

Operation & Maintenance Manual

SEAM05690513T

HD465-5

HD605-5

DUMP TRUCK

SERIAL NUMBERS HD465-4763 and up
HD605-1073

WARNING

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

NOTICE

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

KOMATSU

1. FOREWORD

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

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

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

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

WARNING

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

INFORMATION IMPORTANTE SUR LE MOTEUR

CE MOTEUR EST CONFORME AUX NORMES AMÉRICAINES DE L'EPA (ANNÉE DU MODÈLE) ET DE LA CALIFORNIE POUR LES MOTEURS LARGES NON-ROUTIERS À IGNI-TION PAR COMPRESSION. CE MOTEUR EST CERTIFIÉ POUR OPERATION À ESSENCE DIÉSEL.

AVERTISSEMENT

DES BLESSURES PEUVENT RESULTER ET LA GARANTIE S'ANNULER SI LES RPM DU TAUX D'ESSENCE OU L'ALTITUDE EXCEDENT LES VALEURS MAXIMALES PUBLIEES POUR CE MODELE ET SON APPLICATION.

IMPORTANT ENGINE INFORMATION	
THIS ENGINE CONFORMS TO YYYY MODEL YEAR U.S. EPA REGULATION AND THE CALIFORNIA REGULATIONS LARGE NON ROAD COMPRESSION IGNITION ENGINES. THIS ENGINE IS CERTIFIED TO OPERATE ON DIESEL FUEL.	
WARNING INJURY MAY RESULT AND WARRANTY IS VOIDED IF FUEL RATE RPM OR ALTITUDES EXCEED PUBLISHED MAXIMUM VALUES FOR THIS MODEL AND APPLICATION.	
ENGINE MODEL	SERIAL NO.
ENGINE FAMILY	DISPLACEMENT
EXHAUST EMISSION CONTROL SYSTEM	FIRING ORDER
ADV. LOAD OUTPUT	Kw (HP)
VALVE LASH COLD (mm)	EX. IN.
IDLE SPEED	RPM
INITIAL INJECTION TIMING	DEG. BTDC
FAMILY EMISSION LIMIT	
DATE OF MANUFACTURE	
KOMATSU LTD. MADE IN JAPAN	

NO. SÉRIE	DÉPLACEMENT	LITRES	SÉQUENCE DE MISE À FEU	mm ³ /BATTEMENT	TAUX D'ESSENCE À ADV.	LIMITE D'ÉMISSION DE LA FAMILLE	DATE DE FABRICATION
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MODÈLE DU MOTEUR	FAMILLE DU MOTEUR	SYSTÈME DE CONTRÔLE DES ÉMISSIONS D'ÉCHAPPEMENT	CHARGE DE SORTIE ADV.	PORTÉE DE VALVE À FROID (mm)	VITESSE STATIQUE	RÉGLAGE DE L'ALLUMAGE - INJECTION INITIALE	DEG. BTDC
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KOMATSU LTÉE
FABRIQUÉ AU JAPON


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 FEATURES

3.1.1 A HARD-WORKING MACHINE

- This machine mounts the highly evaluated SAA6D170E-2 engine with an output of 551.63 kW (740 HP)/2100 rpm for more powerful travel performance.
- The retarder performance when traveling downhill has been improved by using an exhaust brake in addition to the conventional wet-type multiple-disc retarder to give an improvement of 30% in the absorption torque.

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

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

3.1.3 Trouble-free machine

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

3.2 BREAKING IN THE MACHINE

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

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

During breaking in:

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

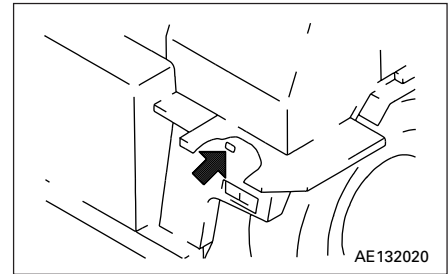
The precautions given in this manual for operating, maintenance, and safety procedures are only those that apply when this product is used for the specified purpose. If the machine is used for a purpose that is not listed in this manual, Komatsu cannot bear any responsibility for safety. All consideration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

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

4. LOCATION OF PLATES, TABLE TO ENTER SERIAL NUMBER AND DISTRIBUTOR

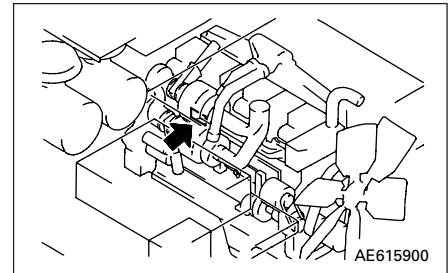
4.1 MACHINE SERIAL NO. PLATE POSITION

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



4.2 ENGINE SERIAL NO. PLATE POSITION

The engine serial number plate is on the upper left side of the cylinder block, when seen from the fan side.



4.3 TABLE TO ENTER SERIAL NO. AND DISTRIBUTOR

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

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SAFETY



WARNING

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

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

6. GENERAL PRECAUTIONS

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

SAFETY RULES

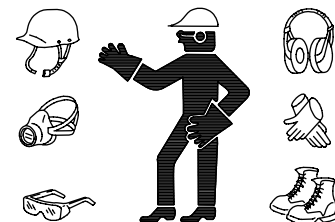
- Only trained and authorized personnel can operate and maintain the machine.
- Follow all safety rules, precautions and instructions when operating or performing maintenance on the machine.
- Do not operate the machine if you are not feeling well, or if you are taking medicine which will make you sleepy,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

SAFETY FEATURES

- Be sure all guards and covers are in their proper position. Have guards and covers repaired if damaged.
Proper position → See “12.1.1 WALK-AROUND CHECK”.
- Learn the proper use of safety features such as safety locks, safety pins, and seat belts, and use these safety features properly.
- NEVER remove any safety features. ALWAYS keep them in good operating condition.
Safety lock, safety pin → See “11. EXPLANATION OF COMPONENTS”.
Seat belt → See “12.1.3 ADJUSTMENT BEFORE OPERATION”.
- Improper use of safety features could result in serious bodily injury or death.

CLOTHING AND PERSONAL PROTECTIVE ITEMS

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

UNAUTHORIZED MODIFICATION

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

STANDING UP FROM THE SEAT

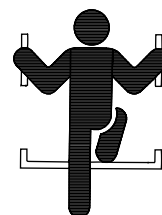
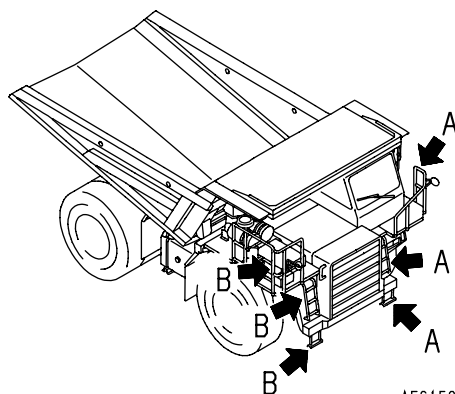
- To prevent any accident occurring if you should touch any control lever that is not locked, always carry out the following before standing up from the operator's seat.
- Place the gear shift lever at neutral and set the parking lever to the PARKING position.
- Lower the dump body, set the dump lever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

MOUNTING AND DISMOUNTING

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

A: For use when getting on or off the machine from the left door

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



FIRE PREVENTION FOR FUEL AND OIL

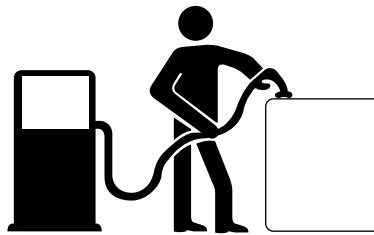
Fuel, oil, and antifreeze can be ignited by a flame. Fuel is particularly flammable and can be hazardous.

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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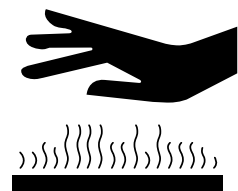
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PRECAUTIONS WHEN HANDLING AT HIGH TEMPERATURE

- 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 dump body and chassis or 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 "PRECAUTIONS DURING MAINTENANCE".

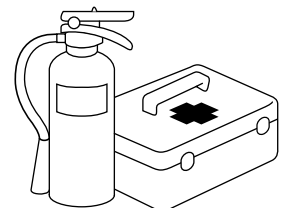
FIRE EXTINGUISHER AND FIRST AID KIT

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.

Location of fire extinguisher, first aid box →

See "11. EXPLANATION OF COMPONENTS".



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ROPS

If ROPS is installed, do not operate the machine with the ROPS removed.

ROPS is installed to protect the operator if the machine should roll over. It supports the load when the machine rolls over and also absorbs impact energy. The Komatsu ROPS fulfills all worldwide regulations and standards, but it is damaged by falling objects or by rolling over, its strength will be reduced and it will not be able to provide its original capacity.

In such a case, please contact your Komatsu distributor for advice on the method of repair. Even if ROPS is installed, it can only protect you properly if you wear the seat belt.

Always fasten the seat belt when operating the machine.

Seat belt → See "12.1.3 ADJUSTMENT BEFORE OPERATION".

PRECAUTIONS FOR ATTACHMENTS

- When installing and using an optional attachment, read the instruction manual for the attachment and the information related to attachments in this manual.
- Do not use optional parts or 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 injury, accidents, product failures resulting from the use of unauthorized attachments will not be the responsibility of Komatsu.

PRECAUTIONS WITH SEAT BELT

- To ensure safety during operations, always wear the seat belt.
- Before fastening the seat belt, check that there is no abnormality in the belt or belt mount bracket. If these are worn or damaged, replace the seat belt.
- Be sure that the seat belt is not twisted when fastening it.

Seat belt → See "12.1.3 ADJUSTMENT BEFORE OPERATION".

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. PRECAUTIONS DURING OPERATION

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

7.1 BEFORE STARTING ENGINE

SAFETY AT WORKSITE

- Before starting operations, thoroughly check the area for any unusual conditions that could be dangerous.
- Check the terrain and condition of the ground at the worksite, and determine the best and safest method of operation.
- Make the ground surface as hard and horizontal as possible before carrying out operations. If 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.
- 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.

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 OPERATION".

- 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 "12.1.4 OPERATIONS, CHECKS BEFORE STARTING ENGINE".

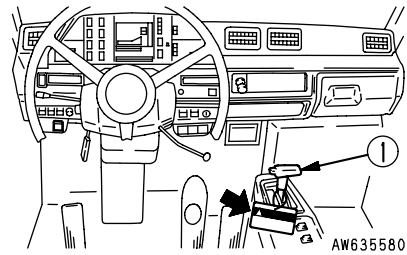
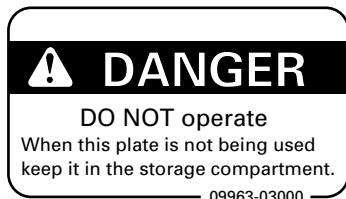
If the above inspections show any abnormality, carry out repairs immediately.



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WHEN STARTING ENGINE

- Walk around your machine again just before mounting it, and check for people and objects that might be in the way.
- Never start the engine if a warning tag has been attached to control lever ①.
- When starting the engine, sound the horn as an alert.
- Start and operate the machine only while seated.
- An additional worker may ride in the machine only when sitting in the passenger seat. Do not allow anyone to ride on the machine body.
- Do not short circuit the starting motor 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

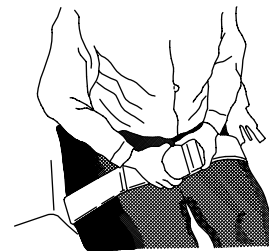
Failure to carry out the checks properly after starting the engine will lead to delays in discovery of abnormalities, and this may lead to serious injury or damage to the machine.

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

PRECAUTIONS WHEN STARTING OFF

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



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PRECAUTIONS BEFORE TRAVEL

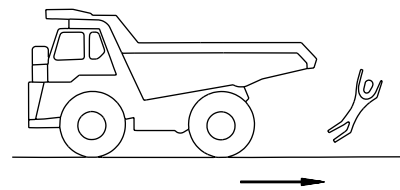
- Always be sure that you know the wear condition of the brakes.
- Check that all the monitor lamps are working normally.
- Check that the brake lamps light up normally.
- Always close the door of the operator's cab.

It is extremely dangerous to travel with the door open. Even when the door is locked open, the lock may come free if you suddenly brake or go down a steep hill, and the door may close unexpectedly.

CHECK WHEN CHANGING DIRECTION

To prevent serious injury or death, always do the following before moving the machine or doing the dumping 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.
- 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.
- When traveling on rough ground, travel at low speed, and avoid sudden changes in direction.
- Avoid traveling over obstacles as far as possible. 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.
- 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.
- Do not turn on slopes or travel across slopes. Always go down to a flat place to perform these operations.
- Do not travel on grass, fallen leaves, or wet steel plates. Even slight slopes may cause the machine to slip to the side, so travel at low speed and make sure that the machine is always traveling directly up or down the slope.
- When traveling downhill, use the retarder brake to reduce speed. Do not turn the steering wheel suddenly.
When traveling downhill, do not use the foot brake except in an emergency.
Retarder brake → See "12.6.1 BRAKE PERFORMANCE GRAPH".
- If the engine should stop on a slope, apply the brakes fully and apply the parking brake also to stop the machine.

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 the following to prevent the work equipment from hitting other objects.
 - When operating in tunnels, under bridges, under electric wires, or other places where the height is limited, be extremely careful not to let the dump body hit anything and lower the dump body completely before driving the machine.
 - To prevent accidents caused by hitting other objects, always operate the machine at a speed which is safe for operation, particularly in confined spaces, indoors, and in places where there are other machines.

DO NOT GO CLOSE TO HIGH-VOLTAGE CABLES

- Do not let the machine touch overhead electric cables. Even going close to high-voltage cables can cause electric shock. Always maintain the safe distance given below between the machine and the electric cable.
- To prevent accidents, always do as follows.
 - On jobsites where there is danger that the machine may touch the electric cables, consult the electricity company before starting operations to check that the actions determined by the relevant laws and regulations have been taken.
 - Wear rubber shoes and gloves. Lay a rubber sheet on top of the operator’s seat, and be careful not to touch the chassis with any exposed part of your body.
 - Use a signalman to give warning if the machine approaches too close to the electric cables.
 - If the work equipment should touch the electric cable, the operator should not leave the operator’s compartment.
 - When carrying out operations near high voltage cables, do not let anyone come close to the machine.
 - Check with the electricity company about the voltage of the cables before starting operations.

	Voltage	Min. safety distance	
Low voltage	100 • 200 V	2 m	7 ft
	6,600 V	2 m	7 ft
Very high voltage	22,000 V	3 m	10 ft
	66,000 V	4 m	14 ft
	154,000 V	5 m	17 ft
	187,000 V	6 m	20 ft
	275,000 V	7 m	23 ft
	500,000 V	11 m	36 ft

USING BRAKES

- When the machine is traveling, do not rest your foot on the brake pedal. Put your foot on the pedal only when using the brakes.
If you travel with your foot resting on the pedal, the brake will always be applied, and this will cause the brakes to overheat and fail.
- Do not depress the brake pedal lightly to apply partial braking to control the travel speed. This will cause the brake to overheat and it will be impossible to use the brakes effectively when they are needed.
- When traveling downhill, use the braking force of the engine, and always use the brake pedal.

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).
- When travelling on snow-covered roads, always install tire chains.

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 ROPS and wear the seat belt when working in areas where there is danger of falling rocks or of the machine turning over.

WHEN RAISING DUMP BODY

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

WHEN DUMPING

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

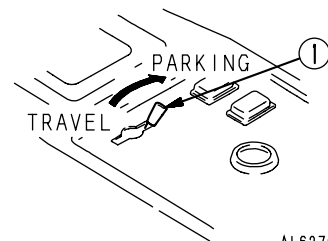
PARKING MACHINE

- 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.
- If it is necessary to park the machine on a slope, set blocks under the tires to prevent the machine from moving.
- When parking on 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.
- When leaving the machine, lower the work equipment completely. Then set parking brake lever ① to the PARKING position, stop the engine, and use the key to lock all the equipment. Always remove the key and take it with you.

Parking procedure → See "12.12 PARKING MACHINE".

Places to locks → See "12.16 LOCKING".

- Always close the door of the operator's compartment.

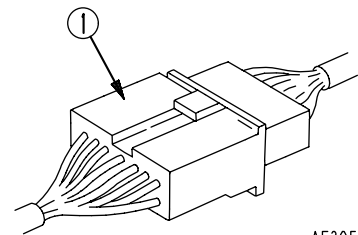


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RECAUTIONS IN COLD AREAS

- Check the operation of all safety devices, switches, and sensors, and if there is any the snow or ice, clear it away.
- Always be sure to drain the water from the air tank.
- If there is no sound of the air being released when the service brake or parking brake are operated, check the air tank pressure and remove any snow or ice from around the brake valve.
- Do not raise the engine speed immediately after starting the engine.
- 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.
- 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".



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7.3 SHIPPING

SHIPPING

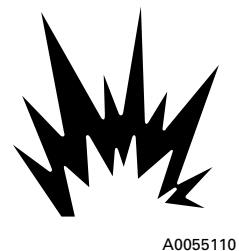
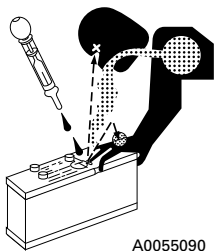
- When shipping the machine on a hauling vehicle, obey all state and local laws governing the weight, width, and length of a load. Also obey all applicable traffic regulations.
- Take into account the width, height and weight of the load when determining the shipping route.
- When passing over bridges 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.

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.

- Do not use or charge the battery if the battery electrolyte level is below the LOWER LEVEL line. This may cause an explosion. Always check the battery electrolyte level periodically and add distilled water to bring the electrolyte level to the UPPER LEVEL line.
- 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 \oplus terminal and negative \ominus terminal) through accidental contact with metal objects, such as tools.
- When installing the battery, connect the positive \oplus terminal first, and when removing the battery, disconnect the negative \ominus terminal (ground side) first.
- When removing or installing, check which is the positive \oplus terminal and negative \ominus 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.



STARTING WITH BOOSTER CABLES

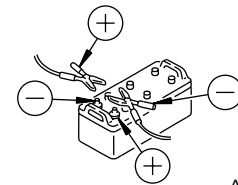
If any mistake is made in the method of connecting the booster cables, it may cause a fire, so always do as follows.

- 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 \oplus cable first when installing the booster cables. Disconnect the ground or negative \ominus cable first when removing them.
- The final ground connection is the connection of the ground to the engine block of the problem machine. However, this will cause sparks, so be sure to connect it as far as possible from the battery.

Starting procedure when using booster cables → See "16.3 IF BATTERY IS DISCHARGED".

- When removing the booster cables, be careful not to let the booster cable clips touch each other or to let the clips touch the machine.

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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.

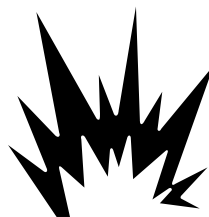
- Carry out the charging in a well-ventilated place, and remove the battery caps. This disperses the hydrogen gas and prevents explosion.
- Set the voltage on the charger to match the voltage on the battery to be charged. If the voltage setting is wrong, it will cause the charger to overheat and catch fire, and this may lead to an explosion.

Connect the positive \oplus charging clip of the charger to the positive \oplus terminal of the battery, then connect the negative \ominus charging clip to the negative \ominus terminal of the battery. Be sure to tighten both terminals securely.

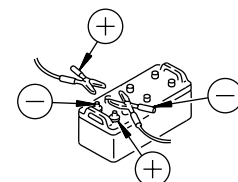
- If the battery charge is less than 1/10 of the rated charge, and high speed charging is carried out, set to a value below the rated capacity of the battery.

If there is an excessive flow of charging current, it may cause leakage or evaporation of the electrolyte, which may catch fire and explode.

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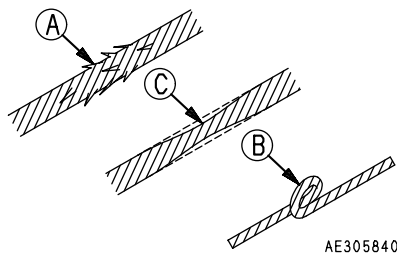


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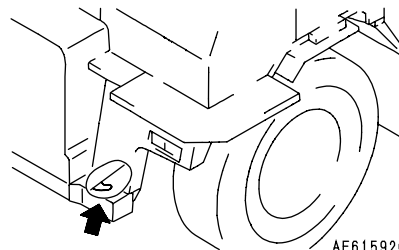
7.5 TOWING

WHEN TOWING

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



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8. PRECAUTIONS FOR MAINTENANCE

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

8.1 BEFORE CARRYING OUT MAINTENANCE

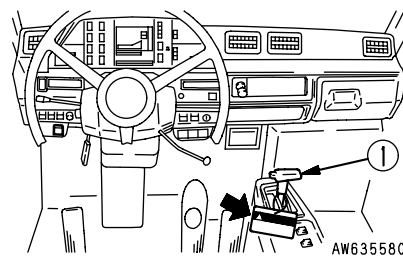
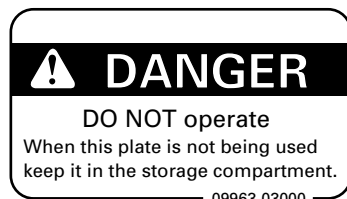
NOTIFICATION OF FAILURE

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

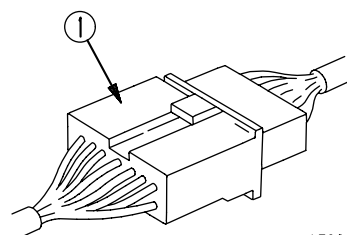
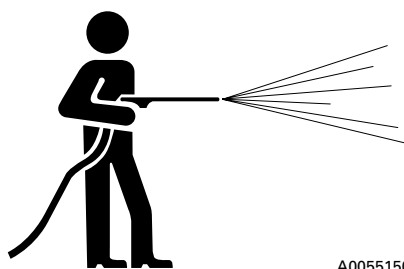
- ALWAYS attach the "DO NOT OPERATE" warning tag to control lever ① in the operator's cab to alert others that you are working on the machine. Attach additional warning tags around the machine if necessary.
- If others start the engine, or touch or operate the control lever while you are performing service 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.



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

8. PRECAUTIONS FOR MAINTENANCE

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 and 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.

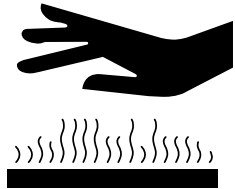
APPOINT LEADER WHEN WORKING WITH OTHERS

When repairing the machine or when removing and installing the work equipment, appoint a leader and follow his instructions during the operation.

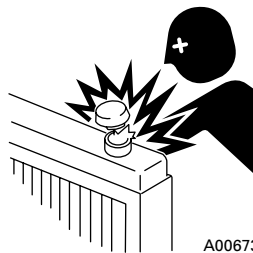
When working with others, misunderstandings between workers can lead to serious accidents.

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.



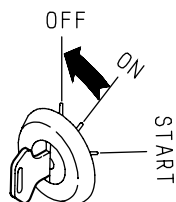
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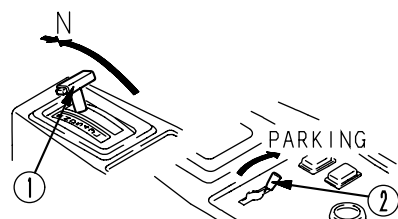
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STOP ENGINE BEFORE CARRYING OUT INSPECTION AND MAINTENANCE

- 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 and stop the engine.
- Put blocks under the tires to prevent the machine from moving.
- If it is necessary to start the engine, such as when flushing the inside of the radiator, place gear shift lever ① at the neutral position, set parking brake lever ② to the PARKING position, and always carry out the operation with two workers.
- One worker should sit in the operator's seat to make sure that the engine can be stopped at any moment. Be careful not to touch any lever unless it is necessary to operate it.
- When carrying out maintenance with the body raised, always set the dump lever to the HOLD and lock it in position, then insert the safety pin securely.



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PREVENT DUMP BODY FROM COMING DOWN

When carrying out inspection with the body raised, always set the dump lever to the HOLD position, and lock it in position, then insert the safety pin securely.



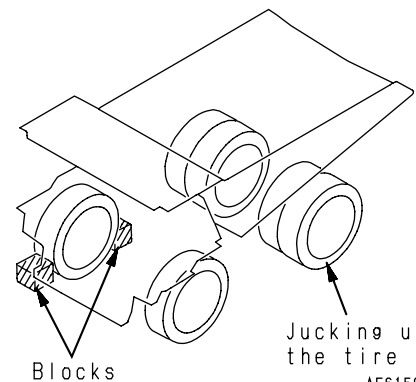
A0055140

PRECAUTIONS WHEN CARRYING OUT WORK WITH CHASSIS RAISED

Always observe the following precautions when jacking up the machine.

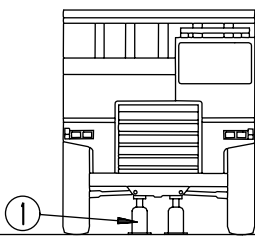
- Do not jack up the machine on soft ground.
- Always stop the machine on flat hard ground where it is possible to carry out the work safely.
- Always apply the parking brake.
- Put blocks under the wheels at the opposite end before jacking up the machine.

When jacking up the front wheels, put blocks behind the rear wheels; when jacking up the rear wheels, put blocks in front of the front wheels.

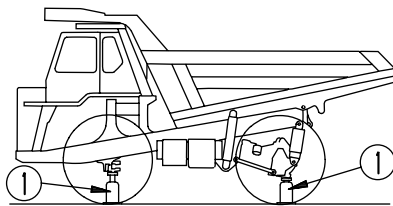


AE61594B

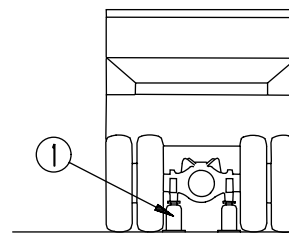
When jacking up the machine to replace the tire, the jacking-up point is as given below. When carrying out such work, please consult your Komatsu distributor.



AL607410

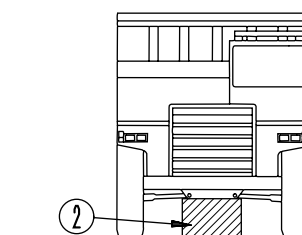


AL607420



AL607430

1. Check that jack ① (30 t or 50 t) is securely set under the chassis before jacking up the machine.
2. Make sure that jack ① is stable and that it will not slip or come out of position. Jack up the chassis slowly and always check the condition of the jack.
3. After jacking up the chassis, set blocks ② securely in the center under the H-frame.



AL607460

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

8. PRECAUTIONS FOR MAINTENANCE

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

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

8. PRECAUTIONS FOR MAINTENANCE

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.



A0055130

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.



AD305870

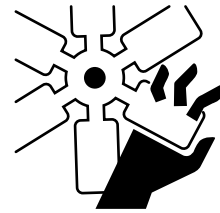
LOCKING INSPECTION COVERS

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.
- 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.



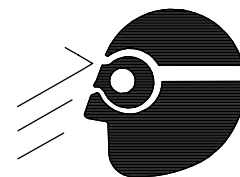
A0055210

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, or bearings are hit with a hammer, there is danger that broken pieces might fly into your eyes and cause injury.



AE305880

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.

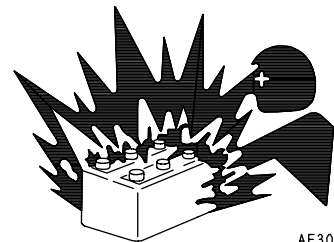
The qualified welder must follow the precautions given below.

- 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".



AE305890

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.

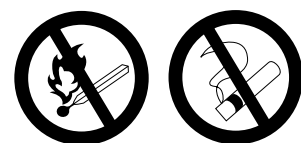
- Stop the engine when adding fuel or oil.
- Do not smoke.
- Spilled fuel and oil may cause you to slip, so always wipe it up immediately.
- Always tighten the cap of the fuel and oil fillers securely.
- Always add fuel and oil in a well-ventilated place.



A0055020



A0055030



A0055040

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.

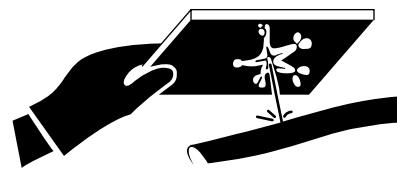
PRECAUTIONS WITH HIGH-PRESSURE OIL

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 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

A0055180

CORRECT

A0055190

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.

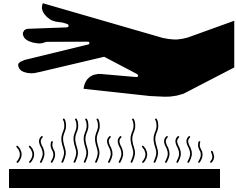
In this condition, if the cap is removed, or the oil is drained, or the filters are replaced, this may result in burns or other injury. Wait for the temperature to go down, then carry out the inspection and maintenance in accordance with the procedures given in this manual.

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 "24.3 – 4 PERIODIC MAINTENANCE".

Changing oil, replacing filters → see "24.4 – 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.

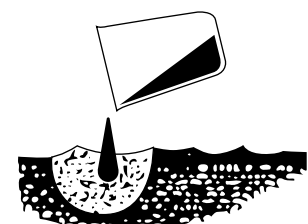
 - Do the inspection and maintenance locations work normally?
 - Is there any oil leakage when the engine speed is raised and load is applied to the hydraulic system?

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

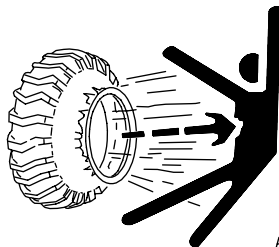
8.3 TIRES

HANDLING TIRES

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

To maintain safety, always observe the following items.

- Since maintenance, disassembly, repair and assembly of the tires and rims require special equipment and technology, be sure to ask them for a tire repair shop.
- Use only the specified tires and inflate them to the specified pressure.
Suitable inflation pressure → See "24.2.15 SELECTION AND INSPECTION OF TIRES".
- When inflating a tire, check that any person will not enter the working area and use an air chuck which has a clip and which can be fixed to the air valve.
While inflating the tire, check the inflation pressure occasionally so that it will not rise too high.
- Abnormal drop of inflation pressure and abnormal fitting of the rim indicate a trouble in the tire or rim. In such cases, be sure to ask a tire repair shop for repair.
- If the rim is not fitted normally, it may be broken and scattered while the tire is inflated. Accordingly, place a guard around the tire and do not work in front of the rim but work on the tread side of the tire.
- Do not adjust the inflation pressure of the tires just after high-speed travel or heavy-load work.
- Do not heat or weld a rim to which the tire is installed. Do not make a fire near the tire.



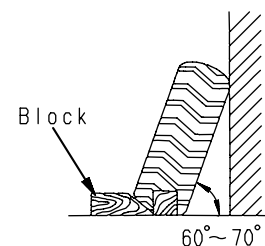
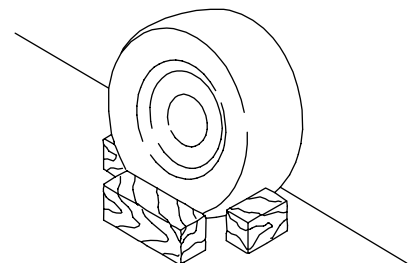
AW636370



AW636380

PRECAUTIONS FOR STORAGE OF TIRES

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



60°~70°

AW51912B

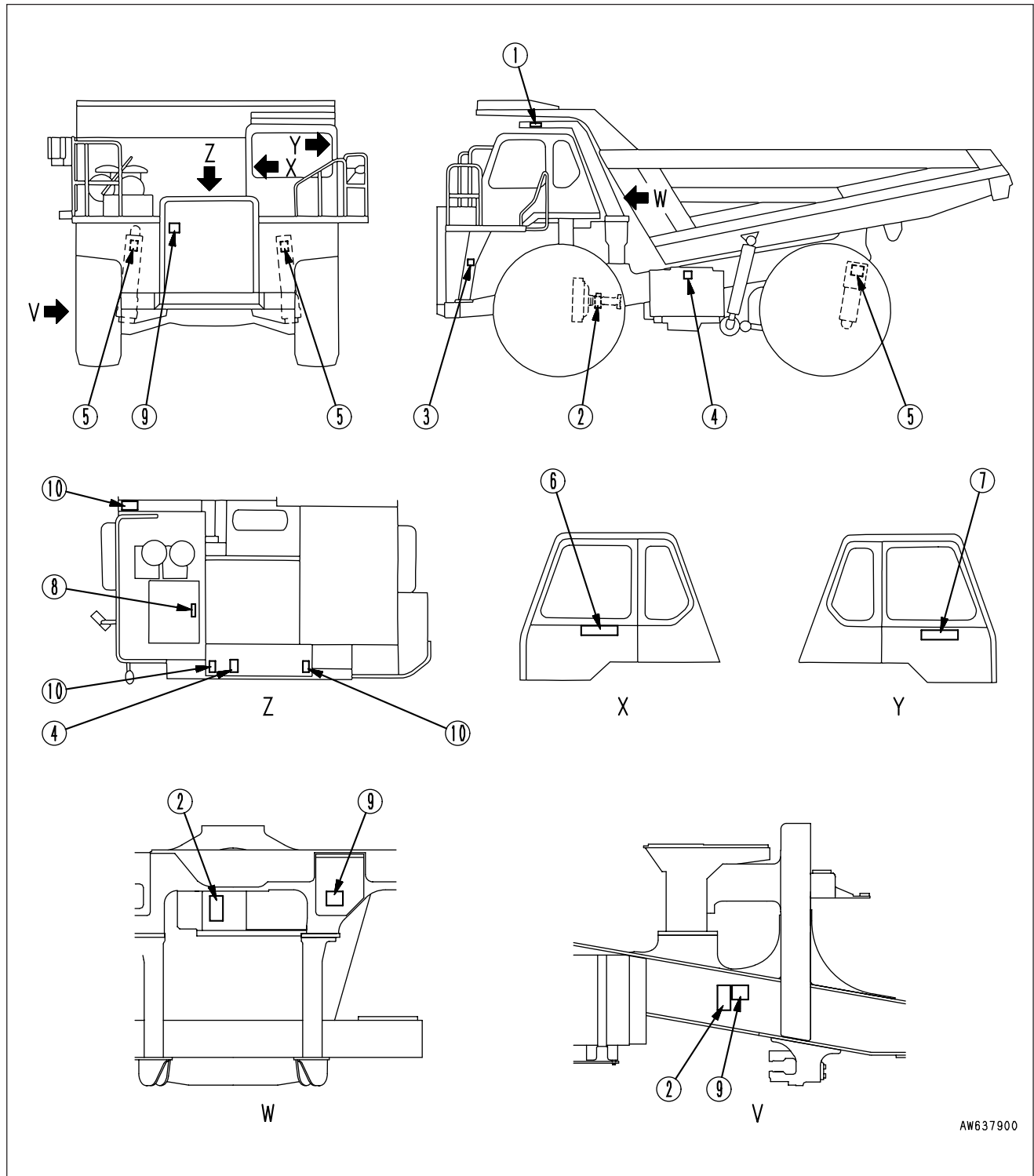
9. POSITION FOR ATTACHING SAFETY LABELS

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

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

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

9.1 POSITION FOR ATTACHING SAFETY LABELS



9. POSITION FOR ATTACHING SAFETY LABELS

1. Roll-over protective structure (ROPS)
(09620-30202)

KOMATSU

ROLL-OVER PROTECTIVE STRUCTURE (ROPS) CERTIFICATION
THIS KOMATSU ROPS, MODEL & type No. [] SERIAL No. [] WHEN
INSTALLED IN ACCORDANCE WITH THE MANUFACTURES INSTALLATION IN-
STRUCTIONS ON A [] FOR MAXIMUM PRIME MOVER
MASS NOT GREATER THAN [] LBS/(kg). IS CERTIFIED TO
COMPLY WITH THE FOLLOWING REQUIREMENTS: a) OSHA 29CFR. 1926. 1001
b) ISO 3471 (ROPS) c) SAE J [] & SAE J []

WARNING

- Altering ROPS may weaken it. Consult Komatsu Distributor before altering.
- ROPS may provide less protection if it has been structurally damaged or involved in roll-over.
- Always wear seat belt when moving.

Komatsu Ltd. Japan 2-3-6 Akasaka, Minato-ku, Tokyo, Japan 09620-30202

2. Cautions for checking engine room
(09667-23001)

CAUTION

Keep away from fan and fan-belt
while engine is running.

09667-23001

3. Cautions for checking engine room
(without engine side cover)
(09667-23001)

CAUTION

Keep away from fan and fan-belt
while engine is running.

09667-23001

3. Cautions for checking engine room
(with engine side cover)
(09667-03001)


CAUTION

While engine is running:

1. Do not open cover.
2. Keep away from fan and fan-belt.

09667-03001

4. Cautions for opening hydraulic tank cap
Cautions for opening radiator cap
(09653-03001)



WARNING


Hot oil hazard.

To prevent hot oil from spurting out:

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

09653-03001

5. Warning for handling suspension
(09659-33000)



WARNING

Explosion hazard.

Suspension cylinder is charged with high-pressure nitrogen gas.


To prevent SEVERE INJURY or DEATH, handle with care:

- Do not hit
- Keep away from flame
- Do not weld or drill cylinder
- Do not remove and disassemble


Filling and discharging of gas in this cylinder must only be done by trained Komatsu serve personnel.

09659-33000

6. Warnings for high voltage
Warnings for crush hazard when inspection and maintenance
Warnings for inspection of emergency steering system, emergency brake system
Warning for leaving operator's seat, stopping engine
Warning for retarder oil temperature
(561-93-61733)




DANGER



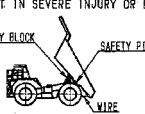
HAZARDOUS VOLTAGE HAZARD. SERIOUS INJURY OR DEATH CAN OCCUR IF MACHINE OR ATTACHMENTS ARE NOT KEPT SAFE DISTANCE AWAY FROM ELECTRIC LINES.

VOLTAGE	SAFE DISTANCE
LOW VOLTAGE	
100 V, 200 V	2 m
5, 600 V	2 m
22, 000 V	3 m
60, 000 V	4 m
80, 000 V	4 m
154, 000 V	5 m
187, 000 V	6 m
270, 000 V	7 m
502, 000 V	11 m



DANGER

CRUSH HAZARD
TO HOLD THE DUMP BODY IN A SAFE RAISED POSITION, ALWAYS DO THE FOLLOWING:
-MOVE HOLST CONTROL LEVER TO "HOLD" AND SAFETY "LOCK" TO LOCK.
-LOCK DUMP BODY WITH SAFETY PIN OR WIRE (WHICHEVER IS INCLUDED); AND
-PLACE BLOCK BETWEEN FRAME AND BODY.
SEE MANUAL FOR MORE COMPLETE INSTRUCTIONS. FAILURE TO FOLLOW THESE INSTRUCTIONS COULD RESULT IN SEVERE INJURY OR DEATH.




NOTICE

1. EMERGENCY STEERING SYSTEM (DAILY CHECK)
CHECK THE FUNCTION WITH THE ENGINE STOP ON FLAT GROUND.
1. TURN THE STARTING SWITCH TO THE "ON" POSITION.
2. APPLY THE EMERGENCY STEERING SWITCH TO THE "ON" POSITION AND CHECK THE STEERING WHEEL CAN BE OPERATED.
3. TURN THE EMERGENCY STEERING SWITCH TO "OFF" POSITION.
IN CASE OF THE AUTOMATIC EMERGENCY STEERING SYSTEM IF EQUIPPED.
1. TURN THE STARTING SWITCH TO THE "ON" POSITION.
2. RELEASE THE PARKING BRAKE. THE SYSTEM WILL ACTIVATE WITHIN 1.5 SECONDS.
3. APPLY THE PARKING BRAKE.

2. EMERGENCY BRAKE SYSTEM (DAILY CHECK)
1. RAISE THE AIR PRESSURE TO THE MAXIMUM AND APPLY EMERGENCY BRAKE.
2. PLACE GEAR SHIFT LEVER IN THE "D" POSITION. GRADUALLY INCREASE THE ENGINE SPEED. AND CHECK THAT MACHINE DOES NOT MOVE EVEN WHEN THE ENGINE SPEED REACHES 1400RPM.
DO NOT USE EMERGENCY OR RETARDER BRAKE FOR PARKING.

NOTICE

WHEN LEAVING OPERATOR SEAT
1. LOWER DUMP BODY.
2. PARK THE MACHINE ON LEVEL GROUND.
3. STOP ENGINE AND APPLY PARKING BRAKE COMPLETELY.
BLOCK WHEELS SECURELY BEFORE LEAVING MACHINE.
IDLE ENGINE FOR 5 MINUTES BEFORE SHUTTING IT DOWN.



WARNING

IF THE RETARDER OIL TEMPERATURE WARNING LAMP LIGHTS UP, STOP MACHINE IMMEDIATELY, OR THE BRAKES WILL FAIL BEFORE STARTING UP. ENGINE AT IDLE SPEED (2,000rpm) UNTIL THE LIGHT GOES OUT.

561-93-61733

- If the machine comes too close to electric cables, there is danger of electrocution. Always keep a safe distance from electric cables.
- There is danger that the dump body may come down. Before carrying out inspection or maintenance with the dump body raised, always read the Operation and Maintenance Manual and take the correct action.

9. POSITION FOR ATTACHING SAFETY LABELS

7. Cautions before starting
 Cautions when traveling in reverse
 Cautions for operating hoist control lever
 (561-93-61723)

<p>⚠ WARNING</p> <p>Improper operation and maintenance can cause serious injury or death.</p> <p>Read manual and labels before operation and maintenance. Follow instructions and warnings in manual and in labels on machine.</p> <p>Keep manual in machine cab near operator. Contact Komatsu distributor for a replacement manual.</p>	<p>⚠ WARNING</p>  <p>TO PREVENT SEVERE INJURY OR DEATH. DO THE FOLLOWING BEFORE MOVING MACHINE OR ITS DUMP BODY.</p> <ul style="list-style-type: none"> • HONK HORN TO ALERT PEOPLE NEARBY. • BE SURE NO ONE IS ON OR NEAR MACHINE. • USE SPOTTER IF VIEW IS OBSTRUCTED. <p>FOLLOW ABOVE EVEN IF MACHINE EQUIPPED WITH BACK-UP ALARM AND MIRRORS.</p>	<p>NOTICE</p> <p>Be sure to lower dump body and keep hoist control lever at the FLOAT position during travel.</p>  <p style="text-align: right;">561-93-61723</p>
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8. Precautions when handling battery cable (09808-03000)

⚠ WARNING

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

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

09808-03000

9. Exhaust pipe is hot ! (09817-A1103)

	
09817-A1103	

When touching at high temperature portion (engine, motor, muffler, etc.) during operation or immediately after stopping operation causing burns.

Do not touch at high temperature portions of the machine.

10. Precautions for avoiding falling down (09805-13000)

⚠ CAUTION

NEVER be on this hood.

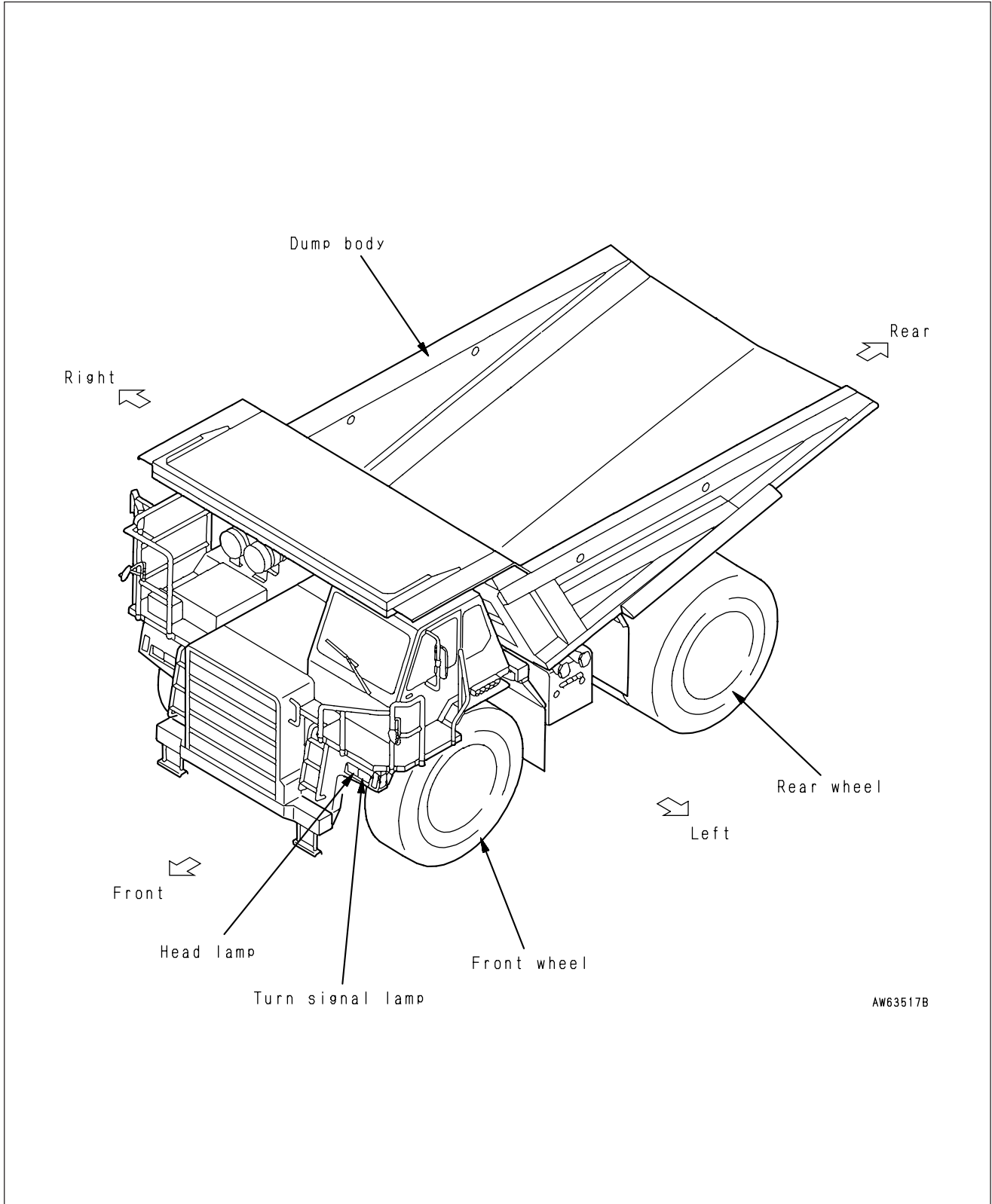
09805-13000

OPERATION

10. GENERAL VIEW

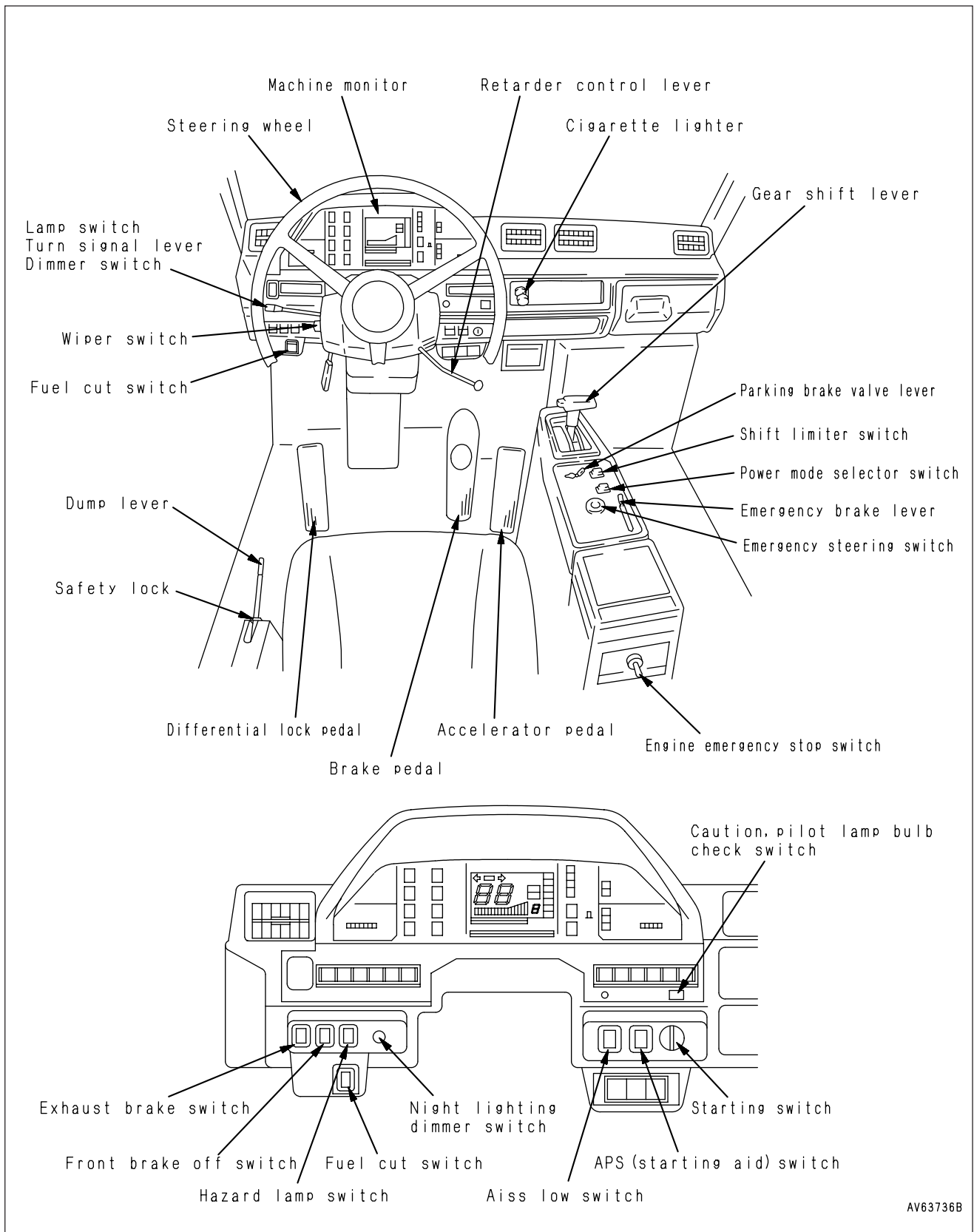
10.1 GENERAL VIEW OF MACHINE

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



This illustration shows the HD465-5.

10.2 GENERAL VIEW OF CONTROLS AND GAUGES



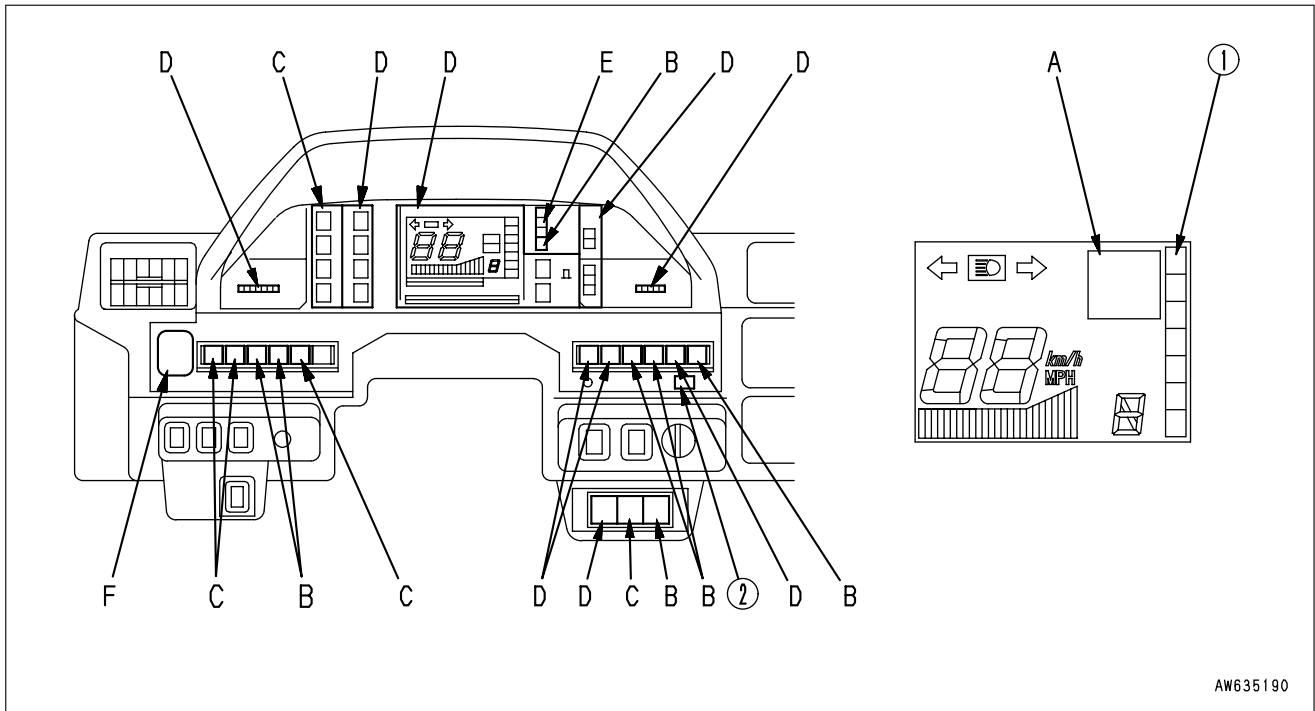
AV63736B

11. EXPLANATION OF COMPONENTS

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

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

11.1 MACHINE MONITOR



AW635190

A. ACTION CODE DISPLAY (11.1.1)

If any trouble occurs and check or maintenance is required, this displays the action code indicating the appropriate corrective action. At this time, the appropriate monitor lights up or flashes, and at the same time, the central warning lamp flashes.

B. CAUTION ITEMS (11.1.2) **CAUTION**

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

If there is an abnormality in any CAUTION item, the monitor for the location of the abnormality will light up.

C. EMERGENCY STOP ITEMS (11.1.3) **CAUTION**

If any of these monitors lights up, stop operations immediately and carry out the inspection and maintenance of the appropriate item according to the action code.

If there is an abnormality in any of the emergency stop items, the alarm buzzer will sound intermittently, the monitor for the location of the abnormality will light up or flash and the central warning lamp will flash.

D. METER DISPLAY PORTION (11.1.4)

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

E. MECHATRONIC CAUTION LAMP PORTION (11.1.5)

If any trouble occurred on the mechatronic devices of the control system, the appropriate monitor will flash.
If these monitors flash, carry out the specified action according to the action code.

F. CENTRAL WARNING LAMP

If the machine is in the following condition, this lamp will flash.

- When an abnormality has occurred in any of B caution items.

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

- When an abnormality has occurred in any of C emergency stop items.
- When E. MECHATRONIC CAUTION lamp portion flashes.
- If the parking brake is applied, but the shift lever is not at neutral.
- When the dump lever is not at the FLOAT position and the shift lever is not at neutral.
- When engine tachometer red range lights up.
- When the machine travel speed exceeds the overrun warning speed prescribed for each transmission speed range.

Operating check for machine monitor system

When the starting switch is turned to the ON position before the engine is started, all the monitors, gauges, and the central warning lamp will light up for approx. 3 seconds, and the alarm buzzer will sound for approx. one second. When this happens, the speedometer will display 88.

If no monitor light up, there is probably a failure or disconnection in that circuit, so please contact your Komatsu distributor to have the circuit checked.

When the starting switch is at the ON position, if there is not at the neutral position, transmission shift lever position pilot lamp ① and the central warning lamp will flash and the alarm buzzer will continue to sound intermittently. At this time, when the lever is placed at neutral, letter "N" is displayed, the central warning lamp goes out and the buzzer stops.

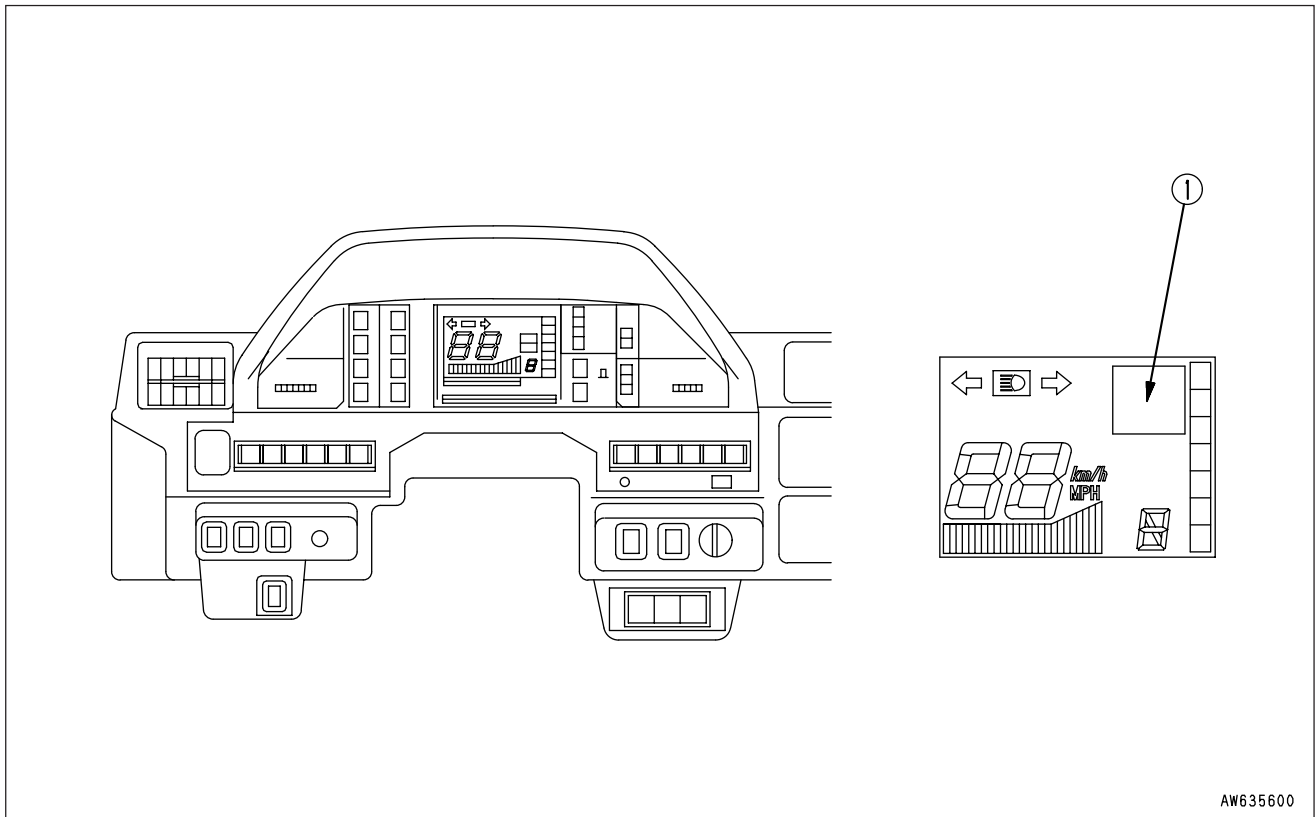
Checking for blown caution lamp or pilot lamp bulbs

Turn the starting switch to the ON position before starting the engine, press bulb check switch ② and check that no caution lamp or pilot lamp bulbs are blown.

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

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

11.1.1 A. ACTION CODE DISPLAY



AW635600

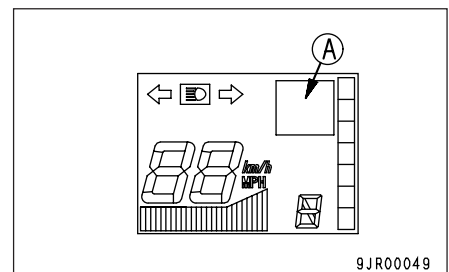
1. ACTION CODE DISPLAY

If any failure occurred on the machine or if the operation needs to be changed or if checks and maintenance are required, this shows the action code indicating appropriate corrective action.

If two or more failures occurred at the same time, this shows the more important action code first.

NOTICE

If letter "E-" and any action code of "01" to "07" in turn at the upper right of the liquid crystal display on the monitor panel, stop the machine once. Then, take the corrective action as follows after checking the action code.



9JR00049

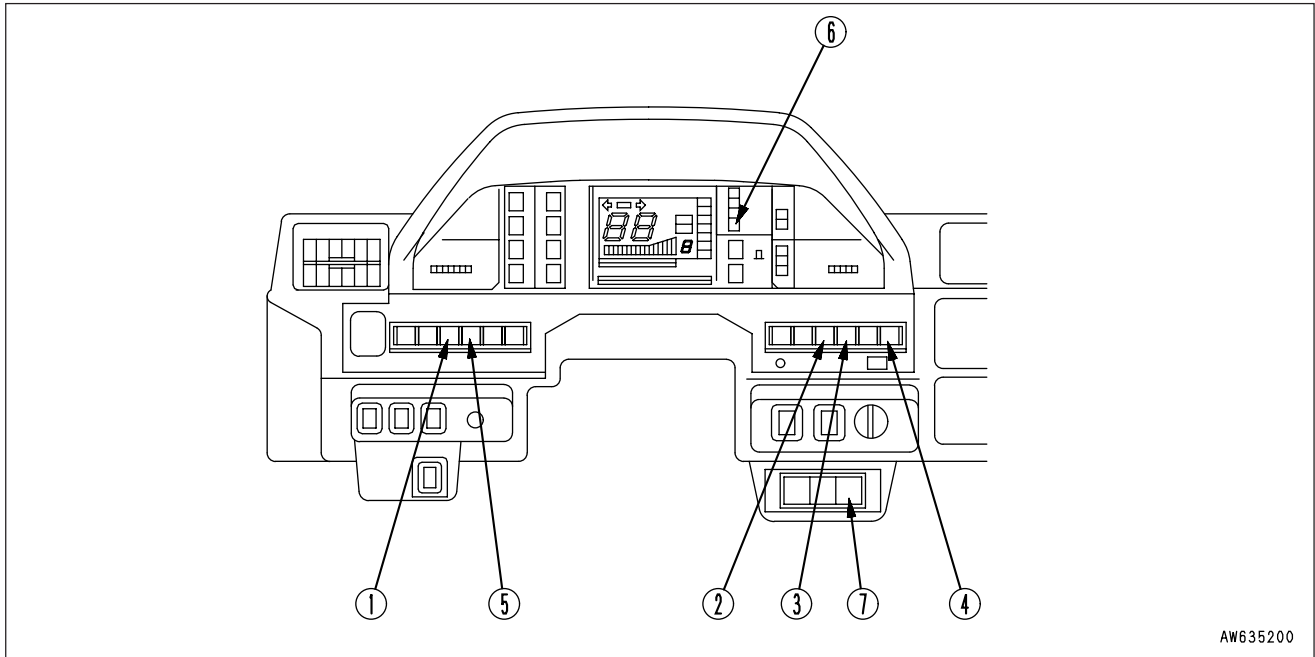
Action code

- 02 Park the machine at a safe location and contact Komatsu's Service Department.
- 04 Carry out an emergency stop. Stop the engine and contact Komatsu's serviceman.
- 01 Carry out checks and maintenance according to the Operation and Maintenance Manual.
- 03 Operate the machine keeping the engine at low revolution and low travel speed.
- 05 Stop the machine. Run the engine at a mid-range speed under no load.
- 06 Restart the engine. Idle the engine for a while.
- 07 Do not raise the body.

11.1.2 B. CAUTION ITEMS

CAUTION

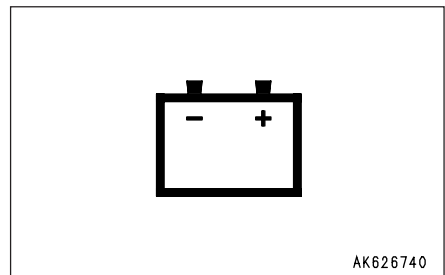
If any of these monitors lights up, carry out inspection and maintenance of the appropriate item as soon as possible.



AW635200

1. BATTERY CHARGE

This identifies the operator of any abnormality in the charging system when the engine is running. If it lights up and simultaneously displays action code "01", check the charging circuit.

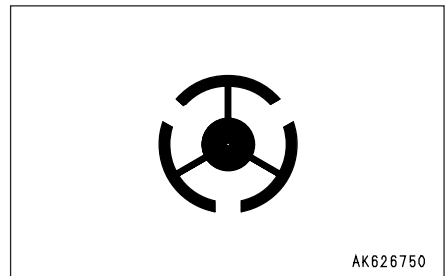


AK626740

2. EMERGENCY STEERING

This lights up when the emergency steering is actuated.

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

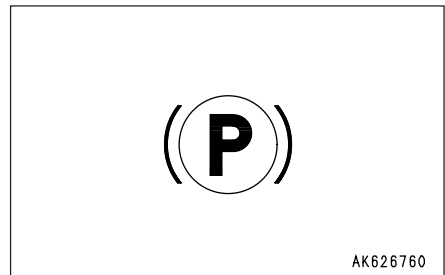


AK626750

3. PARKING BRAKE

This lights up when the parking brake is applied.

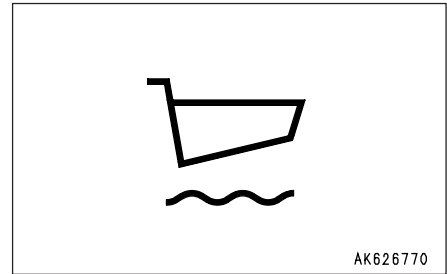
If this goes on and out respectively responding to the lever shifting of PARK/TRAVEL, the parking brake functions normally; no check or maintenance is needed.



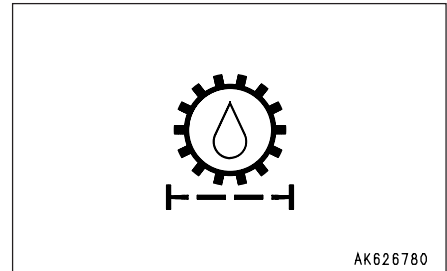
AK626760

4. DUMP BODY ACTUATION CAUTION

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

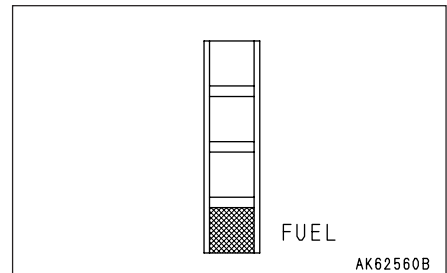
**5. TRANSMISSION FILTER CLOGGING**

This identifies the operator that the transmission filter is clogged. If it lights up and displays action code "01" at the same time, replace the transmission filter.

**6. FUEL LEVEL**

This flashes when the level of the fuel in the fuel tank goes below 120 ℓ (31.68 US gal, 26.40 UK gal).

If it flashes, check the fuel level and add fuel.

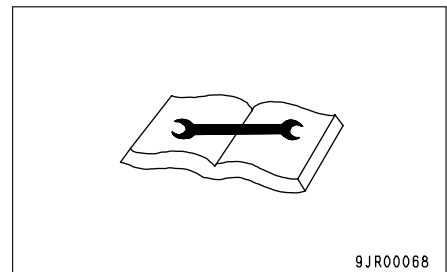
**7. MAINTENANCE CAUTION LAMP (If equipped)**

If the machine is in any of the following conditions, this lamp will light up.

If it lights up and displays action code "01" at the same time, carry out check, replenishment or replacement.

All the units listed below are optional.

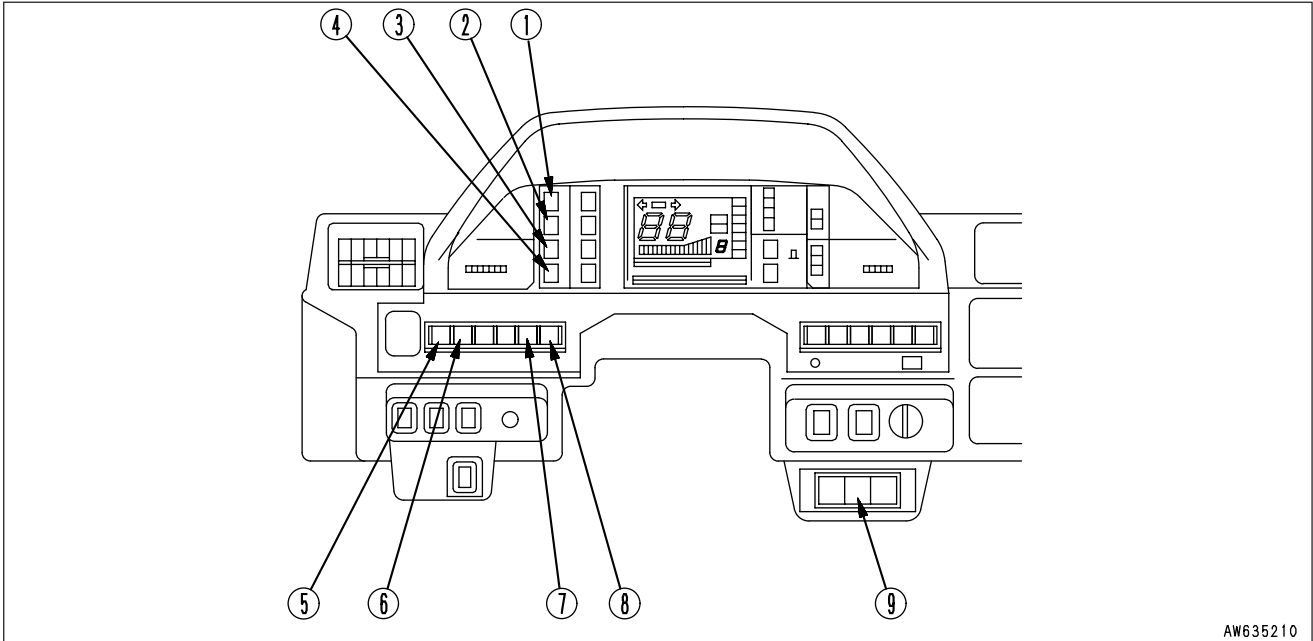
- Insufficient oil in the front brake oil tank
- Insufficient oil in the retarder oil tank
- Insufficient oil in the spring and hoist tanks
- Clogging of the retarder oil filter
- Clogging of the full flow filter (the engine oil filter)
- Clogging of the hydraulic oil filter
- Wear of the retarder brake disc (right hand)
- Wear of the retarder brake disc (left hand)
- Drop of the battery electrolyte level
- Insufficient oil in the engine oil pan
- Clogging of the air cleaner



11.1.3 C. EMERGENCY STOP ITEM

CAUTION

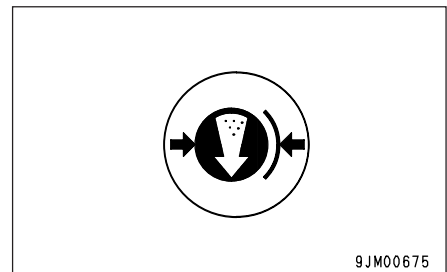
If any of these monitor lights up or flashes, stop operations immediately and carry out the following action according to the action code.



AW635210

1. AIR PRESSURE

This warns the operator that the air pressure inside the air tank has dropped. If it flashes and displays the action code at the same time, stop the machine, run the engine at a mid-range speed, and wait until the lamp goes out.



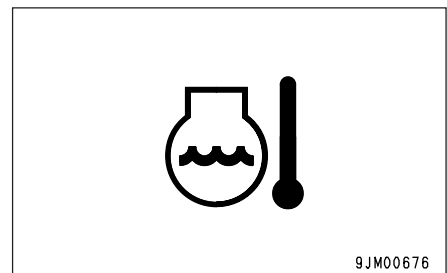
9JM00675

2. ENGINE WATER TEMPERATURE

This warns the operator that the engine cooling water temperature has risen, and the engine output is automatically limited.

For the machine equipped with an electronic governor, the engine output is automatically limited.

If it flashes and displays action code "05" at the same time, stop the machine and run the engine under no load at a mid-range speed until the engine water temperature gauge enters the green range.

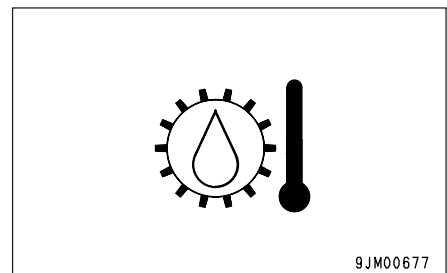


9JM00676

3. TORQUE CONVERTER OIL TEMPERATURE

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

If it flashes and displays action code "05" at the same time, stop the machine and run the engine under no load at a mid-range speed until the torque converter oil temperature gauges enters the green range.

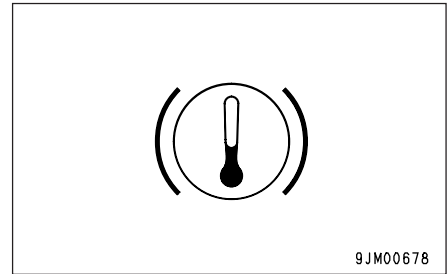


9JM00677

4. RETARDER OIL TEMPERATURE

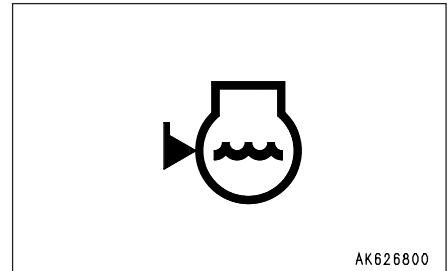
This warns the operator that the retarder oil temperature has risen.

If it flashes and displays action code "05" at the same time, stop the machine, place the shift lever at the N (neutral) position, then run the engine under no load at a mid-range speed until the warning lamp goes out.

**5. RADIATOR WATER LEVEL**

This warns the operator that the radiator water level has dropped.

If it lights up and displays action code "01" at the same time, stop the engine, check the level of the cooling water in the radiator, and add the water.

**6. ENGINE OIL PRESSURE**

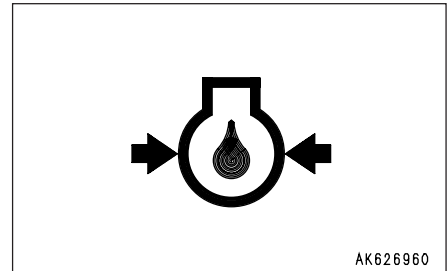
This warns the operator that the engine lubricating oil pressure has dropped, and the engine output is automatically limited.

For the machine equipped with an electronic governor, the engine output is automatically limited.

If it lights up and displays action code "04" at the same time, stop the machine safely. Then, stop the engine and carry out inspection.

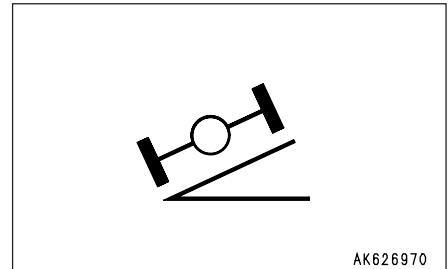
The lamp lights up if the engine lubricating oil pressure goes below the specified value when the engine is running,

If the engine is not running, the lamp does not light up.

**7. ANGLE WARNING**

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

If it lights up and displays action code "07" at the same time, lower the body and move the machine to a safe, stable place.

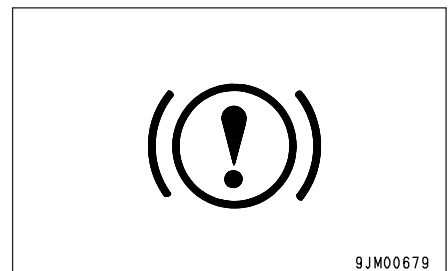
**8. REAR BRAKE CAUTION LAMP**

This lights up if the brake oil pressure drops under the normal value.

If it lights up and display action code "04" at the same time, immediately check the rear brake system.

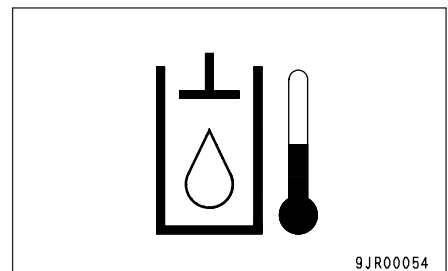
After checking and repairing, depress the rod for the overstroke sensor on the brake chamber.

If depressing is not carried out, the rear brake caution lamp will continue to light up.

**9. STEERING OIL TEMPERATURE**

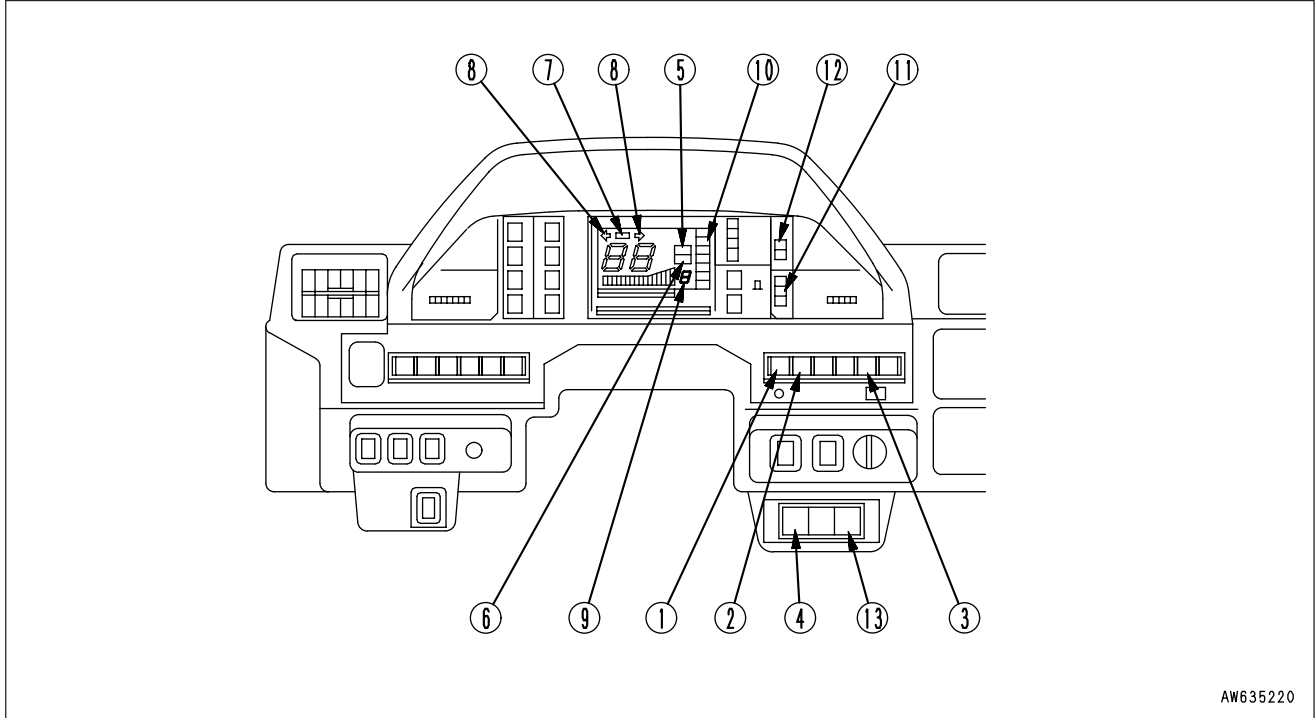
This warns the operator that the steering oil temperature has risen.

If it lights up and displays action code "05" at the same time, stop the machine, place the shift lever at the N (neutral) position, then run the engine under no load at a mid-range speed until the warning lamp goes out.



**11.1.4 D METER DISPLAY PORTION
PILOT DISPLAY PORTION**

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

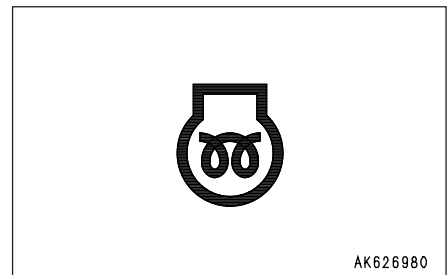


AW635220

1. COLD START PILOT

When starting the engine using the APS in cold weather and the preheating is operated, this lamp lights up. After the cold starting switch is pressed, and when the preheating starts, this lamp lights up for approx. 12 seconds and goes out. This lets you know the preheating is completed.

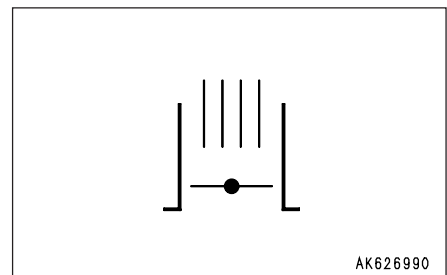
For use of the APS, see "12.2.2 STARTING IN COLD WEATHER".



AK626980

2. EXHAUST BRAKE PILOT

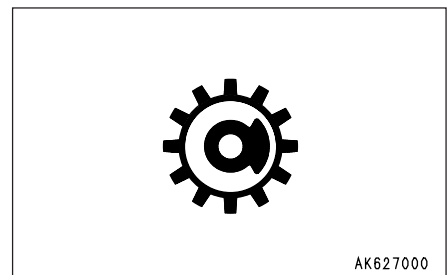
This pilot lamp lights up when the exhaust brake is actuated.



AK626990

3. REAR BRAKE PILOT (Retarder)

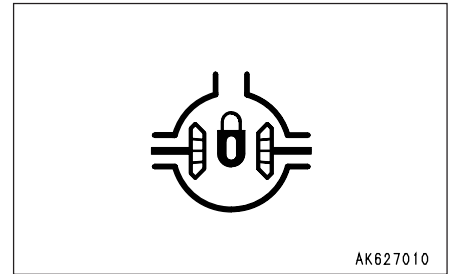
This lamp lights up when the foot brake is depressed or the retarder control lever is pulled, and the rear brake is applied.



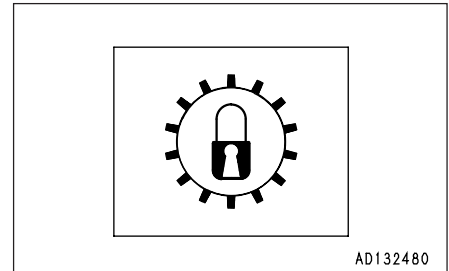
AK627000

4. DIFFERENTIAL LOCK PILOT

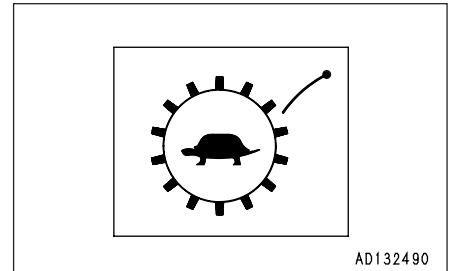
This lamp lights up when the differential lock pedal (if equipped) is depressed and the differential lock is actuated.

**5. LOCKUP PILOT LAMP**

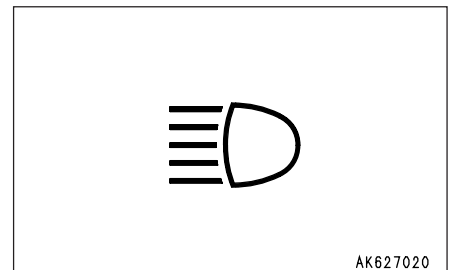
This lamp lights up when the torque converter lockup is engaged and the transmission is shifted to direct drive.

**6. SHIFT LIMITER PILOT LAMP**

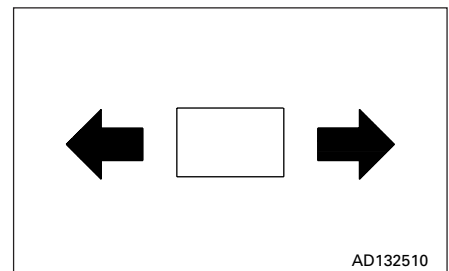
This lights up when the shift limiter switch is actuated.

**7. HIGH BEAM**

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

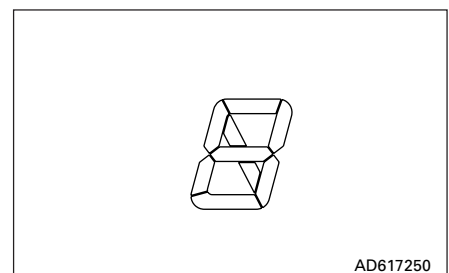
**8. TURN SIGNAL PILOT LAMP**

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

**9. SHIFT INDICATOR**

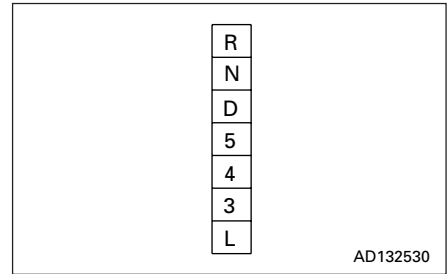
This displays the transmission shift range (speed range).

When the key was turned ON, if the shift lever is operated, it will display "2" at the lever position D, "1" at the 5-L position, and "R" at the R position even if the engine is stopped.



10. TRANSMISSION SHIFT LEVER POSITION PILOT LAMP

This indicates the position of the transmission shift lever.

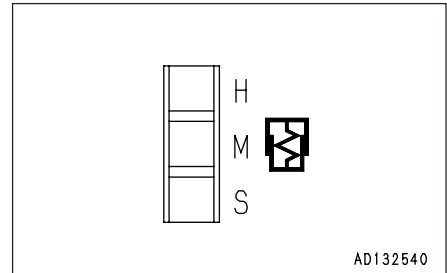


11. SUSPENSION MODE DISPLAY LAMP

This displays the suspension mode, when the machine is equipped with the suspension controller.

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

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

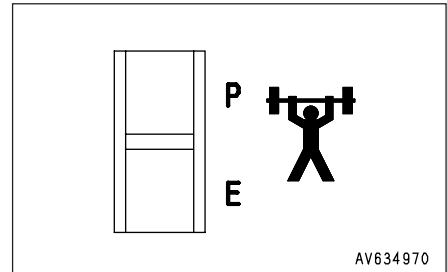


12. POWER MODE DISPLAY LAMP

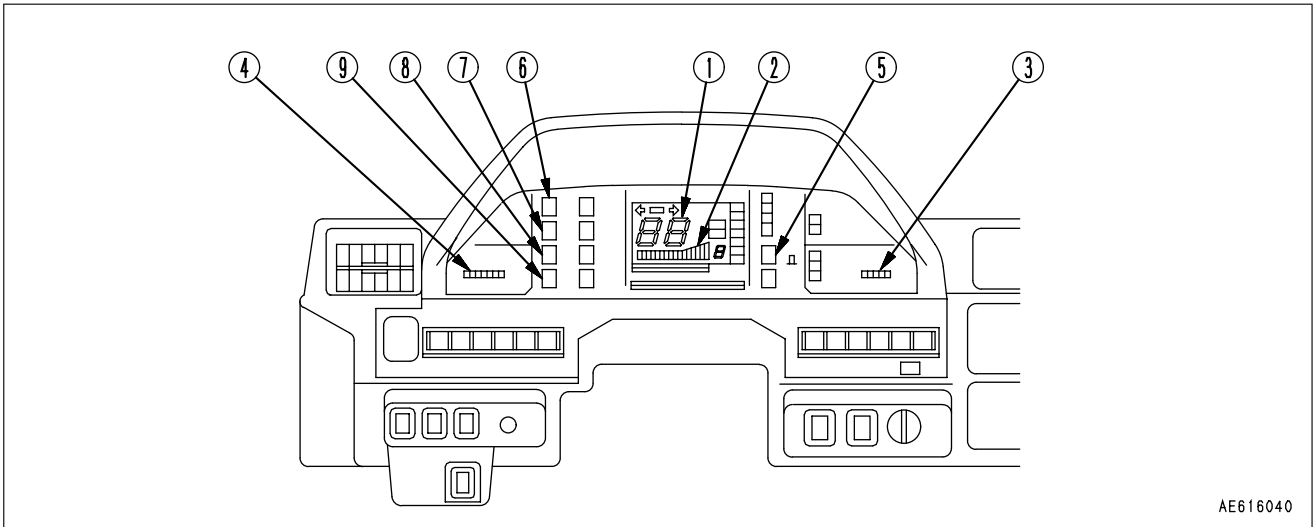
(If equipped with electronic governor)

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

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



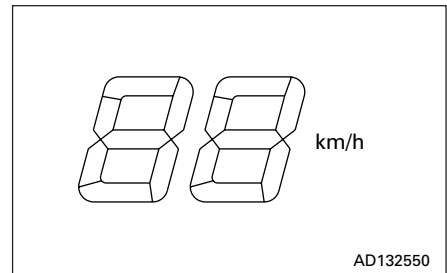
METERS



AE616040

1. SPEEDOMETER

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

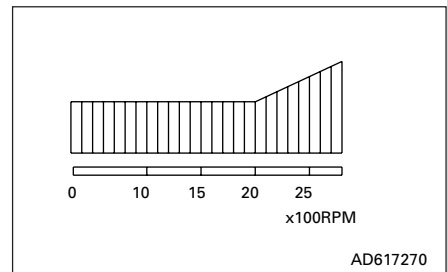


AD132550

2. ENGINE TACHOMETER

This indicates the speed of the engine.

While operating the machine, if the red range lights up, simultaneously the warning buzzer sounds and the central warning lamp flashes, then operate the machine while lowering the engine speed and the traveling speed.



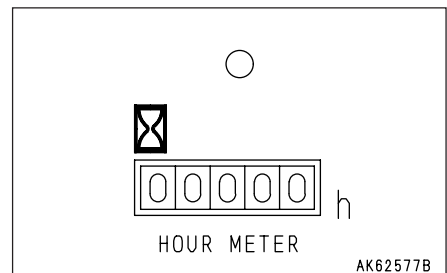
AD617270

3. SERVICE METER

This shows the total hours of operation of the machine.

If the engine is running, the service meter will advance even if the machine is not moving.

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



HOUR METER

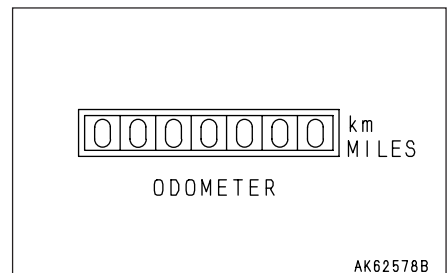
AK62577B

4. ODOMETER

This indicates the distance traveled in kilometers.

An odometer for MILES is also available.

This unit is included in the speedometer.



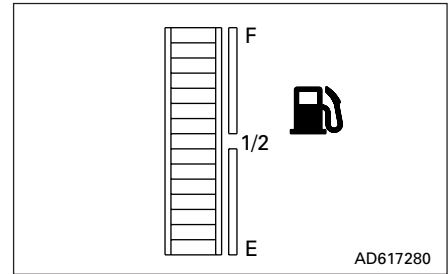
ODOMETER

AK62578B

5. FUEL GAUGE

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

If only the red range remains lighted during operation, it indicates that there is less than 120 ℓ (31.68 US gal, 26.40 UK gal) of fuel remaining in the tank, so check and add fuel.

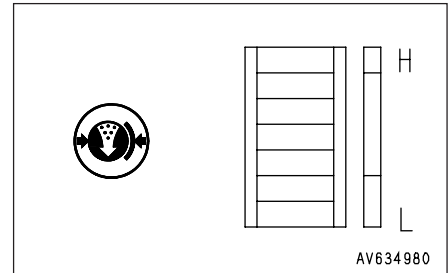


6. AIR PRESSURE GAUGE

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

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

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



REMARK

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

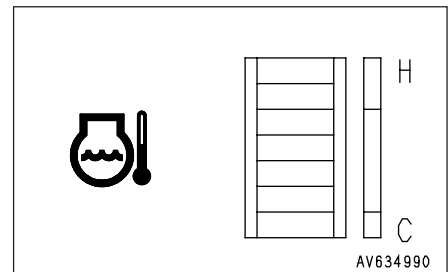
7. ENGINE WATER TEMPERATURE GAUGE

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

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

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

If the red range lights up, the engine output of the machine equipped with an electronic governor is automatically limited.

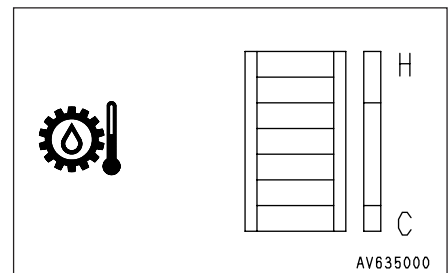


8. TORQUE CONVERTER OIL TEMPERATURE GAUGE

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

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

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

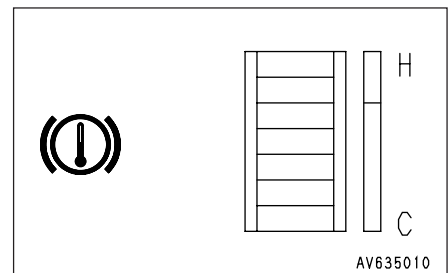


9. RETARDER OIL TEMPERATURE GAUGE

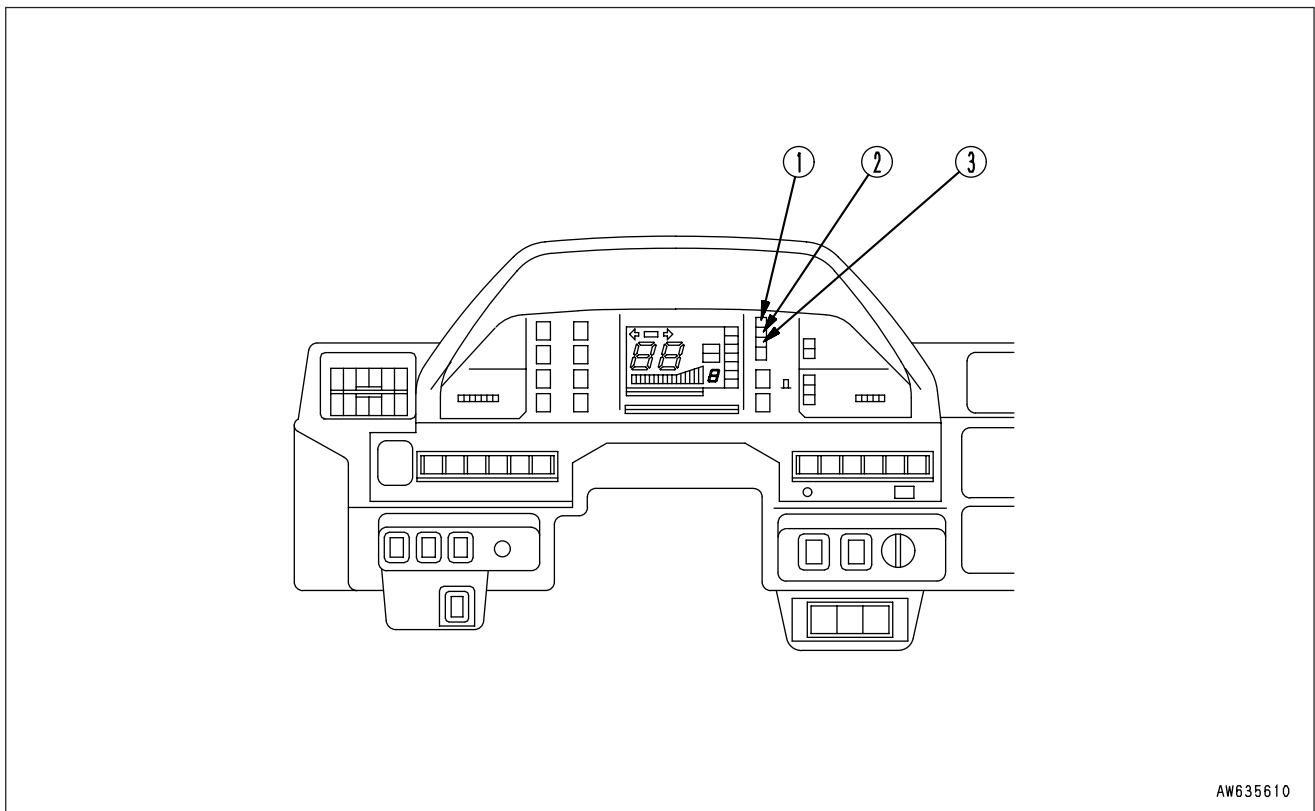
This gauge indicates the retarder cooling oil temperature. The green range should be lighted up during operation.

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

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

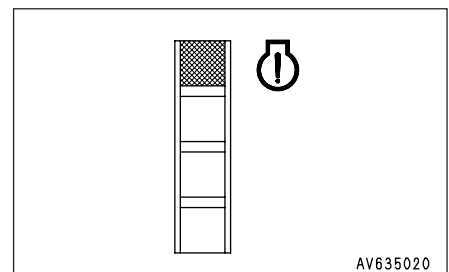


11.1.5 MECHATRONIC CAUTION LAMP PORTION



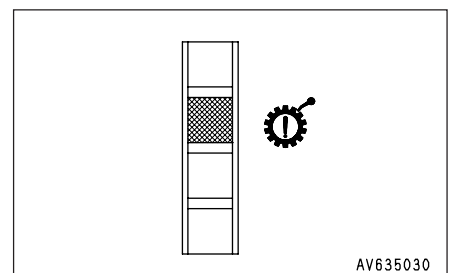
1. ENGINE (Mechatronic-related)

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



2. AUTOMATIC TRANSMISSION (Mechatronic-related)

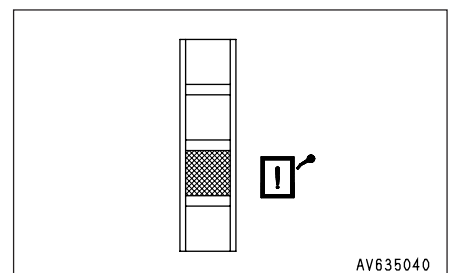
If an abnormality is detected in the mechatronics-related parts of the transmission control system, this lamp flashes to warn of the abnormality.



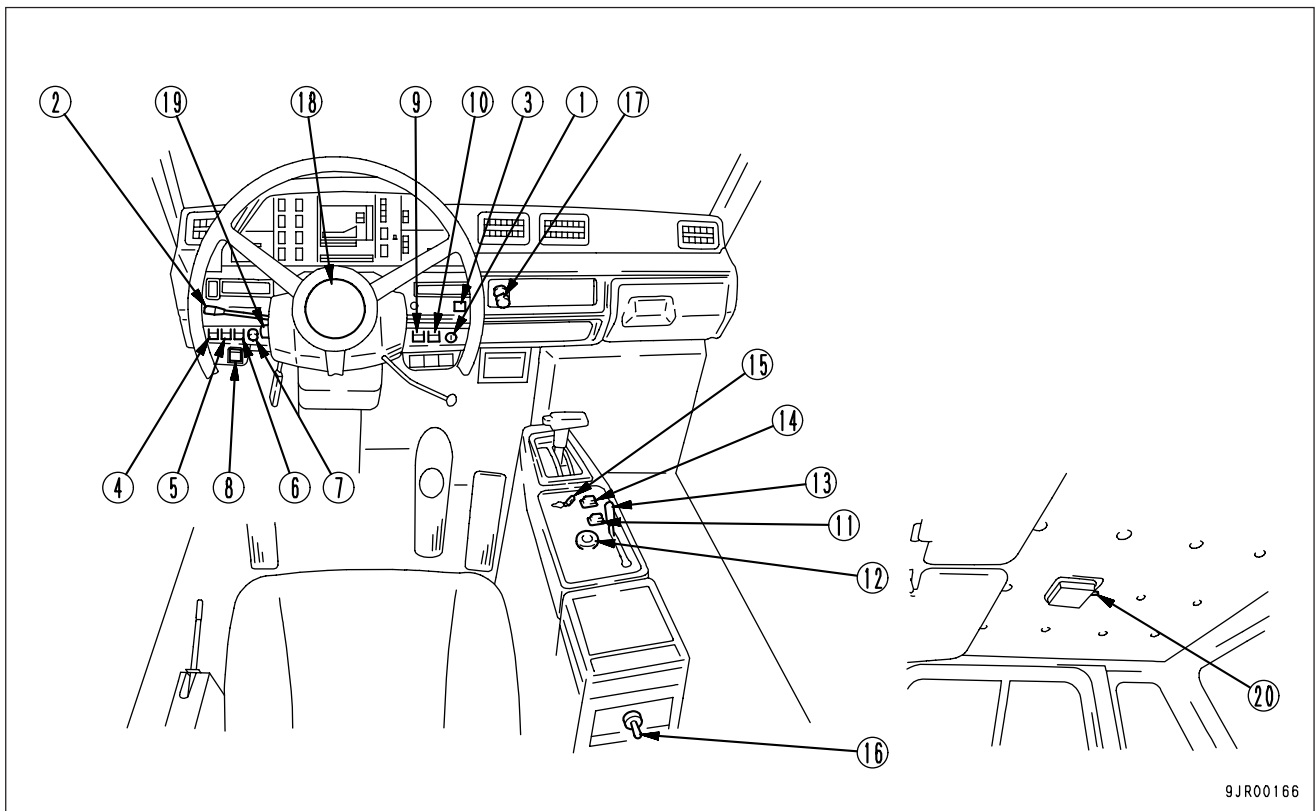
3. MECHATRONICS-RELATED PARTS (Excluding 1. and 2. above)

If an abnormality is detected in the mechatronics-related parts of the control system other than those of the engine and transmission, this lamp flashes to warn of the abnormality.

If any of these monitor lamps and the central warning lamp light up and the alarm buzzer sounds intermittently, stop the machine, then take appropriate corrective action according to the action code.



11.2 SWITCHES



9JR00166

1. STARTING SWITCH

This switch is used to start or stop the engine.

OFF position

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

ON position

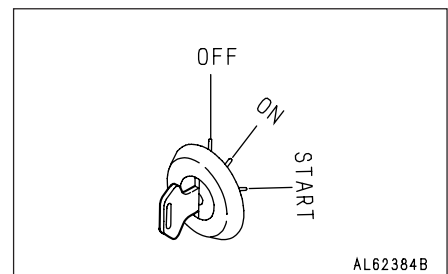
In this position, electric current flows in the charging and lamp circuits.

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

When turning the starting switch ON or OFF, if the starting switch is held at a position between ON and OFF, the controller may detect this as an abnormality. If this happens, return the starting switch to the OFF position, then operate it as usual to the ON position.

START position

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



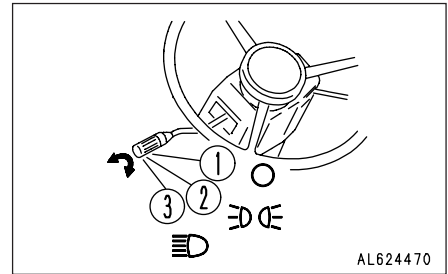
AL62384B

2. LAMP SWITCH

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

- ① OFF
- ②  position: Side clearance lamps, tail lamps, rear lamps, machine monitor lighting light up
- ③  position: The head lamps light up in addition to the lamps in the  position

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



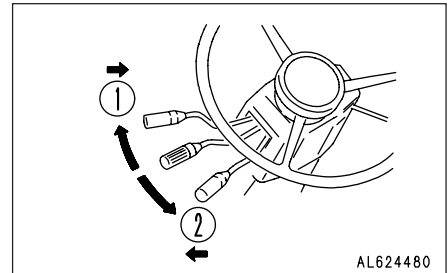
2. TURN SIGNAL LEVER

This lever operates the turn signal lamp.

- ① Right turn: Push the lever forward
- ② Left turn: Push the lever back

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

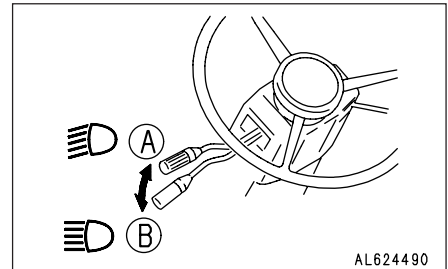
The lever is automatically returned when the steering wheel is turned back. If the lever does not return, move it by hand.



2. DIMMER SWITCH

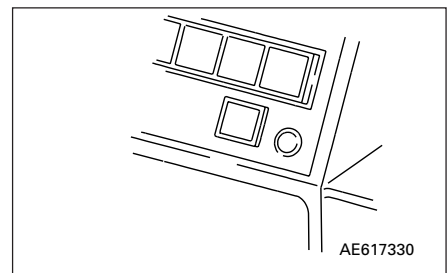
This is used to switch the head lamps between high beam and low beam.

- A Low beam
- B High beam





3. CAUTION, PILOT LAMP BULB CHECK SWITCH

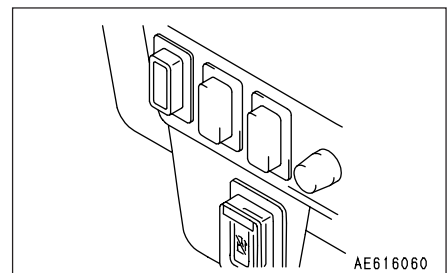
Press this switch when the starting switch is at the ON position to check for any blown bulbs.



4. EXHAUST BRAKE SWITCH


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

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





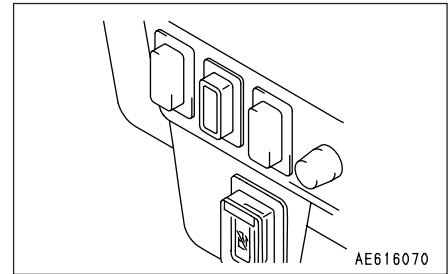
5. FRONT BRAKE OFF SWITCH

⚠ WARNING

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

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

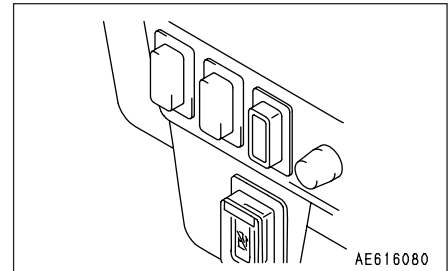
-  position (OFF): When the brake pedal is depressed, the brakes are applied to both the front and rear wheels.
-  position (ON): When the brake pedal is depressed, the front brakes are not applied. The brakes are applied only to the rear wheels.



6. HAZARD LAMP SWITCH

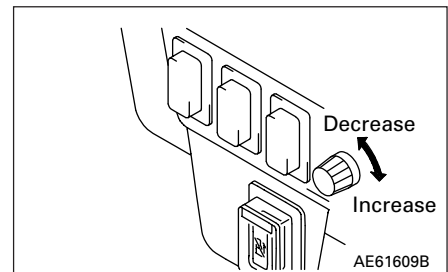
This flashes the left- and right-hand turn signal lamps.

When the switch is turned on, the turn signal pilot lamp flashes at the same time. If the starting switch is OFF, the turn signal pilot lamp does not flash.



7. NIGHT LIGHTING DIMMER SWITCH

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



8. FUEL CUT SWITCH

NOTICE

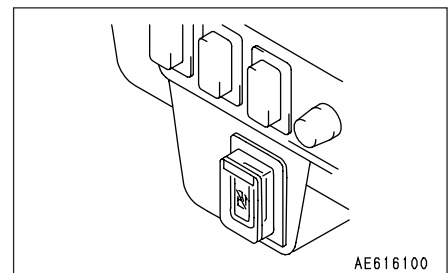
Do not operate this switch when the engine is running (when the machine is traveling).

This cuts the supply of fuel to the engine. It is used when starting the engine using the APS (starting aid) in cold weather.

- OFF: No fuel is supplied to the engine
- ON: Fuel is supplied as normal

REMARK

If the switch is released when it is at the OFF position, it will return to the ON position. For details of the method of using the fuel cut switch, see "12.2.2 STARTING IN COLD WEATHER".



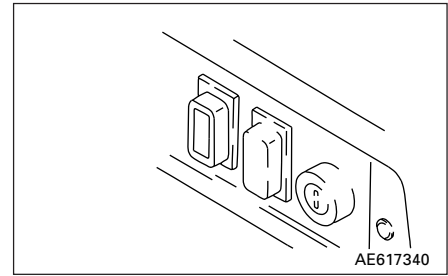
9. AISS LOW SWITCH

Using the AISS LOW switch, it is possible to switch the AISS to AUTO or LOW as desired. The positions are used as follows.

- position: LOW position
 Used when fine control movements are needed, such as when parking in confined spaces. The pilot lamp inside the switch lights up.
- position: AUTO position
 This is used for normal operations.

If the switch is set to the AUTO position, the following conditions are actuated.

1. When the machine is stopped, the idling speed is set to LOW speed when the parking brake or retarder are ON. When the parking brake is released to start traveling, the idling speed is set to HIGH speed.
2. The cooling water temperature is detected, and if the water temperature is low, the idling speed is automatically set to HIGH speed to reduce the time taken for the warming up operation.

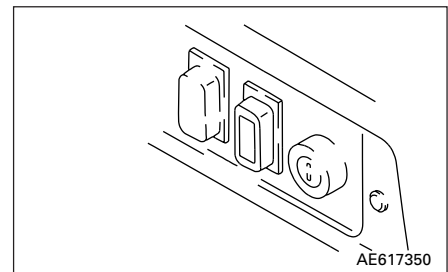


10. APS (STARTING AID) SWITCH

This is used when starting in cold areas.

The APS monitor will light up while the switch is being pressed continuously, and will go out after approx. 12 seconds to show that the APS function has been completed.

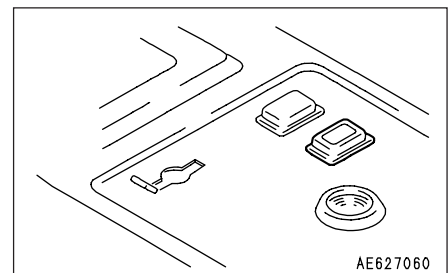
For details of the method of operation, see "12.2.2 Starting in cold weather".



11. POWER MODE SELECTOR SWITCH

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

- position: High power (general operations)
 This is used for general operating conditions.
- position: Economy (traveling in flat areas)
 This position is used when the emphasis is on reducing fuel consumption, such as when traveling on flat ground where the maximum output is not needed.



12. EMERGENCY STEERING SWITCH

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

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

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

When the emergency steering is being used, keep the travel speed to a maximum of 5 km/h (3.1 MPH).

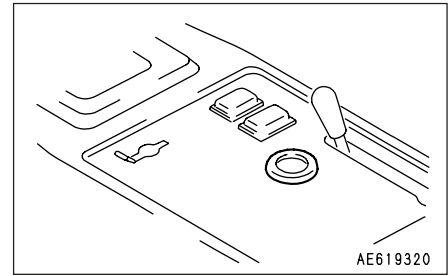
When the emergency steering is actuated, it is possible to use the dump lever to raise the dump body.

Automatic emergency steering will be activated automatically in the following cases:

- Steering pump failure
- Engine stoppage during operation

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

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



13. EMERGENCY BRAKE LEVER

This lever is used to actuate the emergency brake.

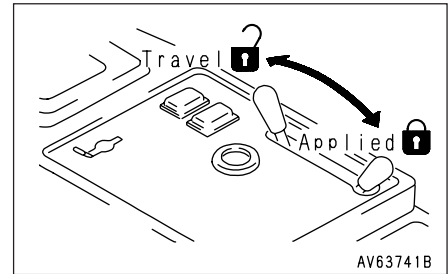
APPLIED: Emergency brake actuated

TRAVEL: Emergency brake released

If the pressure in the air tank drops below 0.22 MPa (2.2 kgf/cm², 31.24 PSI) the emergency brake is automatically applied.

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

For details of the method of releasing the brake if this happens, see "16.2.3 RELEASE METHOD WHEN PARKING BRAKE AND EMERGENCY BRAKE HAVE BEEN ACTIVATED IN EMERGENCY"

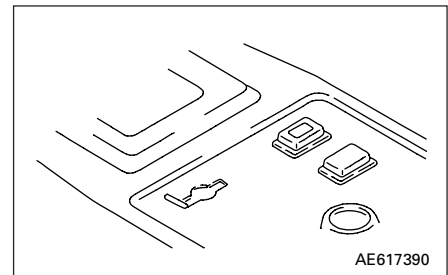


14. SHIFT LIMITER SWITCH

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

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

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



15. PARKING BRAKE VALVE LEVER

WARNING

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

This lever is used to actuate the parking brake valve.

PARKING: Parking brake actuated

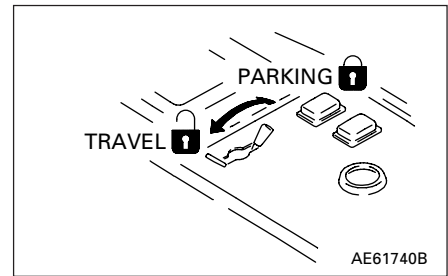
TRAVEL: Parking brake is released

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

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

If the air pressure in the brake circuit drops below 0.22 MPa (2.2 kgf/cm², 31.24 PSI), the emergency brake and parking brake are automatically applied.

For details of the method of releasing the brake when it is applied because of failure in the air system, see "16.2.3 RELEASE METHOD WHEN PARKING BRAKE AND EMERGENCY BRAKE HAVE BEEN ACTUATED IN EMERGENCY"

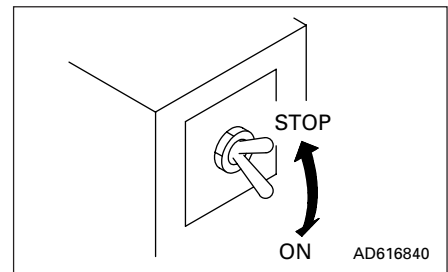


16. ENGINE EMERGENCY STOP SWITCH

WARNING

Do not use this switch when stopping the engine normally. If you use this switch, always return it to the ON (travel) position when the engine has stopped completely.

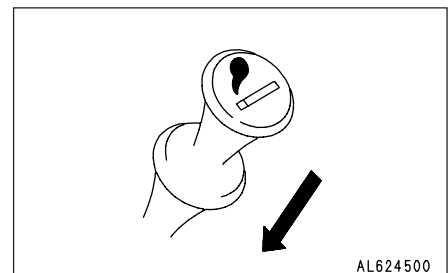
Use this switch if the engine does not stop when the starting switch is turned to the OFF position.



17. CIGARETTE LIGHTER

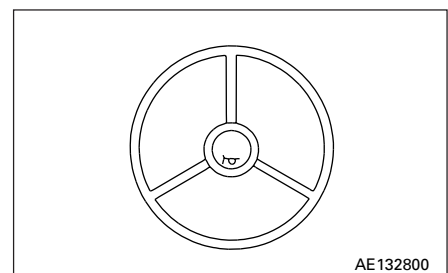
This is used to light cigarettes.

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



18. HORN BUTTON

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



19. WIPER SWITCH

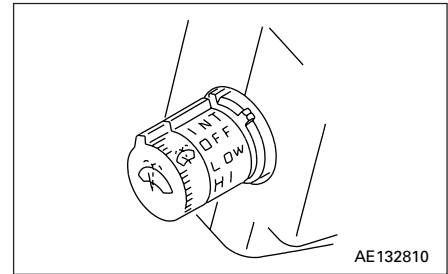
This switch is used to operate the wiper.

INT position: Wiper moves intermittently
OFF

LOW position: Wiper moves at low speed

HI position: Wiper moves at high speed

When the switch is pressed, washer fluid is sprayed out.

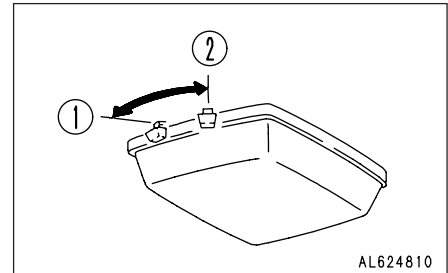


20. ROOM LAMP SWITCH

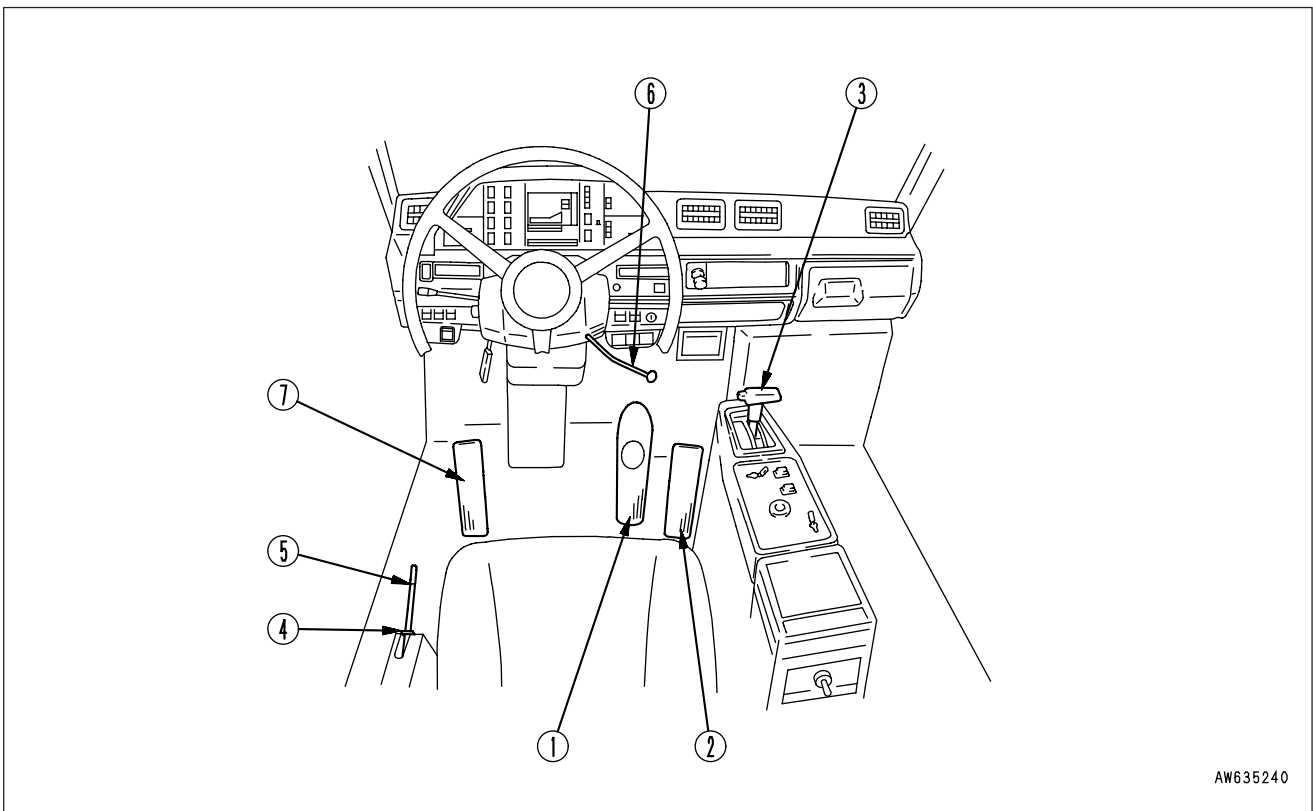
This is used to switch the room lamp on or off.

① OFF

② ON



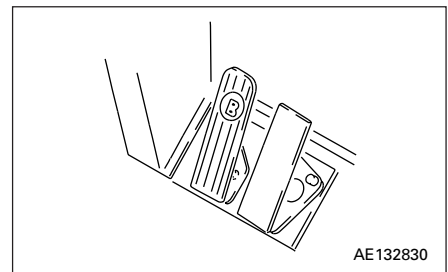
11.3 CONTROL LEVERS AND PEDALS



AW635240

1. BRAKE PEDAL

This is used to apply the wheel brakes.

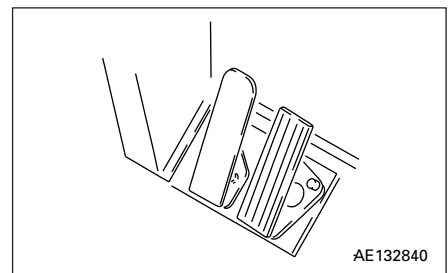


AE132830

2. ACCELERATOR PEDAL

This is used to adjust the engine speed.

It can be operated freely between the engine low idling position and the full throttle position.



AE132840

3. SHIFT LEVER

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

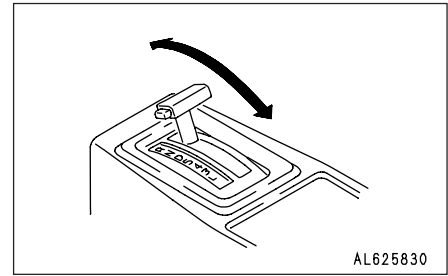
D position

This is used for normal travel.

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

If the dump body is raised, the shift lever is fixed at 2nd. Always lower the dump body when traveling.

The maximum speed in this position is 70 km/h (43.5 MPH), (when the machine is equipped with small tires, the maximum speed is 66 km/h (41.0 MPH).)



R position

This is used when traveling in reverse.

This position uses the torque converter drive.

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

5 - L position

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

Position	Speed range	HD465-5		HD605-5
		Max. speed (Standard tire)	Max. speed (Small size tire)	Max. speed (Standard tire)
5	1st torque converter – 5th direct	38.5 km/h (23.9 MPH)	37.0 km/h (23.0 MPH)	38.5 km/h (23.9 MPH)
4	1st torque converter – 4th direct	28.5 km/h (17.7 MPH)	27.5 km/h (17.1 MPH)	28.5 km/h (17.7 MPH)
3	1st torque converter – 3rd direct	21.0 km/h (13.1 MPH)	20.0 km/h (12.4 MPH)	21.0 km/h (13.1 MPH)
L	1st torque converter – 2nd direct	15.5 km/h (9.6 MPH)	15.0 km/h (9.3 MPH)	15.5 km/h (9.6 MPH)

- The speed ranges for each position are as follows.

If the dump body is raised, it is impossible to shift up from 1st. Always lower the dump body when traveling.

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

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

Before shifting between forward and reverse, stop the machine completely and then run the engine at low idling.

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

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

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

When the dump lever is not at the FLOAT position and when the dump body has risen, if the shift lever is not at the N (neutral) position, the central warning lamp will flash and the alarm buzzer will sound.

The shift lever must not be returned to the N (neutral) position while traveling.

Release the accelerator pedal and run the engine at low idling when moving the shift lever from the N (neutral) position to the forward or reverse position.

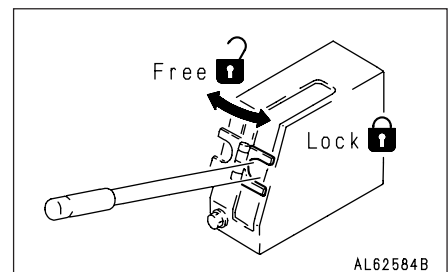
When moving the shift lever from the N (neutral) position to the R (reverse) position or from the D position to position 5, press the lock button on the shift lever before moving it.

4. SAFETY LOCK

WARNING

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

This device is used to lock the dump lever.

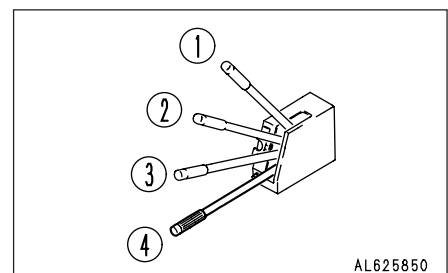


5. DUMP LEVER

CAUTION

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

This lever is used to operate the dump body.



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

When traveling, always set the dump lever to the FLOAT position.

For details, see "12.10 OPERATING DUMP BODY".

6. RETARDER CONTROL LEVER



CAUTION

The retarder must not be used as a parking brake.

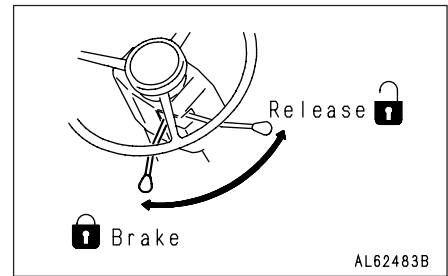
This lever is used to operate the retarder, which applies the rear brake when going downhill.

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

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

For details, see "12.6 TRAVELING DOWNHILL".

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

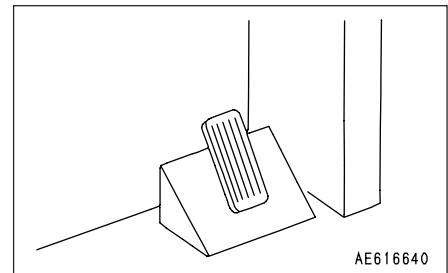


7. DIFFERENTIAL LOCK PEDAL

This is used to actuate the differential lock control.

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

For details, see "31. USING DIFFERENTIAL LOCK".



11.4 MECHATRONICS EQUIPMENT CONTROLLER

1. SHIFT CONTROLLER

A two-digit number followed by the action code is displayed in the inspection window to identify the location of the abnormality. When the condition is normal, "0.0" or "0.C" is displayed.

2. ENGINE CONTROLLER

A two-digit number followed the action code is displayed in the inspection window to identify the location of the abnormality. When the condition is normal, "0.0" is displayed.

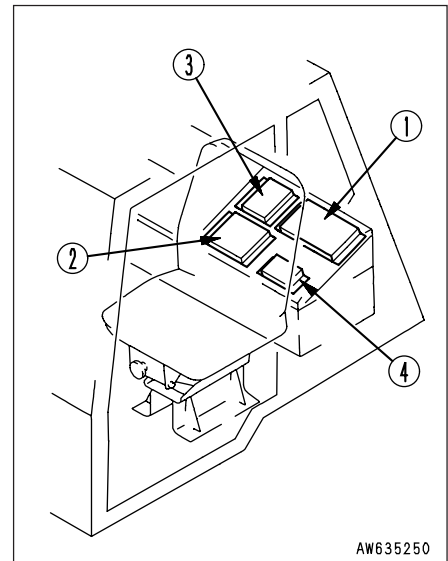
3. SUSPENSION CONTROLLER

A two-digit number followed the action code is displayed in the inspection window to identify of the location of the abnormality. When the condition is normal, "0.0" is displayed.

4. APS CONTROLLER

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

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



11.5 SAFETY PIN

⚠ WARNING

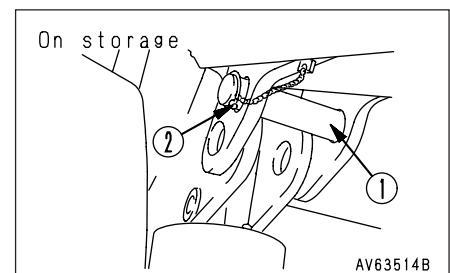
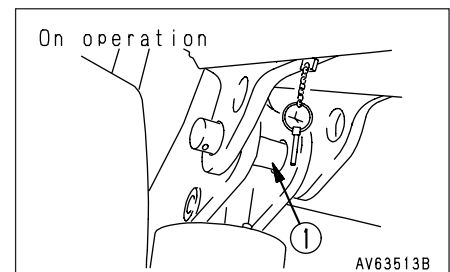
When raising the dump body to inspect the machine, always place the dump lever at the HOLD position, apply the lock, and then use the safety pins.

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

- Raise the dump body fully, insert safety pins ①.
- Always insert the safety pins on both sides.

STOWING SAFETY PIN

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

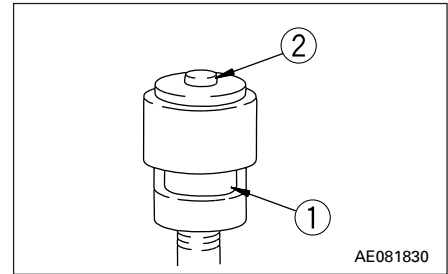


11.6 DUST INDICATOR

This device indicates clogging of the air cleaner element.

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

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

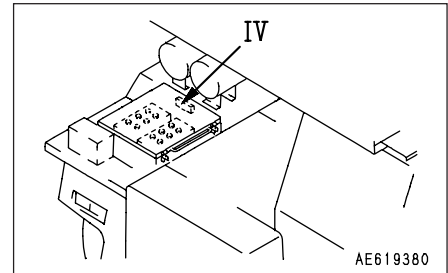
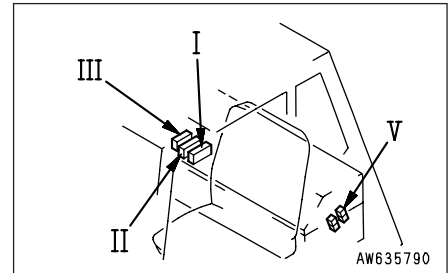


11.7 FUSES

⚠ WARNING

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

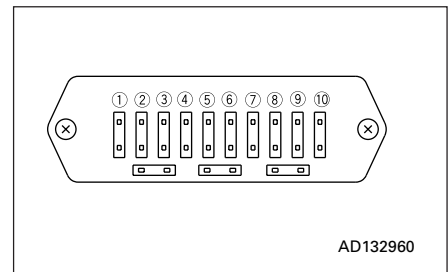
The fuses are used to protect the electrical equipment and wiring from burning out. If the fuse is corroded and covered with white powder, or if the fuse is loose in the fuse holder, replace the fuse.



Fuse capacity and circuit name

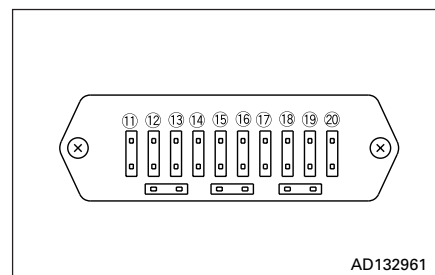
Fuse box I

No.	Fuse capacity	Circuit name
1	10A	Car radio, car stereo
2	10A	Horn switch
3	10A	Cigar lighter
4	20A	Turn signal indicator lamp, fog lamp (if equipped)
5	10A	Engine start relay, neutral relay
6	20A	Head lamp (low beam), stop lamp, room lamp
7	20A	Head lamp (high beam), side clearance lamp, tail lamp, night lighting
8	10A	Backup lamp, backup buzzer
9	10A	APS controller power supply relay, front brake cut solenoid, BVC relay solenoid
10	10A	Overrun prevention solenoid, shift controller, exhaust brake solenoid



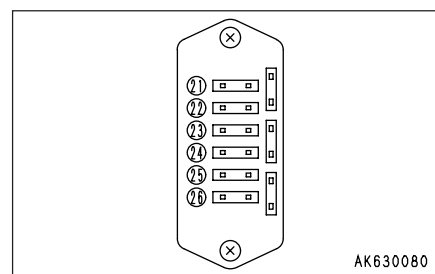
Fuse box II

No.	Fuse capacity	Circuit name
11	10A	Engine controller, governor cut relay
12	10A	Electronic display panel, monitor lamps, central warning lamp, buzzer, PMC (if equipped)
13	5A	Suspension control solenoid, suspension controller
14	5A	Payload meter (if equipped), payload relay (if equipped)
15	20A	Payload external display lamp (if equipped)
16	5A	PMC (if equipped)
17	10A	Start switch, radio back-up, emergency engine stop solenoid (if equipped electronic governor), engine stop motor
18	10A	T/M controller, engine controller (if equipped), PMC (if equipped)
19	10A	Emergency steering
20	10A	Spare (Direct from battery)



Fuse box III

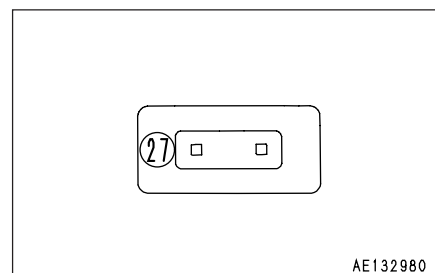
No.	Fuse capacity	Circuit name
21	10A	APS controller
22	20A	Wiper motor, washer motor
23	10A	Air conditioner blower motor
24	10A	Air conditioner compressor
25	10A	Spare
26	10A	Spare



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

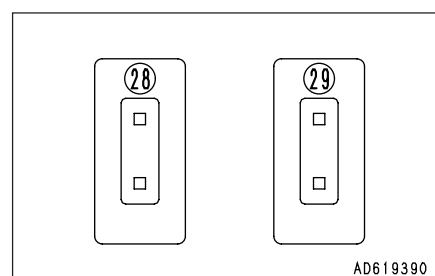
Fuse box IV

No.	Fuse capacity	Circuit name
27	30A	Power source for fuse box



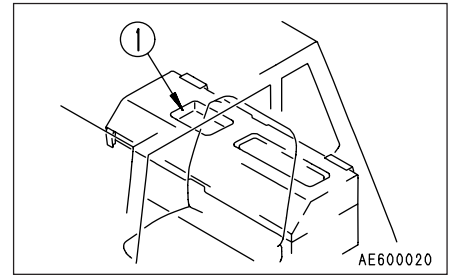
Fuse box V

No.	Fuse capacity	Circuit name
28	20A	APS glow plug 1
29	20A	APS glow plug 2



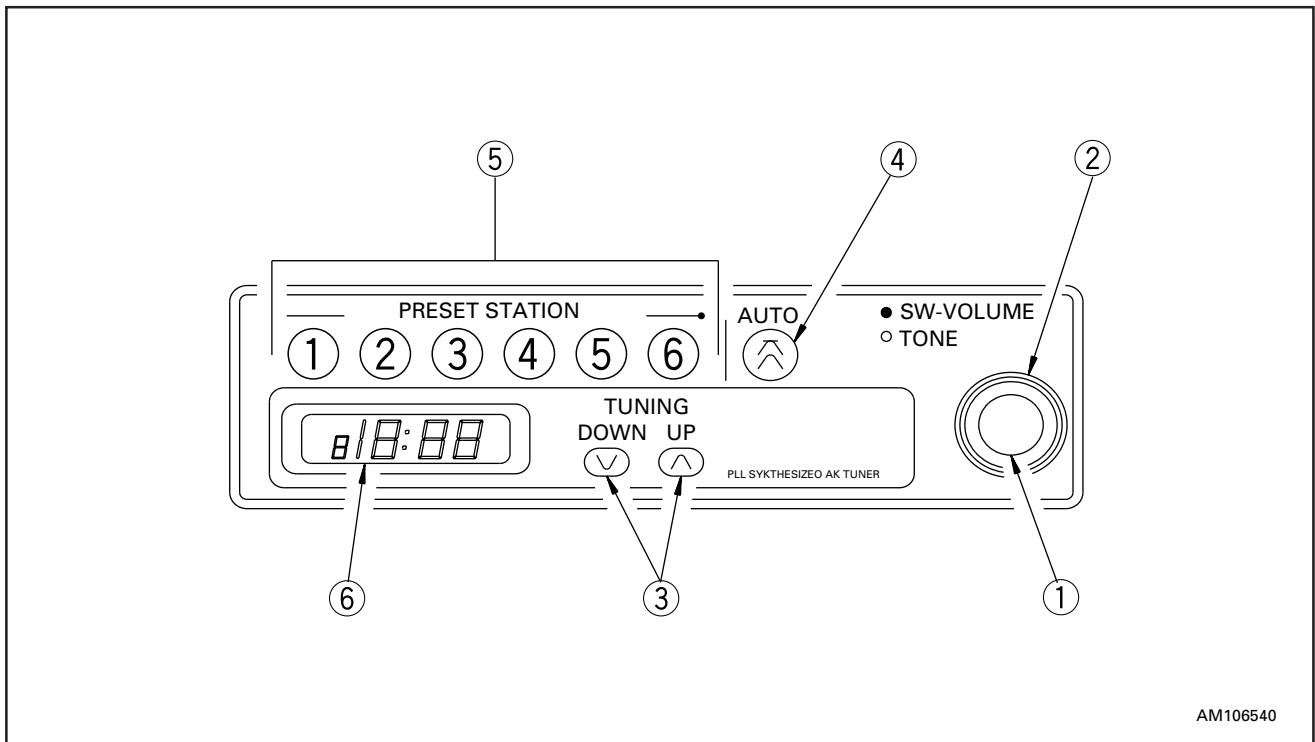
11.8 LOCATION OF MANUAL BOX

Manual box ① is located on top of the rear cover in the cab. Always keep the operation and maintenance manual in this box for easy reading access.



11.9 CAR RADIO

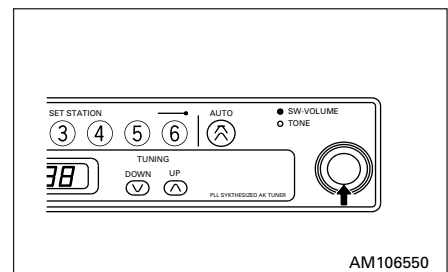
11.9.1 EXPLANATION OF COMPONENTS



AM106540

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

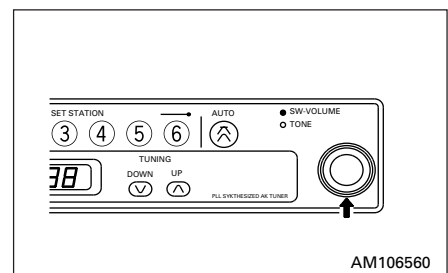
When this switch is depressed, the radio is turned on and the selected frequency appears on the display ⑥. When the switch is pressed again, the power is turned off. When the knob is turned clockwise, the sound volume increases. Counterclockwise turning lowers the volume.



AM106550

2. Tone control (○ TONE)

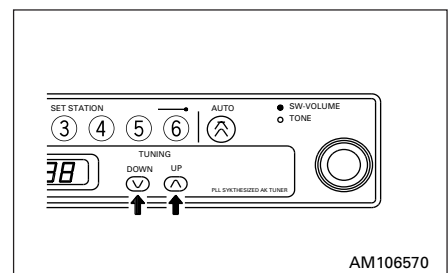
When the control switch is turned clockwise from the intermediate position, treble tone is emphasized. Counterclockwise turning reduces the treble and emphasizes the bass.



AM106560

3. Manual tuning button (TUNING)

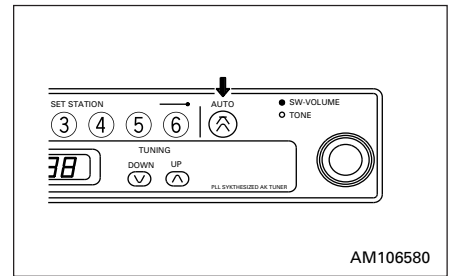
Frequency is changed using this button. Each time the up-button ^ is pressed, the frequency increases by 9 kHz, and each time the down button v is pressed, the frequency decreases by 9 kHz. If either button is continuously pressed for about 0.5 seconds or more, the frequency also increases/decreases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



AM106570

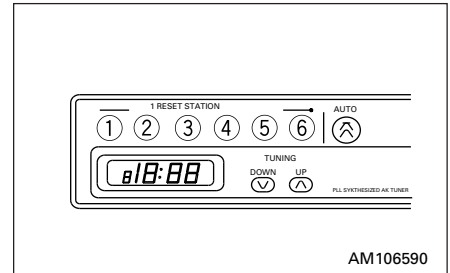
4. Auto tuning button (AUTO)

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



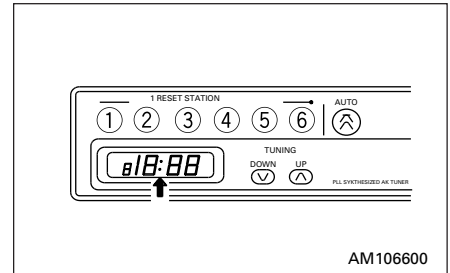
5. Preset button (1, 2, 3, 4, 5, 6) (PRESET STATION)

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



6. Display

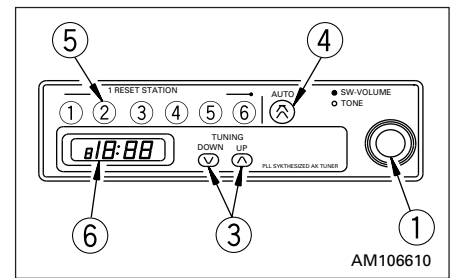
The frequency and preset No. are displayed.



11.9.2 SETTING METHOD

Presetting

1. Press the power switch ①. A frequency will appear on the display ⑥.
2. Select a desired frequency using the auto-tuning button ④ or manual-tuning button ③.
3. Press the preset button for 1.5 sec or longer to store the number into the memory. The display ⑥ will show the preset number when storing is completed. Then, when preset button ⑤ is released after being pressed for less than 1.5 seconds, the stations stored in the memory can be selected. One station per button can be stored.



Manual tuning

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

^ button: selects higher frequency.

∨ button: selects lower frequency.

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

Auto tuning

When the auto tuning button ④ is pressed, the frequency increases and once the desired station is selected, auto tuning will stop.

If wishing to select another station, press the auto tuning button again.

During auto tuning, when this button is pressed, auto tuning is released and the frequency prior to auto tuning is selected.

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

Antenna

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

NOTICE

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

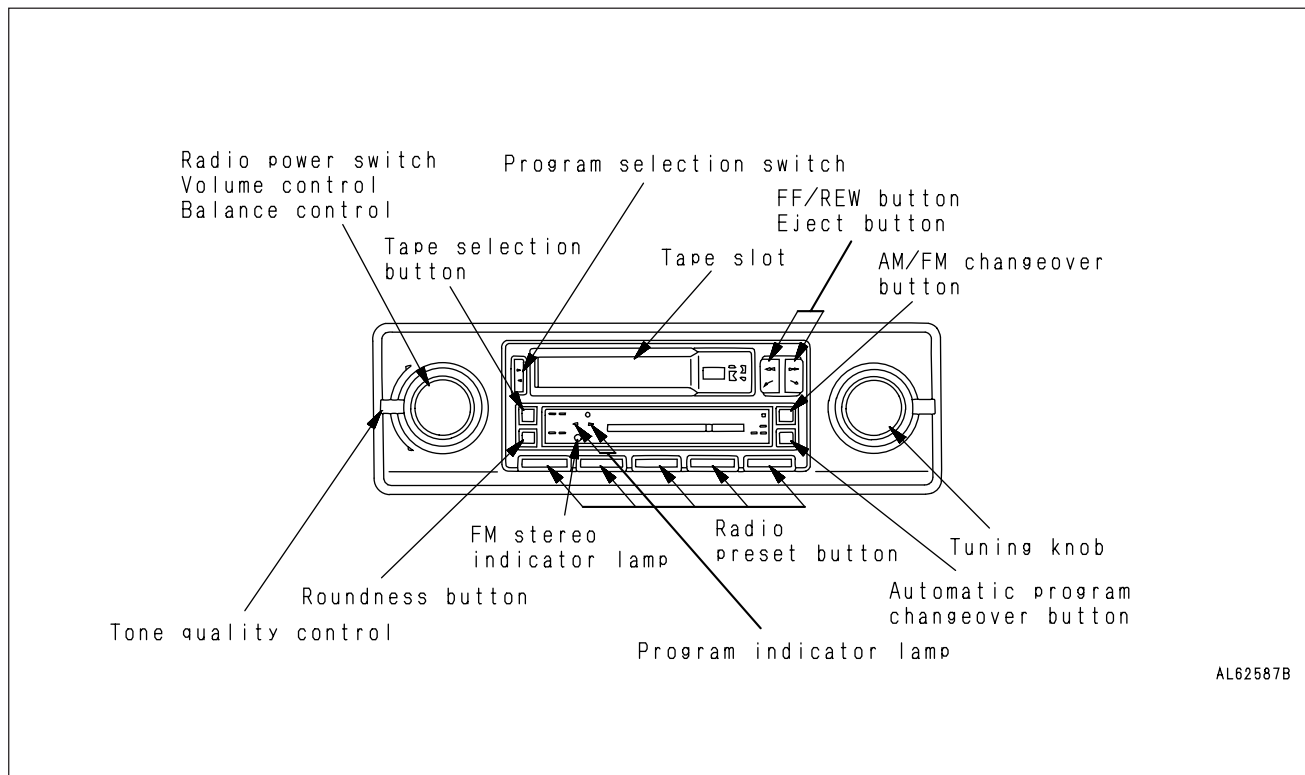
11.9.3 PRECAUTIONS FOR USE

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

11.9.4 SPECIFICATIONS

Tuning system	: PLL synthesizer system
Receiving frequency	: 522 kHz to 1629 kHz (in 9 kHz steps)
Actual max. sensitivity	: 30 dB
Actual max. output	: 8 W
Current consumption	: 0.35 A (at 0.5 W output)
External dimensions	: W 184 mm x H 58 mm x D 116 mm (7.2 in x 2.3 in x 4.6 in)
Weight	: 0.45 kg (1 lb)

11.10 CAR STEREO



11.10.1 METHOD OF USE

When listening to the cassette tape

1. POWER

Turn the power switch clockwise to turn the power on.

2. INSERTING TAPE

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

3. STOPPING

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

4. SELECTING PROGRAM

1. Automatic selection

When one side of the tape finishes, the direction of the tape is automatically reversed to provide continuous play.

2. Manual reverse

If the program selection button is pressed before the tape finishes, the direction of the tape can be reversed.

5. PROGRAM INDICATOR

Two indicators show the direction of play for the program.

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

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

To release the lock

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

7. VOLUME CONTROL

Turn the knob clockwise to increase the sound.

8. BALANCE CONTROL

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

9. TONE CONTROL

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

10. ROUNDNESS CONTROL

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

11. APC (AUTOMATIC SELECTION BUTTON)

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

WHEN LISTENING TO RADIO (AM/FM)**1. AM/FM SELECTION**

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

2. PUSH BUTTON SELECTION

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

3. MANUAL TUNING

Turn the tuning button to select the desired station.

4. METHOD OF PRESETTING

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

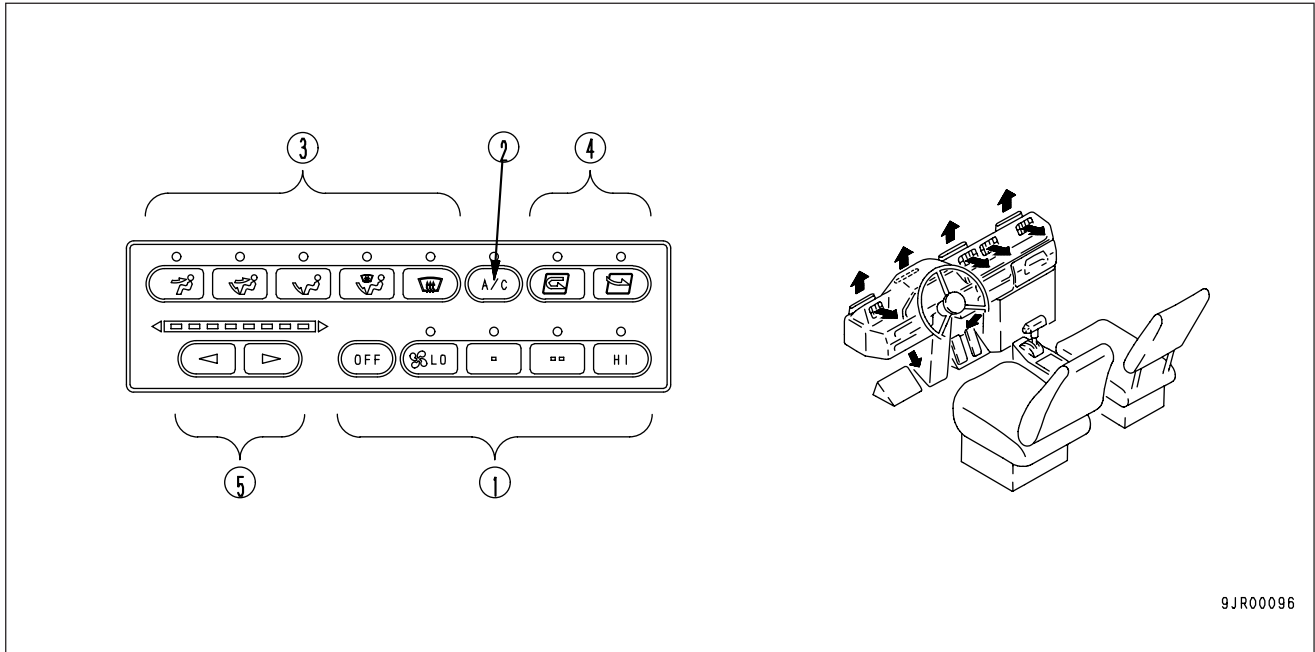
11.10.2 PRECAUTIONS WHEN HANDLING

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

11.11 AIR CONDITIONER

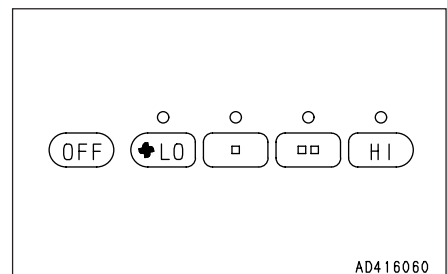
By taking fresh air into the cab through a filter, it is possible to raise the pressure inside the cab. This makes it possible to provide a pleasant working environment even on dusty jobsites.

11.11.1 GENERAL LOCATIONS ON CONTROL PANEL



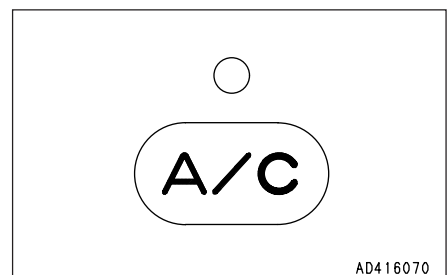
1. FAN SWITCH

This can be used to adjust the air flow to 4 stages.
 This switch also acts as the main switch for the air conditioner.
 When the switch is pressed, the indicator lamp above the switch lights up to indicate the air flow.



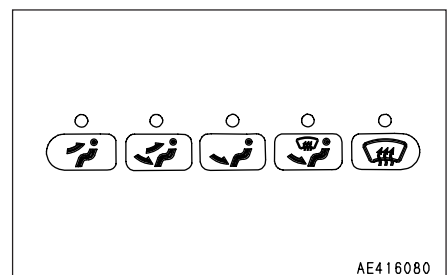
2. AIR CONDITIONER SWITCH

This is used to start or stop the cooling or dehumidifying function.
 When the fan switch is turned ON and the air conditioner switch is pressed, the indicator lamp above the switch lights up.
 When the switch is pressed again, the switch is turned OFF and the indicator lamp goes out.



3. MODE SELECTOR SWITCH

This is used to select the vents.
 The following five vent modes are available: FACE, FACE/FOOT, FOOT, FOOT/DEF, DEF.
 When the switch is pressed, the indicator lamp above the switch lights up to display the vent mode.



4. EXTERNAL/INTERNAL AIR CHANGEOVER SWITCH

Changes between internal air circulation and external air intake.

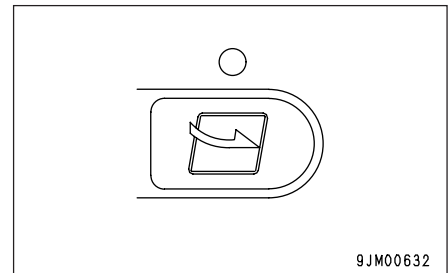
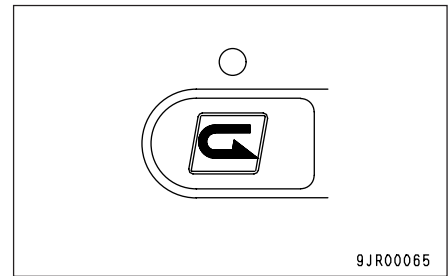
When pressing the switch, the indicator lamp on the top of switch lights up.

Internal air circulation

This is used when wishing to quickly cool or warm the cab or when the air inside the cab is stale.

External air intake

This is used for fresh air intake or to remove condensation on windows.



5. TEMPERATURE CONTROL SWITCH

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

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

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

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

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

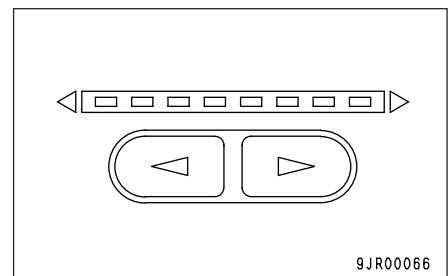
The settings for each mode are retained in memory even when the starting switch is turned OFF.

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

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

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

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



11.11.2 METHOD OF OPERATION

Switch		Fan switch	Air conditioner switch	Temperature control switch	External/internal air changeover switch	Vent mode selector switch
Cooling	Rapid	HI	ON	All green	RECIRC	FACE
	Normal	HI-LO	ON	More than half are green	FRESH	FACE
Dehumidifying, heating		HI-LO	ON	More than half are red	FRESH	FOOT
Heating	Rapid	HI	OFF	All red	RECIRC	FOOT
	Normal	HI-LO	OFF	More than half are red	FRESH	FOOT
Defroster		HI	ON	More than half are red	FRESH	DEF
Ventilation or pressurizing		HI-LO	OFF	All green	FRESH	FACE

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

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

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

WHEN NOT USING THE AIR CONDITIONER REGULARLY

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

REMARK

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

11.11.3 PRECAUTIONS WHEN USING AIR CONDITIONER

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

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

Be careful not to cool the cab too much.

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

Be careful to adjust the temperature to a suitable level.

11.11.4 INSPECTION AND MAINTENANCE

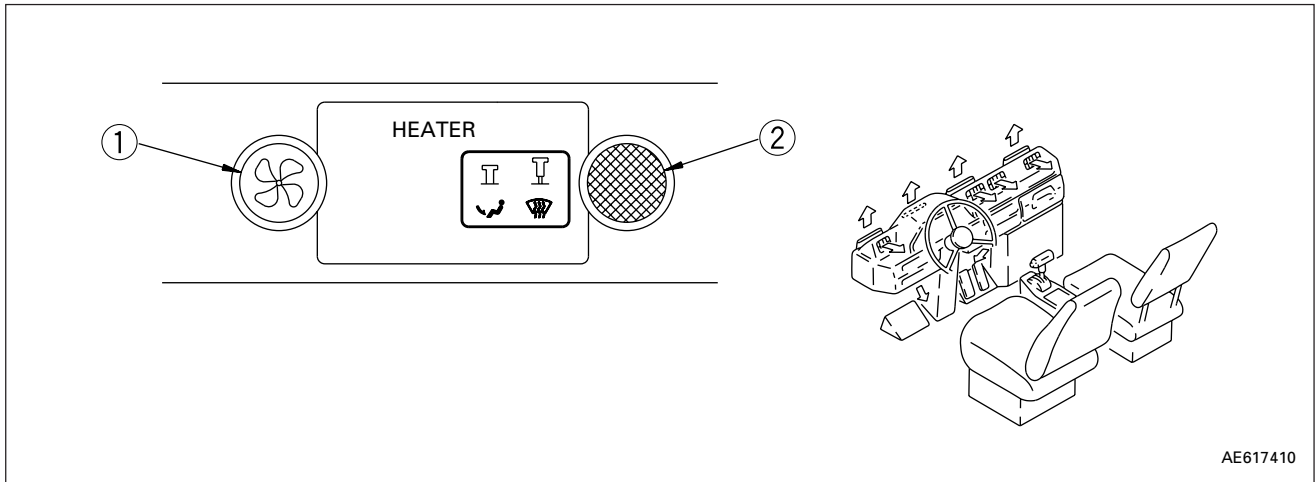
When the air conditioner is not being used, run the compressor at low speed for several minutes once a week to ensure that the oil film at various parts of the compressor is not lost. (Run the engine at low speed and set the temperature control lever to the medium position.)

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

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

11.12 CAR HEATER

11.12.1 GENERAL LOCATIONS ON CONTROL PANEL

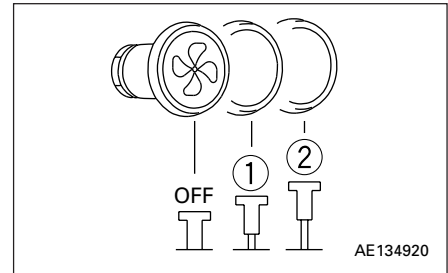


1. HEATER SWITCH

This switch is used for turning the heater ON/OFF and for adjusting the air flow.

Stopped: OFF

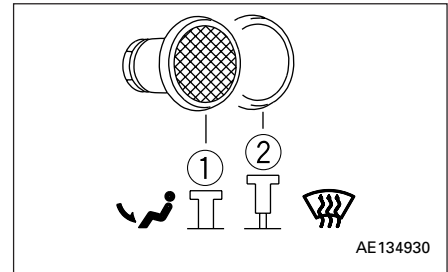
- ①: Low
- ②: High



2. VENT SELECTOR KNOB

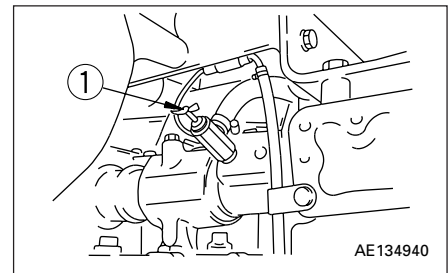
This is used to select the vent.

- ①: Foot
- ②: Defroster



11.12.2 PRECAUTIONS WHEN HANDLING

1. When using the car heater, open valve ① installed to the engine thermostat housing.
2. When the season for using the car heater ends, close valve ①.



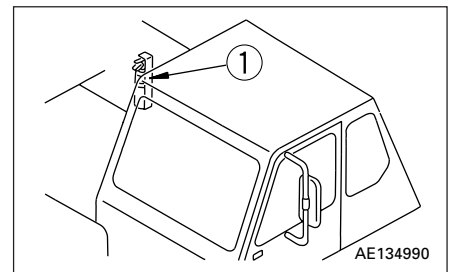
11.12.3 PRECAUTIONS ON USING HEATER

- In winter season always use antifreeze fluid with the density suitable to outside air temperature. Do not use antifreeze fluid stored over a period longer than its recommended serviceable life.
- If you don't use antifreeze fluid in winter season for your car, drain the coolant from the radiator after at the end of each day.
- Be sure to change the water hose every two years.
- DAILY INSPECTION
 - If malfunctions are found as follows, go to the car dealer for repair.
 - Scratch cracks or swelling of hose.
 - Water leaks from the joint of water hose.
 - Removal of protection cover for the water hose.
 - Broken heater unit bracket or loosening of heater unit installation bolts.

Since this heater warms the cab by using hot water from the engine, it functions only while the engine coolant is hot.

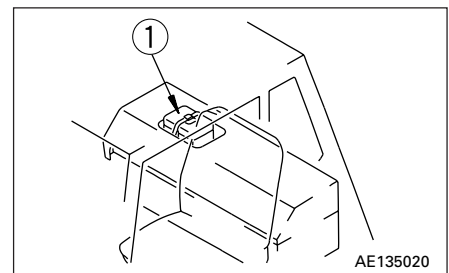
11.13 LOCATION OF FIRE EXTINGUISHER

First extinguisher ① is located on the side of the brake chamber mount bracket at the back of the engine hood.



11.14 LOCATION OF FIRST AID AND MANUAL BOX

First aid and manual box ① is located on top of the rear cover in the cab.



12. OPERATION

12.1 CHECK BEFORE STARTING ENGINE

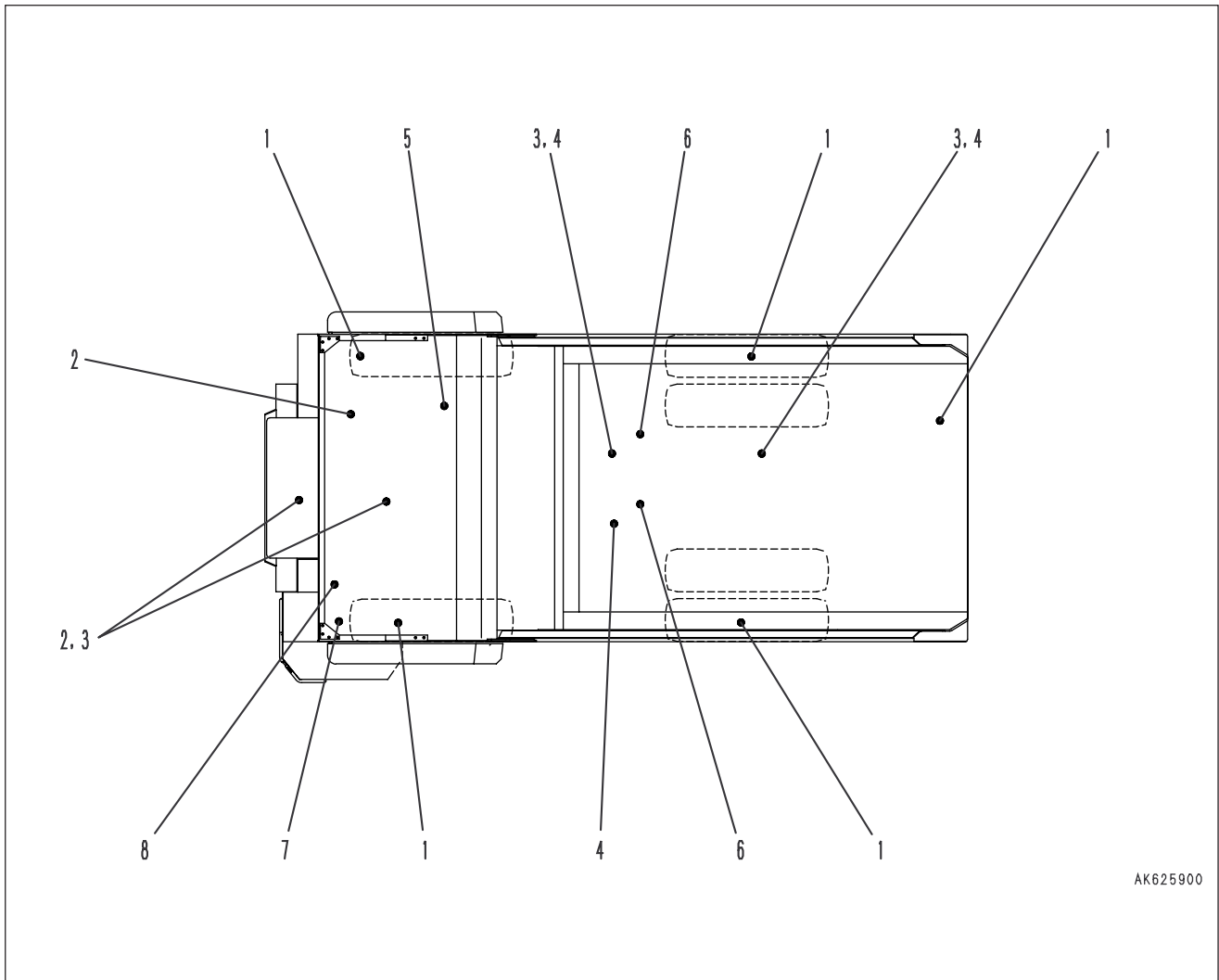
12.1.1 WALK-AROUND CHECK

⚠ WARNING

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

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

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



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

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

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

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

3. CHECK FOR LEAKAGE OF WATER, OIL FROM AROUND ENGINE

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

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

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

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

5. CHECK FOR LOOSE AIR CLEANER MOUNTING BOLTS

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

6. CHECK DUMP BODY MOUNT RUBBER

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

7. CHECK HANDRAIL FOR DAMAGE, LOOSE BOLTS

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

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

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

Clean any dirt from the surface.

9. CHECK REAR VIEW MIRROR, UNDER VIEW MIRROR

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

10. CHECK SEAT BELT AND CLAMPS

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

- Check for any loose bolts of the clamps mounting the equipment to the machine. Tighten any loose bolts.
- When the belt has been used for a long time, if any external damage or fraying of the belt can be seen, or if the clamps are broken or deformed, replace the seat belt.

11. INSPECTION OF TIRES

 **WARNING**

If worn or damaged tires are used, they may burst and cause serious injury or death.

To ensure safety, do not use the following tires.

Wear:

- A tire having tread groove less than 15% of the new tire.
- A tire worn extremely unevenly or having stepped-type wear.

Damage:

- A tire having a flow which has reached the cords or a crack in the rubber part.
- A tire, the cords of which are broken or dragged.
- A tire, the surface of which is pealed (separated).
- A tire, the bead of which is damaged.
- A tubeless tire which is leaking or which has not been repaired.
- A tire which is aged, deformed or damaged abnormally and which does not seem usable.

12. INSPECTION OF RIMS

 **WARNING**

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

12.1.2 CHECK BEFORE STARTING

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

CHECK COOLANT LEVEL, ADD WATER

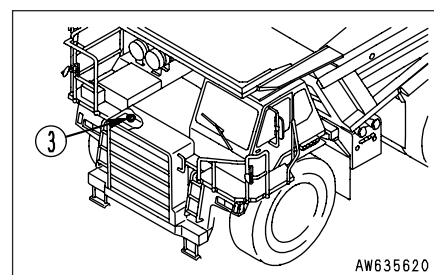
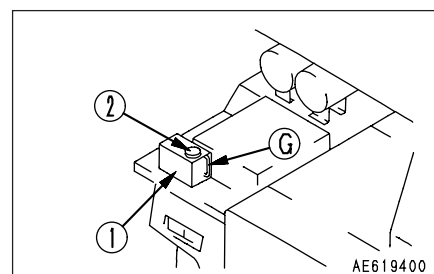
⚠ WARNING

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

⚠ CAUTION

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

1. Check that the cooling water in reservoir tank ① is between the FULL and LOW marks on gauge ⑥.
2. If the level is LOW, remove cap ② and add the cooling water to the FULL mark.
3. If there is no cooling water in the reservoir tank, remove the upper cover of the radiator guard, and add the cooling water from water filler ③ to the radiator guard. Further, add water to the reservoir tank.
4. Check that there is no oil in the water or any other abnormality.
5. After adding water, tighten the cap securely.
6. If more water is added than normal, check for water leakage.



CHECK OIL LEVEL IN FRONT BRAKE OIL TANK, ADD OIL

⚠ WARNING

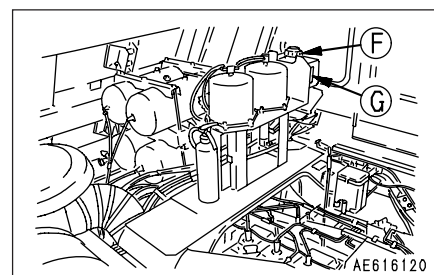
When adding oil to the front brake oil tank, always use engine oil.

1. Check that the oil is between the FULL and LOW marks on sight gauge ⑥.

If the oil level is low, add engine oil through oil filler ⑦.

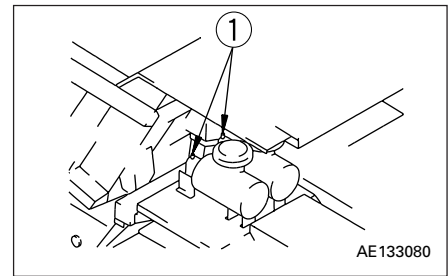
For details of the oil to use, see "20. USE OF FUEL, COOLANT, AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".

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



CHECK DUST INDICATOR

1. Check that the red piston has not appeared in the transparent portion of dust indicator ①.
2. If the red piston has appeared, clean or replace the element immediately.
For details of the method of cleaning the element, see "24.2 WHEN REQUIRED".
3. After checking, cleaning, or replacing, press dust indicator ① to return the red piston to its original position.

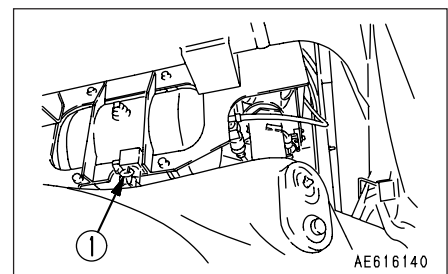
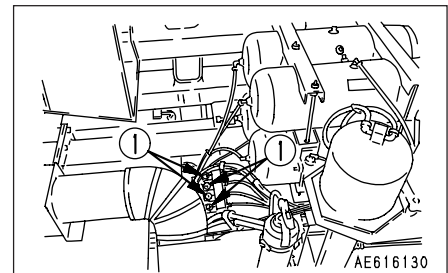


DRAIN WATER FROM AIR TANK

1. After starting the engine, pull ring ① of the tank drain valve to drain the water from the tank.
2. Carry out the same operation after completing work.

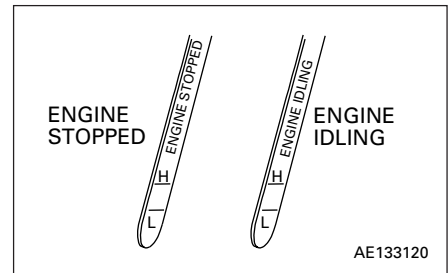
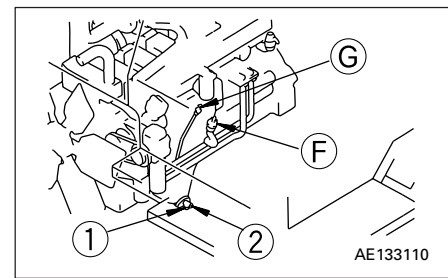
NOTICE

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



CHECK OIL LEVEL IN ENGINE OIL PAN, ADD OIL

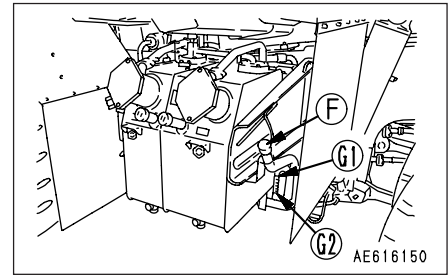
1. Check the oil level with dipstick ③.
2. Remove dipstick ③, and wipe the oil off with a cloth.
3. Insert dipstick ③ fully in the oil filler pipe, then take it out again.
4. The oil level should be between the H and L marks on the ENGINE STOPPED side of dipstick ③.
If the oil is below the L mark, add engine oil through oil filler ④.
For details of the oil to use, see "20. USE OF FUEL, COOLANT, AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".
5. If the oil is above the H mark, remove drain plug ①, and loosen drain valve ② to drain the excess engine oil, then check the engine oil level again.
6. If the oil level is correct, tighten the handle of the oil filler cap securely.

**REMARK**

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

CHECK OIL LEVEL IN TRANSMISSION CASE, ADD OIL

1. After starting the engine, run the engine at low idling and check the oil level with sight gauge ②.
2. If the oil level is low, add engine oil through oil filler ①.
For details of the oil to use, see "20. USE OF FUEL, COOLANT, AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".



NOTICE

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

CHECK OIL LEVEL IN STEERING AND HOIST OIL TANK, ADD OIL

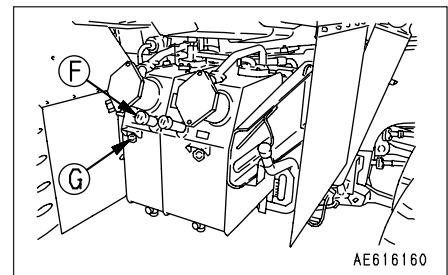
⚠ WARNING

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

1. Check with sight gauge ③.
2. If the oil level is not up to the window of sight gauge ③, add engine oil through oil filler ④.

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

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



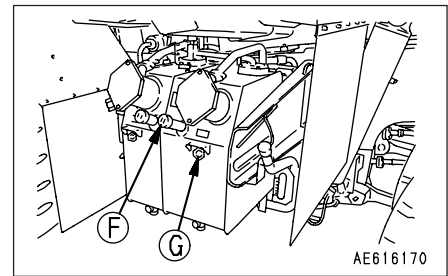
CHECK OIL LEVEL IN REAR BRAKE COOLING OIL TANK, ADD OIL**⚠ WARNING**

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

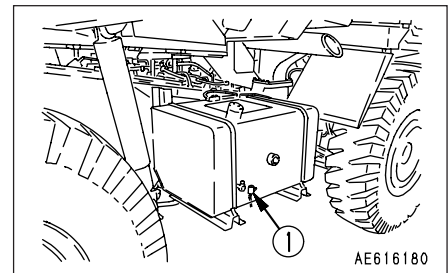
1. Check with sight gauge ⑥.
2. If the oil level is not up to the window of sight gauge ⑥, add engine oil through oil filler ⑦.

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

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

**DRAIN WATER, SEDIMENT FROM FUEL TANK**

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



CHECK FUEL LEVEL

⚠ WARNING

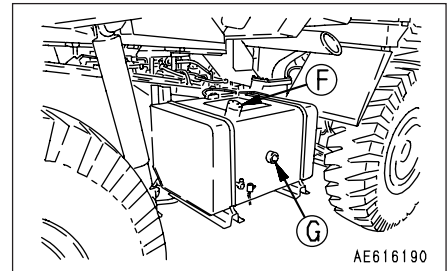
When adding fuel, do not let the fuel overflow. This may cause fire. If any oil spills, wipe it up completely.

1. Check the fuel level with fuel gauge ③ installed to the fuel tank.
2. After completing operations, add fuel through fuel filler ④ to fill the tank.

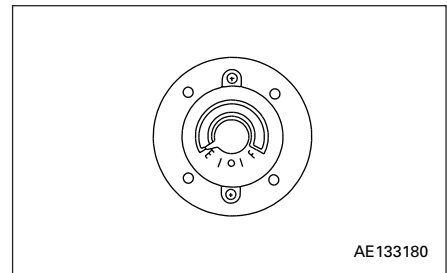
Fuel tank capacity: 780 l (205.92 US gal, 171.60 UK gal)

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

3. After adding fuel, tighten the cap securely.



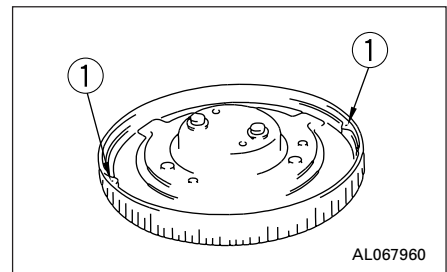
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REMARK

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



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CHECK WHEEL HUB NUTS, TIGHTEN

Check for loose hub nuts, and if any are loose, tighten 3 or 4 times to the specified torque in the order given in the diagram.

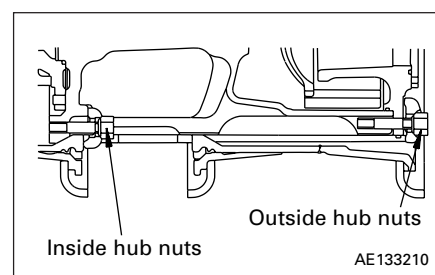
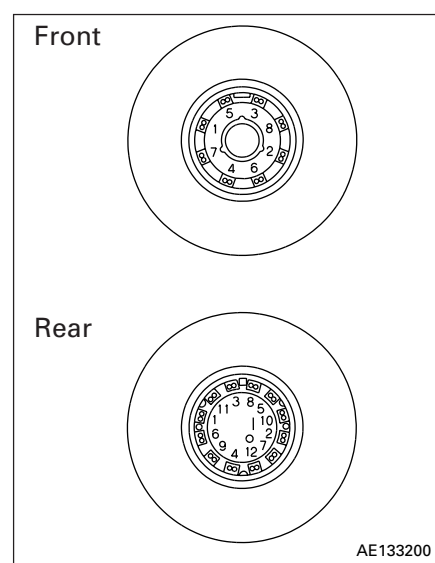
Tightening torque:

- $1320 \pm 147 \text{ N}\cdot\text{m}$ ($135 \pm 15 \text{ kgf}\cdot\text{m}$, $976.5 \pm 108.5 \text{ lbft}$)
(When thread and nut seat are not coated with grease)
- $927 \pm 103 \text{ N}\cdot\text{m}$ ($94.5 \pm 10.5 \text{ kgf}\cdot\text{m}$, $683.5 \pm 75.9 \text{ lbft}$)
(When thread and nut seat are coated with molybdenum disulphide grease)

If the hub nuts have been tightened again after replacing the tire, travel for 5 to 6 km, then tighten again to settle all the contacting parts.

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

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

**CHECK INFLATION PRESSURE OF TIRES**

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

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

Check for loose wheel hub nuts (bolts).

The proper inflation pressure is shown below.

HD465-5

Tire size	Inflation pressure
24.00-35-36PR (standard)	0.44 MPa (4.5 kgf/cm ² , 63.9 PSI)
24.00R35★★ (if equipped)	0.69 MPa (7.0 kgf/cm ² , 99.4 PSI)
21.00-35-36PR (if equipped)	0.54 MPa (5.5 kgf/cm ² , 78.1 PSI)
21.00-35-32PR (if equipped)	0.49 MPa (5.0 kgf/cm ² , 71.0 PSI)

HD605-5

Tire size	Inflation pressure
24.00R35★★ (standard)	0.69 MPa (7.0 kgf/cm ² , 99.4 PSI)
24.00-35-36PR (if equipped)	0.44 MPa (4.5 kgf/cm ² , 63.9 PSI)

NOTICE

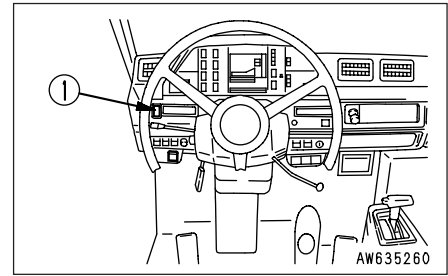
If the tires are used when the inflation pressure is less than the value given in the table above, the rim may be damaged.

Always keep the tire inflation pressure within $+0 - +0.03 \text{ MPa}$ (0.3 kgf/cm^2 , 4.3 PSI) of the value in the table above.

CHECK CENTRAL WARNING LAMP

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

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

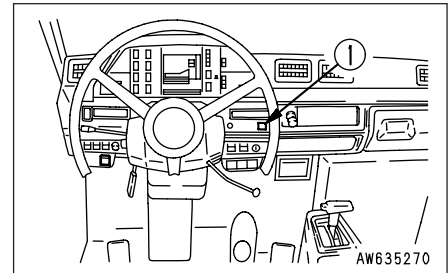


CHECK MACHINE MONITOR SYSTEM

1. Before starting the engine, turn the starting switch to the ON position.
2. Check that all monitor lamps, gauges, and the central warning lamp light up for approx. 3 seconds and that the alarm buzzer sounds for approx. 1 second.

REMARK

- When this is done, the speedometer should display 88.
 - When the starting switch is at the ON position, if there is not at the neutral position, the transmission shift lever position pilot lamp and the central warning lamp will flash and the alarm buzzer will continue to sound intermittently. At this time, when the lever is placed at neutral, letter "N" is displayed, the central warning lamp goes out and the buzzer stops.
 - After the engine is stopped, the monitor cannot be checked until at least 30 seconds have passed.
3. When checking the monitor, check for blown bulbs in the the caution lamps and pilot lamps at the same time. Before starting the engine, turn the starting switch to the ON position, press bulb check switch ①, and check that no caution lamp or pilot lamp bulb is blown.



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

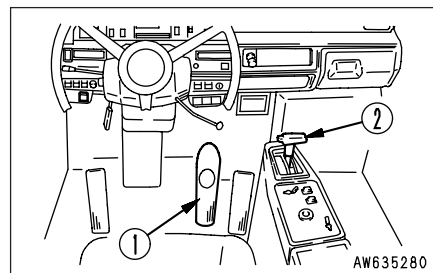
CHECK FOR NORMAL ACTUATION OF FOOT BRAKE

Check when starting operations, and if the braking effect is poor, check and adjust. For details, see "24.5.3 CHECK WEAR OF FRONT DISC BRAKE PADS".

CHECK BRAKING CAPACITY OF FOOT BRAKE

Check the braking capacity of the foot brake as follows.

1. Set the air pressure to the maximum with the machine on flat ground, and depress foot brake ①.
2. Set shift lever ② to the D position, gradually raise the engine speed, and check that the machine does not move even when the engine speed reaches 1850 rpm.

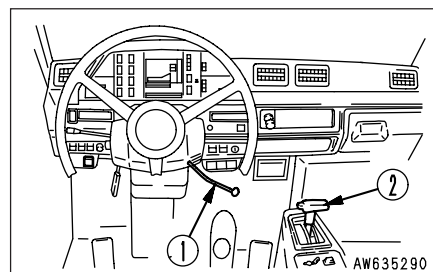
**CHECK FOR NORMAL ACTUATION OF RETARDER BRAKE**

Check when starting operations, and if the braking effect is poor, check and adjust. For details, see "24.6.5 CHECK WEAR OF REAR BRAKE DISC".

CHECK BRAKING CAPACITY OF RETARDER BRAKE

Check the braking capacity of the retarder brake as follows.

1. Set the air pressure to the maximum with the machine on flat ground, and pull retarder lever ① fully.
2. Set shift lever ② to the D position, gradually raise the engine speed, and check that the machine does not move even when the engine speed reaches 1320 rpm.

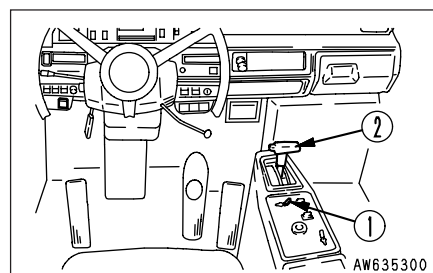
**CHECK FOR NORMAL ACTUATION OF PARKING BRAKE**

Check when starting operations, and if the braking effect is poor, adjust the parking brake. For details, see "24.2.10 ADJUSTMENT OF PARKING BRAKE".

CHECK BRAKING CAPACITY OF PARKING BRAKE

Check the braking capacity of the parking brake as follows.

1. Set the air pressure to the maximum with the machine on flat ground, and set parking brake lever ① to the PARKING position.
2. Set shift lever ② to the D position, gradually raise the engine speed, and check that the machine does not move even when the engine speed reaches 1430 rpm.



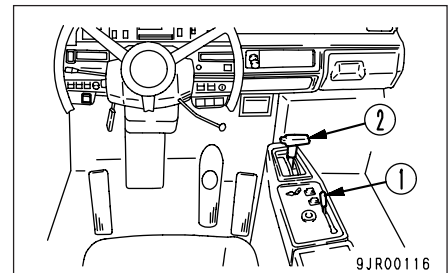
CHECK FOR NORMAL ACTUATION OF EMERGENCY BRAKE

Check when starting operations.

CHECK BRAKING CAPACITY OF EMERGENCY BRAKE

Check the braking capacity of the emergency brake as follows.

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

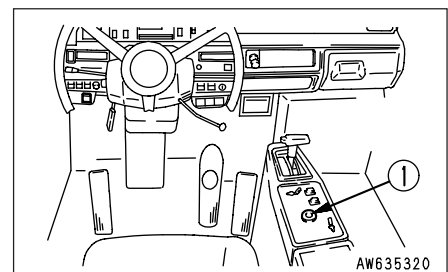


CHECK EMERGENCY STEERING

● **Checking manual emergency steering**

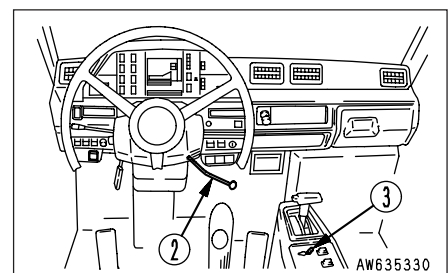
1. Turn the starting switch key to the ON position.
2. Turn emergency steering switch ① ON, and check that the steering wheel can be operated for 20 seconds.

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



● **Checking auto emergency steering**

3. Turn the starting switch key to the START position and start the engine.
4. Check that the air pressure gauge is in the green range, then pull retarder lever ② fully and stop the engine.
5. Turn the starting switch key to the ON position.
6. Check that the emergency motor is actuated and the steering can be operated one second after parking brake lever ③ is set to the TRAVEL position.



CHECK ACTUATION OF STEERING**CHECK FLASHING OF LAMPS****CHECK SOUND OF HORN****CHECK MOVEMENT OF GAUGES DURING OPERATION****CHECK EXHAUST COLOR AND SOUND****CHECK ELECTRICAL WIRING****⚠ WARNING**

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

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

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

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

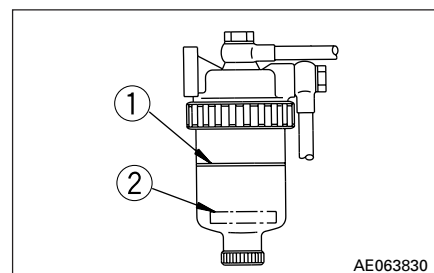
Please contact your Komatsu distributor for investigation and correction of the cause.

CHECK FOR WATER AND SEDIMENT IN WATER SEPARATOR

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

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

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



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12.1.3 ADJUSTMENT BEFORE OPERATION ADJUSTING OPERATOR'S SEAT

⚠ WARNING

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

A Adjusting fore-and-aft position

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

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

B Adjusting seat angle

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

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

C Adjusting seat weight

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

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

REMARK

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

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

D Adjusting backrest angle

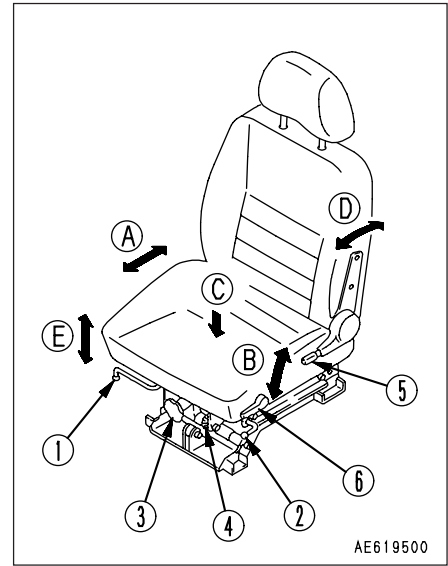
Pull lever ⑤, set the backrest to the desired position, then release the lever.

Adjustment range: 28 stages (56°)

E Adjusting seat height

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

Adjustment range: 50 mm (2.0 in)



ADJUST SEAT BELT

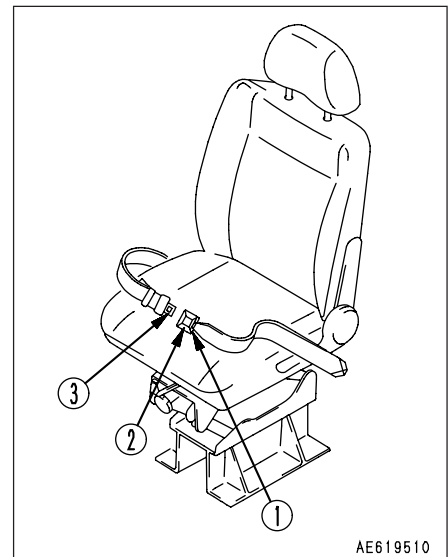
 **WARNING**

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

- **Fastening and removing belt**

1. Sit on the seat, depress the brake pedal fully, and adjust the seat so that your back is pressed against the backrest.
2. Sit on the seat, take buckle ① and tongue ③ in your left and right hands, insert tongue ③ into buckle ①, and pull the belt to check that it is securely locked.
3. When removing the belt, press button ② of buckle ① to release the belt.

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

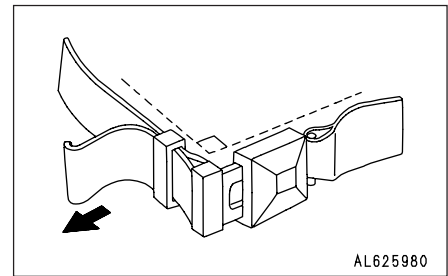


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● **Adjust belt length**

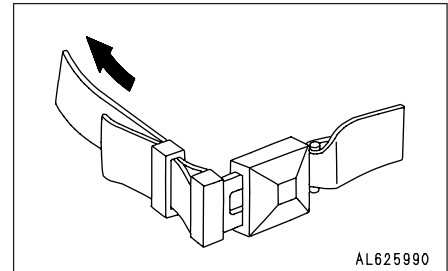
To make belt shorter:

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



To make belt longer:

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

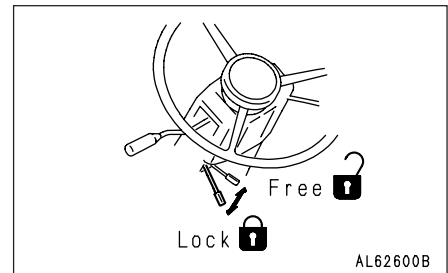


ADJUST STEERING WHEEL TILT

⚠ WARNING

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

It is possible to adjust the tilt of the steering wheel to the front and rear, and up and down. Pull lever ① up and set the steering wheel to the desired position, then push lever ① down to lock the steering wheel securely in position.



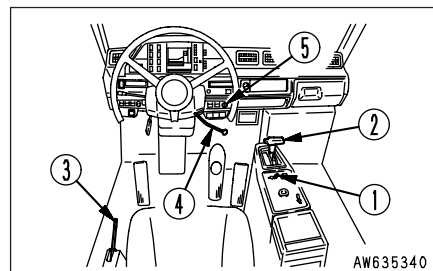
Adjustment range: Front-rear: 5°
Up: 30 mm (1.2 in)
Down: 20 mm (0.8 in)

12.1.4 OPERATIONS, CHECKS BEFORE STARTING ENGINE

⚠ WARNING

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

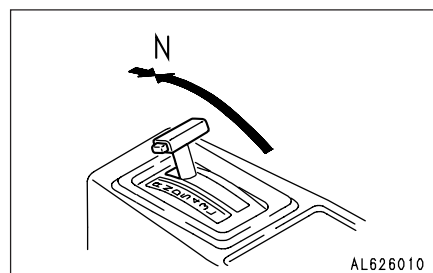
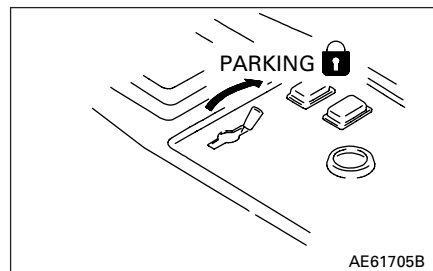
1. Check that parking brake lever ① is at the PARKING position.



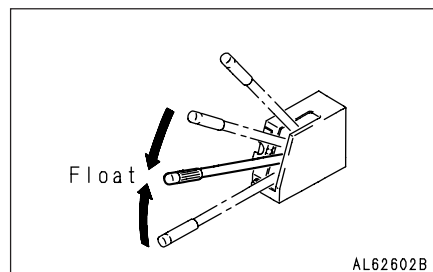
2. Check that shift lever ② is at the N position.

REMARK

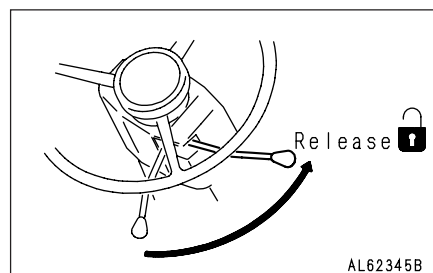
If the shift lever is not at the N (neutral) position, the engine will not start. If the starting switch is turned to the ON position when the shift lever is not at N (neutral), the transmission shift lever position pilot lamp and the central warning lamp will flash and the alarm buzzer will sound.



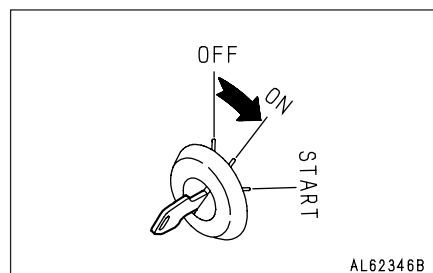
3. Check that dump lever ③ is at the FLOAT position.



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



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



12.2 STARTING ENGINE

12.2.1 NORMAL STARTING

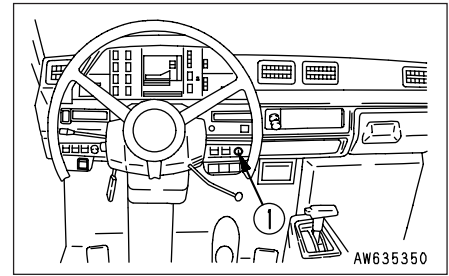
⚠ WARNING

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

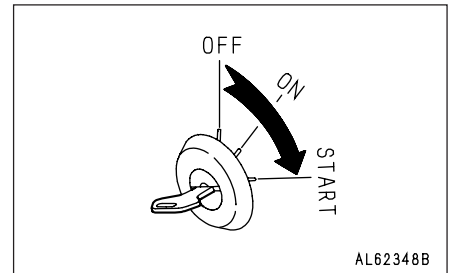
NOTICE

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

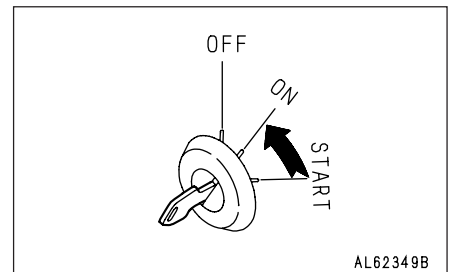
If the engine will not start, wait for at least 2 minutes before trying to start the engine again.



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



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



12.2.2 STARTING IN COLD WEATHER (when using APS)

When starting the engine in cold weather, do as follows.

⚠ WARNING

If a starting aid fluid is used, there is danger of an explosion.
Never use any starting aid fluid.

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, then repeat Steps 2 to 8.

1. Open fuel valve ① of the starting aid.

NOTICE

During cold weather (below 15°C), keep fuel valve ① of the starting aid open.

2. Turn the key in starting switch ② to the ON position.

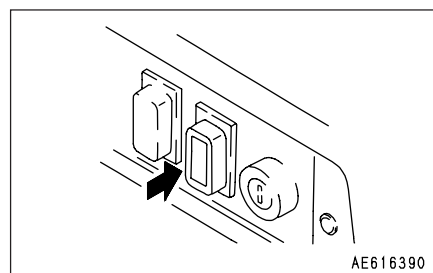
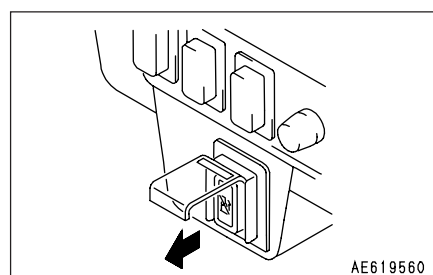
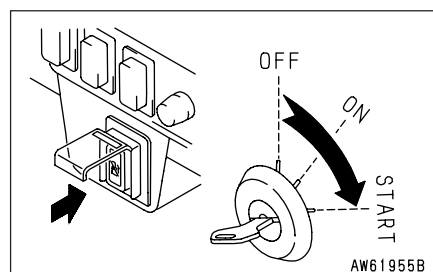
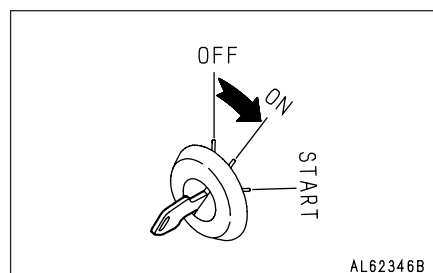
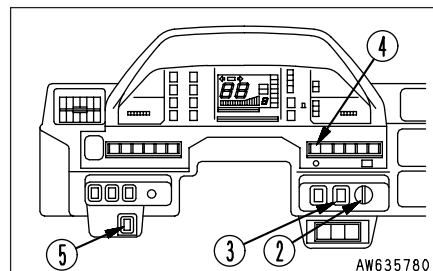
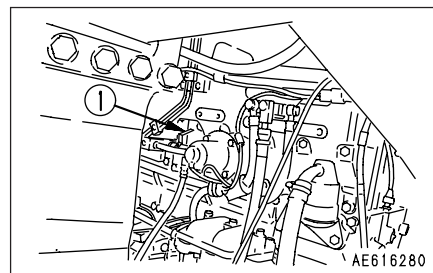
NOTICE

If this step is not carried out and the operation is carried out using Steps 4 to 8, the service life of the nozzle will be reduced, so always carry out Step 2.

3. Keep fuel cut switch ⑤ pressed, turn starting switch ② to the START position, and crank the engine for approx. 10 seconds. After finishing, put starting switch ② to the ON position.

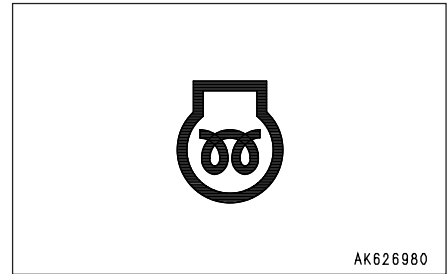
4. Release fuel cut switch ⑤.
The switch will automatically return.

5. Keep APS switch ③ pressed up to Step 10.
After a short time, preheating monitor ④ will light up.
When it lights up, the APS function automatically starts.

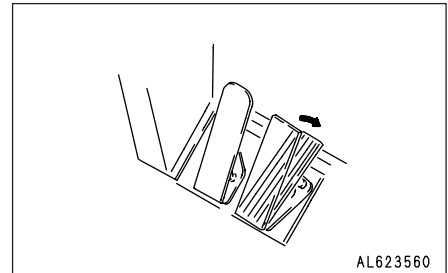


12. OPERATION

6. Maintain the same condition and wait.
 After approx. 12 seconds, the preheating is completed and cold start pilot ④ changes to flashing. Keeping the hand on APS switch ③ causes flashing to continue.



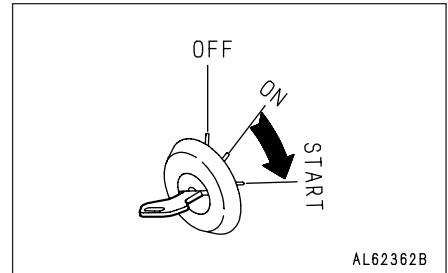
7. Depress accelerator pedal ⑤ about half way.



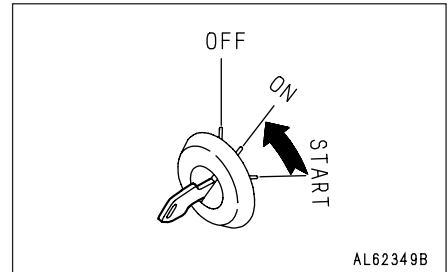
8. Turn the key to the START position and start the engine.

NOTICE

If the key is turned to the START position when the preheating monitor is still lighted up in Step 8, the glow plug will become wet and ignition will become impossible, so it will be difficult to start the engine.



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

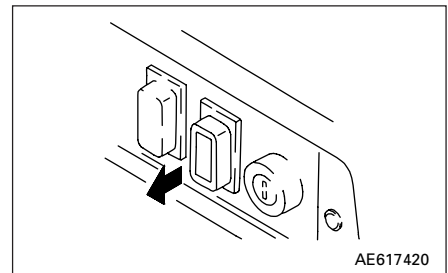


10. After the engine starts, when the engine rotation is smooth and the exhaust gas color is normal, release APS switch ③.

REMARK

The length of time before the APS switch is released depends on the ambient temperature, so use the following as a guide.

Ambient temperature	Time between starting engine and releasing APS switch
15 – 0°C	1 – 2 min
Below 0°C	3 – 5 min



12.3 OPERATIONS AND CHECKS AFTER STARTING ENGINE

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

NOTICE

Avoid abrupt acceleration until the warming-up run is completed.

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

If it is necessary to run the engine at low idling or high idling, apply a load or run at a medium speed from time to time.

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

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

When the AISS switch is at the AUTO position and the engine water temperature is still low, high idling revolution is automatically maintained (for electronic governor specification).

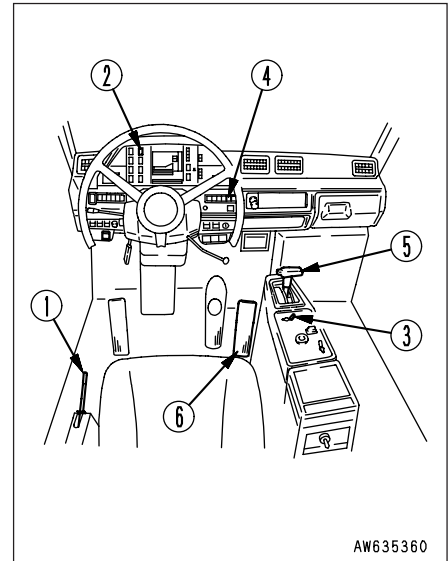
2. Check that there is no abnormal exhaust gas color, noise, or vibration. If any abnormality is found, repair it.


12.4 MOVING MACHINE OFF

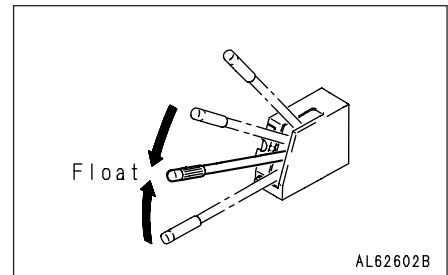
WARNING



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

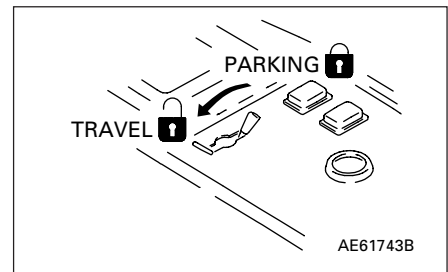
1. Check that there is no warning display on the machine monitor.





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



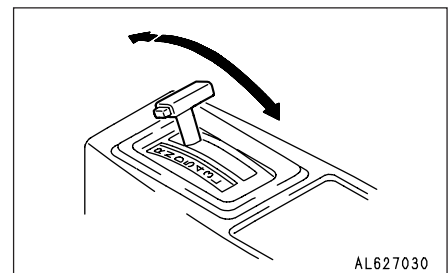
3. Depress the brake pedal fully. Check that air pressure gauge  is in the green range, then set parking brake lever  to the TRAVEL position to release the parking brake.



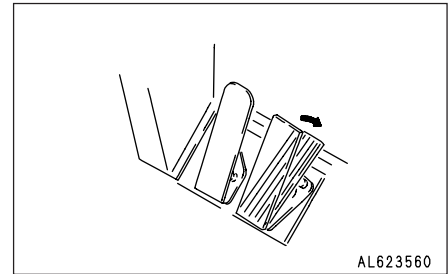
4. Check that retarder pilot lamp  has gone out, then set shift lever  to the desired position.

NOTICE

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



5. Depress accelerator pedal ⑥ to move the machine off.



AL623560

NOTICE

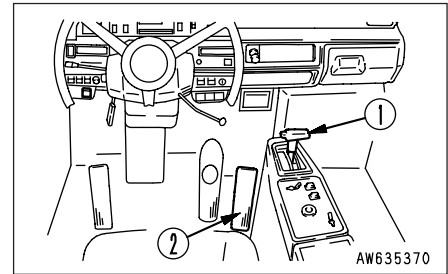
- If the parking brake is not released, and the shift lever is shifted to a position other than N, the central warning lamp will flash and the alarm buzzer will sound.
- If the dump lever is not at the FLOAT position, and the shift lever is shifted to a position other than N, the central warning lamp will flash and the alarm buzzer will sound.
- Do not operate the shift lever with the accelerator pedal depressed. This will cause a big shock, and will also reduce the life of the machine.

12.5 SHIFTING GEAR

Shift gear as follows.

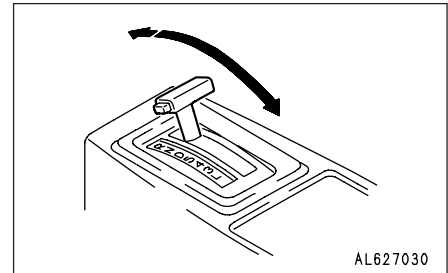
This machine has an automatic transmission, so set shift lever ① to the desired position, and the transmission will automatically shift to a position to match the travel speed.

When the dump body has risen, the shift lever is locked to 2nd speed at the D position and 1st speed at the 5-L position. While traveling, lower the dump body.



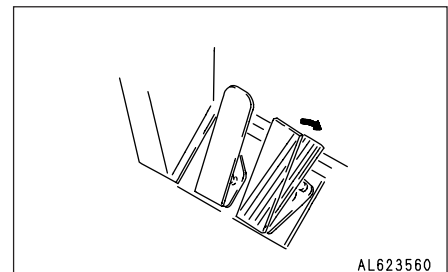
NOTICE

- When shifting between **FORWARD** and **REVERSE**, stop the machine completely, and run the engine at low idling when shifting the lever.
After moving the shift lever, do not depress the accelerator until you detect that the transmission clutch has engaged.
- Do not operate the shift lever with the accelerator pedal depressed.
This will cause a big shock, and will also reduce the life of the machine.



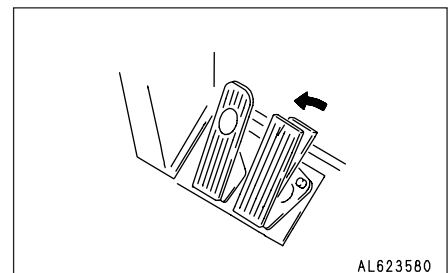
SHIFTING UP

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



SHIFTING DOWN

If accelerator pedal ② is released, the machine speed will be reduced, and the transmission will automatically shift down.



DOWN SHIFT INHIBIT

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

OVERRUN PREVENTION DEVICE

While operating the machine, if the red range lights up, simultaneously the warning buzzer sounds and the central warning lamp flashes, then operate the machine lowering the engine speed and the traveling speed.

If the travel speed goes above the maximum speed for the range of the shift lever, the overrun prevention device is actuated to act the retarder and to reduce the travel speed.

12.6 TRAVELING DOWNHILL

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

WARNING

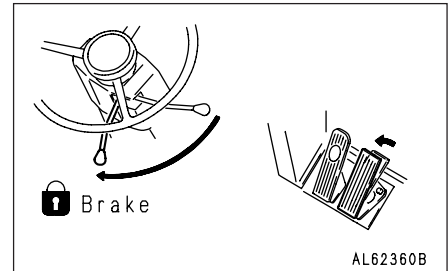
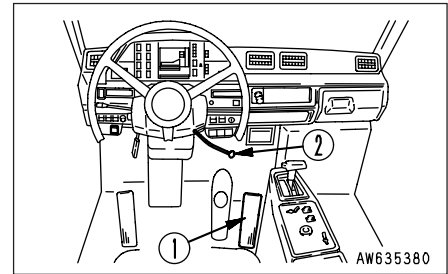
- If the machine is stopped, put blocks under the wheel immediately.
- For the maximum permissible speed when traveling downhill using the retarder, see the brake performance graph for the downhill distance and grade.
Traveling continuously downhill at a speed greater than the maximum permitted speed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

NOTICE

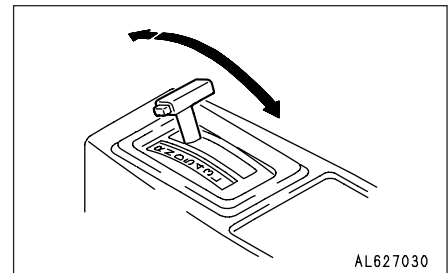
- If the retarder lever is operated when traveling downhill, the transmission can be shifted down sooner than with normal deceleration. It is also possible to travel without shifting up.
- When traveling downhill, do not use the foot brake except in an emergency. Using the foot brake will cause overheating of the front brake and reduce the life.
- Do not accelerate or shift up when using the retarder. The engine speed will rise and this may cause the alarm buzzer to sound and the central warning lamp to flash.

12. OPERATION

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



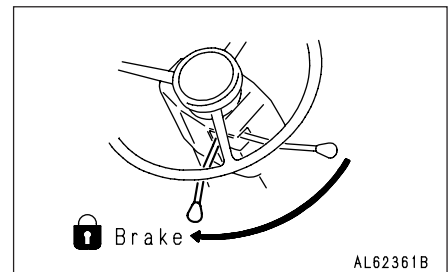
2. Move the shift lever to a position (5, 4, 3, L) that matches the maximum permissible speed for the retarder brake performance.



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

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

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



12.6.1 BRAKE PERFORMANCE CURVE

- **HD465-5**

- **Method of using graph**

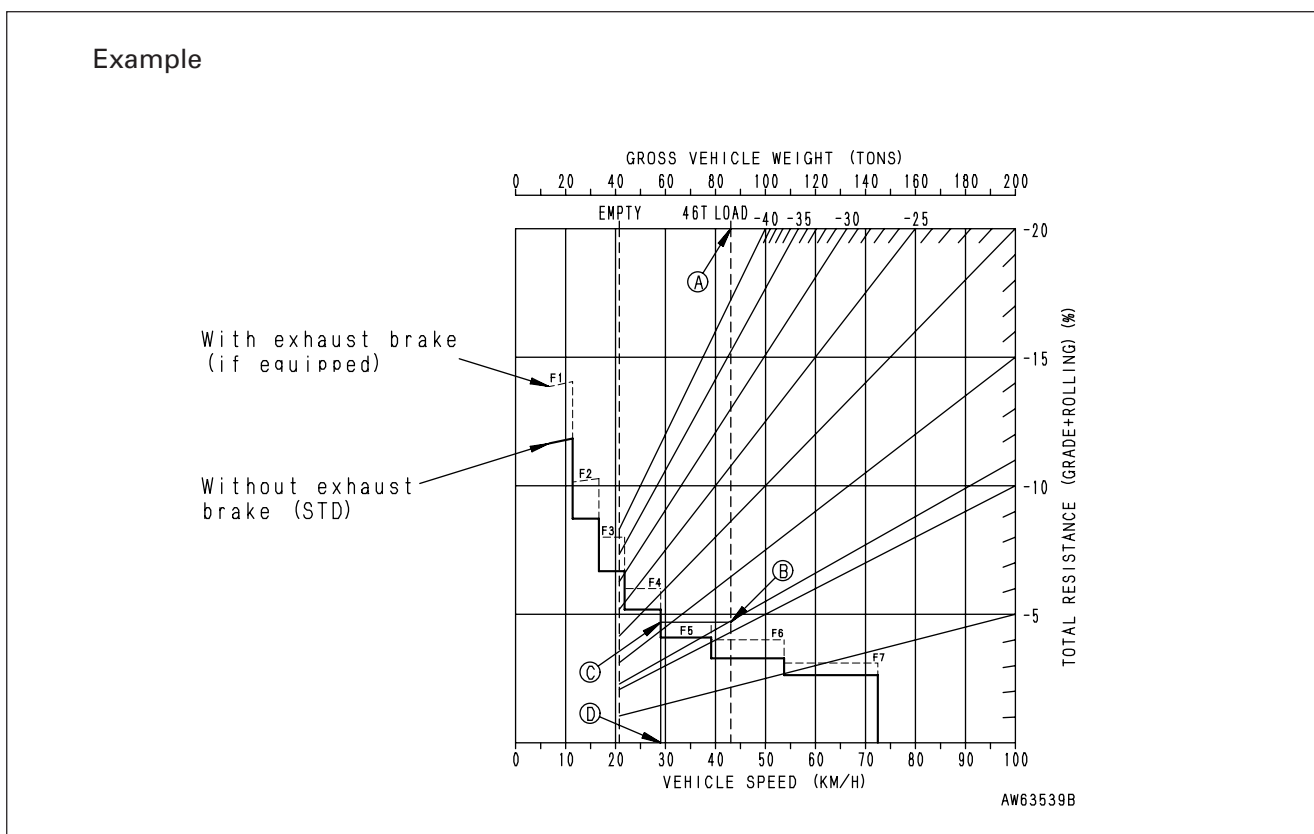
- Example: Downhill distance: 1500 m (4921 ft)

- Travel resistance – 11% [grade resistance – 13%
[rolling resistance 2%]

- Load: 46 tons

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

1. Use the brake performance graph for the downhill distance of 1500 m (4921 ft).
2. Starting from point **A** which corresponds to the overall weight of the machine, draw a perpendicular line down.
3. Take the point where it crosses the line for travel resistance – 11% as **B** and draw a horizontal line.

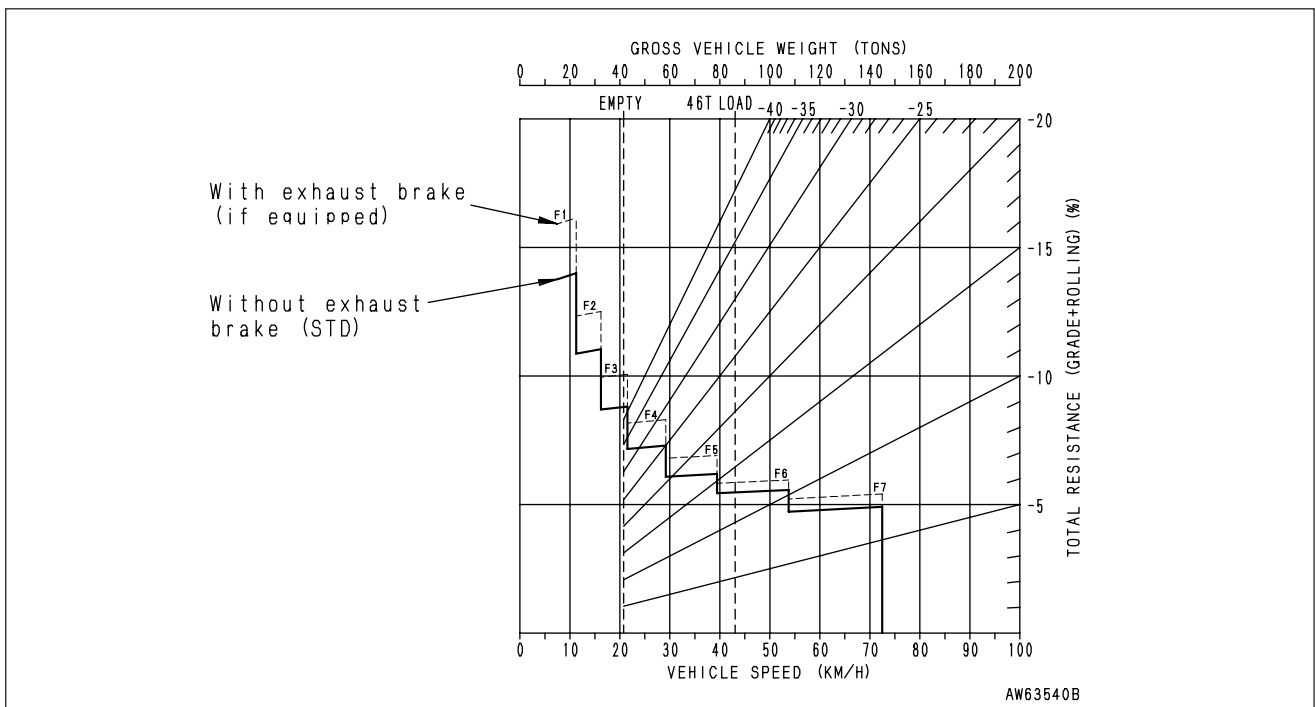


12. OPERATION

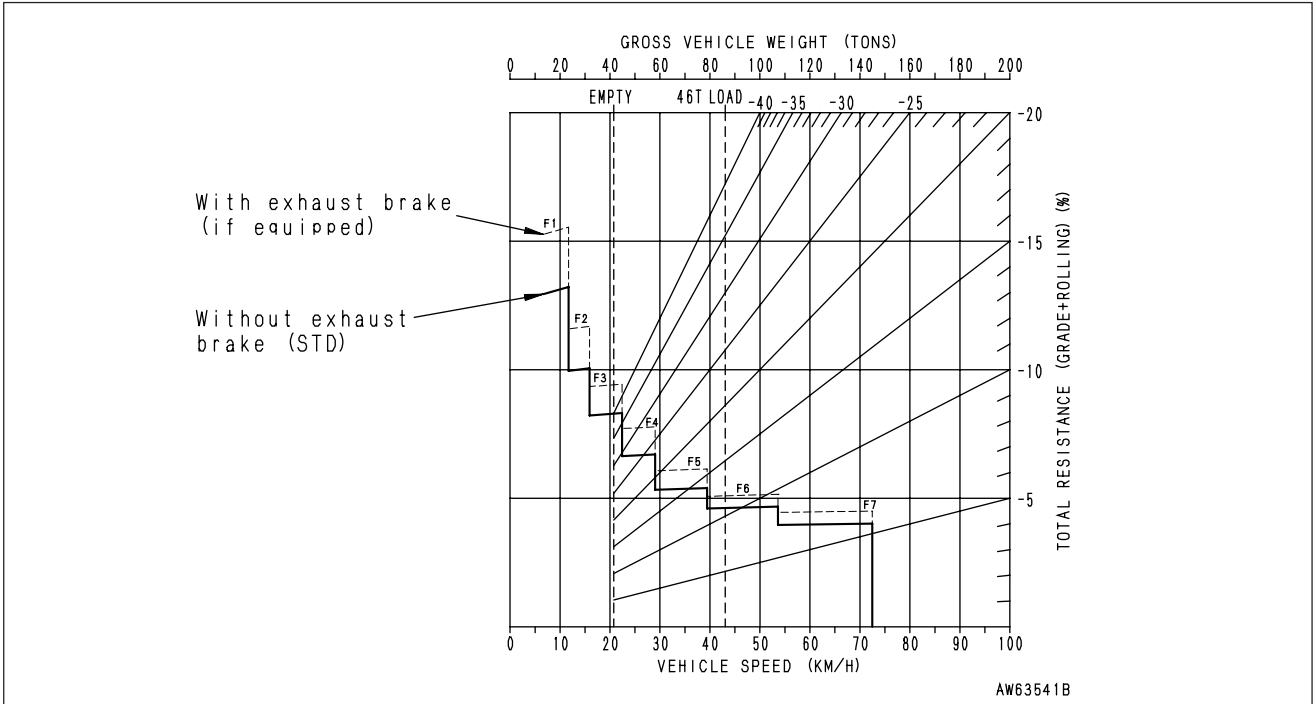
4. Take the point where it crosses the performance curve as ©, and draw a perpendicular line down. Take the point where this line crosses the travel speed scale as ④.
5. The following information can be obtained from this procedure.
 From point ④ : Maximum permissible speed = 29.5 km/h
 (18.3 MPH)
 From point © : Speed range = F4

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

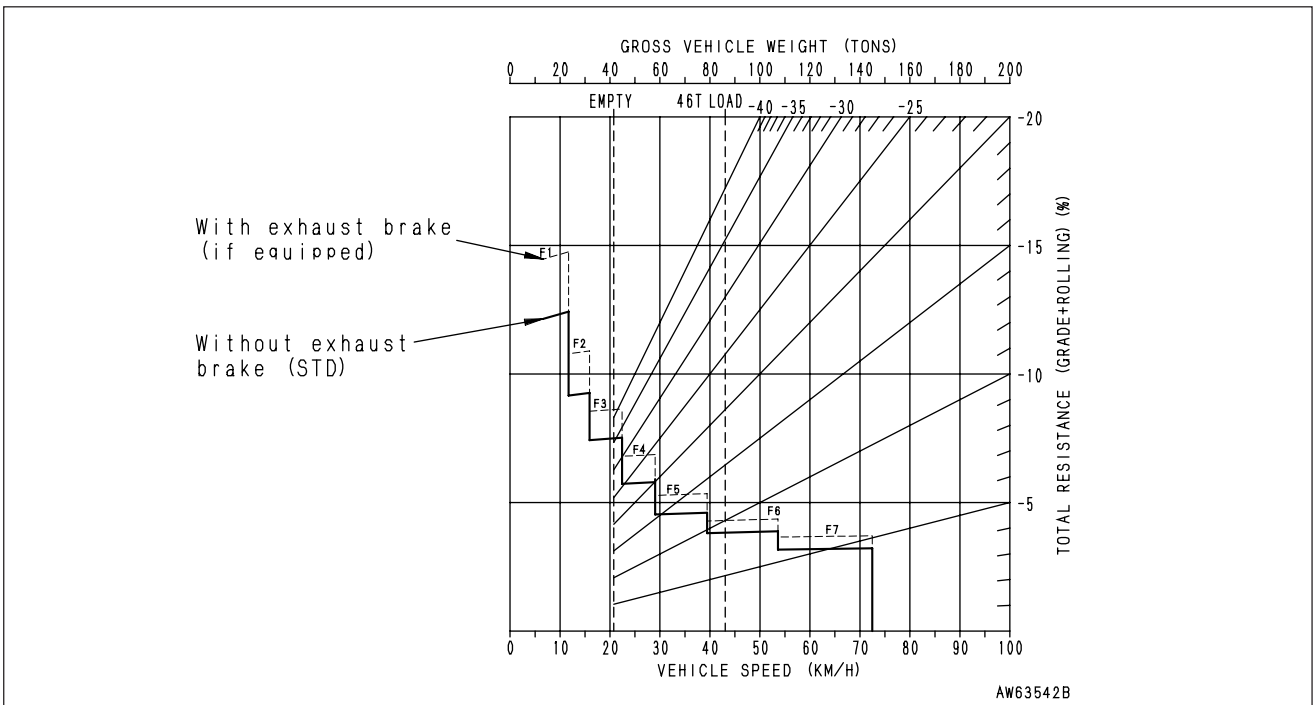
- **Brake performance**
[Downhill distance: 450 m (1476 ft)]
(Standard tire 24.00-35)



- **Brake performance**
[Downhill distance: 600 m (1968 ft)]
(Standard tire 24.00-35)

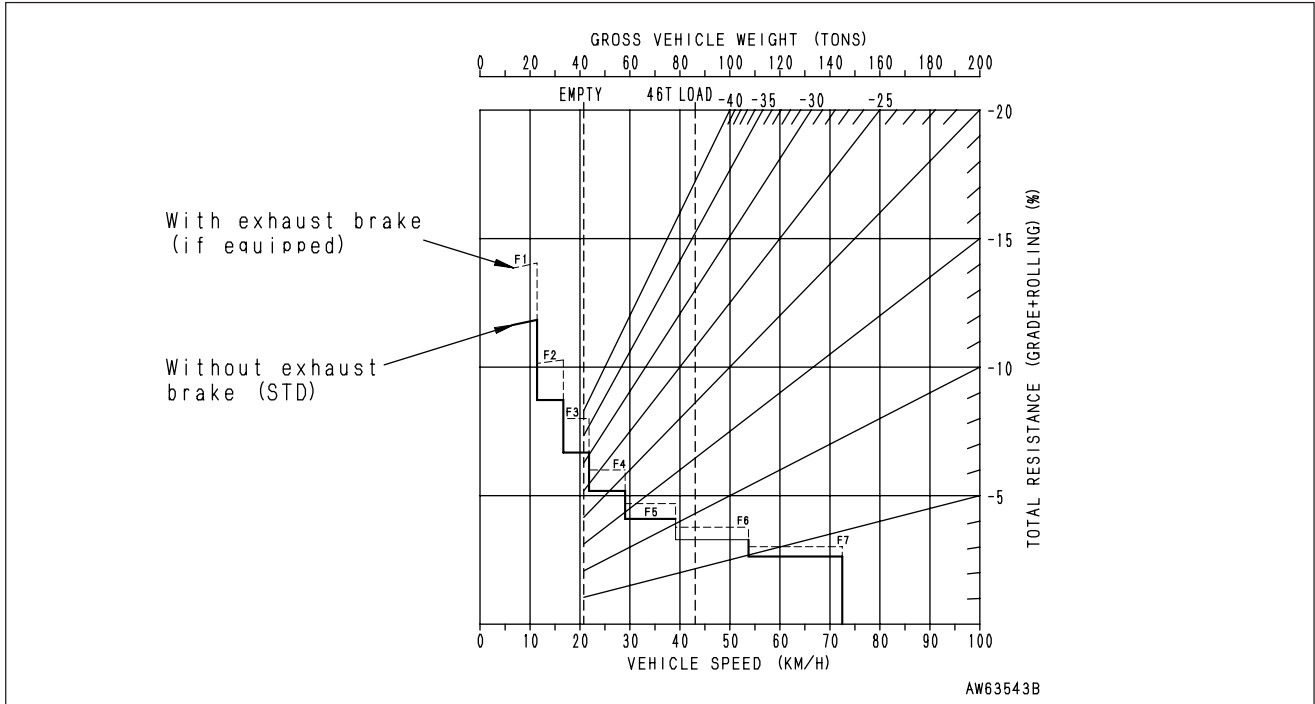


- **Brake performance**
[Downhill distance: 900 m (2952 ft)]
(Standard tire 24.00-35)

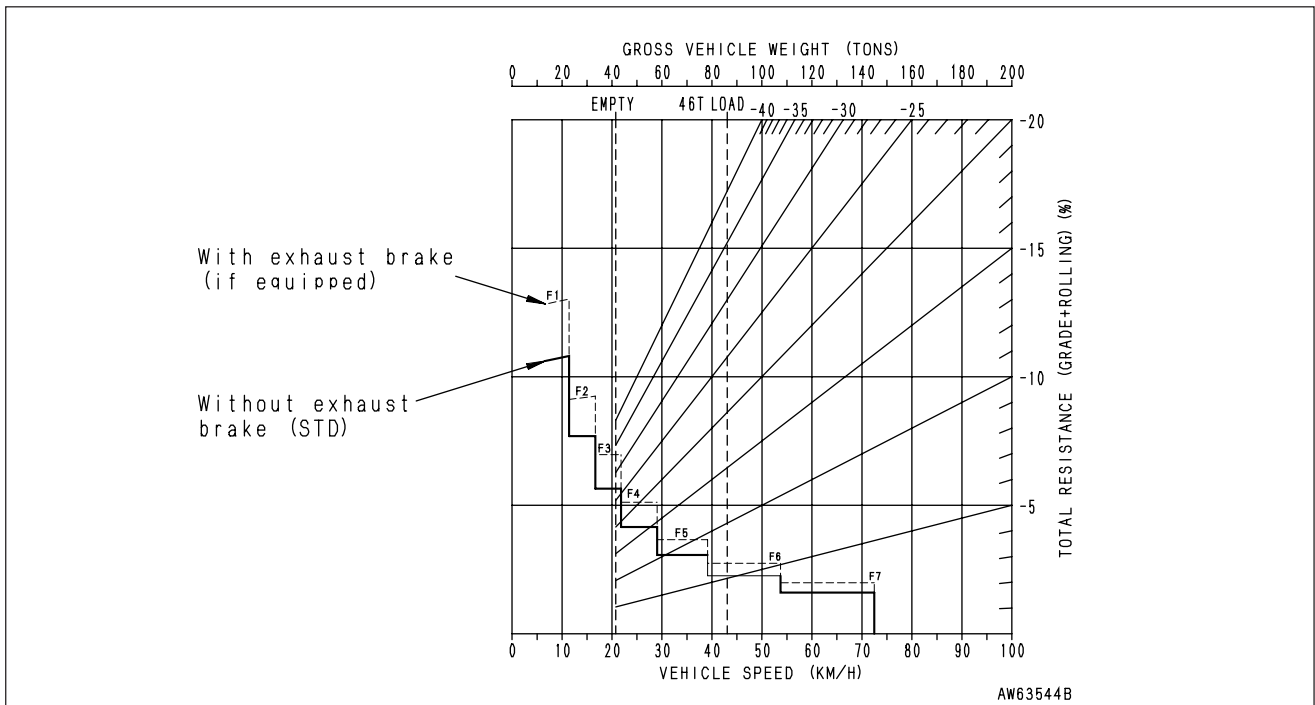


12. OPERATION

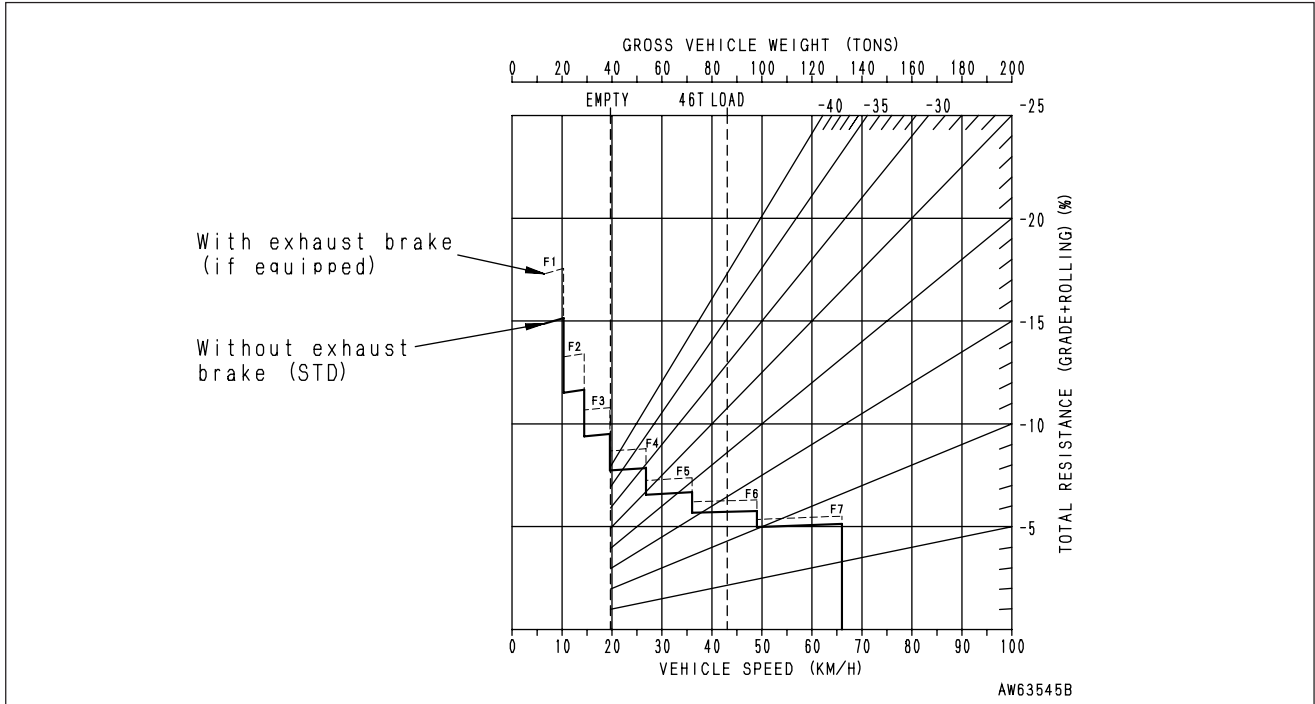
- **Brake performance**
[Downhill distance: 1500 m (4921 ft)]
(Standard tire 24.00-35)



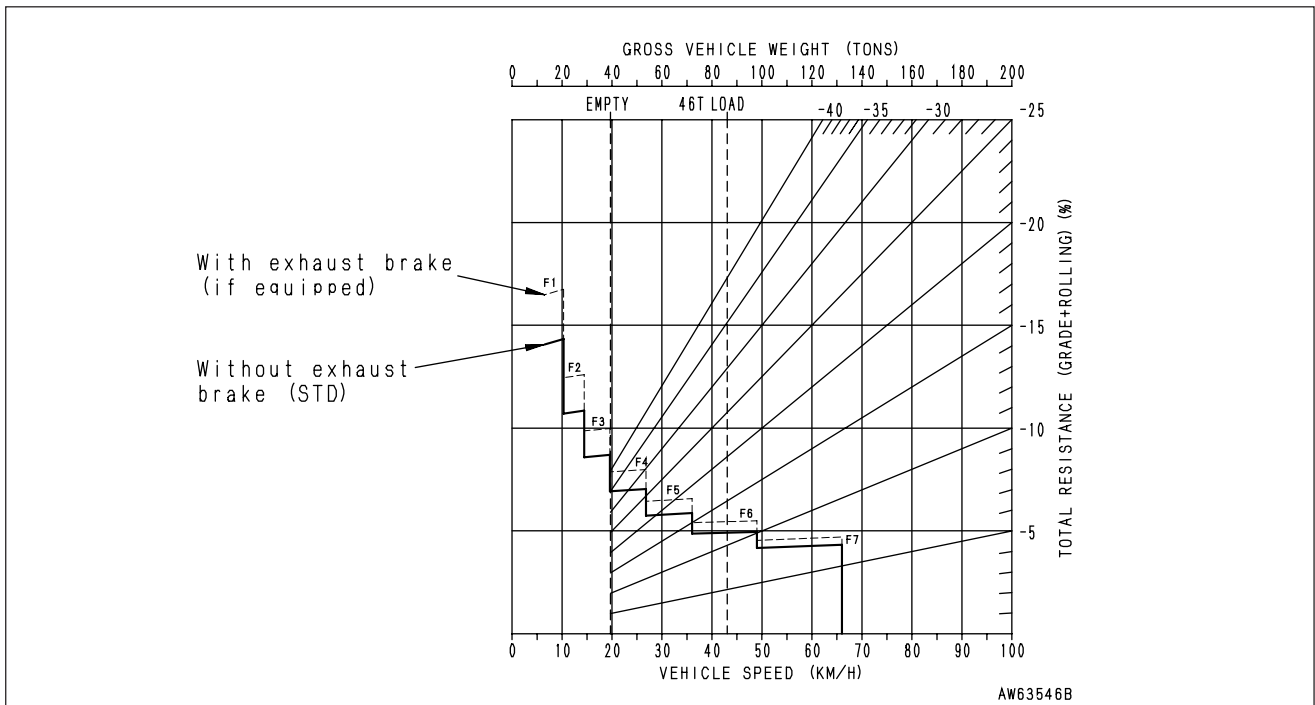
- **Brake performance**
[Downhill distance: Continuous]
(Standard tire 24.00-35)



- **Brake performance**
[Downhill distance: 450 m (1476 ft)]
(Small size tire 21.00-35)

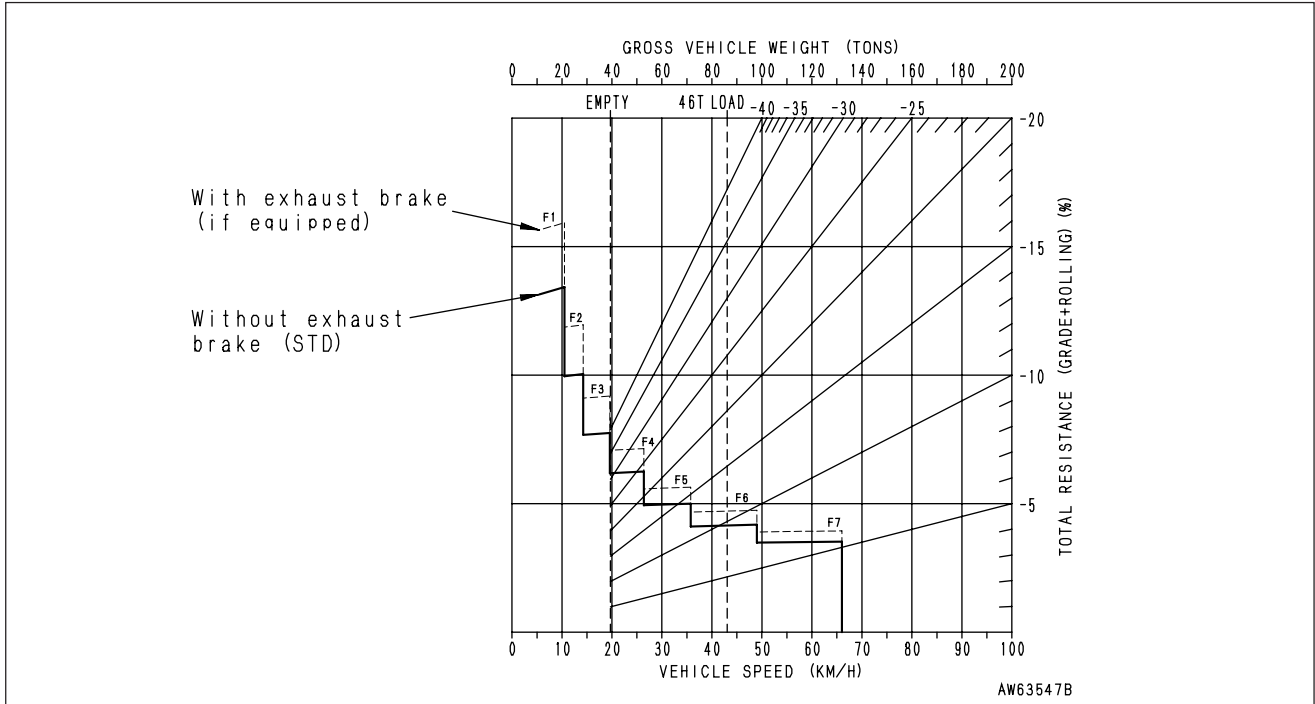


- **Brake performance**
[Downhill distance: 600 m (1968 ft)]
(Small size tire 21.00-35)

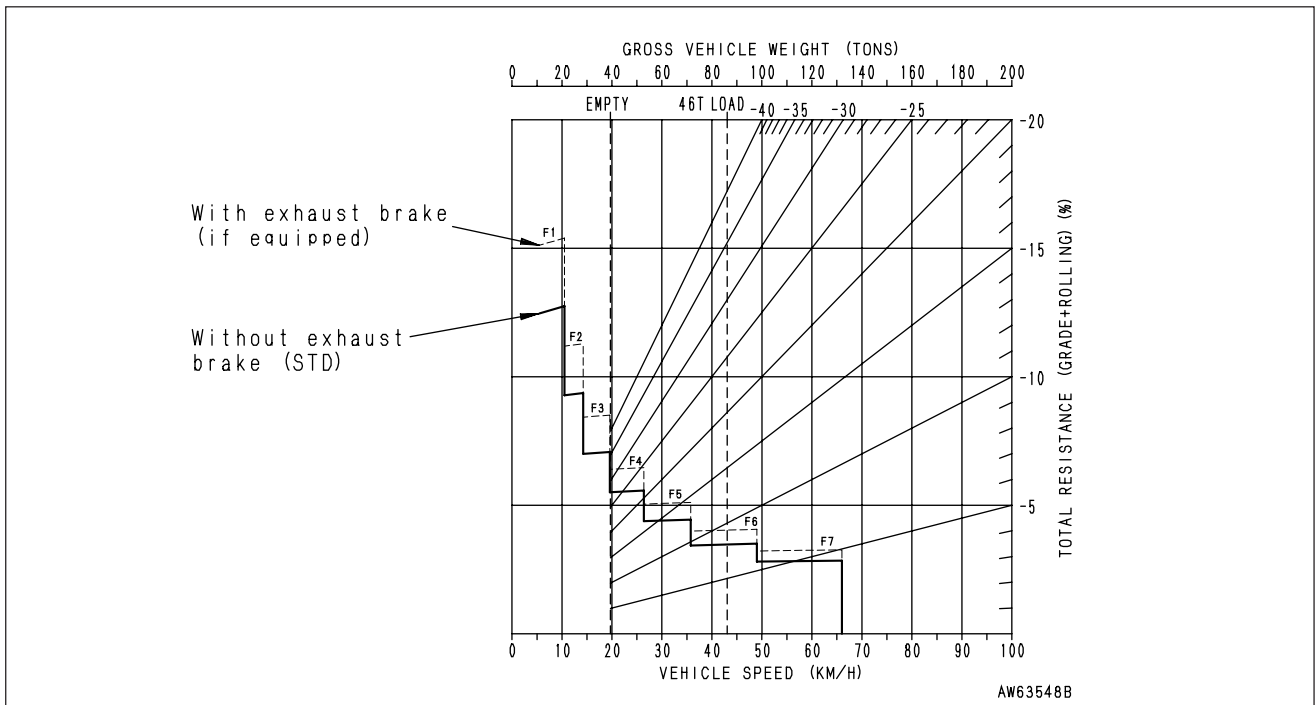


12. OPERATION

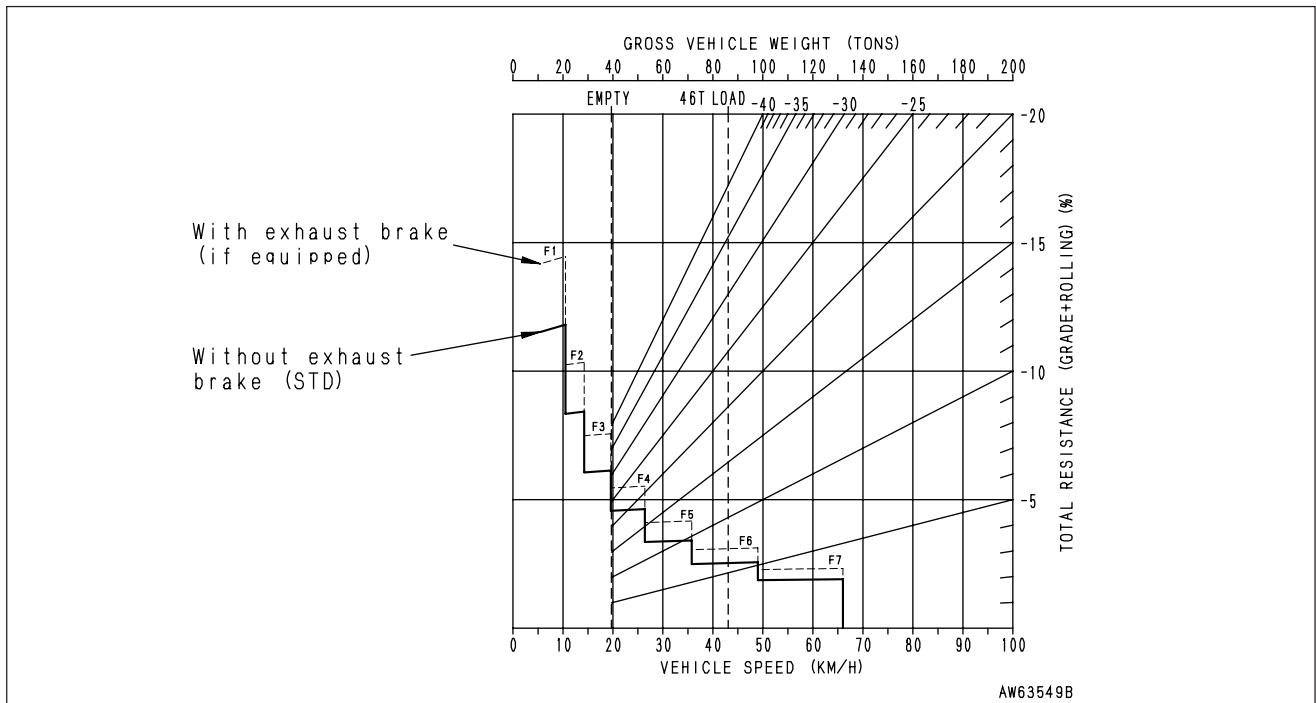
- **Brake performance**
[Downhill distance: 900 m (2952 ft)]
(Small size tire 21.00-35)



- **Brake performance**
[Downhill distance: 1500 m (4921 ft)]
(Small size tire 21.00-35)



- **Brake performance**
[Downhill distance: Continuous]
(Small size tire 21.00-35)



● **HD605-5**

Method of using graph

Example: Downhill distance: 1500 m (4921 ft)

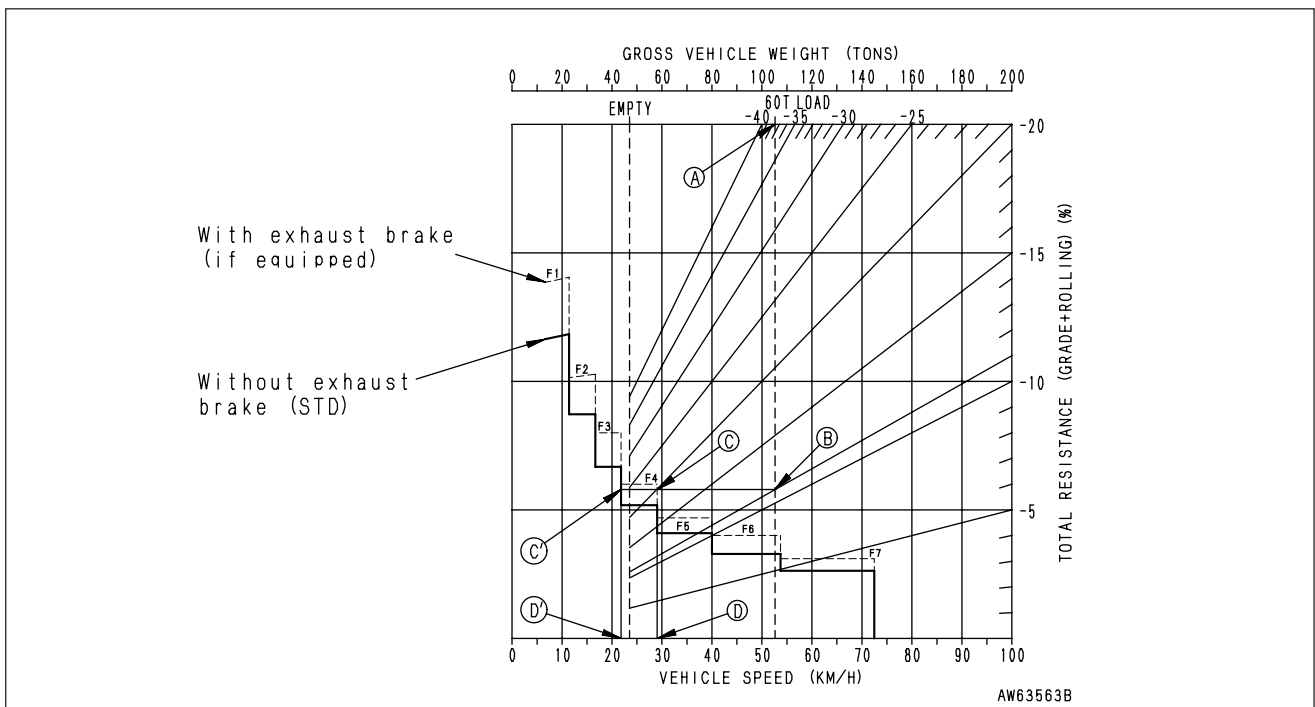
Travel resistance – 11% [grade resistance – 13%]

[rolling resistance 2%]

Load: 60 tons

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

1. Use the brake performance graph for the downhill distance of 1500 m (4921 ft).
2. Starting from point **A** which corresponds to the overall weight of the machine, draw a perpendicular line down.
3. Take the point where it crosses the line for travel resistance – 11% as **B** and draw a horizontal line.



4. Take the point where it crosses the performance curve as ©, and draw a perpendicular line down. Take the point where this line crosses the travel speed scale as ④.

5. The following information can be obtained from this procedure.

Without exhaust brake

From point ④ : Maximum permissible speed = 29.5 km/h
(18.3 MPH)

From point © : Speed range = F4

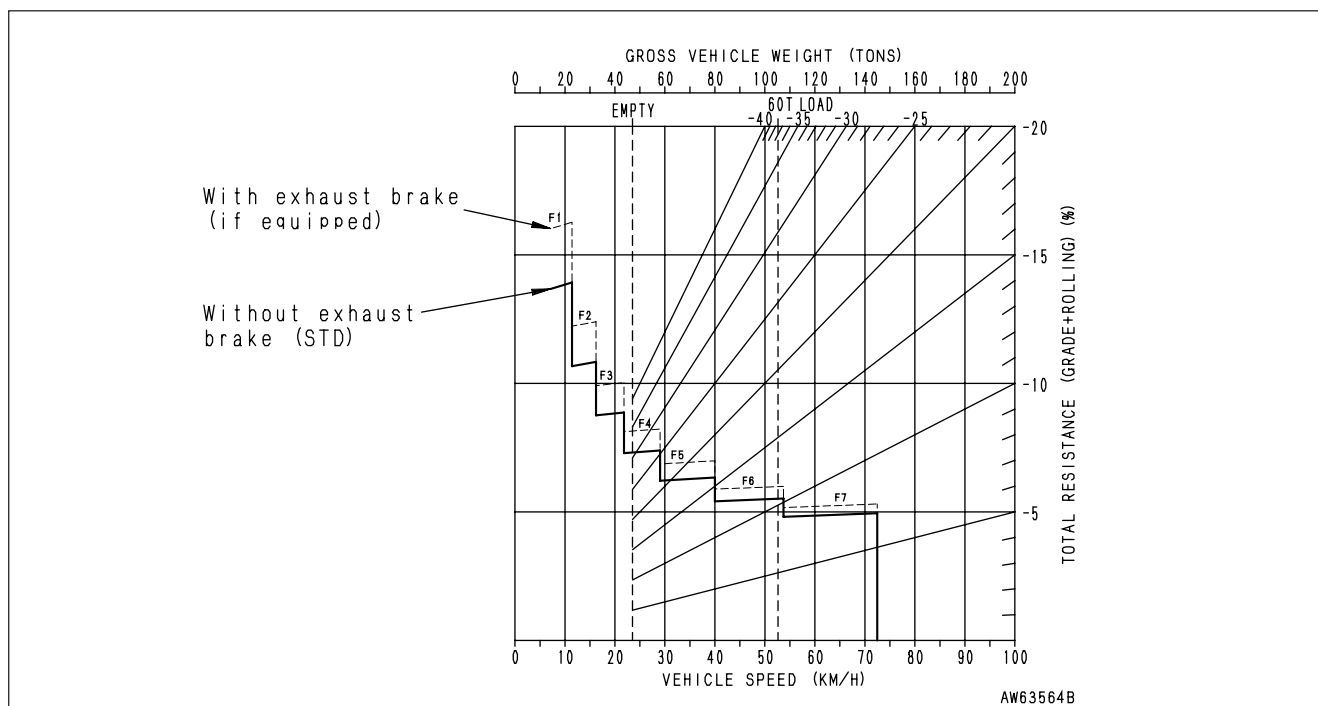
With exhaust brake (if equipped)

From point ④' : Maximum permissible speed = 22 km/h
(13.7 MPH)

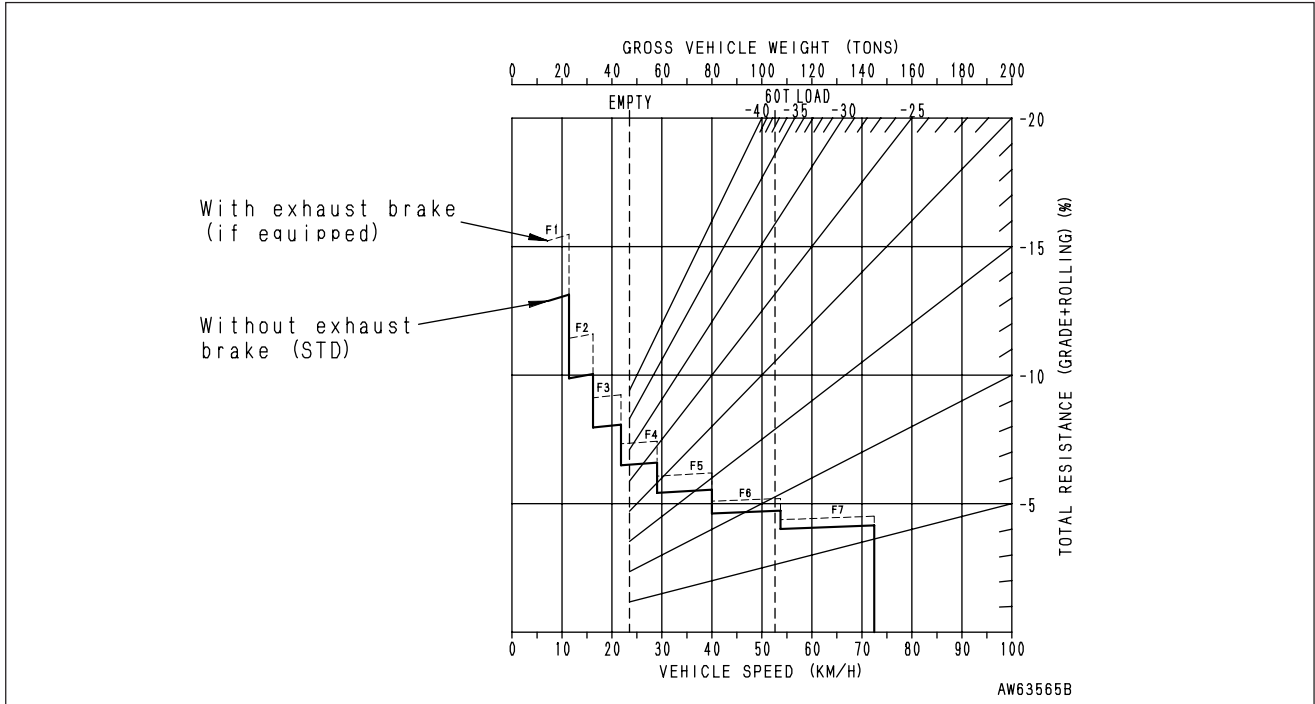
From point ©' : Speed range = F3

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

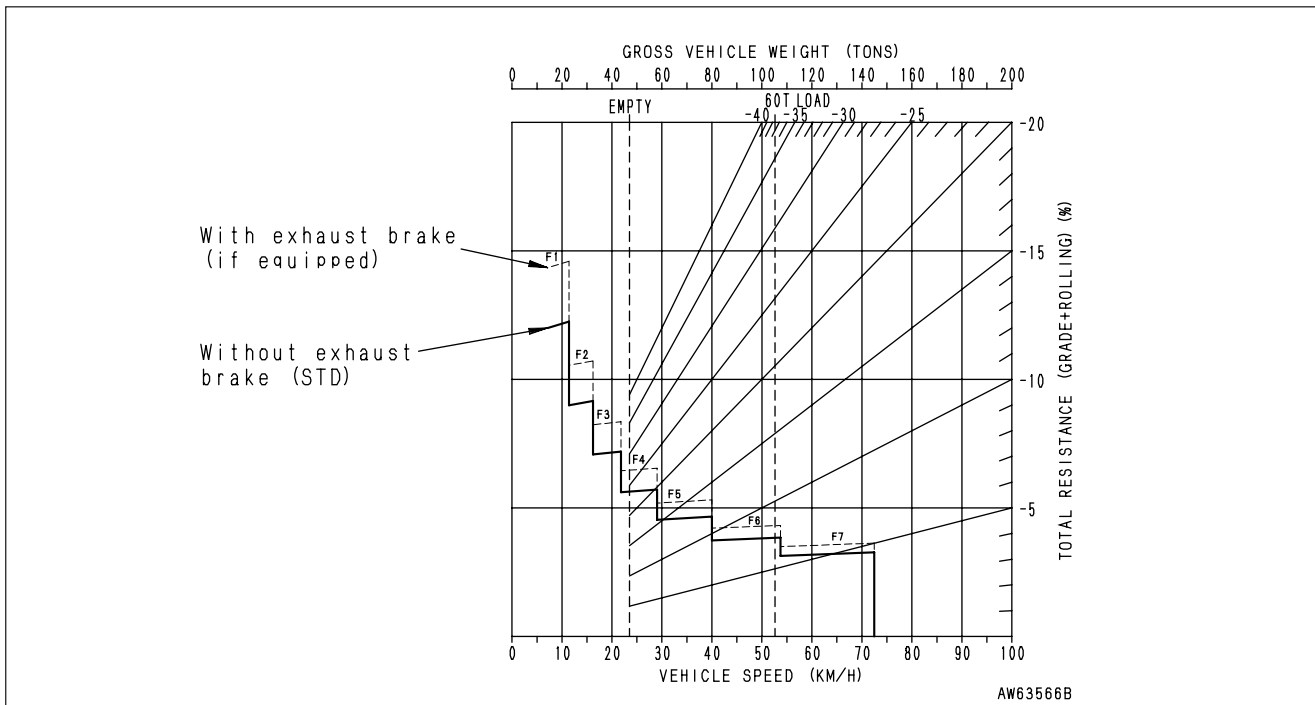
- **Brake performance**
[Downhill distance: 450 m (1476 ft)]
(Standard tire 24.00R35★★)



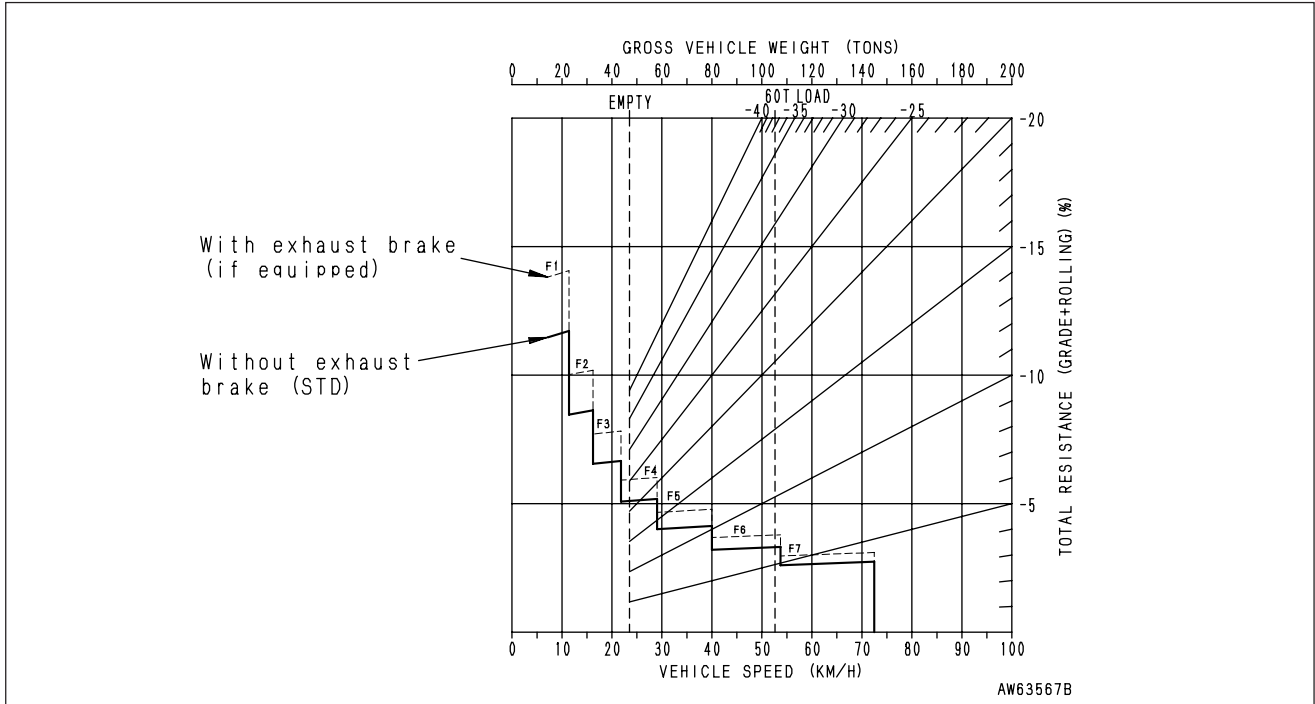
- **Brake performance**
[Downhill distance: 600 m (1968 ft)]
(Standard tire 24.00R35★★)



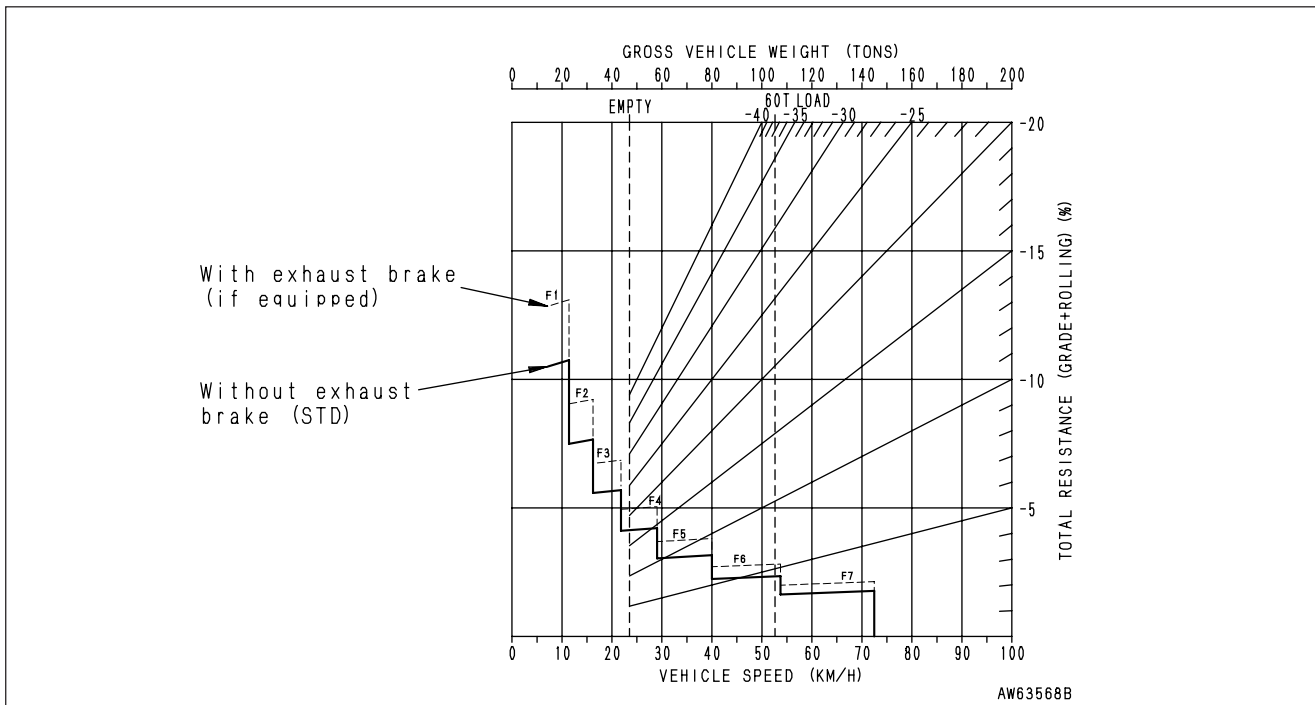
- **Brake performance**
[Downhill distance: 900 m (2952 ft)]
(Standard tire 24.00R35★★)



- **Brake performance**
[Downhill distance: 1500 m (4921 ft)]
(Standard tire 24.00R35★★)



- **Brake performance**
[Downhill distance: Continuous]
(Standard tire 24.00R35★★)



12.7 TRAVELING IN REVERSE

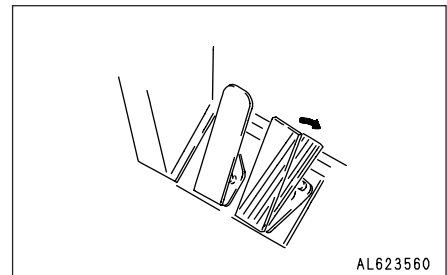
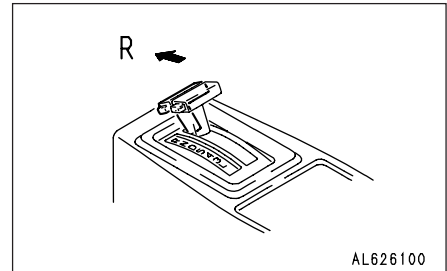
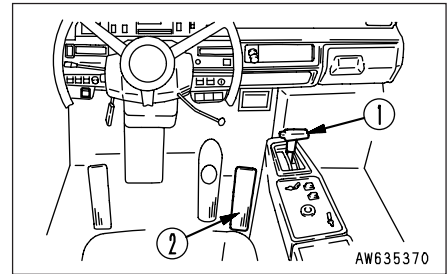
WARNING

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

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

NOTICE

- The machine cannot travel in reverse if the dump lever is not at the FLOAT position. Place the dump lever at the FLOAT position before operating to the R position.
- When shifting between FORWARD and REVERSE, stop the machine completely, and run the engine at low idling when shifting the lever. After moving the shift lever, do not depress the accelerator until you detect that the transmission clutch has engaged.
- Do not operate the shift lever with the accelerator pedal depressed. This will cause a big shock, and will also reduce the life of the machine.



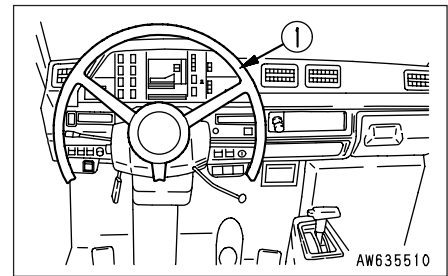
12.8 STEERING THE MACHINE

⚠ WARNING

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

⚠ CAUTION

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



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

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

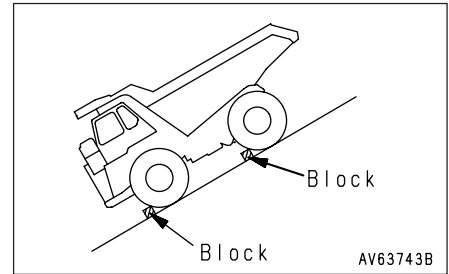
REMARK

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

12.9 STOPPING THE MACHINE

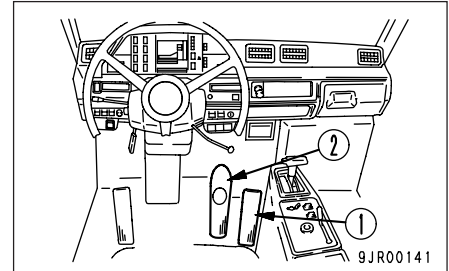
WARNING

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



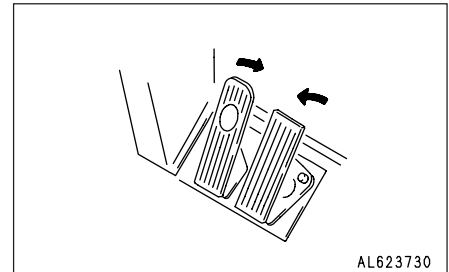
CAUTION

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



12.9.1 NORMAL STOPPING

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



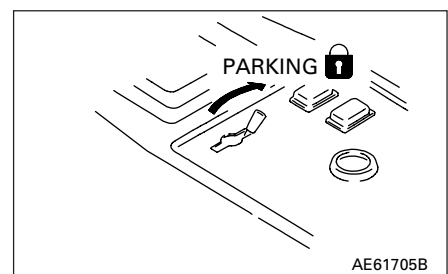
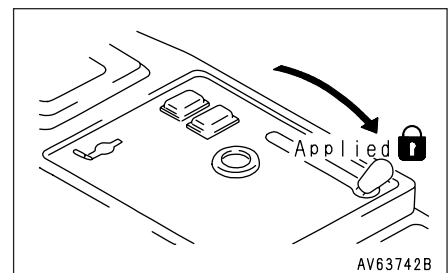
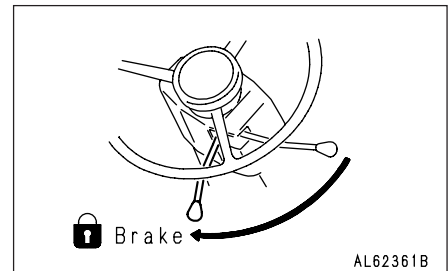
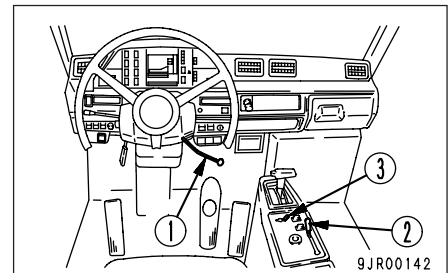
12.9.2 STOPPING IN EMERGENCY

⚠ WARNING

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

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

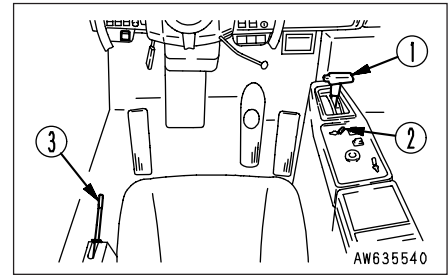
1. Pull retarder control lever ① fully to apply the retarder.
2. If operating the retarder control lever dose not give enough braking force, set emergency brake lever ② to the actuation position to apply the emergency brake.
When emergency brake lever ② is placed at the actuation position, the parking brake is automatically applied.
3. Move parking brake lever ③ to the right to the PARKING position.
4. When the machine stops, put blocks under the tires immediately, then try to find the cause, and repair it.
5. If an emergency stop has been made, adjust the parking brake again.



12.10 OPERATING DUMP BODY

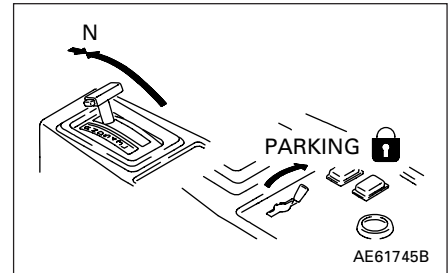
WARNING

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

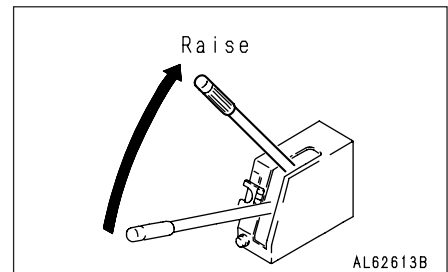


Operate the dump body as follows.

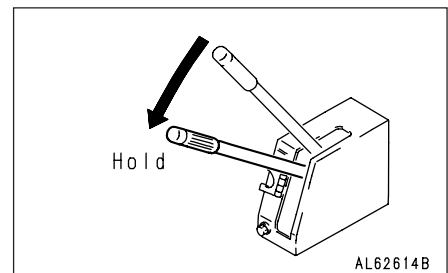
1. Place shift lever ① at the N position, and set parking brake lever ② to the PARKING position.



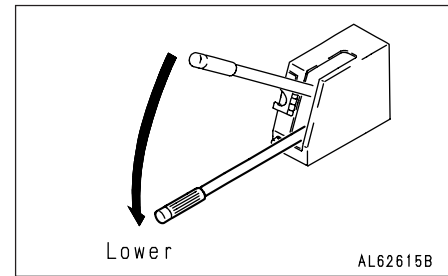
2. Move dump lever ③ to the RAISE position, then depress the accelerator pedal to raise the dump body.
If the dump lever is released when it is at the RAISE position, it is held at the RAISE position and the dump body will continue to rise.
The dumping speed increases in proportion to the engine speed.



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



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



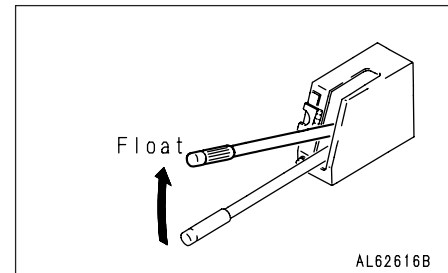
5. When the dump body has moved down a certain distance, move dump lever ③ to the FLOAT position. (When the lever is released, it will return to the FLOAT position.) The dump body will then move down under its own weight.

When traveling, always set the dump lever to the FLOAT position regardless of whether the dump body is empty or loaded.

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

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

When the dump body has risen, the shift lever is locked to 2nd speed at the D position and 1st speed at the 5-L position. While traveling, lower the dump body.



PRECAUTIONS REGARDING LOAD

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

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

- Rocks with one side over 0.5 m (1 ft 8 in)
- Rocks of Mohs hardness of more than 4.5
- Rocks with a weight of more than 300 kg (662 lb)
- When transporting steel ingots

For details of the types of dump body and the procedure for selection, see "27. SELECTING DUMP BODY" (HD465-5 only).

12.11 PRECAUTIONS FOR OPERATION

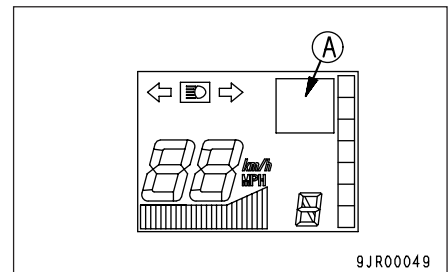
- When traveling on roads in rain or snow, or when traveling on muddy or soft ground, consider the loaded condition of the dump truck and be extremely careful not to let the tires slip or spin and sink into the ground.
- If the engine should stop when the machine is traveling, stop the machine immediately, then move the speed lever to the N position, and start the engine again.
- If the central warning lamp and pilot lamp for any EMERGENCY item on the machine monitor should flash and the buzzer sounds during operation, stop the machine immediately and invest the cause.
For details, see "16. TROUBLESHOOTING".
- When loading, be careful to load the dump body uniformly, and be particularly careful to avoid loading too much at the front.
- On slippery road surfaces, apply the retarder control lever slowly and shift the transmission down to prevent the rear wheels from locking.
- When traveling through pools of water, water may get inside the front brakes and cause a big drop in the braking force, so drive carefully in such areas. If water should get into the brakes, apply the brakes several times while traveling to produce friction heat between the pad and disc to remove the water.

NOTICE

If letter "E-" and any of action code "01" to "07" are displayed in turn at the upper right of the liquid crystal display on the monitor panel, stop the machine once. Take corrective action as follows after checking the action code.

Action code

- 02 Park the machine on safe place and contact Komatsu's service department.
- 04 Carry out safety stop. Stop the engine and contact Komatsu's service department.
- 01 Carry out checks and maintenance according to the Operation and Maintenance Manual.
- 03 Operate the machine keeping the engine at low revolution and low travel speed.
- 05 Stop the machine. Run the engine at a mid-range speed under no load.
- 06 Restart the engine. Idle the engine for a while.
- 07 Do not raise the body.

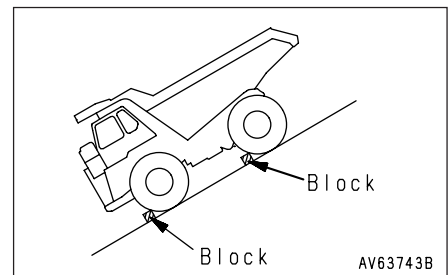


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12.12 PARKING MACHINE

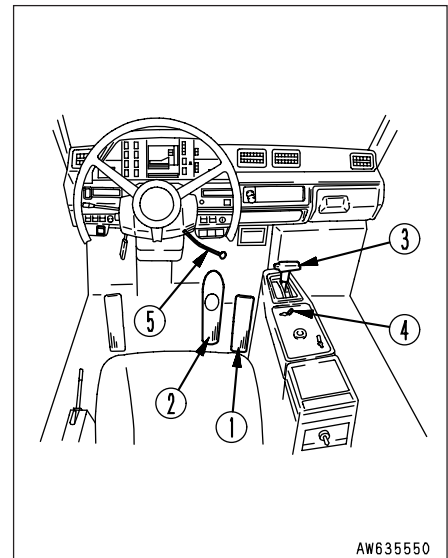
⚠ WARNING

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

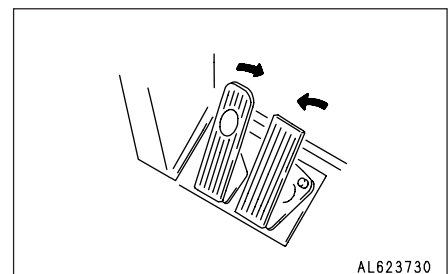


⚠ CAUTION

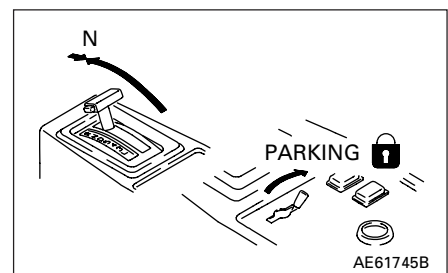
To prevent damage to the parking brake, apply the parking brake only when parking the machine.



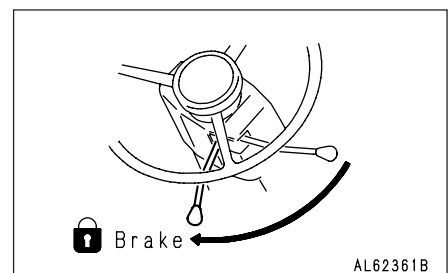
1. Release accelerator pedal ①, then depress brake pedal ② to stop the machine.



2. Move shift lever ③ to the N position, then move parking brake lever ④ to the PARKING position to apply the parking brake.



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



NOTICE

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

12.13 CHECKS AFTER COMPLETION OF WORK

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

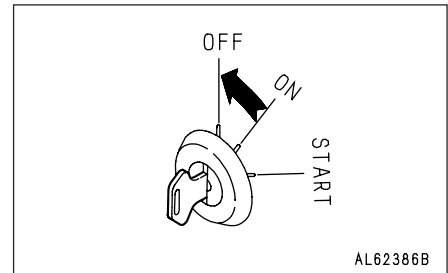
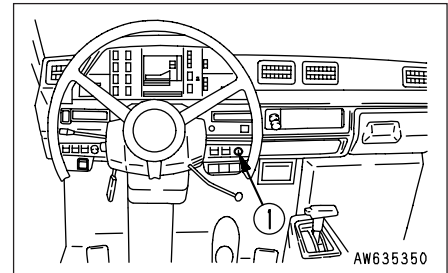
If the engine has overheated, do not stop the engine suddenly. Run it at a mid-range speed to cool it gradually before stopping.

12.14 STOPPING ENGINE

NOTICE

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

1. Run the engine for 5 minutes at low idling to allow the engine to cool down gradually.
2. Turn the key in starting switch ① to the OFF position to stop the engine.
3. Remove the key from starting switch ①.



12.15 CHECKS AFTER STOPPING ENGINE

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

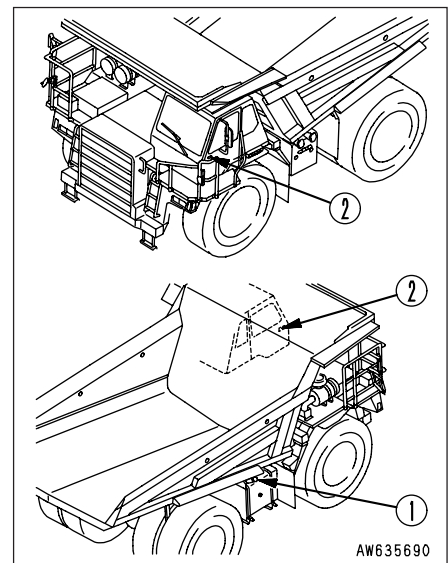
12.16 LOCKING

Always lock the following places.

- ① Fuel cap of fuel tank
- ② Cab doors (left and right)
Lock the right side door manually from the inside (operator's seat).

REMARK

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



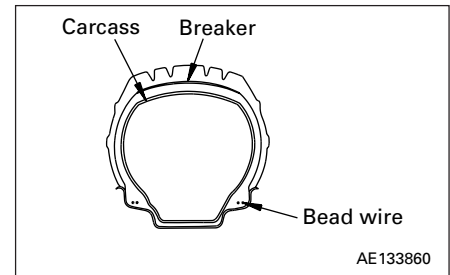
12.17 HANDLING TIRES

12.17.1 PRECAUTIONS WHEN HANDLING TIRES

WARNING

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

- (1) Tires where the bead wire has been cut, broken, or greatly deformed
- (2) Excessively worn tires where more than 1/4 of the circumference of the carcass ply (excluding the breaker) is exposed
- (3) Tires where damage to the carcass exceeds 1/3 of the tire width
- (4) Tires where ply separation has occurred
- (5) Tires where radial cracks extend to the carcass
- (6) Tires where there is abnormal deterioration, deformation, and damage, and the tire cannot withstand use



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

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

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

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

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

In such cases, do as follows.

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

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

● HD465-5

Tire	Tire ton-km-per-hour rating with ambient temperature				Maximum continuous traveling speed (km/h) with ambient temperature				
	16°C	27°C	38°C	49°C		16°C	27°C	38°C	49°C
Size: 24.00-35-36PR (standard) Structure: CR Cord No. (TRA): E3	335	313	292	270	Without load (front-wheel basis)	37	35	33	30
					With load (rear-wheel basis)	23	22	20	19
Size: 24.00R35★★ (if equipped) Structure: CR Cord No. (VRLSA): E4	396	355	314	293	Without load (front-wheel basis)	35.1	31.4	27.8	25.9
					With load (rear-wheel basis)	21.5	19.3	17.0	15.9
Size: 21.00-35-36PR (if equipped) Structure: CR Cord No. (TRA): E4	244	228	212	196	Without load (front-wheel basis)	28	26	24	22
					With load (rear-wheel basis)	17	16	15	14
Size: 21.00-35-32PR (if equipped) Structure: CR Cord No. (TRA): E3	285	266	248	230	Without load (front-wheel basis)	33	30	28	26
					With load (rear-wheel basis)	20	19	18	16

● HD605-5

Tire	Tire ton-km-per-hour rating with ambient temperature				Maximum continuous traveling speed (km/h) with ambient temperature				
	16°C	27°C	38°C	49°C		16°C	27°C	38°C	49°C
Size: 24.00R35★★ (standard) Structure: CR Cord No. (VRLSA): E4	396	355	314	293	Without load (front-wheel basis)	35.1	31.4	27.8	25.9
					With load (rear-wheel basis)	21.5	19.3	17.0	15.9
Size: 24.00-35-36PR (if equipped) Structure: CR Cord No. (TRA): E3	335	313	292	270	Without load (front-wheel basis)	37	35	33	30
					With load (rear-wheel basis)	23	22	20	19

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

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

$$\text{Average travel speed} = \frac{\text{round trip distance} \times \text{number of round trips per day}}{\text{total operating hours per day}}$$

$$\text{Average load} = (\text{load when empty} + \text{load when loaded}) / 2$$

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

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

12.17.5 PRECAUTIONS FOR LONG DISTANCE TRAVEL

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

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

HD465-5

Tire size	Inflation pressure
24.00-35-36PR (standard)	0.44 MPa (4.5 kgf/cm ² , 63.9 PSI)
24.00R35★★ (if equipped)	0.69 MPa (7.0 kgf/cm ² , 99.4 PSI)
21.00-35-36PR (if equipped)	0.54 MPa (5.5 kgf/cm ² , 78.1 PSI)
21.00-35-32PR (if equipped)	0.49 MPa (5.0 kgf/cm ² , 71.0 PSI)

HD605-5

Tire size	Inflation pressure
24.00R35★★ (Standard)	0.69 MPa (7.0 kgf/cm ² , 99.4 PSI)
24.00-35-36PR (if equipped)	0.44 MPa (4.5 kgf/cm ² , 63.9 PSI)

NOTICE

If the tires are used when the inflation pressure is less than the value given in the table above, the rim may be damaged.

Always keep the tire inflation pressure within +0 – +0.03 MPa (0.3 kgf/cm², 4.3 PSI) of the value in the table above.

- Do not reduce the tire inflation pressure while traveling.
- The maximum travel speed must be kept to less than 40 km/h (24.9 MPH). Stop for at least one hour for every one hour of travel to allow the tires and other components to cool down.
- Never travel with water or dry ballast in the tires.

13. DETERMINING AND MAINTAINING TRAVEL ROAD

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

To ensure safety in operations, do as follows.

13.1 DETERMINING TRAVEL ROAD

- As far as possible, restrict the travel road to one-way travel.
- If it is impossible to keep to one-way traffic, make the road with ample width to enable trucks traveling in opposite directions to pass each other. If it is impossible to provide a sufficient road width, provide passing places at various points along the road.
- Always design the road so that the loaded truck passes on the side closest to the hill face.
- If there are curves with poor visibility along the road, set up mirrors.
- In places where the road should be weak or likely to collapse, set up a sign at a point at least 1.5 m (4 ft 11 in) from the road shoulder to warn of the danger.
- It is important to set up lighting or reflectors to enable the road to be traveled at night.
- The grade of slope should be kept within 10% (approx. 6°) as far as possible, and emergency escape points should be set up on downhill slopes in case of any brake failure.
- Make the road as straight as possible, and particularly in intermediate areas with curves, where the machine is traveling at high speed, make the radius of the curve as large as possible.
- Small S curves are particularly dangerous, so avoid such curves. The radius of the curve must be a minimum of 12 – 15 m (39 ft 4 in – 49 ft 3 in).
- Make the radius of curves as large as possible.
- Make the road wider at curves than it is in straight areas.
- Make the outside of the curve slightly higher.
- Be particularly careful to strengthen the road shoulder on the outside of curve.
- As far as possible, design the road so that no other roads cross it. In particular, if roads cross at an angle on slopes, a stepped difference is formed in the road. This is extremely dangerous, as it causes the machine to roll when traveling at high speed.
- Cut the slope face to provide a special road for the trucks.

13.2 MAINTAINING TRAVEL ROAD

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

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

14. COLD WEATHER OPERATION

14.1 PRECAUTIONS FOR LOW TEMPERATURE

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

14.1.1 FUEL AND LUBRICANTS

Change to fuel and oil with low viscosity for all components. For details of the specified viscosity, see "20. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".

14.1.2 COOLANT

 **WARNING**

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

NOTICE

- **Never use methanol, ethanol or propanol based antifreeze.**
- **Absolutely avoid using any water leak preventing agent irrespective of whether it is used independently or mixed with an antifreeze.**
- **Do not mix one antifreeze with a different brand.**

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

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

Standard requirements for permanent antifreeze

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

REMARK

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

14.1.3 BATTERY

⚠ WARNING

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

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

REMARK

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

Temp. of fluid Rate of charge	20°C	0°C	-10°C	-20°C
100%	1.28	1.29	1.30	1.31
90%	1.26	1.27	1.28	1.29
80%	1.24	1.25	1.26	1.27
75%	1.23	1.24	1.25	1.26

14.1.4 INSTALLATION OF RADIATOR CURTAIN (if equipped)

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

14.2 PRECAUTIONS AFTER COMPLETION OF WORK

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

- Mud and water on the machine body should be completely removed. This is to prevent damage to the seal caused by water in mud or dirt getting inside the seal and freezing.
- Park the machine on hard, dry ground. If this is impossible, park the machine on wooden boards. The boards help protect the tracks from being frozen in the soil and the machine can start next morning.
- Bleed the air from the tank to prevent moisture from collecting inside the tank.
- Open the drain valve and drain any water collected in the fuel system to prevent it from freezing.
- As the battery capacity drops markedly in low temperatures, cover the battery or remove it from the machine, keep it in a warm place, and install it again the next morning.
- If the battery electrolyte level is low, add distilled water before starting operations on the next morning. To prevent the electrolyte from freezing at night, do not add distilled water after finishing operations.

14.3 AFTER COLD WEATHER

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

- Replace the fuel and oil for all parts with oil of the viscosity specified.
For details, see "20. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".
- If for any reason permanent antifreeze cannot be used, and an ethyl glycol base antifreeze (winter, one season type) is used instead, or if no antifreeze is used, drain the cooling system completely, then clean out the inside of the cooling system thoroughly, and fill with fresh water.
- As the APS (starting aid) system becomes useless (at 15°C or above), be sure to close the fuel valve for the APS.

15. LONG-TERM STORAGE

15.1 BEFORE STORAGE

When putting the machine in storage for a long time, do as follows.

- After every part is washed and dried, house the machine in a dry building. Never leave it outdoors.
If the machine must be left outdoors, park it on well-drained concrete and cover it with canvas, etc.
- Completely fill the fuel tank, lubricate, and change the oil before storage.
- Apply a thin coat of grease to the metal surface of the hydraulic piston rods.
- Disconnect the negative terminals of the battery and cover it, or remove it from the machine and store it separately.
- If the ambient temperature is expected to drop below 0°C, always add antifreeze to the cooling water.
- Lock dump lever with the safety lock, and apply the parking brake.
- Set the tire inflation pressure for each tire to within the range of the specified inflation pressure for the type of tire.
- Open the drain valve of the air tank, release the air, then tighten the drain valve again.
- Push the retarder control lever forward to the OFF position.
- Place the shift lever at the N position and turn the starting switch OFF.

15.2 DURING STORAGE

 **WARNING**

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

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

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

15.3 AFTER STORAGE

NOTICE

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

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

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

15.4 PRECAUTIONS BEFORE TRAVELING AFTER LONG-TERM STORAGE

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

16. TROUBLESHOOTING

16.1 AFTER RUNNING OUT OF FUEL

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

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

16.2 TOWING MACHINE

 **WARNING**

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

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

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

16.2.1 WHEN ENGINE RUNS

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

16.2.2 WHEN ENGINE DOES NOT RUN

NOTICE

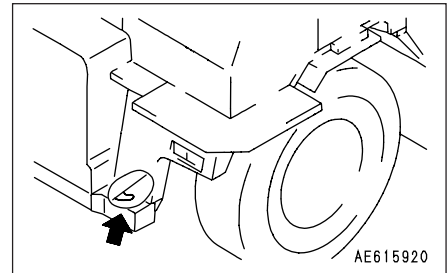
Towing the machine is for moving it to a place where inspection and maintenance can be carried out. It is not for towing the machine long distances.

Do not tow the machine for long distances.

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

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

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



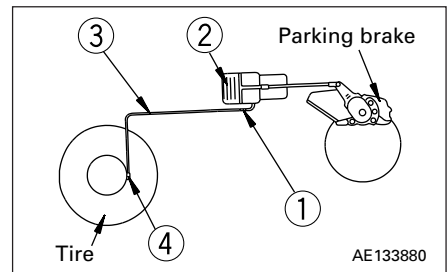
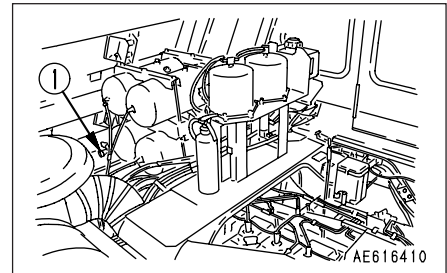
METHOD OF RELEASING PARKING BRAKE

⚠ WARNING

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

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

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

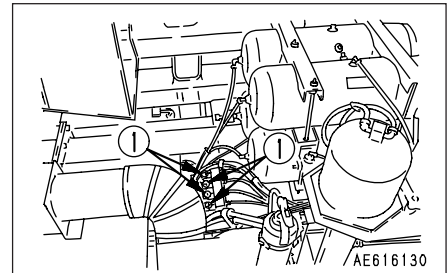


METHOD OF RELEASING EMERGENCY BRAKE**⚠ WARNING**

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

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

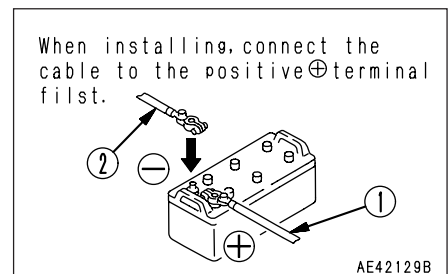
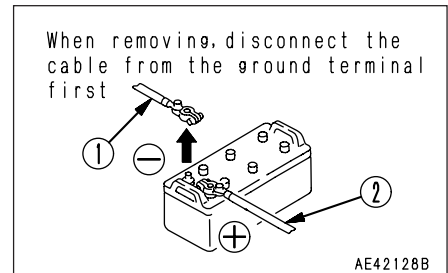
1. When the preparations for towing the machine are completed, pull rings ① of the air tank drain valve (4 places), and release the air pressure to release the emergency brake.
2. After releasing the emergency brake, release rings ①.



16.3 IF BATTERY IS DISCHARGED

⚠ WARNING

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

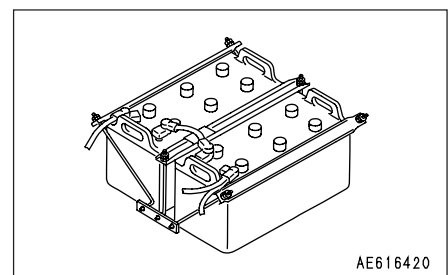


16.3.1 REMOVAL AND INSTALLATION OF BATTERY

- When removing battery, first disconnect the cable from the ground (normally, from the negative \ominus terminal). If a tool touches a cable connecting the positive terminal and the chassis, there is danger of sparks being emitted.
- When installing battery, the ground cable should be connected to the ground terminal as the last step.
- When replacing the battery, fix the battery securely in position with the battery mount bracket.
Tightening torque for mounting nut: 9.81 – 14.7 N·m (1 – 1.5 kgf·m, 7.2 – 10.8 lbft)

NOTICE

After securing the battery, check that it does not move. If it moves, secure it in position again.



16.3.2 PRECAUTIONS FOR CHARGING BATTERY CHARGING BATTERY WHEN MOUNTED ON MACHINE

When charging the battery, if the battery is not handled correctly, there is a hazard that the battery may explode. Always follow the instructions of "16.3 IF BATTERY DISCHARGED" and the instruction manual accompanying the charger, and do as follows.

- Set the voltage of the charger to match the voltage of the battery to be charged. If the voltage is not selected correctly, the charger may overheat and cause an explosion.
- Connect the positive ⊕ charger clip of the charger to the positive ⊕ terminal of the battery, then connect the negative ⊖ charger clip of the charger to the negative ⊖ terminal of the battery. Be sure to fix the clips securely.
- Set the charging current to 1/10 of the value of the rated battery capacity; when carrying out rapid charging, set it to less than the rated battery capacity.
If the charger current is too high, the electrolyte will leak or dry up, and this may cause the battery to catch fire and explode.
- If the battery electrolyte is frozen, do not charge the battery or start the engine with a different power source. There is a hazard that this will ignite the battery electrolyte and cause the battery to explode.
- Do not use or charge the battery if the battery electrolyte level is below the LOWER LEVEL line. This may cause an explosion. Always check the battery electrolyte level periodically and add distilled water to bring the electrolyte level to the UPPER LEVEL line.

16.3.3 STARTING ENGINE WITH BOOSTER CABLE

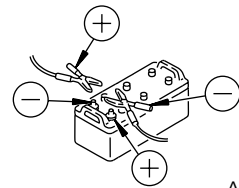
When starting the engine with a booster cable, do as follows:

PRECAUTIONS WHEN CONNECTING AND DISCONNECTING BOOSTER CABLE

⚠ WARNING

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

INCORRECT



AE063650

NOTICE

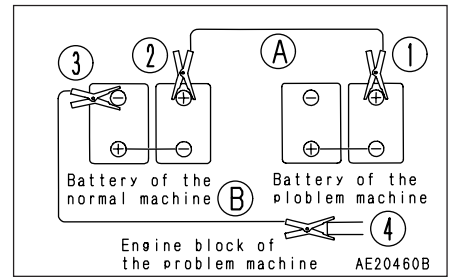
- The size of the booster cable and clip should be suitable for the battery size.
- The battery of the normal machine must be the same capacity as that of the engine to be started.
- Check the cables and clips for damage or corrosion.
- Make sure that the cables and clips are firmly connected.

CONNECTING THE BOOSTER CABLES

Keep the starting switch at the OFF position.

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

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

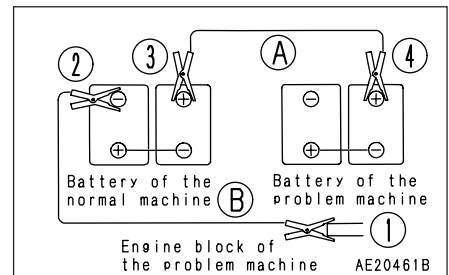
**STARTING THE ENGINE**

1. Make sure the clips are firmly connected to the battery terminals.
2. Turn the starting switch of the problem machine to the START position and start the engine. If the engine doesn't start at first, wait for at least 2 minutes before trying again.

DISCONNECTING THE BOOSTER CABLES

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

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



16.4 OTHER TROUBLE

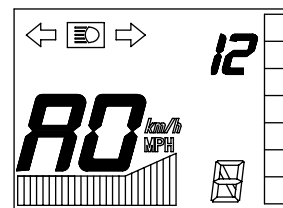
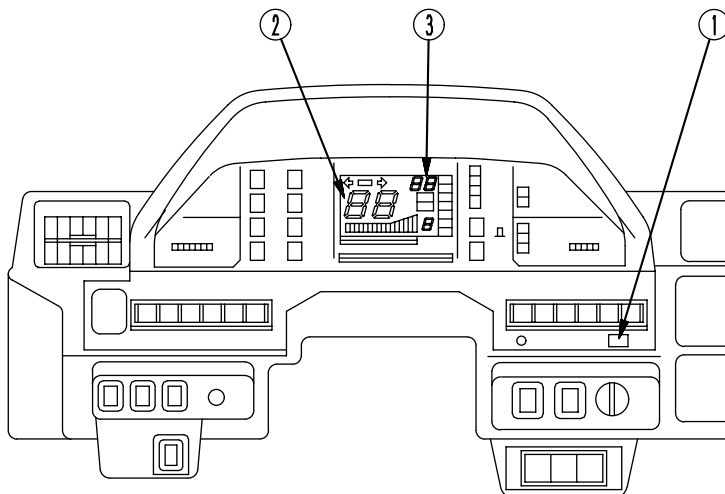
16.4.1 ACTION CODE

If action code "02" or "04" appears, take the action as below.

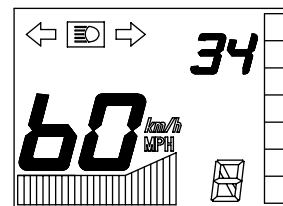
1. If action code "02" is displayed, stop the machine on a safe place and apply the parking brake.
If action code "04" is displayed, immediately stop the machine in a safe place and apply the parking brake.
2. While the action code is displayed, depress check switch ① for the caution pilot lamp bulb until the buzzer sounds three times or more.
3. If the service code indicating possible cause is displayed on speedometer ② and action code display ③, release the check switch for caution pilot lamp bulb and check the service speed.
If action code "04" is displayed, check the service code and immediately stop the engine.
4. After checking the service code, contact your Komatsu distributor for repairs.

REMARK

- The most significant two-digit number is displayed on the speedometer and the least significant two-digit number on the action code display.
- The first digit indicates an English letter and the following two digits indicate numeric letters.
- The service code is seen for 3 seconds, then the normal screen returns. If two or more troubles occur at the same time, each trouble is displayed for 3 seconds in turn.



Example 1. service code A012



Example 2. service code b034

AW63570B

16.4.2 ELECTRICAL SYSTEM

- (): Always contact your Komatsu distributor when dealing with these items.
- In cases of abnormalities or causes which are not listed below, please contact your Komatsu distributor for repairs.
- If "02" or "04" is displayed, stop the machine at a safe place and apply the parking brake. After checking the service code, contact your Komatsu distributor for repairs.

Problem	Main causes	Remedy
Lamp does not glow brightly even when engine runs at high speed	<ul style="list-style-type: none"> ● Defective wiring 	<ul style="list-style-type: none"> ● Check, repair loose terminals, disconnections ● Charge ● Add distilled water ● Adjust alternator belt tension. See EVERY 250 HOURS SERVICE.
Lamp flickers while engine is running	<ul style="list-style-type: none"> ● Insufficient battery charge ● Defective adjustment of belt tension 	<ul style="list-style-type: none"> ● Charge ● Add distilled water ● Adjust alternator belt tension. See EVERY 250 HOURS SERVICE.
Charge monitor lights up while running engine.	<ul style="list-style-type: none"> ● Defective alternator ● Defective wiring 	<ul style="list-style-type: none"> ● Replace ● Check, repair
Abnormal noise is generated from alternator	<ul style="list-style-type: none"> ● Defective alternator 	<ul style="list-style-type: none"> ● Replace
Starting motor does not turn when starting switch is turned to ON	<ul style="list-style-type: none"> ● Defective wiring ● Defective starting switch ● Insufficient battery charge ● Defective battery switch 	<ul style="list-style-type: none"> ● Check, repair ● Replace switch ● Charge ● Replace switch
Starting motor turns engine sluggishly	<ul style="list-style-type: none"> ● Defective wiring ● Insufficient battery charge 	<ul style="list-style-type: none"> ● Check, repair ● Charge
Starting motor disengages before engine starts	<ul style="list-style-type: none"> ● Defective wiring ● Insufficient battery charge 	<ul style="list-style-type: none"> ● Check, repair ● Charge
APS monitor does not light up	<ul style="list-style-type: none"> ● Defective wiring ● Defective timer ● Defective monitor ● Disconnection in glow plug wiring 	<ul style="list-style-type: none"> ● Check, repair ● Check ● Replace ● Replace

16.4.3 CHASSIS

- (): Always contact your Komatsu distributor when dealing with these items.
- In cases of abnormalities or causes which are not listed below, please contact your Komatsu distributor for repairs.
- If "02" or "04" is displayed, stop the machine at a safe place and apply the parking brake. After checking the service code, contact your Komatsu distributor for repairs.

Problem	Main causes	Remedy
Torque converter oil temperature monitor lamp flashes	<ul style="list-style-type: none"> ● Leakage of oil or entry of air due to damage or defective tightening of oil pipe, pipe joint ● Wear, scuffing of gear pump ● Insufficient oil in transmission case ● Loose fan belt ● Clogged oil cooler ● Long distance traveled in torque converter range ● Disconnected, broken wiring to sensor 	<ul style="list-style-type: none"> (● Check, repair) (● Check, replace) <ul style="list-style-type: none"> ● Add oil to specified level. See CHECK BEFORE STARTING. ● Replace belt. See EVERY 500 HOURS SERVICE. (● Clean or replace) <ul style="list-style-type: none"> ● Drive in direct range (● Repair, connect wiring)
Steering wheel is heavy	<ul style="list-style-type: none"> ● Lack of grease at link ● Internal leakage inside steering cylinder 	<ul style="list-style-type: none"> ● Add grease (● Replace cylinder seal)
Steering wheel pulls	<ul style="list-style-type: none"> ● Tire inflation pressure not uniform on left and right ● Dragging, pulling of front brake 	<ul style="list-style-type: none"> ● Make tire inflation pressure uniform. See CHECK BEFORE STARTING. ● Check wear of front brake pad. For details, see EVERY 500 HOURS SERVICE.
Braking effect is poor when brake pedal is depressed	<ul style="list-style-type: none"> ● Pad has reached wear limit ● Rear disc has reached wear limit ● Insufficient air pressure ● Insufficient brake oil 	<ul style="list-style-type: none"> (● Replace pad) (● Replace disc) <ul style="list-style-type: none"> ● Charge to specified pressure ● Add brake oil. See CHECK BEFORE STARTING.
Brake pulls to one side	<ul style="list-style-type: none"> ● Air in brake circuit 	<ul style="list-style-type: none"> ● Bleed air. See WHEN REQUIRED.

CHASSIS (continued) (16.4.3)

Problem	Main causes	Remedy
Work equipment speed is slow	<ul style="list-style-type: none"> ● Defective gear pump ● Insufficient oil 	<ul style="list-style-type: none"> (● Replace gear pump) ● Add oil to specified level. See CHECK BEFORE STARTING.
Suspension is hard	<ul style="list-style-type: none"> ● Entry of soil or sand due to breakage of dust seal, gas leakage due to breakage of U-packing ● Gas leaking from valve core 	<ul style="list-style-type: none"> (● Replace U-packing) (● Replace valve core)
Rear wheel on one side tends to slip	<ul style="list-style-type: none"> ● Air in rear brake circuit (between slack adjuster and rear brake) ● Excessive difference in wear between left and right tires ● Excessive difference in division of load between left and right wheels (unbalanced load) ● Excessive deformation of disc 	<ul style="list-style-type: none"> ● Bleed air from rear brakes (left, right). See WHEN REQUIRED. (● Replace tires) ● Make load uniform (● Disassemble and adjust brake)

IF ACCELERATOR PEDAL HAS FAILED

In addition to the potentiometer detecting the pedal depression depth, the switch is installed on the accelerator pedal assembly in order to detect whether the accelerator pedal is depressed or not.

If the pedal depression depth is not detected correctly due to a failure of the accelerator pedal or incorrect electric wiring, the engine controller or PMC (if equipped) controls the engine speed responding to the signal from this check switch. The engine runs at 1400 rpm when the accelerator pedal is depressed, while the engine runs at low idling when the pedal is released. The engine speed varies depending on the load.

After moving the machine to a safe place by operating the accelerator pedal, contact your Komatsu distributor for repairs.

There are two methods when operating the accelerator pedal: either release the pedal and set to the OFF (low idling) position, or depress the pedal fully (1400 rpm).

If the accelerator pedal is held at an intermediate position, the system may not be able to judge if the accelerator pedal is being operated or not.

REMARK

If the engine controller or PMC (if equipped) can not be received the signal of the accelerator pedal depth, the central warning lamp flashes and simultaneously the alarm buzzer sounds and action code "02" appears.

16.4.4 ENGINE

- (): Always contact your Komatsu distributor when dealing with these items.
- In cases of abnormalities or causes which are not listed below, please contact your Komatsu distributor for repairs.
- If “02” or “04” is displayed, stop the machine at a safe place and apply the parking brake. After checking the service code, contact your Komatsu distributor for repairs.

Problem	Main causes	Remedy
Engine oil pressure monitor lights up	<ul style="list-style-type: none"> ● Insufficient oil in oil pan ● Clogged oil filter cartridge ● Oil leakage due to damage caused by defective tightening of oil pan, pipe joint ● Disconnection, broken wiring to sensor 	<ul style="list-style-type: none"> ● Add oil to specified level. See CHECK BEFORE STARTING. ● Replace cartridge, see EVERY 250 HOURS SERVICE (● Check, repair) (● Repair, connect wiring)
Steam spurts out from top of radiator (pressure valve)	<ul style="list-style-type: none"> ● Insufficient coolant, water leakage ● Loose fan belt 	<ul style="list-style-type: none"> ● Check, add cooling water. See CHECK BEFORE STARTING. ● Replace belt. See EVERY 500 HOURS SERVICE.
Radiator cooling water level monitor lights up	<ul style="list-style-type: none"> ● Dirt or scale accumulated in cooling system 	<ul style="list-style-type: none"> ● Change coolant, clean inside of cooling system. See WHEN REQUIRED.
Water temperature gauge is in red range	<ul style="list-style-type: none"> ● Radiator fins clogged or damaged ● Defective water temperature gauge 	<ul style="list-style-type: none"> ● Clean or repair. See EVERY 500 HOURS SERVICE. (● Replace water temperature gauge)
Engine water temperature monitor flashes	<ul style="list-style-type: none"> ● Defective thermostat ● Defective thermostat seal ● Loose radiator filler cap (operations at high altitude) ● Disconnection, broken wiring to sensor 	<ul style="list-style-type: none"> (● Replace thermostat) (● Replace thermostat seal) ● Tighten or replace cap. (● Repair, connect wiring)
Water temperature gauge display stays at lowest level and does not rise	<ul style="list-style-type: none"> ● Defective water temperature gauge monitor ● Defective thermostat ● In cold weather, cold wind is blowing strongly against engine 	<ul style="list-style-type: none"> (● Replace water temperature gauge monitor) ● Replace thermostat (● Install radiator curtain)
Engine does not start even when starting motor is cranked	<ul style="list-style-type: none"> ● Insufficient fuel ● Air in fuel system ● No fuel in fuel filter ● Starting motor cranks engine too slowly ● Starting motor does not turn ● Defective valve clearance (defective compression) 	<ul style="list-style-type: none"> ● Add fuel. See CHECK BEFORE STARTING. (● Repair place where air is leaking in) ● Fill filter with fuel. See EVERY 500 HOURS SERVICE. See electrical components (● Adjust valve clearance)

ENGINE (continued) (16.4.4)

Problem	Main causes	Remedy
Fuel stops from time to time	<ul style="list-style-type: none"> ● Crushed fuel tank breather tube 	<ul style="list-style-type: none"> (● Replace breather tube)
Excessive oil consumption Exhaust gas is white or bluish	<ul style="list-style-type: none"> ● Oil leakage ● Excessive oil in oil pan ● Worn piston, ring, cylinder liner ● Improper fuel ● Defective turbocharger seal 	<ul style="list-style-type: none"> (● Check, repair) ● Add oil to specified level. See CHECK BEFORE STARTING. (● Replace) ● Replace with specified fuel (● Check, replace)
Exhaust gas is black	<ul style="list-style-type: none"> ● Clogged air cleaner element ● Worn piston, ring, cylinder liner ● Defective compression ● Defective turbocharger ● Defective exhaust brake 	<ul style="list-style-type: none"> ● Clean or replace. See WHEN REQUIRED. (● Check, repair) ● See adjustment of clearance above (● Check, replace) (● Check, replace, repair)
Engine hunts	<ul style="list-style-type: none"> ● Air entering suction side of fuel line 	<ul style="list-style-type: none"> (● Repair place where air is leaking in)
There is knocking (combustion or mechanical)	<ul style="list-style-type: none"> ● Poor quality fuel being used ● Overheating 	<ul style="list-style-type: none"> ● Replace with specified fuel ● See "Water temperature gauge is in red range" above.

16.4.5 APS (STARTING AID) SYSTEM

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

Problem	Main causes	Remedy
Engine does not start at all	<ul style="list-style-type: none"> ● Clogged nozzle (dirt, precipitation of paraffin, defective nozzle) ● Defective glow plug ● Crushed, clogged fuel piping, fuel leakage ● Defective wiring ● Blown fuse ● Defective APS controller 	<ul style="list-style-type: none"> ● Clean, change to specified fuel, replace nozzle ● Replace ● Check, repair ● Check, repair ● Replace ● Replace
Engine starts at once, but there is excessive white smoke or engine stops again	<ul style="list-style-type: none"> ● Clogged nozzle (dirt, precipitation of paraffin, defective nozzle) ● Defective glow plug ● Blown fuse ● Defective alternator function (alternator output is too low) ● Defective APS water temperature sensor ● Defective APS controller 	<ul style="list-style-type: none"> ● Clean, change to specified fuel, replace nozzle ● Replace ● Replace ● Check, repair or replace ● Replace temperature sensor ● Replace
When load is applied, black smoke comes out and engine stops	<ul style="list-style-type: none"> ● Defective APS water temperature sensor ● Melted heater relay points 	<ul style="list-style-type: none"> ● Replace temperature sensor
APS monitor lamp stays lighted up and burner burns		<ul style="list-style-type: none"> ● Replace heater relay
APS monitor lamp does not light up (this is normal when engine water temperature is 20°C or above)	<ul style="list-style-type: none"> ● Disconnection in APS monitor, glow plug wiring ● Defective wiring ● Defective timer 	<ul style="list-style-type: none"> ● Replace ● Check, repair ● Replace
Burner does not burn	<ul style="list-style-type: none"> ● Glow plug is not red hot 	<ul style="list-style-type: none"> ● See above "APS monitor lamp does not light up"
	<ul style="list-style-type: none"> ● Fuel is not being sprayed out from nozzle, or spray amount is too small <ul style="list-style-type: none"> ○ Clogged nozzle (dirt, precipitation of paraffin, defective nozzle) ○ Defective APS controller 	<ul style="list-style-type: none"> ○ Clean, change to specified fuel, replace nozzle ○ Replace

MECHATRONICS-RELATED UNITS

If any abnormality occurs, stop the machine, apply the parking brake and check the service code, then contact your Komatsu distributor for repairs.

- **Electronic display panel**

ELECTRONIC DISPLAY PANEL SERVICE CODE LIST

NO.	ITEM	SERVICE CODE	ACTION CODE	MECHATRONIC CAUTION
1	LAMP OUTPUT FAILED LOW	A001	02	○
2	CNTRL LAMP OUTPUT FAILED LOW	A002	02	○
3	BUZZER OUTPUT FAILED LOW	A003	02	○
4	S-NET COMMUNICATION FAILURE	A012	02	○
5	S-NET COMMUNICATION LOST (T/M)	A013	02	○
6	S-NET COMMUNICATION LOST (PMC)	A014	02	○
7	S-NET COMMUNICATION LOST (ENG.)	A015	02	○
8	S-NET COMMUNICATION LOST (SUS)	A016	02	○
9	MACHINE SELECT INFO. FAILURE	A018	04	○
10	OPTION INFO. FAILURE	A019	04	○

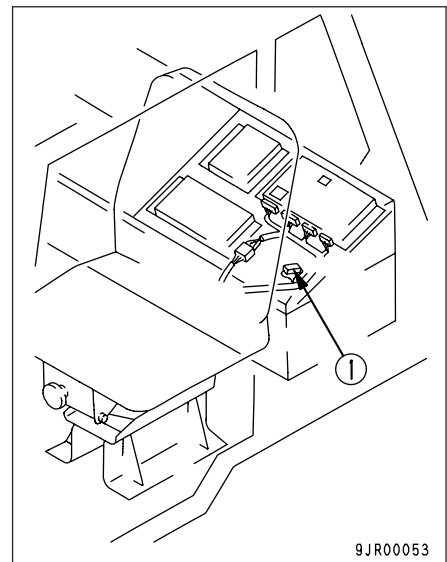
- **Transmission controller**

If any abnormality occurs in the transmission, reduce the travel speed by using the brake, stop the machine on a safe place. Gear shifting may not work for some failure modes.

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

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

When working emergency escape function, shift indicator of machine monitor panel are displayed E and transmission shift range (speed range) alternately.



TRANSMISSION CONTROLLER SERVICE CODE LIST

NO.	ITEM	SERVICE CODE	ACTION CODE	TRANSMISSION CAUTION
1	BATTERY VOLTAGE LOW	b001	04	○
2	SOLENOID VOLTAGE FAILURE	b002	04	○
3	N SAFETY ON	b003	-	○
4	ROM SUM CHECK FAULT	b004	04	○
5	CLUTCH ENGAGED DOUBLE	b005	04	○
6	T/M CUT RELAY FAILURE	b006	04	○
7	BATTERY VOLTAGE LOW (12V)	b007	04	○
8	R. BR. SOLENOID FAILURE	b008	02	○
9	EXHAUST BR. SOLENOID FAILURE	b009	02	○
10	ENG. SPEED SIGNAL LOST	b010	02	○
11	T/M INPUT SPEED SIGNAL LOST	b011	02	○
12	T/M MID. SPEED SIGNAL LOST	b012	02	○
13	T/M OUTPUT SPEED SIGNAL LOST	b013	02	○
14	MACHINE SELECT SIGNAL FAILURE	b014	04	○
15	LEVER SIGNAL FAILURE A	b015	02	○
16	LEVER SIGNAL FAILURE B	b016	02	○
17	ACCEL SENSOR FAILURE	b017	02	○
18	ECMV OIL TEMP. SENSOR FAILURE	b019	02	○
19	H CLUTCH FAILURE	b022	02	○
20	L CLUTCH FAILURE	b023	02	○
21	1st CLUTCH FAILURE	b024	02	○
22	2nd CLUTCH FAILURE	b025	02	○
23	3rd CLUTCH FAILURE	b026	02	○
24	4th CLUTCH FAILURE	b027	02	○
25	R CLUTCH FAILURE	b028	02	○
26	H CLUTCH ECMV FAILURE 1	b032	02	○
27	L CLUTCH ECMV FAILURE 1	b033	02	○
28	1st CLUTCH ECMV FAILURE 1	b034	02	○
29	2nd CLUTCH ECMV FAILURE 1	b035	02	○
30	3rd CLUTCH ECMV FAILURE 1	b036	02	○
31	4th CLUTCH ECMV FAILURE 1	b037	02	○
32	R CLUTCH ECMV FAILURE 1	b038	02	○
33	H CLUTCH ECMV FAILURE 2	b042	02	○
34	L CLUTCH ECMV FAILURE 2	b043	02	○
35	1st CLUTCH ECMV FAILURE 2	b044	02	○
36	2nd CLUTCH ECMV FAILURE 2	b045	02	○
37	3rd CLUTCH ECMV FAILURE 2	b046	02	○
38	4th CLUTCH ECMV FAILURE 2	b047	02	○
39	R CLUTCH ECMV FAILURE 2	b048	02	○
40	H CLUTCH ECMV FAILURE 3	b052	02	○
41	L CLUTCH ECMV FAILURE 3	b053	02	○
42	1st CLUTCH ECMV FAILURE 3	b054	02	○
43	2nd CLUTCH ECMV FAILURE 3	b055	02	○
44	3rd CLUTCH ECMV FAILURE 3	b056	02	○
45	4th CLUTCH ECMV FAILURE 3	b057	02	○

TRANSMISSION CONTROLLER SERVICE CODE LIST (continued)

NO.	ITEM	SERVICE CODE	ACTION CODE	TRANSMISSION CAUTION
46	R CLUTCH ECMV FAILURE 3	b058	02	○
47	ENG. SPEED SENSOR FAILURE	b060	02	○
48	T/M IN SPEED SENSOR FAILURE	b061	02	○
49	T/M MID. SPEED SENSOR FAILURE	b062	02	○
50	T/M OUT SPEED SENSOR FAILURE	b063	02	○
51	L/U CLUTCH SLNOID FAILED HIGH	b071	02	○
52	H. CLUTCH SLNOID FAILED HIGH	b072	02	○
53	L CLUTCH SLNOID FAILED HIGH	b073	02	○
54	1st CLUTCH SLNOID FAILED HIGH	b074	02	○
55	2nd CLUTCH SLNOID FAILED HIGH	b075	02	○
56	3rd CLUTCH SLNOID FAILED HIGH	b076	02	○
57	4th CLUTCH SLNOID FAILED HIGH	b077	02	○
58	R CLUTCH SLNOID FAILED HIGH	b078	02	○
59	L/U CLUTCH SLNOID FAILED LOW	b091	02	○
60	H CLUTCH SLNOID FAILED LOW	b092	02	○
61	L CLUTCH SLNOID FAILED LOW	b093	02	○
62	1st CLUTCH SLNOID FAILED LOW	b094	02	○
63	2nd CLUTCH SLNOID FAILED LOW	b095	02	○
64	3rd CLUTCH SLNOID FAILED LOW	b096	02	○
65	4th CLUTCH SLNOID FAILED LOW	b097	02	○
66	R CLUTCH SLNOID FAILED LOW	b098	02	○
67	MACHINE SELECT FAILURE	b0A1	04	○
68	T/C OIL TEMP. SENSOR FAILURE	b0A2	02	○
69	FUEL LEVEL SENSOR FAILURE	b0A3	02	○
70	R. BR. OIL TEMP. SNSR L FAILURE	b0A4	02	○
71	COOLANT TEMP. SENSOR FAILURE	b0b2	02	○
72	BR. AIR PRESS. SENSOR FAILURE	b0b3	02	○
73	ENG. OIL PRESS. SENSOR FAILURE	b0b7	02	○
74	CONNECTOR MISMATCH	b0C1	04	○
75	BCV R SOLENOID HOT SHORT	b0C4	02	○
76	BCV R SOLENOID DISCONNECT	b0C6	02	○
77	BCV R SOLENOID SHORT TO GND	b0C8	02	○
78	CHANGE T/M FILTER	b0d1	01	
79	** T/C OVERHEAT	b0d2	05	
80	** COOLANT TEMP. OVERHEAT	b0d3	05	
81	* R. BR. OIL TEMP. L OVERHEAT	b0d4	05	
82	LARGE LATERAL INCLINATION	b0d5	07	
83	LOW COOLANT LEVEL	b0d6	01	
84	BTTRY CHARGE CIRCUIT FAILURE	b0d7	01	○
85	OVERRUN PREVENTION ACTIVATION 1	b0d8	03	
86	OVERSHOOT	b0d9	02	○
87	BTTRY DIRECT VOLTAGE FAILURE	b0dA	04	○
88	SWITCHED VOLTAGE FAILURE	b0dB	04	○
89	OVERRUN PREVENTION ACTIVATION 2	b0dF	03	
90	HIGH STRG. OIL TEMP.	b0E5	05	

TRANSMISSION CONTROLLER SERVICE CODE LIST (continued)

NO.	ITEM	SERVICE CODE	ACTION CODE	TRANSMISSION CAUTION
91	** LOW BR. AIR PRESS	b0E9	05	
92	ENG. OIL PRESS. ABNORMAL	b0F5	04	
93	R BRAKE CHAMBER STROKE END	b0F6	04	

- **Engine controller**
(If equipped electronic governor)

ENG. CONTROLLER SERVICE CODE LIST

NO.	ITEM	SERVICE CODE	ACTION CODE	ENGINE CAUTION	POWER DERATE
1	BATTERY VOLTAGE ABNORMAL	C010	04	○	
2	CONTROLLER ABNORMAL	C011	04	○	
3	RACK SENSOR RB FAILURE	C012	02	○	
5	GOVERNOR SOL. RB FAILURE	C014	04	○	
7	GOVERNOR CUT RELAY RB FAILURE	C016	02	○	
9	RACK SENSOR VOLTAGE ABNORMAL	C018	02	○	
10	GOVERNOR SERVO RB FAILURE	C019	04	○	
12	ENG. SPEED SENSOR FAILURE(A)	C01b	02	○	○
13	ENG. SPEED SENSOR FAILURE(B)	C01c	02	○	○
14	PRESTROKE SOL. RB FAILURE	C01d	02	○	○
16	CONNECTOR MISMATCH	C021	04	○	
17	OVERRUN	C022	03		
18	OVERHEAT	C023	05		○
19	LOW ENG. OIL PRESS. ABNORMAL	C024	04		○
20	OIL COOLER FAILURE	C02F	02		
21	ACCEL SENSOR FAILURE	C031	02	○	
22	THROTTLE MOD. SIGNAL (1) LOST	C032	02	○	
23	COOLANT TEMP. SENSOR FAILURE	C034	02	○	
24	OIL TEMP. SENSOR FAILURE	C035	02	○	
25	OIL PRESS. SENSOR FAILURE	C036	02	○	
26	S-NET SIGNAL LOST	C055	02	○	
27	SOLENOID 1 VOLTAGE FAILURE	C056	04	○	
28	SOLENOID 2 VOLTAGE FAILURE	C057	04	○	
29	BATTERY DIRECT VOLTAGE FAILURE	C058	02	○	
30	SWITCHED VOLTAGE FAILURE	C059	02	○	
31	HIGH OIL TEMP.	C060	05		○
32	MACHINE SELECT INFO. FAILURE	C0C2	04	○	
33	VEHICLE SPEED INFO. FAILURE	C0C3	04	○	
34	THROTTLE SIGNAL LOST	C0C4	02	○	
35	IVS INVALID STATUS	C0C5	02	○	

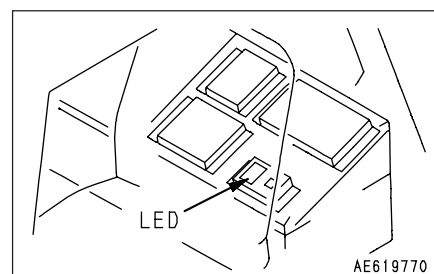
- **Suspension controller**

SUSPENSION CONTROLLER SERVICE CODE LIST

NO.	ITEM	SERVICE CODE	ACTION CODE	MECHATRONIC CAUTION
1	BATTERY VOLTAGE ABNORMAL	d001	–	–
2	CONTROLLER ABNORMAL	d002	–	–
3	SUS. PRESS. SNSR FR FAILURE	d011	02	○
4	SUS. PRESS. SNSR FL FAILURE	d012	02	○
5	T/M OUTPUT SPEED SIGNAL LOST	d015	02	○
6	STRG. SPEED SIGNAL LOST	d016	02	○
7	SOLENOID 1 OUTPUT FAILURE	d021	02	○
8	SOLENOID 2 OUTPUT FAILURE	d022	02	○
9	SOLENOID 3 OUTPUT FAILURE	d023	02	○
10	S-NET SIGNAL LOST	d0C1	–	–
11	MACHINE SELECT INFO. FAILURE	d0C2	–	–
12	VEHICLE SPEED INFO. FAILURE	d0C3	–	–

- **APS controller**

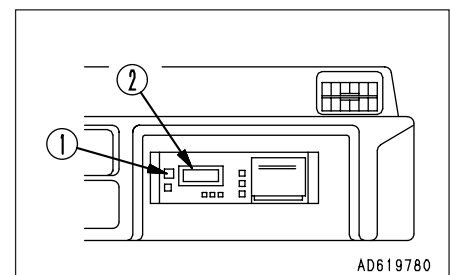
No.	LED	Abnormal system	Normal	Abnormal
1	Red	Glow plug 1 short circuit	○ OFF	● ON
2	Green	Disconnection in glow plug 1	● ON	○ OFF
3	Red	Glow plug 2 short circuit	○ OFF	● ON
4	Green	Disconnection in glow plug 2	● ON	○ OFF
5	Red	Nozzle short circuit	○ OFF	● ON
6	Green	Disconnection in nozzle	● ON	○ OFF



● **Payload meter (if equipped)**

Order of priority	Display	Content	
1	--8	Internal CPU stopped (CPU reset) (Controller power source, etc. is normal)	
2	E-31	Sensor power source (18V) abnormal	
	E-32	Relay short circuit	
	E-33	Drop in voltage of backup battery	
3	E-01	Rear right wheel	<ul style="list-style-type: none"> ● Disconnection in pressure sensor signal line ● Signal line in contact with chassis ● Defect inside sensor
	E-02	Rear left wheel	
	E-03	Front right wheel	
	E-04	Front left wheel	
4	E-11	Rear right wheel	<ul style="list-style-type: none"> ● Pressure sensor signal line in contact with power source line
	E-12	Rear left wheel	
	E-13	Front right wheel	
	E-14	Front left wheel	
5	E-41	Disconnection in clinometer signal line or contact with chassis	
	E-42	Clinometer signal line in contact with power source line	
6	PAPE	Printer READY signal not given (paper jam)	
7	FULL	Data in memory have reached 200 cycles (overflow)	
8	CAL	Calibration needed	
9	E-21	Rear right wheel	<ul style="list-style-type: none"> ● Abnormality detected in sensor system when sensor check is carried out
	E-22	Rear left wheel	
	E-33	Front right wheel	
	E-24	Front left wheel	

Once an error has been displayed, it continues to be displayed in display unit ② until CAL switch ① is pressed. If the controller detects one of the abnormalities in the above table, all the external display lamps light up.



● **Payload meter (cord type, if equipped)**

Priority of display	Description	Service code	External display lamp
1	Dump lever not at FLOAT (except dozing)	b-FL lights up.	All lamps flash
		b-FL lights up.	–
2	Memory card not inserted.	Cd flashes.	–
3	Backup battery voltage dropped	F-09 flashes.	–
4	Cycle data memory FULL	See (*1)	–
	Engine ON/OFF data memory FULL		
	Abnormality/warning data memory FULL		
	Data memory FULL of accumulated payload and number of total cycles		
5	R terminal disconnection	F-18 flashes.	All lamps flash.
6	Sensor power supply (18 volt) abnormal	F-20 flashes.	All lamps flash.
7	Ground fault or disconnection of front left suspension pressure sensing system	F-21 flashes.	All lamps flash.
8	Ground fault or disconnection of front right suspension pressure sensing system	F-22 flashes.	
9	Ground fault or disconnection of rear left suspension pressure sensing system	F-23 flashes.	
10	Ground fault or disconnection of rear right suspension pressure sensing system	F-24 flashes.	
11	Power supply abnormality or short circuit of front left suspension pressure sensing system	F-25 flashes.	
12	Power supply abnormality or short circuit of front right suspension pressure sensing system	F-26 flashes.	
13	Power supply abnormality or short circuit of rear left suspension pressure sensing system	F-27 flashes.	
14	Power supply abnormality or short circuit of rear right suspension pressure sensing system	F-28 flashes.	
15	Ground fault or disconnection of clinometer system	F-31 flashes.	
16	Power supply abnormality or short circuit of clinometer system	F-32 flashes	
17	Calibration is executed or RAM abnormal	F-CAL flashes.	All lamps flash.

16. TROUBLESHOOTING

Priority of display	Description	Service code	External display lamp
18	External display lamp No.1 relay short circuit	F-41 flashes.	Related lamp: Lights up when parking. Lights off when traveling. Other lamps: Normally operates when loading. Except loading; Flashes when parking. Lights off when traveling.
19	External display lamp No.2 relay short circuit	F-42 flashes.	
20	External display lamp No.3 relay short circuit	F-43 flashes.	
21	External display lamp No.4 relay short circuit	F-44 flashes.	
22	External display lamp No.5 relay short circuit	F-45 flashes.	
23	Incorrect cycle data of loading (*2)	L.bad flashes.	-
24	Over limit-speed	SP:SP flashes.	-
25	Incorrect communication or incorrect option code setting	F-71 flashes, F-73 flashes, F-80 flashes, F-81 flashes, F-91 flashes, F-92 flashes, F-93 flashes, F-94 flashes, F-95 flashes, F-96 flashes, F-97 flashes, F-98 flashes	-

Symbols (*1) and (*2) in abnormality/warning chart

Warning display (*1) in "memory FULL"

(1) Cycle data

- ① If the data of 2600 cycles or more are stored in the memory (remaining data under 3000 cycles), the screen repeats the cycle as follows.
L:FULL flashes 7 times.
: flashes once.
- ② If the data of 2900 cycles are stored (remaining data 0), the screen repeats the cycle as follows.
L:FULL lights up (for 3 seconds).
: flashes once.
- ③ If the data are additionally stored in such way as 2901, 2902 and so on, the data disappears in order from the first stored data.
(The screen holds data series stored in ②.)

(2) Engine ON/OFF data

- ① If the data of 105 or more are stored in the memory (remaining data under 10), the screen repeats the cycle as follows.
E:FULL flashes 7 times (for 3 seconds).
: flashes twice. Then, the display disappears.
- ② If the data of 115 are stored (remaining data 0), the screen repeats the cycle as follows.
E:FULL lights up for 3 seconds.
: flashes once. Then, the display disappears.
- ③ If the data are additionally stored in such way as 116, 117 and so on, the engine ON/OFF data is deleted in order from the first stored data .

(3) Abnormality/warning data

- ① If the data 220 or more are stored in the memory (remaining data under 10), the screen repeats the cycle as follows.
F:FULL flashes 7 times for 3 seconds.
: flashes once.
- ② If the data of 230 are stored (remaining data 0), the screen repeats the cycle as follows.
F:FULL lights up for 3 seconds.
: flashes once.
- ③ If the data of abnormality/warning are additionally stored in such way as 231, 232 and so on, the data disappears in order from the first stored data.
(The screen holds data series stored in ②.)

(4) Accumulated payload and number of total cycles

- ① If the number of the total cycles counts 9994 or more (remaining under 5) or if the difference between the stored accumulated-payload and 999900 tons (the upper limit) falls to 5 times as many as the rated payload or less, the screen repeats the cycle as follows.
H:FULL flashes 7 times (for 3 seconds).
: flashes.
- ② If the number of the total cycles counts 9997 or more (remaining under 2) or if the difference between the stored accumulated-payload and 999900 tons (the upper limit) falls to 2 times as many as the rated payload or less, the screen repeats the cycle as follows.
H:FULL lights up (for 3 seconds).
: flashes once.
- ③ If the number of the total cycles reaches 9999 or the accumulated payload reaches 999900 tons or more, both the accumulated payload and the number of the total cycles are cleared to zero. After then, both the values are accumulated again from zero.
(The screen returns to the normal operating hours.)

- (5) For releasing "data FULL" described in (1) to (3) , see the separate manual for PLM II (Card-type payload meter) of "8.3 OPERATOR CHECK MODE, 8. OPERATION OF SWITCH".

Once "data FULL" in (4) is displayed, it can not be cleared until automatically cleared to zero. Always clear data before "data FULL" appears. For operation, see the separate manual for PLM II (Card-type payload meter) of "8.2 FORCED DISPLAY OF TOTAL PAYLOAD AND OVERALL NUMBER OF CYCLES, 8. SWITCH OPERATION".

- (6) There is no priority among (1) to (4).
If two or more "data FULL" occur at the same time, they are displayed one after another except when loading.

(*2)Incorrect cycle data of loading

The payload-meter detects the payload based on the pressure sensing signal from the suspension. This detection functions all the time. However, during loading or immediately after loading, the detected data becomes slightly uncertain due to the dynamic friction of the suspension. To assure accuracy, the payload-meter is designed to detect and store the payload when it is free from the dynamic friction of the suspension: after traveling with load and just before dozing. (This payload is stored as part of the cycle data.)

If the operator operates dozing (handling of the dump lever) before the body vibration (pitching) settles down, the payload stored in the payload-meter could be inaccuracy.

The stored payload could be also inaccuracy, if the machine stops suddenly or climbs a chocks, or if it bumps obstacles.

Thus, if dozing is done before the vibration of the body settles down, the payload-meter sends a warning to the operator, displaying "Incorrect payload data " shown in the abnormality/warning chart. In this case, the detected payload is stored.

 **WARNING**

- **When parking the machine in a disposal area, avoid braking abruptly, climbing chocks and rocks, or bumping obstacles.**
- **Carry out dozing by the dump lever, after the machine parked safely in the disposal area and the vibration settled down. (Operation of the dump lever should be done after 3 seconds or longer elapsed.)**
- **Make the disposal area as flat as possible and the road surface as level as possible.**

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 Book as replacement parts.

Komatsu genuine oils:

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

Always use clean washer fluid:

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

Always use clean oil and grease:

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

Keeping the machine clean:

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

Be careful of hot water and oil:

Draining hot oils and coolants and removing their filters immediately after the engine stops are hazardous. Allow the engine to cool.

If the oil has to be drained when it is cold, warm up the oil to a suitable temperature (approx. 20 – 40°C) before draining it.

Checking foreign materials in drained oil and on filters:

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

Fuel strainer:

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

Oil change:

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

Warning tag:

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

Obey precautions:

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

Welding instructions:

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

Fire prevention:

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

Clamp faces:

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

Objects in your pockets:

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

Checking undercarriage:

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

Precautions when washing machine:

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

Controller:

The controller for the machine monitor may be mistakenly actuated by interference from external electric waves> For this reason, when installing a radio or other such device, please consult your Komatsu distributor.

Pre-and post-work checks:

Before starting work in mud, rain, snow or at the seashore, check plugs and valves for tightness.

Wash the machine immediately after the work to protect components from rusting.

Lubricate components more frequently than usual. Be sure to lubricate work equipment pins daily if they are submerged in water.

On jobsites where heavy-duty operations are common, reduce the maintenance intervals and carry out greasing more frequently.

Dusty worksites:

When working at dusty worksites, do as follows:

- Inspect the dust indicator to see whether the air cleaner is blocked up. Clean the air cleaner at shorter intervals than specified.
- Clean the radiator core frequently to avoid clogging.
- Clean and replace the fuel filter frequently.
- Clean electrical components, especially the starting motor and alternator, to avoid accumulation of dust.

Avoid mixing oils:

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

18. OUTLINES OF SERVICE

18.1 HANDLING OIL, FUEL, COOLANT, AND PERFORMING OIL CLINIC

18.1.1 OIL

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

18.1.2 FUEL

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

18.1.3 COOLANT

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

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

18.1.5 CARRYING OUT KOWA (Komatsu Oil Wear Analysis)

KOWA is a maintenance service that makes it possible to prevent machine failures and down-time. With KOWA, the oil is periodically sampled and analyzed. This enables early detection of wear of the machine drive parts and other abnormalities.

Periodic use of KOWA makes the following possible:

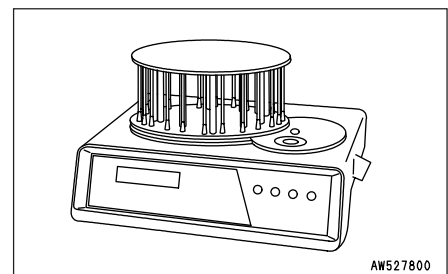
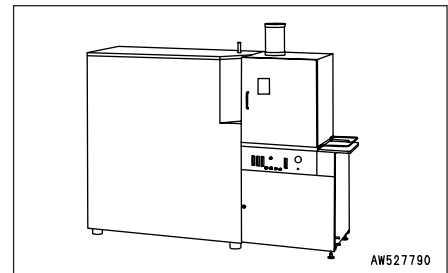
- It enables abnormalities to be detected early, leading to reduction of repair costs and machine downtime.
- It enables repair schedules to be planned, leading to improved machine availability.

KOWA analysis items

- Analysis of metal wear particles
This uses an ICP (Inductively Coupled Plasma) analyzer to measure the density of metal wear particles in the oil.

- Measurement of particle quantity
This uses a PQI (Particle Quantifier Index) measurer to measure the quantity of large iron particles in the oil.

- Others
Measurements are made of items such as the ratio of water or fuel in the oil, and the dynamic viscosity.



Oil sampling

- Sampling interval
 - 250 hours: Engine
 - 500 hours: Other components

- Precautions when sampling
 - Make sure that the oil is well mixed before sampling.
 - Carry out sampling regularly at fixed intervals.
 - Do not carry out sampling on rainy or windy days when water or dust can get into the oil.

For further details of KOWA, please contact your Komatsu distributor.

18.1.6 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).

18.1.7 FILTERS

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

18.2 OUTLINE OF ELECTRIC SYSTEM

- If the wiring gets wet or the insulation is damaged, the electric system leaks and this could result in hazardous malfunction of the machine.
- Services relating to the electric system are (1) check of fan belt tension, (2) check of damage or wear in the fan belt and (3) check of battery fluid level.
- Never remove or disassemble any electric components installed in the machine.
- Never install any electric components other than those specified by Komatsu.
- Be careful to keep the electric system free of water when washing the machine or when it rains.
- When working on the seashore, carefully clean the electric system to prevent corrosion.
- The optional power source must never be connected to the fuse, starting switch, or battery relay.

19. WEAR PARTS LIST

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

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

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

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

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

Item	Part No.	Part Name	Q'ty	Replacement frequency
Engine oil filter	600-211-1231	Cartridge	2	EVERY 250 HOURS
Engine by-pass oil filter	600-212-1511	Cartridge	1	EVERY 250 HOURS
Fuel filter	600-311-8293	Cartridge	3	EVERY 500 HOURS
Transmission oil filter	424-16-11140 (07000-02125)	Element (O-ring)	2 (2)	EVERY 500 HOURS
Hydraulic filter (• Steering, hoist oil • Rear brake cooling oil)	07063-01210 (07000-28185)	Element (O-ring)	2 (2)	Every 1000 HOURS
Corrosion resistor	600-411-1171	Cartridge	1	EVERY 1000 HOURS
Steering, hoist oil line filter	581-61-19120 (07000-52090) (07001-02090)	Element (O-ring) (Ring)	2 2 2	EVERY 2000 HOURS
Air cleaner	561-02-62520	Element Ass'y	2	-
	561-02-62530	Outer element Ass'y	2	
Payload meter paper	7818-27-2910	Paper	1	-
Payload meter inner battery	7818-27-2860	Battery	1	-

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

PROPER SELECTION OF FUEL, COOLANT AND LUBRICANTS

RESERVOIR	KIND OF FLUID	AMBIENT TEMPERATURE									CAPACITY	
		-22 -30	-4 -20	14 -10	32 0	50 10	68 20	86 30	104 40	122 50	°F	Specified
Engine oil pan	Engine oil	SAE 30					61ℓ 16.10 US gal 13.42 UK gal	54ℓ 14.26 US gal 11.88 UK gal				
		SAE 10W										
		SAE 15W-40										
		SAE 10W-30										
Tmission case		SAE 30					89ℓ 23.50 US gal 19.58 UK gal	69ℓ 18.22 US gal 15.18 UK gal				
		SAE 10W										
Front brake oil tank											2ℓ 0.53 US gal 0.44 UK gal	-
Hydraulic tank ● Steering hoist oil ● Rear brake cooling		SAE 10W					169ℓ 44.62 US gal 37.18 UK gal 238ℓ 62.83 US gal 52.36 UK gal	95ℓ 25.08 US gal 20.90 UK gal 143ℓ 37.75 US gal 31.46 UK gal				
Front suspension											17ℓ(each) 4.49 US gal(each) 3.74 UK gal(each)	-
Rear suspension										9.5ℓ(each) 2.51 US gal(each) 2.09 UK gal(each)	-	
Differential case	SAE 30					95ℓ 25.08 US gal 20.90 UK gal	95ℓ 25.08 US gal 20.90 UK gal					
Final drive case										31.5ℓ(each) 8.32 US gal(each) 6.93 UK gal(each)	31.5ℓ(each) 8.32 US gal(each) 6.93 UK gal(each)	
Fuel tank	Diesel fuel	ASTM D975 No.2					780ℓ 205.92 US gal 171.60 UK gal	-				
		※										
Cooling system	Water	Add antifreeze									171ℓ 45.14 US gal 37.62 UK gal	-

※ ASTM D975 No. 1

REMARK

- When fuel sulphur content is less than 0.5%, change oil in the oil pan every periodic maintenance hours described in this manual.
Change oil according to the following table if fuel sulphur content is above 0.5%.

Fuel sulphur content	Change interval of oil in engine oil pan
0.5 to 1.0%	1/2 of regular interval
Above 1.0%	1/4 of regular interval

- When starting the engine in an atmospheric temperature of lower than 0°C, be sure to use engine oil of SAE10W, SAE10W-30 and SAE15W-40, even though an atmospheric temperature goes up to 10°C more or less in the day time.
- Use API classification CD as engine oil and if API classification CC, reduce the engine oil change interval to half.
- There is no problem if single grade oil is mixed with multigrade oil (SAE10W-30, 15W-40), but be sure to add single grade oil that matches the temperature in the table.
- We recommend Komatsu genuine oil which has been specifically formulated and approved for use in engine and hydraulic work equipment applications.

Specified capacity: Total amount of oil including oil for components and oil in piping.

Refill capacity: Amount of oil needed to refill system during normal inspection and maintenance.

ASTM: American Society of Testing and Material

SAE: Society of Automotive Engineers

API: American Petroleum Institute

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

No.	Supplier	Engine Oil [CD or CE] SAE10W, 30, 40 10W30, 15W40 (The 15W40 oil marked * is CE.)	Gear Oil [GL-4 or GL-5] SAE80, 90, 140	Grease [Lithium-Base] NLGI No. 2	Anti-freeze Coolant [Ethylene Glycol Base] Permanent Type
1	KOMATSU	EO10-CD EO30-CD EO10-30CD EO15-40CD	GO90 GO140	G2-LI G2-LI-S	AF-ACL AF-PTL AF-PT (Winter, one season type)
2	AGIP	Diesel sigma S Super dieselmulti- grade *Sigma turbo	Rotra MP	GR MU/EP	-
3	AMOCO	*Amoco 300	Multi-purpose gear oil	RYKON premium grease	-
4	ARCO	*Arcofleet S3 plus	Arco HD gear oil	Litholine HEP 2 Arco EP moly D	-
5	BP	Vanellus C3	Gear oil EP Hypogear EP	Energrease LS-EP2	Antifreeze
6	CALTEX	*RPM delo 400 RPM delo 450	Universal thuban Universal thuban EP	Marfak all purpose 2 Ultra-duty grease 2	AF engine coolant
7	CASTROL	*Turbomax *RX super CRD	EP EPX Hypoy Hypoy B Hypoy C	MS3 Spheerol EPL2	Anti-freeze
8	CHEVRON	*Delo 400	Universal gear	Ultra-duty grease 2	-
9	CONOCO	*Fleet motor oil	Universal gear lubricant	Super-sta grease	-
10	ELF	Multiperformance 3C Performance 3C	-	Tranself EP Tranself EP type 2	Glacelf
11	EXXON (ESSO)	Essolube D3 *Essolube XD-3 *Essolube XD-3 Extra *Esso heavy duty Exxon heavy duty	Gear oil GP Gear oil GX	Beacon EP2	All season coolant
12	GULF	Super duty motor oil *Super duty plus	Multi-purpose gear lubricant	Gulfcrown EP2 Gulfcrown EP special	Antifreeze and coolant
13	MOBIL	Delvac 1300 *Delvac super 10W-30, 15W-40	Mobilube GX Mobilube HD	Mobilux EP2 Mobilgrease 77 Mobilgrease special	-

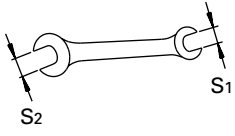
20. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE

No.	Supplier	Engine Oil [CD or CE] SAE10W, 30, 40 10W30, 15W40 (The 15W40 oil marked * is CE.)	Gear Oil [GL-4 or GL-5] SAE80, 90, 140	Grease [Lithium-Base] NLGI No. 2	Anti-freeze Coolant [Ethylene Glycol Base] Permanent Type
14	PENNZOIL	*Supreme duty fleet motor oil	Multi-purpose 4092 Multi-purpose 4140	Multi-purpose white grease 705 707L White – bearing grease	Anti-freeze and summer coolant
15	PETROFINA	FINA kappa TD	FINA potonic N FINA potonic NE	FINA marson EPL2	FINA tamidor
16	SHELL	Rimula X	Spirax EP Spirax heavy duty	Alvania EP grease	–
17	SUN	–	Sunoco GL5 gear oil	Sunoco ultra prestige 2EP Sun prestige 742	Sunoco antifreeze and summer coolant
18	TEXACO	*Ursa super plus Ursa premium	Multigear	Multifak EP2 Starplex 2	Code 2055 startex antifreeze coolant
19	TOTAL	Rubia S *Rubia X	Total EP Total transmission TM	Multis EP2	Antigel/antifreeze
20	UNION	*Guardol	MP gear lube LS	Unoba EP	–
21	VEEDOL	*Turbostar *Diesel star MDC	Multigear Multigear B Multigear C	–	Antifreeze

21. STANDARD TIGHTENING TORQUES FOR BOLTS AND NUTS

21.1 INTRODUCTION OF NECESSARY TOOLS

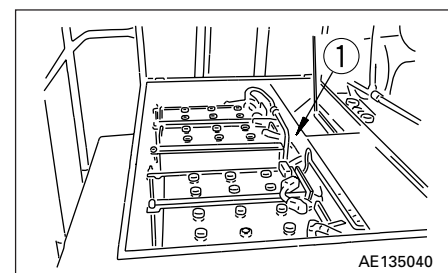
The following tools are provided with the machine.

No.	Name of tool	Part No.	Remarks
1	Wrench set	09000-30006	Applicable width across flats ($S_1 - S_2$) 8mm – 10mm, 12mm – 14mm 13mm – 17mm, 19mm – 22mm 24mm – 27mm, 30mm – 32mm  AD053370
2	Socket wrench	195-98-11590	
3	Wrench	09014-10200	
4	Filter wrench	09019-08035	
5	Socket wrench set	09020-10284	
6	Handle	09023-00380	
7	Screwdriver	09033-00190	Interchangeable flat-head and cross-head type
8	Pliers	09036-00150	
9	Hammer	09039-00150	
10	Thickness gauge	09054-00009	
11	Bar	09055-10390	
12	Tire air pressure gauge	09289-10000	
13	Grease cartridge	07950-90403	(Lithium base grease, 400 g)
14	Nozzle	07951-11400	
15	Grease pump ass'y	07952-80002	
16	Hose	568-35-11210	
17	Disc gauge ass'y	561-98-61120	
18	Calliper disc gauge	566-98-41410	

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

21.1.1 PLACE FOR STORING TOOLS

Store the tools at position ① inside the battery box.



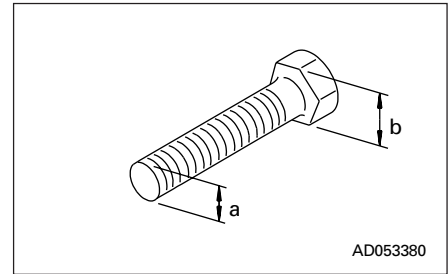
21.2 TORQUE LIST



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 $\text{\textcircled{b}}$ 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): $1\text{N}\cdot\text{m} \cong 0.1 \text{kgf}\cdot\text{m}$
 $\cong 0.74 \text{lbft}$



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

NOTICE

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

22. PERIODIC REPLACEMENT OF SAFETY CRITICAL PARTS

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

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

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

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

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

Ask your Komatsu distributor to replace the safety critical parts.

SAFETY CRITICAL PARTS

No.	Safety parts for periodic replacement	Q'ty	Replacement interval	Remarks
1	Fuel hose (Fuel tank – priming hose)	1	Every 4000 hours or every two years, whichever comes first	-
2	Fuel hose (Priming hose – injection pump)	1		
3	Fuel hose (Injection pump – fuel filter)	1		
4	Fuel hose (Fuel filter – solenoid valve)	1		
5	Fuel hose (Solenoid valve – injection pump)	1		
6	Fuel hose (Solenoid valve – joint)	1		
7	Fuel return hose (Overflow valve – joint)	1		
8	Fuel return hose (Joint – fuel tank)	1		
9	Fuel spill hose (between nozzles)	5		
10	Turbocharger lubrication hose	2		
11	APS fuel hose (between burners)	2		
12	APS fuel hose (Fuel filter – burner)	1		
13	Fuel spill hose (Nozzle – fuel tank)	1		
14	Rubber hose of brake piping	20		
15	High-pressure hoses in steering circuit (pump↔demand valve↔steering valve↔steering cylinder)	11		
16	High-pressure hose in hoist circuit (pump↔demand valve↔hoist valve↔hoist cylinder)	8		
17	Outlet hose of retarder cooling oil pump	5	-	
18	Outlet hose of transmission oil pump	2		
19	Brake valve parts	1	Every 2000 hours or every one year, whichever comes first	Replace as a service kit
20	Parking brake valve parts	1		
21	Relay valve parts	1		
22	Air governor parts	1		
23	Retarder control valve parts	1		
24	Emergency relay valve parts	4		
25	Emergency brake valve parts	1		
26	Quick release parts	2		
27	Parking brake chamber parts	1		
28	Brake chamber parts (Front and rear)	4		
29	Reducing valve parts	3		
30	Seat belt	1	Every 3 years	Replace

23. MAINTENANCE SCHEDULE CHART

23.1 MAINTENANCE SCHEDULE CHART

SERVICE ITEM	PAGE
INITIAL 250 HOURS SERVICE (only after the first 250 hours)	
Replace fuel filter cartridge	3-23
Replace transmission filter element	3-23
Change oil in transmission case, clean transmission case strainer	3-23
Replace steering, hoist oil tank and rear brake cooling oil tank filter element	3-23
Change oil in steering and hoist oil tank	3-23
Change oil in rear brake cooling oil tank	3-23
Change oil in final drive case	3-23
Change oil in differential case	3-23
Check engine valve clearance, adjust	3-23
WHEN REQUIRED	
Clean inside of cooling system	3-24
Check, clean and replace air cleaner	3-28
Check level of window washer fluid, add fluid	3-30
Clean air conditioner air filter	3-30
Check refrigerant (gas) level	3-30
Check dump body	3-31
Check length of suspension cylinder, check oil level	3-31
Bleed air from rear brake	3-32
Bleed air from front brake	3-32
Adjust parking brake	3-33
Adjust body positioner	3-34
Check play of output coupling of output shaft	3-34
Check APS (starting aid)	3-35
Drain water from water separator	3-35
Selection and inspection of tires	3-36
CHECK BEFORE STARTING	
Check coolant level, add water	3-38
Check oil level in front brake oil tank, add oil	3-38
Check dust indicator	3-39

SERVICE ITEM	PAGE
CHECK BEFORE STARTING (continued)	
Drain water from air tank	3-39
Check oil level in engine oil pan, add oil	3-40
Check oil level in transmission case, add oil	3-41
Check oil level in steering and hoist oil tank, add oil	3-41
Check oil level in rear brake cooling oil tank, add oil	3-42
Drain water, sediment from fuel tank	3-42
Check fuel level	3-43
Check wheel hub nuts, tighten	3-44
Check inflation pressure of tires	3-44
Check central warning lamp	3-45
Check machine monitor system	3-45
Check for normal actuation of foot brake	3-46
Check braking capacity of foot brake	3-46
Check for normal actuation of retarder brake	3-46
Check braking capacity of retarder brake	3-46
Check for normal actuation of parking brake	3-46
Check braking capacity of parking brake	3-46
Check for normal actuation of emergency brake	3-47
Check braking capacity of emergency brake	3-47
Check emergency steering	3-47
Check actuation of steering	3-48
Check flashing of lamps	3-48
Check sound of horn	3-48
Check movement of gauges during operation	3-48
Check exhaust color and sound	3-48
Check electrical wiring	3-48
Check for water and sediment in water separator	3-48

23. MAINTENANCE SCHEDULE CHART

SERVICE ITEM	PAGE
EVERY 250 HOURS SERVICE	
Change oil in engine oil pan, replace engine oil filter (full-flow and bypass) cartridge	3-49
Check oil level in differential case, add oil	3-51
Check oil level in final drive case, add oil	3-51
Lubrication	3-52
● Dump body hinge pin (left and right: 1 point each)	3-52
● Rear suspension (left and right: 2 points each)	3-52
● Differential support (left and right: 4 points each)	3-52
● Hoist cylinder pin (left and right: 2 points each)	3-52
● Front suspension (left and right: 1 point each)	3-53
● Steering cylinder pin (left and right: 2 points each)	3-53
● Steering link pin (5 points)	3-53
● Steering linkage (left and right: 3 points each)	3-53
● Drive shaft (5 points)	3-53
Check level of battery electrolyte	3-54
Check alternator belt, adjust	3-56
Check tension of air conditioner compressor belt, adjust	3-57
Clean transmission case breather	3-58
Clean hydraulic tank breather	3-58
Check drive shaft	3-58
Check frame	3-58
Check wear of parking brake pads	3-59
Check, clean automatic suspension	3-59
EVERY 500 HOURS SERVICE	
Replace fuel filter cartridge	3-60
Replace transmission filter element	3-61
Check wear of front disc brake pads	3-62
Clean, check radiator fins and after cooler fins	3-63
Check wear of fan belt	3-63

SERVICE ITEM	PAGE
EVERY 1000 HOURS SERVICE	
Replace corrosion resistor cartridge	3-64
Change oil in transmission case, clean transmission case strainer	3-65
Replace steering, hoist oil tank and rear brake cooling oil tank filter element	3-66
Lubrication	3-67
● Transmission mount (1 point)	3-67
● Automatic suspension link (left and right: 1 point each)	3-67
● Parking brake linkage (3 points)	3-67
● Dump control link (4 points)	3-67
● Tension pulley and fan pulley (3 points)	3-67
Check wear of rear brake discs	3-68
Check tightening of turbocharger	3-69
Check play of turbocharger rotor	3-69
EVERY 2000 HOURS SERVICE	
Change oil in steering, hoist oil tank	3-70
Change oil in rear brake cooling oil tank	3-71
Change oil in final drive case	3-72
Change oil in differential case	3-72
Clean differential case breather	3-73
Clean engine breather element	3-73
Replace plug with strainer from make-up tank of rear brake chamber	3-73
Clean emergency relay valve	3-74
Check alternator, starting motor	3-74
Check, adjust engine valve clearance	3-74
Clean, check turbocharger	3-74
Check play of turbocharger rotor	3-74
Replace critical parts for periodical replacement from service kit	3-74
Clean air dryer filter and deflector	3-74

23. MAINTENANCE SCHEDULE CHART

SERVICE ITEM	PAGE
EVERY 4000 HOURS SERVICE	
Replace injection pump screen filter	3-75
Clean injection pump oil inlet strainer	3-75
Check water pump	3-75
Replace critical parts for periodical replacement from service kit	3-75
Check, adjust air compressor	3-75
Check fan pulley and tension pulley	3-75
Check vibration damper	3-75
EVERY 3 YEARS SERVICE	
Replace seat belt	3-76

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
- CHANGE OIL IN TRANSMISSION CASE, CLEAN TRANSMISSION CASE STRAINER
- REPLACE STEERING, HOIST OIL TANK AND REAR BRAKE COOLING OIL TANK FILTER ELEMENT
- CHANGE OIL IN STEERING AND HOIST OIL TANK
- CHANGE OIL IN REAR BRAKE COOLING OIL TANK
- CHANGE OIL IN FINAL DRIVE CASE
- CHANGE OIL IN DIFFERENTIAL CASE
- CHECK ENGINE VALVE CLEARANCE, ADJUST

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

24.2 WHEN REQUIRED

24.2.1 CLEAN INSIDE OF COOLING SYSTEM

⚠ WARNING

- **Soon after the engine has been stopped, the coolant is hot and can cause personal injury. Allow the engine to cool before draining water.**
- **Since cleaning is performed while the engine is running, it is very dangerous to go under the machine as the machine may suddenly start moving. While the engine is running, never go under the machine.**
- **Never remove the radiator cap when the engine is at operating temperature. At operating temperature, the coolant is under pressure. Boiling water and steam spurting out from the radiator could cause personal injury. Allow the engine to cool until the radiator filler cap is cool enough to touch with your hand. Remove the filler cap slowly to allow pressure to be relieved.**

- Stop the machine on level ground when cleaning or changing the coolant.
- Clean the inside of the cooling system change the coolant and replace the corrosion resistor according to the table below.

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

- When deciding the ratio of antifreeze to water, check the lowest temperature in the past, and decide from the mixing rate table given below.

It is actually better to estimate a temperature about 10°C lower when deciding the mixing rate.

Mixing rate of water and antifreeze

Min. atmospheric temperature	°C	-10	-15	-20	-25	-30
	°F	14	5	-4	-13	-22
Amount of antifreeze	ℓ	51	62	70	79	85.5
	US gal	13.46	16.37	18.48	20.86	22.57
	UK gal	11.22	13.64	15.40	17.38	18.81
Amount of water	ℓ	120	109	101	92	85.5
	US gal	31.68	28.77	26.66	24.28	22.57
	UK gal	26.40	23.98	22.22	20.24	18.81

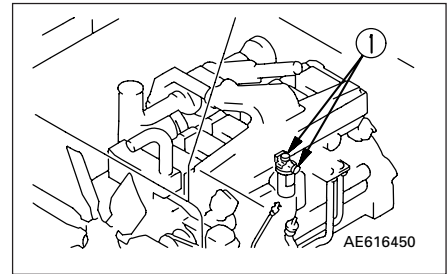
WARNING

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

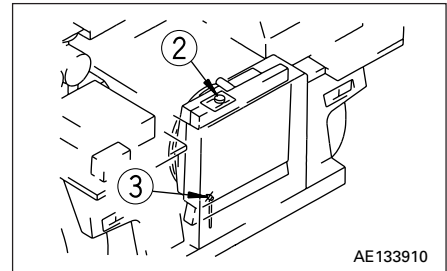
- Use city water for the cooling water.
If river water, well water or other such water supply must be used, contact your Komatsu distributor.
- We recommend use of an antifreeze density gauge to control the mixing proportions.

24. SERVICE PROCEDURE

1. Stop the engine and tighten corrosion resistor valve ① (2 places).
2. Turn radiator cap ② slowly, and remove it.
3. Open drain valve ③ at the bottom of the radiator, drain plug ④ at the side of the cylinder block, and drain the water.
4. After draining the water, close drain valve ③, drain plugs ④, and fill with city water.

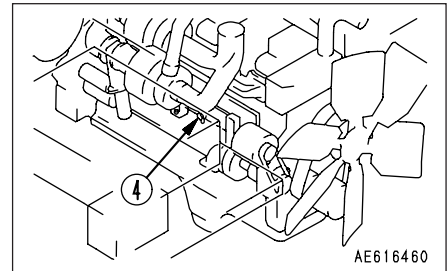


5. When the radiator is full, open drain valve ③, drain plug ④, start the engine, and run it at low idling.
Keep the engine running at low idling and flush water through the system for 10 minutes.
When doing this, adjust the speed of filling and draining the water so that the radiator is always full. While flushing water through the system, watch carefully that the water inlet hose does not come out of the radiator water filler.



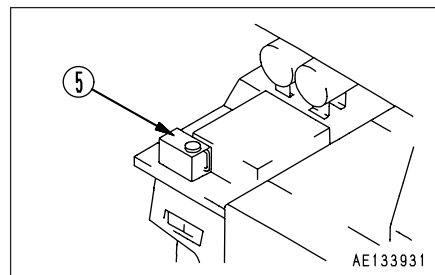
6. After flushing, stop the engine, open drain valve ③ and drain plug ④, then close them after all the water has drained out.
7. After draining the water, clean with a flushing agent.

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



8. After flushing, open drain valve ③, drain plug ④, drain all the water out, then close drain valve ③, drain plug ④ and add city water until the water level is near the opening of the water filler.
9. After filling with water, open drain valve ③, drain plug ④, start the engine, and run the engine at low idling to flush the system until clean water comes out.
When doing this, adjust the speed of filling and draining the water so that the radiator is always full.
10. When clean water comes out, stop the engine, then close drain valve ③, and drain plug ④.

11. Replace the corrosion resistor, and open valve ① (2 places).
For details of the procedure for replacing the corrosion resistor, see 24.6 EVERY 1000 HOURS SERVICE.
12. Supply the antifreeze and city water until it overflows from the water filler. For mixing ratio of the antifreeze and city water, decide by using the "Mixing rate of water and antifreeze".
13. To remove the air contained in the coolant, run the engine at low idling for 5 minutes, then run for a further 5 minutes at high idling.
(When doing this, leave the water filler cap OFF.)
14. Stop the engine, wait for approx. 3 minutes, then add city water until the water level is near the opening of the water filler, and tighten the cap.
15. Drain the cooling water inside reserve tank ⑤ and fill again with water to a point between the H and L lines.



24.2.2 CHECK, CLEAN AND REPLACE AIR CLEANER

⚠ WARNING

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

CHECKING

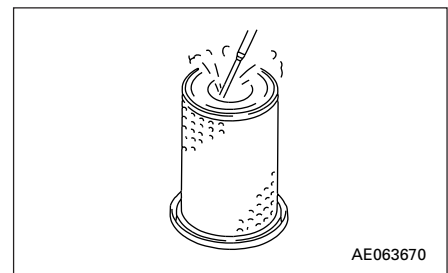
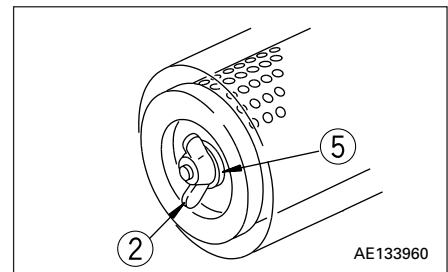
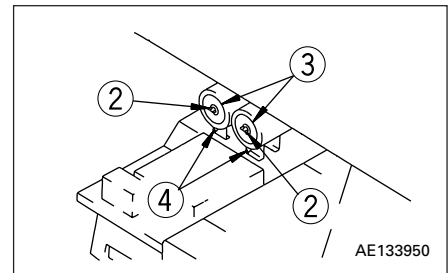
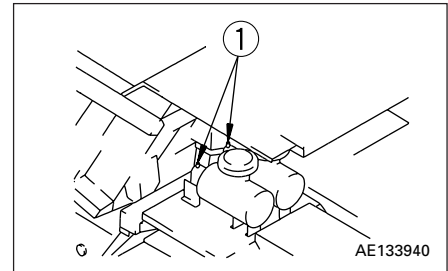
If dust indicator ① shows red, clean the air cleaner element.

NOTICE

Do not clean the air cleaner element until the dust indicator shows red. When cleaning the element frequently before the dust indicator shows red, the original function of the air cleaner cannot be performed and cleaning efficiency is deteriorated. What's more, when cleaning the element frequently, the frequency of the dusts, which is adhered to the element, dropping to the inner element, is increased.

CLEANING OR REPLACING OUTER ELEMENT

1. Remove the wing nut ②, then remove outer element ③.
2. Clean inside the body.
3. Direct dry compressed air (less than 0.69 MPa (7 kgf/cm², 99.4 PSI) along the folds of the element from the inside. Next, blow with air along the folds from the outside, then blow with air again from the inside.
 - (1) Remove one seal every time the element is clean.
 - (2) Replace the outer element if it has been cleaned 6 times or if it has been used for one year. When replacing the outer element, replace the inner element at the same time.
 - (3) If the dust indicator shows red immediately after the outer element has been cleaned, replace both the inner and outer elements even if the outer element has not been cleaned 6 times.
 - (4) Check for looseness of the inner element mounting nut, and tighten it if necessary.
 - (5) If seal washer ⑤ is damaged or the thread of wing nut ② is broken, replace with new parts.
 - (6) Remove evacuator valve ④ and clean it with compressed air. After cleaning, install it again.

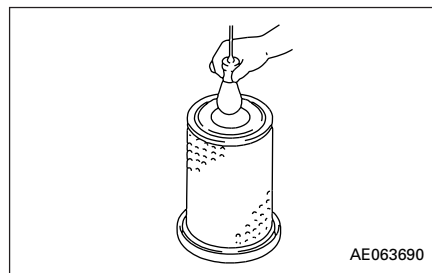


- After cleaning, put a light bulb inside the element, and if small holes or thinner parts are found, replace the element.

NOTICE

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

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



- Install the cleaned element.
- Press the button of dust indicator ① to return the red piston to its original position.

REPLACING INNER ELEMENT

- First remove the outer element, and then remove the inner element.
- To prevent dust from getting in, use a clean cloth or tape to cover the air connector (outlet side).
- Clean the air cleaner body interior, then remove the cover installed in Step 2.
- Fit a new inner element to the connector and tighten it with nuts. Do not clean and reinstall an inner element.
- Install the outer element and the cover.
- Remove evacuator valve ④ and clean it with compressed air. After cleaning, install it again.
- After replacing the element, return the red piston in the dust indicator to its original position.

REMARK

When both inner element and outer element are installed, tighten the nuts while swinging the element lightly so the sealing rubber contacts with the body internal.

The following methods require spare parts.

With water

Dash city water (less than 0.29 MPa (3 kgf/cm², 42.6 PSI) on element from inside along folds, then from outside and again from inside. Dry and check it.

With cleaning agent

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

Drying can be speeded up by blowing dried compressed air less than 0.69 MPa (7 kgf/cm², 99.4 PSI) from the inside to the outside of the element.

Never attempt to heat the element.

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

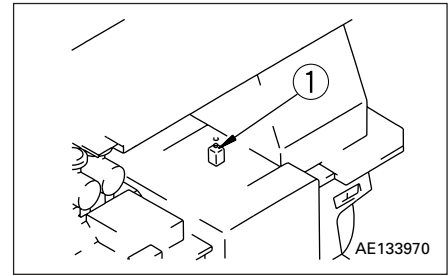
24.2.3 CHECK LEVEL OF WINDOW WASHER FLUID, ADD FLUID

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

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

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

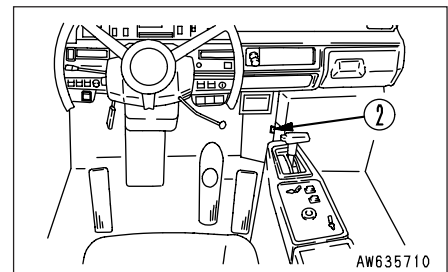
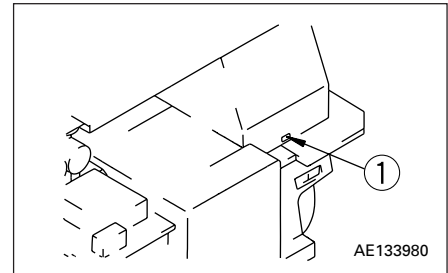
When operating at below freezing point, use fluid with anti-freeze.



24.2.4 CLEAN AIR CONDITIONER AIR FILTER

If the air filter at the suction port of the air conditioner unit and the air filter for both the fresh air and recirculated air at the FRESH/RECIRC suction port are clogged, the cooling or heating capacity will drop, so clean the filters once a week.

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



24.2.5 CHECK REFRIGERANT (GAS) LEVEL

WARNING

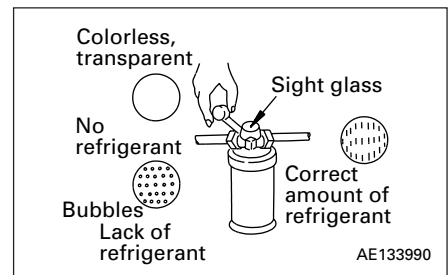
If the cooler refrigerant liquid gets into eyes or on your hands it may cause loss of sight or frost bite, so never loosen any part of the refrigerant circuit.

If the cooling effect is poor, the level of the refrigerant (gas) is probably low.

Check the sight glass of the receiver dryer on the inside left of the radiator guard.

REMARK

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



24.2.6 CHECK DUMP BODY

Check that there are no cracks in the dump body.

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

24.2.7 CHECK ELECTRIC INTAKE AIR HEATER

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

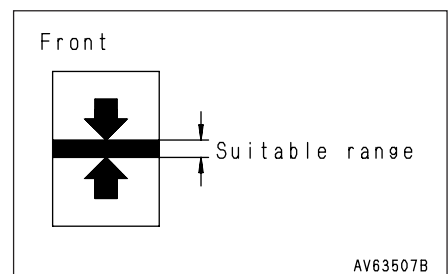
24.2.8 CHECK LENGTH OF SUSPENSION CYLINDER, CHECK OIL LEVEL

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

CHECK LENGTH OF CYLINDER

Front

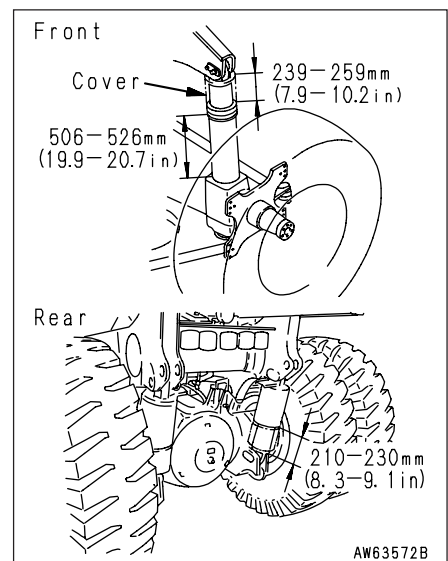
Check that the bottom of the suspension cylinder cover is within the proper range on the label when the machine is unloaded and on flat ground.



Front and rear

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

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



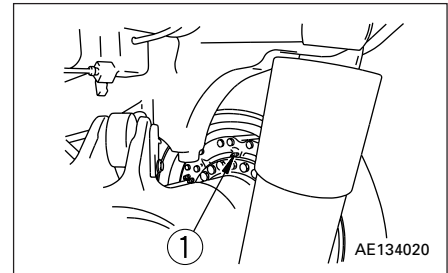
24.2.8 BLEED AIR FROM REAR BRAKE

⚠ WARNING

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

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

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



24.2.9 BLEED AIR FROM FRONT BRAKE

⚠ WARNING

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

1. Start the engine and raise the pressure to the maximum position in the green range on the air pressure gauge.
2. Fill oil reservoir ① with engine oil (CD class SAE10W).
3. Remove the cap of bleeder screw ②, insert a vinyl hose (inside diameter: 8 mm (0.32 in)), then loosen the bleeder screw approx. 3/4 turns and depress the brake pedal slowly. After tightening the bleeder screw, release the brake pedal. Repeat this procedure until no more bubbles come out from the vinyl hose.

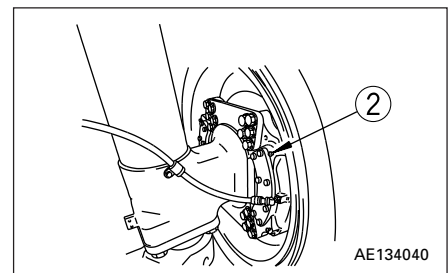
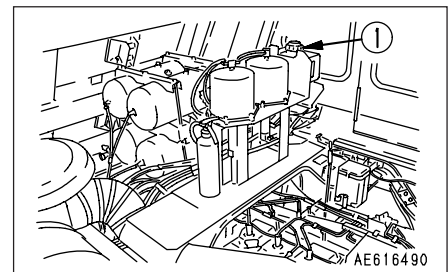
Do not keep the brake pedal depressed continuously. Depress it each time slowly to bleed the air.

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

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

Repeat the same procedure on the left and right sides.

When bleeding the air from the front brakes and rear brakes at the same time, bleed the air from the rear brakes first.



24.2.10 ADJUST PARKING BRAKE

⚠ WARNING

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

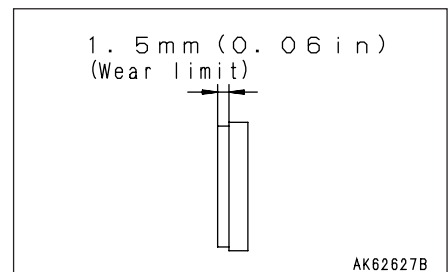
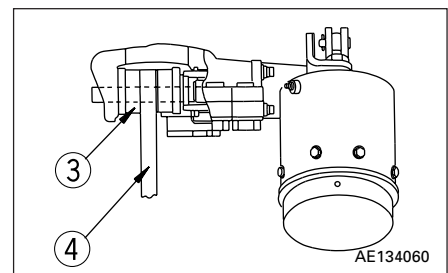
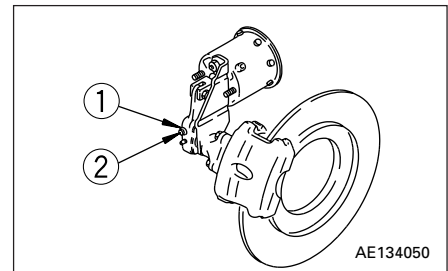
If the parking brake effect is poor, adjust as follows.

1. Check that the air pressure gauge is in the green range, then release the parking brake.
2. Keep bolt retainer ① pressed and turn bolt ② in a clockwise direction to bring both pads ③ into tight contact with disc ④.
3. Keep bolt retainer ① pressed and turn bolt ② 1/2 turn back in a counterclockwise direction.
4. Release bolt retainer ① and check that the retainer is in the stopper position for bolt ②.

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

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

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



24.2.11 ADJUST BODY POSITIONER

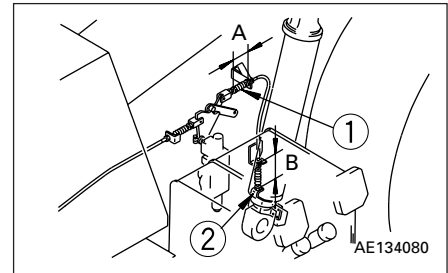
With the positioner device, it is possible to automatically stop the dump body when it rises to the desired position (dump body turning angle) without any shock.

Adjusting

1. Set the dump lever to the HOLD position.
2. Adjust push cable ① to the standard length.
Standard length A: 188 mm (7.4 in)
3. Raise the dump body until the hoist cylinder is 15 mm before the end of its stroke, and adjust plate ② so that the hoist valve lever is released from the detent.

Reference dimension B: 149 mm (5.9 in)

4. After adjusting, start the engine, operate the dump lever, and check that the lever is automatically returned to the HOLD position when the dump body reaches the specified height.



24.2.12 CHECK PLAY OF OUTPUT COUPLING OF OUTPUT SHAFT

If any abnormal noise occurs around the output shaft or front drive shaft, the rubber inside the output shaft may be deteriorated or damaged, so check the play of the coupling as follows.

Play in circumferential direction

Using a bar, move the coupling in the direction of the circumference and check the play in the circumferential direction at the outside diameter of the coupling.

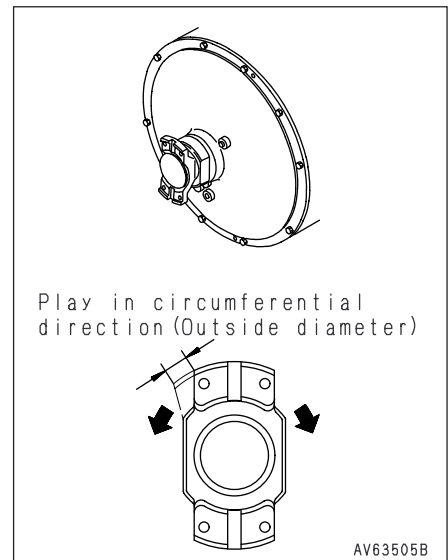
Standard: Max. 15 mm (0.6 in)

REMARK

If any excessive force is used during inspection, the engine will rotate under no load and it will be impossible to judge.

When carrying out the inspection, check that the engine fan is not rotating.

If the result of the measurement shows that it is greater than the standard value, please contact your Komatsu distributor for disassembly and inspection.

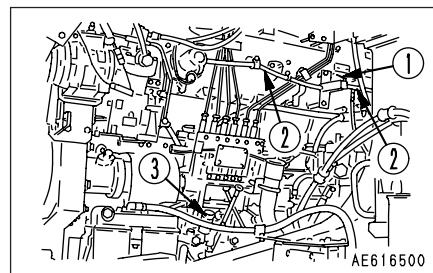


24.2.13 CHECK APS (STARTING AID)

Check the APS (starting aid) after the end of summer (when the ambient temperature goes below 15°C and the engine cooling water temperature is below 13°C).

If the engine cooling water temperature is above 13°C, please ask your Komatsu distributor to carry out the inspection.

1. Open fuel valve ① of the starting aid and remove hose ② at the nozzle intake port end.
2. Operation priming pump ③ up and down until no more bubbles come out from hose ②. Carry out the following checks at the same time.
 - Check for leakage of fuel
 - Check for clogged fuel piping
3. Move the fuel control lever to the engine STOP position, turn the starting switch to the ON position, then turn the APS switch ON and check the following.
 - Does the cold start pilot light up for approx. 12 seconds?
 - Are the 2 glow plugs red hot when the cold start pilot goes off?
 - When the cold start pilot is off and the starting switch is turned to the START position (for less than 20 seconds), is there combustion inside the intake manifold?



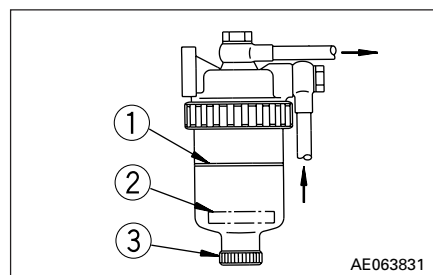
Remove the plug when checking the glow plug.

If there is any abnormality, see "16. TROUBLESHOOTING".

24.2.14 DRAIN WATER FROM WATER SEPARATOR

When float ② is at or above red line ①, drain the water according to the following procedure:

1. Loosen drain plug ③ and drain the accumulated water until the float reaches the bottom.
2. Tighten drain plug ③.
3. If the air is sucked into fuel line when drain the water, be sure to bleed air in the same manner as for the fuel filter. See Fuel Filter Cartridge in "24.5 EVERY 500 HOURS SERVICE" section.

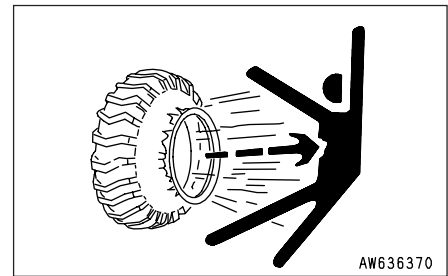


24.2.15 SELECTION AND INSPECTION OF TIRES

⚠ WARNING

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

- Since maintenance, disassembly, repair and assembly of the tires and rims require special equipment and technology, be sure to ask them for a tire repair shop.
- Do not heat or weld a rim to which the tire is installed. Do not make a fire near the tire.



SELECTION OF TIRES

⚠ WARNING

Select the tires according to the conditions of use and attachments of the machine. Use only specified tires and inflate them to the specified pressure.

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

HD465-5

	Specification of tire	Size	Remarks
Front wheel	15500 kg (34178 lb) 18500 kg (40793 lb) 12850 kg (28334 lb) 12150 kg (26791 lb)	24.00-35-36PR (standard) 24.00R35★★ (if equipped) 21.00-35-36PR (if equipped) 21.00-35-32PR (if equipped)	Type 1 for construction equipment
Rear wheel	15500 kg (34178 lb) 18500 kg (40793 lb) 12850 kg (28334 lb) 12150 kg (26791 lb)	24.00-35-36PR (standard) 24.00R35★★ (if equipped) 21.00-35-36PR (if equipped) 21.00-35-32PR (if equipped)	

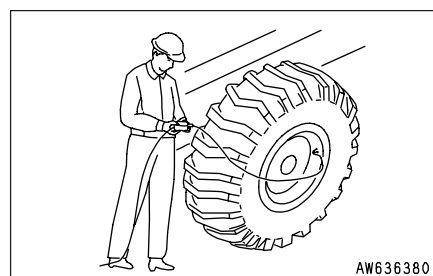
HD605-5

	Specification of tire	Size	Remarks
Front wheel	18500 kg (40793 lb) 12850 kg (28334 lb)	24.00R35★★ (standard) 21.00-35-36PR (if equipped)	Type 1 for construction equipment
Rear wheel	18500 kg (40793 lb) 12850 kg (28334 lb)	24.00R35★★ (standard) 21.00-35-36PR (if equipped)	

CHECK OF INFLATION OF PRESSURE OF TIRES AND INFLATION OF THEM

⚠ WARNING

- When inflating a tire, check that any person will not enter the working area and use an air chuck which has a clip and which can be fixed to the air valve.
While inflating the tire, check the inflation pressure occasionally so that it will not rise too high.
If the rim is not fitted normally, it may be broken and scattered while the tire is inflated. Accordingly, place a guard around the tire and do not work in front of the rim but work on the tread side of the tire.
- Abnormal drop of inflation pressure and abnormal fitting of the rim indicate a trouble in the trouble or rim. In this case, be sure to ask a tire repair shop for repair.
- Be sure to observe the specified inflation pressure.
- Do not adjust the inflation pressure of the tires just after high-speed travel or heavy-load work.



Check

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

Inflation of tires

Adjust the inflation pressure properly.

When inflating a tire, use an air chuck which can be fixed to the air valve of the tire as shown in the figure. Do not work in front of the rim but work on the tread side of the tire.

The proper inflation pressure is shown below.

HD465-5

Tire size	Inflation pressure
24.00-35-36PR (standard)	0.44 MPa (4.5 kgf/cm ² , 63.9 PSI)
24.00R35★★ (if equipped)	0.69 MPa (7.0 kgf/cm ² , 99.4 PSI)
21.00-35-36PR (if equipped)	0.54 MPa (5.5 kgf/cm ² , 78.1 PSI)
21.00-35-32PR (if equipped)	0.49 MPa (5.0 kgf/cm ² , 71.0 PSI)

HD605-5

Tire size	Inflation pressure
24.00R35★★ (standard)	0.69 MPa (7.0 kgf/cm ² , 99.4 PSI)
24.00-35-36PR (if equipped)	0.44 MPa (4.5 kgf/cm ² , 63.9 PSI)

NOTICE

If the tires are used when the inflation pressure is less than the value given in the table above, the rim may be damaged.

Always keep the tire inflation pressure within +0 – +0.03 MPa (0.3 kgf/cm², 4.3 PSI) of the value in the table above.

24.3 CHECK BEFORE STARTING

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

24.3.1 CHECK COOLANT LEVEL, ADD WATER

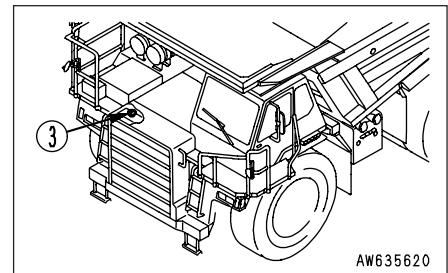
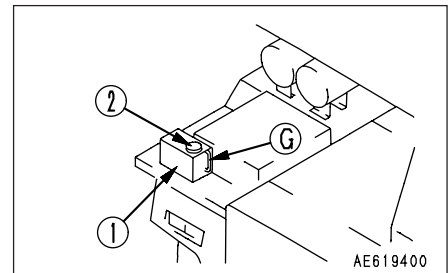
⚠ WARNING

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

⚠ CAUTION

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

1. Check that the cooling water in reservoir tank ① is between the FULL and LOW marks on gauge ⑥.
2. If the level is LOW, remove cap ② and add the cooling water to the FULL mark.
3. If there is no cooling water in the reservoir tank, remove the upper cover of the radiator guard, and add the cooling water from water filler ③ to the radiator guard. Further, add water to the reservoir tank.
4. Check that there is no oil in the water or any other abnormality.
5. After adding water, tighten the cap securely.
6. If more water is added than normal, check for water leakage.



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

⚠ WARNING

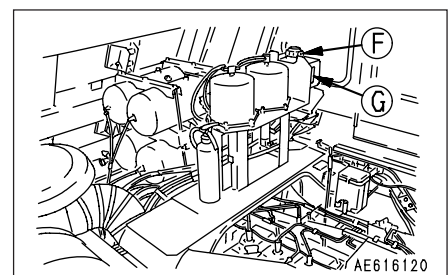
When adding oil to the front brake oil tank, always use engine oil.

1. Check that the oil is between the FULL and LOW marks on sight gauge ⑥.

If the oil level is low, add engine oil through oil filler ⑦.

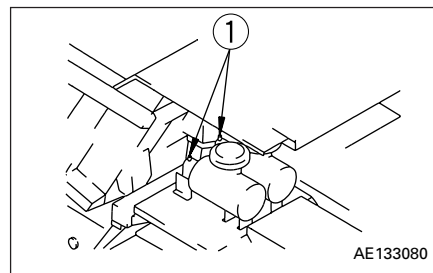
For details of the oil to use, see "20. USE OF FUEL, COOLANT, AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".

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



24.3.3 CHECK DUST INDICATOR

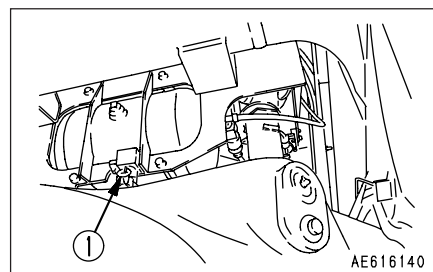
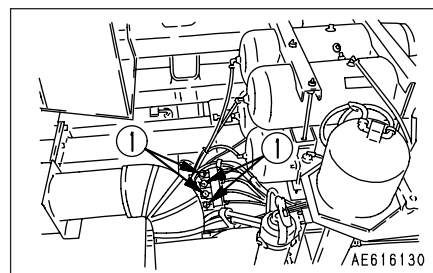
1. Check that the red piston has not appeared in the transparent portion of dust indicator ①.
2. If the red piston has appeared, clean or replace the element immediately.
For details of the method of cleaning the element, see "24.2 WHEN REQUIRED".
3. After checking, cleaning, or replacing, press dust indicator ① to return the red piston to its original position.

**24.3.4 DRAIN WATER FROM AIR TANK**

1. After starting the engine, pull ring ① of the tank drain valve to drain the water from the tank.
2. Carry out the same operation after completing work.

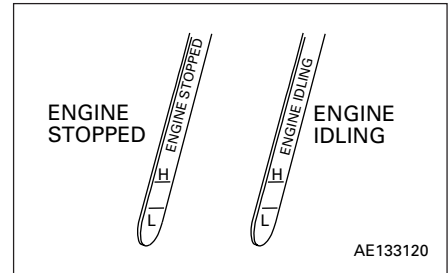
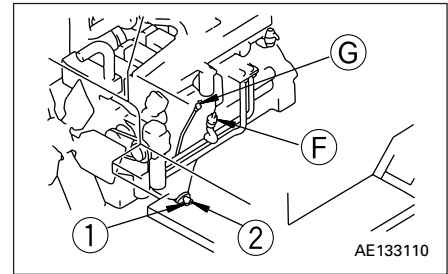
NOTICE

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



24.3.5 CHECK OIL LEVEL IN ENGINE OIL PAN, ADD OIL

1. Check the oil level with dipstick ③.
2. Remove dipstick ③, and wipe the oil off with a cloth.
3. Insert dipstick ③ fully in the oil filler pipe, then take it out again.
4. The oil level should be between the H and L marks on the ENGINE STOPPED side of dipstick ③.
If the oil is below the L mark, add engine oil through oil filler ④. For details of the oil to use, see "20. USE OF FUEL, COOLANT, AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".
5. If the oil is above the H mark, remove drain plug ①, and loosen drain valve ② to drain the excess engine oil, then check the engine oil level again.
6. If the oil level is correct, tighten the handle of the oil filler cap securely.

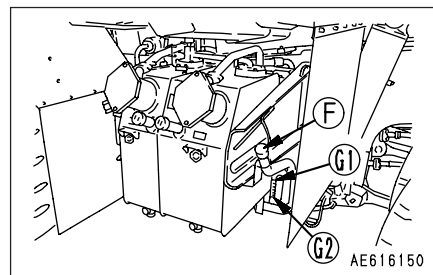


REMARK

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

24.3.6 CHECK OIL LEVEL IN TRANSMISSION CASE, ADD OIL

1. After starting the engine, run the engine at low idling and check the oil level with sight gauge G_2 .
2. If the oil level is low, add engine oil through oil filler F .
For details of the oil to use, see "20. USE OF FUEL, COOLANT, AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".



NOTICE

- The oil level changes according to the oil temperature, so carry out the check after completing the warming-up operation.
- During operations, or when the engine is running at idling after operations, the oil level be above G_2 .
- When checking the oil level with the engine stopped, check with sight gauge G_1 as a guide line, and make the final check with G_2 .
- When checking the oil level with the engine stopped, wait for 20 minutes after stopping the engine and check with sight gauge G_1 .

24.3.7 CHECK OIL LEVEL IN STEERING AND HOIST OIL TANK, ADD OIL

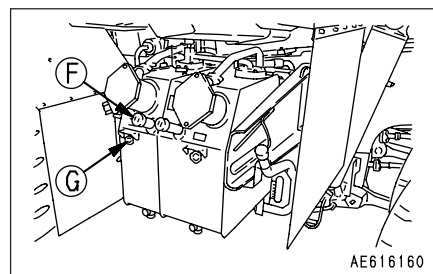
⚠ WARNING

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

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

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

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



24.3.8 CHECK OIL LEVEL IN REAR BRAKE COOLING OIL TANK, ADD OIL

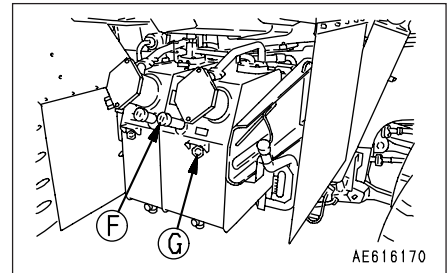
⚠ WARNING

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

1. Check with sight gauge ⑥.
2. If the oil level is not up to the window of sight gauge ⑥, add engine oil through oil filler ⑦.

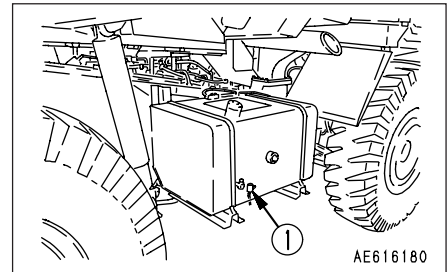
When checking the oil level, stop the machine on horizontal ground, lower the dump body, then stop the engine before checking.

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



24.3.9 DRAIN WATER, SEDIMENT FROM FUEL TANK

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



24.3.10 CHECK FUEL LEVEL

⚠ WARNING

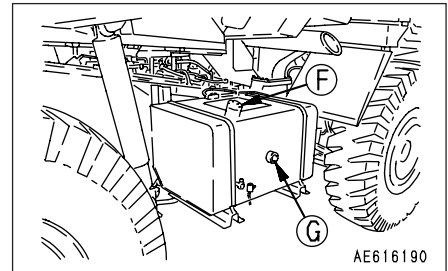
When adding fuel, do not let the fuel overflow. This may cause fire. If any oil spills, wipe it up completely.

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

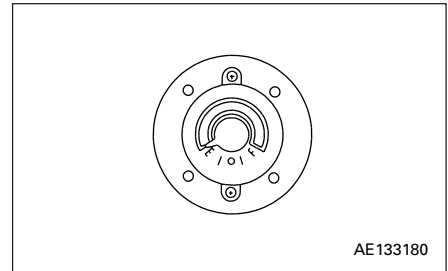
Fuel tank capacity: 780 ℓ (205.92 US gal, 171.60 UK gal)

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

3. After adding fuel, tighten the cap securely.



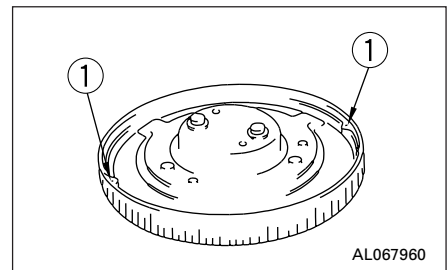
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REMARK

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



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24.3.11 CHECK WHEEL HUB NUTS, TIGHTEN

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

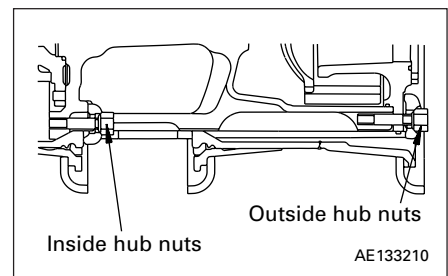
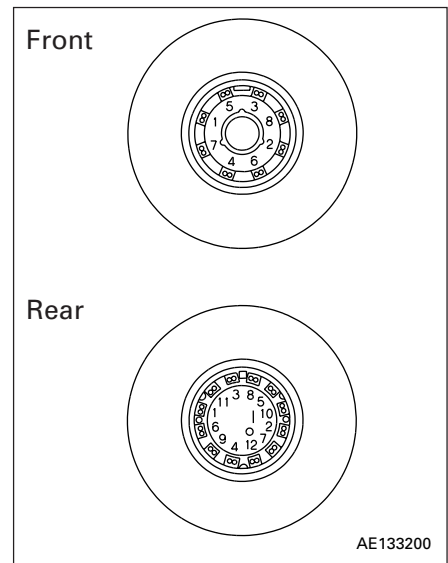
Tightening torque:

- 1320 ± 147 N•m (135 ± 15 kgf•m, 976.5 ± 108.5 lbft)
(When thread and nut seat are not coated with grease)
- 927 ± 103 N•m (94.5 ± 10.5 kgf•m, 683.5 ± 75.9 lbft)
(When thread and nut seat are coated with molybdenum disulphide grease)

If the hub nuts have been tightened again after replacing the tire, travel for 5 to 6 km, then tighten again to settle all the contacting parts.

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

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



24.3.12 CHECK INFLATION PRESSURE OF TIRES

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

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

Check for loose wheel hub nuts (bolts).

The proper inflation pressure is shown below.

HD465-5

Tire size	Inflation pressure
24.00-35-36PR (standard)	0.44 MPa (4.5 kgf/cm ² , 63.9 PSI)
24.00R35★★ (if equipped)	0.69 MPa (7.0 kgf/cm ² , 99.4 PSI)
21.00-35-36PR (if equipped)	0.54 MPa (5.5 kgf/cm ² , 78.1 PSI)
21.00-35-32PR (if equipped)	0.49 MPa (5.0 kgf/cm ² , 71.0 PSI)

HD605-5

Tire size	Inflation pressure
24.00R35★★ (standard)	0.69 MPa (7.0 kgf/cm ² , 99.4 PSI)
21.00-35-36PR (if equipped)	0.44 MPa (4.5 kgf/cm ² , 63.9 PSI)

NOTICE

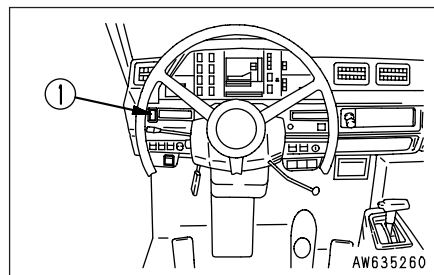
If the tires are used when the inflation pressure is less than the value given in the table above, the rim may be damaged.

Always keep the tire inflation pressure within +0 – +0.03 MPa (0.3 kgf/cm², 4.3 PSI) of the value in the table above.

24.3.13 CHECK CENTRAL WARNING LAMP

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

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

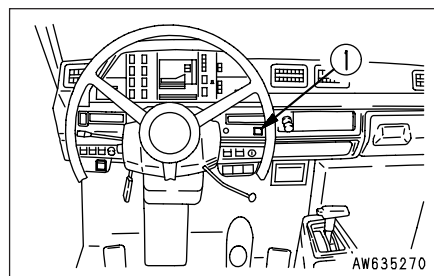


24.3.14 CHECK MACHINE MONITOR SYSTEM

1. Before starting the engine, turn the starting switch to the ON position.
2. Check that all monitor lamps, gauges, and the central warning lamp light up for approx. 3 seconds and that the alarm buzzer sounds for approx. 1 second.

REMARK

- When this is done, the speedometer should display 88.
 - When the starting switch is at the ON position, if there is not at the neutral position, the transmission shift lever position pilot lamp and the central warning lamp will flash and the alarm buzzer will continue to sound intermittently. At this time, when the lever is placed at neutral, letter "N" is displayed, the central warning lamp goes out and the buzzer stops.
 - After the engine is stopped, the monitor cannot be checked until at least 30 seconds have passed.
3. When checking the monitor, check for blown bulbs in the the caution lamps and pilot lamps at the same time. Before starting the engine, turn the starting switch to the ON position, press bulb check switch ①, and check that no caution lamp or pilot lamp bulb is blown.



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

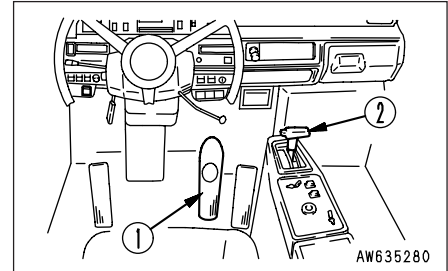
24.3.15 CHECK FOR NORMAL ACTUATION OF FOOT BRAKE

Check when starting operations, and if the braking effect is poor, check and adjust. For details, see "24.5.3 CHECK WEAR OF FRONT DISC BRAKE PADS".

24.3.16 CHECK BRAKING CAPACITY OF FOOT BRAKE

Check the braking capacity of the foot brake as follows.

1. Set the air pressure to the maximum with the machine on flat ground, and depress foot brake ①.
2. Set shift lever ② to the D position, gradually raise the engine speed, and check that the machine does not move even when the engine speed reaches 1850 rpm.



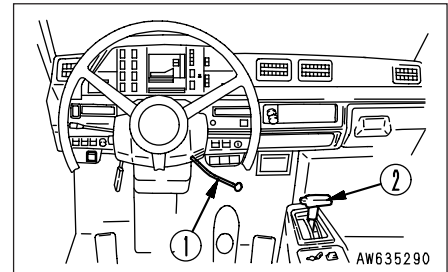
24.3.17 CHECK FOR NORMAL ACTUATION OF RETARDER BRAKE

Check when starting operations, and if the braking effect is poor, check and adjust. For details, see "24.6.5 CHECK WEAR OF REAR BRAKE DISC".

24.3.18 CHECK BRAKING CAPACITY OF RETARDER BRAKE

Check the braking capacity of the retarder brake as follows.

1. Set the air pressure to the maximum with the machine on flat ground, and pull retarder lever ① fully.
2. Set shift lever ② to the D position, gradually raise the engine speed, and check that the machine does not move even when the engine speed reaches 1320 rpm.



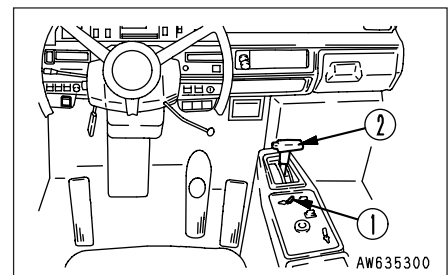
24.3.19 CHECK FOR NORMAL ACTUATION OF PARKING BRAKE

Check when starting operations, and if the braking effect is poor, adjust the parking brake. For details, see "24.2.10 ADJUSTMENT OF PARKING BRAKE".

24.3.20 CHECK BRAKING CAPACITY OF PARKING BRAKE

Check the braking capacity of the parking brake as follows.

1. Set the air pressure to the maximum with the machine on flat ground, and set parking brake lever ① to the PARKING position.
2. Set shift lever ② to the D position, gradually raise the engine speed, and check that the machine does not move even when the engine speed reaches 1430 rpm.



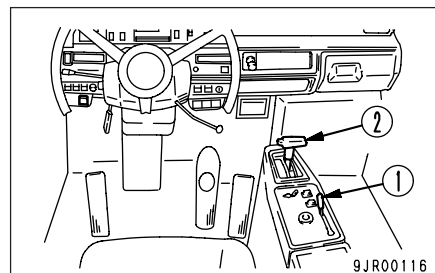
24.3.21 CHECK FOR NORMAL ACTUATION OF EMERGENCY BRAKE

Check when starting operations.

24.3.22 CHECK BRAKING CAPACITY OF EMERGENCY BRAKE

Check the braking capacity of the emergency brake as follows.

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

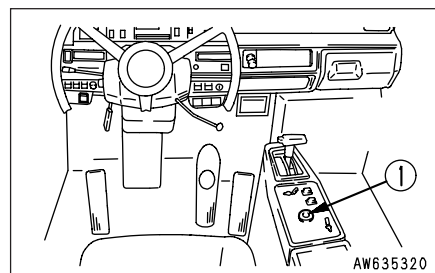


24.3.23 CHECK EMERGENCY STEERING

● Checking manual emergency steering

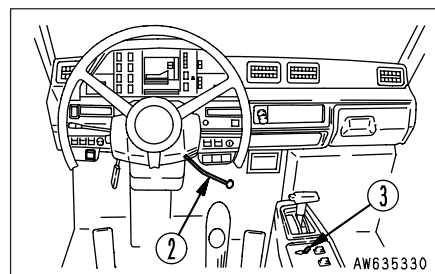
1. Turn the starting switch key to the ON position.
2. Turn emergency steering switch ① ON, and check that the steering wheel can be operated for 20 seconds.

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



● Checking auto emergency steering

3. Turn the starting switch key to the START position and start the engine.
4. Check that the air pressure gauge is in the green range, then pull retarder lever ② fully and stop the engine.
5. Turn the starting switch key to the ON position.
6. Check that the emergency motor is actuated and the steering can be operated one second after parking brake lever ③ is set to the TRAVEL position.



24.3.24 CHECK ACTUATION OF STEERING

24.3.25 CHECK FLASHING OF LAMPS

24.3.26 CHECK SOUND OF HORN

24.3.27 CHECK MOVEMENT OF GAUGES DURING OPERATION

24.3.28 CHECK EXHAUST COLOR AND SOUND

24.3.29 CHECK ELECTRICAL WIRING

⚠ WARNING

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

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

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

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

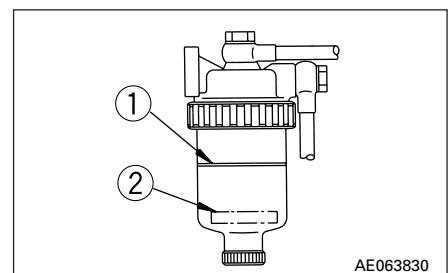
Please contact your Komatsu distributor for investigation and correction of the cause.

24.3.30 CHECK FOR WATER AND SEDIMENT IN WATER SEPARATOR

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

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

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



24.4 EVERY 250 HOURS SERVICE

24.4.1 CHANGE OIL IN ENGINE OIL PAN, REPLACE ENGINE OIL FILTER (FULL-FLOW AND BYPASS) CARTRIDGE

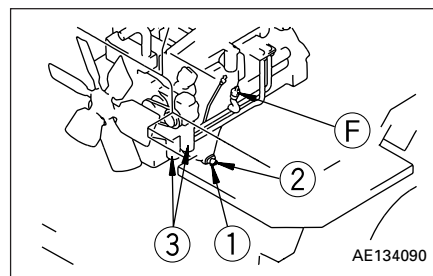
WARNING

The oil is at high temperature after the engine has been operated, so never change the oil immediately after finishing operations. Wait for the oil to cool down before changing it.

Prepare the following.

- Container to catch drained oil: Min. 54 ℓ capacity
- Refill capacity: 54 ℓ (14.36 US gal, 11.88 UK gal)
- Filter wrench

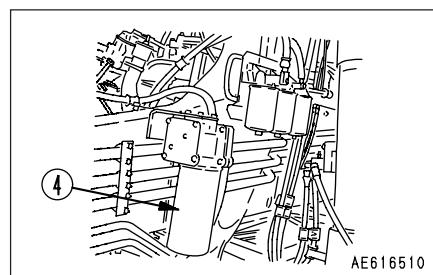
1. Set a container to catch the oil immediately under the drain valve under the chassis
2. Remove drain plug ①, then loosen drain valve ② slowly to avoid getting oil on yourself, and drain the oil. Be careful not to loosen the drain valve too far and deform the stopper pin inside the valve.
3. Check the drained oil, and if there are excessive metal particles or foreign material, please contact your Komatsu distributor.
4. Tighten drain valve ② and drain plug ①.



Tightening torque

Drain plug ①, drain plug ②: $68.6 \pm 9.81 \text{ N}\cdot\text{m}$
 $(7 \pm 1 \text{ kgf}\cdot\text{m}, 50.6 \pm 7.2 \text{ lbft})$

5. Using the filter wrench, turn the 2 full-flow filter cartridges ③ and 1 bypass filter cartridge ④ to the left to remove them. When doing this, to prevent getting oil on yourself, do not carry out this operation from immediately under the cartridge. In particular, if this operation is carried out immediately after stopping the engine, a large amount of oil will come out, so wait for 10 minutes before starting the operation.



6. Clean the filter holder, fill the new filter cartridge with clean engine oil, coat the packing face and thread with engine oil (or coat thinly with grease), then install the filter cartridge.
7. When installing the filter cartridge, tighten until the packing face is in contact with the filter holder, then tighten a further 3/4 – 1 turn.
8. Add engine oil through oil filler $\text{\textcircled{E}}$ to fill to the specified level.
9. Run the engine for a short time at idling, then check the oil level. For details, see "24.3 CHECK BEFORE STARTING".

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

Even if the machine has not been operated for 250 hours, the oil and filter cartridge must be replaced when the machine has been operated for 6 months.

In the same way, even if the machine has not been operated for 6 months, the oil and filter cartridge must be replaced when the machine has been operated for 250 hours.

Use API category CD class oil. If CC class oil must be used, change the oil and replace the oil filter at half the usual interval (125 hours).

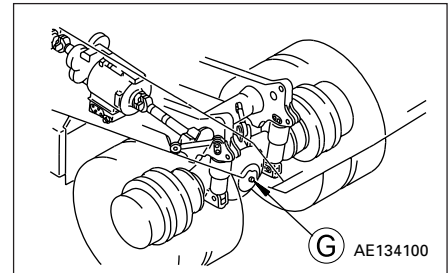
24.4.2 CHECK OIL LEVEL IN DIFFERENTIAL CASE, ADD OIL

⚠ WARNING

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

1. Remove plug **Ⓒ** and check that the oil level is near the bottom of the plug hole.
2. If the oil level is low, add engine oil until the oil overflows from the plug hole.

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



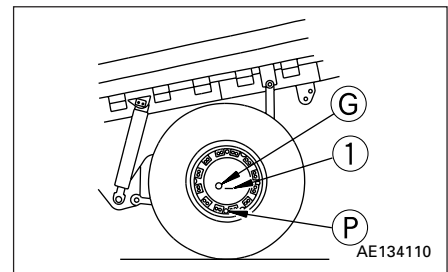
24.4.3 CHECK OIL LEVEL IN FINAL DRIVE CASE, ADD OIL

⚠ WARNING

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

1. Stop the machine so that casting line **①** is horizontal and drain plug **⒫** is immediately at the bottom.
2. Remove plug **Ⓒ** and check that the oil level is near the bottom of the plug hole.
3. If the oil level is low, add engine oil until the oil overflows from the plug hole.

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

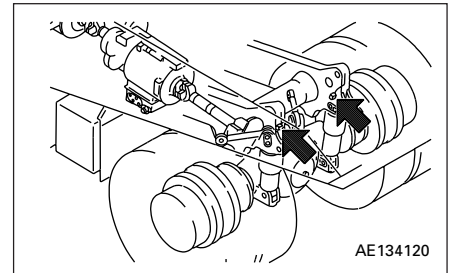


24.4.4 LUBRICATION

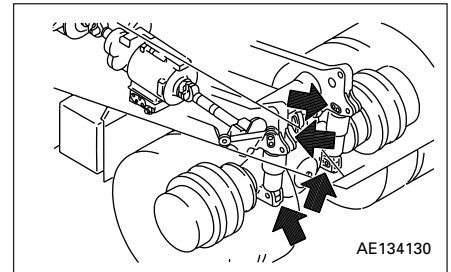
1. Stop the engine.
2. Use the grease pump to pump in grease through the grease fitting marked by the arrow.
3. After greasing, wipe off all the old grease that is pushed out.

Carry out the greasing operation every day when operating in places where the grease flows out easily, such as when traveling through mud or water.

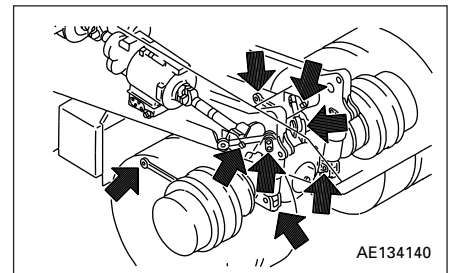
1. Dump body hinge pin (left and right: 1 point each)



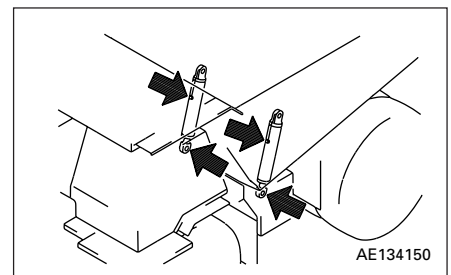
2. Rear suspension (left and right: 2 points each)



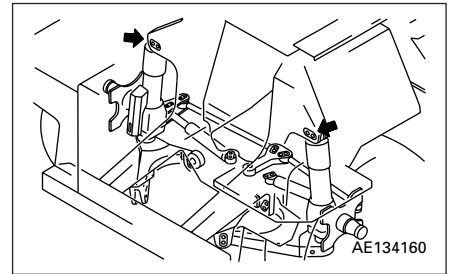
3. Differential support (left and right: 4 points each)



4. Hoist cylinder pin (left and right: 2 points each)

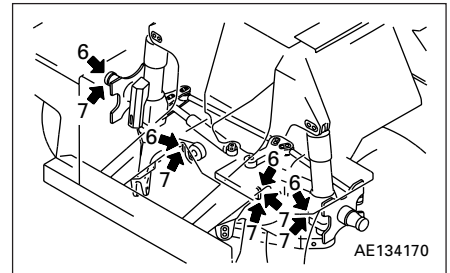


5. Front suspension (left and right: 1 point each)

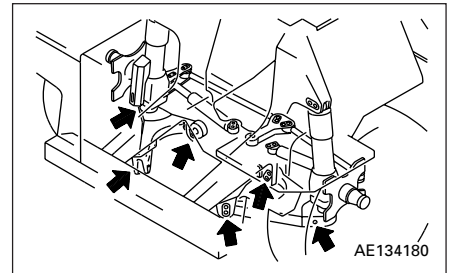


6. Steering cylinder pin (left and right: 2 points each)

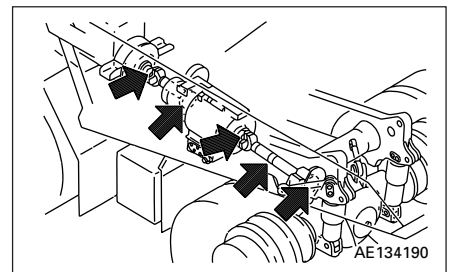
7. Steering link pin (5 points)



8. Steering linkage (left and right: 3 points each)



9. Drive shaft (5 points)



24.4.5 CHECK LEVEL OF BATTERY ELECTROLYTE

Carry out this check before operating the machine.

⚠ WARNING

- Do not use the battery if the battery electrolyte level is below the LOWER LEVEL line. This will accelerate deterioration of the inside of the battery and reduce the service life of the battery. In addition, it may also cause an explosion.
- The battery generates flammable gas and there is danger of explosion, so 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 amount of water and consult a doctor.
- When adding distilled water to the battery, do not allow the battery electrolyte to go above the UPPER LEVEL line. If the electrolyte level is too high, it may leak and cause damage to the paint surface or corrode other parts.

NOTICE

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

Inspect the battery electrolyte level at least once a month and follow the basic safety procedures given below.

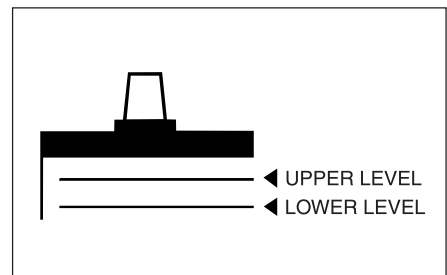
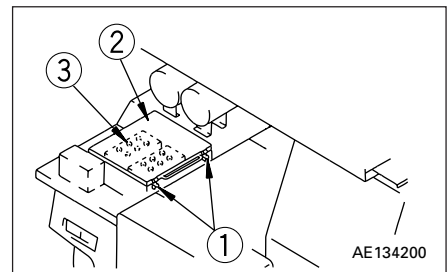
WHEN CHECKING ELECTROLYTE LEVEL FROM SIDE OF BATTERY

If it is possible to check the electrolyte level from the side of the battery, check as follows.

1. Remove hook ①, then open inspection cover ②.
2. Use a wet cloth to clean the area around the electrolyte level lines and check that the electrolyte level is between the UPPER LEVEL (U.L) and LOWER LEVEL (L.L) lines.
If the battery is wiped with a dry cloth, static electricity may cause a fire or explosion.
3. If the electrolyte level is below the midway point between the U.L and L.L lines, remove cap ③ and add distilled water to the U.L line.
4. After adding distilled water, tighten cap ③ securely.

REMARK

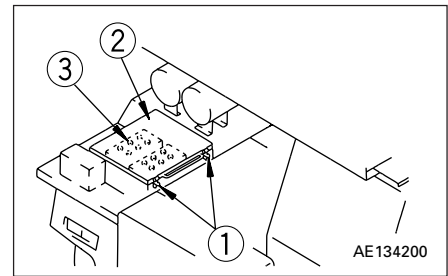
If distilled water is added to above the U.L line, use a pipette to lower the level to the U.L line. Neutralize the removed fluid with baking soda (sodium bicarbonate), then flush it away with a large amount of water or consult your Komatsu distributor or battery maker.



WHEN IT IS IMPOSSIBLE TO CHECK ELECTROLYTE LEVEL FROM SIDE OF BATTERY

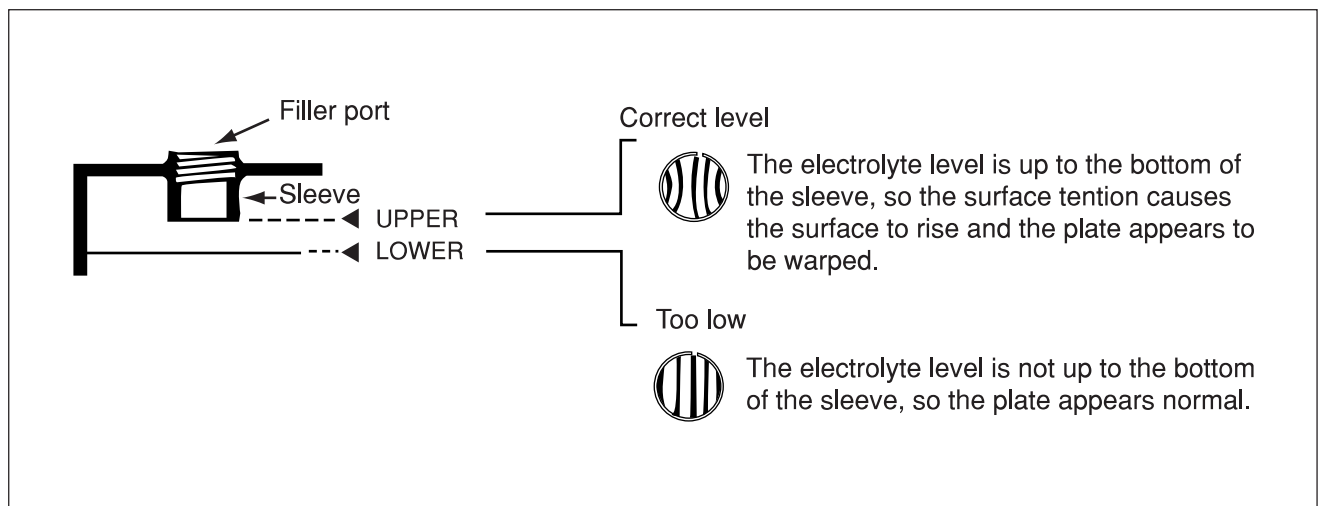
If it is impossible to check the electrolyte level from the side of the battery, or there is no display of the UPPER LEVEL line on the side of the battery, check as follows.

1. Remove hook ①, then open inspection cover ②.
2. Remove cap ③ at the top of the battery, look through the water filler port, and check the electrolyte surface. If the electrolyte does not reach the sleeve, add distilled water so that the level reaches the bottom of the sleeve (UPPER LEVEL line) without fail.



AE134200

Use the diagram below for reference, and check if the electrolyte reaches the bottom of the sleeve.



3. After adding distilled water, tighten cap ③ securely.

REMARK

If distilled water is added to above the bottom of the sleeve, use a pipette to lower the level to the bottom of the sleeve. Neutralize the removed fluid with baking soda (sodium bicarbonate), then flush it away with a large amount of water or consult your Komatsu distributor or battery maker.

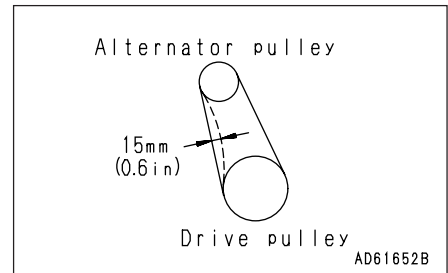
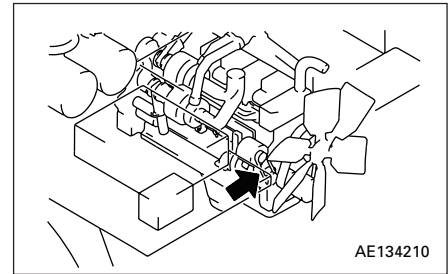
WHEN IT IS POSSIBLE TO USE INDICATOR TO CHECK ELECTROLYTE LEVEL

If it is possible to use an indicator to check the electrolyte level, follow the instructions given.

24.4.6 CHECK ALTERNATOR BELT, ADJUST

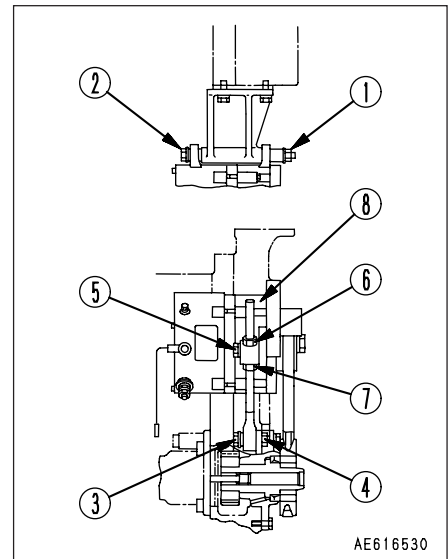
Checking

The belt should normally deflect by above 15 mm (0.6 in) when pressed with the thumb (with a force of approx. 58.8 N (6 kgf) at a point midway between the drive pulley and alternator pulley.



Adjusting

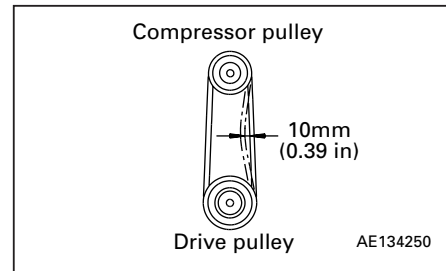
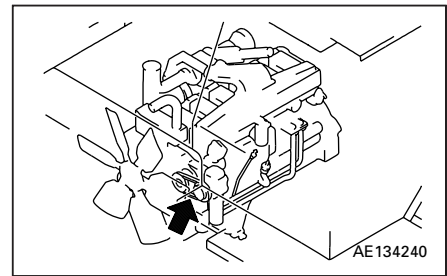
1. Insert a bar between alternator ⑧ and the cylinder block to fix alternator ⑧ in position.
When fixing alternator ⑧ in position, insert a wooden block between the bar and alternator ⑧ to prevent damage to the alternator.
2. Loosen nuts and bolts ① to ⑥ in numerical order, then remove alternator ⑧ and adjust.
Turn nut ⑦ to adjust as follows.
TIGHTEN nut to INCREASE belt tension
LOOSEN nut to DECREASE belt tension
3. After adjusting the belt, tighten nuts and bolts ① to ⑥ in numerical order, then tighten nut ⑦.
4. Check each pulley for damage, wear of the V-groove, and wear of the V-belt. In particular, be sure to check that the V-belt is not touching the bottom of the V-groove.
5. Replace the V-belt if it has stretched, leaving no allowance for adjustment, or if the belt is cut or cracked.
6. When the V-belt has been replaced, adjust it again after operating for one hour.



24.4.7 CHECK TENSION OF AIR CONDITIONER COMPRESSOR BELT, ADJUST

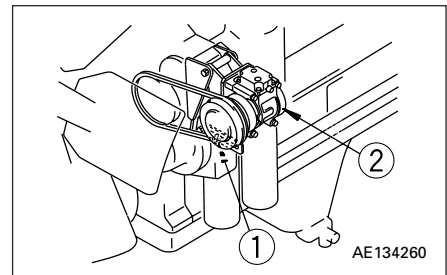
Checking

The belt should normally deflect by above 10 mm (0.39 in) when pressed with the thumb (with a force of approx. 58.8 N (6 kgf) at a point midway between the air compressor pulley and drive pulley.



Adjusting

1. Loosen bolt ①.
2. Move compressor ② so that the deflection of the belt is approx. 10 mm (with a force of approx. 58.8 N (6 kgf)).
3. After adjusting, tighten bolt ①.
4. Check each pulley for damage, wear of the V-groove, and wear of the V-belt. In particular, be sure to check that the V-belt is not touching the bottom of the V-groove.
5. Replace the V-belt if it has stretched, leaving no allowance for adjustment, or if the belt is cut or cracked.
6. If the V-belt has been replaced with a new part, there will be initial elongation, so adjust the belt again after operating for 2 to 3 days.

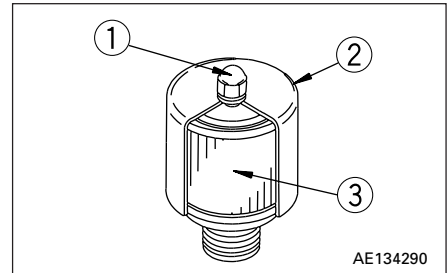
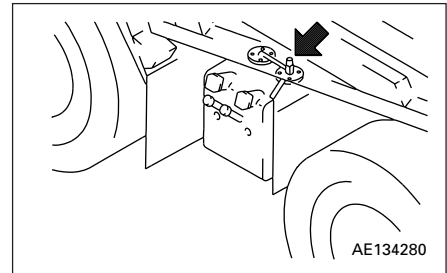
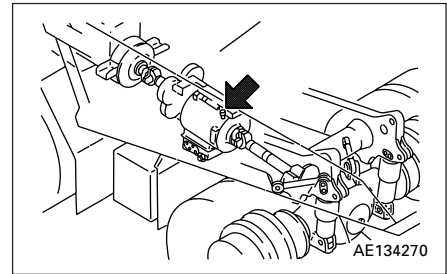


24.4.8 CLEAN BREATHERS

Remove the mud and dirt from around the breathers, then remove the breathers and wash out the dirt with clean diesel oil or flushing oil.

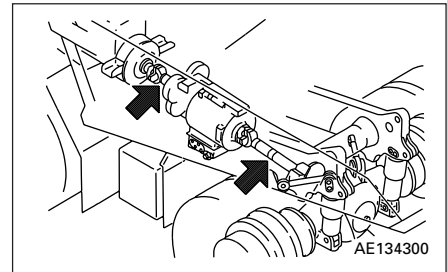
- Transmission case

- Hydraulic tank
 1. Remove nut ①, then remove cover ② and wash element ③.
 2. Install element ③, then install cover ② and nut ①.



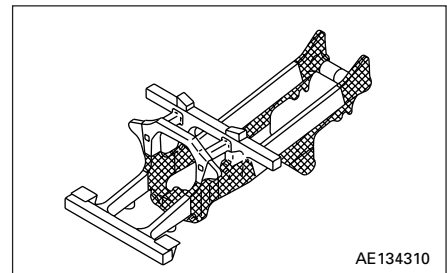
24.4.9 CHECK DRIVE SHAFT

If there is any abnormality, such as looseness of the drive shaft connection, play in the spline or bearing portion, or runout of the shaft, please contact your Komatsu distributor for repair.



24.4.10 CHECK FRAME

1. Wash the frame to make it easier to check.
2. Check all parts of the frame for damage. In particular, check the colored portions in the diagram and if any cracks or damage are found, repair the damage. Please contact your Komatsu distributor for details of the repair procedure.

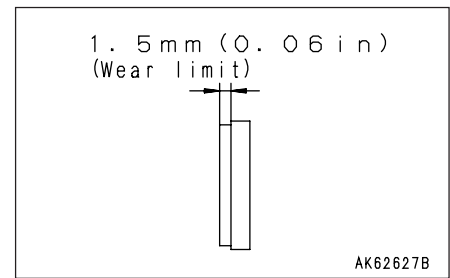


24.4.11 CHECK WEAR OF PARKING BRAKE PADS

⚠ WARNING

Never put any oil or grease on the surface of the pad or disc.

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

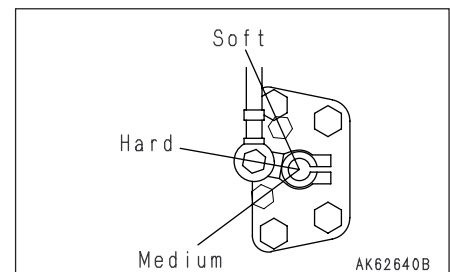
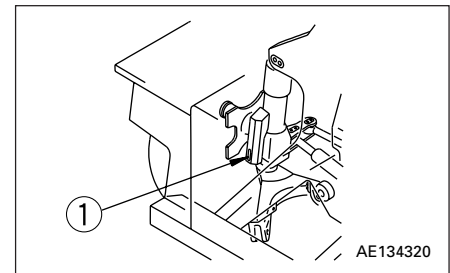


24.4.12 CHECK, CLEAN AUTOMATIC SUSPENSION

1. When bolts of inspection cover ① are loosened and the cover is moved to the side, the inspection hole can be seen.
2. Check the positions of the link. Check that it moves to the following positions:
 For normal travel when empty: soft;
 When the brake is depressed: medium
 When the dump lever is at any position other than FLOAT: hard.

If any abnormality is found, please contact your Komatsu distributor for inspection and adjustment.

If operations are carried out on muddy or wet ground, mud will stick to the link, and the movement may become slow, so check and clean.



24.5 EVERY 500 HOURS SERVICE

Carry out maintenance for EVERY 250 HOURS SERVICE at the same time.

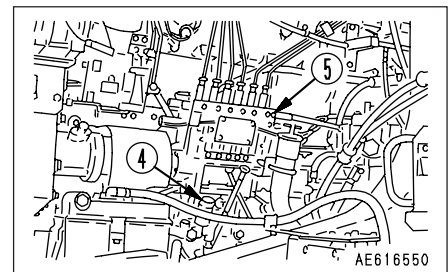
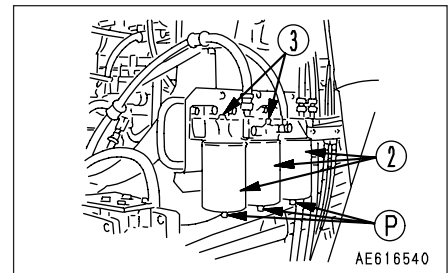
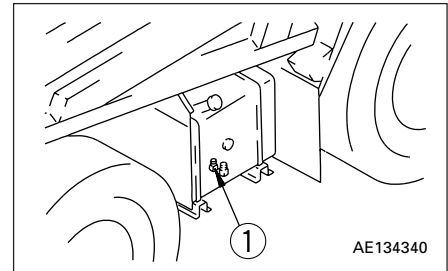
24.5.1 REPLACE FUEL FILTER CARTRIDGE

⚠ WARNING

- The oil is at high temperature after the engine has been operated, so never change the oil immediately after finishing operations. Wait for the oil to cool down before changing it.
- Do not bring fire or sparks near the fuel.

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

1. Close supply valve ① of the fuel tank.
2. Set the container to catch the fuel under the filter cartridge.
3. Remove drain plug ⑤ and drain the oil.
4. Using a filter wrench, turn filter cartridge ② to the left and remove it.
5. Clean the filter head, fill a new filter cartridge with clean fuel, coat the packing surface thinly with engine oil, then install it to the filter holder.
6. When installing, tighten until the packing surface contacts the seal surface of the filter holder, then tighten a further 1/2 to 3/4 turns.
If the filter cartridge is tightened too far, the packing will be damaged and this will lead to leakage of fuel. If the filter is too loose, fuel will also leak from the packing, so always tighten the correct amount.
7. After replacing filter cartridge ②, loosen air bleed plug ③, and open supply valve ①.
8. Loosen the knob of priming pump ④, and move it up and down to make the fuel overflow until no more bubbles come out from air bleed plug ③.



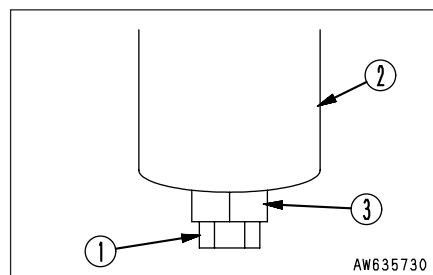
9. Tighten air bleed plug ③, then push in knob ④ of the priming pump, and tighten it.
10. After replacing the filter cartridge, start the engine and check that there is no leakage of fuel from the filter seal surface. If there is any leakage of fuel, check the tightening of the filter cartridge. If there is still leakage of fuel, follow Step 2 – 4 to remove the filter cartridge, then check the packing surface for damage or foreign material. If any damage or foreign material is found in the packing, replace the cartridge with a new part, then repeat Steps 5 – 11 to install the filter cartridge.

When the engine is started after it has run out of fuel, if the engine misfires or black smoke comes out, bleed the air from the fuel line as follows.

11. Loosen air bleed plug ⑤ of the injection pump, then repeat Steps 7 to 9 and operate the priming pump to bleed the air.

24.5.2 REPLACE TRANSMISSION FILTER ELEMENT

- Prepare a container to catch the oil.
1. Set the container to catch the oil under the filter case.
 2. Remove drain plug ① at the bottom of the filter case, drain the oil, then tighten the plug again.
 3. Loosen hexagonal portion ③ of case ②, and remove case ②.
 4. Remove the element and clean the inside of the case.
 5. Replace the filter gasket and O-ring with new parts. Coat the gasket and O-ring thinly with clean engine oil before installing.
 6. Assemble the new element to the case, set the case in position, and install with center bolt ③.
Be careful not to tighten center bolt ③ too far.



Tightening torque:

Drain plug: 49 – 58.8 N•m (5 – 6 kgf•m, 36.2 – 43.4 lbft)

Case tightening: 58.8 – 78.5 N•m (6 – 8 kgf•m, 43.4 – 57.9 lbft)

7. Run the engine for a short time at idling, then stop the engine, and check that the oil is up to the specified level. For details, see "24.3 CHECK BEFORE STARTING".

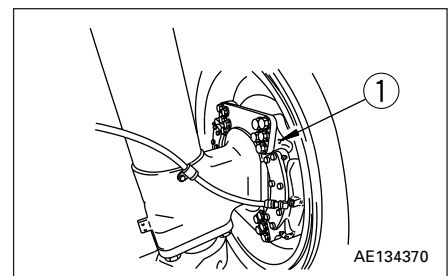
Run the engine at high idling, and when the oil is warmed up, if the transmission filter clogging monitor lamp flashes, replace the element immediately.

24.5.3 CHECK WEAR OF FRONT DISC BRAKE PADS

⚠ WARNING

- If you continue to use the pad after it has passed the wear limit, there is not only risk of damage to the disc, but there is also danger that the brakes will have no effect. When the wear approaches the wear limit, check more frequently and replace the pad at the correct time.
- On jobsites where there is a large amount of sand or where the foot brake is frequently used, carry out this check every 250 hours.

1. Insert the inspection gauge into the wear inspection hole in the caliper body and check the wear.

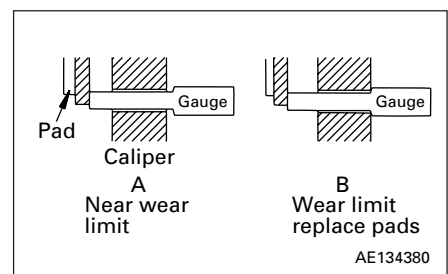


2. If the stepped portion of the gauge contacts the caliper, the wear limit has been reached (remaining pad thickness: 3 mm (0.12 in)), so replace the pad.

If the result of the inspection shows that the pad must be replaced, please contact your Komatsu distributor for replacement.

The pad wear is not necessarily the same for the left and right wheels, so always check the pads on both the left and right. If any of the pads has reached the wear limit, always replace all eight pads.

When working on muddy or wet ground, mud may stick to the caliper or disc. If it is left in this condition, the pad will wear more quickly, so always wash the area thoroughly after finishing operations.



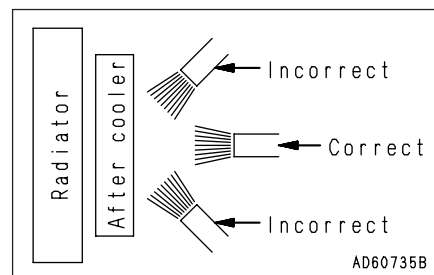
24.5.4 CLEAN, CHECK RADIATOR FINS AND AFTER COOLER FINS

If the radiator fins become clogged or bent, this may cause overheating of the engine, so always clean or carry out inspection and take the necessary actions.

- Cleaning can be carried out by using jets of air, steam, or water, but be careful not to let the nozzle contact the fin.

Air pressure: Max. 98.1 N·m (10 kgf/cm², 72.3 lbft)
 Steam pressure: Max. 39.2 N·m (4 kgf/cm², 28.9 lbft)

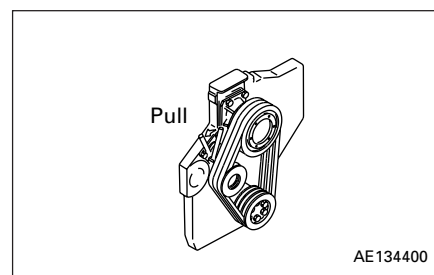
- When using compressed air or steam, keep the nozzle at a right angle to the radiator.
- Examine the rubber hose, and if any cracks or brittle places are found, replace the hose. In addition, check also for loose hose clamps.



24.5.5 CHECK WEAR OF FAN BELT

Inspect the V-belt and if it is in the following condition, replace the V-belt.

- The V-belt is in contact with the bottom of the groove of each pulley
- The V-belt is worn and has sunk below the outside diameter of the pulley
- The V-belt is cracked or peeling



Replacing

When replacing the V-belt, do as follows.

1. Insert a bar (length: approx. 50 cm (20 in)) into the hole (ø80 mm (3.2 in)) in 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.
3. Install the new belt in the same way.

Replace the V-belts as a set.

The machine is equipped with an auto-tensioner, so there is no need to carry out any adjustment until the belt is replaced.

24.6 EVERY 1000 HOURS SERVICE

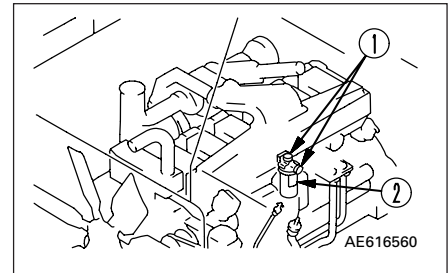
Carry out maintenance for EVERY 250 HOURS and EVERY 500 HOURS SERVICE at the same time.

24.6.1 REPLACE CORROSION RESISTOR CARTRIDGE

⚠ WARNING

The oil is at high temperature after the engine has been operated, so never replace the cartridge immediately after finishing operations.
Wait for the oil to cool down before replacing the cartridge.

- Prepare a filter wrench and a container to catch the water.
1. Screw in valve ① (2 places) at the top of the corrosion resistor.
 2. Set the container to catch the water under the cartridge.
 3. Using a filter wrench, remove cartridge ②.
 4. Clean the filter holder, coat the seal surface of the new cartridge thinly with engine oil, then install the cartridge.
 5. When installing, tighten until the gasket contacts the seal surface of the filter holder, then tighten a further 2/3 turns.
If the filter cartridge is tightened too far, the gasket will be damaged and this will lead to leakage of water. If the filter is too loose, water will also leak from the gap at the gasket, so always tighten the correct amount.
 6. Open valve ① (2 places).
 7. After replacing the cartridge, start the engine and check that there is no leakage of water from the filter seal surface. If there is any leakage of water, check the tightening of the filter cartridge.



24.6.2 CHANGE OIL IN TRANSMISSION CASE, CLEAN TRANSMISSION CASE STRAINER

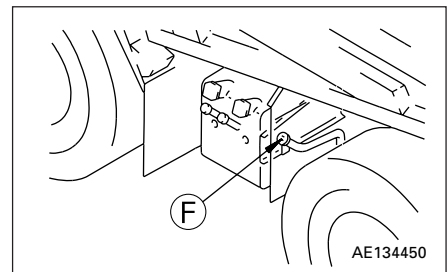
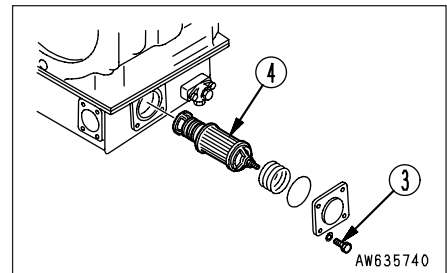
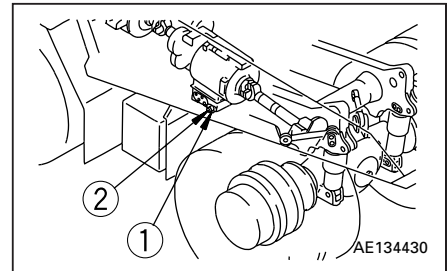
WARNING

The oil is at high temperature after the engine has been operated, so never change the oil immediately after finishing operations.

Wait for the oil to cool down before starting the operation.

- Container to catch drained oil: Min. 69 ℓ capacity
 - Refill capacity: 69 ℓ (18.22 US gal, 15.18 UK gal)
1. Set the container to catch the oil directly under the drain plug. Remove drain plug ①, then loosen drain valve ② slowly to avoid getting oil on yourself, and drain the oil, then tighten the plug again.
 2. Remove bolt ③, then remove the cover and take out strainer ④.
 3. Remove any dirt stuck to the strainer, then wash in clean diesel oil or flushing oil. If the strainer is damaged, replace it.
 4. After installing the strainer, add engine oil through oil filler ⑤ to the specified level.
- For details of the oil to use, see "20. USE OF FUEL, COOLANT, AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".
5. After adding oil, check that the oil is at the specified level. See "24.3 CHECK BEFORE STARTING".

Change the oil every 1000 hours or 10000 km of travel, whichever comes sooner.

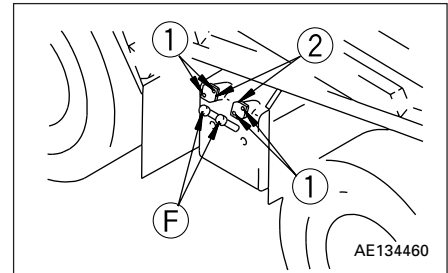


24.6.3 REPLACE STEERING, HOIST OIL TANK AND REAR BRAKE COOLING OIL TANK FILTER ELEMENT

⚠ WARNING

When removing the oil filler cap, turn it slowly to release the internal pressure before removing it.

1. Turn the cap of oil filler (F) slowly to release the internal pressure, then remove the cap.
2. Remove bolt (1), then remove cover (2).
3. Take out the element, then wash the inside of the case and the removed parts.
4. Install the new element, then install cover (2) with bolt (1).

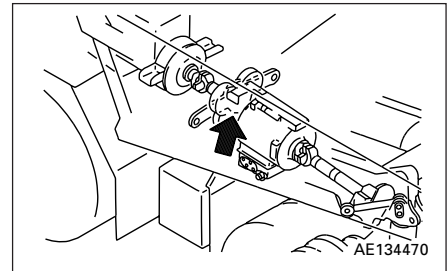


If the filter element clogging caution lamp lights up when the engine water temperature gauge is in the green range and the engine is running at 1200 – 2100 rpm, replace the element immediately.

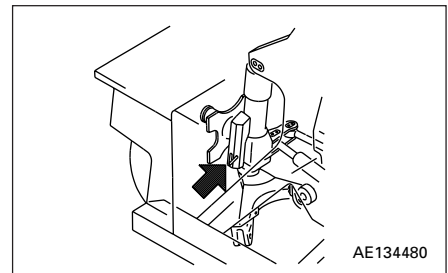
24.6.4 LUBRICATION

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

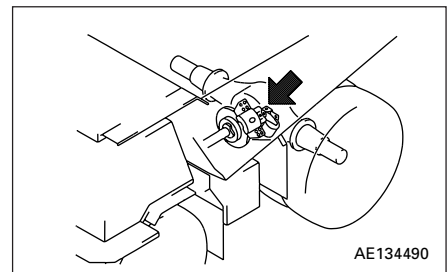
1. Transmission mount (1 point)



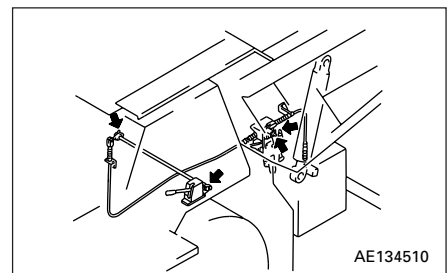
2. Automatic suspension link (left and right: 1 point each)



3. Parking brake linkage (3 points)

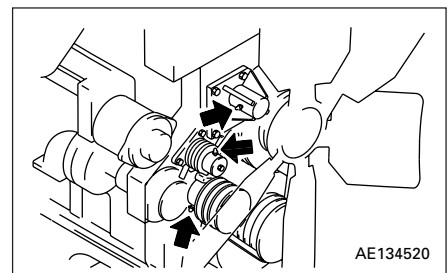


4. Dump control link (4 points)



5. Tension pulley and fan pulley (3 points)

Supply grease to the grease fittings until grease comes out from the seal portion.

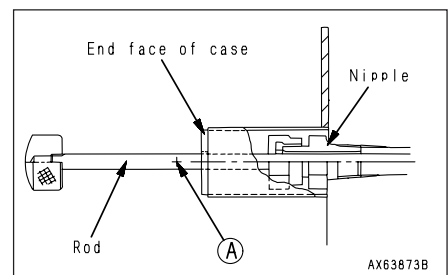
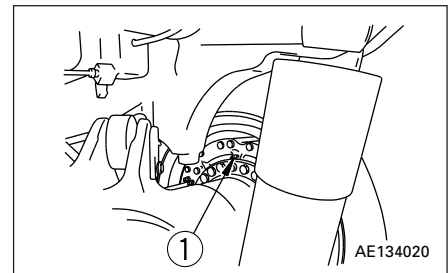


24.6.5 CHECK WEAR OF REAR BRAKE DISCS

⚠ WARNING

- Carry out this check when the brake oil temperature is below 60°C (140°F).
- When carrying out the work with two workers, if the retarder control lever is pulled suddenly, there is danger that the rod of the disc wear measurement gauge may fly out suddenly under hydraulic pressure. Pull the rod out fully, and operate the retarder control lever slowly over a period of approx. 10 seconds.
- If the disc wear approaches the wear limit, check the condition frequently, regardless of the maintenance interval. In addition, check the retarder capacity carefully.

1. Stop the machine on level ground, set the parking brake valve lever to the PARKING position, then check that the other brakes are not applied before starting inspection.
2. Remove air bleed plug ① from the rear brake and install the disc wear measurement gauge.
When doing this, tighten the nipple fully and pull the rod of the wear measurement gauge out fully. If it is not pulled out, there is danger that the rod may fly out under hydraulic pressure when the retarder lever is pulled.
Gauge Part No.: 561-98-61120
3. Turn the starting switch to the ON position and check that the air pressure gauge is in the green range.
4. If the air pressure is low, start the engine and run the engine at 2000 rpm until the air pressure gauge enters the green range. When it enters the green range, turn the starting switch OFF.
5. Operate the retarder control lever slowly over approx. 10 seconds to apply the brake.
In this condition, push the gauge rod in slowly until it contacts the piston.
6. If mark ④ of the wear measurement gauge goes in beyond the end face of the case, this means that the disc has reached the wear limit.
If this happens, please contact your Komatsu distributor for inspection and maintenance.
If the rod is released suddenly after measurement, there is great danger that the rod may fly out under hydraulic pressure. Keep the rod held down and let it back slowly. When it reaches the end of its stroke, release it.
7. Return the retarder control lever.
8. Remove the disc wear measurement gauge and install air bleed plug ①.
9. Bleed all the air from the circuit. For details, see "24.2.8 BLEED AIR FROM REAR BRAKE".



24.6.6 CHECK TIGHTENING OF TURBOCHARGER

Please contact your Komatsu distributor to have the tightening portions checked.

24.6.7 CHECK PLAY OF TURBOCHARGER ROTOR

Please contact your Komatsu distributor for inspection of the rotor play.

24.7 EVERY 2000 HOURS SERVICE

Carry out maintenance for EVERY 250 HOURS, EVERY 500 HOURS and EVERY 1000 HOURS SERVICE at the same time.

24.7.1 CHANGE OIL IN STEERING, HOIST OIL TANK

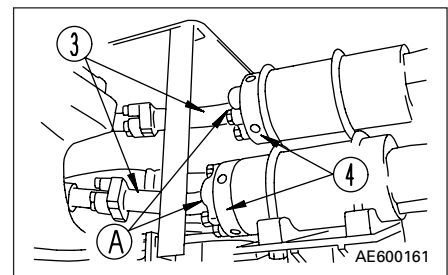
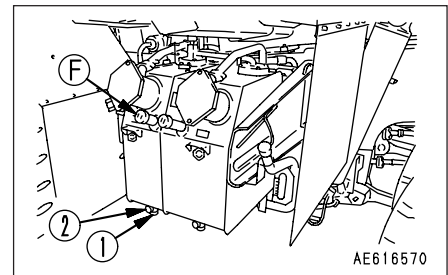
⚠ WARNING

The oil is at high temperature after the engine has been operated, so never change the oil immediately after finishing operations.

Wait for the oil to cool down before starting the operation.

When removing the oil filler cap, turn it slowly to release

- Container to catch drained oil: Min. 95 ℓ capacity
 - Refill capacity: 95 ℓ (25.08 US gal, 20.90 UK gal)
1. Lower the dump body and stop the engine.
 2. Turn the cap of oil filler (F) to release the internal pressure before removing the cap.
 3. Remove drain plug (1), then loosen drain valve (2) slowly to avoid getting oil on yourself, and drain the oil.
 4. Add engine oil through oil filler (F) to the specified level.
For details of the oil to use, see "20. USE OF FUEL, COOLANT, AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".
 5. After adding oil, check that the oil is at the specified level. See "24.3 CHECK BEFORE STARTING".
 6. After disconnecting tube (3) at filter cover side (A), turn filter cover (4) to remove it.
 7. Remove the filter element and wash it.
If the mesh openings are enlarged or there is any other abnormality in the element, replace the element.
 8. After washing, assemble the element and tighten cover (4).
Replace the O-ring and ring with new parts.



Tightening torque for cover: 98.1 – 118 N•m
(10 – 12 kgf•m, 72.3 – 86.8 lbft)

9. Assemble tube (3) again.

24.7.2 CHANGE OIL IN REAR BRAKE COOLING OIL TANK

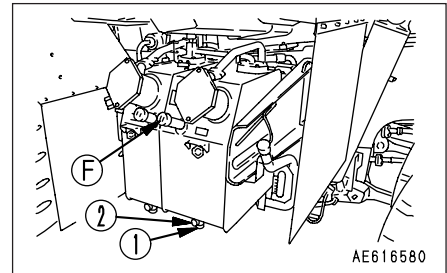
⚠ WARNING

The oil is at high temperature after the engine has been operated, so never change the oil immediately after finishing operations.

Wait for the oil to cool down before starting the operation.

When removing the oil filler cap, turn it slowly to release

- Container to catch drained oil: Min. 143 ℓ capacity
 - Refill capacity: 143 ℓ (37.75 US gal, 31.46 UK gal)
1. Lower the dump body and stop the engine.
 2. Turn the cap of oil filler (F) to release the internal pressure before removing the cap.
 3. Remove drain plug (1), then loosen drain valve (2) slowly to avoid getting oil on yourself, and drain the oil.
 4. Add engine oil through oil filler (F) to the specified level.
For details of the oil to use, see "20. USE OF FUEL, COOLANT, AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".
 5. After adding oil, check that the oil is at the specified level. See "24.3 CHECK BEFORE STARTING".



24.7.3 CHANGE OIL IN FINAL DRIVE CASE

⚠ WARNING

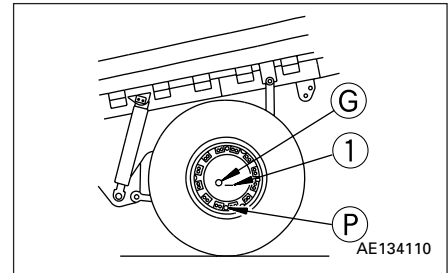
The oil is at high temperature after the engine has been operated, so never change the oil immediately after finishing operations.

Wait for the oil to cool down before starting the operation.

- Container to catch drained oil: Min. 31.5 ℓ capacity
 - Refill capacity: 31.5 ℓ (8.32 US gal, 6.93 UK gal)
1. Stop the machine so that casting line ① is horizontal and drain plug ② is at the bottom.
 2. Remove drain plug ②, drain the oil, then tighten the plug again.
 3. Add engine oil through the hole for plug ③ to the specified level.

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

4. After adding oil, check that the oil is at the specified level. See "24.4 EVERY 250 HOURS SERVICE".



24.7.4 CHANGE OIL IN DIFFERENTIAL CASE

⚠ WARNING

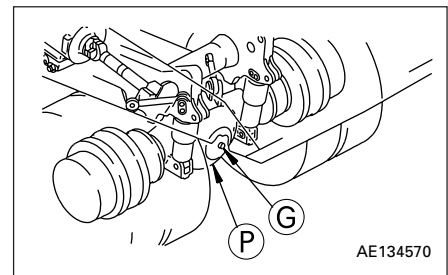
The oil is at high temperature after the engine has been operated, so never change the oil immediately after finishing operations.

Wait for the oil to cool down before starting the operation.

- Container to catch drained oil: Min. 95 ℓ capacity
 - Refill capacity: 95 ℓ (25.08 US gal, 20.90 UK gal)
1. Remove drain plug ②, drain the oil, then tighten the plug again.
 2. Add engine oil through the hole in plug ③ to the specified level.

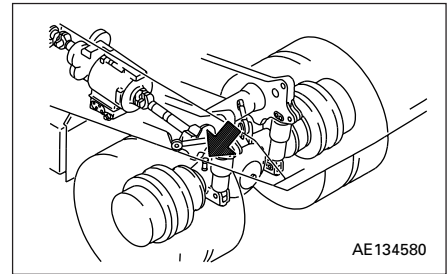
For details of the oil to use, see "20. USE OF FUEL, COOLANT, AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".

3. After adding oil, check that the oil is at the specified level. See "24.4 EVERY 250 HOURS SERVICE".



24.7.5 CLEAN DIFFERENTIAL CASE BREATHER

Remove the mud and dirt from around the breather, then remove the breather and wash out the dirt from inside with clean diesel oil or flushing oil.

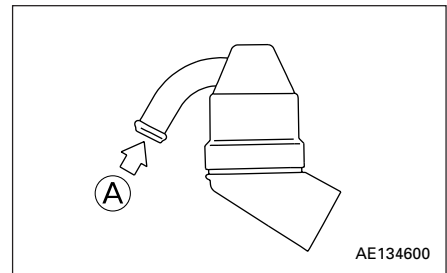
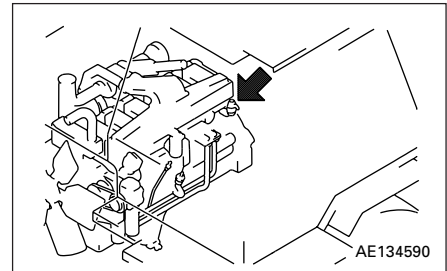


24.7.6 CLEAN ENGINE BREATHER ELEMENT

1. Wipe off the dirt from around the breather.
2. Remove the breather from the cylinder block.
3. Rinse the whole breather in diesel oil or flushing oil.
4. After washing, pass diesel oil through in the direction marked by the arrow (A).
5. Dry with compressed air, then coat the O-ring with engine oil, and install.

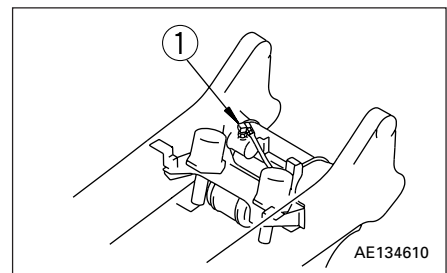
Check the element and O-ring, and replace them with new parts if necessary.

6. Check the breather hose, and if any deteriorated oil is stuck to the inside, replace the hose with a new hose.



24.7.7 REPLACE PLUG WITH STRAINER FROM MAKE-UP TANK OF REAR BRAKE CHAMBER

1. Change the oil in the rear brake cooling oil tank, and at the same time remove the hose and tee installed to the top of the make-up tank, then remove plug ① and replace it with a new plug.
2. Install the hose and tee to the top of the plug.
Replace this part every 2000 hours or every year, whichever comes sooner.
When replacing the plug, change the oil in the tank, then add the same type of oil as the brake cooling oil to fill to the top of the tank.



24.7.8 CLEAN EMERGENCY RELAY VALVE

Please contact your Komatsu distributor to have the valve disassembled and cleaned.

24.7.9 CHECK ALTERNATOR, STARTING MOTOR

The brush may be worn or there may be no grease on the bearing, so please contact your Komatsu distributor for inspection and repair.

If the engine is started frequently, have this inspection carried out every 1000 hours.

24.7.10 CHECK, ADJUST ENGINE VALVE CLEARANCE

Special tools are needed for the inspection and maintenance, so please contact your Komatsu distributor to have this work carried out.

24.7.11 CLEAN, CHECK TURBOCHARGER

Please contact your Komatsu distributor for cleaning and inspection.

24.7.12 CHECK PLAY OF TURBOCHARGER ROTOR

Please contact your Komatsu distributor for inspection of the rotor play.

24.7.13 REPLACE CRITICAL PARTS FOR PERIODICAL REPLACEMENT FROM SERVICE KIT

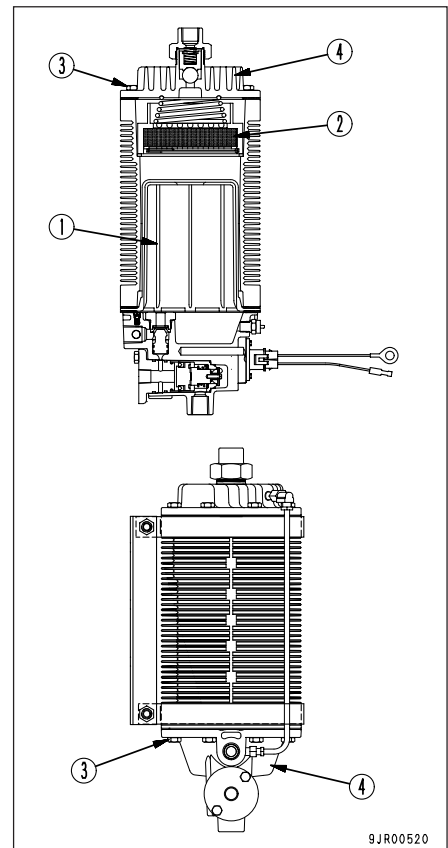
For details, see "22. PERIODIC REPLACEMENT OF SAFETY CRITICAL PARTS".

Please contact your Komatsu distributor for replacement of critical parts.

24.7.14 CLEAN AIR DRYER FILTER AND DEFLECTOR (if equipped)

Always clean once every 6 months regardless of the operating hours.

1. Remove bolt ③, then remove cap ④.
2. Disassemble deflector ① and filter ② and wash in diesel oil.



24.8 EVERY 4000 HOURS SERVICE

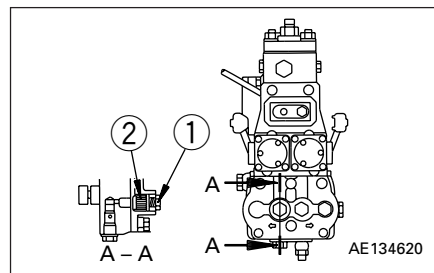
Carry out maintenance for **EVERY 50 HOURS, EVERY 250 HOURS, EVERY 500 HOURS, EVERY 1000 HOURS, and EVERY 2000 HOURS SERVICE** at the same time.

24.8.1 REPLACE INJECTION PUMP SCREEN FILTER (If equipped with electronic governor)

Remove injection pump cap ①, then replace screen filter ② with a new part.

The side of the screen filter with the holes is assembled facing the inside.

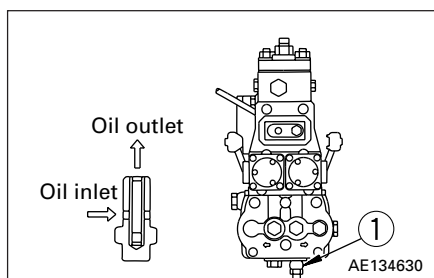
Tightening torque of cap ①: $22.1 \pm 2.45 \text{ N}\cdot\text{m}$ ($2.25 \pm 0.25 \text{ kgf}\cdot\text{m}$, $16.3 \pm 1.8 \text{ lbft}$)



24.8.2 CLEAN INJECTION PUMP OIL INLET STRAINER (If equipped with electronic governor)

1. Remove oil inlet strainer ①, soak the whole strainer in diesel oil, then rinse it clean.
2. Blow compressed air in through the oil discharge port at the tip of the strainer.

Repeat Steps 1 and 2 two or three times to clean the strainer.
Tightening torque of strainer ①: $11.3 \pm 1.47 \text{ N}\cdot\text{m}$
($1.15 \pm 0.15 \text{ kgf}\cdot\text{m}$, $8.3 \pm 1.1 \text{ lbft}$)



24.8.3 CHECK WATER PUMP

Check for play in the pulley, leakage of grease or water, or clogging of the drain hole. If any abnormality is found, contact your Komatsu distributor for disassembly and repair or replacement

24.8.4 REPLACE CRITICAL PARTS FOR PERIODICAL REPLACEMENT FROM SERVICE KIT

For details, see "22. PERIODIC REPLACEMENT OF SAFETY CRITICAL PARTS".

Please contact your Komatsu distributor for replacement of critical parts.

24.8.5 CHECK, ADJUST AIR COMPRESSOR

Ask your Komatsu distributor to carry out this work.

24.8.6 CHECK FAN PULLEY AND TENSION PULLEY

Check for play of the pulley and leakage of grease. If any abnormality is found, please contact your Komatsu distributor.

24.8.7 CHECK VIBRATION DAMPER

Check for any drop in the level of the damper fluid and for runout of the concave surface.

If there is any leakage of the damper fluid or dents, please contact your Komatsu distributor for repair.

24.9 EVERY 3 YEARS SERVICE

24.9.1 REPLACE SEAT BELT

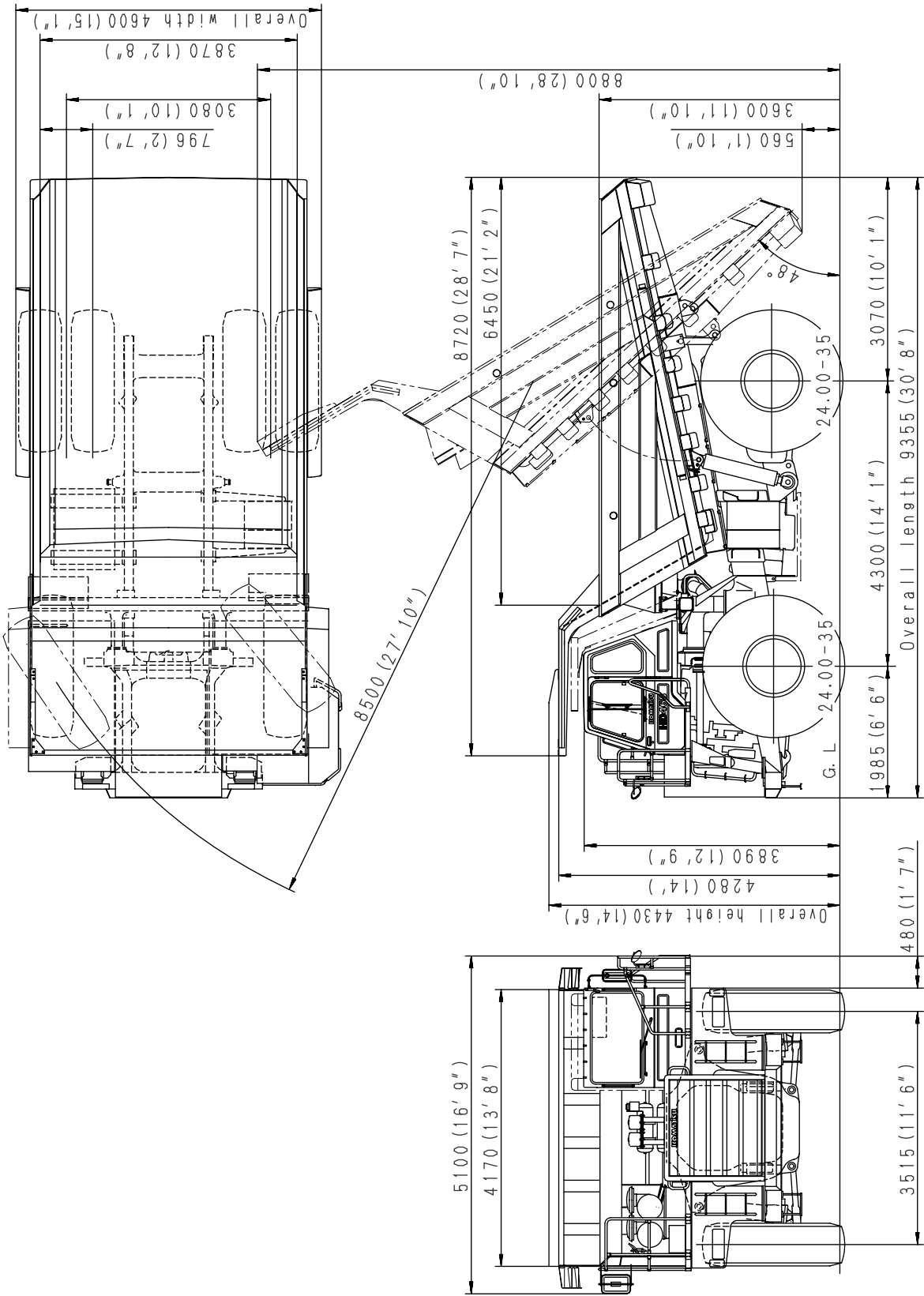
Replace the seat belt once every 3 years.

SPECIFICATIONS

25. SPECIFICATIONS

HD465-5

		Standard tire	Small size tire	
Weight				
● Overall weight (unladen weight + max. payload + 1 operator)		96175 kg (212066 lb)	85975 kg (189575 lb)	
● Unladen weight		41100 kg (90626 lb)	39900 kg (87980 lb)	
● Operator		75 kg (165 lb)		
Performance				
● Travel speed	FORWARD	1st	11.5 (7.1 MPH)	10.5 km/h (6.5 MPH)
		2nd	16.0 (9.9 MPH)	15.5 km/h (9.6 MPH)
		3rd	21.5 (13.4 MPH)	20.5 km/h (12.7 MPH)
		4th	29.5 (18.3 MPH)	28.0 km/h (17.4 MPH)
		5th	39.0 (24.5 MPH)	37.5 km/h (23.3 MPH)
		6th	52.5 (32.6 MPH)	50.5 km/h (31.4 MPH)
		7th	70.0 (43.5 MPH)	66.0 km/h (41.0 MPH)
	REVERSE	1st	9.0 (5.6 MPH)	8.5 km/h (5.3 MPH)
● Max. payload		55000 kg (121275 lb)	46000 kg (101430 lb)	
● Dump body capacity	Struck	25 m ³ (32.4 cu • yd)		
	Heaped	34.2 m ³ (44.3 cu • yd)		
● Dumping speed	(At 2000 rpm) (raised)	11.5 sec		
● Min. turning radius		8500 mm (27 ft 10 in)		
● Min. ground clearance (bottom of rear axle)		645 (2 ft 1 in)	555 mm (1 ft 10 in)	
Engine				
● Type	Komatsu SAA6D170E-2 diesel engine			
● Flywheel horsepower	551.63 kw (740 HP) 2000 rpm			
● Max. torque	3010 N•m (307 kgf•m, 2220 lbft)/1400 rpm			
● Starting motor	24V7.5kW x 2			
● Alternator	24V50A			
● Battery	12V200Ah x 2			
Sound level				
● Surrounding (sound power level L WA) dB(A)		78.5 dB(A)		
● Operator's (sound pressure level L PA) dB(A) measurement procedures described in ISO6394 or 86/622/EEC		79.5 dB(A)		
Vibration level				
● Hands/Arms	The weighted root mean square acceleration Measurement standards: ISO7096	4.27 m/S ²		
● Whole body		0.54 m/S ²		



AW63556B

25. SPECIFICATIONS

HD605-5

Weight

● Overall weight (unladen weight + max. payload + 1 operator)	106675 kg (235218 lb)
● Unladen weight	46600 kg (102753 lb)
● Operator	75 kg (165 lb)

Performance

● Travel speed	FORWARD	1st	11.5 (7.1 MPH)
		2nd	16.0 (9.9 MPH)
		3rd	21.5 (13.4 MPH)
		4th	29.5 (18.3 MPH)
		5th	39.0 (24.2 MPH)
		6th	52.5 (32.6 MPH)
		7th	70.0 (43.5 MPH)
	REVERSE	1st	9.0 (5.6 MPH)
● Max. payload			60000 kg (132300 lb)
● Dump body capacity	Struck		29 m ³ (37.6 cu • yd)
	Heaped (2 : 1)		40 m ³ (51.8 cu • yd)
● Dumping speed	(At 2000 rpm) (raised)		11.5 sec
● Min. turning radius			8500 mm (27 ft 11 in)
● Min. ground clearance (bottom of rear axle)			645 (2 ft 1 in)

Engine

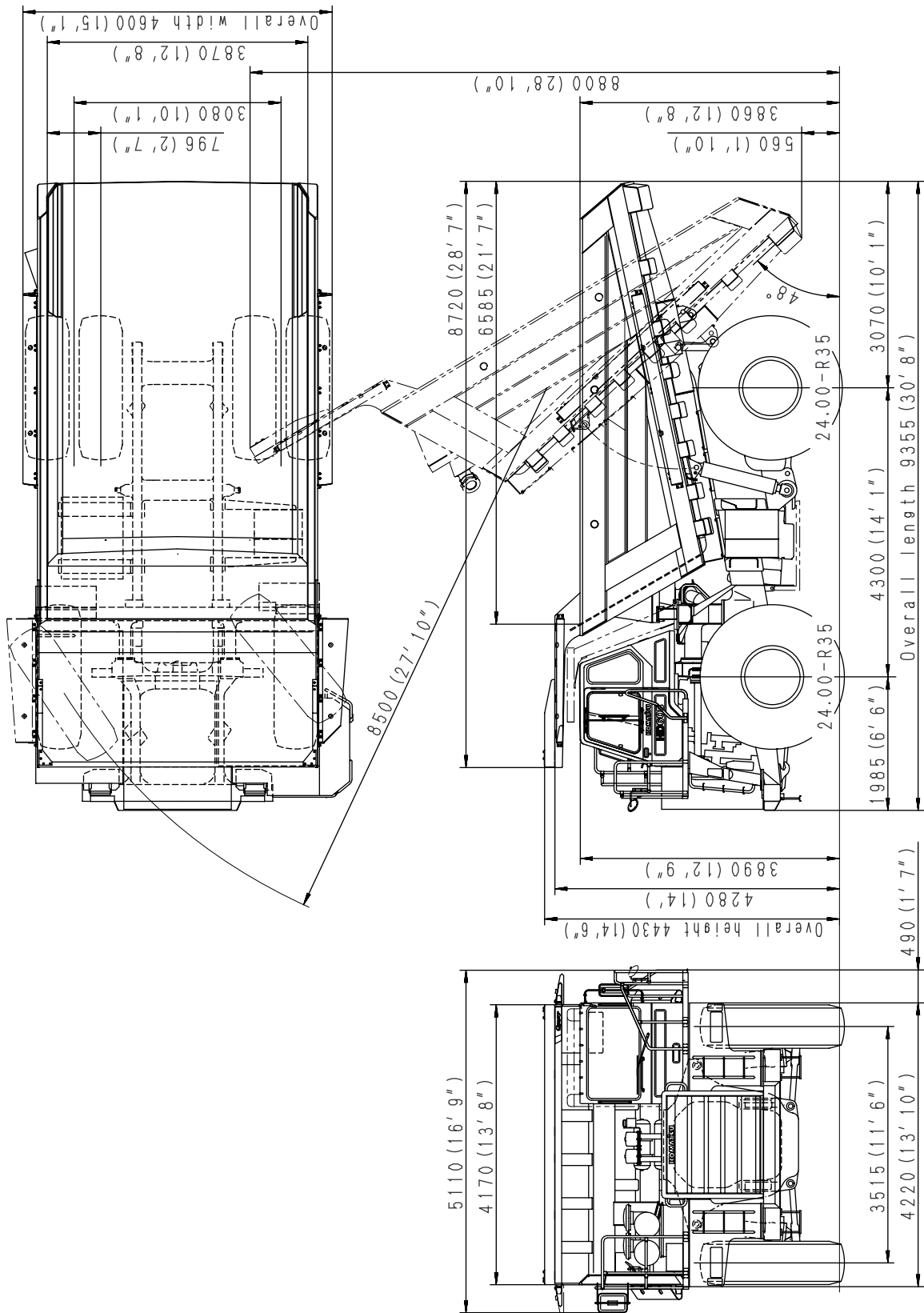
● Type	Komatsu SAA6D170E-2 diesel engine		
● Flywheel horsepower	551.63 kW (740 HP) 2000 rpm		
● Max. torque	3030 N•m (309 kgf•m, 2235 lbft)/1400 rpm		
● Starting motor	24 V 7.5 kW x 2 pieces		
● Alternator	24 V 50 A, 24 V 75 A (if equipped)		
● Battery	12 V 200 Ah x 2 pieces		

Sound level

● Surrounding (sound power level L WA) dB(A)	78.5 dB(A)
● Operator's (sound pressure level L PA) dB(A) measurement procedures described in ISO6394 or 86/622/EEC	79.5 dB(A)

Vibration level

● Hands/Arms	The weighted root mean square acceleration Measurement standards: ISO7096	4.27 m/S ²
● Whole body		0.54 m/S ²



AW63575B

OPTIONS, ATTACHMENTS

26. HANDLING PAYLOAD METER

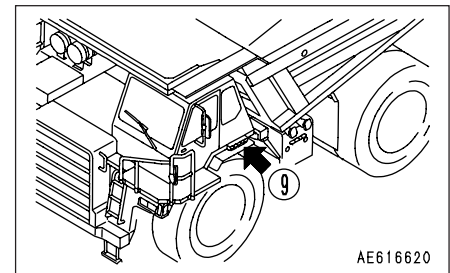
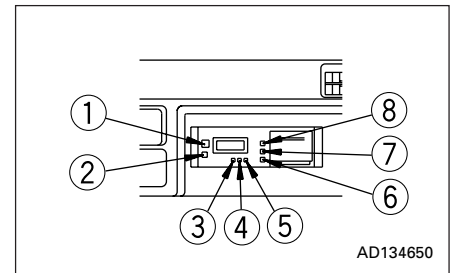
There are two types of payload meter: a card type and a printer type. The explanation for the payload meter given here is for the printer type. For details of handling the card type payload meter, see the separate operation manual for payload meter II.

The payload meter inputs the signals from the pressure sensors, clinometer, body float detection, neutral detection, and other signals, and calculates the weight of the load using its built-in micro computer. It displays the results on the panel and also uses the external display lamps to show the condition of the load.

In addition, the data saved in memory can be printed out together with the date the load was dumped and the number of loads.

26.1 NAME OF PARTS

1. Calibration switch
2. Night lighting dimmer switch
3. Clock setting adjustment switch
4. Clock adjustment shift switch
5. Clock adjustment increase switch
6. Memory data clear switch
7. Printer feed switch
8. Print switch
9. External display lamps



26.2 EXTERNAL DISPLAY LAMPS

● HD465-5

When the actual load is displayed, the lamps light up as follows.

Lamp 1 (green): Displays load between 14 tons and 21 tons

Lamp 2 (green): Displays load between 21 tons and 41 tons

Lamp 3 (green): Displays load between 41 tons and 51 tons

Lamp 4 (yellow): Displays load between 51 tons and 55 tons

Lamp 5 (red): Displays load over 55 tons

● HD605-5

When the actual load is displayed, the lamps light up as follows.

Lamp 1 (green): Displays load between 18 tons and 27 tons

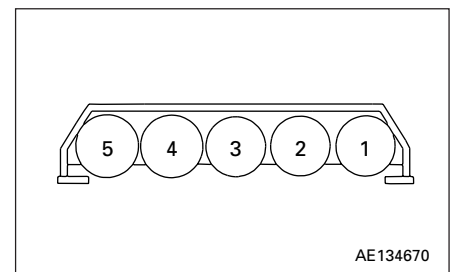
Lamp 2 (green): Displays load between 27 tons and 54 tons

Lamp 3 (green): Displays load between 54 tons and 60 tons

Lamp 4 (yellow): Displays load between 60 tons and 63 tons

Lamp 5 (red): Displays load over 63 tons

- If the gear shift lever is not at neutral and the dump lever is not at the FLOAT position, none of the display lamps light up.
- All the lamps light up for 10 seconds after the power is turned ON.
- To prevent overloading, use the lamps for loading up to the point where the 3 green lamps light up.



26.2.1 PREDICTION DISPLAY

- The weight of the load changes in stages as each bucket is emptied into the dump body. The average weight of the load up to that point is calculated to predict what the weight of the load will be if one more bucket is loaded. The appropriate lamp flashes, so it is possible to adjust the weight of the next load when operating the loader.

The prediction display for the load level and the actual load display are shown at the same time.

Example:

HD465-5

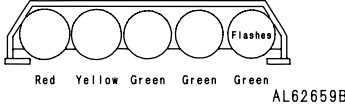
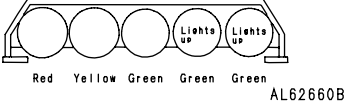
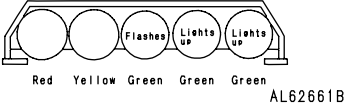
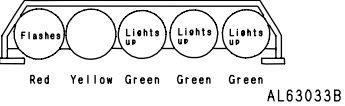
1st bucket: 10 tons

2nd bucket: 12 tons (22 tons)

3rd bucket: 12 tons (34 tons)

4th bucket: 11 tons (45 tons)

If the load changes as above, the external display lamps will give the display in the table below.

No. of loads	External display lamp	Remarks
1st bucket		<ul style="list-style-type: none"> The weight actually loaded is 10 tons, so no lamp lights up. The predicted load is 20 tons (10 tons x 2), so the first green lamp flashes
2nd bucket		<ul style="list-style-type: none"> The weight actually loaded is 22 tons (10 tons + 12 tons), so two green lamps light up. The predicted load is 33 tons (22 tons + 22/2 tons), so no lamp flashes.
3rd bucket		<ul style="list-style-type: none"> The weight actually loaded is 34 tons (22 tons + 12 tons), so two green lamps stay lighted up. The predicted load is 45.3 tons (34 tons + 34/3 tons), so the 3rd lamp flashes.
4th bucket		<ul style="list-style-type: none"> The weight actually loaded is 45 tons (34 tons + 11 tons), so three green lamps light up. The predicted load is 56.3 tons (45 tons + 45/4 tons), so the red lamp flashes.

26. HANDLING PAYLOAD METER

Example:

HD605-5

1st bucket: 12 tons

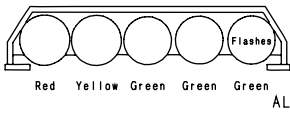
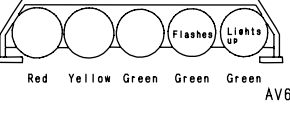
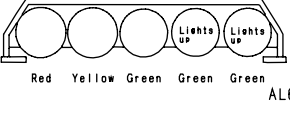
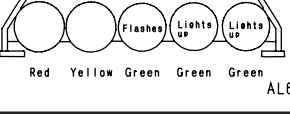
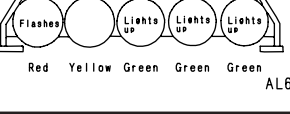
2nd bucket: 11 tons (23 tons)

3rd bucket: 12 tons (35 tons)

4th bucket: 12 tons (47 tons)

5th bucket: 13 tons (60 tons)

If the load changes as above, the external display lamps will give the display in the table below.

No. of loads	External display lamp	Remarks
1st bucket	 <p style="text-align: center;">Red Yellow Green Green Green AL62659B</p>	<ul style="list-style-type: none"> ● The weight actually loaded is 12 tons, so no lamp lights up. ● The predicted load is 24 tons (12 tons x 2), so the first green lamp flashes
2nd bucket	 <p style="text-align: center;">Red Yellow Green Green Green AV61982B</p>	<ul style="list-style-type: none"> ● The weight actually loaded is 23 tons (12 tons + 11 tons), so the first green lamps light up. ● The predicted load is 34.5 tons (23 tons + 23/2 tons), so 2nd lamp flashes.
3rd bucket	 <p style="text-align: center;">Red Yellow Green Green Green AL62660B</p>	<ul style="list-style-type: none"> ● The weight actually loaded is 35 tons (23 tons + 12 tons), so two green lamps light up. ● The predicted load is 46.6 tons (35 tons + 35/3 tons), so no lamp flashes.
4th bucket	 <p style="text-align: center;">Red Yellow Green Green Green AL62661B</p>	<ul style="list-style-type: none"> ● The weight actually loaded is 47 tons (35 tons + 12 tons), so two green lamps stay lighted up. ● The predicted load is 58.8 tons (47 tons + 47/4 tons), so the 3rd lamp flashes.
5th bucket	 <p style="text-align: center;">Red Yellow Green Green Green AL63033B</p>	<ul style="list-style-type: none"> ● The weight actually loaded is 60 tons (47 tons + 13 tons), so three green lamps light up. ● The predicted load is 72 tons (60 tons + 60/5 tons), so the red lamp flashes.

26.3 OPERATING PAYLOAD METER

Resetting power (the power can be reset by turning the power ON.)

- The display for the first 3 seconds is 88:88, and after that, the time is displayed for 7 seconds.
- After 10 seconds, the normal display is given.
- The printer feeds one line of paper and stops at the home position.

26.3.1 CONTENT OF DISPLAY

- When the dump lever is at FLOAT and the shift lever is at neutral, the actual load is displayed.
- When the load is less than 3.9 tons, or if the dump lever is not at FLOAT, the display is 0.
- If the dump lever is at FLOAT but the shift lever is not at neutral, the time display is given.
A maximum of 200 cycles of data can be written to memory. If this level is exceeded, FULL is displayed. If FULL is displayed, print out the data and clear the data from the memory. For details, see "DELETING DATA FROM MEMORY".
- After completion of operations, we recommend that you stop the machine, print out the data, and clear the data from memory.
- There may be a slight change between the load displayed at the loading point and the load displayed at the dumping point.
- Save the data to memory when the dump lever is raised.
When the machine is completely stopped, it is possible to carry out accurate calculation if the load is dumped when the swaying of the machine has completely stopped. We recommend that the slope at the dumping point be kept to within $\pm 5^\circ$.
- When the value displayed by the payload meter becomes stable, move the dump lever to the RAISE position. If the machine is still swaying violently when the dump lever is moved to the RAISE position, ***** is printed when the print out is made.
- When the dump lever is returned from LOWER to FLOAT, wait for at least 5 seconds before turning the starting switch OFF.

26.3.2 OPERATION OF SWITCHES

WHEN CARRYING OUT CALIBRATION

Carry out calibration at the following times.

- When the machine is delivered, and once every month after that.
- When the gas pressure and oil have been adjusted in the suspension cylinder.
(When the suspension has been adjusted.)
- When the machine has been modified and the unladen weight has changed more than 100 kg.
- When the suspension pressure sensor has been replaced.
- When other modifications have been made around the suspension.
- When the built-in battery has been replaced.
- When CAL is displayed.

METHOD OF CARRYING OUT CALIBRATION

1. Set the machine with the dump body empty.
2. Place the shift lever at the N position, and press calibration switch ① for at least 2 seconds. (The letters CAL flash)
3. Drive the machine slowly and when the travel speed reaches approx. 10 km/h (6.2 MPH), press calibration switch ① again. (The letters CAL light up) The display returns to the time display to show that the operation is completed.

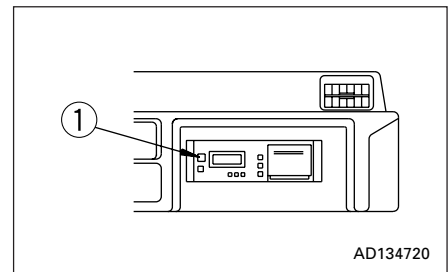
Carry out calibration on a flat even road surface.

Travel in a straight line. (Distance: Approx. 100 m (328 ft))

Keep the machine traveling at a constant travel speed.

The calibration data are written to the internal RAM, and are retained even when the power is turned off.

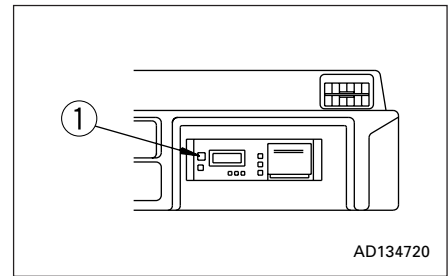
To stop the calibration operation (when in neutral), press calibration switch ① again. The display will change from a flashing CAL to a flashing SCH. When calibration switch ① is pressed again, the display will return to the normal display.



CARRYING OUT SENSOR CHECK

1. Drive the machine unloaded on flat ground.
2. Set the shift lever to N and press calibration switch ① for at least 2 seconds, then press calibration switch ① again for at least 2 seconds. (The letters SCH will flash)
3. When traveling at a speed of approx. 10 km/h (6.2 MPH), press calibration switch ① again. (The letters SCH will light up) If the display returns to the time display, the operation is completed. If there is an abnormality in any sensor, the error code is displayed.

Carry out the sensor check at least once every month.

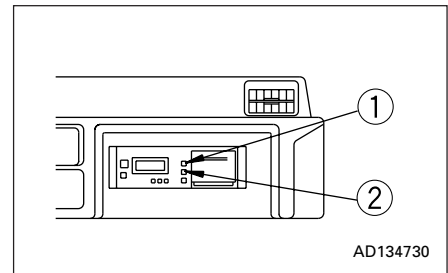
**PRINTING OUT**

1. When print out switch ① is pressed for at least 2 seconds, the data are printed out.

To stop the print during the printout, press the print switch again for at least 2 seconds.

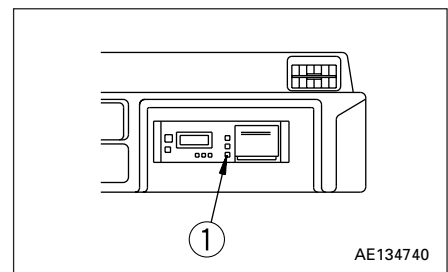
Do not hold the paper coming out from the printer during the printout. This will cause the print to overlap.

2. When print feed switch ② is pressed for at least 2 seconds, the paper is fed.

**DELETING DATA FROM MEMORY**

1. Print out the necessary data before clearing the memory.
2. Press memory data clear switch ① for at least 2 seconds. (The letters CLEA will flash)
3. Press memory data clear switch ① again for at least 2 seconds to completely clear the memory.

After completion of operations, we recommend that you stop the machine, print out the data, and clear the data from memory.

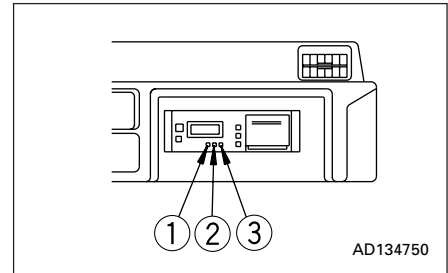


RESETTING TIME

⚠ WARNING

Never try to reset the time when traveling.

1. When time set adjustment switch ① is pressed for at least 2 seconds, the minute display will flash. Press time adjustment increase switch ③ to set the minute display correctly.
2. When time adjustment switch ② is pressed for at least 2 seconds, the hour display will flash. Press time adjustment increase switch ③ to set the hour display correctly.
3. Following this, each time that time adjustment switch ② is pressed, the flashing point changes to day, month, and year. Press time adjustment increase switch ③ to correct any item that needs correcting.
4. After setting the time correctly, press time set adjustment switch ①.



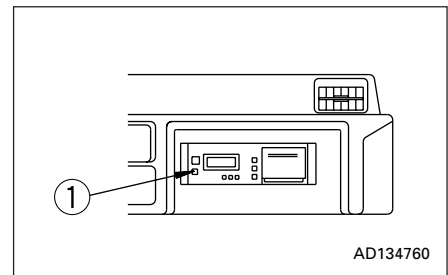
OPERATING LIGHTING DIMMER SWITCH

To change the brightness of the display, do as follows.

1. Each time dimmer switch ① is pressed, the lighting becomes one stage dimmer. If the switch is pressed again after it reaches the dimmest level, it will change to the brightest level.

The brightness can be changed in 10 stages.

If it is pressed continuously, the brightness will change continuously.



SETTING PAPER IN PRINTER

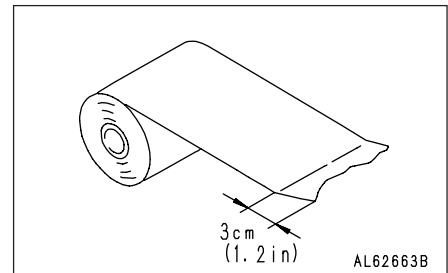
When there is only 30 cm (12 in) of paper remaining in the printer, a red line will appear on the left edge to show that it is time to replace the paper.

Press the FEED switch to feed out the remaining paper.

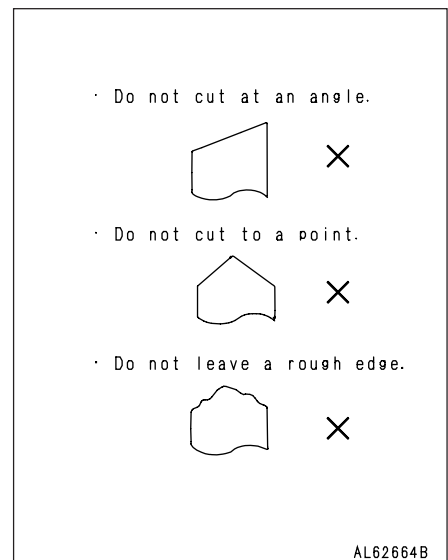
Never try to pull the paper out forcibly.

Always use Komatsu genuine printer paper (7818-27-2910).

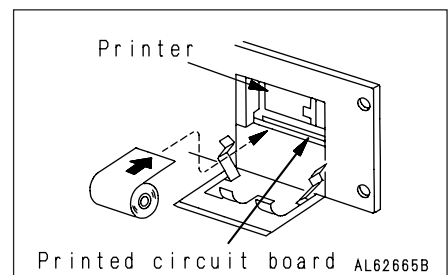
1. Open the roll of printer paper, fold the paper at a point approx. 3 cm (1.2 in) from the end of the paper, then cut the paper straight along the fold.



Never cut the paper in the way shown on the right. It will cause the paper to jam.



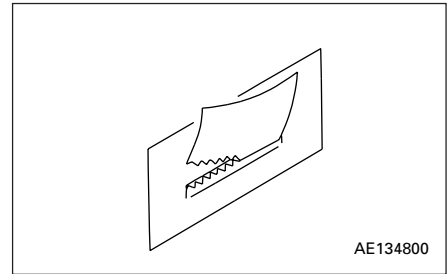
2. Set the print paper with the printing side facing up, and insert it straight into the paper feed hole. If the FEED switch is pressed while feeding in the paper, the paper will feed automatically.
3. When the paper comes out from the printer, pass it through the slit in the lid of the printer, then close the lid.



METHOD OF CUTTING PRINTER PAPER

1. Press the FEED switch to feed the paper out to the necessary position.
2. Put the paper in contact with the cutter on the lid, then pull up to cut the paper from one side to the other.

Do not pull the paper out and cut it without using the paper cutter.



STORING PRINTER PAPER

The printer paper is thermal paper, so store it in a place where the temperature range is between 0°C and 40°C.

Do not keep it in a place exposed to direct sun light.

IF ERROR MESSAGE E-33 IS DISPLAYED

When the starting switch key is turned to the OFF position, the payload meter uses the internal battery to prevent the load data from being deleted.

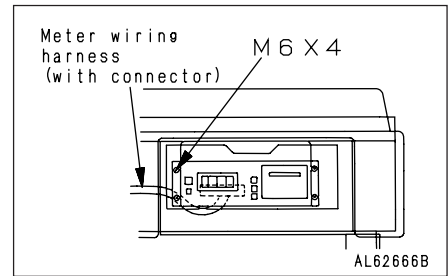
If the battery voltage drops, error message E-33 is displayed, so replace the battery as follows.

Replacing battery

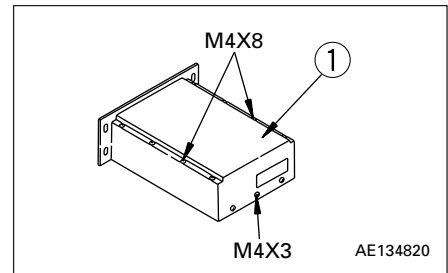
Move the machine to a place where it is safe to carry out the replacement operation.

- Parts to prepare
 - Crosshead screwdriver
 - Socket wrench (for M4 nut)
 - New battery (7818-27-2860)
1. Turn the starting switch key to the ON position, press the PRINT switch for at least 2 seconds, and print out the load data from memory.
Do not start the engine when doing this.
 2. Turn the starting switch back to the OFF position.

- Remove the screws (M6 x 4) holding the payload meter, then pull the payload meter out to the front.



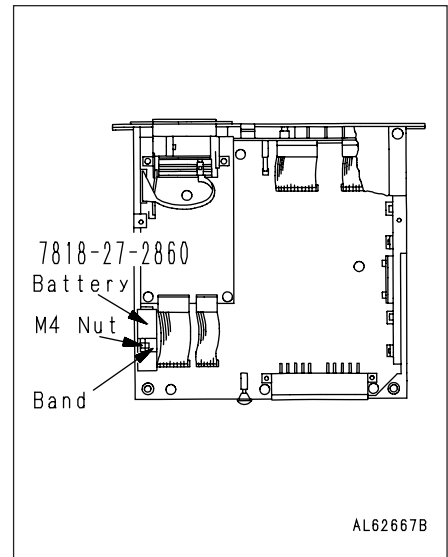
- Remove the connectors, remove the screws (top: M4 x 8, rear: M4 x 3) of top cover ① of the payload meter, then remove top cover ①.



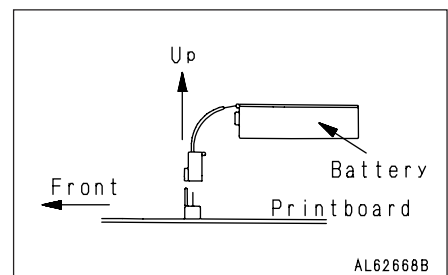
- Remove the nut (M4) and the band holding the battery.

Do not wear gloves when carrying out this operation.

Be careful not to let dirt, dust, or metal particles get inside the controller. Be careful not to drop any nuts or washers inside the controller.



- Pull the battery connectors up directly from the printboard to remove them.
- Push the connectors of the new battery down straight to connect them to the printboard.
- Fit the battery band, then fix the battery to the payload meter with the nut (M4) and washer (flat spring).



Check that the battery has not moved out of position.

- Install the top cover.

10. Install the payload meter to its original position on the panel.

After replacing the battery, do as follows.

- 1) Turn the starting switch to the ON position.
- 2) Press the memory data clear switch twice to delete the data from memory. (The first time, it will flash; the second time, it will light up and then display the load.)
- 3) Carry out calibration.
- 4) After carrying out calibration, operate the dump lever once FLOAT → LOWER → FLOAT with the dump body empty.

Replace the battery within 48 hours.

The life of the battery is approx. 2 years.

OPERATION AFTER REPLACING CONTROLLER

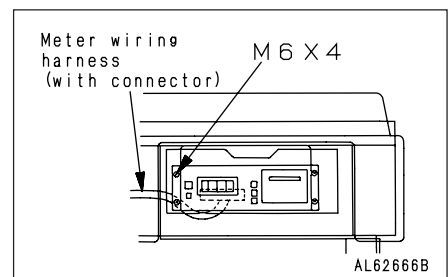
After replacing the controller, always carry out calibration, and operate the dump lever FLOAT→ LOWER → FLOAT with the dump body empty.

IF ERROR MESSAGE PAPE FLASHES (PAPER JAM) NOTICE

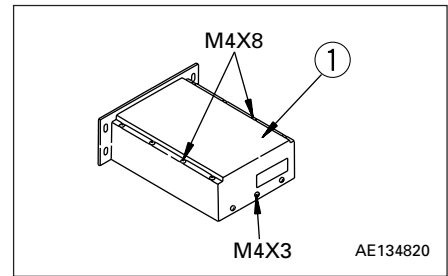
- **Never touch the printer head (white). If the printer head is removed, it is impossible to install it again.**
- **Always be extremely careful not to let any dust or metal particles inside the controller.**

If the paper jams, PAPE is displayed on the payload meter load display, so move the machine to a safe place and clear the paper jam as follows.

1. Turn the starting switch key to the OFF position.
2. Remove the screws (M6 x 4) holding the payload meter, then pull the payload meter out to the front.



3. Remove the connectors, remove the screws (top: M4 x 8, rear: M4 x 3) of top cover ① of the payload meter, then remove top cover ①.



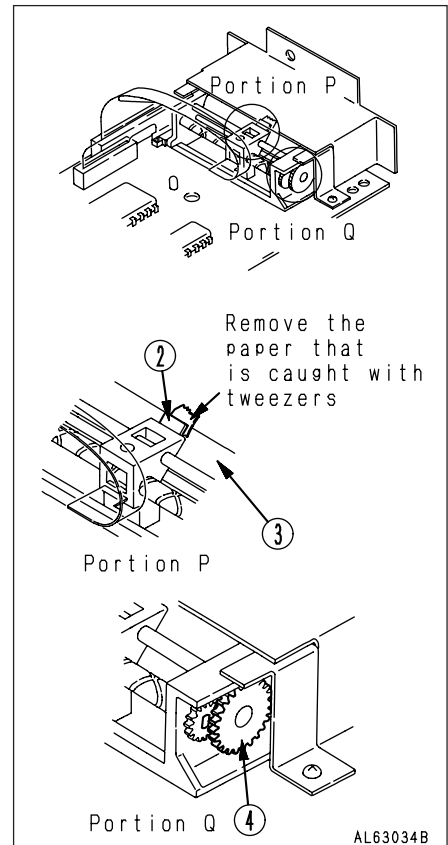
4. Use tweezers to remove the paper caught between printer head ② and guide ③.

Do not wear gloves when carrying out this operation.

When using tweezers to remove the jammed paper, press the guide with your finger to make a clearance between the printer head and guide to make it easier to remove the paper.

If there is any paper remaining immediately under the printer head, turn gear ④ with the flat of your fingers to move the head. If gear ④ is turned counterclockwise, the head will move to the right.

5. After removing the paper, install the connectors before installing the top cover.



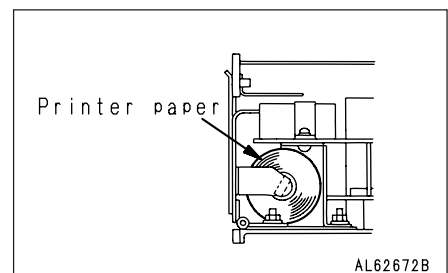
6. Remove the printer paper remaining inside the printer, and cut the leading end of the paper.

For details of the method of cutting the end of the paper, see "Method of cutting printer paper".

7. Turn the starting switch key to the ON position, and press the FEED switch.


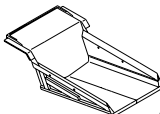
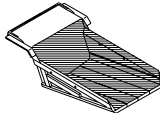
For details of the method of inserting the paper, see "Setting paper in printer".

8. Turn the starting switch key to the OFF position, remove the connectors, then assemble to the original condition.



27. SELECTING DUMP BODY

Select the dump body from the following table. (HD465-5 only)

Purpose	Body type	Features	Body shape
Transporting rocks	Rock body	<ul style="list-style-type: none"> A liner is installed to the whole inside surface of the dump body to allow the loading of crushed rock, coal, or timber. Example: Coal mine 	 <small>AE134880</small>
Transporting soil or sand	Linerless body	<ul style="list-style-type: none"> This is suitable for jobsites where soil or sand is loaded. No liner is installed. Example: Loading loose soil for landfills 	 <small>AE134890</small>
(Special specification) Transporting rubble	Rubber liner body	<ul style="list-style-type: none"> This is suitable for jobsites where rubble or large rocks are loaded. A rubber liner is installed. This is also effective in reducing noise when loading. Example: Jobsites handling rubble 	 <small>AE134900</small>

※: It is possible to install a side extension (if equipped) to these dump bodies.

28. OPTIONS AND ATTACHMENTS

High speed fuel supply system

This can be installed directly to the fuel tank and reduces the time taken to charge the fuel supply hose with fuel.

Tire chain

This is used to prevent the tires from slipping on snow or ice.

Radiator curtain

This is used to control the wind flow to the radiator to prevent overcooling when working in cold weather.

Body liner

This is a plate used to reinforce the inside surface of the dump body when loading large rocks or steel.

PLM II (Card-type payload meter)

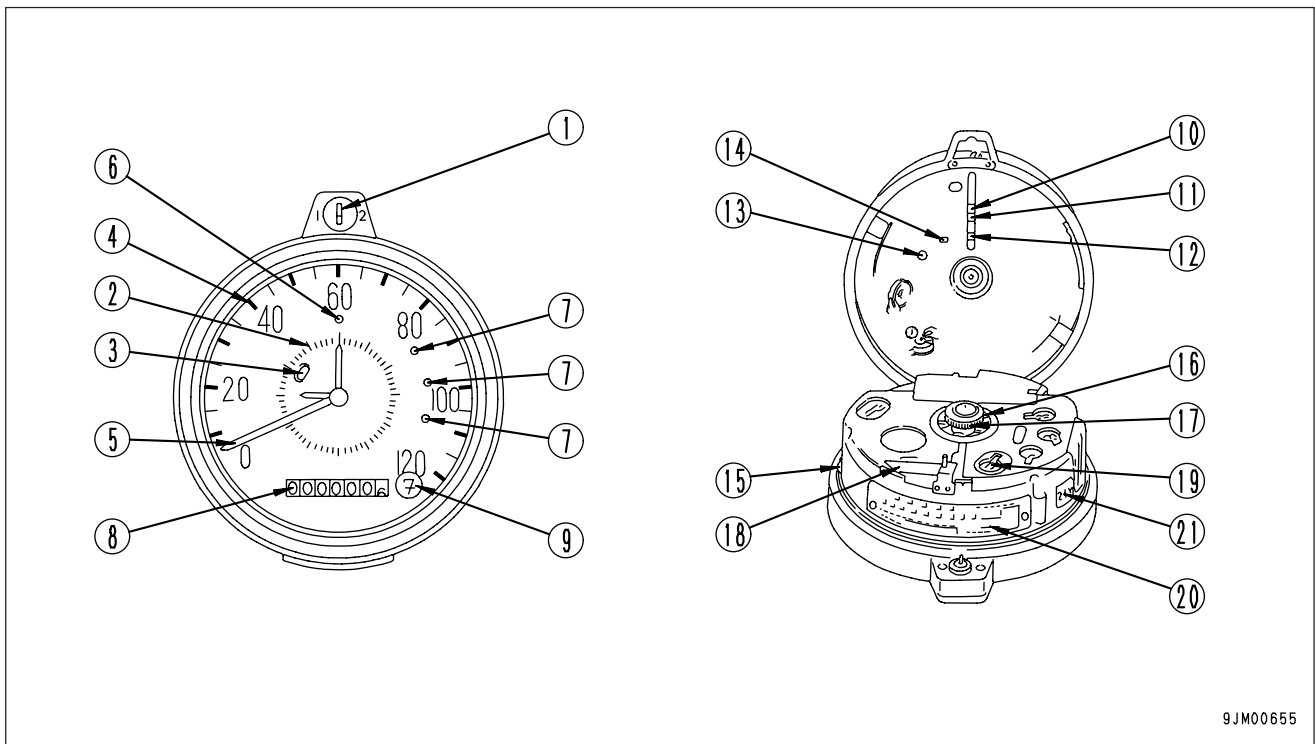
For operation, see the separate manual for PLM II (Card-type payload meter).

- **Spare rim**
- **Spare tire**
- **Body extension (HD465-5 only)**
- **Fog lamp**

Please contact your Komatsu distributor for details.

29. TACHOGRAPH (TCO 15-6)

29.1 EXPLANATION OF COMPONENTS



9JM00655

1. INSTRUMENT LOCK

This can be used for the instrument lock key when replacing the charts, or for operator change identification keys 1 and 2.

2. CLOCK DIAL

One line indicates one minute.

3. CLOCK OPERATION CONFIRMATION APERTURE

It is possible to check the action of the second hand when the clock is working.

4. SPEED SCALE

This is the scale for the machine travel speed.

5. SPEED INDICATOR

This indicates the machine travel speed.

6. SPEED WARNING LAMP

When the machine exceeds the maximum set speed, the lamp lights up to warn the operator.

Models with the speed warning lamp do not have the speed indication confirmation lamp.

7. SPEED INDICATION CONFIRMATION LAMP

This is interconnected with the speedometer and is used to confirm the speed indication. When using the confirmation switch to light up the confirmation lamp during checks before starting, always check for any disconnection in the three indication confirmation lamps.

Models with the speed indication confirmation lamp do not have the speed warning lamp.

8. ODOMETER

This displays the total distance (km) traveled by the machine.

9. PERIOD INDICATING LABEL

This indicates that it is for 7 days.

10. SPEED RECORDING STYLUS

This records the momentary speed of the machine on the chart.

11. OPERATOR CHANGE RECORDING STYLUS

When the operator change key is used, the operator change is recorded on the chart.

12. TRAVEL DISTANCE RECORDING STYLUS

This records the distance travel by the machine on the chart. One up-and-down recording motion is 10 km.

13. ADJUSTMENT SCREW FOR SPEED WARNING LAMP

The speed at which the lamp gives a warning can be set as desired.

14. SPEED CONFIRMATION APERTURE FOR SPEED WARNING LAMP INDICATION

This is the speed indication aperture for setting the desired speed.

15. CLOCK SETTING KNOB

Turn clockwise to advance the hand, and counterclockwise to turn the hand back.

16. CHART SUPPORT

This is the rotating part of the clock and has teeth to prevent the chart from slipping.

17. PRESSING RING

This is a ring that presses the chart and holds it against the chart support.

18. CUTTING KNIFE

This knife cuts the tape connecting the charts.

19. INSTRUMENT LIGHTING LAMP

20. NAME PLATE

This indicates the type and model.

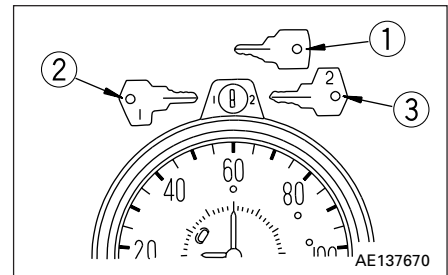
21. VOLTAGE INDICATION LABEL

29.2 METHOD OF USING KEY

There are three types of key. Key ① with no mark is used for opening and locking the instrument. Key ② (marked with No. 1) is change key ①, and key ③ (marked with No. 2) is change key ②. With these three keys, it is possible to know the details of the operation and the change of operator. To use the change key, remove the instrument lock key and insert change key ① in the same key hole, then turn 45° in the No. 1 direction. Use change key ② in the same way and turn to the No. 2 direction

The change key will only turn in the direction of its number.

The change keys cannot be used to open the instrument.



Recording width of chart

When using key with no mark: 1.45 mm (0.057 in)

When using key with No. 1 mark: 2.15 mm (0.085 in)

When using key with No. 2 mark: 0.7 mm (0.028 in)

29.3 METHOD OF USE

1. Checking operation of clock

Watch through clock operation confirmation aperture ① to confirm that the clock is working.

The clock is electric, so there is no need to wind it up.

2. Opening the cover

Insert the instrument lock key in hole ②, turn counterclockwise 90°, then pull open carefully.

The cover can be opened approx. 115°. Do not open it further than that, or pull it strongly, or put anything heavy on the cover, as these will cause failures.

3. Setting the time

Turn time setting knob ③ to set the time.

Precautions when setting time

Always set the time with the time setting knob. Turn the hand in the direction of rotation 10 minutes beyond the correct time, then turn back to the correct time.

4. Filling in chart

Before inserting new chart paper, always fill in the required items. (Operator code No., machine code No., date, etc.)

Fill in the above items with a steel pen.

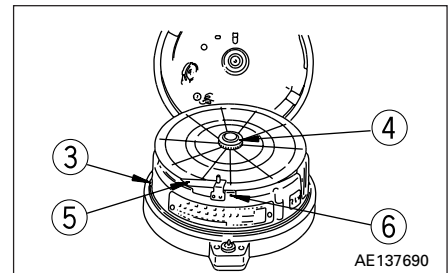
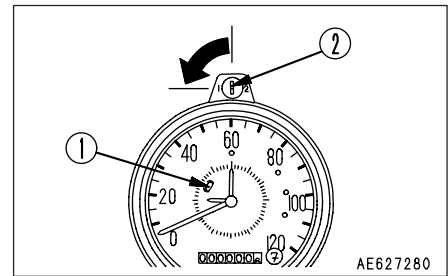
Handle the charts carefully with clean hands, and do not fold or scratch them.

5. Removing used charts

Push down the clamp and pressing ring ④ holding the charts, turn counterclockwise, and pull out the pressing ring at the point where it contacts the stopper, then remove the charts.

6. Inserting new charts

Remove pressing ring ④, then set the charts under cutting knife ⑤. When doing this, align the time on the charts (for example when the starting time is 9 am) exactly with red point ⑥ on the instrument body.



Precautions when replacing the charts

When aligning the charts with the center of the chart support, do not force them into position or use your finger to make the hole in the center of the chart paper larger. If the size of the hole changes, it may cause an error in the recording.

Stop the engine completely before inserting the new charts.

Use Komatsu genuine charts (P/N: YZ762929-980) for 90 km/h (55.9 MPH) 7 days.

7. Closing the cover

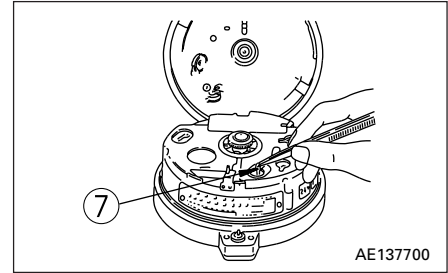
Lift up the cover to close it, then turn the instrument lock key 90° clockwise.

Replacing instrument lighting lamp bulb

Raise contact piece ⑦, and take out the old bulb with a pincette. It comes out easily.

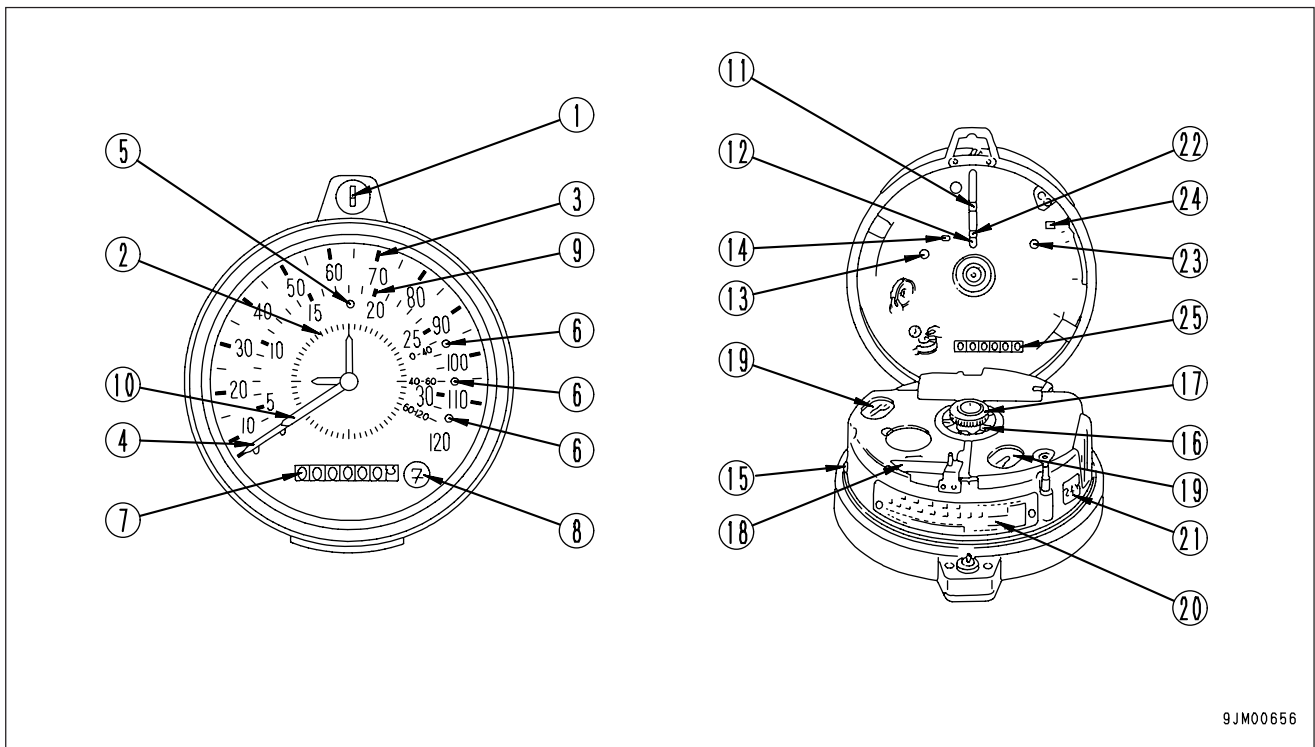
After replacing, check that the contact piece is holding down the lamp base firmly.

Use a 24 V bulb.



30. REVO TACHOGRAPH (TCO 15-7)

30.1 EXPLANATION OF COMPONENTS



9JM00656

1. INSTRUMENT LOCK

This can be used for the key to open when replacing the chart.

2. CLOCK DIAL

One line indicates one minute.

3. SPEED SCALE

This is the scale for the machine travel speed.

4. SPEED INDICATOR

This indicates the machine travel speed.

5. SPEED WARNING LAMP

When the machine exceeds the maximum set speed, the lamp lights up to warn the operator.

Models with the speed warning lamp do not have the speed indication confirmation lamp.

6. SPEED INDICATION CONFIRMATION LAMP

This is interconnected with the speedometer and is used to confirm the speed indication. When using the confirmation switch to light up the confirmation lamp during checks before starting, always check for any disconnection in the three indication confirmation lamps.

Models with the speed indication confirmation lamp do not have the speed warning lamp.

7. ODOMETER

This displays the total distance (km) traveled by the machine.

8. PERIOD INDICATING LABEL

This indicates that it is for 7 days.

9. RPM SCALE

This is the scale for the momentary speed in revolutions per minute (rpm).

10. RPM INDICATOR

This shows the momentary speed in revolutions per minute (rpm).

11. SPEED RECORDING STYLUS

This records the momentary speed of the machine on the chart.

12. TRAVEL DISTANCE RECORDING STYLUS

This records the distance travel by the machine on the chart. One up-and-down recording motion is 10 km.

13. ADJUSTMENT SCREW FOR SPEED WARNING LAMP

The speed at which the lamp gives a warning can be set as desired.

14. SPEED CONFIRMATION APERTURE FOR SPEED WARNING LAMP INDICATION

This is the speed indication aperture for setting the desired speed.

15. CLOCK SETTING KNOB

Turn clockwise to advance the hand, and counterclockwise to turn the hand back.

16. CHART SUPPORT

This is the rotating part of the clock and has teeth to prevent the chart from slipping.

17. PRESSING RING

This is a ring that presses the chart and holds it against the chart support.

18. CUTTING KNIFE

This knife cuts the tape connecting the charts.

19. INSTRUMENT LIGHTING LAMP

20. NAME PLATE

This indicates the type and model.

21. VOLTAGE INDICATION LABEL

22. RPM RECORDING STYLUS

This records the momentary engine speed on the chart.

23. ADJUSTMENT SCREW FOR RPM WARNING LAMP

The speed at which the lamp gives a warning can be set as desired.

24. SPEED CONFIRMATION APERTURE FOR RPM WARNING LAMP INDICATION

This is the speed indication aperture for setting the desired speed of revolution.

25. TOTAL REVOLUTION COUNTER

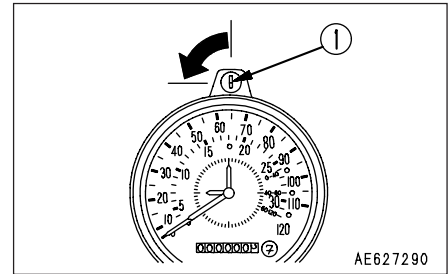
This indicates the total number of revolutions (x1000) of the engine.

30.2 METHOD OF USE

1. Opening the cover

Insert the instrument lock key in hole ①, turn counterclockwise 90°, then pull open carefully.

The cover can be opened approx. 115°. Do not open it further than that, or pull it strongly, or put anything heavy on the cover, as these will cause failures.



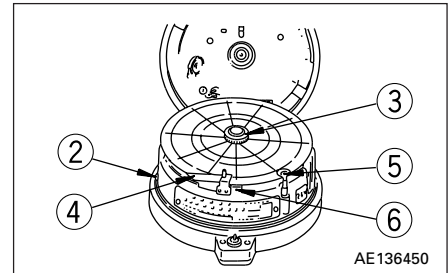
2. Setting the time

Turn time setting knob ② to set the time.

Precautions when setting time.

Always set the time with the time setting knob. Turn the hand in the direction of rotation 10 minutes beyond the correct time, then turn back to the correct time.

Check the operation of the clock by watching the movement of the minute hand. The clock is electric, so there is no need to wind it up.



3. Filling in chart

Before inserting new chart paper, always fill in the required items. (Operator code No., machine code No., date, etc.)

Fill in the above items with a steel pen.

Handle the charts carefully with clean hands, and do not fold or scratch them.

4. Removal of old charts

A protection chart or normally recorded chart is installed to protect the recording stylus in the cover. To remove the charts, push down the clamp and pressing ring ③ holding the charts, turn counterclockwise, and pull out the pressing ring at the point where it contacts the stopper, then remove the charts.

Handle the charts carefully with clean hands, and do not fold or scratch them.

5. Inserting new charts

Remove pressing ring ③, then set the charts under cutting knife ④, and below fan-shaped rotating transfer shaft ⑤ on the right. When doing this, align the time on the charts (for example when the starting time is 9 am) exactly with red point ⑥ on the instrument body.

Precautions when replacing the charts

When aligning the charts with the center of the chart support, do not force them into position or use your finger to make the hole in the center of the chart paper larger. If the size of the hole changes, it may cause an error in the recording.

Stop the engine completely before inserting the new charts.

Use Komatsu genuine charts (P/N: YZ762929-730) for 90 km/h (55.9 MPH) 7 days.

6. Closing the cover

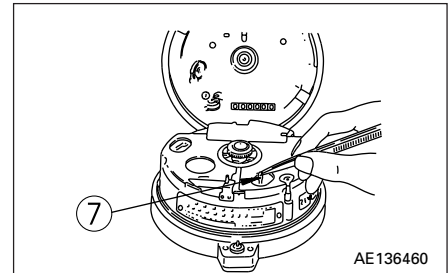
Lift up the cover to close it, then turn the instrument lock key 90° clockwise. When operating, please remove the instrument lock key.

Replacing instrument lighting lamp bulb

Raise contact piece ⑦, and take out the old bulb with a pincette. It comes out easily.

After replacing, check that the contact piece is holding down the lamp base firmly.

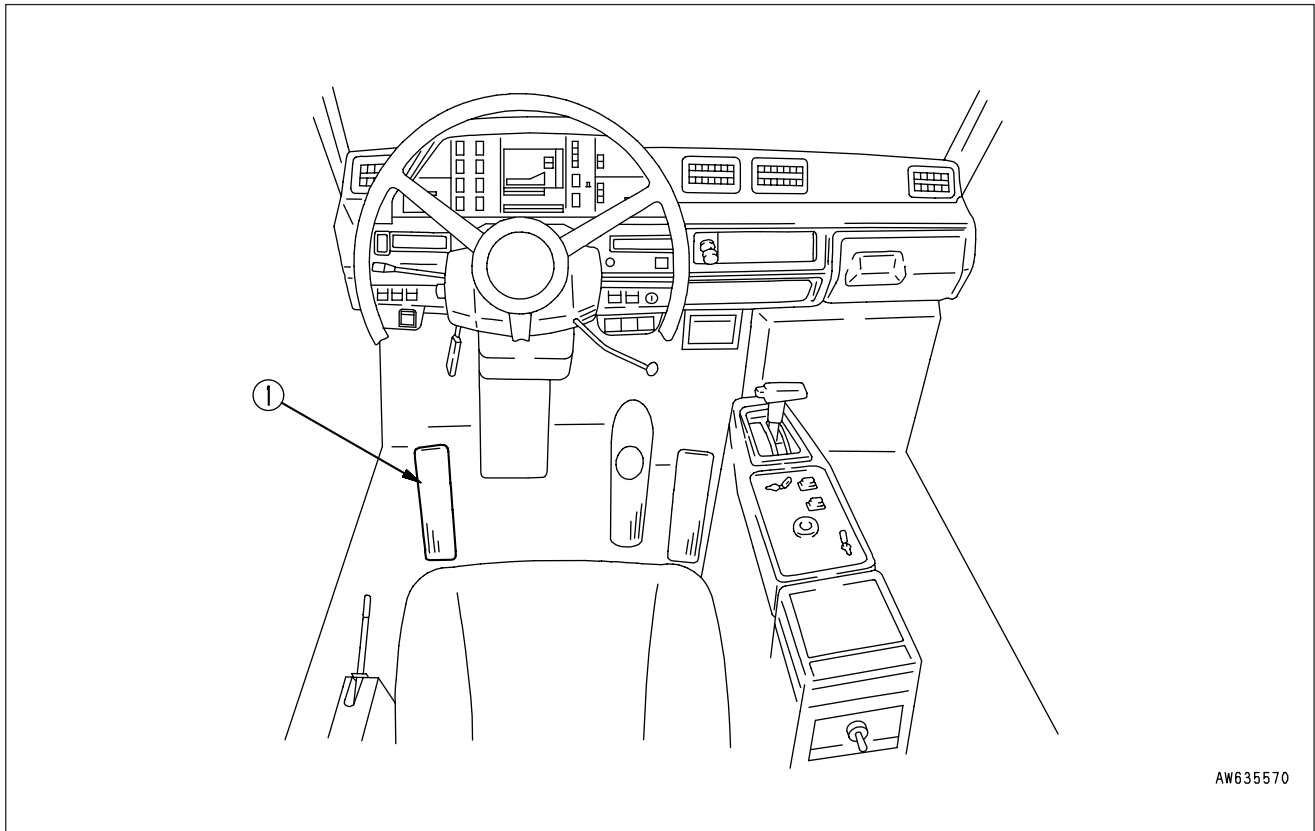
Use a 24 V bulb.



31. USING DIFFERENTIAL LOCK

31.1 DIFFERENTIAL LOCK PEDAL

The differential lock is used on snow-covered or muddy areas where the tires are likely to slip. The left and right wheels on the rear axle are locked together to prevent slipping and to provide a powerful drive force. This also helps to improve the service of the tires.



AW635570

WARNING

- Do not use the differential lock pedal when traveling at high speed (4th gear, 20 km/h (12.4 MPH) and above).
- Do not use the differential lock pedal when turning.

NOTICE

Do not use the differential lock pedal when the wheels are already slipping.

This may reduce the durability.

First, stop the machine, then depress the differential lock pedal, and start the machine again.

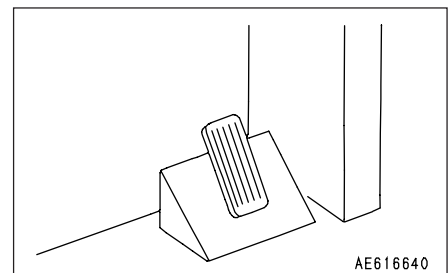
1. DIFFERENTIAL LOCK PEDAL

This pedal actuates the differential lock control.

When the pedal is depressed, the differential lock is actuated; when the pedal is released, the differential lock is cancelled.

REMARK

When traveling on soft ground where the wheel on one side slips, or when traveling on road surfaces where the tires are likely to slip, depress the differential lock pedal. This actuates the differential lock and makes both the left and right wheels rotate at the same speed to prevent slipping.



AE616640

31.2 PRECAUTIONS AND METHOD OF USE

- Depress the differential lock pedal to actuate the differential lock 5 – 10 m before entering the area where the tires may slip.

REMARK

Using the differential lock before the tires slip makes it possible to obtain the full capacity of the differential lock, and also extends the tire life.

- If the differential lock is applied when the tires are already slipping, the durability may be reduced.
Do not actuate the differential lock when the tires are slipping.
- If the tires should slip and it becomes impossible to escape, stop the machine, then depress the differential lock pedal and start the machine again.
- When traveling on road surfaces where the tires may slip, be particularly careful to avoid sudden changes in travel speed (decelerating or accelerating).
- Do not use the differential lock pedal when traveling at high speed (4th gear, 20 km/h (12.4 MPH) and above).
- Do not use the differential lock pedal when turning.
If the differential lock is used when turning, it will cause the following problems.
 1. It will be more difficult to turn than when the differential lock is not used, so the truck may be unable to turn on curves where it could normally turn easily.
 2. The inside wheels and outside wheels will turn at the same speed when turning, so one side will spin and reduce the tire life, and it may also damage the road surface.
 3. In order to absorb the difference in rotation of the left and right tires which is caused when the machine turns, the differential lock disc will slip, and this will reduce the durability of the differential lock.
 4. An excessive load will be brought to bear on the final drive, and this may reduce the life of the final drive.

NOTICE

If the tires are likely to slip on the road surface on curves, carry out maintenance of the road surface to reduce this problem.

32. OPERATION OF ABS AND ABS/ASR

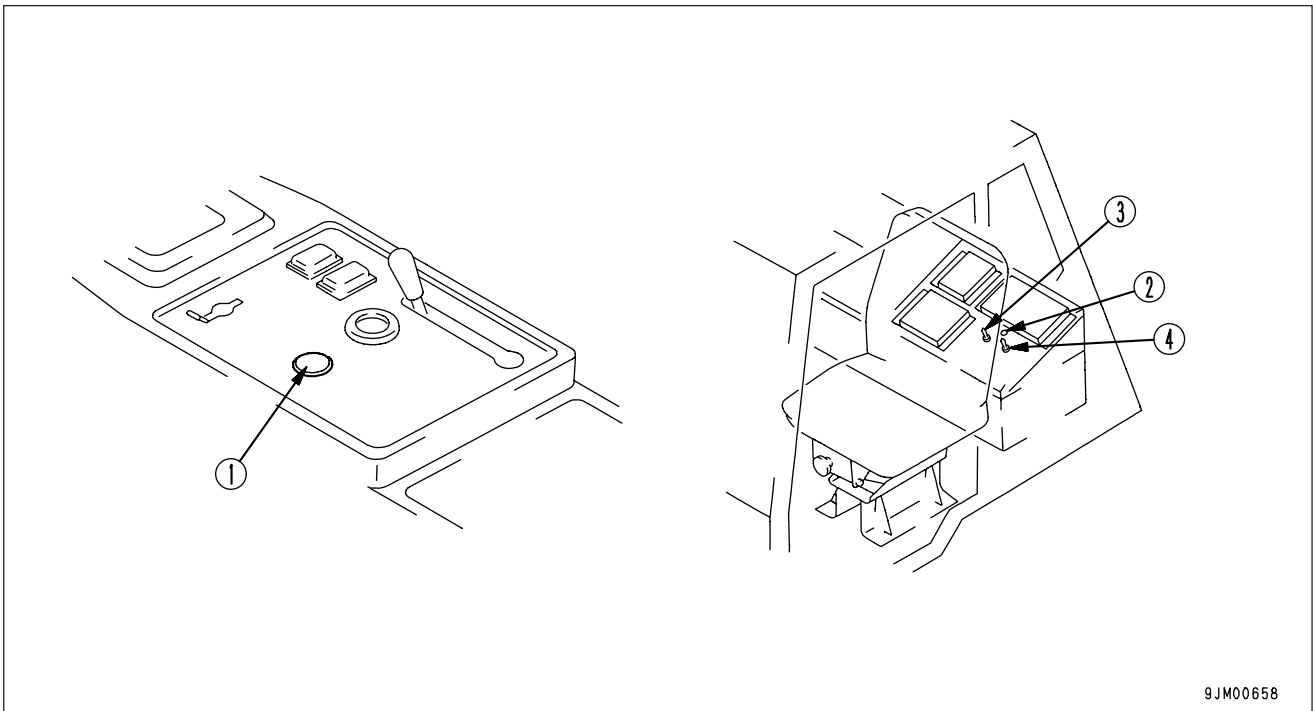
ABS (ANTI-SKID BRAKE SYSTEM)

When the truck is braked suddenly or braked on a slippery snow-covered road, etc., this system works to prevent the tires from locking and skidding. Accordingly, the truck is kept in a normal attitude and good steering performance is secured.

ABS/ASR (Automatic Spin Regulator)

In addition to the above functions of the ABS, this system has a function to prevent slipping of the drive wheels caused by excessive torque. Accordingly, the truck can start and travel normally even on a bad or frozen road surface.

32.1 EXPLANATION OF COMPONENTS



1. WARNING LAMP (RED)

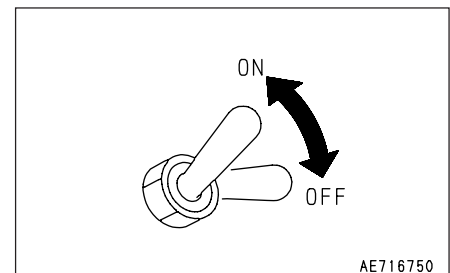
Lights up at engine start and when the ABS/ASR is turned off or malfunctions.

2. ASR INFORMATION LAMP (YELLOW) (Also used as troubleshooting lamp)

Lights up when the ASR operates and during troubleshooting.

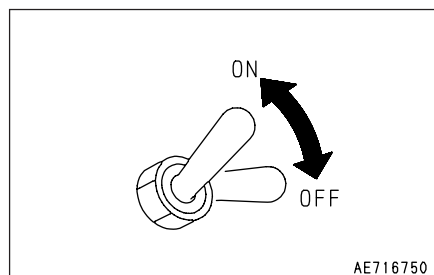
3. ABS/ASR MAIN SWITCH

Used to turn the ABS/ASR system on/off.



4. TROUBLESHOOTING SWITCH

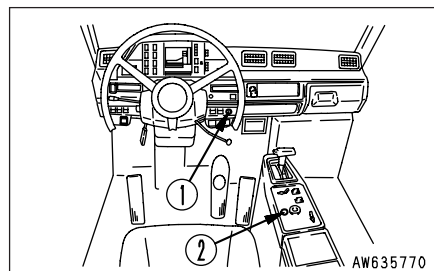
Used for troubleshooting.



AE716750

32.2 OPERATION METHOD**32.2.1 ABS OPERATION****⚠ WARNING**

Always stop the truck before turning on the ABS/ASR main switch ③. If it is turned on while the truck is running, the ABS/ASR may not function normally.

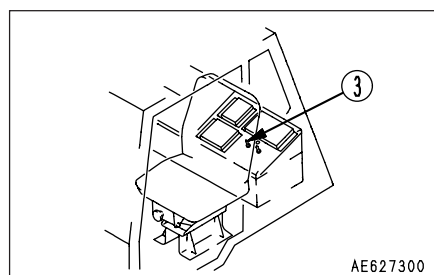


AW635770

1. Turn on the truck starting switch ①. At this time, warning lamp ② will light up.
2. Turn on the ABS/ASR main switch ③. Start the truck. When the speed rises to about 10 km/h (6.2 MPH), the warning lamp ② will go off.

If the truck starting switch ① is turned on/off while the ABS/ASR main switch ③ is turned on, the electric power for the ABS/ASR system will also be turned on/off.

Accordingly, keep the ABS/ASR main switch turned on for normal operation.

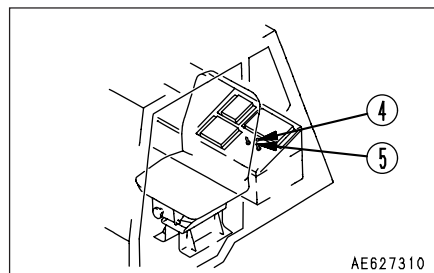


AE627300

32.2.2 ASR OPERATION**⚠ WARNING**

Turn on the troubleshooting switch ⑤ only when performing troubleshooting on the truck. The ABS/ASR system will not function while the troubleshooting switch is turned on.

1. Since the ASR and ABS are interlocked, if the ABS is turned on, the ASR is also turned on automatically.
2. The ASR information lamp ④ lights up when the system detects slippage of the rear wheels, and the ASR starts functioning.



AE627310

32.3 PRECAUTIONS FOR USE

 **WARNING**

- **If the ABS functions while traveling on a slippery road, the braking distance may be slightly lengthened. Even if the ABS is turned on, the tires may lock when the truck is braked when running at a very low speed. Accordingly, take care when driving on slippery roads.**
 - **If the truck is braked while running at high speed or on a slippery road, more air is consumed by the ABS/ASR. If the air pressure drops and the warning buzzer sounds, stop the truck in a safe place. Wait until the air pressure is restored sufficiently, then start again.**
 - **Even with the ABS/ASR system installed, there may be instances where the truck can not travel safely such as on a road having an extremely low coefficient of friction (a frozen road, etc.) or on a steep slope. In this case, repair the road surface before driving.**
-
- The truck can be driven normally even if the ABS/ASR main switch is turned off. In this case, however, watch out for lateral skidding of the truck.
 - Even if the ABS/ASR system malfunctions, the truck can be driven normally. Watch out for lateral skidding in this case, however, while driving on slippery roads. If the warning lamp lights up, the system is automatically turned off and the ABS/ASR system does not function.
 - Even if the ABS/ASR system is installed, the emergency brake function is maintained.
 - If the ABS/ASR main switch is turned on with the brake pedal depressed or the retarder control lever pulled, exhaust sound will be momentarily emitted from the ABS valve. This does not indicate a fault.
 - If both rear wheels slip at the same speed, the ASR will not function. In this case, adjust the engine output with the accelerator pedal.
 - When installing a wireless device on the truck, select one which does not violate the wireless device-related laws/regulations and use it according to law. Mount it as far away from the devices and harness of the ABS/ASR system as possible.

32.4 TROUBLESHOOTING

- When the truck starting switch is turned on, if the warning lamp does not light up, it may be broken. In this case, replace the lamp.
- If the ABS/ASR system malfunctions while being used, the warning lamp (Red) will light up. In this case, stop the truck at a safe place immediately, then ask your Komatsu distributor to carry out.

The positions of each switch and the statuses of the corresponding warning lamps are as follows.

Starting switch	ABS/ASR main switch	Warning lamp
OFF	OFF	Goes off
OFF	ON	Goes off
ON	OFF	Lighted (Normal)
ON	ON	<ul style="list-style-type: none"> ● Stays lighted until travel speed rises to about 10 km/h (6.2 MPH), then goes off (Normal). ● Lights up when a fault occurs (Malfunction).

33. HANDLING AUTO-GREASING SYSTEM

With this system, the electric pump is connected to the divider valve, and a lubricating controller with built-in micro computer controls the electric pump and automatically supplies the grease.

33.1 METHOD OF OPERATING AUTO-GREASING SYSTEM

1. Turn the starting switch ON and start the electric pump.

REMARK

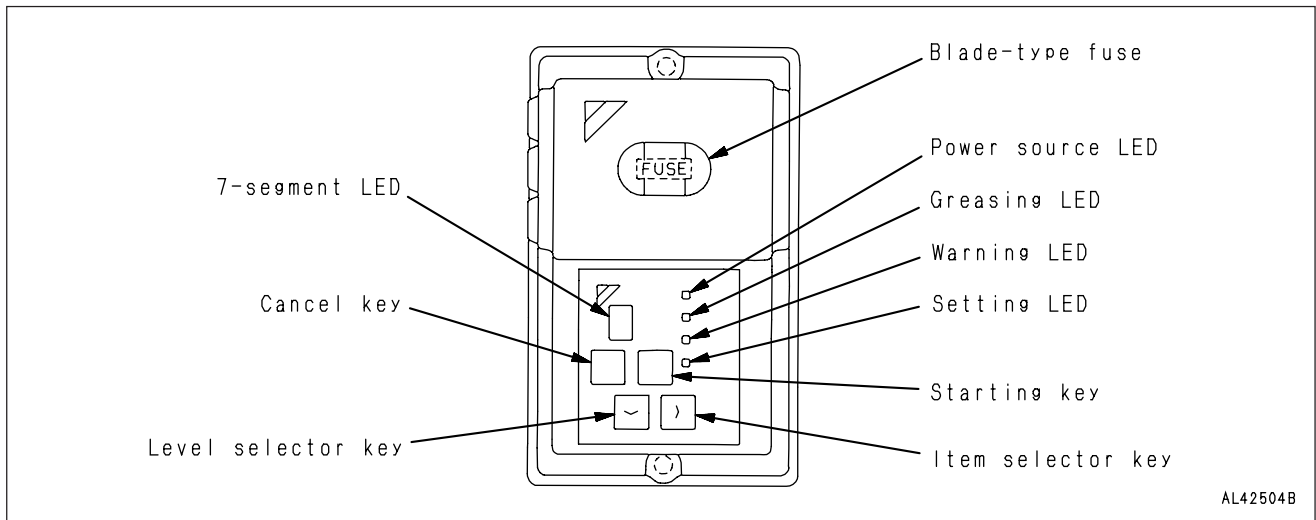
Immediately after the power is turned on, all display lamps on the lubrication controller inside the console box will light up for several seconds. This is a self-check for the lamps, and does not indicate any abnormality.

The display portion for starting the calculation of the greasing interval will flash, but all other displays will go out after a few seconds.

However, even if the greasing interval has not been reached, if the switch is turned ON/OFF repeatedly, greasing will automatically start due to the function of the supplemental circuit, immediately after the starting switch is turned ON. After display of the 7-segment LED and greasing-in-progress LED, as shown in the LUBRICATION CONTROLLER DISPLAY TABLE, the above condition will be returned.

2. When the starting switch is turned ON, centralized greasing is carried out in accordance with the set time and frequency limit for greasing.

LUBRICATION CONTROLLER DISPLAY TABLE



The condition of the lubricating system can be seen from the 7-segment LED and the LED display on the controller panel.

Type	Item	Symptom	LED display	7-segment display
When normal	Counting	When normal	Power source LED lights up	flashes or numeral flashes ※
	Greasing	I Pump operating	Greasing LED lights up	Rotating display
		II Maintaining pressure	Greasing LED flashes slowly (1 time/sec)	Stop display
		III Releasing pressure	Greasing LED flashes rapidly (2 times/sec)	Reverse rotation display
Setting	Set mode	Set LED flashes	Depends on each set mode	
When abnormal	Abnormality in pump pressure	Pressure does not rise within greasing time	Warning LED flashes	(E) (a) Flash alternately
	Abnormality in release of pressure	Pressure still remains after pressure is released (reverse rotation)		(E) (b) Flash alternately
	Abnormality in pressure detection	Limit switch for pressure detection is already actuated before system is started		(E) (c) Flash alternately
	Tank empty	No. of times of greasing has reached greasing frequency limit		(E) (0) Flash alternately

※ If the remaining number of times of greasing is less than 10, a numeral (0 – 9) will flash.

33.1.1 ACTUATION OF AUTO-GREASING

When engine starting switch ① is turned one stage, the auto-greasing system is automatically set to the actuation condition.

Do not press start button ③ of lubrication controller ②.

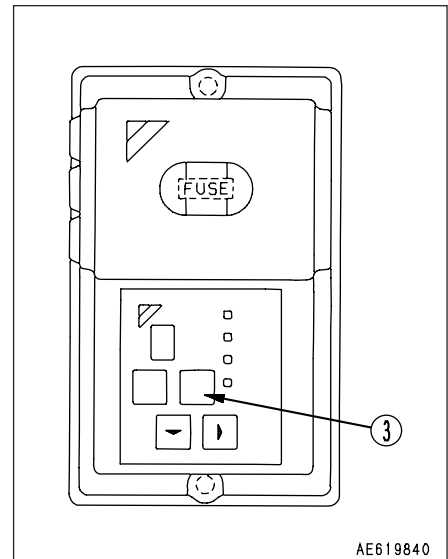
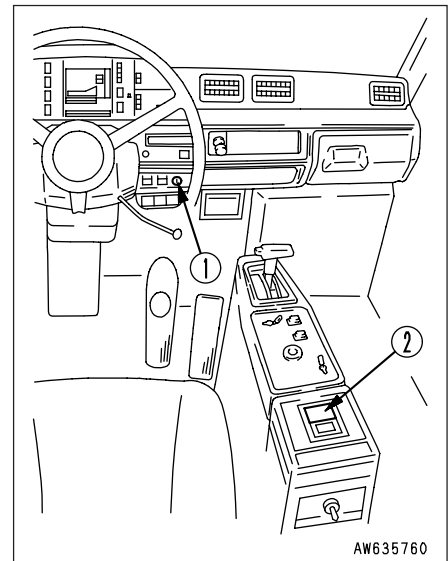
REMARK

Operating when desired

It is possible to start the system and carry out one cycle of greasing regardless of the time count.

To do this, press the button ③ for the lubrication controller inside the console box.

The count for the greasing time is canceled, and the electric pump starts the count again automatically after it is stopped.



33.1.2 SETTING GREASING TIME

The set time and greasing frequency limit differs according to the operating condition and greasing plan for the machine, so set the following items to carry out suitable centralized greasing.

- Greasing interval (Hr): Greasing interval for automatic operation
- Greasing time (min): Length of time pump is operated for each greasing operation
- Greasing frequency limit (times): No. of times for operating pump before the 1600 cc grease cartridge becomes empty

The settings when shipping from the factory are as follows.

Greasing interval: 2 hours

Greasing time: 15 minutes

Greasing frequency limit: 75 times

The grease level alarm is set to sound after 300 hours on the hourmeter (when normal operation).

Setting greasing time in cold areas

In cold temperatures, the viscosity of the grease increases and the resistance inside the piping becomes greater, so it is necessary to extend the length of the greasing operations in order to ensure that the greasing is carried out properly.

If the machine is used in ambient temperatures below -20°C , set the greasing time to 20 minutes (code No. 7). In addition, use lithium-based grease No. 0.

For details of setting the time, see "33.1.3 METHOD OF SETTING".

When changing the set value, please contact your Komatsu distributor.

33.1.3 METHOD OF SETTING

When setting the various items, the value is not input directly. Select the code number from the set code table below, and set as follows.

Setting code table

Code no.	0	1	2	3	4	5	6	7	8	9
Greasing interval (Hr) (a)	/	1	1.5	2	3	4	5	6	8	/
Greasing time (min) (b)	/	2	3	5	7	10	15	20	25	/
Greasing frequency limit (c)	/	25	50	75	100	150	200	250	/	/

NOTICE

When using the machine at ambient temperatures of below -20°C, set to greasing time (b) at code No. 7.

Procedure for setting

Turn the starting switch ON and start the engine.

1. Press the LEVEL and ITEM keys at the same time to set to the setting mode.
2. Press the ITEM key one or more times to select the item to be set.

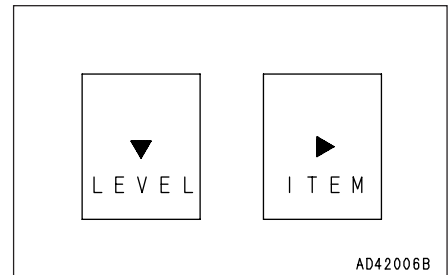
REMARK

Each time the ITEM key is pressed, the setting item is changed:
a → b → c → a.

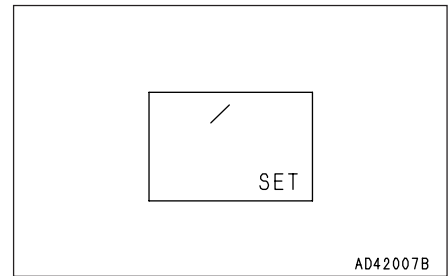
3. When the item to be set flashes, press the LEVEL key. The set item and numeral are displayed alternately (a →→ 0 →→ a →→ 0).
4. Refer to the setting code table and press the ITEM key one or more times to select the code number to be set.

REMARK

Each time the ITEM key is pressed, the code number (numeric portion) goes up by 1.



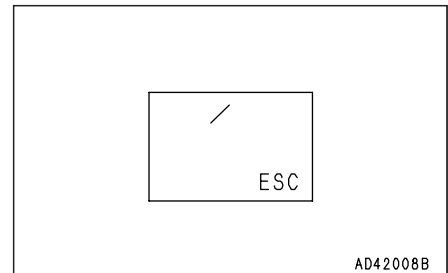
5. When the code number that is to be set flashes, press the SET key to carry out the setting.



6. Repeat Steps 3 to 5 to set all of the items a, b, and c. After completing the setting, press the ESC key to leave the setting mode.

REMARK

Even if it is desired to change only one item, always carry out the setting according to Steps 1 to 5. After completing the setting, always press the ESC key to leave the setting mode.



If the power is then turned ON, the count for the greasing interval will start immediately after the ESC key is pressed. Part of the display segment flashes to indicate that the system is counting. After setting, the set value is retained in memory even if the power is turned OFF.

33.1.4 GREASING

NOTICE

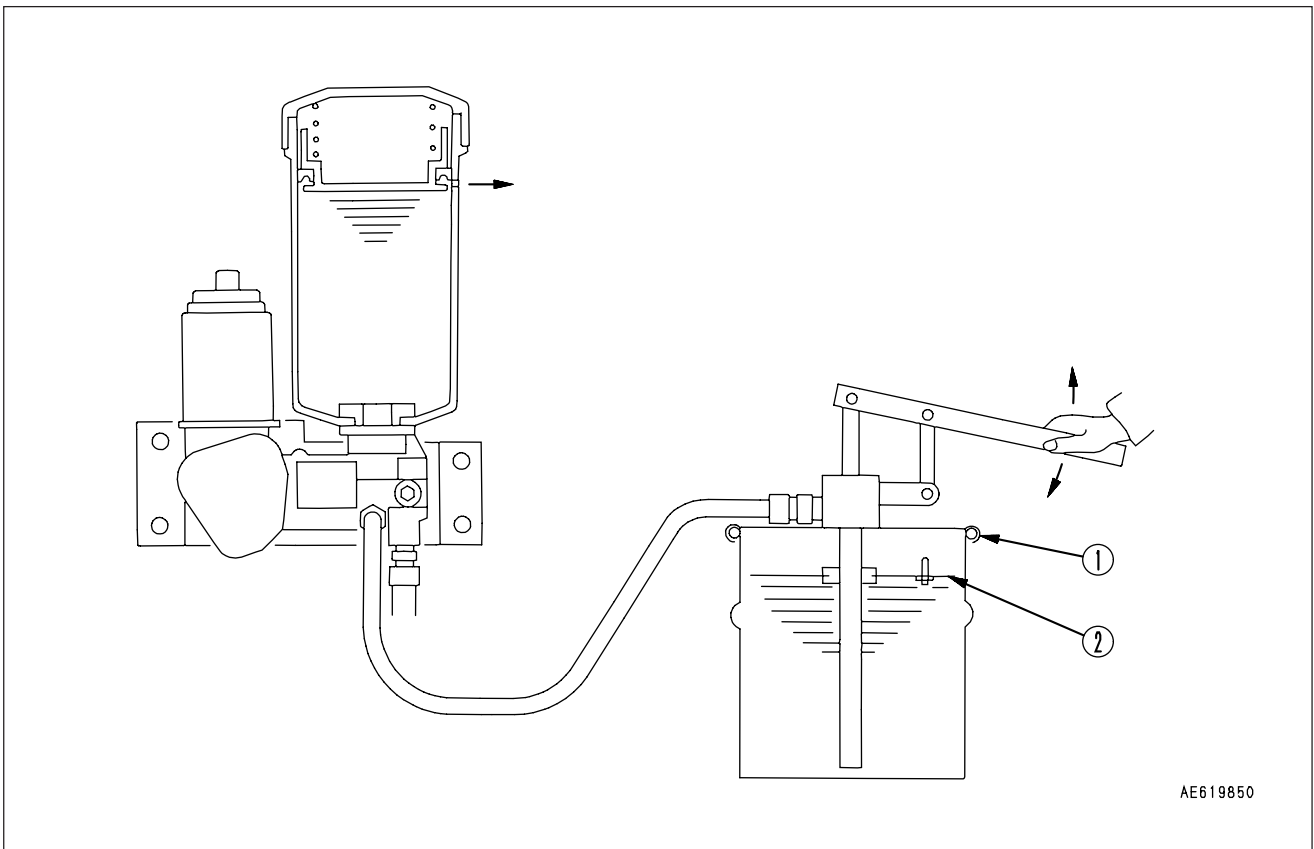
After supplying grease, be sure to reset the counter of the controller (See "33.3 TROUBLESHOOTING").

Supply grease according to the following procedures:

Be sure to use the special grease pump (566-96-6A840) and supply grease with it according to the following procedures, taking care not to let air or dust get in to the grease. Supply grease while the ambient temperature is above -10°C .

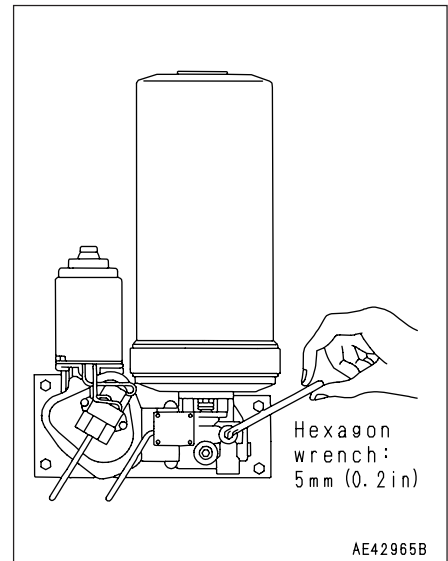
1. Prepare a new 18-kg grease pail and remove the cover. Press the follower plate of the grease pump against the greasing surface, then insert the pump and set special cover ① to the pail. Then, operate the handle of the pump and confirm that clean grease comes out of the hose end.
2. Remove the cap of the grease filler of the pump and screw in the hose fitting, then operate the pump.

3. When grease is supplied for the first time, there is usually some air under the follower plate ②. If grease is supplied to the upper limit, however, the air is bled through the small hole on the side of the tank. When supplying grease next time and there after, stop supplying it when it reaches the bottom of this air bleed hole.
4. After supplying grease, remove the hose fitting and fit the cap to the grease filler of the grease pump without fail. Keep the pump and pail in a clean place.



33.1.5 METHOD FOR BLEEDING AIR**1. When there is air in piston portion of pump**

1. Remove the air bleed screw (hexagon head socket plug 1/8) from the side of the pump.
2. Turn the power on, press the SET/START key, and run the pump.
3. Continue to run the pump until no more bubbles come out with the grease from the pump.
4. After checking that clean grease comes out continuously, turn off the power and stop the pump.
5. Install the air bleed screw to its original position in the pump.

**2. When there is air in piping**

1. After installing the divider valve, remove the plug from the greasing port of the divider valve at the end.
2. Run the grease pump until no more bubble come out with the grease from the pump.
3. Connect the grease piping to the discharge port of the divider valve, rotate the pump several times, and check that grease comes out, then connect the bearing end also.

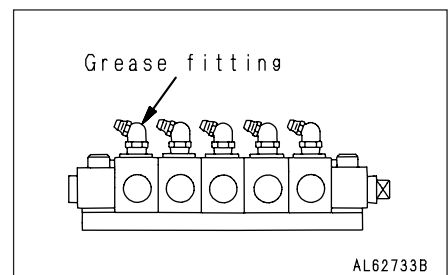
Method of checking operation in cold areas

If the temperature suddenly drops, grease may not come out if the pump is operated only once.

If the grease comes out after the pump is operated 2 or 3 times, this does not indicate any abnormality in the system.

Greasing with grease gun

If the auto-greasing system does not work properly and does not supply grease, it is possible to carry out greasing by pumping in grease manually with a grease gun through the grease fittings installed to each divider valve.



33.2 PRECAUTIONS WHEN HANDLING AUTO-GREASING SYSTEM

- Basically, the power source input to the lubrication controller should be DC24V, but use a maximum limit of 30V.
- The grease nipple installed to the service port used for initial charging of the divider valve has a ball check structure, so it may leak if dirt gets stuck in it.
Check it from time to time, and replace the grease nipple immediately if any grease is leaking.
- When carrying out initial operation or when the grease tank is empty, air may get into the piston portion of the pump. If the pressure does not rise within the specified time when running the pump, and an error is displayed for the controller, bleed the air.
- If the divider valve or grease piping are removed when replacing the attachment on the machine, handle carefully to prevent any damage. When storing or installing again, be extremely careful to prevent the entry of air, and particularly dirt. If there is any air in the system, bleed the air immediately.

33.3 TROUBLESHOOTING

If any abnormality occurs in the greasing system, the error codes will flash alternately to display the type of abnormality.

Error code	Item	Cause	Remedy
E → a	Defective pressurizing of pump	Air in main piping Air inside pump Grease tank is empty Grease leaking from main piping	Run pump as necessary and release grease from end of piping to bleed air Release grease from air bleed in pump to bleed air Add grease Check, tighten connections of main piping (including hoses)
E → b	Abnormality in release of pressure	Abnormality in pressure-releasing structure built into pump Abnormality in pressure-detection equipment built into pump	Disassemble pressure-releasing portion carefully, then check and clean Check limit switch at pressure-detection portion
E → c	Abnormality in pressure detection	Abnormality in pressure-releasing structure built into pump Abnormality in pressure-detection equipment built into pump	Check limit switch Check limit switch at pressure-detection portion
E → 0	Empty tank	Greasing frequency limit has been reached Grease added during frequency count	Add grease Confirm that 0 flashes three times on 7-segment LED by pressing reset button on controller for more than 5 seconds.

33.4 SPECIFICATIONS

Electric pump

Model: LD10F

Delivery pressure: 24.03 MPa (245 kgf/cm², 3479 PSI) (MAX)

Tank specification: 1000 cc cartridge type

Available temperature range: -20 to 60°C

Applicable grease: NLGI No. 2 to No. 0 lithium-based grease

Rated voltage: DC24V

Rated current: 3A (Note: 6.5A when temperature is -20°C)

Divider valve

Model: LL1

Discharge amount adjustment method: Fixed type

Available pressure: 24.03 MPa (245 kgf/cm², 3479 PSI) (MAX)

Discharge amount: 0.6 – 0.1 cc/st

No. of valves (discharge ports): 1 – 5

Available temperature range: -20 to 60°C

Applicable grease: NLGI No. 2 to No. 0 lithium-based grease

34. ARSC (AUTOMATIC RETARD SPEED CONTROL)

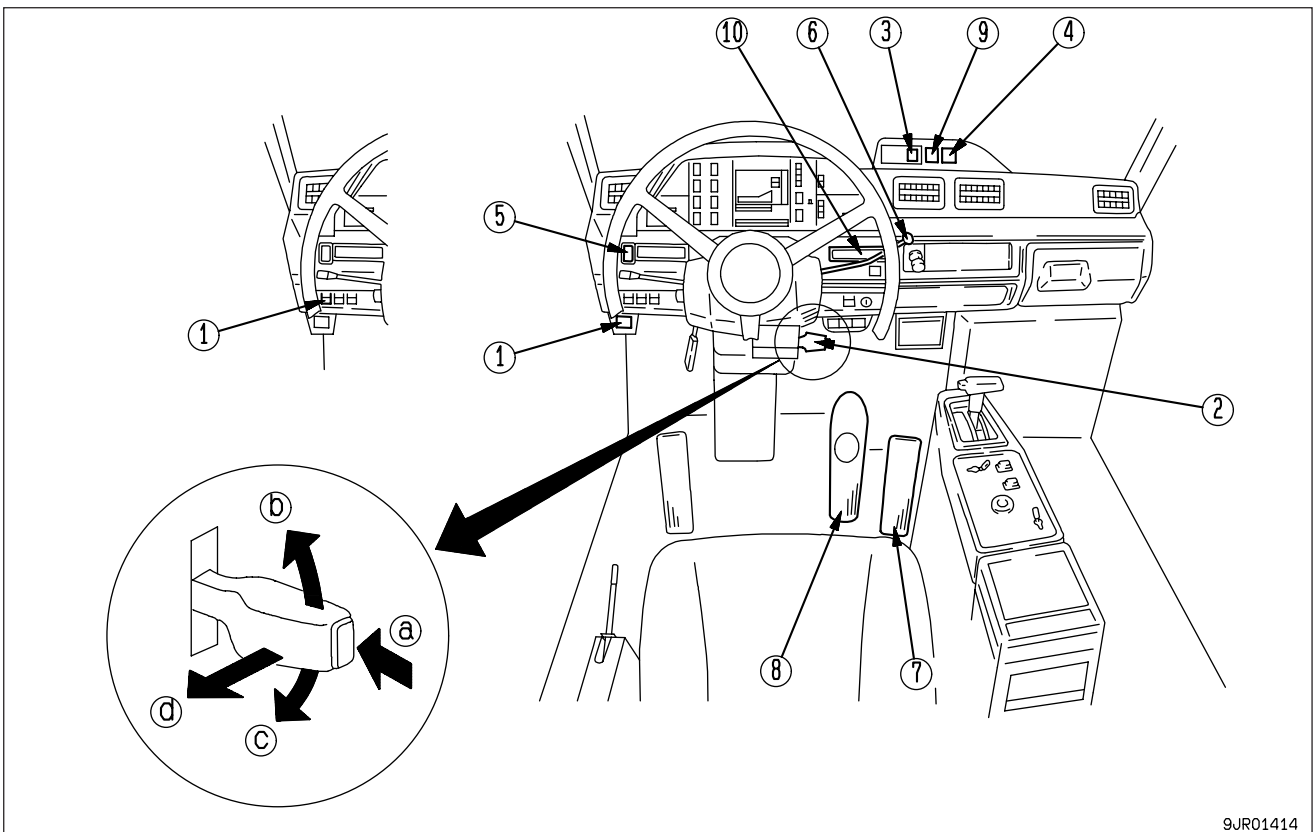
When traveling downhill, if the switch is pressed at the speed that is to be maintained, the retarder is automatically actuated to prevent the travel speed from exceeding the set speed, so this makes retarder operations easy.

There are two types of travel speed display for the set travel speed display: km/h and MPH. Check the display monitor on your machine when setting the travel speed.

⚠ WARNING

- The ARSC system is actuated when the system switch is ON. Before traveling downhill, check that the system switch is ON.
- If the speed is set to a speed that exceeds the maximum permissible speed obtained from the brake performance graph, there is danger that there will be overheating and that the retarder brake may be damaged. Always set the speed so that it does not exceed the maximum permissible speed.
- When the ARSC is actuated on slippery roads, the tires may lock. If this happens, cancel the ARSC.
- If any abnormality occurs in the system and braking cannot be carried out properly, the alarm sounds and the system is turned OFF to cancel the ARSC. If necessary, control the machine with the retarder control lever and foot brake to stop the machine in a safe place, then turn the system switch OFF.

34.1 EXPLANATION OF COMPONENTS



The position of system switch ① may differ according to the combination of optional equipment.

- Ⓐ Set
- Ⓑ Increase speed
- Ⓒ Decrease speed
- Ⓓ Cancel

1. SYSTEM SWITCH

This is used to turn the ARSC system ON/OFF.

2. ARSC SET LEVER

This lever is used in the following cases:

When setting the travel speed

When making fine adjustments to the set speed (tap up/tap down)

When canceling the speed setting

When setting the travel speed, check the display on the set travel speed display.

3. SET SPEED DISPLAY

This displays the speed (km/h) that has been set.

The display goes out when the system switch is OFF.

It displays 0 when the set value is canceled.

When the machine starting switch is ON or the system switch is ON, the display shows —, and then shows 0.

There is also an MPH display on the set travel speed display.

4. ARSC CAUTION LAMP

This flashes if there is any abnormality in the ARSC system when the system switch is ON.

It lights up for 3 seconds when the machine starting switch is turned ON to check the bulb.

5. CENTRAL WARNING LAMP

This lights up together with the ARSC caution lamp if there is a serious abnormality in the ARSC system when the system switch is ON.

6. RETARDER CONTROL LEVER

Even when the ARSC is in operation, the retarder can be operated with this lever.

7. ACCELERATOR PEDAL

The ARSC is actuated only when the accelerator pedal is not being pressed.

8. BRAKE PEDAL

This pedal operates the wheel brake even when the ARSC is being operated.

9. READY LAMP

When this lamp is lighted up, it shows that the travel speed is set and that operation of the ARSC is possible. When it is out, the ARSC is not actuated.

It lights up for 3 seconds when the machine starting switch is turned ON to check the bulb.

10. REAR BRAKE PILOT LAMP

This lamp lights up when the retarder or brake pedal are operated, even when the ARSC is being operated.

34.2 METHOD OF OPERATION

34.2.1 ACTUATION OF ARSC SYSTEM

The ARSC system is actuated when the system switch is ON.

If the set switch on the ARSC set lever is pressed, the travel speed at that moment is set as the downhill travel speed. If the travel speed exceeds the set downhill speed, the retarder is automatically actuated.

The set travel speed is displayed on the set travel speed display and is stored in memory.

If the accelerator pedal is pressed while the ARSC is being operated, the ARSC is canceled and the speed increases.

If the brake pedal or retarder control lever are operated while the ARSC is being operated, it is possible to reduce the machine speed or stop in the same way as during normal brake operations.

34.2.2 SET SPEED

WARNING

If the speed is set to a speed that exceeds the maximum permissible speed obtained from the brake performance graph, there is danger that there will be overheating and that the retarder brake may be damaged. Always set the speed so that it does not exceed the maximum permissible speed.

If the machine speed during the setting operation is less than 10 km/h (6 MPH), the speed is set to 10 km/h (6 MPH). In all other cases, it is set to the actual travel speed.

The travel speeds that can be set depend on the selection of the speed lever as follows.

When the gearshift lever is at the D, 5, 4, 3, or L positions, the range for the set speed is 10 to 55 km/h (6 to 34 MPH).

It is impossible to set the speed when the gearshift lever is at the N or R positions.

34.2.3 METHOD OF CARRYING OUT FINE ADJUSTMENT OF SET TRAVEL SPEED

To raise the set travel speed 1 km/h (0.6 MPH), push the ARSC set lever forward once.

To raise the set travel speed 1 km/h (0.6 MPH), pull the ARSC set lever back once.

WARNING

Fine adjustment of the set travel speed is possible with the tap up or tap down operation. The speed changes approx. 1 km/h (0.6 MPH) each time the tap up or tap down is operated, but even if the display on the set travel speed display does not change, this does not indicate any abnormality.

REMARK

Release the ARSC set lever after changing the set travel speed.

If the set switch and cancel are operated at the same time, the cancel operation is given priority.

If the set switch and tap up are operated at the same time, the tap up operation is given priority.

If the set switch and tap down are operated at the same time, the tap down operation is given priority.

The tap up and tap down operations are used for making fine adjustment of the set travel speed.

It is possible to adjust the set travel speed by using the tap up or tap down up to 5 times when traveling in ARSC (when the accelerator pedal is released). When the accelerator pedal is being depressed, the ARSC is canceled, so it is possible to operate freely in a range from 10 to 55 km/h (from 6 to 34 MPH).

34.2.4 METHOD OF INCREASING SET SPEED

If it is desired to increase the set speed, depress the accelerator pedal to increase speed, and when the desired set travel speed is reached, press the set switch on the ARSC set lever. The set travel speed will be changed to the new speed.

34.2.5 METHOD OF DECREASING SET SPEED

If it is desired to decrease the set speed, operate the retarder control lever to reduce speed, and when the desired set travel speed is reached, press the set switch on the ARSC set lever. The set travel speed will be changed to the new speed.

REMARK

After using the retarder control lever to reduce the speed, return it to its original position.

34.2.6 TRAVELING AGAIN AT SET SPEED

If the machine repeatedly travels on the same slope, once the travel speed has been set, it is possible to operate the ARSC without carrying out the setting operation each time.

Before entering a downhill slope, if the travel speed has been adjusted to a speed lower than the set speed displayed on the travel speed display, the READY lamp (green) lights and the ARSC is actuated when the accelerator pedal is released.

REMARK

When traveling at a speed greater than the set speed displayed on the travel speed display, the ARSC is not actuated even when the accelerator pedal is released. When this happens, the READY lamp (green) also does not light up. Always adjust the travel speed to a speed lower than the set speed displayed on the travel speed display, and check that the READY lamp lights up.

34.2.7 METHOD OF CANCELING SET TRAVEL


Method 1: If the cancel switch is operated for more than 1 second, the control is stopped. When this happens, the travel speed display shows 0.


Method 2: If the system switch is turned OFF, the control is canceled. When this happens, the travel speed display goes out.

REMARK

The switch must be operated for at least 1 second (different from other switches) to cancel the control. This is to prevent any problem of the control being canceled if the switch is touched by mistake.

34.2.8 RELATIONSHIP WITH EXHAUST BRAKE

If the exhaust brake switch is at () position (ON), the exhaust brake is actuated in the normal way when the accelerator pedal is released if the torque converter lock-up is ON. If the machine attempts to travel at a speed greater than the set speed, the ARSC is actuated.

If the exhaust brake switch is at () position (OFF), the exhaust brake is not actuated when the ARSC is being operated. If the foot brake or retarder control lever are operated, the exhaust brake is actuated in the same way as normal.

If the downhill slope is not steep and the engine brake and exhaust brake have ample effect, the machine will not accelerate to the set travel speed, so the ARSC may not be actuated.

34.2.9 RECOMMENDED SET SPEED

Set the travel speed so that the engine speed is at least 1800 rpm, and travel so that the retarder oil temperature gauge is in the green range.

34.2.10 OVERHEAT WARNING

If there is danger that the retarder oil may overheat, the ARSC caution lamp lights up and the set travel speed is automatically reduced approx. 1 km/h (0.6 MPH) every 3 seconds. The lower value for the set travel speed when the speed is automatically reduced is 10 km/h (6 MPH).

34.3 TROUBLESHOOTING**34.3.1 WHEN A PROBELM OCCURS IN THE SYSTEM**

This system is equipped with a self-diagnostic function. If any problem occurs, a failure code is displayed by the controller LED under the assistant's seat.

No.	Failure code	Details	Remedy pattern*
1	0.1	Abnormality in power source	1
2	1.0	Disconnection, short circuit with ground, short circuit in engine speed sensor system	1
3	1.3	Disconnection, short circuit with ground, short circuit in transmission output shaft speed sensor system	1
4	1.5	Short circuit with ground in retarder oil temperature sensor system	1
5	1.7	Disconnection, short circuit with ground, short circuit in accelerator signal system	1
6	1.8	Disconnection, short circuit with ground in suspension pressure sensor (left) system	1
7	1.9	Disconnection, short circuit with ground in suspension pressure sensor (right) system	1
8	4.2	Disconnection, short circuit in exhaust brake signal system	2
9	4.3	Disconnection, short circuit in ARSC caution lamp system	1
10	4.4	Disconnection in READY lamp system	2
11	4.5	Disconnection, short circuit in central warning lamp system or buzzer system	2
12	5.2	Short circuit with ground in exhaust brake signal system	2
13	5.3	Short circuit with ground in ARSC caution lamp system	1
14	5.4	Short circuit with ground in READY lamp system	2
15	5.5	Short circuit with ground in central warning lamp system or buzzer system	2
16	6.0	Failure in engine speed sensor system	1
17	7.0	Disconnection, short circuit in speed display up output	2
18	7.1	Disconnection, short circuit in speed display down output	2
19	7.2	Disconnection, short circuit in speed display clear output	2
20	7.3	Short circuit with ground in speed display up output	2
21	7.4	Short circuit with ground in speed display down output	2
22	7.5	Short circuit with ground in speed display clear output	2
23	8.1	Short circuit with ground in pressure control valve system	1
24	8.3	Disconnection, short circuit in pressure control valve system	1
25	8.5	Failure in pressure control valve (retarder remains applied) or failure in pressure switch 1 system	1
26	8.7	Failure in pressure control valve (retarder has no effect) or failure in pressure switch 1 system	1
27	8.9	Short circuit with ground in pressure cracking valve	1
28	9.0	Disconnection, short circuit in pressure cracking valve	1
29	9.1	Failure in pressure cracking valve (remains open) or failure in pressure switch 2 system	1
30	9.2	Failure in pressure cracking valve (does not open) or failure in pressure switch 2 system	1
31	9.3	Disconnection, short circuit in system switch system	1
32	9.4	Short circuit with ground in system switch system	1
33	9.5	Disconnection, short circuit with ground in travel speed set switch system	1

*: See next page

Remedy pattern 1

If the central warning lamp and the ARSC caution lamp flash and the buzzer sounds, it means that a serious problem has occurred in the ARSC system.

Operation of the ARSC system is stopped. Operate the brake pedal or retarder lever as necessary to ensure safety.

When the system switch is turned OFF, the central warning lamp and ARSC caution lamp go out and the buzzer stops.

REMARK

If the starting switch is turned ON when the air pressure in the air tank has dropped, failure code "9.2" may be displayed. If this happens, start the engine and raise the air pressure to the normal level, then start again.

If the failure code is "9.3" or "9.4", it shows that there is a failure in the system switch, so even if the system switch is turned OFF, the central warning lamp and ARSC caution lamp will flash and the buzzer will sound.

Remedy pattern 2

When only the ARSC caution lamp flashes

The ARSC system continues to be actuated, but an abnormality has occurred in the system.

Turn the system switch OFF to stop use of the ARSC.

When the system switch is turned OFF, the ARSC caution lamp will go out.

In the case of patterns 1 and 2 above, turn the system switch OFF quickly, stop use of the ARSC and contact your Komatsu distributor for repairs.

The set travel speed display is also equipped with a self- diagnostic function, and a failure code is displayed on the set travel speed display.

No.	Failure code	Details	Method of resetting
1	E1	Abnormality in CPU	Turn the machine starting switch ON again or turn the system switch ON again.
2	E2	Abnormality in memory	Turn the machine starting switch ON again or turn the system switch ON again.

34.3.2 WHEN SYSTEM IS NORMAL

A code is displayed on the controller LED under the assistant's seat.

No.	Code	Conditions
1	0.0	When accelerator pedal is being depressed
2	0.0.	When accelerator pedal is not being depressed

REMARK

If the above code is not displayed when the accelerator pedal is being depressed or not being depressed, it is necessary to adjust the accelerator link. If it is not properly adjusted, the ARSC system will not be able to judge correctly if the accelerator pedal is being depressed or not, so the ARSC may not work normally.

34.3.3 METHOD OF MODEL SELECTION, TIRE LARGE DIAMETER/SMALL DIAMETER, REFERENCE FOR FAILURE CODE

When the machine starting switch is turned ON, the codes below are automatically displayed in the following order on the controller LED.

1. LEDs all light up.
2. Model
Code: 46
3. Tire diameter

Code	Tire Large/Small
B.	Large size
S.	Small size

Large size tire is standard.

4. Initial failure code
5. Failure code that occurred immediately before the failure code in 4.
6. Failure code that occurred immediately before the failure code in 5.

34.3.4 METHOD OF CLEARING FAILURE CODE

Turn the machine starting switch to ON (the engine is not started) and disconnect connectors CR1 and CR2 under the assistant's seat.

When this is done, "--" is displayed on the controller LED.

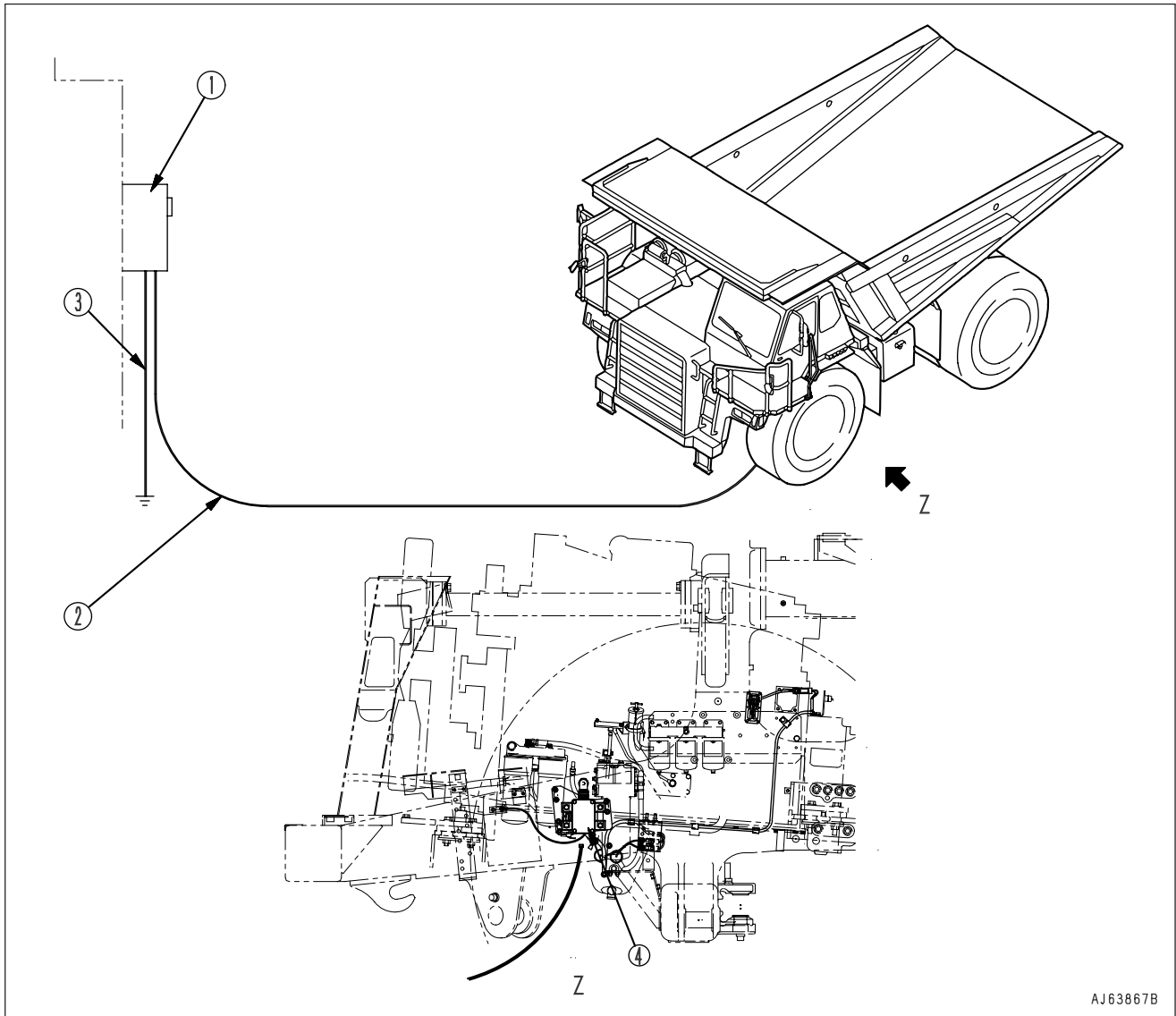
When the "--" changes from flashing and stays lighted up (3 seconds), the failure code has been cleared.

REMARK

When using the ARSC for the first time, always clear the failure codes.
After clearing the codes, connect connectors CR1 and CR2.

35. ENGINE OIL PAN HEATER, COOLANT HEATER

To keep the engine warm and make it easy to start again when the engine has been stopped in cold areas, an electric heater for the coolant and lubrication oil is available as an option.



AJ63867B

- ① Power supply : Prepare an AC, 3-phase, 230 V power supply with a capacity of at least 6 kW. Provide also a breaker and fuses.
- ② Insulated cable : Prepare a 3-core 5 – 8 mm³ cable with a length of within 30 m.
- ③ Ground cable: Always ground the equipment.
- ④ Heater connector : There is a connector for the heater installed to the side face of the frame on the left side of the engine.

REMARK

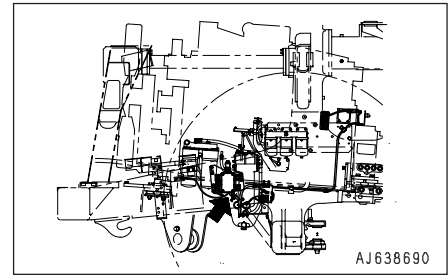
The customer should provide 1, 2, and 3.

	Oil pan heater	Coolant heater
Voltage	230 V	230 V
Capacity	600 W	1.5 kW
Current	Approx. 2.6 A	Approx. 6.5 A

35.1 METHOD OF USE

In seasons when the ambient temperature when starting the engine is less than -20°C (for SAE30 engine oil, the season when the temperature is less than $+4^{\circ}\text{C}$), start the heater immediately after stopping the engine on the previous day to prevent the temperature of the engine water and lubricating oil from going down.

The connector for the heater is installed to the side face of the frame on the left side of the engine.



If the engine is stopped and the machine is to be left unused, and the engine is to be started again in ambient temperatures below -20°C (for SAE30 engine oil, below 4°C), start the heater immediately after stopping the engine to make it easier to start the engine again.

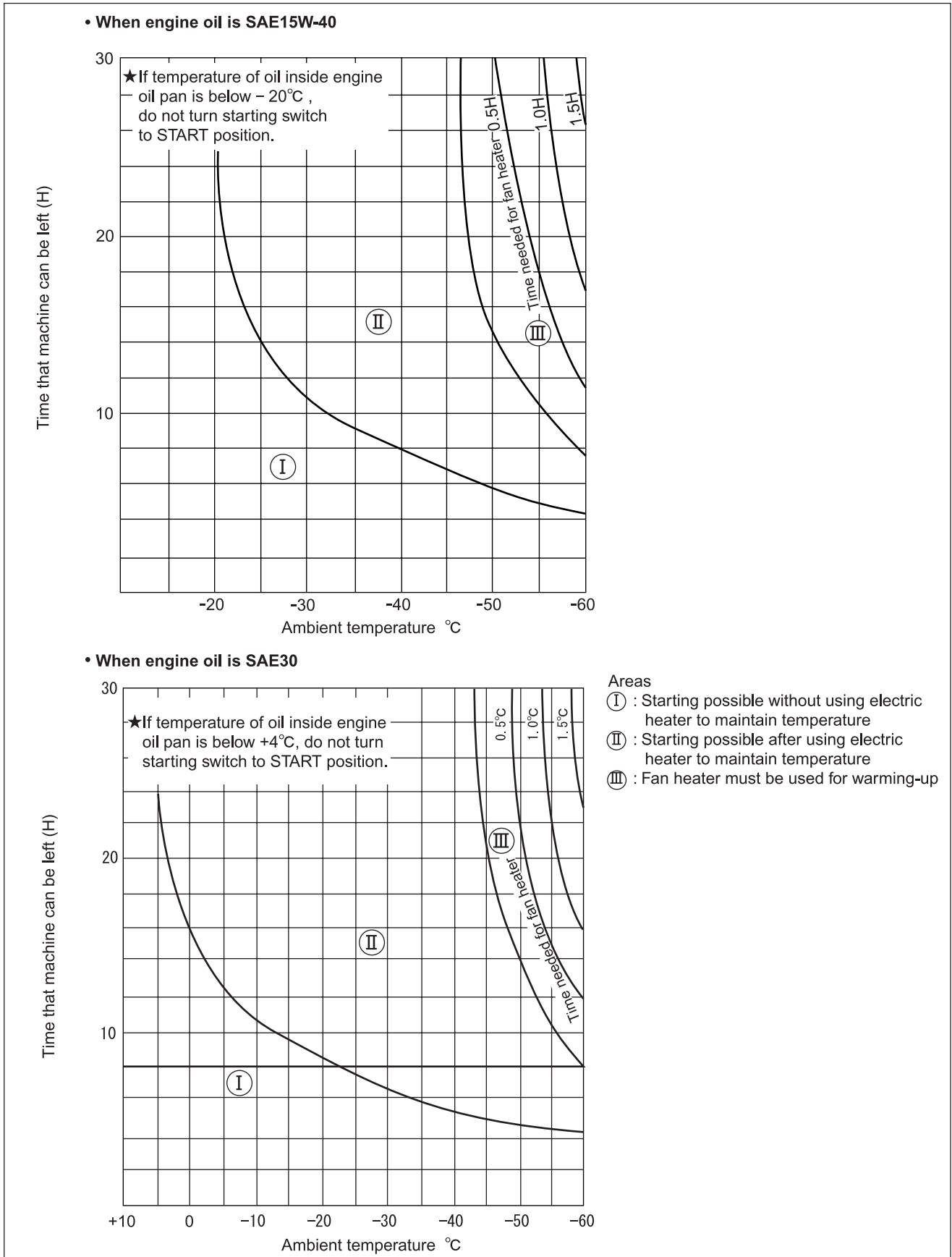
The relationship between the ambient temperature and the time that the machine can be left before starting the engine again is shown in graph A. Please use this graph for reference.

Graph A gives the general situation, so adjust the values to match the actual working conditions of the machine. Note that the items marked with ★ must not be adjusted.

Precautions when using graph A

1. Depending on the relationship between the ambient temperature and the time that the machine is left, it may be possible to start the engine without using the electric heater to maintain the temperature. However, to reduce the load on the engine starting system, use the heater to maintain the temperature after stopping the engine when the ambient temperature is less than -20°C (for SAE30 engine oil, the season when the temperature is less than $+4^{\circ}\text{C}$).
2. If the ambient temperature is less than -43°C , depending on the relationship between the type of oil and the time that the machine is left, it may be difficult to start the engine using only the electric heater to maintain the temperature. In such cases, use an electric fan heater to blow hot air and warm the engine and the inside of the engine room before starting.
3. Even when using the electric heater to maintain the temperature, if the temperature of the oil inside the engine oil pan is below -20°C , do not turn the starting switch to the START position.

Graph A Relationship between ambient temperature and time that machine can be left (when machine temperature has been maintained)



35.2 PRECAUTIONS WHEN USING

1. This heater is used for maintaining the temperature. If the engine has cooled completely, it will take an extremely long time to warm up the engine. In such cases, do as follows.
If the machine has cooled to the ambient temperature, it is necessary to use the electric heater (engine) and a fan heater (to warm the inside of the engine room) before starting the engine. The relationship between the ambient temperature and the heater device and time taken to warm up the engine until the engine can be started again is shown in graph B. Please use this graph for reference.
Graph B gives the general situation, so adjust the values to match the actual working conditions of the machine. (Note that the items marked with ★ must not be adjusted.)

Example of using graph B

When ambient temperature is -40°C and engine oil is SAE15W-40

Start the electric heater 6.5 hours before starting the engine. This makes it possible for the engine to be started.

NOTICE

- Be sure to turn off the heater before starting the engine.
- Do not attempt to start the engine under any circumstances before the heater has been used for at least 4 hours (★ mark in graph B).
- If a fan heater is also used, it is possible to reduce the warming-up time.
- If a fan heater is used, cover the rear of the engine with canvas.
- The curve for the fan heater shown in graph B is the curve when using a 88,000 kcal/h jet heater.

When ambient temperature is -50°C and engine oil is SAE15W-40

Start the electric heater 4 hours before starting the engine and use a fan heater (88,000 kcal/h) in the engine room at the same time. This makes it possible for the engine to be started.

NOTICE

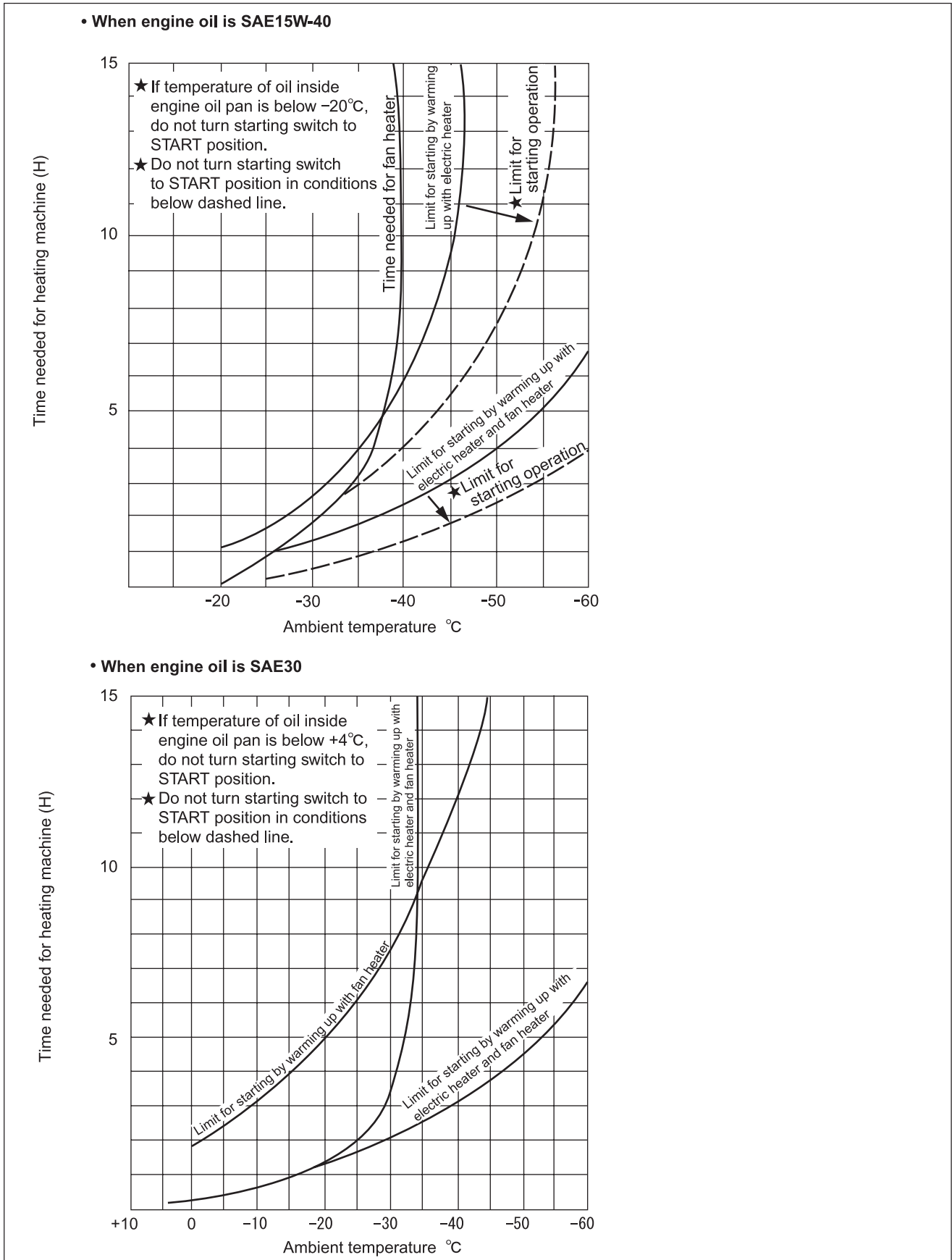
- It is difficult to start the engine using only the electric heater.
 - Do not attempt to start the engine under any circumstances before the electric heater and fan heater (88,000 kcal/h) have been used for at least 2.5 hours (★ mark in graph B).
2. Always be sure to turn the electric heater off before starting the engine. If the engine is started with the electric heater still switched on, the following troubles will occur.
 - When the filament of the electric heater is at a high temperature, the high-temperature strength of the filament is reduced, and vibration caused by starting the engine may cause the filament to break because of fatigue.
 - If the electric heater is switched on when the engine is running, the heat of the engine itself will be added to the heat from the heater, and this will cause overheating of the coolant and lubricating oil.

CAUTION

When the filament of the electric heater is at a high temperature, the high-temperature strength of the filament is reduced, and vibration caused by starting the engine may cause the filament to break because of fatigue.

3. Do not use the heater when the ambient temperature is more than 5°C . If heater is used when the ambient temperature is more than 5°C , it will cause deterioration of the lubricating oil.
4. If air is trapped in the engine cooling water circuit, the circulation of the heated water will be poor and the heat maintenance effect will be reduced. If the cooling water has been changed or it is thought that there is air trapped in the water circuit, crank the engine to bleed the air.
5. When using the electric heater, always make sure that the power supply is properly grounded.

Graph B Relationship between ambient temperature and warming-up time (when machine has cooled to ambient temperature)



HD465-5, HD605-5 DUMP TRUCK

Form No. SEAM05690513T