Operation & Maintenance Manual

SEAM045600T

D375A-3

BULLDOZER

SERIAL NUMBERS **D375A-17736** and up

⚠ WARNING

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

NOTICE

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

KOMATSU

1. FOREWORD

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

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

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

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

⚠ WARNING

- **Improper operation and maintenance of this machine can be hazardous and could result in serious injury or death.**
- **Operators and maintenance personnel should read this manual thoroughly before beginning operation or maintenance.**
  Keep this manual in a readily available place near the machine, and have all personnel involved in working on the machine read the manual periodically.
- **Some actions involved in operation and maintenance of the machine can cause a serious accident, if they are not done in a manner described in this manual.**
- **The procedures and precautions given in this manual apply only to intended uses of the machine. If you use your machine for any unintended uses that are not specifically prohibited, you must be sure that it is safe for you and others. In no event should you or others engage in prohibited uses or actions as described in this manual.**
- **Komatsu delivers machines that comply with all applicable regulations and standards of the country to which it has been shipped. If this machine has been purchased in another country or purchased from someone in another country, it may lack certain safety devices and specifications that are necessary for use in your country. If there is any question about whether your product complies with the applicable standards and regulations of your country, consult Komatsu or your Komatsu distributor before operating the machine.**
- **The description of safety is given in SAFETY INFORMATION on page 0-4 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:

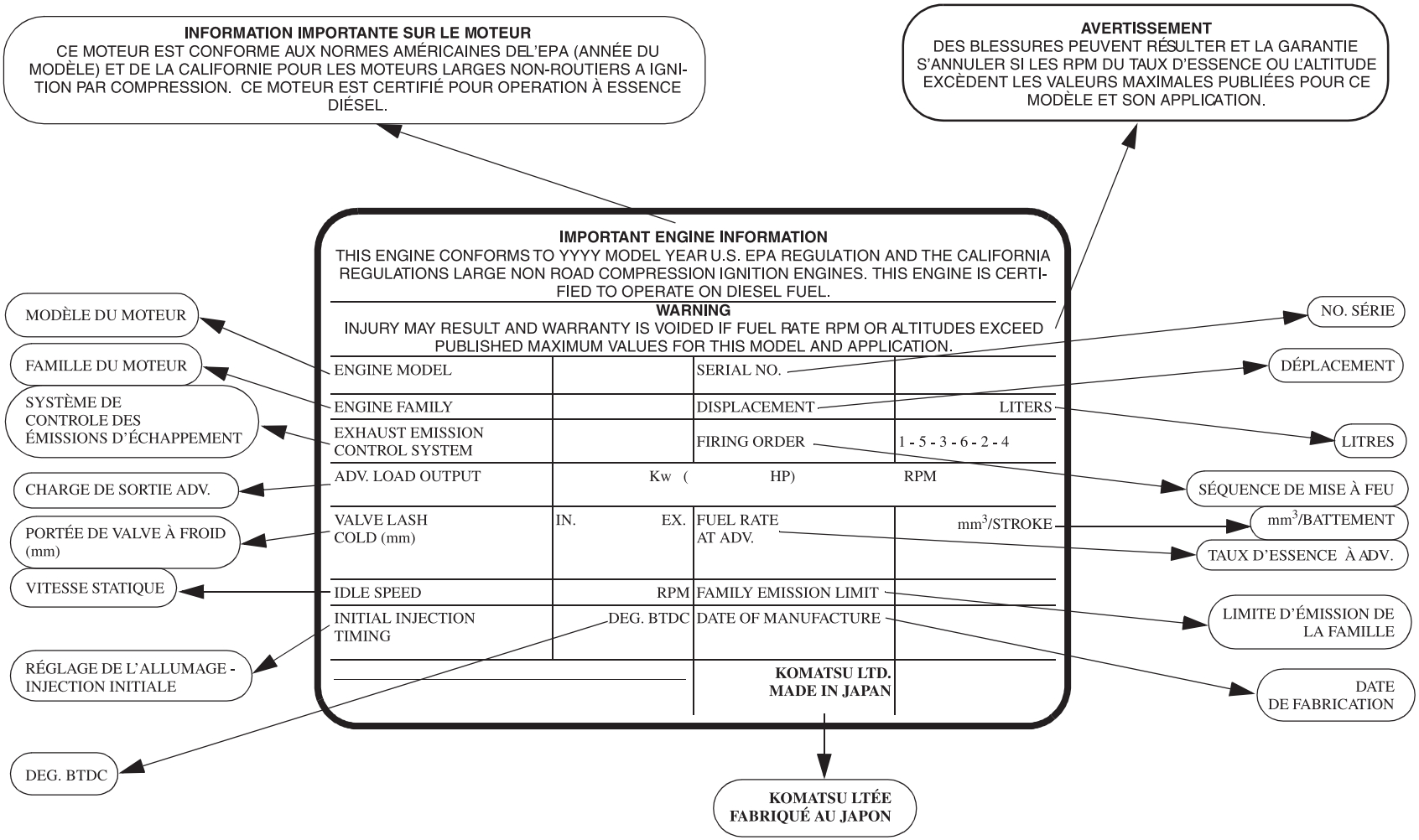
Komatsu garantit à l'acheteur ultime et chaque acheteur subséquent que le moteur est conçu, construit et équipé en toute conformité, au moment de la vente par Komatsu, avec toutes les Réglementations fédérales américaines sur les émissions applicables au moment de la fabrication et qu'il est exempt de 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 Komatsu BULLDOZER is designed to be used mainly for the following work.
- Dozing
- Cutting into hard or frozen ground or ditching
- Felling trees, removing stumps
- Pushing
- Ripping

See the section "12.10 WORK POSSIBLE USING BULL DOZER" and "12.11 RIPPER OPERATION" for further details.

3.2 FEATURES

- Simple lever operation with directional, steering and gear shift joystick
- Pressurized, sealed cab with air conditioner for pleasant operations
- Simple check operations using monitor panel
- Increase in production through use of lock-up torque converter
- Reduction in fuel costs and undercarriage costs through use of mode selection system
- High power engine with turbocharger and after cooler
- A flexible undercarriage mechanism and cab mount with viscous damper are employed to improve the ride for the operator
- Low noise, high visibility design to ensure simple and safe operations

3.3 BREAKING IN THE MACHINE

NOTICE

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

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

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

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

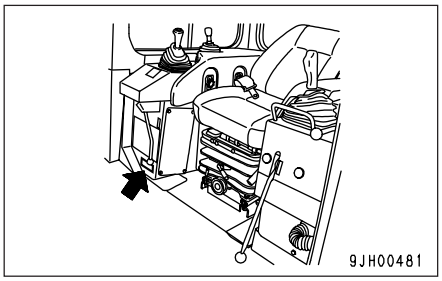
The precautions given in this manual for operating, maintenance, and safety procedures are only those that apply when this product is used for the specified purpose. If the machine is used for a purpose that is not listed in this manual, Komatsu cannot bear any responsibility for safety. All consideration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

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

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

4.1 MACHINE SERIAL NO. PLATE POSITION

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

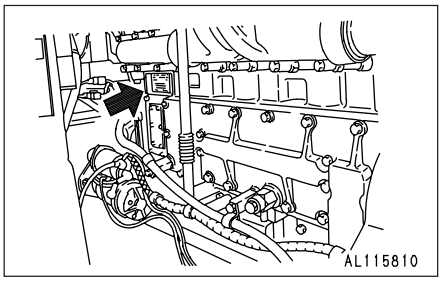


4.2 ENGINE SERIAL NO. PLATE POSITION

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

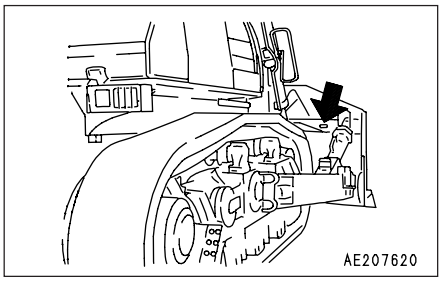
(The EPA auxiliary nameplate is on the after-cooler block.)

EPA: Environmental Protection Agency, U.S.A.



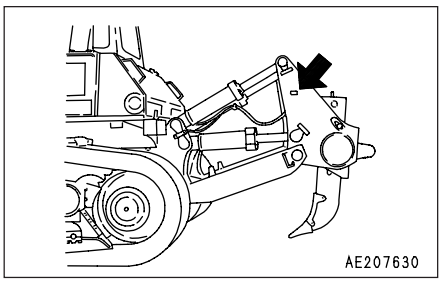
4.3 BLADE SERIAL NO. PLATE POSITION

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



4.4 RIPPER SERIAL NO. PLATE POSITION

This is located at the left side surface of ripper beam.



4.5 TABLE TO ENTER SERIAL NO. AND DISTRIBUTOR

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

5. CONTENTS

SAFETY

OPERATION

MAINTENANCE

SPECIFICATIONS

OPTIONS, ATTACHMENTS

SAFETY

⚠ WARNING

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

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

6. GENERAL PRECAUTIONS

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

SAFETY RULES

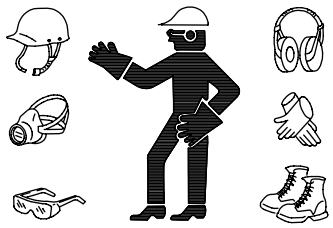
- Only trained and authorized personnel can operate and maintain the machine.
- Follow all safety rules, precautions and instructions when operating or performing maintenance on the machine.
- Do not operate the machine if you are not feeling well, or if you are taking medicine which will make you sleepy, 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 that all guards and covers are in their proper position. Have guards and covers repaired if damaged.
- Use safety features such as safety lock levers and the seat belt properly.
- Never remove any safety features. Always keep them in good operating condition.
  Safety lock lever → See "12.13 PARKING MACHINE".
  Seat belt → See "27. USING SEAT BELT".
- Improper use of safety features could result in serious bodily injury or death.

CLOTHING AND PERSONAL PROTECTIVE ITEMS

- Avoid loose clothing, jewelry, and loose long hair. They can catch on controls or in moving parts and cause serious injury or death.
- Also, do not wear oily clothes, because they are flammable.
- Wear a hard hat, safety glasses, safety shoes, mask or gloves when operating or maintaining the machine. Always wear safety goggles, hard hat and heavy gloves if your job involves scattering metal chips or minute materials 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.



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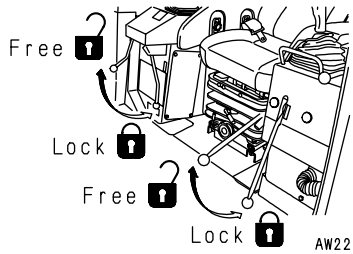
UNAUTHORIZED MODIFICATION

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

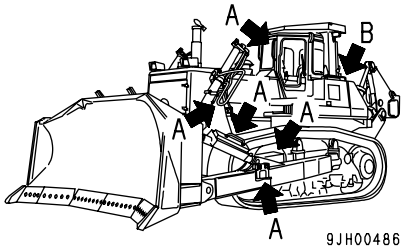
ALWAYS APPLY LOCK WHEN LEAVING OPERATOR'S SEAT

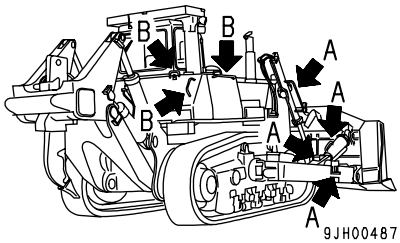
- When standing up from the operator's seat, always place the safety lock levers securely in the LOCK position. If you accidentally touch the levers when they are not locked, the work equipment may suddenly move and cause serious injury or damage.
- When leaving the machine, lower the blade and ripper completely to the ground, set the safety lock levers to the LOCK position, then stop the engine. Use the key to lock all the equipment. Always remove the key and take it with you.
  Work equipment posture → See "12.13 PARKING MACHINE".
  Locking → See "12.17 LOCKING"



MOUNTING AND DISMOUNTING

- Never jump on or off the machine. Never get on or off a moving machine.
- When getting on or off the machine, always face the machine and use the handrails and steps.
- Never hold any control levers or lock levers when getting on or off the machine.
- To ensure safety, always 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.
- If there is any oil, grease, or mud on the handrails or steps, wipe it off immediately. Always keep these parts clean. Repair any damage and tighten any loose bolts.
- Use the parts marked by arrow A in the diagram below when getting on or off machine.
  Never use the parts marked by arrow B when getting on or off the machine.
  Use them only when moving along the top of the track or when checking or carrying out maintenance inside the side cover, or when filling the tank with oil.





FIRE PREVENTION FOR FUEL AND OIL

Fuel, oil, and antifreeze can be ignited by a flame. Fuel is particularly flammable and can be hazardous.
Always observe the following:

- Keep any flame or lighted cigarette away from flammable fluids.
- Stop the engine and do not smoke when refueling.
- Tighten all fuel and oil caps securely.
- Use well-ventilated areas for adding or storing oil and fuel.
- Keep oil and fuel in the determined place and do not allow unauthorized persons to enter.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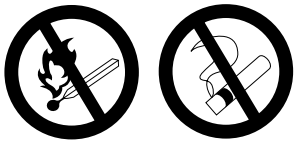
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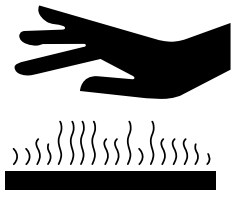
PRECAUTIONS WHEN HANDLING AT HIGH TEMPERATURE

- 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.
Komatsu does not use asbestos in its products, but if you handle materials containing asbestos fibers, follow the guidelines given below:

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

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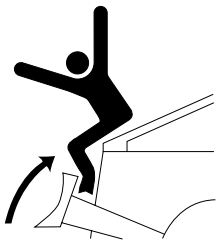
CRUSHING OR CUTTING PREVENTION

Do not enter, or put your hand or arm or any other part of your body between movable parts such as 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 go between movable parts, always lock the levers and be sure that the work equipment cannot move. For details, **see "8. PRECAUTIONS FOR MAINTENANCE".**



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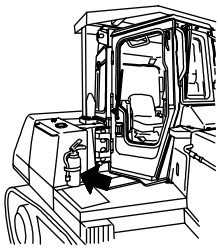
FIRE EXTINGUISHER AND FIRST AID KIT

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

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



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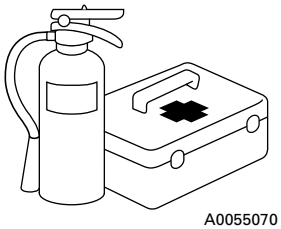

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PRECAUTIONS FOR ROPS

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

PRECAUTIONS FOR ATTACHMENTS

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

MACHINES WITH ACCUMULATOR

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

When releasing the pressure inside the work equipment circuit on machines equipped with an accumulator, follow the procedure given in the inspection and maintenance section.
Method of releasing pressure → See "11.14 HANDLING ACCUMULATOR".

The accumulator is filled with high-pressure nitrogen gas, and it is extremely dangerous if it is handled in the wrong way. Always observe the following precautions.
- Never make any hole in the accumulator or expose it to flame or fire.
- Do not weld any boss to the accumulator.
- When carrying out disassembly or maintenance of the accumulator, or when disposing of the accumulator, it is necessary to release the gas from the accumulator. A special air bleed valve is necessary for this operation, so please contact your Komatsu distributor.
  Gas in accumulator → See "11.14 HANDLING ACCUMULATOR".


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VENTILATION FOR ENCLOSED AREAS

Exhaust fumes from the engine can kill.
- If it is necessary to start the engine within an enclosed area, or you handle fuel, flushing oil, or paint, 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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7.1 BEFORE STARTING ENGINE

SAFETY AT WORKSITE

- Before starting operations, thoroughly check the area for any unusual conditions that could be dangerous.
- Check the terrain and condition of the ground at the worksite, and determine the best and safest method of operation.
- Make the ground surface as hard and horizontal as possible before carrying out operations. If the jobsite is dusty, spray water before starting operations.
- If you need to operate on a road, protect pedestrians and cars by designating a person for worksite traffic duty or by installing fences and putting up No Entry signs around the worksite.
- If water lines, gas lines, or high-voltage electrical lines may be buried under the worksite, contact each utility and identify their locations. Be careful not to sever or damage any of these lines.
- Check the ground condition and the depth and flow of water before operating in water or crossing a river. NEVER be in water which is in excess of the permissible water depth.

  Permissible water depth → See "12.9 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 days work. Failure to carry out these checks may lead to serious injury or damage.

- Completely remove all flammable materials accumulated around the engine and battery, 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.

  Walk-around checks → See "12.1.1 WALK-AROUND CHECK".

- Check the coolant level, fuel level, and oil level in the hydraulic tank, check for clogging of the air cleaner, and check the electric wiring.

  Checks before starting → See "12.1.2 CHECK BEFORE STARTING".

- Adjust the operator's seat to a position where it is easy to carry out operations, and check for wear or damage to the seat belt and seat belt mounting equipment.

  Adjusting operator's seat → See "12.1.3 ADJUSTMENT BEFORE STARTING OPERATION".

  Seat belt → See "27. USING SEAT BELT".

- Check that the gauges work properly, and check that the control levers are all at the NEUTRAL position.

  Method of checking operation of gauges → See "12.1.5 OPERATIONS AND CHECKS BEFORE STARTING ENGINE".

- Check that the mirrors and window glass provide a clear view.

If the above inspections show any abnormality, carry out repairs immediately.

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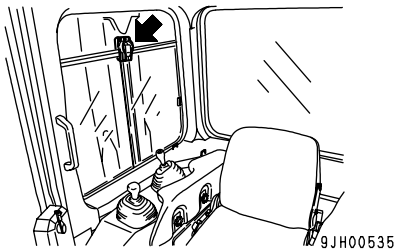
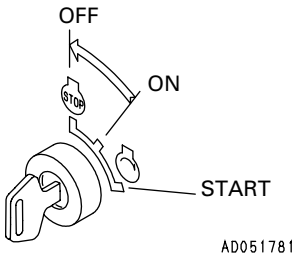
PRECAUTIONS FOR SLIDING GLASS INTERMEDIATE LOCK

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



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 the blade control lever.
- 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 circuit to start the engine. It is not only dangerous, but will also cause damage to the equipment.



7.2 AFTER STARTING ENGINE

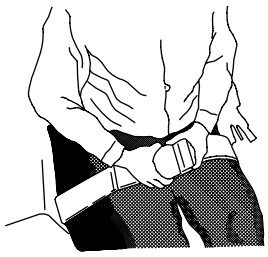
CHECKS AFTER STARTING ENGINE

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 blade, brakes, travel system, and steering system.
- Checks for any abnormality in the sound of the machine, vibration, heat, smell, or gauges; check also that there is no leakage of air, oil, or fuel.
- If any abnormality is found, carry out repairs immediately.
  If the machine is used when it is not improper condition, it may lead to serious injury or damage to the machine.

PRECAUTIONS WHEN STARTING OFF

- Before moving the machine off, check again that there are no persons or obstacles in the surrounding area.
- When moving the machine off, sound the horn to warn people in the surrounding area.
- Always sit in the operator's seat when driving the machine.
- Fasten your seat belt securely.
- The operator must not let any other person sit anywhere except in the assistant's seat.
- Check that the travel alarm (option) works properly.
- Always close the door of the operator's cab and check that the door is locked in position securely.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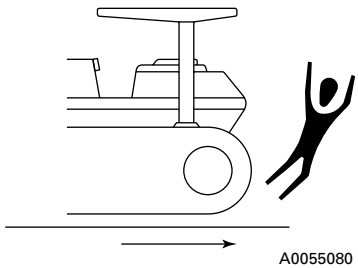
PRECAUTIONS WHEN MOVING FORWARD OR BACKWARD

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

- Before changing between forward and reverse, reduce speed and stop the machine.
- Before operating the machine, 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.
- When operating in areas that may be hazardous or have poor visibility, designate a person to direct worksite traffic.
- Ensure that no unauthorized person can come within the direction of turning or direction of travel.

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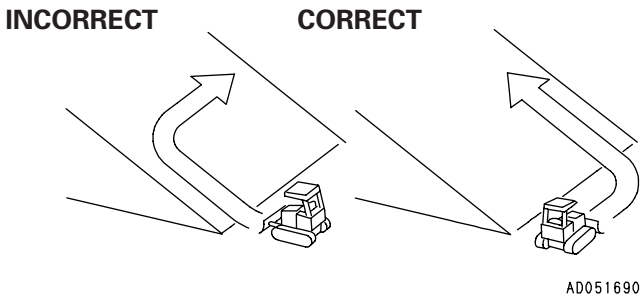
PRECAUTIONS WHEN TRAVELING

- Never turn the key in the starting switch to the OFF position when traveling.
  It is dangerous if the engine stops when the machine is traveling, because it becomes impossible to operate the steering.
- It is dangerous to look around you when operating. Always concentrate on your work.
- It is dangerous to drive too fast, or to start suddenly, stop suddenly, turn sharply, or zigzag.
- If you find any abnormality in the machine during operation (noise, vibration, smell, incorrect gauges, air leakage, oil leakage, etc.), move the machine immediately to a safe place and look for the cause.
- Set the work equipment to a height of 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, never operate them suddenly.
- Do not operate the steering 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. Never travel over obstacles which make the machine tilt strongly (10° or more).
- 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 "12.9 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.

TRAVELING ON SLOPES

- Traveling on slopes could result in the machine tipping over or slipping to the side.
- When traveling on slopes, keep the work equipment 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.
- If the engine stops on a slope, place the travel lever at the neutral position and lower the work equipment to the ground. Do not operate the steering. There is danger that the machine will turn under its own weight.
- When traveling downhill with the machine being pushed by its own weight, the machine may steer in the opposite direction, so be careful when steering.
  Reverse steering when traveling downhill → **See "12.7.2 TURNING WHILE DESCENDING A SLOPE".**



PRECAUTIONS WHEN OPERATING

- Be careful not to approach too close to the edge of cliffs.
- Carry out only work that is specified as the purpose of the machine.
  Carrying out other operations will cause breakdowns.
- 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 as follows to prevent the work equipment from hitting other objects.
  - 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
	6,600 V	2 m
Very high voltage	22,000 V	3 m
	66,000 V	4 m
	154,000 V	5 m
	187,000 V	6 m
	275,000 V	7 m
	500,000 V	11 m

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 operations carefully.
  When traveling on snow-covered slopes, never apply the brakes suddenly. Reduce the speed and use the engine as a brake while applying the foot brake intermittently (depress the brake intermittently several times). If necessary, lower the bucket to the ground to stop the machine.
- The load varies greatly according to the characteristics of the snow, so adjust the load accordingly and be careful not to let the machine slip.

WORKING ON LOOSE GROUND

- Do not operate the machine on soft ground. It is difficult to get the machine out again.
- Avoid operating your machine too close to the edge of cliffs, overhangs, and deep ditches. If these areas collapse under the mass or vibration of your machine, it 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.
- 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.

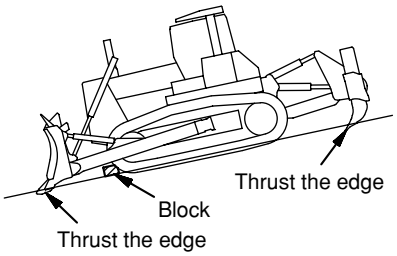
PARKING MACHINE

- 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 tracks to prevent the machine from moving, then dig the work equipment into the ground.
- After stopping the engine, operate the blade control lever several times to the RAISE and LOWER positions to release the remaining pressure in the hydraulic circuit.
- 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, set the safety lock lever to the LOCK position, stop the engine, and use the key to lock all the equipment. Always remove the key and take it with you.

  Work equipment posture → See "12.13 PARKING MACHINE".

  Locks → See "12.17 LOCKING".
- Always close the door of the operator's compartment.



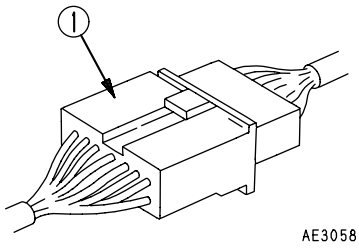
PRECAUTIONS IN COLD AREAS

- 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, which 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".



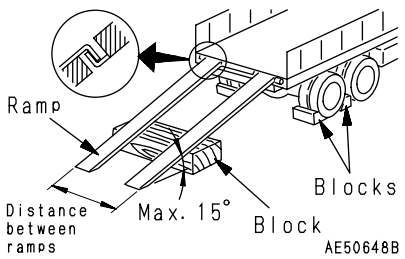
7.3 TRANSPORTATION

LOADING AND UNLOADING

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

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

CORRECT



SHIPPING

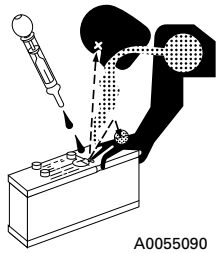
- When shipping the machine on a hauling vehicle, obey all state and local laws governing the weight, width, and length of a load. Also obey all applicable traffic regulations.
- Determine the shipping route while taking into account the width, height and weight of the load.

7.4 BATTERY

BATTERY HAZARD PREVENTION

Battery electrolyte contains 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 damp cloth. Never use gasoline, thinner, or any other organic solvent or cleaning agent.
- Tighten the battery caps securely.
- If the battery electrolyte is frozen, do not charge the battery or start the engine with a different power source. There is danger that this will ignite the battery.
  When charging or starting the engine with a different power source, melt the battery electrolyte and check for leakage of battery electrolyte before starting.
- Always remove the battery from the chassis before charging it.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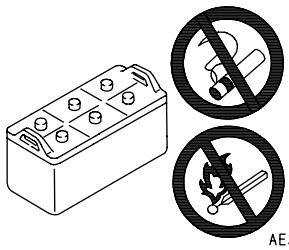
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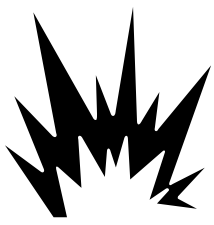
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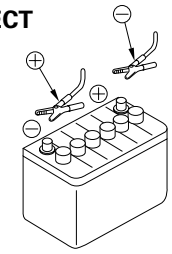
STARTING WITH BOOSTER CABLES

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

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

INCORRECT



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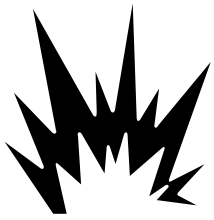
CHARGING BATTERY

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.

INCORRECT



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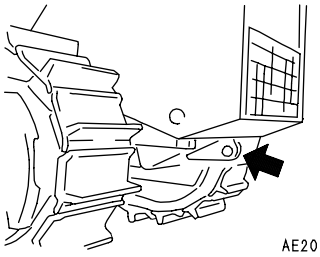
7.5 TOWING

FIT WIRE TO HOOK WHEN TOWING

- Injury or death could result if a disabled machine is towed incorrectly.
- If your machine is towed by another machine, ALWAYS use a wire rope with a sufficient towing capacity.
- If your machine is towed by another machine, stop the engine and release the brake. Please contact your Komatsu distributor to have the brake released.
- NEVER allow a disabled machine to be towed on a slope.
- Do not use a kinked or frayed wire rope.
- Do not straddle the towing cable or wire rope.
- When connecting up a towing machine, do not let anyone enter the area between the towing machine and the equipment being towed.
- Set the towing machine and the towing connection of the equipment being towed in a straight line when connecting it.
- Take up the slack in the wire rope and tow the machine.
- When lifting the machine up, use the towing hook.
- If the machine is stuck in sandy soil, dig out the soil around the towing hook, then use the towing hook to pull the machine out.
  Permissible load for towing hook: 48500 kg (475623 N)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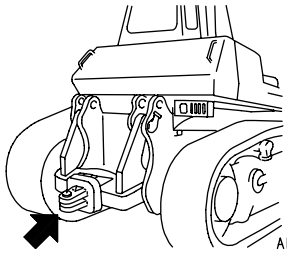
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8.1 BEFORE CARRYING OUT MAINTENANCE

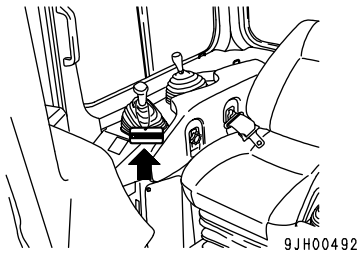
NOTIFICATION OF FAILURE

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

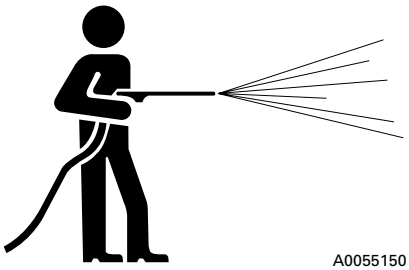
- ALWAYS attach the "DO NOT OPERATE" warning tag to the blade control lever in the operator's cab to alert others that you are working on the machine. Attach additional warning tags around the machine if necessary.
- If others start the engine, or touch or operate the blade control lever while you are performing service or maintenance, you could suffer serious injury or death.

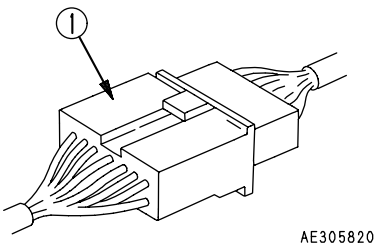
Warning tag Part No. 09963-03000



CLEAN BEFORE INSPECTION AND MAINTENANCE

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





KEEP WORK PLACE CLEAN AND TIDY

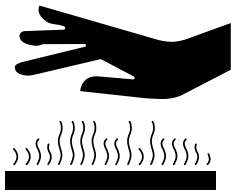
Do not leave hammers or other tools lying around in the work place. Wipe up all grease, oil, or other substances that will cause you to slip. Always keep the work place clean the tidy to enable you to carry out operations safely.
If the work place is not kept clean and tidy, there is danger that you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

APPOINT LEADER WHEN WORKING WITH OTHERS

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

RADIATOR WATER LEVEL

- When inspecting the radiator water level, stop the engine, and wait for the engine and radiator to cool down. Check the water level in the sub-tank. Under normal conditions, do not open the radiator cap.
- If there is no 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 touch the radiator or engine.)
- Release the internal pressure before removing the radiator cap, and remove the radiator cap slowly.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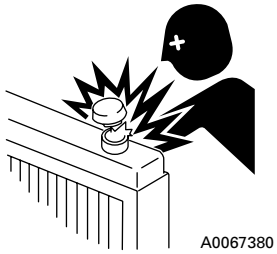
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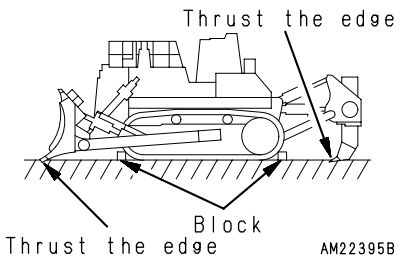
STOP ENGINE BEFORE CARRYING OUT INSPECTION AND MAINTENANCE

- When carrying out inspection and maintenance, park the machine on level ground where there is no danger of falling rocks or land slides, or of flooding if the land is low, then lower the work equipment to the ground and stop the engine.
- Operate the blade control lever several times to the RAISE and LOWER positions to release the remaining pressure in the hydraulic circuit, then set safety lock lever to the LOCK position.
- Put blocks under the track to prevent the machine from moving.
- The worker carrying out the maintenance should be extremely careful not to touch or get caught in the moving parts.



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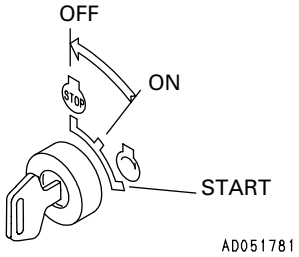

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SAFETY DEVICES FOR WORK EQUIPMENT

When carrying out inspection and maintenance with the work equipment raised, fit stand securely to the boom to prevent the work equipment from coming down.
Place the work equipment control levers at hold, and set safety lock lever to the lock position.

A0055140

PROPER TOOLS

Use only tools suited to the task. Using damaged, low quality, faulty, or makeshift tools could cause personal injury.
Broken pieces of chisels or hammers could fly into your eyes and blind you.

Tools → See "21.1 INTRODUCTION OF NECESSARY TOOLS".

A0055120

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, or battery electrolyte, 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.

A0055160

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.

A0055020

8.2 DURING MAINTENANCE

PERSONNEL

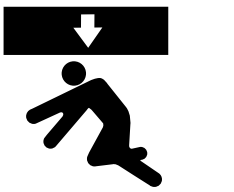
Only authorized personnel can service and repair the machine. Do not allow unauthorized personnel into the area. If necessary, employ an observer.
Extra precaution should be used when grinding, welding, and using a sledge-hammer.

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.

WORK UNDER THE MACHINE

- Stop the machine on firm, level ground, and always lower all work equipment to the ground before performing service or repairs under the machine.
- Always block the track shoes securely.
- It is extremely dangerous to work under the machine if the track shoes 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.



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.

LOCKING INSPECTION COVERS

When carrying out maintenance with the inspection cover open, lock it securely with a lock bar. If maintenance is carried out with the inspection cover open and not locked in position, it may close suddenly if knocked or blown by the wind, and may cause injury to the operator.

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 to the LOCK position to prevent the work equipment from moving.
- 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.

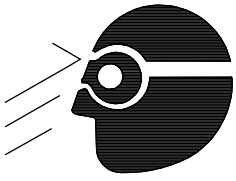
A0055210

DO NOT DROP TOOLS OR PARTS INSIDE MACHINE

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

PRECAUTIONS WHEN USING HAMMER

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



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REPAIR WELDING

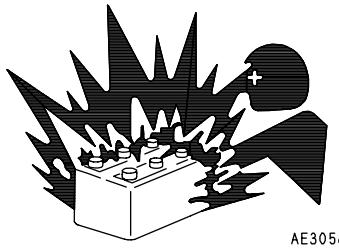
Welding operations must always be carried out by a qualified welder and in a place equipped with a proper equipment. Gas is generated, and there is danger of fire or electrocution when carrying out welding, so never allow any unqualified personnel to carry out welding.
The qualified welder must follow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

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

PRECAUTIONS WITH BATTERY

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

Handling battery → See "16.3 IF BATTERY IS DISCHARGED".



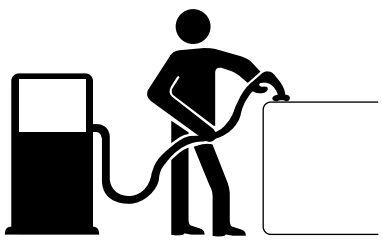
WHEN ABNORMALITY IS LOCATED

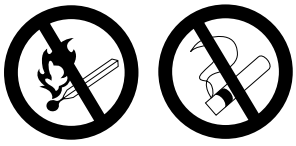
- If any abnormality is found during inspection, always carry out repairs. In particular, if the machine is used when there is any abnormality in the brakes or work equipment systems, it may lead to serious accident.
- Depending on the type of failure, please contact your Komatsu distributor for repairs.

RULES TO FOLLOW WHEN ADDING FUEL OR OIL

If any flame is brought close to fuel or oil, there is danger that it will catch fire, so always follow the precautions below.

- Stop the engine when adding fuel or oil.
- Do not smoke.
- Spilled fuel and oil may cause you to slip, so always wipe it up immediately.
- Always tighten the cap of the fuel and oil fillers securely.
- Always add fuel and oil in a well-ventilated place.

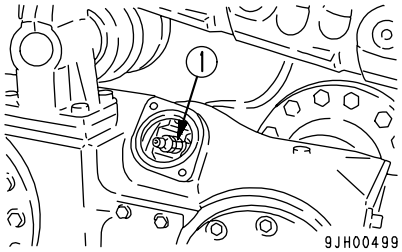


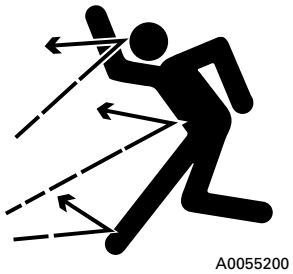


PRECAUTIONS WHEN USING HIGH-PRESSURE GREASE TO ADJUST TRACK TENSION

- Grease is pumped into the track tension adjustment system under high pressure.
  If the specified procedure for maintenance is not followed when making adjustment, plug ① may fly out and cause damage or personal injury.
- When loosening grease drain plug ①, never loosen it more than one turn.
- Never put your face, hands, feet, or any other part of your body directly in front of any grease drain valve.

Adjusting track tension → See "24.2 WHEN REQUIRED".





HANDLING HIGH-PRESSURE HOSES

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

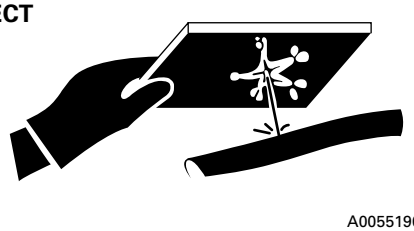
PRECAUTIONS WITH HIGH-PRESSURE OIL

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

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

INCORRECT

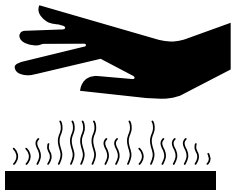
CORRECT



PRECAUTIONS WHEN CARRYING OUT MAINTENANCE AT HIGH TEMPERATURE

Immediately after stopping operations, the engine coolant, oil at all parts, the exhaust manifold, and the muffler are at high temperature.
In this condition, if the cap is removed, or the oil is 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.

Cleaning inside of cooling system → See "24.2 WHEN REQUIRED".
Checking coolant level, oil level in hydraulic tank → see "24.3 CHECK BEFORE STARTING".
Checking lubricating oil level, adding oil → see "24.4-6 PERIODIC MAINTENANCE".
Changing oil, replacing filters → see "24.7-8 PERIODIC MAINTENANCE".


A0055050

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

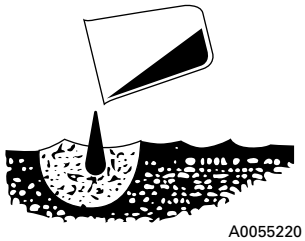
To prevent pollution, particularly in places where people or animals are living, always follow the procedures given below.

- Never dump waste oil in a sewer system, rivers, etc.

- Always put oil drained from your machine in containers. Never drain oil directly onto the ground.

- Obey appropriate laws and regulations when disposing of harmful objects such as oil, fuel, coolant, solvent, filters, and batteries.

INCORRECT


A0055220

9. POSITION FOR ATTACHING SAFETY LABELS

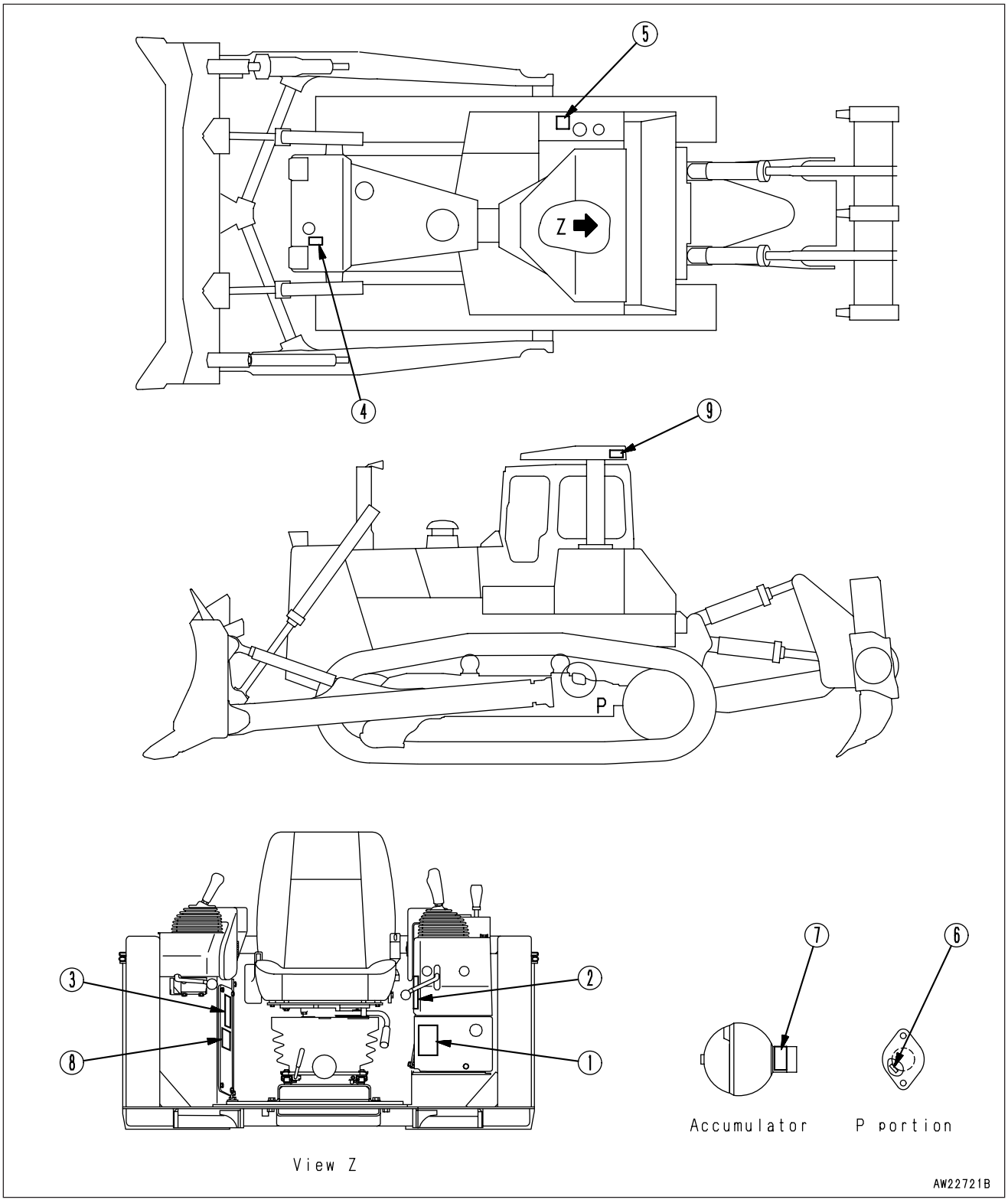
Always keep these labels clean. If they are lost or damage, attaching them again or replace them with a new label.

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

Safety labels may be available in languages other than English.

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

9.1 POSITION FOR ATTACHING SAFETY LABELS



1. Warning before operating machine (09651-03001)

⚠ WARNING

Improper operation and maintenance can cause serious injury or death.

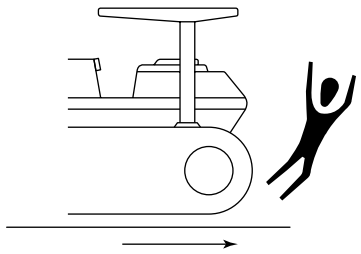
Read manual and labels before operation and maintenance. Follow instructions and warnings in manual and in labels on machine.

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

09651-03001

2. Warning before moving in reverse (09802-13000)

⚠ WARNING



To prevents 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.

09802-13000

3. Warning for leaving operator's seat (09654-33001)

⚠ WARNING

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

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

09654-33001

4. Warning for hot water hazard (09668-03001)

⚠ WARNING

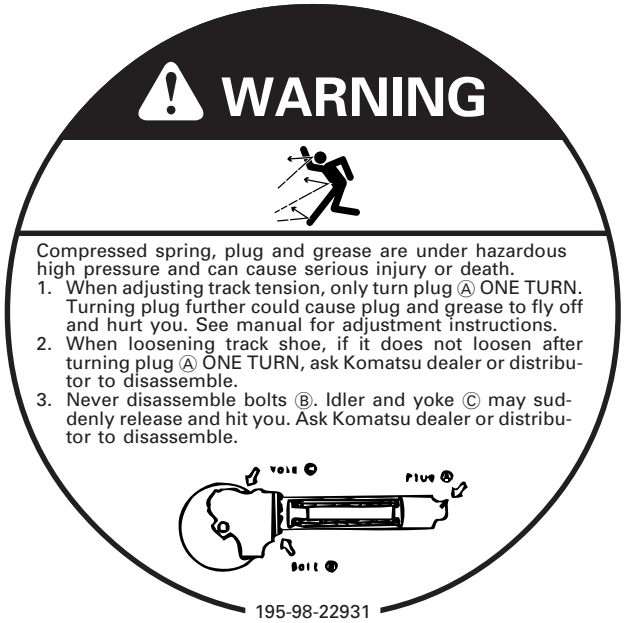
Hot water hazard.

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

09668-03001

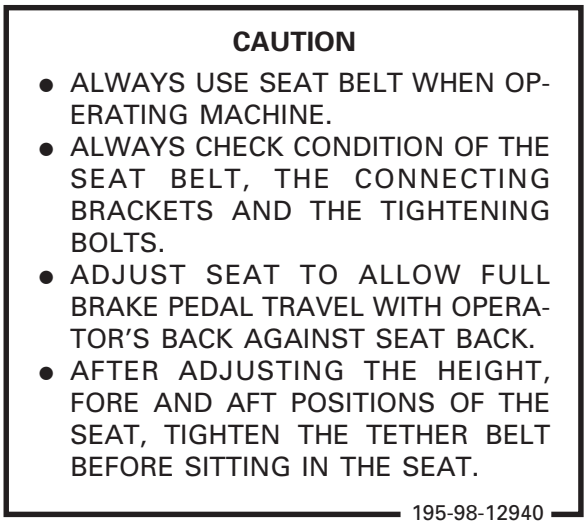
5. Warning for hot oil hazard (09653-03001)

6. Warning for adjusting track tension (195-98-22931)

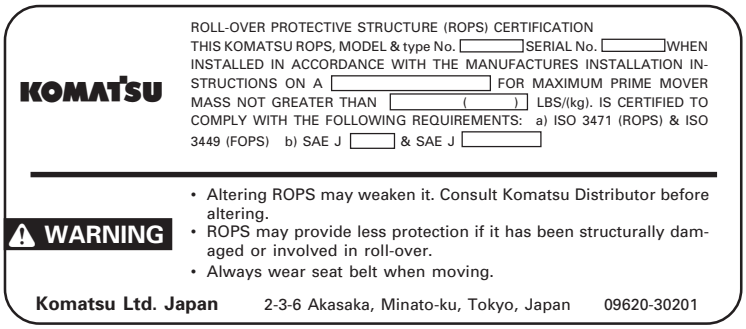


7. Warning for handling accumulator (09659-53000)

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



9. Warning for ROPS
(09620-30201)



9.2 CONTENT AND USE OF WARNING PLATES

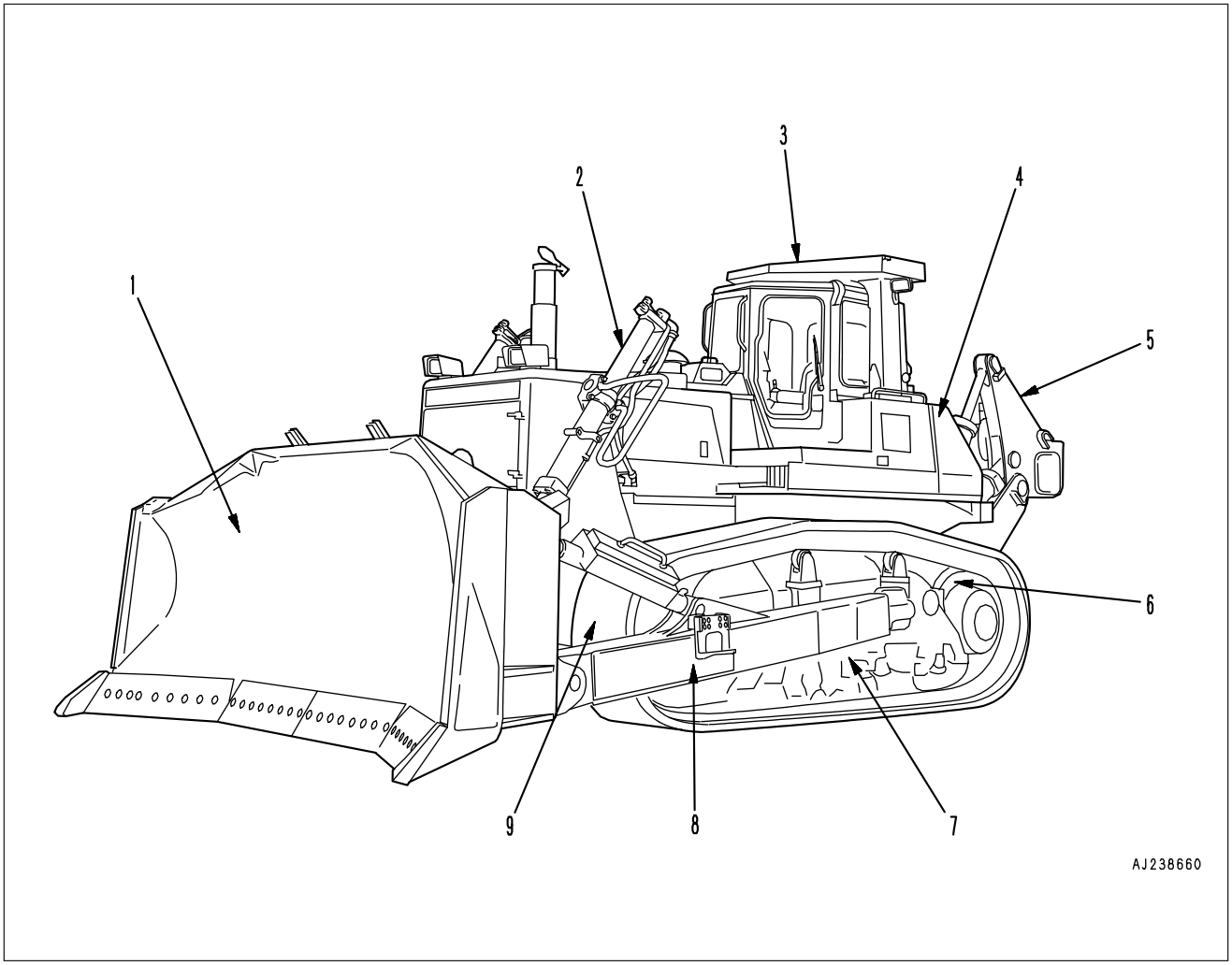
1. Warning to prevent operation during maintenance (09963-03000)
Hang this warning plate on the controls in the operator's compartment.

OPERATION

10. GENERAL VIEW

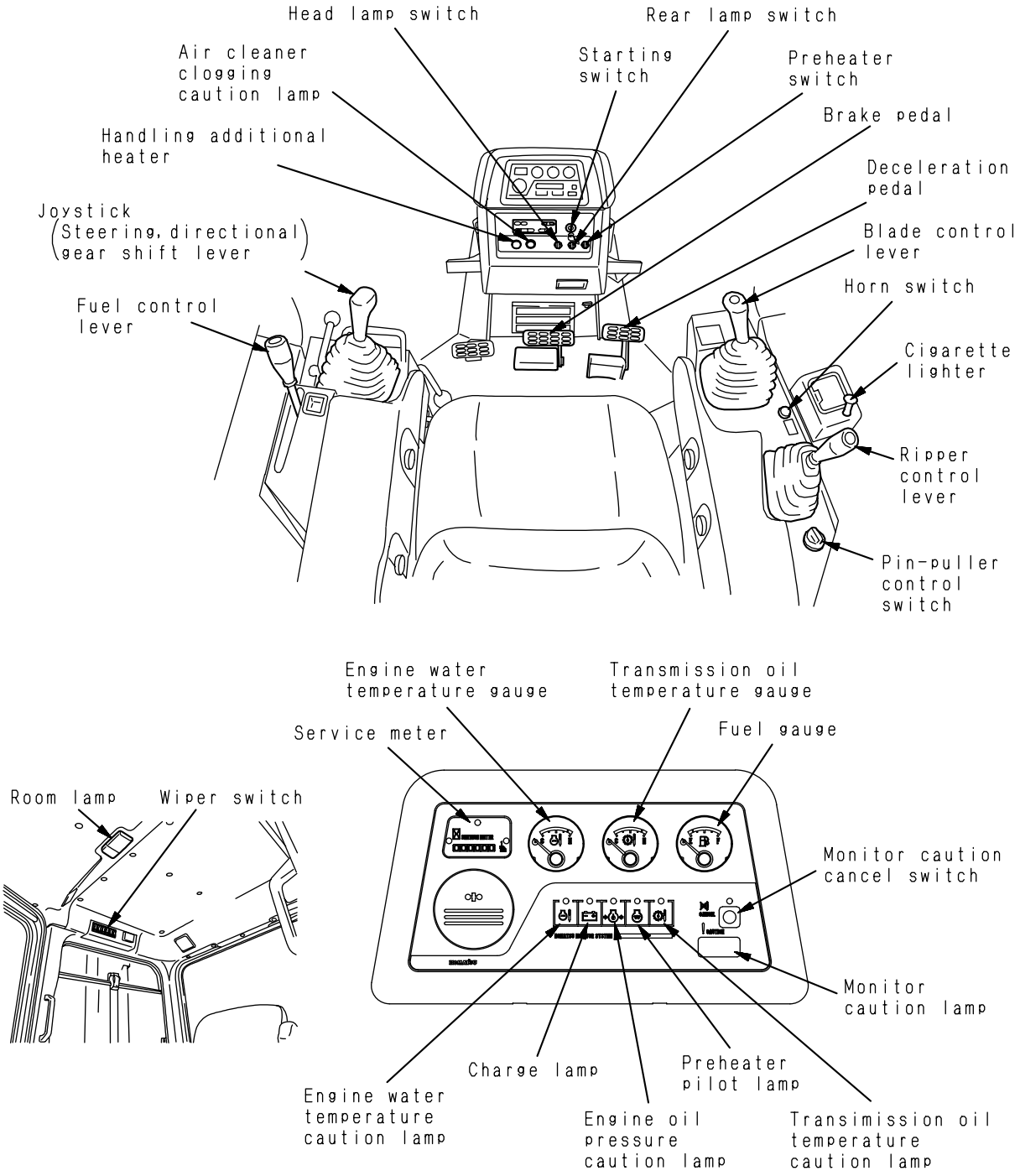
10.1 GENERAL VIEW OF MACHINE

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



1. Blade
2. Blade lift cylinder
3. Cab
4. Fuel tank
5. Multi ripper
6. Sprocket
7. Track frame
8. Frame
9. Track shoe

10.2 GENERAL VIEW OF CONTROLS AND GAUGES



11. EXPLANATION OF COMPONENTS

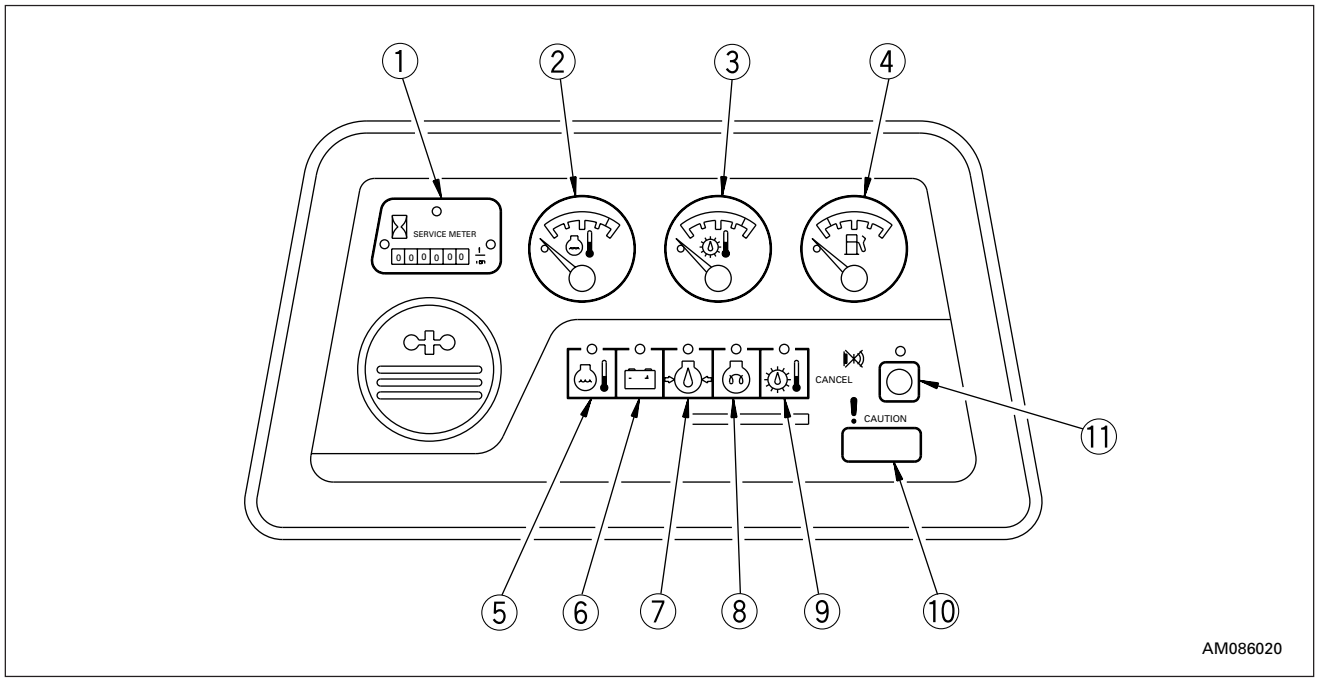
The following is an explanation of the devices needed for operating the machine.

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

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

11.1 FRONT PANEL (METERS, LAMPS, SWITCHES)

11.1.1 MONITOR PANEL (MONITOR PANEL SPECIFICATION)



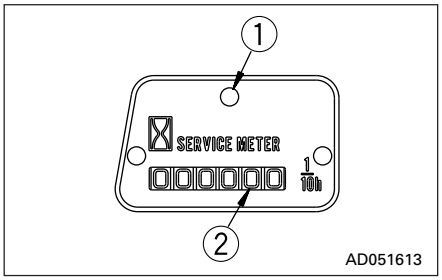
1. SERVICE METER

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

Set the periodic maintenance intervals using this display.

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

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



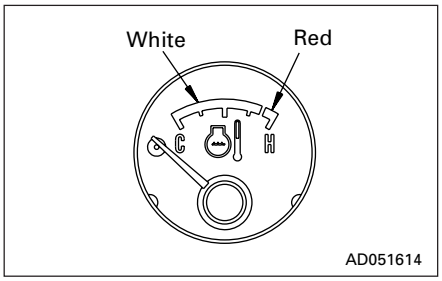
2. ENGINE WATER TEMPERATURE GAUGE

This gauge indicates the cooling water temperature.

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

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

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



NOTICE

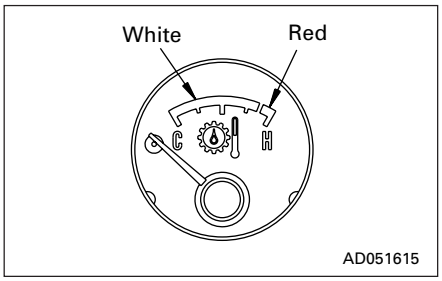
If the water temperature gauge often enters the red range, check the radiator for clogging.

3. TRANSMISSION OIL TEMPERATURE GAUGE

This indicates the temperature of the transmission lubricating oil.

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

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



NOTICE

If the Transmission oil temperature gauge often enters the red range, we recommend you to lower the travel speed one range (for example, F2 → F1) to reduce the load on the power train when operating.

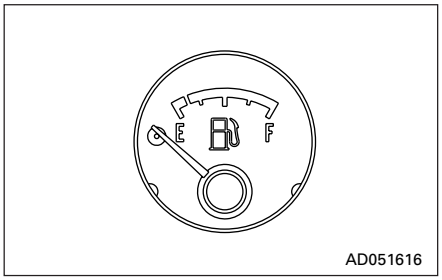
4. FUEL GAUGE

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

F indicates a full tank.

When the indicator points to E, it indicates that there is less than 150 ℓ (39.63 US gal) remaining, so add fuel.

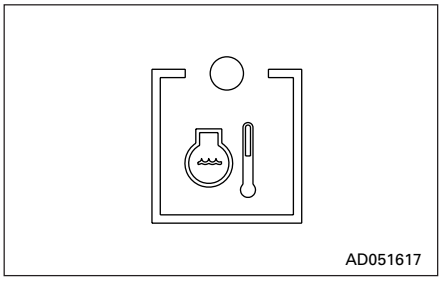
Always fill the tank after finishing operations.



5. ENGINE WATER TEMPERATURE CAUTION LAMP

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

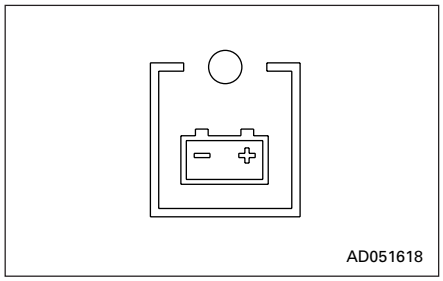
If the lamp lights up, stop the machine, run the engine under no load at a midrange speed, and wait for the indicator of the engine water temperature gauge to go down to the white range.



6. CHARGE MONITOR

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

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


AD051618

REMARK

This monitor lamp lights, when the starting switch is turned to ON immediately after the engine is started or immediately before the engine is stopped. It does not indicate an abnormality.

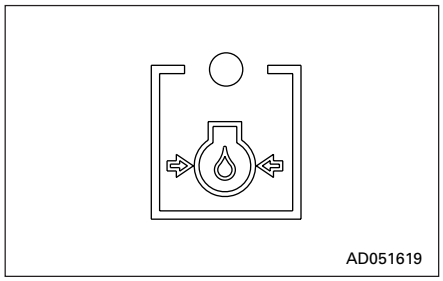
7. ENGINE OIL PRESSURE CAUTION LAMP

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

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

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

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

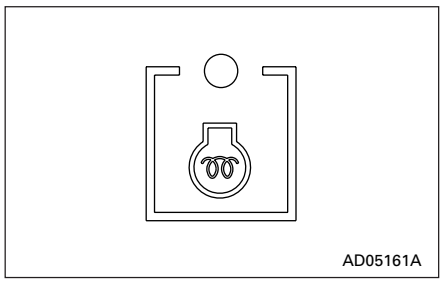

AD051619

REMARK

This monitor lamp flashes and the alarm buzzer sounds, when the starting switch is turned to ON immediately after the engine is started or immediately before the engine is stopped. It does not indicate an abnormality.

8. ENGINE PREHEATING PILOT LAMP

This lamp indicators the engine preheating time when starting the engine by operating APS (Automatic Priming System). When the starting switch key is placed in ON, this lamp lights and goes out after approx. 12 seconds, indicating that the preheating of the engine has been completed.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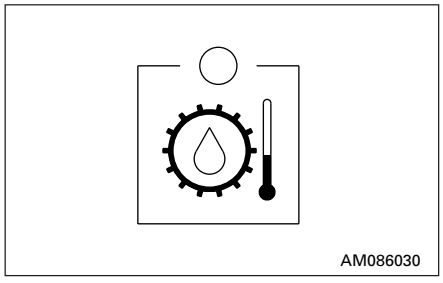
9. TRANSMISSION OIL TEMPERATURE CAUTION LAMP

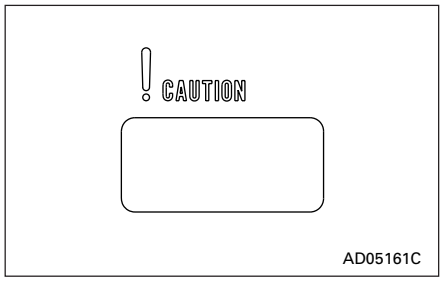
This warns the operator that the oil temperature at the transmission outlet port has risen.

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


AM086030

10. MONITOR CAUTION LAMP

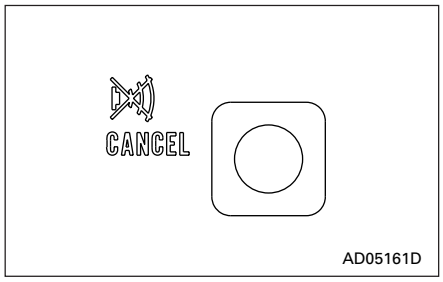
If any of caution lamps 5, 6, 7 or 9 light up, the monitor caution lamp lights up. In addition, the alarm buzzer sounds at the same time.



AD05161C

11. MONITOR CAUTION CANCEL SWITCH

This switch is used to cancel monitor caution lamp ⑩. Press the switch to turn the monitor caution lamp out and to stop the alarm buzzer.



AD05161D

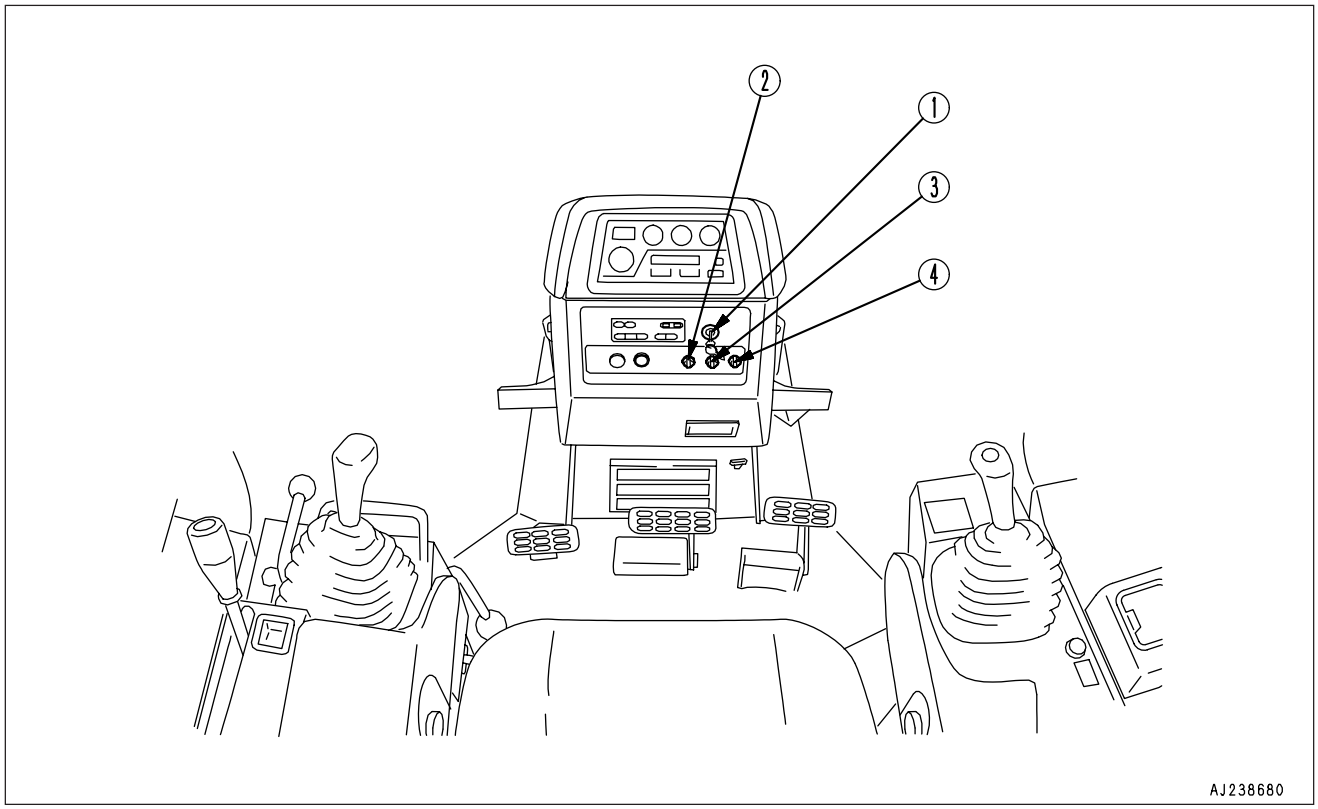
REMARK

The alarm buzzer sounds in the following cases.

1. When the engine water temperature has become abnormally high.
2. When the engine oil temperature has become abnormally low.
3. When the torque converter oil temperature has become abnormally high.

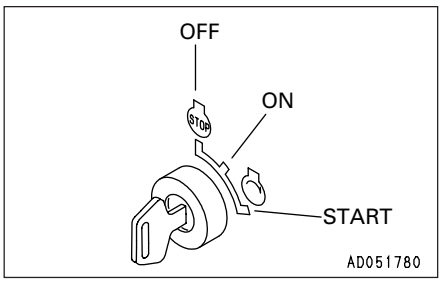
When the starting switch is turned to the ON position, the buzzer will sound for approx. 1 sec., but this is to check that the buzzer is working properly. It does not indicate any abnormality.

11.1.2 SWITCHES



1. STARTING SWITCH

This switch is used to start the engine.



OFF

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

ON

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

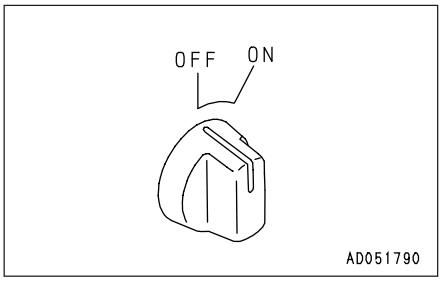
START

At this key position, the starting motor will crank the engine. Immediately after starting the engine, release the key which will automatically return to the ON position.

2. FRONT LAMP, WORKING LAMP SWITCH

This lights up the front lamps, working lamps at the front of the left and right fenders, and the panel lamp.

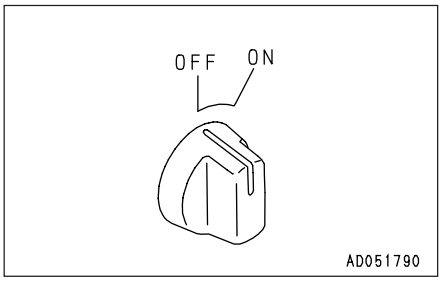
OFF position: Lamps are out
ON position: Lamps light up



3. REAR LAMP SWITCH

This lights up the rear lamps.

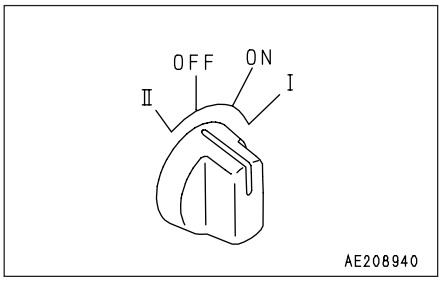
OFF position: Lamps are out
ON position: Lamps light up



4. PREHEATING SWITCH

This lights up the rear lamps.

OFF position: Preheating is not actuated
ON position: Automatic preheating is actuated
I, II position: Preheating is not actuated. Normally do not turn the key to these positions.

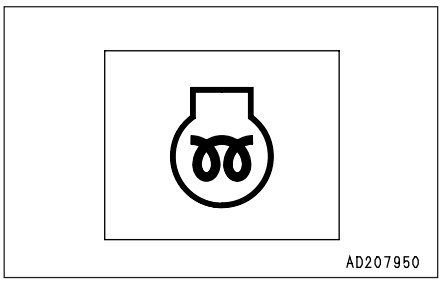


⚠ CAUTION

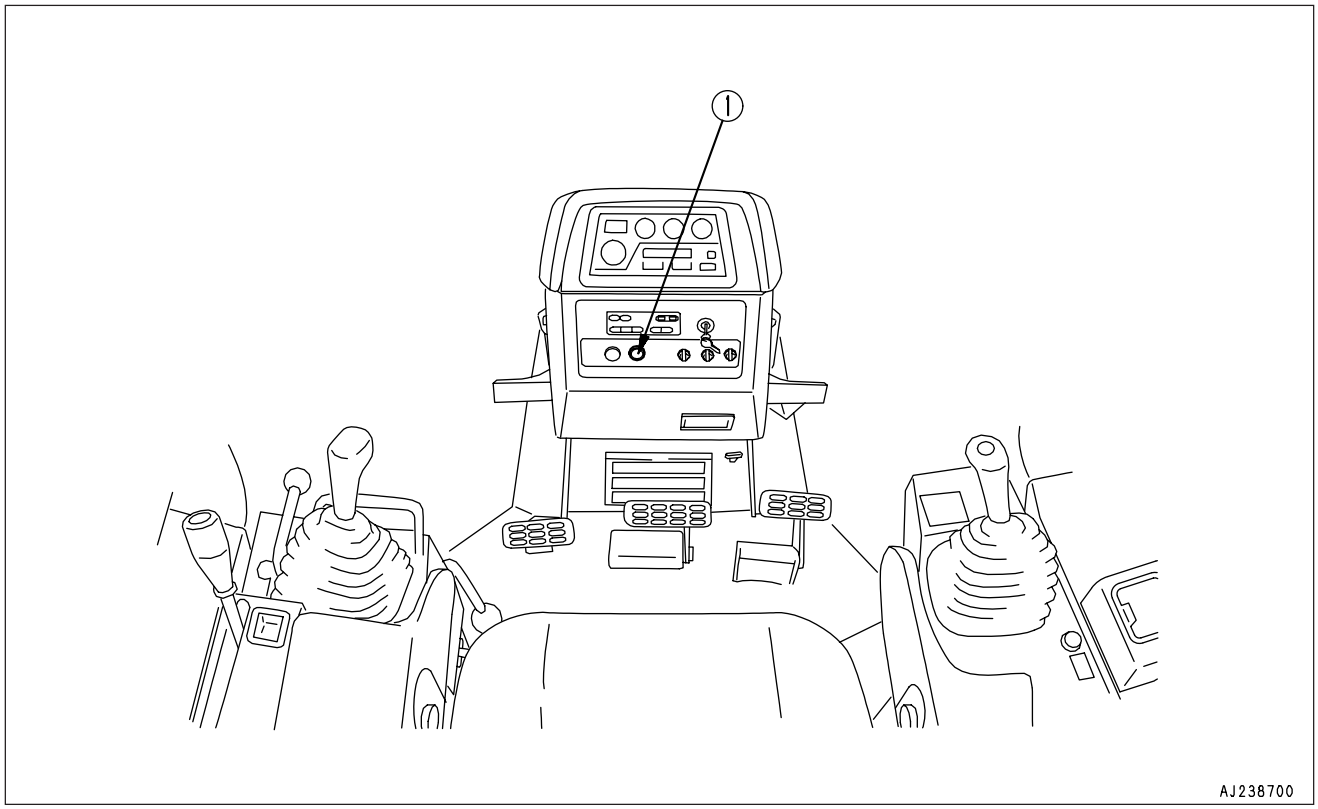
When not using the APS, do not turn the switch to the ON position. For details, see 12.2.2 STARTING IN COLD WEATHER.

This is used when using the APS to start the engine in cold areas. When the switch is turned to the ON position, electricity flows to the glow plug and the intake air is heated. The preheating monitor on the monitor panel lights up when the switch is turned ON.

Do not turn the switch to the ON position when not using the APS.



11.1.3 LAMP

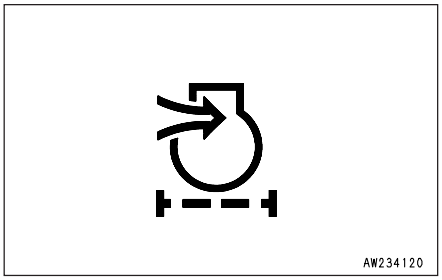


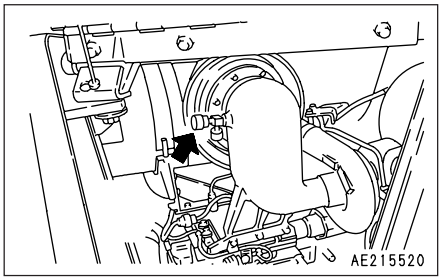
1. AIR CLEANER CLOGGING CAUTION LAMP

This warns the operator that the air cleaner element is clogged. The lamp should be OFF during normal operation.
If the lamp lights up during operation, replace the element immediately.

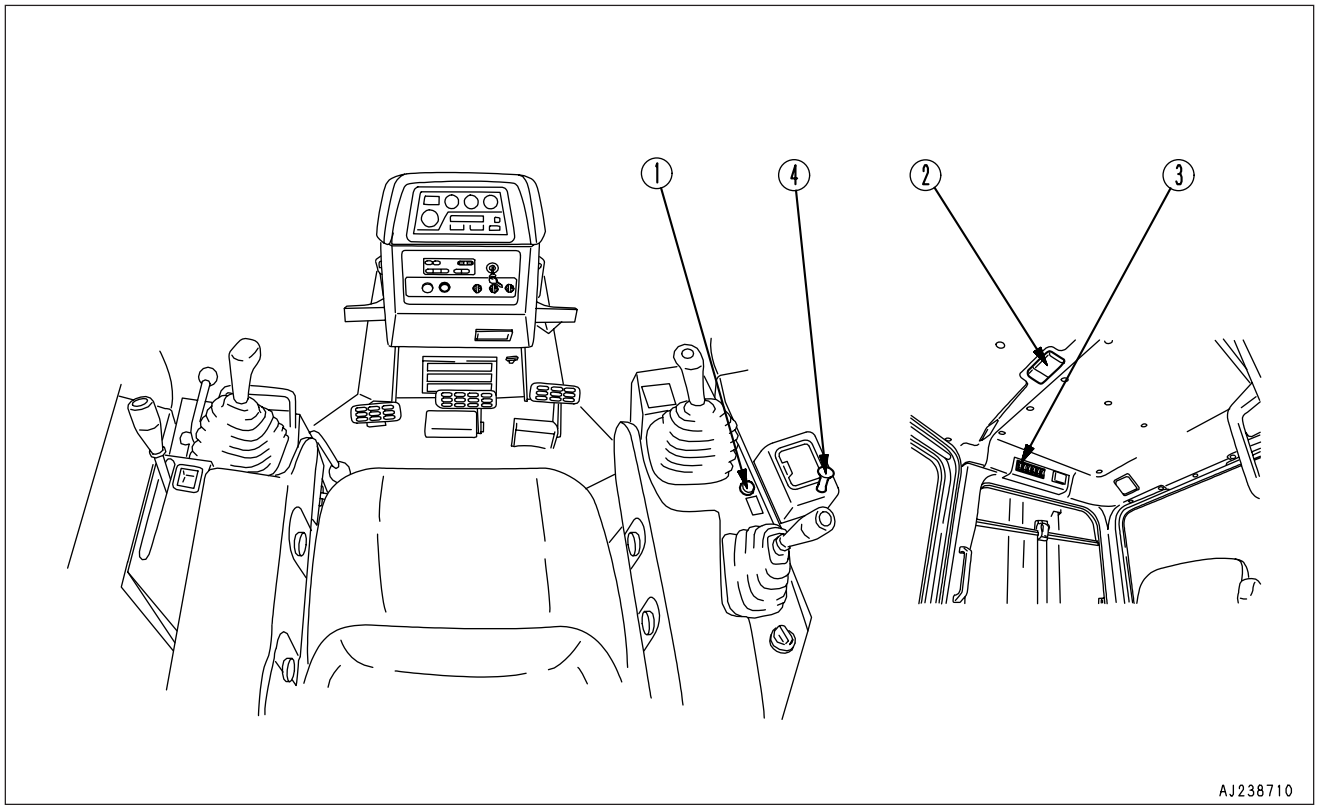
After cleaning, check that the air cleaner clogging caution lamp does not light up.

A dust indicator is installed to the inlet pipe of the air cleaner inside the engine room on the right side of the machine. Use this together with the air cleaner clogging caution lamp to check for clogging. For details of the method of checking for clogging with the dust indicator, see "12.1.2 CHECK DUST INDICATOR".



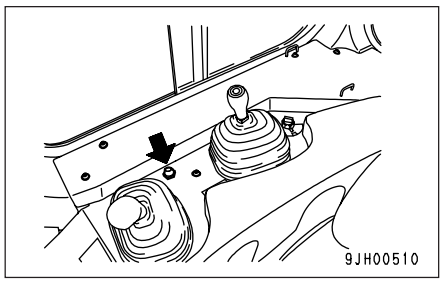


11.2 SWITCHES



1. HORN SWITCH

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

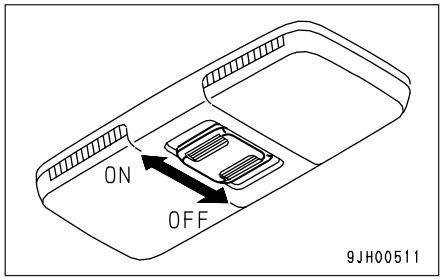


2. ROOM LAMP SWITCH (MACHINES EQUIPPED WITH CAB)

This lights up the room lamp.

ON position: Lamp lights up

OFF position: Lamp is out

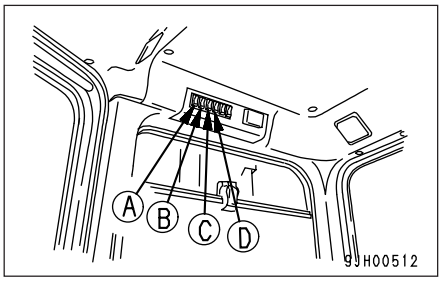


3. WIPER SWITCH

This activates the wipers.

The wiper switches are as follows.

Ⓐ Left door
Ⓑ Front window
Ⓒ Right door
Ⓓ Rear window

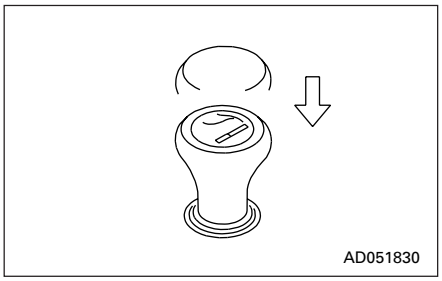


4. CIGARETTE LIGHTER

This is used to light cigarettes.

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

If the cigarette lighter is removed, the socket can be used as a power source.

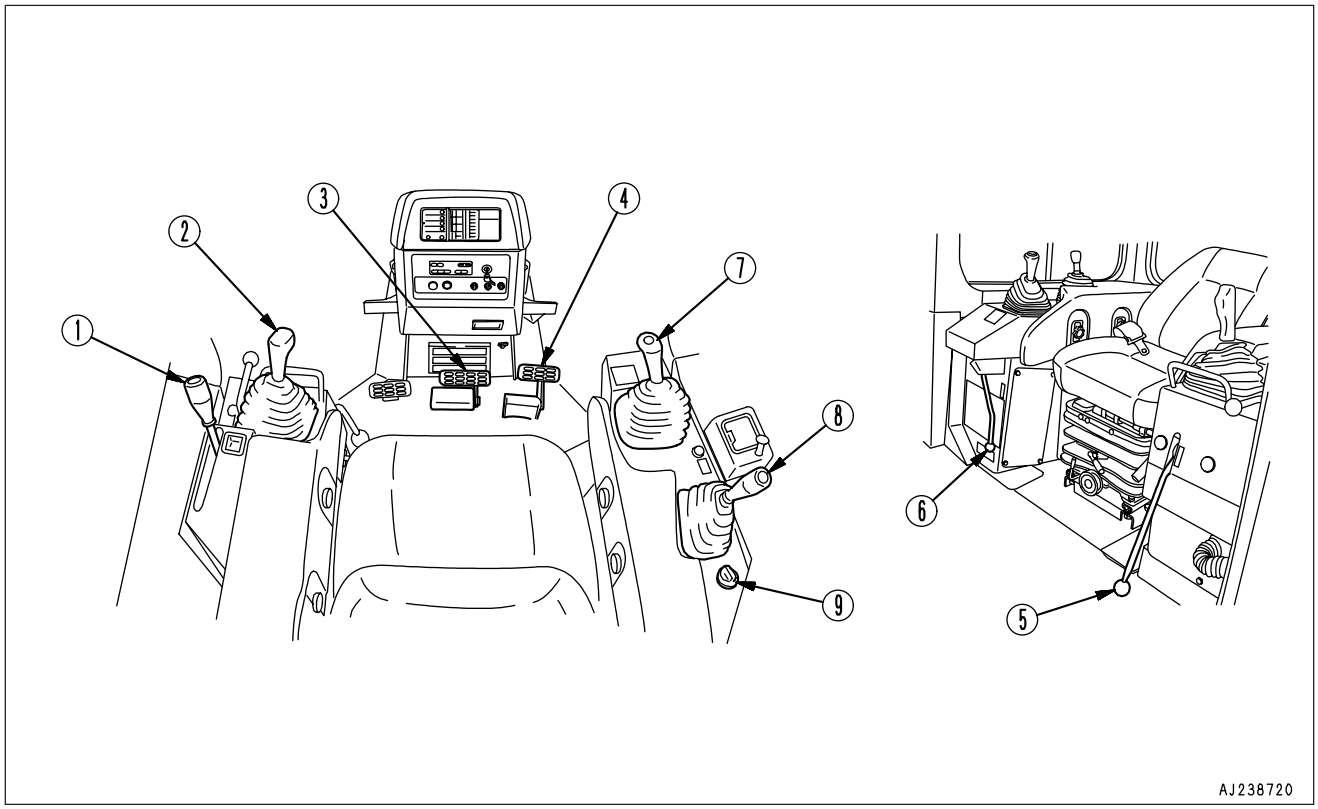


NOTICE

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

The capacity of the cigarette lighter is 120W (24V x 5A).

11.3 CONTROL LEVERS AND PEDALS



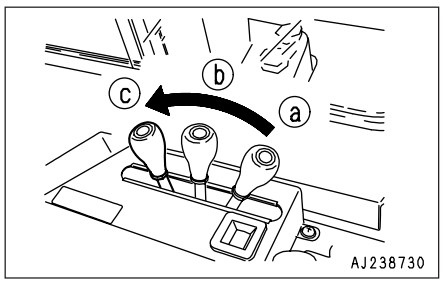
1. FUEL CONTROL LEVER

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

ⓐ Engine stop position: Push the lever forward fully.

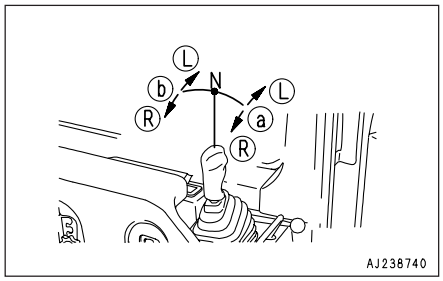
ⓑ Low idling position: Pull the lever from engine stop position ⓐ until you feel the operating force falls off.

ⓒ High idling position: Pull the lever fully from low idling position.



2. JOYSTICK (STEERING, DIRECTIONAL AND GEAR SHIFT LEVER)

This is used to select the direction of travel, to carry out steering, and to carry out counterrotation turns.



Forward-reverse shifting

ⓐ: FORWARD
ⓑ: REVERSE
N: NEUTRAL

Push the lever forward, the machine will move off forward.

Pull the lever backward, the machine will move off in reverse.

Steering

Ⓛ: LEFT TURN
Ⓡ: RIGHT TURN

Move the joystick to the FRONT to travel FORWARD

Move the joystick to the REAR to travel in REVERSE

If the joystick is operated to travel forward or in reverse, and is then moved partially in the direction of turn, the machine will turn gradually.

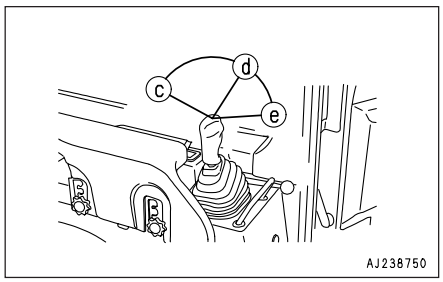
If the joystick is moved further in the direction of turn, the machine will turn more sharply.

REMARK

If the lever is released when steering the machine, the lever will return to the ⓐ position or the ⓑ position and the machine will be returned to straight movement.

Gear shifting

Rotate the joystick 30° to carry out gear shifting operation.



Position ⓒ: 1st
Position ⓓ: 2nd
Position ⓔ: 3rd

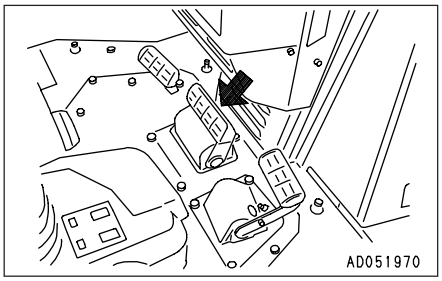
For details of the maximum speed at each speed range, see “25. SPECIFICATIONS”.

REMARK

When gear shifting operation is carried out, the display panel at the rear of the joystick will display the speed range.

1st: 1 is displayed on the display panel
2nd: 2 is displayed on the display panel
3rd: 3 is displayed on the display panel

3. BRAKE PEDAL

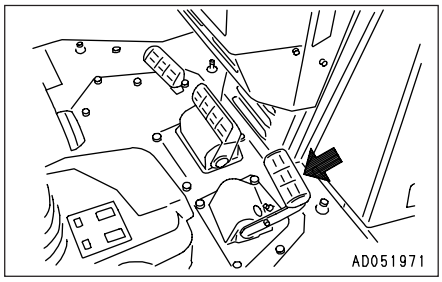


⚠ WARNING

Do not place your foot on this pedal unnecessarily.

Depress the pedal to apply the right and left brakes.

4. DECELERATION PEDAL



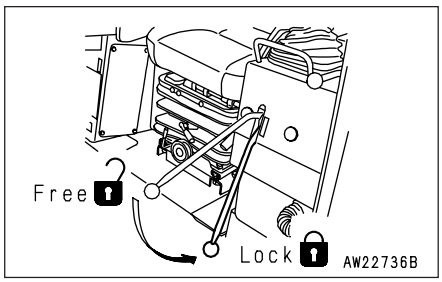
⚠ WARNING

- **Do not place your foot on this pedal unnecessarily.**
- **When passing over the top of a hill or when a load is dumped over a cliff, the load is suddenly reduced, so there is danger that the travel speed will also increase suddenly. To prevent this, depress the decelerator pedal to reduce the travel speed.**

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

When switching between forward and reverse, or when stopping the machine, use this pedal to reduce speed.

5. PARKING LEVER



⚠ WARNING

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

This lever is used to apply the parking brake.

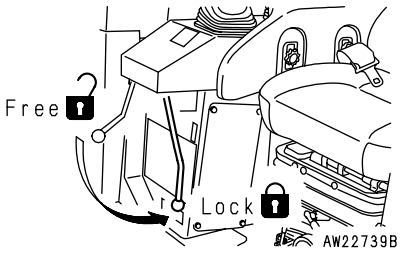
REMARK

- If the parking lever is set to the LOCK position when the directional and steering lever is at the forward or reverse position, the directional and steering lever is automatically returned to the N position.
- When starting the engine, if the parking lever is not at the LOCK position, the limit switch is actuated and the engine cannot be started.

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

⚠ WARNING

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



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

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

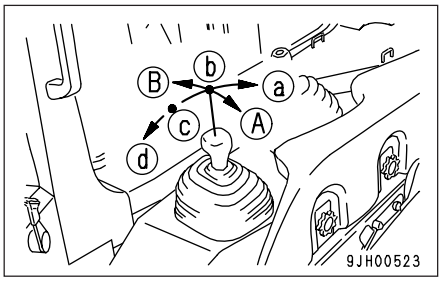
If the blade control lever is at the FLOAT position and the safety lever is set to the LOCK position, the blade control lever is automatically returned to the HOLD position.

REMARK

When starting the engine, to ensure safety, always set the safety lever to the LOCK position.

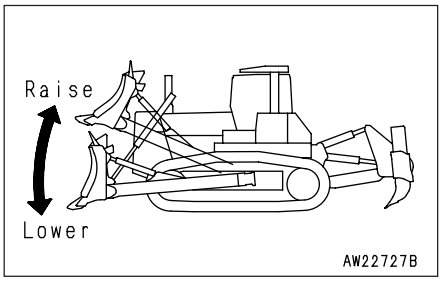
7. BLADE CONTROL LEVER (POWER TILTDOZER)

This lever is used to raise or tilt the blade.



Lifting control

ⓐ RAISE : ( )
ⓑ HOLD : ( )
Blade is stopped and held in this position.
ⓒ LOWER : ( )
ⓓ FLOAT : ( )
Blade will move freely according to external force.

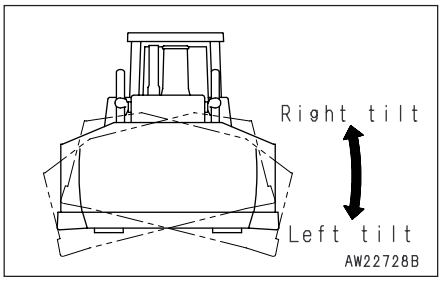


REMARK

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

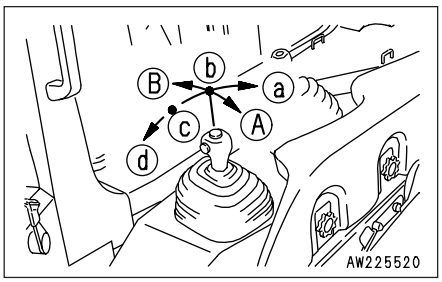
Tilting control

Ⓐ LEFT TILT : ( )
Ⓑ RIGHT TILT : ( )



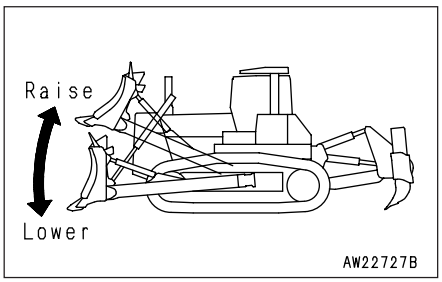
7. BLADE CONTROL LEVER (FOR DUAL TILT DOZER)

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



Lifting control

ⓐ RAISE : ( )
ⓑ HOLD : ( )
Blade is stopped and held in this position.
ⓒ LOWER : ( )
ⓓ FLOAT : ( )
Blade will move freely according to external force.

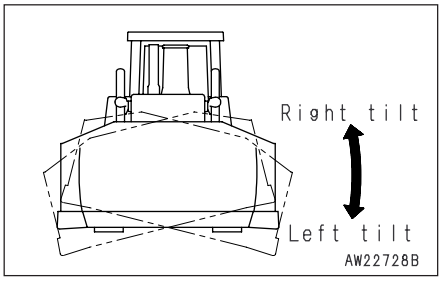


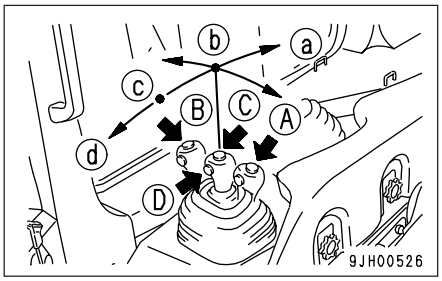
REMARK

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

Tilting control

Ⓐ LEFT TILT : ( )
Ⓑ RIGHT TILT : ( )

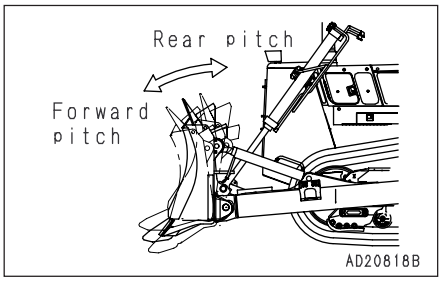




- **DUAL TILT OPERATION**

Ⓒ + Ⓐ: Left dual tilt (keep button Ⓒ pressed and operate in direction Ⓐ.)
Ⓒ + Ⓐ: Right tilt (keep button Ⓒ pressed and operate in direction Ⓑ.)

If the tilt operation is carried out with button Ⓒ at the top center of the knob kept pressed, a larger tilting force can be obtained than in normal tilt operations.



- **PITCH OPERATION**

Ⓓ + Ⓐ: Rear pitch: Smaller cutting edge angle (keep button Ⓓ pressed and operate in direction Ⓐ.)
Ⓓ + Ⓑ: Forward pitch: Larger cutting edge angle (keep button Ⓓ pressed and operate in direction Ⓑ.)

Return the lever to the neutral position, then keep button Ⓓ at the front center of the knob pressed, and operate the tilt to change the angle of the cutting edging of the blade.

PRECAUTIONS WHEN USING DUAL TILT, PITCH

- If the tilt operation is carried out with buttons Ⓒ and Ⓑ both pressed at the same time, the blade will be pitched. (The pitch operation is the priority circuit.)
- To make effect use of the dual tiltdozer, see OPTIONS, ATTACHMENTS.

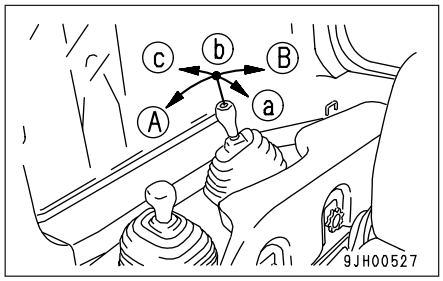
REMARK

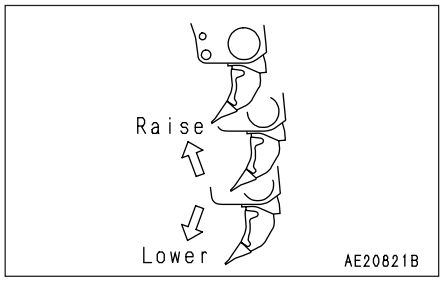
- For the dual tilt and pitch operations, keep the button pressed and move the lever to the left or right to start the actuation.
- The pitch operation is the priority circuit, so if both buttons are pressed at the same time, the pitch will be operated.

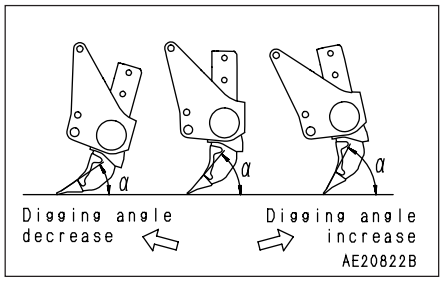
8. RIPPER CONTROL LEVER (FOR VARIABLE RIPPER)
This is used to operate the ripper.

ⓐ RAISE ( )
ⓑ HOLD ( ): Ripper is stopped and held in the same position.
ⓒ LOWER( )

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

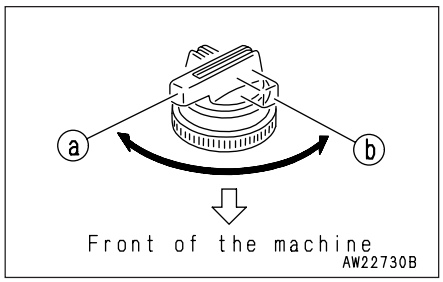




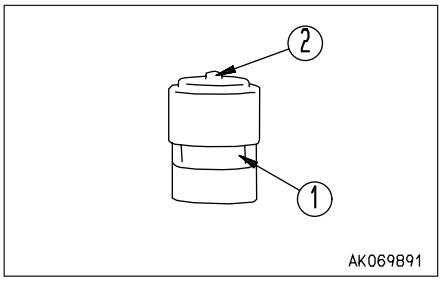


9. PIN PULLER CONTROL SWITCH (FOR GIANT RIPPER)
This is used to operate the pin puller.

ⓐ PULL OUT: Pin is pulled out.
ⓑ PUSH IN: Pin is pushed in.



11.4 DUST INDICATOR



This device indicates clogging of the air cleaner element.

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

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

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

11.5 POWER SOURCE

The cigarette lighter socket can be used as a power source for 24 V equipment and the accessory socket can be used for 12 V equipment.

NOTICE

The power from the cigarette lighter socket is 24V. Do not use this as the power source for any 12V equipment.

The capacity of the cigarette lighter power source is 120W (24V x 5A).

11.6 FUSE BOX

NOTICE

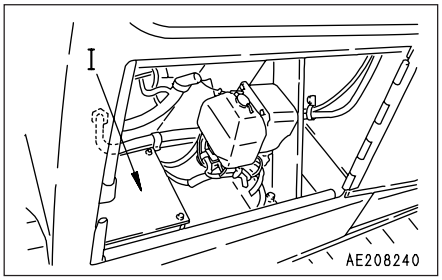
Before replacing a fuse, be sure to turn off the starting switch.

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

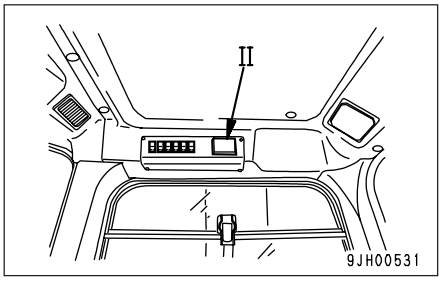
If the fuse becomes corroded, or white powder can be seen, or the fuse is loose in the fuse holder, replace the fuse.

Replace a fuse with another of the same capacity.

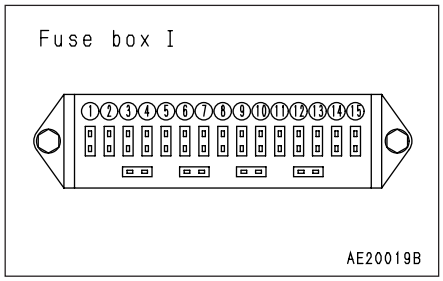
- Chassis
  Fuse box I is installed inside the cover (left).



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

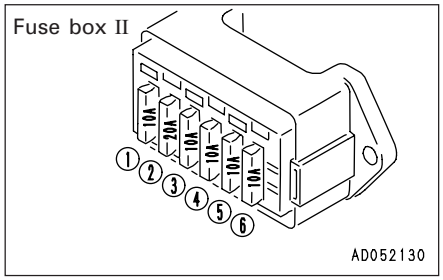


11.6.1 FUSE CAPACITY AND CIRCUIT NAME



Fuse box I

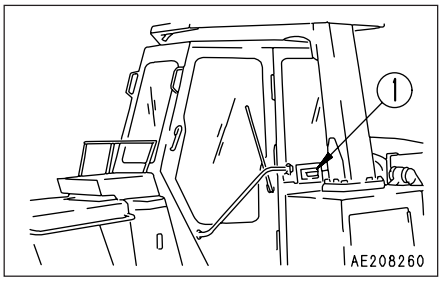
No.	Fuse capacity	Circuit
①	20 A	Starting switch
②	20 A	Car stereo, cigarette lighter, room lamp
③	–	–
④	–	–
⑤	–	–
⑥	–	–
⑦	20 A	Spare power source I
⑧	20 A	Spare power source II
⑨	–	–
⑩	20 A	Backup alarm
⑪	20 A	Horn
⑫	20 A	–
⑬	20 A	Rear lamp
⑭	20 A	Head lamp, work lamp
⑮	20 A	Monitor, pin-puller switch, cab heater



Fuse box II (Machines equipped with cab)

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

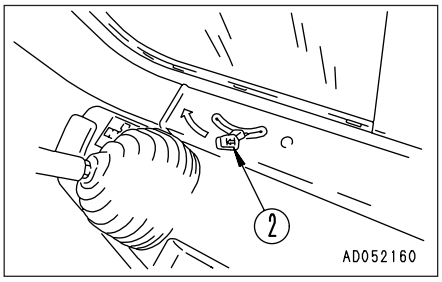
11.7 DOOR-OPEN LOCK



Use this when your want to keep the door held open.

1. Push the door against door catch ①. The door will be held by the door catch.

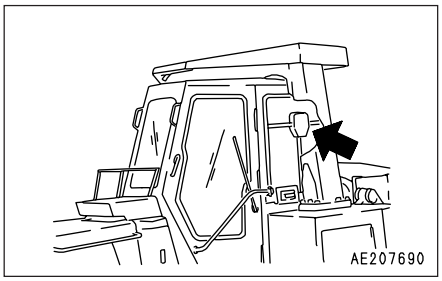
2. To release the door, move lever ② inside the cab to the front of the cab. This will release the catch.



NOTICE

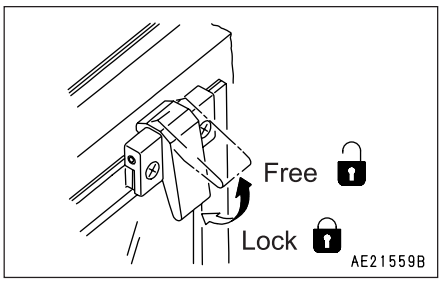
- **When keeping the door open, fix it securely to the catch.**
- **Always close the door when traveling or carrying out operations. Leaving the door open will cause the door to break.**
- **Keep the door locked open securely.**
  The door may swing closed because of the vibration.

11.8 SASH GLASS INTERMEDIATE LOCK



When carrying out operations with the cab sash glass open, use this block to prevent the glass from moving.

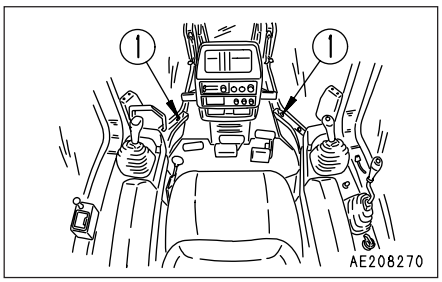
- When the lever is at the FREE position, the glass can be opened or closed.
- When the lever is moved to the LOCK (up or down) position, the glass is fixed in position.



NOTICE

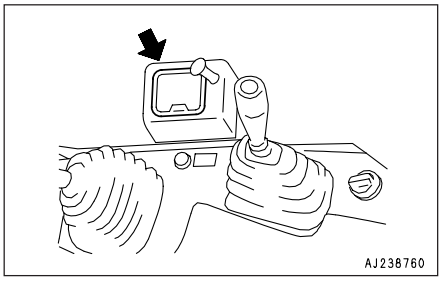
Always close the window when traveling or carrying out operations. Leaving the window open will cause the window to break.

11.9 DOOR POCKET



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

11.10 ASHTRAY

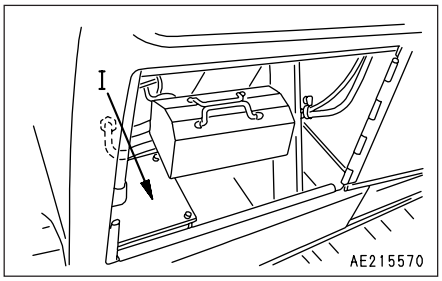


This is on the left side of the operator's seat.

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

11.11 TOOL BOX

This is inside the cover at the left of the machine.
It is used for storing tools.



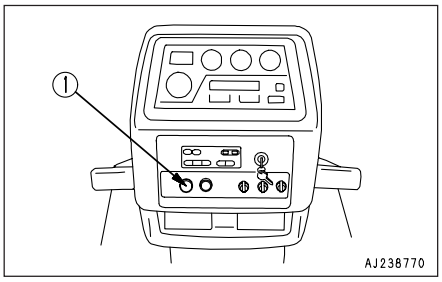
11.12 HANDLING ADDITIONAL HEATER

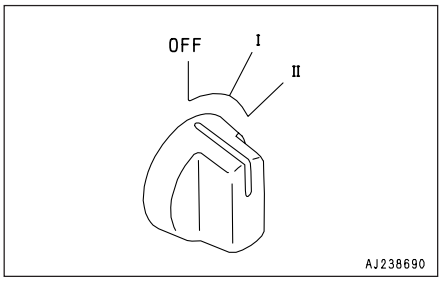
If more powerful heating is required during cold weather, use an additional heater.

Control switch ① also acts to regulate the air flow.

Control switch ① can be used to switch the air flow to 2 levels.

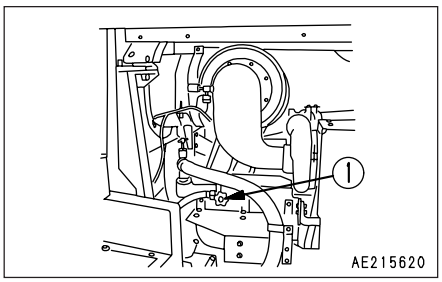
When control switch ① is turned to the OFF position, the electric power is cut and the heater stops.





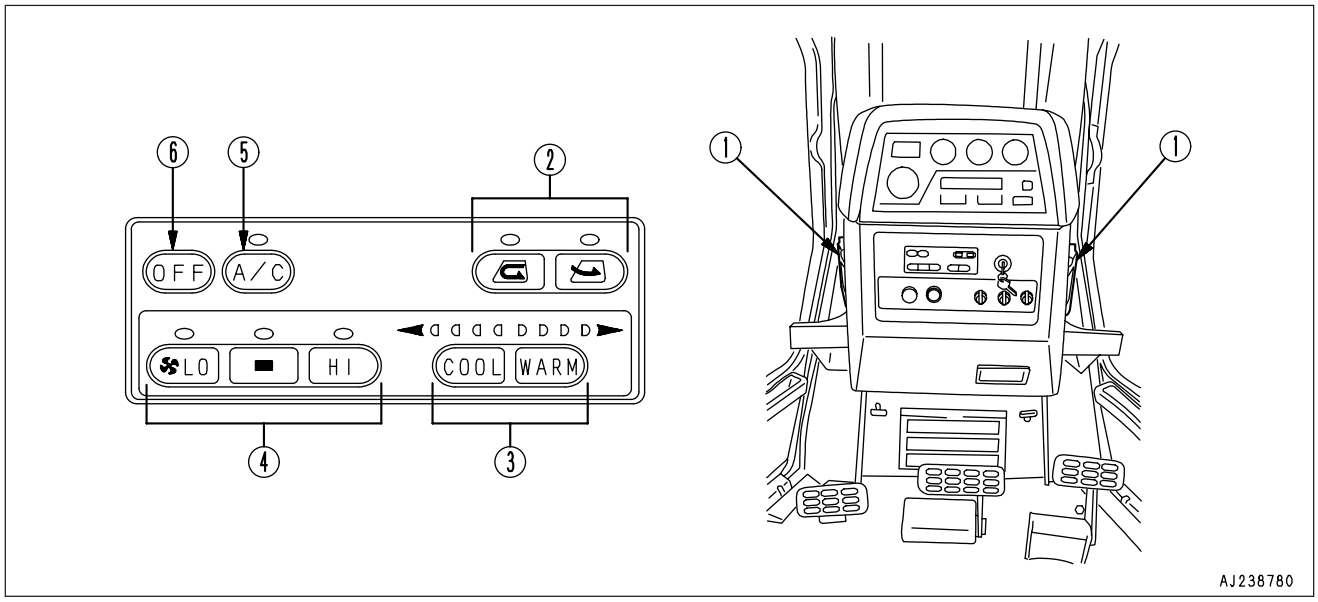
NOTICE

- **When using the heater, check the heater piping from time to time.**
  If there is any leakage of water from the heater piping, the level of the engine cooling water will go down. This brings the danger that the engine will seize up.
- **When not using the heater in summer, close valve ① at the hot water take-off port.**



11.13 HANDLING AIR CONDITIONER

11.13.1 GENERAL LOCATIONS OF CONTROL PANEL

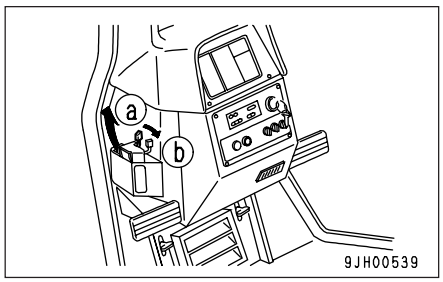


① Vent selector lever
② FRESH/RECIRC selector switch
③ Temperature control switch
④ Air flow selector switch
⑤ Air conditioner switch
⑥ OFF switch
⑦ Defroster selector lever

VENT SELECTOR SWITCH (sending air to upper half of cab)

If lever ① is pulled to position ⓑ, the air from the air conditioner is all directed to the upper half of the cab.

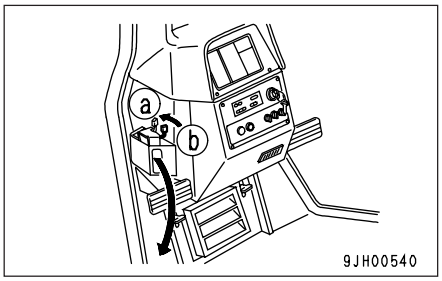
This can be used when sending a cool breeze during hot weather.



VENT SELECTOR SWITCH (sending air to feet)

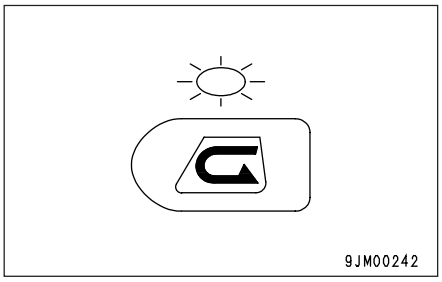
If lever ① is pushed to position ⓐ, the air from the air conditioner is all directed to the feet.

This can be used to send warm air to the feet during cold weather.



FRESH/RECIRC SELECTOR SWITCH (RECIRCULATE)

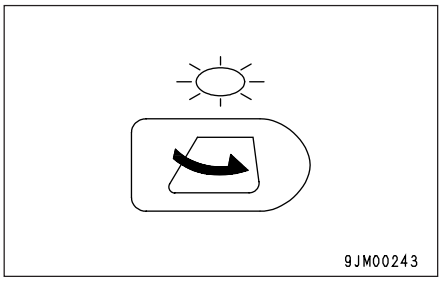
When switch ② is pressed, the air inside the cab is recirculated and no fresh air is taken in from outside. This position is used when heating or cooling the cab quickly or when the outside air is dirty.



FRESH/RECIRC SELECTOR SWITCH (FRESH)

When switch ② is pressed, fresh air is taken into the cab during heating or cooling.

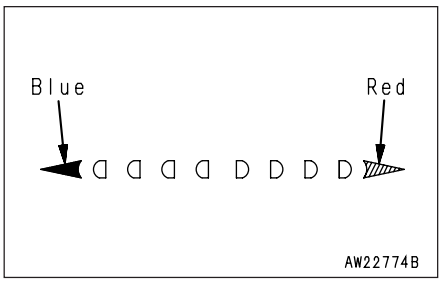
This position is used to bring in clean fresh air into the cab or to remove the mist from the cab windows.



TEMPERATURE INDICATOR

The further the indicator is in the blue range, the lower the temperature is; the further the indicator is in the red range, the higher the temperature is.

The indicator range is divided into 7 levels, but within each range the temperature changes steplessly.

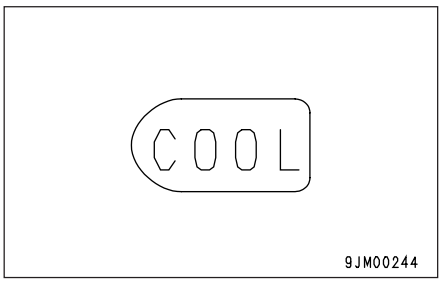


TEMPERATURE CONTROL SWITCH (COOL)

Use switch ③ to reduce the temperature.

Press this switch to reduce the temperature of the air sent from the air conditioner.

The lower the temperature becomes, the further the indicator moves into the blue range.

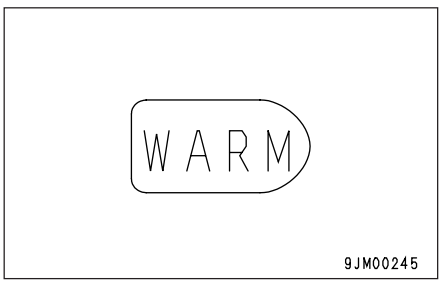


TEMPERATURE CONTROL SWITCH (WARM)

Use switch ③ to increase the temperature.

Press this switch to increase the temperature of the air sent from the air conditioner.

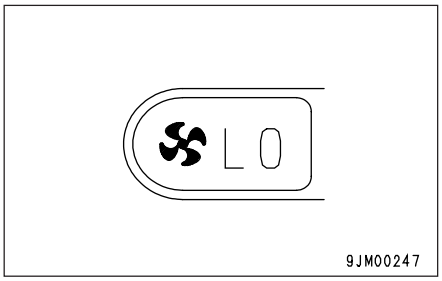
The higher the temperature becomes, the further the indicator moves into the red range.



AIR FLOW SELECTOR SWITCH (LO)

Switch ④ is used to set the flow of air from the air conditioner to LOW.

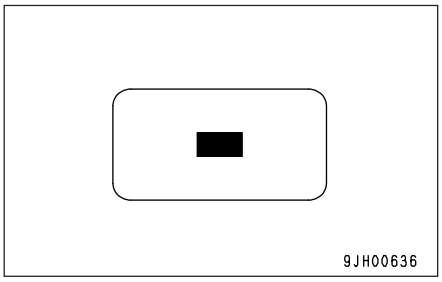
When this switch is pressed, the air flow is set to the minimum amount of the three available levels.



AIR FLOW SELECTOR SWITCH (MID)

Switch ④ is used to set the flow of air from the air conditioner to MID (medium).

When this switch is pressed, the air flow is set to the middle of the three available levels.



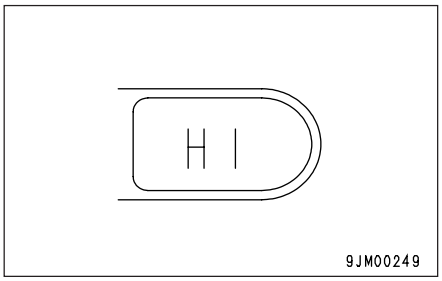
AIR FLOW SELECTOR SWITCH (HI)

Switch ④ is used to set the flow of air from the air conditioner to HI.

When this switch is pressed, the air flow is set to the maximum amount of the three available levels.

AIR CONDITIONER SWITCH

Switch ⑤ is used to switch the air conditioner functions ON/OFF.



REMARK

For machines equipped with a heater only, switch ⑤ is not available. (Option)

OFF SWITCH

Switch ⑥ is used to stop operation of the fan.

11.13.2 PRECAUTIONS WHEN USING AIR CONDITIONER

CARRY OUT VENTILATION FROM TIME TO TIME WHEN USING THE COOLER.

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

BE CAREFUL NOT TO MAKE THE TEMPERATURE IN THE CAB TOO LOW.

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

DIRECTION OF VENTS WHEN COOLING

If the vents (left and right) in the middle of the dashboard are turned so that cold air plays directly on the cab door glass, moisture may condense on the outside of the cab door glass and reduce the visibility. (This occurs particularly in outside high temperatures.)

If this happens, turn the vent shutter selector lever to stop the air going directly to the glass and direct it upward.

REMARK

If the vents at the front of the dashboard are turned so that cold air plays directly on the front glass, moisture may condense on the outside of the glass and reduce the visibility. (This occurs particularly in high temperatures.)

If this happens, adjust the vent so that the air does not play directly on to the glass.

11.13.3 CHECKS DURING OFF-SEASON

Even during the off-season, run the engine at low idling for several minutes every week and operate the compressor at low speed to maintain the oil film at all parts of the compressor. (Run the engine at low speed and set the temperature control lever to the central position when doing this.)

REMARK

If the outside temperature is low and the compressor is suddenly run at high speed, it may cause failure of the compressor. The compressor is set so that if the outside temperature is below 2 – 6.5°C, it will not run even if the cooler switch is turned ON.

11.13.4 PROCEDURE FOR REPLACING RECEIVER

Replace the receiver every two years.

After replacing the receiver, add compressor oil. When adding oil, place the receiver at an angle and measure the amount of oil remaining inside the receiver. Add the same amount of fresh oil (Densoil 6) to the receiver.

REMARK

- The replacement interval may become shorter depending on the condition of use.
- If the receiver is used when the moisture absorption limit of the desiccant has been exceeded, the refrigerant circuit may become blocked and cause the compressor to break down.

PRECAUTIONS WHEN REPLACING RECEIVER

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

11.13.5 CLEANING AIR FILTER

If the air filter for the FRESH or RECIRC air intake becomes clogged, the cooling or heating capacity will drop.

To prevent this, clean the air filter with compressed air once a week.

For details of the cleaning method, see “WHEN REQUIRED”.

11.13.6 CHECK COMPRESSOR BELT TENSION AND REFRIGERANT (GAS) LEVEL

If the compressor belt is loose, or the refrigerant level is low, cooling is not carried out efficiently.

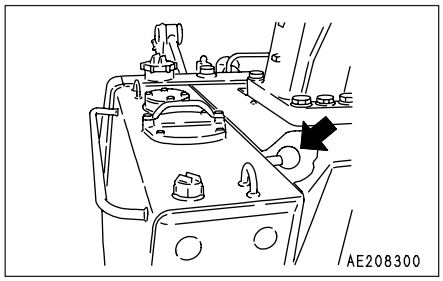
For details, see “24.2 WHEN REQUIRED”.

11.14 HANDLING ACCUMULATOR

⚠ WARNING

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

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



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

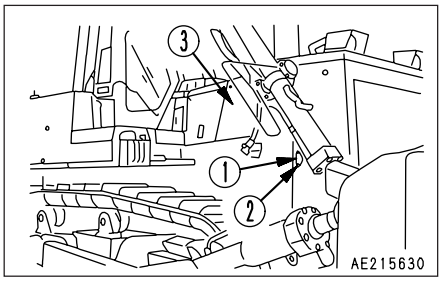
The accumulator is installed to the position shown in the diagram on the right.

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

1. Lower the work equipment and stop the engine.

2. After stopping the engine, operate the control lever fully to the front, rear, left, and right to release the pressure inside the work equipment circuit.
   However, the pressure cannot be completely removed, so when removing the work equipment circuit, loosen the screw slowly, and never stand in the direction where the oil spurts out.

11.15 REVERSING REVERSIBLE FAN



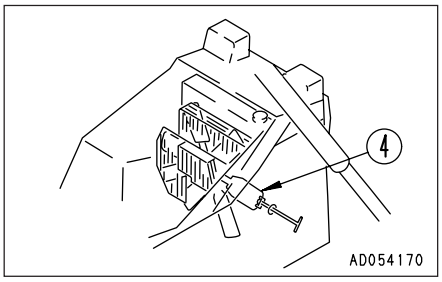
When reversing the reversible fan in cold weather, do as follows.

1. Loosen bolt ②, then remove cover ① on the right side of the radiator guard. A hole for inserting the tool can be seen.

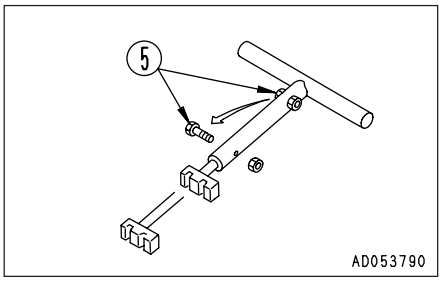
2. Open engine side cover ③ on the right side of the machine so that the reversing operation can be seen.

3. Insert the tip of the tool into fan blade ④.

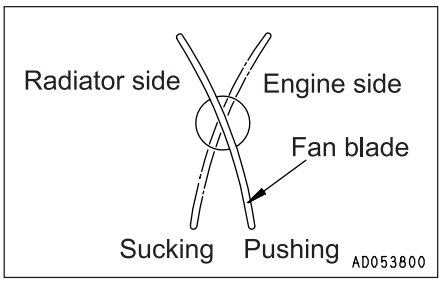
4. Push towards the center of the fan, and turn the handle of the tool to reverse the fan blades.



5. Reverse 8 fan blades, but rotate the fan as follows.
- Use the starting motor to rotate the fan.
- Loosen the nut of the spring which applies tension to the tension pulley, reduce the belt tension, and rotate by hand.
  Do not loosen the nut too far or remove it.
- After completely reversing all the fan blades, tighten the nut to its original position.

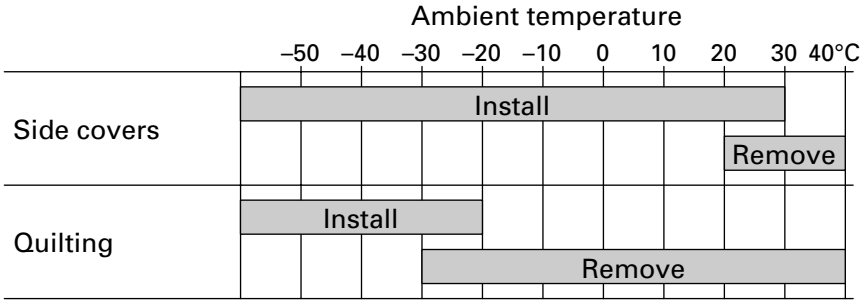


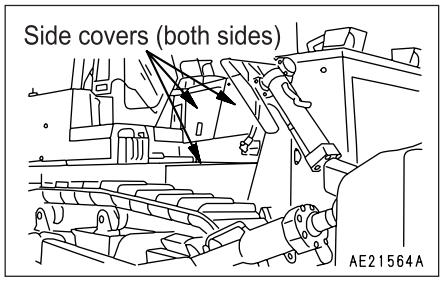
REMARKS
- When inserting the tool, if the work equipment or any other part is in the way, change the position of bolt ⑤ to extend the tool when using it.
- If the fan is used in the suction direction in temperature below –30°C, it has the effect of heating or maintaining the battery temperature.
- Use part number 175-900-3910 for the tool.
- If winter fuel is not available, to prevent clogging of the fuel due to precipitation of the paraffin, we recommend use of the fan in the suction position at temperatures below –15°C.

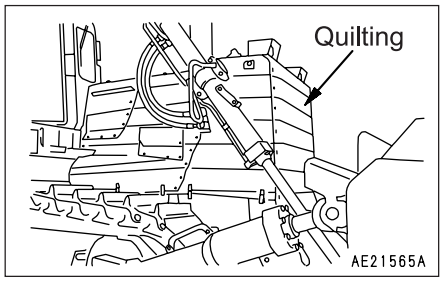


11.16 HANDLING ENGINE SIDE COVER, ENGINE ROOM QUILTING (if equipped)

Install and remove the engine side covers and engine room quilting as shown in the chart below.



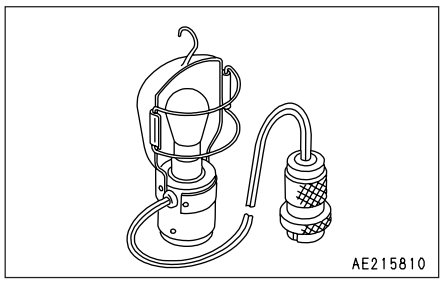


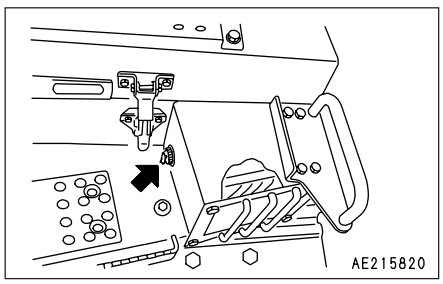


11.17 HANDLING INSPECTION LAMP

Use this to inspect the inside of the chassis.

- The electric power pickup is inside the working lamp at the front of the fender (left).
- Do not use the electric power pickup except when using the inspection lamp.





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.
- **Do not get on or off the machine from the rear. Using this position is dangerous because it is easy to slip and you cannot be seen from the operator's compartment. Always use the handrail and step at the side when getting on or off the machine.**

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

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

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

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

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

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

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

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

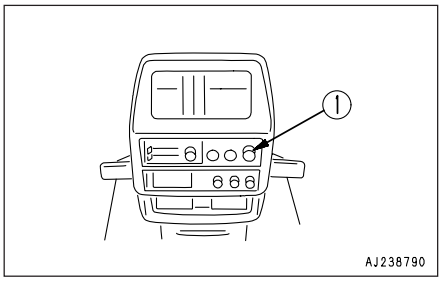
6. **Check for damage to handrail, loose bolts**
   Repair any damage and tighten any loose.

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

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

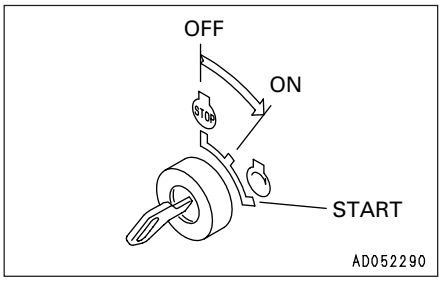
12.1.2 CHECK BEFORE STARTING

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



CHECK MACHINE MONITOR

1. Turn starting switch ① to the ON position.
2. Check that all monitor lamps and gauges light up for 3 seconds and the alarm buzzer sounds for about 2 seconds.



REMARK

If the lamps do not light up, there may be a failure or disconnection in the monitor, so please contact your Komatsu distributor.

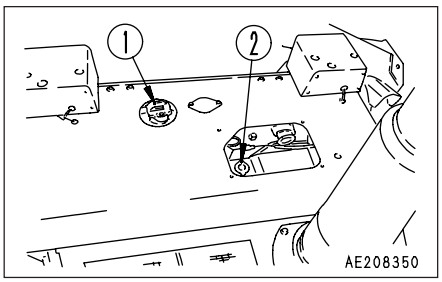
NOTICE

When carrying out the checks before starting, do not relay only on the monitor. Always carry out all the items listed for the following check and maintenance.

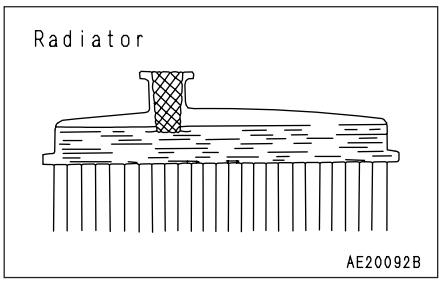
CHECK COOLANT LEVEL, ADD WATER

⚠ WARNING

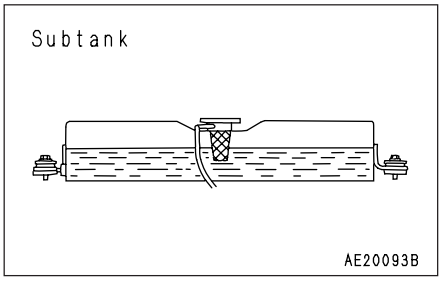
Do not remove cap ①, ② while cooling water is hot. Hot water may spout out.
When removing cap ①, ② wait until the water temperature goes down and release radiator pressure little by little by loosening caps slowly, then remove the cap.



1. Remove radiator cap ① and check that coolant is above the bottom of the strainer as shown in the diagram. If necessary, add water through filler of radiator cap ①.
2. Check that there is no abnormality, such as oil in the coolant.
3. If the water level is low, add water through fillers of both radiator cap ① and subtank cap ②. Add into the subtank up to the level above the bottom of strainer through filler of cap ② as shown in the diagram.



4. To refill the radiator, first stop the engine and pour in water until the water overflows the filler opening. Then, start the engine, check the water level again after a five-minute idling, and add water if necessary.
5. After adding water, tighten the cap ①, ② securely.
6. If the volume of coolant added is more than usual, check for possible water leakage.



CHECK FUEL LEVEL, ADD FUEL

⚠ WARNING

When adding fuel, never let the fuel overflow. This may cause a fire.

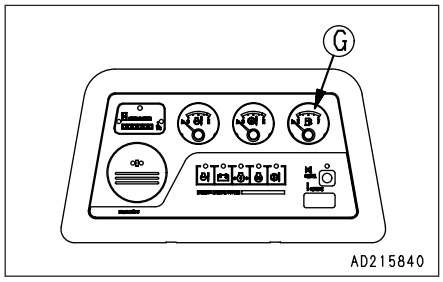
1. Turn the engine starting switch to the ON position and check the fuel level with fuel level gauge Ⓖ on the monitor panel. After checking, turn the switch back to the OFF position.

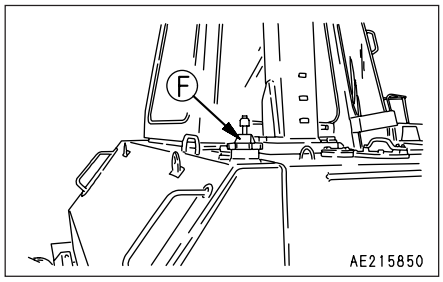
2. After completing work, fill the fuel tank through fuel filler port Ⓕ. Check the fuel level with the fuel gauge at the fuel filler port.

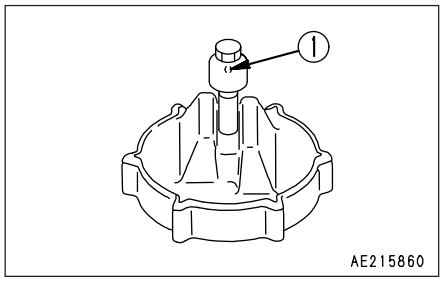
3. After adding fuel, tighten the cap securely. Fuel capacity: 1050 ℓ (277 US gal, 231 UK gal)

REMARK

- When dozing on a grade, make sure there is plenty of fuel in the tank so that the engine fuel line does not becomes aerated.
- If breather hole ① on the cap is clogged, the pressure in the tank will drop and fuel will not flow. Clean the hole from time to time.

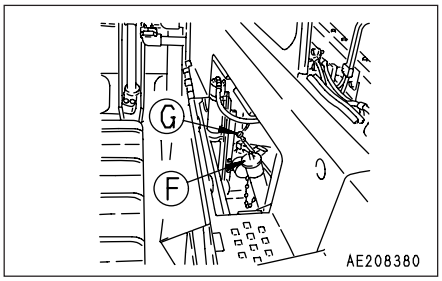




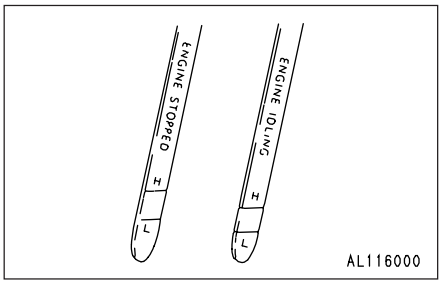


CHECK OIL LEVEL IN ENGINE OIL PAN, ADD OIL

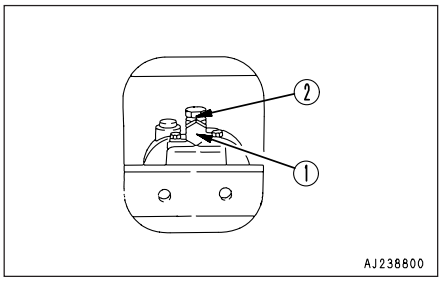
1. Open the engine side cover on the right side of the chassis.
2. Remove dipstick Ⓖ and wipe the oil off with a cloth.
3. Insert dipstick Ⓖ fully in the oil filler pipe, then take it out again.



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



5. If the oil is above the H mark, remove drain plug ①, loosen drain valve ② to drain the excess oil, then check the oil level again.
6. If the oil level is correct, tighten the oil filler cap securely and close the engine side cover.



REMARK

- When checking the oil level after the engine has been operated, wait for at least 15 minutes after stopping the engine before checking.
- If the machine is at an angle, make it horizontal before checking.
- When adding oil, remove the dipstick from the holder to release the air inside the crankcase.
- The dipstick is marked with the levels for ENGINE STOPPED on one side and ENGINE IDLING on the other side.
  It is also possible to check the oil level with the engine idling, but be sure to remember the following points.
  - Check that the engine water temperature gauge shows green range.
  - Read the dipstick on its reverse side marked with “ENGINE IDLING”.

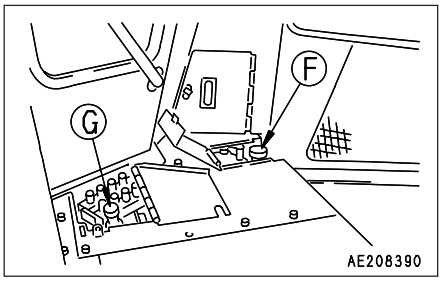
CHECK OIL LEVEL IN POWER TRAIN CASE (INCL. TRANSMISSION, TORQUE CONVERTER AND BEVEL GEAR CASES), ADD OIL

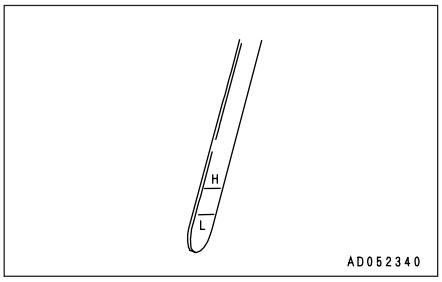
1. Start the engine and run at idling for 5 minutes, then check the oil level with the COLD side of dipstick Ⓖ.

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

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

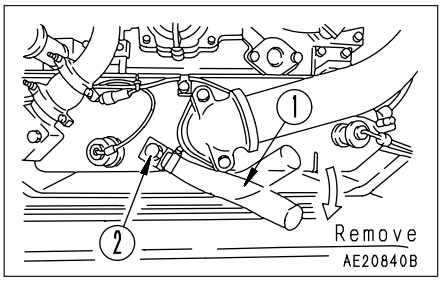
4. The oil level should be between the H and L marks on dipstick Ⓖ.
   If the oil level is below the L mark, add engine oil through oil filler Ⓕ.





5. If the oil is above the H mark, pull out hose ①, and loosen drain plug ② to drain the excess oil, then check the oil level again.

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



REMARK

- If the machine is at an angle, make it horizontal before checking.
- When the engine is stopped, the oil level will rise, so it is impossible to check the oil level correctly. When checking while the engine is running, run the engine at idling and check with the HOT side of dipstick Ⓖ.
- When working on a slop of more than 20°, check that the oil is up to the H level.

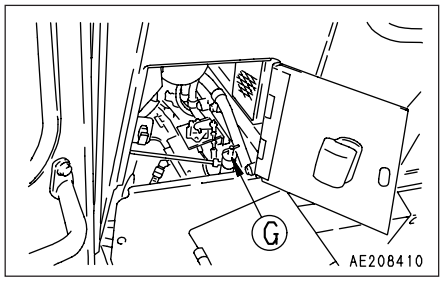
CHECK DAMPER CASE OIL LEVEL, ADD OIL

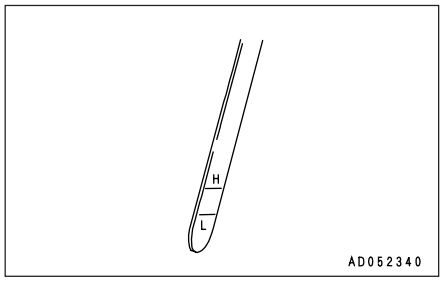
1. Remove dipstick Ⓖ, and wipe the oil off with a cloth.

2. Insert dipstick Ⓖ fully into the dipstick holder, then pull it out again.

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

4. If the oil is above the H mark, drain the excess oil from drain plug. After draining the oil, check the oil level again.





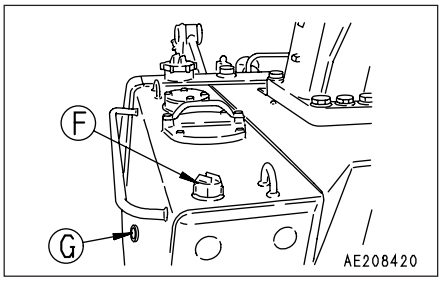
REMARK

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

CHECK BRAKE PEDAL TRAVEL

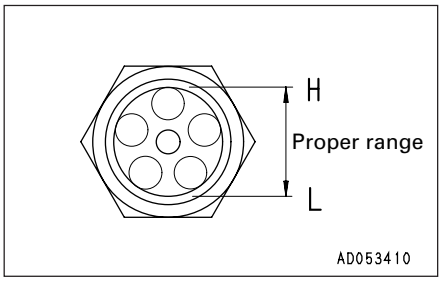
Drive the machine, depress the brake pedal, and check that the machine stops.

CHECK OIL LEVEL IN HYDRAULIC TANK, ADD OIL



⚠ WARNING

- **When removing the oil filler cap, oil may spurt out, so stop the engine and wait for the oil temperature to go down, then turn the cap slowly to release the internal pressure before removing the cap.**
- **If oil has been added to above the H mark, stop the engine and wait for the hydraulic oil to cool down. Then remove drain plug Ⓟ, loosen drain valve ①, and drain the excess oil.**

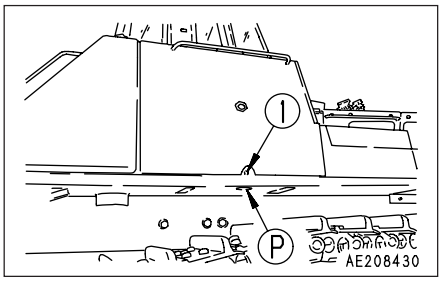


NOTICE

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

1. Lower the blade to the ground, stop the engine and wait for about 5 minutes before checking oil level. If oil level is between H and L in sight gauge Ⓖ.

2. If the level is below the L mark, add engine oil through oil filler Ⓕ.



REMARK

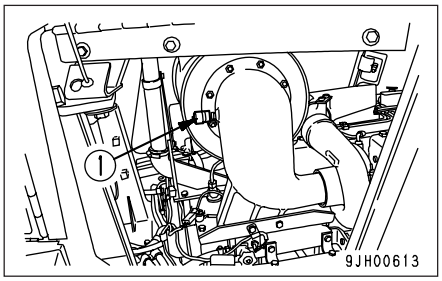
When inspecting, if the machine is at an angle, move it to a horizontal place to carry out the check.

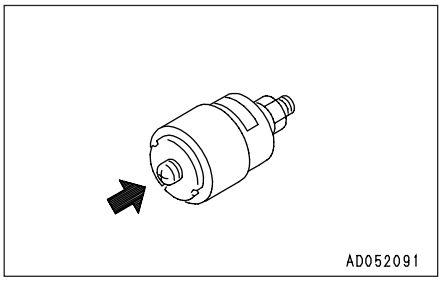
CHECK DUST INDICATOR

1. Open the engine side cover on the right side of the chassis, check that the red piston has not appeared in the transparent portion of dust indicator ①.

2. If the red piston has appeared, clean or replace the element immediately.
   For details of the method of cleaning the element, see "24.2 WHEN REQUIRED".

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





CHECK ELECTRIC WIRINGS

⚠ WARNING

- **If 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.

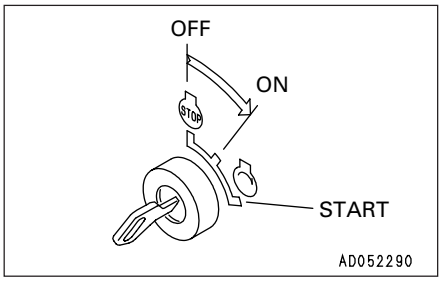
Check the wiring of the "battery", "starting motor" and "alternator" carefully in particular.

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.

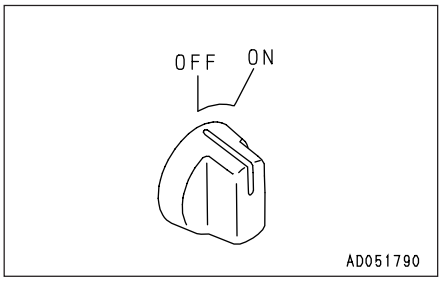
Please contact your Komatsu distributor for investigation and correction of the cause.

CHECK THAT LAMPS LIGHT UP

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

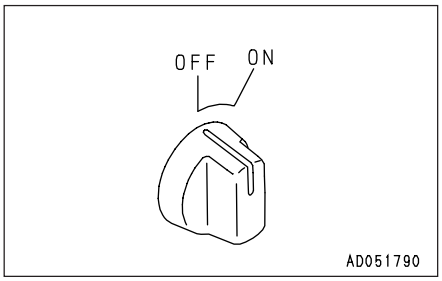


2. Turn the front lamp and working lamp switch to the ON position and check that the front lamps and working lamp light up.



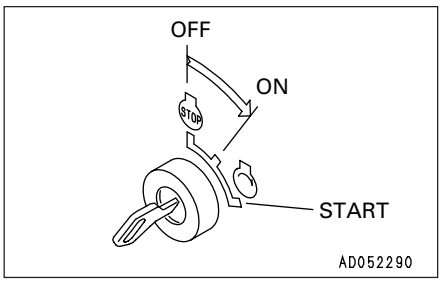
3. Turn the rear lamp switch to the ON position and check that the rear lamps on the left and right fenders light up.

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

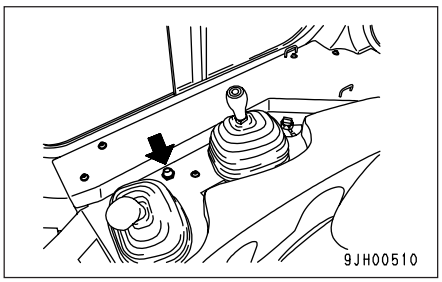


CHECK HORN SOUND

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

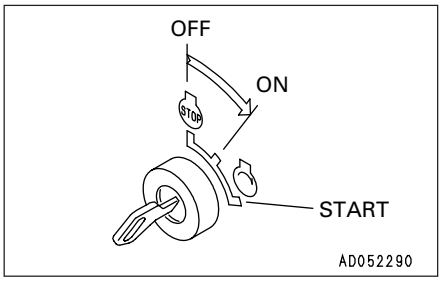


2. Press the horn switch and check that the horn sounds.

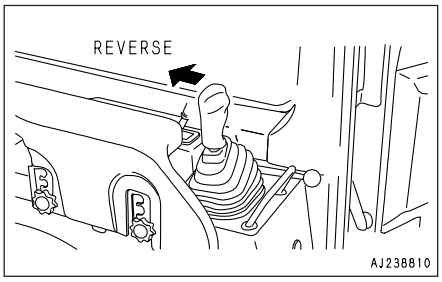


CHECK BACKUP ALARM SOUND

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



2. Set the joystick to the REVERSE position. The buzzer must sound immediately. The buzzer will continue to sound until the joystick is moved to the NEUTRAL or FORWARD position.



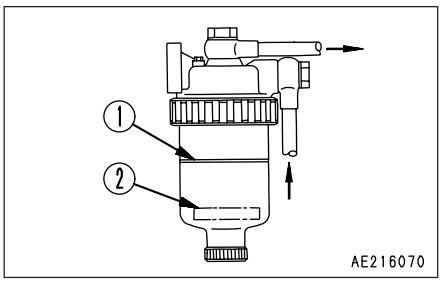
CHECK WATER SEPARATOR

The water separator removes out the water from the fuel.

1. Check that float ② of the water separator has not reached red line ①.

2. If the float has reached red line ①, drain the water immediately.

   For details of the method of draining the water, see “DRAIN WATER FROM WATER SEPARATOR”.



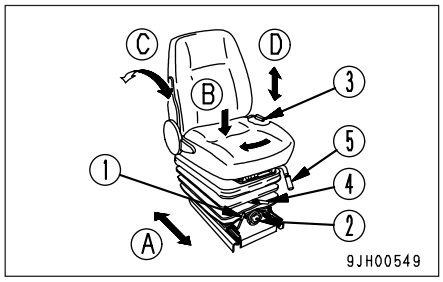
NOTICE

Carry out the operation for “DRAIN WATER AND SEDIMENT FROM FUEL TANK” every day when carrying out the checks before starting, regardless of whether there is a water separator or not.

12.1.3 ADJUSTMENT BEFORE STARTING OPERATION
ADJUST OPERATOR'S SEAT

⚠ WARNING

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



Ⓐ **FORE-AFT ADJUSTMENT OF SEAT**
Pull up handle ①, set the seat to the desired position, then release the handle.
Fore-aft adjustment: 200 mm (7.9 in) (10 stages)

Ⓑ **WEIGHT ADJUSTMENT OF SEAT**
Turn knob ② so that the indicator of the weight display (kg) inside knob ② shows your own weight.
Turn the knob to adjust the weight as follows.
To make LIGHTER, turn COUNTERCLOCKWISE
To make HEAVIER, turn CLOCKWISE

The weight can be adjusted within a range of 50 – 120 kg (110.3 – 117.8 lb)

Ⓒ **ADJUSTING RECLINING ANGLE**

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

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

Ⓓ **ADJUSTING VERTICAL HEIGHT OF SEAT**
Turn lever ④ to adjust the height as follows.
To make seat HIGHER, turn CLOCKWISE
To make seat LOWER, turn COUNTERCLOCKWISE
Do not sit in the seat or apply your weight to the seat when turning the lever: the lever operation will become heavy.
After adjusting, release the levers and lock them.
(Vertical adjustment amount: stepless, 50 mm)

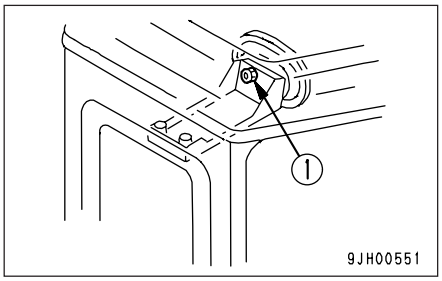
Ⓔ **ADJUSTING DIRECTION OF SEAT**
Pull up lever ⑤ to release the lock, then turn the seat to the right by hand. It is possible to change the direction of the seat to the 15° position.
After changing the angle of the seat, return the lever securely and lock it in position.

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

ADJUST MIRROR

Loosen nut ① of the mirror and adjust the mirror to a position where it gives the best view from the operator's seat.

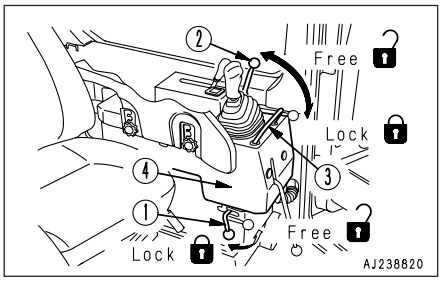
In particular, be sure to adjust the mirror so that people at the rear left or right of the machine can be seen clearly.



12.1.4 ADJUST STEERING, DIRECTIONAL, SPEED LEVER (WRIST CONTROL TYPE SINGLE LEVER :JOYSTICK)

The steering, directional, and speed lever (wrist control type single lever :joystick) can be adjusted by 100 mm in 5 stages to the front or rear. Adjust to the most suitable position to match the adjustment of the operator's seat.

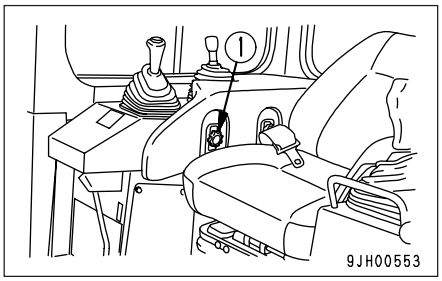
1. Pull up lock levers ① and ② to release the locks.
2. Hold handle ③ and move case ④ to the front or rear. The whole case including the steering, directional, and speed lever (wrist control type single lever :joystick) will move.
3. When moving the case, set it in the desired position where it clicks into the notch, then push lock levers ① and ② to apply the lock.

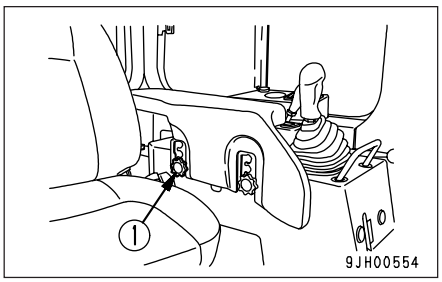


ADJUST ARMREST

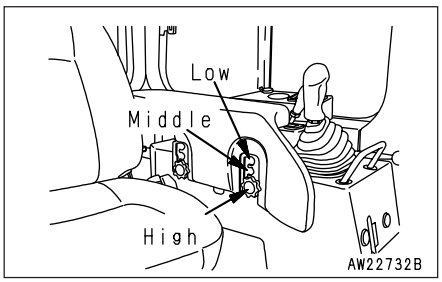
The height of the armrest on the left and right sides of the operator's seat can be adjusted to 3 positions. After adjusting the operator's seat, adjust the armrest to a suitable height.

1. Loosen knob ① on the left and right sides of the operator's seat.





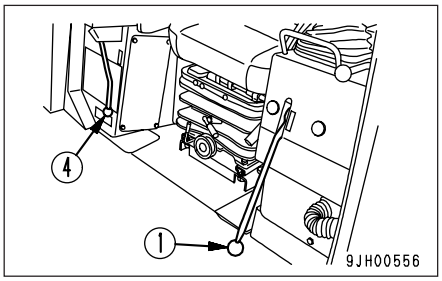
2. Move the armrest on the left and right sides of the operator's seat to the front, then align the position of the 3 holes (high, middle, low).
3. Tighten knob ① securely.

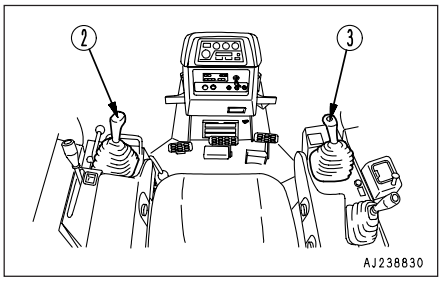


12.1.5 OPERATIONS AND CHECKS BEFORE STARTING ENGINE

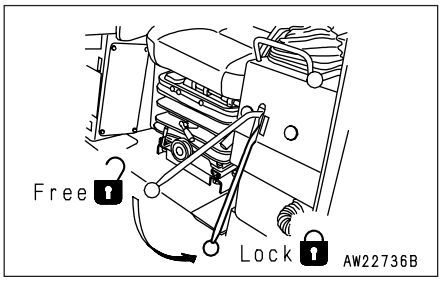
⚠ WARNING

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

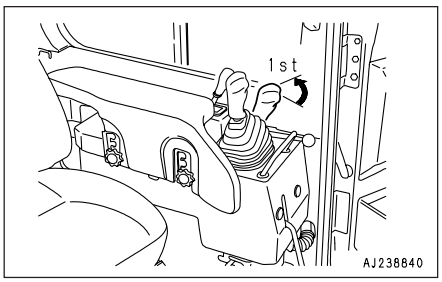




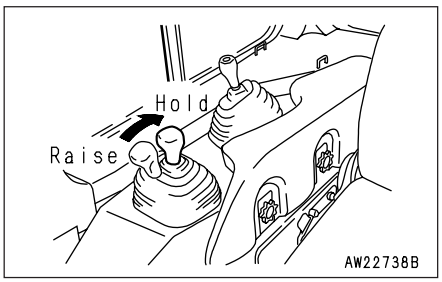
1. Check that parking lever ① is locked. If this lever is not at the LOCK position, the engine will not start.
   If parking lever ① is placed at the LOCK position, joystick ② is returned to neutral even if it is at the FORWARD (REVERSE) position.



2. Check that joystick ② is at the 1st position.

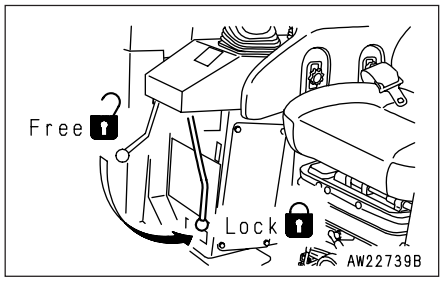


3. Check that the blade is lowered to the ground and that blade control lever ③ is at the HOLD position. If it is at the FLOAT position, the engine will not start.



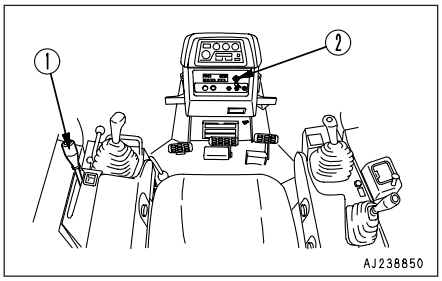
4. Check that the ripper is lowered to the ground.

5. Check that safety lever ④ is locked.
   If safety lever ④ is locked, the blade control lever is returned to the HOLD position even if it is at the FLOAT position.



12.2 STARTING ENGINE

12.2.1 NORMAL STARTING



⚠ WARNING

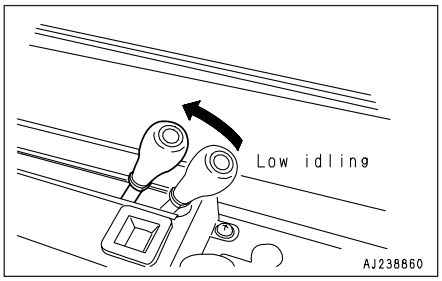
Check that there are no persons or obstacles in the surrounding area, then sound the horn and start the engine.

NOTICE

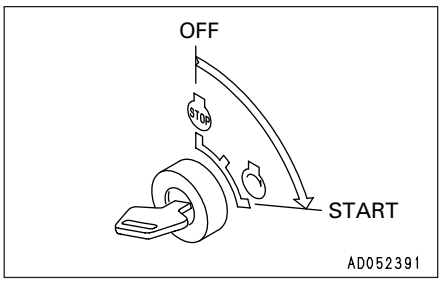
Do not keep the starting motor rotating continuously for more than 20 seconds.

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

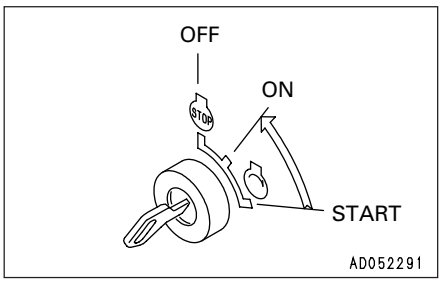
1. Pull fuel control lever ① a little toward you from the low idling position.



2. Turn the key of starting switch ② to the START position.



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

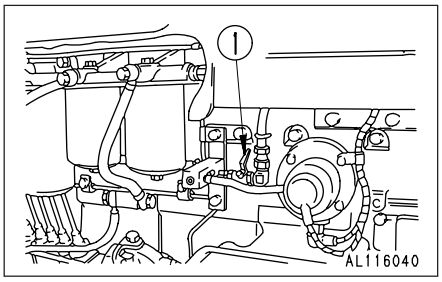


12.2.2 STARTING IN COLD WEATHER (Starting with APS (Automatic Priming System))

When starting in low temperatures, do as follows.

⚠ WARNING

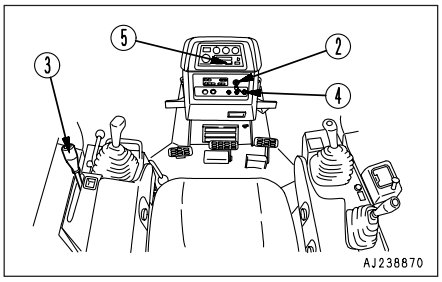
- **Never use starting aid fluids as they may cause explosions.**
- **Check that there is no person or obstacle in the surrounding area, then sound the horn before starting.**



NOTICE

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

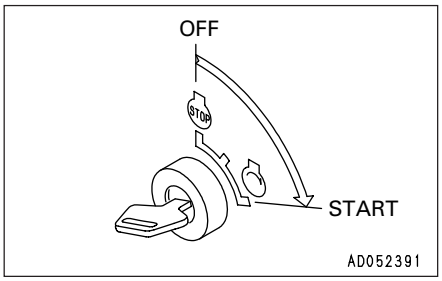
If the engine fails to start, repeat steps 3 and 4 after waiting for about 2 minutes.



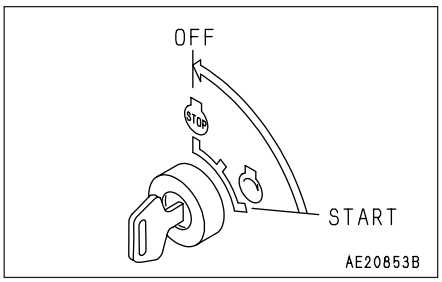
Do as follows when starting the engine in cold weather.

1. Open fuel valve ① for the APS.

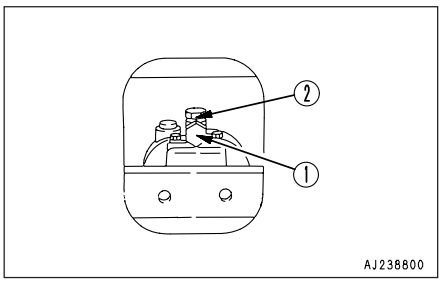
2. Turn the key of starting switch ② to the START position and run the engine for 10 seconds.



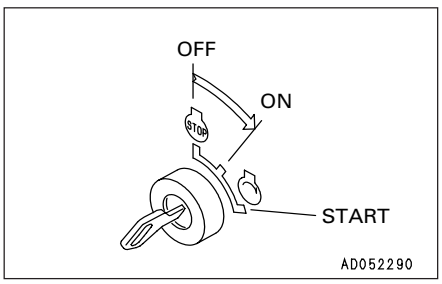
3. Turn the key of starting switch ② to the OFF position.



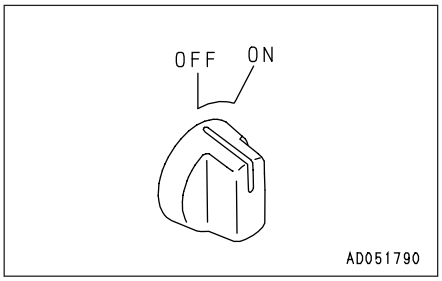
4. Pull fuel control lever ③ a little toward you from the low idling position.



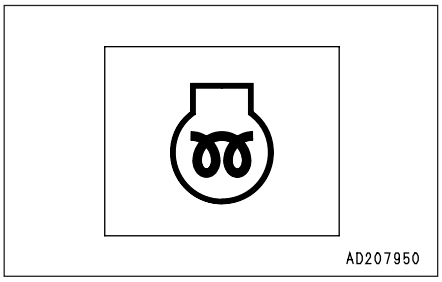
5. Turn the key of starting switch ② to the ON position.



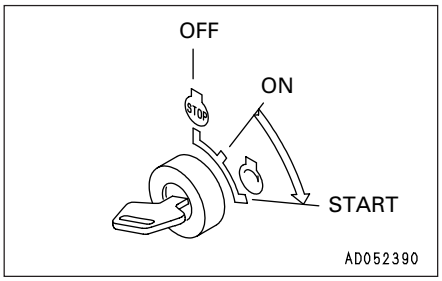
6. When preheating switch ④ is turned ON, preheating pilot lamp ⑤ will also light up, and preheating will automatically start.



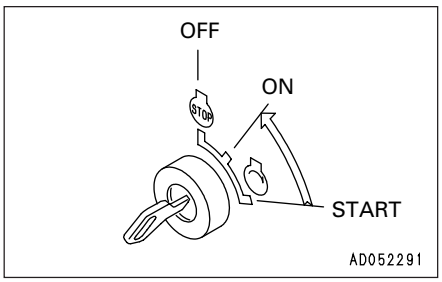
7. Keep in this condition until preheating pilot lamp ⑤ goes out. (Preheating is completed after approx. 12 seconds, and the lamp goes out.)



8. When preheating pilot lamp ⑤ goes off, turn the starting switch key to the START position and start the engine.



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



10. When the engine runs smoothly and the color of exhaust gas becomes normal, put preheating switch ④ in the OFF position.

REMARK

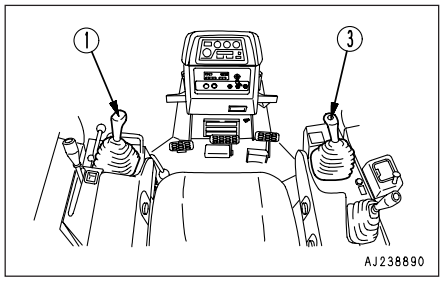
- The time which should elapse before turning the preheating switch off varies with the ambient temperature. Confirm the time to the table below.

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

REMARK

- When the air temperature is below 15°C, leave the valve open.
- If Step 6 to 8 are carried out without performing Step 1, it may shorten the nozzle life. Be sure to carry out Step 1.
- If the engine does not start through the steps specified above, return the fuel control lever to the engine stop position and repeat Steps 2 to 8 at an interval of approx. 2 minutes.
- If the switch is moved to START while the preheating pilot lamp is on in Step 8, glow plugs will get wet, making firing impossible. This will make it difficult to start the engine.

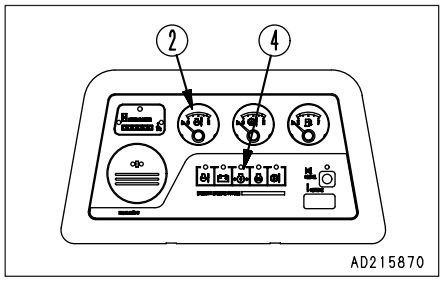
12.3 OPERATIONS AND CHECKS AFTER STARTING ENGINE



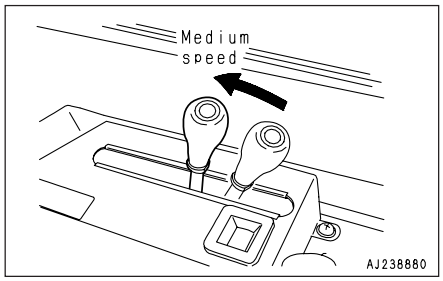
After starting the engine, do not immediately start operations. First, carry out the following operations and checks.

NOTICE

- **Avoid abrupt acceleration until warm-up run is completed.**
- **Do not run the engine at low idling or high idling for more than 20 minutes. If it is necessary to run the engine at idling, apply a load or run at a medium speed from time to time.**
- **If engine oil pressure monitor ④ flashes or the buzzer sounds intermittently, stop the engine and check for the cause.**



12.3.1 NORMAL OPERATION



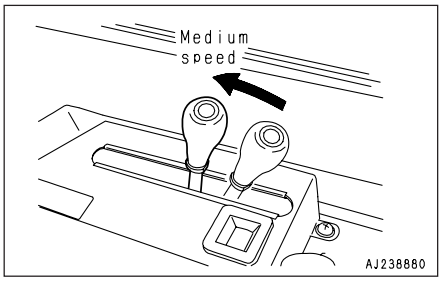
1. Pull fuel control lever ① to the center position between LOW IDLING and HIGH IDLING and run the engine at medium speed for about 5 minutes with no load (warm-up run).

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

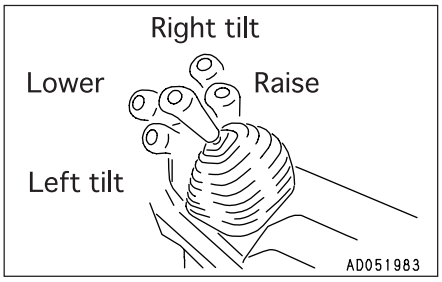
3. Check that there is no abnormal exhaust gas color, noise, or vibration. If any abnormality is found, repair it.

12.3.2 IN COLD AREAS

1. Pull fuel control lever ① to the center position between LOW IDLING and HIGH IDLING and run the engine at medium speed for about 10 minutes with no load (warm-up run).



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



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

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

REMARK

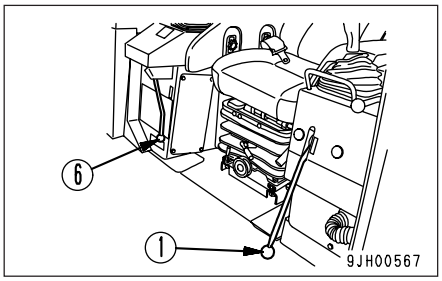
If the oil temperature in the power train is not raised properly, it will take longer to accelerate to the maximum speed.

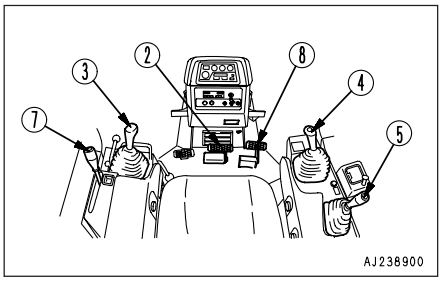
5. Check that there is no abnormal exhaust gas color, noise, or vibration. If any abnormality is found, repair it.

12.4 MOVING MACHINE

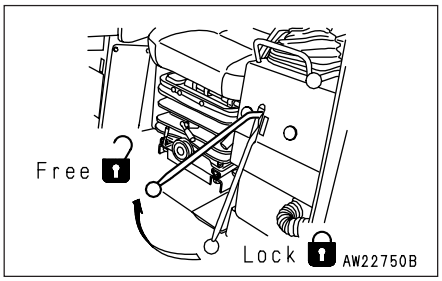
⚠ WARNING

- **When moving machine, check that the area around the machine is safe, and sound the horn before moving.**
  Clear all personnel from the machine and the area.
  Clear all obstacles from the path of the machine.
  Use extreme care when reversing the machine. Note there is an blind spot behind the machine.
- **When starting on slopes, always keep brake pedal ② depressed even after releasing parking lever ①.**
- **When starting to travel up a steep hill, pull fuel control lever ⑦ fully to run the engine at full throttle, and keep brake pedal ② depressed. Use joystick ③ to select 1st, then move it in the direction of travel and slowly release brake pedal ② to allow the machine to move off gradually. When the machine has started moving, release the brake pedal completely.**

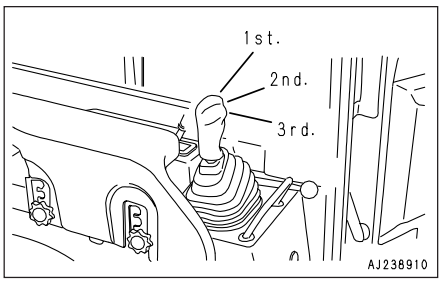




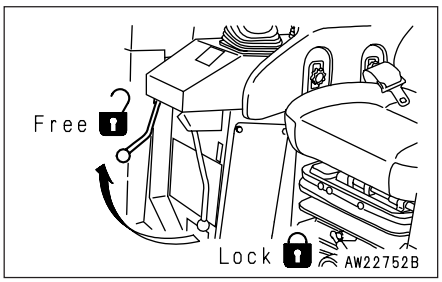
1. Set parking lever ① to the FREE position.



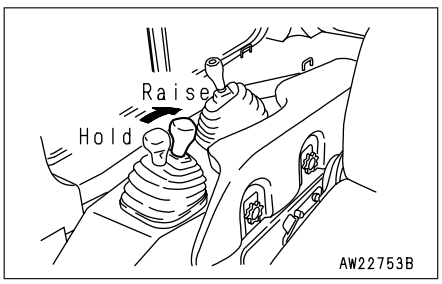
2. Set joystick ③ to the desired position.



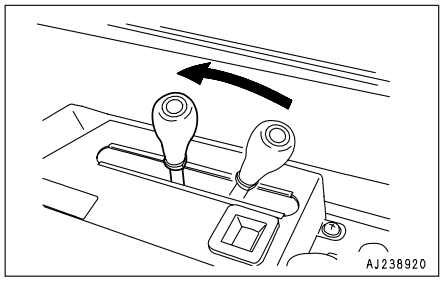
3. Set safety lever ⑥ for blade control lever ④ and ripper control lever ⑤ to the FREE position.



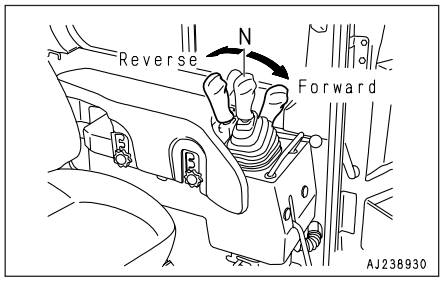
4. Operate blade control lever ④ and ripper control lever ⑤ to the RAISE position, raise the blade 40 – 50 cm (15.8 – 19.7 in) from the ground, and raise the ripper to the maximum height.



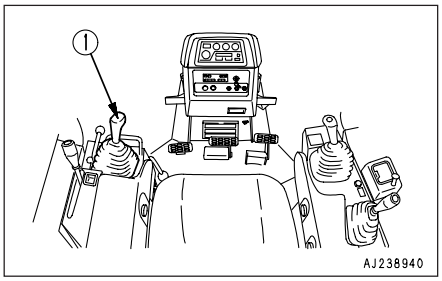
5. Pull fuel control lever ⑦, raise the engine speed, and fully depress decelerator pedal ⑧.



6. Move joystick ③ to the F (FORWARD) or R (REVERSE) position, gradually release decelerator pedal ⑧ and allow the machine to move off.

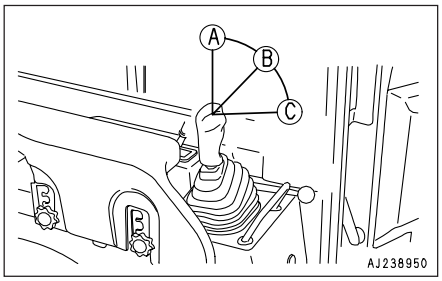


12.5 SHIFTING GEAR



It is possible to change the speed range when traveling, so there is no need to stop the machine when shifting gear.

1. Move joystick ① to the desired gear position to shift gears.



Gear shifting

Rotate the joystick 30° to carry out gear shifting operation.
Position Ⓐ: 1st
Position Ⓑ: 2nd
Position Ⓒ: 3rd

For details of the maximum speed at each speed range, see "25. SPECIFICATIONS".

REMARK

When gear shifting operation is carried out, the display panel at the rear of the joystick will display the speed range.
1st: [1] is displayed on the display panel
2nd: [2] is displayed on the display panel
3rd: [3] is displayed on the display panel

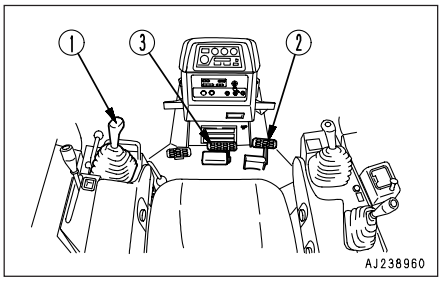
12.6 SHIFTING BETWEEN FORWARD AND REVERSE

⚠ WARNING

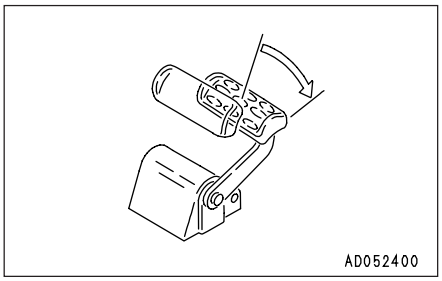
When switching between FORWARD and REVERSE, check first that the direction of travel is safe.

⚠ CAUTION

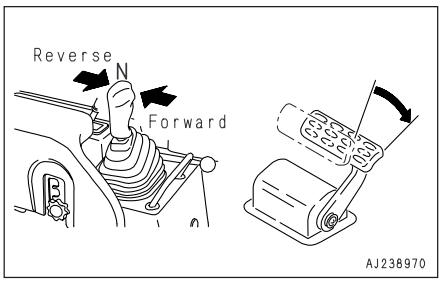
There is no need to stop the machine even when switching between FORWARD and REVERSE.
To increase safety, operator comfort, and the life of the transmission, leave the engine running at full speed, and always depress the decelerator pedal to lower the engine speed.



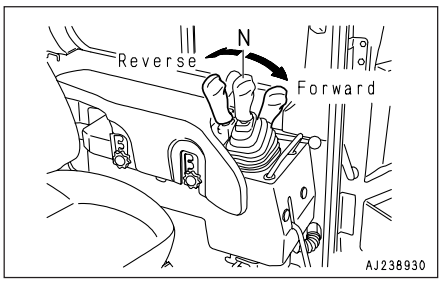
1. Depress decelerator pedal ② and reduce the engine speed.



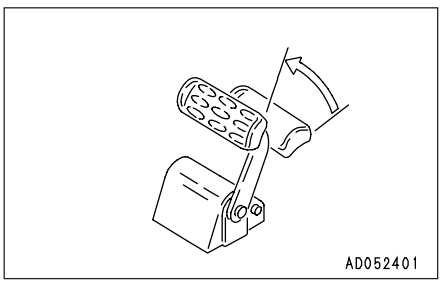
2. Return joystick ① to the neutral position, reduce the speed, then depress brake pedal ③ and stop the machine.



3. After depressing decelerator pedal ②, move joystick ① to the desired position.



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



REMARK

When the gear shift lever is placed in REVERSE, the REVERSE warning buzzer will sound.

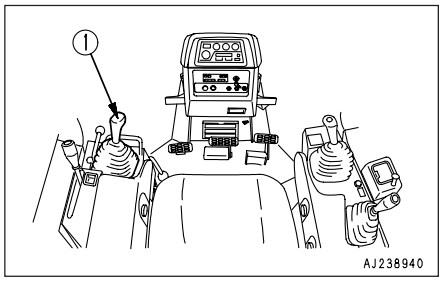
12.7 STEERING MACHINE

⚠ WARNING

- **Avoid as much as possible turning the machine on a slope. The machine will tend to slip sideways. Particular care should be taken on soft or clay land.**
- **Never make a pivot turn at high speed.**

12.7.1 NORMAL TURNING

To turn the machine while traveling, incline joystick ① in the direction to turn.

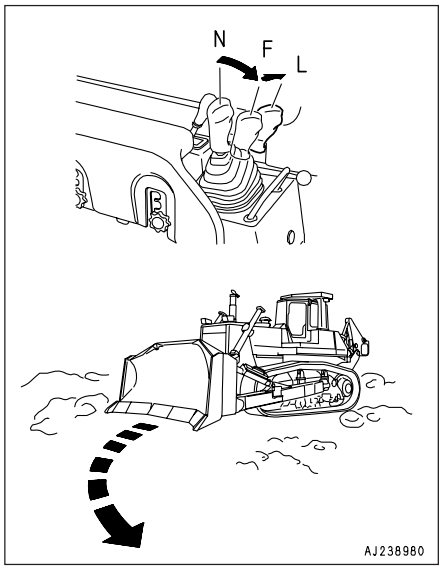


- Turning gradually to left while traveling forward
  If the joystick is pushed forward and moved partially to the left (L), the steering clutch is disengaged and the machine turns gradually to the left.

REMARK

When turning gradually to the right, push the joystick forward, and move it partially to the right.

Do the same when traveling in reverse.

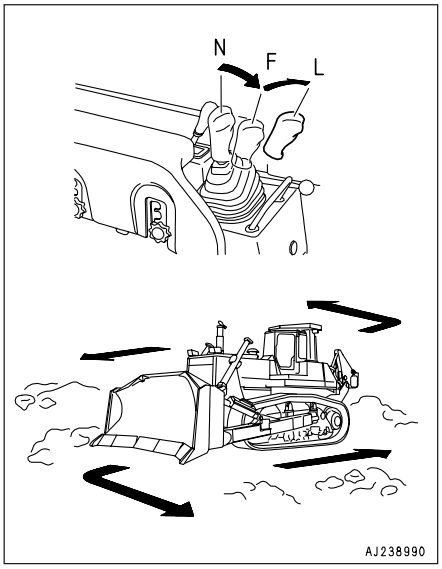


- Making sharp turns to left while traveling forward
  If the joystick is pushed forward and moved fully to the left (L), the steering clutch is disengaged, the brake is applied, and the machine turns sharply to the left.

REMARK

When making sharp turns to the right, push the joystick forward, and move it fully to the right.

Do the same when traveling in reverse.

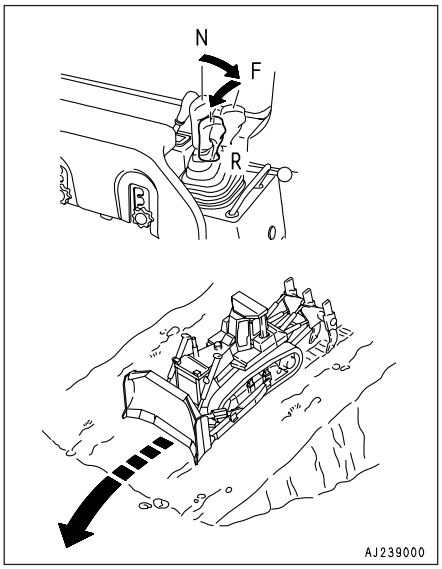


12.7.2 TURNING WHILE DESCENDING A SLOPE

⚠ WARNING

- **On steep downhill slopes where the machine may travel under its own weight, or on downhill slopes where it is being pushed by a towed machine, the machine will steer in the opposite direction, so do as follows.**
- **Avoid as much as possible turning the machine on a slope. The machine will tend to slip sideways. Particular care should be taken on soft or clay land.**

- Turning gradually to left while traveling forward
  If the joystick is pushed forward and moved partially to the right (R), the machine turns gradually to the left. (Becomes reverse steering)

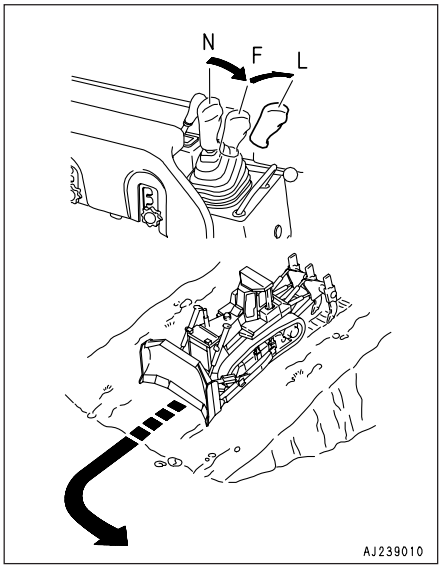


REMARK

When turning gradually to the right, push the joystick forward, and move it partially to the left. (Becomes reverse steering)

Do the same when traveling in reverse.

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



REMARK

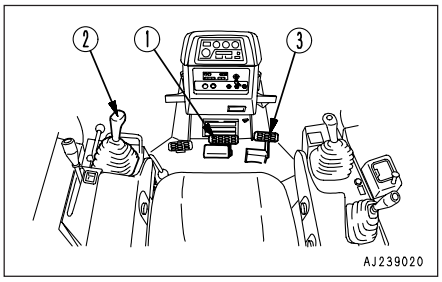
When making sharp turns to the right, push the joystick forward, and move it fully to the right. (Does not become reverse steering)

Do the same when traveling in reverse.

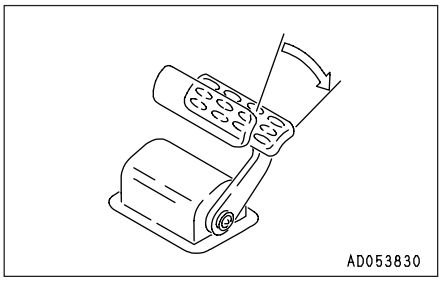
12.8 STOPPING MACHINE

⚠ WARNING

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



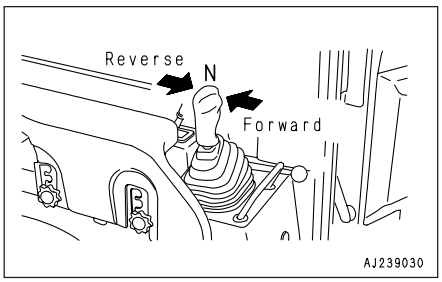
1. Depress brake pedal ① to stop the machine.

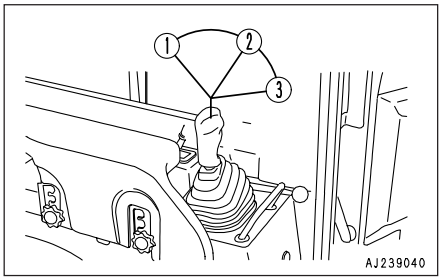


NOTICE

If the brake is depressed when the engine speed or travel speed is high, the brake disc may make a slipping sound. Normally, depress decelerator pedal ③ to reduce the engine speed and travel speed before depressing the brake.

2. Place joystick ② at the neutral position and set the speed range to 1st.





12.9 PRECAUTIONS FOR OPERATION

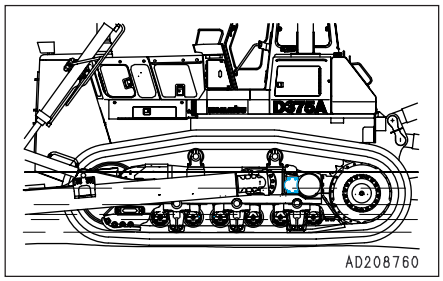
12.9.1 PAY ATTENTION TO GAUGES

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

12.9.2 METHOD OF USING STEERING CLUTCH

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

12.9.3 PERMISSIBLE WATER DEPTH



When operating in water, always keep top surface ① of the track frame above the surface of the water.

Also, be careful that the engine cooling fan will not come in contact with water. The fan can be damaged.

12.9.4 PRECAUTIONS WHEN TRAVELING UP OR DOWN HILLS

Method of using decelerator pedal

When stepping on the decelerator pedal while going uphill, climbing ability will be reduced and the machine will stop. Furthermore, the engine sometimes will stall.

Use engine as brake

When going downhill, shift gear shift lever into low speed to run engine at slow speed and travel down slope using the engine as a brake.

Do not move the joystick to the N position.

When traveling down hills of more than 15°, shift down to 1st speed (R1 or F1).

Braking when traveling downhill

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

Failure to brake may result in overrunning, causing engine trouble.

12.9.5 PRECAUTIONS ON SLOPES

Be careful of fuel level

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

Be careful of oil level

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

Precautions when engine stops on slopes

If the engine stops while working or traveling on a hill, immediately depress the brake pedal to bring the machine to a complete stop.

12.9.6 METHOD OF USING BRAKES

The following actions cause premature damage to the brakes, so avoid such operations.

- Using emergency brake at full speed
- Using brake with engine running at full speed in first gear (F1, R1) (Machine stall condition)

REMARK

Always depress the decelerator pedal to lower the engine speed before actuating the brakes.

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

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

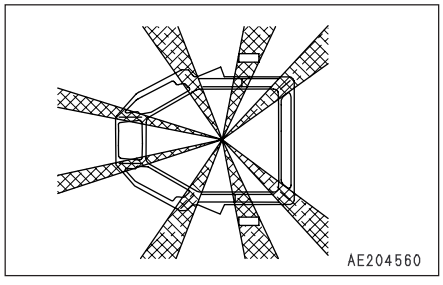
12.9.8 IT IS PROHIBITED TO MODIFY THE CAB GLASS IN ANY WAY THAT WILL OBSTRUCT THE VIEW (MACHINES EQUIPPED WITH CAB)

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

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

⚠ WARNING

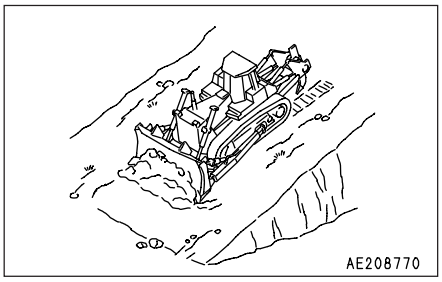
The cab stay and ROPS stay cause blind spots.
When operating, always be sure to check carefully that there is no obstacle or worker in the surrounding area.



12.10 WORK POSSIBLE USING BULLDOZER

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

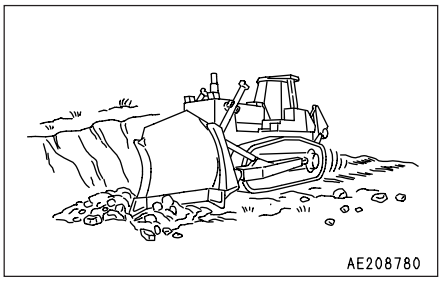
12.10.1 DOZING



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

With the dual tiltdozer, the angle of the blade cutting edge can be changed, so the angle of the cutting edge can be adjusted during the digging operation to improve the efficiency of the work.

12.10.2 CUTTING INTO HARD OR FROZEN GROUND OR DITCHING



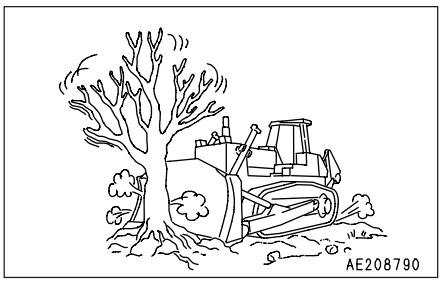
For digging and ditch excavation of hard or frozen ground, tilt the blade. Even hard ground can be dug effectively by a tilted or angled blade.

If the ground is harder, use a ripper attachment for better efficiency.

12.10.3 FELLING TREES, REMOVING STUMPS

NOTICE

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

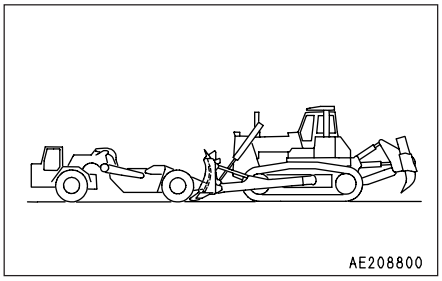


For trees with a diameter of 10 – 30 cm (3.9 – 11.8 in), raise the blade high and push 2 or 3 times to fell the tree.

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

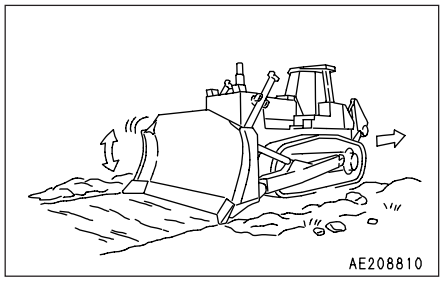
When doing this, never hit the tree at high speed or apply shock to fell the tree.

12.10.4 PUSHER OPERATIONS



- When carrying out pusher operations, always install a pusher plate.
- When approaching the other machine, depress the decelerator pedal to reduce the engine speed and approach slowly. After coming into contact, raise the travel speed slowly and push with full power.

12.10.5 SMOOTHING



NOTICE

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

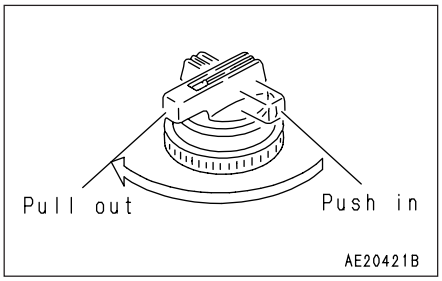
When finishing the ground surface to a smooth finish after digging or filling operations, keep a full load of soil in the blade and operate the blade up or down in small movements while traveling forward. When leveling windrows or ruts left by the tracks, set the blade to the FLOAT position, travel at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

12.11 RIPPER OPERATION

12.11.1 METHOD OF OPERATING PIN PULLER

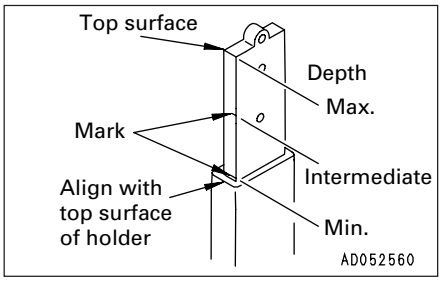
This is used only on machines equipped with a giant ripper.

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

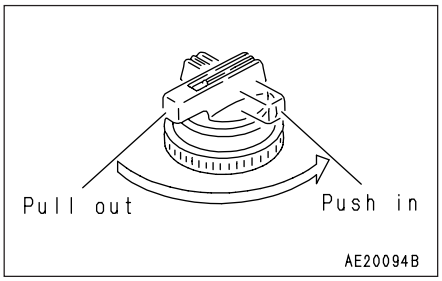


2. Operate the pin puller controller switch to the PULL OUT position and remove the mounting pin.

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



4. Operate the pin puller control switch to insert the mounting pin. If the pin does not match the position of the hole in the shank, set the pin puller control switch to the PUSH IN position and slowly move the ripper up or down.



REMARK

When raising the pin position to increase the digging depth, use a long protector to prevent wear of the shank.

12.12 ADJUSTMENT OF WORK EQUIPMENT

⚠ WARNING

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

12.12.1 BLADE ADJUSTMENT

TILTING THE TILTDOZER

NOTICE

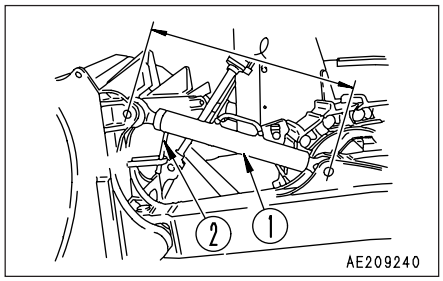
The maximum amount of tilt is 1065 mm (3.5 ft). (When the semi-U blade is used.)

Be sure not to exceed 1065 mm (3.5 ft) for the tilt.

The tiltdozer can be tilted by manipulating the blade control lever as indicated below.

Tilting adjustment to the right: 650 mm (2.1 ft) or more

Tilting adjustment to the left: 650 mm (2.1 ft) or more (When the semi-U blade is used.)



When a larger tilting adjustment is required, proceed as follows:

By turning brace ① with handle bar ② secured to the L.H. brace, the blade can be tilted up to the max. adjustment of 1065 mm (3.5 ft) by changing the length of the brace (ℓ).

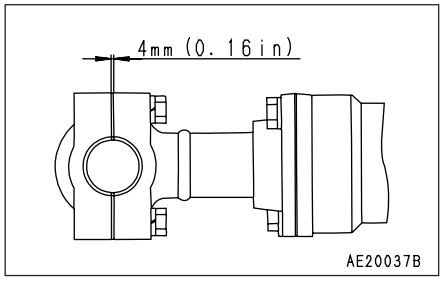
Standard distance (ℓ) between joints is 1552 mm (5.1 ft).

ADJUSTING SHIM IN BLADE CYLINDER CAP

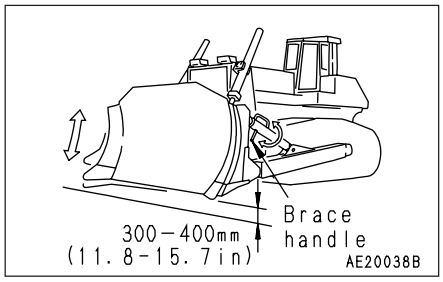
Set the standard shim adjustment in the blade cylinder cap to 4 mm (0.16 in).

Remove shims to balance the wear of the cap and the ball at the end of the piston rod.

The proper clearance to be maintained with the shims is 0.2 to 0.5 mm (0.008 to 0.02 in).



ADJUSTING BRACE



⚠ WARNING

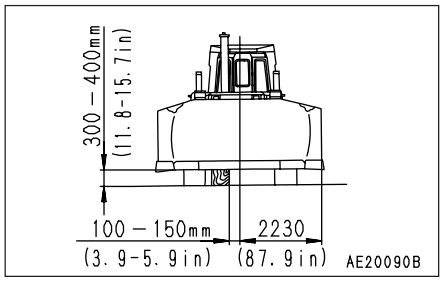
If maintenance is carried out with the engine running, always have one worker sitting in the operator's seat while another worker carries out the maintenance. Both workers must mutually confirm the safety during the operation.

Start the engine and use inching control to tilt to the left and right. Adjustment can be carried out easily by rotating the brace handle while raising and lowering.

- When extending the brace
  Set the blade at FLOAT and rotate the brace handle to adjust.

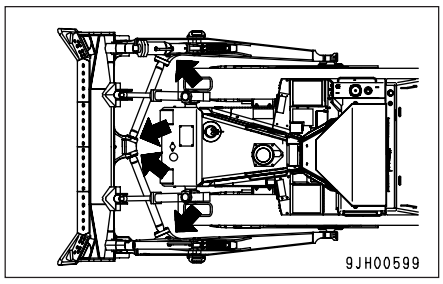
REMARK

When operated in this way, the blade is tilted, so the handle gradually becomes heavier. When this happens, return the blade from the tilt position to the horizontal position and turn the handle again according to the procedure given above.

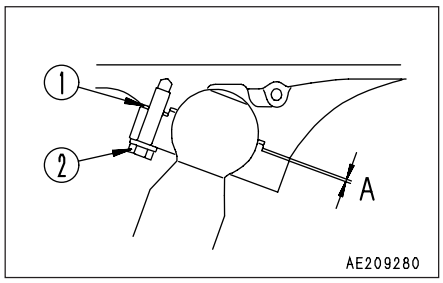


SHIM ADJUSTMENT

Adjust the thickness of shim so that the ball joint play (7 points) in the axial direction (shown by the arrow) does not exceed 1 mm (0.04 in).



1. Remove shim ① and tighten bolts ② to eliminate the ball joint play.
2. Measure clearance "A" and remove bolts ②.
3. Install shim ① having its thickness of "A" mm to "A + 1" mm ("A" in. to "A + 0.04" in) in place with bolts ②.
4. Confirm that ball joint can move smoothly after tightening bolts.



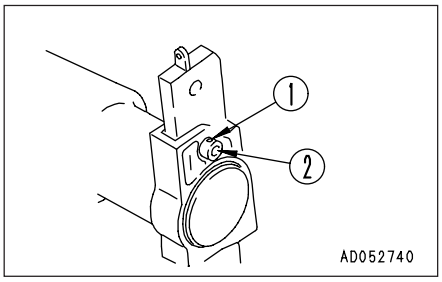
12.12.2 ADJUSTING RIPPER

ADJUSTING DIGGING DEPTH

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

To change the digging depth, do as follows.

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

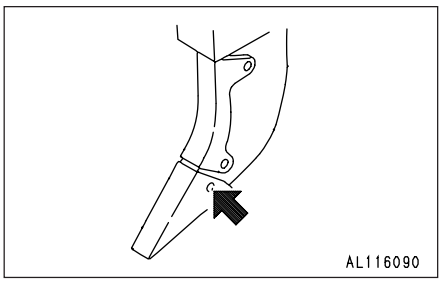


- The pin is made of one piece, so insert it partially by hand then knock it in with a hammer.
- When a giant ripper is installed, use the pin puller.
  For details, see "12.11.1 METHOD OF OPERATING PIN PULLER".

REPLACING POINT AND PROTECTOR

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

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



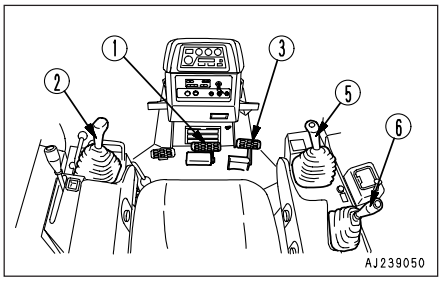
REMARK

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

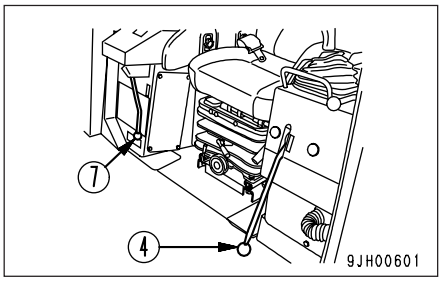
12.13 PARKING MACHINE

⚠ WARNING

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

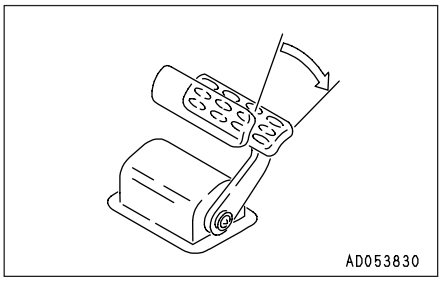


1. Depress brake pedal ① to stop the machine.



NOTICE

If the brake is depressed when the engine speed or travel speed is high, the brake disc may make a slipping sound. Normally, depress decelerator pedal ③ to reduce the engine speed and travel speed before depressing the brake.



2. Place joystick ② at the neutral position and set the speed range to 1st.

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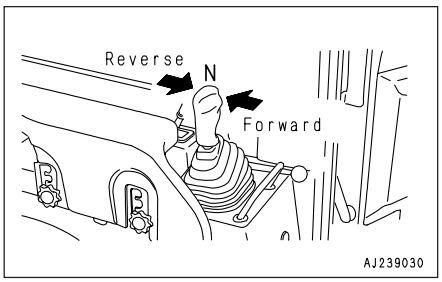
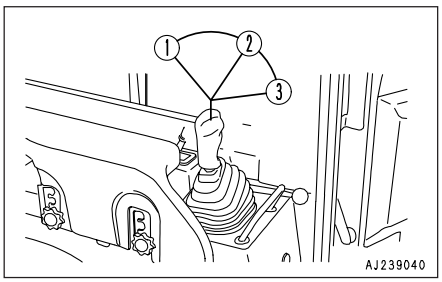
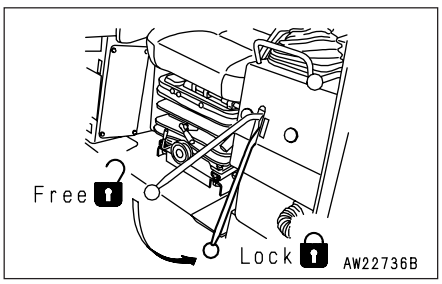


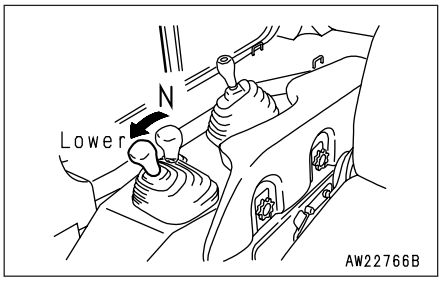


3. Operate parking lever ④ to lock the brakes.

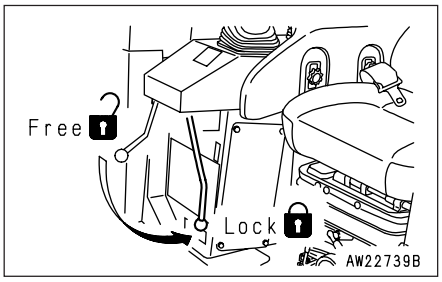


4. Operate blade control lever ⑤ and ripper control lever ⑥ to the LOWER position, and lower the blade and ripper to the ground.

5. Set blade control lever ⑤ and ripper control lever ⑥ to the HOLD position.

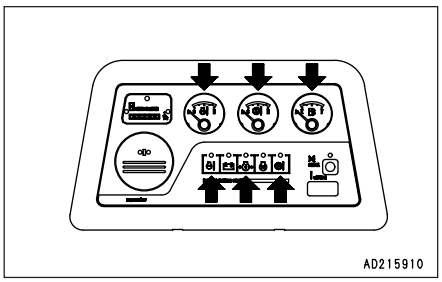


6. Lock blade control lever ⑤ and ripper control lever ⑥ with safety lever ⑦.

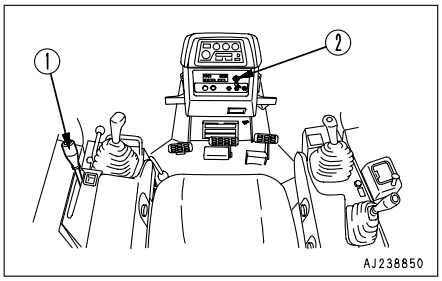


12.14 CHECK AFTER FINISHING WORK

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



12.15 STOPPING ENGINE

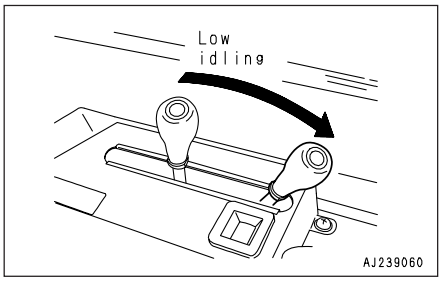


NOTICE

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.

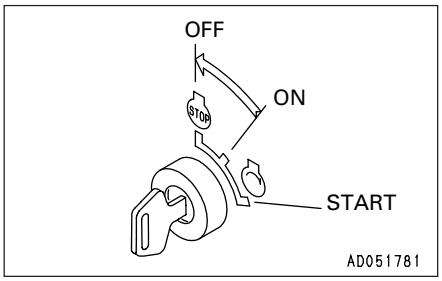
In particular, if the engine has overheated, do not abruptly stop it but run it at low speed to allow it to cool gradually, then stop it.

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



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

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



12.16 CHECK AFTER STOPPING ENGINE

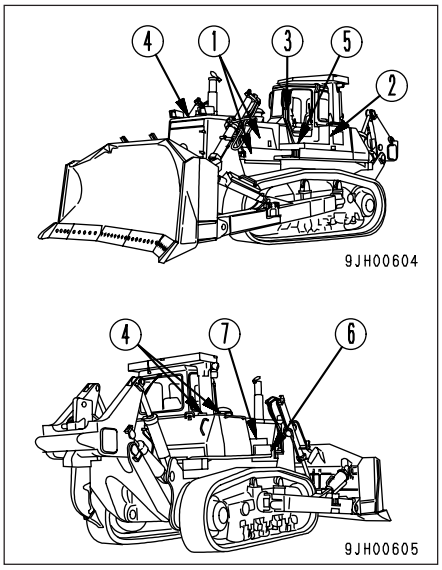
1. Walk around the machine and check the work equipment, paintwork, and undercarriage, and check also for leakage of oil or water. If any abnormalities are found, repair them.

2. Fill the fuel tank.

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

4. Remove any mud stuck to the undercarriage.

12.17 LOCKING



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

- Right and left engine side cover ① (left side: 3 places, right side: 2 places)
- Electrical component box inspection cover (left) ②
- Cab door opener ③
- Cap with lock ④
  - Radiator cap
  - Fuel tank cap
  - Hydraulic oil tank cap
  - Power train oil filler cap
- Battery inspection cover ⑤
- Tool box inspection cover ⑥

Commercially available locks can be fitted to the following places.

- Power train centralized pressure detection, power train oil level inspection cover ⑦

12.18 TIPS FOR LONGER UNDERCARRIAGE LIFE

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

12.18.1 OPERATION METHOD

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

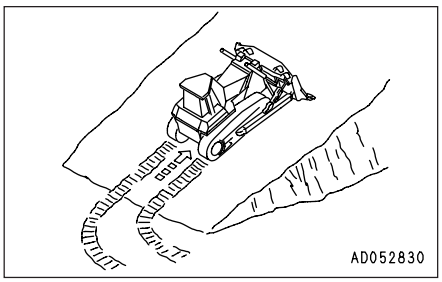
- Do not allow shoe slipping to occur during operation. If shoe slipping occurs, reduce load to the blade until slipping stops.

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

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

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

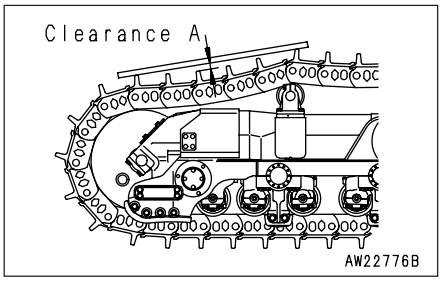
- On a slope, operate the machine parallel to the inclination of the slope. Do not operate across the slope. Also when stopping the machine on a slope, the machine should face toward the top of the slope.



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

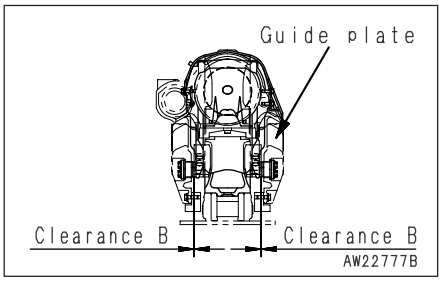
- Do not force the machine to carry out work that exceeds its working capability. Such work includes cases where the idler or sprocket come off the ground when the machine meets obstacles that resist the power of the machine during dozing or ripping operations.

12.18.2 INSPECTION AND ADJUSTMENT



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

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



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

12.18.3 INSPECTION AND REPAIR

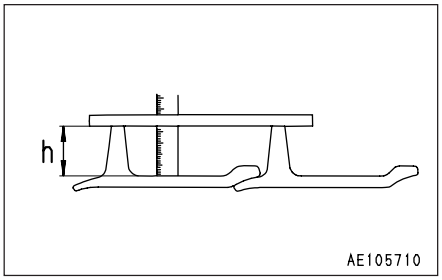
Frequent inspection and prompt repair will reduce repair costs.

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

MEASURING HEIGHT OF GROUSER

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

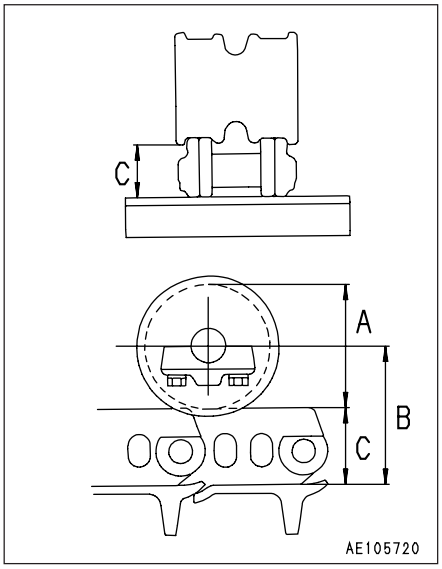
Standard height (h): 93 mm (3.7 in)
Repair limits: 30 mm (1.2 in)



MEASURING OUTSIDE DIAMETER OF TRACK ROLLER

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

Standard size (A): 270 mm (10.6 in)
Repair limits: 234 mm (9.2 in)



13. TRANSPORTATION

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

13.1 LOADING, UNLOADING WORK

⚠ WARNING

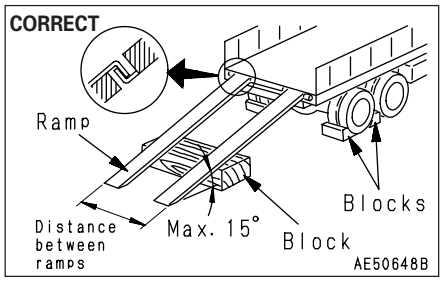
- **Make sure the ramp has sufficient width, length and thickness to enable the machine to be safely loaded and unloaded. If the ramp sags appreciably, reinforce it with blocks, etc.**
- **When loading and unloading the machine, park the trailer on a flat firm roadbed. Keep a fairly long distance between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

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

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

2. Set the machine in line with the ramps, then load or unloading the machine at slow travel.

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



13.2 PRECAUTIONS FOR LOADING

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

1. Lower the blade slowly.
2. Lock all the control levers securely with the safety lever.
3. Set the parking lever to the LOCK position.
4. Move the fuel control lever to the low idling position and turn the starting switch key to the OFF position to stop the engine. Remove the key.
5. Lock the cab door, left and right engine side covers, and the battery inspection cover.
6. Put blocks under the front and rear of both tracks and secure the machine in position with chains or wire rope of appropriate strength to prevent the machine from moving during transportation. Be particularly careful to tie the machine down securely so that it does not slip to the side.

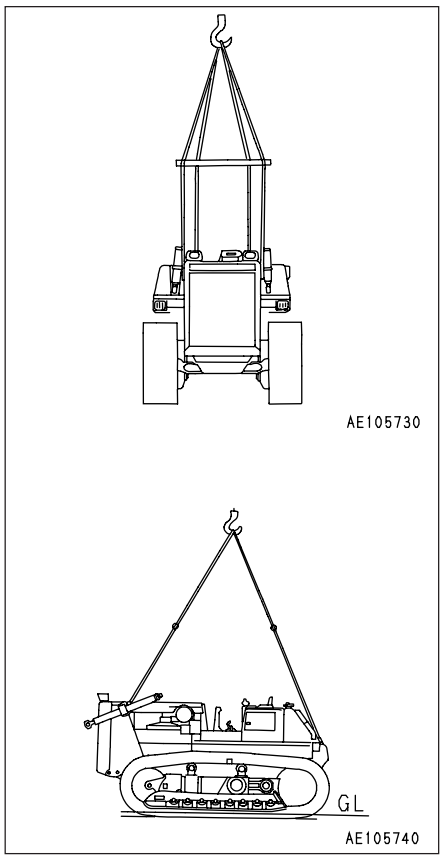
13.3 METHOD OF LIFTING MACHINE

⚠ WARNING

- **Never raise the machine with any worker on it.**
- **Always make sure that the wire rope used for lifting the machine is of ample strength for the weight of the machine.**
- **Never try to lift the machine in any posture other than the posture given in the procedure below. There is danger that the machine may lose its balance.**
- **When lifting the chassis, pay attention to the center of gravity and be careful to maintain the balance.**

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

1. Stop the engine and be sure to set the parking lever to the LOCK position.
2. Set the lifting position for the machine as shown in the diagram on the right.



NOTICE

This description of the method for lifting the chassis applies to standard specification machines.

Depending on the attachments and options installed, the method of lifting will differ. In such cases, please contact your Komatsu distributor for advice.

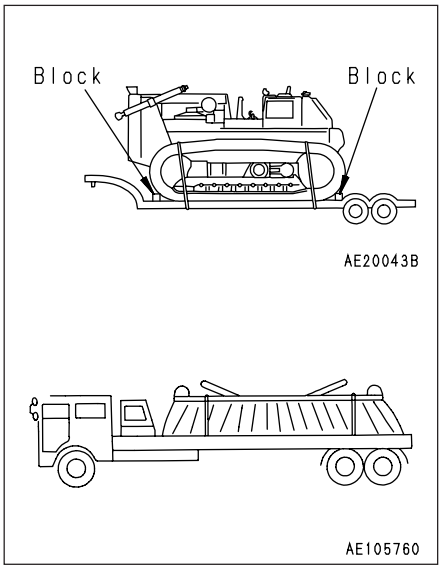
For details of the weight, see “25. SPECIFICATIONS”.

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.



13.5 REMOVAL OF CAB (MACHINES EQUIPPED WITH CAB)

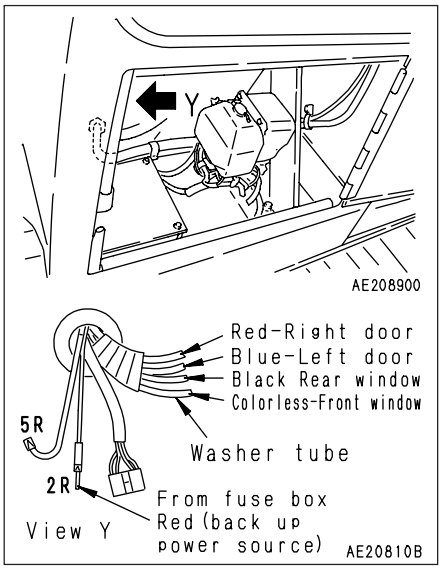
If it is necessary to remove the cab for transportation, disconnect the washer hoses, and cab power source and washer motor wiring from the socket before removing the cab.

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

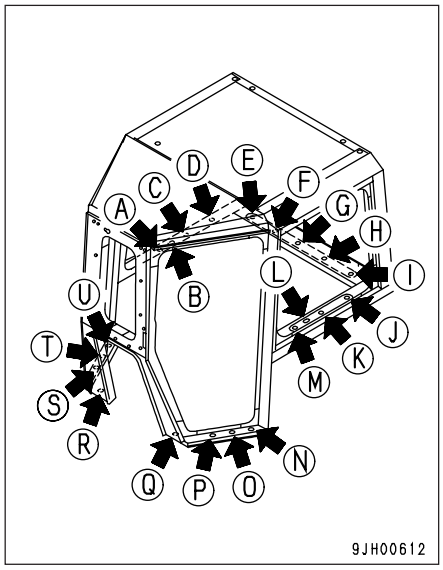
2. Disconnect 4 washer hoses and the wiring (single wires x 2, 4-pin plug x 1) from the socket.

REMARK

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



13.6 INSTALLATION OF CAB (MACHINES EQUIPPED WITH CAB)



Install the cab parts in the opposite order to removal.
Connect all parts that were disconnected.
Install the cab mounting bolts as follows.

1. Lower the cab slowly on top of the floor frame.

2. Align the cab with the floor frame, then install bolts and washers in holes Ⓐ – Ⓤ.
   Do not screw the bolts in fully. Screw them in 3 or 4 turns.

3. Tighten the bolts in holes Ⓝ – Ⓤ fully.
   Tighten in the order Ⓝ, Ⓤ, Ⓠ, Ⓡ, Ⓞ, Ⓣ, Ⓟ, Ⓢ.

4. Tighten bolts Ⓐ – Ⓜ fully.

14. COLD WEATHER OPERATION

14.1 PRECAUTIONS FOR LOW TEMPERATURE

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

14.1.1 FUEL AND LUBRICANTS

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

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

14.1.2 COOLANT

⚠ WARNING

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

NOTICE

Never use methanol, ethanol or propanol based antifreeze.

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

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

Do not mix one antifreeze with a different brand.

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

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

Standard requirements for permanent antifreeze.

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

14.1.3 BATTERY

⚠ WARNING

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

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

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

Temp. of fluid / Rate of charge	20°C	0°C	–10°C	–20°C	–30°C	–50°C
100%	1.28	1.29	1.30	1.31	1.32	1.33
90%	1.26	1.27	1.28	1.29	1.30	1.31
80%	1.24	1.25	1.26	1.27	1.28	1.29
75%	1.23	1.24	1.25	1.26	1.27	1.28
0% (Fully discharged)	1.08	1.09	1.10	1.11	1.12	1.13

REMARK

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

14.2 AFTER COMPLETION OF WORK

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

- Mud and water on the machine body should be completely removed. This is to prevent damage to the seal caused by mud or dirt getting inside the seal with frozen drops of water.
- Park the machine on concrete or hard ground. If this is impossible, park the machine on wooden boards.
- Open the drain valve and drain any water collected in the fuel system to prevent it from freezing.
- When operating in mud or water, remove the water from the undercarriage to extend the life of the undercarriage.
- 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.
- When it is unnecessary to use the automatic starting aid (APS) (when the ambient temperature is above 15°C), always keep the fuel valve closed.

15. LONG-TERM STORAGE

15.1 BEFORE STORAGE

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

- After washing and drying each part, store the machine indoors. If it has to be left outdoors, choose a flat place where the machine will be safe from flooding or other problems, and cover the machine.

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

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

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

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

- Place all control levers at the neutral position, set the safety lever and parking brake lever to the LOCK position, and set the fuel control lever to the low idling position.

15.2 DURING STORAGE

⚠ WARNING

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

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

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

15.3 AFTER STORAGE

NOTICE

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

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

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

16. TROUBLESHOOTING

16.1 AFTER RUNNING OUT OF FUEL

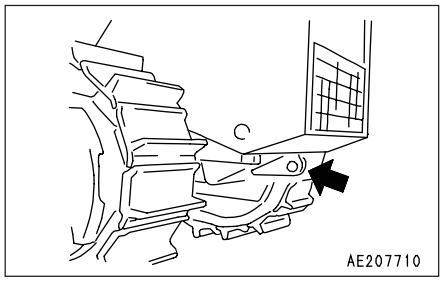
When starting after running out of fuel, fill with fuel and bleed the air from the fuel system before starting.

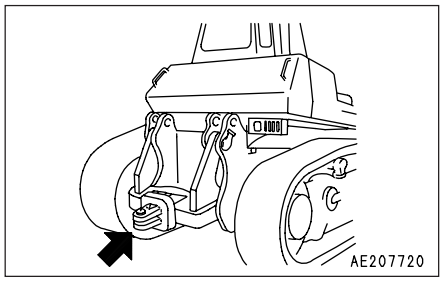
For details of bleeding the air, see "24.5 EVERY 500 HOURS SERVICE".

16.2 METHOD OF TOWING MACHINE

⚠ WARNING

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





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

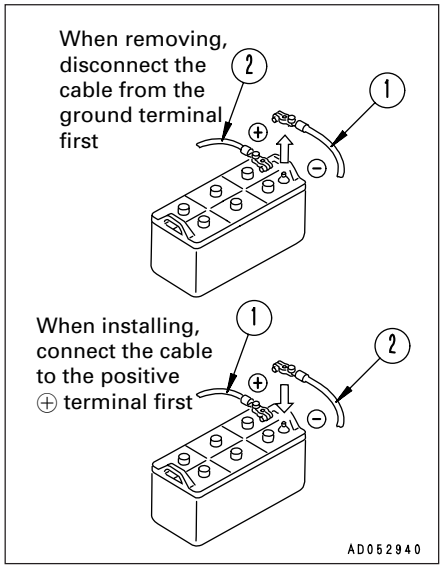
Permissible load for towing hook: 48500 kg (475623 N)

Always carry out towing operations within the specified range for the permissible load.

16.3 IF BATTERY IS DISCHARGED

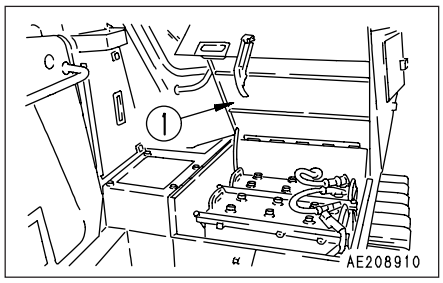
⚠ WARNING

- **When checking or handling the battery, stop the engine and turn the starting key to the OFF position before starting.**
- **The battery generates hydrogen gas, so there is danger of explosion. Do not bring lighted cigarettes near the battery, or do anything that will cause sparks.**
- **Battery electrolyte is dilute sulphuric acid, and it will attack your clothes and skin. If it gets on your clothes or on your skin, wash it immediately off with large amounts of water. If it gets in your eyes, wash it out with fresh water, and consult a doctor.**
- **Wear protective glasses and rubber gloves when handling the battery.**
- **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.**
- **Check the positive ⊕ and negative ⊖ terminals carefully when removing or installing.**



16.3.1 STARTING ENGINE WITH BOOSTER CABLE

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



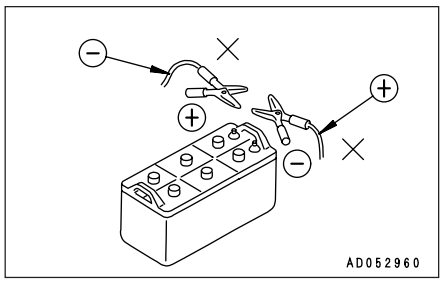
REMOVAL, INSTALLATION OF BATTERY CABLE

1. Open battery cover ①.
2. Before removing the battery, remove the ground cable (normally connected to the negative ⊖ terminal). If any tool touches between the positive terminal and the chassis, there is danger of sparks being generated. Loosen the nut of the terminal and remove the wires from the battery.
3. When installing the battery, connect the ground cable last. Insert the hole of the terminal on the battery and tighten the nut. Tightening torque: 9.8 – 19.6 Nm (1 – 2 kgm, 7.2 – 14.5 lbft)
4. Close battery cover ①.

PRECAUTIONS WHEN CONNECTING AND DISCONNECTING BOOSTER CABLE

⚠ WARNING

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

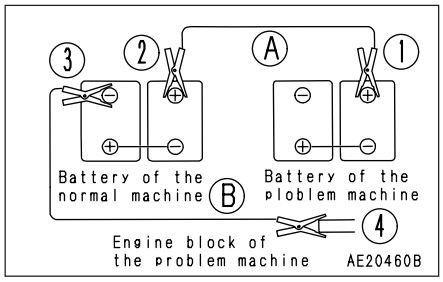


NOTICE

- **The size of the booster cable and clip should be suitable for the battery size.**
- **The battery of the normal machine must be the same capacity as that of the engine to be started.**
- **Check the cables and clips for damage or corrosion.**
- **Make sure that the cables and clips are firmly connected.**
- **Check that the safety lock levers and parking brake levers on both machines are securely at the LOCK position.**
- **Check that all control levers are at the neutral position.**

CONNECTING THE BOOSTER CABLES

Keep the starting switch at the OFF position.



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

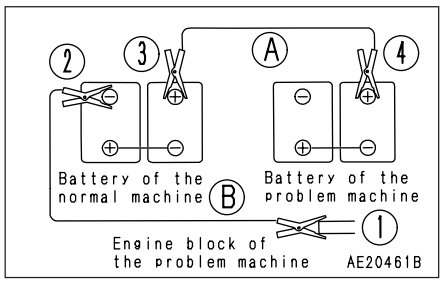
1. Make sure that the starting switches of the normal machine and problem machine are both at the OFF position.
2. Connect one clip of booster cable Ⓐ to the positive ⊕ terminal of the problem machine.
3. Connect the other clip of booster cable Ⓐ to the positive ⊕ terminal of the normal machine.
4. Connect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

STARTING THE ENGINE

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

DISCONNECTING THE BOOSTER CABLES

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



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

16.4 OTHER TROUBLE

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

16.4.1 ELECTRICAL SYSTEM

Problem	Main causes	Remedy
Lamp does not glow brightly even when the engine runs at high speed	• Defective wiring • Defective adjustment of fan belt tension	(• Check, repair loose terminals, disconnections) • Adjust fan belt tension For details, see EVERY 250 HOURS SERVICE
Lamp flickers while engine is running		
Charge lamp does not go out even when engine is running	• Defective alternator • Defective wiring	(• Replace) (• Check, repair)
Abnormal noise is generated from alternator	• Defective alternator	(• Replace)
Starting motor does not turn when starting switch is turned to ON	• Defective wiring • Insufficient battery charge	(• Check, repair) • Charge
Pinion of starting motor keeps going in and out	• Insufficient battery charge	• Charge
Starting motor turns engine sluggishly	• Insufficient battery charge • Defective starting motor	• Charge (• Replace)
Starting motor disengages before engine starts	• Defective wiring • Insufficient battery charge	• (Check, repair) • Charge
Preheating monitor lamp does not light up (When the temperature of the engine cooling water exceeds 20°C, this condition is normal)	• Defective wiring • Defective timer • Defective monitor lamp • Disconnection in glow plug	(• Check, repair) (• Replace) (• Replace) (• Replace)
Air conditioner operation is defective	• Blown fuse • Low battery charge • Defective air conditioner switch • Defective blower switch • Defective compressor	(• Check, repair) • Charge (• Replace air conditioner switch) (• Replace blower switch) (• Replace)
Blade does not pitch when pitch operation is carried out (dual tilt specification machine only)	• Defective wiring • Defective switch • Defective solenoid valve	(• Check, repair) (• Replace) (• Replace)

16.4.2 CHASSIS

Problem	Main causes	Remedy
Oil pressure in torque converter fails to rise	● Improper tightening of oil pipe, pipe joint, air leaking in or oil leaking out because of damage	● Check, repair
	● Wear, scuffing of gear pump	(● Check, replace)
	● Insufficient oil in transmission case	● Add oil to the specified level. For details, see CHECK BEFORE STARTING
	● Clogged oil filter element strainer in transmission case	● Clean. For details, see EVERY 1000 HOURS SERVICE
Torque converter is overheats	● Loose fan belt	● Replace fan belt
	● Engine water temperature is high	● See Engine related parts
	● Clogged oil cooler	(● Clean or replace)
	● Oil pressure too low	● Go to “Oil pressure in torque converter fails to rise”
	● Lack of flow of lubricant caused by wear of power train gear pump	(● Replace gear pump)
Torque converter oil temperature gauge does not work	● Defective oil temperature gauge	(● Replace oil temperature gauge)
	● Defective contact in wiring connection	(● Check, repair)
Lacks drawbar pull (machine does not pick up speed)	● Lack of engine horsepower	● See Engine related parts
	● Oil pressure in torque converter is too low	● Go to “Oil pressure in torque converter fails to rise”
	● Steering clutch is slipping	(● Check, repair)
Machine will not move off when joystick is placed at FORWARD or REVERSE	● Lack of oil in steering clutch case	● Add oil to the specified level. For details, see CHECK BEFORE STARTING
	● Transmission oil pressure does not rise	● Go to “Oil pressure in torque converter fails to rise”
	● Steering clutch slips ○ Wear, scuffing of gear pump ○ Clogged oil strainer element in steering clutch case	(○ Check, replace) ○ Clean. For details, see EVERY 1000 HOURS SERVICE
Does not steer even when steering is operated	● Brake is not applied on side which is pulled	(● Adjust linkage) (● Check brake pressure)
Machine doesn’t stop when brake pedal are depressed	● Defective brake adjustment	(● Adjust linkage) (● Check brake pressure)
Track comes off	● Track is too loose	● Adjust track tension. For details, see WHEN REQUIRED.
Sprocket develops abnormal wear	● Track is too loose or too tight	● Adjust track tension. For details, see WHEN REQUIRED.
Brake rises too slowly or does not rise at all (or blade tilts too slowly)	● Lack of hydraulic oil	● Add oil to specified level. For details, see EVERY 250 HOURS SERVICE
	● Work equipment lock lever is at LOCK position	● Set to FREE position
Ripper moves too slowly	● Lack of hydraulic oil position	● Add oil to specified level. For details, see EVERY 250 HOURS SERVICE
	● Work equipment lock lever is at LOCK position	● Set to FREE position
Insufficient force of ripper	● Leakage from piping	(● Tighten)

16.4.3 ENGINE

Problem	Main causes	Remedy
Engine oil pressure monitor flashes when engine speed is raised after completion of warm-up.	● Engine oil pan oil level is low (sucking in air) ● Clogged oil filter cartridge ● Defective tightening of oil pipe joint, oil leakage from damaged part ● Defective caution lamp	● Add oil to specified level, see CHECK BEFORE STARTING ● Replace cartridge, see EVERY 250 HOURS SERVICE (● Check, repair) (● Replace lamp)
Steam is emitted from top part of radiator (pressure valve)	● Cooling water level low, water leakage ● Loose fan belt ● Dirt or scale accumulated in cooling system ● Clogged radiator fin or damaged fin	● Add cooling water, repair, see CHECK BEFORE STARTING ● Replace fan belt ● Change cooling water, clean inside of cooling system, see WHEN REQUIRED ● Clean or repair, see WHEN REQUIRED
Engine water temperature monitor remains alight	● Defective thermostat ● Loose radiator filler cap (high altitude operation) ● Defective water temperature monitor	(● Replace thermostat) ● Tighten cap or replace packing (● 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 ● Defective compression ○ Defective valve clearance	● Add fuel, see CHECK BEFORE STARTING ● Repair place where air is sucked in (● Replace pump or nozzle) ● See ELECTRICAL SYSTEM (○ Adjust valve clearance)
Exhaust gas is white or blue	● Too much oil in oil pan ● Improper fuel	● Add oil to specified level, see CHECK BEFORE STARTING ● Change to specified fuel
Exhaust gas occasionally turns black	● Clogged air cleaner element ● Defective nozzle ● Defective compression ● Defective turbocharger	● Clean or replace, see WHEN REQUIRED (● Replace nozzle) (● Adjust valve clearance) (● 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 ● See item “Indicator of water temperature gauge is in red range on right side of gauge”. (● Replace muffler) (● Adjust valve clearance)

16.4.3 ENGINE

Problem	Main causes	Remedy
Engine oil pressure monitor flashes when engine speed is raised after completion of warm-up.	● Engine oil pan oil level is low (sucking in air) ● Clogged oil filter cartridge ● Defective tightening of oil pipe joint, oil leakage from damaged part ● Defective caution lamp	● Add oil to specified level, see CHECK BEFORE STARTING ● Replace cartridge, see EVERY 250 HOURS SERVICE (● Check, repair) (● Replace lamp)
Steam is emitted from top part of radiator (pressure valve)	● Cooling water level low, water leakage ● Loose fan belt ● Dirt or scale accumulated in cooling system ● Clogged radiator fin or damaged fin ● Defective thermostat ● Loose radiator filler cap (high altitude operation) ● Defective water temperature monitor	● Add cooling water, repair, see CHECK BEFORE STARTING ● Replace fan belt ● Change cooling water, clean inside of cooling system, see WHEN REQUIRED ● Clean or repair, see WHEN REQUIRED (● Replace thermostat) ● Tighten cap or replace packing (● Replace)
Engine water temperature monitor remains alight		
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 ● Defective compression ○ Defective valve clearance	● Add fuel, see CHECK BEFORE STARTING ● Repair place where air is sucked in (● Replace pump or nozzle) ● See ELECTRICAL SYSTEM (○ Adjust valve clearance)
Exhaust gas is white or blue	● Too much oil in oil pan ● Improper fuel	● Add oil to specified level, see CHECK BEFORE STARTING ● Change to specified fuel
Exhaust gas occasionally turns black	● Clogged air cleaner element ● Defective nozzle ● Defective compression ● Defective turbocharger	● Clean or replace, see WHEN REQUIRED (● Replace nozzle) (● Adjust valve clearance) (● 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 ● See item “Indicator of water temperature gauge is in red range on right side of gauge”. (● Replace muffler) (● Adjust valve clearance)

16.4.4 APS (Automatic Priming System)

Problem	Main causes	Remedy
Engine does not start at all.	● Nozzle clogging (dust, paraffin precipitation, defective nozzle) ● Defective glow plug ● Fuel pipe collapse, fuel leak, clogging ● Defective wiring ● Fuse breaking ● Defective APS controller	(● Clean, change to specified fuel, replace nozzle) (● Replace) (● Check, repair) (● Check, repair) (● Replace) (● Replace)
Engine does start smoothly but much white smoke emits or the engine stop.	● Nozzle clogging (dust, paraffin precipitation, defective nozzle) ● Defective glow plug ● Fuse breaking ● Alternator functional defect (Alternator output shortage) ● Defective APS water temperature sensor ● Defective APS controller	(● Clean, change to specified fuel, replace nozzle) (● Replace) (● Replace) (● Check, repair or replace) (● Replace temperature sensor) (● Replace)
When loaded, the engine will emit black smoke and stop.	● Defective APS water temperature sensor ● Deposited heater relay contact point	(● Replace temperature sensor) (● Replace heater relay)
Burner is ignited and preheating monitor lamp remaining lighted.		
Preheating monitor lamp does not become bright (when the temperature of the engine cooling water exceeds 20°C, the engine preheating system is in normal condition)	● Disconnection in electrical intake air heater and glow plug ● Defective wiring ● Defective timer	(● Replace) (● Check, repair) (● Replace)
Burner is not ignited	● Glow plug is not heated red.	● See item “Preheating monitor lamp does not become bright”
	● Fuel is not or less sprayed. ○ Nozzle clogging (dust, paraffin, precipitation, defective nozzle) ○ Defective APS controller	(○ Clean, change to specified fuel, replace nozzle) (○ Replace)

MAINTENANCE

17. GUIDES TO MAINTENANCE

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

Perform maintenance work on hard, flat ground.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Cleaning machine:
- Do not direct a high-pressure jet directly at the radiator.
- Do not splash water over the electrical equipment.
- Never spray steam or water directly at the radiator or oil cooler portions.

Controller:
The machine monitor controller may malfunction if affected by electrical interference from an outside source, so when installing any radio system to the machine, please contact your Komatsu distributor for advice.

Checking lubricating oil level:
The lubricating oil level should be neither too high nor too low. When checking and adding oil, check that the oil at the proper level.

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

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

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

Bleeding air:
After changing the oil, or replacing or cleaning the filter element or strainer, bleed the air from inside the circuit.

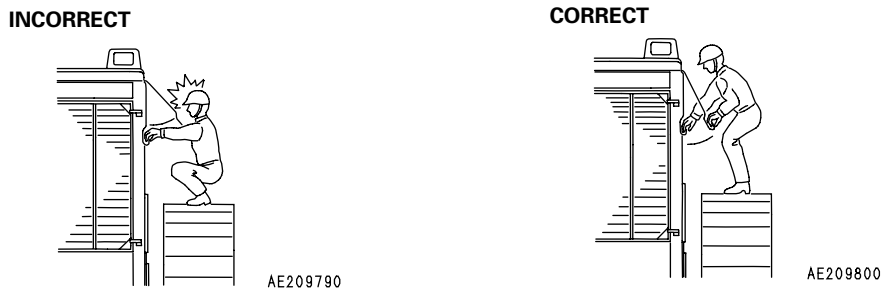
If the oil in the hydraulic tank has been changed, or the element replaced, or the hydraulic cylinders or work equipment piping have been removed, run the engine at low idling after completion of the operation to bleed the air as follows.

1. Operate each cylinder 4 – 5 times to a point approx. 100 mm before the end of its stroke.

2. Next, perate each cylinder to the end of its stroke 3 – 4 times.

If, at first, the engine is run at high speed or the cylinder is operated to the end of its stroke, the air inside the cylinder may cause damage to the piston packing or other parts.

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



18. OUTLINES OF SERVICE

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

Item	Kind of fluid
Engine oil pan	SAE 10W API classification CD
Power train oil pan (incl. transmission, torque converter and bevel gear cases)	SAE 10W API classification CD
Damper case	SAE 10W API classification CD
Final drive case	SAE 30W API classification CD
Hydraulic tank	HO15
Fuel tank	ASTM D975
Radiator	Komatsu Super Coolant (AF-ACL) 65% added to water

18.1 OUTLINE OF OIL, FUEL, COOLANT

18.1.1 OIL

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

18.1.2 FUEL

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

18.1.3 COOLANT

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

18.1.4 GREASE

⚠ WARNING

Do not carry out greasing when the engine is running.

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

18.1.5 STORING OIL AND FUEL

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

18.1.6 FILTERS

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

18.2 RELATING TO ELECTRIC SYSTEM

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

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

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

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

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

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

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

18.3 OUTLINE OF HYDRAULIC SYSTEM

- During operation and immediately after operation is ended, the temperature of the hydraulic system still remains high.
  In addition, high hydraulic pressure is applied to the system. Take care when inspecting and maintaining the hydraulic system.
  - ○ Stop the machine on level ground, lower the blade to the ground, then set so that there is no pressure applied to the cylinder circuit.
  - ○ Always stop the engine.
  - ○ Immediately after operations, the hydraulic oil and lubricating oil are at high temperature and high pressure, so wait for the oil temperature to go down before starting maintenance.
    Even when the temperature goes down, the circuit may still be under internal pressure, so when loosening the plug or screw, or the hose joint, do not stand in front of the part. Loosen it slowly to release the internal pressure before removing it.
  - ○ When carrying out inspection or maintenance of the hydraulic circuit, always bleed the air form the hydraulic tank to remove the internal pressure.

- Periodic maintenance includes the inspection of the hydraulic oil level, replacement of the filter and refilling of hydraulic oil.

- When the high pressure hose, etc. is removed, check the O-ring for damage. If necessary, replace it.

- After the hydraulic filter element and strainer are cleaned or replaced, or after the hydraulic system is repaired or replaced or the hydraulic piping is removed, bleed air from the hydraulic circuit.

- The accumulator is charged with high-pressure nitrogen gas. Incorrect handling may be dangerous. For the handling procedure, see “11.14 HANDLING ACCUMULATOR”.

19. WEAR PARTS LIST

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

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

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

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

Item		Part No.	Part Name	Weight (kg)	Q'ty	Replacement frequency
Engine oil filter		600-211-1291	Cartridge	–	2	Every 250 hours service
Transmission filter		07063-01142 (07000-45175)	Element (O-ring)	– –	1 (1)	Every 500 hours sevice
Torque converter filter		07063-01142 (07000-45175)	Element (O-ring)	– –	1 (1)	
Fuel filter		600-311-8331	Cartridge	–	2	
Corrosion resistor		600-411-1591	Cartridge	–	1	Every 1000 hours service
Hydraulic oil filter		07063-01142 (07000-45180) (07000-45195)	Element (O-ring) (O-ring)	– – –	1 (1) (1)	Every 2000 hours sevice
Air cleaner		6128-81-7093	Element	–	1	–
Air conditioner filter		17M-911-3530 20Y-979-3380	Element Filter	– –	2 1	–
Blade	Semi U-dozer	195-71-61550 198-72-11181 (198-71-21710) (198-71-11230) (195-71-61950) 195-71-61930 195-71-61940 (198-71-21720) (198-71-11230) (195-71-61950)	Cutting edge Cutting edge (Bolt) (Washer) (Nut) End bit (left) End bit (right) (Bolt) (Washer) (Nut)	93.2 99.6 – – – 113.0 113.0 – – –	2 2 (22) (22) (22) 1 1 (16) (16) (16)	–
	U-dozer	198-72-11181 198-71-11181 (198-71-21710) (198-71-11230) (195-71-61950) 195-71-61930 195-71-61940 (198-71-21720) (198-71-11230) (195-71-61950)	Cutting edge Cutting edge (Bolt) (Washer) (Nut) End bit (left) End bit (right) (Bolt) (Washer) (Nut)	99.6 125.2 – – – 113.0 113.0 – – –	2 2 (26) (26) (26) 1 1 (16) (16) (16)	

Item		Part No.	Part Name	Weight (kg)	Q'ty	Replacement frequency
Ripper	Multi	195-78-71111 195-78-71320 (195-78-71360)	Protector Point (Pin)	– 26.0 –	3 3 (9)	–
	Giant	195-78-71111 195-78-71320 (195-78-71360)	Protector Point (Pin)	– 26.0 –	1 1 (3)	–

NOTICE

When handling parts that weight more than 25 kg (55 lb), remember that they are heavy objects, and take the necessary care.

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

PROPER SELECTION OF FUEL, COOLANT AND LUBRICANTS

RESERVOIR	KIND OF FLUID	AMBIENT TEMPERATURE −40 −22 −4 14 32 50 68 86°F −40 −30 −20 −10 0 10 20 30°C	CAPACITY Specified amount	CAPACITY Refill capacity
Engine oil pan	Engine oil	SAE 15W-40 SAE 10W-30 SAE 30 SAE 10WCD	58 ℓ 15.31 US gal	51 ℓ 13.46 US gal
Power train oil pan (incl. transmission, torque converter and bevel gear case)	Engine oil	SAE 30 SAE 10W	250 ℓ 66 US gal	150 ℓ 39.6 US gal
Damper case	Engine oil	SAE 10W	2.1 ℓ 0.55 US gal	2.1ℓ 0.55 US gal
Final drive case (each)	Engine oil	SAE 30	65 ℓ 17.16 US gal	65 ℓ 17.16 US gal
Pivot shaft case (each)	Engine oil	SAE 30	18 ℓ 4.76 US gal	—
Hydraulic system	Engine oil	SAE 10W MIL-H-5606C	270 ℓ 71.33 US gal	120 ℓ 31.70 US gal
Carrier roller (each)	Gear oil	GO 140	0.70 – 0.80 ℓ 0.18–0.21 US gal	0.70 – 0.80 ℓ 0.18–0.21 US gal
Track roller (each)	Gear oil	GO 140	1.40 – 1.50 ℓ 0.37–0.40 US gal	1.40 – 1.50 ℓ 0.37–0.40 US gal
Idler (each)	Gear oil	GO 140	1.45 – 1.70 ℓ 0.38–0.45 US gal	1.45 – 1.70 ℓ 0.38–0.45 US gal
Bogie cartridge pin (each)	Gear oil	GO 140	0.23 – 0.25 ℓ 0.06–0.07 US gal	0.23 – 0.25 ℓ 0.06–0.07 US gal
Fuel tank	Diesel fuel	ASTM D975 No.2 ASTM D975 No.1	1050 ℓ 277.41 US gal	—
Grease fitting	Grease	NLGL (MIL-G-18709A) NLGL (MIL-G-10924C)	—	—
Cooling system	Water	Add antifreeze / Water	165 ℓ 43.59 US gal	—

In this range, preheating with a starting aid is necessary.

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.

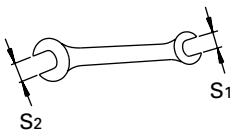
Specified capacity: Total amount of oil including oil for components and oil in piping.
Refill capacity: Amount of oil needed to refill system during normal inspection and maintenance.

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

21. STANDARD TIGHTENING TORQUES FOR BOLTS AND NUTS

21.1 INTRODUCTION OF NECESSARY TOOLS

The following tools are needed when carrying out maintenance.

No.	Name of tool	Part No.	Remarks
1	Wrench set	09000-30006	Applicable width across flats (S1 – S2) 8 mm – 10 mm, 12 mm – 14 mm 13 mm – 17 mm, 19 mm – 22 mm 24 mm – 27 mm, 30 mm – 32 mm  AD053370
2	Screwdriver	09033-00190	Interchangeable flat-head and cross-head type
3	Socket wrench set	09020-10284	Applicable width across flats 10 mm, 13 mm 14 mm, 17 mm 19 mm, 22 mm, 24 mm, 27 mm, 30 mm, 32 mm, 36 mm Extension, Handle, Joint
4	Wrench	09002-03641	36 mm – 41 mm
5	Wrench	09001-04600	Applicable wide across flats 46 mm
6	Plier	09036-00150	
7	Hammer	09039-00150	
8	Bar	09055-10390	
9	Filter wrench	09019-08035	For filter cartridges
10	Grease pump	07952-80002	For greasing work
11	Nozzle	07951-11400	For grease pump
12	Grease cartridge	07950-90403	(Lithium base grease, 400 g)
13	Gauge	09054-00009	
14	Lever assembly	175-900-3910	Reversible fan

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

When not using the tools, always put them in the tool box on the inside of the fender cover on the right side of the machine.

Always put these tools in the toolbox inside the cover on the left side of the machine.

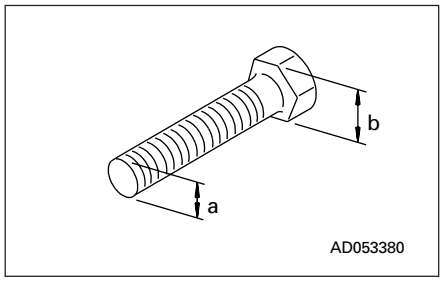
21.2 TORQUE LIST

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

The tightening torque is determined by the width across the flats ⓑ of the nut and bolt.

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

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



Thread diameter of bolt (mm) (a)	Width across flat (mm) (b)	T H AD054300		
		Nm	kgm	lbft
6	10	13.2 ± 1.4	1.35 ± 0.15	9.73 ± 1.03
8	13	31.4 ± 2.9	3.2 ± 0.3	23.2 ± 2.1
10	17	65.7 ± 6.8	6.7 ± 0.7	48.5 ± 5.0
12	19	112 ± 9.8	11.5 ± 1.0	82.6 ± 7.2
14	22	177 ± 19	18.0 ± 2.0	131 ± 14
16	24	279 ± 29	28.5 ± 3	206 ± 21
18	27	383 ± 39	39 ± 3	282 ± 29
20	30	549 ± 58	56 ± 6	405 ± 43
22	32	745 ± 78	76 ± 8	549 ± 58
24	36	927 ± 98	94.5 ± 10	684 ± 72
27	41	1320 ± 140	135 ± 15	973 ± 100
30	46	1720 ± 190	175 ± 20	1270 ± 140
33	50	2210 ± 240	225 ± 25	1630 ± 180
36	55	2750 ± 290	280 ± 30	2030 ± 210
39	60	3280 ± 340	335 ± 35	2420 ± 250

NOTICE

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

22. PERIODIC REPLACEMENT OF SAFETY CRITICAL PARTS

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

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

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

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

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

Ask your Komatsu distributor to replace the critical parts.

SAFETY CRITICAL PARTS

No.	Safety critical parts for periodic replacement	Q'ty	Replacement interval
1	Fuel hose (between nozzles)	5	Every 2 years or 4000 hours, whichever comes sooner
2	Turbocharger lubricating hose	1	
3	Fuel hose (nozzle – fuel return hose)	1	
4	Fuel hose for APS	3	
5	Fuel hose (fuel filter – injection pump)	3	
6	Fuel hose (feed pump – fuel return hose)	1	
7	Hose (torque converter oil cooler – steering case)	1	
8	Hose (blade valve – blade cylinder)	4	
9	Inspection hose assembly for power train pressure	1	
10	Fuel hose (fuel tank – fuel strainer)	3	
11	Fuel return hose	1	
12	Hose (torque converter outlet – torque converter oil cooler)	2	
13	Fuel hose (fuel strainer – feed pump)	1	
14	Hose (ripper low valve – ripper high valve)	4	
15	Hose (ripper high valve – work equipment pump)	1	
16	Hose (ripper high valve – tank)	1	
17	Hose (ripper high valve – ripper lift cylinder)	4	
18	Hose (ripper high valve – ripper tilt cylinder)	4	
19	Hose (PPC charge valve – PPC lock valve)	1	
20	Hose (PPC lock valve – PPC valve for blade)	1	
21	Hose (PPC lock valve – PPC valve for ripper)	1	
22	Hose (PPC pump – PPC charge valve)	1	
23	Hose (hydraulic oil cooler – relay block)	2	
24	Hose (relay block – PPC charge valve)	1	
25	Hose (relay block – suction tube)	1	
26	Hose (PPC valve for blade – main valve)	4	

No.	Safety critical parts for periodic replacement	Q'ty	Replacement interval
27	Hose (PPC valve for blade – PPC drain relay block)	1	Every 2 years or 4000 hours, whichever comes sooner
28	Hose (PPC valve for ripper – main valve)	4	
29	Hose (PPC valve for ripper – PPC drain relay block)	1	
30	Hose (PPC charge valve – PPC drain relay block)	1	
31	Hose (PPC drain relay block – suction tube)	1	
32	Hose (work equipment pump – blade lift valve)	1	
33	Hose (work equipment pump – ripper low valve)	1	
34	Hose (blade valve – blade lift divider block)	2	
35	Hose (blade lift divider block - relay tube)	2	
36	Hose (relay tube – blade lift cylinder)	4	
37	Hose (ripper low valve – blade tilt relay tube)	2	
38	Seat belt	1	Every 3 years

23. MAINTENANCE SCHEDULE CHART

23.1 MAINTENANCE SCHEDULE CHART

SERVICE ITEM	PAGE
(WHEN REQUIRED)	
Lubricating	3-42
● Fuel control lever shaft (5 places)	3-42
● Steering brake control lever shaft (18 places)	3-42
● Universal joint (2 places)	3-43
Drain water and sediment in water separator	3-43
CHECK BEFORE STARTING	
Check machine monitor	2-34
Check coolant level, add water	2-34
Check fuel level, add fuel	2-35
Check oil level in engine oil pan, add oil	2-36
Check oil level in power train case (incl. transmission case, torque converter case and bevel gear case), add oil	2-37
Check damper case oil level, add oil	2-38
Check brake pedal tavel	2-38
Check oil level in hydraulic tank, add oil	2-39
Check dust indicator	2-40
Check electric wirings	2-40
Check that lamps light up	2-41
Check horn sound	2-41
Check backup alarm sound	2-42
Check for water and sediment in water separator	2-42
EVERY 250 HOURS SERVICE	
Lubricating	3-45
● Blade left cylinder support yoke (4 places)	3-45
● Blade lift cylinder support shaft (2 places)	3-45
● Blade arm ball joint (3 places)	3-45
● Brace screw (2 places)	3-45
● Ripper tilt cylinder bottom pin (2 places)	3-45
● Ripper lift cylinder bottom pin (2 places)	3-45
● Ripper tilt cylinder rod end pin (2 places)	3-45
● Ripper lift cylinder rod end pin (2 places)	3-45

SERVICE ITEM	PAGE
(EVERY 2000 HOURS SERVICE)	
Clean, check turbocharger	3-65
Check play of turbocharger rotor	3-65
Check alternator, starting motor	3-65
Check engine valve clearance, adjust	3-65
EVERY 4000 HOURS SERVICE	
Check water pump	3-66
Check vibration damper	3-66
Check fan pully and tension pulley	3-66
Check main frame, work equipment (blade, ripper)	3-67

24. SERVICE PROCEDURE

24.1 INITIAL 250 HOURS SERVICE

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

- **REPLACE FUEL FILTER CARTRIDGE**
- **REPLACE TRANSMISSION FILTER ELEMENT AND TORQUE CONVERTER OIL FILTER ELEMENT**
- **CHANGE OIL IN POWER TRAIN CASE, CLEAN STRAINER (INCL. TRANSMISSION CASE, TORQUE CONVERTER CASE AND BEVEL GEAR CASE)**
- **CHANGE OIL IN HYDRAULIC TANK, REPLACE HYDRAULIC OIL FILTER ELEMENT**
- **CHANGE OIL IN FINAL DRIVE CASE**
- **CHECK ENGINE VALVE CLEARANCE, ADJUST**

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

24.2 WHEN REQUIRED

24.2.1 CLEAN INSIDE OF COOLING SYSTEM

⚠ WARNING

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

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

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

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

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

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

Mixing rate of water and antifreeze

Min. atmospheric temperature	°C	–10	–15	–20	–25	–30	–35	–40	–45	–50
	°F	14	5	–4	–13	-22	–31	–40	–49	–58
Amount of antifreeze	ℓ	50	59.5	68	76	83	89	96	101	105
	US gal	13.2	15.7	18.0	20.1	21.9	23.5	25.4	26.7	27.7
	UK gal	11.0	13.1	15.0	16.7	18.3	19.6	21.1	22.2	23.1
Amount of water	ℓ	115	105.5	97	89	82	76	69	64	60
	US gal	30.4	27.9	25.6	23.5	21.7	20.1	18.2	16.9	15.9
	UK gal	25.3	23.2	21.3	19.6	18.0	16.7	15.2	14.1	13.2

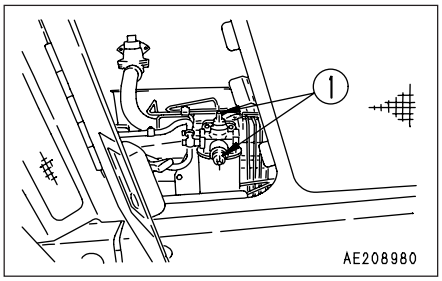
⚠ WARNING

When removing the drain plug, be careful not to be covered with the drained coolant.
Antifreeze is flammable, so keep it away from any flame.

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

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

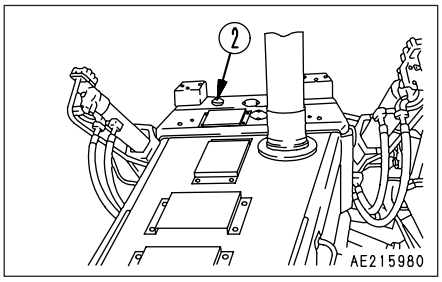
1. Stop the engine and tighten valve ① of the corrosion resistor.



2. Turn radiator cap ② slowly and remove it.

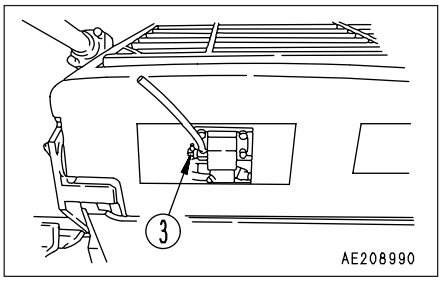
3. Set a container to catch the coolant, open drain valve ③ at the bottom of the radiator and drain valve ④ at the bottom of oil cooler and drain plugs ⑤ at the both sides of cylinder block, and drain off the cooling water.

4. After draining, close up drain valve ③, ④ and plugs ⑤ and pour in clean water (ex. city water) up to the vicinity of the water filler.



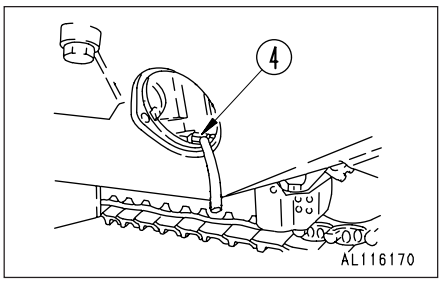
5. When the water reaches the vicinity of the water filler, put the engine at low idling, open drain valve ③, ④ and plugs ⑤, then pass water through the cooling system for 10 minutes.
   When doing this, keep the radiator filled up to the filler with water.
   When filling with water, be careful to check that the hose supplying the water does not come out of the water filler port at the radiator cap.

6 After washing the cooling system, stop the engine. Drain water and close drain valve ③, ④ and plugs ⑤.



7. After draining the water, flush the system with a flushing agent. For details of the flushing method, see the instructions on the flushing agent.

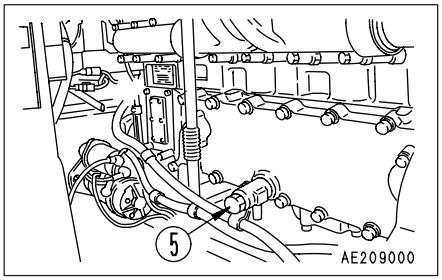
8. After flushing, open drain valve ③, ④ and drain plugs ⑤, completely drain all the water, then close the drain valve and drain plug, and fill with city water up to near the filler port.



9. When the tank is filled to near the water filler port, open drain valve ③, ④ and drain plugs ⑤, start the engine, run at low idling, and continue the flushing operation until clean water comes out.

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

10. When clean water comes out, stop the engine and close drain valve ③, ④ and drain plug ⑤.



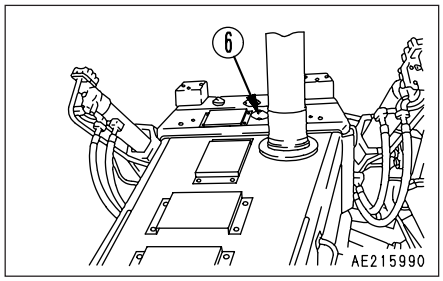
11. Replace the corrosion resistor and open valve ①.
    For details on the corrosion resistor replacement method, see "24.6 EVERY 1000 HOURS SERVICE".

12. Add city water until the water overflows from the water filler port.

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

14. Stop the engine, wait for 3 minutes, add city water until the water level reaches near the water filler port, then tighten the cap ②.

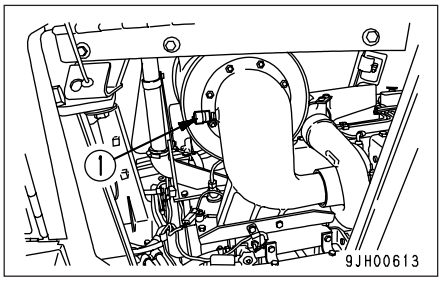
15. Open the cap of subtank ⑥ and add water into the subtank referring to the section “24.3 CHECK BEFORE STARTING”.



24.2.2 CHECK, CLEAN AND REPLACE AIR CLEANER ELEMENT

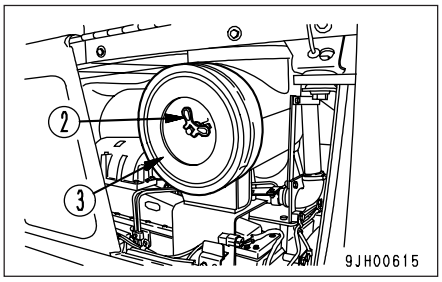
⚠ WARNING

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



CHECK

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

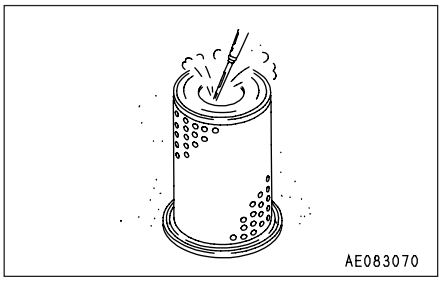


NOTICE

Do not clean the air cleaner element until the air cleaner clogging monitor on the monitor panel flashes.

If the element is cleaned frequently before the clogging monitor flashes, the air cleaner will not be able to display its performance fully, and the cleaning efficiency will also go down.

In addition, during the cleaning operation, more dirt stuck to the element will fall inside the inner element.

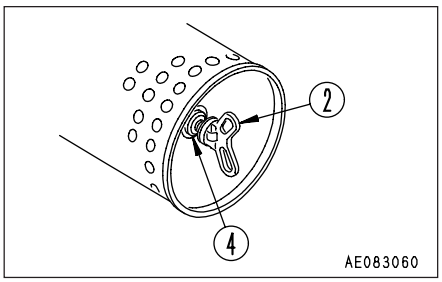


CLEAN, REPLACE OUTER ELEMENT

1. Loosen wing nut ②, then remove the outer element ③.

2. Clean the air cleaner body interior.

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

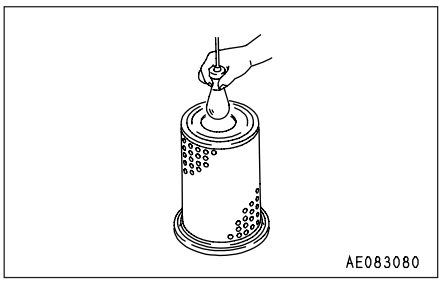


NOTICE

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

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

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



4. Set the cleaned element.

REPLACING INNER ELEMENT

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

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

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

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

5. Install the outer element.

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

24.2.3 CHECK TRACK TENSION

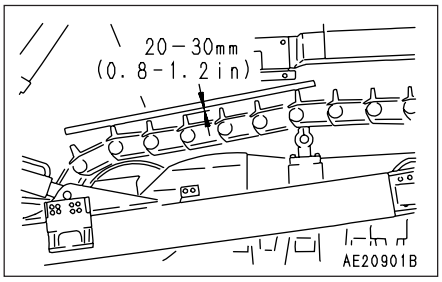
The wear of pins and bushings on the undercarriage will vary with the working conditions and soil properties. It is thus necessary to continually inspect the track tension so as to maintain the standard tension.

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

INSPECTION

Stop the machine on level ground (stop with the transmission in FORWARD without applying the brake). Then place a straight bar on the track shoes between the carrier roller and the idler as shown in the figure, and measure the clearance between the bar and the grouser at the midpoint. If the clearance is 20 – 30 mm (0.8 – 1.2 in), the tension is standard.

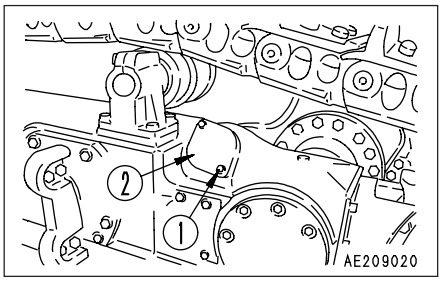
If the track tension is not at the standard value, adjust it in the following manner.

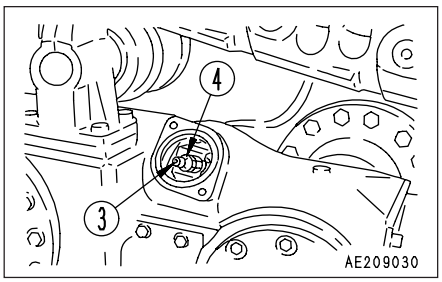


ADJUSTMENT

⚠ WARNING

Grease inside the adjusting mechanism is under high pressure. Grease coming from plug ④ under pressure can penetrate the body causing injury or death. For this reason, do not loosen plug ④ more than one turn. Do not loosen any part other than plug ④. Furthermore, do not bring your face in front of the grease fitting.
If the track tension is not relieved by this procedure, please contact your Komatsu distributor.





- **When increasing tension**

1. First remove the bolt ①, and then remove the cover ②.

NOTICE

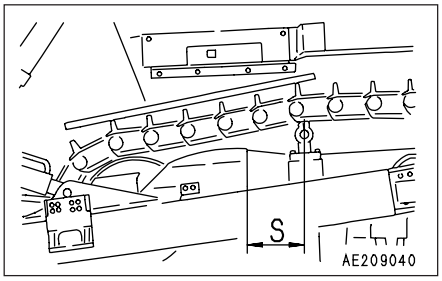
- **When removing cover ②, be careful not to let soil get in.**
- **There is a safety label stuck to the back of cover ②. Be careful not to damage the safety label.**

2. Pump in grease through the grease fitting ③ with a grease pump.

3. To check that the correct tension has been achieved, move the machine backwards and forwards.

4. Check the track tension again, and if the tension is not correct, adjust it again.

5. Continue to pump in grease until S becomes 560 mm (22.1 in). If the tension is still loose, the pin and bushing are excessively worn, so they must be either turned or replaced. Please contact your Komatsu distributor.

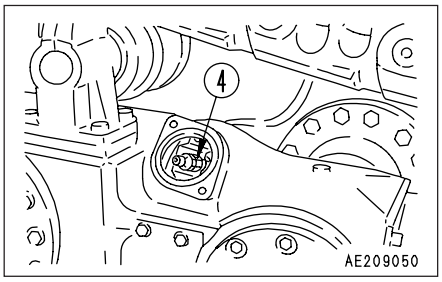


- **When loosening tension**

⚠ WARNING

It is extremely dangerous to release the grease by any method except the procedure given below. If the track tension is not relieved by this procedure, please contact your Komatsu distributor.

1. Remove both bolts ①, then remove cover ②.



NOTICE
- **When removing cover ②, be careful not to let any dirt get inside.**
- **There is a safety label stuck to the back of cover ②. Be careful not to damage the safety label.**

2. Loosen plug ④ gradually to release the grease.
3. Turn plug ④ a maximum of one turn.
4. If the grease does not come out smoothly, move the machine backwards and forwards a short distance.
5. Tighten plug ④.
6. To check that the correct tension has been achieved, move the machine backwards and forwards.
7. Check the track tension again, and if the tension is not correct, adjust it again.

- **When removing track**

⚠ WARNING

Depending on the situation, the operation to remove the track may be extremely dangerous.
Before removing the track, if the procedure above "When loosening tension" does not loosen the track tension, please contact your Komatsu distributor for repair.

24.2.4 CHECK AND TIGHTEN TRACK SHOE BOLTS

If the machine is used with track shoe bolts loose, they will break, so tighten any loose bolts immediately.

- **Method for tightening (shoe bolt)**

1. First tighten to a tightening torque of 1372 ± 137 Nm (140 ± 14 kgm, 1013 ± 101 lbft)) then check that the nut and shoe are in close contact with the link contact surface.

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

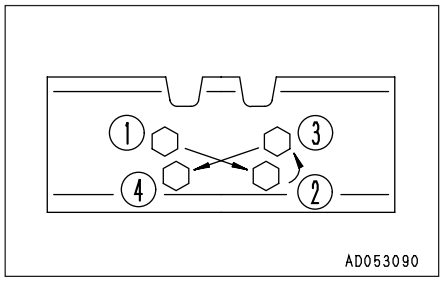
- **Method for tightening (master link connecting bolt)**

1. First tighten to a tightening torque of 686 ± 69 Nm (70 ± 7 kgm, 506 ± 51 lbft) then check that the link contact surfaces are in close contact.

2. After checking, tighten a further 180° ± 10°.

Order for tightening

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

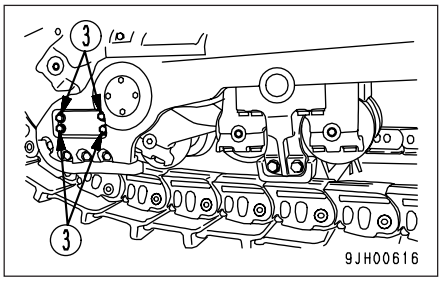


24.2.5 CHECK ELECTRICAL INTAKE AIR HEATER

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

24.2.6 ADJUST IDLER CLEARANCE

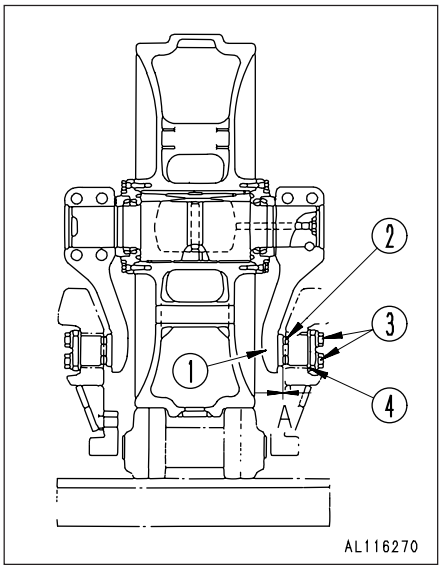
The idler moves forward and backward under external pressure. When this happens, side guide ① and guide plate ② become worn. As they become worn, there is side play in the idler, or the idler turns at an angle, causing the track to come off or resulting in uneven wear, so adjust as follows.



Adjustment

1. Drive the machine for 1 – 2 m (3 – 7 ft) on flat ground, then measure clearance A (4 places: left, right, inside, outside) between the track frame and side guide ①.

2. If clearance A is more than 3 mm (0.1 in), remove bolt ③, then take out shim ④, and adjust so that the clearance on one side is less than 0.5 mm (0.02 in).



REMARK

There are two types of shim (thickness: 0.5 mm (0.02 in) and 1.0 mm (0.04 in).

24.2.7 REVERSE AND REPLACE THE END BITS AND CUTTING EDGES

⚠ WARNING

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

Reverse or replace the end bits and cutting edges before it is worn out to the blade end.

1. Raise the blade to a proper height and apply a block to the frame so as to prevent fall of the blade.

2. Operate the safety lever to the LOCK position.

If the cutting edge and the end bit on both sides are worn out, replace with new one.

If it has been worn out up to the fitting surface, repair the fitting surface and then reverse or replace.

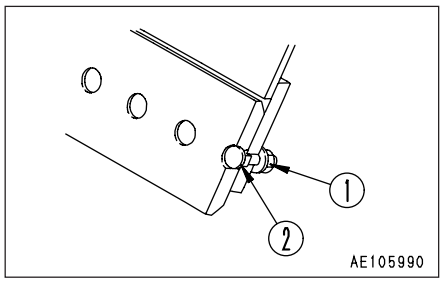
3. Loosen nut ① and remove bolt ②. Then remove the cutting edge and the end bit and clean the mounting surface.

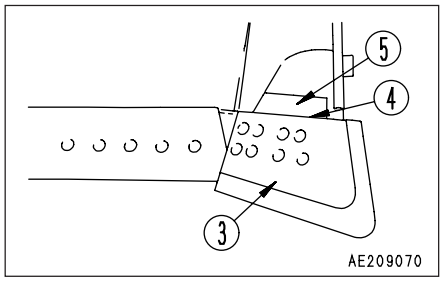
4. Reverse or replace the cutting edge and the end bit when worn out.

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

5. Install the edge to the blade, then tighten partially. Drop the blade three to five times on to the ground or rock to remove any play in bolt ②, then tighten it to the correct tightening torque. When installing end bit ③, put top surface ④ of the end bit in close contact with stopper ⑤, then tighten with the bolts.

   Tightening torque: 2226 ± 275 Nm (227 ± 28 kgm, 1642 ± 203 lbft)





6. After several hours of running, retighten the nuts.

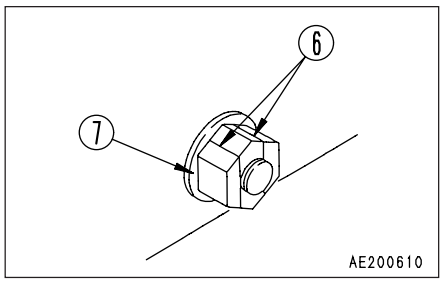
REMARK

The tightening operation is easier if the power wrench that has been supplied is used.

When the nut is rusted and is removed by gas cutting, cut on both sides ⑥ of the nut as shown in the diagram.

Be careful not to damage seat surface ⑦.

If it is damaged, repair it. Be careful not to get spatter on the mounting surface.



24.2.8 CHECK AND CLEAN RADIATOR FIN

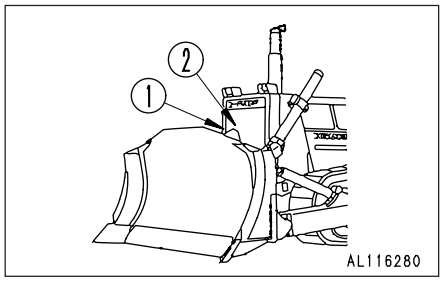
⚠ WARNING

When carrying out cleaning or inspection, always stop the engine and check that the fan is not rotating before starting.

When the radiator fin block with mud, dirt or leaves, clean it as follows.

1. Loosen bolts ① and open radiator grille ②.

2. Clean the radiator fins clogged with mud, dust and leaves with compressed air. Steam or water may be used instead of compressed air.



REMARK

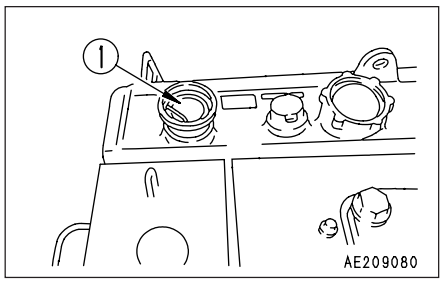
Check the rubber hose. If the hose is found to have cracks to be hardened by ageing, replace such hose with new one. Further, loosen hose clamp should also be checked.

24.2.9 CLEAN FUEL TANK STRAINER

Clean the strainer if there is any dirt collected in it.

Remove the filler cap of the fuel tank and take out strainer ①.

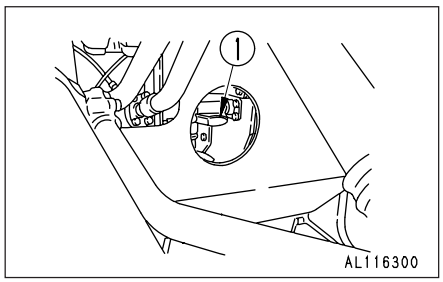
If the strainer is dirty, clean it with diesel fuel.



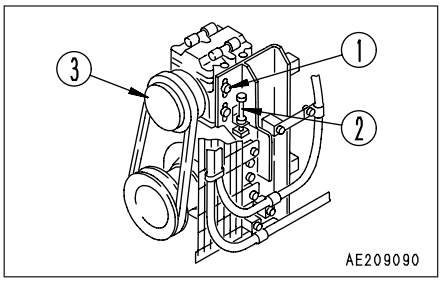
24.2.10 DRAIN WATER AND SEDIMENT IN FUEL TANK

Carry out this procedure after the machine has been at rest for a long time and after a long spell of rainy days.

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



24.2.11 REPLACE AIR CONDITIONER BELT



1. Loosen 4 bolts ① and jack bolt ②, then move compressor 3 to the side.

2. Replace the V-belt.

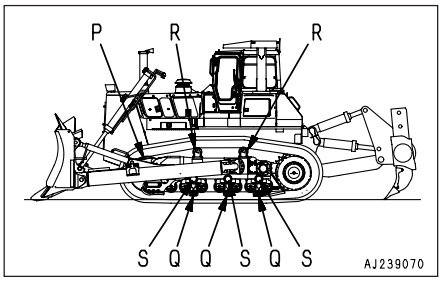
REMARK

When adjusting the V-belt, do not push the compressor directly with a bar. Use jack bolt ②.

3. Tighten jack bolt ② and bolts ①, and apply tension to the V-belt. The standard deflection for the V-belt is approx. 15 – 18 mm (0.6 – 0.7 in) when the belt is pushed by thumb (approx. 6 kg (13.2 lb)) at a point midway between the air compressor pulley and fan pulley.

24.2.12 CHECK UNDERCARRIAGE OIL

Stop the machine on level ground, and check for any reduction in the oil at the idler (portion P), track roller (portion Q), bogie shaft (portion S), and carrier roller (portion R).

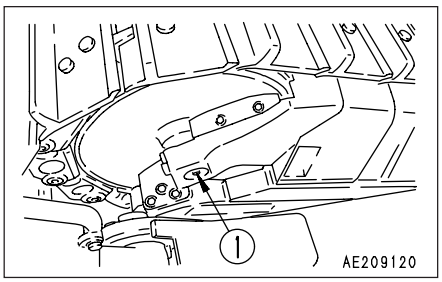


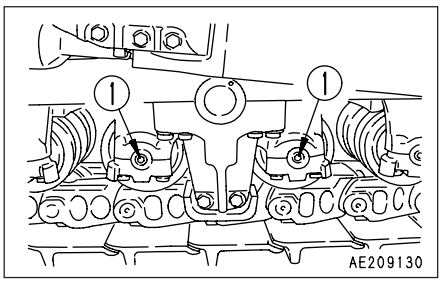
1. Loosen seal bolt ① slowly and check if oil oozes out from the thread. If oil oozes out, the oil level has not gone down, so tighten the bolt.

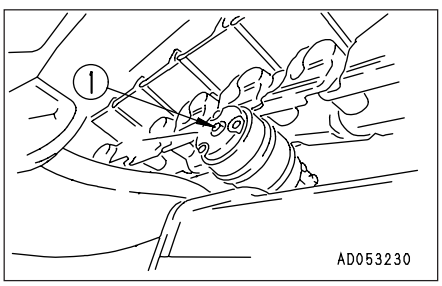
2. If no oil comes out even when seal bolt ① is removed, the oil level is low, so please contact your Komatsu distributor for repair.

REMARK

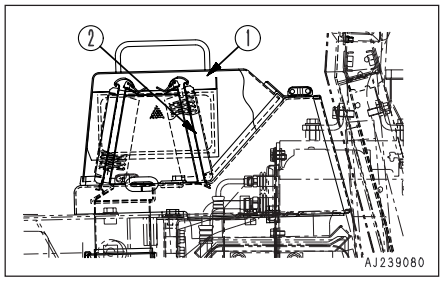
There is one bogie shaft seal bolt ① each on the inside and outside.

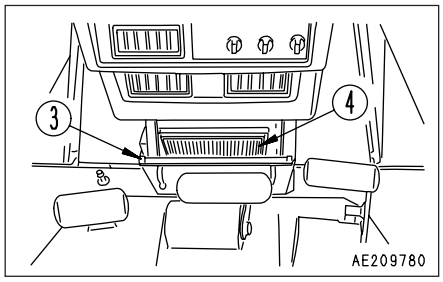






24.2.13 CLEAN AIR CONDITIONER AIR FILTER (FRESH/RECIRC FILTER)





If the air conditioner air filter is clogged or there is dirt or dust in it, clean the filter.

1. Open inspection cover ① and remove fresh air filter ②.

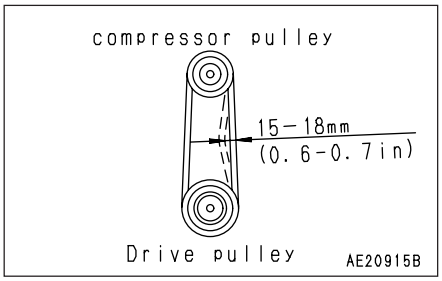
2. Open inspection cover ③ under the front panel and pull up recirculation air filter ④ to remove it.

3. Clean filters ② and ④ with compressed air. If there is oil stuck to the filter, or it is extremely dirty, wash it in a neutral agent. After washing it, dry it completely before installing it again.

REMARK

If the clogging of the filter cannot be removed by washing or using compressed air, replace the filter with a new part.

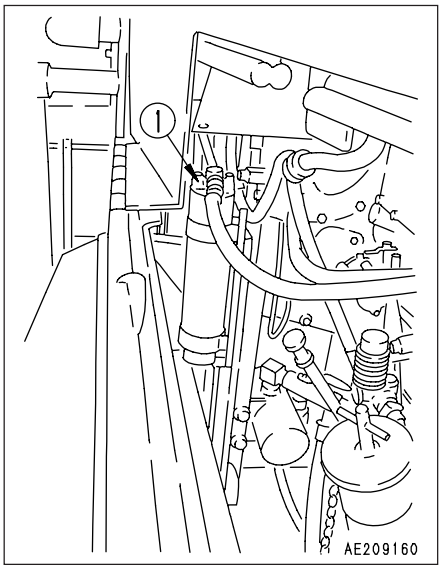
24.2.14 CHECK, ADJUST AIR CONDITIONER



CHECKING TENSION OF COMPRESSOR BELT

If the belt is loose, it will slip and the cooling effect will be reduced. From time to time, press a point midway between the drive pulley and compressor pulley with your finger (approx. 6 kg (13.2 lb)) and check that the tension is 15 – 18 mm (0.6 – 0.7 in).

When the belt is new, there will be initial elongation, so always adjust again after 2 or 3 days.



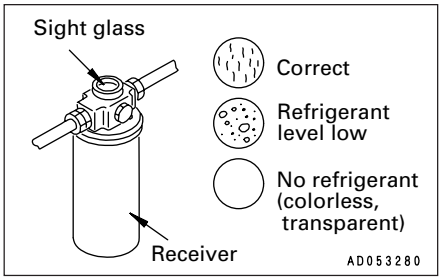
CHECK LEVEL OF REFRIGERANT (GAS)

⚠ WARNING

- **When handling refrigerant gas, always follow local laws and regulations.**
- **The refrigerant used in the cooler is colorless and odorless and does not harm the atmosphere, but if the liquid gets into your eyes or on your hands, it may cause loss of sight or frostbite, so never loosen any part of the refrigerant circuit.**

If the level of the refrigerant (gas) is low, the cooling effect will be reduced. Run the engine at high idling, and check the flow of the refrigerant in the refrigerant circuit through the sight glass of the receiver when the cooler is running at high speed.

- No bubbles in refrigerant flow: Correct
- Bubbles in refrigerant flow (bubbles continuously pass through): Refrigerant level low
- Colorless, transparent: No refrigerant



REMARK

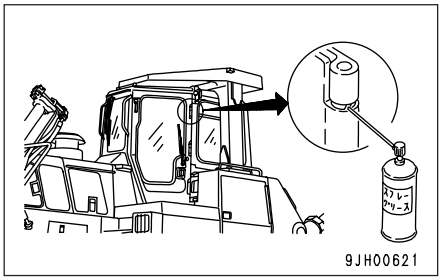
When there are bubbles, the refrigerant gas level is low, so contact your refrigerant dealer to have refrigerant added. If the air conditioner is run with the refrigerant gas level low, it will cause damage to the compressor.

New Freon R-134a is used as refrigerant.

24.2.15 GREASE DOOR HINGE

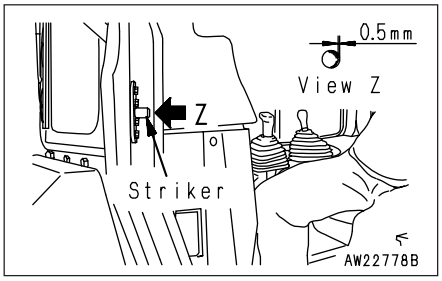
If the door makes a squeaking noise when it is opened or closed, spray lubricant in through the split in the hinge bushing.

If the bushing is worn, replace the hinge.



24.2.16 CHECK DOOR LOCK STRIKER

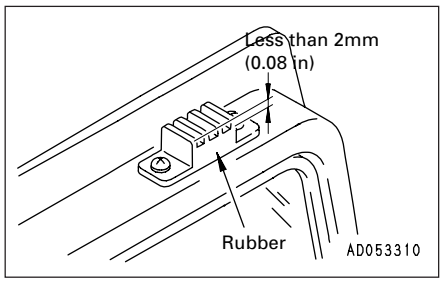
If the wear of the doors lock striker exceeds 0.5 mm (0.02 in), replace the striker. If it is used at it is, the play will increase and this may result in breakage of the hinge or door lock.



24.2.17 REPLACE DOOR DAMPER

If the depth of the door damper rubber groove is less than 2 mm (0.08 in), replace the damper.

There are two dampers each at the top and bottom on the left and right doors.



24.2.18 BLEED AIR FROM HEAD END OF RIGHT PITCH CYLINDER (POWER TILT, POWER PITCH DOZER ONLY)

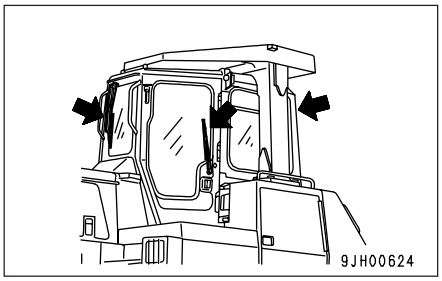
Bleed the air if the work equipment has been removed or repaired.

1. Raise the blade and run the engine at low idling.
2. Operate the left and right tilt 5 – 10 times to bleed the air from the tilt circuit.
3. Operate the forward and rear pitch 5 – 10 times to bleed the air from the bottom end of the right cylinder.
4. Set the left and right cylinders at the neutral position, then carry out the following operations 5 – 10 times to bleed the air from the head end of the right pitch cylinder.

① Forward pitch ←
↓
② Left tilt
↓
③ Right tilt
↓
④ Rear pitch ——┘

24.2.19 REPLACE WIPER BLADE

If the blade is damaged, it will not wipe the window clean, so replace the blade.

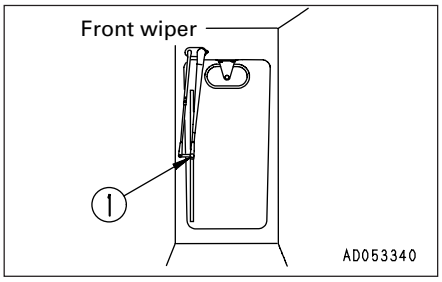


Method of replacement

- Front, rear wiper

1. Remove screw ①, then remove the blade.

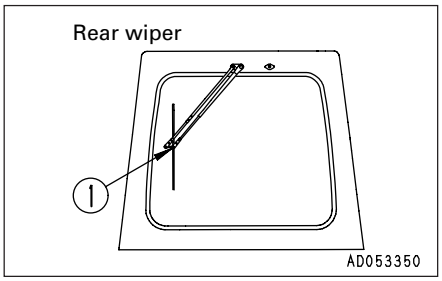
2. Install a new blade, then tighten screw ① securely.



Rear wiper

1. Remove E-ring ①.
   The blade can then be removed.

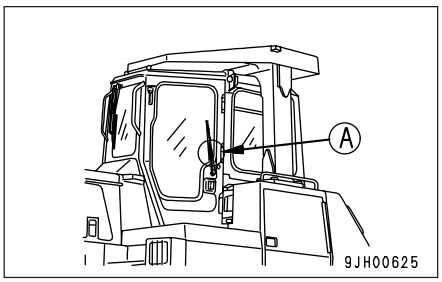
2. Install a new blade, then install securely with E-ring ①.



- Door wiper

1. It is hooked at portion Ⓐ, so move the blade in the direction of the arrow to remove it.

2. Install the new blade and hook it securely.



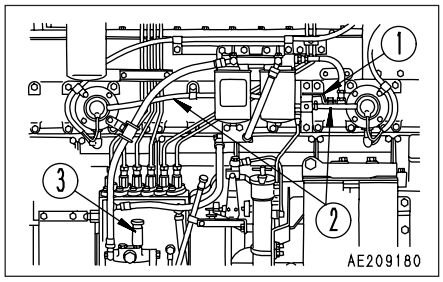
24.2.20 CHECK APS (Automatic Priming System)

Check the APS in autumn (ambient temperature below 15°C, engine cooling water temperature below 13°C).

If it is necessary to inspect the APS when the engine cooling water is above 13°C, so please contact your Komatsu distributor.

1. Open fuel valve ① of the APS and remove hoses ② of the nozzle inlet.

2. Move feed pump ③ up and down to bleed air until no air bubbles comes out of the hose connecting port.
   At the same time, check for fuel leakage and clogging of fuel pipe.



3. Place the fuel control lever in the "engine stop" position. Turn the starting switch to ON position. Turn on the preheater switch. Then, confirm the following.
   - Confirm that the preheater monitor lamp stays on for about 80 seconds.
   - Confirm that when the preheater monitor lamp goes off, the two glow plugs are red hot.
   - With preheater monitor lamp off, turn the starting switch key to START position (do not keep the key in this position for more than 20 seconds), and check for proper fuel combustion inside the intake manifold.

   When checking the glow plug, remove plug.

If any abnormality is assumed, refer to the "16. TROUBLE SHOOTING".

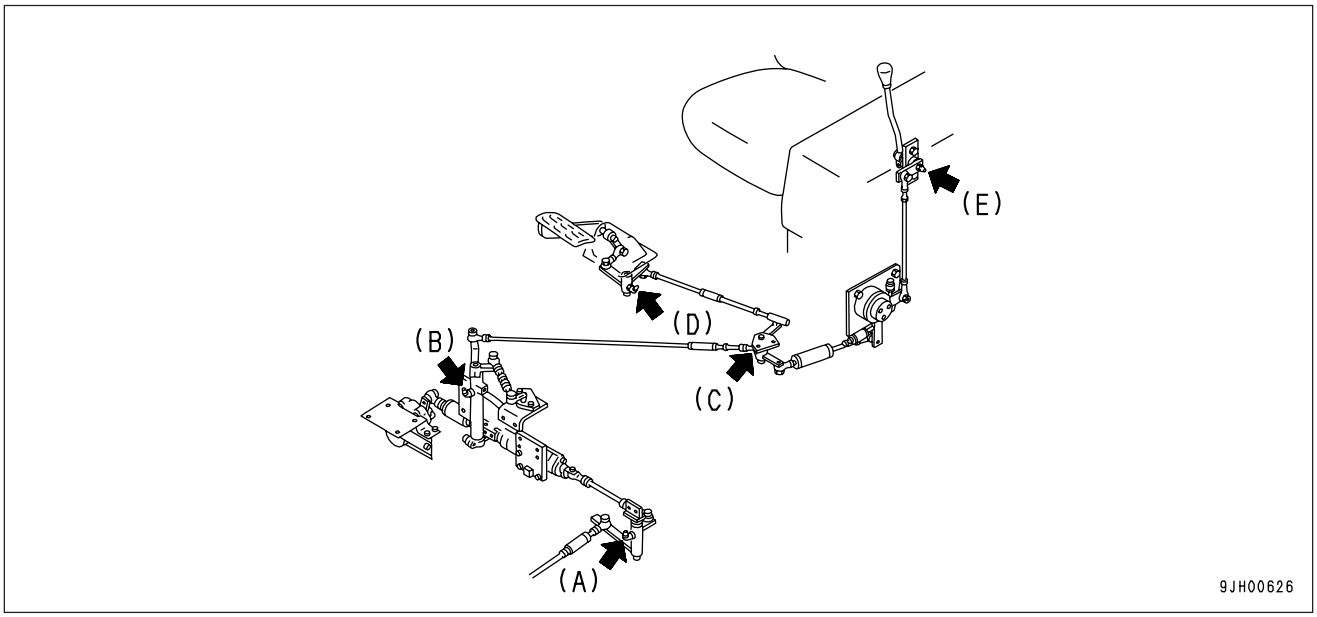
24.2.21 LUBRICATING

1. Lower the work equipment to the ground, then stop the engine.

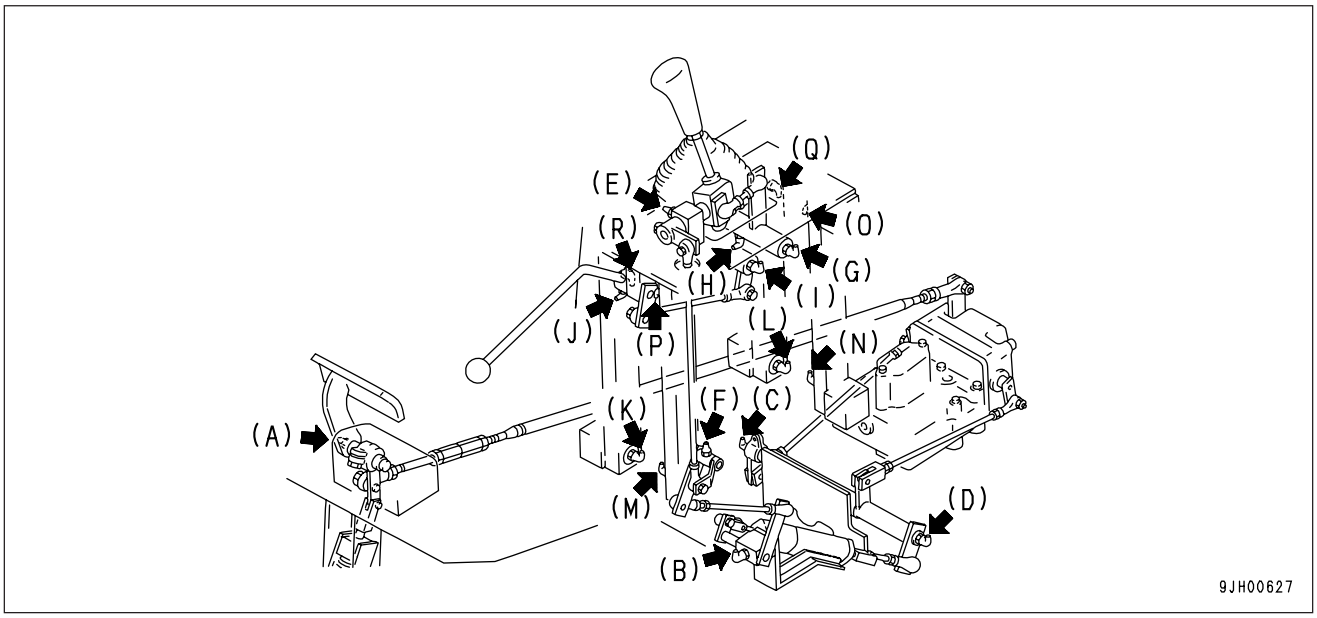
2. Using a grease pump, pump in grease through the grease fittings shown by arrows.

3. After greasing, wipe off any old grease that was pushed out.

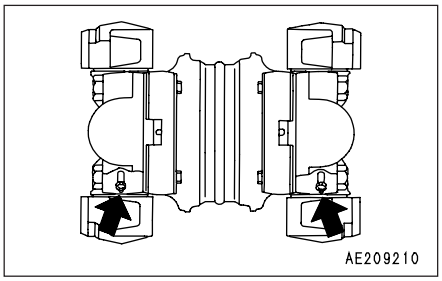
1. Fuel control lever shaft (5 places)



2. Steering brake control lever shaft (18 places)
   Carry out greasing for the 8 places from Ⓚ – Ⓡ when overhauling the machine.



3. Universal joint
   Apply grease to the grease fittings (2 places) shown by arrows.

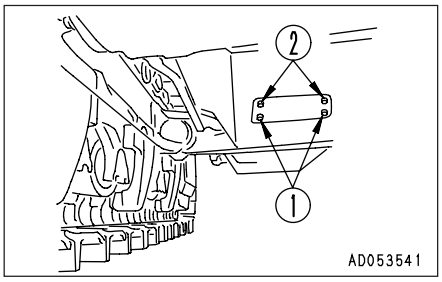


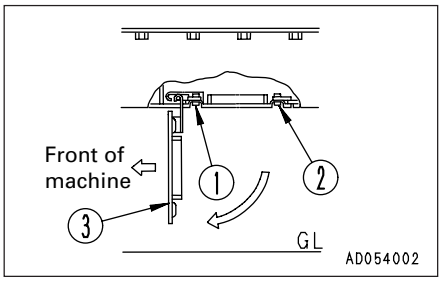
⚠ WARNING

The undercover is heavy.
Never try to open or close the cover when directly beneath it.
When removing bolts ②, carry out the work from the rear below the cover so that you can easily get out of the way.

Remove inspection cover ③ of the undercover at the rear bottom of the chassis as follows.

(1) Remove 2 bolts ① at the front of the machine.
(2) Support the cover with your elbow while gradually removing 2 bolts ② at the rear of the machine.
(3) Lower the cover gradually to open it.





24.2.22 DRAIN WATER FROM WATER SEPARATOR

If float ② of the water separator reaches red line ①, drain the water as follows.

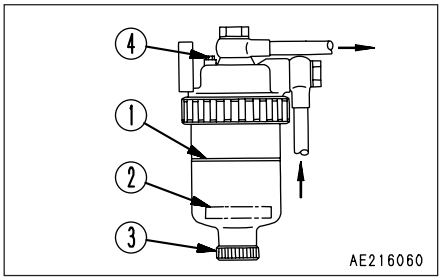
1. Loosen drain plug ③ of the water separator and drain the water until float ② reaches the bottom.

2. If the machine is equipped with air bleed plug ④, loosen air bleed plug ④ also to make it easier to drain the water.

3. Tighten air bleed plug ④ (on machines equipped with an air bleed plug), then tighten drain plug ③.

4. If air was sucked in when the water was drained, bleed the air in the same way as for the fuel filter.

For details, see “REPLACE FUEL FILTER CARTRIDGE (24.5 EVERY 500 HOURS SERVICE)”.



24.3 CHECK BEFORE STARTING

For details of the following items, see "12.1.2 CHECK BEFORE STARTING" in the OPERATION section.

- Check machine monitor
- Check coolant level, add water
- Check fuel level, add fuel
- Check oil level in engine oil pan, add oil
- Check oil level in power train case (incl. transmission, torque converter and bevel gear cases), add oil
- Check damper case oil level, add oil
- Check brake pedal travel
- Check oil level in hydraulic tank, add oil
- Check dust indicator
- Check electric wirings
- Check that lamps light up
- Check horn sound
- Check backup alarm sound
- Check water separator

24.4 EVERY 250 HOURS SERVICE

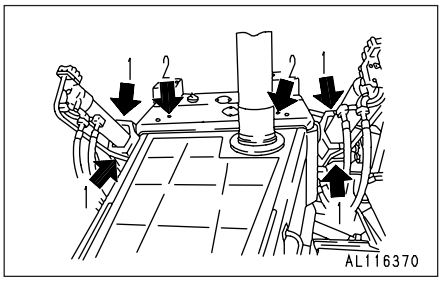
24.4.1 LUBRICATING

1. Lower the work equipment to the ground, then stop the engine.

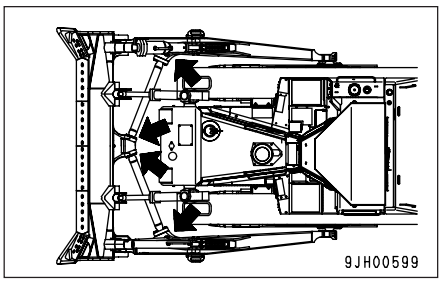
2. Using a grease pump, pump in grease through the grease fittings shown by arrows.

3. After greasing, wipe off any old grease that was pushed out.

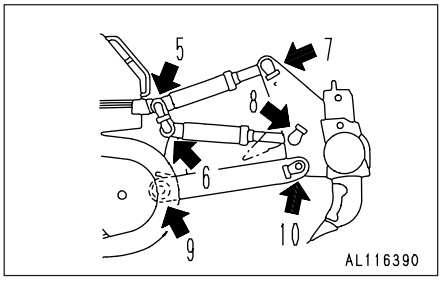
1. Blade lift cylinder support yoke (4 places)
2. Blade lift cylinder support shaft (2 places)



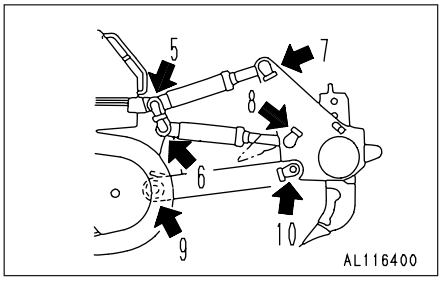
3. Blade arm ball joint (3 places)
4. Brace screw (2 places)



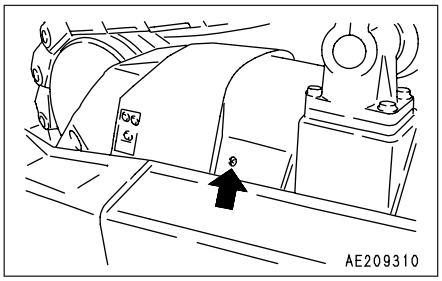
5. Ripper tilt cylinder bottom pin (2 places)
6. Ripper lift cylinder bottom pin (2 places)
7. Ripper tilt cylinder rod end pin (2 places)
8. Ripper lift cylinder rod end pin (2 places)
9. Ripper arm pin (front) (2 places)
10. Ripper arm pin (rear) (2 places)



The ripper on the upper side is a multishank ripper, and the one on the lower side is a giant ripper.



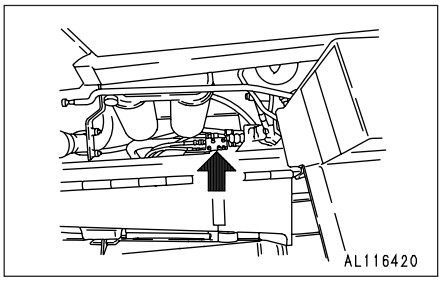
11. Equalizer bar side shaft (2 places)



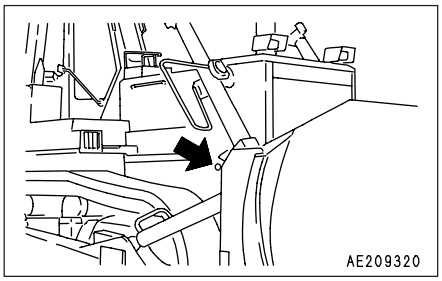
12. Suspension (Equalizer bar center shaft) (1 place)
Grease the suspension through the grease fittings marked by arrow.

1) Carry out greasing of the suspension (equalizer bar center shaft) through the grease fittings marked by arrows.

2) Pump the greasing lever up and down 3 – 5 times.



13. Fan pulley (1 place)

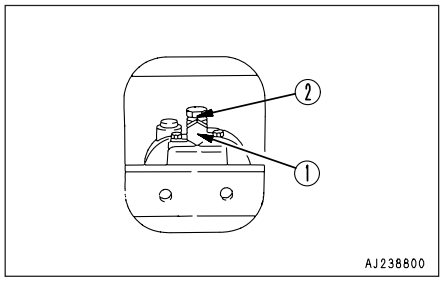


24.4.2 CHANGE OIL IN ENGINE OIL PAN, REPLACE ENGINE OIL FILTER CARTRIDGE

⚠ 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 51 ℓ capacity
- Refill capacity: 51 ℓ (13.46 US gal, 11.22 UK gal)
- Socket wrench, filter wrench.

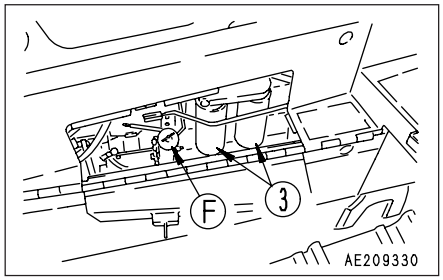


1. Open cover on the under the chassis. Set a container to catch the oil under the drain valve.

2. Remove drain plug ① and loosen drain valve ② slowly to avoid getting oil on yourself, and drain the oil.
   Take care not to loosen drain valve ② so much that the stopper pin in the valve is distorted.
   Tightening torque drain valve ①: 69 ± 10 Nm
   (7 ± 1 kgm, 51 ± 7 lbft)
   Tightening torque drain valve ②: 64 ± 15 Nm
   (6.5 ± 1.5 kgm, 47 ± 11 lbft)

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

4. Tighten drain valve ②.



5. Using a filter wrench, remove full-flow filter cartridge ③ by turning it counterclockwise.
   When doing this, to prevent getting oil on yourself, do not carry out this operation from immediately under the cartridge.
   In particular, if this operation is carried out immediately after stopping the engine, a large amount of oil will come out, so wait for 10 minutes before starting the operation.

6. Clean the filter holder, fill a new cartridge with clean engine oil and coat the packing surface and thread of the new filter cartridge with engine oil (a thin coat of grease is also possible), then install the cartridge.

7. When installing the filter cartridge, bring the packing surface into contact with the filter holder, then tighten a further 3/4 – 1 turn.

8. After replacing the filter cartridge, add engine oil through oil filler Ⓕ until the oil level is between the H and L marks on the dipstick.

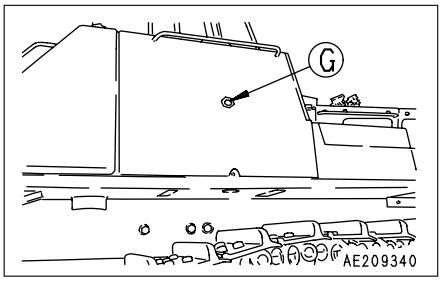
9. Run the engine at idling for a short time, then stop the engine, and check that the oil level is between the H and L marks on the dipstick. For details, see "24.3 CHECK BEFORE STARTING".

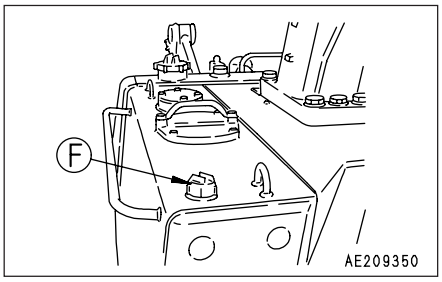
NOTICE

Even if the machine has not been operated for 250 hours, the oil and filter cartridge must be replaced when the machine has been operated for 6 months.

In the same way, even if the machine has not been operated for 6 months, the oil and filter cartridge must be replaced when the machine has been operated for 250 hours.

24.4.3 CHECK OIL LEVEL IN HYDRAULIC TANK, ADD OIL





⚠ WARNING

- **When removing the oil filler cap, oil may spurt out, so stop the engine and wait for the oil temperature to go down, then turn the cap slowly to release the internal pressure before removing the cap.**
- **If oil has been added to above the H mark, stop the engine and wait for the hydraulic oil to cool down, then drain the excess oil from the drain plug.**

1. Lower the blade to the ground in horizontal position, lower the ripper shank vertically and put the tip of the shank in contact with the ground.

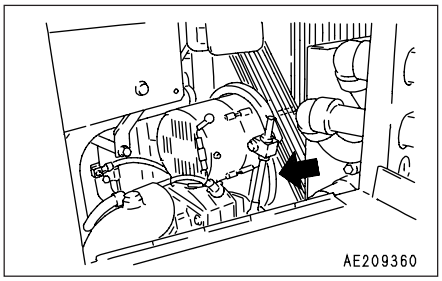
2. Stop the engine and wait for about 5 minutes before checking oil level. If oil level is between top and bottom of red circle sight gauge Ⓖ, it is normal.

NOTICE

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

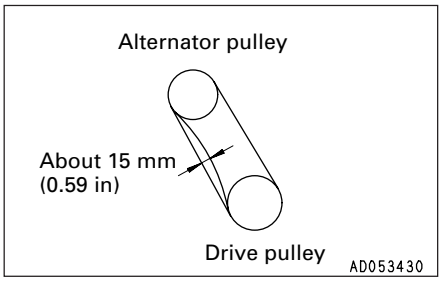
3. If the level is below the L mark, add engine oil through oil filler Ⓕ.

24.4.4 CHECK, ADJUST ALTERNATOR DRIVE BELT TENSION



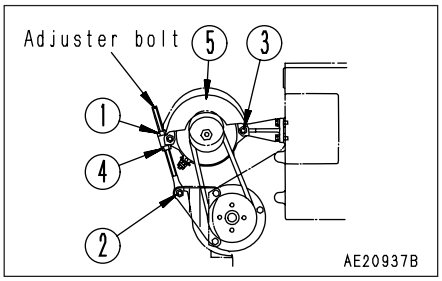
CHECK

The standard deflection for the drive belt is approx. 15 mm (0.59 in) when pressed by thumb (approx. 6 kg (13.23 lb)) at a point midway between the drive pulley and alternator pulley.



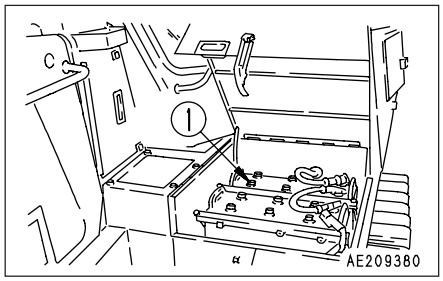
ADJUSTING

1. Loosen bolts and nuts ①, ② and ③.
2. Turn nut ④ clockwise, then move alternator ⑤ to adjust the belt tension so that the deflection is approx. 15 mm (0.59 in) when pushed with a force of 6 kg.
3. Tighten the bolts and nuts ①, ② and ③ to fix alternator ⑤ in position.
4. Check each pulley for damage, wear of the V-groove, and wear of the V-belt. In particular, be sure to check that the V-belt is not touching the bottom of the V-groove.
5. If any belt has stretched and there is no allowance for adjustment, or if there are cuts or cracks on any belt, replace the belt.
6. When the new belt is set, readjust it after operation for an hour.



24.4.5 CHECK LEVEL OF BATTERY ELECTROLYTE

Carry out this check before operating the machine.



⚠ WARNING

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

1. Open the battery cover.

2. Remove cap ① and check that the 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 has spilled, have dilute sulphuric acid added.

3. When adding distilled water to any cell at cap ①, add distilled water also to the other cells.

4. Clean the air hole in the battery cap, then tighten the cap securely.
   Wipe the top surface of the battery with a damp cloth to keep it clean.

NOTICE

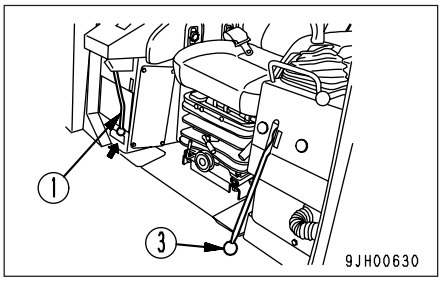
When adding distilled water in cold weather, add it before starting operations in the morning to prevent the electrolyte from freezing.

24.4.6 CHECK BRAKE PERFORMANCE

⚠ WARNING

If the machine moves during the following operation, please contact your Komatsu distributor for repairs immediately.

Before starting the engine, check that the area around the machine is safe, then do as follows.

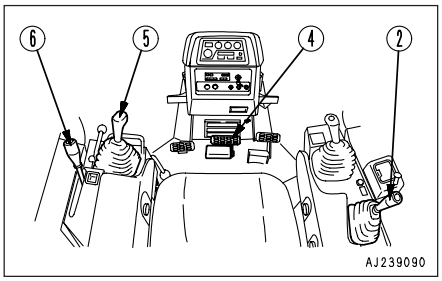


1. Start the engine.

2. Set safety lever ① to the FREE position then operate blade control lever and ripper control lever ③ to raise the blade and ripper.
   Leave the safety lever to the FREE position.

3. Set parking lever ③ to the FREE position.

4. Depress brake pedal ④ and move joystick ⑤ to the FORWARD 2nd position.



NOTICE

Do not place the gear shift lever in the 1st speed position. Otherwise, it will cause damage to the machine.

5. Operate fuel control lever ⑥ to raise the engine speed gradually to full throttle.

6. Check that the machine does not move. This indicates that brake performance is normal.

24.5 EVERY 500 HOURS SERVICE

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

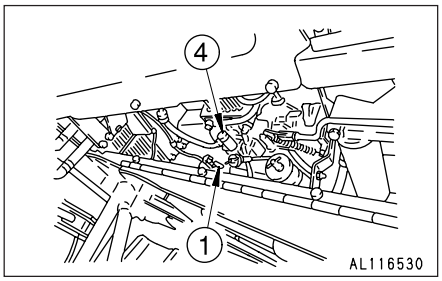
24.5.1 REPLACE FUEL FILTER CARTRIDGE

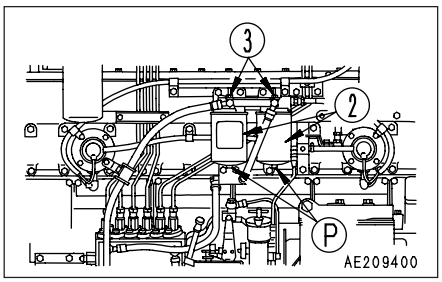
⚠ WARNING

- **Engine is at high temperature immediately after the machine has been operated. Wait for engine to cool down before replacing the filter.**
- **Do not bring fire or sparks near the fuel.**
- **When bleeding the air, be carefull not to let the fuel overflow. It may cause a fire.**

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

1. Set the container to catch the fuel under the filter cartridge.
2. Close valve ①.
3. Remove drain plug Ⓟ at the bottom of the filter, and drain the oil. After draining the oil, tighten drain plug Ⓟ again.
4. Using a filter wrench, turn filter cartridge ② counterclockwise to remove it.
5. 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.
6. When installing, tighten until the packing surface contacts the seal surface of the filter holder, then tighten it up 3/4 to 1 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.
7. Open valve ① and loosen air bleeding plug ③.
8. Loosen the knob of feed pump ④ and move the pump up and down to draw off fuel until air ceases to come out of plug ③.





9. Tighten air bleed plug ③, then push in the knob of feed pump ④ and tighten it.

10. After replacing the filter cartridge, start the engine and check that there is no leakage of oil from the filter seal surface.

REMARK

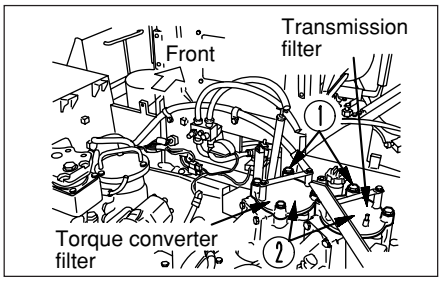
When only replacing the filter cartridge, it is enough to bleed the air from the air bleeding plug at the filter head.

However, if the fuel piping is removed, bleed the air also from the air bleeding valve of the injection pump.

24.5.2 REPLACE TRANSMISSION FILTER ELEMENT AND TORQUE CONVERTER OIL FILTER ELEMENT

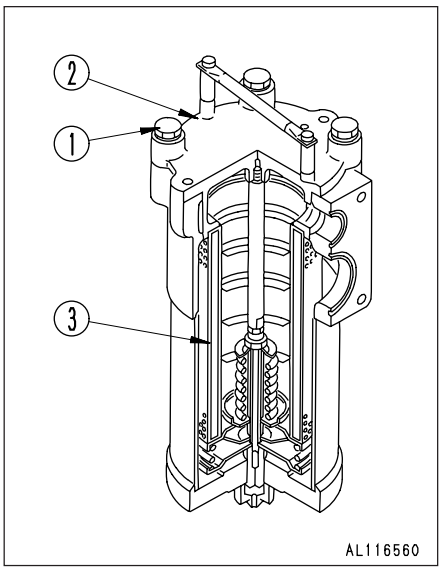
⚠ WARNING

Before opening the filter case, depress the brake pedal several times to release the pressure, then lock the brake pedal. If there is still pressure inside the filter, the oil may spurt out.



1. Remove the floor cover on right side fender.

2. Remove bolts ① and cover ② is lifted up, then take out element ③.
   Clean the inside of the case and the removed parts, and install new elements.
   Replace the O-ring at the same time.



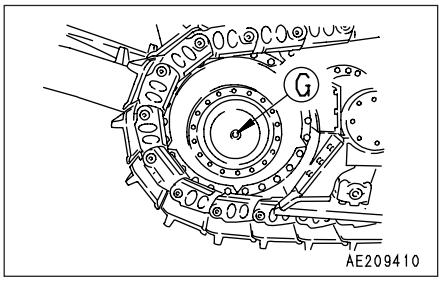
24.5.3 CHECK OIL LEVEL IN FINAL DRIVE CASE, ADD OIL

⚠ WARNING

There is danger that the oil may spurt out under internal pressure, so to the side, and gradually turn the plug to release the internal pressure before removing the plug completely.

1. Place the machine on a horizontal place.

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



3. If the oil level is still too low, add gear oil through oil level plug hole Ⓖ until the oil overflows.
   Before removing oil level plug Ⓖ, remove all the mud and dirt from around oil oil level plug Ⓖ. Be careful not to let any dirt or sand get in when adding oil.

24.5.4 CHECK, REPLACE FAN BELT

Check the V-belt, and replace the V-belt if the condition is as follows.

- If the V-belt is in contact with the bottom of the pulley groove.
- If the V-belt is worn and has sunk below the outside diameter of the pulley.
- If the V-belt is cracked or peeling

Replacement

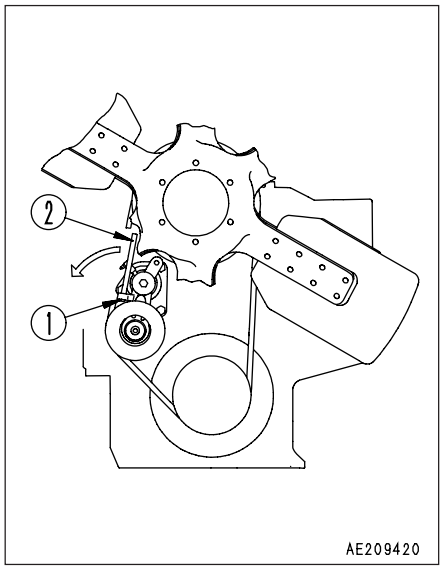
When replacing the V-belt, do as follows.

1. Insert bar ② (length approx. 50 cm) into hole ① (18 mm) of the tension pulley bracket, then pull strongly.

2. The spring will extend and the tension pulley will move to the inside, so remove the old belt and install the new one.

Always replace the V-belts as a set (3 belts).

An autotensioner is installed, so there is no need to adjust the belt tension until the belt is replaced.



24.6 EVERY 1000 HOURS SERVICE

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

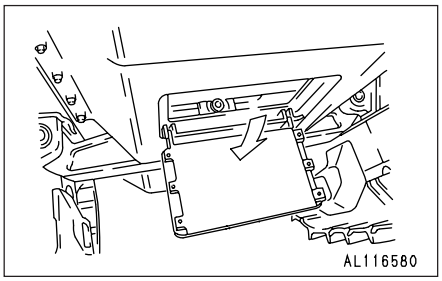
24.6.1 CHANGE OIL IN POWER TRAIN CASE, CLEAN STRAINERS (INCL. TRANSMISSION CASE, TORQUE CONVERTER CASE AND BEVEL GEAR CASE)

⚠ WARNING

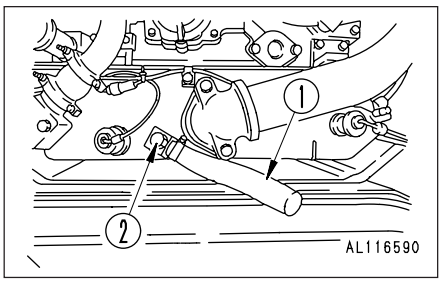
The oil is at high temperature immediately after the machine has been operated. Wait for the oil to cool down before starting the operation.

Prepare the following.
- Container to catch drained oil: Min 150 ℓ capacity
- Refill capacity: 150 ℓ (39.6 US gal, 33.0 UK gal)

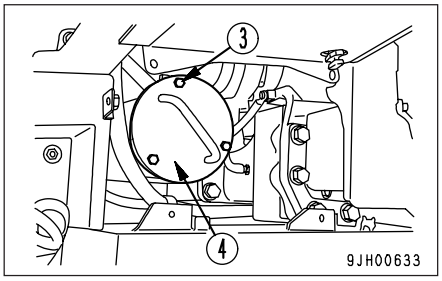
1. Remove the cover on the bottom of the rear body.



2. Pull out hose ① slowly to avoid getting oil on yourself, and loosen drain plug ② to drain the oil.
3. After draining, tighten drain plug ②.
4. Insert hose ① inside the cover, then install the cover.



5. Remove the cover on left fender, remove bolts ③ and case ④.



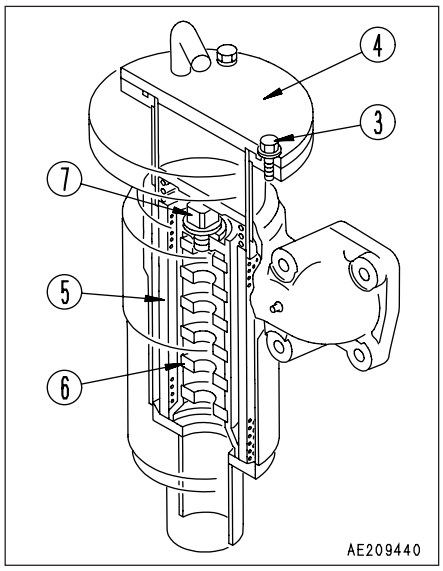
6. Take out strainer ⑤ and magnet ⑥.
   If any damage to strainer ⑤ or magnet ⑥ is found, replace with a new one.

7. Loosen bolt ⑦, then divide into strainer ⑤ and magnet ⑥.
   Tightening torque of bolt ⑦: 46 – 59 Nm (4.7 – 5.9 kgm, 34 – 43 lbft)

8. Remove all dirt from strainer, then wash in clean diesel oil or flushing oil.
   Clean the case interior and the removed parts.

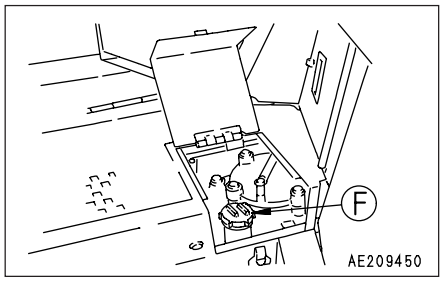
9. Install the strainers to their original position.

10. After installing, replace the element in the power train oil filter.
    For details, see "24.5 EVERY 500 HOURS SERVICE".



11. Refill the specified quantity of engine oil through oil filler Ⓕ.

12. Check that the oil is at the specified level.
    For details, see "24.2 CHECK BEFORE STARTING".



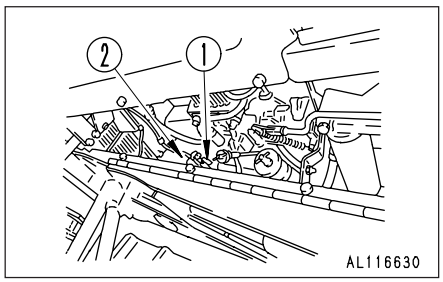
24.6.2 CHECK, CLEAN FUEL STRAINER

1. Tighten valve ①.

2. Remove cap ②, and wash the strainer and strainer case.
   The strainer forms one unit with the cap.

3. After checking and cleaning, set the strainer in the case, then tighten cap ②.

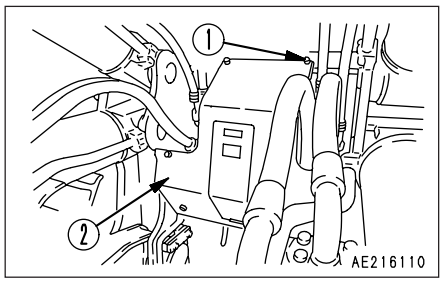
4. After installing, open valve ①.

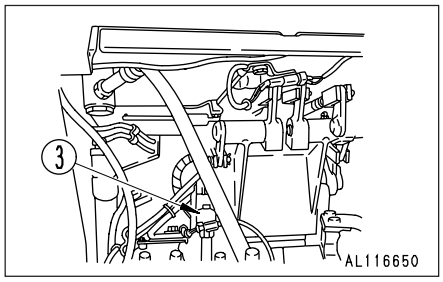


24.6.3 CLEAN STEERING CLUTCH CASE BREATHER

1. Remove bolts ①, then remove cover ②.

2. Remove breather ③ on steering clutch case, and wash out dust remaining inside with diesel fuel or flushing oil.



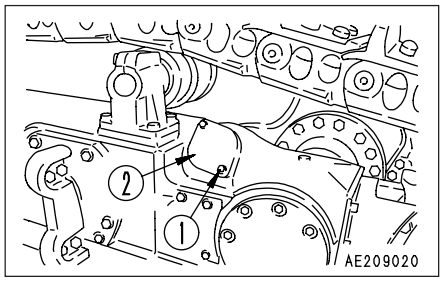


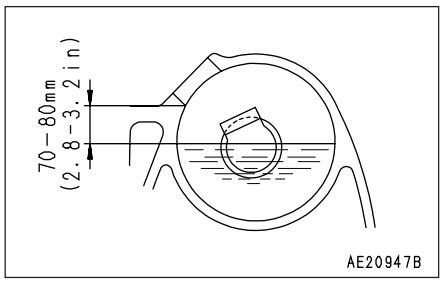
24.6.4 CHECK OIL LEVEL IN RECOIL SPRING, ASSIST CYLINDER CASE, ADD OIL

1. Remove bolts ①, then remove cover ②.
   When removing the cover, be careful not to let dirt or sand get in.

2. Insert a scale and check that the oil level is 70 – 80 mm (2.6 – 3.2 in) from the bottom edge of the inspection port.

3. If the oil level is low, add engine oil so that the oil.

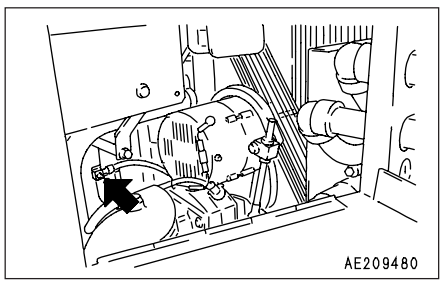




24.6.5 GREASE TENSION PULLEY ASSEMBLY

1. Using a grease pump, pump in grease through the grease fitting shown by arrow.

2. After greasing, wipe off any old grease that was pushed out.



24.6.6 CHECK FOR LOOSE ROPS MOUNT BOLTS

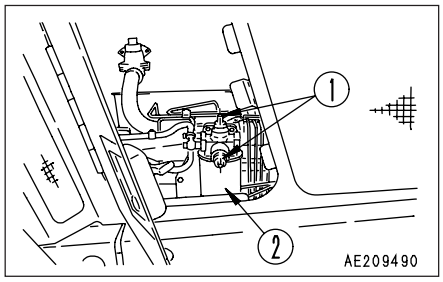
Check for loose and damaged bolts. If any loose bolt is found, tighten to a torque of 1520 – 1912 Nm (155 – 195 kgm, 1121 – 1410 lbft).

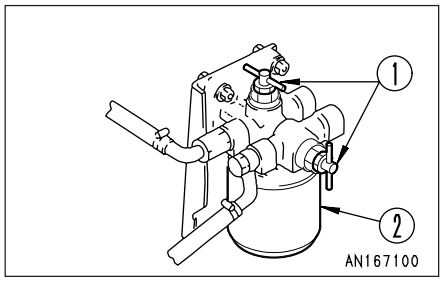
If any damaged bolt is found, replace the bolt with a genuine Komatsu bolt.

24.6.7 REPLACE CORROSION RESISTOR CARTRIDGE

⚠ WARNING

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





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

1. Close valves ① (2 places).
2. Set a container to catch the coolant under the cartridge.
3. Using a filter wrench, remove cartridge ②.
4. Clean the filter holder, coat the packing surface and thread of the new cartridge with engine oil, then install it to the filter holder.
5. When installing, tighten until the packing surface contacts the seal surface of the filter holder, then tighten it up 2/3 of a turn. If the filter cartridge is tightened too far, the packing will be damaged and this will lead to leakage of coolant. If the filter cartridge is too loose, coolant will also leak from the packing, so always tighten to the correct amount.
6. Open valves ① (2 places).
7. After replacing the cartridge, start the engine and check for any leakage of water from the filter seal surface. If there is any water leakage, check if the cartridge is tightened properly.

24.6.8 CHECK ALL TIGHTENING PARTS OF TURBOCHARGER

Contact your Komatsu distributor for inspection or adjustment.

24.7 EVERY 2000 HOURS SERVICE

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

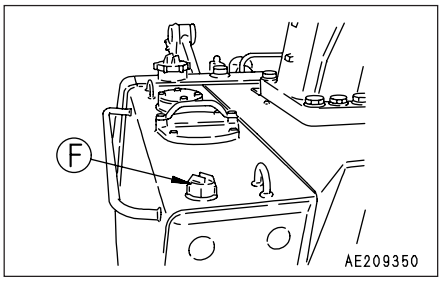
24.7.1 CHANGE OIL IN HYDRAULIC TANK, REPLACE HYDRAULIC OIL FILTER ELEMENT

⚠ WARNING

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

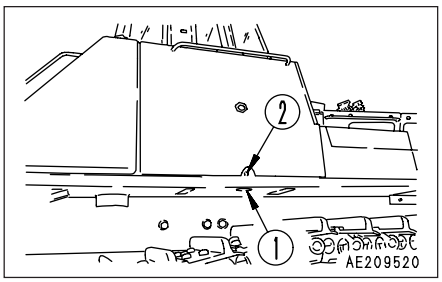
Prepare the following.
- Container to catch drained oil: Min. 120 ℓ capacity
- Refill capacity: 120 ℓ (31.68 US gal, 26.4 UK gal)

1. Lower the blade and ripper on the ground securely, stop the engine and slowly turn the cap of oil filler Ⓕ to release the internal pressure. Then, remove the cap.



2. Remove drain plug ① at the bottom of the tank and loosen drain valve ②. After draining the oil, tighten drain plug ① and drain valve ②. When loosening drain valve ①, be careful not to get oil on yourself.

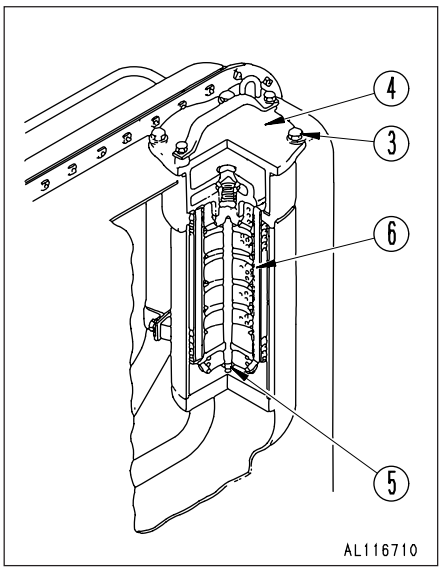
3. Remove bolts ③, lift up cover ④, and take out element ⑥ and valve together with the cover.



4. Remove nut ⑤ which is tightening element ⑥ and clean the removed parts and install new element.
   Replace O-ring at the same time.

5. Add engine oil through oil filler port Ⓕ to the specified level.

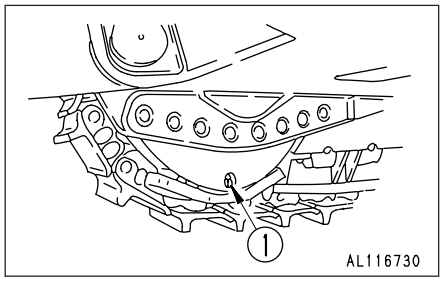
6. After adding oil, check that the oil is at the specified level. For details, see “25.4 EVERY 250 HOURS SERVICE”.

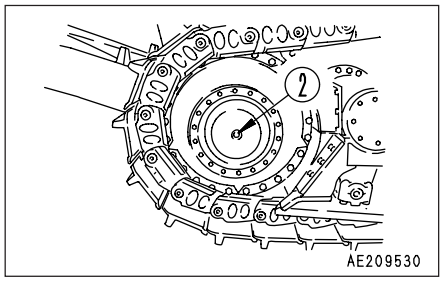


24.7.2 CHANGE OIL IN FINAL DRIVE CASE

⚠ WARNING

- **The oil is at high temperature immediately after the machine has been operated. Wait for the oil to cool down before starting the operation.**
- **There is danger that the internal pressure will cause the oil to spurt out, so when removing the plug, stand to the side and turn the plug slowly to release the internal pressure, then remove the plug carefully.**





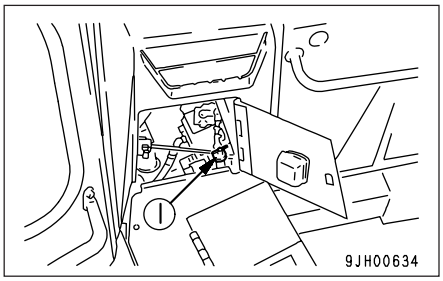
Prepare the following.
- Container to catch drained oil: Min. 65 ℓ capacity
- Refill capacity: each 65 ℓ (17.16 US gal, 14.3 UK gal)

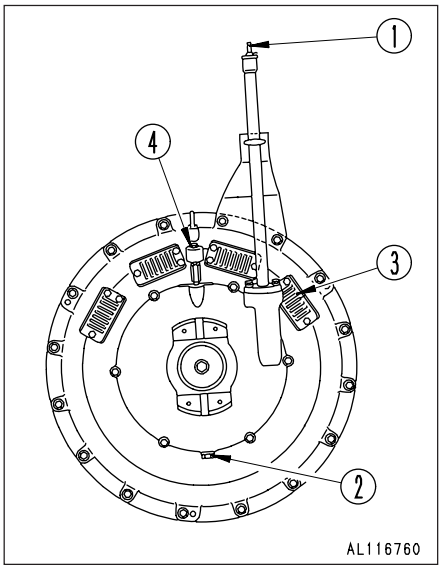
1. Remove oil filler plug ②, then remove drain plugs ①, and drain the oil.
   Remove all the mud and dirt from around oil filler plug ② before removing it. Be careful not to let any dirt or sand get in when adding oil.

2. After draining the oil, tighten the drain plug ①.

3. Refill the engine oil until oil overflows from filler plug hole ②, and tighten the plugs.

24.7.3 CHANGE OIL IN DAMPER CASE, CLEAN AIR HOLE AND BREATHER

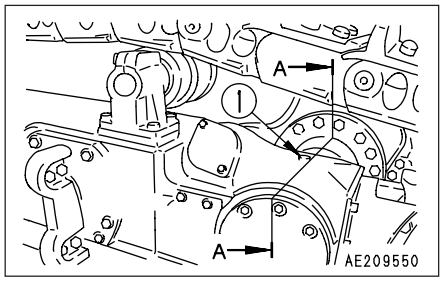


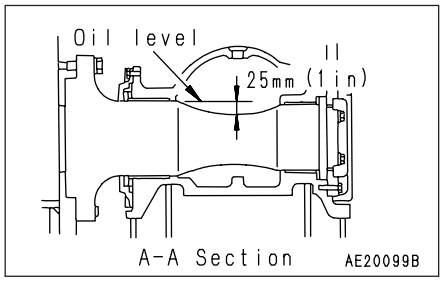


Prepare the following.
- Container to catch drained oil: Min. 2.1 ℓ capacity
- Refill capacity: 2.1 ℓ (0.55 US gal, 0.46 UK gal)

1. Remove breather ④ at the top of the damper.
2. Wash out dust remaining inside of breather with diesel oil and flushing oil.
3. Install breather ④ to the original position.
4. Remove air hole plate ③ (4 places) from the top of the damper cover.
5. Remove any dirt or dust, then wash it in clean diesel oil or flushing oil.
6. Open the inspection cover under the chassis.
7. Remove drain plug ② slowly to avoid getting oil on yourself, and drain the oil.
   After draining the oil, tighten plug ②.
8. Pull out dipstick ①, and add engine oil to the specified level through oil filler.
9. Check that the oil level is between the H and L marks on dipstick ①. For details, see “24.3 CHECK BEFORE STARTING”.
10. Close the inspection cover.

24.7.4 CHECK PIVOT BEARING OIL LEVEL, ADD OIL



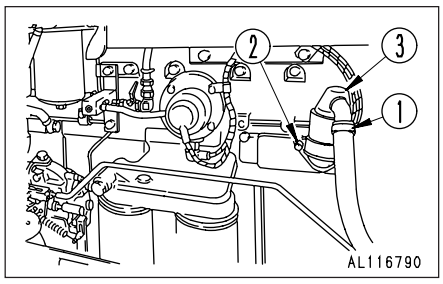


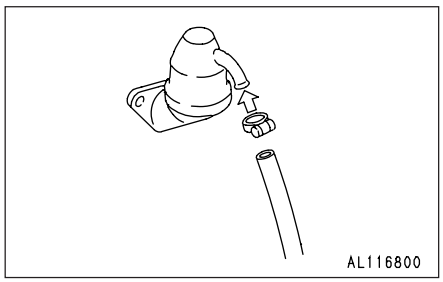
1. Remove plug ①.
   When removing plug ①, be careful not to let dirt or dust get it.

2. Check that the oil is at the level shown in the diagram. If the oil level is low, add engine oil through the hole of plug ①.

   Use Class CD SAE 30 engine oil regardless of the ambient temperature.

24.7.5 CLEAN ENGINE BREATHER ELEMENT





1. Loosen clamp ①, then remove the hose.

2. Remove bolt ②, then remove breather ③.

3. Wash the whole breather in diesel oil or flushing oil, then blow it dry with compressed air.

4. Replace the breather O-ring with a new part, coat with engine oil, and install it.

5. Check the bleather hose, and if there is any oil sludge on the inside, replace it with a new hose.

24.7.6 CLEAN, CHECK TURBOCHARGER

Contact your Komatsu distributor for cleaning or inspection.

24.7.7 CHECK PLAY OF TURBOCHARGER ROTOR

Contact your Komatsu distributor to have the play checked.

24.7.8 CHECK ALTERNATOR, STARTING MOTOR

The brush may be worn, or the bearing may have run out of grease, so contact your Komatsu distributor for inspection or repair.

If the engine is started frequently, carry out inspection every 1000 hours.

24.7.9 CHECK ENGINE VALVE CLEARANCE, ADJUST

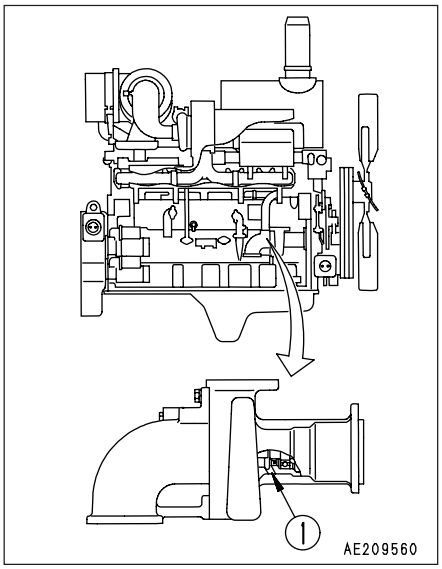
As special tool is required for removing and adjusting the parts, you shall request Komatsu distributor for service.

24.8 EVERY 4000 HOURS SERVICE

Maintenance for every 250, 500, 1000 and 2000 hours service should be carried out at the same time.

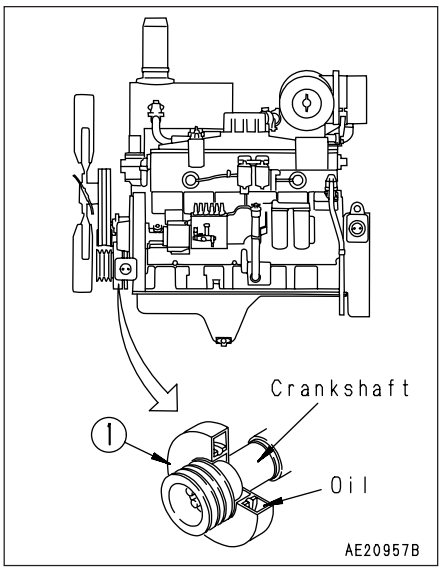
24.8.1 CHECK WATER PUMP

Check that there is oil leakage, water leakage, or clogging of drain hole ①. If any abnormality is found, contact your Komatsu distributor for disassembly and repair or replacement.



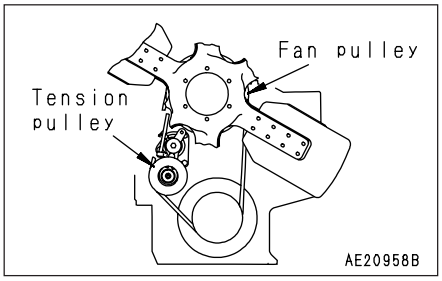
24.8.2 CHECK VIBRATION DAMPER

Check decrease of damper ① fluid, dent or out-of-flat. If there is any abnormality, contact Komatsu distributor for repair.



24.8.3 CHECK FAN PULLEY AND TENSION PULLEY

Check the pulley for play and leakage of grease. If there is any abnormality, please contact your Komatsu distributor for disassembly and repair or replacement.



24.8.4 CHECK MAIN FRAME, WORK EQUIPMENT (BLADE, RIPPER)

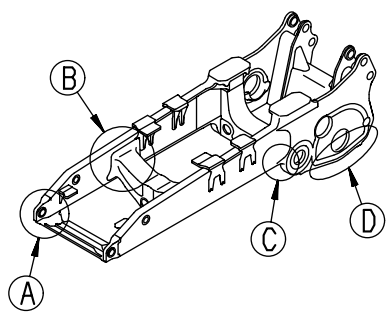
Check after the first 4000 hours, and every 1000 hours after that.

1. Preparation
   Wipe off all the mud that is stuck around portions Ⓐ – Ⓛ of the work equipment and frame to make it easier to carry out the check.

2. Visual check
   Carefully check the base material of the steel casting and welding at portions Ⓐ – Ⓛ, and check that there is no damage.
   If any cracks or other damage are found, carry out repairs.

Please contact your Komatsu distributor for details of the repair procedure.

Main frame



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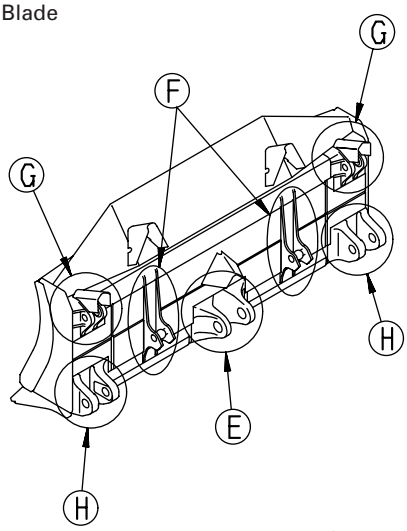
Blade



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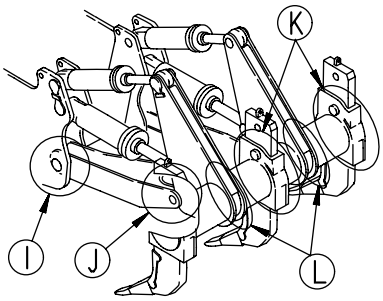
Ripper



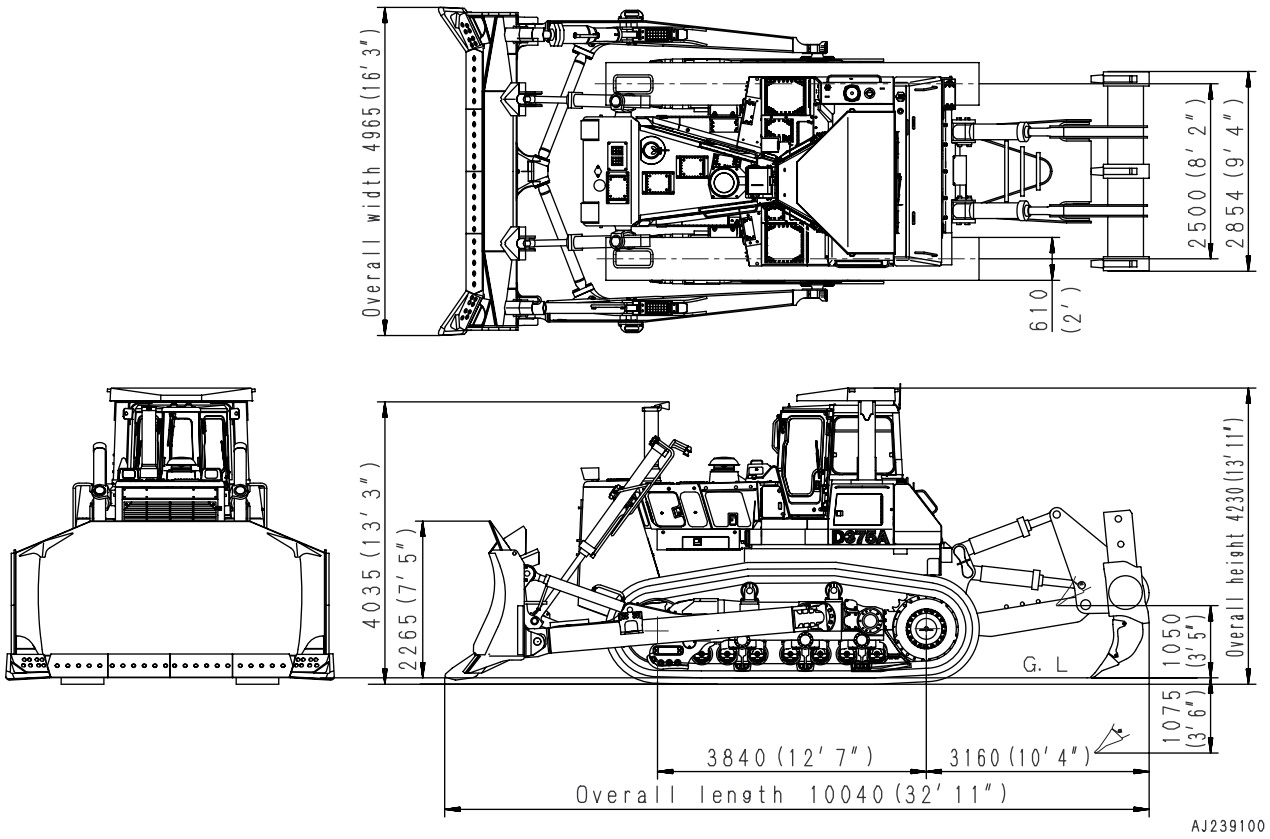
AE209610

SPECIFICATIONS

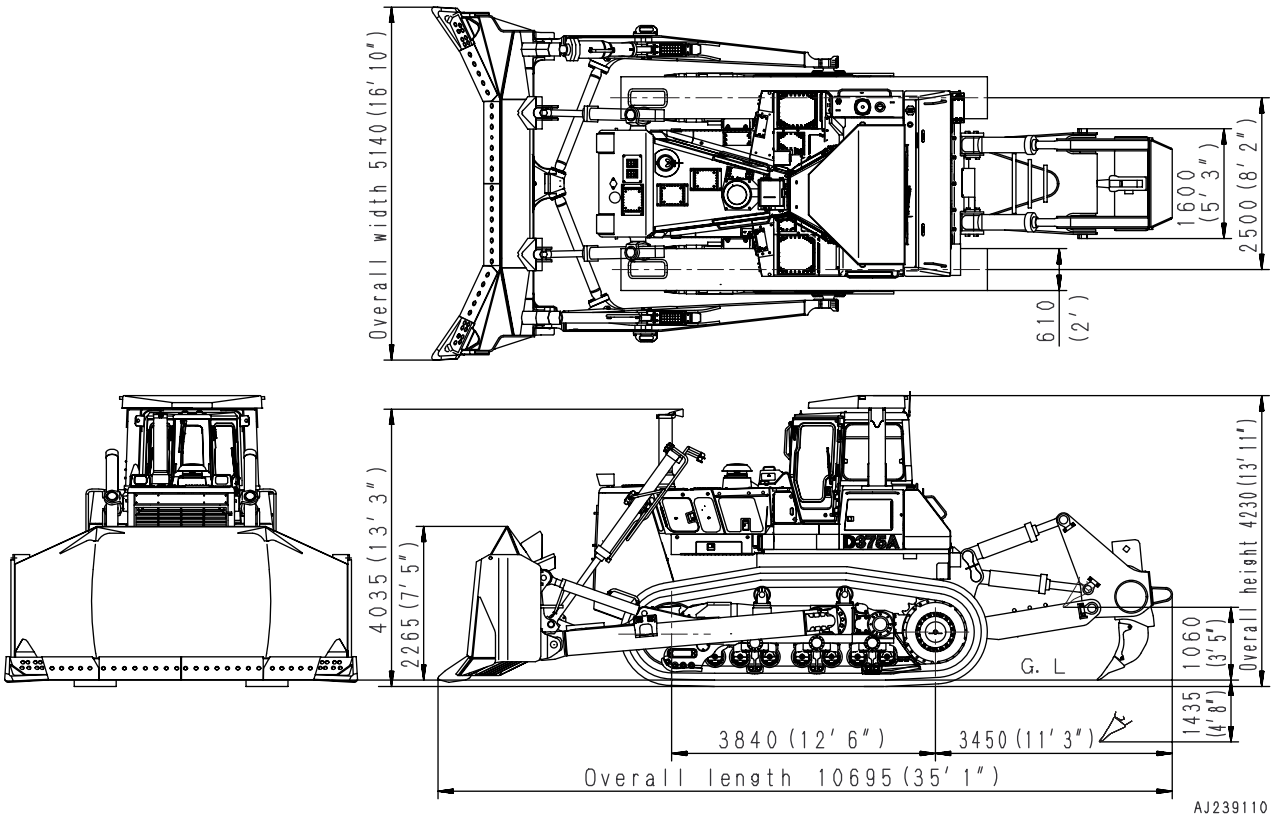
25. SPECIFICATIONS

OPERATING WEIGHT (without operator)			68200 kg (150354 lb)
(with semi-U dozer, variable multi ripper, 610 mm (24 in) shoe, ROPS cab, and air conditioner)			
PERFORMANCE			
● Travel speed	Forward	1st	3.8 km/h (2.4 MPH)
		2nd	6.8 km/h (4.2 MPH)
		3rd	11.8 km/h (7.3 MPH)
	Reverse	1st	5.1 km/h (3.2 MPH)
		2nd	9.2 km/h (5.7 MPH)
		3rd	15.8 km/h (9.8 MPH)
BLADE (semi-U blade)			
● Weight of attachment (incl. tilt cylinder and cylinder support)			10540 kg (23241 lb)
● Max. tilt			1065 mm (3 ft 6 in)
RIPPER (variable giant ripper)			
● Weight of attachment			6720 kg (14818 lb)
● Digging angle			Standard 45° (possible to adjust steplessly between 32.5° and 55.5°)
TOWING			
● Towing force			48500 kg (475623 N)
ENGINE			
● Model			Komatsu SA6D170E-2 diesel engine
● Flywheel horsepower			386 kW (525 HP)/1800 rpm
● Maximum torque			2648 Nm (270 kgm)/1300 rpm
● Starting motor			24 V 11 kW x 2 pieces
● Alternator			24 V 50 A
● Battery			12 V 200 Ah x 2 pieces

Semi-U tilt dozer + variable multi ripper



U tilt dozer + giant ripper



OPTIONS, ATTACHMENTS

26. GENERAL PRECAUTIONS

26.1 PRECAUTIONS RELATED TO SAFETY

If attachments or options other than those authorized by Komatsu are installed, this will not only affect the life of the machine, but will also cause problems with safety.

When installing attachments not listed in this Operation and Maintenance Manual, please contact your Komatsu distributor first.

If you do not contact Komatsu, we cannot accept any responsibility for any accident or failure.

⚠ WARNING

Precautions for removal and installation operations

- **When removing or installing attachments, obey the following precautions and take care to ensure safety during the operation.**
- **Carry out the removal and installation operations on a flat, firm ground surface.**
- **When the operation is carried out by two or more workers, determine signals and follow these during the operation.**
- **When carrying heavy objects (more than 25 kg (55 lb)), use a crane.**
- **When removing heavy parts, always support the part before removing it.**
  When lifting such heavy parts with a crane, always pay careful attention to the position of the center of gravity.
- **It is dangerous to carry out operations with the load kept suspended. Always set the load on a stand, and check that it is safe.**
- **When removing or installing attachments, make sure that they are in a stable condition and will not fall over.**
- **Never go under a load suspended front a crane.**
  Always stand in a position that is safe even if the load should fall.

NOTICE

Qualifications are required to operate a crane. Never allow the crane to be operated by an unqualified person.

For details of the removal and installation operations, please contact your Komatsu distributor.

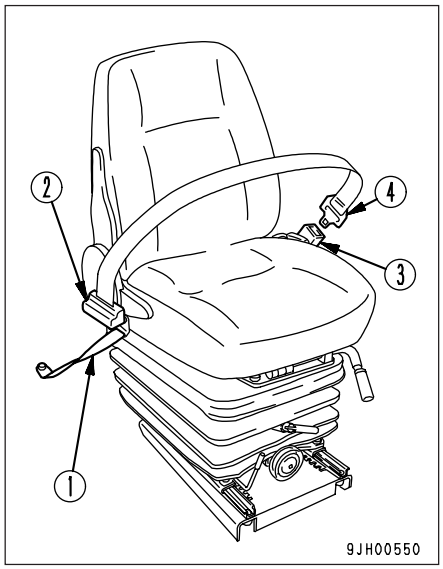
27. USING SEAT BELT

When operating a machine equipped with ROPS, be sure to use the seat belt.

⚠ WARNING

- **Before fastening the seat belt, inspect the securing brackets and belt for abnormal conditions.**
  Replace any worn or damaged seat belt or the securing brackets.
- **Adjust and fasten the seat belt before operating the machine.**
- **Always use seat belt when operating the machine.**
- **Fit the seat belt across your lap without twisting.**

27.1 FASTEN THE BELT AND REMOVE IT IN THE FOLLOWING MANNER



HANDLING SEAT BELT

⚠ WARNING

- **Before fitting the seat belt, check that there is no abnormality in the belt mount bracket or mounting belt. If it is worn or damaged, replace the seat belt.**
- **Even if no abnormality can be seen in the belt, replace the seat belt every 3 years. The date of manufacture of the belt is shown on the back of the belt.**
- **Adjust the seat belt and fit it before starting operation.**
- **Always wear the seat belt during operation.**
- **Fit the seat belt so that it fits across your abdomen and is not twisted.**

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

2. After positioning the seat, adjust the tether belt ①. With the seat unoccupied, tense the belt slightly across the seat and install.

3. Sit in the seat, hold tongue ④ of reel ②, and pull the belt out slowly to a length which fully covers your lap.

4. Insert tongue ④ into buckle ③ and push until there is a click. Pull back reel ② until the belt fits securely across your lap. In this condition, the lock is applied to prevent the belt from extending any further.
   Fit the seat belt across your lap without twisting.

REMARK

If the lock is applied before the tongue is installed into the buckle, return the belt to the reel, then carry out the operation again from the beginning.

5. Tense the belt and check that the lock is applied.

6. To remove the belt, press the red button on buckle ③. The belt will automatically wind in.

Inspect bolts and fittings on the chassis for tightness. Retighten any loose bolts to 19.6 to 29.4 Nm (2 to 3 kgm, 14.5 to 21.7 lbft) torque.

If the seat is scratched or frayed or if any of the fittings are broken or deformed from long service, replace the seat belt immediately.

28. SELECTION OF TRACK SHOE

28.1 SELECTION OF TRACK SHOES

Select suitable track shoes to match the operating conditions.

METHOD OF SELECTING SHOES

If a wider shoe than necessary is used, the load on the track will increase, and this will cause the shoes to bend, links to crack, pins to break, shoe bolts to come loose, and various other problems.

Category	Use	Precautions when using	Track shoe width
A	Bedrock, normal soil	This shoe can be used for a wide range of work from crushed rock to general civil engineering work such as reclamation of residential land. There is no particular limit to its use.	610 mm (24 in)
B	Normal soil	Use this shoe for general soil, such as where the main work is scraper work and pusher work, reclaiming land for golf courses, or stripping the overburden for coal mines. This shoe cannot be used on bedrock. On jobsites where there are rocks in the soil, be careful to avoid letting the machine mount the rocks.	610 mm (24 in)
C	Soft soil	Use this shoe on soft ground where the shoe in category B sinks into the ground. Do not use this shoe on jobsites where there are rocks in the soil.	710 mm (28 in) 810 mm (32 in)

29. PROCEDURE FOR SELECTING RIPPER POINT

29.1 PROCEDURE FOR SELECTING RIPPER POINT

Typical rock	Hardness	Soft ⟷ Hard			Soft ⟷ Medium	Soft ⟷ Hard		
	Type of rock	Shale, limestone	All type of general rock		Sandstone	Basalt, andesite, granite, chest		
	Features	● Little quartz, little wear ● Deposited in layers, so ripping is easy	—		● Proportion of quartz is high (70% – 95%), point wears rapidly	● Proportion of quartz is not so high (40% – 70%) ● Rock is not in layers or seams, so heat is generated at point, point wear rapidly, ripping is difficult		
Suitable point	Features	Point Ⓐ ● Non-symmetrical shape ● Yellow ● Short	Point Ⓑ ● Non-symmetrical shape ● Yellow ● Short	Point Ⓒ ● Symmetrical shape ● Yellow ● Short	Point Ⓓ ● Non-symmetrical shape ● Yellow ● Long	Point Ⓔ ● Non-symmetrical shape ● Red ● Long	Point Ⓕ ● Non-symmetrical shape ● Red ● Short	Point Ⓖ ● Symmetrical shape ● Red ● Short
	Shape	AL116820	AL116820	AL116840	AL116850	AL116850	AL116820	AL116840
	Part No.	195-78-71420	195-78-71320	195-78-71370	195-78-71340	195-78-71350	195-78-71330	195-78-71390

30. HANDLING CAP WITH LOCK

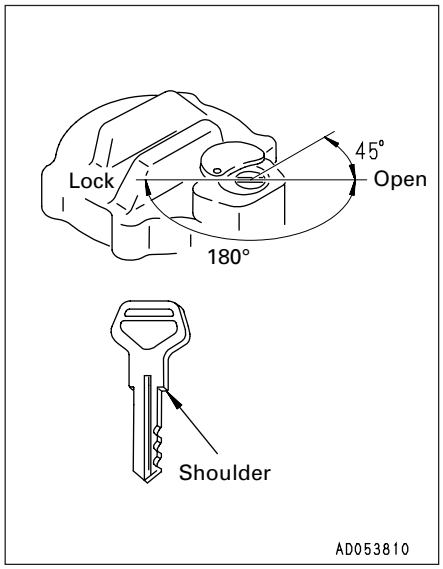
30.1 OPENING AND CLOSING LOCKABLE CAP

Lock-type caps are available for the radiator water filler cap, fuel tank filler cap, power train case oil filler cap, hydraulic tank oil filler cap, and hydraulic tank breather cap. The cap opening and closing method is as follows.

WHEN OPENING CAP

1. Insert the key. Make sure that you have inserted the key fully before turning it. If the key is turned when only partially inserted, it may break.

2. Turn the key counterclockwise to align the match mark on the cap with the rotor groove, then turn the cap slowly. When a click is heard, the lock is released, enabling the cap to be opened.



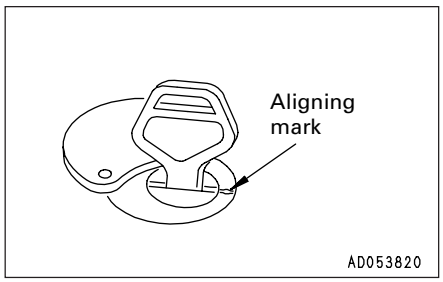
TO LOCK THE CAP

1. Turn the cap into place.

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

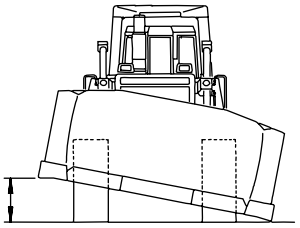
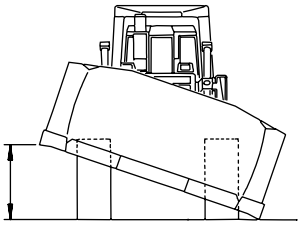
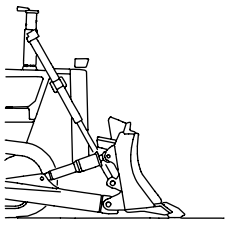
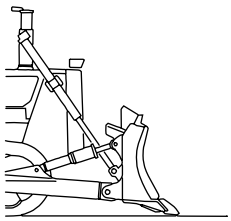
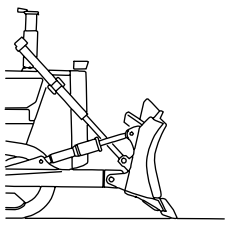
REMARK

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



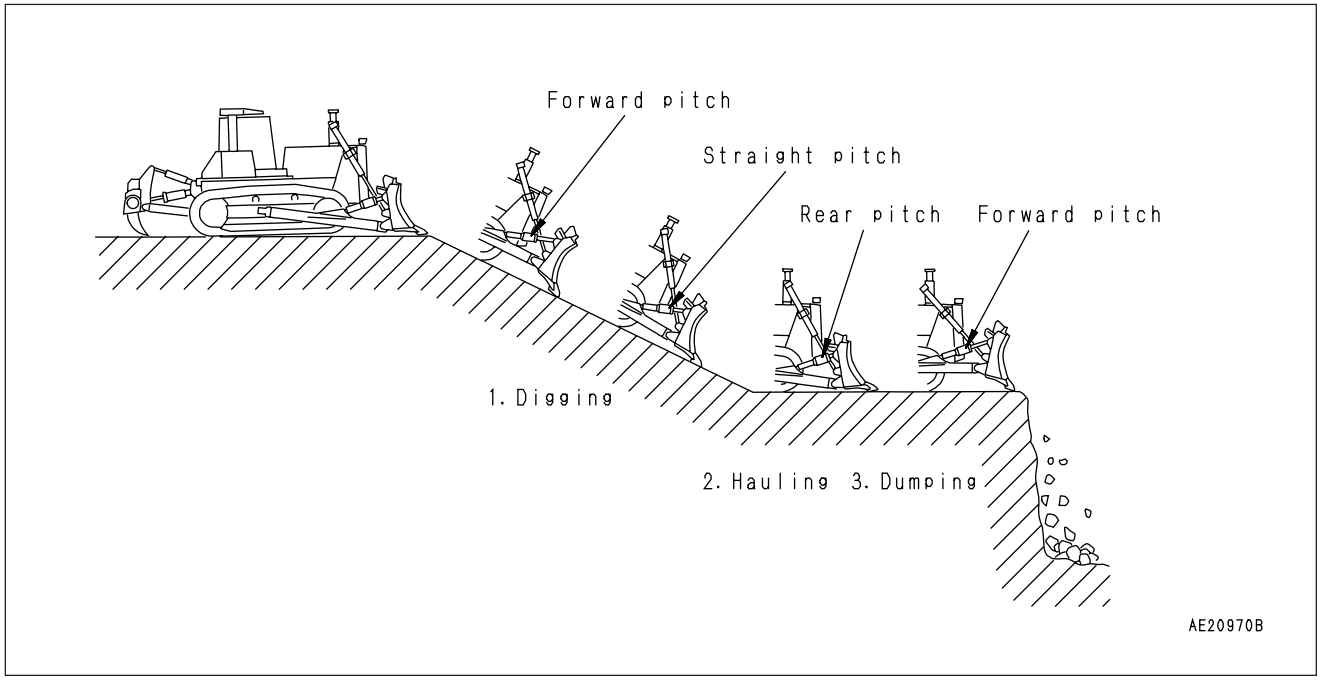
31. EFFECTIVE METHOD OF OPERATION FOR DUAL TILT DOZER

31.1 BLADE CONDITION

Operating method	Applicable operation	Blade position
Single tilt ● Normal tilt operation	● Normal operations	 AE209650
Dual tilt ● Turn the dual button ON and carry out tilt operation	● Digging up boulders ● Side cutting operations (high places) ● Horizontal dozing operations from side slope (rough ground) ● Ditching operations	 AE209660
R pitch (pitch back) ● Turn the pitch button ON and carry out left tilt operations	● Hauling ● Dozing soft soil (filling) ● Leveling operations (spreading) ● Side-cutting operations	 AE209670
S pitch (standard)	● Normal operations	 AE209680
F pitch (pitch dump) ● Turn the pitch button ON and carry out right tilt operations	● Digging natural ground and bed-rock (digging hard soil) ● Pushing soil over cliffs ● Pushing-up soil (Reduces spillage of soil over the top surface of the blade, and reduces amount of soil carried back)	 AE209690

31.2 DOZING WORK
31.2.1 DOZING ON LEVEL GROUND OR DOWNHILL

Natural ground, bedrock



⚠ WARNING

If you feel that the situation is dangerous when dumping the soil, for safety reasons, use two movements to push the soil over the edge.

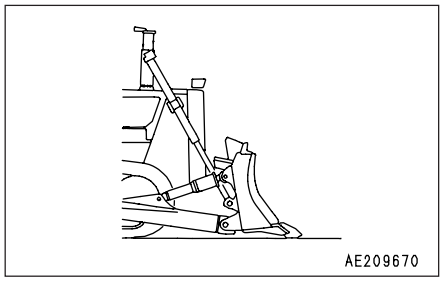
1. Dig with the F (Forward) pitch, and when the load on the blade is approx. 80%, return to S (Straight) pitch and continue digging.

2. Set to R (Rear) pitch which gives a larger load, and haul the soil. Adjust the cutting angle to the most effective angle for rolling the soil.

3. Use F pitch to dump the soil.

Filling, soft soil

Carry out digging in R pitch or S pitch, and haul in R pitch.

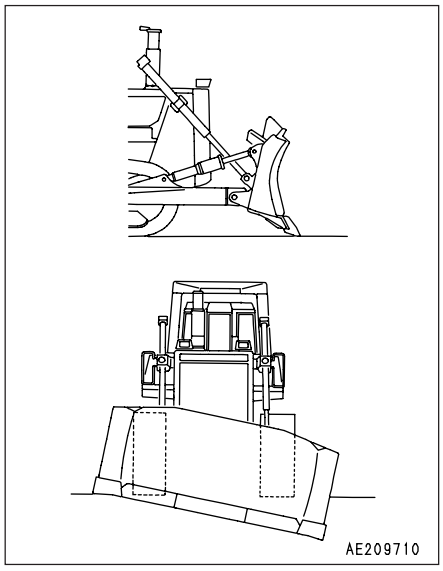


REMARK

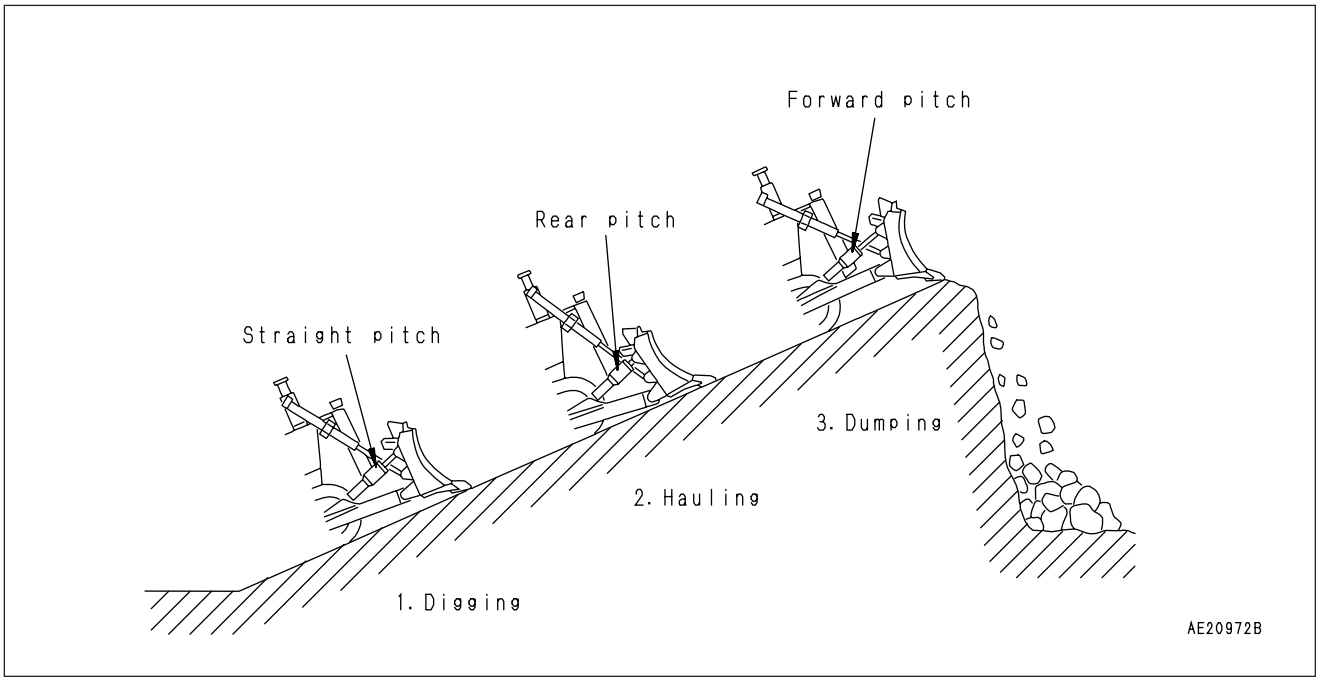
If the digging is carried out in R pitch, there is no sudden digging into the soil, and the operation can be carried out smoothly.

Hard soil (hard clay, shale, etc.)

If digging is carried out in F pitch, and the chassis is raised and the blade is tilted, the end bit will dig in better.



31.2.2 PUSHING-UP SOIL

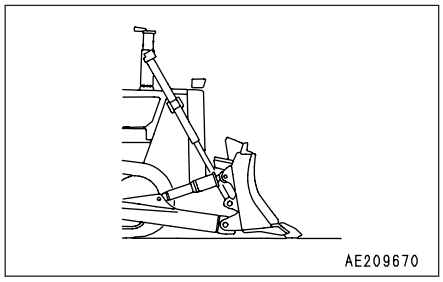


1. Dig with S pitch
   When digging gradually, use R pitch.
   If the ground is hard, use F pitch.

2. Haul with R pitch.
   If there is any spillage of soil over the top of the blade, change to S pitch.

3. Dump the soil with F pitch.
   This dumps the soil more effectively, and less soil is carried back after dumping.

31.3 LEVELING (SPREADING) OPERATIONS



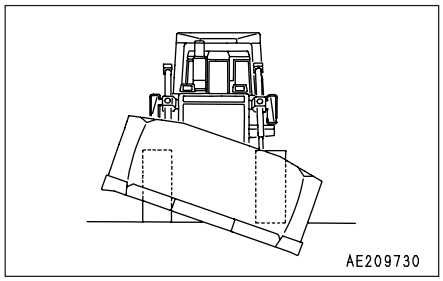
Carry out this operation with R pitch.

When carry out this operation with R pitch, the end bit does not dig in, and the ground can be leveled (or the soil can be spread) smoothly.

REMARK

If the tilt cylinder is moved completely to the end of its stroke, the tilt operation cannot be carried out on one side, so move the cylinder back slightly from the end of its stroke to the S pitch position.

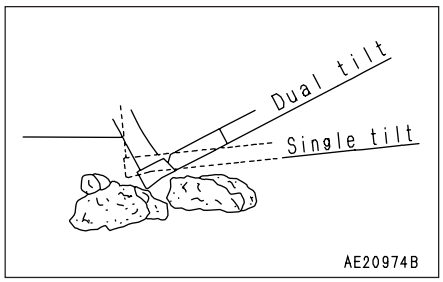
31.4 DITCHING OPERATIONS



If the dual tilt is used, the digging width becomes smaller and a deeper ditch can be dug.

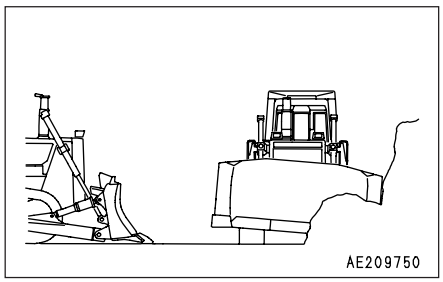
If R pitch is used, the digging can be carried out gradually, and this reduces the unevenness.

31.5 BOULDER RAISING OPERATIONS



Because the dual tilt greatly increases the amount of tilt, the blade can dig in deep and hook under the boulder. In addition, the operating stroke is large, so operations to raise boulders can be carried out effectively.

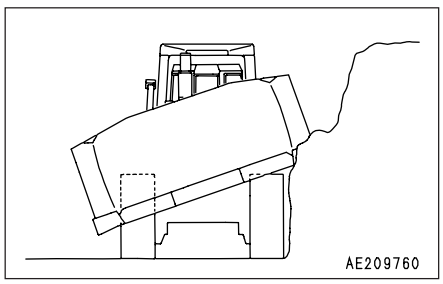
31.6 SIDE-CUTTING OPERATIONS



Carry out this operation in R pitch, and set the end face of the end bit in contact with the rock face to carry out cutting.

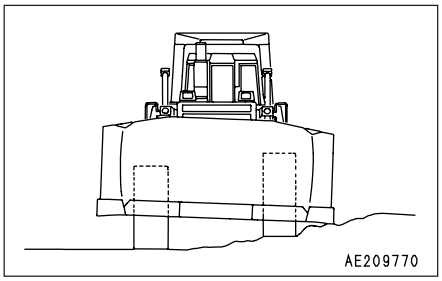
REMARK

With the dual tilt it is possible to increase the amount of tilt and to carry out side-cutting operations on higher walls.



31.7 HORIZONTAL DOZING OPERATIONS FROM SIDE SLOPE (ROUGH GROUND)

The dual tilt can give a larger amount of tilt, so when dozing from a side slope, this is effective because the chassis becomes horizontal after a short digging distance.



D375A-3 BULLDOZER

Form No. SEAM045600T