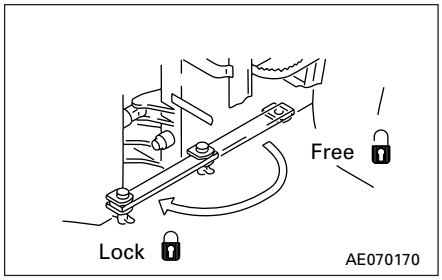
2. Turn the key counterclockwise and take the key out.



11.5 SAFETY BAR

⚠ WARNING

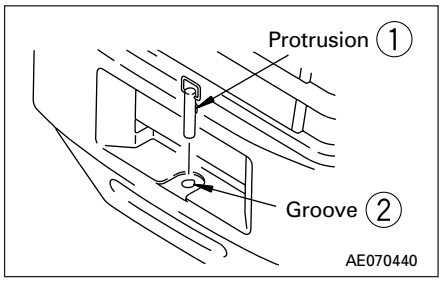
- **Always use the safety bar for maintenance or when transporting the machine.**
- **Always remove the safety bar during normal travel operations.**



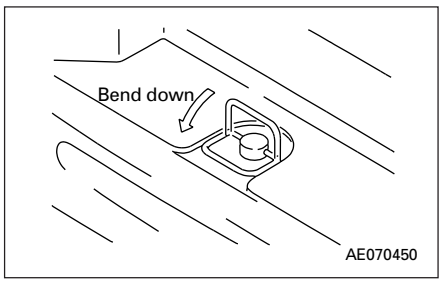
The safety bar is used during maintenance or when transporting the machine. It locks the front frame and rear frame, and prevents the front and rear frames from bending.

11.6 TOWING PIN

1. Align protrusion ① in the towing pin with groove ② in the counterweight, then insert and turn the pin 180°.



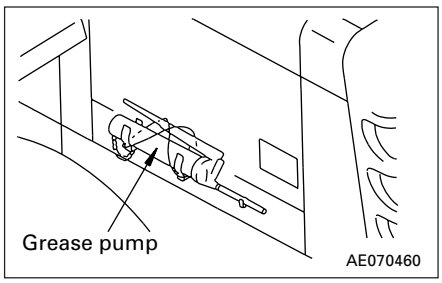
2. To prevent the towing pin from turning, bend the towing pin handle down and set it in position.
   When removing the towing pin, carry out the above procedure in reverse.



11.7 GREASE PUMP CLAMP AND RUBBER RING

Set the grease pump in the clamp which can be seen when the engine side panel is opened, and fit the chain to the clamp to prevent any play.

In addition, fit the rubber ring in a figure of 8 as shown in the diagram in the right to hold the grease pump in position.



11.8 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.

If the alarm cannot be heard clearly or is too loud, adjust the volume as follows.

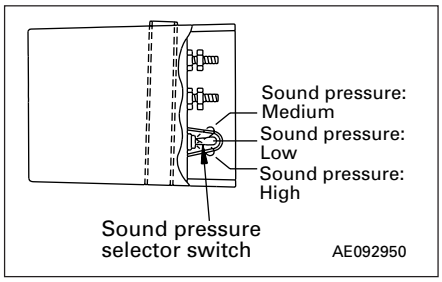
The volume can be adjusted to three levels.

REMARK

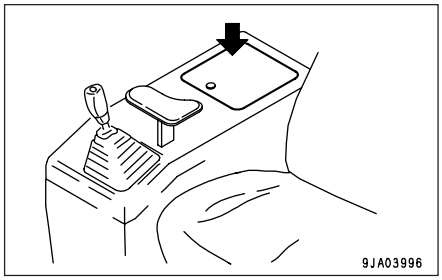
The alarm is set to the highest level when the machine is shipped from the factory.

METHOD OF CHANGING

Operate the sound pressure selector switch at the rear face of the backup alarm to adjust the volume.
High: 112 dB
Medium: 107 dB
Low: 97 dB



11.9 FUSE



NOTICE

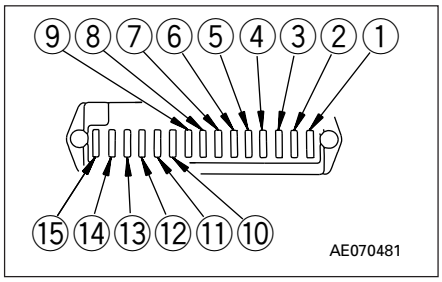
Before replacing a fuse, be sure to turn off the starting switch.

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.

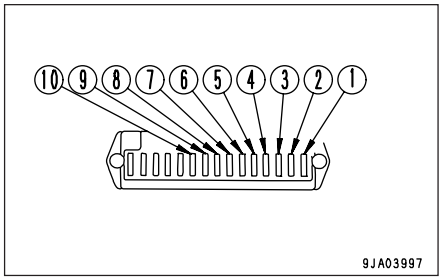
11.9.1 FUSE CAPACITY AND NAME OF CIRCUIT



No.	Fuse capacity	Name of circuit
①	10A	Spare
②	10A	Spare
③	10A	Clearance lamp
④	10A	Head lamp
⑤	10A	Heater relay
⑥	20A	Working lamp
⑦	10A	Tail lamp Buckup alarm, Horn
⑧	10A	Turn signal lamp
⑨	20A	Main lamp circuit, Brake lamp
⑩	10A	Instrument panel
⑪	10A	Work equipment positioner
⑫	10A	Transmission control
⑬	–	–
⑭	10A	Hazard warning flashing lamp
⑮	20A	Starting switch

11.9.2 FUSE CAPACITY AND NAME OF CIRCUIT (MACHINE EQUIPPED WITH CAB)

The following fuses are added.

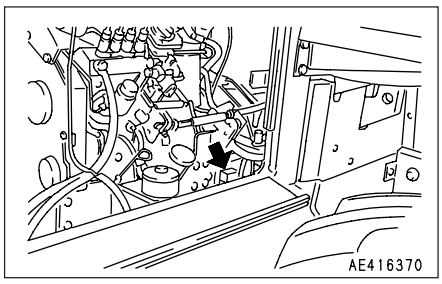


No.	Fuse capacity	Name of circuit
①	10A	Spare
②	10A	Spare
③	10A	Spare
④	10A	Room lamp, Air conditioner controller
⑤	10A	Rotating lamp
⑥	10A	Cigarette lighter, radio
⑦	20A	Air conditioner
⑧	20A	Air conditioner
⑨	20A	Wiper motor
⑩	25A	Rear defroster

11.10 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.

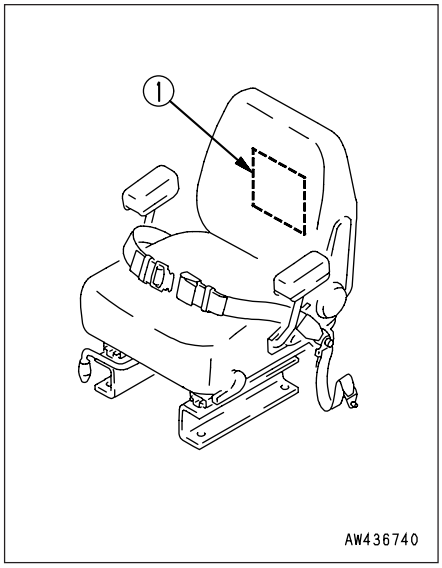


SLOW-BLOW FUSE

① 80A: Chassis power source
② 120A: Power source for engine preheating heater

11.11 MANUAL POCKET

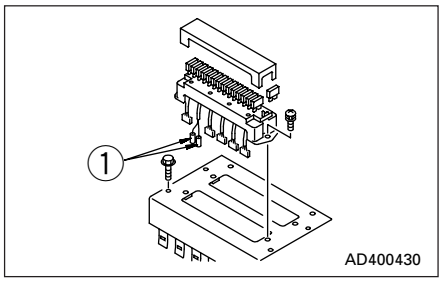
A pocket ① to store the operation manual is installed on the back of the operator's seat. Keep the operation manual in this pocket ① so that you can read it when you need it.



11.12 POWER SUPPLY SOCKET

Use terminal ① of the fuse box inside the right console box as the power source.

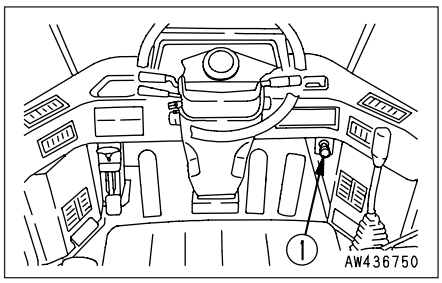
Max. current: 240W (24V x 10A)



MACHINE EQUIPPED WITH CAB

It is possible to remove the cigarette lighter ① and use the socket as a power supply.

Capacity of cigarette lighter: 168 W (24V x 7 A)



12. OPERATION

12.1 CHECK BEFORE STARTING ENGINE

12.1.1 WALK-AROUND CHECK

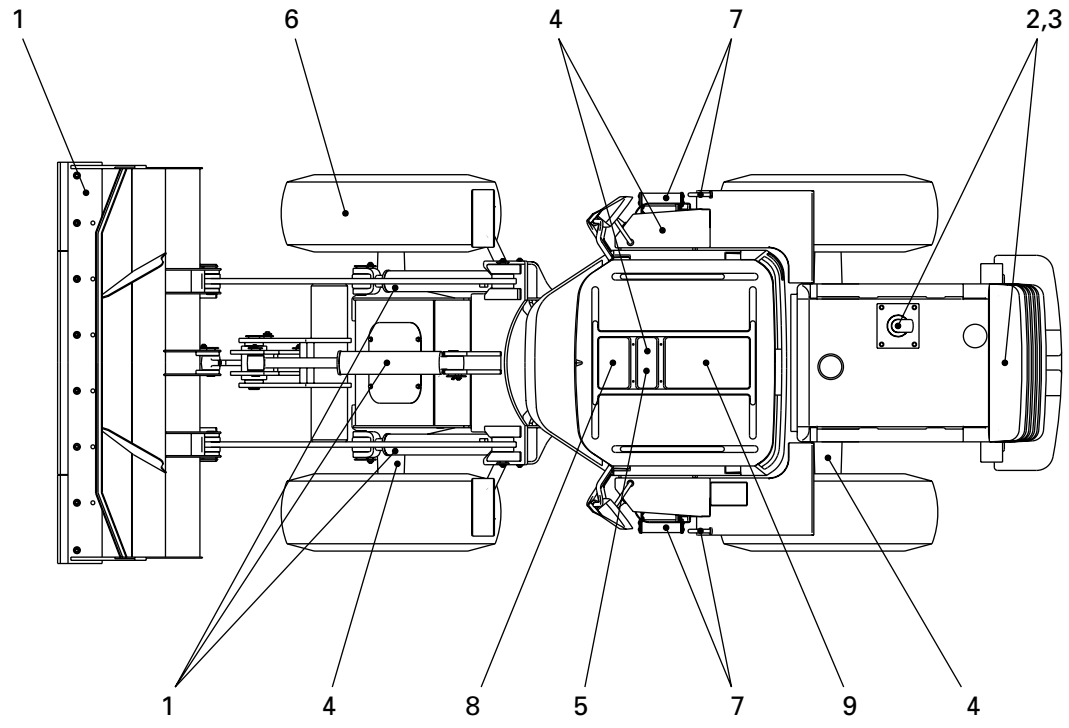
⚠ WARNING

Leakage of oil or fuel, or accumulation of flammable material around high temperature parts, such as the engine muffler or turbocharger, may cause fire.
Check carefully, and if any abnormality is found, repair it or contact your Komatsu distributor.

Before starting the engine, look around the machine and under the machine to check for loose nuts or bolts, or leakage of oil, fuel, or coolant, and check the condition of the work equipment and hydraulic system.

Check also for loose wiring, play, and collection of dust at places which reach high temperatures.

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



1. **Check 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. 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 meters, lamps, gauges, 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.

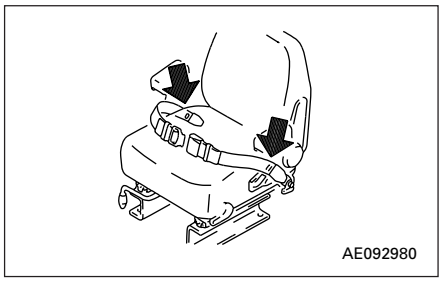
9. Check seat belt and equipment

⚠ WARNING

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

REMARK

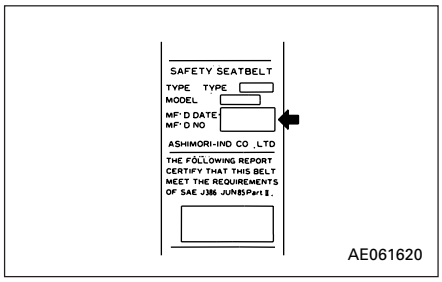
The date of manufacture of the seat belt is marked on the belt at the place indicated by the arrow in the diagram on the right.


AE092980

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 Nm (2.5 ± 0.5 kgm, 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.



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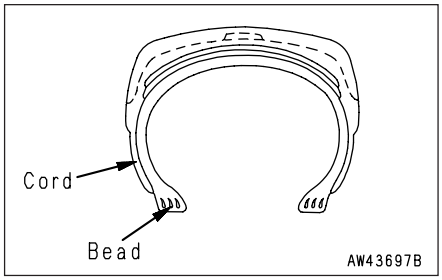
10. Check for loose bolts on ROPS

Check for any loose or damaged bolts. If any loose bolts are found tighten them to 549 ± 59 Nm (56 ± 6 kgm, 405 ± 43 lbft). If any bolts are damaged, replace them with genuine Komatsu bolts.

11. Clean cab window (machine equipped with cab)

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

12. 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**

13. Inspection of rims

⚠ WARNING

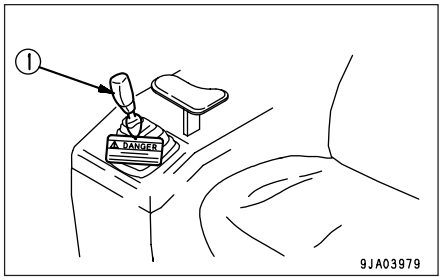
Check the rims (wheels) and rings for deformation, corrosion and cracks.
In particular, check the side rings, lock rings and rim flanges thoroughly.

12.1.2 CHECK BEFORE STARTING

⚠ WARNING

Always hang a warning tag on work equipment control lever ①.

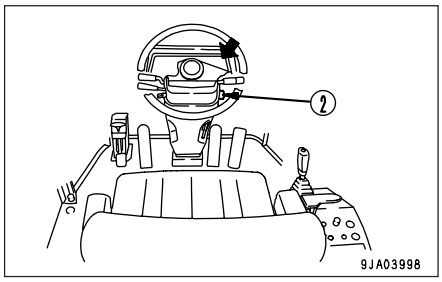
Always carry out the items in this section before starting the engine each day.



CHECK MONITOR PANEL

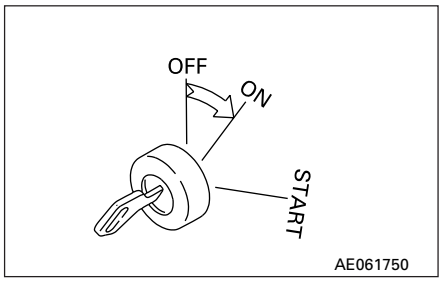
1. Turn the starting switch ② to ON.

2. Check that all the monitor lamps, the warning lamp light up.



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

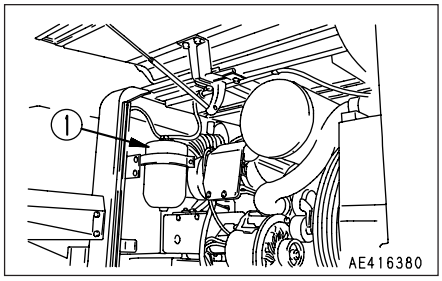
Do not carry out the checks before starting using only the monitor, always carry out also the items specified for the periodic maintenance.



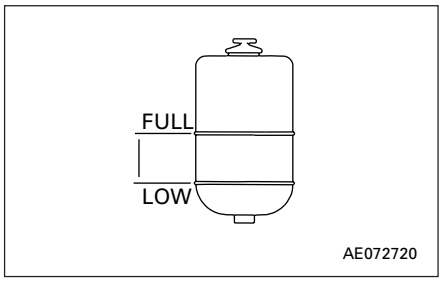
CHECK COOLANT LEVEL, ADD WATER

⚠ WARNING

Normally, do not open the radiator cap. Always wait for the engine to cool down before checking the water level, and check using the sub-tank.



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



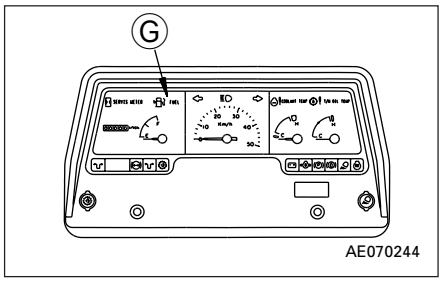
2. After adding water, tighten the cap securely.

3. If sub-tank ① is empty, check for water leakage, then add water to the radiator and sub-tank.

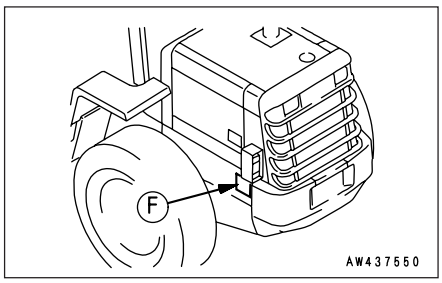
CHECK FUEL LEVEL, ADD FUEL

⚠ 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, add fuel through filler Ⓕ until the fuel tank is full.

   For details of the method for opening and closing the cap, see “11.4 CAP WITH LOCK”.

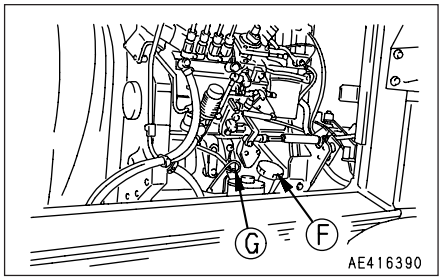
   For details of the fuel to use, see “20. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE”.

3. After adding fuel, tighten the cap securely.

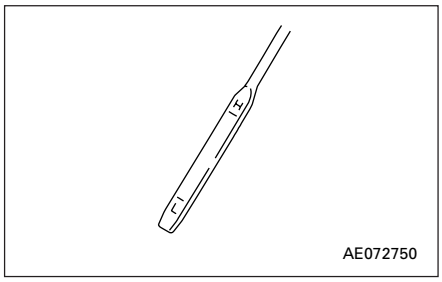
   Fuel capacity: 133 ℓ (35.1 US gal)

CHECK OIL LEVEL IN ENGINE OIL PAN, ADD OIL

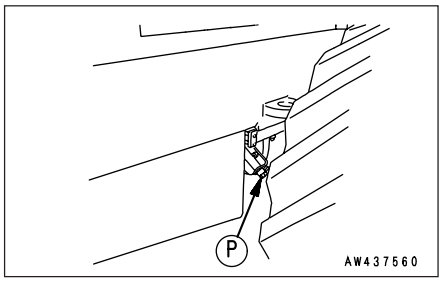
1. Open the engine side cover at the rear right side of the machine.
2. Remove dipstick Ⓖ and wipe the oil off with a cloth.
3. Insert dipstick Ⓖ fully in the oil filler pipe, then take it out again.
4. The oil level should be between the H and L marks on dipstick Ⓖ.
   If the oil level is below the 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".



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 tighten the engine side cover.



REMARK

When checking the oil level after the engine has been operated, wait for at least 15 minutes after stopping the engine before checking.

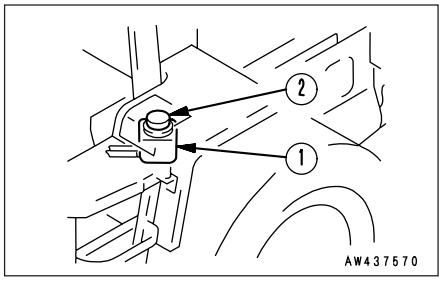
If the machine is at an angle, make it horizontal before checking.

CHECK AND REFILL OF OIL IN BRAKE OIL TANK

⚠ WARNING

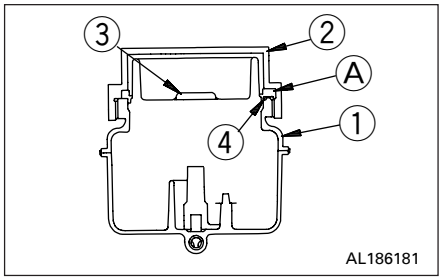
Always use engine oil to refill the brake oil tank.

1. Open the inspection cover on the step on the left side of the machine, and check that the oil in brake tank ① is between the MAX and MIN marks on the gauge at the side of the tank.
2. If the oil is below the MIN mark, remove cap ② and add engine oil.



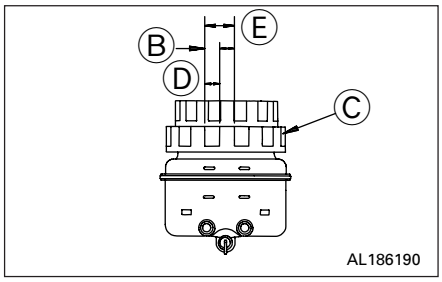
For details of the oil to use, see "20. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".

3. After adding oil, use a cloth to wipe off all the brake oil stuck to contact surface Ⓐ of diaphragm ③ and cap ②, then install cap ②.
   If there is any brake oil stuck to the inside of the cap or the top of the diaphragm, wipe it off at the same time with a clean cloth.



4. Assemble diaphragm ③ to cap ②, then screw cap ② on to tank ①.

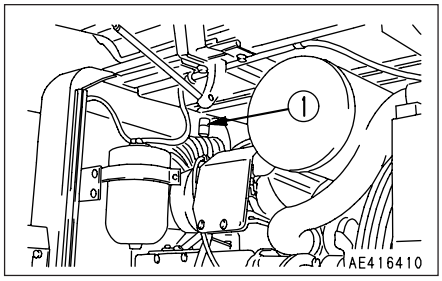
5. Screw cap ② on to tank ① to position Ⓑ where resistance is felt (the position where diaphragm ③ contacts seal surface ④ of tank ①), then tighten the cap one more section Ⓓ or two more sections Ⓔ on the knurled pattern at large diameter portion Ⓒ of the cap.



NOTICE

Be careful not to tighten cap ② too far. If it is tightened too far, diaphragm ③ will be deformed and twisted, and this will cause leakage of oil.

CHECK DUST INDICATOR



1. Check that the red piston of dust indicator ① has not reached the service level.

2. If the red piston is showing, clean or replace the element immediately.

   For details of cleaning the element, see "24.2 WHEN REQUIRED, CHECK, CLEAN, OR REPLACE AIR CLEANER ELEMENT".

3. After cleaning, push indicator ① button to return red piston to original position.

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 clean 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.

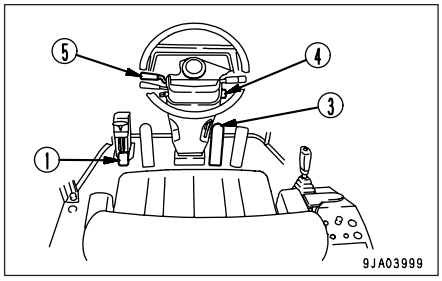
When carrying out walk-around checks or checks before starting, always check if there is any accumulation of flammable material around the battery, and remove such flammable material.

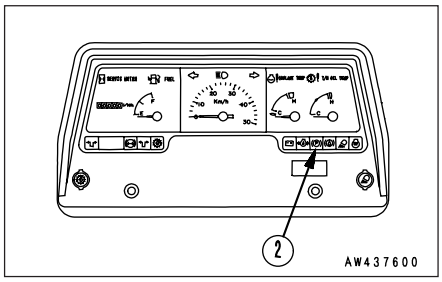
Please contact your Komatsu distributor for investigation and correction of the cause.

CHECK EFFECT OF PARKING BRAKE

⚠ WARNING

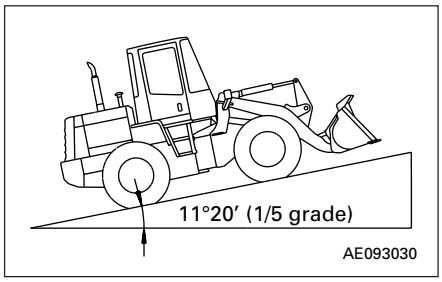
Even if parking brake pedal ① is depressed LOCK, there is danger until parking brake pilot lamp ② lights up, so keep brake pedal ③ depressed.

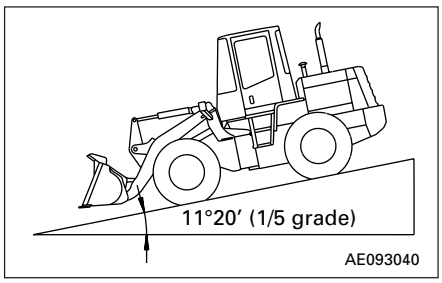




Measurement conditions

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





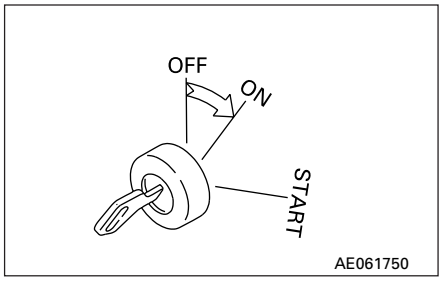
Method of measurement

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

2. Start the engine, set the machine facing straight to the front, then drive the machine up a 1/5 grade with the bucket empty.

3. Depress brake pedal ③, stop the machine, return directional lever ⑤ to the neutral position, then stop the engine.

4. Depress parking brake pedal ① to the LOCK 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 5 m (16.4 ft).

CHECK SOUND OF HORN AND BACKUP ALARM

CHECK FLASHING OF LAMPS, CHECK FOR DIRT AND DAMAGE

CHECK ENGINE EXHAUST COLOR AND SOUND

CHECK OPERATION OF GAUGES

CHECK PLAY OF STEERING WHEEL, CHECK OPERATION OF STEERING

CHECK DIRECTION OF REAR VIEW MIRROR, CHECK FOR DIRT OR DAMAGE (IF EQUIPPED)

CHECK LOCK OF CAB DOOR (MACHINE EQUIPPED WITH CAB)

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 (pattern)	Inflation pressure
16.9-24-10PR (standard) (L2 traction)	0.24 MPa (2.4 kgf/cm^2)
14.00-24-12PR (if equipped) (L2 traction)	0.29 MPa (3.0 kgf/cm^2)
17.5-25-12PR (if equipped) (L2 traction)	0.29 MPa (3.0 kgf/cm^2)
15.5–25–8PR (if equipped) (L2 traction)	0.29 MPa (3.0 kgf/cm^2)

NOTICE

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

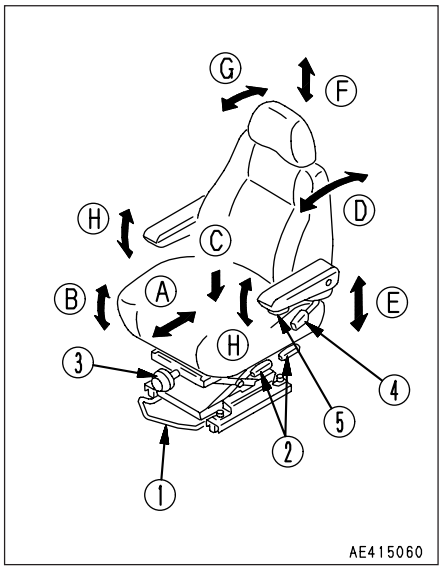
12.1.3 ADJUSTMENT BEFORE OPERTION

OPERATOR'S SEAT

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.**



A: Forward-backward adjustment

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

Fore-and-aft adjustment: 160 mm (6.3 in)
(16 mm (0.63 in) x 10 stages)

B: Adjusting seat angle

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

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

Range of adjustment: 13° (front tilt, rear tilt: 4 stages each)

C: Adjusting seat weight

Turn grip ③ to adjust the strength of the suspension.

Adjustment range: (Target) 50 kg – 120 kg (110.3 – 264.6 lb)

D: Adjusting backrest angle

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

Sit with your back against the seat back when carrying out adjustment. If your back is not pushing against the seat back, it may suddenly spring forward.

Adjustment range: Front 66° (3° x 22 stages)
Rear 72° (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.

When reclining the seat fully to take a rest, set the seat in the following position.

- **Fore-and-aft adjustment: Max. front position**
- **Up-down adjustment: Max. height**
- **Seat angle adjustment: Horizontal or fully tilted**
- **Reclining adjustment: Fully tilted backward 36° (12 stages)**

E: Seat height adjustment

Move lever ② up/down, then move the seat up or down as desired. Since lever ② is also used for adjusting seat angle, set the seat to the desired height while adjusting the angle.
Adjustment range: 60 mm (2.36 in)

F: Adjusting height of headrest

Move the headrest up and down to the desired height.
Adjustment range: 50 mm (1.97 in)

G: Adjusting headrest angle

Rotate the headrest to the front or rear.

H: Angle of armrest

Adjust angle of armrest by rotating knob ⑤ (left side only).
Adjustment range: 30° (forward tilt: 25°, backward tilt: 5°)
Also, when armrest is turned, it will spring up.

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.**

Fastening and removing belt

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

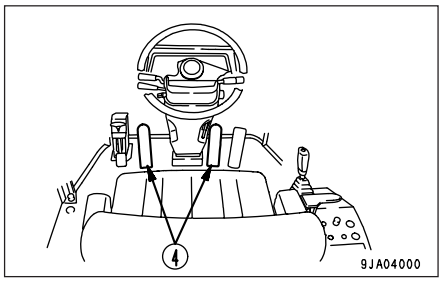
1. Sit on the seat, depress brake pedal ④ fully, and adjust the seat so that your back is pressed against the backrest.

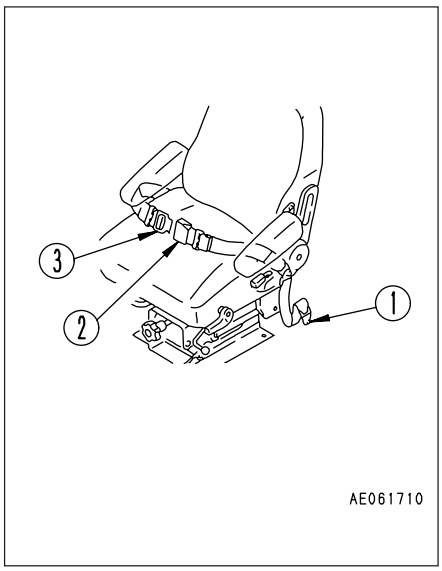
2. After adjusting the seat position, adjust teaser belt ①. Tense the teaser belt and install it when there is no one sitting on the seat. (Machine equipped with suspection seat)

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

4. When removing the belt, raise the lever of buckle ② to free the belt.

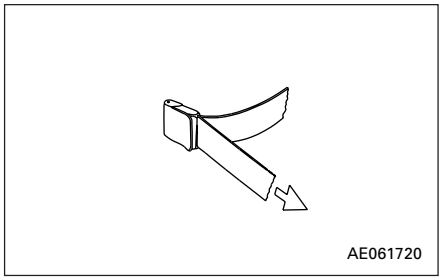
Adjust the length of the buckle and tongue so that the belt follows your body without twisting, and adjust so that the buckle is in the middle at the front of your body.



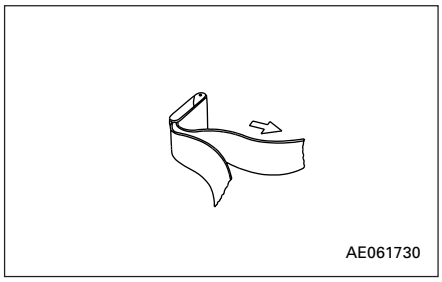


Adjust belt length

To make belt shorter: Pull the free end of the belt at the buckle end or tongue end.

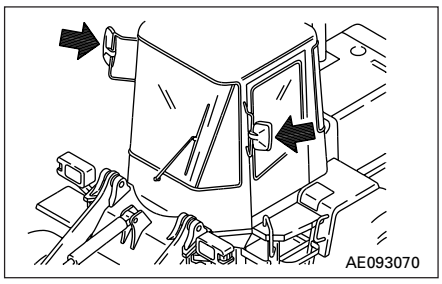

AE061720

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

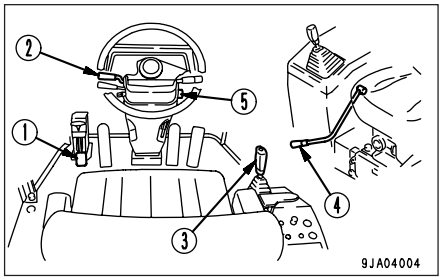

AE061730

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.


AE093070

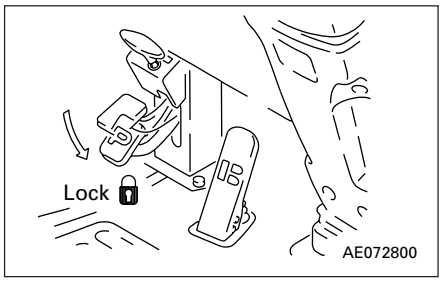
12.1.4 OPERATIONS AND CHECKS BEFORE STARTING ENGINE



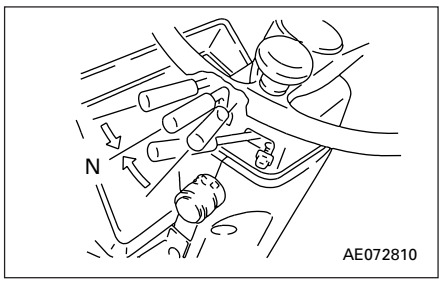
⚠ WARNING

- **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.**

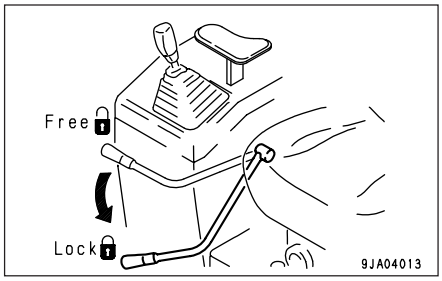
1. Check that parking brake pedal ① is at the LOCK position.



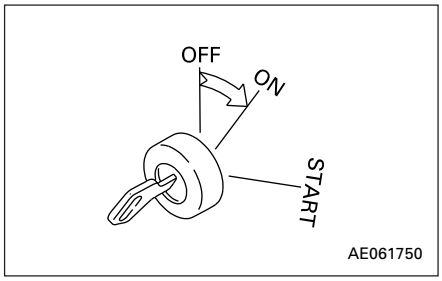
2. Check that directional lever ② is at the N position.
   When starting the engine, if directional lever ② is not at the N position, the engine will not start.



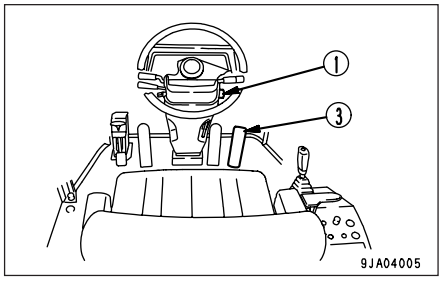
3. Lower the bucket to the ground, then check that work equipment control lever ③ is locked by safety lock lever ④.



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



12.2 STARTING ENGINE



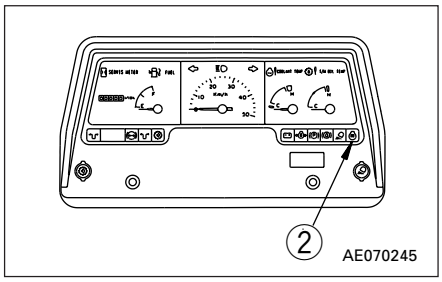
⚠ WARNING

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.

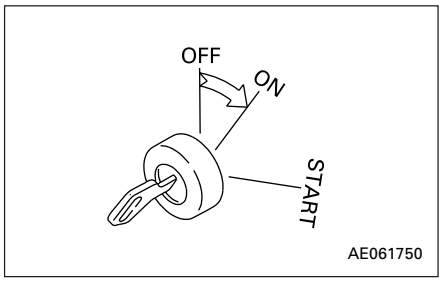
If the engine will not start, wait for at least 2 minutes before trying to start the engine again.



1. Turn the key in starting switch ① to the ON position. Preheating will automatically start and preheating pilot lamp ② will light up.

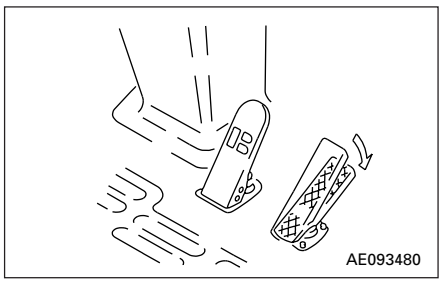
   The table shown below gives a guide to preheating time.

Temperature	Preheating time (Light up time)
Above 0°C	0 second (About 1 second)
0°C to –20°C	0 to 30 seconds (0 to 30 seconds)

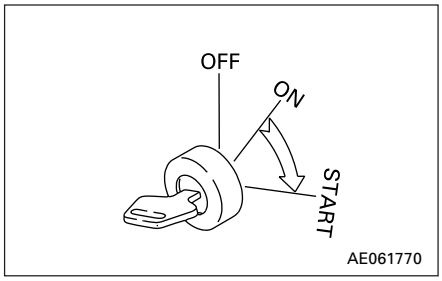


The preheating time in cold areas changes according to the water temperature when starting the engine.

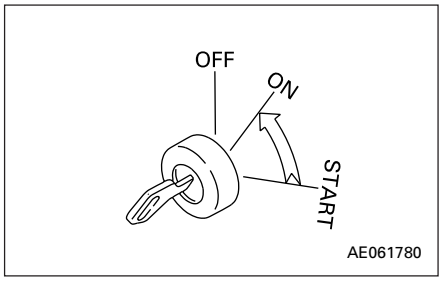
2. Depress accelerator pedal ③ lightly.



3. Check that preheat pilot lamp ② is out, then turn the key of starting switch ① to the START position to start the engine.

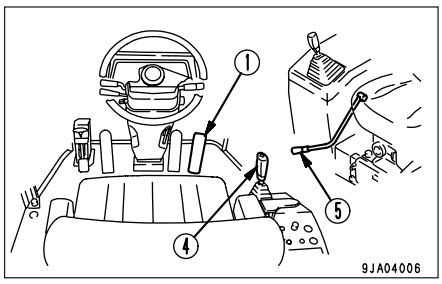


4. When engine is started, release the key of starting switch ① and the key will return automatically to ON.



12.3 OPERATIONS AND CHECKS AFTER STARTING ENGINE

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

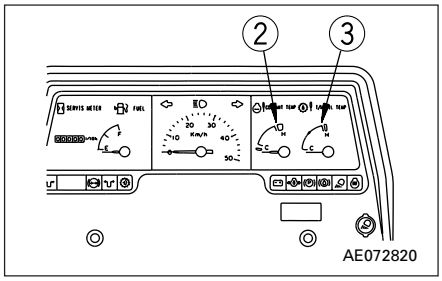


NOTICE

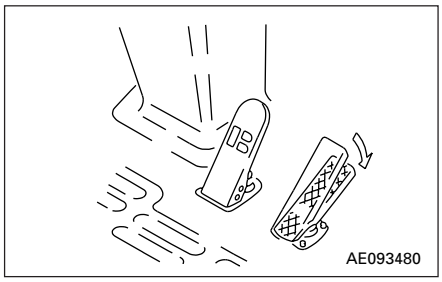
Do not suddenly accelerate the engine before the warming-up operation is completed.

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

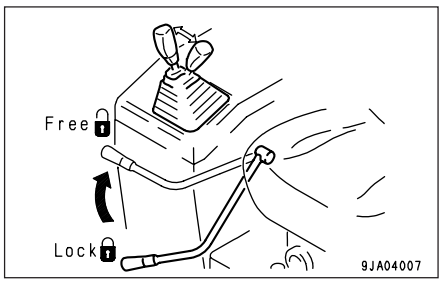
If it is necessary to run the engine at idling, apply a load from time to time or run the engine at a mid-range speed.



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 safety lock lever ⑤ of work equipment control lever ④ 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.



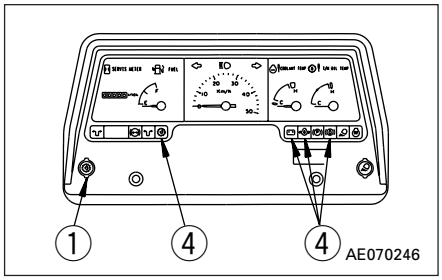
3. After carrying out the warming-up operation, check that the gauges and caution lamps are normal.
   If there is any abnormality, carry out maintenance or repair.
   Run the engine under a light load until engine water temperature gauge ② and torque converter oil gauge ③ are in the green range.

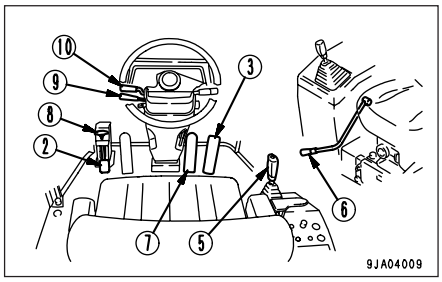
4. Check that there is no abnormality in the exhaust color, sound, or vibration.
   If there is any abnormality, carry out repairs.

12.4 MOVING MACHINE OFF

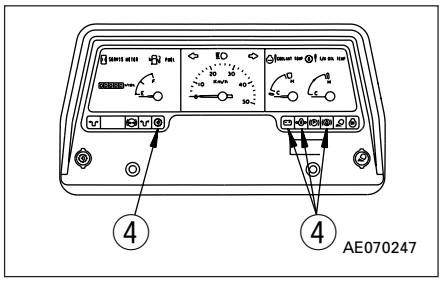
⚠ WARNING

- **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.**

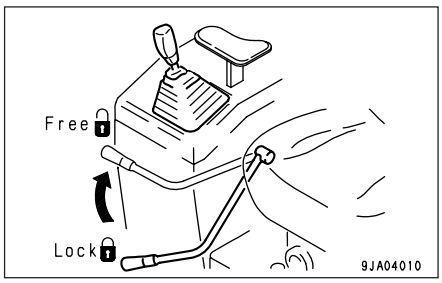




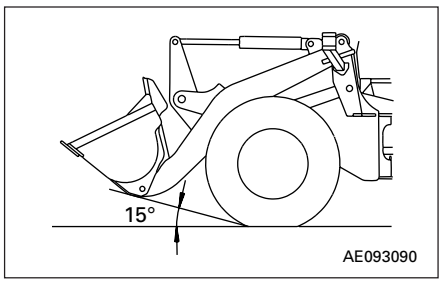
1. Check that caution pilot lamps ④ is not lighted up.



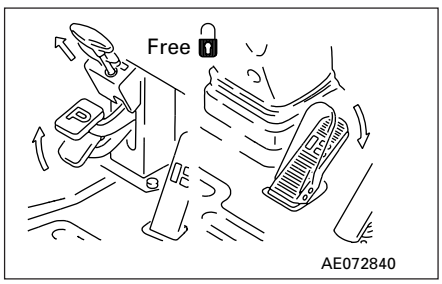
2. Set safety lock lever ⑥ of work equipment control lever ⑤ to the FREE position.



3. Operate work equipment control lever ⑤ to set the work equipment to the travel posture shown in the diagram on the right.



4. Depress right brake pedal ⑦ and pull parking brake release lever ⑧ to the FREE position to release the parking brake.
   Keep right brake pedal ⑦ depressed.



12.5 CHANGING GEAR SPEED

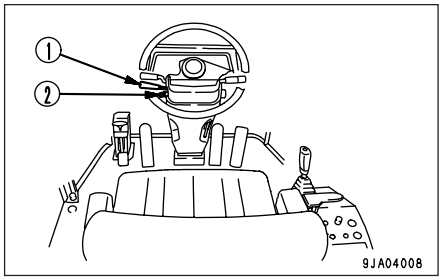
⚠ WARNING

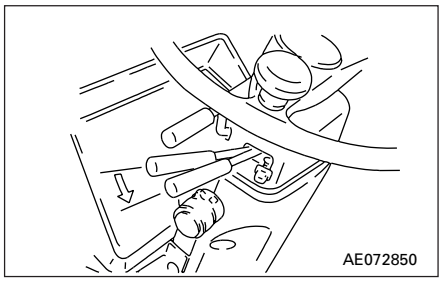
When traveling at high speed, do not change the gear speed suddenly. When shifting gear, use the brakes to reduce the travel speed, then shift gear.

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 ②.

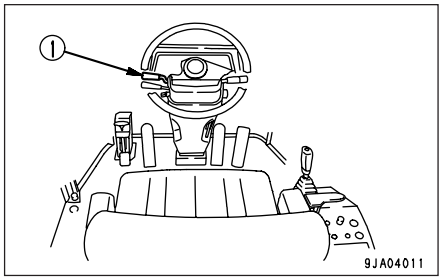




12.6 CHANGING DIRECTION

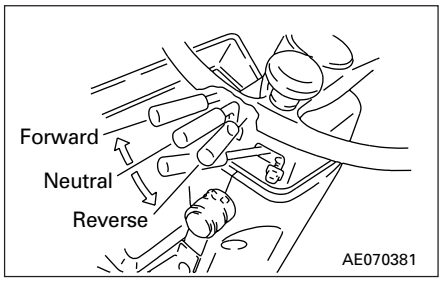
⚠ WARNING

- **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.**



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

Place directional lever ① in the desired position.



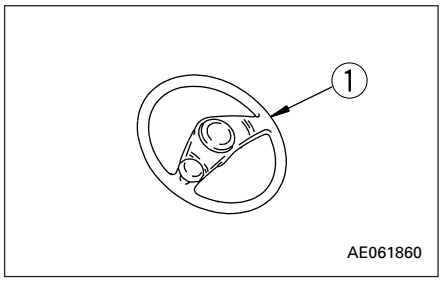
REMARK

This machine is equipped with an auto-shift system that automatically shifts the gear. For details of the method of use, see “TRANSMISSION AUTO SHIFT/MANUAL SELECTOR SWITCH” and “AUTO-SHIFT FUNCTION”.

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 steering wheel becomes heavy, so do not stop the engine.**
  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.

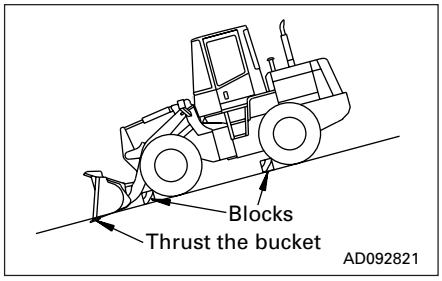


When traveling, use steering wheel ① to turn the machine.

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.

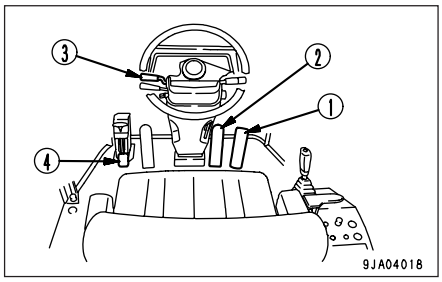
Turn the steering wheel lightly to follow the machine as it turns. When turning the steering wheel fully, do not turn it beyond the end of the stroke.

12.8 STOPPING MACHINE



⚠ WARNING

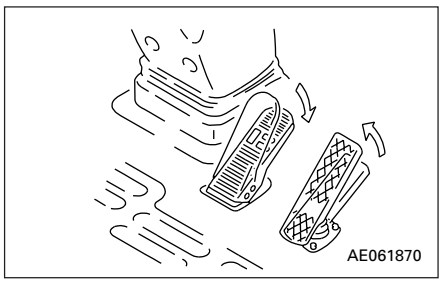
- **Avoid stopping suddenly. Give yourself ample room when stopping.**
- **Do not park the machine on slopes.**
  If the machine has to be parked on a slope, set it facing directly down the slope, then dig the bucket into the ground and put blocks under the tires to prevent the machine from moving.
- **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 pedal is depressed LOCK, there is danger until the parking brake pilot lamp lights up, so keep the brake pedal depressed.**



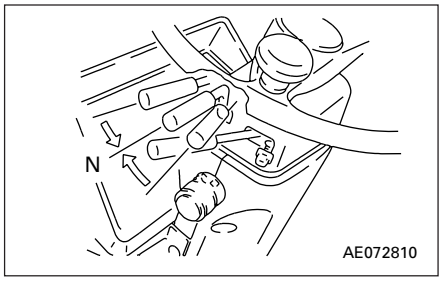
NOTICE

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

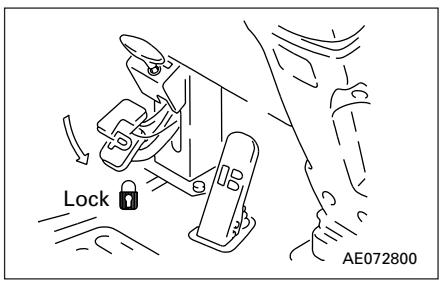
1. Release accelerator pedal ①, and depress brake pedal ② to stop the machine.



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

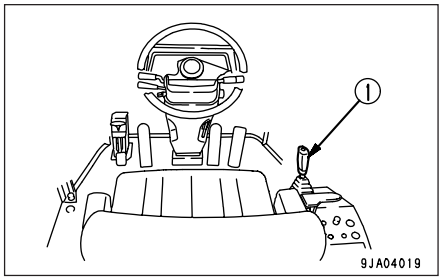


3. Depress parking brake pedal ④ to LOCK to apply the parking brake.



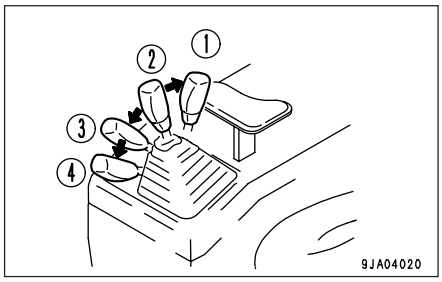
12.9 OPERATION OF WORK EQUIPMENT

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



LIFT ARM OPERATION

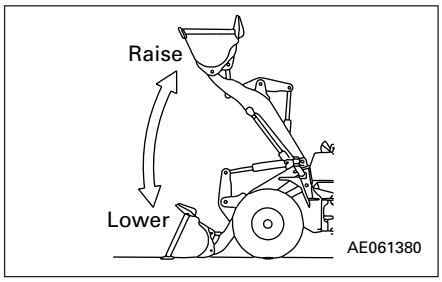
① Raise ( )
② Hold ( ): The lift arm is kept in the same position.
③ Lower ( )
④ Float ( ): The lift arm moves freely under external force.



When the work equipment 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.

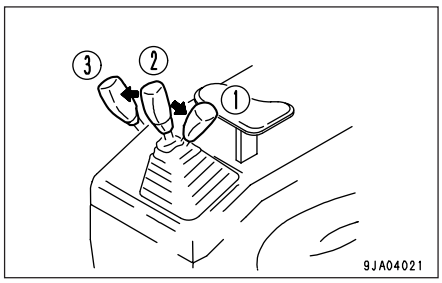
NOTICE

Do not use the FLOAT position when lowering the bucket.

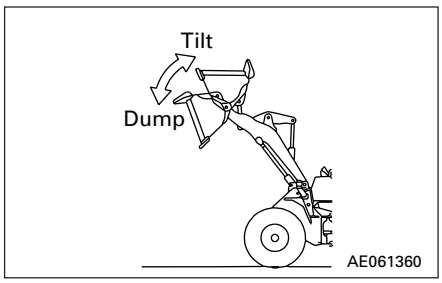


BUCKET OPERATION

① Tilt ( )
② Hold ( ): The bucket is kept in the same position.
③ Dump ( )



When the work equipment 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

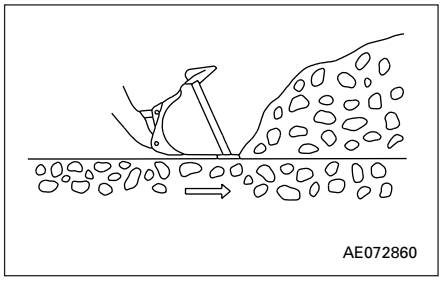
Always set the machine facing directly to the front when carrying out digging or scooping operations. Never carry out these operations with the machine articulated.

NOTICE

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

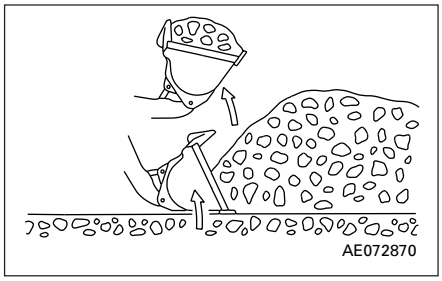
- Scoop up the piled soil by moving the machine forward as shown below. If the tires begin slipping under heavy load, raise the bucket slightly to reduce the load.

1. Force the bucket into the pile of soil while moving the machine forward.

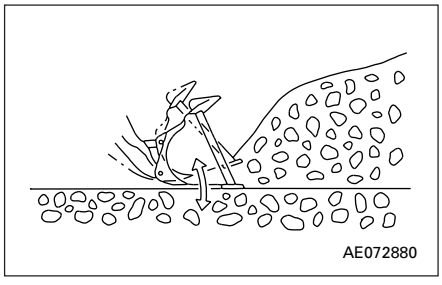

AE072860

2. After the bucket has fully penetrated into the soil, place the work equipment control lever in raise position while moving the machine forward. Move the work equipment control lever to tilt position from time to time until the bucket is filled with soil.

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.

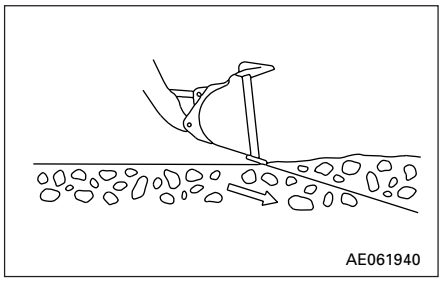

AE072870

3. When it is difficult for the bucket to penetrate into the piled soil, move the work equipment control lever left and right to move the bucket teeth up and down.

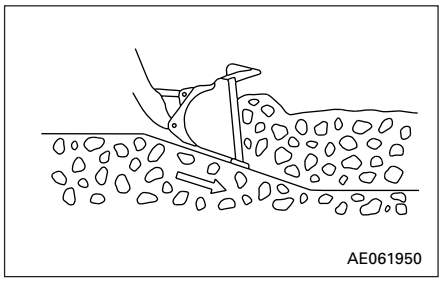

AE072880

- 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.

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

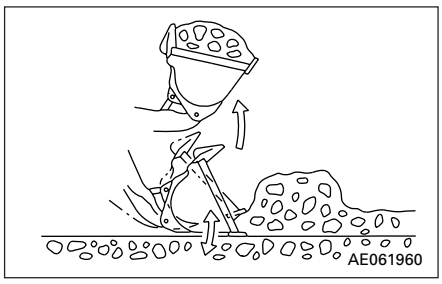

AE061940

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


AE061950

3. Operate the work equipment 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.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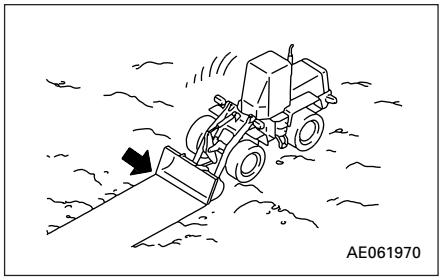
12.10.2 LEVELING OPERATIONS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NOTICE

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. Scoop some more soil into the bucket, put the lift arm in float, level the bucket at ground level, and smooth the ground by moving backward.

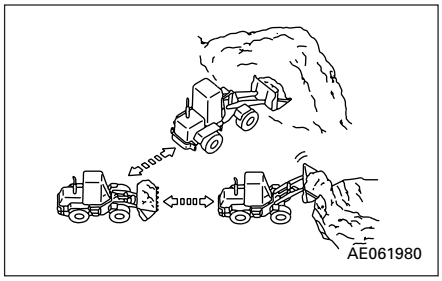
12.10.3 PUSHING OPERATIONS

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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⚠ 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

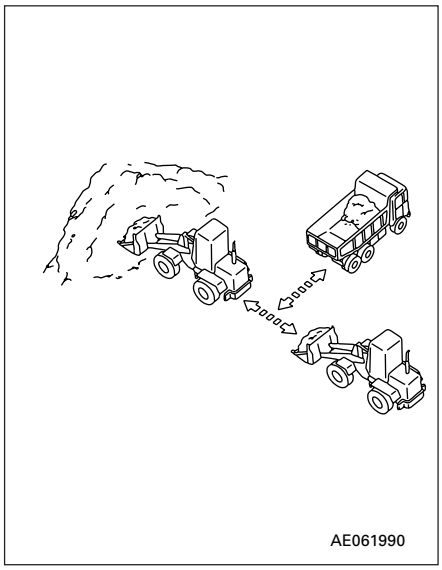
- **Always keep the working area flat. Do not turn suddenly or apply the brake suddenly when traveling with a raised load. These actions are dangerous.**
- **It is also dangerous to drive the bucket at high speed into a stockpile or pile of rocks.**

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.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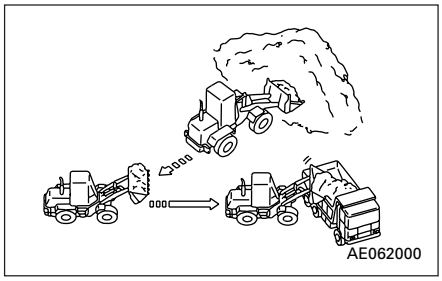
V-SHAPE LOADING

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.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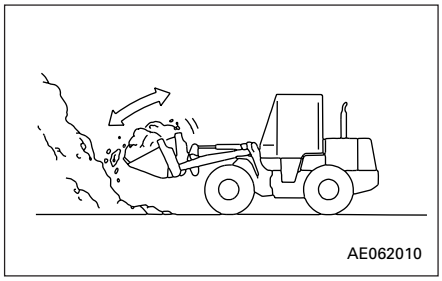
Precautions when piling up loads

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.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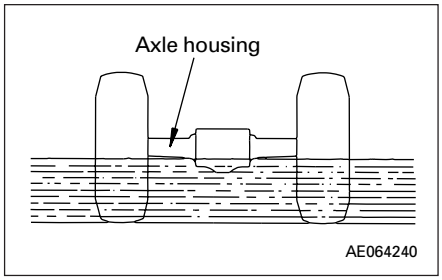
12.11 PRECAUTIONS FOR OPERATION

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.
- The following is a guide to suitable tire pressures and speeds when traveling on a paved surface with standard tires.
  Tire pressure (front and rear): 235.4 kPa (2.4 kg/cm^2, 34.1 psi)
  Speed: 25 – 30 km/h (16 – 18 MPH)
- 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.

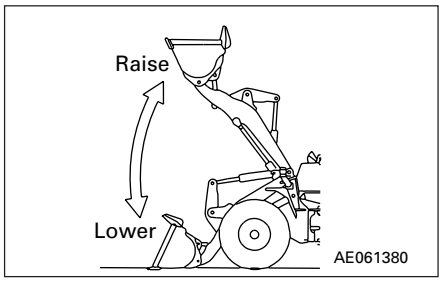
12.12 ADJUSTING WORK EQUIPMENT POSTURE

⚠ 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.**
- **Do not go under the work equipment when the arm is raised.**

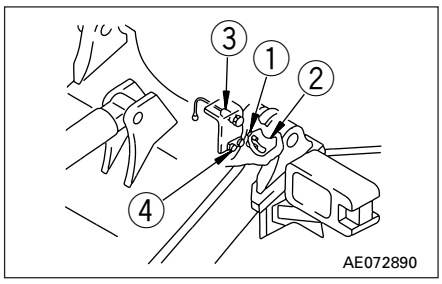
The boom kickout makes it possible to set the bucket so that it automatically stops at the desired lifting height (lift arm higher than horizontal) and the bucket positioner makes it possible to set the bucket so that it automatically stops at the desired digging angle. The setting can be adjusted to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

12.12.1 ADJUSTING BOOM KICKOUT



1. Raise the bucket to the desired height, set the work equipment 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.

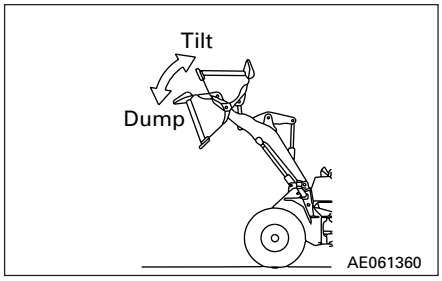


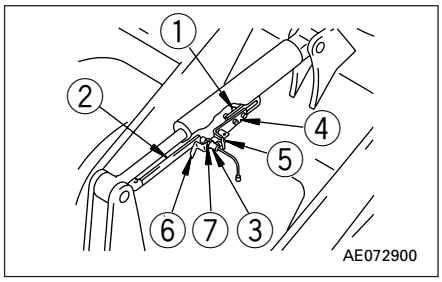
3. Loosen two nuts ④ to make a clearance of 3 to 5 mm (0.12 to 0.20 in) between plate ② and the sensing surface of proximity switch ③. Then tighten the nuts to hold in position.

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 work equipment 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 work equipment 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 bar 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 bolt ⑤ to give a clearance of 0.5 to 2 mm (0.02 to 0.08 in) between bar ② and support ⑥. Then tighten the nuts to hold in position.

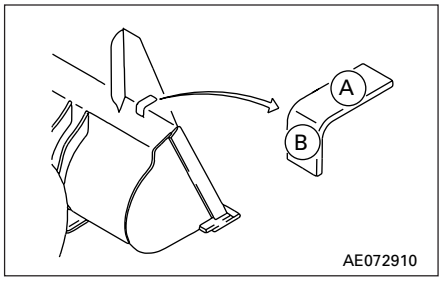
Tightening torque: 17.2 ± 2.5 N·m (1.75 ± 0.25 kgf·m, 12.7 ± 1.8 lbft)

4. Loosen two nuts ⑦ and to make a clearance of 3 to 5 mm (0.12 to 0.20 in) between bar ② and the sensing surface of proximity switch ③.

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

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

12.12.3 BUCKET LEVEL INDICATOR

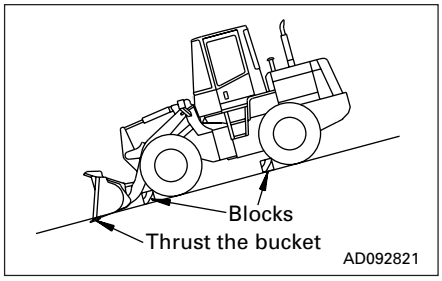


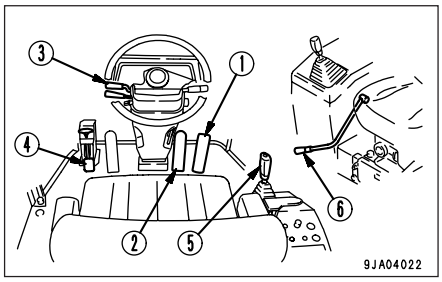
Ⓐ and Ⓑ at the top rear of the bucket are the level indicators, so the bucket angle can be checked during operations.
Ⓐ: Parallel with cutting edge
Ⓑ: 90° to cutting edge

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 pedal is depressed LOCK, there is danger until the parking brake pilot lamp lights up, so keep the brake pedal depressed.**

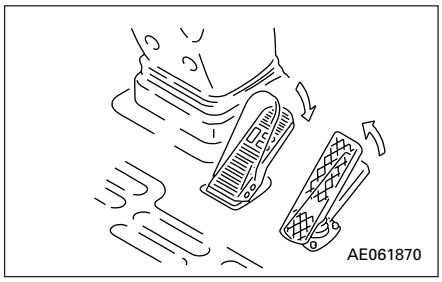




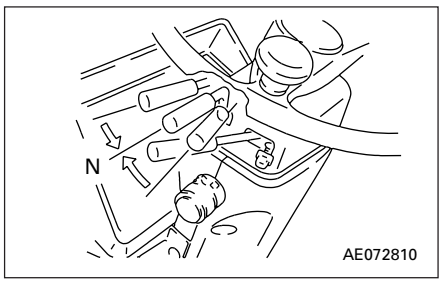
NOTICE

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

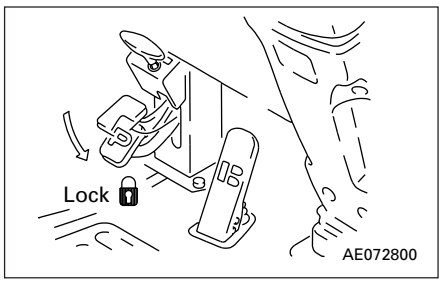
1. Release accelerator pedal ①, and depress brake pedal ② to stop the machine.



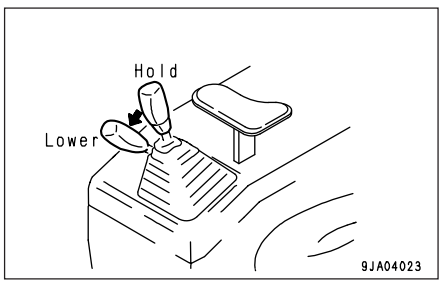
2. Place directional lever ③ in N (neutral).



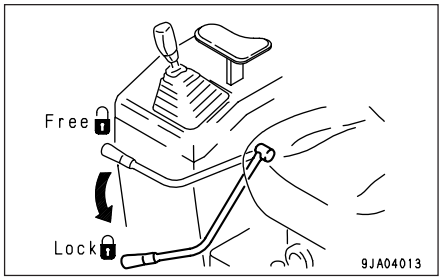
3. Depress parking brake pedal ④ to LOCK to apply the parking brake.



4. Operate work equipment control lever ⑤ to lower the bucket to the ground.



5. Lock work equipment control lever ⑤ with safety lock lever ⑥.



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.

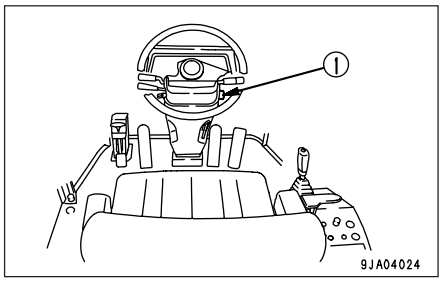
12.15 STOPPING ENGINE

NOTICE

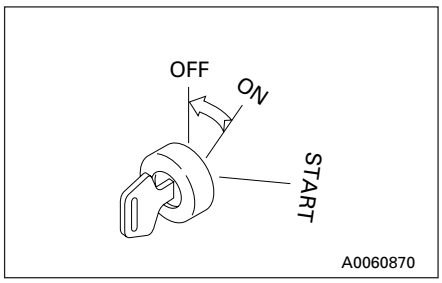
If the engine is abruptly stopped before it has cooled down, engine life may be greatly shortened. Consequently, do not abruptly stop the engine apart from an emergency.

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.

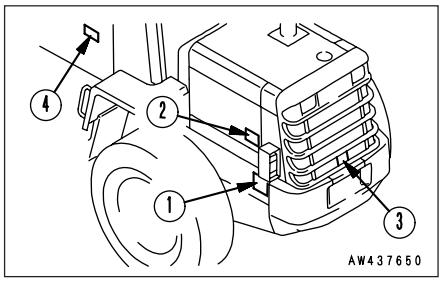
12.17 LOCKING

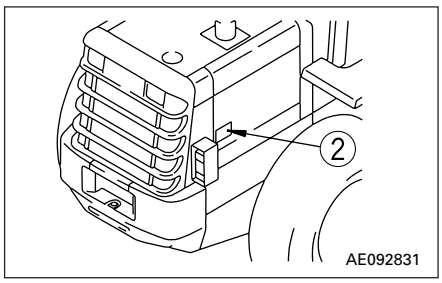
Always lock the following places.

① Fuel tank filler cap
② Engine side panel (left, right)
③ Rear grill
④ Cab door (left, right)

REMARK

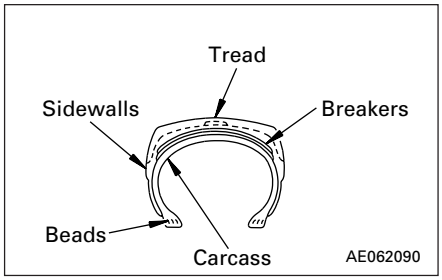
The starting switch key is used also for locks ①, ②, ③ and ④.





12.18 HANDLING THE TIRES

12.18.1 PRECAUTIONS WHEN HANDLING TIRES



If the following defects are found in tires, for safety reasons the tire should be replaced with a new tire.

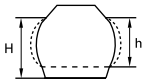
- Bead wire is broken or bent, or the tire is greatly deformed.
- Wear is excessive and the carcass ply (excluding breaker) is exposed for more than 1/4 of the circumference.
- Damage to the carcass exceeds 1/3 of the tire width.
- Tire layers are separated.
- Radial cracks reach the carcass.
- Deformation or damage which makes the tire unsuitable for use.

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. 15 – 25%
When digging (rear wheels off ground): Approx. 25 – 35%

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

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	Inflation pressure MPa (kgf/cm²)			
		Soft ground (sandy ground)	Normal road		When shipped from factory
			Stockpile	Digging	
16.9 – 24 (L2 Traction)	10	0.20 – 0.22 (2.0 – 2.2)	0.20 – 0.24 (2.0 – 2.4)	0.20 – 0.24 (2.0 – 2.4)	front tire: 0.24 (2.4) rear tire: 0.24 (2.4)
14.00 – 24 (L2 Traction)	12	0.18 – 0.30 (1.8 – 3.0)	0.18 – 0.34 (1.8 – 3.5)	0.18 – 0.34 (1.8 – 3.5)	front tire: 0.30 (3.0) rear tire: 0.30 (3.0)
17.5 – 25 (L2 Traction)	12	0.18 – 0.34 (1.8 – 3.5)	0.18 – 0.34 (1.8 – 3.5)	0.18 – 0.34 (1.8 – 3.5)	front tire: 0.30 (3.0) rear tire: 0.30 (3.0)
15.5 – 25 (L2 Traction)	8	0.20 – 0.34 (2.0 – 3.5)	0.20 – 0.34 (2.0 – 3.5)	0.20 – 0.34 (2.0 – 3.5)	front tire: 0.30 (3.0) rear tire: 0.30 (3.0)

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, observe all related laws and regulations, and be careful to assure safety.

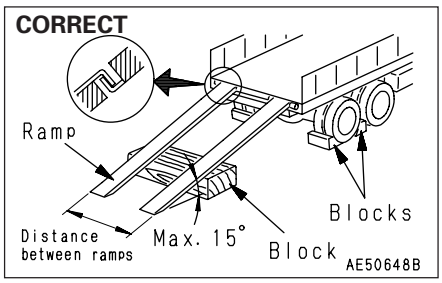
13.1 LOADING, UNLOADING WORK

⚠ WARNING

- **Make sure the ramp has sufficient width, length and thickness to enable the machine to be safely loaded and unloaded.**
- **When loading and unloading the machine, park the trailer on a flat firm roadbed. Keep a fairly long distance between the road shoulder and the machine.**
- **Remove the mud from the undercarriage to prevent the machine from slipping to the side on slopes.**
  Be sure the ramp surface is clean and free of grease, oil, ice and loose materials.
- **Never change the direction of travel when on the ramps. If it is necessary to change direction, drive off the ramps and correct the direction, then drive on to the ramps again.**

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

1. Properly apply the brakes on the trailer and insert blocks beneath the tires to ensure that it does not move. Then fix the ramps in line with the centers of the trailer and the machine. Be sure that the two sides are at the same level as one another.
   If the lamp sags appreciably, reinforce it with blocks, etc.



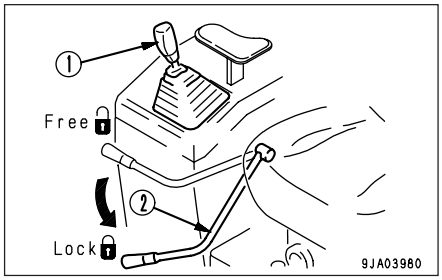
2. Determine the direction of the ramp, then slowly load or unload the machine.

REMARK

When transmission cut-off switch is set to OFF, the left brake pedal and accelerator pedal are operated at the same time.

3. Correctly load the machine onto the specified part of the trailer.

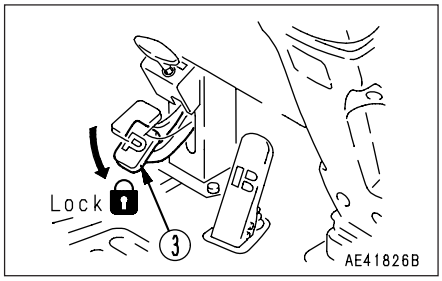
13.2 PRECAUTIONS FOR LOADING

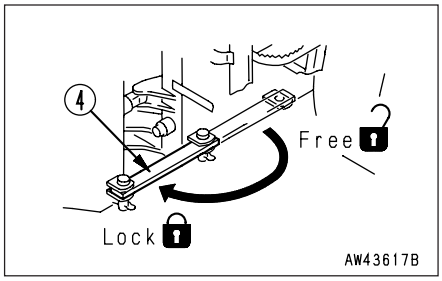


After loading the machine in the specified position, secure it in place as follows.

1. Lower the work equipment slowly.
2. Apply safety lock lever ② to lock all control levers ① securely.
3. Turn the starting switch to the OFF position and stop the engine. Remove the key from the starting switch.
4. Lock front frame and rear frame with safety bar.
5. Put blocks in front and behind the wheels, and secure the machine with chains or wire rope to prevent the machine from moving during transportation.
6. Always retract the car radio antenna fully.

13.3 LIFTING MACHINE





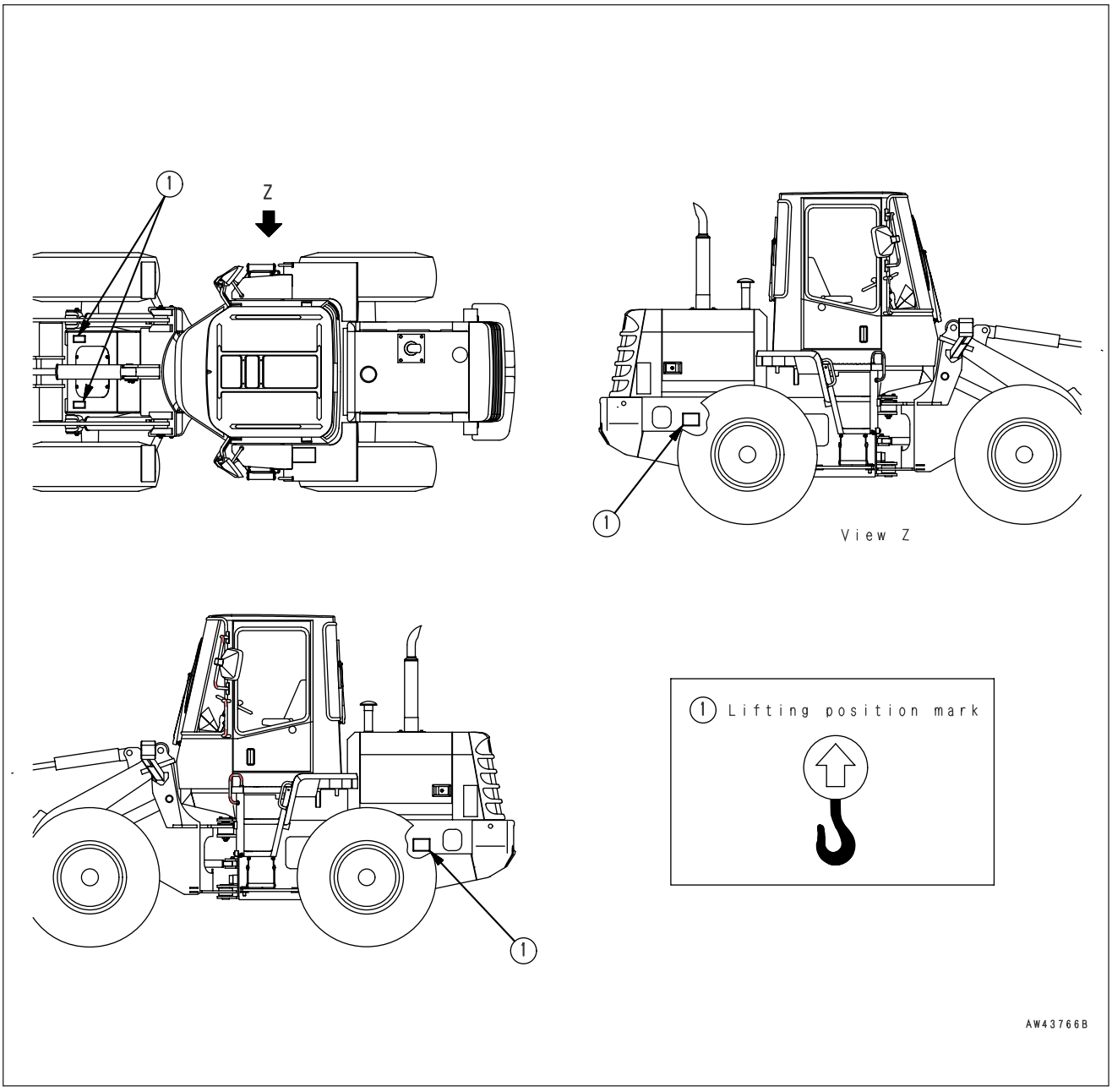
⚠ DANGER

- **When lifting the machine, if the wire rope is not fitted correctly the machine may fall and cause serious injury or even death. Raise the machine 100 – 200 mm (4 – 8 in) from the ground, check that the machine is horizontal and that there is no slack in the wire rope, then continue to lift the machine.**
- **Before lifting the machine, always stop the engine and lock parking brake pedal ③ and safety bar ④.**

⚠ WARNING

- **Lifting operations using a crane must be carried out by a qualified operator.**
- **Never raise the machine with any worker on it.**
- **Always make sure that the wire rope used for lifting the machine is of ample strength for the weight of the machine.**
- **Never try to lift the machine at any position or in any posture other than the posture given in the procedure next page.**

13.3.1 POSITION FOR STICKING LIFTING POSITION MARK



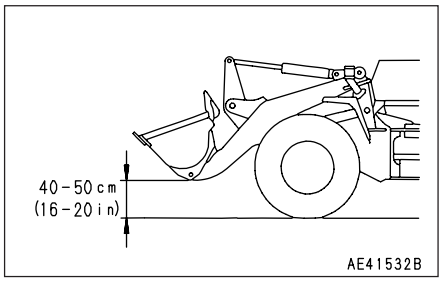
13.3.2 WEIGHT TABLE

Operating weight	Front wheel load	Rear wheel load	Center of gravity (from front axle)
7830 kg (17265 lb)	3240 kg (7144 lb)	4590 kg (10121 lb)	1525 mm (5 ft)

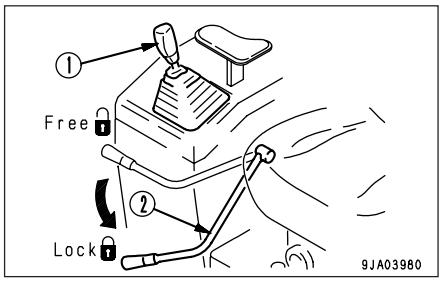
13.3.3 LIFTING PROCEDURE

Lifting work can be carried out only for machines with lifting marks. Before starting the lifting operation, stop the machine in a horizontal place and do as follows.

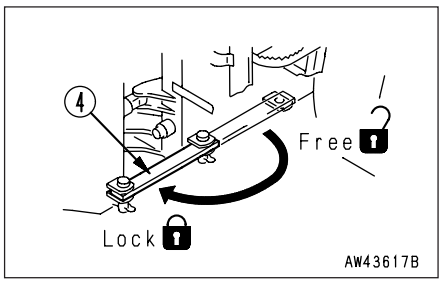
1. Start the engine, make sure that the machine is horizontal, then set the work equipment to the travel posture.
   For details, see "12.4 MOVING MACHINE OFF".



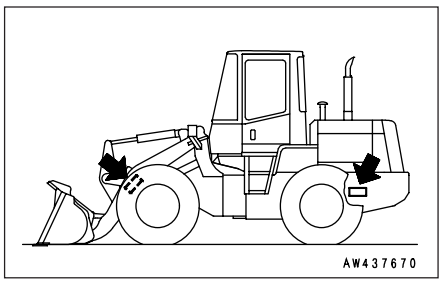
2. Set safety lock lever ② of work equipment control lever ① to the LOCK position.



3. Stop the engine, check that the area around the operator's compartment is safe, then lock with safety bar ④ so that the front frame and rear frame do not articulate.



4. Fit the lifting equipment to the lifting hooks (marked by the lifting mark) at the front of the front frame and the rear of the rear frame.
   For machines equipped with a rear full fender, remove the rear full fender before carrying out the procedure above.



5. When the machine leaves the ground, stop for a moment and wait for the machine to stabilize, then continue the lifting operation slowly.

⚠ CAUTION

When lifting the machine, check that there is no leakage of oil from the hydraulic circuit or any other part.

13.4 PRECAUTIONS FOR TRANSPORTATION

⚠ WARNING

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

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

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 (68°F)	0°C (32°F)	–10°C (14°F)	–20°C (–4°F)	–30°C (–22°F)
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

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.

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.

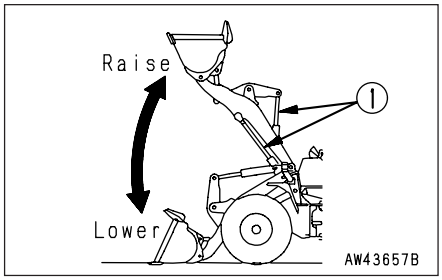
- Completely fill the fuel tank, lubricate, and change the oil before storage.

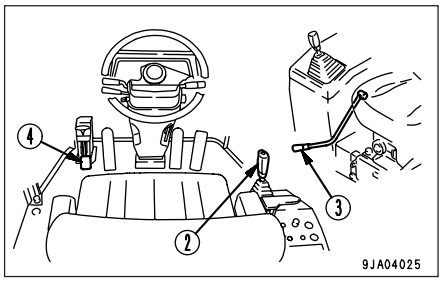
- Apply a thin coat of grease to the metal surface of hydraulic cylinder rods ①.

- 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 safety lock lever ③ to work equipment control lever ② and directional lever, then apply parking brake pedal ④.





15.2 DURING STORAGE

⚠ WARNING

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

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

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

15.3 AFTER STORAGE

NOTICE

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

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

- Wipe off the grease from the hydraulic cylinder rods.

- Add oil and grease to all places.

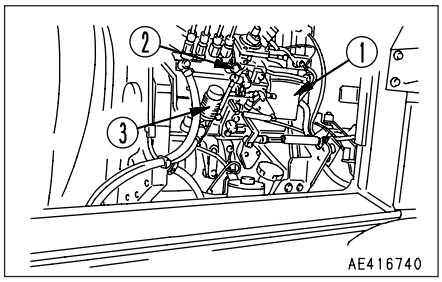
16. TROUBLESHOOTING

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.

When starting the engine after the machine has run out of fuel, add fuel, then fill fuel filter cartridge ① with clean fuel and bleed the air from the fuel system before starting.



PROCEDURE FOR BLEEDING AIR

1. Loosen joint bolt ②.
2. Loosen the knob of feed pump ③, then pump it up and down until no more bubbles come out with the fuel from joint bolt ②.
3. Tighten joint bolt ②, then push in the knob of feed pump ③ and tighten it.

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.**

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. If the machine being towed must travel through mud or up hills, use a tow rope or bar of a strength of at least 1.5 times the weight of the machine being towed.

- 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.

1. The transmission oil does not lubricate the system, so remove the front and rear drive shafts. Pull the parking brake lever to apply the parking brake. If necessary, block the tires to prevent the machine from moving.

2. The steering cannot be operated, so remove the steering cylinder.
   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.

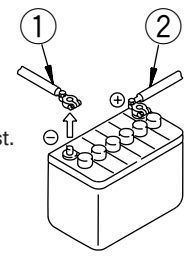
3. Connect the towing equipment securely. When carrying out towing operations, use two machines of at least the same class as the machine being towed. Connect one machine each to the front and rear of the machine being towed, then remove the blocks from the tires and tow the machine.

16.3 IF BATTERY IS DISCHARGED

⚠ WARNING

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

When removing, disconnect the cable from the ground terminal first.



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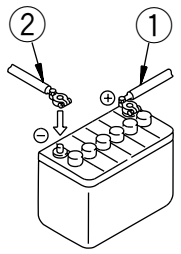
When installing, connect the cable to the positive ⊕ terminal first.



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16.3.1 REMOVAL AND INSTALLATION OF BATTERY

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

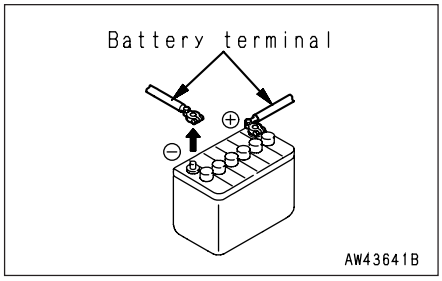
- When removing battery, first disconnect the cable from the ground (normally, from the negative ⊖ terminal). If a tool touches a cable connecting the positive terminal and the chassis, there is danger of sparks being emitted.
- When installing battery, the ground cable should be connected to the ground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

REMARK

The batteries are on 2 pieces 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 level or measuring the specific gravity, disconnect cables from the battery.

REMARK

The batteries are on 2 pieces at the rear of the machine. The battery used for the ground is on the right side of the machine.

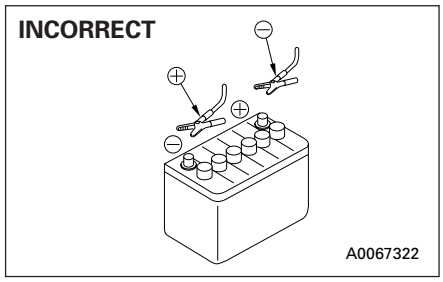
16.3.3 STARTING ENGINE WITH BOOSTER CABLE

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.**
- **Be careful not to let the normal machine and problem machine contact each other. This prevents sparks from generating near the battery which could ignite the hydrogen gas given off by the battery. If hydrogen gas explodes, it could cause serious injury.**
- **Make sure that there is no mistake in the booster cable connections. The final connection is to the engine block of the problem machine, but sparks will be generated when this is done, so connect to a place as far as possible from the battery.**
- **Use care when removing the cables from the machine that has been started. Do not allow the cable ends to contact each other or the machine, to avoid hydrogen explosion.**



NOTICE

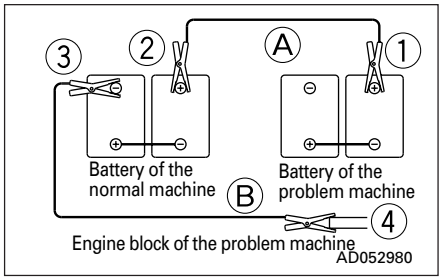
- **The size of the booster cable and clip should be suitable for the battery size.**
- **The battery of the normal machine must be the same capacity as that of the engine to be started.**
- **Check the cables and clips for damage or corrosion.**
- **Make sure that the cables and clips are firmly connected.**

The batteries are on 2 pieces 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.



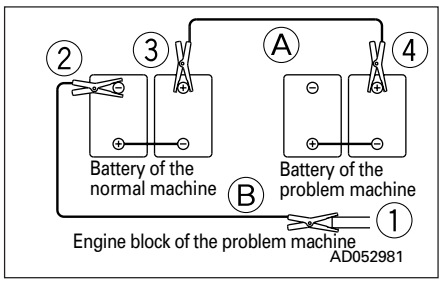
1. Make sure that the starting switches of the normal machine and problem machine are both at the OFF position.
2. Connect one clip of booster cable Ⓐ to the positive ⊕ terminal of the problem machine.
3. Connect the other clip of booster cable Ⓐ to the positive ⊕ terminal of the normal machine.
4. Connect 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 fan belt tension	(● Check, repair loose terminals, disconnections) ● Adjust fan belt tension For details, see EVERY 1000 HOURS SERVICE
Lamp flickers while engine is running		
Even when the engine is rotating, the voltmeter is not stable	● Defective alternator ● Defective wiring ● Defective adjustment of fan belt tension	(● Replace) (● Check, repair) ● Adjust fan belt tension. See EVERY 1000 HOURS SERVICE
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 ● Defective starting motor	(● Check, repair) ● Charge (● Replace)
Preheating pilot lamp does not light up	● Defective wiring ● Defective glow relay, glow controller, water temperature sensor ● Defective preheating pilot lamp	(● 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 caution pilot lamp	(● Check, repair) (● Replace)
Even when engine is stopped, engine oil pressure caution pilot lamp does not light up (starting switch at ON position)	● Defective caution pilot lamp ● Defective caution pilot lamp switch	(● 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 ● Disconnection of lever linkage (3-speed specification machine only)	● Release parking brake ● Shift lever properly ● Add oil to specified level. See WHEN REQUIRED ● Connect linkage (3-speed specification machine only)
Even when engine is run at full throttle, machine only move slowly and lacks power	● Lack of oil in transmission case ● Screen 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
Disc brake		
Brake is not applied when pedal is depressed	● Disc has reached wear limit ● Lack of brake 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 master cylinder is clogged	● Clean
Brakes squeal	● Disc is worn ● Large amount of water in axle oil ● Deteriorated axle oil due to overuse of brake	(● Replace disc) ● Change axle oil ● Change axle oil
Parking brake		
Braking effect is poor	● Linkage is loose ● Disc is worn	● Adjust (● Replace disc)
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	● Lack of oil	● Add oil to specified level. See EVERY 100 HOURS SERVICE
Bucket takes time to rise	● Clogged hydraulic tank filter	● Replace filter. See EVERY 1000 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 EVERY 1000 HOURS SERVICE
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 EVERY 1000 HOURS SERVICE
Movement of cylinder is irregular	● Oil level is low ● Leakage 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 engine oil pressure sensor	● Add oil to specified level, see CHECK BEFORE STARTING ● Replace cartridge, see EVERY 250 HOURS SERVICE (● Check, repair) (● Replace sensor)
Steam is emitted from top part of radiator (pressure valve)	● Cooling water level low, water leakage ● Loosen fan belt ● Dirt or scale accumulated in cooling system	● Add cooling water, repair, see CHECK BEFORE STARTING ● Adjust fan belt tension, see EVERY 1000 HOURS SERVICE ● Change cooling water, clean inside of cooling system, see WHEN REQUIRED
Water temperature gauge is in red range	● Clogged radiator fin or damaged fin ● Defective thermostat ● Loose radiator filler cap (high altitude operation) ● Defective water level sensor	● Clean or repair, see WHEN REQUIRED (● Replace thermostat) ● Tighten cap or replace packing (● Replace sensor)
Water temperature gauge is in white range	● 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, see EVERY 500 HOURS SERVICE (● 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)

MEMO

MAINTENANCE

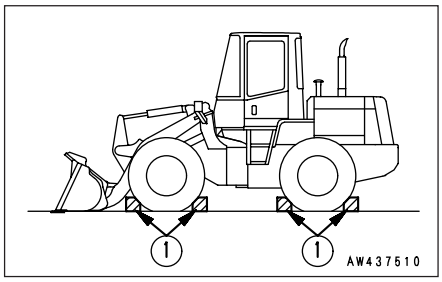
17. GUIDES TO MAINTENANCE

Do not carry out any inspection or maintenance operations not given in this manual. Stop the machine on firm level ground before starting inspection and maintenance operations.

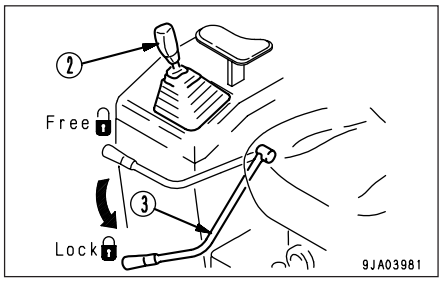
Set to the inspection and maintenance posture.

Carry out operations in the posture given below unless there are special instructions.

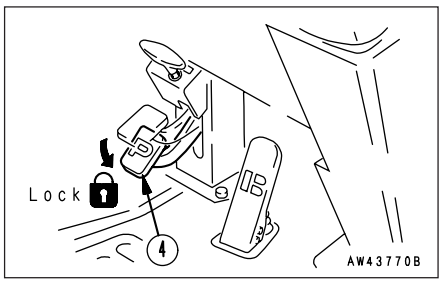
- Lower the work equipment to the ground, set it in the posture shown in the diagram on the right, then put blocks ① in front of and behind the tires.



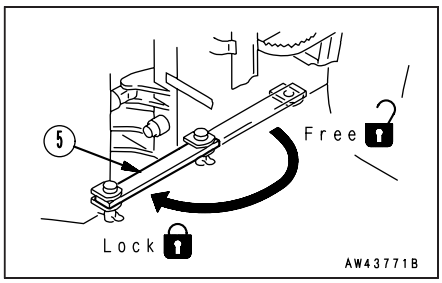
- Place all control levers ② at the N or HOLD position.
- Set the safety lock lever ③ to lock position.



- Depress parking brake pedal ④ to apply the parking brake.



- Lock the front and rear frames with safety bar ⑤.



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

Komatsu genuine replacement parts:
Use Komatsu genuine parts specified in the Parts Book as replacement parts.

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

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

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

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

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

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

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

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

Warning tag:
Attach the warning tag to the starting switch or other appropriate control lever to prevent anyone from starting the engine during maintenance.

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

Welding instructions:
- Turn off the engine starting switch.
- Do not apply more than 200 V continuously.
- Connect grounding the cable within 1 m (3.28 ft) from the area to be welded.
- Avoid seals or bearings from being between the area to be welded and the position of the grounding point.
- Never weld any pipe or tube containing fuel or oil.

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

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

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

Checking undercarriage:
When working in rocky areas, check for damage to the undercarriage and for looseness, flaws, wear and damage in bolts and nuts.

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

Pre-and post-work checks:
Before starting work in mud, rain, snow or at the seashore, check plugs and valves for tightness.
Wash the machine immediately after the work to protect components from rusting.
Lubricate components more frequently than usual. Be sure to lubricate work equipment pins daily if they are submerged in water.
On jobsites where heavy-duty operations are common, reduce the maintenance intervals and carry out greasing more frequently.

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

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

18. OUTLINES OF SERVICE

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

Item	Kind of fluid
Engine oil pan	SAE 15W-40 API classification CD
Transmission case	SAE 10W API classification CD
Axle (Front and rear)	AXO75
Brake	SAE 5W-20 API classification CD
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) above 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, bolt on edge, etc. are to be replaced at the time of periodic maintenance or before their abrasion limits.

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

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

When ordering parts, please check the part number in the parts book.

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

Item	Part No.	Part Name	Q'ty	Replacement frequency
Engine oil filter	6732-51-5141	Cartridge	1	EVERY 250 HOURS
Fuel filter	6732-71-6111	Cartridge	1	EVERY 500 HOURS
Transmission oil filter	714-07-28711	Cartridge	1	EVERY 1000 HOURS
Transmission strainer	07000-12085	O-ring	1	EVERY 1000 HOURS
Hydraulic filter	07063-01054 (07000-12115)	Element (O-ring)	1 (1)	EVERY 1000 HOURS
Hydraulic tank breather	417-60-15380	Element	1	EVERY 2000 HOURS
Air cleaner	600-181-6050	Element ass'y (Outer, inner element ass'y)	1	–
Bolt on edge	416-815-1310 416-815-1320 (02090-11270) (02290-11219) (01643-32060)	Center edge Side edge (Bolt) (Nut) (Washer)	1 2 (8) (8) (8)	–
Electrical intake air heater	6732-11-4811	Gasket	2	–

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	13.5 ℓ 3.56 US gal	12.0 ℓ 3.17 US gal
Brake		SAE 5W-20	1 ℓ 0.26 US gal	1 ℓ 0.26 US gal
Transmission case		SAE 10W	28.0 ℓ 7.4 US gal	23.5 ℓ 6.2 US gal
Hydraulic system		SAE 10W	80 ℓ 21.1 US gal	41 ℓ 10.8 US gal
Axle (Front and rear) (Each)	Axle oil	See Note 1	14 ℓ 3.70 US gal	14 ℓ 3.70 US gal
Pins	Grease	NLGI No. 2	–	–
Fuel tank	Diesel fuel	ASTM D975 No.2 ※	133 ℓ 35.1 US gal	–
Cooling system	Water	**Add antifreeze**	19.5 ℓ 5.15 US gal	–

※ ASTM D975 No. 1

When operating the machine at temperatures below –20°C (–4°F), 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

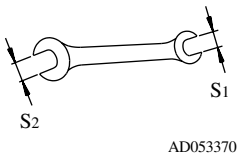
No.	Supplier	**Engine Oil [CD or CE]** SAE10W, 30, 40 10W30, 15W40 (The 15W40 oil marked * is CE.)	**Gear Oil [GL-4 or GL-5]** SAE80, 90, 140	**Grease [Lithium-Base]** NLGI No. 2	**Anti-freeze Coolant [Ethylene Glycol Base] Permanent Type**
1	KOMATSU	EO10-CD EO30-CD EO10-30CD EO15-40CD	GO90 GO140	G2-LI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

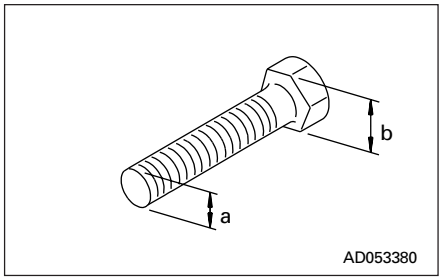
The following tools are provided with the machine.

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	Screwdriver	09033-00190	Cross head and flat head interchangeable type
3	Wrench	09014-10200	
4	Pliers	09036-00150	
5	Wrench	09001-03200	32 jaw
6	Tire wrench	417-98-11121	
7	Filter wrench	09019-08030	For filter cartridge
8	Bar	417-98-11110	
9	Tire gauge	09289-00000	
10	Grease pump	07952-70003	For greasing work
11	Nozzle	07951-11400	Hose nozzle for grease pump
12	Grease cartridge	07950-90403	(Lithium base grease: 400 g)
13	Thickness gauge	09054-00009	
14	Hammer	09039-00150	
15	Plate	09963-03000	Warning tag

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

In addition to above items 1 – 15, rubber ring 07000-15090 is also provided. This is the rubber band used to secure the grease pump to the machine. For details of the method of using it, see "11. EXPLANATION OF COMPONENTS".

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 ± 3	282 ± 29
20	30	549 ± 58	56 ± 6	405 ± 43
22	32	745 ± 78	76 ± 8	549 ± 58
24	36	927 ± 98	94.5 ± 10	684 ± 72
27	41	1320 ± 140	135 ± 15	973 ± 100
30	46	1720 ± 190	175 ± 20	1270 ± 140
33	50	2210 ± 240	225 ± 25	1630 ± 180
36	55	2750 ± 290	280 ± 30	2030 ± 210
39	60	3280 ± 340	335 ± 35	2420 ± 250

NOTICE

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

22. PERIODIC REPLACEMENT OF SAFETY CRITICAL PARTS

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

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

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

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

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

Ask your Komatsu distributor to replace the safety critical parts.

SAFETY CRITICAL PARTS

No.	Safety critical parts for periodic replacement	Q'ty	Replacement interval
1	Fuel hose (fuel tank – injection pump)	1	Every 2 years or every 4000 hours, whichever comes first
2	Fuel return hose (injection nozzle – fuel tank)	1	
3	Fuel spill hose (fuel filter – intermediate divider tube)	1	
4	Fuel spill hose (intermediate divider tube – fuel tank)	1	
5	Turbocharger lubricating oil hose	1	
6	Steering hose (pump – priority valve)	1	
7	Steering hose (priority valve – orbitrol valve)	1	
8	Steering hose (orbitrol valve – steering cylinder)	2	
9	Steering hose (orbitrol valve – steering cylinder)	4	
10	Packings, seals, O-rings of steering cylinder	2	
11	Brake hose (oil tank – master cylinder)	2	
12	Brake hose (master cylinder – front brake)	1	
13	Brake hose (master cylinder – front brake)	1	
14	Brake hose (master cylinder – rear brake)	1	
15	Brake hose (master cylinder – rear brake)	1	
16	Piston and packing of master cylinder	1	
17	Seat belt	1	Every 3 years

23. MAINTENANCE SCHEDULE CHART

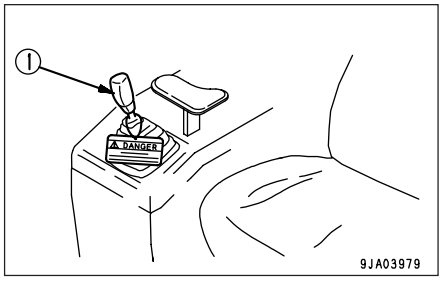
23.1 MAINTENANCE SCHEDULE CHART

SERVICE ITEM	PAGE
EVERY 1000 HOURS SERVICE	
Change oil in transmission case and transmission oil filter cartridge, clean strainer	3-53
Clean transmission case breather	3-54
Lubricating	3-55
● Front drive shaft (2 points)	3-55
● Drive shaft center support (1 point)	3-55
● Center drive shaft (2 points)	3-55
● Rear drive shaft (2 points)	3-56
Change oil in hydraulic tank, replace hydraulic filter element	3-57
Check tightening parts of turbocharger	3-59
Check play of turbocharger rotor	3-59
Check fan belt tension and replace fan belt	3-59
EVERY 2000 HOURS SERVICE	
Replace hydraulic tank breather element	3-60
Change axle oil ★	3-61
Check brake disc wear	3-62
Check alternator, starting motor	3-62
Check engine valve clearance, adjust	3-62
Replace element in car heater and air conditioner (if equipped) recirculation air filter, fresh air filter	3-62
EVERY 4000 HOURS SERVICE	
Check water pump	3-63

★ 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

Always hang a warning tag on work equipment control lever ①.

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

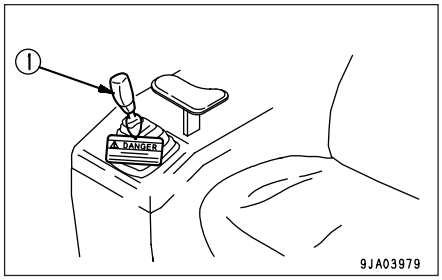
- **REPLACE FUEL FILTER CARTRIDGE**
- **REPLACE TRANSMISSION OIL FILTER ELEMENT**
- **REPLACE HYDRAULIC TANK FILTER ELEMENT**
- **CHECK ENGINE VALVE CLEARANCE, ADJUST**

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

24.2 WHEN REQUIRED

⚠ WARNING

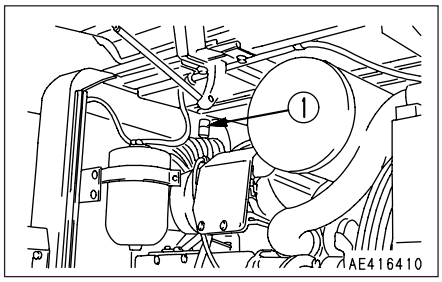
Always hang a warning tag on work equipment control lever ①.



24.2.1 CHECK, CLEAN, OR REPLACE AIR CLEANER ELEMENT

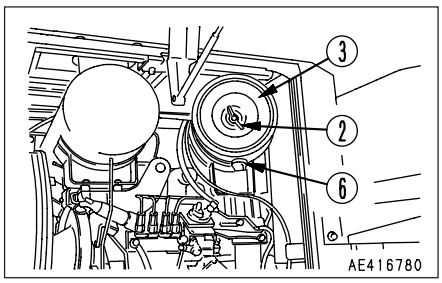
⚠ WARNING

- **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.**



NOTICE

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.



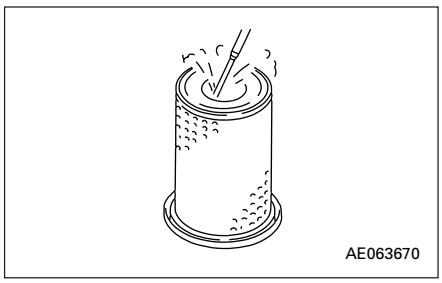
CHECKING

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

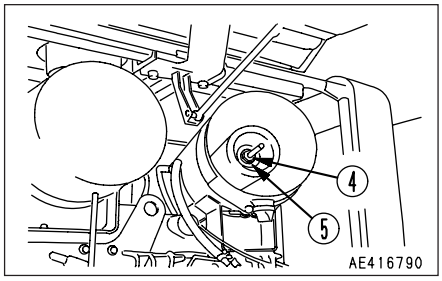
CLEANING OR REPLACING OUTER ELEMENT

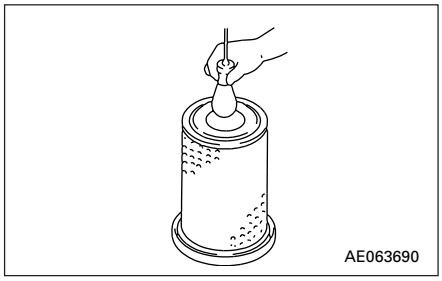
1. Loosen wing nut ② and take out outer element ③.

2. Clean the inside of the air cleaner body.



3. Direct dry compressed air (less than 700 kPa (7 kgf/cm^2, 100 psi)), to the element from inside along its folds, then direct it from outside along its folds and again from inside.
   1) Remove one seal from the outer element 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 displays red immediately after the outer element has been cleaned, replace both the inner and outer elements, even if the outer element has not been cleaned 6 times.
   4) Check inner element mounting nut ④ for looseness and, if necessary, retighten.
      Tightening torque of mounting nut: 5.4 ± 0.5 N·m (0.55 ± 0.05 kgf·m, 4.0 ± 0.4 lbft)
   5) Replace seal washer ⑤ or wing nut ②, mounting nut ④ with new parts if they are broken.
      Tightening torque of mounting nut: 5.4 ± 0.5 N·m (0.55 ± 0.05 kgf·m, 4.0 ± 0.4 lbft))
   6) Remove evacuator valve ⑥ and clean with compressed air. After cleaning, reset the evacuator valve.



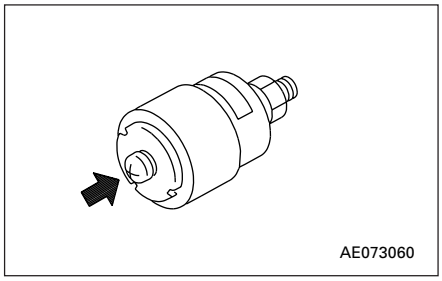


NOTICE

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.
   Tightening torque of wing nut: 6.9 ± 1.0 N·m (0.7 ± 0.1 kgf·m, 5.1 ± 0.7 lbft)

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

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.

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

The following methods require spare parts.

With water

Dash city water (less than 294.2 kPa (3 kgf/cm^2, 42.6 psi) on element from inside along folds, then from outside and again from inside. Dry and check it.

With cleaning agent

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

Drying can be speeded up by blowing dried compressed air less than 700 kPa (7 kgf/cm^2, 100 psi) from the inside to the outside of the element.

Never attempt to heat the element.

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

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 slowly to allow pressure to be relieved.**

- Stop the machine on level ground when cleaning or changing the coolant.
- Use a permanent type of antifreeze.
  If, for some reason, it is impossible to use permanent type antifreeze, use an antifreeze containing ethylene glycol.
- Be sure to replace the corrosion resistor cartridge.
- 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

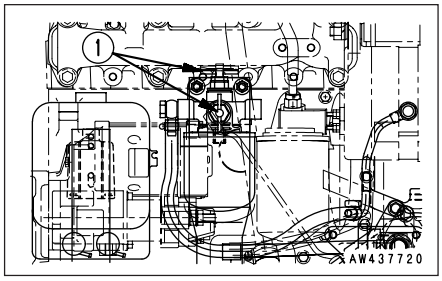
Min. atmospheric temperature	°C	–5	–10	–15	–20	–25	–30
	°F	23	14	5	–4	–13	–22
Amount of antifreeze	ℓ	4.5	5.9	7.0	8.0	8.8	9.75
	US gal	1.19	1.56	1.85	2.11	2.32	2.57
Amount of water	ℓ	15.0	13.6	12.5	11.5	10.7	9.75
	US gal	3.96	3.59	3.30	3.04	2.82	2.57

⚠WARNING

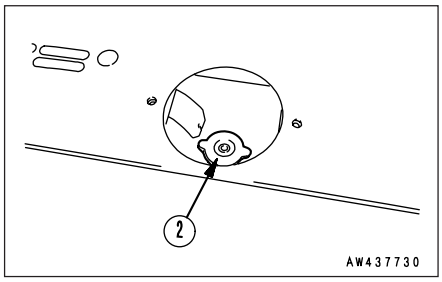
Antifreeze is flammable, so keep it away from any flame.

- 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 up corrosion resistor valves ①.

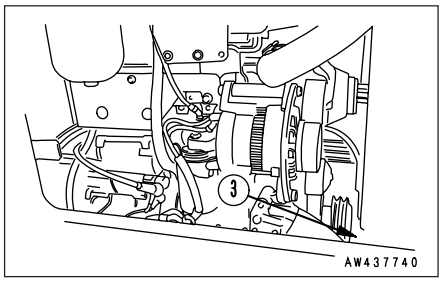


2. Turn radiator cap ② slowly to remove it.



3. Prepare a container to catch the coolant, then open drain valve ③ at the radiator left lower portion to drain the coolant.

4. After draining the water, close drain valve ③, 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, 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, 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 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, 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.

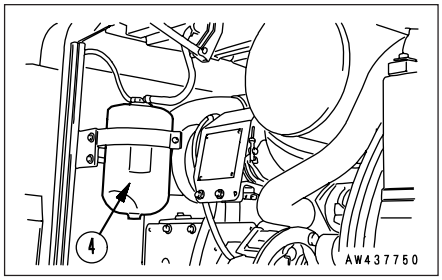
11. Replace the corrosion resistor cartridge and open valves ①.
    For details of replacement of the corrosion resistor, see "24.8 EVERY 1000 HOURS SERVICE".

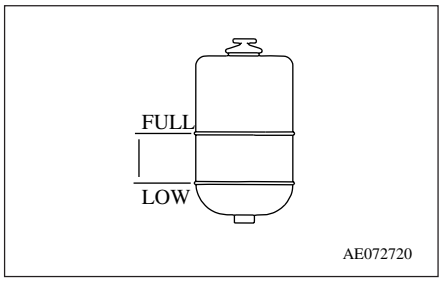
12. Add cooling water until it overflows from the water filler.

13. To remove the air in the cooling water, run for 5 minutes at low idling, then for another five minutes at high idling.
    When doing this, leave radiator cap ② off.

14 Drain the coolant inside sub-tank ④, then clean the inside of the sub-tank and fill again with water to a point between the FULL and LOW lines.

15. Stop the engine, wait for about 3 minutes, add cooling water up to near the radiator water filler port, then tighten the cap.

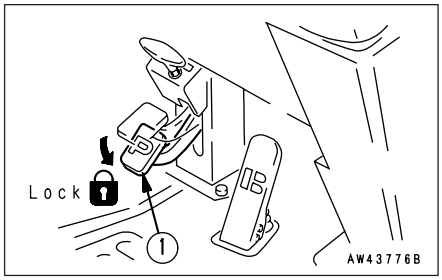




24.2.3 CHECK TRANSMISSION OIL LEVEL, ADD OIL

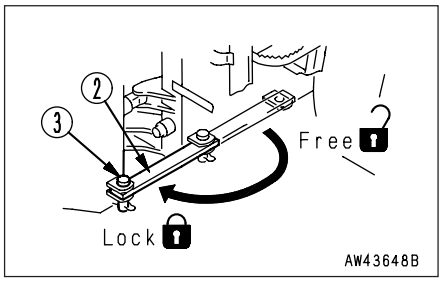
⚠ WARNING

- **When checking the oil level, apply parking brake pedal ①, and lock the front and rear frames with safety bar ② and pin ③.**
- **The oil is at high temperature after the machine has been operated. Always wait for the temperature to go down before starting this operation.**



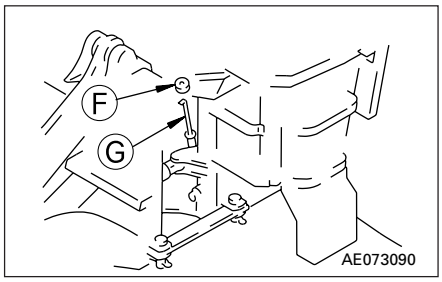
Carry out this procedure if there is any sign of oil on the transmission case, or if there is oil mixed with the cooling water.

1. Start the engine and run it for at least 5 minutes.
   Check the oil level of the transmission in neutral position at the engine low idling.



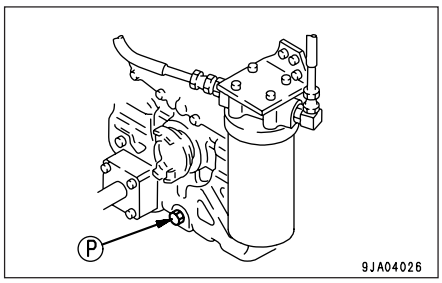
2. Open the cap of oil filler port Ⓕ, remove dipstick Ⓖ, and wipe the oil off with a cloth.

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



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

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



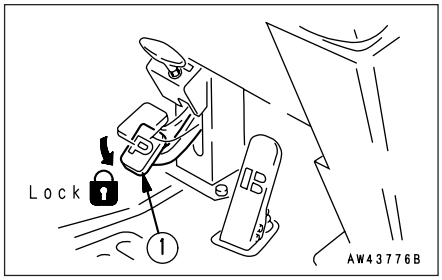
5. If the oil is above the H mark, drain the excessive engine oil from drain plug Ⓟ, then check the oil level again.

6. If the oil level is correct, insert dipstick Ⓖ into the oil filler pipe, then tighten the cap.

24.2.4 CHECK AXLE OIL LEVEL, ADD OIL

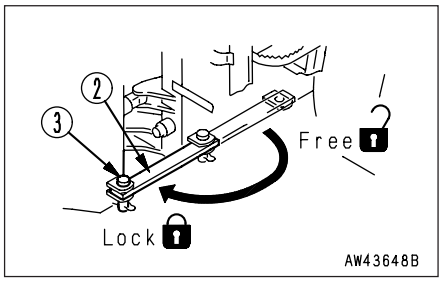
⚠ WARNING

- **When checking the oil level, apply parking brake pedal ①, and lock the front and rear frames with safety bar ② and pin ③.**
- **The oil is at high temperature after the machine has been operated. Always wait for the temperature to go down before starting this operation.**



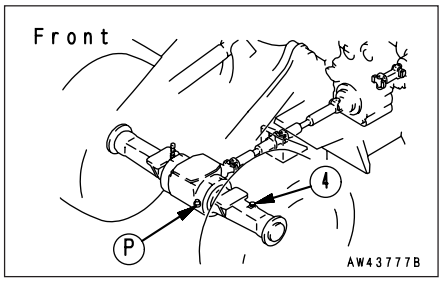
Carry out this procedure if there is any sign of oil on the axle case.

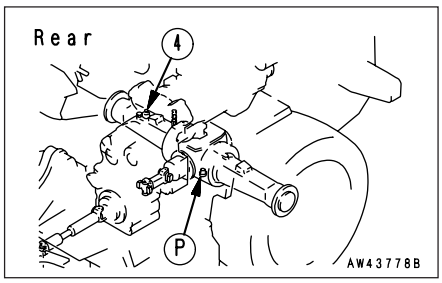
Carry out the inspection with the machine on a horizontal road surface.
(If the road surface is at an angle, the oil level cannot be checked correctly.)



1. Stop the engine and remove oil level plug ④.

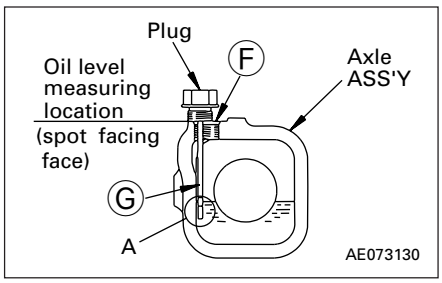
2. Wipe off any oil adhering to the oil level gauge attached to plug ④ with waste cloth.





3. Set the oil level gauge Ⓖ as shown in the right diagram.

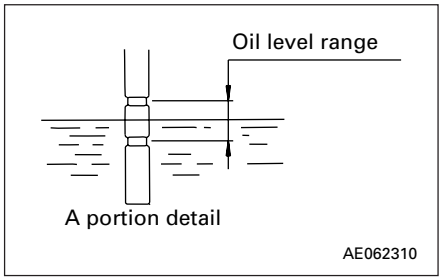
4. The oil level is correct when it is between the two lines provided on the oil level gauge. If the oil level does not reach the lower line, add axle oil through filler port Ⓕ.



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

5. If the oil level is above the upper line, drain off the excess oil through drain plug Ⓟ and check the oil level again.

6. If the oil level is correct, install plug ④.



Tightening torque: 132 ± 39 N·m (13.5 ± 4 kgf·m, 98 ± 29 lbft)

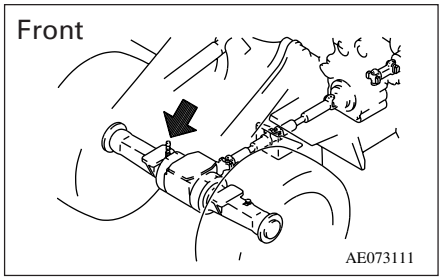
24.2.5 CHECK AXLE CASE BREATHER

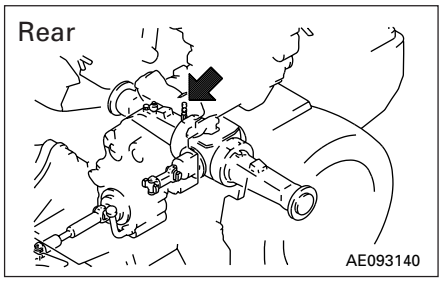
⚠WARNING

When cleaning, apply the parking brake pedal, and lock the front and rear frames with the safety bar and pin.

Remove all mud and dirt from around the breather with a brush.

When cleaning the breather, clean the breathers at two places (front and rear).





24.2.6 CLEAN RADIATOR FINS

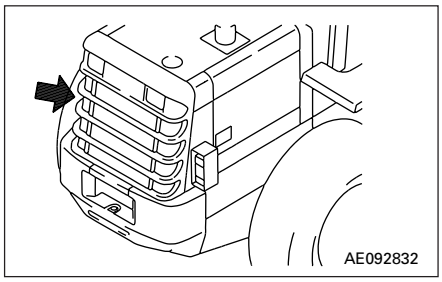
Carry out this procedure if there is any mud or dirt seen stuck to the radiator.

1. Open the rear grill from the rear of the machine.

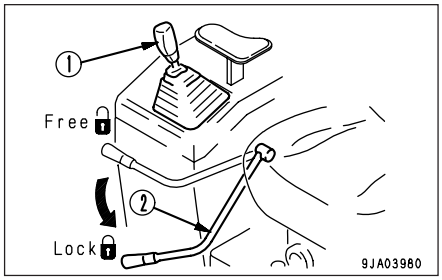
2. Use compressed air to clean the mud dust, and leaves from the radiator fins. Steam or water may be used instead of compressed air.

When using steam, the radiator fins may be damaged if the steam nozzle is brought too close to the fins, so stand well away from the radiator.

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.



24.2.7 REPLACE BOLT-ON CUTTING EDGE



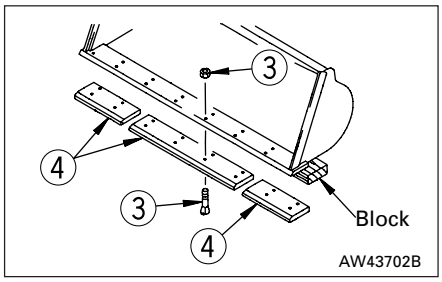
⚠ WARNING

It is extremely dangerous if the work equipment moves when carrying out the turning or replacement operation.
Set the work equipment in a stable position, stop the engine, then set safety lock lever ② for work equipment control lever ① securely to the LOCK position.

Turn or replace the cutting edge before the wear reaches the edge of the bucket.

1. Raise the bucket to a suitable height, then put blocks under the bucket to prevent the bucket from coming down.
   Raise the bucket so that the bottom surface of the bucket is horizontal.

2. Remove nuts and bolts ③, then remove cutting edge ④.



3. Clean the mounting surface of cutting edge ④.

4. Turn cutting edge ④ and install it to the bucket. When turning the edge, install it to the opposite side (left edge to right side, right edge to left side).

If both sides of the cutting edge are worn, replace with a new part.

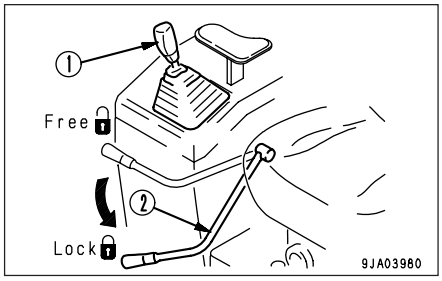
If the wear extends to the mounting surface, repair the mounting surface before installing the cutting edge.

5. Tighten nuts and bolts ③ uniformly so that there is no gap between the bucket and cutting edge.

Tightening torque for mounting bolt: 461 ± 69 N·m
(47 ± 7 kgf·m, 340 ± 50 lbft)

6. Tighten the mounting bolts again after operating for several hours.

24.2.8 REPLACE BUCKET TEETH (IF EQUIPPED)

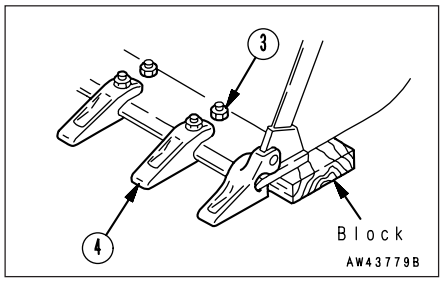


⚠WARNING

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 and lock work equipment control lever ① with safety lock lever ②.

When the bucket teeth are worn, replace them as follows.

1. Raise the bucket to a convenient height, and put blocks under the bucket to prevent it from coming down.
   Raise the bucket so that the bottom is horizontal.



2. Remove the bolts and nuts ③, then remove bucket tooth ④.
3. Clean the installation surface of bucket tooth ④.
4. Install new teeth to the bucket. When doing this, insert shims so that there is no clearance between the teeth and the top surface of the bucket.
   Continue to add shims until it becomes impossible to add a 0.5 mm (0.02 in) shim.

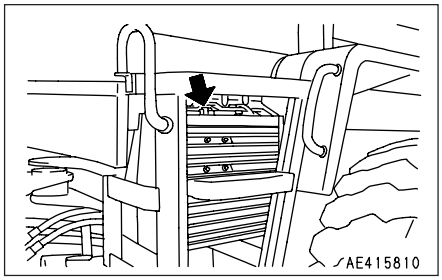
If the mounting surface is worn, correct the mounting surface before installing the teeth.

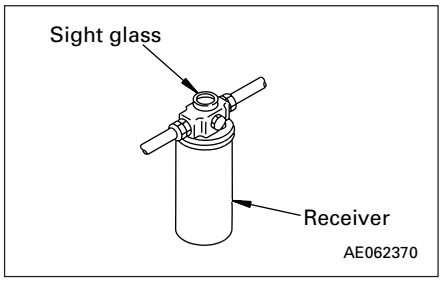
5. To prevent any gap from forming between the teeth and tip of the bucket, tighten bolts and nuts ③ temporarily, then hit the tip of the teeth with a hammer.

   Tightening torque of mounting bolt:
   461 ± 69 N·m (47 ± 7 kgf·m, 340 ± 51 lbft)

6. After operating the machine for a few hours, tighten the mounting bolts again.

24.2.9 CHECK AIR CONDITIONER (IF EQUIPPED)





CHECK LEVELS OF REFRIGERANT (GAS)

Check twice a year, in spring and autumn.

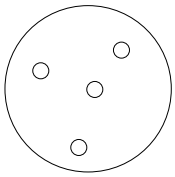
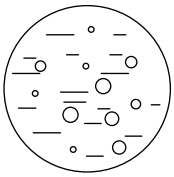
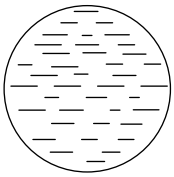
⚠WARNING

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.

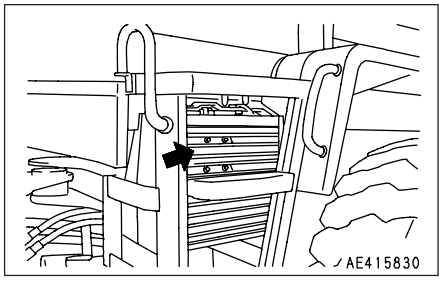
The sight glass is installed to the receiver at the side of the condenser.

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

To lubricate each part of the compressor during the off-season, operate the air conditioner for a few minutes two or three times a month.

24.2.10 CLEAN CONDENSER OF AIR CONDITIONER (IF EQUIPPED)



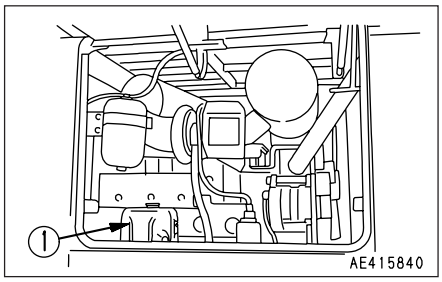
⚠ WARNING

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.

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.

24.2.11 CHECK WINDOW WASHING FLUID LEVEL, ADD FLUID



Check the washing fluid levels in washer tank ①. When the fluid has run short, add automotive window washing fluid.

To prevent the nozzles from clogging, be careful not to let dust get into the fluid.

24.2.12 ADJUSTING PARKING BRAKE

The parking brake is a sealed wet type disc brake, so the brake itself does not need adjusting. However, if the travel of the brake pedal increases because of looseness of the control cable mount or elongation of the control cable, adjust as follows.

Checking

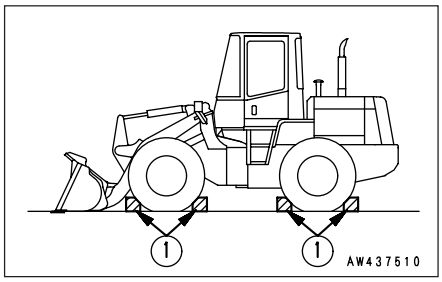
Depress the parking brake pedal with a force of approx. 294 N (30 kgf). If the travel of brake pedal is more than 13 clicks, check for looseness of the control cable mount (pedal end and brake end). If any looseness is found, tighten and then adjust as follows.

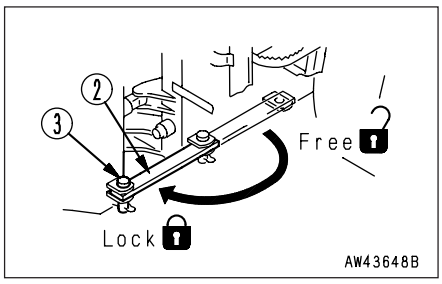
Adjusting

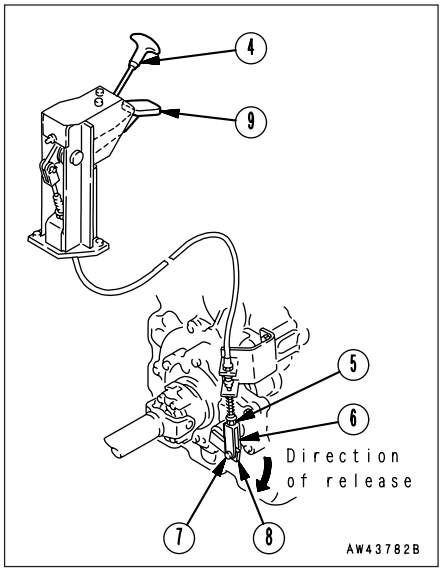
⚠ WARNING

When adjusting, always block ① the tires and prevent the machine from slipping. Secure the front and rear frames with safety bar ② and pin ③.

1. Pull release lever ④ and release the parking brake.
2. Loosen locknut ⑤ and remove clevis pin ⑦.
3. Pull lever ⑧ at the parking brake end fully to release the brake, and set it in the release position.
4. Screw in clevis ⑥, align the pin with the pin hole in lever ⑧ at the parking brake end, then assemble clevis pin ⑦ and tighten locknut ⑤.
5. After adjusting, depress parking brake pedal ⑨ with a force of approx. 294 N (30 kgf), and check that the travel of the pedal is 7 – 11 clicks.



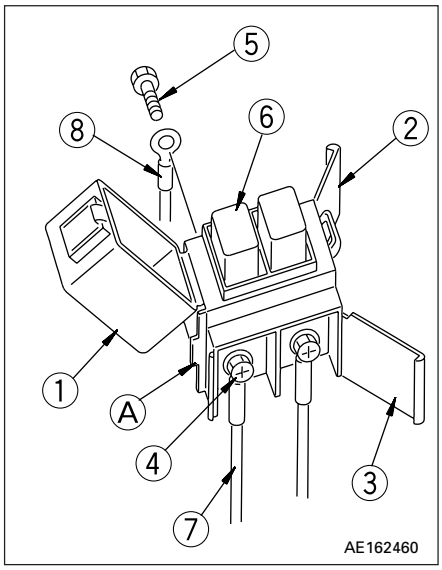




24.2.13 CHECK ELECTRICAL INTAKE AIR HEATER

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

24.2.14 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.

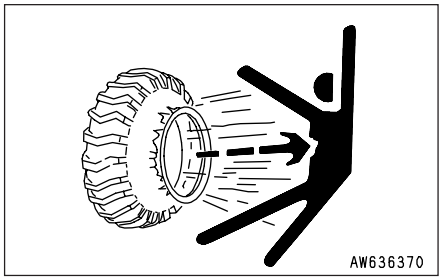
3. Open covers ①, ②, and ③ of the slow blow fuse box.
   Covers ② and ③ can be removed easily by using protrusion Ⓐ on the body as a fulcrum and levering the catch of the cover with a flat-headed screwdriver to release it.

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.

24.2.15 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.

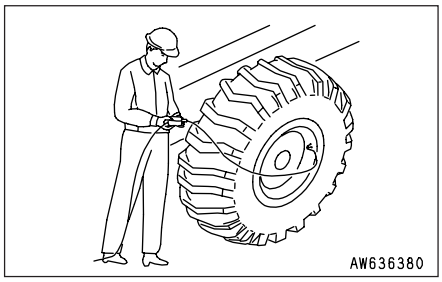
Select the tires according to the conditions of use and attachments of the machine. Use the following table. Since the indicated speed varies with the tire size, consult your Komatsu distributor when using optional tires.

	Specification of tire	Tire size	Remarks
Front wheel	3455 kg (7618 lb) 6070 kg (13384 lb)	16.9-24-10PR (standard) 17.5-25-12PR (if equipped)	Type 3 for construction equipment
Rear wheel	3455 kg (7618 lb) 6070 kg (13384 lb)	16.9-24-10PR (standard) 17.5-25-12PR (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
16.9–24–10PR (standard)	0.24 MPa (2.4 kgf/cm^2)
17.5–25–12PR (if equipped)	0.29 MPa (3.0 kgf/cm^2)

NOTICE

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

24.3 CHECK BEFORE STARTING

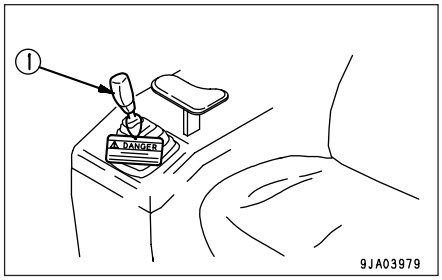
For the following items, see "12.1.2 CHECK BEFORE STARTING" in the operation section.

- **CHECK MONITOR PANEL**
- **CHECK COOLANT LEVEL, ADD WATER**
- **CHECK FUEL LEVEL, ADD FUEL**
- **CHECK OIL LEVEL IN ENGINE OIL PAN, ADD OIL**
- **CHECK AND REFILL OF OIL IN BRAKE OIL TANK**
- **CHECK DUST INDICATOR**
- **CHECK ELECTRIC WIRINGS**
- **CHECK EFFECT OF PARKING BRAKE**
- **CHECK EFFECT OF BRAKE**
- **CHECK SOUND OF HORN AND BACKUP ALARM**
- **CHECK FLASHING OF LAMPS, CHECK FOR DIRT AND DAMAGE**
- **CHECK ENGINE EXHAUST COLOR AND SOUND**
- **CHECK OPERATION OF GAUGES**
- **CHECK PLAY OF STEERING WHEEL, CHECK OPERATION OF STEERING**
- **CHECK DIRECTION OF REAR VIEW MIRROR, CHECK FOR DIRT OR DAMAGE**
- **CHECK LOCK OF CAB DOOR (MACHINE EQUIPPED WITH CAB)**
- **CHECK INFLATION PRESSURE OF TIRES**

24.4 EVERY 50 HOURS SERVICE

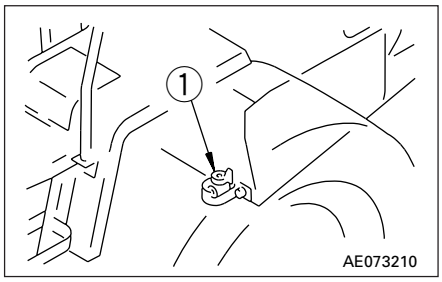
⚠WARNING

Always hang a warning tag on work equipment control lever ①.

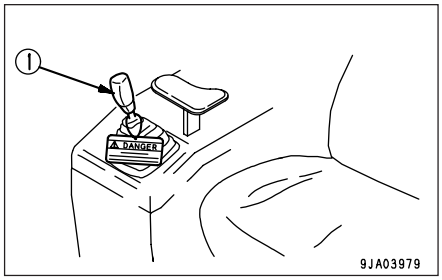


24.4.1 DRAIN WATER, SEDIMENT FROM FUEL TANK

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

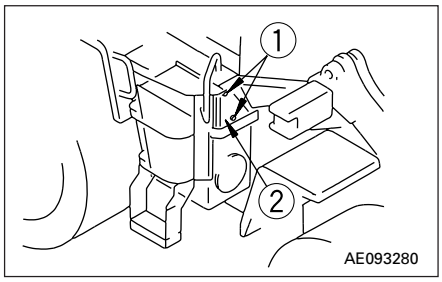


⚠WARNING

Always hang a warning tag on work equipment control lever ①.

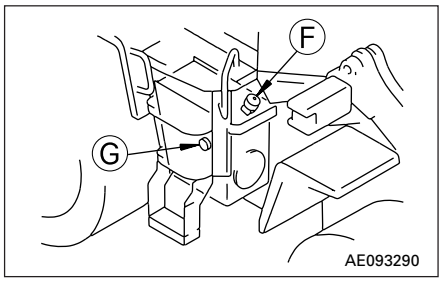
Maintenance for every 50 hours should be carried out at the same time.

24.5.1 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 mark. This will damage the hydraulic equipment and cause the oil to spurt out.

2. If the oil level is below the L level, loosen bolt ① and remove cover ②. 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”.

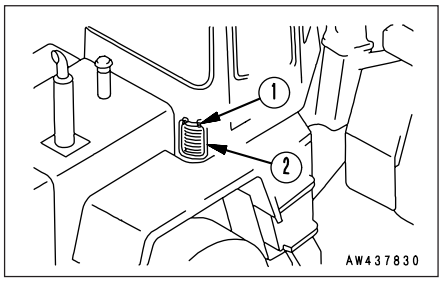
24.5.2 CLEAN ELEMENT IN CAR HEATER AIR CONDITIONER (IF EQUIPPED) FRESH AIR FILTER

⚠ WARNING

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

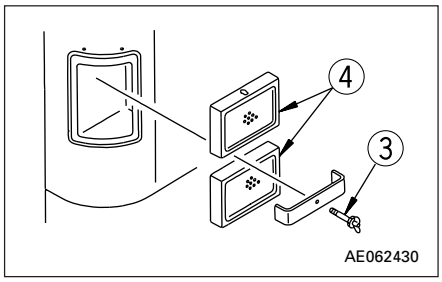
If the car heater and air conditioner has been used, the air filter should be cleaned.

Stop the air conditioner before cleaning the element.



1. Loosen bolt ① and remove cover ②.

2. Loosen screw ③, then take out element ④ and clean it.



3. Blow dry compressed air (max. 700 kPa (7 kg/cm^2, 100 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.

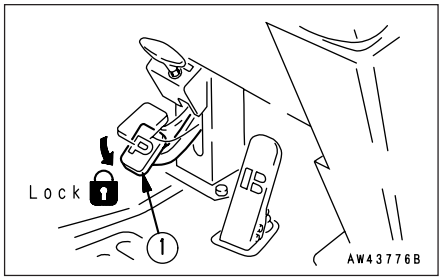
REMARK

When assembling the element again, install so that the arrow on top of the element is facing the inside of the cab.

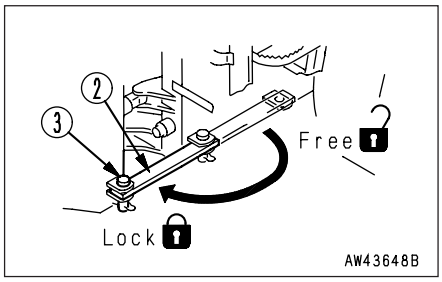
24.5.3 LUBRICATING

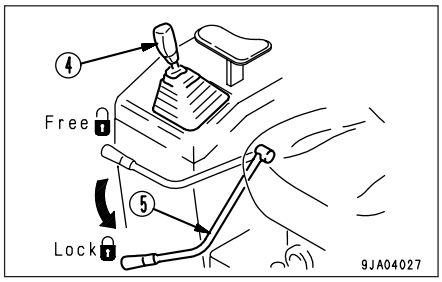
⚠WARNING

- **Apply parking brake pedal ①, and lock the front and rear frames with safety bar ② and pin ③.**
- **Set the work equipment in a stable condition, then stop the engine and lock work equipment control lever ④ with safety lock lever ⑤.**

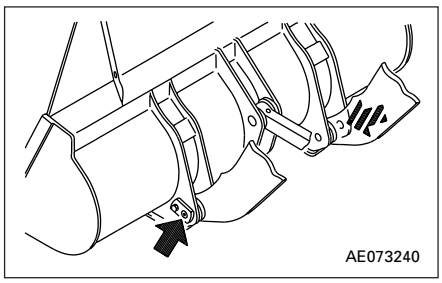


1. Using a grease pump, pump in grease through the grease fittings marked by the arrows.
2. After greasing, wipe off any old grease that is pushed out.

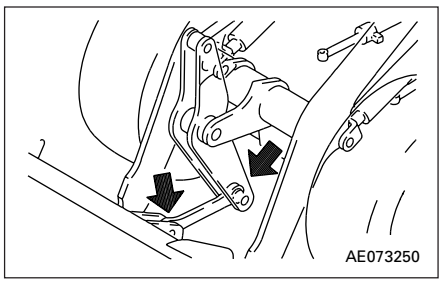




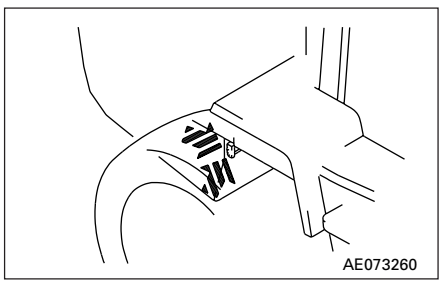
1. Bucket pin (2 points)



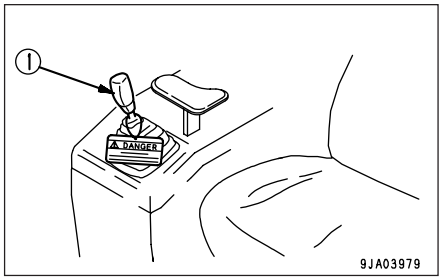
2. Bucket link pin (2 points)



3. Rear axle pivot pin (2 points)



24.6 EVERY 250 HOURS SERVICE



⚠WARNING

Always hang a warning tag on work equipment control lever ①.

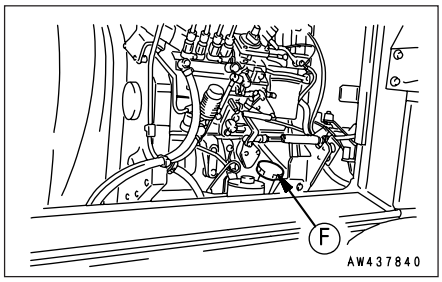
Maintenance for every 50 and 100 hours should be carried out at the same time.

24.6.1 CHANGE OIL IN ENGINE OIL PAN, REPLACE ENGINE OIL FILTER CARTRIDGE

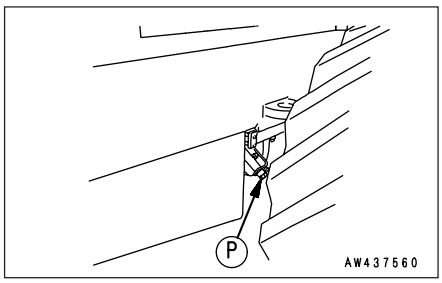
⚠WARNING

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.

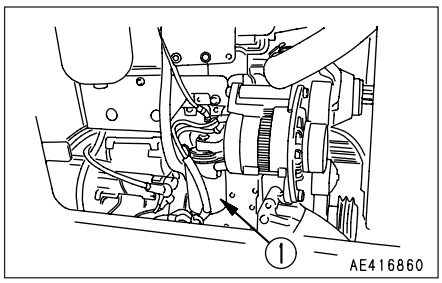
Prepare the following
- Container to catch drained oil: Min 12.0 ℓ capacity
- Refill capacity: 12.0 ℓ (3.17 US gal)
- Filter wrench



1. Open the engine side cover located on the left of machine.
2. Open oil filler Ⓕ.
3. Place a container to catch the oil under drain plug Ⓟ.



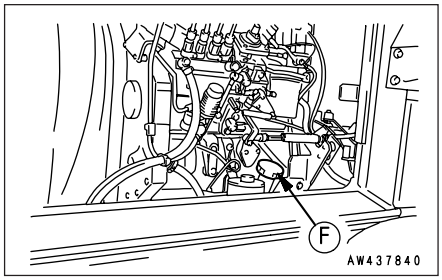
4. Loosen drain plug Ⓟ, and drain the oil.
5. Check the drained oil, and if there are excessive metal particles or foreign material, please contact your Komatsu distributor.
6. Install drain plug Ⓟ.
7. Using the filter wrench, turn filter cartridge ① counterclockwise to remove it.
   In particular, if 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.

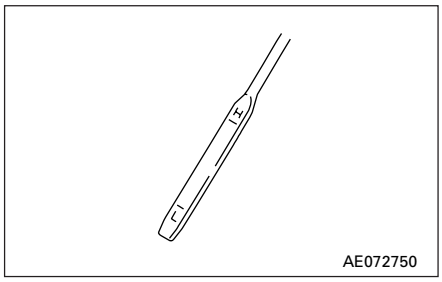


8. Clean the filter holder, fill the new filter cartridge with engine oil, then coat the seal portion and thread portion of the new filter cartridge with engine oil (or coat thinly with grease), and install.

9. When installing, bring the seal surface into contact with the filter holder, then tighten a further 1/2 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 dipstick. For details, see “24.3 CHECK BEFORE STARTING”.

Even if the machine has not been operated for 500 hours, the oil and filter cartridge must be replaced when the machine has been operated for 6 months.

In the same way, even if the machine has not been operated for 6 months, the oil and filter cartridge must be replaced when the machine has been operated for 500 hours.

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 (250 hours).

- **Procedure for normal air bleeding**

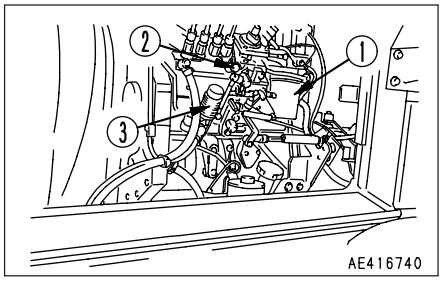
1. Fill the fuel tank with fuel (to the FULL position on the fuel gauge).

2. After replacing filter cartridge ①, loosen joint bolt ②.

3. Loosen the knob of feed pump ③, then pump it up and down until no more bubbles come out with the fuel from the joint bolt.

4. Tighten joint bolt ②.

5. Always use a genuine Komatsu filter cartridge.
   After replacing the filter cartridge, start the engine, and check for leakage of oil from the filter seal surface.



REMARK

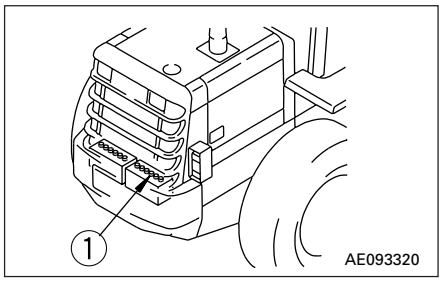
When the machine has run out of fuel, operate feed pump ③ in the same way to bleed the air.

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 rear grill.

2. Remove cap ①, and check that 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.

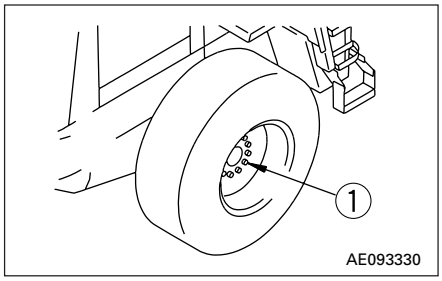
3. If distilled water has been added to any cell of cap ①, add distilled water also to the other cells.

4. Clean the air hole in the battery cap, then tighten the cap securely.

NOTICE

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

24.6.3 CHECK FOR LOOSE WHEEL HUB NUTS, TIGHTEN



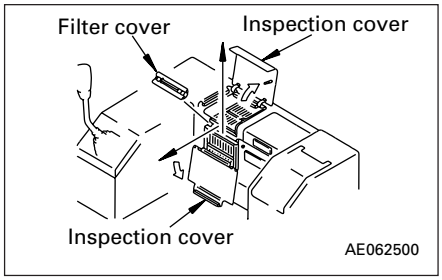
If wheel hub nuts ① are loose, tire wear will be increased and accidents may be caused.

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: 927 ± 103 N·m (94.5 ± 10.5 kgf·m, 684 ± 76 lbft)

2. If any stud bolt is broken, replace all the stud bolts for that wheel.

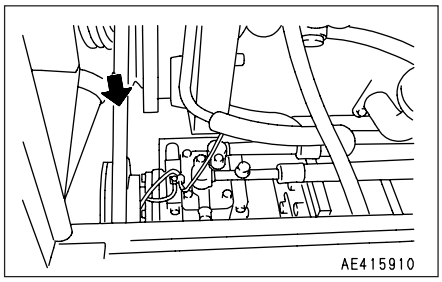
24.6.4 CLEAN ELEMENT IN CAR HEATER AND AIR CONDITIONER (IF EQUIPPED) RECIRCULATION FILTER



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.

24.6.5 CHECK AIR CONDITIONER COMPRESSOR BELT TENSION, ADJUST (IF EQUIPPED)



CHECKING

The deflection of the belt should be approx. 9.5 – 13.5 mm (0.37 – 0.53 in) when pressed with the thumb force of approx. 98.1 N (10 kgf) at a point midway between the air conditioner compressor pulley and fan 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).

Check when changing the V-belt

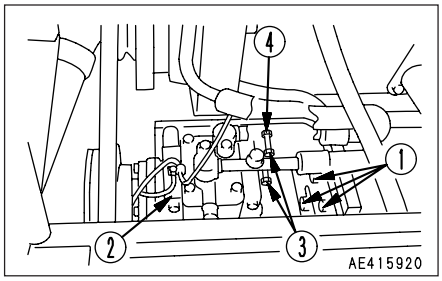
The deflection of the belt should be approx. 7 – 10 mm (0.28 – 0.39 in) when pressed with the thumb force of approx. 98.1 N (10 kgf) at a point midway between the air conditioner compressor pulley and fan pulley.

When belt tension gauge is used, it is considered normal for tension to remain in the range of 530 – 745 N (54 – 76 kgf).

ADJUSTING

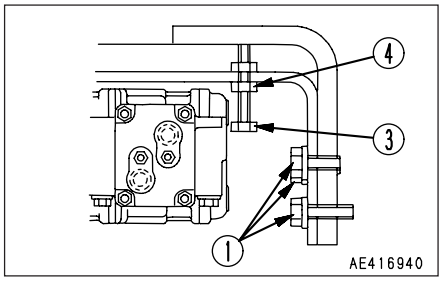
To adjust the belt tension, loosen bolts ① and nut ④, then tighten adjustment bolt ③ to move compressor ② and adjust the tension.

After adjusting, tighten bolts ① and nut ④ to the correct.



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.

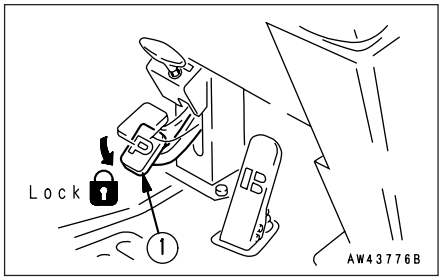
Replace the V-belt if it has stretched, leaving no allowance for adjustment, or if there is any cut or crack on belt.



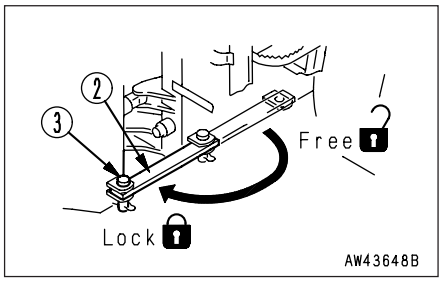
24.6.6 LUBRICATING

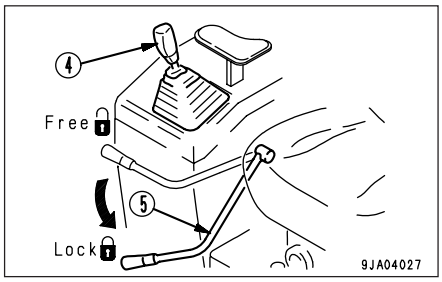
⚠WARNING

- **Apply parking brake pedal ①, and lock the front and rear frames with safety bar ② and pin ③.**
- **Set the work equipment in a stable condition, then stop the engine and lock work equipment control lever ④ with safety lock lever ⑤.**

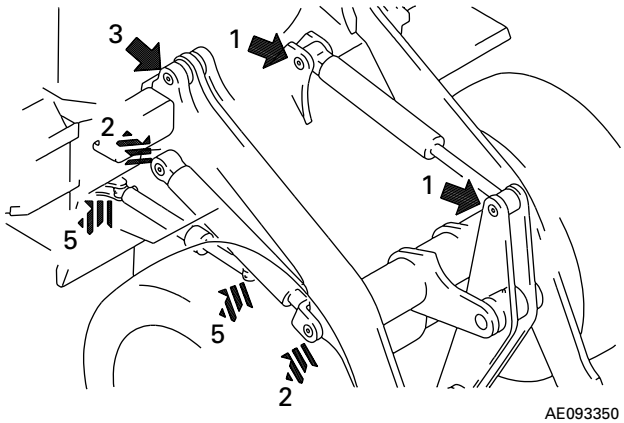


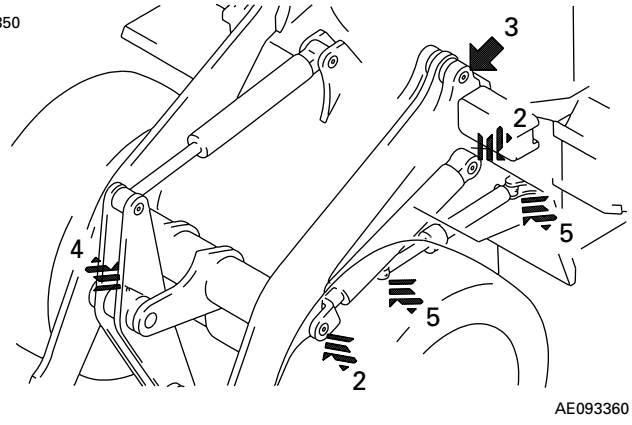
1. Using a grease pump, pump in grease through the grease fittings marked by the arrows.
2. After greasing, wipe off any old grease that is pushed out.



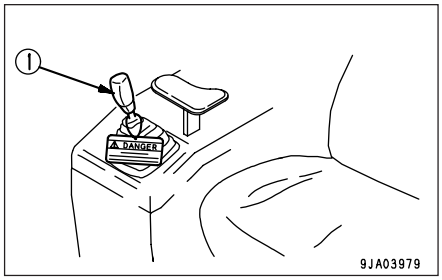


1. Dump cylinder pin (2 points)
2. Lift cylinder pin (4 points)
3. Lift arm pivot pin (2 points)
4. Tilt lever pin (1 point)
5. Steering cylinder pin (4 points)





24.7 EVERY 500 HOURS SERVICE



WARNING

Always hang a warning tag on work equipment control lever ①.

Maintenance for every 50, 100 and 250 hours should be carried out at the same time.

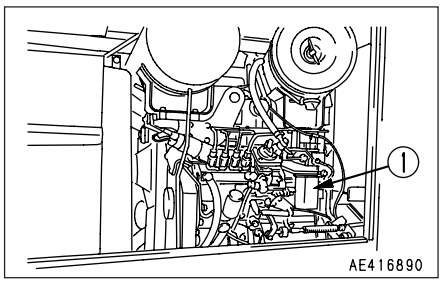
24.7.1 REPLACE FUEL FILTER CARTRIDGE

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 cover located on the right of the machine.
2. Set the container to catch the fuel under the filter cartridge.
3. Using a filter wrench, turn filter cartridge ① counterclockwise to remove it.

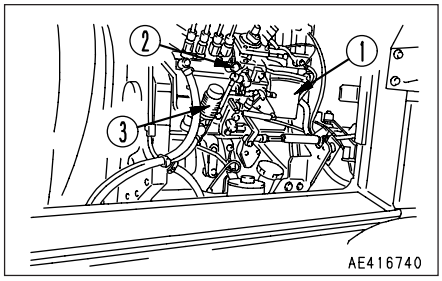


4. Clean the filter holder, fill a new filter cartridge with clean fuel, coat the packing surface with engine oil, then install it to the filter holder.
5. When installing, tighten until the packing surface contacts the seal surface of the filter holder, then tighten approx. 1/2 of a turn. If the filter 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.

WARNING

When cranking the engine, confirm the safety around the engine, as the engine may start.

6. After replacing the fuel filter cartridge ①, bleed air according to the following procedures.



- **Procedure for normal air bleeding**

1. Fill the fuel tank with fuel (to the FULL position on the fuel gauge).
2. After replacing filter cartridge ①, loosen joint bolt ②.
3. Loosen the knob of feed pump ③, then pump it up and down until no more bubbles come out with the fuel from the joint bolt.
4. Tighten joint bolt ②.
5. Always use a genuine Komatsu filter cartridge.
   After replacing the filter cartridge, start the engine, and check for leakage of oil from the filter seal surface.

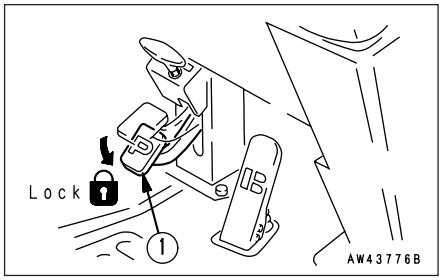
REMARK

When the machine has run out of fuel, operate feed pump ③ in the same way to bleed the air.

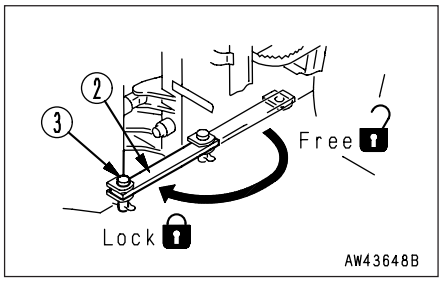
24.7.2 LUBRICATING

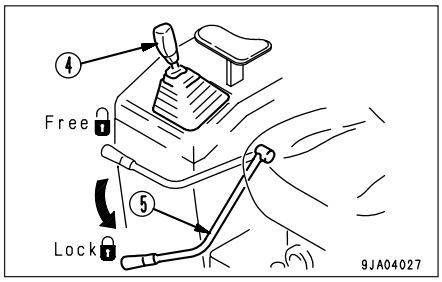
⚠WARNING

- **Apply parking brake pedal ①, and lock the front and rear frames with safety bar ② and pin ③.**
- **Set the work equipment in a stable condition, then stop the engine and lock work equipment control lever ④ with safety lock lever ⑤.**

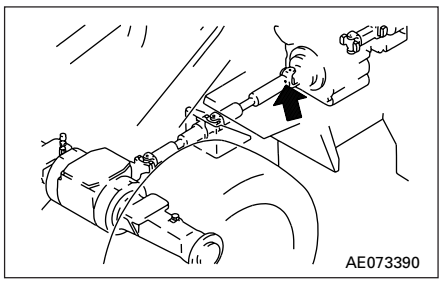


1. Using a grease pump, pump in grease through the grease fittings marked by the arrows.
2. After greasing, wipe off any old grease that is pushed out.

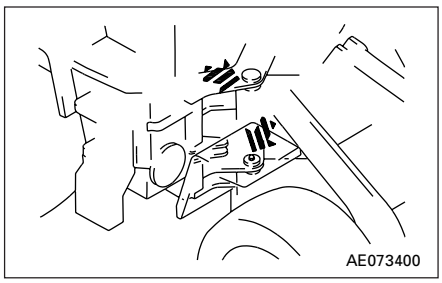




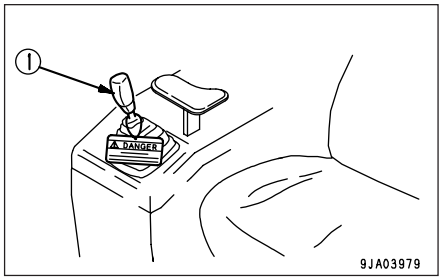
1. Center drive shaft spline (1 point)



2. Center hinge pin (2 points)



24.8 EVERY 1000 HOURS SERVICE



⚠WARNING

Always hang a warning tag on work equipment control lever ①.

Maintenance for every 50, 100, 250 and 500 hours should be carried out at the same time.

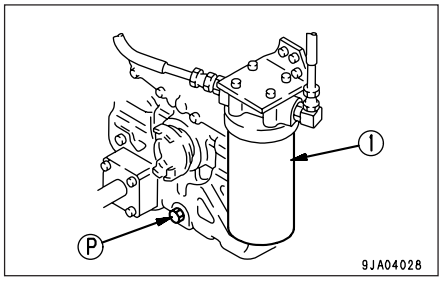
24.8.1 CHANGE OIL IN TRANSMISSION CASE AND TRANSMISSION OIL FILTER CARTRIDGE, CLEAN STRAINER

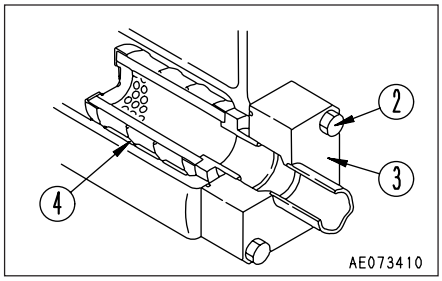
⚠WARNING

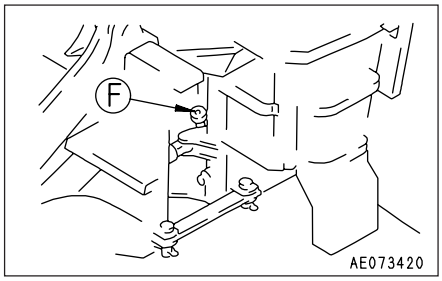
- **The parts and oil are at high temperature after the engine is stopped, and may cause burns. Wait for the temperature to go down before starting the work.**
- **When removing the oil filler cap, turn it slowly to release the internal pressure, then remove it.**

Container to catch drained oil: min. 23.5 ℓ
Refill capacity: 23.5 ℓ (6.2 US gal)

1. Set a container to catch the oil under drain plug Ⓟ, then remove drain plug Ⓟ and drain the oil.
   To prevent the oil from pouring out suddenly, loosen drain plug Ⓟ and remove it gradually.
2. After draining the oil, install drain plug Ⓟ.
   Tightening torque: 68.6 ± 9.8 N·m (7.0 ± 1.0 kgf·m, 50.6 ± 7.2 lbft)
3. Set a container to catch the oil under the transmission filter.
4. Using a filter wrench, turn filter cartridge ① to the left to remove it.
5. Clean in the filter holder, coat the seal surface and thread of the new filter cartridge with engine oil, then install it.
6. When the seal surface comes into contact with the filter holder, tighten a further 2/5 turns with the filter wrench.
7. Remove bolt ②, then remove cover ③ and take out strainer ④, which is screwed into cover ③.
8. Remove any dirt stuck to strainer ④, then wash it in clean diesel oil or flushing oil. If strainer ④ is damaged, replace it with a new part.
9. Install strainer ④ to cover ③.
   Strainer tightening torque: 17.2 ± 2.5 N·m (17.5 ± 0.25 kgf·m, 12.7 ± 1.8 lbft)
   Replace the O-ring on the cover with a new part, then install the cover.
10. Pour in the specified amount of engine oil from oil filler Ⓕ.
11. After filling with oil, check that the oil is at the specified level. For details, see "24.2.3 CHECK TRANSMISSION OIL LEVEL, ADD OIL".
12. Check that there is no leakage of oil from the transmission case or oil filter.



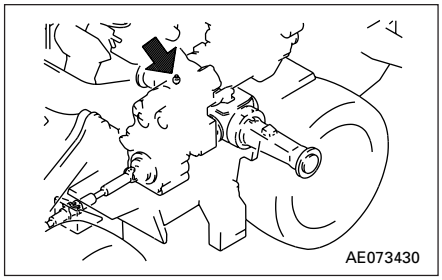




24.8.2 CLEAN TRANSMISSION CASE BREATHER

Remove all mud and dirt from around the breather, then remove the breather. Put in cleaning fluid and clean the breather.

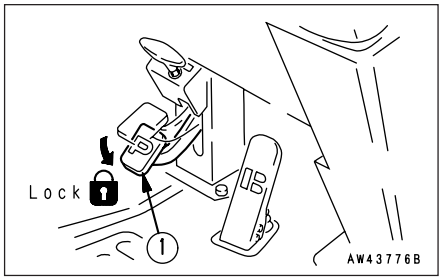
Take care not to allow dust and dirt to enter the transmission case through the port while the breather is removed.



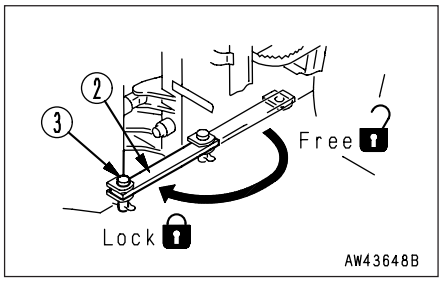
24.8.3 LUBRICATING

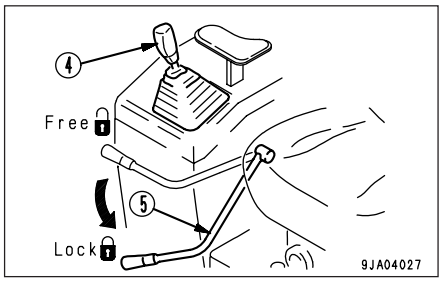
⚠WARNING

- **Apply parking brake pedal ①, and lock the front and rear frames with safety bar ② and pin ③.**
- **Set the work equipment in a stable condition, then stop the engine and lock work equipment control lever ④ with safety lock lever ⑤.**

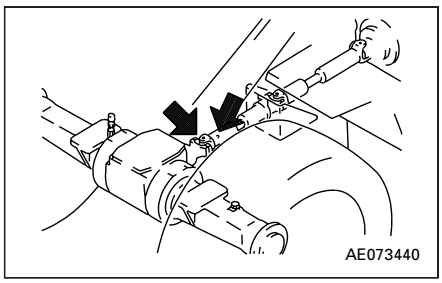


1. Using a grease pump, pump in grease through the grease fittings marked by the arrows.
2. After greasing, wipe off any old grease that is pushed out.

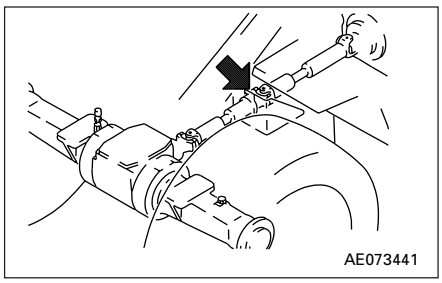




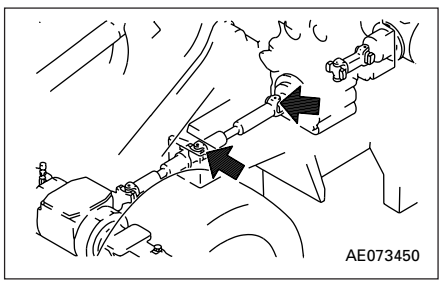
1. Front drive shaft (2 points)



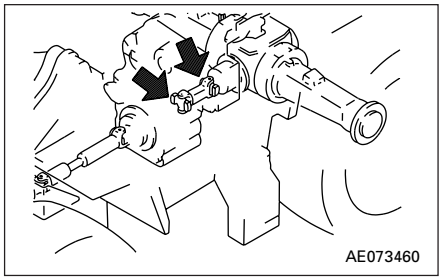
2. Drive shaft center support (1 point)



3. Center drive shaft (2 points)



4. Rear drive shaft (2 points)



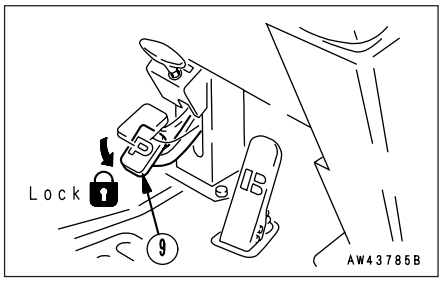
24.8.4 CHANGE OIL IN HYDRAULIC TANK, REPLACE HYDRAULIC FILTER ELEMENT

⚠WARNING

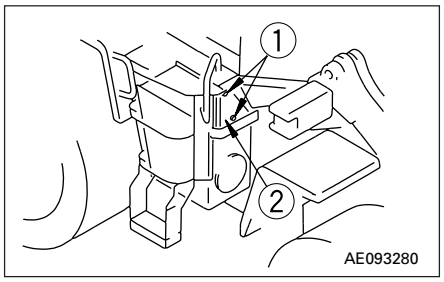
The oil is at high temperature immediately after the machine has been operated.
Wait for the oil to cool down before changing the oil.
When removing the oil filler cap, turn it slowly to release the internal pressure, then remove it carefully.

Prepare the following.
- Container to catch drained oil: min. 41 ℓ capacity
- Refill capacity: 41 ℓ (10.8 US gal)

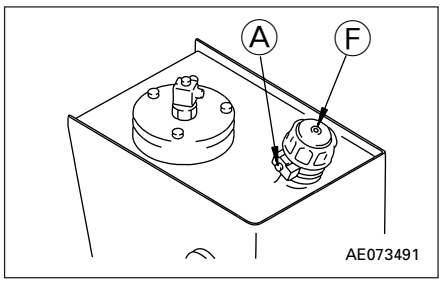
1. Lower the bucket horizontally to the ground and apply parking brake pedal ⑨, then stop the engine.



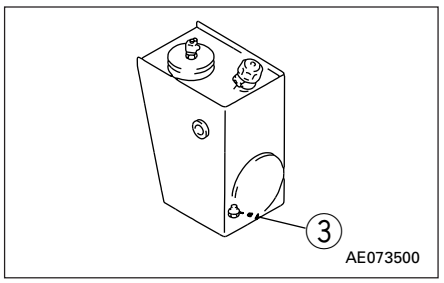
2. Loosen bolts ①, then remove cover ②.



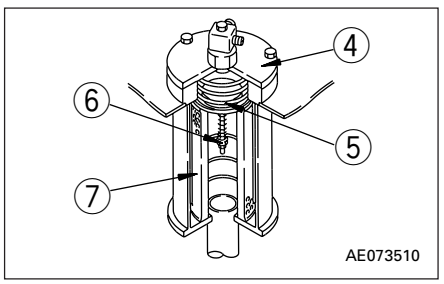
3. Keep knob Ⓐ of oil filler port Ⓕ pulled, then turn the cap counterclockwise and remove it.



4. Set a container to catch the oil under drain plug ③.
5. Remove drain plug ③ to drain oil.
6. After draining the oil, tighten drain plug ③.



7. Remove the mounting bolt of filter cover ④, then remove the covers.
   When doing this, the cover may fly off because of the force of spring ⑤, so keep the cover pushed down while removing the bolts.
8. Remove spring ⑤ and bypass valve ⑥, then remove element ⑦.



9. Check that there is no foreign matter inside the tank before cleaning it.

10. Install a new element, then install bypass valve ⑥, spring ⑤, and cover ④.
    If the O-ring of the cover is damaged or deteriorated, replace it with a new part.

11. When installing the cover bolts, push down the cover and tighten the bolts evenly.

12. Add engine oil through oil filler port Ⓕ to the specified level, then install cap Ⓕ.

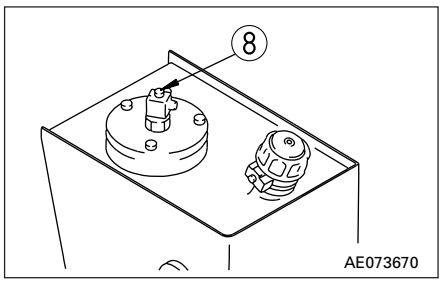
    For details of the oil to use, see "20. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".

13. Check that the hydraulic oil is at the standard level. For details, see "24.5 EVERY 100 HOUR SERVICE".

14. 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.



15. Next, operate the steering, bucket, and lift arm cylinders to the end of their stroke 3 – 4 times, then stop the engine and loosen bleed plug ⑧ to bleed the air from the hydraulic tank. After bleeding the air, tighten plug ⑧ again.

16. Check the hydraulic oil level and add oil to the specified level. For details, see "24.5 EVERY 100 HOURS SERVICE".

17. Next, increase the engine speed and repeat the procedure in Step 15 to bleed the air. Continue this operation until no more air comes out from plug ⑧.

18. After completing the air bleed operation, tighten plug ⑧.

Tightening torque: 11.3 ± 1.5 N·m (1.15 ± 0.15 kgf·m, 8.3 ± 1.1 lbft)

19. Check that the hydraulic oil is at the standard level. For details, see "24.5 EVERY 100 HOUR SERVICE".

20. Check that there is no leakage of oil from the filter cover mount.

24.8.5 CHECK TIGHTENING PARTS OF TURBOCHARGER

Contact your Komatsu distributor to have the tightening portions checked.

24.8.6 CHECK PLAY OF TURBOCHARGER ROTOR

Ask your Komatsu distributor to check the play of the turbocharger rotor.

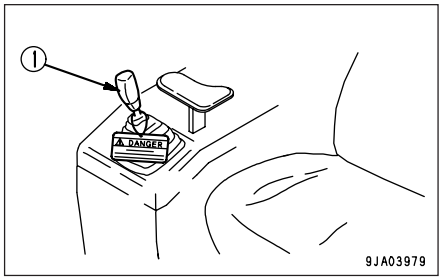
24.8.7 CHECK FAN BELT TENSION AND REPLACE FAN BELT

Special tools are required for inspection and replacement of the fan belt. Contact your Komatsu distributors for inspection and replacement.

REMARK

Since the auto-tensioner fan belt is installed, its tension does not need to be adjusted.

24.9 EVERY 2000 HOURS SERVICE



WARNING

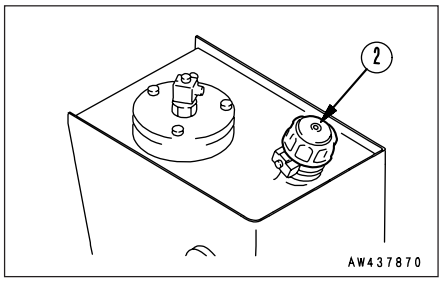
Always hang a warning tag on work equipment control lever ①.

Maintenance for every 50, 100, 250, 500 and 1000 hours should be carried out at the same time.

24.9.1 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.



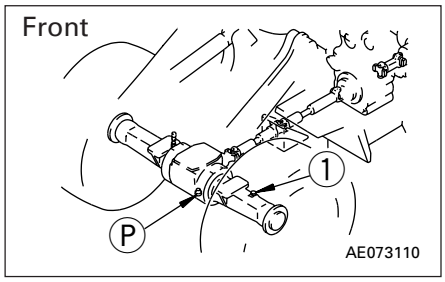
1. Loosen bolt ② at the top of the cap.
2. Remove the cap, then take out the element.
3. Coat the O-ring of the new element with grease, then install the element.
4. Align the cap with the body and tighten the bolts.

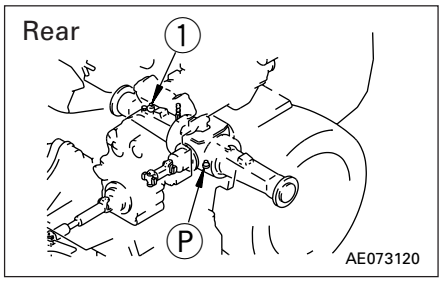
24.9.2 CHANGE AXLE OIL

⚠WARNING

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. 28 ℓ capacity
- Refill, capacity (front and rear, each): 14 ℓ (3.7 US gal)





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

2. Remove front and rear oil filler plugs ①, then remove drain plug Ⓟ to drain the oil.

3. After draining the oil, clean drain plug Ⓟ, then install it.

4. Add axle oil through plug hole ① at the specified level.

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

5. 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.

24.9.3 CHECK BRAKE DISC WEAR

Ask Komatsu distributor to check and repair brake disc.

24.9.4 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.

24.9.5 CHECK ENGINE VALVE CLEARANCE, ADJUST

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

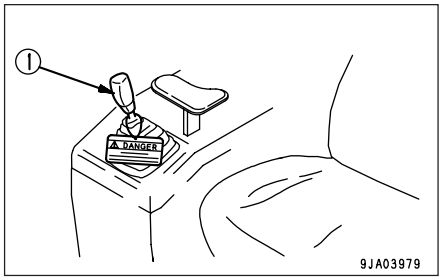
24.9.6 REPLACE ELEMENT IN CAR HEATER AND AIR CONDITIONER (IF EQUIPPED) RECIRCULATION AIR FILTER, FRESH AIR FILTER

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 ”24.6.4 CLEAN ELEMENT IN CAR HEATER AND AIR CONDITIONER (IF EQUIPPED) RECIRCULATION FILTER“.

For details of cleaning the fresh air filter, see ”24.5.2 CLEAN ELEMENT IN CAR HEATER AND AIR CONDITIONER (IF EQUIPPED) FRESH AIR FILTER“.

24.10 EVERY 4000 HOURS SERVICE



WARNING

Always hang a warning tag on work equipment control lever 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, grease 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.

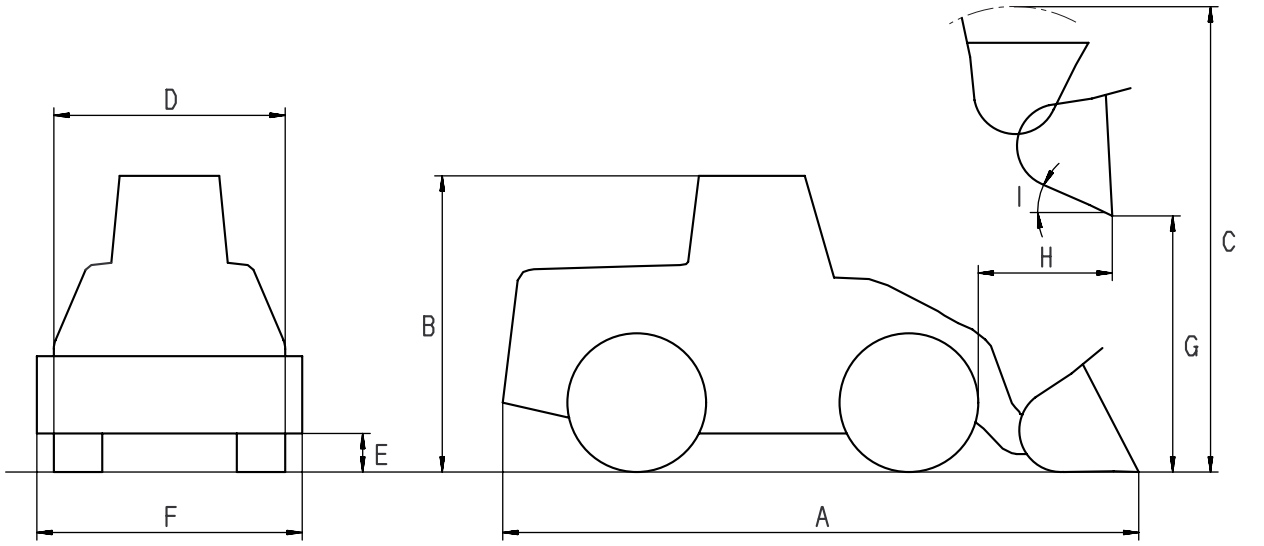
MEMO

SPECIFICATIONS

25. SPECIFICATIONS

WA120L-3

	Item			Unit	
	Operating weight (including 1 operator: 80 kg (176 lb).) (with bolt on cutting edge)			kg (lb)	7830 (17265)
	Normal load			kg (lb)	2240 (4939)
	Bucket capacity (with BOC)			m^3 (cy.yd)	1.4 (1.8)
	Engine model			–	Komatsu S4D102E-1 diesel engine
	Flywheel horsepower			kW (HP)/rpm	78 (105)/2400
A	Overall length			mm (ft in)	5960 (19′7″)
B	Overall height			mm (ft in)	3100 (10′2″)
C	Max. dimension when shanking bucket			mm (ft in)	4570 (15′)
D	Overall width			mm (ft in)	2220 (7′3″)
E	Min. ground clearance			mm (ft in)	425 (1′5″)
F	Bucket width			mm (ft in)	2390 (7′10″)
G	Clearance	Cutting edge [BOC tip]		mm (ft in)	2790 (9′2″) [2730 (8′11″)]
H	Reach	Cutting edge [BOC tip]		mm (ft in)	920 (3′) [950 (3′1″)]
I	Dump angle			degrees	47
	Min. turning radius	Outside of chassis		mm (ft in)	5170 (17′)
		Center of outside tire		mm (ft in)	4470 (14′8″)
	Travel speed	Forward	1st	km/h (MPH)	7.2 (4.5)
			2nd		12.0 (7.5)
			3rd		22.0 (13.7)
			4th		34.9 (21.7)
		Reverse	1st	km/h (MPH)	7.7 (4.8)
			2nd		12.6 (7.8)
			3rd		22.9 (14.2)
			4th		36.7 (22.8)



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OPTIONS, ATTACHMENTS

26. OPTIONAL PARTS AND ATTACHMENTS

Name	Specifications, use
Excavating bucket	Capacity (flat edge, for rock) 1.2 m^3 (1.6 cu.yd)
Bucket tooth	● Bolt-on tooth ● Tip tooth
Lumber grapple	Loading and transporting large logs or lumber
Lumber fork	Loading and carrying comparatively small diameter lumber
Dumping fork	Loading and carrying comparatively small diameter lumber

The following attachments are also available, so please contact your Komatsu distributor.

- ROPS canopy
- Air conditioner
- Heater and defroster
- Car radio
- Car stereo
- E.C.S.S. (Electronic controlled suspension system)
- Tires

27. SELECTING BUCKETS AND TIRES

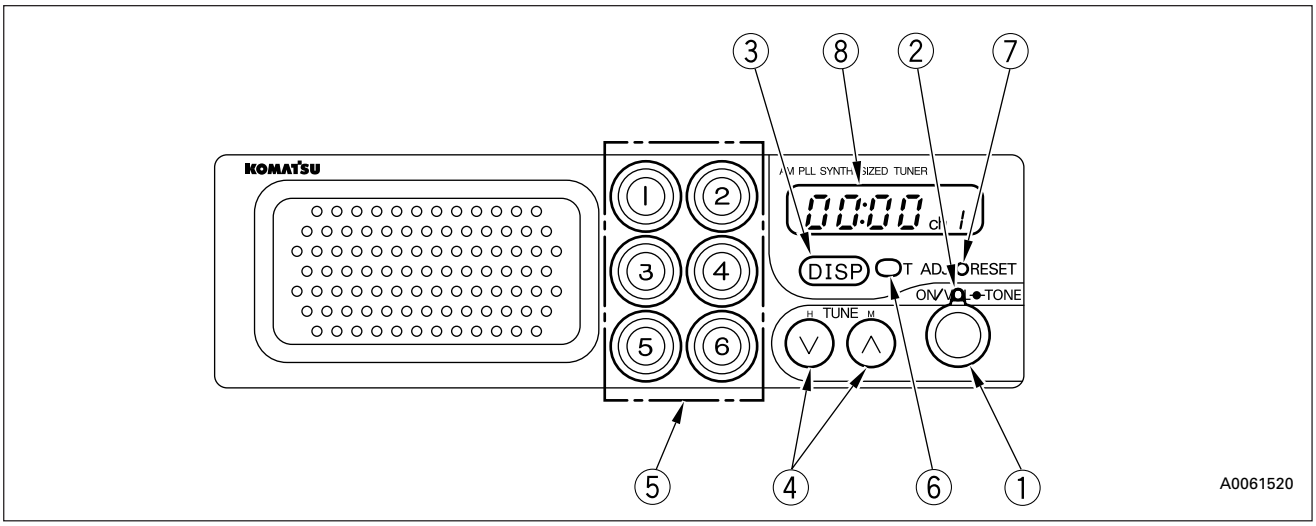
Select the most suitable bucket and tires for the type of work and jobsite conditions.

Type of work	Bucket	Ground conditions	Tire
● Loading products ● Loading and carrying products	Stockpile bucket (1.4 m^3 (1.8 cu.yd))	General ground condition	16.9-24-10PR (Traction) 15.5-24-8PR (Traction)
		Leveled ground	15.5-24-8PR (Traction) 13.00-24-8PR (Traction)
		On soft level ground	16.9-24-10PR (Traction) 15.5-24-8PR (Traction)
		Hard ground	16.9-24-10PR (Rock) 15.5-24-8PR (Rock) 13.00-24-8PR (Rock)
● Loading products and crushed rock	Excavating bucket (1.2 m^3 (1.6 cu.yd))	General ground condition	16.9-24-10PR (Rock) 15.5-24-8PR (Rock)
		Soft ground	16.9-24-10PR (Rock) 15.5-24-8PR (Rock)
		Ground with many rocks	13.00-24-8PR (Rock)
● Loading, hauling lumber	Dumping fork Lumber fork Lumber grapple	General ground condition	15.5-24-8PR (Rock) 13.00-24-8PR (Rock)
		Soft ground	15.5-24-8PR (Traction) 13.00-24-8PR (Traction)

The speed display differs according to the tire size, so when using optional tires, please contact your Komatsu distributor.

28. CAR RADIO

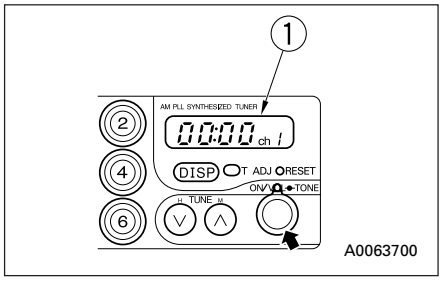
28.1 EXPLANATION OF COMPONENTS



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

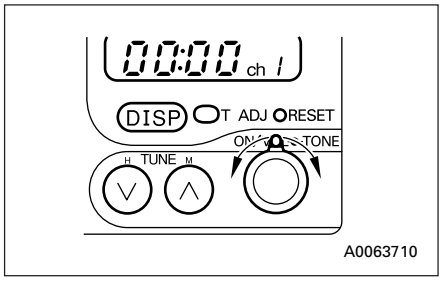
Push this knob to switch the radio on. The lighting in display area ① will light up and the frequency will be displayed. Press again to switch the power off.

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



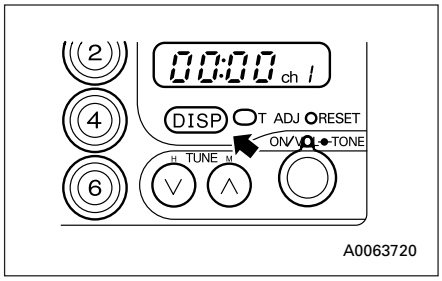
2. TONE CONTROL KNOB (TONE)

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



3. DISPLAY BUTTON (DISP)

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



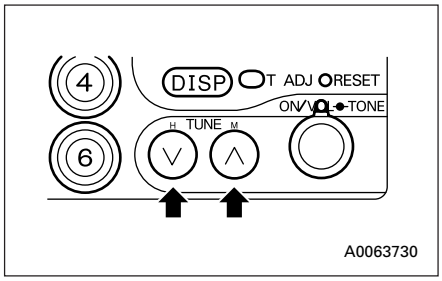
4. TUNING/HOUR, MIN ADJUSTMENT BUTTON (TUNE)

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

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

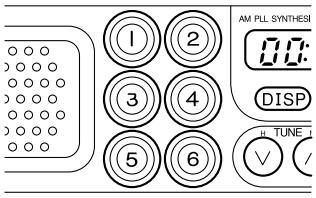
If these buttons are kept pressed for more than 2 seconds, the station will be selected automatically.

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



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

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



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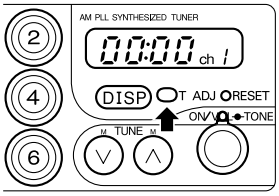
6. TIME ADJUSTMENT BUTTON (T.ADJ)

Press this button to adjust the time.



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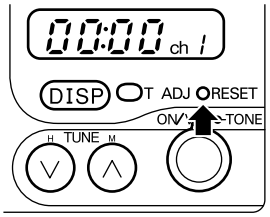
7. TIME RESET BUTTON (RESET)

Press this button to reset to the exact hour.



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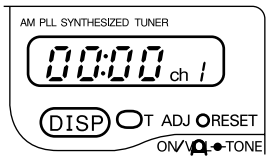
8. DISPLAY

This displays the frequency, time, and preset symbols.



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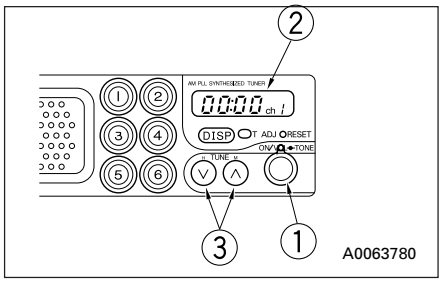
28.2 METHOD OF USE

METHOD OF SETTING PRESET BUTTONS



1. Press power switch ①. The frequency is displayed in display area ②.

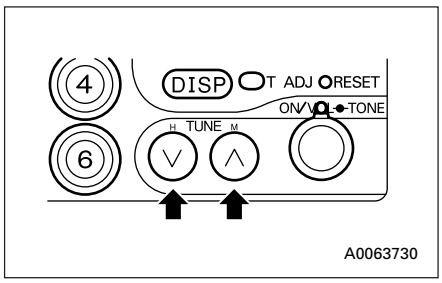
2. Use selector button ③ (∧ or ∨) to adjust to the desired frequency.

3. Choose a preset button to use for this station, and keep it pressed for at least 2 seconds to program the button to that frequency.
   When the sound suddenly disappears and appears again, the button is programmed, and the preset number is shown in display area ②.

After programming the button, press the preset button and release it within approx. 2 sec. The station programmed to that button will be selected for reception.

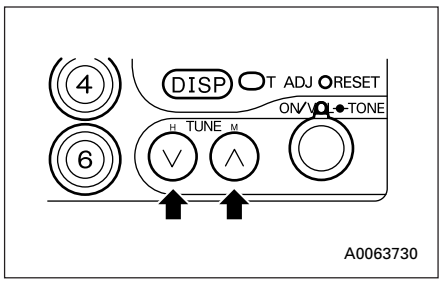
It is possible to program one station for each preset button.

METHOD OF MANUAL TUNING



Press the tuning button lightly to adjust to the desired frequency. Each time the button is pressed, the frequency will change by 9 kHz.
∧ button: Select station at higher frequency
∨ button: Select station at lower frequency

METHOD OF AUTOMATIC TUNING



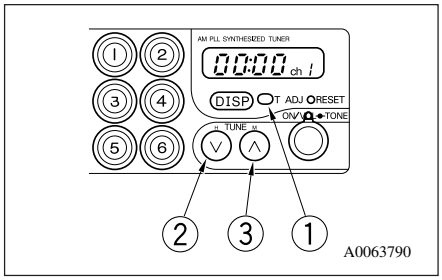
Keep the tuning button pressed for at least 2 seconds and then release it. When reception from a broadcasting station is picked up, the selector will automatically stop at that position.

When searching for the next station, keep the selector button pressed again for at least 2 seconds.
∧ button: Select station at higher frequency
∨ button: Select station at lower frequency

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

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

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

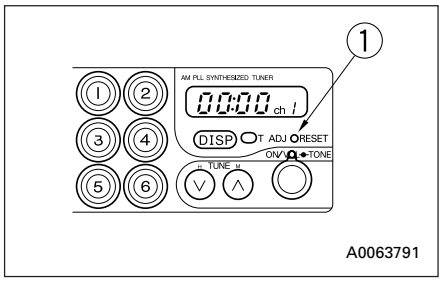


METHOD OF USING PRESET BUTTON

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

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

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



28.3 PRECAUTIONS WHEN USING RADIO

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

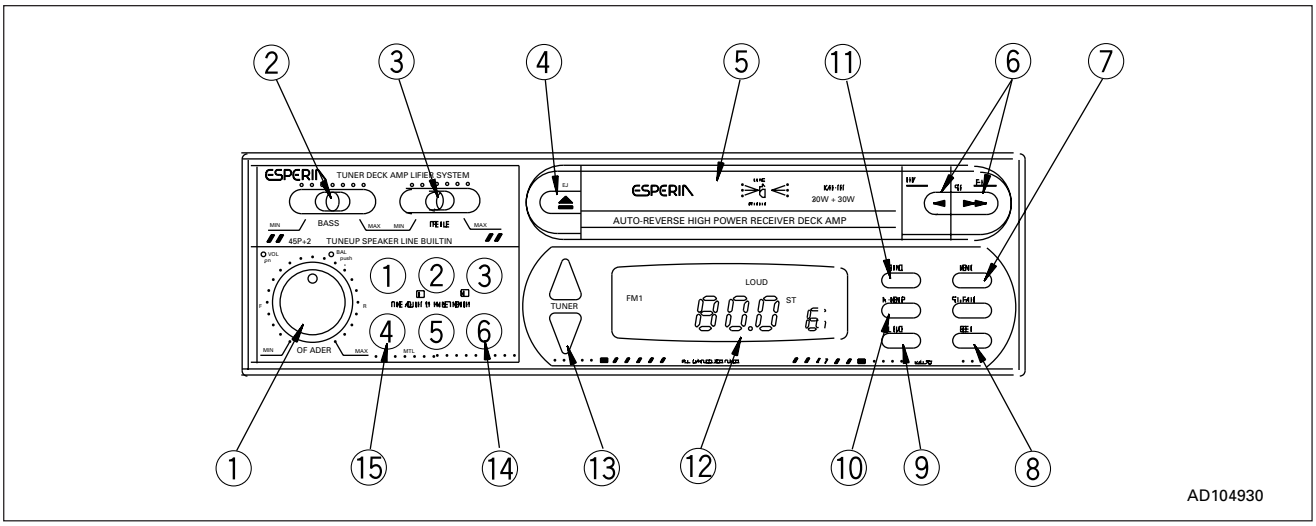
- For safety reasons, when operating keep the sound to a level where you can enjoy the sound but still hear the sound from outside vehicles.

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

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

29. CAR STEREO

29.1 EXPLANATION OF COMPONENTS



1. POWER SWITCH/VOLUME CONTROL/BALANCE CONTROL KNOB

Turn this knob clockwise. The "click" sound indicates that the power supply is turned on. Further turning increases the speaker volume.

For balance control, depress the knob while turning it to left or right and regulate the sound balance between the left and right speakers.

2. BASS CONTROL SLIDE-KNOB

Slide this knob to the right to increases the bass sound and to the left to decrease the base.

3. TREBLE CONTROL SLIDE-KNOB

Slide this knob to the right to enhance high frequency sound and to the left to suppress high frequency sound.

4. EJECT BUTTON

Push this button to eject the cassette tape.

5. CASSETTE DOOR

Insert cassette tape with the exposed magnetic tape side facing to the right.

6. FAST-FORWARD/REWIND/PROGRAM CHANGEOVER KNOB

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

7. MEMORY SWITCH

Press this button to preset the frequencies of desired stations. (ME flashes.)

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

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

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

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

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

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

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

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

29.2 WHEN RECEIVING RADIO BROADCASTS

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

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

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

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

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

REMARK

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

AUTOMATIC TUNING WITH SEEK BUTTON

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

MANUAL TUNING

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

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

AUTOMATIC SELECTION BETWEEN MONAURAL AND STEREO RECEIVING MODES

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

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

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

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

3. Press the MEMO switch.

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

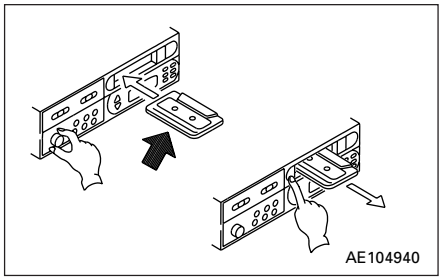
5. Repeat the above procedure Steps 2 to 4 to preset to other desired stations.

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

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

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

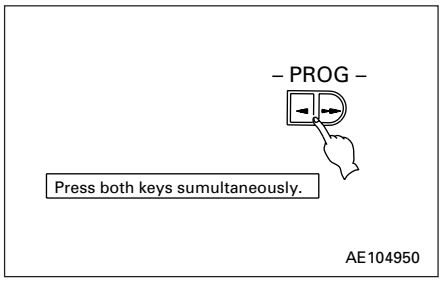
29.3 WHEN PLAYING A CASSETTE TAPE



1. Turn ON the ignition key or turn it to the ACC position before turning on the power switch of the stereo system.
2, Insert your cassette tape through the cassette opening in the direction with the exposed tape to the right. The tape will start playing automatically. When the tape running direction indication is ▶ , the upper channel of the tape is being played and when ◀ is indicated, the lower channel is being played.
   When the tape ends in one direction, the system automatically reverses the tape and plays the other side.
3. To stop the tape, press the eject button to eject it and the system will automatically change over to radio.

WHEN CHANGING TAPE CHANNELS

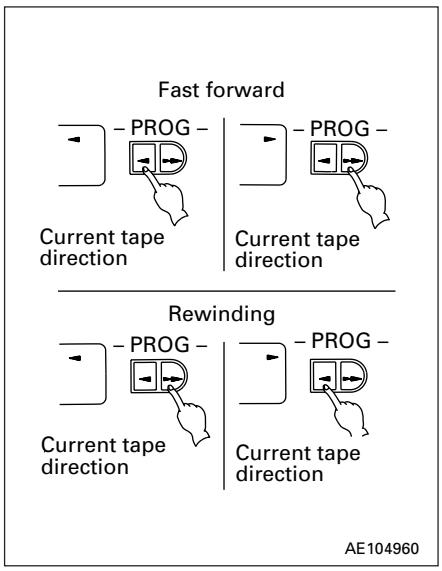
Lightly press both the PROG ◂ and ▸▸ keys simultaneously while the tape is being played.



FAST-FORWARDING AND REWINDING

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

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



29.4 SPECIFICATIONS

TAPE

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

RADIO

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

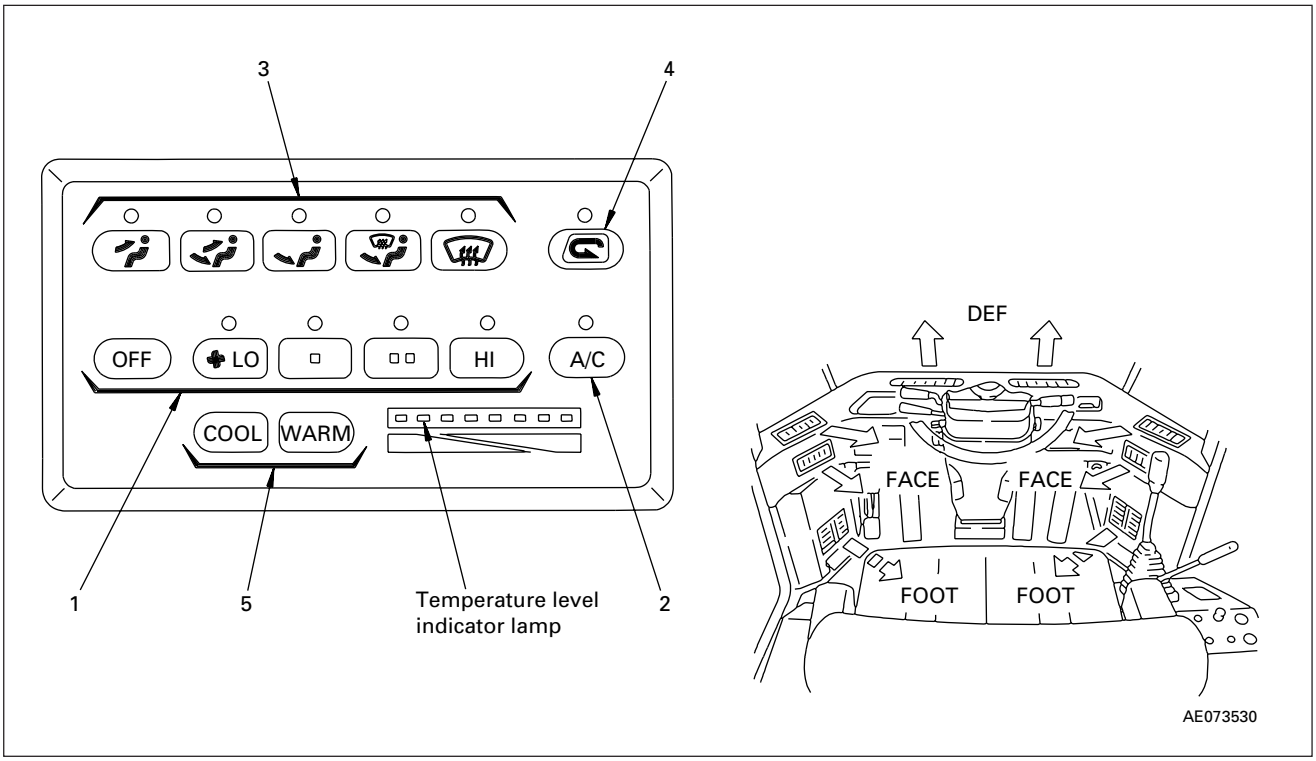
COMMON TO TAPE AND RADIO

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

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

30. AIR CONDITIONER

30.1 GENERAL LOCATIONS AND FUNCTION OF CONTROL PANEL

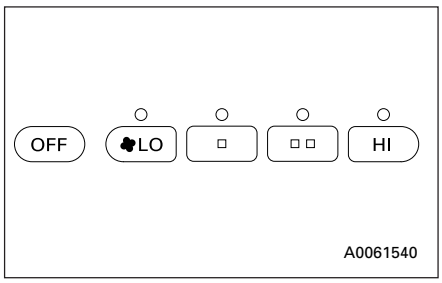


1. FAN SWITCH

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.

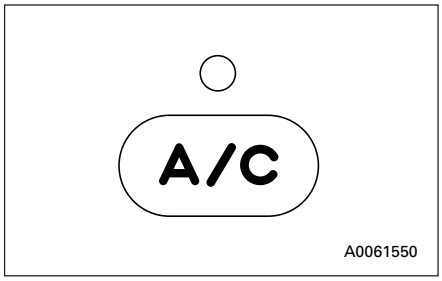


2. AIR CONDITIONER SWITCH

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.

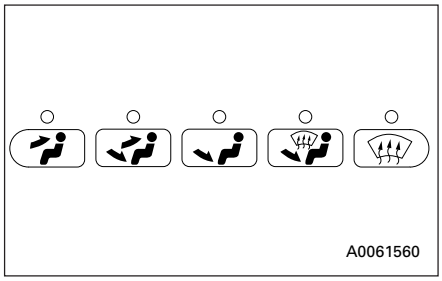


3. MODE SELECTOR SWITCH

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.

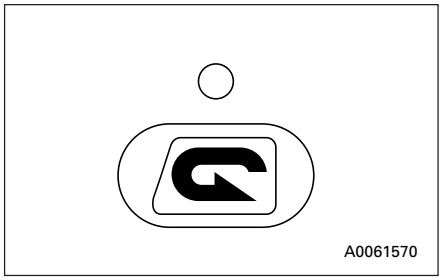


4. FRESH/RECIRC SELECTOR SWITCH

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

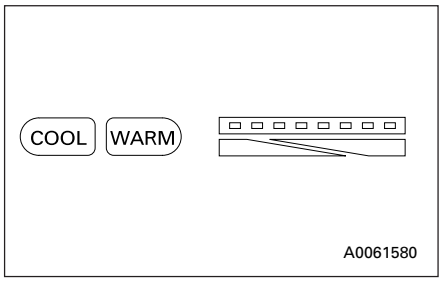
The temperature can be adjusted steplessly from low temperature to high temperature.

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.

30.2 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.

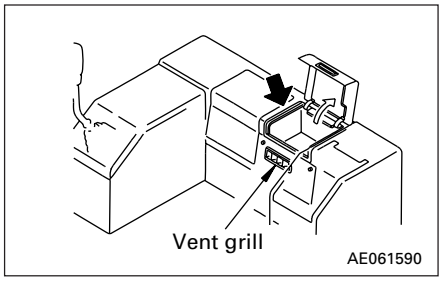
Set the vent mode selector switch to the intermediate position to give the desired condition.

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.

30.3 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.



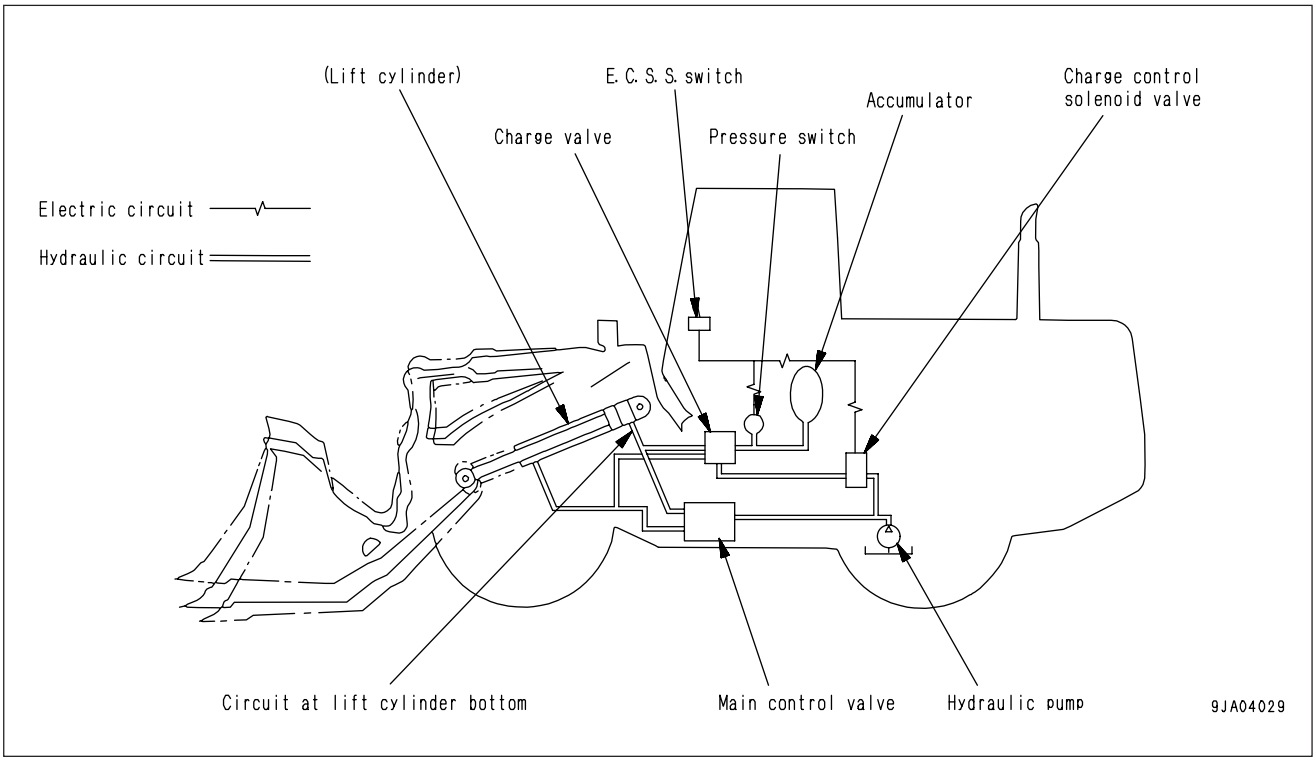
Do not use the cool box for things which smell or leak water or break easily.

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

31. HANDLING E.C.S.S. (Electronic controlled suspension system)

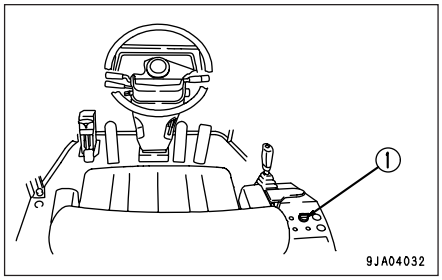
Always read this section before using the E.C.S.S. in order to enable you to use it safely and effectively.

31.1 STRUCTURE AND FUNCTION OF E.C.S.S.



- The E.C.S.S. uses the hydraulic spring effect of the hydraulic accumulator installed to the circuit at the lift cylinder bottom to absorb the vibration of the chassis when the machine is traveling. This enables the machine to travel smoothly at high speed.
- The E.C.S.S. consists of the E.C.S.S. switch, hydraulic accumulator, solenoid valves, and pressure switches. When the E.C.S.S. switch is turned ON, the solenoid valves open, the circuit at the lift cylinder bottom is connected with the hydraulic accumulator, and the E.C.S.S. is actuated. When the E.C.S.S. switch is turned OFF, the solenoid valves close, the circuit at the lift cylinder bottom is shut off from the hydraulic accumulator, and the E.C.S.S. is not actuated.
- When the E.C.S.S. is actuated, the pressure switches automatically open and close the solenoid valves in accordance with the bucket load to actuate the accumulator and provide the most effective absorption of the travel vibration both when empty and when traveling loaded.

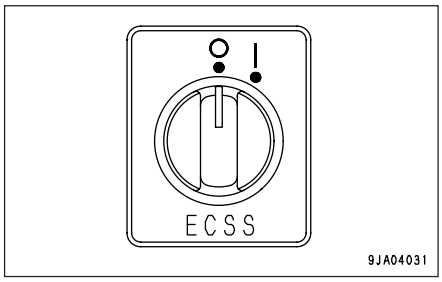
31.2 METHOD OF OPERATING E.C.S.S.



E.C.S.S. switch ① is at the top of the console box on the right side of the operator's compartment.

| OFF: E.C.S.S. is not actuated
O ON: E.C.S.S. is actuated

- It is possible to carry out operations with E.C.S.S. switch ① kept ON. If the switch is kept ON during operations, and the hydraulic pressure in the circuit at the bottom end of the lift cylinder exceeds 14.7 MPa (150 kgf/cm^2, 2130 PSI) during operations, the solenoid valves are automatically closed, and the E.C.S.S. is deactuated to protect the hydraulic accumulator from high pressure.



31.3 PRECAUTIONS WHEN OPERATING E.C.S.S. SWITCH

⚠ WARNING

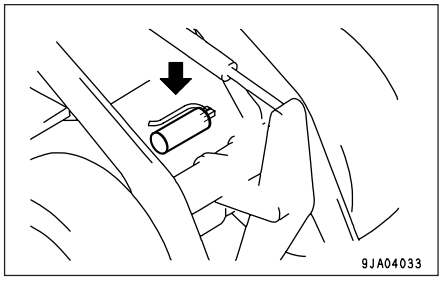
- **If the E.C.S.S. switch is turned ON when the machine is traveling or when the work equipment is raised, the hydraulic accumulator for the E.C.S.S. is immediately connected to the circuit at the bottom of the lift cylinder, and the oil enters or leaves the hydraulic accumulator in the direction to maintain the balance. This means that the work equipment will move, so be extremely careful when operating the switch.**
- **If operations are carried out with the E.C.S.S. switch kept ON, and the hydraulic accumulator is automatically switched by the action of the pressure switches during operation, the work equipment may immediately move.**
- **Never carry out inspection and maintenance with the E.C.S.S. switch kept ON. This is extremely dangerous, as the work equipment may move.**

- Always stop the machine and lower the work equipment to the ground before operating the E.C.S.S. switch.
- When carrying out inspection and maintenance, also lower the work equipment to the ground then turn the E.C.S.S. switch OFF before starting the maintenance operation.

REMARK

If the starting switch is at the OFF position the E.C.S.S. will not work even if the E.C.S.S. switch is at the ON position. However, if the starting switch is at the ON position it is possible for the E.C.S.S. to be actuated, so it will switch to the actuation condition if the E.C.S.S. switch is turned ON.

31.4 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.

WA120L-3 WHEEL LOADER

Form No. SEAM038301T