

Operation & Maintenance Manual

EEAM020802

D155AX-5

BULLDOZER

SERIAL NUMBER

D155AX - 75001 and up



WARNING

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

KOMATSU

FOREWORD

FOREWORD

This manual provides rules and guidelines which will help you use this machine safely and effectively. The precautions in this manual must be followed at all times when performing operation and maintenance. Most accidents are caused by the failure to follow fundamental safety rules for the operation and maintenance of machines. Accidents can be prevented by knowing beforehand conditions that may cause hazard when performing operation and maintenance.

WARNING

Operators and maintenance personnel must always do as follows before beginning operation or maintenance.

- **Always be sure to read and understand this manual thoroughly before performing operation and maintenance.**
- **This machine complies with EC directive (89/392/EEC). Machines complying with this directive display the CE mark**
- **Read the safety messages given in this manual and the safety labels affixed to the machine thoroughly and be sure that you understand them fully.**

Keep this manual at the storage location for the Operation and Maintenance Manual given below, and have all personnel read it periodically.

If this manual has been lost or has become dirty and cannot be read, request a replacement manual immediately from Komatsu or your Komatsu distributor.

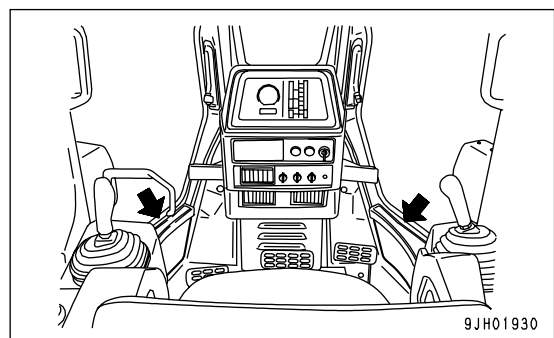
If you sell the machine, be sure to give this manual to the new owners together with the machine.

Komatsu delivers machines that comply with all applicable regulations and standards of the country to which it has been shipped. If this machine has been purchased in another country or purchased from someone in another country, it may lack certain safety devices and specifications that are necessary for use in your country. If there is any question about whether your product complies with the applicable standards and regulations of your country, consult Komatsu or your Komatsu distributor before operating the machine.

Storage location for the Operation and Maintenance Manual:

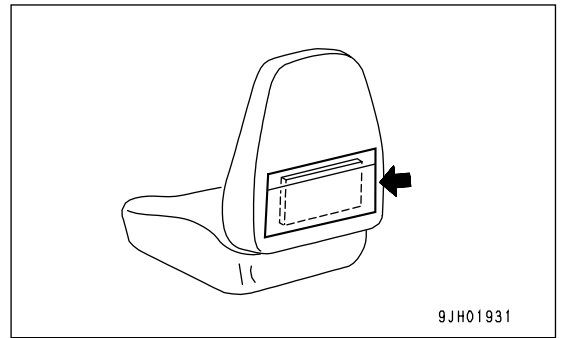
Machine equipped with cab

Inside of right and left doors



Machine without cab

Back pocket of operator's seat



9JH01931

SAFETY INFORMATION

To enable you to use this machine safely, safety precautions and labels are given in this manual and affixed to the machine to give explanations of situations involving potential hazards and of the methods of avoiding such situations.

Signal words

The following signal words are used to inform you that there is a potential hazardous situation that may lead to personal injury or damage.

In this manual and on machine labels, the following signal words are used to express the potential level of hazard.

DANGER

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.

WARNING

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

CAUTION

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.

Example of safety message using signal word

WARNING

To avoid hitting unlocked operation levers, lower equipment to ground and move SAFETY LOCK LEVER (located near seat) to LOCK position before starting up from operator's seat.
Sudden and unwanted machine movement can cause serious injury or death.

Other signal words

In addition to the above, the following signal words are used to indicate precautions that should be followed to protect the machine or to give information that is useful to know.

NOTICE

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

REMARKS

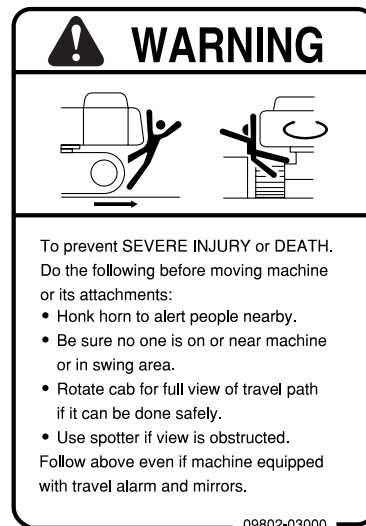
This gives information that is useful to know.

Safety labels

Safety labels are affixed to the machine to inform the operator or maintenance worker on the spot when carrying out operation or maintenance of the machine that may involve hazard.

This machine uses "Safety labels using words" and "Safety labels using pictograms" to indicate safety procedures.

Example of safety label using words



Part No.

Safety labels using pictogram

Safety pictograms use a picture to express a level of hazardous condition equivalent to the signal word. These safety pictograms use pictures in order to let the operator or maintenance worker understand the level and type of hazardous condition at all times. Safety pictograms show the type of hazardous condition at the top or left side, and the method of avoiding the hazardous condition at the bottom or right side. In addition, the type of hazardous condition is displayed inside a triangle and the method of avoiding the hazardous condition is shown inside a circle.



Part No.

Komatsu cannot predict every circumstance that might involve a potential hazard in operation and maintenance. Therefore, the safety messages in this manual and on the machine may not include all possible safety precautions. If any procedures or actions not specifically recommended or allowed in this manual are used, it is your responsibility to take the necessary steps to ensure safety.

In no event should you engage in prohibited uses or actions described in this manual.

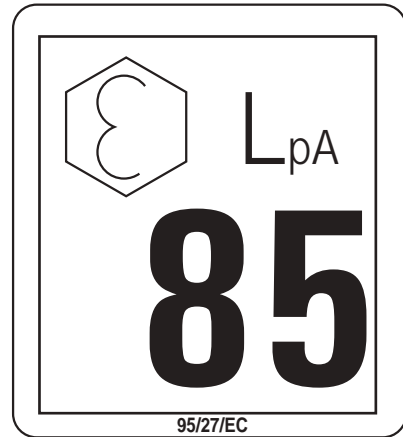
The explanations, values, and illustrations in this manual were prepared based on the latest information available at that time. Continuing improvements in the design of this machine can lead to changes in detail which may not be reflected in this manual. Consult Komatsu or your Komatsu distributor for the latest available information of your machine or for questions regarding information in this manual.

The numbers in circles in the illustrations correspond to the numbers in () in the text. (For example: ① → (1))

NOISE

Valid until 31 December 2001

Operator ears noise value (Sound pressure level)

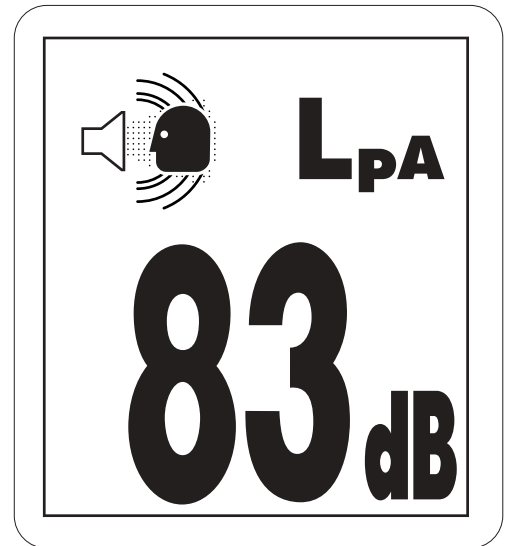


Ambiant noise value (Sound power level)

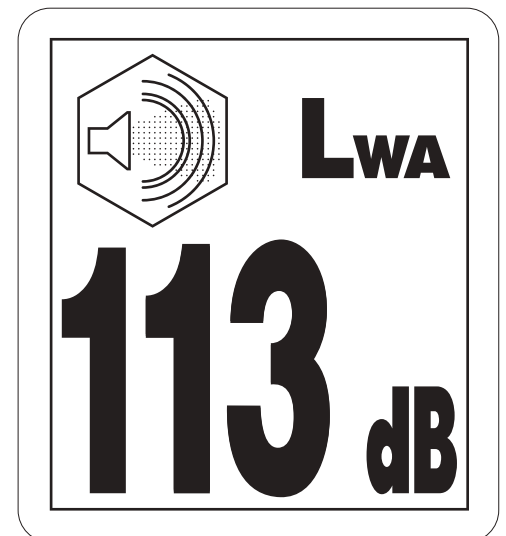


Valid as of 1 January 2002

- Sound pressure level at the operator's station, measured according to ISO6396 (Dynamic test method, simulated working cycle)



- Sound power level emitted. This is the guaranteed value as specified in European directive 2000/14/EC.

**VIBRATION**

When used for its intended purpose, levels of vibration for the earthworking machine transmitted from the operator's seat are lower or equal to the test vibrations for the relative machinery class in compliance with ISO 7096. The actual acceleration value of the upper limbs is less than 2.5 m/s². The actual acceleration value for the body is less than 1.25 m/s². These values were determined using a representative machine and with the help of the measurement procedures that are defined in the directives ISO 2631/1 and ISO 5349.

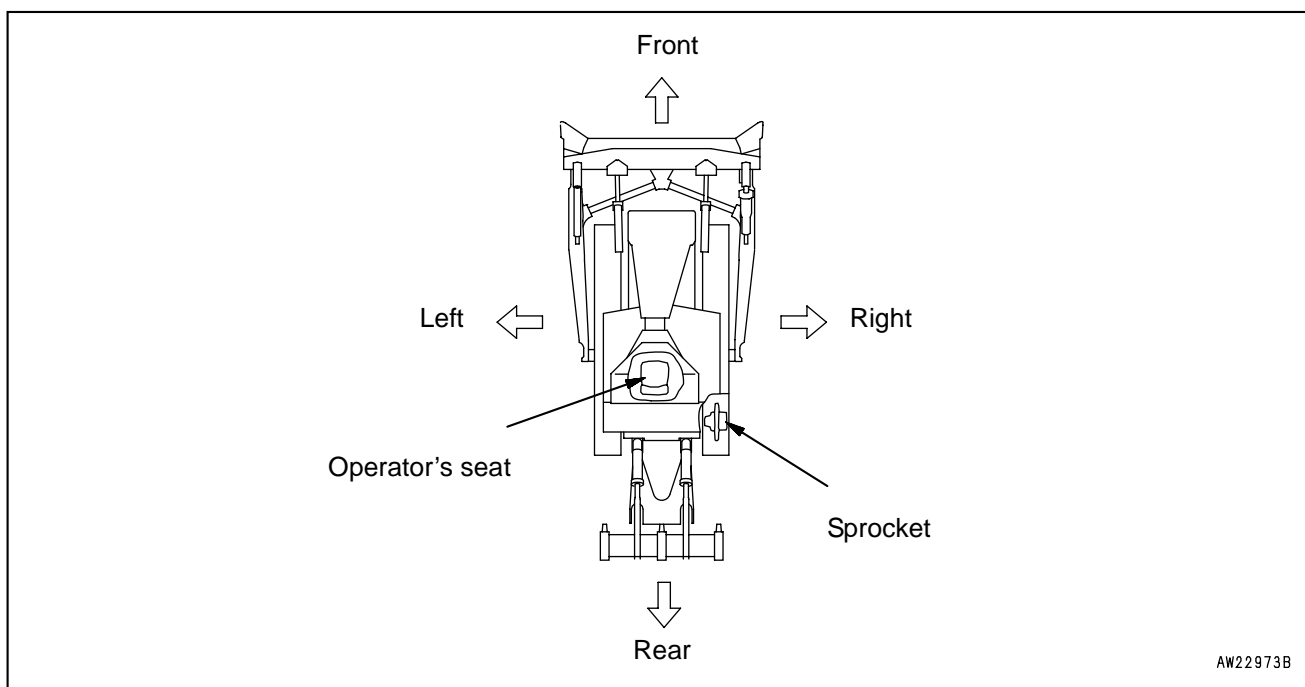
INTRODUCTION

This Komatsu machine is designed to be used mainly for the following works:

- Dozing
- Smoothing
- Cutting into hard or frozen ground or ditching.
- Felling trees, removing stumps

See the section "WORK POSSIBLE USING BULLDOZER (PAGE 3-107)" for further details.

FRONT/REAR, LEFT/RIGHT DIRECTIONS OF MACHINE



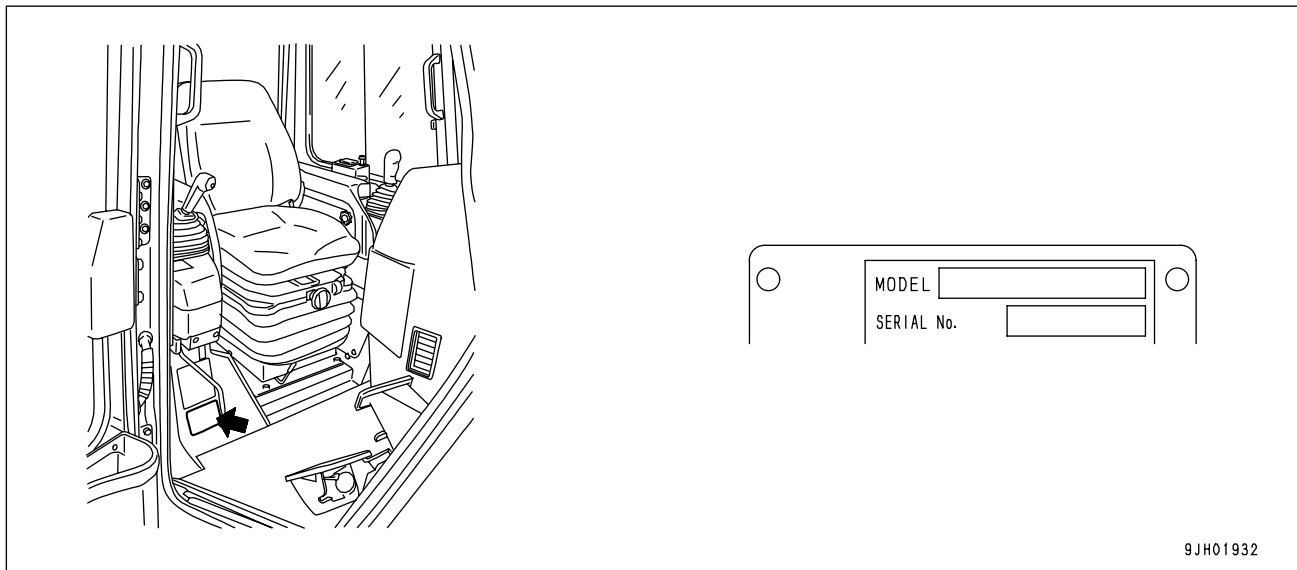
In this manual, the terms front, rear, left, and right refer to the travel direction as seen from the operator's cab when the operator's cab is facing the front and the sprocket is at the rear of the machine.

NECESSARY INFORMATION

When requesting service or ordering replacement parts, please inform your Komatsu distributor of the following items.

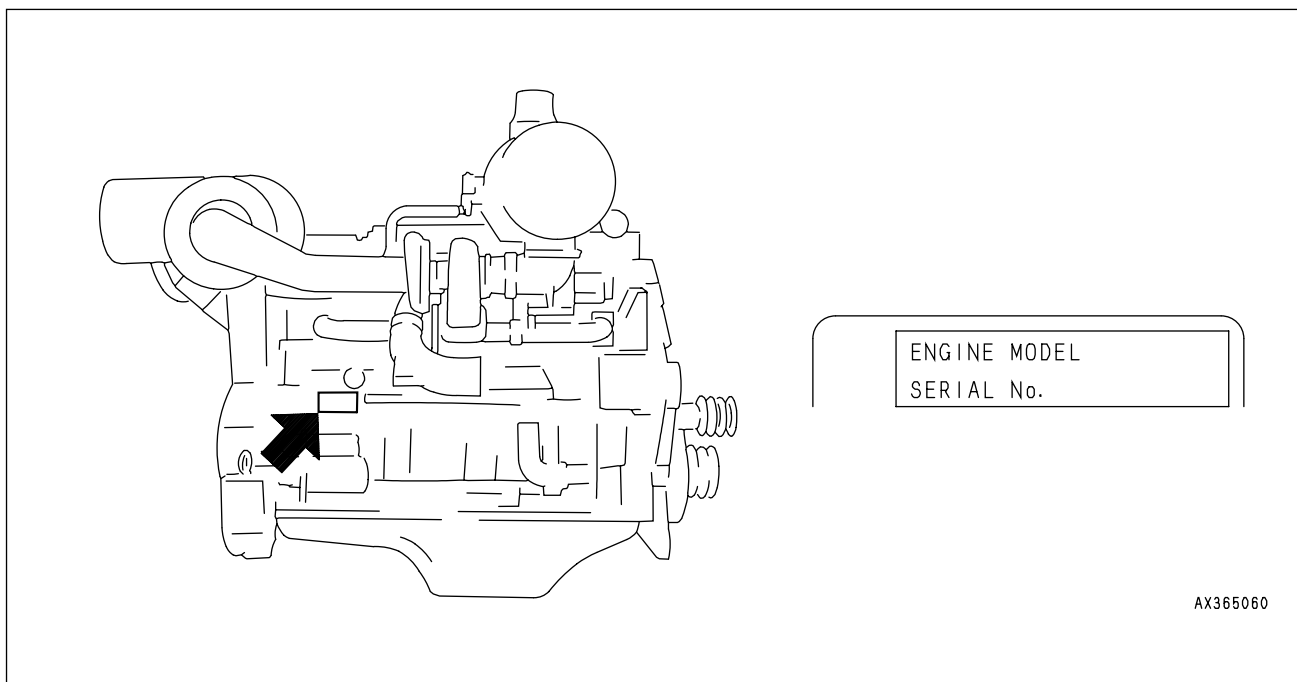
MACHINE SERIAL NO. PLATE AND POSITION

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



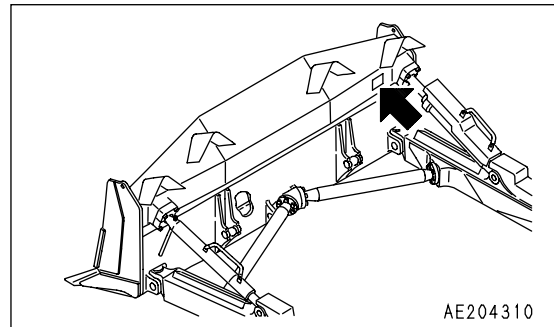
ENGINE SERIAL NO. PLATE AND POSITION

On the upper of the engine starting motor on the right side of the machine.



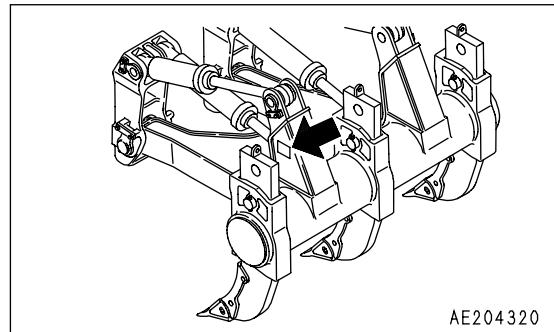
BLADE SERIAL NO. PLATE POSITION

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



RIPPER SERIAL NO. PLATE POSITION

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



POSITION OF SERVICE METER

This is at the left upper part of the monitor panel.

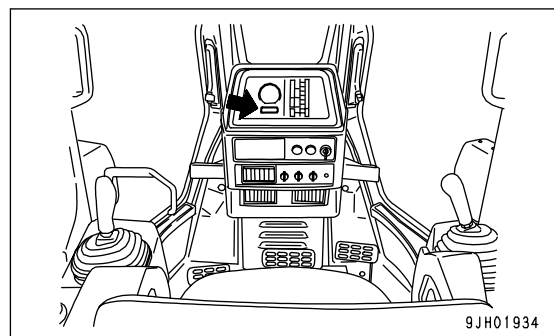


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Engine serial No.	
Distributor name	
Address	----- ----- -----
Service Personal	-----
Phone/Fax	-----

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SAFETY

WARNING

Please read and make sure that you fully understand the precautions described in this manual and the safety labels on the machine. When operating or servicing the machine, always follow these precautions strictly.

SAFETY

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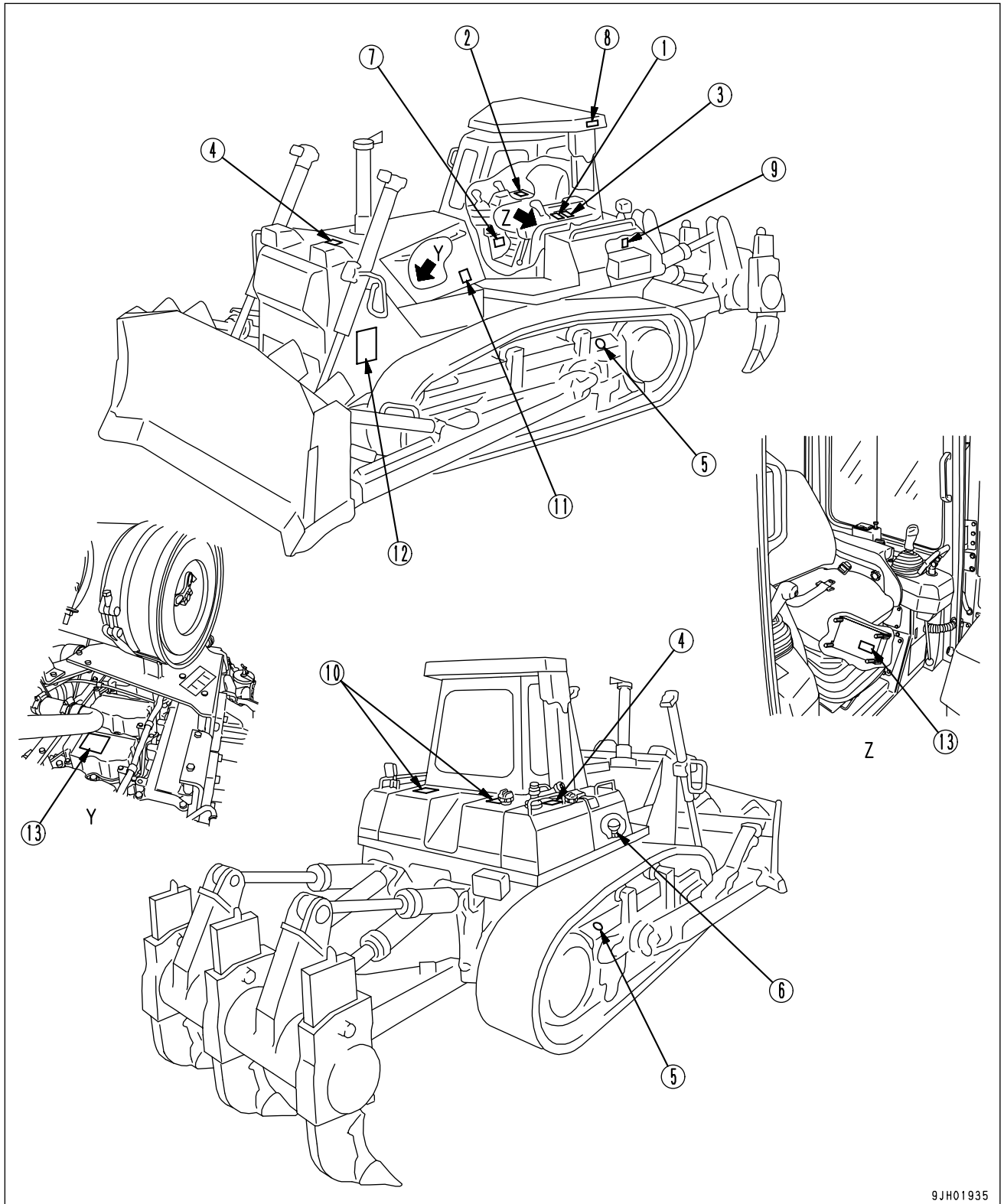
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SAFETY LABELS

The following warning signs and safety labels are used on this machine.

- Be sure that you fully understand the correct position and content of labels.
- To ensure that the content of labels can be read properly. Be sure that they are in the correct place and always keep them clean. When cleaning them, do not use organic solvents or gasoline, there may cause the labels to peel off.
- There are also other labels in addition to the warning signs and safety labels. Handle those labels in the same way.
- If the labels are damaged, lost, or cannot be read properly, replace them with new ones. For details of the part numbers for the labels, see this manual or the actual label, and place an order with Komatsu distributor.

POSITIONS OF SAFETY PICTOGRAMS



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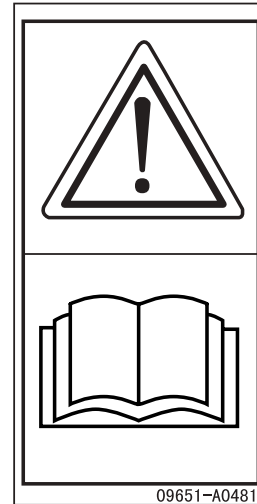
SAFETY LABELS

1. Precautions before starting, inspection and maintenance (09651-A0481)

Improper operation and maintenance can cause serious injury or death.

Read the operation and maintenance manual before operating, maintaining, carrying out disassembly, assembly or transportation of this machine.

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



2. Precautions when traveling in reverse (09802-B0750°)



3. Precautions for leaving the operator's seat (09654-B0481)

To avoid hitting unlocked operation levers, before standing up from operator's seat, do the followings:

Move steering and directional lever to neutral and move SAFETY LOCK LEVER (located left of the seat) to Lock position.

Lower equipment to ground and move SAFETY LOCK LEVER (located right of seat) to LOCK position.

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



4. Precautions for high-temperature hydraulic oil (09653-A0481)

Never remove the cap when the engine is at operating (High) temperature. Stream or high temperature oil blowing up from the radiator or hydraulic tank, will cause personal injury and or burns.

Never remove the cap when the engine is at operating (High) temperature. Stream or high temperature oil blowing up from the radiator or hydraulic tank, will cause personal injury and or burns.

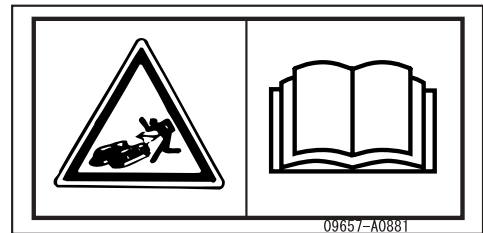


5. Precautions for check and adjust track tension (09657-A0881)

Safety label is attached on the back side of the inspection cover of the track frame

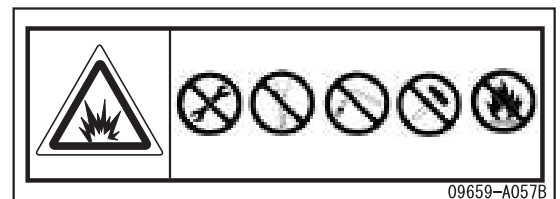
Sign indicates a hazard of flying plug from track adjuster that could cause injury.

Read manual and adjusting track for safe and proper handling.



6. Precautions for handling accumulator (09659-A057B)

Sign indicates : Never drill, cut with gas, hit or disassemble. Also, keep open flame away . Explosion hazard.



7. Precaution for use of seat belt (195-98-12940)

- ALWAYS USE SEAT BELT WHEN OPERATING MACHINE
- ALWAYS CHECK CONDITION OF THE SEAT BELT, THE CONNECTING BRACKETS AND THE TIGHTENING BOLTS
- ADJUST SEAT TO ALLOW FULL BREAK PEDAL WITH OPERATOR'S BACK AGAINST SEAT BACK.
- AFTER ADJUSTING THE HEIGHT, FORE AND AFT POSITION OF THE SEAT, TIGHTEN THE TETHER BELT BEFORE SITTING IN THE SEAT.

CAUTION

- ALWAYS USE SEAT BELT WHEN OPERATING MACHINE.
- ALWAYS CHECK CONDITION OF THE SEAT BELT, THE CONNECTING BRACKETS AND THE TIGHTENING BOLTS.
- ADJUST SEAT TO ALLOW FULL BREAK PEDAL TRAVEL WITH OPERATOR'S BACK AGAINST SEAT BACK.
- AFTER ADJUSTING THE HEIGHT, FORE AND AFT POSITION OF THE SEAT, TIGHTEN THE TETHER BELT BEFORE SITTING IN THE SEAT.

195-98-12940

8. Warning for ROPS (09620-30200)

ROLL-OVER PROTECTIVE STRUCTURE (ROPS)
 THE ROLL-OVER PROTECTIVE STRUCTURE OF THIS MACHINE COMPLIES WITH THE FOLLOWING STANDARDS OR (RECOMMENDED PRACTICES)
 INTERNATIONAL STANDARD: ISO 3471 (ROPS) & ISO 3449 (FOPS)
 AMERICAN STANDARD: SAE J & SAE J

KOMATSU

MODEL MACHINE MODEL SERIAL NO. MAX MASS

WARNING

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

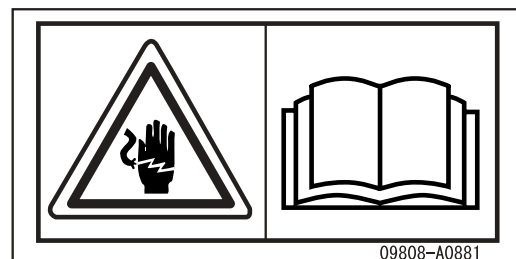
Komatsu Ltd. Japan 2-3-6 Akasaka, Mimato-ku, Tokyo, Japan 09620-30200

9. Precautions for handling electric wires (09808-A0881)

There is the hazard to electric shock when handling electric wires.

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

Read the operation and maintenance manual and carrying out the correct method when handling.



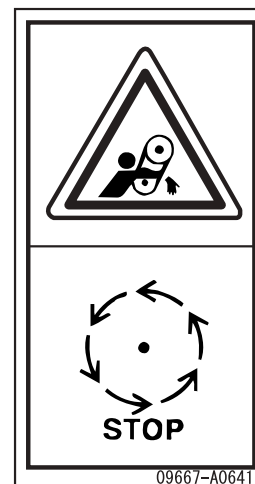
10. Precaution for avoiding falling down (09805-C0881)

- Sign indicates a hazard of falling
- Do not stand on this place here



11. Caution for engine running (09667-A0641)

- There is the hazard of being caught in the rotating parts of the machine causing injury.
- Stop the rotating parts of the machine completely when carrying out inspection and maintenance.

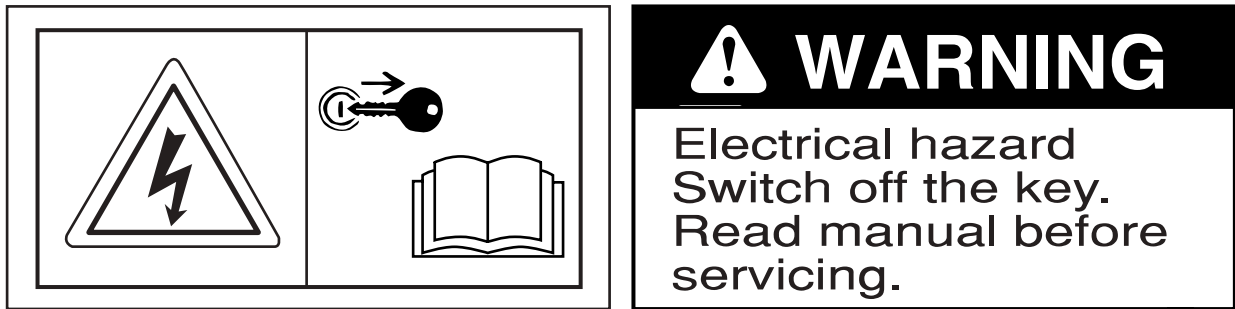


12. Caution for approach when machine moving (09806-B1201)

- Sign indicates a hazard of being run over by moving equipment.
- Keep a safe distance from equipment when it is moving



13. Precaution for high voltage (7872-10-1600)



There is a danger of electrocution.

Turn the starting switch OFF before starting inspection or repairs, and read the operation and maintenance manual

WARNING

Electrical hazard. switch off the key. Read manual before servicing.

GENERAL PRECAUTIONS

SAFETY RULES

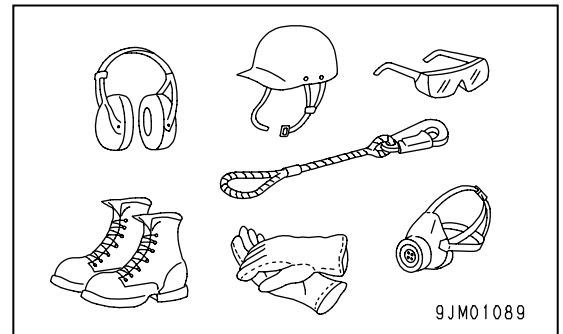
- Only trained and authorized personnel can operate and maintain the machine.
- Follow all safety rules, precautions and instructions when operating or performing maintenance on the machine.
- If you are under the influence of alcohol or medication, your ability to safely operate or repair your machine may be severely impaired putting yourself and everyone else on your jobsite in danger.
- When working with another operator or with a person on worksite traffic duty, be sure that all personnel understand all hand signals that are to be used.

IF ABNORMALITIES ARE FOUND

If you find any abnormality in the machine during operation or maintenance (noise, vibration, smell, incorrect gauges, smoke, oil leakage, etc., or any abnormal display on the warning devices or monitor), report to the person in charge and have the necessary action taken. Do not operate the machine until the abnormality has been corrected.

CLOTHING AND PERSONAL PROTECTIVE ITEMS

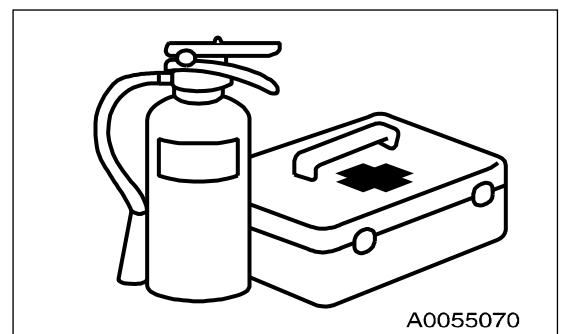
- Do not wear loose clothing and accessories. There is a hazard that they may catch on control levers or other protruding parts.
- If you have long hair and it hangs out from your hard hat, there is a hazard that it may get caught up in the machine, so tie your hair up and be careful not to let it get caught.
- Always wear a hard hat and safety shoes. If the nature of the work requires it, wear safety glasses, mask, gloves, ear plugs, and safety belt when operating or maintaining the machine.
- Check that all protective equipment functions properly before using it.



FIRE EXTINGUISHER AND FIRST AID KIT

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

- Be sure that fire extinguishers have been provided and read the labels to ensure that you know how to use them in emergencies.
- Carry out periodic inspection and maintenance to ensure that the fire extinguisher can always be used.
- Provide a first aid kit at the storage point. Carry out periodic checks and add to the contents if necessary.

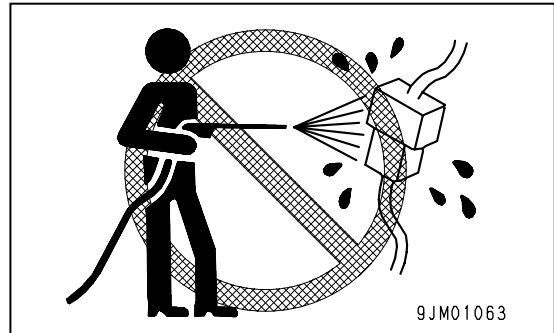


SAFETY FEATURES

- Be sure that all guards and covers are in their proper position. Have guards and covers repaired immediately if they are damaged.
- Understand the method of use of safety features and use them properly.
- Never remove any safety features. Always keep them in good operating condition.

KEEP MACHINE CLEAN

- If water gets into the electrical system, there is a hazard that it will cause malfunctions or misoperation. Do not use water or steam to wash the electrical system (sensors, connectors).
- If inspection and maintenance is carried out when the machine is still dirty with mud or oil, there is a hazard that you will slip and fall, or that dirt or mud will get into your eyes. Always keep the machine clean.

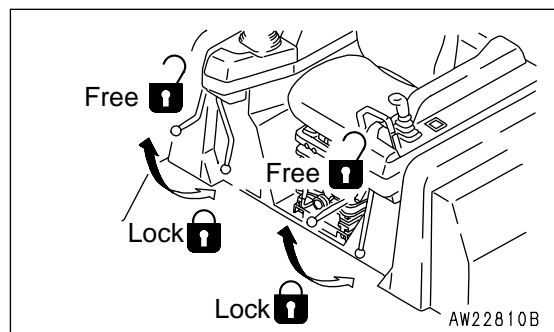


INSIDE OPERATOR'S COMPARTMENT

- When entering the operator's compartment, always remove all mud and oil from the soles of your shoes. If you operate the pedal with mud or oil affixed to your shoes, your foot may slip and this may cause a serious accident.
- Do not leave parts or tools lying around the operator's compartment.
- Do not stick suction pads to the window glass. Suction pads act as a lens and may cause fire.
- Do not use cellular telephones inside the operator's compartment when driving or operating the machine.
- Never bring any dangerous objects such as flammable or explosive items into the operator's cab.

ALWAYS APPLY LOCK WHEN LEAVING OPERATOR'S SEAT

- Before standing up from the operator's seat (such as when adjusting the operator's seat), lower the work equipment completely to the ground, set safety lock lever and brake lock lever securely to the LOCK position, then stop the engine. If you accidentally touch the levers when they are not locked, there is a hazard that the machine may suddenly move and cause serious injury or property damage.

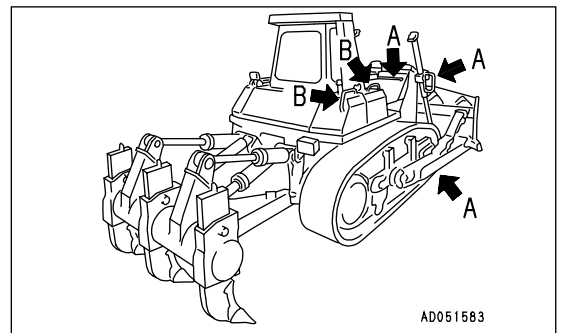
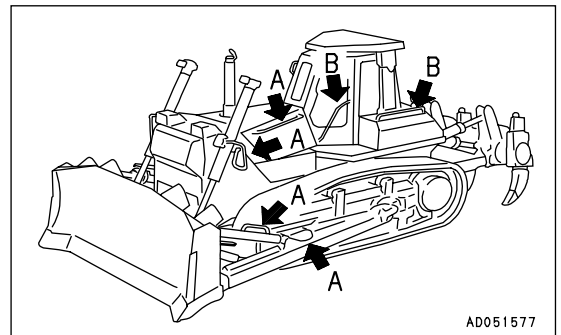


- When leaving the machine, always lower the work equipment completely to the ground, set safety lock lever and brake lock lever securely to the LOCK position, then stop the engine. Use the key to lock all the equipment. Always remove the key, take it with you, and keep it in the specified place.

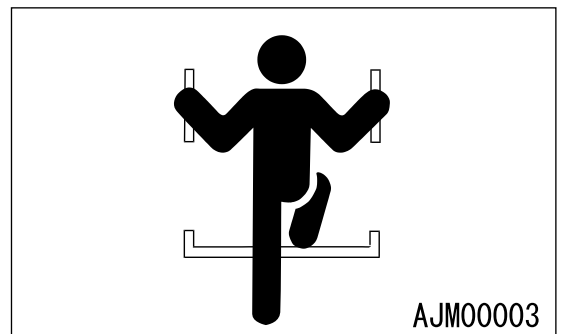
HANDRAILS AND STEPS

To prevent personal injury caused by slipping or falling off the machine, always do as follows.

- Use the parts marked by arrow A in the diagram below when getting on or off machine. Never use the parts marked by arrow B when getting on or off the machine. Use them only when moving along the top of the track or when checking or carrying out maintenance inside the side cover, or when filling the tank with oil.
- Never hold any control levers or lock levers when getting on or off the machine.



- To ensure safety, always face the machine and maintain three-point contact (both feet and one hand, or both hands and one foot) with the handrails and steps (including the track shoe) to ensure that you support yourself.
- Do not grip the control levers when getting on or off the machine.
- Never climb on the engine hood or covers where there are no non-slip pads.



- Before getting on or off the machine, check the handrails and steps (including the track shoe). If there is any oil, grease, or mud on the handrails or steps (including the track shoe), wipe it off immediately. Always keep these parts clean. Repair any damage and tighten any loose bolts.
- Do not get on or off the machine while holding tools in your hand.

MOUNTING AND DISMOUNTING

- Never jump on or off the machine. Never get on or off a moving machine.
- If the machine starts to move when there is no operator on the machine, do not jump on to the machine and try to stop it.

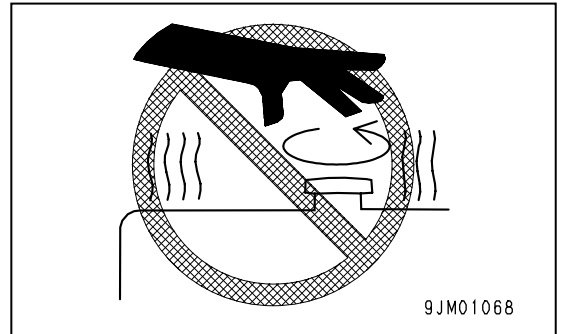
NO PEOPLE ON ATTACHMENTS

Never let anyone ride on the attachments. There is a hazard of falling and suffering serious injury.

PREVENTION OF BURNS

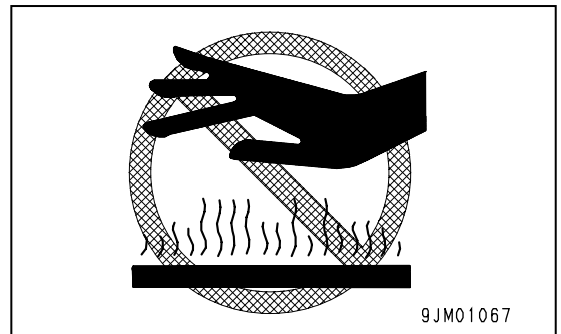
Hot coolant

- To prevent burns from hot water or steam spurting out when checking or draining the coolant, wait for the water to cool to a temperature where it is possible to touch the radiator cap by hand before starting the operation. Even when the coolant has cooled down, loosen the cap slowly to relieve the pressure inside the radiator before removing the cap.



Hot oil

- To prevent burns from hot oil or other parts when checking or draining the oil, wait for the oil to cool to a temperature where it is possible to touch the cap by hand before starting the operation. Even when the oil has cooled down, loosen the plug slowly to relieve the internal pressure before removing the plug.

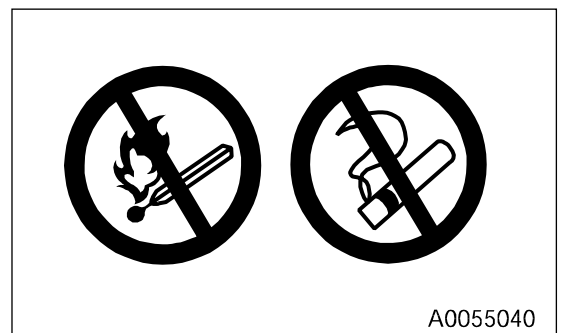


FIRE PREVENTION

● Fire caused by fuel or oil

Fuel, oil, antifreeze, and window washer liquid are particularly flammable and can be hazardous. To prevent fire, always observe the following:

- 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.
- 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, so 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, chips, pieces of paper, dust, or any other flammable materials accumulated or affixed around the engine, exhaust manifold, muffler, or battery, or inside the undercovers.
- **Fire coming from electric wiring**

Short circuits in the electrical system can cause fire.

 - Always keep electric wiring connections clean and securely tightened.
 - Check the wiring every day for looseness or damage. Tighten any loose connectors or wiring clamps. Repair or replace any damaged wiring.
- **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 lead to damage to the hoses, and cause high-pressure oil to spurt out, leading to fire damage or serious injury.
- **Explosion caused by lighting equipment**
 - When checking fuel, oil, battery electrolyte, window washer fluid, or coolant, use explosion-proof lighting. If you do not use explosion-proof lighting, there is a hazard of serious injury or damage caused by explosion.
 - When taking the electrical power for the lighting from the machine, follow the instructions in this manual.

ACTION IF FIRE OCCURS

If a fire occurs, escape from the machine as follows.

- Turn the starting switch OFF and stop the engine.
- Use the handrails and steps to get off the machine.

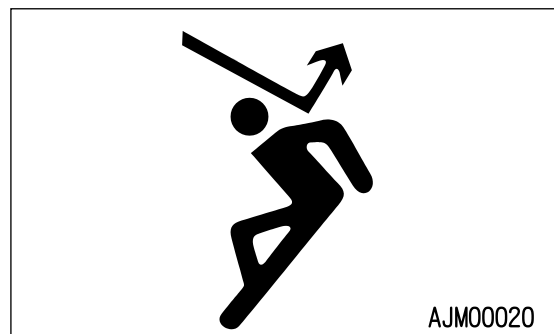
WINDOW WASHER LIQUID

Use an ethyl alcohol base washer liquid. Methyl alcohol base washer liquid may irritate your eyes, so do not use it.

PRECAUTIONS WHEN USING ROPS

Install ROPS when working in places where there is danger of falling rocks, such as in mines and quarries, or in places where there is danger of rolling over.

- If ROPS is installed, do not remove it when operating the machine.
- ROPS is installed to protect the operator when machine rolls over. When machine rolls over, ROPS supports its weight and absorbs its impact energy.
- If ROPS is modified, its strength may lower. When modifying it, consult your Komatsu distributor.
- If ROPS is deformed by falling objects or by rolling over, its strength lowers and its design functions cannot be maintained. In this case, be sure to ask your Komatsu distributor about repair method.
- Even if ROPS is installed, it does not work normally, if your seat belt is not fastened. Be sure to fasten your seat belt when operating machine.



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PRECAUTIONS FOR ATTACHMENTS

- When installing optional parts or attachments, there may be problems with safety or legal restrictions, so please contact your Komatsu distributor for advice.
- Any injuries, accidents, or product failures resulting from the use of unauthorized attachments or parts will not be the responsibility of Komatsu.
- When installing and using optional attachments, read the instruction manual for the attachment, and the general information related to attachments in this manual.

UNAUTHORIZED MODIFICATION

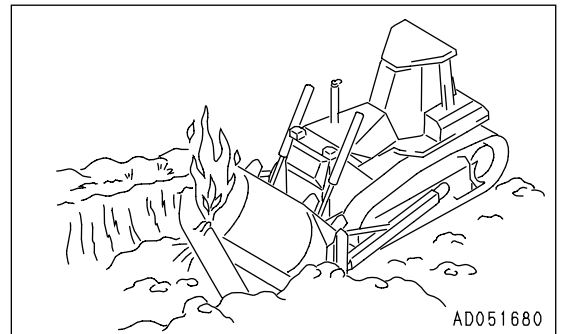
Any modification made without authorization from Komatsu can create hazards. Before making a modification, consult your Komatsu distributor.

- Komatsu will not be responsible for any injuries, accidents, or product failures resulting from modifications made without authorization from Komatsu.

SAFETY AT WORKSITE

Before starting operations, thoroughly check the area for any unusual conditions that could be dangerous.

- When carrying out operations near combustible materials such as thatched roofs, dry leaves or dry grass, there is a hazard of fire, so be careful when operating.
- Check the terrain and condition of the ground at the worksite, and determine the safest method of operation. Do not carry out operations at places 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 worksite, contact each utility and identify their locations. Be careful not to sever or damage any of these lines.
- Take necessary measures to prevent any unauthorized person from entering the operating area.
- In particular, if you need to operate on a road, protect pedestrian and cars by designating a person for worksite traffic duty or by installing fences around the worksite.
- 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.



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 should 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 after heavy rain or blasting or after earthquakes is weak in these areas.
- When working on embankments or near excavated ditches, there is a hazard that the weight and vibration of the machine will 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.

DO NOT GO CLOSE TO HIGH-VOLTAGE CABLES

Do not travel or operate the machine near electric cables. There is a hazard of electric shock, which may cause serious injury or property damage. On jobsites where the machine may go close to electric cables, always do as follows.

- Before starting work near electric cables, inform the local power company of the work to be performed, and ask them to take the necessary action.
- Even going close to high-voltage cables can cause electric shock, which may cause serious burns or even death. Always maintain a safe distance (see the table on the right) between the machine and the electric cable. Check with the local power company about safe operating procedure before starting operations.
- To prepare for any possible emergencies, wear rubber shoes and gloves. Lay a rubber sheet on top of the seat, and be careful not to touch the chassis with any exposed part of your body.
- Use a signalman to give warning if the machine approaches too close to the electric cables.
- When carrying out operations near high voltage cables, do not let anyone come close to the machine.
- If the machine should come too close or touch the electric cable, to prevent electric shock, the operator should not leave the operator's compartment until it has been confirmed that the electricity has been shut off. Also, do not let anyone come close to the machine.

	Voltage	Min. safety distance
Low voltage	100V 200V	2m
	6,600V	2m
Very high voltage	22,000V	3m
	66,000V	4m
	154,000V	5m
	187,000V	6m
	275,000V	7m
	500,000V	11m

ENSURE GOOD VISIBILITY

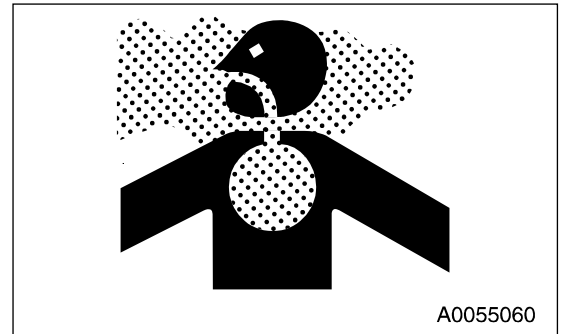
Check for any persons or obstacles in the area around the machine and check the conditions of the jobsite to ensure that operations and travel can be carried out safely. Always do as follows.

- Position a signalman if there are areas at the rear of the machine where the visibility is not good.
- When working in dark places, turn on the working lamp and front lamps installed to the machine, and set up additional lighting in the work area if necessary.
- Stop operations if the visibility is poor, such as in mist, snow, rain, or dust.

VENTILATION FOR ENCLOSED AREAS

Exhaust fumes from the engine can kill.

- If it is necessary to start the engine within an enclosed area, or when handling fuel, flushing oil, or paint, open the doors and windows to ensure that you provide adequate ventilation is provided to prevent gas poisoning.



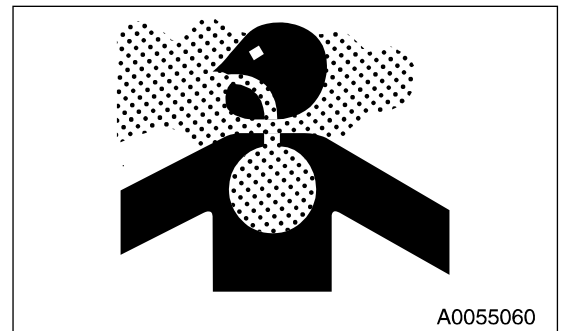
CHECKING SIGNALMAN'S SIGNALS AND SIGNS

- Set up signs to inform of road shoulders and soft ground. If the visibility is not good, position a signalman if necessary. Operators should pay careful attention to the signs and follow the instructions from the signalman.
- Only one signalman should give signals.
- Make sure that all workers understand the meaning of all signals and signs before starting work.

BE CAREFUL ABOUT ASBESTOS DUST

Asbestos dust in the air can cause lung cancer if it is inhaled. There is danger of inhaling asbestos when working on jobsites handling demolition work or work handling industrial waste. Always observe the following.

- 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 persons to approach during the operation.
- Always observe the rules and regulations for the work site and environmental standards.

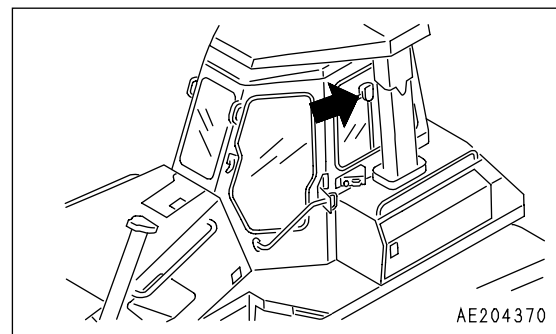
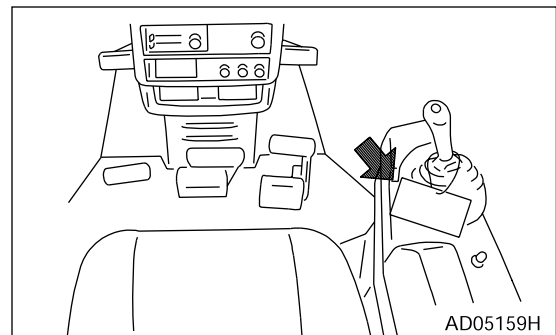


This machine does not use asbestos, but there is a danger that imitation parts may contain asbestos, so always use genuine Komatsu parts.

PRECAUTIONS FOR OPERATION

STARTING ENGINE

If there is a warning tag hanging from the work equipment control lever, do not start the engine or touch the levers.



CHECKS BEFORE STARTING ENGINE

Carry out the following checks before starting the engine at the beginning of the day's work.

- Completely remove all flammable materials accumulated around the engine and battery, and remove all dirt from the window glasses, mirrors, lights, hand rails, and steps.
- Check the coolant level, fuel level, and oil level in engine oil pan, check for clogging of the air cleaner, and check for damage to the electric wiring.
- Adjust the operator's seat to a position where it is easy to carry out operations, and check that there is no damage or wear to the seat belt or mounting clamps.
- Check that the gauges work properly, check the angle of the lights and working lamps, and check that the control levers are all at the neutral position.
- Adjust the mirrors so that the rear of the machine can be seen clearly from the operator's seat. When adjusting, see "ADJUSTING MIRROR (PAGE 3-74)".
- Check that there are no persons or obstacles above, below, or in the area around the machine.

PRECAUTIONS WHEN STARTING

- When starting the engine, sound the horn as a warning.
- Start and operate the machine only while seated.
- Do not allow anyone apart from the operator to ride on the machine.
- Do not short circuit the starting motor circuit to start the engine. It is not only dangerous, but will also cause damage to the equipment.

PRECAUTIONS IN COLD AREAS

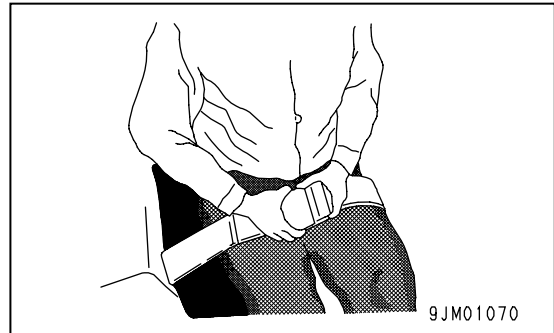
- Carry out the warming-up operation thoroughly. If the machine is not thoroughly warmed up before the control levers are operated, the reaction of the machine will be slow, and this may lead to unexpected accidents.
- If the battery electrolyte is frozen, do not charge the battery or start the engine with a different power source. There is a hazard that this will ignite the battery. Before charging or starting the engine with a different power source, melt the battery electrolyte and check for frost and leakage of battery electrolyte before starting.

OPERATION

CHECKS BEFORE OPERATION

When carrying out the checks, move the machine to a wide area where there are no obstructions, and operate slowly. Do not allow anyone near the machine.

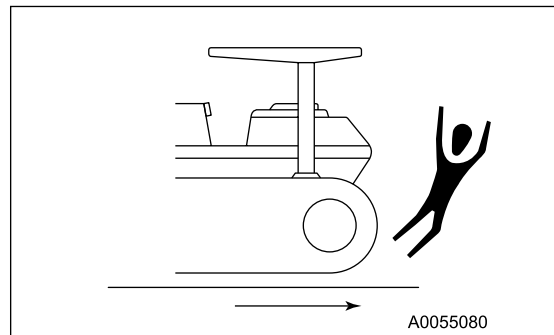
- Always fasten your seat belt.
- Check the operation of travel, steering and brake systems, and work equipment control system.
- Check for any abnormality in the sound of the machine, vibration, heat, smell, or gauges; check also that there is no leakage of oil or fuel.
- If any abnormality is found, carry out repairs immediately.



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PRECAUTIONS FOR MOVING MACHINE FORWARD OR IN REVERSE

- Before travelling, check again that there is no one in the surrounding area, and that there are no obstacles.
- Before travelling, sound the horn to warn people in the area.
- Always operate the machine only when seated.
- Do not allow anyone apart from the operator to ride on the machine.
- Check that the back-up alarm (alarm buzzer when machine travels in reverse) works properly.
- Fix the operator's compartment doors and windows in position securely.



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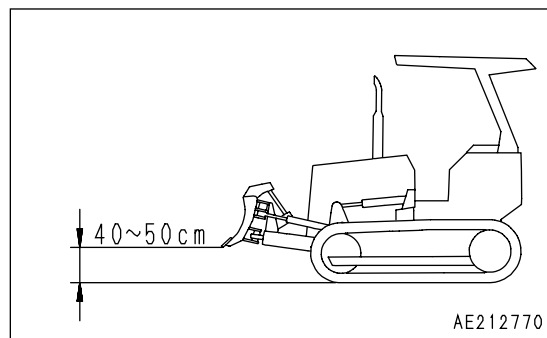
Always be sure to carry out the above precautions even when the machine is equipped with mirrors.

PRECAUTIONS WHEN TRAVELING

- Never turn the key in the starting switch to the OFF position while traveling. If the engine stops while traveling, steering mechanism does not function, and it results in dangerous situation. In this case, immediately depress the brake pedal to stop the machine.

- When traveling on flat ground, keep its height at 40 to 50 cm above the ground.

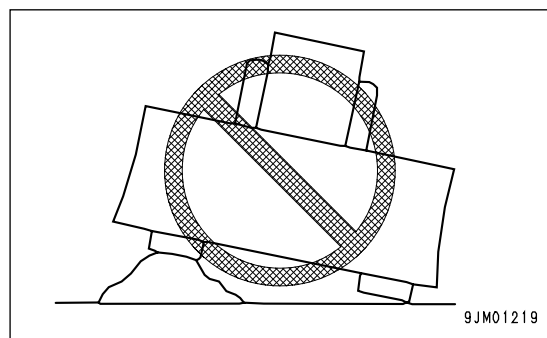
- When traveling on rough ground, travel at low speed and do not operate the steering suddenly. There is danger that the machine may turn over. The work equipment may hit the ground surface and cause the machine to lose its balance, or may damage the machine or structures in the area.



- Avoid traveling over obstacles when possible. If the machine has to travel over an obstacle, keep the work equipment close to the ground and travel at low speed. Never travel over obstacles which make the machine tilt strongly to one side.

- When traveling or carrying out operations, always keep a safe distance from people, structures, or other machines to avoid coming into contact with them.

- When passing over bridges or structures, check first that the structure is strong enough to support the weight of the machine. When traveling on public roads, check first with the relevant authorities and follow their instructions.



- When operating in tunnels, under bridges, under electric wires, or other places where the height is limited, operate slowly and be extremely careful not to let the work equipment hit anything.

- Do not approach the edge of a cliff carelessly. When dropping soil over a cliff for banking or reclamation, leave soil of one scoop at the edge of the cliff and push it with the next scoop.

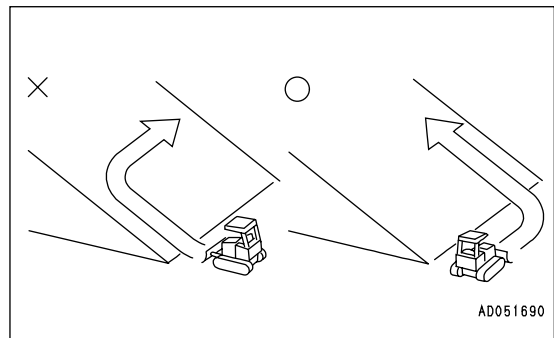
- When the machine passes over the top of a hill or when a load is dumped over a cliff, the load is suddenly reduced, and there is danger that the travel speed rises suddenly. To prevent this, lower the travel speed.

- If the machine moves with only either side of the blade loaded, its tail may swing. Take care.

TRAVELING ON SLOPES

To prevent the machine from tipping over or slipping to the side, always do as follows.

- When traveling on slopes, keep the blade 20 to 30 cm above the ground. In case of emergency, quickly lower the blade to the ground to help the machine to stop. Apply the brake and use engine as a brake, if necessary.
- Always travel straight up or down a slope. Traveling at an angle or across the slope is extremely dangerous.
- 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 on grass, fallen leaves, or wet steel plates with low speed. Even with slight slopes there is a hazard that the machine may slip.
- Do not shift the gear while traveling downhill or travel downhill with the transmission in neutral. If this is neglected, the engine does not work as a brake, and that is dangerous. Be sure to set the transmission in one of the lower speeds.



PROHIBITION OF DANGEROUS WORK

- Do not work near the edge of cliff or road. When unavoidably working at such place, set crawlers at right angles to the edge with the sprockets at the rear to make it easier to escape if there is any problem.
- When using the machine, to prevent accidents caused by damage to the work equipment and overturning caused by excessive load, do not use the machine in excess of its ability (in terms of the maximum load and stability determined by the structure of the machine).

USING BRAKES

- When the machine is traveling, do not rest your foot on the brake pedal. If you travel with your foot resting on the pedal, the brake will always be applied, and this will cause the brakes to overheat and fail.
- Do not depress the brake pedal repeatedly if not necessary. If this is neglected, the brake will be overheated and will not work when required.
- When traveling downhill, use the braking force of the engine. If necessary, use the brake pedal at the same time.

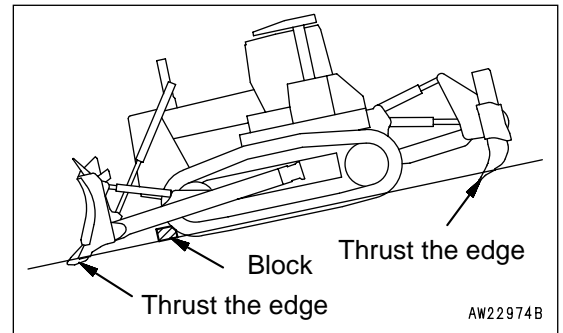
OPERATE CAREFULLY ON SNOW

- Snow-covered or frozen surfaces are slippery, so be extremely careful when traveling or operating the machine, and do not operate the levers suddenly. Even a slight slope may cause the machine to slip, so be particularly careful when working on slopes.
- With frozen ground surfaces, the ground becomes soft when the temperature rises, and this may cause the machine to tip over.
- If the machine enters deep snow, there is a hazard that it may tip over or become buried in the snow. Be careful not to leave the road shoulder or to get trapped in a snow drift.
- When clearing snow, the road shoulder and objects placed beside the road are buried in the snow and cannot be seen. There is a hazard of the machine tipping over or hitting covered objects, so always carry out operations carefully.

- When traveling on snow-covered slopes, never apply the brakes suddenly. Reduce the speed and use the engine as a brake while applying the foot brake intermittently (depress the brake intermittently several times). If necessary, lower the blade to the ground to stop the machine.

PARKING MACHINE

- Park the machine on level ground where there is no danger of falling rocks or landslides, or of flooding if the land is low, and lower the work equipment to the ground.
- If it is necessary to park the machine on a slope, set blocks under the tracks to prevent the machine from moving, then dig the work equipment into the ground.
- After stopping the engine, operate the blade control lever several times to the RAISE and LOWER positions to release the remaining pressure in the hydraulic circuit.



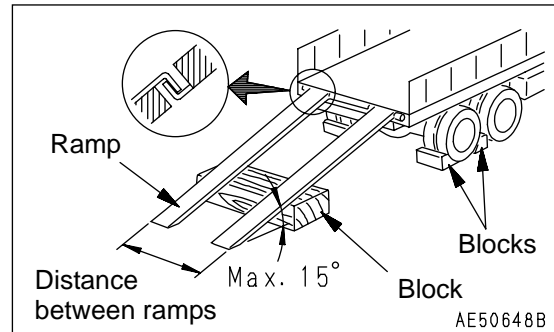
- When parking on public roads, provide fences, signs, flags, or lights, and put up any other necessary signs to ensure that passing traffic can see the machine clearly, and park the machine so that the machine, flags, and fences do not obstruct traffic.
Parking procedure : See "PARKING MACHINE (PAGE 3-102)".
- When leaving the machine, set the safety lock lever to the LOCK position, stop the engine, and use the key to lock all the equipment. Always remove the key and take it with you.
Work equipment posture : See "PARKING MACHINE (PAGE 3-102)".
Locks : See "LOCKING (PAGE 3-104)".
- Always close the door of the operator's compartment.

TRANSPORTATION

LOADING AND UNLOADING

When loading or unloading the machine, mistaken operation may bring the hazard of the machine tipping over or falling, so particular care is necessary. Always do as follows.

- Perform loading and unloading on firm, level ground only. Maintain a safe distance from the edge of the road or cliff.
- Always use ramps of adequate strength. Be sure that the ramps are wide, long, and thick enough to provide a safe loading slope. Take suitable steps to prevent the ramps from moving out of position or coming off.
- Be sure the ramp surface is clean and free of grease, oil, ice and loose materials. Remove dirt from machine-tracks. On a rainy day, in particular, take extremely careful since the ramp surface is slippery.
- Run the engine at low idling, set to low speed, and operate the machine slowly when loading or unloading.
- When on the ramps, do not operate any lever except for the travel lever.
- Never correct your steering on the ramps. If necessary, drive off the ramps, correct the direction, then enter the ramps again.
- The center of gravity of the machine will change suddenly at the joint between the ramps and the track or trailer, and there is danger of the machine losing its balance. Travel slowly over this point.
- When loading or unloading to an embankment or platform, make sure that it has suitable width, strength, and grade.
- For machines equipped with a cab, always lock the door after loading the machine. If this is not done, the door may suddenly open during transportation. Refer to "TRANSPORTATION (PAGE 3-119)".



SHIPPING

When shipping the machine on a trailer, do as follows.

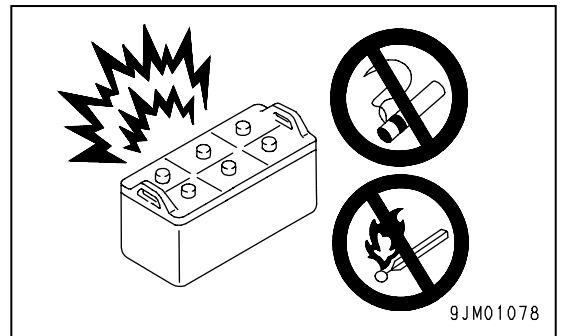
- Investigate all state and local laws governing the weight, width, and length of a load. If necessary, disassemble the work equipment. The width, height and weight of the load differ according to the work equipment, so take this into account when determining the shipping route.
- When passing over bridges or structures on private land, check first that the structure is strong enough to support the weight of the machine. When traveling on public roads, check first with the relevant authorities and follow their instructions.
- For details of the shipping procedure, see "TRANSPORTATION (PAGE 3-119)" in the OPERATION section.

BATTERY

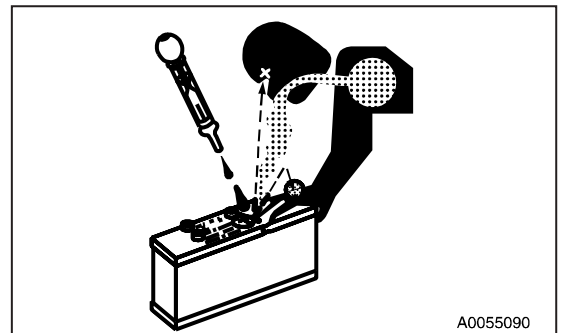
BATTERY HAZARD PREVENTION

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

- Do not use or charge the battery if the battery electrolyte level is below the LOWER LEVEL line. This may cause an explosion. Always check the battery electrolyte level periodically and add distilled water to bring the electrolyte level to the UPPER LEVEL line.
- When working with batteries, always wear safety glasses and rubber gloves.
- Never smoke or use any flame near the battery.



- If you spill acid on your clothes or skin, immediately flush the area with large amounts of water.
- If acid gets into your eyes, flush them immediately with large quantities of water and seek medical attention.



- Before working with batteries, turn the starting switch to the OFF position.

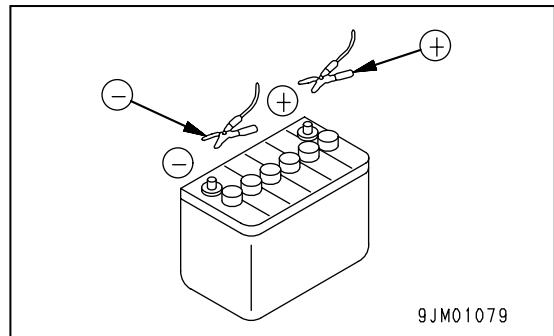
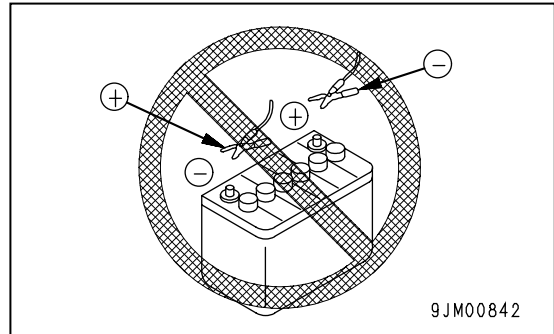
As there is a hazard that sparks will be generated, always do as follows.

- Do not let tools or other metal objects make any contact between the battery terminals. Do not leave tools or other metal objects lying around near the battery.
- Always disconnect the negative (-) terminal (ground side) first when removing the battery; when installing the battery, connect the positive (+) terminal first, and connect the ground last. Tighten the battery terminals securely.
- Tighten the battery terminals securely.
- Flammable hydrogen gas is generated when the battery is charged, so remove the battery from the chassis, take it to a well-ventilated place, and remove the battery caps before charging it.
- Tighten the battery caps securely.
- Install the battery securely to the determined place.

STARTING WITH BOOSTER CABLE

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

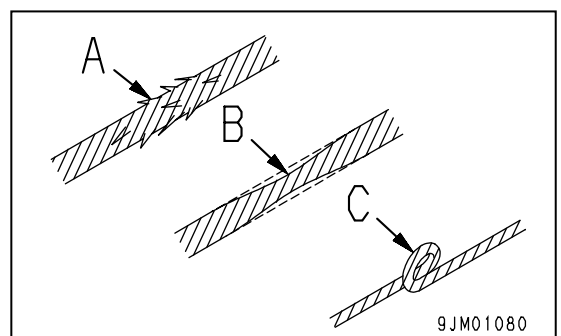
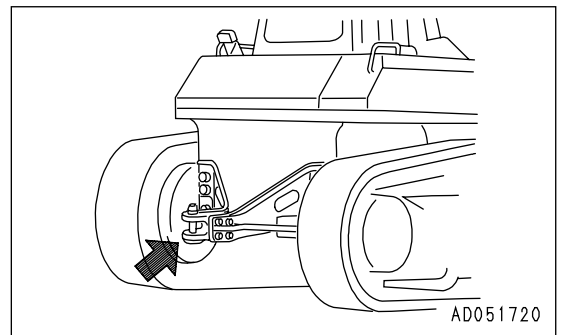
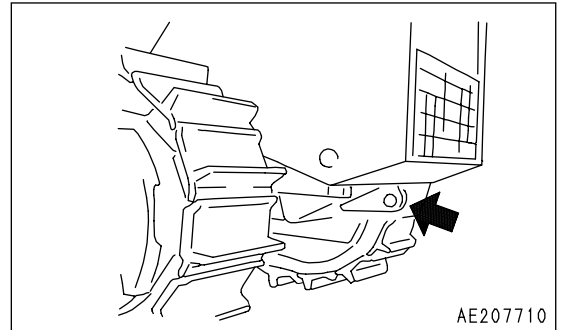
- When starting with a booster cable, carry out the starting operation with two workers (one worker sitting in the operator's seat and the other working with the battery).
- When starting from another machine, do not allow the two machines to touch.
- When connecting the booster cables, turn the starting switch OFF for both the normal machine and problem machine. There is a hazard that the machine will move when the power is connected.
- Be sure to connect the positive (+) cable first when installing the booster cables. Disconnect the ground or negative (-) cable (ground side) first when removing them.
- When removing the booster cables, be careful not to let the booster cable clips touch each other or to let the clips touch the machine.
- Always wear safety goggles and rubber gloves when starting the engine with booster cables.
- When connecting a normal machine to a problem machine with booster cables, always use a normal machine with the same battery voltage as the problem machine.
- For details of the starting procedure when using booster cables, see "STARTING ENGINE WITH BOOSTER CABLES (PAGE 3-132)" in the OPERATION section.



TOWING

WHEN TOWING

- Injury or death could result if a disabled machine is towed incorrectly or if there is mistake in the selection of the wire rope, so always do as follows.
- Do not tow in a different way from the method given in the section "METHOD OF TOWING MACHINE (PAGE 3-129)".
- Always wear leather gloves when handling wire rope.
- When carrying out the preparation for towing with another worker, agree on signals before starting the operation.
- If your machine is towed by another machine, stop the engine and release the brake. Please contact your Komatsu distributor to have the brake released.
- It is dangerous to tow a machine on a slope, so choose a place where there is a gradual slope. If there is no place with a gradual slope, carry out work to make the slope as small as possible.
- When connecting up a towing machine, do not let anyone enter the area between the towing machine and the equipment being towed.
- Do not straddle the towing cable or wire rope.
- If your machine is towed by another machine, ALWAYS use a wire rope with a sufficient towing capacity.
- Set the towing machine and the towing connection of the equipment being towed in a straight line when connecting it.
- Take up the slack in the wire rope and tow the machine.
- When pulling out the machine getting stuck in mud, use the towing hook.
- If the machine is stuck in sandy soil, dig out the soil around the towing hook, then use the towing hook to pull the machine out.
Permissible load for towing hook: 29,300 kg (288,371 N)
- 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.



PRECAUTIONS FOR MAINTENANCE

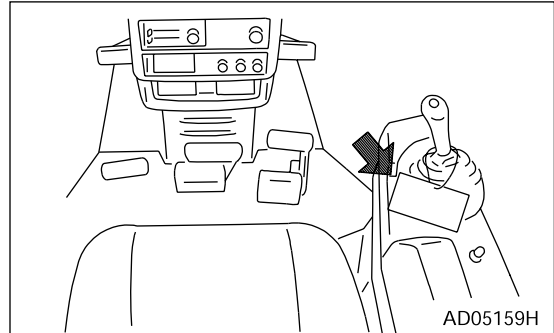
WARNING TAG

- Always attach the "DO NOT OPERATE" warning tag to the work equipment control lever in the operator's cab to alert others that you are performing service or maintenance on the machine. Attach additional warning tags around the machine if necessary.

Warning tag Part No. 09963-A1640

Keep this warning tag in the tool box while it is not used. If there is not the tool box, keep the tag in the operation manual pocket.

- If others start the engine, or touch or operate the work equipment control lever while you are performing service or maintenance, you could suffer serious injury or property damage.



KEEP WORK PLACE CLEAN AND TIDY

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

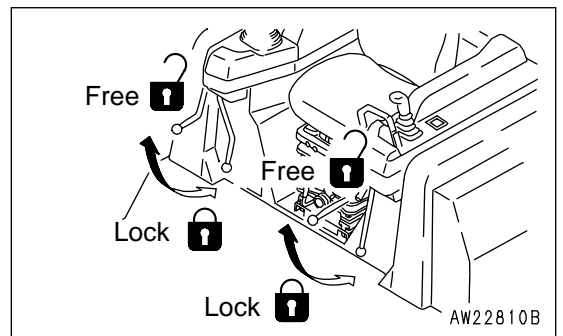
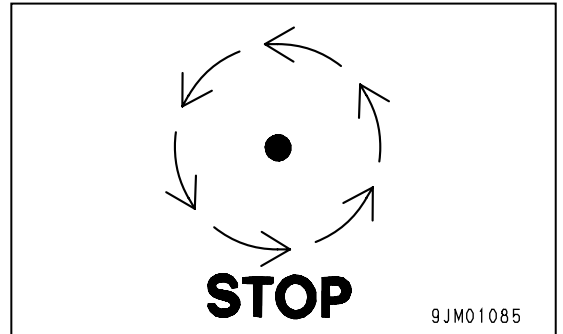
APPOINT LEADER WHEN WORKING WITH OTHERS

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

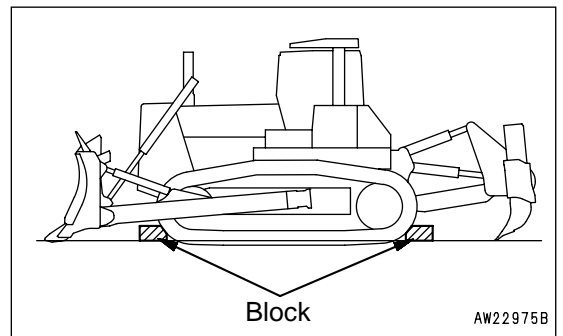
When working with others, misunderstandings between workers can lead to serious accidents.

STOP ENGINE BEFORE CARRYING OUT INSPECTION AND MAINTENANCE

- Stop the machine on firm, level ground.
- Select a place where there is no hazard of falling rocks or landslides, or of flooding if the land is low.
- Lower the work equipment completely to the ground and stop the engine.
- After stopping the engine, operate the work equipment control lever to the RAISE and LOWER positions 2 or 3 times to release the pressure remaining in the hydraulic circuit, then set the safety lock lever to LOCK position.



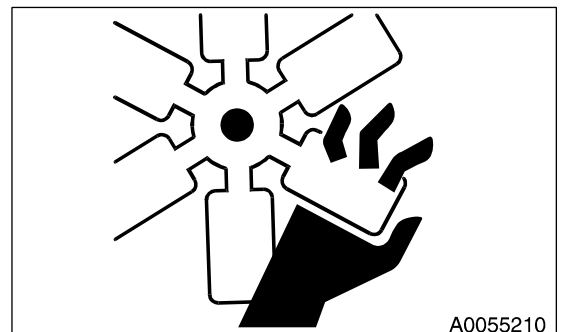
- Put blocks under the track to prevent the machine from moving.



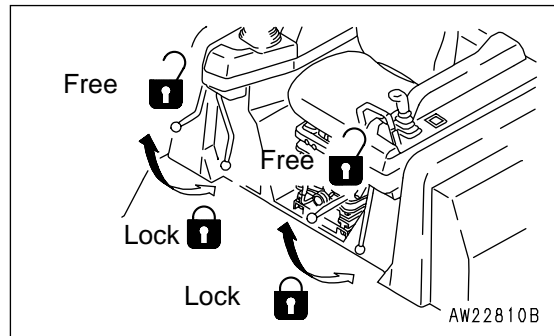
TWO WORKERS FOR MAINTENANCE WHEN ENGINE IS RUNNING

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

- One worker must always sit in the operator's seat and be ready to stop the engine at any time. All workers must maintain contact with the other workers.

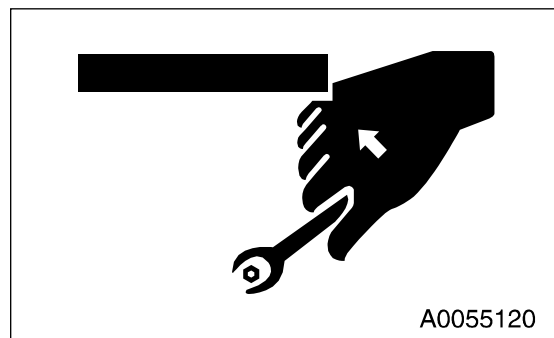


- Set safety lock lever and brake lock lever to the LOCK position.
- When carrying out operations near the fan, fan belt, or other rotating parts, there is a hazard of being caught in the parts, so be extremely careful.
- Do not touch any control levers. If any control lever must be operated, always give a signal to the other workers to warn them to move to a safe place.
- Never drop or insert tools or other objects into the fan or fan belt. Parts may break or be sent flying.



PROPER TOOLS

Use only tools suited to the task and be sure to use the tools correctly. Using damaged, low quality, faulty, makeshift tools or improper use of the tools could cause serious personal injury.



HANDLING ACCUMULATOR

- On machines equipped with an accumulator, for a short time after the engine is stopped, if the blade control lever is moved to the LOWER position, the work equipment will move down under its own weight. After stopping the engine, always place the safety lever in the LOCK position.
- When releasing the pressure inside the work equipment circuit on machines equipped with an accumulator, follow the procedure given in the following section.
Method of releasing pressure : See "HANDLING ACCUMULATOR (PAGE 3-59)".
- The accumulator is filled with high-pressure nitrogen gas, and it is extremely dangerous if it is handled in the wrong way. Always observe the following precautions.
 - Never make any hole in the accumulator or expose it to flame or fire.
 - Do not weld any boss to the accumulator.
 - When disposing the accumulator, it is necessary to release the gas from the accumulator, so please contact your Komatsu distributor.

NO UNAUTHORIZED PERSONNEL INTO AREA

Only authorized personnel can service and repair the machine. Do not allow unauthorized personnel into the area. If necessary, employ an observer.

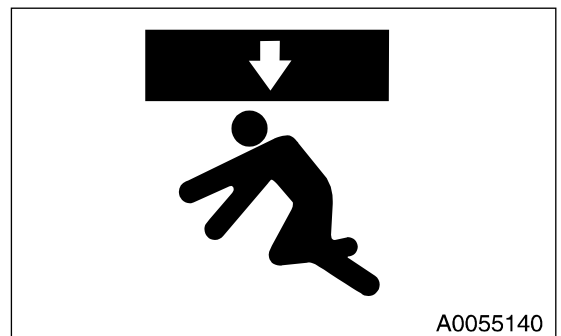
ATTACHMENTS

- Appoint a leader before starting removal or installation operations for attachments.
- Place attachments that have been removed from the machine in a stable condition so that they do not fall. And take steps to prevent unauthorized persons from entering the storage area.



PRECAUTIONS FOR WORK UNDER MACHINE AND WORK EQUIPMENT

- If it is necessary to go under the work equipment or the machine to carry out service and maintenance, support the work equipment and machine securely with blocks and stands strong enough to support the weight of the work equipment and machine.
- It is extremely dangerous to work under the machine if the track shoes are off the ground and the machine is supported only by the work equipment. If the control levers are touched by mistake, or there is a hazard to the hydraulic line, the work equipment or the machine may suddenly descend. This is extremely dangerous. Never work under the machine if the machine is not properly supported by blocks or stands.



NOISE

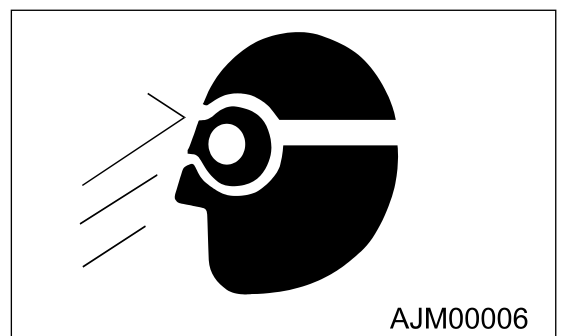
If the noise from the machine is too loud, it may cause temporary or permanent hearing problems.

When carrying out maintenance of the engine and you are exposed to noise for long periods of time, wear ear covers or ear plugs while working.

PRECAUTIONS WHEN USING HAMMER

When using a hammer, pins may fly out or metal particles may be scattered. This may lead to serious injury. Always do as follows.

- If hard metal parts such as pins, or bearings are hit with a hammer, there is a hazard that pieces might be scattered and cause injury. Always wear safety goggles and gloves.
- When hitting pins, there is a hazard that broken pieces might be sent flying and injure people in the surrounding area. Always check that there is no one in the surrounding area.
- If pins are hit with strong force, there is a hazard that the pin may fly out and injure people in the surrounding area.



REPAIR WELDING

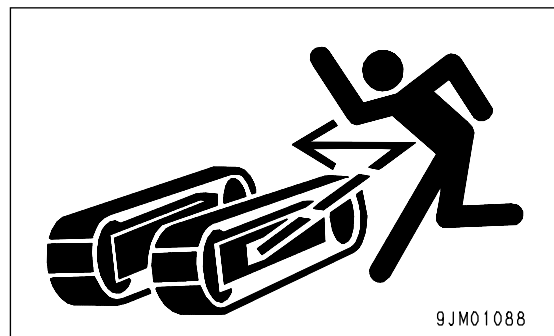
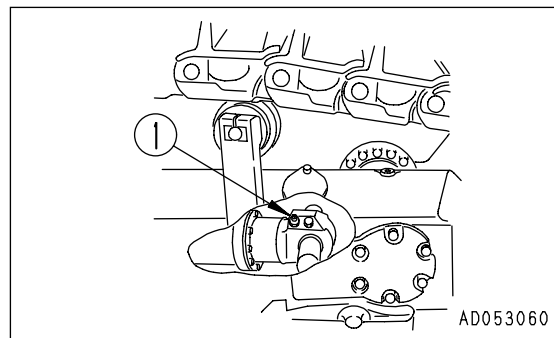
Welding operations must always be carried out by a qualified welder and in a place equipped with a proper equipment. There is a hazard of fire or electrocution when carrying out welding, so never allow any unqualified personnel to carry out welding.

REMOVING BATTERY TERMINAL

When repairing the electrical system or when carrying out electrical welding, remove the negative (-) terminal of the battery to prevent the flow of current.

PRECAUTIONS WHEN USING HIGH-PRESSURE GREASE TO ADJUST TRACK TENSION

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



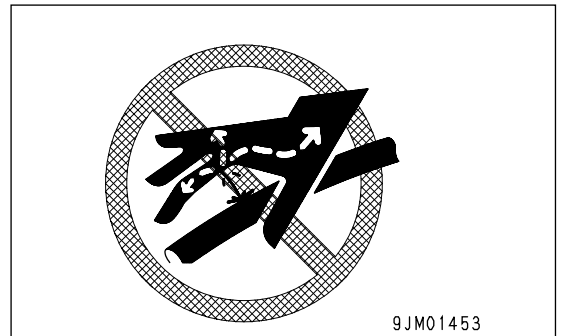
DO NOT DISASSEMBLE RECOIL SPRING

The recoil spring assembly is used to reduce the impact on the idler. It contains a spring under high pressure, so if it is disassembled by mistake, the spring will fly out and cause serious injury or even death. Never disassemble the recoil spring.

PRECAUTION WITH HIGH-PRESSURE OIL

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 or property damage, so always do as follows.

- For the releasing procedure of the internal pressure, see "PROCEDURE FOR RELEASING INTERNAL PRESSURE OF HYDRAULIC SYSTEM (PAGE 4-43)". Do not inspect or replace any part while the internal pressure is applied.
- If there is any leakage from the piping or hoses, the surrounding area will be wet, so check for cracks in the piping and hoses and for swelling in the hoses.
When carry 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 place with clean water, and consult a doctor immediately for medical attention.



PRECAUTIONS WITH PRESSURIZED FUEL

The fuel piping system of the engine is under high pressure when the engine is running. Check and adjust the fuel piping system 30 seconds or more after the engine stops to wait until the internal pressure lowers.

HANDLING HIGH-PRESSURE HOSES

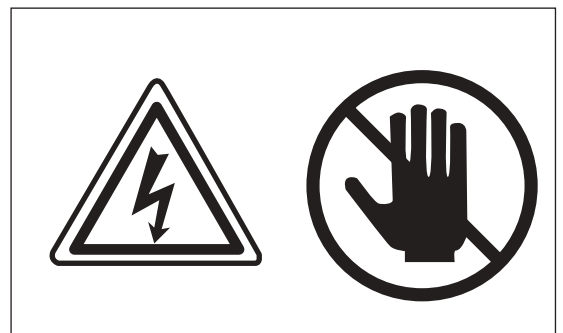
- If oil or fuel leaks from high-pressure hoses, it may cause fire or defective operation, which may lead to serious injury or property damage. If any loose bolts are found, stop work and tighten to the specified torque. If any damaged hoses are found, stop operations immediately and contact your Komatsu distributor.

Replace the hose if any of the following problems are found.

- Damaged or leaking hydraulic fitting.
- Frayed or cut covering or exposed reinforcement layer of wire.
- Covering swollen in places.
- Twisted or crushed movable portion.
- Foreign material embedded in covering.

PRECAUTIONS WITH HIGH VOLTAGE

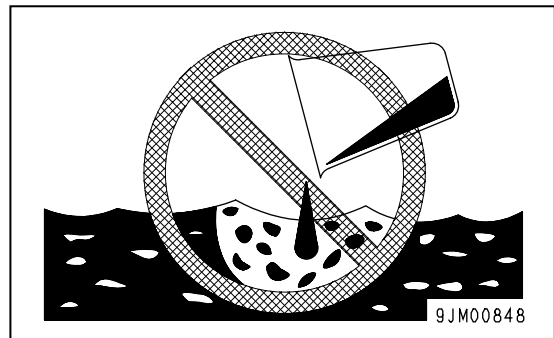
- When the engine is running and immediately after it is stopped, high voltage is generated inside the engine controller and the engine injector, and there is danger of electrocution. Never touch the inside of the controller or the engine injector portion. If it is necessary to touch the inside of the controller or the engine injector portion, please contact your Komatsu distributor.



WASTE MATERIAL

To prevent pollution, pay careful attention to the method of disposing of waste materials.

- Always put oil drained from your machine in containers. Never drain oil directly onto the ground or dump into the sewage system, rivers, the sea, or lakes.
- Obey appropriate laws and regulations when disposing of harmful objects such as oil, fuel, coolant, solvent, filters, and batteries.



MAINTENANCE FOR AIR CONDITIONER

If air conditioner refrigerant gets into your eyes, it may cause blindness; if it touches your skin, it may cause frostbite. Never touch refrigerant.

COMPRESSED AIR

- When carrying out cleaning with compressed air, there is a hazard of serious injury or property damage caused by flying particles.
- When using compressed air to clean elements or the radiator, always wear safety goggles, dust mask, gloves, and other protective equipment.

PERIODIC REPLACEMENT OF SAFETY CRITICAL PARTS

- In order for the machine to be operated safely for a long time, it is necessary to add oil and to carry out service and maintenance at periodic intervals. In order to further increase safety, components with a strong relationship to safety, such as hoses and seat belts, must be replaced at periodic intervals.

Replacement of safety critical parts: See "PERIODIC REPLACEMENT OF SAFETY CRITICAL PARTS (PAGE 4-16)".

- The material of these components naturally changes over time, and repeated use causes deterioration, wear, and fatigue. As a result, there is a hazard that these components may fail and cause serious injury or property damage. It is difficult to judge the remaining life of these components from external inspection or the feeling when operating, so always replace them at the specified interval.
- Replace or repair safety critical parts if any defect is found, even when they have not reached the time specified interval.

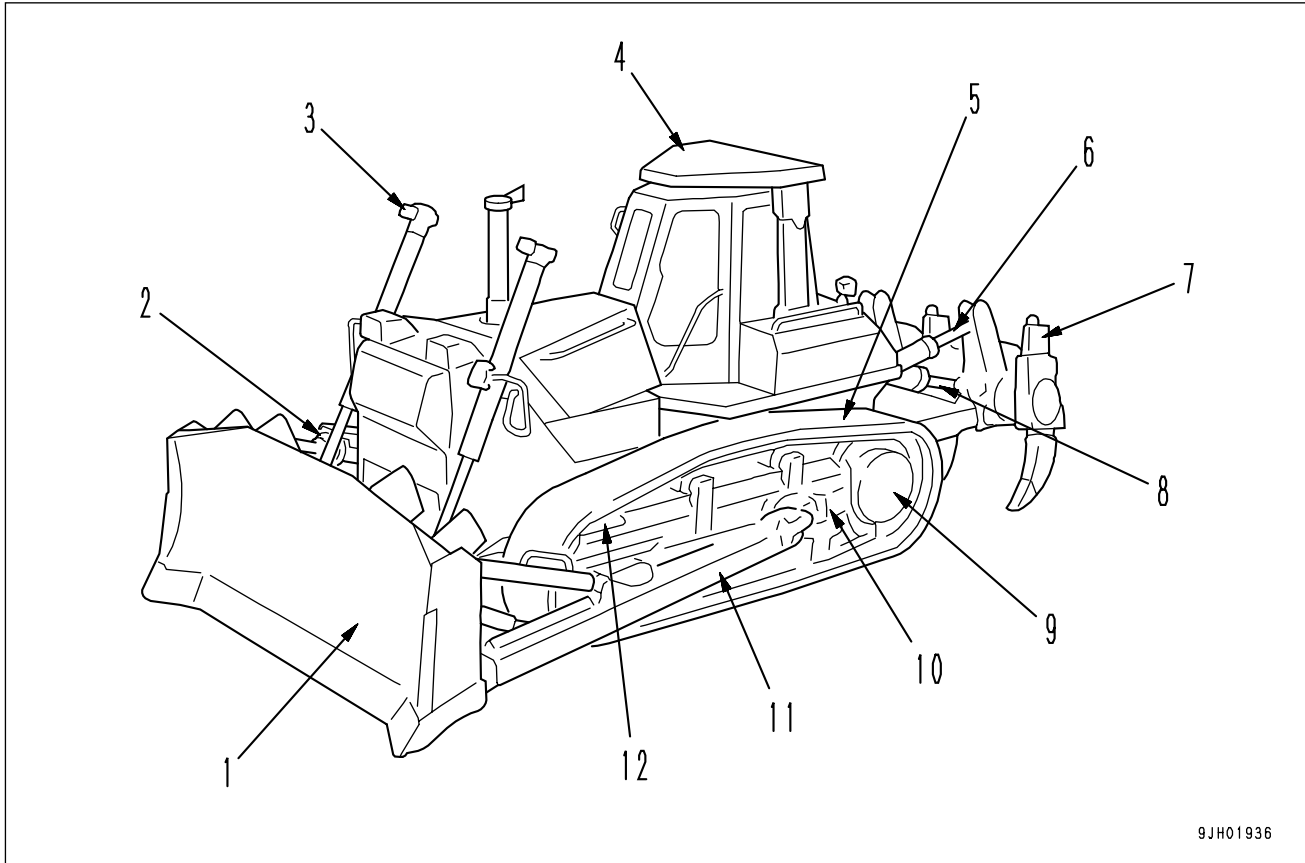
OPERATION

 **WARNING**

Please read and make sure that you understand the **SAFETY** section before reading this section.

GENERAL VIEW

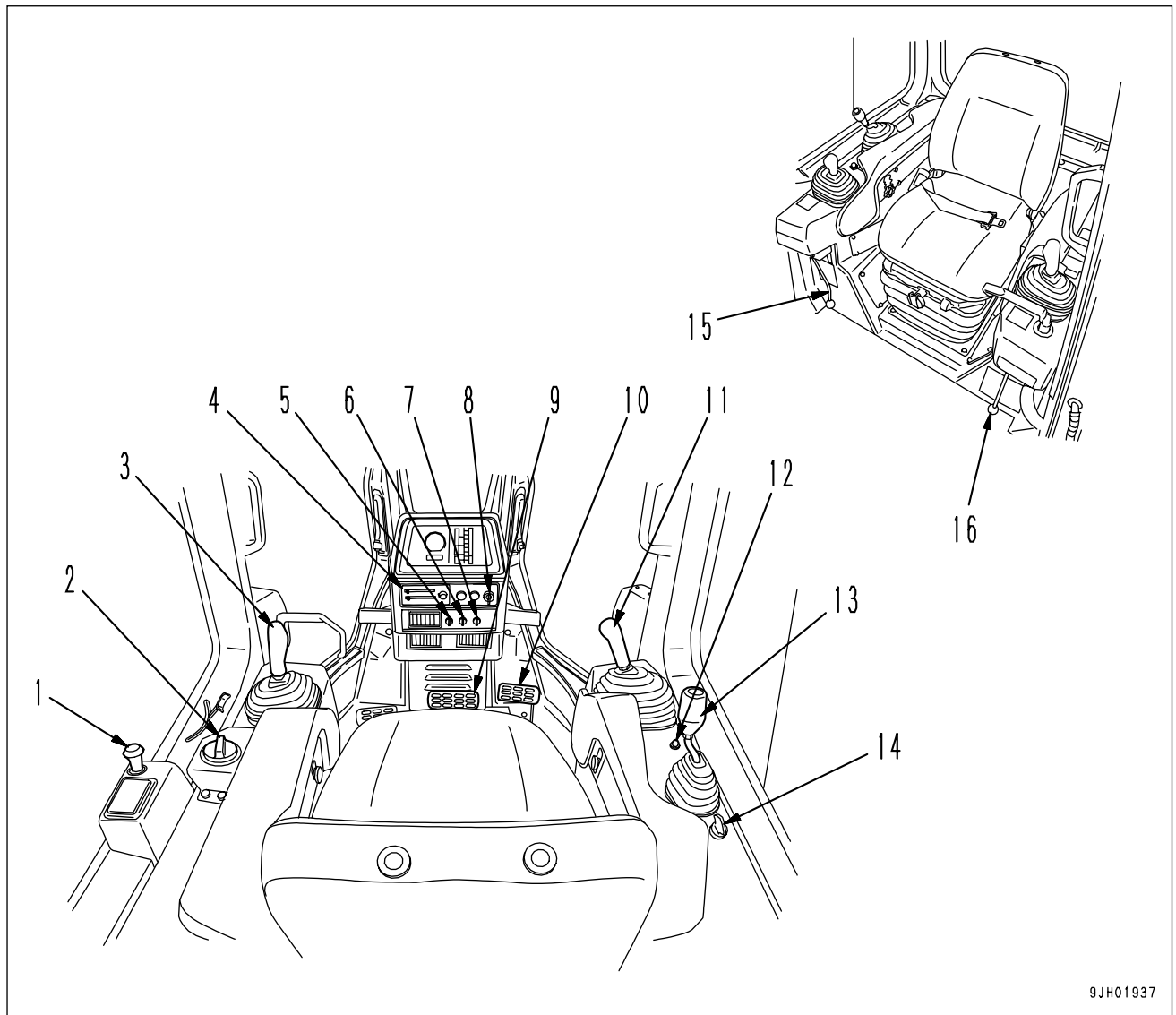
GENERAL VIEW OF MACHINE



(1)	Blade	(7)	Multi ripper
(2)	Blade tilt cylinder	(8)	Ripper lift cylinder
(3)	Blade lift cylinder	(9)	Sprocket
(4)	Cab	(10)	Track frame
(5)	Track shoe	(11)	Frame
(6)	Ripper tilt cylinder	(12)	Idler

GENERAL VIEW OF CONTROLS AND GAUGES

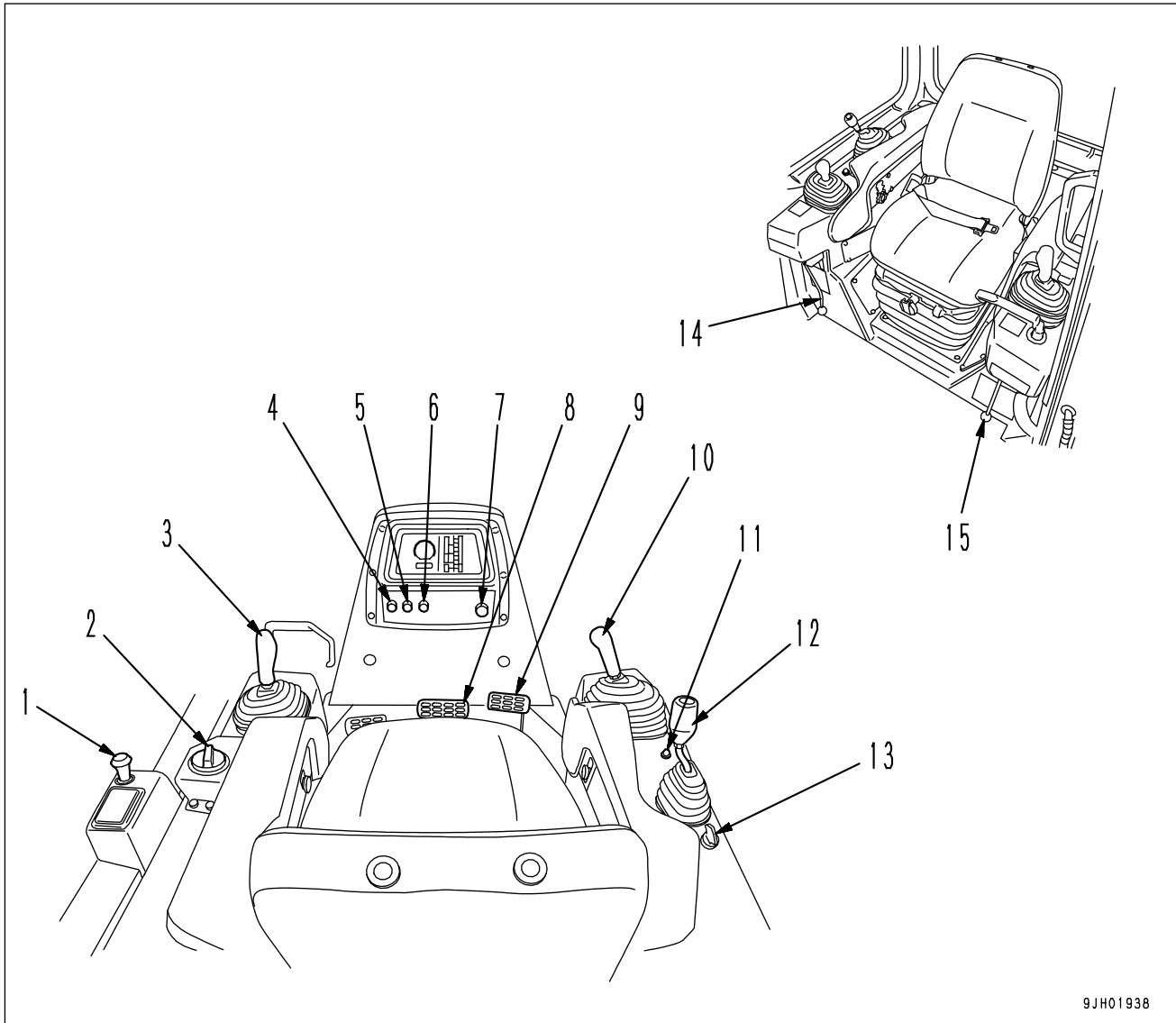
Machine equipped with cab
Monitor panel specification



9JH01937

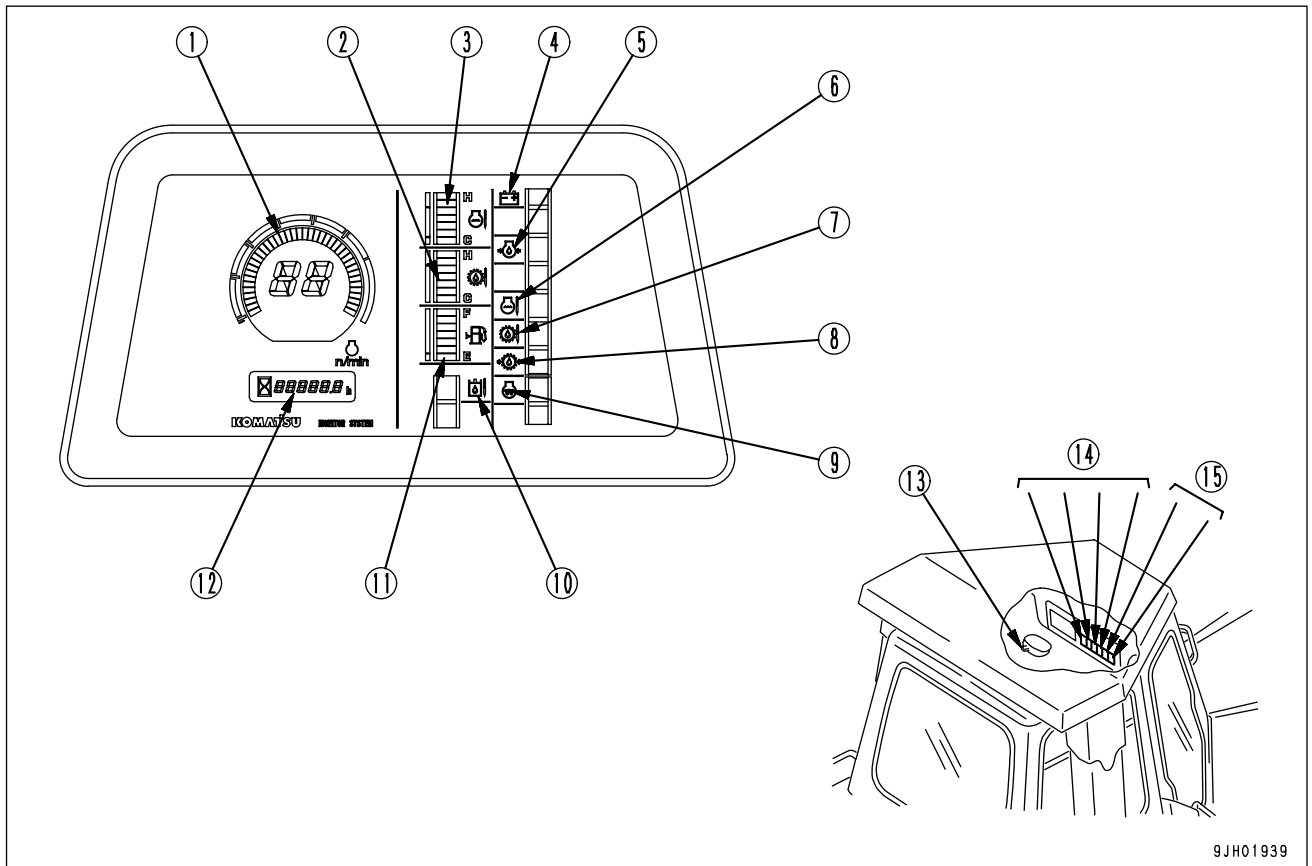
(1)	Cigarette lighter	(9)	Brake pedal
(2)	Fuel control dial	(10)	Deceleraion pedal
(3)	Steering, directional and gear shift lever	(11)	Blade control lever
(4)	Air conditioner panel or heater panel	(12)	Horn switch
(5)	Buzzer cancel switch	(13)	Ripper control lever
(6)	Head lamp switch	(14)	Pin puller control switch (if equipped)
(7)	Rear lamp switch	(15)	Safety lock lever
(8)	Starting switch	(16)	Parking lever

Machine equipped with canopy
 Monitor panel specification



9JH01938

(1)	Cigarette lighter	(9)	Deceleration pedal
(2)	Fuel control dial	(10)	Blade control lever
(3)	Steering, directional and gear shift lever	(11)	Horn switch
(4)	Buzzer cancel switch	(12)	Ripper control lever
(5)	Head lamp switch	(13)	Pin puller control switch (if equipped)
(6)	Rear lamp switch	(14)	Safety lock lever
(7)	Starting switch	(15)	Parking lever
(8)	Brake pedal		



9JH01939

(1)	Display panel A (Speed range and engine speed display)	(8)	HSS charge pressure caution lamp
(2)	Power train oil temperature	(9)	Engine preheating pilot lamp
(3)	Engine cooling water temperature gauge	(10)	HSS oil temperature caution lamp
(4)	Charge level monitor	(11)	Fuel gauge
(5)	Engine oil pressure monitor	(12)	Display panel B (Service meter)
(6)	Engine cooling water temperature monitor	(13)	Room lamp switch (Machine equipped with cab)
(7)	Power train oil temperature monitor	(14)	Wiper switch (Machine equipped with cab)
		(15)	Additional working lamp switch (Machine equipped with cab)

HSS : Hydro Static Steering System

EXPLANATION OF COMPONENTS

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

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

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

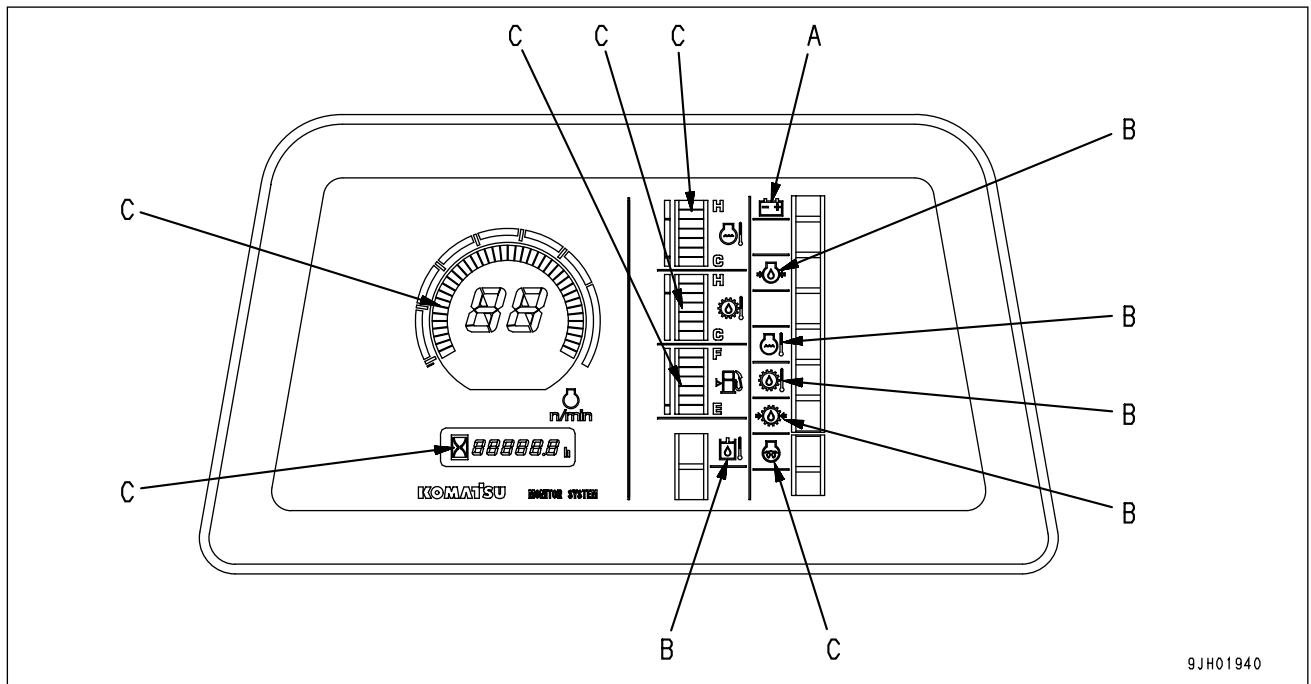
Equipment		D155AX-5	
		Canopy	Cab
Front panel	Monitor panel	○	○
	Air conditioner panel	—	○
	Heater panel	—	○
	Switch panel (cab)	—	○
	Switch panel (canopy)	○	—
	Alarm lamp (canopy)	○	—
Switches	Horn switch	○	○
	Room lamp switch	—	○
	Cigarette lighter	—	○
	Wiper switch	—	○
	Additional working lamp switch (if equipped)	—	○
Control levers, pedals, switches	Fuel control dial	○	○
	Joystick (counterrotation turning possible)	○	○
	Brake pedal	○	○
	Decelerator pedal	○	○
	Parking lever	○	○
	Safety lever (for blade control lever, ripper control lever)		
	Blade control lever	○	○
Power tiltdozer specification	○	○	
Angle dozer specification	○	○	
Engine	Dust indicator	○	○

REMARK

- When the key in starting switch is turned to the ON position before starting the engine, the caution lamps (3 seconds) and alarm lamp (2 seconds) light up, and the alarm buzzer (1 second) sounds.
- After the engine stops, the caution lamps cannot be checked unless 30 seconds or more lapses.

FRONT PANEL

MONITOR PANEL



9JH01940

- A: Caution Items
 B: Emergency Stop Items
 C: Meter Display Portion
 D: Monitor Switches ("SWITCHES (PAGE 3-24)")

A. Caution items (See "CAUTION ITEMS (PAGE 3-9)")

⚠ CAUTION

If these monitor items flash, check and repair the appropriate location as soon as possible.

These are items which need to be observed while the engine is running. If any abnormality occurs, items which need to be repaired as soon as possible are displayed.

If there is any abnormality, the appropriate monitor lamp will flash to indicate the location of the abnormality.

B. Emergency stop items (See "EMERGENCY STOP ITEMS (PAGE 3-10)")

⚠ CAUTION

If the monitor for any of these items flashes, stop the engine immediately or run it at low idling, and take the following action.

This displays those of the abnormality items for which action must be taken immediately when the engine is running.

If there is any abnormality, the monitor showing the location of the abnormality will flash and the alarm buzzer will sound.

- C. Meter Display Portion (See "METER DISPLAY PORTION (PAGE 3-12)")
This portion consists of pre-heating pilot lamp, power train oil temperature gauge, engine water temperature gauge, fuel gauge, service meter and display.

- D. Monitor switches (See "SWITCHES (PAGE 3-24)")
This select working mode, travel speed and time setting of clock.

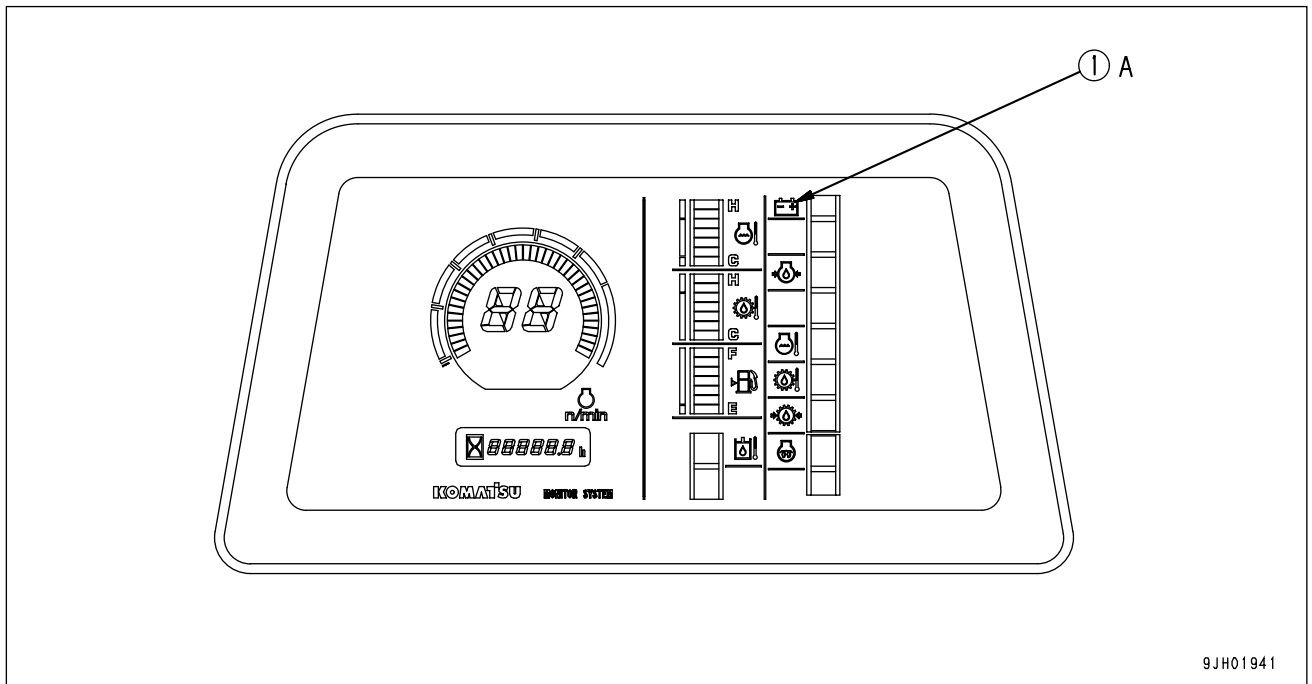
CAUTION ITEMS

⚠ CAUTION

If the warning monitor flashes or lights up, carry out inspection and maintenance of the appropriate point as soon as possible.

If the problem is not corrected, it may lead to failure of the machine.

These are items which need to be observed when the engine is running. If any abnormality occurs, the item needing immediate repair is displayed. If there is any abnormality, the abnormal location on the monitor will flash.



(1) Charge level monitor

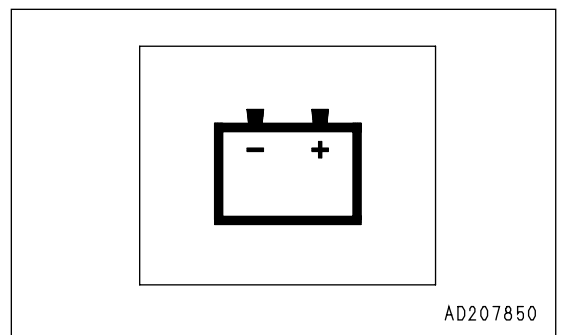
CHARGE LEVEL MONITOR

This monitor (1) indicates an abnormality in the charging system while the engine is running.

If the monitor lamp flashes, check the V-belt tension. If any abnormality is found, see "OTHER TROUBLE (PAGE 3-134)".

REMARK

When the engine is started or stopped with the starting switch at the ON position, the lamp may light up momentarily, but this does not indicate any abnormality.



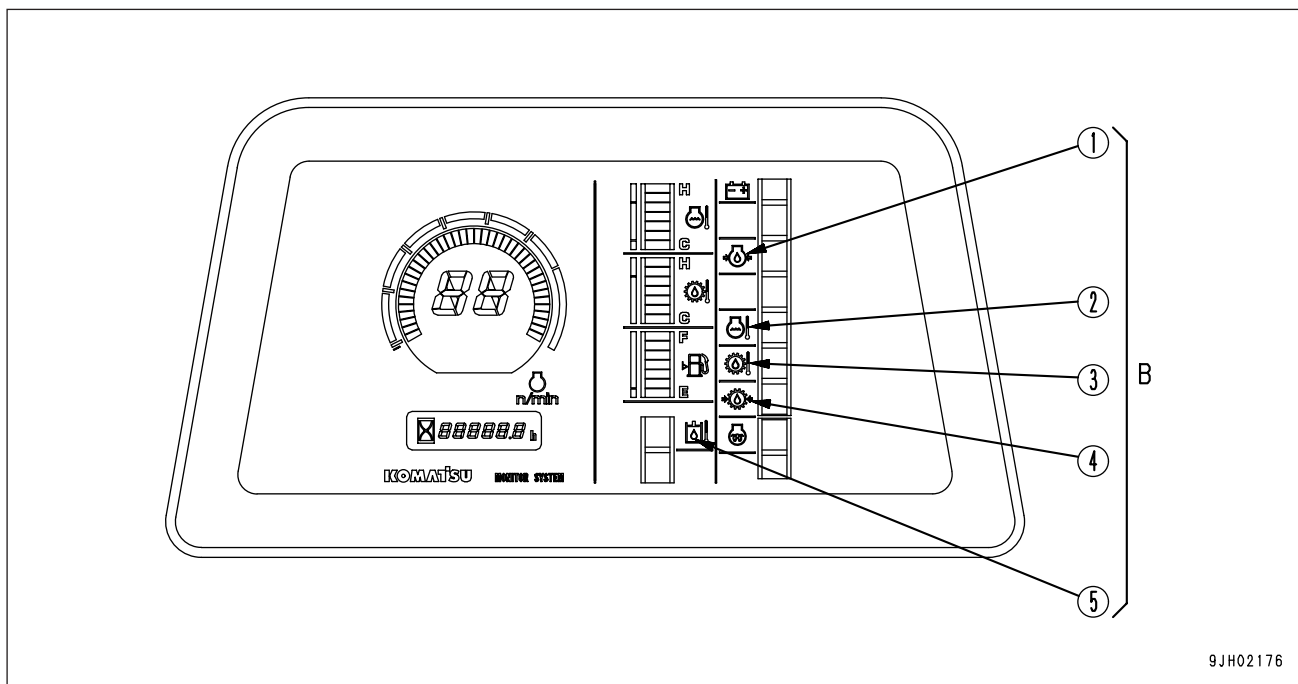
AD207850

EMERGENCY STOP ITEMS

⚠ CAUTION

If any monitor lamp flashes, stop the engine or run it at a low idling speed, and repair it immediately.

These items need to be observed while the engine is running. If any abnormality occurs, items which need to be repaired immediately are displayed. If there is any abnormality, the alarm buzzer sounds intermittently and the caution lamp for the location of abnormality flashes.



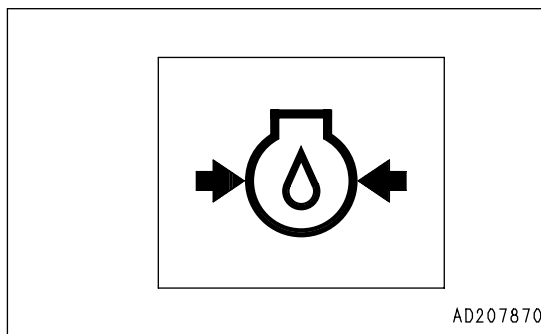
- (1) Engine oil pressure monitor
- (2) Engine cooling water temperature monitor
- (3) Power train oil temperature monitor
- (4) HSS charge pressure caution lamp
- (5) HSS oil temperature caution lamp

ENGINE OIL PRESSURE MONITOR

This monitor (1) indicates a low engine oil pressure. If the monitor lamp flashes, stop the engine and check it immediately.

REMARK

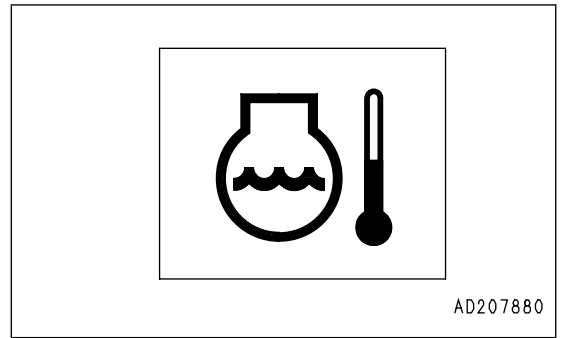
The alarm buzzer sounds, when the starting switch is turned to ON immediately after the engine oil changed. It does not indicate an abnormality.



ENGINE COOLING WATER TEMPERATURE MONITOR

This monitor (2) indicates a rise in the cooling water temperature.

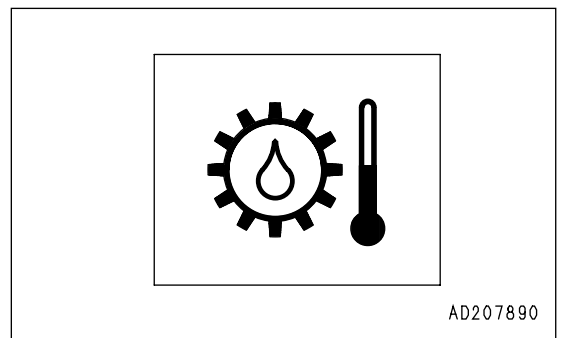
When the monitor lamp flashes, run the engine at the low idling speed until the green range of the engine water temperature gauge lights.



POWER TRAIN OIL TEMPERATURE MONITOR

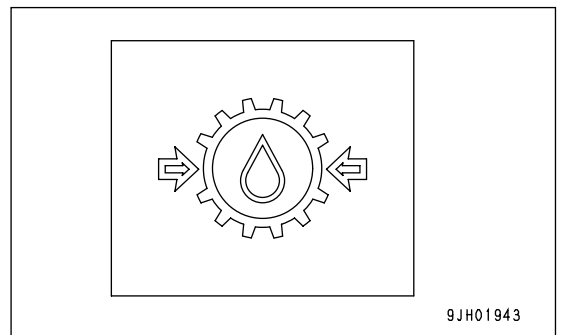
This monitor (3) indicates a rise in the oil temperature of the torque converter outlet.

When the monitor lamp flashes, run the engine at the low idling speed until the green range of the power train oil temperature gauge lights.



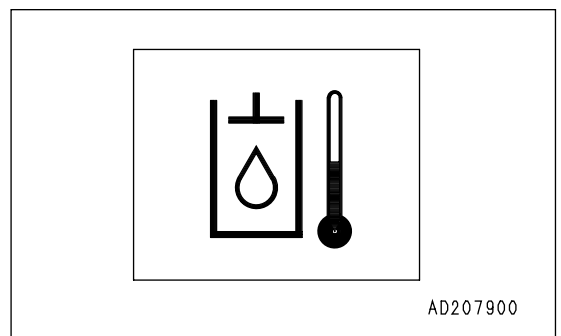
HSS CHARGE PRESSURE CAUTION LAMP

If any drop in the HSS charge pressure is detected by the pressure detector, the lamp (4) flashes and the alarm buzzer sounds at the same time to warn the operator. If there is any abnormality, stop the engine immediately and contact your Komatsu distributor.



HSS OIL TEMPERATURE CAUTION LAMP

This lamp (5) warns of any rise in the oil temperature at the HSS monitor outlet port. If this lamp lights up, run the engine at low idling or stop the engine and wait for the hydraulic oil temperature to go down.

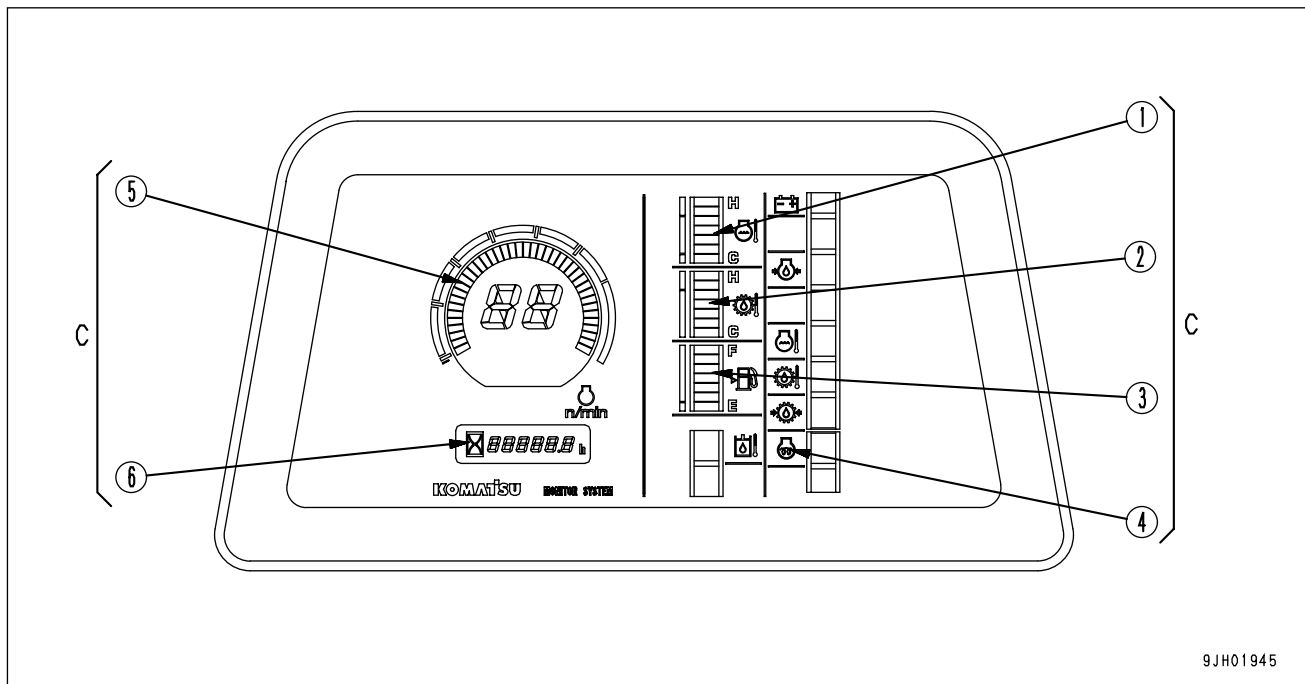


METER DISPLAY PORTION

NOTICE

Turn the key in starting switch to the ON position while the engine is at rest, and confirm that the engine water temperature gauge, power train oil temperature gauge, and fuel gauge, and the caution lamps for these items light up. If they do not light up, please ask your Komatsu distributor to check them.

The meter display portion consists of the engine water temperature gauge, power train oil temperature gauge, fuel gauge, service meter, and preheating pilot lamp.



9JH01945

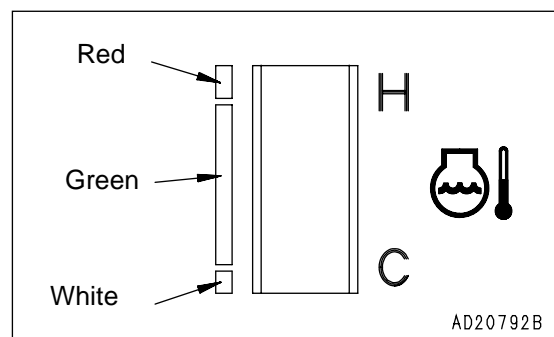
- | | |
|--|---|
| (1) Engine cooling water temperature gauge | (4) Engine preheating pilot lamp |
| (2) Power train oil temperature gauge | (5) Display panel A
(Speed range and engine speed display) |
| (3) Fuel gauge | (6) Display panel B (Service meter) |

ENGINE COOLING WATER TEMPERATURE GAUGE

This gauge (1) indicates the temperature of the cooling water. If the temperature is normal during operation, the green range will light.

If the red range lights up during operation, move the Fuel control dial to lower the engine speed to approx. 3/4 of the full speed, and run until the water temperature enters the green range.

If the engine cooling water temperature enters the red range, and the engine water temperature monitor flashes and the alarm buzzer sounds, stop the machine and run at low idling until the water temperature enters the green range.



NOTICE

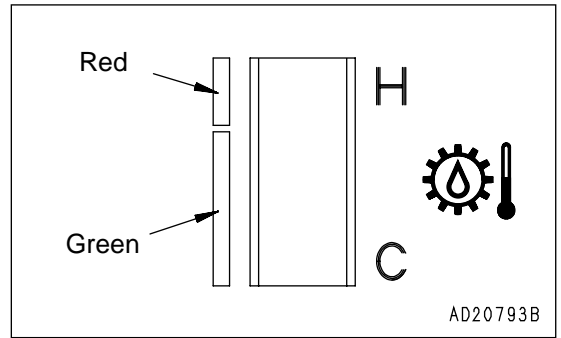
If the water temperature gauge often enters the red range, check the radiator for clogging.

POWER TRAIN OIL TEMPERATURE GAUGE

This gauge (2) indicates the oil temperature of the torque converter outlet. If the temperature is normal during operation, the green range will light.

If the red range lights up during operation, move the Fuel control dial to lower the engine speed to approx. 3/4 of the full speed, reduce the load and run until the oil temperature enters the green range.

If the power train oil temperature enters the red range, and the power train oil temperature monitor flashes and the alarm buzzer sounds, stop the machine and run at low idling until the oil temperature enters the green range.



NOTICE

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

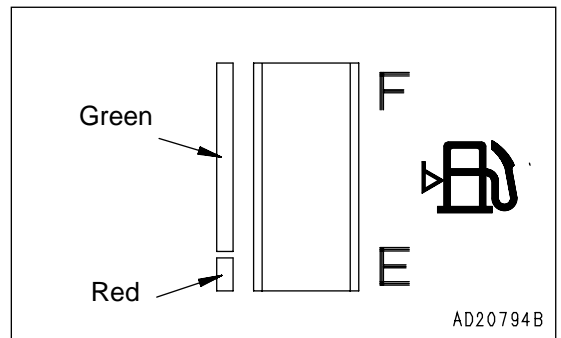
FUEL GAUGE

This gauge (3) indicates the amount of fuel in the fuel tank. If there is enough fuel in the tank while the engine is running, the green range lights. If the red range lights, there is less than 60 l of fuel in the tank.

When the red range lights, add fuel.

REMARK

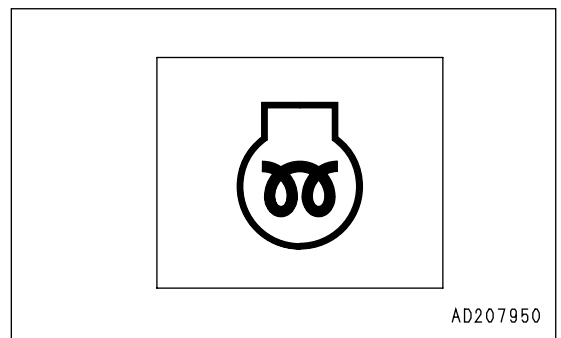
The display is not directly proportional with the remaining amount of fuel.



ENGINE PREHEATING PILOT LAMP

When the electrical heater is used to start the engine in cold weather, this lamp (4) indicates that preheating is being carried out.

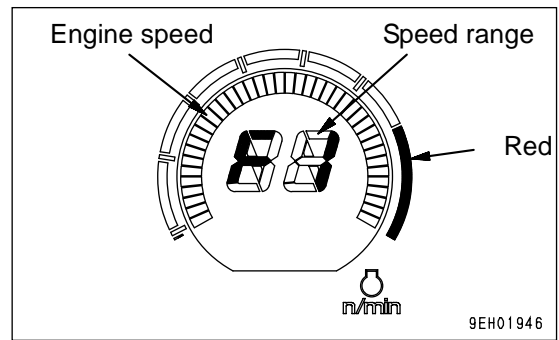
When the switch is ON, the preheating pilot lamp on the monitor panel lights up. (when the ambient temperature is below approx. -5°C.)



DISPLAY PANEL A (SPEED RANGE AND ENGINE SPEED DISPLAY)

Meter (5) displays the transmission speed range being used on the machine and engine speed.

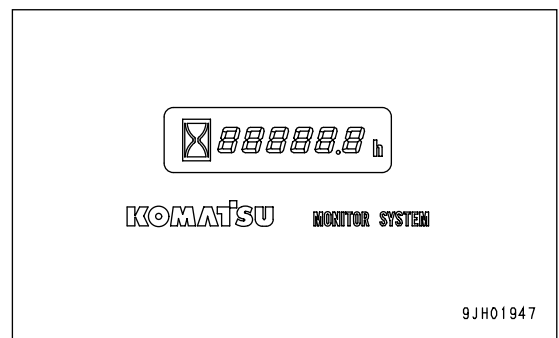
- When the transmission is in 1st FORWARD, the display shows F1, and when it is in 1st REVERSE, the display shows R1.
- The peripheral bar graph indicates the engine speed. When the red range lights up during running, shift the gear to a lower speed to run the engine at a speed within the green range.



DISPLAY PANEL B (SERVICE METER)

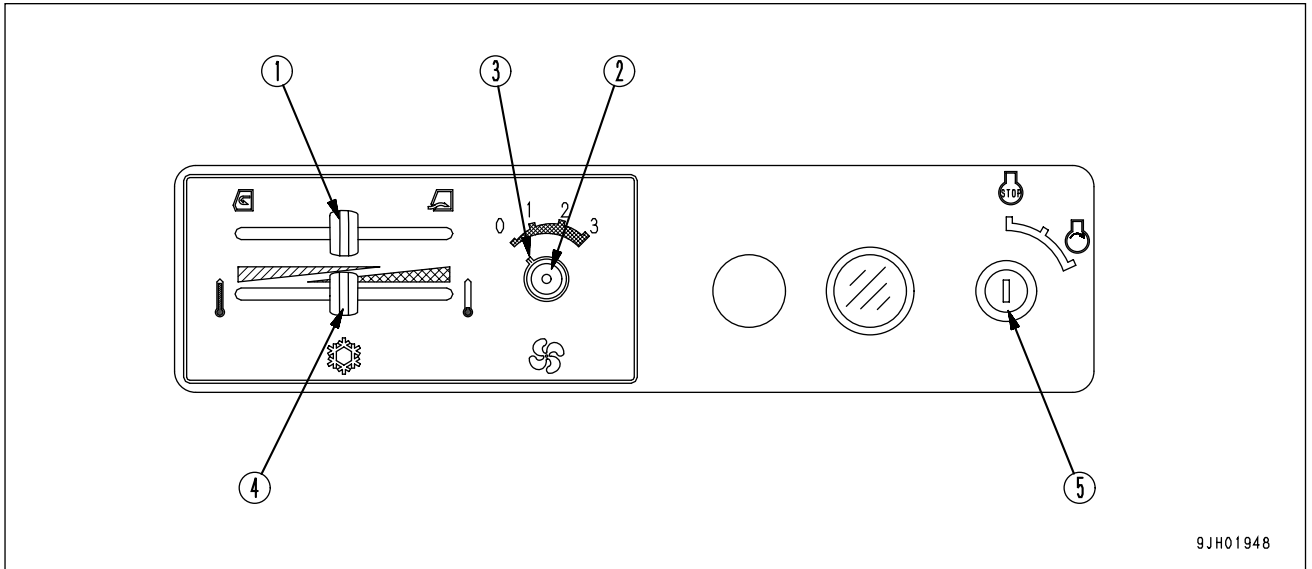
This meter (6) shows the total operation hours of the machine. Set the periodic maintenance intervals using this display.

- The service meter advances while the engine is running - even if the machine is not traveling.
- When the engine is running, the sand glass pilot lamp by the side of the meters flashes to indicate that the meter is advancing. Meter will advance by 1 for each hour of operation regardless of the engine speed.
- If any abnormality occurs, an abnormality code and service hours are alternately displayed on the service meter section of the display panel B. When an abnormality code is displayed during running, see "OTHER TROUBLE (PAGE 3-134)".



AIR CONDITIONER PANEL

(MACHINES EQUIPPED WITH CAB, AIR CONDITIONER)



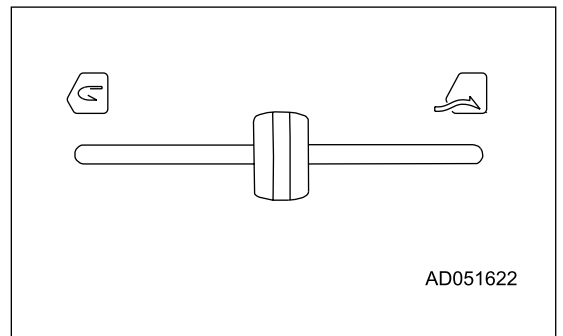
- (1) FRESH/RECIRC selector lever
- (2) Air condition switch
- (3) Blower switch
- (4) Temperature control lever
- (5) Starting switch

For details of handling levers and switches (1) to (4) below, see "HANDLING AIR CONDITIONER (PAGE 3-54)".

FRESH/RECIRC SELECTOR LEVER

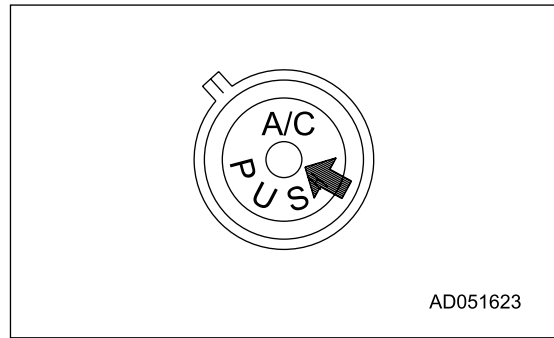
This lever (1) changes the air intake port used when cooling or heating.

- **RECIRC:** Move lever to left to suck in air inside cab.
Turn the switch normally to this position when strong cooling is needed. In this position, no ventilation or pressurizing is carried out.
- **FRESH:** Move lever to right to suck in air from outside.
This is the standard position for cooling and heating.
In this position, fresh air is brought in from outside to carry out ventilation. In addition, the inside of the cab is pressurized to prevent the entry of dust.



AIR CONDITION SWITCH

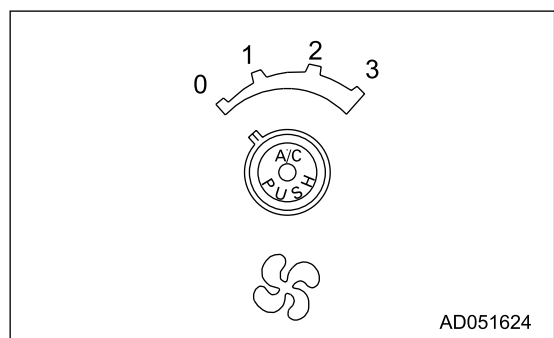
When the switch (2) is pressed and the blue lamp lights up, the cooling function is actuated. Use this switch for cooling or dehumidifying.



BLOWER SWITCH

This switch (3) acts as the wind flow control switch and main switch when cooling or heating.

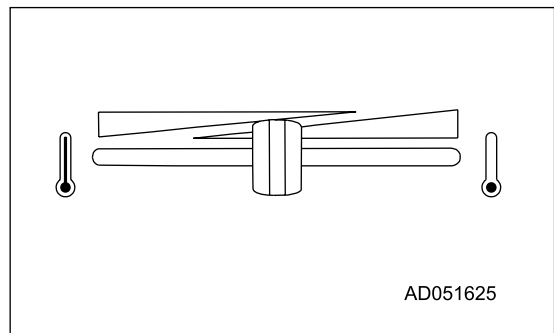
- The air flow can be set to three stages: 1 (LOW), 2 (MEDIUM), 3 (HIGH).
- If the switch is set to 0, the power is switched off and the air conditioner stops.



TEMPERATURE CONTROL LEVER

This lever (4) is used to control the temperature for cooling or heating.

- When the temperature control lever is moved to the right, the temperature of the air coming from the vents becomes lower. (The water valve is closed and the heating function is stopped.)
- When the temperature control lever is moved to the left, the temperature of the air coming from the vents becomes higher. (The water valve is opened and the heating function is started.)



STARTING SWITCH

This switch (5) is used to start the engine.

OFF position: OFF

The key can be inserted or withdrawn. The switches for the electric system are all turned off and the engine is stopped.

ON position: ON

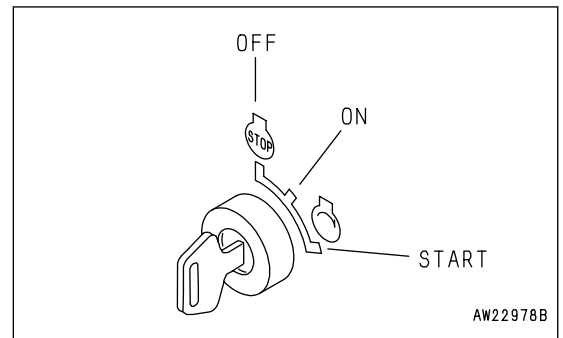
In this position, electric current flows in the charging and lamp circuits.

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

START position: START

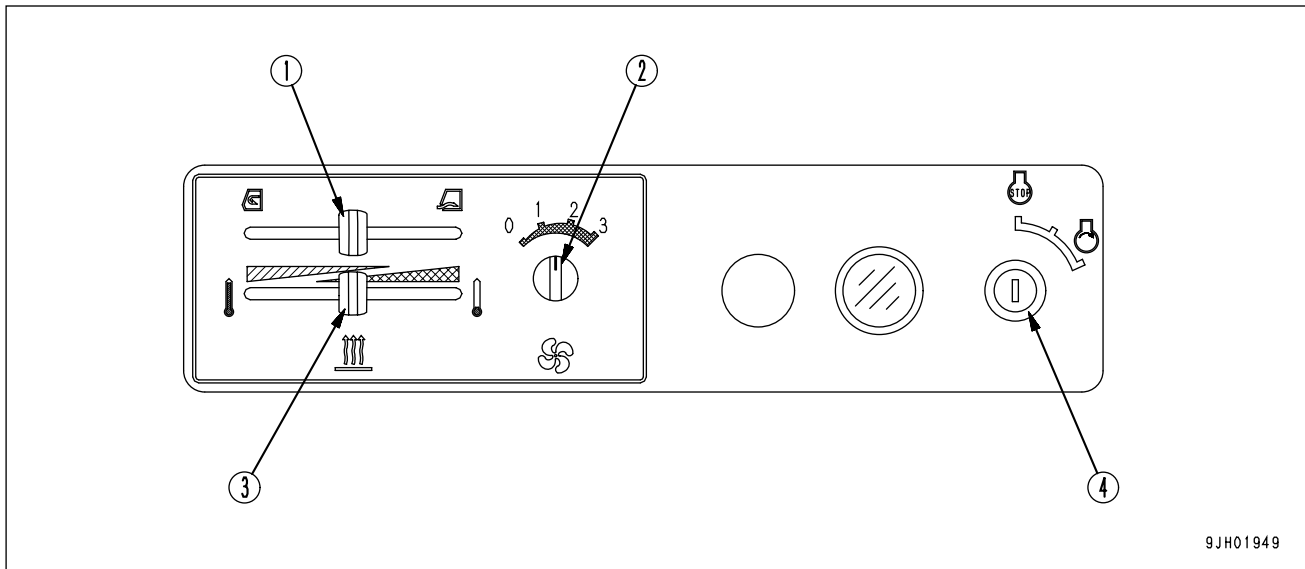
This is the position to start the engine. Hold the key at this position while cranking. Release the key immediately after the engine has been started. The key will return to ON position when released.

Do not turn the starting switch key to the START position while the engine is running.



HEATER PANEL

(MACHINES EQUIPPED WITH CAB, HEATER)



9JH01949

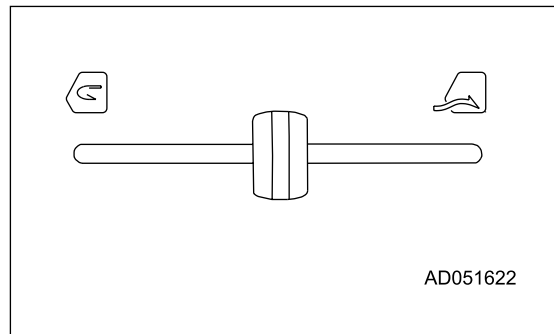
- | | |
|---------------------------------|-------------------------------|
| (1) FRESH/RECIRC selector lever | (3) Temperature control lever |
| (2) Blower switch | (4) Starting switch |

For details of handling switches (1) to (3) below, see "HANDLING HEATER (PAGE 3-58)".

FRESH/RECIRC SELECTOR LEVER

This lever (1) changes the air intake port used when heating.

- **RECIRC:** Move lever to left to suck in air inside cab.
Turn the switch normally to this position when strong heating is needed. In this position, no ventilation or pressurizing is carried out.
- **FRESH:** Move lever to right to suck in air from outside.
This is the standard position for heating. In this position, fresh air is brought in from outside to carry out ventilation. In addition, the inside of the cab is pressurized to prevent the entry of dust.

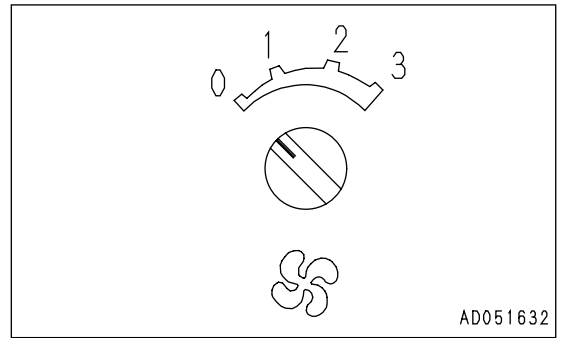


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BLOWER SWITCH

This switch (2) acts as the wind flow control switch and main switch when heating.

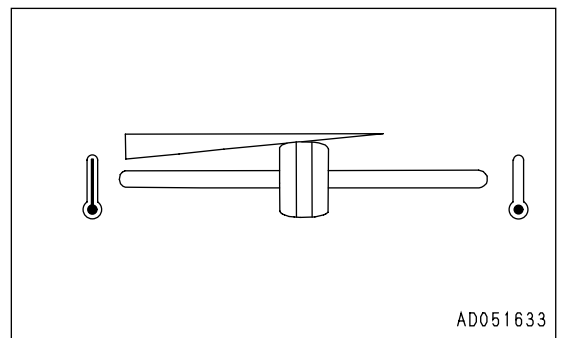
- The air flow can be set to three stages: 1 (LOW), 2 (MEDIUM), 3 (HIGH).
- If the switch is set to 0, the power is switched off and the heater stops.



TEMPERATURE CONTROL LEVER

This lever (3) is used to control the temperature for heating.

- When the temperature control lever is moved to the right, the temperature of the air coming from the vents becomes lower.
- When the temperature control lever is moved to the left, the temperature of the air coming from the vents becomes higher.



STARTING SWITCH

This switch (4) is used to start the engine.

OFF position: OFF

The key can be inserted or withdrawn. The switches for the electric system are all turned off and the engine is stopped.

ON position: ON

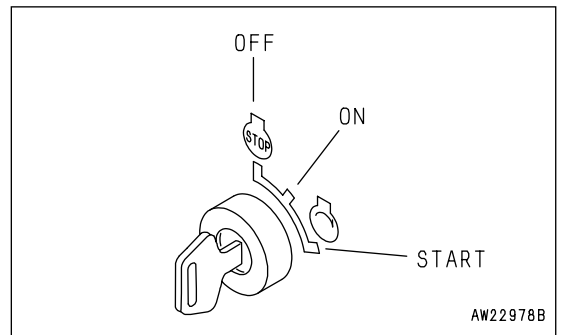
In this position, electric current flows in the charging and lamp circuits.

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

START position: START

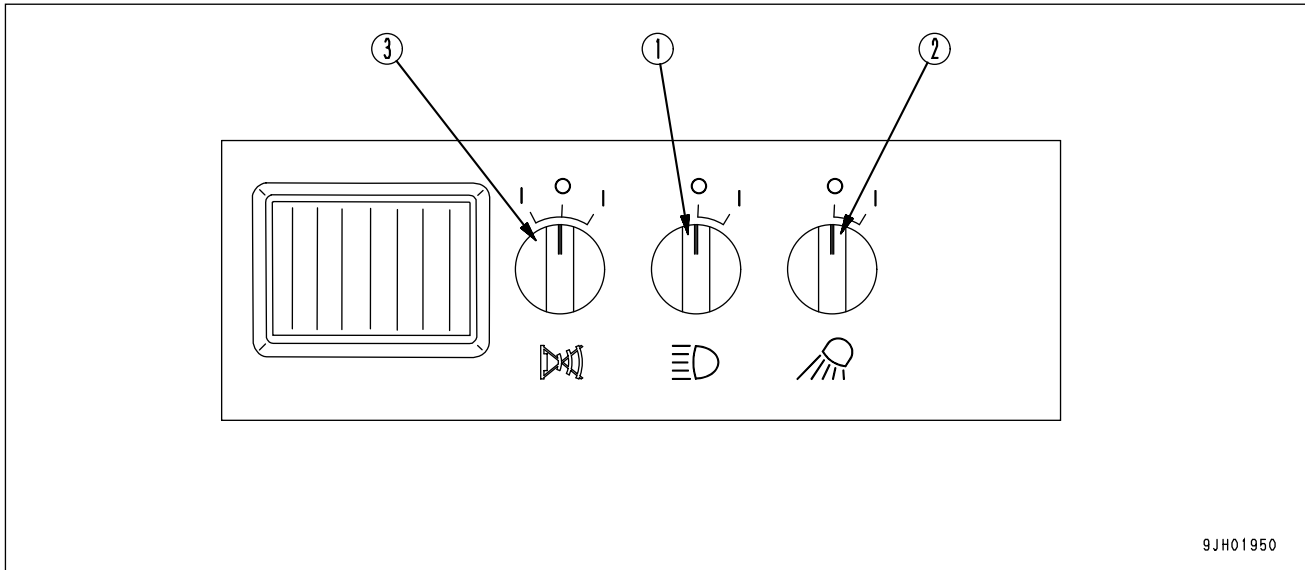
This is the position to start the engine. Hold the key at this position while ranking. Release the key immediately after the engine has been started. The key will return to ON position when released.

Do not turn the starting switch key to the START position while the engine is running.

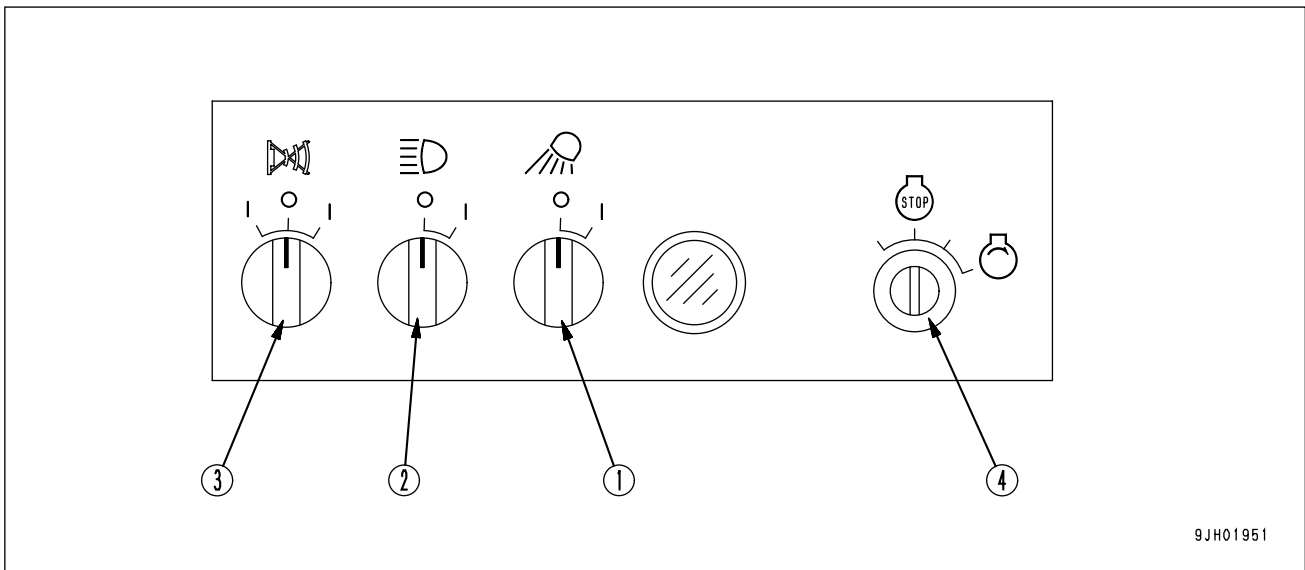


SWITCH PANEL

(MACHINES EQUIPPED WITH CAB)



(MACHINES EQUIPPED WITH CANOPY)



- (1) Head lamp switch
- (2) Rear lamp switch

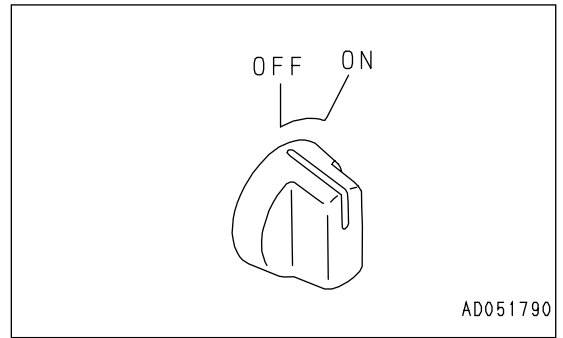
- (3) Buzzer cancel switch
- (4) Starting switch (Machine equipped with canopy)

HEAD LAMP SWITCH

This switch (1) lights up the head lamps.

OFF position: Lamps are out

ON position: Lamps light up

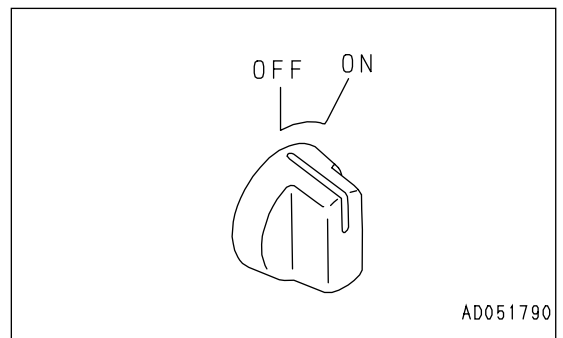


REAR LAMP SWITCH

This switch (2) lights up the rear lamps.

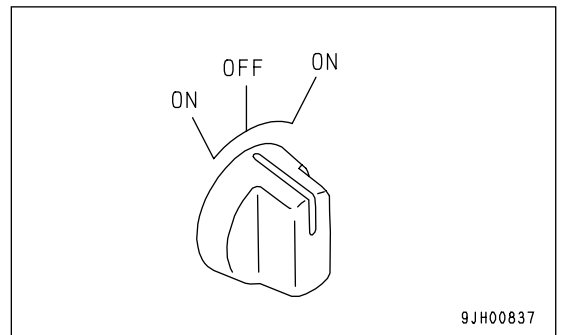
OFF position: Lamps are out

ON position: Lamps light up



BUZZER CANCEL SWITCH

Operate this switch (3) to the left or right to stop the alarm buzzer.



STARTING SWITCH

This switch is used to start the engine.

OFF position: OFF

At this position, the starting switch key can be inserted or removed. When the switch is turned to this position, the electrical circuits are switched off.

ON position: ON

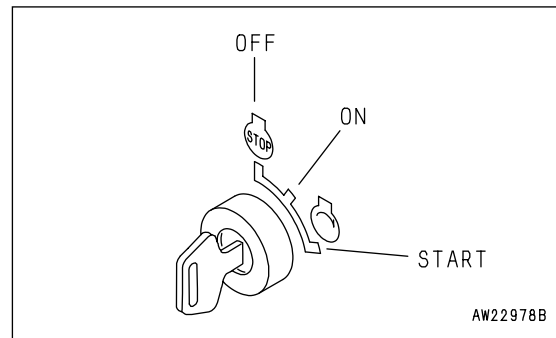
In this position, electric current flows in the charging and lamp circuits.

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

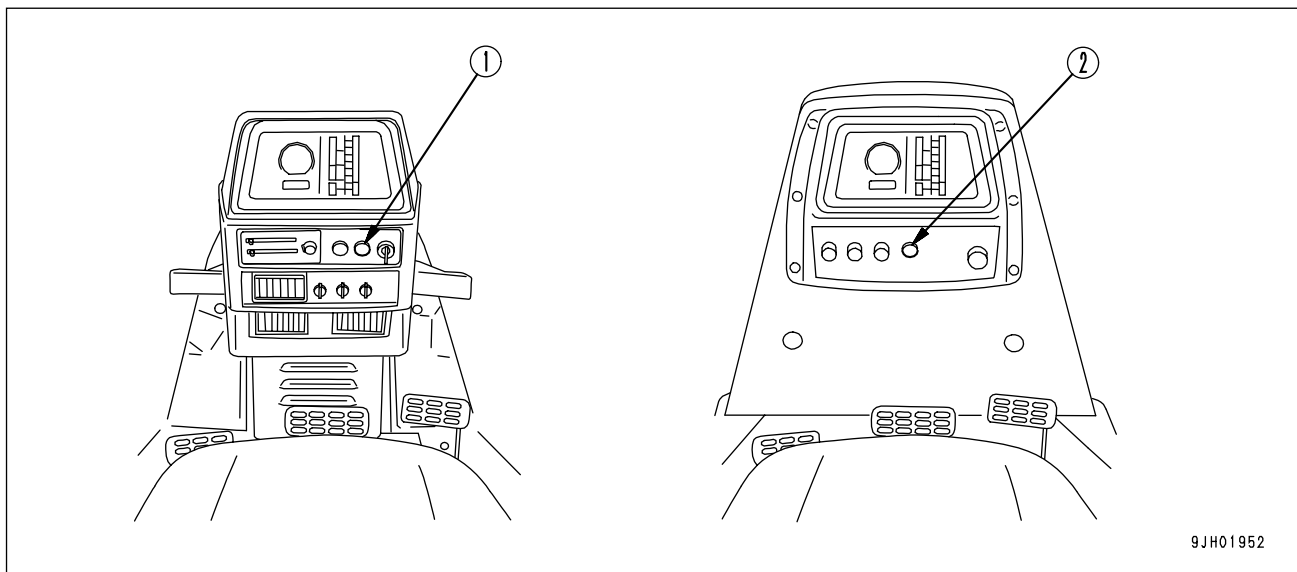
START position: START

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

Do not turn the starting switch key to the START position while the engine is running.



ALARM LAMPS



(1) Alarm lamp on machine equipped with cab

(2) Alarm lamp on machine equipped with canopy

NOTICE

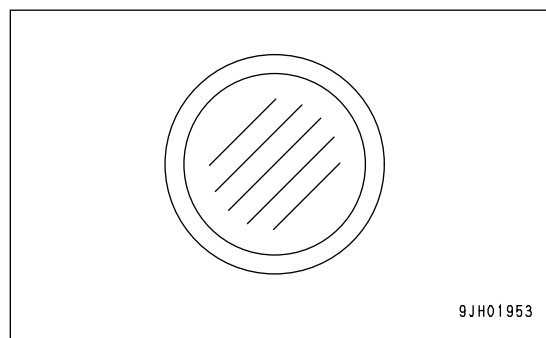
If the alarm buzzer sounds, immediately stop the operation, then check and repair the corresponding portion.

ALARM LAMPS

The alarm lamps (1) and (2) flash when the following caution lamps flash.

- Engine water temperature caution lamp
- Engine oil pressure caution lamp
- Power train oil temperature caution lamp
- HSS oil pressure caution lamp
- HSS charge pressure caution lamp

These lamps (1) and (2) also flash when one of the abnormality codes E02, CALL03, and CALL is displayed on the service meter.

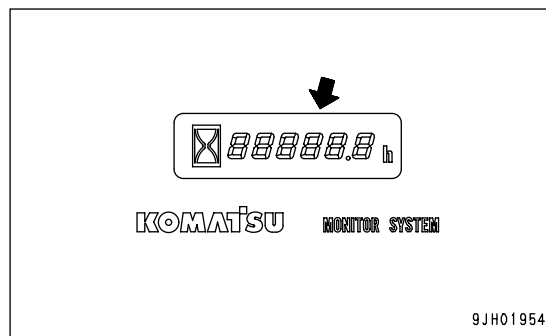


REMARK

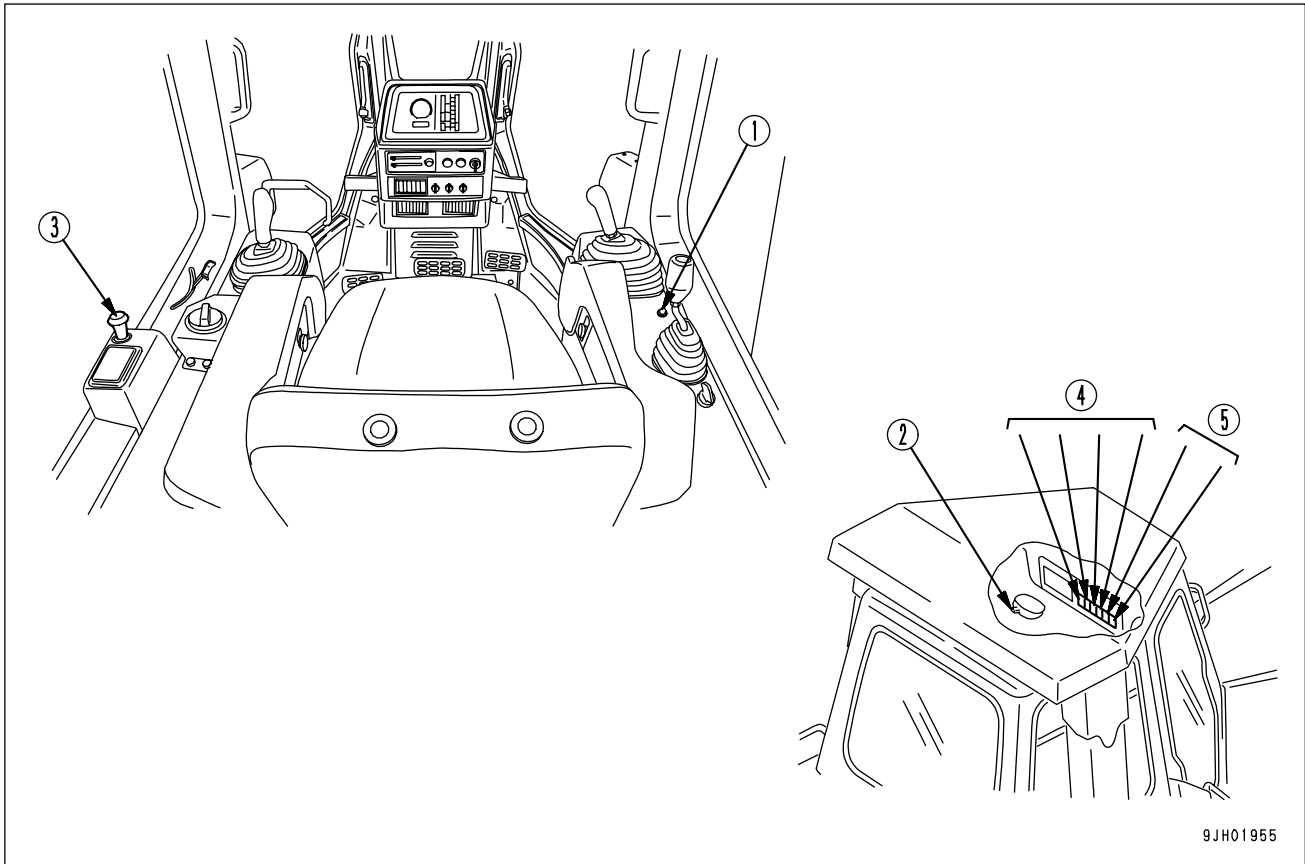
The alarm buzzer sounds in the following cases:

- When the engine water temperature is abnormally high
- When the engine oil pressure is abnormally low
- When the power train oil temperature is abnormally high
- When the HSS oil temperature is abnormally high
- When the HSS oil temperature is abnormally low
- Abnormality code E02, CALL03, or CALL is displayed on the service meter.

When the key in starting switch is turned to the ON position, the buzzer sounds for about 1 second, but this is to check the function of the buzzer. It does not indicate any abnormality.



SWITCHES



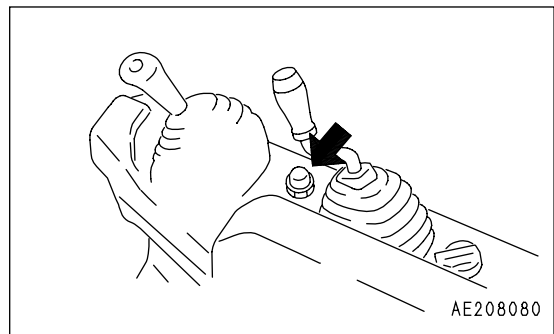
9JH01955

The sketch shows the D155AX-5 (with cab, monitor panel specification).

- (1) Horn switch
- (2) Room lamp switch (machines equipped with cab)
- (3) Cigarette lighter (machines equipped with cab)
- (4) Wiper switch (machines equipped with cab)
- (5) Additional working lamp switch (machines equipped with cab)

HORN SWITCH

The horn sounds when the button (1) at the rear of the blade control lever at the right side of the operator's seat is pressed.



AE208080

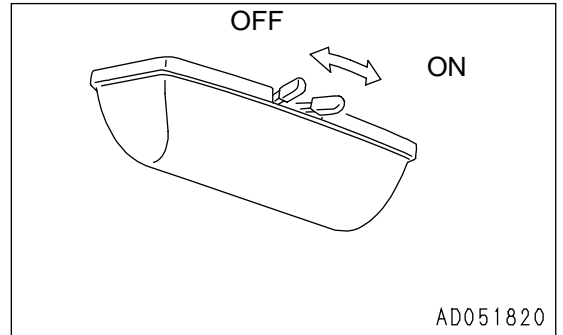
ROOM LAMP SWITCH

(MACHINES EQUIPPED WITH CAB)

This switch (2) lights up the room lamp.

ON position: Lamp lights up

OFF position: Lamp is out



CIGARETTE LIGHTER

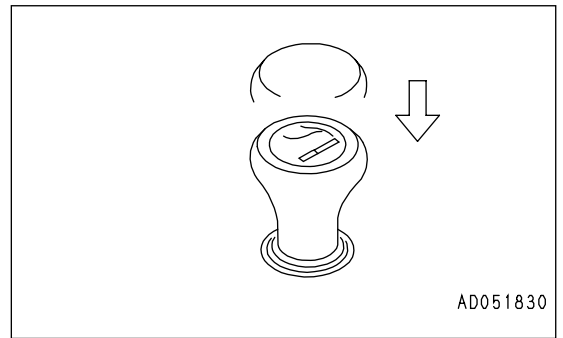
(MACHINES EQUIPPED WITH CAB)

This switch (3) is used to light igarettes.

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

NOTICE

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



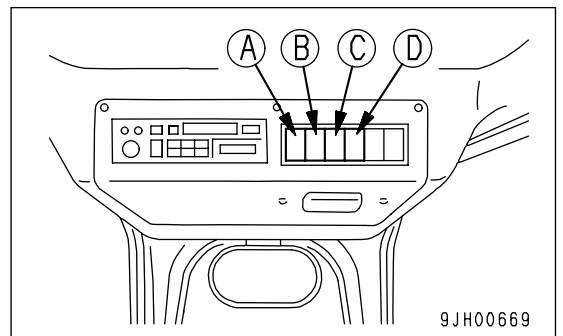
WIPER SWITCH

(MACHINES EQUIPPED WITH CAB)

This switch (4) activates the wipers.

The wiper switches are as follows.

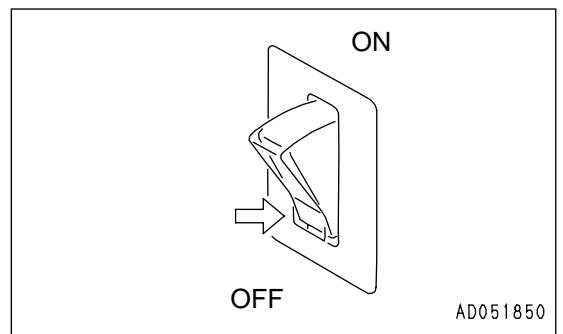
- (A) Left door
- (B) Front window
- (C) Right door
- (D) Rear window



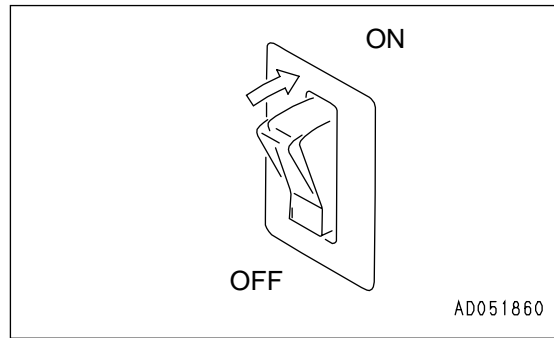
This is also used as the window washer switch.

The switch is operated as follows.

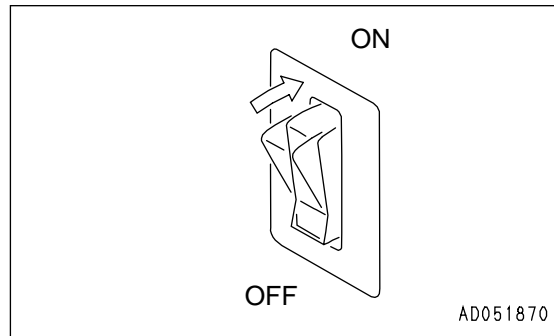
- Window washer only
Keep the switch pressed to the OFF position to spray out water.



- Wiper only
If this is switched on, the wiper will start.



- Wiper and window washer
If this is kept pressed to the ON position while the wiper is working, water will be sprayed out.



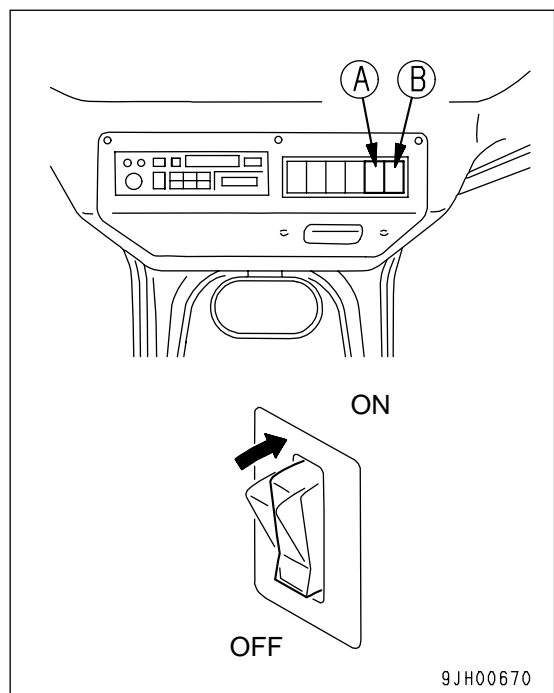
ADDITIONAL WORKING LAMP SWITCH

(MACHINES EQUIPPED WITH CAB) (OPTION)

This switch (5) is used to turn on the additional working lamp.

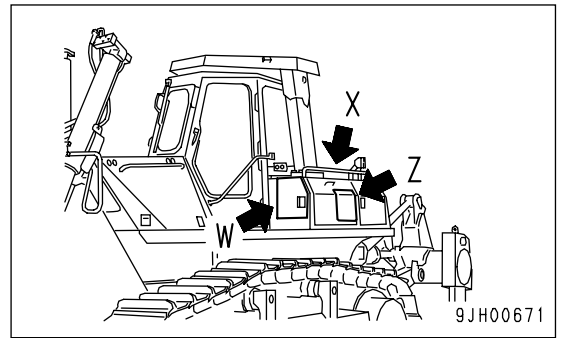
- (A) Head lamp switch
- (B) Rear lamp switch

Push in the direction of the arrow to turn on the lamps.

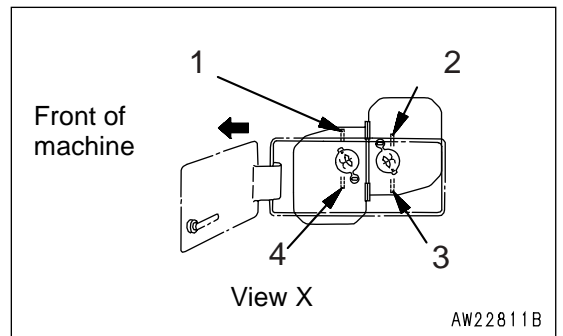


REMARK

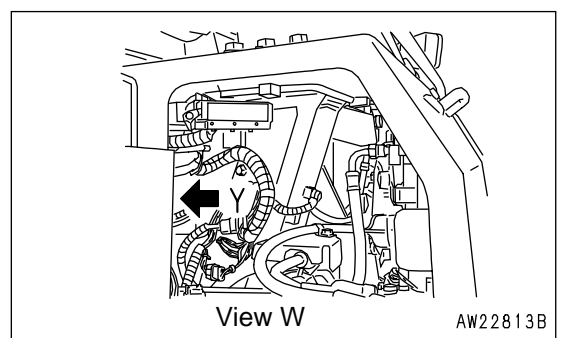
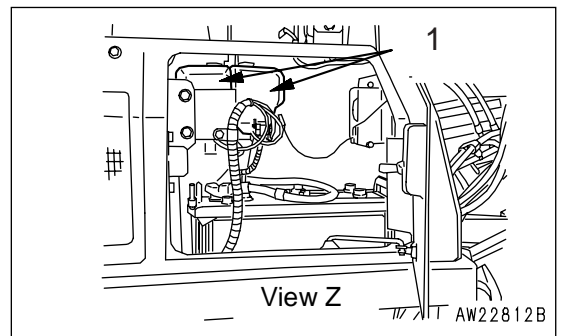
- When installing the cab, check the colors of the washer tank and window washer hoses, and be sure to connect correctly.
- When installing the cab, please contact your Komatsu distributor for installation.



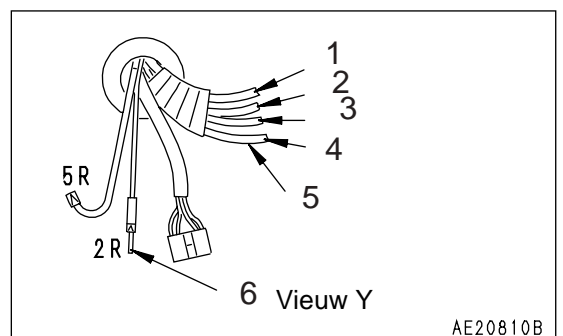
View X	
(1) For right door (red)	(3) For left door (blue)
(2) For front window (colorless)	(4) For rear window (black)



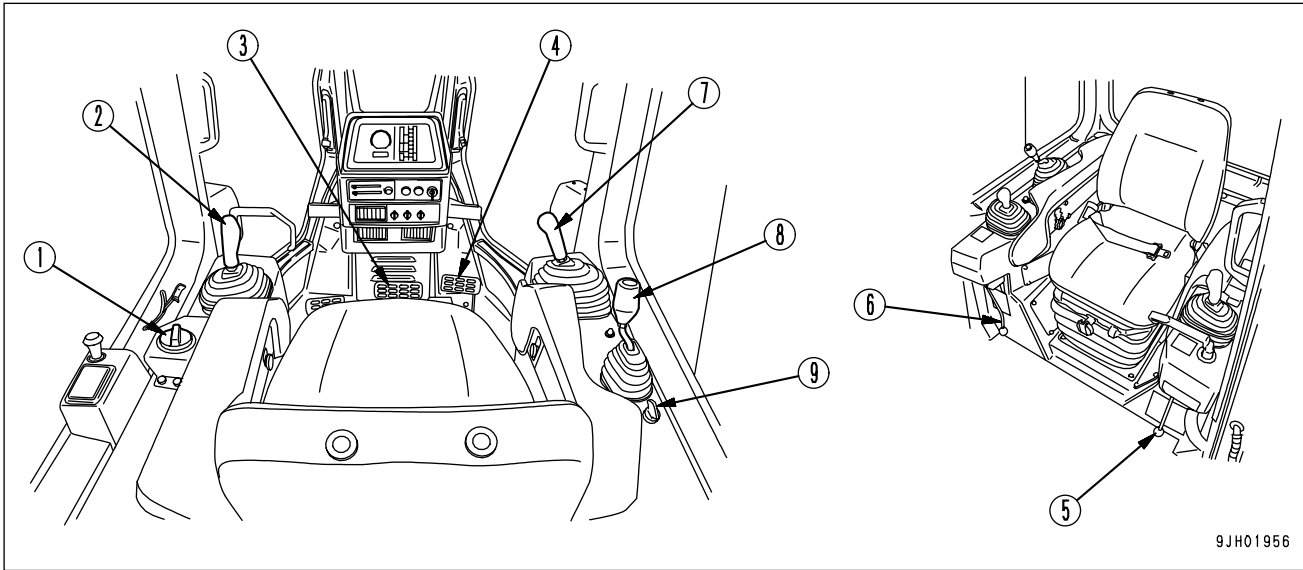
View Z	
(1)	Washer tank



View Y	
(1) Red - Right door	(4) Colorless - Front window
(2) Blue - Left door	(5) Washer tube
(3) Black - Rear window	(6) From hose box red (back up power source)



CONTROL LEVERS, PEDALS, DIAL



- | | |
|---|---|
| (1) Fuel control dial | (6) Safety lever |
| (2) Joystick (Steering, directional and gear shift lever) | (for blade control lever, ripper control lever) |
| (3) Brake pedal | (7) Blade control lever |
| (4) Deceleration pedal | (8) Ripper control lever |
| (5) Parking lever | (9) Pin puller control switch (if equipped) |

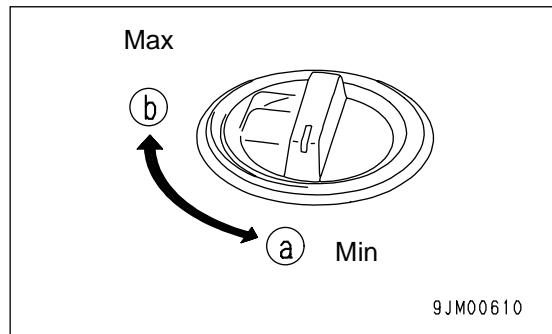
FUEL CONTROL DIAL

This dial (1) is used to control the engine speed and output.

- (a) Low idling position: Turn fully to the left
- (b) High idling position: Turn fully to the right

REMARK

Turn the starting switch key to OFF position to stop the engine.



JOYSTICK

(STEERING, DIRECTIONAL AND GEAR SHIFT LEVER)

This lever (2) is used to switch between forward and reverse to steer and gear shift the machine or carry out counterrotation turns.

- Switching between forward and reverse

Position (a) : FORWARD

Position (b) : REVERSE

Position N : Neutral

- Steering operations

Position (L) : Left turn

Position (R) : Right turn

When the lever is pushed forward, the machine will travel forward, and when it is moved back, the machine will travel in reverse.

When the lever is being set to the FORWARD or REVERSE position, if it is moved to the left or right to steer the machine, the machine will turn smoothly in the direction of the lever with a turning angle that matches the amount the lever is moved.

If this lever is operated fully to the left or right, the turning radius will become smaller.

REMARK

- When carrying out turning operations, if the lever is released, it will return to position (a) or (b) and the machine will travel in a straight line.
- During steering operations, if you use the lever guide to support your hand, the turning performance will be improved.

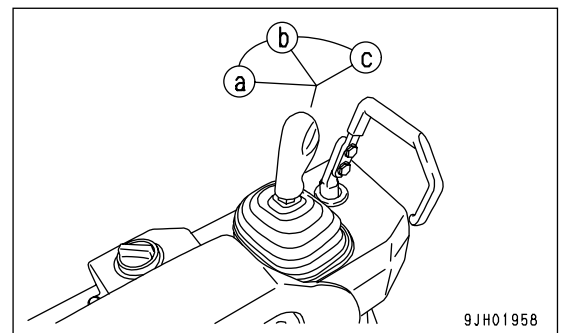
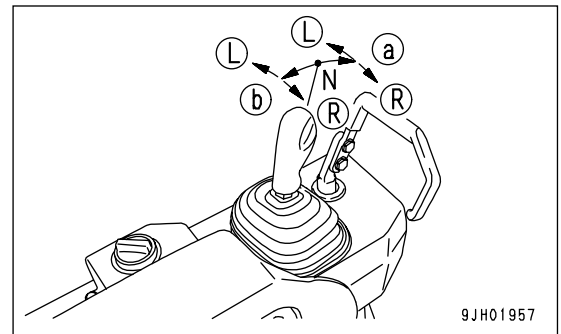
- Gear shifting

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

Position (A) : 1st

Position (B) : 2nd

Position (C) : 3rd

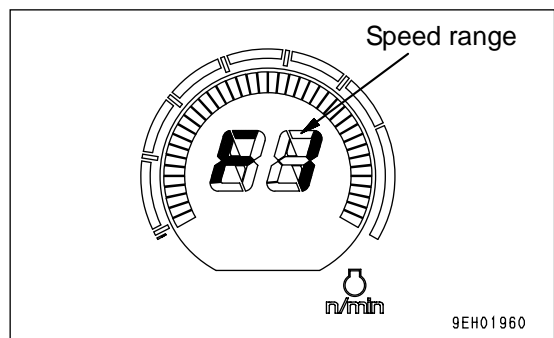


For details of the maximum speed at each speed range, see "SPECIFICATIONS (PAGE 5-2)".



When gear shifting operation is carried out, the display panel A will display the used speed range.

- 1st: F1, R1, or N1 is displayed
- 2nd: F2, R2, or N2 is displayed
- 3rd: F3, R3, or N3 is displayed

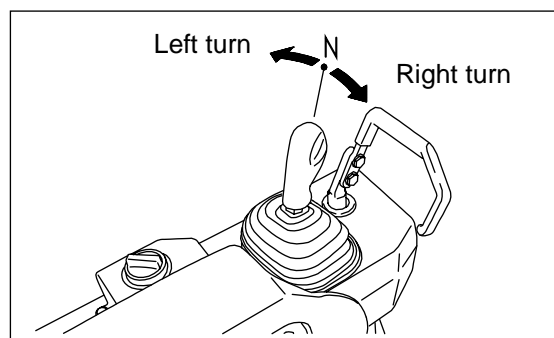


● Counterrotation turn

⚠ WARNING

When carrying out a counterrotation turn, if the load is not equal on the left and right sides, the machine may carry out a pivot turn, so check the ground conditions and be careful not to hit any obstacles.

If the lever is operated partially in the direction of turn with the lever at the (N) position, the left and right tracks will rotate in opposite directions and the machine will turn smoothly on the spot. If the steering lever is operated fully, the speed of the counterrotation turn will increase.

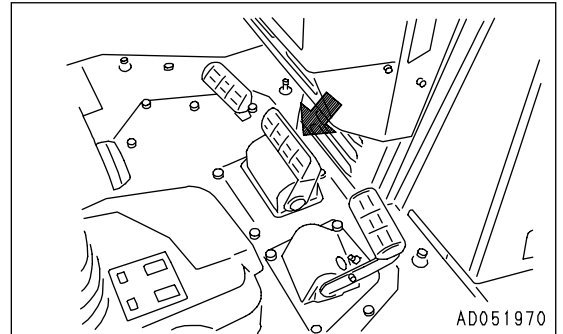


BRAKE PEDAL

⚠ WARNING

Do not place your foot on this pedal unnecessarily.

Depress the pedal (3) to apply the right and left brakes.



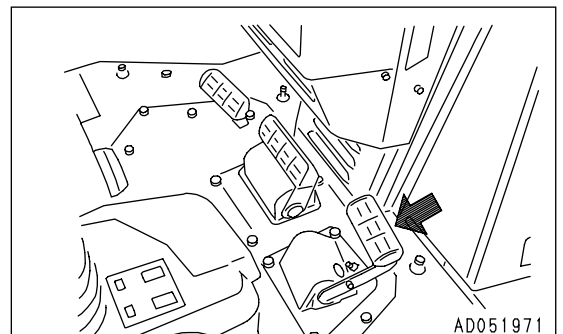
DECELERATION PEDAL

⚠ WARNING

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

This pedal (4) is used for reducing the engine speed or stopping the machine.

Depress this pedal to reduce the speed when shifting between forward and reverse or when stopping the machine.



PARKING LEVER

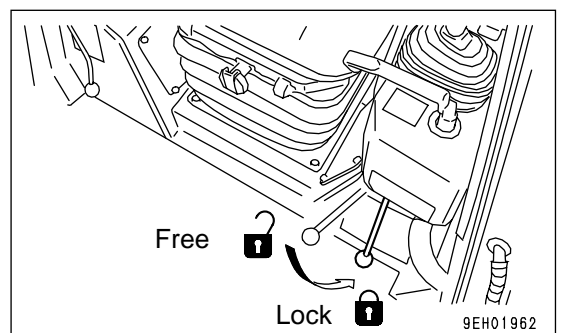
⚠ WARNING

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

This lever (5) is used to apply the parking brake.

REMARK

- If the steering, directional, and gearshift lever is at the FORWARD or REVERSE position and the parking brake lever is operated to the LOCK position, the steering, directional, and gearshift lever is automatically returned to the N position.
- When starting the engine, if the parking lever is not at the lock position, the engine does not start.



SAFETY LEVER

(FOR BLADE CONTROL LEVER, RIPPER CONTROL LEVER)

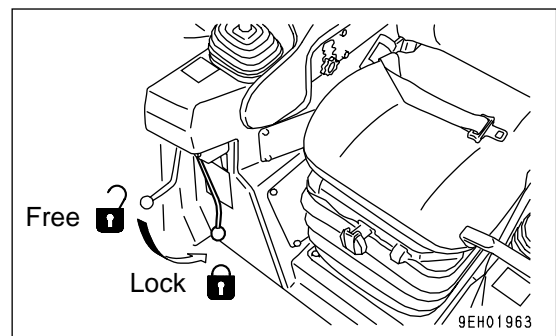
WARNING

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

This safety lever (6) is a device to lock the blade control and ripper control levers.

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

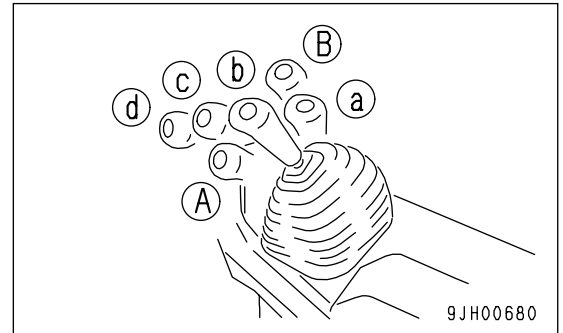
If the blade control lever is at the FLOAT position and the safety lever is set to the LOCK position, the blade control lever is automatically returned to the HOLD position.



BLADE CONTROL LEVER

(POWER TILTDOZER)

This lever (7) is used to raise or tilt the blade.

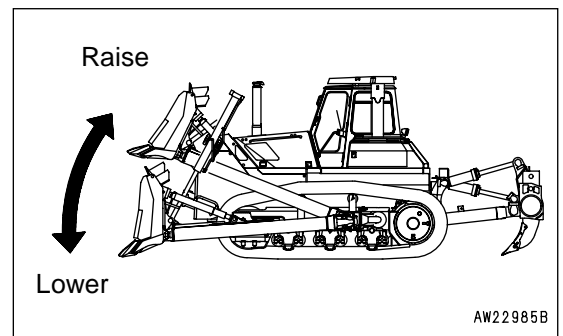


Lifting control

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

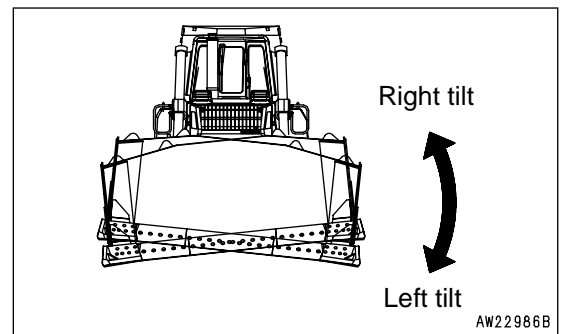
REMARK

- When released from FLOAT position, this lever will not return to HOLD position, so it must be moved back by hand.
- When starting the engine, set the blade control lever to the HOLD position.
If it is at the FLOAT position, the engine will not start.



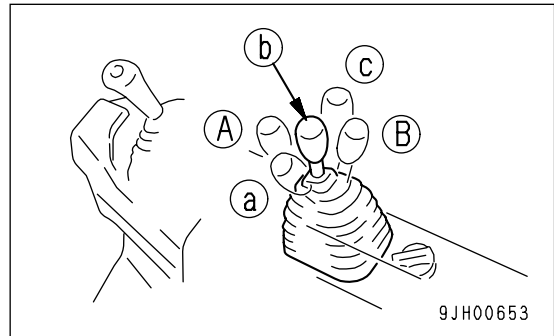
Tilting control

- (A) LEFT TILT
- (B) RIGHT TILT

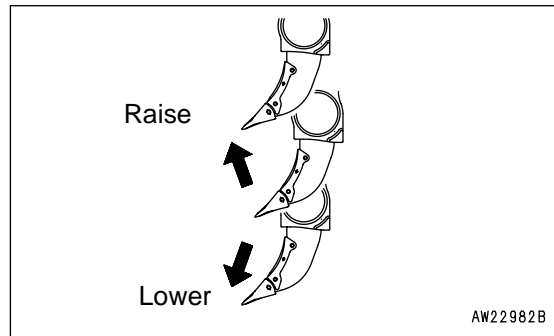


RIPPER CONTROL LEVER

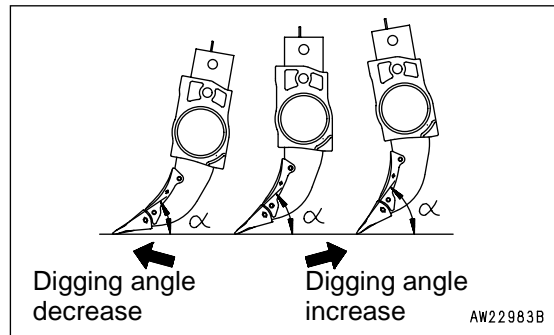
This lever (8) is used to operate the ripper.



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



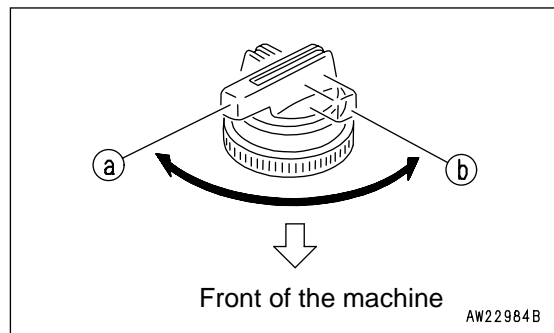
- (A) Digging angle reduced: Cutting angle (α) becomes smaller.
- (B) Digging angle increased: Cutting angle (α) becomes larger.



PIN PULLER CONTROL SWITCH

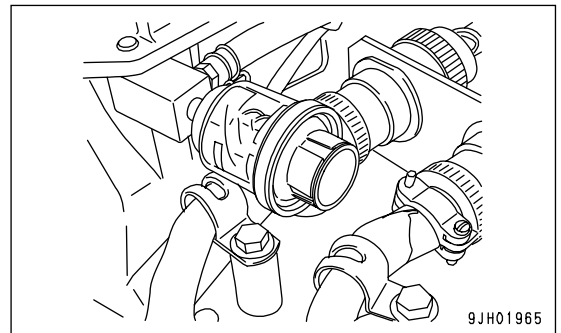
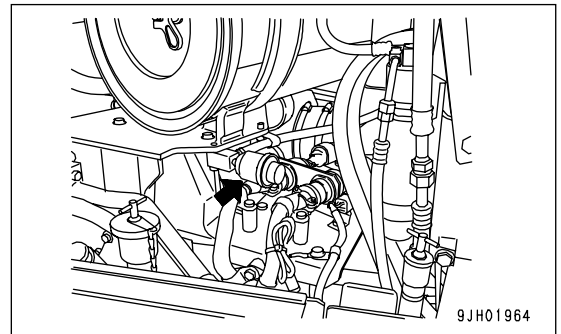
This switch (9) is used to operate the pin puller.

- (1) PULL OUT: Pin is pulled out.
- (2) PUSH IN: Pin is pushed in.



DUST INDICATOR

This device indicates that the air cleaner element is clogged. For details on how to lean the element, see "CHECK, CLEAN AND REPLACE AIR CLEANER ELEMENT (PAGE 4-26)".



POWER SOURCE

The cigarette lighter socket can be used as a power source. The capacity of the cigarette lighter power source is 120 W (24V x 5A).

NOTICE

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

FUSE BOX

NOTICE

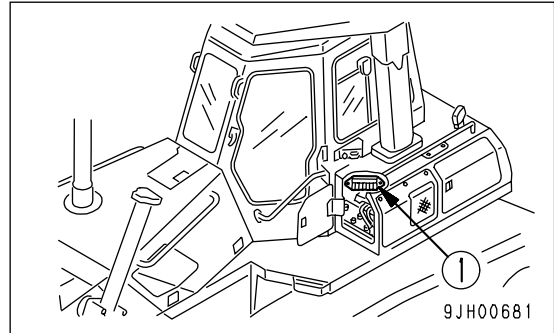
Before replacing a fuse, be sure to turn off the starting switch.

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

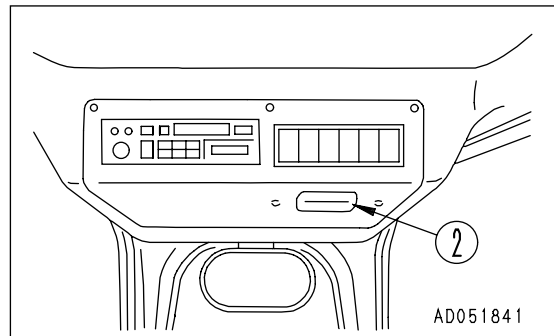
If the fuse becomes corroded, or white powder can be seen, or the fuse is loose in the fuse holder, replace the fuse.

Replace a fuse with another of the same capacity.

- Chassis
When the battery cover is opened, fuse box (1) can be found inside.



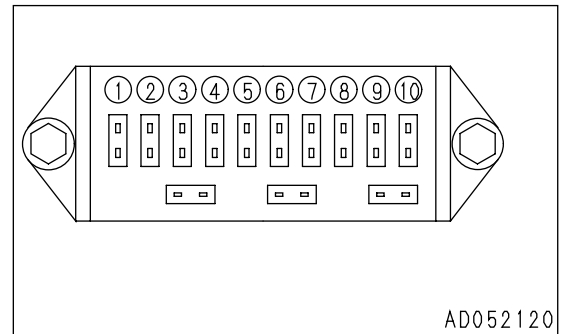
- Cab (machines equipped with cab)
Fuse box (2) is installed at the bottom of the overhead panel.



FUSE CAPACITY AND NAME OF CIRCUIT

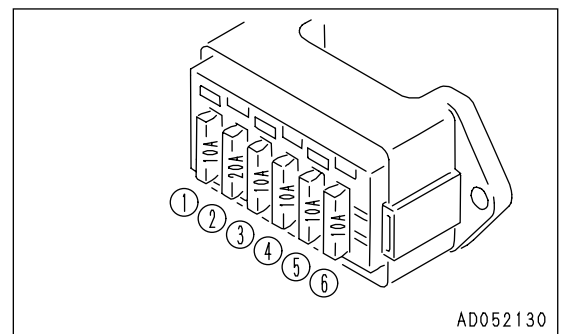
Fuse box (1)

No.	Fuse capacity	Circuit	Remarks
(1)	15 A	Horn, pin puller	
(2)	15 A	Engine	
(3)	20 A	Rear lamp	
(4)	20 A	Front lamp	
(5)	10 A	Controller,HSS	
(6)	15 A	Monitor pannel, alarm buzzer	
(7)	—	—	
(8)	20 A	Air conditioner	
(9)	20 A	Backup alarm	
(10)	10 A	Cab, key switch	Power circuit



Fuse box (2) (machine equipped with cab)

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

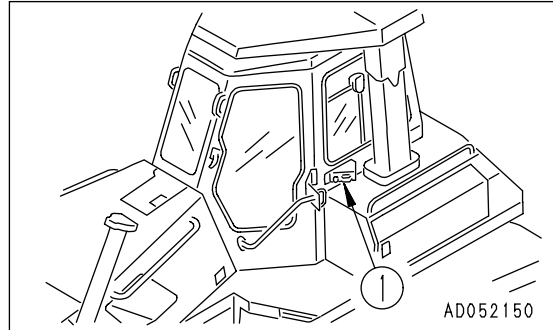


DOOR-OPEN LOCK

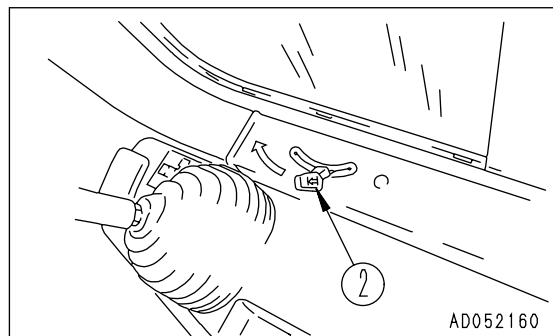
(MACHINES EQUIPPED WITH CAB)

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

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



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



NOTICE

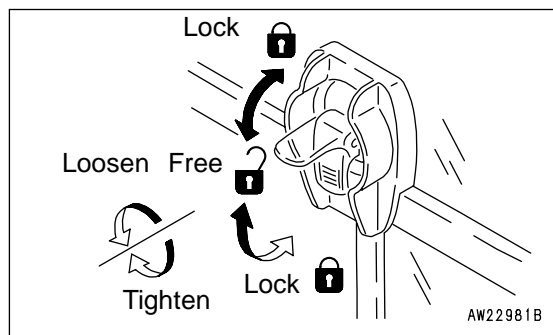
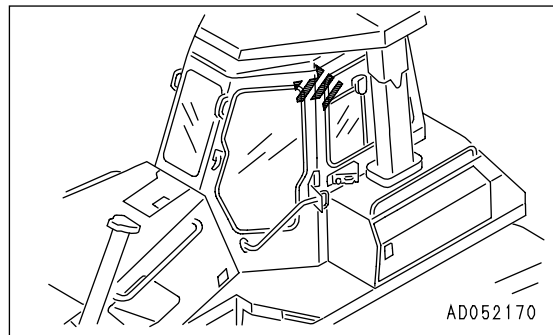
- When keeping the door open, fix it securely to the catch.
- Always close the door when traveling or carrying out operations. Leaving the door open will cause the door to break.
- Keep the door locked open securely. The door may swing closed because of the vibration.

SASH GLASS INTERMEDIATE LOCK

(MACHINES EQUIPPED WITH CAB)

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

- When the lever is at the FREE position, the glass can be opened or closed.
- When the lever is moved to the LOCK (up or down) position, the glass is fixed in position.
- If the glass is not held securely, set the lever in the FREE position and rotate clockwise to strengthen the holding power.
- To reduce the holding power, turn counterclockwise.

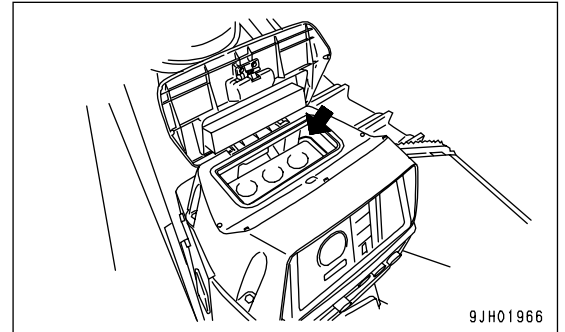


HOT AND COOL BOX

(MACHINES EQUIPPED WITH CAB)

This is at the top of the front panel. It can be used to warm or cool three canned drinks.

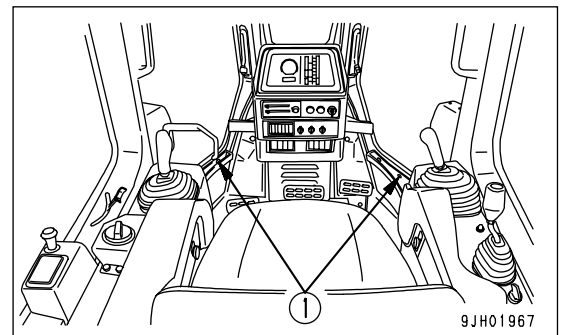
This is interconnected with the air conditioner: During heating, it warms up the drinks; during cooling, it cools down the drinks.



DOOR POCKET

(MACHINES EQUIPPED WITH CAB)

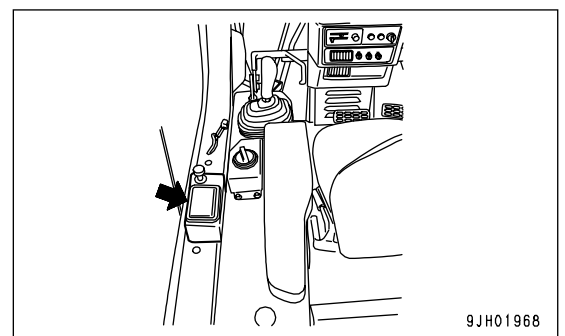
These are on the inside of the left and right doors, and can be used for keeping things. However, do not put tools or other heavy objects in the pocket. If the pocket becomes dirty, turn three clips (1), remove the pocket and wash it.



ASHTRAY

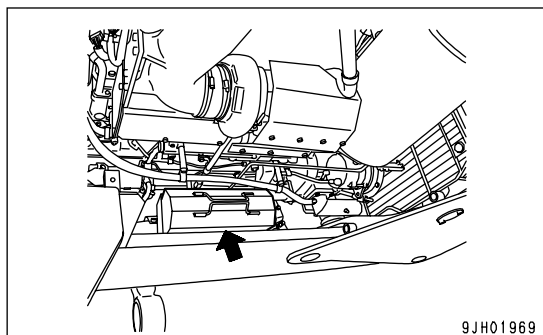
(MACHINES EQUIPPED WITH CAB)

This is on the left side of the operator's seat. Always make sure that you extinguish the cigarette before closing the lid.



TOOL BOX

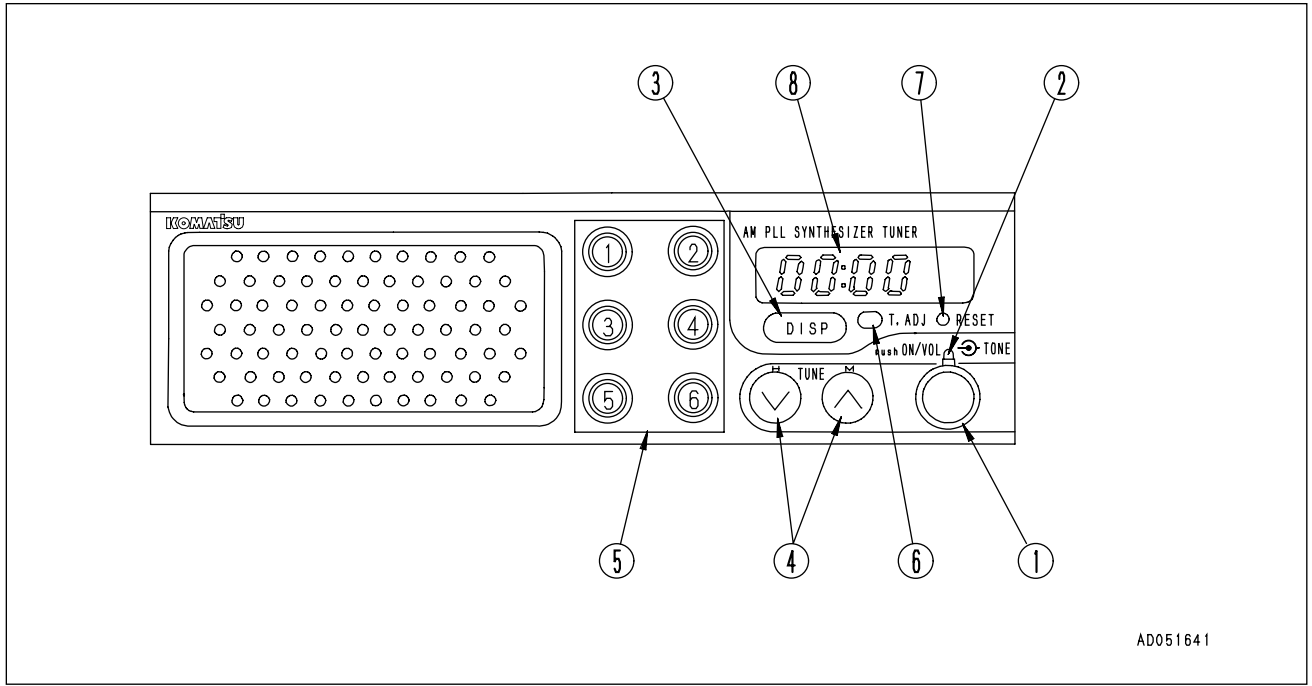
This is inside the right engine side cover.
It is used for storing tools.



USING CAR RADIO

(MACHINES EQUIPPED WITH CAB, CAR RADIO)

EXPLANATION OF PARTS



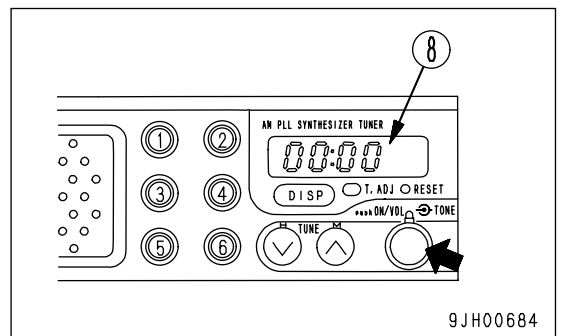
AD051641

- | | |
|--|--------------------------------------|
| (1) Power switch/volume control knob (push ON/VOL) | (5) Preset button (1, 2, 3, 4, 5, 6) |
| (2) Tone control knob (TONE) | (6) Time adjustment button (T, ADJ) |
| (3) Display button (DISP) | (7) Time reset button (RESET) |
| (4) Tuning/hour, min adjustment button (TUNE) | (8) Display |

POWER SWITCH/VOLUME CONTROL KNOB (PUSH ON/VOL)

Push this knob (1) to switch the radio on. The lighting in display area (8) will light up and the frequency will be displayed. Press again to switch the power off.

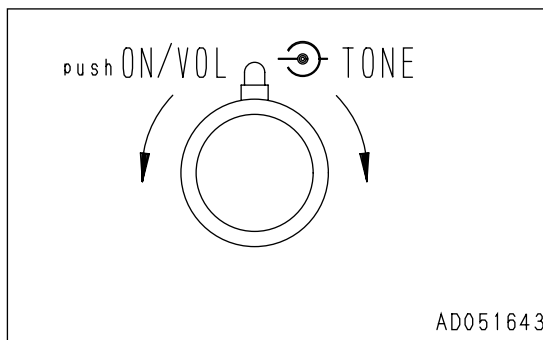
Turn the knob clockwise to increase the sound, and counter-clockwise to reduce it.



9JH00684

TONE CONTROL KNOB (TONE)

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



AD051643

DISPLAY BUTTON (DISP)

If the display button (3) is pressed when the radio is being used, the frequency of the station being listened to is displayed for 5 seconds.



AD051644

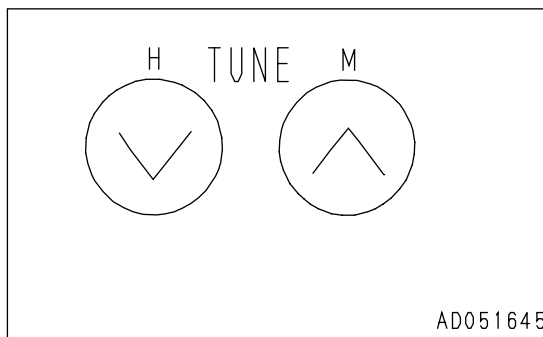
TUNING/HOUR, MIN ADJUSTMENT BUTTON (TUNE)

This button (4) is used to select the station or change the frequency.

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

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

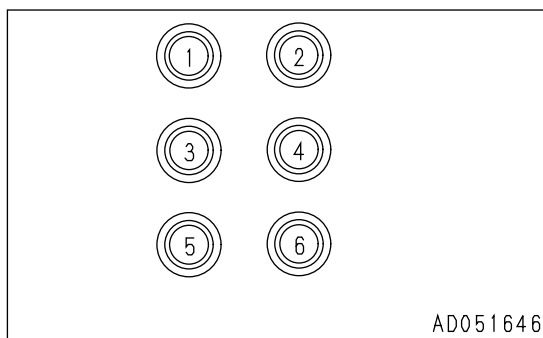
When adjusting the time, these change the hour display and minute display.



AD051645

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

These buttons (5) can be used to program the desired broadcasting stations. It is then possible to select the station at a touch.



AD051646

TIME ADJUSTMENT BUTTON (T, ADJ)

Press this button (6) to adjust the time.



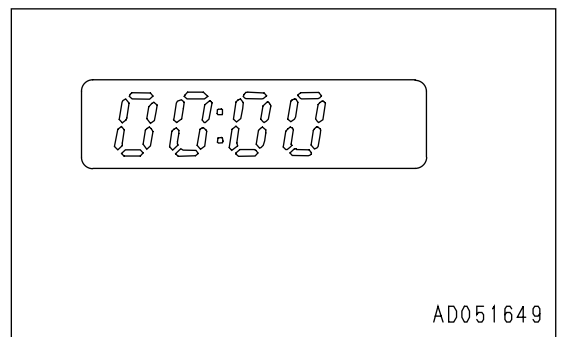
TIME RESET BUTTON (RESET)

Press this button (7) to reset to the exact hour.



DISPLAY

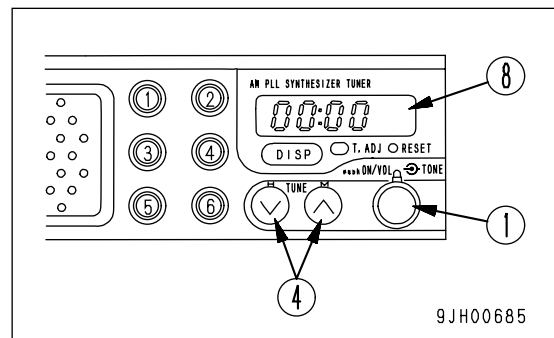
This display (8) displays the frequency, time, and preset symbols.



METHOD OF USE

Method of setting preset buttons

1. Press power switch (1). The frequency is displayed in display area (8).
2. Use selector button (4) (∧ or ∨) to adjust to the desired frequency.
3. Choose a preset button to use for this station, and keep it pressed for at least 2 seconds to program the button to that frequency.



When the sound suddenly disappears and appears again, the button is programmed, and the preset number is shown in display area (8) .

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

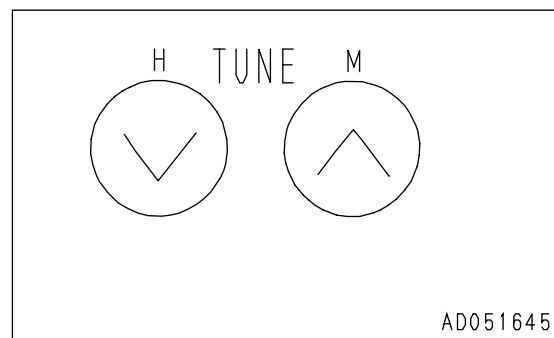
It is possible to program one station for each preset button.

Method of manual tuning

Press the tuning button lightly to adjust to the desired frequency.

Each time the button is pressed, the frequency will change by 9 kHz.

- ∧ button: Select station at higher frequency
- ∨ button: Select station at lower frequency



Method of automatic tuning

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

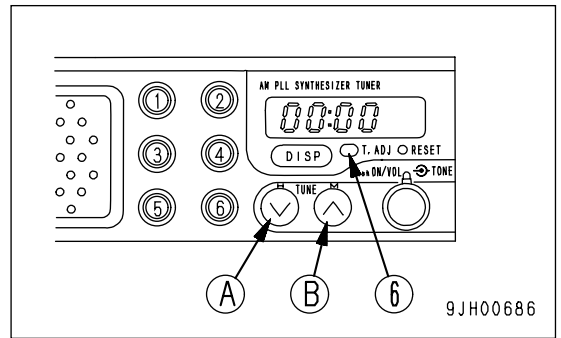
When searching for the next station, keep the selector button pressed again for at least 2 seconds.

- ∧ button: Select station at higher frequency
- ∨ button: Select station at lower frequency

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

Adjusting time

1. Keep T.ADJ button (6) pressed, and press H button (A). The hour display will change, so when it reaches the correct hour, release the button.
2. Keep T.ADJ button (6) pressed and press M button (B). The minute display will change, so when it reaches the correct time, release the button.



Method of using RESET button

If RESET button (7) is pressed at the same time as the time signal or standard time, the display will return immediately to the exact hour (○ hour 00 min).

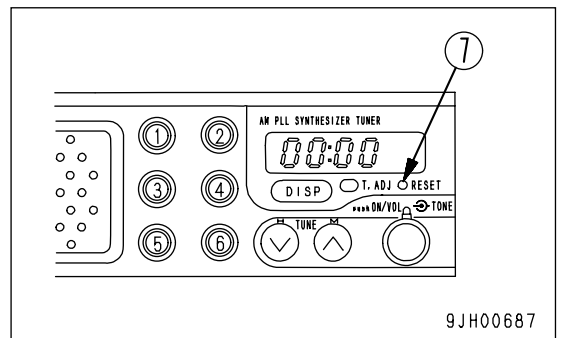
If the display is 01 - 29 min, the display will go back to 0 min.

If the display is 30 - 59 min, the display will advance to 0 min.

[Example]

10:29 to 10:00 (return to exact hour)

10:30 to 11:00 (advances to exact hour)

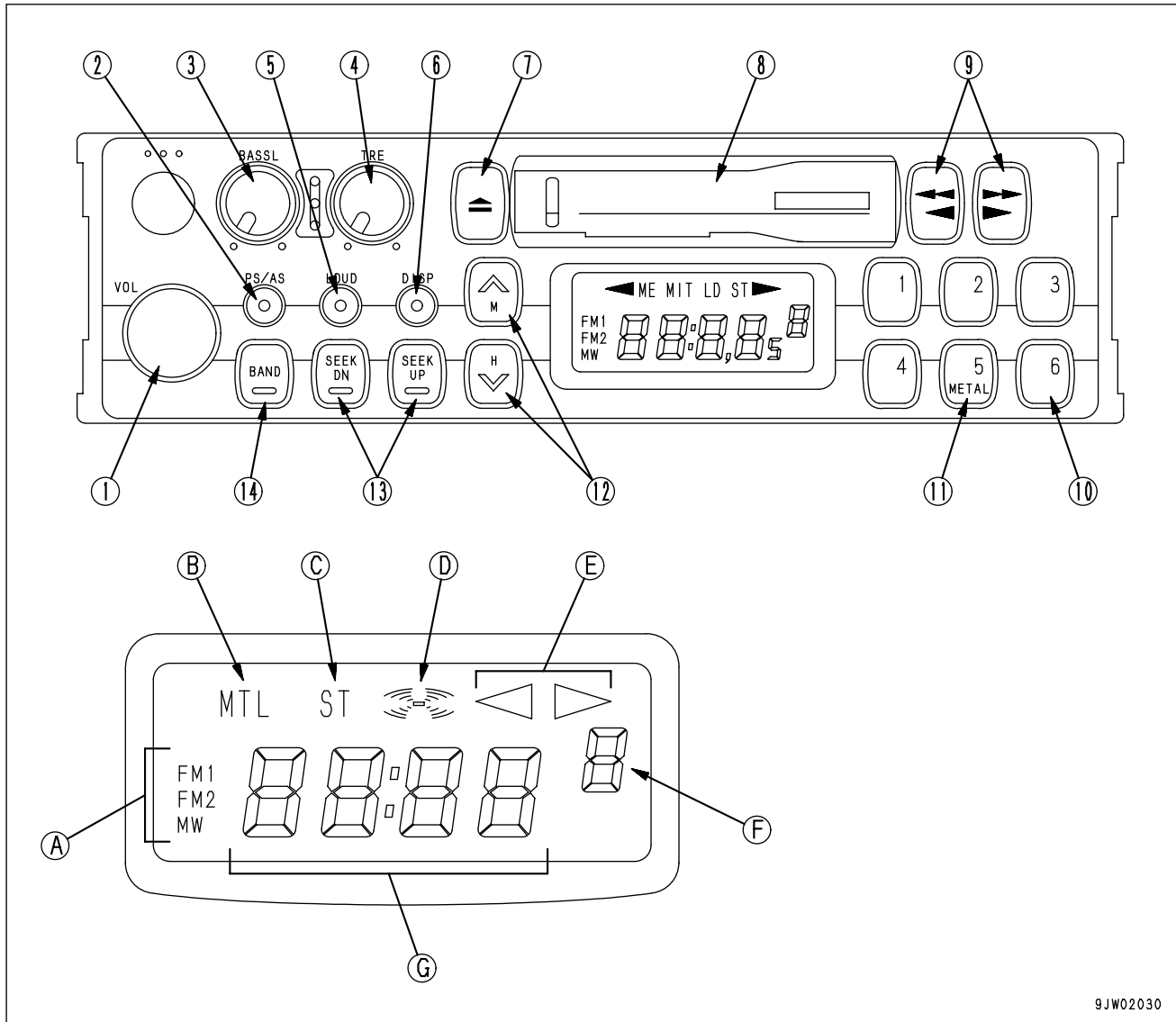


PRECAUTIONS WHEN USING

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

AM/FM RADIO

EXPLANATION OF COMPONENTS

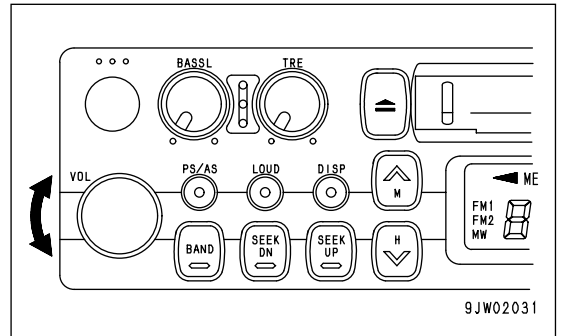


9JW02030

- | | |
|--|---------------------------------|
| (1) Power switch/volume | (8) Cassette door |
| (2) Auto-store/preset scan button | (9) Fast forward,rewind buttons |
| (3) Bass control knob | (10) Preset buttons |
| (4) Treble control knob | (11) Metal tape button |
| (5) Loudness button | (12) Manual tuning buttons |
| (6) Time/radio display selector button | (13) Seek tuning buttons |
| (7) Tape eject button | (14) Band selector button |
-
- | | |
|---------------------------------|----------------------------|
| (A) Band display | (E) Tape direction display |
| (B) Metal tape display | (F) Preset channel display |
| (C) FM stereo reception display | (G) Time/frequency display |
| (D) Loudness display | |

POWER SWITCH/VOLUME

Turn this knob (1) to the right until it clicks to turn the power on. Turn it further to increase the volume.



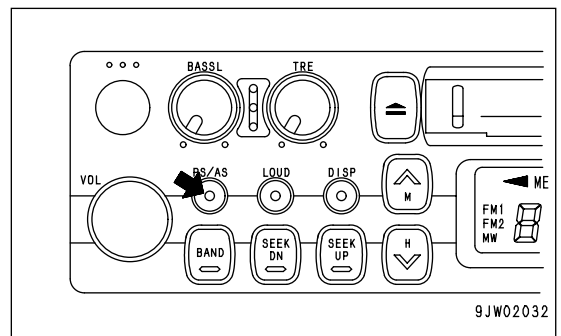
AUTO-STORE/PRESET SCAN BUTTON

Use this button (2) to actuate the preset scan and auto-store functions.

● **Auto-store**

If this button is pressed for at least 2 seconds during radio reception, the system will automatically search for radio stations within the same band and will store the frequency in the preset memory. During this operation, the channel display on the right side of the display will change.

This shows that the frequency is being saved to each memory channel.



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 2 seconds during radio reception, the stations preset in the present reception band are broadcast for 5 seconds each from No.1 to No.6.

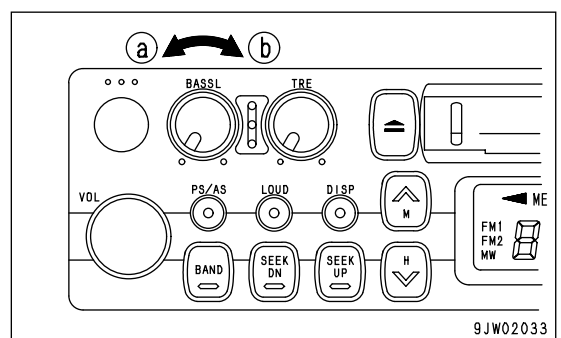
To listen to the desired station, press the button again. After the preset scan operation is completed, it will return to normal broadcasting.

BASS CONTROL KNOB

Turn this knob (3) to the left to reduce the low tones; turn it to the right to emphasize the low tones.

Direction (a): Low tone reduced

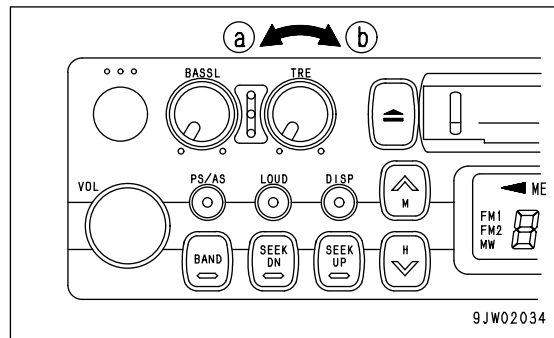
Direction (b): Low tone emphasized



TREBLE CONTROL KNOB

Turn this button (4) to the left to reduce the low tones; turn it to the right to emphasize the high tones.

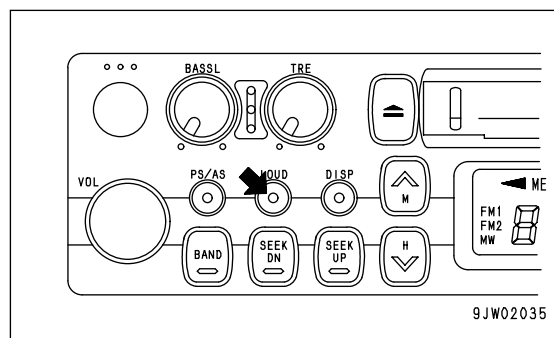
- Direction (a): High tone reduced
- Direction (b): High tone emphasized



LOUDNESS BUTTON

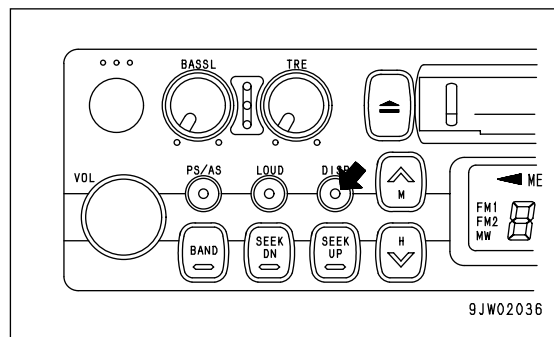
This button (5) is used when playing at low volume. It makes it possible to hear more easily by emphasizing the low tone when it is felt that the low tones are weak.

- Push button: Actuated (ON)
- Push button again: Canceled (OFF)



TIME/RADIO DISPLAY SELECTOR BUTTON

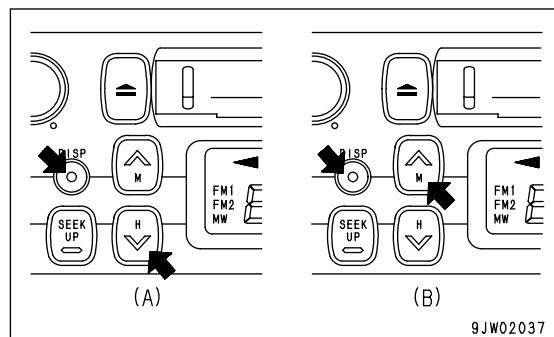
This button (6) is used to switch between the "Radio/tape display" and the "Time display".



● Correcting time

Press the button to set to the time display.

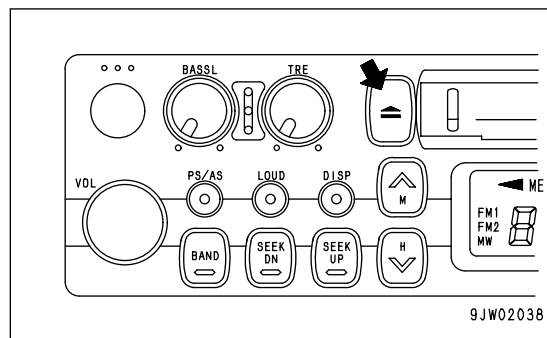
- (A) Correcting hour: Keep the DISP button pressed and press the bottom tuning button (H) to correct the hour.
- (B) Correcting minute: Keep the DISP button pressed and press the top tuning button (M) to correct the minute.



TAPE EJECT BUTTON

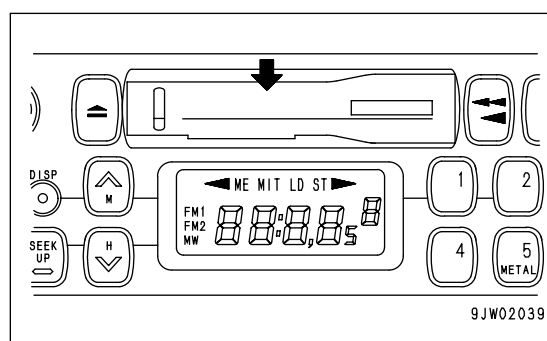
This button (7) is used to stop the tape and to eject the cassette.

When this button is pressed, the tape is ejected and the 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).



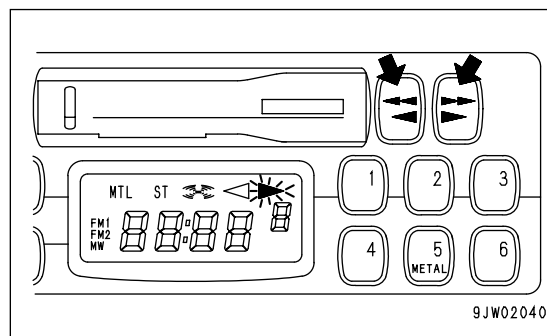
FAST FORWARD, REWIND BUTTONS

These buttons (9) are used to fast forward or rewind the tape.

- **Fast forward/rewind**

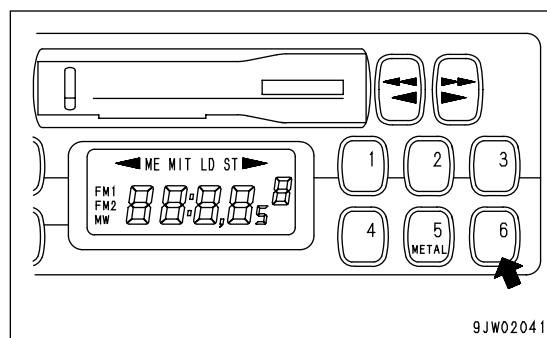
If you press the button pointing in the same direction as the arrow indicating the direction of play, the tape will be fast forwarded; if you press the button pointing in the opposite direction, the tape will be rewound.

To stop the tape, lightly press the button that is not locked. The fast forward or rewind operation will be canceled.



PRESET BUTTONS

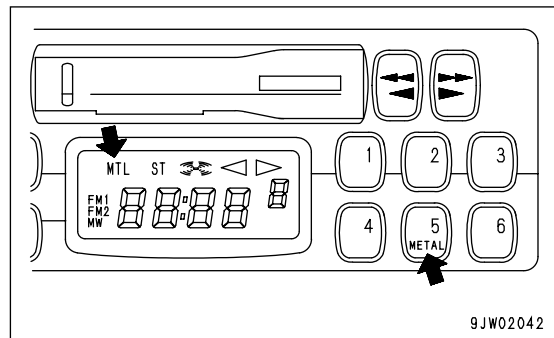
These buttons (10) are used to call up the broadcast station frequencies preset in memory for each of buttons No.1 to No.6. It is possible to preset 18 stations (FM:12; AM:6)with these buttons.



METAL TAPE BUTTON

(used also for preset button No.5)

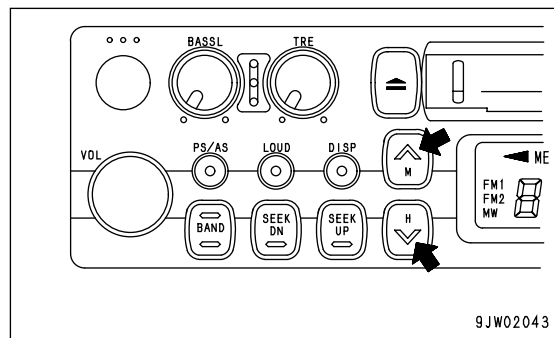
This button (11) is used when playing a metal or chrome tape. This button is used also for preset button No.5. When it is pressed, "MTL" appears on the display.



MANUAL TUNING BUTTONS

When the \wedge button of button (12) is pressed, the frequency goes up 9 kHz for AM or 0.1 MHz for FM; when the \vee button of button is pressed, the frequency goes down 9 kHz for AM or 0.1 MHz for FM.

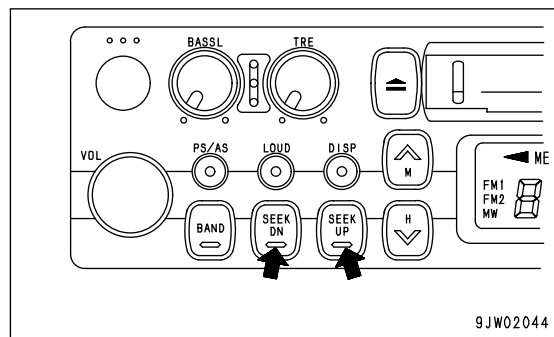
If the button is kept pressed, the frequency will change continuously.



SEEK TUNING BUTTONS

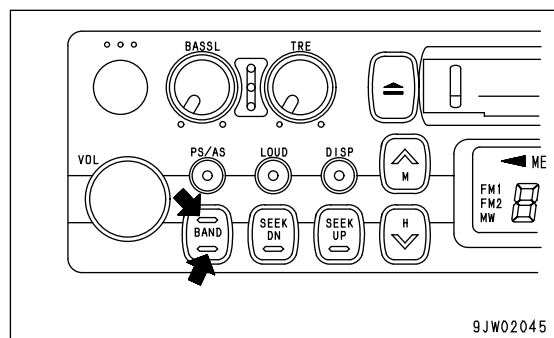
When the "SEEK UP" button of button (13) is pressed, the frequency automatically goes up; when the "SEEK DOWN" button of button is pressed, the frequency automatically goes down.

When the next station that can be received is found, it automatically stops.



BAND SELECTOR BUTTON

When this button (14) is pressed, the band is switched between FM1, FM2, and MW(AM). The band is shown on the display.



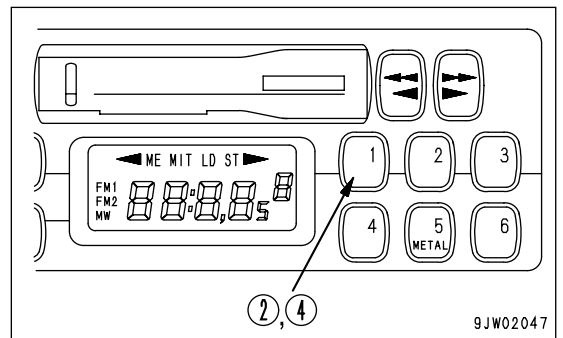
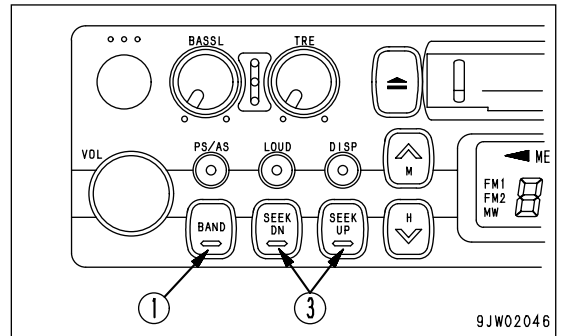
METHOD OF OPERATION

METHOD OF SETTING PRESET BUTTONS

To listen to a preset station, use band selector button (1) to select AM, FM1, or FM2, then press the preset switch number to listen to the desired station.

It is possible to preset six AM stations and 12 FM stations (FM1:6, FM2:6).

1. If you are playing a cassette, press the tape eject button to stop the tape.
2. Select the station to be preset.
Use band selector button (1) to select MW (AM), FM1, or FM2, then use the manual tuning button to select the frequency of the broadcasting station.
3. Press manual memory button (2) or seek tuning button (3).
4. Press preset button (4) of the number to be preset for 2 seconds while the frequency display is being shown on the display. (The preset channel and frequency are displayed and the presetting is completed).
5. Repeat Steps 2 to 4 to preset other stations.

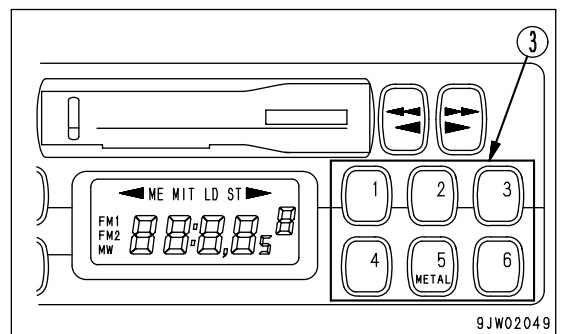
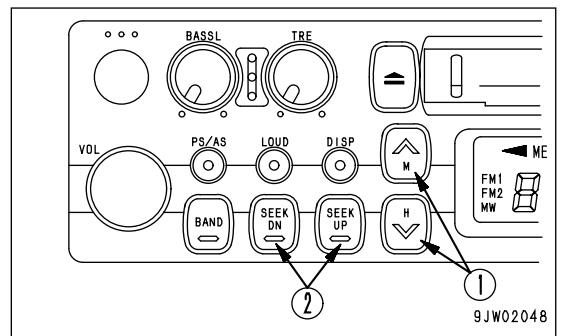


REMARK

- Use Steps 2 to 4 also 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, so preset the stations again.

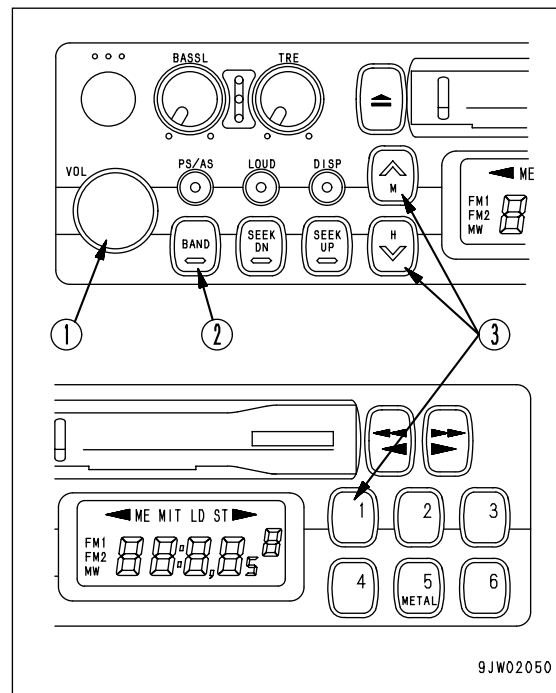
MANUAL MEMORY BUTTON

Select the station to be preset with manual tuning button (1) or seek tuning button (2), then keep button No.1 to button No.6 of button (3) pressed for 2 seconds while the frequency is being displayed to preset the station.



LISTENING TO RADIO

1. Turn the starting switch ON, 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).
4. Adjust the volume, balance, and tone as desired.
5. When turning the radio OFF, turn power switch (1) to the left until there is a click.

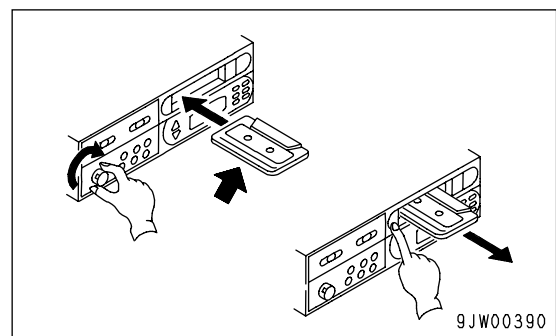
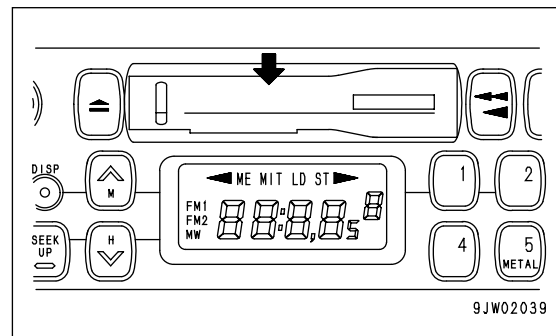


REMARK

- 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.

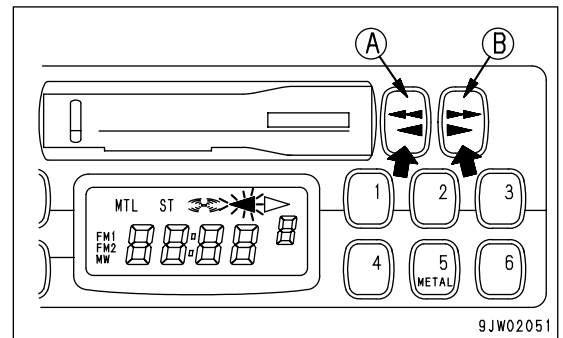
LISTENING TO CASSETTE TAPE

1. Turn the starting switch ON, then turn power switch (1) ON.
2. Set the cassette with the exposed portion of the tape on the right side and push it into the cassette door. The tape will automatically start playing.
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 is automatically reversed and the other side starts to play.
3. When finishing with the tape, press the cassette eject button to eject the tape and automatically switch to the radio.



REVERSING TAPE

When listening to the tape, 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

- Stow the antenna when traveling in places with low overhead clearance.
- To ensure safety during operations, keep the volume at a level where it is possible to hear other machines.
- If water gets inside the speaker case or car radio (auto tuning), it may lead to an unexpected accident. Always be careful not to get water on these parts.
- When cleaning the scales or buttons, never use any solvent such as benzene or thinner. Wipe off the dirt with a soft, dry cloth (soak the cloth in alcohol if the dirt is excessive).

NOTICE

Handling cassette tape

- Clean the tape head approx. once a month with a commercially available head cleaning tape.
- Do not leave the tape in 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 120-minute tapes. The tape is thin and it is easily gets caught up inside the machine.
- If the tape is slack, it easily gets caught up inside the machine. Use a pencil to wind in the tape to remove any slack.
- Do not use any 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.

HANDLING AIR CONDITIONER

(MACHINES EQUIPPED WITH CAB)

COOLING OPERATION

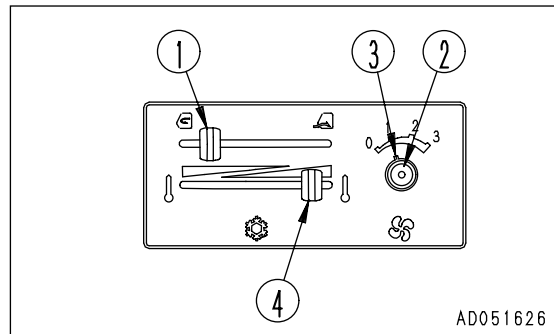
When the cooling operation is carried out, the inside of the cab is cooled, and at the same time the drinks inside the hot and cool box can be cooled.

Cooling (RECIRC)

When the control switch and lever are operated as shown in the diagram, a cool breeze is sent out.

Use this position when strong cooling is needed.

- Press switch (2).
- Place levers (1) and (4) in the position shown in the diagram.
- Set switch (3) to the desired position.



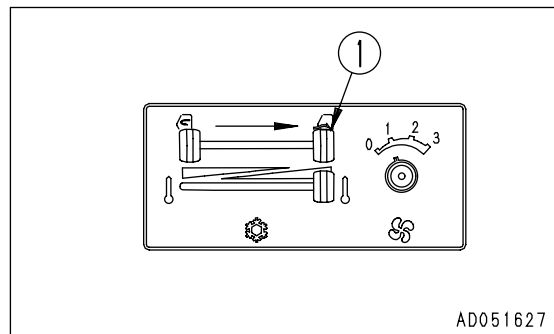
Cooling (FRESH)

If the air inside the cab is no longer fresh, set FRESH/RECIRC selector lever (1) to FRESH to bring in fresh air. Keep the other switches at the same positions as for cooling (RECIRC).

In this position, the inside of the cab is pressurized to prevent the entry of dust.

REMARK

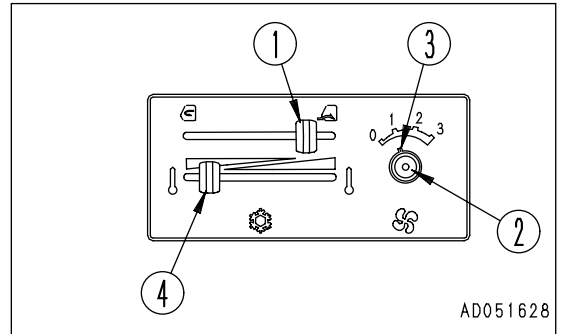
- If the cooling effect is reduced, set FRESH/RECIRC selector lever (1) to RECIRC again. This increases the cooling effect.
- New Freon R134a is used as the refrigerant.
- The tightening torque for the air conditioner gas piping thread is as follows.



Thread size	Tightening torque N•m (kgf•m)
Discharge 22 x 1.5	19.6 to 24.5 (2 to 2.5)
Liquid 16 x 1.5	11.8 to 14.7 (1.2 to 1.5)
Suction 24 x 1.5	29.4 to 24.3 (3 to 3.5)

HEATING OPERATION

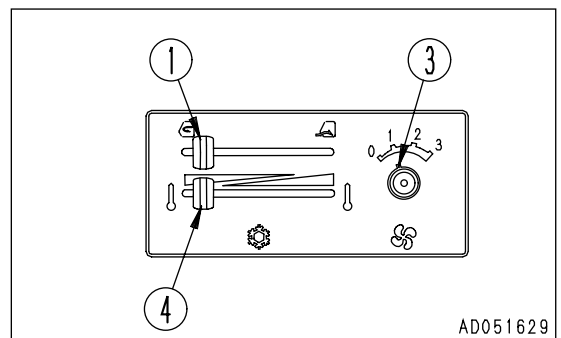
When the heating operation is carried out, the inside of the cab is heated, and at the same time the drinks inside the hot and cool box can be heated.



Heating (RECIRC)

When the control switch and lever are operated as shown in the diagram, warm air is sent out. Use this position when strong cooling is needed.

- Place levers (1) and (4) in the position shown in the diagram.
- Set switch (3) to the desired position.

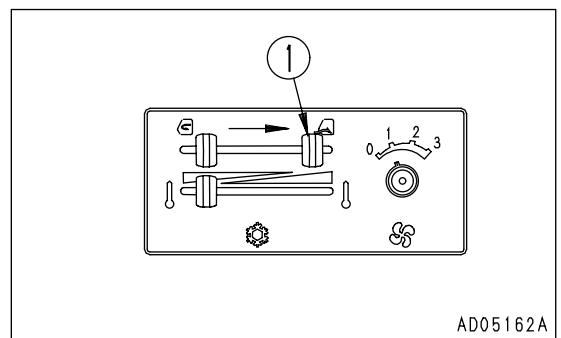


Heating (FRESH)

If the air inside the cab is no longer fresh, set FRESH/RECIRC selector lever (1) to FRESH to bring in fresh air. Keep the other switches at the same positions as for heating (RECIRC). In this position, the inside of the cab is pressurized to prevent the entry of dust.

REMARK

If the cab is not heated up sufficiently, turn FRESH/RECIRC selector lever (1) back to RECIRC. This increases the heating effect.

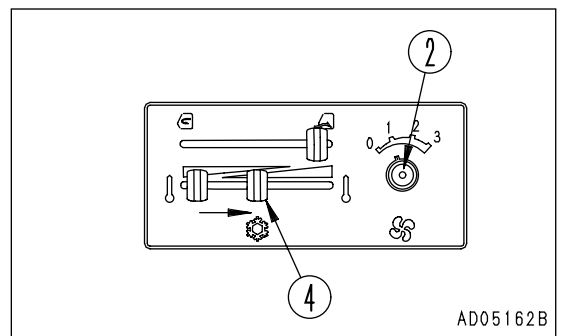


Dehumidifying and heating

Push switch (2). When temperature control lever (4) is placed at the central position, dry warm air blows out. Keep the other switches at the same positions as for heating (FRESH).

REMARK

If this is used in spring and fall on rainy days when the air inside the cab is damp, there is no problem of the windows misting up, and the cab be warmed up to a comfortable temperature.



PRECAUTIONS WHEN USING AIR CONDITIONER

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

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

Be careful not to make the temperature in the cab too low.

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

Direction of vents when cooling

- If the vents (left and right) in the middle of the dashboard are turned so that cold air plays directly on the cab door glass, moisture may condense on the outside of the cab door glass and reduce the visibility. (This occurs particularly in high temperatures.)
If this happens, turn the vent shutter selector lever to stop the air going directly to the glass and direct it upward.

INSPECTION DURING OFF-SEASON

Even during the off-season, run the compressor at low speed for several minutes once a week to prevent the loss of the oil film at the lubricated parts of the compressor. (Run the engine at low speed and set the temperature control lever at the central position.)

REMARK

When the ambient temperature is low, if the compressor is suddenly run at high speed, it may cause failure of the compressor.

Note that the system is set so that the compressor will not run when the cooler switch is turned on if the ambient temperature is less than 2 - 6.5°C.

PROCEDURE FOR REPLACING RECEIVER

Replace the receiver once every two years.

After replacing the receiver, add compressor oil. Turn the old receiver at an angle and measure the oil remaining inside the receiver, then add the same amount of oil (Denso Oil 6) to fill the new receiver.

REMARK

- Depending on the condition of use, the replacement interval may be shorter.
- If the receiver is used when the desiccant has exceeded the water absorption limit, the refrigerant circuit may become clogged and cause failure of the compressor.

Precautions when replacing receiver

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

CLEANING AIR FILTER

If the air filter for the FRESH or RECIRC air intake becomes clogged, the cooling or heating capacity will drop. To prevent this, clean the air filter with compressed air once a week.

For details of the cleaning method, see "CLEAN AIR CONDITIONER AIR FILTER (PAGE 4-37)".

CLEAN AIR CONDITIONER CONDENSER FINS

If the air conditioner condenser fins are clogged, the cooling capacity will drop. To prevent this, lean the air conditioner condenser fins with compressed air.

For details of the cleaning method, see "CLEAN, CHECK AIR CONDITIONER CONDENSER FINS (PAGE 4-35)".

HANDLING HEATER

(MACHINES EQUIPPED WITH CAB)

METHOD OF OPERATION

To heat quickly

Set the switches to the position shown in the diagram on the right to carry out heating quickly.

- Set FRESH/RECIRC selector lever (1) and temperature control lever (3) to the position in the diagram on the right.
- Set blower switch (2) to position 3 (HIGH).

NOTICE

If heating is carried out continuously for a long period with the lever at the RECIRC position, the air inside the cab will become stale, so when the cab is warmed up, always set the FRESH/RECIRC selector lever (1) to the FRESH position.

In this position, the inside of the cab is pressurized to prevent the entry of dust.

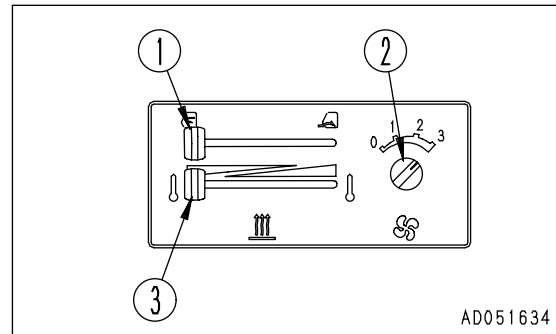
Normal use

Set each switch to the desired position.

CLEANING AIR FILTER

If the air filter for the FRESH or RECIRC air intake becomes clogged, the heating capacity will drop. To prevent this, lean the air filter with compressed air once a week.

For details of the cleaning method, see "CLEAN AIR CONDITIONER AIR FILTER (PAGE 4-37)".



HANDLING ACCUMULATOR

WARNING

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

After stopping the engine, always place the safety lever in the LOCK position.

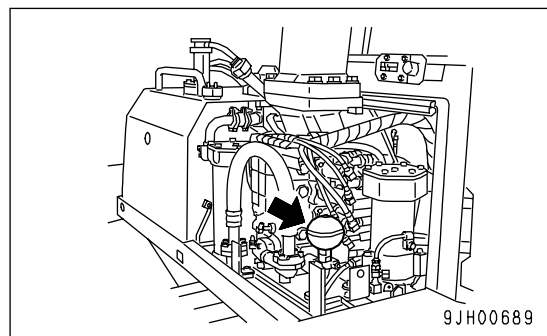
The accumulator is filled with high-pressure nitrogen gas, and it is extremely dangerous if it is handled in the wrong way.

Always observe the following precautions.

- Never make any hole in the accumulator or expose it to flame or fire.
- Do not weld any boss to the accumulator.
- When disposing of the accumulator, it is necessary to release the gas from the accumulator, so please contact your Komatsu distributor.

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

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



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

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

OPERATION

CHECK BEFORE STARTING ENGINE

WALK-AROUND CHECK

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

WARNING

Remove any flammable materials from around the battery or engine muffler, or other high temperature engine parts. Leakage of fuel or oil will cause the machine to catch fire. Check carefully, and be sure to repair any abnormalities, or please contact your Komatsu distributor.

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

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

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

1. Check for damage, wear, play in work equipment, cylinders, linkage, hoses

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

2. Remove dirt and dust from around engine, battery radiator

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

3. Check for leakage of water or oil around engine

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

4. Check for leakage of oil from power train case, final drive case, hydraulic tank, hose, joints

Check that there is no oil leakage. If any abnormality is found, repair the place where the oil is leaking. Check for leakage of oil from the undercover. Check the ground for traces of oil leakage.

5. Check the undercarriage (track, sprocket, idler, guard) for damage, wear, loose bolts, or leakage of oil from rollers

If any damage, wear, or oil leakage is found, repair the problem and tighten the bolts.

6. Check for damage to handrail, loose bolts

Repair any damage and tighten any loose.

7. Check for damage to gauges, lamps on instrument panel, loose bolts

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

8. Check for damage to seat belt and mounting clamps

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

CHECK BEFORE STARTING

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

CHECKING WITH MACHINE MONITOR

(MONITOR PANEL SPECIFICATION)

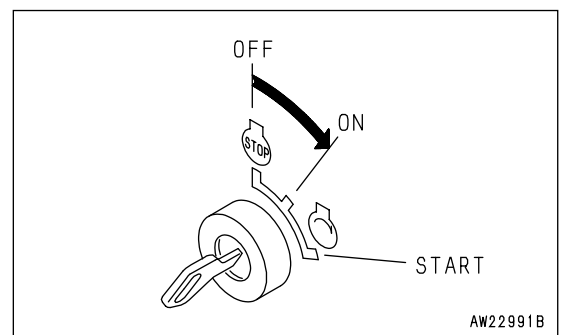
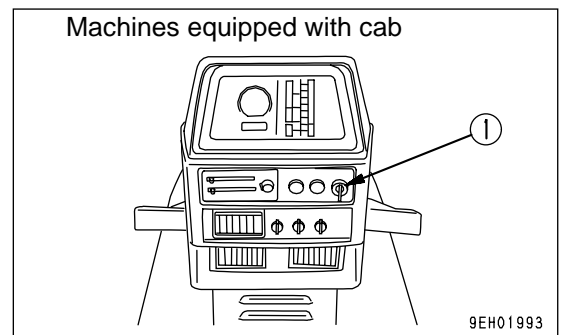
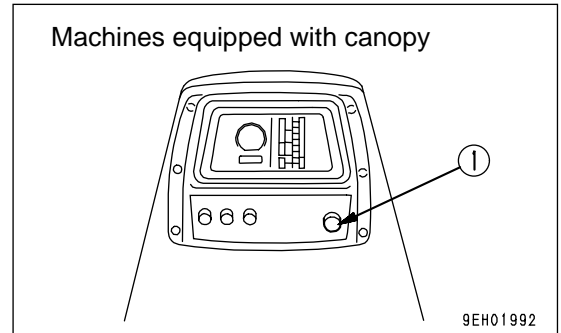
1. Turn starting switch (1) to the ON position.
2. Check that all monitor lamps light up for 3 seconds, the warning lamp lights up for 2 seconds, and the alarm buzzer sounds for (1) second.

REMARK

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

NOTICE

When carrying out the checks before starting, do not rely only on the monitor. Always carry out all the items listed for periodic maintenance.



CHECK COOLANT LEVEL, ADD WATER**⚠ WARNING**

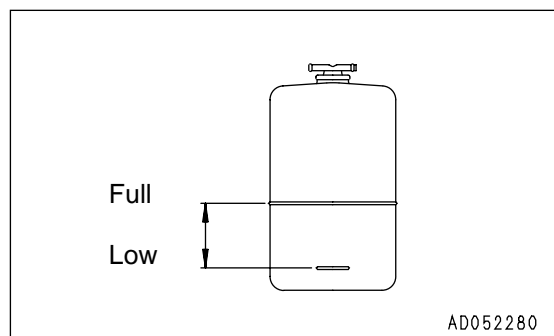
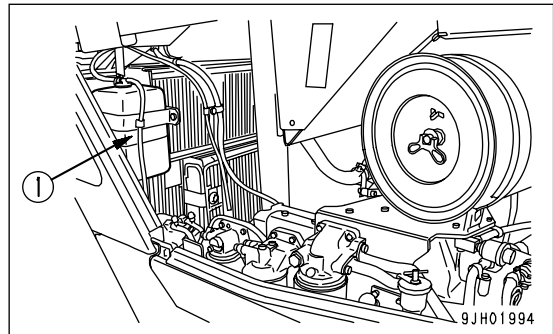
- Normally, do not open the radiator cap. When checking the cooling water level, check the sub-tank when the engine is cold.
- Do not remove the cap when the radiator water is hot. Boiling water may spurt out. After the water temperature goes down, turn the cap slowly to release the pressure, then remove it.

1. Open the engine side cover on the left side of the chassis, and check that the cooling water is between the FULL and LOW marks on sub-tank (1). If the water level is low, add water to the FULL level through the water filler port in sub-tank (1).

REMARK

The coolant may overflow from the sub-tank drain hose. This is no problem. It occurs because too much coolant has been added.

2. After adding water, tighten the cap securely.
3. If the sub-tank is empty, check for leakage of water, then add water to the radiator and sub-tank.
4. After adding water, close the engine side cover.

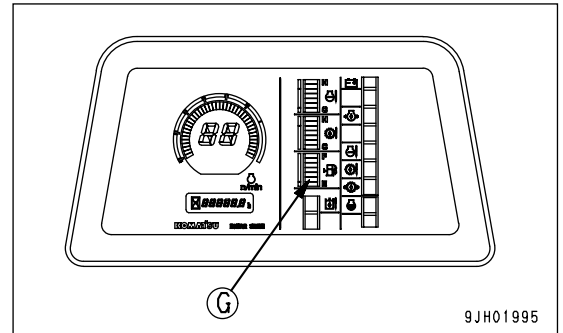


CHECK FUEL LEVEL, ADD FUEL

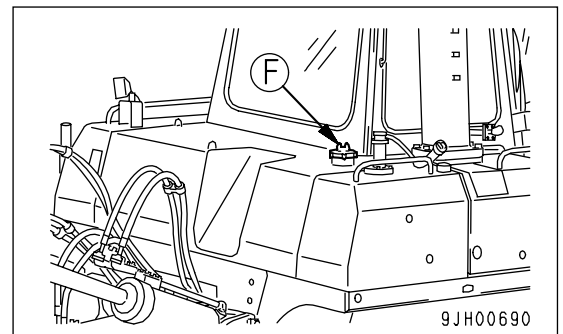
⚠ WARNING

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

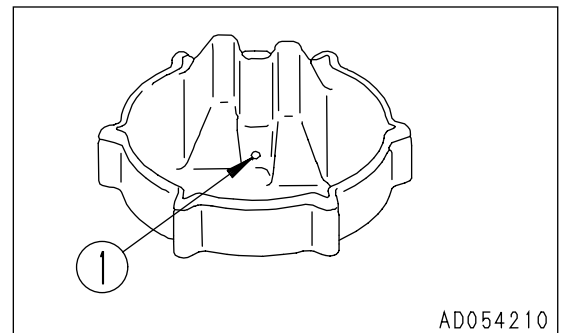
1. Turn the engine starting switch to the ON position and check the fuel level with fuel level gauge (G) on the monitor panel.
After checking, turn the switch back to the OFF position.



2. After completing work, fill the fuel tank through fuel filler port (F).
3. After adding fuel, tighten the cap securely.
Fuel capacity: 625 ℓ

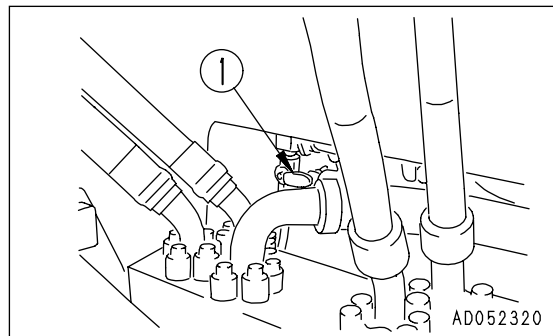
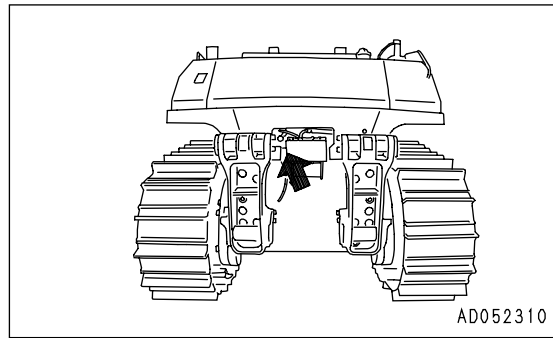
**REMARK**

If breather hole (1) on the cap is logged, the pressure in the tank will drop and fuel will not flow.
Clean the hole from time to time.



DRAIN WATER, SEDIMENT FROM FUEL TANK

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

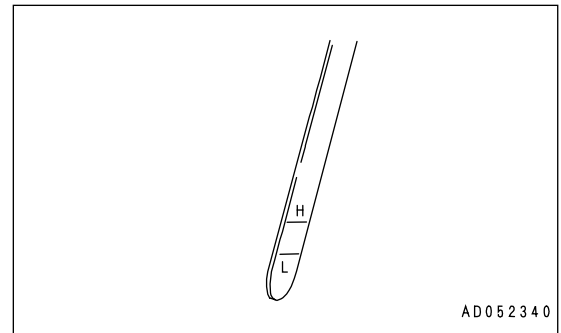
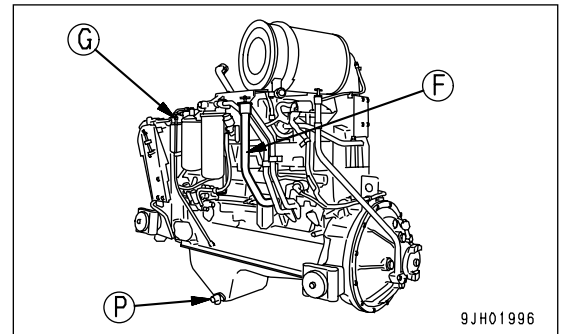


CHECK OIL LEVEL IN ENGINE OIL PAN, ADD OIL

⚠ 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.

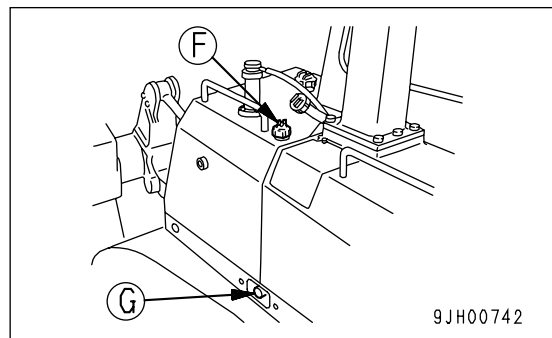
1. 1. Open the engine side cover on the left side of the chassis.
2. Remove dipstick (G) and wipe the oil off with a cloth.
3. Insert dipstick (G) fully in the dipstick holder, then take it out again.
4. The oil level should be between the H and L marks on dipstick (G).
If the oil level is below the L mark, add engine oil through oil filler (F).
5. If the oil is above the H mark, drain the excess engine oil from drain plug (P), and check the oil level again.
6. If the oil level is correct, tighten the oil filler cap securely and close the engine side cover.

**REMARK**

- Check the oil level with the engine stopped.
- When checking the oil level after the engine has been operated, wait for at least 15 minutes after stopping the engine before checking.
- If the machine is at an angle, make it horizontal before checking.
- When adding oil, remove the dipstick from the dipstick holder to release the air inside the crankcase.

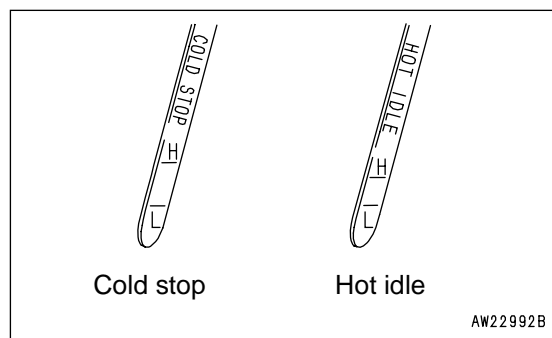
CHECK OIL LEVEL IN POWER TRAIN CASE, ADD OIL

1. Remove dipstick (G), and wipe the oil off with a loth.
2. Insert dipstick (G) fully in the dipstick holder, then take it out again.
3. The oil level should be between the H and L marks on dipstick (G).
If the oil level is below the L mark, add engine oil through oil filler (F).
The oil level is stamped on both sides of the dipstick. One side is used when the engine is stopped and the oil temperature is low (COLD STOP). The other side is used when the engine is idling and the oil temperature is high (HOT IDLING).

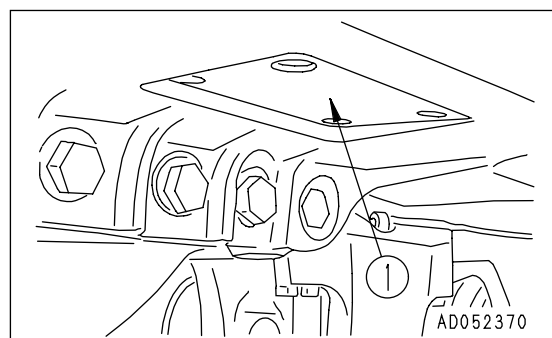


REMARK

When checking the oil level before starting operations, check with the engine stopped and use the dipstick COLD STOP side. It is also possible to check the oil level after the engine has been run and the power train oil temperature is high, but in this case, run the engine at idling and use the dipstick HOT IDLING side.

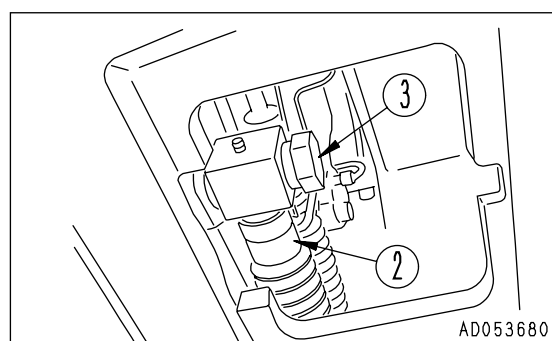


4. If the oil is above the H mark, remove drain cover (1) at the bottom left of the power train case, pull drain hose (2) out from the pickup port, then loosen drain plug (3) and drain the excess oil. After draining the oil, check the oil level again.
5. If the oil level is correct, tighten the oil filler cap securely.



REMARK

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

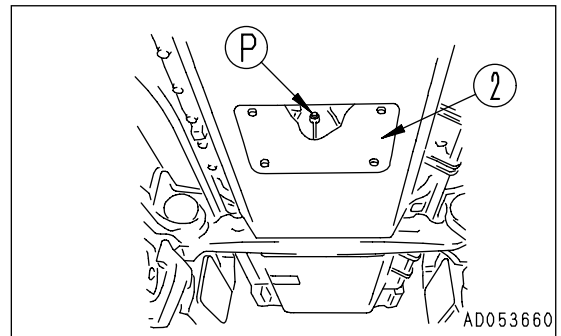
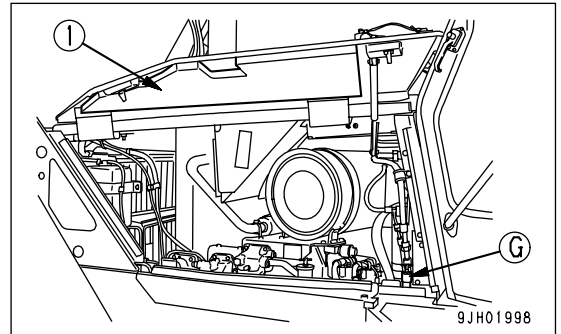


CHECK BRAKE PEDAL TRAVEL

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

CHECK DAMPER CASE OIL LEVEL, ADD OIL

1. Open engine side cover (1) on the left side of the machine.
2. Remove dipstick (G), and wipe the oil off with a cloth.
3. Insert dipstick (G) fully into the dipstick holder, then pull it out again.
4. The oil level should be between the H and L marks on dipstick (G).
If the oil is below the L mark, add engine oil through the dipstick holder.
5. If the oil is above the H mark, open inspection cover (2) at the bottom center of the power train case, and drain the excess oil from drain plug (P) of the engine damper (this can be seen to the front of the machine through the inspection window). After draining the oil, check the oil level again.



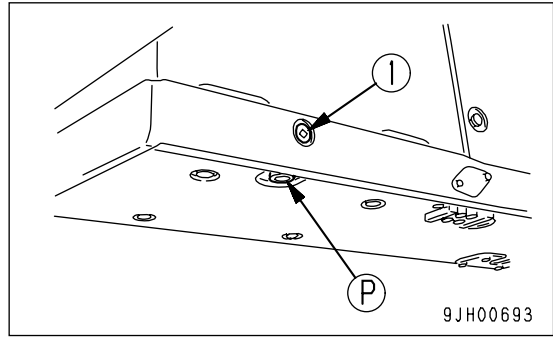
REMARK

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

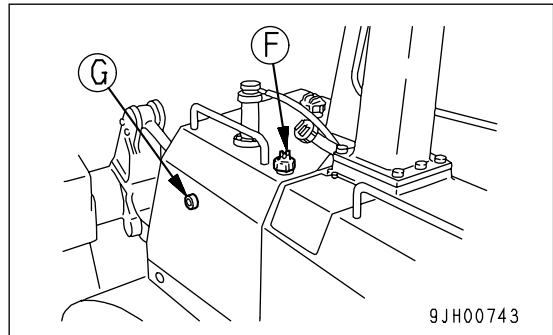
CHECK OIL LEVEL IN HYDRAULIC TANK, ADD OIL

⚠ WARNING

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



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



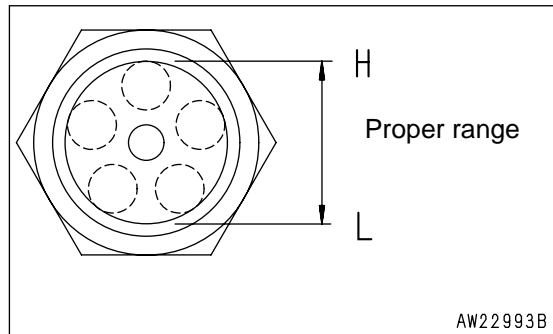
NOTICE

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

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

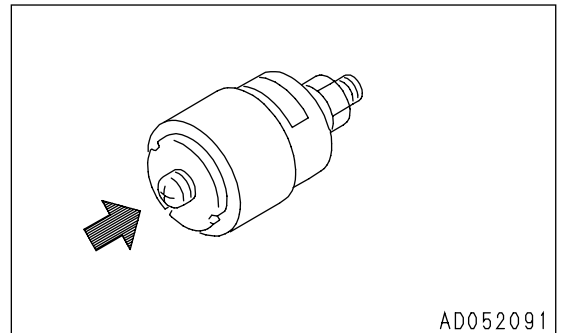
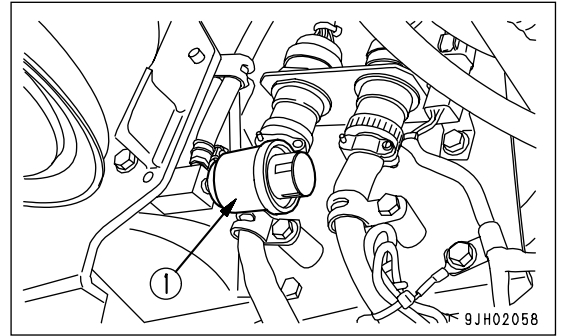
REMARK

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



CHECK DUST INDICATOR

1. Open the engine side Cover on the left side of the chassis, and check that the red piston has not appeared in the transparent portion of dust indicator (1).
2. If the red piston has appeared, clean or replace the element immediately.
For details of the method of cleaning the element, see "CHECK, CLEAN AND REPLACE AIR CLEANER ELEMENT (PAGE 4-26)".
3. After checking, cleaning, and replacing, press the knob of dust indicator (1) to return the red piston to its original position.



CHECK ELECTRIC WIRINGS

WARNING

- If the fuses are frequently blown or if there are traces of short circuits on the electrical wiring, locate the cause immediately and carry out repairs, or contact your Komatsu distributor for repairs.
- If flammable materials (dead leaves, twigs, dry grass, etc.) accumulate around the battery, they will cause fire, so always remove such material immediately.
- Keep the top surface of the battery clean and check the breather hole in the battery cap. If it is clogged with dirt or dust, wash the battery cap to clean the breather hole.

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

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

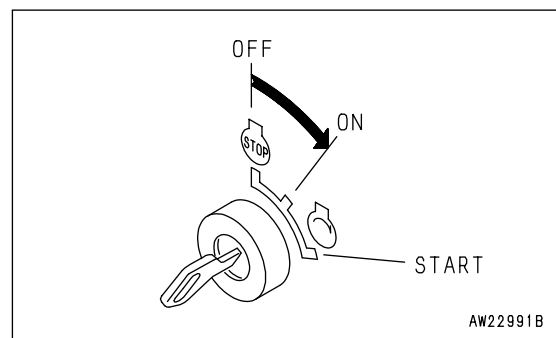
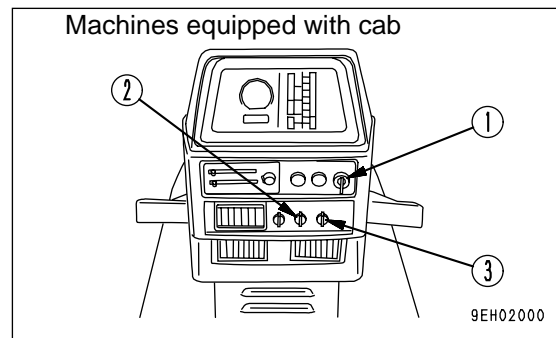
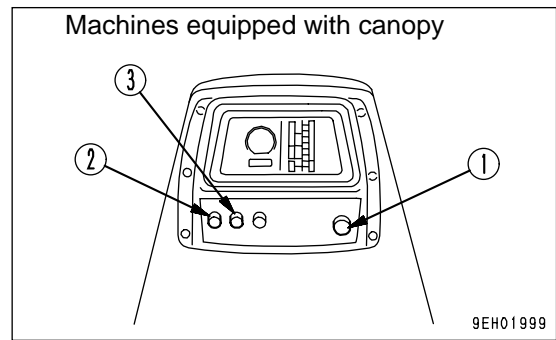
When carrying out walk-around checks or checks before starting, always check if there is any accumulation of flammable material around the battery, and remove such flammable material.

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

CHECK THAT LAMPS LIGHT UP

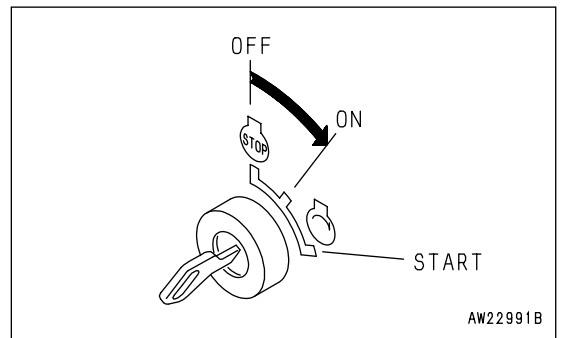
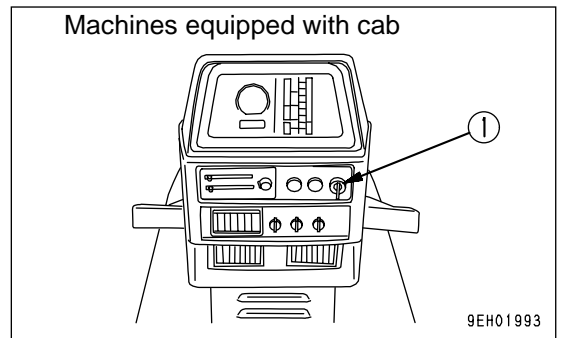
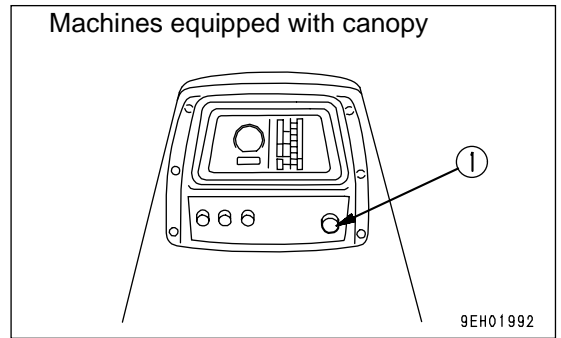
1. Turn the key of starting switch (1) to the ON position.
2. Turn the front lamp switch (2) and rear lamp switch (3) to the ON position and check that the front lamp and rear lamp light up.

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

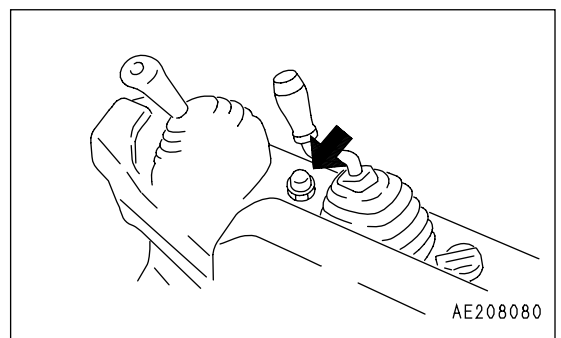


CHECK HORN SOUND

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

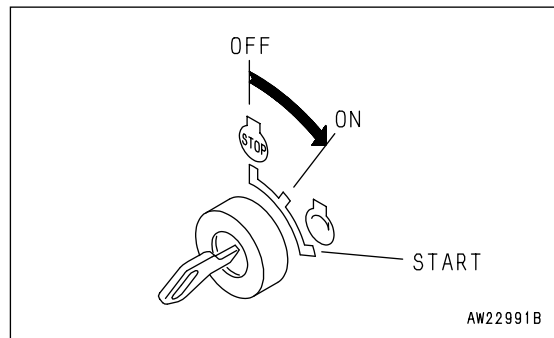
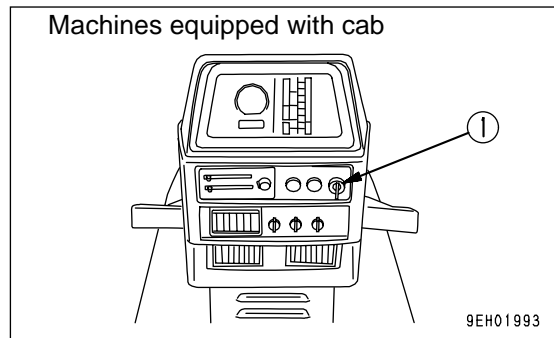
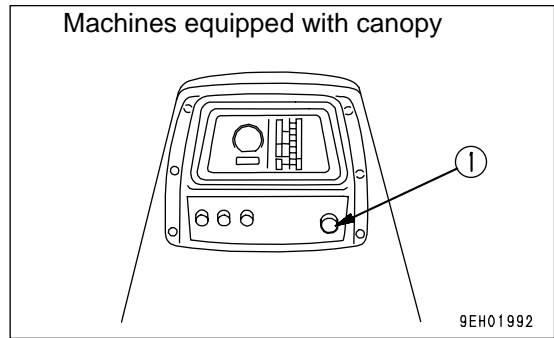


2. Press the horn switch and check that the horn sounds.

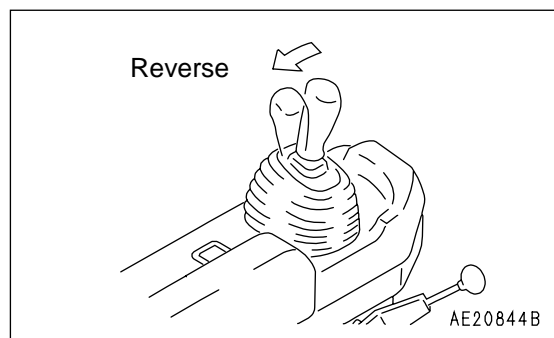


CHECK BACKUP ALARM SOUND

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



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



ADJUSTING BEFORE STARTING OPERATION

⚠ WARNING

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

ADJUSTING OPERATOR'S SEAT

(A) Fore-aft adjustment of seat

Pull up lever (1), set the seat to a position where it is easy to operate, then release the lever.

Fore-aft adjustment: 160 mm (8 stages)

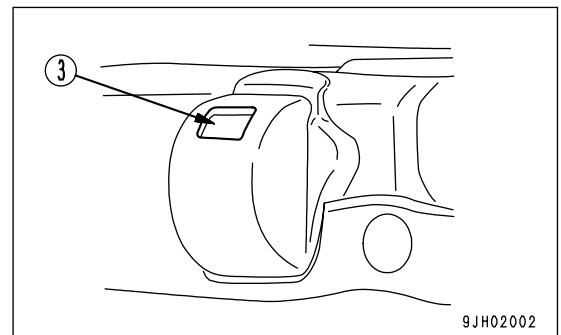
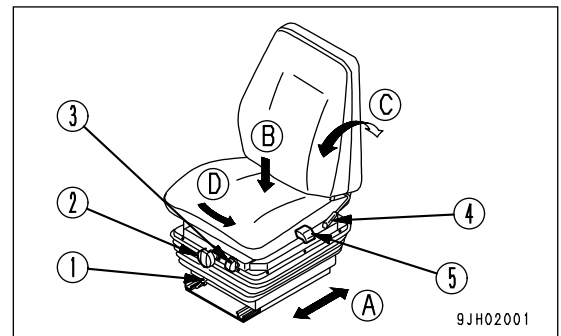
(B) Weight and height adjustment of seat

- Turn knob (2) under the seat so that weight adjustment indicator (3) displays the green range. The height can be adjusted by turning the knob (2) while the green range is displayed.

- Turn the knob clockwise to raise the seat and turn the knob counterclockwise to lower the seat.

Height adjustment range: stepless, 75 mm

Weight adjustment range: 50 to 130 kg



(C) Adjusting reclining angle

REMARK

When the seat is pushed forward, the available reclining angle becomes greater; when the seat is pushed back, the available reclining angle becomes smaller. When moving the seat back, return the seat back to its original position before moving the seat.

Pull up lever (4), set the seatback to a position where it is easy to operate, then release the lever.

(D) Adjusting direction of seat

Pull up lever (5) to release the lock, then turn the seat to the right by hand. It is possible to change the direction of the seat to the 15° position.

After changing the angle of the seat, return the lever securely and lock it in position.

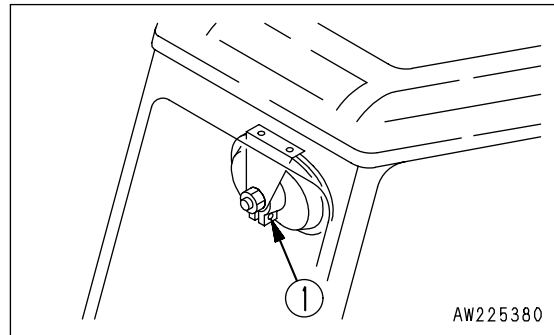
- Adjusting the seat angle to the right is done to make it easier to carry out ripper operations.

ADJUSTING MIRROR

(MACHINES EQUIPPED WITH CAB)

Loosen screw (1) which is installed on the mirror, and adjust the mirror to the best position to see the mirror from the operator's seat.

Especially for seeing behind the machine, adjust in such a way that you can easily see persons at the rear L.H and R.H corners.



AW225380

USING SEAT BELT

Always install a seat belt on machines equipped with ROPS.

⚠ WARNING

- Before fitting the seat belt, check that there is no abnormality in the mounting bracket and mounting belt of the belt. If the belt is worn or damaged, replace it.
- Replace the seat belt every three years, even if their outside is free from abnormality. The year of manufacture is woven on the back side of the belt.
- Always fasten the seat belt before starting operations.
- Always use the seat belt during operations.
- Do not twist the left or right side of the seat belt when fastening it.

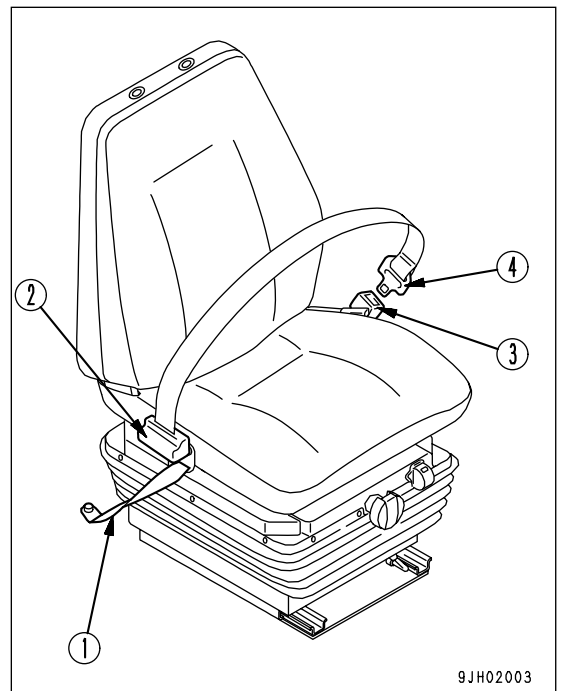
FASTENING AND REMOVING BELT

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 and hold tongue (4) connected to wind-in mechanism (2) and pull out the belt slowly so that the belt will cover your abdomen sufficiently.
4. Insert tongue (4) in buckle (3) until it clicks. The belt is pulled back into wind-in mechanism (2) until it is fitted to your abdomen. The belt is locked under this condition and cannot be extended anymore. Fit the belt to your abdomen without twisting it.

REMARK

If the belt is locked before the tongue is inserted in the buckle, let it return to the wind-in mechanism, then repeat the above procedure from the first.

5. Pull the belt to check that it is securely locked in position.
6. When removing the belt, press the red button on buckle (3).
The belt will automatically be wound in.



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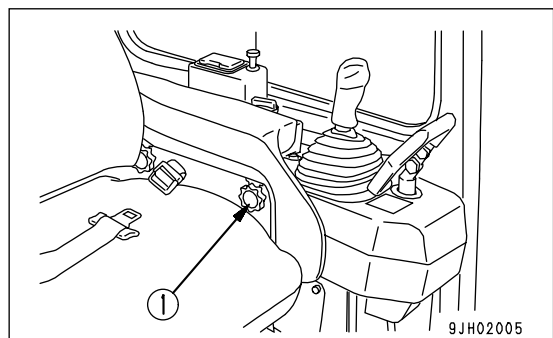
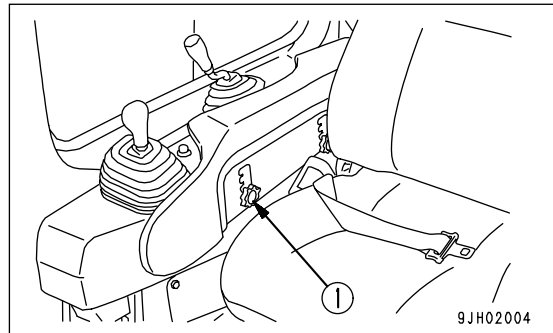
Check that the bolts of the clamp securing the belt to the chassis are not loose. Tighten them if they are loose. The tightening torque for the mounting bolt is $24.5 \pm 4.9 \text{ N}\cdot\text{m}$ ($2.5 \pm 0.5 \text{ kgf}\cdot\text{m}$).

If the belt surface is scratched or frayed or if the fittings are broken or deformed, replace the seat belt unit.

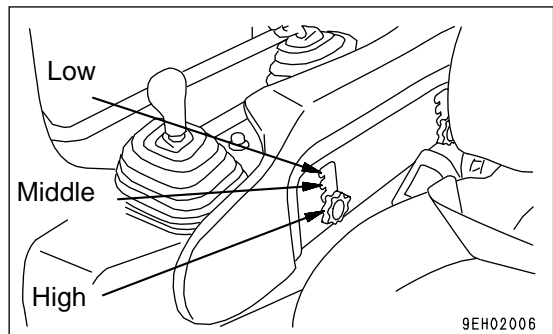
ADJUST ARMREST

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

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



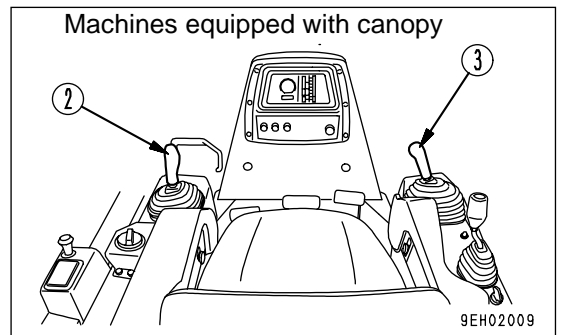
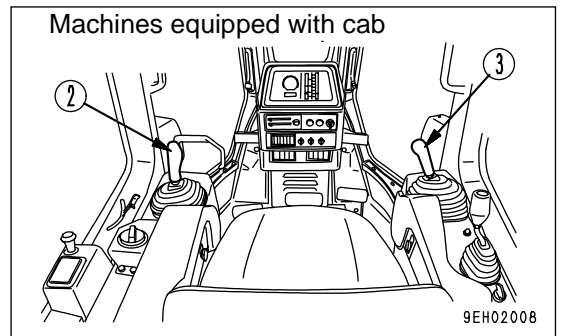
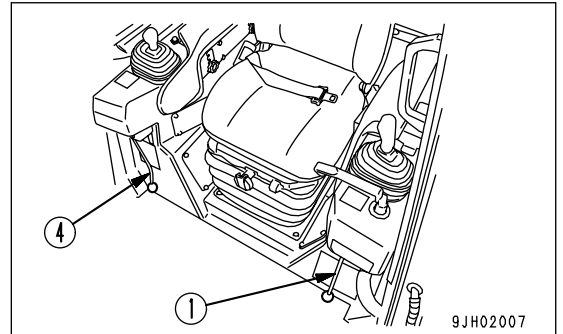
2. Move the armrest on the left and right sides of the operator's seat to the front, then align the position of the 3 holes (high, middle, low).
3. Tighten knob (1) securely.



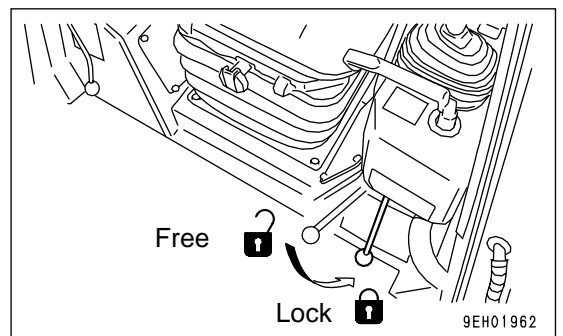
OPERATIONS AND CHECKS BEFORE STARTING ENGINE

WARNING

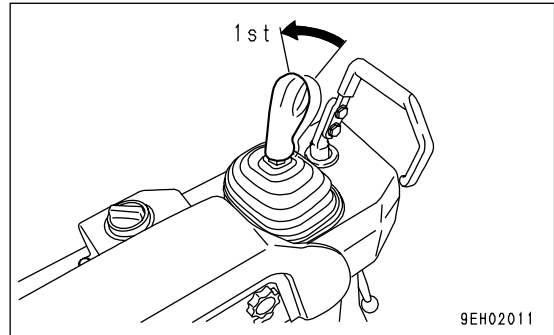
- When starting the engine, check that the safety lock lever is securely at the LOCK position. If the control levers are not locked and they are touched by accident when starting the engine, the work equipment may move unexpectedly, and this may lead to a serious injury or death.
- When standing up from the operator's seat, always set the safety lock lever to the LOCK position, regardless of whether the engine is running or stopped.



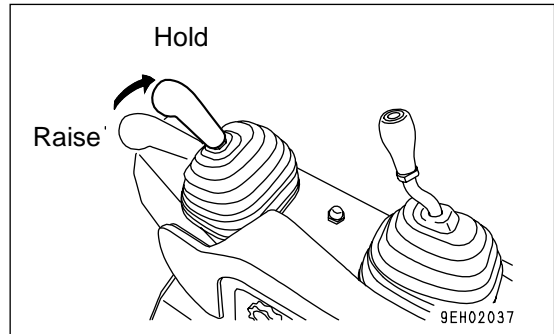
1. Check that parking lever (1) is locked. If this lever is not at the LOCK position, the engine will not start. If parking lever (1) is placed at the LOCK position, joystick (2) is returned to neutral even if it is at the FORWARD (REVERSE) position.



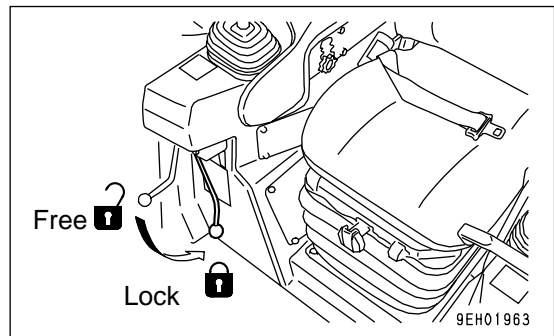
- 2. Check that joystick (2) is at the 1st position.



- 3. Check that the blade is lowered to the ground and that blade control lever (3) is at the HOLD position.
- 4. Check that the ripper is lowered to the ground.



- 5. Check that the safety lever (4) is locked.



STARTING ENGINE

NORMAL STARTING

⚠ WARNING

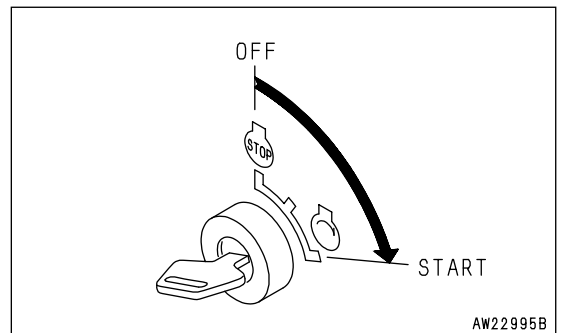
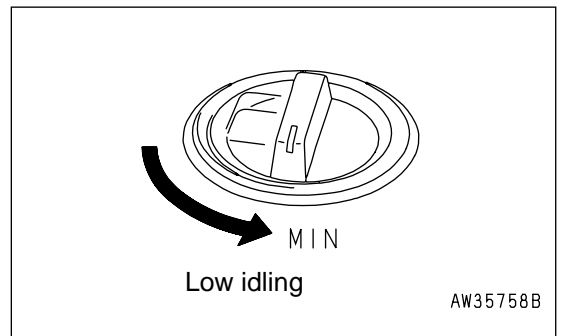
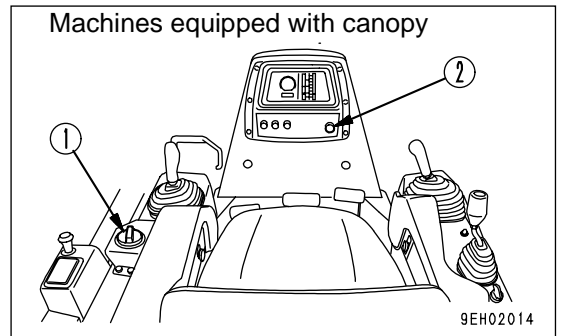
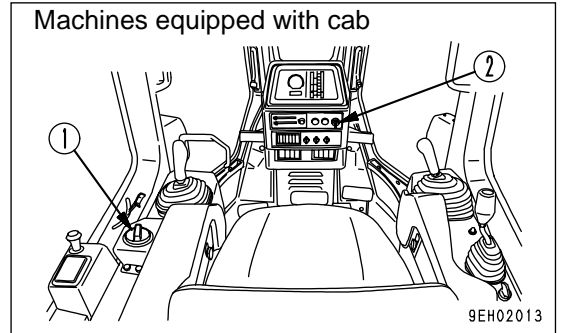
- Check that there are no persons or obstacles in the surrounding area, then sound the horn and start the engine.
- Exhaust gas is toxic. When starting the engine in confined spaces, be particularly careful to ensure good ventilation.
- Never use starting aid fluids as they may cause explosions.

NOTICE

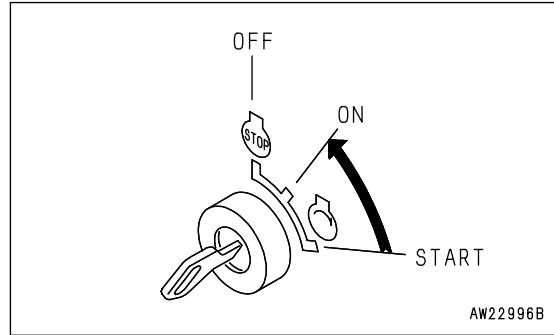
- Before starting the engine, check that the fuel control dial is at the low idling (MIN) position.
- Do not crank the starting motor continuously for more than 20 seconds.
If the engine does not start, wait for at least 2 minutes before trying again.
- If the fuel control dial is at the FULL position, the engine will accelerate suddenly and cause damage to the engine parts, so set it to an intermediate or low speed position.

1. Set the fuel control dial to the low idling (MIN) position.
 - If it is at the high idling (MAX) position, always change it to the low idling (MIN) position.

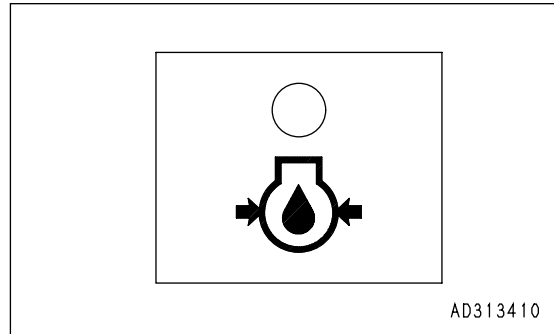
2. Insert the key into starting switch (2) and turn the key to the START position. The engine will start.



- 3. When the engine starts, release the key in starting switch (2). The key will return automatically to the ON position.



- 4. Even if the engine has started, if the engine oil pressure monitor lamp is lighted up, do not touch the work equipment control levers or brake pedal.



STARTING IN COLD WEATHER

WARNING

- Check that there are no persons or obstacles in the surrounding area, then sound the horn and start the engine.
- Never use starting aid fluids as they may cause explosions.

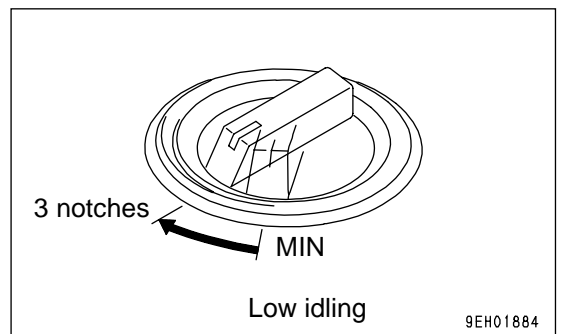
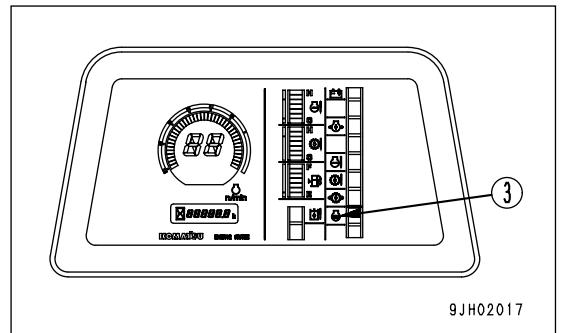
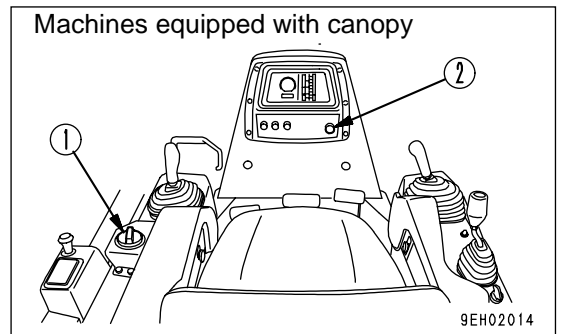
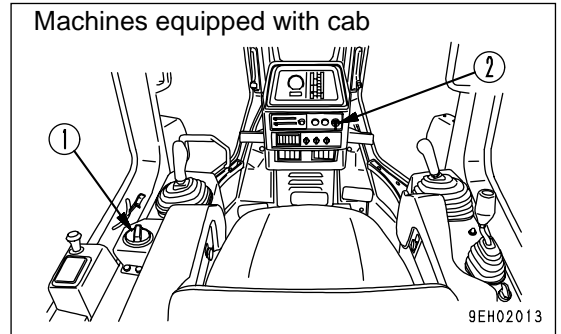
NOTICE

- Do not crank the starting motor continuously for more than 20 seconds. If the engine does not start, wait for at least 2 minutes, then repeat the procedure from Step 2.
- Before starting the engine, check that the fuel control dial is at the low idling (MIN) position.
- On this machine, to protect the turbocharger, a turbo protect function is provided. In cold weather, even if fuel control dial (1) is operated immediately after starting the engine, the engine speed may not change for several seconds.
- If the fuel control dial is at the FULL position, the engine will accelerate suddenly and cause damage to the engine parts, so set it to an intermediate or low speed position.

1. Turn fuel control dial (1) three notches from the low idling (MIN) position.
Avoid setting the fuel control dial at the high idling (MAX) position.

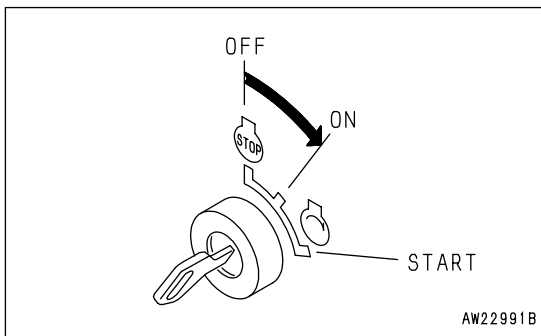
REMARK

There are 10 notches in the dial rotation. A click can be felt by hand when the dial is turned.



2. Insert the key into the starting switch (2) and turn the key to the ON position.

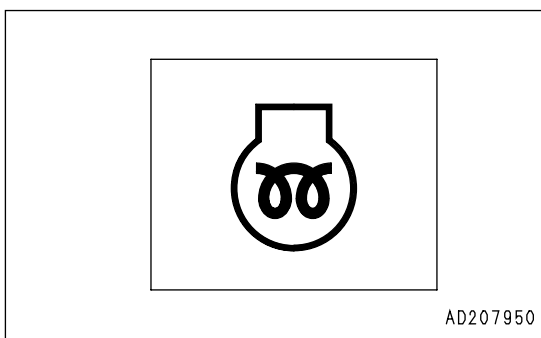
- When the key is turned to the ON position, preheating is automatically carried out according to the ambient temperature (engine water temperature). The preheating pilot lamp (3) lights up during the preheating operation.



REMARK

- When the ambient temperature is higher than about -5°C, the automatic preheating is not actuated.
- When the ambient temperature is lower than about -5°C, the preheating is automatically carried out for about 20 to 40 seconds according to the ambient temperature.

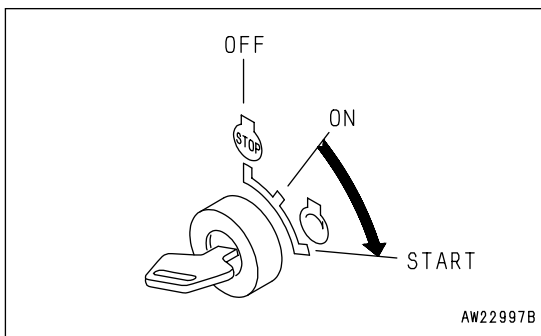
3. Keep this state until the preheating pilot lamp (3) goes out.



REMARK

When the ambient temperature is low, this lamp lights up for 36 seconds and then the lamp switches to flashing.

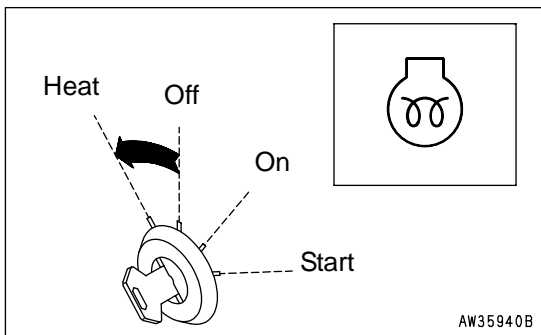
4. When preheating pilot lamp (3) goes out, turn the key in starting switch (2) to the START position to start the engine. The time that preheating pilot lamp (3) stays on changes according to the ambient temperature as shown in the table below.



Ambient temperature	Preheat time
-5°C to -10°C	20 to 27 seconds
-10°C to -20°C	27 to 40 seconds
-20°C to -30°C	40 seconds

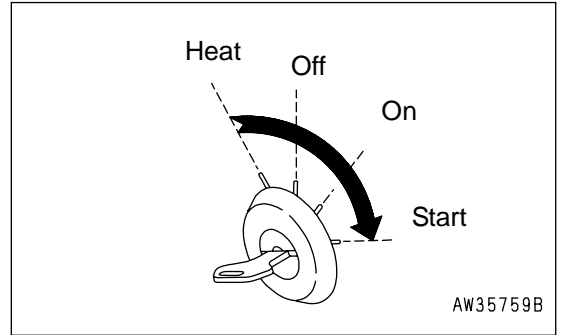
REMARK

Regardless of the ambient temperature, if the key in starting switch (2) is turned from OFF position to left, preheating pilot lamp (3) will light up and preheating will start. (Preheating continues while the starting switch is held at the left.) For the details of the preheating time, see the table in Step 4.

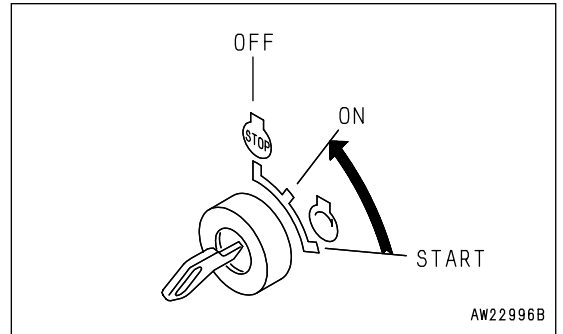


While preheating is being carried out, the preheating pilot lamp (3) lights up to show that preheating is being carried out. After it lights up for 36 seconds, it flashes for 16 seconds and goes out. When it goes out, complete the preheating immediately.

If the engine does not start with the above operation, wait for about 2 minutes, and repeat steps from Step 2.



- 5. When the engine starts, release the key in starting switch (2). The key will return automatically to the ON position.



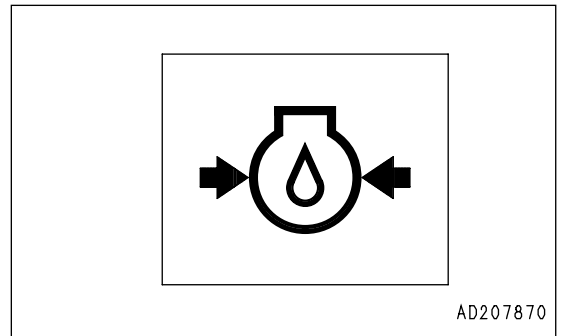
REMARK

Immediately after starting the engine, run the engine at idling, and do not operate the decelerator pedal or work equipment during this time.

Guideline for idling time

- Cold weather: At least 15 seconds
- When first starting engine after changing engine oil or replacing engine oil filter: 20 seconds

- 6. Even if the engine has started, if the engine oil pressure monitor lamp is lighted up, do not touch the work equipment control levers or brake pedal.



REMARK

- The actuation time for the turbo protect function and the relationship with the engine coolant temperature are as shown below.
If the fuel control dial is operated within the time shown below, the engine speed will not change.

Cooling water temperature	Turbo protect time (sec.)
+10°C above	0
+10 to -10°C	Change 0 to 5
-10°C below	5

- In cold weather, the turbo protect function is actuated, so the engine speed is maintained below 1,000 rpm for several seconds. After that, it changes to the speed specified by the set position of fuel control dial.

AFTER STARTING ENGINE

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

WARNING

- **Emergency stop**
If there has been any abnormal actuation or trouble, turn the starting switch key to the OFF position.
- If the work equipment is operated without warming the machine up sufficiently, the response of the work equipment to the movement of the control lever will be slow, and the work equipment may not move as the operator desires, so always carry out the warming-up operation. Particularly in cold areas, be sure to carry out the warming-up operation fully.

BREAKING-IN THE NEW MACHINE

NOTICE

Before operating the machine for the first time, confirm that cooling water is in the radiator. If the machine is delivered without cooling water in the radiator, completely clean the inside of the radiator by flowing city water through the radiator, then fill the radiator with cooling water.

CAUTION

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

Be sure to breaking-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.

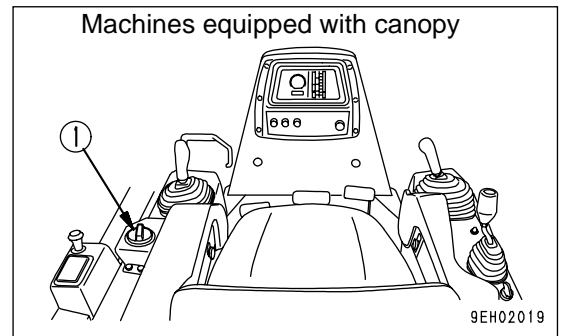
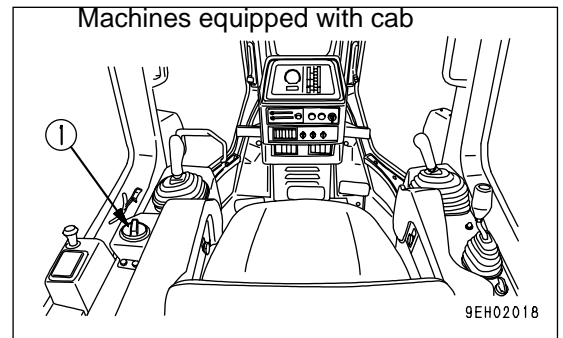
- Run the engine at idling for 15 seconds after starting it. During this time, do not operate the control levers or fuel control dial.
- Idle the engine for 5 minutes after starting it up.
- Avoid operation with heavy loads or at high speeds.
- Avoid sudden starts, sudden acceleration, sudden steering and sudden stops except in cases of emergency.

WARMING-UP OPERATION

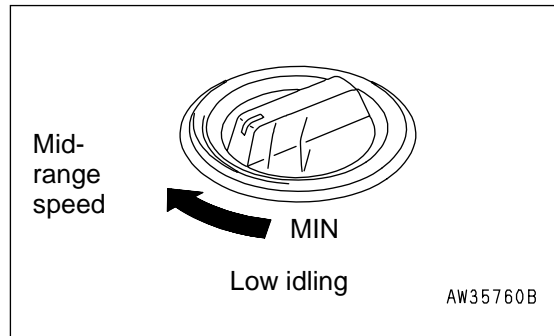
After starting the engine, do not immediately start operations. First, carry out the following operations and checks.

NOTICE

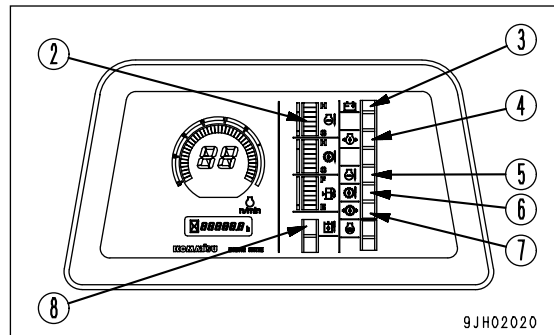
Avoid abrupt acceleration until warm-up run is completed. Do not run the engine at low idling or high idling for more than 20 minutes. If it is necessary to run the engine at idling, apply a load or run at a medium speed from time to time.



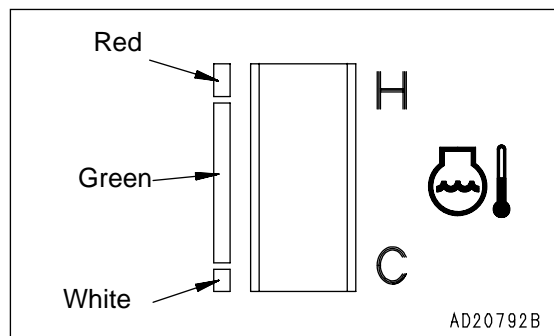
1. Turn fuel control dial (1) to the center position between LOW IDLING (MIN) and HIGH IDLING (MAX) and run the engine at medium speed for about 5 minutes with no load.
2. After warm-up run is completed, check gauges and caution lamps for proper operation. If any abnormality is found, repair it.
Check that each lamp does not light up.
 - Battery charge lamp (3)
 - Engine oil pressure caution lamp (4)
 - Engine water temperature caution lamp (5)
 - Power train oil temperature caution lamp (6)
 - HSS charge pressure caution lamp (7)
 - HSS oil temperature caution lamp (8)
3. Continue to run the engine at light load until the green range of the engine water temperature gauge (2) lights.



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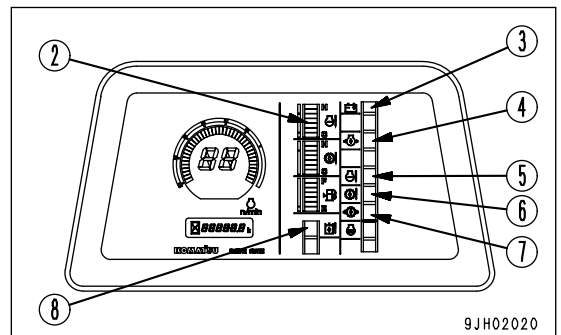
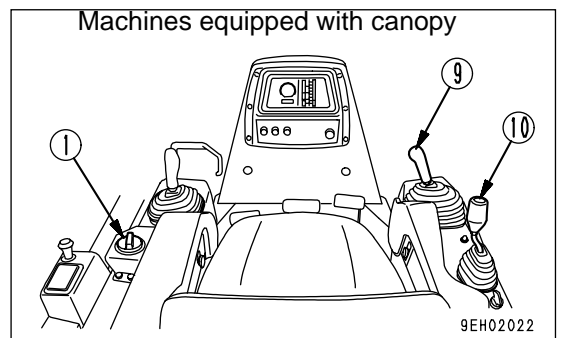
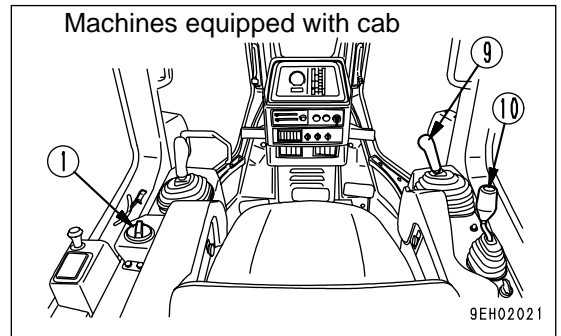
4. Check that there is no abnormal exhaust gas color, noise, or vibration. If any abnormality is found, repair it.

IN COLD AREAS

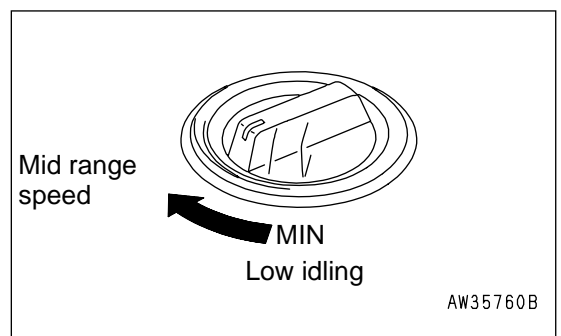
After starting the engine, do not immediately start operations. First, carry out the following operations and checks.

NOTICE

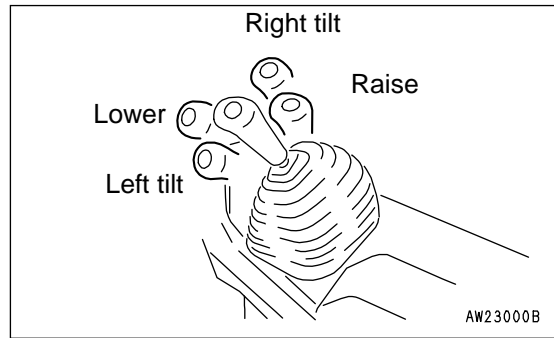
Avoid abrupt acceleration until warm-up run is completed. Do not run the engine at low idling or high idling for more than 20 minutes. If it is necessary to run the engine at idling, apply a load or run at a medium speed from time to time.



1. Turn fuel control dial (1) to the center position between LOW IDLING (MIN) and HIGH IDLING (MAX) and run the engine at medium speed for about 5 minutes with no load.



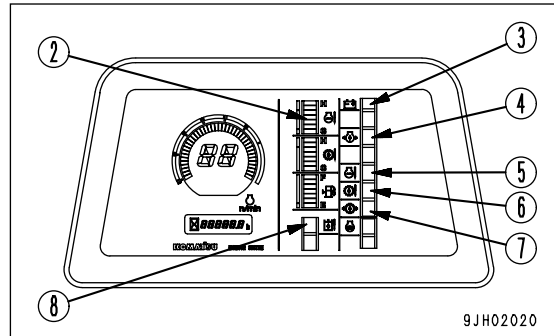
2. Operate blade control lever (9) to the RAISE position, then keep the blade raised to the maximum height and continue to relieve the circuit for 10 minutes.
3. Finally, operate blade control lever (9) and ripper control lever (10) to operate all the blade and ripper cylinders several times.
If the oil temperature in the work equipment is not properly raised, there will be a time lag in the response of the work equipment and steering.



4. After warm-up run is completed, check gauges and caution lamps for proper operation. If any abnormality is found, repair it.

Check that each lamp does not light up.

- Battery charge lamp (3)
- Engine oil pressure caution lamp (4)
- Engine water temperature caution lamp (5)
- Power train oil temperature caution lamp (6)
- HSS charge pressure caution lamp (7)
- HSS oil temperature caution lamp (8)

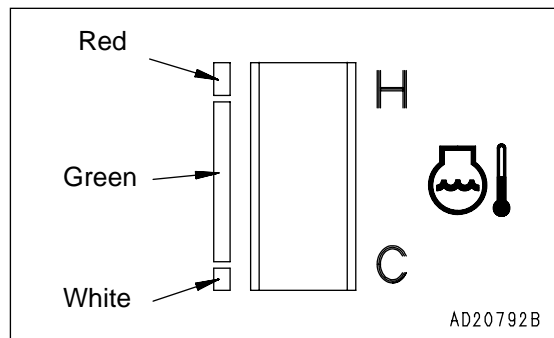


5. Continue to run the engine at light load until the green range of the engine water temperature gauge (2) lights.

REMARK

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

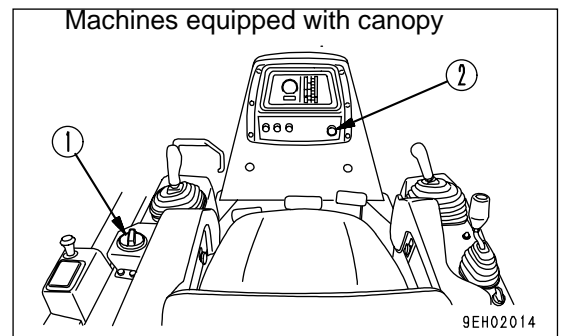
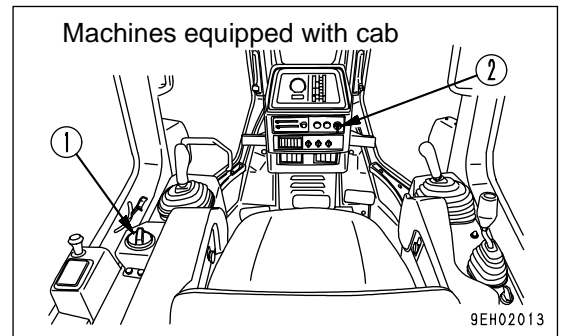
6. Check that there is no abnormal exhaust gas color, noise, or vibration. If any abnormality is found, repair it.



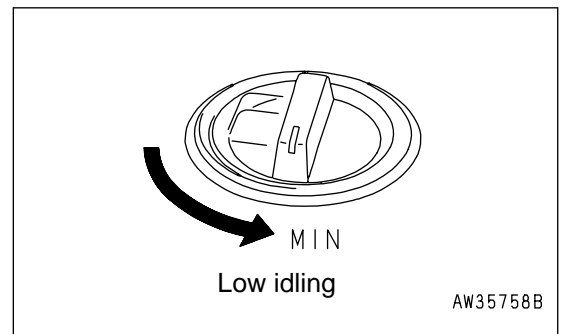
STOPPING ENGINE

NOTICE

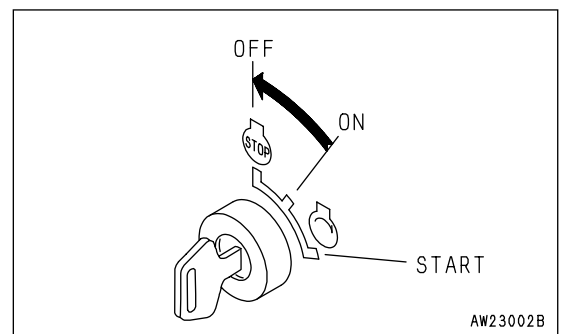
If the engine is abruptly stopped before it has cooled down, engine life may be greatly shortened. Consequently, do not abruptly stop the engine apart from an emergency. In particular, if the engine has overheated, do not abruptly stop it but run it at medium speed to allow it to cool gradually, then stop it.



1. Turn fuel control dial (1) to the low idling position and run the engine at low idling speed for about 5 minutes to allow it to gradually cool down.



2. Turn the key in starting switch (2) to OFF position and stop the engine.
3. Remove the key from starting switch (2).



CHECK AFTER STOPPING ENGINE

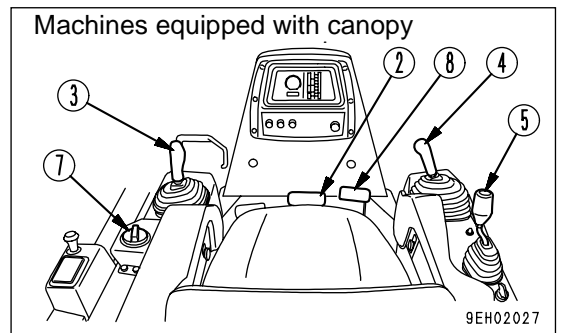
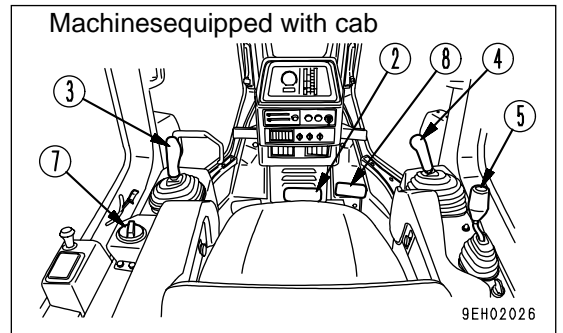
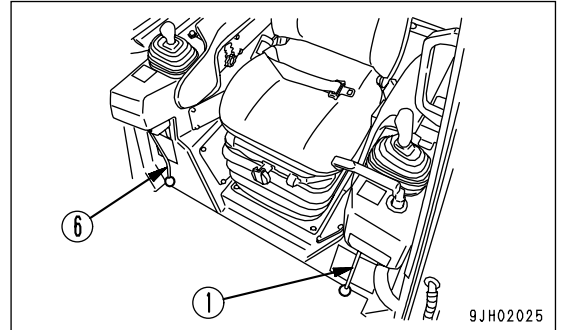
1. Walk around the machine and check the work equipment, machine exterior, and undercarriage, and check also for leakage of oil or water. If any abnormalities are found, repair them.
2. Fill the fuel tank.
3. Check the engine compartment for paper and debris. Clean out any paper and debris to avoid a fire hazard.
4. Remove any mud affixed to the undercarriage.

MACHINE OPERATION

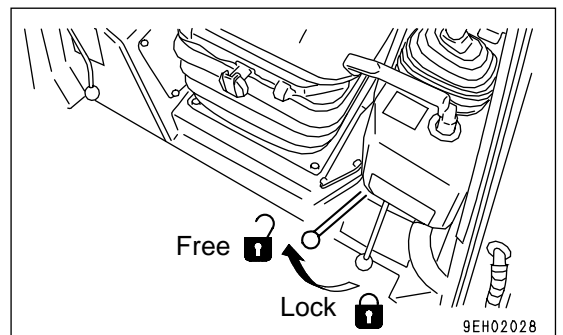
MOVING MACHINE OFF

⚠ WARNING

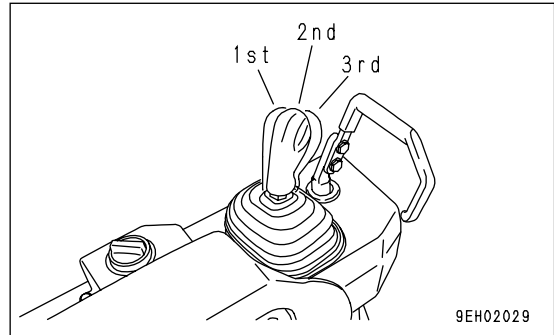
- When moving machine, check that the area around the machine is safe, and sound the horn before moving. Clear all personnel from the machine and the area. Clear all obstacles from the path of the machine. Use extreme care when reversing the machine. Note there is an blind spot behind the machine.
- When starting on slopes, always keep brake pedal (2) depressed even after releasing parking lever (1).
- When starting the machine up a steep slope, turn fuel control dial (7) to the full speed (MAX) position to set the engine to full speed. Then keep brake pedal (2) depressed, pull joystick (3) to the 1st speed position, operate joystick (3) in the direction of travel, then release brake pedal (2) slowly to allow the machine to start gradually. When the machine starts, release the brake pedal completely.



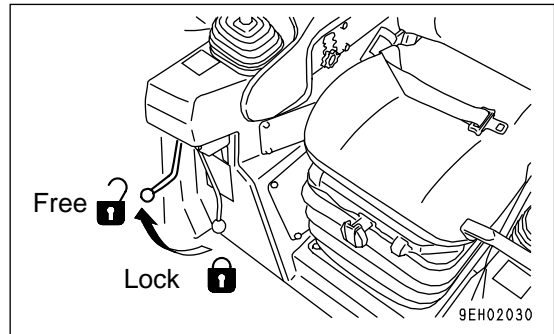
1. Set parking lever (1) to the FREE position.



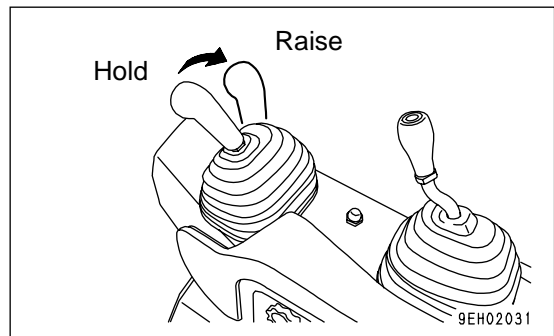
- Set joystick (3) to the desired position.



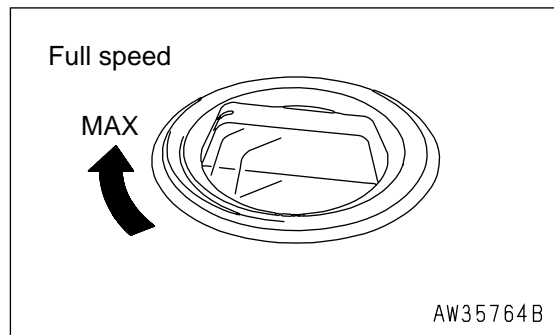
- Set safety lever (6) for blade control lever (4) and ripper control lever (5) to the FREE position.



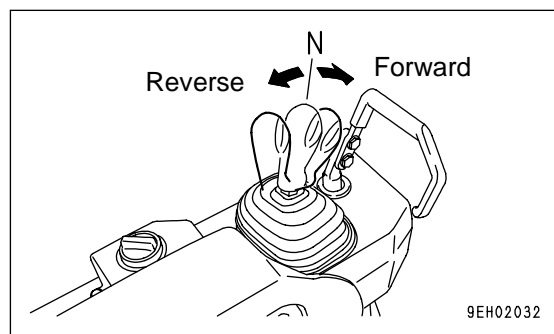
- Operate blade control lever (4) and ripper control lever (5) to the RAISE position, raise the blade 40 - 50 cm from the ground, and raise the ripper to the maximum height.



- Turn fuel control dial (7) to the full speed (MAX) position, raise the engine speed, and fully depress decelerator pedal (8).



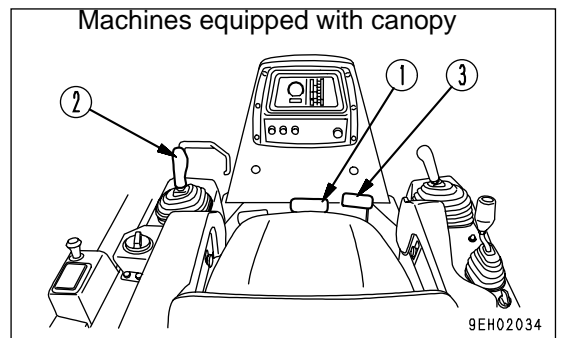
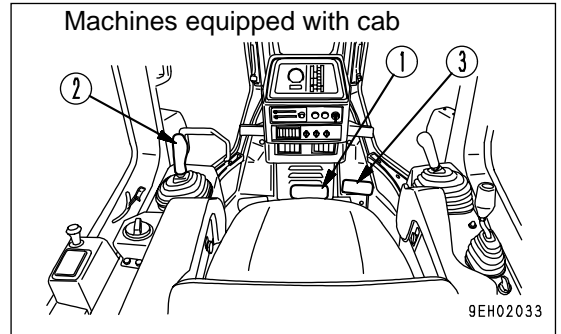
- Move joystick (3) to the F (FORWARD) or R (REVERSE) position, gradually release the decelerator pedal (8) and allow the machine to move off.



STOPPING MACHINE

⚠ WARNING

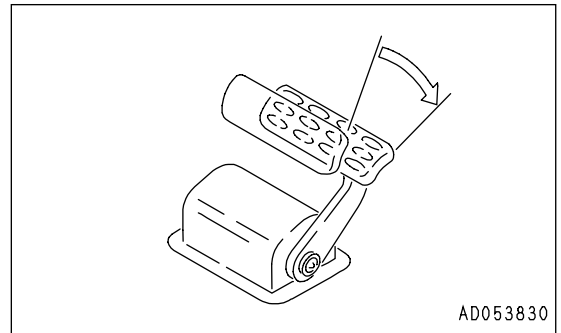
- Avoid stopping suddenly. Give yourself ample room when stopping.
- When stopping the machine, select flat hard ground and avoid dangerous places. If it is unavoidably necessary to park the machine on a slope, place the parking lever in the LOCK position and insert blocks underneath the track shoes.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



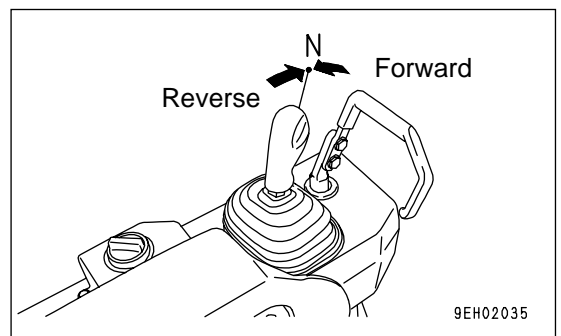
1. Depress brake pedal (1) to stop the machine.

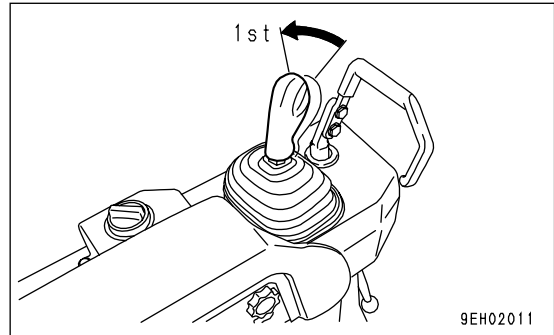
NOTICE

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



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

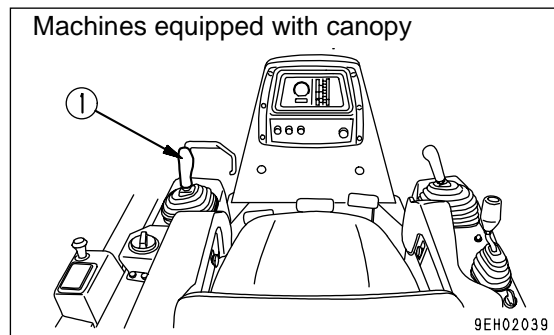
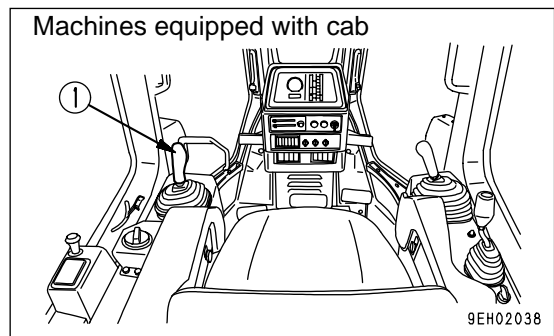




SHIFTING GEAR

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

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

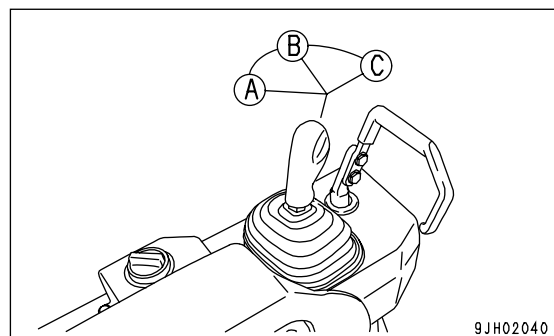


Gear shifting

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

- Position (A): 1st
- Position (B): 2nd
- Position (C): 3rd

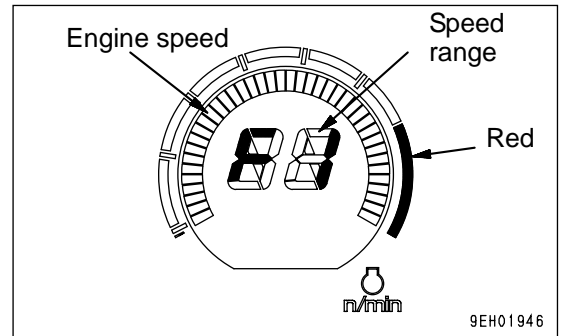
For details of the maximum speed at each speed range, see "SPECIFICATIONS (PAGE 5-2)".



REMARK

When gear shifting operation is carried out, the display panel will display the used speed range.

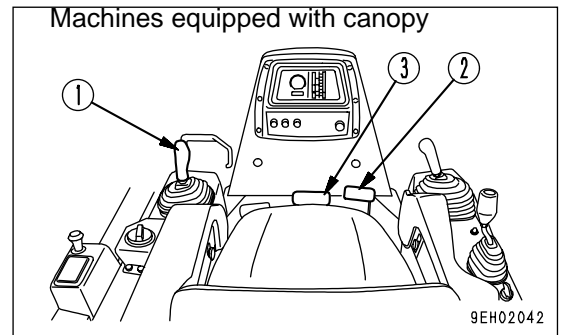
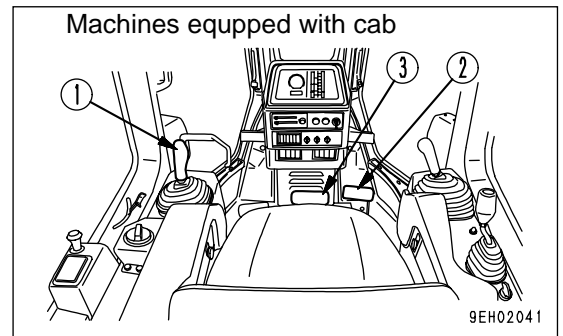
- NEUTRAL 1st: N1 is displayed on the display panel
- FORWARD 2nd: F2 is displayed on the display panel
- REVERSE 3rd: R3 is displayed on the display panel



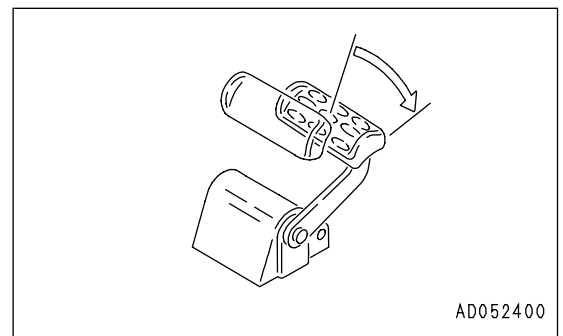
SHIFTING BETWEEN FORWARD AND REVERSE

⚠ CAUTION

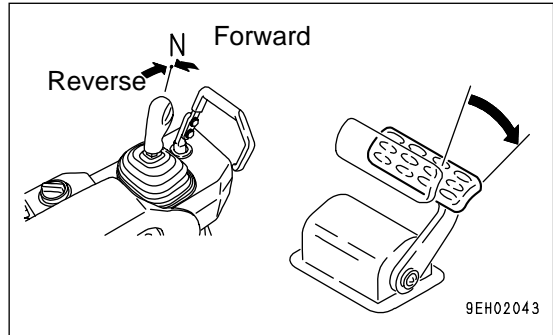
There is no need to stop the machine even when switching between FORWARD and REVERSE. To increase safety, operator comfort, and the life of the transmission, do not carry out switching operations with the engine running at full speed. Always depress the decelerator pedal to lower the engine speed.



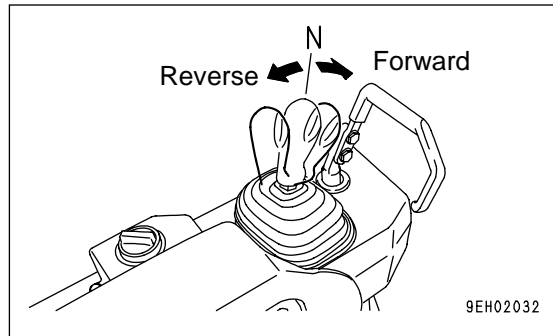
1. Depress decelerator pedal (2) and reduce the engine speed.



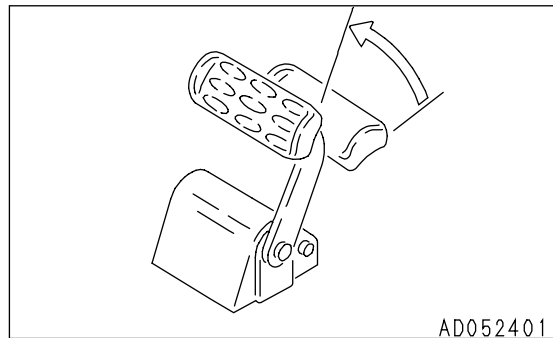
- 2. Return joystick (1) to the neutral position, reduce the speed, then depress brake pedal (3) and stop the machine.



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



- 4. Release decelerator pedal (2) to raise the engine speed.



STEERING MACHINE

WARNING

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

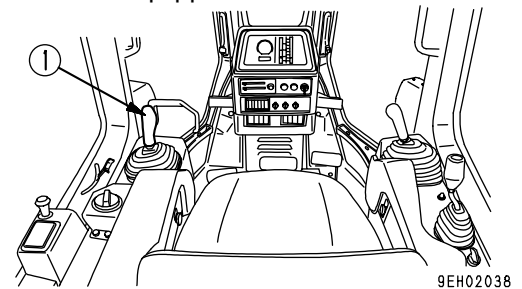
NORMAL TURNING

WARNING

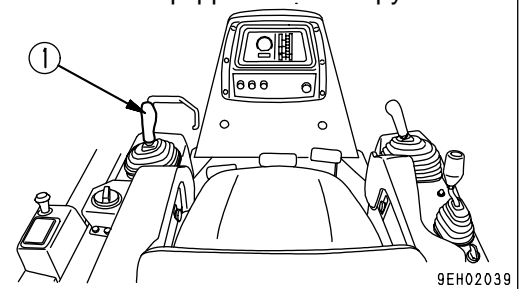
The feeling of the operation if the operator carries out a counterrotation turn when your head is facing the rear is different from the feeling when facing the front, so never carry out counterrotation turns when facing the rear.

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

Machines equipped with cab



Machines equipped with canopy



● Turnig to left while traveling forward

NOTICE

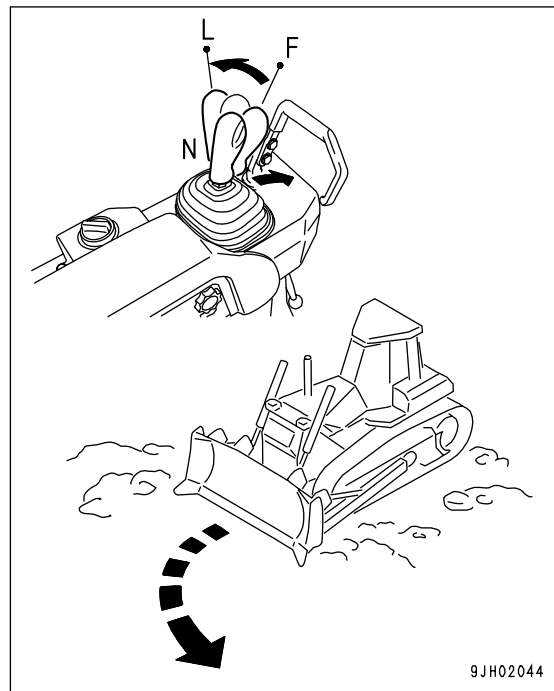
If the lever is operated partially to the forward or reverse position and then is operated in the direction of turn, the machine may carry out a counterrotation turn,so operate the lever fully to the forward or reverse position.

If the joystick (1) is pushed forward and moved partially to the left (L), the machine will start to turn gradually. After that, the lever can be moved further toward the end of its stroke to give the desired turning radius.

REMARK

If the joystick (1) is pushed forward and moved partially to the right, the machine will start to turn gradually to the right. After that, the lever can be moved further toward the end of its stroke to give the desired turning radius.

Do the same when traveling in reverse.



● Carrying out counterrotation turn to left

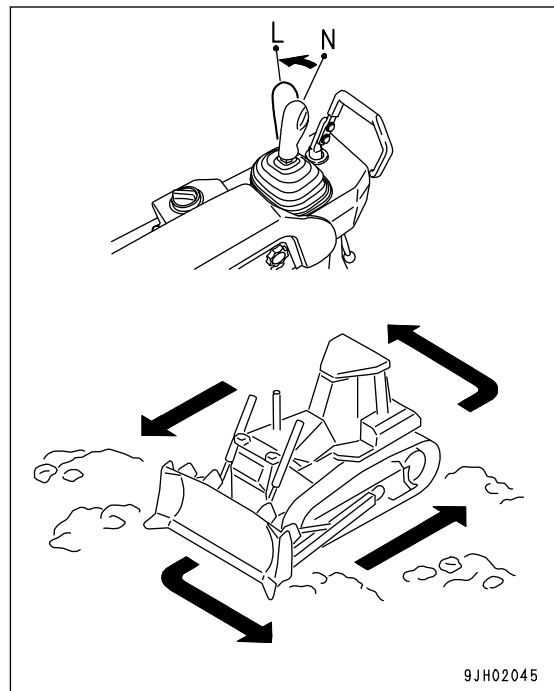
NOTICE

When carrying out a counterrotation turn, if the load is not equal on the left and right sides, the machine may carry out a pivot turn, so check the ground conditions and be careful not to hit any obstacles.

If the joystick (1) is placed at the N position and is operated partially to the left, the left and right tracks will rotate in opposite directions and the machine will carry out a counterrotation turn smoothly. If the lever is operated fully, the speed of the counterrotation turn will increase.

REMARK

When carrying out a counterrotation turn to the right, move the joystick (1) to the right in the same way.



TURNING WHILE DESCENDING A SLOPE

With machines that can carry out counterrotation turns, on steep downhill slopes where the machine may travel under its own weight, or on downhill slopes where it is being pushed by a towed machine, the machine will not steer in the opposite direction, so do as follows.

NOTICE

Do not use the counterrotation turn on slopes. The load on the left and right sides will not be uniform, and the machine may turn sharply to one side.

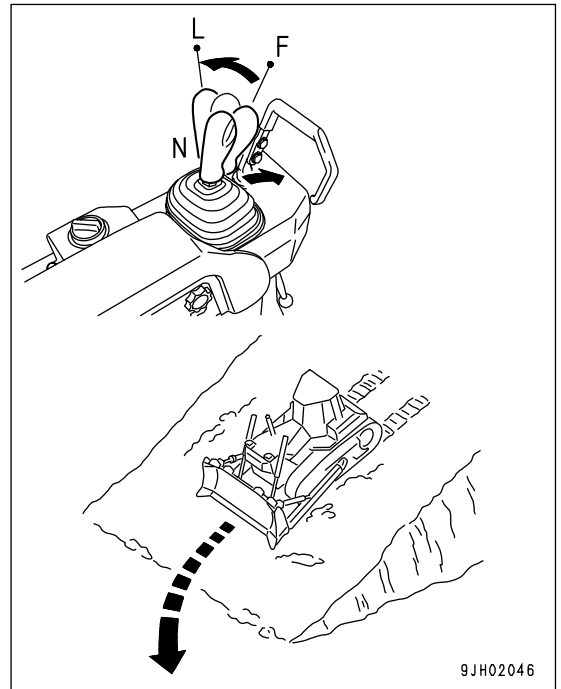
- **Making gradual turns to left while traveling forward**

If the joystick (1) is pushed forward and moved partially to the left (L), the machine turns gradually to the left. (Does not become reverse steering)

REMARK

When making gradual turns to the right, push the joystick (1) forward, and move it partially to the right. (Does not become reverse steering)

Do the same when traveling in reverse.

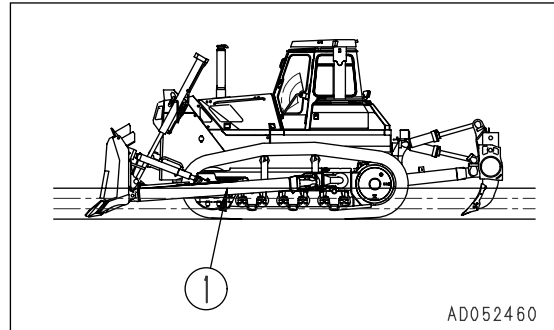


PRECAUTIONS FOR OPERATION

PERMISSIBLE WATER DEPTH

When operating in water, always keep center line (1) of the idler above the surface of the water.

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



PAY ATTENTION TO GAUGES

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

PRECAUTIONS WHEN TRAVELING UP OR DOWN HILLS

Method of using decelerator pedal

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

Use engine as brake

Do not move the joystick to the N position.

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

Braking when traveling downhill

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

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

PRECAUTIONS ON SLOPES

Be careful of fuel level

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

Precautions when engine stops on slopes

If the engine stops while working or traveling on a hill, the brake is automatically applied, move the parking lever to the LOCK position to apply the parking brake.

METHOD OF USING BRAKES

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

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

REMARK

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

IT IS PROHIBITED TO KEEP THE DOOR OPEN DURING OPERATIONS

(MACHINES EQUIPPED WITH CAB)

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

IT IS PROHIBITED TO MODIFY THE CAB GLASS IN ANY WAY THAT WILL OBSTRUCT THE VIEW

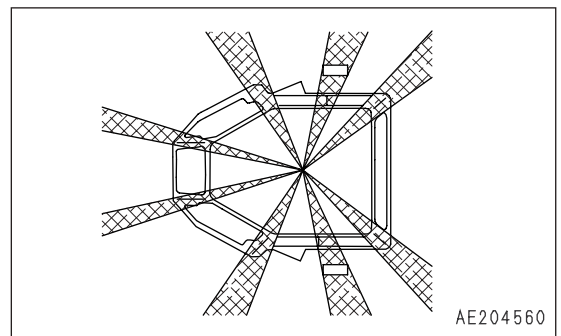
(MACHINES EQUIPPED WITH CAB)

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

PRECAUTIONS FOR BLIND SPOTS CAUSED BY CAB STAY AND ROPS STAY

WARNING

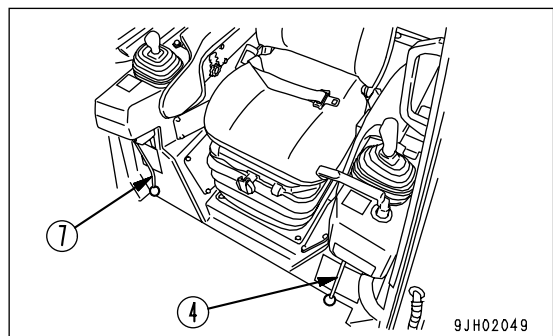
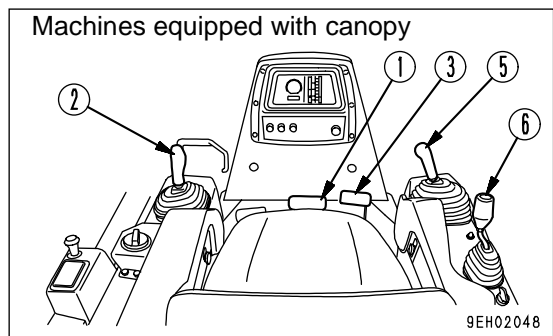
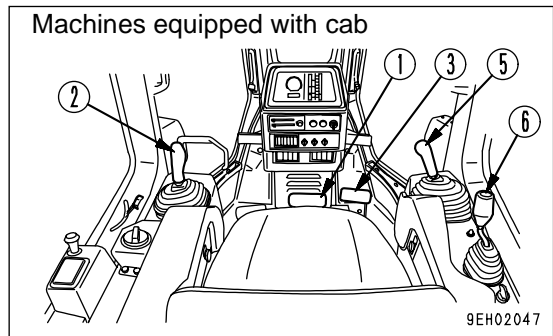
The cab stay and ROPS stay cause blind spots. When operating, always be sure to check carefully that there is no obstacle or worker in the surrounding area.



PARKING MACHINE

⚠ WARNING

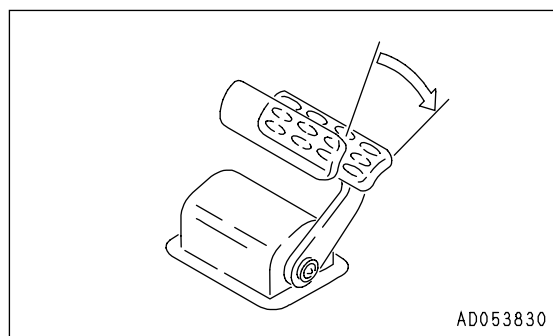
- Avoid stopping suddenly. Give yourself ample room when stopping.
- When stopping the machine, select flat hard ground and avoid dangerous places. If it is unavoidably necessary to park the machine on a slope, place the parking lever in the LOCK position and insert blocks underneath the track shoes.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



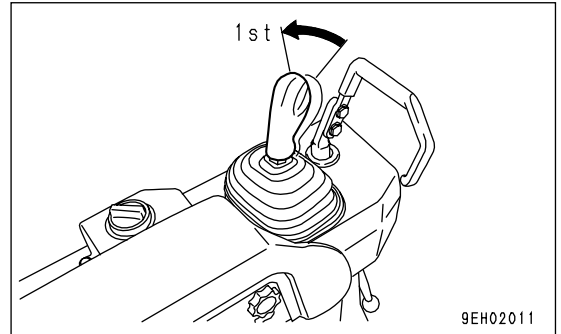
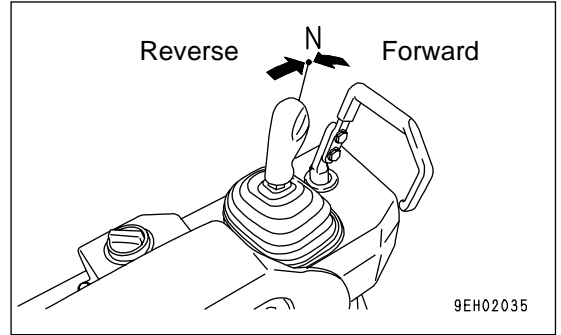
1. Depress brake pedal (1) to stop the machine.

NOTICE

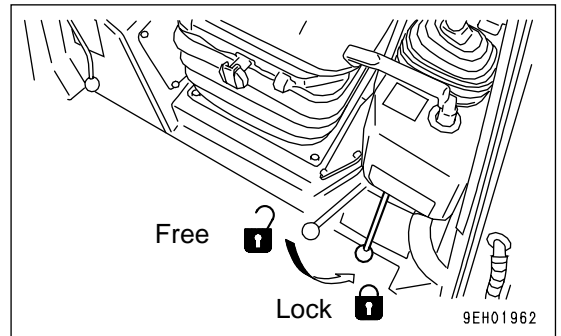
If the brake is depressed when the engine speed or travel speed is high, the brake disc may make a slipping sound. Normally, depress decelerator pedal (3) to reduce the engine speed and travel speed before depressing the brake.



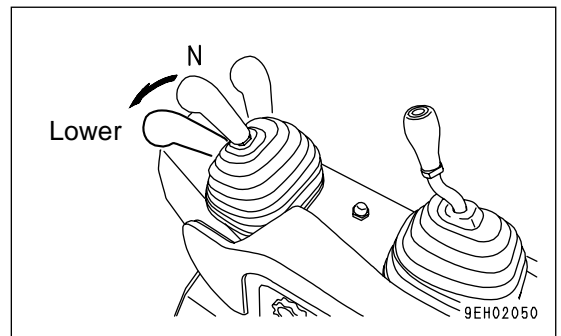
- 2. Place joystick (2) in NEUTRAL position and set the speed range to 1st.



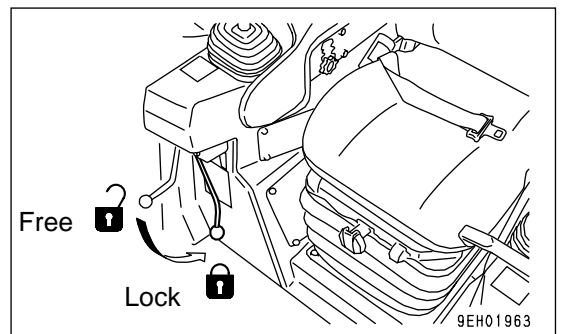
- 3. Operate parking lever (4) to lock the brakes.



- 4. Operate blade control lever (5) and ripper control lever (6) to the LOWER position, and lower the blade and ripper to the ground.
- 5. Set blade control lever (5) and ripper control lever (6) to the HOLD position.

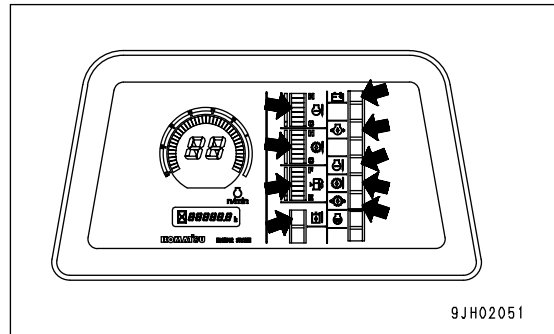


- 6. Lock blade control lever (5) and ripper control lever (6) with safety lever (7).



CHECK AFTER FINISHING WORK

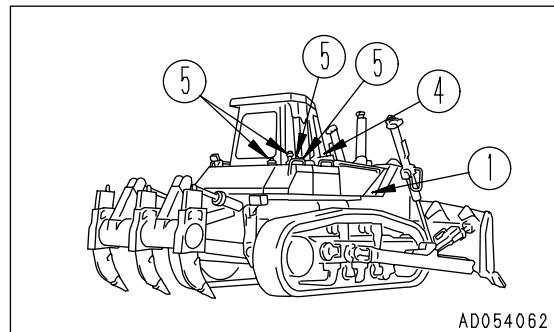
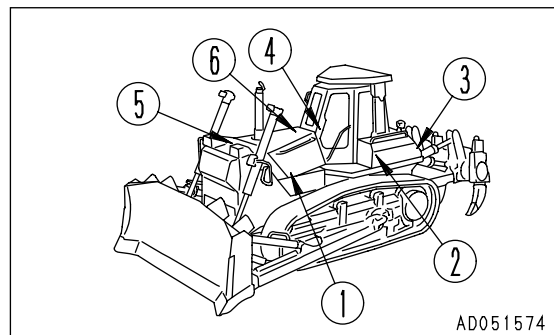
1. Use the meters and caution lamps to check the engine water temperature, engine oil pressure, fuel level, power train oil temperature gauge, charge lamp, HSS charge oil pressure and HSS oil temperature.



LOCKING

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

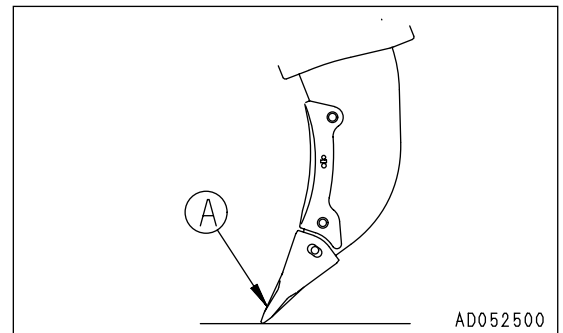
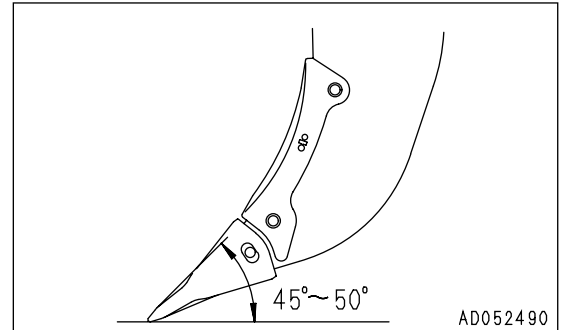
- Right and left engine side cover (1)
- Battery inspection cover (2)
- Inspection cover for fuel tank drain valve (3) (option)
- Cab door opener (4) (machines equipped with cab)
- Cap with lock (5) (option)
 - Radiator cap
 - Fuel tank cap
 - Hydraulic oil tank cap
 - Hydraulic oil tank breather
 - Power train oil filler cap
- Top cover of hood at cab front (air conditioner filter cover) (6)



RIPPER OPERATION

EFFECTIVE METHOD OF USE

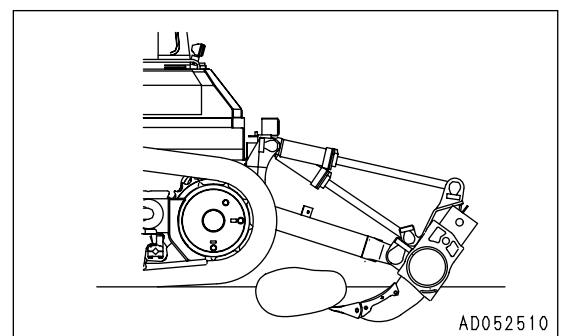
- The optimum digging angle for the shank is when the shank is perpendicular to the ground (ripping angle:45° - 50°).
- In comparatively soft rock (seismic velocity:1200 m/s or below), it is also possible to carry out ripping with the shank tilted to the rear (max.ripping angle).
- On comparatively hard rock, if ripping is carried out with the shank tilted to the rear, there will be excessive wear of the point of tip (A), and the self-sharpening ability will be lost.
- During ripping operations, if the shoes slip because of boulders or resistance from the bedrock, use the tilt cylinder.



- Choosing a suitable ripper point to match the type of rock is one of the most important elements in using the ripper effectively.
Ripper points are available for different types of rock, so select the most suitable ripper point from the list. For details, see "PROCEDURE FOR SELECTING RIPPER POINT (PAGE 6-8)".

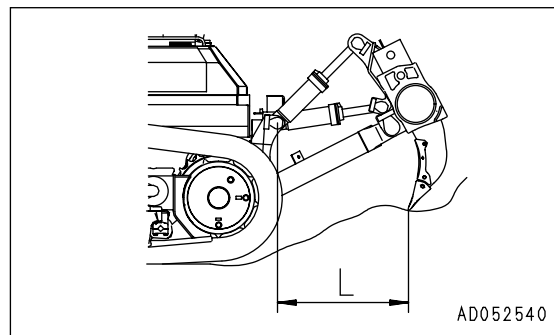
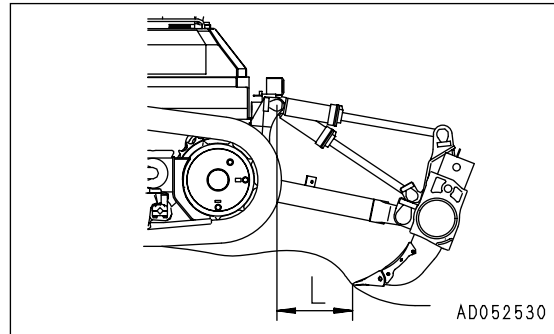
DIGGING UP BOULDERS OR ROCKBED

During ripper operations, if stubborn boulders or rockbed cause the tracks to slip or the travel speed to become slower, operate the tilt cylinder to dig up the boulder/rockbed.



OPERATING ON SLOPES

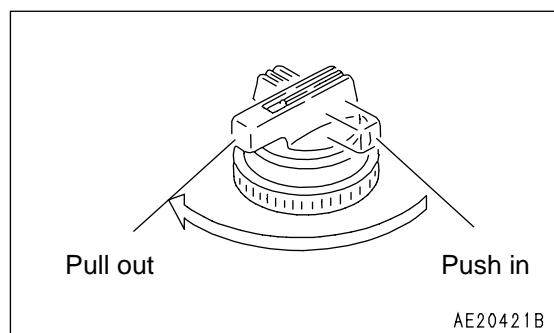
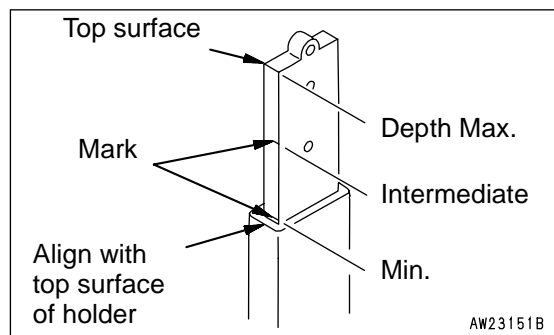
When using the variable ripper, adjust the length of the tilt cylinder to select dimension L.



METHOD OF OPERATING PIN PULLER

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

1. Stop the machine in a safe place and lower the shank to the ground.
2. Operate the pin puller controller switch and remove the mounting pin.
3. Move the ripper up or down to set to the desired shank position.
4. Operate the pin puller control switch to insert the mounting pin.
If the pin does not match the position of the hole in the shank, set the pin puller control switch to the PUSH IN position and slowly move the ripper up or down.
 - When raising the pin position to increase the digging depth, use a long protector to prevent wear of the shank.

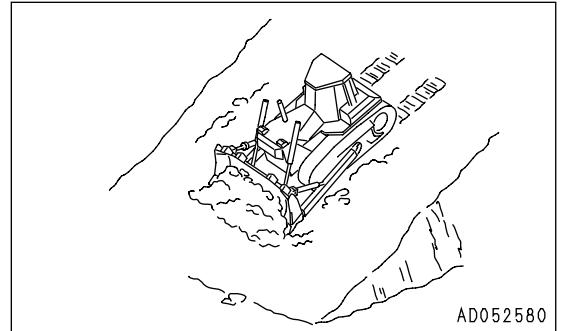


WORK POSSIBLE USING BULLDOZER

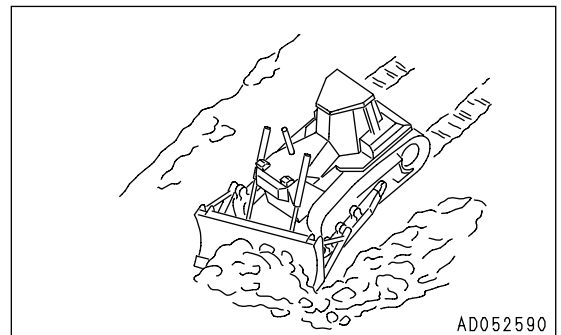
In addition to the following, it is possible to further increase the range of applications by using various attachments.

DOZING

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



When dozing toward one side only, operate with angled blade (angledozer only).

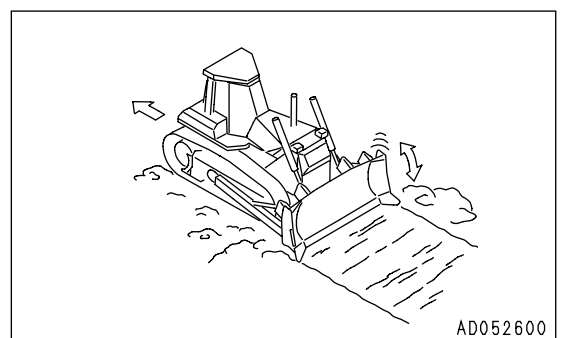


SMOOTHING NOTICE

NOTICE

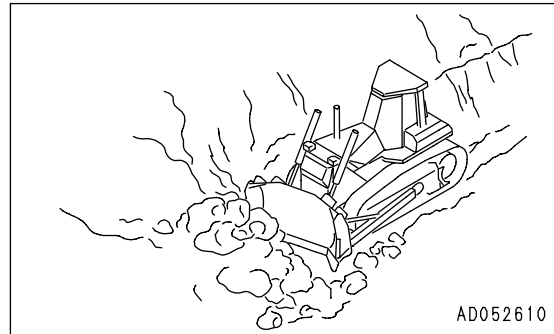
Avoid smoothing on rocky or stony ground. It can damage the blade.

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



CUTTING INTO HARD OR FROZEN GROUND OR DITCHING

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



FELLING TREES, REMOVING STUMPS

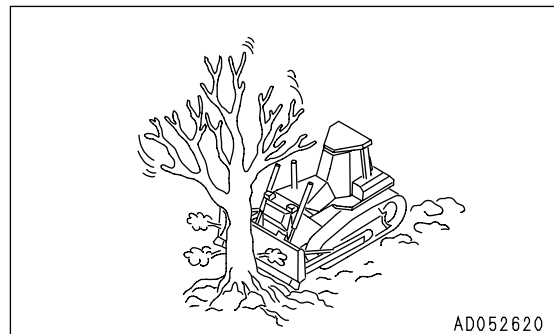
NOTICE

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

For trees with a diameter of 10-30 cm, raise the blade high and push 2 or 3 times to fell the tree.

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

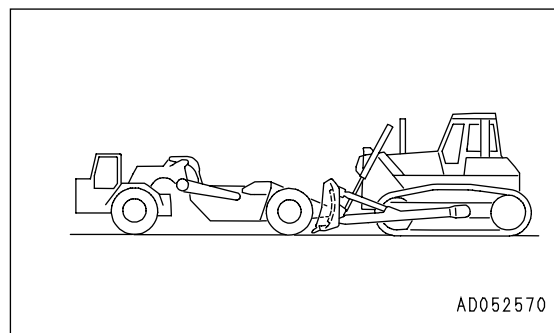
When doing this, never hit the tree at high speed or apply shock to fell the tree.



PUSHER OPERATIONS

NOTICE

- When carrying out pusher operations, always install a pusher plate.
- When approaching other machine, depress the decelerator pedal or reduce the travel speed with the fuel control dial and bring the machines gently into contact. When in contact, raise the engine speed gradually and push with full power.



ADJUSTING POSTURE OF WORK EQUIPMENT

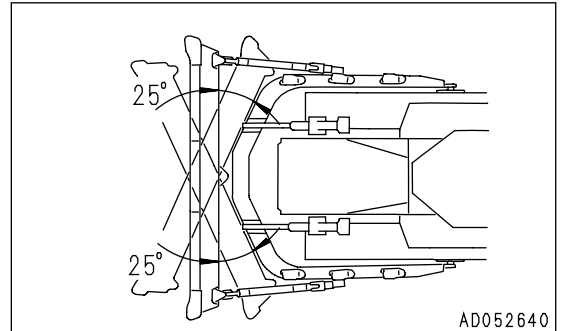
METHOD OF ANGLING BLADE

(ANGLED OZER ONLY)

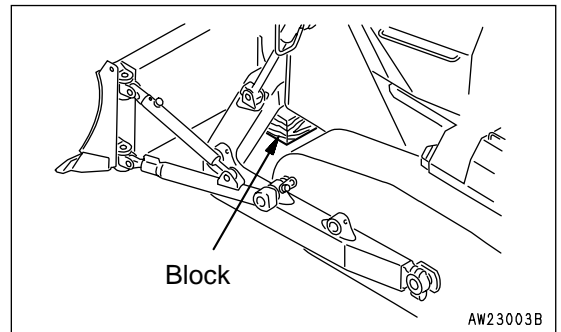
Angle the blade when it is needed to dump the soil on one side.

WARNING

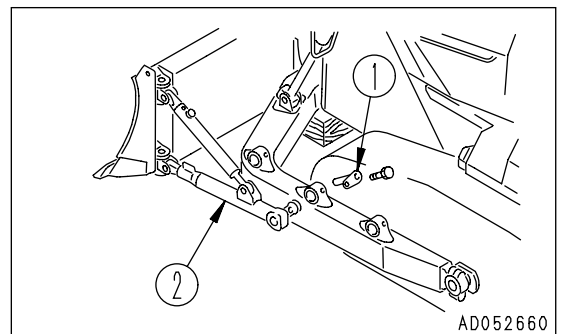
- When adjusting the amount of angling, it is dangerous if the work equipment is moved by mistake. Set the work equipment in a safe condition, then stop the engine and lock the work equipment securely with the safety lever.
- Be careful when removing arm (2). After arm (2) is removed the blade can move freely.



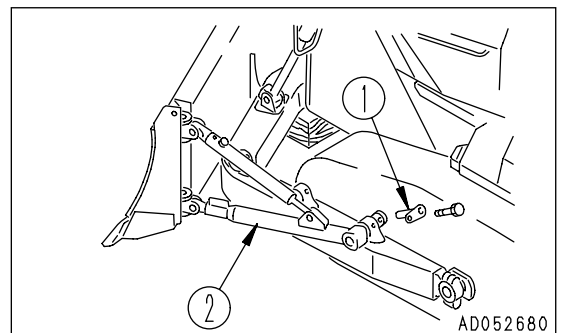
1. Raise the blade 300 - 400 mm above the ground, then put blocks under the frame so that the blade does not come down.



2. Remove pins (1) on the left and right sides, then remove arm (2) from the frame.

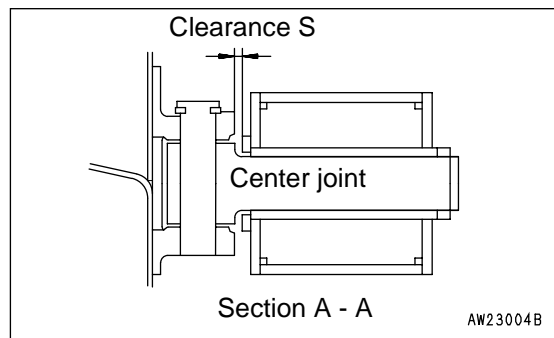
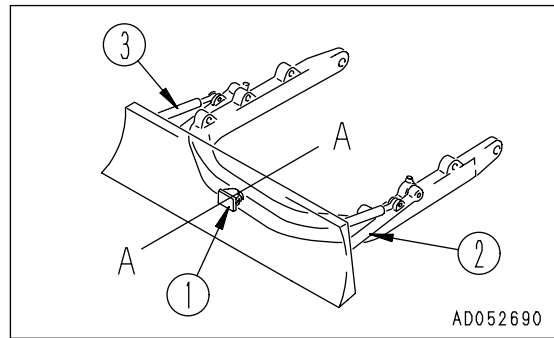


3. Insert arm (2) into the desired position on the bracket on top of the frame (3 places on each side), and insert pin (1).



REMARK

When assembling an angle dozer to the C-frame, adjust the clearance of the center joint by adjusting the length of arm (2) and brace (3) so that dimension S of center joint (4) is 20 mm (0.8 in).



ADJUSTING TILT AMOUNT

(ANGLEDZOZER, POWER TILTDOZER, POWER TILT POWER PITCHDOZER)

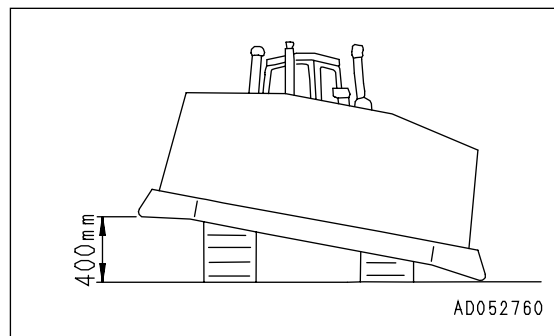
⚠ WARNING

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

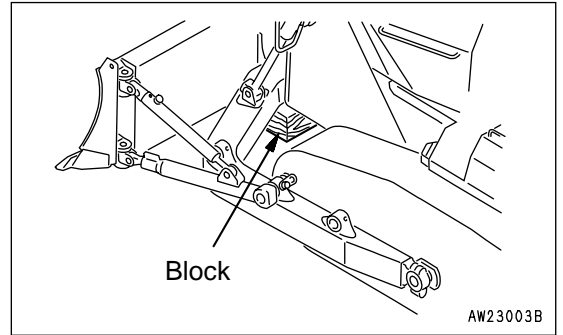
Angledozer

NOTICE

The maximum amount of tilt is 400 mm.
Be sure not to exceed 400 mm for the tilt.



1. Raise the blade 300 - 400 mm above the ground, then put blocks under the frame so that the blade does not come down.



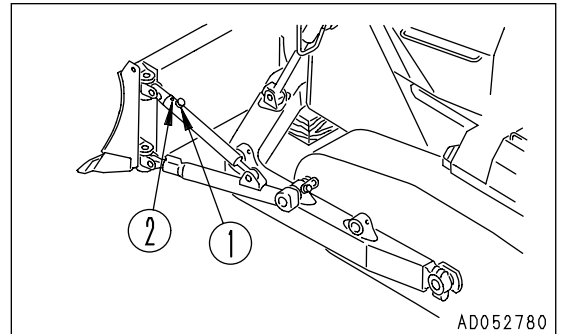
2. Loosen set bolt (1) of the brace, insert a suitable bar into hole (2) of the brace, and turn it.

REMARK

When rotating the brace with the adjustment bar, carry out the operation with the blade raised from the ground.

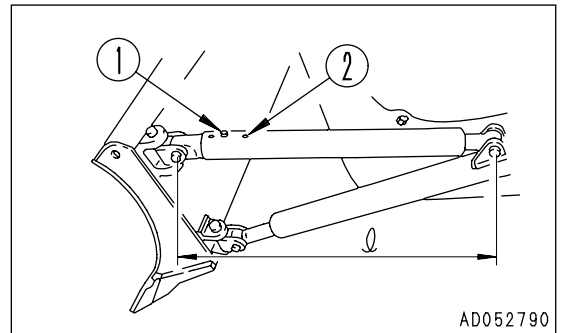
Right tilt: Make right side shorter, left side longer
 Left tilt: Make left side shorter, right side longer

3. Tighten set bolt (1).



NOTICE

The standard value for distance ℓ between the brace joints is 1493 mm, but adjust so that the maximum tilt does not exceed 400 mm. Do not use if the tilt exceeds 400 mm as this will cause strain on various parts.

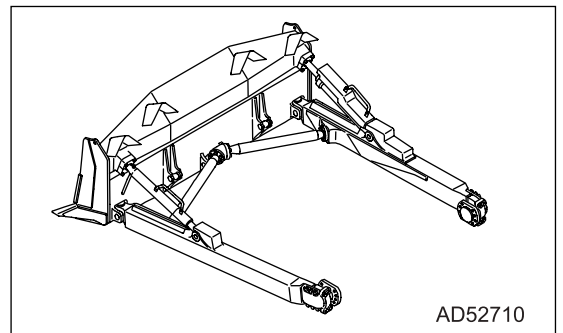


Power tiltdozer

NOTICE

The maximum tilt amount is 1000 mm. Be sure not to exceed this value.

1. A tilt of approx. 500 mm can be obtained by operating the blade control lever.



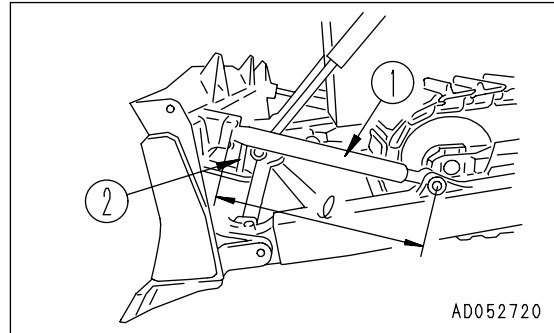
2. If a greater tilt amount is needed, use adjustment bar (2) installed to left brace (1) to rotate brace (1) and change the brace length.
It is possible to tilt to a maximum of 1000 mm.

REMARK

When adjusting the tilt in Steps 1 and 2, carry out the operation with the blade raised from the ground.

NOTICE

The standard value for distance (l) between the joints is 1389 mm, but adjust the brace length so that the maximum tilt does not exceed 1000 mm. Do not use if the tilt exceeds 1000 mm as this will cause strain on various parts.



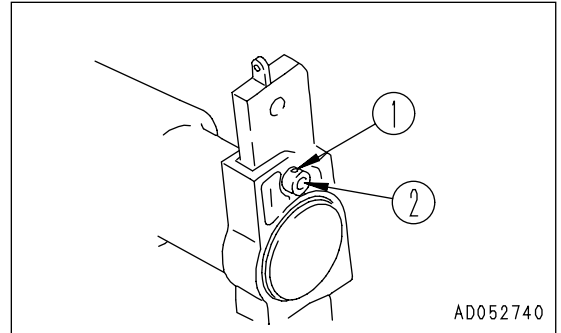
ADJUSTING RIPPER

ADJUSTING DIGGING DEPTH

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

To change the digging depth, do as follows.

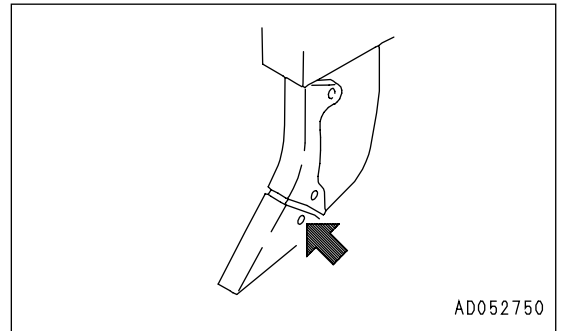
1. Place a pointed object on the tip of pin (1), then hit with a hammer to remove from the opposite side.
2. Remove pin (2) and change the position of the shank hole.
3. Insert pin (1) partially by hand then knock it in with a hammer.
 - Insert pin partially by hand to align the holes then knock it in with a hammer.
 - When a giant ripper is installed, use the pin puller. For details, see "METHOD OF OPERATING PIN PULLER (PAGE 3-106)".



REPLACING POINT AND PROTECTOR

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

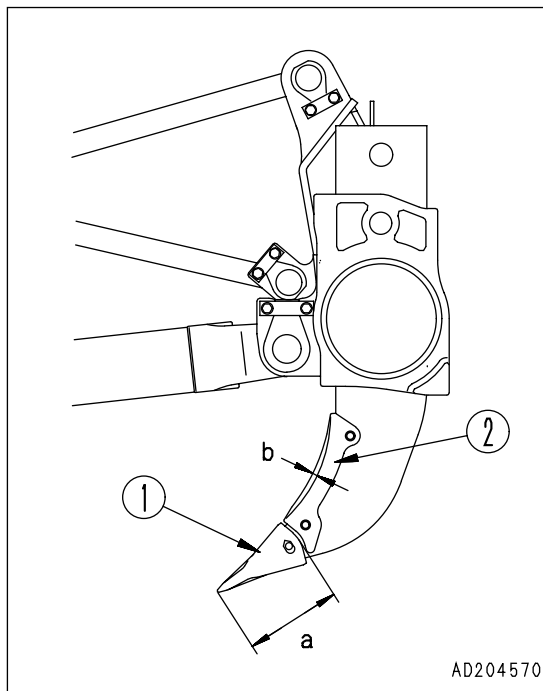
Place a pin remover on the pin marked by the arrow, then hit with a hammer to remove from the opposite side.



If the wear exceeds the wear limit in the table below, replace the worn parts.

Unit :mm

	Basic dimension	Wear limit
(1) Point	335	225
(2) Protector	115	90



ADJUST ANGLE OF BLADE EDGE

(ANGLEDZOZER, POWER TILTDOZER, POWER TILT POWER PITCHDOZER)

⚠ WARNING

It is dangerous if the work equipment moves by mistake when adjusting angle of the blade edge. Set the work equipment in a stable condition, then stop the engine and apply the locks securely to the safety lever.

Adjust the angle (θ) of the blade edge to match the type of soil.

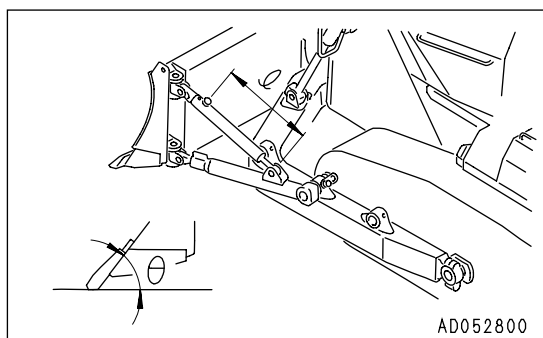
Angledozer

Adjust the cutting angle by changing the distance (ℓ) between the joints so that the length of the brace is the same on the left and right sides.

INCREASE distance (ℓ) to INCREASE angle (θ)
 DECREASE distance (ℓ) to DECREASE angle (θ).

The standard for the cutting angle (θ) is 54°.

The standard for the distance (ℓ) between the joints is 1493 mm.



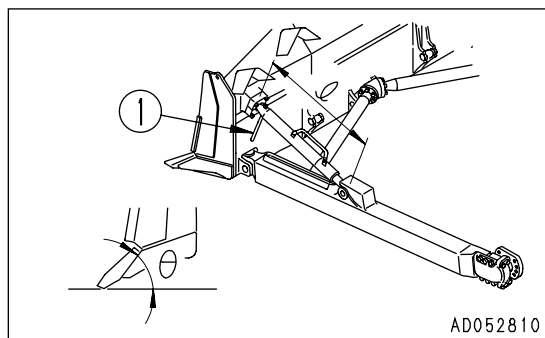
Power tiltdozer

Turn the brace with bar handle (1) to change the distance (ℓ) between the joints to change the cutting angle (θ) as follows.

INCREASE distance (ℓ) to INCREASE angle (θ)
DECREASE distance (ℓ) to DECREASE angle (θ).

The standard for the cutting angle (θ) is 52° .

The standard for the distance (ℓ) between the joints is 1389 mm.

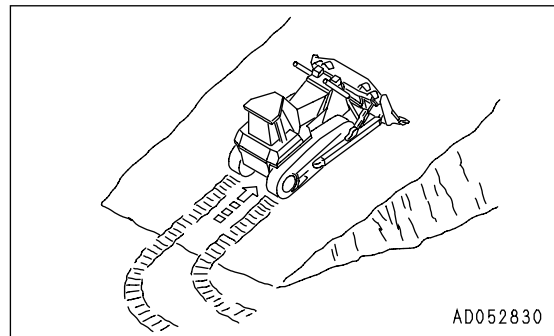


TIPS FOR LONGER UNDERCARRIAGE LIFE

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

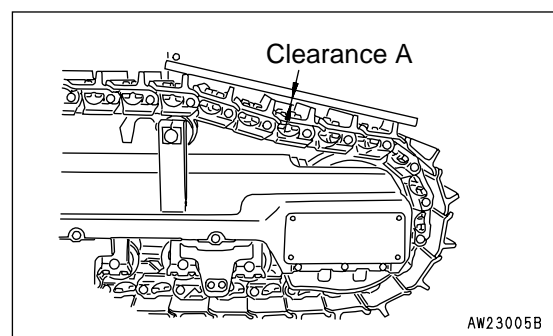
OPERATION METHOD

- Select the track shoe that best suits the type of soil to be encountered in service. Please consult your Komatsu distributor when selecting track shoes.
- Do not allow shoe slipping to occur during operation. If shoe slipping occurs, reduce load to the blade until slipping stops.
- Avoid sudden starts, acceleration or stops, unnecessarily high speeds and sharp turns.
- Always operate machine in a straight line whenever possible. When making turns, be careful not to allow the machine to stay to one side, so operation in both turning directions can be done properly. Make turns with the largest possible radius.
- Prior to operation, clear boulders and obstacles to prevent machine from riding over them while operating.
- On a slope, operate the machine parallel to the inclination of the slope. Do not operate across the slope. Also when stopping the machine on a slope, the machine should face toward the top of the slope.
- When ground inclines to left or right during digging operation, do not continue to dig with machine inclined. Move machine back to level ground and start to dig again.
- Do not force the machine to carry out work that exceeds its working capability. Such work includes cases where the idler or sprocket come off the ground when the machine meets obstacles that resist the power of the machine during dozing or ripping operations.

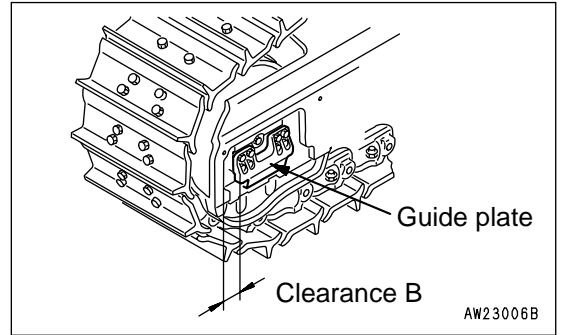


INSPECTION AND ADJUSTMENT

- Properly adjust track tension. Tension should be measured at clearance (A) shown in the diagram - usually 20 to 30 mm at this point. For rocky terrain, tighten tracks slightly. In clay or sandy areas, slightly loosen them. (For inspection and adjustment procedures, refer to "CHECK TRACK TENSION (PAGE 4-28)").
- Check idler rollers for oil leakage as well as for loose bolts and nuts. If any trouble is detected, repair immediately.



- Check the clearance between the idler guide plate and the track frame. If clearance (B) increases, idler may develop side motion and tracks may come off. (For inspection and adjustment procedures, refer to "ADJUST IDLER CLEARANCE (PAGE 4-35)").

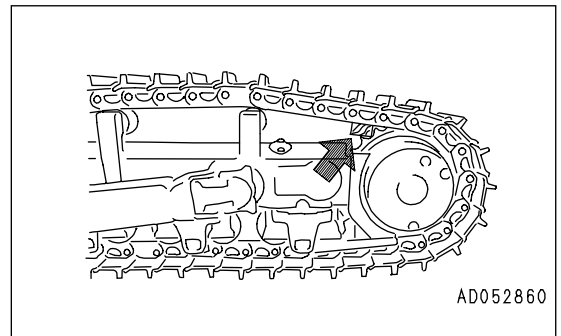


INSPECTION AND REPAIR

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

MEASURING LINK PITCH

1. Insert a wooden block between track shoe and sprocket to take up the slack in track shoes.
2. Measure pitch length of 4 links in stretched portion at more than 2 links away from master pin. Of length obtained, 1/4 is the link pitch.

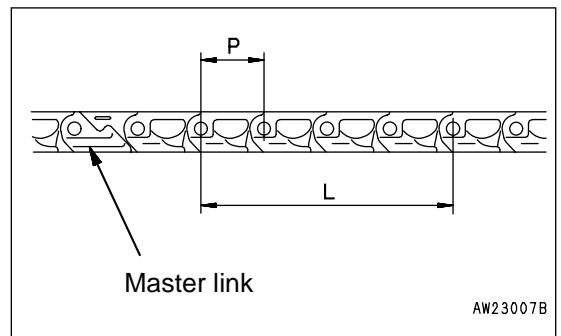


REMARK

Basic link pitch (P): 228.85 mm
 Link pitch limit for turning bushing

Heavy-duty: 231.85 mm
 Standard: 233.85 mm

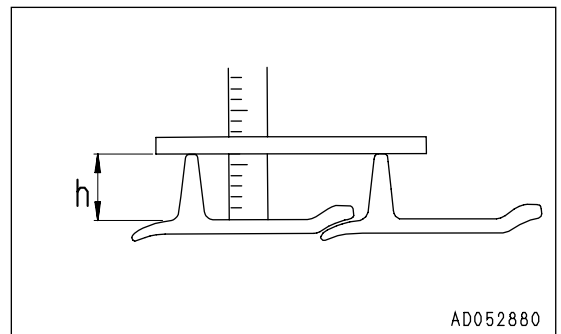
There is no link window on the master link.



MEASURING HEIGHT OF GROUSER

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

Standard height (h): 80 mm
 Repair limits: 25 mm

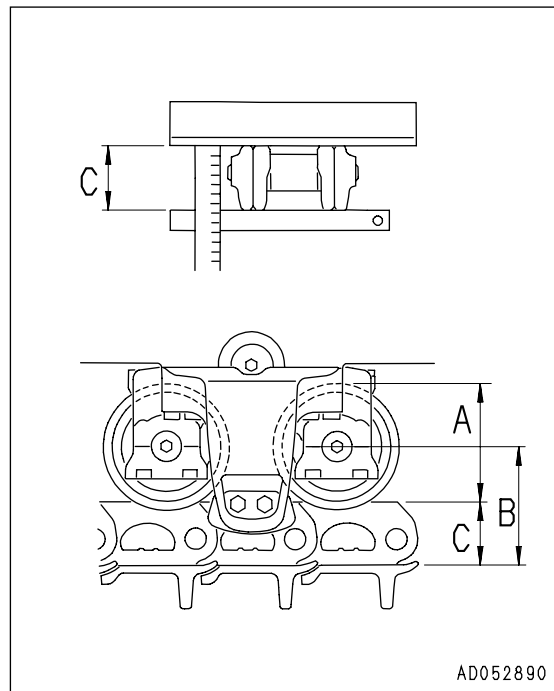


MEASURING OUTSIDE DIAMETER OF TRACK ROLLER

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

Standard size (A): 250 mm

Repair limits: 210 mm



TRANSPORTATION

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

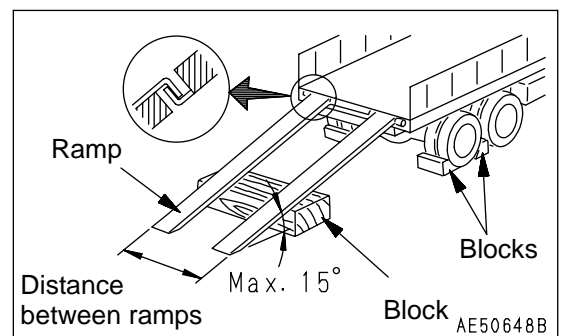
LOADING, UNLOADING WORK

⚠ WARNING

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

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

1. Properly apply the brakes on the trailer and insert blocks beneath the tires to ensure that it does not move. Then fix the ramps in line with the centers of the trailer and the machine.
2. Set the machine in line with the ramps, set the joystick to 1st speed, then load or unload the machine at slow travel.
3. Load the machine correctly in the specified position on the trailer.



PRECAUTIONS FOR LOADING

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

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

METHOD OF LIFTING MACHINE

WARNING

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

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

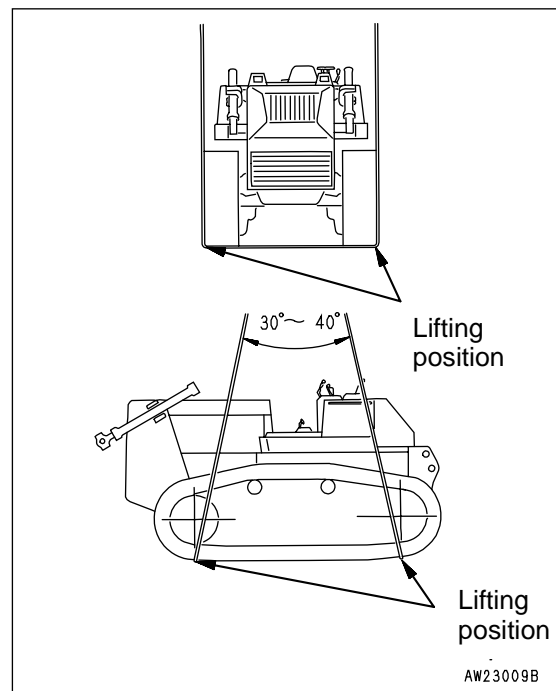
1. Stop the engine and be sure to set the parking lever to the LOCK position.
2. Set the lifting position for the machine as shown in the diagram on the right.

NOTICE

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

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

For details of the weight, see "SPECIFICATIONS (PAGE 5-2)".



PRECAUTIONS FOR TRANSPORTATION

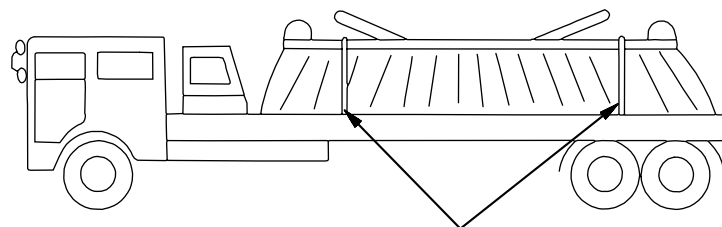
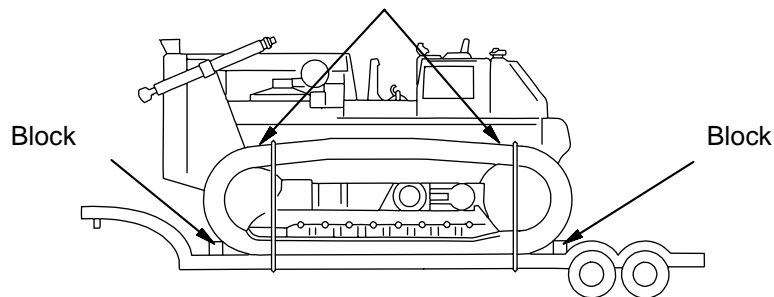
WARNING

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

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

Method of transportation

Pass wires through the front and rear holes in the track links and tighten to secure the machine.



Fit wires to the attachment at two places.

AW23010B

REMOVAL OF CAB

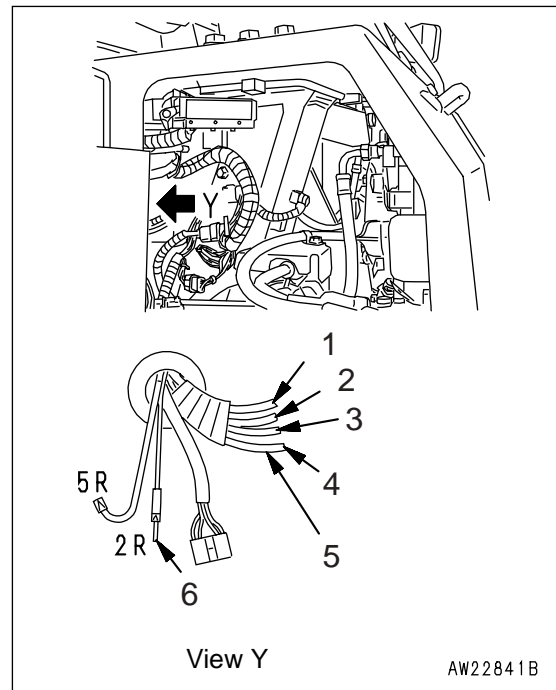
(MACHINES EQUIPPED WITH CAB)

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

1. Push the grommet portion from the hole in the machine cover towards the cab, then remove.
2. Disconnect 4 washer hoses and the wiring (single wires x 2, 4-pin plug x 1).

REMARK

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



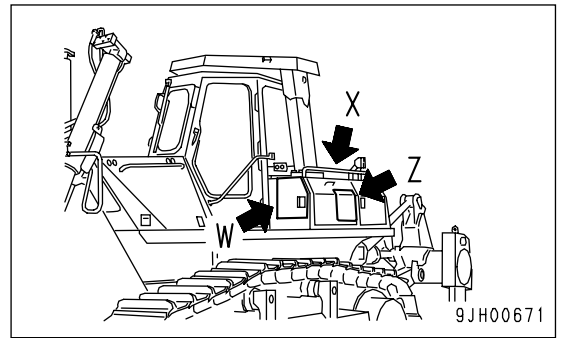
AW22841B

View Y

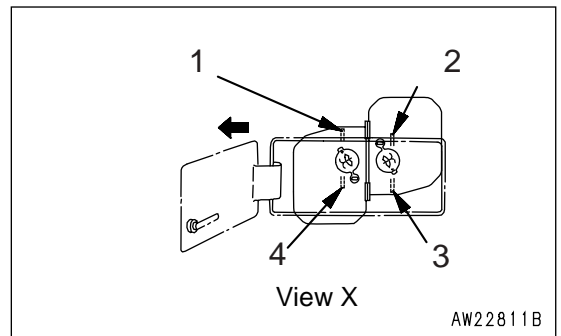
1	Red - right door
2	Blue - left door
3	Black - rear window
4	Colorless - front window
5	From fuse box, red (back up power source) Washer tube
6	

REMARK

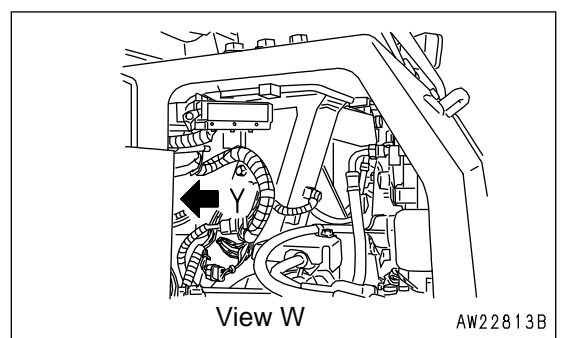
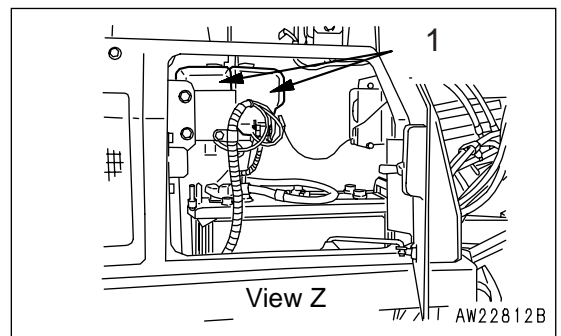
- When installing the cab, check the colors of the washer tank and window washer hoses, and be sure to connect correctly.
- When installing the cab, please contact your Komatsu distributor for installation.



View X	
1	For right door (red)
2	For front windows (colorless)
3	For left door (blue)
4	For rear window (black)



View Z	
1	Washer tank



COLD WEATHER OPERATION

COLD WEATHER OPERATION INFORMATION

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

FUEL AND LUBRICANTS

Change to fuel and oil with low viscosity for all components. For details of the specified viscosity, see "USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE (PAGE 4-11)".

COOLING SYSTEM COOLANT

WARNING

- 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 large quantities of fresh water and see a doctor at once.
- Antifreeze is toxic. Be extremely careful when handling it. When replacing coolant containing antifreeze or when handling coolant when repairing the radiator, contact your Komatsu distributor or ask your local antifreeze dealer. Be careful not to let the water flow into drainage ditches or spray on to the ground surface.
- Antifreeze is flammable, so do not bring any flame close. Do not smoke when handling antifreeze.

NOTICE

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

For details of the antifreeze mixture when changing the coolant, see "CLEAN INSIDE OF COOLING SYSTEM (PAGE 4-23)".

REMARK

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

For details of the antifreeze mixture when changing the coolant, see "CLEAN INSIDE OF COOLING SYSTEM (PAGE 4-23)".

BATTERY

WARNING

- The battery generates flammable gas, so do not bring fire or sparks near the battery.
- Battery electrolyte is dangerous. If it gets in your eyes or on your skin, wash it off with large amount of water, and consult a doctor.
- Battery electrolyte dissolves paint. If it gets on to 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.

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

REMARK

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

Rate of charge	Temp. of fluid			
	20°C	0°C	-10°C	-20°C
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 markedly in low temperatures, cover the battery or remove it from the machine, keep it in a warm place, and install it again the next morning.
- If the electrolyte level is low, add distilled water in the morning before beginning work. Do not add the water after the day's work so as to prevent fluid in the battery from freezing in the night.

AFTER DAILY WORK COMPLETION

WARNING

- Performing idle-running of the tracks is dangerous, so stay well away from the tracks.
- After completion of operations, fill the fuel tank to prevent the formation of water caused by condensation of moisture in the empty space in the tank when the temperature goes down.

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

- Mud and water on the machine body should be completely removed. This is to prevent damage to the seal caused by mud or dirt getting inside the seal with frozen drops of water.
- Park the machine on hard, dry ground.

If this is impossible, park the machine on wooden boards.

The boards help protect the tracks from being frozen in soil and the machine can start next morning.

- Open the drain valve and drain any water collected in the fuel system to prevent it from freezing.
- After operation in water or mud, remove water from undercarriage as described below to extend undercarriage service life.

AFTER COLD WEATHER SEASON

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

- Replace the fuel and oil for all parts with oil of the viscosity specified.

For details, see "USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE (PAGE 4-11)".

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

LONG TERM STORAGE

BEFORE STORAGE

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

- Clean and wash all parts, then store the machine indoors. If the machine has to be stored outdoors, select level ground and cover the machine with a sheet.
- Completely fill the fuel tank, lubricate and change the oil before storage.
- Apply a thin coat of grease to the metal surface of the hydraulic piston rods.
- Disconnect the negative terminals of the battery and cover it or remove it from the machine and store it separately.
- If the ambient temperature is expected to drop below 0°C, always add antifreeze to the cooling water.
- Place all control levers at the neutral position, set the safety lever and parking brake lever to the LOCK position, and set the fuel control lever to the low idling position.

DURING STORAGE

WARNING

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

- During storage, always operate the machine once a month so that a new film of oil will be coated over movable parts and component surfaces. At the same time, also charge the battery.
- For machines equipped with an air conditioner, run the air conditioner.
- Rotate the tracks.

AFTER STORAGE

NOTICE

If the machine is to be used when the monthly rust prevention operation has not been carried out, please contact your Komatsu distributor.

When using the machine after long-term storage, do as follows before using it.

- Wipe off all the grease coating the hydraulic cylinder rods.
- Add oil and grease to all places.
- When the machine has been stored for a long time, the moisture in the atmosphere will get into the oil. Check the oil at all parts before and after starting the engine. If there is water in the oil, change all the oil.

TROUBLESHOOTING

AFTER RUNNING OUT OF FUEL

⚠ WARNING

When air bleed plug (2) at the top of the fuel filter head or supply pump air breather (4) are removed, the system is still under pressure, so fuel may spurt out. Loosen these parts slowly before opening them.

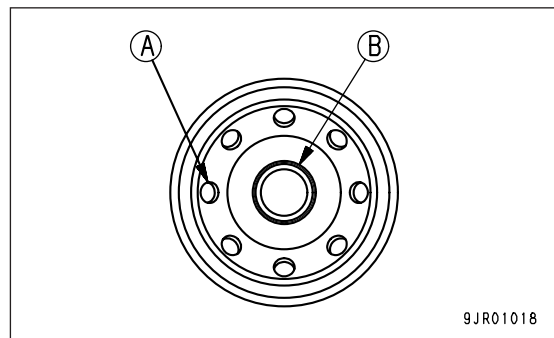
When starting after running out of fuel, fill the filter cartridge with fuel and bleed the air from the fuel system before starting.

Procedure for Bleeding Air

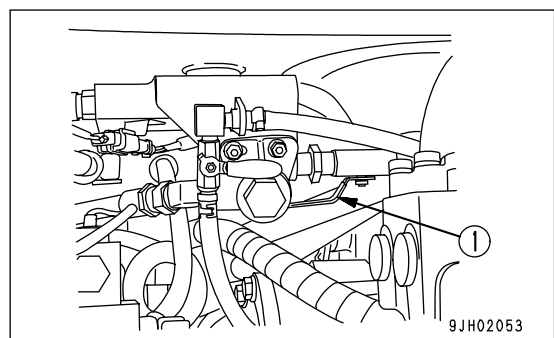
1. Remove the fuel filter cartridge, fill the filter case with fuel, then install again.

NOTICE

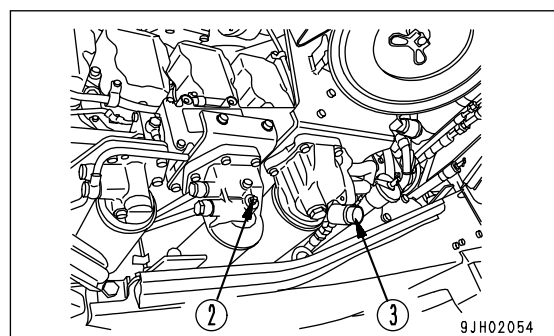
- The common rail fuel injection system used on this machine consists of more precise parts than the conventional injection pump and nozzle, so problems may be caused by dust or dirt getting in. When carrying out inspection or maintenance of the fuel system, pay more attention than normal to the entry of dirt. If dirt is stuck to any part, use fuel to wash it off completely.
 - When filling with fuel, use clean fuel and be careful not to let any dust or dirt get in. Portion (B) at the center is the clean side, so be particularly careful not to let any dust or dirt get in.
 - When adding fuel, always add from small hole (A) at eight places on the dirty side.
 - If no clean fuel is available, bleed the air with priming pump (3) without removing the fuel cartridge.
2. Loosen air bleed plug (2) at the top of the fuel filter head and open fuel supply valve (1) at the bottom of the fuel tank.
 3. Loosen the knob of priming pump (3), pump the knob, and check that fuel comes out from air bleed plug (2). After checking, tighten the plug.
Tightening torque: 7.8 to 9.8 N•m (0.8 to 1 kgf•m)



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9JH02053



9JH02054

4. Push the knob of priming pump (3) in and tighten it.
5. If the air is not bled properly, return to Step 3 and bleed the air again.
6. For normal starting operations, turn the key in the starting switch to the START position to start the engine.

METHOD OF TOWING MACHINE

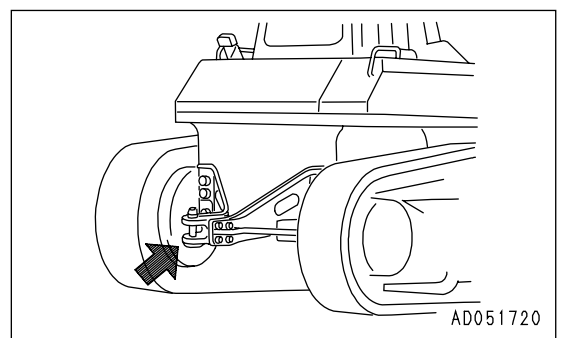
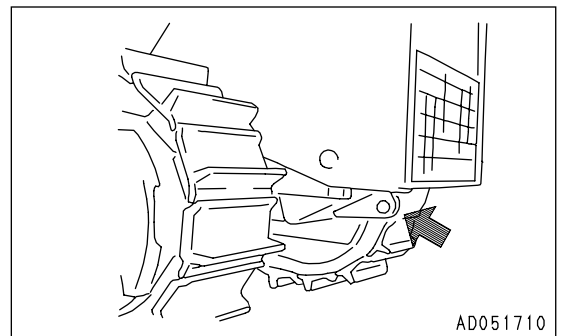
WARNING

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

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

NOTICE

The maximum towing capacity for this machine is 29,300 kg (288,371 N). Always carry out towing operations within the maximum towing capacity.

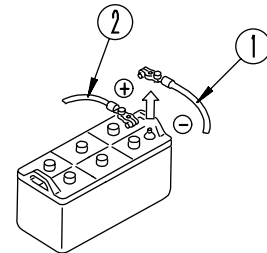


DISCHARGED BATTERY

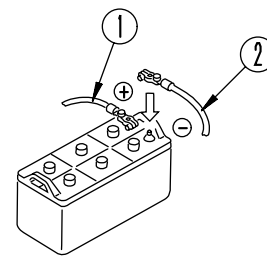
⚠ WARNING

- It is dangerous to charge the battery while it is still mounted on the machine. Always remove the battery before charging it.
- When checking or handling the battery, stop the engine and turn the starting switch key to the OFF position.
- The battery generates hydrogen gas, so there is a hazard of explosion. Do not bring lighted cigarettes near the battery, or do anything that will cause sparks.
- Battery electrolyte is dilute sulphuric acid, and it will attack your clothes and skin. If it gets on your clothes or on your skin, wash it immediately off with large amount of water. If it gets in your eyes, wash it out with fresh water, and consult a doctor.
- When handling batteries, always wear protective goggles and rubber gloves.
- When removing the battery, first disconnect the cable from the ground (normally the negative (-) terminal). When installing, install the positive (+) terminal first. If a tool touches the positive terminal and the chassis, there is danger that it will cause a spark, so be extremely careful.
- If the terminals are loose, there is danger that the defective contact may generate sparks that will cause an explosion.
- When installing the terminals, install them tightly. When removing or installing the terminals, check which is the positive (+) terminal and which is the negative (-) terminal.
- Green rust around the terminals is a cause of self-discharge of the battery. Polish the terminals with sandpaper. After removing the rust, coat the terminals thinly with grease before installing.

When removing, disconnect the cable from the ground terminal first



When installing, connect the cable to the positive (+) terminal first.



REMOVAL AND INSTALLATION OF BATTERY

NOTICE

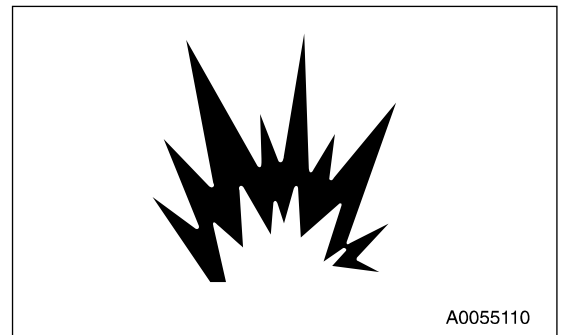
After fixing the battery in position, check that it does not move. If it moves, install it again.

- When removing, remove from the ground side first (normally the negative (-) terminal). Be careful not to touch between the (+) terminal and the machine with any tool. Letting a tool touch is dangerous as it causes sparks.
- When installing, connect the ground side last.
- When replacing the battery, fix the battery securely with the battery mount clamp.
- Tightening torque of mounting bolts: 9.8 to 14.7 N•m {1 to 1.5 kgf•m}

BATTERY CHARGES

When charging the battery, there is danger that the battery may explode if it is handled wrongly, so follow the instructions in "OTHER TROUBLE (PAGE 3-134)" and the instruction manual supplied with the charger, and be sure to observe the following precautions.

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

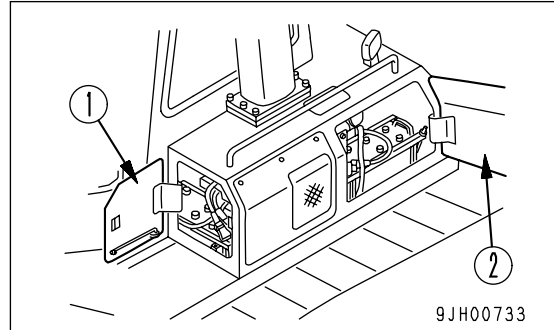


STARTING ENGINE WITH BOOSTER CABLES

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

REMOVAL, INSTALLATION OF BATTERY CABLE

1. Open battery cover (1) and (2).
2. Before removing the battery, remove the ground cable (normally connected to the negative (-) terminal). If any tool touches between the positive terminal and the chassis, there is danger of sparks being generated. Loosen the nut of the terminal and remove the wires from the battery.
3. When installing the battery, connect the ground cable last.
 - Insert the hole of the terminal on the battery and tighten the nut.
 - Tightening torque: 9.8 to 19.6 Nm (1.0 to 2.0 kgm)
4. Install battery cover (1) and (2).

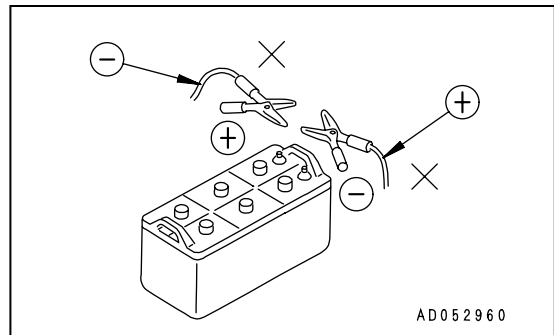


CONNECTING AND DISCONNECTING BOOSTER CABLES

⚠ WARNING

- When connecting the cables, never contact the positive (+) and negative (-) terminals.
- When starting the engine with a booster cable, always wear safety glasses.
- Be careful not to let the normal machine and problem machine contact each other. This prevents sparks from generating near the battery which could ignite the hydrogen gas given off by the battery. If hydrogen gas explodes, it could cause serious injury.
- Make sure that there is no mistake in the booster cable connections.

The final connection is to the engine block, but sparks will be generated when this is done, so connect to a place as far as possible from the battery. (However, avoid connecting the cable to the work equipment, as conduction is poor.)
- Use care when removing the cables from the machine that has been started. To avoid hydrogen explosion, do not allow the cable ends to contact each other or the machine.



NOTICE

- The starting system for this machine uses 24 V. For the normal machine, also use a 24V battery.
- The size of the booster cable and clip should be suitable for the battery size.
- The battery of the normal machine must be the same capacity as that of the engine to be started.
- Check the cables and clips for damage or corrosion.
- Make sure that the cables and clips are firmly connected.

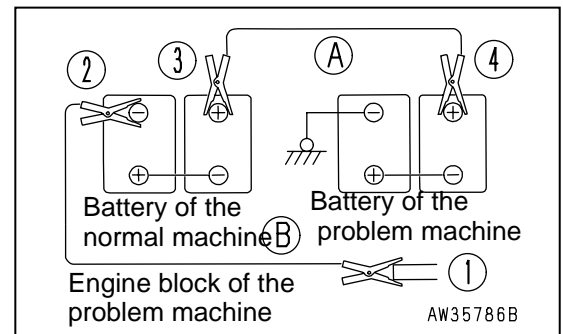
- Check that the safety lock levers and parking brake levers of both machine are in the LOCK position.
- Check that each lever is in the NEUTRAL position.

BOOSTER CABLE CONNECTION

Keep the starting switch of the normal machine and problem machine both at the OFF position.

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

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



STARTING THE ENGINE

⚠ CAUTION

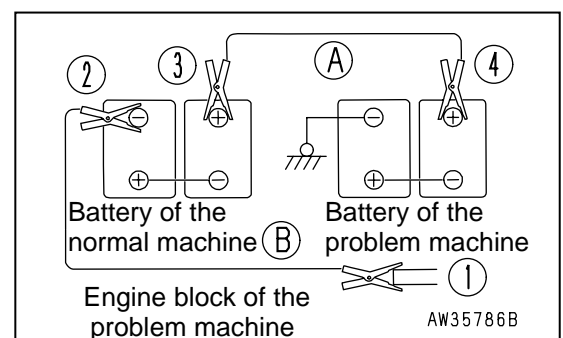
Always check that the safety lock lever is set to the LOCK position, regardless of whether the machine is working normally or has failed. Check also that all the control levers are at the HOLD or NEUTRAL position.

1. Make sure the clips are firmly connected to the battery terminals.
2. Start the engine of the normal machine and keep it to run at high idling speed.
3. Turn the starting switch of the problem machine to the START position and start the engine. If the engine doesn't start at first, try again after 2 minutes or so.

BOOSTER CABLE DISCONNECTION

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

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



OTHER TROUBLE

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

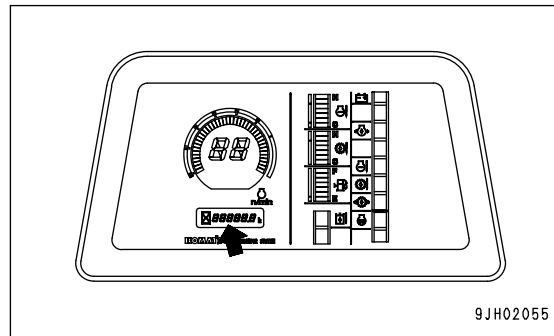
ELECTRICAL SYSTEM

Problem	Main causes	Remedy
Lamp does not glow brightly even when the engine runs at high speed	<ul style="list-style-type: none"> ● Defective wiring ● Defective adjustment of fan belt tension 	<ul style="list-style-type: none"> ● Check, repair loose terminals, disconnections ● Adjust alternator belt tension For details, see EVERY 250 HOURS SERVICE
Lamp flickers while engine is running		
Charge lamp does not go out even when engine is running	<ul style="list-style-type: none"> ● Defective alternator ● Defective wiring 	<ul style="list-style-type: none"> ● Replace ● Check, repair
Abnormal noise is generated from alternator	<ul style="list-style-type: none"> ● Defective alternator 	<ul style="list-style-type: none"> ● Replace
Starting motor does not turn when starting switch is turned to ON	<ul style="list-style-type: none"> ● Defective wiring ● Insufficient battery charge ● Safety switch out of adjust 	<ul style="list-style-type: none"> ● Check, repair ● Charge ● Adjust safety switch
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
Automatic preheating is not actuated	<ul style="list-style-type: none"> ● Defective wiring ● Defective heater relay ● Defective engine controller 	<ul style="list-style-type: none"> ● Check, repair ● Replace ● Check, replace
Preheating pilot lamp does not light up (When the engine water temperature is below -5°C)	<ul style="list-style-type: none"> ● Defective wiring ● Defective heater relay 	<ul style="list-style-type: none"> ● Check, repair ● Replace
Oil pressure caution lamp does not light up when engine is stopped (starting switch at ON position)	<ul style="list-style-type: none"> ● Defective caution lamp ● Defective caution lamp switch ● Defective wiring 	<ul style="list-style-type: none"> ● Replace ● Replace ● Check, repair
Charge lamp does not light up when engine is stopped (starting switch at ON position)	<ul style="list-style-type: none"> ● Defective charge lamp ● Defective wiring 	<ul style="list-style-type: none"> ● Replace ● Check, repair
Outside of electrical intake air heater is not warm when touched by hand	<ul style="list-style-type: none"> ● Defective wiring ● Disconnection in electrical intake air heater ● Defective operation of heater relay 	<ul style="list-style-type: none"> ● Check, repair ● Replace ● Check, repair heater relay

Problem	Main causes	Remedy
Air conditioner does not work properly	<ul style="list-style-type: none">● Blown fuse● Insufficient battery charge● Defective air conditioner switch● Defective blower switch● Defective compressor	<ul style="list-style-type: none">(● Check, repair)● Charge(● Replace air conditioner switch)(● Replace blower switch)(● Replace)
HSS charge pressure caution lamp does not light up when starting switch is turned ON.	<ul style="list-style-type: none">● Defective caution lamp● Defective wiring● Defective charge pressure sensor	<ul style="list-style-type: none">(● Replace)(● Check, repair)(● Replace)

MONITOR RELATED

If an abnormality code is displayed on the service meter display, take the necessary action according to the table below.



Abnormality code	Abnormality	Method of displaying abnormality	Remedy
E01	<ul style="list-style-type: none"> ● Abnormality in backup alarm relay ● Abnormality in sensor for displaying engine speed on monitor panel ● Abnormality in buzzer cancel switch 	Abnormality code and service hour are displayed in turn on service meter portion	The automatic functions stop and some functions stop, but it is still possible to carry out operations. Please contact your Komatsu distributor immediately for repairs.
E02	<ul style="list-style-type: none"> ● Abnormality in water temperature sensor ● Abnormality in HSS control function of power distribution 	Abnormality code and service hour are displayed in turn on service meter portion, caution lamp flashes, buzzer sounds	If user stops engine and then starts again, operations are possible without limit functions. However, user must be careful. Please contact your Komatsu distributor immediately for repairs.
CALL 03	<ul style="list-style-type: none"> ● Abnormality in injector ● Abnormality in steering potentiometer 1 system ● Abnormality in sensor for detecting forward or reverse travel 	Abnormality code and service hour are displayed in turn on service meter portion, caution lamp flashes, buzzer sounds	Move machine to a safe place, then contact your Komatsu distributor immediately for repairs.
CALL	<ul style="list-style-type: none"> ● Abnormality in controller power source ● Abnormality in steering potentiometer 2 system ● Abnormality in engine pump 	Abnormality code and service hour are displayed in turn on service meter portion, caution lamp flashes, buzzer sounds	Stop machine, then contact your Komatsu distributor immediately for repairs.

CHASSIS

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

Problem	Main causes	Remedy
When brake pedal is depressed, machine does not stop	<ul style="list-style-type: none"> ● Brakes out of adjust, defective brake oil pressure 	(● Check, adjust, repair)
Track comes off	<ul style="list-style-type: none"> ● Track too loose 	<ul style="list-style-type: none"> ● Adjust track tension, see WHEN REQUIRED
Abnormal wear of sprocket	<ul style="list-style-type: none"> ● Track too loose or too tightened 	
Blade, ripper lifting speed is slow or they do not move	<ul style="list-style-type: none"> ● Lack of hydraulic oil ● Work equipment lock lever is at LOCK position 	<ul style="list-style-type: none"> ● Add oil to specified level. See EVERY 250 HOURS SERVICE. ● Set to FREE position
Machine does not turn when steering is operated	<ul style="list-style-type: none"> ● Parking brake is at LOCK position ● Defective lever wiring ● Abnormality in HSS pump ● Abnormality in HSS motor 	<ul style="list-style-type: none"> ● Set to FREE position (● Check, repair) (● Check, replace) (● Check, replace)
Transmission oil pressure does not rise	<ul style="list-style-type: none"> ● Wear, scuffing of gear pump ● Lack of oil in power train case ● Element strainer of oil filter in power train case clogged 	<ul style="list-style-type: none"> (● Check, replace) ● Add oil to specified level. For details, see CHECKS BEFORE STARTING. ● Clean. For details, see EVERY 1000 HOURS SERVICE.
Lack of drawbar pull (travel speed does not rise)	<ul style="list-style-type: none"> ● Lack of engine horsepower 	<ul style="list-style-type: none"> ● See ENGINE
Pickup of travel speed is slow	<ul style="list-style-type: none"> ● Power train oil temperature is low ● Lack of engine horsepower 	<ul style="list-style-type: none"> ● Carry out warming-up operation ● See ENGINE
Machine does not move when joystick is operated to travel position	<ul style="list-style-type: none"> ● Lack of oil in power train case ● Transmission oil pressure does not rise ● Parking brake is at LOCK position 	<ul style="list-style-type: none"> ● Add oil to specified level. See CHECK BEFORE STARTING. ● See "Transmission oil pressure does not rise" above ● Set to FREE position
Machine does not travel in straight line	<ul style="list-style-type: none"> ● Defective adjustment of HSS controller ● Abnormality in HSS pump 	<ul style="list-style-type: none"> (● Adjust) (● Check, replace)

Problem	Main causes	Remedy
Torque converter overheats (Red range of power train oil temperature gauge lights up)	<ul style="list-style-type: none">● Lack of oil in power train case● Transmission oil pressure does not rise● Excessive load	<ul style="list-style-type: none">● Add oil to specified level. See CHECK BEFORE STARTING● See "Transmission oil pressure does not rise" above● Shift down one gear, or reduce load and raise speed during operation

ENGINE

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

Problem	Main causes	Remedy
Engine oil pressure caution lamp flashes when engine speed is raised after completion of warm-up	<ul style="list-style-type: none"> ● Engine oil pan oil level is low (sucking in air) ● Clogged oil filter cartridge ● Defective tightening of oil pipe joint, oil leakage from damaged part ● Defective caution lamp 	<ul style="list-style-type: none"> ● Add oil to specified level, see CHECK BEFORE STARTING ● Replace cartridge, see EVERY 500 HOURS SERVICE (● Check, repair) (● Replace lamp)
Steam is emitted from top part of radiator (pressure valve)	<ul style="list-style-type: none"> ● Cooling water level low, water leakage ● Loose fan belt ● Dirt or scale accumulated in cooling system 	<ul style="list-style-type: none"> ● Add cooling water, repair, see CHECK BEFORE STARTING ● Adjust fan belt tension, see EVERY 250 HOURS SERVICE ● Change cooling water, clean inside of cooling system, see WHEN REQUIRED
Red range of water temperature gauge flashes	<ul style="list-style-type: none"> ● Clogged radiator fin or damaged fin ● Defective thermostat ● Loose radiator filler cap (high altitude operation) ● Defective monitor panel 	<ul style="list-style-type: none"> ● Clean or repair, see WHEN REQUIRED (● Replace thermostat) ● Tighten cap or replace packing (● Replace monitor panel)
White range of water temperature gauge flashes	<ul style="list-style-type: none"> ● Defective thermostat ● Defective water temperature gauge 	<ul style="list-style-type: none"> (● Replace thermostat) (● Replace water temperature gauge)
Engine does not start when starting motor is turned	<ul style="list-style-type: none"> ● Lack of fuel ● Air in fuel system ● No fuel in fuel filter ● Starting motor cranks engine sluggishly ● Glow signal does not glow red ● Defective compression <ul style="list-style-type: none"> ● Defective valve clearance 	<ul style="list-style-type: none"> ● Add fuel, see CHECK BEFORE STARTING ● Repair place where air is sucked in (● Fill fuel filter with fuel, see EVERY 500 HOURS SERVICE) — See ELECTRICAL SYSTEM (● Adjust valve clearance)
Exhaust gas is white or blue	<ul style="list-style-type: none"> ● Too much oil in oil pan ● Improper fuel 	<ul style="list-style-type: none"> ● Add oil to specified level, see CHECK BEFORE STARTING ● Change to specified fuel
Exhaust gas occasionally turns black	<ul style="list-style-type: none"> ● Clogged air cleaner element ● Defective nozzle ● Defective compression 	<ul style="list-style-type: none"> ● Clean or replace, see WHEN REQUIRED (● Replace nozzle) (● Adjust valve clearance)
Combustion noise occasionally makes breathing sound	<ul style="list-style-type: none"> ● Defective nozzle 	<ul style="list-style-type: none"> (● Replace nozzle)

Problem	Main causes	Remedy
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 ● See item "Red range of water temperature gauge flashes". <ul style="list-style-type: none"> (● Replace muffler) (● Adjust valve clearance)
Monitor displays error code	<ul style="list-style-type: none"> ● Please contact your Komatsu distributor 	
Alarm buzzer sounds		
Engine horsepower lowered suddenly (engine is running in deration mode)		

MEMO

MAINTENANCE

 **WARNING**

Please read and make sure that you understand the safety volume before reading this section.

GUIDE TO MAINTENANCE

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

CHECK SERVICE METER

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

KOMATSU GENUINE REPLACEMENT PARTS:

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

KOMATSU GENUINE OILS:

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

ALWAYS USE CLEAN WASHER FLUID:

Use automobile windshield washer fluid, and be sure not to let any dirt get into it.

CLEAN OIL AND GREASE:

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

CHECKING FOREIGN MATERIALS DRAINED OIL:

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 carry out suitable action.

FUEL STRAINER:

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

WELDING INSTRUCTIONS:

- Turn off the engine starting switch.
- Do not apply more than 200V continuously.
- Connect grounding cable within 1 m from the area to be welded. If grounding cable is connected near instruments, connectors, etc., the instruments may have troubles.
- Avoid seals or bearings from being between the area to be welded and the position of grounding point.
- Do not use the area around the work equipment pins or the hydraulic cylinders as the grounding point.

DO NOT DROP THINGS INSIDE MACHINE:

- When opening inspection windows or the oil filler port of the tank to carry out inspection, be careful not to drop nuts, bolts, or tools inside the machine.
If such things are dropped inside the machine, it will cause damage and malfunction of the machine, and will 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 WORKSITES:

When working at dusty worksites, do as follows:

- Inspect the air cleaner clogging monitor 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 accumulation of dust.
- When inspecting or changing the oil, move the machine to a place that is free of dust to prevent dirt from getting into the oil.

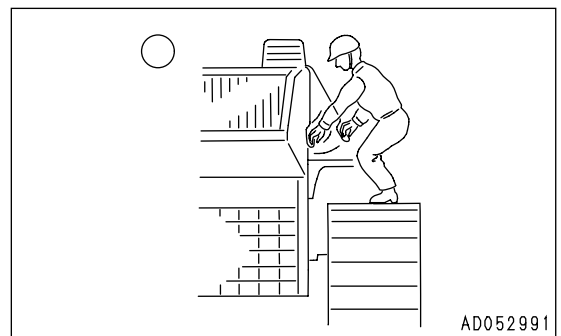
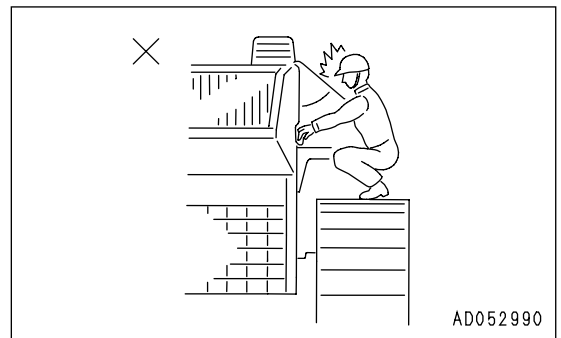
AVOID MIXING OILS:

Never mix different kinds of oil. If a different type of oil has to be added, drain the old oil and replace all the oil with the new type of oil.

PRECAUTIONS FOR OPENING AND CLOSING ENGINE SIDE COVER

Precautions when opening and closing engine side cover:

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



LOOKING THE INSPECTION COVERS:

When carrying out maintenance with the inspection cover open, lock it in position securely with a lock bar. If inspection or maintenance is carried out with the inspection cover open and not locked in position, there is a hazard that it may be suddenly blown shut by the wind and cause injury to the worker.

HYDRAULIC SYSTEM - AIR BLEEDING

After repairing or replacing the hydraulic equipment or after removing the hydraulic piping, it is necessary to bleed the air from the circuit. For details, see "PROCEDURE FOR BLEEDING AIR IN HYDRAULIC SYSTEM (PAGE 4-43)".

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, be careful not to forget to assemble the O-rings and gaskets.

- When installing the hoses, do not twist them or bend them into loops with a small radius.

This will cause damage to the hose and markedly reduce its service life.

CHECK AFTER INSPECTION AND MAINTENANCE WORKS:

If you forget to carry out the checks after inspection and maintenance, unexpected problems may occur, and this may lead to serious injury or property damage. Always do as follows.

- Checks after operation (with engine stopped)
 - Have any inspection and maintenance points been forgotten?
 - Have all inspection and maintenance items been carried out correctly?
 - Have any tools or parts been dropped inside the machine? It is particularly dangerous if parts are dropped inside machine and get caught in the lever linkage mechanism.
 - Is there any leakage of water or oil? Have all the bolts been tightened?
- Checks when engine is running
 - For the checks when the engine is running, see "TWO WORKERS FOR MAINTENANCE WHEN ENGINE IS RUNNING (PAGE 2-31)" in the SAFETY section, and take care of safety sufficiently.
 - Check that the inspected and maintained parts work normally.
 - Raise the engine speed and check for fuel leakage and oil leakage.

FUEL AND LUBRICANTS TO MATCH THE AMBIENT TEMPERATURE

Select the fuel and lubricants to match the ambient temperature.

For details, see "USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE (PAGE 4-11)".

OUTLINE OF SERVICE

OUTLINE OF OIL, FUEL, COOLANT

OIL

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

FUEL

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

COOLANT

- River water contains large amounts of calcium and other impurities, so if it is used, scale will stick to the engine and radiator, and this will cause defective heat exchange and overheating.
Do not use water that is not suitable for drinking.
- When using anti-freeze, always observe the precautions given in the Operation and Maintenance Manual.
- Komatsu machines are supplied with Komatsu original anti-freeze in the coolant when the machine is shipped. This anti-freeze is effective in preventing corrosion of the cooling system.
The anti-freeze can be used continuously for two years or 4000 hours. Therefore, it can be used as it is even in hot areas.
- Anti-freeze is flammable, so be extremely careful not to expose it to flame or fire.
- The proper mixing proportion of the antifreeze depends on the ambient temperature. For the mixing proportion, see "CLEAN INSIDE OF COOLING SYSTEM (PAGE 4-23)".
- If the engine overheats, wait for the engine to cool before adding coolant.
- If the coolant level is low, it will cause overheating and will also cause problems with corrosion from the air in the coolant.

GREASE

- Grease is used to prevent twisting and noise at the joints.
- The nipples not included in the MAINTENANCE section are nipples used when overhauling, so they do not need grease.
If any part becomes stiff or generates noise after being used for a long time, grease it.
- 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.

CARRYING OUT KOWA (Komatsu Oil Wear Analysis)

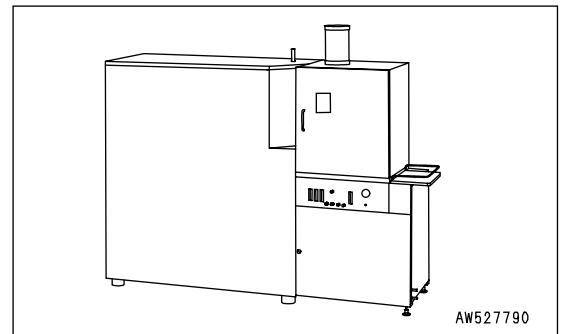
KOWA is a maintenance service that makes it possible to prevent machine failures and down-time. With KOWA, the oil is periodically sampled and analyzed. This enables early detection of wear of the machine drive parts and other abnormalities.

Periodic use of KOWA makes the following possible:

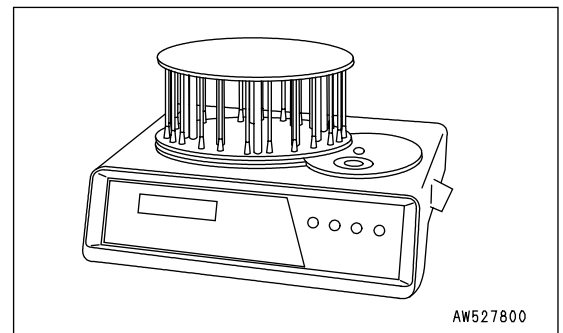
- It enables abnormalities to be detected early, leading to reduction of repair costs and machine downtime.
- It enables repair schedules to be planned, leading to improved machine availability.

KOWA ANALYSIS ITEMS

- Analysis of metal wear particles
This uses an ICP (Inductively Coupled Plasma) analyzer to measure the density of metal wear particles in the oil.



- Measurement of particle quantity
This uses a PQI (Particle Quantifier Index) measurer to measure the quantity of large iron particles in the oil.



- Others
Measurements are made of items such as the ratio of water or fuel in the oil, and the dynamic viscosity.

OIL SAMPLING

- Sampling interval
250 hours: Engine
500 hours: Other components
- Precautions when sampling
 - Make sure that the oil is well mixed before sampling.
 - Carry out sampling regularly at fixed intervals.
 - Do not carry out sampling on rainy or windy days when water or dust can get into the oil.

For further details of KOWA, please contact your Komatsu distributor.

STORING OIL AND FUEL

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

FILTERS

- Filters are extremely important safety parts. They prevent impurities in the fuel and air circuits from entering important equipment and causing problems.

Replace all filters periodically. For details, see the Operation and Maintenance Manual.

However, when working in severe conditions, 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 affixed to the old filter. If any metal particles are found, please contact your Komatsu distributor.
- Do not open packs of spare filters until just before they are to be used.
- Always use Komatsu genuine filters.

ELECTRIC SYSTEM MAINTENANCE

- It is extremely dangerous if the electrical equipment becomes wet or the covering of the wiring is damaged. This will cause electrical leakage and may lead to malfunction of the machine. 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 is check of fan belt tension, check of damage or wear in the fan belt and check of battery fluid level.
- Never install any electric components other than there specified by Komatsu.
- External electrical interference may cause malfunction of the control system controller, so before installing a radio receiver or other wireless equipment, please contact your Komatsu distributor.
- When working at the seashore, carefully clean the electric system to prevent corrosion.
- When installing an operator's cab cooler or any other electrical equipment, connect it to an independent power source connector. The optional power source must never be connected to the fuse, starting switch, or battery relay.

WEAR PARTS

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

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

When changing parts, use Komatsu genuine parts of excellent quality.

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

WEAR PARTS LIST

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

Item	Part No.	Part Name	Weight (kg)	Q'ty	Replacement frequency	
Engine oil filter	600-211-1340	Cartridge	—	1	Every 500 hour service	
Power train filter	07063-01100 (07000-02130)	Element (O-ring)	— —	1 (1)		
Fuel filter	600-311-3110	Cartridge	—	1		
Hydraulic tank breather	20Y-60-21470	Cap element	—	1		
Corrosion resistor	600-411-1161	Cartridge	—	1	Every 1000 hours service	
Charge filter	07063-51054 (07000-02110)	Element (O-ring)	— —	1 (1)		
Hydraulic oil filter	07063-51100 (07000-02130)	Element (O-ring)	— —	1 (1)	Every 2000 hours service	
Air cleaner	6128-81-7042	Element ass'y	—	1	—	
	600-181-4401	Outer element ass'y	—	1		
Air conditioner	Fresh filter	14X-911-7750	Filter	—	2	
	Recirc filter	14X-911-7741	Filter	—	1	
Blade	Semi U-blade	195-70-12492	Cutting edge	103.4	1	—
		17A-71-11351	Cutting edge	57	2	
		17M-71-21930	End bit (left)	63	1	
		17M-71-21940	End bit (right)	63	1	
		17A-71-12451	(Bolt)	—	(33)	
		17M-71-21530	(Nut)	—	(33)	
	U-blade	17A-72-12221	Cutting edge	69	2	
		17M-72-21160	Cutting edge	58	2	
		17M-71-21930	End bit (left)	63	1	
		17M-71-21940	End bit (right)	63	1	
		17A-71-12451	(Bolt)	—	(36)	
		17M-71-21530	(Nut)	—	(36)	
	Angledozer	175-70-26310	Cutting edge	48.8	1	
		175-70-21115	Cutting edge	64.1	2	
		175-71-11454	(Bolt)	—	(25)	
		175-71-11530	(Nut)	—	(25)	
		175-70-21126	End bit (left)	37	1	
		175-70-21136	End bit (right)	37	1	
		175-71-11463	(Bolt)	—	(14)	
		175-71-11530	(Nut)	—	(14)	

Item		Part No.	Part Name	Weight (kg)	Q'ty	Replacement frequency
Ripper	Multi	175-78-31230	Point	15	3	—
		195-78-21320	Protector	13	3	
		09244-02508	(Pin)	—	(9)	
	Giant	175-78-31230	Point	15	1	—
		195-78-21320	Protector	13	1	
		09244-02508	(Pin)	—	3	

NOTICE

When handling parts that weigh more than 25 kg, remember that they are heavy objects, and take the necessary care.

USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE

PROPER SELECTION OF FUEL, COOLANT AND LUBRICANTS

Reservoir	Kind of fluid	AMBIENT TEMPERATURE		Type	CAPACITY	
		Min	Max		Specified	Refill
Engine oil pan	Engine oil	0°C	40°C	SAE 30	42 liter	37 liter
		-20° C	10° C	SAE 10W		
		-20°C	50° C	SAE 15W-40		
		-20° C	40° C	SAE 10W-30		
Damper case		-20°C	40° C	SAE 30	1.5 liter	1.5 liter
Power train case		0°C	40° C	SAE 30	105 liter	60 liter
Final drive case (each)		-20° C	10°C	SAE 10W	58 liter	58 liter
Hydraulic system		-20° C	40° C	SAE 10W	136 liter	87 liter
		-20° C	40° C	SAE 10W-30		
		-15° C	40° C	SAE 15W-40		
Fuel tank	Diesel fuel	-10° C	40° C	ASTM D975 No. 2	625 liter	
		-30° C	-10° C	ASTM D975 No. 1 (for winter use)		
Cooling sytem (incl. sub-tank)	Water	Add antifreeze			101 liter	
Grease fitting	Grease	-20° C	40° C	NLGI No. 2		

NOTICE

Use only diesel fuel.

The engine mounted on this machine employs electronic control and a high-pressure fuel injection device to obtain good fuel consumption and good exhaust gas characteristics. For this reason, it requires high precision for the parts and good lubrication.

If kerosene or other fuel with low lubricating ability is used, there will be a big drop in durability.

REMARK

- When fuel sulphur content is less than 0.5%, change oil in the oil pan every periodic maintenance hours described in this manual.
Change oil according to the following table if fuel sulphur content is above 0.5%.
- When starting the engine in an atmospheric temperature of lower than 0°C, be sure to use engine oil of SAE10W, SAE10W-30 and SAE15W-40, even though an atmospheric temperature goes up to 10°C more or less in the day time.
Use CE or CF class oil for the engine oil.
- Use API classification CD as engine oil and if API classification CC, reduce the engine oil change interval to half.
- There is no problem if single grade oil is mixed with multigrade oil (SAE10W-30, 15W-40), but be sure to add single grade oil than matches the temperature in the table.
- We recommend Komatsu genuine oil which has been specifically formulated and approved for use in engine and hydraulic work equipment applications.

Specified capacity: Total amount of oil including oil for components and oil in piping.

Refill capacity: Amount of oil needed to refill system during normal inspection and maintenance.

ASTM: American Society of Testing and Material

SAE: Society of Automotive Engineers

API: American Petroleum Institute

Fuel sulphur content	Charge interval of oil in engine oil pan
0.5 to 1.0%	1/2 of regular interval
Above 1.0%	1/4 of regular interval

No.	Supplier	Engine Oil [CD or CE] SAE10W, 30, 40 10W30, 15W40 (The 15W40 oil marked * is CE.)	Gear Oil [GL-4 or GL-5] SAE80, 90, 140	Grease [Lithium-Base] NLGI No.2	Anti-freeze Coolant [Ethylene Glycol Base] Permanent Type
1	KOMATSU	EO10-CD EO30-CD EO10-30CD EO15-40CD	GO90 GO140	G2-LI G2-LI-S	AF-ACL AF-PTL AF-PT(Winter, one season type)
2	AGIP	Diesel sigma S super dieselmulti- grade *Sigma turbo	Rotra MP	GR MU/EP	-
3	AMOCO	*Amoco 300	Multi-purpose gear oil	PYKON premium grease	-
4	ARCO	*Arcofleet S3 plus	Arco HD gear oil	Litholine HEP 2 Arco EP moly D	-
5	BP	Vanellus C3	Gear oil EP Hypogear EP	Energrease LS-EP2	Antifreeze
6	CALTEX	*RPM delo 400 RPM delo 450	Universal thuban Universal thuban EP	Marfak all purpose 2 Ultra-duty grease 2	AF engine coolant
7	CASTROL	*Turbomax *RX super CRD	EP EPX Hypoy Hypoy B Hypoy C	MS3 Spheerol EPL2	Anti-freeze
8	CHEVRON	*Delo 400	Universal gear	Ultra-duty grease 2	-
9	CONOCO	*Fleet motor oil	Universal gear lubricant	Super-sta grease	-
10	ELF	Multiperformance 3C Performance 3C	-	Tranself EP Tranself EP type 2	Glacelf
11	EXXON (ESSO)	Essolube D3 *Essolube XD-3 *Essolube XD-3 Extra *Esso heavy duty Exxon heavy duty	Gear oil GP Gear oil GX	Beacon EP2	All season coolant
12	GULF	Super duty motor oil *Super duty plus	Multi-purpose gear lubricant	Gulfcrown EP2 Gulfcrown EP special	Antifeeze and coolant
13	MOBIL	Delvac 1300 *Delvac super 10W-30, 15W-40	Mobilube GX Mobilube HD	Mobilux EP2 Mobilgrease 77 Mobilgrease special	-
14	PENNZOIL	*Superme duty fleet motor oil	Multi-purpose 4092 Multi-purpose 4140	Multi-purpose white grease 705 707L White-bearing grease	Anti-freeze and summer coolant

No.	Supplier	Engine Oil [CD or CE] SAE10W, 30, 40 10W30, 15W40 (The 15W40 oil marked * is CE.)	Gear Oil [GL-4 or GL-5] SAE80, 90, 140	Grease [Lithium-Base] NLGI No.2	Anti-freeze Coolant [Ethylene Glycol Base] Permanent Type
15	PETROFINA	FINA kappa TD	FINA potonic N FINA potonic NE	FINA marson EPL2	FINA tamidor
16	SHELL	Rimura X	Spirax EP Spirax heavy duty	Albania EP grease	-
17	SUN	-	Sunoco GL5 gear oil	Sunoco ultra pres- tidge 2EP Sun prestige 742	Sunoco antifreeze and summer cool- ant
18	TEXACO	*Ursa super plus Ursa premium	Multigear	Multifak EP2 Starplex 2	Coda 2055 startex antifreeze coolant
19	TOTAL	Rubia S *Rubia X	Total EP Total Transmission TM	Multis EP2	Antigal/antifreeze
20	UNION	*Guardol	MP gear lube LS	Unoba EP	-
21	VEEDOL	*Turbostar *Diesel star MDC	Multigear Multigear B Multigear C	-	Antifreeze

STANDARD TIGHTENING TORQUES FOR BOLTS AND NUTS

TORQUE LIST

⚠ CAUTION

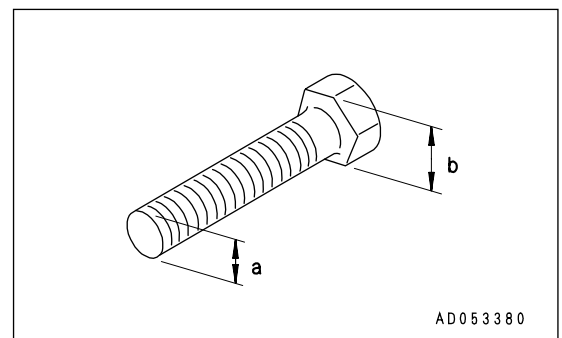
If nuts, bolts, or other parts are not tightened to the specified torque, it will cause looseness or damage to the tightened parts, and this will cause failure of the machine or problems with operation. Always pay careful attention when tightening parts.

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

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

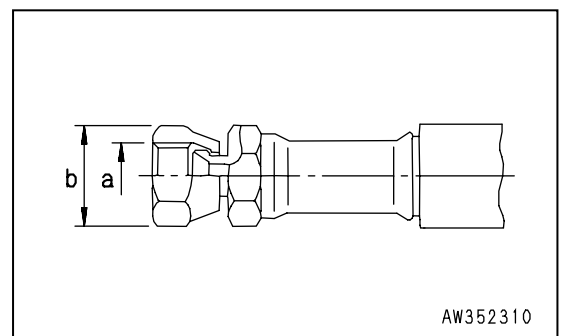
If it is necessary to replace any nut or bolt, always use a Komatsu genuine part of the same size as the part that was replaced.

Thread diameter a(mm)	Width across flat b(mm)	Tightening torque			
		Target value		Service limit	
		N•m	kgf•m	N•m	kgf•m
6	10	13.2	1.35	11.8 - 14.7	1.2 - 1.5
8	13	31	3.2	27 - 34	2.8 - 3.5
10	17	66	6.7	59 - 74	6.0 - 7.5
12	19	113	11.5	98 - 123	10.0 - 12.5
14	22	177	18	157 - 196	16.0 - 20.0
16	24	279	28.5	245 - 309	25.0 - 31.5
18	27	382	39	343 - 425	35.0 - 43.5
20	30	549	56	490 - 608	50.0 - 62.0
22	32	745	76	662 - 829	67.5 - 84.5
24	36	927	94.5	824 - 1030	84.0 - 105.0
27	41	1320	135.0	1180 - 1470	120.0 - 150.0
30	46	1720	175.0	1520 - 1910	155.0 - 195.0
33	50	2210	225.0	1960 - 2450	200.0 - 250.0
36	55	2750	280.0	2450 - 3040	250.0 - 310.0
39	60	3280	335.0	2890 - 3630	295.0 - 370.0



Apply the following table for Hydraulic Hose.

Thread diameter a(mm)	Width across flat b(mm)	Tightening torque			
		Target value		Service limit	
		N•m	kgf•m	N•m	kgf•m
10	14	14.7	1.5	12.7 - 16.7	1.3 - 1.7
14	19	29.4	3.0	27.5 - 39.2	2.8 - 4.0
18	24	78.5	8.0	58.8 - 98.1	6.0 - 10.0
22	27	117.7	12.0	88.3 - 137.3	9.0 - 14.0
24	32	147.1	15.0	117.7 - 176.5	12.0 - 18.0
30	36	215.7	22.0	176.5 - 245.2	18.0 - 25.0
33	41	255.0	26.0	215.7 - 284.4	22.0 - 29.0



PERIODIC REPLACEMENT OF SAFETY CRITICAL PARTS

To ensure safety at all times when operating or driving the machine, the user of the machine must always carry out periodic maintenance. In addition, to further improve safety, the parts in the safety-critical parts list on the next page must also be replaced at the specified interval. These parts are particularly closely connected to safety and fire prevention, so please contact your Komatsu distributor to have them replaced.

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

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

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

In addition, carry out the following checks for the hydraulic hoses not listed as periodic replacement parts. If any abnormality is found, tighten or replace the parts.

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

Ask your Komatsu distributor to replace the critical parts.

SAFETY CRITICAL PARTS

No.	Safety critical parts for periodic replacement	Q'ty	Replacement interval
1	Fuel tank - hand priming pump	1	Every 2 years or 4000 hours, whichever comes sooner
2	Engine overflow nipple - joint (bottom of fuel tank)	1	
3	Engine overflow nipple - joint (bottom of fuel tank)	1	
4	Joint (bottom of fuel tank) - fuel tank (overflow)	1	
5	Joint (bottom of fuel tank) - fuel tank (spill)	1	
6	Hand priming pump - supply pump	1	
7	P/L pump - P/L filter	1	
8	Steering case cover - HSS motor gear train	1	
9	P/L filter - transmission control valve	1	
10	Transmission control valve - brake valve	1	
11	Torque converter - oil cooler	1	
12	Oil cooler - transmission case, torque converter case	1	
13	Central pressure detection hose - transmission case, torque converter case	1	
14	Hydraulic tank - charge pump	1	
15	Charge pump - charge filter	1	
16	HSS, PPC charge valve - accumulator	1	
17	HSS, PPC charge valve - hydraulic tank	1	
18	HSS, PPC charge valve - PPC lock valve	1	
19	PPC lock valve - PPC valve (blade)	1	
20	PPC lock valve - PPC valve (ripper)	1	
21	HSS, PPC charge valve - CLSS valve	1	
22	HSS, PPC charge valve - HSS pump	1	
23	PPC relief valve - HSS pump	1	
24	HSS pump - HSS motor	1	
25	HSS pump - HSS motor	1	
26	HSS motor - central drain block	1	
27	Central drain block - hydraulic tank	1	
28	HSS motor - central drain block	1	
29	HSS motor - central drain block	1	
30	HSS pump - central drain block	1	
31	Central drain block - cooler bypass valve	1	

No.	Safety critical parts for periodic replacement	Q'ty	Replacement interval
32	HSS pump - cooler bypass valve	1	Every 2 years or 4000 hours, whichever comes sooner
33	Cooler bypass valve - oil cooler	1	
34	Cooler bypass valve - oil cooler	1	
35	Oil cooler - cooler bypass valve	1	
36	Oil cooler - cooler bypass valve	1	
37	Cooler bypass valve - hydraulic tank	1	
38	Work equipment hydraulic pump - CLSS valve	1	
39	CLSS valve - block (blade lift)	2	
40	Block (blade lift) - blade lift cylinder	4	
41	CLSS valve - divider block (ripper)	1	
42	CLSS valve - divider block (ripper)	1	
43	CLSS valve - divider block (ripper)	1	
44	CLSS valve - divider block (ripper)	1	
45	Divider block (ripper) - ripper lift cylinder	4	
46	Divider block (ripper) - ripper tilt cylinder	4	
47	Seat belt	1	
48	Injector nozzle tip	1 set	Every 8000 hours
49	High pressure pipe clamp	1 set	
50	Fuel scattering prevention cap	1 set	

MAINTENANCE SCHEDULE CHART

MAINTENANCE SCHEDULE CHART

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SERVICE PROCEDURE

INITIAL 250 HOURS MAINTENANCE

(ONLY AFTER THE FIRST 250 HOURS)

Carry out the following maintenance only after the first 250 hours of operation on new machines.

- **REPLACE POWER TRAIN OIL FILTER ELEMENT**
- **CHANGE OIL IN POWER TRAIN CASE, WASH STRAINERS (POWER TRAIN PUMP STRAINER, SCAVENGING PUMP STRAINER)**
- **CHANGE OIL IN FINAL DRIVE CASE**
- **REPLACE CHARGE FILTER ELEMENT**
- **CHANGE OIL IN HYDRAULIC TANK, REPLACE HYDRAULIC OIL FILTER ELEMENT**

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

WHEN REQUIRED

CLEAN INSIDE OF COOLING SYSTEM

⚠ WARNING

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

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

Kind of coolant	Cleaning inside of cooling system and changing coolant	Adding corrosion resistor
Permanent type antifreeze (All season type)	Every year (autumn) or every 2000 hours whichever comes first	Every 500 hours and when cleaning the inside of the cooling system and when changing coolant.
Non permanent type antifreeze containing ethylene glycol (Winter, one season type)	Every 6 months (spring, autumn) (Drain antifreeze in spring, add antifreeze in autumn)	
When not using antifreeze	Every 6 months or every 1000 hours whichever comes first	

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

Use a permanent type of antifreeze.

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

Super Coolant (AF-ACL) has an anti-corrosion effect as well as an antifreeze effect.

The ratio of antifreeze to water depends on the ambient temperature, but to obtain the corrosion resistance effect, a minimum ratio of 30% by volume is necessary.

When deciding the ratio of antifreeze to water, check the lowest temperature in the past, and decide from the mixing rate table given below.

It is actually better to estimate a temperature about 10°C lower when deciding the mixing rate.

Mixing rate of water and antifreeze

Min. atmospheric temperature	°C	-10	-15	-20	-25
Amount of antifreeze	liters	30.3	36.3	41.4	46.4
Amount of water	liters	70.7	64.7	59.6	54.6

⚠ WARNING

Antifreeze is flammable, so keep it away from flame.

Antifreeze is toxic. When removing the drain plug, be careful not to get water containing antifreeze on you. If it gets in your eyes, flush your eyes with large quantity of fresh water and see a doctor at once.

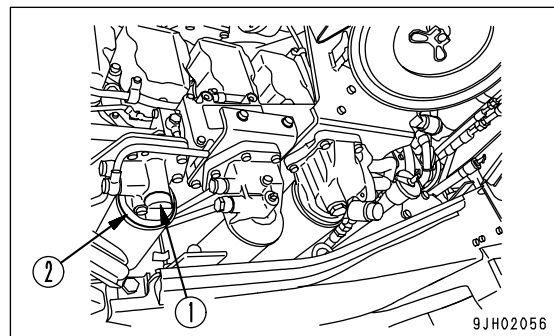
Use city water for the cooling water.

If river water, well water or other such water supply must be used, contact your Komatsu distributor.

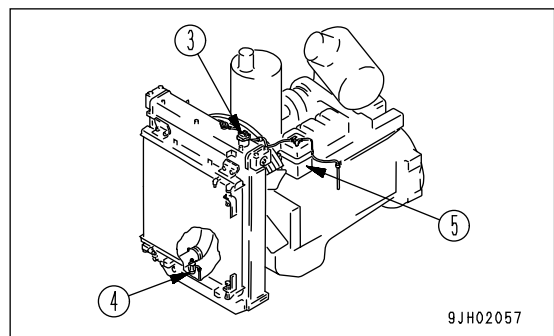
We recommend use of an antifreeze density gauge to control the mixing proportions.

- Prepare a container to catch drained coolant:
Min 101 liters capacity.

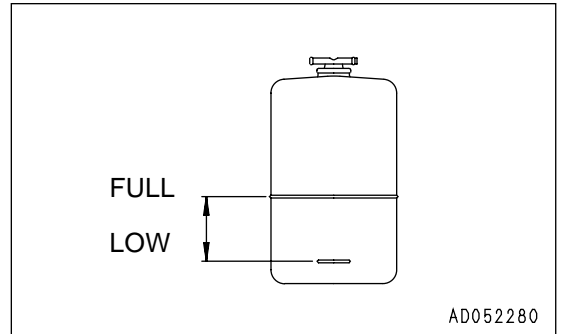
1. Stop the engine, then turn valve (1) of corrosion resistor (2) to the CLOSE stopper position.
2. Turn cap (3) of the radiator water filler slowly.
3. Set a container to catch the coolant under engine coolant drain valve (4) at the bottom of the radiator.
4. Open drain valve (4) and drain the water.



5. After draining the water, tighten drain valve (4), and fill with city water. When the radiator is full, start the engine and run at low idling.
6. Open drain valve (4), keep the engine running at low idling, and flush for 10 minutes.
When flushing, adjust the amount of water poured in and drained to ensure that the radiator is always full of water. Always check that the hose has not come off the radiator cap during the flushing operation.
7. After flushing, stop the engine, stop the flow of water, then drain the water and close drain valve (4).
8. After draining the water, clean the radiator with detergent.
When carrying out the flushing operation, follow the instructions given with the flushing agent.
9. After flushing, open drain valve (4), drain all the water, then close the drain valve and add city water up to near the water filler port.
10. When the water reaches near the water filler port, open drain valve (4), run the engine at low idling, and carry out the flushing operation until clean water comes out.
When flushing, adjust the amount of water added and drained to ensure that the radiator is always full of water.
11. When clean water comes out, stop the engine and close drain valve (4).



12. Replace the corrosion resistor, and turn valve (1) to the OPEN stopper position.
For details of the method for replacing the corrosion resistor cartridge, see "REPLACE CORROSION RESISTOR CARTRIDGE (PAGE 4-62)".
13. Fill with antifreeze and city water until the water overflows from the water filler. Determine the proportions of antifreeze and water in accordance with the water and antifreeze mixture table.
14. Run the engine idle at a low speed for 5 minutes, then at a high speed for 5 minutes to bleed air mixed in the cooling water. (At this time, keep the water filler cap removed.)
15. Drain the cooling water inside sub-tank (5), clean the inside of the sub-tank, then fill again with cooling water to a point midway between the FULL and LOW marks.
16. Stop the engine, wait for 3 minutes, add city water until the water level reaches near the water filler port, then tighten the cap (3).



CHECK, CLEAN AND REPLACE AIR CLEANER ELEMENT

⚠ WARNING

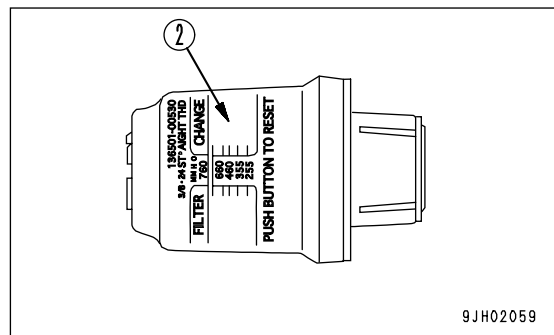
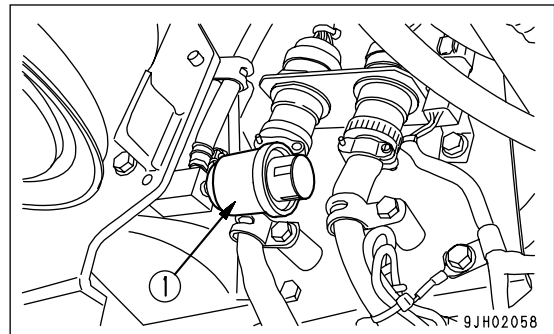
- Never clean or replace the air cleaner element with the engine running.
- When using compressed air to clean the element, wear safety glasses or goggles to protect the eyes.

CHECK

When the yellow display panel indicating the pressure of dust indicator (1) goes over the red line, clean the air cleaner element.

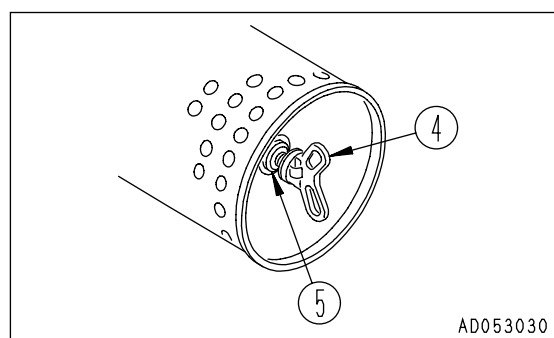
NOTICE

Do not clean the air cleaner element before the yellow display panel of the dust indicator goes over the red line. If the element is cleaned frequently before the yellow display panel of the dust indicator goes over the red line, the air cleaner will not be able to display its performance fully, and the cleaning efficiency will also go down. In addition, during the cleaning operation the dust sticking to the element will fall inside the inner element.

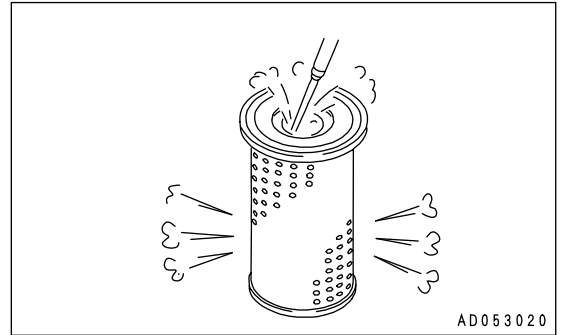


CLEAN, REPLACE OUTER ELEMENT

1. Loosen wing nut (4), then remove the outer element.
2. Clean the air cleaner body interior.



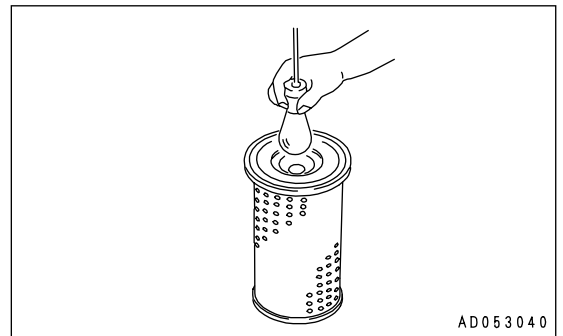
3. Direct dry compressed air (less than 700 kPa (7 kg/cm², 100 psi)) to the element from inside along its folds, then direct it from outside along its folds and again from inside.
 - 1) Remove one seal from the outer element. The number of times the outer element has been cleaned can be seen by the number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



NOTICE

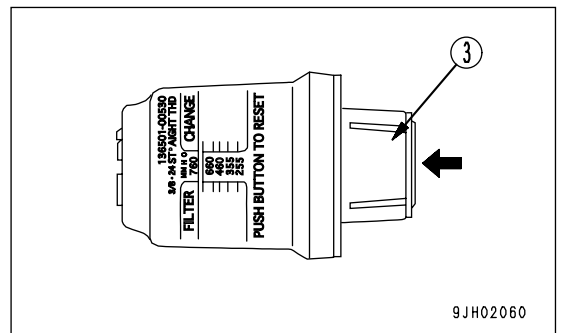
If small holes or thinner parts are found on the element when it is checked with an electric bulb after cleaning and drying, replace the element. Do not use an element whose folds or gasket or seal are damaged. When cleaning the element, do not hit it or beat it against something.

4. Set the cleaned element.



REPLACING INNER ELEMENT

1. First remove the outer element, and then remove the inner element.
2. To prevent dust from getting in, use a clean cloth or tape to cover the air connector (outlet side).
3. Clean the air cleaner body interior, then remove the cover installed in Step 2.
4. Fit a new inner element to the connector and tighten it with nuts. Do not clean and reinstall a inner element.
5. Install the outer element.
6. After replacing the element, press dust indicator reset button (3) to return the yellow display panel to its original position.



CHECK ELECTRICAL INTAKE AIR HEATER

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

CHECK TRACK TENSION

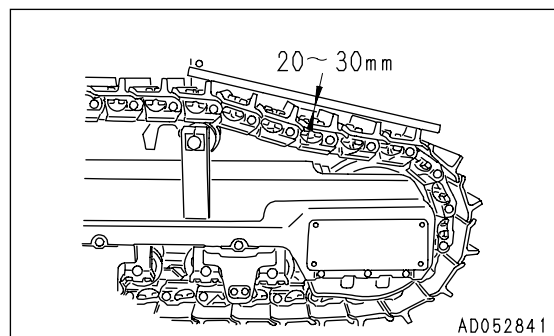
The wear of pins and bushings on the undercarriage will vary with the working conditions and soil properties. It is thus necessary to continually inspect the track tension so as to maintain the standard tension.

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

INSPECTION

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

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



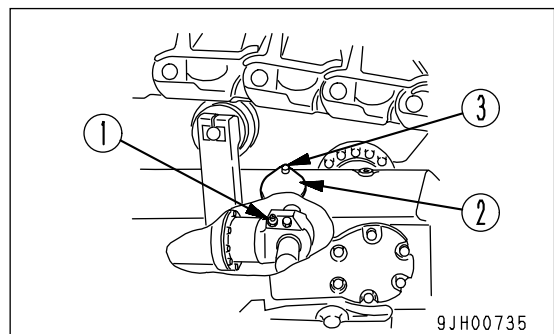
ADJUSTMENT

⚠ WARNING

Grease inside the adjusting mechanism is under high pressure.

Grease coming from lubricator (1) under pressure can penetrate the body causing injury or death. For this reason, do not loosen lubricator (1) more than one turn. Do not loosen any part other than lubricator (1). Furthermore, do not bring your face in front of the grease fitting.

If the track tension is not relieved by this procedure, please contact your Komatsu distributor.



When increasing tension

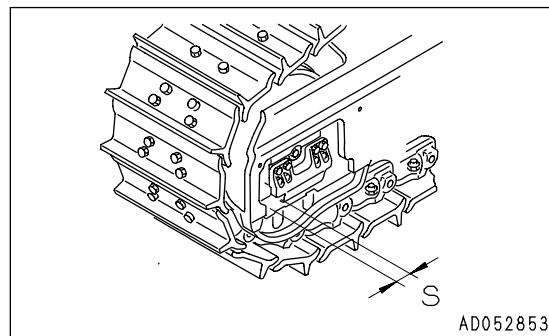
1. Remove both bolts (3), then remove cover (2).

NOTICE

- There is a safety label stuck to the rear face of cover (2), so be careful not to damage the safety label.
- Be careful not to let dirt or soil get in when removing cover (2).

2. Pump in grease through the grease fitting with a grease pump.
3. To check that the correct tension has been achieved, move the machine backwards and forwards.
4. Check the track tension again, and if the tension is not correct, adjust it again.

5. Continue to pump in grease until S becomes 0 mm. If the tension is still loose, the pin and bushing are excessively worn, so they must be either turned or replaced. Please contact your Komatsu distributor.



When loosening tension

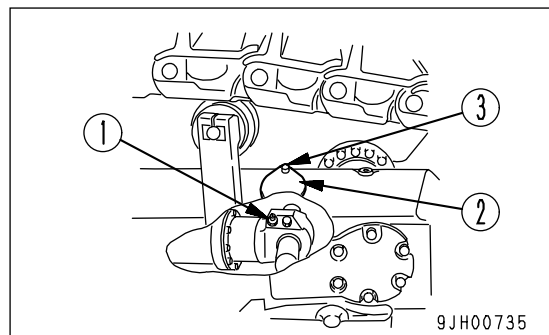
⚠ WARNING

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

1. Remove both bolts (3), then remove cover (2).

NOTICE

- There is a safety label stuck to the rear face of cover (2), so be careful not to damage the safety label.
- Be careful not to let dirt or soil get in when removing cover (2).



2. Loosen lubricator (1) gradually to release the grease.
3. Turn lubricator (1) a maximum of one turn.
4. If the grease does not come out smoothly, move the machine backwards and forwards a short distance.
5. Tighten lubricator (1).
6. To check that the correct tension has been achieved, move the machine backwards and forwards.
7. Check the track tension again, and if the tension is not correct, adjust it again.

When removing track

⚠ WARNING

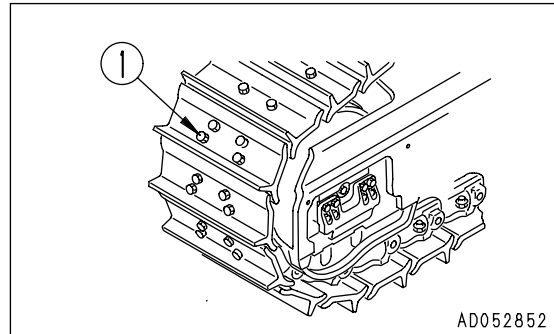
Depending on the situation, the operation to remove the track may be extremely dangerous. Before removing the track, if the procedure above "When loosening tension" does not loosen the track tension, please contact your Komatsu distributor for repair.

CHECK AND TIGHTEN TRACK SHOE BOLTS

If the machine is used with track shoe bolts (1) loose, they will break, so tighten any loose bolts immediately.

Method for tightening (shoe bolt)

1. First tighten to a tightening torque of $588 \pm 58.8 \text{ N}\cdot\text{m}$ ($60 \pm 6 \text{ kgf}\cdot\text{m}$) then check that the nut and shoe are in close contact with the link contact surface.
2. After checking, tighten a further $120 \pm 10^\circ$.

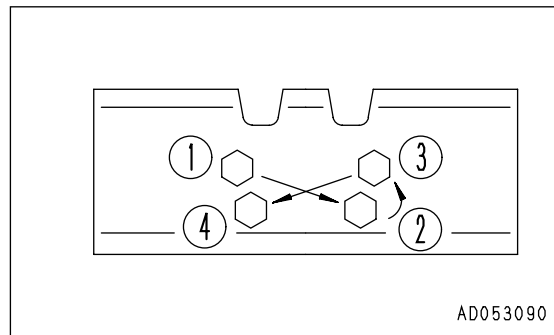


Method for tightening (master link connecting bolt)

1. First tighten to a tightening torque of $392 \pm 39.2 \text{ Nm}$ ($40 \pm 4 \text{ kgm}$) then check that the link contact surfaces are in close contact.
2. After checking, tighten a further $180 \pm 10^\circ$.

Order for tightening

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



REVERSE AND REPLACE THE END BITS AND CUTTING EDGES

WARNING

It is dangerous if the blade moves by mistake when the cutting edges and end bits are being reversed or replaced.

Set the blade in a stable condition, then stop the engine and lock the blade control lever securely with the safety lever.

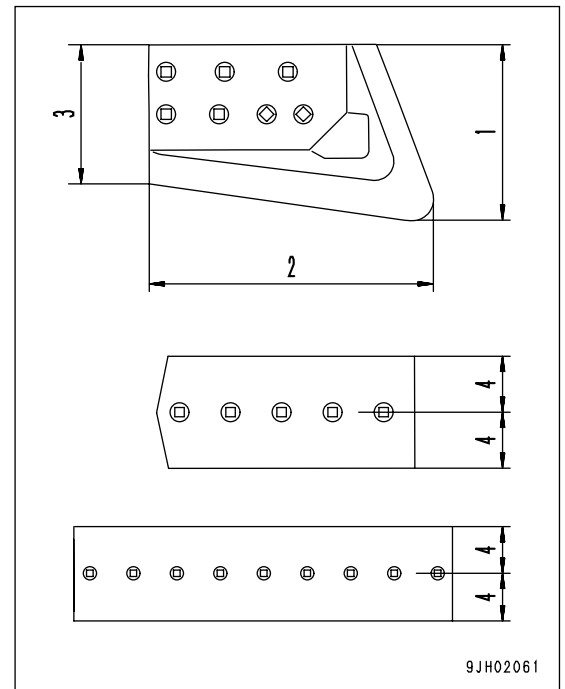
Reverse or replace the end bits and cutting edges before it is worn out to the blade end.

1. Raise the blade to a proper height and apply a block to the frame so as to prevent fall of the blade.
2. Operate the safety lever to the LOCK position.
3. Measure the wear of the end bit and cutting edge in accordance with the wear standards given below.

Wear standards

Unit: mm

Item			Judgement standard	
No.	Measurement point	Work equipment	Standard dimension	Repair limit
1	Height of outside of end bit	A	415	300
		B	292	211
2	Width of end bit	A	662	500
		B	435	360
3	Height of inside of end bit	A	330	260
		B	254	211
4	Height of cutting edge (from center of bolt mounting hole to end face)	A	165	95
		B	127	86



The symbols in the work equipment column have the following meaning.

- A: Semi-U blade, U blade
 B: Angledozer

REMARK

- If the cutting edge and the end bit on both sides are worn out, replace with new one.
 - If it has been worn out up to the fitting surface, repair the fitting surface and then reverse or replace.
4. Remove the cutting edge and the end bit and clean the mounting surface.

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

Nut tightening torque:

Semi-U blade: 1330 to 1660 N•m
(136 to 169 kgf•m)

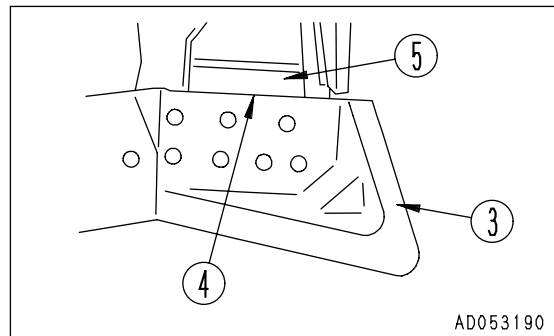
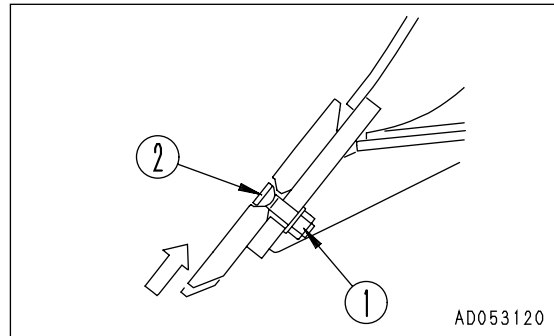
Angledozer: 738 to 999 N•m
(75.3 to 101.9 kgf•m)

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

Loosen nuts (1), remove bolts (2), then replace or reverse the cutting edge.

- 1) Install the edge to the blade and tighten temporarily. Lower the blade and push it against the ground to remove the play in bolt (2), then tighten to the correct tightening torque.
- 2) When installing end bit (3), bring top edge (4) of the end bit into tight contact with stopper (5), then tighten the bolts.

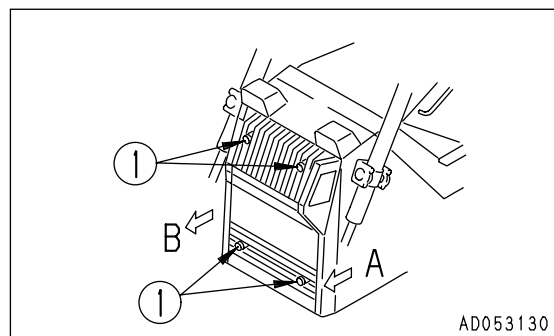
6. After several hours of running, retighten the nuts.



CLEAN, CHECK RADIATOR FINS

If the radiator fins are clogged or dirty, clean and inspect them.

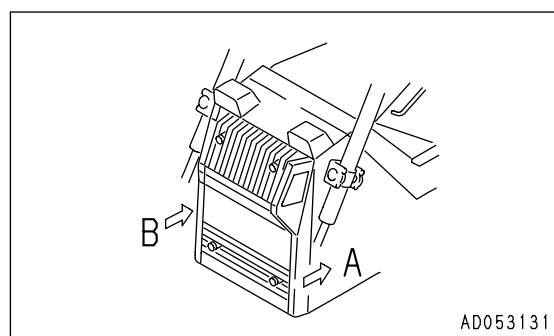
1. Remove bolts (1) (4 bolts).
2. Open the A side (hinge side) of the radiator mask. It opens approx. 30 mm.
3. Leave the B side of the radiator mask open.
4. Open the hydraulic cooler. For details of the opening method, see "CLEAN, CHECK HYDRAULIC COOLER FINS (PAGE 4-34)".
5. Clean the radiator fins clogged with mud, dust and leaves with compressed air. Steam or water may be used instead of compressed air.



REMARK

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

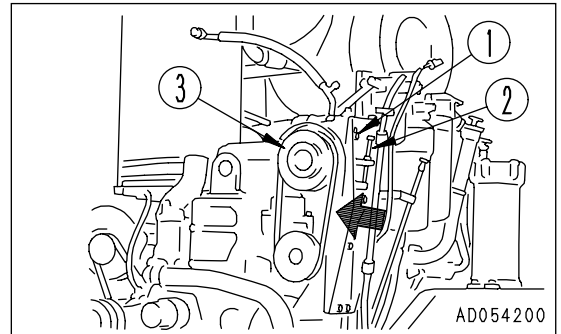
6. When closing the radiator mask, always push in the A side first, then push in the B side, align the bolt holes, and tighten bolt (1).



REPLACE AIR CONDITIONER BELT

1. Loosen 4 bolts (1) and jack bolt (2), then move compressor (3) to the side.
2. Replace the V-belt.
 - When adjusting the V-belt, do not push the compressor directly with a bar. Use jack bolt (2).
3. Tighten jack bolt (2) and bolts (1), and apply tension to the V-belt.

The standard deflection for the V-belt is approx. 10 mm when the belt is pushed by thumb (approx. 6 kg) at a point midway between the air compressor pulley and fan pulley.



CLEAN, CHECK HYDRAULIC COOLER FINS

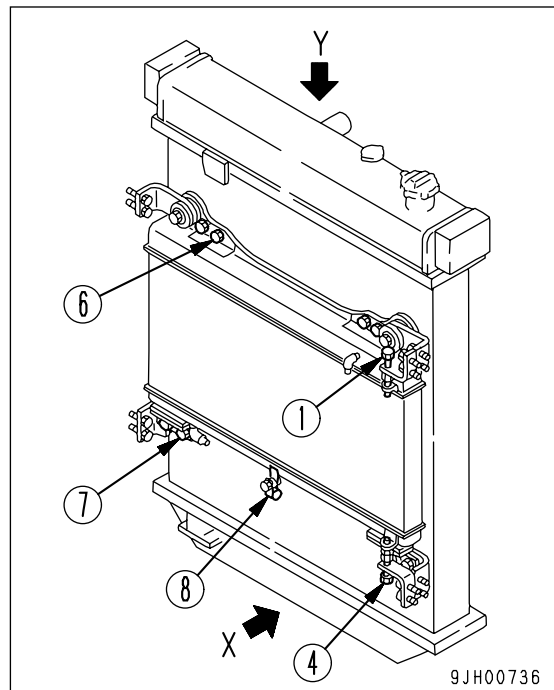
If the hydraulic cooler fins are clogged or there is dirt caught in the fins, clean and check the fins.

1. Open the radiator mask. For details on how to open the radiator mask, see "CLEAN, CHECK RADIATOR FINS (PAGE 4-32)".
2. Set the hinge pin in position.
 - 1) Top
Extend pin bolt (1), and when it penetrates plate (2) (welded to the hydraulic cooler) by 8 mm, set nut (9) in position.
 - 2) Bottom
Extend pin bolt (4), and when it penetrates plate (5) by 8 mm, set double nut (3) in position.
3. Remove cooler mounting bolts (6) (x 4) and (7) (x 4), and hose clips (8).
4. Open the hydraulic cooler to the hinge side, then clean and check the fins. The hydraulic cooler can be opened approx. 40°.
5. Use compressed air to remove the mud, dirt, and leaves clogging the hydraulic cooler fins. Steam or water may be used instead of compressed air.

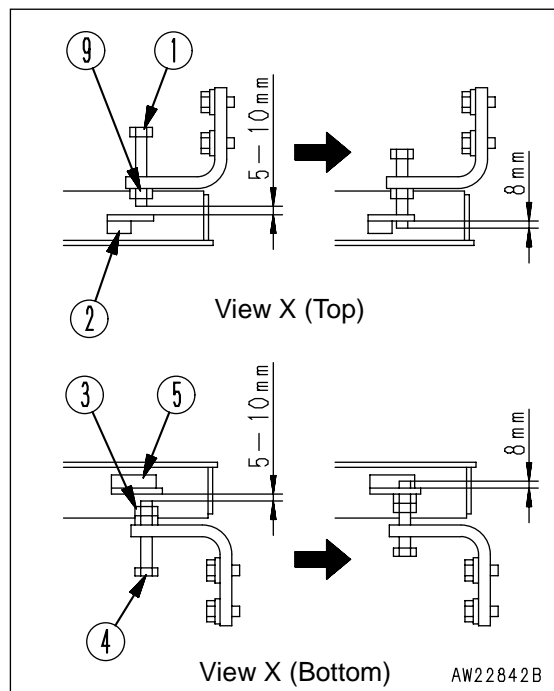
REMARK

Inspect the rubber hoses, and replace them if they are cracked or brittle. Check also for loose hose clamps.

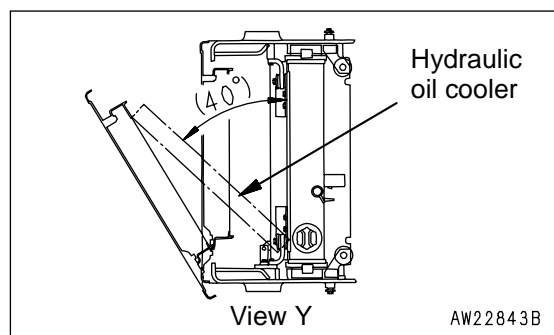
6. When fixing the hydraulic cooler in position again:
 - 1) Fix the hydraulic cooler in position with bolts (6) and (7), then fix the hose in position with clamp (8).
 - 2) Retract pin bolts (1) and (4) and set so that there is a clearance of 5 - 10 mm at the top from plate (2) and at the bottom from plate (5).



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AW22842B

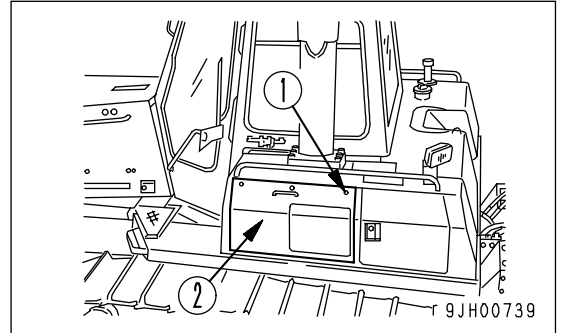


AW22843B

CLEAN, CHECK AIR CONDITIONER CONDENSER FINS

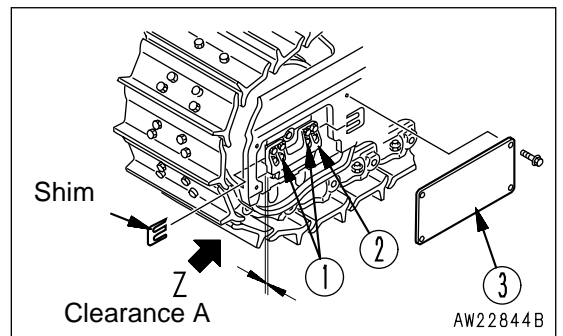
If the air conditioner condenser fins are clogged, clean and check the fins.

1. Remove 3 mounting bolts (1) of the upper cover, then remove upper cover (2).
2. Use compressed air to blow off the mud, dirt, or leaves clogging the fins.
3. Install upper cover (2) with bolts (1).



ADJUST IDLER CLEARANCE

Since the idlers are forced to move forward and backward by an external force, guide plates (2) will be worn out. Wear of these plates will cause the vibration of idlers from side to side or inclination of the idlers, and running off of track links from the idlers or unevenly worn idler and links may result. Therefore, adjust the idlers according to the following procedure.

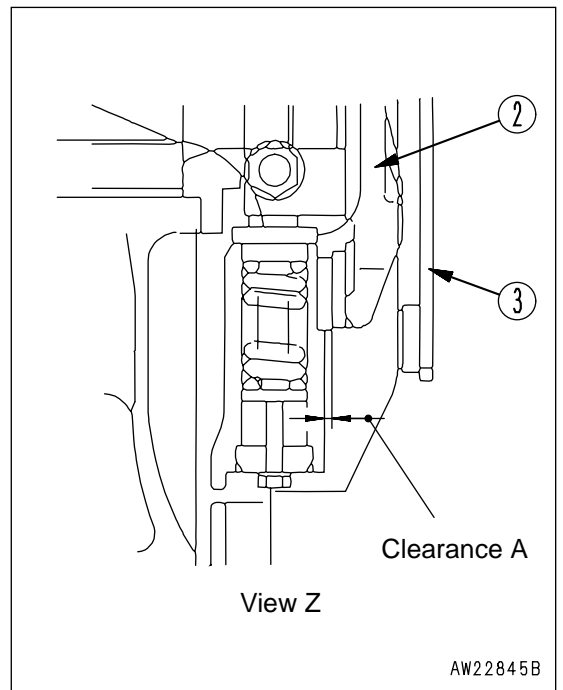


ADJUSTMENT

1. Drive the machine on level ground for 1 - 2 m, then remove covers (3) (both inside and outside) at the side face of the idler.
2. Measure the clearance **A** (4 locations: left, right, inside and outside) between the track frame and the guide plate.
3. If the clearance **A** exceeds 3.0 mm, loosen bolt (1), and pull out the shim to adjust the clearance at one end to 0.5 - 1.0 mm.

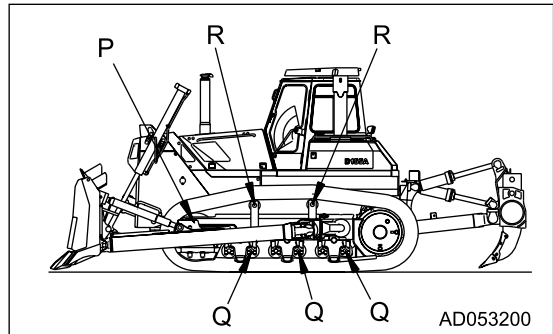
REMARK

Thickness of one shim is 1.0 mm.

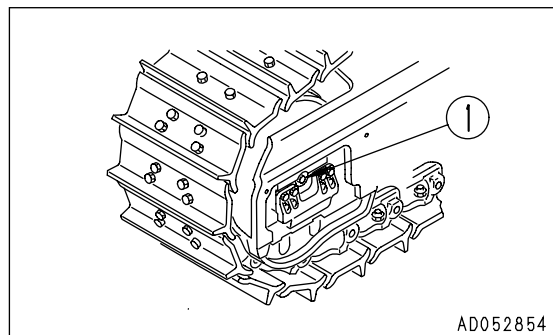


CHECK UNDERCARRIAGE OIL

Stop the machine on level ground, and check for any reduction in the oil at the idler (portion P), track roller (portion Q), bogie shaft (portion Q), and carrier roller (portion R).

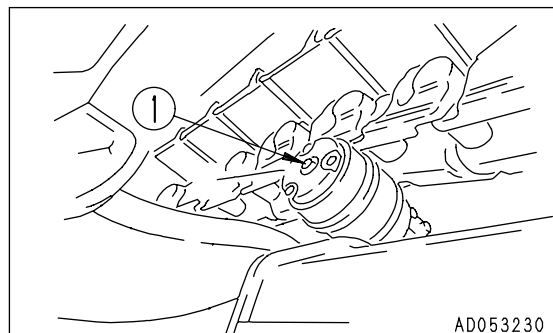
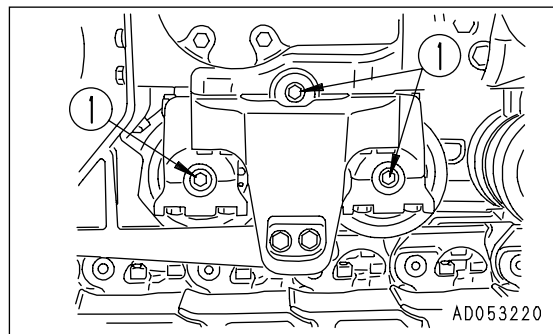


1. Loosen seal bolt (1) slowly and check if oil oozes out from the thread. If oil oozes out, the oil level has not gone down, so tighten the bolt.
2. If no oil comes out even when seal bolt (1) is removed, the oil level is low, so please contact your Komatsu distributor for repair.



REMARK

- On the idler, seal bolt (1) cannot be seen unless outside cover is removed.
- There is one bogie shaft seal bolt (1) each on the inside and outside.

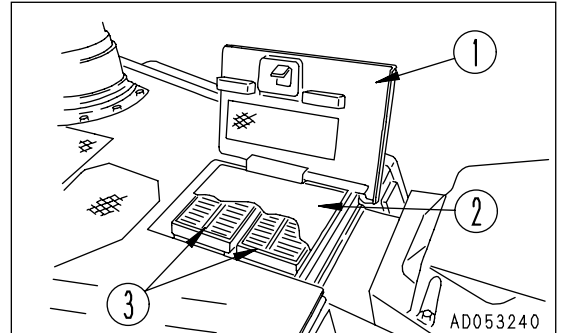


CLEAN AIR CONDITIONER AIR FILTER

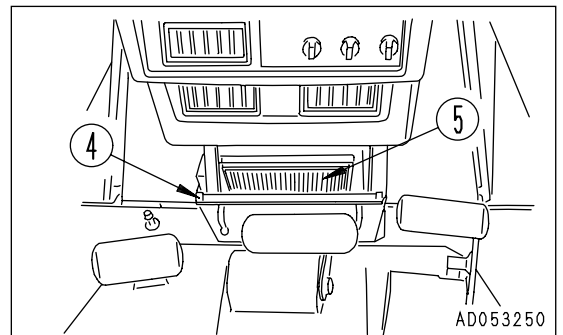
(FRESH/RECIRC FILTER)
(MACHINES EQUIPPED WITH CAB)

If the air conditioner air filter is clogged or there is dirt or dust in it, clean the filter.

1. Open inspection cover (1), open cover (2), then remove FRESH filter (3).



2. Open inspection cover (4) under the front panel, pull up RECIRC filter (5), and remove it.
3. Clean filters (3) and (5) with compressed air. If there is oil stuck to the filter, or it is extremely dirty, wash it in a neutral detergent. After washing it, dry it completely before installing it again.



REMARK

If the clogging of the filter cannot be removed by blowing with compressed air or washing in water, replace the filter with a new part.

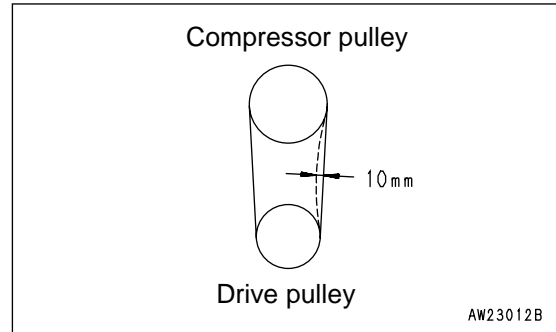
CHECK, ADJUST AIR CONDITIONER

(MACHINES EQUIPPED WITH CAB)

CHECKING TENSION OF COMPRESSOR BELT

If the belt is loose, it will slip and the cooling effect will be reduced. From time to time, press a point midway between the drive pulley and compressor pulley with your finger (approx.6 kg) and check that the tension is 10 mm.

When the belt is new, there will be initial elongation, so always adjust again after 2 or 3 days.

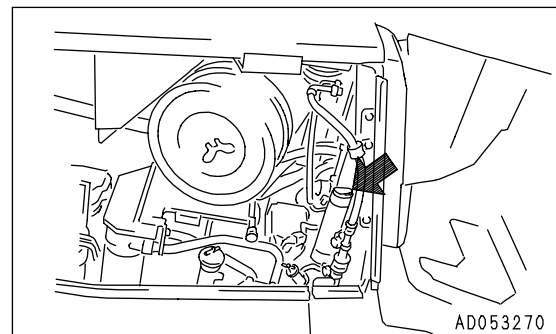


CHECK LEVEL OF REFRIGERANT (GAS)

⚠ WARNING

- When handling refrigerant (gas), always follow local laws and regulations.
- The refrigerant used in the cooler is colorless and odorless and does not harm the atmosphere, but if the liquid gets into your eyes or on your hands, it may cause loss of sight or frostbite, so never loosen any part of the refrigerant circuit.

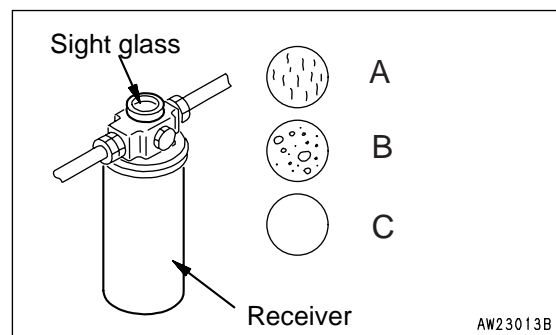
If the level of the refrigerant (gas) is low, the cooling effect will be reduced. Run the engine at high idling, and check the flow of the refrigerant in the refrigerant circuit through the sight glass of the receiver when the cooler is running at high speed.



- No bubbles in refrigerant flow: Suitable (A)
- Some bubbles in flow (bubbles pass continuously): Lack of refrigerant (B)
- Colorless, transparent: No refrigerant (C)

REMARK

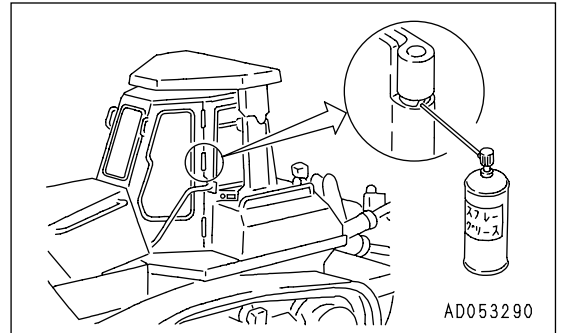
- When there are bubbles, the refrigerant gas level is low, so contact your refrigerant dealer to have refrigerant added. If the air conditioner is run with the refrigerant gas level low, it will cause damage to the compressor.
- New Freon R-134a is used as refrigerant.



GREASE DOOR HINGE

(MACHINES EQUIPPED WITH CAB)

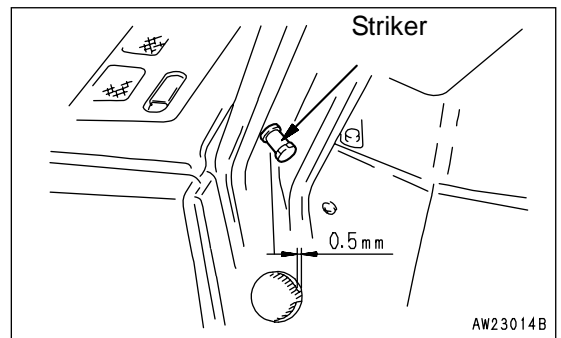
If the door makes a squeaking noise when it is opened or closed, spray lubricant in through the split in the hinge bushing. If the bushing is worn, replace the hinge.



CHECK DOOR LOCK STRIKER

(MACHINES EQUIPPED WITH CAB)

If the wear of the doors lock striker exceeds 0.5 mm, replace the striker. If it is used at it is, the play will increase and this may result in breakage of the hinge or door lock.

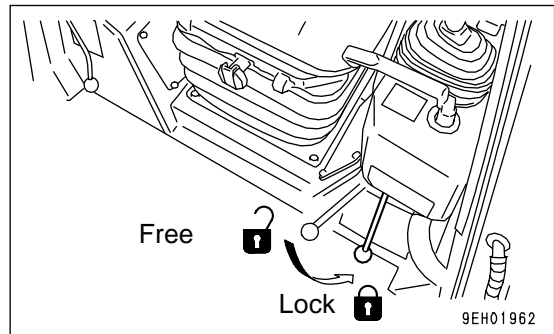


CHECK DOOR LATCH

⚠ WARNING

If the control lever is touched by accident during checking, the machine moves off suddenly, and this may lead to serious injury or death.

Before checking door latch, stop the engine and set the parking lever securely to the LOCK position.

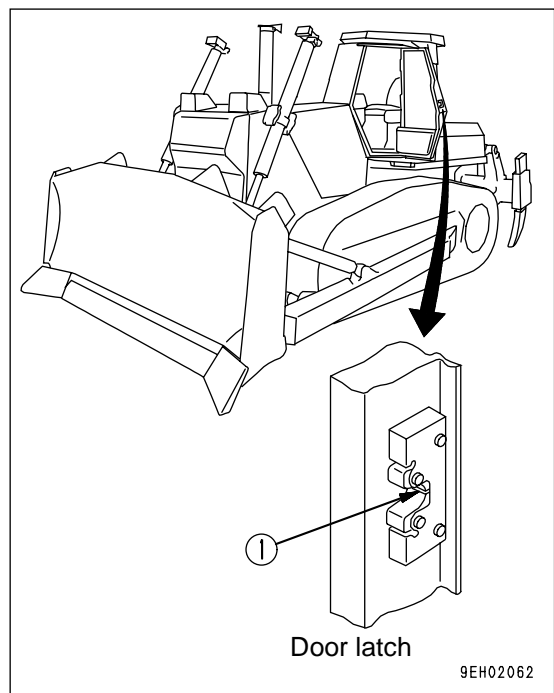


CHECK

Hold the door open-locked, and check that there is still grease inside the latch. If the amount of grease is low or there is no more grease, coat the inside of the latch with grease from portion (1).

REMARK

If there is no more grease inside the latch, the movement will become poor because of dust inside the latch, and the handle may be stiff when opening the door.

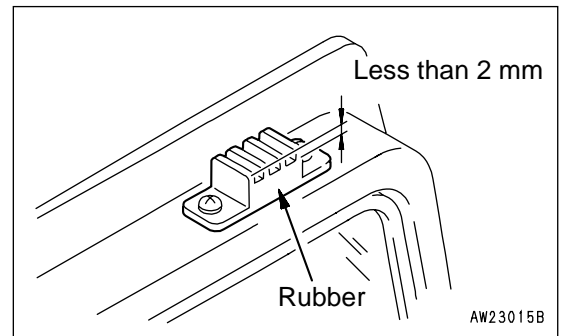


REPLACE DOOR DAMPER

(MACHINES EQUIPPED WITH CAB)

If the depth of the door damper rubber groove is less than 2 mm, replace the damper.

There are two dampers each at the top and bottom on the left and right doors.



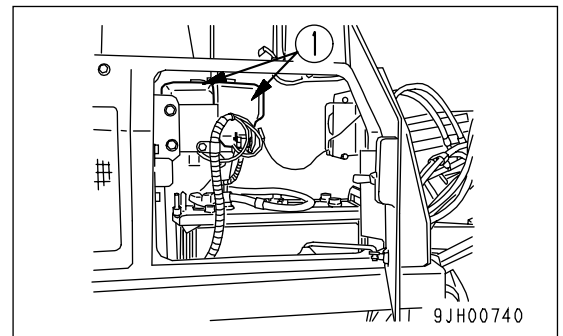
CHECK WINDOW WASHER FLUID LEVEL, ADD FLUID

(MACHINES EQUIPPED WITH CAB)

If there is air in the window washer fluid, check the level and add fluid.

Open the battery cover, check the level of the fluid in window washer tank (1), and if it is low, add automobile window washer fluid.

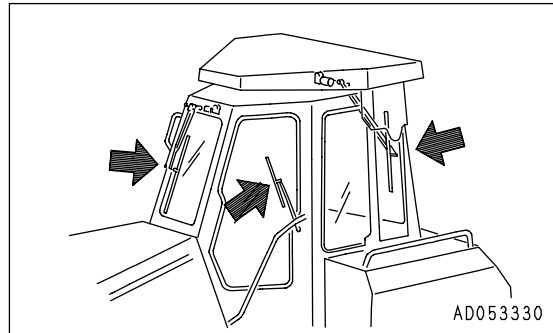
When adding fluid, be careful not to let dirt or dust get in.



REPLACE WIPER BLADE

(MACHINES EQUIPPED WITH CAB)

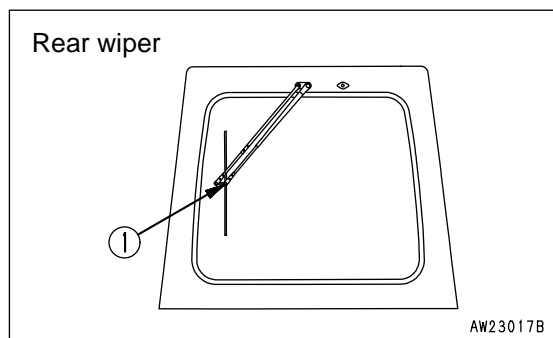
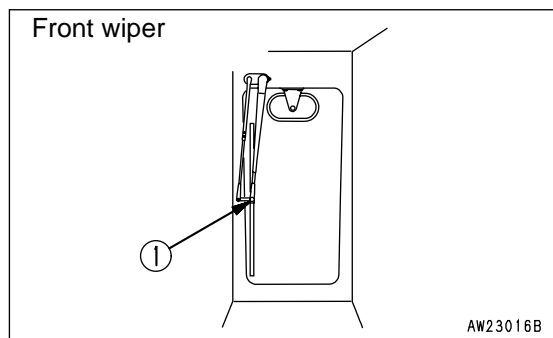
If the blade is damaged, it will not wipe the window clean, so replace the blade.



Method of replacement

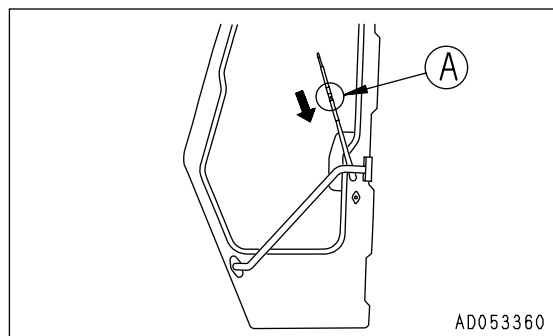
- Front, rear wiper

1. Remove screw (1), then remove the blade.
2. Install a new blade, then tighten screw (1) securely.



- Door wiper

1. It is hooked at portion (A), so move the blade in the direction of the arrow to remove it.
2. Install the new blade and hook it securely.



PROCEDURE FOR BLEEDING AIR IN HYDRAULIC SYSTEM

See "STARTING ENGINE (PAGE 3-79)".

Since the engine must be started and the blade must be operated, see OPERATION.

NOTICE

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

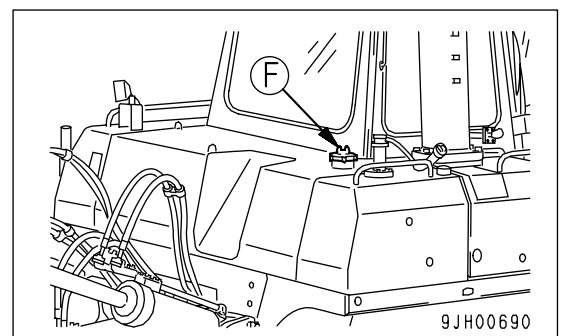
1. Bleeding air from cylinders
 - 1) Run the engine at low idling, and extend and retract each cylinder 4 to 5 times. Do not operate the cylinder to the end of its stroke. (Stop at a point approx. 100 mm before the end of the stroke.)
 - 2) Next, operate each cylinder 3 to 4 times to the end of its stroke.
 - 3) Finally, operate each cylinder 4 to 5 times to the end of its stroke to completely remove the air.

PROCEDURE FOR RELEASING INTERNAL PRESSURE OF HYDRAULIC SYSTEM

WARNING

- The hydraulic system is always under internal pressure, so when inspecting or replacing the piping or hoses, always release the pressure in the circuit before starting. If the pressure is not released, high pressure oil may spurt out and cause serious personal injury.
- 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 starting the operation.
- When the oil filler cap is removed, oil may spurt out, so turn the cap slowly to release the pressure before removing the cap.

1. Stop the machine on firm level ground.
2. Lower the blade to the ground, then stop the engine.
3. Operate the blade control lever in each direction to the stroke end to release the internal pressure within 15 seconds after the engine is stopped.
4. Loosen oil filler cap (F) at the top of the hydraulic tank slowly to release the internal pressure.
5. Run the engine at low idling for about 5 seconds, and stop the engine. Move the blade control lever to backward, forward, right and left.
 - Repeat step 2 to 3 times to completely release the remaining pressure.



CHECK BEFORE STARTING

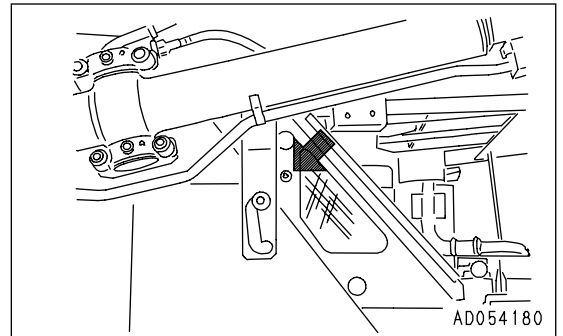
For details of the following items, see "CHECK BEFORE STARTING (PAGE 3-61)" in the OPERATION section.

- Check coolant level, add water
- Checking with machine monitor (Monitor panel specification)
- Check fuel level, add fuel
- Drain water, sediment from fuel tank
- Check oil level in engine oil pan, add oil
- Check oil level in power train case, add oil
- Check brake pedal travel
- Check damper case oil level, add oil
- Check oil level in hydraulic tank, add oil
- Check electric wirings
- Check that lamps light up
- Check horn sound
- Check backup alarm sound

EVERY 250 HOURS SERVICE

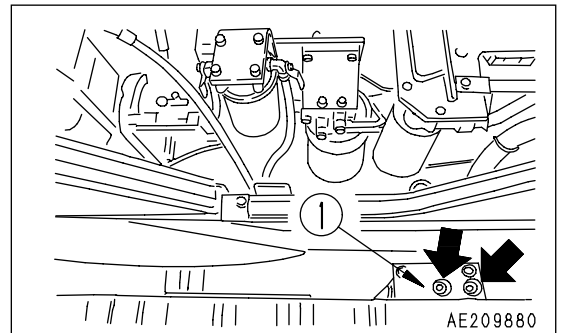
LUBRICATING

1. Lower the work equipment to the ground, then stop the engine.
 2. Using a grease pump, pump in grease through the grease fittings shown by arrows.
 3. After greasing, wipe off any old grease that was pushed out.
- Grease fan pulley (1 place)
Front of engine side cover (left)



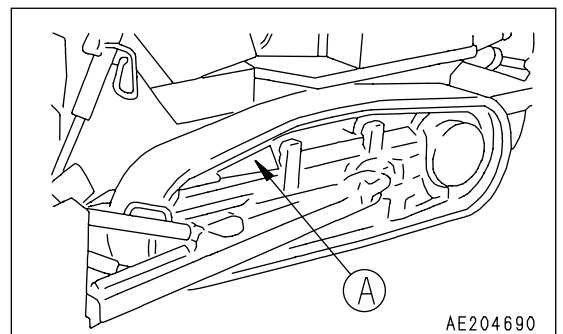
- Grease equalizer bar side pin (4 places)
Two each on the left and right sides of the machine

1. Remove all the sand and soil from the top of the track frame and cover (1).

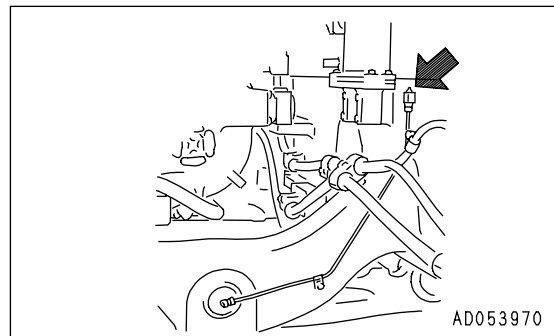
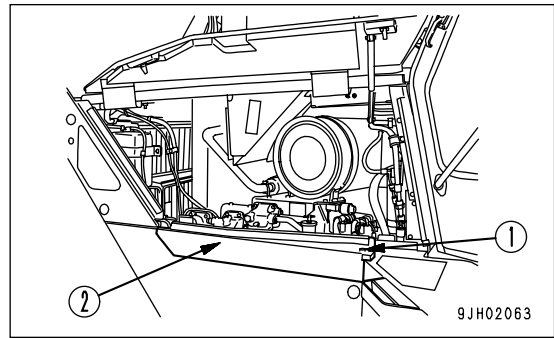


2. Mount the straight frame and remove the red plug from (A) between the track frame and track.
3. Add grease from the top of the track.

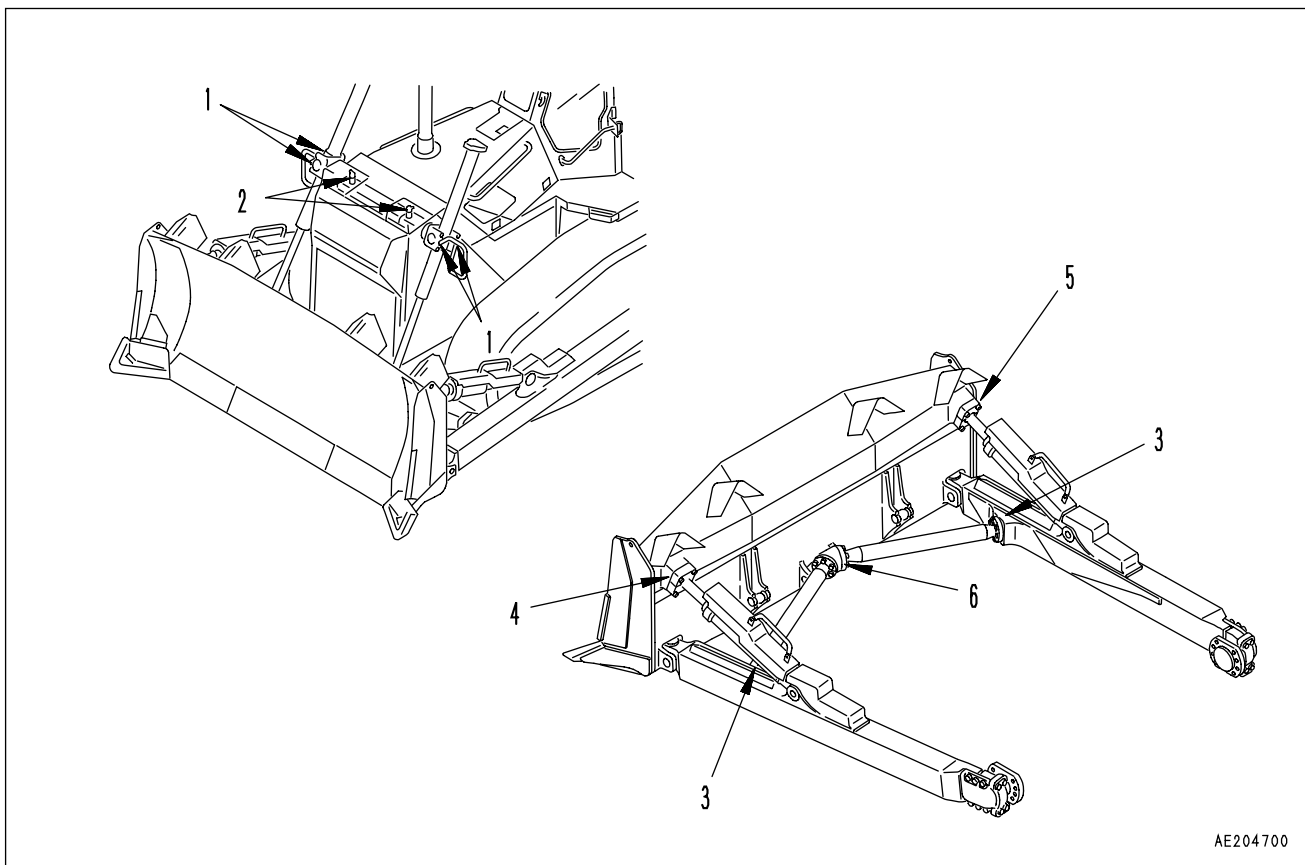
Tools to use
Grease pump assembly (07952-80002)
Nozzle (07951-41043) tube type



- Grease equalizer bar center pin (1 place)
1. Open the engine side cover at the left side of the machine, then remove 2 bolts (1).
 2. Pull hinged cover (2) out and open it.
 3. Add grease through the grease fitting marked by the arrow.
 4. Return hinged cover (2) to its original position, install bolt (1) to hold it in position, then close the engine side cover.

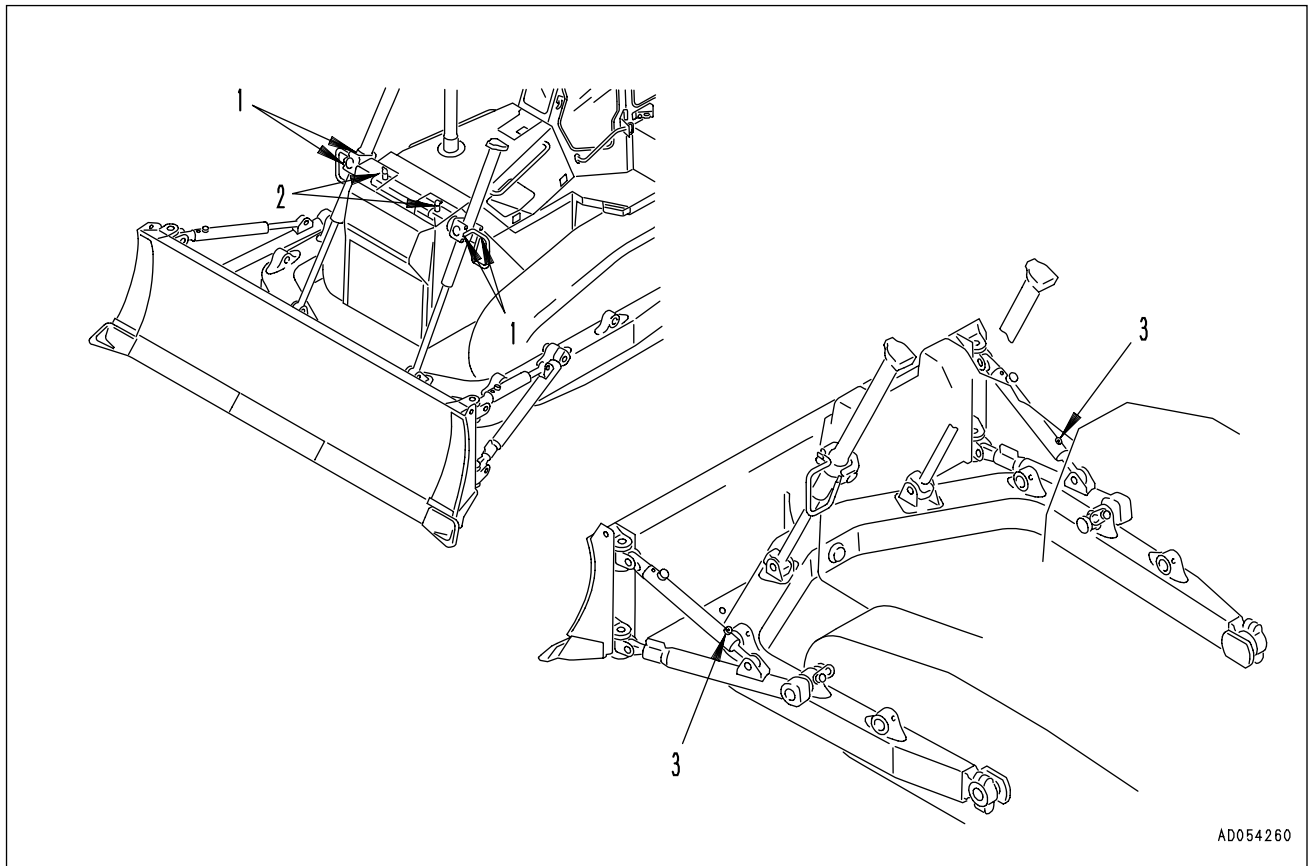


Power tilt dozer



- | | |
|--|--|
| (1) Lift cylinder support yoke (4 places) | (4) Tilt cylinder ball joint (1 place) |
| (2) Lift cylinder support shaft (2 places) | (5) Tilt brace ball joint (1 place) |
| (3) Blade arm (2 places) | (6) Blade center link (1 place) |

Angledozer

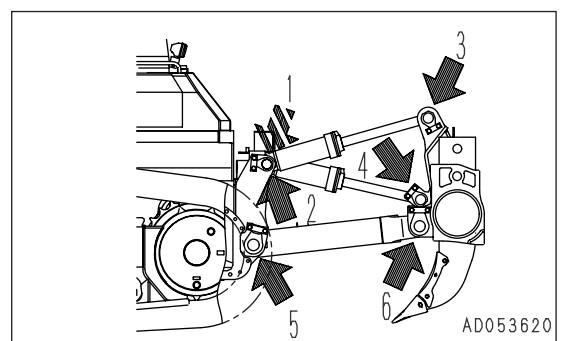


AD054260

- (1) Lift cylinder support yoke (4 places)
- (2) Lift cylinder support shaft (2 places)
- (3) Tilt brace thread (2 places)

Ripper

- (1) Tilt cylinder bottom pin (2 places)
- (2) Lift cylinder bottom pin (2 places)
- (3) Tilt cylinder rod end pin (2 places)
- (4) Lift cylinder rod end pin (2 places)
- (5) Arm pin (front) (2 places)
- (6) Arm pin (rear) (2 places)



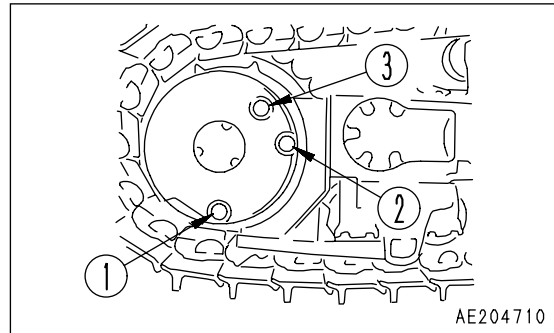
AD053620

CHECK OIL LEVEL IN FINAL DRIVE CASE, ADD OIL

WARNING

The oil is at high temperature immediately after the machine has been operated. Wait for the oil to cool down before starting the operation.

1. Stop the machine so that drain plug (1) is directly at the bottom.
2. Remove oil level plug (2) and check whether the final drive case is filled with oil to lower edge of the plug hole.
3. If the oil level is low, remove plug (3) and add engine oil until it overflows from oil level plug (2).



CHECK LEVEL OF BATTERY ELECTROLYTE

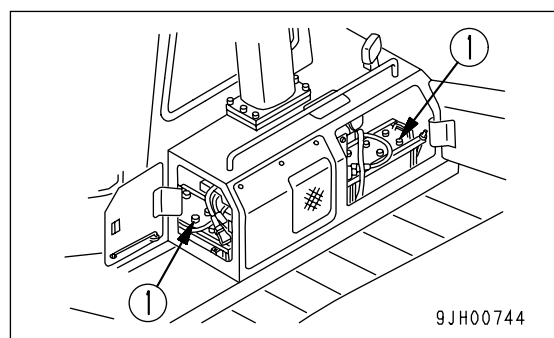
Carry out this check before operating the machine.

WARNING

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

WHEN CHECKING ELECTROLYTE LEVEL FROM SIDE OF BATTERY

1. Open the battery cover.
2. Remove cap (1), and check that the electrolyte is at the specified level (10 to 12 mm) above the plate. If the electrolyte level is low, add distilled water to the specified level.
If the battery electrolyte is spilled, have dilute sulphuric acid added.
3. When adding distilled water to any cell at cap (1), add distilled water also to the other cells.
4. Clean the air hole in the battery cap, then tighten the cap securely.



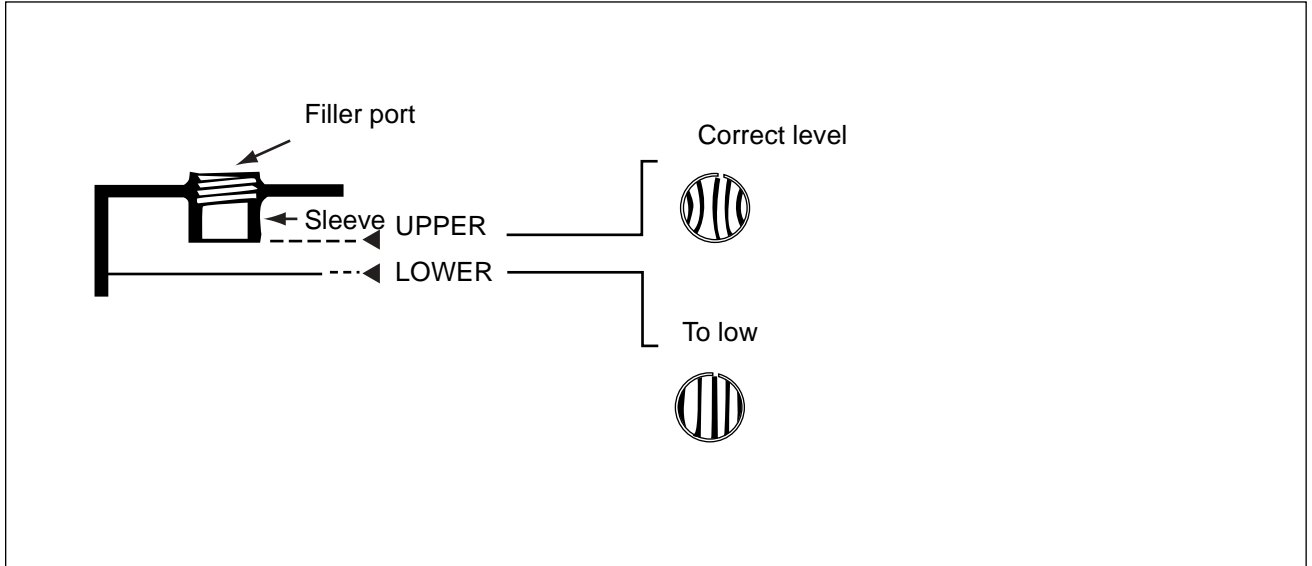
NOTICE

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

WHEN IT IS IMPOSSIBLE TO CHECK ELECTROLYTE LEVEL FROM SIDE OF BATTERY

Check the line for the battery electrolyte level as follows.

1. To judge the position of the electrolyte level, remove cap (1), look through the filler port, and check if the electrolyte level reaches the sleeve.



Correct level	The electrolyte level is up to the bottom of the sleeve, so the surface tension causes the surface to raise and the plate appears to be warped.
Too low	The electrolyte level is not up to the bottom of the sleeve, so the plate appears normal.

NOTICE

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

2. Clean the vent on battery cap and tighten the cap securely. Moreover keep the battery top clean and if necessary, wipe it with a wet cloth.
When adding distilled water, add it before starting an operation in the morning to prevent the electrolyte from freezing.

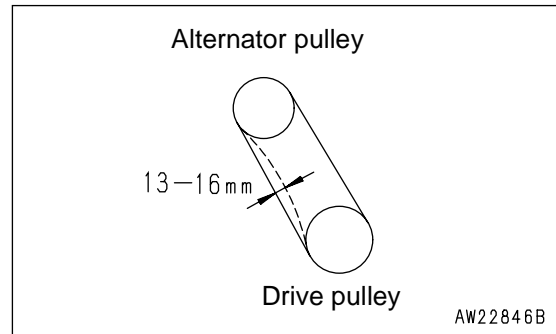
REMARK

Should distilled water have been added above the bottom of the sleeve, lower the level to the bottom using a pipette. Neutralize the removed fluid with baking soda (sodium bicarbonate), then flush it away with a large amount of water, or consult the Komatsu distributor or the battery manufacturer.

CHECK, ADJUST ALTERNATOR DRIVE BELT TENSION

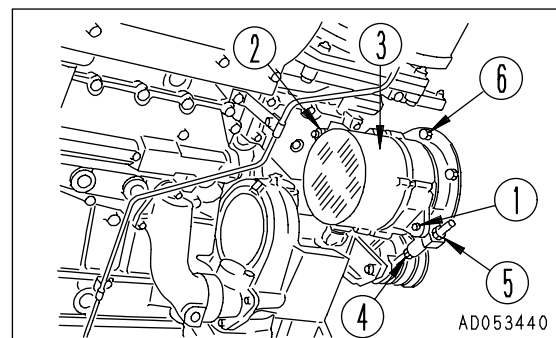
CHECK

The standard deflection for the drive belt is approx. 13 - 16 mm when pressed by thumb (approx. 10 kg) at a point midway between the drive pulley and alternator pulley.



ADJUSTING

1. Loosen 2 cover mounting bolts (6) and remove the cover.
2. Loosen bolts and nuts (1), (2), and (5), then turn nut (4) and adjust the belt tension.
3. After adjusting, tighten bolts and nuts (1), (2), and (5), to secure alternator (3) in position.
4. Install the cover and tighten cover mounting bolts (6). Check that the covers do not contact the rotating portion of the alternator.



REMARK

- Check for damage to each pulley, wear of the V-groove, and wear of the V-belt. Check in particular that the V-belt does not contact the bottom of the V-groove.
- When an abnormality is detected, ask your Komatsu distributor to replace the pulley.
- If the V-belt is elongated and there is no more allowance for adjustment, or if the belt is cracked or cut, replace the belt.
- When adjusting the V-belt, do not push the alternator directly with a bar. Insert a wooden block and push the block with a bar.
- After replacing the V-belt, operate the machine for one hour, then check and adjust again.

CHECK BRAKE PERFORMANCE

⚠ WARNING

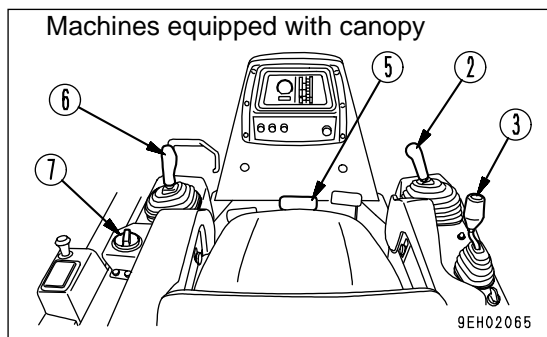
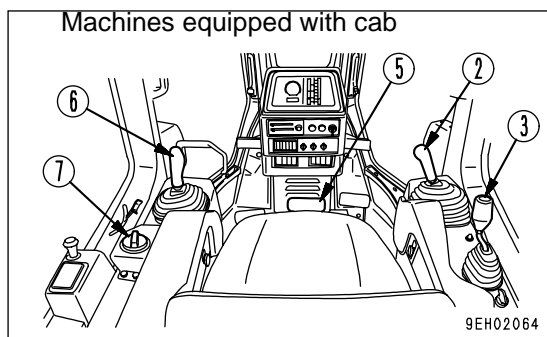
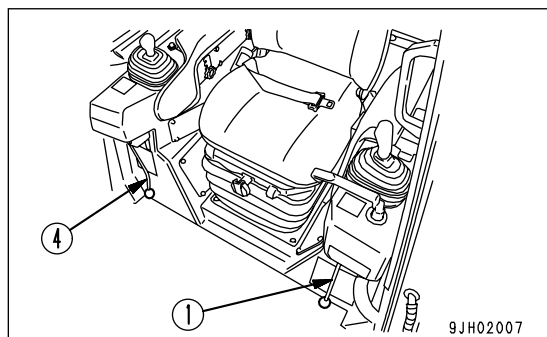
If the machine moves during the following operation, please contact your Komatsu distributor for repairs immediately.

NOTICE

Do not place the joystick in the 1st speed position. Otherwise, it will cause damage to the machine.

Before starting the engine, check that the area around the machine is safe, then do as follows.

1. Start the engine.
2. Set safety lever (1) to the FREE position then operate blade control lever (2) and ripper control lever (3) to raise the blade and ripper. Leave the safety lever to the FREE position.
3. Set parking lever (4) to the FREE position.
4. Depress brake pedal (5) and move joystick (6) to the FORWARD 2nd position.
5. Operate fuel control dial (7) to raise the engine speed gradually to full throttle.
6. Check that the machine does not move. This indicates that brake performance is normal.



EVERY 500 HOURS SERVICE

Maintenance for every 250 hours service should be carried out at the same time.

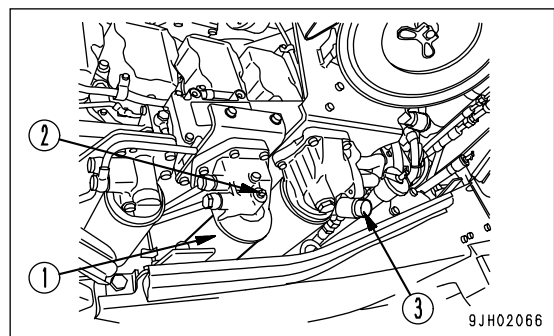
REPLACE FUEL FILTER CARTRIDGE

⚠ WARNING

- After the engine has been operated, all parts are at high temperature, so do not replace the filter immediately. Wait for all parts 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 stopping the engine to let the internal pressure go down before replacing the filter.
- Do not bring any fire or flame close.

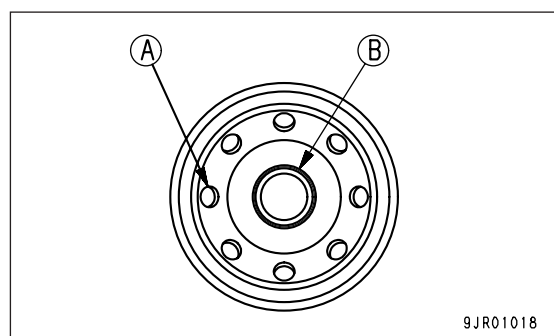
- Genuine Komatsu fuel filter cartridges use a special filter that has highly efficient filtering ability. When replacing the filter cartridge, always use a genuine Komatsu part.
- The common rail fuel injection system used on this machine consists of more precise parts than the conventional injection 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. Always avoid using substitute parts.
- When carrying out 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.
- Container to catch the oil
- Filter wrench

1. Set the container to catch the fuel under the filter cartridge.
 - The fuel filter is found by opening the engine side cover at the left of the machine.
2. Using a filter wrench, turn filter cartridge (1) counterclockwise to remove it.
3. Clean the filter holder, fill the new filter cartridge with clean fuel, coat the packing surface thinly with engine oil, then install to the filter holder.



NOTICE

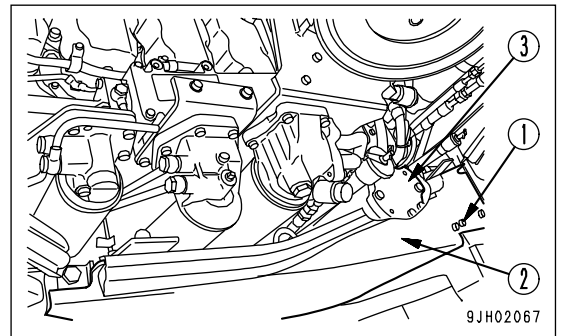
- When filling with fuel, use clean fuel and be careful not to let any dirt or dust get in. In particular, the center area is the clean side, so be careful not to let dirt or dust get in.
- When filling with fuel, use clean fuel and be careful not to let any dust or dirt get in. Portion (B) at the center is the clean side, so be particularly careful not to let any dust or dirt get in.
- When adding fuel, always add from small hole (A) at eight places on the dirty side.
- If no clean fuel is available, bleed the air with priming pump (3) without removing the fuel cartridge.



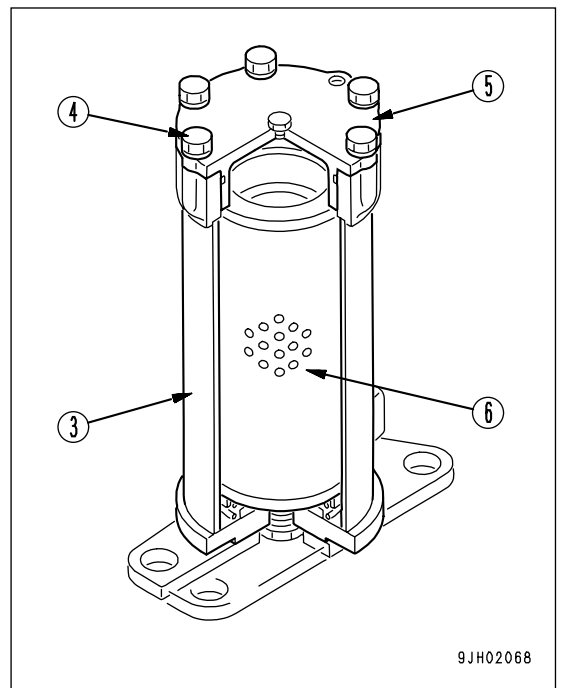
4. When installing, tighten until the packing surface contacts the seal surface of the filter holder, then tighten it up 1/2 to 3/4 of a turn.
If the filter cartridge is tightened too far, the packing will be damaged and this will lead to leakage of fuel. If the filter cartridge is too loose, fuel will also leak from the packing, so always tighten to the correct amount.
5. After completion of the replacement of fuel filter cartridge (1), bleed the air.
Bleed the air as follows.
6. Add fuel to the fuel tank until full (to FULL mark on the fuel gauge).
7. After replacing filter cartridge (1), loosen air bleed plug (2).
8. Loosen the knob of priming pump (3), move it up and down (90 to 100 times), and continue until no bubbles come out with the fuel.
9. Tighten air bleed plug (2), push in the knob of priming pump (3), then tighten it.
Use a genuine Komatsu part for the fuel filter cartridge. After replacing the filter cartridge, run the engine, and check for any leakage of oil from the filter seal surface.

REPLACE POWER TRAIN OIL FILTER ELEMENT

1. Open engine side cover at the left side of the machine, remove bolt (1), then open cover (2) to the outside using the hinge at the bottom as the fulcrum.



2. Remove mounting bolt (4) of filter (3), then remove cover (5).
3. Take out element (6).
4. Clean the removed parts and the inside of the case, then install a new element.
Always use a genuine Komatsu element.
5. Close cover (2), tighten bolt (1), then close engine side cover on the left side of the machine.

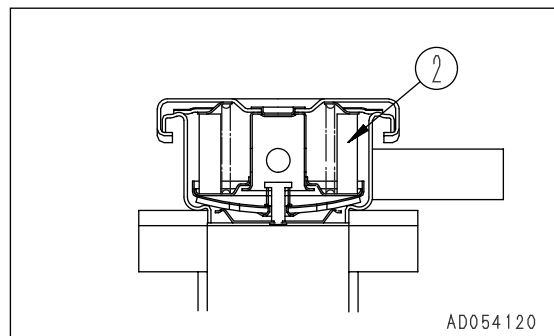
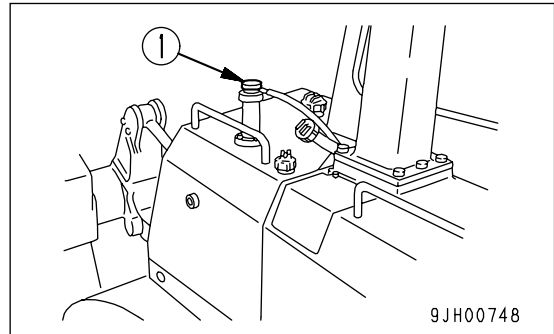


REPLACE HYDRAULIC TANK BREATHER ELEMENT

WARNING

Replace the element when the oil is cold.
When removing breather cap (1), turn it slowly to release the internal pressure before removing it.

1. Remove breather cap (1) at the top of the hydraulic tank.
2. Replace element (2) inside the cap.



CHECK AND REPLACE FAN BELT

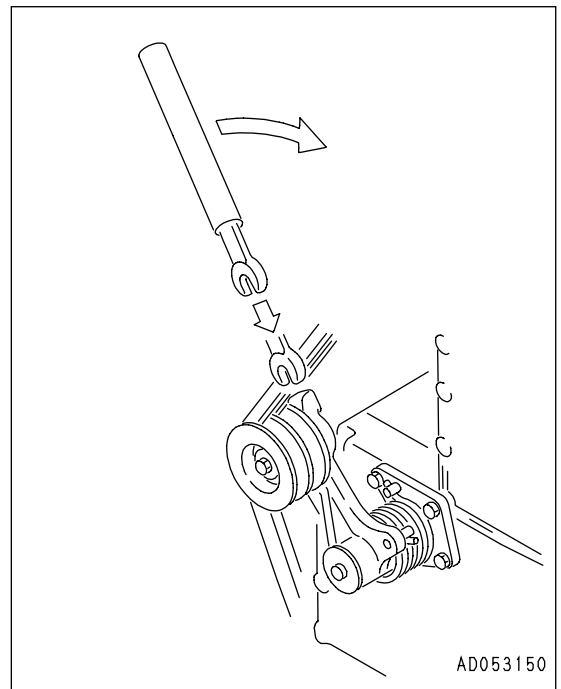
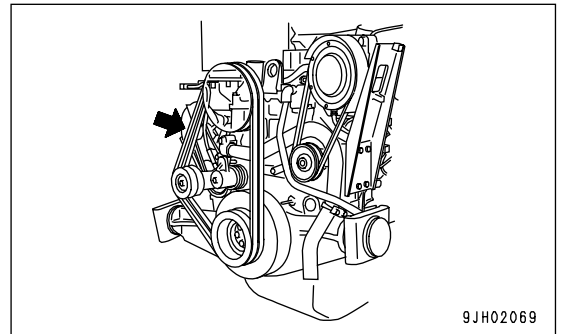
Check the V-belt and when the following conditions exist, replace the V-belt.

- 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 cracking and peeling of the V-belt occurs.

A device is installed to maintain the tension constant regardless of any elongation of the V-belt, so there is no need to carry out adjustment until the V-belt is replaced.

REPLACE

- Fit a wrench to the tension pulley, push the pulley in the direction of the arrow to remove the V-belt, then replace the V-belt.
- Replace the V-belts as a set.



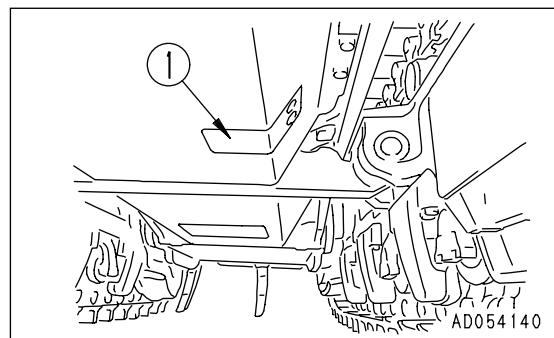
CHANGE OIL IN ENGINE OIL PAN, REPLACE ENGINE OIL FILTER CARTRIDGE

WARNING

The oil is at high temperature after the engine has been operated, so never change the oil immediately after finishing operations. Wait for the oil to cool down before changing it.

Prepare the following.

- Refill capacity: 37 ℓ
 - Socket wrench, filter wrench.
1. Remove the cover (1) at the bottom of the machine and set a container to catch the oil under the drain plug.



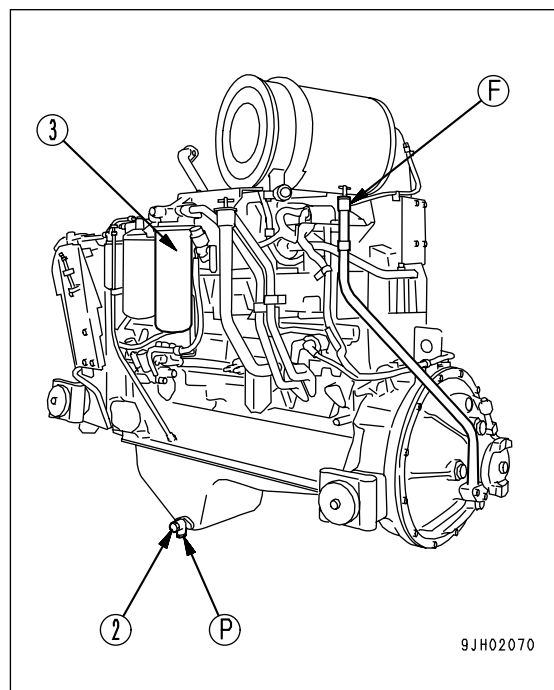
2. To prevent getting oil on yourself, remove drain plug (P) slowly, then loosen drain valve (2) to drain the oil. Do not loosen the drain valve too far, otherwise, the stopper pin inside the valve may be deformed.
3. Check the drained oil, and if there are excessive metal particles or foreign material, please contact your Komatsu distributor.
4. Install drain plug (P) and drain valve (2) .

Tightening torque

Drain plug (P): $68.6 \pm 9.8 \text{ N}\cdot\text{m}$
($7 \pm 1 \text{ kgf}\cdot\text{m}$)

Drain valve (2): $63.7 \pm 14.7 \text{ N}\cdot\text{m}$
($6.5 \pm 1.5 \text{ kgf}\cdot\text{m}$)

5. Using a filter wrench, turn filter cartridge (3) counterclockwise to remove it. When doing this, to prevent getting oil on yourself, do not carry out this operation from immediately under the cartridge.
In particular, if this operation is carried out immediately after stopping the engine, a large amount of oil will come out, so wait for 10 minutes before starting the operation.

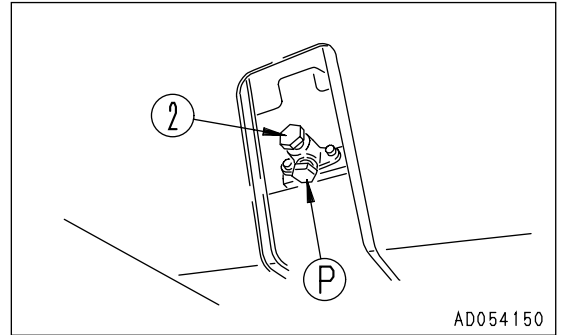


6. Clean the filter holder, fill the new filter cartridge with engine oil, coat the packing surface and thread with engine oil (or coat it thinly with grease), then install the filter cartridge.

REMARK

Confirm that no remnants of old packing still adhere to the filter holder as this may result in oil leakage.

Check that there is no old packing affixed to the filter holder. If there is any old packing affixed to the filter, it will cause leakage of oil.



7. When installing the filter cartridge, bring the packing surface into contact with the filter holder, then tighten a further 3/4 - 1 turn.
 - When using a filter wrench for tightening, be extremely careful not to damage the filter or cause dents.
8. 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.
9. Run the engine at idling for a short time, then stop the engine, and check that the oil level is between the H and L marks on the dipstick. For details, see "CHECK OIL LEVEL IN ENGINE OIL PAN, ADD OIL (PAGE 3-65)".

EVERY 1000 HOURS SERVICE

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

CHANGE OIL IN POWER TRAIN CASE, WASH STRAINERS

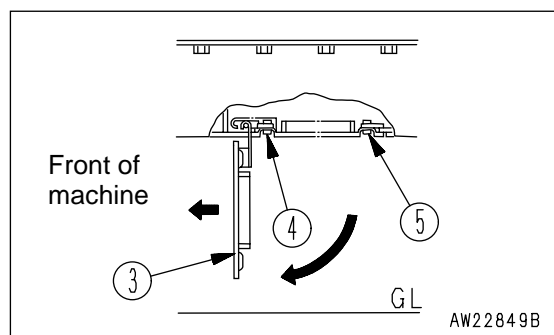
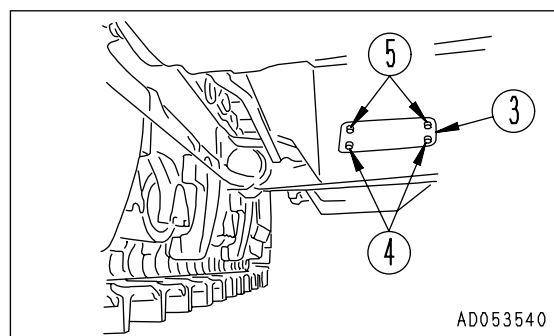
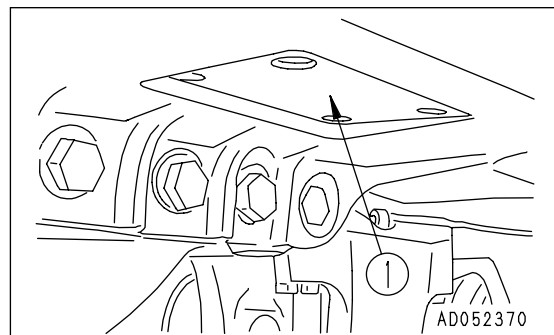
(POWER TRAIN PUMP STRAINER, SCAVENGING PUMP STRAINER)

⚠ WARNING

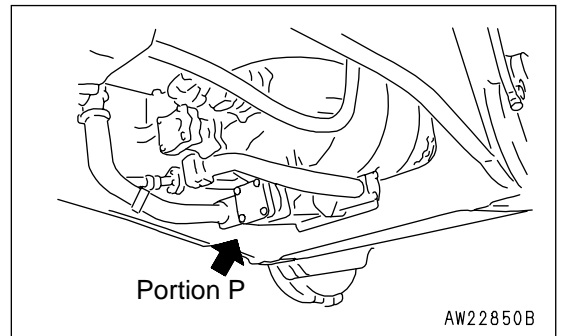
- The oil is at high temperature immediately after operations, so wait for the temperature to go down before starting the operation.
- The undercover is heavy. Do not go directly under the cover when opening or closing it. When removing bolts (5), carry out the operation at the rear of the point immediately under the cover so that it is possible to escape at any time.

Prepare the following.

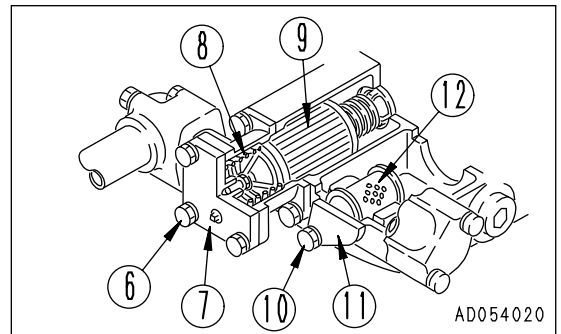
- Refill capacity: 60 ℓ
1. Remove drain cover (1) at the bottom left of the power train case, pull out drain hose (2) from the pick-up port, then loosen drain plug (P1) and drain the oil. After draining the oil, tighten drain plug (P1). Do not remove drain plug (P1).
 2. Remove inspection cover (3) in the undercover at the bottom rear of the machine as follows.
 - 1) Remove 2 bolts (4) at the front (front of machine).
 - 2) Hold cover (3) in position and gradually remove 2 bolts (5) at the rear (rear of machine). (Rain water may flow out when doing this.)
 - 3) Lower cover (3) gradually to open it. (The front of the cover is attached by a hinge.)
If you look up, you can see the strainer at portion (P).
 3. Remove drain plug (P2) in the strainer cover, and drain the oil (approx. 4 ℓ) collected inside the piping.
 4. Loosen mounting bolt (6) of the power train strainer, then remove cover (7).
 5. Remove spring (8), then remove strainer (9).
 6. Remove any dirt stuck to strainer (9), then wash it in clean diesel oil or flushing oil. Wash the removed parts and the inside of the case at the same time.



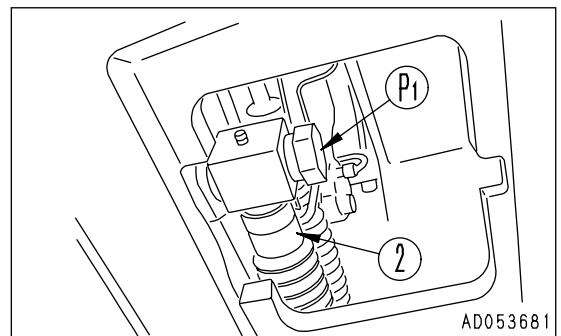
7. Loosen mounting bolt (10) of the scavenging pump strainer, then remove cover (11).



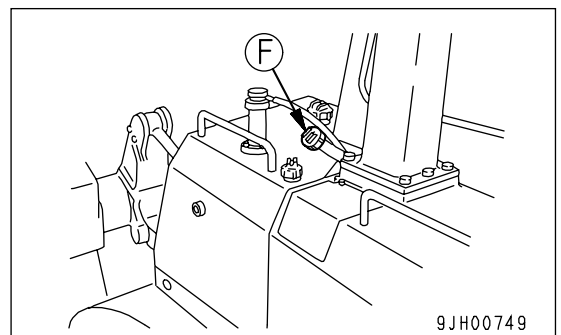
8. Remove strainer (12).
9. Remove any dirt stuck to strainer (12), then wash it in clean diesel oil or flushing oil. Wash the removed parts and the inside of the case at the same time.
10. Install the strainers to their original positions.



11. Replace the power train filter element.
For details, see "REPLACE POWER TRAIN OIL FILTER ELEMENT (PAGE 4-53)".



12. Add engine oil through oil filler port (F) to the specified level.
13. After adding the oil, check that the oil is at the specified level.
For details, see "CHECK OIL LEVEL IN POWER TRAIN CASE, ADD OIL (PAGE 3-66)".
If the spring or strainer are damaged, replace them with new parts.



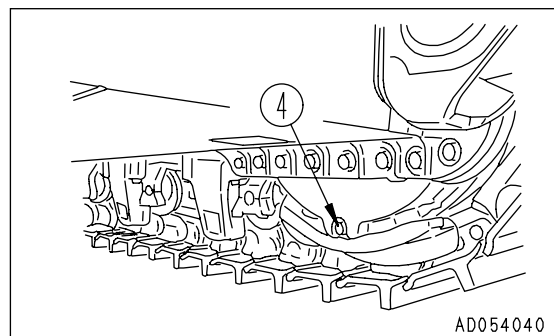
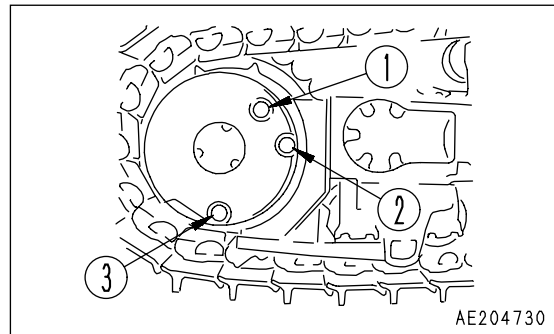
CHANGE OIL IN FINAL DRIVE CASE

WARNING

The oil is at high temperature immediately after the machine has been operated. Wait for the oil to cool down before starting the operation.

Prepare the following.

- Refill capacity: each 58 ℓ
- 1. Stop the machine so that drain plug (3) is directly at the bottom.
- 2. Remove oil level plug (2) and oil filler plug (1), then remove drain plugs (3) and (4), and drain the oil. After draining the oil, tighten the plugs.
- 3. Add engine oil to the specified level through the hole in oil filler plug (1).
- 4. Check that the oil is at the specified level.
For details, see "CHECK OIL LEVEL IN FINAL DRIVE CASE, ADD OIL (PAGE 4-48)".

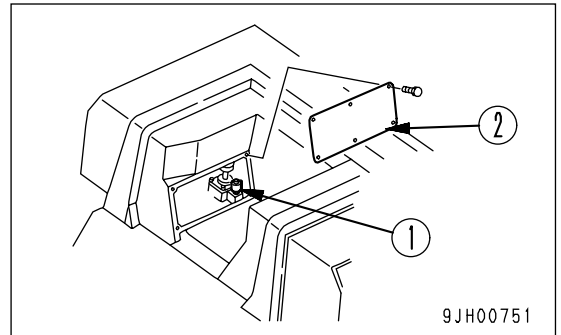


CLEAN POWER TRAIN CASE BREATHER

Remove the breather and wash out dust remaining inside with diesel oil and flushing oil.

Power train case breather (1 place)

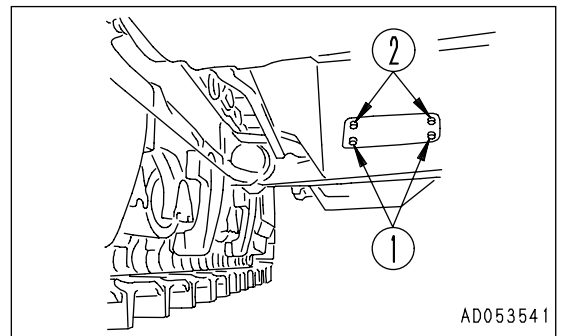
Remove the inspection cover (2) at bottom right of the operator's seat. Breather (1) is installed to the right side of the window (rear side of chassis).



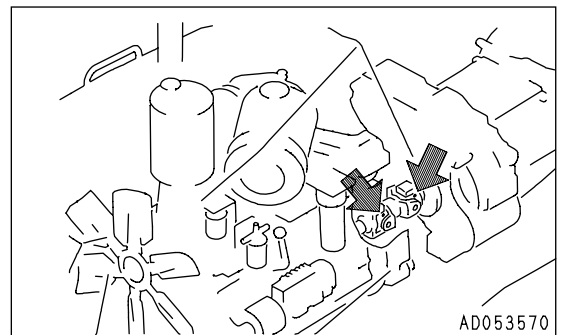
GREASE UNIVERSAL JOINT (2 PLACES)

⚠ WARNING

The undercover is heavy. Do not go directly under the cover when opening or closing it. When removing bolts (5), carry out the operation at the rear of the point immediately under the cover so that it is possible to escape at any time.

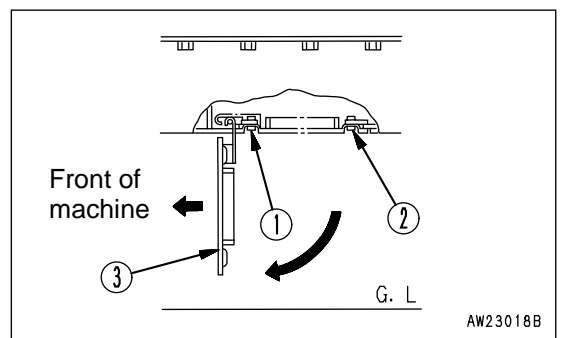


Apply grease to the grease fittings (2 places) shown by arrows.



Remove inspection cover (3) of the undercover at the rear bottom of the chassis as follows.

1. Remove 2 bolts (1) at the front of the machine.
2. Support the cover with your elbow while gradually removing 2 bolts (2) at the rear of the machine.
3. Lower the cover gradually to open it.



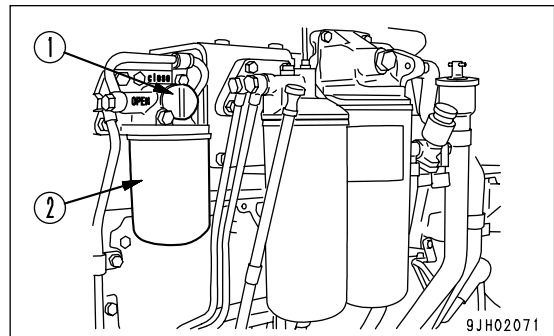
REPLACE CORROSION RESISTOR CARTRIDGE

⚠ WARNING

The oil is at high temperature after the engine has been operated, so never replace the cartridge immediately after finishing operations.

Wait for the oil to cool down before replacing cartridge.

- Container to catch coolant
 - Filter wrench
1. Turn valve (1) of corrosion resistor (2) to the CLOSE stopper position.
 2. Set a container under the cartridge to catch the coolant.
 3. Using a filter wrench, turn cartridge (2) to the left to remove it.
 4. Clean the filter holder, coat the seal surface of the new cartridge thinly with engine oil, then install the cartridge.



- Always use a genuine Komatsu part for the cartridge.
5. When installing the cartridge, bring the packing surface into contact with the seal surface of the filter holder, then tighten a further 2/3 turn.
If the filter cartridge is tightened too far, the gasket will be damaged and water will leak. If it is too loose, water will leak from the gap in the gasket, so always keep to the proper tightening angle.
 6. Turn valve (1) of corrosion resistor (2) to the OPEN stopper position.
 7. After replacing the cartridge, run the engine, and check for any leakage of water from the filter seal surface. If any water leakage is found, check the tightening of the filter cartridge.

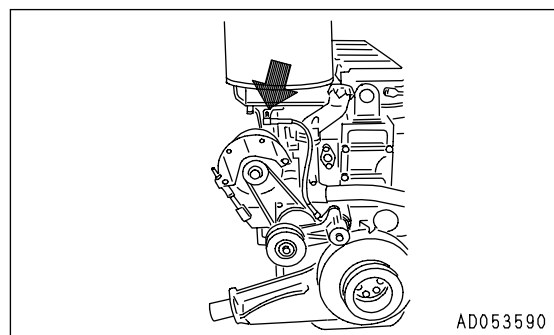
CHECK ALL TIGHTENING PARTS OF TURBOCHARGER

Contact your Komatsu distributor to have the tightening portions checked.

GREASE TENSION PULLEY ASSEMBLY

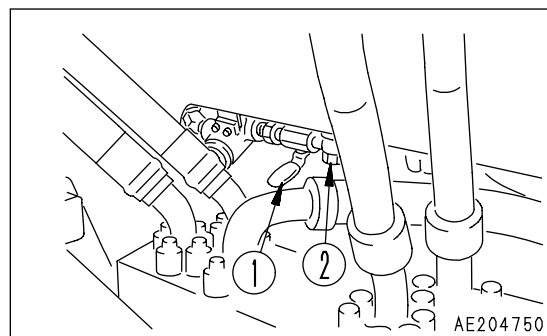
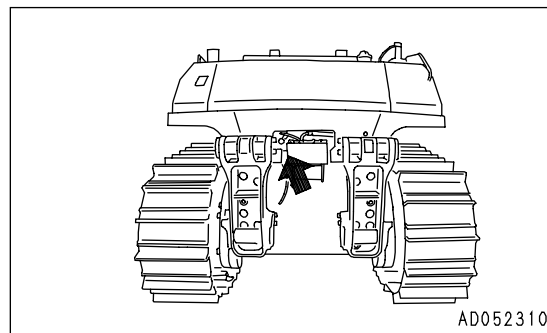
(1 PLACE)

Add grease through the grease fitting until grease comes out from the relief valve.



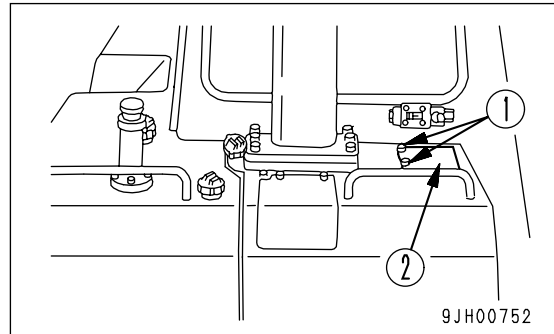
CHECK, CLEAN FUEL STRAINER

1. Tighten fuel supply valve (1) at the bottom of the fuel tank, remove cap (2), and wash the strainer and strainer case.
The strainer forms one unit with the cap.
2. After checking and cleaning, set the strainer in the case, then tighten cap (2).
3. After installing, open fuel supply valve (1).

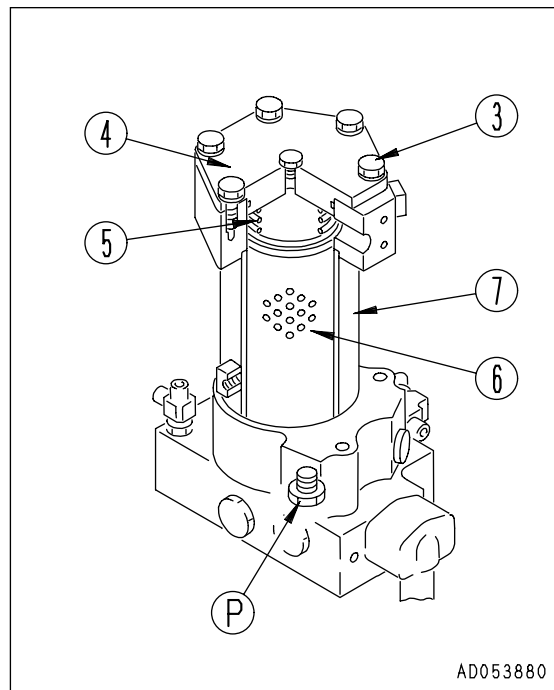


REPLACE CHARGE FILTER ELEMENT

1. Loosen mounting bolt (1) and remove inspection cover (2).



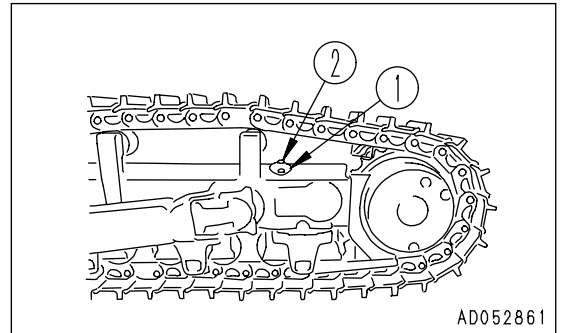
2. Loosen mounting bolt (3) and remove filter cover (4).
3. Remove drain plug (P) (which can be seen from under the fender) and drain the oil.
4. Remove spring (5), then take out element (6) .
5. Clean the removed parts and the inside of filter case (7), then install a new element.
- Use a genuine Komatsu element.
6. Install inspection cover (2) with bolt (1).



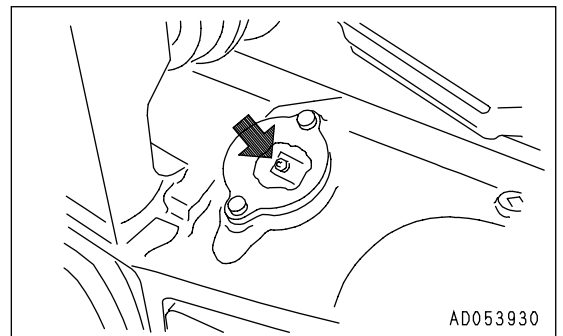
GREASE DLER ADJUSTMENT ROD

(LEFT, RIGHT: 1 PLACE EACH)

1. Remove bolt (2), then remove cover (1).



2. Add grease through the grease fitting marked by the arrow.



CHECK FOR LOOSE ROPS MOUNT BOLTS

(If equipped)

Check for any loose or damaged bolts. If any bolt is loose, tighten to a torque of 926.7 ± 103.0 Nm (94.5 ± 10.5 kgm).

If any bolt is damaged, replace it with a genuine Komatsu bolt.

EVERY 2000 HOURS SERVICE

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

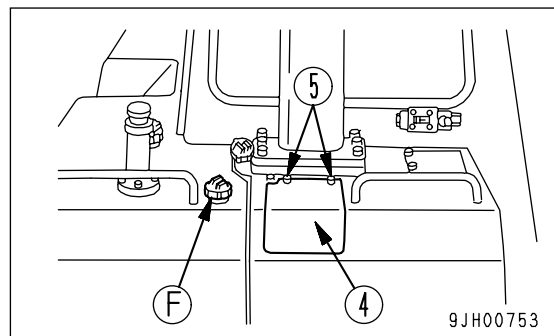
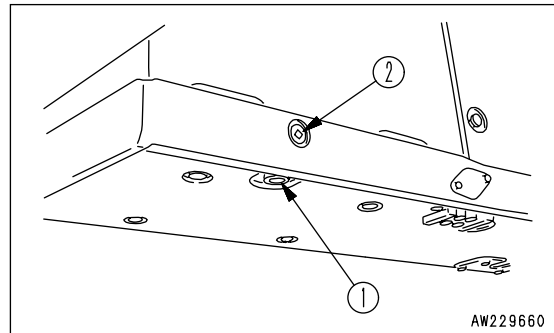
CHANGE OIL IN HYDRAULIC TANK, REPLACE HYDRAULIC OIL FILTER ELEMENT

WARNING

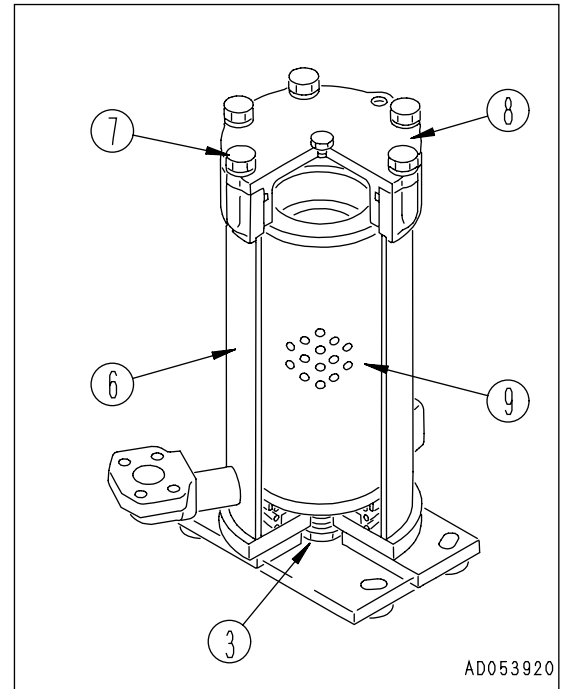
The oil is at high temperature immediately after the machine has been operated. Wait for the oil to cool down before changing the oil. When removing the oil filler cap, turn it slowly to release the internal pressure, then remove it carefully.

Prepare the following.

- Refill capacity: 87 ℓ
1. Lower the blade and ripper on the ground securely, stop the engine and slowly turn the cap of oil filler (F) to release the internal pressure. Then, remove the cap.
 2. Remove plug (1) at the bottom of the hydraulic tank, loosen drain valve (2), then drain the oil. After draining the oil, tighten drain valve (2) and plug (1). When loosening drain valve (2), be careful not to get oil on yourself.
 3. Loosen mounting bolt (5) of inspection cover (4) of the fuel tank front cover, then remove the inspection cover.
 4. Remove mounting bolt (7) of hydraulic filter (6), then remove cover (8).
 5. Remove drain plug (3) (which can be seen from under the fender) and drain the oil from the hydraulic filter case. When loosening drain plug (3), be careful not to get oil on yourself.
 6. Remove element (9).
 7. Clean the removed parts and the inside of the case, then install the new element.
Use a genuine Komatsu element.



8. Install drain plug (3).
9. Close filter cover (8), then tighten bolt (7).
10. Add engine oil through oil filler port (F) to the specified level.
11. After adding oil, check that the oil is at the specified level. For details, see "CHECK OIL LEVEL IN HYDRAULIC TANK, ADD OIL (PAGE 3-68)".



CHECK PLAY OF TURBOCHARGER ROTOR

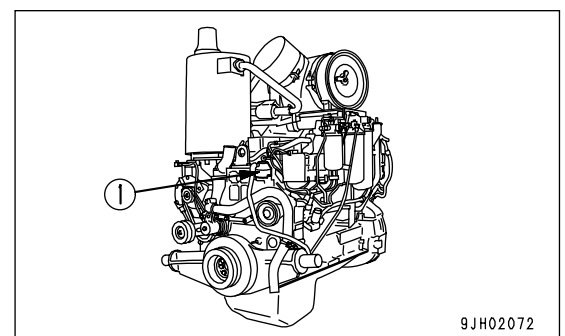
Contact your Komatsu distributor to have the play checked.

CLEAN, CHECK TURBOCHARGER

Contact your Komatsu distributor for cleaning or inspection.

CLEAN ENGINE BREATHER ELEMENT

1. Wipe off all the dirt around breather (1).
2. Remove breather (1).
3. Wash the whole breather in diesel oil or flushing oil, then blow it dry with compressed air.
4. Replace the breather O-ring with a new part, coat with engine oil, and install it.



CHECK ALTERNATOR, STARTING MOTOR

The brush may be worn, or the bearing may have run out of grease, so contact your Komatsu distributor for inspection or repair.

If the engine is started frequently, carry out inspection every 1000 hours.

CHECK ENGINE VALVE CLEARANCE, ADJUST

As special tool is required for removing and adjusting the parts, contact your Komatsu distributor for inspection or adjustment.

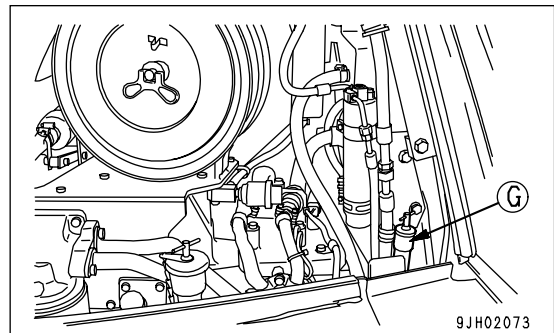
CHANGE OIL IN DAMPER CASE, CLEAN DAMPER BREATHER

⚠ WARNING

- The oil is at high temperature immediately after the machine has been operated. Wait for the oil to cool down before carrying out maintenance.
- The undercover is heavy. Do not go directly under the cover when opening or closing it. When removing bolts (4), carry out the operation at the rear of the point immediately under the cover so that it is possible to escape at any time.

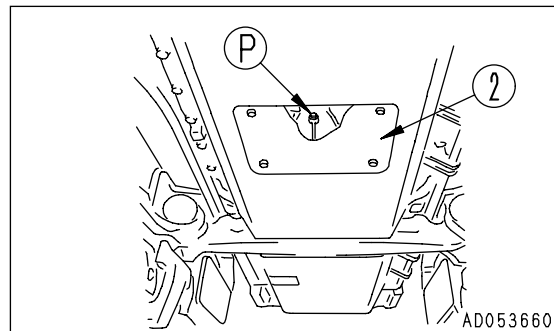
- Refill capacity 1.5 ℓ

1. Open the engine side cover at the left of the machine; you can see gauge (G).



2. Remove the undercover (2) at the bottom rear of the chassis as follows.

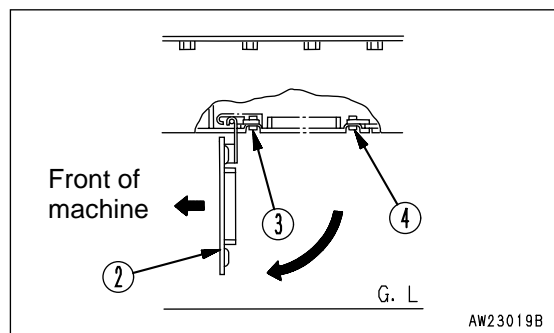
- 1) Remove 2 bolts (3) at the front of the chassis.
- 2) Hold cover (1) and gradually remove 2 bolts (4) at the rear of the chassis. (Be careful when doing this. Rain water may run out.)
- 3) Lower cover (2) slowly and open it. Drain plug (P) can be seen at the top.



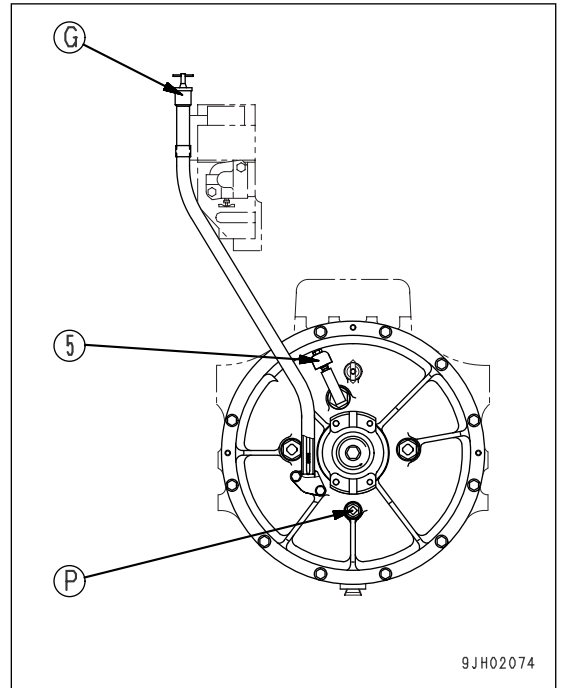
3. Remove dipstick (G), then remove drain plug (P) and drain the oil. After draining the oil, tighten drain plug (P).

4. Add engine oil through the holder of dipstick (G). After adding the oil, insert dipstick (G).

5. Remove any dirt or dust stuck to breather (5), then wash with clean diesel oil or flushing oil. If it cannot be cleaned completely, replace with a new part.

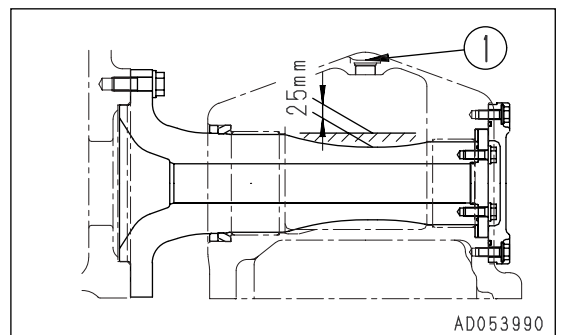
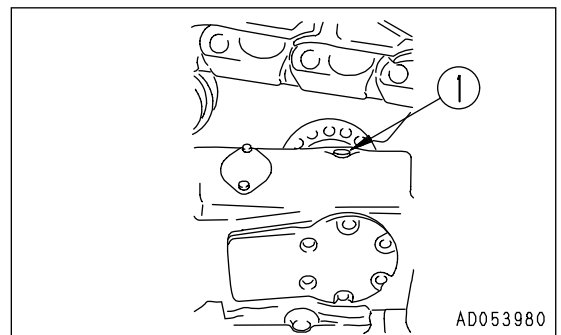


6. Install undercover (2), then close engine side cover (1) at the left side of the machine.



CHECK PIVOT BEARING OIL LEVEL, ADD OIL

1. Remove plug (1).
2. Check that the oil is at the level (25 m) in the diagram. If the oil level is low, add engine oil through the hole of plug (1).
3. Install plug (1).



CHECK INJECTOR

Check the color of the exhaust gas visually. If there is any abnormality in the exhaust gas color, contact your Komatsu distributor for inspection.

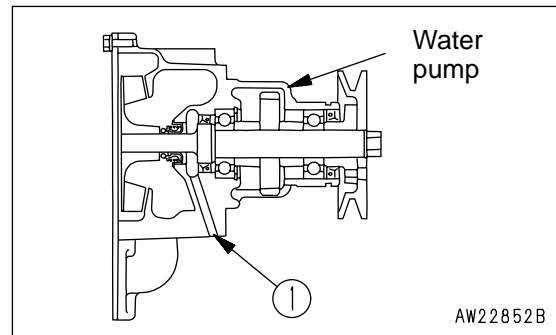
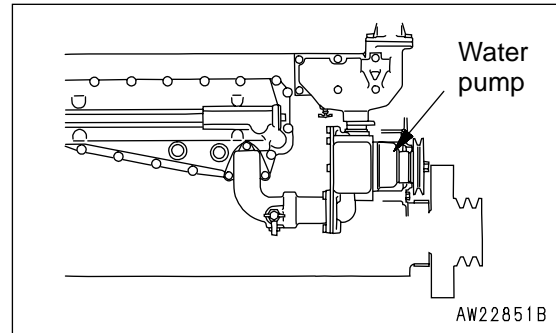
For details, see "TROUBLESHOOTING (PAGE 3-128)" "Exhaust color is black".

EVERY 4000 HOURS SERVICE

Maintenance for every 250, 500, 1000 and 2000 hours service should be carried out at the same time.

CHECK WATER PUMP

Check that there is no oil leakage, water leakage, or clogging of the drain hole (1). If any abnormality is found, contact your Komatsu distributor for disassembly and repair or replacement.



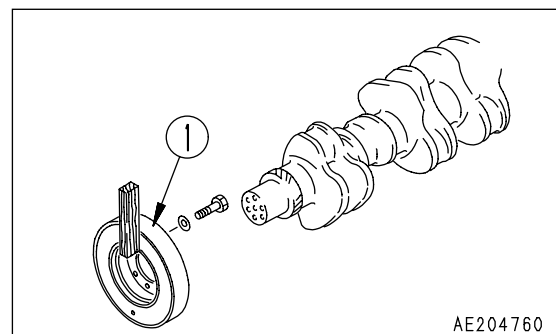
CHECK FAN PULLEY AND TENSION PULLEY

Check the pulley for play or leakage of grease. If any abnormality is found, please contact your Komatsu distributor.

CHECK VIBRATION DAMPER

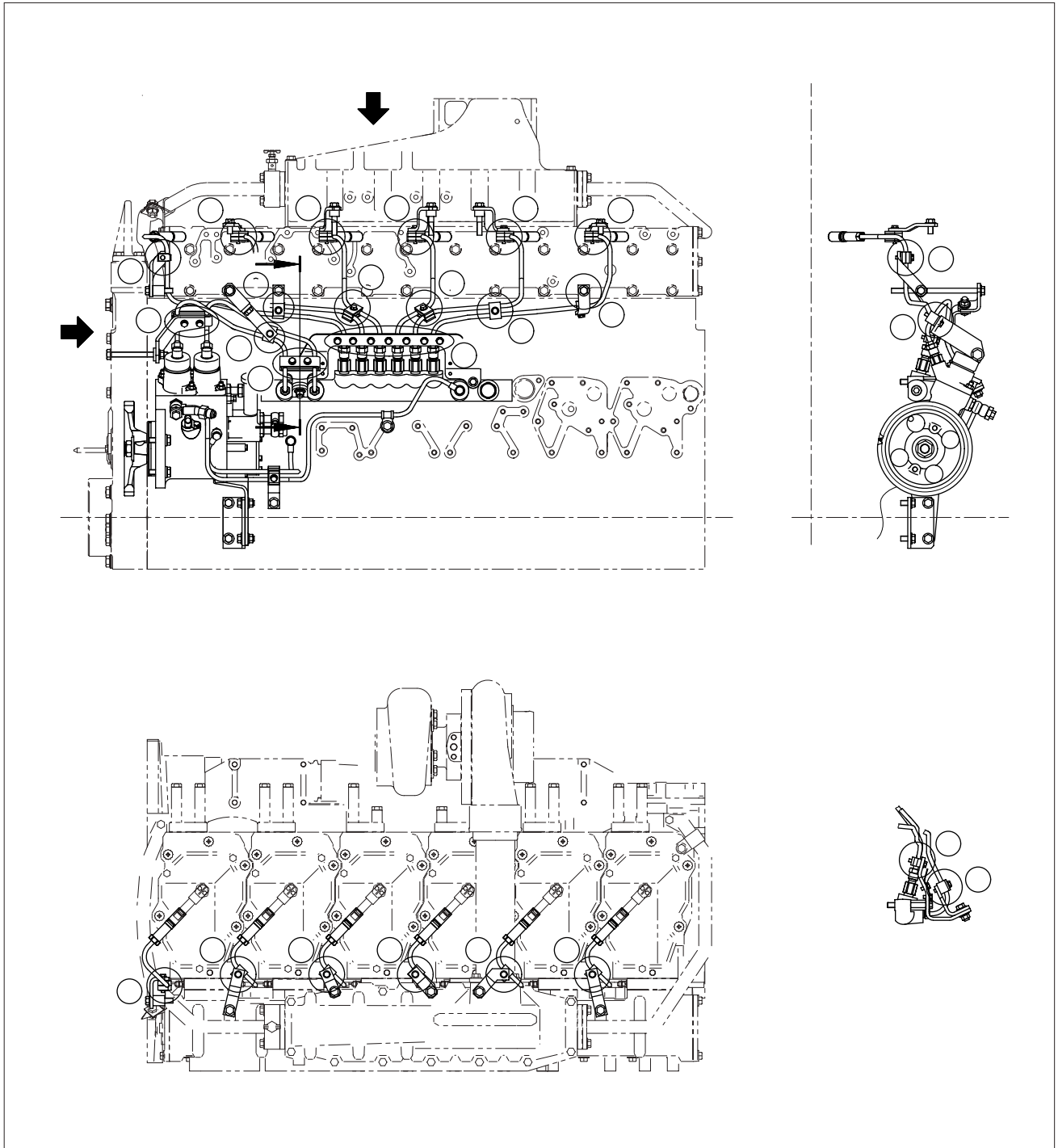
Check that there are no cracks or peeling in the outside surface of the vibration damper (1).

If any cracks or peeling are found, contact your Komatsu distributor to have the parts replaced.



CHECKING FOR LOOSENESS OF HIGH-PRESSURE CLAMP, HARDENING OF RUBBER

Check that there is no looseness in the high-pressure clamp mounting bolts (1) - (15) in the drawing on the next page. Check visually and feel with your finger to check that the rubber has not hardened. If there is any problem, the problem part must be replaced. In such a case, please contact your Komatsu distributor.

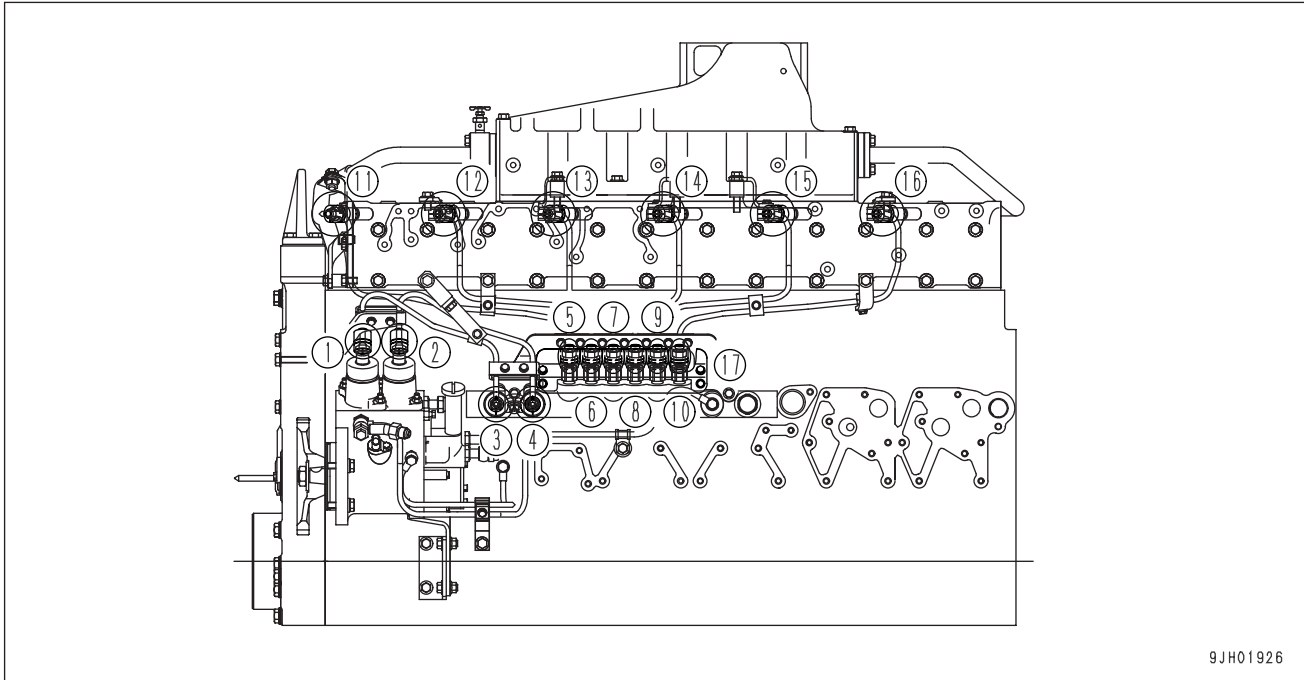


NOTICE

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 high-pressure piping. Always check that the proper high-pressure piping clamps are correctly installed.

CHECKING FOR MISSING FUEL SPRAY PREVENTION CAP, HARDENING OF RUBBER

Fuel spray prevention caps (1) - (16) and fuel spray prevention cover (17) are protective parts installed to prevent fire caused by fuel leaking and spraying out on to high temperature parts of the engine. Check visually that there are no missing caps or loose bolts, and feel with your finger to check that the rubber has not hardened. If there is any problem, the problem part must be replaced. In such a case, please contact your Komatsu distributor.



9JH01926

REPLACE INJECTOR NOZZLE TIP

Please contact your Komatsu distributor to have the injector nozzle tip replaced.

EVERY 8000 HOURS SERVICE

Maintenance for every 10, 100, 250, 500, 1000, 2000 and 4000 hours service should be carried out at the same time.

REPLACE HIGH-PRESSURE PIPING CLAMP

Please contact your Komatsu distributor to have the engine high-pressure clamp replaced.

REPLACE FUEL SPLAY PREVENTION CAP

Please contact your Komatsu distributor to have the fuel spray prevention cap replaced.

SPECIFICATIONS

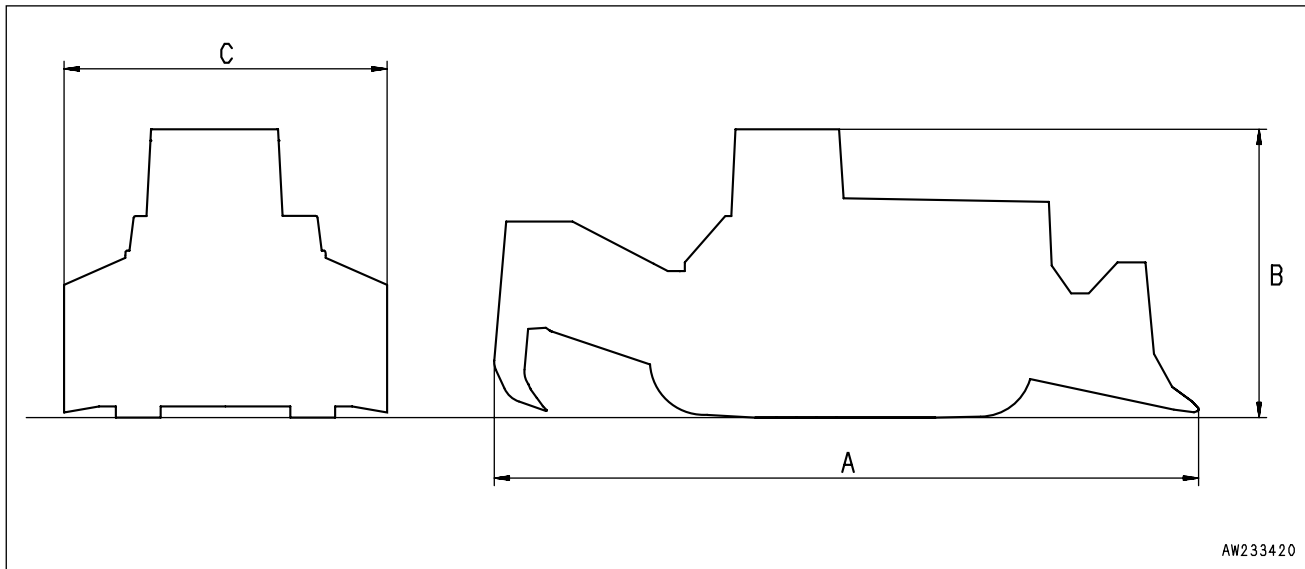
SPECIFICATIONS

D155AX-5

Item		Unit	D155AX-5
Operating weight (without operator)		kg	38,500 *1
Blade (straight tilt)dozer) Unit weight (including cylinder)		kg	4,900
Ripper unit weight		kg	3,710
Name of engine		—	Komatsu SA6D140E-3 diesel engine
Engine horsepower		Kw{HP}/rpm	231{310}/1,900
A	Overall length	mm	8,155
B	Overall height	mm	3,500
C	Overall width	mm	3,955
Travel speed (1st/2nd/3rd)	Forward	km/h	3.5/6.2/10.8
	Reverse	km/h	4.8/8.4/13.9

***1 Hydraulic tilt)dozer (semi U-dozer)**

With hydraulic variable multi-shank ripper, ROPS, cab, 560 mm HD shoe, side cover.



AW233420

ATTACHMENTS AND OPTIONS

 **WARNING**

Please read and make sure that you understand the safety volume before reading this section.

GENERAL PRECAUTIONS

PRECAUTIONS RELATED TO SAFETY

If attachments or options other than those authorized by Komatsu are installed, this will not only affect the life of the machine, but will also cause problems with safety.

When installing attachments not listed in this Operation and Maintenance Manual, contact your Komatsu distributor first.

If you do not contact Komatsu, we cannot accept any responsibility for any accidents or failures.

WARNING

General precautions

- **Read the instruction manual for the attachment thoroughly, and do not use this attachment unless you are sure that you have understood the guides completely.**
If you lose the instruction manual, always ask the manufacturer or your Komatsu distributor for a new copy.
 - **Depending on the attachment, install the necessary front guard to the machine.**
 - **Depending on the attachment, the impact noise may make it difficult for fellow workers to transmit instructions for the operation. Before starting operation, decide a leader and determine the signals to be used.**
 - **When an attachment is installed, the swing range and center of gravity of the machine are different, and the machine may move in an unexpected way. Be sure that you understand the condition of the machine properly.**
 - **Before starting operations, set up a fence around the machine to prevent people from entering. Never operate the machine when there are people near the machine.**
 - **To prevent serious accidents caused by misoperation, do not put your foot on the pedal except when operating the pedal.**
-

 **WARNING****Precautions for removal and installation operations**

When removing or installing the attachment, always do as follows to ensure safety in the operation.

- Carry out the removal and installation operation on firm, level ground.
- When carrying out the operation with two or more workers, determine the signals and follow these during the operation.
- Always use a crane when you lift or carrying heavy objects (more than 25 kg).
- When removing heavy components, always support the component before removing it. When lifting with a crane, be particularly careful about the position of the center of gravity.
- It is dangerous to carry out operations with a load left raised by a crane. Always prepare a stand and ensure that the condition is safe.
- When leaving an attachment removed or when installing the attachment, make sure that it is in a stable condition and cannot fall over.
- Never go under a load raised by a crane. Stay in a safe place where there is no danger if the load should fall.

NOTICE

Qualifications are required to operate a crane. Never allow the crane to be operated by an unqualified person.

For details of removal and installation operations, contact your Komatsu distributor.

INTRODUCTION OF OPTIONAL PARTS AND ATTACHMENTS

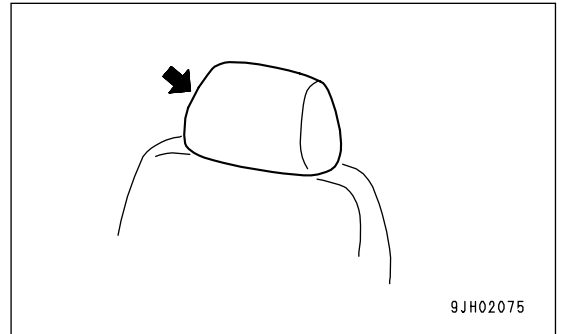
INTRODUCTION OF OPTIONAL PARTS AND ATTACHMENTS

Name	Specifications, use
Track shoes	Wide shoe width 610 mm
	Wide shoe width 660 mm
	Wide shoe width 710 mm
	Heavy-duty shoe width 610 mm
	Heavy-duty shoe width 660 mm
Ripper point	
Reversible fan	
Cap with lock	
Headrest	

Various other optional parts are available, so please contact your Komatsu distributor.

HANDLING HEADREST

Use the headrest with the headrest pushed down to the lowest position.

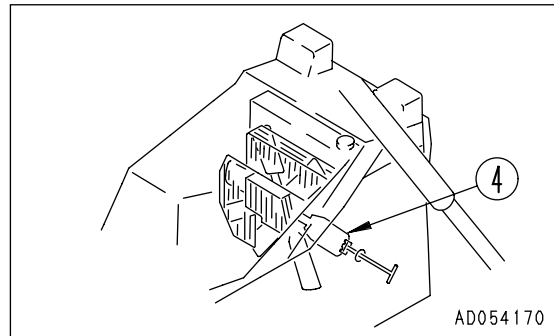
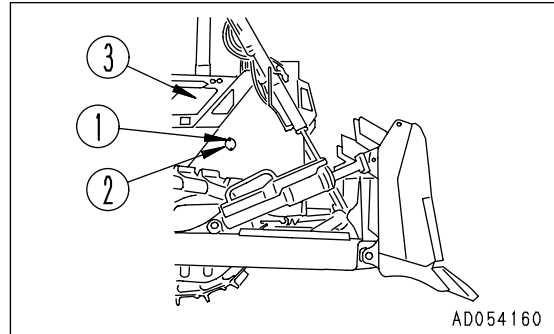


HANDLING REVERSIBLE FAN

REVERSING REVERSIBLE FAN

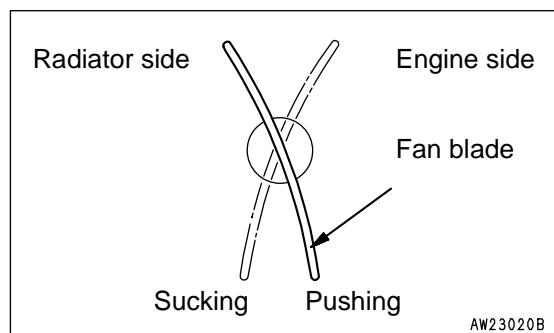
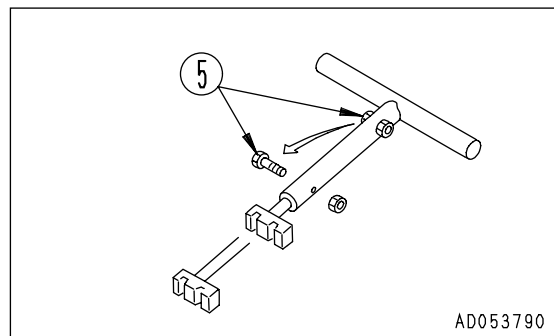
When reversing the reversible fan in cold weather, do as follows.

1. Loosen bolt (2), then remove cover (1) on the right side of the radiator guard. A hold for inserting the tool can be seen.
2. Open engine side cover (3) on the right side of the machine so that the reversing operation can be seen.
3. Insert the tip of the tool into fan blade (4).
4. Push towards the center of the fan, and turn the handle of the tool to reverse the fan blades.
5. Reverse 8 fan blades, but rotate the fan as follows.
 - Use the starting motor to rotate the fan.
 - Loosen the nut of the spring which applies tension to the tension pulley, reduce the belt tension, and rotate by hand. Do not loosen the nut too far or remove it.
 - After completely reversing all the fan blades, tighten the nut to its original position.



REMARK

- When inserting the tool, if the work equipment or any other part is in the way, change the position of bolt (5) to extend the tool when using it.
- If the fan is used in the suction direction in temperatures below -30°C, it has the effect of heating or maintaining the battery temperature.
- Use part number 175-900-3910 for the tool.



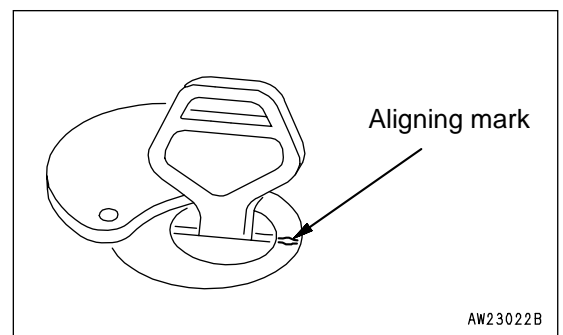
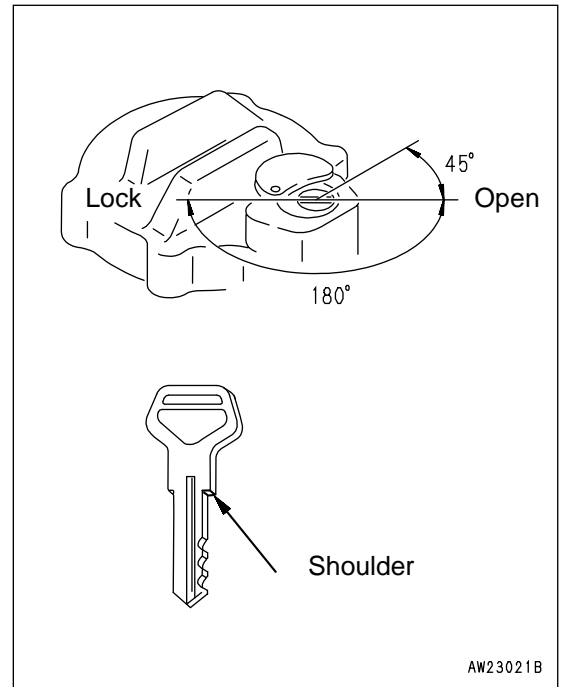
HANDLING CAP WITH LOCK

OPENING AND CLOSING LOCKABLE CAP

Lock-type caps are available for the radiator water filler cap, fuel tank filler cap, power train case oil filler cap, hydraulic tank oil filler cap, and hydraulic tank breather cap. The cap opening and closing method is as follows.

WHEN OPENING CAP

1. Insert the key. Make sure that you have inserted the key fully (to the shoulder) before turning it. If the key is turned when only partially inserted, it may break.
2. Turn the key counterclockwise to align the match mark on the cap with the rotor groove, then turn the cap slowly. When a click is heard, the lock is released, enabling the cap to be opened.

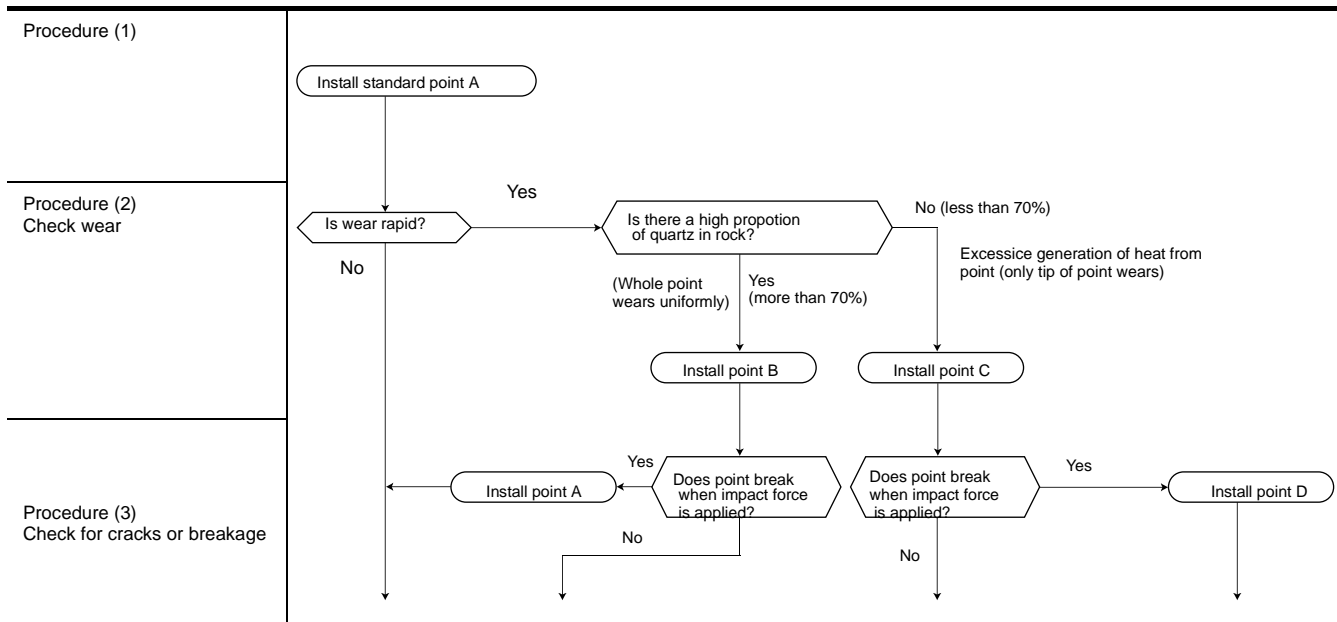


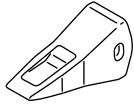
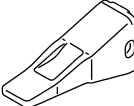
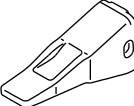
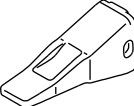
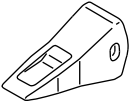
TO LOCK THE CAP

1. Turn the cap into place.
2. Turn the key clockwise and take the key out.

PROCEDURE FOR SELECTING RIPPER POINT

PROCEDURE FOR SELECTING RIPPER POINT



	Hardness	Soft - Hard	Soft - Medium hard	Soft	Medium hard	Hard
Typical rock	Type of rock	General rock	Sandstone	Basalt, andesite, granite, chert		
	Features	-	. Very high proportion of quartz (70 - 95%) point wears rapidly	. Fairly high proportion of quartz (40 - 70%) . Does not form seams of layers, so there is excessive generation of heat from the point, the tip wears rapidly, and ripping is difficult.		
	Features	Point A . Symmetrical shape . Yellow . Short (can be turned and used)	Point B . Non-symmetrical shape . Yellow . Long	Point C . Non-symmetrical shape . Red . Long	Point D . Symmetrical shape . Red . Long (can be turned and used)	Point E . Symmetrical shape . Red . Short (can be turned and used)
Suitable point	Shape	 AD053700	 AD053710	 AD053710	 AD053710	 AD053700
	Part No.	175-78-31230	175-78-34131	175-78-34141	175-78-31293	175-78-31232

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