

Operation & Maintenance Manual



WA500-3LK

WHEEL LOADER

SERIAL NUMBERS **WA500-3LK** **A71001** and UP

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

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

INTRODUCTION

INTRODUCTION

FOREWORD

This manual describes procedures for operation, handling, lubrication, maintenance, checking, and adjustment. It will help the operator and maintenance personnel achieve peak performance through effective, economical, and safe machine operation and maintenance.

Keep this manual handy and have all personnel read it periodically. If this manual is lost, damaged, or becomes dirty and can not be read, request a replacement manual from your local distributor.

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

Continuing improvements in the design of this machine can lead to changes which may not be reflected in this manual.

Consult your local Komatsu distributor for the latest available information on your machine or for questions regarding information in this manual.

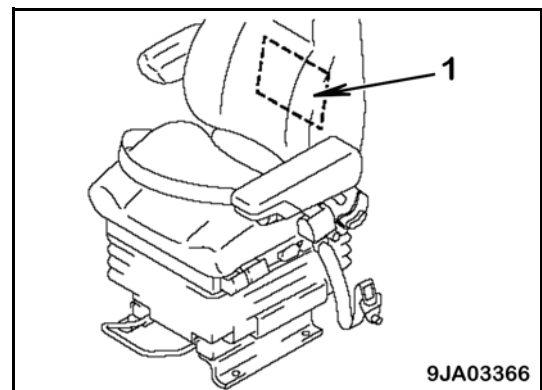
This manual may contain attachments and optional equipment that are not available in your area. Consult your local Komatsu distributor for items that you may require.

WARNING

Improper operation and maintenance of this machine can be hazardous and could result in serious injury or death.

- Operators and maintenance personnel must read this manual thoroughly before operating or maintaining this machine.
- This manual should be kept near, or with, the machine for reference. All personnel who operate the machine should periodically review the manual.
- Some actions involved in operation and maintenance can cause a serious accident if they are not performed in the manner described in this manual.
- The procedures and precautions given in this manual apply only to the intended uses of this 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. You or others should never engage in prohibited uses or actions described in this manual.
- Komatsu delivers machines that comply with all applicable regulations and standards of the country to which they are shipped. If this machine has been purchased in another country, or purchased from someone in another country, it may lack certain safety features 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 your local distributor or Komatsu before operating the machine.
- The safety description is given in "SAFETY INFORMATION" on page 0-3 and in Section 1, *Safety*.

- ★ Storage location for *Operation and Maintenance Manual* is in the pocket (1) at the rear of the operator's seat backrest.



SAFETY INFORMATION

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

The following signal words are used to inform you that there is a potentially hazardous situation that may lead to personal injury or damage. In this manual and on machine labels, different signal words are used to express the potential level of hazard.



Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. This signal word is to be limited to most extreme situations.



Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

Remark

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 the **SAFETY** section (Section 1).

KOMATSU AMERICA CORP. cannot predict every circumstance that might involve a potential hazard in operation and maintenance. Therefore the safety message 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 local distributor or KOMATSU AMERICA CORP.

APPROVED AND NON-APPROVED USES

The Komatsu WHEEL LOADER described in this manual has been designed and constructed to be used mainly for the following functions. Any non-approved use may void the warranty, damage the machine, or possibly injure the operator.

Approved Functions

- Loading operations
- Excavating
- Grading
- Pushing

Installation of optional equipment can also be used in the following applications. Use only **Komatsu** approved equipment.

- Handling of materials (bucket - pallet forks)
- Lifting of materials (extendable boom)

Non-Approved Functions

This paragraph describes some of the improper or unauthorized uses of the machine.

It is impossible to predict all the possible improper uses. If the machine is used for any particular application other than those listed in the Approved Functions list, it is important to contact your authorized Komatsu dealer before carrying out the work operations.

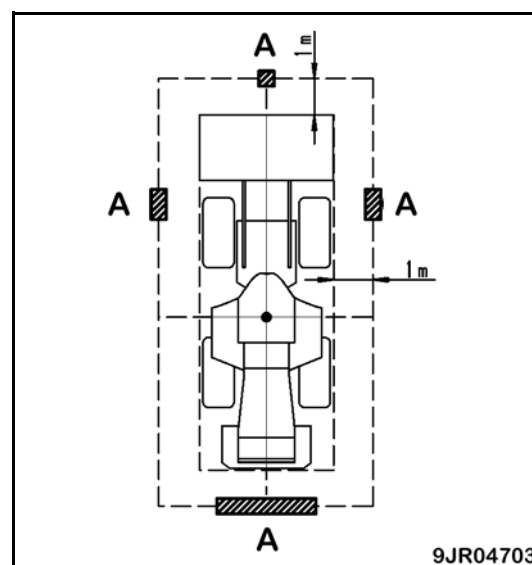
- Use of machine for lifting or transporting personnel in any manner
- Transportation of flammable liquids
- Lifting, moving, or transporting other machines with the front-end loader
- Towing other equipment with the tractor unit or work equipment
- Using the loader as a hammer or for striking or driving objects
- Towing the machine at high speeds
- Traveling at high speeds

VISIBILITY STANDARD

The visibility standards (ISO 5006) for this machine require a view shown in this diagram.

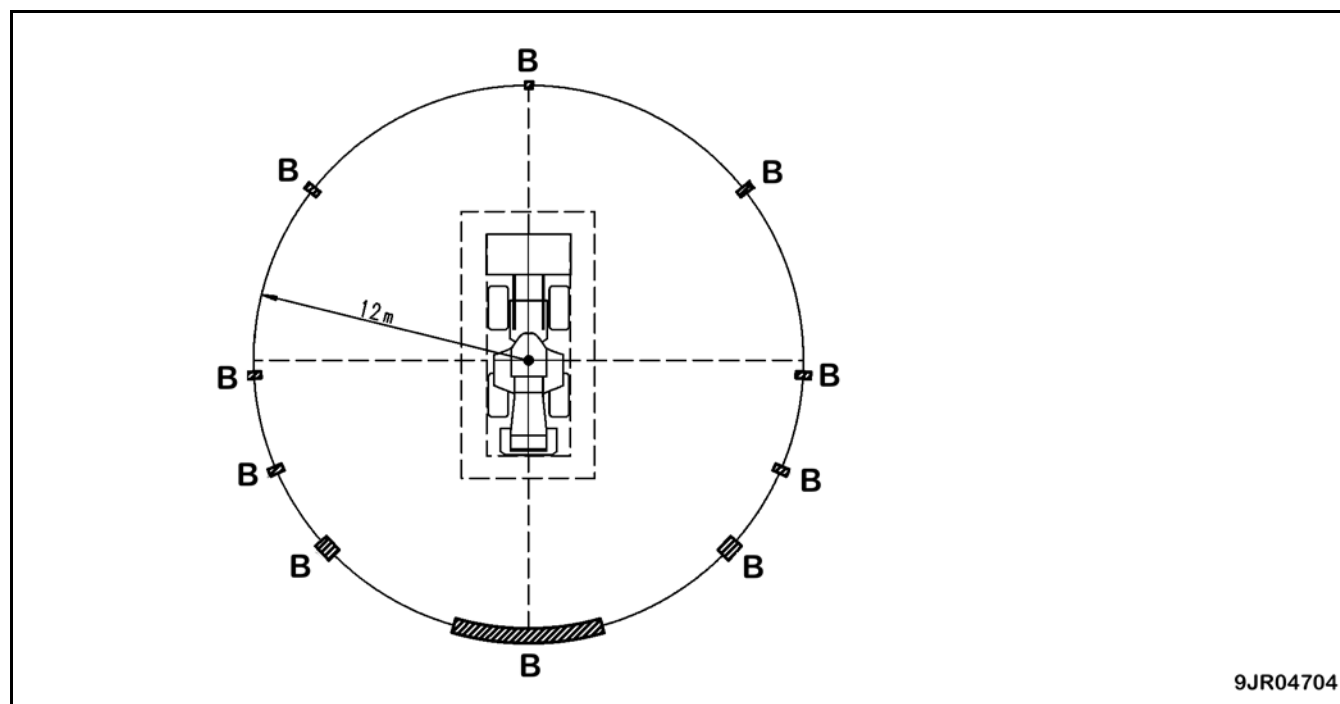
Visibility in Immediate Area

The visibility of this machine in the area 1 meter (1.1 yd) from the outside surface of the machine at a height of 1.5 m (1.6 yd) is shown in the diagram. The hatched area (A) shows the area where the view is blocked by part of the machine when mirrors or other aids to visibility are installed as standard. Be careful; there are places around the machine that cannot be seen when operating the machine.



12-M Radius Visibility

The visibility at a radius of 12 meters (13.1 yd) from the machine is shown in the following diagram. The hatched areas (B) show the areas where the view is blocked when mirrors or other aids to visibility are installed as standard. Be careful; there are places around the machine that cannot be seen when operating the machine.



INTRODUCTION

PRODUCT IDENTIFICATION

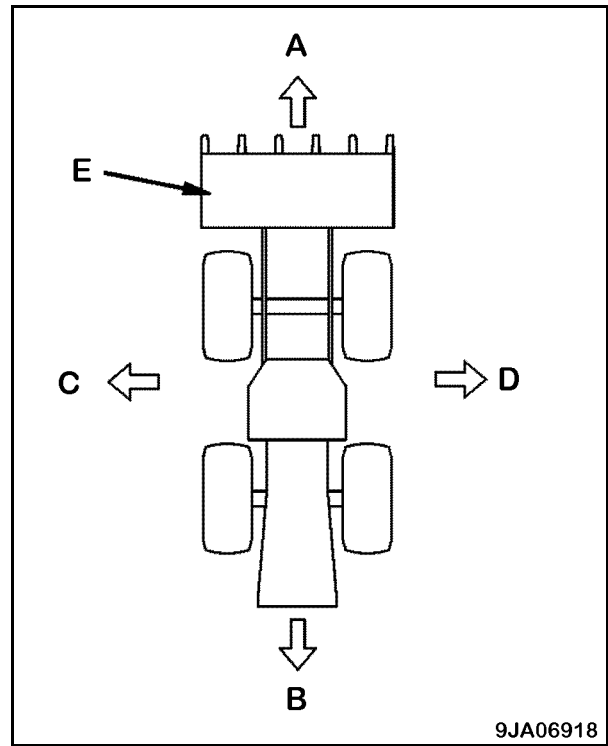
The serial numbers and model numbers on the components are the only numbers that your dealer needs when you require assistance or order replacement parts.

It is a good idea to record this information in this manual. See “SERIAL NUMBERS AND DEALER INFORMATION” on page 0-9.

Directions of Machine

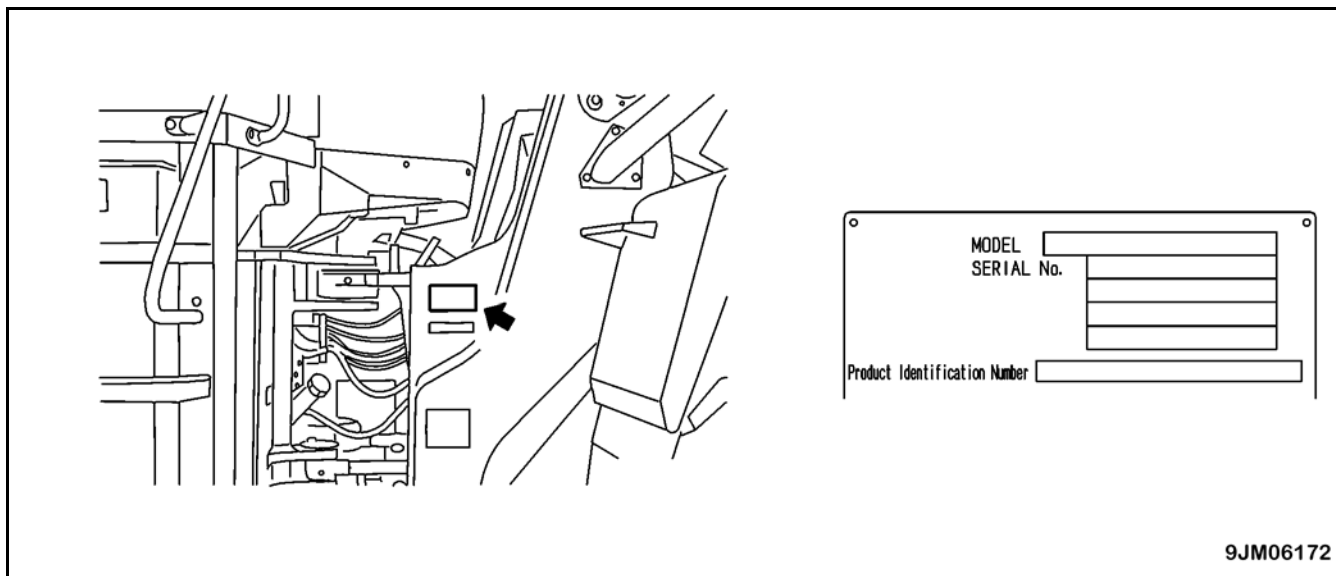
In this manual, the direction of the machine is determined according to the view from the operator's seat, in the direction of travel (front) of the machine.

- A. Front
- B. Rear
- C. Left
- D. Right
- E. Bucket



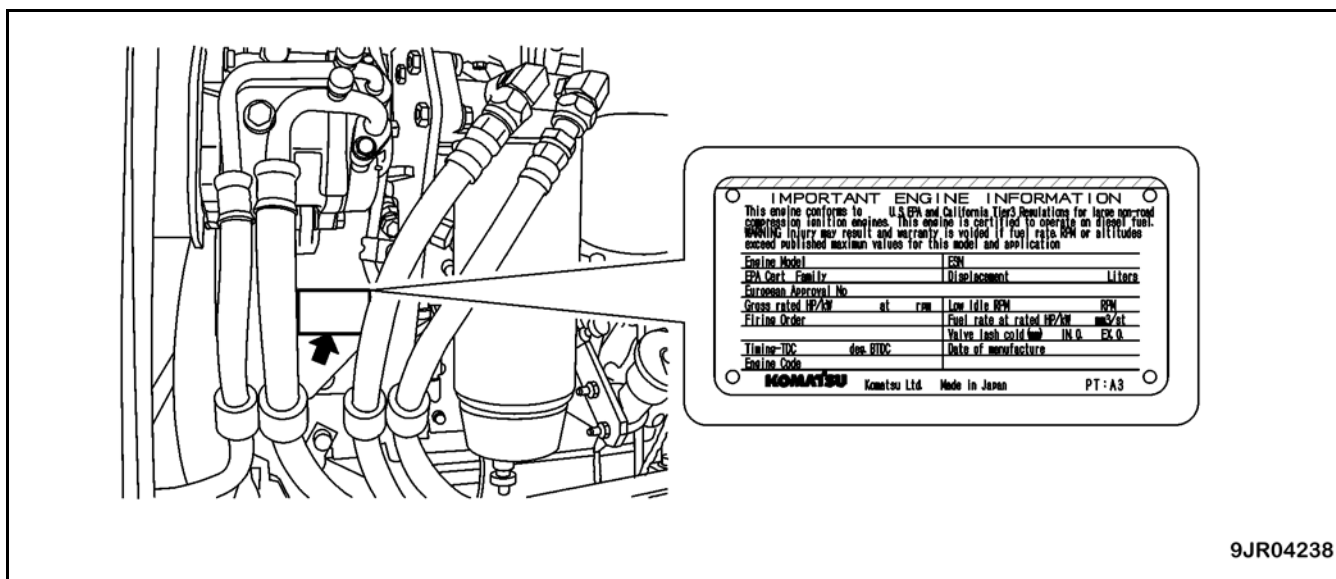
Machine Serial Number

The machine serial number is stamped on the right side, center of the front frame.



Engine Serial Number, EPA Regulations

The engine serial number is on a plate on the upper left side of the cylinder block, on the right side of the machine.

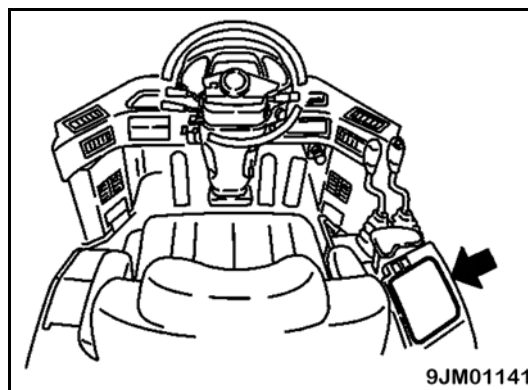


★ EPA: Environmental Protection Agency, USA

INTRODUCTION

Service Meter Location

The service meter is part of the maintenance monitor and is located on the console to the right of the operator's seat.



SERIAL NUMBERS AND DEALER INFORMATION

Model: WA500-3LK

Machine #	
Engine #	

Dealer:

Address:

Phone #

Contacts:

NOTES:

MEMORANDUM

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MEMORANDUM

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.

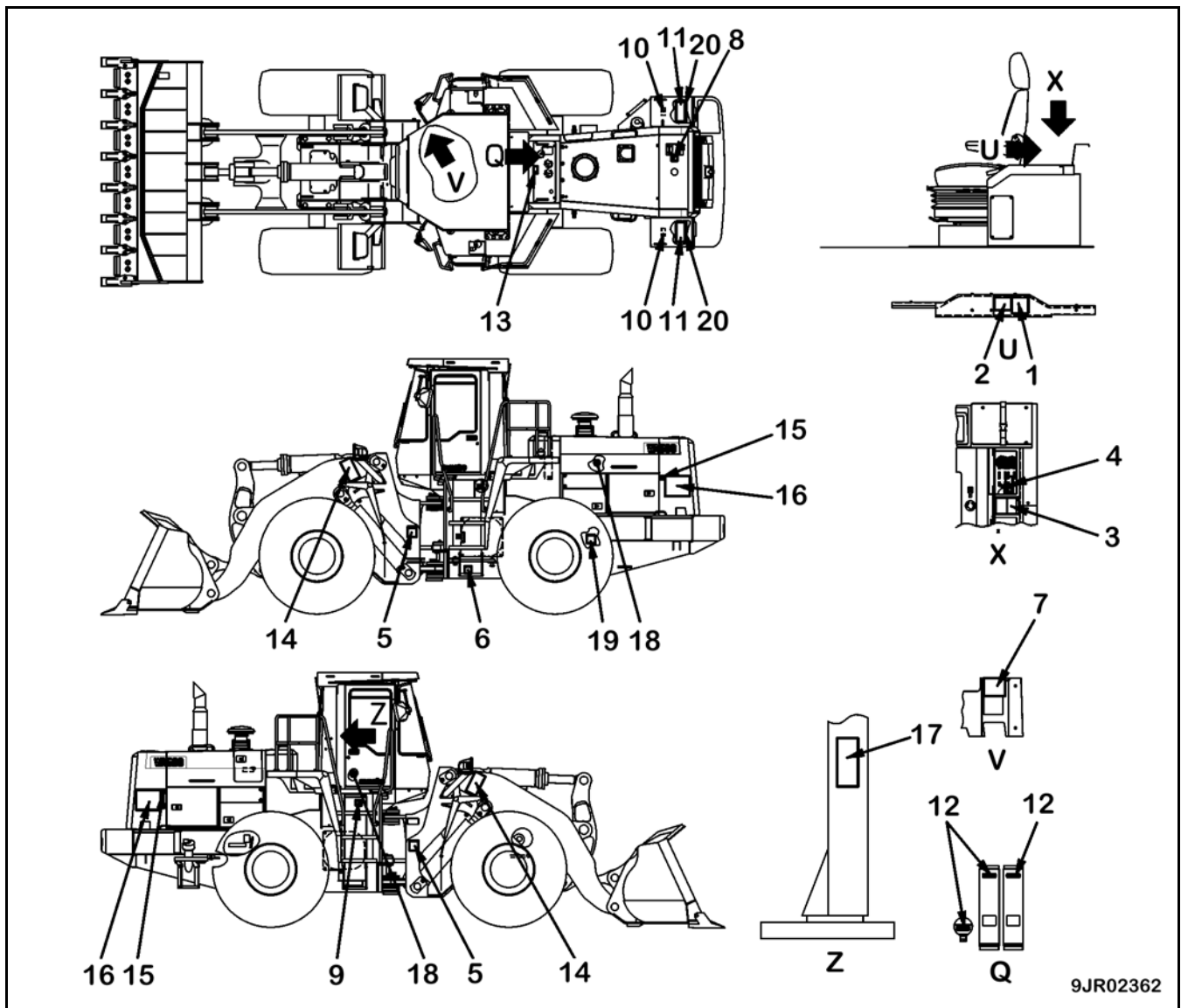
SAFETY

SAFETY AND WARNING DECALS

It is important that all safety and warning decals are in place, not damaged, covered up, or removed. It is also important for the operator to be aware of the decal content and location.

Location of the Safety Decals

- To ensure that the content of these safety decals can be read properly, be sure that they are placed correctly and always keep them clean.
- When cleaning any decal, use soap and water. **NEVER** use organic solvents or gasoline; these solutions may cause the decal to peel off.
- Your **Komatsu** Dealer can provide new replacement decals if the ones on the machine are damaged or missing.
- For part numbers of the safety decals, see this manual or check the actual decal then order the new decals from your Komatsu distributor.
- When replacing damaged or missing decals, be sure that they are placed in the proper location.
- Additional safety or warning decals may be added to your machine, if desired.



Safety Labels

1. Cautions before starting (09651-03001).

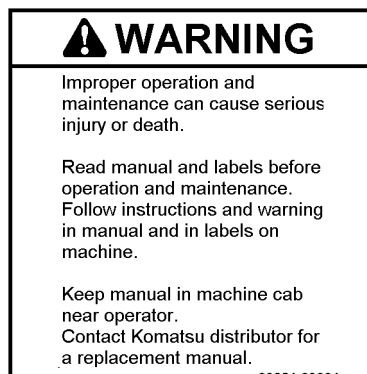
Improper operation and maintenance can cause serious injury or death.

Read manual and labels before operation and maintenance.

Follow instructions and warning in manual and in labels on machine.

Keep manual in machine cab near operator.

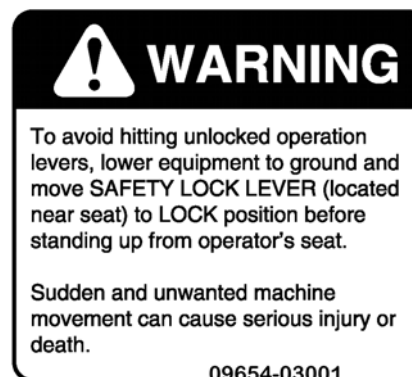
Contact Komatsu distributor for a replacement manual.



2. Cautions for leaving the operator's seat (09654-03001).

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

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

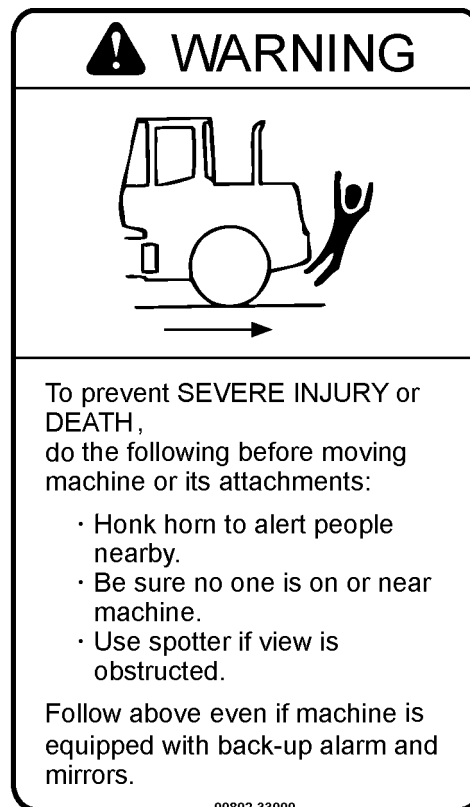


3. Cautions when travelling in reverse (09802-33000).

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

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

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



SAFETY

4. Cautions for parking brake.

If the switch is set to **RELEASE**, a serious accident could result, as this operation releases the parking brake and the machine may move off suddenly.

Never set the switch to **RELEASE** except when towing a disabled machine.

Before towing such machine, read its manual carefully and be sure to follow the instructions given therein.

⚠ WARNING

If the switch is set to **RELEASE**, a serious accident could result, as this operation releases the parking brake and the machine may move off suddenly.
Never set the switch to **RELEASE** except when towing a disabled machine.
Before towing such machine, read its manual carefully and be sure to follow the instructions given therein.


425-93-42320

5. There is a crush hazard between the articulating parts of the vehicle (09162-23000).

Crush Hazard. Can cause severe injury or death.

When machine is being operated, never place yourself in articulated area of machine.

⚠ DANGER



Crush Hazard. Can cause severe injury or death.

When machine is being operated, never place yourself in articulated area of machine.

09162-23000

6. Cautions for frame lock bar (09161-23000).

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

Jackknifing can cause serious injury or death to bystanders.

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

⚠ WARNING

If safety bar is unlocked, machine can jackknife unexpectedly when it is being transported or hoisted.
Jackknifing can cause serious injury or death to bystanders.

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


09161-23000

7. Cautions for working close to electric cables (09801-13001).

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	100V - 200V	2 m (7 ft.)
	6,600V	2 m (7 ft.)
Special High Voltage	22,000V	3 m (10 ft.)
	66,000V	4 m (13 ft.)
	154,000V	5 m (16 ft.)
	187,000V	6 m (20 ft.)
	275,000V	7 m (23 ft.)
	500,000V	11 m (36 ft.)



⚠ 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	100V-200V	2m
	6,600V	2m
Special High Voltage	22,000V	3m
	66,000V	4m
	154,000V	5m
	187,000V	6m
	275,000V	7m
	500,000V	11m

09801-13001

8. Cautions when coolant is at high temperature (09668-03001).

Hot water hazard.

To prevent hot water from spurting out:

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

⚠ WARNING

Hot water hazard.

To prevent hot water from spurting out:

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

09668-03001

9. Cautions when oil is at high temperature (09653-03001).

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.

⚠ 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.

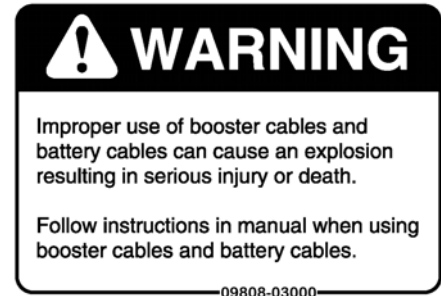
09653-03001

SAFETY

10. Cautions when handling battery cables (09808-03000).

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.



11. Caution when handling battery.

Keep sparks, flame, cigarettes away.

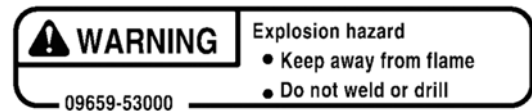


AJR00131

12. Caution to prevent explosion (09659-53000).

Explosion hazard

- Keep away from flame.
- Do not weld or drill.



13. Do not climb on hood (09805-13000).

NEVER be on this hood.



14. Do not go under work equipment (09807-C1201).

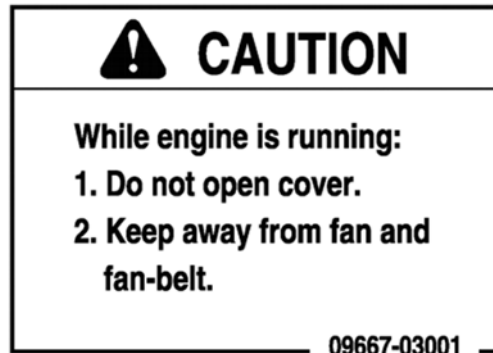
- Sign indicates a crush hazard from a falling working device.
- Keep away when the working device is raised.



15. Do not open when the engine is running (09667-03001).

While engine is running:

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



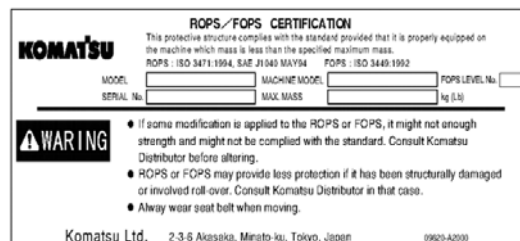
16. Do not come near the machine (09812-13000).

Keep a safe distance.



17. Do not modify ROPS (09620-A2000).

- Do not drill, cut, bend, or modify ROPS in any way.
- If damaged, replace the ROPS.
- **DO NOT REPAIR.**

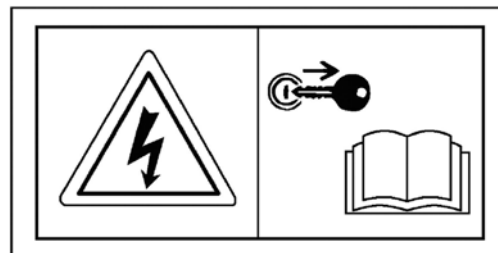


18. Cautions for high voltage (6217-81-9270) (6217-81-9280).

Electrical hazard

Switch off the key.

Read manual before servicing.



SAFETY

19. Jump start prohibited (09842-A0481).

- Start the engine only after sitting in the operator's seat.
- Do not attempt to start the engine by short-circuiting the starter circuit. Serious injury or fire may result.



20. Cautions when handling batteries (09664-30010).

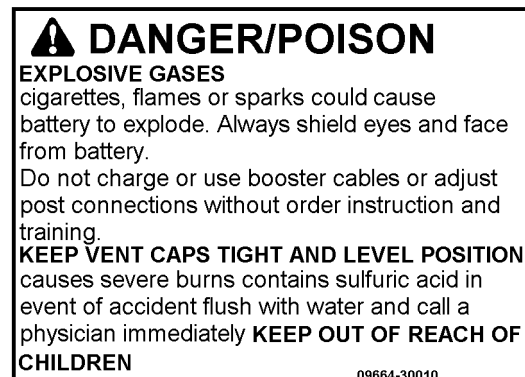
EXPLOSIVE GASES

- Cigarettes, flames or sparks could cause battery to explode. Always shield eyes and face from battery.
- Do not charge or use booster cables or adjust post connections without proper instruction and training.

KEEP VENT CAPS TIGHT AND LEVEL POSITION.

- Causes severe burns.
- Contains sulfuric acid.
- In event of accident flush with water and call a physician immediately.

KEEP OUT OF REACH OF CHILDREN.



Additional Safety Decals

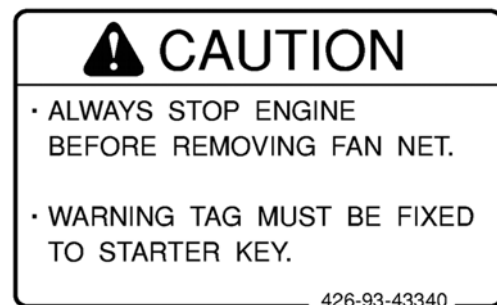
1. Do not climb on fender (09805-03000).

NEVER be on this fender.



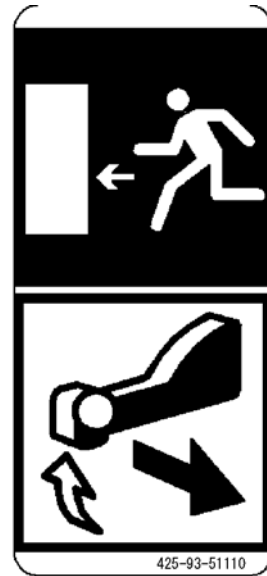
2. Precautions when removing fan net (426-93-43340).

- ALWAYS STOP ENGINE BEFORE REMOVING FAN NET.
- WARNING TAG MUST BE FIXED TO STARTER KEY.



3. Emergency escape (425-93-51110).

- Sign indicates the doors on the machine through which you can escape in an emergency.
- Sign indicates the lock knob on the emergency escape door.



GENERAL SAFETY RULES AND PRECAUTIONS

General Safety Rules

- Only trained and authorized personnel are allowed to operate and service this machine.
- Before operating this machine, it is important to study the operator's manual thoroughly and become familiar with all controls and safety decals. Keep this manual with your machine at all times for easy and quick reference.
- Safety must always be the operator's most important concern. Never operate a machine that is unsafe or in poor operating condition.
- Always perform a pre-operational check on your machine before operating it.
- If the machine is equipped with a seat belt and rollover protective structure, Komatsu requires that the operator is within the confines of the rollover protective structure, with the seat belt fastened snugly around his/her waist, before operating the machine.
- Komatsu requires that if your equipment is designed for operation by one person, it is for one person only. Never allow other personnel to ride on your machine in any manner.
- Never leave your machine running and unattended. Always park the machine in a level area; lower any work equipment to the ground; set the parking brake; lock the controls; and turn the engine off before exiting the operator's compartment.
- Be sure that all personnel are at least 12 m (40 ft) away from any point on the machine before moving or operating the machine. Never allow anyone to stand near the machine while it is in operation. Remember that the larger the machine, the more restricted is your visibility.
- If pedestrians are in the area, proceed slowly and sound your horn. Keep in mind that pedestrians have the right-of-way. A loaded or smaller machine has the right-of-way over an unloaded machine.
- Never use your machine for tasks for which it was not designed; damage to the machine or injury to the operator may result.
- Follow all safety rules, precautions, and instructions when operating or performing maintenance on the machine.
- It is the owner and/or operator's responsibility to replace any safety or warning decals if they are defaced or removed from the machine.
- Think before you act; study the job carefully. Careful operators and service personnel are the best insurance against accidents.
- The operator of this machine must be alert, physically fit, and free from the influence of alcohol, drugs, or medications that might affect his/her eyesight, hearing, or reactions.
- When working with another person on a work site, or during traffic control, be sure that all personnel involved understand all hand signals that are to be used.
- When leaving a job site for long periods of time, always lower all work equipment to the ground; neutralize work equipment controls; and lock and secure your machine properly to avoid tampering by other personnel.
- Never drive up to anyone standing in your path of travel. Always be sure all personnel are standing to the side when you approach them and that they acknowledge your approach.
- Follow all rules relating to safety as outlined in this manual and by your company. Never get involved in horseplay.

Unauthorized Modifications

- If this machine is modified without permission from Komatsu, there is a danger that problems may occur with safety that may lead to serious personal injury.
 - Modifications may have an adverse effect on items such as machine strength and visibility.
 - Before making any modifications, consult your Komatsu distributor. Komatsu cannot take any responsibility for accidents, failures, or damage caused by modifications not authorized by Komatsu.

General Safety at Job Site

- Before starting operations, thoroughly check the area for any unusual conditions that could be dangerous.
- Know where to report an accident or fire. In case of an emergency, have a local emergency phone number available.
- Be careful when operating around or near open burning operations.
- Maintain the fire extinguisher on the machine and a second one at the job site.
- Keep the machine clean, especially from flammable materials such as trash, grease, oil, or fuel.
- Keep all safety equipment in good working condition.
- Check the terrain and condition of the ground at the work site, and determine the safest method of operation.
- Do not operate where there is a hazard of landslides or falling rocks.
- If water lines, gas lines, or high-voltage electrical lines may be buried under the work site, contact each utility company and have them identify the location of these lines.
- Take action to prevent unauthorized people from approaching the job site.
- When working on public roads, position flagmen and erect barriers to ensure the safety of passing traffic and pedestrians.
- When traveling or operating in shallow water or on soft ground, check the shape and condition of the bedrock, and the depth and speed of flow of the water before starting operations.
- Conduct periodic safety training and familiarize all personnel with emergency procedures.

Working on Loose Ground

- Avoid traveling or operating your machine too close to the edge of cliffs, overhangs, and deep ditches. The ground may be weak in such areas. If the ground could collapse under the weight or vibration of the machine, there is a hazard that the machine may fall or tip over.
- Remember that the soil is loose after heavy rain, blasting, or after earthquakes.
- When working on embankments or near excavated ditches, there is a hazard that the weight and vibration of the machine could cause the soil to collapse.
- Before starting operations, take steps to ensure that the ground is safe and to prevent the machine from rolling over or falling.

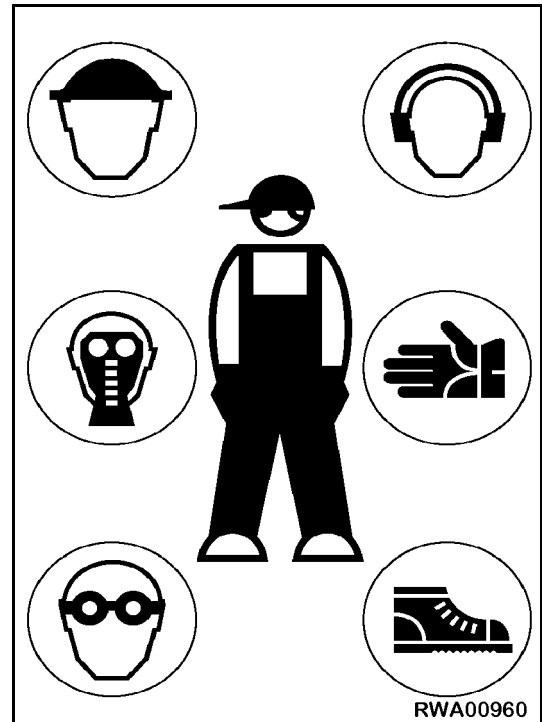
Safety Features

- Be sure that all guards and covers are in place especially after servicing the machine.
- Have guards or covers repaired immediately, if they are damaged. See “Starting Engine” on page 2-56.
- Use safety equipment such as safety locks and seat belt properly.
- Never remove any safety features. Always keep them in good operating condition.
- Always secure the machine in a safe position. See “Parking the Machine” on page 2-96.
- Seat belt: See “Inside Operator’s Compartment” on page 1-16.
- Improper use of safety features could result in serious bodily injury or death.
- Be sure the machine has the correct equipment required by local rules and regulations.

SAFETY

Personal Protective Equipment

- If your machine is equipped with safety equipment, Komatsu requires this equipment to be used when operating your machine.
- Avoid loose fitting clothing, jewelry, and loose long hair. These can catch on controls or in moving parts and cause serious injury.
- 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 driving pins with a hammer or cleaning the air cleaner element with compressed air.
- Check to be sure no one is near your work area.
- Check to be sure all personal protective equipment is in good condition before using it.
- If you are subjected to loud noise, always wear ear protection.



Fire and Explosion Prevention

Fuel and oil are flammable. Fuel is particularly flammable and can be hazardous.

Always observe the following precautions:

- Keep any open flames, airborne sparks, or burning embers away from flammable fluids.
- Stop the engine and do not smoke when refueling.
- Tighten all fuel and oil caps securely.
- Refueling or adding oil should be done in well-ventilated areas.
- Clean up any fluid spills.



Fire Caused by Fuel or Oil

Fuel and oils are particularly flammable and can be hazardous.

To prevent fire, always observe the following precautions:

- Do not smoke or use any flame near fuel or oil.
- Stop the engine before refueling.
- Do not leave the machine while adding fuel or oil.
- Tighten all fuel and oil caps securely.
- Always inspect around the entire fuel tank for leaks; clean or repair, if required.
- Inspect fuel system for leaks.
 - This includes fuel lines, filters, and injection system.
 - Clean or repair, if required.
- Do not spill fuel on overheated surfaces or on parts of the electrical system.



- 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.
- After adding fuel or oil, wipe up any spilled fuel or oil.
- When carrying out grinding or welding work on the chassis, move any flammable materials to a safe place before starting.
- When washing parts with oil, use a non-flammable oil. Diesel oil and gasoline may catch fire. Do not use them.
- Put greasy rags and other flammable materials into a safe container to maintain safety at the work place.
- Do not weld or use a cutting torch to cut any pipes or tubes that contain flammable liquids.

Fire Caused by Accumulation of Flammable Material

- Remove any dry leaves, wood chips, pieces of paper, wood dust, or any other flammable materials accumulated or affixed around the engine, exhaust manifold, muffler, air cleaner, battery, or inside the undercovers.
- Be aware that operations such as logging, mulching, clearing, and landfill work may cause trash and debris to accumulate on the machine. Always remove accumulated trash and debris on a daily basis.
- Clean the machine after servicing the hydraulic system, engine, or fuel system.
- Operations near burn piles or other open burning may cause airborne sparks or glowing embers to cause a fire on the machine.

Fire Coming from Electrical Wiring

Short circuits in the electrical system can cause a fire.

- Always keep electric wiring connections clean and securely tightened.
- Check the wiring every day for looseness or damage to the wire insulation.
 - Tighten any loose connectors or wiring clamps.
 - Repair or replace any damaged, pinched, or chaffed wiring.
- After-market radios or other electrically-operated equipment in the cab must be fused close to the power supply.

Fire Coming from Hydraulic Line

- Check that all the hose and tube clamps, guards, and cushions are securely fixed in position.
 - If they are loose, they may vibrate during operation and rub against other parts. This may damage the hoses and cause high-pressure oil to spurt out, leading to fire damage or serious injury.
- Check for oil leaks daily and repair them immediately.

Windshield Washer Fluid

- Use an automotive-type washer fluid in the windshield washer system.
- Never use flammable fluids in the windshield washer system.

Action if Fire Occurs

If a fire occurs, escape from the machine and take the following actions:

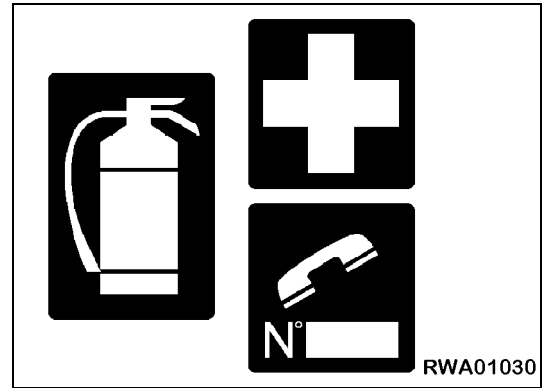
- Do not attempt to move the machine or continue operations.
- Turn the start switch OFF to stop the engine.
- Use the handrails and steps to get off the machine.
- Immediately call for help.
- When using a fire extinguisher, always aim the extinguisher nozzle at the base of the fire.
- If an optional fire extinguishing system is in place, be familiar with its operating procedures.

SAFETY

Fire Extinguisher and First Aid Kit

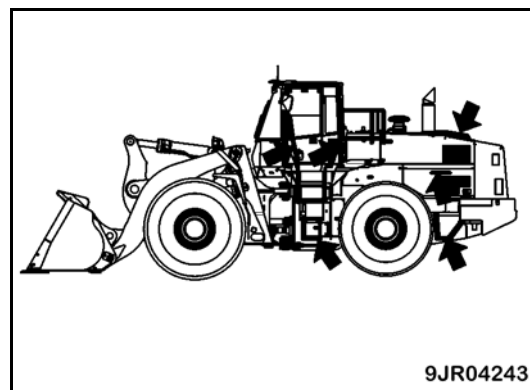
As a precaution in case a fire or an injury occurs, always keep a fire extinguisher and first aid kit on your machine and take the following precautions:

- Be sure that the fire extinguisher is in good condition. Read the label on it to ensure you know how to use it.
- Keep a first aid kit in the storage area. Check the kit periodically and make any additions, if necessary.
- Keep a list of emergency phone numbers in case of an accident.

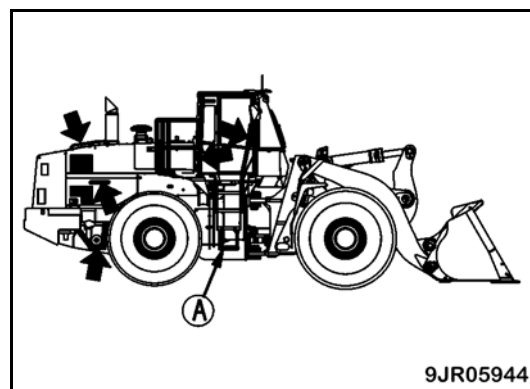


Mounting and Dismounting

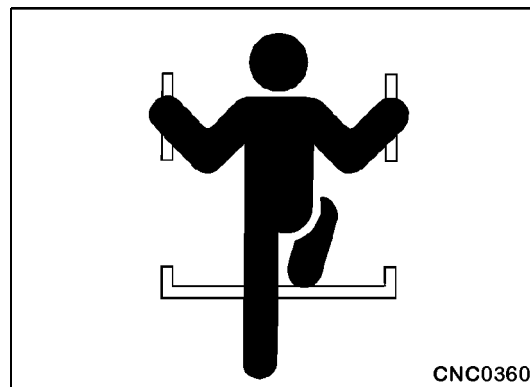
- When mounting or dismounting this machine, always be sure the work equipment is fully lowered to the ground; the engine is OFF; and the parking brake is set.
- Use all hand holds and step plates on your machine.
- Never climb on the engine hood or covers where there are no non-slip pads.
- Never jump off or on to the machine.
- Never move from the step at the rear of the machine or the step at the side of the cab to stand on top of the tire.



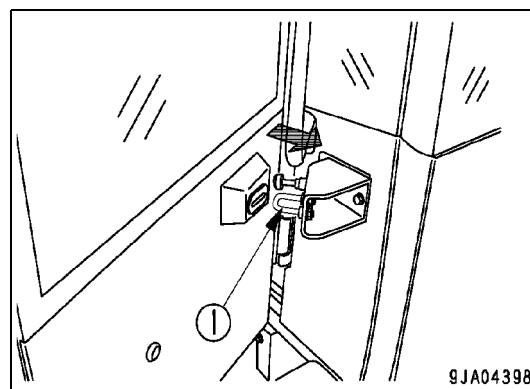
- If there is any oil, grease, or mud on your shoes, wipe it off immediately before getting on the machine.
- If there is any oil, grease, or mud on the rails, steps, or platforms, wipe it off immediately before getting on the machine.
 - Always keep these areas clean and in good condition.
- Never get on or off a moving machine.
 - These actions may lead to serious injury.
 - Always bring the machine to a full stop.



- When entering the cab, stand on the top step before opening the door.
- When getting on or off the machine, always face the machine and maintain a **Three-Point Contact** (both feet and one hand, or one foot and both hands) with the handrails, steps, and platforms to ensure that you support yourself properly.



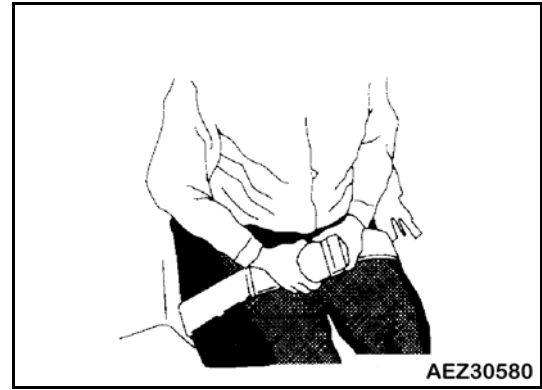
- When entering the cab and opening the cab door, push the door open until it is securely into door latch (1) and held in position.
- Use the handrails on the inside of the door while entering or exiting the cab.
- Never hold the control levers, work equipment, or the steering wheel when getting on or off the machine.



SAFETY

Inside Operator's Compartment

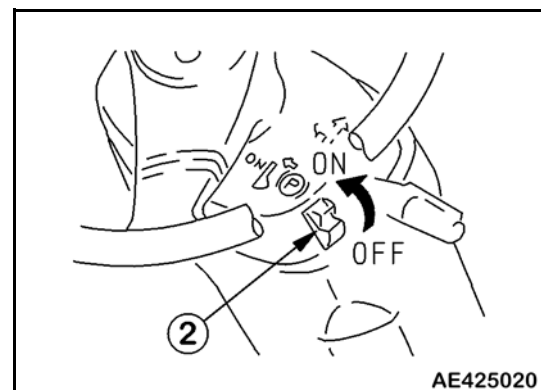
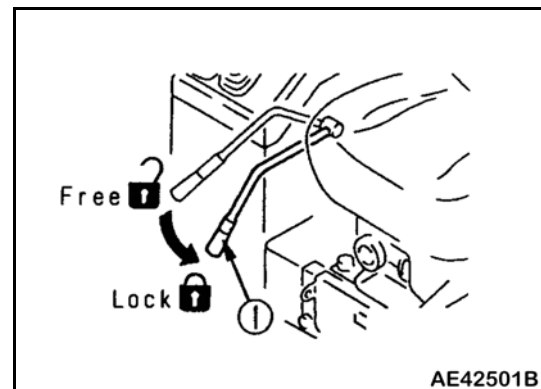
- When entering the operator's compartment, always remove mud and oil from the soles of your shoes.
 - If you operate the brake pedal with mud or oil on your shoes, your foot may slip and may cause an accident.
- After using the ashtray, make sure matches or cigarettes are properly extinguished and be sure to close the lid.
 - If the ashtray is left open, there is danger of fire.
- Do not leave lighters or aerosol cans laying around the operator's compartment.
 - If the temperature inside the operator's compartment gets too high, there is danger that the lighter or aerosol can may explode.
- Do not stick suction pads to the window glass.
 - Suction pads may act as a lens and could cause a fire.
- Do not use cellular telephones inside the operator's compartment when driving or operating the machine.
- After-market radios or other electrically-operated equipment in the cab must be fused close to the power supply.
- Never bring any dangerous objects, such as flammable or explosive items, into the operator's cab.
- To ensure safety, do not use the radio or music headphones when operating the machine.
- Keep the operator's compartment clean.
 - Never allow trash or tools to accumulate; these may hinder the operation of the controls or pedals.
- When operating the machine, do not put your hands or head out of the window or beyond the protection of the ROPS.
- Always use the seat belt equipped with your machine.
 - Be sure the seat belt is fastened snugly around your waist before operating the machine.



Precautions When Standing Up from Operator's Seat

When standing up from the operator's seat:

- Lower the work equipment completely to the ground.
 - Set safety lock lever (1) to the LOCK position.
-
- Set parking brake switch (2) to ON.
 - Stop the engine.
 - ★ If you accidentally touch the control levers when they are not locked, the machine or work equipment may suddenly move and cause serious personal injury or death.



Precautions When Using ROPS

The ROPS (Roll Over Protective Structure) must never be removed from the machine. The ROPS is installed to protect the operator if the machine rolls over. It is designed not only to support the load if the machine rolls over, but also to absorb the impact of the energy.

The ROPS fulfills all the regulations and standards for all countries.

- If the ROPS is modified without authorization or is damaged, the strength may be reduced and it may not be able to fulfill its function properly.
- Never drill, cut, weld on, or modify the ROPS structure.
- If the ROPS structure should become damaged in any way, replace it immediately.
- Do not make repairs to the ROPS structure itself.

WARNING

Never modify, weld, cut, or drill on any part of a ROPS structure. Doing so may weaken the structure which could lead to possible failure in a rollover situation.

Emergency Escape from Operator's Cab

If the left door of the cab does not open or if it is dangerous to get off the machine from the left side, release the open lock of the right door (emergency door) and use the right door as an emergency escape route.

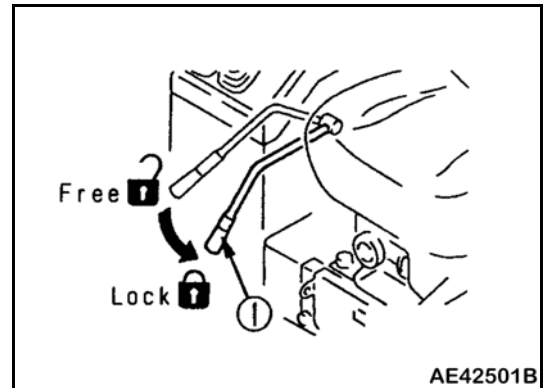
See "Door Operating as Emergency Escape" on page 2-36.

SAFETY

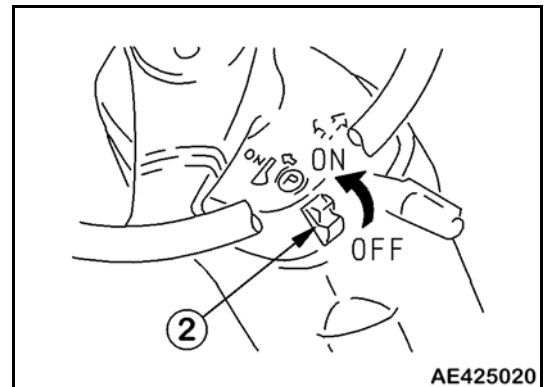
Leaving Operator's Compartment

These procedures must be followed when exiting the operator's cab.

1. Park the machine in a level area.
2. Lower the work equipment completely to the ground.
3. Set safety lock lever (1) to the LOCK position.



4. Set parking brake switch (2) to ON.
5. Turn the engine OFF.



6. Remove the ignition key and keep the key with you.
7. Use the key to lock and secure all the equipment locks.
 - This will prevent unauthorized personnel from tampering with your machine.
 - You are responsible for securing your machine.

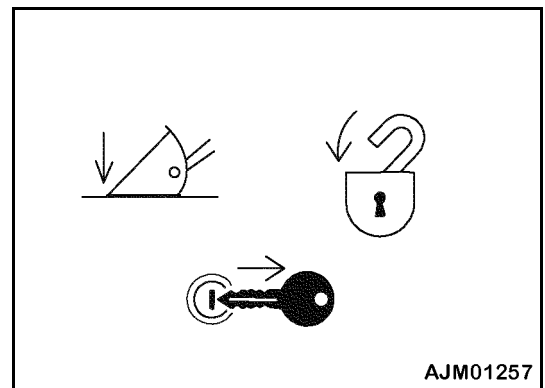
Remark

Never leave your machine running and unattended, even for a moment.

Remark

Work equipment posture: See "Parking the Machine" on page 2-96.

Lock: See "Locking the Machine" on page 2-98.

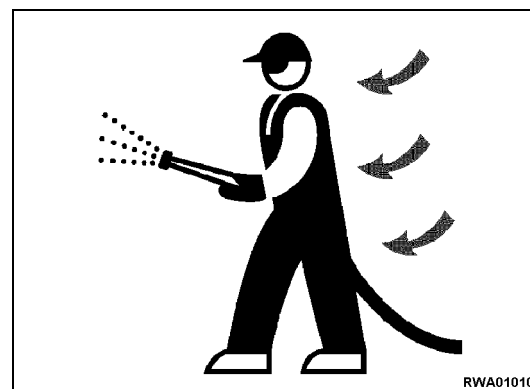
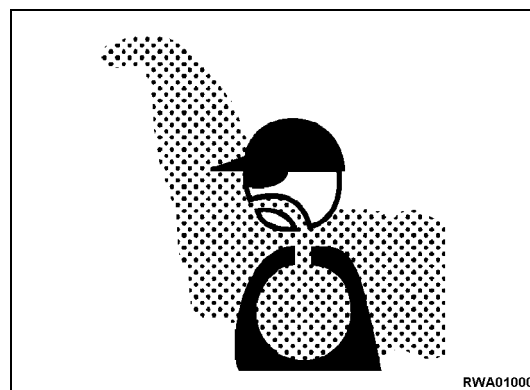


Asbestos Hazard Alert

Asbestos dust in the air can cause lung cancer, if it is inhaled. There is danger of inhaling asbestos materials when working on job sites handling industrial waste. Always observe the following precautions.

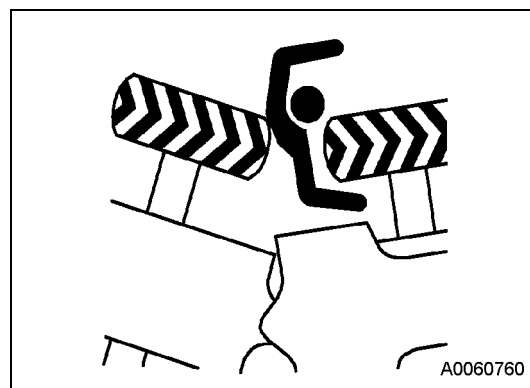
- Spray water to keep down the dust when cleaning. Do not use compressed air for cleaning.
- If there is danger that there may be asbestos dust in the air, always operate the machine from an upwind position. All workers should use an approved respirator.
- Do not allow other people to approach during the operation.
- Always observe the rules and regulations for the work site and environmental standards.

The machine does not contain asbestos but there is a possibility that imitation parts may contain asbestos.



Crush or Pinch-Point Dangers

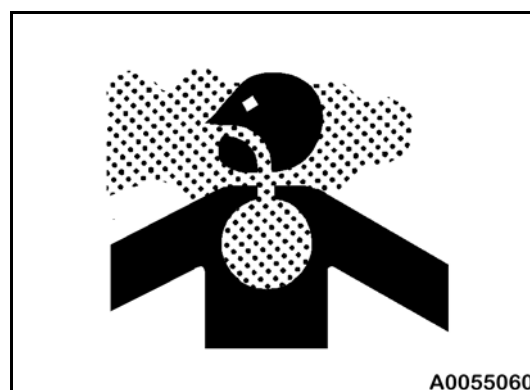
- Never stand in or place any part of your body between the movable components, such as the articulating portions of the machine or between the machine's work equipment.
- When the machine is operated, the clearance changes.
 - If you get caught in this area, it may lead to serious personal injury or death.
- Never drive up to anyone standing in front of a solid object or in your path of travel.
 - The brakes could fail or the machine could slide on a slippery surface causing injury or even death.



Precautions for Ventilation Exhaust Gas

The engine exhaust gas contains substances that may damage your health or even cause death.

- Start or operate the engine in a place where there is good ventilation.
- If the engine or machine must be operated inside a building or underground, where the ventilation is poor, take steps to ensure that the engine exhaust gas is removed and that ample fresh air is brought in.



PRECAUTIONS BEFORE STARTING OPERATIONS

As an operator, you are responsible for the safe operation of this machine at all times, regardless of the situation. Although Komatsu cannot cover all operating conditions that pose a major hazard, here are a few basic situations to avoid when using the loader during work or travel operations. It is advisable to study these and always be aware of them before starting your work operations. Failure to do so may result in damage to the machine or injury to the operator and other personnel.

Pre-Operational Checks

Before starting your work operations, it is important to perform a **Pre-operational Check** to be sure your equipment is in safe operating condition. If any problems are found during your pre-operational check, have them repaired immediately. Never operate a machine that is unsafe, damaged, or in need of repair. Failure to perform a pre-operational check before starting work operations may result in damage to the machine or injury to the operator and other personnel.

Remark

It is important that a pre-operational check be performed at the beginning of your work shift. Even if you are taking the machine operations over from another operator, always perform a pre-operational check before you start work.

Ensure Good Visibility

This machine is equipped with mirrors to improve visibility but, even with mirrors, there are blind spots which cannot be seen from the operator's seat. Always be careful when operating the machine.

When operating or traveling in places with poor visibility where it is impossible to confirm the condition of the job site or obstacles in the area around the machine, there is a danger the machine may be damaged or the operator may suffer serious personal injury. When operating in places with poor visibility, always observe the following rules.

- If visibility is not sufficient, position a flagman. The operator should pay close attention to the signs and follow all of the flagman's instructions.
- Signals should be given by only one flagman.
- When working in dark places, turn the machine's working and front lamps on and, if necessary, set up additional lighting in the area.
- Stop operations if the poor visibility is due to fog, snow, rain, or sand storms.
- Clean the windows and mirrors on the machine then adjust all mirrors to ensure good visibility before starting operations every day.

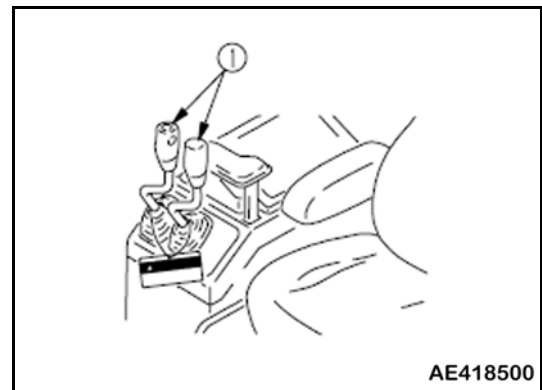
Confirmation of Marks

- On road shoulders or soft ground, set up signs to inform personnel of conditions.
- Make sure all personnel understand the meaning of all the signs.
- If the operators do not know the condition of a job site, the machine may tip over or fall, resulting in injury to the operator.

Precaution for Warning Tag

If there is a “DO NOT OPERATE” warning sign on the work equipment control levers, it means that someone is performing inspection and maintenance of the machine.

- Do not start the engine or touch the levers (1).
- If this tag is ignored and the machine is operated, the serviceman may be caught in moving or rotating parts of the machine; this will cause serious personal injury or death.
- **ALWAYS** follow the warning sign and do not start the engine or operate any of the controls.

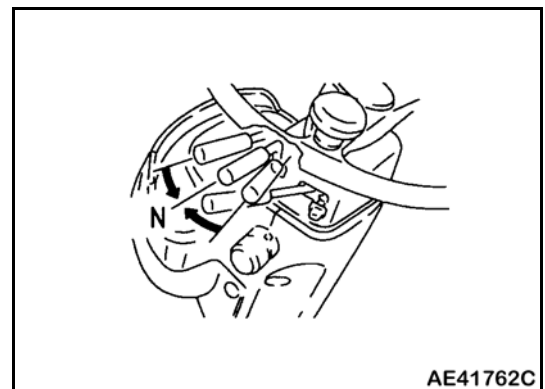
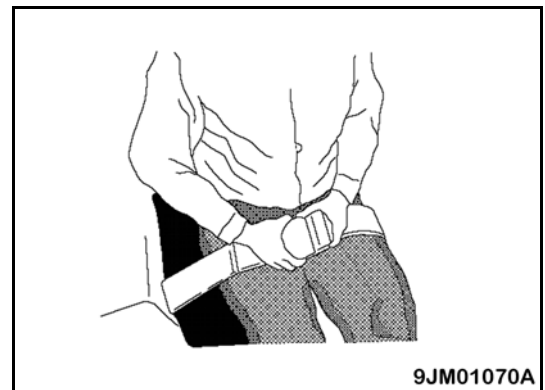
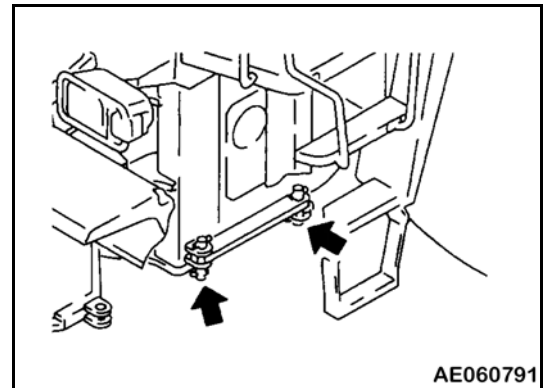


SAFETY

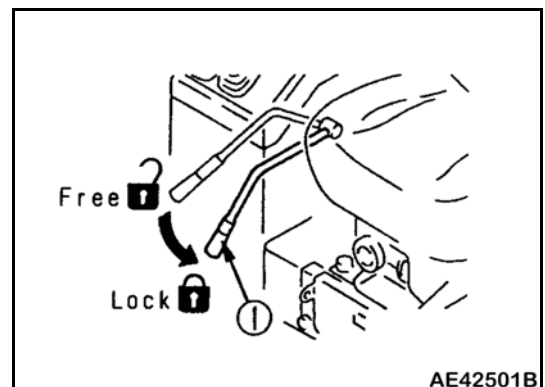
Checks Before Starting Engine, Adjustments

Before starting the engine, perform the following checks and adjustments to confirm that there is no problem with operating the machine. If this step is not performed properly, there is a danger of serious personal injury to the operator or damage to the machine during operation.

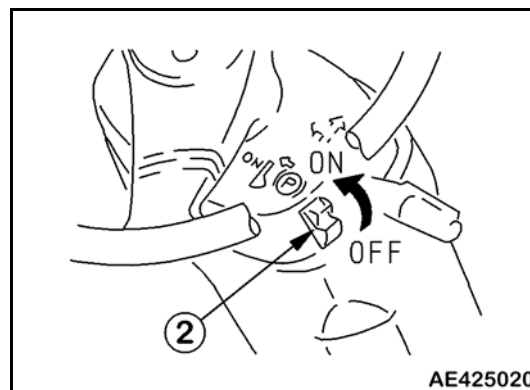
- Clean all windows and mirrors on the machine then adjust all mirrors to prevent any reduction in visibility.
- Securely fix the safety bar (1) at the free position.
- Perform pre-operational checks of the machine.
 - See “Precautions Before Starting Work Operations” on page 2-42.
- Remove all dirt from the front lamps, work lamps, and combination lamps.
- Remove mud, dust, and debris accumulated around the movable parts of the accelerator and brake pedals.
- Check and make sure the pedals work properly.
- Walk around the machine and make sure there are no persons or obstacles above, below, or around the machine.
- Adjust the operator’s seat so it is easy to see to the front of the machine.
- Fasten your seat belt.
- Check for damage or wear to the seat belt or seat belt mounts.
- Adjust the mirrors so the rear of the machine can clearly be seen from the operator’s seat.
- Check and be sure that the gauges and meters work properly.
- Check that the directional lever is at the Neutral position.



- Make sure that the lock lever (1) is in the LOCK position. In this position, it locks the work equipment control lever.



- Check that the parking brake switch is in the ON position (2)

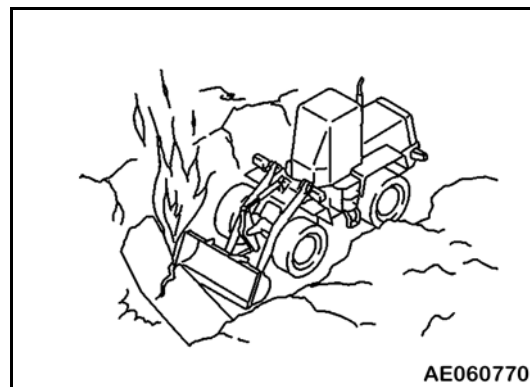


Precautions When Starting

- Do not start the engine if warning tags have been attached to the steering wheel or control levers.
- Before starting the machine, always be in a seated position only, with the seat belt fastened snugly around your waist.
 - It will be impossible to stop operations if a problem occurs and you are not seated, with the seat belt secured.
 - There is a danger of serious personal injury if you are not seated, with the seat belt secured.
- Sound your horn to warn others in the area before starting the engine or moving the machine.
 - There is a danger of serious injury when the machine moves.
- Do not allow anyone in the cab, or on the machine, during operations.
- Be sure all personnel are clear from your work site before starting any work operations.
- DO NOT attempt to start the engine by short-circuiting the engine starting circuit.
 - Such an act could cause serious bodily injury or fire.
 - If necessary, use jumper cables. See “Using Jumper Cables” on page 1-37.

Work Site Hazards

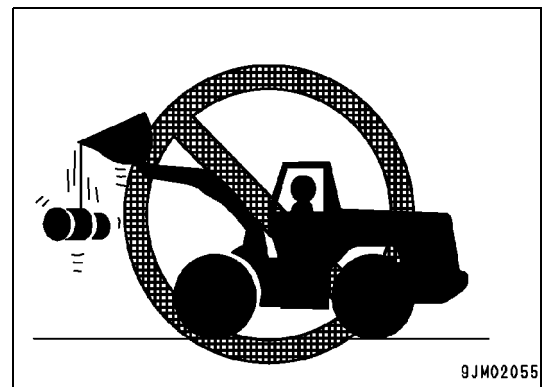
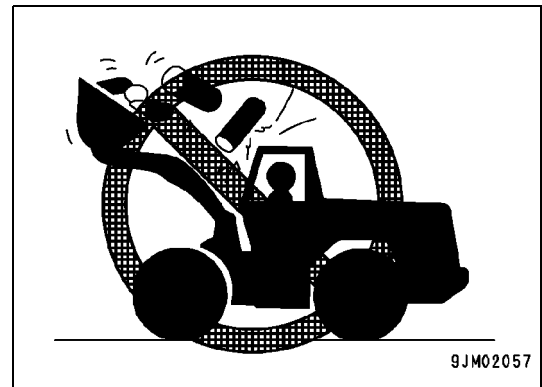
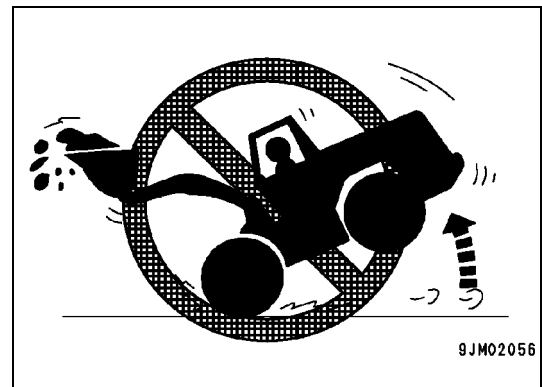
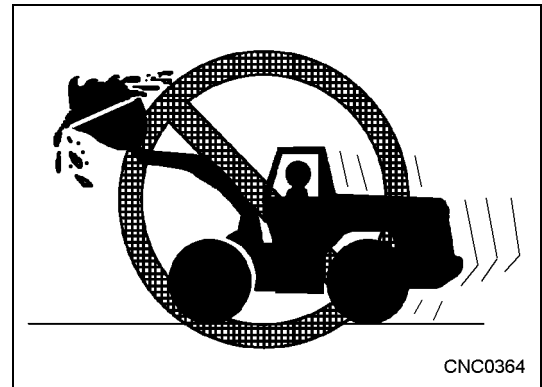
- Before starting any excavating or grading operations, contact all utility departments in your area and have them identify and mark any underground system locations (gas lines, water lines, electrical lines, sewer lines, etc.).
- Check your work area for any unusual ground conditions.
- Make sure your work area is as level as possible and that you will be able to maneuver your work equipment or machine easily.
- If you will be working near a high-traffic area (pedestrians or cars), have a dedicated worker available to direct traffic or install safety fencing around your work site.
- Always be aware of all your work site dangers or distractions.
- Operations such as logging, mulching, land clearing, or landfill operations may cause trash and debris to accumulate on the machine.
 - Remove debris or trash on a daily or more frequent basis (as necessary) to prevent fire.
- Always clean trash from the exhaust system compartments.
 - The hot exhaust compartments may cause fire from contact with flammable material.
- Remove any leaves, wood chips, paper, wood dust, or anything accumulated around the engine that could catch fire.



SAFETY

Avoiding Dangerous Situations

- Avoid traveling with the bucket raised.
 - Raising the bucket raises the center of gravity on the machine. Traveling with a raised bucket, especially a loaded bucket, may result in loss of control or a rollover situation.
 - Never raise the bucket unless the machine is stopped.
- When the bucket is raised and loaded, never make sharp turns or start or stop the machine suddenly.
 - This may cause the machine to tip forward.
- Always handle unstable loads carefully.
- Avoid tipping the bucket back or raising the load too high.
- Be sure to operate the work equipment carefully and keep the load as close to the ground as possible.
- Do not use the bucket or lift arms as a crane.
 - The object you are lifting may swing or shift causing the machine to tip, sway, or possibly roll over.



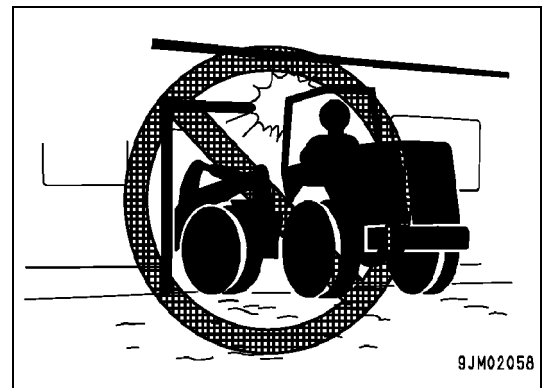
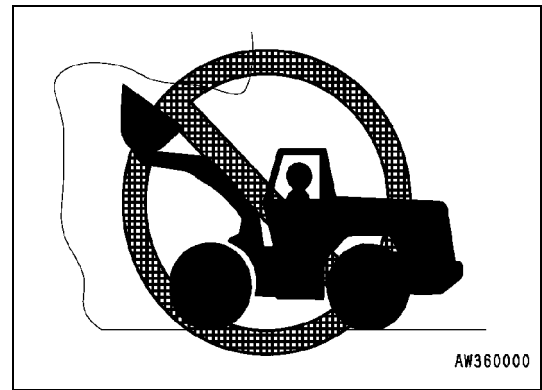
- Never work under overhangs or excavated bank areas.
 - These could collapse and damage the machine or injure the operator.
- Do not approach too close to the edge of cliffs.
 - When doing landfills or when dropping soil over a cliff, dump one pile then use the next pile of soil to push the first pile.
 - The load suddenly becomes lighter when the soil is pushed over a cliff or when the machine reaches the top of a slope.
 - When this happens, there is a danger that the travel speed will suddenly increase; be sure to reduce the speed.

Working Clearances

It is always a good idea to be aware of the clearances around, in front of, behind, and especially above your work area or travel route.

Some basic safety precautions to prevent risk are:

- When working or traveling in an area where clearances are a problem, travel at a slow cautious speed.
- If you are not sure of your clearances, request the aid of another person who can guide or warn you if you get too close to objects.

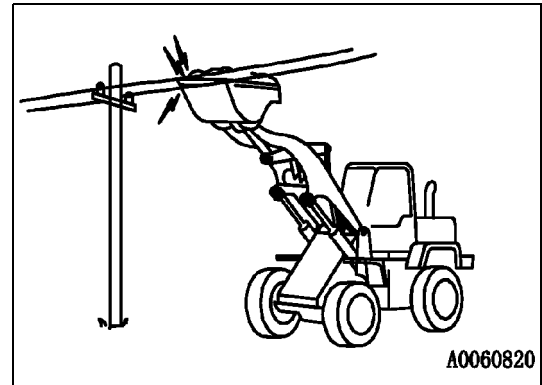


SAFETY

Working Near High Voltage Cables

WARNING

- Electrocutation can result from contacting or approaching underground or overhead power cables.
 - NEVER approach overhead power lines with any part of the machine.
 - ALWAYS use extreme caution.
-
- Before starting work in the vicinity of electric cables, inform the local power company of the work to be performed.
 - Have them take the necessary steps to ensure safety.
 - Be aware of the dangers when working around overhead electrical lines. High humidity may pose an electrical hazard even if your machine clears the overhead power lines.
 - Know your margin of safety. If possible, have power to the lines disconnected.
 - See the table at the bottom of the page.
 - If disconnection is not possible, request a signal person for guidance to maintain at least the minimum distance required by law from the overhead lines.
 - Be prepared for any possible emergency.
 - Wear rubber shoes and gloves.
 - Lay a rubber sheet on top of the seat,
 - Be careful not to touch the chassis with any exposed part of your body.
 - When working near high-voltage power lines, **NEVER** let anyone near the machine.
 - If your machine should come in contact with overhead electrical lines, stop the machine and remain on the machine until the power company clears the lines and it is safe to get off or move the machine.
 - Do not let anyone near the machine.
 - If low power lines pose a greater hazard, have the power company remove the lines until your work is finished.

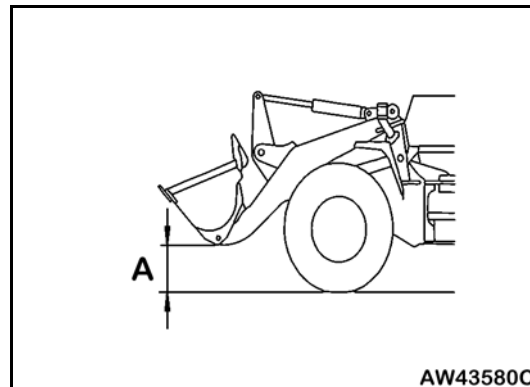


Cable Voltage	Minimum Safe Distance	
100 - 200V	2 m	7 ft.
6,600V	2 m	7 ft.
22,000V	3 m	10 ft.
66,000V	4 m	13 ft.
154,000V	5 m	16 ft.
187,000V	6 m	20 ft.
275,000V	7 m	23 ft.
500,000V	11 m	36 ft.

RULES FOR ROAD TRAVEL

Traveling with your machine may pose some hazards. When traveling, always travel in a safe manner and remain alert at all times. A safety-conscious operator is the most important insurance when traveling with the machine. The operator should be aware of the following situations and information.

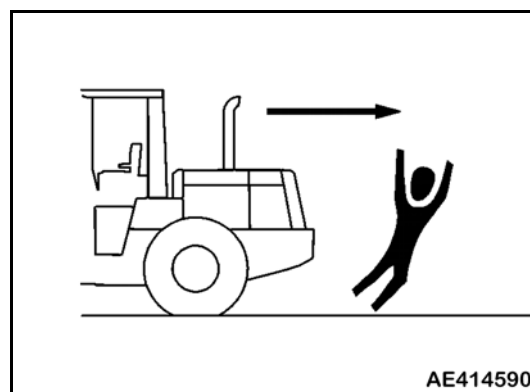
- Raise the bucket to a safe travel height (A) of 40 to 50 cm (16 to 20 in) from the ground.
 - If the work equipment is not raised far enough from the ground, there is danger that the work equipment will touch the ground and cause the machine to tip over.
- Lock the loader control levers using the safety lock.
- Obey all traffic rules when traveling on local and state roads.
- Always travel at a safe, controllable speed.
- Never turn the key in the starting switch to the OFF position.
 - If the engine stops, apply the brakes and stop the machine immediately.
- Always be aware of your clearances and road surface.
 - When traveling on rough ground, travel at low speed and do not operate the steering suddenly.
- When passing over bridges or structures, check first that the structure is strong enough to support the weight of the machine.
- Avoid traveling over obstacles when possible. Do not travel over obstacles which make the machine tilt strongly to the left or right side.
 - There is more danger of the machine tipping over to the left or right than tipping over to the front or rear.
- Plan your route in advance. If necessary, obtain the aid of an escort to lead or prepare your travel route.
- Never travel at high speeds.
 - Loss of control or tire damage may result.



Traveling in Reverse

Traveling in reverse may pose several hazards. This is a list of basic rules to follow when traveling in reverse.

- Always operate the machine only when you are seated.
- Be sure that the area behind you is clear of people or objects that might be in the way.
- Before moving your machine, sound the horn to warn others in your area that you are moving.
- Check that the backup alarm (alarm buzzer when machine travels in reverse) works properly.
- When operating in areas that may pose a hazard or where there is poor visibility, designate a person to direct your movements.
- Do not rely totally on the mirrors on your machine. There are blind spots when using the mirrors.



SAFETY

Working on Loose or Unstable Ground

To limit the risk when working in these areas:

- Avoid operating the machine too close to the edge of a cliff, open trenches, or ditch lines. These areas may collapse under the weight of your machine causing serious damage to the machine or injury to the operator.
- After a heavy rain or thaw, the surface conditions may become unstable.

Operating on Snow or Frozen Surfaces

It is extremely important to be careful when traveling or operating the machine on icy surfaces. Snow-covered or frozen surfaces are slippery. Your ability to maneuver is seriously affected. The machine may not respond as you expected when turning the steering wheel.

When frozen ground begins to thaw, the ground becomes soft and could cause a machine to get stuck or tip over.

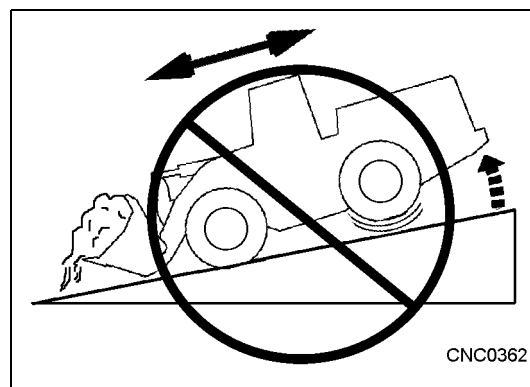
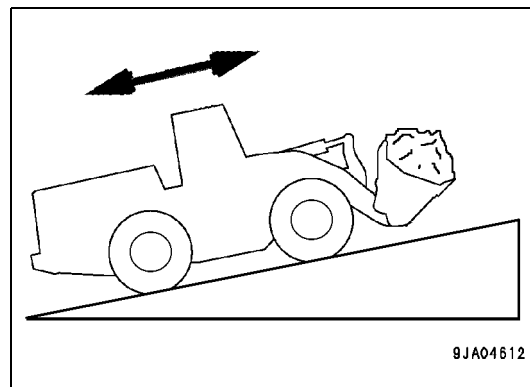
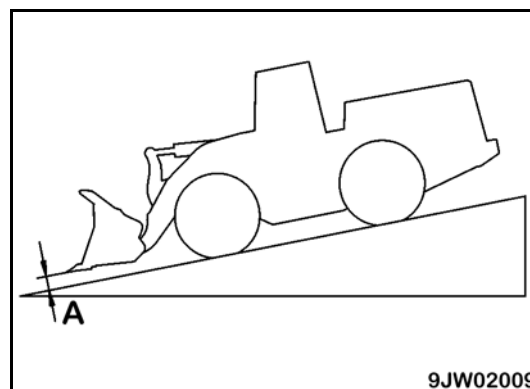
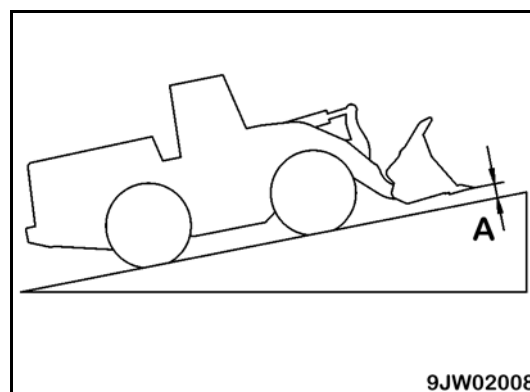
When traveling on frozen surfaces, proceed in the following manner.

- Travel at a slow, safe speed.
- Gently operate the levers.
- Avoid rapid acceleration or braking.
- Stopping distance is increased during slippery conditions. Give yourself sufficient distance to stop the machine.
- When traveling on snow-covered roads, always use tire chains.
- Avoid deep snow. Be careful not to get trapped in a snow drift.
- When clearing snow, it may be difficult to determine where the road shoulder ends. Be careful not to slide off the shoulder and get stuck or tip over. Proceed cautiously.
- When clearing snow, you may not see objects buried in the snow. Proceed cautiously.
- Even a slight slope may cause the machine to slip out of control. Be particularly careful when working on slopes.
- When traveling on snow-covered slopes, apply the brakes gently.
 - Reduce the speed and use the engine as a brake while applying the foot brake intermittently (depress the brake intermittently several times). If necessary, lower the work equipment to the ground to stop the machine.

Travel on Slopes

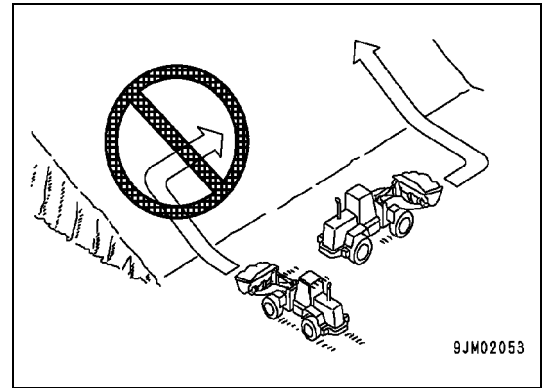
Traveling on slopes may pose a hazard. In order to prevent tipping the machine or losing control, it is important to follow some basic simple rules.

- When traveling over rough ground, travel at a slow, controllable speed.
- Never turn the ignition key off when traveling up or down a slope.
 - If the engine stops, apply the brakes and lower the bucket to the ground to stop the machine immediately.
- When traveling up or down slopes with an empty bucket, it is important to travel at a safe, controllable speed with the bucket set in position (A), 40 to 50 cm (16 to 20 in) above the ground.
 - In case of emergency, quickly lower the bucket to the ground to help the machine to stop.
- When traveling up or down a slope with a load, always keep the bucket 40 to 50 cm (16 to 20 in) above the ground and the load facing the top of the hill.
- Never travel up or down a slope with the load facing the bottom of the hill.
 - Loss of control may result when the brakes are applied.



SAFETY

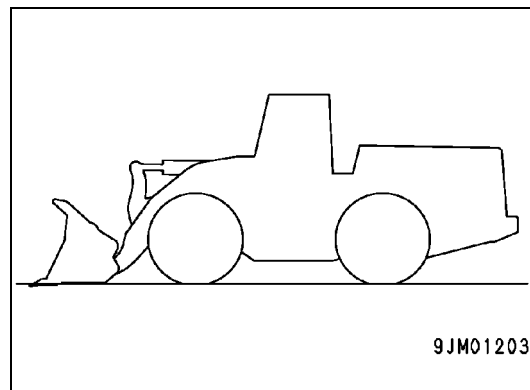
- Always travel straight up or straight down a slope.
 - Traveling at an angle on a slope may cause the machine to tip or possibly roll over.
- Do not turn on slopes or travel across slopes. Always go down to a flat place to change the position of the machine then travel on to the slope again.
- Travel at low speed when traveling on grass, fallen leaves, or wet steel plates.
 - Even with slight slopes, there is a hazard that the machine may slip.
- If the engine stops, depress the brake pedal immediately; lower the bucket to the ground; and apply the parking brake to stop the machine.
- When traveling downhill:
 - Never shift gear or place the transmission at neutral.
 - Always place the transmission in a low gear before starting to travel.
 - Travel slowly.
 - It is dangerous not to use the braking force of the engine.
 - If necessary, use the braking force of the engine together with the brake pedal to control the travel speed.



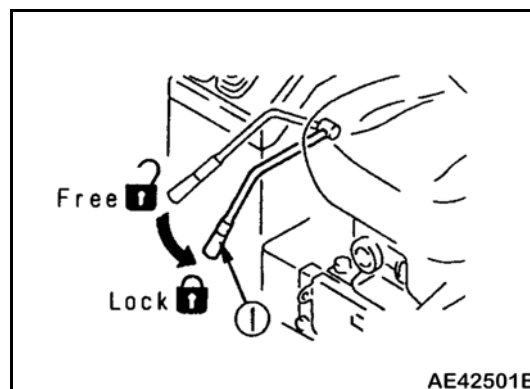
Parking the Machine

When parking the machine, it is important to follow several basic safety rules. You are responsible for the security of the machine when it is parked.

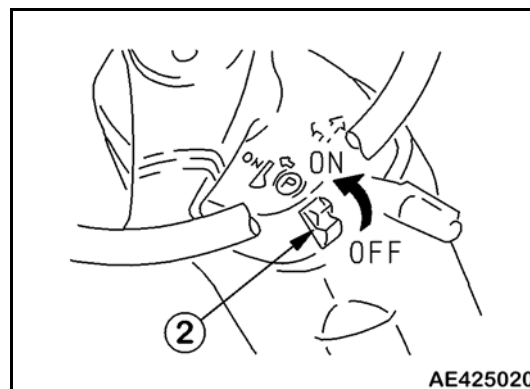
- Always park the machine on a flat, level location away from moving equipment, pedestrians, or traffic.
- Lower all work equipment completely to the ground.



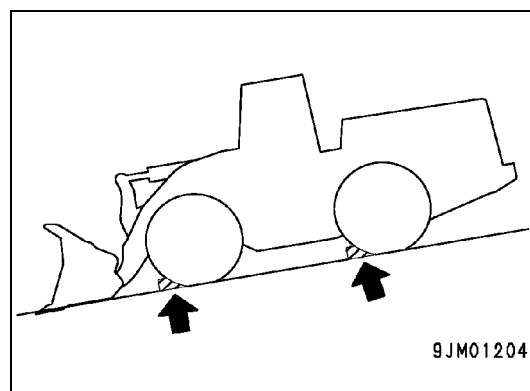
- Set safety lock lever (1) to the LOCK position (L).



- Set parking brake switch (2) to the ON position; turn the engine OFF; and remove the ignition key.
 - See “Leaving Operator’s Compartment” on page 1-18.
 - Be sure all access panels, cab, fuel and oil tanks are locked and secure to prevent tampering with the machine while unattended.



- Avoid parking the machine on a slope of any kind.
 - If you must park on a slope, park with the bucket facing down the slope and the wheels blocked to prevent any movement of the machine.



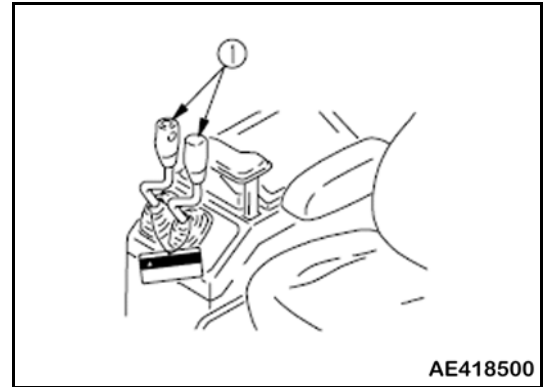
SAFETY

PRECAUTIONS DURING MAINTENANCE OPERATIONS

All maintenance performed on this machine must be performed only by trained and authorized personnel. When performing maintenance it is important to follow the outlined maintenance procedures and safety information outlined in this manual and in the *Shop Manual* for this machine.

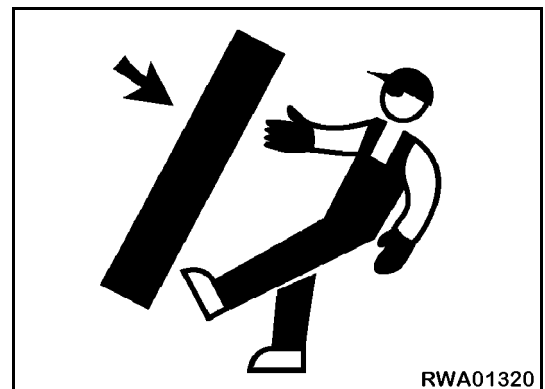
Warning Tags

- For machines equipped with ECSS (Electronically Controlled Suspension System), be sure the system is OFF before proceeding with any maintenance procedures.
- Before performing any maintenance operations on this machine, position the machine on a level and firm surface.
- Lock the equipment controls; remove the ignition key; and tag the steering wheel.
- Alert all personnel in your area that the machine is down for maintenance. If necessary, tag the machine around specific points to warn others that this machine is down for maintenance.
- If the machine will be down for maintenance for a long period of time, be sure to check and see if the warning tags are still in place before you start your repair procedures the next day.

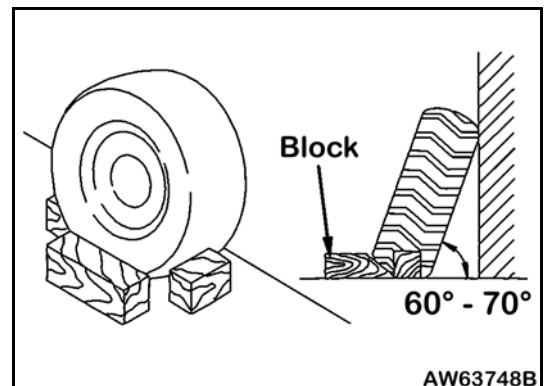


Equipment Storage

- Always store optional or extra work equipment in a safe and secure location.
- Do not store flammable liquids or materials for any length of time.

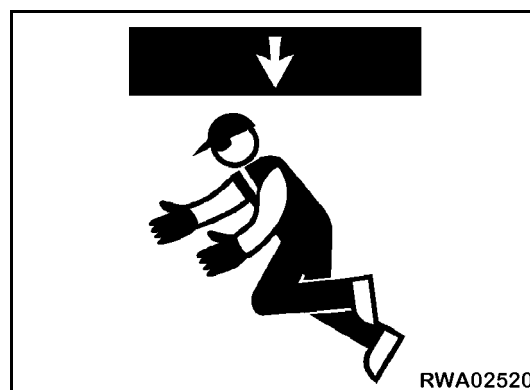


- Store equipment in such a way that it cannot fall or cause injury to others.

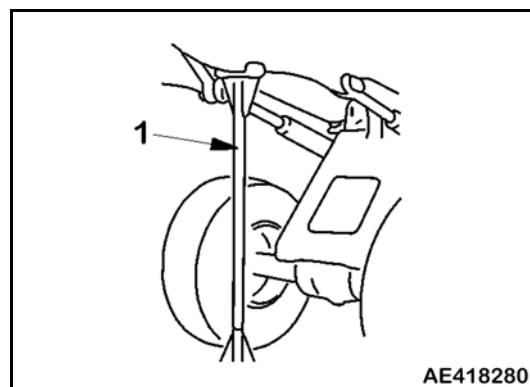


Working Under the Machine

- Always use approved jack stands to support the machine when performing maintenance under the chassis.
 - Never rely on hydraulic jacks or the machine's work equipment to support the machine when working under or on the machine.
 - Always lower the work equipment to the ground **before** raising the machine for repairs.
-
- When performing maintenance or repairs with the bucket raised, always support the bucket safely with the proper support (1) as shown in the figure.



RWA02520



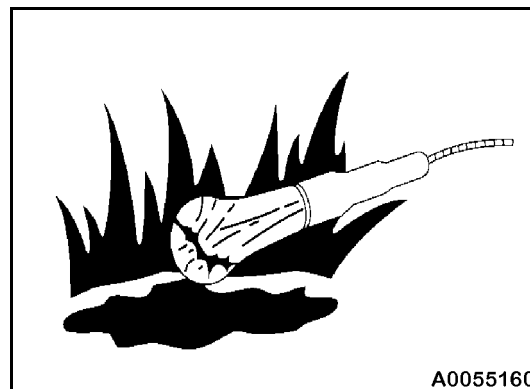
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Using Drop Lamps

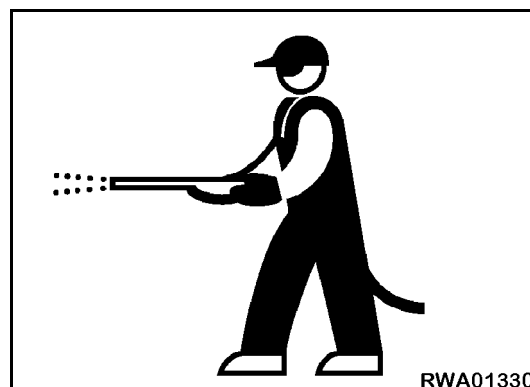
- Use only approved anti-explosion proof lamps when checking fuel, oil, or batteries.
 - Non-approved lamps can cause an explosion or fire.

Keeping the Machine Clean

- Never use flammable liquids to clean your machine. Use only approved non-flammable cleaning solvents to clean parts or the machine itself.
- Do not use high-pressure steam cleaners or caustic soaps to wash the machine. Steam cleaning or using caustic soaps may damage paint, wiring, or sensitive electrical components.
- Never use high-pressure water to flood the inside of the operator's cab. Doing so may damage sensitive electrical components.
- When pressure washing, use high-pressure hot water and mild grease-cutting soaps.
- Always grease the machine after cleaning to push any water out of the pivot-point connections.
- Remove trash daily or more often as necessary. Never allow trash to accumulate on the machine.



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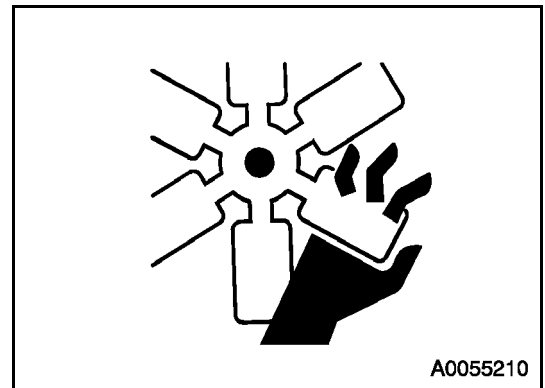
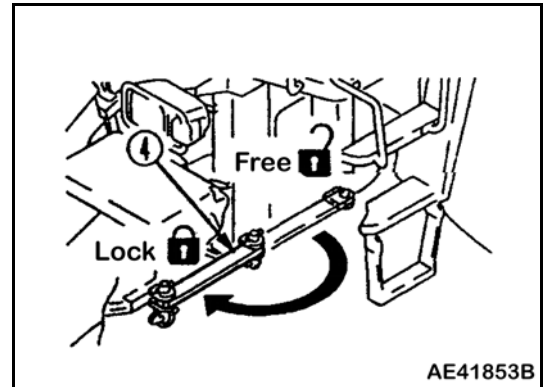
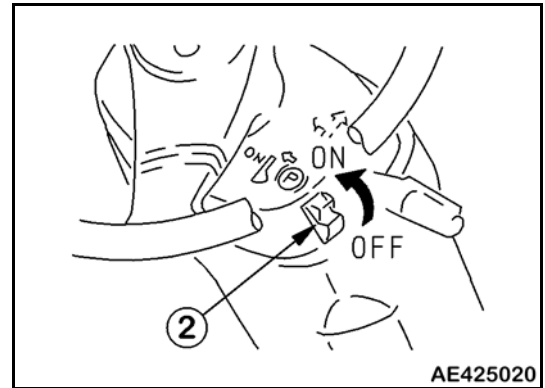
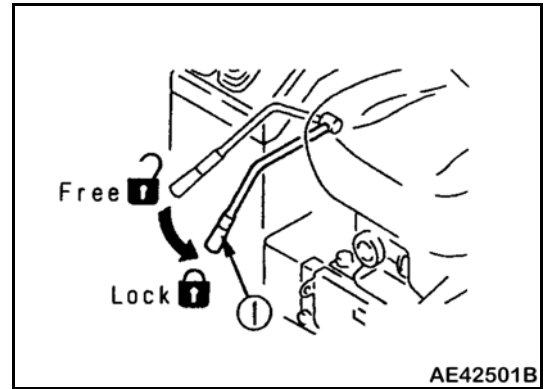


RWA01330

SAFETY

Running the Machine During Maintenance

- If during maintenance you must run the engine, have someone remain in the operator's seat while the engine is running.
- One worker must be ready to stop the engine at all times.
- Instruct the person sitting in the cab not to operate any controls unless instructed to do so.
- For machines equipped with ECSS (Electronically Controlled Suspension System), be sure the system is **OFF** before proceeding with any maintenance procedures.
- Be sure all work equipment is **LOCKED**.
- Set safety lock lever (1) to the **LOCK** position (L) to prevent the work equipment from moving.
- Set parking brake switch (2) to the **ON** position and apply the parking brake.
- Set safety bar (4) to **LOCK** position (L) to prevent the machine from articulating.
- Be aware of rotating parts while the engine is running.
- Never drop or insert tools or other objects into the fan, fan belt, or other rotating parts.
 - There is danger that these objects may contact the rotating parts and break, or be sent flying.



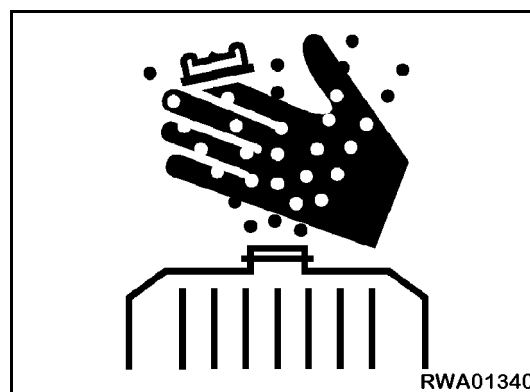
Rules for Refueling the Machine

- Always clean up any spills.
 - Grease, fuel, oil, or coolant spills can pose a trip hazard if not mopped up immediately.
- Be sure you are adding the correct fluids to the proper location.
 - Mixing fluids or adding fluids to the wrong tank can cause damage to internal components.
- When refueling or adding any fluids, be sure you are in a well-ventilated area.
- Never smoke or allow open flames near you while you are refueling the machine.
- Never mix gasoline with diesel fuel.
 - Gasoline is extremely flammable and could cause an explosion.
- Do not fill the fuel tank completely; leave room for the fuel to expand.



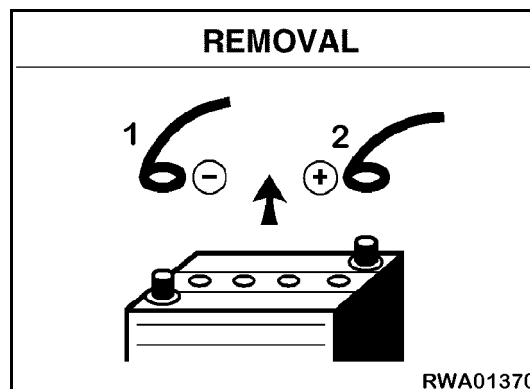
Cooling System Precautions

- Never add coolant to a hot or warm engine.
 - Always allow the engine time to cool down completely before opening the radiator cap.
- Never dump used coolant on the ground, in a lake, stream, or in a sewer system.
 - Komatsu requires these fluids to be captured and recycled properly.



Battery Precautions

- When working on the electrical system, disconnect the negative (-) battery cable first then the positive (+) battery cable last.
- On completion of work, reconnect the positive (+) cable **first** then the negative (-) cable **last**.



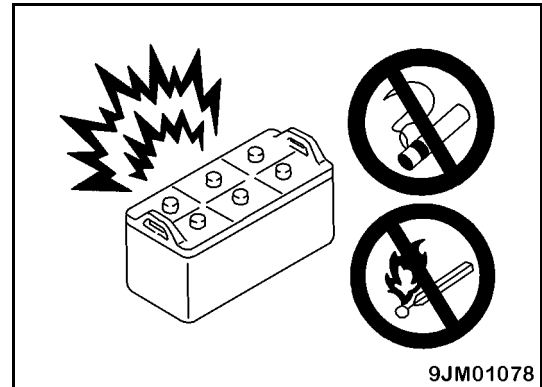
SAFETY

Battery Hazard Prevention

Danger of Battery Exploding

When charging the battery, flammable hydrogen gas is generated from the poles. If the gas ignites, it may explode and cause serious injury or fire.

- **DO NOT** use or charge a battery if the electrolyte is below the LOWER LEVEL mark.
 - Check the electrolyte level periodically and add distilled water **only** to the UPPER LEVEL mark, when required.
- DO NOT smoke or use any flame close to the battery.
- Remove the battery from the machine and take it to a well-ventilated area.
- Remove the battery caps.
- Connect the charger positive (+) cable **first** then the negative (-) cable **last** to the battery posts.
- Start charging the battery.
- After charging the battery, unplug the charger and remove the cables.
- Replace and tighten the battery caps securely.

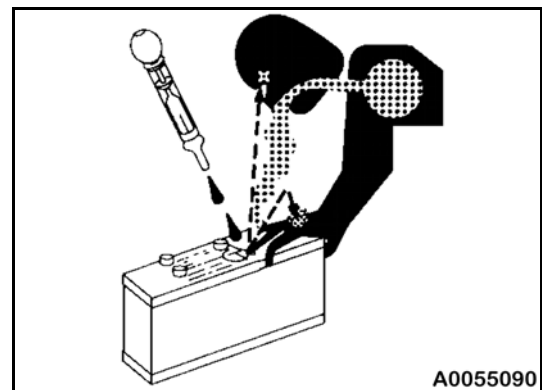


Danger of Dilute Sulfuric Acid

Battery electrolyte includes dilute sulfuric acid. If dilute sulfuric acid gets on your skin or in your eyes, you may suffer serious injury.

Always do the following when handling batteries.

- **ALWAYS** wear safety glasses and rubber gloves.
- If battery electrolyte gets into your eyes:
 - Immediately wash your eyes with a large amount of fresh water for at least 15 minutes.
 - Be sure to wash behind your eyelids.
 - Get immediate medical attention.
- If battery electrolyte gets on your skin or clothes:
 - Immediately wash it off with a large amount of water.
 - Do not use any alkaline fluid as a neutralizer.
 - If you suffer any chemical burn, get immediate medical attention.



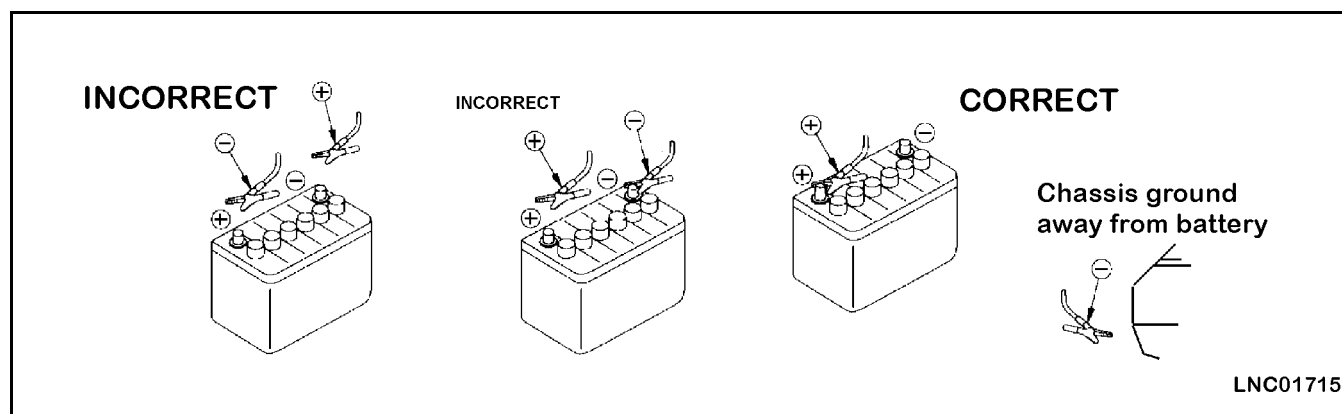
Danger of Sparks

If sparks are generated, they may fly and cause serious personal injury.

- **DO NOT** short-circuit the battery terminals through contact with metal objects, such as tools across the terminals.
- **DO NOT** leave tools laying around.
- When disconnecting the battery terminals, wait approximately one minute after turning the ignition switch off. Always disconnect the negative (-) battery cable **first** then the positive (+) battery cable **last**.
- On completion of work, reconnect the positive (+) cable **first** then the negative (-) cable **last**.
- Secure the battery firmly in the specified position.

Using Jumper Cables

When using jumper cables to start the machine, attach the positive (+) jumper **first** then the negative (-) jumper **last** to a remote location on the chassis, as shown in the following figure. For additional information, see “Starting Engine With Booster Cable” on page 2-122.



Starting the Machine

- Never try to start the machine by tampering or shorting the starter terminals.
 - Accidental movements of the machine could cause injury or even death.
- Always start the machine by using the ignition switch while seated in the operator's cab.

WARNING

- Never use a welder or a machine with a higher voltage system to jump-start the machine.
 - Using a higher voltage to jump-start a machine may damage the machine's electrical system or cause an unexpected explosion or fire.
- Always jump-start a machine with one of equal voltage.
- Never allow the machines to touch each other when jump-starting a machine.



SAFETY

High-Pressure Hoses

The hydraulic system is always under internal pressure. When inspecting or replacing 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.

Always take the following precautions.

- Do not carry out any inspection or replacement work when the hydraulic system is under pressure.
- If there is any leakage from the piping or hoses, the surrounding area will be wet. Check for cracks in the piping and hoses and for swelling in the hoses.
- When carrying out inspection, wear safety glasses and leather gloves.

There is a hazard that high-pressure oil leaking from small holes may penetrate your skin or cause blindness if it contacts your eyes directly.

- If you are hit by a jet of high-pressure oil and suffer injury to your skin or eyes, wash the area with clean water and consult a doctor immediately for medical attention.

Safe Handling of High-Pressure Hoses

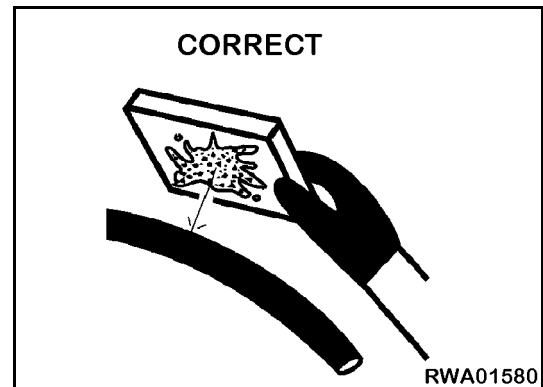
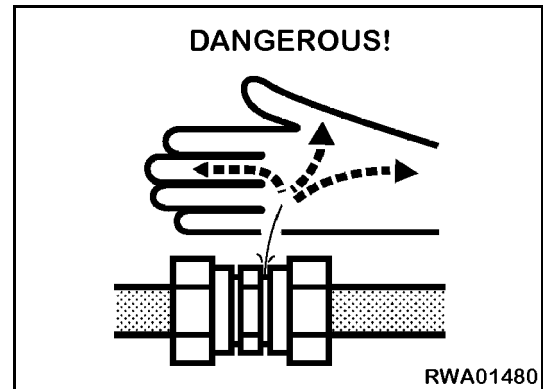
If oil or fuel leaks from high-pressure hoses, it may cause fire or defective operation which may lead to serious injury.

- If any loose bolts are found, stop work and tighten to the specified torque.
- If any damaged hoses are found, stop operations immediately and contact your Komatsu distributor.
- Replace the hose if any of the following problems are found:
 - Damaged or leaking hydraulic fitting
 - Frayed or cut covering or exposed reinforcement wire layer
 - Covering swollen in places
 - Twisted or crushed movable portion
 - Foreign material embedded in covering

Precautions for High-Pressure Fuel

High pressure is generated inside the engine fuel piping when the engine is running.

- When carrying out inspection or maintenance of the fuel piping system, wait for at least 30 seconds after stopping the engine to let the internal pressure go down before starting inspection or maintenance.
- Never loosen a fuel injector line while the engine is running. Severe injury may result from the high-pressure fuel spray.



High-Temperature Areas

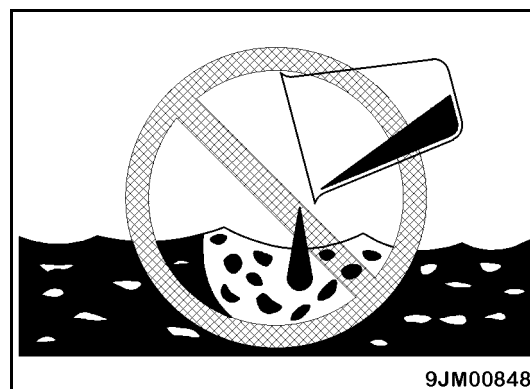
When you stop the machine at the end of a job, remember that the engine coolant, oil, all engine parts, exhaust stack, and the hydraulic system are still hot and under pressure. If you attempt to drain engine coolant, hydraulic fluid, or engine oil under these conditions, you expose yourself to various dangers, including the risk of serious burns.

Perform maintenance procedures described in this manual only when the machine has had time to cool down.

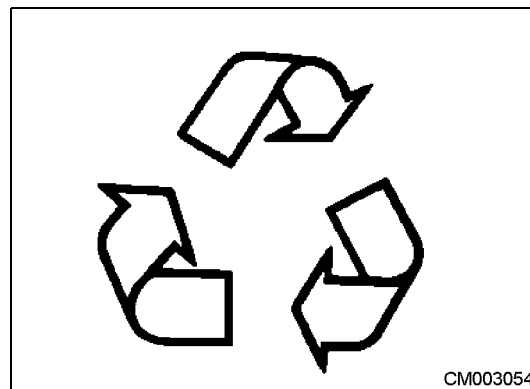


Disposal of Waste Materials

- Never dump waste fluids in a sewer system, on the ground, in rivers, etc.
- Always drain fluids from your machine into the appropriate containers. Never drain fluids directly onto the ground.



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

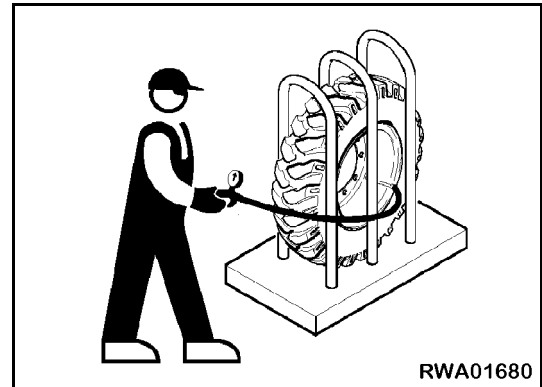


SAFETY

Inflating Tires

Always remember that tires can burst while being inflated, causing serious accidents. Before servicing the tires, observe the following precautions.

- Before inflating tires, always check the wheel rims, tire walls, and tread for cuts, broken cords, or other damage.
- Have a tire expert perform checks and tire maintenance.
- When inflating tires, use a protective cage and a compressed air gun with extension hose and pressure gauge.
- Make sure that there is nobody in the vicinity before starting to inflate a tire.
- Stand at the tread side of the tire to inflate it.



Accumulator

This machine is equipped with an accumulator charged with high-pressure nitrogen gas.

When handling the accumulator, a careless procedure may cause an explosion which could lead to serious personal injury or death. Always observe the following precautions.

- Do not disassemble the accumulator.
- Do not expose the accumulator to high heat or an open flame.
- Do not weld on the accumulator.
- Do not drill or cut the accumulator.
- Do not strike or crush the accumulator.
- When replacing or disposing of the accumulator, always release the nitrogen pressure from the chamber.

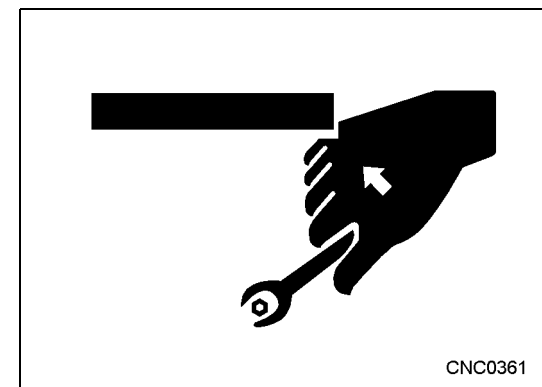


Critical Parts

Periodically some parts must be replaced due to safety purposes. Even if these parts seem to be in good condition and operating properly, they may fail at some point, possibly causing injury to the operator or pedestrian.

Some of the following systems contain components that may fail under extended use:

- Seat belts
- Fuel supply and delivery hoses
- Hydraulic system: main delivery hoses and tubing
- Hydraulic hoses: all the hoses that feed and return the hydraulic fluid to and from the work equipment



For additional information, see “PERIODIC REPLACEMENT OF SAFETY-CRITICAL PARTS” on page 3-16.

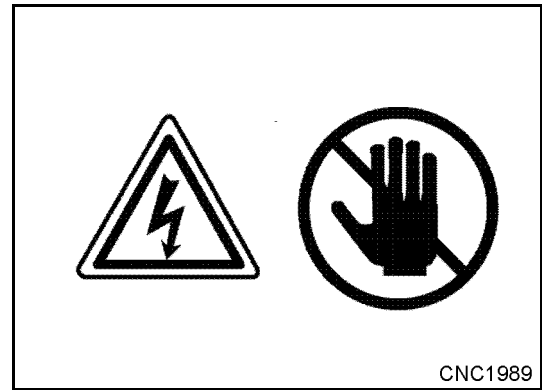
High Voltage

When the engine is running or immediately after it has stopped, high voltage is generated at the injector terminal and inside the engine controller. **There is danger of electrocution.**

- Never touch the injector terminal or inside the engine controller.
 - If it is necessary to touch the injector terminal or the inside of the engine controller, please contact your Komatsu distributor.

Maintenance of Air Conditioner

- **NEVER** touch the refrigerant.
- **NEVER** loosen any part of the refrigerant circuit.
- **NEVER** release any refrigerant into the atmosphere.

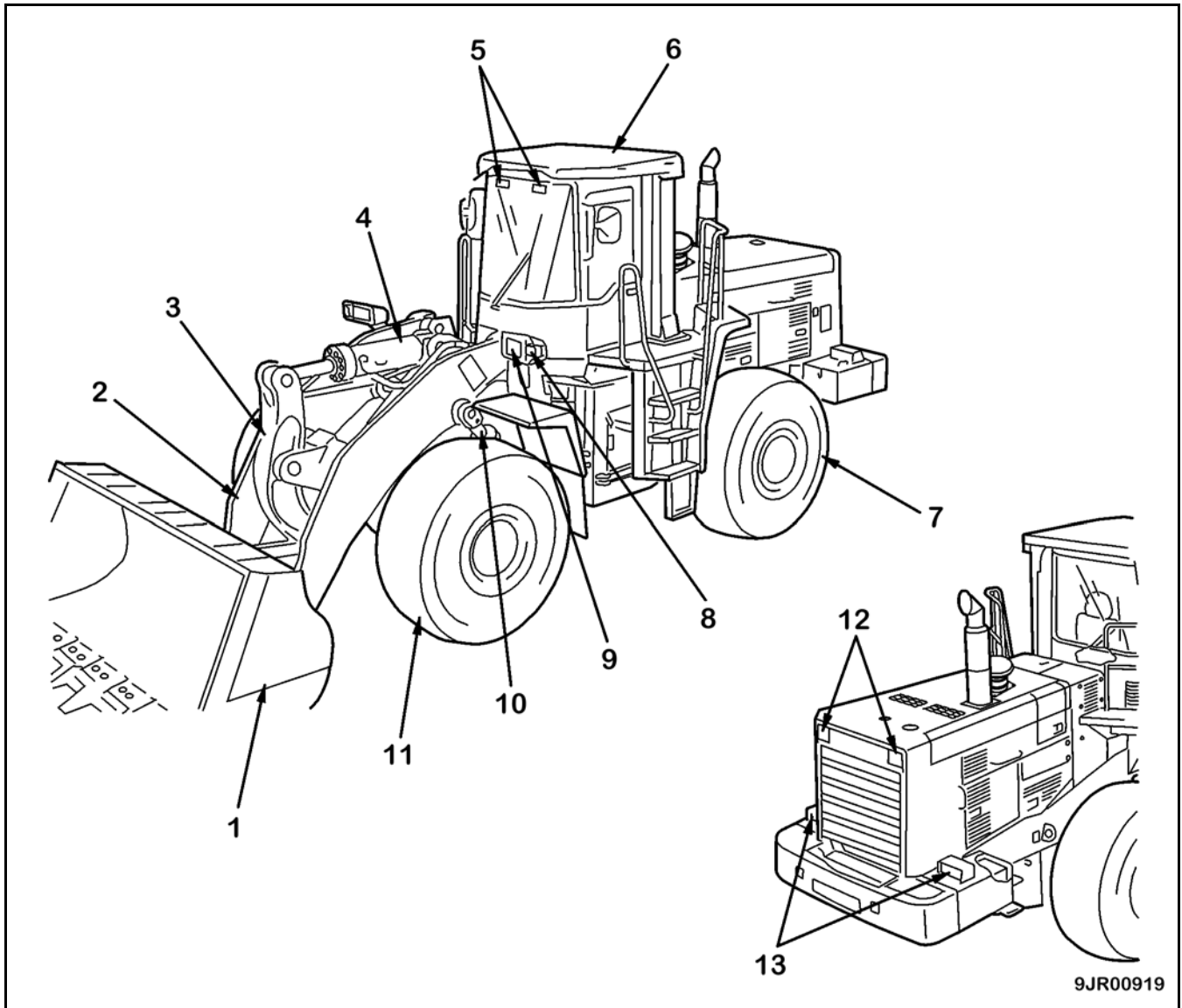


MEMORANDUM

OPERATION

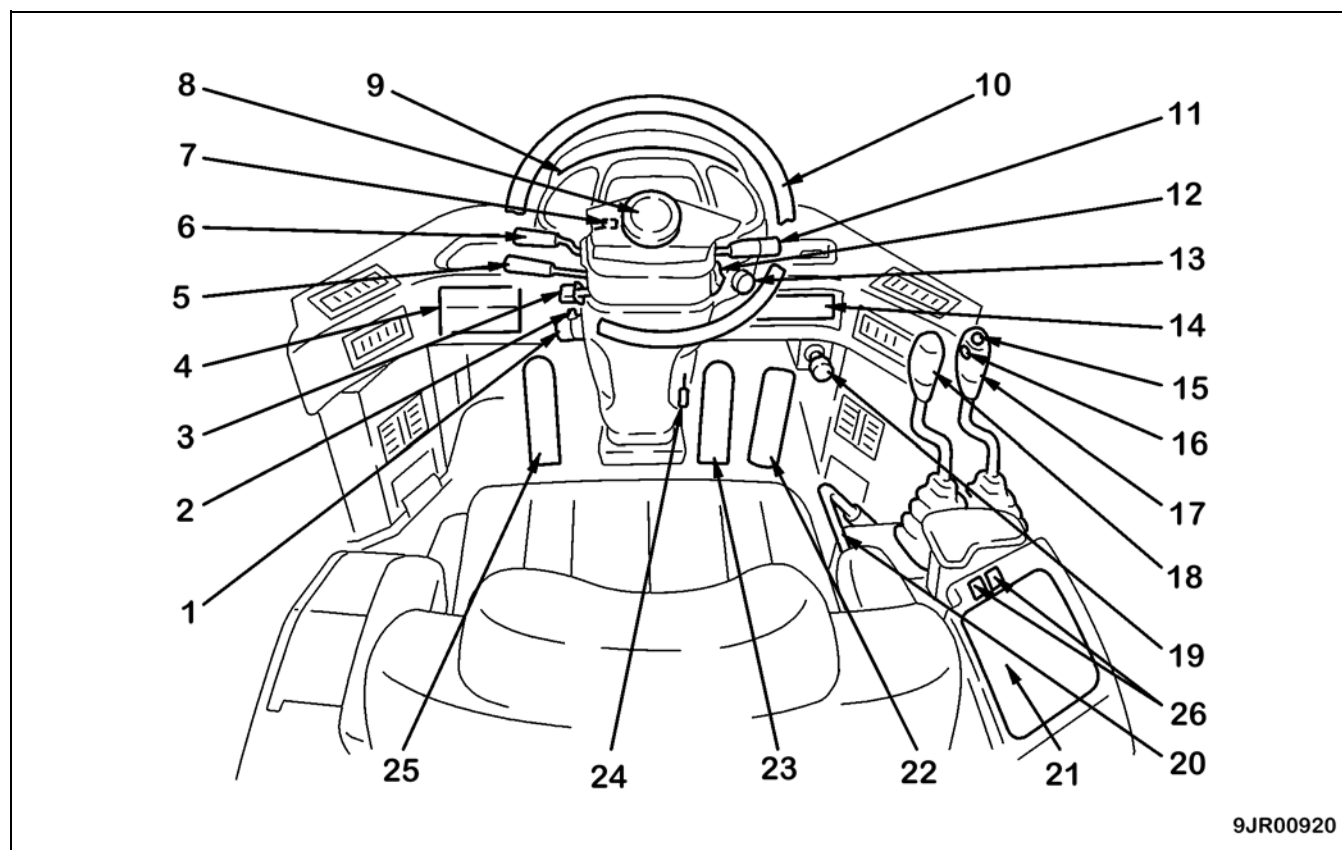
GENERAL VIEW

General View of Machine



- | | |
|-----------------------|---------------------------|
| 1. Bucket | 8. Turn signal lamp |
| 2. Lift arm | 9. Headlamp |
| 3. Tilt lever | 10. Lift cylinder |
| 4. Bucket cylinder | 11. Front wheel |
| 5. Front working lamp | 12. Rear working lamp |
| 6. ROPS cab | 13. Rear combination lamp |
| 7. Rear wheel | |

Controls and Gauges

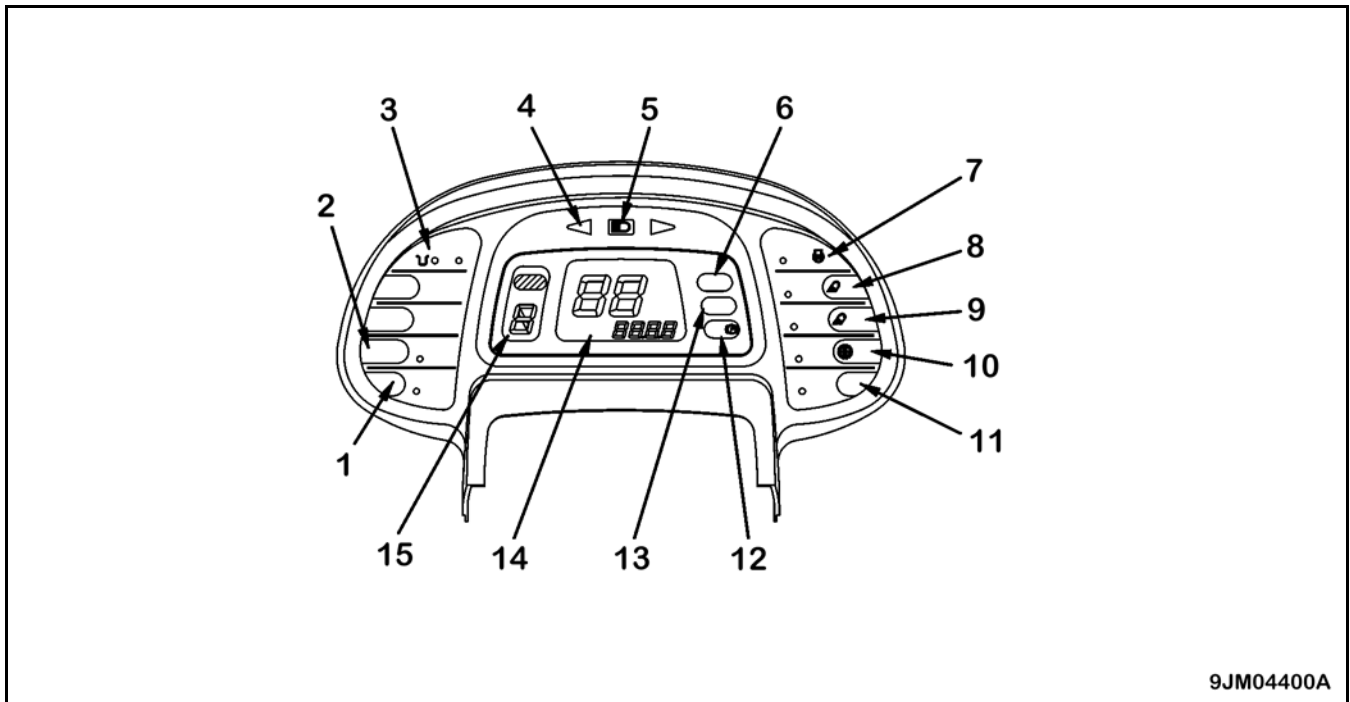


9JR00920

- | | |
|--|-------------------------------------|
| 1. Front wiper switch | 13. Starting switch |
| 2. Rear wiper switch | 14. Car radio (if equipped) |
| 3. Gearshift lever stopper | 15. Kickdown switch |
| 4. Air conditioner panel (if equipped) | 16. Hold switch |
| 5. Gearshift lever | 17. Lift arm control lever |
| 6. Directional lever | 18. Bucket control lever |
| 7. Hazard lamp switch | 19. Cigarette lighter (if equipped) |
| 8. Horn button | 20. Safety lock lever |
| 9. Main monitor | 21. Maintenance monitor |
| 10. Steering wheel | 22. Accelerator pedal |
| 11. Lamp switch | 23. Brake pedal |
| Turn signal lever | 24. Steering column tilt lever |
| Dimmer switch | 25. Brake pedal |
| 12. Parking brake switch | 26. Power window switch |

OPERATION

Main Monitor

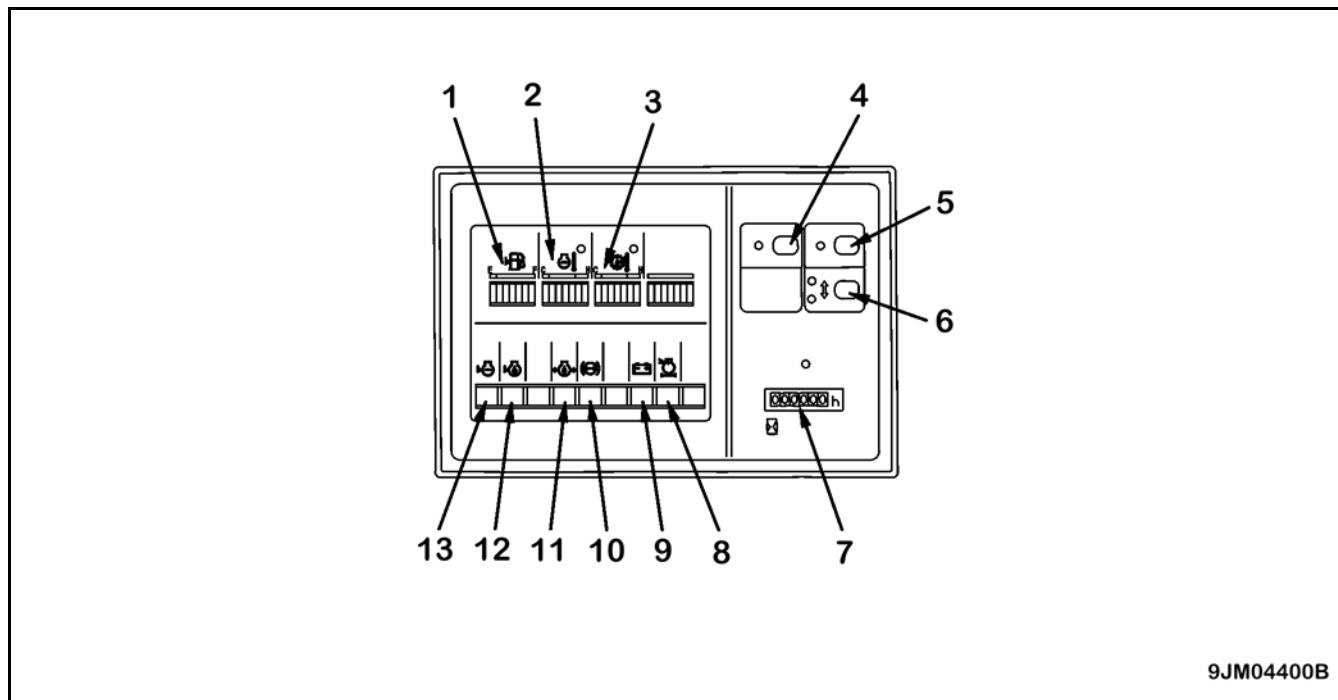


9JM04400A

1. ECSS* switch (switch, pilot lamp) (if equipped)
2. Auto-greasing switch (if equipped)
3. Emergency steering pilot lamp (if equipped)
4. Turn signal pilot lamp
5. Headlamp high beam pilot lamp
6. Central check lamp
7. Engine preheating pilot lamp
8. Front working lamp (switch, pilot lamp)
9. Rear working lamp (switch, pilot lamp)
10. Transmission cutoff (switch, pilot lamp)
11. Transmission auto-shift/manual selector (switch, pilot lamp)
12. Parking brake pilot lamp
13. Central warning lamp
14. Speedometer
15. Transmission shift indicator

* ECSS = Electronic Controlled Suspension System

Maintenance Monitor



9JM04400B

1. Fuel level
2. Engine water temperature gauge
3. Torque converter oil temperature gauge
4. Remote positioner LOWER position set switch (if equipped)
5. Remote positioner RAISE position set switch (if equipped)
6. Remote positioner RAISE position/LOWER selector (if equipped)
7. Service meter
8. Air cleaner clogging caution lamp
9. Battery electrolyte level caution lamp
10. Brake oil pressure caution lamp
11. Engine oil pressure caution lamp
12. Engine oil level caution lamp
13. Radiator water level caution lamp

EXPLANATION OF COMPONENTS

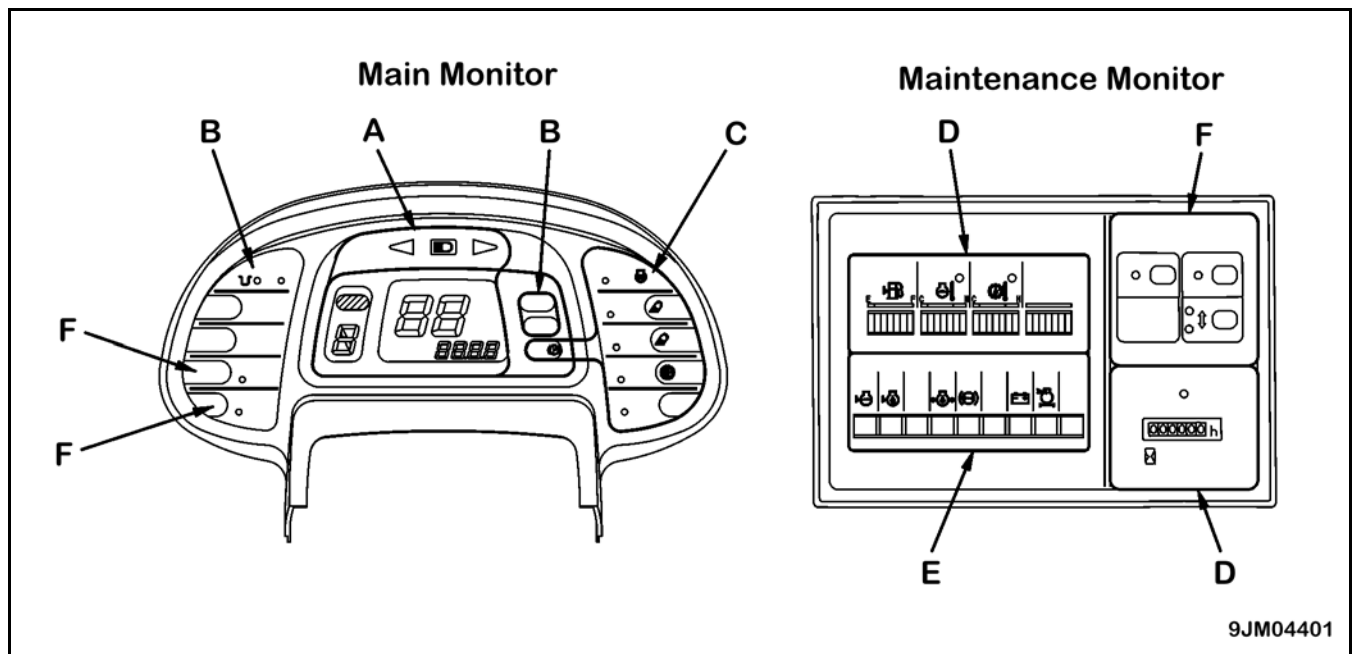
This section provides an explanation of the devices needed for operating the machine.

To perform suitable operations correctly and safely, it is important to completely understand methods of operating the equipment and the meaning of the displays.

Machine Monitor System

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

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



- A. Meter display portion
- B. Warning display portion
- C. Meter display portion
- D. Meter display portion
- E. Warning display portion
- F. Option display portion

 **WARNING**

- These monitors do not guarantee the condition of the machine.
- Do not rely solely on the monitor when carrying out preoperation checks (daily inspection). Get off the machine and check each item directly.

Warning Display (B, E)

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

See “Warning Display” on page 2-8.

Meter Display Portion (A, C, D)

These consist of the meters (speedometer, fuel gauge, engine water temperature gauge, torque converter oil temperature gauge, service meter, transmission shift indicator) and the pilot lamps (turn signal indicator, headlamp high beam, preheating, front working lamp, rear working lamp, transmission cutoff, parking brake, transmission auto-shift/manual selector).

See “Meter Display Portion” on page 2-13.

Option Display Portion (F)

This consists of the monitor lamps and switches for the ECSS, auto-greasing system, and remote positioner.

For details about each system or component, see “OPTIONS, ATTACHMENTS” on page 5-1.

Testing Actuation of Machine Monitor System

When the starting switch is turned to the ON position before starting the engine, all monitor lamps, gauges, and centralized warning lamps light up for approximately three seconds, and the alarm buzzer sounds for approximately one second.

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

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

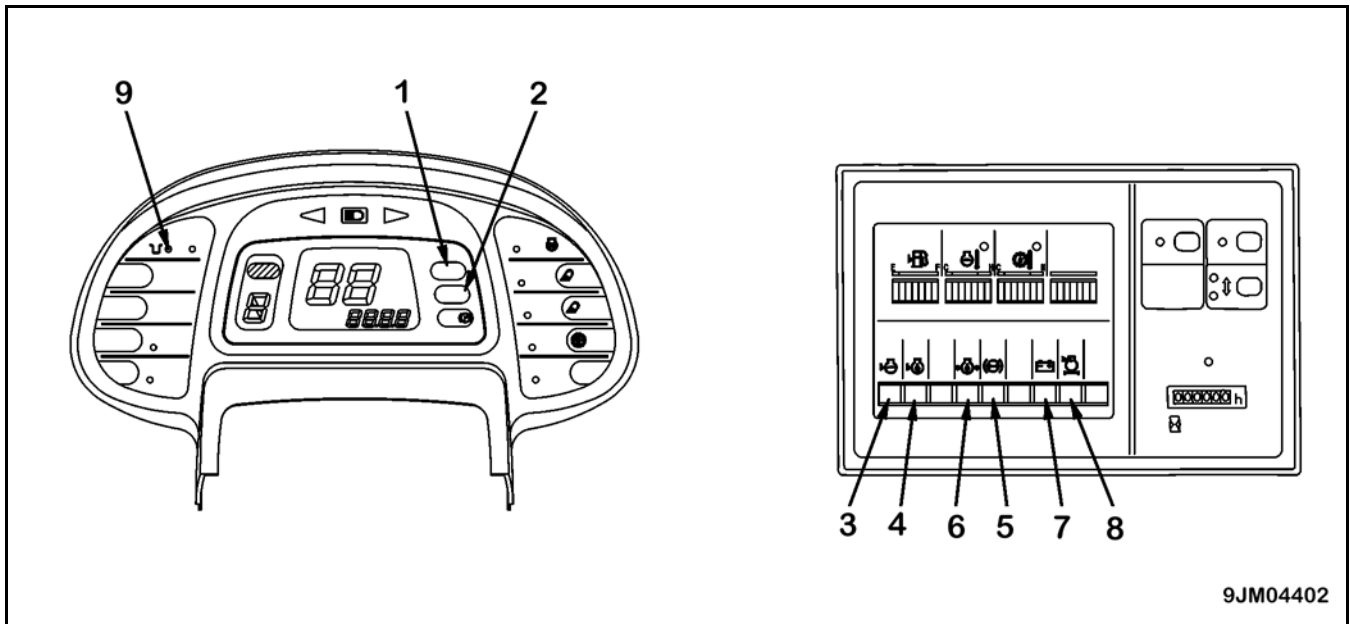
If the monitor lamps do not light up, there is probably a failure or disconnection. Contact your Komatsu distributor for inspection.

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

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

OPERATION

Warning Display



1. Central check lamp (CHECK)
2. Central caution lamp (CAUTION)
3. Engine water level caution pilot lamp
4. Engine oil level caution pilot lamp
5. Brake oil pressure caution pilot lamp
6. Engine oil pressure caution pilot lamp
7. Battery charge caution pilot lamp
8. Air cleaner clogging caution pilot lamp
9. Emergency steering pilot lamp (red) (if equipped)

Central Check Lamp (CHECK)



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

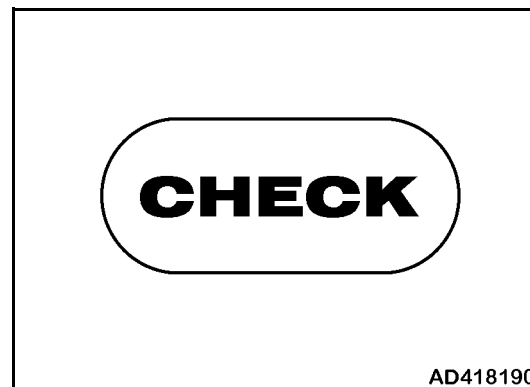
- If any abnormality is found in the CHECK items before starting the engine (engine oil level, engine water level), the monitor lamp for the abnormal location will flash and the central check lamp (CHECK) (1) will also flash.

Check the location where the monitor lamp is flashing and carry out the check before starting.

When carrying out the checks before starting, do not rely simply on the monitor. Always carry out the specified check before starting items “Check Before Starting Engine” on page 2-45.

When carrying out checks before starting, if the engine oil level is abnormal, the engine oil level will change when the engine is started. Even if there is an abnormality, the central CHECK lamp and monitor lamp will stop flashing.

- If there is any abnormality in the engine water level, the central CHECK lamp will go out when the engine is started, but the central caution lamp will flash and the alarm buzzer will sound intermittently.
- If there is an abnormality in the battery charging system when the engine is running, the battery charge caution pilot lamp will flash and the central CHECK lamp (1) will also flash at the same time. If the lamps flash, check the charging circuit.

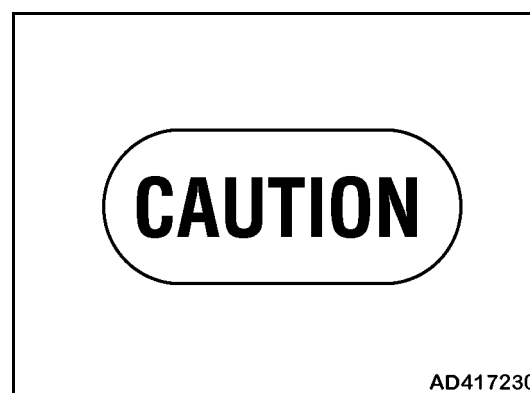


Central Caution Lamp (CAUTION)



If this monitor flashes, stop the engine immediately or run it at slow idling and do the following steps.

- If there is abnormality in any CAUTION item when the engine is running (engine water temperature, torque converter oil temperature, engine water level, brake oil pressure, engine oil pressure), the alarm buzzer will sound intermittently and the monitor lamp for the location of the abnormality will flash; the central CAUTION lamp (2) will also flash.
- If the fuel gauge enters the red range while the engine is running, the fuel gauge will flash and the central CAUTION lamp (2) will also flash. If they flash, check the fuel level and add fuel.



OPERATION

Engine Water Level Caution Pilot Lamp

The engine water level caution pilot lamp (3) warns the operator that the coolant level in the radiator has dropped.

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

- If the level of coolant in the radiator is low, the caution pilot lamp and central CHECK lamp will flash.
- If the monitor lamps flash, check the coolant level in the radiator subtank and add water.

When operating (engine running):

- If the condition is normal, the caution pilot lamp should be off.
- If the level of the coolant in the radiator is too low, the warning pilot lamp and the central CAUTION lamp will flash; the alarm buzzer will sound intermittently.
- If the monitor lamps flash, stop the engine; check the level of the coolant in the radiator and subtank; and add water.

Remark

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

Engine Oil Level Caution Pilot Lamp

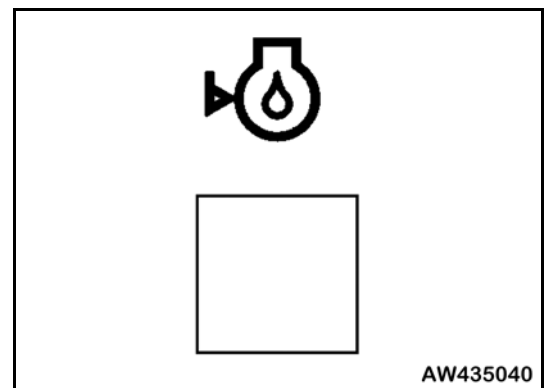
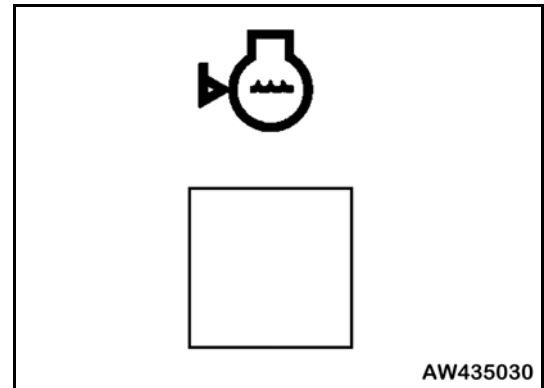
The engine oil level caution pilot lamp (4) warns the operator that the level of oil in the engine oil pan has dropped.

When carrying out checks before starting:

- If the oil level in the engine oil pan is low, the caution pilot lamp and central CHECK lamp will flash.
- If the monitor lamps flash, check the oil level in the engine oil pan and add oil.

When operating:

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



Brake Oil Pressure Caution Pilot Lamp

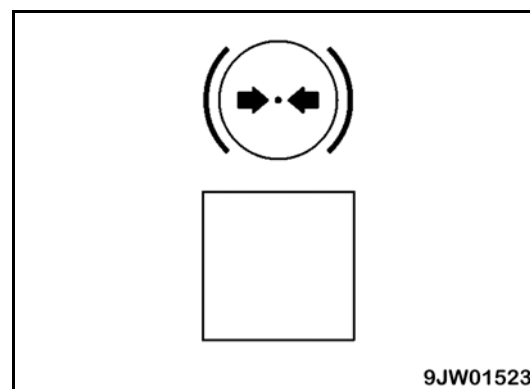
The brake oil pressure caution pilot lamp (5) warns the operator that the brake oil pressure has dropped.

When carrying out checks before starting:

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

When operating:

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



Remark

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

Engine Oil Pressure Caution Pilot Lamp

The engine oil pressure caution pilot lamp (6) warns the operator that the engine lubricating oil pressure has dropped.

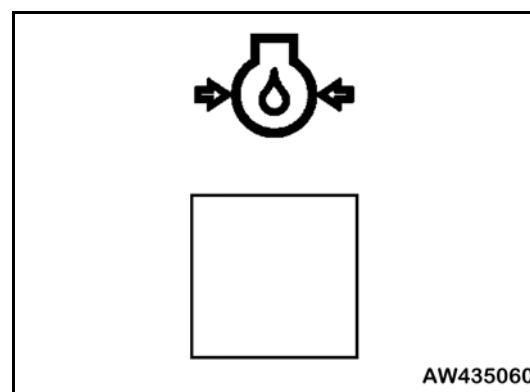
If this lamp flashes, stop the engine and check.

Check before starting:

- Lights up.

Engine started or running:

- When the engine is started, the lubrication pressure is formed and the lamp goes out. If the engine lubrication pressure drops, the warning pilot lamp and the central CAUTION lamp will flash, and the buzzer will sound intermittently.



Battery Charge Caution Pilot Lamp

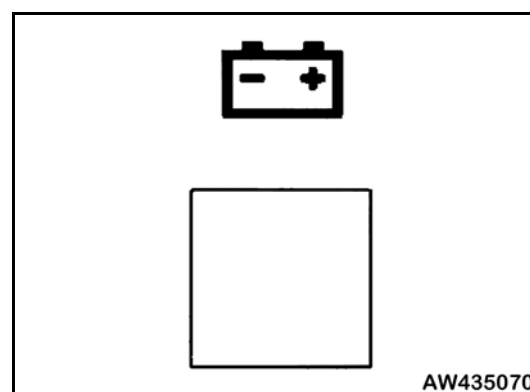
The battery charge caution pilot lamp (7) warns the operator that there is an abnormality in the charging system when the engine is running.

Check before starting:

- Lights up.

Engine started or running:

- When the engine is started, the alternator generates electricity and the lamp goes out. If any abnormality occurs in the charging system, the caution pilot lamp and the central CHECK lamp will flash. If they flash, check the charging circuit.



OPERATION

Air Cleaner Clogging Caution Pilot Lamp

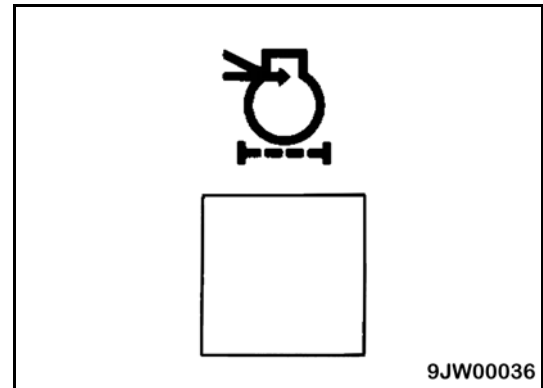
When the engine is running, the air cleaner clogging caution pilot lamp (8) warns the operator that the air cleaner element is clogged.

Check before starting:

- OFF

When operating:

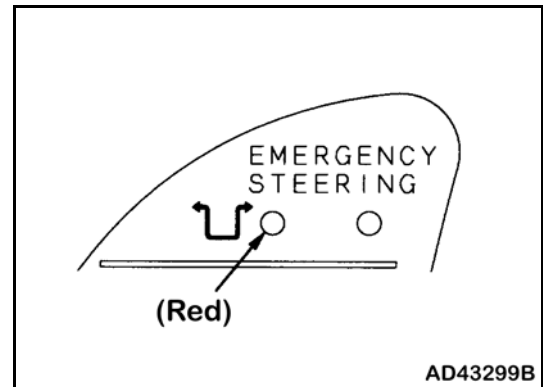
- If the air cleaner becomes clogged, the caution pilot lamp and central CHECK lamp will flash. If they flash, clean or replace the element.



Emergency Steering Pilot Lamp (if equipped)

The emergency steering pilot lamp (9) indicates that the main pump is operating normally when the machine is traveling.

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



Front Axle Oil Temperature Warning Lamp (if equipped)

The front axle oil temperature warning lamp is located below the left dash panel and acts as a warning system to inform the operator when the front axle oil temperature rises.

- ★ The caution lamp turns on and the buzzer sounds continuously when the axle oil temperature reaches 102°C (216°F).

Remark

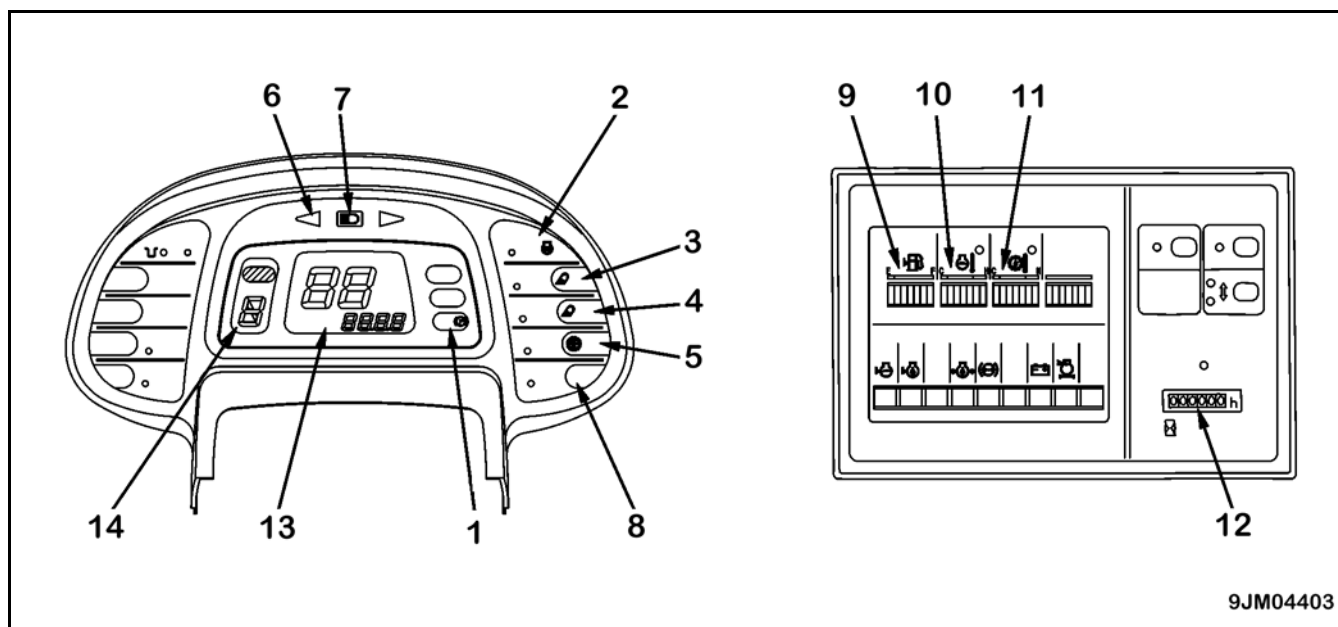
When the wheel loader performs truck or hopper loading operations, it is necessary to maintain high engine RPM for optimum performance. This requires simultaneous use of the throttle and brake. This action will generate excessive heat if the T/M cutoff function is not used, thus causing the brakes to fail prematurely.

If the caution lamp and buzzer turn on:

- Reduce travel speed as much as possible to lessen the frequency of braking application.
- When traveling downhill, use the engine for slowing the machine down by selecting a lower gear range.
- ★ If the caution lamp does not turn off after trying these recommendations, stop the machine to allow the oils to cool down. Restart the machine only after the overheat warnings have stopped.

Meter Display Portion

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

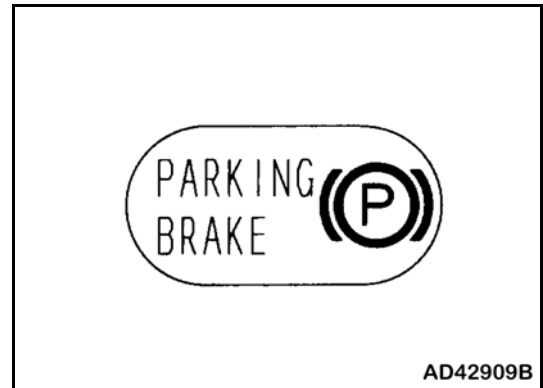


- | | |
|-----------------------------------|---|
| 1. Parking brake pilot lamp | 8. Transmission auto-shift/manual selector pilot lamp |
| 2. Engine preheating pilot lamp | 9. Fuel gauge |
| 3. Front working lamp pilot lamp | 10. Engine water temperature gauge |
| 4. Rear working lamp pilot lamp | 11. Torque converter oil temperature gauge |
| 5. Transmission cutoff pilot lamp | 12. Service meter |
| 6. Turn signal pilot lamp | 13. Speedometer |
| 7. High beam pilot lamp | 14. Transmission shift indicator |

OPERATION

Parking Brake Pilot Lamp

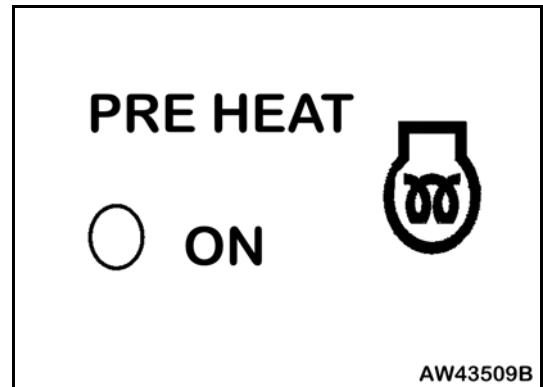
The parking brake pilot lamp (1) lights up when the parking brake is applied.



Engine Preheating Pilot Lamp

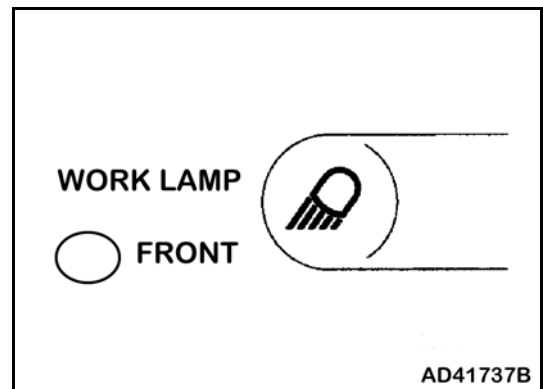
The engine preheating pilot lamp (2) informs the operator of the preheating status of the electrical intake air heater.

The lamp lights up when the starting switch is turned to the ON position and goes out when the preheating is completed. The time that it remains lit differs according to the water temperature when the engine is started.



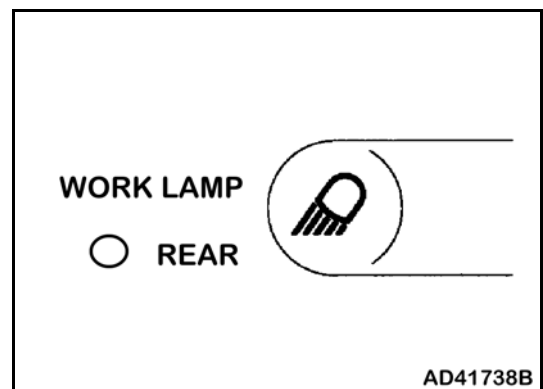
Front Working Lamp Pilot Lamp

The front working lamp pilot lamp (3) lights up when the front working lamp is switched ON.



Rear Working Lamp Pilot Lamp

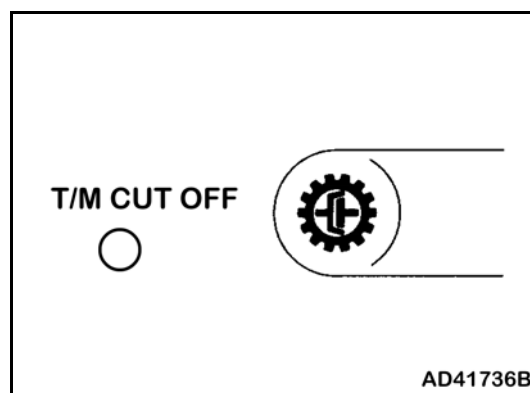
The rear working lamp pilot lamp (4) lights up when the rear working lamp is switched ON.



Transmission Cutoff Pilot Lamp

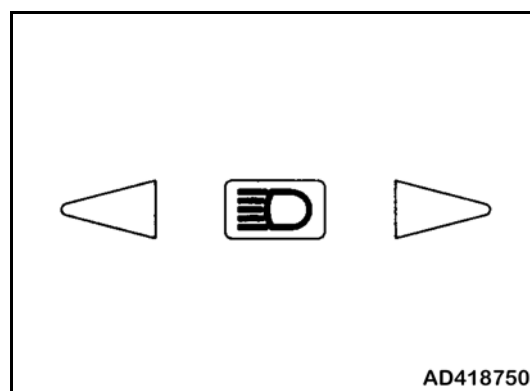
The transmission cutoff pilot lamp (5) lights up when the transmission cutoff switch is turned ON.

If the monitor lamp is ON and the left brake pedal is depressed, the transmission will return to neutral.



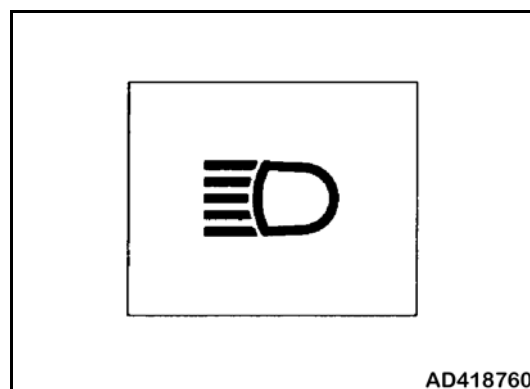
Turn Signal Pilot Lamp

When the turn signal lamp flashes, the turn signal pilot lamp (6) also flashes.



High Beam Pilot Lamp

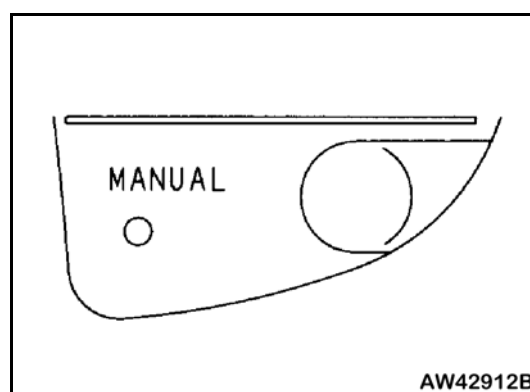
The high beam pilot lamp (7) lights up when the headlamp is at high beam.



Transmission Auto-Shift/Manual Selector Pilot Lamp

The transmission auto-shift/manual selector pilot lamp (8) lights up when the transmission manual selector is operated and the transmission shift is changed to manual mode.

While the monitor is lit, the transmission speed range can be changed by operating the speed control lever.



OPERATION

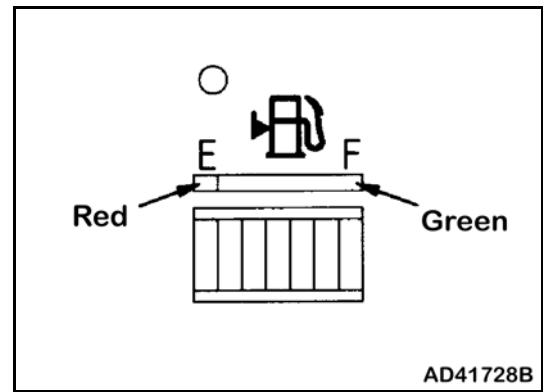
Fuel Gauge

The fuel gauge (9) indicates the amount of fuel in the fuel tank.

- E: Tank is EMPTY.
- F: Tank is FULL.

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

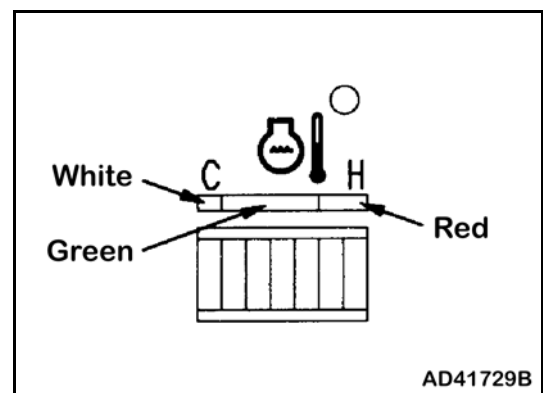
- If the red range lights during operation, the fuel gauge lamp and central CAUTION lamp will flash.
- If only the red range lights up during operation, it means that there is less than 40 liters (10.6 US gal) of fuel left. Check and add fuel.



Engine Water Temperature Gauge

The engine water temperature gauge (10) indicates the temperature of the cooling water.

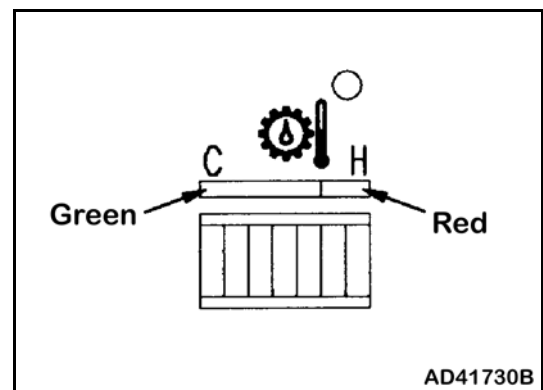
- If the temperature is normal during operation, the green range will light.
- If the red range lights during operation, stop the machine and run the engine with no load at midrange speed until the green range lights.
- If the lamps light up to the first red level, the engine water temperature gauge lamp and central CAUTION lamp will flash; when the lamps light up to the second red level, the alarm buzzer will also sound intermittently.



Torque Converter Oil Temperature Gauge

The torque converter oil temperature gauge (11) indicates the temperature of the torque converter oil.

- If the temperature is normal during operation, the green range will light.
- If the red range lights during operation, stop the machine and run the engine with no load at midrange speed until the green range lights.
- If the lamps light up to the first red level, the torque converter oil temperature gauge lamp and central CAUTION lamp will flash; when the lamps light up to the second red level, the alarm buzzer will also sound intermittently.



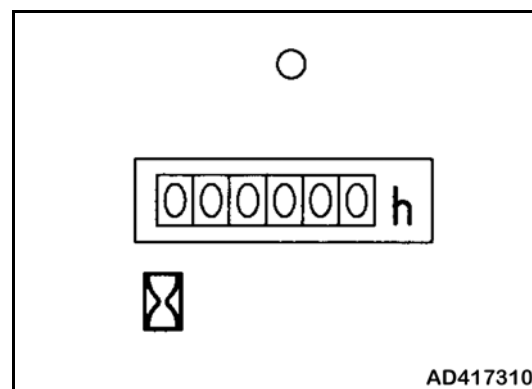
Service Meter

The service meter (12) shows the total operation hours of the machine.

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

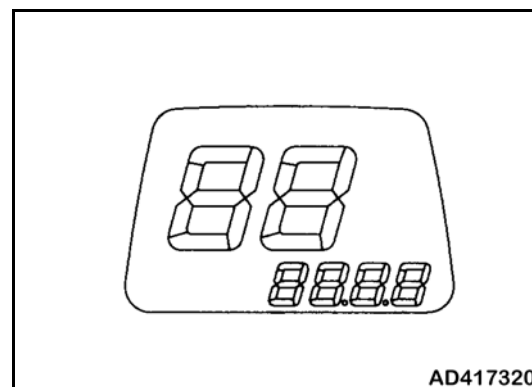
While the engine is running, the green pilot lamp on the service meter flashes to show the service meter advances.

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



Speedometer

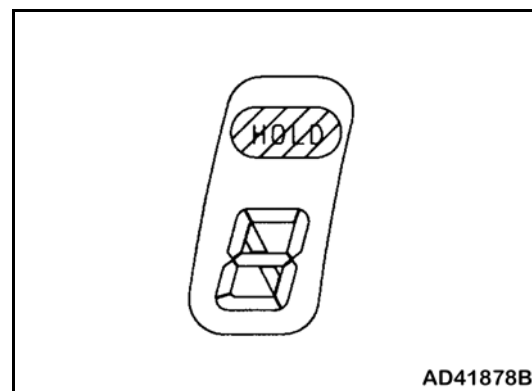
The speedometer (13) indicates the travel speed of the machine.



Transmission Shift Indicator

The transmission shift indicator (14) shows the present speed range of the transmission.

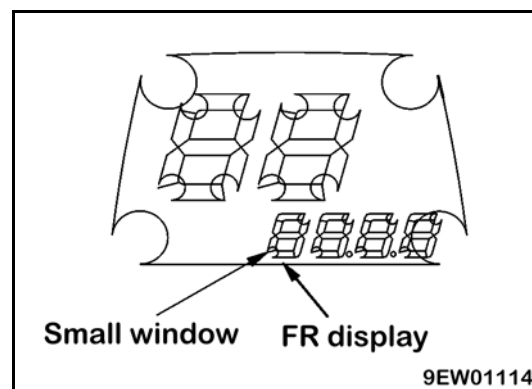
- When the directional lever is at the N position, N is displayed on the indicator.
- When the directional lever is at the F or R position, the shift position of the speed control lever is displayed as a numeral.
- When the auto-shift is being used, the transmission speed range is displayed.



When Using Joystick Steering (if equipped)

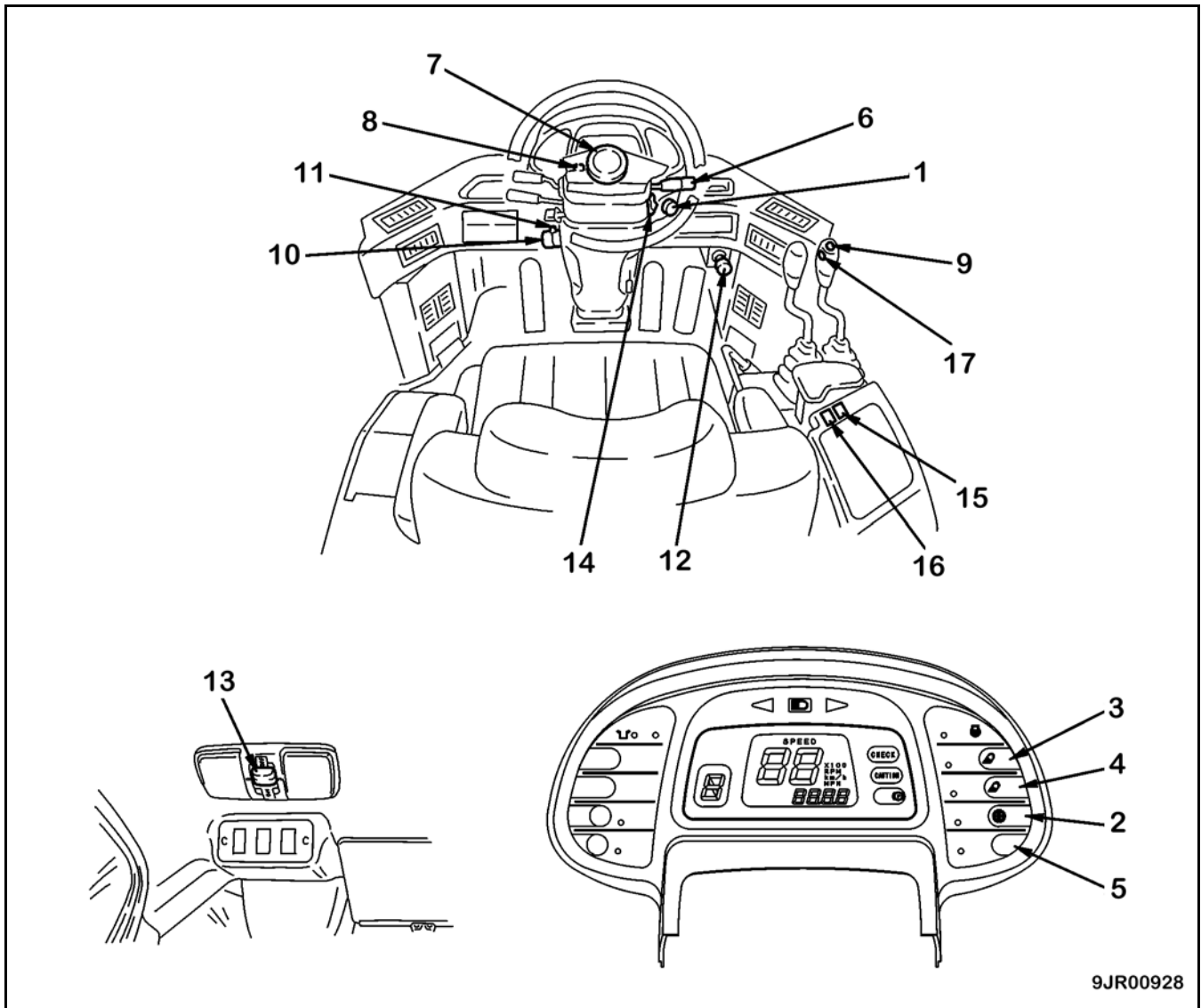
The transmission shift indicator (14) shows the present speed range of the transmission.

- When the F, N, R switch at the top of the joystick lever is set to the N position, the indicator displays N. (F and R are displayed in the small window at the bottom of the speedometer.)
- When the FNR switch on the head of the joystick is set to the F or R position, F or R is displayed in the small window at the bottom of the speedometer and the shift indicator displays the transmission speed range and N.



OPERATION

Switches



- | | |
|---|-------------------------------------|
| 1. Starting switch | 9. Kickdown switch |
| 2. Transmission cutoff switch | 10. Front wiper switch |
| 3. Front working lamp switch | 11. Rear wiper switch |
| 4. Rear working lamp switch | 12. Cigarette lighter (if equipped) |
| 5. Transmission auto-shift/manual selector switch | 13. Room lamp switch |
| 6. Lamp switch | 14. Parking brake switch |
| Turn signal lever | 15. Right power window switch |
| Dimmer switch | 16. Left power window switch |
| 7. Horn button | 17. Hold switch |
| 8. Hazard lamp switch | |

Starting Switch

The starting switch (1) is used to start or stop the engine.

OFF position

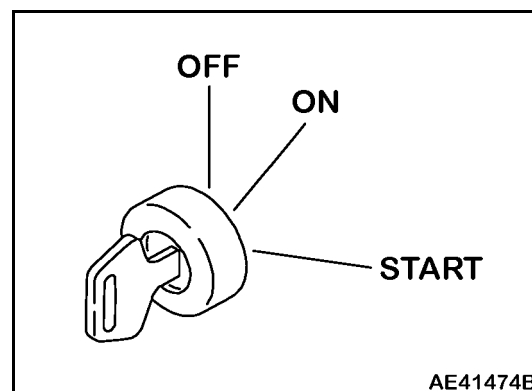
- The key can be inserted and removed at this position. When the key is turned to this position, the electric circuits are turned off and the engine stops. In addition, the parking brake is automatically applied.

ON position

- In this position, electric current flows to the charging circuit, lamp circuit, and accessory circuit. Keep the starting switch key at the ON position while the engine is running.

START position

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



Transmission Cutoff Switch

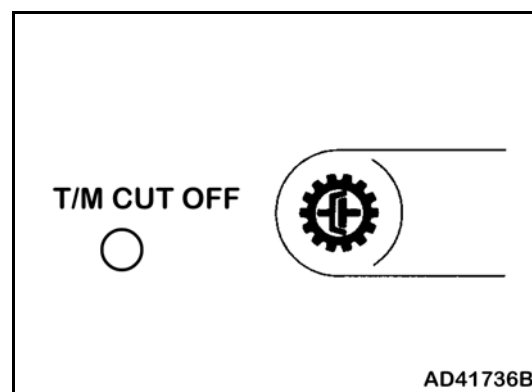
WARNING

- When moving the machine off an uphill slope, set the transmission cutoff switch to the OFF position; depress the accelerator pedal while keeping the left brake pedal depressed; then gradually release the brake pedal and allow the machine to move.
- This prevents the machine from traveling backwards.

Press the transmission cutoff pushbutton switch (2) to turn the transmission cutoff ON and OFF.

When the pilot lamp is pressed, it lights up and turns ON; if it is pressed again, the pilot lamp goes out and the transmission cutoff is turned off.

- ★ Set at ON normally.
- OFF: Left brake pedal acts as normal brake (like right brake pedal).
- ON: Left brake pedal acts as normal brake, but also switches the transmission to NEUTRAL.



If the switch is turned to ON, the transmission cutoff pilot lamp will light up.

Remark

For general operations, using the transmission cutoff function reduces the rise in the brake oil temperature and torque converter oil temperature.

OPERATION

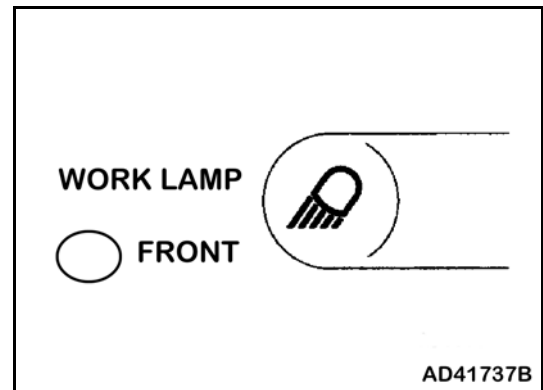
Front Working Lamp Switch



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

When turning on the front work lamp, turn the front working lamp switch to the ON position for the side clearance lamp or the ON position for the headlamp, then operate the switch (3).

- When the pilot lamp is pressed, it lights up and turns ON; if it is pressed again, the pilot lamp goes out and the working lamp is turned OFF.
- The working lamp does not light up if the lamp switch is not at the ON position for the side clearance lamp or the ON position for the headlamp.



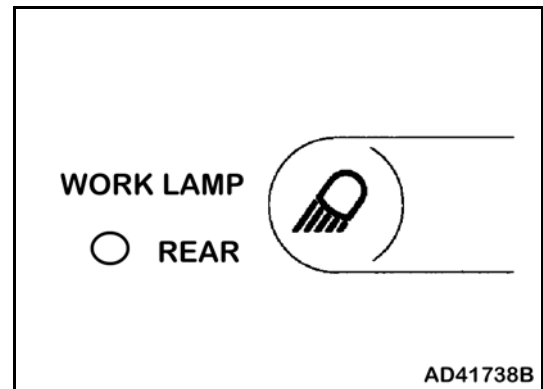
Rear Working Lamp Switch



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

When turning on the rear working lamp, turn the rear working lamp switch to the ON position for the side clearance lamp or the ON position for the headlamp, then operate the switch (4).

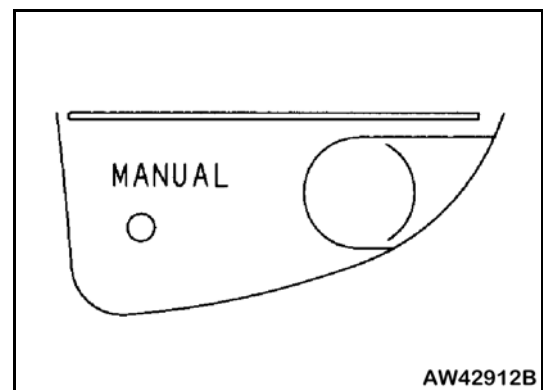
- When the pilot lamp is pressed, it lights up and turns ON; if it is pressed again, the pilot lamp goes out and the working lamp is turned OFF.
- The working lamp does not light up if the lamp switch is not at the ON position for the side clearance lamp or the ON position for the headlamp.



Transmission Auto-Shift/Manual Selector Switch

Press the transmission auto-shift/manual selector pushbutton switch (5) to turn the system ON or OFF.

- If the switch is pressed once, the pilot lamp lights up and the system is switched ON.
- If the switch is pressed again, the pilot lamp goes out and the system is switched OFF.
- ★ Normally, set this switch to the OFF position.
- OFF: Transmission set to auto-shift
- ON: Transmission set to manual shift



When the switch is at the ON position, the transmission AUTO-SHIFT/MANUAL selector pilot lamp lights up.

Remark

For details about the manual shift, see "Manual Shift" on page 2-27.

For details about the auto-shift, see "Automatic Shift" on page 2-27.

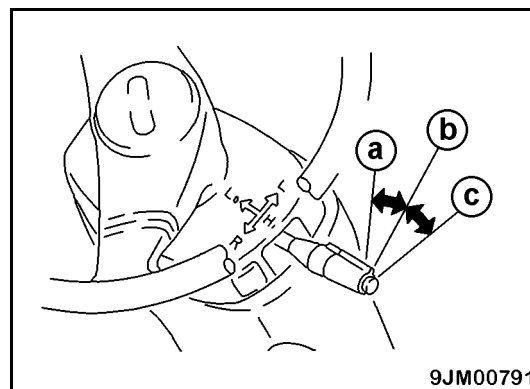
Lamp Switch

The lamp switch (6) is used to light up the front lamps, side clearance lamps, tail lamps, and instrument panel.

- Position (a): OFF
- Position (b): Side clearance lamp, tail lamps, and instrument panel light up.
- Position (c): Headlamps light up in addition to lamps at position (b).

Remark

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



Turn Signal Lever

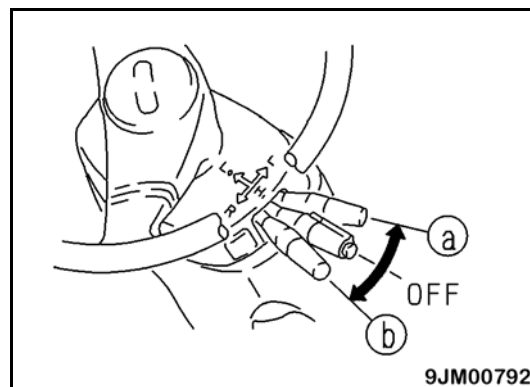
The turn signal lever (6) is used to operate the turn signal lamp.

- Position (a): LEFT TURN - Push lever FORWARD.
- Position (b): RIGHT TURN - Pull lever BACK.

Remark

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

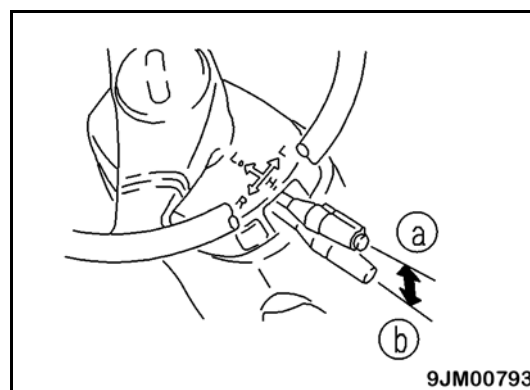
When the steering wheel is turned back, the lever automatically returns to its original position. If it does not return, return it manually.



Dimmer Switch

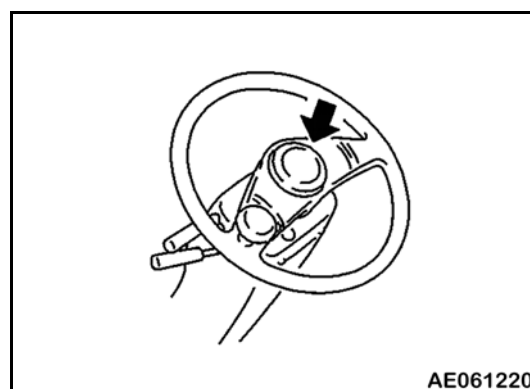
The dimmer switch (6) is used to switch the headlamps between high beam and low beam.

- Position (a): Low beam
- Position (b): High beam



Horn Button

The horn button (7) in the center of the steering wheel is used to sound the horn.



OPERATION

Hazard Lamp Switch



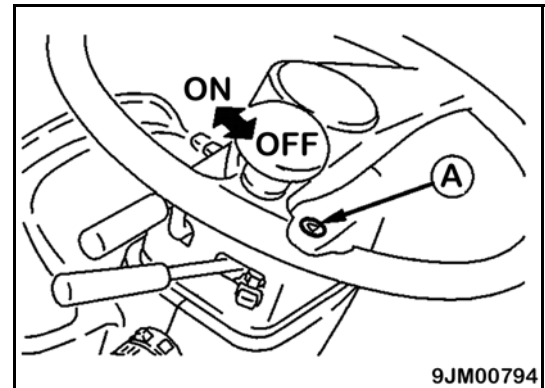
- Use the hazard lamps only for emergencies.
- Using the hazard lamps when traveling will cause problems for other machine operators.

The hazard switch (8) is used in emergencies, such as when the machine breaks down and has to be parked on the road.

- ON position: All turn signal lamps flash.

Remark

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



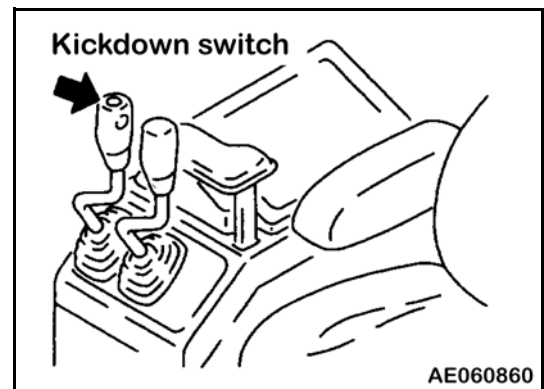
Kickdown Switch

When the gearshift lever is in 2nd and the kickdown switch (9) at the top of the knob of the lift arm control lever is pressed, the gear shifts down to 1st.

Use this when you need to increase the drawbar pull in digging operations.

Remark

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

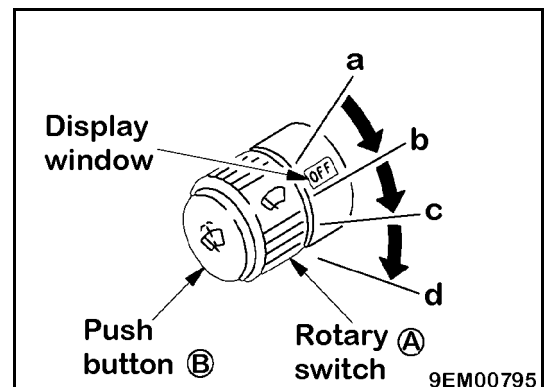


Front Wiper Switch

Turn rotary switch (A) of the front wiper switch (10) to operate the front wiper.

If pushbutton (B) is pressed, washer fluid sprays onto the front glass while the button is pressed.

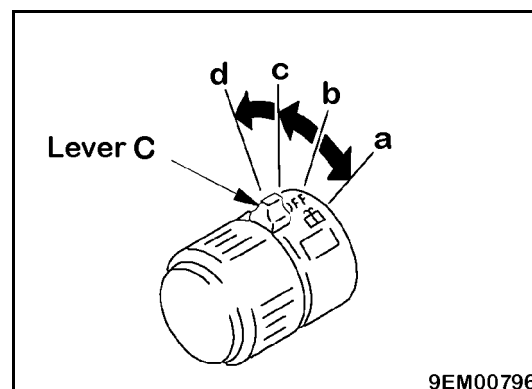
- Position (a): (OFF) Stop
- Position (b): (INT) Intermittent wiper
- Position (c): Low-speed wiper
- Position (d): High-speed wiper



Rear Wiper Switch

Turn lever (C) on the rear wiper switch (11) to operate the rear wiper.

- Position (a): Washer liquid is sprayed out.
- Position (b): OFF
- Position (c): Wiper is operated.
- Position (d): Washer fluid is sprayed out; wiper is operated.

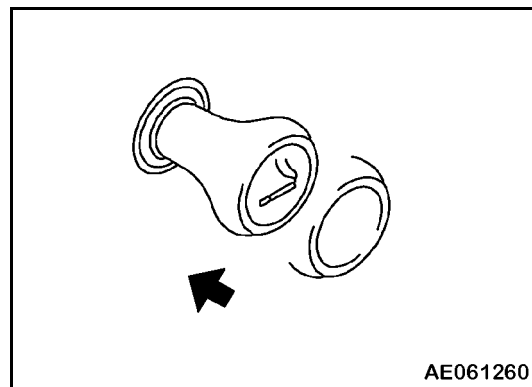


9EM00796

Cigarette Lighter (if equipped)

The cigarette lighter (12) is used to light cigarettes.

If the cigarette lighter is pushed in, it returns to its original position after several seconds. When it returns, pull it out and light the cigarette.



AE061260

Room Lamp Switch

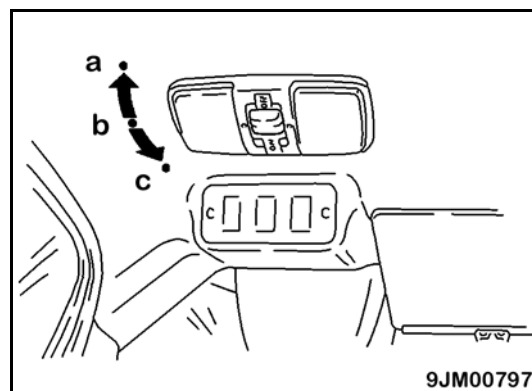
The room lamp switch (13) lights up the room lamp.

- Position (a): OFF
- Position (b): Lights up when cab door is opened.
- Position (c): Lights up.

Remark

The room lamp lights up even when the main switch is OFF. When leaving the operator's compartment, turn the switch to position (a) (OFF) or (b).

When operating with the cab door fully open, set the switch to position (a) (OFF).



9JM00797

OPERATION

Parking Brake Switch

WARNING

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

Remark

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

If the parking brake has been used as an emergency brake when traveling at high speed (near the maximum speed), contact your Komatsu distributor to have the parking brake checked for any abnormality.

The parking brake switch (14) is used to actuate the parking brake.

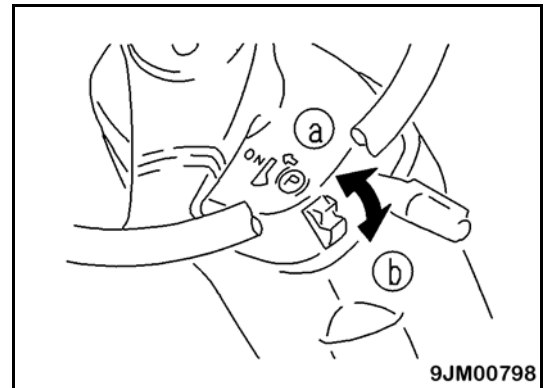
- Position (a): ON - The parking brake is applied and the parking brake pilot lamp lights up.
- Position (b): OFF - The parking brake is released.

Remark

If the directional lever is placed in F (FORWARD) or R (REVERSE) with the parking brake applied, the warning lamp flashes and the alarm buzzer sounds.

Before starting the engine, turn the parking brake switch to ON, then turn it to OFF.

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



Power Window Switch

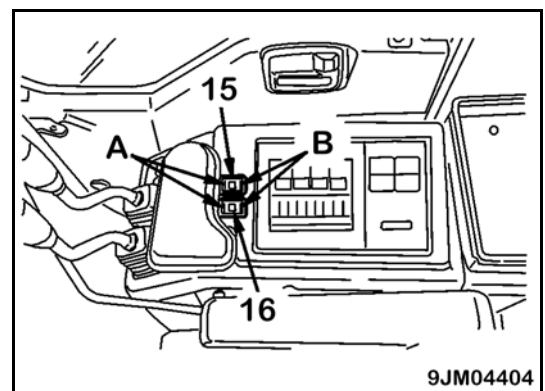
WARNING

- When closing the window glass, be careful not to get anyone's hands or head caught. There is danger of serious injury if anyone gets their head or hands caught in the window glass.
- Do not continue to operate the switch when the window is fully opened or fully closed. This may cause failure of the power window.

The power window switches (15) and (16) can be used when the starting switch is at the ON position.

- Portion (A) is pressed - the side window goes down.
- Portion (B) is pressed - the side window goes up.

When the window reaches the top or bottom and the window stops moving, release the switch immediately.



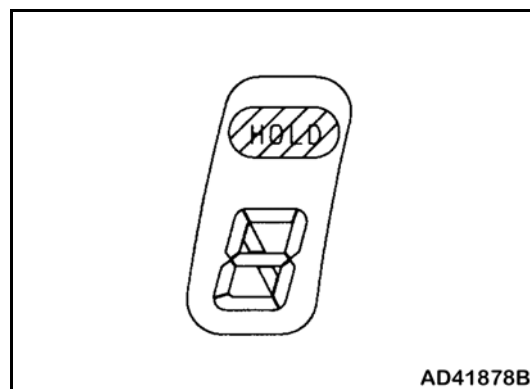
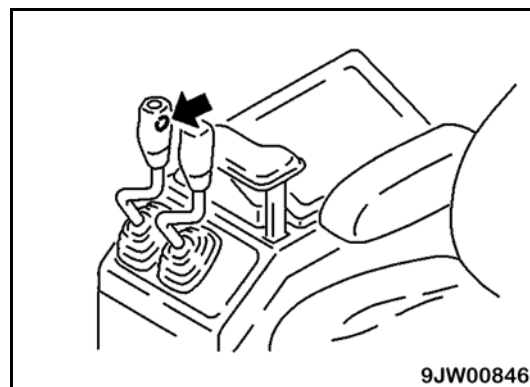
Hold Switch

To fix the speed range when traveling and using the automatic transmission, press the hold switch (17) at the side of the lift arm control lever knob. The transmission will be fixed in the speed range displayed on the shift indicator and the HOLD display lights up. When the switch is pressed again, the display goes out.

Use this function to select the desired speed range when traveling uphill or downhill, or when carrying out operations such as grading.

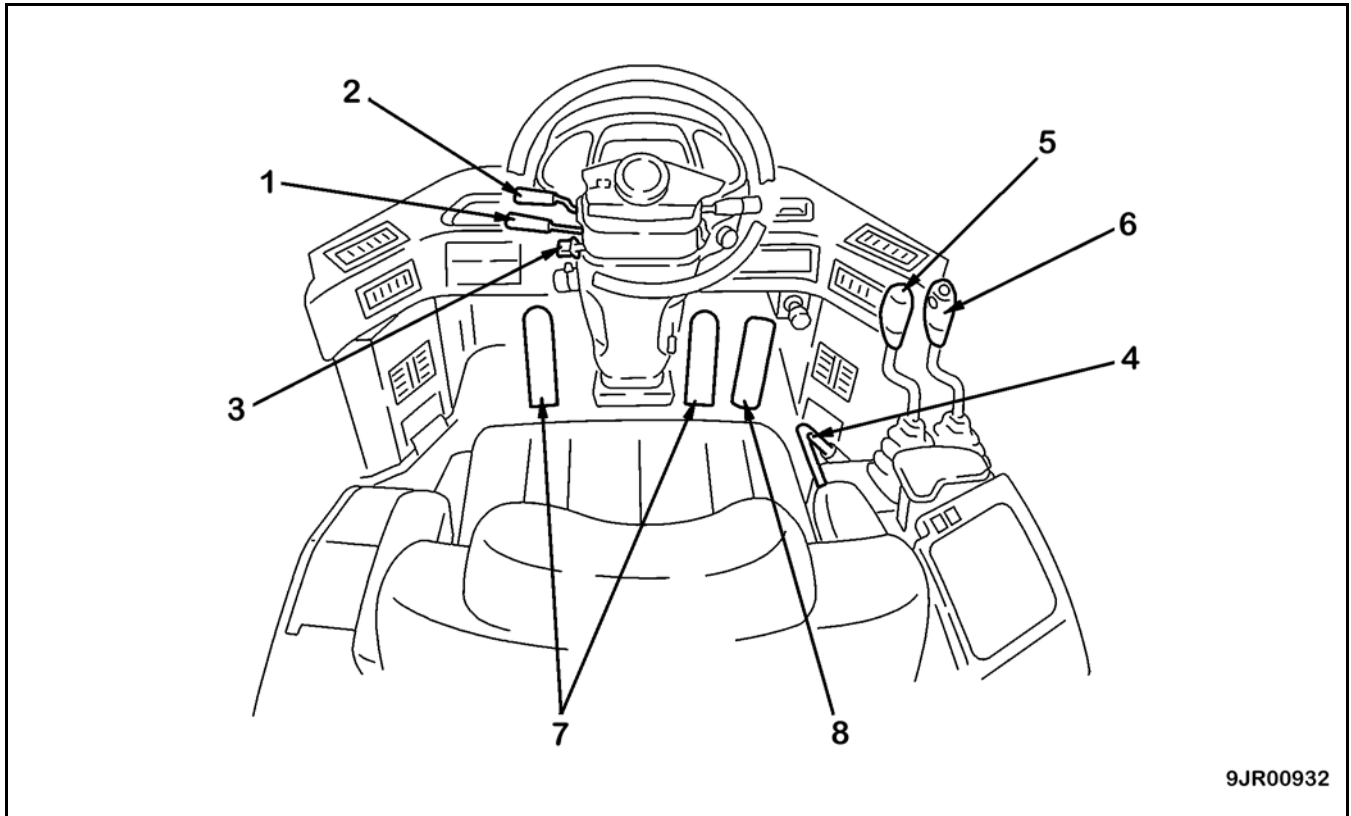
Remark

It is possible to shift up or down from the fixed speed range by operating the gearshift lever.



OPERATION

Control Levers, Pedals



9JR00932

1. Gearshift lever
2. Directional lever
3. Gearshift lever stopper
4. Safety lock lever (for work equipment lever)
5. Bucket control lever
6. Lift arm control lever
7. Brake pedals
8. Accelerator pedal

Gearshift Lever

The gearshift lever (1) changes the speed range of the transmission.

Manual Shift

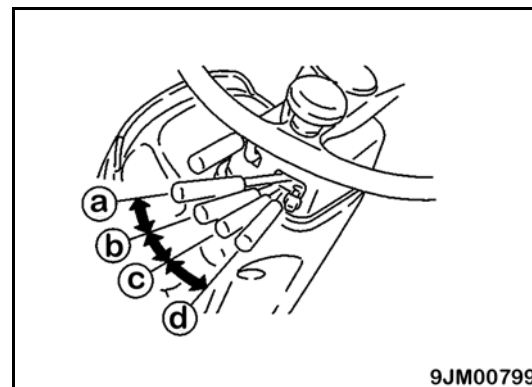
This machine has a 4-FORWARD, 4-REVERSE speed transmission.

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

- 1st and 2nd speeds are used for working.
- 3rd and 4th speeds are used for traveling.

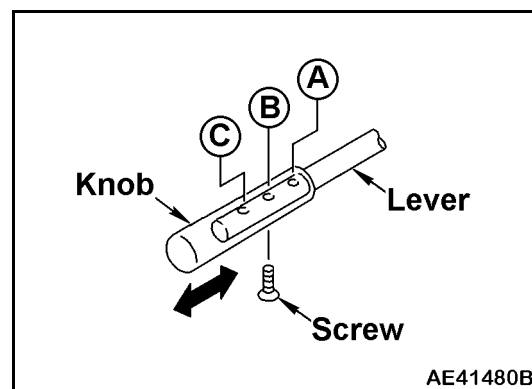
When the gearshift lever stopper is used, it is impossible to shift to 3rd or 4th. Disengage the gearshift lever stopper before trying to shift gears.

- Position (a): 1st
- Position (b): 2nd
- Position (c): 3rd
- Position (d): 4th



Remark

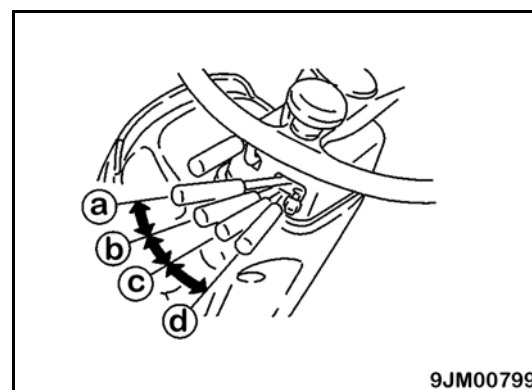
The length of the lever can be adjusted to three stages (positions (A), (B), or (C)). To adjust the length, remove the screw at the bottom of the lever knob; slide the knob to the desired position; then tighten the screw again. (The lever is installed to position (B) when shipped from the factory.)



Automatic Shift

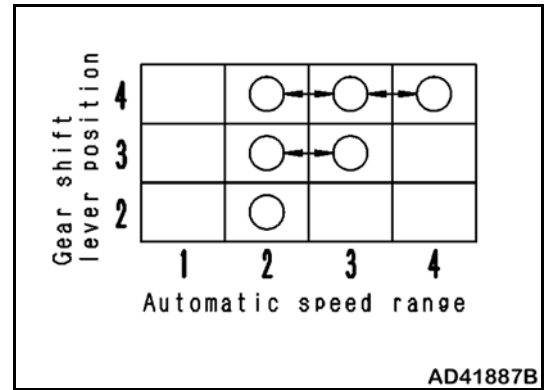
Automatic gearshifting can be carried out in 2nd, 3rd, or 4th speed range of the four forward and reverse speeds, depending on the travel conditions.

- Position (a): 1st
- Position (b): 2nd
- Position (c): 3rd
- Position (d): 4th



OPERATION

The range of speeds during automatic gearshifting is determined by the position of the gearshift lever as shown in the chart on the right.

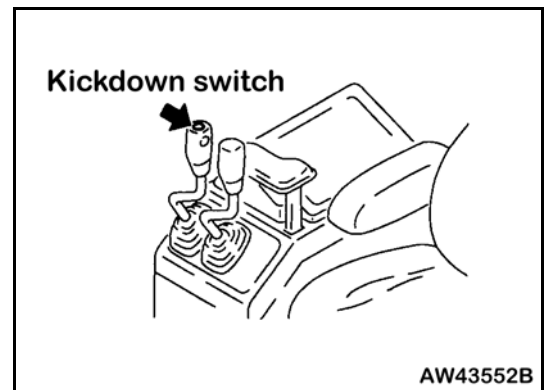


Remark

The first position for the gearshift lever fixes the transmission in 1st. There is no automatic shifting of the transmission.

When shifting down from 2nd to 1st, press the kickdown switch on the lift arm control lever.

If the transmission is in auto-shift and the travel speed is below 12 km/h (7.8 mph) in any speed range when traveling in either forward or reverse, the kickdown switch is actuated and makes it possible to shift down to 1st. This makes it easy to carry out load-and-carry operations.



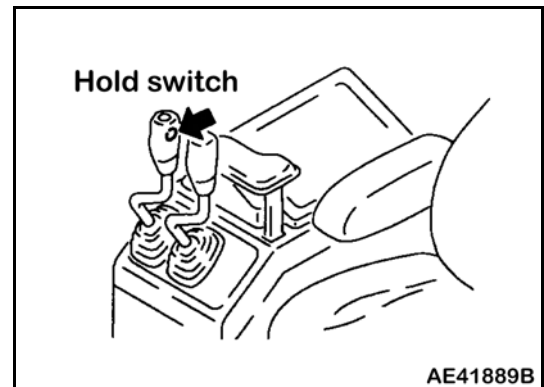
To set the desired speed range when traveling uphill or downhill, or when carrying out grading, do as follows.

When fixing the speed range:

- Press the HOLD switch on the lift arm control lever. The speed range is fixed at the speed range displayed on the transmission indicator on the main monitor.

When shifting up or down from set speed range:

- Shift gear with the gearshift lever.



Remark

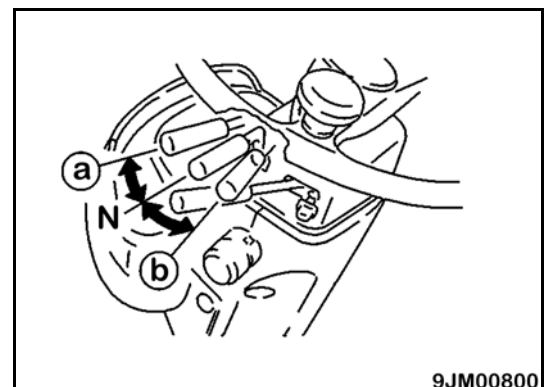
When the transmission has been shifted down from 2nd to 1st with the kickdown switch, it will shift up from 1st to 2nd when the travel speed increases.

Directional Lever

The directional lever (2) is used to change the direction of travel of the machine between forward and reverse.

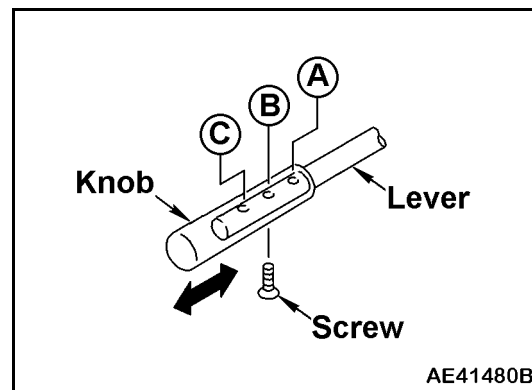
If the directional lever is not at the N position when starting the engine, the engine does not start.

- Position (a): Forward
- Position N: Neutral
- Position (b): Reverse



Remark

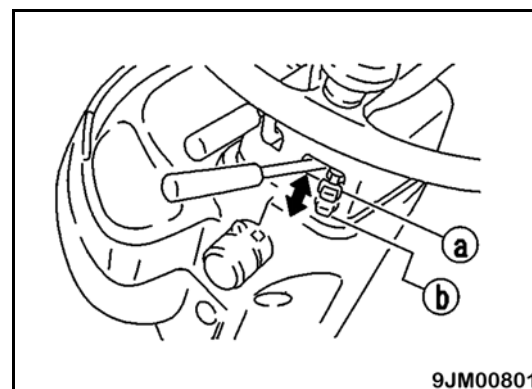
The length of the lever can be adjusted to three positions (A), (B), (C). To adjust the length, remove the screw at the bottom of the lever knob; slide the knob to the desired position; then tighten the screw again. (The lever is installed to position (B) when shipped from the factory.)



Gearshift Lever Stopper

This stopper (3) prevents the gearshift lever from entering the 3rd or 4th position when working.

- Position (a): Stopper actuated.
- Position (b): Stopper released.

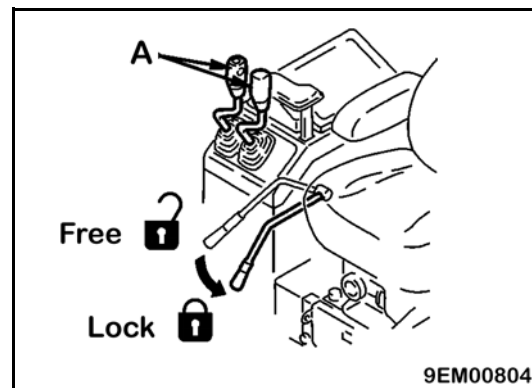


Safety Lock Lever (for Work Equipment Lever)



WARNING

- Before leaving the operator's seat, set the safety lock lever securely to the LOCK position. If the safety lock lever is not locked and the work equipment lever (A) is touched by mistake, this may lead to a serious accident.
- If the safety lock lever is not placed securely in the LOCK position, the control levers may not be properly locked. Check that the lever setting is as shown in the figure.
- When the safety lock lever is pulled up, do not touch the work equipment lever (A).



The safety lock lever (4) is a lock device for the work equipment control lever.

Push the work equipment lock lever down to lock it.

OPERATION

Bucket Control Lever

The bucket control lever (5) operates the bucket.

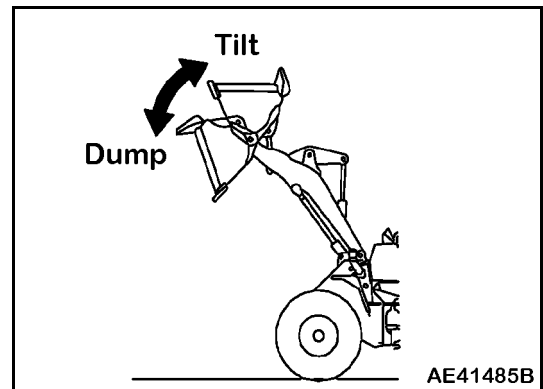
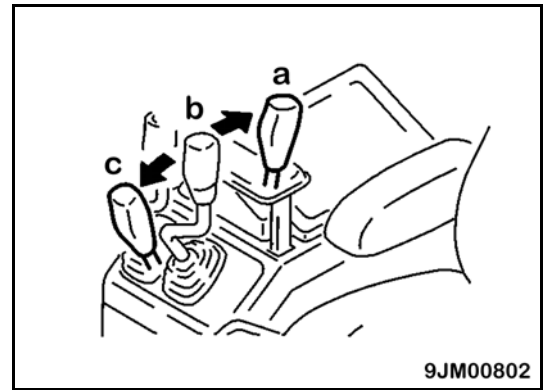
- Position (a): TILT

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

- Position (b): HOLD

The bucket is stopped and held in position.

- Position (c): DUMP



Lift Arm Control Lever

The lift arm control lever (6) is used to operate the lift arm.

- Position (a): RAISE

When the lift arm control lever is pulled further from the RAISE position, the lever stops at this position until the lift arm reaches the preset position of the kickout, and the lever is returned to the HOLD position.

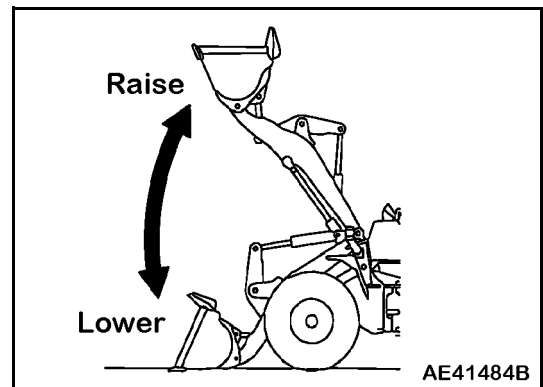
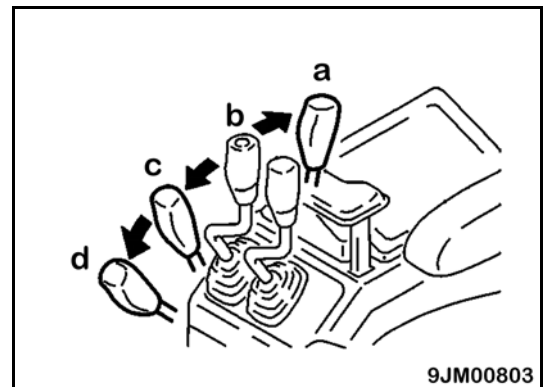
- Position (b): HOLD

The lift arm is kept in the same position.

- Position (c): LOWER

- Position (d): FLOAT

The lift arm moves freely under external force.



Brake Pedals

WARNING

- When traveling downhill, always use the right brake pedal. Use the braking force of the engine together with the brake.
- Do not use the brake pedal more than necessary. If the brake is used too frequently, the brake will overheat. If this happens, the brakes will not work and may lead to a serious accident.
- Do not put your foot on the brake pedal unless necessary.

The brake pedals (7) operate the brakes.

Right Brake Pedal

The right brake pedal operates the wheel brakes.

Use the right brake pedal for normal braking operations.

Left Brake Pedal

The left brake pedal operates the wheel brakes.

When the transmission cutoff switch is in the ON position and if the left brake pedal is depressed, wheel brakes are applied and the transmission is set to the neutral position at the same time. If the transmission cutoff switch is at OFF, the left brake pedal acts in the same manner as the right brake pedal.

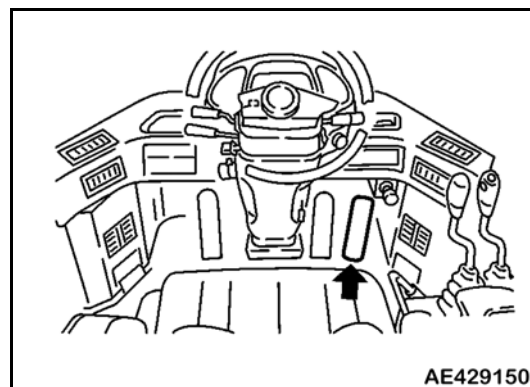
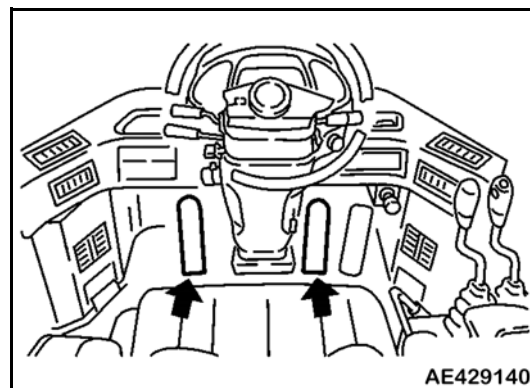
Remark

When the accelerator is being used for operating the work equipment, always set the transmission cutoff switch to the ON position and use the left brake pedal to slow or stop the machine.

Accelerator Pedal

The accelerator pedal (8) controls the engine speed and output.

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



SECURITY LOCKS AND SAFETY FEATURES

This machine is equipped with several security locks and safety features designed to protect the operator, persons performing service, repair, or inspections on the machine, as well as the general public when the machine is not in use and unattended. It is important for the operator of the machine to know where these features are located and when to use them.

Failure to do so may result in damage to the machine or injury to personnel.

Steering Column Tilt Lever

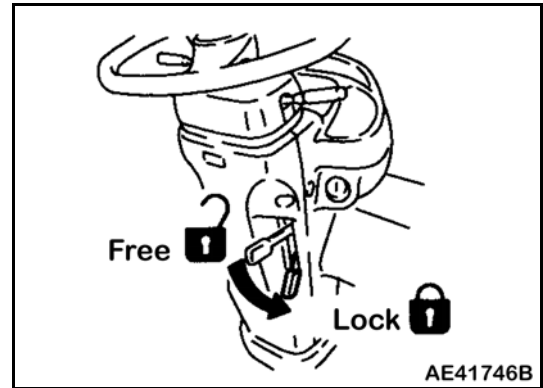


Stop the machine before adjusting the tilt of the steering wheel. If this operation (adjustment) is carried out while the machine is moving, it may lead to a serious accident or personal injury.

The steering column tilt lever is used to tilt the steering column forward or backward.

- ★ Pull the lever up and move the steering wheel to the desired position.
- ★ Push the lever down to lock the steering wheel in position.

Adjustment range: 125 mm (4.9 in) (stepless)



Cap with Lock

This machine is equipped with cap locks for the following ports:

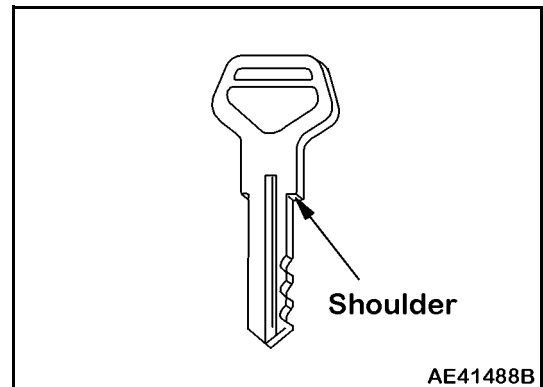
- Subtank filler port
- Fuel tank filler port
- Hydraulic tank filler port (if equipped)
- Transmission filler port (if equipped).

Use the starting switch key to open or close the caps.

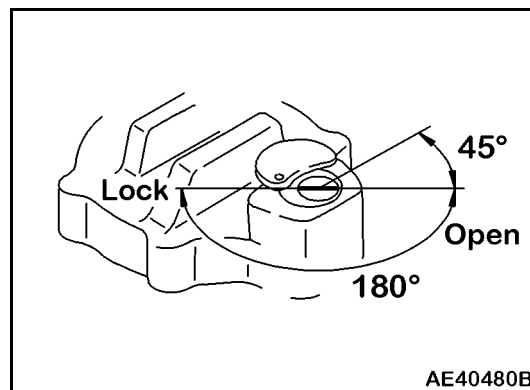
Opening the Cap

1. Insert the starting switch key into the cap securely until the shoulder contacts the keyhole.

If the key is turned before it is inserted fully into the keyhole, the key may break.

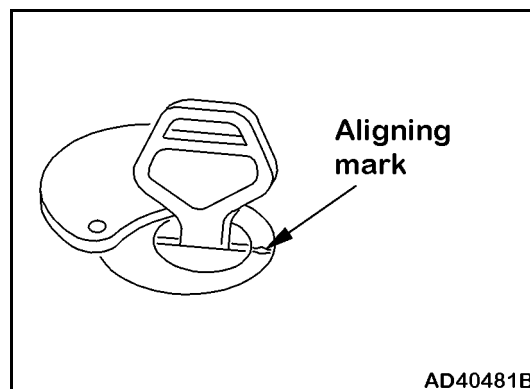


- Turn the starting switch key counterclockwise and align the groove in the rotor with the countermark on the cap. Turn the key slowly until you hear a clicking sound. This releases the cap and it can be opened.



Locking the Cap

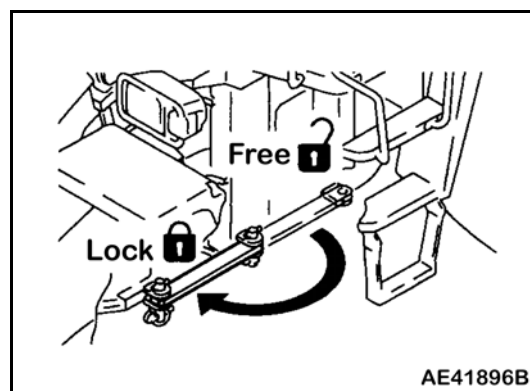
- Screw the cap into place.
- Turn the key counterclockwise and take the key out.



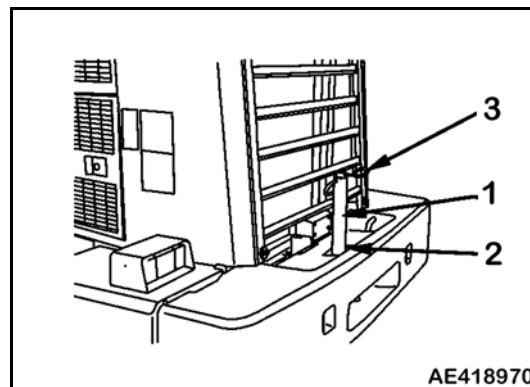
Safety Bar

WARNING

- Always lock the safety bar when transporting or lifting the machine. If the machine is transported or lifted when the frame is not locked, the machine may suddenly articulate. If the machine articulates, it may cause serious personal injury to people in the surrounding area.
- During maintenance, lock the safety bar.
- Always remove the safety bar for general travel operations. If it is not removed, the steering wheel cannot be used for steering. This is extremely dangerous.



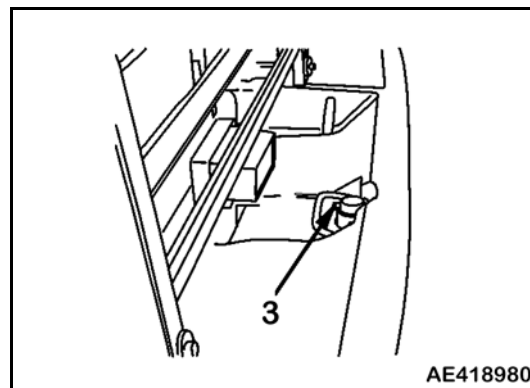
The safety bar is used to lock the front and rear frames so that the machine does not articulate when servicing or transporting the machine.



OPERATION

Towing Pin

1. Insert towing pin (1) into hole (2) in the counterweight.
 2. Set lynch pin (3) so that the towing pin does not come out.
- ★ Carry out this operation in reverse to remove the pin.



Backup Alarm

This alarm sounds when the directional lever is set to the R position.
The alarm warns people behind the machine that the machine will travel in reverse.

MACHINE FEATURES

Cab Door

Emergency Escape Right Door

WARNING

- The right cab door is provided as an emergency escape from the cab when it is impossible to leave the cab from the left cab door. Do not use the right cab door for getting in or out of the operator's compartment.
- Never operate the machine with the door opened to around 90 degrees. There is danger that the door will extend beyond the outermost part of the machine. There is also danger that the door may suddenly shut when the brakes are operated.
- Always operate with the right door fully closed (locked) or partially opened (quarter lock).

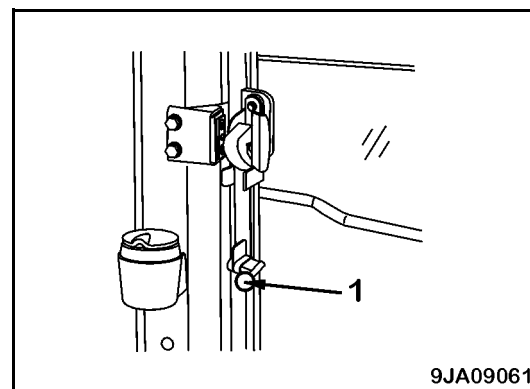
Remark

The right window of the cab cannot be opened or closed from the outside.

Normal Condition of Right Door During Operation

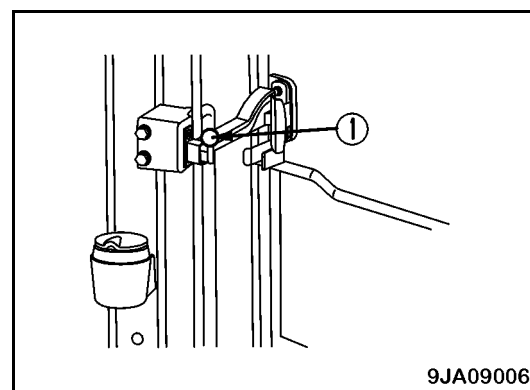
When the lock release knob (1) is pushed down securely, the lock is applied.

- When using the air conditioner or heater, carry out operations with the knob in this position.



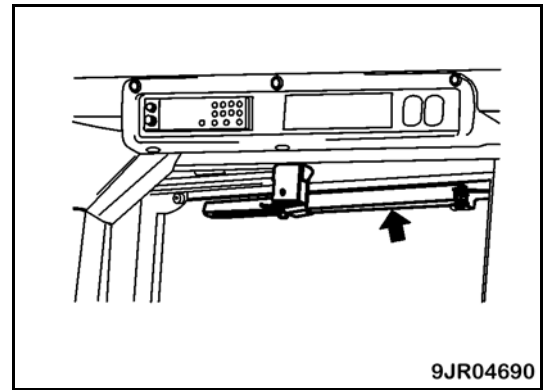
If open lock knob (1) is lifted up, the right door will partially open (quarter lock).

- When letting outside air in on the right side, carry out operations with the knob in this position.



OPERATION

- ★ The gas damper is not a lock device to keep the cab door open.

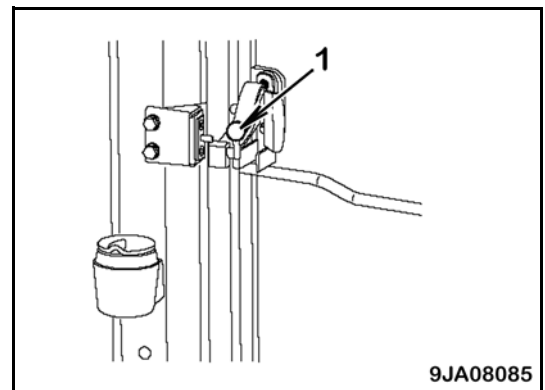
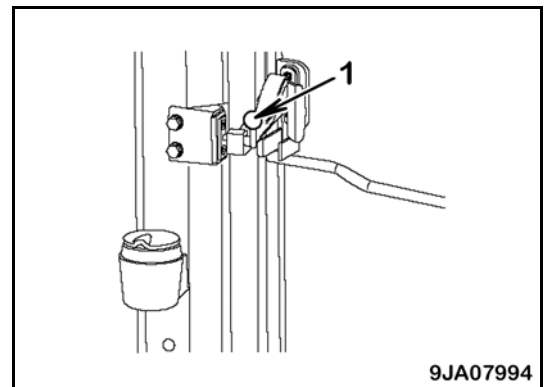
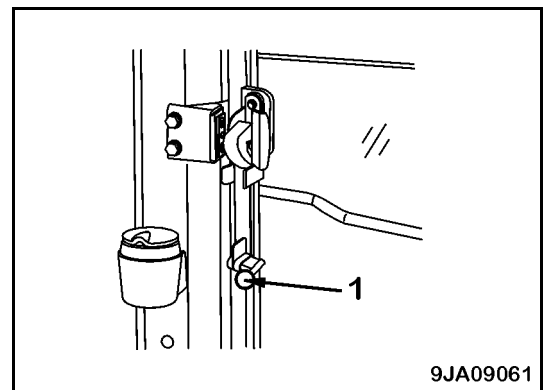


Door Operating as Emergency Escape

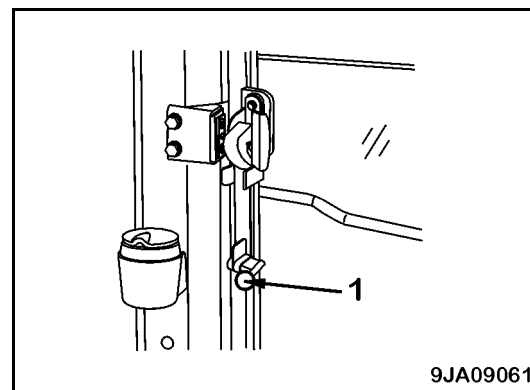
If the left door of the cab does not open or if it is dangerous to get off the machine from the left side, use the right emergency door.

Release the open lock of the right door to open the door fully and use it as an emergency escape route.

1. Lift open lock knob (1) up.
2. Grip open lock knob (1) and pull it towards the rear of the machine.
3. Remove the open lock guide rail from the window pillar guide to free the right door lock.



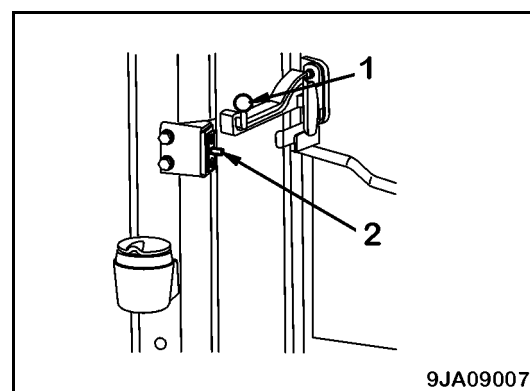
4. Open the right door fully and escape through the door.
5. To return the open lock to its original position, use your hand to hold lock knob (1) open and pull it gradually to align the open lock guide rail with the guide and then push the open lock knob to the front.
Check that the rail is completely fitted into the guide then push open lock knob (1) down to set it securely to the LOCK position.
6. Check that the rail is completely fitted into the guide and then push open lock knob (1) down to set it securely to the LOCK position.



Remark

If the door is closed without holding the open lock knob (1) by hand, the plastic part of the lock lever will hit pin (2) at the cab side; this may break the plastic part.

Always use your hand to hold the lock knob (1) open when closing the door.



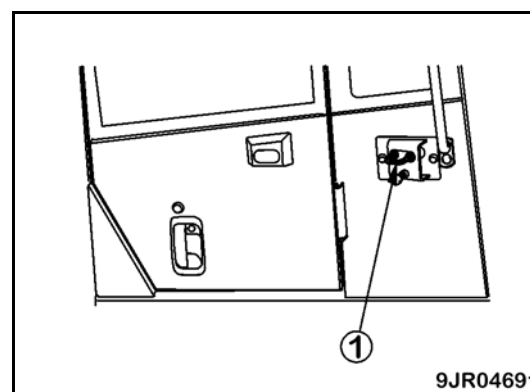
WARNING

- Always check that the cab door is locked, both when it is open and when it is closed.
- Always stop the machine on level ground before opening or closing the door.
- Avoid opening or closing the door on a slope. There is danger that the operating effort may suddenly change.
- When opening or closing the door, always use the door handle and knob.
- Be careful not to get your hands caught by the front pillar or center pillar.
- When there is any person inside the cab, always call out a warning before opening or closing the door.

Left Cab Door, Opening Lock

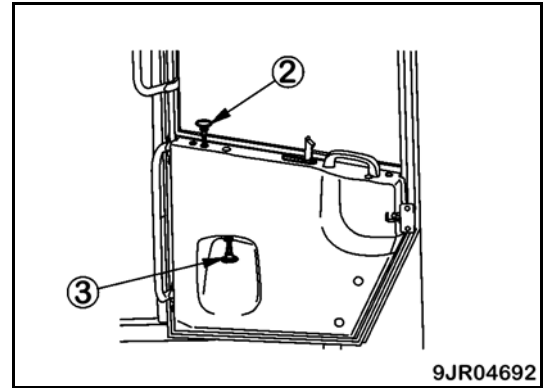
When getting in or out of the operator's compartment, or when operating with the door open, use this lock to hold the door in position.

1. Push the door against catch (1) to lock it in position.
2. When attaching the door in position, lock it firmly to the catch.
3. When getting on or off the machine, hold the handrail on the inside.



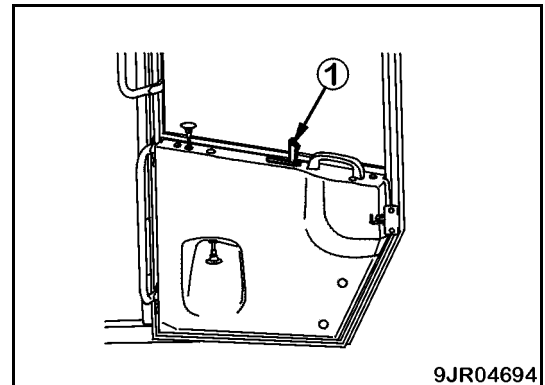
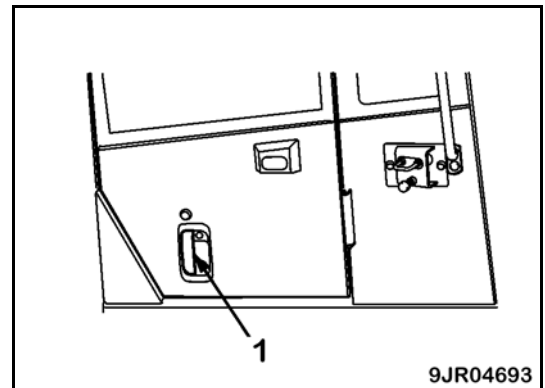
OPERATION

4. When closing the door from the operator's seat, push knob (2) to release the catch.
5. When closing the door after getting off the machine, pull knob (3) to release the catch.



Left Cab Door, Opening Knob

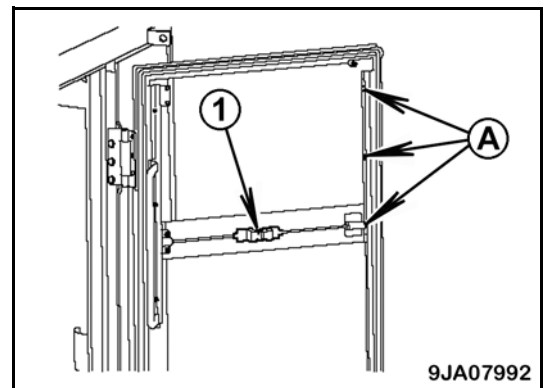
Pull open knob (1) to open the left door fully.



Left Cab Window (Open, Lock, Cancel Knob)

Use this knob when you want to move the door window glass up or down to open or close it.

1. Grip lock cancel knob (1) to release the lock and move it down to a lower lock position.
 2. Release lock cancel knob (1).
- ★ There are three points for lock position (A).



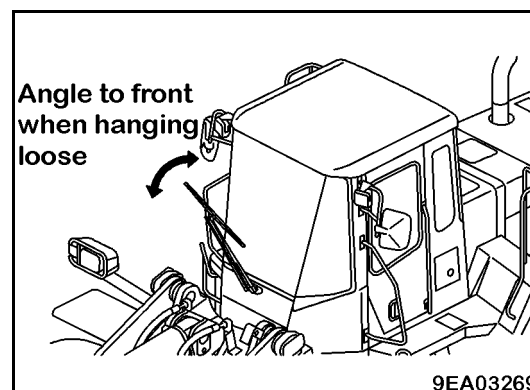
Cab Wiper

Preventing Wiper Arm Bracket Damage

Remark

When angling the wiper arm to the front, check that the wiper blade is hanging free.

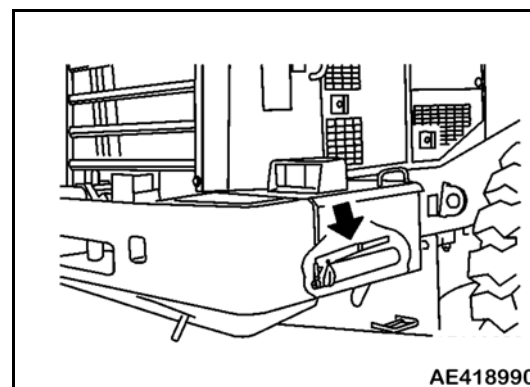
If, when angling the wiper arm to the front, the wiper arm is angled with the wiper blade locked to the arm (the bottom of the blade is caught on the arm), abnormal force is brought to bear on the mounting bracket. This force may break the bracket.



Grease Pump

The grease pump is stored inside the battery box at the rear of the machine. After using the pump, wipe off all grease stuck to the outside of the pump and then store it in the box.

- ★ You can store the grease pump in the right or left battery box.

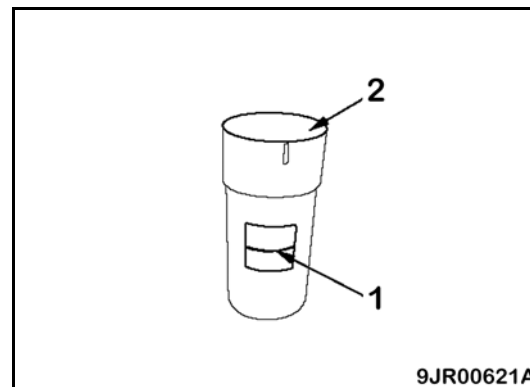


Dust Indicator

This device indicates that the air cleaner is clogged.

Depending on the degree that the element is clogged, red line (1) appears in the transparent portion.

- If red line (1) indicates 0.0075 MPa (30 inches of H₂O) (1.09 psi), clean the element immediately.
- After cleaning, press top portion (2) of the indicator to return red line (1) to its original position.



ELECTRICAL

Fuses

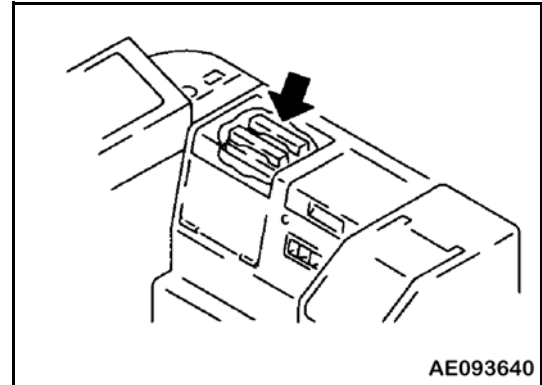


Before replacing a fuse, be sure to turn off the starting switch

The fuses protect the electrical equipment and wiring from a short circuit or overload condition.

Replace the fuse if any of the following conditions are present:

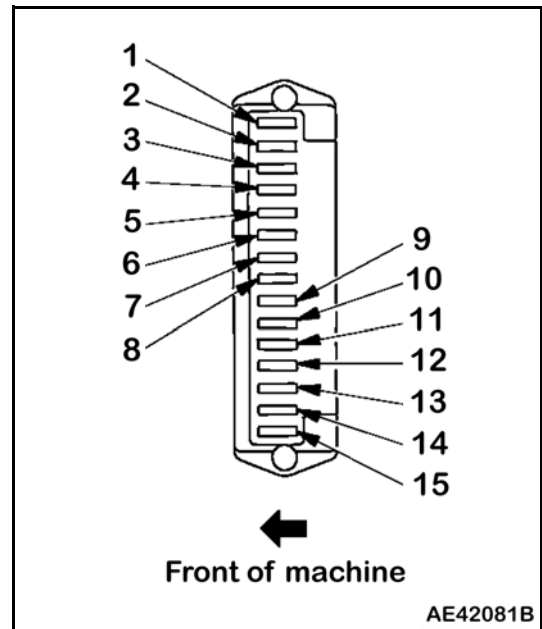
- The fuse is corroded.
- There is white powder around the fuse.
- The fuse is loose in the fuse holder.
- ★ Replace a fuse only with another of the same capacity.



Fuse Capacity and Circuits

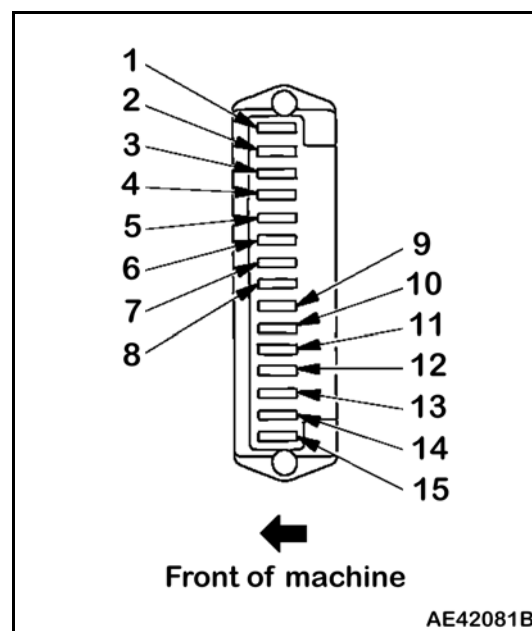
Fuse Box 1

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



Fuse Box 2

No.	Fuse Capacity	Circuit
1	20A	Front working lamp
2	20A	Rear working lamp
3	30A	Air conditioner 1
4	20A	Air conditioner 2
5	20A	Wiper, washer
6	10A	Auto-shift
7	10A	Cigarette lighter (if equipped) Radio (if equipped)
8	10A	Rotating lamp (if equipped)
9	10A	Air suspension (if equipped)
10	10A	Auto-greasing (if equipped)
11	30A	Spare
12	20A	Power window (L.H.)
13	20A	Power window (R.H.)
14	10A	Spare
15	10A	Spare

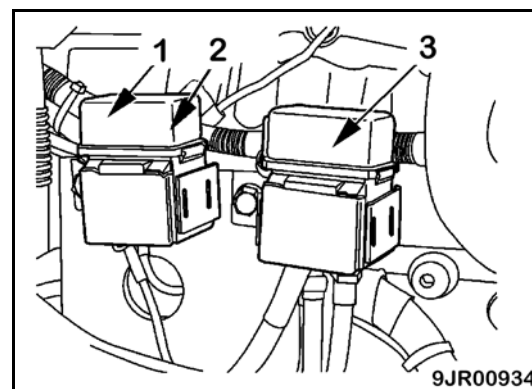


Slow-Blow Fuses

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

The slow-blow fuses are protected by covers and are located on the left side of the machine.

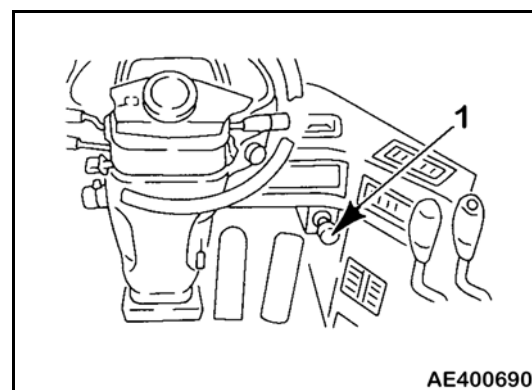
- (1) 120A: Heater relay (glow plug)
- (2) 80A: Main power
- (3) 30A: Battery power (starting switch, hazard)



Power Outlet

The cigarette lighter receptacle can be used as a power source. The maximum electric current is 7 A (168 W).

Remove the cigarette lighter (1) to access the receptacle.



WORK OPERATIONS

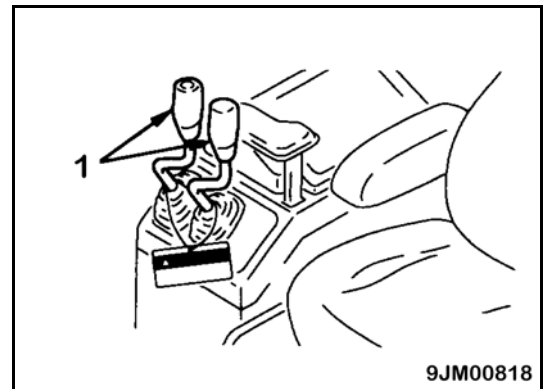
WARNING

- Always hang a warning sign on the work equipment control lever (1).
- Accumulation of flammable materials and leakage of fuel or oil around the battery or high-temperature parts of the engine, such as the engine muffler and turbocharger, may cause fire on the machine. Check thoroughly and repair any problems that are found, or contact your Komatsu distributor.
- Always repair any damage to the handrails and steps and tighten any loose bolts. Failure to do this may cause workers to fall and suffer serious personal injury.

Walk-Around Check

Before starting your machine and proceeding with any work operations:

- Check the area around and under the machine.
- Check for loose nuts and bolts, damage to any parts, leakage of fuel, oil, or coolant.
- Check the condition of the work equipment and the hydraulic systems.
- Check for looseness or play in electric wiring.
- Check that there is no dust accumulated around high-temperature parts.



Precautions Before Starting Work Operations

Before starting work operations, it is important to perform several procedures to be sure your equipment is in a safe operating condition. It is also important to be aware of the hazards involved when operating your machine.

If the machine is at an angle, reposition it so that it is level before starting your check.

Perform the following inspections and cleaning every day before starting the engine for the day's work.

1. Check for damage, wear, play in the work equipment, cylinders, linkage, and hoses.
 - Check that there are no cracks, excessive wear, or play in the work equipment, cylinders, linkage, or hoses. If there is an abnormality, repair it.
2. Remove dirt and dust from around engine, battery, and radiator.
 - Check if there is any dirt or dust accumulated around the engine or radiator.
 - Check if there is any flammable material (dead leaves, twigs, etc.) accumulated around the battery, engine muffler, turbocharger, or other high-temperature engine parts.
 - Remove all such dirt, dust, or flammable material.
3. Check for coolant or oil leakage around the engine.
 - Check that there is no oil leakage from the engine or coolant leakage from the cooling system. If there is a problem, repair it.

4. Check for oil leakage from the transmission case, axle, hydraulic tank, hoses, joints.
 - Check that there is no oil leakage. If there is a problem, repair the leakage.
5. Check for oil leakage from the brake line.
 - Check that there is no oil leakage. If there is a problem, repair the leakage.
6. Check for damage to the lamps.

Remark

Before starting operations, clean all dirt from the surface of the lamps.

If the lamps are used with mud stuck to the surface, the lamp may overheat and be damaged.

If the lamp is cleaned when it is overheated, the sudden change in temperature may cause the lens to crack.

Turn the lamp off and wait for the temperature to go down before cleaning the lamp.

7. Check for loose air cleaner mounting bolts.
 - Check for loose bolts. Tighten any loose bolts.
8. Inspect rims.



WARNING

- Check the rims (wheels) and rings to confirm that there is no deformation, corrosion, or cracks.
- In particular, check the side rings, lock rings, and rim flanges thoroughly.

9. Check for damaged or worn tires, wheels, and wheel hub bolts. Check for loose mounting bolts.
 - Check for cracks or peeling of the tires and for cracks or wear to the wheels (side rim, rim base, lock ring). If there is an abnormality, repair or replace the part.
 - Tighten any loose wheel bolts.
 - If any valve caps are missing, install new caps.

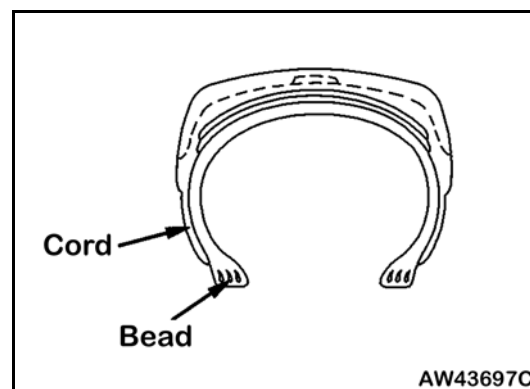


WARNING

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

To ensure safety, do not use tires exhibiting the following characteristics.

- Wear:
 - Tires with a tread groove of less than 15% of that of a new tire
 - Tires with extreme uneven wear or with stepped-type wear
- Damage:
 - Tires with damage which has reached the cords, or with cracks in the rubber
 - Tires with cut or pulled cords
 - Tires with peeled (separated) surface
 - Tires with damaged bead
 - Leaking or improperly repaired tubeless tires
- Deteriorated, deformed, or abnormally damaged tires which do not seem usable.

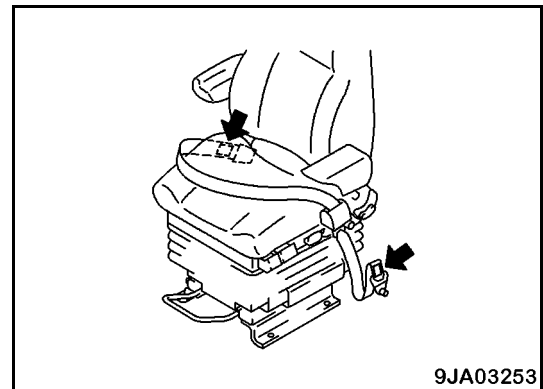


OPERATION

10. Check for loose battery terminals.
 - Tighten any loose terminal.
11. Clean the cab window.
 - Clean the cab window to ensure good visibility when operating the machine.
12. Check rear view mirror, underview mirror.
 - Check that the mirrors are not damaged. Replace them if they are damaged.
 - Clean the surface of the mirrors and adjust the angle so that the operator can see the area to the rear and under the machine from the operator's seat.
 - When cleaning the mirrors, use a mop with a long handle.
13. Check for loose ROPS mounting bolts.
 - If any loose bolts are found, tighten them to $927 \pm 103 \text{ N}\cdot\text{m}$ ($683.7 \pm 76.0 \text{ lbf ft}$).
 - If bolts are damaged, replace them with genuine Komatsu bolts.
14. Check for damage and loose bolts on the handrail and steps.
 - Repair any damage and tighten any loose bolts.
15. Check for damage to the seat belt and mounting clamps.
 - Check that there are no loose bolts on the equipment mounting the seat belt to the machine.
 - Tighten the bolts if necessary.

Tightening torque: $24.5 \pm 4.9 \text{ N}\cdot\text{m}$ [$18.1 \pm 3.6 \text{ lbf ft}$]

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



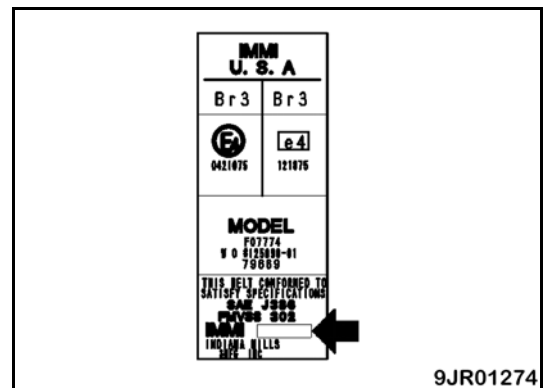
WARNING

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

Remark

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

16. Check for damage to gauges, lamps on the instrument panel, and loose bolts.
 - Check for damage to the panel, gauges, and lamps. If there is a problem, replace the parts.
 - Clean off any dirt on the surface.
 - Tighten any loose bolts.



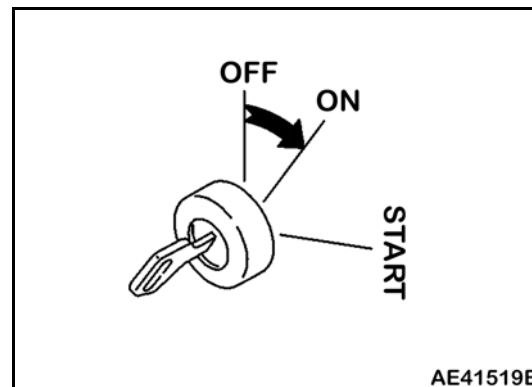
Check Before Starting Engine

Remark

Perform the checks in this section before starting the engine each day.

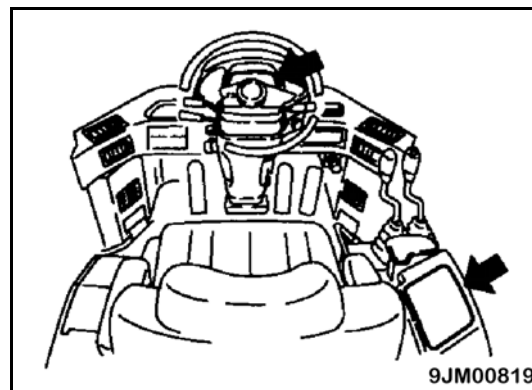
Check Machine Monitor

1. Turn the starting switch ON.



2. Check that all the monitors, gauges, and the central warning lamp illuminate for approximately three seconds, and that the alarm buzzer sounds for approximately one second.

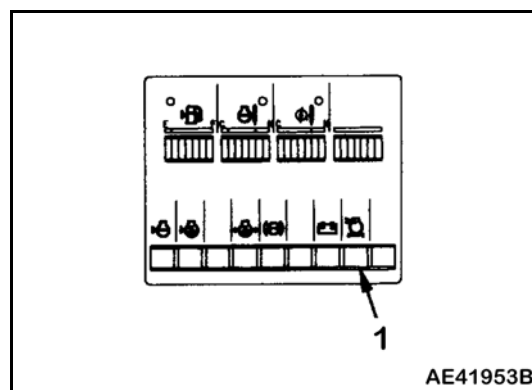
If the lamps do not illuminate, there is probably a failure or disconnection. Contact your Komatsu distributor for inspection.



Check Dust Indicator

If the air cleaner clogging caution lamp pilot lamp (1) on the maintenance monitor flashes, clean the air cleaner element.

For details, see "Check, Clean, Replace Air Cleaner Element" on page 3-21.



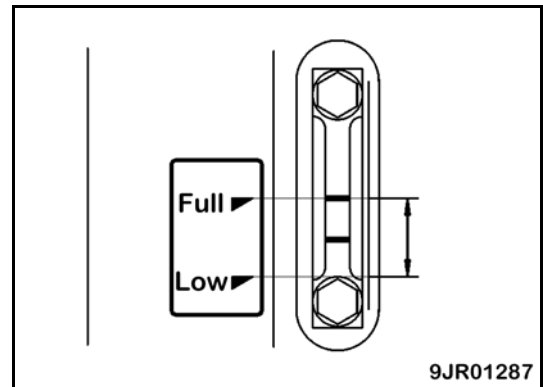
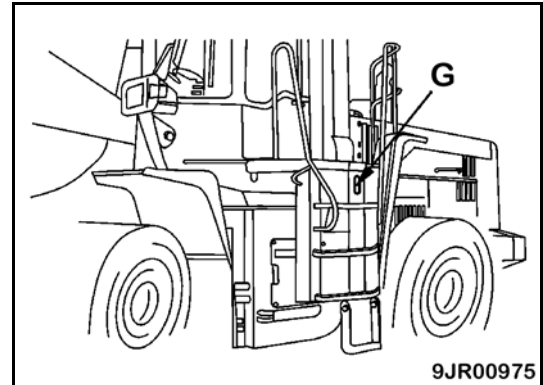
OPERATION

Check Coolant Level, Add Coolant

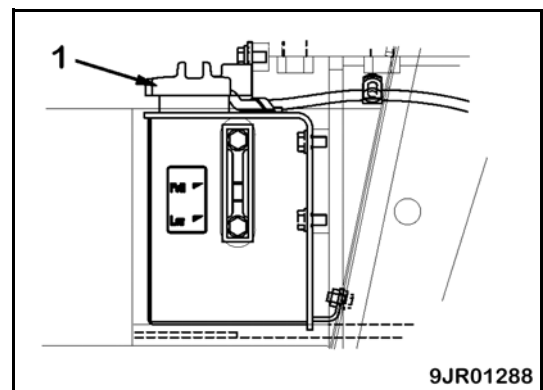
WARNING

- Do not open the radiator cap unless necessary.
- Wait for the engine to cool down before checking the coolant in the subtank. The coolant remains at high temperature and the radiator is under high internal pressure immediately after the engine has stopped. If the cap is removed to check the coolant level in this condition, there is a hazard of burns.
- Wait for the temperature to go down and then turn the cap slowly to release the pressure before removing it.
- When adding coolant, use the step and handrail on your machine to support yourself securely.

1. Check that the cooling water level is in the range between the FULL and LOW marks on sight gauge (G) of the subtank.



- If the water level is low, open the cover at the top of the platform and add water through subtank filler port (1) to the FULL level.
2. After adding coolant, tighten the cap securely.
3. If the subtank is empty, check for water leakage. After checking, fill the radiator with water and then fill the subtank with water.
 - If the volume of coolant added is more than usual, check for possible leakage.
 - Confirm that there is no oil in the coolant.



Check Oil Level in Engine Oil Pan, Add Oil

WARNING

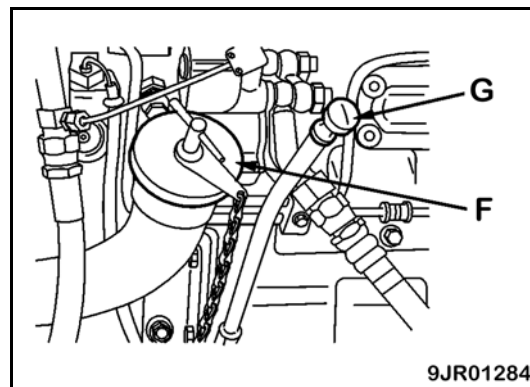
The parts and oil are at high temperature immediately after the engine is stopped and may cause serious burns. Wait for the temperature to go down before starting the operation.

- ★ Make sure that the machine is parked on a horizontal position before you check the oil level.

Remark

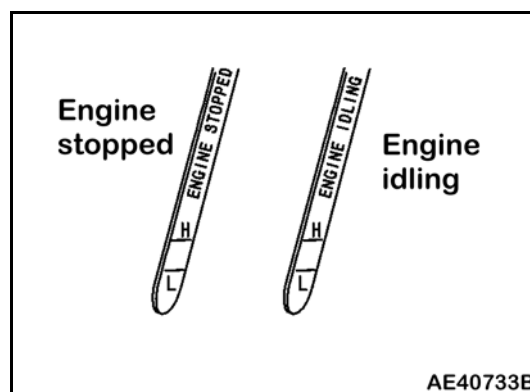
After the engine has been operated, wait for at least 15 minutes after stopping the engine before checking the oil level.

1. Stop the engine and wait for the temperature of all parts to go down.
2. Open the inspection cover on the right side at the rear of the machine.
3. Take out dipstick (G) and use a cloth to wipe off the oil.
4. Fully insert dipstick (G) into filler pipe (F) and then remove it.



5. The oil level should be between the H and L marks on dipstick (G).
 - If the oil level is below the L mark, add oil through oil filler (F).
 - The dipstick has level markings on both sides.
 - Side 1: ENGINE STOPPED: Indicates the levels for measuring when the engine is stopped.
 - Side 2: ENGINE IDLING: Indicates the levels for measuring when the engine is idling.

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

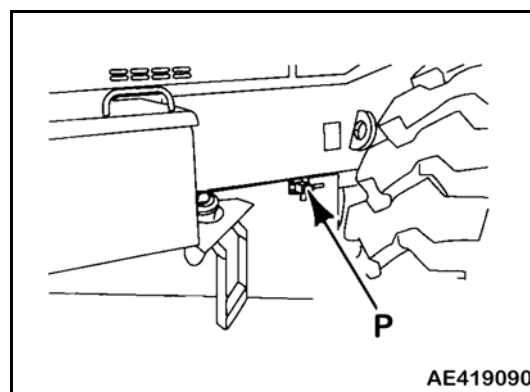


6. If the oil is above the H mark, drain the excess engine oil from drain plug (P) and check the oil level again.
7. If the oil level is correct, tighten oil filler cap (F) securely and close the inspection window.

Remark

Checking the oil level with the engine idling can be done if the following precautions are taken:

- Check that the engine water temperature gauge shows in the green range.
- Use the side of the dipstick marked "ENGINE IDLING."
- Remove the oil filler cap.
- Make sure that the machine is parked on a horizontal surface.



OPERATION

Check Fuel Level, Add Fuel

WARNING

- When filling with fuel, never let the fuel overflow. This may cause a fire. If too much fuel is added, there is danger that the fuel may expand because of the rise in the ambient temperature and cause the fuel to overflow.
- Spilled fuel may cause a fire. Always wipe off any spilled fuel completely.
- Fuel is highly flammable and a dangerous substance. Never bring fire or flames near fuel.

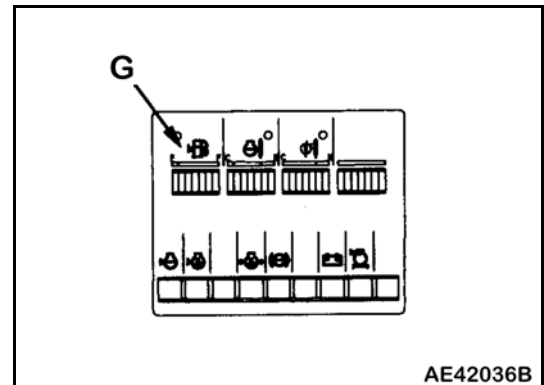
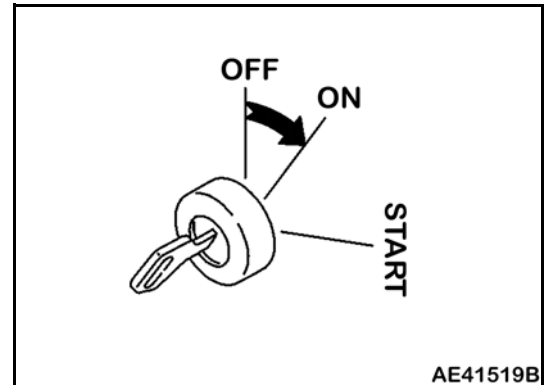
Remark

If the engine has run out of fuel and has stopped, it is necessary to operate the priming pump to bleed the air completely from the fuel line before starting the engine again. See “Replace Fuel Filter Cartridge” on page 3-55 for instructions on using the priming pump.

Be careful not to let the engine stop because of lack of fuel.

If the engine has run out of fuel, the air bleeding operation can be carried out more quickly when the fuel tank is full.

1. Turn the engine starting switch to the ON position and check the fuel level with fuel level gauge (G).
2. After checking, turn the switch back to the OFF position.

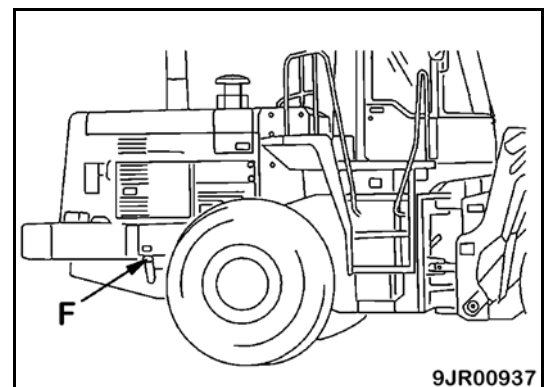


3. After completing operations, add fuel through fuel filler (F) until the fuel tank is full.

For details about opening and closing the cap, see “Cap with Lock” on page 2-32.

4. After adding fuel, tighten the cap securely.

Fuel capacity: 450 liters (118.9 US gal)



Check Electric Wiring



- If fuses frequently blow or if there are traces of short circuits on the electrical wiring, locate the cause and repair immediately, or contact your Komatsu distributor for repairs.
 - Accumulation of flammable material (dead leaves, twigs, dry grass, etc.) around the battery may cause a fire. Always 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 that the fuses are not damaged, that the fuses are of the correct capacity, and that there are no signs of short circuits or disconnections in the electric wiring.
 - Check that there are no loose terminals or connectors. Tighten any loose parts.
 - Check the wiring of the battery, starting motor, and alternator carefully.
 - Check that there is no flammable material accumulated around the battery. Remove all flammable material.
 - Consult your Komatsu distributor about repairs and correction of problems.

Check Inflation Pressure of Tires

- Check for damage or wear to the tires and the rims.
- Check for loose wheel hub nuts (bolts).
- Measure the inflation pressure with a tire pressure gauge while the tires are cool, before starting work.

The proper inflation pressure is shown in the table.

Tire Size	Inflation Pressure
26.5-25-20PR (L3 Rock) (Standard)	Front Tire: 0.44 MPa (63.82 psi) Rear Tire: 0.34 MPa (49.31 psi)
29.5-25-22PR (L3 Rock) (Option)	Front Tire: 0.44 MPa (63.82 psi) Rear Tire: 0.34 MPa (49.31 psi)

Remark

The appropriate inflation pressure differs according to the type of work. See "HANDLING TIRES" on page 2-99.

Check Parking Brake

- Check that the parking brake works properly.
- If there is any problem in the operation of the parking brake or the brake does not provide the proper braking effect, contact your Komatsu distributor to have the brake adjusted.

Check Brake Pedal

- Drive the machine forward and check the effect of the brakes.
- If there is any problem in the functioning of the brakes, contact your Komatsu distributor to have the brakes adjusted.

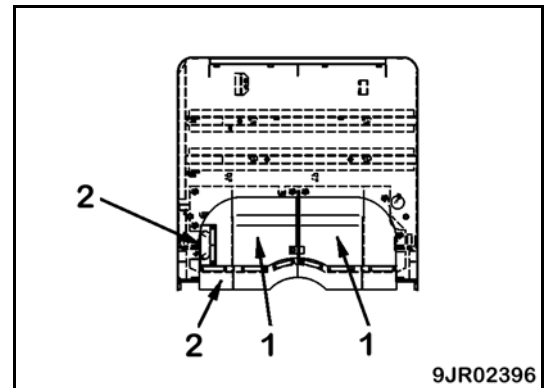
OPERATION

Check Waterproof/Fireproof Dividing Walls

WARNING

- If the wall between the engine room and the hydraulic pump or the rubber sheet, is damaged or missing and the hydraulic hose breaks, oil will spray onto the high-temperature parts of the engine; this will lead to a fire or other secondary damage.
- If the wall or rubber sheet is damaged or missing, contact your Komatsu distributor for repairs.

- Check that there is no damage or missing parts of rubber sheet (2) or wall (1) between the engine room and the hydraulic pump.
- If there is any damage or missing parts, contact your Komatsu distributor for repairs.



Adjust Seat



- Park the machine in a safe place and stop the engine when adjusting the operator's seat.
- Adjust the seat position at the beginning of each shift or when operators change.
- Adjust the seat so that you can depress the brake pedal fully while sitting with your back against the backrest.

(A) Fore-and-aft adjustment

- Pull lever (1) up; set the seat to the desired position; then release the lever.

Adjustment range: 160 mm (6.30 in)
 (16 mm (0.63 in) x 10 stages)

(B) Adjusting seat angle

- Move lever (2) up and, while sitting, push down on the rear of the seat to tilt it backward.
- Move lever (2) down and push down on the front of the seat to tilt it forward.

Adjustment range: 13 degrees (front and rear tilt)
 (four stages each)

(C) Setting seat for weight

- Sit on the seat; raise your body slightly; then turn grip (3) to adjust the strength of the suspension.

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

(D) Adjusting backrest angle

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

Adjustment range:

Front: 66 degrees (3 degrees x 22 stages)

Rear: 72 degrees (3 degrees x 24 stages)

Remark

If the backrest is reclined too far, the backrest may hit the rear glass. Move it to a position where it does not contact the glass.

(E) Adjusting height of seat

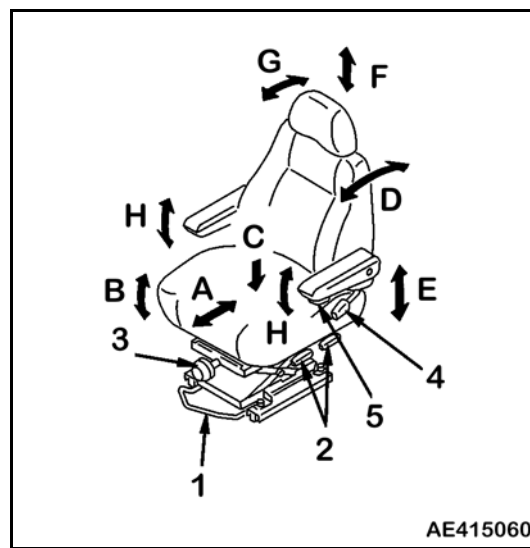
- Move lever (2) up or down, then move the seat up or down to the desired position.
- Since lever (2) is also used for adjusting the seat angle, set the seat to the desired height while adjusting the angle.

Adjustment range: 60 mm (2.36 in)

(F) Adjusting headrest height

- Move the headrest up and down to the desired height

Adjustment range: 50 mm (1.97 in)



AE415060

OPERATION

(G) Adjusting headrest angle

- Rotate the headrest to the front or rear.

(H) Adjusting armrest angle

- Rotate knob (5) and adjust the angle of the armrest (left side only).

Adjustment range:30 degrees

Forward tilt:25 degrees

Backward tilt:5 degrees

- ★ If the arm rest is turned, it will spring up (both left and right sides).

(I) Reclining the seat fully

- Set the seat in the following position:

Fore-and-aft adjustment: Maximum front position

Up/down adjustment:Maximum height

Seat angle adjustment:.....Horizontal or fully tilted

Reclining adjustment: Fully tilted backward

..... 36 degrees (12 stages)

Adjust Seat Belt



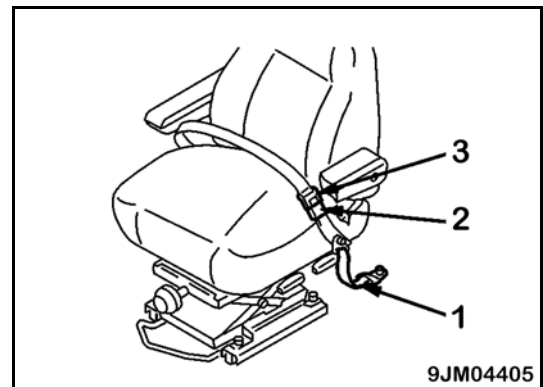
WARNING

- Before fastening the seat belt, check that there is no abnormality in the seat belt or the seat belt mounting bracket. If the belt is worn or damaged, replace it.
- Fasten the seat belt before starting operations.
- Always wear the seat belt during operations.
- Make sure that the seat belt is not twisted when fastening it.

Fastening and Removing Seat Belt

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

1. Sit on the seat; depress the brake pedal fully; and adjust the seat so that your back is pressed against the backrest.
2. After adjusting the seat position, adjust tether belt (1). Tense the tether belt and install it when there is no one sitting on the seat.
3. Sit on the seat; pull the right side of the belt; insert buckle tongue (3) into buckle (2) until you hear a click.
 - Fasten the belt along your body without kinking it.
 - Adjust the lengths of the belt on both the buckle and the tongue sides so that the buckle is located at the front, mid-point of your body.
4. When removing the belt, press the red button in buckle (2) to free the belt.



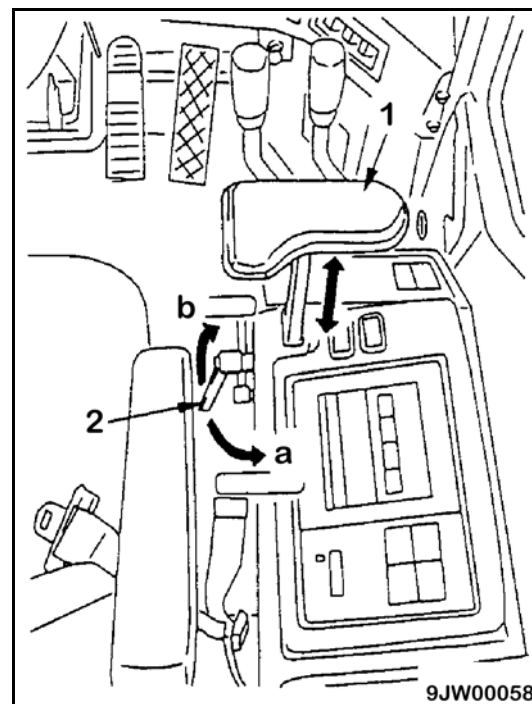
Adjust Wrist Rest Height

The height of wrist rest (1) can be adjusted easily with adjustment lever (2).

- Position (a): Loosening position
 - Position (b): Fixing direction
1. Turn adjustment lever (2) in the loosening direction and adjust the height of lift rest (1).
 2. Turn adjustment lever (2) to the fixing direction.

Remark

If adjustment lever (2) is pulled towards the seat, the lever becomes free and faces directly down.

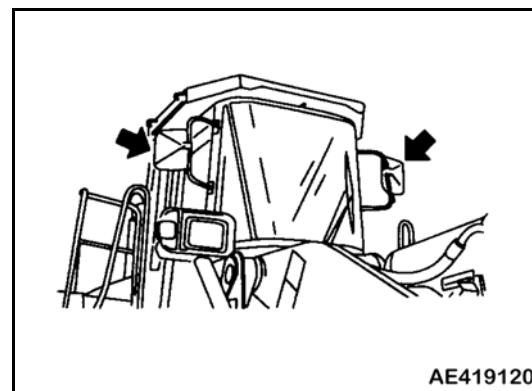


Adjust Rearview Mirrors



Be sure to adjust the mirrors before starting work. If the mirrors are not adjusted properly, you cannot ensure good visibility. The lack of adequate visibility could result in serious injury to you or anybody in the vicinity of the machine.

- Sit in the operator's seat and adjust the rearview mirrors so that there is a good view of the rear from the operator's seat.
- In particular, be careful to adjust the mirrors so that it is possible to see people on the left and right sides at the rear of the machine.



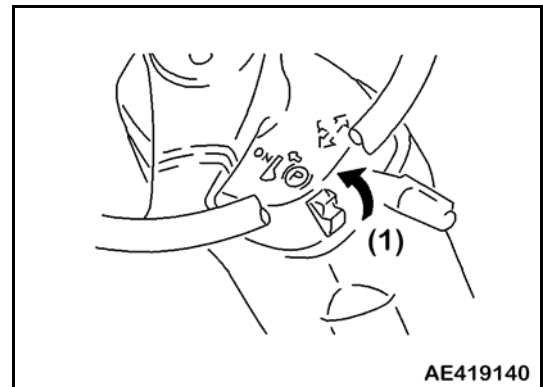
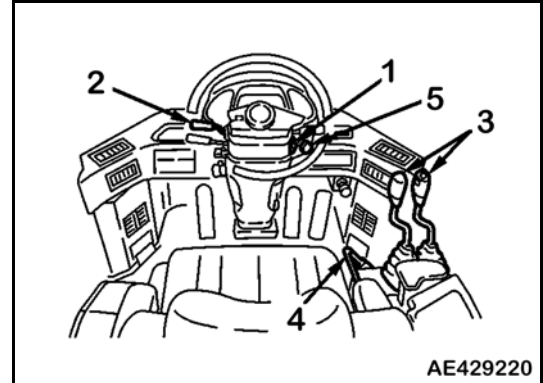
OPERATION

Final Checks Before Starting Engine

WARNING

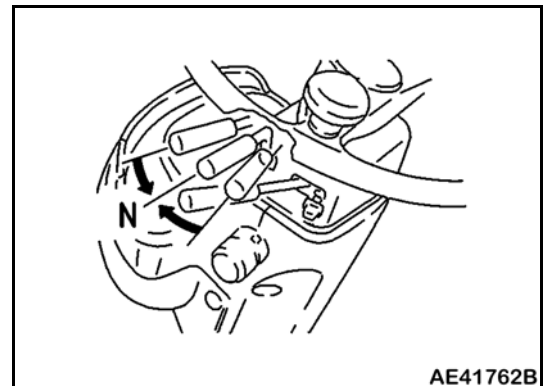
- Before starting the engine, check that the safety lock lever is securely at the LOCK position.
- If the work equipment control lever is touched accidentally when the engine starts, the work equipment may move unexpectedly, leading to serious damage or personal injury.

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

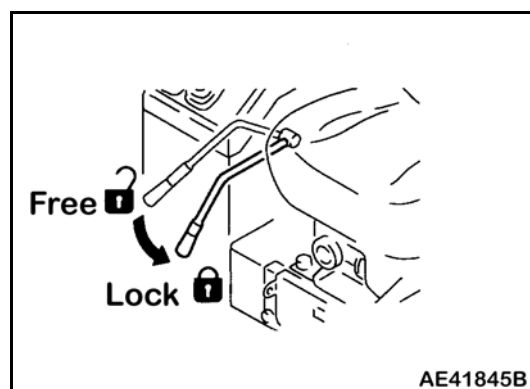
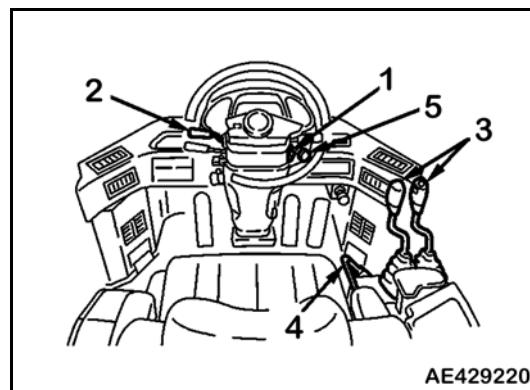


2. Check that directional lever (2) is at the N position.

If starting the engine with directional lever (2) not at the N position, the engine will not start.



3. Lower the bucket to the ground and check that work equipment control lever (3) is locked by safety lock lever (4).

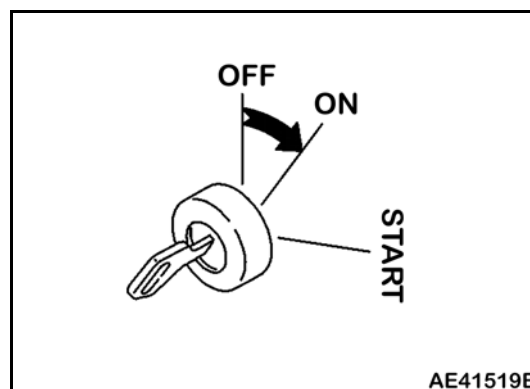


4. Insert the key in starting switch (5); turn the key to the ON position; and check that the machine monitor system works.

When the starting switch is at the ON position before starting the engine, all monitors, gauges, and central warning lamps will light up for approximately three seconds. The alarm buzzer will sound for one second.

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

If any monitor lamps do not illuminate, there is probably a failure or disconnection. Contact your Komatsu distributor for inspection.



OPERATION

Starting Engine

Normal Starting

WARNING

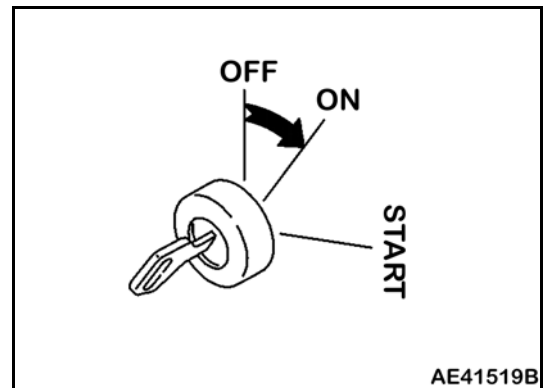
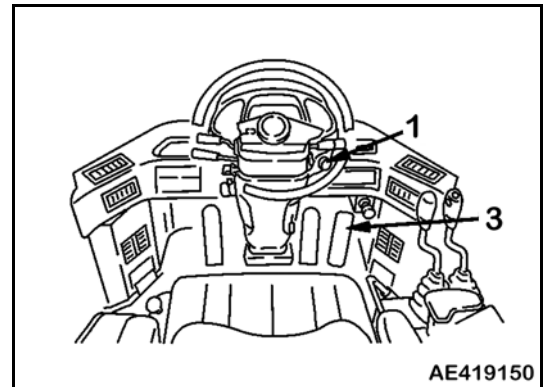
- Sit down in the operator's seat before starting the engine.
- Do not attempt to start the engine by short-circuiting the engine-starting circuit. Such an act may cause serious bodily injury or fire.
- Check that there are no persons or obstacles in the surrounding area and then sound the horn and start the engine.
- Never use starting-aid fluids as they may cause an explosion.
- Exhaust gas is toxic. When starting the engine in confined spaces, be particularly careful to ensure good ventilation.

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

Remark

Do not keep the starting motor rotating continuously for more than 20 seconds. If the engine does not start, wait for at least two minutes before trying to start the engine again.

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

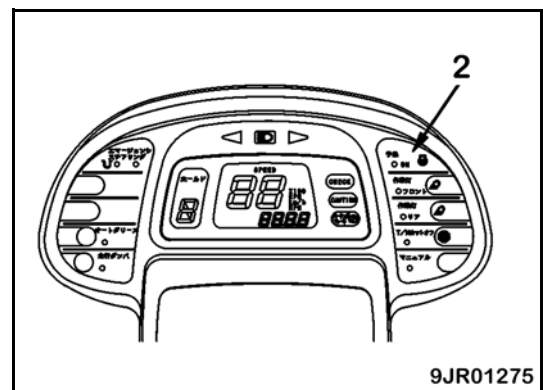


Preheating automatically starts and preheating pilot lamp (2) illuminates.

- Preheating time in cold areas changes according to the water temperature when starting the engine.
- Automatic preheating is actuated when the cooling water temperature is less than -5°C (23°F).

Preheating times are shown in the following table.

Cooling Water Temperature	Preheating Time
Above -5°C (23°F)	0 second
-5°C (23°F)	20 seconds
Below -20°C (-4°F)	40 seconds



2. After the preheating pilot lamp (2) goes out, release the accelerator pedal; then turn the key in starting switch (1) to the START position. The engine starts.
3. After the engine starts, release the key in starting switch (1). The key automatically returns to the ON position.
4. Immediately after starting the engine, run the engine at idling. Do not depress the accelerator pedal or operate the work equipment during this time.

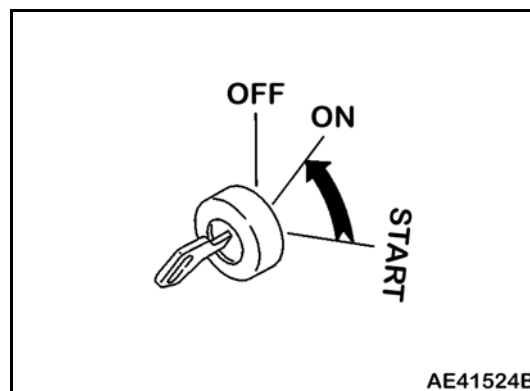
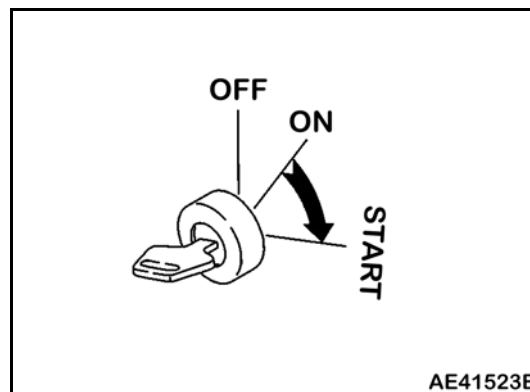
Guideline for idling time:

- Cold temperature: 15 seconds or more
- When first starting the engine after changing engine oil and replacing engine oil filter: 20 seconds

Remark

Immediately after the engine is started, the turbo-protect function is actuated. Even if the accelerator pedal is depressed, the engine speed will not rise above 1,000 rpm.

Cooling Water Temperature	Turbo-Protect Time
Above 10°C (50°F)	0 second
0°C to 10°C (32°F to 50°F)	0 to 6 seconds
-10°C to 10°C (14°F to 32°F)	6 to 12 seconds
-20°C to -10°C (-4°F to 14°F)	12 to 16 seconds
-30°C to -20°C (-22°F to -4°F)	16 to 20 seconds
Below -30°C (-22°F)	20 seconds



- ★ If the accelerator pedal is kept depressed, the engine speed will suddenly rise after the turbo-protect time. To prevent this, release the accelerator pedal.
- ★ The turbocharger rotates at extremely high speed. Immediately after the engine is started, the pressure of the lubricating oil has not risen sufficiently. If the engine speed is suddenly raised, it may lead to damage or seizure of the turbocharger bearing. The turbo-protect function acts to prevent this problem. This function uses an electronic control to prevent the engine speed from rising above a certain speed for the first few seconds after the engine starts.
- ★ To improve the ease of starting in cold weather, the low idling speed becomes slightly higher for the time given in the following table and the engine sound is different. In addition, it functions to make the accelerator gradual during this time.

Cooling Water Temperature	Injection Characteristics Change Time
Above 20°C (68°F)	0 second
20°C to 0°C (68°F to 32°F)	0 to 6 seconds
0°C to -20°C (32°F to -4°F)	6 to 12 seconds
-20°C to -30°C (-4°F to -22°F)	12 to 15 seconds

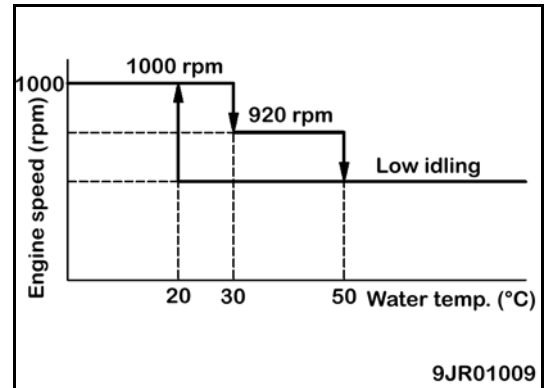
OPERATION

Automatic Warming-Up Operation

If the engine water temperature is low after the engine starts, the automatic warming-up operation is actuated. When the water temperature rises above 50°C (122°F), the warming-up operation is canceled.

Remark

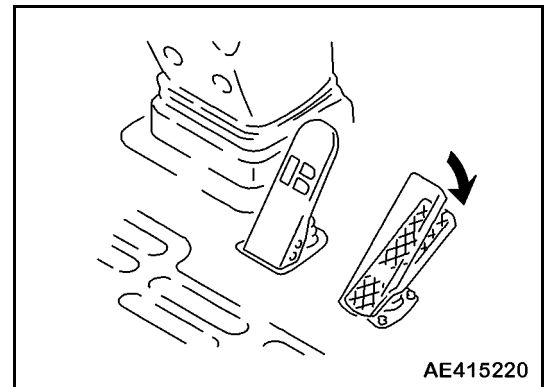
The automatic warming-up operation changes according to the engine water temperature (shown in the diagram to the right).



- ★ If it is necessary to cancel the automatic warming-up operation, depress the accelerator pedal fully and run at full throttle for three seconds.

Remark

If the engine water is less than 50°C (122°F), the engine speed is held at 920 rpm even if the automatic warming-up operation is canceled.



Operations and Checks After Starting Engine

WARNING

- Emergency stop: If the operation is abnormal or any other trouble occurs, turn the key in the starting switch to the OFF position.
- If the work equipment is operated without warming up the machine sufficiently, the response of the work equipment to the movement of the control lever will be slow. The work equipment may not move as the operator desires. Do all warm-up procedures.
- In cold areas, make sure to warm up the machine properly.

Breaking in the Machine

WARNING

- 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 life of the machine.
 - Be sure to break in the machine for the initial 100 hours (as indicated by the service meter).
 - During breaking-in operations, follow the precautions described in this manual.
-
- Idle the engine for five minutes after starting.
 - Avoid operations with heavy loads or at high speeds.
 - Immediately after starting the engine, avoid sudden starts, sudden acceleration, unnecessary sudden stops, and sudden changes in direction.

Checks After Starting Engine

Check Parking Brake

- Check that the parking brake works properly.
 - If there is any abnormality in the operation of the parking brake or the brake does not provide the proper braking effect, contact your Komatsu distributor for adjustment.

Check Brake Pedal

- Set the machine on level ground with no obstacles in the surrounding area. Drive the machine slowly forward and in reverse and check the braking effect of the brakes.
 - If there is any abnormality in the operation of the brakes, ask your Komatsu distributor to carry out adjustments.

Check Travel of Brake Pedal

- Depress the brake pedal fully and check the distance from the floor. Check that the pedal is not too close to the floor and that there is no abnormal feeling when operating the brake pedal.
 - If any abnormality is found, ask your Komatsu distributor to carry out adjustments.

OPERATION

Check for Ease of Starting Engine, Abnormal Noise

- When starting the engine, check that the engine does not make an abnormal noise and that it starts up easily and smoothly.
- Check that there is no abnormal noise when the engine is idling or when the revolution rises slightly.
 - When there is an abnormal noise at engine start-up and if that condition continues, the engine may be damaged. In that case, ask your Komatsu distributor to check the engine as soon as possible.

Check Engine at Low Speed and When Accelerating

- Check that there is no irregularity in the engine speed and that the engine does not suddenly stop when the machine is stopped during normal travel.
- Check that the engine accelerates smoothly when the accelerator pedal is depressed.
 - Carry out the inspection in a safe place and check that there is no one in the surrounding area.
 - If the condition at low speed or when accelerating is extremely poor and that condition continues, there is danger that the engine may be damaged, that the operation of the machine may become erratic, that the braking effect may deteriorate, or that an unexpected accident may happen.
 - Ask your Komatsu distributor to carry out repairs as soon as possible.

Check Location of Abnormalities from Previous Days

- Check the places where problems occurred when using the machine on previous days.
 - If any abnormality is found, contact your Komatsu distributor for inspection and repair.

Normal Operation

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

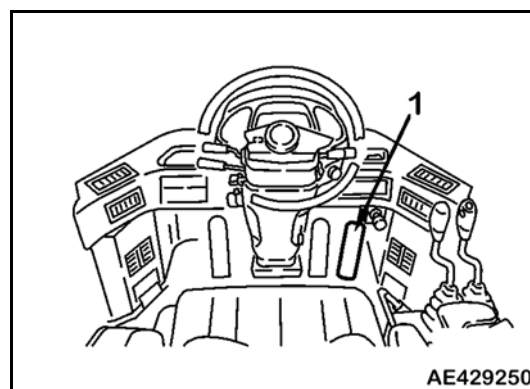
Remark

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

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

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

1. Depress accelerator pedal (1) lightly and run the engine with no load at mid-range speed for about five minutes.

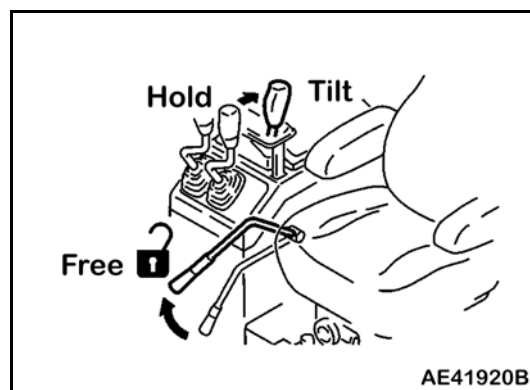
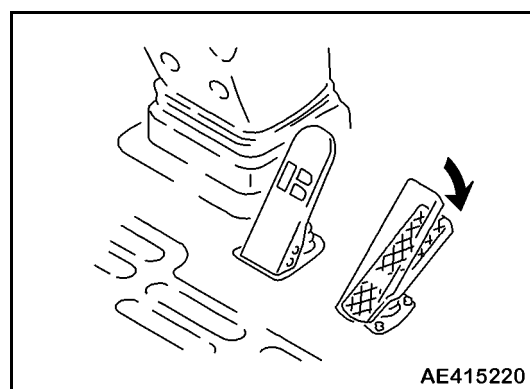


2. Carry out the following operation to warm up the hydraulic oil only in cold weather.

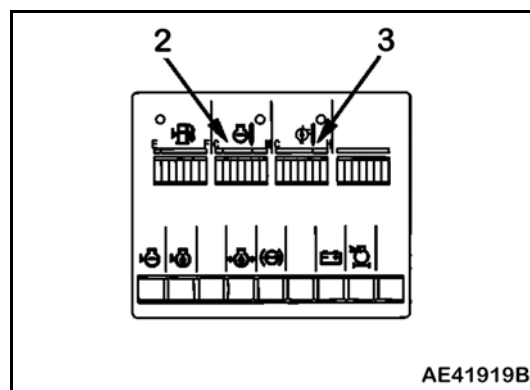
During the warming-up operation:

- Check that the engine rotation is smooth.
- Set the work equipment safety lock lever to the FREE position.
- Move bucket control lever in and out of the TILT position to warm up the hydraulic oil. The relief time at the TILT position should be a maximum of 10 seconds.

With this operation, the oil will reach the relief pressure and this will warm up the hydraulic oil more quickly.



3. After carrying out the warming-up operation, check that the gauges and caution lamps are normal. If there is an abnormality, carry out maintenance or repair.
4. Run the engine under light load until engine water temperature gauge (2) and torque converter oil temperature gauge (3) are in the green range.
5. Check for abnormal exhaust gas color, noise, or vibration. If any problem is found, contact your Komatsu distributor.



OPERATION

Stopping Engine

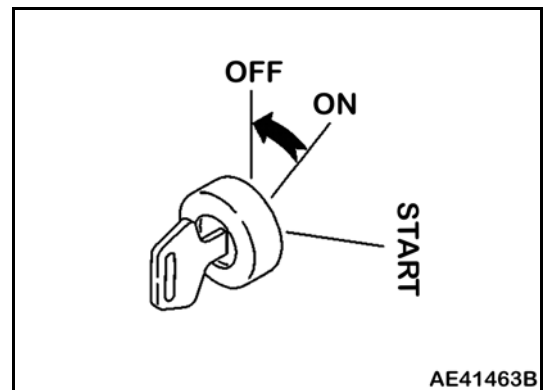
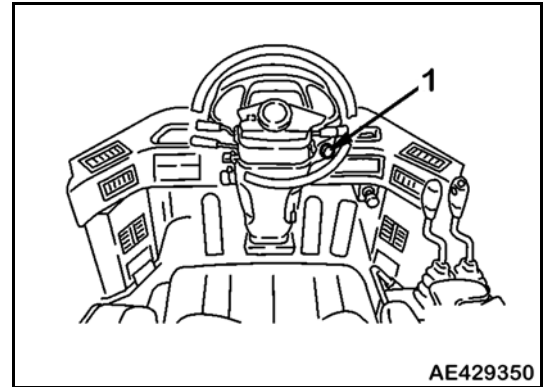
Remark

If the engine is abruptly stopped before it has cooled down, engine life may be greatly shortened.

Do not abruptly stop the engine except for an emergency.

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

1. Run the engine at low idle for about five minutes to cool it down gradually.
2. Turn the key of starting switch (1) to the OFF position to stop the engine.
3. Remove the key from starting switch (1).



Check After Stopping Engine

1. Walk around the machine and check the work equipment, bodywork, and undercarriage and check for oil and water leakage.
2. Fill the fuel tank.
3. Check the engine compartment for paper and debris. Clean out any paper and debris to avoid a fire hazard.
4. Remove any mud stuck to the undercarriage.

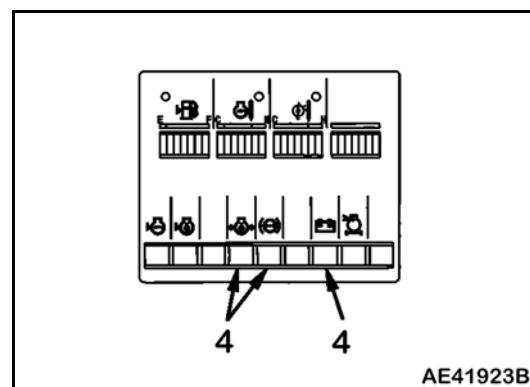
Moving the Machine (Directional, Speed), Stopping the Machine

WARNING

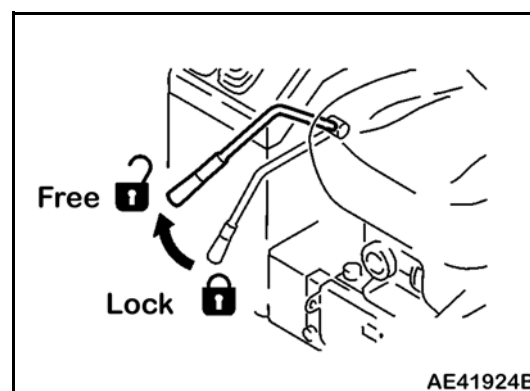
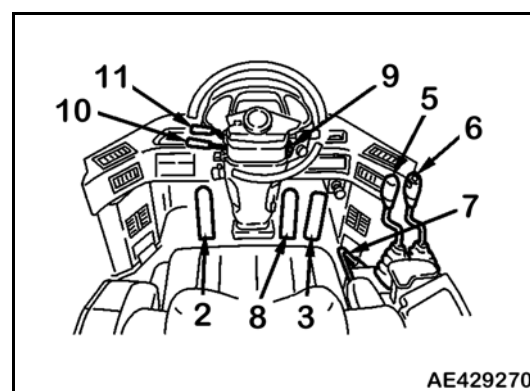
- Always remove the safety bar for travel operations. If it is not removed, the steering wheel cannot be used for steering. This may lead to serious damage or injury.
- When moving the machine, check that the area around the machine is safe and then sound the horn before starting.
- Do not allow people to get near the machine.
- Clear obstacles from the machine's travel path.
- The engine hood creates a blind spot at the rear of the machine. Be very careful when traveling in reverse.

Moving the Machine

1. Check that caution pilot lamp (4) is not illuminated.



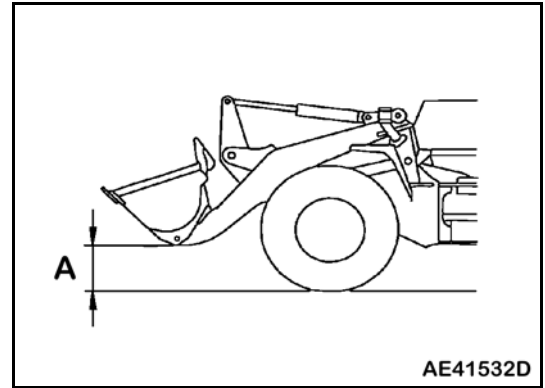
2. Set safety lock lever (7) for bucket control lever (5) and lift arm control lever (6) to the FREE position.



OPERATION

- Operate lift arm control lever (6) to set the work equipment to travel posture (A).

(A): 40 – 50 cm (16 – 20 in)



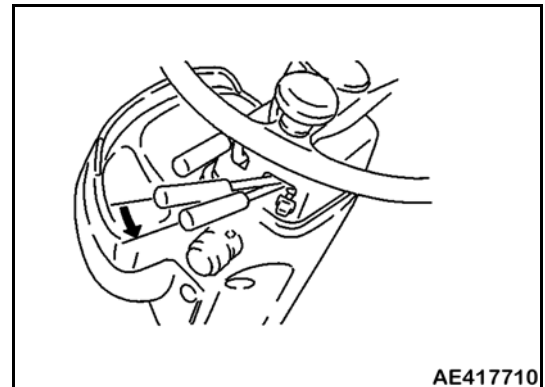
- Depress right brake pedal (8) and then turn parking brake switch (9) to the OFF (RELEASE) position to release the parking brake. Keep right brake pedal (8) depressed.

Remark

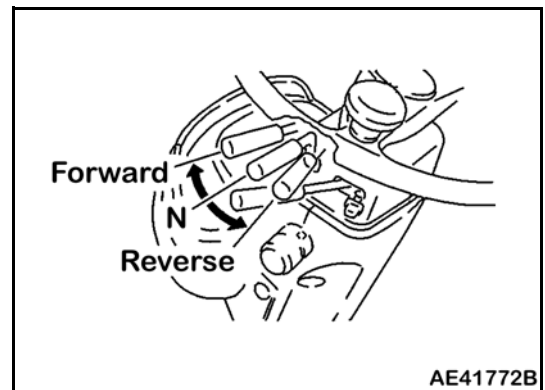
If the parking brake is still actuated when parking brake switch (9) is at the OFF (RELEASE) position, turn the parking brake switch ON and then turn it OFF again.



- Set gearshift lever (10) to the desired position.

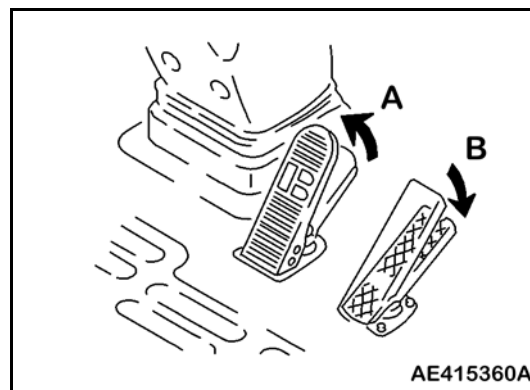


- Set directional lever (11) to the desired position.



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

- (A) Right brake pedal
- (B) Accelerator pedal

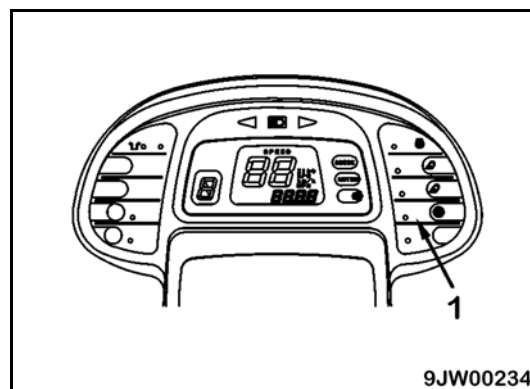


Remark

When starting off on a slope, turn the transmission cutoff switch (1) to the OFF position; depress left brake pedal (2); and operate the gearshift lever to the low speed range.

Depress accelerator pedal (3) and gradually release left brake pedal (2) to let the machine move.

This makes it possible to prevent the machine from rolling back.



OPERATION

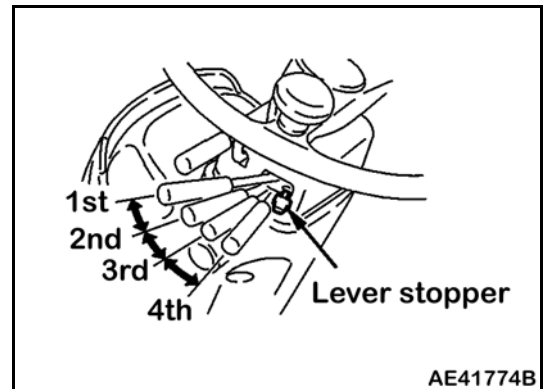
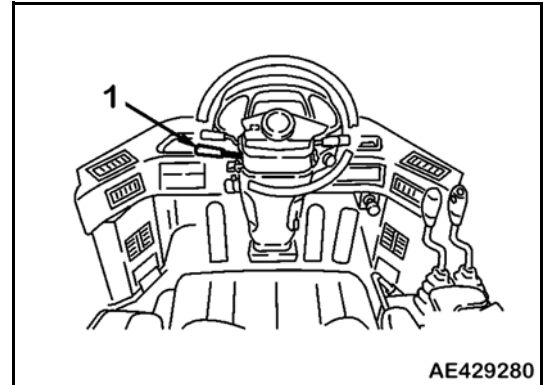
Changing Gear Speed

WARNING

When traveling at high speed, do not shift gear suddenly. Use the brake to reduce the travel speed before shifting gear.

★ Shifting gear

- When shifting gear, move the gearshift lever (1) to the desired position.
- When carrying out digging and loading operations, 1st and 2nd gears are used. Use the gearshift lever stopper.

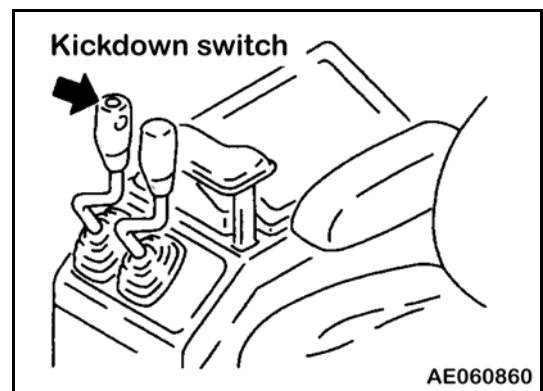


Remark

This machine is equipped with a kickdown switch that shifts the gear down to 1st if the button at the tip of the lift arm control lever is pushed when the machine is traveling in 2nd gear. We recommend the use of the kickdown switch when carrying out digging or loading operations in 1st or 2nd gear.

For details, see "Kickdown Switch" on page 2-22.

If the gearshift lever is operated slowly or it is stopped between speed ranges, error code CALL may be displayed. This is not a failure; the gearshift lever must be operated to complete the gearshifting within two seconds.



Changing Direction

WARNING

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

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

- Place directional lever (1) in the desired position.
- ★ On machines equipped with auto-shift when switching between FORWARD and REVERSE, the machine starts automatically from 2nd speed.

Manual Shift 3rd and 4th Speed and Automatic Shift

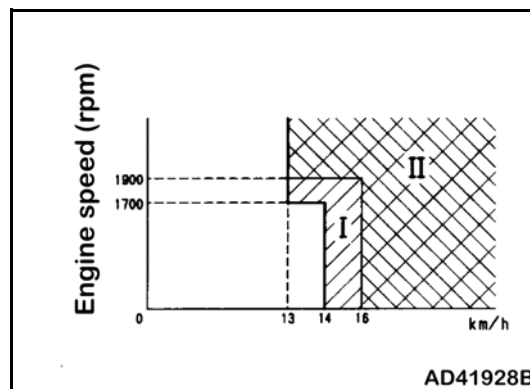
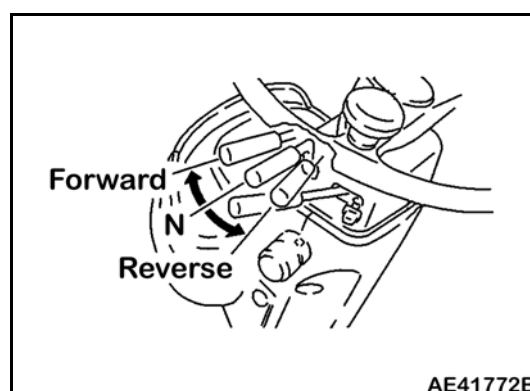
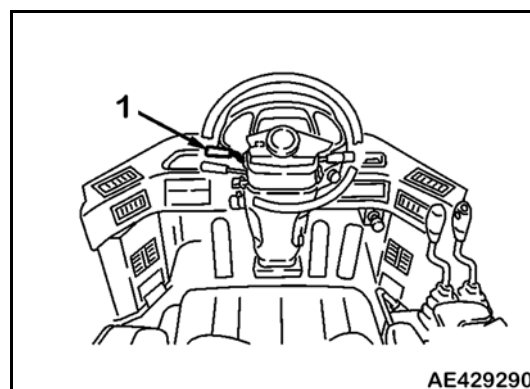
When traveling in 3rd or 4th on manual shift machines (or at high speed on auto-shift machines) if you attempt to switch between FORWARD and REVERSE, the alarm buzzer sounds (rapid intermittent sound) for three seconds if the machine speed and engine speed are in Area I on the chart to the right.

If you attempt to shift between FORWARD and REVERSE when the speed is in Area II, the alarm buzzer sounds and the transmission shifts to the speed range in the following table. The speed is reduced and the deceleration is weaker than when the machine speed is in Area I.

Gear Speed before Changing between FORWARD and REVERSE	Gear Speed after Changing between FORWARD and REVERSE
F2	R3
F3	R3 or R4
F4	R3 or R4
R2	F3
R3	F3 or F4
R4	F3 or F4

Remark

If the directional lever is operated slowly or is stopped between directional range, error code CALL may be displayed. This is not a failure; operate the directional lever to complete the directional shifting within two seconds.

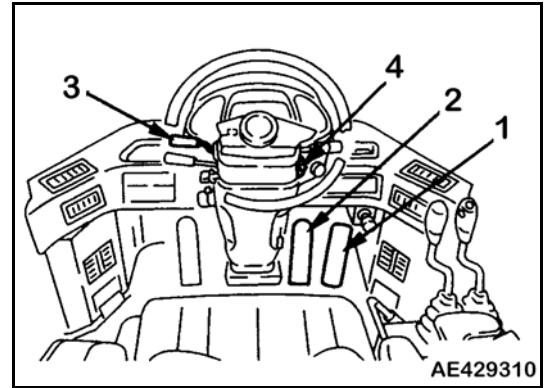


OPERATION

Stopping the Machine

WARNING

- Avoid stopping suddenly. Allow ample room when stopping.
- Do not park the machine on a slope. If it is necessary to park the machine on a slope, stop the machine facing directly down the slope; fit blocks under the tires; and lower the bucket to the ground to prevent the machine from moving.
- If the work equipment control lever is accidentally touched, there is danger that the work equipment or machine may move suddenly and cause a serious accident. Before leaving the cab, always set the safety lock lever securely to the LOCK position.
- When the parking brake switch is turned ON, it is dangerous to release the brake pedal immediately. Always keep the brake pedal depressed until the parking brake pilot lamp lights up.

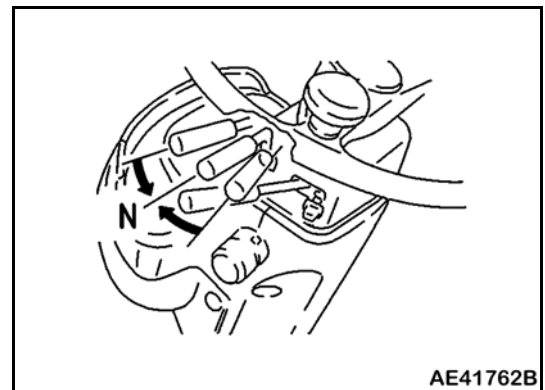
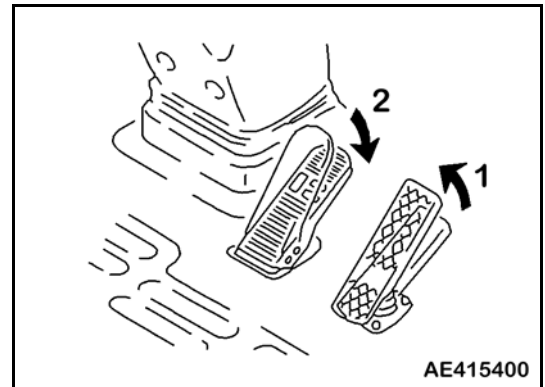


Remark

Never use the parking brake switch to brake the machine when traveling, except in an emergency.

Apply the parking brake only after the machine has stopped.

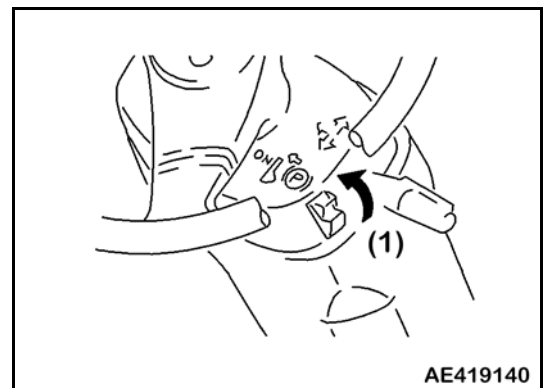
1. Release accelerator pedal (1) and then depress brake pedal (2) to stop the machine.
2. Place directional lever (3) in the N (neutral) position.
3. Turn parking brake switch (4) ON to apply the parking brake.



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

Remark

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



Turning

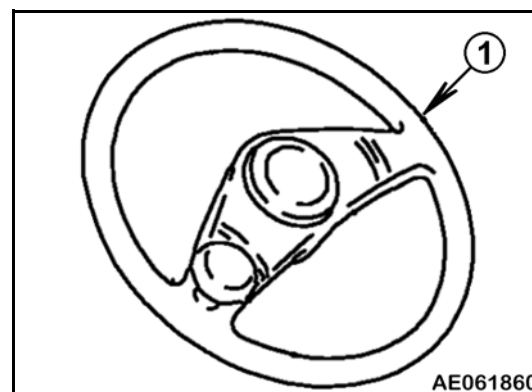
 **WARNING**

- Operating the steering wheel suddenly at high speed or operating the steering wheel on steep slopes is dangerous. Do not operate the steering wheel in such situations.
- If the engine stops when the machine is traveling, the emergency steering is actuated. This system is only for steering in emergencies; never stop the engine.
- It is particularly dangerous if the engine stops when the machine is traveling on slopes. Never let the engine stop when traveling on slopes.
- If the engine stops, stop the machine immediately in a safe place.

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

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

- Turn the steering wheel lightly to follow the machine as it turns.

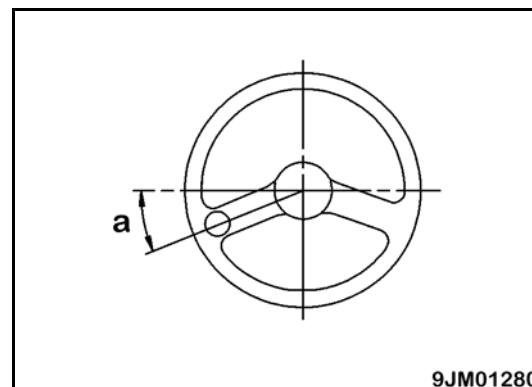
**Remark**

When the steering wheel is turned fully and it reaches the end of its stroke, do not try to turn it further.

Check that there is a play of 50 to 100 mm (2.0 to 3.9 in) in the steering wheel.

Check that the steering works properly.

If any abnormality is found, contact your Komatsu distributor for inspection.



OPERATION

Operation of Work Equipment

WARNING

- When standing up from the operator's seat, always set the safety lock lever securely to the LOCK position. If the safety lock lever is not locked and work equipment control lever (A) is touched by mistake, this may lead to a serious accident.
- If the safety lock lever is not set securely in the LOCK position, the control levers may not be properly locked. The work equipment may move and cause serious personal injury. Check that the lever setting is as shown in the graphic.
- When pulling the safety lock lever up or pushing it down, be careful not to touch work equipment control lever (A).

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

Lift Arm Operation

The lift arm control lever is used to operate the lift arm.

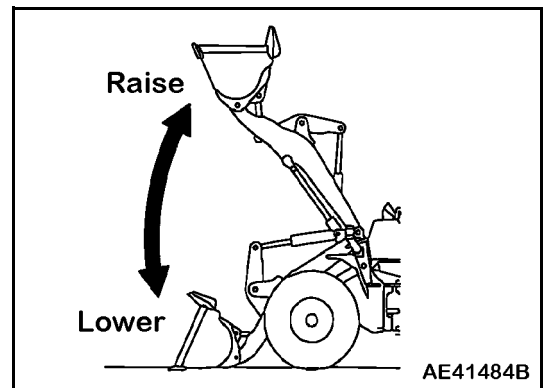
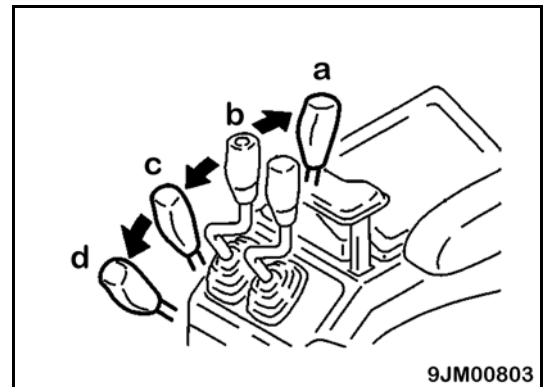
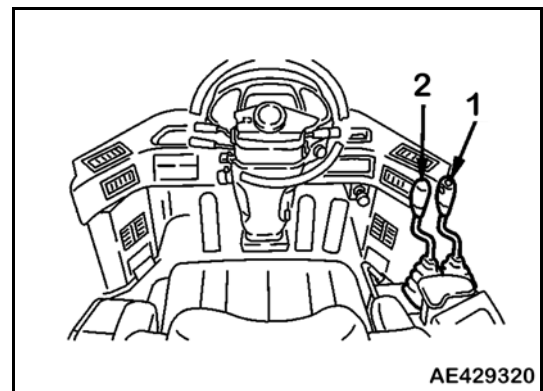
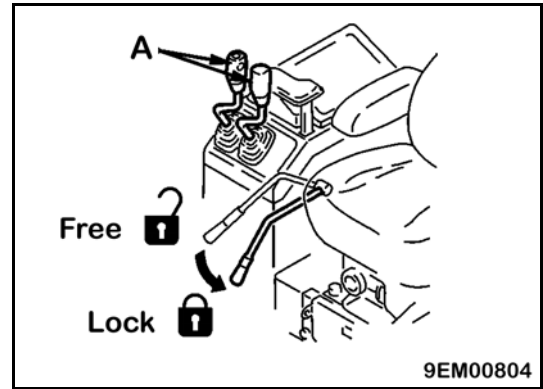
Set the work equipment lock lever to the FREE position before operating the control lever.

- Position (a): RAISE
- Position (b): HOLD
 - The lift arm is kept in the same position.
- Position (c): LOWER
- Position (d): FLOAT
 - The lift arm moves freely under external force.

When the lift arm control lever is pulled further from the RAISE position, the lever stops at that position until the lift arm reaches the preset kickdown position. At that point, the lever returns to the HOLD position.

Remark

Do not use the FLOAT position when lowering the bucket. Use the FLOAT position when leveling; see "Leveling Operations" on page 2-75.



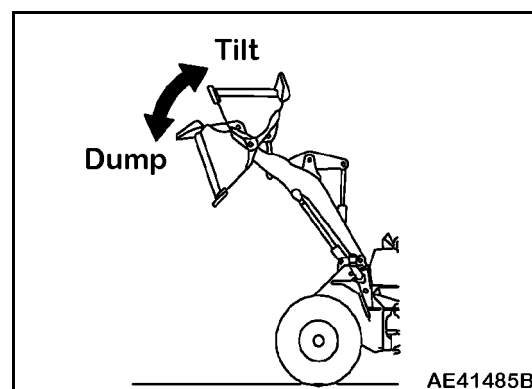
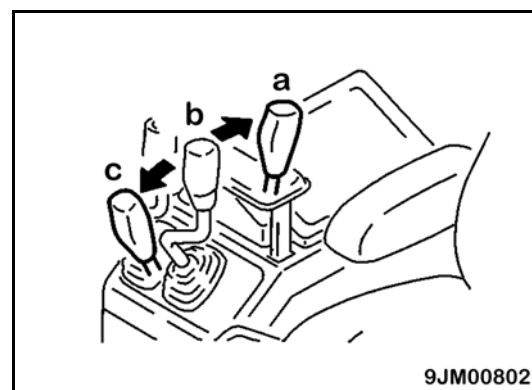
Bucket Operation

The bucket control lever is used to operate the bucket.

Set the work equipment lock lever to the FREE position before operating the control lever.

- Position (a): TILT
- Position (b): HOLD
 - The bucket is stopped and held in position.
- Position (c): DUMP

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



OPERATION

Work Possible Using Wheel Loader

This section explains general operations. Be sure to operate the machine correctly.

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

Digging Operations



- Never dig or scoop with the machine articulated. There is danger that the machine may tip over. Always set the machine facing directly to the front.
- Never raise the boom with the bucket fully loaded when the machine is articulated. There is danger that the machine may tip over.

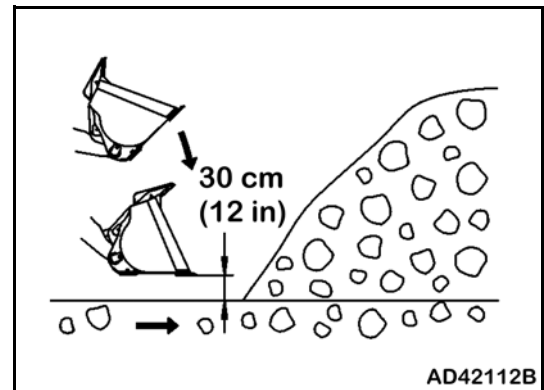
Remark

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

Loading Piled Soil or Blasted Rock

When loading piled soil or blasted rock, drive the machine forward to load. To prevent cutting the tires caused by the tires slipping, be careful of the following points during the operation.

- Always keep the operating job site flat.
 - Remove any fallen rocks.
 - When working with stockpiles, operate the machine in 1st or 2nd gear.
 - When loading blasted rock operate the machine in 1st gear.
1. When driving the machine forward and lowering the bucket, stop the bucket about 30 cm (12 in) from the ground and then lower it slowly.



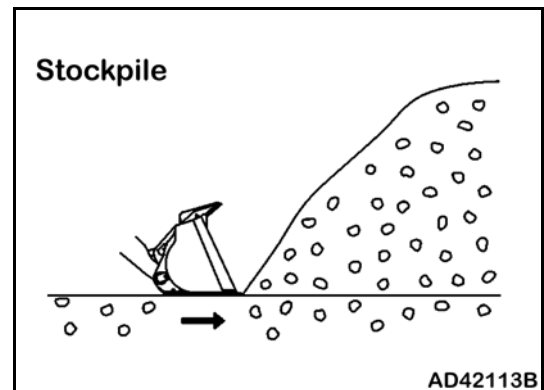
Remark

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

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

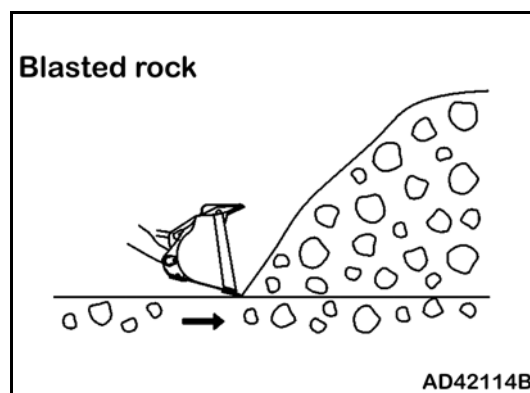
Remark

To reduce fuel consumption, depress the accelerator pedal the minimum possible amount. If it is depressed fully, the fuel consumption will increase but there will be no increase in the amount loaded.



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

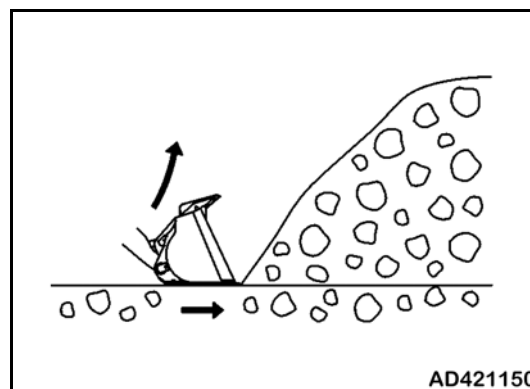
- Be careful not to get blasted rock under the bucket. This will make the front tires come off the ground and slip.
- Try to keep the load in the center of the bucket; if the load is on one side of the bucket, the load will be unbalanced.



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

Remark

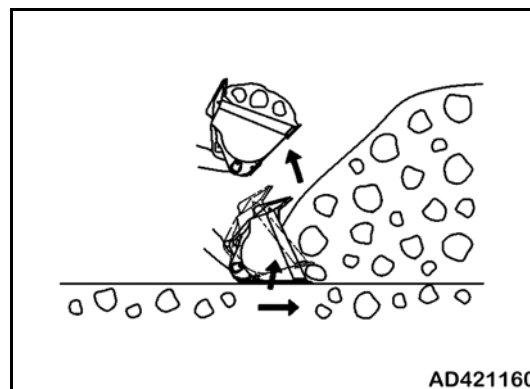
If the bucket is thrust too much and the lift arm stops rising or the machine stops moving forward, release the accelerator pedal a little. Proper operation of the accelerator pedal for each type of soil is effective for saving fuel and preventing tire wear.



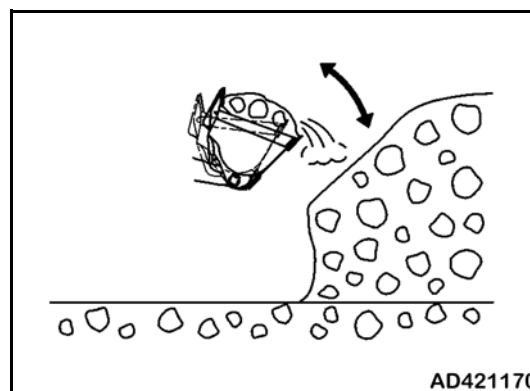
- Check that there is enough material loaded into the bucket and then operate the bucket control lever to tilt the bucket and load the bucket fully.

Remark

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



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



OPERATION

Digging and Loading on Level Ground

WARNING

- Do not set the bucket facing down more than 20 degrees.
- If the bucket hits rocks in the ground first, a large shock is generated; this may damage the machine.

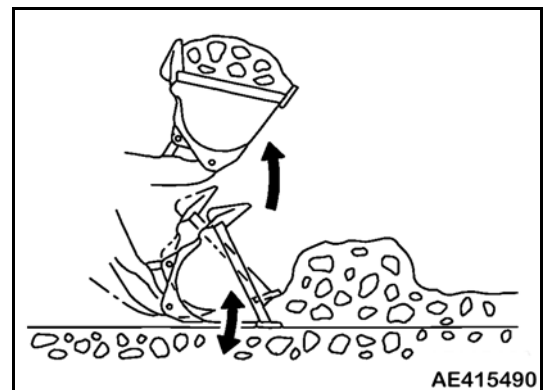
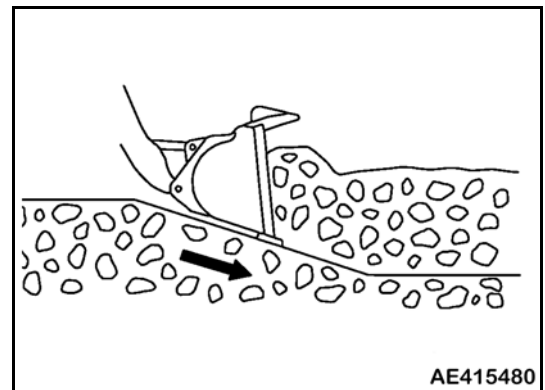
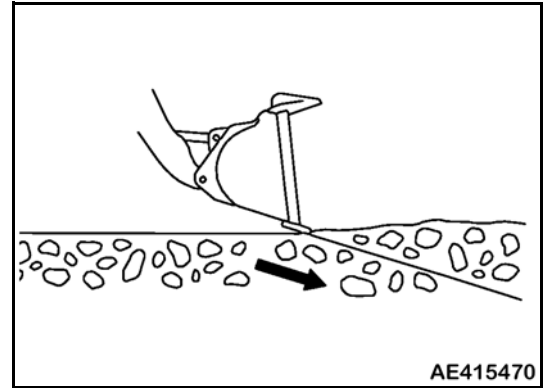
Remark

When digging and loading on level ground, set the bucket edge facing down slightly and drive the machine forward. Be careful not to load the bucket on one side and cause an unbalanced load.

This operation should be carried out in 1st gear.

1. Set the edge of the bucket facing slightly down.
2. Drive the machine slowly forward; operate the lift arm control lever forward to cut a thin layer of the surface each time when excavating the soil.
3. Operate the lift arm control lever slightly up and down to reduce the resistance when driving the machine forward.

When digging with the bucket, avoid putting the digging force on one side of the bucket.



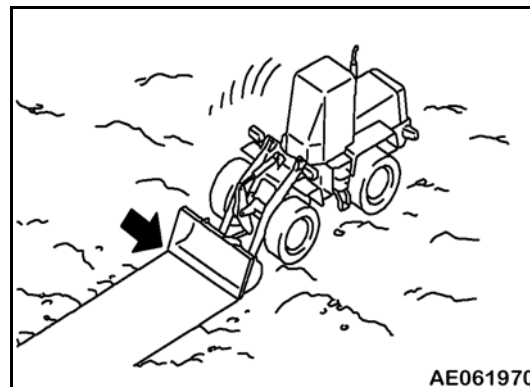
Leveling Operations

Remark

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

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

1. Scoop soil into the bucket. Move the machine backward while spreading soil from the bucket, little by little.
2. Go over the spread soil with the bucket teeth touching the ground and level the ground by back-dragging.
3. Scoop some more soil into the bucket; put the lift arm control lever in FLOAT position; level the bucket at ground level; and smooth the ground by moving backward.



Pushing Operations

! WARNING

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

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

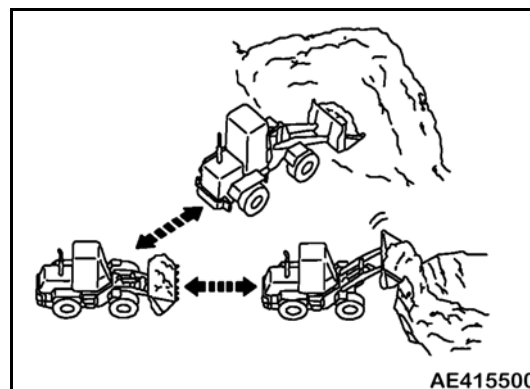
Load-and-Carry Operations

! WARNING

- When carrying a load, lower the bucket to keep the center of gravity as low as possible when traveling.

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

- Always keep the travel path properly maintained.
- When using the load-and-carry method, see “Precautions for Using Load-and-Carry Method” on page 2-101.



OPERATION

Loading Operations

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

WARNING

- Always keep the working area flat. Do not turn suddenly or apply the brakes suddenly while traveling with a raised load. This is dangerous.
- While loading, never thrust the bucket in soil or crushed rock when traveling at high speed. This is dangerous.

Remark

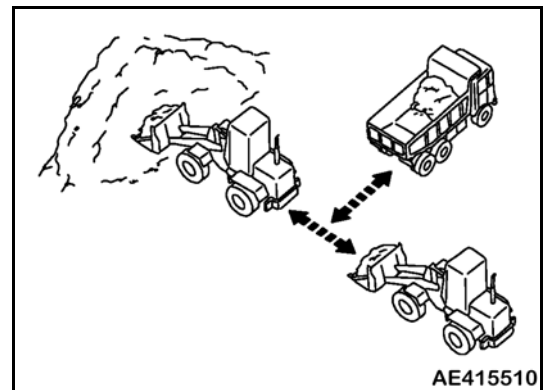
If the tires slip, the tire life will be reduced. Do not allow the tires to slip during operation.

Avoid excessive bucket shaking.

Cross-Drive Loading

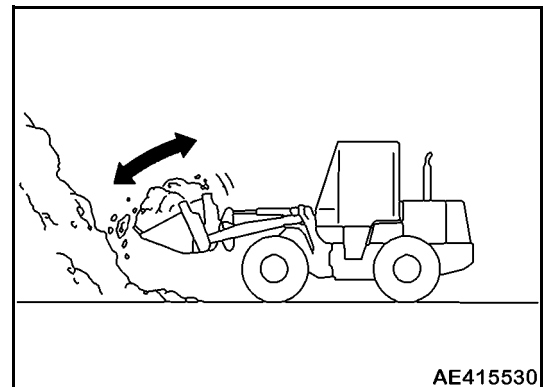
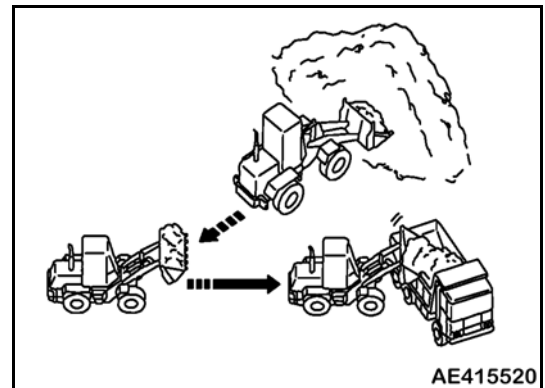
This method requires the least time for loading and is extremely effective in reducing the cycle time.

- Always set the wheel loader facing at a right angle to the stockpile.
- After digging in and scooping up the load, drive the machine straight back in reverse and then bring the dump truck in between the stock pile and the wheel loader.



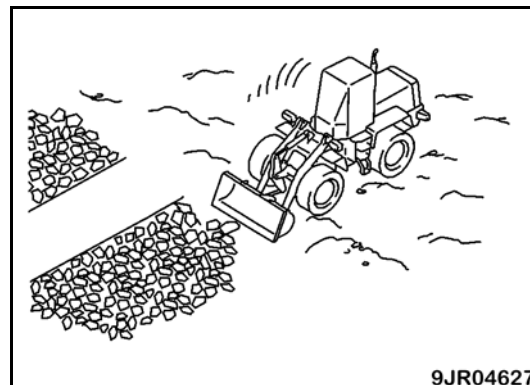
V-Shape Loading

- Position the dump truck so that the direction of approach of the wheel loader is approximately 60 degrees from the direction of approach to the stockpile.
 - After loading the bucket, drive the wheel loader in reverse; turn it to face the dump truck; and travel forward to load the dump truck.
- ★ The smaller the turning angle of the wheel loader, the more efficient the operation becomes.



Preparations for Loading, Gathering Rocks

- ★ Always keep the job area level and remove any rocks or boulders.
 - When gathering rocks, if the operation is carried out over an area longer than the length of the machine, there is danger that the machine will ride up on boulders and incur cuts to the tires. When gathering rocks, always carry out the operation in an area shorter than the length of the machine.
 - When carrying out operations with the bucket in contact with the ground, do not articulate the machine. Articulation will cause tire slippage and damage to the machine.
1. Put the bucket horizontally in contact with the ground; drive forward; and gather the rocks that have been scattered after loading and after splitting or blasting.
 2. After collecting the rocks in an area the length of the machine, change the direction of the machine to gather rocks and increase the area of level ground.



Approaching Facing

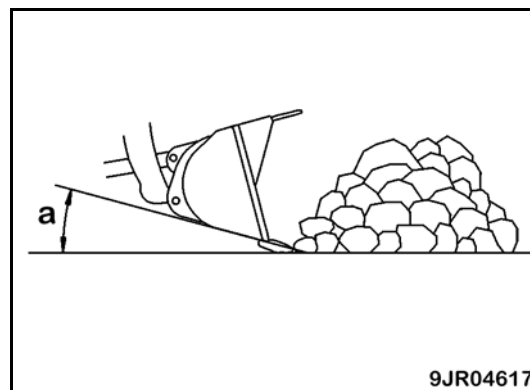
- When approaching the facing and lowering the bucket to the ground, do not drop the bucket suddenly into contact with the ground.

If the bucket is dropped suddenly, the bucket, work equipment, area around the pins, and the machine frame will be subjected to excessive shock. This will lead to damage or deformation of various parts of the machine. In addition, the front wheels will come off the ground and cause the machine to slip.

- When lowering the bucket to the ground, reduce the lowering speed of the bucket when it is close to the ground and bring it slowly into contact with the ground.
- Do not set the cutting edge of the bucket at a large angle to the ground surface when digging or lowering the roadbed. Keep the angle between the bucket and the ground surface to a maximum of 8° .

If the angle between the cutting edge of the bucket and the ground surface is more than 8° when digging or lowering the roadbed, there is danger of damage to the work equipment.

- Do not load the bucket or scoop up the load with the load on the corner of the bucket or on one side of the bucket. This will cause the machine to twist and will reduce the service life of the work equipment and the frame.
1. Set the machine to the travel posture.
 2. Set the shift position to F2; gradually depress the accelerator pedal; and raise the travel speed.
 3. When lowering the bucket to the ground, reduce the lowering speed of the bucket when it is close to the ground and bring it slowly into contact with the ground.
 4. Make angle (a) between the bucket and the ground surface a maximum of 8° . Operate the tilt and dump so that only the cutting edge comes in contact with the ground.



OPERATION

5. Drive forward at right angles to the rock and change the direction that the machine is facing.
6. Operate the accelerator to match the condition of the road surface so that the tires do not slip.
7. Scoop up the gathered rock. Load hard-cutting rock or boulders in the middle of the bucket.

Digging

- Do not shift down with the accelerator pedal depressed (with the engine speed raised).

If the transmission is shifted down when the engine speed is high, there will be an excessive load on the engine, torque converter, transmission, axles, final drive, and the whole power train.

- When thrusting the bucket in, shift down to 1st.

If the bucket is thrust in at high speed, there will be an impact load on the machine. This will reduce the service life of the machine.

- When shifting down, release the accelerator pedal to reduce the engine speed before shifting down and then gradually depress the accelerator pedal.

If the accelerator is operated suddenly after shifting down, there will be an excessive load placed on the engine and power train.

- Do not carry out operations with the machine articulated.

If the machine is articulated, the direction of force will be different on the front wheels and rear wheels. As a result, the power, when traveling, will not be transmitted fully to the front wheels. This will reduce the digging force and place an excessive load on the center hinge pin. In addition, even with the front wheels, the power will not be transmitted uniformly to the left and right wheels. The load will be placed on one wheel thus reducing the service life of the tire on one side.

- Do not push the bucket in too far. If it is pushed in too far, a heavy load will be placed on the machine. This will reduce the service life of the work equipment and frame.
- Operate the control lever slowly near the end of the bucket tilt operation.

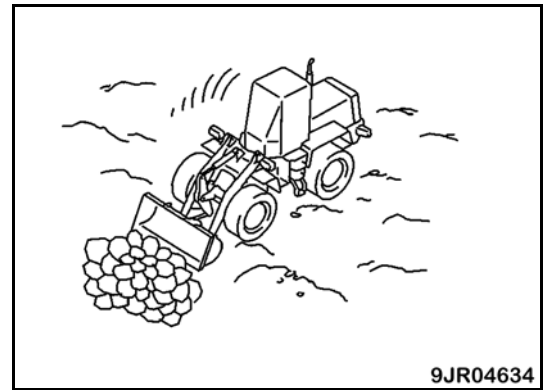
If the control lever is operated suddenly, an impact load will be placed on the tilt cylinder. There is danger that the cylinder may be damaged.

- When close to a pit excavation, do not let the front wheels rise up on the cutting face. The rocks will cut the tires.

1. Immediately in front of the rock, let the accelerator pedal back and shift down from 2nd to 1st.
2. After shifting down, depress the accelerator pedal gradually and push the rock.
3. Raise the lift arm slightly and increase the driving force of the front wheels. When doing this, do not push the bucket in too far.

Remark

When digging up large rocks, in some cases it may be better not to raise the lift arm too high. If the lift arm is raised too high, the rear wheels may come off the ground.

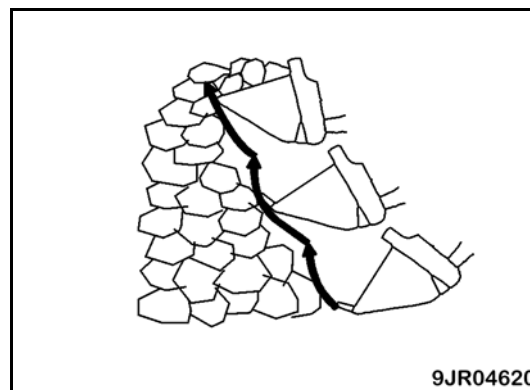


4. After loading the rock completely into the bucket, operate the bucket tilt and lift two to three times repeatedly to fill the bucket.
5. Let back the accelerator pedal; operate the control levers slowly; and tilt the bucket back fully.
6. To prevent the load from falling out of the bucket, after completing the scooping-up operation operate in the dump and tilt direction when the bucket is near the full tilt in order to stabilize the load.

Remark

If the brakes are operated lightly before traveling in reverse, it is possible to stabilize the load in the bucket.

To prevent generation of heat in the torque converter, keep the standard time for digging to within 10 seconds from the start of pushing the bucket in to the completion of scooping up.



OPERATION

Traveling in Reverse After Excavation

- Do not operate the steering immediately after starting to travel in reverse. The bucket is still thrust into the rock.

If the steering is operated, excessive force will be placed on the bucket or frame. There is danger of damage to the frame.

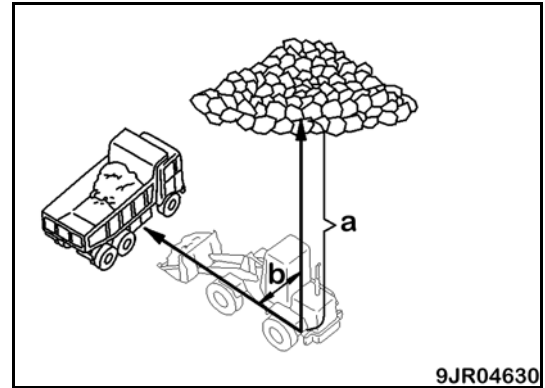
- After shifting the transmission, operate the accelerator pedal slowly.

If the accelerator pedal is operated suddenly, the tires will slip and cause wear or cutting of the tires.

- After completing the excavation, shift to R2 and travel in reverse without operating the steering.

- As a guideline, reverse travel distance (a) should be 1.2 -1.5 times the length of the machine. At this distance, the rolling of the tires can prevent wear to the tires.

In addition, keep an angle (b) of 60° at the intersection between the straight line from the dilution and the straight line from the dump truck.

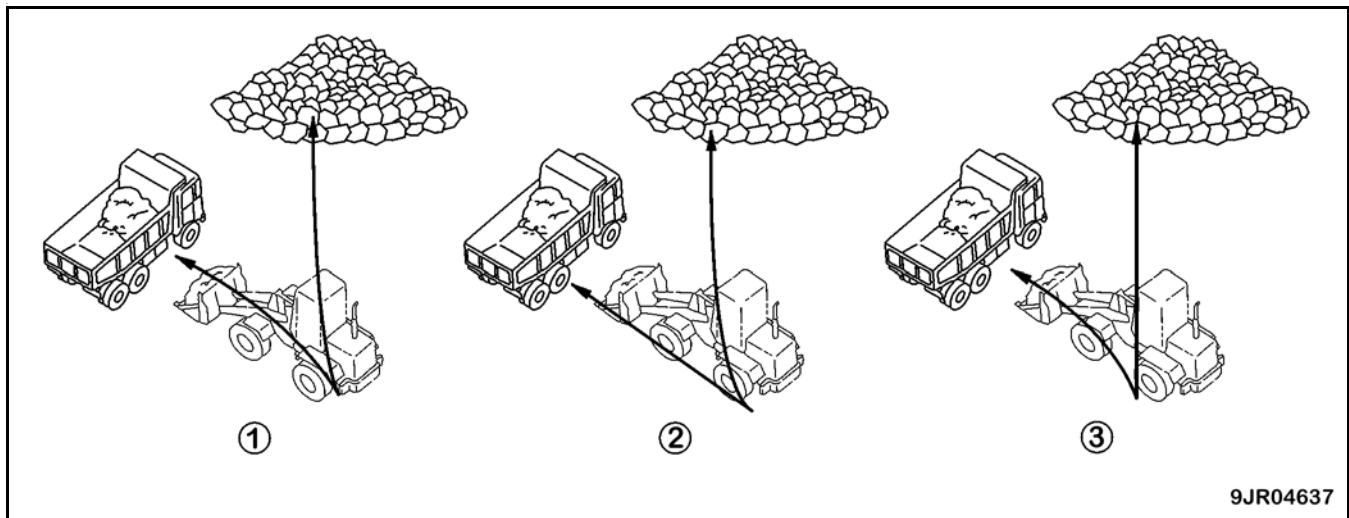


Remark

Choose the steering procedure to match the stopping point of the dump truck and the condition of the dilution. When doing this, decide the stopping point for the dump truck so that the operating angle for the steering is less than 20° .

- When driving in reverse, do not raise the bucket more than necessary.

Consider the position of the dump truck, the condition of the road surface, the travel speed, and the speed of the work equipment when deciding the height of the bucket. However, do not raise the bucket so that the top of the load is higher than the horizontal line of sight from the operator.



- Gradual steering to left or right
- Gradual steering to dilution
- Direct line to dilution

Approaching Dump Truck



Do not operate the steering suddenly when the bucket is raised. If the steering is operated when the bucket is raised, there is danger that the machine may tip over and cause serious personal injury.

Remark

- Do not shift down with the accelerator pedal depressed (with the engine speed raised).

If the transmission is shifted down when the engine speed is high, there will be an excessive load on the engine, torque converter, transmission, axles, final drive, and the whole power train. In addition, the tires will slip; this will cause wear of the tires.

- Do not operate the steering immediately after switching between forward and reverse (when the machine is stationary).

If the steering is operated when the machine is stationary, it will cause wear or cuts to the tires.

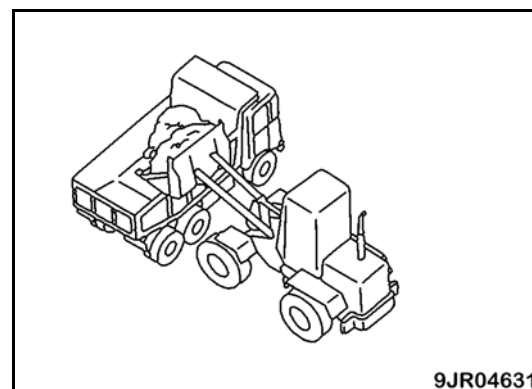
- If a transmission cutoff system is installed, turn the transmission cutoff switch to the OFF position and depress the brake, but do not raise the bucket.

In this condition, the brake is operated. Heat is generated in the brake chamber; this heat will cause heat fatigue to parts inside the axle.

- Let the accelerator pedal back to reduce the engine speed and then depress the parking brake pedal to stop the machine.
- Shift gear from R2 to F2.
- Operate the steering to set the load at right angles to the dump truck and then drive forward.

Remark

Operate the steering in the following order: let accelerator pedal back → switch between forward and reverse → depress accelerator pedal to drive forward → approach dump truck. If these operations are carried out at the same time, the engine acceleration will be poor resulting in poor fuel consumption.



- Raise the bucket to adjust the bucket height so that when the bucket is tilted down, the cutting edge of the bucket does not hit the bottom face of the dump body or the dilution.

Loading Dump Truck

- Do not load the dump truck suddenly from a high position.

If the dump truck is loaded in this manner, the dump truck will suffer impact load. There is danger that this may damage the body.

- Do not operate the dump or stop operations when the engine is running at high speed.

There is danger of impact pressure being generated in the hydraulic equipment and causing damage to the hydraulic equipment.

- Do not shake the bucket violently to dump the load inside the bucket.

The machine will sway and there is danger of damage to the machine. In addition, there is danger of impact pressure being generated in the hydraulic equipment resulting in damage to the hydraulic equipment.

OPERATION

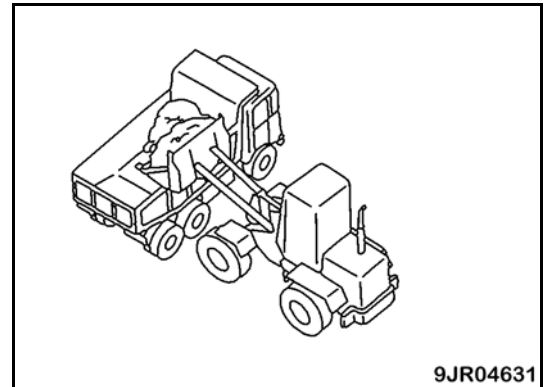
- When loading the dump truck, do not push forcibly with the bucket.

The machine and the dump truck will suffer impact shock, resulting in damage. When pushing the load with the bucket to prevent rocks from falling, carry out the operation gently.

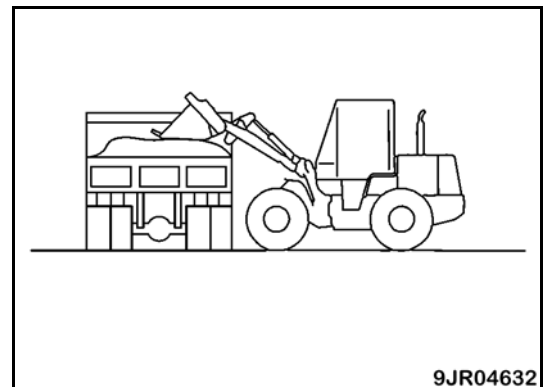
- When loading large rocks, first load with sand or soil to act as a cushion and then load the large rocks on top.

If large rocks are loaded directly, they will cause deformation or damage to the dump body.

1. When loading the dump truck, load at a low point that does not hit the dump truck or dilution.



2. After completing the loading, if there is danger of rocks falling off, push the load softly with the bucket.



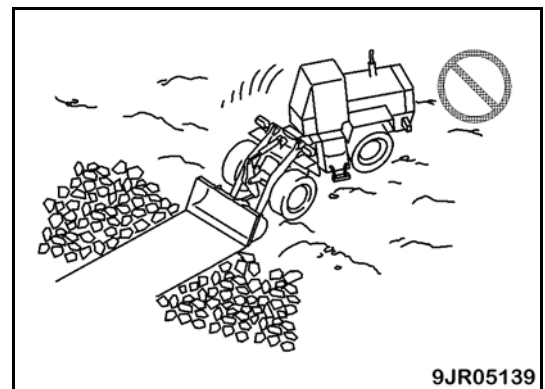
Reversing Away From Dump Truck

- Do not shift down with the accelerator pedal depressed (with the engine speed raised).

If the transmission is shifted down when the engine speed is high, there will be an excessive load on the engine, torque converter, transmission, axles, final drive, and the whole power train. In addition, the tires will slip and cause wear of the tires.

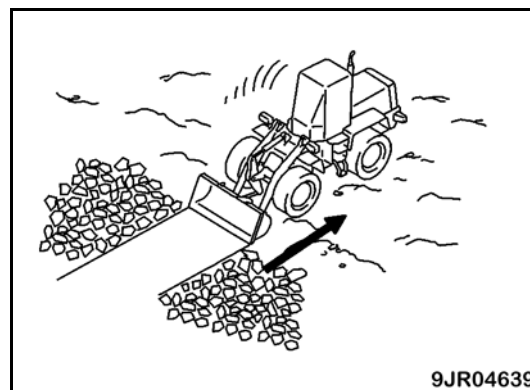
- Do not operate the steering immediately after switching between forward and reverse (when the machine is stationary).

If the steering is operated when the machine is stationary, it will cause wear or cuts to the tires.



1. Switch to R2 and drive in reverse.
2. While driving in reverse, lower the lift arm and operate the steering to face the position for scooping up.
3. Depress the brake pedal and stop the machine.
4. Ease off the accelerator pedal to reduce the engine speed and then switch from R2 to F2.
5. Lower the bucket to the ground and drive forward to clear the surface (remove all boulders).

Do not operate the steering when carrying out the leveling operation. Travel forward with the machine facing directly forward.



OPERATION

Precautions

When Piling Up Loads

- When forming products into a pile, be careful not to let the rear counterweight come into contact with the ground.
- Do not set the bucket to the DUMP position when piling up loads.

Remark

As much as possible, do not use the transmission cutoff function during scraping-up operations. This will prevent the machine from rolling back.

When Handling Blasted Rock

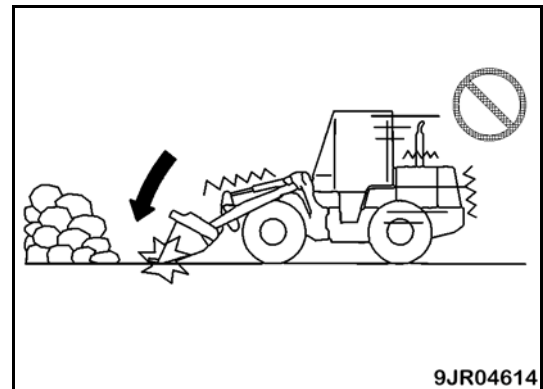
If the target load is blasted rock, pay careful attention to the following items when carrying out the operation in order to extend the service life of the machine.

Handling Bucket

- When approaching the facing and lowering the bucket to the ground, do not drop the bucket suddenly into contact with the ground.

If the bucket is dropped suddenly, the bucket, work equipment, area around the pins, and the machine frame will be subjected to excessive shock. This will lead to damage or deformation of various parts of the machine. In addition, the front wheels will come off the ground and cause the machine to slip.

- When lowering the bucket to the ground, reduce the lowering speed of the bucket when it is close to the ground and bring it slowly into contact with the ground.



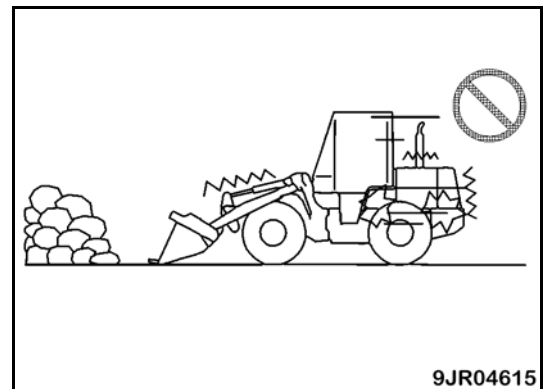
Shifting Transmission When Thrusting Bucket Into Facing

- When thrusting the bucket into the facing to carry out excavation, do not shift down with the accelerator pedal depressed (with the engine speed raised).

If the transmission shifts down when the engine speed is high, there will be an excessive load on the engine, torque converter, transmission, axles, final drive, and the whole power train.

- When shifting down to 1st and thrusting the bucket into the facing, release the accelerator pedal to reduce the engine speed before shifting down and then gradually depress the accelerator pedal.

If the accelerator is operated suddenly after shifting down, there will be excessive load brought to bear on the engine and power train.



Articulating Machine During Digging Operations

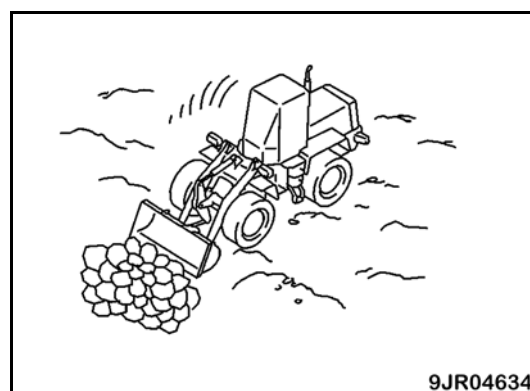
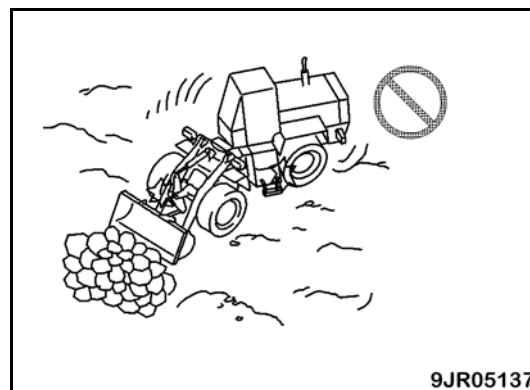
- Do not carry out operations with the machine articulated.

If the machine is articulated, the direction of force will be different for the front wheels and rear wheels. As a result, the power, when traveling, will not be transmitted fully to the front wheels. This will reduce the digging force and bring an excessive load to bear on the center hinge pin. In addition, even with the front wheels, the power will not be transmitted uniformly to the left and right wheels. The load will be brought to bear on one wheel thus reducing the service life of the tire on one side.

If digging work is carried out with the machine articulated, the overall stability of the machine will be poor. There is danger of the machine tipping over.

- When carrying out operations, do not articulate the machine. Drive straight forward and thrust the bucket in.

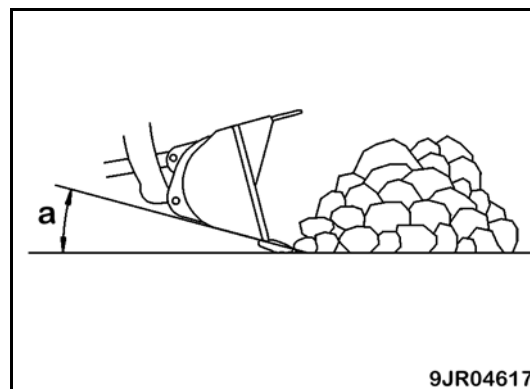
If this is done, the load on the bucket will be uniform. This makes it possible to avoid an overload on one side and makes it easier to load the bucket.



Bucket Dump Angle When Digging or Lowering Roadbed

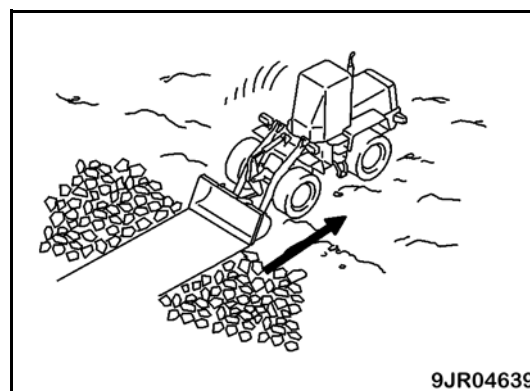
- Do not set the cutting edge of the bucket at a large angle to the ground surface when digging or lowering the roadbed. Keep angle (a) between the bucket and the ground surface to a maximum of 8° .

If angle (a) between the cutting edge of the bucket and the ground surface is more than 8° when digging or lowering the roadbed, there is danger of damage to the work equipment.



Bucket Dump Angle When Leveling

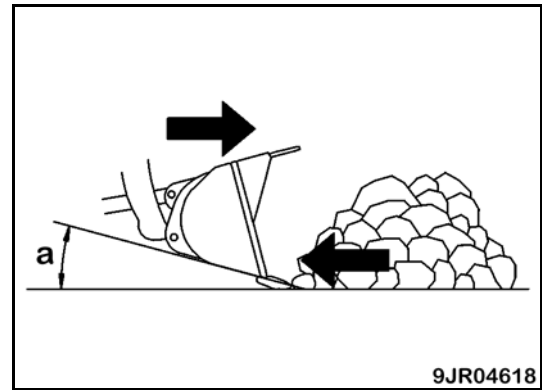
- Drive the machine in reverse when carrying out leveling operations.



OPERATION

- If leveling operations are carried out with the machine traveling forward, do not make angle (a) between the cutting edge of the bucket and the ground surface facing down more than 8° .

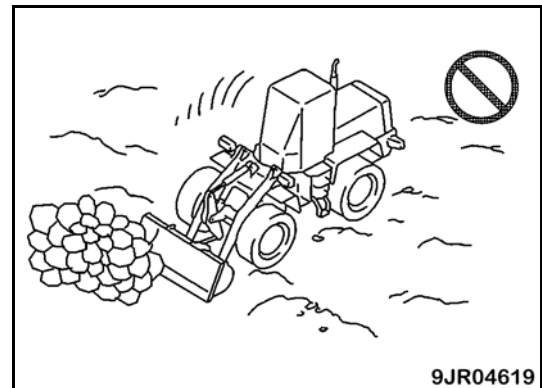
If leveling operations are carried out when driving forward with angle (a) between the cutting edge of the bucket and the ground surface facing down more than 8° , the bucket cylinder will be pushed by the pushing force of the machine. This will cause the cylinder to retract and the bucket will face down at a greater angle. There is danger of the work equipment breaking.



Loading Bucket

- Do not load the bucket or scoop up the load with the load on the corner of the bucket or on one side of the bucket.

This will cause the machine to twist and will reduce the service life of the work equipment and the frame.

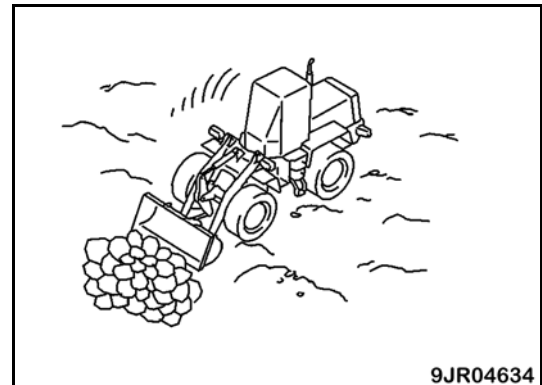


- When carrying out digging or scooping-up operations, thrust the center of the bucket into the load.

Bucket Dump Operation When Digging

- Do not operate the bucket in the DUMP direction when digging.

If the bucket control lever is operated to the DUMP position during digging, the machine will not be able to travel forward; the tires will slip; and an excessive load will be brought to bear on the work equipment.



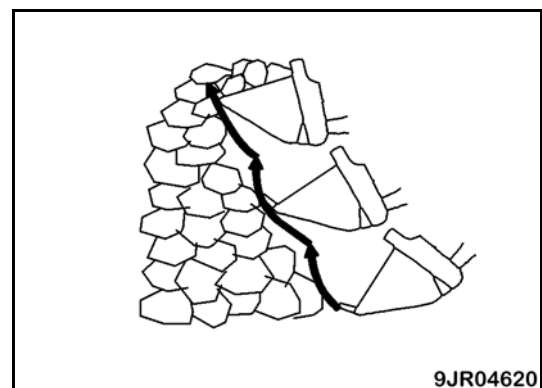
Carry out the scooping-up operations as follows.

1. When thrusting the bucket in, raise the lift arm slightly at the same time. Ample driving force will work on the front wheels.
2. To fill the bucket, operate the bucket tilt and lift two to three times repeatedly when thrusting the bucket in.

Operate the control lever slowly near the end of the bucket tilt.

3. When the bucket reaches the end of the tilt stroke, depress the brake pedal to stop the machine.

When doing this, do not push the bottom of the bucket against the pile. If the bucket is pushed against the pile, the bucket, cylinders, and work equipment will be damaged.



4. When the scooping-up operation is completed, operate the bucket tilt and dump. Apply the brakes when traveling in reverse to stabilize the load inside the bucket and prevent spillage of the load.

Remark

To reduce the generation of heat by the torque converter, keep the target time for the digging operation within 10 seconds from the start of thrusting in to the completion of scooping up.

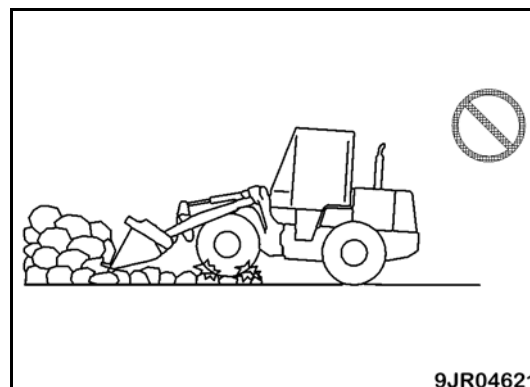
The fuel consumption increases during digging work. Fuel cost is saved by shortening the digging time.

Front Wheels Going on Blasted Rock

- Do not carry out operations that make the front wheels ride up on blasted rock.

If the front wheels go on top of blasted rock, there is danger that the sharp parts of the blasted rock will cut the tires.

- In particular, avoid pushing the bucket in too far. When operating near natural rock after blasting (roots), do not let the front wheels ride up on the natural rock (roots). For scooping-up operations near natural rock (roots), do not use a wheel loader. Use a bulldozer or hydraulic excavator.



Handling Loosened Boulders

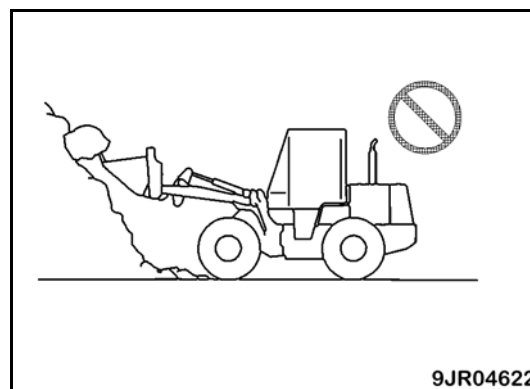
WARNING

Do not use this machine to deal with loosened boulders. If the boulder is dropped by mistake when handling it, there is danger that it may fall on top of the operator's compartment and cause serious personal injury.

- Do not use this machine to handle hanging rocks. There is danger that the rock will fall while moving it and hit the machine or operator's cab.

If dropped boulders hit the work equipment cylinders, there is danger that the cylinder will bend and be unable to move.

If the boulder is dropped on the operator's compartment, there is danger of serious personal injury.

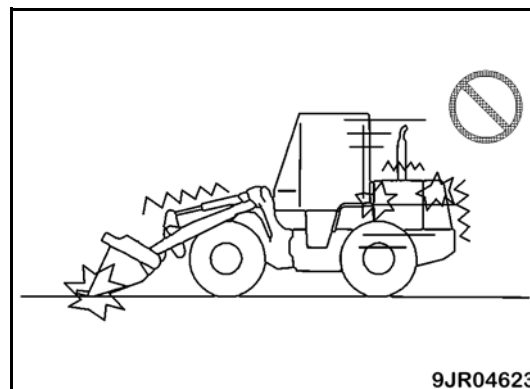


Pit Excavation

- Do not try to shave off natural rock (roots) remaining from blasting.

Excessive force will be applied to the machine and there is danger that this may damage the work equipment or frame.

- For pit excavation operations, do not use a wheel loader. Use a bulldozer or hydraulic excavator.



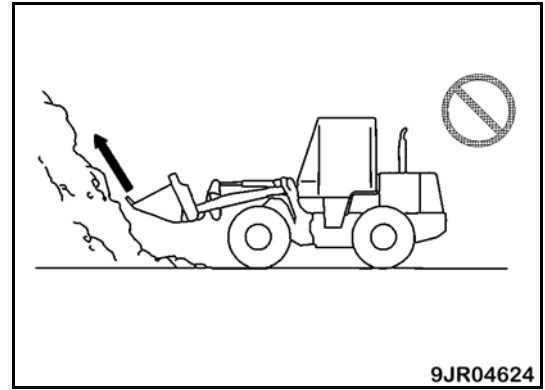
OPERATION

During Cutting Face Operations

- Do not excavate cutting faces.

If the cutting face is excavated, excessive force will be applied to the machine. There is danger that this may damage the bucket, work equipment, or frame.

- In particular, do not excavate with the bucket raised to a height above the travel posture. For excavation of cutting faces, use a hydraulic excavator.

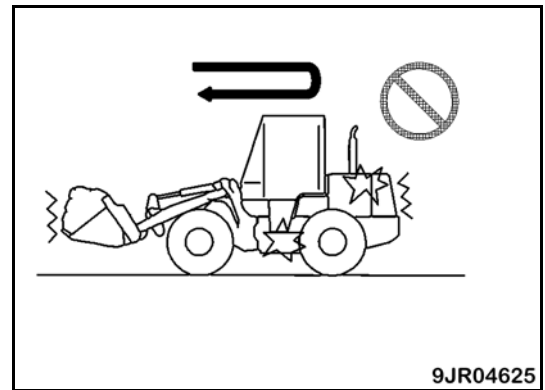


When Switching Between Forward and Reverse

- Do not switch the direction of travel of the machine between forward and reverse when traveling at high speed or when the accelerator pedal is depressed.

When the machine is traveling at high speed or when the accelerator pedal is depressed, the engine speed is high. If the direction of travel is switched between forward and reverse, an excessive load is applied to the engine, torque converter, transmission, and other parts of the power train. This will reduce the service life of the machine.

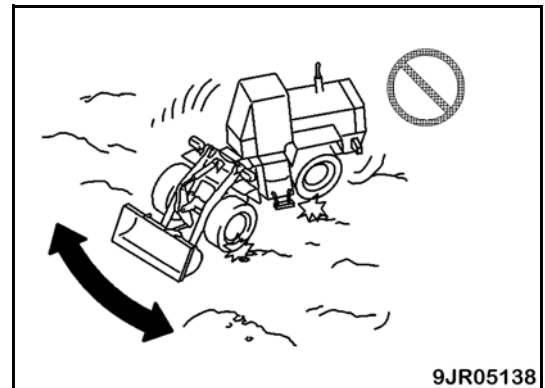
- When switching between forward and reverse, travel at low speed; reduce the engine speed; then stop the machine and switch the direction of travel.



When Turning When Tires Are Stationary

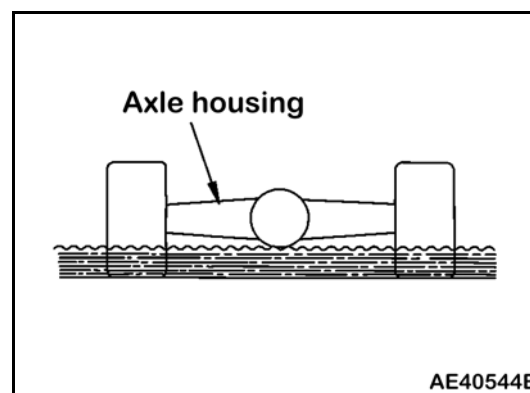
- Do not operate the steering when the machine is stationary.

If the steering is operated when the machine is stationary, it will cause wear or cuts in the tires. In addition, it will reduce the durability of the frame and the undercarriage.



Permissible Water Depth

- When working in water or on swampy ground, do not let the water come above the bottom of the axle housing.
- After finishing the operation, wash and check the lubricating points.



When Wheel Brake Does Not Work

If the machine does not stop when you depress the brake pedal, use the parking brake to stop the machine.

Remark

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

When Driving Up or Down Slopes

Lower the Center of Gravity When Turning

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

Braking on Downhill Slope

- If the foot brake is used frequently when traveling downhill, the brake will overheat and may be damaged. To prevent this, shift down to a low range and use the braking force of the engine to reduce the speed.

Normally, the most suitable speed range when traveling down a slope is the speed range needed when traveling up that slope.

- When braking, use the right brake pedal.
- If the correct speed range is not used, the torque converter oil may overheat. If this happens, shift down one speed to reduce the oil temperature.
- If the indicator does not enter the green range even in 1st, stop the machine; place the directional selector lever at the N position; and run at the engine at a mid-range speed until the gauge enters the green range.

If Engine Stops

If the engine stops on a slope:

- Apply the parking brake immediately.
- Lower the work equipment to the ground.
- Stop the machine.
- Put the directional lever in the neutral position.
- Start the engine again.

OPERATION

When Driving the Machine

When the machine travels at high speed for a long distance, the tires become extremely hot. This causes early wear of the tires. Avoid traveling at high speed for a long distance. If the machine must be driven for a long distance, take the following precautions.

- Follow the regulations related to this machine and drive carefully.
- Before driving the machine, carry out the checks before starting; see “Check Before Starting Engine” on page 2-45.
- The most suitable tire pressure, travel speed, or tire type differ according to the condition of the travel surface. Contact your Komatsu distributor or tire dealer for information.
- The following table is a guide to suitable tire inflation pressures and appropriate speeds when traveling on a paved surface with the standard tires.

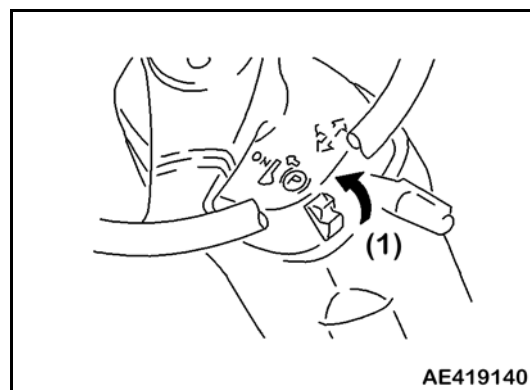
Item	Tire Pressure	Speed
Front tire	0.34 MPa (3.5 kg/cm ²) [49.3 psi]	19 km/h (11.8 mph)
Rear tire	0.34 MPa (3.5 kg/cm ²) [49.3 psi]	19 km/h (11.8 mph)

- Check the tire pressure before starting, when the tire is cool.
- After traveling for one hour, stop for 30 minutes. Check the tires and other parts for damage. Check the oil and coolant levels.
- Always travel with the bucket empty.
- Never put calcium chloride or dry ballast in the tires when traveling.
- To prevent the radiator water temperature from rising suddenly, do not stop the engine suddenly. Run it at low idle for five minutes to cool it down gradually and then stop it.

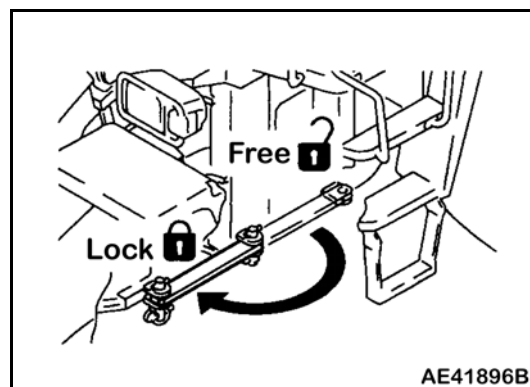
Adjusting Work Equipment

WARNING

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

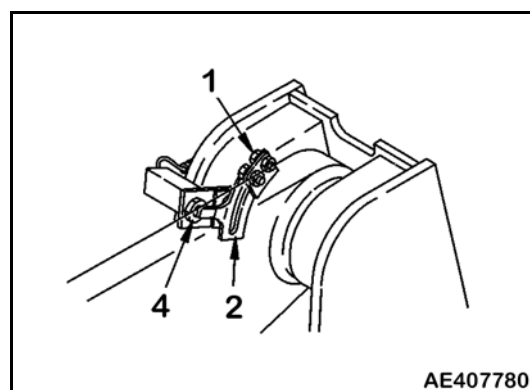
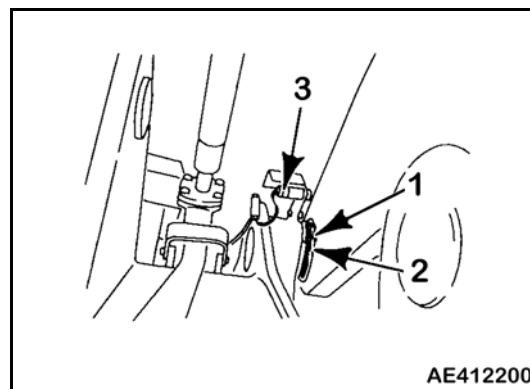


- The boom kickout makes it possible to set the bucket so that it automatically stops at the desired lifting height (lift arm higher than horizontal).
- The bucket positioner makes it possible to set the bucket so that it automatically stops at the desired digging angle.
- The setting can be adjusted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



Adjusting Boom Kickout

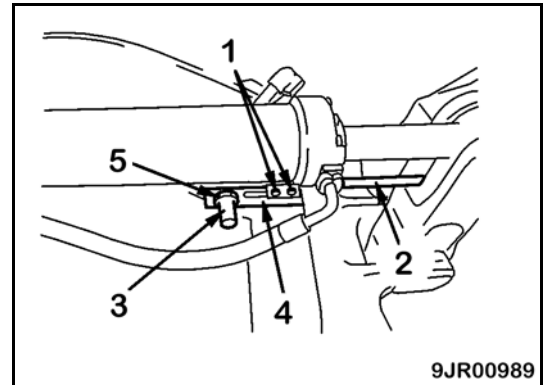
1. Raise the bucket to the desired height; set the lift arm control lever at HOLD; and lock the lever in position.
2. Stop the engine and adjust in this manner:
 - Loosen two bolts (1) and adjust plate (2) so that the bottom edge is in line with the center of the sensing surface of proximity switch (3).
 - Tighten the bolts to hold the plate in position.
3. Loosen two nuts (4) to make a clearance of 3 to 5 mm (0.118 to 0.197 in) between plate (2) and the sensing surface of proximity switch (3). Tighten the nuts to hold in position.
Tightening torque: 17.2 ±2.5 N•m (12.69 ±1.84 lbf ft)
4. After adjusting, start the engine and operate the lift arm control lever. Check that the lever is automatically returned to HOLD when the bucket reaches the desired height.



OPERATION

Adjusting Bucket Positioner

1. Lower the bucket to the ground; set to the desired digging angle.
2. Return the bucket control lever to the HOLD position; lock the work equipment control lever; and stop the engine.
3. Loosen two bolts (1) and adjust mounting bracket (4) of the proximity switch so that the rear tip of angle (2) is in line with the center of the sensing surface of the proximity switch (3).
 - Tighten the bolts to hold the bracket in position.
4. Loosen two nuts (5) and adjust to make a clearance of 3 to 5 mm (0.118 to 0.197 in) between bar (2) and the sensing surface of proximity switch (3).
 - Tighten the nuts to hold in position.



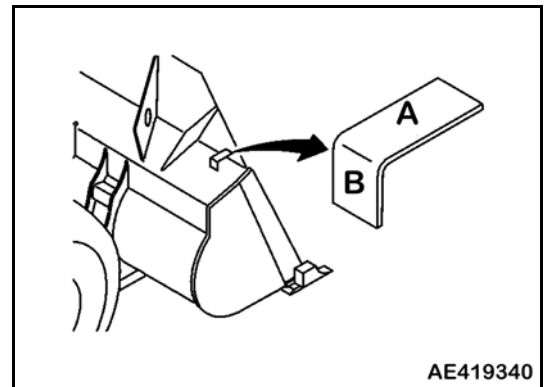
Tightening torque: (17.2 ±2.5 N•m (12.69 ±1.84 lbf ft))

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

Bucket Level Indicator

Level indicators (A) and (B) are located at the rear of the bucket. They check the bucket angle during operation.

- A: Parallel with cutting edge
- B: 90° to cutting edge



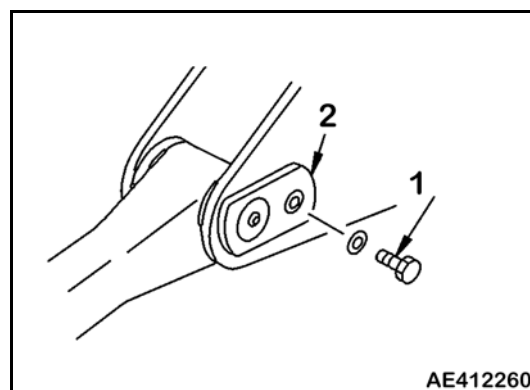
Removing the Bucket

WARNING

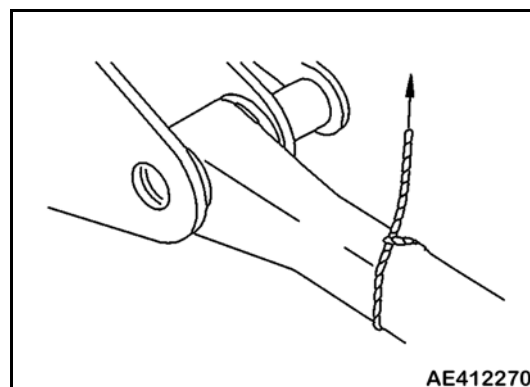
- When removing pins, do not stand behind the bucket.
- Do not put your foot under the bucket while standing at the side for the work.
- If pins are hit with a strong force, there is a hazard that the pin may fly out and injure people in the surrounding area. Make sure that there is no one in the surrounding area before starting the operation.
- When the bucket is removed, place it in a stable condition.
- When removing or inserting pins, be extremely careful not to get your fingers caught.
- Never insert your fingers into the pin holes when aligning the holes.
- When pins are knocked in with a hammer, pieces of metal may fly and cause serious injury. When carrying out this operation, always wear goggles, hard hat, gloves, and other protective equipment.

★ It may be more convenient to remove the bucket if the machine is transported.

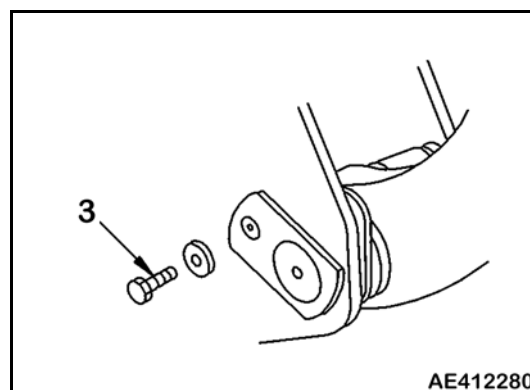
1. Remove mounting bolt (1).
2. Sling the bucket link and then pull out bucket link pin (2).



3. Secure the bucket link to the tilt lever with wires.

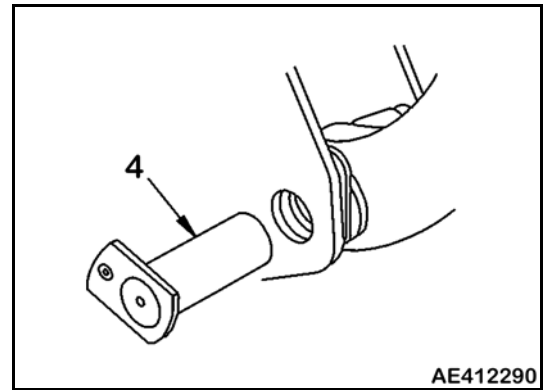


4. Remove mounting bolt (3).

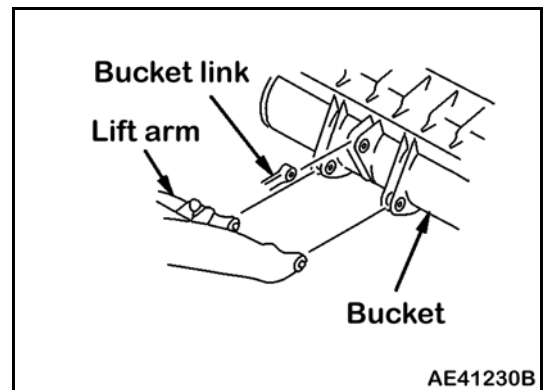


OPERATION

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



6. Disconnect the lift arm and bucket.



Installing the Bucket

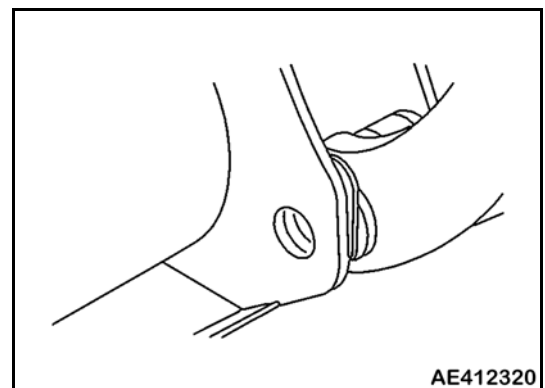
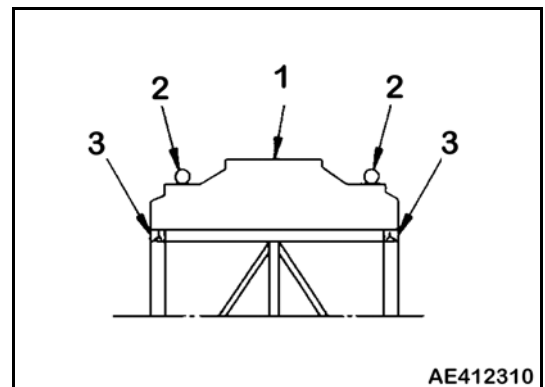
Read the safety instructions; see "Removing the Bucket" on page 2-93.

Remark

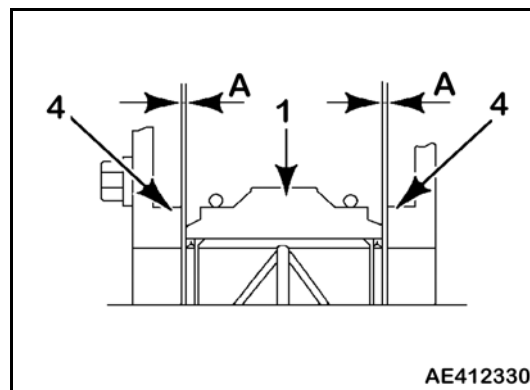
Before installing the bucket, remove all grease, mud, or sand and clean the pin, pin hole, and area around the boss. (If there is any rust or dirt on the inside surface of the pin hole, use sandpaper and remove it carefully.)

After cleaning, coat the pin and inside surface of the pin hole with fresh grease.

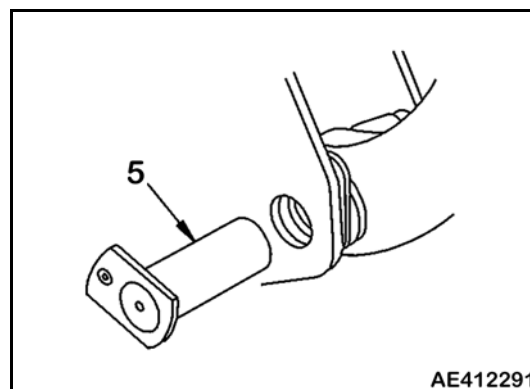
1. Set cord ring (2) on top of lift arm boss (1).
2. Coat dust seal lip portion (3) with grease.
3. Align the left and right bucket pin holes.



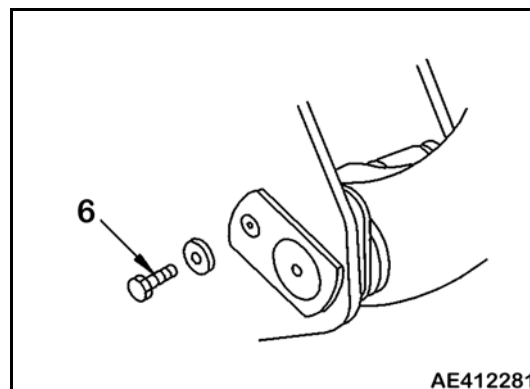
4. Select the number of shims so that clearances (A) between bucket hinge boss (4) and lift arm boss (1) are less than 1.0 mm (0.04 in).



5. Assemble the shims selected in Step 4; align the pin holes; then insert bucket hinge pin (5).
 - ★ Coat with grease to prevent damage to the dust seal when inserting the bucket hinge pin.
 - ★ Use a bucket hinge pin that has a grease hole.

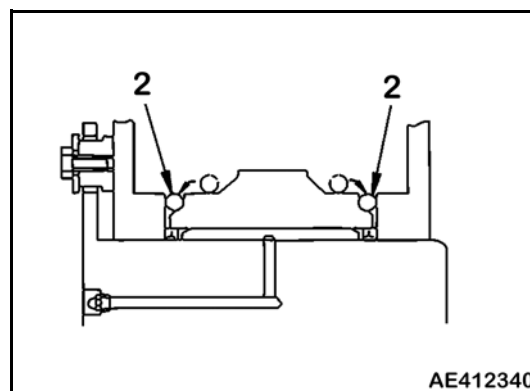


6. Install mounting bolt (6).



7. Move cord ring (2) down to the groove.
8. Use the same procedure as in Steps 1 to 7 to install the bucket link pin.

Assemble a pin that has no grease hole at the bucket link.
9. Coat the bucket hinge pin and bucket link pin with grease. For details, see "Lubricating" on page 3-50.
 - ★ For additional details about removing and installing the bucket, contact your Komatsu distributor.



OPERATION

Parking the Machine

WARNING

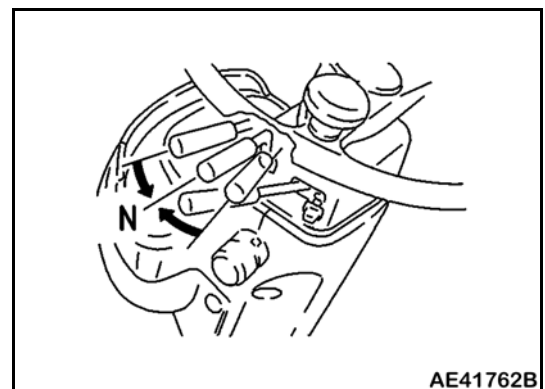
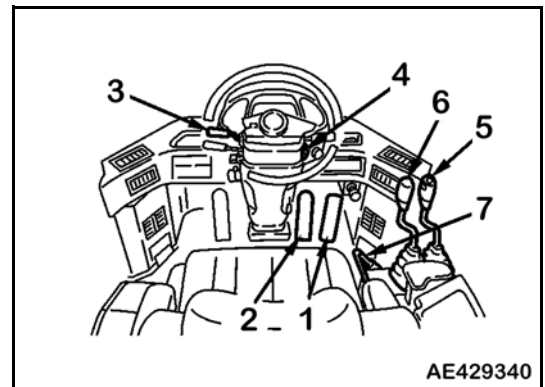
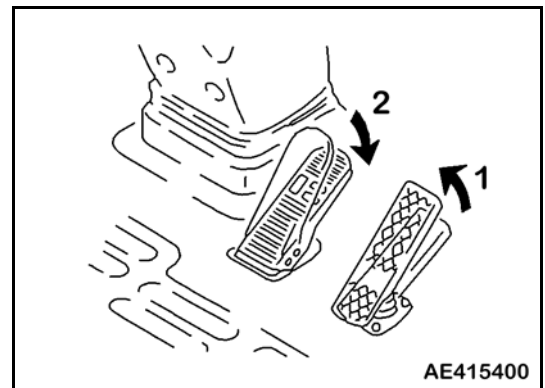
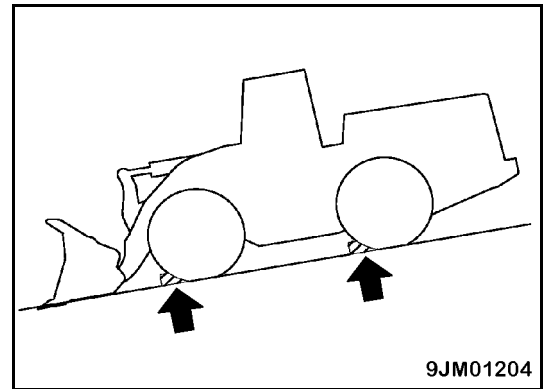
- Avoid stopping suddenly. Give yourself ample room when stopping.
- Do not park the machine on a slope. If the machine must be parked on a slope, set it facing directly down the slope; dig the bucket into the ground; and put blocks under the tires to prevent the machine from moving.
- If the control lever is touched by accident, the work equipment or the machine may move suddenly. This may lead to a serious accident. Before leaving the operator's compartment, always set the safety lock lever securely to the LOCK position.
- When the parking brake switch is turned ON, it is dangerous to release the brake pedal immediately. Always keep the brake pedal depressed until the parking brake pilot lamp illuminates.

Remark

Never use the parking brake switch to brake the machine when traveling, except in an emergency.

Apply the parking brake only after the machine has stopped.

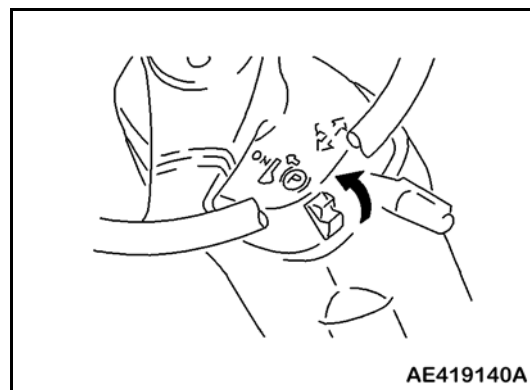
1. Release accelerator pedal (1) and then depress brake pedal (2) to stop the machine.
2. Place directional lever (3) in the N (neutral) position.



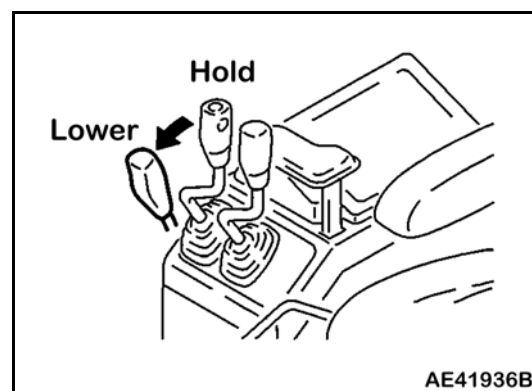
3. Turn parking brake switch (4) ON to apply the parking brake.

Remark

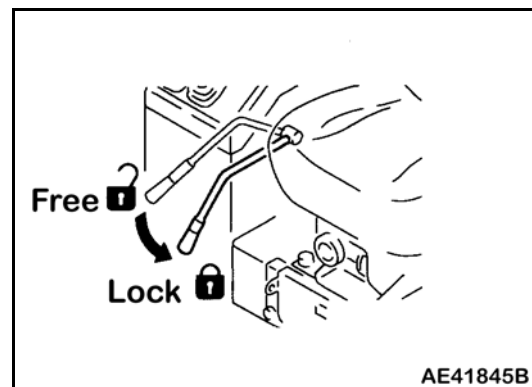
When the parking brake is applied, the transmission is automatically returned to neutral.



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



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



OPERATION

Checks After Completion of Operation

Before Stopping Engine

- Use the meters and lamps on the machine monitor to check the engine water temperature, engine oil pressure, torque converter oil temperature, and fuel level.
- If the engine has overheated, do not stop it suddenly. Run the engine at a mid-range speed to allow the engine time to cool down before stopping it.

After Stopping Engine

- Walk around the machine and check the work equipment, chassis, and undercarriage.
- Check that there are no loose bodywork mounting bolts.
- Check that there are no cracks in the work equipment or bucket.
- Check for oil and water leakage.
- Fill the fuel tank.
- Check the engine compartment for paper and debris. Clean out any paper and debris to avoid a fire hazard.
- Remove any mud stuck to the undercarriage.

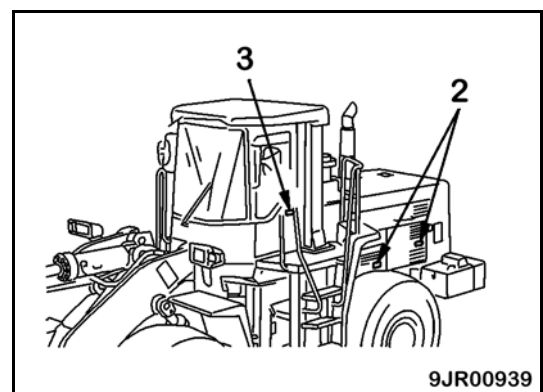
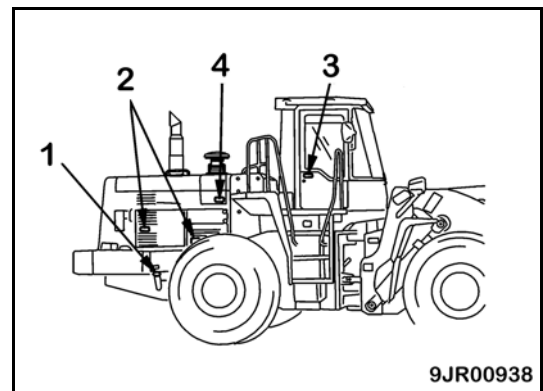
Locking the Machine

Always lock the following parts.

- (1) Fuel tank filler cap
- (2) Engine side panel (four places)
- (3) Cab door (two places)
- (4) Engine hood (one place) (air cleaner cover)

Remark

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



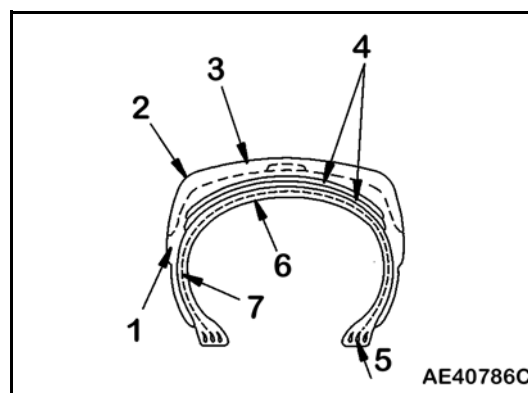
HANDLING TIRES

Precautions When Handling Tires

WARNING

- If a tire has reached any of the following service limits, there is danger that the tire may burst or cause an accident. To ensure safety, replace it with a new tire.
- Service limits for wear:
 - When the remaining depth of the groove on construction equipment tires (at a point approximately 1/4 of the tread width) is 15% of the groove depth on a new tire.
 - When the tire shows marked uneven wear, stepped wear, or other abnormal wear, or when the cord layer is exposed.
- Service limits for damage:
 - When there is external damage extending to the cord or when the cord is broken.
 - When the cord is cut or there is dragging.
 - When the tire is peeling (there is separation).
 - When the bead is damaged.
 - For tubeless tires, when there is air leakage or improper repair.

1. Side wall
2. Shoulder
3. Tread
4. Breaker or belt (cord layer)
5. Bead
6. Inner liner
7. Carcass



Remark

It is dangerous to jack up the machine without taking proper care.

Contact your Komatsu distributor when replacing the tires.

After replacing the tires, carry out the breaking-in operation for approximately 30 hours (the time displayed on the service meter) until the tires and rims are settled.

Pay particular attention to the following points when operating the machine.

- Avoid heavy loads (heavy digging operations) and operations at high speed.
- Immediately after starting the engine, avoid sudden starts, sudden acceleration, unnecessary sudden stops, and sudden changes in direction.

OPERATION

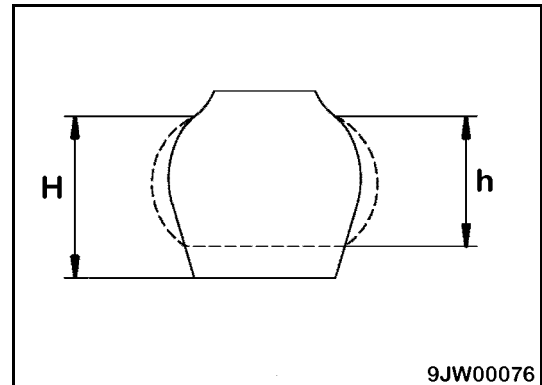
Tire Pressure

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

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

★ Deflection ratio = $H - h / H \times 100$

- When checking the tire inflation pressure, check also for small scratches or peeling of the tire, for nails or pieces of metal which may cause punctures, and for any abnormal wear.
- Clearing fallen stones and rocks from the operating area and maintaining the surface will extend the tire life and give improved economy.



Operations on normal road surfaces, rock digging operations:

..... High end of range in Air Pressure chart

Stockpile operations (loading of sand and other loose materials) on soft ground:

..... Average pressure in Air Pressure chart

Operations on sand (operations not using much digging force):

..... Low end of range in Air Pressure chart

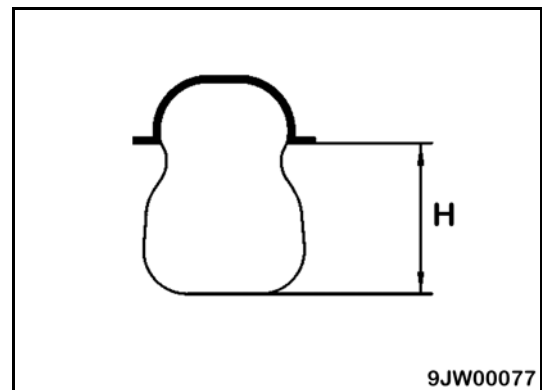
As a guideline that can be checked visibly, the deflection ratio of the front tire (deflection/free height) is:

When carrying normal load (lift arm horizontal):.....

..... Approximately 15 to 25%

When digging (rear wheels off ground):.....

..... Approximately 25 to 35%



If the deflection of the tire is excessive, raise the inflation pressure within the limits given in the Air Pressure chart in order to get a suitable deflection.

Air Pressure Chart

Tire Size (Pattern)	H Free Height (mm)	Inflation Pressure MPa [kgf/cm ²] (psi)			
		Soft Ground (sandy ground)	Normal Road		When Shipped from Factory
			Stockpile	Stockpile	
26.5-25-20PR L3 Rock (Standard)	492(BS) 485(TOYO) 483(YOKOHAMA)	0.29 - 0.39 [3.0 - 4.0] (42.1 - 56.6)	0.34 - 0.44 [3.5 - 4.5] (49.3 - 63.8)	0.34 - 0.44 [3.5 - 4.5] (49.3 - 63.8)	Front tire: 0.44 [4.5] (63.8) Rear tire: 0.34 [3.5] (49.3)
29.5-25-22PR L3 Rock (Option)	529(BS) 531(TOYO)	0.29 - 0.39 [3.0 - 4.0] (42.1 - 56.6)	0.34 - 0.44 [3.5 - 4.5] (49.3 - 63.8)	0.34 - 0.44 [3.5 - 4.5] (49.3 - 63.8)	

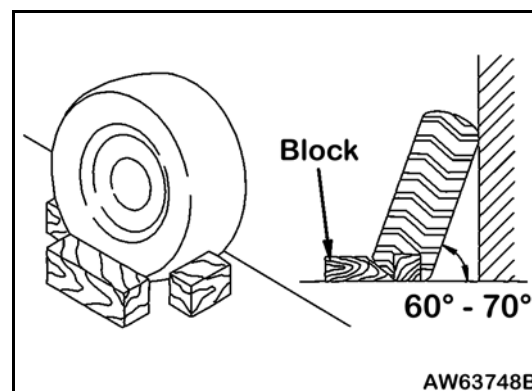
Precautions for Using Load-and-Carry Method

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

Precautions when Storing Tires

Tires for construction equipment are extremely heavy and may cause serious personal injury if handled improperly.

- As a basic rule, store the tires in a warehouse with restricted access for authorized persons only.
- If the tires must be stored outside, store them within a fence and post “No Entry” signs.
- Stand the tire on level ground and block it securely so that it cannot roll or fall over if anybody should touch it.
- Do not lay the tire on its side. This will deform the tire and cause it to deteriorate.
- If the tire should fall over, do not attempt to stop it. Get out of the way quickly.



OPERATION

TRANSPORTATION

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

Transportation Procedure

As a general rule, always transport the machine on a trailer.

When selecting a trailer and transporting the machine, choose the optimum transportation method in reference to the weight and dimensions shown in "SPECIFICATIONS" on page 4-2. Note that machine specifications (weight and dimensions) vary depending on the kind of tires and bucket.

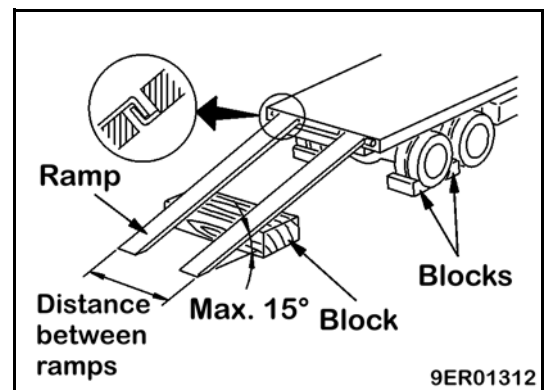
Loading and Unloading Trailers

WARNING

- When loading or unloading the machine, run the engine at low speed; travel at low speed; and operate slowly.
- When loading or unloading the machine, stop the trailer on firm, level ground. Keep well away from the road shoulder.
- Use ramps of ample width, length, thickness, and strength. Install them securely at an angle of less than 15°. When using an embankment, compact the fill soil thoroughly and make sure that the slope face does not collapse.
- Remove the mud stuck to the undercarriage to prevent the machine from slipping to the side on the ramps. Remove any water, snow, ice, grease, or oil from the ramps.
- Never change direction on the ramps. There is danger that the machine may tip over. If it is necessary to change direction, return to the ground surface or the trailer platform; correct the direction; and start again.
- The position of the center of gravity of the machine will change suddenly at the connection of the ramp and trailer. At this point, there is danger of the machine losing its balance. Always drive slowly over the connection point.

Loading Machine

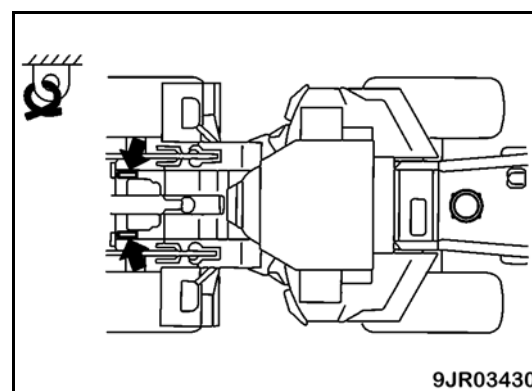
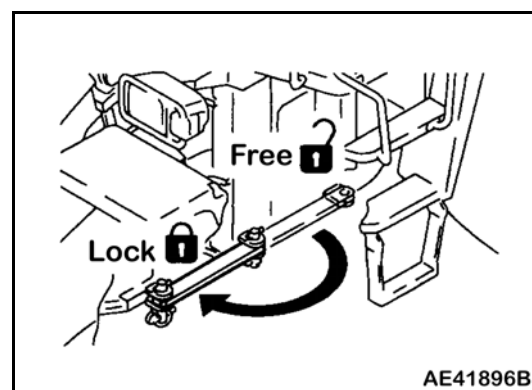
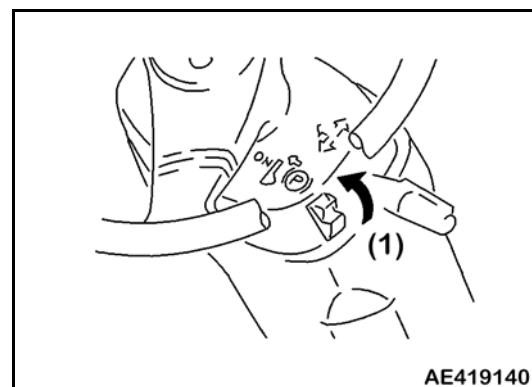
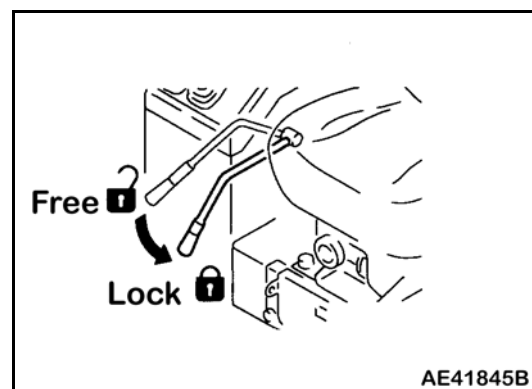
- ★ When loading the machine, always use ramps or a platform.
 - ★ Be sure the loading area is flat and dry.
1. Load on firm, level ground. Maintain a safe distance from the edge of the road.
 2. Apply the brakes on the trailer and insert the blocks under the tires to ensure that the trailer does not move.
 3. Fix the ramps in line with the center of the trailer and the machine.
 - Be sure that the two sides are at the same height.
 - Make the angle of the ramps a maximum of 15°.
 - Set the distance between the ramps to match the center of the tires.
 - If the ramps sag a lot, reinforce them with blocks, etc.
 4. Determine the direction of the ramps, then slowly drive the machine up the ramps.
 5. Load the machine correctly in the specified position on the trailer.



Securing Machine

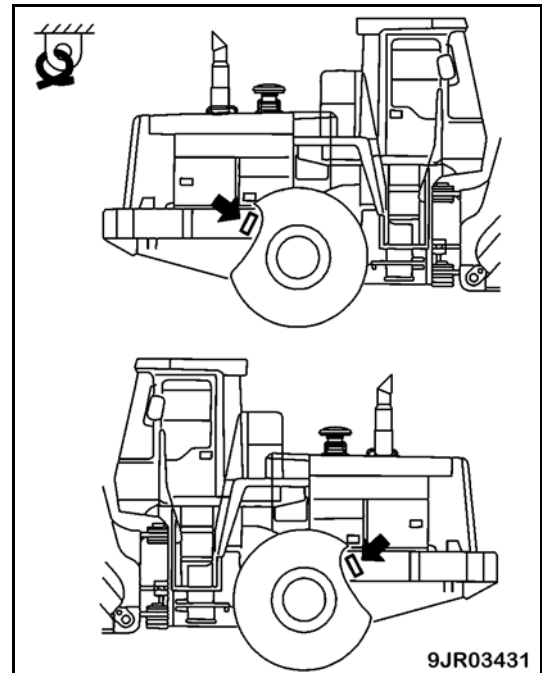
Secure the machine to the trailer in the following manner.

1. Lower the work equipment slowly.
2. Set the safety lock lever to LOCK to lock the work equipment control levers securely.
3. Set the parking brake switch to the ON position to apply the parking brake.
4. Turn the starting switch to the OFF position to stop the engine.
5. Remove the key from the starting switch.
6. Set the safety bar to the LOCK position to lock the front frame and rear frame.
7. Put blocks in front and behind the wheels.
8. Secure the machine with chains or wire rope of a suitable strength to prevent the machine from moving during transportation.
 - In particular, attach the machine securely to prevent it from slipping sideways.



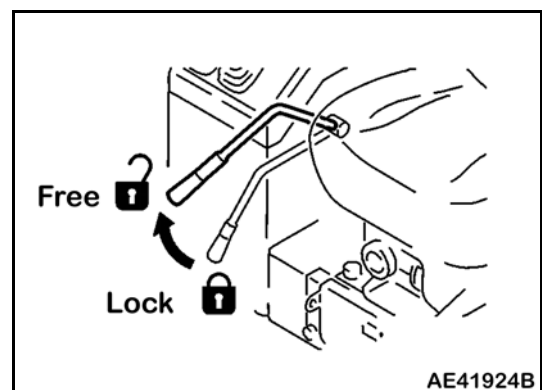
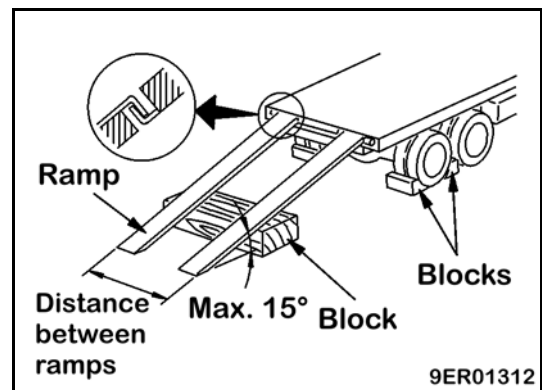
OPERATION

9. Retract the antenna fully.
10. Adjust the mirrors so that they are within the width of the trailer.
11. Protect the exhaust stack from moisture, if necessary.



Unloading Machine

- ★ When unloading the machine, always use ramps or a platform.
 - ★ Be sure the loading area is flat and dry.
1. Unload on firm, level ground. Maintain a safe distance from the edge of the road.
 2. Apply the brakes on the trailer and insert the blocks under the tires to ensure that the trailer does not move.
 3. Fix the ramps in line with the centers of the trailer and the machine.
 - Be sure that the two sides are at the same height.
 - Make the angle of the ramps a maximum of 15°.
 - Set the distance between the ramps to match the center of the tires.
 - If the ramps sag a lot, reinforce them with blocks, etc.
 4. Remove the chains and wire ropes fastening the machine to the trailer.
 5. Start the engine. Warm up the engine completely.
 6. Set the safety lock lever to the FREE position.
 7. Determine the direction of the ramps, then drive the machine slowly down the ramps.



LIFTING MACHINE

WARNING

- Before lifting the machine, do the following steps to prevent the machine from moving unexpectedly.
 - Stop the engine.
 - Set the parking brake switch to the ON position.
 - Set the lock lever to the LOCK position.
 - Set the safety bar to the LOCK position to prevent the machine from articulating.
- The person using the crane to carry out lifting operations MUST be a qualified crane operator.
- Never lift the machine with a worker on it.
- Make sure the wire rope used for lifting is of ample strength for the weight of the machine.
- When lifting the machine, the wire rope must be fitted correctly or the machine may fall and cause serious injury or even death.
- Raise the machine 100 to 200 mm (3.9 to 7.9 in) from the ground; check that the machine is horizontal; that there is no slack in the wire rope; and then continue to lift the machine.
- Never enter the area under or around a raised machine. There is danger that the machine may lose its balance.

- ★ The lifting procedure applies to machines with standard specifications.
- ★ The method of lifting may differ depending on the attachments and options installed.
- ★ For details of the procedure for machines that do not conform to standard specifications, contact your Komatsu distributor.
- ★ For details of the weight, see “SPECIFICATIONS” on page 4-2.

Remark

Use protectors to prevent the wire rope from being cut on sharp corners and to prevent the wire rope from cutting into the machine bodywork.

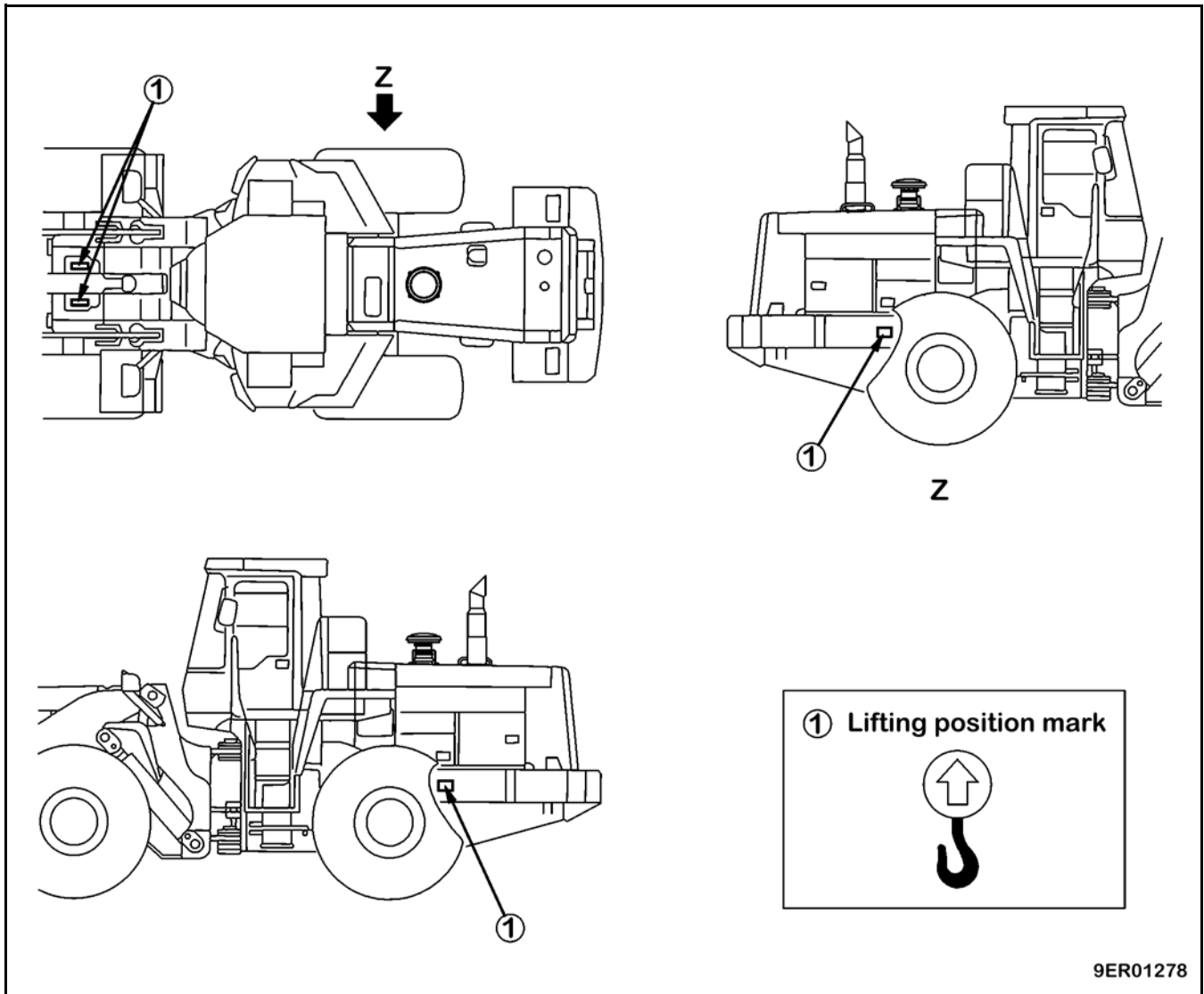
When using a spreader bar, select an ample width to prevent contact with the machine.

When the machine is raised, check that there is no oil leakage from the hydraulic circuits.

Consult your Komatsu distributor when carrying out the lifting operation.

OPERATION

Lifting Position Marks



Weight Table

	Operating Weight	Front Wheel Load	Rear Wheel Load	Center of Gravity (from front axle)
WA500-3LK	28.220 kg (62,214 lb)	13,090 kg (28,859 lb)	15,130 kg (33,356 lb)	1,920 mm (6.3 ft)

Lifting Procedure

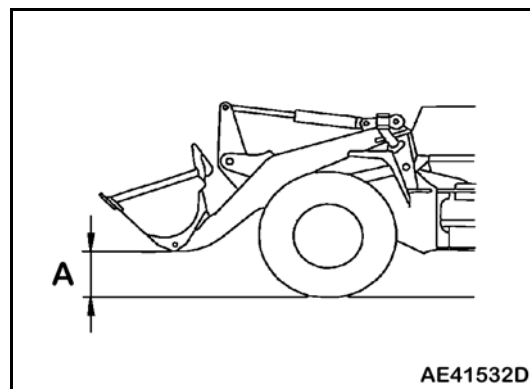
- ★ Lifting work can be carried out only for machines with hook mark labels (lifting marks).
- ★ Before starting the lifting operation, stop the machine on level ground.

Use the following procedure to set the machine in the proper posture and use the lifting equipment when lifting the machine.

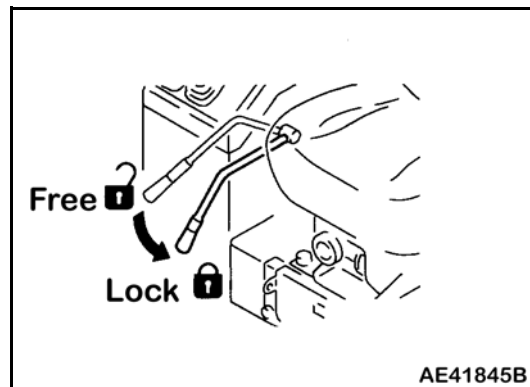
1. Start the engine; make sure that the machine is horizontal; then set the work equipment to the travel posture.

For details, see “Moving the Machine (Directional, Speed), Stopping the Machine” on page 2-63.

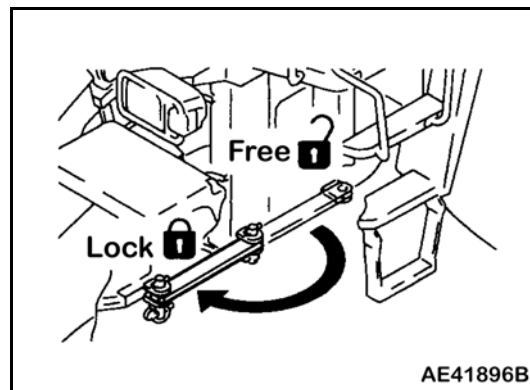
(A): 40 – 50 cm (16 – 20 in)



2. Move the work equipment safety lock lever to the LOCK position.



3. Stop the engine; check that the area around the operator's compartment is safe; then set the safety bar to the LOCK position so that the front frame and rear frame do not articulate.



OPERATION

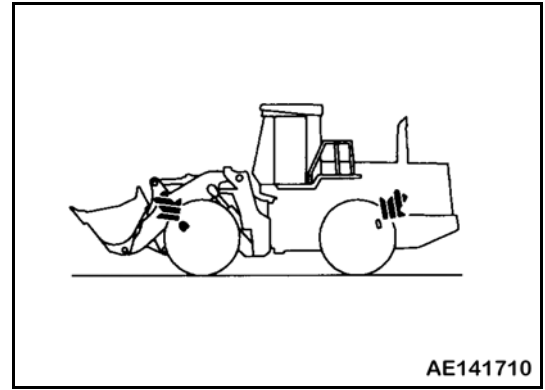
4. Use wire ropes, slings, spreader bars, and other lifting equipment that match the weight of the machine.
 - Fit the lifting equipment to the lifting hooks (indicated by hook marks) at the front of the front frame and the rear of the rear frame. See “Lifting Position Marks” on page 2-106.

Remark

Use protectors, etc. so that the wire ropes do not break at sharp edges or narrow places.

Use threaders and bars having sufficient width so that the slings and wire ropes do not touch the machine.

For machines equipped with a rear full fender, remove the rear full fender before carrying out the operation.



5. When the machine leaves the ground, stop the lifting operation for a moment and wait for the machine to stabilize. Make sure that the wire ropes are not slack and that the machine is level.

If the wire ropes are taut and the machine is level, continue to lift the machine slowly.

COLD WEATHER OPERATION

Precautions for Low Temperature

If the temperature drops, it becomes difficult to start the engine. The coolant may freeze.

Fuel and Lubricants

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

For details of the specified viscosity, see “RECOMMENDED FUEL, COOLANT, AND LUBRICANTS” on page 3-11.

Coolant



- Antifreeze is toxic. Be careful not to get it into your eyes or on your skin. If it should get into your eyes or on your skin, wash it off with a large amount of fresh water and see a doctor immediately.
- Contact your Komatsu distributor for information regarding handling coolant that contains antifreeze (as when draining and changing coolant or repairing the radiator).
- Antifreeze is toxic. Do not let it flow into drainage ditches or spray it on the ground surface.
- Antifreeze is flammable. Do not bring any flame close to the antifreeze. Do not smoke when handling antifreeze.

Remark

Use Komatsu Supercoolant (AF-NAC). We do not recommend the use of any coolant other than Komatsu genuine supercoolant.

When using Komatsu Supercoolant (AF-NAC), there is no need to use a corrosion resistor; see “Clean Inside of Cooling System” on page 3-24.

Never use methanol-, ethanol-, or propanol-based antifreeze.

Do not use any leak-preventing agent, regardless of whether it is sold separately or in antifreeze.

Do not mix one brand of antifreeze with that of a different brand.

For details of the antifreeze mixture when changing the coolant, see “Clean Inside of Cooling System” on page 3-24.

OPERATION

Battery



- The battery generates flammable gas. 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 a large amount of water and consult a doctor immediately.
- Battery electrolyte dissolves paint. If it gets on the bodywork, wash it off immediately with water.
- If the battery electrolyte is frozen, do not charge the battery or start the engine with a different power source. There is danger that the battery may explode.
- Battery electrolyte is toxic. Do not let it flow into drainage ditches or spray it on the ground surface.

When the ambient temperature drops, the battery capacity will drop also. If the battery charge ratio is low, the battery electrolyte may freeze.

- Maintain the battery charge as close as possible to 100%.
- Insulate the battery 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.

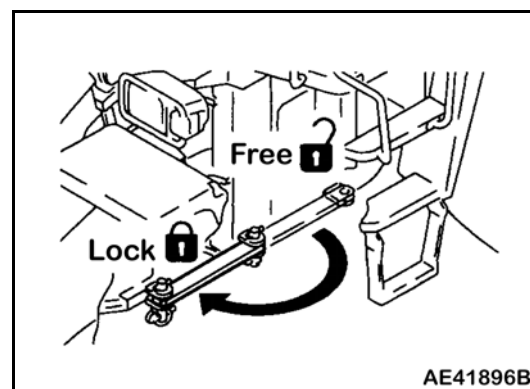
Charging Rate (%)	Electrolyte Temperature			
	20°C (68°F)	0°C (32°F)	-10°C (14°F)	-20°C (-4°F)
100	1.28	1.29	1.30	1.31
90	1.26	1.27	1.28	1.29
80	1.24	1.25	1.26	1.27
75	1.23	1.24	1.25	1.26

- As the battery capacity drops drastically 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 electrolyte level is low, add distilled water in the morning before beginning work.
- Do not add water after the day's work. Diluted electrolyte in the battery may freeze during the night.

Warming-Up Operation for Steering Hydraulic Circuit

WARNING

- If the oil temperature is low, when the steering wheel is turned and stopped there may be a time lag before the machine turns and stops.
- Set the safety bar to the LOCK position to ensure safety.
- Carry out the warming-up operation in an open area.
- Do not relieve the pressure in the hydraulic circuit continuously for more than five seconds.



When the temperature is low, do not start the operation of the machine immediately after starting the engine.

Warming Up Steering Hydraulic Circuit

Slowly operate the steering wheel to the left and right to warm up the oil in the steering valve. Repeat this operation for about 10 minutes to warm up the oil.

Remark

Turn the steering wheel a little and stop in that position. Confirm that the machine turns by an angle equivalent to the amount that the steering wheel is turned.

Recommended Oil

Select the oil according to the ambient temperature; see “RECOMMENDED FUEL, COOLANT, AND LUBRICANTS” on page 3-11.

Precautions After Completion of Work

Mud and water on the undercarriage can freeze overnight and make machine movement difficult the following morning.

Observe the following precautions.

- Remove all mud and water from the machine body. In particular, wipe the hydraulic cylinder rods clean to prevent damage to the seals caused if mud, dirt, and/or water on the rod surface gets inside the seal.
- Park the machine on hard, dry ground. If this is impossible, park the machine on wooden boards. The boards help protect the tires from freezing to the ground so the machine can be moved the next morning.
- Open the drain valve and drain any water collected in the fuel system to prevent it from freezing.
- Fill the fuel tank to capacity. This minimizes moisture condensation in the tank when the temperature drops.

When Cold Weather Ends

When the season changes and the weather becomes warmer, do the following procedure.

- Replace all oil and fuel with fuel and oil of the specified viscosity.
- For details, see “RECOMMENDED FUEL, COOLANT, AND LUBRICANTS” on page 3-11.

LONG-TERM STORAGE

Before Storage

When putting the machine in storage for a long period (more than one month), do the following procedure.

- Clean and wash all parts and then store the machine indoors.
If the machine must be stored outdoors, select level ground and cover the machine with a sheet.
- Completely fill the fuel tank; this prevents moisture from collecting inside the tank.
- Lubricate and change the oil before storage.
- Apply a thin coat of grease to the exposed portion of the hydraulic cylinder piston rods.
- Disconnect the negative terminals of the battery. Cover the battery or remove it from the machine and store it separately.
- Set the lock lever to the LOCK position to prevent the machine from moving.
- To prevent corrosion, fill the cooling system with Komatsu genuine Supercoolant (AF-NAC) (density between 30% and 68%).

During Storage



- If it is necessary to perform the rust-prevention operation while the machine is indoors, open doors and windows for ventilation since the engine will be running.
 - Be sure to provide adequate ventilation in order to prevent gas poisoning.
-
- During storage, operate and move the machine for a short distance once a month so that a new film of oil coats the moving parts. At the same time, also charge the battery.
 - When operating the work equipment, wipe off all the grease from the hydraulic cylinder rods.
 - If the machine is equipped with an air conditioner, run the air conditioner for three to five minutes once a month to lubricate all parts of the air conditioner compressor.
Always run the engine at low idle when doing this.
 - Check the refrigerant level twice a year.

After Storage

Remark

If the machine has been stored without carrying out the monthly rust-prevention operation, contact your Komatsu distributor before returning the machine to operation.

Before returning the machine to operation after a long-term period of storage, do the following procedure.

- Wipe off the grease from the hydraulic cylinder rods.
- Add oil and grease at all lubrication points.
- When a machine is stored for a long period, moisture in the air mixes with the oil. Check the oil before and after starting the engine.

If there is water in the oil, change the oil.

- Check that there is no rust on the engine pulley and no abnormality in the belt.

If there is excessive rust on the belt contact surface of the pulley, remove it with a wire brush.

- If the belt is loose, adjust the belt tension to ensure that there is no slipping.

For details about adjusting the belt tension, see “Check Alternator Belt Tension, Adjust” on page 3-48.

TROUBLESHOOTING

When Machine Runs Out of Fuel

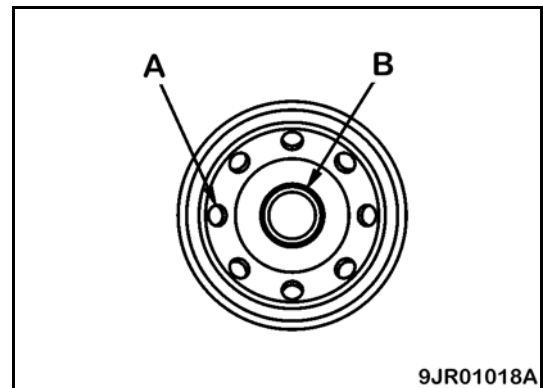
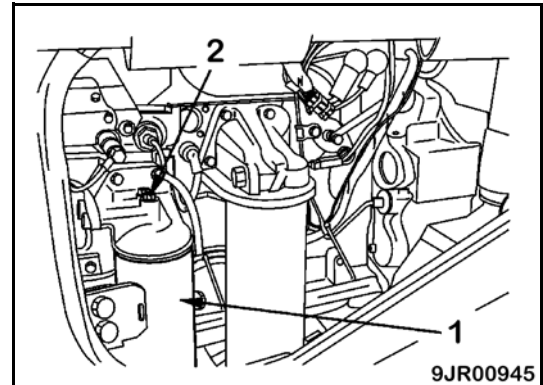
Always watch the fuel level and be careful not to run out of fuel.

WARNING

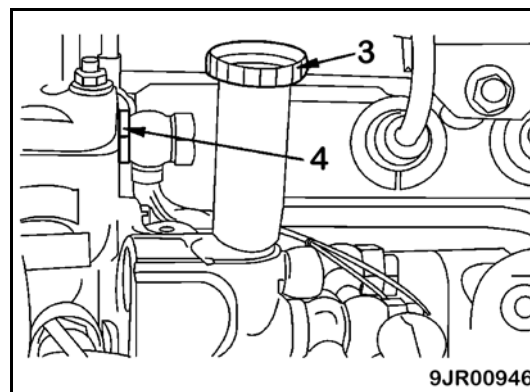
- This engine is made off higher precision parts than on the conventional fuel injection pump and nozzle. If dirt gets into the fuel system, it will cause problems. If there is any dirt stuck to the fuel line, use fuel to wash it off.
 - Be careful when opening the air bleed plug at the fuel filter head and the air bleeder of the supply pump. The system is still under pressure and fuel may spurt out.
 - When starting the engine after running out of fuel, check carefully that the area around the engine is safe before cranking the engine.
-
- ★ When starting the engine after running out of fuel, fill with fuel and bleed the air from the fuel system before starting the engine.
 - ★ If the engine has stopped because of lack of fuel, it is necessary to use the priming pump to bleed the air completely from the fuel circuit.

Bleeding Air from Fuel Line

1. Remove fuel filter cartridge (1); fill the inside of the filter with clean fuel, being careful not to let dirt or dust get into the filter; and then install the fuel filter cartridge.
 - Add fuel from small hole (A) (dirty side) at eight places. Do not add fuel from hole (B) (clean side) at the center. If clean fuel is not available, go to Step 2.
2. Loosen air bleed plug (2) at the fuel filter head.



3. Loosen the knob of priming pump (3), then pump the knob and check that the fuel comes out from air bleed plug (2).
4. Tighten air bleed plug (2).
Tightening torque: 7.8 to 9.8 N•m (69.0 to 86.7 lbf in)
5. Loosen air bleeder (4) of the supply pump.
6. Pump priming pump (3) 90 to 100 times, until no more bubbles come out with the fuel from air bleeder (4).
7. Tighten air bleeder (4).
Tightening torque: 4.9 to 6.0 N•m (43.4 to 53.1 lbf in)
8. Continue pumping until priming pump (3) becomes stiff.
9. Push the knob of priming pump (3) in and tighten it.
10. Turn the key in the starting switch to the START position and start the engine.
★ If the engine does not start, repeat the procedure from Step 2.



OPERATION

Towing the Machine

WARNING

- Serious injury or death could result if a disabled machine is towed incorrectly or if there is any mistake in the selection or inspection of the wire rope.
- Always be sure to check carefully that the capacity of the wire rope used for towing is ample for the weight of the towed machine.
- Never use a wire rope which has cut strands (A), reduced diameter (B), or kinks (C). There is danger that the rope may break during the towing operation.
- Always wear leather gloves when handling wire rope.
- Never tow a machine on a slope.
- During the towing operation, never stand between the towing machine and the machine being towed.
- Move the machine gradually to a constant speed. Do not apply any sudden load on the wire rope because the towing wire may break.
- If there is a failure in the engine or brake system, the brakes cannot be used. Be extremely careful when towing.
- If the steering and the brakes on the disabled machine cannot be operated, do not let anybody ride on the disabled machine.

Remark

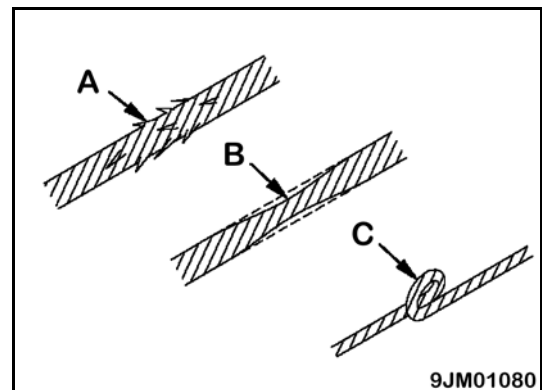
Towing is for moving the machine a short distance to a place where inspection and maintenance can be carried out.

The machine must not be towed for long distances.

For details of the permissible towing load for this machine, see "SPECIFICATIONS" on page 4-2. Do not tow any load greater than this.

For details about the procedure for towing a machine when it has broken down, contact your Komatsu distributor.

- ★ This machine must not be towed except in emergencies.



When towing the machine, take the following precautions.

- Before releasing the brakes, put blocks under the wheels to prevent the machine from moving.
If the wheels are not blocked, the machine may move suddenly.
- If it is impossible to operate the steering and brakes of the machine being towed, do not let anyone ride on the machine.
- Keep the angle of the tow rope as small as possible.
Keep the angle between the center lines of the two machines to within 30 degrees.
- The towing machine should normally be of the same class as the machine being towed.
Check that the towing machine has ample braking power, weight, and rimpull to allow it to control both machines on a slope or on the tow road.
- Use the specified towing pin for both the towing machine and the machine being towed.
- To protect the operator if the towing wire or towing bar breaks, install protective plates on both the towing machine and the machine being towed.

- When towing a machine, tow it at a low speed of less than 2 km/h (1.2 mph) and for a distance of a few meters to a place where repairs can be carried out.

The machine should be towed only in emergencies. If the machine must be moved long distances, use a transporter.

- Check that the tow rope or bar is of ample strength for the weight of the machine being towed. If the machine being towed must travel through mud or up hills, use a tow rope or bar of a strength of at least 1.5 times the weight of the machine being towed.
- If the machine is moved suddenly, the tow rope or bar will be subjected to excessive load and may break. Start the machine gradually and travel at a constant speed.
- When towing a machine downhill, use a larger machine for towing to provide ample rimpull and braking power, or connect another machine to the rear of the machine being towed. This prevents the machine from losing control and turning over.
- Towing may be carried out under different conditions; it is impossible to determine beforehand the requirements for towing.

Towing on flat horizontal roads requires the minimum rimpull; towing on slopes or on uneven road surfaces requires the maximum rimpull.

When Engine Can Be Used

- If the transmission and steering wheel can be operated and the engine is running, it is possible to tow the machine out of mud or to move it for a short distance to the edge of the road.
- The operator should sit in the cab of the machine being towed and operate the steering in the direction that the machine is towed.

When Engine Cannot Be Used

When towing a machine with the engine stopped, use the following procedure.

1. The transmission oil does not lubricate the system; remove the front and rear drive shafts. If necessary, block the tires to prevent the machine from moving.
2. The steering cannot be operated; remove the steering cylinder.

Even if the brakes are in good condition, the brakes can only be used a limited number of times. There is no change in the operating force for the brake pedal but the braking force is reduced each time the pedal is depressed.

3. Connect the towing equipment securely. When carrying out towing operations, use two machines of at least the same class as the machine being towed.

Connect one machine to the front and one to the rear of the machine being towed; remove the blocks from the tires; and tow the machine.

4. The parking brake cannot be turned OFF.

Release the parking brake; see “Releasing Parking Brake” on page 2-118.

OPERATION

Releasing Parking Brake

WARNING

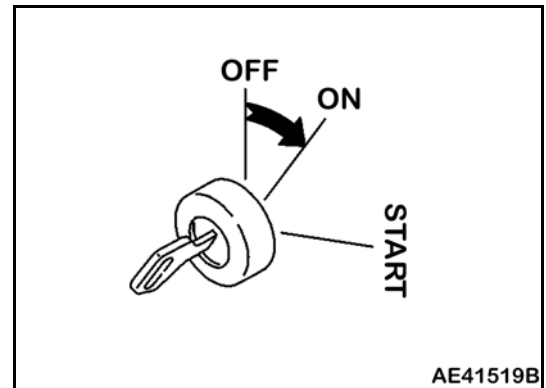
- When releasing the parking brake, stop the machine on level ground and check that the surrounding area is safe. If it is necessary to release the brake on a slope in an emergency, block the tires before starting the operation.
- If the parking brake is released, there is no braking force. Ensure that the situation is safe when moving the machine.

If the engine does not run for some reason, use the following methods to release the parking brake and tow the machine.

Releasing Parking Brake by Using Emergency Parking Brake Cancel Switch

If the pressure in the brake accumulator is high, do the following steps.

1. Turn the starting switch ON.



2. Set the emergency parking brake switch to the CANCEL position.

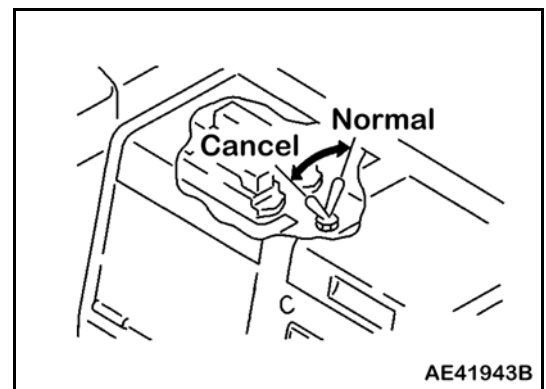
When doing this, check that the parking brake caution lamp goes out. When the switch is turned to the CANCEL position, the alarm buzzer sounds continuously.

Remark

Normally, keep this switch at the NORMAL position to actuate it.

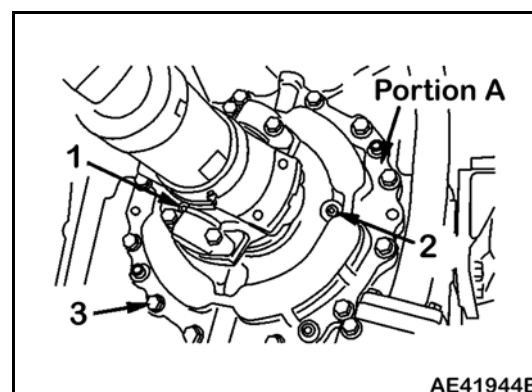
If the pressure in the brake accumulator is low, the parking brake caution lamp will not go out and the alarm buzzer will sound with a continuous beep.

If this happens, release the brake. For details, see "Releasing Parking Brake Mechanically" on page 2-119.



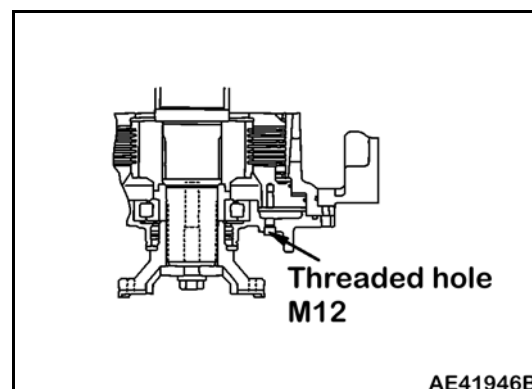
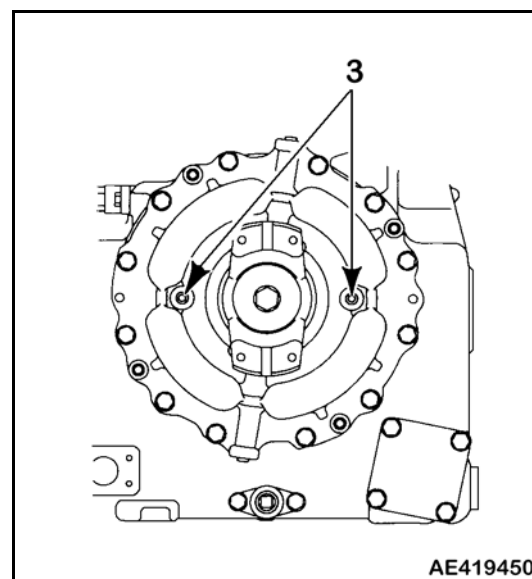
Releasing Parking Brake Mechanically

1. Remove plugs (1) and (2) at the rear of the transmission case.
2. Remove bolts (3) (remove 2 out of 12) at portion A, installing the parking brake chamber cover.



3. Screw bolts (3) into the holes from which plugs (1) and (2) were removed and tighten uniformly until they stop.

The parking brake is released.



Emergency Travel Operation

The normal gearshifting operation is carried out by electric signals. If there is a failure in the electrical system and the machine does not move, contact your Komatsu distributor to have the machine moved.

Remark

Always ask your Komatsu distributor to carry out the emergency travel operation.

OPERATION

If Battery is Discharged

Precautions



- It is dangerous to charge a battery when it is mounted on a machine. Make sure that it is removed before charging.
- When checking or handling the battery, stop the engine and turn the starting switch key to the OFF position.
- The battery generates hydrogen gas; there is a hazard of explosion. Do not smoke nor bring lighted cigarettes near the battery, or do anything that will cause sparks.
- Battery electrolyte is dilute sulfuric acid; it will attack your clothes and skin.
 - If it gets on your clothes or on your skin, immediately wash it off with a large amount of water.
 - If it gets in your eyes, wash your eyes out with copious amounts of fresh water and consult a doctor immediately.
- When handling batteries, always wear safety glasses and rubber gloves.
- When removing the battery, first disconnect the cable from the negative (-) terminal. When installing, connect the positive (+) terminal first.
- If a tool touches the positive terminal and the chassis, there is danger that it will cause a spark. Be extremely careful.
- If the terminals are loose, there is danger that the defective contact may generate sparks that will cause an explosion.
- When removing or installing the terminals, check which is the positive (+) terminal and which is the negative (-) terminal.

Remark

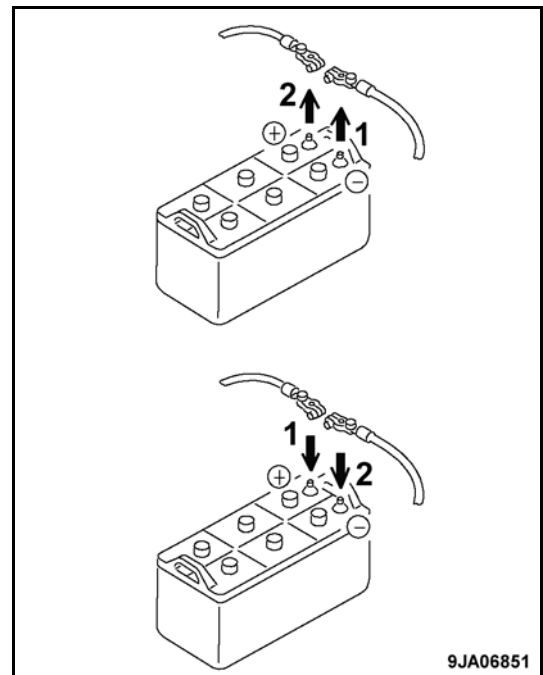
The batteries are on both sides at the rear of the machine. The battery used for the ground is on the right side of the machine.

Removing the Battery

1. Remove the ground cable (normally connected to the negative (-) terminal).
 - Loosen the nuts of the terminal and remove the cable from the battery.
 - ★ If any tool touches between the positive terminal and the chassis, there is danger of sparks being generated.
2. Loosen the nuts and remove the cable from the positive (+) terminal.
3. Remove the battery clamp.
4. Remove the battery.

Installing the Battery

1. Install the battery and fix it securely with the battery clamp.
Tightening torque: 2.0 to 2.9 N•m (17.7 to 25.7 lbf in)
2. Connect the cable to the positive (+) terminal.
 - Insert the hole of the terminal on the battery and tighten the nuts.Tightening torque: 5.9 to 9.8 N•m (52.2 to 86.7 lbf in)
3. Connect the ground cable to the negative (-) terminal and tighten the nuts.



Precautions for Charging Battery

WARNING

- If you do not handle the battery correctly when charging it, there is danger that the battery may explode.
- Always follow the instructions in "If Battery is Discharged" on page 2-120 and the instruction manual accompanying the charger.

Observe the following rules.

- Do not use or charge the battery if the battery electrolyte level is below the LOWER LEVEL line. This may cause an explosion.

Check the battery electrolyte level periodically and add distilled water to bring the electrolyte level to the UPPER LEVEL line.

- 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. Connect the negative (-) charger clip of the charger to the negative (-) terminal of the battery.

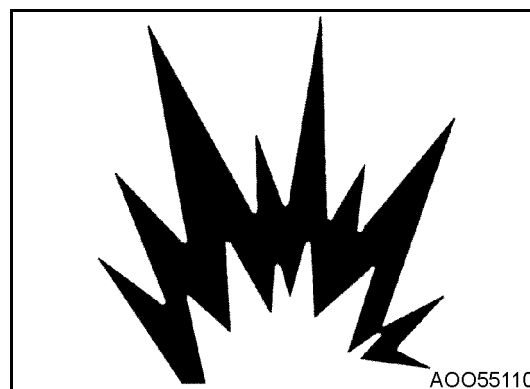
Be sure to fix the clips securely.

- 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; 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 danger that this may ignite the battery electrolyte and cause the battery to explode.



OPERATION

Starting Engine With Booster Cable

Precautions When Connecting or Disconnecting Booster Cable

WARNING

- When connecting the cables, never let the positive (+) and negative (-) terminals contact each other.
- When starting the engine with a booster cable, always wear safety glasses and rubber gloves.
- Be careful not to let the normal machine and the problem machine contact each other. This prevents sparks from generating near the battery which could ignite the hydrogen gas given off by the battery.
- Make sure that there is no mistake in the booster cable connections. The final connection is to the engine block of the problem machine. Sparks will be generated when this is done; connect to a place as far as possible from the battery.
- When disconnecting the booster cable, be careful not to bring the clips in contact with each other or with the machine body.

When starting the engine with a booster cable, follow these instructions.

Remark

The size of the booster cable and clips should be suitable for the battery size.

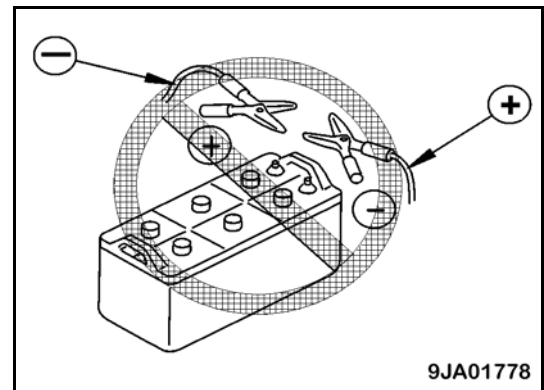
The battery of the normal machine must be the same capacity as the battery on the machine to be started.

Check the cables and clips for damage or corrosion.

Make sure that the cables and clips are firmly connected.

Check that the safety lock levers and the parking brake levers on both machines are in the LOCK position.

Check that each lever is in the NEUTRAL position.

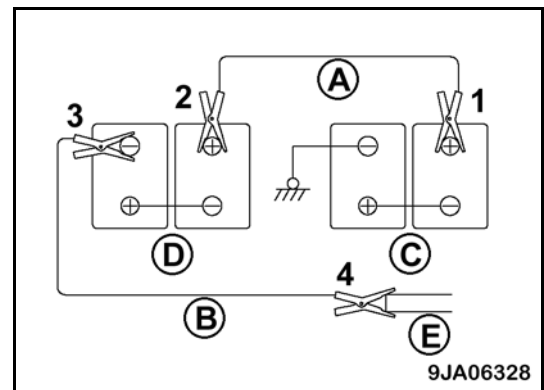


Connecting Booster Cable

Keep the starting switch of the normal machine and problem machine at the OFF position.

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

1. Connect the clip of booster cable (A) to the positive (+) terminal of battery (C) on the problem machine.
2. Connect the clip at the other end of booster cable (A) to the positive (+) terminal of battery (D) on the normal machine.
3. Connect the clip of booster cable (B) to the negative (-) terminal of battery (D) on the normal machine.
4. Connect the clip at the other end of booster cable (B) to engine block (E) on the problem machine.



Starting Engine

WARNING

- Always check that the safety lock lever is set to the LOCK position, regardless of whether the machine is working normally or has failed.
- Check that all the control levers are at the HOLD or neutral position.

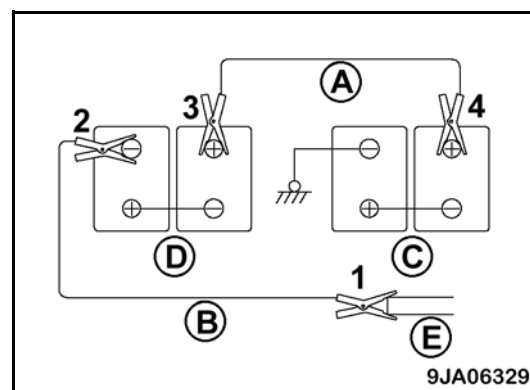
1. Make sure the clips are firmly connected to the battery terminals.
2. Start the engine of the normal machine and keep it running at high idle speed.
3. Turn the starting switch of the problem machine to the START position and start the engine.

If the engine does not start at first, wait at least two minutes before trying again.

Disconnecting Booster Cable

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

1. Remove the clip of booster cable (B) from engine block (E) on the problem machine.
2. Remove the clip of booster cable (B) from the negative (-) terminal of battery (D) on the normal machine.
3. Remove the clip of booster cable (A) from the positive (+) terminal of battery (D) on the normal machine.
4. Remove the clip of booster cable (A) from the positive (+) terminal of battery (C) on the problem machine.



MEMORANDUM

Other Troubleshooting

Electrical System

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

Problem	Main Causes	Remedy
Lamp does not glow brightly even when the engine runs at high speed. Lamp flickers while engine is running.	<ul style="list-style-type: none"> • Defective wiring • Defective adjustment of alternator belt tension 	<ul style="list-style-type: none"> • (Check, repair loose terminals, disconnections.) • Adjust alternator belt tension. * See EVERY 250 HOURS SERVICE.
Even when the engine is running, the battery charge circuit caution lamp does not go out.	<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 ON.	<ul style="list-style-type: none"> • Defective wiring • Insufficient battery charge 	<ul style="list-style-type: none"> • (Check, repair.) • Charge.
Pinion of starting motor keeps going in and out.	<ul style="list-style-type: none"> • Insufficient battery charge 	<ul style="list-style-type: none"> • Charge.
Starting motor turns engine sluggishly.	<ul style="list-style-type: none"> • Insufficient battery charge • Defective starting motor 	<ul style="list-style-type: none"> • Charge. • (Replace.)
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.
Engine preheating pilot lamp does not illuminate.	<ul style="list-style-type: none"> • Defective wiring • Defective glow relay, glow controller, water temperature sensor • Defective engine preheating pilot lamp 	<ul style="list-style-type: none"> • (Check, repair.) • (Replace.) • (Replace.)
Even when engine is stopped, battery charge circuit caution lamp does not illuminate (starting switch at ON position).	<ul style="list-style-type: none"> • Defective wiring • Defective monitor 	<ul style="list-style-type: none"> • (Check, repair.) • (Replace.)

* See "Every 250 Hours Service" on page 3-46.

OPERATION

Chassis

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

Problem	Main Causes	Remedy
Transmission		
Engine is running but machine does not move.	<ul style="list-style-type: none"> • Parking brake applied. • Directional lever is not shifted properly. • Lack of oil in transmission case 	<ul style="list-style-type: none"> • Release parking brake. • Shift lever properly. • Add oil to specified level. * See WHEN REQUIRED.
Even when engine is run at full throttle, machine only moves slowly and lacks power.	<ul style="list-style-type: none"> • Lack of oil in transmission case • Screen is clogged. 	<ul style="list-style-type: none"> • Add or drain oil to specified level. * See WHEN REQUIRED. • (Disassemble, clean.)
Oil overheats.	<ul style="list-style-type: none"> • Too much oil or too little oil • Machine is not traveling in correct speed range. • Torque converter is stalled for long periods. • Engine is overheating. 	<ul style="list-style-type: none"> • Add or drain oil to specified level. * See WHEN REQUIRED. • Place in correct speed range. • Reduce stall time. • (Check engine.)
Noise generated.	<ul style="list-style-type: none"> • Lack of oil 	<ul style="list-style-type: none"> • Add oil to specified level. * See WHEN REQUIRED.
Axle		
Noise generated.	<ul style="list-style-type: none"> • Lack of oil • Improper oil used (for machines with limited slip differential) 	<ul style="list-style-type: none"> • Add oil to specified level. * See WHEN REQUIRED. • Replace with specified oil.
Brake		
Brake is not applied when pedal is depressed.	<ul style="list-style-type: none"> • Disc has reached wear limit. • Defective hydraulic system • Lack of oil • Air in brake line 	<ul style="list-style-type: none"> • (Replace disc.) • (Check, repair.) • Add oil to specified level. ** See EVERY 100 HOURS SERVICE. • Bleed air. * See WHEN REQUIRED.
Brake drags or remains applied.	<ul style="list-style-type: none"> • Vent hole of brake valve is clogged. 	<ul style="list-style-type: none"> • Clean
Brakes squeal.	<ul style="list-style-type: none"> • Disc is worn. • Large amount of water in axle oil • Deteriorated axle oil due to overuse of brake 	<ul style="list-style-type: none"> • (Replace disc.) • Change axle oil. • Change axle oil.

* See "When Required" on page 3-21.

** See "Every 100 Hours Service" on page 3-44.

Problem	Main Causes	Remedy
Steering		
Steering wheel is heavy.	<ul style="list-style-type: none"> Defective hydraulic system Lack of oil 	<ul style="list-style-type: none"> (Check, repair.) Add oil to specified level. * See EVERY 100 HOURS SERVICE.
Steering wheel is loose.	<ul style="list-style-type: none"> Play in steering cylinder pin Defective hydraulic system Lack of oil 	<ul style="list-style-type: none"> Grease bearing or replace pin and bushing where there is play. (Check, repair.) Add oil to specified level. * See EVERY 100 HOURS SERVICE.
Parking brake		
Brake does not work well.	<ul style="list-style-type: none"> Disc is worn. 	<ul style="list-style-type: none"> (Replace disc.)
Brake drags or remains applied.	<ul style="list-style-type: none"> Lack of oil in transmission case Screen is clogged. 	<ul style="list-style-type: none"> Add oil to specified level. ** See WHEN REQUIRED. (Disassemble, clean.)
Hydraulic system		
Lacks bucket lifting power. Takes time to lift the bucket.	<ul style="list-style-type: none"> Lack of oil Clogged hydraulic tank filter 	<ul style="list-style-type: none"> Add oil to specified level. * See EVERY 100 HOURS SERVICE. Replace filter. *** See EVERY 2000 HOURS SERVICE.
Excessive bubbles in oil	<ul style="list-style-type: none"> Low quality oil being used Oil level is low. Air in oil line 	<ul style="list-style-type: none"> Replace with good quality oil. Add oil to specified level. * See EVERY 100 HOURS SERVICE. Bleed air. ** See EVERY 2000 HOURS SERVICE.
Hydraulic pressure is low.	<ul style="list-style-type: none"> Oil level is low and pump is sucking in air. 	<ul style="list-style-type: none"> Add oil to specified level. * See EVERY 100 HOURS SERVICE. Then bleed air. ** See EVERY 2000 HOURS SERVICE.
Movement of cylinder is irregular.	<ul style="list-style-type: none"> Oil level is low. 	<ul style="list-style-type: none"> Add oil to specified level. * See EVERY 100 HOURS SERVICE.

* See "Every 100 Hours Service" on page 3-44.

** See "When Required" on page 3-21.

*** See "Every 2000 Hours Service" on page 3-65.

OPERATION

Engine

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

Problem	Main Causes	Remedy
Engine oil pressure caution pilot lamp illuminates.	<ul style="list-style-type: none"> • Engine oil pan level is low (sucking in air). • Clogged oil filter cartridge • Defective tightening of oil pipe joint; oil leakage from damaged part • Defective monitor 	<ul style="list-style-type: none"> • Add oil specified level. * See CHECK BEFORE STARTING. • Replace cartridge. ** See EVERY 500 HOURS SERVICE. • (Check, repair.) • (Replace.)
Steam is emitted from top part of radiator (pressure valve). Water temperature gauge is in red range. Coolant temperature monitor illuminates.	<ul style="list-style-type: none"> • Cooling water level low, water leakage • Dirt or scale accumulated in cooling system • Clogged radiator fin or damaged fin • Defective thermostat • Loose radiator filler cap (high altitude operation) • Defective monitor 	<ul style="list-style-type: none"> • Check, add cooling water, repair. *** See WHEN REQUIRED. • Change cooling water, clean inside of cooling system. *** See WHEN REQUIRED. • Clean or repair. *** See WHEN REQUIRED. • (Replace thermostat.) • Tighten cap or replace packing. • (Replace.)
Water temperature gauge is in white range on left.	<ul style="list-style-type: none"> • Defective thermostat • Defective monitor 	<ul style="list-style-type: none"> • (Replace thermostat.) • (Replace.)
Engine does not start when starting motor is turned.	<ul style="list-style-type: none"> • Lack of fuel • Air in fuel system • Defective supply pump or injector • Starting motor cranks engine too slowly. • Engine preheating pilot lamp does not illuminate. • Defective compression • Defective valve clearance 	<ul style="list-style-type: none"> • Add fuel. * See CHECK BEFORE STARTING. • Repair place where air is sucked in. (Replace pump or nozzle.) • **** See ELECTRICAL SYSTEM • **** See ELECTRICAL SYSTEM • (Check, repair.) • (Adjust valve clearance.)
Exhaust gas is white or blue.	<ul style="list-style-type: none"> • Too much oil in oil pan • Lack of fuel 	<ul style="list-style-type: none"> • Add oil to specified level. * See CHECK BEFORE STARTING. • Add fuel * See CHECK BEFORE STARTING.
Exhaust gas occasionally turns black.	<ul style="list-style-type: none"> • Clogged air cleaner element • Defective nozzle • Defective compression • Defective turbocharger • Defective injector 	<ul style="list-style-type: none"> • Clean or replace. *** See WHEN REQUIRED. • (Replace nozzle.) • (Check, repair.) • (Clean or replace turbocharger.) • (Check, adjust, repair.)
Combustion noise occasionally makes breathing sound.	<ul style="list-style-type: none"> • Defective nozzle 	<ul style="list-style-type: none"> • (Replace nozzle.)
Abnormal noise generated (combustion or mechanical).	<ul style="list-style-type: none"> • Low grade fuel being used • Overheating • Damage inside muffler • Excessive valve clearance 	<ul style="list-style-type: none"> • Change to specified fuel. • Refer to "Water temperature gauge is in red range" in this table. • Replace muffler. • (Adjust valve clearance.)
Error code displayed on monitor Alarm buzzer sounds. Engine suddenly lost power (entered delay mode)	Contact your Komatsu distributor.	

Notes

* See "Check Before Starting Engine" on page 2-45.

** See "Every 500 Hours Service" on page 3-53.

*** See "When Required" on page 3-21.

**** See "ELECTRICAL" on page 2-40.

OPERATION

Relationship of Electronic Control System

If an error code is displayed on the main monitor portion (normally the speedometer display) of the machine monitor, follow the corresponding table to carry out self-diagnostic troubleshooting.

Error Code	Transmission Control System		Option			
			ECSS Control System		Work Equipment Control System	
	Problem System	Condition of Machine	Problem System	Condition of Machine	Problem System	Condition of Machine
E00	Disconnection in travel speed sensor system	Does not shift gears automatically (switches to manual gearshifting)	-	-	-	-
	Disconnection, short circuit, or abnormality in engine speed sensor system	Engine speed taken as 2100 rpm (there is gearshifting shock)	-	-	-	-
	Disconnection in fill switch	Clutch is engaged without fill signal (there is shock)	-	-	-	-
E01+ CALL	Short circuit in transmission oil temperature sensor	Impossible to select suitable gearshift data for transmission oil temperature (there is gearshifting shock)	-	-	Short circuit between damping solenoid and + side power supply 24 V	Boom movement is slow
	-	-	-	-	-	-
	-	-	-	-	-	-
	-	-	-	-	-	-
	-	-	-	-	-	-
	-	-	-	-	-	-

Error Code	Option				Alarm Buzzer	Action by Operator
	Joystick Control System		Electronic Governor System			
	Problem System	Condition of Machine	Problem system	Condition of machine		
E00	Disconnection, short circuit, or short circuit with ground in joystick FNR signal system	Returns to neutral (possible to manual switch)	-	-	No	Normal work possible with manual operation
	-	-	-	-		Normal work possible, but there is gearshifting shock
	-	-	-	-		
E01+ CALL	-	-	-	-	Yes	Travel under own power possible; move to safe place; call service
	-	-	Power supply	Not cut when starting switch is turned OFF		
	-	-	Supply pump drive circuit	Deterioration in emission		
	-	-	Supply pump	Deterioration in emission		
	-	-	Common rail pressure normal (1st stage)	Normal operation		
	-	-	Impossible to control common rail drop in pressure (1st stage)	Deterioration in emission; increase in noise		
	-	-	Disconnection in TWV	Drop in output; increase in noise		

OPERATION

Error Code	Transmission Control System		Option			
			ECSS Control System		Work Equipment Control System	
	Problem System	Condition of Machine	Problem System	Condition of Machine	Problem System	Condition of Machine
E01 + CALL	-	-	-	-	-	-
	-	-	-	-	-	-
	-	-	-	-	-	-
	-	-	-	-	-	-
	-	-	-	-	-	-
	-	-	-	-	-	-
	-	-	-	-	-	-
	-	-	-	-	-	-
	-	-	-	-	-	-
	-	-	-	-	-	-

Error Code	Option				Alarm Buzzer	Action by Operator
	Joystick Control System		Electronic Governor System			
	Problem System	Condition of Machine	Problem system	Condition of machine		
E01 + CALL	-	-	Short circuit in TWV	Drop in output	Yes	Travel under own power possible; move to safe place; call service
	-	-	Boost pressure sensor	Drop in output; black smoke when accelerating		
	-	-	Common rail pressure sensor	Deterioration in emission; increase in noise		
	-	-	Ne sensor	Engine speed unstable; engine stops		
	-	-	G sensor	Normal operation but no backup when Ne is abnormal		
	-	-	Water temperature (low temperature) system	Deterioration in exhaust gas color; drop in starting ability		
	-	-	Fuel injection amount adjustment switch signal	Output excessive, insufficient		
	-	-	Accelerator sensor	Impossible to control with accelerator pedal		
	-	-	Preheating relay coil	Drop in starting ability when temperature is low		
	-	-	Short circuit in starting switch	Engine acceleration impossible; black smoke		

OPERATION

Error Code	Transmission Control System		Option			
			ECSS Control System		Work Equipment Control System	
	Problem System	Condition of Machine	Problem System	Condition of Machine	Problem System	Condition of Machine
CALL	Fill switch short circuiting with ground	Becomes neutral; travel impossible (modulation output OFF)	-	-	Wiring harness on damping solenoid return side short circuiting with power source	Remote positioner function stopped; possible burning out of controller
	Disconnection, short circuit with ground, or short circuit in shift lever system	Becomes neutral; travel impossible (judges controller input as N)	-	-	-	-
	Disconnection, short circuit with ground, or short circuit in F, R ECMV solenoid signal system	Becomes neutral; travel impossible (ECMV output OFF)	-	-	-	-
	Disconnection, short circuit with ground, or short circuit with speed range ECMV solenoid signal system	Becomes neutral; travel impossible (ECMV output OFF)	-	-	-	-

Error Code	Option				Alarm Buzzer	Action by Operator
	Joystick Control System		Electronic Governor System			
	Problem System	Condition of Machine	Problem system	Condition of machine		
CALL	-	-	Power supply	Engine stops	Yes	Stop machine; turn starting switch OFF; move to safe place, call service
	-	-	Drive circuit	Drop in performance; deterioration in emission; engine stops; black smoke; white smoke		
	-	-	Common rail pressure abnormal (2nd stage)	Injection pump stops		
	-	-	Impossible to control common rail, drop in pressure (2nd stage)	Injection pump stops		

OPERATION**Transmission Control System**

Error Code	Item	Problem System	
		Short Circuit	Disconnection
10	Backup lamp relay	○	○
11	None	—	—
12	F ECMV Solenoid	○	○
13	R ECMV Solenoid	○	○
14	1st ECMV Solenoid	○	○
15	2nd ECMV Solenoid	○	○
16	3rd ECMV Solenoid	○	○
17	4th ECMV Solenoid	○	○
18	None	-	-
19	Joystick direction switch signal	○	○
20	Direction switch signal	○	○
21	Range switch signal	○	○
22	Travel speed sensor	X	○
23	Engine speed sensor	○	○
24	Abnormality in EEP ROM	○	○
25	Transmission oil pressure sensor	○	X
26	F ECMV fill switch	○	X
27	R ECMV fill switch	○	X
28	1st ECMV fill switch	○	X
29	2nd ECMV fill switch	○	X
30	3rd ECMV fill switch	○	X
31	4th ECMV fill switch	○	X
32	R or F ECMV fill switch	X	○
33	1st, 2nd, 3rd, or 4th ECMV fill switch	X	○

ECSS Control System

Error Code	Item	Problem System	
		Short Circuit	Disconnection
d0	ECSS relay	○	○

Joystick Control System

Error Code	Item	Problem System	
		Short Circuit	Disconnection
56	Joystick caution relay	○	○
57	Steering R (right) solenoid	○	X
58	Steering L (left) solenoid	○	X
59	Steering R (right) short circuit at solenoid HOT end	○	X
60	Steering L (left) short circuit at solenoid HOT end	○	X
61	Steering solenoid cut relay	○	○
62	Abnormality in joystick neutral switch	○	○
63	Abnormality in joystick potentiometer	○	○

OPERATION**Electronic Governor Control System**

Error Code	Electronic Governor Controller Fault Code	Item
90	E56	Power source abnormality 1
	E7A	Abnormality in common rail pressure (control system 2nd stage)
	E7C	No-force feed of pump (2nd stage)
	E80	Abnormality in controller (drive circuit)
91	E1B	Abnormality in Ne sensor
	E1C	Abnormality in G sensor
	E31	Abnormality in accelerator sensor
	E3C	Abnormality in boost pressure sensor
	E51	Abnormality in preheating relay coil
	E54	Short circuit in starting switch
	E5A	Abnormality in fuel injection amount adjustment switch signal
	E57	Power source abnormality 2 (not cut when starting switch is turned OFF)
	E6A	Abnormality in water temperature (low temperature) sensor system
	E70	PCV1 excess current detected
	E71	PCV2 excess current detected
	E74	PCV1 disconnection detected
	E75	PCV2 disconnection detected
	E77	Abnormality in common rail pressure sensor
	E79	Abnormality in common rail pressure (control system 1st stage)
	E7B	No-force feed of pump (1st stage)
	E7D	Abnormality in common rail pressure (excess forced feed of pump)
	E81	TWV #1 disconnection detected
	E82	TWV #2 disconnection detected
	E83	TWV #3 disconnection detected
	E84	TWV #4 disconnection detected
	E85	TWV #5 disconnection detected
	E86	TWV #6 disconnection detected
	E8A	Short circuit in TWV #1, 2, 3 system
E8B	Short circuit in TWV #4, 5, 6 system	
99	E22	Overrun

MAINTENANCE

GUIDES TO MAINTENANCE

Remark

Do not perform any inspection and maintenance operation that is not found in this manual.

WARNING

Due to the high voltage/amps and high-pressure fuel, avoid any contact with the engine electrical system (1) and the fuel injection system (2) when the engine is running. Severe injury may result.

Check Service Meter

- Check service meter reading every day to see if it is time for any necessary maintenance to be performed.

Komatsu Genuine Replacement Parts

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

Komatsu Genuine Oils

- Use Komatsu genuine oils and greases.
- Choose oils and greases with the proper viscosities specified for the ambient temperature.

★ See “RECOMMENDED FUEL, COOLANT, AND LUBRICANTS” on page 3-11.

Always Use Clean Washer Fluid

- Use automobile window washer fluid.
- Be careful not to let any dirt get into the fluid.

Always Use Clean Oil and Grease

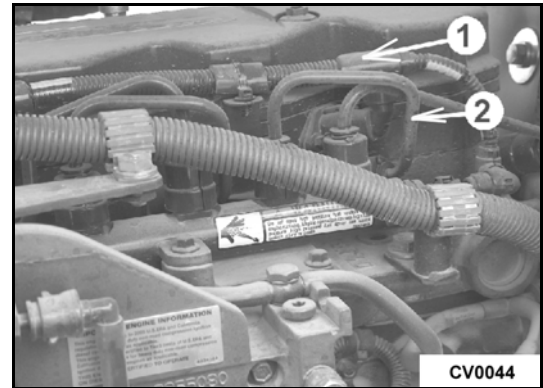
- Use clean oil and grease.
- Keep containers for the oil and grease clean.
- Keep foreign materials away from oil and grease.

Checking for Foreign Materials in Drained Oil and On Filters

- After oil is changed or filters are replaced, check the old oil and filters for metal particles and foreign materials.
- If large quantities of metal particles or foreign materials are found, always report to the person in charge and take suitable action.

Fuel Strainer

- Do not remove the fuel strainer from the filler port when adding fuel.



Welding Instructions

- Turn the engine starting switch off; wait for approximately one minute; then disconnect the battery negative (-) terminal.
- Do not apply more than 200V continuously.
- Connect grounding cable within 1 m (3.3 ft) of the area to be welded.
 - If the grounding cable is connected near instruments, connectors, etc., the instruments may malfunction.
- Avoid seals or bearings located between the area to be welded and the grounding point.
- Do not use the area around the work equipment pins or hydraulic cylinders as the grounding point.

Do Not Drop Things Inside Machine

- When opening inspection windows or the oil filler port of the tank, be careful not to drop nuts, bolts, or tools inside the machine.
 - If such things are dropped inside the machine, it may cause damage and/or malfunction of the machine and lead to failure.
 - If you drop anything inside the machine, always remove it immediately.
- Do not put unnecessary things in your pockets. Carry only things which are necessary for inspection.

Dusty Work Sites

When working at dusty work sites, do the following:

- Check the air cleaner clogging caution pilot lamp frequently to see if the air cleaner is clogged. Clean the air cleaner element at a shorter interval 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 an accumulation of dust.
- When inspecting or changing oil, move the machine to a place that is free of dust to prevent dirt from getting into the oil.

Avoid Mixing Oil

- Never mix different brands or grades of oil.
- If a different brand or grade of oil has to be added, drain the old oil and replace all the oil with the new brand or grade of oil.

Locking Inspection Covers

- Lock the inspection cover in position securely with the lock bar.
 - If inspection or maintenance is performed with the inspection cover open and not locked into position, there is a danger that it may be suddenly blown shut by the wind and injure the worker.

Bleeding Air from Hydraulic Circuit

- If the hydraulic oil equipment has been repaired or replaced and if the hydraulic hoses, pipes, etc. have been disconnected, it is necessary to bleed air from the circuit.
- ★ See “Change Oil in Hydraulic Tank, Replace Hydraulic Tank Filter Element” on page 3-65.

MAINTENANCE

Precautions When Installing Hydraulic Hoses

- When removing parts at locations where there are O-rings or gasket seals, clean the mounting surface and replace with new parts.
 - When doing this, do not forget to assemble the O-rings and gaskets when installing the hoses.
- When installing the hoses, do not twist or bend them sharply. If installed in this manner, the hose will be damaged and its service life drastically reduced.

Checks After Inspection and Maintenance

If you forget to perform the checks after inspection and maintenance, unexpected problems may occur. This may lead to serious injury or property damage. Always do the following checks.

Checks after Operation (with engine stopped)

- Have any inspection and maintenance points been forgotten?
- Have all inspection and maintenance items been performed correctly?
- Have any tools or parts been dropped inside the machine?
 - It is particularly dangerous if parts are dropped inside the machine and get caught in the lever linkage mechanism.
- Are there any coolant or oil leaks?
- Have all nuts and bolts been tightened?

Checks When Engine is Running

- Be extremely careful to ensure safety during this operation. When checking the operation of the engine, see “Running the Machine During Maintenance” on page 1-34.
- Check that the inspected and maintenance area is working properly.
- Increase the engine speed and check for coolant, oil, and fuel leaks.

OUTLINES OF SERVICE

- Always use Komatsu genuine parts for replacement parts, grease, or oil.
- When changing or adding oil, do not mix different types of oil.
- When changing the type of oil, drain all the old oil and fill completely with the new oil.
- Always replace the filter at the same time.
 - There is no problem if the small amount of oil remaining in the piping mixes with the new oil.
- Unless otherwise specified, when the machine is shipped from the factory, it is filled with the oil and coolant listed in the following table.

Item	Type
Engine oil pan	Engine oil EO15W40-DH (Komatsu genuine parts)
Transmission case	Power train oil TO30 (Komatsu genuine parts)
Hydraulic oil system	Engine oil EO10W30-DH (Komatsu genuine parts)
Axle	Axle oil AXO80 (Komatsu genuine parts)
Radiator	Supercoolant AF-NAC (Komatsu genuine parts) (density: 30% or above)

Handling Oil, Fuel, Coolant, and Performing Oil Clinic

Oil

- Oil is used in the engine and hydraulic equipment under extremely severe conditions (high temperature, high pressure); it deteriorates with use.
- Always use oil that matches the grade and maximum and minimum ambient temperatures recommended in this manual.
 - ★ See “RECOMMENDED FUEL, COOLANT, AND LUBRICANTS” on page 3-11.
- Even if the oil is not dirty, always change the oil after the specified interval.
- Oil corresponds to blood in the human body; it provides life-sustaining properties. Always be careful when handling it to prevent any impurities (water, metal particles, dirt, etc.) from getting into the oil.
 - The majority of problems with machines are caused by the entry of such impurities.
 - Be very careful not to contaminate the oil when storing or adding it.
- Never mix oils of different grades or brands.
- Always add the specified amount of oil.
 - Having too much oil or too little oil both cause problems.
- If the oil in the work equipment is not clear, there is probably water or air getting into the circuit.
 - ★ In such cases, contact your Komatsu distributor for inspection and repair.
- When changing the oil, always replace the related filters at the same time.

MAINTENANCE

- Komatsu strongly recommends that you have an analysis made of the oil periodically to check the condition of your machine.
 - ★ For details of this service, contact your Komatsu distributor.
- When using commercially available oil, it may be necessary to reduce the oil change interval.
 - We recommend that you use the Komatsu oil clinic to carry out a detailed check of the characteristics of the oil.

Fuel

- 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.
- The fuel pump is a precision instrument. If fuel containing water or dirt is used, the fuel pump cannot work properly.
- Be extremely careful not to let impurities get into the fuel when storing or adding it.
- Always use the fuel specified for the temperature.
 - ★ See "RECOMMENDED FUEL, COOLANT, AND LUBRICANTS" on page 3-11.
 - The fuel will solidify if it is used at temperatures lower than the specified temperature (particularly at temperatures below -15°C (5°F)).
 - If the fuel is used at temperatures higher than the specified temperature, the viscosity will drop. This may result in problems such as a drop in output.
- 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.
- If there is any foreign material in the fuel tank, wash the tank and fuel system.

Remark

Always use diesel fuel.

The engine mounted on this machine uses an electronically controlled, high-pressure fuel injection device to ensure good fuel consumption and exhaust gas characteristics.

This device requires high-precision parts and lubrication. If low-viscosity fuel with low lubricating ability is used, the durability of the engine may drop markedly.

Coolant and Water for Dilution

- Coolant prevents corrosion and freezing.
- Even in areas where it is not necessary to prevent freezing, the use of antifreeze coolant is essential.
- Komatsu machines are supplied with Komatsu Supercoolant (AF-NAC). Komatsu Supercoolant (AF-NAC) has excellent anti-corrosion, antifreeze, and cooling properties and can be used continuously for two years or 4,000 hours.
- Komatsu Supercoolant (AF-NAC) is strongly recommended.
 - We do not recommend the use of any coolant other than Komatsu genuine Supercoolant (AF-NAC).
 - If you use another coolant, it may cause serious problems such as corrosion of the engine and parts of the cooling system that use light metals, such as aluminum.
- When using Komatsu Supercoolant (AF-NAC), there is no need to use a corrosion resistor. For details, see "Clean Inside of Cooling System" on page 3-24.

- When diluting the antifreeze coolant, use distilled water or tap water (soft water).
 - Natural water, such as river water or well water (hard water), contains large amounts of minerals (calcium, magnesium, etc.). This makes it easier for scale to form inside the engine or radiator. Once scale is deposited inside the engine or radiator, it is extremely difficult to remove it. The deposition of scale also causes overheating due to poor heat exchange.
 - When you dilute the coolant, we recommend that you use water with an overall hardness of less than 100 PPM.
- When using antifreeze, always observe the precautions given in Section 1 of this manual. See “Cooling System Precautions” on page 1-35 and “Disposal of Waste Materials” on page 1-39.
- Antifreeze coolant is flammable; be sure to keep it away from flames.
- The ratio of Supercoolant (AF-NAC) to water differs according to the ambient temperature.
 - For details of the ratio when mixing, see “Clean Inside of Cooling System” on page 3-24.
 - Supercoolant (AF-NAC) may be supplied already mixed. In such cases, never dilute with water.
- If the engine overheats, wait for the engine to cool before adding coolant.
- If the coolant level is low, it will cause overheating; it will also cause problems with corrosion due to air entering the coolant.

Grease

- Grease is used to prevent seizure and noises at the joints.
- This construction equipment is used under heavy-duty conditions. Always use the recommended grease and follow the change intervals and ambient temperatures given in this manual.
- Grease fittings not included in the MAINTENANCE section are grease fittings that are used at the time of overhaul; there is no need to grease these points.
- When using the machine after it has been in storage for a long time, carry out greasing if there is any stiffness or screeching.
- If any part becomes stiff or makes noise after being used for a long time, apply 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.

MAINTENANCE

Performing KOWA (Komatsu Oil Wear Analysis)

KOWA (Komatsu Oil Wear Analysis) is a maintenance service that makes it possible to prevent machine failures and downtime. With KOWA, the oil is periodically sampled and analyzed. This enables early detection of wear of the machine drive parts and other abnormalities.

- We strongly recommend that you use the KOWA service.
- The results of the analysis are reported, together with recommendations which will reduce repair costs and machine downtime.
- The oil analysis is done at low cost (only the actual expenses are charged).

KOWA Analysis Items

The analysis of the following items enables you to obtain a very precise diagnosis of the health of the machine.

- Measurement of density of metal wear particles

This uses an ICP (Inductively Coupled Plasma) analyzer to measure the density of iron, copper, and other 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 (larger than 5 microns) in the oil, which enables the early detection of failures.

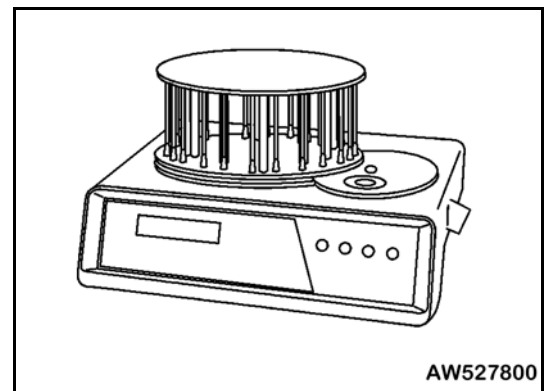
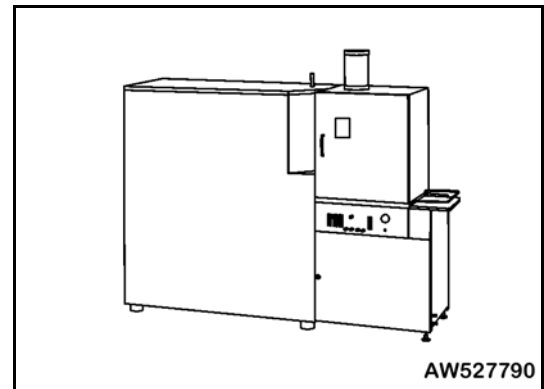
- Others

Measurements are made of items such as the ratio of water in the oil, density of the antifreeze coolant, ratio of fuel in the oil, and 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.
 - Perform sampling at regular fixed intervals.
 - Do not perform sampling on rainy or windy days when water or dust can get into the oil.

★ For further details about KOWA, contact your Komatsu distributor.



Storing Oil and Fuel

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

Filters

- Filters are extremely important safety parts. Filters prevent impurities in the fuel and air circuits from entering important equipment where they could cause problems.
 - Replace all filters periodically. Details are provided in the SERVICE PROCEDURE section of this manual.
 - When working in severe conditions, replace 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 attached to the old filter. If you find any metal particles, contact your Komatsu distributor.
- Do not open packs of spare filters until just before they are to be used.
- Always use Komatsu genuine filters.

Outline of Electric System

- It is extremely dangerous if the electrical equipment becomes wet or the covering of the wiring is damaged. This situation will cause an electrical short circuit and may cause the machine to malfunction.
 - Do not wash the inside of the operator’s cab with water.
 - When washing the machine, be careful not to let water get into the electrical components.
- Service relating to the electric system:
 - Checking fan belt tension
 - Checking damage or wear to the fan belt
 - Checking the battery fluid level
- Never install any electric components other than those specified by Komatsu.
- External electromagnetic interference may cause malfunction of the control system controller.
 - Before installing a radio receiver or other wireless equipment, contact your Komatsu distributor.
- When working at the seashore, carefully clean the electrical system to prevent corrosion.
- The optional power source must never be connected to the fuse, starting switch, or battery relay.

MAINTENANCE

WEAR PARTS

- Replace wear parts (such as the filter element, air cleaner element, bucket tooth, etc.) at the time of periodic maintenance or before they reach the wear limit.
- The wear parts should be replaced correctly in order to ensure more economical use of the machine.
- Always use Komatsu genuine parts of excellent quality.
- As a result of Komatsu's continuous efforts to improve product quality, part numbers may change.
- When ordering parts, always inform your Komatsu distributor of your machine serial number so he can check for the latest part number.

Wear Parts List

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

Item	Part Name	QTY	Replacement Frequency
Engine oil filter	Cartridge	1	EVERY 500 HOURS
Additional fuel filter	Cartridge	1	
Transmission oil filter	Element (O-ring) (O-ring)	1 (4) (2)	
Fuel filter	Cartridge	1	EVERY 1000 HOURS
Corrosion resistor	Cartridge	1	
Hydraulic filter	Element (O-ring)	1 (1)	EVERY 2000 HOURS
Air cleaner	Element assembly	1	
	Outer element assembly	1	
Air conditioner air filter	Element	2	WHEN REQUIRED
1-piece bucket tooth	Tooth	6	
	Bolt	18	
	Nut	18	
	Shim (0.5 mm)	12	
	Shim (1.0 mm)	6	
1-piece corner tooth	Right corner tooth	1	
	Left corner tooth	1	
	Bolt	2	
	Nut	2	
	Washer	2	
	Bolt	4	
	Nut	4	
	Shim (0.5 mm)	4	
Shim (1.0 mm)	2		
Tip tooth	Tooth	8	
	Pin	8	
Segment edge	Edge	7	
	Bolt	14	
	Washer	14	
	Nut	14	

RECOMMENDED FUEL, COOLANT, AND LUBRICANTS

- Komatsu genuine oils are formulated to maintain the reliability and durability of Komatsu construction equipment and components.
- In order to keep your machine in the best condition for long periods of time, it is essential to follow the instructions in this manual.
 - Failure to follow these recommendations may result in the shortened life or excess wear of the engine, power train, cooling system, and/or other components.
- Commercially available lubricants and additives may be good for the machine, but they may also cause harm.
 - Komatsu does not recommend any commercially available lubricants and/or additives.
- Use the oil recommended according to the ambient temperature listed in the “Fuel, Coolant, and Lubricant Ambient Temperature Chart” on page 3-12.
- *Specified capacity* means the total amount of oil in the tank and the piping. *Refill capacity* means the amount of oil required to refill the system during inspection and maintenance.
- When starting the engine in temperatures below 0°C (32°F), be sure to use the recommended multi-grade oil, even if the ambient temperature may become higher during the day.
- If the machine is operated at a temperature below -20°C (-4°F), a separate device is required. Consult your Komatsu distributor.
- When the fuel sulfur content is less than 0.5%, change the engine oil according to the period inspection table given in this manual.
- If the fuel sulfur content is more than 0.5%, change the oil according to the following table.

Fuel Sulfur Content (%)	Engine Oil Change Interval
0.5 to 1.0%	1/2 regular interval
Above 1.0%	1/4 regular interval

MAINTENANCE

Fuel, Coolant, and Lubricant Ambient Temperature Chart

Reservoir	Fluid Type	Ambient Temperature, degrees Celsius										Recommended Komatsu Fluids
		-22	-4	14	32	50	68	86	104	122 °F		
		-30	-20	-10	0	10	20	30	40	50 °C		
Engine oil pan	Engine oil	SAE10W30DH										Komatsu EO10W30-DH
		SAE15W40DH										Komatsu EO15W40-DH
		SAE30DH										Komatsu EO30-DH
Transmission case	Power train oil (Note.1)	T030										T030
		T010										T010
Hydraulic system	Power train oil	T010										T010
	Hydraulic oil	HO46-HM										HO46-HM
	Engine oil	SAE10W30DH										Komatsu EO10W30-DH
SAE15W40DH										Komatsu EO15W40-DH		
Axle	Axle oil (Note.2)	AXO80										AXO80
	Engine oil	(Note.3)										EO50-CD
Pin/Bushing Grease fitting (Note.4)	Hyper grease (Note.5)	G2-T, G2-TE										G2-T, G2-TE
	Lithium EP grease	G2-LI										G2-LI
Cooling system	Supercoolant AF-NAC	AF-NAC (Note.6)										AF-NAC
Fuel tank	Diesel fuel	No.2-D										ASTM No.2-D
		No.1-D										ASTM No.1-D

Reservoir Capacity		Engine Oil Pan	Transmission Case	Hydraulic System	Axle (front and rear) (each)	Pins	Fuel Tank	Cooling System
Specified	Liters	42	70	284	78	–	450	99
	US gal	11.1	18.5	75.0	20.6	–	118.9	26.2
Refill	Liters	37	62	175	78	–	–	–
	US gal	9.8	16.4	46.2	20.6	–	–	–

Remark

Use diesel fuel only.

This engine uses an electronically controlled, high-pressure fuel injection system to obtain good fuel economy and low emissions. For this reason, it requires high-precision parts and good lubrication.

If kerosene or other fuel with low lubricating ability is used, the durability may drop markedly.

Note	Explanation
1	Power train oil has different properties from engine oil. Be sure to use the recommended oil.
2	Axle oil AX080 prevents squealing from the brakes and LSD (Limited Slip Differential). If only AX080 is recommended, use Komatsu genuine AX080 or equivalent.
3	When the ambient temperature is higher than 45°C (113°F) and the machine operation hour is longer than 12 hours/day, use E050-CD instead of AX080. Squealing of the brakes may occur with the use of E050-CD but there is no problem with the brake performance or durability.
4	If the machine is equipped with an automatic greasing system, see "AUTO-GREASING SYSTEM" on page 5-7.
5	Hypergrease (G2-T, G2-TE) is a high-performance grease. When it is necessary to improve the lubricating ability of the grease in order to prevent squealing of pins and bushings, the use of G2-T or G2-TE is recommended.
6	<p>Supercoolant (AF-NAC)</p> <ul style="list-style-type: none"> • The coolant has the important function of preventing corrosion as well as preventing overheating and freezing. • Even in areas where freezing is not an issue, the use of antifreeze coolant is essential. • Komatsu machines are supplied with Komatsu Supercoolant (AF-NAC). Komatsu Supercoolant (AF-NAC) has excellent anticorrosion, antifreeze, and cooling properties and can be used continuously for two years or 4000 hours. • Komatsu Supercoolant (AF-NAC) is strongly recommended wherever available. • For details of the ratio when diluting super coolant with water, see "Clean Inside of Cooling System" on page 3-24. • When the machine is shipped from the factory, it may be filled with coolant containing 30% or more Supercoolant (AF-NAC). In this case, no adjustment is needed for temperatures down to -10°C (14°F) (never dilute with water). • To maintain the anticorrosion properties of Supercoolant (AF-NAC), always keep the density of Supercoolant between 30% and 68%.

Recommended Brands, Other Than Komatsu Genuine Oil

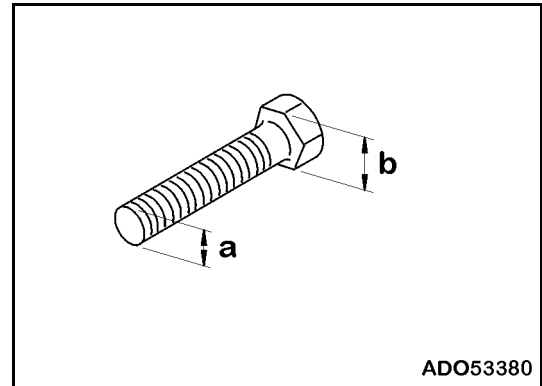
When using commercially available oils other than Komatsu genuine oil, consult your Komatsu distributor.

STANDARD TIGHTENING TORQUES FOR BOLTS AND NUTS

! WARNING

- If nuts, bolts, or other parts are not tightened to the specified torque, it will cause looseness or damage to the tightened parts. This will cause failure of the machine or problems with operation.
- Always pay careful attention when tightening parts

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



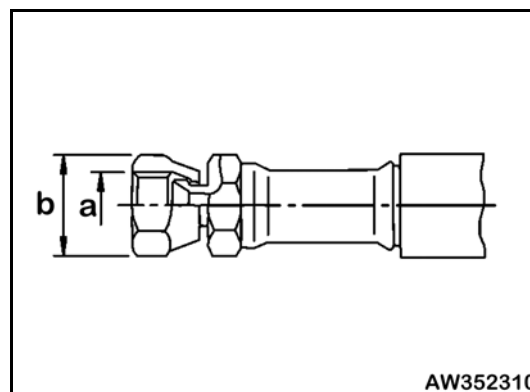
Tightening Torque Table

Thread Diameter of Bolt (a)	Width across Flats (b)	Tightening Torque					
		Target Value			Service Limit		
mm	mm	N•m	kgm	lbf ft	N•m	kgm	lbf ft
6	10	13.2	1.3	9.7	11.8 – 14.7	1.2 – 1.5	8.7 – 10.8
8	13	31	3.2	22.9	27 – 34	2.8 – 3.5	19.9 – 25.1
10	17	66	6.7	48.7	59 – 74	6.0 – 7.5	43.5 – 54.6
12	19	113	11.5	83.3	98 – 123	10.0 – 12.5	72.3 – 90.7
14	22	177	18.0	130.5	157 – 196	16.0 – 20.0	115.8 – 144.6
16	24	279	28.5	205.8	245 – 309	25.0 – 31.5	180.7 – 227.9
18	27	382	39.0	281.7	343 – 425	35.0 – 43.3	253.0 – 313.5
20	30	549	56.0	404.9	490 – 608	50.0 – 62.0	361.4 – 448.4
22	32	745	76.0	549.5	662 – 829	67.5 – 84.5	488.3 – 611.4
24	36	927	94.5	683.7	824 – 1030	84.0 – 105.0	607.8 – 759.7
27	41	1320	134.6	973.6	1180 – 1470	120.3 – 149.9	870.3 – 1084.2
30	46	1720	175.4	1268.6	1520 – 1910	155.0 – 194.8	1121.1 – 1408.7
33	50	2210	225.4	1630.0	1960 – 2450	199.9 – 249.8	1445.6 – 1807.0
36	55	2750	280.4	2028.3	2450 – 3040	249.8 – 310.0	1807.0 – 2242.2
39	60	3280	334.5	2419.2	2890 – 3630	294.7 – 370.2	2131.6 – 2677.3

★ Use the following table for hydraulic hoses.

Taper Seal

Thread Diameter (a)	Width across Flats (b)	Tightening Torque					
		Target Value			Permissible Range		
mm	mm	N•m	kgm	lbf ft	N•m	kgm	lbf ft
10	14	14.7	1.5	10.8	12.7 – 16.7	1.3 – 1.7	9.4 – 12.3
14	19	29.4	3.0	21.7	27.5 – 39.2	2.8 – 4.0	20.3 – 28.9
18	24	78.5	8.0	57.9	58.8 – 98.1	6.0 – 10.0	43.4 – 72.4
22	27	117.7	12.0	86.8	88.3 – 137.3	9.0 – 14.0	65.1 – 101.3
24	32	147.1	15.0	108.5	117.7 – 176.5	12.0 – 18.0	86.8 – 130.2
30	36	215.7	22.0	159.1	176.5 – 245.2	18.0 – 25.0	130.2 – 180.9
33	41	255.0	26.0	188.1	215.7 – 284.4	22.0 – 29.0	159.1 – 209.8



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 perform periodic maintenance. In addition, to further improve safety, the parts in the Safety Critical Parts List must also be replaced at the specified interval. These parts are closely related to safety and fire prevention; please contact your Komatsu distributor to have them replaced.

The material quality of these parts can change as time passes; they are likely to wear out or deteriorate. However, it is difficult to determine the extent of wear or deterioration at the time of periodic maintenance. Therefore, you must replace them with new ones regardless of their condition after a certain period of usage. This is important in order to ensure that these parts maintain their full performance at all times.

- Should anything abnormal be found on any of these parts, replace it with a new one even if the periodic replacement time for the part has not yet arrived.
- If any of the hose clamps show deterioration such as deformation or cracking, replace the clamps at the same time as the hoses.
- Perform checks of the hydraulic hoses which need to be replaced periodically. Tighten all loose clamps and replace defective hoses, as required.
- When replacing hoses, always replace O-rings, gaskets, and other such parts at the same time.
- Have your Komatsu distributor replace the critical parts.

Safety Critical Parts List

No.	Safety Critical Parts for Periodic Replacement	Qty	Replacement Interval
1	Fuel hose (fuel tank - fuel strainer)	1	Every 2 years or every 4,000 hours, whichever comes first
2	Fuel hose (fuel strainer - injection pump)	1	
3	Fuel return hose (injection pump - fuel tank)	1	
4	Fuel hose (injection nozzle - fuel filter)	2	
5	Fuel spill hose (engine output connector - fuel tank)	1	
6	Steering hose (pump - steering valve)	2	
7	Steering hose (steering valve - steering cylinder)	4	
8	Steering hose (steering valve - stop valve)	2	
9	Steering hose (Orbitrol valve - stop valve)	2	
10	Steering hose (Orbitrol valve - charge valve)	1	
11	Steering hose (Orbitrol valve - joint to tank)	1	
12	Brake hose (pump - accumulator charge valve)	2	
13	Brake hose (accumulator charge valve - check valve)	1	
14	Brake hose (accumulator - tandem valve)	2	
15	Brake hose (accumulator - single valve)	1	
16	Brake hose (check valve - accumulator PP port)	1	
17	Brake hose (tandem valve - front brake)	2	
18	Brake hose (tandem valve - rear brake)	2	
19	Brake hose (single valve - tandem valve)	1	
20	Brake hose (tandem valve - drain block)	1	
21	Brake hose (single valve - drain block)	1	
22	Brake hose (drain block - hydraulic tank)	1	
23	Brake hose (brake accumulator - reduction valve for emergency parking brake CANCEL)	1	
24	Brake hose (transmission valve - reduction valve)	1	
25	Brake hose (reduction valve - parking brake chamber)	1	
26	Brake hose (parking brake - reduction valve)	1	
27	Brake hose (reduction valve - charge valve drain)	1	
28	Brake hose (charge valve drain - hydraulic tank)	1	
29	Alarm	2	
30	Seat belt	1	Every 3 years
31	Injector nozzle tip	6	Every 4,000 hours
32	High-pressure piping clamp	15	Every 8,000 hours
33	Fuel spray prevention cap	16	

MAINTENANCE

MAINTENANCE SCHEDULE CHART

This schedule outlines the maintenance to be performed on the machine according to the hours accumulated on the machine. Following this schedule will prolong the life of the machine.

Maintenance Interval and Item	Section - Page
INITIAL 250 HOURS SERVICE	
(ONLY AFTER THE FIRST 250 HOURS)	
REPLACE TRANSMISSION OIL FILTER ELEMENT	3-57
CHANGE OIL IN HYDRAULIC TANK, REPLACE HYDRAULIC TANK FILTER ELEMENT	3-65
WHEN REQUIRED	
CHECK, CLEAN, REPLACE AIR CLEANER ELEMENT	3-21
CLEAN INSIDE OF COOLING SYSTEM	3-24
CHECK TRANSMISSION OIL LEVEL, ADD OIL	3-28
CHECK AXLE OIL LEVEL, ADD OIL	3-30
CLEAN AXLE CASE BREATHER	3-31
CLEAN AIR CONDITIONER CONDENSER	3-32
CHECK WINDOW WASHER FLUID LEVEL, ADD FLUID	3-32
CLEAN RADIATOR FINS AND OIL COOLER FINS	3-33
CHECK ELECTRICAL INTAKE AIR HEATER	3-33
REPLACE BUCKET TEETH	3-34
REPLACE BUCKET TOOTH WITH SEGMENT EDGE	3-36
TURN, REPLACE BOLT-ON CUTTING EDGE	3-37
LUBRICATE WORK EQUIPMENT CONTROL VALVE LINKAGE	3-37
CHECK AIR CONDITIONER	3-38
REPLACE SLOW-BLOW FUSE	3-39
SELECT TIRES	3-40
CHECK TIRE PRESSURE	3-41
CHECK BEFORE STARTING	3-42
EVERY 50 HOURS SERVICE	
DRAIN WATER, SEDIMENT FROM FUEL TANK	3-43
EVERY 100 HOURS SERVICE	
LUBRICATE REAR AXLE PIVOT PIN	3-44
CLEAN ELEMENT IN AIR CONDITIONER FRESH AIR FILTER	3-44
CHECK OIL LEVEL IN HYDRAULIC TANK, ADD OIL	3-45
EVERY 250 HOURS SERVICE	
CHECK BATTERY ELECTROLYTE LEVEL	3-46
CHECK PARKING BRAKE	3-48
CHECK ALTERNATOR BELT TENSION, ADJUST	3-48
CHECK AIR CONDITIONER COMPRESSOR BELT TENSION, ADJUST	3-49
CHECK FOR LOOSE WHEEL HUB NUTS, TIGHTEN	3-49
CLEAN ELEMENT IN AIR CONDITIONER RECIRCULATION FILTER	3-50
LUBRICATING	3-50

EVERY 500 HOURS SERVICE

CHANGE OIL IN ENGINE PAN, REPLACE ENGINE OIL FILTER CARTRIDGE	3-53
REPLACE FUEL FILTER CARTRIDGE	3-55
REPLACE TRANSMISSION OIL FILTER ELEMENT.	3-57
LUBRICATE CENTER DRIVE SHAFT SPLINE	3-58
CHECK FAN BELT FOR WEAR	3-58

EVERY 1000 HOURS SERVICE

CHANGE OIL IN TRANSMISSION CASE, CLEAN STRAINER	3-59
CLEAN TRANSMISSION CASE BREATHER	3-60
LUBRICATING	3-60
CHECK TIGHTENING PARTS OF TURBOCHARGER.	3-62
REPLACE CORROSION RESISTOR CARTRIDGE	3-62
CLEAN RADIATOR SUBTANK BREATHER.	3-63
CLEAN FUEL STRAINER	3-63
WASH FUEL TANK BREATHER.	3-63
TIGHTEN ROPS CANOPY.	3-64

EVERY 2000 HOURS SERVICE

CHANGE OIL IN HYDRAULIC TANK, REPLACE HYDRAULIC FILTER ELEMENT	3-65
REPLACE HYDRAULIC TANK BREATHER ELEMENT	3-67
CHANGE AXLE OIL (*).	3-68
REPLACE ELEMENT IN AIR CONDITIONER RECIRCULATION AIR FILTER, FRESH AIR FILTER	3-69
CLEAN PPC CIRCUIT STRAINER	3-69
CLEAN ENGINE BREATHER ELEMENT	3-70
CHECK ALTERNATOR, STARTING MOTOR	3-70
CHECK ENGINE VALVE CLEARANCE, ADJUST	3-70
CHECK BRAKE DISC WEAR	3-70
CLEAN AND CHECK TURBOCHARGER	3-70
CHECK PLAY OF TURBOCHARGER ROTOR	3-70
CHECK ACCUMULATOR FUNCTION	3-71
CHECK ACCUMULATOR GAS PRESSURE	3-71
CHECK INJECTOR.	3-71

* The interval of 2,000 hours for changing the axle oil is for standard operations. If the brakes are used more frequently or the brakes make a sound, change the oil at shorter intervals.

EVERY 4000 HOURS SERVICE

CHECK WATER PUMP.	3-72
CHECK VIBRATION DAMPER.	3-72
CHECK FAN PULLEY AND TENSION PULLEY	3-72
CHECK AIR CONDITIONER COMPRESSOR, ADJUST	3-72
REPLACE INJECTOR.	3-72
CHECK FOR LOOSE ENGINE HIGH-PRESSURE CLAMPS, HARDENING OF RUBBER	3-73
CHECK FOR MISSING FUEL SPRAY PREVENTION CAPS, HARDENING OF RUBBER	3-74

EVERY 8000 HOURS SERVICE

REPLACE HIGH-PRESSURE PIPING CLAMPS	3-75
REPLACE FUEL SPRAY PREVENTION CAPS	3-75

SERVICE PROCEDURE

Initial 10 Hours Service

Carry out the following maintenance every 10 hours for the first 50 hours of operation of a new machine.

- Lubricating
 - For details, see “Every 100 Hours Service” on page 3-44 and “Every 250 Hours Service” on page 3-46.

Initial 250 Hours Service

Perform the following maintenance only after the first 250 hours.

- Replace transmission oil filter element.
 - For details, see “Replace Transmission Oil Filter Element” on page 3-57.
- Replace hydraulic tank filter element.
 - For details, see “Change Oil in Hydraulic Tank, Replace Hydraulic Tank Filter Element” on page 3-65.

When Required

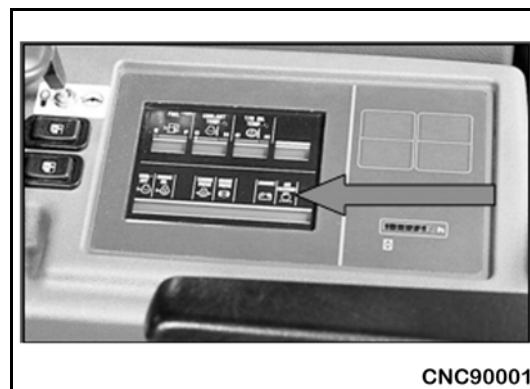
Check, Clean, Replace Air Cleaner Element

⚠ WARNING

- If inspection, cleaning, or maintenance is carried out with the engine running, dirt will get into the engine and damage it. Always stop the engine before carrying out these operations.
- When using compressed air, there is danger that dirt may be blown around and cause serious injury. Always use protective glasses, dust mask, and other protective equipment.

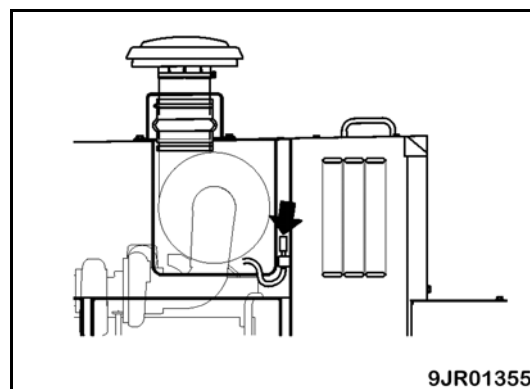
Checking

- ★ If air cleaner clogging caution lamp on the maintenance monitor flashes, clean the air cleaner element.
 - ★ For the location of the lamp, see “Warning Display” on page 2-8 and “Air Cleaner Clogging Caution Pilot Lamp” on page 2-12.
 - ★ Do not clean the element until the air cleaner clogging caution lamp flashes.
 - If you clean the air cleaner element frequently before the air cleaner clogging caution lamp flashes, the air cleaner will not be able to display its performance fully and the cleaning efficiency will drop.
 - Cleaning the element too frequently also increases the likelihood that dirt stuck to the element will fall inside the inner element.



Remark

A dust indicator (5-stage display) is installed to the side of the air cleaner. The dust indicator shows the degree of clogging. This makes it possible to check how clean the element is and when it should be replaced.

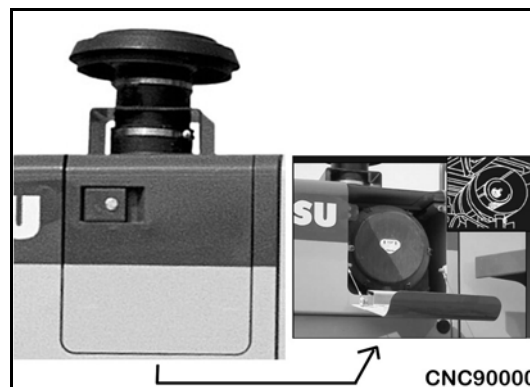


Cleaning or Replacing Outer Element

Remark

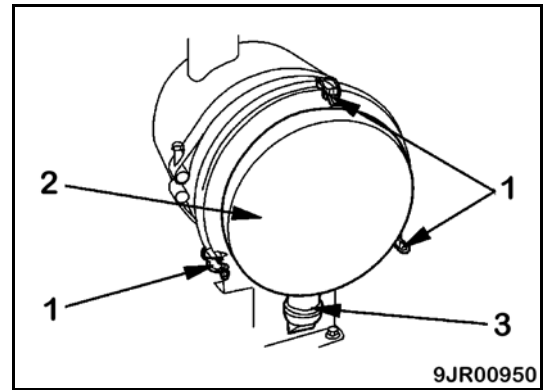
When replacing the outer element, replace the inner element at the same time.

1. Stop the engine.
2. Open the door to access the air cleaner element.



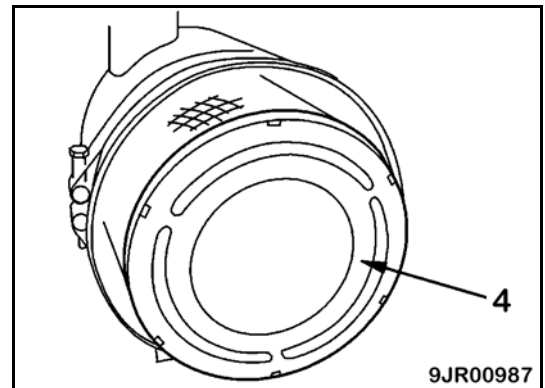
MAINTENANCE

3. Remove lock (1) from the cover, then remove cover (2).



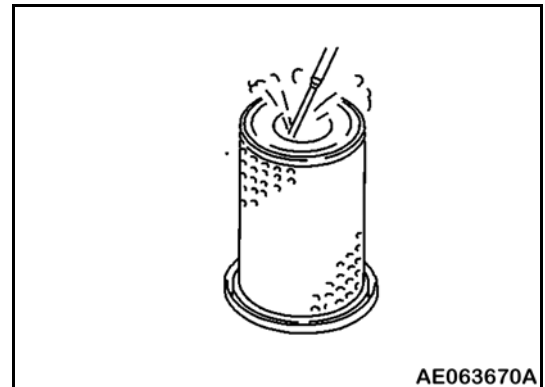
4. Remove outer element (4).

5. Clean the inside and the cover of the air cleaner body.



6. Direct dry compressed air (less than 0.69 MPa (100.1 psi)) from the inside of the outer element along its folds. Then direct the compressed air from the outside along the folds, and again from the inside.

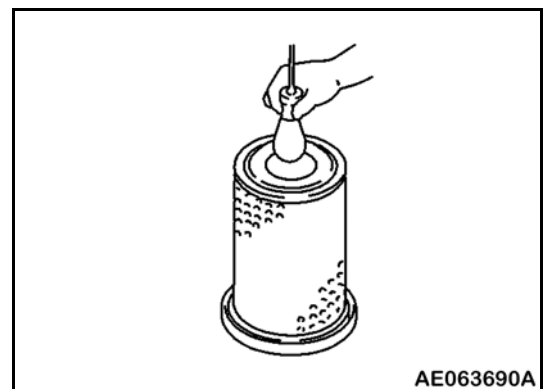
- Remove one seal every time the element is cleaned.
- Replace the outer element if it has been cleaned six times or used for one year. Replace the inner element at the same time.
- Replace both inner and outer elements when the dust indicator red piston appears soon after installing the cleaned outer element even though it has not been cleaned six times.
- Remove actuator valve (3), then clean it with compressed air. After cleaning it, install it again.



7. After cleaning and drying the element, check it by shining a light through it. If any small holes or thin cracks are found, replace the element.

- When cleaning the element, do not hit it or beat it against anything.
- Do not use an element that has damaged folds, gaskets, or seals.

8. Replace the inner element. See “Replacing Inner Element” on page 3-23.



9. Install cover (2).
10. Return the red display of the dust indicator to its original position.

Replacing Inner Element

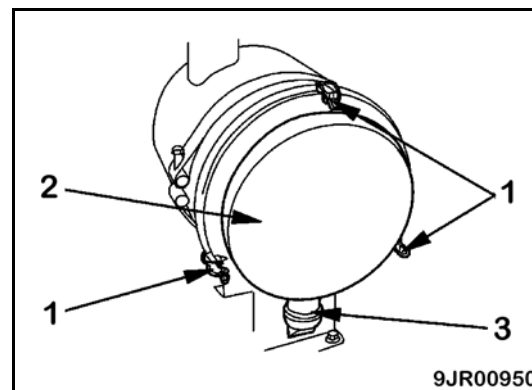
Remark

The inner element must not be used again even after cleaning.

When replacing the outer element, replace the inner element at the same time.

Since the inner element is replaced every time that you replace the outer element, the cover has already been removed, the outer element is outside the air cleaner, and the inner element is exposed.

1. Remove the inner element and unplug the connector.
2. Cover the air connector side (outlet side) with a clean cloth or tape.
3. Clean the inside of the air cleaner body.
4. Fit a new inner element to the connector and tighten it with nuts.
5. Install the inner element.
6. Install the outer element.
7. Replace cover (2).
8. Return the red display of the dust indicator to its original position.



MAINTENANCE

Clean Inside of Cooling System

WARNING

- Immediately after stopping the engine, the engine coolant is VERY HOT and the pressure inside the radiator is high. Removing the cap and draining the coolant under this condition could cause burns. Allow the engine to cool down and then turn the cap slowly to release the pressure.
- Start the engine and flush the system. When standing up or leaving the operator's seat, set the safety lock lever to the LOCK position.
- For details of starting the engine, see "Check Before Starting Engine" on page 2-45, "Adjusting Work Equipment" on page 2-91, and "Starting Engine" on page 2-56 in the *Operation* section of this manual.
- When the undercover is removed, there is danger of touching the fan. Never enter the rear of the machine when the engine is running.

- ★ 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 following table.

Antifreeze Coolant	Interval for Cleaning Inside Cooling system and Changing Antifreeze Coolant	Replacing Corrosion Resistor
Komatsu Supercoolant (AF-NAC)	Every two years or every 4,000 hours, whichever comes first	Every 1,000 hours; when cleaning the interior of the cooling system; when changing coolant
Permanent-type antifreeze (All-season type) *	Every year (autumn) or every 2,000 hours, whichever comes first	

* Permanent-type antifreeze must meet the requirements of ASTM D3306-03.

- The coolant prevents corrosion as well as freezing.
- Even in areas where freezing is not an issue, the use of an antifreeze coolant is essential. Use Supercoolant (AF-NAC) at a mixing ratio of at least 30% to prevent corrosion of the cooling system.
- Komatsu machines are supplied with Komatsu Supercoolant (AF-NAC).
 - Komatsu Supercoolant (AF-NAC) has excellent anti-corrosion, antifreeze, and cooling properties and can be used continuously for two years or 4,000 hours.
- As a basic rule, we do not recommend the use of any coolant other than Komatsu genuine Supercoolant (AF-NAC).
 - If you use another coolant, it may cause serious problems such as corrosion of the engine and parts of the cooling system that use light metals, such as aluminum.
- When using Komatsu Supercoolant (AF-NAC), there is no need to use a corrosion resistor.
- To maintain the anti-corrosion properties of Supercoolant (AF-NAC), always keep the density of the Supercoolant between 30% and 68%.
- It is better to estimate a temperature about 10°C (50°F) lower than the minimum temperature.
- The mixing ratio depends on the ambient temperature, but it should always be a minimum of 30% by volume (amount of antifreeze/total amount of coolant in system x 100).
- The freezing temperature of 100% undiluted Supercoolant is -15°C (5°F). Do not store undiluted Supercoolant at a temperature below -15°C (5°F).

- When deciding the proportions for mixing the coolant with water, check the lowest recorded temperature for your area and use the Water and Supercoolant Mix Ratio table to decide the mixing ratio.

Water and Supercoolant Mix Ratio Table

Min. atmospheric temperature	°C	-10	-15	-20	-25	-30
	°F	14	5	-4	-13	-22
Amount of antifreeze	Liters	30	36	41	46	50
	US gal	7.93	9.51	10.83	12.15	13.21
Amount of water	Liters	69	63	58	53	49
	US gal	18.23	16.64	15.32	14.00	12.94
Volume ratio	%	30	36	41	46	50

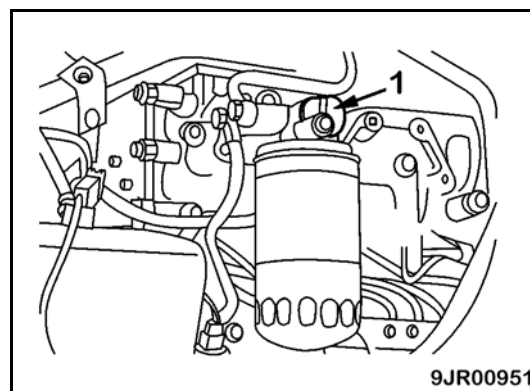
WARNING

- Antifreeze is flammable. Keep it away from flame.
- Antifreeze is toxic. When removing the drain plug, be careful not to get water containing antifreeze on yourself.
- If antifreeze gets in your eyes, flush your eyes with a large amount of fresh water and see a doctor immediately.

Required

- Suitable water: To dilute the antifreeze; for details, see “Coolant and Water for Dilution” on page 3-6.
- Antifreeze density gauge: To control the mixing proportions
- Container: To catch the drained coolant; capacity must be larger than the specified coolant volume
- Hose: To fill the machine with antifreeze coolant and water

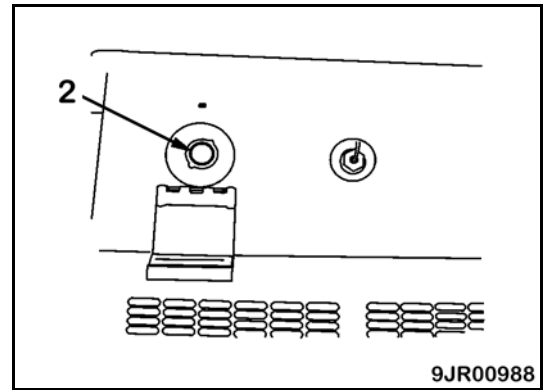
- Park the machine on a level surface.
- Stop the engine.
- Open the engine door.
- Set valve (1) of the corrosion resistor cartridge to the CLOSED position.



MAINTENANCE

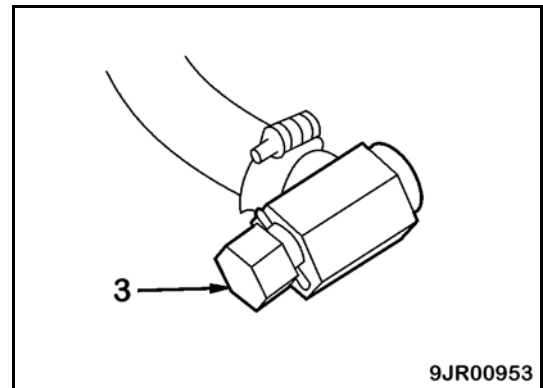
5. Check that the surface of the radiator cap is cool enough to be touched by hand. Turn radiator cap (2) slowly to release the pressure.

6. Remove the radiator cap.



7. Set a container in position to catch the antifreeze mix.

8. Open drain valve (3) at the radiator lower tank and drain plug (4) of the engine; drain the coolant.



9. After draining the coolant, close drain plugs (3) and (4).

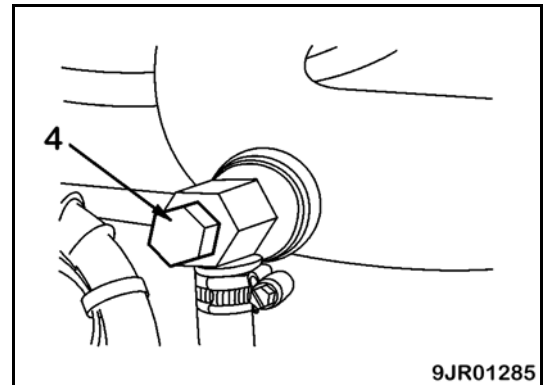
10. Fill with tap water.

11. When the radiator is full, start the engine and run it at low idle.

- Keep the engine running at low idle for 10 minutes until the coolant temperature reaches more than 90°C (194°F).

12. Stop the engine.

13. Open drain plugs (3) and (4) and drain the water.



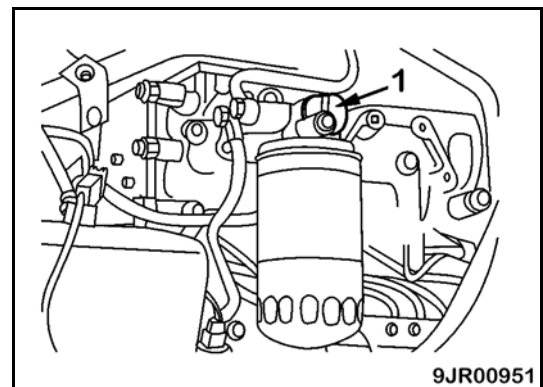
14. After draining the water, clean the cooling system with cleaning agent.

- Follow the instructions provided with the cleaning agent.

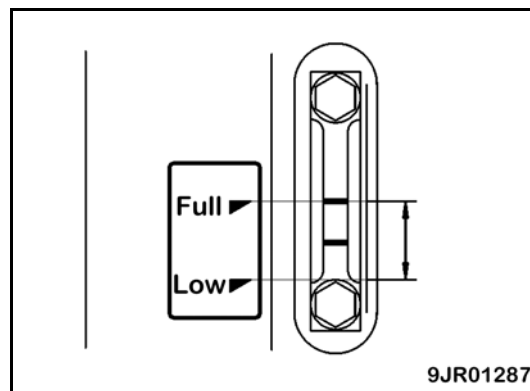
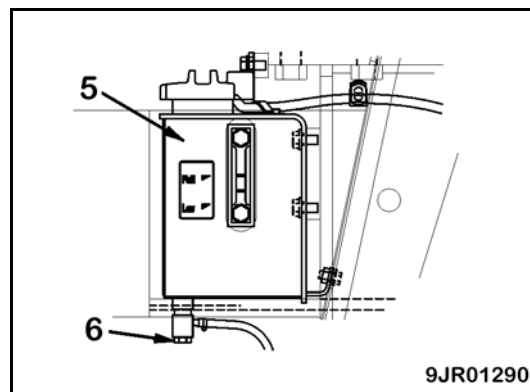
15. Close drain plugs (3) and (4).

16. Replace the corrosion resistor. Set valve (1) to the OPEN position.

- For details about replacing the corrosion resistor, see “Replace Corrosion Resistor Cartridge” on page 3-62.



17. Add coolant mixed with antifreeze until it overflows from the water filler.
 - Determine the proportions of antifreeze and water according to the “Water and Supercoolant Mix Ratio Table” on page 3-25.
18. To bleed air from the cooling system, run the engine at low idle for five minutes, and for a further five minutes at high idle. Leave the radiator cap off while running the engine.
19. Open drain plug (6) to drain the coolant from subtank (5); wash the inside of the subtank.
20. Add coolant until the coolant level is between the FULL and LOW marks.
21. Stop the engine and wait three minutes.
22. Add coolant until the coolant level is near the coolant filler port.
23. Tighten the radiator cap.
24. Check the coolant level and add more coolant, if necessary.



MAINTENANCE

Check Transmission Oil Level, Add Oil

⚠ WARNING

- The parts and oil are VERY HOT immediately after the engine is stopped and may cause burns, if touched.
- Wait for the temperature to drop before starting the work.

★ Do this procedure if there is any sign of oil on the transmission case or if there is oil mixed with the cooling water.

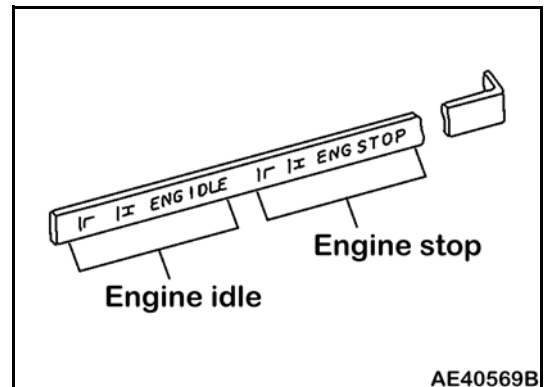
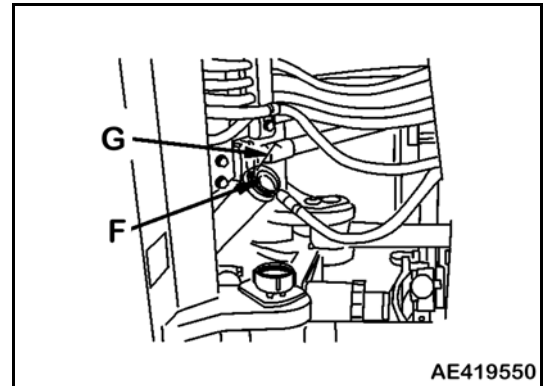
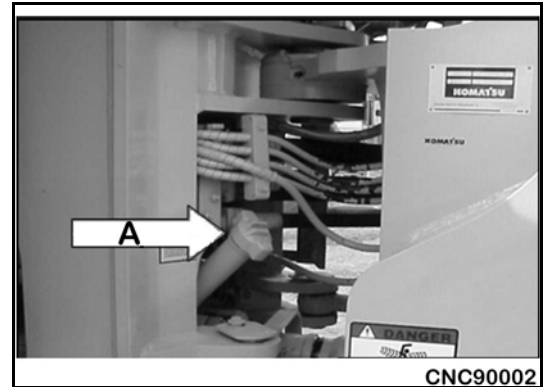
Remark

Wait for at least eight hours after stopping the engine before carrying out the inspection. If this is not done, there will be oil remaining at various places and it will be impossible to check the oil level correctly.

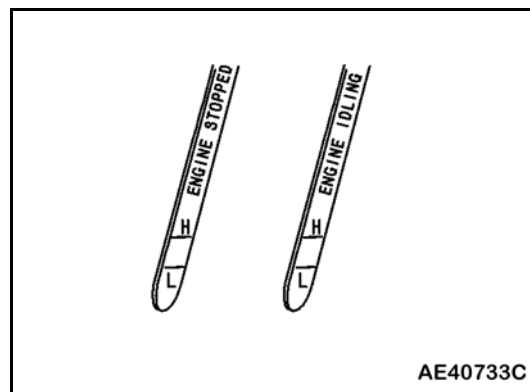
★ The fill port (A) is located on the right side of the machine, inside the articulation area.

1. Stop the engine.
2. Remove the cap of oil filler (F).
3. Take out the dipstick (G) and use a cloth to wipe off the oil.

★ The dipstick has two level marks on one side: ENG STOP (for measuring when the engine is stopped) and ENG IDLE (for measuring when the engine is idling).

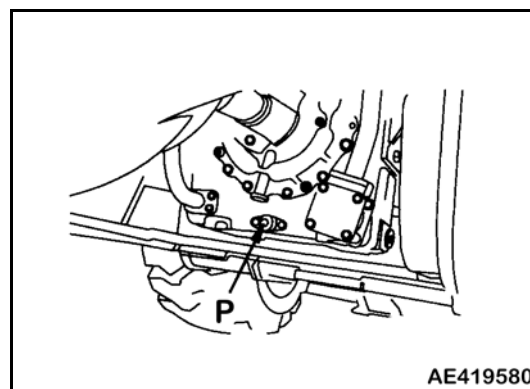


4. Fully insert dipstick (G) into filler pipe (F) and then remove it.
 - ★ The oil level should be between the H and L marks on dipstick (G).
 - If the oil level is below the L mark: add oil through oil filler (F).
 - If the oil level is above the H mark: drain the excess engine oil from drain plug (P) and check the oil level again.
 - If the oil level is correct: insert dipstick (G) in the dipstick guide and tighten the cap.



Remark

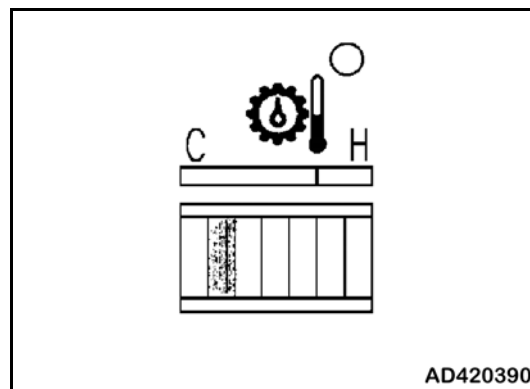
It is also possible to check the transmission oil level when the engine is running at low idle. Use the Check Transmission Oil Level When Engine is Idling instructions.



Check Transmission Oil Level When Engine is Idling

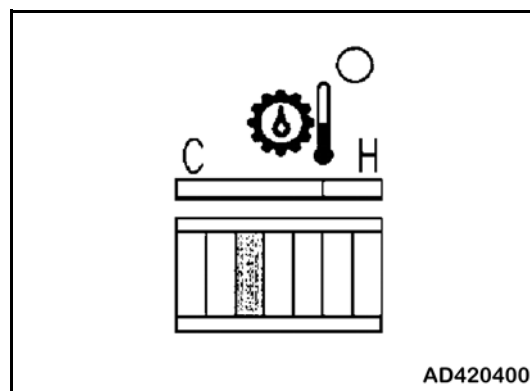
Conditions:

- ★ When checking after engine left idling (when heat is balanced in whole transmission).
- ★ User operating continuously (check during lunch time or check during change of shift).
 - Run at idle for at least 15 minutes and then leave.
 - Check when torque converter oil temperature gauge is in middle of bottom scale.



Conditions:

- ★ When checking after raising temperature with stall
- ★ When shipped from factory, etc.
 - Run at idling for five minutes.
 - Check at point when stall temperature rises and torque oil temperature gauge is at 3rd segment from left.



MAINTENANCE

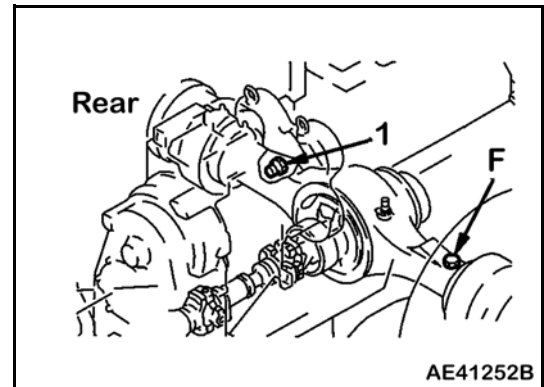
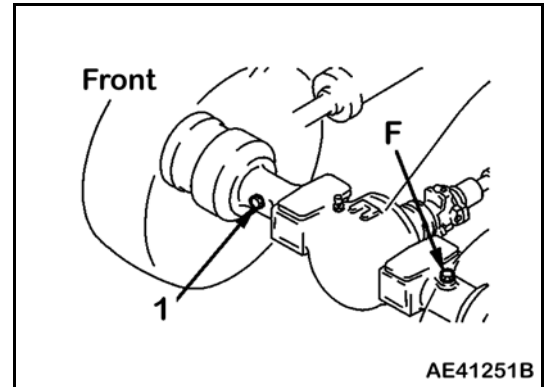
Check Axle Oil Level, Add Oil

WARNING

- When checking the oil level, apply the parking brake and lock the front and rear frames with the safety bar.
- After stopping the engine, the parts and oil are VERY HOT. Wait for the temperature to go down before starting this operation.

- ★ Do this procedure if there is any sign of oil on the axle case.
 - ★ The machine must be parked on a horizontal road surface. If the road surface is at an angle, the oil level cannot be checked correctly.
1. Park the machine on a horizontal surface.
 2. Stop the engine.
 3. Wait for the oil temperature to go down.
 4. Remove oil level plug (1).
 5. Check that the oil level is near the bottom of the plug hole.
 - If the oil is not near the bottom of the plug hole, add axle oil through plug hole (F).
 6. If the oil level is correct, install plug (1).

Tightening torque: 152 ±24.5 N•m (112.1 ±18.1 lbf ft)



Clean Axle Case Breather

WARNING

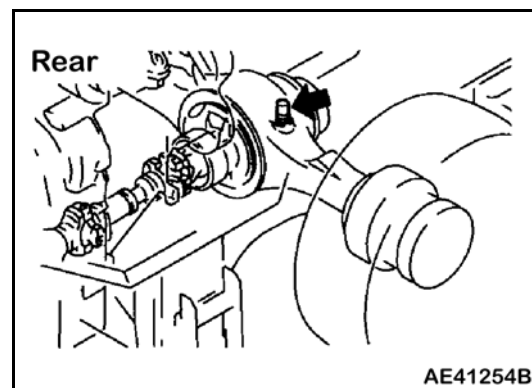
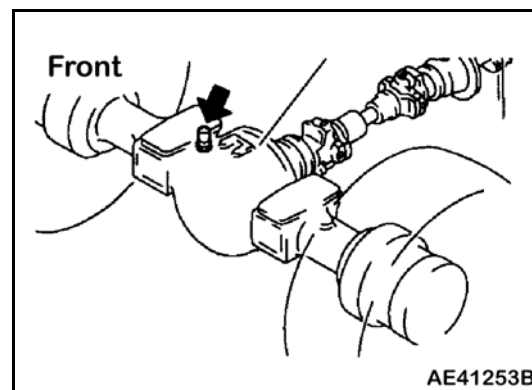
When cleaning the axle breather, apply the parking brake and lock the front and rear frames with the safety bar.

1. Park the machine on a horizontal surface.
2. Stop the engine.
3. Use a brush to clean off the mud and dirt from around the breather.
4. Remove the breather.

Remark

When removing the breather, be careful that dirt and dust do not get into the axle case.

5. Soak the breather in cleaning fluid and clean it.
6. Clean the breather at two places (front and rear).
7. Install the breather.



MAINTENANCE

Clean Air Conditioner Condenser

WARNING

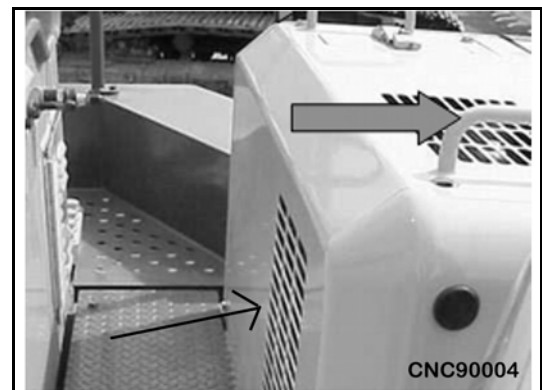
- Do not wash the condenser using a steam cleaner. There is danger that the condenser could overheat.
- If high-pressure water hits your body directly or the water sends dirt flying, there is danger of personal injury.
- Always wear protective glasses, dust mask, and other protective equipment.

- ★ The air conditioner condenser is located in the bulkhead behind the cab.
- ★ If there is mud or dust on the air conditioner condenser, clean it with water.
 - If the water pressure is too high, the fins may get deformed.
 - When washing with a high-pressure washer, apply the water from a reasonable distance.

1. Park the machine on a horizontal surface.
2. Stop the engine.
3. You can wash the condenser by directing the water jet through the vent slots on the top of the bulkhead or at the front of the bulkhead.
4. If you suspect that the condenser requires a more thorough cleaning, it is possible to remove the bulkhead hood to access the condenser. See *Removal of Bulkhead Assembly* in the *Disassembly and Assembly* section of the *Shop Manual*.

Remark

Removing the bulkhead hood is a very labor-intensive process. Try to clean the condenser through the vent slots before resorting to removing the bulkhead hood.



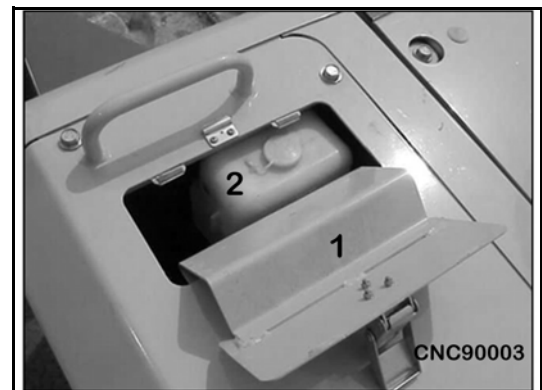
Check Window Washing Fluid Level, Add Fluid

The washing fluid tank is located in the bulkhead behind the cab.

1. Open the top cover (1) on the top, right side of the bulkhead.
2. Check the washing fluid levels in washer tank (2).
3. Add automotive window washing fluid as required.

Remark

Be careful not to let dirt and dust get into the fluid.



Clean Radiator Fins and Oil Cooler Fins

⚠ WARNING

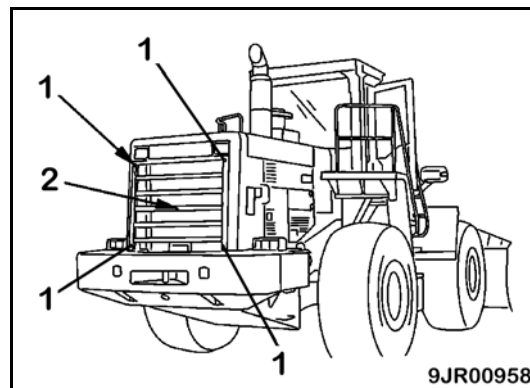
- Never open the engine side cover when the engine is running. Stop the engine completely before starting the cleaning operation.
- If compressed air, pressurized water, or steam hits your body directly or causes dirt to fly, there is danger of personal injury.
- Always wear safety glasses, dust mask, or other protective equipment.

★ Clean the radiator fins if any mud or dirt is stuck to the radiator or oil cooler.

1. Park the machine on a horizontal surface and turn the parking brake switch ON.
2. Stop the engine.
3. Remove four bolts (1) and remove radiator grill (2).
4. Use the steam jet nozzle to blow out mud, dirt, or leaves clogging the radiator or cooler fins.

★ Steam or water can be used instead of compressed air.

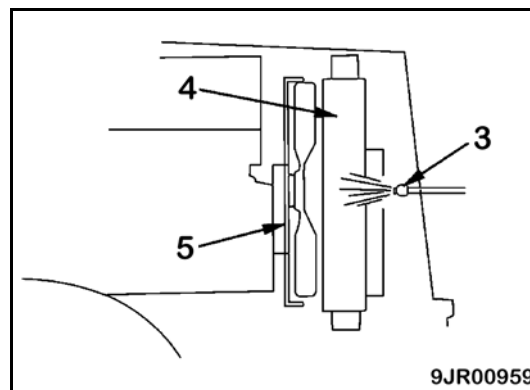
★ The guideline for the spray pressure is 4 MPa (568 psi). With a nozzle (3) diameter of 2 mm (0.1 in), keep the nozzle at least 100 mm (3.9 in) away from the fins.



Remark

If the steam jet nozzle is brought too close to the fins, it may damage the fins. Keep the nozzle a suitable distance away from the fins when cleaning them.

5. If the mud and dirt cannot be removed by cleaning only from the radiator grill side, remove fan net (5) and clean also from radiator (4) side.
6. Check the rubber hose. Replace it with a new one if the hose has cracks or is hardened by aging.
7. Check the hose clamps for looseness.



Remark

If you removed the fan net, replace it before replacing the radiator grill.

8. Replace radiator grill (2) and tighten bolts (1).

Check Electrical Intake Air Heater

Before the start of the cold season, ask your Komatsu distributor to check the electrical intake air heater for dirt or disconnections.

MAINTENANCE

Replace Bucket Teeth (if equipped)

WARNING

- It is extremely dangerous if the work equipment moves when the teeth are being replaced. Set the work equipment in a stable position; stop the engine; and set the safety lock for the work equipment control lever to the LOCK position.
- If the pin is hit with a strong force, there is danger that the pin may fly out. Check that there is no one in the surrounding area.
- There is danger of pieces flying during the replacement operation. Always wear protective clothing, such as safety glasses and gloves.

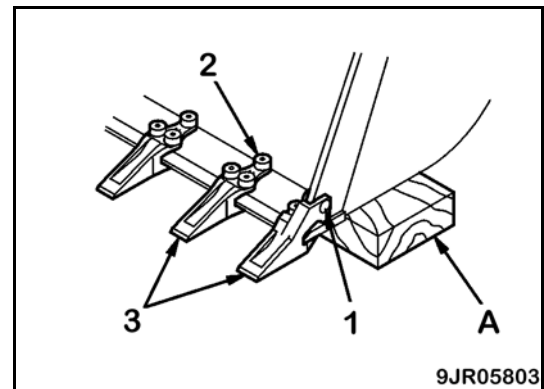
One-Piece Tooth

Remark

Replace bucket teeth before they wear down as far as the bucket.

Required

- Block to place under the bucket
1. Raise the bucket to a height greater than the height of the block (A).
 2. Set the bucket so that the bottom of the bucket is horizontal to the block (A) and then set the center of the bucket bottom on the block.
 3. After lowering the bucket onto the block (A), stabilize the bucket and then stop the engine.
 4. Remove the bolt (1) and nuts (2) and then remove bucket tooth (3).
 5. Clean the installation surface of bucket tooth (3).
 6. Install new teeth to the bucket.
 - When doing this, insert shims so that there is no clearance between the teeth and the top surface of the bucket.
 - Continue to add shims until it becomes impossible to add a 0.5 mm (0.02 in) shim.
 7. To prevent any gap from forming between the teeth and tip of the bucket, tighten bolts (1) and nuts (2) temporarily, and then hit the tip of the teeth with a hammer.



Tightening torque: 883 to 1200 N•m (651.3 to 885.1 lbf ft)

8. After operating the machine for a few hours, tighten the mounting nuts again.

Bucket with Tip Tooth

! WARNING

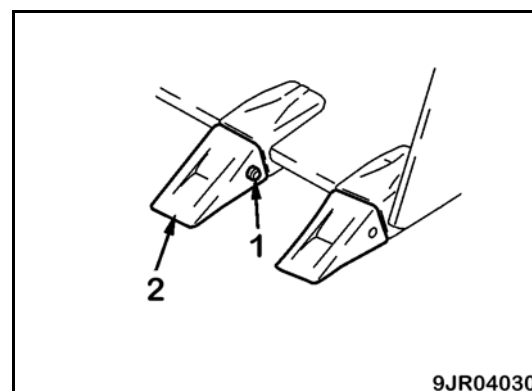
- It is dangerous if the work equipment moves by mistake when the teeth are being replaced. Set the work equipment in a stable condition; stop the engine; and set the safety lock for the work equipment control lever securely to the LOCK position.
- If the pin is hit with a strong force, there is danger that the pin may fly out. Check that there is no one in the surrounding area.
- There is danger of pieces flying during the replacement operation. Always wear protective clothing, such as safety glasses and gloves.

Remark

Replace the teeth before they wear down as far as the adapters.

Required

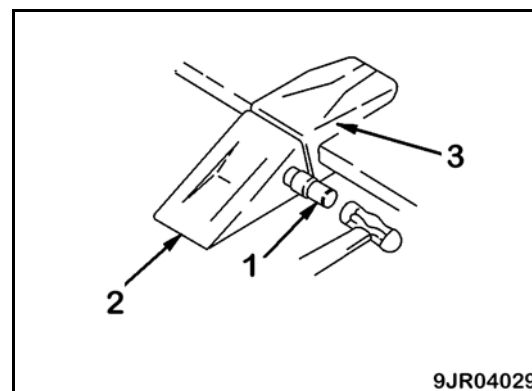
- Block to place under the bucket
1. Raise the bucket to an appropriate height then put a block under the bucket.
 2. Set the bucket so that the bottom of the bucket is horizontal to the block and then set the center of the bucket bottom on the block.
 3. After lowering the bucket onto the block, stabilize the bucket and then stop the engine.
 4. Using a rod of slightly smaller circumference than pin (1), put it in contact with the pin and then hit the rod with a hammer to remove the pin.
 5. Remove tooth (2).



Remark

If the tooth cannot be removed by this method, for safety reasons always contact your Komatsu distributor to have the replacement carried out.

6. Clean bucket and adapter (3).
7. Fit new tooth (2) in bucket adapter (3).
8. Insert pin (1) partially into the bucket tooth and then hit the pin with a hammer.
9. After operating the machine for a few hours, check that the pin has not come out.



MAINTENANCE

Replace Bucket Tooth with Segment Edge

WARNING

- It is dangerous if the work equipment moves by mistake when the teeth are being replaced. Set the work equipment in a stable condition; stop the engine; and set the safety lock for the work equipment control lever securely to the LOCK position.
- Pieces may fly during the replacement operation. Always wear protective glasses, gloves, and other protective equipment.

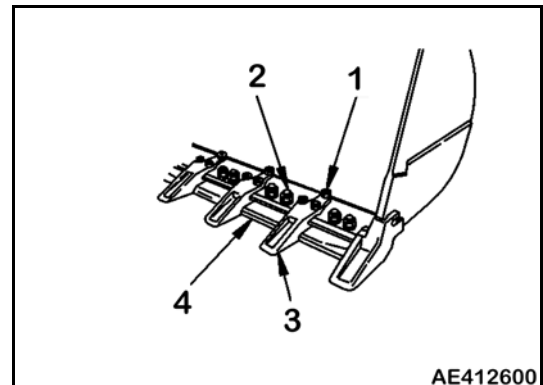
Remark

Replace the bucket teeth and the segment edges before they wear down to the end face of the bucket.

Required

- Block to place under the bucket
1. Raise the bucket to an appropriate height and place a block under the bucket.
 2. Set the bucket so that the bottom of the bucket is horizontal to the block and then set the center of the bucket bottom on the block.
 3. After lowering the bucket onto the block, stabilize the bucket and then stop the engine.

4. Remove the bolt (1) and nuts (2) and then remove bucket tooth (3) and segment edge (4).
5. Clean the installation surface of bucket tooth (3) and segment edge (4).
6. Install a new tooth and segment edge to the bucket. When doing this, insert shims to remove any clearance between the tooth and top surface of the bucket.



Remark

The segment edge can be turned over and used again.

7. Tighten the nut temporarily so that there is no clearance between the tooth and tip of the bucket and then hit the tip of the tooth with a hammer.

★ Mounting bolt tightening torque

Mounting bolt for bucket tooth:
..... 883 to 1200 N•m (651.3 to 885.1 lbf ft)

Mounting bolt for segment edge:
..... 1600 to 2160 N•m (1180.1 to 1593.1 lbf ft)

8. After operating the machine for a few hours, tighten the mounting nuts again.

Turn, Replace Bolt-On Cutting Edge

WARNING

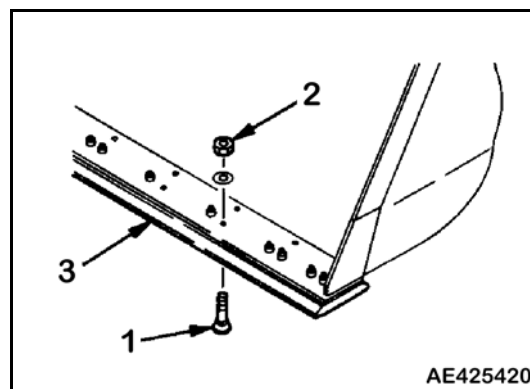
It is extremely dangerous if the work equipment moves by mistake when doing this procedure. Set the work equipment in a stable condition; stop the engine; and set the safety lock for the work equipment control lever securely to the LOCK position.

Remark

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

Required

- Block to place under the bucket
1. Raise the bucket to an appropriate height and place a block under the bucket.
 2. Set the bucket so that the bottom of the bucket is horizontal to the block and then set the center of the bucket bottom on the block.
 3. After lowering the bucket onto the block, stabilize the bucket and then stop the engine.
 4. Remove bolts (1) and nuts (2) and then remove cutting edge (3).
 5. Clean the mounting surface of cutting edge (3).
 6. Turn cutting edge (3) and install it to the bucket.
 - ★ If both sides of the cutting edge are worn, replace it with a new part.
 - ★ If the wear extends to the mounting surface, repair the mounting surface before installing the cutting edge.
 7. Tighten bolts (1) and nuts (2) uniformly so that there is no gap between the bucket and cutting edge (3).



Tightening torque: 883 to 1200 N•m (651.3 to 885.1 lbf ft)

8. After operating the machine for a few hours, tighten the mounting nuts again.

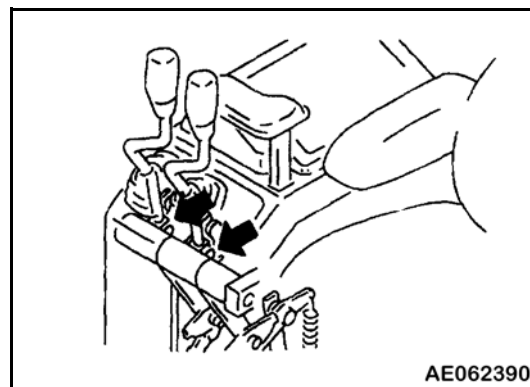
Lubricate Work Equipment Control Valve Linkage

If the work equipment control lever is heavy or does not move smoothly, apply grease.

Remark

Lubricate in two places.

1. Using a grease pump, pump in grease through the grease fittings shown by arrows in the graphic.
2. After greasing, wipe off any grease that was pushed out.



MAINTENANCE

Check Air Conditioner

⚠ WARNING

- If the refrigerant used in the air conditioner gets into your eyes or on your hands, it may cause loss of sight or frostbite.
- Do not touch the refrigerant.
- Never loosen any part of the refrigerant circuit.
- Do not bring any flame close to any point where the refrigerant gas is leaking.

Check Level of Refrigerant (Gas)

If the cooling effect of the air conditioner is poor, there may be a lack of refrigerant gas (R134a).

- ★ To determine the condition and volume of the refrigerant, check sight glass (2), located on the right inside of the engine side cover.

Before carrying out inspection, set the following conditions.

1. Start the engine and run it at approximately 1,500 rpm.
2. Turn the air conditioner ON/OFF switch to the ON position.
3. Set the air flow to the maximum position.
4. Set the temperature to the lowest position.
5. Open the doors and windows fully.
6. Check the condition of the sight glass. The sight glass is located on top of the receiver dryer inside the bulkhead (D), next to the condenser.

- ★ If the condition of sight glass (2) is *correct* as shown in the diagram on the right, the condition is normal. (After the air conditioner switch is turned ON, a small number of bubbles will be seen but, after that, the fluid becomes a transparent, milky white color.)

- A: Bubbles mixed with liquid refrigerant.
- B: All refrigerant is clear liquid.
- C: Oil and refrigerant are separated; liquid is a thin, milky white color.

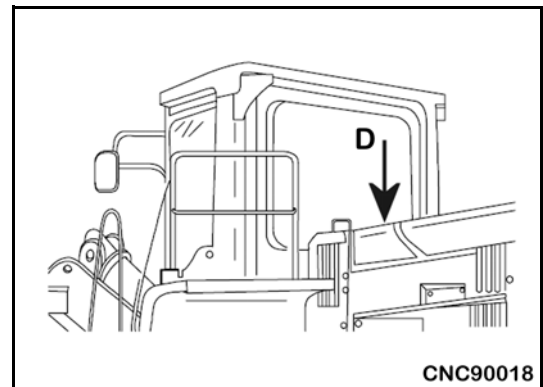
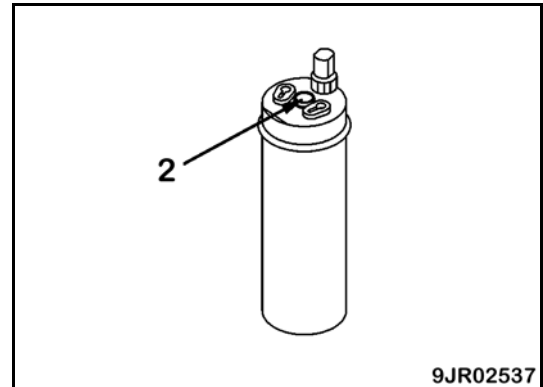
- ★ If the condition of sight glass (2) is *insufficient* as shown in the diagram on the right, there is lack of refrigerant. Ask your Komatsu distributor to charge with refrigerant. (After the air conditioner switch is turned ON, bubbles can be seen continuously.)

Remark

If the air conditioner is run with a low level of refrigerant gas, it will damage the compressor.

Operating the Air Conditioner Off-Season

Even during the off-season, operate the air conditioner for three to five minutes once a month to maintain the oil film on all parts of the compressor.



Refrigerant	Condition in sight glass
Correct	A → B → C
Insufficient	A → A → A

AJR00326

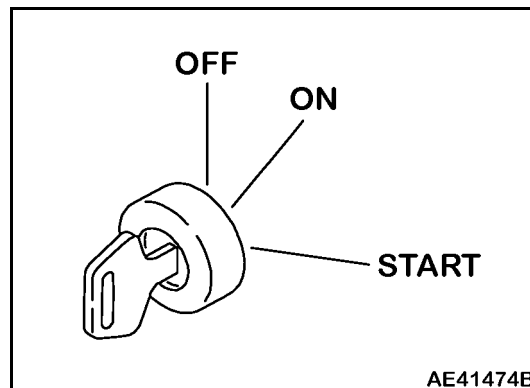
Replace Slow-Blow Fuse

Remark

Always turn the power OFF when replacing the slow-blow fuse (turn the starting switch to the OFF position).

Always replace the slow-blow fuse with one of the same capacity.

1. Turn the starting switch to the OFF position.
2. Remove the slow-blow fuse box from the chassis.



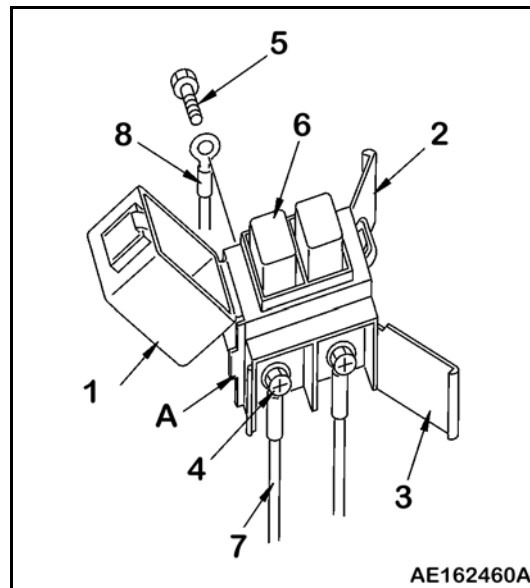
3. Open covers (1), (2), and (3) of the slow-blow fuse box.

Covers (2) and (3) can be removed easily by using protrusion (A) on the body as a fulcrum and levering the catch of the cover with a flat-headed screwdriver to release it.

4. Loosen screws (4) and (5) and remove them.

When screws (4) and (5) are removed, slow-blow fuse (6) will also come off, together with electric wiring (7) and (8).

5. Using screws (4) and (5), install a new slow-blow fuse together with electric wiring (7) and (8) in the slow-blow fuse box; then close covers (1), (2), and (3).
6. Install the slow-blow fuse box to the chassis.

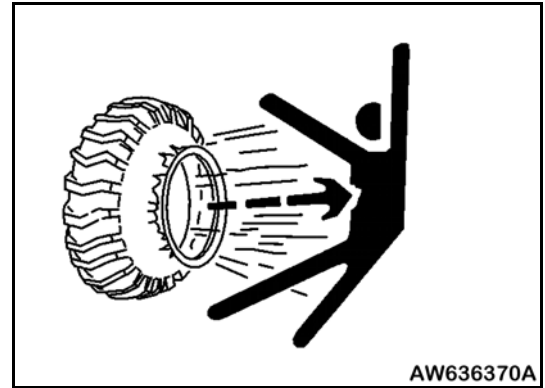


MAINTENANCE

Select Tires

WARNING

- If a tire or a rim is handled improperly, the tire may burst or be damaged and the rim may be broken and scattered. This can cause serious injury or death.
- Because maintenance, disassembly, repair, and assembly of the tires and rims require special equipment and skill, make sure to ask a tire repair shop to do the work.
- Do not heat or weld the rim to which the tire is installed. Do not make a fire near the tire.



WARNING

- Select the tires according to the conditions of use and the weight of the attachments on the machine.
- Use only specified tires and inflate them to the specified pressure. See "Check Tire Pressure" on page 3-41.
- Use the following table to select the tires according to the conditions of use and the weight of the attachments of the machine.
- Since the travel speed indicated on the speedometer varies with the tire size, consult your Komatsu distributor when using optional tires.

	Maximum Load [kg (lb)]	Tire Size	Remark
Front wheel	12,690 (27,977)	26.5-25-20PR (L3 Rock)	-
Rear wheel	12,690 (27,977)	26.5-25-20PR (L3 Rock)	

Check Tire Pressure

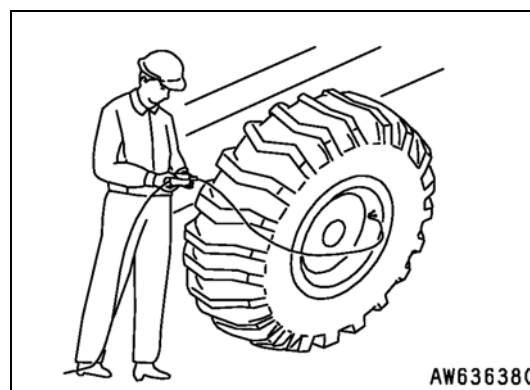
⚠ WARNING

- When inflating a tire, check that no one enters the working area.
- Use an air chuck which has a clip and can be fixed to the air valve.
- While inflating the tire, check the inflation pressure occasionally so that it does not rise too high.
- If the rim is not fitted normally, it may be broken and scattered while the tire is inflated. To ensure safety, place a guard around the tire and do not work in front of the rim; work on the tread side of the tire.
- Abnormal drop of inflation pressure and abnormal fitting of the rim indicate a problem in the tire or rim. In this case, be sure to ask a tire repair shop to do the repairs.
- Be sure to observe the specified inflation pressure.
- Do not adjust the inflation pressure of the tires immediately after high-speed travel or heavy-duty work.

- ★ 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 graphic.
- Do not work in front of the rim; work on the tread side of the tire.



Remark

The optimum inflation pressure differs according to the type of work being performed. For details, see "HANDLING TIRES" on page 2-99.

The proper inflation pressure is shown in the following table.

Size	Standard Inflation Pressure
26.5-25-20PR (L3 Rock) Standard	Front tire: 0.44 MPa {4.5 kg/cm ² } [63.8 psi] Rear tire: 0.34 MPa {3.5 kg/cm ² } [49.3 psi]
26.5-25-22PR (L3 Rock) Option	Front tire: 0.44 MPa {4.5 kg/cm ² } [63.8 psi] Rear tire: 0.34 MPa {3.5 kg/cm ² } [49.3 psi]

MAINTENANCE

Check Before Starting

For the following items, see “Check Before Starting Engine” on page 2-45.

- Check machine monitor
- Check dust indicator
- Check coolant level, add coolant
- Check oil level in engine oil pan, add oil
- Check fuel level, add fuel
- Check electric wiring
- Check parking brake
- Check brake pedal
- Check inflation pressure of tires
- Check waterproof/fireproof dividing walls

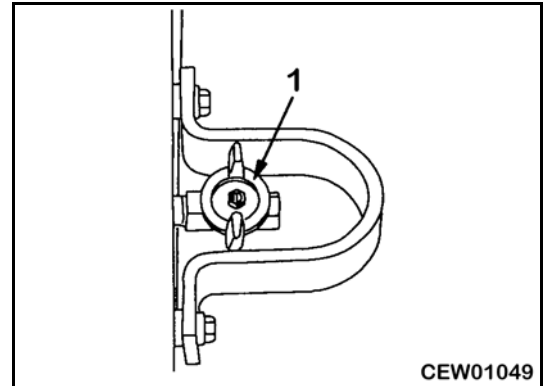
Additional Checks

- Check window washer fluid
- Check condition of wipers
- Check horn
- Check locks
- Check emergency exit

Every 50 Hours Service

Drain Water, Sediment from Fuel Tank

- ★ The fuel tank is located on the right side of the machine.
1. Prepare a container to catch the fuel and place it under the drain valve of the fuel tank.
 2. Loosen drain valve (1) on the right side of the fuel tank.
 3. Drain out all the water and sediment collected at the bottom of the tank.
 4. When all the water and sediment have drained out, close the drain valve.



MAINTENANCE

Every 100 Hours Service

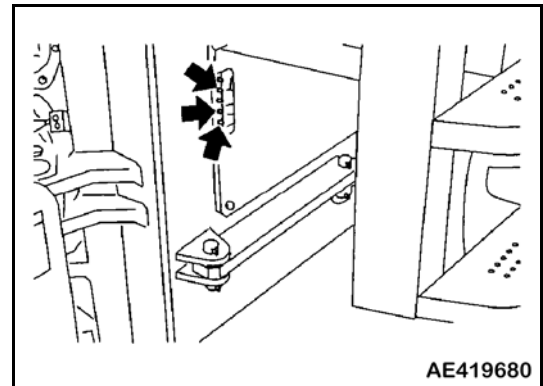
- ★ Maintenance for every 50 hours service should be performed at the same time.

Lubricate Rear Axle Pivot Pin

Remark

There are three lubrication points.

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

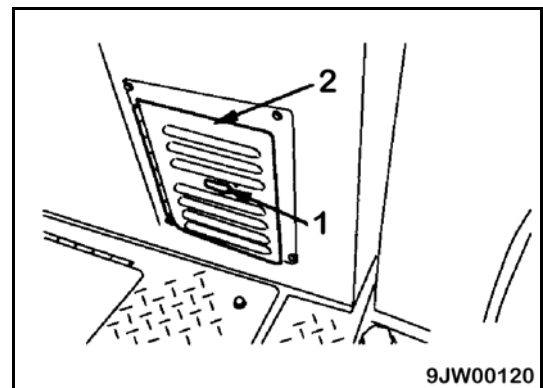


Clean Element in Air Conditioner Fresh Air Filter

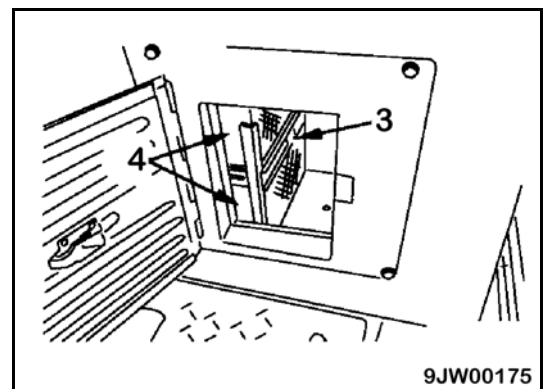
WARNING

If compressed air is used, there is danger that dirt may fly and cause personal injury. Always wear safety glasses, dust mask, and other protective equipment.

- ★ If the air conditioner has been used, the air filter should be cleaned.
 - ★ Stop the air conditioner before cleaning the element.
1. Stop the engine.
 2. Loosen bolt (1) and remove cover (2).



3. Loosen screw (3).
4. Remove element (4) and clean it.
5. Direct dry compressed air (less than 0.69 MPa (7 kg/cm²) [100 psi] to the element from inside along its folds, and then direct it from outside along its folds and again from inside.
6. Install the element so that the arrow at the top of the element faces the inside of the cab.



Check Oil Level in Hydraulic Tank, Add Oil

⚠ WARNING

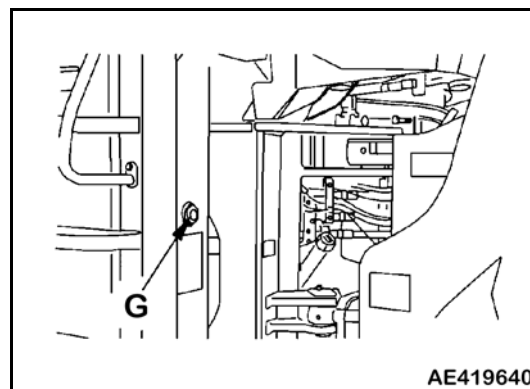
- The parts and oil are VERY HOT immediately after stopping the engine and may cause burns. Wait for the temperature to decrease before starting the work.
- When removing the oil filler cap, turn it slowly to release any internal pressure and then remove it.

★ The sight gauge is located on the outside of the hydraulic tank, on the right side of the machine.

★ The fill port is on the right side, inside an access door at the top of the platform.

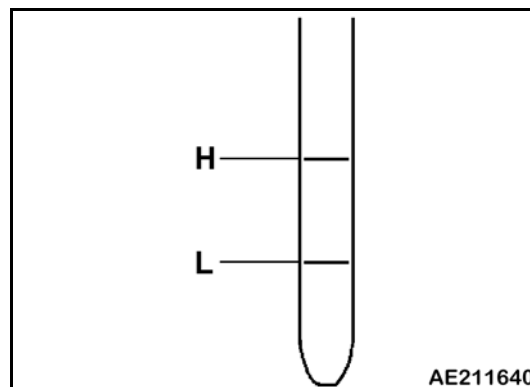
1. Lower the bucket to the ground; stop the engine; and wait for approximately five minutes.
2. Check the oil level with sight gauge (G) on the hydraulic tank.

The oil level should be between the H and L marks.

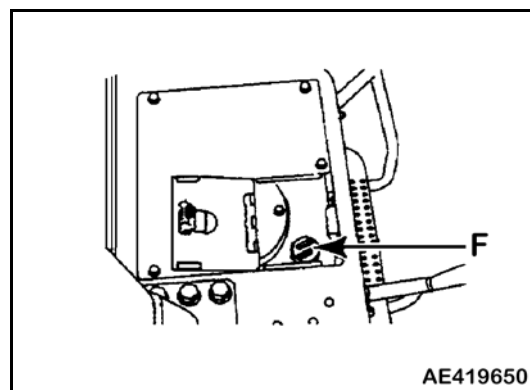


Remark

If the oil level is above the H level, stop the engine; wait for the hydraulic oil to cool down; then drain the excess oil from the drain plug. Using the machine with excess oil in the circuit will damage the hydraulic circuit or cause the oil to spurt out.



3. If the oil is below the L level, open the inspection cover over the step and add oil through filler (F).



MAINTENANCE

Every 250 Hours Service

- ★ Maintenance for every 50 and 100 hours service should be performed at the same time.

Check Battery Electrolyte Level

WARNING

- Do not use the battery if the battery electrolyte level is below the LOWER LEVEL line. This situation will accelerate deterioration of the inside of the battery and reduce the service life of the battery. In addition, it may cause an explosion.
- The battery generates flammable gas and there is danger of explosion. 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 a large amount of water and consult a doctor immediately.
- 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.

Remark

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

- ★ Perform this check before operating the machine. See “Battery Precautions” on page 1-35.
- ★ Try to check the electrolyte level on a daily basis.
- ★ Be sure to check it at least once a month. Always follow the basic safety procedures.

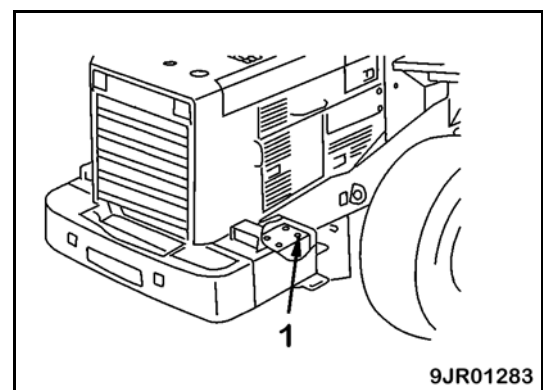
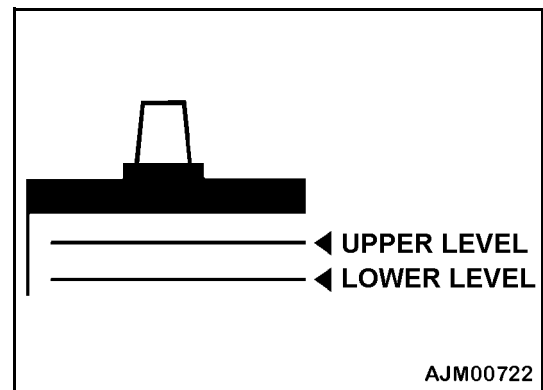
When Checking Electrolyte Level from Side of Battery

If it is possible to check the electrolyte level from the side of the battery, do this procedure.

1. Use a wet cloth to clean the area around the electrolyte level lines and check that the electrolyte level is between the UPPER LEVEL (UL) and LOWER LEVEL (LL) lines.
 - ★ If you wipe the battery with a dry cloth, static electricity may cause a fire or explosion.
2. If the electrolyte level is below the midway point between the UPPER LEVEL (UL) and LOWER LEVEL (LL) lines, remove cap (1) and add the distilled water up to the UL line.
3. Replace the cap (1) and tighten it securely.

Remark

If distilled water is added above the bottom of the sleeve, use a syringe to lower the level to the the bottom of the sleeve. Neutralize the fluid that is removed with baking soda (sodium bicarbonate) and then flush it away with a large amount of water, or consult your Komatsu distributor or battery manufacturer.



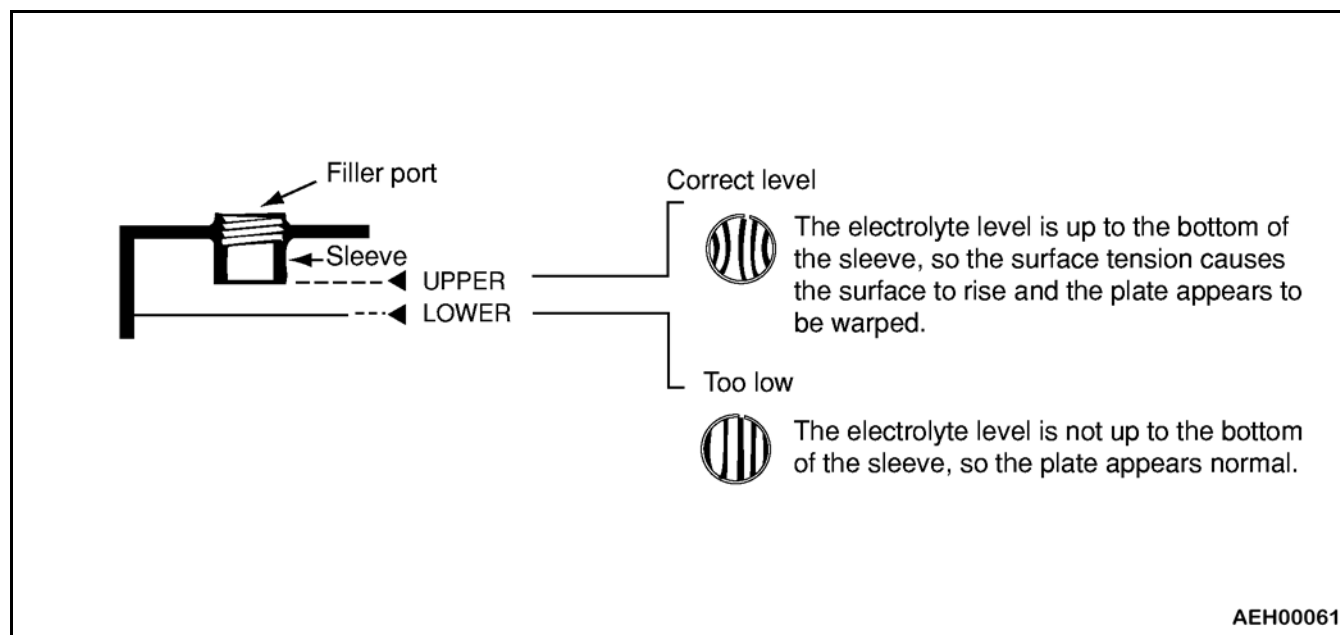
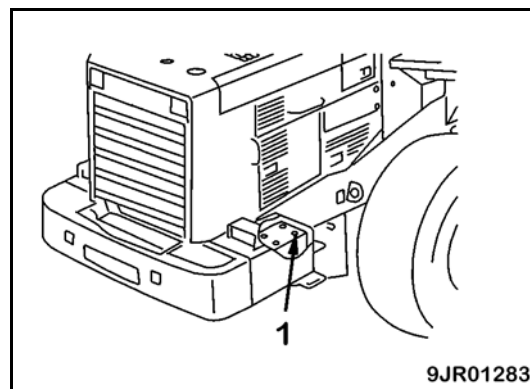
When It Is Impossible to Check Electrolyte Level from Side of Battery

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, use this procedure to check the level.

1. Remove cap (1) on the top of the battery; look into the filler port; and check the electrolyte level.

If the electrolyte level does not reach the sleeve, add distilled water so that the level reaches the bottom of the sleeve (UPPER LEVEL line).

2. Use the following diagram for reference and check if the electrolyte reaches the bottom of the sleeve.



3. Replace cap (1) and tighten it securely.

Remark

If water is added above the bottom tip of the sleeve, use a syringe to remove the electrolyte and lower the level to the UPPER LEVEL (UL) line. Neutralize the removed fluid with baking soda (sodium bicarbonate) and then flush it away with a large amount of water, or consult your Komatsu distributor or battery manufacturer.

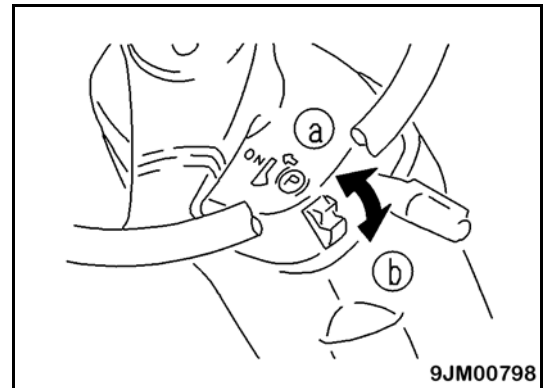
When It Is Possible to Use Indicator to Check Electrolyte Level

If it is possible to use an indicator to check the electrolyte level, follow the instructions provided with the indicator.

MAINTENANCE

Check Parking Brake

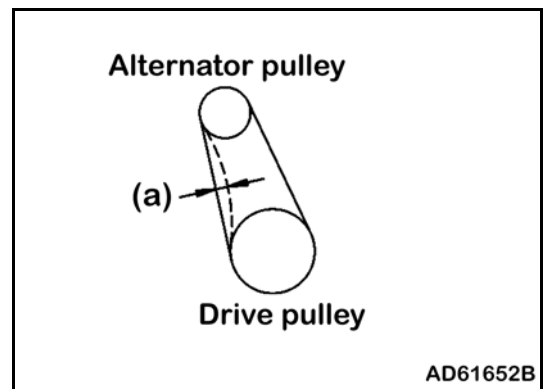
1. Set the machine on a dry, downhill slope.
2. Press the parking brake switch to the ON position and check if the parking brake holds the machine in position.
 - Position (a): ON
 - Parking brake is actuated and parking brake pilot lamp illuminates.
 - Position (b): OFF
 - The parking brake is released.
3. If there is a problem, contact your Komatsu distributor.



Check Alternator Belt Tension, Adjust

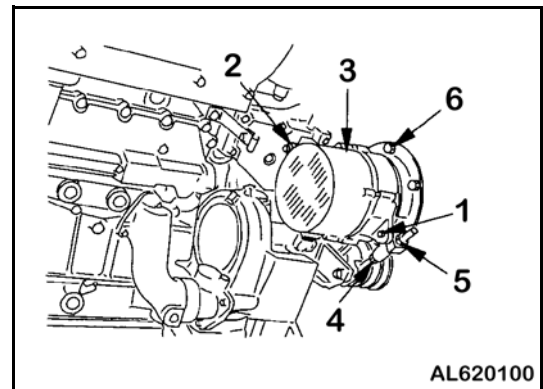
Checking

The standard deflection (a) between the drive pulley and alternator pulley is about 13 to 16 mm (0.51 to 0.63 in) when pressed by a thumb force of 98.1 N (22.1 lbf) at a point midway between the drive pulley and the alternator pulley.



Adjusting

1. Remove cover mounting bolts (6) in two places and remove the cover.
2. Loosen bolts (1), (2), and (5) and then turn nut (4) to adjust the tension of the belt.
3. After adjusting, tighten bolts (1), (2), and (5) to secure alternator (3).
4. Reinstall the cover. Make sure that no part of the cover touches any moving part of the alternator.
5. Check each pulley for damage and wear of the V-groove.

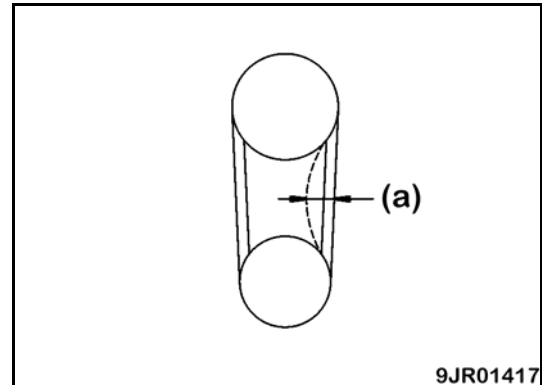


- ★ Be particularly careful to check that the V-belt does not touch the bottom of the V-groove. If there is an abnormality, contact your Komatsu distributor for replacement of the pulley.
- ★ If the belt has elongated and there is no more allowance for adjustment or if the belt is cut or cracked, replace the belt.
- ★ When adjusting the V-belt, do not press the alternator directly with a bar; use a piece of wood between the bar and the V-belt.
- ★ If you have replaced the V-belt, operate the machine for one hour and then adjust the belt again. The V-belt elongates when first used.

Check Air Conditioner Compressor Belt Tension, Adjust

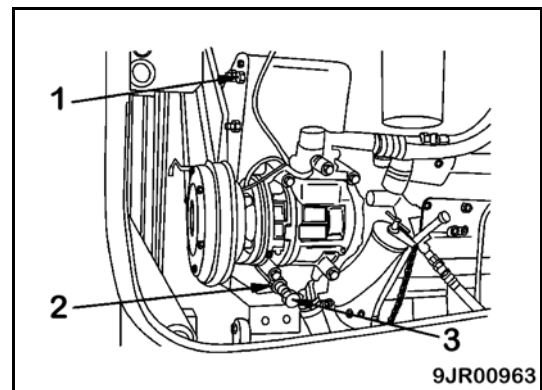
Checking

The standard deflection (a) between the air conditioner compressor pulley and the drive pulley should be 8.5 to 11 mm (0.33 to 0.43 in) when pressed with a thumb force of approximately 58.8 N (13.2 lbf) at a midway point.



Checking When Changing the V-Belt

The standard deflection (a) between the air conditioner compressor pulley and the drive pulley should be 6 to 8.5 mm (0.24 to 0.33 in) when pressed with a thumb force of approximately 98.0 N (22.0 lbf) at a midway point.



Adjusting

1. Loosen bolt (1).
2. Loosen locknut (2).
3. Turn adjustment bolt (3) to adjust the belt tension so that the deflection (a) is the specified value.
4. Tighten locknut (2).
5. Tighten bolt (1).
6. Check each pulley for damage and wear of the V-groove.

★ Be particularly careful to check that the V-belt does not touch the bottom of the V-groove.

7. Check for wear of the V-belt.

- ★ If the belt has elongated and there is no more allowance for adjustment or if the belt is cut or cracked, replace the belt.
- ★ When adjusting the V-belt, do not press the alternator directly with a bar; use a piece of wood between the bar and the V-belt.
- ★ If you have replaced the V-belt, operate the machine for one hour and then adjust the belt again. The V-belt elongates when first used.

Check for Loose Wheel Hub Nuts, Tighten

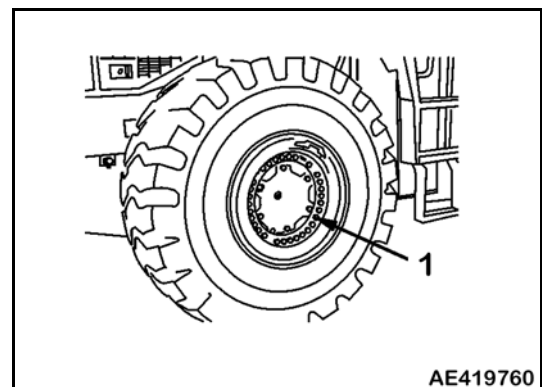
If wheel hub bolts (1) are loose, tire wear will increase and accidents might happen.

1. Check for loose nuts and tighten, if necessary.

When checking for loose nuts, always turn the nuts in the tightening direction.

Tightening torque: 471 ±49 N•m (347.39 ±36.14 lbf ft)

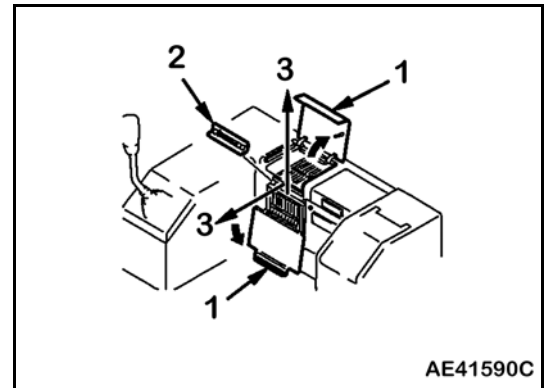
2. If any stud bolt is broken, replace **all** the stud bolts for that wheel.



MAINTENANCE

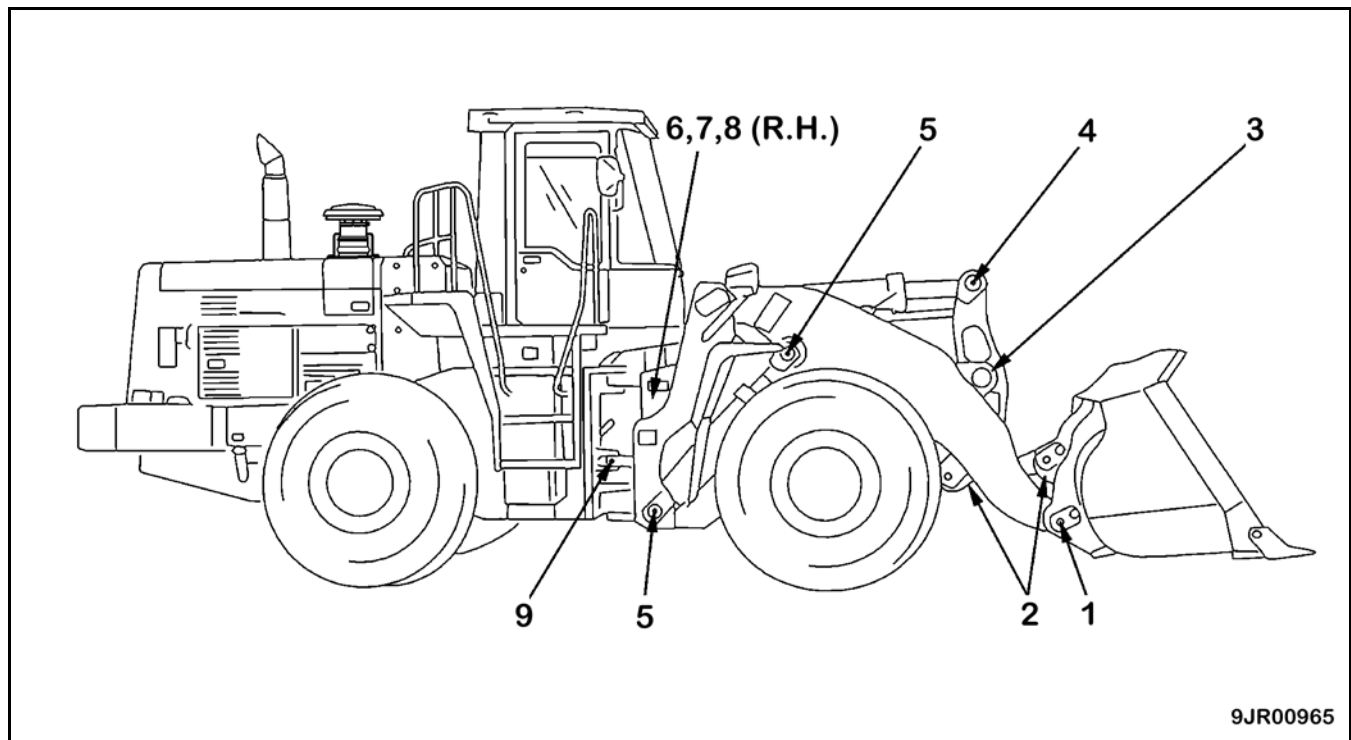
Clean Element in Air Conditioner Recirculation Filter

1. Open filter inspection cover (1) and remove the filter cover (2).
2. Pull out filter (3) in the direction of the arrow.
 - ★ When removing the filter to the side, put your weight on the seat and push down.
3. Clean with compressed air in the same way as for the fresh air filter.
 - ★ For details, see “Clean Element in Air Conditioner Fresh Air Filter” on page 3-44.
 - ★ If the filter is extremely dirty, rinse it in water.
4. After rinsing the filter, dry it completely before installing it again.



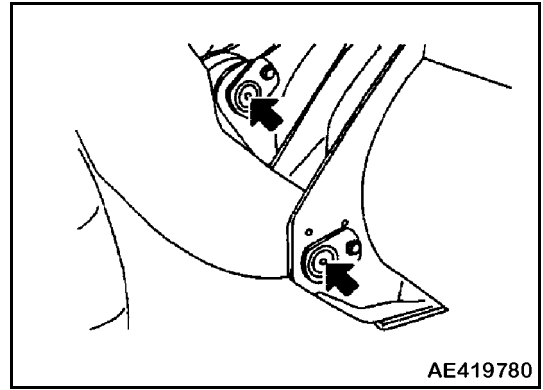
Lubricating

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

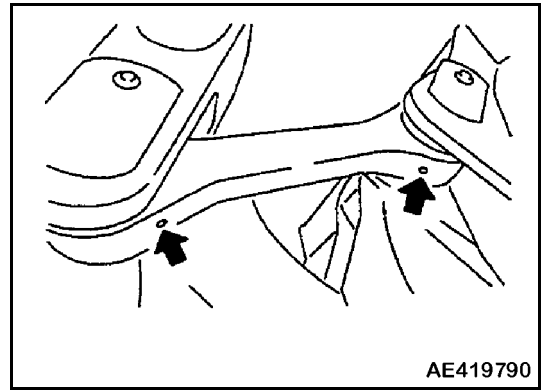


- | | | |
|--------------------|--------------------------|---------------------------------|
| 1. Bucket pin | 4. Dump cylinder rod end | 7. Dump cylinder bottom pin |
| 2. Bucket link pin | 5. Lift cylinder pin | 8. Steering cylinder bottom pin |
| 3. Tilt lever pin | 6. Lift arm pivot pin | 9. Steering cylinder rod end |

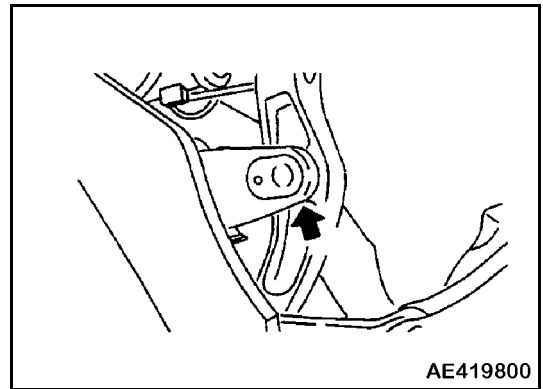
- ★ (1) Bucket pin (two places)



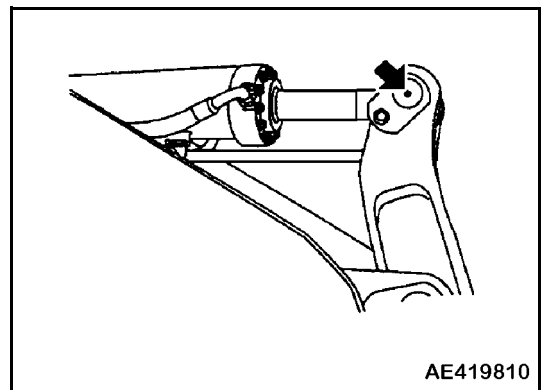
- ★ (2) Bucket link pin (two places)



- ★ (3) Tilt lever pin (one place)

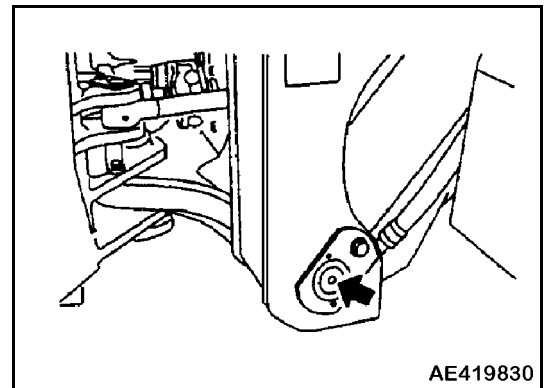
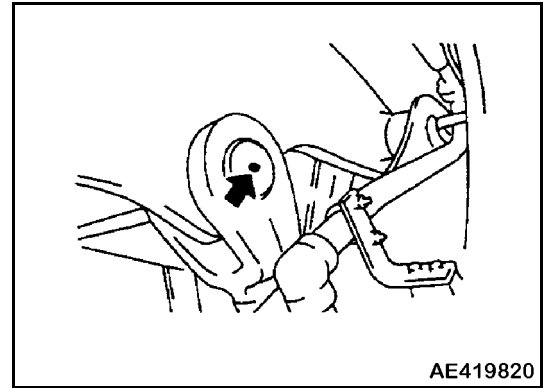


- ★ (4) Dump cylinder pin (one place)

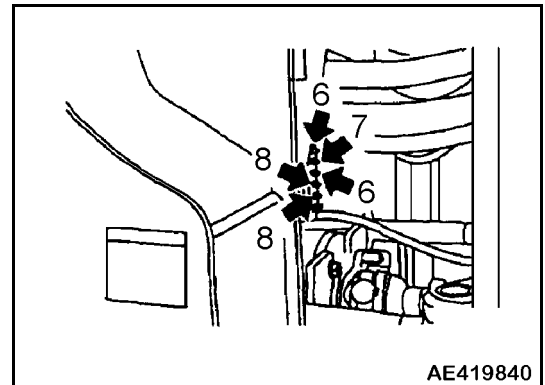


MAINTENANCE

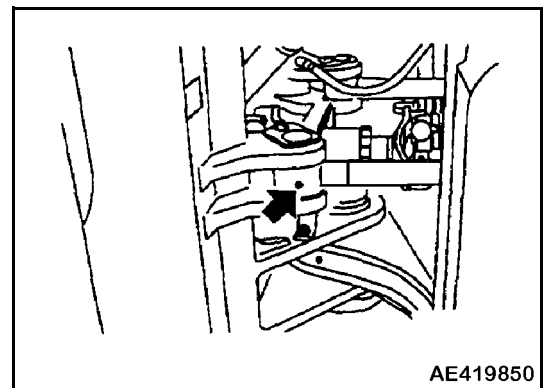
- ★ (5) Lift cylinder pin (four places)



- ★ (6) Lift arm pivot pin (two places)
- ★ (7) Dump cylinder bottom pin (one place)
- ★ (8) Steering cylinder bottom pin (two places)



- ★ (9) Steering cylinder rod (two places)



Every 500 Hours Service

★ Maintenance for every 50, 100, and 250 hours service should be performed at the same time.

Change Oil in Engine Oil Pan, Replace Engine Oil Filter Cartridge

⚠ WARNING

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

Required

- Container to catch engine oil
 Refill capacity: 37 liters (9.8 US gallons)

- Filter wrench

1. Stop the engine and wait for the temperature of all parts to go down.

2. Open the engine side cover on the right side of the chassis.

3. Open oil filler (F).

4. Place a container under drain plug (P) to catch the oil.

5. Loosen drain plug (P) and drain the oil.

6. Check the drained oil.

★ If there are excessive metal particles or foreign material, contact your Komatsu distributor.

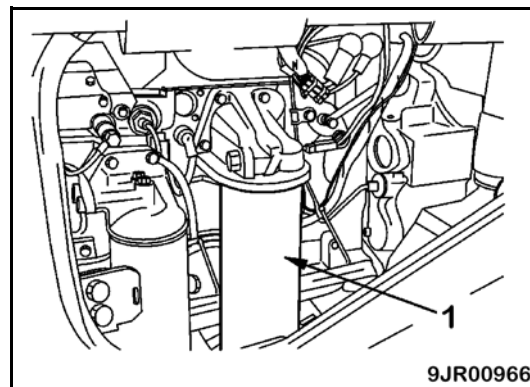
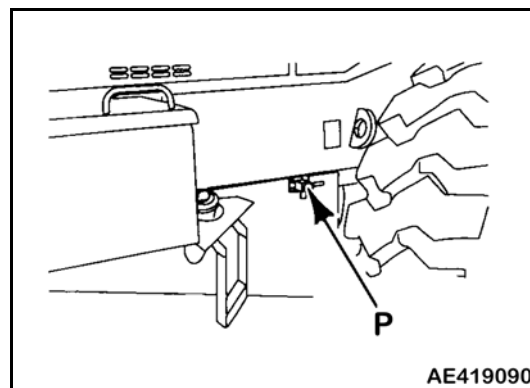
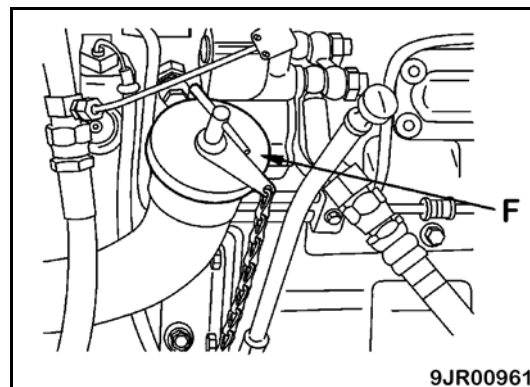
7. Install drain plug (P).

8. Using the filter wrench, turn filter cartridge (1) counterclockwise to remove it.

★ If this operation is carried out immediately after stopping the engine, a large amount of oil will come out. Wait for 10 minutes before starting the operation.

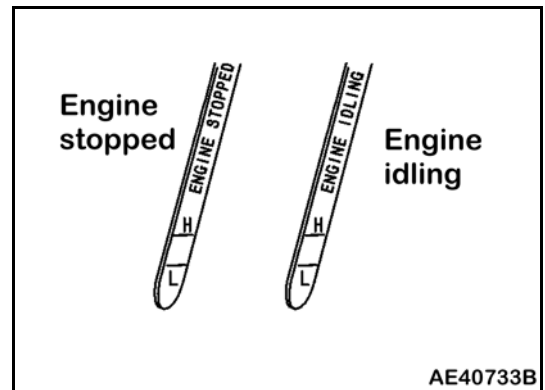
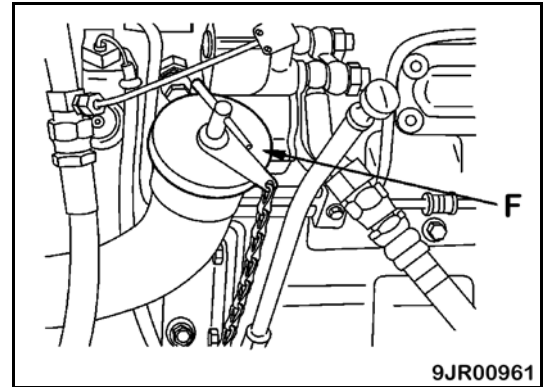
9. Clean the filter holder.

10. Fill a new filter cartridge with clean engine oil; coat the seal portion and the threaded portion of the filter cartridge with engine oil.



MAINTENANCE

11. Install the new filter cartridge to the filter holder.
 - ★ When installing the cartridge, bring the seal surface into contact with the filter holder and then tighten a further 3/4 to 1 turn by hand.
 - ★ If you use a filter wrench to tighten the filter, be careful not to scratch or deform the filter.
12. After replacing the filter cartridge, add engine oil through oil filler (F) until the oil level is between the H and L marks on the dipstick.
13. Run the engine for a short time at low idling. Stop the engine and check that the oil level is between the H and L lines on the dipstick.
 - ★ For details, see “Check Oil Level in Engine Oil Pan, Add Oil” on page 2-47.



Replace Fuel Filter Cartridge

WARNING

- Immediately after the engine is stopped, all parts are VERY HOT. Do not replace the filter immediately. Wait for the engine to cool down before starting the operation.
- High pressure is generated inside the engine fuel piping system when the engine is running. When replacing the filter, wait for at least 30 seconds after the engine stops to let the internal pressure go down before replacing the filter.
- Do not bring any fire or spark close to the machine.
- Be careful when opening the air bleed plug at the fuel filter head and the air bleeder of the supply pump. The system is still under pressure and fuel may spurt out.

Remark

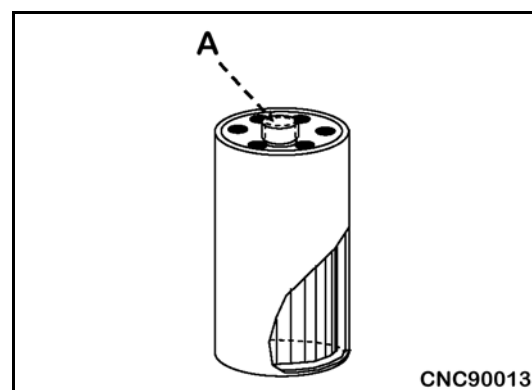
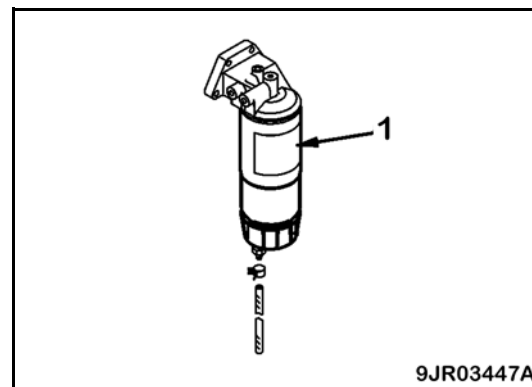
Genuine Komatsu fuel filter cartridges use a special filter that has a highly efficient filtering ability. When replacing the filter cartridge, always use a genuine Komatsu part.

The common rail fuel injection system used on this machine consists of more precise parts than the conventional injection pump and nozzle. If any part other than a genuine Komatsu filter cartridge is used, dust or dirt may get in and cause problems with the injection system. Never use substitute parts.

When performing inspection or maintenance of the fuel system, pay more attention than normal to the entry of dirt. If dirt is stuck to any part, use fuel to wash it off completely.

Required

- Container to catch fuel
 - Filter wrench
1. Set the container to catch the fuel under the filter cartridge (1).
 2. Using a filter wrench, turn filter cartridge (1) counterclockwise to remove it.
 3. Clean the filter holder.
 4. Make sure that cap (A) is attached to the filter.



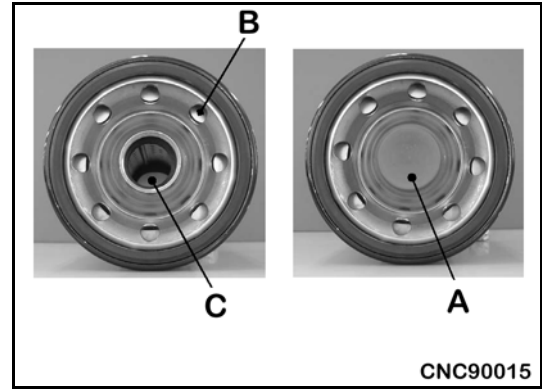
Remark

Cap (A) prevents the entry of dirt or dust into the filter cartridge. If fuel dust gets into the clean side of the filter, it may result in a failure of the fuel injection system.

MAINTENANCE

- ★ The cap (A) covers the large hole (C) at the top of the filter and prevents you from pouring fuel through that hole and into the *clean* side of the filter. The cap forces you to add the fuel through the eight holes in the *dirty* side of the filter.

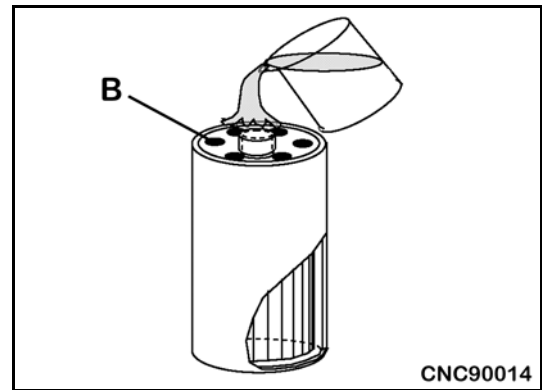
- Fill the filter cartridge with clean fuel through the eight small holes (B) in the new filter cartridge.
- Coat the packing surface of the filter cartridge with oil.
- Remove filter cartridge cap (A) and throw it away.



- Install the filter to the filter holder. Tighten the filter cartridge until the packing surface contacts the seal surface of the filter holder, and then tighten it 3/4 of a turn.

- ★ If the filter cartridge is tightened too much, the packing will be damaged; this will result in leakage of fuel. If the filter cartridge is too loose, fuel will leak from the packing. Always tighten the filter cartridge the correct amount.

- After replacing filter cartridge (1), loosen air bleed plug (2).
- Loosen the knob of priming pump (3), then pump the knob and check that fuel comes out from air bleed plug (2).
- Tighten air bleed plug (2).

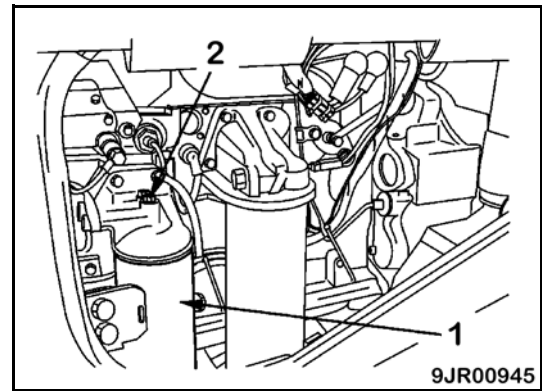


Tightening torque: 7.8 to 9.8 N•m (69.0 to 86.7 lbf in)

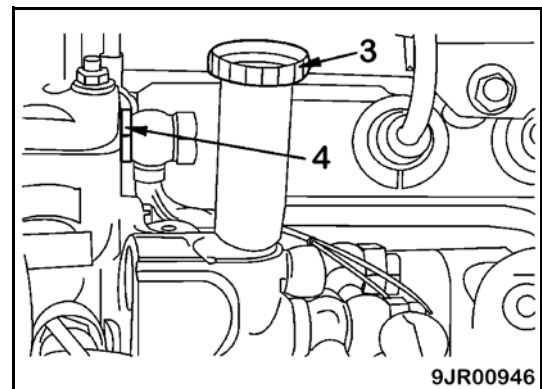
- Loosen air bleeder (4) of the supply pump.
- Pump priming pump (3) (approximately 90 to 100 times) until no more bubbles come out with the fuel from air bleeder (4), then tighten air bleeder (4).

Tightening torque: 4.9 to 6.9 N•m (3.6 to 5.1 lbf in)

- Continue pumping until priming pump (3) becomes stiff.
- Push the knob of priming pump (3) in and tighten it.
- 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 leakage of fuel, check that the filter cartridge is tightened properly.
- If the fuel still leaks, repeat Steps 1 and 2 to remove the filter cartridge, then check the packing surface for damage or embedded dirt.
- If any problem is found, replace the cartridge with a new part, then repeat Steps 3 - 15 to install the new cartridge.



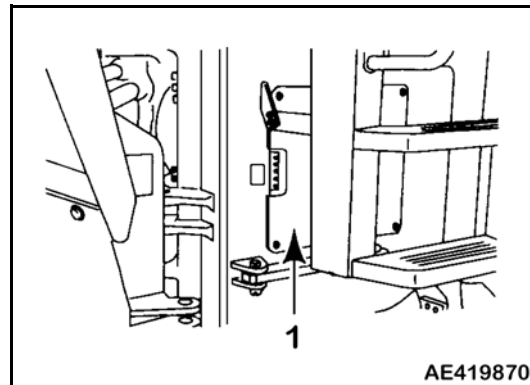
Replace Transmission Oil Filter Element

⚠ WARNING

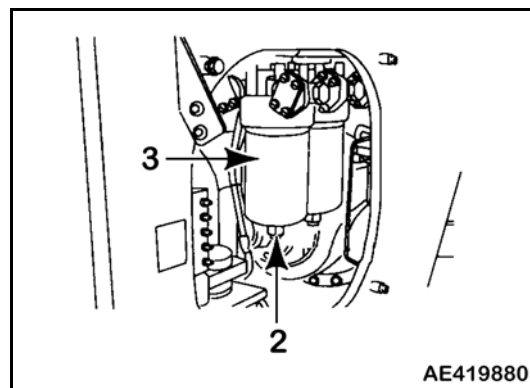
- Immediately after the engine is stopped, all parts are VERY HOT. Do not replace the filter immediately. Wait for the engine to cool down before cleaning the engine breather.
- High pressure is generated inside the engine fuel piping system when the engine is running. When replacing the filter, wait for at least 30 seconds after the engine stops to let the internal pressure go down before replacing the filter.
- When using compressed air, there is a hazard that dirt may be blown up and cause serious injury. Always use safety glasses, dust mask, or other protective equipment.

Required

- Container to catch oil
1. Remove cover (1) and set the container to catch the oil under the filter case.



2. Remove drain plug (2) at the bottom of the filter case; drain the oil; then tighten the plug again.



3. Loosen hexagonal portion (4) of case (3) and then remove case (3).

4. Take out the element and clean the inside of the case.

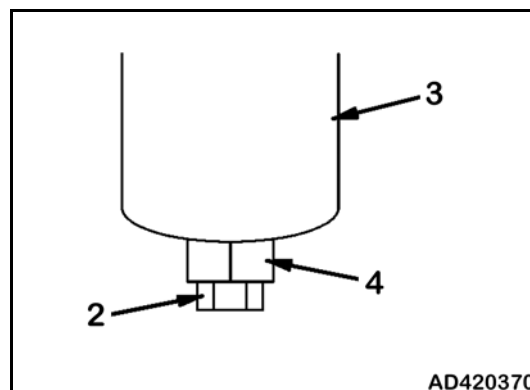
5. Replace the filter gasket and O-ring with new parts. Coat the gasket and O-ring thinly with clean engine oil before installing them.

6. Assemble the new element, then set the case in position and install it.

Drain mount tightening torque: . . . 49 – 58.8 N•m (36.1 – 43.4 lbf ft)

Case tightening torque: 58.8 – 78.5 N•m (43.4 – 57.9 lbf ft)

7. Run the engine for a short time at idling and then check that the oil is at the specified level.

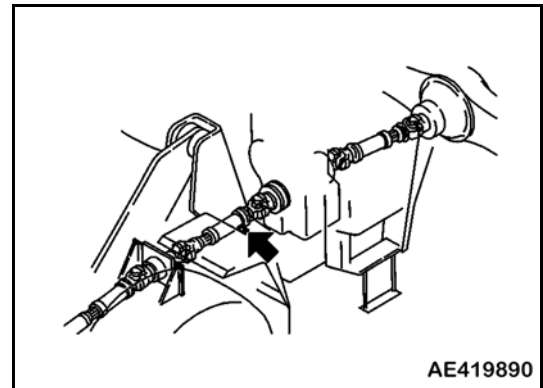


★ For details, see “Check Transmission Oil Level, Add Oil” on page 3-28.

MAINTENANCE

Lubricate Center Drive Shaft Spline

- ★ One grease point
- 1. Using a grease pump, pump in grease through the grease fittings marked by the arrow.
- 2. After greasing, wipe off any grease that was pushed out.



Check Fan Belt for Wear

- Check the V-belt.
- If any of the following conditions are present, replace or adjust the V-belt.
 - When there is a clearance between the tension pulley lever and tip of the adjustment screw.
 - When the V-belt makes contact with the bottom of the groove in each pulley.
 - When the V-belt is worn and its surface is lower than the outer diameter of the pulley.
 - When the V-belt is cracked or flaked.
 - When the V-belt makes an abnormal noise.
- ★ A device is installed to maintain the tension constant regardless of any elongation of the V-belt. There is no need to carry out adjustment until the V-belt is replaced.

Every 1000 Hours Service

Change Oil in Transmission Case, Clean Strainer

⚠ WARNING

- Immediately after stopping the engine, the parts and oil are VERY HOT and may cause burns. Wait for the temperature to go down before starting the work.
- When removing the oil filler cap, turn it slowly to release the internal pressure and then remove the cap.

Required

- Container to catch oil

Refill capacity:62 liters (16 US gallons)

1. Stop the engine and wait for the temperature of all parts to go down.
2. Set a container to catch the oil directly under drain plug (P).
3. Remove drain plug (P) and drain the oil.

★ To prevent the oil from spurting out, loosen drain plug (P) slowly and then gradually remove it.

4. After draining the oil, install drain plug (P).

Tightening torque 68.6 ±9.8 N•m (50.6 ±7.2 lbf ft)

5. Set a container to catch the oil directly under the transmission filter.
6. Remove drain plug (1) of the transmission filter; drain the oil; then tighten the plug again.

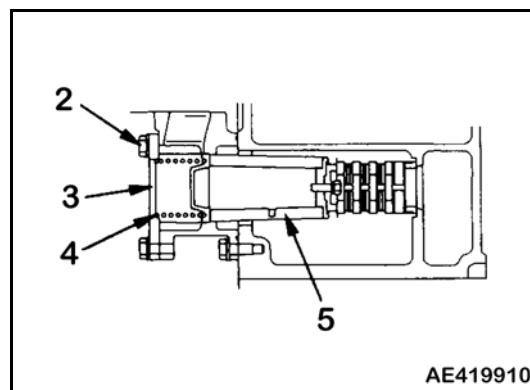
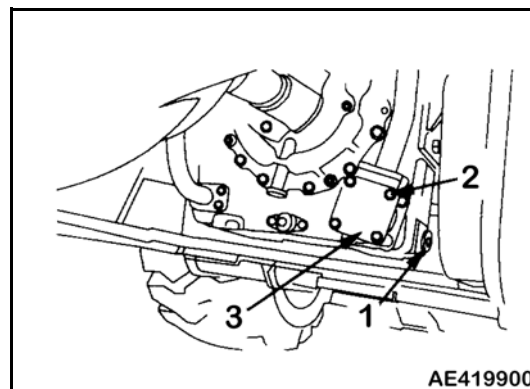
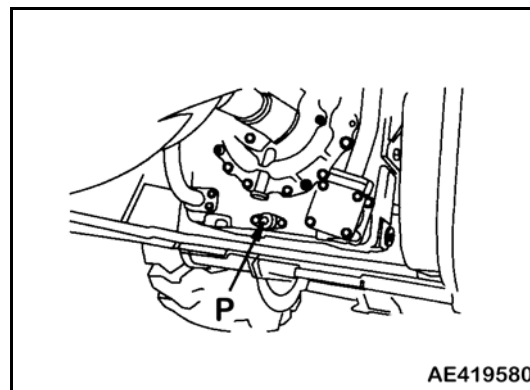
Tightening torque: 108 ±14.7 N•m (79.7 ±10.8 lbf ft)

7. Remove bolt (2); remove cover (3); and take out strainer (5), which is screwed into cover (3).

8. Remove any dirt stuck to strainer (5), then wash it in clean diesel oil or flushing oil. If strainer (5) is damaged, replace it with a new part.

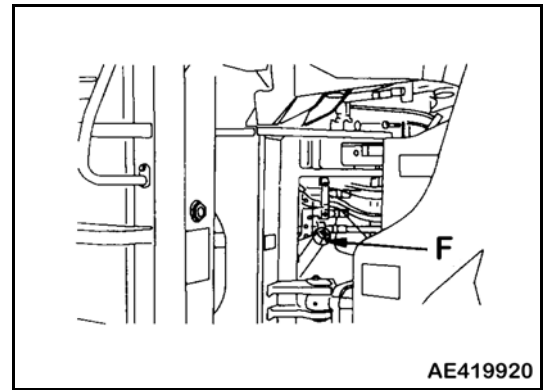
9. Install spring (4) and strainer (5) to cover (3).

★ Replace the O-ring on the cover with a new part, then install the cover.



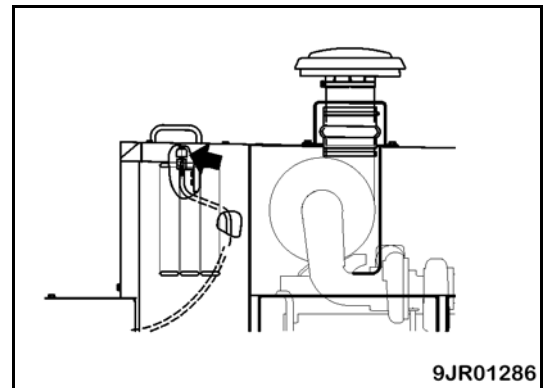
MAINTENANCE

10. Pour in the specified amount of engine oil from oil filler (F).
11. After filling with oil, check that the oil is at the specified level. For details, see “Check Transmission Oil Level, Add Oil” on page 3-28.
12. Check that there is no leakage of oil from the transmission case or oil filter.



Clean Transmission Case Breather

1. Stop the engine and wait for the temperature of all parts to go down.
2. Remove all mud and dirt from around the breather.
3. Remove the breather and fit a cover to the breather mounting hole to prevent dirt from entering.
4. Soak the breather in cleaner fluid and wash it.
5. Install the breather.

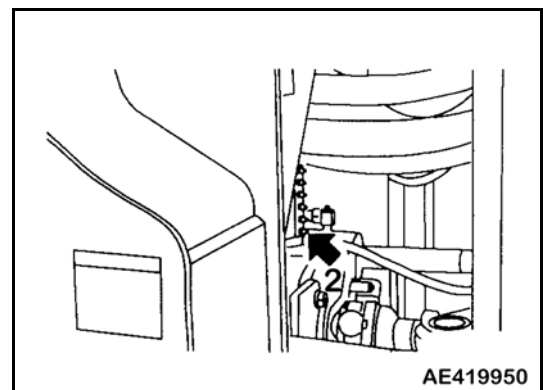
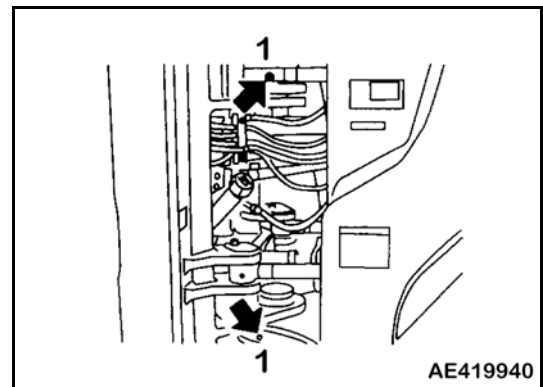


Lubricating

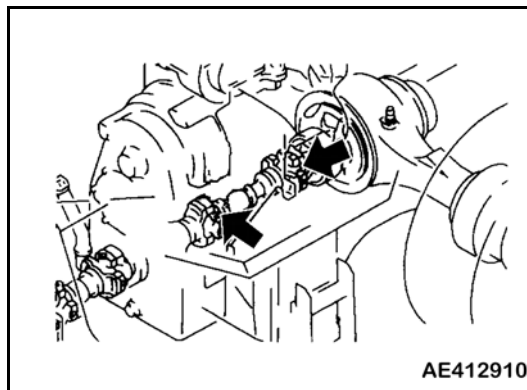
1. Park the machine on a flat, level surface and lower the work equipment to the ground.
2. Shut off the engine and cycle the controls to remove any residual hydraulic pressure from the work equipment circuits.
3. Using a grease pump, pump in grease through the grease fittings marked by the arrows.
4. After greasing, wipe off any grease that was pushed out.

★ (1) Center hinge pin (two places)

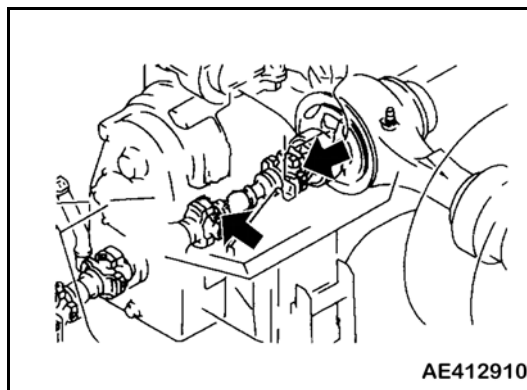
★ (2) Drive shaft center support (one place)



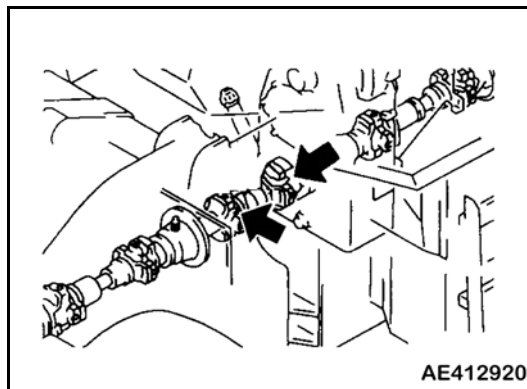
- ★ (3) Front drive shaft (three places)



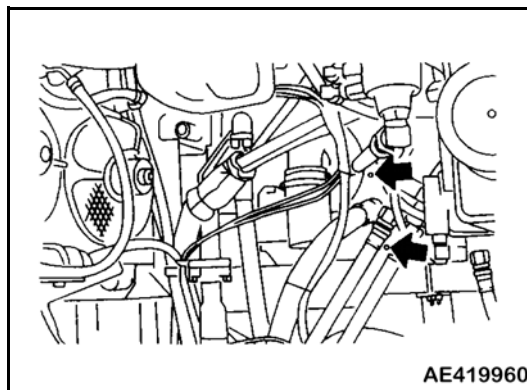
- ★ (4) Rear drive shaft (three places)



- ★ (5) Center drive shaft (three places)

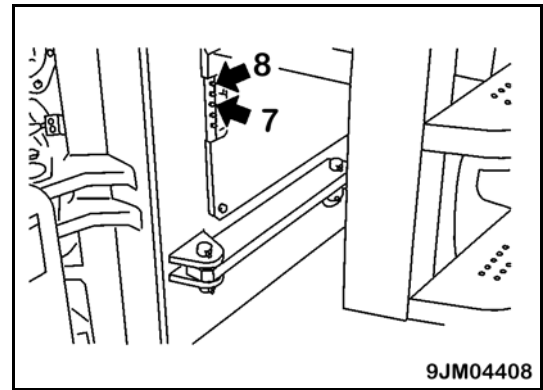


- ★ (6) Upper drive shaft (two places)

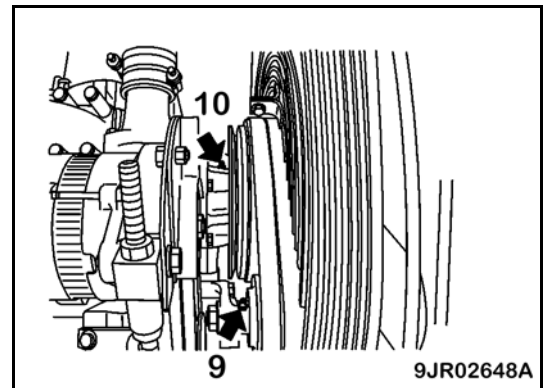


MAINTENANCE

- ★ (7) Damper (one place)
- ★ (8) Transmission mount trunnion (one place)



- ★ (9) Fan pulley (one place)
- ★ (10) Tension pulley (one place)

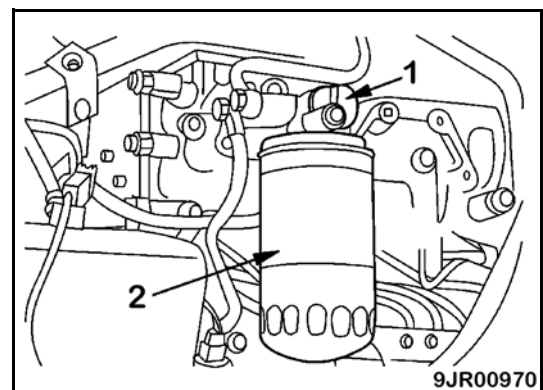


Check Tightening Parts of Turbocharger

- ★ Contact your Komatsu distributor to have the tightening portions checked.

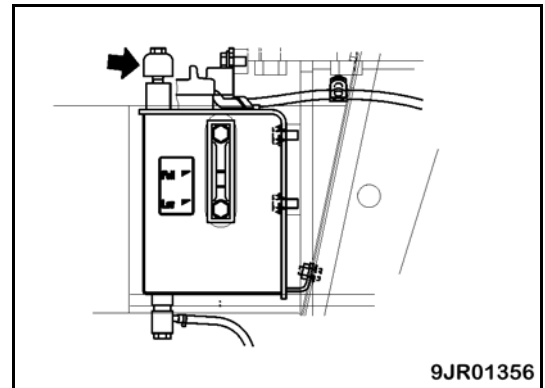
Replace Corrosion Resistor Cartridge

- ★ Only when corrosion resistor is used.
1. Open the engine side cover located on the right of the engine hood.
 2. Set valve (1) at the side of the corrosion resistor to the CLOSED position.
 3. Using a filter wrench, turn cartridge (2) to the left to remove it.
 4. Apply engine oil to the sealing surface of a new cartridge and then install it to the filter holder.
 5. When installing, bring the gasket into contact with the seal surface of the filter holder and then tighten approximately 2/3 of a turn.
 6. Set valve (1) to the OPEN position.
 7. After replacing the cartridge, start the engine and check that there is no leakage of water from the cartridge seal surface.



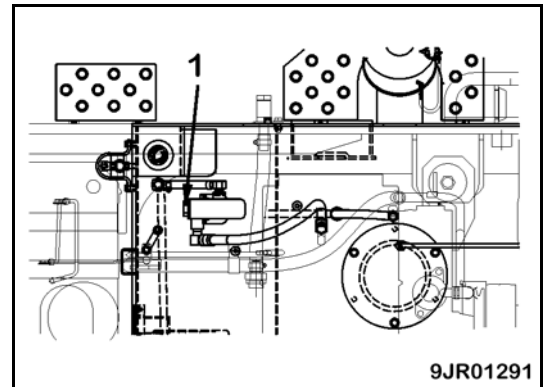
Clean Radiator Subtank Breather

1. Remove all mud and dirt from around the breather.
 2. Remove the breather.
 3. Immerse the breather in cleaning fluid and clean it.
- ★ Be careful not to let dirt enter through the mount while the breather is removed.



Clean Fuel Strainer

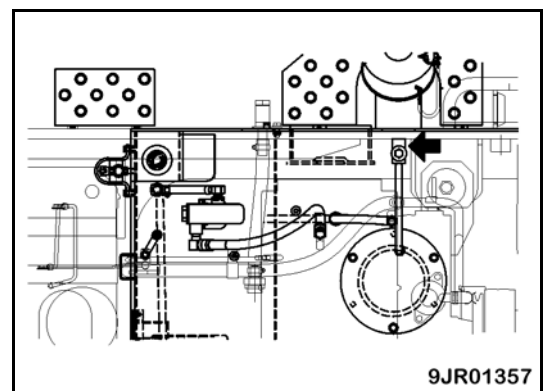
1. Remove plug (1).
 2. Remove the strainer together with the plug.
 3. Remove the dirt stuck to the strainer and strainer case.
 4. Wash the strainer with clean diesel oil or flushing oil.
- ★ If the strainer is damaged, replace it with a new part.
5. Insert the strainer, then install plug (1).
- ★ If the plug O-ring is damaged or deteriorated, replace it with a new part.



Tightening torque for plug: 78.4 N•m (57.8 lbf ft)

Wash Fuel Tank Breather

1. Stop the engine and wait for the temperature of all parts to go down.
2. Remove all mud and dirt from around the breather.
3. Remove the breather and fit a cover to the breather mounting hole to prevent dirt from entering.
4. Soak the breather in cleaning fluid and wash it.
5. Install the breather.



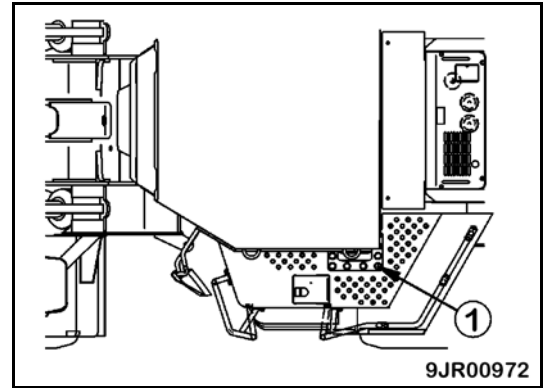
MAINTENANCE

Tighten ROPS Canopy

1. Check that there are no loose mounting bolts (1) on the ROPS canopy.

★ Tighten any loose bolts.

Tightening torque: 927 ±103 N•m (683.7 ±76.0 lbf ft)



Every 2000 Hours Service

★ Maintenance for every 50, 100, 250, 500, and 1,000 hours service should be performed at the same time.

Change Oil in Hydraulic Tank, Replace Hydraulic Tank Filter Element

⚠ WARNING

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

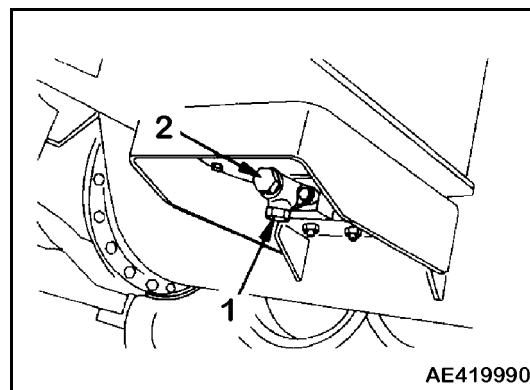
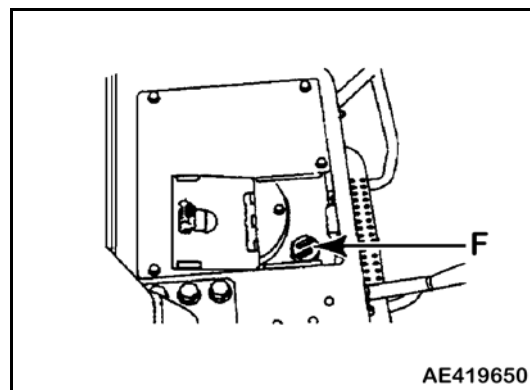
Required

- Container to catch oil.

Refill capacity: 175 liters (46.2 US gallons)

★ Before removing the oil filter cap for filter or oil change, clean around the filter cap to avoid any dust or dirt from entering the hydraulic system. Dust or dirt can damage the system.

1. Lower the bucket horizontally to the ground and apply the parking brake.
2. Stop the engine and wait for the temperature of all parts to go down.
3. Remove the bolts and then remove the cover.
4. Remove oil filler cap (F).
5. Set a container to catch the oil under drain plug (1).
6. Remove drain plug (1).
7. Open drain valve (2) gradually and drain the oil.
8. After draining the oil, close drain valve (2) and tighten drain plug (1).



MAINTENANCE

9. Remove mounting bolts (4) of filter cover (3) at one place at the top of the tank, then remove the cover.

- ★ When the cover is removed, the force of spring (5) may make the cover fly off; keep the cover pushed down when removing the bolts.

10. Remove spring (5) and bypass valve (6), then remove element (7).

11. Check that there is no foreign material inside the tank, then clean it.

12. Install the new element, then set bypass valve (6), spring (5), and cover (3) to the tank.

- ★ If the O-ring of the cover is damaged or deteriorated, replace it.

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

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

15. Check that the hydraulic oil is at the standard level. For details, see “Check Oil Level in Hydraulic Tank, Add Oil” on page 3-45.

16. Run the engine at low idling and extend and retract the steering, bucket, and lift arm cylinders four to five times. Be careful not to operate the cylinder to the end of its stroke; stop approximately 100 mm (3.9 in) before the end of the stroke.

Remark

If the engine is run at high speed immediately after startup or a cylinder is operated to the end of its stroke, the air taken inside the cylinder will damage the piston packing.

17. Operate the steering, bucket, and lift arm cylinders to the end of their stroke three to four times, then stop the engine and loosen bleed plug (8) to bleed the air from the hydraulic tank. After bleeding the air, tighten plug (8) again.

18. Check that the hydraulic oil is at the standard level. For details, see “Check Oil Level in Hydraulic Tank, Add Oil” on page 3-45.

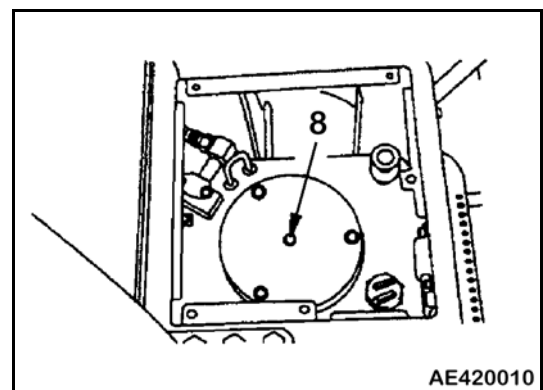
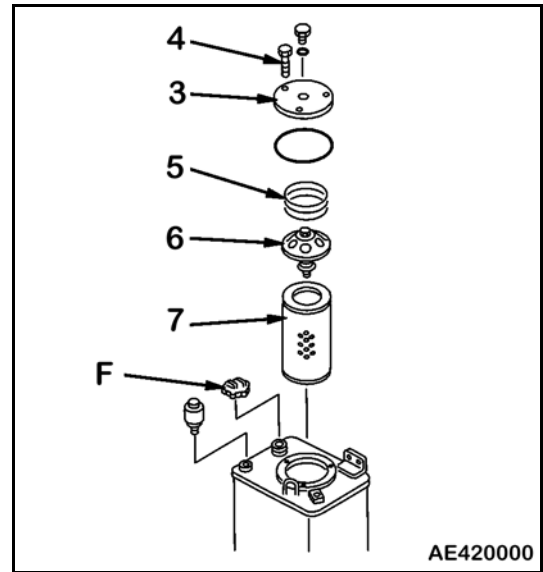
19. Increase the engine speed and repeat the procedure in Step 17 to bleed the air. Continue this operation until no more air comes out from plug (8).

20. After completing the air bleed operation, tighten plug (8).

Tightening torque: $11.3 \pm 1.5 \text{ N}\cdot\text{m}$ ($100.0 \pm 13.3 \text{ lbf in}$)

21. Check that the hydraulic oil is at the standard level. For details, see “Check Oil Level in Hydraulic Tank, Add Oil” on page 3-45.

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

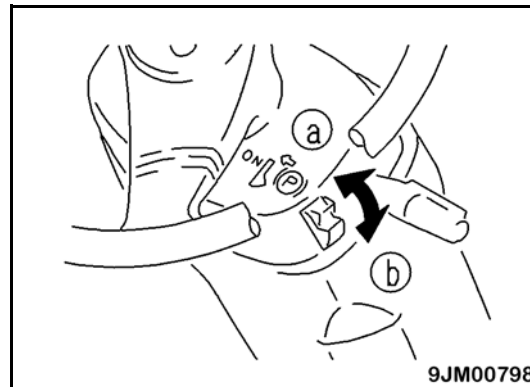


Replace Hydraulic Tank Breather Element

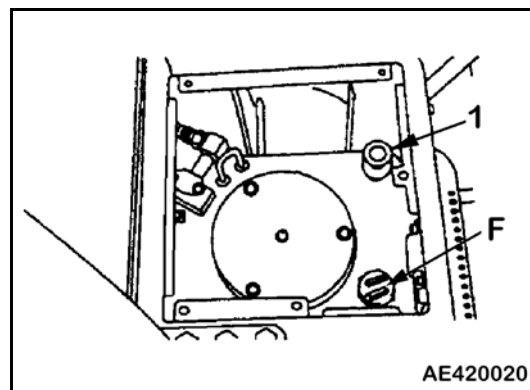
⚠ WARNING

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

1. Lower the bucket horizontally to the ground and turn the parking brake switch ON.
2. Stop the engine and wait for the temperature of all parts to go down.



3. Remove the cap of oil filler (F).
4. Remove the snap ring from breather (1) and then remove the breather cap.
5. Replace the filter element with a new part.
6. Install the breather cap and snap ring.
7. Tighten the cap of oil filler (F).



Remark

It is possible to replace the element with the breather installed in the tank. However, if the breather is removed, do not wrap the taper thread of the breather with seal tape when assembling again, and be careful not to tighten too much.

MAINTENANCE

Change Axle Oil

WARNING

- Immediately after stopping the engine, the parts and oil are VERY HOT and may cause serious burns. Wait for the temperature to go down before starting the operation.
- When the plug is removed, oil may spurt out. Turn the plug slowly to release the internal pressure and then remove the plug carefully.

Remark

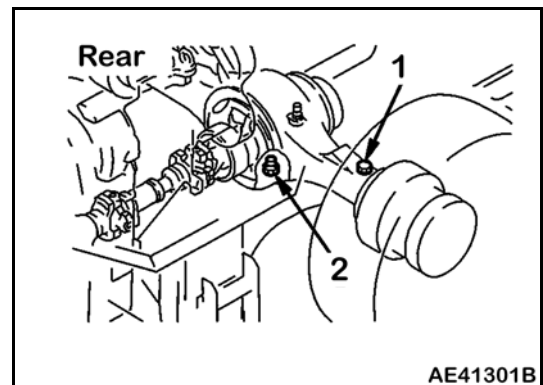
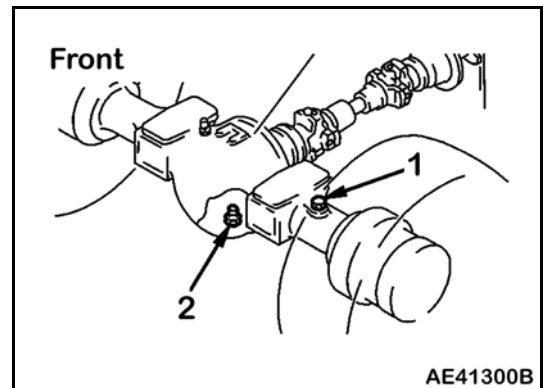
For operations where the brake is used frequently, change the axle oil at shorter intervals.

Required

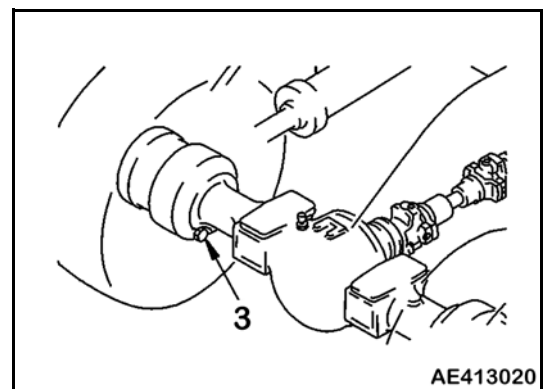
- Container to catch oil.

Refill capacity: 78 liters (20.6 US gallons)

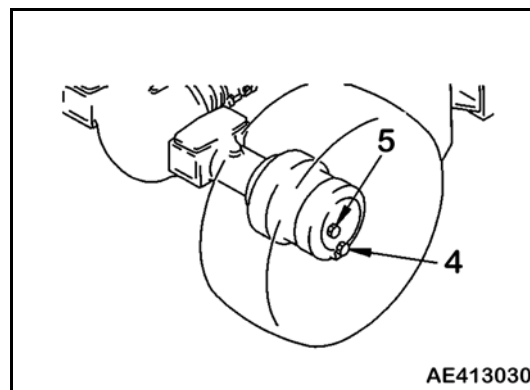
1. Remove front and rear oil filler plugs (1) then remove drain plug (2) to drain the oil.



2. Remove drain plug (3) to drain the oil.



3. Stop the machine so that drain plug (4) of the final drive is at the bottom.
4. Remove oil filler plug (5) and drain plug (4) and drain the oil.
5. After draining the oil, clean drain plugs (2), (3), and (4) and then install them.
6. Add oil to the specified level through the oil filler ports (1) and (5) of the axle housing and left and right final drives.
7. After adding oil, check that the oil is at the specified level.



★ For details, see “Check Axle Oil Level, Add Oil” on page 3-30.

Replace Element in Air Conditioner Recirculation Air Filter, Fresh Air Filter

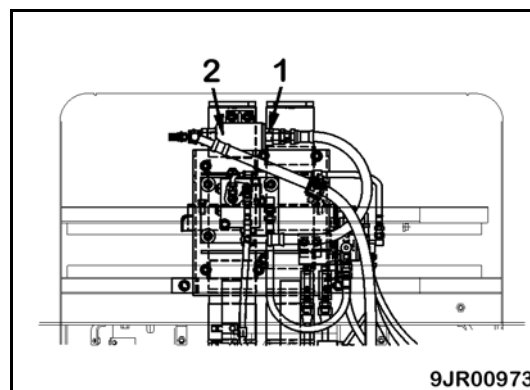
- Remove both the recirculation air filter and fresh air filter in the same manner as when performing the cleaning procedure.
 - ★ For details about cleaning the recirculation air filter, see “Clean Element in Air Conditioner Recirculation Filter” on page 3-50.
 - ★ For details about cleaning the fresh air filter, see “Clean Element in Air Conditioner Fresh Air Filter” on page 3-44.
- Replace both filters with new parts.

Clean PPC Circuit Strainer

WARNING

After the engine is stopped, the parts and oil are VERY HOT and may cause burns. Wait for the temperature to go down before starting the operation.

1. Remove flange (1).
2. Remove strainer case (2).
3. Take out the strainer and wash it in clean diesel oil.
4. Assemble the strainer to strainer case (2), then install with flange (1).

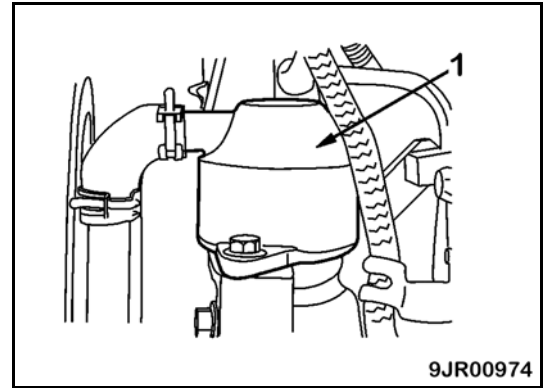


MAINTENANCE

Clean Engine Breather Element

WARNING

- The parts and oil are at high temperature after the engine is stopped, and may cause serious burns. Wait for the temperature to go down before cleaning the engine breather.
- When using compressed air, there is a hazard that dirt may be blown up and cause serious injury.
- Always use safety glasses, dust mask, or other protective equipment.



1. Wipe away any dust around the breather.
2. Remove breather (1).
3. Clean the breather body with light oil or cleaning oil, and dry it with compressed air.
4. Replace the O-ring with a new one. Coat a new O-ring with engine oil; set it; then install breather (1).

Check Alternator, Starting Motor

- The brush may be worn or have no grease on the bearing; contact your Komatsu distributor for inspection or repair.
- ★ If the engine is started frequently, carry out inspection every 1,000 hours.

Check Engine Valve Clearance, Adjust

- ★ A special tool is required for removing and adjusting the parts; ask your Komatsu distributor for service.

Check Brake Disc Wear

- ★ A special tool is required for checking and adjusting the parts; ask your Komatsu distributor for service.

Clean and Check Turbocharger

- If there is carbon or oil sludge stuck to the blower impeller, it will reduce the performance of the turbocharger or cause it to break.
- ★ Ask your Komatsu distributor to carry out the cleaning.

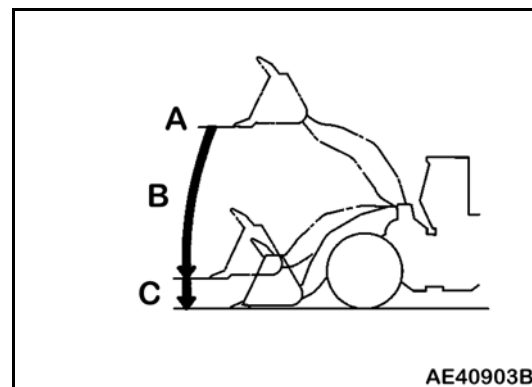
Check Play of Turbocharger Rotor

- ★ Contact your Komatsu distributor to have the rotor play checked.

Check Accumulator Function

★ For details about handling the accumulator, see “Accumulator” on page 1-40.

1. Stop the machine on level ground.
2. Apply the parking brake.
3. Raise the work equipment to the maximum height (A) and then place the lift arm control lever at HOLD.
4. Leave the work equipment in this position and stop the engine.
5. Confirm that the area around the machine is safe; then set the lift arm at FLOAT (B) and lower the work equipment to a position 1 m (3.28 ft) (C) from the ground.



6. When the work equipment reaches the position (C), move the lift arm control lever to LOWER and lower the work equipment slowly to the ground.

★ If the work equipment stops moving during the inspection, the gas pressure may be below the service limit (0.69 MPa (100.08 psi)). Contact your Komatsu distributor to have the gas pressure measured or the gas charged.

Remark

Carry out the check within five minutes after stopping the engine. If the machine is left with the engine stopped, the accumulator pressure will drop and it will be impossible to do the check.

Check Accumulator Gas Pressure

When carrying out the EVERY 2000 HOURS SERVICE or the EVERY YEAR SERVICE, or when making periodic replacement of the critical safety parts, ask your Komatsu distributor to check the accumulator gas pressure.

Check Injector

Check the exhaust gas color visually. If there is any abnormality in the exhaust gas color, contact your Komatsu distributor for inspection or replacement.

★ For details about the action to take if there is an abnormality, see “Engine” on page 2-128, “Exhaust gas occasionally turns black.”

MAINTENANCE

Every 4000 Hours Service

★ Maintenance for every 50, 100, 250, 500, 1,000, and 2,000 hours service should be performed at the same time.

Check Water Pump

- Check the water pump and its related parts for water or grease leakage.
 - Check that there is no play in the pulley.
 - Check to see if the drain hole is clogged.
- ★ If any abnormality is found, contact your Komatsu distributor for repairs or replacement.

Check Vibration Damper

- Check that there is no drum-shaped deformation of the surface of the damper.
 - Check that there are no traces of leakage of the damper oil around the damper.
- ★ If any abnormality is found, please contact your Komatsu distributor for replacement of the parts.

Check Fan Pulley and Tension Pulley

- Check for play of the pulley.
 - Check for grease leakage.
- ★ If any problem is found, please contact your Komatsu distributor.

Check Air Conditioner Compressor, Adjust

★ As a special tool is required for checking and adjusting the parts of the air conditioner compressor, ask your Komatsu distributor for service.

Replace Injector

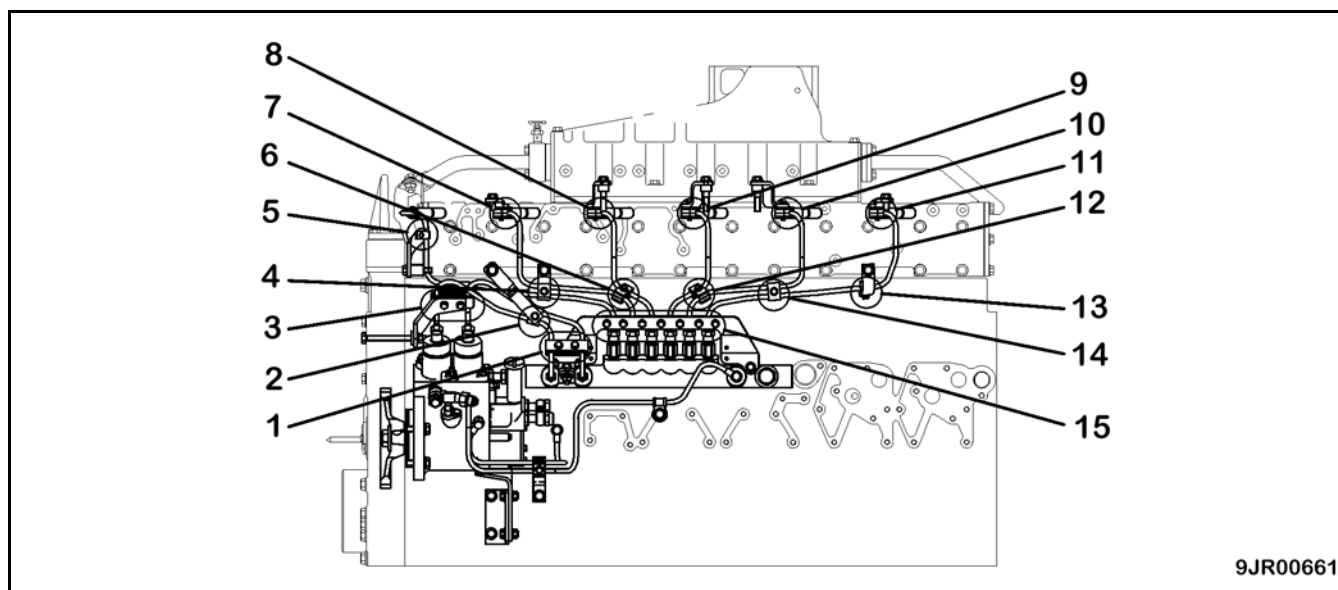
★ Ask your Komatsu distributor to carry out this work.

Check for Loose Engine High-Pressure Piping Clamps, Hardening of Rubber

- Check visually and then use your hand to feel if there are any loose mounting bolts for the high-pressure piping clamps (1) to (15).
- Check if there is any hardening of the rubber parts.
- ★ If any problem is found, the part must be replaced. Ask your Komatsu distributor to carry out the replacement.

Remark

If the engine continues to be used when there are loose bolts, hardened rubber, or missing parts, there is danger of damage or breakage occurring due to vibration and wear at the connections of the high-pressure piping. Always check that the proper high-pressure piping clamps are correctly installed.



MAINTENANCE

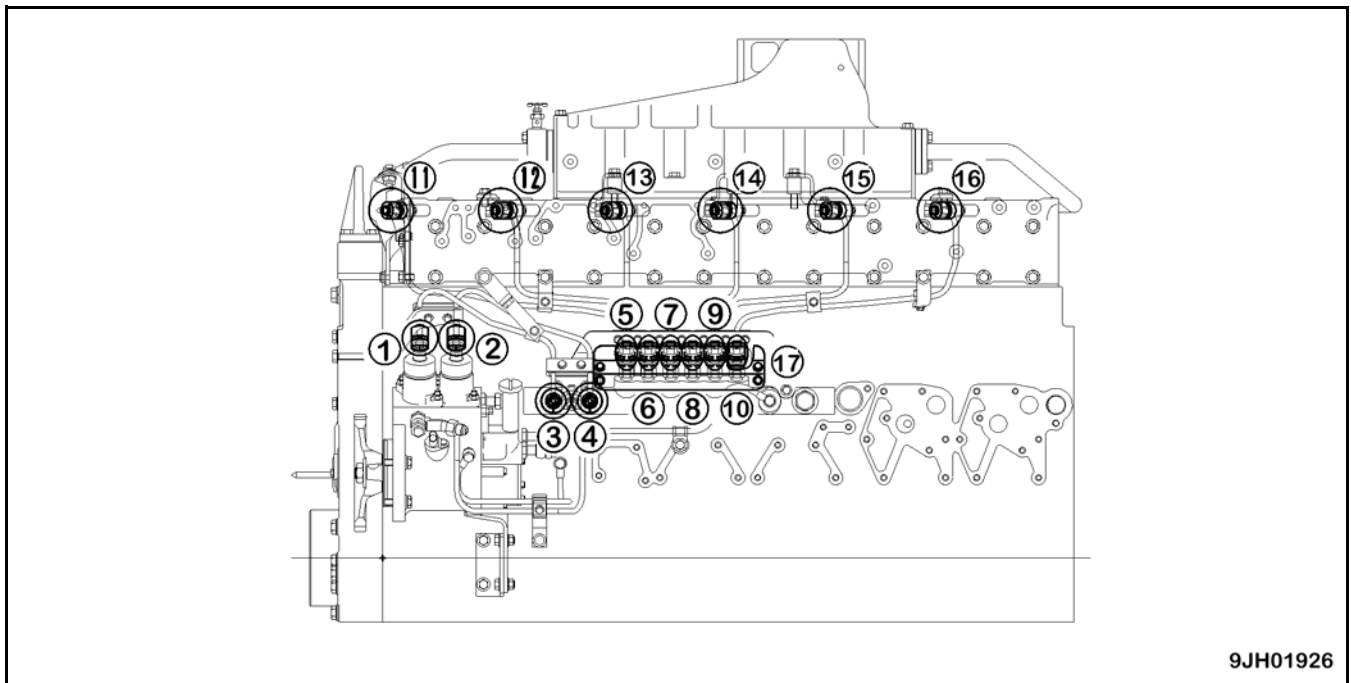
Check for Missing Fuel Spray Prevention Caps, Hardening of Rubber

Fuel spray prevention caps are protective parts installed to prevent fire caused by fuel leaking and spraying on high-temperature parts of the engine.

Remark

The fuel spray prevention caps must be installed correctly.

- Check for any missing fuel spray prevention caps (1) to (16) or fuel spray prevention cover (17).
- Check for any hardened rubber portions.
 - Install rubber caps (1) to (10) with the slit facing the cylinder block.
 - Install rubber caps (11) to (16) with the slit facing down.
- ★ If there are any missing caps or cover or the rubber is hardened, please contact your Komatsu distributor for repairs.



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Every 8000 Hours Service

- ★ Maintenance for every 50, 250, 500, 1,000, 2,000, and 4,000 hours service should be performed at the same time.

Replace High-Pressure Piping Clamps

- ★ Contact your Komatsu distributor to replace the engine high-pressure clamps.

Replace Fuel Spray Prevention Caps

- ★ Contact your Komatsu distributor to replace the fuel spray prevention caps.

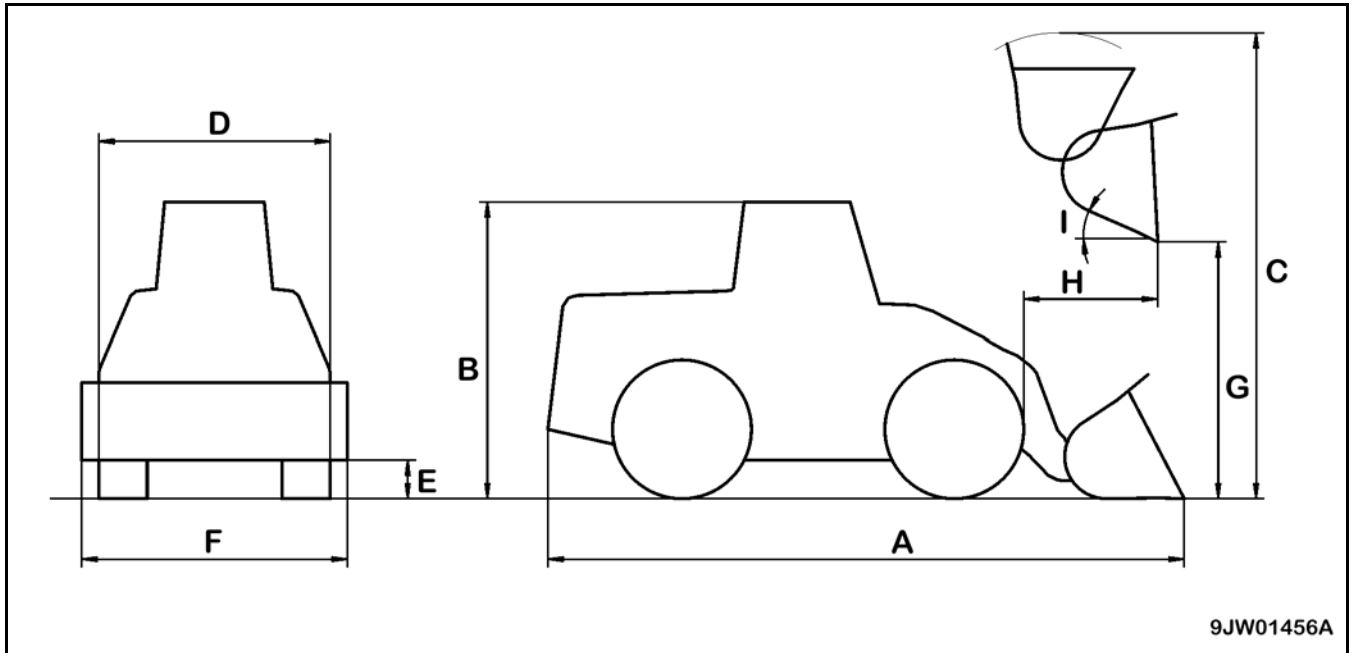
MEMORANDUM

SPECIFICATIONS

SPECIFICATIONS

SPECIFICATIONS

	Item		Unit	WA500-3	
	Operating weight (including one operator: 75 kg (165 lb))		kg (lb)	28,220 (62,214)	
	Normal load		kg (lb)	8,100 (17,857)	
	Bucket capacity (with tip tooth)		m ³ (cu.yd)	4.3 (5.6)	
	Engine model		–	SAA6D140E-3E	
	Flywheel horsepower		kW(HP)/rpm	235 (316)/2,100	
A	Overall length (without tooth)		mm (ft in)	9,055 (29 ft 9 in)	
B	Overall height		mm (ft in)	3,815 (12 ft 6 in)	
C	Maximum dimension when shaking bucket		mm (ft in)	6,070 (19 ft 11 in)	
D	Overall width		mm (ft in)	3,090 (10 ft 2 in)	
E	Minimum ground clearance		mm (ft in)	405 (1 ft 4 in)	
F	Bucket width (cutting edge width)		mm (ft in)	3,400 (11 ft 2 in)	
G	Clearance	Tip of bucket	mm (ft in)	3,290 (10 ft 10 in)	
		Tip of teeth	mm (ft in)	3,025 (9 ft 11 in)	
H	Reach	Tip of bucket	mm (ft in)	1,320 (4 ft 4 in)	
		Tip of teeth	mm (ft in)	1,490 (4 ft 11 in)	
I	Dump angle		degrees	45	
	Minimum turning radius	Outside of chassis	mm (ft in)	7,390 (24 ft 3 in)	
		Center of outside tire	mm (ft in)	6,160 (20 ft 3 in)	
	Travel speed	Forward	1st	km/h (mph)	6.7 (4.2)
			2nd	km/h (mph)	12.0 (7.5)
			3rd	km/h (mph)	20.2 (12.6)
			4th	km/h (mph)	33.0 (20.5)
		Reverse	1st	km/h (mph)	7.5 (4.7)
			2nd	km/h (mph)	13.4 (8.3)
			3rd	km/h (mph)	22.5 (14.0)
			4th	km/h (mph)	36.1 (22.4)



MEMORANDUM

OPTIONS, ATTACHMENTS

OPTIONS, ATTACHMENTS

BUCKET AND TIRES

Select the most suitable bucket and tires for the type of work and ground conditions on the job site.

Remark

When installing large diameter tires you must be careful that there is sufficient clearance for the tire. Refer to "Clearance between Front Fender and Tire" on page 5-3 and "Clearance between Hydraulic Tank and Tire, between Platform and Tire" on page 5-4.

Type of Work	Bucket	Ground Conditions	Tire
Loading products and crushed rock Loading and carrying products	Stockpile bucket (5.0 m ³ (6.6 cu.yd)) (with BOC)	General ground conditions	26.5-25-20PR (Rock)
		Leveled ground	29.5-25-22PR (Rock)
		Hard ground	
Loading products and crushed rock	Excavating bucket (4.5 m ³ (5.9 cu.yd)) (with teeth, segment edge)	General ground conditions	26.5-25-20PR (Rock)
		Hard ground	29.5-25-22PR (Rock)
Loading crushed rock	Excavating bucket (4.5 m ³ (5.9 cu.yd)) (with teeth, segment edge)	General ground conditions	26.5-25-20PR (Rock, side steel breaker)
		Hard ground	29.5-25-22PR (Rock, side steel breaker)
	Spade nose rock bucket (4.3 m ³ (5.6 cu.yd))	Ground with many light rocks	
		Soft ground with many light rocks	
Loading and carrying crushed rock	Spade nose rock bucket (4.3 m ³ (5.6 cu.yd))	General ground conditions	26.5-25-20PR (Rock)
		Hard ground	29.5-25-22PR (Rock)
		Ground with many rocks and stones	26.5-25-20PR (Rock, steel breaker) 29.5-25-22PR (Rock, steel breaker)
		Soft ground	29.5-25-22PR (Rock)

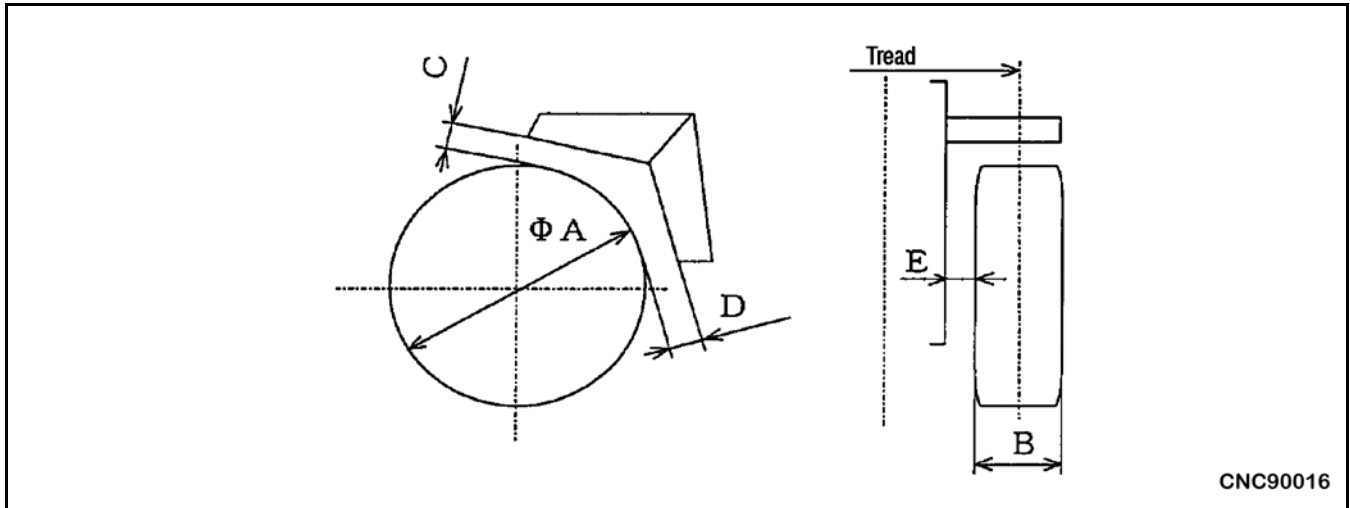
- ★ BOC indicates a bolt-on cutting edge
- ★ The displayed travel speed changes according to the tire size.
When installing optional tires, contact your Komatsu distributor.
- ★ On job sites where there are boulders or sharp rocks, install tire protectors (mesh chain).
- ★ Check the mesh chain for cuts or sagging before starting operation.
- ★ Be careful not to let the tires and chain slip during operation.

TIRE CHAINS

When installing tire chains you must be careful that there is sufficient clearance for the tire chain.

- ★ Refer to “Clearance between Front Fender and Tire” on page 5-3 and “Clearance between Hydraulic Tank and Tire, between Platform and Tire” on page 5-4 before you install the chains.
- ★ On job sites where there are boulders or sharp rocks, install tire protectors (mesh chain).
- ★ Check the mesh chain for cuts or sagging before starting operation.
- ★ Be careful not to let the tires and chain slip during operation.

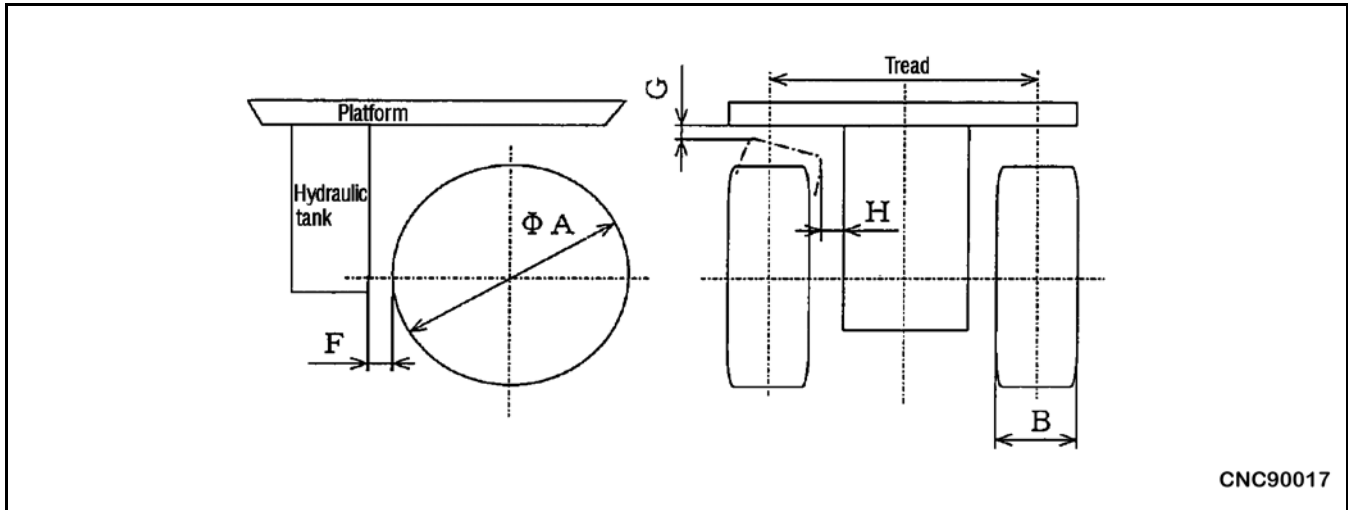
Clearance between Front Fender and Tire



Unit: mm				Clearances				
Machine Model		Tire Size	A	B	C	D	E	Tread
WA500-3	Standard	26.5-25	1770	688	227	176	122	2400
	Large diameter	29.5-25	1870	775	165	114	79	2400
Design standard					80 or more; 65 or more when using large diameter tires		80 or more; 65 or more when using large diameter tires	

OPTIONS, ATTACHMENTS

Clearance between Hydraulic Tank and Tire, between Platform and Tire



Unit: mm					Clearances			
Machine Model		Tire Size	A	B	F	G	H	Tread
WA500-3	Standard	26.5-25	1770	688	163	–	90	2400
	Large diameter	29.5-25	1870	775	165	–	44	2400
Design standard					80 or more; 65 or more when using large diameter tires		80 or more; 65 or more when using large diameter tires	

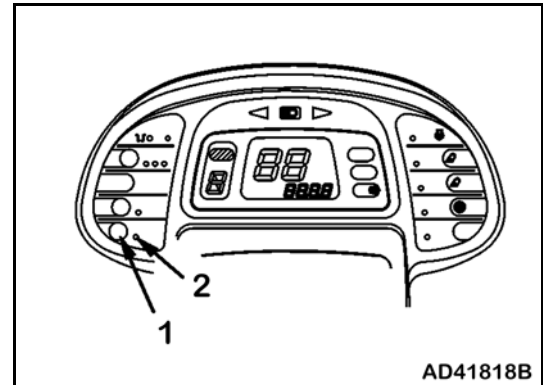
ELECTRONIC-CONTROLLED SUSPENSION SYSTEM

★ Electronic-controlled suspension system = ECSS

Operating ECSS

The ECSS switch (1) is on the left side of the main panel and is used to actuate the electronic-controlled suspension system.

- Press the ECSS switch to turn on the ECSS. The pilot lamp (2) lights up and the ECSS is actuated.
 - ★ The pilot lamp is orange.
- Press the switch again to turn off the ECSS. The pilot lamp goes out and the ECSS is canceled.



Precautions When Using ECSS Switch

WARNING

- If the machine is traveling or the work equipment is raised, the work equipment will move the moment the ECSS switch is turned ON.
 - The work equipment may move the moment operations are started if the ECSS switch is at the ON position.
 - Keep the ECSS switch turned OFF during operations.
 - Never turn the ECSS switch ON during inspection or maintenance. The work equipment will move and create a dangerous situation.
-
- Always stop the machine and lower the work equipment to the ground before operating the ECSS switch.
 - When carrying out inspection and maintenance, first lower the work equipment to the ground, then turn the ECSS switch OFF before starting the inspection and maintenance operation.
 - If the starting switch is at the OFF position, the ECSS will not be actuated even if the ECSS switch is at the ON position. If the starting switch is at the ON position, it is possible to actuate the ECSS. If the ECSS switch is turned to the ON position, it will switch to the actuated condition.
 - The ECSS will not be actuated if the transmission is in 1st or if the travel speed is less than 5 km/h (3.1 mph).
 - If the transmission is in 2nd to 4th and the travel speed is more than 5 km/h (3.1 mph), the swaying of the chassis is effectively damped by the accumulator pressure in accordance with the condition of the load.

Removal of ECSS Piping

Do not remove the piping or parts of the ECSS. If they must be removed, ask your Komatsu distributor to carry out the operation.

Precautions When Handling Accumulator

WARNING

- The accumulator is charged with high-pressure nitrogen gas. If it is handled improperly, there is danger that it will explode causing serious personal injury.
 - Always obey the following precautions when handling the regulator.
 - Do not disassemble it.
 - Do not bring it close to flame or put it in a fire.
 - Do not make holes in it, weld it, or cut it with a gas cutter.
 - Do not hit it, roll it, or subject it to any impact.
 - When disposing of the accumulator, the gas must be removed. Ask your Komatsu distributor to carry out this operation.
-

AUTO-GREASING SYSTEM

The auto-greasing system automatically supplies grease to many of the moving parts of the machine. This system consists of an electric pump, valves, and a lubrication controller with microcomputer.

The lubrication controller is located inside a box under the step on the left side of the machine.

If any abnormality occurs in the lubrication controller, inform your Komatsu distributor of the symptoms and ask for repairs.

Method of Operation

- Immediately after the starting switch is turned ON, all the display lamps on the lubrication controller 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 remain on and flashing after the first initial seconds; all other displays will go out.
- If the starting switch is turned ON/OFF repeatedly, even if the greasing interval has not been reached, greasing will automatically start (as a function of the supplemental circuit) immediately after the switch is turned ON. After display of the 7-segment LED and greasing LED, as shown in “Lubrication Controller Display” on page 5-8, the above condition will be returned.
- After the starting switch is turned ON, centralized greasing is carried out in accordance with the set time and frequency limit for greasing.

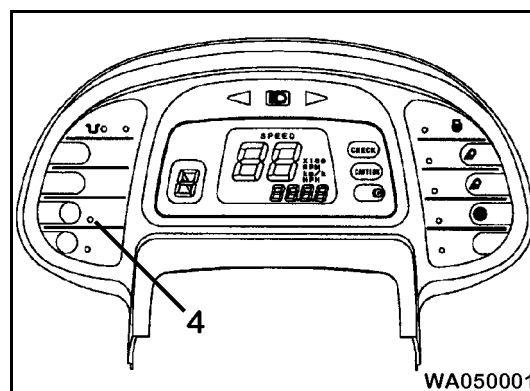
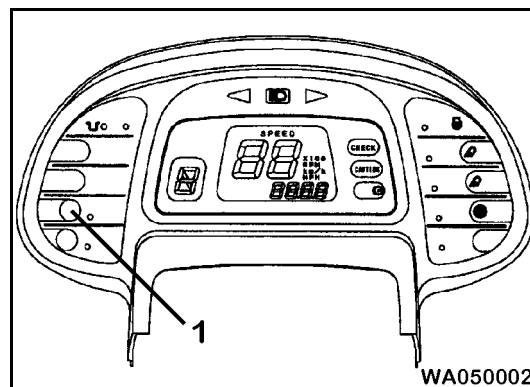
Remark

If the starting switch is turned ON/OFF frequently before the greasing interval is reached, the warning for the remaining time is displayed earlier; this does not indicate an abnormality.

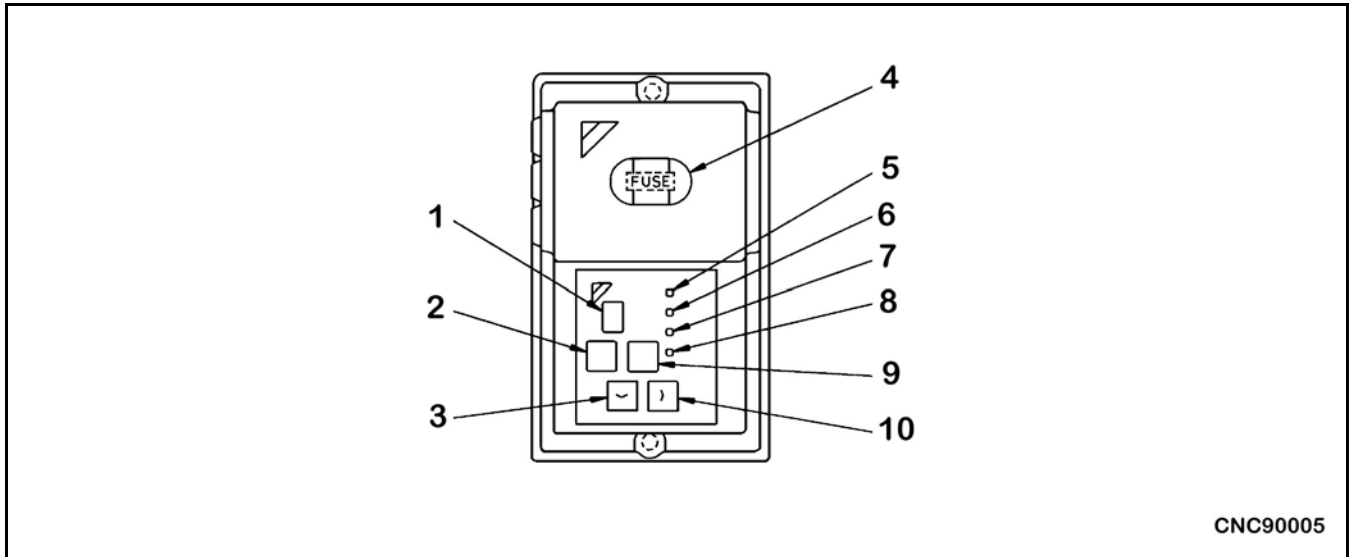
Starting Auto-Greasing

It is possible to start the system and perform one manual cycle of greasing regardless of the time count.

1. Press the auto-greasing switch (1) on the main monitor or the starting button on the lubrication controller.
 - This cancels the greasing time count.
 - After the electric pump finishes the manual cycle, the timer will restart automatically.
 - ★ Avoid pressing the auto-greasing switch as much as possible.
2. When the engine starting switch is turned one stage, the auto-greasing system is automatically set to begin actuation and the lamp (4) on the monitor panel lights up.
 - ★ Each time the auto-greasing switch (1) is pressed, the system manually forces grease to the machine.
 - ★ Pilot lamp indications:
 - Lamp illuminated: Normal operation.
 - Lamp flashes at 1-second interval: Grease cartridge empty.
 - Lamp flashes at 0.5-second interval: Improper release of pressure; pump pressurized; pressure detected in system; or a fuse is blown.



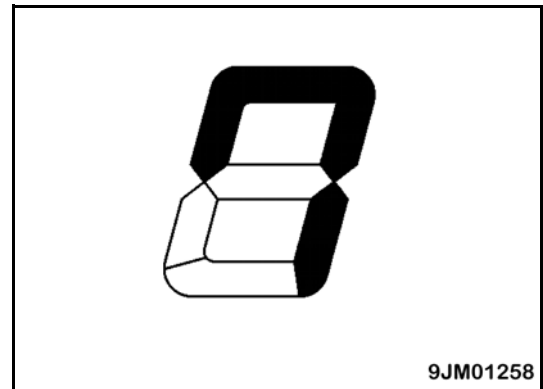
Lubrication Controller Display



1. 7-Segment LED
2. Cancel key
3. Level selector key
4. Blade-type fuse
5. Power source LED
6. Greasing LED
7. Warning LED
8. Setting LED
9. Starting key
10. Item selector key

Remaining Number for Greasing

- ★ If the remaining number of times for greasing is less than 10, the 7-segment LED flashes and displays the number.
- ★ If the remaining number of times is 10 or more, only the flashing is shown without displaying the number.



Lubrication Controller Display Table

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	<p>Rotating display </p> <p>Stop display </p> <p>Reverse rotation display </p>
		II Maintaining pressure	Greasing LED flashes slowly (1 time/sec.)	
		III Releasing pressure	Greasing LED flashes rapidly (2 times/sec.)	
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	<p>(E) (a) Flashes alternately</p>
	Abnormality in release of grease pressure	Pressure still remains after pressure is released (reverse rotation)		<p>(E) (b) Flashes alternately</p>
	Abnormality in pressure detection	Limit switch for pressure detection is already actuated before system is started.		<p>(E) (c) Flashes alternately</p>
	Tank empty	Number of times greasing has reached greasing frequency limit		<p>(E) (O) Flashes alternately</p>

OPTIONS, ATTACHMENTS

Setting the Greasing Time

The set time and greasing frequency limit differ according to the operating condition and greasing plan for the machine.

★ 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): Number of times for operating pump before the 1000 cc grease cartridge is empty

★ The settings when shipped from the factory:

- Greasing interval: 3 hours
- Greasing time: 7 minutes
- Greasing frequency limit: 50 times

★ The grease level alarm is set to sound after 130 hours on the hourmeter (under normal operating conditions).

Remark

Be careful since the life of the grease cartridge is shortened if the greasing interval is shorter. If the greasing interval is shorter, the amount of grease dripping from the tip of the working machine increases. It may make the machine and surrounding area dirty.

Set 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	/	/

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Setting Greasing Time in Cold Areas

Cold temperatures cause the viscosity of the grease to increase, which creates greater resistance inside of the piping. It is necessary to extend the length of greasing operations to ensure that adequate grease reaches the components.

★ For example, if the machine is used at temperatures below -20°C (-4°F), set the greasing time to 20 minutes (code No. 7). In addition, use lithium-based grease No. 0.

When changing the set value, consult your Komatsu distributor.

Remark

When using the machine at ambient temperatures of below -20°C (-4°F), set to greasing time (b) at code No. 7.

Procedure for Setting Greasing Time

★ When setting the various items, the value is not input directly. Select the code number from the Set Code table; see “Set Code Table” on page 5-10.

1. Stop the working machine on flat, hard ground and stop the engine.
2. Set the safety lock lever at the LOCK position.
3. Set the starting switch at the ON position.
4. Turn the starting switch ON and start the engine.
5. Press the LEVEL and ITEM keys at the same time to set to the setting mode.

6. Press the ITEM key one or more times to select the item to be set.

★ Each time the ITEM key is pressed, the setting item is changed: a → b → c → a.

7. When the item to be set flashes, press the LEVEL key.

★ The set item and numeral are displayed alternately (a →→ 0 →→ a →→ 0).

8. Refer to the Set Code table and press the ITEM key one or more times to select the code number to be set.

★ Each time the ITEM key is pressed, the code number (numeric portion) goes up by 1.

9. When the code number to be set flashes, press the SET key to confirm the setting.

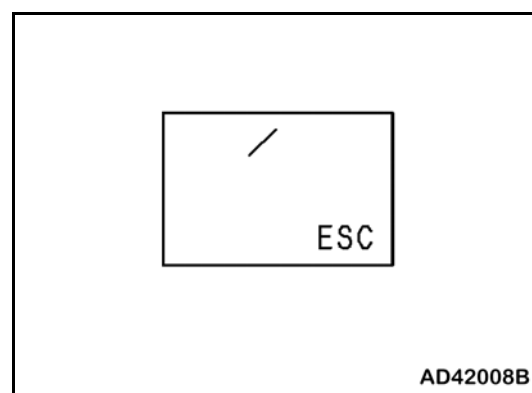
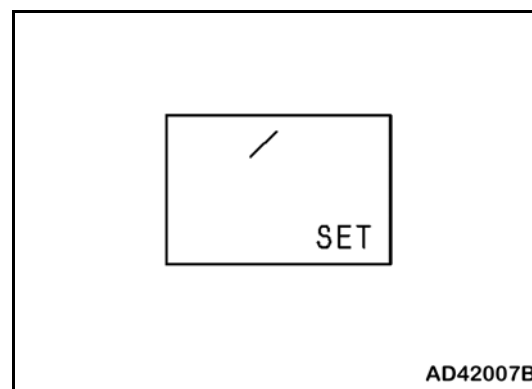
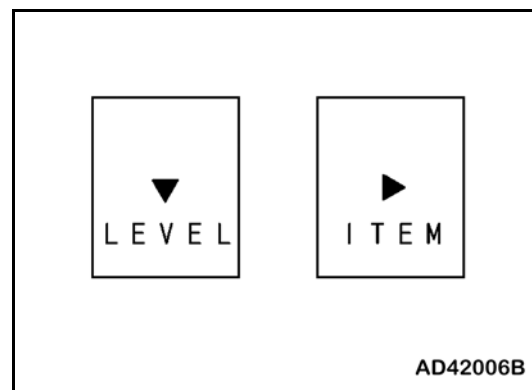
10. Repeat Steps 7 to 9 to set all of the items (a, b, and c).

★ After completing the setting, press the ESC key to exit the setting mode.

Remark

Even if only one item is being changed, always make changes according to Steps 5 to 8 and press the ESC key to exit the setting mode.

If the power is 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.

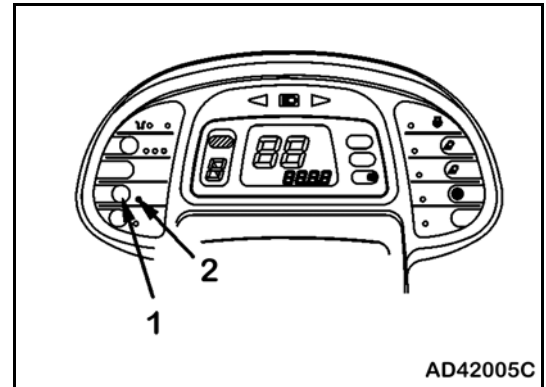


OPTIONS, ATTACHMENTS

Checking Amount of Grease

1. Turn the auto-greasing starting switch (1) ON.
2. Check the pilot lamp (2) on the main monitor. If it flashes at 1-second intervals, the grease cartridge is empty.

★ Replace the cartridge with a new one.



Replacing Grease Cartridge

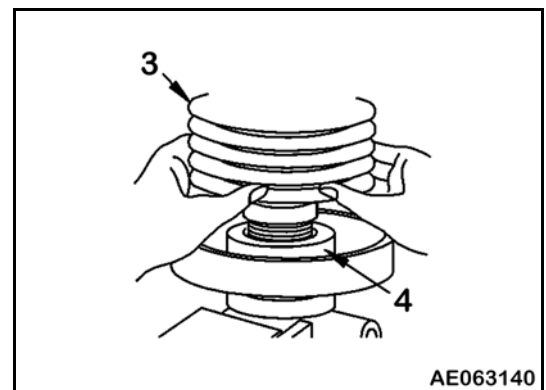
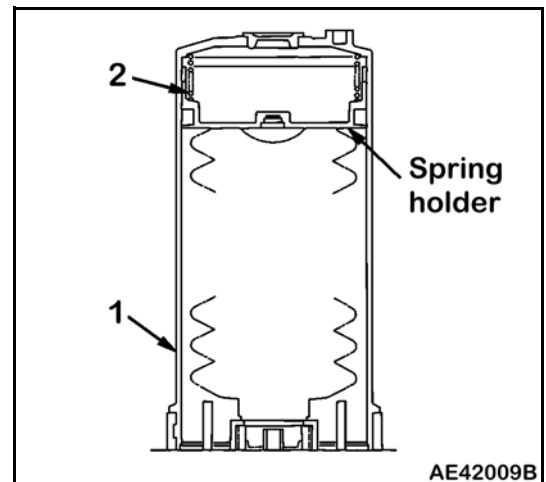
! WARNING

- Bleeding air from the pump is dangerous because of the high pressure. Ask your Komatsu distributor to bleed the air.
- Be careful of the force exerted by spring (2) which is located inside the cover.

Remark

After replacing the cartridge, make sure to reset the number counter on the controller. If you have a problem, see "Troubleshooting Auto-Greasing System" on page 5-14.

1. Remove cover by turning cartridge cover (1) approximately 60 degrees to the left.
2. Remove grease cartridge (3) by turning it to the left. Do not detach seal cap (4) at this time.



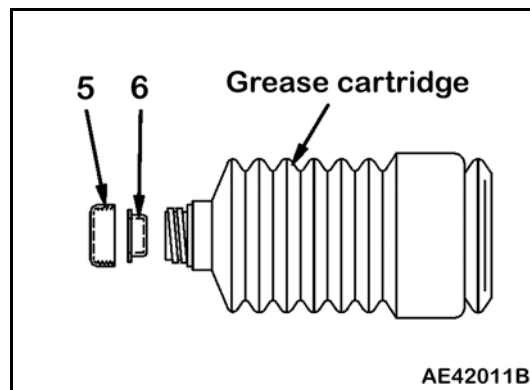
3. Detach cap (5) and middle plug (6) from the new grease cartridge and tightly screw it into the suction port connector.

★ Screw the cartridge in tightly to make sure that no air enters.

4. If when fixing the cartridge to the connector the grease cartridge is pressed slightly so that grease comes out and deposits in a heaped shape, no air will enter if the grease cartridge is screwed into the suction port connector under these conditions.

Remark

The maximum number of turns is five (5).



5. Turn the cover to the right and tighten it until it is securely fixed. If it is not tightened well, there is a possibility that it will work loose due to the machine vibration.

★ See the *Shop Manual* for additional information about the auto-grease system:

- Filling the auto-grease system with grease
- Specifications
- Electrical schematics

★ Use the brands of grease shown in the following table.

Type	Name	Grease	Capacity	Manufacturer
GSL-2-100	Reservoir grease No.2	Albania EP No.2	1000 cc	Showa Shell Sekiyu
GKL-2-100	Uni reservoir grease DL-2	Unilube DL No.2T	1000 cc	Kyodo Yushi

Precautions When Handling Auto-Greasing System

- 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; it may leak if dirt gets stuck in it.
- Check the grease nipple occasionally and replace it 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 is removed when replacing the attachment on the machine, handle them carefully to prevent any damage. When storing or installing them, be extremely careful to prevent the entry of air, and particularly dirt. If there is any air in the system, bleed the air immediately.

OPTIONS, ATTACHMENTS

Troubleshooting Auto-Greasing System

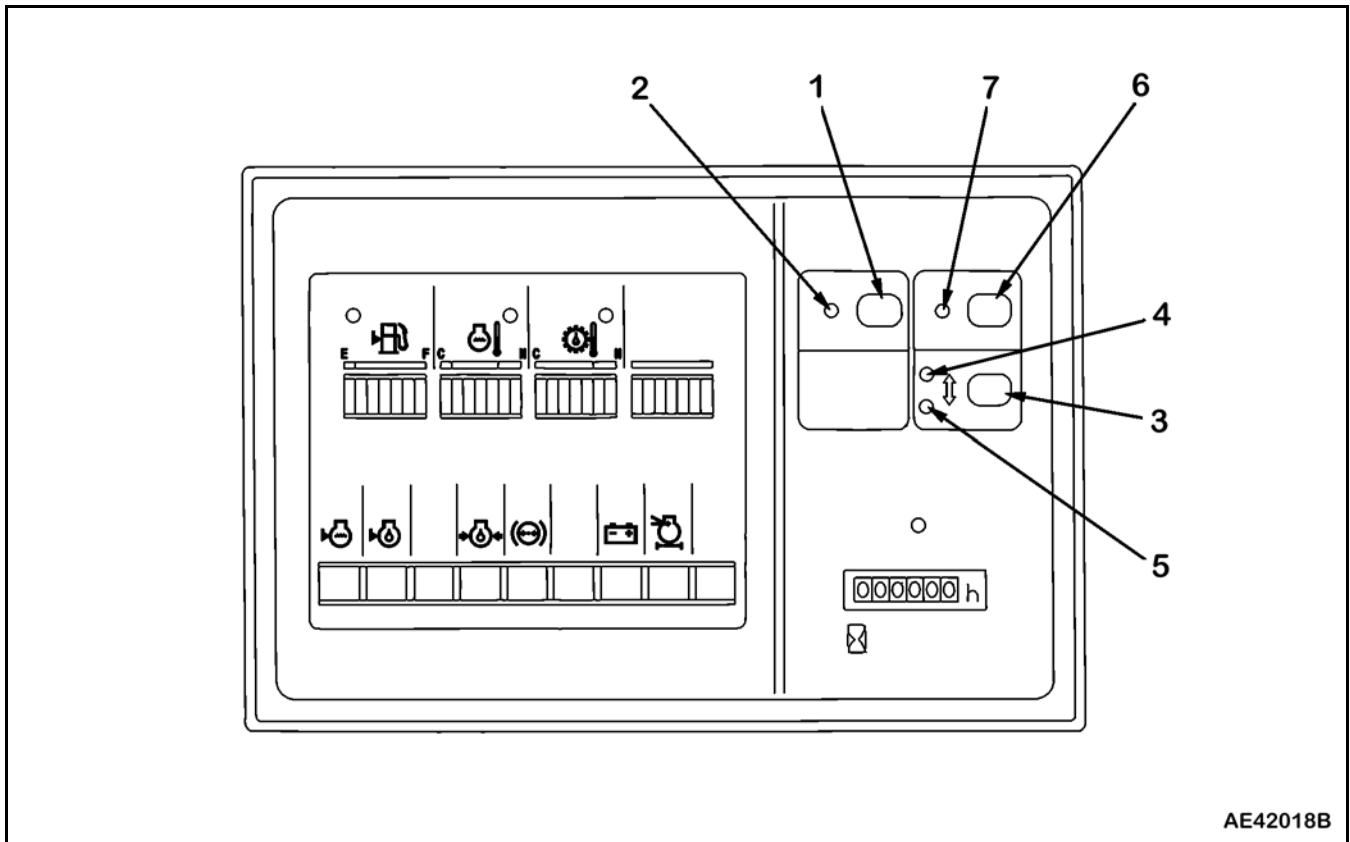
If any abnormality occurs in the greasing system, the error codes will flash alternately to display the type of abnormality.

Error Code	Item	Cause	Remedy
E → a	Defective pressurizing of pump	<ul style="list-style-type: none">• Air in main piping• Air inside pump• Grease tank is empty.• Grease leaking from main piping	<ul style="list-style-type: none">• 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	<ul style="list-style-type: none">• Abnormality in pressure-releasing structure built into pump• Abnormality in pressure-detection equipment built into pump	<ul style="list-style-type: none">• Disassemble pressure-releasing portion carefully, then check and clean.• Check limit switch at pressure-detection portion.
E → c	Abnormality in pressure detection	<ul style="list-style-type: none">• Abnormality in pressure-detection equipment built into pump• Abnormality in pressure-releasing structure built into pump	<ul style="list-style-type: none">• Check limit switch at pressure-detection portion.• Disassemble pressure-releasing portion carefully, then check and clean.
E → 0	Empty tank	<ul style="list-style-type: none">• Greasing frequency limit has been reached.• Grease added during frequency count	<ul style="list-style-type: none">• Add grease.• Reset frequency counter to zero.• Confirm that 0 flashes three times on 7-segment LED by pressing reset button on controller for more than 5 seconds.

REMOTE POSITIONER

This machine is equipped with a remote positioner. From the operator's seat it is possible to use the remote positioner to set the stopping position of the lift arm and to slow down and stop the lift arm. This feature is designed to increase the operating efficiency and to reduce operator fatigue.

General Locations



1. Remote positioner LOWER position set switch
2. LOWER set pilot lamp
3. RAISE/LOWER selector switch
4. RAISE stop display lamp
5. LOWER stop display lamp
6. RAISE position set switch
7. RAISE set pilot lamp

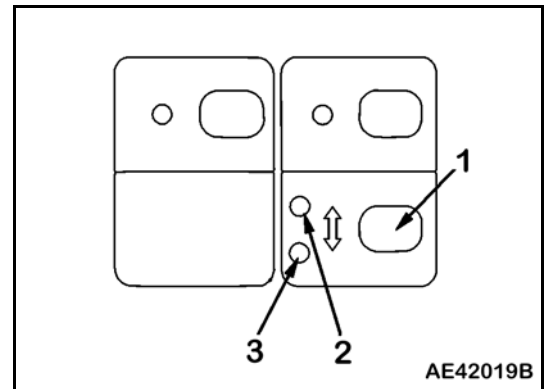
Operating Remote Positioner

1. When RAISE/LOWER selector switch (1) is pressed, the system is turned ON; the stop display lamp lights up; and the remote positioner is set to the actuation condition.

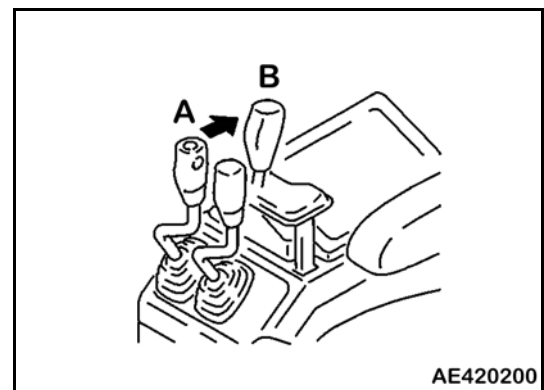
Remark

Each time the RAISE/LOWER selector switch is pressed, the lighting of the display lamp changes as follows.

- RAISE ON/LOWER OFF
↓
- RAISE OFF/LOWER ON
↓
- RAISE ON/LOWER ON
↓
- RAISE OFF/LOWER OFF



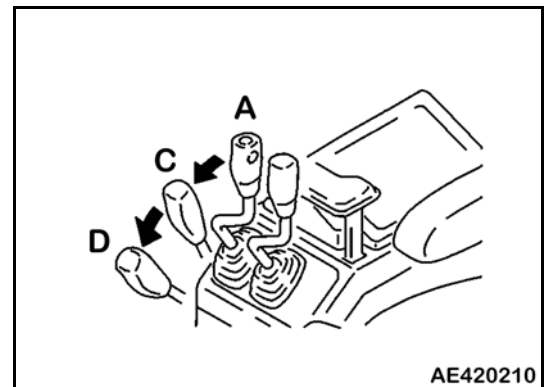
2. When RAISE stop display lamp (2) is illuminated and the boom control lever is moved from HOLD position (A) to RAISE position (B), the lever stops in that position. When the lift arm rises to the RAISE stop set position, it reduces speed and stops and, at the same time, the control lever is returned to HOLD position (A).



3. When LOWER stop display lamp (3) is illuminated and the boom control lever is moved from HOLD position (A) to FLOAT position (C) or maximum LOWER position (D), and the lift arm goes down to the LOWER stop set position, it reduces speed and stops. If the lever is held in position, the lift arm is set to the STOP condition.

Adjusting Remote Positioner

When the lift arm has been removed or the setting does not work efficiently, contact your Komatsu distributor for adjustment.



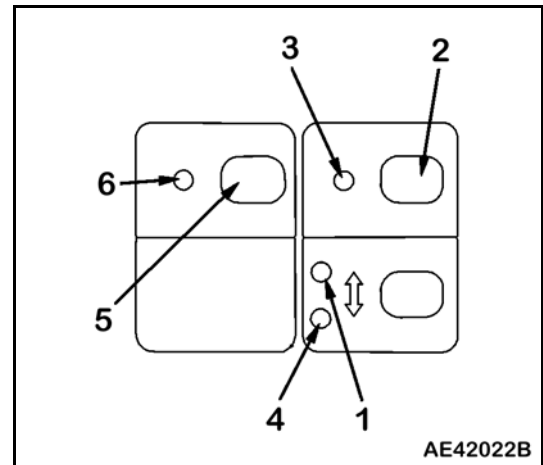
Setting Remote Positioner Stop Position

1. When RAISE stop display lamp (1) is illuminated, operate the boom lever to raise the lift arm to the desired height (above horizontal), then return the control lever to HOLD and press RAISE position set switch (2).

- ★ RAISE stop display lamp (1) will go out and RAISE set pilot lamp (3) will flash for 2.5 seconds.
- ★ When RAISE set pilot lamp (3) goes out and RAISE stop display lamp (1) illuminates, the RAISE stop position is recorded in memory and the setting is complete.

2. When LOWER stop display lamp (4) is illuminated, operate the boom lever to lower the lift arm to the desired height (above horizontal), then return the control lever to HOLD and press LOWER position set switch (5).

- ★ LOWER stop display lamp (4) will go out and LOWER set pilot lamp (6) will flash for 2.5 seconds.
- ★ When LOWER set pilot lamp (6) goes out and LOWER stop display lamp (4) illuminates, the LOWER stop position is recorded in memory and the setting is complete.



Adjusting Sensor

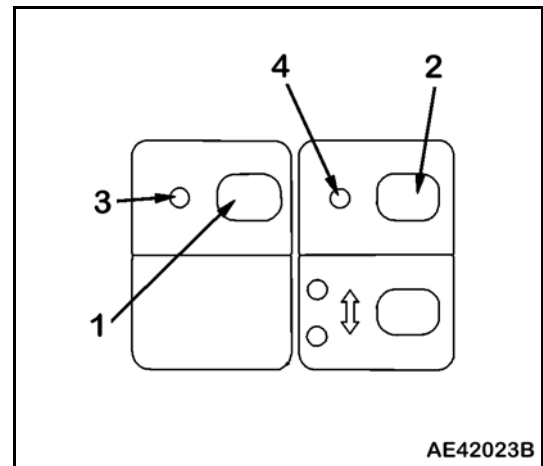
This function offsets the error caused by the mounting of the potentiometer and makes it possible to detect the correct position data for the work equipment.

Remark

Always carry out this function when replacing the controller potentiometer or work equipment.

1. Set the work equipment to the lift arm top end position.
2. Keep LOWER position set switch (1) and RAISE position set switch (2) pressed at the same time for at least three seconds.
3. When LOWER set pilot lamp (3) and RAISE set pilot lamp (4) illuminate, release the switches and set to the sensor adjustment mode.
 - ★ The LOWER set pilot lamp (3) and RAISE set pilot lamp (4) illuminate for two seconds. When both lamps go out, the offset is recorded in memory.
4. If the lamps flash in Step 3, the potentiometer output is not within the offset range; adjust the potentiometer mount.

- ★ Adjustment can be carried out at the position in Step 1.



Remark

After adjusting each potentiometer, always carry out Steps 1 and 2 again.

Check that the condition in Step 3 is correct (the set lamps light up for two seconds and then go out).

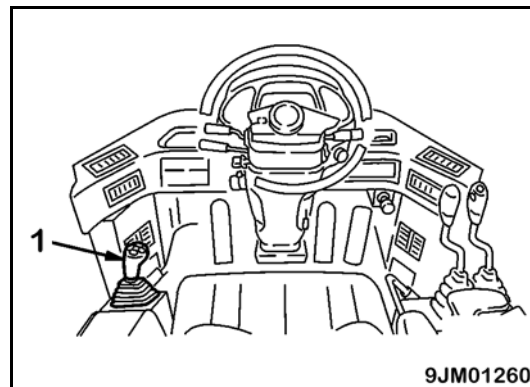
JOYSTICK STEERING SYSTEM

To enable you to use the joystick steering safely and efficiently, read the information in this section before using the system.

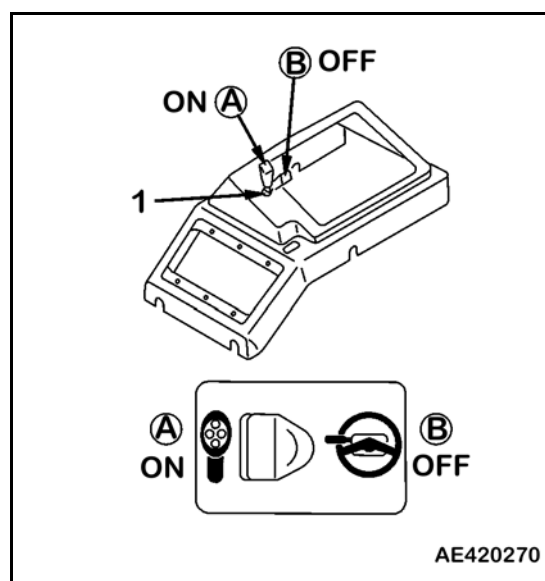
Structure and Function

The joystick steering system is used to steer wheel loaders with a lever instead of a steering wheel.

- The joystick enables steering with small, light movements and helps to reduce operator fatigue.
- When joystick ON/OFF switch (1) is turned ON, it is possible to operate the steering with the joystick.
- If the joystick steering system is installed, the steering and transmission control methods can be selected with joystick ON/OFF switch (1).



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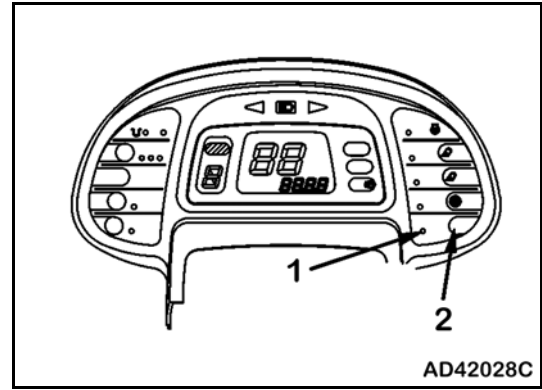


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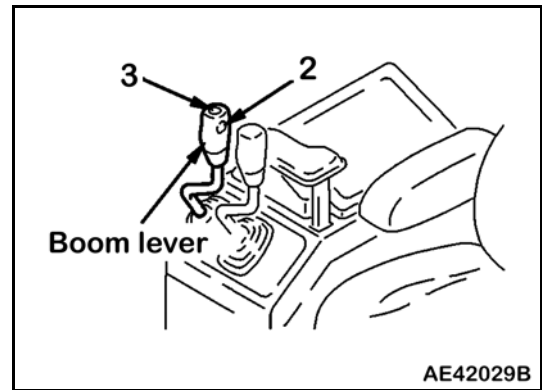
- The functional difference between steering with the joystick steering system as opposed to the steering wheel is shown in the following table.

Selection		(A)	(B)
Joystick steering ON/OFF switch		ON (Steering with joystick)	OFF (Steering with steering wheel)
Steering		Steering with joystick (Steering with steering wheel is also possible.)	Steering with steering wheel
Transmission	F/N/R	Operated with F/N/R button on joystick head	Operated with directional lever
	Selection of gear speed	Auto-shift *1: When manual switch is turned ON, operation is also possible with the shift-up/shift-down switch on the lift arm control lever. *2: Shift-up switch: Speed range shifts 1→2→3→4 Shift-down switch: Speed range shifts 4→3→2→1	Auto-shift *1: When manual switch is turned ON, operation is also possible with transmission control lever. Speed range shifts 1↔2↔3↔4

- ★ *1: Manual switch
 - Press the pushbutton switch to turn OFF/ON.
 - When the switch is pressed once, the pilot lamp lights up and the system is turned ON; when the switch is pressed again, the pilot lamp goes out and the system is switched OFF.
 - OFF: Automatic gear shifting
 - ON: Gear shifting using transmission control lever, or shift up or shift down switch (joystick steering machine only)



- ★ *2: When the joystick steering is ON (operated with joystick lever) and the manual switch is turned ON, it is possible to shift the speed range between 1 and 4 with shift-up switch (2) or shift-down switch (3) as shown in the following table.



Gearshift lever position	Shift range			
	1	2	3	4
1st	○			
2nd	○ ←→	○		
3rd	○ ←→	○ ←→	○	
4th	○ ←→	○ ←→	○ ←→	○

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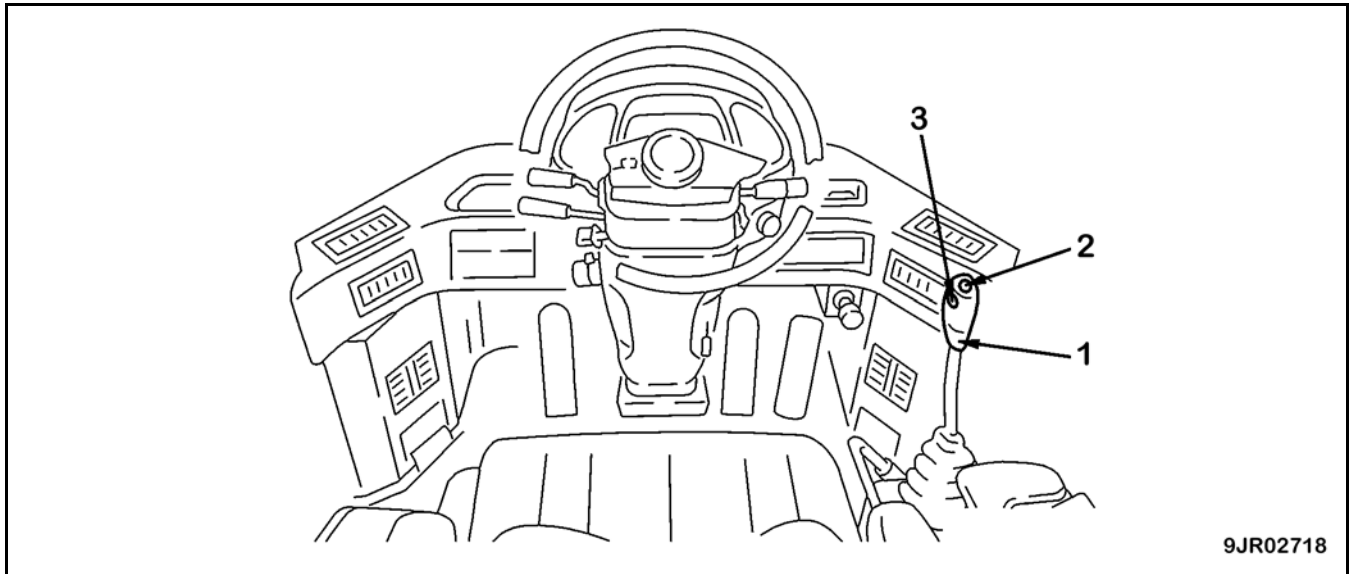
The combination of functions for switches (2) and (3) is shown in the following table.

Steering		Steering Wheel		Joystick	
		Automatic	Manual	Automatic	Manual
Function	Boom lever switch (2)	Hold	-	Hold	Shift up
	Boom lever switch (3)	Kick down	Kick down	Kick down	Shift down

OPTIONS, ATTACHMENTS

Components

Normally two control levers are used to operate the bucket and lift arm. With the joystick, the bucket and lift arm can both be operated with the same lever. This makes operation easier because there is no need to switch between levers when carrying out operations.



1. Joystick
2. Kickdown switch
3. Hold switch

Joystick Steering Lever

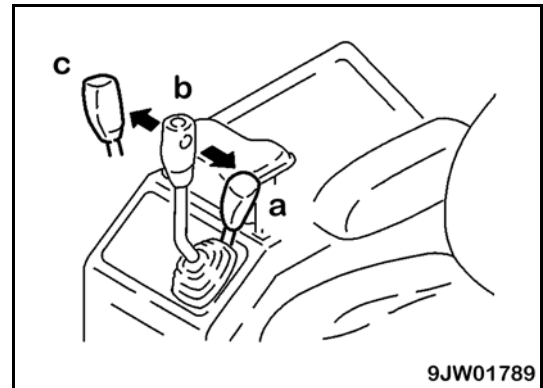
This lever (1) is used to operate the bucket and lift arm.

Operating Bucket

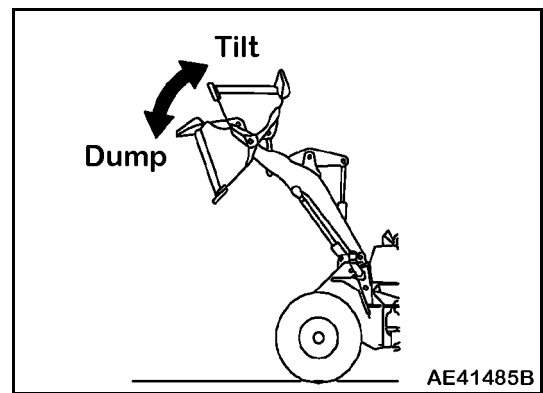
- Position (a): Dump
- Position (b): HOLD
- Position (c): Tilt

The bucket is kept in the same position.

If the lever is pulled further from the TILT position, the lever stops at that position. The bucket positioner is adjusted to that position and, at the same time, the lever returns to the HOLD position.



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Operating Lift Arm

- Position (a): RAISE
- Position (b): HOLD
- Position (c): LOWER
- Position (d): FLOAT

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

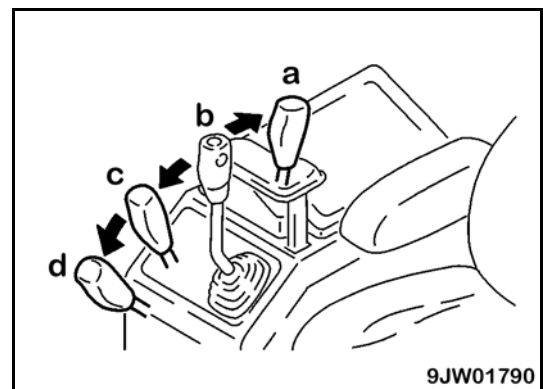
The lift arm is kept in the same position.

The lift arm moves freely under external force.

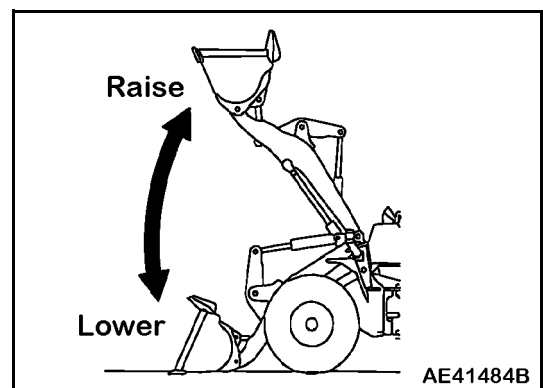
Remark

Do not use the FLOAT position when lowering the bucket. Use the FLOAT position when leveling.

- ★ See "Leveling Operations" on page 2-75.



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OPTIONS, ATTACHMENTS

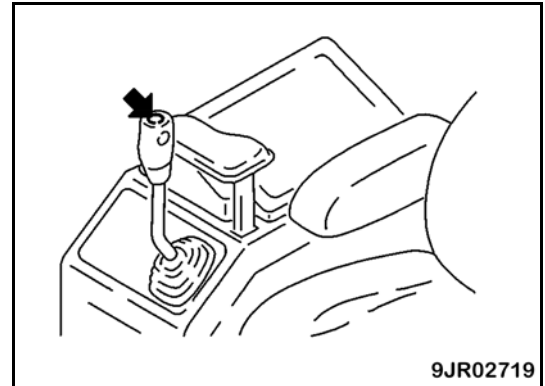
Kickdown Switch

When the machine is traveling in F2 and the kickdown switch (2) on the head of the joystick is pressed, the transmission is shifted down to F1.

Use this switch when you need to increase the drawbar pull in digging operations.

Remark

To cancel the kick-down switch, operate the directional lever to REVERSE or Neutral, or operate the gear shift lever to any position other than 2nd. You can also cancel kickdown by operating the parking brake switch or turning the starting switch OFF.



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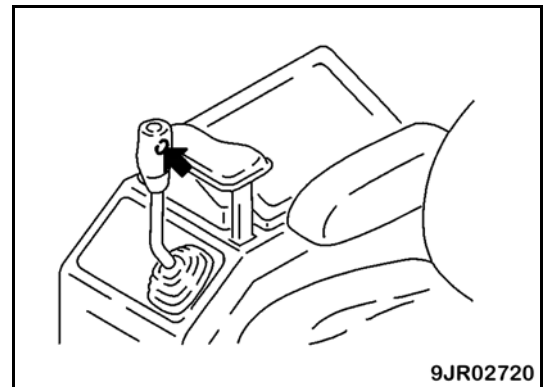
Hold Switch

To lock the speed range when traveling in automatic transmission, press the hold switch (3) at the side of the joystick knob. The speed range displayed in the transmission indicator of the main monitor is held, and the HOLD display lights up. If the switch is pressed again, the setting is canceled and the display goes out.

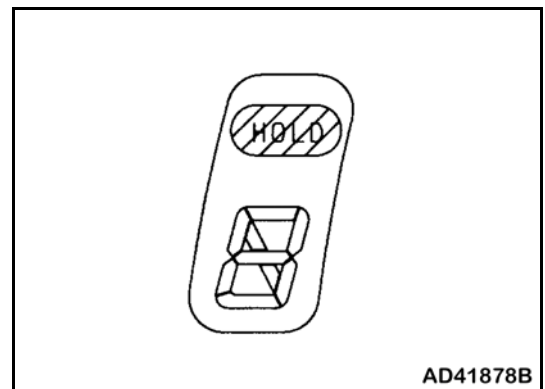
Use this system to set the desired speed range when traveling up or down hills or during grading operations.

Remark

It is possible to shift up or down from the fixed speed range by operating the gearshift lever.



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Steering with Joystick Lever or Steering Wheel

WARNING

- If the directional lever and FNR button on the joystick are not both at the neutral position, the forward and reverse directions of the transmission cannot be switched (from the directional lever to the FNR button on the joystick when the joystick ON/OFF switch is ON, or from the FNR button on the joystick to the directional lever when the joystick ON/OFF switch is OFF).
- Do not use the joystick when traveling on public roads.

Select joystick operation or steering wheel operation according to the type of work.

- ★ Before using the joystick steering, read the precautions in “Precautions for Steering with Joystick” on page 5-24.

Steering Using Joystick

- This is suited for continuous loading operations on job sites with ample space, where the loading operation can be carried out with a comparatively relaxed cycle time.
- Because operations can be carried out with small movements and light operating effort, this is also suitable for reducing operator fatigue when operating continuously.

Steering Using Steering Wheel

- This provides excellent fine control and ability to travel in a straight line.
- It is suitable for travel between job sites and for load-and-carry operations.
- It is also suitable for short-cycle loading operations because the upper part of the operator’s body is supported by the steering wheel when frequently switching between FORWARD and REVERSE.

Precautions for Steering with Joystick

WARNING

- If the machine and transmission cannot be operated normally with the joystick, or if the warning lamp lights up, use the brake to stop the machine. Turn off the joystick ON/OFF switch and move to a safe place by using the steering wheel and directional lever.
- Before restarting the operation of the machine, find and repair the problem part and confirm that the function is normal. For troubleshooting and repair, contact your Komatsu distributor.
- Never operate the machine before it is repaired completely.

- Do not move the joystick to the left or right until the N display on the machine monitor FNR display lights up to indicate that the joystick is ready.

The joystick controller senses the neutral position of the joystick.

If the joystick is moved before the neutral position is sensed, an error is detected and the caution lamp flashes; the joystick steering system does not work.

If an error is indicated, turn off the joystick ON/OFF switch, then turn it on again.

- If the machine is steered with the steering wheel, its turning angle is fixed when turning of the steering wheel stops. If the machine is steered with the joystick and the joystick is held in a turning position, the machine is steered to the articulate end.

Since the feel of steering with the joystick is different from using the steering wheel, be very careful until you are accustomed to the joystick.

- If the F or R button at the joystick head is pushed and held more than 30 seconds, a short circuit is sensed and an error is indicated.

Touch these buttons only when required.

- If the directional lever is not at the neutral position when the joystick ON/OFF switch is turned off, the neutral interlock circuit prevents it from turning to the joystick lever side. Since the transmission is kept at the neutral position, the machine cannot move either forward or in reverse.

In this case, turn the directional lever to the neutral position, then turn off the joystick ON/OFF switch.

- If there is a problem with the electric circuit of the joystick steering system or transmission control system, the central caution lamp (red) on the left side of the main monitor flashes to notify the operator of the problem.

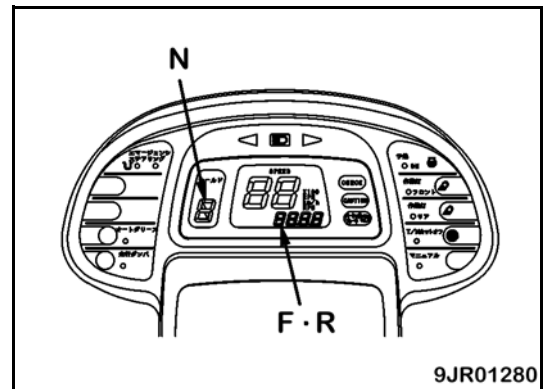
Since both steering system and transmission are set in the respective neutral positions, turn off the joystick ON/OFF switch, then drive the machine with the steering wheel and the directional lever.

Operating the Joystick Steering System

⚠ WARNING

- It is dangerous to turn the machine suddenly at high speed, or to turn on steep hills. Do not operate the steering in such conditions.
- When turning, the articulation stops at the position to which the steering wheel is turned. If the joystick is held in the tilted position, the body of the machine will articulate fully.
- The feel of steering with the joystick is different from when steering with the steering wheel. Be extremely careful until you have become used to operating the joystick.
- When operating with joystick lever (4), always adjust the angle of the steering wheel so that it is possible to see the FNR display on the machine monitor.

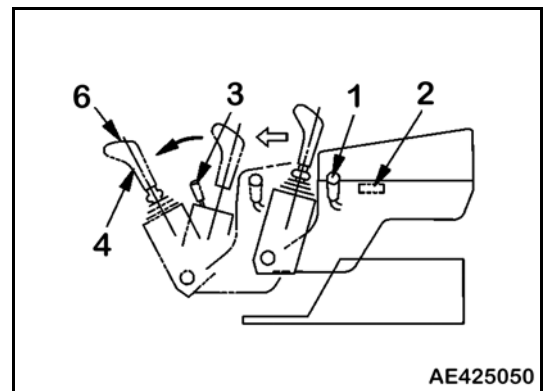
1. Check the adjustment and operation before starting the engine. For details, see “Check Before Starting Engine” on page 2-109.
2. Before starting the engine, check the operation of the joystick lever steering; check that the transmission directional lever is at N; and that the surrounding area is safe.



3. Sit on the operator's seat and pull up lever (1) to unlock the joystick console; slide the joystick console from the rear position to the forward stroke end; then lock it securely.

Under this condition, safety switch (2) is turned on.

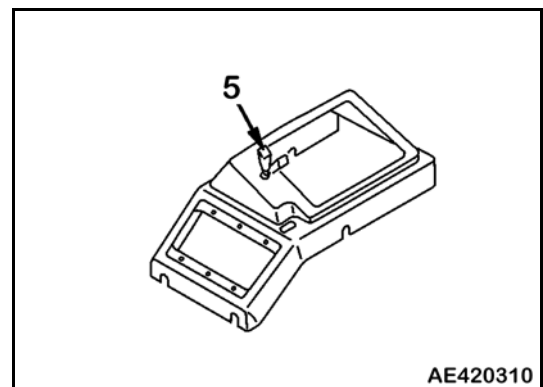
4. Adjust joystick (4) to the angle for easy operation with console box adjustment lever (3). For instructions about adjusting the joystick console, see “Adjustments” on page 5-28.



5. Fasten the seat belt.
6. Confirm that joystick (4) operates normally and the directional lever of the transmission is at the neutral position, then start the engine.

7. Turn on joystick ON/OFF switch (5).

FNR button (6) on joystick (4) head is set to the neutral position automatically.



OPTIONS, ATTACHMENTS

8. If joystick (4) is turned to the right, the machine turns to the right; if the joystick is turned to the left, the machine turns to the left.

★ The sharper the angle of the joystick, the faster the machine turns.

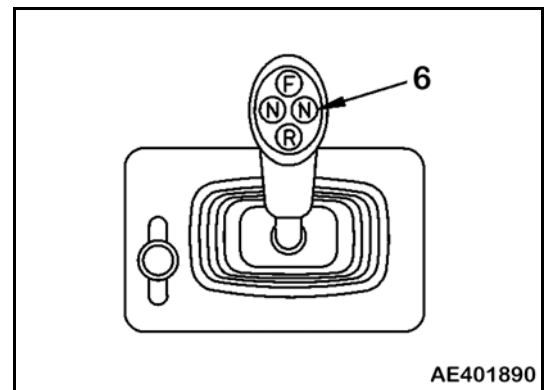
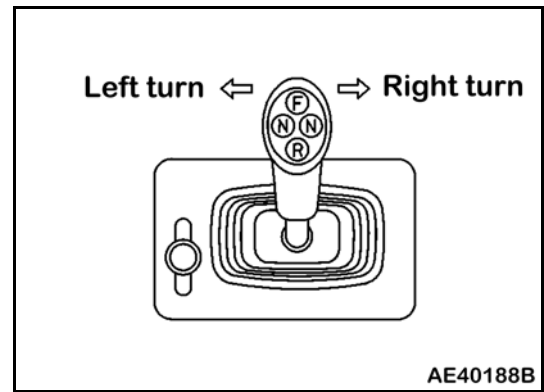
9. After the machine turns to the desired angle, return the joystick to the neutral position.
10. When returning the machine to the straight position, turn the joystick in the opposite direction from the neutral position. (If it was turned to the right, turn it to the left.)

Even when the joystick is returned to the neutral position, the machine remains at the same angle of articulation. It does not return to the straight travel position.

11. Select the forward or reverse direction of the transmission with FNR button (6) on joystick head (4).

- Button N: Neutral
Transmission is set to the neutral position the moment this button is pushed.
- Button F: Forward
Transmission is set to the forward position the moment this button is pushed and released.
- Button R: Reverse
Transmission is set to the reverse position the moment this button is pushed and released.

12. Turn off joystick ON/OFF switch (5) to turn off the operation of the joystick.



Getting In and Out of Operator's Cab

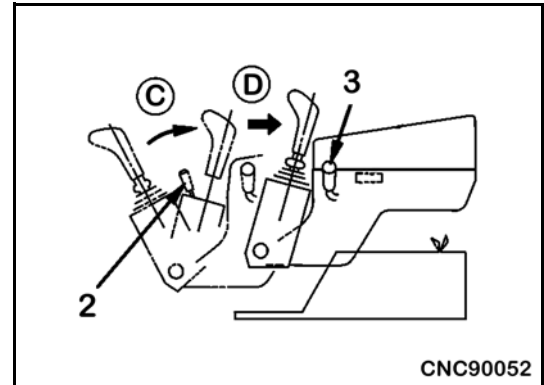
! WARNING

- Before getting in or out of the operator's cab, turn the joystick ON/OFF switch to the OFF position.
- Slide the joystick console backward. If the console is slid backward, safety switch (3) is turned off and operation of the joystick is automatically turned off.

Moving the joystick console makes it easier to get on and off the machine. See "Adjustments" on page 5-28.

It is possible to tilt the console box to position C (→) by operating lever (2) and to slide the console to position D (⇒) by operating lever (3).

When the engine is running, there is a danger that the joystick lever can be moved by mistake causing the machine to articulate unexpectedly. To avoid this, always slide the joystick console backward when not operating the machine.



Adjustments

! WARNING

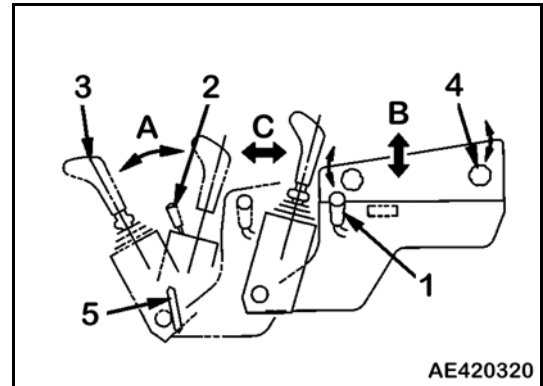
- Stop the machine on level ground in a safe place when carrying out the adjustment.
- Carry out the adjustment before starting operations or when changing operator shifts.
- Put your back against the backrest of the operator's seat and adjust the seat so that it is possible to depress the brake fully before starting the console adjustment.

Adjusting Console

1. Turn lever (2) forward and set the knob to a desired position.
2. After setting, release the lever.

Forward/Backward adjustment: . . . 130 mm (5.12 in) (at knob top)

3. Loosen lever (5) and move the console to the rear until it contacts the stopper, then tighten lever (5). In this way, lever (3) can be set to the desired position and there will be no need to adjust the position of lever (3) in the future.



Adjusting Height of Armrest

1. To adjust the height of the armrest (B), turn grip (4) to unlock the armrest, then set the armrest to a desired position.
2. After setting, tighten the grip securely.

Sliding the Console

! WARNING

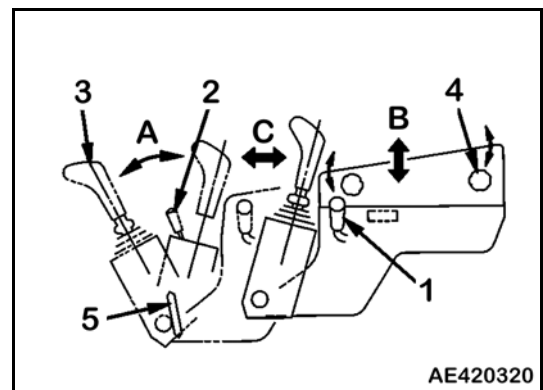
When traveling or operating the work equipment, be sure to lock the console at the forward stroke end.

1. When getting on or off the machine, pull up lever (1) and slide the console to the rear.

When doing this, do not stop the console half way but slide it fully to the rear and lock it in position.

2. After getting of the machine, be sure to slide the console fully to the front and lock it in position.

Vertical adjustment range: 35 mm (1.38 in)



Adjusting Air-Suspension Seat

⚠ WARNING

- Stop the machine in a safe place before adjusting the operator's seat.
- Adjust the seat position at the beginning of each shift or when operators change.
- Put your back against the backrest of the operator's seat and adjust the seat so that it is possible to depress the brake fully.

(A) Fore-and-aft adjustment

Pull lever (1) up; set the seat to the desired position; then release the lever.

Fore-and-aft adjustment:
 180 mm (18 mm x 10 stages) (7.09 in [0.71 in x 10 stages])

(B) Adjusting seat angle

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

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

Adjustment range (four stages each):

Forward tilt: 13 degrees

Rear tilt: 13 degrees

(C) Adjusting seat for operator's weight

Sit on the seat and operate valve (3) to adjust the strength of the suspension.

- Push: suspension becomes stronger.
- Pull: suspension becomes weaker.

Adjustment range (Target): 50 to 120 kg (110 to 265 lb)

(D) Adjusting backrest angle

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

Push your back against the backrest when carrying out this adjustment. If your back is not pressing against the backrest, the backrest may suddenly spring forward.

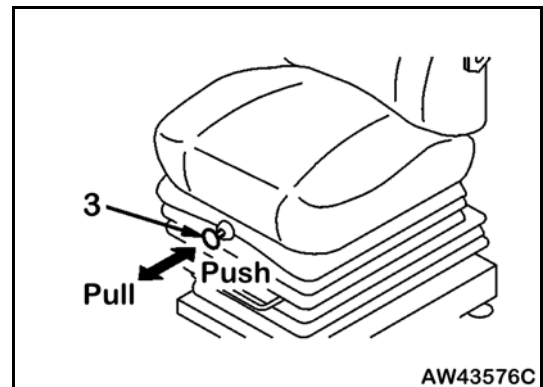
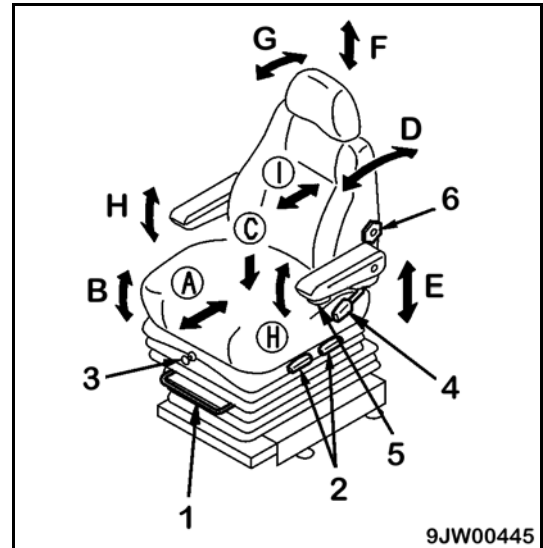
Adjustment range:

Forward tilt: 66 degrees (3 degrees x 22 stages)

Rear tilt: 72 degrees (3 degrees x 24 stages)

Remark

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



OPTIONS, ATTACHMENTS

- (E) Adjusting seat height

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

Adjustment range: 60 mm (2.4 in)

- (F) Adjusting headrest height

Move the headrest up or down to the desired height.

Adjustment range: 50 mm (2.0 in)

- (G) Adjusting headrest angle

Rotate the headrest to the front or rear.

- (H) Adjusting armrest angle

Adjust angle of armrest by rotating knob (5) (left side only).

When armrest is turned, it will spring up (both left and right sides).

Adjustment range (30 degrees):

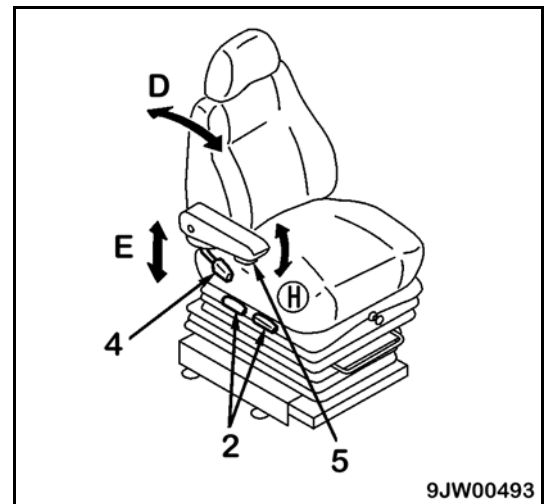
Forward tilt:25 degrees

Backward tilt:5 degrees

- (I) Adjusting lumbar support

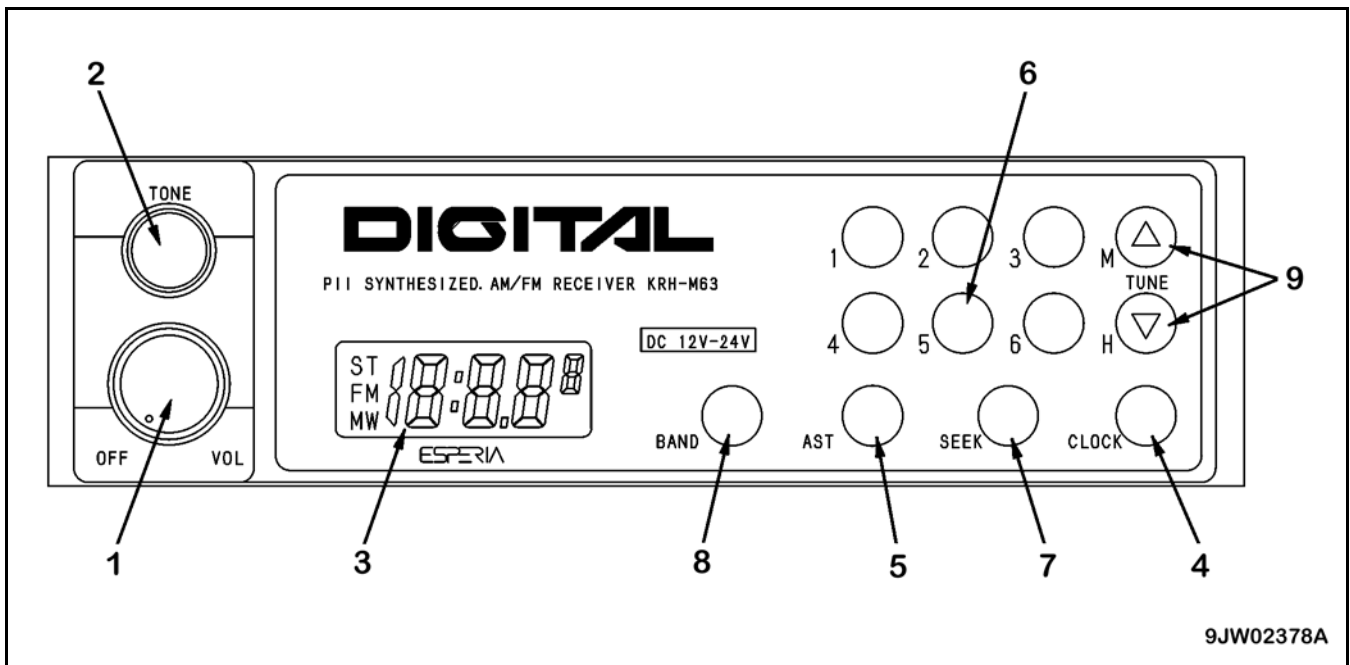
Turn grip (6) to provide suitable support for the lumbar region.

★ The grip is on the left side of the seat; see the graphic in “Adjusting Air-Suspension Seat” on page 5-29.



CAR RADIO

Components



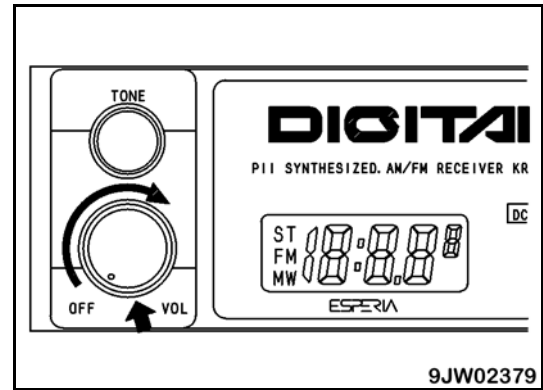
1. Power switch/volume
2. Tone control knob
3. Display
4. Clock button/Displaying frequency
5. AST
6. Preset button
7. SEEK
8. Band selector switch
9. Tuning switch

OPTIONS, ATTACHMENTS

Power Switch/Volume

The power switch (1) turns on the power to the radio and adjusts the volume.

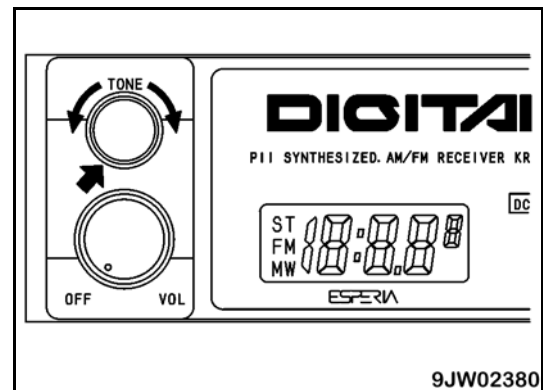
- Turn the switch to the right to turn on the power; you will hear a click.
- Turn the switch further to the right to adjust the speaker volume.



Tone Control Knob

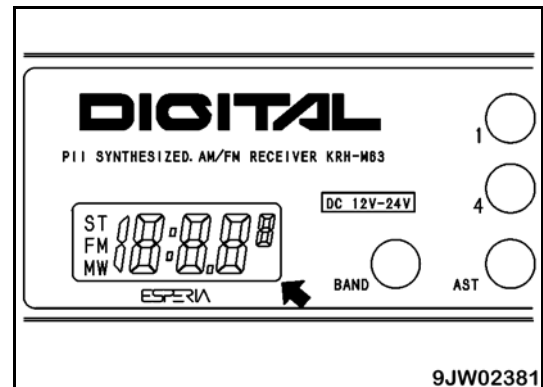
The tone control knob (2) controls the tone.

- Turn the knob to the right to emphasize the high tone.
- Turn the knob to the left to reduce the high tone.



Display

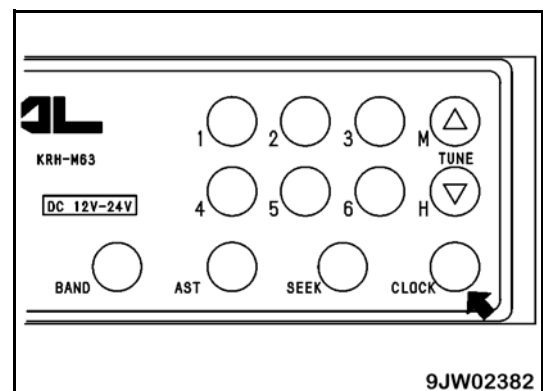
The display (3) shows the radio reception frequency and the operating mode.



Clock Button/Displaying Frequency

The clock button (4) is used to display time and frequency.

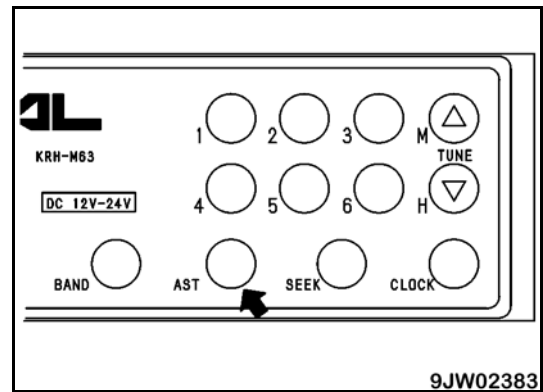
- Press the button to display the time.
- Press the button again to display the frequency.



AST

The AST button (5) is used to call up preset stations.

- Press the AST button to call up preset stations in turn.
- Press the button again to stop at a broadcasting station.
- ★ If you keep the button pressed continuously for two seconds, the station is set to auto-memory.

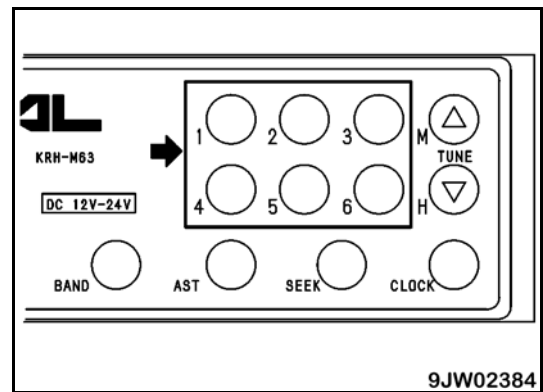


Preset Button

The preset switch (6) consists of six buttons and is used to set preset stations.

Each button can be set to one station for FM and MW (AM).

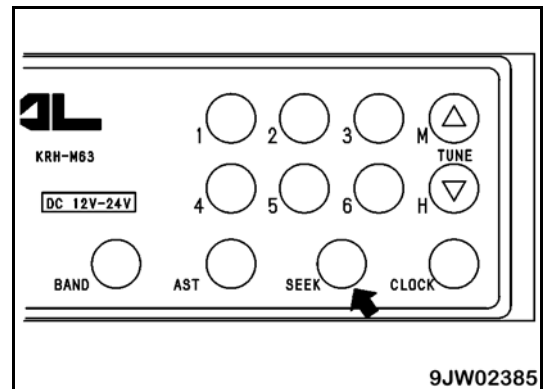
- ★ For details about setting and resetting preset stations, see “Setting Preset Buttons” on page 5-35.



SEEK

The SEEK switch (7) is used to find any radio station within range and to stop when the station is received.

- Press the SEEK switch to search for stations within your broadcasting range.

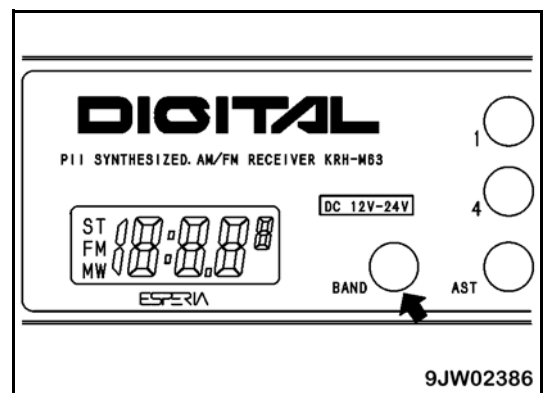


Band Selector Switch

The band selector switch (8) is used to move between the FM and MW (AM) bands.

- Press the band selector switch to switch between FM and MW (AM).

The reception band and frequency are shown on the display.

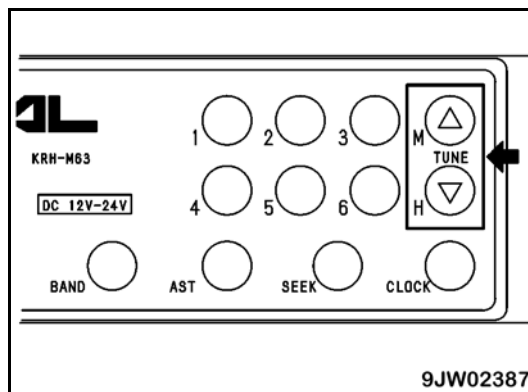


OPTIONS, ATTACHMENTS

Tuning Switch

The tuning switch (9) is used to change the frequency.

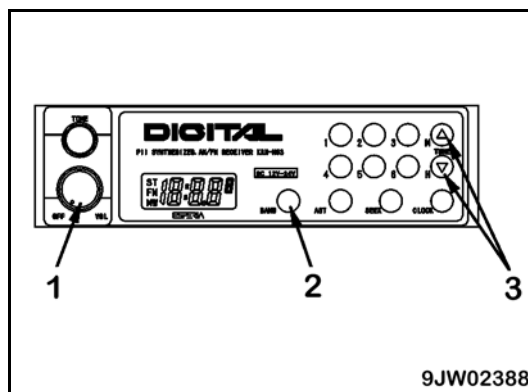
- Press the TUNE ▲ button to increase the frequency.
- Press the TUNE ▼ button to decrease the frequency.
- Keep the button pressed to change the frequency continuously.



Method of Operation

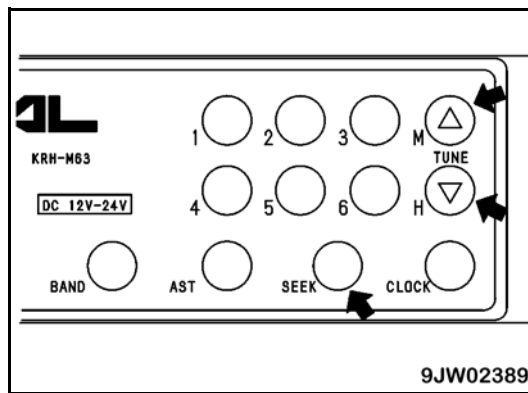
Listening to Radio

1. Use power switch (1) to turn on the power for the radio.
2. Use BAND switch (2) to select MW (AM) or FM.
3. Use the preset switch or tuning switch (3) to select the station.
4. Adjust the volume and tone as desired.
5. To turn the radio OFF, turn VOL knob (1) to the left until you hear a click.



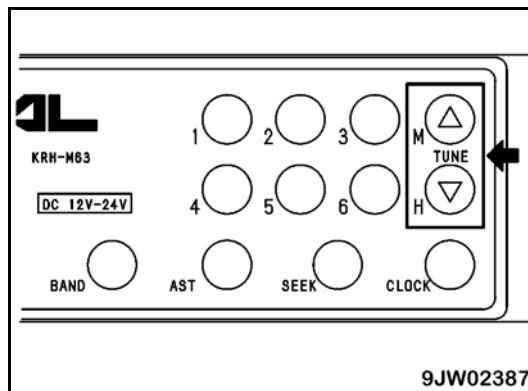
Automatic Tuning

Press the SEEK switch to search the higher frequencies. When a station is received, the search stops automatically.



Manual Tuning

- Press the TUNE ▲ button to increase the frequency.
- Press the TUNE ▼ button to decrease the frequency.
- Press and hold either TUNE button to change the frequency continuously.



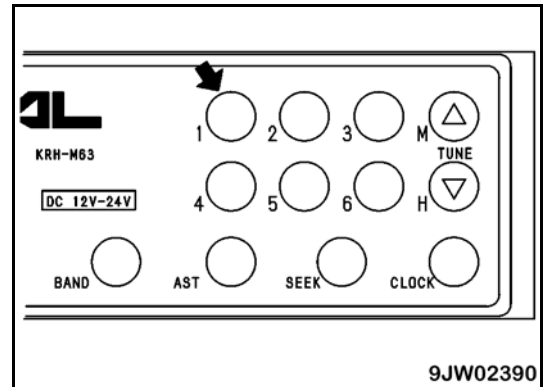
Setting Preset Buttons

It is possible to preset six AM (MW) stations and six FM stations.

Remark

If the battery is replaced or the power is switched off, all the preset settings are deleted. It is necessary to repeat the presetting operation to reselect the stations.

1. Select the desired preset station.
 - Use the BAND button to select MW (AM) or FM.
 - Use the TUNE button to select the frequency of the broadcasting station.
2. Determine the number of the button to be preset and keep that button pressed for two seconds.
The number of the button will be displayed and the presetting is completed.
3. Repeat Steps 1 to 2 to preset other broadcasting stations.

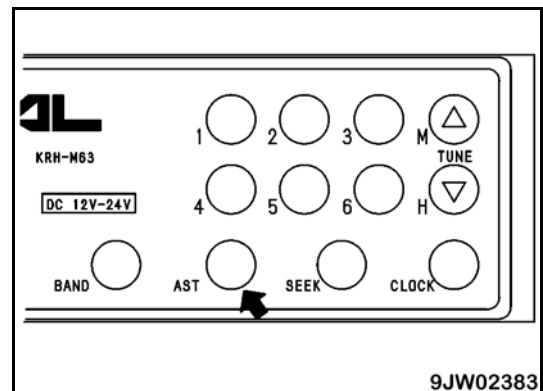


Remark

To change the setting of a preset switch to another station, repeat Steps 1 and 2.

Automatic Memory

If the AST button is pressed for two seconds, the broadcasting stations within broadcasting range are called up in turn and automatically saved in the preset memory.



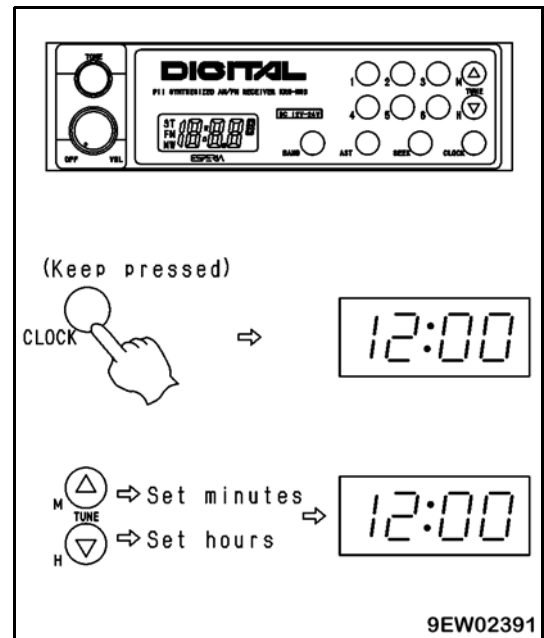
OPTIONS, ATTACHMENTS

Automatic Switching of Monaural/Stereo Reception

If the reception of the FM stereo broadcast is weak (when you are far from the broadcasting station or are surrounded by hills), the radio is automatically switched from stereo to monaural to reduce the interference. When the stereo broadcast signals become stronger, the radio automatically switches back to stereo broadcasting.

Adjusting Time

1. Turn the radio power ON. If the display shows the frequency, set the CLOCK button to the time display.
2. To set the time, keep the CLOCK button pressed and:
 - Press the ▲ button to change the minutes.
 - Press the ▼ button to change the hours.



Precautions When Using

- Stow the antenna when traveling in places with low overhead clearance.
- To ensure safety, always keep the sound to a level where it is possible to hear outside sounds during operation.
- If water gets into the speaker case or radio, it may lead to an unexpected failure; be careful not to get water on the equipment.
- Do not wipe the scales or buttons with solvents such as benzene or thinner. Wipe with a dry soft cloth. If the dirt cannot be removed easily, soak the cloth with alcohol.

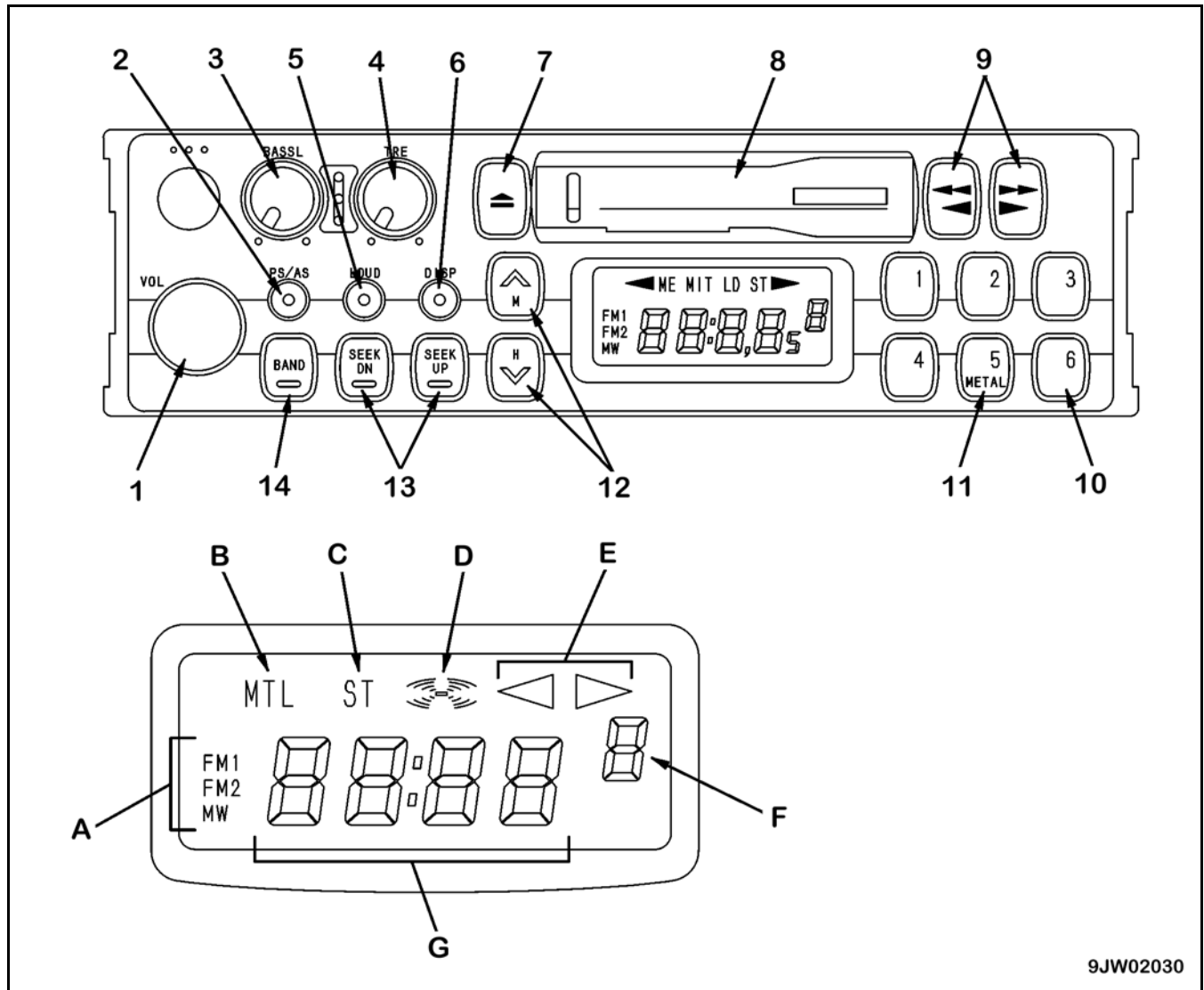
MEMORANDUM

OPTIONS, ATTACHMENTS

AM/FM RADIO CASSETTE STEREO SOUND SYSTEM

Your machine may be equipped with an AM/FM radio-cassette system.

Using the radio during machine operations may lead to distractions. When using the radio, always be aware of what you are doing and your operating environment. Do not allow yourself to become distracted.



9JW02030

1. Power switch/Volume
2. Auto-store/Preset scan button
3. Bass control knob
4. Treble control knob
5. Loudness button
6. Time/Radio display selector button
7. Tape eject button
8. Cassette door
9. Fast forward/Rewind buttons
10. Preset buttons
11. Metal tape button
12. Manual tuning buttons
13. Seek tuning buttons
14. Band selector button

- A. Band display
- B. Metal tape display
- C. FM stereo reception display
- D. Loudness display
- E. Tape direction display
- F. Preset channel display
- G. Time/Frequency display

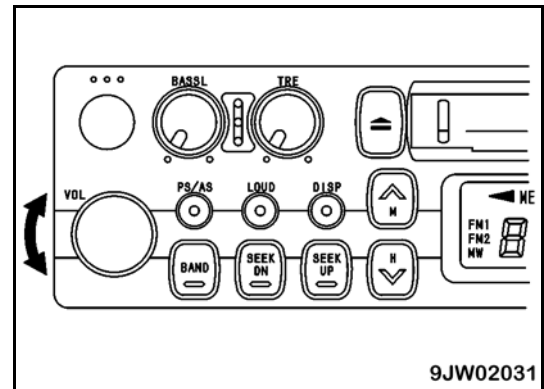
OPTIONS, ATTACHMENTS

Sound System Components

Power Switch/Volume

Turn the power switch/volume knob (1) to the right to turn the power ON; you will hear a click.

- To increase the volume, turn the knob to the right.
- To decrease the volume, turn the knob to the left.



Auto-Store/Preset Scan Button

Use the auto-store/preset scan button (2) to actuate the preset scan and auto-store functions.

Auto-Store

Each time this button is pressed for more than two seconds while in radio reception, the auto-store function automatically starts to search for the desired station within a receivable band, and memorizes the frequency in the preset memory. During this scanning process, the frequency shown in the right side of the display continues to change. This indicates that each frequency is memorized in auto-store.

Remark

The auto-store function cannot be used when the channel display is flashing. When the display is flashing, the preset scan function is being used.

Preset Scan

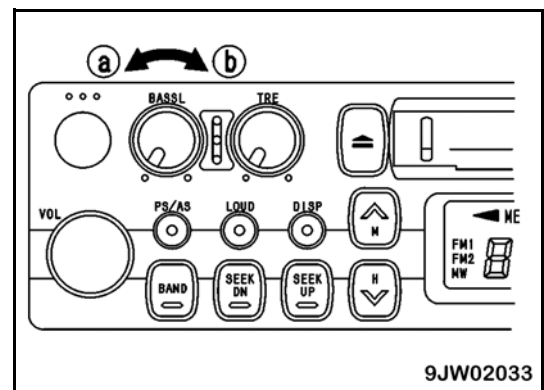
If this button is pressed for less than 0.5 second while in radio reception, programs from the six preset stations in the same band will be broadcast one after another for five seconds each, starting from No. 1 through 6 stations consecutively.

When the desired station is reached, press the button again. This stops the preset scan tuning process and switches to ordinary broadcasting. The same process will be repeated continuously until the button is pressed again.

Bass Control Knob

Use the bass control knob (3) to control the low tones.

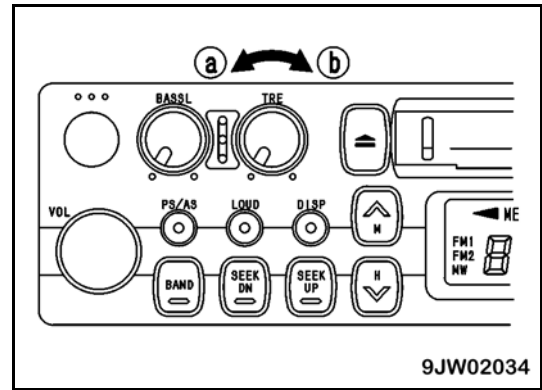
- Direction (a): Low tone reduced
- Direction (b): Low tone emphasized



Treble Control Knob

Use the treble control knob (4) to control the high tones.

- Direction (a): High tone reduced
- Direction (b): High tone emphasized

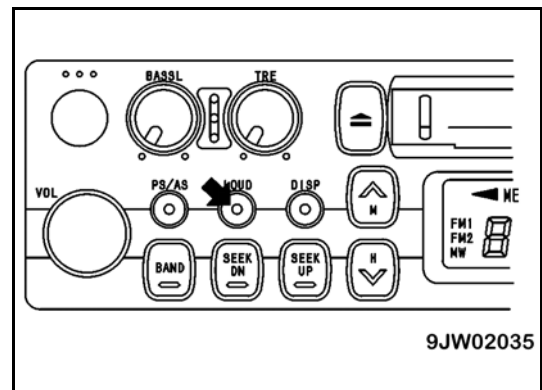


Loudness Button

Use the loudness button (5) to play the stereo at low volume.

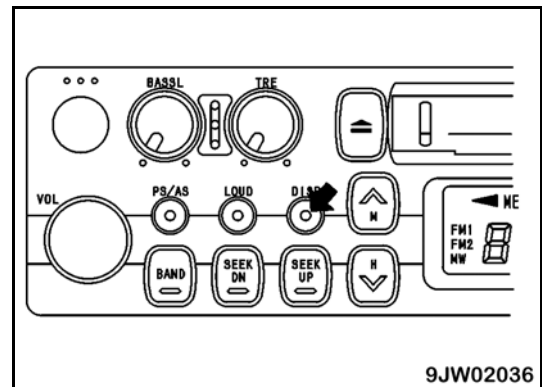
This makes it possible to hear more easily by emphasizing the low tone when the low tones are weak.

- Push button: Actuated (ON)
- Push button again: Canceled (OFF)



Time/Radio Display Selector Button

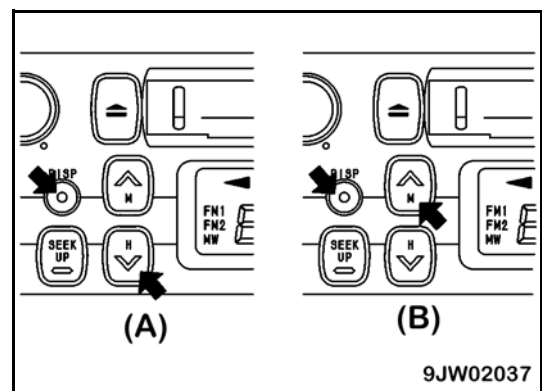
Use the time/radio display selector button (6) to switch between the Radio/Tape display and the Time display.



Correcting the Time

Press the button to set the time display.

- (A) Correcting Hour
 - Keep the DISP button pressed and press the bottom (H) of the TUNING button to correct the hour.
- (B) Correcting Minute
 - Keep the DISP button pressed and press the top (M) of the TUNING button to correct the minute.

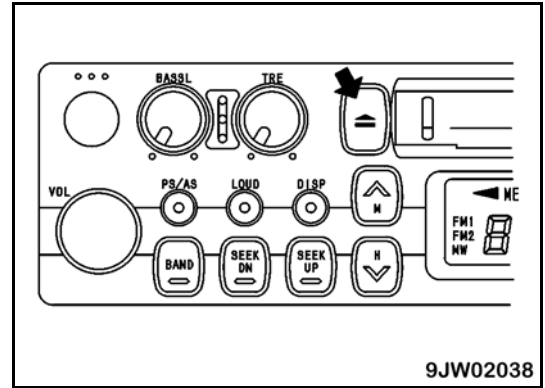


OPTIONS, ATTACHMENTS

Tape Eject Button

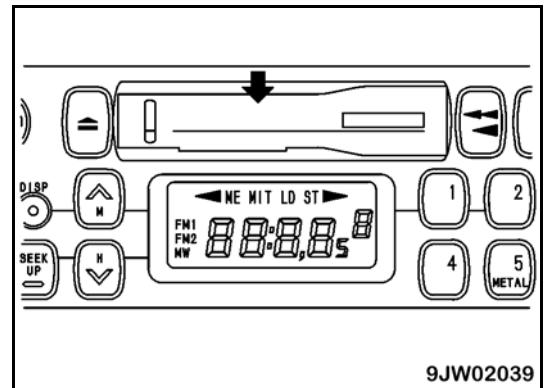
Use the tape eject button (7) to stop the tape and to eject the cassette.

When the tape is ejected, the radio plays.



Cassette Door

Set the cassette with the exposed portion of the tape on the right side and insert it in cassette door (8).



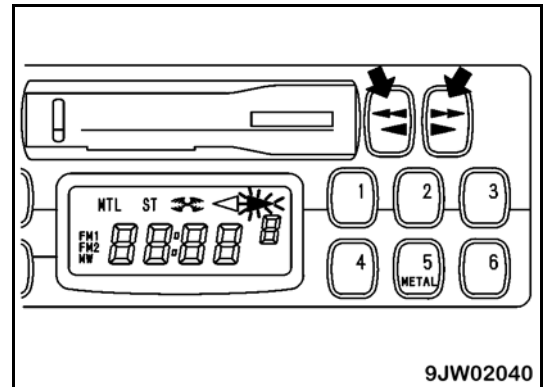
Fast-Forward, Rewind Buttons

Use the fast-forward button (9) to fast forward the tape. Use the rewind button (9) to rewind the tape.

If you press the button pointing in the same direction as the illuminated arrow (indicating the direction of play), the tape will fast forward; if you press the button pointing in the opposite direction, the tape will rewind.

To stop the tape, lightly press the button that is not locked. The fast-forward or rewind operation will be canceled.

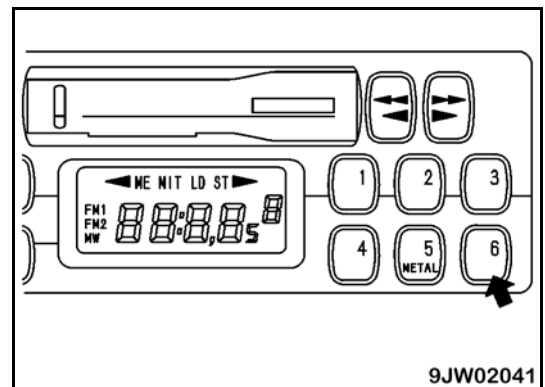
If the fast-forward and rewind buttons are pressed at the same time, the tape will change sides.



Preset Buttons

Use the preset buttons (10) to obtain the broadcast station frequencies preset in memory for each of buttons No. 1 to No. 6.

It is possible to preset 18 stations (FM: 12; AM: 6) with these buttons.



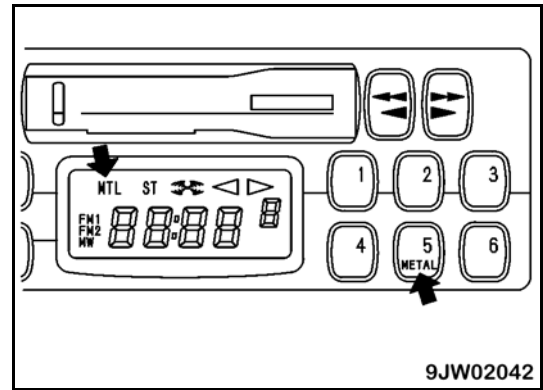
Metal Tape Button

Use the metal tape button (11) to play a metal or chrome tape.

When it is pressed, “MTL” appears on the display.

Remark

This button is used also for preset button No. 5.

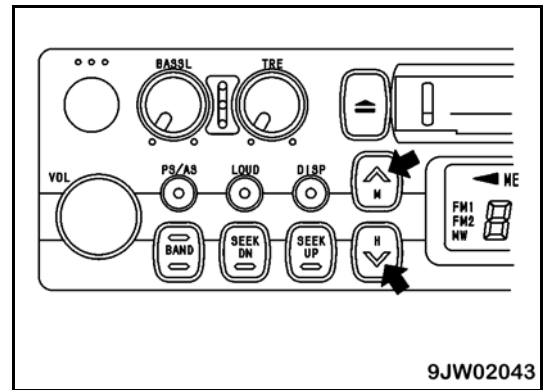


Manual Tuning Buttons

Use the manual tuning buttons (12) to change the frequency manually.

When the **TUN ^** button is pressed, the frequency goes up 9 kHz for AM and 0.1 MHz for FM; when the **TUN v** button is pressed, the frequency goes down 9 kHz for AM and 0.1 MHz for FM.

If the button is pressed and held, the frequency changes continuously.

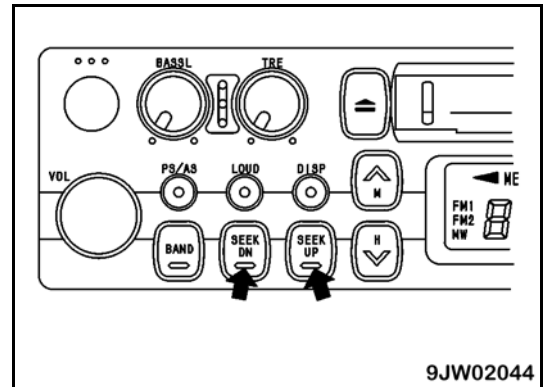


Seek Tuning Buttons

Use the SEEK tuning buttons (13) to find stations within your broadcasting range.

When the **SEEK UP** button is pressed, the frequency goes up automatically; when the **SEEK DOWN** button is pressed, the frequency goes down automatically.

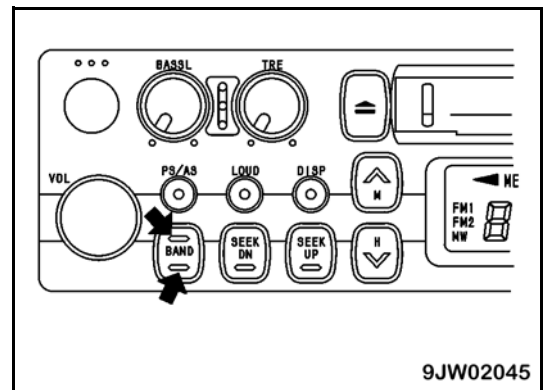
When the next station within broadcasting range is found, seeking stops automatically.



Band Selector Button

Press the band selector button (14) to switch the band between FM1, FM2, and MW (AM).

The band is shown on the display.



OPTIONS, ATTACHMENTS

Method of Operation

Setting Preset Buttons

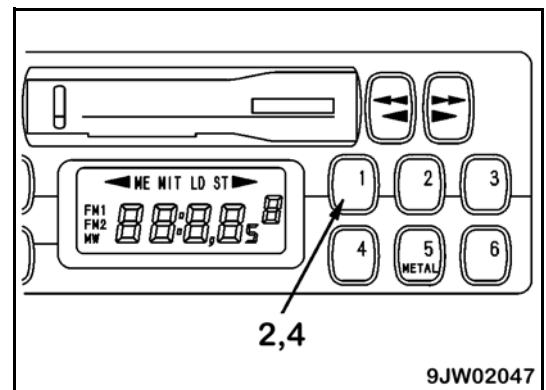
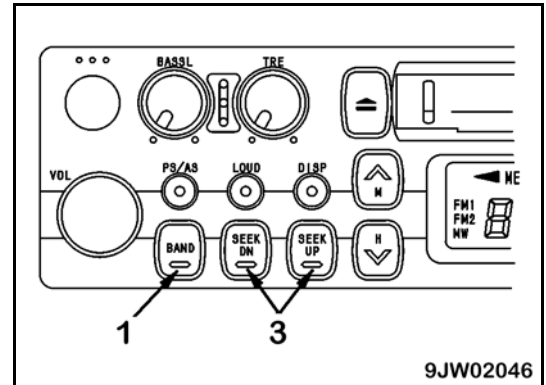
It is possible to preset six MW (AM) stations and 12 FM stations (FM1: six stations, FM2: six stations).

Remark

If you are playing the cassette, press the tape eject button to stop the tape.

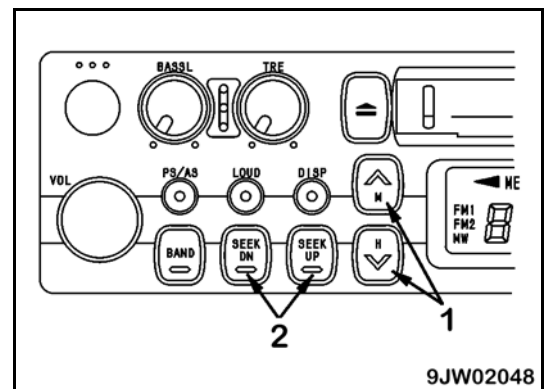
Using Auto-Preset

1. Use band selector button (1) to select MW (AM), FM1, or FM2.
2. Press manual memory button (2) or SEEK tuning button (3) to select the frequency of the broadcasting station.
3. Press preset button (4) of the number to be preset for two seconds while the frequency display is being shown on the display. (The preset channel and frequency are displayed and the presetting is completed).
4. Repeat Steps 2 and 3 to preset other stations.



Using Manual Preset

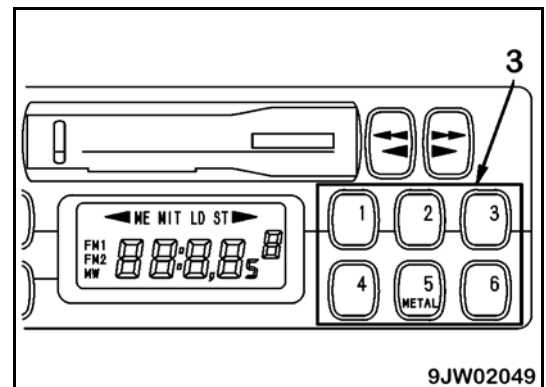
1. Use band selector button to select MW (AM), FM1, or FM2.
2. Press manual tuning buttons (1) or SEEK tuning buttons (2) to select the station to be preset.
3. Keep one of the preset buttons (3) pressed for two seconds while the frequency display is shown on the display. (The preset channel and frequency are displayed and the presetting is completed.)
4. Repeat Steps 2 and 3 to preset other stations.



Remark

Use Steps 2 and 3 when changing the setting of a preset switch to another station.

When the power is disconnected, such as when the battery is replaced, all the settings are deleted. You must preset the stations again.



Listening to Radio

1. Turn the starting switch ON and then turn power switch (1) ON.
2. Set band selector button (2) to AM or FM.
3. Select the station with the preset buttons or manual tuning button (3).

Remark

In case you do not remember the number assigned to a certain preset station, press the auto-store/preset scan button (4) for less than 0.5 second.

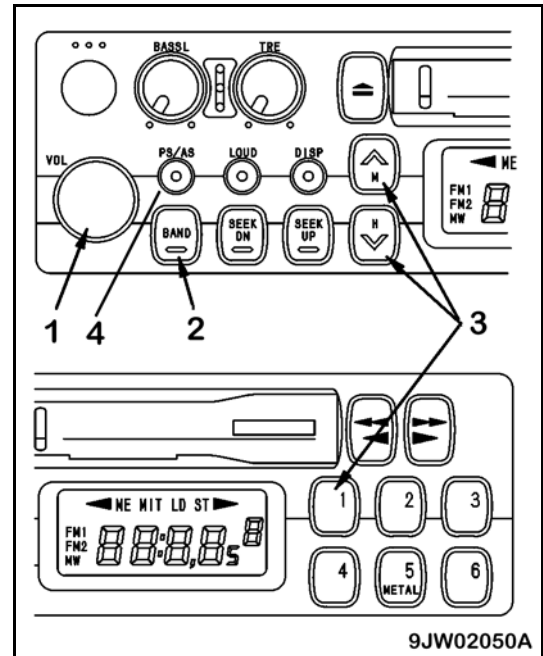
The six preset stations will broadcast one after another for five seconds each. When the desired station broadcasts, press the button again and scan tuning stops at that station.

4. Adjust the volume, balance, and tone as desired.
5. When turning the radio OFF, turn power switch (1) to the left until you hear a click.

Remark

To switch to the radio when listening to a cassette, press the cassette eject button to stop the tape.

If you insert a cassette when listening to the radio, the tape will start to play.



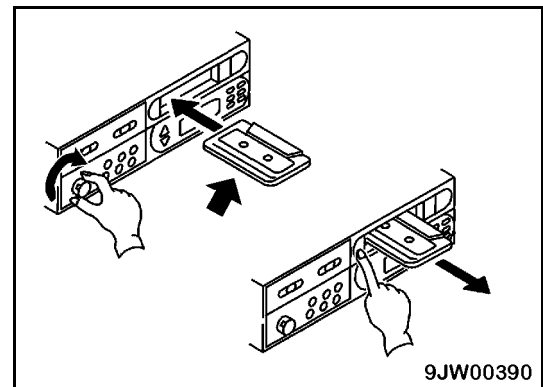
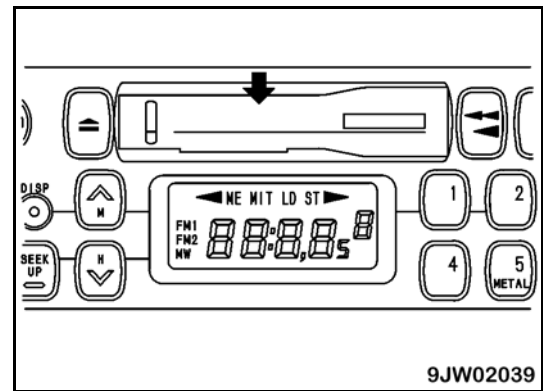
Listening to Cassette Tape

1. Turn the starting switch ON and then turn power switch (1) ON.
2. Set the cassette with the exposed portion of the tape on the right side and push it through the cassette door. The tape starts to play automatically.

If the arrow indicating the direction of play is pointing to the right, the top side is being played; if the arrow is pointing to the left, the bottom side is being played.

When the tape reaches the end, it reverses automatically and the other side starts to play.

3. When you have finished with the tape, press the cassette eject button to eject the tape and automatically switch to the radio.

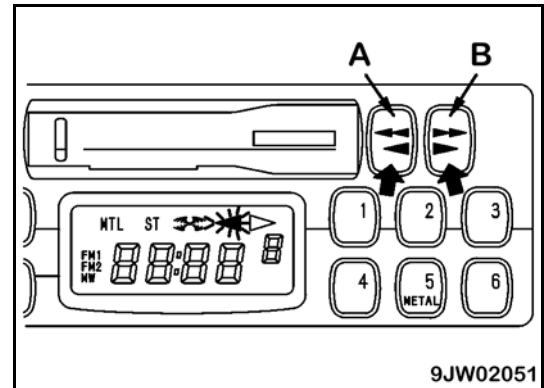


OPTIONS, ATTACHMENTS

Reversing the Tape

If you want to reverse the tape while listening to it, press both FAST FORWARD, REWIND buttons (A) and (B) at the same time lightly.

When this is done, the tape direction display will be reversed.



Precautions When Using

WARNING

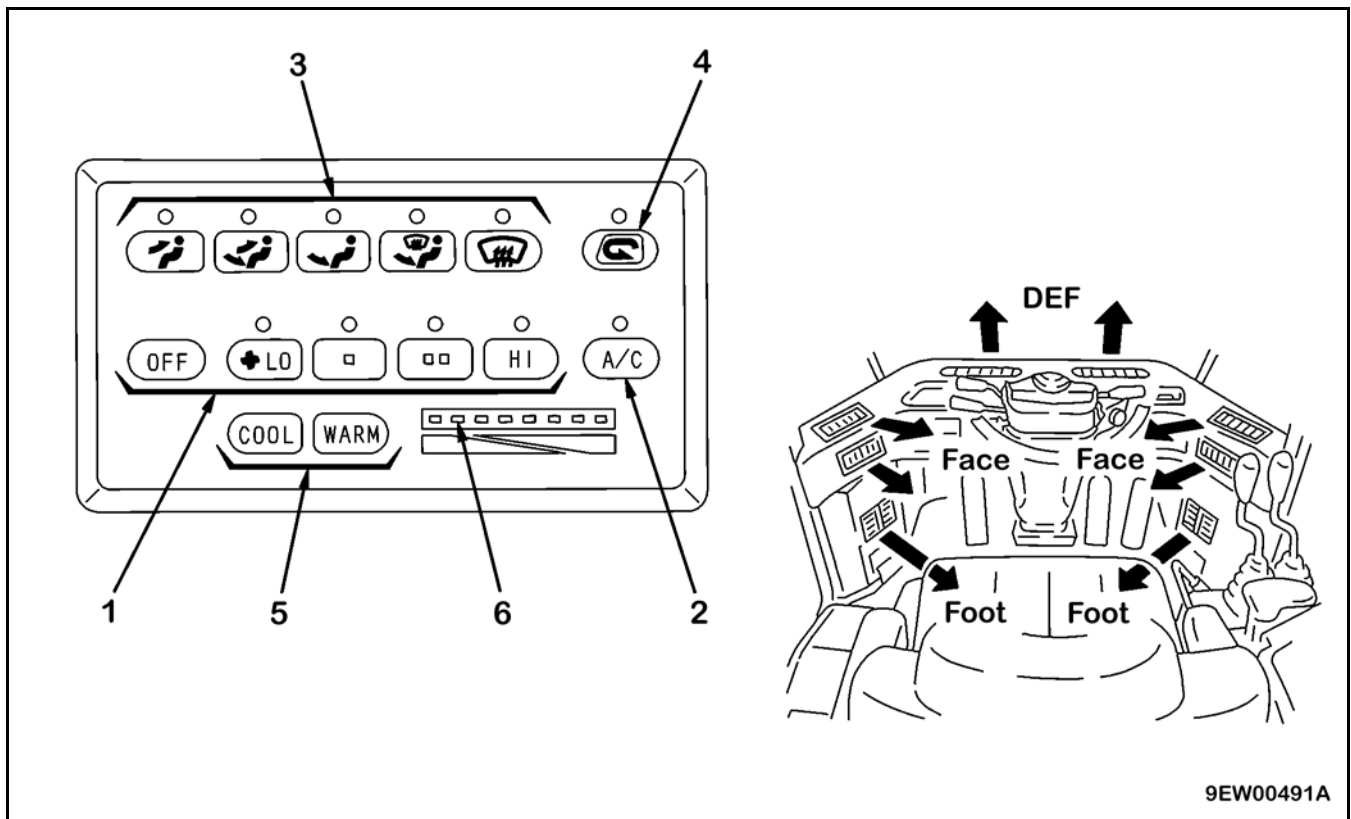
- If a voltage greater than the specified voltage is input, it may cause fire, electrocution, or other failure. Never input any voltage other than the specified voltage.
 - Places inside the radio are under high voltage. Do not remove the cover.
 - Do not carry out any modifications. This may cause fire, electrocution, or other failure.
 - If you cannot hear any sound or nothing is displayed, or any other problem occurs, turn off the power switch and ask your Komatsu distributor to make repairs without delay.
-
- Stow the antenna when traveling in places with low overhead clearance.
 - To ensure safety, always keep the volume at a level where it is possible to hear outside sounds during operation.
 - If water gets inside the speaker case or radio, it may cause a serious problem. Be careful not to get water on the equipment.
 - Do not wipe the display panel or buttons with solvents such as benzene or thinner. Wipe with a soft, dry cloth. Use a cloth soaked in alcohol if the equipment is extremely dirty.

Handling Cassette Tape

- Clean the tape head approximately once a month with a commercially available head cleaning tape.
- Do not leave the tape any place where it is exposed to direct sunlight, any place that is excessively dusty, or any place where there is a magnetic field.
- Do not use a 120-minute tape. This tape is thin and can easily get caught inside the machine.
- If the tape is slack, it can easily get caught inside the machine. Use a pencil to wind the tape to remove any slack.
- Do not use a cassette tape if the label has started to come off. It may cause defective rotation, or it may be impossible to get the tape out of the machine.

AIR CONDITIONER

Control Panel



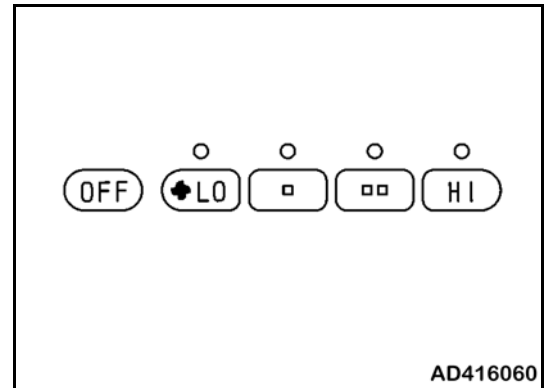
1. Fan switch
2. Air conditioner switch
3. Mode selector switch
4. FRESH/RECIRC selector switch
5. Temperature control switch
6. Temperature level indicator lamp

OPTIONS, ATTACHMENTS

Fan Switch

The fan switch (1) is used to adjust the airflow in four stages. It also acts as the main switch for the air conditioner.

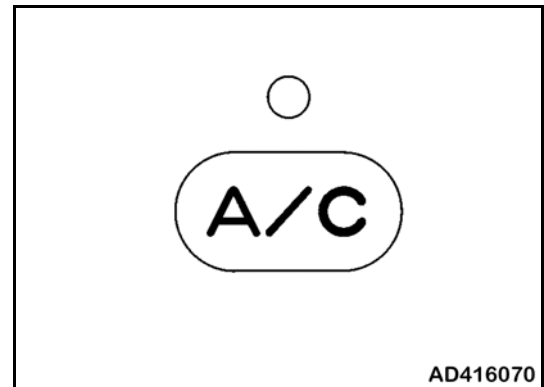
- When the OFF switch is pressed, the fan stops.
- When the switch is pressed, the indicator lamp above the switch lights up to display the airflow.



Air Conditioner Switch

The air conditioner switch (2) 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.

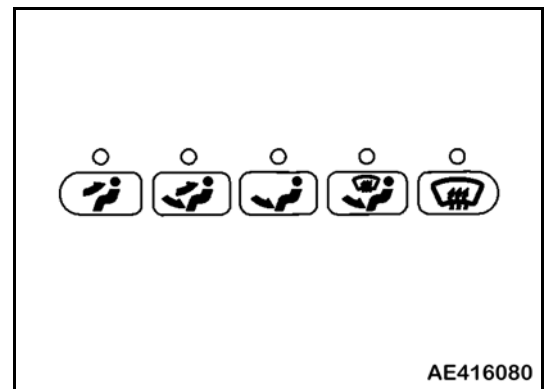


Mode Selector Switch

The mode selector switch (3) is used to select the vents.

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

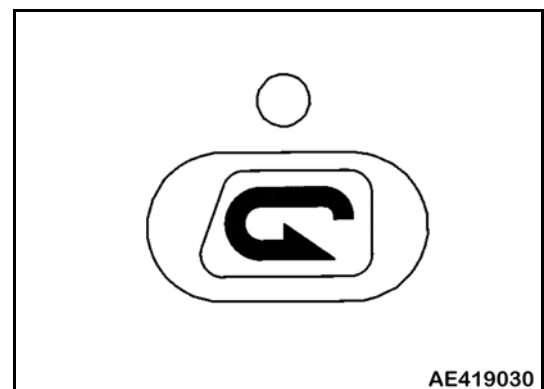
When the switch is pressed, the indicator lamp above the switch lights up and displays the vent mode.



FRESH/RECIRC Selector Switch

The FRESH/RECIRC switch (4) is used to select between recirculating air inside the cab or taking in fresh air from outside.

- When the RECIRC position is selected, the indicator lamp above the switch lights up.
- When the switch is pressed again, the indicator lamp goes out and fresh air is taken in.



Temperature Control Switch

The temperature control switch (5) is used to adjust the air temperature. Press and hold the UP or DOWN button to make the adjustment.

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

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.

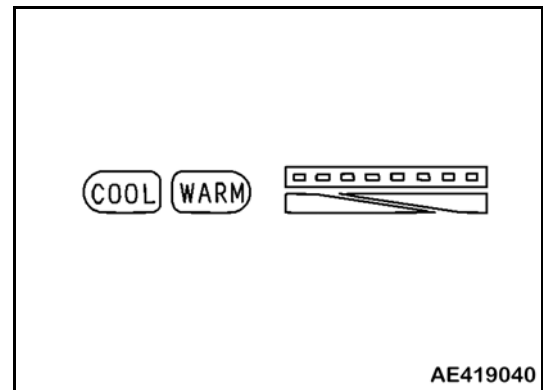
The settings for each mode are retained in memory even when the starting switch is turned OFF. However, in the following cases, the settings must be reset.

- When the machine has been out of use for more than seven 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).

Remark

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

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



OPTIONS, ATTACHMENTS

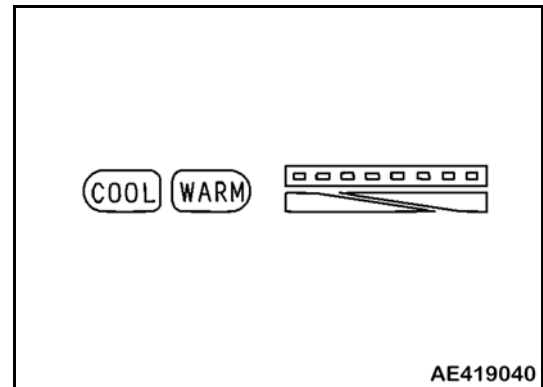
Method of Operation

Switch Condition of Use		Fan Switch	Air Conditioner Switch	Temperature Control Switch	FRESH/RECIRC Selector Switch	Mode Selector Switch
Cooling	Rapid	HI	ON	All blue	RECIRC	FACE
	Normal	HI - LO	ON	More than half are blue	FRESH	FACE
Dehumidifying, heating		HI - LO	ON	More than half are red	FRESH	FOOT
Heating	Rapid	HI	OFF	All red	RECIRC	FOOT
	Normal	HI - LO	OFF	More than half are red	FRESH	FOOT
Defroster		HI	ON	More than half are red	FRESH	DEF
Ventilation or pressurizing		HI - LO	OFF	All blue	FRESH	FACE

- When defrosting, set the temperature control switch so that all lamps are red. This will improve defrosting and demisting.
- Set the vent mode selector switch to the intermediate position to give the desired condition.
- With the FACE vents, it is possible to adjust the direction of the air flow and to turn it on or off.

Remark

Do not set to the FACE mode with the vents closed.



When Not Using the Air Conditioner Regularly

To prevent leakage of the refrigerant from the air conditioner cooling circuit, operate the air conditioner for several minutes two or three times a month during the off-season. If the air conditioner is left for a long time when the refrigerant is leaking, it may cause internal rust.

Run the air conditioner in cooling or dehumidification plus heating mode for several minutes from time to time to prevent the loss of the oil film in various parts of the compressor.

If the temperature inside the cab is low, the air conditioner may not work. In such cases, use the recirculated air to warm up the inside of the cab, then turn the air conditioner switch on. The air conditioner will run.

Precautions When Using Air Conditioner

- To prevent any excessive load on the engine or compressor, use the air conditioner only when the engine is running.
- If the machine is used in places where there is dust or a bad odor, recirculate the air inside the cab when using the air conditioner.

Remark

If water gets into the control panel, it may lead to unexpected failure. Be careful not to let water get on this part. In addition, never bring any flame near the control panel.

Ventilate from Time to Time when Cooling

- When turning the cooling on, if the temperature inside the cab is high, open the doors and windows to bring in fresh air before starting the air conditioner.
- If you smoke when using the cooling, your eyes may sting. If this happens, switch temporarily to cooling and ventilation to remove the smoke.
- When using the air conditioner for a long time, carry out ventilation and cooling once every hour.

Do Not Make Temperature in Cab Too Low

- For reasons of health, the optimum setting for cooling is considered to be when it feels slightly cool (5 or 6°C (9 or 10.8°F) lower than the ambient temperature) when you enter the cab. Do not make the temperature inside the cab too low or direct the air flow directly onto your skin.
- Be extremely careful to select the appropriate temperature.

Inspection and Maintenance

To prevent loss of the oil film at various parts of the compressor when the air conditioner is not being used, run the compressor at low speed for several minutes once a week. (Run the engine at low speed and set the temperature to a medium temperature.)

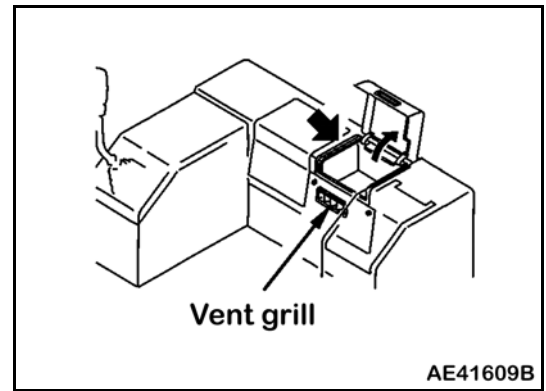
For information about cleaning the air filter and inspecting the refrigerant, see “Check Air Conditioner” on page 3-38, “Clean Element in Air Conditioner Fresh Air Filter” on page 3-44, and “Clean Element in Air Conditioner Recirculation Filter” on page 3-50.

To enable the air conditioner to perform to the fullest and maintain a pleasant working environment, always contact your Komatsu distributor to have the air conditioner refilled with refrigerant and carry out other checks.

OPTIONS, ATTACHMENTS

Cool Box

- When the cooling is being used, this function can be used for keeping drinks and other things cool.
- When the heating is being used, it can be used to keep things warm.
- When using the box, open the vent grill.
- When not using the box, close the grill.
- Do not use the cool box for things which smell, leak water, or break easily.
- Do not use it as a holder for tools or other small objects.



BRAKE COOLING SYSTEM

An air-cooled oil cooler may be installed to improve the cooling efficiency for the brake cooling oil (axle oil).

For machines equipped with the brake cooling system, carry out the following inspection and maintenance.

When Required

Check Axle Oil Level, Add Oil

⚠ WARNING

- When checking the oil, apply the parking brake and lock the front and rear frames with the safety bar.
- The parts and oil are at high temperature immediately after the engine is stopped and may cause burns. Wait for the temperature to go down before starting the work.
- When the plug is removed, oil may spurt out. Turn the plug slowly to release the internal pressure and then remove the plug carefully.

Carry out the following inspection if there are any signs of oil leakage from the axle case or brake cooling circuit.

- ★ Park the machine on a horizontal surface. If the road surface is at an angle, the oil level cannot be checked correctly.

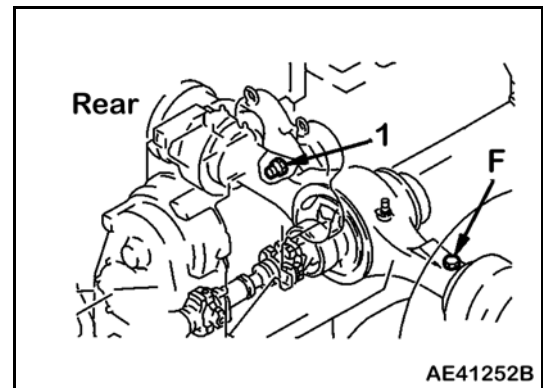
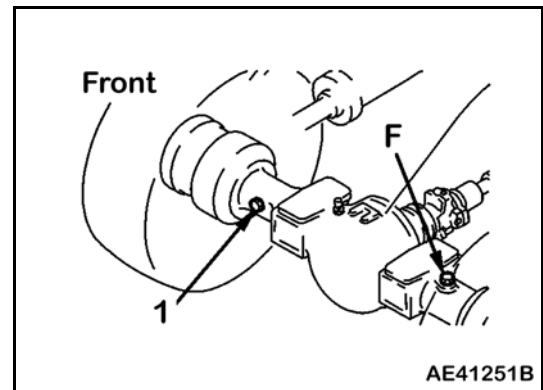
Required

- Container to catch oil.

Refill capacity: 78 liters (20.6 US gallons)

1. Start the engine and run at low idling for at least five minutes to circulate the oil in the brake cooling circuit.
2. Stop the engine and wait for the oil temperature to go down.
3. Remove oil level plug (1).
4. Check that the oil level is at the bottom edge of the plug hole when the engine is running at low idling.
 - If the oil is not near the bottom of the plug hole, add axle oil through the plug hole (F).
 - If the oil level is correct, install plug (1).

Tightening torque: 152 ±24.5 N•m (112.1 ±1.8 lb ft)



OPTIONS, ATTACHMENTS

Clean Axle Case Breather

⚠ WARNING

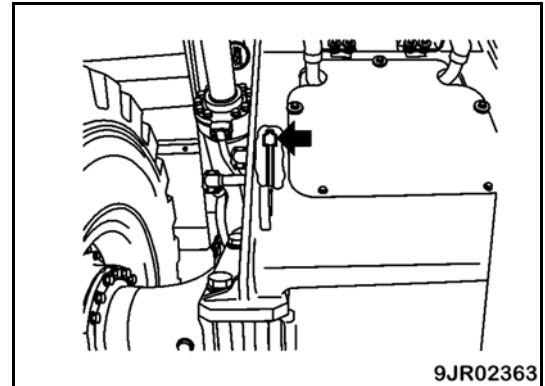
When checking the oil, apply the parking brake and lock the front and rear frames with the safety bar.

1. Park the machine on a horizontal surface.
2. Stop the engine.
3. Use a brush to remove all mud and dirt from around the breather.
4. Remove the breather.

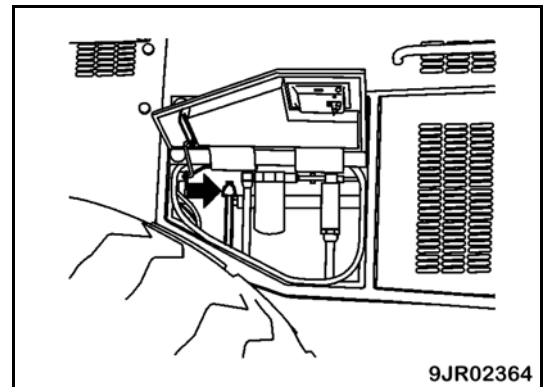
Remark

After removing the breather, be careful to prevent dirt or dust from entering the mount.

5. Soak the breather in cleaning fluid and clean it.
 - ★ Clean the breather at two places (front and rear).
6. Install the breather.



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Clean Brake Cooling Oil Cooler Fins

⚠ WARNING

- Never open the engine side cover when the engine is running. Stop the engine completely before starting the cleaning operation.
- If compressed air, pressurized water, or steam hits your body directly or causes dirt to fly, there is danger of personal injury.
- Always wear safety glasses, dust mask, or other protective equipment.

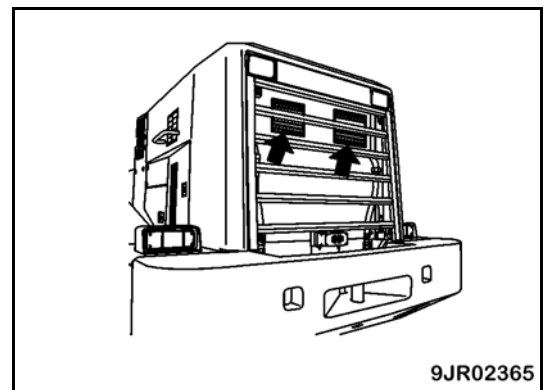
- ★ Clean the radiator fins if any mud or dirt is stuck to the radiator or oil cooler.

Use compressed air to blow out mud, dirt, or leaves clogging the oil cooler fins.

- ★ Steam or water can be used instead of compressed air.
- ★ The guideline for the spray pressure is 4 MPa (568 psi). With a nozzle (3) diameter of 2 mm (0.1 in), keep the nozzle at least 100 mm (3.9 in) away from the fins.

Remark

If the steam jet nozzle is brought too close to the fins, it may damage the fins. Keep the nozzle a suitable distance away from the fins when cleaning them.



9JR02365

Every 2000 Hours Service

Replace Axle Oil and Brake Cooling Oil Filter Cartridge

WARNING

- The parts and oil are at high temperature immediately after the engine is stopped and may cause serious burns. Wait for the temperature to go down before starting the work.
- When removing the plug, oil may spurt out. Turn the plug slowly to release the internal pressure, then remove it carefully.

Remark

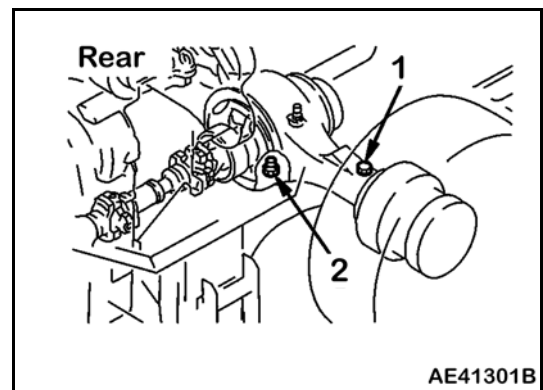
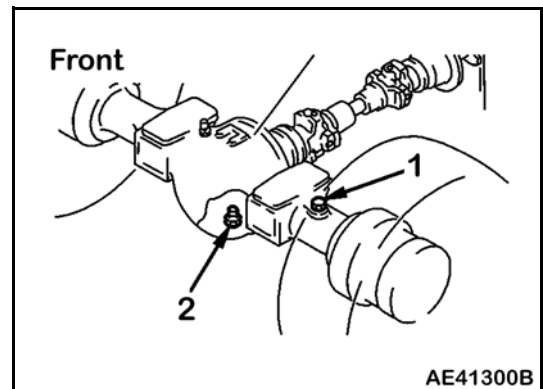
For operations where the brake is used frequently, change the axle oil at shorter intervals.

Required

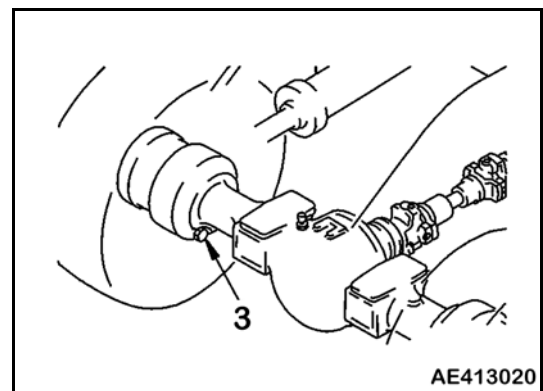
- Filter wrench
- Container to catch the oil

Refill capacity (front and rear, each): 78 liters (20.6 US gal)

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

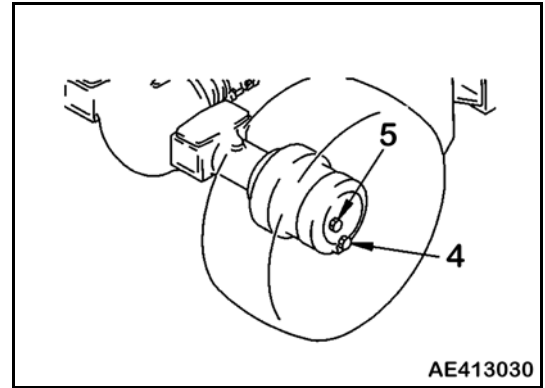


2. Remove drain plug (3) to drain the oil.

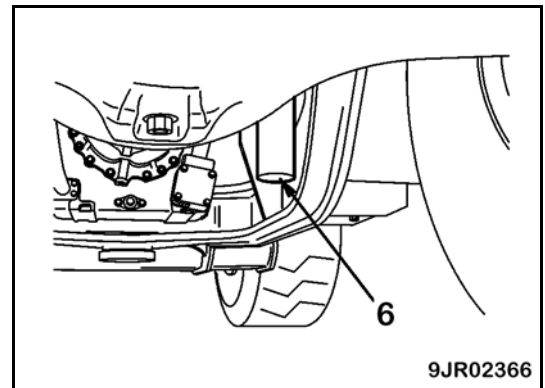


OPTIONS, ATTACHMENTS

3. Stop the machine so that drain plug (4) of the final drive is at the bottom. Remove oil filler plug (5) and drain plug (4), and drain the oil.
4. After draining the oil, clean drain plugs (2), (3), and (4), then install them.



5. Using a filter wrench, turn brake cooling oil filter cartridge (6) on the inside of the frame to the left to remove it.



6. Open engine side cover (7) on the left side of the machine. Using a filter wrench, turn brake cooling oil filter cartridge (8) to the left to remove it.
7. Clean the filter holder, then tighten the new filter cartridge fully by hand.

Filter cartridge part No: 425-S05-2700
 Qty: 2

8. Add oil to the specified level through the oil filler ports (1) and (5) of the axle housing and left and right final drives.
9. After adding the oil, check that the oil is at the specified level. For details, see "Check Axle Oil Level, Add Oil" on page 5-53.

