

Operation & Maintenance Manual

BULLDOZER

D65EX -16

D65PX -16

D65WX -16

SERIAL NUMBERS 80001 and up

ecot3

⚠ WARNING

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

NOTICE

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

KOMATSU

FOREWORD

CALIFORNIA

Proposition 65 Warning

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

CALIFORNIA

Proposition 65 Warning

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

Wash hands after handling.

BEFORE READING THIS MANUAL

This manual gives details of the operation and methods of inspection and maintenance for this machine that must be obeyed in order to use the machine safely. Most accidents are caused by the failure to follow fundamental safety rules for the operation and maintenance of machines.

Read, understand and follow all precautions and warnings in this manual and on the machine before performing operation and maintenance. Failure to do so may result in serious injury or death.

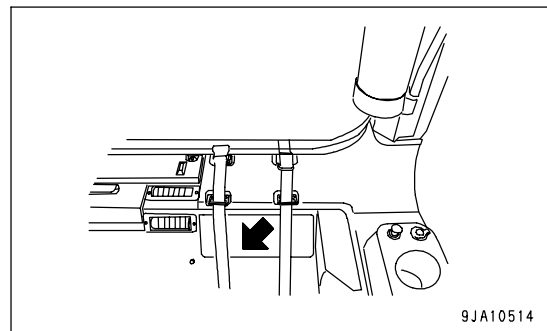
Komatsu cannot predict every circumstance that might involve a potential hazard when the machine is used. Therefore, the safety messages in this manual and on the machine may not include all possible safety precautions. If you carry out any operation, inspection, or maintenance under conditions that are not described in this manual, understand that it is your responsibility to take the necessary precautions to ensure safety. In no event should you or others engage in the prohibited uses or actions described in this manual. Improper operation and maintenance of the machine can be hazardous and could result in serious injury or death.

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

Always keep this Operation and Maintenance Manual in the location shown on the right so that all relevant personnel can read it at any time.

Operation and Maintenance Manual Storing Place

For a machine with a cab, a pocket is provided on the back side of the floor.



If this manual is lost or damaged, contact your distributor immediately to arrange for its replacement. For details regarding the machine serial No. you will need to provide your Komatsu distributor, see "TABLE TO ENTER SERIAL NO. AND DISTRIBUTOR (PAGE 1-7)".

This manual uses the international units (SI) for units of measurement. For reference, units that have been used in the past are given in ().

The explanations, values, and illustrations in this manual have been prepared based on the latest information available as of the date of its publication. Continuing improvements in the design of this machine may lead to additional changes that are not reflected in this manual. Consult Komatsu or your Komatsu distributor for the latest available information concerning your machine or with questions regarding information contained in this manual.

- The numbers in circles in the illustrations correspond to the numbers in () in the text.

(For example: ① → (1))




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, 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.

IMPORTANT SAFETY INFORMATION

To enable you to use the machine safely, and to prevent injury to operators, service personnel or bystanders, the precautions and warnings included in this manual and the safety signs attached to the machine must always be followed.

To identify important safety messages in the manual and on the machine labels, the following signal words are used.

The "Safety Alert Symbol" identifies important safety messages on machines, in manuals, and elsewhere. When you see this symbol, be alert to the risk of personal injury or death. Follow the instructions in the safety message.

- | | |
|--|--|
|  DANGER | This signal word indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. |
|  WARNING | This signal word indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury. |
|  CAUTION | This signal word indicates a potentially hazardous situation exists which, if not avoided, may result in minor or moderate injury. |

The following signal words are used to alert you to information that must be followed to avoid damage to the machine.

- | | |
|----------------|--|
| NOTICE | This precaution is given where the machine may be damaged or the service life reduced if the precaution is not followed. |
| REMARKS | This word is used for information that is useful to know. |

INTENDED USE

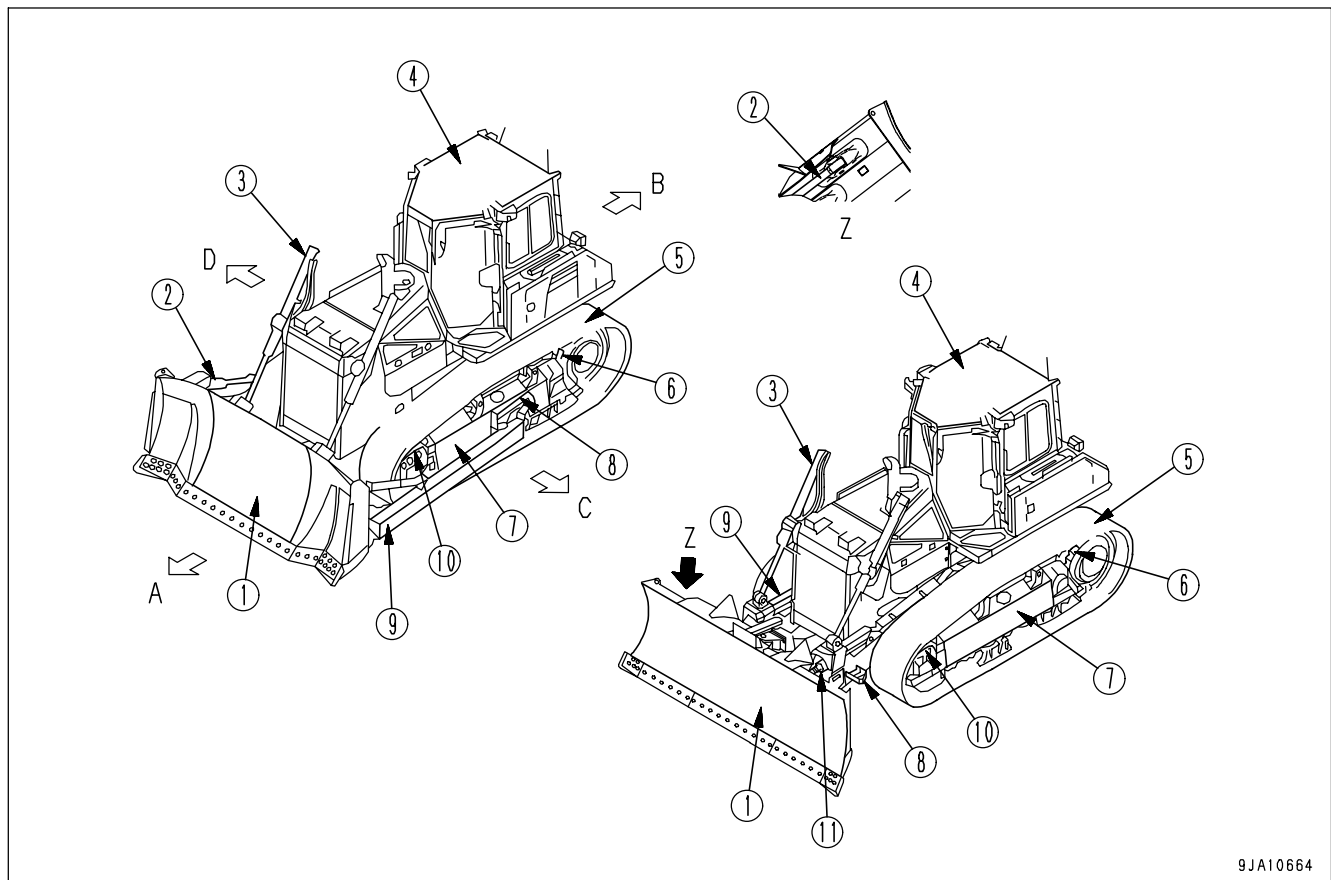
USE OF MACHINE

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

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

See the section "WORK POSSIBLE USING BULLDOZER (PAGE 3-136)" for further details.

GENERAL VIEW AND DIRECTIONS OF MACHINE



9JA10664

In this manual, the directions of the machine (front, rear, left, right) are determined according to the view from the operator's seat in the direction of travel (front) of the machine.

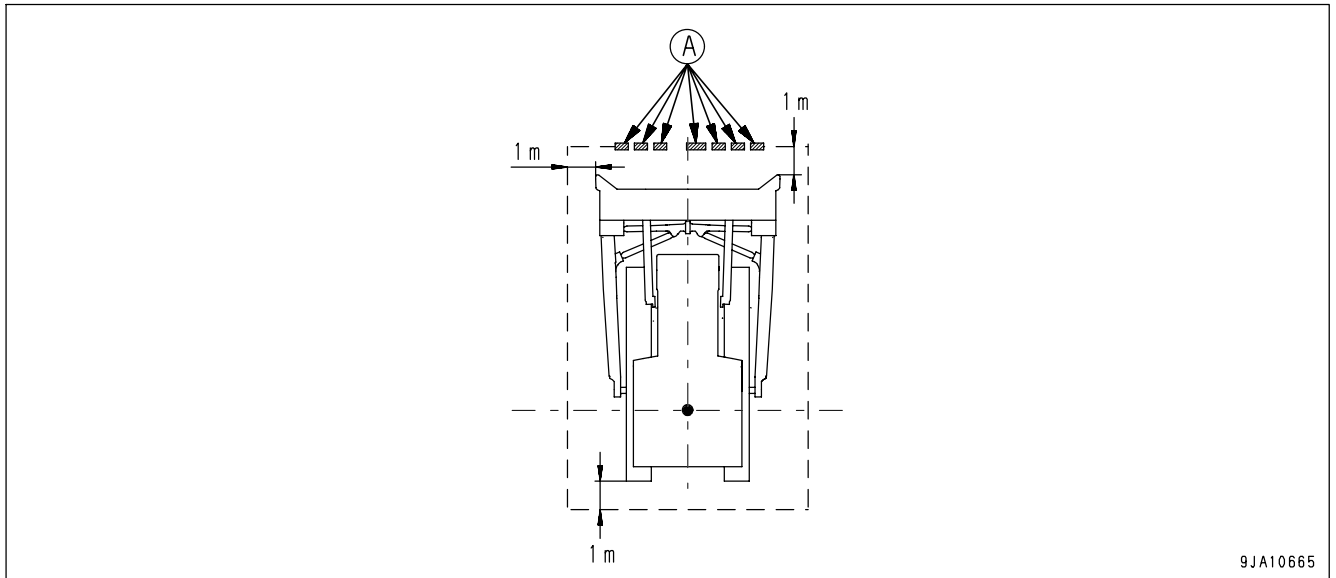
- | | |
|-------------------------|---------------------------|
| (1) Blade | (7) Track frame |
| (2) Blade tilt cylinder | (8) Step |
| (3) Blade lift cylinder | (9) Frame |
| (4) ROPS cab | (10) Idler |
| (5) Track shoe | (11) Blade angle cylinder |
| (6) Sprocket | |
| (A) Front | (C) Left |
| (B) Rear | (D) Right |

VISIBILITY FROM OPERATOR'S SEAT

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

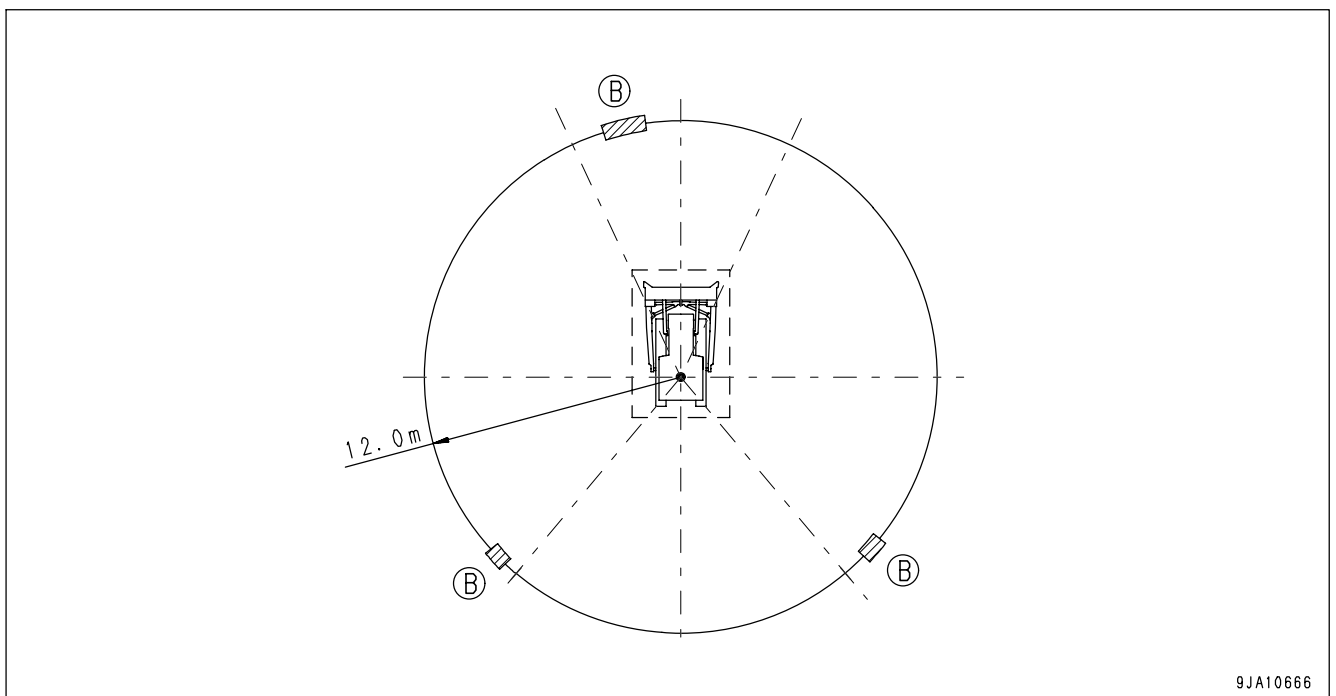
PROXIMITY VISIBILITY

The figure bellows shows a front visibility from the machine at a spot 1.0 m away from the side and 1.5 m above the ground. Shaded area (A) in the figure shows an area whose view is blocked by part of the machine. Operate the machine, fully aware that the machine has a portion that an operator cannot see.



12M CIRCUMFERENCE VISIBILITY

The figure below shows a visibility from the machine within a circle of 12 m in radius. Shaded area (B) in the figure shows an area whose view is blocked by part of the machine. Operate the machine, fully aware that the machine has a portion that an operator cannot see.

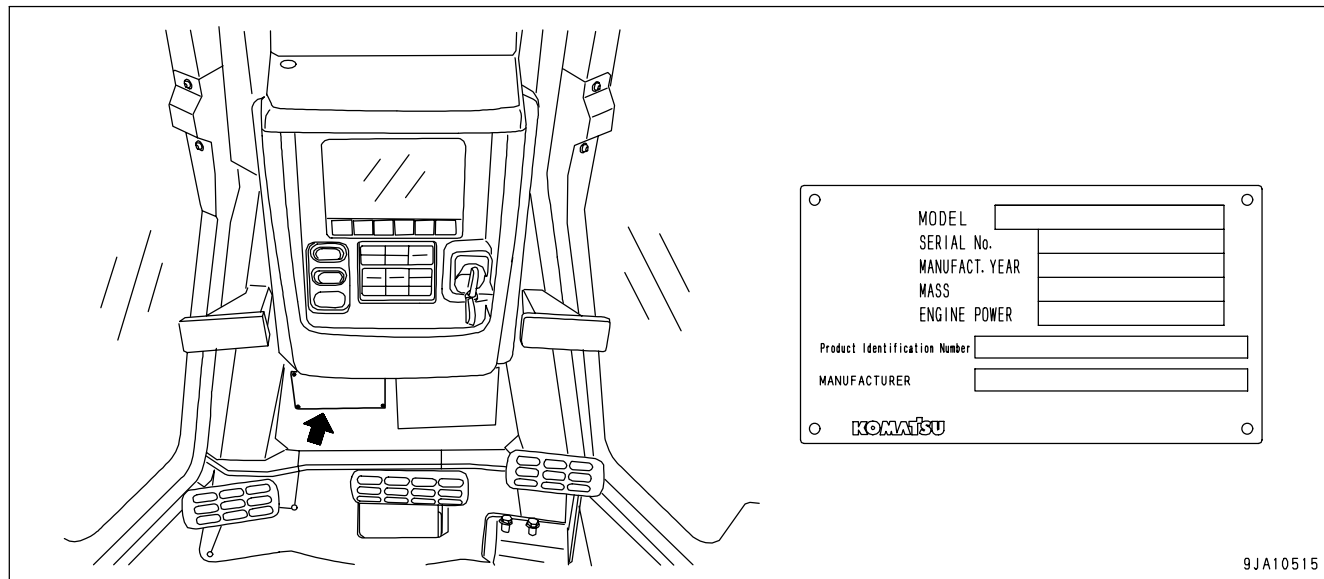


LOCATION OF PLATES, TABLE TO ENTER SERIAL NO. AND DISTRIBUTOR

When ordering replacement parts, please inform your Komatsu distributor of the following.

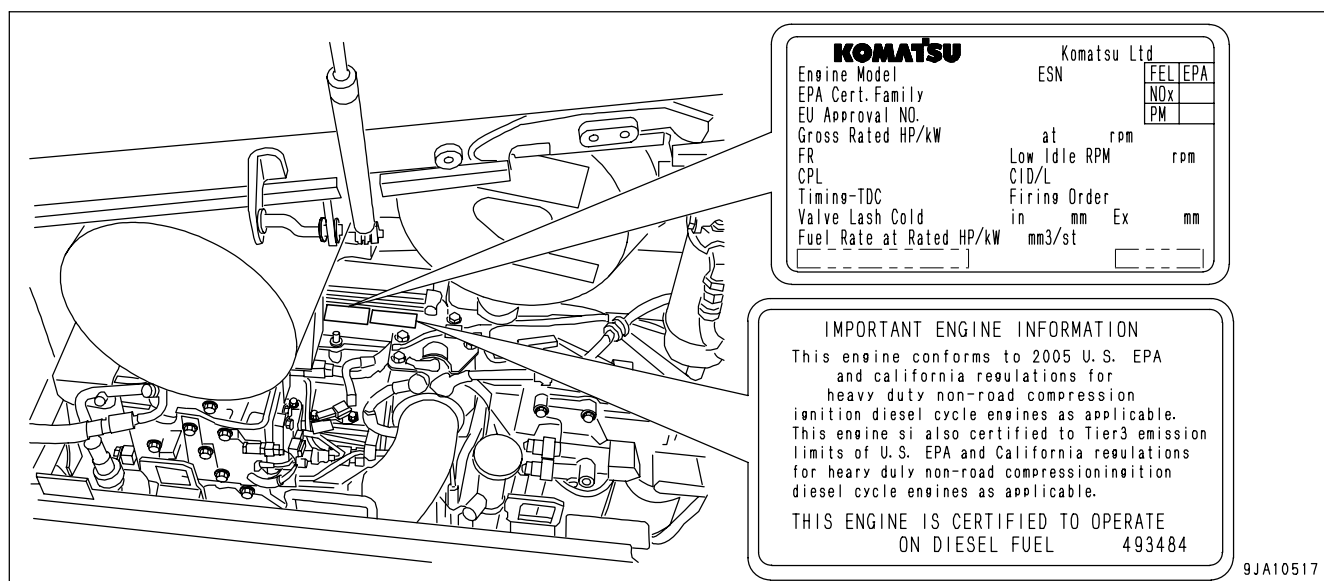
PRODUCT IDENTIFICATION NUMBER (PIN)/MACHINE SERIAL NO. PLATE

This is at the bottom left at the front of the operator's seat.
The design of the nameplate differs according to the territory.



EPA REGULATION, ENGINE SERIAL NO. PLATE

The additional EPA nameplate is located on top of the engine head cover on the left side of the machine.



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

SERVICE METER POSITION

The service meter is provided at the center of the machine monitor.

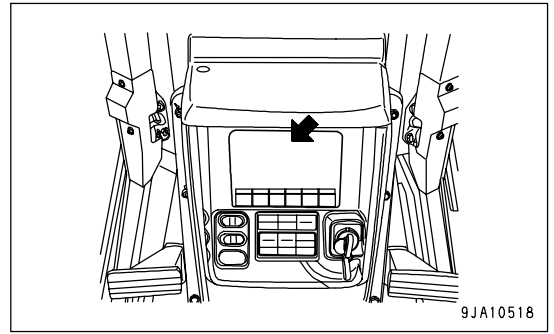


TABLE TO ENTER SERIAL NO. AND DISTRIBUTOR

Machine serial No.	
Engine serial No.	
Product identification number (PIN)	
Distributor name	
Address	-----

Service Personnel	-----
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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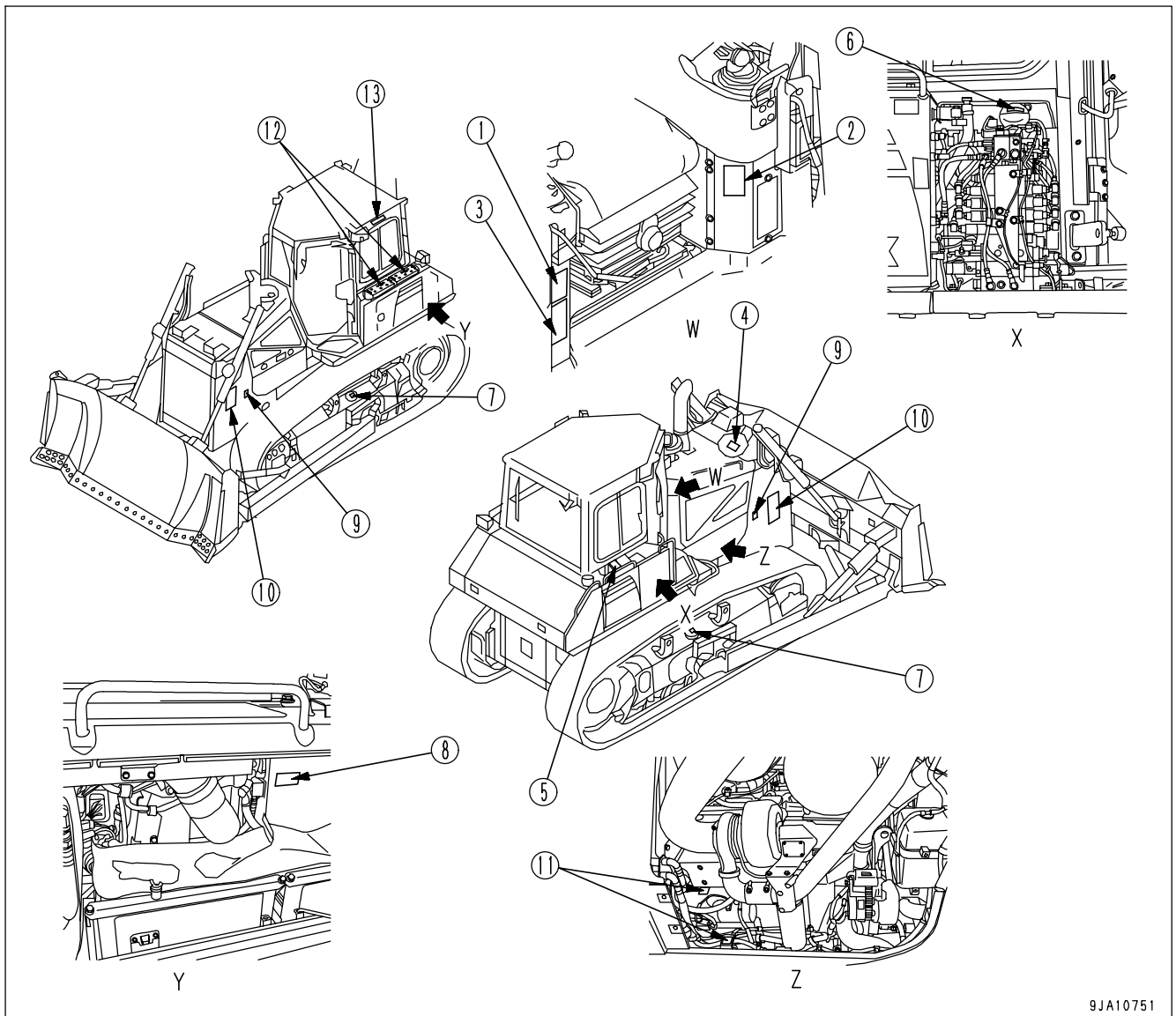
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SAFETY LABELS

The following safety labels are used on this machine.

- Make sure that you fully understand the location and content of each safety label, together with the means of avoiding the danger shown.
- To ensure that the contents of safety labels can be read properly, be sure that they are in the correct place and always keep them clean. When cleaning the labels, do not use organic solvents or gasoline. They may cause the labels to peel off.
- If the labels are damaged, lost, or cannot be read properly, contact your Komatsu distributor immediately regarding their replacement. For details concerning the part numbers for the labels, see this manual or the actual label.
- There are also other labels on the machine in addition to the safety labels. Handle those labels in the same way.

POSITIONS OF SAFETY PICTOGRAMS



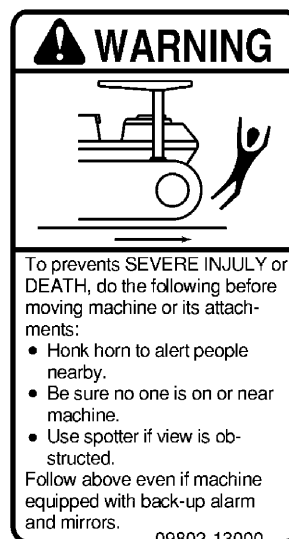
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SAFETY LABELS

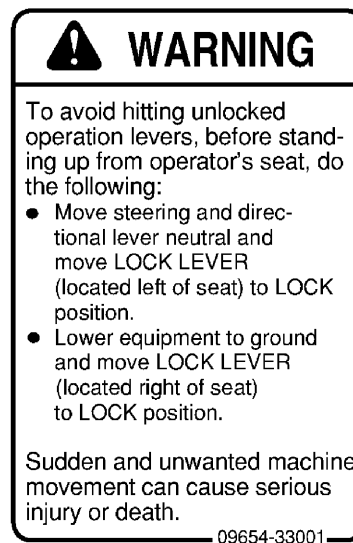
- (1) Caution before operating or maintaining machine
(09651-03001)



- (2) Caution before moving in reverse (09802-13000)



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



(4) Caution for high-temperature coolant (09668-03001)



(5) Caution for high-temperature oil (09653-03001)

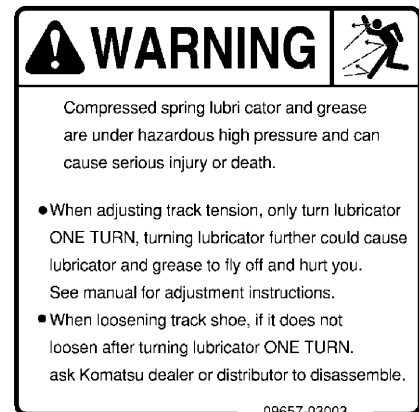


(6) Caution for accumulator (09659-53000)

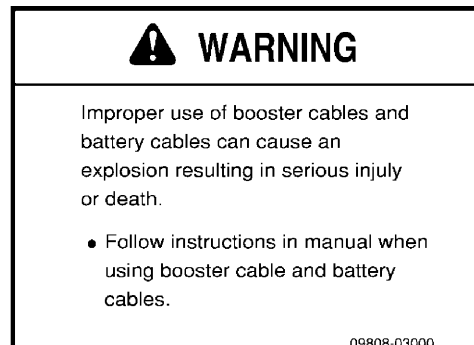


(7) Caution for adjusting track tension (09657-03003)

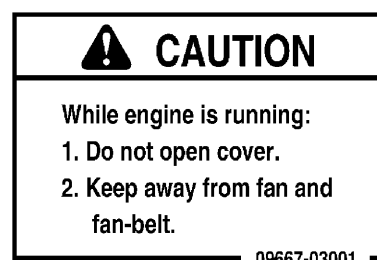
The safety label is attached to the back side of the cover of the track adjustment window.



(8) Caution for battery cable (09808-03000)



(9) Caution for engine running (09667-03001)



(10) Caution for approach when machine moving (09812-13000)



(11) Jump start prohibited (09842-A0481)



Start the engine only after sitting down in the operator's seat.

Do not attempt to start the engine by short-circuiting the engine starting circuit. Such an act may cause a serious bodily injury or fire.

(12) Caution when handling battery (09664-30011)

<p>⚠ DANGER/POISON EXPLOSIVE GASES Cigarettes, flames or sparks could cause battery to explode. Always shield eyes and face from battery. Do not charge or use booster cables or adjust post connections without order instruction and training. KEEP VENT CAPS TIGHT AND LEVEL. Poison causes severe burns. Contains sulfuric acid. In event of accident flush with water and call a physician immediately. KEEP OUT OF REACH OF CHILDREN.</p>
--

(13) Caution for ROPS/FOPS (09620-A2000)

ROPS/FOPS CERTIFICATION			
<small>This protective structure complies with the standard provided that it is properly equipped on the machine which mass is less than the specified maximum mass.</small>			
KOMATSU		ROPS : ISO 3471/1094, SAE J150 3471 MA'93	FOPS : ISO 3442/1092
MODEL	_____	MACHINE MODEL	_____
SERIAL No.	_____	MAX. MASS	_____ kg (Lb)
⚠ WARNING		<ul style="list-style-type: none"> ● If any modification is applied to the ROPS or FOPS, it may affect the strength and may not comply with the standard. Consult Komatsu Distributor before altering. ● ROPS or FOPS may provide less protection if it has been structurally damaged or involved roll-over. Consult Komatsu Distributor in that case. ● Always wear seat belt when moving. 	
Komatsu Ltd.		2-3-8 Akasaka, Minato-ku, Tokyo, Japan	09620 A2000

GENERAL PRECAUTIONS COMMON TO OPERATION AND MAINTENANCE

Mistakes in operation, inspection, or maintenance may result in serious personal injury or death. Before carrying out operation, inspection, or maintenance, always read this manual and the safety labels on the machine carefully and obey the warnings.

PRECAUTIONS BEFORE STARTING OPERATION

ENSURING SAFE OPERATION

- Only trained and authorized personnel can operate and maintain the machine.
- Follow all safety, precautions, and instructions in this manual when operating or performing inspection or maintenance on the machine.
- If you are not feeling well, or 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 job site in danger.
- When working with another operator or with the person on the worksite traffic duty, discuss the content of the operation beforehand and use the determined signals when carrying out the operation.

UNDERSTANDING THE MACHINE

Before operating the machine, read this manual thoroughly. If there are any places in this manual that you do not understand, ask the person in charge of safety to give an explanation.

PREPARATIONS FOR SAFE OPERATION

PRECAUTIONS REGARDING SAFETY-RELATED EQUIPMENT

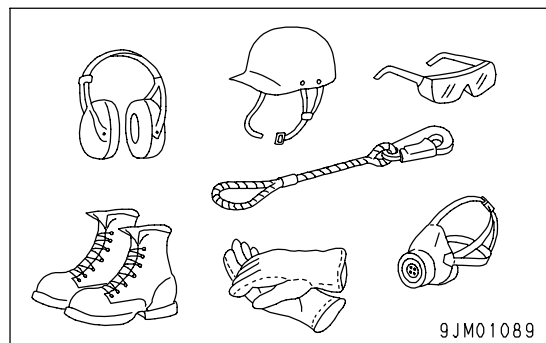
- Be sure that all guards, covers and mirrors are in their proper position. Have guards and covers repaired immediately if they are damaged.
- Understand the method of use of safety features and use them properly.
- Never remove any safety features. Always keep them in good operating condition.

INSPECTING MACHINE

Check the machine before starting operations. If any abnormality is found, do not operate the machine until repairs of the problem location have been completed.

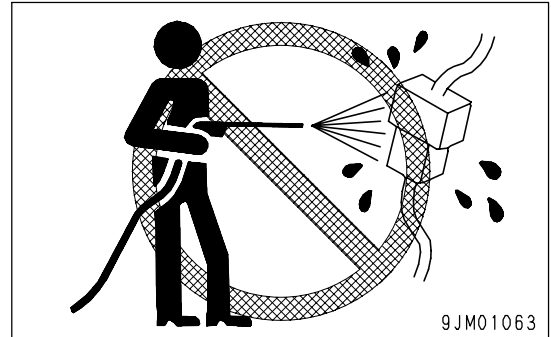
WEAR WELL-FITTING CLOTHES AND PROTECTIVE EQUIPMENT

- Do not wear loose clothes or any accessories. If these catch on the control levers or protruding parts, there is danger that it may cause the machine to move unexpectedly.
- 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.
- 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.
- Check that all protective equipment functions properly before using it.



KEEP MACHINE CLEAN

- If you get on or off the machine or carry out inspection and maintenance when the machine is dirty with mud or oil, there is a hazard that you will slip and fall. Wipe off any mud or oil from the machine. Always keep the machine clean.
- If water gets into the electrical system, there is a hazard that it will cause malfunctions or misoperation. If there is any misoperation, there is danger that the machine may move unexpectedly and cause serious personal injury or death. When washing the machine with water or steam, do not allow the water or steam to come into direct contact with electrical components.

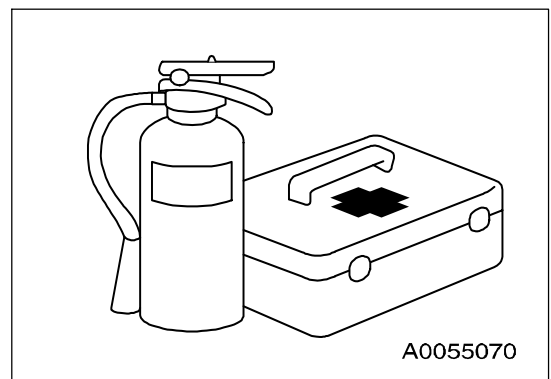
**PRECAUTIONS INSIDE OPERATOR'S COMPARTMENT**

- 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 tools or a machine parts lying around inside the operator's compartment. If tools or parts get into the control devices, it may obstruct operation and cause the machine to move unexpectedly, resulting in serious personal injury or death.
- Do not stick suction pads to the window glass. Suction pads act as a lens and may cause fire.
- Do not use a cell phone when driving or operating the machine. This may lead to mistakes in operation, which could cause serious personal injury or death.
- Never bring any dangerous objects such as flammable or explosive items into the operator's compartment.

PROVIDE 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 in the storage point. Carry out periodic checks and add to the contents if necessary.

**IF ANY PROBLEM IS FOUND**

If you find any problems 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 problem has been corrected.

FIRE PREVENTION

ACTION IF FIRE OCCURS

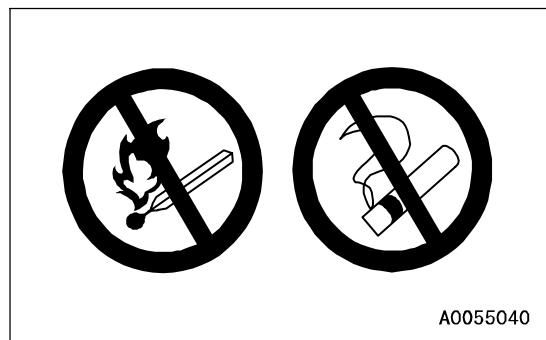
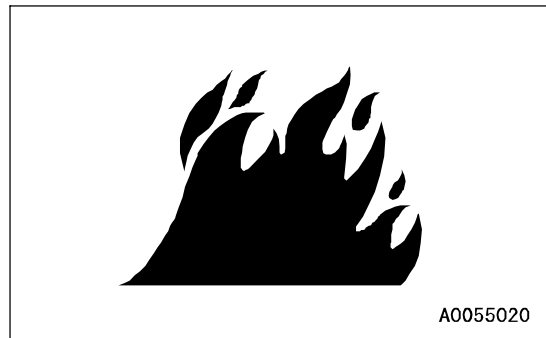
- Turn the start switch OFF to stop the engine.
- Use the handrails and steps to get off the machine.
- Do not jump off the machine. There is the danger of falling and suffering serious injury.

PRECAUTIONS TO PREVENT FIRE

• Fire caused by fuel, oil, antifreeze, or window washer fluid

Do not bring any flame or fire close to flammable substances such as fuel, oil, antifreeze, or window washer fluid. There is danger that they may catch fire. To prevent fire, always observe the following:

- Do not smoke or use any flame near fuel or other flammable substances.
- Stop the engine before adding fuel.
- Do not leave the machine when adding fuel or oil.
- Tighten all fuel and oil caps securely.
- Be careful not to spill fuel on overheated surfaces or on parts of the electrical system.
- After adding fuel or oil, wipe up any spilled fuel or oil.
- Put greasy rags and other flammable materials into a safe container to maintain safety at the workplace.
- When washing parts with oil, use a non-flammable oil. Do not use diesel oil or gasoline. There is danger that they may catch fire.
- Do not weld or use a cutting torch to cut any pipes or tubes that contain flammable liquids.
- Determine well-ventilated areas for storing oil and fuel. Keep the oil and fuel in the determined place and do not allow unauthorized persons to enter.
- When carrying out grinding or welding work on the machine, move any flammable materials to a safe place before starting.



• Fire caused by accumulation of flammable material.

- Remove any dry leaves, chips, pieces of paper, coal dust, or any other flammable materials accumulated or affixed around the engine, exhaust manifold, muffler, or battery, or inside the undercovers.
- To prevent fires spreading from sparks or burning particles from other fires, remove any flammable materials such as dry leaves, chips, pieces of paper, coal dust, or any other flammable materials accumulated around the cooling system (radiator, oil cooler) or inside the undercover.

• Fire coming from electric wiring

Short circuits in the electrical system can cause fire. To prevent fire, always observe the following.

- Keep all 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 piping**

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. There is danger that this may lead to damage to the hoses and cause high-pressure oil to spurt out, leading to fire, serious personal injury or death.

- **Explosion caused by lighting equipment**

- When checking fuel, oil, battery electrolyte, or coolant, always use lighting with anti-explosion specifications.
- When taking the electrical power for the lighting from the machine itself, follow the instructions in this manual.

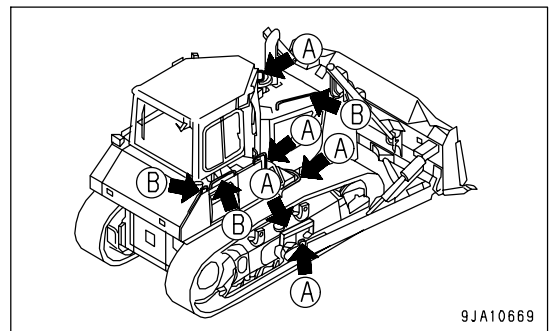
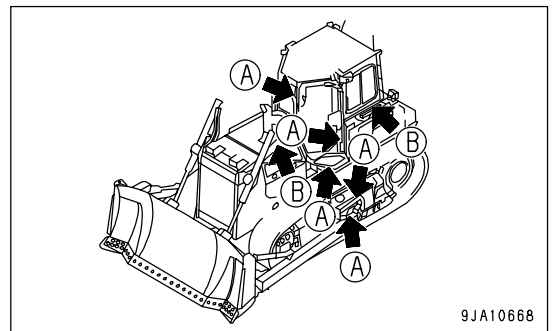
PRECAUTIONS WHEN GETTING ON OR OFF MACHINE

USE HANDRAILS AND STEPS WHEN GETTING ON OR OFF MACHINE

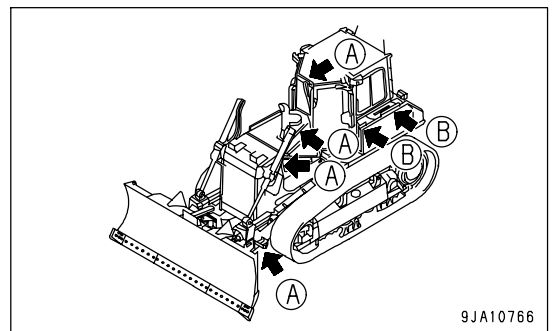
To prevent personal injury caused by slipping or falling off the machine, always do as follows.

- Use the parts marked by arrow A in the diagrams when getting on or off the machine.

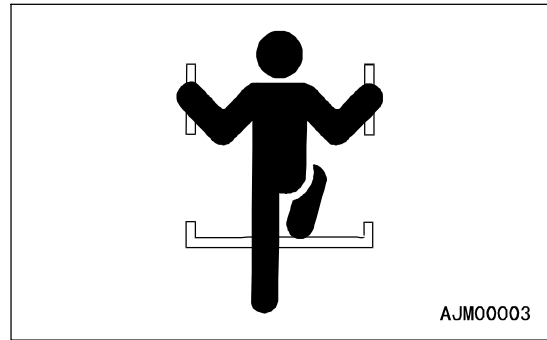
Never use the parts marked by arrow B when getting on or off the machine. Use them only when moving along the top of the track or when checking or carrying out maintenance inside the side cover, or when filling the tank with oil.



(Power angle power tilt dozer)



- Always face the machine and maintain at least three-point contact (both feet and one hand, or both hands and one foot) with the handrail and steps to ensure that you support yourself.



- Before getting on or off the machine, check the handrails and steps, and if there is any oil, grease, or mud on them, wipe it off immediately. In addition, repair any damage and tighten any loose bolts.
- Do not grip the control levers and work equipment lock lever when getting on or off the machine.
- Never climb on the engine hood or covers where there are no non-slip pads.
- Do not get on or off the machine while holding tools in your hand.

NO JUMPING ON OR OFF MACHINE

- 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.

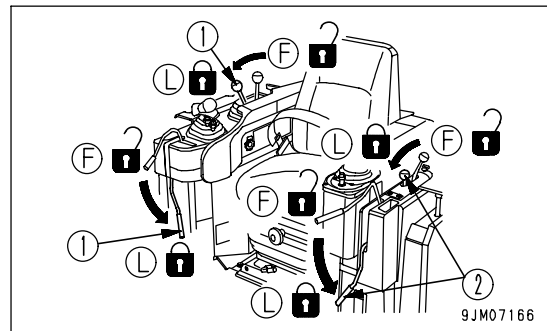
NO PEOPLE ON ATTACHMENTS

Never let anyone ride on the work equipment or other attachments. There is a hazard of falling and suffering serious personal injury or death.

PRECAUTIONS WHEN STANDING UP FROM OPERATOR'S SEAT

When standing up from the operator's seat to adjust the operator's seat, always lower the work equipment completely to the ground, set work equipment lock lever (1) and parking brake lever (2) to the LOCK position (L), and stop the engine.

If the control lever is touched by accident, there is danger that the machine may suddenly move and cause serious personal injury.

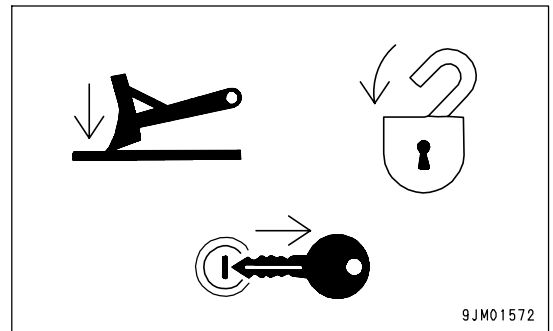
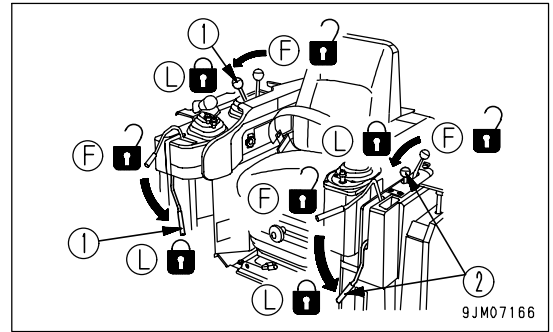


PRECAUTIONS WHEN LEAVING MACHINE

If the proper procedures are not taken when parking the machine, the machine may suddenly move off by itself, and this may lead to serious personal injury or death. Always do the following.

- When leaving the machine, always lower the work equipment completely to the ground, set work equipment lock lever (1) and parking brake lever (2) to the LOCK position (L), and stop the engine.

Always lock all parts, take the key with you and leave it in the specified place.

**EMERGENCY EXIT FROM OPERATOR'S CAB**

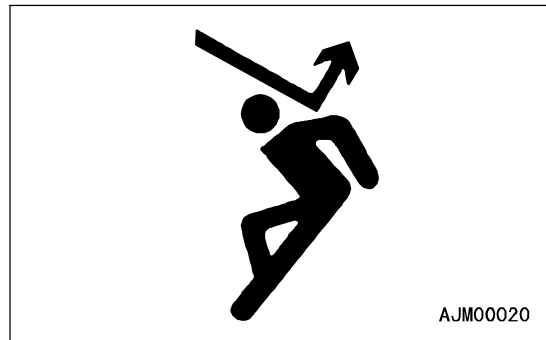
Machines equipped with a cab have doors on the left and right sides. If the door on the one side does not open, escape from the door on the other side.

DO NOT GET CAUGHT IN WORK EQUIPMENT

The clearance in the area around the work equipment changes according to the movement of the link. If you get caught, you may suffer serious personal injury or death. Do not allow anyone to come close to any rotating or extending/retracting portion.

PRECAUTIONS RELATED TO PROTECTIVE STRUCTURES

The operator's compartment is equipped with a structure (ROPS, FOPS) to protect the operator by absorbing the impact energy. If the machine weight (mass) exceeds the certified value (shown on the ROLL-OVER PROTECTIVE STRUCTURE (ROPS) CERTIFICATION plate), ROPS will not be able to fulfill its function. Do not increase machine weight beyond the certified value by modifying the machine or by installing attachments to the machine. Also, if the function of the protective equipment is impeded, the protective equipment will not be able to protect the operator, and the operator may suffer injury or death. Always observe the following.



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- If the machine is equipped with a protective structure, do not remove the protective structure and carry out operations without it.
- If the protective structure is welded, or holes are drilled in it, or it is modified in any other way, its strength may drop. Consult your Komatsu distributor before carrying out any modifications.
- If the protective structure is damaged or deformed by falling objects or by rolling over, its strength will be reduced and it will not be able to fulfill its function properly. In such cases, always contact your Komatsu distributor for advice on the method of repair.
- Even if the protective structure is installed, always fasten your seat belt properly when operating the machine. If you do not fasten your seatbelt properly, it cannot display its effect.

UNAUTHORIZED MODIFICATION

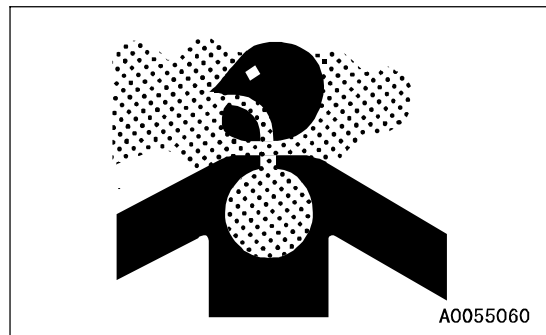
- Komatsu will not be responsible for any injuries, accidents, product failures or other property damages resulting from modifications made without authorization from Komatsu.
- Any modification made without authorization from Komatsu can create hazards. Before making a modification, consult your Komatsu distributor.

PRECAUTIONS RELATED TO ATTACHMENTS AND OPTIONS

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

PRECAUTIONS WHEN RUNNING ENGINE INSIDE BUILDING

The engine exhaust gas contains substances that may damage your health or even cause death. Start or operate the engine in a place where there is good ventilation. If the engine or machine must be operated inside a building or under ground, where the ventilation is poor, take steps to ensure that the engine exhaust gas is removed and that ample fresh air is brought in.



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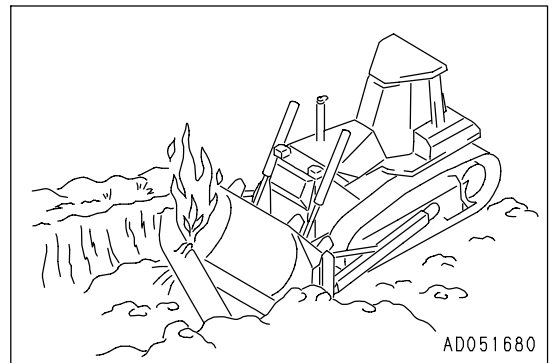
PRECAUTIONS FOR OPERATION

PRECAUTIONS FOR JOBSITE

INVESTIGATE AND CONFIRM JOBSITE CONDITIONS

On the jobsite, there are various hidden dangers that may lead to personal injury or death. Before starting operations, always check the following to confirm that there is no danger on the jobsite.

- 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 operate where there is a hazard of landslides or falling rocks.
- If water lines, gas lines, or high-voltage electrical lines may be buried under the 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 water or on soft ground, check the water depth, speed of the current, bedrock, and shape of the ground beforehand and avoid any place that will obstruct travel.



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 personal injury or death. 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 near 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 near the machine.

Voltage of Cables	Safety Distance
100V - 200V	Over 2 m (7 ft)
6,600V	Over 2 m (7 ft)
22,000V	Over 3 m (10 ft)
66,000V	Over 4 m (14 ft)
154,000V	Over 5 m (17 ft)
187,000V	Over 6 m (20 ft)
275,000V	Over 7 m (23 ft)
500,000V	Over 11 m (36 ft)

ENSURE GOOD VISIBILITY

This machine is equipped with mirrors to ensure good visibility, but even then there are places that cannot be seen from the operator’s seat, so be careful when operating.

When traveling or carrying out operations in places with poor visibility, it is impossible to check for obstacles in the area around the machine and to check the condition of the jobsite. This leads to danger of serious personal injury or death. When traveling or carrying out operations in places with poor visibility, always observe the following.

- Position a signalman if there are areas where the visibility is not good.
- Only one signalman should give signals.
- 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.
- When checking the mirrors installed to the machine, remove all dirt and adjust the angle of the mirror to ensure good visibility.

CHECKING SIGNS AND SIGNALMAN'S SIGNALS

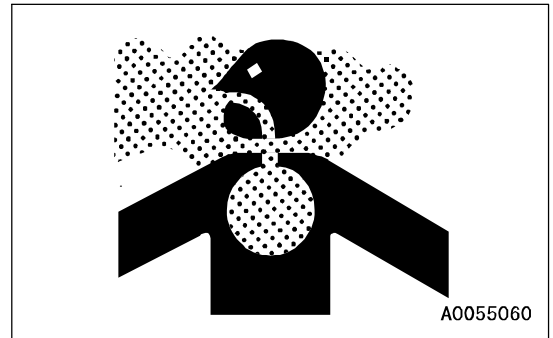
- Set up signs to inform of road shoulders and soft ground. If the visibility is not good, position a signalman if necessary. Operators should pay careful attention to the signs and follow the instructions from the signalman.
- Only one signalman should give signals.
- Make sure that all workers understand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

BEWARE OF 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.
- Do not use compressed air.
- If there is danger that there may be asbestos dust in the air, always operate the machine from an upwind position, and make sure that all workers operate on the upwind side.
- All workers should use anti-dust masks.
- Do not allow other persons to approach during the operation.
- Always observe the rules and regulations for the work site and environmental standards.

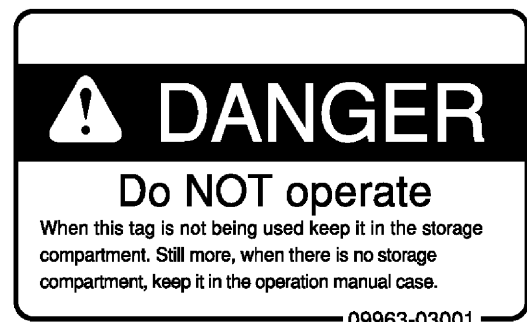
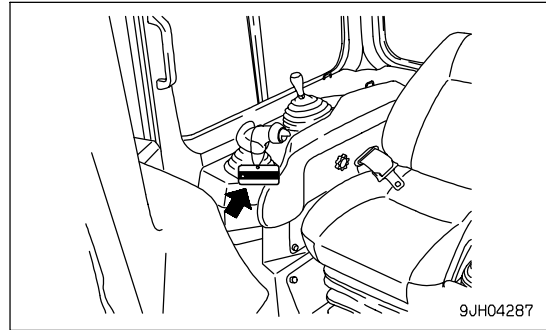
This machine does not use asbestos, but there is a danger that imitation parts may contain asbestos, so always use genuine Komatsu parts.



STARTING ENGINE

USE WARNING TAGS

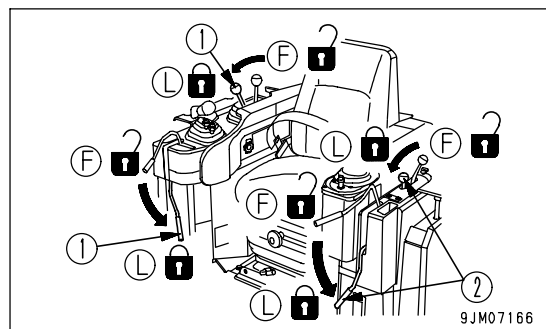
If there is any "DANGER! Do NOT operate!" warning tag displayed, it means that someone is carrying out inspection and maintenance of the machine. If the warning sign is ignored and the machine is operated, there is danger that the person carrying out inspection or maintenance may be caught in the rotating parts or moving parts and suffer serious personal injury or death. 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 to ensure that there is no problem with the operation of the machine. If this inspection is not carried out properly problems may occur with the operation of the machine, and there is danger that this may lead to serious personal injury or death.

- Remove all dirt from the surface of the window glass to ensure a good view.
- Be sure to carry out "WALK-AROUND CHECK (PAGE 3-90)".
- Remove all dirt from the surface of the lens of the front lamps and working lamps, and check that they light up correctly.
- 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.
- Check that there is no mud or dust accumulated around the movable parts of any pedals, and check that the pedals work properly.
- 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 mirror, and check that the control levers are all at the Neutral position.
- Before starting the engine, check that work equipment lock lever (1) and parking brake lever (2) are in LOCK position (L).
- Adjust the mirror so that the rear of the machine can be seen easily from the operator's seat.
For details of the adjustment procedure, see "ADJUST MIRROR (PAGE 3-107)".
- Check that there are no persons or obstacles above, below, or in the area around the machine.



PRECAUTIONS WHEN STARTING

- Start and operate the machine only while seated.
- When starting the engine, sound the horn as a warning.
- Do not allow anyone apart from the operator to ride on the machine.
- Do not attempt to start the engine by short-circuiting the engine starting circuit. This may cause fire, serious personal injury or death.

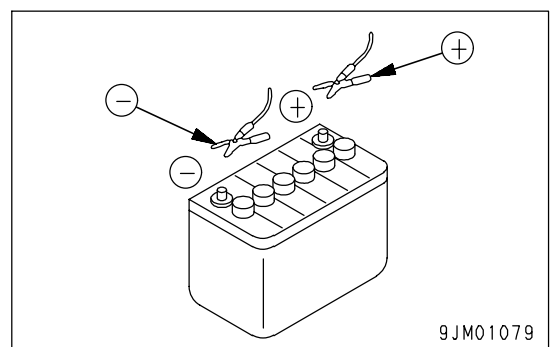
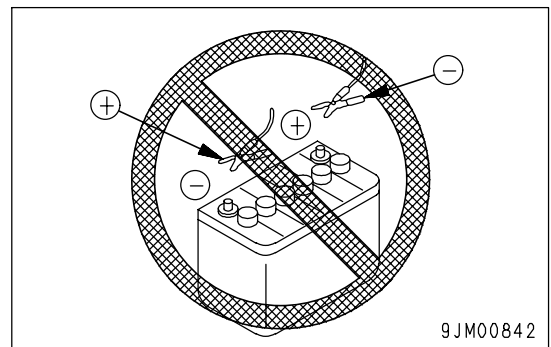
PRECAUTIONS IN COLD AREAS

- 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 and cause the battery to explode. Before charging or starting the engine with a different power source, melt the battery electrolyte and check that there is no leakage of electrolyte before starting.

STARTING WITH BOOSTER CABLES

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.

- Always wear safety goggles and rubber gloves when starting the engine with booster cable.
- 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.
- 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 to the OFF position 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 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.
- For details of the starting procedure when using booster cables, see "STARTING ENGINE WITH BOOSTER CABLE (PAGE 3-170)" in the OPERATION section.



OPERATION

CHECKS BEFORE OPERATION

If the checks before starting are not carried out properly, the machine will be unable to display its full performance, and there is also danger that it may lead to serious personal injury or death.

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

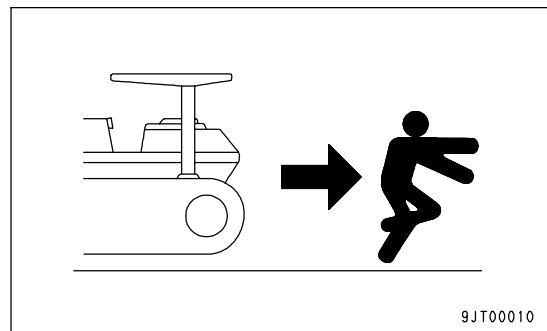
- Always wear the seatbelt. There is danger that you may be thrown out of the operator's seat and suffer serious injury when the brakes are applied suddenly.
- Check the operation of travel, steering and brake systems, and work equipment control system.
- Check for any problem in the sound of the machine, vibration, heat, smell, or gauges; check also that there is no leakage of oil or fuel.
- If any problem is found, carry out repairs immediately.



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PRECAUTIONS WHEN TRAVELING IN FORWARD OR REVERSE

- Lock the cab door and windows securely, both when they are open and when they are closed.
- Do not allow anyone apart from the operator to ride on the machine.
- If there are any persons in the area around the machine, there is danger that they may be hit or caught by the machine, and this may lead to serious personal injury or death. Always observe the following before traveling.
 - Always operate the machine only when seated.
 - Before moving off, check again that there is no person or obstruction in the surrounding area.
 - Before moving, sound the horn to warn people in the surrounding area.
 - Check that the backup alarm (alarm buzzer when machine travels in reverse) works properly.
 - If there is an area to the rear of the machine which cannot be seen, position a signalman.

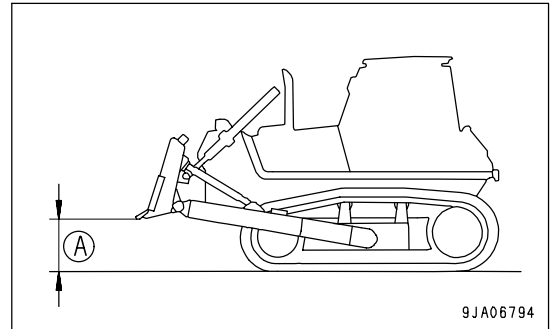


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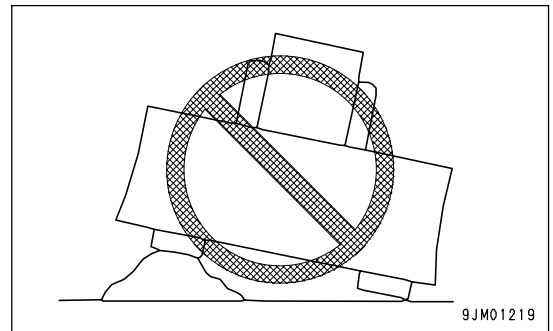
Always be sure to carry out the above precautions even when the machine is equipped with mirrors.

PRECAUTIONS WHEN TRAVELING

- Never turn the starting switch key to the OFF position when the machine is traveling. If the engine stops when the machine is traveling, it may become impossible to operate the steering, and this may cause serious personal injury or death. If the engine stops, depress the brake pedal immediately to stop the machine.
- 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 traveling the machine on a flat land, hold the work equipment at height (A) of 40 cm to 50 cm (16 in to 20 in) above the ground. If that height is not maintained between the work equipment and the ground, the work equipment may get stuck in the ground and tip over.



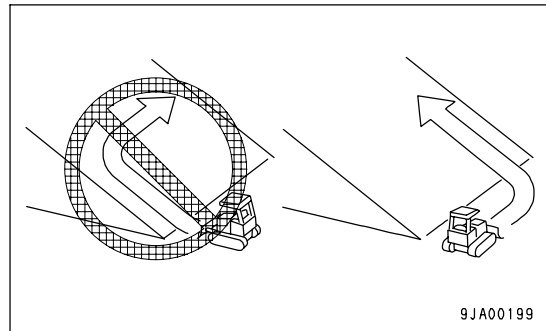
- Avoid traveling over obstacles when possible. If the machine has to travel over an obstacle, keep the work equipment close to the ground and travel at low speed. There is more danger of the machine tipping over to the left or right than tipping over to the front or rear, so do not travel over obstacles which make the machine tilt strongly to the left or right sides.
- 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.
- When using the machine, to prevent personal injury caused by damage to the work equipment or by the machine overturning due to overloading, do not exceed the permitted performance of the machine or the maximum permitted load for the structure of the machine.
- When passing over bridges or structures, check first that the structure is strong enough to support the weight of the machine.
- 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 machine body or work equipment hit anything.



TRAVELING ON SLOPES

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

- Keep the work equipment approx. 20 to 30 cm (8 to 12 in) above the ground. In case of emergency, lower the work equipment to the ground immediately to help stop the machine.
- 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.
- When traveling downhill, never shift gear or place the transmission at neutral. It is dangerous not to use the braking force of the engine. Always place the transmission in a low gear before starting to travel downhill.
- Depress the brake or use the braking effect of the engine as necessary.



PRECAUTIONS WHEN OPERATING

- When using the machine, to prevent personal injury caused by damage to the work equipment or by the machine overturning due to overloading, do not exceed the permitted performance of the machine or the maximum permitted load for the structure of the machine.
- Be careful not to approach too close to the edge of cliffs. When making embankments or landfills, or when dropping soil over a cliff, dump one pile, then use the next pile of soil to push the first pile.
- The load suddenly becomes lighter when the soil is pushed over a cliff or when the machine reaches the top of a slope. When this happens, there is danger that the travel speed will suddenly increase, so be sure to reduce the speed.
- If the machine moves with only either side of the blade loaded, its tail may swing. Take care.

METHOD OF USING BRAKES

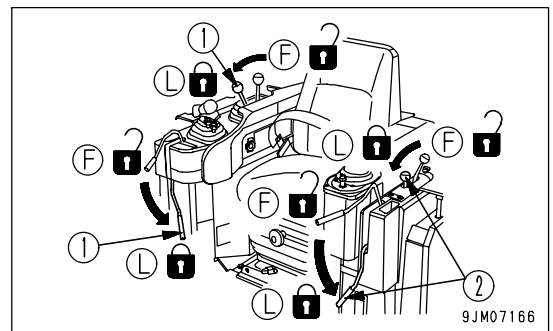
- When the machine is traveling, do not rest your foot on the brake pedal. If you travel with your foot resting on the pedal, the brake will always be applied, and this will cause the brakes to overheat and fail.
- Do not depress the brake pedal repeatedly if not necessary.
- When traveling downhill,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

TRAVELING ON SNOW-COVERED OR FROZEN SURFACES

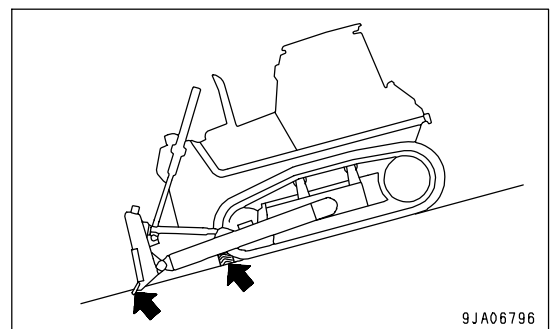
- Snow-covered or frozen surfaces are slippery, so be extremely careful when traveling or operating the machine, and do not operate the levers suddenly. Even a slight slope may cause the machine to slip, so be particularly careful when working on slopes.
- With frozen ground surfaces, the ground becomes soft when the temperature rises, and this may cause the machine to tip over or make it impossible for the machine to escape.
- 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 foot brake 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 work equipment to the ground to stop the machine.

PARKING MACHINE

- Park the machine on firm, level ground.
- Select a place where there is no hazard of landslides, falling rocks, or flooding.
- Lower the work equipment completely to the ground.
- When leaving the machine, set work equipment lock lever (1) to the LOCK position and parking brake lever (2) to the LOCK position (L), and stop the engine.
- Always close the operator's cab door, and use the key to lock all the equipment in order to prevent any unauthorized person from moving the machine. Always remove the key, take it with you, and leave it in the specified place.



- If it is necessary to park the machine on a slope, always do as follows.
 - Set the work equipment on the downhill side and dig it into the ground.
 - In addition, put blocks under the tracks to prevent the machine from moving.



TRANSPORTATION

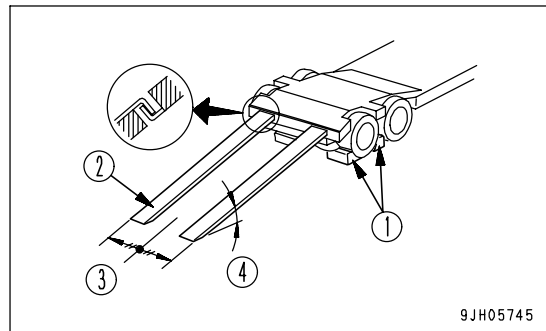
When the machine is transported on a trailer, there is danger of serious personal injury or death during transportation. Always do as follows.

- Always check the machine dimensions carefully. Depending on the work equipment installed, the machine weight, transportation height, and overall length may differ.
- Check beforehand that all bridges and other structures on the transportation route are strong enough to withstand the combined weight of the transporter and the machine being transported.
- The machine can be divided into parts for transportation, so when transporting the machine, please contact your Komatsu distributor to have the work carried out.

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, be extremely careful since the ramp surface is slippery.
 - Run the engine at low idling and drive the machine slowly at low speed.
 - 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 boarding the machine. If this is not done, the door may suddenly open during transportation.
- Refer to "TRANSPORTATION (PAGE 3-156)".



(1) Blocks
 (2) Ramp
 (3) Centerline of trailer
 (4) Angle of ramps: Max. 15°

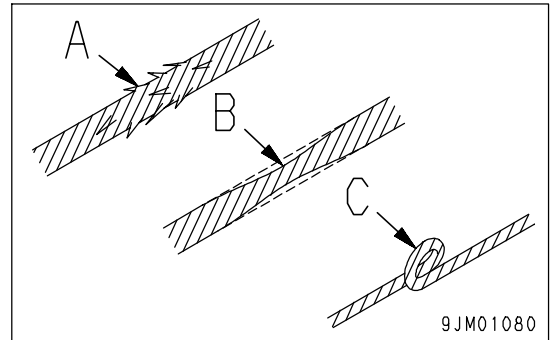
TOWING

PRECAUTIONS WHEN TOWING

Always use the correct towing equipment and towing method. Any mistake in the selection of the wire rope or towing bar or in the method of towing a disabled machine may lead to serious personal injury or death.

For details of the procedure for towing, see the "METHOD OF TOWING MACHINE (PAGE 3-167)"

- Always confirm that the wire rope or drawbar used for towing has ample strength for the weight of the machine being towed.
- Never use a wire rope which has cut strands (A), reduced diameter (B), or kinks (C). There is danger that the rope may break during the towing operation.
- Always wear leather gloves when handling wire rope.
- Never tow a machine on a slope.
- During the towing operation, never stand between the towing machine and the machine being towed.



PRECAUTIONS FOR MAINTENANCE

PRECAUTIONS BEFORE STARTING INSPECTION AND MAINTENANCE

DISPLAY WARNING TAG DURING INSPECTION AND MAINTENANCE

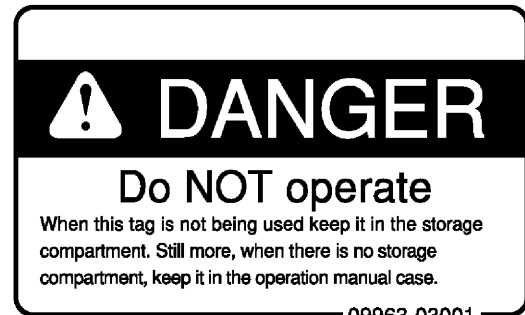
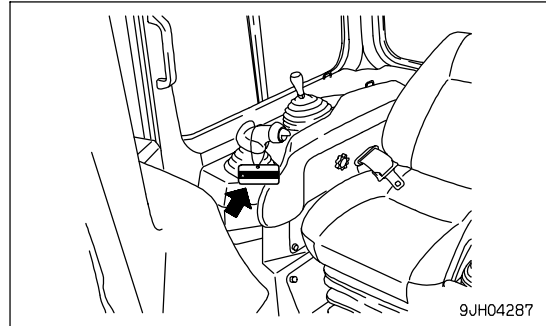
Always display the "DANGER! Do NOT operate" warning tag during the inspection and maintenance. If there is any "DANGER! Do NOT operate!" warning tag displayed, it means that someone is carrying out inspection and maintenance of the machine. If the warning sign is ignored and the machine is operated, there is danger that the person carrying out inspection or maintenance may be caught in the rotating parts or moving parts and suffer serious personal injury or death. Do not start the engine or touch the levers.

- If necessary, put up signs around the machine also.

Warning tag part number: 09963-03001

When not using this warning tag, keep it in the toolbox.

If there is no toolbox, keep it in the pocket for the Operation and Maintenance Manual



KEEP WORKPLACE 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.

SELECT SUITABLE PLACE FOR INSPECTION AND MAINTENANCE

- Stop the machine on firm, level ground.
- Select a place where there is no hazard of landslides, falling rocks, or flooding.

ONLY AUTHORIZED PERSONNEL

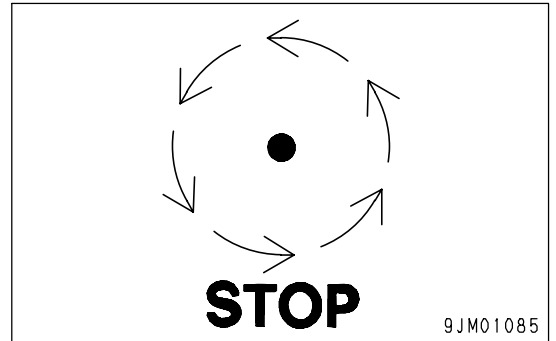
Do not allow any unauthorized personnel into the area when servicing the machine. If necessary, employ a guard.

APPOINT LEADER WHEN WORKING WITH OTHERS

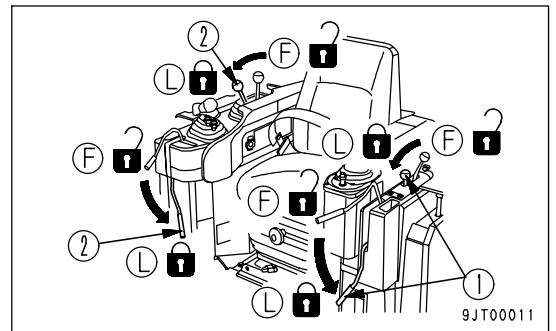
When repairing the machine or when removing and installing the work equipment, appoint a leader and follow his instructions during the operation.

STOP ENGINE BEFORE CARRYING OUT INSPECTION AND MAINTENANCE

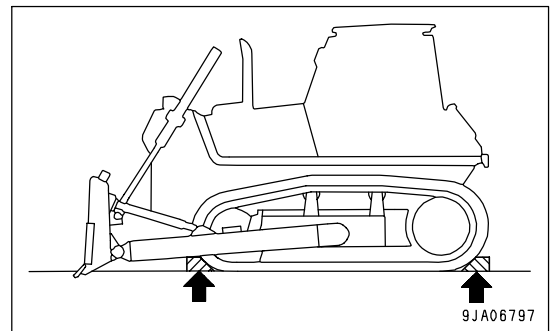
- Lower the work equipment completely to the ground and stop the engine before performing any inspection and maintenance.



- Turn the starting switch to the ON position, operate the work equipment control lever to the RAISE and LOWER position 2 or 3 times repeatedly to release the remaining pressure in the hydraulic circuit, then set parking brake lever (1) and work equipment lock lever (2) to the LOCK position (L).



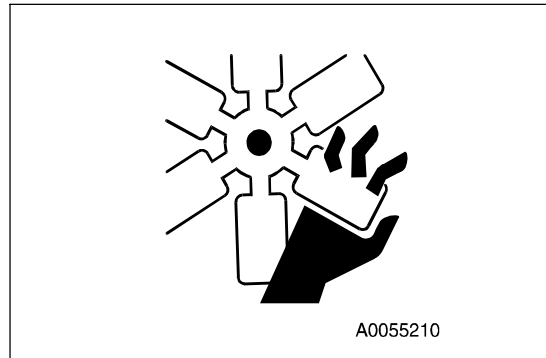
- Put blocks under the track to prevent the machine from moving.



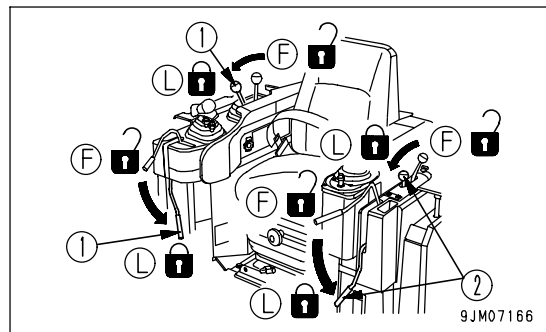
TWO WORKERS FOR MAINTENANCE WHEN ENGINE IS RUNNING

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

- One worker must always sit in the operator’s seat and be ready to stop the engine at any time. All workers must maintain contact with the other workers.
- When carrying out operations near the fan, fan belt, or other rotating parts, there is a hazard of being caught in the parts, so be careful not to come close.
- Never drop or insert tools or other objects into the fan, fan belt, or other rotating parts. There is danger that they may contact the rotating parts and break or be sent flying.



- Set work equipment lock lever (1) and parking brake lever (2) to the LOCK position (L) to prevent the work equipment from moving.
- Do not touch any control levers. If any control lever must be operated, give a signal to the other workers to warn them to move to a safe place.



INSTALLING, REMOVING, OR STORING 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.

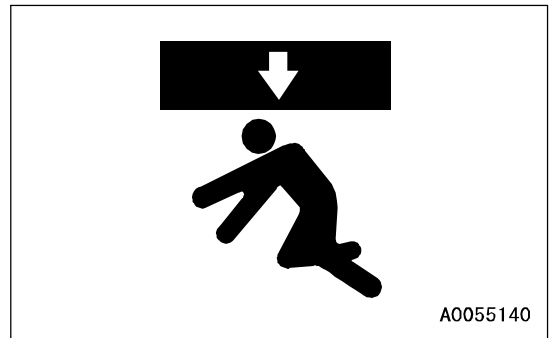


PRECAUTIONS WHEN WORKING AT HIGH PLACES

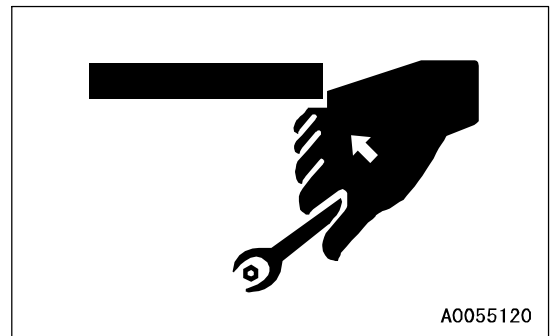
When working at high places, use a step ladder or other stand to ensure that the work can be carried out safely.

PRECAUTIONS WHEN WORKING UNDER MACHINE OR WORK EQUIPMENT

- Make sure the hoists or jacks you use are in good repair and strong enough to handle the weight of the component. Never use jacks at places where the machine is damaged, bent, or twisted. Never use frayed, twisted or pinched wire rope. Never use bent or distorted hooks.
- It is extremely dangerous to work under the machine if the track shoes are lifted off the ground and the machine is supported only with the work equipment. If any of the control levers is touched by accident, or there is damage occurring to the hydraulic piping, the work equipment or the machine will suddenly drop. This is extremely dangerous. Never work under the work equipment or the machine.
- If it is necessary to raise the work equipment or the machine and then go under it to carry out inspection or maintenance, support the work equipment and machine securely with blocks and stands strong enough to support the weight of the work equipment and machine.
If the work equipment and machine are not supported, there is a hazard that they may come down and that this may lead to serious personal injury or death.
- Never use concrete blocks for supports. They can collapse under even light loads.

**PROPER TOOLS**

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



PRECAUTIONS FOR INSPECTION AND MAINTENANCE

PRECAUTIONS WHEN WELDING

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

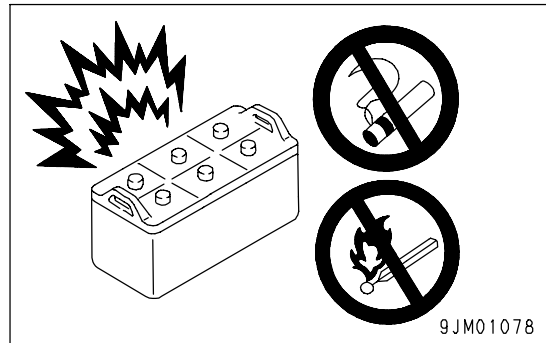
HANDLING BATTERY

Before inspecting or handling the battery, turn the key in the starting switch to the OFF position.

- **Danger of battery exploding**

When the battery is being charged, flammable hydrogen gas is generated and may explode. In addition, the battery electrolyte includes dilute sulphuric acid. Any mistake in handling may cause serious personal injury, explosion, or fire, so always observe the following.

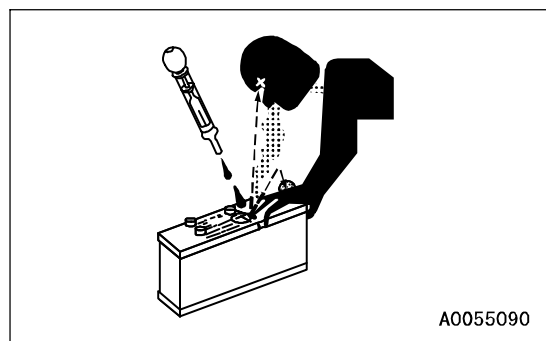
- Do not use or charge the battery if the battery electrolyte is below the LOWER LEVEL mark. This will cause explosion. Always carry out periodic inspection of the battery electrolyte level, and add distilled water (or commercially available battery filler solution) to the UPPER LEVEL mark.
- Do not smoke or bring any flame close to the battery.
- Hydrogen gas is generated when the battery is being charged, so remove the battery from the machine, take it to a well-ventilated place, remove the battery caps, then carry out the charging.
- After charging, tighten the battery caps securely.



- **Danger from dilute sulphuric acid**

When the battery is being charged, flammable hydrogen gas is generated and may explode. In addition, the battery electrolyte includes dilute sulphuric acid. Any mistake in handling may cause serious personal injury, explosion, or fire, so always observe the following.

- When handling the battery, always wear protective goggles and rubber gloves.
- If battery electrolyte gets into your eyes, immediately wash your eyes with large amounts of fresh water. After that, get medical attention immediately.
- If battery electrolyte gets on your clothes or skin, wash it off immediately with large amounts of water.



- **Removing battery cables**

Before repairing the electrical system or carrying out electric welding, turn the starting switch OFF. Wait for approx. 1 minute, then remove the negative (-) battery cable to stop the flow of electricity.

- **Danger of sparks**

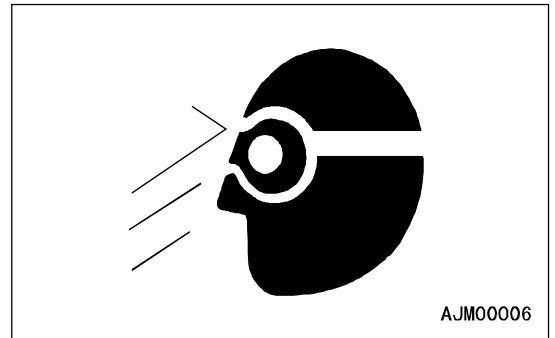
There is hazard that sparks will be generated, so always observe the following.

- Do not let tools or other metal objects make any contact between the battery cables. Do not leave tools lying around near the battery.
- When removing the battery cables, remove the ground cable (negative (-) cable) first. When installing, connect the positive (+) cable first, then connect the ground. Tighten the battery cable terminals securely.
- Secure the battery firmly in the specified position.

PRECAUTIONS WHEN USING HAMMER

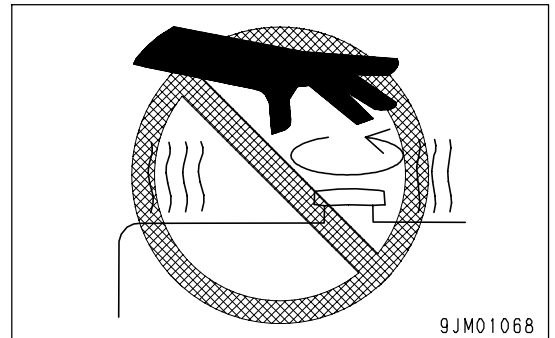
When using a hammer, pins may fly out or metal particles may be scattered. This may lead to serious personal injury or death. Always do as follows.

- When hitting pins or bucket teeth, 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 hard metal parts such as pins, bucket teeth, cutting edges, or bearings are hit with a hammer, there is a hazard that pieces might be scattered and cause serious personal injury or death. Always wear safety glasses and gloves.
- If the pin is hit with strong force, there is a hazard that it may fly out and injure people in the surrounding area. Do not allow anyone to enter the surrounding area.



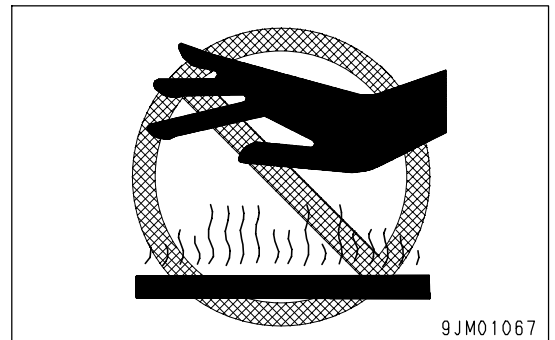
PRECAUTIONS WITH HIGH-TEMPERATURE COOLANT

To prevent burns from boiling water or steam spurting out when checking or draining the coolant, wait for the coolant to cool down to a temperature where the radiator cap can be touched by hand. Then loosen the cap slowly to release the pressure inside the radiator, and remove the cap.



PRECAUTIONS WITH HIGH-TEMPERATURE OIL

To prevent burns from hot oil spurting out or from touching high-temperature parts when checking or draining the oil, wait for the oil to cool down to a temperature where the cap or plug can be touched by hand. Then loosen the cap or plug slowly to release the internal pressure and remove the cap or plug.



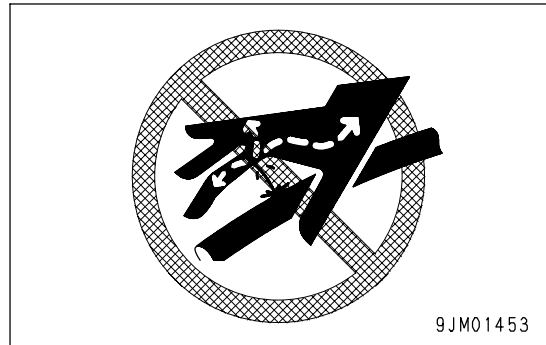
PRECAUTIONS WITH HIGH-PRESSURE OIL

The hydraulic system is always under internal pressure. In addition, the fuel piping is also under internal pressure when the engine is running and immediately after the engine is stopped. When carrying out inspection or replacement of the piping or hoses, check that the internal pressure in the circuit has been released. If this is not done, it may lead to serious personal injury or death. Always do as follows.

- Do not carry out inspection or replacement operations when the system is still under pressure.
For details of the procedure for releasing the pressure, see "PROCEDURE FOR BLEEDING AIR IN HYDRAULIC SYSTEM (PAGE 4-44)".
- 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 loss of sight if it contacts your skin or 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 HIGH-PRESSURE FUEL**

When the engine is running, high-pressure is generated in the engine fuel piping. When carrying out inspection or maintenance of the fuel piping system, stop the engine and wait for at least 30 seconds to allow the internal pressure to go down before starting the operation.

HANDLING HIGH-PRESSURE HOSES AND PIPING

- If oil or fuel leaks from high-pressure hoses or piping, it may cause fire or misoperation, and lead to serious personal injury, or death. If the hose or piping mounts are loose or oil or fuel is found to be leaking from the mount, stop operations and tighten to the specified torque.

If any damaged or deformed hoses or piping are found, please consult your Komatsu distributor.

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

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

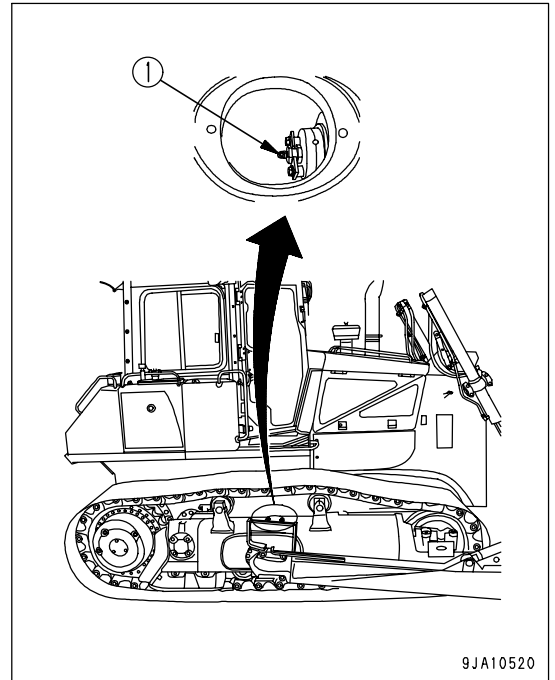
NOISE

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.

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

PRECAUTIONS WITH HIGH-PRESSURE GREASE WHEN ADJUSTING 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**

Never disassemble the recoil spring assembly. The recoil spring assembly has a powerful spring that acts to reduce the impact on the idler. If it is disassembled by mistake, the spring may shoot out and cause serious personal injury or death.

It is necessary to disassemble the recoil spring assembly, always ask your Komatsu distributor to carry out the operation.

HANDLING ACCUMULATOR AND GAS SPRING

This machine is equipped with an accumulator. Even after the engine stops, if the work equipment control lever is operated soon after stop of the engine in the direction to lower the work equipment, the work equipment goes down under its own weight.

After stopping the engine, set the parking brake lever and the work equipment lock lever to the LOCK position. The accumulator and gas spring are charged with high-pressure nitrogen gas. If the accumulator is handled mistakenly, it may cause an explosion that could lead to serious personal injury or death. For this reason, always observe the following precautions.

- Do not disassemble the accumulator.
- Do not bring it near flame or dispose of it in fire.
- Do not make holes in it, weld it, or use a cutting torch.
- Do not hit or roll the accumulator, or subject it to any impact.
- When disposing of the accumulator, the gas must be released. Please contact your Komatsu distributor to have this work performed.



PRECAUTIONS WITH COMPRESSED AIR

- When carrying out cleaning with compressed air, there is a hazard of serious personal injury caused by flying dust or particles.
- When using compressed air to clean the filter element or radiator, wear safety glasses, anti-dust mask, gloves, and other protective equipment.

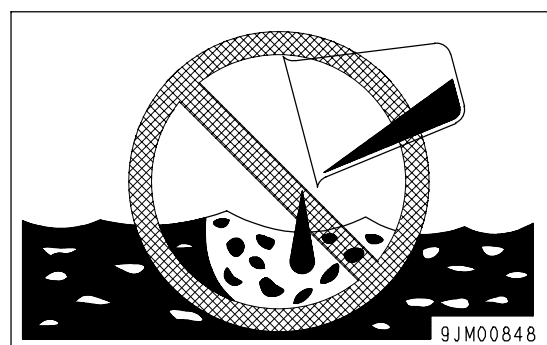
MAINTENANCE OF AIR CONDITIONER

- If air conditioner refrigerant gets into your eyes, it may cause loss of sight; if it contacts your skin, it may cause frostbite. Never loosen any parts of the cooling circuit.

DISPOSING OF WASTE MATERIALS

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.



METHOD OF SELECTING WINDOW WASHER FLUID

Use an ethyl alcohol base washer liquid.

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

PERIODIC REPLACEMENT OF SAFETY CRITICAL PARTS

- To enable this machine to be used safely for a long period, always carry out periodic replacement of safety critical parts that have a particularly close relation to safety, such as hoses and the seatbelt.
For details of the 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 personal injury or death. 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 specified replacement time.

OPERATION

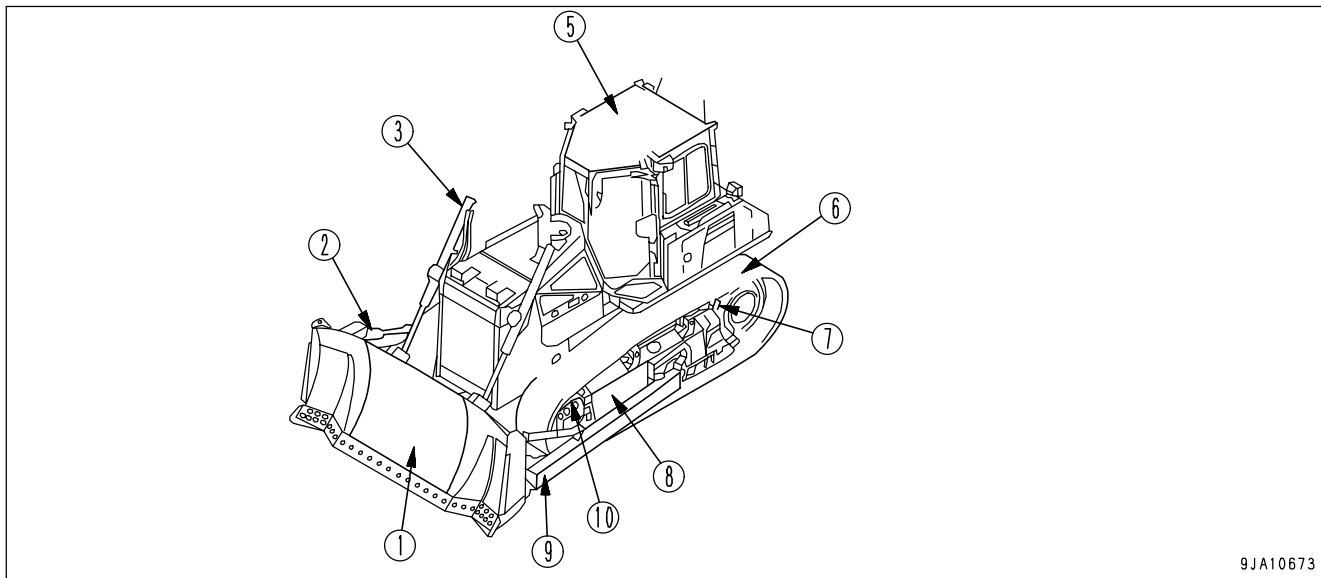
 **WARNING**

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

GENERAL VIEW

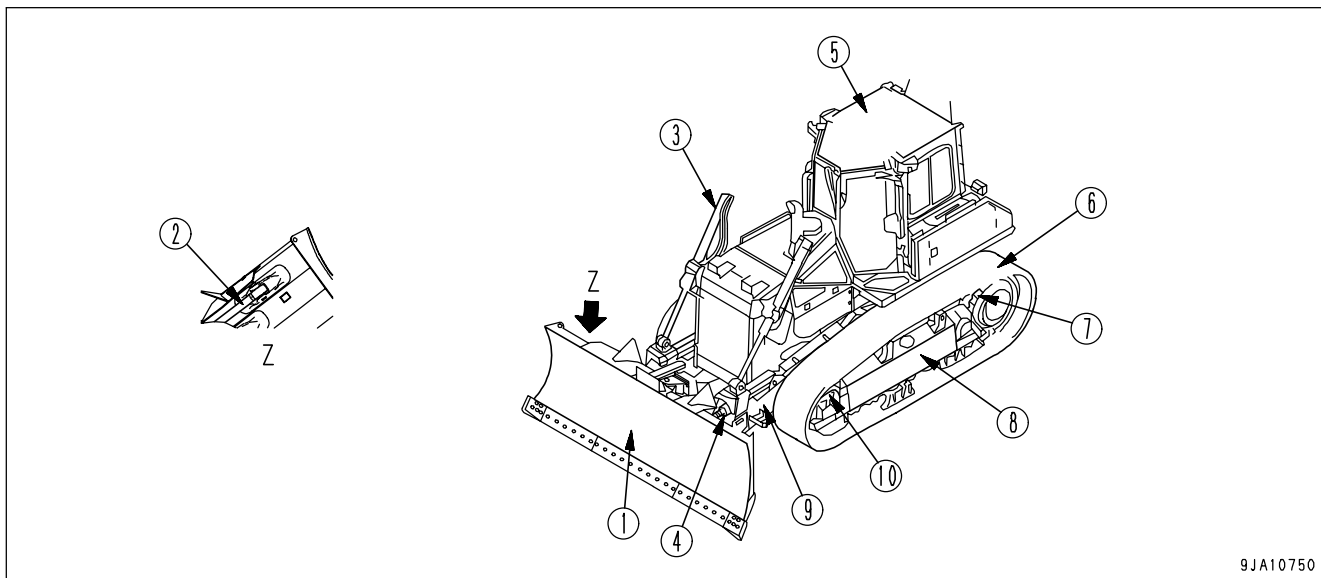
GENERAL VIEW OF MACHINE

- Sigma dozer



9JA10673

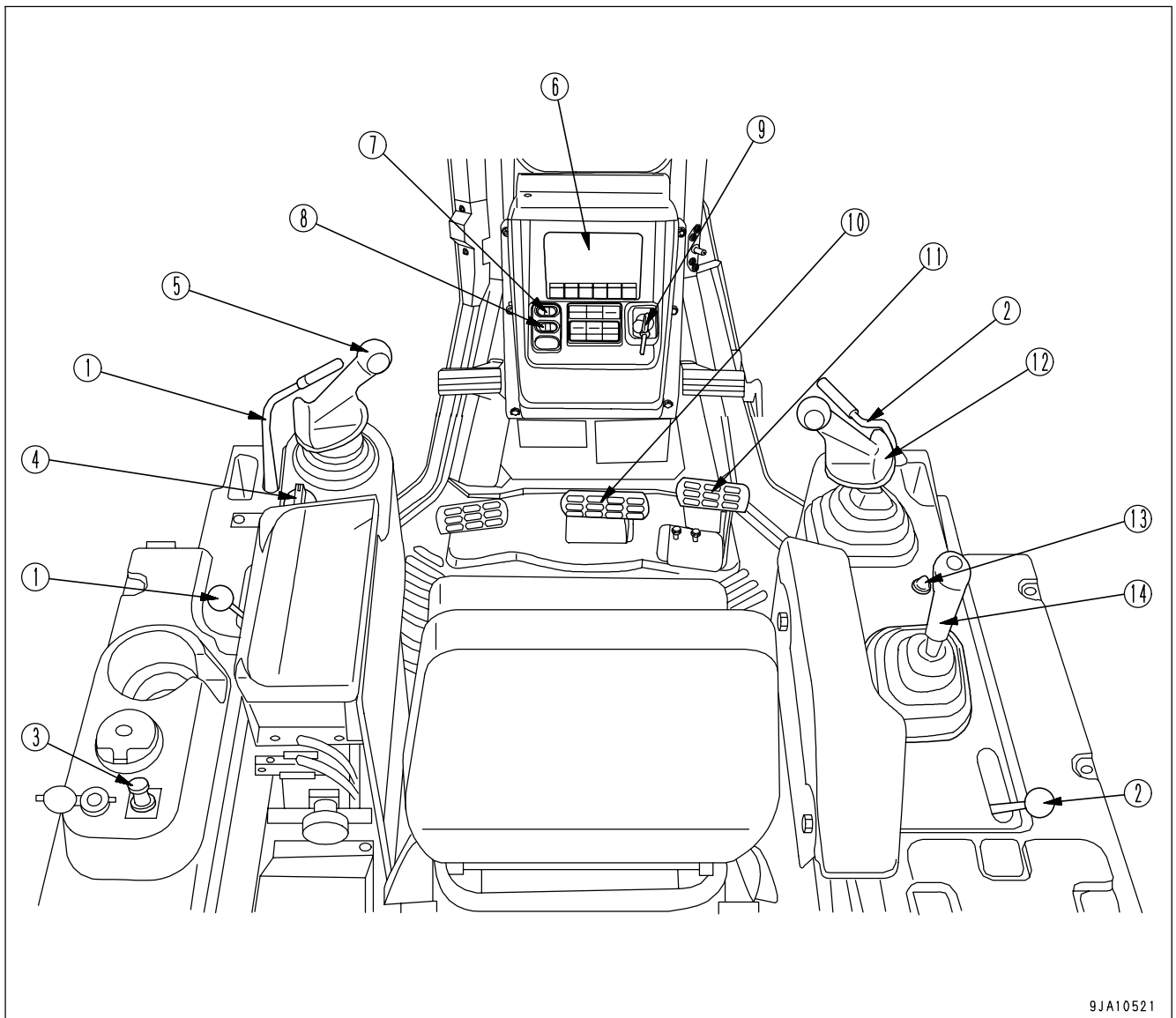
- Power angle power tilt dozer



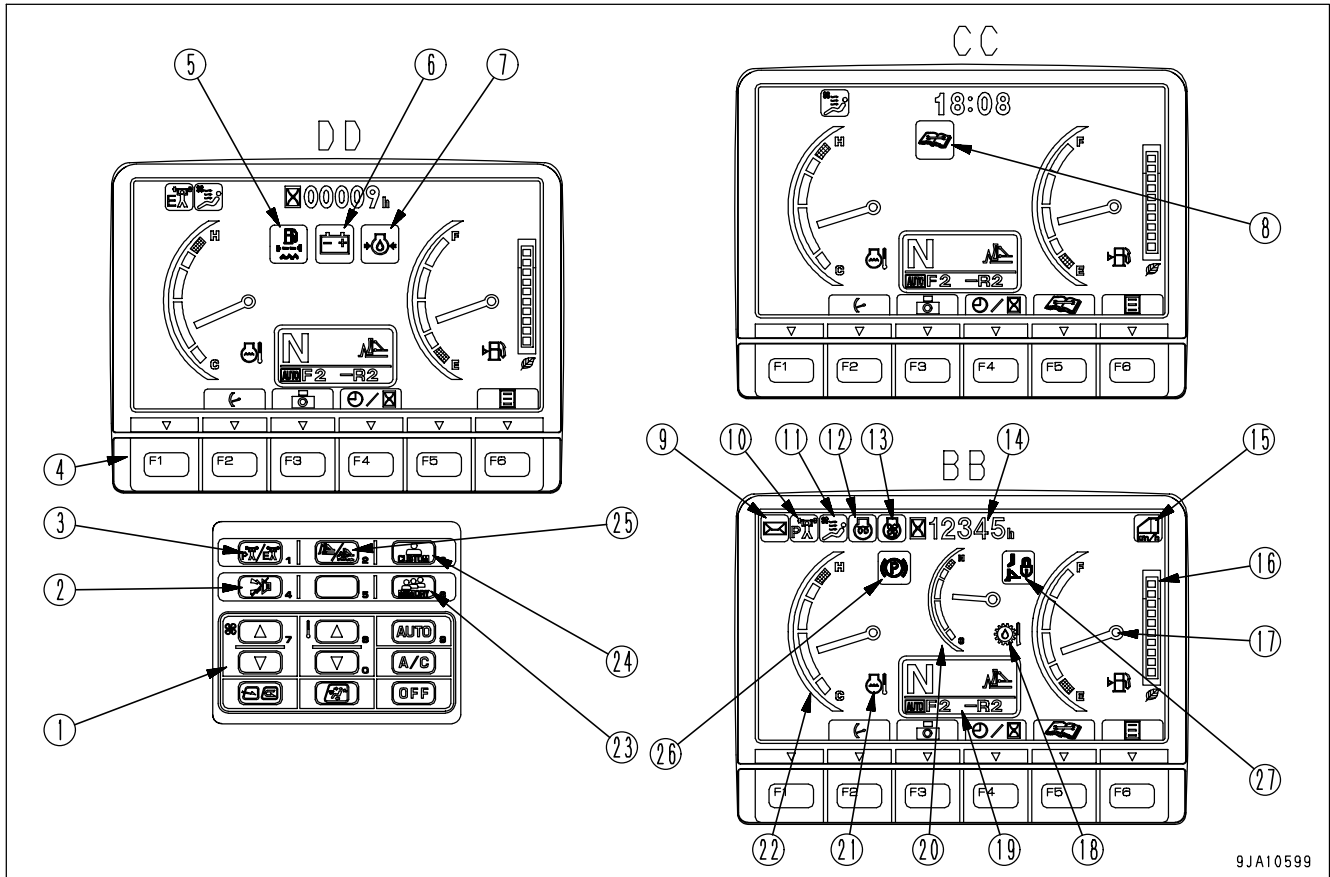
9JA10750

- | | |
|--------------------------|-----------------|
| (1) Blade | (6) Track shoe |
| (2) Blade tilt cylinder | (7) Sprocket |
| (3) Blade lift cylinder | (8) Track frame |
| (4) Blade angle cylinder | (9) Frame |
| (5) ROPS cab | (10) Idler |

GENERAL VIEW OF CONTROLS AND GAUGES



- | | |
|---|---|
| (1) Parking brake lever | (8) Rear lamp switch |
| (2) Work equipment lock lever | (9) Starting switch |
| (3) Cigarette lighter | (10) Brake pedal |
| (4) Fuel control dial | (11) Deceleration pedal |
| (5) Steering, forward-reverse, gear shift lever | (12) Blade control lever |
| (6) Machine monitor | (13) Horn switch |
| (7) Front lamp switch | (14) Ripper control lever (if equipped) |



9JA10599

DD: Check before starting screen
 BB: Screen with all lamps lit up
 CC: Maintenance time warning screen

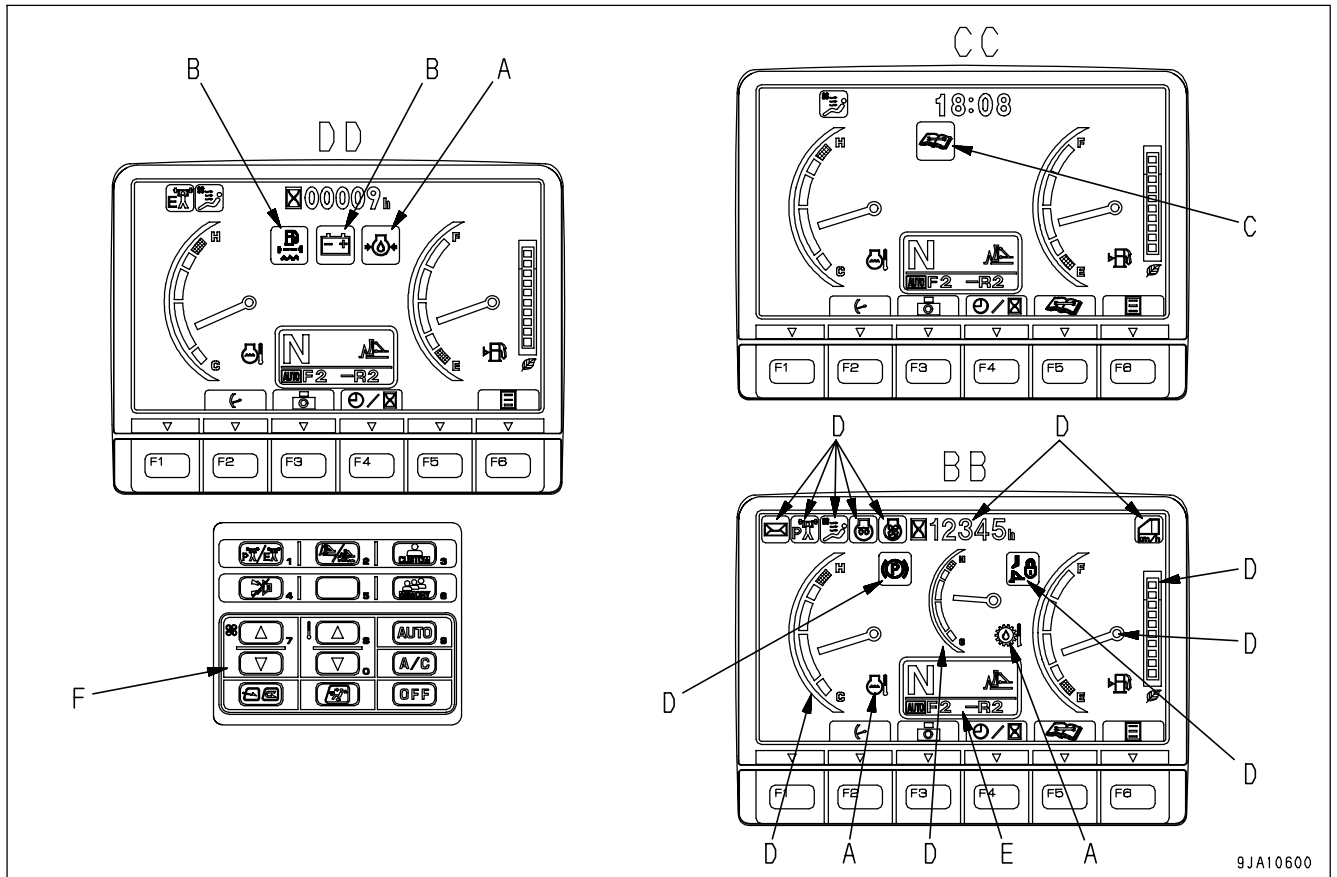
- | | |
|------------------------------------|---|
| (1) Air conditioner switch | (15) Reverse slow mode monitor |
| (2) Buzzer cancel switch | (16) ECO indicator |
| (3) Operating mode selector switch | (17) Fuel gauge |
| (4) Function switch | (18) Power train oil temperature monitor,
hydraulic oil temperture monitor |
| (5) Water separator monitor | (19) Speed range display |
| (6) Charge level monitor | (20) Multi-gauge |
| (7) Engine oil pressure monitor | (21) Engine coolant temperature monitor |
| (8) Maintenance interval monitor | (22) Engine coolant temperature gauge |
| (9) Message monitor | (23) Customize memory switch |
| (10) Operation mode monitor | (24) Customize switch |
| (11) Air conditioner monitor | (25) Gear shift mode selector switch |
| (12) Engine pre-heating monitor | (26) Parking brake monitor |
| (13) Fan reverse monitor | (27) Work equipment lock monitor |
| (14) Service meter, clock | |

EXPLANATION OF COMPONENTS

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

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

MACHINE MONITOR



- DD: Check before starting screen
- BB: Screen with all lamps lighted up
- CC: Maintenance time warning screen

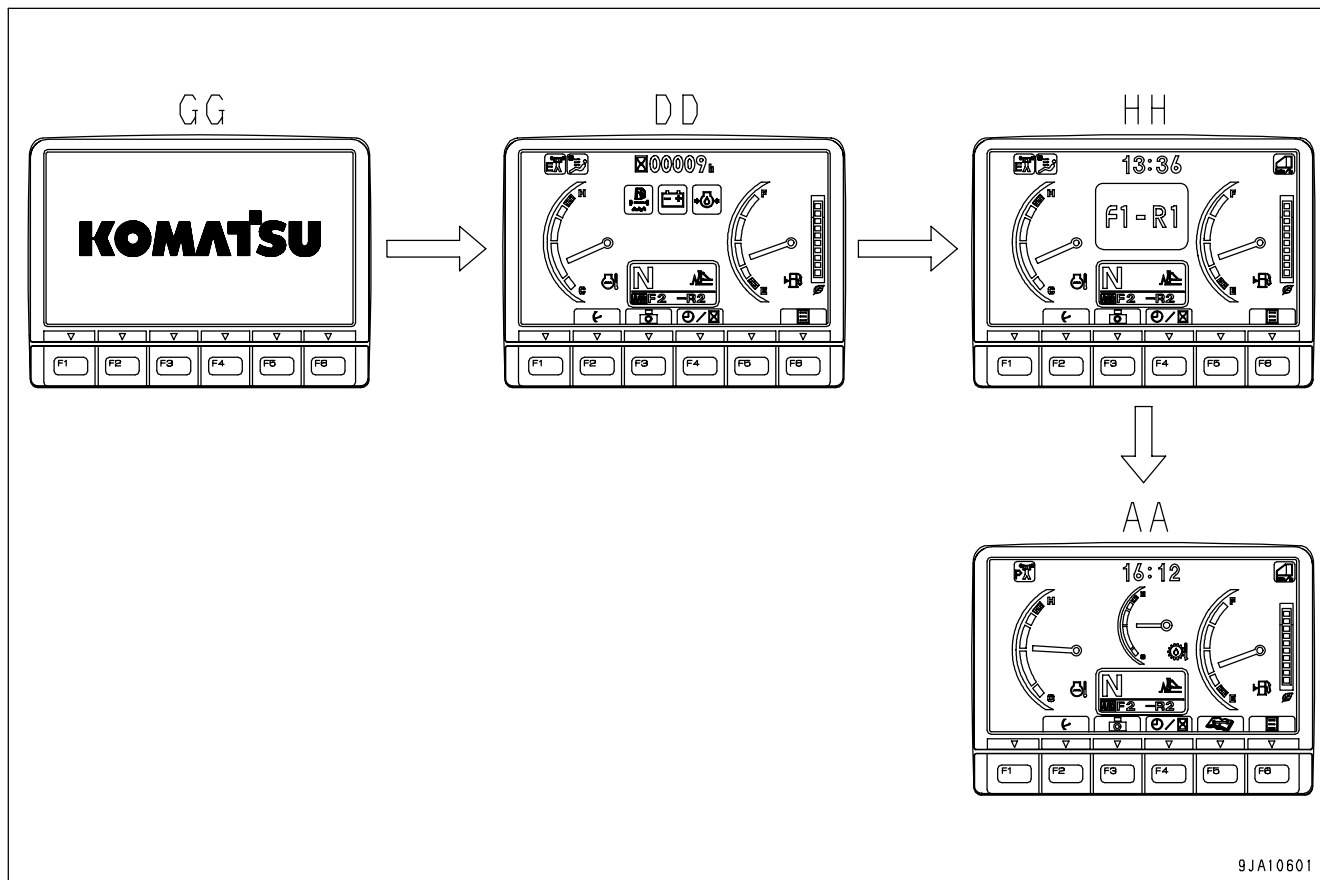
- | | |
|-------------------------|--------------------------|
| A: Emergency monitors | D: Meter display portion |
| B: Caution monitors | E: Speed range display |
| C: Basic check monitors | F: Monitor switches |

REMARK

One of the features of liquid crystal display panels is that there may be black spots (spots that do not light up) or white spots (spots that stay lighted up) on the screen. If there are fewer than 10 black or white spots, this is not a failure or a defect.

BASIC OPERATION OF MACHINE MONITOR

STARTING ENGINE WHEN SITUATION IS NORMAL

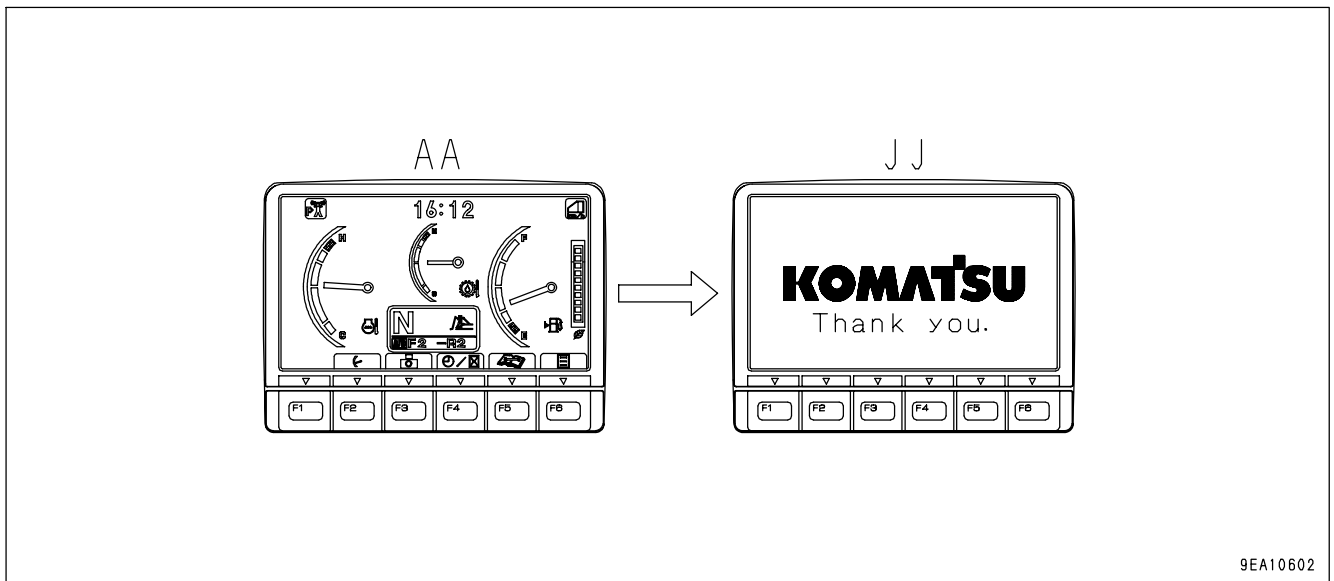


- When the starting switch is turned to the ON position, the opening screen GG is displayed.
- After the opening screen GG is displayed for 2 seconds, the screen switches to the check before starting screen DD.
- After the check before starting screen DD is displayed for 2 seconds, the screen switches to the mode display screen HH.
- After the mode display screen HH is displayed for 2 seconds, the screen switches to standard display screen AA.

REMARK

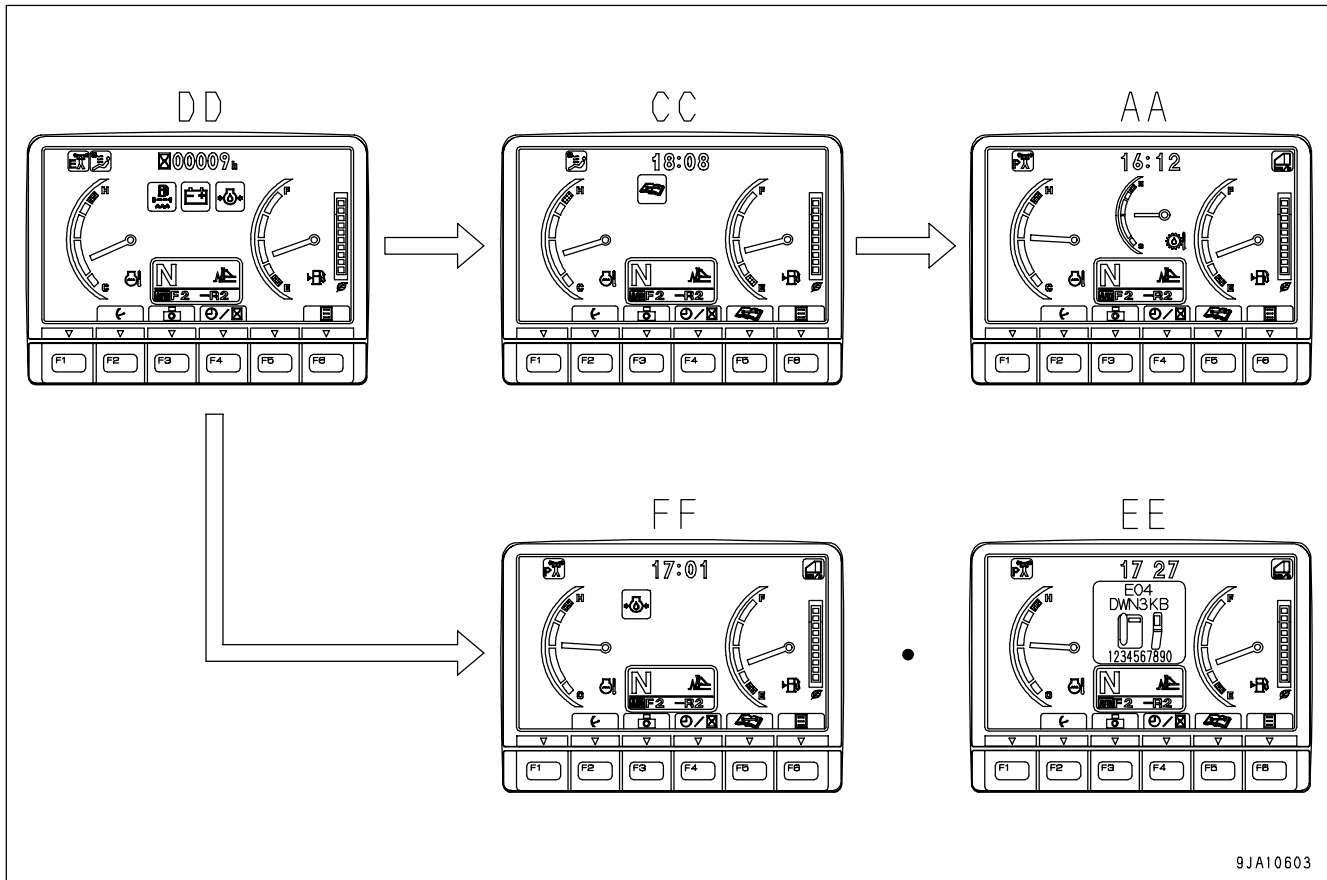
When the engine is started, the battery voltage may suddenly drop depending on the temperature and the battery condition. If this happens, the display on the machine monitor may momentarily go out, but this does not indicate any abnormality.

STOPPING ENGINE WHEN SITUATION IS NORMAL



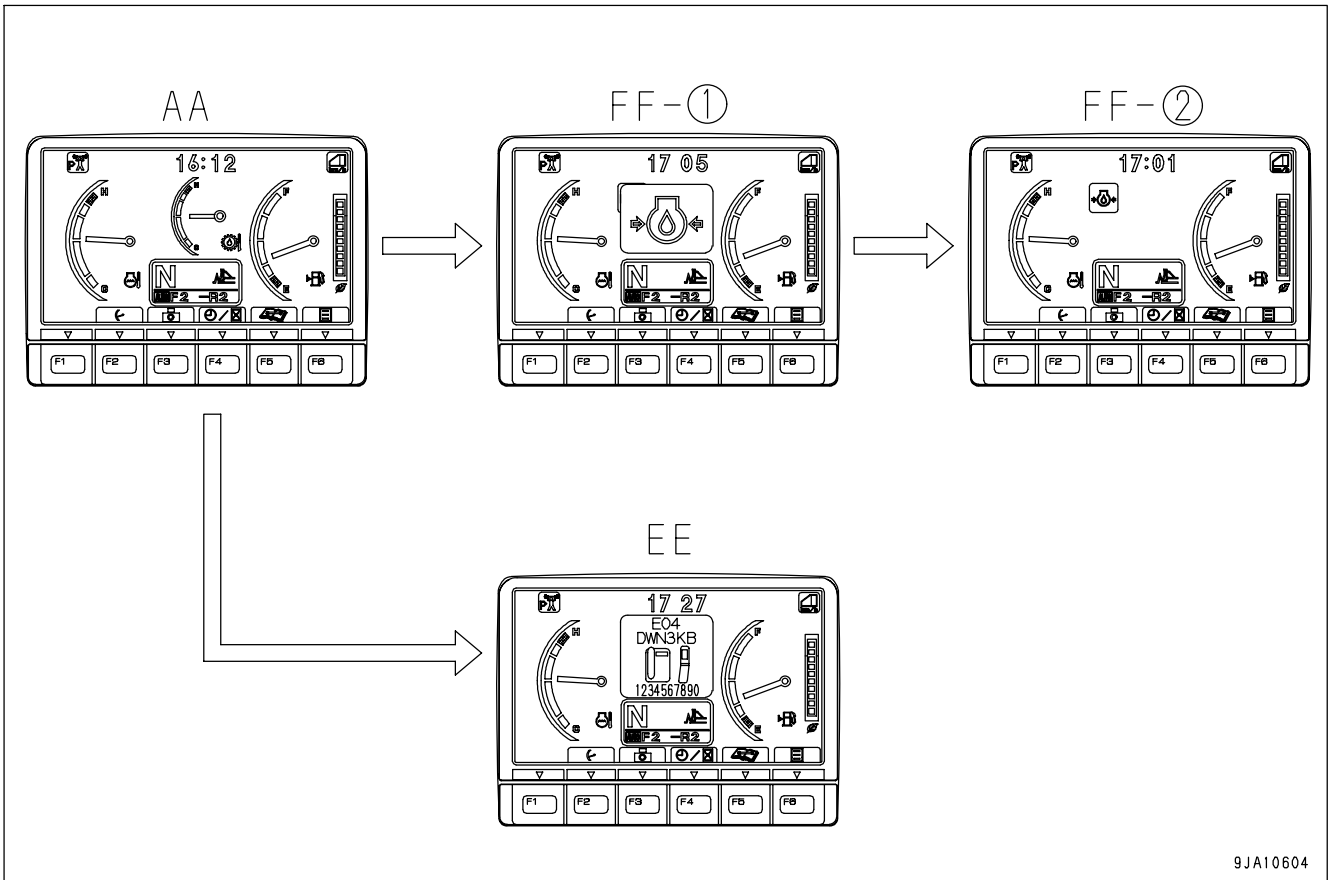
- When the starting switch is turned to the OFF position, ending screen JJ is displayed for 5 seconds, then the display goes out.

IF THERE IS ABNORMALITY WHEN STARTING SWITCH IS TURNED ON



- If there is any abnormality when the starting switch is turned ON, the check before starting screen DD changes to the maintenance interval warning screen CC, warning screen FF, or error screen EE.
- After displaying the check before starting screen DD for 2 seconds, the screen changes to the maintenance interval warning screen CC.
- After displaying the maintenance interval warning screen CC for 30 seconds, the screen returns to the standard screen AA.
- After displaying the check before starting screen DD for 2 seconds, the screen changes to the warning screen FF or error screen EE.

IF ANY ABNORMALITY OCCURS DURING OPERATION



9JA10604

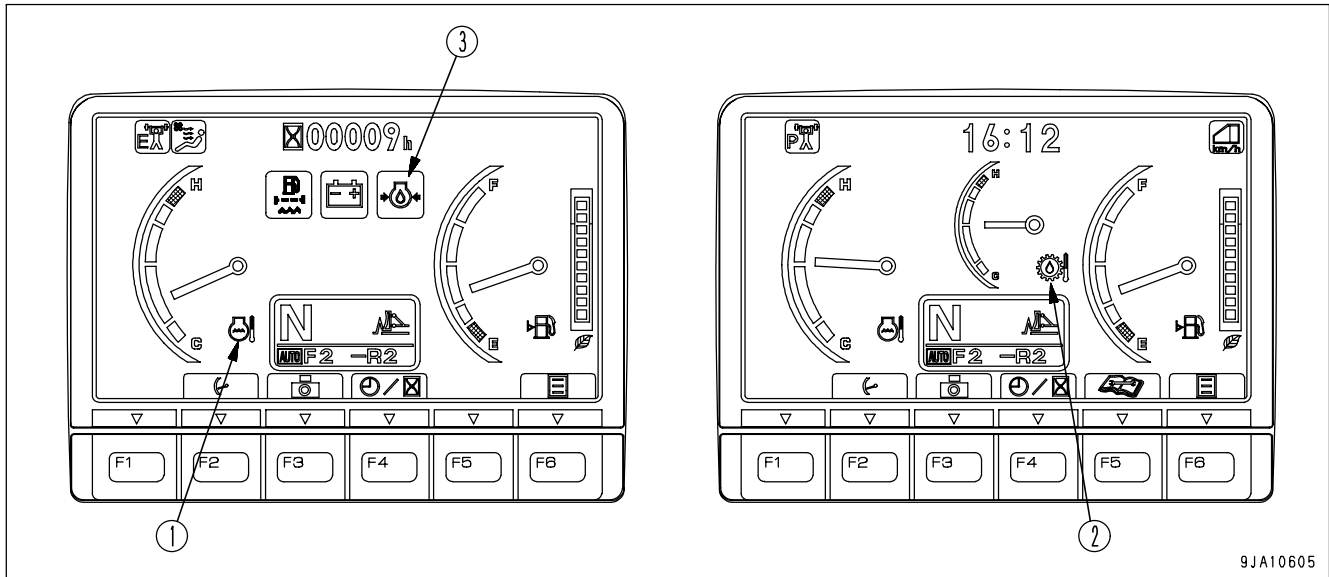
- If any abnormality occurs during operation, the standard screen AA changes to warning screen FF-(1) or the error screen EE.
- After displaying warning screen FF-(1) for 2 seconds, the screen automatically changes to warning screen FF-(2).

EMERGENCY MONITORS

CAUTION

If the monitor lights up red, stop the engine immediately or run at low idle, check applicable location, then perform necessary actions.

These items should be observed while the engine is running. If there is a problem, the monitor for the abnormal location lights up red and buzzer sounds, perform action immediately.



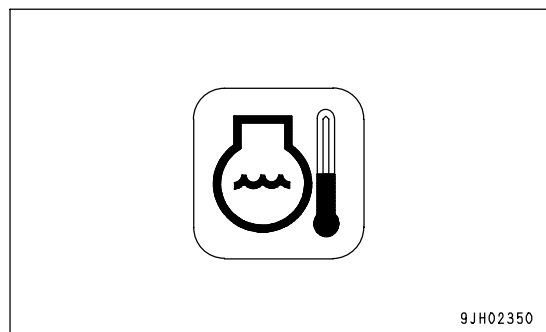
- (1) Engine coolant temperature monitor
- (2) Power train oil temperature monitor, hydraulic oil temperature monitor
- (3) Engine oil pressure monitor

ENGINE COOLANT TEMPERATURE MONITOR

Monitor (1) warns operator that the engine coolant temperature has risen.

If the engine coolant temperature becomes abnormally high, the monitor shows abnormal display. The overheat prevention system is automatically actuated and the engine output drops.

Stop operations and run the engine at low idling until monitor (1) shows normal display.



POWER TRAIN OIL TEMPERATURE MONITOR, HYDRAULIC OIL TEMPERATURE MONITOR

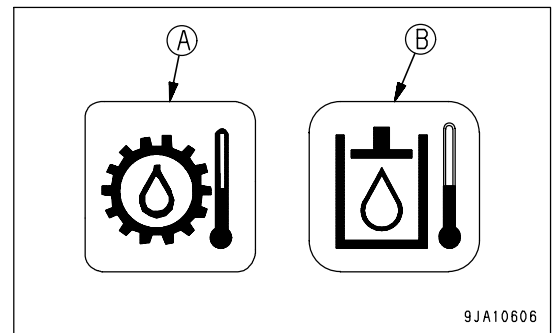
This monitor (2) warns of an abnormal rise of power train oil temperature (A) and hydraulic oil temperature (B). When the temperature becomes abnormally high, an abnormality symbol is displayed, the overheat prevention system operates, and the engine output lowers.

When the symbol appears, stop the work and idle the engine until the monitor returns to the normal symbol, or simply stop the engine.

With this monitor (2), the display can be switched as desired.

For details of the method of operation for switching the display, see "MULTI-GAUGE (PAGE 3-18)".

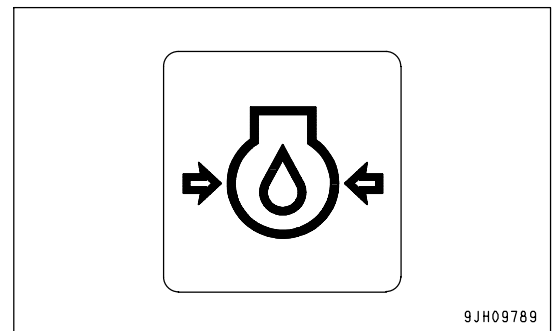
(The display can also be switched by pressing the "F2" key.)

**ENGINE OIL PRESSURE MONITOR**

Monitor (3) lights up red if the engine lubrication oil pressure goes below normal level. If monitor lights up red, stop the engine immediately, check the lubrication system and level of oil in the engine oil pan.

REMARK

The alarm buzzer sounds, when the starting switch is turned to ON immediately after the engine oil has been changed. It does not indicate a problem.



CAUTION MONITORS



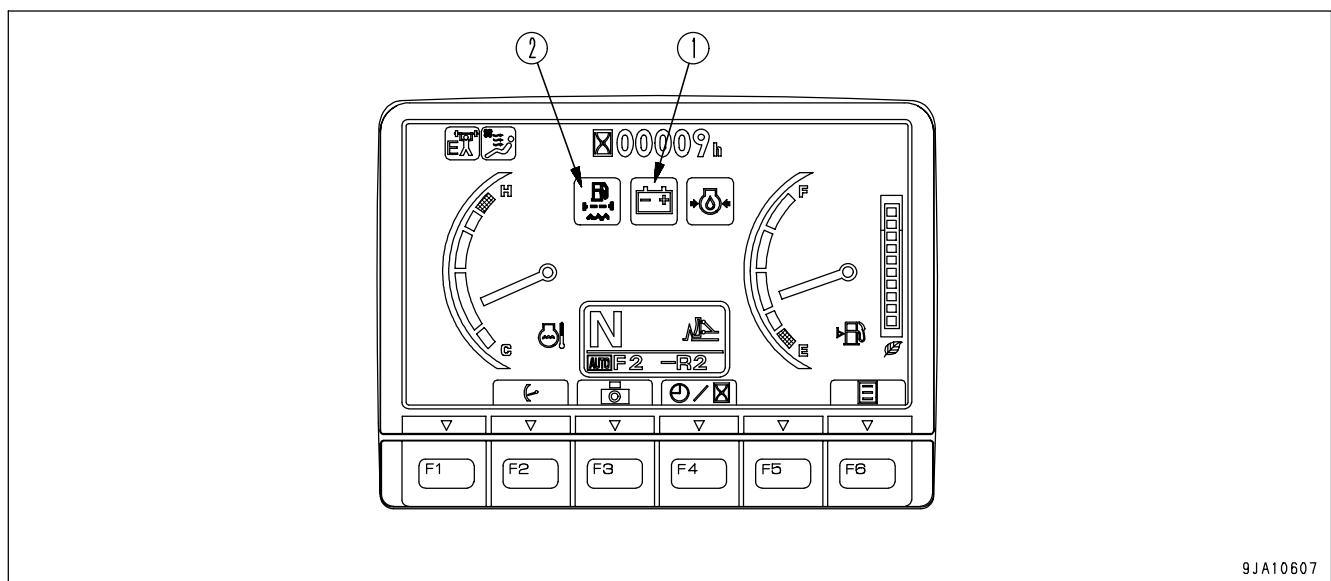
If the warning monitor lights up red, stop operations as soon as possible and perform inspection and maintenance of the applicable location. If the warning is ignored, it may lead to failure.

NOTICE

Stop the machine on level ground and check the monitor.

These are items that should be observed while the engine is running. If any abnormality occurs, the screen displays the item that needs immediate action.

If there is an abnormality, the monitor for the abnormal location lights up red.



9JA10607

(1) Charge level monitor

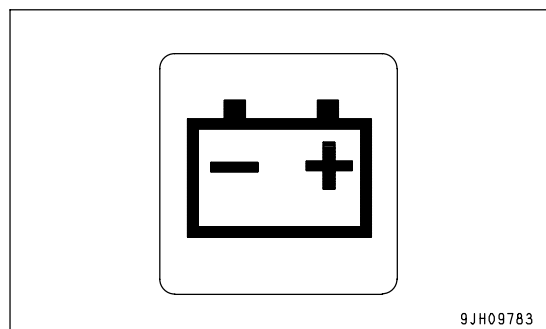
(2) Water separator monitor

CHARGE LEVEL MONITOR

Monitor (1) warns the operator of an abnormality in the charging system while the engine is running.

If the battery is not being charged properly while the engine is running, monitor lights up red.

If the red lamp lights up, check for looseness of the V-belt, and if there is any abnormality, see "OTHER TROUBLE (PAGE 3-172)".



9JH09783

WATER SEPARATOR MONITOR

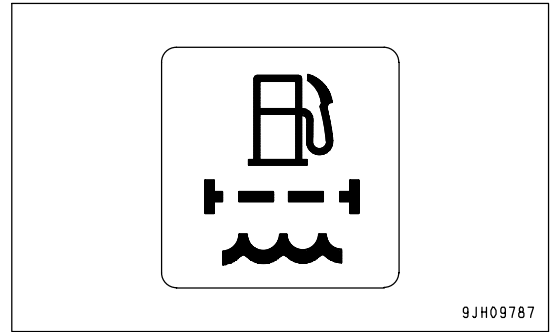
This monitor (2) warns the operator when water has accumulated inside the water separator.

If the red lamp lights up, stop the engine, then drain the water separator.

For details of the method of draining the water from the water separator, see "CHECK, DRAIN WATER SEPARATOR (PAGE 3-94)".

REMARK

The water separator forms one unit with the fuel pre-filter. It is at the bottom of the fuel pre-filter and can be removed.



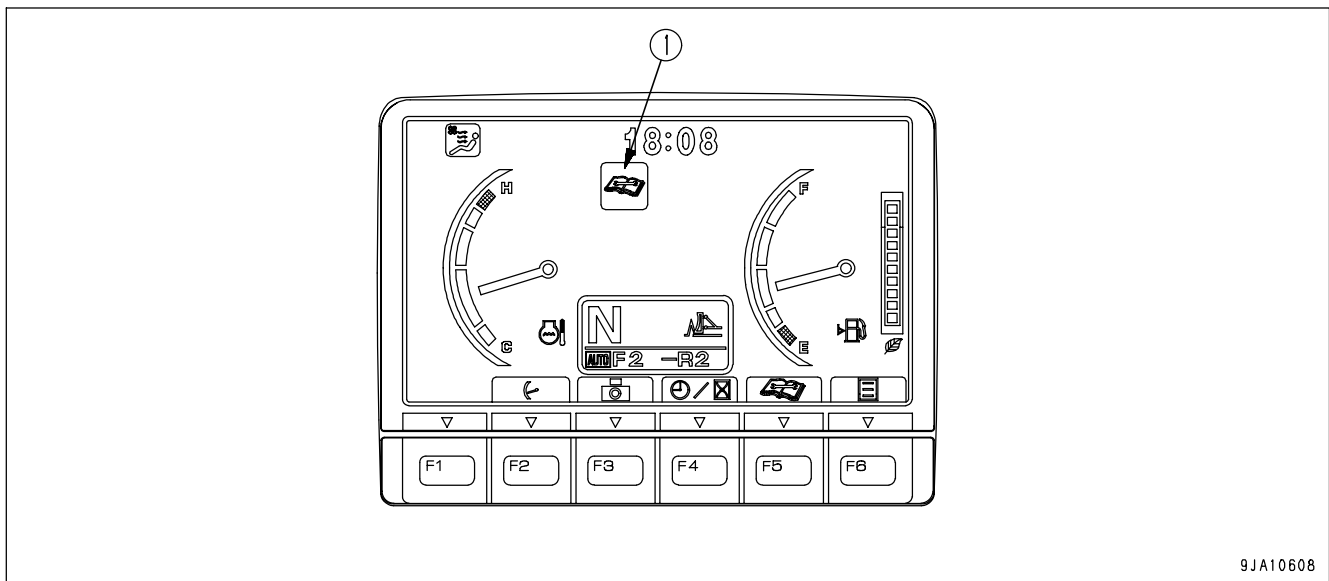
BASIC CHECK MONITORS



These monitors do not guarantee the condition of the machine.

Do not simply rely on the monitor when carrying out checks before starting (daily inspection). Always get off the machine and check each item directly.

Displays basic items among the check before starting items that must be checked before starting the engine. If there is any abnormality, monitor for the location of abnormality will light up.



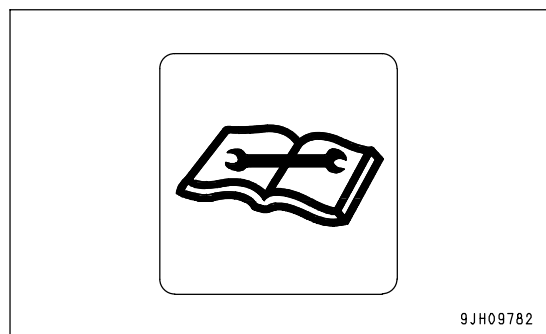
(1) Maintenance interval monitor

MAINTENANCE INTERVAL MONITOR

This monitor (1) lights up yellow 30 hours before the next periodic maintenance after the previous periodic maintenance work was carried out, and turns red to warn the operator that the set time has passed.

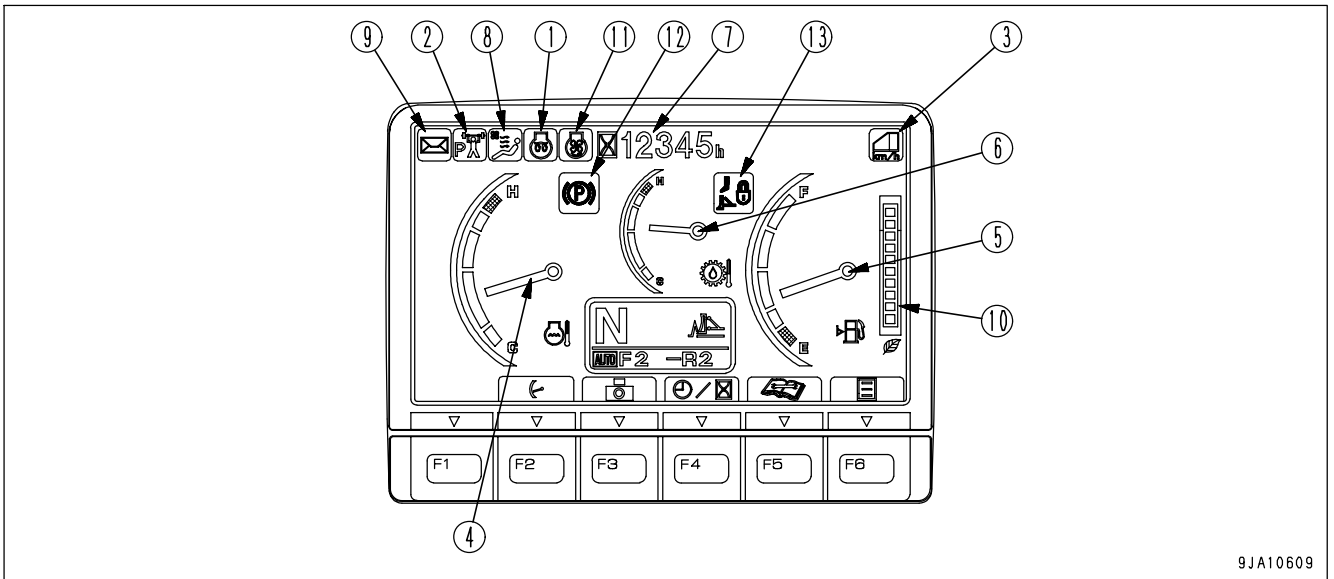
This monitor screen goes out after 30 seconds and the screen returns to the standard working screen.

- For details of the method of checking the maintenance interval, see "MAINTENANCE MODE SELECTOR SWITCH (PAGE 3-29)".



If it is desired to change settings for the maintenance interval, have your Komatsu distributor change the settings.

METER DISPLAY PORTION



- | | |
|--------------------------------------|---|
| (1) Engine pre-heating monitor | (8) Air conditioner monitor |
| (2) Operation mode monitor | (9) Message monitor (only machines equipped with KOMTRAX) |
| (3) Reverse slow mode monitor | (10) ECO indicator |
| (4) Engine coolant temperature gauge | (11) Fan reverse monitor |
| (5) Fuel gauge | (12) Parking brake monitor |
| (6) Multi-gauge | (13) Work equipment lock monitor |
| (7) Service meter, clock | |

PILOT DISPLAY

- The pilot display at the top of the screen consists of the pilot lamps to confirm the actuation of each function.
- When the starting switch is turned ON, the pilot lamp lights up when the display items are functioning.

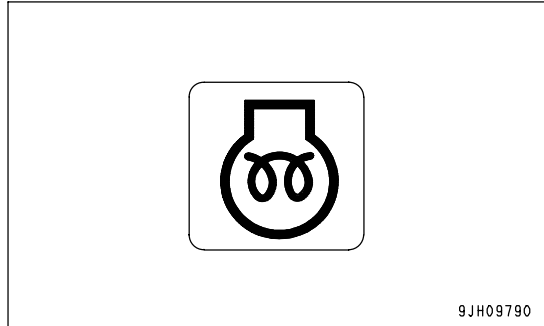
ENGINE PRE-HEATING MONITOR

This monitor (1) displays the preheating time needed when starting the engine in temperatures below -3°C (26.6°F).

When the temperature is low (in cold areas) and the preheating function is automatically actuated, the preheating monitor lights up.

When the preheating is completed, it goes out.

Automatic preheating is for a maximum of approx. 45 seconds.



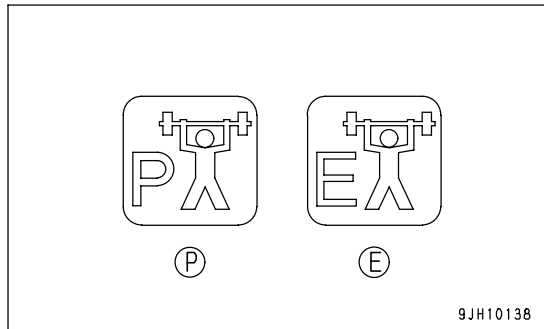
OPERATION MODE MONITOR

This monitor (2) displays the operation mode.

(P): Lights up when mode is set to power mode

(E): Lights up when mode is set to economy mode

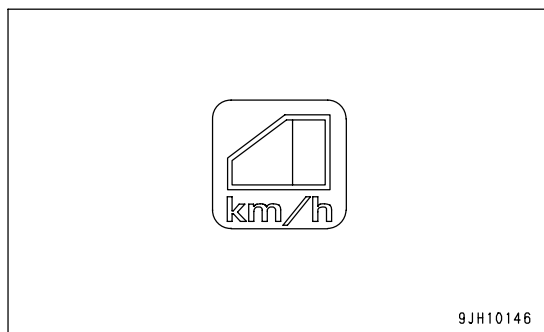
The mode switches every time the operation mode selector switch is pressed.



REVERSE SLOW MODE MONITOR

When this monitor (3) is lighted up, it is possible to throttle down the engine speed and make the reverse speed slower when traveling in reverse.

This mode is selected in the customize mode.



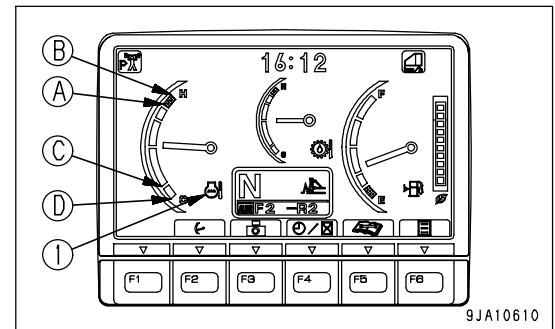
GAUGES AND METER

ENGINE COOLANT TEMPERATURE GAUGE

This meter (4) shows the engine coolant temperature.

During normal operations, the indicator should be in the green range. If the indicator enters the red range during operations, the overheat prevention system is actuated.

- (A) - (B): Red range
- (A) - (C): Green range
- (C) - (D): White range



The overheat prevention system is actuated as follows.

Red range (A) position: Engine coolant temperature monitor (1) shows abnormality display.

Red range (B) position: Engine output lowers and engine coolant temperature monitor (1) shows abnormality display. Alarm buzzer sounds at same time.

The overheat prevention system continues to work until the indicator enters the green range.

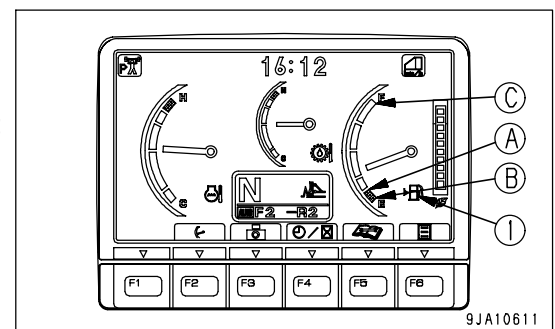
FUEL GAUGE

This monitor (5) shows the amount of fuel remaining in the fuel tank.

The indicator should be in the green range during operations.

If the indicator enters the red range (A) during operation, carry out inspection and add fuel.

- (A) - (B): Indicates red range
- (A) - (C): Indicates green range



The correct fuel level may not be displayed for a short time when the starting switch is turned ON, but this is not an abnormality.

MULTI-GAUGE

This gauge (6) displays a variety of items, but the following explanation describes the actuation for the power train oil temperature gauge and hydraulic oil temperature gauge.

The indicator should be in the green range during operations.

If the indicator enters the red range (A) during operation, it means that the oil temperature is too high. If this happens, turn the fuel control dial down to approx. 3/4 of the maximum speed, reduce the load, and wait for the oil temperature to go down to the green range.

If the indicator enters the red range (A) during operations and the alarm buzzer sounds, run the engine at low idling and wait for the oil temperature to go down.

- (A) - (B): Red range
- (A) - (C): Green range
- (C) - (D): White range

The overheat prevention system is actuated as follows.

Red range (A) position: Power train oil temperature monitor (E) or hydraulic oil temperature monitor (F) shows abnormality display

Red range (B) position: Engine output lowers and speed range is fixed to 1st. Power train oil temperature monitor (E) or hydraulic oil temperature monitor (F) shows abnormality display. Alarm buzzer sounds at same time

NOTICE

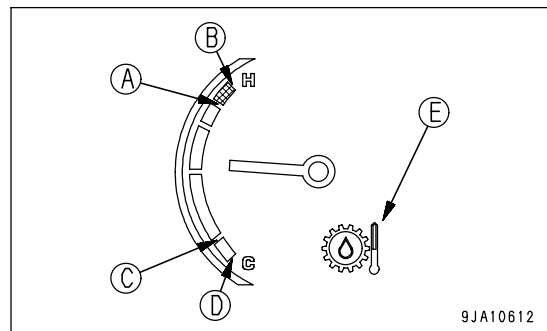
If the engine output is limited by the overheat prevention system, stop working until the oil temperature lowers.

After confirm that the abnormality display has gone OFF, stop the machine before starting work. At this time, be sure to lower the engine output with the fuel control dial or decelerator pedal.

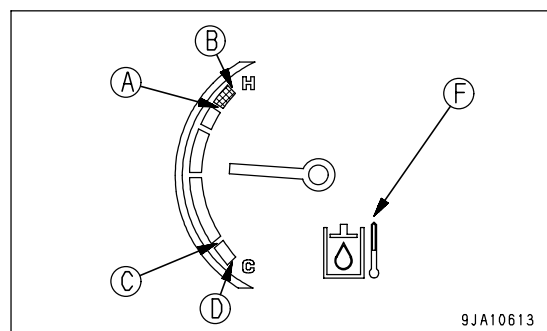
Limitation of the engine output is reset.

POWER TRAIN OIL TEMPERATURE GAUGE**NOTICE**

If the power train oil temperature gauge tends to enter red range (A), shift down one speed range to reduce the load on the power train during operations.

**HYDRAULIC OIL TEMPERATURE GAUGE****NOTICE**

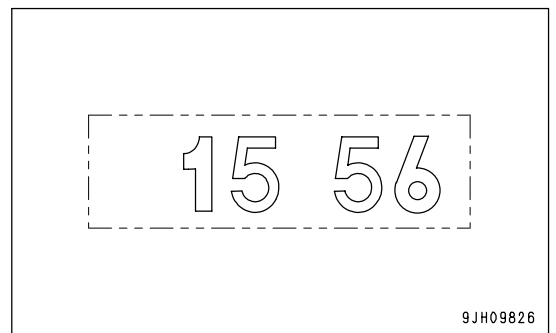
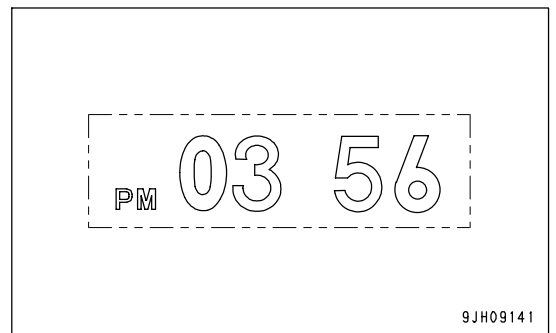
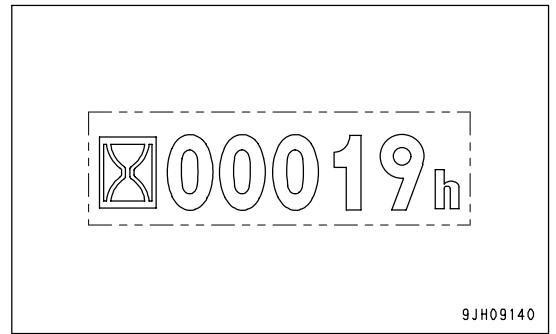
When the indicator comes close to the red range during operation, the hydraulic oil temperature has exceeded 102° C. Then run the engine at low idling or stop it and wait for the oil temperature to go down.



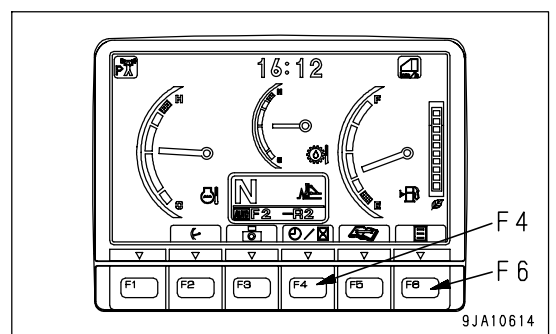
SERVICE METER, CLOCK

This meter (7) shows the total hours of operation of the machine or the present time.

When the engine is running, the service meter advances even if the machine is not moving. The service meter advances 1 for every hour that the machine is working, regardless of the engine speed.



- When the standard screen is being displayed, if function switch F4 is pressed, it is possible to switch between the clock display and the service meter display.
- Clock display (12-hour or 24-hour displays are available)
To set or correct the time, press function switch F6 (user mode switch).

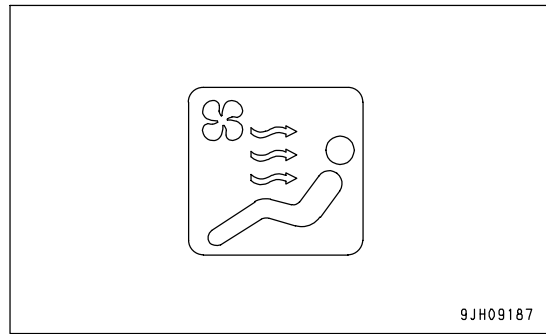


AIR CONDITIONER MONITOR

This monitor (8) displays the working status of the air conditioner.

Monitor lighted up: Air conditioner ON

Monitor off: Air conditioner OFF



9JH09187

MESSAGE MONITOR (ONLY MACHINES EQUIPPED WITH KOMTRAX)

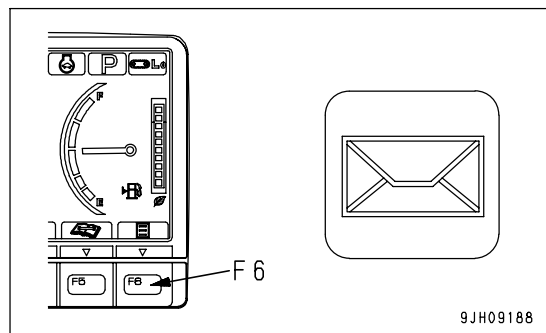
This monitor (9) lights up when there is a message from Komatsu.

Press function switch F6 on the user menu to display the message.

Lighted up green: There is unread message

Lighted up blue: There is message awaiting reply

OFF: There are no messages



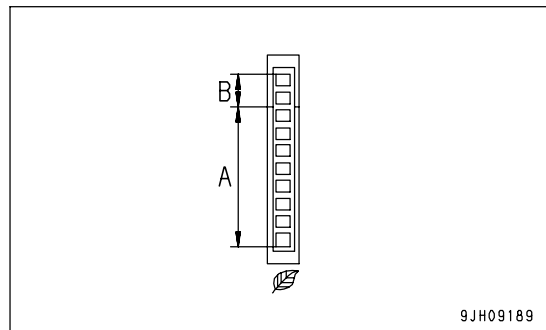
9JH09188

ECO INDICATOR

This gauge (10) shows the working load status.

When the gauge is in green range A, the work load is light to medium. When the gauge is in orange range B, the load is heavy.

- When the gauge enters the orange range, there is no abnormality on the machine, but to protect the environment, reduce the engine output to a point where there is no adverse effect on the operation. Generally, carry out energy-saving operations in the green range. Reducing the frequency of travel also helps to save energy. Consider the best way of saving energy.

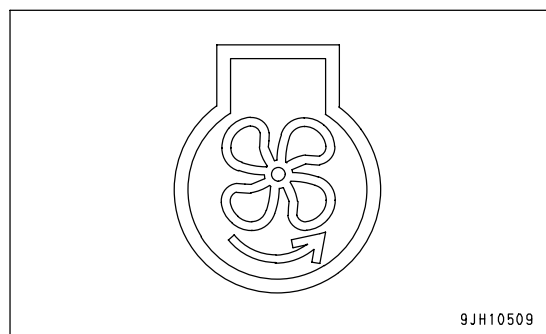


9JH09189

FAN REVERSE MONITOR

This monitor (11) shows that the fan is rotating in reverse.

For details of operating the fan in reverse, see "HYDRAULIC DRIVE FAN REVERSE MODE (PAGE 3-48)".

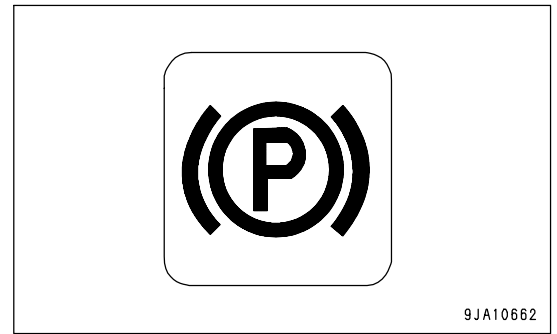


9JH10509

PARKING BRAKE MONITOR

This monitor (12) lights up when the parking brake lever is in the LOCK position.

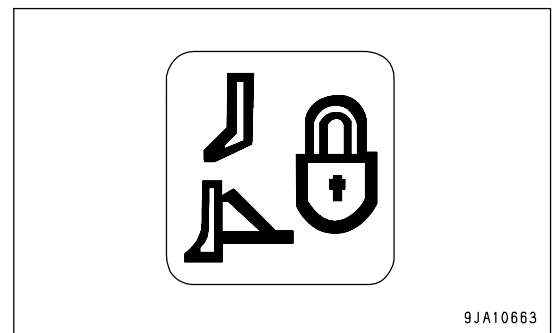
It goes OFF when the parking brake lever is set in the FREE position.



WORK EQUIPMENT LOCK MONITOR

This monitor (13) lights up when the work equipment lock lever is in the LOCK position.

It goes OFF when the work equipment lock lever is set in the FREE position.



SPEED RANGE DISPLAY

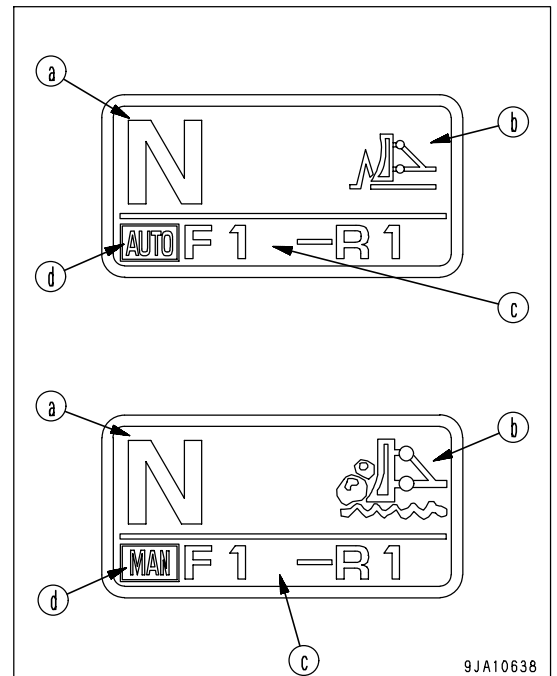
The travel speed range of the machine (F1 for FORWARD 1st, R2 for REVERSE 2nd) is displayed in top left area (a) of the speed range display.

The gear shift mode is displayed in top right area (b).

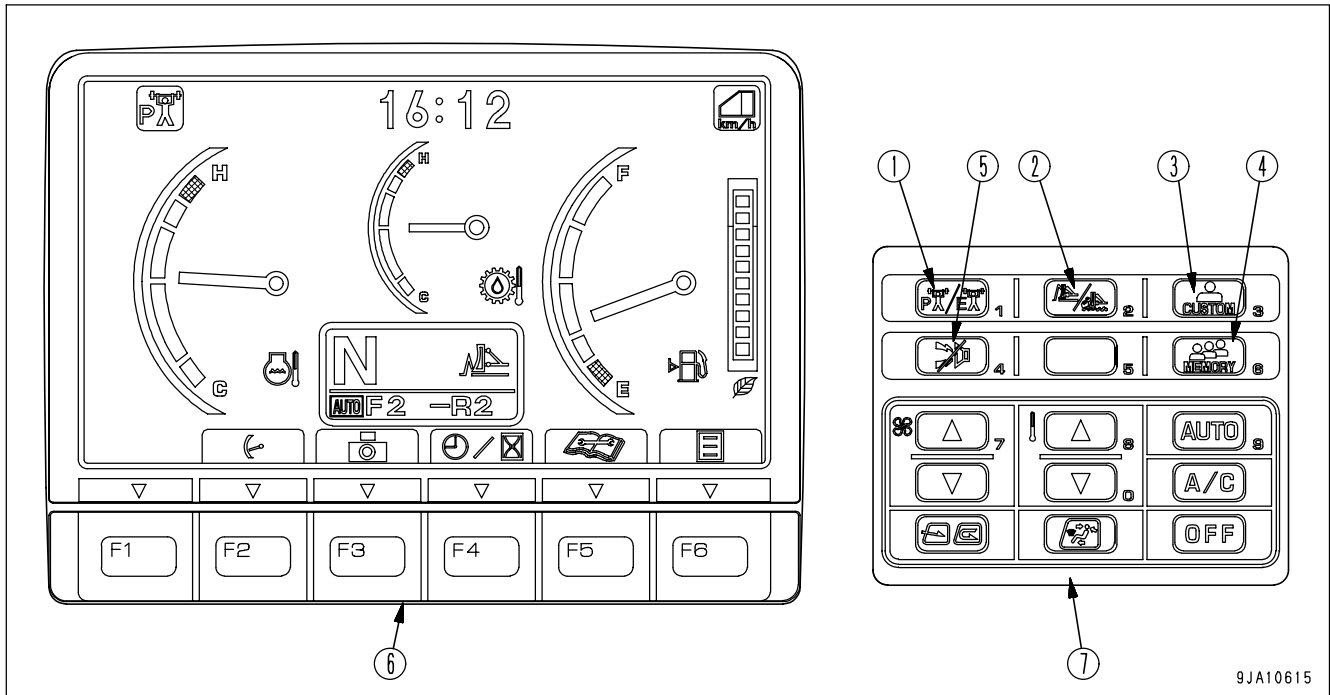
The preset mode is displayed in bottom area (c).

In addition, when the automatic mode is selected, the AUTO mark is displayed in the bottom left area (d), and when the manual mode is selected, the MAN mark is displayed in the bottom left area (d).

For details of the procedure for shifting gear on this machine, see "SHIFTING GEARS (PAGE 3-123)".



MONITOR SWITCHES PORTION

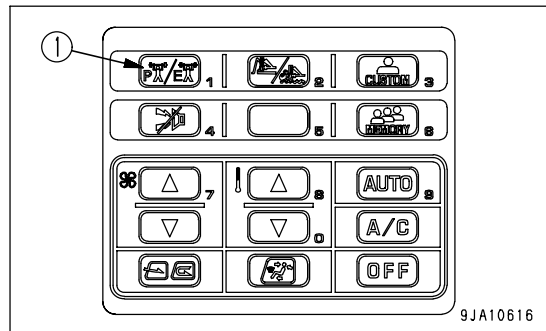


9JA10615

- (1) Operating mode selector switch
- (2) Gear shift mode selector switch
- (3) Customize switch
- (4) Customize memory switch
- (5) Buzzer cancel switch
- (6) Function switches
- (7) Air conditioner switch

OPERATING MODE SELECTOR SWITCH

This switch (1) is used to switch the operating mode of the engine. Normally, it is possible to carry out all operations in E mode, and this mode reduces fuel consumption. Compared with E mode, P mode has more power, but the fuel consumption increases. When the starting switch is turned ON, the mode used for the previous operation is selected as the default. The selected mode is displayed at the top of the screen.



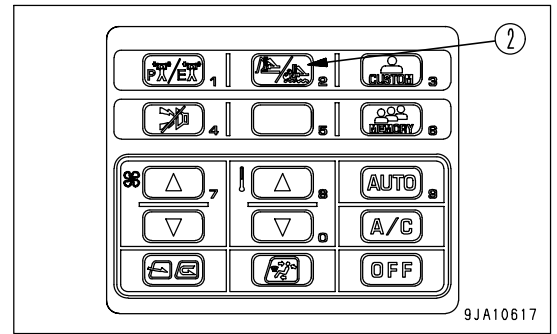
9JA10616

GEAR SHIFT MODE SELECTOR SWITCH

This switch (2) switches the gear shift mode to automatic shift mode and manual shift mode. In the automatic shift mode, the transmission shifts up automatically to the maximum set speed range, and shifts down according to the load.

In the manual shift mode, the transmission shifts down according to the load, but shifting up is carried out manually.

For precautions and details of the gear shift modes, see "SHIFTING GEARS (PAGE 3-123)".



CUSTOMIZE SWITCH

 **CAUTION**

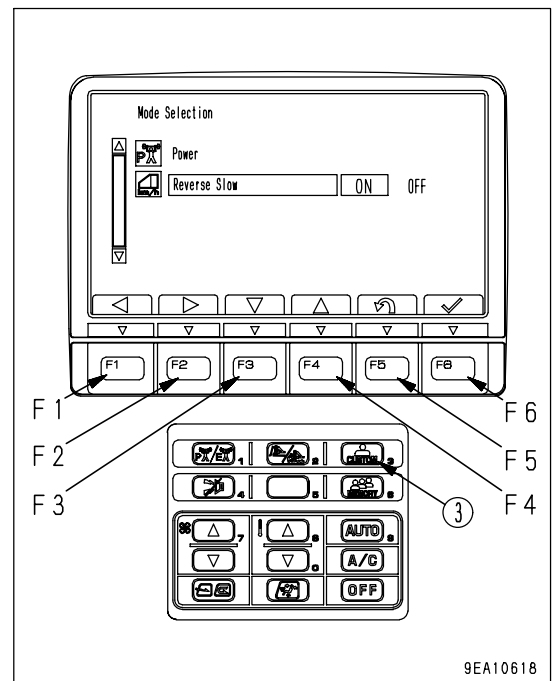
To ensure safety, always stop the machine before changing the mode.

When this switch (3) is pressed, the system switches to the customize mode.

1. Press function key F3 or F4 to set the yellow cursor to the item to be changed.
2. In this condition, use function keys F1 and F2 to switch ON and OFF, and set each mode to the desired setting.
3. The display returns to a normal screen by pressing the "F6" enter key.
4. If it is desired to reset all items, press function key F2 to turn OFF, then press function key F6.

REMARK

The items set on the screen can be saved for up to 5 people, and it is possible to recall the settings the next time the machine is used. This is called the customize memory function.

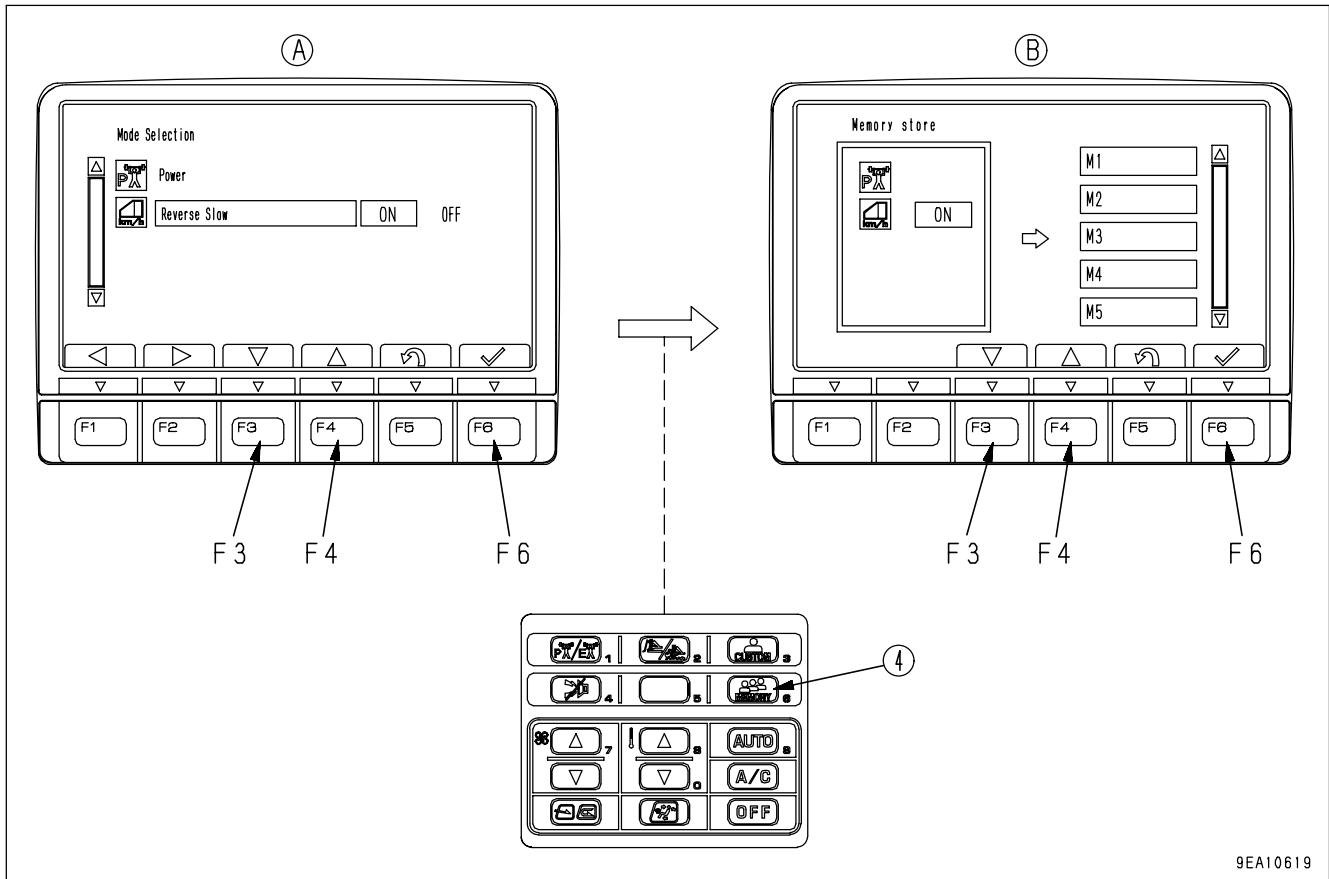


CUSTOMIZE MEMORY SWITCH



To ensure safety, always stop the machine before changing the mode.

With this switch (4) the items set for up to 5 people using the customize function can be saved, and it is possible to recall the settings the next time the machine is used.



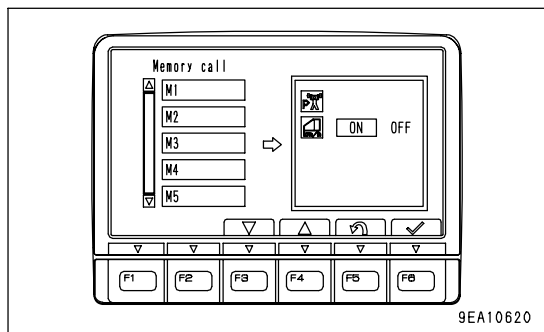
9EA10619

1. Memory store

If customize memory switch (4) is pressed on mode selection screen (A), the screen switches to memory store screen (B). The selected condition can be saved to memory as M1 - M5.

(Use function switches F3 and F4 to select the number for storing the setting, then save it with F6.)

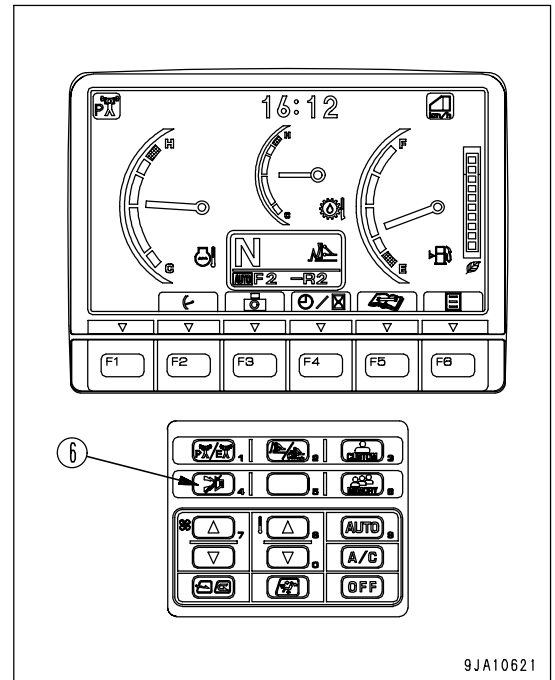
2. To call up items already set in memory, press the customize memory switch on the standard screen. The screen on the right is displayed, so use function switches F3 and F4 to, then confirm the selection with F6.



9EA10620

BUZZER CANCEL SWITCH

When this switch (5) is pressed, the warning buzzer for the abnormal warning item stops.



FUNCTION SWITCHES

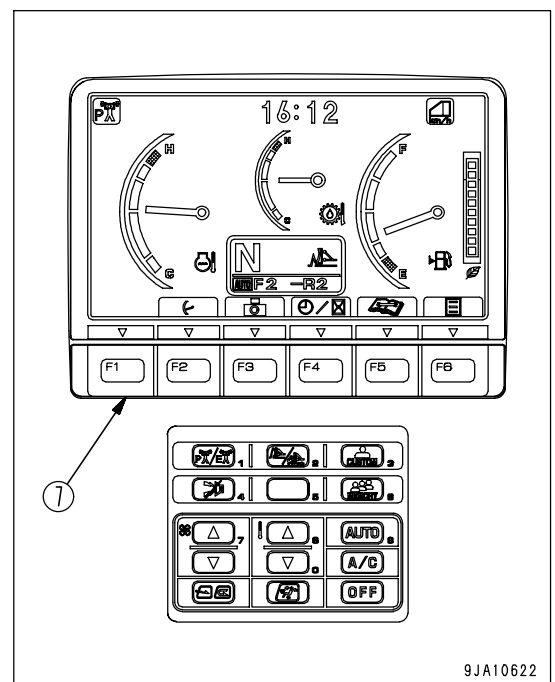
Function switches (6) consist of 6 switches (F1 to F6). The function of each switch differs according to the content of each screen.

When the monitor display shows the standard screen, the functions are displayed as follows.

- F2: Multi-gauge display selector switch
- F4: Service meter/time display selector switch
- F5: Maintenance mode selector switch
- F6: User mode selector switch

Switches F3 are auxiliary switches used when expanding the function.

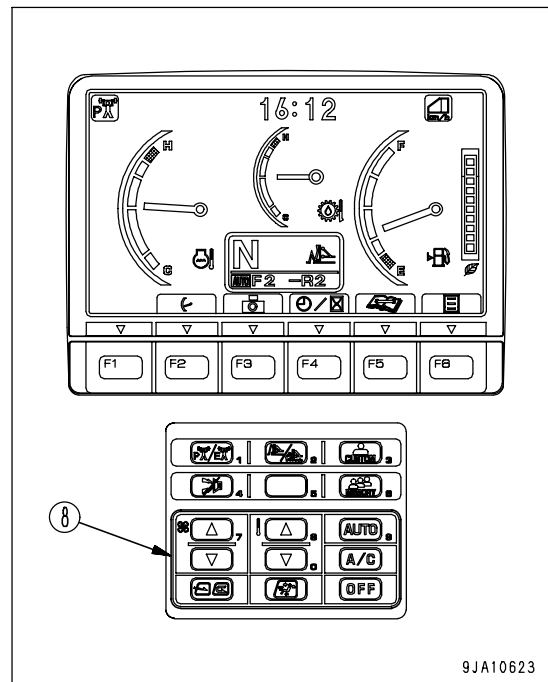
For explanation of each switch, see "HANDLING FUNCTION SWITCHES (PAGE 3-27)".



AIR CONDITIONER SWITCH

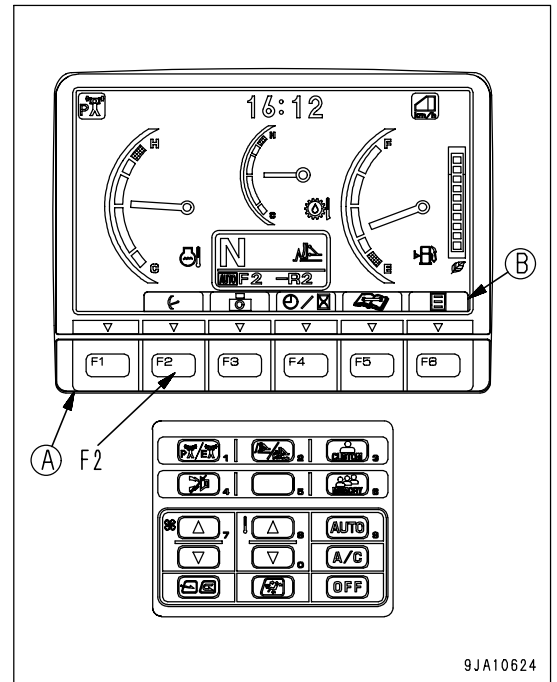
The air conditioner switches (7) consist of 9 switches.

For explanation of each switch, see "AIR CONDITIONER, HANDLING (PAGE 3-76)".



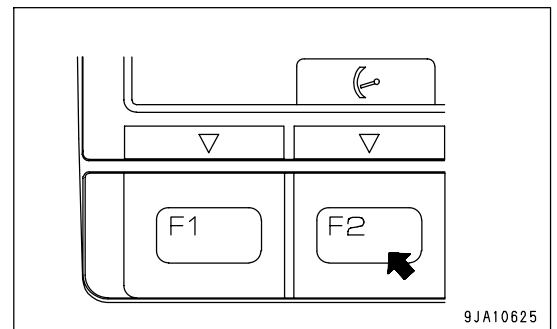
HANDLING FUNCTION SWITCHES

- The function switches (A) at the bottom of the monitor display consist of 6 switches (F1 - F6). The function of each switch differs according to the content of each screen.
- The function of switches (A) on each screen can be confirmed by guidance icons (B) displayed on top of each switch.
- If there is no display in guidance icon (B), even if switch (A) is pressed, it will not function.
- Even if guidance icon (B) is pressed, it will not function. Press switch (A) immediately below the guidance icon display to operate the function.



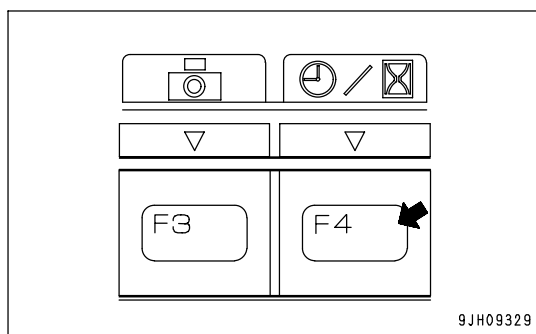
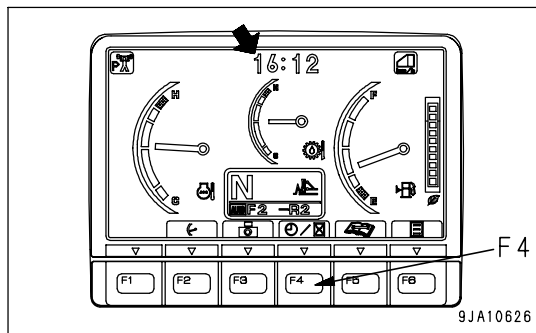
MULTI-GAUGE DISPLAY SELECTOR SWITCH

Multi-gauge display items can be switched by pressing the function switch "F2". For the items, see "MULTI-GAUGE (PAGE 3-18)".

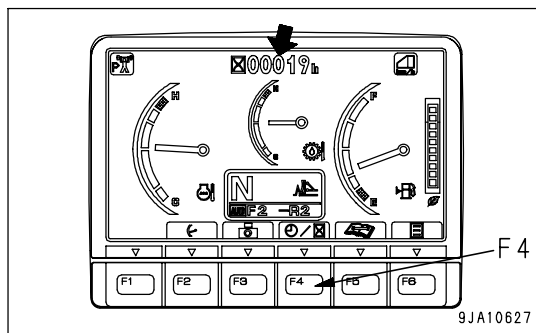


SERVICE METER/CLOCK DISPLAY SELECTOR SWITCH

On the standard screen, it is possible to press switch F4 to switch the service meter and clock display at the top of the monitor display.

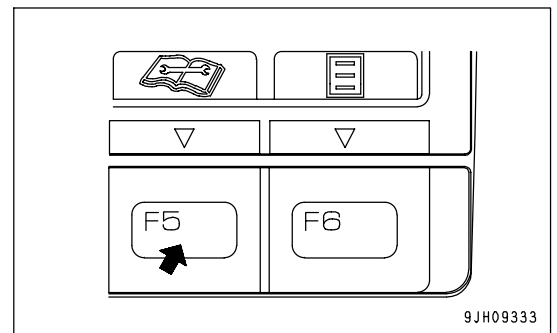
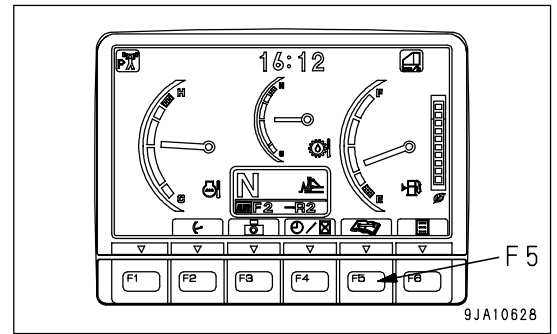


- When the time is being displayed, press switch F4 to switch to the service meter display.
- When the service meter is being displayed, press switch F4 to switch to the time display.



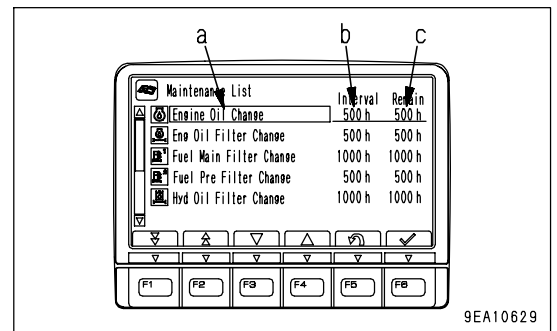
MAINTENANCE MODE SELECTOR SWITCH

When switch F5 is pressed on the standard screen, the monitor display screen switches to the maintenance mode screen.



The items on the maintenance display are as follows.

a	b
Change engine oil	500
Replace engine oil filter	500
Replace fuel main filter	1000
Replace fuel pre-filter	500
Replace hydraulic oil filter	2000
Replace corrosion resistor	1000
Check damper case oil level, add oil	2000
Change final drive case oil	1000
Change hydraulic oil	2000
Change P/L oil	1000
Replace P/L oil filter	500

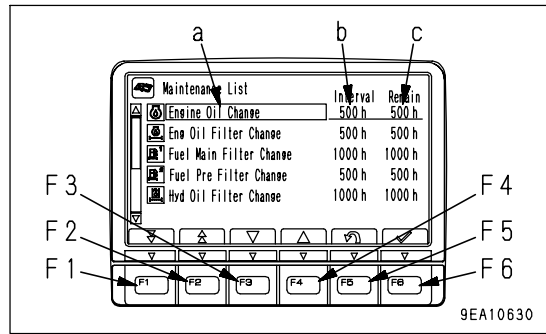


- a: Maintenance items
- b: Default maintenance interval settings (h)
- c: Time remaining until maintenance (h)

OPERATIONS ON MAINTENANCE LIST SCREEN

On the maintenance list screen, it is possible to carry out the following operations with switches F1 to F6.

- F1: Displays next page. When on the last page, it displays the first page.
- F2: Displays previous page. When on the first page, it displays the last page.
- F3: Moves to next item (1 line down). When on the last line, it moves to the first line on the next page.
- F4: Moves to previous item (1 line up). When on the first line, it moves to the last line on the previous page.
- F5: Returns to standard screen.
- F6: If this switch is kept pressed, the screen changes to the screen for resetting the remaining time for the selected item (item highlighted in yellow).

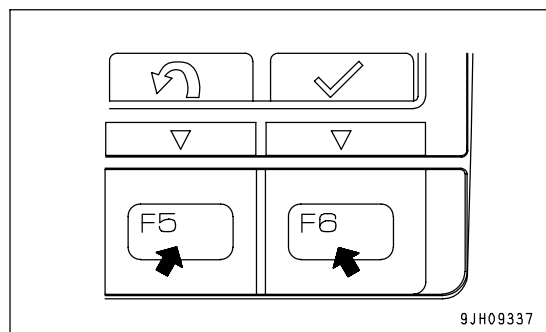
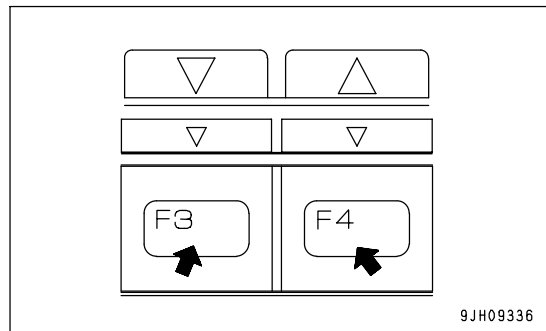
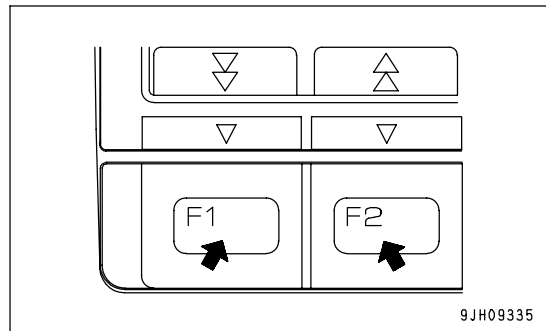


REMARK

When resetting the remaining time, keep switch F6 pressed for at least 1.5 seconds. If switch F6 is not kept pressed for at least 1.5 seconds, the switch operating sound can be heard, but the screen does not switch to the screen for resetting the remaining time.

- If no switch is operated for 30 seconds on the maintenance list screen, the screen automatically returns to the standard screen.

- On the maintenance list screen, if the time remaining until maintenance for any item is less than 30 hours, the remaining time display is highlighted in yellow. If the time remaining until maintenance becomes 0 hours, the remaining time display is highlighted in red.
- If you want to change the setting for the maintenance interval, please consult your Komatsu distributor.



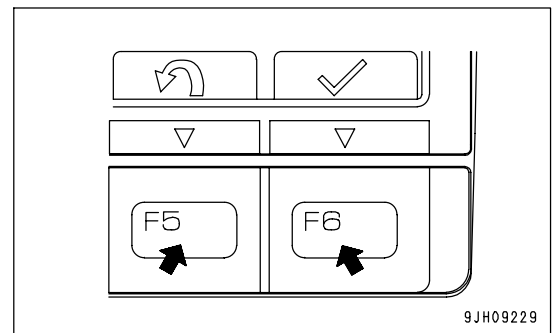
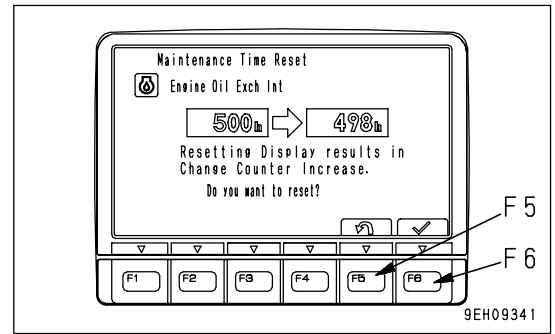
OPERATIONS ON MAINTENANCE INTERVAL RESET SCREEN

On the maintenance interval reset screen, it is possible to carry out the following operations.

F5: Cancels reset, returns to maintenance list screen

F6: Resets remaining time, returns to standard screen

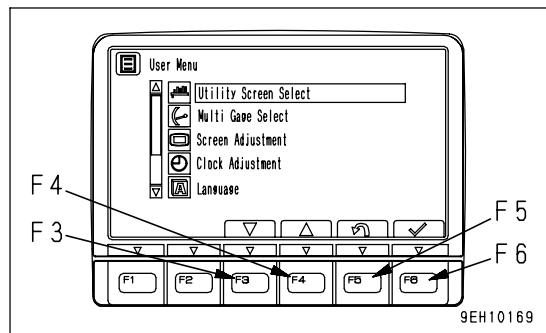
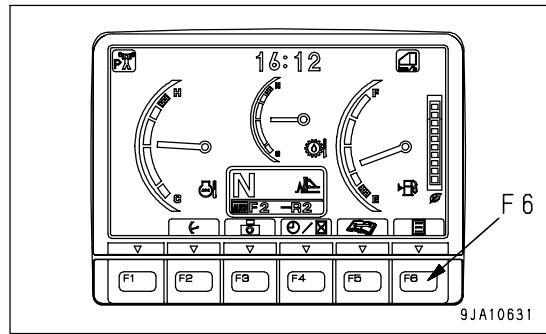
- If no switch is operated for 30 seconds on the maintenance interval reset screen, the screen automatically returns to the standard screen.



USER MODE SELECTOR SWITCH

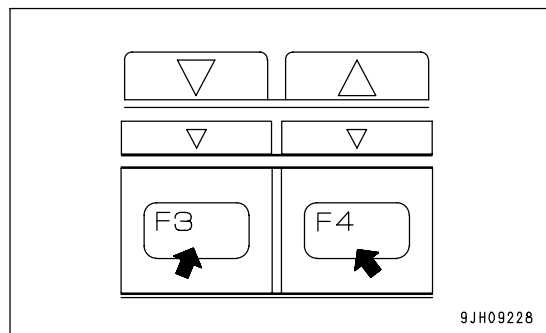
When the switch F6 is pressed, the monitor display screen switches to the setting mode screen for the machine.

- On the User Menu screen, it is possible to carry out the following operations with switches F3 to F6.



F3: Moves to next item (1 line down). When on the last line, it moves to the first line on the next page.

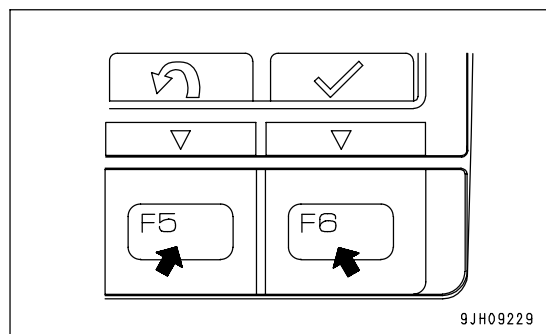
F4: Moves to previous item (1 line up). When on the first line, it moves to the last line on the previous page.



F5: Returns to standard screen.

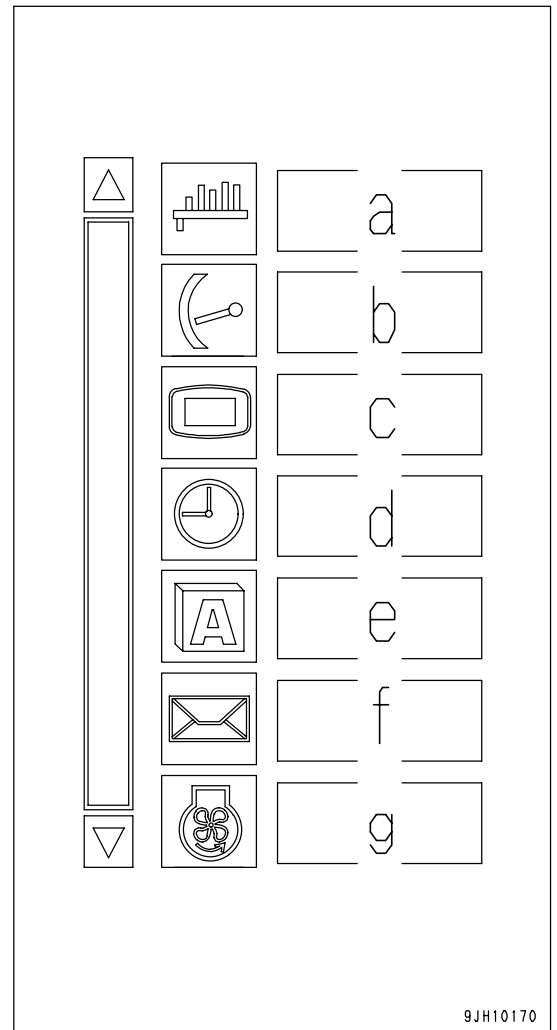
F6: Switches to setting screen for selected item.

- If no switch is operated for 30 seconds on the user menu screen, the screen automatically returns to the previous screen.



- The following items can be set.

- a: Utility Screen
- b: Multi-gauge
- c: Screen Adjustment
- d: Time Adjustment
- e: Language Setting
- f: Message display
- g: Fan Reverse

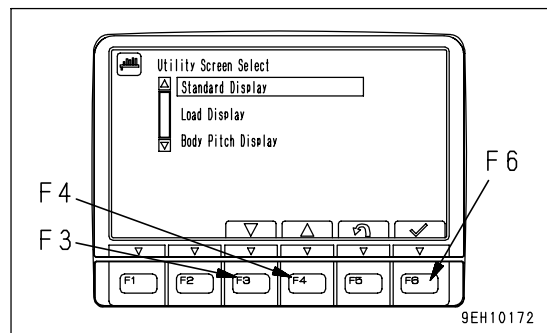
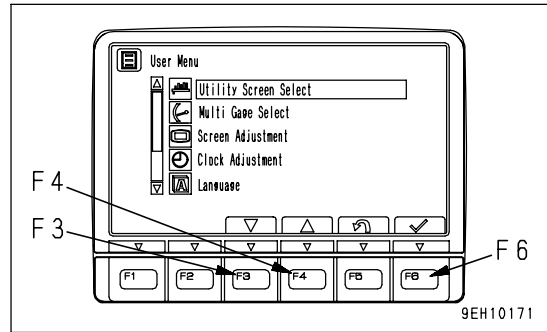


The operation to set a - g is as follows.

UTILITY SCREEN

When the utility graph is selected with switch F6, it becomes possible to select the Standard Display, Load Display, or Body Pitch Display.

Use switches F3 or F4 to select the item, then press switch F6 to confirm.



STANDARD DISPLAY

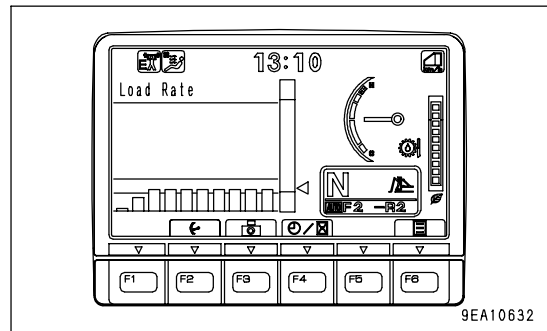
This selects the standard screen.

LOAD DISPLAY

The horizontal axis shows the time and the vertical axis shows the rim pull.

In the same way as with the ECO gauge, we recommend that you use it in the green range.

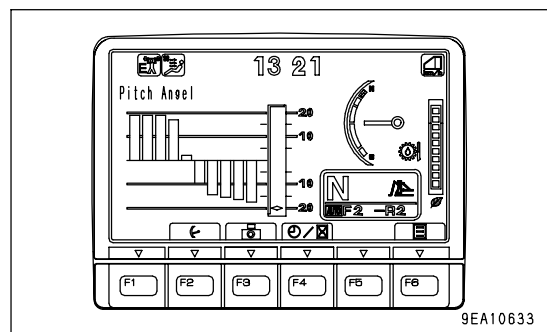
The graph on the screen is updated every few seconds and scrolls to the left.



BODY PITCH DISPLAY

The horizontal axis shows the time and the vertical axis shows the pitch angle of the machine.

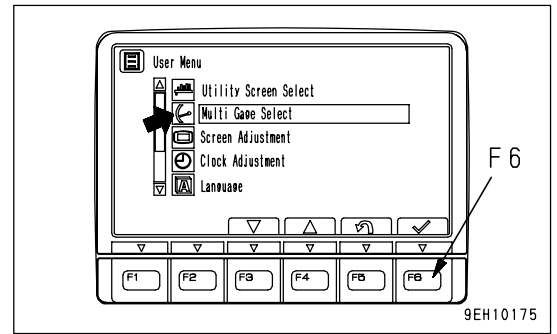
The graph on the screen is updated every few seconds and scrolls to the left.



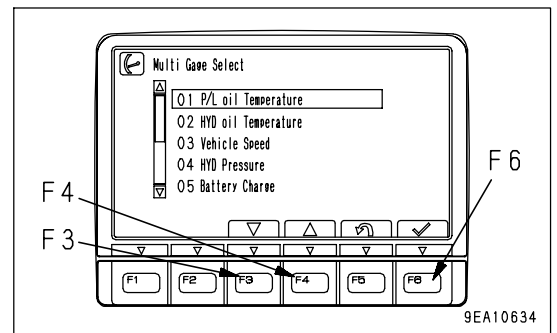
MULTI-GAUGE

With this monitor, it is possible to select the gauge that is displayed in the center.

Use switches F3 or F4 to select the item, then press switch F6 to confirm.



NO.	Multi-gauge selection item	Remarks
1	P/L oil Temperature	There is a caution lamp
2	HYD oil Temperature	There is a caution lamp
3	Vehicle Speed	-
4	HYD Pressure	-
5	Battery Voltage	-
6	ENG Speed	-
7	Traction	-
8	Time	-
9	ENG Temperature	Utility Screen
10	Fuel	Utility Screen



When "01 Utility Screen" is selected, the engine water temperature gauge and fuel gauge are added on the Multi-gauge selection item.

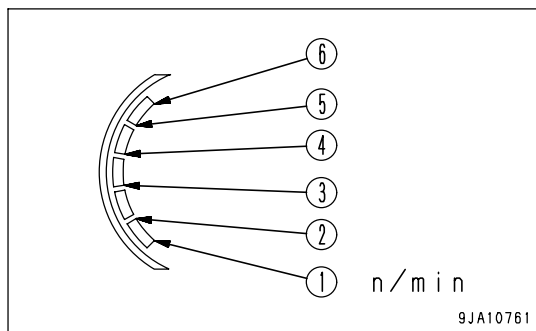
NOTICE

If the P/L oil (the power train oil) temperature or the hydraulic oil temperature rises near the overheat level, the multi-gauge changes to the power train oil temperature gauge or hydraulic oil temperature gauge automatically. When this happens, the multi-gauge cannot be changed to another gauge, so lower the oil temperature, and then select the multi-gauge.

An approximate value indicated by the gauge is as follows.

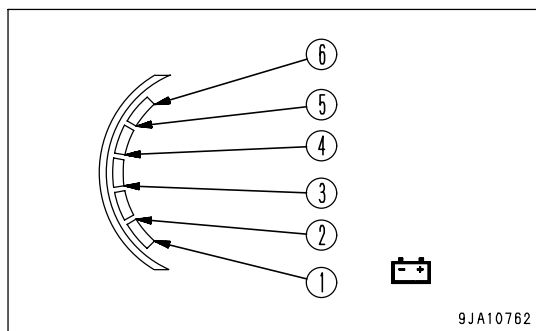
Engine speed

- (1) 500rpm
- (2) 1,000rpm
- (3) 1,500rpm
- (4) 2,000rpm
- (5) 2,500rpm
- (6) 3,000rpm



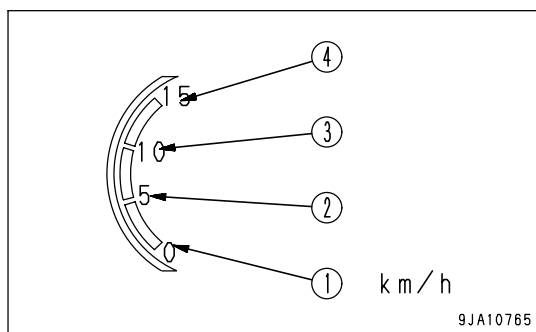
Battery voltage

- (1) 0V
- (2) 17V
- (3) 20V
- (4) 25V
- (5) 30V
- (6) 31V



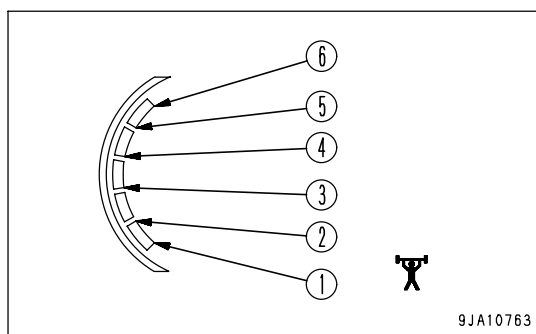
Machine speed

- (1) 0km/h
- (2) 5km/h
- (3) 10km/h
- (4) 15km/h



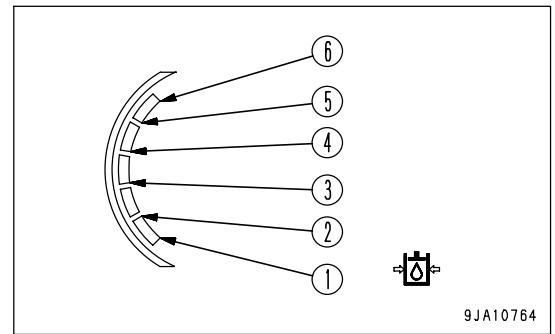
Drawbar pull

- (1) 0W
- (2) 0.2W
- (3) 0.4W
- (4) 0.6W
- (5) 0.8W
- (6) 1.0W



Hydraulic pressure

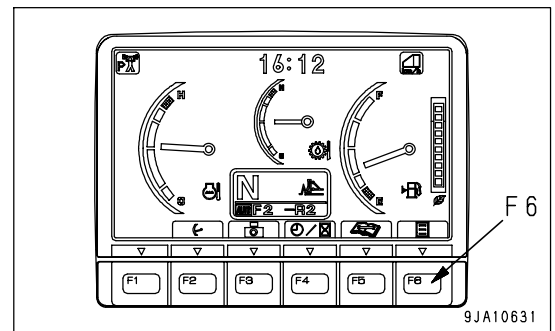
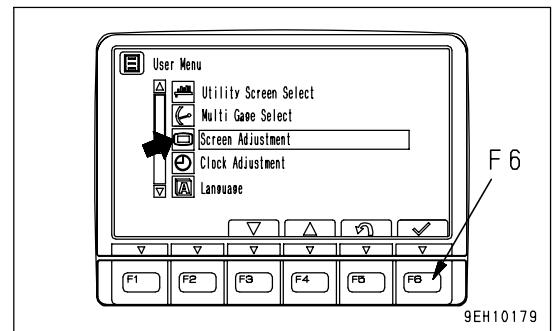
- (1)0MPa
- (2)10MPa
- (3)20MPa
- (4)30MPa
- (5)40MPa
- (6)50MPa



ADJUSTING SCREEN

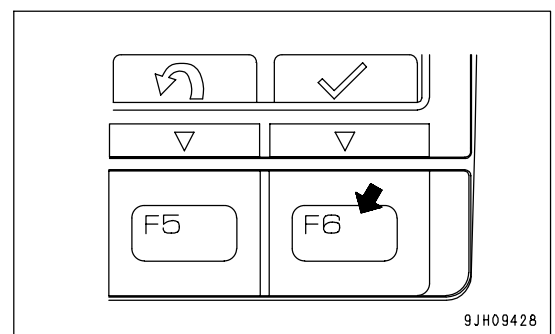
Use this screen adjustment menu to adjust the brightness, contrast, and back light of the screen.

1. On the standard screen, press switch F6.



2. Select screen adjustment on the user menu, then press switch F6. The screen switches to the selection menu screen for screen adjustment.

- On machines equipped with cameras, it is possible to adjust the brightness, contrast, and back light of the cameras screen on this menu.



3. Select item to be adjusted (a) or (b) from the selection menu screen for screen adjustment, then press switch F6. The screen switches to the setting screen for the selected item.

(a): Standard screen adjustment

(b): Camera screen adjustment (only machines equipped with camera)

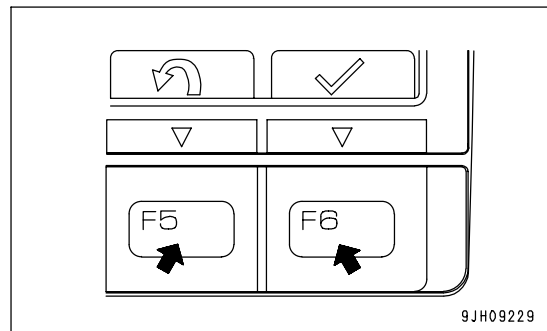
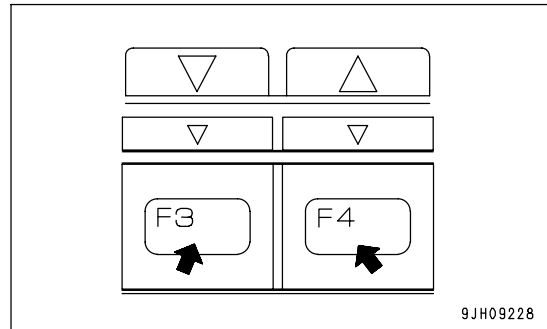
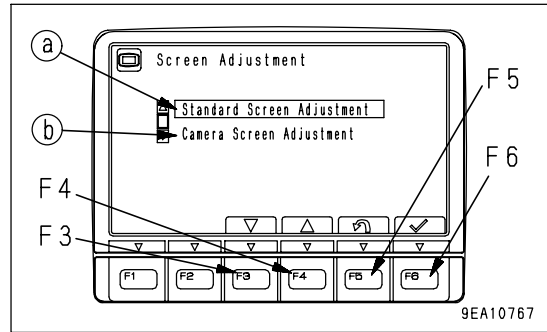
- On the mode selection screen shown on the right, it is possible to carry out the following operations with switches F3 to F6.

F3: Moves to next item (1 line down).

F4: Moves to previous item (1 line up).

F5: Returns to user menu screen.

F6: Switches to setting screen for selected item.



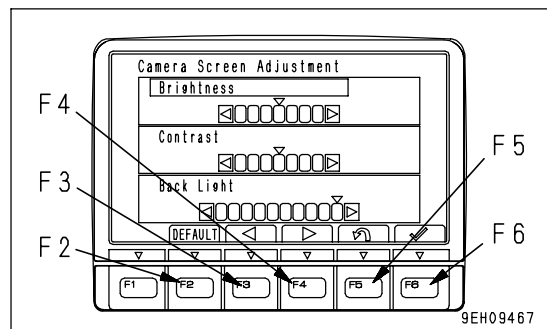
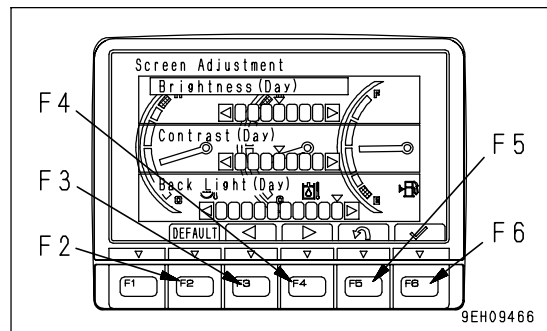
4. Use switches F2 to F6 to adjust the brightness, contrast, and back light of the selected screen.

1) Adjustment screen for standard screen

- If the light switch is at night mode ON, and the standard screen is adjusted, it is possible to adjust the brightness of the monitor screen (night mode).
- If the light switch is at day mode ON or OFF, and the standard screen is adjusted, it is possible to adjust the brightness of the monitor screen (day mode).

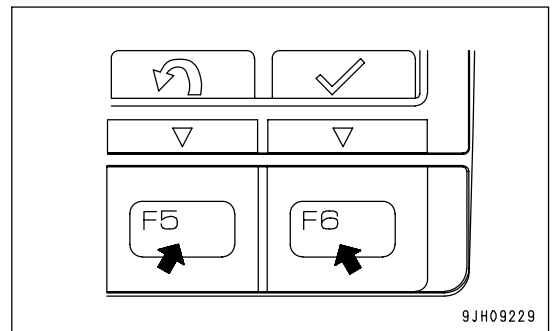
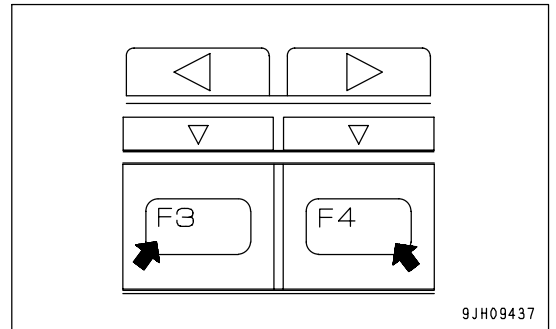
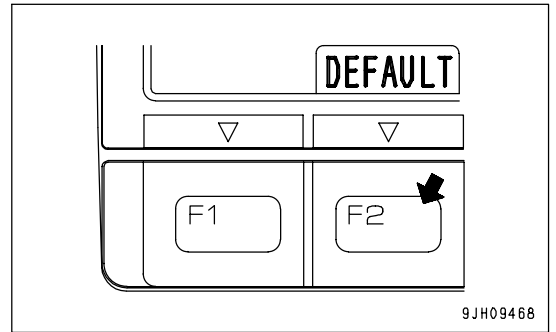
2) Adjusting camera screen

- The background when adjusting the camera image is the image for the No. 1 camera.
- When displaying the camera screen, the screen may become dark if the image is on snow. In such cases, we recommend adjustment of the screen.



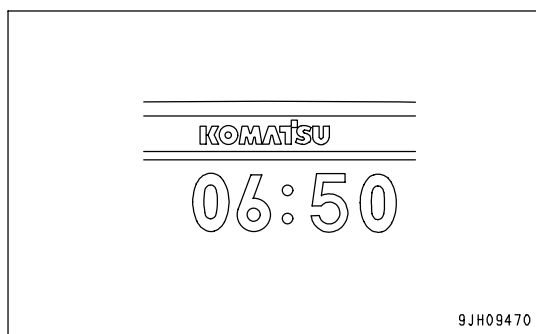
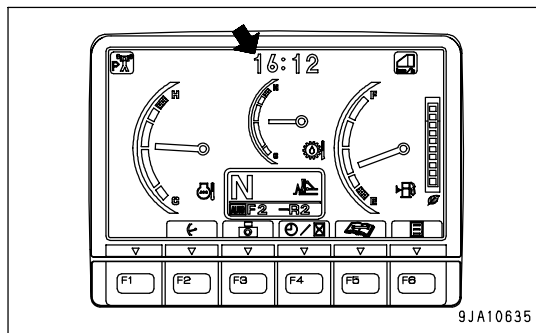
On the screen for Items 1) and 2), it is possible to carry out the following operations with switches F2 to F6.

- F2: Resets all adjusted values to default value
- F3: Indicator of selected item moves 1 segment to left.
- F4: Indicator of selected item moves 1 segment to right.
- F5: Returns to user menu.
- F6: Accepts change and switches to next item setting.

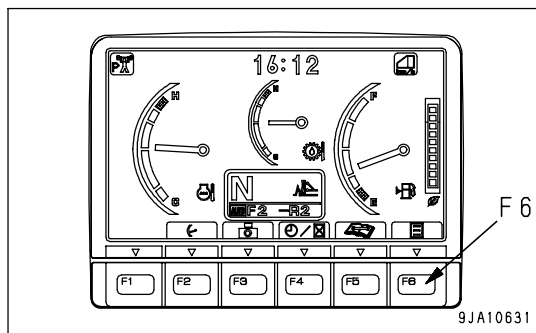


CLOCK ADJUSTMENT

On this clock adjustment menu, it is possible to change the setting of the clock displayed on the pilot monitor of the standard display.

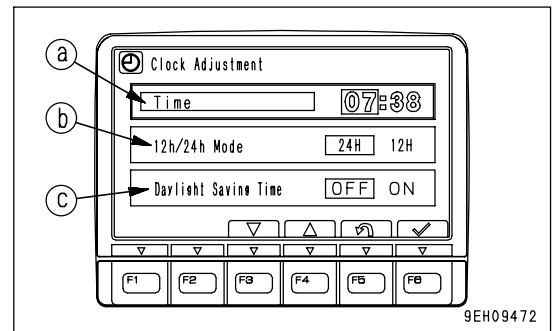
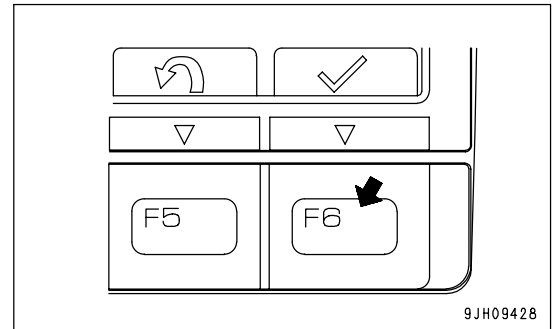
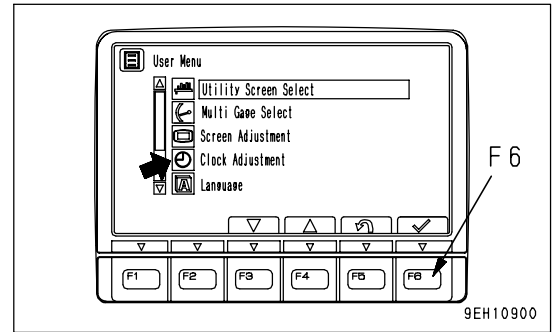


- 1. On the standard screen, press switch F6.



2. Select "Clock Adjustment" on the user menu, then press switch F6. The screen switches to the time adjustment selection menu screen.

- The following three items can be changed.
 - (a) Clock setting
 - (b) 12/24 hour display mode
 - (c) Daylight saving time



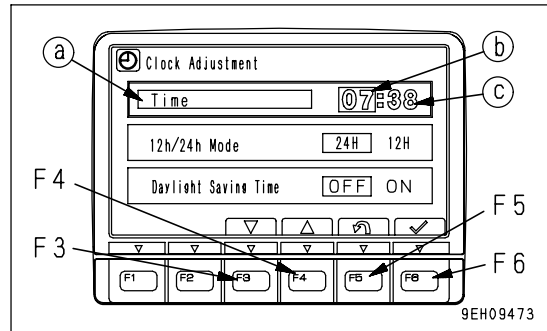
3. On the clock adjustment selection screen, it is possible to carry out the following operations with switches F3 to F6.

• Time

Adjust the hour setting.

1) If "Time" (a) is not highlighted in yellow, press switch F6 to highlight "Time" (a) in yellow. When this is done, hour display (b) changes to orange.

Adjust hour display (b) with the switches as follows. If it is not necessary to change the hour setting, press switch F6.

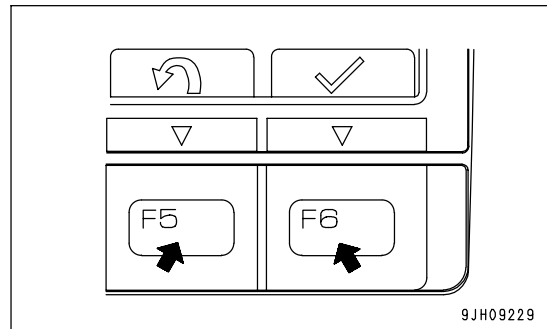
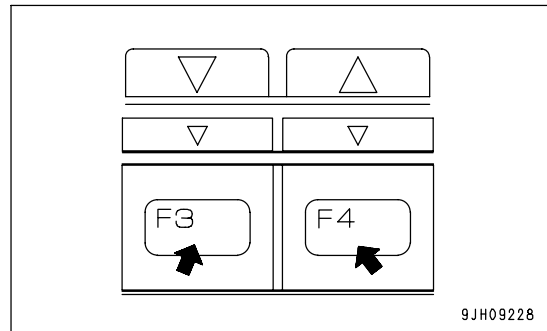


F3: Time advances 1 hour.

F4: Time goes back 1 hour.

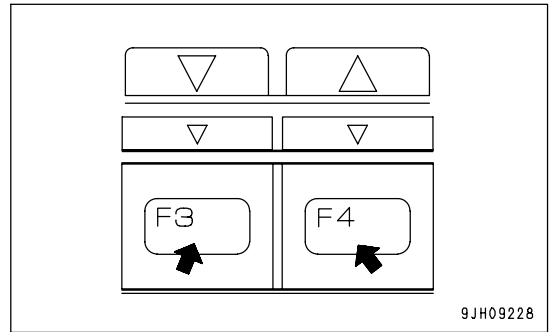
F5: Cancels change and returns to user menu.

F6: Accepts change and goes to setting for minutes.

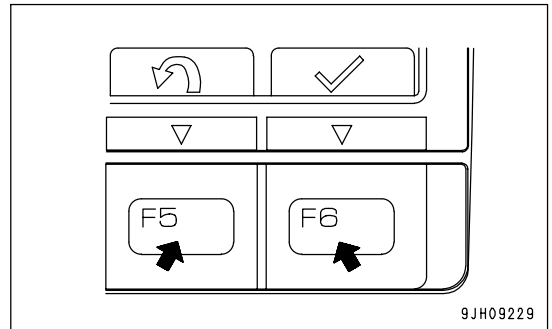


2) When minute display (c) is highlighted in orange, operate the switches as follows to adjust minute display (c).
 If it is not necessary to change the minute setting, press switch F6. If the time has been changed, always press switch F6.

- F3: Time advances 1 minute.
- F4: Time goes back 1 minute.
- F5: Cancels change and returns to user menu.
- F6: Accepts change and goes to setting for 12/24 hour display mode.



9JH09228

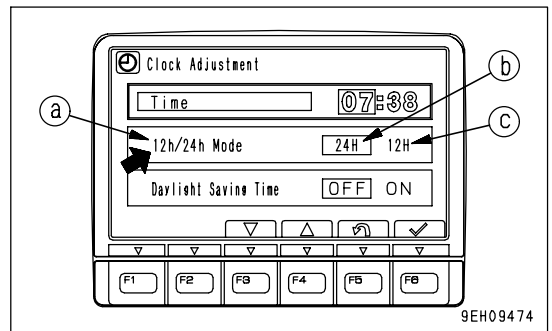


9JH09229

- 12h/24h Mode
 Choose either a 12-hour display (am/pm) or a 24-hour display.

- (b): 24-hour display
- (c): 12-hour display (am/pm)

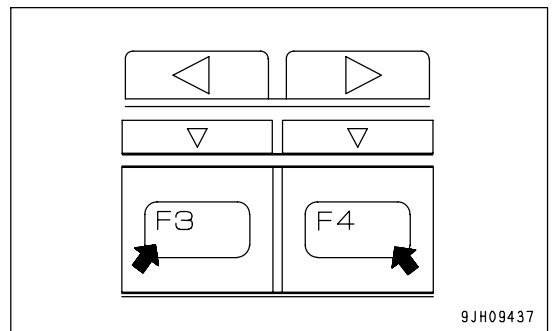
- 1) If "12h/24h Mode" (a) is not highlighted in yellow, press switch F6 to highlight "12h/24h Mode" (a) in yellow.
- 2) Change the "12h/24h mode" with the switches as follows. The selected display mode (b) or (c) is highlighted in green.



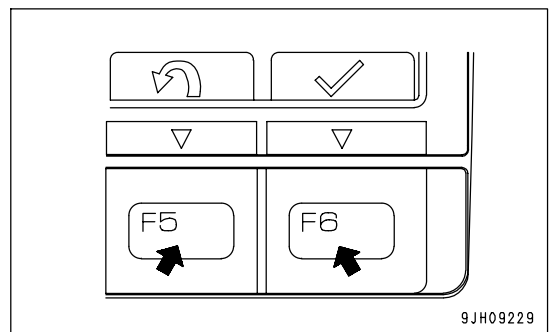
9EH09474

- F3: Moves 1 item to left.
- F4: Moves 1 item to right.
- F5: Cancels change and returns to user menu.
- F6: Accepts change and goes to setting for "Daylight Saving Time".

If the setting has been changed, always press switch F6.



9JH09437



9JH09229

• Daylight Saving Time (Summer time)

1) If daylight saving time is turned ON (a), the clock display becomes 1 hour earlier. If daylight saving time is turned OFF (b), the clock display returns to the set time.

The selected display mode is highlighted in green.

2) Change the daylight saving time with the switches as follows.

F3: Moves 1 item to left.

F4: Moves 1 item to right.

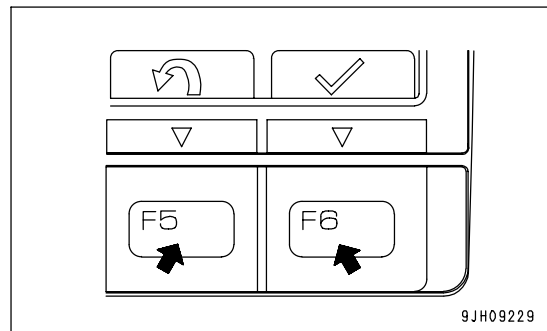
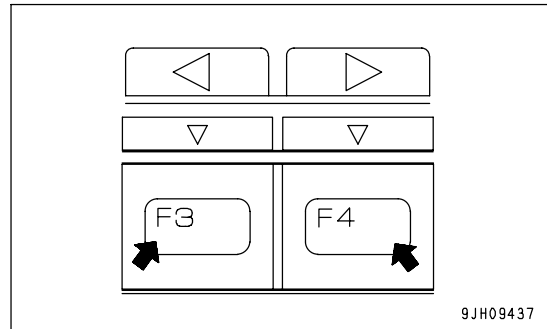
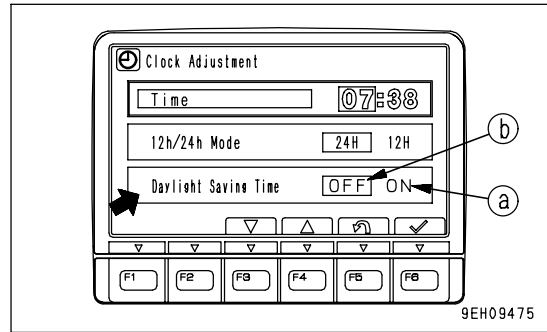
F5: Cancels change and returns to user menu.

F6: Accepts change and goes to setting for "Time".

If the setting has been changed, always press switch F6.

REMARK

Daylight saving time or summer time means moving the clock forward 1 hour to take advantage of the fact that the sun rises early in summer. This system is used in many countries during the summer.

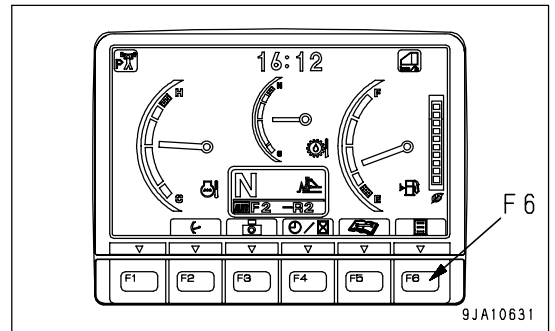


LANGUAGE SELECTION

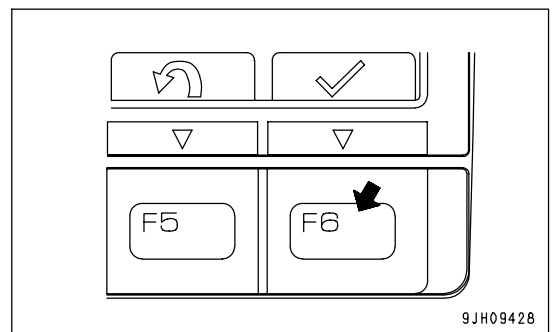
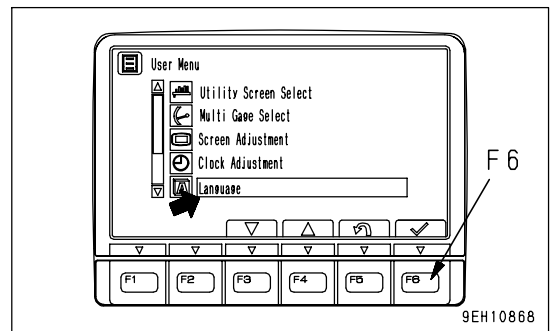
On this language selection menu, it is possible to select the language used on the monitor display.

- The languages that can be selected are as follows.
Japanese, English, Chinese, French, Spanish, Portuguese, Italian, German, Russian, Turkish

1. On the standard screen, press switch F6.



2. Select "Language" on the user menu, then press switch F6.
The screen switches to the language selection menu screen.



3. Select the language to use for the display, then press switch F6. The screen display changes to the selected language.

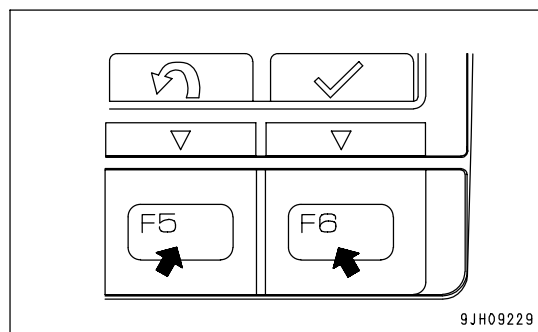
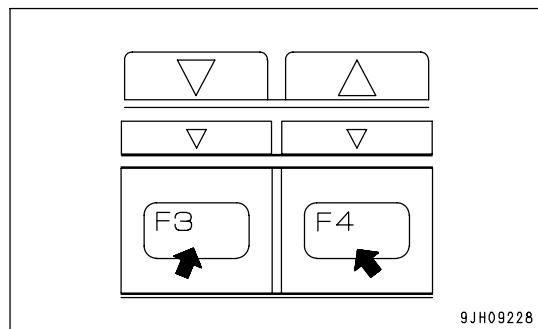
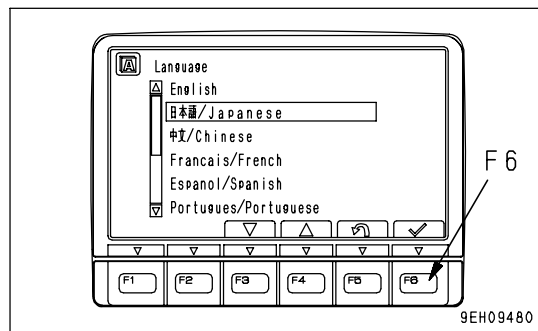
- On the language selection screen, it is possible to carry out the following operations with switches F3 to F6.

F3: Moves to item below.

F4: Moves to item above.

F5: Cancels change and returns to user menu screen.

F6: Accepts change and returns to user menu screen.



MESSAGE DISPLAY

(Machines equipped with KOMTRAX)

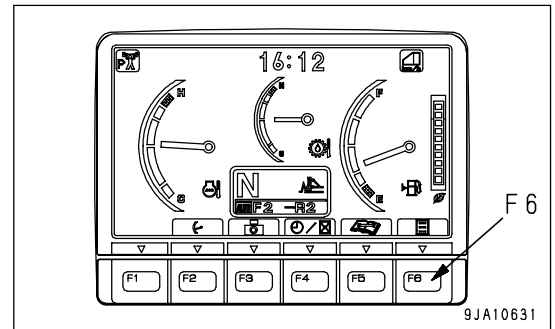
On machines equipped with KOMTRAX, it is possible to see the messages from your Komatsu distributor on this message display menu.

REMARK

At present, there is no territory where it is possible to use the message service.

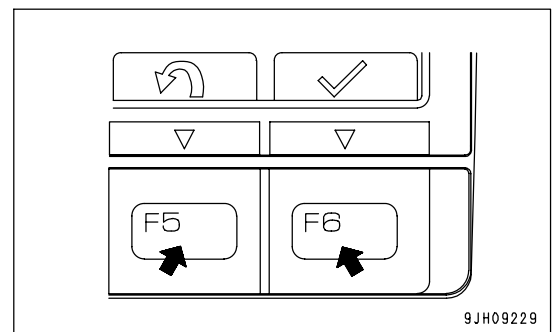
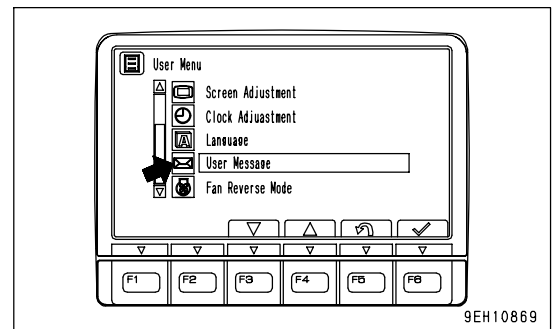
In territories where it is not possible to use the message service, the message display menu functions as follows.

1. On the standard screen, press switch F6.

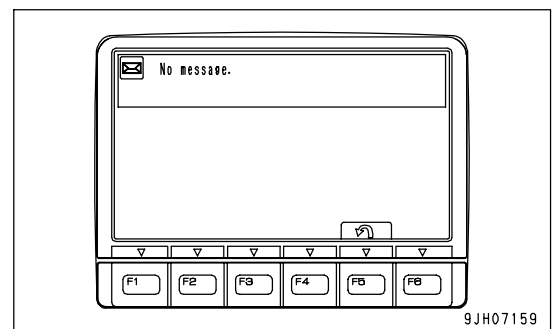


2. Select "User Message" on the User Menu, then press switch F6 to see the messages that have been received.

- If you press switch F5, the screen returns to the user menu screen.



3. "No message" is displayed on the screen.
Press switch F5 to return to the standard screen.



HYDRAULIC DRIVE FAN REVERSE MODE

CAUTION

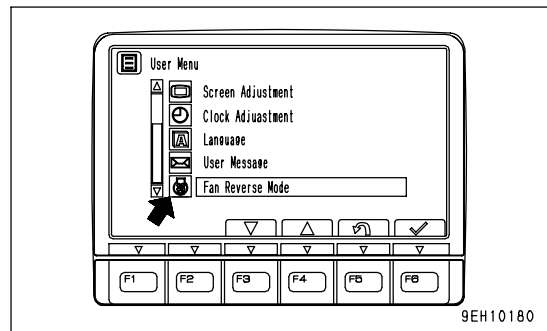
- In this mode, the fan cannot be rotated in reverse with the engine running.
- Keep parking brake lever and work equipment lock lever in the LOCK position.
- The machine cannot be driven while the fan is rotating in reverse.
- To release the cooling fan from a reverse rotation, turn the fuel control dial to the MIN position, then turn the starting switch to the OFF position and stop the engine.
- When using this mode, carry out the warming-up operation thoroughly. If the warming-up operation is not carried out, the air flow may be small.

NOTICE

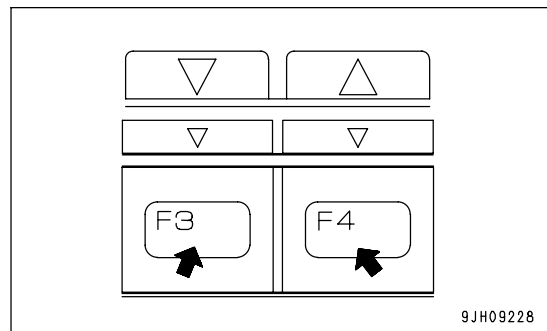
When using Fan Reverse for cleaning, use the following procedure.

1. Open both engine side covers.
2. Use the user menu to set the Fan Reverse mode.
3. Start the engine and blow out the dirt.
4. After stopping the engine, check that there is no dirt at any place. Be particularly careful to check that there is no dirt on the exhaust manifold or around the turbocharger.

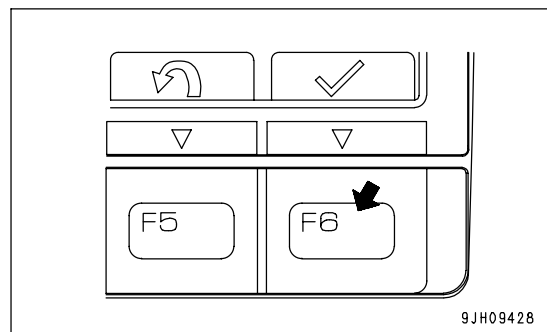
This mode is for rotating the fan in the reverse direction from normal when cleaning the radiator core. When the starting switch is ON, use switches F3 or F4 to select the item, then press switch F6 to confirm.



9EH10180



9JH09228



9JH09428

When this mode is selected, the screen in the diagram on the right appears.

When screen (A) is being shown, press switch F6 to complete the preparations for rotating the fan in reverse.

When screen (B) is being shown, the engine can be started.

REMARK

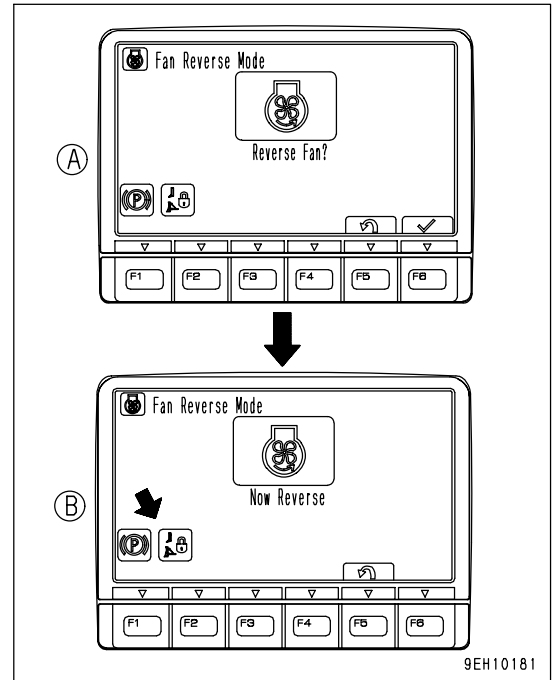
When the icons of the parking brake and work equipment lock lever are not in display, the engine cannot be started.

NOTICE

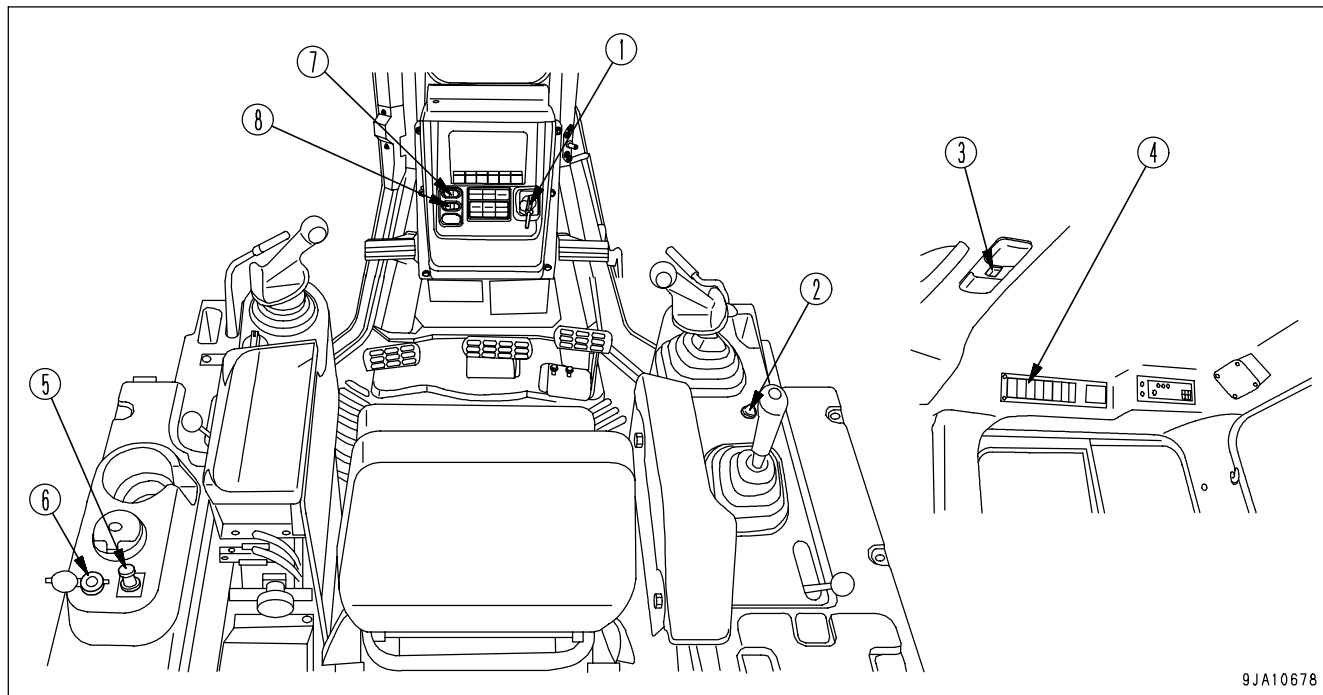
If the fan has been rotated in reverse, the electric power is not turned OFF immediately even if the starting switch is turned OFF for protection of the hydraulic circuit.

If the starting switch is turned ON before the electric power is turned OFF, the fan reverse monitor blinks, the fan keeps rotating in reverse, and the machine cannot start.

Turn the starting switch OFF, wait for at least 10 seconds, then turn the starting switch ON again.



SWITCHES



9JA10678

- | | |
|----------------------|-----------------------------|
| (1) Starting switch | (5) Cigarette lighter (24V) |
| (2) Horn switch | (6) Accessory socket (12V) |
| (3) Room lamp switch | (7) Front lamp switch |
| (4) Wiper switch | (8) Rear lamp switch |

STARTING SWITCH

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

(A): OFF position

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

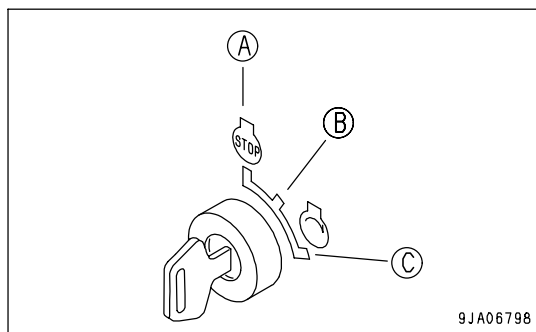
(B): ON position

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

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

(C): START position

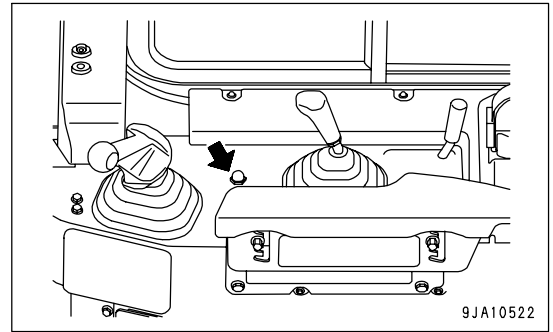
This is the position to start the engine. Hold the key at this position while cranking the engine. Release the key immediately after the engine has been started. The key will return to ON position (B) when released



9JA06798

HORN SWITCH

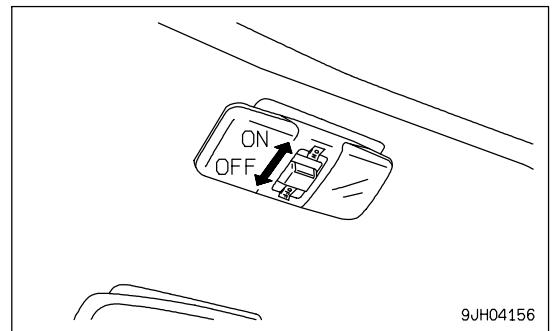
The horn sounds when the button (2) at the rear of the blade control lever at the right side of the operator's seat is pressed.

**ROOM LAMP SWITCH**

This (3) illuminates the room lamp.

OFF position: Lamp is out

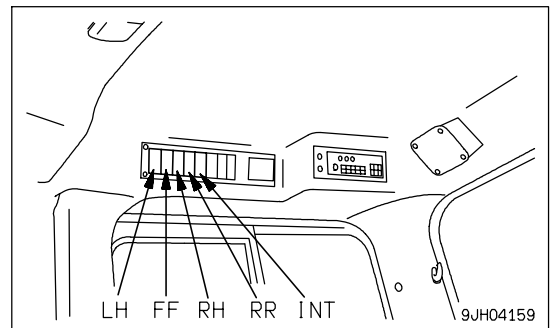
ON position: Lamp lights up

**WIPER SWITCH**

This (4) activates the wipers.

The wiper switches are as follows:

- (LH) Left door
- (FF) Front window
- (RH) Right door
- (RR) Rear window
- (INT) Wiper intermittent operation switch

**REMARK**

If the wiper blade is locked from some cause, the wiper stops automatically. The wiper starts again automatically after a certain period. Be sure to remove the cause of stop, however.

Examples of cause of stop

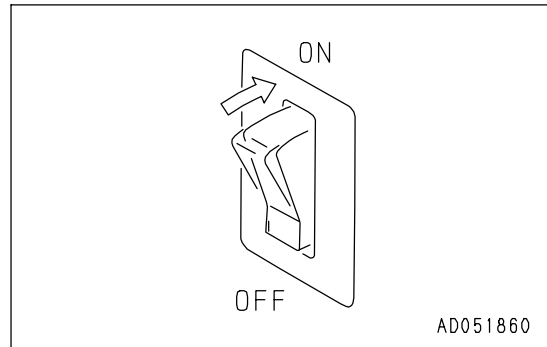
- Long operation while glass is half dry
- Foreign matter caught in arm or blade
- Snow or ice sticking to arm or blade

This is also used as the window washer switch.

The switch is operated as follows.

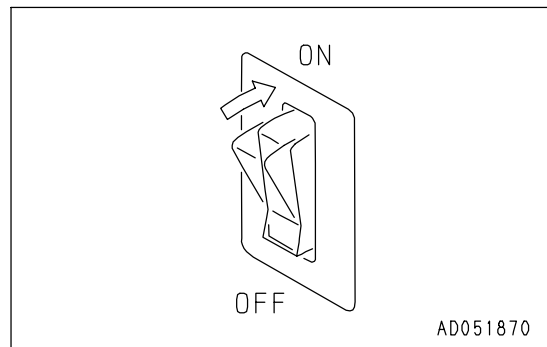
- Wiper only

If this is switched on, the wiper will start.

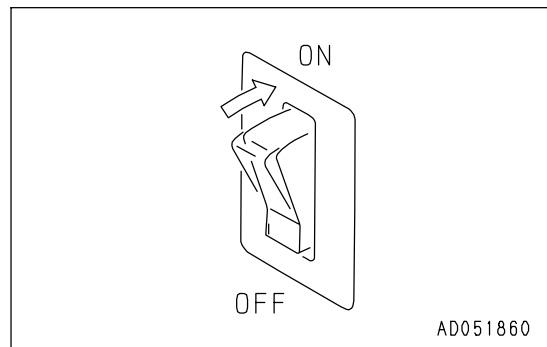


- Wiper and window washer

If this is kept pressed to the ON position while the wiper is working, water will be sprayed out.

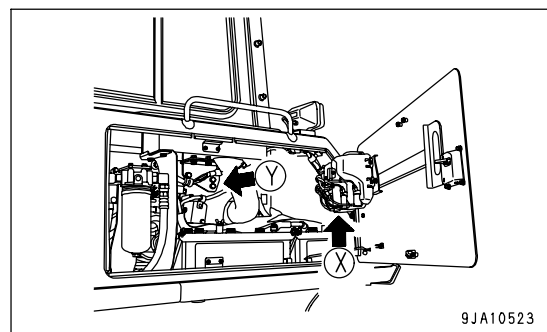


- If the intermittent switch is turned ON, all movement of the wipers will be intermittent.

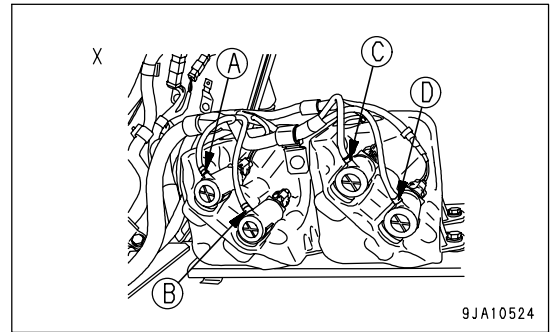


REMARK

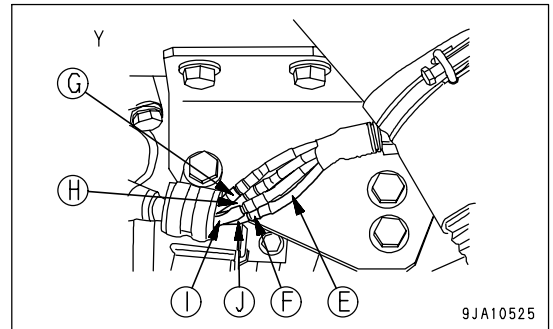
- When installing the cab, check the colors and install the washer tank and each window washer hose correctly.
- When installing the cab, carry out the operation in accordance with the cab installation procedure manual held by your Komatsu distributor.



- (A) For left (blue)
- (B) For right (red)
- (C) For rear (black)
- (D) For front (colorless)



- (E) Washer tube (tank side)
- (F) Washer tube (cab side)
- (G) Left door (blue)
- (H) Right door (red)
- (I) Rear window (black)
- (J) Front window (colorless)



CIGARETTE LIGHTER

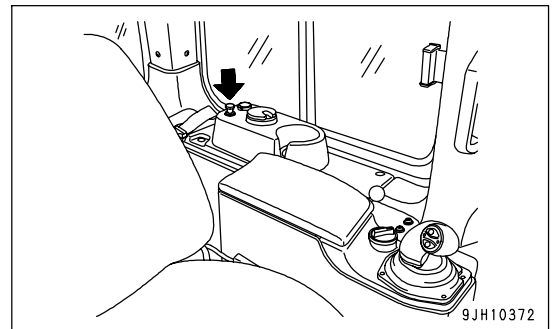
This lighter (5) is used to light cigarettes.

When the cigarette lighter is pushed in, it will return to its original position after a few seconds, so take it out to light your cigarette. By removing the cigarette lighter, the socket is available as a power source.

NOTICE

This cigarette lighter is 24V. Do not use it as the power supply for 12V equipment. This will cause failure of the equipment.

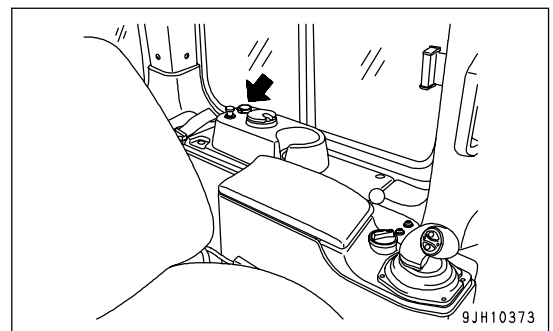
The capacity of the cigarette lighter is 120W (24V x 5A).



ACCESSORY SOCKET

This (6) is used as the power source for a wireless or other 12V equipment.

The capacity of this accessory socket is 144W (12V x 12A).



HEAD LAMP SWITCH

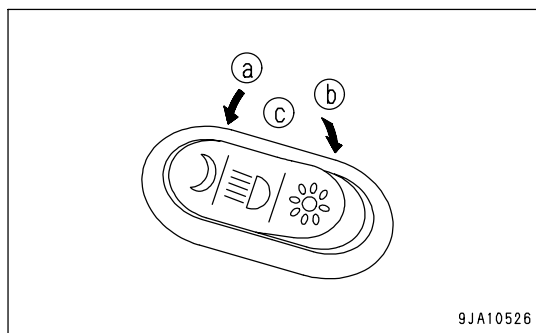
Use this switch (7) to light up the front lamps.

Positions (a) and (b): Lighted up

REMARK

If the switch is pressed at the moon mark end (a), the monitor panel lighting becomes dimmer. (Nighttime mode)

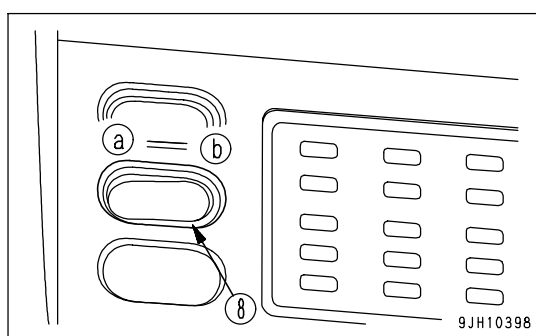
If the switch is pressed at the sun mark end (b), the monitor panel lighting does not become dimmer. (Daytime mode)

**REAR LAMP SWITCH**

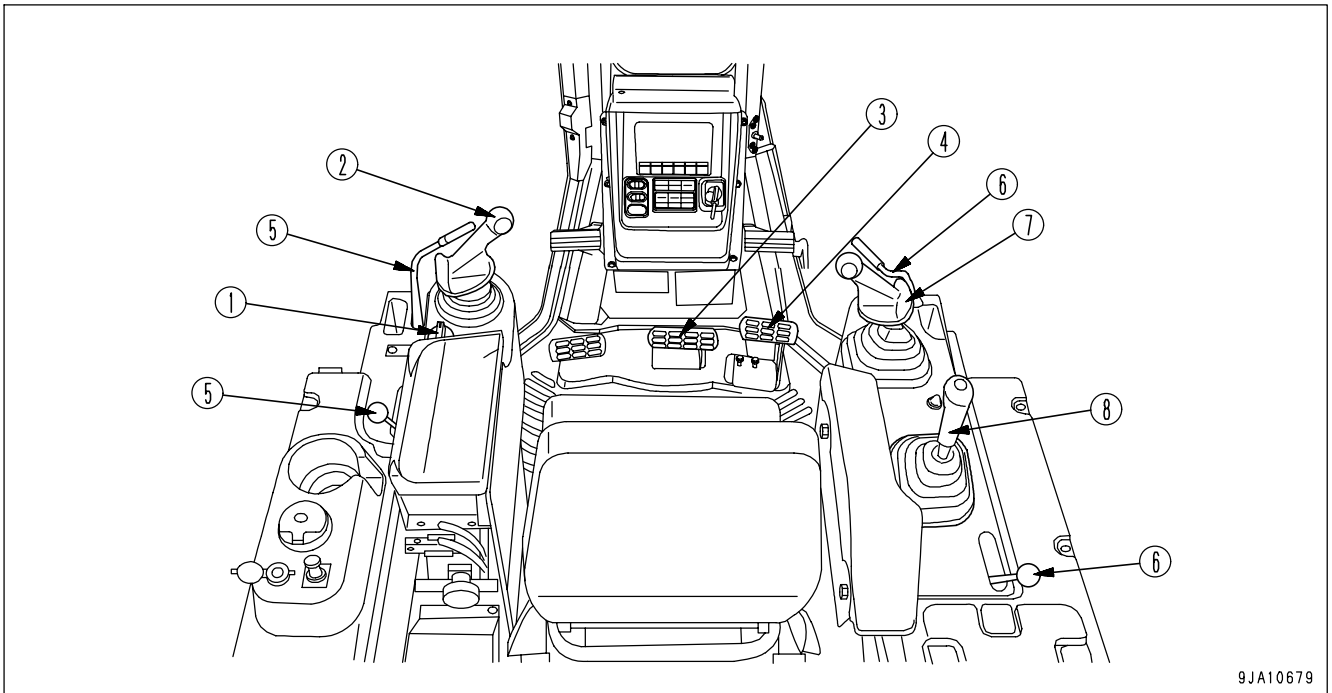
Use this switch (8) to light up the rear lamp.

ON position (a): Lighted up

OFF position (b): Out



CONTROL LEVERS AND PEDALS



9JA10679

- | | |
|---|--|
| (1) Fuel control dial | (5) Parking brake lever |
| (2) Steering, forward-reverse, gear shift lever | (6) Work equipment lock lever |
| (3) Brake pedal | (7) Blade control lever |
| (4) Deceleration pedal | (8) Ripper control lever (if equipped) |

FUEL CONTROL DIAL

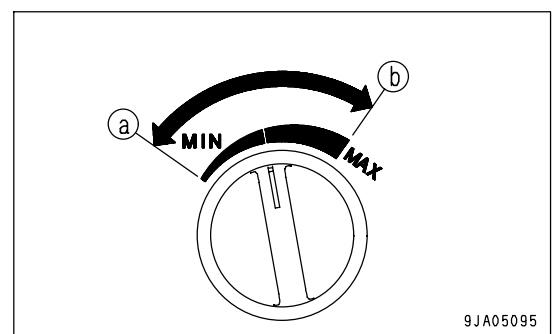
Dial (1) is used to control the engine speed and output.

(a) Low idling position: Turn fully to the left

(b) High idling position: Turn fully to the right

REMARK

When stopping the engine, turn the fuel control dial to the low idling position (MIN) and then switch off the engine.



9JA05095

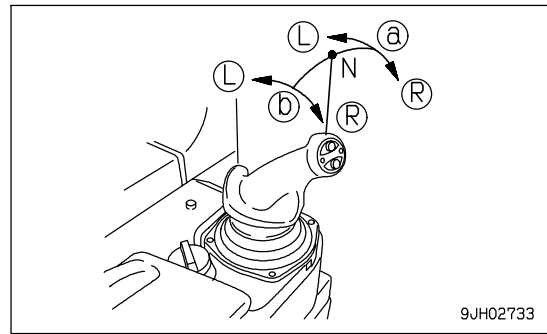
STEERING, FORWARD-REVERSE, GEAR SHIFT LEVER

(PCCS lever)

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

REMARK

PCCS: Palm command control system

**• Forward-reverse shifting**

Position (a): FORWARD

Position (b): REVERSE

Position N: Neutral

Move to the front to drive forward; move to the rear to drive in reverse.

• Steering

Position (L): Left turn

Position (R): Right turn

With the lever moved to the front or rear, operate the lever partially to the left or right to turn the machine. The machine will turn gradually in the same direction as the lever is operated.

If the lever is moved fully to the left or right, the machine will turn in a small radius.

REMARK

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

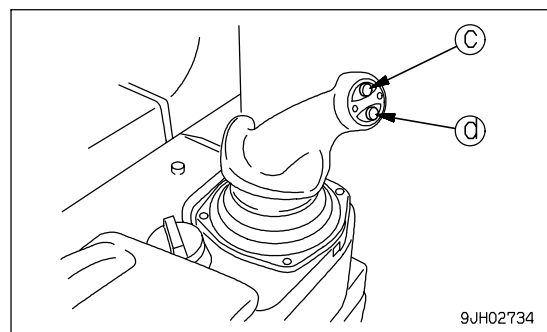
• Gear shifting

When the steering, forward-reverse, gear shift lever is in the FORWARD or REVERSE position, press switch (c) or (d) to shift the transmission.

up switch (c): Each time the switch is pressed, the transmission shifts up one speed range.

down switch (d): Each time the switch is pressed, the transmission shifts down one speed range.

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

**REMARK**

- When the transmission is shifted, the speed range being used is displayed on the speed range display on the machine monitor.

Example:

Neutral: N is displayed on the display.

FORWARD 2nd: F2 is displayed on the display.

REVERSE 3rd: R3 is displayed on the display.

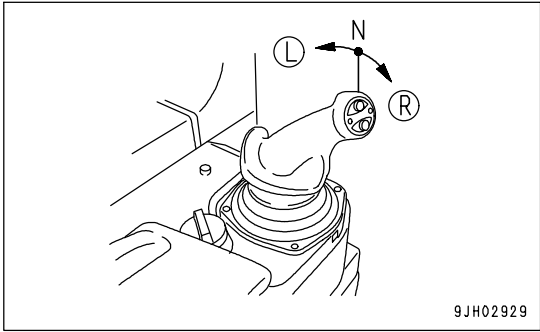
When the parking lever is locked, P is displayed.

- For details of the gearshift operation using the preset mode, see "SHIFTING GEARS (PAGE 3-123)". Preset mode selection means the operation to set the selected speed range beforehand in the N position.

• Operating counter-rotation turn

WARNING

When operating the counter-rotation turn, if the load on the left and right is not balanced, the machine may make a pivot turn, so check the ground conditions and be careful not to hit any obstacles when carrying out the operation.



With the lever in the N position, move the lever partially in the direction of turn. The left and right tracks will rotate in opposite directions, and the machine will make a slow counter-rotation turn. If the lever is moved further, the speed of the counter-rotation turn will increase.

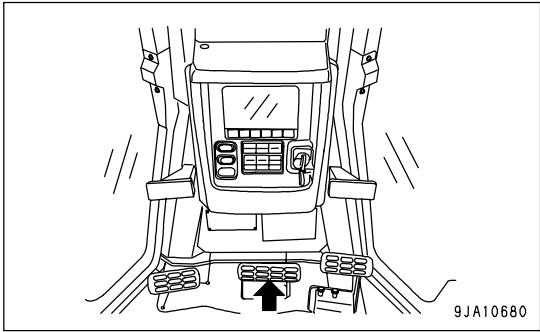
(R): Right counter-rotation turn

(L): Left counter-rotation turn

BRAKE PEDAL

WARNING

Do not place your foot on this pedal unnecessarily.

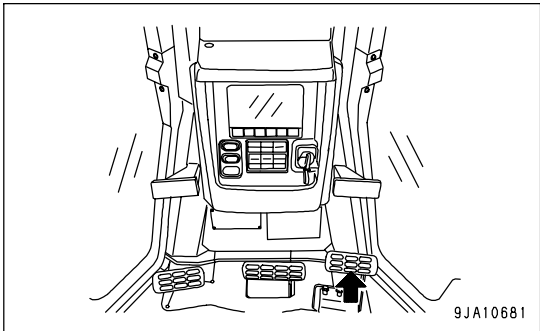


Depress the pedal (3) to apply the right and left brakes.

DECELERATOR PEDAL

WARNING

- Do not rest your foot on the pedal if you are not using it.
- When passing over the top of a slope or when dumping soil from a cliff, the load on the machine will suddenly be reduced and the travel speed will increase. This situation is dangerous, so use the decelerator pedal to reduce the travel speed of the machine



Pedal (4) is used when reducing engine speed or stopping the machine.

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

PARKING BRAKE LEVER

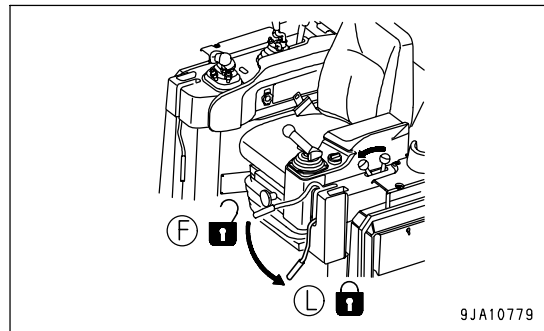
**WARNING**

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

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

REMARK

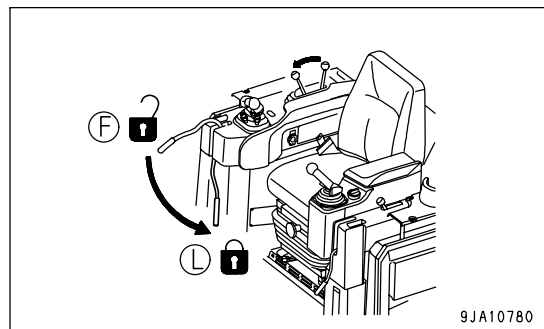
- Before moving the parking brake lever to the LOCK position, return the steering, directional, and gearshift lever to the N position.
- When starting the engine, if the parking brake lever is not in the LOCK position, the limit switch is actuated and it is impossible to start the engine.



WORK EQUIPMENT LOCK LEVER

**WARNING**

- When standing up from the operator's seat, always move the work equipment lock 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 work equipment lock lever is not completely in 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 performing maintenance, always lower the blade or ripper to the ground, then set the work equipment lock lever to the LOCK position.



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.

REMARK

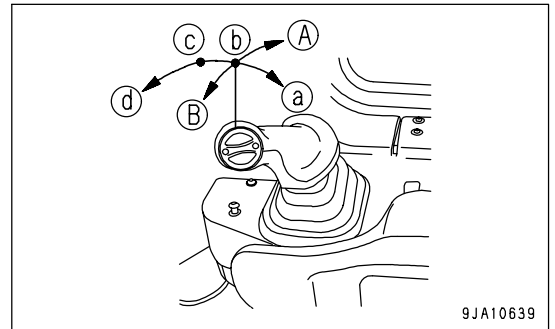
When starting the engine, to ensure safety, always place the work equipment lock lever at the LOCK position.

If the work equipment lock lever is not at the LOCK position, the limit switch is actuated and the engine will not start.

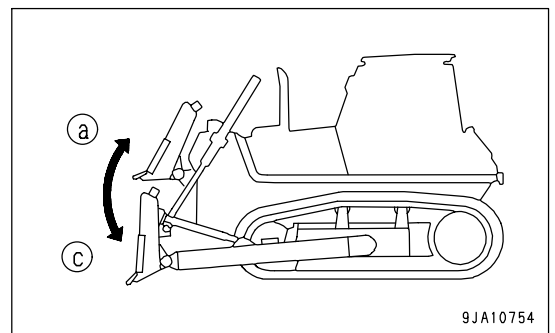
BLADE CONTROL LEVER

SIGMA DOZER

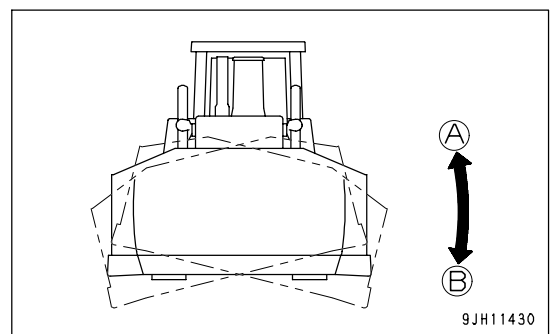
Lever (7) is used to operate the blade.



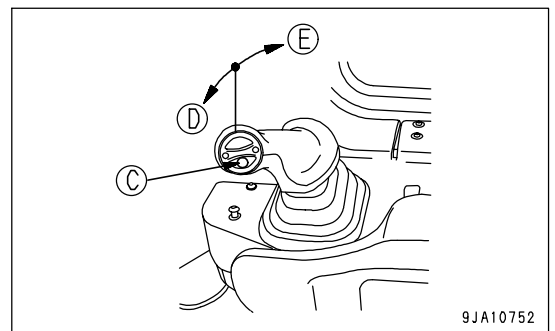
- Lifting control
 - (a) RAISE
 - (b) HOLD: Blade is stopped and held in this position.
 - (c) LOWER
 - (d) FLOAT: Blade will move freely according to external force.



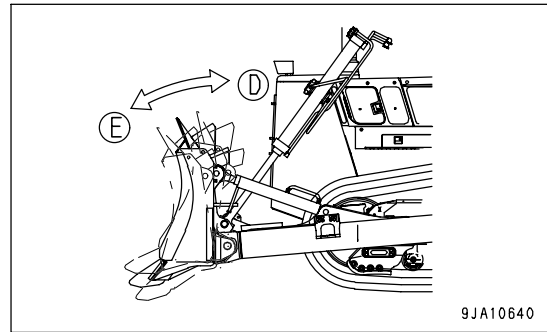
- Tilting control
 - (A) RIGHT TILT
 - (B) LEFT TILT



- Pitch control
(if equipped)
Operate while depressing pitch button (C).

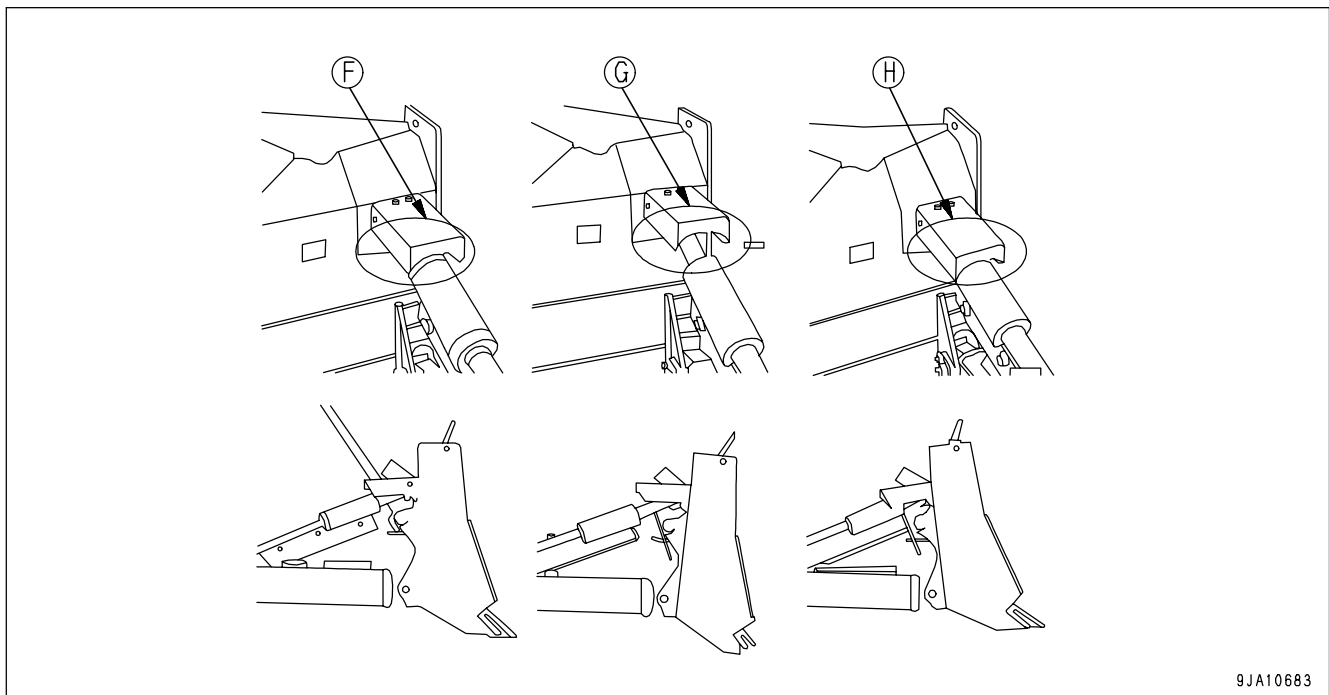


(D) REAR PITCH: Cutting angle is decreased.
 (E) FORWARD PITCH: Cutting angle is increased.



REMARK

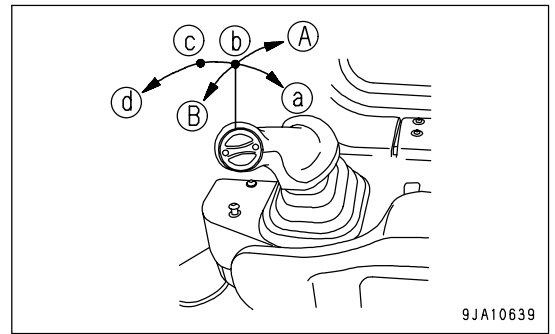
- The blade can be pitched when lever (7) is in the raise, hold or lower position.
- To pitch the blade, operate lever (7) to the left (D) or right (E) while depressing pitch button (C).
- When the blade is about the neutral cutting angle (pitch angle), the cylinder rod starts appearing from the right cylinder cover bottom (F position). If the cylinder rod is seen clear (G position), the blade is pitched in forward. If the former is not seen at all (H position), the latter is pitched in rear.
- At pushing up operation, set the blade cutting angle (pitch angle) between the neutral cutting angle to end of forward pitch angle. This setting can prevent the dirt from spilling from the bowl on the front side of the blade or over the blade top.
- When leveling the ground in reverse with the lever in the float position, set the blade at the neutral blade cutting angle (pitch angle) to finish the ground surface better.



(F)	(G)	(H)
Position at which cylinder rod starts appearing	Position at which cylinder rod is seen clear	Position at which cylinder rod is not seen at all
Neutral pitch angle	Forward pitch	Rear pitch

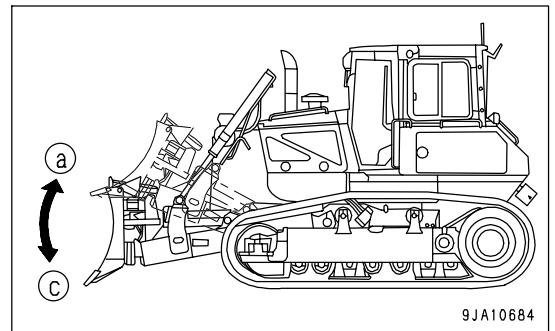
POWER ANGLE POWER TILT DOZER

Lever (7) is used to operate the blade.



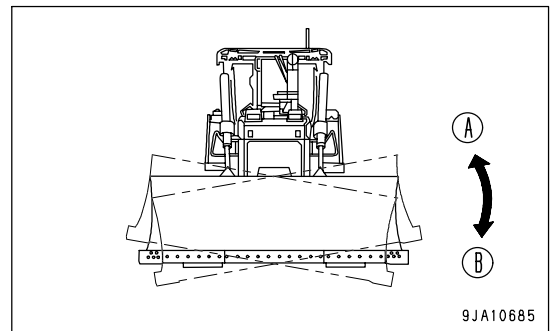
• Lifting control

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



• Tilting control

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



• Angling control

Turn the knob to the right or left to angle the blade.

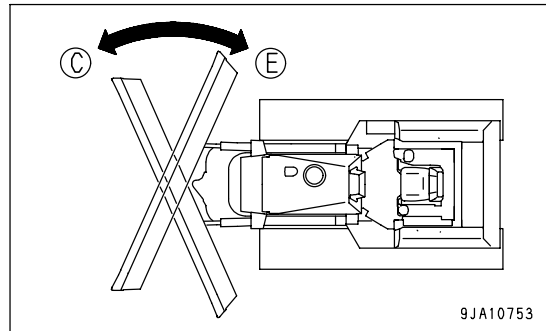
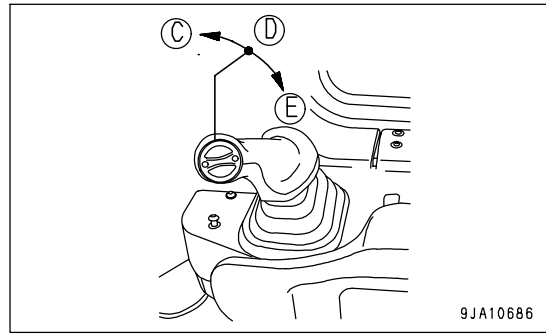
(C) LEFT ANGLE

(D) HOLD: Blade is stopped and held in this position.

(E) RIGHT ANGLE

REMARK

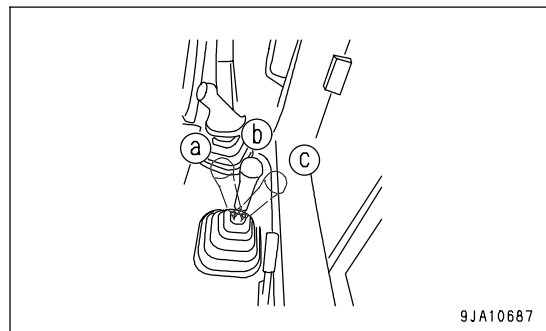
- When performing only angling operation, be sure to set the lever in the HOLD position and turn the knob to the right or left.
- If the angling operation is performed while the lever is not in the HOLD position (while either or both of lifting and tilting operations are performed), all of those operations can be continued, but the moving speed of the blade is lowered. Select the operations according to the type of the work.
- If the lifting or tilting operation is performed while angling operation is performed, the machine moves similarly to the above.



RIPPER CONTROL LEVER

(if equipped)

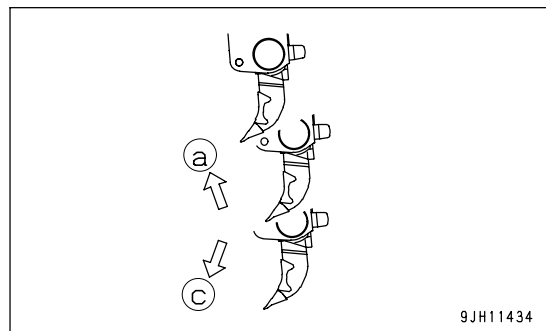
This lever (8) is used to operate the ripper.



(a) RAISE

(b) HOLD: Ripper is stopped and held in the same position.

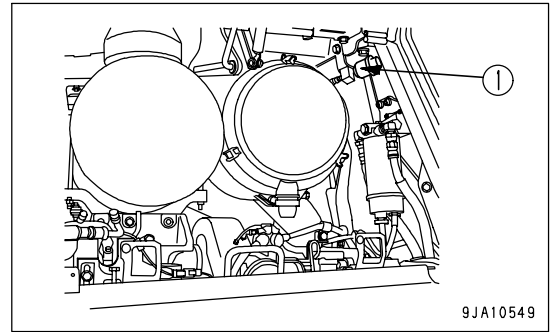
(c) LOWER



DUST INDICATOR

This is equipment to warn the operator that the air cleaner element has clogged up.

For an element cleaning method, see "CHECK, CLEAN AND REPLACE AIR CLEANER ELEMENT (PAGE 4-20)".



FUSE

NOTICE

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

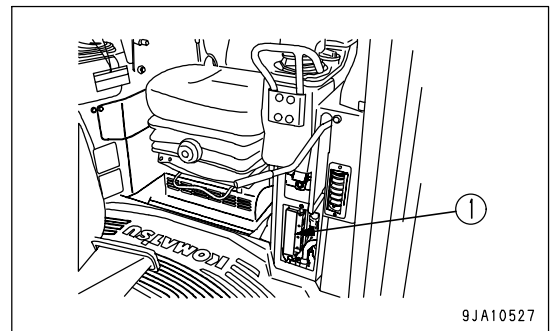
The fuses protect the electrical equipment and wiring from burning out.

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

Replace the fuse with another of the same capacity.

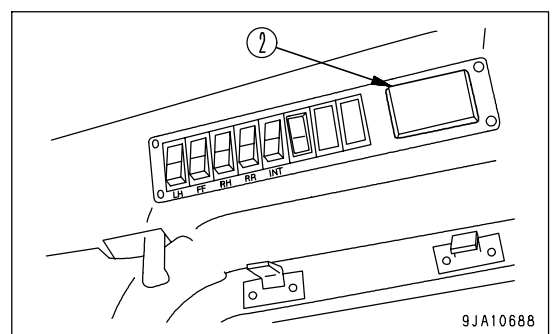
- Chassis

Fuse box (1) is installed under the inspection cover in front of the left console.



- Cab (machines equipped with cab)

Fuse box (2) is installed in the overhead panel.



FUSE CAPACITY AND CIRCUIT NAME

Fuse box (1)

NO.	Fuse capacity	Circuit
1	20A	Starting switch
2	15A	Constant power source for controller
3	30A	Engine controller
4	15A	Constant power source for cab
5	15A	Power train controller
6	5A	ACC power source (engine)
7	5A	Horn
8	5A	Backup alarm
9	20A	Ribbon heater, Air suspension seat
10	20A	Spare power source
11	20A	Front lamp
12	20A	Rear lamp
13	20A	Air conditioner
14	-	-
15	-	-

Fuse box (2)

NO.	Fuse capacity	Circuit
1	10A	Radio memory
2	20A	Additional lamp (optional) Revolving warning lamp (optional)
3	20A	12V converter
4	20A	Radio, room lamp, cigarette lighter, intermittent wiper
5	10A	Front wiper, rear wiper
6	10A	Left and right door wiper

FUSIBLE LINK

NOTICE

When replacing a fusible link, be sure to turn the power source (starting switch) OFF.

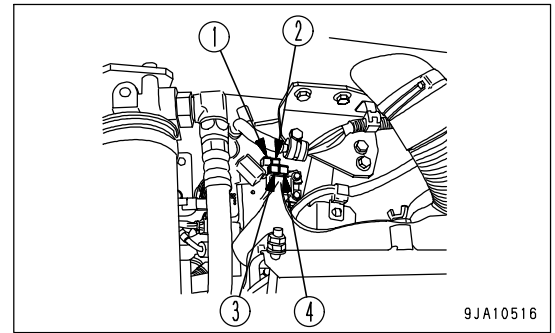
If the starting switch does not work, any of the electrical equipment in the operator's cab does not work, or the pre-heater does not work, a fusible link built in the wiring harness is suspected to be disconnected. In that case, check the link and replace it with a new one, if necessary.

REMARK

A fusible link refers to the large-sized fuse installed in the high current flow portion of the circuit to protect electrical components and wiring from burning, in the same way as an ordinary fuse.

Open the battery cover on the left side of the machine and then open the fusible link case cover, and you see fusible links (1) - (4).

NO.	Fuse capacity	Circuit
1	50A	Cab power source
2	120A	Main power source
3	120A	Ribbon heater
4	50A	Constant power source



ELECTRIC POWER TAKE-OUT ADAPTER

In-cab electric power take-out adapter

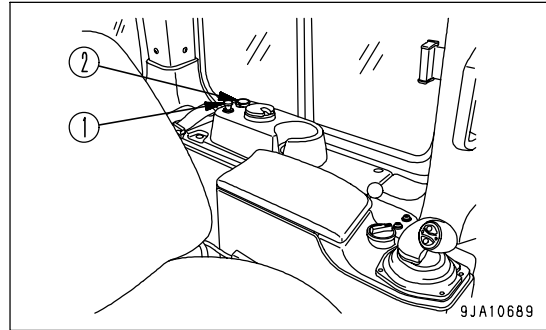
NOTICE

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

The cigarette lighter socket (1) can be used as a power source for 24V equipment and the accessory socket (2) can be used for 12V equipment.

Capacity of cigarette lighter : 120W (24V x 5A)

Capacity of accessory socket : 144W (12V x 12A)



REMARK

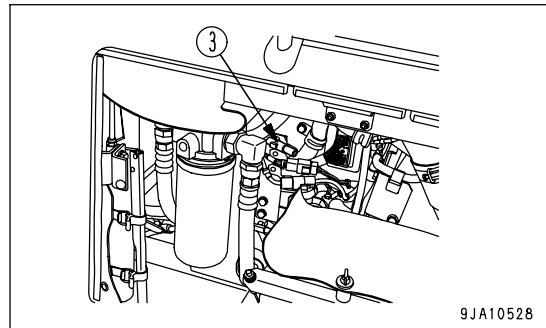
This adapter is not provided in a machine with the ROPS canopy.

Out-of-cab electric power take-out adapter

NOTICE

- Do not use as a power supply for 12V equipment.
This will cause failure of the equipment.
- When using as a power supply pickup, do not install equipment which exceeds 120W (24V x 5A).

1. Open the battery cover on the left side of the machine body.
2. There is the connector for the spare power take-off.
(Connector AUX0 (3) can be used.)



OIL FILLER CAP

METHOD OF OPENING AND CLOSING HYDRAULIC TANK FILLER CAP

The method of opening or closing the hydraulic tank filler cap is as follows.

Use the starting switch key to open and close the cap.

OPENING THE CAP

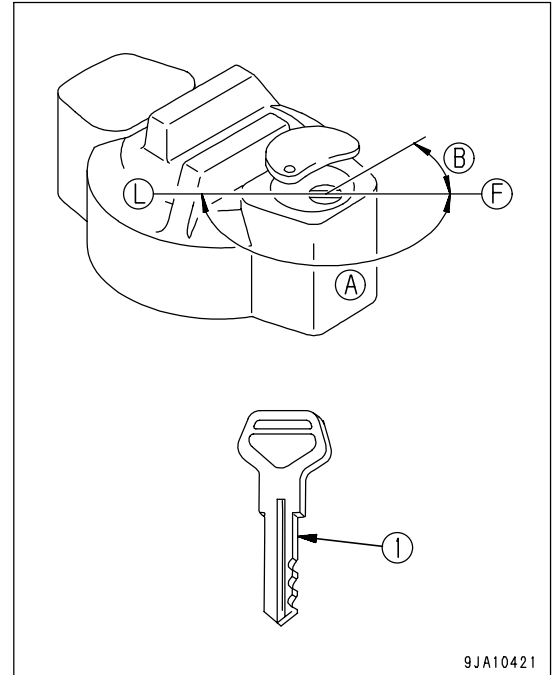
1. Insert the key. Make sure that you have inserted the key fully (1) before turning it. If the key is turned when only partially inserted, it may break.

(L) : Lock position

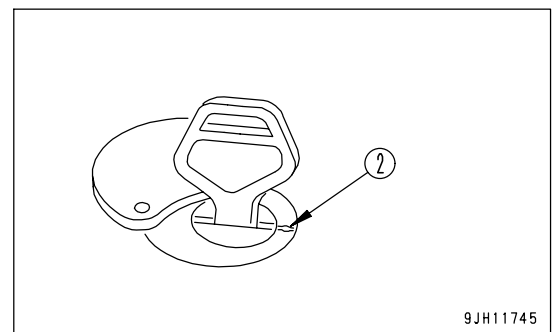
(F) : Open position

(A) : working angle of key 180°

(B) : 45°



2. Turn the key counterclockwise to align the match mark (2) 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.



LOCKING THE CAP

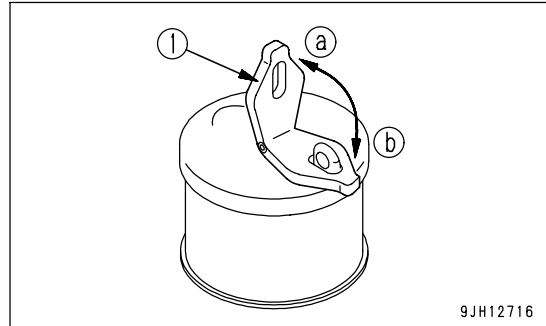
1. Turn the cap into place.
2. Turn the key clockwise and take the key out.

METHOD OF OPENING AND CLOSING FUEL TANK CAP

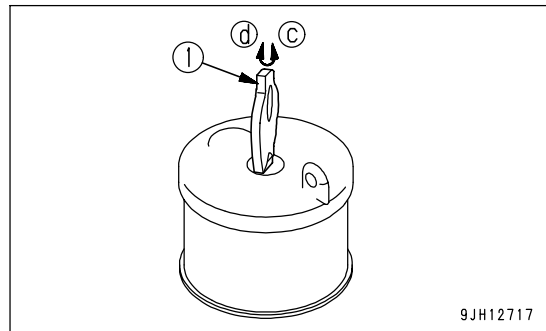
The method of opening or closing the fuel tank cap is as follows.

OPENING THE CAP

1. Raise lever (1) in the (a) direction.
2. When lever (1) is turned in the (c) direction (counterclockwise) by approx 35°, it stops at the stopper, and the cap can be opened.

**CLOSING THE CAP**

1. After turning lever (1) in the (c) direction (counterclockwise), keep it in that position and fit the cap.
2. Turn lever (1) in the (d) direction (clockwise) until it stops at the stopper, and then tilt it in the (b) direction.

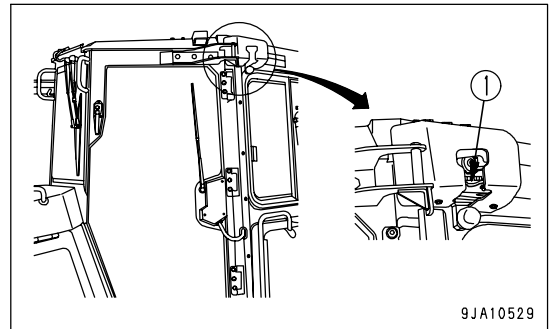


DOOR - OPEN LOCK

(Machine equipped with cab)

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

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

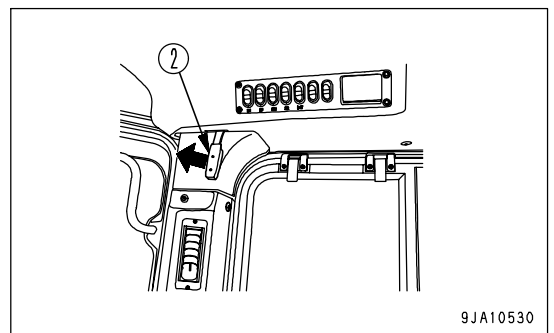


9JA10529

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.



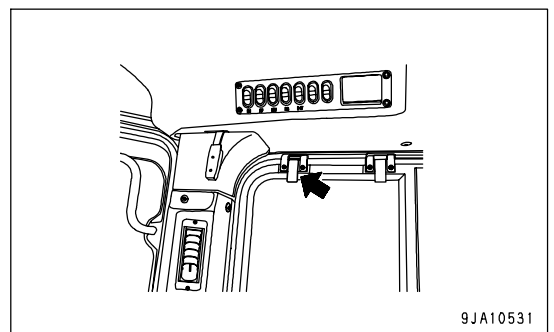
9JA10530

SASH GLASS INTERMEDIATE LOCK

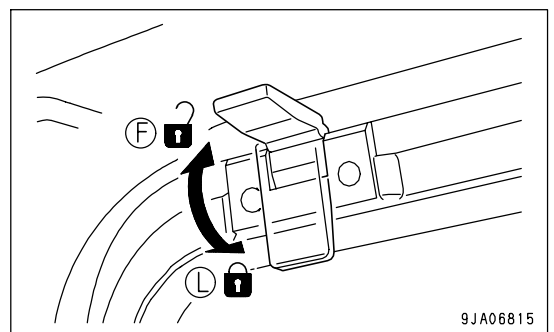
(Machine equipped with cab)

When working with the cab sash glass open, use this lock to prevent the glass from chattering.

- When the lever is in the FREE position (F), the glass can be opened or closed.
- When the lever is in the LOCK position (L), the glass is held in position.



9JA10531



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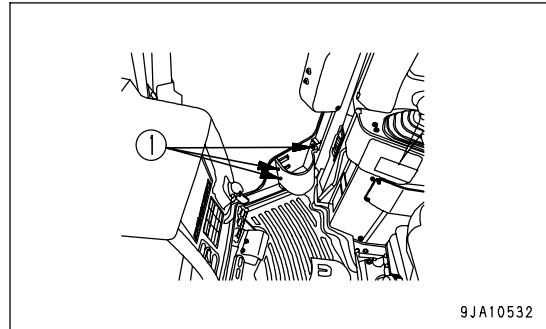
DOOR POCKET

(Machine equipped with cab)

These are inside the left and right doors and can be used for keeping small objects.

Do not put heavy objects such as tools in the pockets.

If the pocket is dirty, turn 3 bolts (1), remove the pocket, and wash it in water.

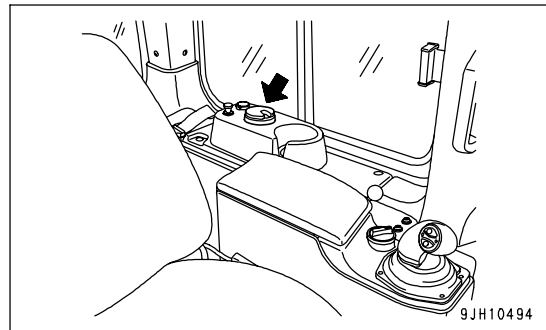


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ASHTRAY

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

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

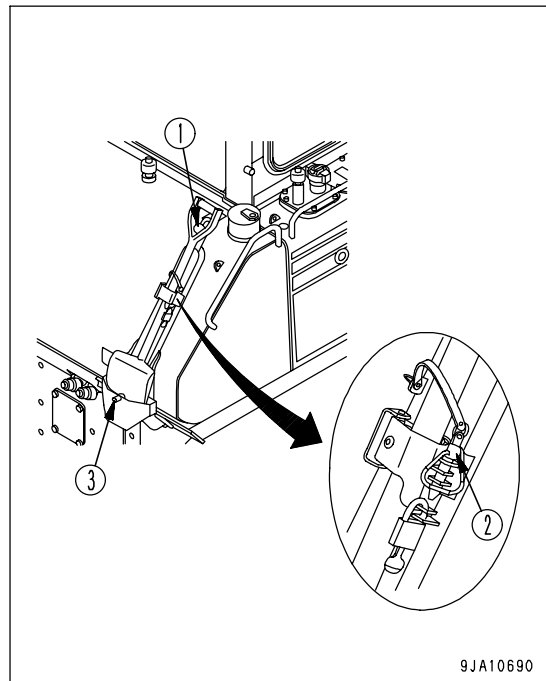


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SHOVEL HOLDER

This can be used for storing a shovel with a rounded blade.

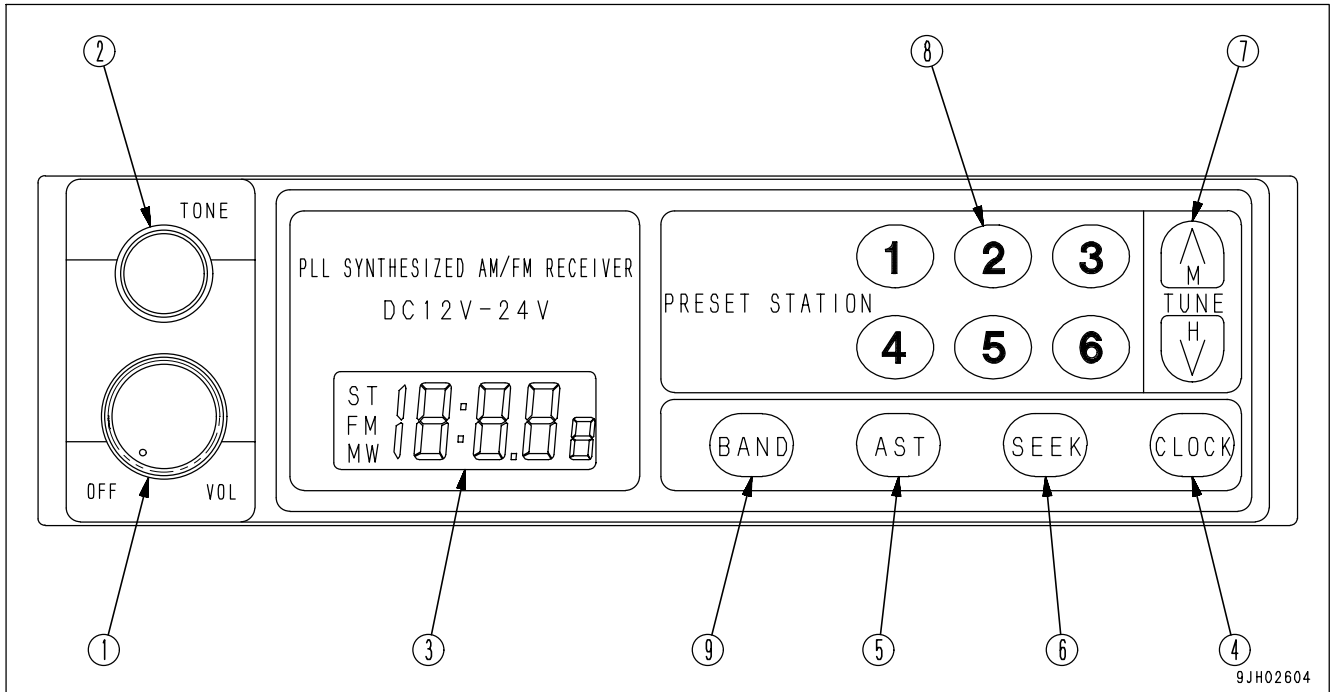
- Method of installing
 1. Position the shovel with stopper(1) and holder(2).
 2. Tighten the adjustment nut (3) so the shovel does not move.



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CAR RADIO, HANDLING

(Machine equipped with cab)

EXPLANATION OF COMPONENTS

- | | |
|-------------------------------------|----------------------------------|
| (1) Power switch, volume knob | (6) Seek button (SEEK) |
| (2) Tone control knob | (7) Tuning button |
| (3) Display | (8) Preset station buttons |
| (4) Display selector button (CLOCK) | (9) FM/AM selector button (BAND) |
| (5) Station selector button (AST) | |

POWER SWITCH, VOLUME KNOB

When this knob (1) is turned clockwise from the OFF position, a click is heard and the power is turned on. If it is turned further clockwise, the sound from the speakers will gradually increase.

TONE CONTROL KNOB

When this knob (2) is turned clockwise, the high tone is emphasized; when it is turned counterclockwise, the high tone is reduced.

DISPLAY

This display (3) shows the time and the frequency of the signal being received.

DISPLAY SELECTOR BUTTON (CLOCK)

When this button (4) is pressed, the display switches to the clock display. If it is pressed again, the radio frequency is displayed.

STATION SELECTOR BUTTON (AST)

When this button (5) is pressed, the preset stations are called up in turn. When the desired broadcasting station is reached, press the button again to stop it.

If this button is kept pressed for 2 seconds, it switches to auto memory.

SEEK BUTTON (SEEK)

When this button (6) is pressed, it automatically searches for stations that can be received. When it finds a station that can be received, it stops.

TUNING BUTTON

When the ∨ part of this button (7) is pressed, the frequency goes up; when the ∧ part of this button (7) is pressed, the frequency goes down. If the button is kept pressed, the frequency changes continuously.

PRESET BUTTON

When this button (8) is pressed, it is possible to preset one station each for FM and AM.

For details of the method of presetting, see "METHOD OF PRESETTING (PAGE 3-73)".

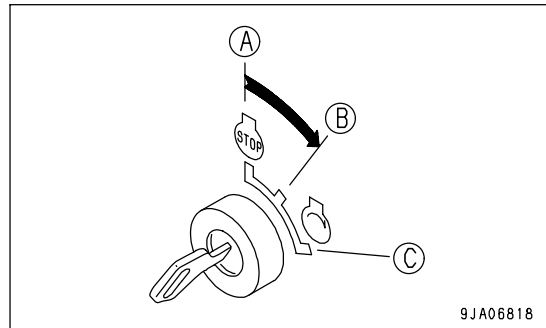
FM/AM SELECTOR BUTTON (BAND)

When this button (9) is pressed, the band switches between FM and AM. Each time the button is pressed, it switches AM → FM → AM.

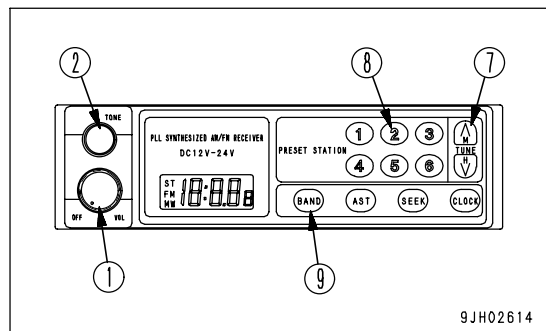
METHOD OF OPERATION

METHOD OF LISTENING TO RADIO

1. Turn the starting switch to the ON position (B), then turn radio power switch (1) ON.
2. Use BAND button (9) to select AM or FM.
3. Select the channel with PRESET STATION button (8) or TUNE button (7).
4. Turn volume knob (1) and TONE control knob (2) to set to the desired volume and tone.
5. To turn the radio OFF, turn the power switch (1) counterclockwise until a click is heard.



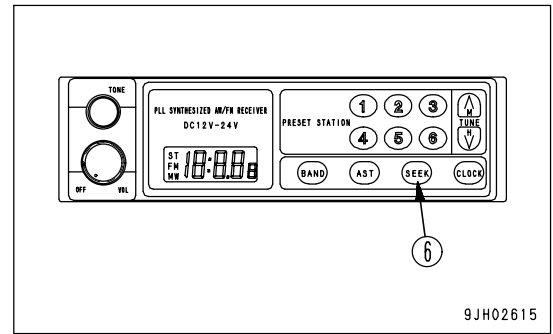
9JA06818



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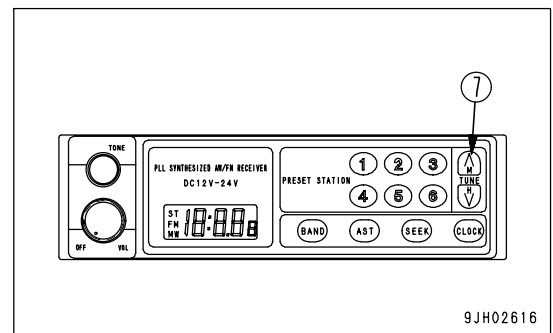
METHOD OF AUTOMATIC TUNING

When SEEK button (6) is pressed, the frequency will move up to a channel that can be received, and then will stop automatically.



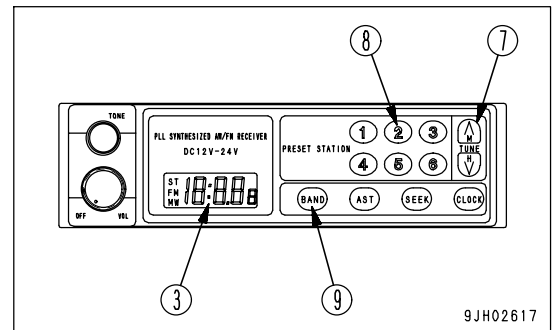
METHOD OF MANUAL TUNING

If the ∨ part of TUNE button (7) is pressed, the frequency will go up; if the ∧ part of the button is pressed, the frequency will go down. If the button is kept pressed, the frequency will move up or down continuously.



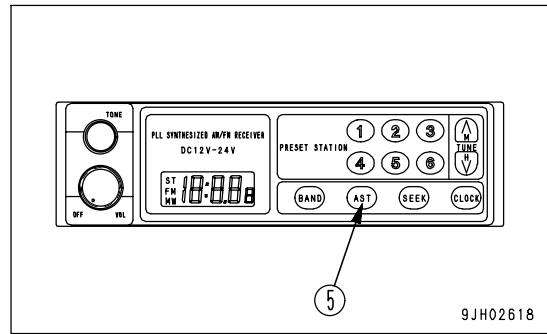
METHOD OF PRESETTING

1. Select the desired preset station.
Use BAND button (9) to select FM or AM, then use TUNE button (7) to select the frequency of the broadcasting station.
2. Decide one of preset buttons (8) to be used for the preset station, and keep it pressed for 2 seconds. The number of the button will be shown on display (3) and the presetting is completed.
3. Repeat Steps 1 - 2 to preset the other broadcasting stations.
 - To change the setting of a preset button to another station, repeat Steps 1 - 2.
 - If the battery is replaced or the power is switched off, all the preset settings are deleted. Carry out the presetting operation again.
 - It is possible to preset 6 FM and 6 AM stations.



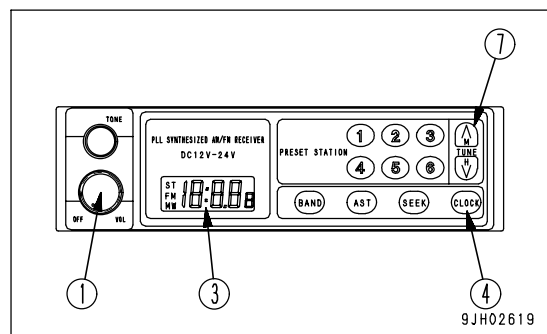
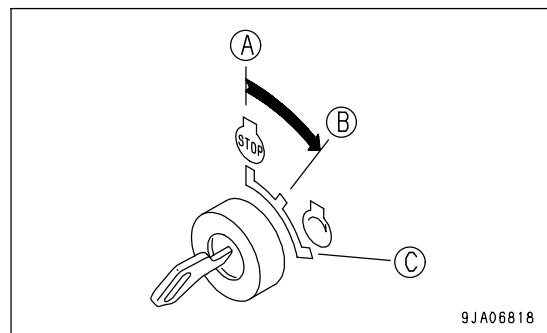
METHOD OF USING AUTO MEMORY

If AST button (5) is kept pressed for 2 seconds, the broadcasting stations that can be received in the area are called up in turn, and the broadcasting stations are automatically saved in the preset memory.



METHOD OF SETTING TIME

1. Turn the starting switch to the ON position (B), then turn radio power switch (1) ON.
If display (3) is showing the frequency, press display selector button (4) to display the time.
2. To set the time, keep the CLOCK button (4) pressed, and Press the ∨ part of TUNE button (7) to change the minutes
Press the ∧ part of TUNE button (7) to change the hours



MONAURAL/STEREO AUTOMATIC SELECTION RECEPTION

If the reception of the FM stereo broadcast is weak (when you are far from the broadcasting station or are surrounded by hills), the radio is automatically switched from stereo to monaural to reduce the interference. When the stereo broadcast becomes stronger, it automatically switches back to stereo broadcasting.

ANTENNA**NOTICE**

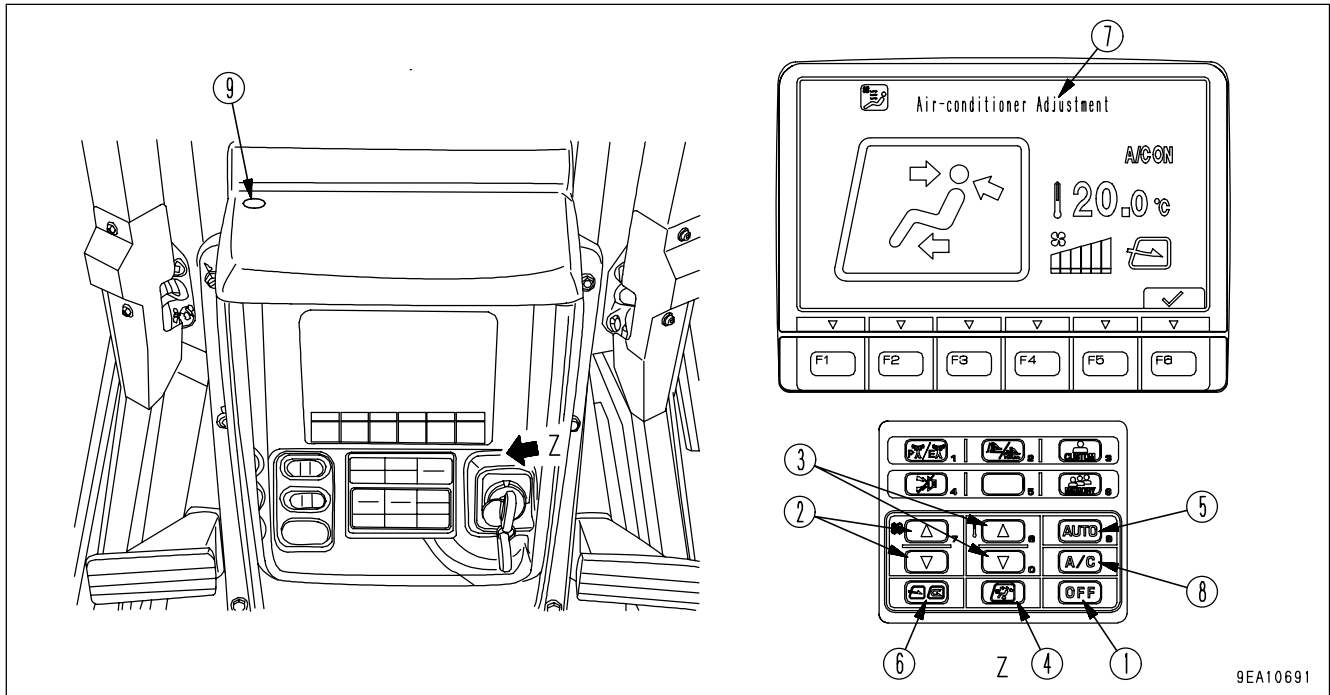
When transporting the machine or when parking it in a garage, lower the antenna and make sure that it does not contact anything.

PRECAUTIONS WHEN USING

- To ensure safety, always keep the sound to a level where it is possible to hear outside sounds during operation.
- If water gets into the speaker case or radio, it may lead to an unexpected failure, so be careful not to get water on the equipment.
- Do not wipe the scales or buttons with solvent such as benzene or thinner. Wipe with a dry soft cloth. If the dirt cannot be removed easily, soak the cloth with alcohol.
- When the battery is replaced, the settings for the preset buttons are all cleared, so set them again.

AIR CONDITIONER, HANDLING

GENERAL LOCATIONS OF CONTROL PANEL



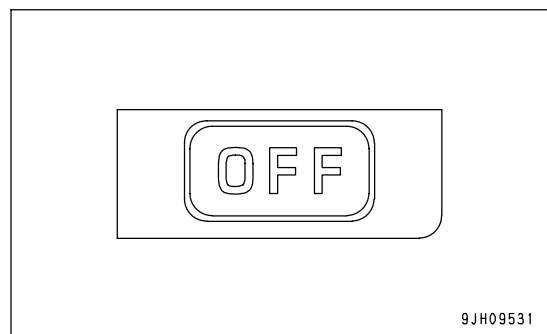
- (1) OFF switch
- (2) Fan switch
- (3) Temperature control switch
- (4) Vent selector switch
- (5) Auto switch
- (6) FRESH/RECIRC selector switch
- (7) Display monitor
- (8) Air conditioner switch
- (9) Sunlight sensor

OFF SWITCH

Switch (1) is used to stop the fan and air conditioner.

REMARK

Even if this switch (1) is pressed, the monitor screen does not switch to the air conditioner adjustment screen.

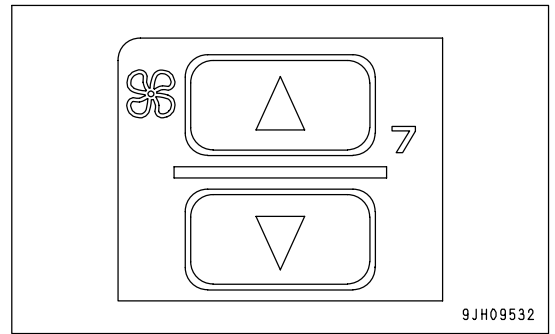


FAN SWITCH

Switch (2) is used to adjust the air flow.

The air flow can be adjusted to six levels.

- Press the \triangle switch to increase the air flow; press the ∇ switch to decrease the air flow.
- During auto operation, the air flow is automatically adjusted.



A: Liquid crystal display

B: Air flow

a: Air flow "low"

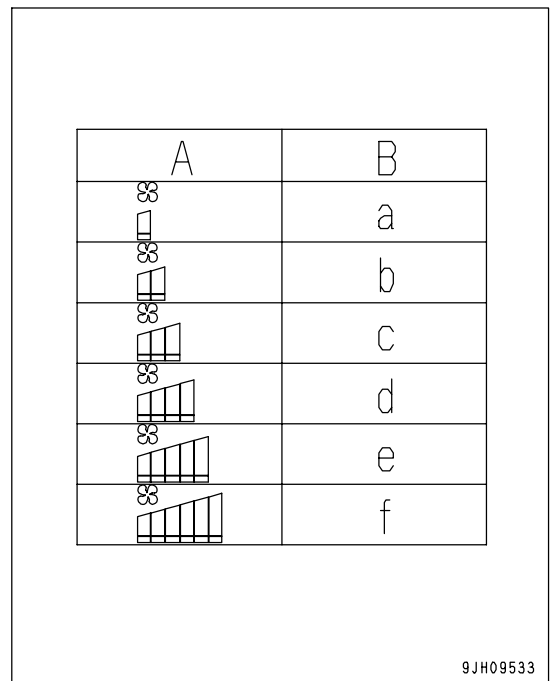
b: Air flow "medium 1"

c: Air flow "medium 2"

d: Air flow "medium 3"

e: Air flow "medium 4"

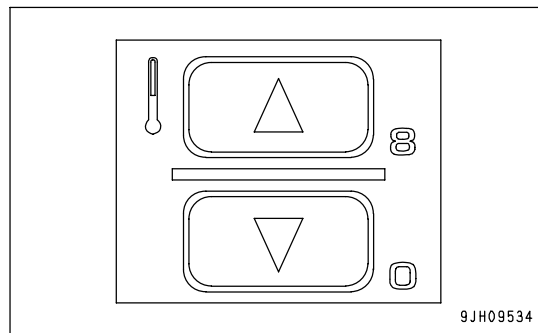
f: Air flow "high"



TEMPERATURE CONTROL SWITCH

Switch (3) is used to control temperature inside the cab. The temperature can be set between 18°C (64.4°F) and 32°C (89.6°F).

- Press the \triangle switch to raise the set temperature; press the ∇ switch to lower the set temperature.
- The temperature is generally set at 25°C (77°F).
- The temperature can be set in stages of 0.5°C (0.9°F).



<Monitor display and the function>

Monitor display °C	Set temperature
18.0	Max. cooling
18.5 to 31.5	Adjusts temperature inside cab to set temperature
32.0	Max. heating

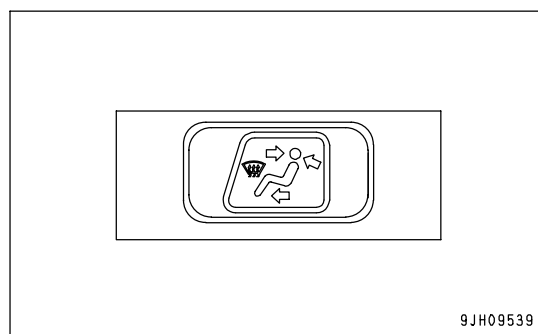
REMARK

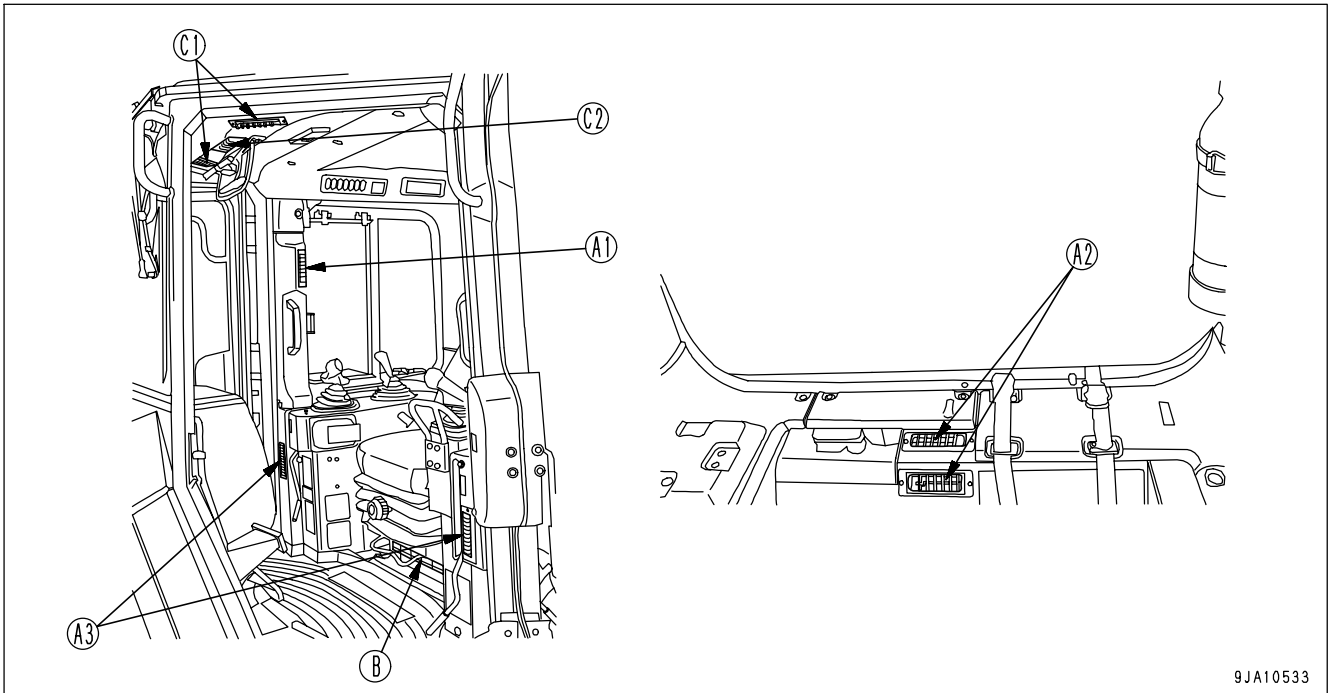
If the mode is set to auto mode and the temperature setting is set to 18.0 °C (64.4 °F) or 32.0 °C (89.6 °F), the air flow from the fan is always set to HIGH and does not change even when the set temperature is reached.

VENT SELECTOR SWITCH

Switch (4) is used to select the vents.

- When switch (4) is pressed, the display on monitor display (7) switches and air blows out from the vents displayed.
- During automatic operation, the vents are automatically selected.





9JA10533

- (A1): Face vent (right and left 1 place)
- (A2): Rear vent (2 places)
- (A3): Front vent (2 place)
- (B): Foot vent (2 place)
- (C1): Door glass vent (right and left 1 places)
- (C2): Front window glass vent (1 place)

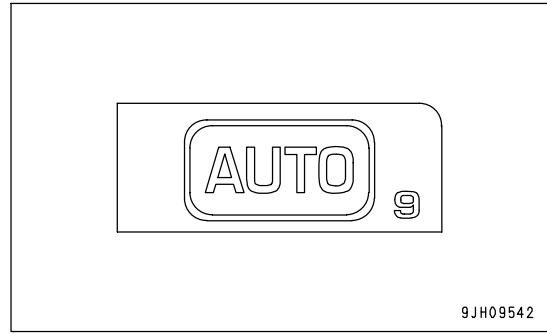
Liquid crystal display	Vent mode	Vent			Remarks
		(A)	(B)	(C)	
	Front and rear vents	○			-
	Front, rear and foot vents	○	○		-
	Foot vent		○		-
	Foot vent Defroster vent		○	○	Cannot be selected for automatic operation
	Defroster vent			○	Cannot be selected for automatic operation

Note 1: Air blows out from vents marked ○

AUTO SWITCH

With switch (5), the air flow, vents, and air source (RECIRC/FRESH) are automatically selected according to the set temperature.

- Press switch (5), then use temperature control switch (3) to set the temperature, and run the air conditioner under automatic control.
- When switching from automatic operation to manual operation, it is possible to use the switches to select the vents and air source (RECIRC/FRESH).



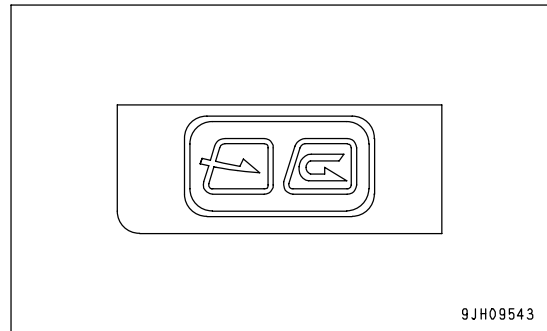
REMARK

When Auto Mode is selected, if the set temperature is set to 18.0 °C (64.4 °F) or 32.0 °C (89.6 °F), the air flow is always set to High, but this is not a problem.

RECIRC/FRESH SELECTOR SWITCH

Switch (6) is used to switch the air source between recirculation of the air inside the cab and intake of fresh air from the outside.

- During automatic operation, the selection of inside air (RECIRC) and outside air (FRESH) is performed automatically.

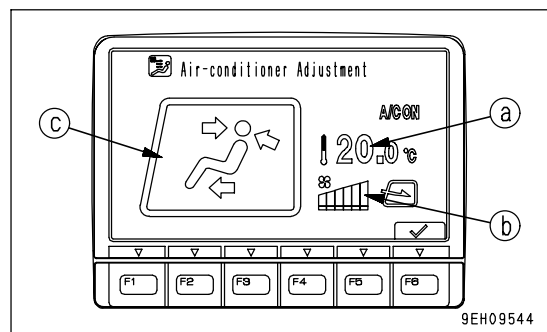


RECIRC	Outside air is shut off and only air inside the cab is circulated. Use this setting to perform rapid cooling of the cab or when outside air is dirty.
FRESH	Outside air is taken into the cab. Use this setting to take in fresh air when performing demisting.

DISPLAY MONITOR

Monitor (7) displays the status of temperature setting (a), air flow (b), and vents (c).

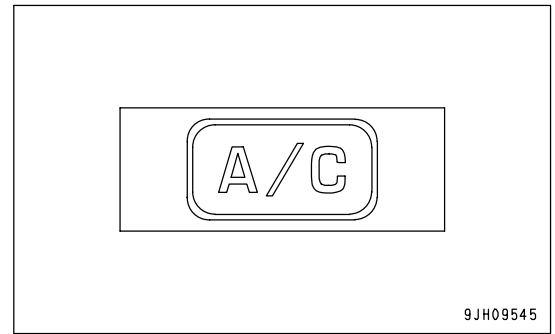
- When OFF switch (1) is pressed, the display of temperature setting (a) and air flow (b) goes out, and operation stops.



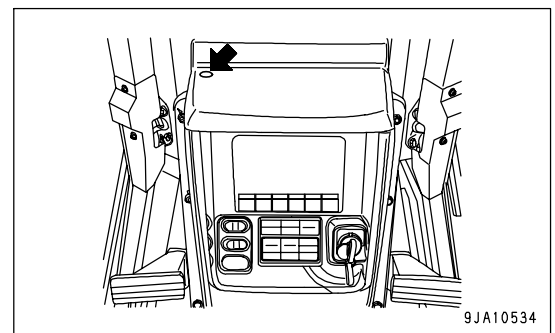
AIR CONDITIONER SWITCH

Switch (8) is used to turn the air conditioner (cooling, dehumidifying, heating) ON or OFF.

- Press air conditioner switch (8) when the fan is operating (when display (b) is shown on the display monitor). The air conditioner is switched ON and starts to work. Press the switch again to stop the air conditioner.
- Air conditioner cannot be operated while the fan is off.

**SUNLIGHT SENSOR**

This sensor (9) automatically adjusts the flow of air from the vents to match the strength of the sun's rays. In addition, it automatically detects changes in the temperature inside the cab caused by changes in the strength of the sun's rays beforehand and automatically adjusts the temperature.



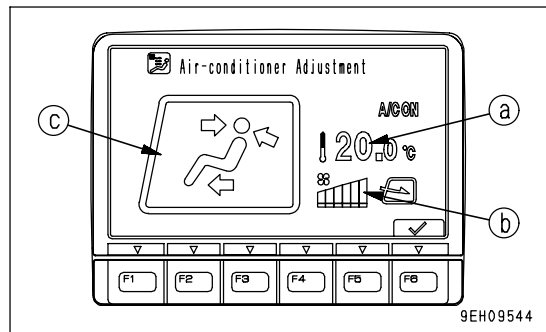
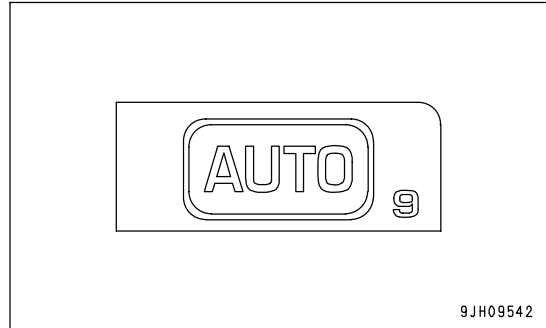
METHOD OF OPERATION

The air conditioner can be operated automatically or manually. Select the method of operation as desired.

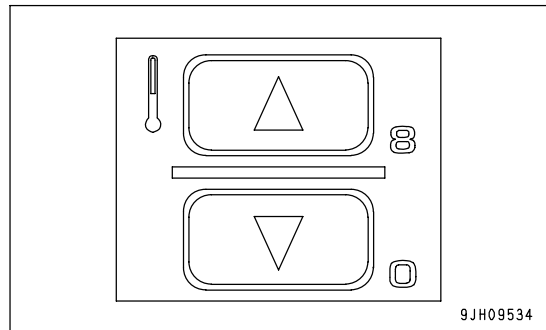
AUTOMATIC OPERATION

1. Turn auto switch (5) ON.

- The monitors for the set temperature (a) and air flow (b) are also displayed.

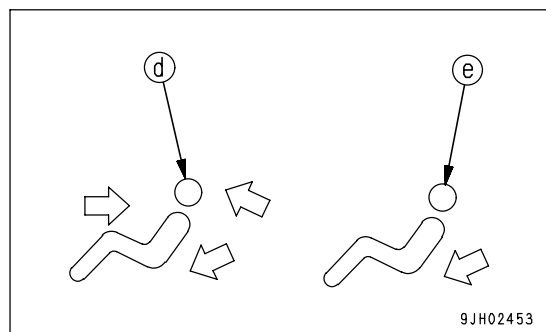


2. Use temperature set switch (3) to set to the desired temperature. The air flow, combination of vents, and selection of fresh or recirculated air is automatically selected according to the set temperature, and the air conditioner is operated automatically to provide the set temperature.



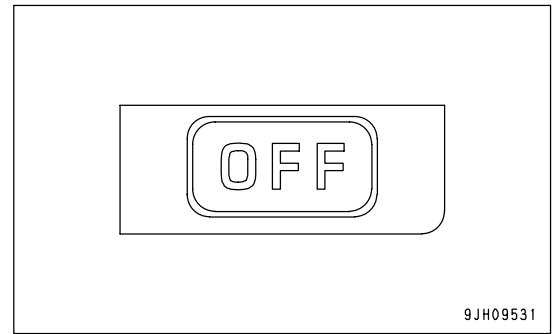
REMARK

When vent display monitor (c) displays (d) or (e), and engine coolant temperature is low, the air flow is automatically limited to prevent cold air from blowing out.



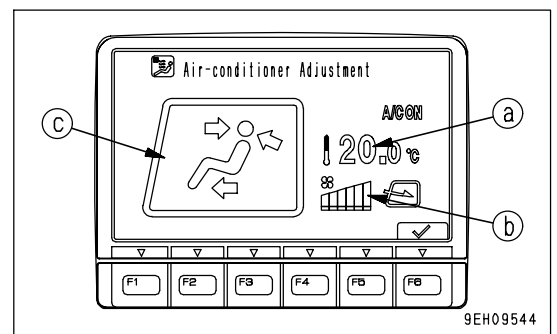
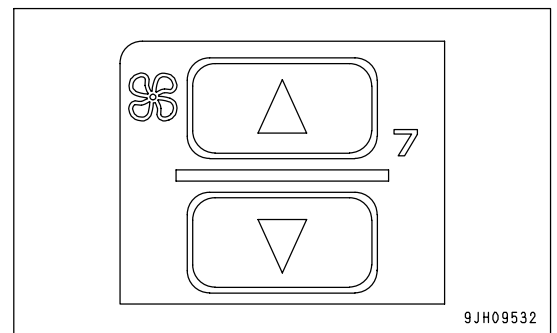
STOPPING AUTOMATIC OPERATION

Press OFF switch (1). Operation stops.

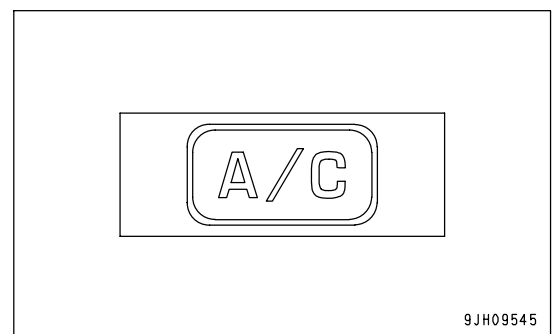


MANUAL OPERATION

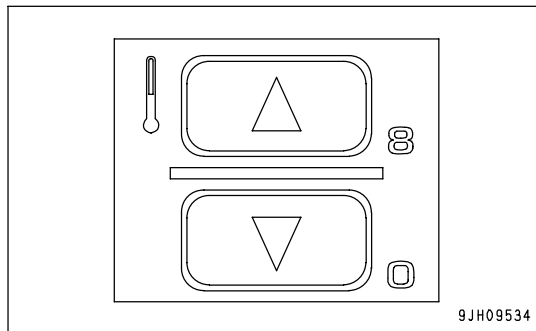
1. Press fan switch (2) and adjust the air flow. When doing this, check that temperature setting (a) and air flow (b) are displayed on monitor (7).



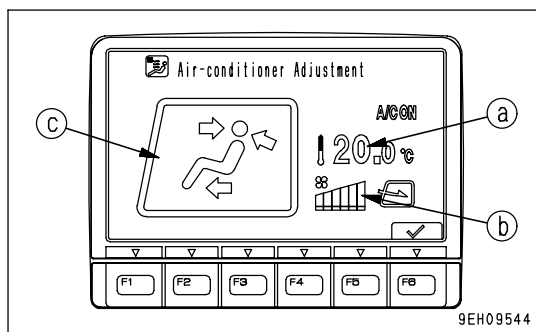
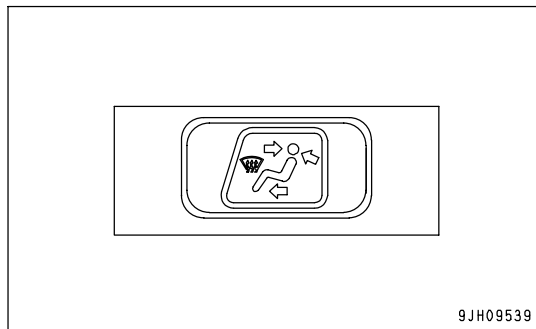
2. Turn air conditioner switch (8) ON.



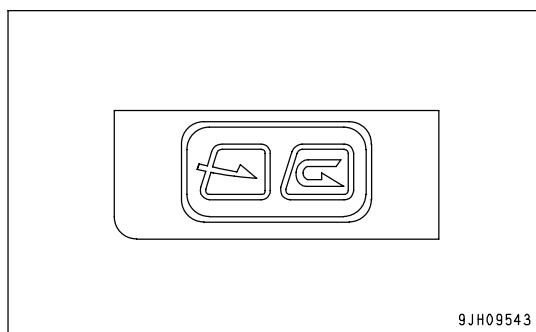
3. Press temperature setting switch (3) and adjust temperature inside the cab.



4. Press vent selector switch (4) and select the desired vents. When this is done, the display for vent (c) of the display monitor changes according to the selection.

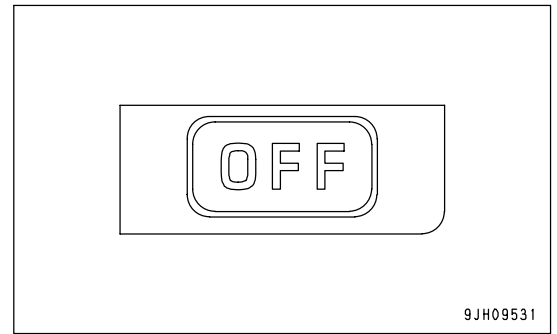


5. Press RECIRC/FRESH selector switch (6) and select recirculation of the air inside the cab (RECIRC) or intake of fresh air from outside (FRESH).



STOPPING MANUAL OPERATION

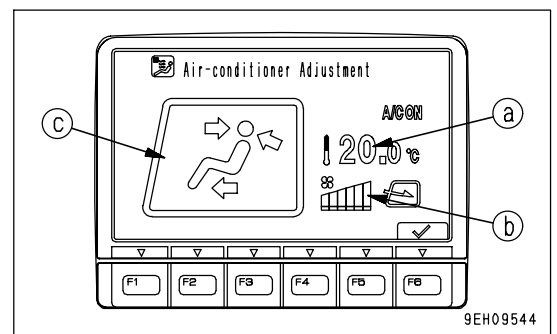
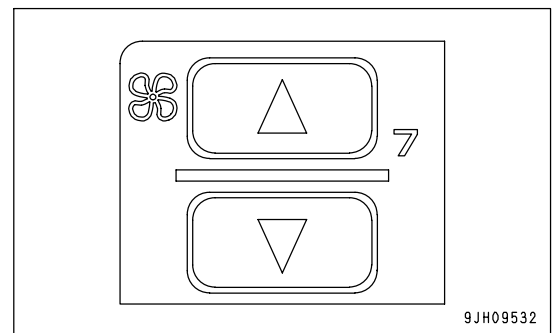
Press OFF switch (1). Operation stops.



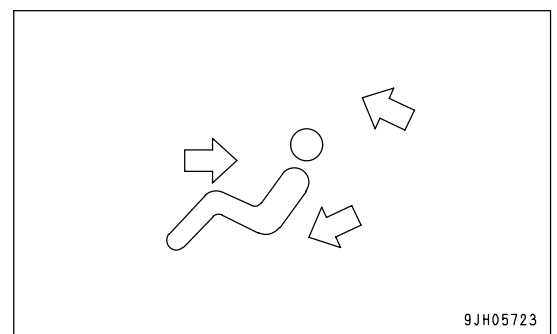
OPERATION WITH COLD AIR TO FACE AND WARM AIR TO FEET

To operate with cold air blowing to the face and warm air blowing to the feet, set as follows.

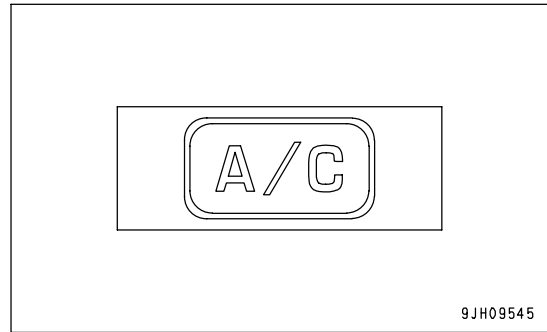
1. Press fan switch (2) and adjust the air flow. When doing this, check that temperature setting (a) and air flow (b) are displayed on monitor (7).



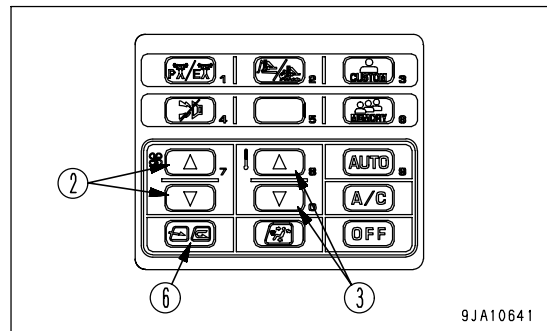
2. Press vent selector switch (4) and set the vent display on the display monitor to the display shown in the diagram on the right.



3. Turn air conditioner switch (8) ON.

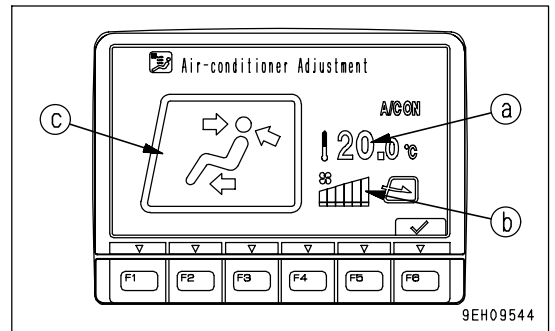
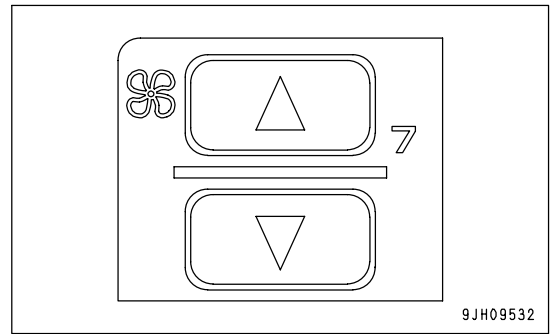


4. Adjust fan switch (2), temperature setting switch (3) and RECIRC/FRESH selector switch (6) to the desired positions.

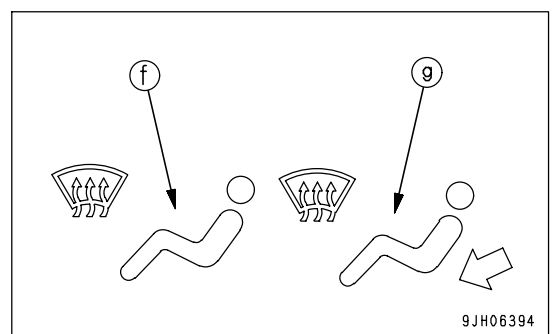
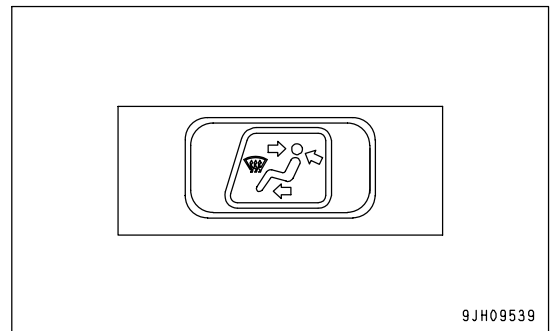


DEFROSTER OPERATION

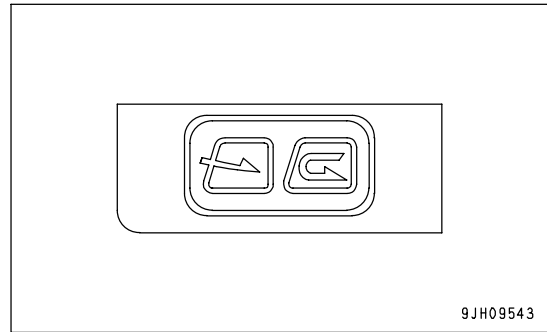
1. Press fan switch (2) and adjust the air flow. When doing this, check that temperature setting (a) and air flow (b) are displayed on monitor (7).



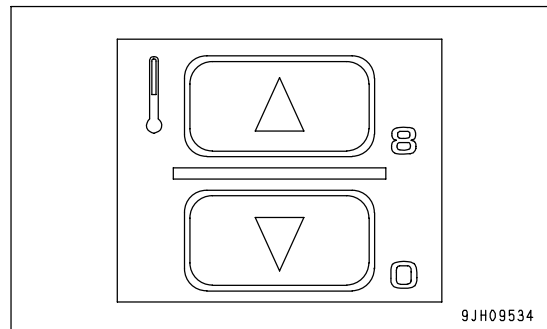
2. Press vent selector switch (4) and set vent display on the display monitor to (f) or (g) as shown in diagram on the right.



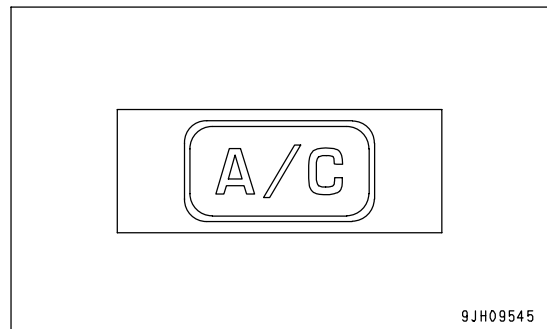
3. Press RECIRC/FRESH selector switch (6) and set it to take in fresh air.



4. Press temperature setting switch (3) and set temperature on the display (7) monitor to maximum heating.



When operating in the rainy season or when it is desired to remove the mist from the window glass or to dehumidify the air, turn air conditioner switch (8) ON.



PRECAUTION WHEN USING AIR CONDITIONER

NOTICE

- When running the air conditioner, always start with the engine running at low speed. Never start the air conditioner when the engine is running at high speed. It will cause failure of the air conditioner.
- If water gets into the control panel or sunlight sensor, it may lead to unexpected failure, be careful not to let water get on these parts. In addition, never bring any flame near these parts.
- For the auto function of the air conditioner to work properly, always keep the sunlight sensor clean and do not leave anything around the sunlight sensor that may interfere with its sensor function.

CARRY OUT VENTILATION FROM TIME TO TIME WHEN USING THE COOLER

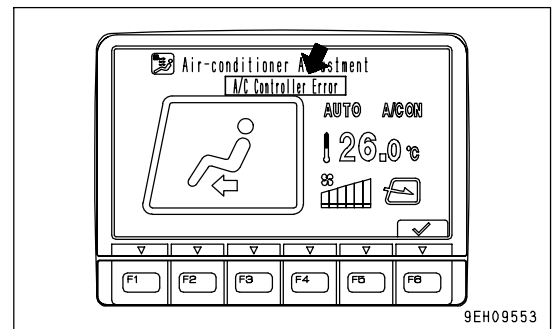
- If you smoke when the air conditioner is on, the smoke may start to hurt your eyes, so open the window and turn the lever to FRESH for a while to remove the smoke while continuing the cooling.
- When running the air conditioner for a long time, turn the lever to the FRESH position once an hour to carry 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 or 6 °C (9 or 10.8 °F) 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.

INSPECTION AND MAINTENANCE OF AIR CONDITIONER EQUIPPED MACHINE

- When carrying out inspection and maintenance on machines equipped with an air conditioner, carry out the inspection and maintenance according to the chart. For details, see "CHECK, ADJUST AIR CONDITIONER (PAGE 4-37), REPLACE AIR CONDITIONER BELT (PAGE 4-38), REPLACE AIR CONDITIONER FRESH/RECIRC FILTERS (PAGE 4-65)".
- When the air conditioner is not being used every day, to prevent loss of the film of oil at various parts, run at the engine at low speed from time to time and carry out cooling or dehumidifying heating for several minutes.
- If the temperature inside the cab is low, the air conditioner may not work. In this case, circulate fresh air to warm the inside of the cab. When the air conditioner switch is turned ON, the air conditioner will work.
- If any abnormality is detected in any equipment or sensor used on the air conditioner, "A/C Controller Error" is displayed on the air conditioner monitor screen. If "A/C Controller Error" is displayed, please ask your Komatsu distributor to carry out inspection and repair.



OPERATION

CHECK BEFORE STARTING ENGINE, ADJUST

WALK-AROUND CHECK

Before starting the engine, walk around the machine and look at the underside of chassis for anything unusual like loose bolts and nuts, leakage of fuel, oil and coolant. Also check the condition of the work equipment and the hydraulic system.

Also check for loose wiring, play, and collection of dust at places that reach high temperature.



WARNING

- Leakage of oil or fuel, or accumulation of flammable material around high temperature parts, such as the engine muffler or turbocharger, may cause fire.
Check carefully, and if any abnormality is found, repair it or contact your Komatsu distributor.
- Do not get on or off the machine from the rear. Using this position is dangerous because it is easy to slip and you cannot be seen from the operator's compartment. Always use the handrail and step at the side when getting on or off the machine.

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

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, and hoses.
Check that there are no cracks, excessive wear, or play in the work equipment, cylinders, linkage, or hoses. If any problem is found, repair it.
2. Remove dirt and debris from around the engine, battery, and radiator.
Check for dirt accumulated around the engine and radiator. Also check for flammable material (dry leaves, twigs, etc.) around the battery, engine muffler, turbocharger, or other high temperature engine parts. If any dirt or flammable materials are found, remove them.
3. Checking engine for leak of water, oil and air
Check the engine for leak of engine oil, leak of water from the cooling system and leak of air from the suction system. If any leak is found, repair it.
4. Check for leakage from fuel line.
Check that there is no leakage of fuel or damage to the hoses and tubes. If any problem is found, carry out repairs.
5. Check for oil leakage of oil from power train case, final drive case, hydraulic tank, hoses, and joints
Check that there is no oil leakage. If any problem 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.
6. Check the undercarriage (track, sprocket, idler, guard) for damage, wear, loose bolts, or leakage of oil from rollers.
If any problem is found, repair it.

7. Check for problems in handrails, steps, loose bolts.
If any problem is found, repair it. Tighten any loose bolts.
8. Check for problems in gauges and monitor
Check that there is no problem in the gauges and monitor in the operator's cab. If any problem is found, replace the parts. Clean off any dirt on the surface.
9. Seat belt and mounting clamps
Check for damage or wear to the seat belt and mounting clamps. If there is any damage, replace with new parts.

CHECK BEFORE STARTING

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

CHECKING WITH MACHINE MONITOR

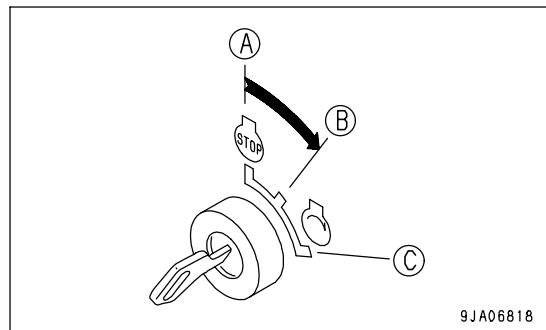
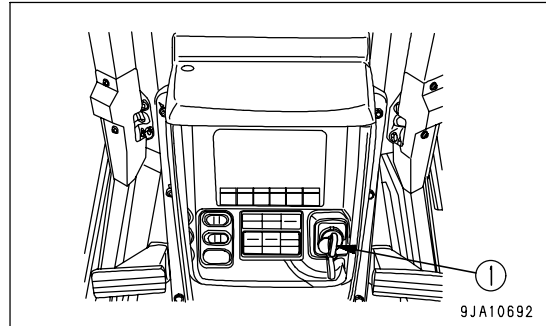
1. Turn starting switch (1) to the ON position (B).
2. After the initial KOMATSU screen, check that the basic monitor screen is displayed and that the alarm buzzer sounds for approx. 2 seconds.

REMARK

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

NOTICE

Do not simply use the monitor to carry out the check before starting. Always carry out the check before starting according to the procedure on the following pages.

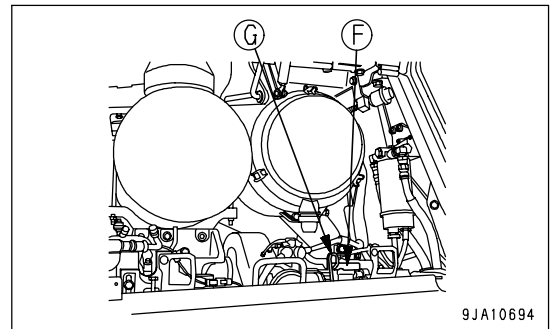


CHECK OIL LEVEL IN ENGINE OIL PAN, ADD OIL

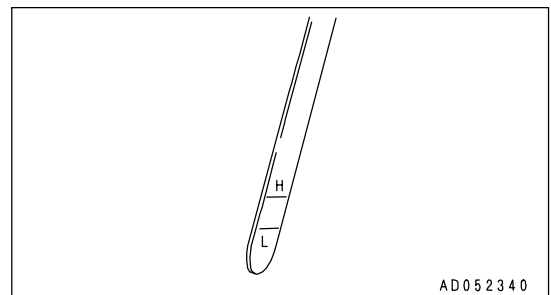
**WARNING**

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

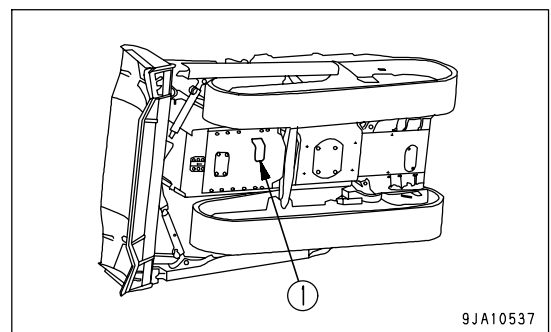
1. Open the engine side cover on the left side of the chassis.
2. Remove dipstick (G) and wipe the oil off with a cloth.
3. Fully insert dipstick (G) into filler pipe, then remove it.



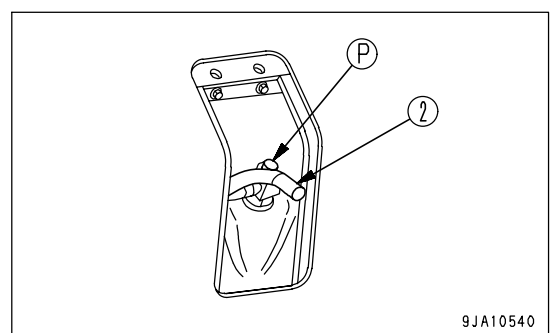
4. The oil level should be between the H and L marks on dipstick (G).
If the oil level is below the L mark, add oil through oil filler port (F).



5. When the oil level is higher than H, remove cover (1) in the underpart of the truck.



6. Take the end of hose (2) out of the inspection window.
7. Loosen drain plug (P), drain excess oil and check the oil level again.



8. If the oil level is correct, tighten the oil filler cap securely and close the engine side cover.

REMARK

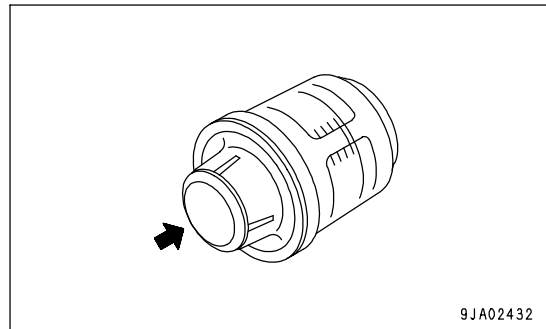
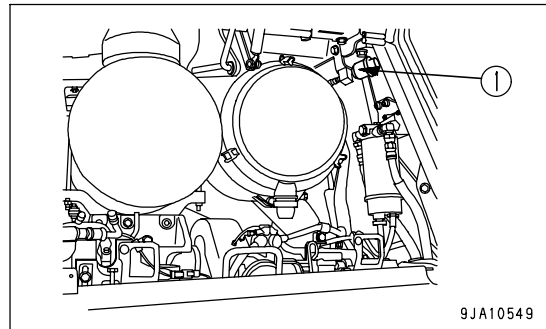
- If the machine is at an angle, reposition it to level before checking.
- When checking the oil level after the engine has been operated, allow the engine to cool for 15 minutes before checking.

CHECK DUST INDICATOR

1. Open engine side cover on the left side of machine.
2. Check if the yellow piston in the dust indicator (1) overlaps the red zone on the outside.
3. If the yellow piston overlaps the red zone, clean or replace the filter element immediately.

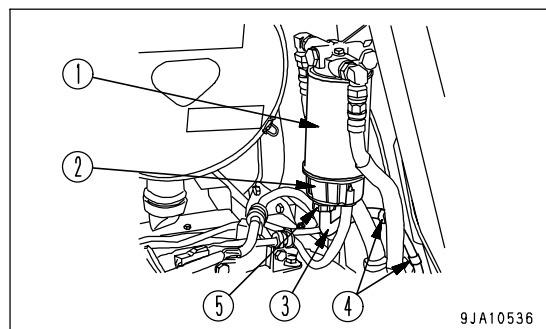
For the filter element cleaning procedure, see "CHECK, CLEAN AND REPLACE AIR CLEANER ELEMENT (PAGE 4-20)".

4. After checking, cleaning, and replacing, press the knob of dust indicator (1) to return the yellow piston to its original position.

**CHECK, DRAIN WATER SEPARATOR**

The water separator serves to separate moisture mixed in the fuel.

1. Open up the engine side cover on the left side of the machine.
The water separator is in one piece with fuel pre-filter (1) and located in the lower part.
2. The water level and sediment are seen through transparent cap (2). When water and sediment have accumulated, disconnect drain hose (3) from clip (4) and take its end out of the machine and put in a container to receive the water and sediment.
3. Loosen plug (5) to drain the water.
4. After draining through drain hose (3), tighten plug (5) immediately and pass drain hose (3) through clip (4).
 - Tightening torque: 0.2 to 0.45 Nm (0.02 to 0.046 kgm, 0.1 to 0.3 lbft)

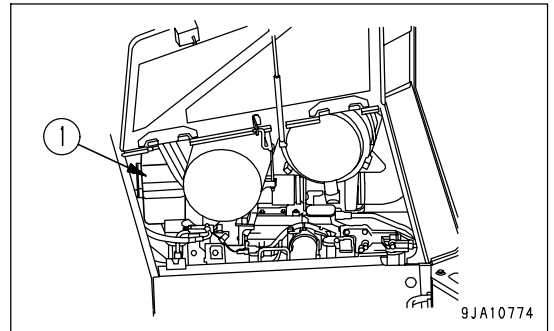


CHECK COOLANT LEVEL, ADD COOLANT

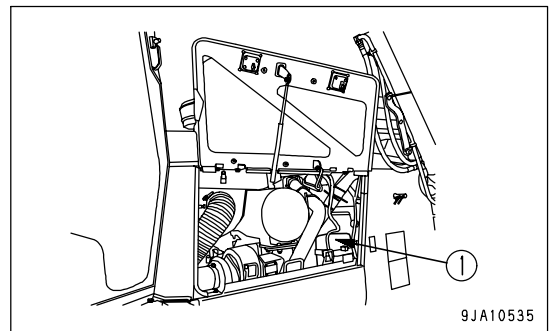
**WARNING**

- Normally, do not open the radiator cap. When checking the coolant level, check the sub-tank when the engine is cold.
- Do not remove the cap when the radiator coolant is hot. Boiling coolant may spurt out. After the coolant 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 coolant is between the FULL and LOW marks on sub-tank (1).

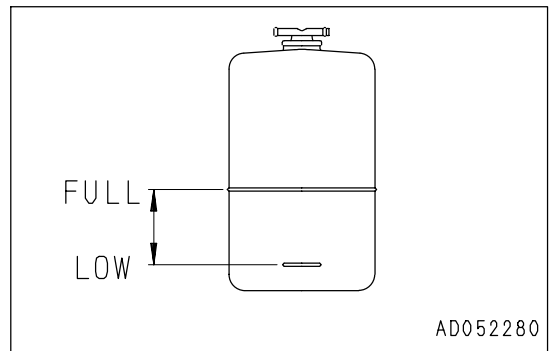


2. If the coolant level is low, open the engine side cover on the light side of the chassis and add coolant to the FULL level through the coolant filler port in sub-tank (1).

**REMARK**

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

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

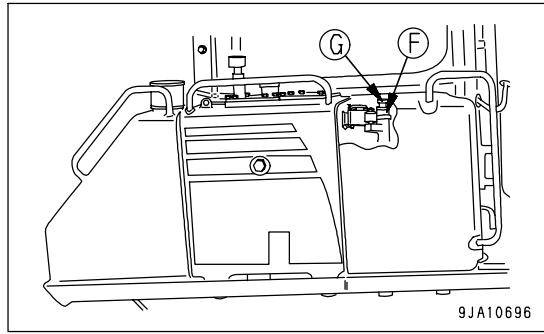


CHECK OIL LEVEL IN POWER TRAIN CASE, ADD OIL

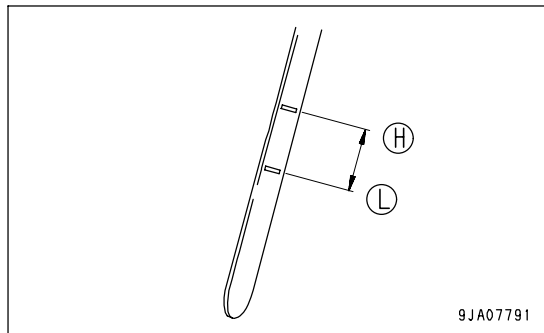
! WARNING

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

1. Open the small cover on the right upper side of the machine.
2. Remove dipstick (G), and wipe the oil off with a cloth.
3. Fully insert dipstick (G) into filler pipe, then remove it.
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 oil through oil filler (F).

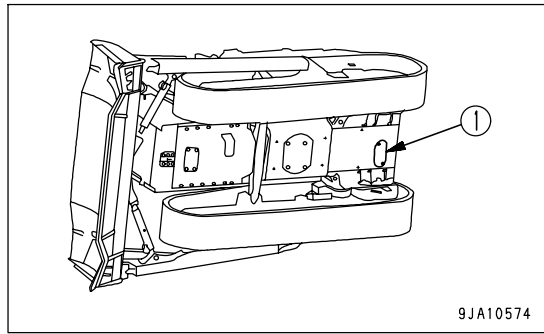


9JA10696



9JA07791

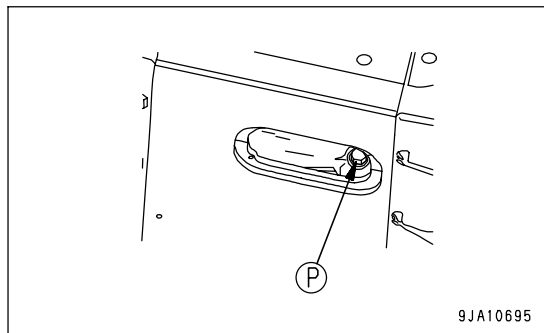
5. If the oil level is above the H mark, remove cover (1) on the bottom of the machine.
Loosen drain plug (P), drain the excess oil, then check the oil level again.
6. If the oil level is correct, insert dipstick (G) fully into the dipstick guide again.



9JA10574

REMARK

- If the machine is at an angle, reposition it to level before checking.
- When checking the oil level after the engine has been operated, allow the engine to cool for 15 minutes before checking.



9JA10695

CHECK ELECTRIC WIRING**WARNING**

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

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

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

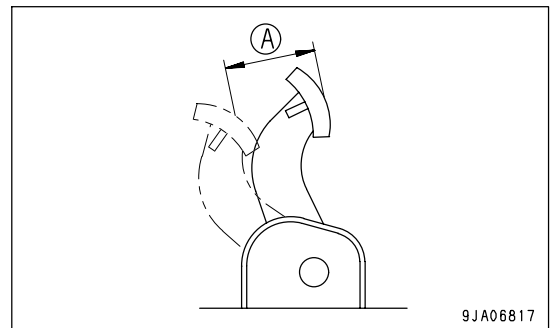
Always check if there is any accumulation of flammable material around the battery, and remove such flammable material.

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

CHECK BRAKE PEDAL TRAVEL**WARNING**

If the brake pedal stroke is not 60 to 80 mm (2.4 to 3.1 in) (below 60 mm or over 80 mm), the brake and steering force is too strong or insufficient. If the stroke is 81 mm (3.1 in) or longer, adjust it.

1. Depress the brake pedal all the way until it stops.
2. Check that the distance of travel (A) at the center of the pedal is 60 to 80 mm (2.4 to 3.1 in).
3. When this value exceeds 81 mm (3.1 in), or the brake fails to work, please contact your Komatsu distributor for adjustment.

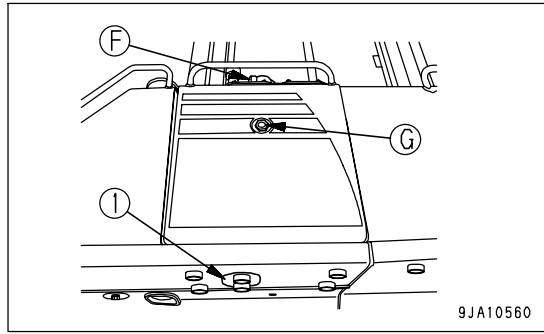


9JA06817

CHECK OIL LEVEL IN HYDRAULIC TANK, ADD OIL

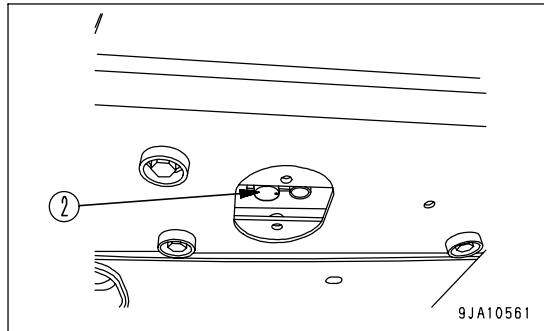
WARNING

- 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 cover (1), loosen drain plug (2), and drain the excess oil.



9JA10560

1. Park the machine on a level ground, lower the work equipment to the ground, and stop the engine.
2. Stop the engine, wait for approx. 5 minutes, then check that the oil level is between the H and L marks on sight gauge (G).



9JA10561

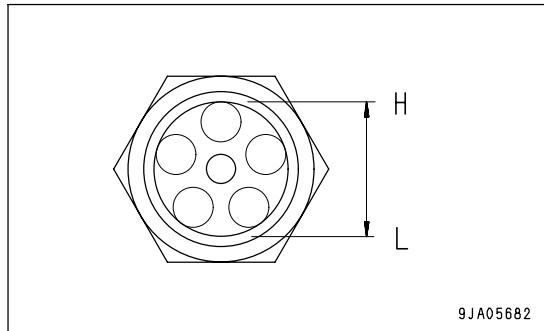
NOTICE

If the oil level is above the H line, do not add oil. Doing so may lead to damage to the oil pressure circuit and spouting out of oil.

3. If the oil level is below the L line, add oil through oil filler (F) at the top of the hydraulic tank.

REMARK

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



9JA05682

CHECK FUEL LEVEL, ADD FUEL

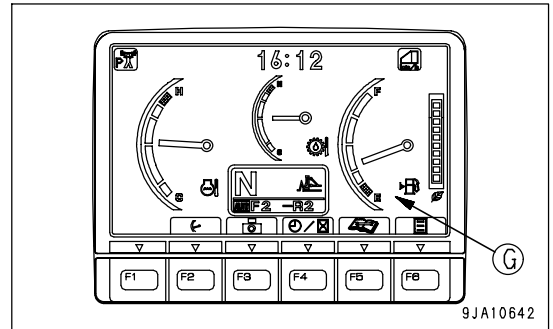
**WARNING**

When adding fuel, never spill the fuel or let it overflow. It will cause fire.

If any fuel has spilled, wipe it up completely. If fuel has spilled over soil or sand, remove that soil or sand.

Fuel is highly flammable and dangerous. Never bring flames near fuel.

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

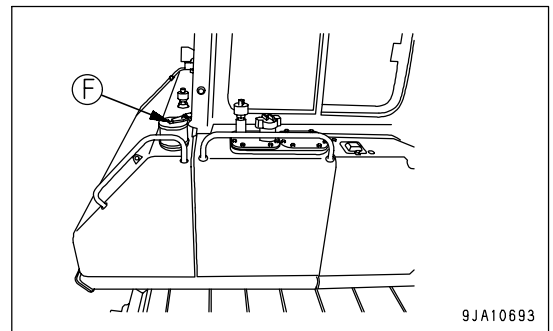


2. After completing work, fill the fuel tank through fuel filler port (F).
3. After adding fuel, tighten the cap securely.

Fuel capacity: 415 liters (109.64 US gal)

REMARK

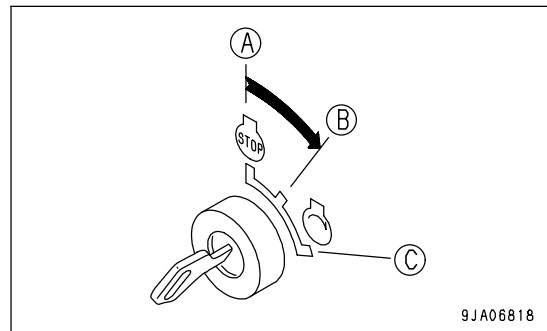
- When carrying out operations on slopes, to prevent the engine from sucking in air, pay careful attention to the amount of fuel remaining in the tank.



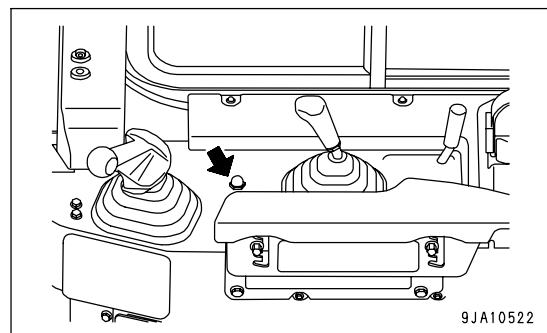
CHECK HORN SOUND

Check that the horn sounds. If it does not sound at all or the sound is extremely feeble, a defect or broken wire is suspected, ask your Komatsu distributor for possible repairs.

1. Turn starting switch to the ON position (B).

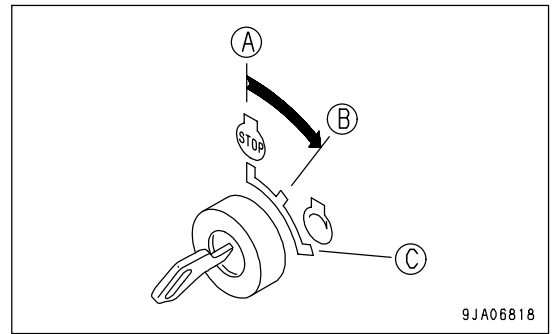


2. Push the horn switch and check that the horn sounds.

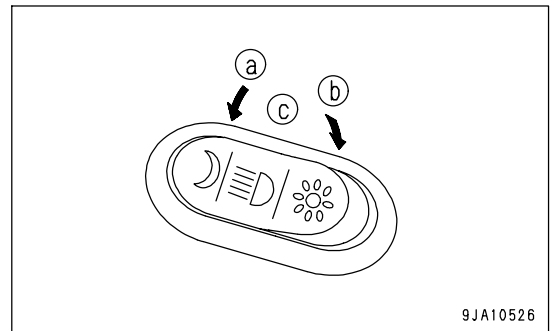


CHECK THAT LAMPS LIGHT UP

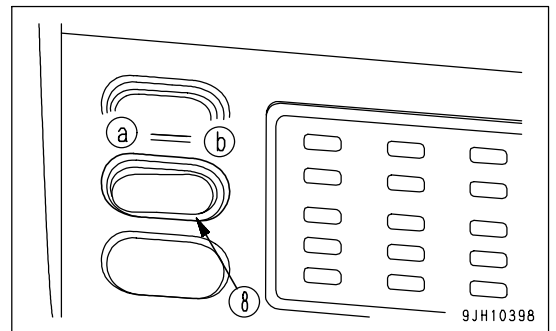
1. Turn starting switch to the ON position (B).



2. Turn the headlamp switch to positions (a) and (b) to check that the headlamps light up.

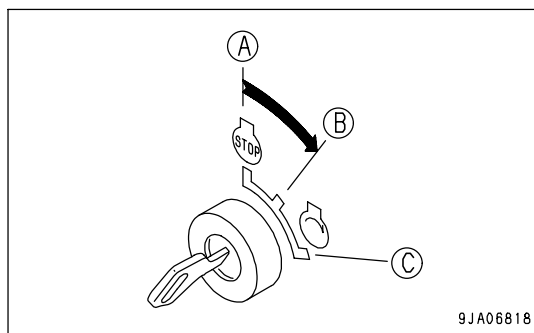


3. Turn the rear lamp switch to position (a) to check that the rear lamps light up.
If the lamps do not light, check for a broken bulb or disconnected wire, contact your Komatsu distributor for repairs.



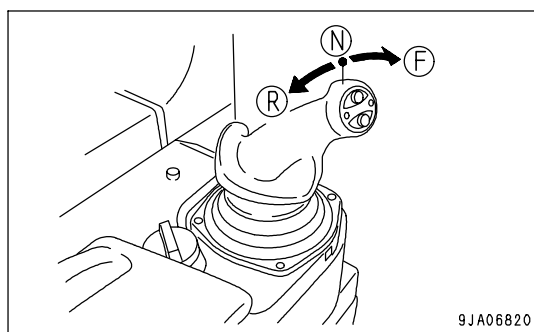
CHECK OF OPERATION OF BACKUP ALARM

1. Turn starting switch to the ON position (B).



2. Set the parking brake lever to the LOCK position.
3. Set the steering, forward-reverse, gear shift lever in the REVERSE position (R).

The alarm must sound immediately at this time. The alarm keeps sounding until the steering, forward-reverse, gear shift lever is set to the NEUTRAL position (N) or FORWARD position (F).



ADJUSTMENT

ADJUST OPERATOR'S SEAT

WARNING

When adjusting the position of the operator's seat, always set the work equipment lock lever to the LOCK position to prevent any accidental contact with the control levers.

WARNING

- Park the machine in a safe place and stop the engine when carrying out adjustment of the operator's seat.
- 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 down with the operator's back against the backrest.

- Always adjust the operator's seat before starting each operation or when the operators change shift.
- When adjusting the seat, put your back against the backrest and adjust to a position where the brake pedal can be fully depressed.

MECHANICAL SUSPENSION SEAT

(A) Fore-and-aft adjustment

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

Fore-aft adjustment: 160 mm (6.3 in) (8 stages)

(B) Weight adjustment of seat

Turn knob (2) under the seat to match the weight adjustment scale with your own weight.

The weight can be adjusted to 50 to 120 kg (110 to 265 lb).

REMARK

To make the seat softer, adjust the weight to make it lighter; to make the seat harder, adjust the weight to make it heavier. When traveling on rough road surfaces, make the seat harder before starting operations.

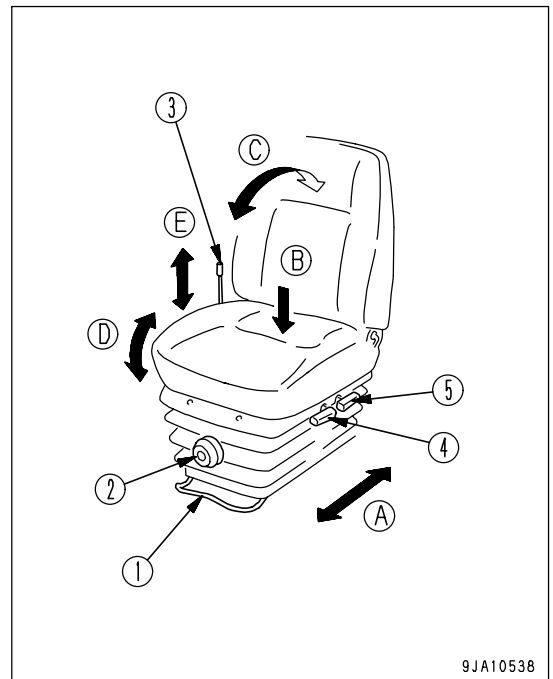
(C) Adjust reclining angle

Pull up lever (3) and set the seat back to a position which is comfortable for operation, then release the lever.

Sit with your back against the seat back when adjusting. If your back is not touching the seat back, the seat back may suddenly move forward.

REMARK

The seat can be reclined more when the seat is pushed to the front. The amount of reclining decreases as the seat is pushed back, so when moving the seat back, return the seatback to the upright position.



(D) Seat angle adjustment

- Front angle adjustment of seat (5 stages)

To raise the front of the seat, apply your weight to the seatback, while pulling up lever (4).

To lower the front of the seat, apply your weight to the front of the seat, while pulling up lever (4).

- Rear angle adjustment of seat (5 stages)

To raise the rear of the seat, stand up on your feet a little, while pulling up lever (5).

To lower the rear of the seat, apply your weight to the rear of the seat, while pulling up lever (5).

(E) Seat height adjustment

Pull up levers (4) and (5) alternately to adjust the angle of the seat.

Then, release the levers to lock the seat.

(Height adjustment distance: 5 stages, 60 mm (2.4 in))

AIR SUSPENSION SEAT

(A) Fore-and-aft adjustment

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

Fore-aft adjustment: 160 mm (6.3 in) (8 stages)

(B) Weight and height adjustment of seat

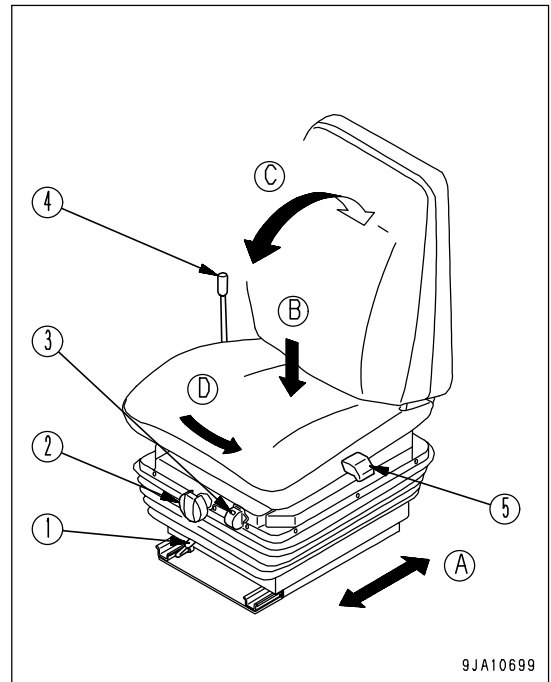
- The seat height is adjusted pneumatically and in steps by fully pressing down or pulling up lever (2). Adjust the weight so that weight indicator (3) will be in the green range. The seat height can be adjusted by moving lever (2) up or down only when indicator (3) is in the green range.
- Turn the knob clockwise to raise the seat and turn the knob counterclockwise to lower the seat.

Height adjustment range: stepless, 75 mm (3 in)

Weight adjustment range: 50 to 150 kg (110 to 331 lb)

(C) Adjust reclining angle

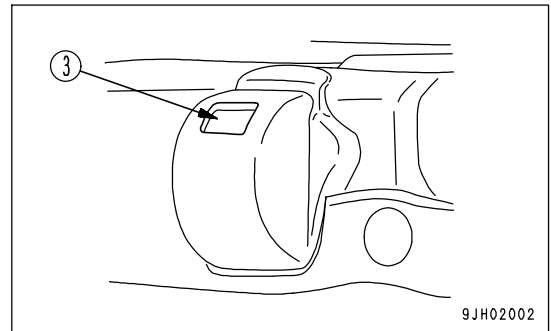
Pull lever (4) up, set the backrest to the desired position, then release the lever.



9JA10699

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 backrest, return the backrest to its original position before moving the seat.



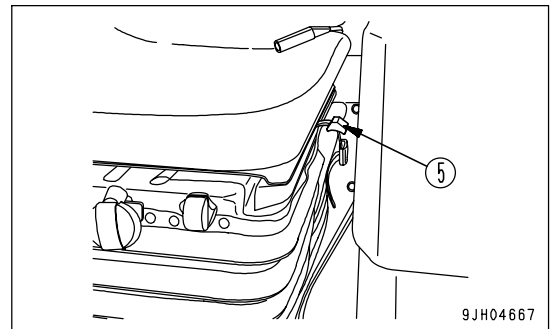
9JH02002

(D) Adjusting direction of seat

Pull up lever (5) to unlock the seat. The seat can then be turned 15° to the right.

After changing the direction of the seat, return the lever securely to lock the seat.

- Change the direction of the seat to the right for the ease of operation of the ripper.



9JH04667

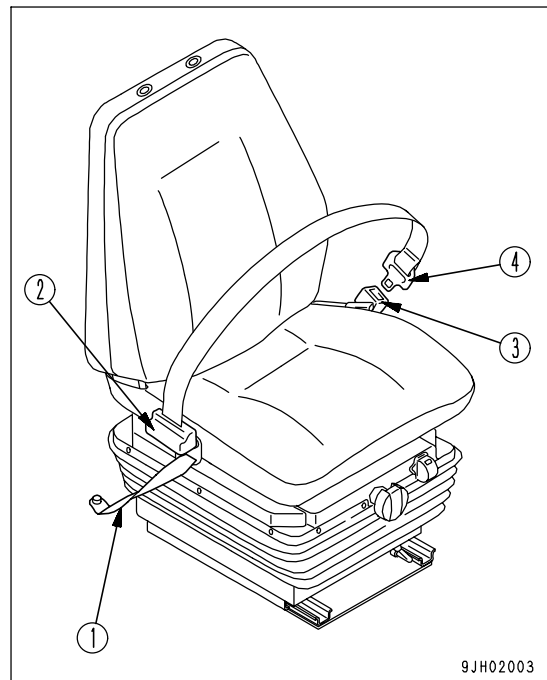
FASTENING AND REMOVING SEAT BELT

**WARNING**

- Before fastening the seat belt, inspect the securing brackets and belt for abnormal conditions. Replace any worn or damaged seat belt or the securing brackets.
- Even no problem can be seen with the belt, always replace the seatbelt once every three years. The date of manufacture is given on the rear side of the belt.
- Adjust and fasten the seat belt before operating the machine.
- Always use the seat belt when operating the machine.
- Fit the seat belt across your lap without twisting.

FASTENING AND REMOVING SEAT 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.



9JH02003

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 start.

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 retract.

Check that the bolts of the clamp securing the belt to the chassis are not loose. Tighten them if they are loose.
Tightening torque: 24.5 ± 4.9 Nm (2.5 ± 0.5 kgm, 18.1 ± 3.6 lbft)

If the seat belt is scratched or frayed, if any fittings are broken or deformed from long service, replace the seat belt immediately.

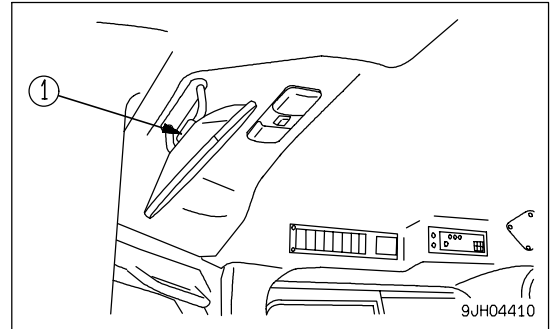
ADJUST MIRROR

**WARNING**

Be sure to adjust the mirrors before starting work. If they are not adjusted properly, you cannot secure the visibility and may be injured or may injure someone seriously.

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

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



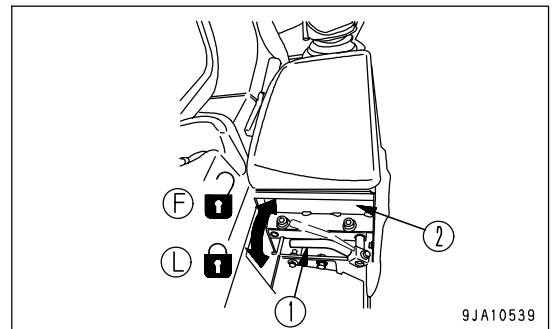
ADJUST STEERING, FORWARD-REVERSE, GEAR SHIFT LEVER

**WARNING**

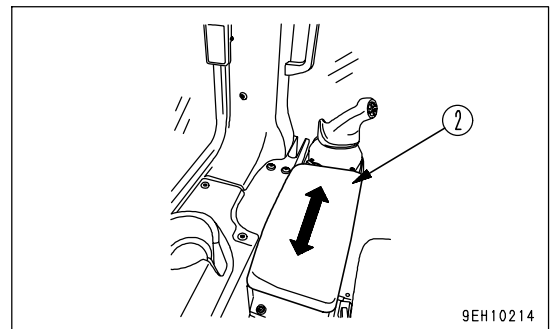
After moving case (2) in order to adjust the position of the steering, forward-reverse, gear shift lever, secure lock lever (1) into the notched hole, making sure it is in the LOCK position. If it is not completely locked, the steering, forward-reverse, gear shift lever may unexpectedly move and cause damage, serious injury, or death.

The steering, forward-reverse, and gear shift lever can be adjusted by 90 mm (3.5 in) in 9 stages to the front or rear. Adjust to the most suitable position to match the adjustment of the operator's seat.

1. Pull up lock lever (1) to the FREE position (F) at the rear of case (2) on left side of the operator's compartment.
2. With lock lever (1) pulled up, use your other hand to grip the front of case (2), then move it forward with your left and right hands. The steering, forward-reverse, gear shift lever moves with case (2).



3. Move case (2) to the desired position until a click is heard. Then pull up lock lever (1) and release it. Lock lever (1) automatically returns to the LOCK position (L).

**REMARK**

PCCS: Palm command control system

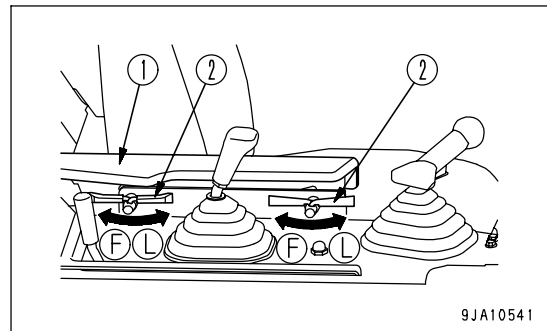
ADJUST ARMREST

The height of the armrests on the right and left sides of the operator's seat can be adjusted according to the following procedure. After adjusting the operator's seat, adjust the armrest height properly.

ADJUST ARMREST (RIGHT)

Arm rest (1) can be adjusted in four stages; 20 mm (0.8 in) and 40 mm (1.6 in) upward, and 20 mm (0.8 in) downward from standard height.

1. Set lock lever (2) to FREE position (F) (2 places).
2. Move armrest (1) forward once, then set it to the hole of your favorite height.
3. While keeping armrest (1) at your favorite height, set lock lever (2) in LOCK position (L). (2 places)
Armrest (1) is fixed.

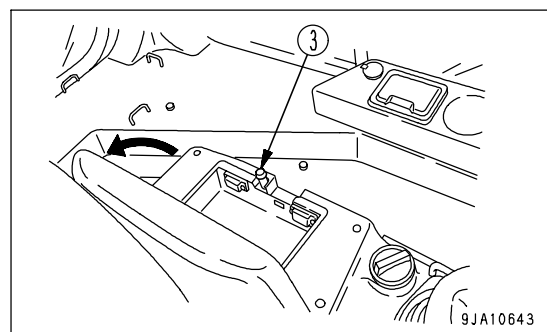


ADJUST ARMREST (LEFT)

The armrest on the left side of the operator's seat can be adjusted in steps to 36 mm (1.4 in) above its contact face to the armrest and case.

The steering, forward-reverse, gear shift lever does not move.

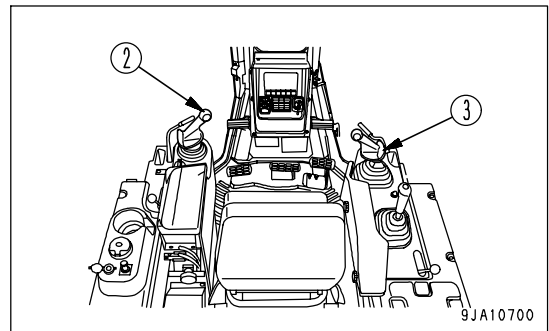
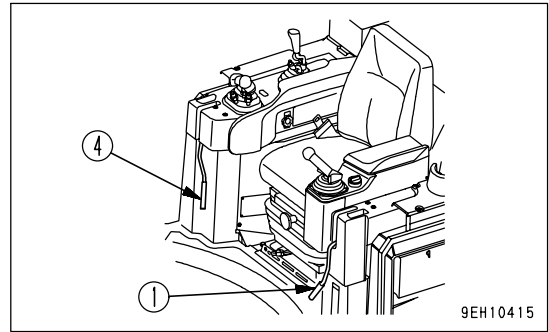
1. Open the armrest and rotate knob (3) counterclockwise (to the left).
Only the armrest moves up.
2. After adjusting the armrest to your favorite height, close it.



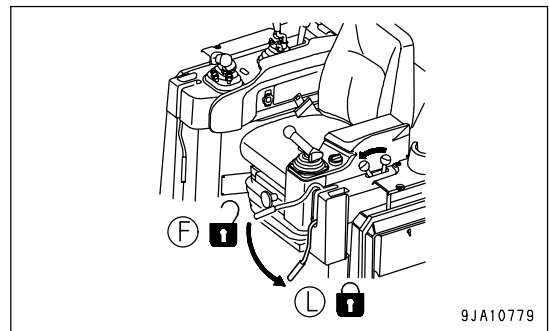
OPERATION AND CHECK BEFORE STARTING ENGINE

⚠ WARNING

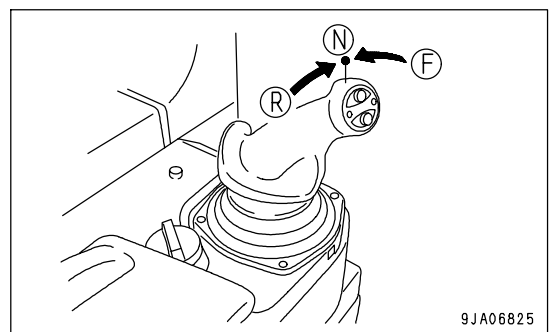
- When starting the engine, check and make sure the work equipment lock lever (4) and parking brake lever (1) are secured in the LOCK position.
If the control levers are not locked and they are touched by accident when starting the engine, the work equipment may move unexpectedly, and this may lead to a serious injury or death.
- When standing up from the operator's seat, always set the work equipment lock lever (4) and parking brake lever (1) to the LOCK position, regardless of whether the engine is running or stopped.



1. Check that parking brake lever (1) is in the LOCK position (L).
If parking brake lever (1) is not in LOCK position (L), the engine cannot be started.



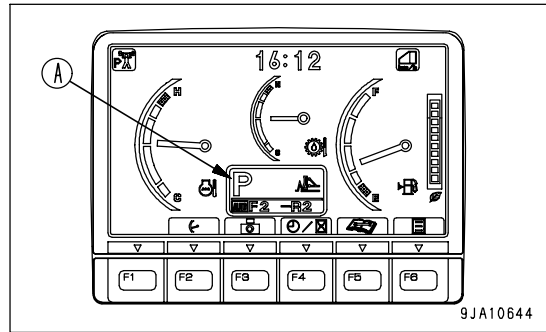
2. Check that steering, forward-reverse, gear shift lever (2) is in the NEUTRAL position (N).



REMARK

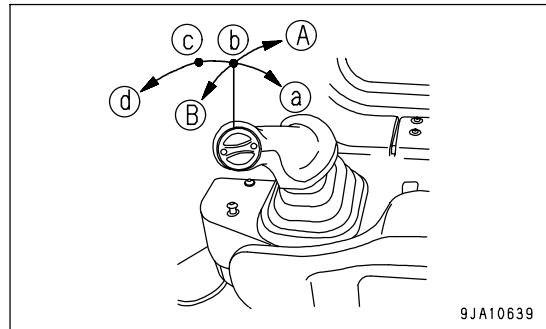
The engine cannot be started if steering, forward-reverse, gear shift lever (2) is not in the N position.

If steering, forward-reverse, gear shift lever (2) is in F or R, the letter P on display panel A will flash.



9JA10644

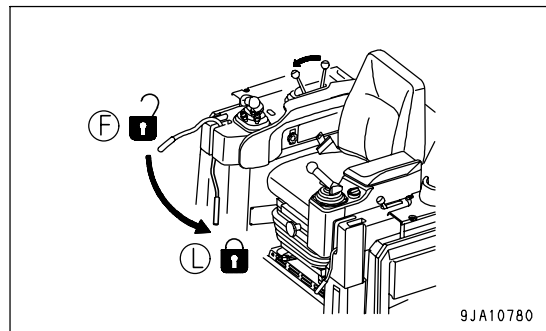
3. Lower the blade to the ground. Check that the blade control lever (3) is HOLD position (b).



9JA10639

4. Check that the ripper is lowered to the ground.
5. Check that the work equipment lock lever (4) is LOCK position (L).

If work equipment lock lever (4) is not in LOCK position (L), the engine cannot be started.



9JA10780

STARTING ENGINE

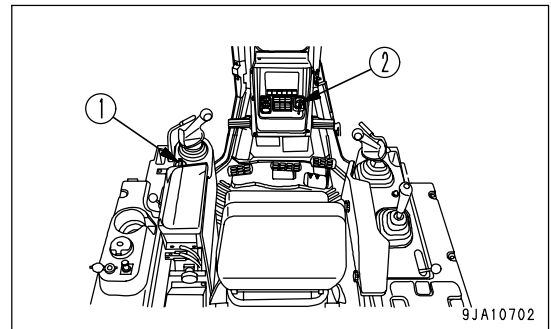
NORMAL STARTING

WARNING

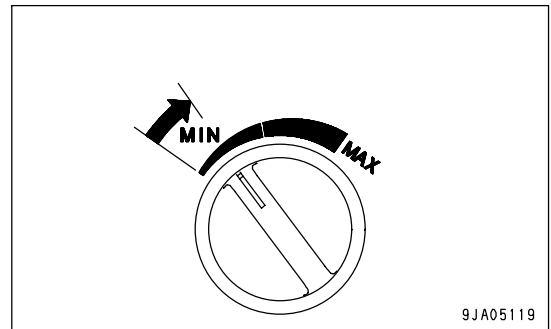
- Sit down in the operator's seat before starting the engine.
- Do not attempt to start the engine by short-circuiting the engine starting circuit. Such an act may cause serious bodily injury or fire.
- Check that there are no persons or obstacles in the surrounding area, then sound the horn and start the engine.
- Exhaust gas is toxic. When starting the engine in confined spaces, be particularly careful to ensure good ventilation.

NOTICE

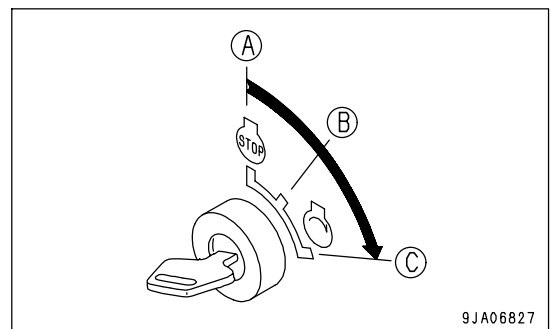
- Do not continue to crank the starting motor continuously for more than 60 seconds under any circumstances. If the engine does not start, wait for at least 2 minutes, then repeat the procedure from Step 2.
- Before starting the engine, check that the fuel control dial is at the low idle (MIN) position.
- The machine is equipped with a function to automatically warm up engine cooling water temperature more quickly and another function to protect the turbocharger. In a cold weather startup, the engine revolution may not change for several seconds immediately after the startup even if fuel control dial (1) is operated.
- If the fuel control dial is in 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.



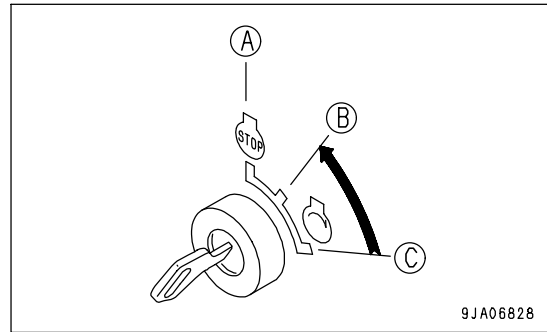
1. Turn fuel control dial (1) from the low idle (MIN) position to a slightly higher speed.



2. Insert the key into starting switch (2) and turn the key to the START position (C). 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 (B).



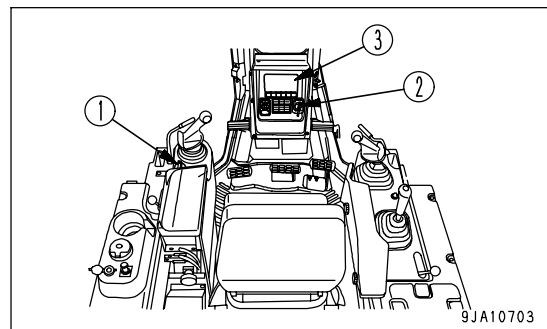
STARTING IN COLD WEATHER

WARNING

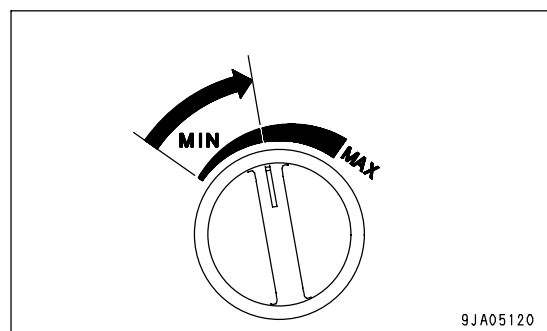
- Start the engine only after sitting down in the operator's seat.
- Do not attempt to start the engine by short-circuiting the engine starting circuit. Such an act may cause a serious bodily injury or fire.
- Check that there are no persons or obstacles in the surrounding area, then sound the horn and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

NOTICE

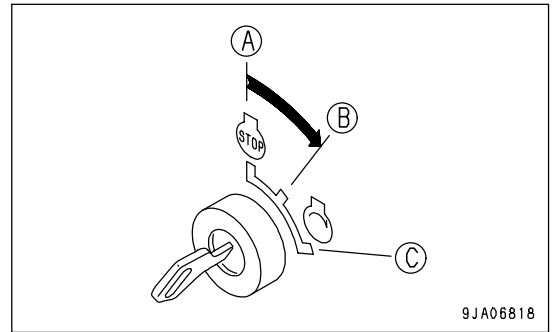
- Do not continue to crank the starting motor continuously for more than 60 seconds under any circumstances. If the engine does not start, wait for at least 2 minutes, then repeat the procedure from Step 2.
- Before starting the engine, check that the fuel control dial is at the low idle (MIN) position.
- The machine is equipped with a function to automatically warm up engine cooling water temperature more quickly and another function to protect the turbocharger. In a cold weather startup, the engine revolution may not change for several seconds immediately after the startup even if fuel control dial (1) is operated.
- If the fuel control dial is in 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.



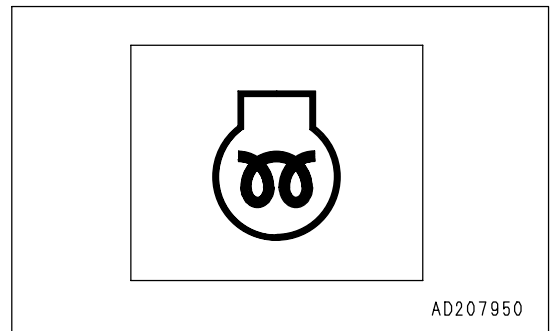
1. Turn fuel control dial (1) to the center position between MIN and MAX position.



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



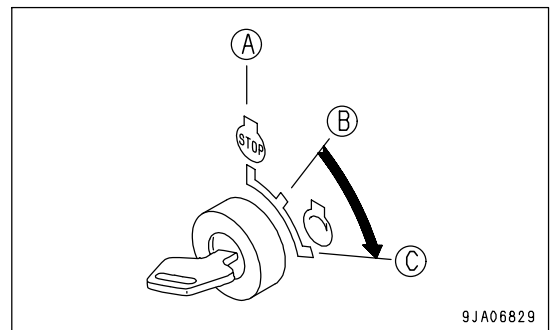
- Check that engine pre-heating monitor (3) on the monitor panel lights up.
- Maintain the key in the ON position (B) until engine pre-heating monitor (3) goes off.



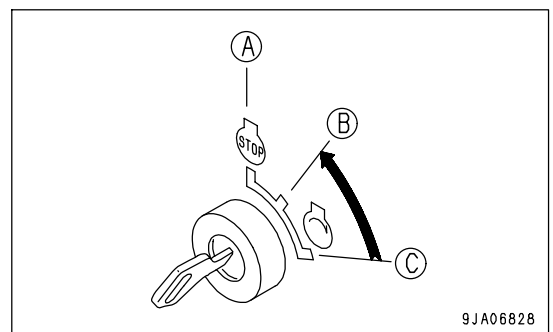
- When engine pre-heating monitor (3) goes off, turn the key of starting switch (2) to the START position (C) to crank the engine.

The time that engine pre-heating monitor (3) stays on changes according to the ambient temperature as shown in the table below.

Ambient temperature	Pre-heat time
-3°C to -10°C (27°F to 14°F)	5 to 15 seconds
-10°C to -20°C (14°F to -4°F)	15 to 32 seconds
-20°C to -30°C (-4°F to -22°F)	32 to 45 seconds



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



REMARK

Immediately after an engine startup, keep the engine idling, and while the engine is idling, keep the foot off the deceleration pedal and do not operate the work equipment.

7. When the engine rotation stabilizes, return to the low idle (MIN) position of fuel control dial (1) and then carry out the warming-up operation.

REMARK

- Regardless of the ambient temperature, if the key in starting switch (2) is turned from OFF position to left, engine pre heating monitor (3) will light up and preheating will start. (Preheating continues while the starting switch (2) is held at the left.)
For the details of the preheat time, see the table in step 5.
- While preheating is being carried out, engine pre-heating monitor (3) lights up to show that preheating is being carried out.
- If the engine does not start with the above operation, wait for about 2 minutes, and repeat steps 3. and 4.

Turbo protect function

The turbo protect function is a function to protect the turbocharger by keeping the engine speed at less than 1000 rpm immediately after the engine is started.

When the turbocharger protection function and engine cooling water auto warming-up function are activated at the same time, the former takes priority over the latter.

- While the turbocharger protect function is in operation, the engine speed is held at 1000 rpm even if the fuel control dial is set above 1000 rpm.
- When the turbo protect function is canceled, the engine speed is set to the speed for the position of the fuel control dial.
- The relationship between the length of time of actuating the turbo protect function and the temperature of the engine coolant is as shown in the table.

Coolant temperature	Turbo protect time (sec.)
Above 10°C (50°F)	0
10 to -30°C (50 to -22°F)	Change 0 to 20

Engine Cooling Water Auto Warming-up Function

Auto warming-up function warm up engine cooling water more quickly by raising an engine idling speed above 1200 rpm when the ambient temperature is low.

When the turbocharger protection function and engine cooling water auto warming-up function are activated at the same time, the former takes priority over the latter.

- While the auto warming-up function is in operation, the engine speed is held at 1200 rpm even if the fuel control dial is set below 1200 rpm.
However, if the fuel control dial is held at the MAX position for more than three seconds, the auto warming-up function is canceled and then the engine speed can be lowered below 1200 rpm.
- This function continues to work for a maximum of 10 minutes, or until the engine cooling water temperature reaches 30°C (86°F).
- If the deceleration pedal is depressed while this function is in operation, the auto warming-up function is canceled and the engine speed goes down below 1200 rpm.

BREAKING IN THE NEW MACHINE

NOTICE

Your Komatsu machine has been thoroughly adjusted and tested before shipment from the factory. However, operating the machine under full load before breaking the machine in can adversely affect the performance and shorten the machine life. Be sure to break in the machine for the initial 100 hours (as indicated on the service meter).

Make sure that you fully understand the content of this manual, and pay careful attention to the following points when breaking in the machine.

- Run the engine at idle 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.
- Immediately after starting the engine, avoid sudden starts, sudden acceleration, unnecessary sudden stops, and sudden changes in direction.

OPERATIONS AND CHECKS AFTER STARTING ENGINE



WARNING

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

CHECKING OF ENGINE STARTABILITY AND NOISE

When starting the engine, check that the engine causes no abnormal noise and that it starts up easily and smoothly. Check also that there is no abnormal noise when the engine is idling or when the revolution rises slightly.

- When there is an abnormal noise at the engine startup and if that condition continues, the engine may be damaged. In that case, ask your Komatsu distributor to check the engine as soon as possible.

CHECKING OF ENGINE ACCELERATION AND DECELERATION

When stopping the machine during the operation, check that there is no irregular engine revolution or that the engine does not stop suddenly.

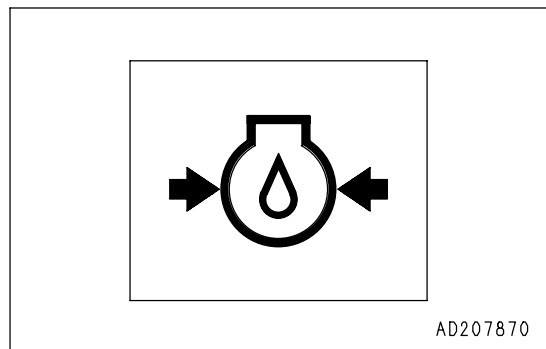
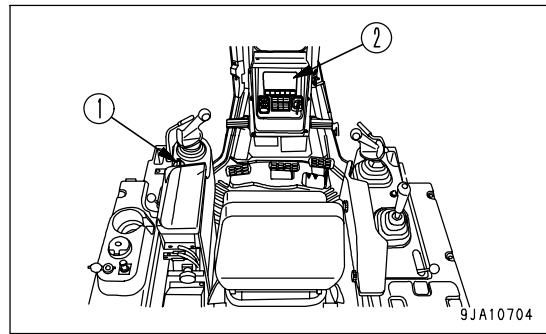
Check also that the engine speed rises smoothly when the fuel control dial is turned to the full (Max).

- Carry out these checks in a safe place, watching out for danger in the surroundings.
- When the engine performs very badly at low idling and in the acceleration and if that condition continues, the engine may be damaged or confuse the operator's sense of driving or lower the braking efficiency, and as a result lead to an unexpected accident. In that case, ask your Komatsu distributor to check the engine as soon as possible.

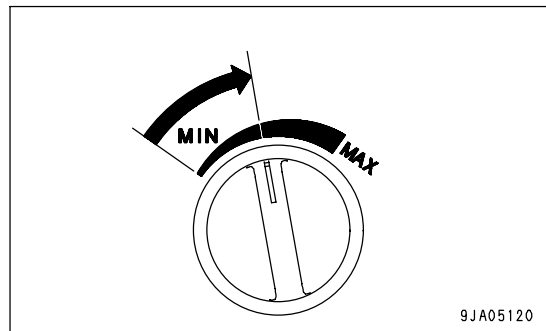
WARMING UP OPERATIONS

NOTICE

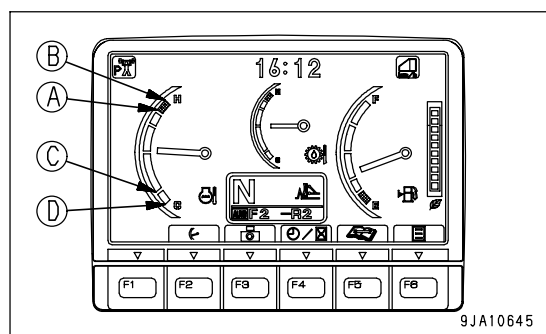
- Do not carry out operations when the hydraulic oil is still at low temperature, and do not operate the control levers suddenly. Always carry out the warming-up operation until the hydraulic oil temperature monitor shows the green display. Performing the warming-up operation properly will extend the service life of the machine. Do not suddenly accelerate the engine before the warming-up operation is completed.
- Do not run the engine under no load at low idling or high idling continuously for more than 20 minutes. This will have an adverse effect on the environment, and will also have an adverse effect on the internal structure of the turbocharger and engine. If it is necessary to run the engine at idling, apply a load from time to time or run at a mid-range speed.
- If the engine oil pressure monitor on machine monitor (2) lights up or the alarm buzzer sounds intermittently, stop the engine and carry out inspection.



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



2. After it completing the warming-up operation, check that all gauges and monitors work properly. If any problem is found, carry out maintenance or repair. Run the engine under light load until the engine water coolant gauge on machine monitor (2) enters green range (A) - (C).
 - (A) - (B): Red range
 - (A) - (C): Green range
 - (C) - (D): White range



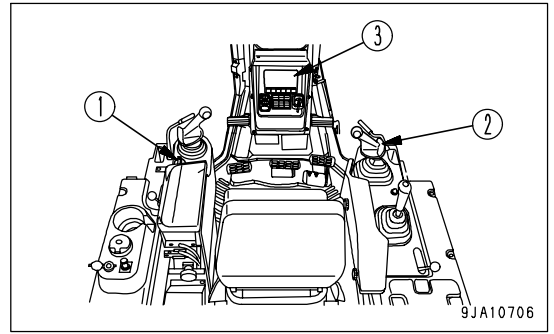
3. Check for abnormal exhaust gas color, noise, or vibration. If any problem is found, contact your Komatsu distributor.

STARTING IN COLD WEATHER

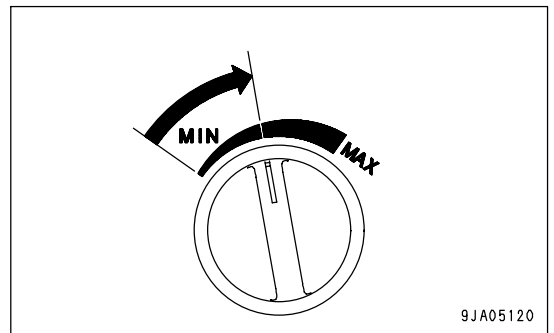
(AUTOMATIC WARMING-UP OPERATION)

This machine is equipped with an automatic warming-up device.

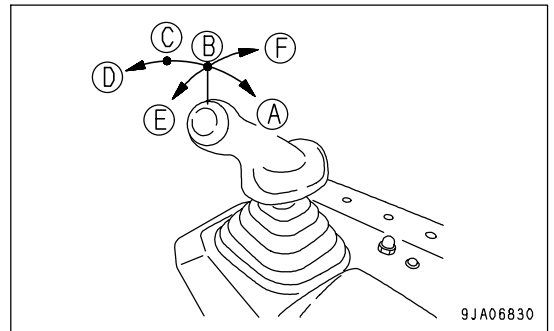
- When the engine is started, if the engine coolant temperature is low (below 30 °C (86 °F)), the warming-up operation is carried out automatically.
- The automatic warming-up operation is canceled if the engine coolant temperature reaches the specified temperature (30 °C (86 °F)) or if the warming-up operation is continued for 10 minutes. If the engine coolant temperature or hydraulic oil temperature are low after the automatic warming-up operation, warm the engine up further as follows.



1. Turn fuel control dial (1) to the center position between LOW IDLE (MIN) and HIGH IDLE (MAX) and run the engine at medium speed for about 10 minutes with no load.



2. Blade control lever (2) to the full RAISE position, then hold the lever in position, and operate slowly to the left tilt relief and right tilt relief positions for 5 minutes.
3. Then operate blade control lever (2) to the full RAISE position (up to the lever stroke end) and hold it in that position; alternate the right and left TILT relief intermittently; lower the blade to the ground by operating the control lever to the LOWER position; operate the control lever to the FLOAT position (up to the lever stroke end); and alternate right and left TILT relief intermittently for five minutes.

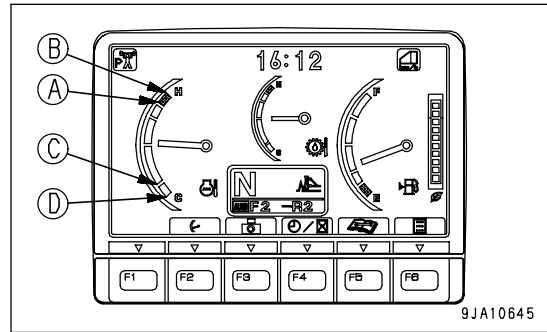


4. Lower the blade to the ground, move the control lever fully to the FLOAT position (lever stroke end) and hold the lever in position for 1 minute. Next, release the lever and check that it stays in the FLOAT position. After waiting for 3 minutes, return the lever to the HOLD position.

- | | |
|-----------|----------------|
| (A) RAISE | (D) FLOAT |
| (B) HOLD | (E) LEFT TILT |
| (C) LOWEW | (F) RIGHT TILT |

5. After it completing the warming-up operation, check that all gauges and monitors work properly. If any problem is found, carry out maintenance or repair. Run the engine under light load until the engine water coolant gauge on machine monitor (3) enters green range (A) - (C).

- (A) - (B): Red range
- (A) - (C): Green range
- (C) - (D): White range



REMARK

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

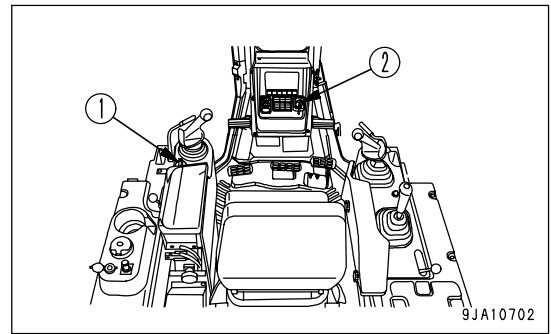
6. Check for abnormal exhaust gas color, noise, or vibration. If any problem is found, contact your Komatsu distributor.

STOPPING ENGINE

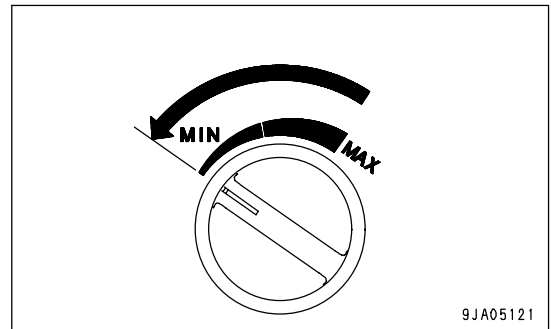
NOTICE

If the engine is stopped without allowing it to cool down, there is danger that the service life of various parts of the engine will be reduced. Except in emergencies, never stop the engine suddenly.

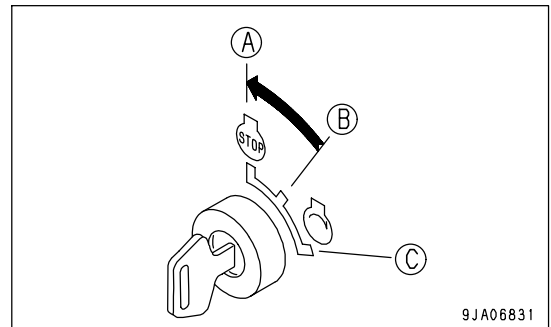
If the engine overheats, do not stop it suddenly. Run it at low speed to allow it to cool down gradually, then stop it.



1. Lower the work equipment to the ground.
2. Place fuel control dial (1) in the low idle (MIN) position and run the engine at low idle speed for about 5 minutes to allow it to gradually cool down.



3. Turn the key in ignition switch (2) to the OFF position (A). The engine will stop.



4. Remove the key from starting switch (2).

REMARK

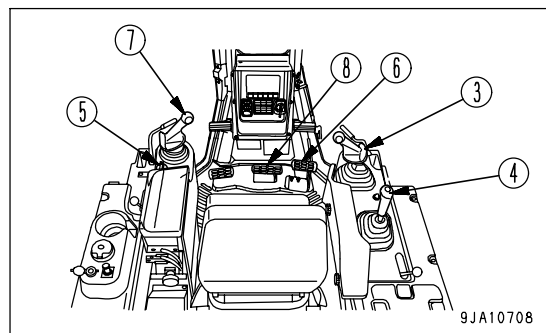
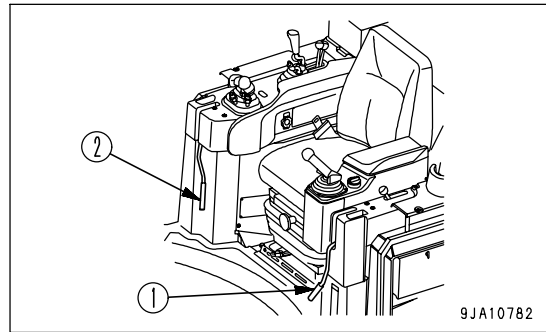
- When engine starting switch (2) key is turned to the OFF position, the engine stops, but the machine's main power source is not turned off immediately. This is a time lag provided for the controller to memorize the operation status and then terminate the system. While this process continues, the main power is maintained. The power holding time varies depending on the operation condition.
- Also when the cooling fan is used for a cleaning purpose, the machine's main power source is not turned off immediately, even if engine starting switch (2) key is turned to the OFF position. This time lag is provided to protect the hydraulic circuit, and in this case, the machine's main power is maintained for seven seconds.

MACHINE OPERATION

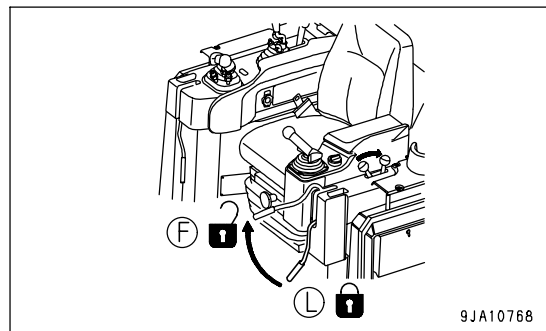
MOVING MACHINE

WARNING

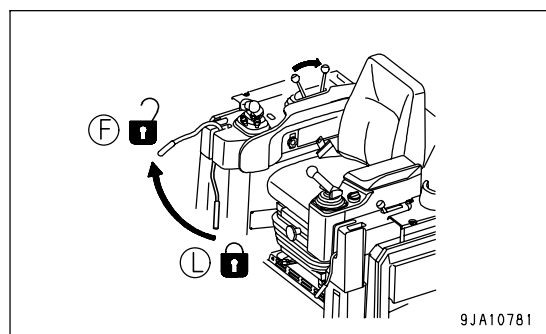
- Before moving the machine, check that the area around the machine is safe, and always sound the horn before moving.
- Do not allow anyone to enter the area around the machine.
- The rear of the machine is a blind spot, so be extremely careful when traveling in reverse.
- When moving the machine down a slope, always keep brake pedal (8) depressed, even after releasing parking brake lever (1).
- When moving the machine up a steep slope, turn fuel control dial (5) to high idling (MAX) position and run the engine at full speed, and keep brake pedal (8) and decelerator pedal (6) depressed. Then operate steering, directional, and gearshift lever (4) from the N (neutral) position to the direction of travel and slowly release brake pedal (8). When the travel speed rises, slowly release decelerator pedal (6).



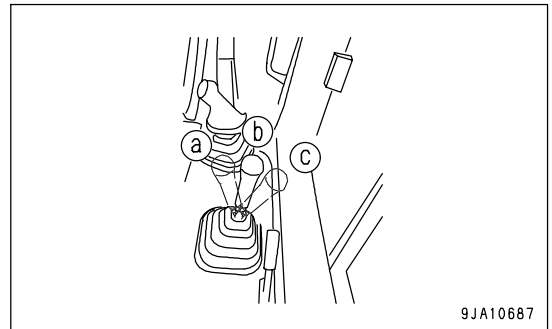
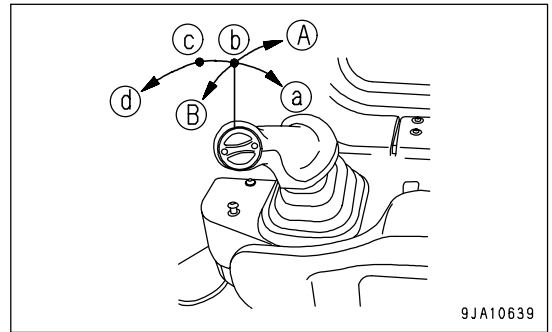
1. Operate parking brake lever (1) to the FREE (F) position.



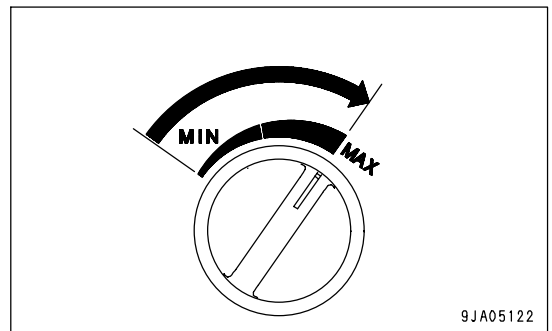
2. Operate work equipment lock lever (2) to the FREE (F) position.



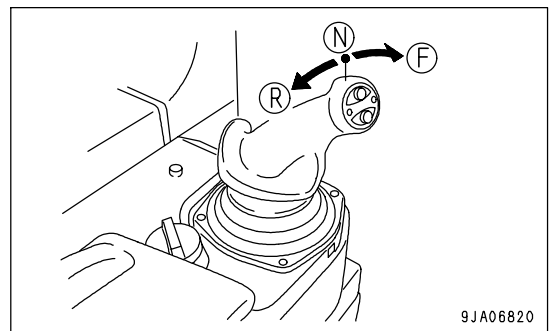
3. Operate blade control lever (3) and ripper control lever (4) to the RAISE position (a), raise the blade 40 - 50 cm (15.8 - 19.7 in) from the ground, and raise the ripper to the maximum height.



4. Turn fuel control dial (5) to the full speed (MAX) position, raise the engine speed, and fully depress decelerator pedal (6).



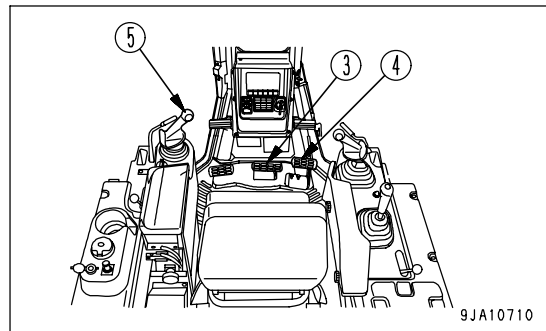
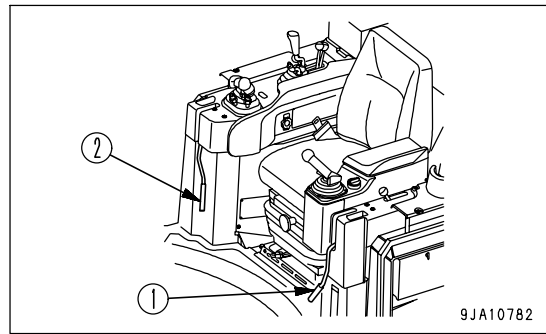
5. Operate steering, forward-reverse, gear shift lever (7) to the FORWARD position (F) or REVERSE position (R) and gradually release deceleration pedal (6).



STOPPING MACHINE

**WARNING**

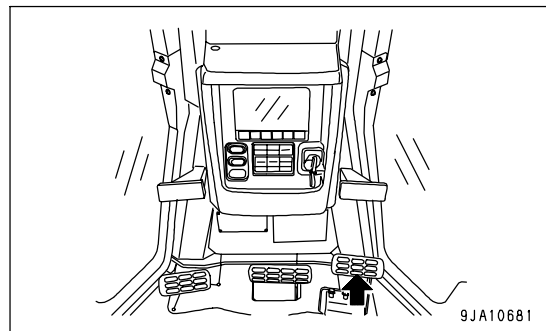
- Avoid stopping suddenly. Give yourself ample room when stopping.
- When stopping the machine, select flat hard ground and avoid dangerous places. If it is unavoidably necessary to park the machine on a slope, place the parking brake lever (1) in the LOCK position and insert blocks underneath the track shoes. As an additional safety measure, thrust the blade into the ground.
- If the work equipment control lever is touched by accident, the work equipment may suddenly move, and may cause damage, serious injury, or death. Before leaving the operator's seat, always secure work equipment lock lever (2) in the LOCK position.



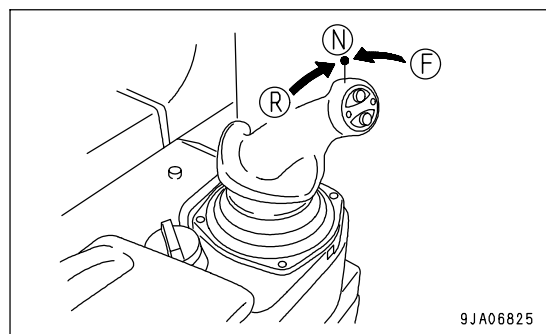
1. Depress brake pedal (3) to apply the brake.

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 (4) to reduce the engine speed and travel speed before depressing the brake.



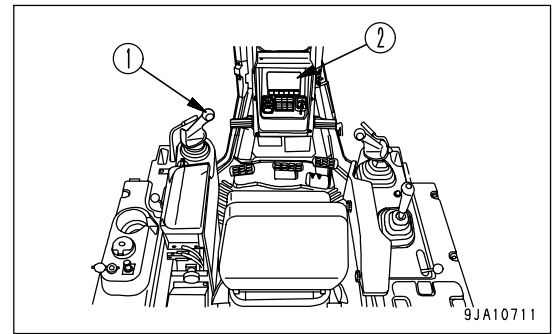
2. Move steering, forward-reverse, gear shift lever (5) to the NEUTRAL position (N), depress brake pedal (3) further, and stop the machine.



SHIFTING GEARS

The machine does not have to be stopped to shift gears.

1. Move steering, forward-reverse, gear shift lever (1) to the desired gear position to shift gears.



GEARSHIFTING OPERATION

- The transmission speed will change when switch (a) or switch (b) is pushed.

Up switch (a): Each time switch is pressed, transmission speed shifts up one speed

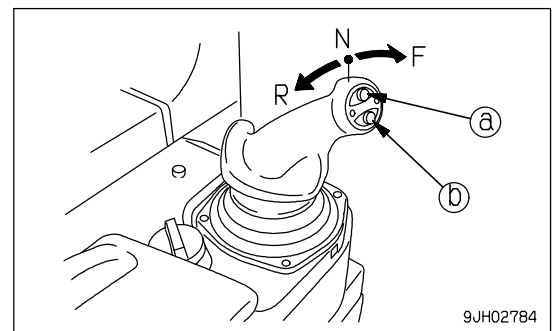
Down switch (b): Each time switch is pressed, transmission speed shifts down one speed

The transmission has the following speed ranges.

Automatic shift mode: 4 respective speed ranges of 1, 2, 3L, and 3 in forward and reverse directions

Manual shift mode: 3 respective speed ranges of 1, 2, and 3 in forward and reverse directions

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



REMARK

The speed range in use is displayed on the speed range display of machine monitor (2) according to the gearshift operation.

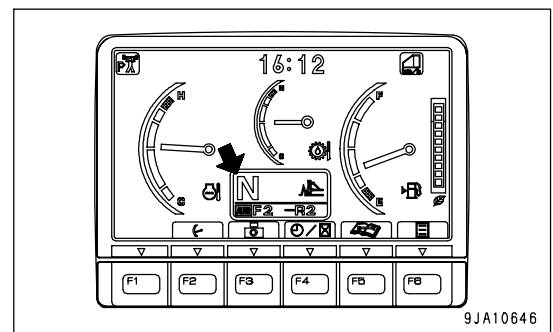
For example:

Neutral: N is displayed on the speed range display

FORWARD 2nd: F2 is displayed on the speed range display

REVERSE 3rd: R3 is displayed on the speed range display

When the parking brake lever is locked, P is displayed.



OUTLINE OF GEAR SHIFT MODES

There are two gear shift modes: automatic shift mode and manual shift mode. Select the mode to match the use.

• Automatic shift mode

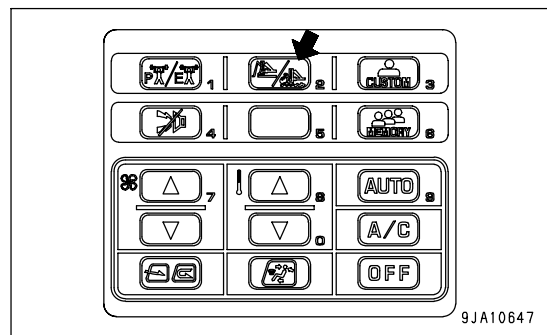
This is the mode used for general dozing operations. If a load is applied, the transmission automatically shifts down, and when the load is removed, it automatically shifts up to the maximum set speed range. The torque converter lock-up is actuated according to the load and the optimum speed range is automatically selected. As a result, this mode provides excellent fuel consumption and production.

• Manual shift mode

This is the mode to use for dozing and ripping on rough ground. If a load is applied, the transmission automatically shifts down, but when the load is removed, the transmission does not automatically shift up.

METHOD OF CHANGING GEAR SHIFT MODE

When switching between automatic shift mode and manual shift mode, set the transmission to Neutral and press the gear shift mode selector switch to change the gear shift mode.



9JA10647

GEAR SHIFT MODE SCREEN DISPLAY

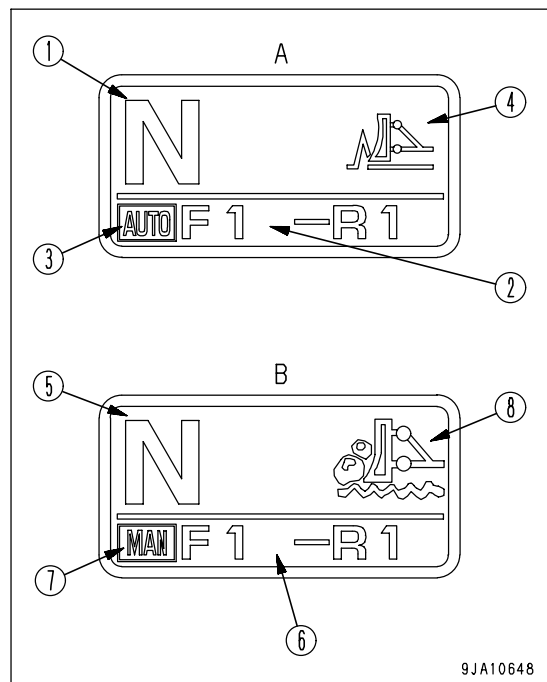
The gear shift mode screen display is shown on the gear shift mode display portion of the monitor panel as follows.

(A) Automatic shift mode

- (1) Present speed range
- (2) Preset (speed range when moving machine off) and maximum speed range when traveling
- (3) AUTO mark displaying automatic mode
- (4) Mark displaying automatic mode

(B) Manual shift mode

- (5) Present speed range
- (6) Preset (speed range when moving machine off)
- (7) MAN mark displaying manual mode
- (8) Mark displaying manual mode



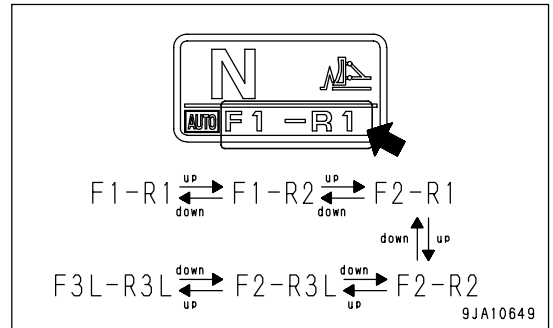
9JA10648

SETTING PRESET WITH SHIFT SWITCH OPERATION AT NEUTRAL

Preset (speed range when moving machine off) and maximum speed range when traveling (automatic mode only) are set by operating the shift switch when the transmission is at neutral.

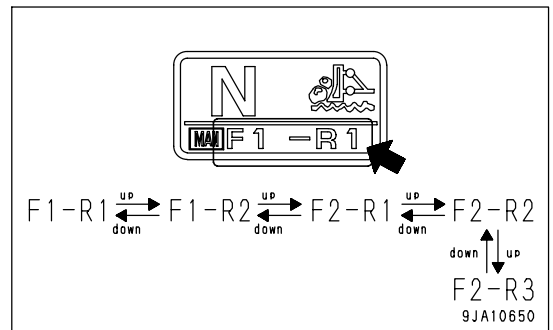
Automatic mode

Preset (speed range when moving machine off) and maximum speed range when traveling can be set.



Manual mode

Preset (speed range when moving machine off) can be set.

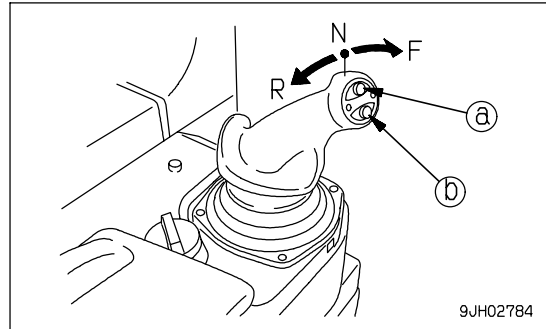


REMARK

When the starting switch is turned ON, the mode is set automatically to automatic mode (set to F1 - R1). When the gear shift mode is switched, F1 - R1 is selected as the default.

GEARSHIFTING OPERATION USING PRESET MODE FUNCTION

- Preset mode selection means the function that set the starting speed range beforehand.
- When the steering, forward-reverse, gear shift lever is in the N position, if UP switch (a) or DOWN switch (b) is pressed, the shift mode selection can be carried out.



Automatic shift mode

- F1-R1 mode
- F1-R2 mode
- F2-R1 mode
- F2-R2 mode
- F2-R3L mode
- F3L-R3L mode

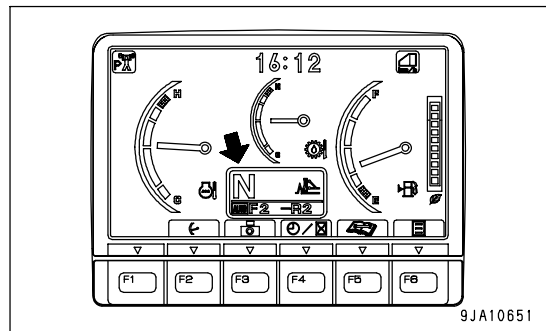
Manual shift mode

- F1-R1 mode
- F1-R2 mode
- F2-R1 mode
- F2-R2 mode
- F2-R3 mode

- The selected shift mode is displayed on the speed range display on the machine monitor.

Shift operation when [F1-R1] mode is set

When the steering, forward-reverse, gear shift lever is operated to the front (FORWARD operation), the speed range shifts to F1. When the lever is operated to the rear (REVERSE operation), the speed range shifts to R1.



Shift operation when [F1-R2] mode is set

When the steering, forward-reverse, gear shift lever is in the N position, if the up switch is pressed once, the mode is set to [F1-R2] mode. After that, if the steering, forward-reverse, gear shift lever is operated forward (forward travel operation), the transmission is shifted to F1. If it is moved back (reverse travel operation), the transmission is shifted to R2.

Shift operation when [F2-R2] mode is set

When the steering, forward-reverse, gear shift lever is in the N position, if the up switch is pressed three times, the mode is set to [F2-R2] mode. After that, if the steering, forward-reverse, gear shift lever is operated forward (forward travel operation), the transmission is shifted to F2. If it is moved back (reverse travel operation), the transmission is shifted to R2.

SHIFTING SPEED RANGE BY OPERATING SWIFT SWITCH WHEN TRAVELING

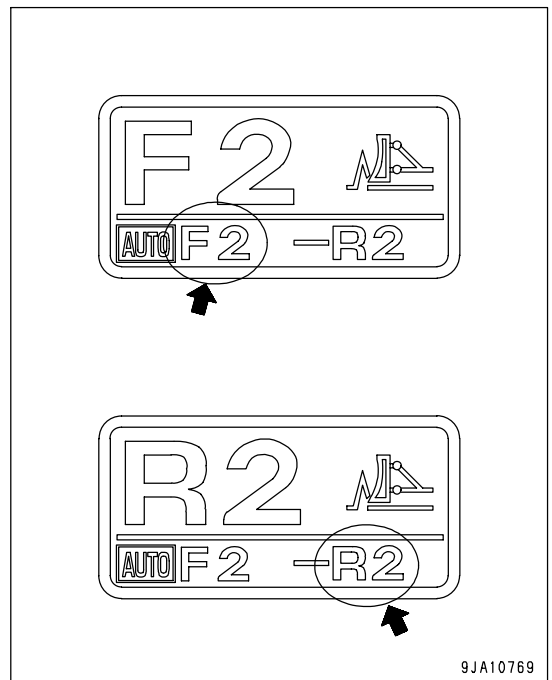
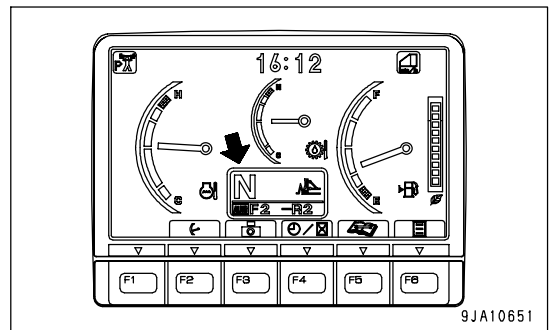
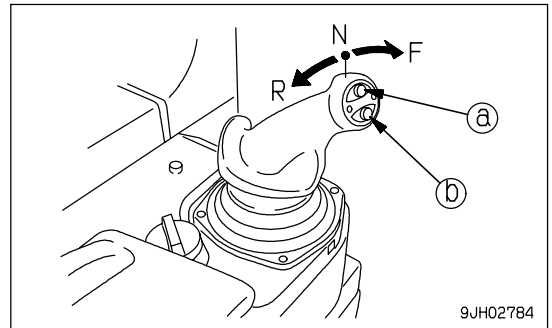
It is possible to operate the shift switch when traveling to change the maximum set speed range when traveling (automatic shift mode) or speed range used when traveling (manual shift mode).

Automatic shift mode

- Changing maximum set speed range when traveling
 When traveling forward: Possible to change maximum speed range to F1 - F3
 When traveling in reverse: Possible to change maximum speed range to R1 - R3

up switch (a): Each time it is pressed, maximum speed range goes up one range

down switch (b): Each time it is pressed, maximum speed range goes down one range

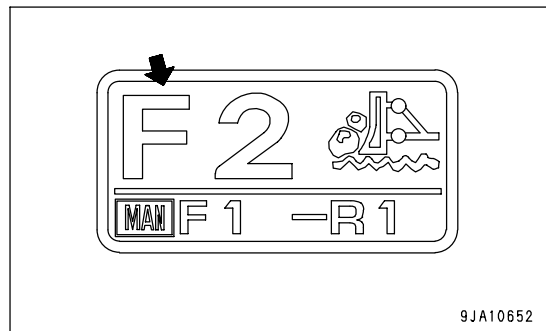
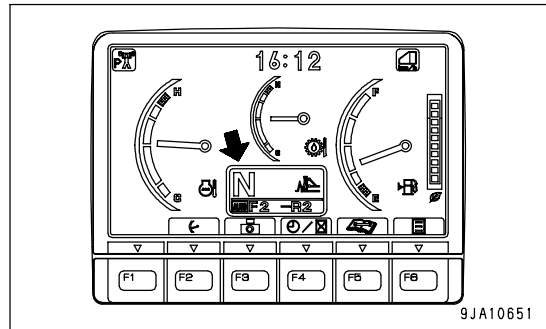
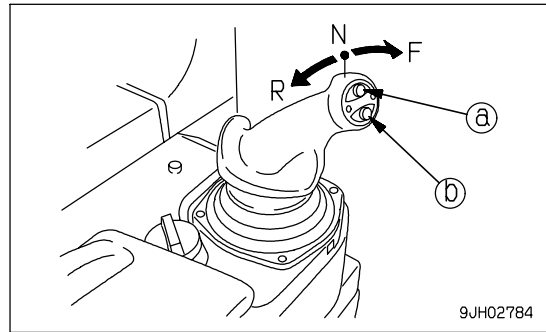


Manual shift mode

- Changing maximum speed range used when traveling
 When traveling forward: Possible to change speed range used to F1 - F3
 When traveling in reverse: Possible to change speed range used to R1 - R3

up switch (a): Each time it is pressed, speed range used goes up one range

down switch (b): Each time it is pressed, speed range used goes down one range



REMARK

- F3L and R3L are speed ranges where the engine speed is controlled at 3rd and the speed range is set to a range between 2nd and 3rd.
- When starting the machine up a slope in 3L, depending on the condition, the machine may be started in 2nd to ensure safety. For example, when shifting from N to F3L when starting off up a slope, the transmission may shift first from N to F2, and then shift to F3L according to the load.
- In automatic shift mode, if the maximum speed range has been changed while traveling, return the steering, forward-reverse, gear shift lever to the Neutral position. The setting is returned to the maximum speed range set in the preset mode before starting to travel (when the transmission was at neutral).
- In the automatic shift mode and manual shift modes, the preset (speed range to start) cannot be changed while the machine is traveling.

NOTICE

- Be careful not to come unnecessarily close to the edge of cliffs. When dropping soil at the edge of a cliff to build an embankment or landfill, always leave one load and use the next load to push the previous load over.
- When reaching the top of a hill, or at the instant when the load is dumped from a cliff, the load will suddenly drop and there is danger that the machine will suddenly increase speed, so depress the decelerator pedal to reduce the speed when dumping the load.
- In automatic shift mode, when a load is applied, the transmission automatically shifts down; when the load is removed, it automatically shifts up to the maximum set speed range. In manual shift mode, if a load is applied, the transmission automatically shifts down, but when the load is removed, the transmission does not automatically shift up.

SHIFTING BETWEEN FORWARD AND REVERSE

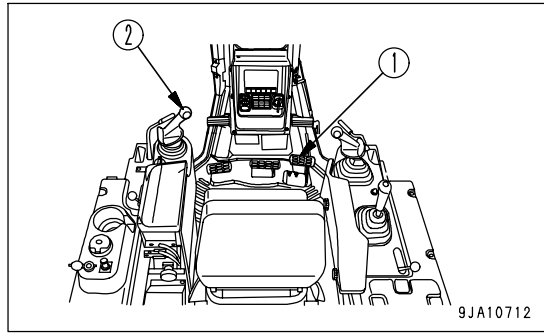
! WARNING

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

! CAUTION

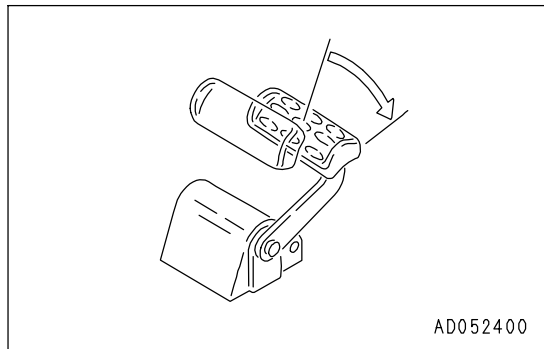
There is no need to stop the machine even when switching between FORWARD and REVERSE.

To increase safety, operator comfort, and the life of the transmission, leave the engine running at full speed, and always depress the decelerator pedal to lower the engine speed.



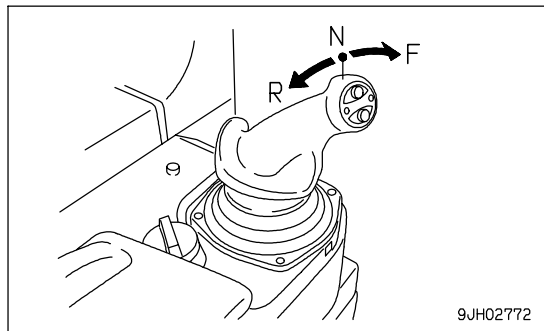
9JA10712

1. Depress decelerator pedal (1) to reduce the engine speed.



AD052400

2. Shift steering, forward-reverse, gear shift lever (2) to the desired position.

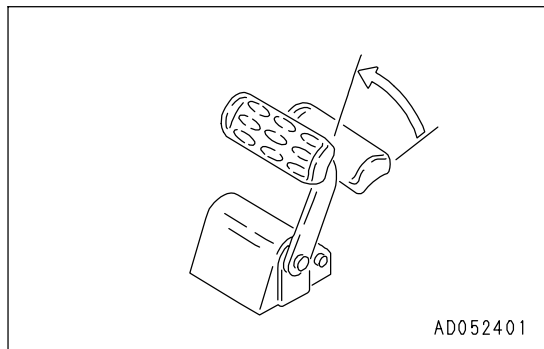


9JH02772

3. Release decelerator pedal (1) and raise the engine speed.

REMARK

- When the steering, forward-reverse, gear shift lever is placed in REVERSE, the backup alarm will sound.
- When changing the direction of travel when traveling downhill, depending on the condition of the machine, the machine may be started in 1st. For example, when switching from F2 to R2 while depressing the decelerator pedal, the transmission may shift from F2 to R1.



AD052401

STEERING MACHINE

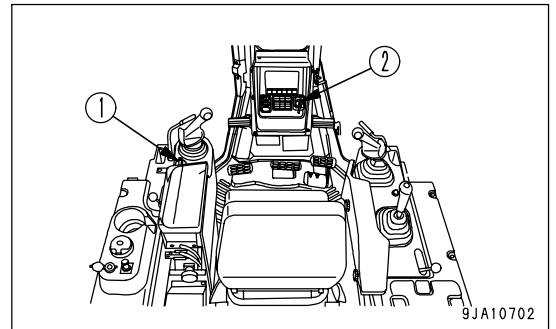


WARNING

- 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 soil.
- Never make a pivot turn at high speed.

NORMAL TURNING

To turn the machine while traveling, incline steering, forward-reverse, gear shift lever (1) in the direction of the turn.

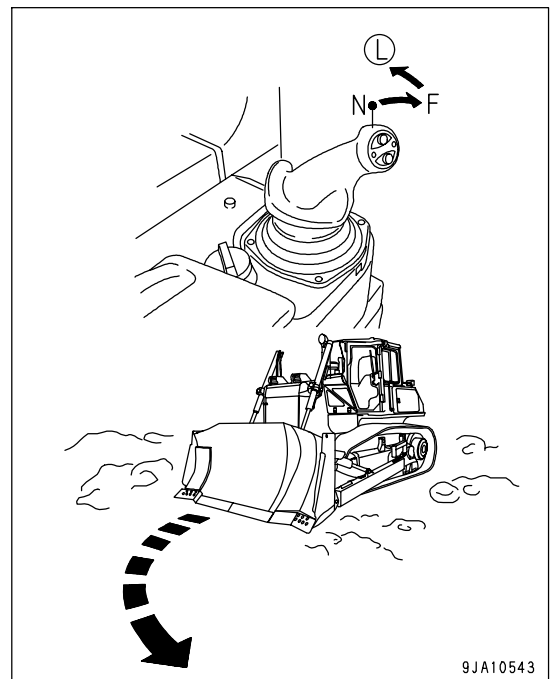


TURNING LEFT WHILE TRAVELING FORWARD

If the steering, forward-reverse, gear shift lever is pushed forward and moved partially to the left (L), the steering clutch is disengaged and the machine turns gradually to the left.

When turning gradually to the right, push the steering, forward-reverse, gear shift lever forward, and move it partially to the right.

Do the same when traveling in reverse.



WHEN MAKING PIVOT TURN TO LEFT WHILE TRAVELING

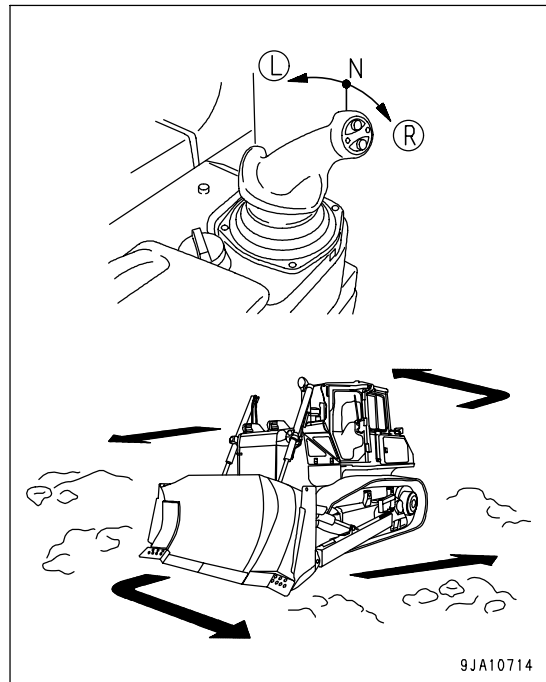
NOTICE

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.

With steering, forward-reverse, gear shift lever (1) in the NEUTRAL position (N), operate the lever partially to the left (L). The left and right tracks will rotate in opposite directions, and the machine will make a slow counterrotation turn. If the lever is moved further, the speed of the counterrotation turn will increase.

REMARK

When making a right counterrotation turn, move the steering, forward-reverse, gear shift lever (1) to the right (R) in the same way.



TURNING WHILE DESCENDING A SLOPE

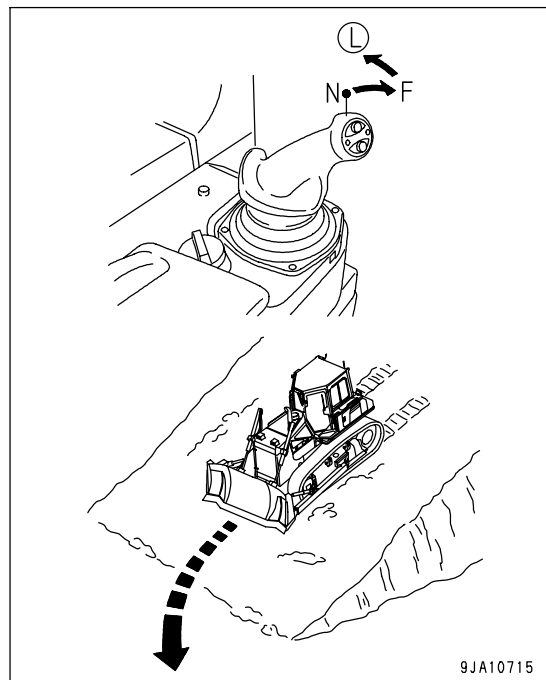
WHEN TURNING TO THE LEFT GRADUALLY WHILE TRAVELING FORWARD

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

REMARK

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

Do the same when traveling in reverse.



PRECAUTIONS FOR OPERATION

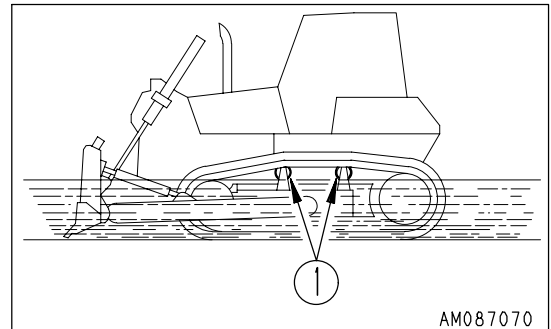
PAY ATTENTION TO GAUGES

If the red range of the power train oil temperature gauge lights up during operation, reduce the load and wait for the temperature to go down.

PERMISSIBLE WATER DEPTH

When operating in water, always keep the bottom of carrier rollers (1) 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.

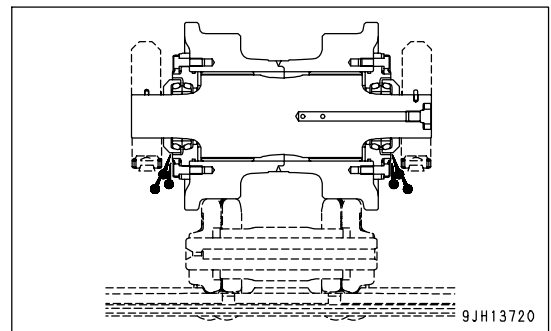
After using the machine in the water for a long time, grease the work equipment and equalizer bar through each grease fitting. For more details on the lubrication method, see "LUBRICATING (PAGE 4-55), GREASE EQUALIZER BAR SIDE PIN (PAGE 4-58) and GREASE EQUALIZER BAR CENTER PIN (PAGE 4-58)".



PRECAUTIONS WHEN TRAVELING FOR A LONG TIME

Avoid operating the machine at high speed for a long time, otherwise the temperature of hydraulic oil sharply rises, and that can cause oil leakage from the track rollers or final drive and lower durability.

If there is no way to avoid operating the machine at high speed for a long time, stop the machine every one hour for 30 minutes and let the track rollers and final drive cool off before starting up the machine again.



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 may stall.

USE ENGINE AS BRAKE

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

Do not move the steering, forward-reverse, gear shift lever to the NEUTRAL 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

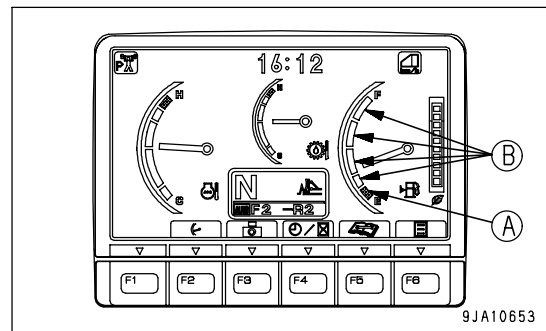
BE CAREFUL OF FUEL LEVEL

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. This makes the engine stop, so be careful not to let the fuel level in the fuel tank become too low.

- When working on slopes with an angle of more than 20°, if the fuel level on the fuel gauge enters the red range, add fuel immediately.

(A): Red range

(B): Green range



TAKE CARE OF ENGINE SPEED ON SLOPES

Set the fuel control dial to a medium speed or higher position and prevent the travel speed from increasing with the decelerator pedal and brake pedal.

BE CAREFUL OF OIL LEVEL

When operating machine on sloped areas of more than 20°, fill all appropriate components with oil to H level.

PRECAUTIONS WHEN ENGINE STOPS ON SLOPES

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

PRECAUTIONS FOR USING BRAKE

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

(Machine equipped with cab)

Always keep the door closed when traveling or carrying out operations.

If the door is 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

(Machine equipped with cab)

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

PRECAUTIONS FOR FLOATING BLADE

If the blade is operated to FLOAT when the engine is running at low speed or when it is idling, hunting may occur. Raise the engine speed when carrying out the FLOAT operation.

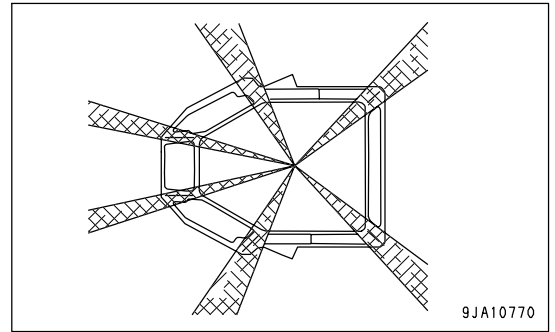
PRECAUTIONS FOR BLIND SPOTS CAUSED BY CAB STAY

(Machine equipped with cab)

**WARNING**

The cab stays create blind spots.

When operating, check carefully that there is no person or obstacle in the surrounding area.

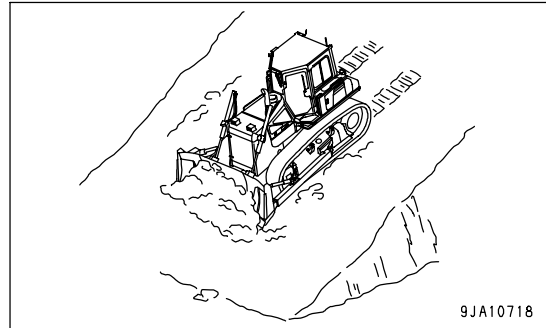


WORK POSSIBLE USING BULLDOZER

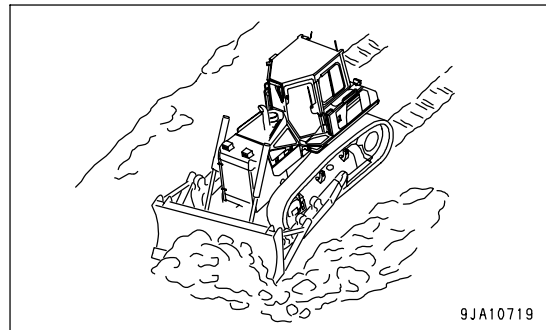
In addition to the following, it is possible to further increase the range of applications by using various attachments.

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 (Angle dozer, Power angle power tilt dozer).

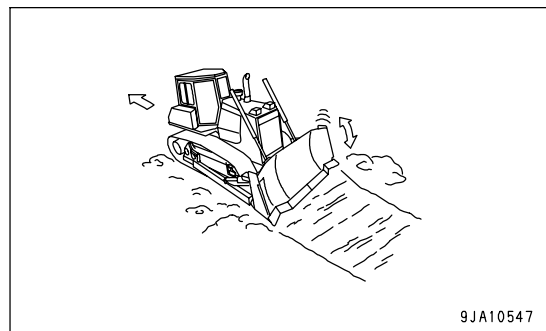


SMOOTHING

NOTICE

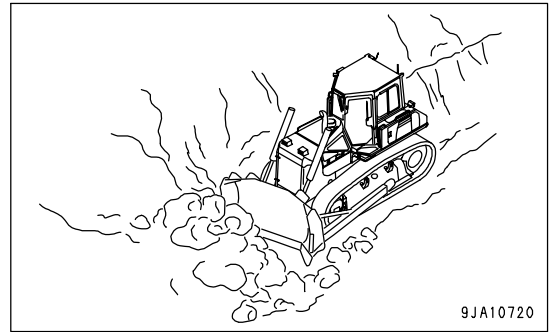
Avoid smoothing on rocky or stony ground. It can damage the blade.

To finish the ground to a flat surface after digging or leveling, put a full load of soil in front of the blade and operate the blade up and down in small movements while traveling forward. Finally, place the blade at FLOAT and travel at low speed in reverse while pulling the blade over the ground surface. Before doing this, hold the lever by hand at the FLOAT position for at least 1 second to make sure that it stays in position. To prevent damage to the blade, be careful not to travel over any stones or rocks.



CUTTING INTO HARD OR FROZEN GROUND OR DITCHING

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



FELLING TREES, REMOVING STUMPS

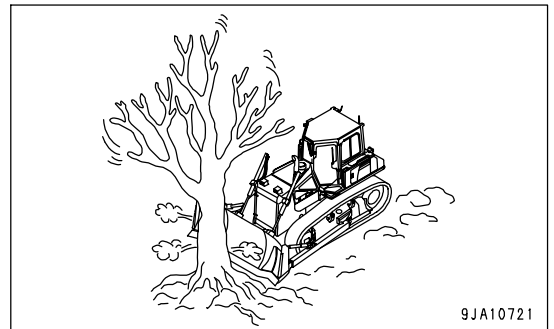
NOTICE

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

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

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

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



RECOMMENDED MODE FOR EACH TYPE OF OPERATION

ADVANTAGES OF EACH MODE

When gear shift mode selector switch (1) is used, gear shift mode can be changed.

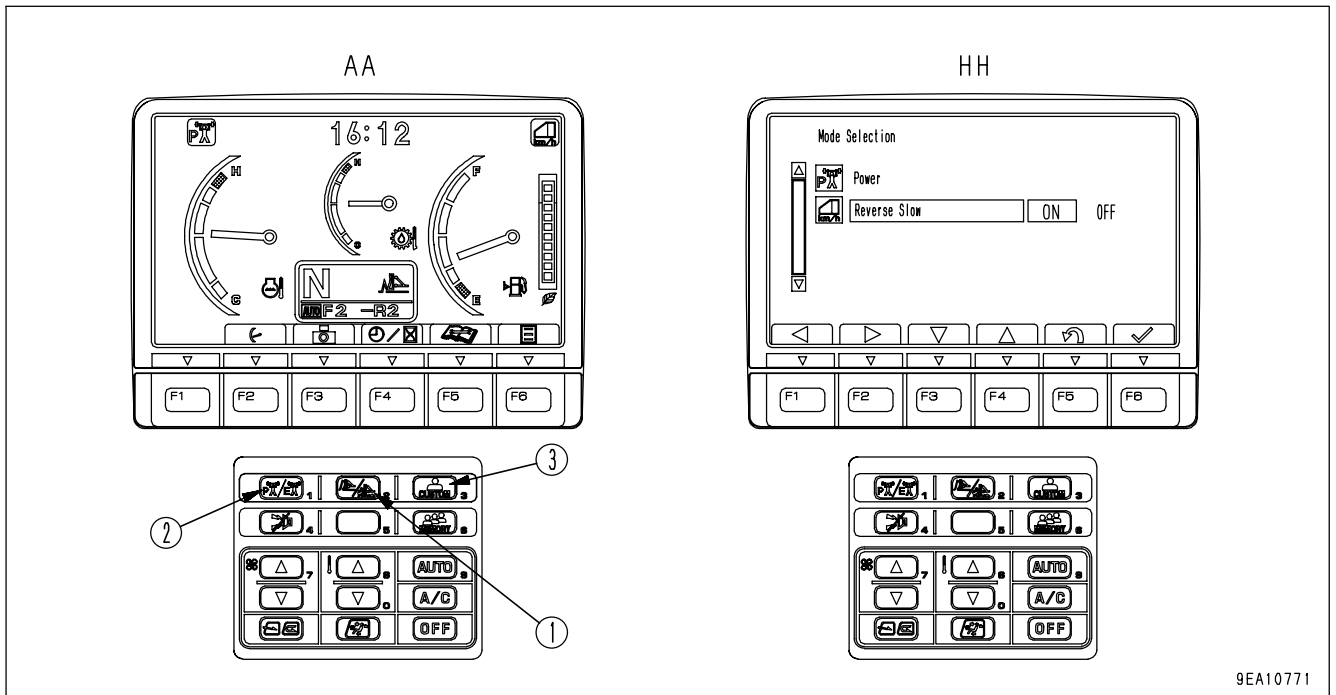
Gear shift mode	Advantages
Automatic shift mode (AUTO)	<ul style="list-style-type: none"> • This mode is recommended for normal soil quality and operations, such as digging, hauling, grading, and leveling. • The power train is driven with high efficiency, so it is possible to reduce fuel consumption. • The optimum travel speed is automatically selected and gear shifting is carried out with no shock, so there are no troublesome gear shifting operations.
Manual shift mode (MAN)	<ul style="list-style-type: none"> • Use this mode for digging and ripping operations on rough ground or where the load changes easily. • Use this mode for operations and removing stumps or for side cutting, where deceleration operations are needed.

When operating mode selector switch (2) is used, operating mode can be changed.

Operating mode	Advantages
Power mode (P)	<ul style="list-style-type: none"> • Full power is generated, so use this mode for operations on uphill slopes or when handling large volumes of soil.
Economy mode (E)	<ul style="list-style-type: none"> • Use this mode when it is desired to reduce fuel consumption. • Use this mode for soil or operations where the shoes tend to slip and where deceleration operations are needed. • Use this mode for pushing-down operations and grading operations where power is not needed.

When customize switch (3) is used, reverse slow mode can be changed.

Reverse slow mode	Advantages
ON	<ul style="list-style-type: none"> • Use this mode for operations on uneven ground or soft rock to improve operator comfort when traveling in reverse.



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AA: Screen for normal

HH: Customize screen

- (1) Gear shift mode selector switch
- (2) Operating mode selector switch
- (3) Customize switch

• For explanation of the method of setting the customize mode, see "CUSTOMIZE SWITCH (PAGE 3-23)".

TABLE OF RECOMMENDED MODES

Type of work	Soil quality	Operating conditions	Gear shift mode		Operating mode		Reverse slow mode
			AUTO	MAN	P	E	
Digging, hauling	Normal soil	Heavy-duty operations, high productivity desired	○		○		
	Sand, soft soil	Light-duty operations, easily slips	○			○	
	Uneven ground, soft rock	Load changes easily		○		○	○
Pushing up		Uphill	○		○		
Pushing down		Downhill	○			○	
Grading, leveling		Light-duty operations	○			○	
Ripping	Uneven ground, soft rock	Shoes slip easily		○		○	○
Removing stumps, side cutting		-		○	○		

ADJUSTING POSTURE OF WORK EQUIPMENT

ADJUST ANGLE OF BLADE EDGE



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 lock the work equipment securely with the work equipment lock lever.

Blade cutting edge angle (A) can be adjusted to meet soil conditions.

STRAIGHT TILT DOZER

Straight tilt dozer with screw-adjustable tilt brace.

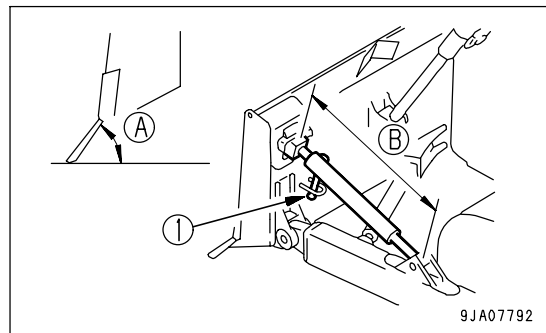
Turn the brace with bar handle (1) to extend a distance between the joints (B), and then blade cutting edge angle (A) increases. To decrease the angle, shorten the distance.

Standard blade cutting edge angle (A) is 55°.

Standard distance between the joints (B) is as shown below.

D65EX: 1150 mm (45.31 in)

D65PX: 1146 mm (45.15 in)



REMARK

When the machine is installed with a fixed type tilt brace, a blade cutting edge angle cannot be adjusted.

Standard blade cutting edge angle (A) is 55°.

When the blade cutting edge is held at the standard angle, the tilt amount is as shown below.

D65EX: 460 mm (18.1 in)

D65PX: 450 mm (17.7 in)

ANGLE DOZER



CAUTION

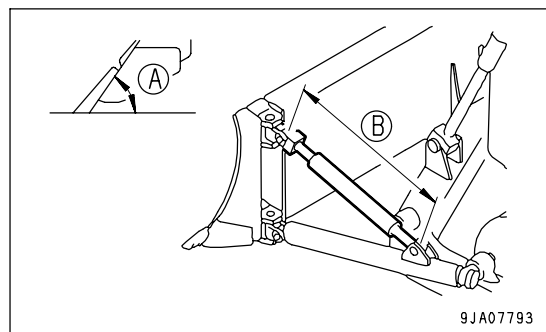
The angle of the blade edge of the angledozer blade can not be adjusted.

If the angle of the blade edge is changed by changing the brace length, an excessive bending stress will be applied to the center pin, which may be broken.

Standard blade cutting edge angle (A) is 55°.

Standard distance between the joints (B) is as shown in the table below.

Model	Standard	Use Range
D65EX	1127mm (44.4in)	1117-1137mm (44.0-44.8in)

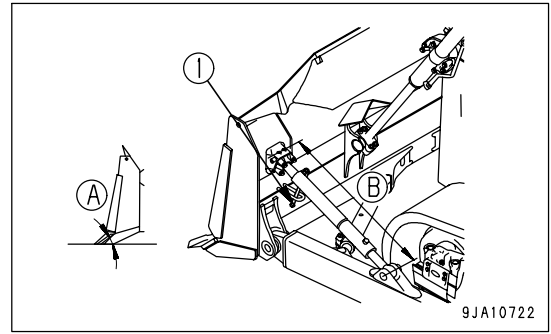


SIGMA DOZER

Turn the brace with bar handle (1) to extend a distance between the joints (B), and then blade cutting edge angle (A) increases. To decrease the angle, shorten the distance.

Standard cutting angle (A) is 46°.

Standard distance (B) between the joints is 1150 mm (45.31 in).



Cutting angle (A)	Advantages	Disadvantages
Large	<ul style="list-style-type: none"> Amount of soil spilled to rear of blade is small Separation of soil is good and little soil is carried back 	<ul style="list-style-type: none"> Soil digging resistance and rolling-up resistance are large Load pushed by blade is small
Small	<ul style="list-style-type: none"> Soil digging resistance and rolling-up resistance are small Load pushed by blade is large Cutting amount on rough surfaces is good 	<ul style="list-style-type: none"> Amount of soil spilled to rear of blade is large Separation of soil is poor and a lot of soil is carried back

POWER ANGLE POWER TILT DOZER

If rod (1) is rotated to increase distance (B) between the joints is increased, cutting angle (A) is increased, too. If the former is decreased, the latter is decreased, too.

The standard cutting angle (A) is 55° and the standard distance (B) between the joints is 456 mm (1 ft 6 in).

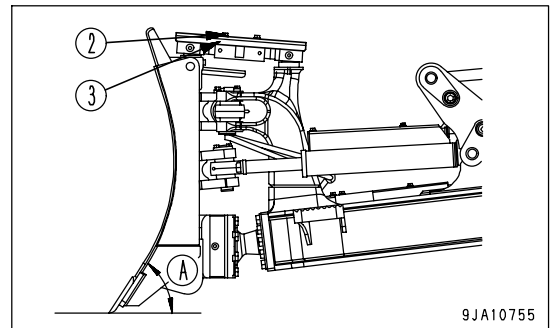
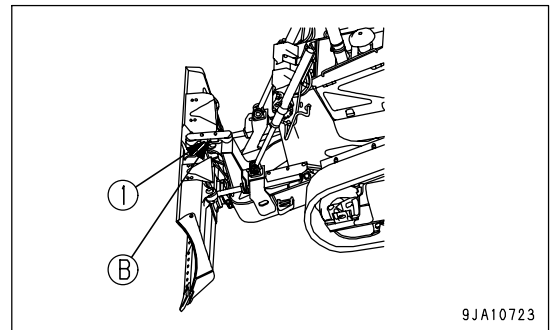
This is suitable for general operations.

The maximum cutting angle (A) is 58° and the distance (B) between the joints is 498 mm (1 ft 8 in).

This is suitable for digging operations on clay soil or hard soil. In addition, this will improve the removal of the soil from the blade and reduce spillage of soil over the back of the blade. This is suitable also for dozing operations on slopes.

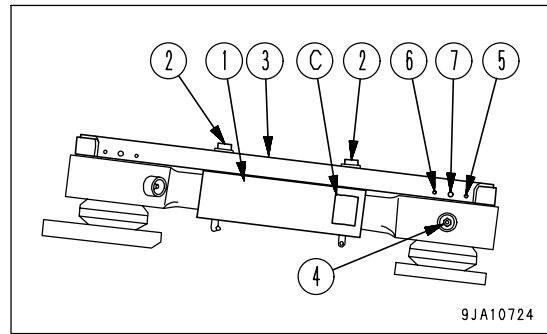
The minimum cutting angle (A) is 52° and the distance (B) between the joints is 412 mm (1 ft 4 in).

This allows the blade to gather a larger amount of soil and is suitable for hauling operations on soft soil. In addition, it makes it easier for the cutting edge of the blade to dig into the soil, so it is suitable for operations digging into hard soil.



Method of adjusting

1. Remove 2 bolts (2), then remove cover (3).
2. Insert a bar in hole (C) of rod (1) and turn rod (1).
3. When increasing distance (B) between the joints, set grease fitting (4) to cover hole (5). Be sure to set so since increasing distance (B) more can cause damage.
4. When decreasing distance (B) between the joints, set grease fitting (4) to cover hole (6). Be sure to set so since decreasing distance (B) more can cause damage.
5. When setting distance (B) between the joints to the standard length, set grease fitting (4) to cover hole (7).
6. After completing adjustment, use 2 bolts (2) to install cover (3) to its original position.

**REMARK**

When the maximum cutting angle (blade tilted fully forward) is changed to the minimum cutting angle (blade tilted back), there is resistance from the pressure stored in the angle cylinder, so the operating effort may gradually become heavier.

In this case, turn the starting switch ON (there is no need to start the engine), then release the work equipment lock lever and operate the blade control lever to the Angle position to release the pressure in the angle cylinder.

ADJUSTING SHIMS IN ASSEMBLING WORK EQUIPMENT

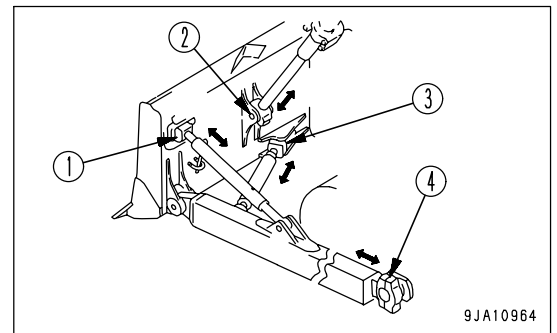
When assembling the work equipment, if the adjustment of the play is not carried out properly, excessive bending stress will be generated at all parts, and this will lead to cracks or breakage.

Adjust the play of parts (1) to (4) to the correct value. For details, see "ADJUSTING SHIMS, ADJUSTING TENSION AT WORK EQUIPMENT LINKS (PAGE 4-45)".

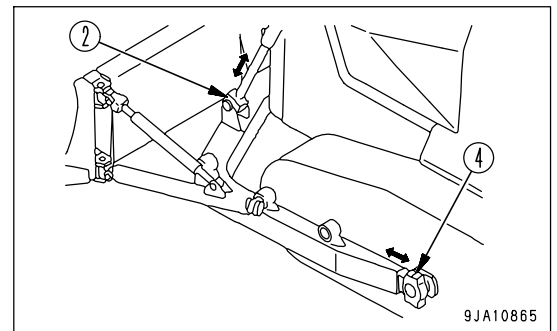
- When disassembling the machine for transportation, be careful not to lose the shims.

Shim adjusting position		(1) Tilt	(2) Lift	(3) Center	(4) Trunnion
Item					
Optimum value	mm (in)	0.2 - 0.7 (0.008 - 0.028)	0.2 - 0.7 (0.008 - 0.028)	0.2 - 0.7 (0.008 - 0.028)	0.2 - 1.2 (0.008 - 0.047)
Thickness of standard shims	mm (in)	5 (0.197)	4 (0.158)	5 (0.197)	10 (0.4)

- Straight tilt dozer
- Straight tilt power pitch dozer
- Sigma dozer
- Sigma power pitch dozer



- Angledozer



ADJUSTING TENSION OF CENTER BRACE

- (Straight tilt dozer)
- (Straight tilt power pitch dozer)
- (Sigma dozer)
- (Sigma power pitch dozer)

If the work equipment assembly is removed for transportation and is assembled again after transportation, the tension of the center brace must be adjusted. If this is not done, the bushing at the connecting part of the blade and straight frame will come out, and sand and soil will enter. This will cause premature wear or damage of the bushing. Adjust the tension of the center brace. For details, see "ADJUSTING SHIMS, ADJUSTING TENSION AT WORK EQUIPMENT LINKS (PAGE 4-45)".

ADJUSTING BRACE OF ANGLE BLADE



WARNING

It is dangerous if the work equipment moves by mistake when it is being adjusted. Move the machine to a horizontal place, stop the machine, and set the work equipment in a stable condition. Then stop the engine and set the work equipment lock lever securely to the LOCK position.



CAUTION

The purpose of the brace length adjustment mechanism of the angle blade is to adjust the tilt of the blade. If this adjustment is not performed properly, the work equipment may be cracked or broken.

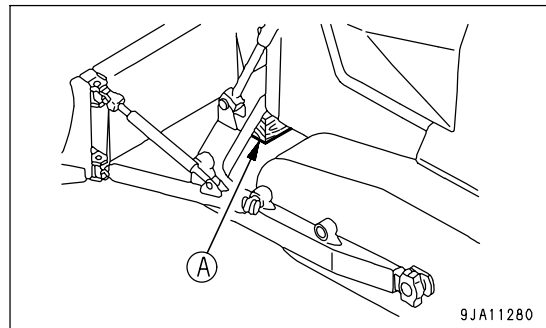
ADJUSTING BRACE FOR USING BLADE IN STANDARD POSTURE



CAUTION

If the brace is not adjusted to a proper length, an excessive bending stress may be applied to the center pin, which may be broken.

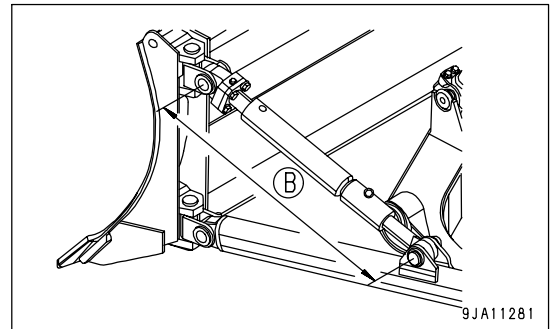
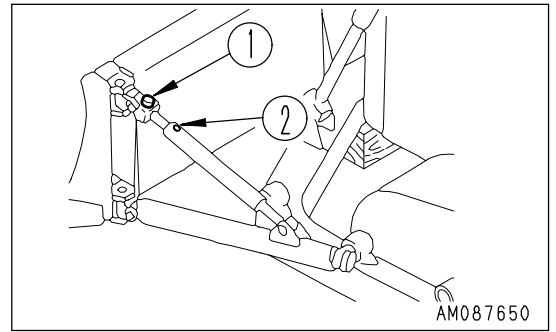
1. Raise the blade up to the height of 400 mm to 500 mm (15.8 in to 19.7 in) above the ground, and put block (A) beneath the blade edge.



2. Loosen set bolt (1) of the brace.
3. Insert a suitable bar into hole (2) of the brace and turn it to adjust length (B) of the brace.

Adjust respective lengths (B) of the right and left braces to the following length.

D65EX: $1,127 \pm 10$ mm (44.4 ± 0.4 in)



4. Tighten set bolt (1).

ADJUST AMOUNT OF TILT

ANGLE DOZER

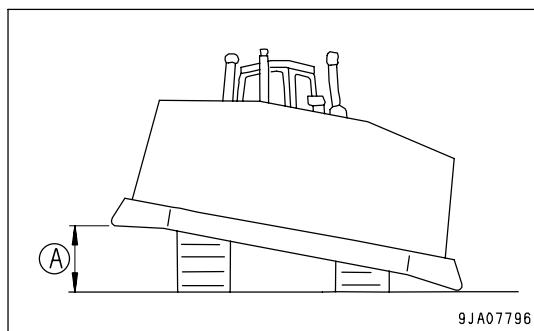


WARNING

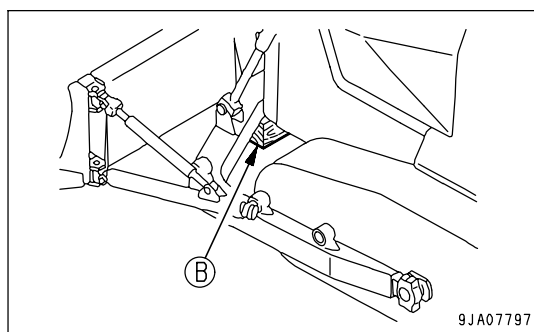
When adjusting the amount of tilt, it is dangerous if the work equipment is moved by mistake. Set the work equipment in a safe condition, then stop the engine and lock the work equipment securely with the work equipment lock lever.

NOTICE

An amount of tilt (A) can be increased to a maximum of 400 mm (15.8 in).
Adjust an amount of tilt (A) within 400 mm (15.8 in).



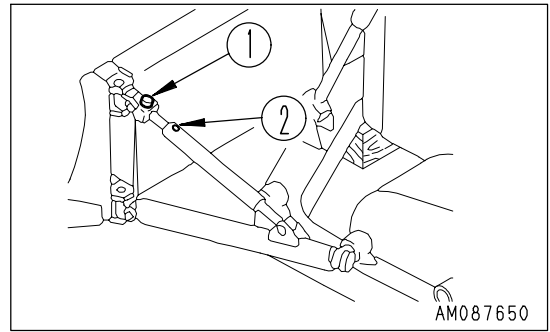
1. Raise the blade up to the height of 400 mm to 500 mm (15.8 in to 19.7 in) above the ground, and put block (B) beneath the blade edge.



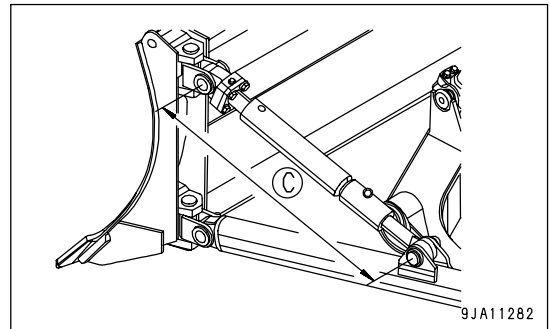
2. Loosen the bolt (1) of the brace, insert a suitable bar into hole (2) of the brace, and turn it.

CAUTION

Do not adjust only either brace.
 If the length of only either brace is changed to adjust the tilt, an excessive bending stress may be applied to the center pin, which may be broken.
 Be sure to lengthen either brace and shorten the opposite one by the same amount.



REMARK
 When turning the brace with bar, keep the blade above the ground.



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

When the tilt is adjusted to the maximum, length (C) of the brace is as shown in the following table.

Model	Max. tilt mm (in)	Brace length (C) mm (in)		
		Shortened side	Lengthened side	In standard posture
D65EX	400 (15.8)	1,070 (42.1)	1,185 (46.7)	1,127 (44.4)

3. Tighten set bolt (1).

METHOD OF ANGLING BLADE

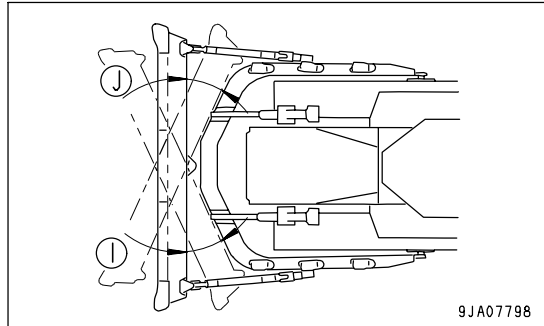
(Angle dozer)

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



WARNING

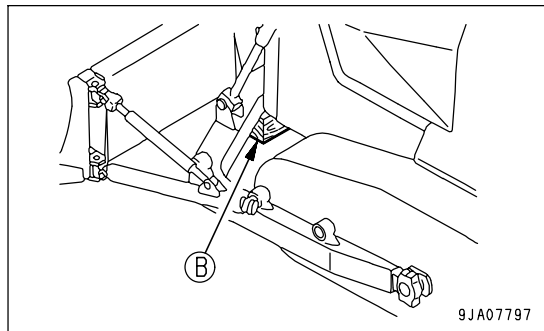
- When adjusting the amount of angling, it is dangerous if the work equipment is moved by mistake. Set the work equipment in a safe condition, then stop the engine and lock the work equipment securely with the work equipment lock lever.
- Be careful when removing arm (2). After arm (2) is removed, the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



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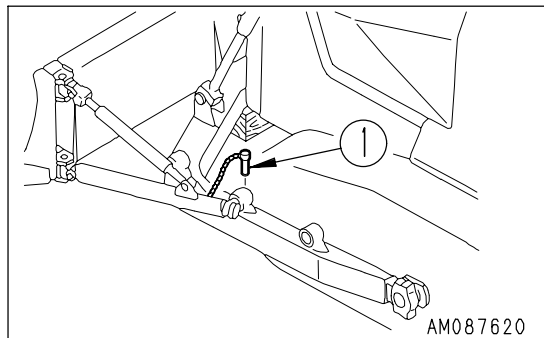
- (I) Left angle : 25°
- (J) Right angle: 25°

1. Raise the blade up to the height of 400 mm to 500 mm (15.8 in to 19.7 in) above the ground, and put block (B) beneath the blade edge.

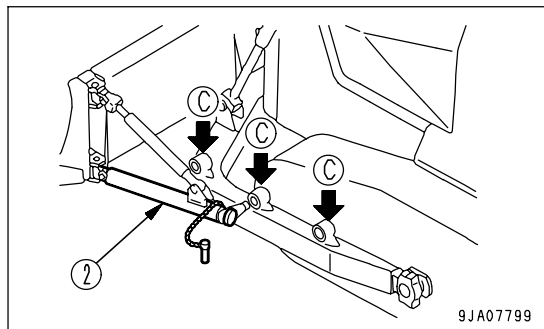


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2. Remove pins (1) on the left and right sides, then remove arm (2) from the frame.
3. Insert arm (2) into any desired bracket (C) on the frame (three brackets provided on one side) and fasten it with pin (1) so that it does not slip off.



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ADJUSTING TILT FOR USING BLADE IN ANGLED POSTURE

Angledozers only

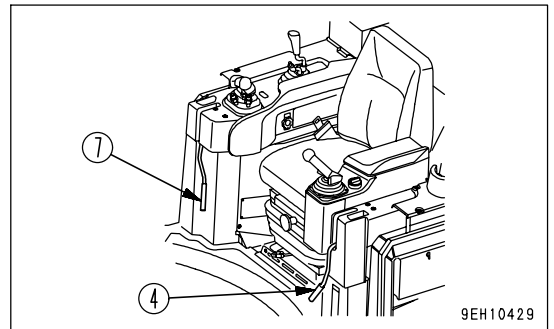
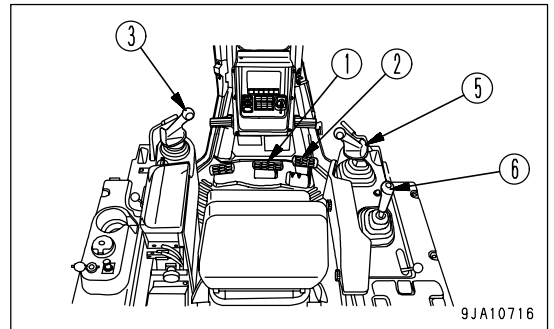
Perform the following adjustment to adjust the blade length properly.

1. Return the blade to the standard posture (non-angled posture).
2. Adjust the blade to the necessary tilt.
3. Angle the blade.

PARKING MACHINE

WARNING

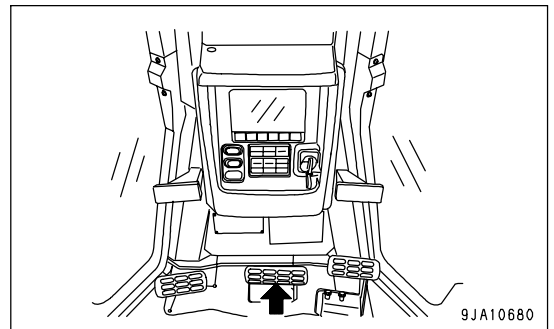
- Avoid stopping suddenly. Give yourself ample room when stopping.
- When stopping the machine, select flat hard ground and avoid dangerous places. If it is unavoidably necessary to park the machine on a slope, place the parking brake lever (4) in the LOCK position and insert blocks underneath the track shoes. As an additional safety measure, thrust the blade into the ground.
- If the work equipment control lever is touched by accident, the work equipment may suddenly move, and may cause damage, serious injury, or death. Before leaving the operator's seat, always secure work equipment lock lever (7) in the LOCK position.



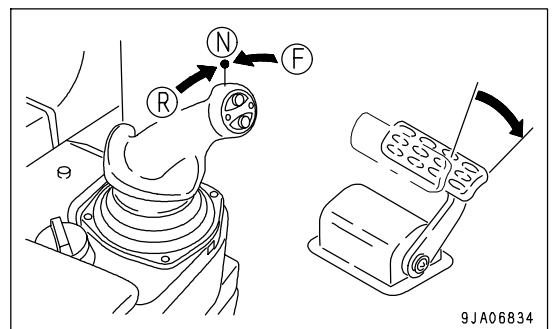
1. Depress brake pedal (1) to stop the machine.

NOTICE

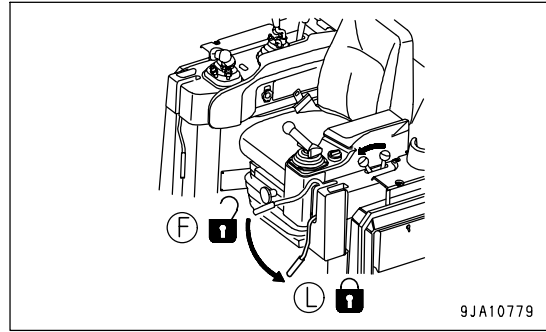
If the brake pedal is depressed when the engine speed or machine travel speed is high, the brake disc may produce a slipping sound. When depressing the brake pedal, usually depress decelerator pedal (2) to reduce the engine speed and machine travel speed.



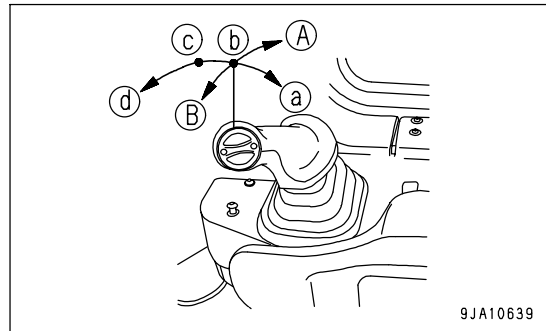
2. Set steering, forward-reverse, gear shift lever (3) to the N position.



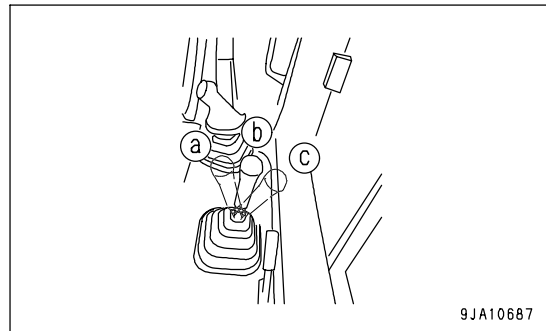
3. Operate parking brake lever (4) to the LOCK (L) position.



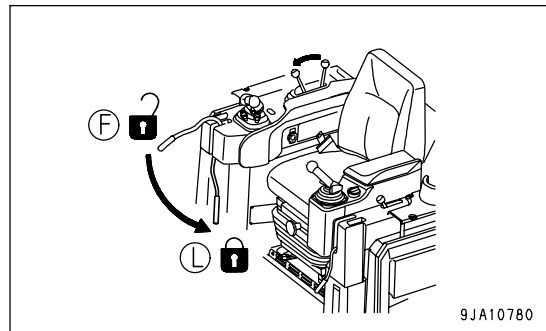
4. Operate blade control lever (5) and ripper control lever (6) to LOWER position (c) and lower the blade and ripper to the ground.



5. Place blade control lever (5) and ripper control lever (6) at HOLD position (b).



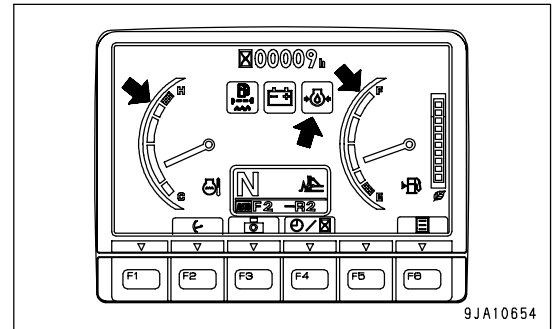
6. Set work equipment lock lever (7) to the LOCK position (L).



CHECK AFTER FINISHING WORK

BEFORE STOPPING ENGINE

Check the engine coolant temperature, engine oil pressure, and fuel level on the machine monitor.



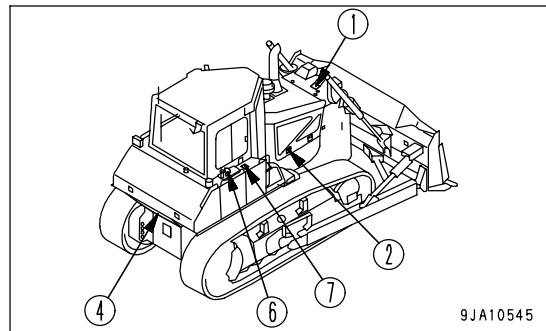
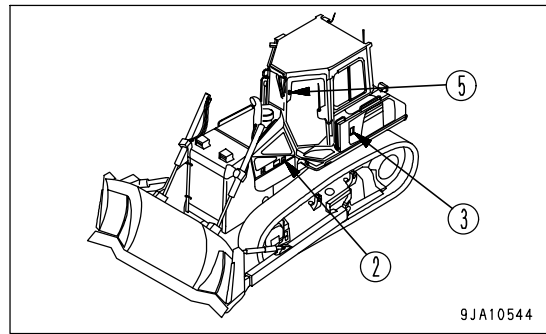
AFTER STOPPING ENGINE

1. Walk around the machine and check the work equipment, machine exterior, and undercarriage, also check for any leakage of oil or coolant. If any problems 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.

LOCKING

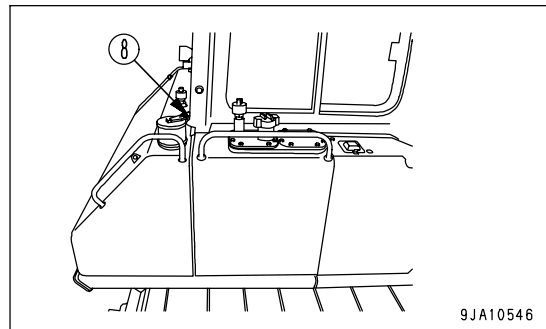
To prevent vandalism, there are locks in the following places.
Places that can be locked with the starting switch key.

- Top cover at front of chassis (1)
- Right and left engine side covers (2)
- Battery inspection cover (3)
- Inspection cover for fuel tank drain valve(4)
- Cab door opener (5) (Machine equipped with cab)
- Hydraulic tank filler cap (6)
- Power train oil level inspection cover (7)



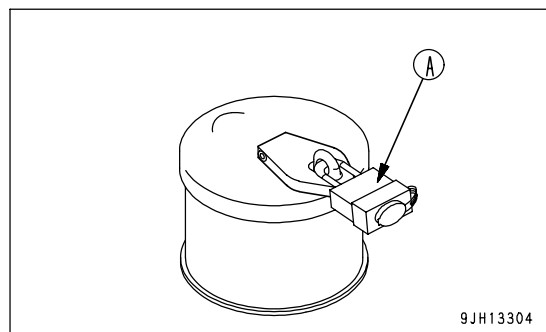
Places locked with special key

- Fuel tank cap (8)



REMARK

If the padlock (A) is to be used, it is recommended to use the type that has the cover to protect the key hole.

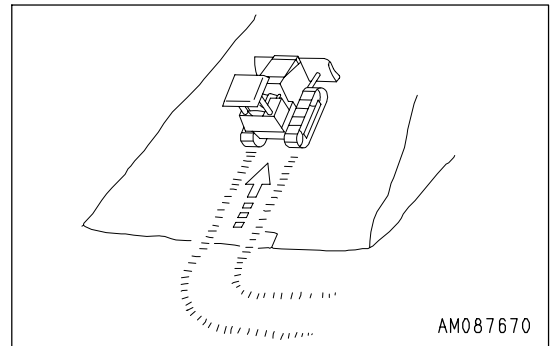


TIPS FOR LONGER UNDERCARRIAGE LIFE

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

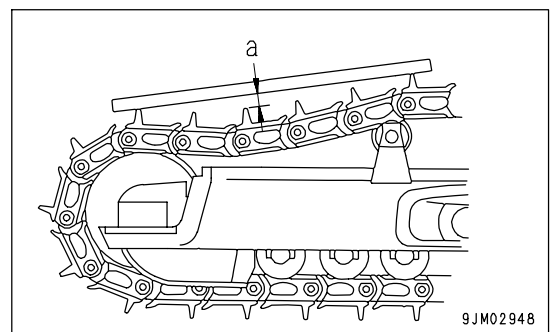
OPERATION METHOD

- 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 on the blade until slipping stops.
- Avoid sudden starts, acceleration or stops, unnecessary 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 the top of the slope.
- When ground inclines to the left or right during digging operations, do not continue to dig with the incline. Move the 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.

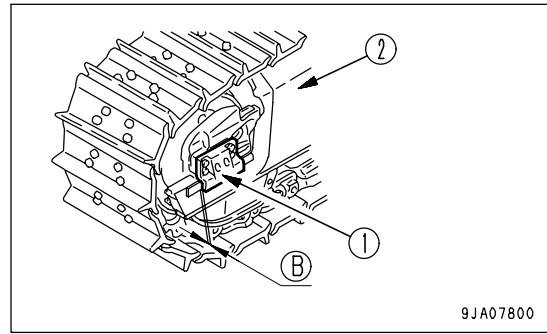


INSPECTION AND ADJUSTMENT

- Adjust the track shoe tension to an adequate level.
The track shoe tension can be measured in terms of clearance "a" between the front idler and carrier rollers as shown in the figure at right. While this clearance is normally 20 mm to 30 mm (0.8 to 1.2 in), increase the tension slightly on a rocky terrain and decrease on the clayish ground.
An excessively loose track shoe can create an abnormal vibration to the machine during the work or cause the sprocket teeth to wear prematurely.
(For an inspection and maintenance method, see "CHECK TRACK SHOE TENSION, ADJUST (PAGE 4-27)". Referring to that section, carry out an inspection and adjustment of track shoe tension.)
- Check idler rollers for oil leakage as well as for loose bolts and nuts. If any trouble is detected, repair immediately.



- Check a clearance (B) between front idler guide plate (1) and track frame (2). As clearance (B) becomes larger, it can cause the front idler to sway sideways and cause the track shoe to jump off rollers. (For an inspection and maintenance method, see "ADJUST IDLER CLEARANCE (PAGE 4-42)".



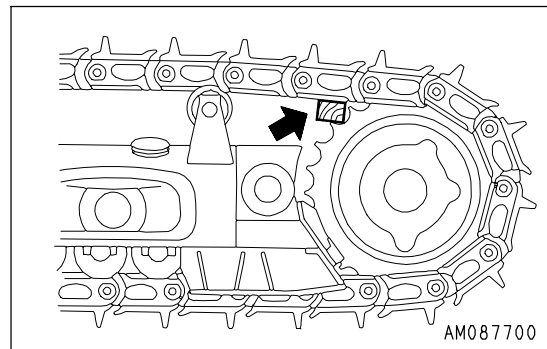
INSPECTION AND REPAIR

Frequent inspection and prompt repair will reduce repair costs.

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

MEASURING LINK PITCH

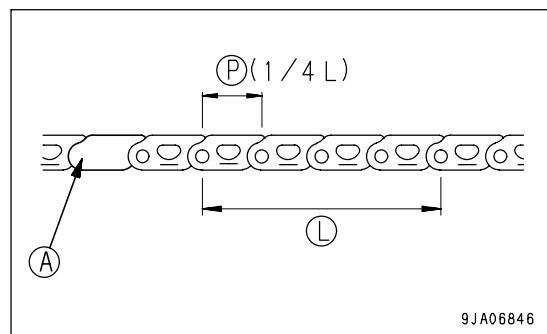
1. Insert a wooden block between track shoe and sprocket to take up the slack in track shoes.



2. Measure the pitch length (L) of 4 links at a straight portion at least 2 links from master pin (A). Divide this measurement by four to obtain the link pitch.

- Basic link pitch (P): 203 mm (8.0 in)
- Link pitch limit for turning: 206 mm (8.1 in)

There is no link window on the master link.



REMARK

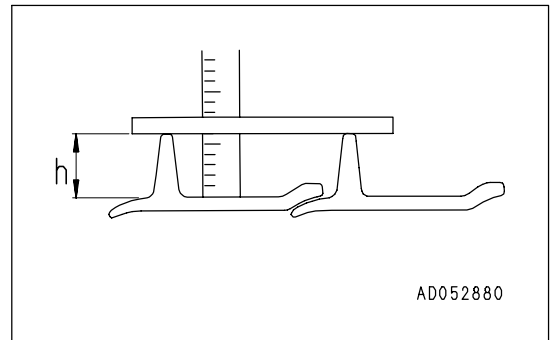
The measured value under decimal of link pitch is different from the basic value depending upon the precision of measure or the tolerance of product even if it isn't worn out.

Don't judge it's worn out too soon, do it with the trend of measured value after that.

MEASURING HEIGHT OF GROUSER

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

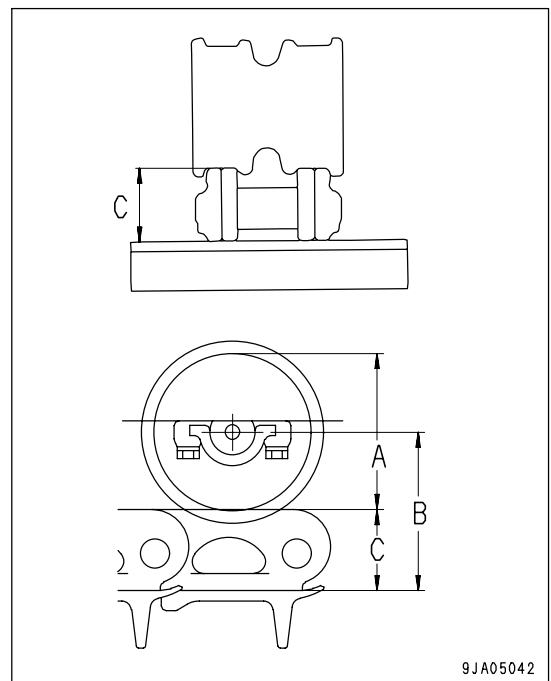
- Standard height (h): 65 mm (2.6 in)
- Repair limits: 25 mm (1.0 in)

**MEASURING OUTSIDE DIAMETER OF TRACK ROLLER**

1. Measure the height (dimension C) of the link tread as shown in the diagram.
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): 210 mm (8.3 in)
- Repair limits: 172 mm (6.8 in)



TRANSPORTATION

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

TRANSPORTATION MEANS

When transporting the machine, choose the transportation method in reference to the weight and dimensions shown in "SPECIFICATIONS (PAGE 5-2)".

Note that the machine specifications (weight and dimensions) vary depending on the kind of track shoes, blade, or other equipment.

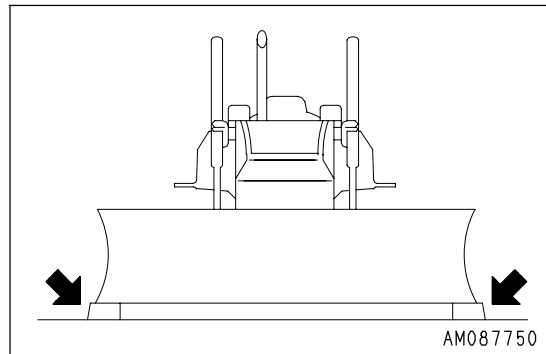
PRECAUTIONS WHEN REMOVING WORK EQUIPMENT

If there is any pressure remaining in the tilt piping after the work equipment has been removed, it may be difficult to remove the quick coupler of the tilt hose, so remove the work equipment as follows.

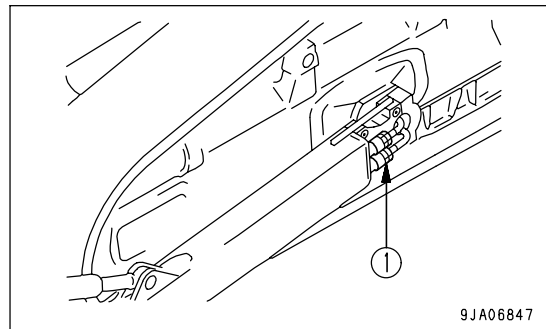
1. Lower the blade to the ground and set it horizontal to the ground surface.

REMARK

If the blade is tilted, the tilt piping will be under internal pressure, so set the blade horizontal to the ground.



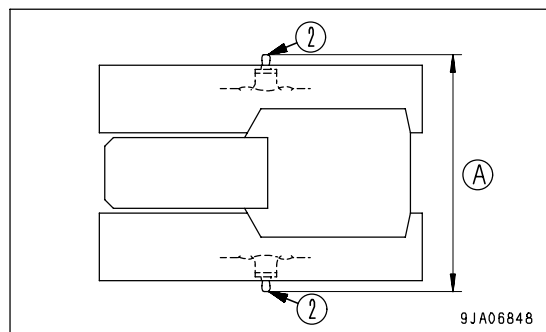
2. Remove the quick coupler (1), then remove the work equipment assembly.



3. Remove right and left trunnions (2).
(D65PX,D65WX)

REMARK

- For D65PX and D65WX, remove right and left trunnions (2).
- For D65EX, right and left trunnions do not need to be removed since width (A) including them is less than 3.0 m.



4. Tie the tilt hose with a band to prevent it from being damaged.

LOADING, UNLOADING WORK

 **WARNING**

- Since loading and unloading of the machine is dangerous, be extremely careful.
- When loading or unloading the machine, operate it slowly with the engine speed low and the transmission in the 1st gear.
- Use ramps having sufficient width, length, thickness, and strength. Install them securely and set their angle to 15° or less. If the ramps are deflected appreciably, reinforce them with blocks.
- Perform the loading work of the machine on firm, level ground. Secure sufficient distance between the shoulder of the road and the trailer.
- Remove mud from the undercarriage of the machine so that the machine will not slip sideways on the ramps. In addition, remove water, snow, ice, grease, oil, etc. from the ramps.
- Never steer the machine on the ramps, since steering on the ramps can cause the machine to tip over. If it is necessary to change the travel direction, return to the ground or to the bed of the trailer, then change the travel direction.
- The center of gravity of the machine shifts suddenly at the border between the ramps and trailer, and the machine is unbalanced and becomes dangerous. Accordingly, pass the border slowly.

When loading or unloading, always use ramps or a platform. Proceed as follows.

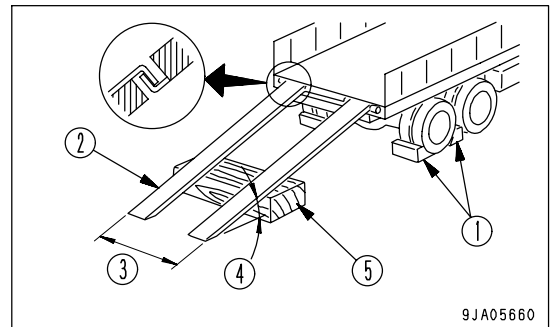
LOADING WORK

1. Load and unload on firm level ground only.

Maintain a safe distance from the edge of a road.

2. Apply the trailer brakes securely and put blocks (1) under the tires to hold the trailer in position. Set gap (3) between ramps (2) to match the distance between the left and right tracks, and keep angle (4) to a maximum of 15°.

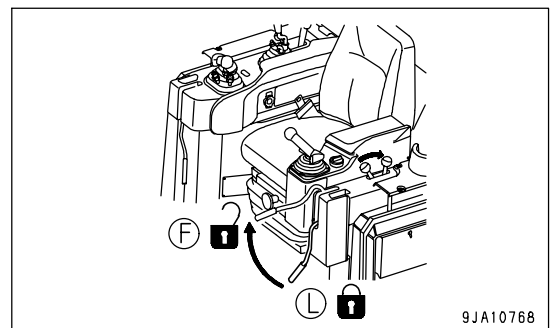
If ramps (2) bend appreciably under the weight of the machine, put wooden block (5) under the ramps to support them.



3. Start the engine.

In a cold weather, carry out an engine warming-up run, referring to the section, "STARTING IN COLD WEATHER (PAGE 3-117)", in this manual.

4. Set parking brake lever to the FREE position (F).
5. Set the transmission in the 1st gear and run the engine at low idle.
6. Set the travel direction toward the ramps and drive slowly.
7. The center of gravity of the machine shifts suddenly at the border between the ramps and trailer, and the machine is unbalanced and becomes dangerous. Accordingly, pass the border slowly.
8. Stop the machine at the specified position on the trailer.



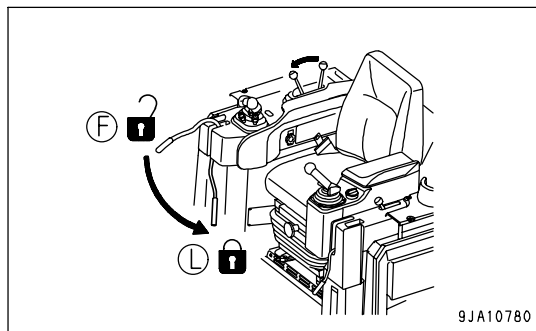
SECURING MACHINE

NOTICE

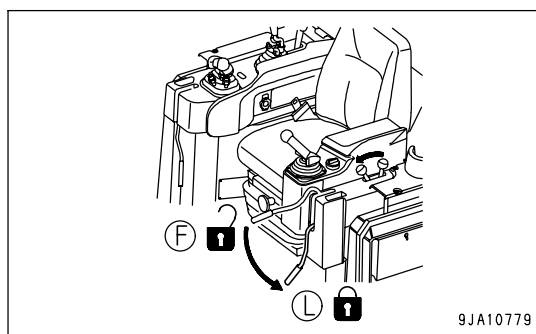
Be sure to lower the car radio antenna to the stow position (if the machine is equipped with a cab).

Load the machine onto a trailer as follows:

1. Lower the work equipment slowly.
(When transporting with work equipment installed)
2. Set the work equipment lock lever to the LOCK position (L) securely.
(When transporting with work equipment installed)

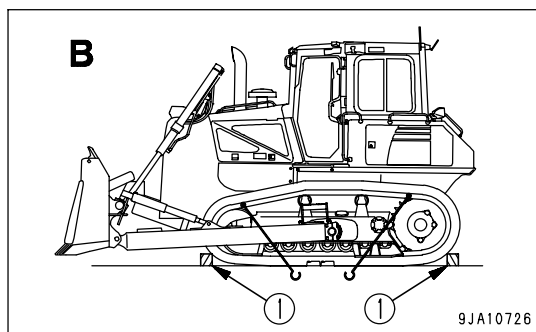
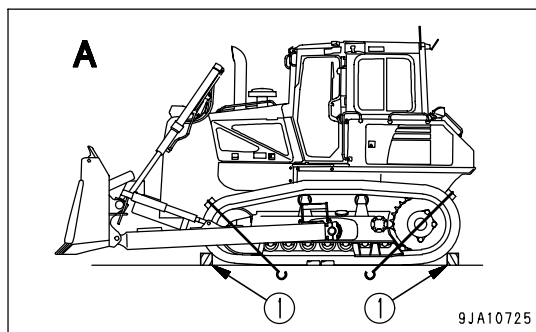


3. Set the parking brake lever to the LOCK position (L) securely.
4. Stop the engine, then remove the key from the starting switch.



5. Fix the machine as explained below so that it will not move during transportation.
In particular, fix the machine securely to prevent it from slipping sideways.

- 1) Put blocks (1) in front and behind the track shoes of both sides.
- 2) Set up chain or wire, following (A) or (B).
 - A: Secure chain or wire around the track shoes.
 - B: Secure chain or wire through the holes of track links.
- 3) Protect the wire from contacting directly with angular parts of the machine, by inserting pads.

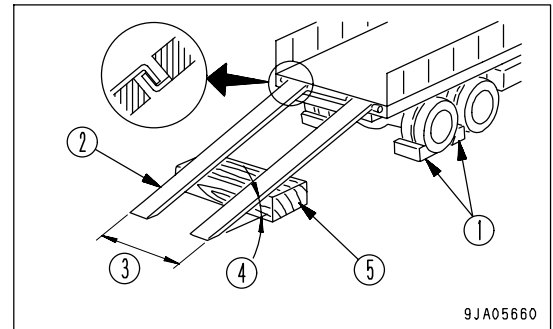


UNLOADING WORK

1. Load and unload on firm level ground only. Maintain a safe distance from the edge of a road.
2. Apply the trailer brakes securely and put blocks (1) under the tires to hold the trailer in position. Set gap (3) between ramps (2) to match the distance between the left and right tracks, and keep angle (4) to a maximum of 15°.

If ramps (2) bend appreciably under the weight of the machine, put wooden block (5) under the ramps to support them.

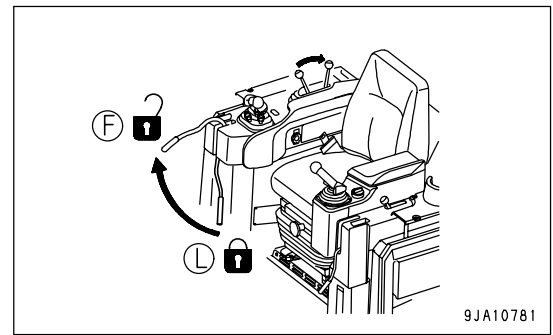
3. Remove the chains and wire ropes fastening the machine.



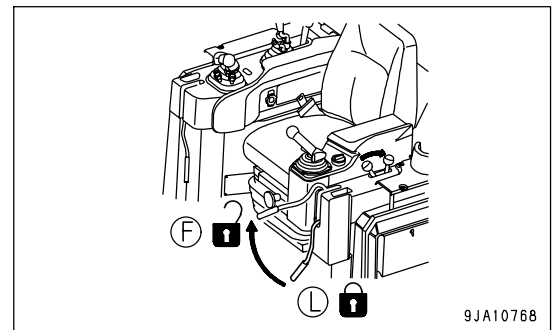
4. Start the engine.

In a cold weather, carry out an engine warming-up run, referring to the section, "STARTING IN COLD WEATHER (PAGE 3-117)", in this manual.

5. Set main work equipment lock lever to FREE position (F), and raise the work equipment.
(When transporting with work equipment installed)



6. Set parking brake lever to the FREE position (F).
7. Set the transmission in the 1st gear and run the engine at low idle.
8. Set the travel direction toward the ramps and drive slowly.
9. The center of gravity of the machine shifts suddenly at the border between the ramps and trailer, and the machine is unbalanced and becomes dangerous. Accordingly, pass the border slowly.
10. Drive down the ramps slowly and carefully until the machine leaves the ramps perfectly.



LIFTING MACHINE



WARNING

- The person using the crane to carry out lifting operations must be a qualified crane operator.
- Never carry out lifting operations if any person is on the machine being lifted.
- Always use a wire rope that has ample strength for the weight of the machine being lifted.
- Keep the machine horizontal when lifting it.
- When carrying out lifting operations, set the work equipment lock lever and parking brake lever to the LOCK position to prevent the machine or work equipment from moving unexpectedly.
- Never enter the area under or around a raised machine.
- There is danger of the machine losing its balance.

Use the procedure below to set the machine in the proper posture and use the lifting equipment when lifting the machine.

NOTICE

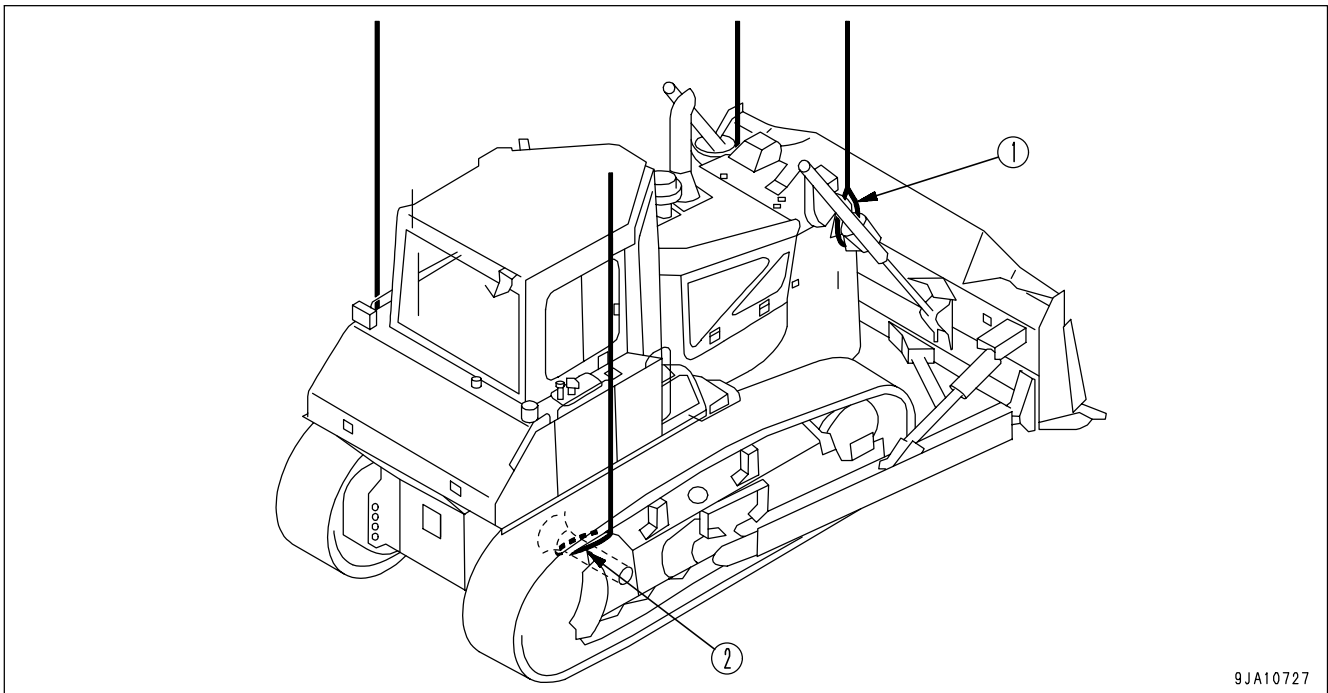
This method of lifting applies to the standard specification machine.

The method of lifting differs according to the attachments and options installed.

For details of the procedure for machines that are not the standard specification, please consult your Komatsu distributor.

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

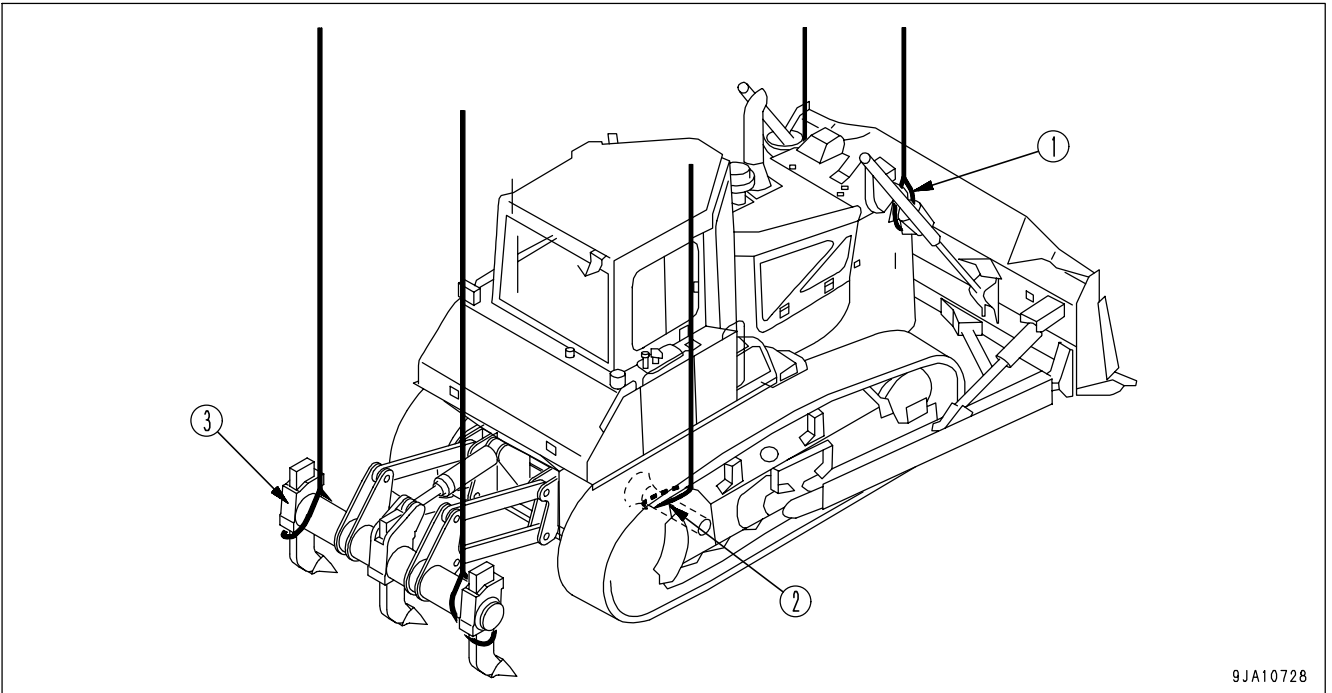
PROCEDURE FOR LIFTING OPERATIONS



9JA10727

- Hang the front wire ropes to each cylinder support (1) on the right and left sides.
- Fit the wire ropes at the rear to both left and the right pivot shafts (2).

For machine equipped with ripper

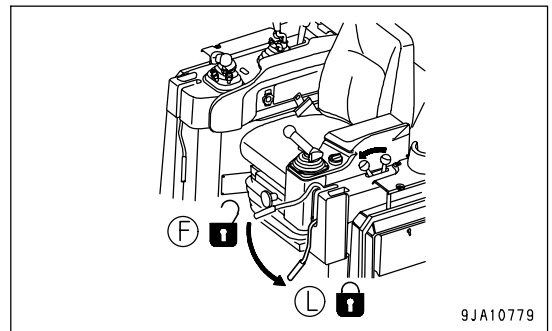


9JA10728

- Fit the wire ropes at the center to both left and the right pivot shafts (2).
- Hang the rear wire rope to ripper beam (3).

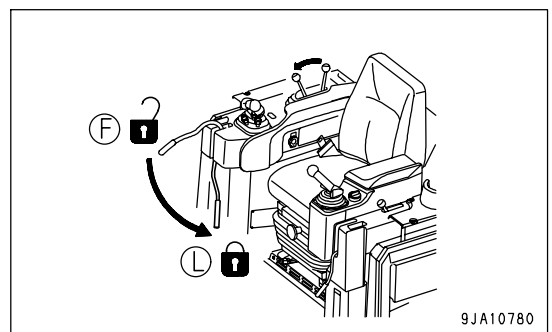
When lifting the machine, stop it on a level place, then observe the following procedure.

1. Stop the engine and set the parking brake lever to the LOCK position (L) securely.



9JA10779

2. Set the work equipment lock lever to the LOCK position (L) securely.
3. Install wire ropes, slings, etc. matched to the weight of the machine to the lifting points as shown in the above figure.



9JA10780

NOTICE

- Use protectors to prevent the wire rope from being cut on sharp corners and to prevent the wire rope from cutting into the machine bodywork.
- When using a spreader bar, select an ample width to prevent contact with the machine.

4. After setting the wire ropes, lift up the machine and stop at 100 to 200 mm (3.9 to 7.9 in) above the ground, and check that the wire ropes are not slack and the machine is level, then lift up slowly.

TRAVELING ON ROADS

- When traveling on paved roads, use flat shoes to protect their surface.
Even when travelling a short distance, always place boards to protect the road surface.

REMARK

Note that the asphalt road becomes soft in summer.

COLD WEATHER OPERATION

PRECAUTIONS FOR LOW TEMPERATURE

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

FUEL AND LUBRICANTS

Change to oil with low viscosity for all components. For details of the specified viscosity, see "RECOMMENDED FUEL, COOLANT, AND LUBRICANT (PAGE 4-12)".

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 amounts of fresh water and see a doctor at once.
- When changing the coolant or when handling coolant containing antifreeze that has been drained when repairing the radiator, please contact your Komatsu distributor or request a specialist company to carry out the operation. Antifreeze is toxic. Do not let it flow into drainage ditches or spray it onto the ground surface.
- Antifreeze is flammable. Do not bring any flame close. Do not smoke when handling antifreeze.

NOTICE

Please use Komatsu genuine supercoolant (AF-NAC) for the coolant. As a basic rule, we do not recommend the use of any coolant other than Komatsu genuine supercoolant.

For details on the amount of antifreeze mixture and on when to change the coolant, see "CLEAN INSIDE OF COOLING SYSTEM (PAGE 4-24)".

BATTERY



WARNING

- The battery generates flammable gas. Do not bring fire or sparks near the battery.
- Battery electrolyte is dangerous. If it gets in your eyes or on your skin, wash it off with a large amount of water and consult a doctor.
- Battery electrolyte dissolves paint. If it gets on the bodywork, wash it off immediately with water.
- If the battery electrolyte is frozen, do not charge the battery or start the engine with a different power source. There is danger that the battery may explode.
- Battery electrolyte is toxic. Do not let it flow into drainage ditches or spray it on to the ground surface.

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%. Insulate it against cold temperature to ensure the machine can be started easily the next morning.

REMARK

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

Charging Rate (%)	Electrolyte Temperature	20°C (68°F)	0°C (32°F)	-10°C (14°F)	-20°C (-4°F)
	100		1.28	1.29	1.30
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 drastically drops in low temperatures, cover or remove the battery from the machine, store the battery in a warm place, and install it again the next morning.
- If the electrolyte level is low, add distilled water in the morning before beginning work. Do not add water after the day's work to prevent diluted electrolyte in the battery from freezing during the night.

AFTER COMPLETION OF WORK



Performing idle-running of the tracks is dangerous, stay well away from the tracks.

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

- Remove all the mud and water from the machine body. In particular, wipe the hydraulic cylinder rods clean to prevent damage to the seal caused by mud, dirt, or drops of water on the rod from getting inside the seal.
- Park the machine on hard, dry ground.

If this is impossible, park the machine on boards.

The boards prevent the tracks from freezing to the ground, and allow the machine to be moved the next morning.

- Open the drain valve and drain any water collected in the fuel system to prevent it from freezing.
- Fill the fuel tank to capacity. This minimizes moisture condensation in the tank when the temperature drops.
- After operation in water or mud, remove water from undercarriage as described below to extend undercarriage service life.

AFTER COLD WEATHER

When the 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 "RECOMMENDED FUEL, COOLANT, AND LUBRICANT (PAGE 4-12)".

LONG-TERM STORAGE

BEFORE STORAGE

When keeping in long-term storage (more than one month), store 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. This prevents moisture from collecting.
- Lubricate and change the oil before storage.
- Apply a thin coat of grease to metal surface of the hydraulic piston rods and the idler adjusting rods.
- Disconnect the negative terminals of the battery and cover it or remove it from the machine and store it separately.
- Place all control levers in the neutral position, set the work equipment lock lever and parking brake lever in the LOCK position, and set the fuel control dial to the low idling position.
- To prevent rust, fill with Komatsu genuine supercoolant (AF-NAC) to give a density of at least 30% for the engine coolant.

DURING STORAGE



WARNING

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

- During storage, operate and move the machine for a short distance once a month so that a new film of oil will coat moving parts. At the same time, also charge the battery.
- When operating the work equipment, wipe off all the grease from the hydraulic cylinder rods.
- If the machine is equipped with an air conditioner, operate the air conditioner for 3 to 5 minutes once a month to lubricate all parts of the air conditioner compressor. Always run the engine at low idle when doing this. In addition, check the refrigerant level twice a year.

AFTER STORAGE

NOTICE

If the machine has been stored without carrying out the monthly rust-prevention operation, consult your Komatsu distributor before using it.

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

- Wipe off the grease from the hydraulic cylinder rods.
- Add oil and grease at all lubrication points.
- When the machine is stored for a long period, moisture in the air will mix with the oil. Check the oil before and after starting the engine. If there is water in the oil, change all the oil.

STARTING MACHINE AFTER LONG-TERM STORAGE

When starting the engine after the machine has been in storage for a long period, carry out the warming-up operation thoroughly. For details, see the procedure in "WARMING UP OPERATIONS (PAGE 3-116)".

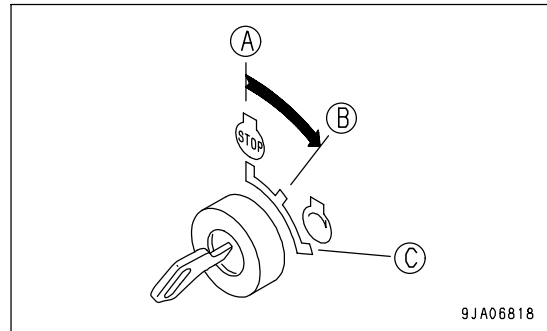
TROUBLESHOOTING

AFTER RUNNING OUT OF FUEL

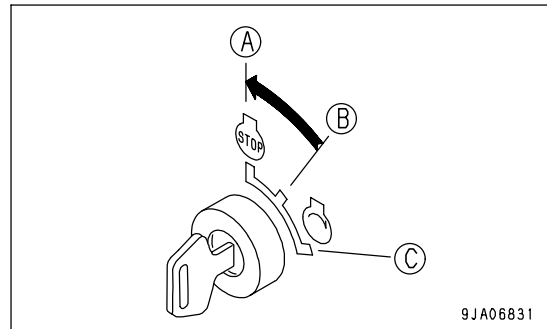
When starting the engine again after running out of fuel, fill with fuel, then bleed the air from the fuel system before starting the engine.

PROCEDURE FOR BLEEDING AIR

1. Insert the key into the engine starting switch and turn the key to ON position (B). Then the electric priming pump begins to work.

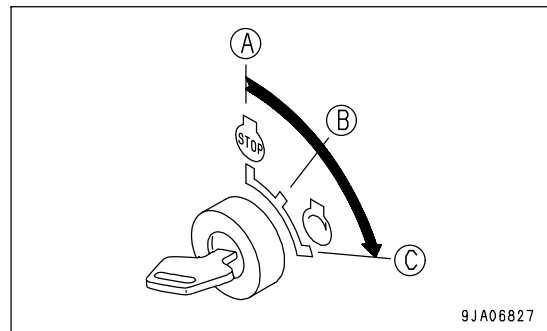


2. After holding the key in ON position (B) for 30 seconds, turn it back to OFF position (A) and hold it there for 10 seconds.



3. Repeat Steps 1 and 2 four times.

4. Turn the engine starting switch key to START position (C) to start up the engine.



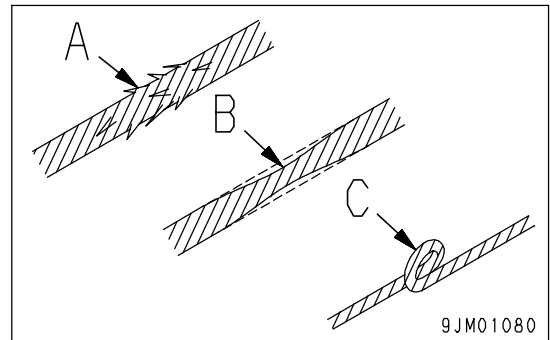
5. If the engine does not start up even after the engine starting motor is kept running for 20 seconds, repeat the procedures of Step 1 through Step 4.

METHOD OF TOWING MACHINE

 **WARNING**

Serious injury or death could result if a disabled machine is towed incorrectly or if there is a mistake in the selection or inspection of the wire rope.

- If the engine does not start, put blocks under the track to prevent the machine from moving, then release the brake. If blocks are not use, there is danger that the machine may move suddenly.
- Always check that the wire rope used for towing has ample strength for the weight of the machine being towed.
- Never use a wire rope which has cut strands (A), reduced diameter (B), or kinks (C). There is danger that the rope may break during the towing operation.
- Always wear leather gloves when handling wire rope.
- Never tow a machine on a slope.
- During the towing operation, never stand between the towing machine and the machine being towed.
- Operate the machine slowly and be careful not to apply any sudden load to the wire rope.

**NOTICE**

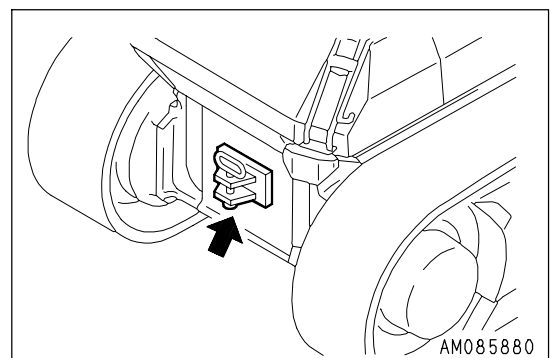
The maximum towing capacity for this machine is 140,000 N (14,275 kg). Always carry out towing operations within the maximum towing capacity.

For details of the method of towing, please contact your Komatsu distributor.

- If the engine stops or the oil pressure in the brake circuit lowers because of a trouble in the hydraulic system, the brake works and the machine cannot move. To move the machine in this case, the oil pressure in the brake circuit must be heightened to the specified level with a special device. Ask your Komatsu distributor.
- Moving a machine by towing is only used to move it to a place where it is possible to carry out inspection and maintenance. It is not intended for moving the machine long distances. Do not use this method for towing the machine for long distances.
- If it is impossible to operate the steering and brakes of the machine being towed, do not let anyone ride on the machine.
- Keep the angle of the towing line to the minimum. Operate the machine so that the angle does not become greater than 30° from the straight line.

If the machine gets stuck in the mud or a heavy thing needs to be towed, install a towing wire rope to the draw bar pin.

- Connect a wire rope to the part indicated with the arrow in the diagram at right.

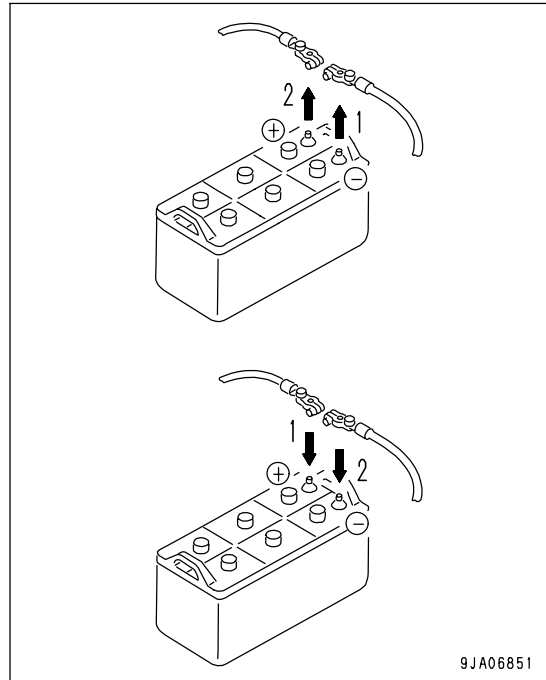


IF BATTERY IS DISCHARGED



WARNING

- It is dangerous to charge a battery when installed on a machine. Make sure that it is removed before charging.
- When checking or handling the battery, stop the engine and turn the starting switch key to the OFF position.
- The battery generates hydrogen gas, 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 sulfuric acid, and it will attack your clothes and skin. If it gets on your clothes or on your skin, immediately wash it off with a large amount of water. If it gets in your eyes, wash it out with fresh water and consult a doctor.
- When handling batteries, always wear safety glasses 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 removing or installing the terminals, check which is the positive (+) terminal and which is the negative (-) terminal.



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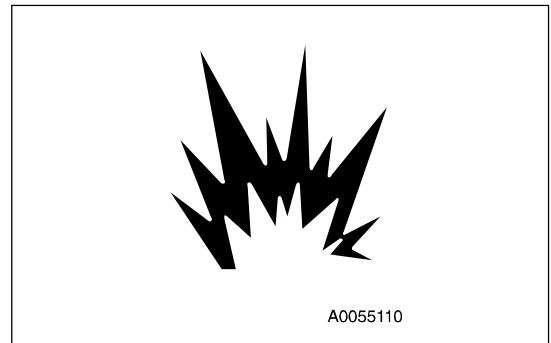
REMOVE AND INSTALL BATTERY

1. Open the battery cover.
2. Before removing 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 nuts of the terminal and remove the wires from the battery.
3. After installing the battery, fix it with the battery hold down.
Tightening torque: 1.47 to 1.96 Nm (0.15 to 0.2 kgm, 1.1 to 1.4 lbft)
4. When installing the battery, connect the ground cable last.
Insert the hole of the terminal on the battery and tighten the nut.
Tightening torque: 5.9 to 9.8 Nm (0.6 to 1.0 kgm, 4.3 to 7.2 lbft)

PRECAUTIONS FOR BATTERY CHARGING

If the battery is charged improperly, it may explode. Accordingly, charge it according to "IF BATTERY IS DISCHARGED (PAGE 3-168)" and the instruction manual attached to the charger, and observe the following items.

- Set the voltage of the charger to match the voltage of the battery to be charged. If the correct voltage is not selected, 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 attach 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 danger 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. Check the battery electrolyte level periodically and add distilled water to bring the electrolyte level to the UPPER LEVEL line.



STARTING ENGINE WITH BOOSTER CABLE

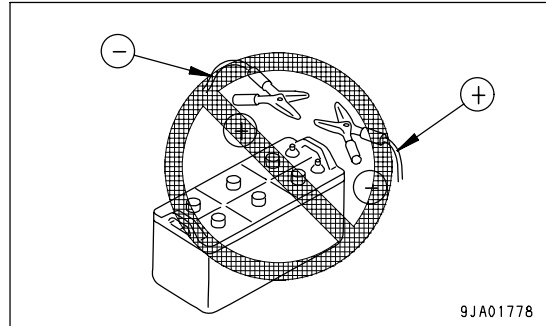
When starting the engine with a booster cable, do as follows.

PRECAUTIONS WHEN CONNECTING AND DISCONNECTING BOOSTER CABLE



WARNING

- When connecting the cables, never contact the positive (+) and negative (-) terminals.
- When starting the engine with a booster cable, wear safety glasses and rubber gloves.
- Be careful not to let the normal machine and problem machine contact each other. This prevents sparks from generating near the battery which could ignite the hydrogen gas given off by the battery.
- Make sure that there is no mistake in the booster cable connections. The final connection is to the engine block of the problem machine, but sparks will be generated when this is done, so connect to a place as far as possible from the battery.
- When disconnecting the booster cable, take care not to bring the clips in contact with each other or with the machine body.



NOTICE

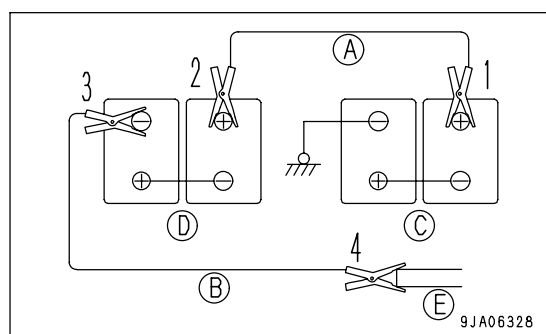
- The starting system for this machine uses 24V. For the normal machine, also use a 24V battery.
- The size of the booster cable and clip should be suitable for the battery size.
- The battery of the normal machine must be the same capacity as that of the engine to be started.
- Check the cables and clips for damage or corrosion.
- Make sure that the cables and clips are firmly connected.
- Check that the work equipment lock levers and parking brake levers of both machine are in the LOCK position.
- Check that each lever is in the NEUTRAL position.

CONNECTING THE BOOSTER CABLE

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

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

1. Connect the clip of booster cable (A) to the positive (+) terminal of battery (C) on the problem machine.
2. Connect the clip at the other end of booster cable (A) to the positive (+) terminal of battery (D) on the normal machine.
3. Connect the clip of booster cable (B) to the negative (-) terminal of battery (D) on the normal machine.
4. Connect the clip at the other end of booster cable (B) to engine block (E) on the problem machine.



STARTING ENGINE

**WARNING**

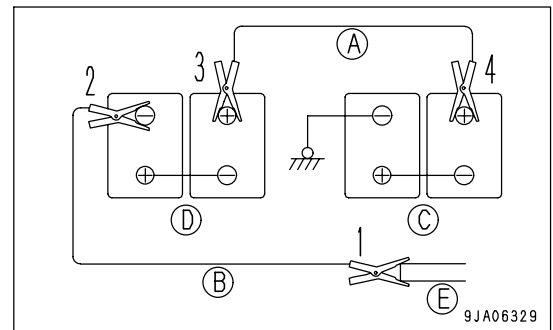
Always check that the work equipment lock lever is set to the LOCK position, regardless of whether the machine is working normally or has failed. Check also that all the control levers are in the HOLD or NEUTRAL position.

1. Make sure the clips are firmly connected to the battery terminals.
2. Start engine of the normal machine and run it at high idle 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.

DISCONNECTING THE BOOSTER CABLE

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

1. Remove the clip of booster cable (B) from engine block (E) on the problem machine.
2. Remove the clip of booster cable (B) from the negative (-) terminal of battery (D) on the normal machine.
3. Remove the clip of booster cable (A) from the positive (+) terminal of battery (D) on the normal machine.
4. Remove the clip of booster cable (A) from the positive (+) terminal of battery (C) on the problem machine.



OTHER TROUBLE

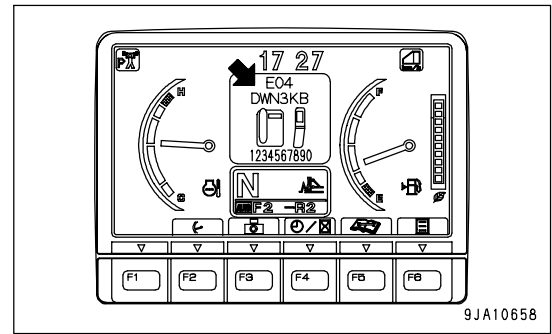
ELECTRICAL SYSTEM

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

Problem	Main causes	Remedy
Lamp does not glow brightly even when the engine runs at high speed	• Defective wiring	(• Check, repair loose terminals, disconnections)
Lamp flickers while engine is running	• Defective adjustment of fan belt tension	• Adjust alternator belt tension For details, see EVERY 250 HOURS SERVICE
Charge level monitor does not go out even when engine is running	• Defective alternator • Defective wiring	(• Replace) (• Check, repair)
Abnormal noise is generated from alternator	• Defective alternator	(• Replace)
Starting motor does not turn when starting switch is turned to ON	• Defective wiring • Insufficient battery charge • Safety switch out of adjust	(• Check, repair) • Charge (• Adjust safety switch)
Pinion of starting motor keeps going in and out	• Insufficient battery charge	• Charge
Starting motor turns engine sluggishly	• Insufficient battery charge • Defective starting motor	• Charge (• Replace)
Starting motor disengages before engine starts	• Defective wiring • Insufficient battery charge	(• Check, repair) • Charge
Automatic pre-heating is not actuated	• Defective wiring • Defective heater relay • Defective engine controller	(• Check, repair) (• Replace) (• Check, replace)
Engine pre-heating monitor does not light (when engine cooling water temperature is -3°C (27°F) or below)	• Defective wiring • Defective heater relay	(• Check, repair) (• Replace)
Outside of electrical heater is not warm when touched by hand	• Defective wiring • Disconnection in electrical intake air heater • Defective operation of heater relay	(• Check, repair) (• Replace) (• Check, repair heater relay)
Air conditioner does not work properly	• Blown fuse • Insufficient battery charge • Defective air conditioner switch • Defective blower switch • Defective compressor	(• Check, repair) • Charge (• Replace air conditioner switch) (• Replace blower switch) (• Replace)

ELECTRONIC CONTROL SYSTEM

When the user code is shown on the display portion of the machine monitor, take the respective measures shown in the self-diagnosis chart below.



MACHINE MONITORING SYSTEM

Failure code	Buzzer	Caution lamp	Remedy	Problem that appears on machine
E01	-	-	Automatic functions stop, some functions stop, but operation is possible Ask your Komatsu distributor to carry out repairs	Inspect after completing operations
E02	○	○	After user action to stop engine, operations are possible without limit functions when engine is restarted. However, user must be careful when operating. Ask your Komatsu distributor immediately to carry out repairs	Automatic limits stop, but possible to continue operations with care Inspect after completing operations
E03	○	○	Move machine to safe place, then ask your Komatsu distributor immediately to carry out repairs	After steering, forward-reverse, gear shift lever is returned to neutral, engine does not run at full speed. Transmission is fixed in 1st, so move to a safe place and carry out inspection
E04	○	○	Stop machine immediately, then ask your Komatsu distributor immediately to carry out repairs	After steering, forward-reverse, gear shift lever is returned to neutral, engine does not run at full speed and machine cannot travel

NOTICE

If the engine speed is limited because of a failure of E03 or higher, it may be still limited after its display on the error screen has disappeared. Before starting work, be sure to stop the machine and lower the engine speed to the low idling level with the fuel control dial or the decelerator pedal.

The engine speed limitation is reset.

CHASSIS

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

Problem	Main causes	Remedy
Machine does not stop even when brake pedal is depressed	<ul style="list-style-type: none"> • Defective brake adjustment, low oil pressure 	(• Adjust, check, repair)
Track shoe comes off	<ul style="list-style-type: none"> • Track shoe 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 shoe too loose or too tight 	
Blade, ripper lifting speed too slow or blade, ripper does not go up	<ul style="list-style-type: none"> • Lack of hydraulic oil • Work equipment lock lever at LOCK position 	<ul style="list-style-type: none"> • Add oil to specified level. See EVERY 250 HOURS SERVICE • Set to FREE position
Swing is operated but upper structure does not swing	<ul style="list-style-type: none"> • Parking brake lever at LOCK position • Defective wiring of lever • Abnormality in steering valve 	<ul style="list-style-type: none"> • Set to FREE position (• Check, repair) (• Check, replace)
Transmission oil pressure does not rise	<ul style="list-style-type: none"> • Gear pump worn or scuffing • Lack of oil in power train case • Clogged oil filter element, strainer in power train case 	(• Check, or replace) <ul style="list-style-type: none"> • Add oil to specified level. See Check before Starting • Clean. See EVERY 1000 HOURS SERVICE
Lack of traction (machine travel speed is low)	<ul style="list-style-type: none"> • Lack of engine power 	<ul style="list-style-type: none"> • See ENGINE
Machine takes time to reach travel speed	<ul style="list-style-type: none"> • Power train oil temperature is low • Lack of engine power 	<ul style="list-style-type: none"> • Carry out warming-up operation • See ENGINE
Even when steering, directional, and gear shift lever is set to travel position, machine does not move off	<ul style="list-style-type: none"> • Lack of oil in power train case • Transmission oil pressure does not rise • Parking brake lever 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 power train controller • Abnormality in steering valve 	(• Adjust) (• Check, replace)
Torque converter overheats (Power train oil temperature gauge pointer enters red range)	<ul style="list-style-type: none"> • Lack of oil in power train case • Transmission oil pressure does not rise • Excessive load during operation 	<ul style="list-style-type: none"> • Add oil to specified level. See Check before Starting • See "Transmission oil pressure does not rise" above • Use transmission speed range one level lower or lighten load and increase speed during operation

ENGINE

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

Problem	Main causes	Remedy
After warming up, when engine speed is increased, engine oil pressure monitor still lights	<ul style="list-style-type: none"> • Lack of oil in oil pan (air being sucked in) • Clogged oil filter cartridge • Defective tightening of oil pipe, pipe joint, oil leakage from damage • Defective monitor 	<ul style="list-style-type: none"> • Add oil to specified level. See Check before Starting • Replace. See EVERY 500 HOURS SERVICE (• Check, repair) (• Replace)
Steam spurts out from top of radiator (pressure valve)	<ul style="list-style-type: none"> • Lack of cooling water, water leakage • Dirt or scale accumulated in cooling system 	<ul style="list-style-type: none"> • Check, add cooling water, repair. See Check before Starting • Change coolant, flush inside of cooling system. See WHEN REQUIRED
Cooling water temperature gauge pointer enters red range	<ul style="list-style-type: none"> • Clogged or damaged radiator fins • Defective thermostat • Loose radiator filler cap (when operating at high altitudes) • 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)
Cooling water temperature gauge pointer enters white range	<ul style="list-style-type: none"> • Defective thermostat • Defective monitor panel 	<ul style="list-style-type: none"> (• Replace thermostat) (• Replace monitor panel)
Starting motor turns but engine does not start	<ul style="list-style-type: none"> • Lack of fuel • Air entering fuel line • No fuel inside fuel filter • Cranking of engine by starting motor is slow • Defective compression <ul style="list-style-type: none"> • Defective valve clearance 	<ul style="list-style-type: none"> • Add fuel. See Check before Starting • Repair places where air enters fuel line (• Fill fuel filter with fuel. See EVERY 500 HOURS SERVICE.) • See ELECTRICAL SYSTEM (• Adjust clearance)
Exhaust gas is white or bluish	<ul style="list-style-type: none"> • Too much oil in oil pan • Improper fuel 	<ul style="list-style-type: none"> • Drain excess oil. See Check before Starting • Replace with specified fuel
Exhaust gas sometimes becomes 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) (• See "Defective compression" above)
Combustion sometimes makes breathing noise	<ul style="list-style-type: none"> • Defective nozzle 	<ul style="list-style-type: none"> (• Replace nozzle)
Abnormal sound is generated (combustion or mechanical)	<ul style="list-style-type: none"> • Low-grade fuel being used • Overheating • Breakage inside muffler • Excessive valve clearance 	<ul style="list-style-type: none"> • Replace with specified fuel • See "Red range at top of engine coolant temperature gauge flashes" above (• Replace muffler) (• Adjust clearance)

Problem	Main causes	Remedy
Error code is displayed on monitor	Contact your Komatsu distributor	
Alarm buzzer sounds		
Engine suddenly lost power (entered delayed mode)		

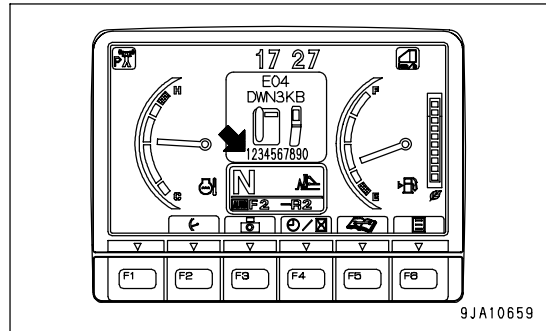
POINT OF CONTACT TO TELEPHONE WHEN ERROR OCCURS

If an error screen is displayed on the monitor, the telephone number for the point of contact is displayed at the bottom of the error screen.

REMARK

If no point of contact telephone number has been registered, no telephone number is displayed.

It is necessary to register the telephone number, please ask your Komatsu distributor to carry out the registration.



MAINTENANCE

WARNING

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

GUIDE TO MAINTENANCE

Do not perform 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 performed.

KOMATSU GENUINE REPLACEMENT PARTS:

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

KOMATSU GENUINE OILS:

For lubrication of the machine, use the Komatsu genuine lubricants. Moreover use oil of the specified viscosity according to the ambient temperature.

ALWAYS USE CLEAN WASHER FLUID:

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

CLEAN OIL AND GREASE:

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

CHECKING FOREIGN MATERIALS IN DRAINED OIL:

After oil is changed or filters are replaced, check the old oil and filters for metal particles and foreign materials. If large quantity of metal particles or foreign materials are found, always report to the person in charge, and carry out suitable action.

FUEL STRAINER:

Do not remove the strainer from the filler port when adding fuel.

WELDING INSTRUCTIONS:

- Cut off power. Wait for approx. one minute after turning off the engine starting switch key, and then disconnect the negative (-) terminal of the battery.
- Do not apply more than 200 V continuously.
- Connect grounding cable within 1 m (3.3 ft) of the area to be welded. If grounding cable is connected near instruments, connectors, etc., the instruments may malfunction.
- If a seal or bearing happens to come between the part being welded and grounding point, change the grounding point to avoid such parts.
- 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 may cause damage and/or 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:

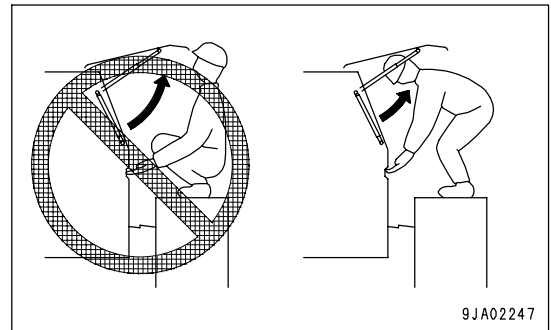
- Inspect the dust indicator frequently to see if the air cleaner is dirty or clogged.
- Clean the radiator core frequently to avoid clogging.
- Clean and replace the fuel filter frequently.
- Clean electrical components, especially the starting motor and alternator, to avoid accumulation of dust.
- 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:

If a different brand or grade of oil has to be added, drain the old oil and replace all the oil with the new brand or grade of oil. Never mix different brand or grade of oil.

PRECAUTIONS FOR 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.
- Fully close or open the engine side cover until it is locked and then open or close the cab door.



LOCKING THE INSPECTION COVER:

Lock inspection cover securely into position with the lock bar. If inspection or maintenance is performed with inspection cover not locked in position, there is a danger that it may be suddenly blow shut by the wind and cause injury to the worker.

HYDRAULIC SYSTEM-AIR BLEEDING:

After repairing or replacing 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 4-44)".

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 sharply. If they are installed so, their service life will be shortened extremely and they may be damaged.

CHECKS AFTER INSPECTION AND MAINTENANCE WORK:

If you forget to perform the checks after inspection and maintenance, unexpected problems may occur, and this may lead to serious injury or property damage. Always do the following:

- Checks after operation (with engine stopped)
 - Have any inspection and maintenance points been forgotten?
 - Have all inspection and maintenance items been performed correctly?
 - Have any tools or parts been dropped inside the machine? It is particularly dangerous if parts are dropped inside the machine and get caught in the lever linkage mechanism.
 - Are there any leakage of coolant or oil? Have all nuts and 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 2-30)" 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 "RECOMMENDED FUEL, COOLANT, AND LUBRICANT (PAGE 4-12)".

OUTLINE OF SERVICE

- Always use Komatsu genuine parts for replacement parts, grease or oil.
- When changing the oil or adding oil, do not mix different types of oil. When changing the type of oil, drain all the old oil and fill completely with the new oil. Always replace the filter at the same time. (There is no problem if the small amount of oil remaining in the piping mixes with the new oil.)
- Unless otherwise specified, when the machine is shipped from the factory, it is filled with the oil and coolant listed in the table below.

Item	Type
Engine oil pan	Engine oil EO15W40DH (Komatsu genuine parts)
Power train case Final drive case Damper case Idler (each)	Power train oil TO30 (Komatsu genuine parts)
Hydraulic system	Power train oil TO10 (Komatsu genuine parts)
Radiator	Supercoolant AF-NAC (Density: 30% or above) (Komatsu genuine parts)

HANDLING OIL, FUEL, COOLANT, AND PERFORMING OIL CLINIC

OIL

- Oil is used in the engine and hydraulic equipment under extremely severe conditions (high temperature, high pressure), and deteriorates with use.
Always use oil that matches the grade and maximum and minimum ambient temperatures recommended in the Operation and Maintenance Manual. Even if the oil is not dirty, always change the oil at the specified interval.
- Oil corresponds to blood in the human body, always be careful when handling it to prevent any impurities (water, metal particles, dirt, etc.) from getting in.
The majority of problems with the machine are caused by the entry of such impurities.
Take particular care not to let any impurities get in when storing or adding oil.
- Never mix oils of different grades or brands.
- Always add the specified amount of oil.
Having too much oil or too little oil are both causes of problems.
- If the oil in the work equipment is not clear, there is probably water or air getting into the circuit. In such cases, please contact your Komatsu distributor.
- When changing the oil, always replace the related filters at the same time.
- We recommend you 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.
- When the machine is shipped from the factory, T010 (power train oil) is used for the hydraulic system.
When using H046-HM hydraulic oil, drain all the oil and fill with the specified amount of oil.
Always use oil recommended by Komatsu. If any other oil is used, it will cause clogging of the filter.
There is no problem if the new oil is mixed with the small amount of oil remaining in the piping and cylinders.

FUEL

- To prevent the moisture in the air from condensing and forming water inside the fuel tank, always fill the fuel tank after completing the day's work.
- The fuel pump is a precision instrument, 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 for the temperature in the Operation and Maintenance Manual.
 - If the fuel is used at temperatures lower than the specified temperature (particularly at temperatures below -15 °C (5°F), the fuel will solidify.
 - If the fuel is used at temperatures higher than the specified temperature, the viscosity will drop, and this may result in problems such as a drop in output.
- Before starting the engine, or when 10 minutes have passed after adding fuel, drain the sediment and water from the fuel tank.
- If the engine runs out of fuel, or if the filters have been replaced, it is necessary to bleed the air from the circuit.
- If there is any foreign material in the fuel tank, wash the tank and fuel system.

NOTICE

Always use diesel oil for the fuel.

To ensure good fuel consumption characteristics and exhaust gas characteristics, the engine mounted on this machine uses an electronically controlled high-pressure fuel injection device. This device requires high precision parts and lubrication, so if low viscosity fuel with low lubricating ability is used, the durability may drop markedly.

COOLANT AND WATER FOR DILUTION

- The coolant has the important function of preventing corrosion as well as preventing freezing. Even in the areas where freezing is not an issue, the use of antifreeze coolant is essential. Komatsu machines are supplied with Komatsu Supercoolant (AF-NAC). Komatsu Supercoolant (AF-NAC) has excellent anticorrosion, antifreeze and cooling properties and can be used continuously for 2 years or 4000 hours. As a basic rule, we do not recommend the use of any coolant other than Komatsu genuine supercoolant (AF-NAC). If you use another coolant, it may cause serious problems, such as corrosion of the engine and aluminum parts of the cooling system.
- When using Komatsu Supercoolant (AF-NAC), there is no need to use a corrosion resistor. For details, see "CLEAN INSIDE OF COOLING SYSTEM (PAGE 4-24)".
- When diluting the antifreeze coolant, use distilled water or tap water (soft water). Natural water, such as a river water or well water (hard water), contains large amounts of minerals (calcium, magnesium, etc.), and this makes it easier for scale to form inside the engine or radiator. Once scale is deposited inside the engine or radiator, it is extremely difficult to remove. It also causes overheating due to poor heat exchange, so when you dilute the coolant, we recommend that you use water with an overall hardness of less than 100 PPM.
- When using antifreeze, always observe the precautions given in the Operation and Maintenance Manual.
- Antifreeze coolant is flammable, so be sure to keep it away from flame.
- The ratio of Supercoolant (AF-NAC) to water differs according to the ambient temperature. For details of the ratio when mixing, see "CLEAN INSIDE OF COOLING SYSTEM (PAGE 4-24)". Even in areas where it is not necessary to prevent freezing, use Supercoolant (AF-NAC) at a mixing ratio of at least 30% to prevent corrosion of the cooling system. Supercoolant (AF-NAC) may be supplied in premix. In this case, never add diluting water.
- 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 due to air entering the coolant.

GREASE

- Grease is used to prevent seizure and noises at the joints.
- This construction equipment is used under heavy-duty conditions. Always use the recommended grease and follow the change intervals and recommended ambient temperatures given in this Operation and Maintenance Manual.
- Grease fittings not included in the maintenance section are grease fittings for overhaul, so they do not need grease.
If any part becomes stiff after being used for long time, add grease.
- Always wipe off all of the old grease that is pushed out when greasing.
Be particularly careful to wipe off the old grease in places where sand or dirt sticking in the grease would cause wear of the rotating parts.

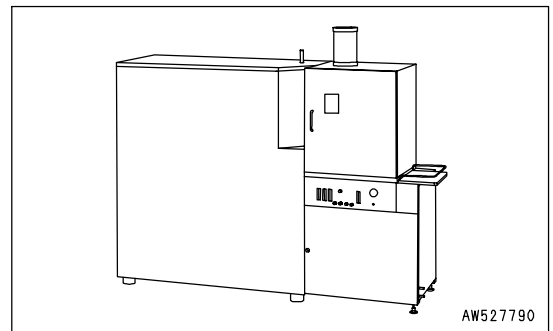
CARRYING OUT KOWA (Komatsu Oil Wear Analysis)

KOWA is a maintenance service that makes it possible to prevent machine failures and downtime. With KOWA, the oil is periodically sampled and analyzed. This enables early detection of wear of the machine drive parts and other problems.

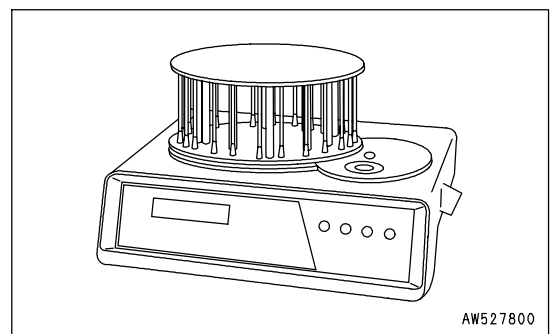
We strongly recommend you to use this service. The oil analysis is carried out at actual cost, so the cost is low, and the results of the analysis are reported together with recommendations which will reduce repair costs and machine downtime.

KOWA ANALYSIS ITEMS

- Measurement of density of metal wear particles
This uses an ICP (Inductively Coupled Plasma) analyzer to measure the density of iron, copper, and other metal wear particles in the oil.



- Measurement of quantity of particles
This uses a PQI (Particle Quantifier Index) measurer to measure the quantity of iron particles of 5µm or more, enabling early detection of failures.



- Others
Measurements are made of items such as the ratio of water in the oil, density of the antifreeze coolant, ratio of fuel in the oil, and dynamic viscosity, enabling a highly precise diagnosis of the machine's health.

OIL SAMPLING

- Sampling interval
 - 250 hours: Engine
 - 500 hours: Other components
- Precautions when sampling
 - Make sure that the oil is well mixed before sampling.
 - Perform sampling at regular fixed intervals.
 - Do not perform sampling on rainy or windy days when water or dust can get into the oil.

For further details 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 drums is at the side to prevent moisture from being sucked in.
If drums 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 attached to the old filter. If any metal particles are found, contact your Komatsu distributor.
- Do not open packs of spare filters until just before they are to be used.
- Always use Komatsu genuine filters.

RELATING TO ELECTRIC SYSTEM

- It is extremely dangerous if the electrical equipment becomes wet or the covering of the wiring is damaged. This will cause an electrical short circuit 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 checking fan belt tension, checking damage or wear to the fan belt and checking battery fluid level.
- Never install any electric components other than those specified by Komatsu.
- External electro-magnetic interference may cause malfunction of the control system controller, before installing a radio receiver or other wireless equipment, contact your Komatsu distributor.
- When working at the seashore, carefully clean the electric system to prevent corrosion.
- When installing electrical equipment, connect it to the special power source connector.
Do not connect the optional power source to the fuse, starting switch, or battery relay.

HANDLING HYDRAULIC SYSTEM

- During operations and after completion of operations, the hydraulic equipment is at a high temperature. During operations, it is also under high pressure, so when carrying out inspection and maintenance of hydraulic related equipment, be careful of the following points.
 - Stop the machine on flat ground, lower the work equipment completely to the ground, and carry out the operation so that there is no pressure on the cylinder circuits.
 - Always stop the engine.
 - Immediately after stopping operations, the hydraulic oil and lubricating oil is at high temperature and high pressure, so wait for the oil temperature to go down before starting maintenance.
Even after the temperature has gone down, some parts may still be under internal pressure, so when loosening plugs, bolts, or hose connections, do not stand directly in front of the parts, and loosen slowly to release the internal pressure before removing.
 - When carrying out inspection and maintenance of the hydraulic circuit, always release the air in the hydraulic tank to remove the internal pressure.
- Inspection and maintenance include checking the hydraulic system for oil level, replacement of filter elements and replacement of hydraulic oil.
- If high-pressure hoses have been removed, check that there is no damage to the O-rings. If any damage is found, replace the O-ring.
- It is necessary to bleed the air from the circuits when the hydraulic filter element or strainer have been replaced or washed, or when hydraulic equipment has been repaired or replaced, or when the hydraulic piping has been removed.
- The accumulator is charged with high-pressure nitrogen gas, and it is extremely dangerous if it is handled incorrectly. For details of the method of handling, see "CHECKING CHARGE PRESSURE OF NITROGEN GAS IN ACCUMULATOR (FOR CONTROL CIRCUIT) (PAGE 4-85)".

WEAR PARTS LIST

Replace wear parts such as the filter element or air cleaner element at the time of periodic maintenance or before they reach the wear limit. The wear parts should be replaced correctly in order to ensure more economic use of the machine. When replacing parts, always use Komatsu genuine parts.

As a result of our continuous efforts to improve product quality, the part number may change, so inform your Komatsu distributor of the machine serial number and check for the latest part number when ordering parts.

WEAR PARTS LIST

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

Item		Part No.	Part Name	Weight (kg(lb))	Q'ty	Replacement frequency
Engine oil filter		6742-01-4540	Cartridge	-	1	Every 500 hour service
Power train filter		714-07-28713 (07000-72110)	Element (O-ring)	-	1 (1)	
Fuel pre-filter		600-319-3610	Cartridge (with O-ring for clear ball)	-	1	
Air conditioner	Fresh filter	14X-911-7750	Filter	-	2	
	Recirc filter	17M-911-3530	Filter	-	2	
Fuel main filter		6754-79-6140	Cartridge (with cap)	-	1	Every 1000 hour service
Corrosion resistor		600-411-1191	Cartridge	-	1	
Hydraulic tank breather element		421-60-35170	Element	-	1	
Fuel tank breather element		421-60-35170	Element	-	1	
Hydraulic oil filter		14X-60-31150 (07000-15195)	Element (O-ring)	- -	1 (1)	Every 2000 hour service
Air cleaner		600-185-5100	Element Ass'y	-	1	-

Item	Part No.	Part Name	Weight (kg(lb))	Q'ty	Replacement frequency			
Blade	D65EX • Power angle power tilt dozer	14X-72-51810	Cutting edge (center)	38.8	1	-		
		13G-72-61420	Cutting edge (side)	24.3	2			
		14Y-71-11330	End bit (left)	-	1			
		14Y-71-11340	End bit (right)	-	1			
		(02090-11270)	(Bolt)	-	(32)			
		(02290-11219)	(Nut)	-	(32)			
		D65PX, D65WX • Power angle power tilt dozer	14X-72-51610	Cutting edge (center)	42.6		1	-
	13G-72-61420		Cutting edge (side)	24.3	2			
	14Y-71-11330		End bit (left)	-	1			
	14Y-71-11340		End bit (right)	-	1			
	(02090-11270)		(Bolt)	-	(33)			
	(02290-11219)		(Nut)	-	(33)			
	D65EX • Straight tilt dozer • Straight tilt power pitch dozer		14X-71-11310	Cutting edge	38.4	2	-	
		14X-71-11330	End bit (left)	-	1			
		14X-71-11340	End bit (right)	-	1			
		(02090-11270)	(Bolt)	-	(28)			
		(02290-11219)	(Nut)	-	(28)			
		D65PX • Straight tilt dozer • Straight tilt power pitch dozer	14Y-71-11210	Cutting edge	45.5	2		-
			14Y-71-11330	End bit (left)	-	1		
	14Y-71-11340		End bit (right)	-	1			
	(02090-11270)		(Bolt)	-	(32)			
(02290-11219)	(Nut)		-	(32)				
D65EX • Angle dozer	144-70-11131		Cutting edge	45.5	2	-		
	14X-71-11330		End bit (left)	-	1			
	14X-71-11340	End bit (right)	-	1				
	(02090-11270)	(Bolt)	-	(32)				
	(02290-11219)	(Nut)	-	(32)				
	D65EX • Sigma dozer • Sigma power pitch dozer	14X-952-5180	Cutting edge (center)	25.7	2		-	
		14X-952-5210	Cutting edge (left)	9.1	1			
14X-952-5190		Cutting edge (right)	9.1	1				
14X-952-5550		End bit (left)	22.6	1				
14X-952-5560		End bit (right)	22.6	1				
(02090-11270)		(Bolt)	-	(32)				
(02290-11219)		(Nut)	-	(32)				
D65WX • Sigma dozer • Sigma power pitch dozer	14X-952-5180	Cutting edge (left of center)	25.7	1	-			
	14X-952-5381	Cutting edge (right of center)	30.4	1				
	14X-952-5210	Cutting edge (left)	9.1	1				
	14X-952-5190	Cutting edge (right)	9.1	1				
	14X-952-5550	End bit (left)	22.6	1				
	14X-952-5560	End bit (right)	22.6	1				
	(02090-11270)	(Bolt)	-	(32)				
(02290-11219)	(Nut)	-	(32)					

NOTICE

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

RECOMMENDED FUEL, COOLANT, AND LUBRICANT

- Komatsu genuine oils are adjusted to maintain the reliability and durability of Komatsu construction equipment and components.

In order to keep your machine in the best conditioner for long periods of time, it is essential to follow the instructions in this Operation and Maintenance Manual.

- Failure to follow these recommendations may result in shortened life or excess wear of the engine, power train, cooling system, and/or other components.
- Commercially available lubricant additives may be good for the machine, but they may also cause harm. Komatsu does not recommend any commercially available lubricant additive.
- Use the oil recommended according to the ambient temperature in the chart below.
- Specified capacity means the total amount of oil including the oil in the tank and the piping. Refill capacity means the amount of oil needed to refill the system during inspection and maintenance.
- When starting the engine in temperatures below 0°C (32°F), be sure to use the recommended multi-grade oil, even if the ambient temperature may become higher during the course of the day.
- If the machine is operated at a temperature below -20°C (-4°F), a separate device is needed, so consult your Komatsu distributor.
- When the fuel sulfur content is less than 0.5%, change the engine oil according to the period inspection table given in this Operation and Maintenance Manual.

If the fuel sulfur content is more than 0.5%, change the oil according to the following table.

Sulfur content (%)	Oil change interval
Less than 0.5	500 hours
0.5 - 1.0	250 hours
1.0 and up	Not recommendable (*)

* If these fuels are used, there is danger that serious trouble may occur because of early deterioration of the engine oil or early wear of the internal parts of the engine. If the local situation makes it necessary to use these fuels, always remember the following.

- 1) Be sure to check Total Basic Number (TBN) of oil frequently by TBN handy checker etc., and change oil based on the result.
- 2) Always be aware that oil change interval is extremely shorter than standard.
- 3) Be sure to carry out periodic engine inspection by distributor's expert since change interval of periodic replacement parts and overhaul interval are also shorter.

USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE

Reservoir	Fluid Type	Ambient Temperature, degrees Celsius										Recommended Komatsu Fluids
		-22 -30	-4 -20	14 -10	32 0	50 10	68 20	86 30	104 40	122 °F 50 °C		
Engine oil pan	Engine oil	(Note.1)										Komatsu EOS5W40
		[Shaded bar from -20 to 104 °C]										Komatsu EO10W30DH
		[Shaded bar from -10 to 104 °C]										Komatsu EO15W40DH
		[Shaded bar from 0 to 104 °C]										Komatsu EO30DH
Damper case Idler (each)	Power train oil (Note.2)	[Shaded bar from -20 to 104 °C]										TO30
Power train case	Power train oil	[Shaded bar from -20 to 68 °C]										TO10
		[Shaded bar from 10 to 104 °C]										TO30
Final drive case (each)	Power train oil	[Shaded bar from -20 to 104 °C]										TO30
Hydraulic system	Power train oil	[Shaded bar from -20 to 104 °C]										TO10
	Hydraulic oil	[Shaded bar from -20 to 104 °C]										HO46-HM
	Engine oil	[Shaded bar from -20 to 104 °C]										Komatsu EO10W30DH
[Shaded bar from -10 to 104 °C]										Komatsu EO15W40DH		
Grease fitting	Hyper grease (Note.3)	[Shaded bar from -20 to 104 °C]										G2-T, G2-TE
	Lithium EP grease	[Shaded bar from -20 to 104 °C]										G2-LI
Cooling system	Supercoolant AF-NAC (Note.4)	[Shaded bar from -20 to 104 °C]										AF-NAC
Fuel tank	Diesel fuel	[Shaded bar from -20 to 68 °C]										ASTM Grade No.1-D S15 ASTM Grade No.1-D S500
		[Shaded bar from 0 to 104 °C]										ASTM Grade No.2-D S15 ASTM Grade No.2-D S500

• ASTM: American Society of Testing and Material

		Engine oil pan	Damper case	Idler (each)	Hydraulic system	Power train case	Final drive case (each)		Fuel tank	Cooling system (including sub-tank)
							EX	PX,WX		
Specified capacity	Liters	33	1.7	0.25	82	53	24	27	415	36
	US gal	8.72	0.45	0.07	21.66	14.00	6.34	7.13	109.64	9.51
Refill capacity	Liters	28	1.7	0.25	55	48	24	27	–	–
	US gal	7.40	0.45	0.07	14.53	12.68	6.34	7.13	–	–

NOTICE

Always use diesel oil for the fuel.

To ensure good fuel consumption characteristics and exhaust gas characteristics, the engine mounted on this machine uses an electronically controlled high-pressure fuel injection device. This device requires high precision parts and lubrication, so if low viscosity fuel with low lubricating ability is used, the durability may drop markedly.

Note 1: HTHS (High-Temperature High-Shear Viscosity 150°C), specified by ASTM D4741 must be equal to or higher than 3.5 mPa-S. Komatsu EOS0W30 and EOS5W40 are the most suitable oils.

Note 2: Powertrain oil has different properties from engine oil. Be sure to use the recommended oils.

Note 3: Hyper grease (G2-T, G2-TE) has a high performance.

When it is necessary to improve the lubricating ability of the grease in order to prevent squeaking of pins and bushings, the use of G2-T or G2-TE is recommended.

Note 4: Supercoolant (AF-NAC)

1) Coolant has the important function of anticorrosion as well as antifreeze.

Even in the areas where freezing is not an issue, the use of antifreeze coolant is essential.

Komatsu machines are supplied with Komatsu Supercoolant (AF-NAC). Komatsu Supercoolant (AF-NAC) has excellent anticorrosion, antifreeze and cooling properties and can be used continuously for 2 years or 4000 hours. Komatsu Supercoolant (AF-NAC) is strongly recommended wherever available.

2) For details of the ratio when diluting super coolant with water, see "CLEAN INSIDE OF COOLING SYSTEM (PAGE 4-24)".

When the machine is shipped from the factory, it may be filled with coolant containing 30% or more Supercoolant (AF-NAC). In this case, no adjustment is needed for temperatures down to -10°C (14°F). (never dilute with water)

3) To maintain the anticorrosion properties of Supercoolant (AF-NAC), always keep the density of Supercoolant between 30% and 68%.

RECOMMENDED BRANDS, RECOMMENDED QUALITY FOR PRODUCTS OTHER THAN KOMATSU GENUINE OIL

When using commercially available oils other than Komatsu genuine oil, consult your Komatsu distributor.

STANDARD TIGHTENING TORQUES FOR BOLTS AND NUTS

TORQUE LIST

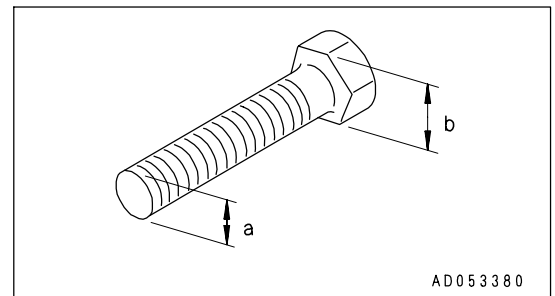


If nuts, bolts, or other parts are not tightened to the specified torque, it will cause looseness or damage to the tightened parts, and this will cause failure of the machine or problems with operation.

Always pay careful attention when tightening parts.

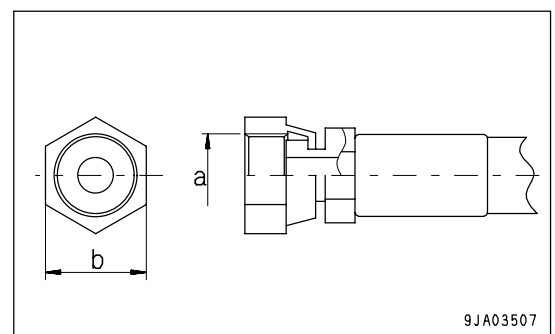
Unless otherwise specified, tighten the metric nuts and bolts to the torque shown in the table below. If it is necessary to replace any nut or bolt, always use a Komatsu genuine part of the same size as the part that was replaced.

Thread diameter of bolt (a)(mm)	Width across flats (b)(mm)	Tightening torque					
		Target value			Service limit		
		Nm	kgm	lbft	Nm	kgm	lbft
6	10	13.2	1.35	9.8	11.8-14.7	1.2-1.5	8.7-10.8
8	13	31	3.2	23.1	27-34	2.8-3.5	20.3-25.3
10	17	66	6.7	48.5	59-74	6.0-7.5	43.4-54.2
12	19	113	11.5	83.2	98-123	10.0-12.5	72.3-90.4
14	22	172	17.5	126.6	153-190	15.5-19.5	112.1-141
16	24	260	26.5	191.7	235-285	23.5-29.5	170.0-213.4
18	27	360	37	267.6	320-400	33.0-41.0	238.7-296.6
20	30	510	52.3	378.3	455-565	46.5-58.0	336.3-419.5
22	32	688	70.3	508.5	610-765	62.5-78.0	452.1-564.2
24	36	883	90	651	785-980	80.0-100.0	578.6-723.3
27	41	1295	132.5	958.4	1150-1440	118.0-147.0	853.5-1063.3
30	46	1720	175.0	1265.8	1520-1910	155.0-195.0	1121.1-1410.4
33	50	2210	225.0	1627.4	1960-2450	200.0-250.0	1446.6-1808.3
36	55	2750	280.0	2025.2	2450-3040	250.0-310.0	1808.3-2242.2
39	60	3280	335.0	2423.1	2890-3630	295.0-370.0	2133.7-2676.2



Apply the following table for Hydraulic Hose.

Nominal- No. of threads (a)	Width across flats (b) mm	Tightening torque					
		Target valve			Permissible range		
		Nm	kgm	lbft	Nm	kgm	lbft
9/16 -18UNF	19	44	4.5	32.5	34 - 54	3.5 - 5.5	25.3 - 39.8
11/16 -16UN	22	74	7.5	54.2	54 - 93	5.5 - 9.5	39.8 - 68.7
13/16 -16UN	27	103	10.5	75.9	84 - 132	8.5 - 13.5	61.5 - 97.6
1 -14UNS	32	157	16.0	115.7	128 - 186	13.0 - 19.0	94.0 - 137.4
1 3/16 -12UN	36	216	22.0	159.1	177 - 245	18.0 - 25.0	130.2 - 180.8



PERIODIC REPLACEMENT OF SAFETY CRITICAL PARTS

To ensure safety at all times when operating or driving the machine, the user of the machine must always 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.

Material quality of these parts can change as time passes and they are likely to wear out or deteriorate. However, it is difficult to determine the extent of wear or deterioration at the time of periodic maintenance. Hence, it is required to replace them with new ones regardless of their condition after a certain period of usage. This is important to ensure that these parts maintain their full performance at all times.

Furthermore, should anything abnormal be found on any of these parts, replace it with a new one even if the periodic replacement time for the part has not yet arrived.

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

Also perform the following checks with hydraulic hoses which need to be replaced periodically. Tighten all loose clamps and replace defective hoses, as required.

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

Have your Komatsu distributor replace the critical parts.

SAFETY CRITICAL PARTS

NO.	Safety critical parts for periodic replacement	Q'ty	Replacement interval
1	Fuel hose (fuel tank - fuel strainer)	1	Every 2 years or 4000 hours, whichever comes sooner
2	Fuel hose (fuel strainer - fuel pre-filter)	1	
3	Fuel hose (fuel pre-filter - engine inlet)	1	
4	Fuel return hose (engine outlet - fuel tank)	1	
5	Hose (power train strainer - power train pump)	1	
6	Hose (power train pump - power train filter)	1	
7	Hose (power train filter - transmission case)	1	
8	Hose (transmission case - steering case)	1	
9	Hose (steering lubrication pump - steering case relay block)	1	
10	Hose (scavenging pump - steering case)	1	
11	Hose (torque converter case - mission oil cooler)	1	
12	Hose (mission oil cooler - transmission case)	1	
13	Hose (central steering block - transmission case)	1	
14	Brake pressure detection hose	1	
15	Torque converter inlet post pressure detection hose	1	
16	Torque converter outlet post pressure detection hose	1	
17	Main relief valve pressure detection hose	1	
18	Hose (HSS pump - main control valve)	3	
19	Hose (HSS pump - central drain elbow)	1	
20	Hose (fan pump - central drain elbow)	1	
21	Hose (main control valve - HSS motor)	2	
22	Hose (main control valve - hydraulic tank)	1	

NO.	Safety critical parts for periodic replacement	Q'ty	Replacement interval
23	Hose (main control valve - central drain block)	1	Every 2 years or 4000 hours, whichever comes sooner
24	Hose (main control valve - blade tilt relay block)	2	
25	Hose (blade tilt relay block - tilt cylinder)	8	
26	Hose (main control valve - blade lift relay tube)	2	
27	Hose (radiator guard upper part - lift cylinder)	4	
28	Hose (fan pump - fan motor)	1	
29	Hose (self-reducing pressure valve - HSS pump)	1	
30	Hose (fan motor - hydraulic oil cooler)	1	
31	Hose (fan motor - hydraulic tank)	1	
32	Hose (hydraulic oil cooler - hydraulic tank)	1	
33	Hose (PPC valve - main control valve)	4	
34	Hose (central PPC block - main control valve)	2	
35	Hose (hydraulic tank - central PPC block)	1	
36	Hose (PPC valve - central PPC block)	1	
37	Hose (PPC valve -central drain block)	1	
38	Hose (HSS motor - hydraulic tank)	1	
39	Accumulator (for operating circuit)	1	
40	Hose (main control valve - blade tilt relay block) [PAT specification]	2	
41	Hose (blade tilt relay tube - tilt cylinder) [PAT specification]	6	
42	Hose (main control valve - blade angle relay block) [PAT specification]	6	
43	Hose (blade angle relay tube - angle cylinder) [PAT specification]	4	
44	High-pressure tube clamp	1S	Every 8000 hours
45	Fuel spray prevention cap	1S	
46	Seat belt	1	Every 3 years

MAINTENANCE SCHEDULE CHART

MAINTENANCE SCHEDULE CHART

WHEN REQUIRED

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SERVICE PROCEDURE

WHEN REQUIRED

CHECK, CLEAN AND REPLACE AIR CLEANER ELEMENT



WARNING

- If inspection, cleaning, or maintenance is carried out with the engine running, dirt will get into the engine and damage it. Be sure to stop the engine before carrying out these operations.
- If compressed air is used, there is danger that dirt may be blown around and cause serious injury. Always use protective glasses, dust mask, and other protective equipment.
- When pulling out the cleaner element at a high place or a bad foothold, take care not fall after the element comes off suddenly.

CHECKING

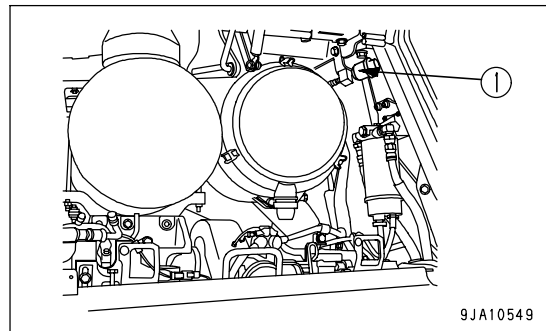
If the yellow piston in the dust indicator (1) overlaps the red zone on the outside, clean the filter element.

NOTICE

Always wait for the yellow piston in the dust indicator to overlap the red zone on the outside before cleaning the element.

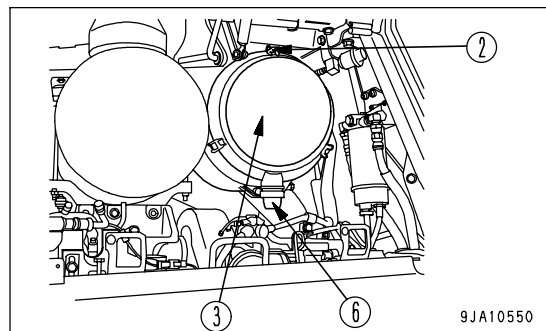
If the element is cleaned frequently before the yellow piston in the dust indicator overlaps the red zone on the outside, the air cleaner will be unable to display its normal performance and the cleaning effect will become poor.

In addition, the frequency of dust stuck to the element falling inside the inner element during the cleaning operation will increase.



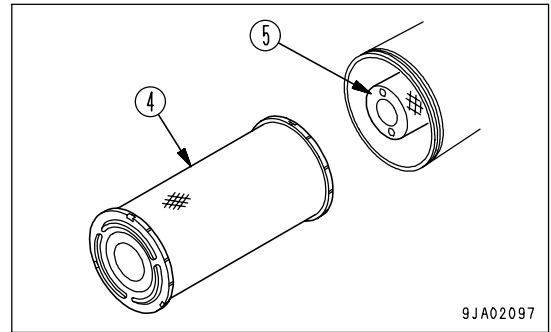
CLEANING OR REPLACING OUTER ELEMENT

1. Open the left engine side cover.
2. Remove three clips (2), then remove cover (3).



NOTICE

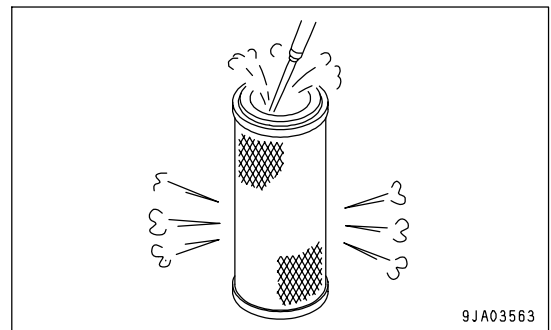
- Do not leave or keep the filter element in a place where it will be exposed to the direct sunlight before and after cleaning it.
- Never remove inner element (5). If it is removed, dirt will enter and can cause an engine trouble.
- Do not use a screwdriver or another tool.



3. Hold the outer element (4), move it carefully up and down and to the left and right, and rotate the element to the left and right while pulling it out.
4. After removing the outer element, cover the air connector inside the air cleaner body with a clean cloth or tape to prevent dirt or dust from entering.
5. Clean the interior of the air cleaner body, cover (3) and evacuator valve (6) with a clean cloth, a whisk or others.
6. Blow dry compressed air (Max. 0.20 MPa (2 kg/cm², 28.4 PSI)) from the inside of the element along its folds. Then blow the compressed air from the outside along the folds, and again from the inside.

NOTICE

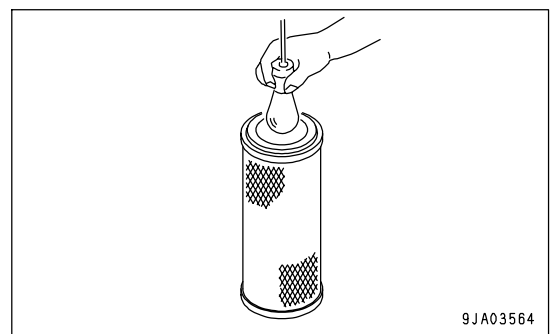
If small holes or thinner parts are found on the element when it is checked with an electric bulb after cleaning and drying, replace the element. When cleaning the element, do not hit it or beat it against something. Do not use an element whose folds or gasket or seal are damaged.



7. Remove the clothe or taps used as a cover in Step 3.
8. Check that there is no dirt or oil stuck to the seal portion of the new element or cleaned element. Wipe off any dirt or oil.

NOTICE

- The inner element must not be cleaned and used again. When replacing the outer element, replace the inner element at the same time.
- If the inner element is not installed properly and the outer element and cover are installed, there is danger that the outer element will be damaged.
- The seal portion on imitation parts lacks precision, and allows the entry of dust, which leads to damage of the engine. Do not use such imitation parts.

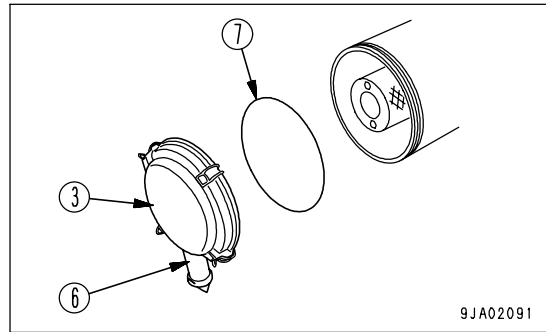


9. Before installing the outer element, check that the inner element is fitted securely. If the inner element is not fitted securely, push it in properly.

CAUTION

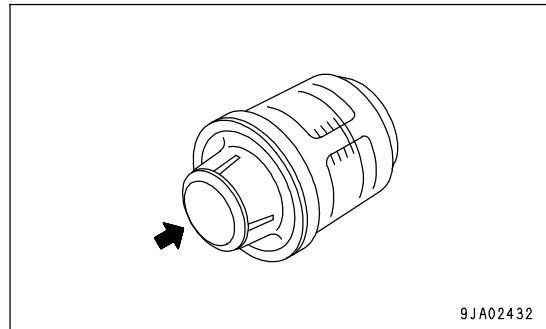
When installing the cover (3), check O-ring (7) and replace it if there are any scratches or damage.

10. Set the cleaned outer element in position, then secure cover (3) with mounting clips (2).
11. Push the button of dust indicator (1) and return the yellow piston to its original position.



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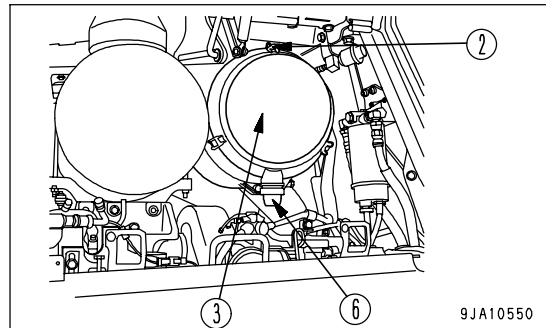
12. Close the left engine side cover.
13. If the yellow piston in dust indicator (1) overlaps the red zone on the outer diameter immediately after the outer element is cleaned, replace both the inner and outer elements.



9JA02432

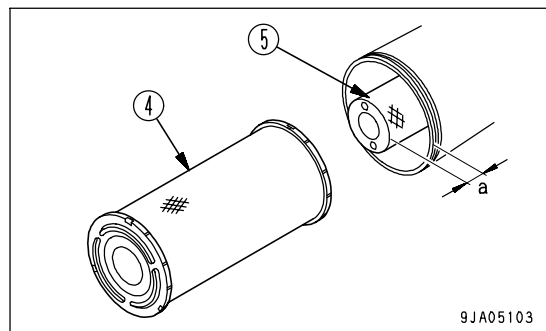
REPLACING ELEMENT

1. Open the left engine side cover.
2. Remove three clips (2), then remove cover (3).



9JA10550

3. Holding outer element (4), remove it by swing it carefully vertically and horizontally and rotating it to the right and left. Do not remove inner element (5) at this time.
4. Clean the interior of the air cleaner body, cover (3) and evacuator valve (6) with a clean cloth, a whisk or others.

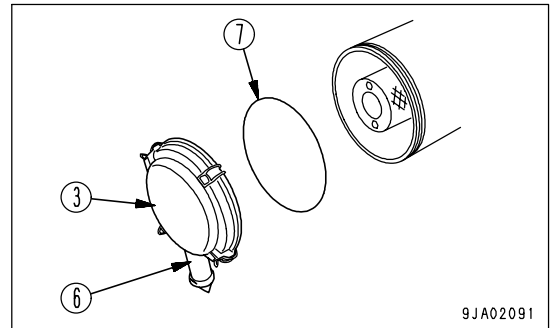


9JA05103

NOTICE

- If the outer element and cover are installed while the inner element is not installed properly, the outer element may break. When installation is correct, protrusion "a" of the inner element from the air cleaner body is 35 mm (1.4 in).
- Do not clean and reuse the inner element. When replacing the outer element, replace the inner element with new one, too.
- Avoid using a non-genuine element, since the accuracy of its seal is low and dirt will enter and can cause an engine trouble.

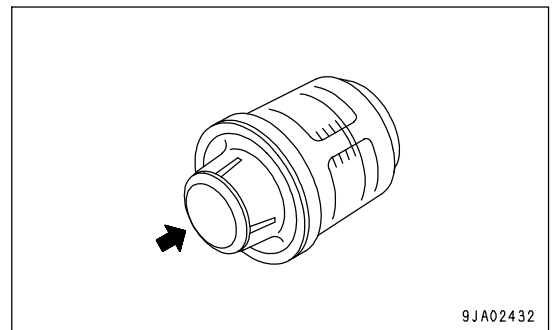
5. Remove inner element (5), then quickly install the new inner element.
Push the inner element in properly and check that it is fitted securely.
6. Set the new outer element (4) in position.
7. Replace O-ring (7) for cover (3) with new one.
8. Set the arrow mark on cover (3) at the top, install to the air cleaner body, then secure with clip (2).



9. Push the button of dust indicator (1) and return the yellow piston to its original position.

REMARK

Immediately after a new element has been installed, the yellow piston of the dust indicator may go to the 2nd position, but this does not indicate any abnormality.



10. Close the left engine side cover.

CLEAN INSIDE OF COOLING SYSTEM



WARNING

- Immediately after the engine is stopped, the cooling water is at high temperature and the radiator is under high internal pressure. If the radiator cap is removed in this condition and the water is drained, it may cause burns. To prevent this, wait for the temperature to go down, then turn the cap slowly to release the internal pressure.
- Start the engine and clean the inside of the cooling system. When standing up or leaving the operator's seat, set the work equipment lock lever and parking brake lever to the LOCK position.
- For details when starting the engine, see "CHECK BEFORE STARTING ENGINE, ADJUST (PAGE 3-90)" and "STARTING ENGINE (PAGE 3-111)".
- Never approach the fan at the front of the machine while the engine is running. There is danger of touching the fan.
- Entering under the machine for cleaning while the engine is running is very dangerous since the machine may start suddenly. Never enter under the machine while the engine is running.

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

Clean the inside of the cooling system, change the coolant according to the table below.

Antifreeze coolant	Interval for cleaning inside of cooling system and changing antifreeze coolant	Precautions for use
Komatsu supercoolant (AF-NAC)	Every two years or every 4000 hours whichever comes first	1*

*1: When using Komatsu Supercoolant (AF-NAC), there is no need to use a corrosion resistor.

When no corrosion resistor is used, use the special cover (600-411-9000). Please consult your Komatsu distributor about the method of installing.

When using corrosion resistor, use Komatsu genuine corrosion resistor. If you use another corrosion resistor, it may cause serious problems such as corrosion of the engine and parts of the cooling system that use light metals such as aluminum.

The coolant has the important function of preventing corrosion as well as preventing freezing.

Even in the areas where freezing is not an issue, the use of antifreeze coolant is essential.

Komatsu machines are supplied with Komatsu Supercoolant (AF-NAC). Komatsu Supercoolant (AF-NAC) has excellent anticorrosion, antifreeze and cooling properties and can be used continuously for 2 years or 4000 hours. As a basic rule, we do not recommend the use of any coolant other than Komatsu genuine supercoolant (AF-NAC). If you use another coolant, it may cause serious problems, such as corrosion of the engine and aluminum parts of the cooling system.

To maintain the anticorrosion properties of Supercoolant (AF-NAC), always keep the density of Supercoolant between 30% and 68%.

When deciding the ratio of antifreeze to water, check the lowest temperature in the past, and decide from the mixing table given below.

It is actually better to estimate and temperature about 10°C (18°F) lower when deciding the mixing ratio.

The mixing ratio depends on the ambient temperature, but it should always be a minimum of 30% by volume (antifreeze/total amount of coolant x 100).

Even in areas where it is not necessary to prevent freezing, use Supercoolant (AF-NAC) at a mixing ratio of at least 30% to prevent corrosion of the cooling system.

The freezing temperature of undiluted antifreeze is -15°C (5°F). Do not store undiluted antifreeze at a temperature of below -15°C (5°F).

Mixing rate of water and antifreeze

Min. atmospheric temperature	°C	-10	-15	-20	-25	-30
	°F	14	5	-4	-13	-22
Amount of antifreeze	liter	11.1	13.3	15.2	17.0	18.5
	US gal	2.93	3.51	4.02	4.49	4.89
Amount of water	liter	25.9	23.7	21.8	20.0	18.5
	US gal	6.84	6.26	5.76	5.28	4.89
Volume ratio (%)		30	36	41	46	50



WARNING

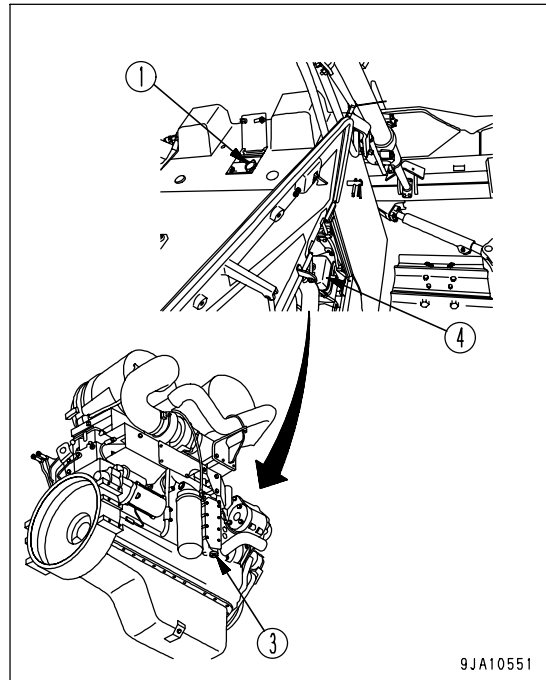
- Antifreeze is flammable, so keep it away from flame.
Antifreeze is toxic. When opening the drain valve, be careful not to get water containing antifreeze on you. If it gets in your eyes, flush your eyes with large amount of fresh water and see a doctor at once.
- When changing the coolant or draining the coolant from the radiator before carrying out repairs, ask a specialist company to handle any coolant containing antifreeze, or contact your Komatsu distributor. Antifreeze is toxic, so never pour it into drainage water ditches or drain it onto the ground surface.

Use antifreeze and appropriate water for diluting (for details, see "COOLANT AND WATER FOR DILUTION (PAGE 4-6)")

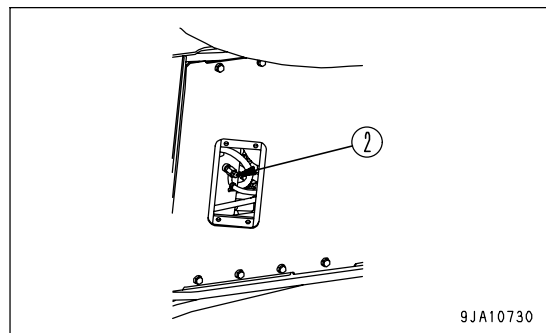
We recommend use of an antifreeze density gauge to control the mixing proportions.

- Prepare a container of at least 60 liters to receive the cooling water.
 1. Stop the engine and tighten 2 valves of the corrosion resistor.

2. Turn radiator cap (1) slowly until it hits the stopper and by so doing, relieving the internal pressure.
3. Turn radiator cap (1) until it hits the next stopper, while depressing it. Keep turning the radiator cap (1) until it hits the last stopper.
4. Put containers to catch the coolant under drain valve (2) at the bottom of the radiator and under drain valve (3) at the side of the cylinder block.
Open drain valve (2) and drain valve (3), and drain the water.
5. After draining the antifreeze solution, close drain valve (2), (3), then fill with clean water. After the radiator is filled with water, start and run the engine at low idling speed. After the water temperature rises above 90°C (194°F), run the engine for about 10 minutes.

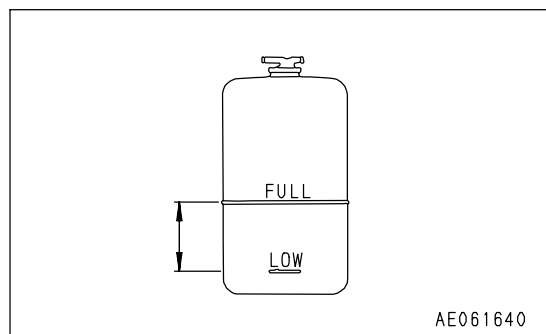


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6. Stop the engine and open drain valve (2), (3) to drain the water.
7. Open 2 valves of the corrosion resistor.
8. Close drain valve (2), (3).
9. Add coolant mixed with antifreeze until it overflows from the water filler.
Decide the proportions of antifreeze and water according to the table for the mixing rate of water and antifreeze.
10. To remove air in the cooling system, run the engine for 5 minutes at low idle, then for 5 minutes at high idle. (While doing this, leave the radiator cap removed.)
11. Drain the coolant inside sub-tank (4), clean the inside of the sub-tank, then fill again with coolant to a point midway between the FULL and LOW marks.
12. Stop the engine and tighten the cap. Check the coolant level, and add water if the level is low.



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CHECK TRACK SHOE TENSION, ADJUST

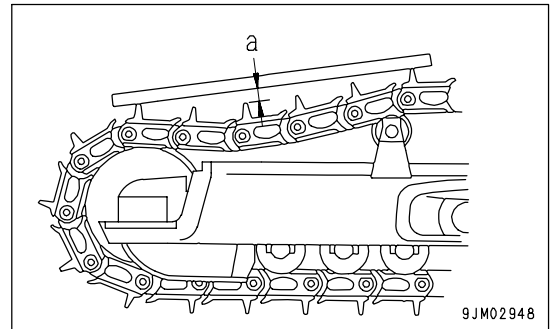
The wear of pins and bushings on the undercarriage will vary with the working conditions and types of soil. It is thus necessary to continually inspect the track tension so as to maintain the standard tension.

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

INSPECTION

Stop the machine on level ground (stop with the transmission in FORWARD without applying the brake). Then place a straight bar on the track shoes between the carrier roller and the idler as shown in the figure, and measure the clearance between the bar and the grouser at the midpoint. If the clearance (a) is 20 to 30 mm (0.79 to 1.18 in), the tension is standard.

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



ADJUSTMENT

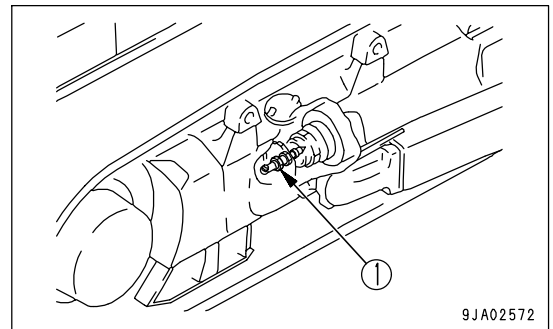


WARNING

There is danger of plug (1) flying out under the high internal pressure of the grease. Never loosen plug (1) more than 1 turn.

Never loosen any part other than plug (1). Never put your face in the mounting direction of plug (1).

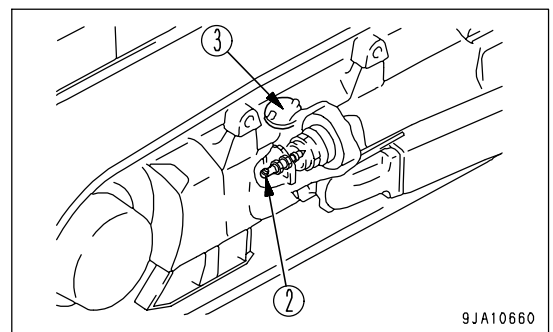
If the track tension cannot be loosened with the procedure given here, please contact your Komatsu distributor.



WHEN INCREASING TENSION

Prepare a grease pump.

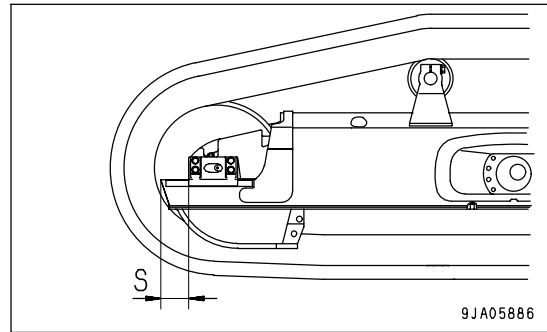
1. Remove cover (3) and pump in grease through grease fitting (2) with a grease pump.
2. To check that the correct tension has been achieved, move the machine backwards and forwards.
3. Check the track tension again, and if the tension is not correct, adjust it again.



NOTICE

- The safety label is stuck on the back of cover (3), so be careful not to damage the safety label.
- When removing cover (3), be careful not to let any dirt or soil get in.

- Continue to pump in grease until S becomes 0 mm. If the tension is still loose, the pins and bushings are excessively worn, so they must be either turned or replaced. Please contact your Komatsu distributor.



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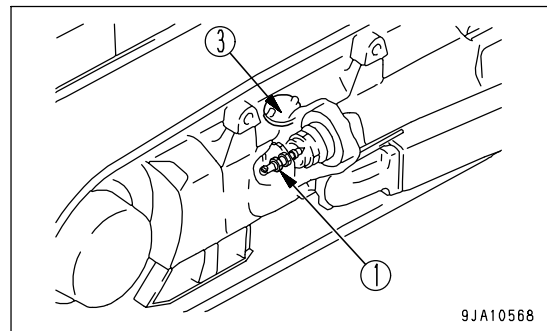
WHEN LOOSENING TENSION



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.

- Loosen plug (1) gradually to release the grease.
- When loosening plug (1), turn it a maximum of one turn.
- If the grease does not come out smoothly, move the machine forwards and backwards a short distance.
- Tighten plug (1).
- To check that the correct tension has been achieved, move the machine backwards and forwards.
- Check the track tension again, and if the tension is not correct, adjust it again.



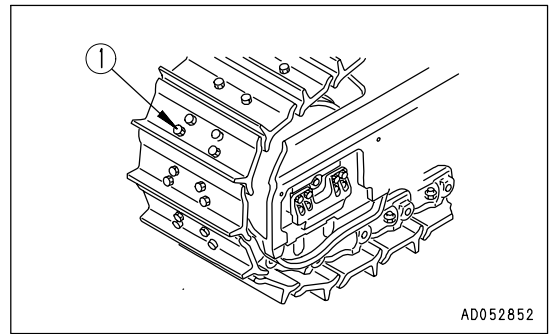
9JA10568

NOTICE

- The safety label is stuck on the back of cover (3), so be careful not to damage the safety label.
- When removing cover (3), be careful not to let any dirt or soil get in.

CHECK AND TIGHTEN TRACK SHOE BOLTS

Track shoes may be broken, if they are used with loosened shoe bolts (1). Hence whenever a loosened bolt is found, be sure to retighten it.



METHOD OF TIGHTENING (TRACK SHOE BOLTS)

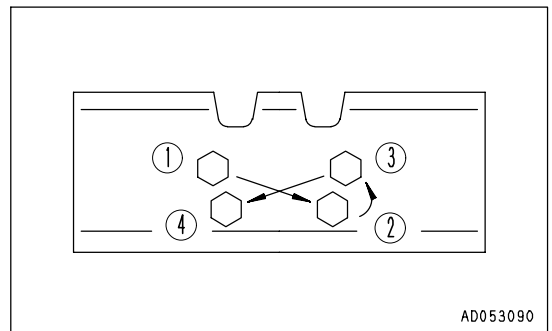
1. Torque the track shoe bolts to 539 ± 49 Nm (55 ± 5 kgm, 398 ± 36.2 lb ft). Then ensure the nut and shoes are in close contact with the link contact surface.
2. After checking, tighten a further. $120^\circ \pm 10^\circ$.

METHOD OF TIGHTENING (MASTER CONNECTING BOLT)

1. First tighten to a tightening torque of 343 ± 39 Nm (35 ± 4 kgm, 253 ± 29 lbf) then check that the link contact surfaces are in close contact.
2. After checking the link contact surfaces, tighten the bolt by 180° (Allowable range: $0^\circ - 20^\circ$).

ORDER FOR TIGHTENING

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



REVERSE AND REPLACE END BITS AND CUTTING EDGES



WARNING

It is dangerous if the work equipment moves during the turning or replacement operation.

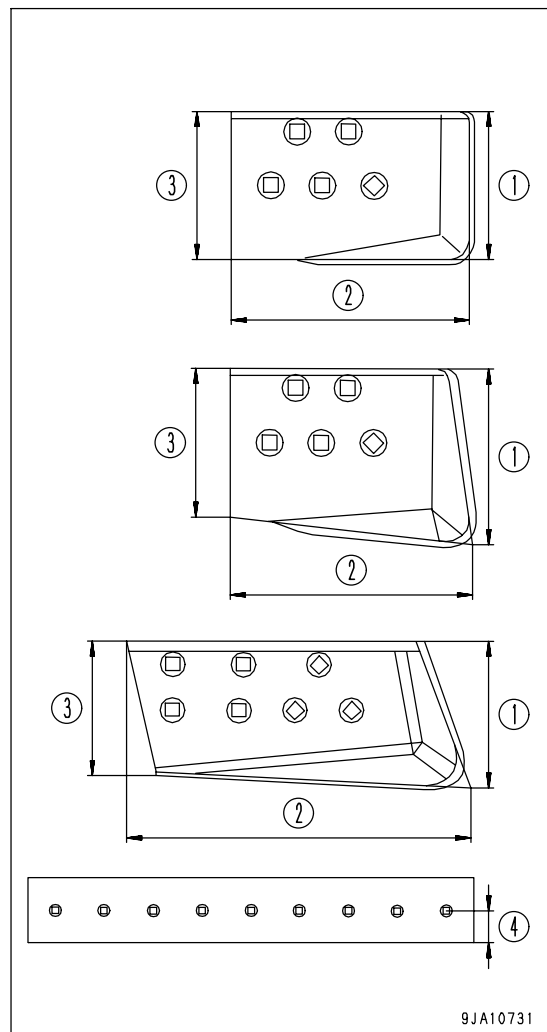
Set the work equipment in a stable condition, set the work equipment lock lever to the LOCK position, then stop the engine.

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, position a block under the frame to prevent the blade from falling.
2. Set the work equipment lock lever to the LOCK position and stop the engine.
3. Measure the wear of the end bit and cutting edge in accordance with the wear standards given below.

Wear standards

Item			Judgement criteria (mm)	
No.	Dimension to be measured	Work equipment	Basic dimension	Allowable max. value
1	Height of end bit (outside)	A,C	242	187
		B,F,G	204	187
		D,E	228	145
2	Width of end bit	A,B,C,F,G	325	300
		D,E	529	440
3	Height of end bit (inside)	A,B,C,F,G	204	187
		D,E	201	145
4	Height of cutting edge (Center of bolt mounting hole to edge)	A,B,C,D, E,F,G	102	85



9JA10731

The symbols in the work equipment column have the following meaning.

- A: Straight tilt dozer (D65EX)
- B: Straight tilt dozer (D65PX)
- C: Angle dozer (D65EX)
- D: Sigma dozer (D65EX)
- E: Sigma dozer (D65WX)
- F: Power angle power tilt dozer (D65EX)
- G: Power angle power tilt dozer (D65WX, D65PX)

REMARK

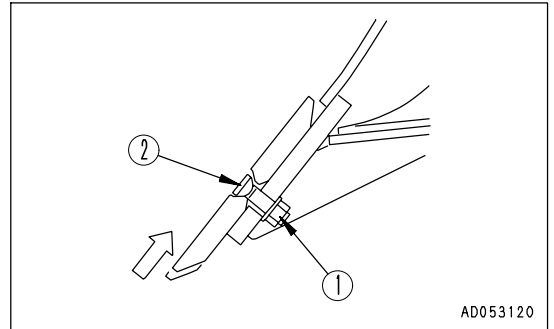
If the cutting edge and the end bit on both sides are worn out, replace with new ones.

4. Remove the cutting edge and the end bit and clean the mounting surface.

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

1) Remove nut (1) and bolt (2), then replace or reverse the cutting edge and the end bit.

2) Install the cutting edge on the blade and tighten the bolt temporarily. Press the blade against the ground to eliminate the play of bolt (2), then tighten the bolt to the specified torque.



Nut tightening torque:

Straight tilt dozer : 392 - 530 Nm (40 - 54 kgm , 289 - 391 lbft.)

Angle dozer : 392 - 530 Nm (40 - 54 kgm , 289 - 391 lbft.)

Sigma dozer : 392 - 530 Nm (40 - 54 kgm , 289 - 391 lbft.)

Power angle power tilt dozer : 392 - 530 Nm (40 - 54 kgm , 289 - 391 lbft.)

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

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

CLEAN AND CHECK RADIATOR FINS AND OIL COOLER FINS

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

REMARK

Check the hydraulic cooler hoses. If any hose is cracked or hardened by age, replace with a new hose. Also check and tighten all loose hose clamps.

CLEANING BY COOLING FAN REVERSE TURN

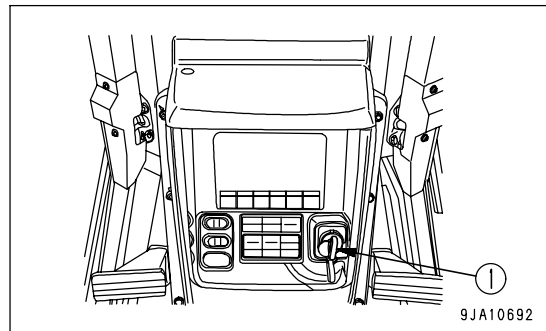
NOTICE

When rotating the cooling fan in the reverse direction, be extremely careful of flying dust.

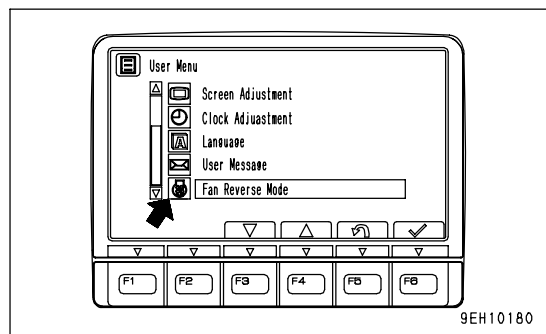
When stopping the engine when the cooling fan is rotating in the reverse direction, first run the engine at low idling, then stop it.

The dust and dirt stuck to the radiator and cooler can be blown out by rotating the cooling fan in the reverse direction.

1. Turn starting switch (1) to the "OFF" position and stop the engine.
2. Fully open the right and left engine side covers and lock them.
3. Turn starting switch (1) to the "ON" position.



4. Set the fan reverse mode on the user menu.
For details of the method of setting the fan reverse mode, see "HYDRAULIC DRIVE FAN REVERSE MODE (PAGE 3-48)".

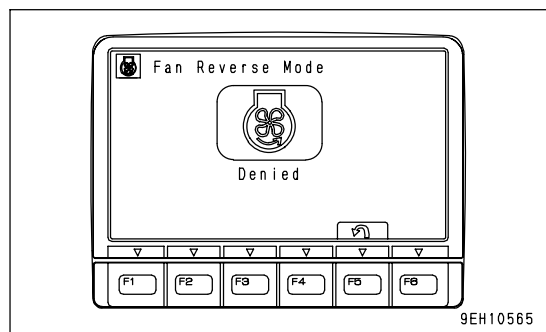


REMARK

When the engine is running, even if the fan rotation selector switch is operated, the direction of rotation of the fan will not change.

The screenshot on the right is displayed to inform the operator that the direction of rotation of the fan has not changed.

Stop the engine once and follow the steps 2 and 3 above.



5. Turn starting switch (1) to the START position and start the engine. The cooling fan will rotate in the reverse direction.
6. Run the engine at high idle.
 Select the time for running the engine at high idle as follows according to the condition of clogging.
 Normal clogging: 1 to 2 minutes
 Excessive clogging: 2 to 3 minutes
7. After completing the cleaning, run the engine at low idle for approx. 10 seconds.
8. Turn starting switch (1) to the "OFF" position and stop the engine.
9. Close the right and left engine side cover.

REMARK

If dirt is caught in the radiator fins, blow with compressed air to clean.

CLEANING WITH COMPRESSED AIR

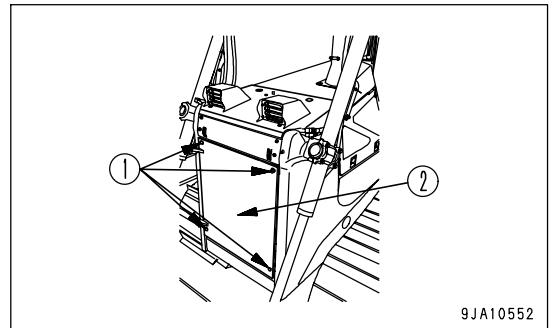


WARNING

- Directing compressed air, pressurized water, or steam directly at your body, or using these and causing dust to fly may cause personal injury. Always wear protective glasses, anti-dust mask, and other protective equipment.
- When carrying out cleaning, always stop the engine and check that the fan is not rotating. If you touch the fan when it is rotating, it will cause serious personal injury.

CLEANING OF RADIATOR FINS AND AFTER-COOLER FINS

1. Remove bolts (1) at the four corners of the radiator grill, then open radiator grill (2).
2. Clean the radiator fins clogged with mud, dust and leaves with compressed air. Steam or water may be used instead of compressed air.



REMARK

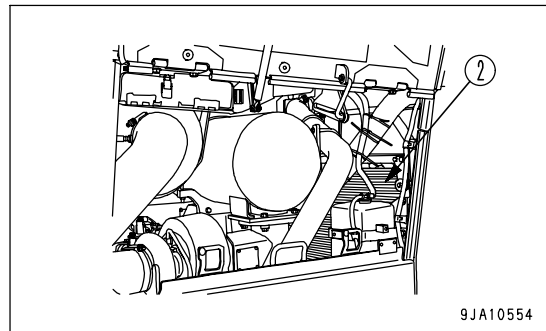
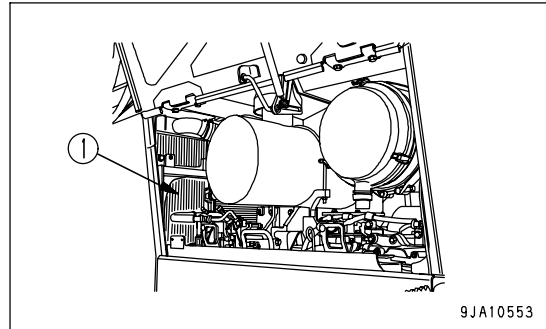
Check the hydraulic cooler hoses. If any hose is cracked or hardened by age, replace with a new hose. Also check and tighten all loose hose clamps.

CLEANING OF OIL COOLER FINS AND CONDENSER FINS

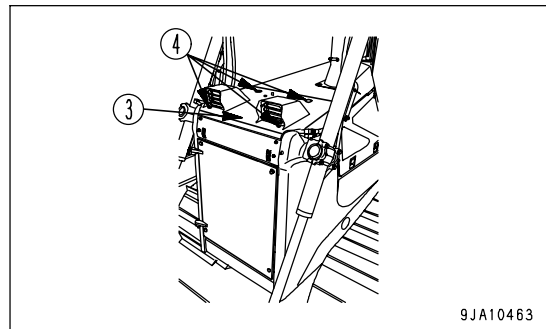
1. Open the right and left engine side covers.
2. Use compressed air to remove the mud, dirt, and leaves clogging hydraulic oil cooler fins (1) and condenser fins (2). Steam or water may be used instead of compressed air.

REMARK

Check the hydraulic cooler hoses. If any hose is cracked or hardened by age, replace with a new hose. Also check and tighten all loose hose clamps.



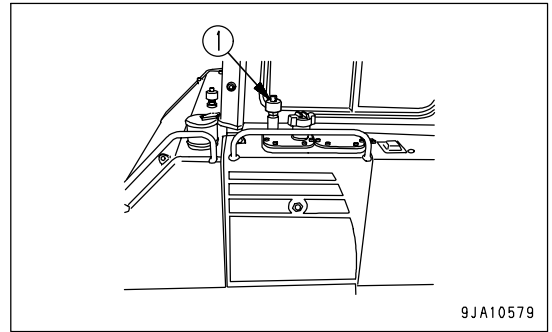
3. When cleaning the space between the front side of the hydraulic oil cooler and the rear side of the radiator, remove mounting bolts (4) of small hood (3) and then remove small hood (3). Use compressed air to blow off the mud, dirt, or leaves clogging the space.



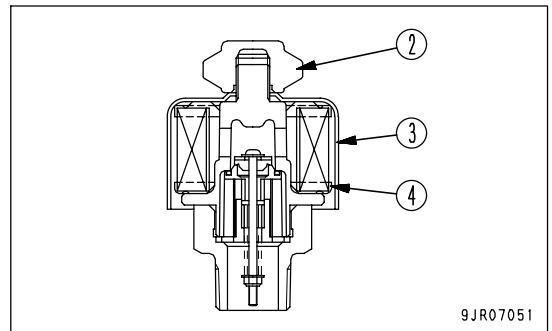
CLEAN HYDRAULIC TANK BREATHER

1. Remove nut (2) of breather assembly (1) at the top of the hydraulic tank, then remove cover (3).
2. Remove dirt stuck to breather element (4) and wash it with clean light oil or detergent oil.
3. Install cover (3) and nut (2).

Tightening torque: 10 to 14 Nm (1.0 to 1.4 kgm , 7.2 to 10.1 lbft)



9JA10579

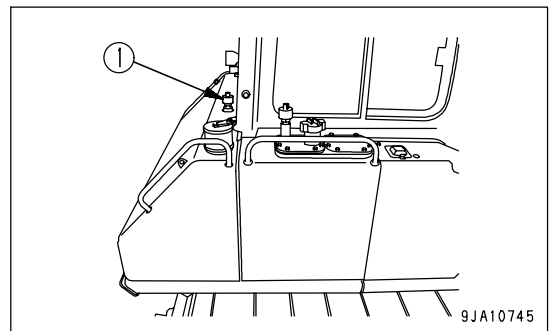


9JR07051

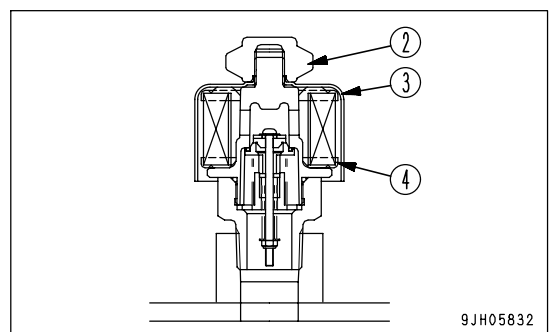
CLEAN FUEL TANK BREATHER

1. Remove nut (2) of breather assembly (1) at the top surface of the fuel tank, then remove cover (3).
2. Remove dirt stuck to breather element (4) and wash it with clean light oil or detergent oil.
3. Install cover (3) and nut (2).

Tightening torque: 10 to 14 Nm (1.0 to 1.4 kgm , 7.2 to 10.1 lbft)



9JA10745



9JH05832

REPLACE FUEL TANK BREATHER ELEMENT

NOTICE

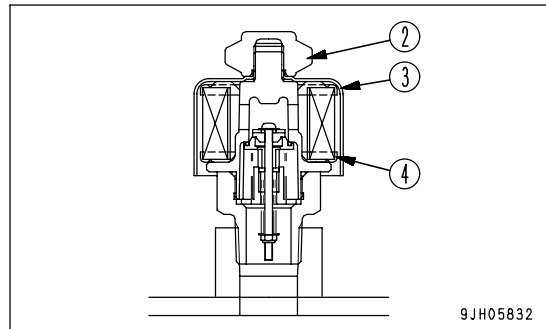
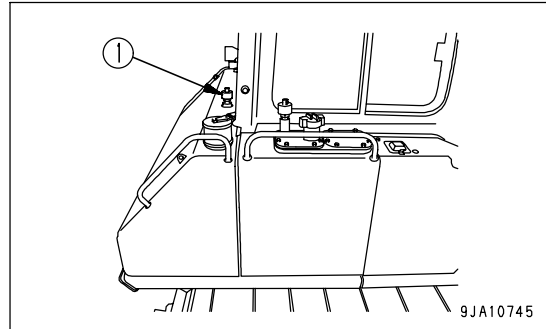
Note that the fuel tank breather and hydraulic tank breather have different part numbers.

(The element is common to both. For details, see "WEAR PARTS LIST (PAGE 4-10)".)

Fuel tank breather part No.: 22U-60-21520

1. Remove nut (2) of breather assembly (1) at the top surface of the fuel tank, then remove cover (3).
2. Replace breather element (4) with a new part.
3. Install cover (3) and nut (2).

Tightening torque: 10 to 14 Nm (1.0 to 1.4 kgm , 7.2 to 10.1 lbft)



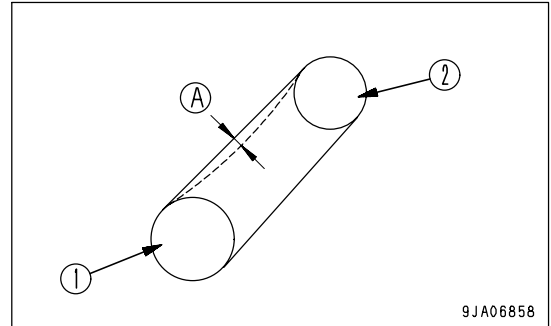
CHECK, ADJUST AIR CONDITIONER

(Machine equipped with cab)

CHECKING TENSION OF COMPRESSOR BELT

If the driving belt slackens, it is likely to slip, lowering the cooling efficiency. Depress the mid point between drive pulley (1) and compressor pulley (2) with a thumb (approx. 98 N (10 kg)) every now and then to make sure that deflection amount (A) is approx. 15 mm to 18 mm (0.59 to 0.71 in).

When it is a new belt, elongation is expected in the initial period of use, so be sure to make an adjustment in a few days after the replacement.



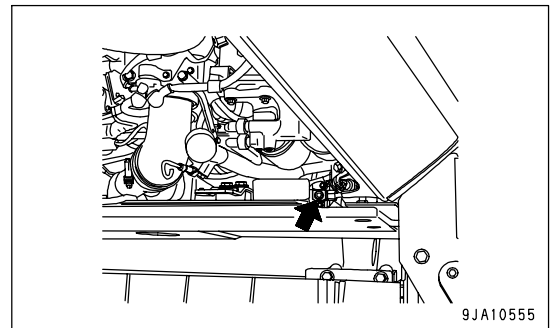
CHECK LEVEL OF REFRIGERANT

! WARNING

- Be sure to handle the refrigerant (gas) according to the local regulations.
- If the refrigerant used in the air conditioner gets into your eyes or on your hands, it may cause loss of sight or frostbite. Do not touch the refrigerant. Never loosen any part of the refrigerant circuit.
- Do not bring any flame close to any point where the refrigerant gas is leaking.

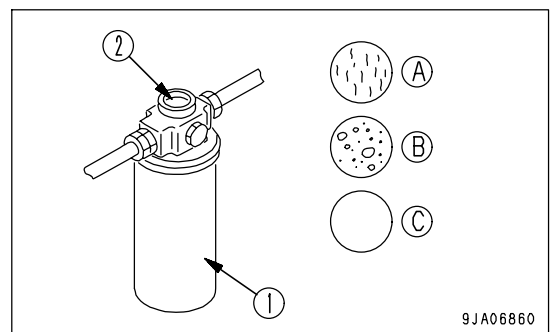
If the level of the refrigerant (gas) is low, the cooling effect will be reduced. Run the engine at high idle, and check the flow of the refrigerant gas (R134a) in the refrigerant circuit through the sight glass (2) (inspection window) of the receiver (1) when the cooler is running at high speed.

- (A) Correct: No bubbles are included in the flow
- (B) Low: Bubbles are included in the flow (bubbles pass continuously)
- (C) None: Colorless, transparent



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 R134a is used as the refrigerant.



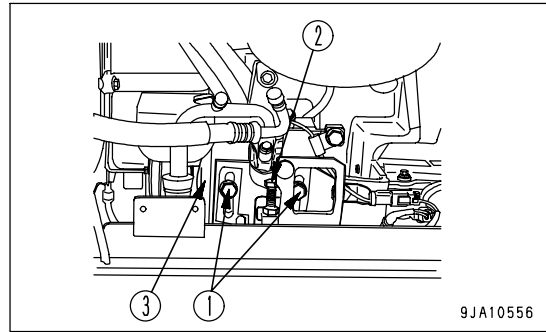
OPERATING AIR CONDITIONER OFF-SEASON

Even during the off-season, operate the air conditioner for 3 to 5 minutes once a month to maintain the oil film at all parts of the compressor.

REPLACE AIR CONDITIONER BELT

1. Loosen 2 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 the bar. Use jack bolt (2).
3. Tighten jack bolt (2) and bolt (1) to apply tension to the V-belt. The deflection of the bolt should be approx. 10 mm (0.4 in) when the belt is pressed at the midpoint between the air compressor pulley and fan pulley with a finger force of approx. 6 kg (58.8 N).

When the belt is a new part, it will stretch at first, so adjust the belt tension again without fail after 2 or 3 days.



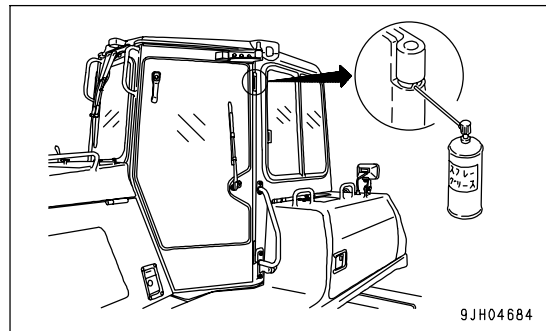
9JA10556

GREASE DOOR HINGE

(Machine 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.

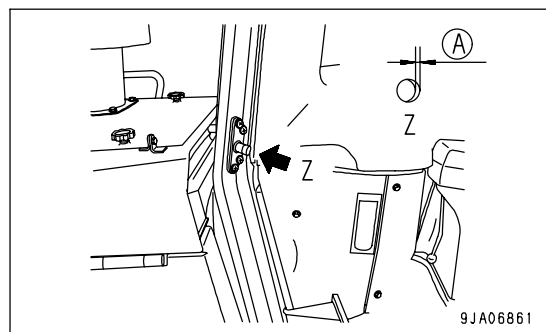


9JH04684

CHECK DOOR LOCK STRIKER

(Machine equipped with cab)

If wear (A) of the door of lock striker exceeds 0.5 mm (0.02 in), replace the striker. If it is used as it is, the play will increase and this may result in breakage of the hinge or door lock.



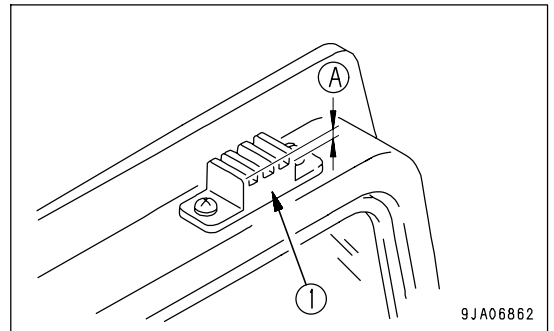
9JA06861

REPLACE DOOR DAMPER

(Machine equipped with cab)

If depth (A) of the groove of door damper rubber (1) is less than 2 mm (0.08 in), replace the damper.

There are 4 dampers: 1 each at the top and bottom on the left and right doors.



9JA06862

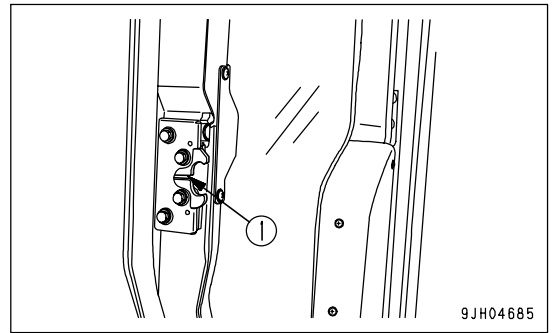
CHECK DOOR LATCH

(Machine equipped with cab)

Hold the door open 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.



9JH04685

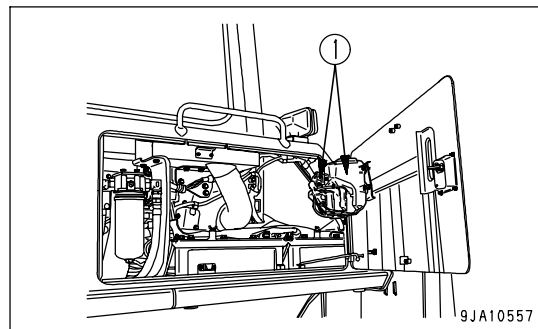
CHECK WINDOW WASHER FLUID LEVEL, ADD FLUID

(Machine equipped with cab)

Perform this check when the window washer fluid does not come out.

Open the battery cover at the rear of the machine and check the level of the fluid in window washer tank (1). If it is low, add automobile window washer fluid.

When adding fluid, be careful not to let any dust get in.



PROPORTION FOR MIXING FLUID WITH WATER

The proportion differs according to the ambient temperature, so dilute the washer fluid with water to the following proportions before adding.

Area, season	Proportions	Freezing temperature
Normal	Washer fluid 1/3: water 2/3	-10°C (14°F)
Winter in cold area	Washer fluid 1/2 : water 1/2	-20°C (-4°F)
Winter in extremely cold area	Pure washer fluid	-30°C (-22°F)

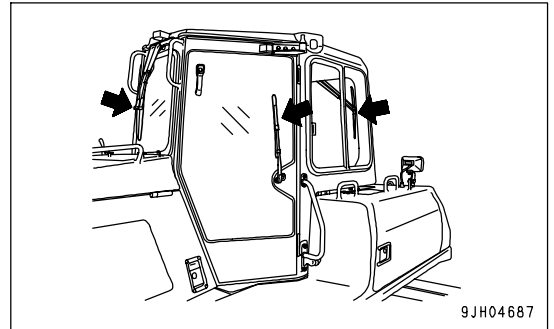
There are two types depending on the freezing temperature:

-10°C (14°F) (general use) and -30°C (-22°F) (cold area use), select according to the area and season.

REPLACE WIPER BLADE

(Machine equipped with cab)

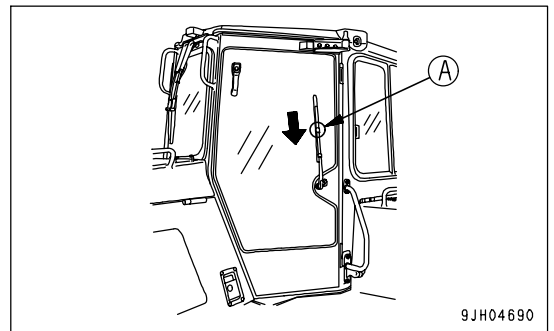
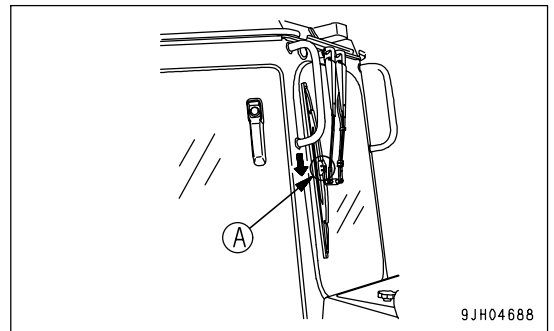
If the blade is damaged, it will not wipe the window clean, so replace the blade.



REPLACEMENT

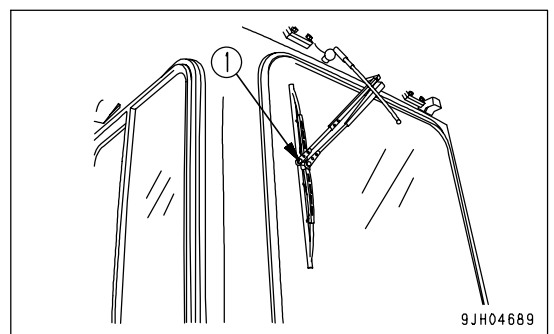
FRONT, DOOR WIPER

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.



REAR WIPER

1. Remove E-ring (1).
The blade can then be removed.
2. Install a new blade, then install securely with E-ring (1).



CHECK IDLER OIL LEVEL



WARNING

If the oil level in the idler is low, new oil must be added, and the machine body must be inclined in this case. Since this work is dangerous, ask your Komatsu distributor.

If the oil level in the idler is low, noise will be generated and there will be seizure, so check the oil level and add oil as follows.

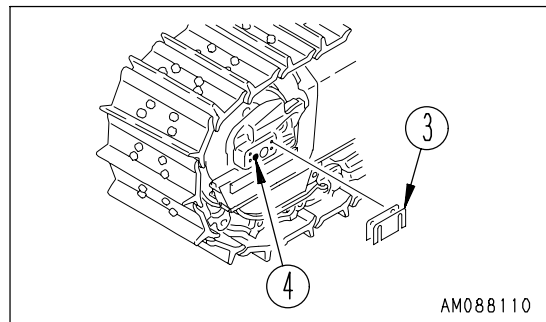
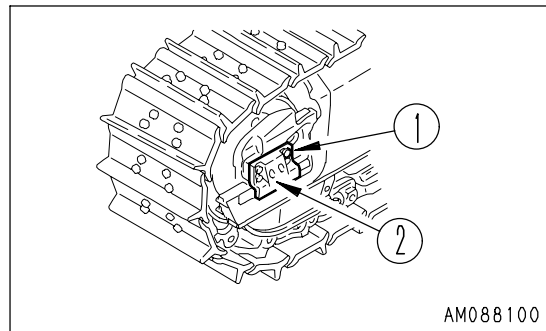
INSPECTION

1. Remove bolt (1), then remove guide plate (2) and shim (3).

REMARK

When removing shim (3) keep it in a safe place and be careful not to lose it.

2. Loosen plug (4) slowly. If oil oozes through the threads at this time, the quantity of oil is sufficient. Tighten plug (4).
3. If any oil does not flow out when plug (4) is removed, the quantity of oil is insufficient. In this case, ask your Komatsu distributor for repair.
4. Install guide plate (2) and shim (3) with bolt (1).



REMARK

When installing guide plate (2), install the same number and thickness of shim (3) as removed in Step 1.

The optimum clearance may be obtained, if the adjustment is made at the same time. For details of adjusting the shim thickness, see "ADJUST IDLER CLEARANCE (PAGE 4-42)".

ADJUST IDLER CLEARANCE

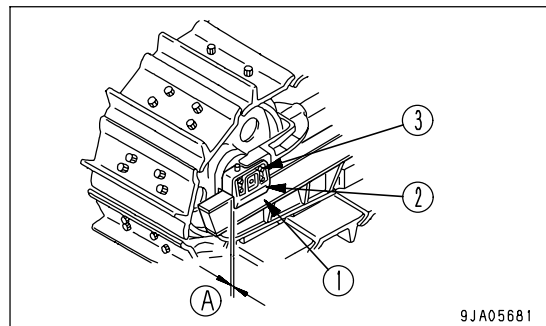
Since the idlers are forced to move forward and backward by an external force guide plates will be worn out.

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. Travel for 1 or 2 meters on flat ground, then measure clearance (A) between track frame (1) and guide plate (2) (4 places: left, right, inside, outside).
2. If the clearance (A) exceeds 4.0 mm (0.16 in), loosen bolt (3), and pull out the shim to adjust the clearance at one end to 0.5 to 1.0 mm (0.02 to 0.04 in).
Thickness of one shim is 1.0 mm (0.04 in).



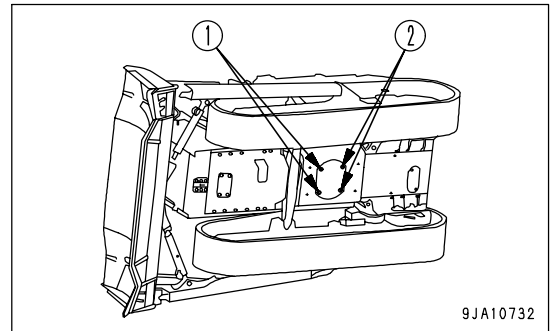
LUBRICATING UNIVERSAL JOINT

! WARNING

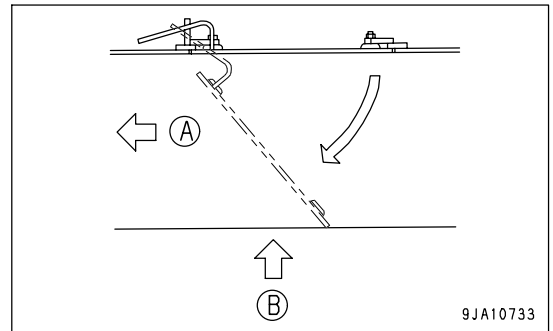
The undercover is heavy. Never try to open or close the cover when directly beneath it. When removing bolts(2), carry out the work from the rear of the cover so that you can easily get out of the way.

1. Remove the undercover from the rear bottom of the machine body as follows.

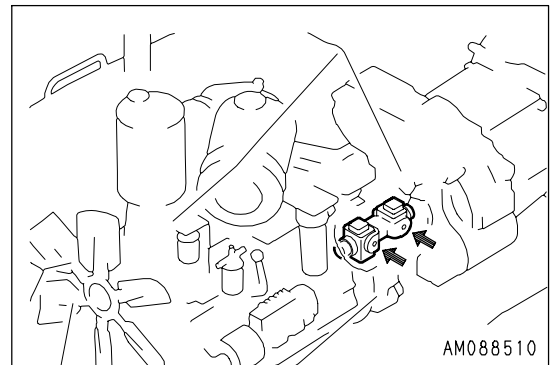
- 1) Remove two bolts (1) from the front side of the machine body.
- 2) Holding the cover, remove two bolts (2) from the rear side of the machine body.



- 3) Lower and open the cover gradually.
 - (A) Front of machine
 - (B) Dangerous place



2. Apply grease to the grease fittings (2 places) shown by arrows.



PROCEDURE FOR BLEEDING AIR IN HYDRAULIC SYSTEM

See "STARTING ENGINE (PAGE 3-111)".

Since the engine must be started and the blade must be operated, see OPERATION.

NOTICE

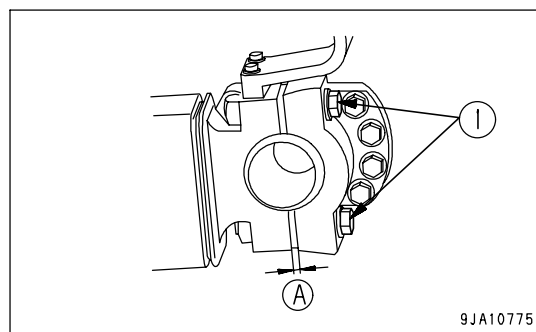
If the engine is run at high speed immediately after startup or a cylinder is pushed up to its stroke end, air taken inside the cylinder may cause damage to the piston packing.

- 1) Run the engine at low idle, and extend and retract each cylinder 4 to 5 times, taking care that a cylinder is not moved to the end of its stroke. (Stop the cylinder approx. 100 mm (3.9 in) short of its stroke end)
- 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.

INSTALLATION OF TRUNNION CAP

1. Lower the work equipment to the ground.
2. After setting the work equipment lock lever to the LOCK position and stop the engine.
3. Install the shims. (Top, bottom: 2 places)
Standard number of shims: Thickness 1mm x 10
4. Tighten bolts (1) in turn until they reach the specified torque.

Thread diameter of bolt to tighten	
24 (Shim part No.: 14Y-71-22280)	Straight tilt dozer Straight tilt power pitch dozer Sigma dozer Sigma power pitch dozer Angle dozer
27 (Shim part No.: 14X-71-51460)	Power angle power tilt dozer



ADJUSTING SHIMS, ADJUSTING TENSION AT WORK EQUIPMENT LINKS

- When assembling the work equipment, carry out adjustment as follows.
- Check the play of the links periodically and carry out adjustment.
- When disassembling the machine for transportation, be careful not to lose the shims.

NEED FOR ADJUSTING WORK EQUIPMENT LINKS



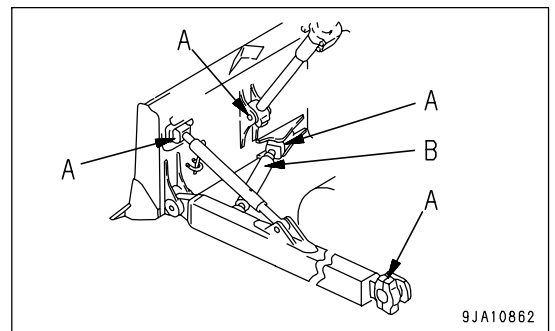
If the clearances at each ball joint of the work equipment and the tension of the center brace are not adjusted properly, it will lead to problems.

It is necessary to carry out adjustment properly regardless of whether the machine is new and regardless of the number of years that it has been used.

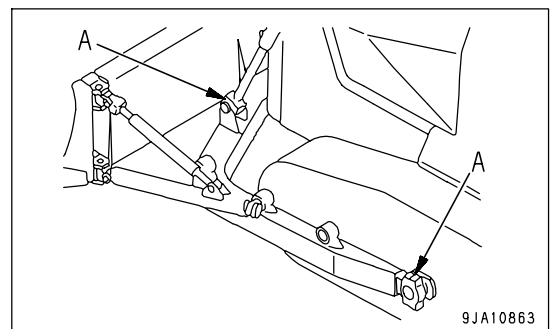
Problems that occur when adjustment is not correct

Location	Condition	Problems that appear
Ball joint portion (portion A in diagram below)	Excessive play	<ul style="list-style-type: none"> • Work equipment play becomes excessive and performance deteriorates • Sand or dust enters through gap and causes wear • Impact load at joints increases and durability is reduced
	No play	<ul style="list-style-type: none"> • Ball cannot rotate, excessive bending stress is generated, and cracks or damage occur
Center brace (portion B in diagram below)	Insufficient tension	<ul style="list-style-type: none"> • Work equipment play becomes excessive and performance deteriorates • Sand or dust enters bushing at blade connection and causes wear • Shaking to side increases, lift cylinder hose contacts bodywork and frame contacts track
	Excessive tension	<ul style="list-style-type: none"> • Excessive bending tension is generated, and cracks or damage occur

- Straight tilt dozer
- Straight tilt power pitch dozer
- Sigma dozer
- Sigma power pitch dozer



- Angledozer
(There is no portion B on the angledozer)

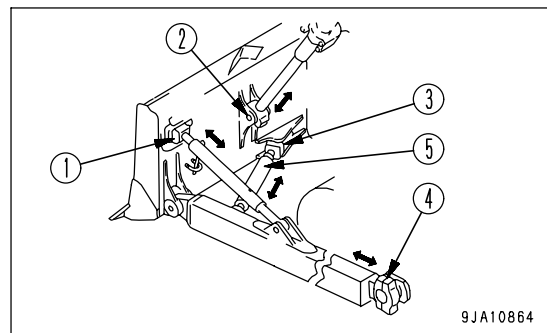


LOCATIONS FOR ADJUSTMENT AND NEED FOR ADJUSTMENT

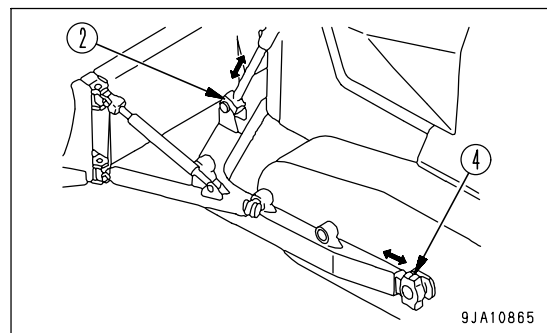
**WARNING**

It is dangerous if the work equipment moves by mistake when it is being adjusted. Move the machine to a horizontal place, stop the machine, and set the work equipment in a stable condition. Then stop the engine and set the work equipment lock lever securely to the LOCK position.

- Straight tilt dozer
- Straight tilt power pitch dozer
- Sigma dozer
- Sigma power pitch dozer



- Angledozer



1. Adjust the play of each link ball joint at positions (1) to (4).

- (1) Tilt brace, tilt cylinder head, pitch cylinder head
- (2) Lift cylinder head
- (3) Center brace
- (4) Trunnion

2. Adjust the tension of center brace (5).

REMARK

For details of the procedure for adjusting each location, see the following items.

"ADJUSTING SHIMS AT TILT BRACE, TILT CYLINDER HEAD, PITCH CYLINDER HEAD (PAGE 4-47)"

"ADJUSTING SHIMS AT LIFT CYLINDER HEAD (PAGE 4-48)"

"ADJUSTING SHIMS AT CENTER BRACE (PAGE 4-49)"

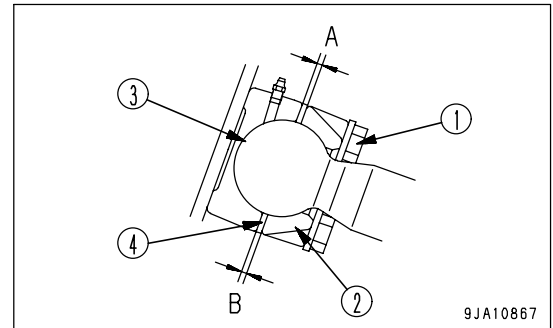
"ADJUSTING SHIMS AT TRUNNION (PAGE 4-50)"

"ADJUSTING TENSION OF CENTER BRACE (PAGE 4-51)"

METHOD OF ADJUSTING EACH LOCATION

ADJUSTING SHIMS AT TILT BRACE, TILT CYLINDER HEAD, PITCH CYLINDER HEAD

- Correct value for play at ball joint: 0.2 - 0.7 mm
- Standard shim thickness: 5 mm

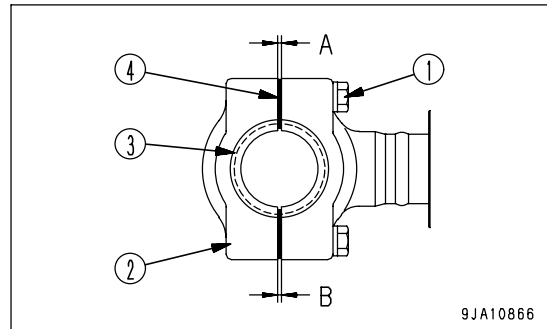


Use the following procedure to adjust the play at the ball joint to the correct value.

1. Remove bolts (1), then remove cap (2).
2. Wipe off the grease and dirt from the sliding surface of ball (3).
3. Remove all shims (4).
4. Install cap (2) and tighten bolts (1) temporarily.
Temporary tightening torque: 19 .6 to 29.4 Nm (2 to 3 kgm, 14.5 to 21.7 lbft)
5. Measure clearance at portion A (top) and portion B (bottom) of ball joint, and calculate average clearance C [C = (A+B)/2].
Set so that the shim thickness is (C + 0.2) - (C + 0.7) mm.
The shim thickness can be set in units of 0.5 mm.
6. Remove bolts (1), then remove cap (2).
7. Install the thickness of shim measured in Step 5, then tighten cap (2) fully with bolts (1).
Tightening torque: 455 to 565 Nm (46.5 to 58 kgm, 336.3 to 419.5 lbft)
8. Before filling with grease, operate the work equipment and check that there is no abnormal noise or abnormal play.
9. Pump in grease through the grease fitting of the ball joint.
10. After greasing, wipe off any old grease that was pushed out.

ADJUSTING SHIMS AT LIFT CYLINDER HEAD

- Correct value for play at ball joint: 0.2 - 0.7 mm
- Standard shim thickness: 4 mm

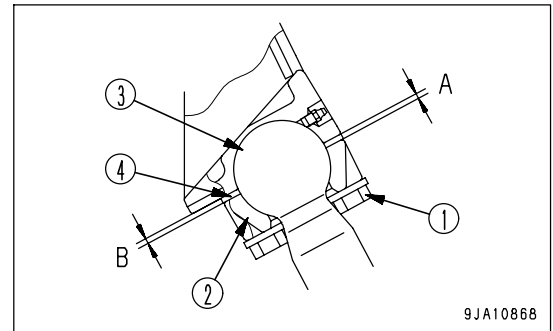


Use the following procedure to adjust the play at the ball joint to the correct value.

1. Remove bolts (1), then remove cap (2).
2. Wipe off the grease and dirt from the sliding surface of ball (3).
3. Remove all shims (4).
4. Install cap (2) and tighten bolts (1) temporarily.
Temporary tightening torque: 19.6 to 29.4 Nm (2 to 3 kgm, 14.5 to 21.7 lbft)
5. Measure clearance at portion A (top) and portion B (bottom) of ball joint, and calculate average clearance C [$C = (A+B)/2$].
Set so that the shim thickness is $(C + 0.2) - (C + 0.7)$ mm.
The shim thickness can be set in units of 0.5 mm.
6. Remove bolts (1), then remove cap (2).
7. Install the thickness of shim measured in Step 5, then tighten cap (2) fully with bolts (1).
Tightening torque: 235 to 285 Nm (23.5 to 29.5 kgm, 170.0 to 213.4 lbft)
8. Before filling with grease, operate the work equipment and check that there is no abnormal noise or abnormal play.
9. Pump in grease through the grease fitting of the ball joint.
10. After greasing, wipe off any old grease that was pushed out.

ADJUSTING SHIMS AT CENTER BRACE

- Correct value for play at ball joint: 0.2 - 0.7 mm
- Standard shim thickness: 5 mm

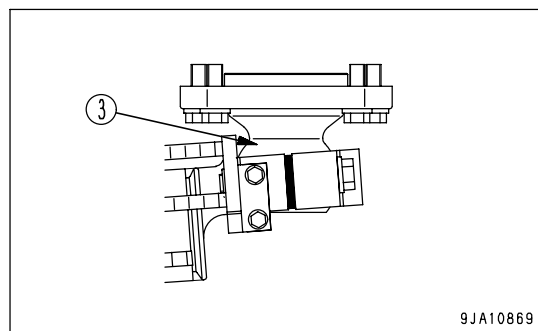
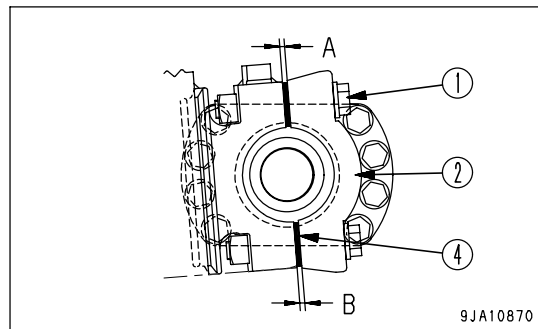


Use the following procedure to adjust the play at the ball joint to the correct value.

1. Remove bolts (1), then remove cap (2).
2. Wipe off the grease and dirt from the sliding surface of ball (3).
3. Remove all shims (4).
4. Install cap (2) and tighten bolts (1) temporarily.
Temporary tightening torque: 19.6 to 29.4 Nm (2 to 3 kgm, 14.5 to 21.7 lbft)
5. Measure clearance at portion A (top) and portion B (bottom) of ball joint, and calculate average clearance C [$C = (A+B)/2$].
Set so that the shim thickness is (C + 0.2) - (C + 0.7) mm.
The shim thickness can be set in units of 0.5 mm.
6. Remove bolts (1), then remove cap (2).
7. Install the thickness of shim measured in Step 5, then tighten cap (2) fully with bolts (1).
Tightening torque: 455 to 565 Nm (46.5 to 58 kgm, 336.3 to 419.5 lbft)
8. Before filling with grease, operate the work equipment and check that there is no abnormal noise or abnormal play.
9. Pump in grease through the grease fitting of the ball joint.
10. After greasing, wipe off any old grease that was pushed out.

ADJUSTING SHIMS AT TRUNNION

- Correct value for play at ball joint: 0.2 - 1.2 mm
- Standard shim thickness: 10 mm



Use the following procedure to adjust the play at the ball joint to the correct value.

1. Remove bolts (1), then remove cap (2).
2. Wipe off the grease and dirt from the sliding surface of ball (3).
3. Remove all shims (4).
4. Install cap (2) and tighten bolts (1) temporarily.
Temporary tightening torque: 39.2 to 49 Nm (4 to 5 kgm, 28.9 to 36.2 lbft)
5. Measure clearance at portion A (top) and portion B (bottom) of ball joint, and calculate average clearance C
[C = (A+B)/2].
Set so that the shim thickness is (C + 0.2) - (C + 1.2) mm.
The shim thickness can be set in units of 1 mm.
6. Remove bolts (1), then remove cap (2).
7. Install the thickness of shim measured in Step 5, then tighten cap (2) fully with bolts (1).
Tighten bolts (1) in turn at the top and bottom to reach the specified torque.

Tightening torque	
785 to 980 Nm (80 to 100 kgm, 578.6 to 723.3 lbft)	Straight tilt dozer Straight tilt power pitch dozer Sigma dozer Sigma power pitch dozer Angle dozer
1,150 to 1,440 Nm (118 to 147 kgm, 853.5 to 1,063.3 lbft)	Power angle power tilt dozer

8. Operate the work equipment and check that there is no abnormal noise or abnormal play.

ADJUSTING TENSION OF CENTER BRACE

(Straight tilt dozer)

(Straight tilt power pitch dozer)

(Sigma dozer)

(Sigma power pitch dozer)

In case the work equipment assembly is disassembled for transportation and reassembled at a worksite, tension of the center brace has to be adjusted anew. Otherwise the bushing at the connecting part of blade and straight frame will likely slip off, allowing sand and dirt to enter the bushing, which eventually leads to premature wear or damage of the bushing. Make this adjustment as follows:

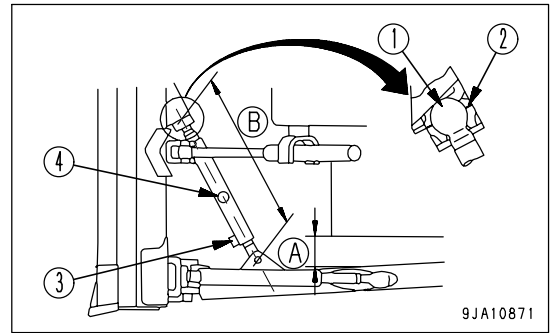
WARNING

Except when operating the blade in Step 4, always lock the blade control lever securely with the work equipment lock lever.

1. Adjust with shim (2) so that the play of ball joint (1) is 0.2 to 0.7 mm (0.008 to 0.028 in).

For details of the method of adjusting, see "ADJUSTING SHIMS AT CENTER BRACE (PAGE 4-49)".

2. Loosen bolt (3).
3. Install the blade assembly.
4. Operate the blade control lever to float the blade.



5. Insert the bar in center brace hole (4) and turn the bar to the protruding side. At that time, adjust clearance between the track shoe and frame (A) so that it is equal on the right and left sides.

Rotating torque: 24.5 to 49 Nm (2.5 to 5 kgm, 18.1 to 36.2 lbft) (Blade at FLOAT)

Standard distance between the joints (B) is as shown below.

D65EX: 995mm (39.2 in) (Straight tilt dozer), (Straight tilt power pitch dozer)

991mm (39.0 in) (Sigma dozer), (Sigma power pitch dozer)

D65PX: 992mm (39.1 in) (Straight tilt dozer), (Straight tilt power pitch dozer)

D65WX: 992mm (39.1 in) (Sigma dozer), (Sigma power pitch dozer)

6. Tighten bolt (3).

Tightening torque: 490.3 to 608 Nm (50 to 62 kgm, 361.7 to 448.4 lbft)

CHECK BEFORE STARTING

For details of the following items, see "CHECK BEFORE STARTING (PAGE 3-92)" in the OPERATION section.

- Checking with machine monitor
- Check oil level in engine oil pan, add oil
- Check dust indicator
- Check, drain water separator
- Check coolant level, add coolant
- Check oil level in power train case, add oil
- Check electric wiring
- Check brake pedal travel
- Check oil level in hydraulic tank, add oil
- Check fuel level, add fuel
- Check horn sound
- Check that lamps light up
- Check backup alarm sound

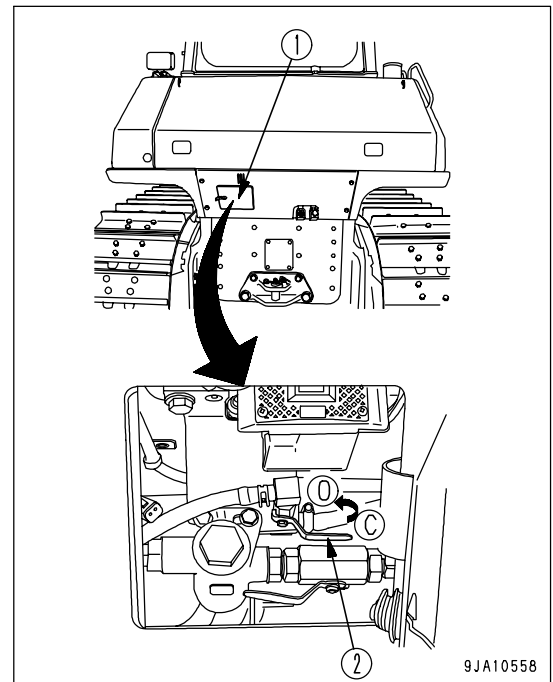
EVERY 50 HOURS SERVICE

DRAIN WATER, SEDIMENT FROM FUEL TANK

Carry out this procedure before operating the machine.

- Prepare a container to catch the fuel that is drained.

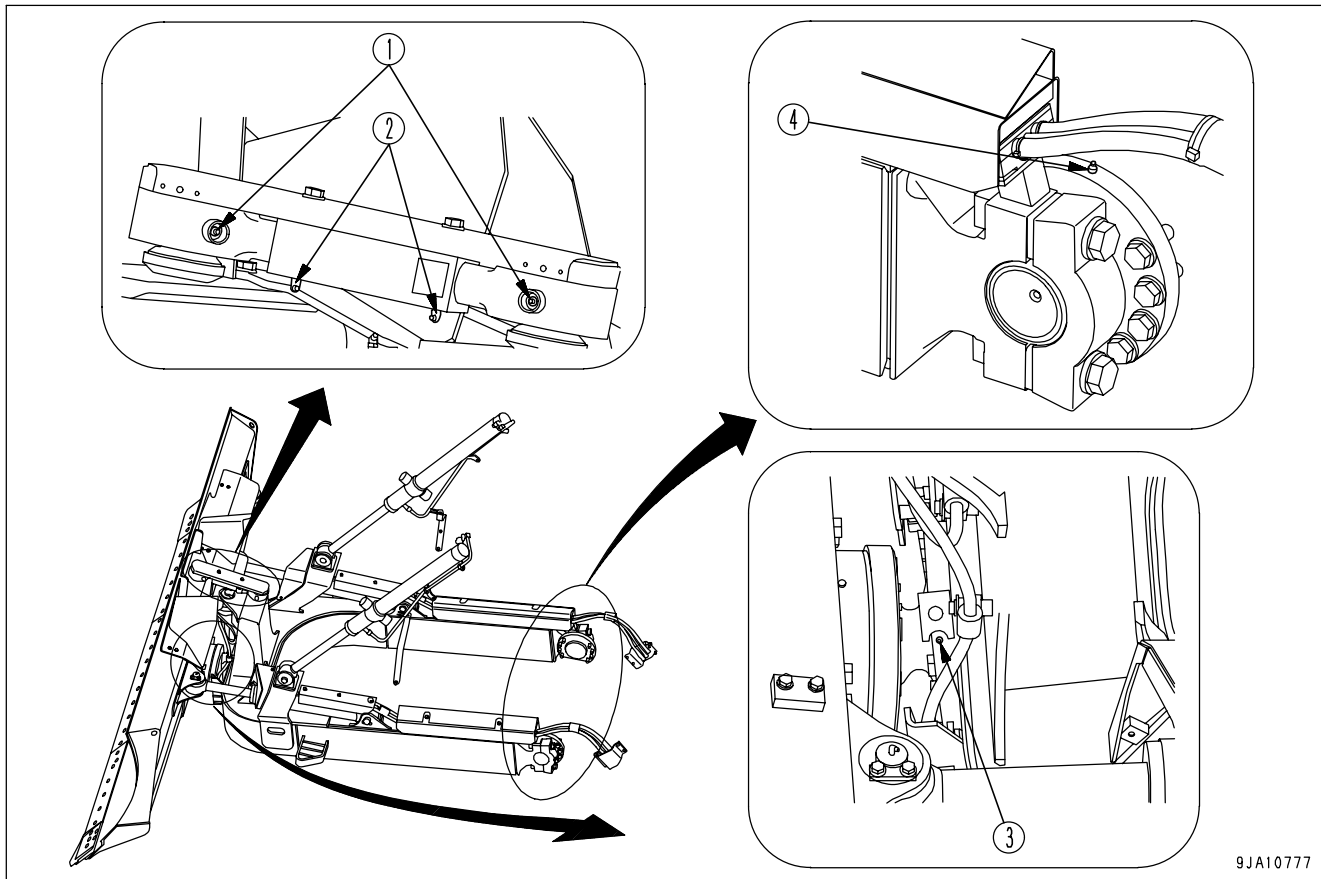
1. Open cover (1).
2. Turn drain valve (2) at the bottom of the tank to OPEN position (O) and drain the sediment and water that has accumulated at the tank bottom together with fuel.
When doing this, be careful not to get fuel on yourself.
3. When clean fuel comes out, turn drain valve (2) to CLOSE position (C).



LUBRICATING

1. Lower the blade to the ground, then stop the engine.
2. Only when lubricating the lift cylinder support shaft, lower the blade to raise the idler 1 to 2 cm from the ground, then stop the engine.
3. Using a grease pump, pump in grease through the grease fittings shown by arrows.
4. After greasing, wipe off any old grease that was pushed out.

POWER ANGLE POWER TILT DOZER



9JA10777

- (1) Pitch rod pin (2 places)
- (2) Turnbuckle screw (2 places)

- (3) Center ball (1 place)
- (4) U-frame trunnion (2 places)

EVERY 250 HOURS SERVICE

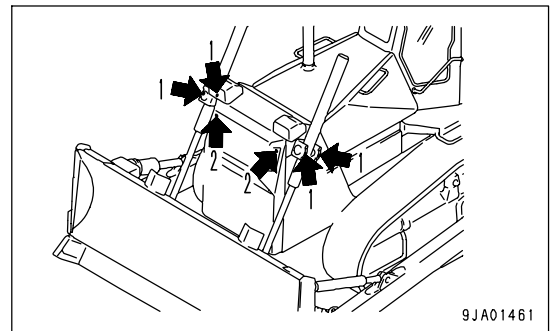
Maintenance for every 50 hours service should be carried out at the same time.

LUBRICATING

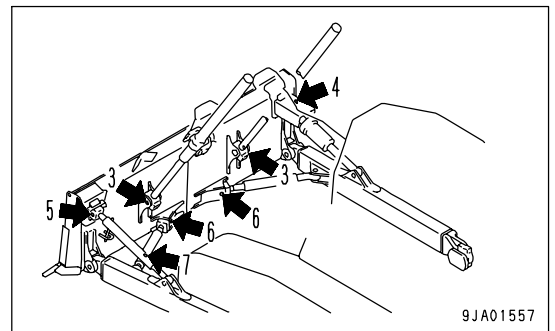
1. Lower the blade to the ground, then stop the engine.
2. Only when lubricating the lift cylinder support shaft, lower the blade to raise the idler 1 to 2 cm from the ground, then stop the engine.
3. Using a grease pump, pump in grease through the grease fittings shown by arrows.
4. After greasing, wipe off any old grease that was pushed out.

STRAIGHT TILT DOZER, SIGMA DOZER

- (1) Lift cylinder support yoke (4 places)
- (2) Lift cylinder support shaft (2 places)

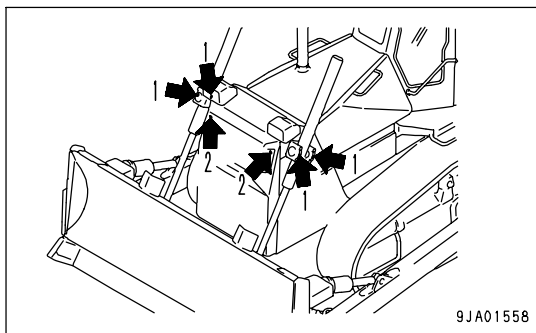


- (3) Lift cylinder ball joint (2 places)
- (4) Tilt cylinder ball joint (1 place)
- (5) Tilt brace ball joint (1 place)
- (6) Brace ball joint (2 places)
- (7) Tilt brace thread (1 place) (screw-adjustable)

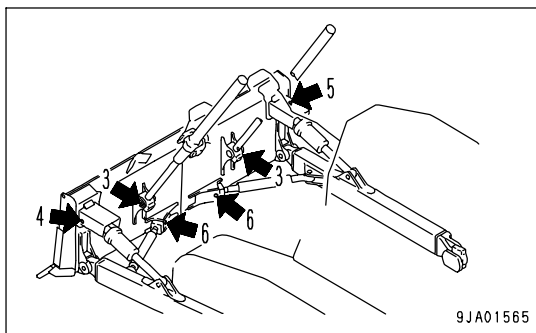


STRAIGHT TILT POWER PITCH DOZER, SIGMA POWER PITCH DOZER

- (1) Lift cylinder support yoke (4 places)
- (2) Lift cylinder support shaft (2 places)

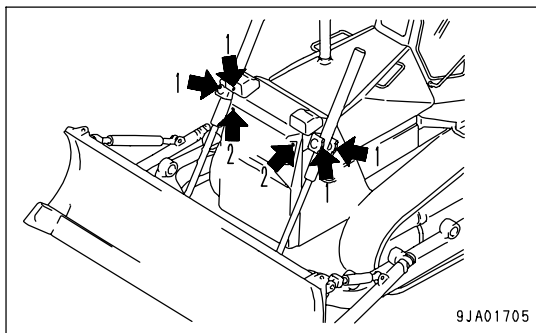


- (3) Lift cylinder ball joint (2 places)
- (4) Tilt cylinder ball joint (1 place)
- (5) Pitch cylinder ball joint (1 place)
- (6) Brace ball joint (2 places)

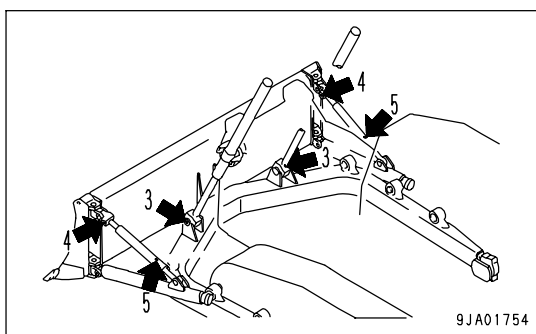


ANGLE DOZER

- (1) Lift cylinder support yoke (4 places)
- (2) Lift cylinder support shaft (2 places)

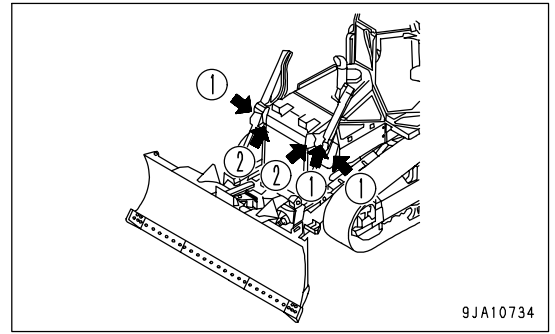


- (3) Lift cylinder ball joint (2 places)
- (4) Tilt brace ball joint (2 places)
- (5) Tilt brace thread (2 places)

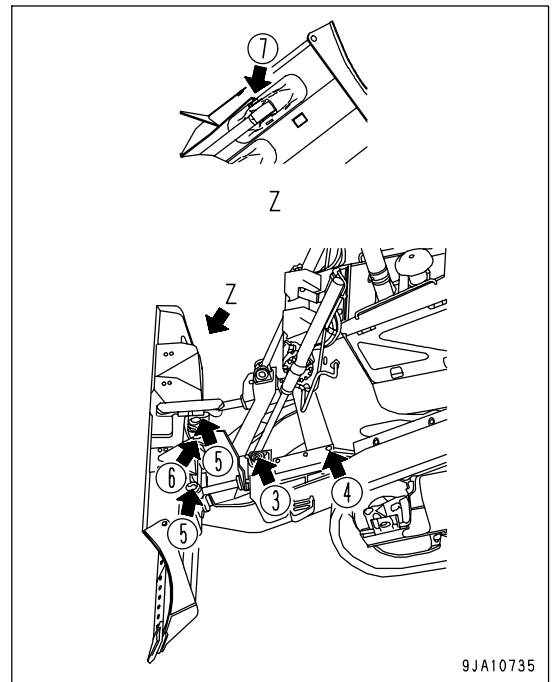


POWER ANGLE POWER TILT DOZER

- (1) Lift cylinder support yoke (4 places)
- (2) Lift cylinder support shaft (2 places)



- (3) Lift cylinder head pin (2 places)
- (4) Angle cylinder bottom pin (2 place)
- (5) Angle cylinder head pin (2 place)
- (6) Tilt cylinder bottom pin (1 places)
- (7) Tilt cylinder head pin (1 place)



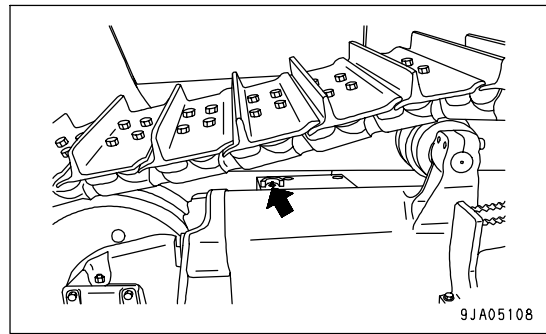
GREASE EQUALIZER BAR SIDE PIN

Left and right, 1 place each

1. Remove all dirt from the top of the track frame and cover.
2. Clean the grease fitting indicated with the arrow, then supply grease to that fitting with a grease pump.

REMARK

- Supply 3 shots of grease (Operate the grease pump lever 3 times) to each grease fitting, and check that grease is newly discharged through the seal lip.
- If grease is not newly discharged through the lip, continue supplying grease until it is discharged.
- If the blade is lowered to raise the idler 1 to 2 cm from the ground in order when carrying out lubrication, the grease will fill the whole circumference of the pin.

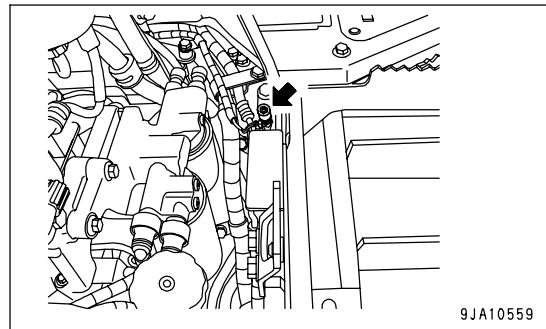
**GREASE EQUALIZER BAR CENTER PIN**

(1 place)

1. Open the engine side cover on the left side of the chassis.
2. Clean the grease fitting indicated with the arrow, then supply grease to that fitting with a grease pump.

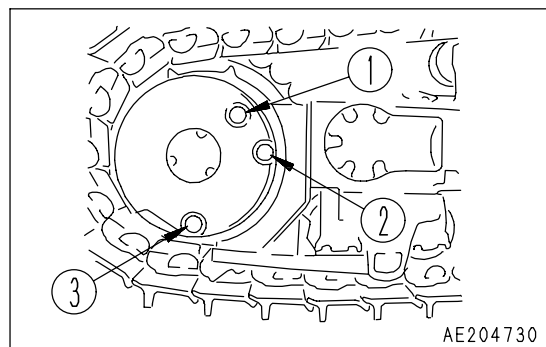
REMARK

If the blade is lowered to raise the idler 1 to 2 cm from the ground in order when carrying out lubrication, the grease will fill the whole circumference of the pin.

**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.
- If there is still pressure remaining inside the case, the oil or plug may fly out. Loosen the plug slowly to release the pressure.

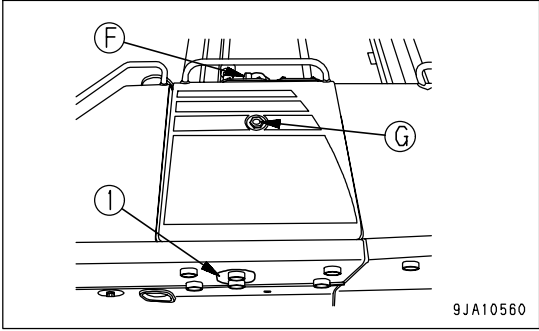
1. Stop the machine so that drain plug (3) is directly at the bottom.
2. Remove oil level plug (2) and check whether the final drive case is filled with oil to lower edge of the plug hole.
3. If the oil level is too low, add oil through the oil filler plug hole(1).
4. When oil starts to overflow from oil level plug (2), stop filling and install oil level plug (2) and oil filler plug (1).



CHECK OIL LEVEL IN HYDRAULIC TANK, ADD OIL

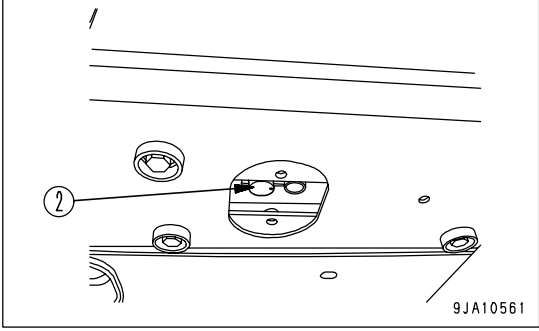
⚠ WARNING

- 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 cover (1), loosen drain plug (2), and drain the excess oil.



NOTICE

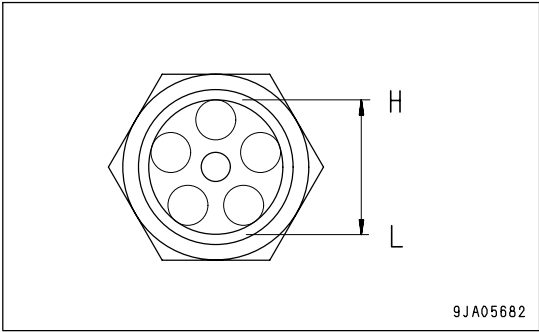
- Check the oil level when the oil is at low temperature. If the oil is at high temperature, the oil level will be higher.
- Do not add oil if the oil level is above the H line. This may damage the oil circuit and cause the oil to spurt out.



1. Lower blade to the ground and stop the engine. Wait for 5 minutes before checking oil level. Oil level should be between the H and L in sight gauge (G).
2. If the oil level is below the L line, add oil through oil filler (F) at the top of the hydraulic tank.

REMARK

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



CHECK LEVEL OF BATTERY ELECTROLYTE

Carry out this procedure before operating the machine.



WARNING

- Do not use the battery if the battery electrolyte level is below the LOWER LEVEL line. This will accelerate deterioration of the inside of the battery and reduce the service life of the battery. In addition, it may cause an explosion.
- The battery generates flammable gas and there is danger of explosion, do not bring fire or sparks near the battery.
- Battery electrolyte is dangerous. If it gets in your eyes or on your skin, wash it off with a large amount of water and consult a doctor.
- When adding distilled water to the battery, do not allow the battery electrolyte to go above the UPPER LEVEL line. If the electrolyte level is too high, it may leak and cause damage to the paint surface or corrode other parts.

NOTICE

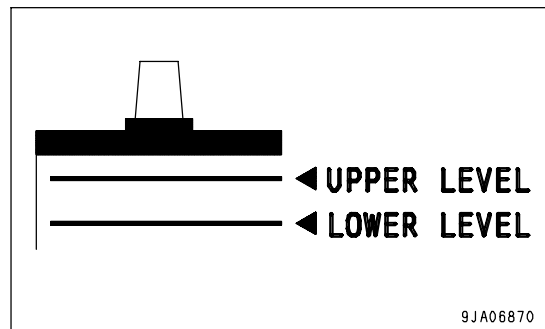
If there is a fear that the battery water may freeze after refilling with purified water (e.g. commercially available replenishment water for a battery), do the replenishment before the day's work on the next day.

Inspect the battery electrolyte level at least once a month and follow the basic safety procedures given below.

WHEN CHECKING ELECTROLYTE LEVEL FROM SIDE OF BATTERY

If it is possible to check the electrolyte level from the side of the battery, check as follows.

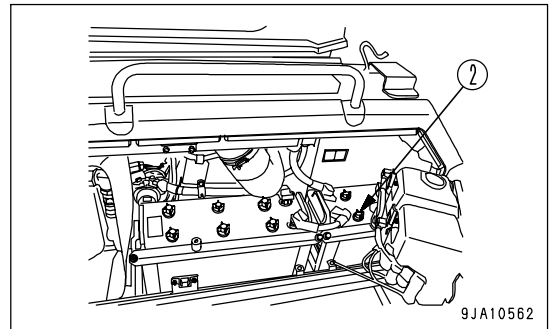
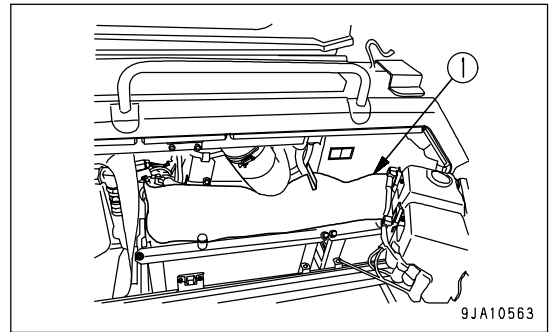
1. Open the battery cover on the left side of the machine body.
2. Use a wet cloth to clean the area around the electrolyte level lines and check that the electrolyte level is between the UPPER LEVEL (U.L.) and LOWER LEVEL (L.L.) lines.
If the battery is wiped with a dry cloth, static electricity may cause a fire or explosion.



3. If the electrolyte level is below the midway point between the U.L and L.L lines, remove vinyl sheet (1) on the battery, remove cap (2), and add distilled water (example: commercially available battery refill) to the U.L line.
4. After adding distilled water, tighten cap (2) securely.

REMARK

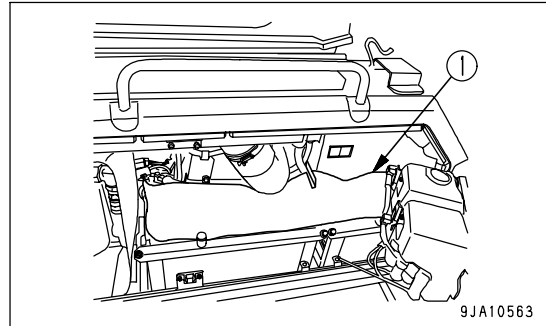
If distilled water is added to above the U.L. line, use a syringe to lower the level to the U.L. line. Neutralize the removed fluid with baking soda (sodium bicarbonate), then flush it away with a large amount of water or consult your Komatsu distributor or battery maker.



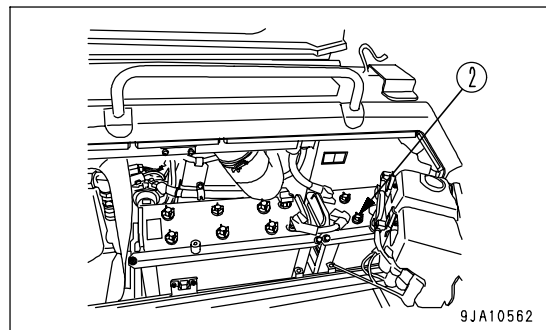
WHEN IT IS IMPOSSIBLE TO CHECK ELECTROLYTE LEVEL FROM SIDE OF BATTERY

If it is impossible to check the electrolyte level from the side of the battery, or there is no display of the UPPER LEVEL line on the side of the battery, check as follows.

1. Open the battery cover on the left side of the machine body.
2. Remove vinyl sheet (1) installed on the top of the battery.



3. Remove cap (2) at the top of the battery, look through water filler port (3), and check the electrolyte surface. If the electrolyte dose not reach the sleeve (4), add distilled water (example: commercially available battery refill) so that the level reaches the bottom of sleeve (4) (Max. level: UPPER LEVEL).

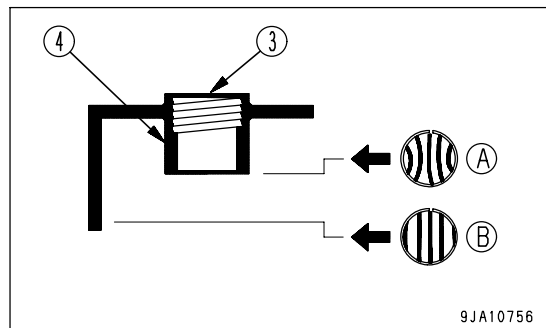


- (A) Suitable level: Electrolyte level is up to bottom of sleeve, so surface tension causes electrolyte surface to bulge and poles appear bent.
- (B) Low: Electrolyte level is not up to bottom of sleeve, so poles appear straight and not bent.

4. After adding distilled water, tighten cap (2) securely.

REMARK

If water is added to above the bottom tip of the sleeve, use a pipette to remove electrolyte. Neutralize the removed electrolyte with sodium bicarbonate, then flush it away with a large amount of water. If necessary, contact your Komatsu distributor or your battery maker.

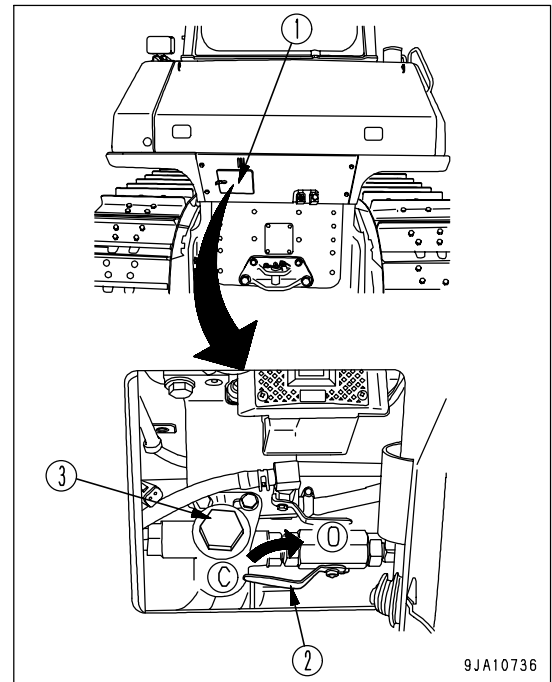


WHEN IT IS POSSIBLE TO USE INDICATOR TO CHECK ELECTROLYTE LEVEL

If it is possible to use an indicator to check the electrolyte level, follow the instructions given.

CHECK, CLEAN ADDITIONAL FUEL STRAINER

1. Open cover (1).
2. Turn fuel supply valve (2) to CLOSE position (C), then remove strainer cap (3).
The strainer forms one unit with the strainer cap.
3. Remove any dirt stuck to the strainer, then wash in clean diesel fuel or flushing oil. If the strainer is damaged, replace it.
4. After checking and cleaning, install the strainer, then tighten cap (3).
5. After installing, turn fuel supply valve (2) to OPEN position (O).



CHECK BRAKE PERFORMANCE

**WARNING**

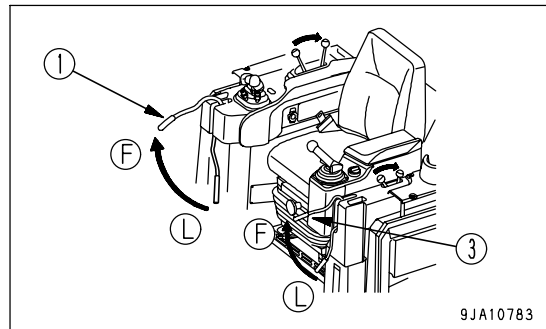
If the machine moves during the following operation, please contact your Komatsu distributor for repairs immediately.

NOTICE

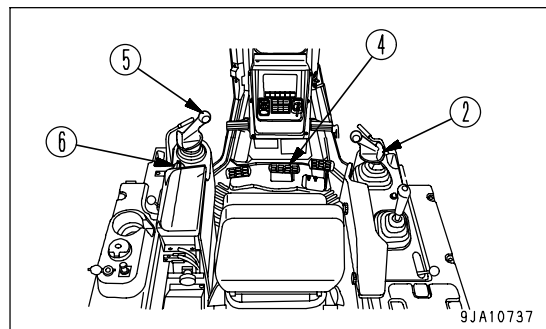
Do not place the gear shift lever in 1st under any circumstances. The machine will be damaged.

Before starting the engine, check that the area around the machine is safe, then do as follows:

1. Start the engine.
2. After starting the engine and completing the warm-up operation, set fuel control dial (6) to the SLOW position.
3. Set work equipment lock lever (1) to the FREE position (F) then operate blade control lever (2) to raise the blade.
Leave the work equipment lock lever(1) to the FREE position (F).
4. Set parking brake lever (3) to the FREE position (F).



5. Depress brake pedal (4), set steering, forward-reverse, gear shift lever (5) in FORWARD, then press the shift up button to enter 2nd speed.
6. Operate fuel control dial (6) and gradually raise the engine speed to full throttle. (Keep the brake pedal depressed.)
7. Check that the machine does not move. This indicates that brake performance is normal.



EVERY 500 HOURS SERVICE

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

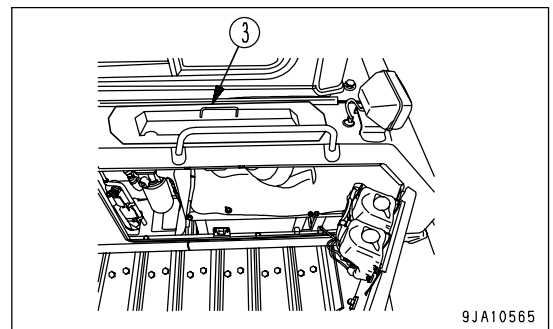
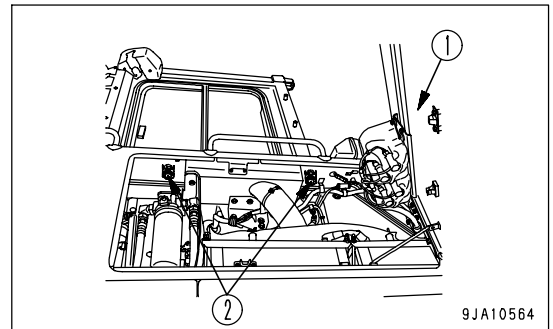
REPLACE AIR CONDITIONER FRESH/RECIRC FILTERS

REMARK

- Filtering capability of the filter can lower due to aging, so be sure to replace it with new one once a year.
- Clean the filter more frequently when the machine is used in a sandy district, bushy or grassy land, etc. where the filter is clogged easily.
- When cleaning, remove the external air filter and internal air filter according to the following procedure and clean with compressed air.
- If the filter is stained with oil or very dirty, wash it in neutral detergent.
- After washing the filter in water, dry it out before using.
- If the filter is so clogged that it cannot be cleaned with compressed air or water, replace it with new one.

REPLACING FRESH AIR FILTER

1. Open and lock inspection door (1) of the battery cover at the left rear of the machine.
2. Loosen knob (2) and remove top cover (3).

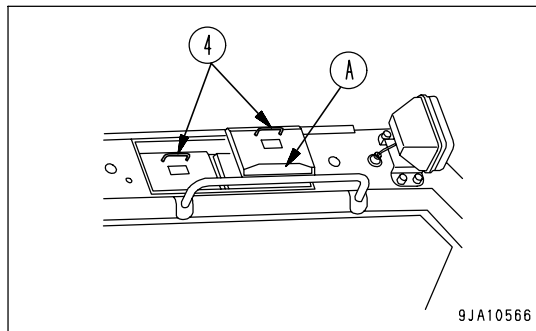


3. Remove external air filter cover (4) and remove external air filter (5).

4. Remove dirt from the seal surface of external air filter cover (4).

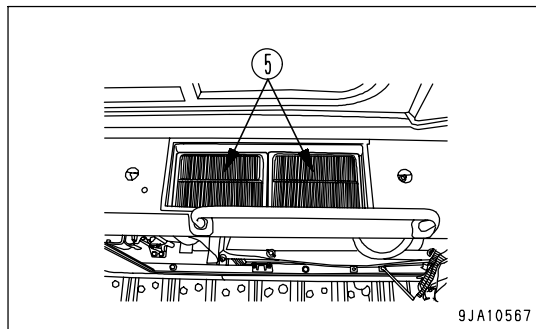
5. Install a new external air filter and then install external air filter cover (4).

Install fresh air filter cover (4) so that intake port (A) faces the outside of the machine.



6. Install top cover (3) and tighten knob (2).

7. Close inspection door (1) of the battery cover at the left rear of the machine.



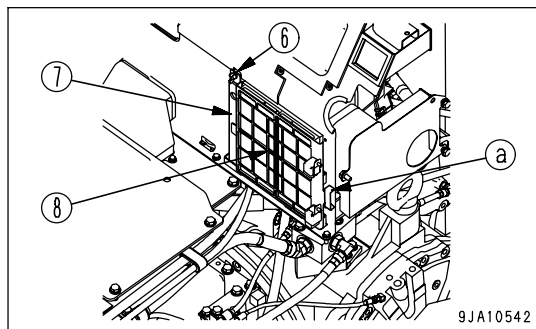
REPLACING RECIRCULATED AIR FILTER

1. Remove nut (6) located in the rear left inside the operator's cab to remove plate (7).

2. Remove bracket (8) from portion (a).

3. Remove the internal air filter from bracket (8).

4. Replace the internal air filter with new one.



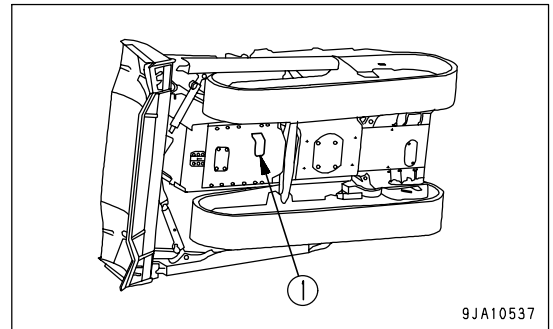
CHANGE OIL IN ENGINE OIL PAN, REPLACE ENGINE OIL FILTER CARTRIDGE

! WARNING

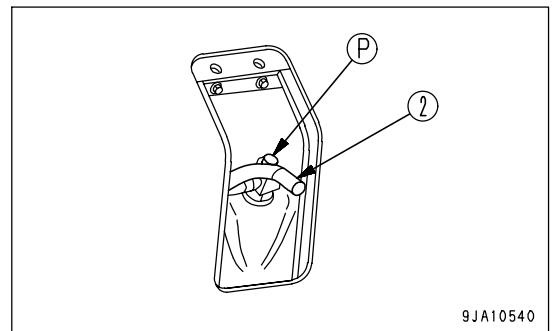
Parts and oil are at high temperature immediately after the engine is stopped and may cause serious burns. Wait for the oil temperature to go down before performing this operation.

- Refill capacity: 28 liters (7.40 US gal)
- Prepare a socket wrench and filter wrench.

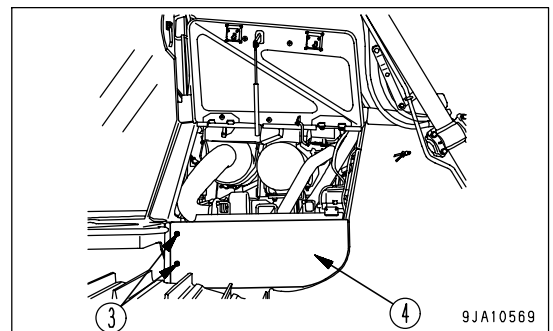
1. Remove the cover (1) on the bottom of the machine and set a container to catch the drained oil directly under the drain plug.



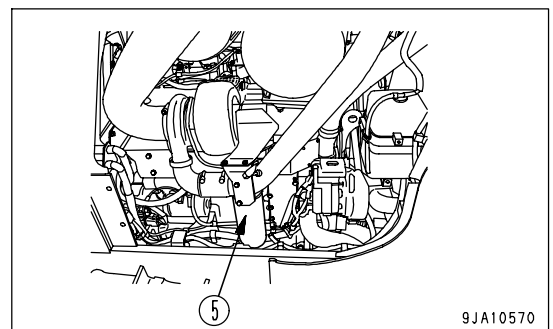
2. Take the end of hose (2) out of the inspection window.
3. Loosen drain plug (P) to drain oil. Do it slowly so that you do not get splashed with drained oil.
4. Check the drained oil, and if there are excessive metal particles or foreign material, please contact your Komatsu distributor.
5. Install drain plug (P).



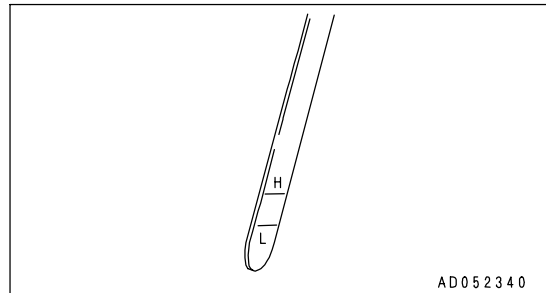
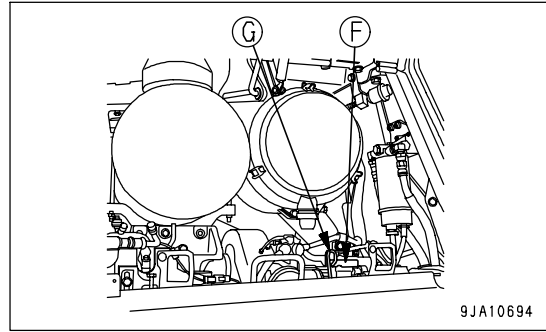
6. Open the engine side cover on the right side of the machine.
7. Remove bolts (3) - 2 bolts in total - to remove lower side cover (4).



8. Turn engine oil filter cartridge (5) to the left with a filter wrench.
9. Clean the filter holder, fill the new filter cartridge with clean oil, coat the thread and packing portion of the new filter cartridge with oil (or coat thinly with grease), then install.
10. When installing the filter cartridge, bring the packing surface into contact with the filter holder, then tighten a further 3/4 to 1 turn.



11. After replacing the filter cartridge, add oil through oil filler (F) until the oil level is between the H and L marks on the dipstick (G).
12. Run the engine at idle 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 3-93)".

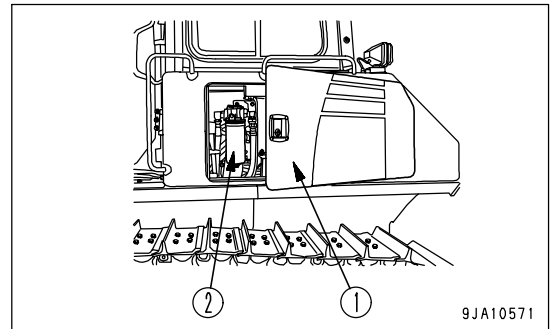


REPLACE POWER TRAIN OIL FILTER ELEMENT

 **WARNING**

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

- Prepare a filter wrench
- 1. Open inspection door (1) of the battery cover at the left rear of the machine.
- 2. Set the container under the filter cartridge to catch the drained oil.
- 3. Using a filter wrench, turn filter cartridge (2) to the left to remove it.
- 4. Remove the grommet under the fender, loosen drain plug (P), and drain the oil from inside the filter case.
- 5. Clean the filter holder, coat the seal surface and thread of the new filter cartridge with clean oil, then install it.
- 6. When the seal surface comes into contact with the filter holder, tighten a further 2/5 turns with the filter wrench.
 - Tightening torque: 54 to 64 Nm (5.51 to 6.53 kgm, 39.9 to 47.2 lbf)



REPLACE FUEL PRE-FILTER CARTRIDGE

**WARNING**

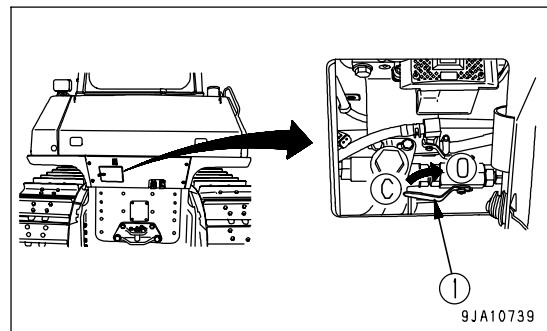
- After the engine has been operated, all parts are at high temperature, so do not replace the filter immediately. Wait for all parts to cool down before starting the operation.
- High pressure is generated inside the engine fuel piping system when the engine is running. When replacing the filter, wait 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.

NOTICE

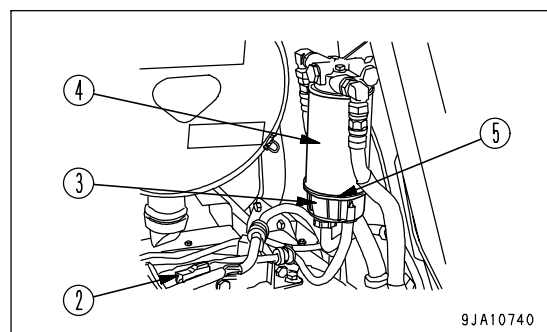
- Genuine Komatsu fuel filter cartridges use a special filter that has highly efficient filtering ability. When replacing the filter cartridge, always use a genuine Komatsu part.
- The common rail fuel injection system used on this machine consists of more precise parts than the conventional injection 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.

Prepare a filter wrench and a container to catch the fuel.

1. Open the inspection cover at the bottom of the fuel tank.
2. Turn fuel tank valve (1) to CLOSE position (C).



3. Open up the engine side cover on the left side of the machine.
4. Put a container under filter cartridge (4) to receive drained oil.
5. Remove connector (2) of the water separator monitor. After removing the connector, cover it with a vinyl bag to prevent water from getting on it.
6. Turn transparent cap (3) to the left with a filter wrench. (This cap is to be used again, so replace it with a new one if there is any damage on it.)
7. Using a filter wrench, turn cartridge (4) to the left to remove it.
8. Fix earlier removed transparent cap (3) to the base of the new filter cartridge.



At this time, be sure to replace O-ring (5) with a new one.

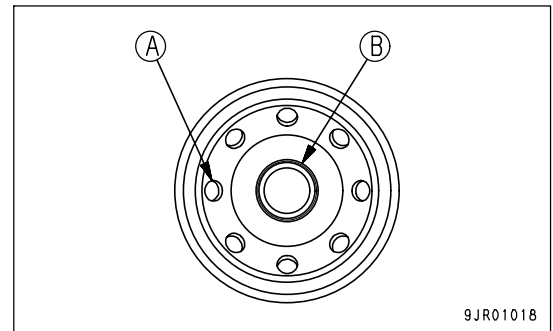
- Tightening torque of transparent cap: 11 Nm (1.0 kgm)

When the O-ring has been replaced, coat the surface with clean fuel before installing it.

9. When installing, bring the packing surface into contact with the seal surface of filter cartridge (4), then tighten it a further 1/4 -1/2 turns.
If the transparent cap is tightened too much, the O-ring may be damaged, and this will cause leakage of fuel. If it is not tightened enough, fuel will leak through the gap at the O-ring. Always be sure to tighten to the specified angle.
10. Clean the filter holder, fill the new filter cartridge with clean fuel, coat the packing surface thinly with oil, then install to the filter holder.

NOTICE

- When adding fuel, do not remove cap (B). Always add fuel from the 8 small holes (A) on the dirty side.
- After adding fuel, remove cap (B) and install the fuel filter.
- Always fill with clean fuel. Be careful not to let any dirt or dust get into the fuel. In particular, center portion is the clean side, so do not remove cap (B) when adding fuel. Be careful not to let dirt or dust get into center portion on the clean side.



11. When installing, tighten until the packing surface contacts the seal surface of the filter holder, then tighten it 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 the correct amount.
 - When tightening with a filter wrench, be extremely careful not to dent or damage the filter.
12. Make sure that drain plug, which is provided in the lower part of transparent plug (3), is firmly tightened.
Specified tightening torque of drain plug: 0.2 to 0.45 Nm (0.02 to 0.046 kgm , 0.1 to 0.3 lbft)
13. Remove the vinyl bag covering connector (2), then connect connector (2).

REMARK

- If water gets on the connector (2), the sensor may malfunction and the water separator monitor may light up. When removing connector (2), be extremely careful not to let water get on the connector.
- If water gets on connector (2), dry it completely before connecting it.

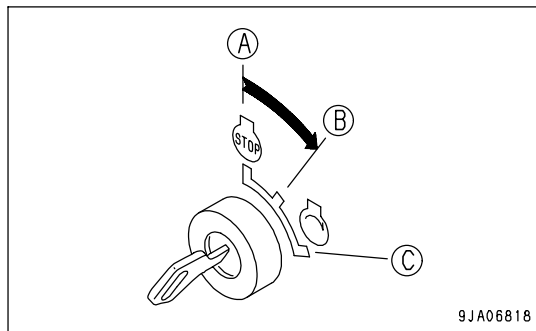
14. Turn valve (1) at the bottom of the fuel tank to OPEN position (O).
15. After completing the replacement of filter cartridge (4), bleed the air.

Bleed the air as follows:

16. Add fuel to the fuel tank until full (to FULL mark on the fuel gauge).

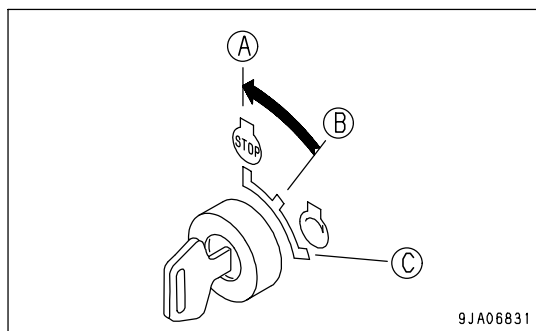
17. Insert the key in the starting switch and turn the key to the ON position (B).

The electric priming pump is actuated.



18. Hold the key at the ON position (B) for 30 seconds, then return it to OFF position (A) and wait for 10 seconds.

19. Repeat Steps 17 and 18 four times.



20. Start the engine, check that there is no leakage of fuel from the filter seal surface or water separator mounting surface, then run for approx. 10 minutes at low idling.

EVERY 1000 HOURS SERVICE

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

REPLACE FUEL MAIN FILTER CARTRIDGE

Carry out this operation after carrying out the maintenance in the "REPLACE FUEL PRE-FILTER CARTRIDGE (PAGE 4-70)" for every 500 hours.

! WARNING

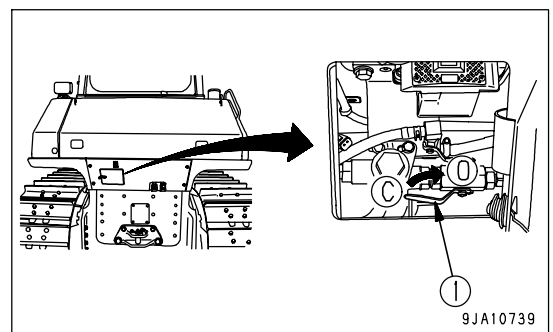
- After the engine has been operated, all parts are at high temperature, so do not replace the filter immediately. Wait for all parts to cool down before starting the operation.
- High pressure is generated inside the engine fuel piping system when the engine is running. When replacing the filter, wait 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.

NOTICE

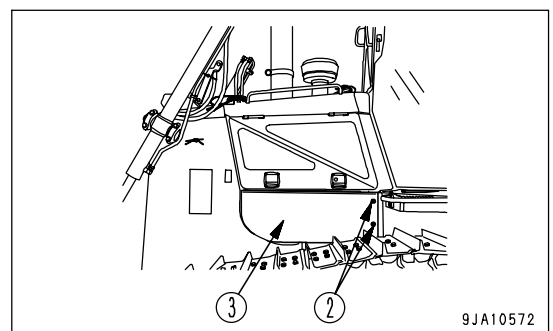
- Genuine Komatsu fuel filter cartridges use a special filter that has highly efficient filtering ability. When replacing the filter cartridge, always use a genuine Komatsu part.
- The common rail fuel injection system used on this machine consists of more precise parts than the conventional injection 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.

Prepare a filter wrench and a container to catch the fuel.

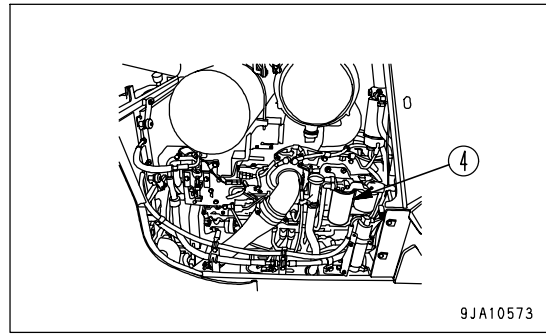
1. Open the inspection cover at the bottom of the fuel tank.
2. Turn fuel tank valve (1) to CLOSE position (C).



3. Open up the engine side cover on the left side of the machine.
4. Remove bolts (2) - 2 bolts in total- to remove lower side cover (3).



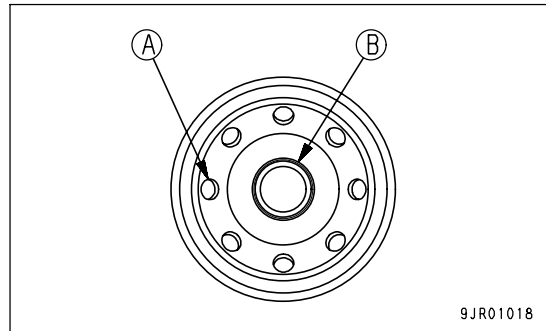
5. Put a container under filter cartridge (4) to receive drained oil.
6. Using a filter wrench, turn cartridge (4) to the left to remove it.



NOTICE

- Do not fill the new filter cartridge with fuel.
- Remove cap (B) and install the filter cartridge.

7. Clean the filter holder, coat the packing surface of the new filter cartridge thinly with oil, then install the filter cartridge to the filter holder.

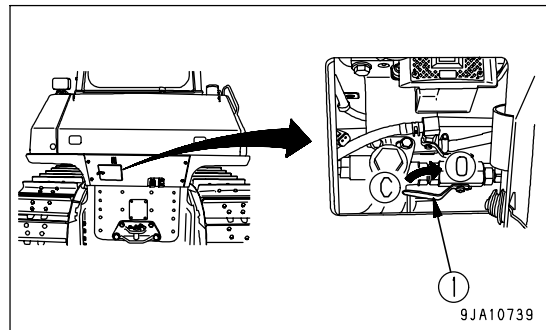


8. When installing, tighten until the packing surface contacts the seal surface of the filter holder, then tighten it 3/4 of a turn.

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 the correct amount.

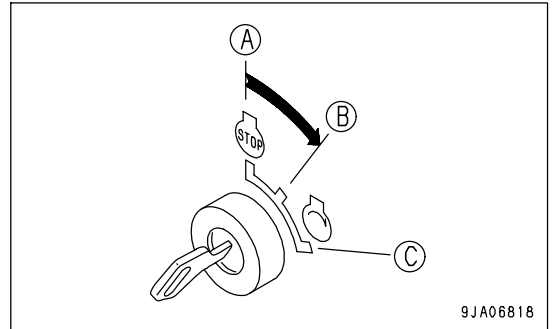
9. Turn valve (1) at the bottom of the fuel tank to OPEN position (O).

10. Bleed air from fuel filter cartridge (4) after the replacement.

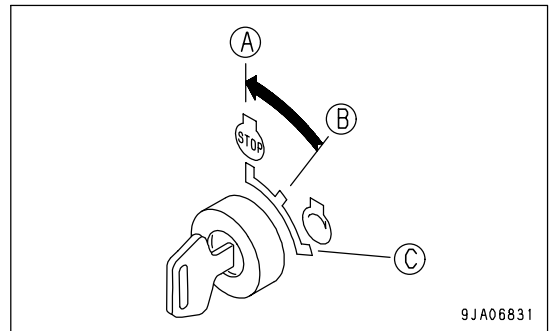


Bleed the air as follows:

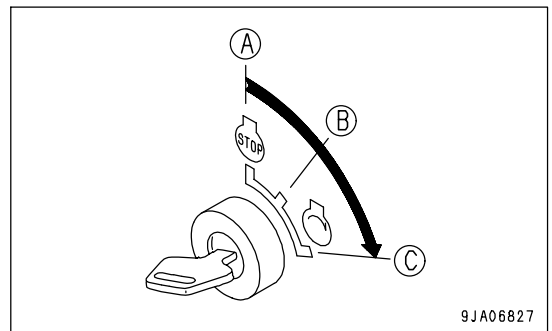
11. Add fuel to the fuel tank until full (to FULL mark on the fuel gauge).
12. Insert the key into the engine starting switch and turn the key to ON position (B). Then the electric priming pump begins to work.



13. After holding the key in ON position (B) for 30 seconds, turn it back to OFF position (A) and hold it there for 10 seconds.



14. Repeat the operation in Step 12 and 13 four times.
15. Turn the engine starting switch key to START position (C) to start up the engine and check the filter sealing face for fuel leak. If leak is noticed, check the filter cartridge for its tightening condition. If it is correctly tightened and fuel still leaks, remove the filter cartridge once and check the contact face with the packing for damage or any caught- in foreign material. If any, replace it with a new one.



CHANGE OIL IN POWER TRAIN CASE, CLEAN STRAINERS (POWER TRAIN PUMP STRAINER, SCAVENGING PUMP STRAINER)

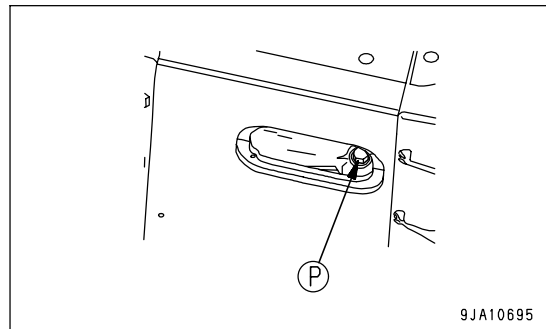
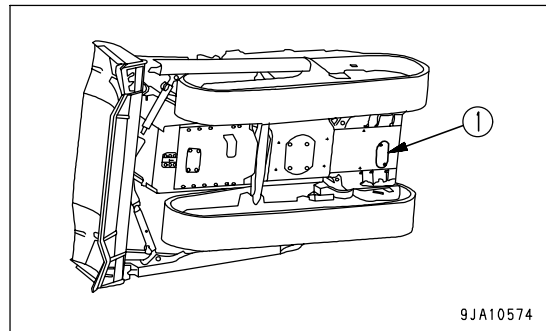


WARNING

- The oil is at high temperature immediately after the machine has been operated. Wait for the oil to cool down before starting the operation.
- The undercover is heavy. Never try to open or close the cover when directly beneath it. When removing bolts(3), carry out the work from the rear of the cover so that you can easily get out of the way.

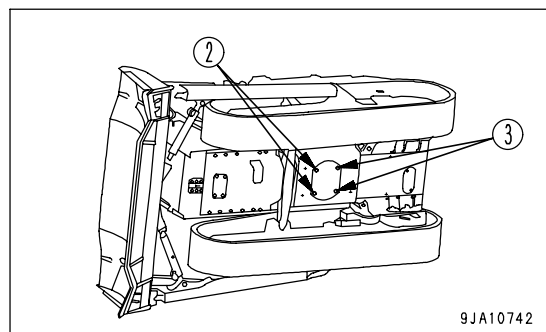
- Refill capacity: 48 liters (12.68 US gal)

1. Remove cover (1) at the bottom rear of the machine.
2. Loosen drain plug (P) (with slit) and drain the oil.
After draining the oil, tighten drain plug (P).

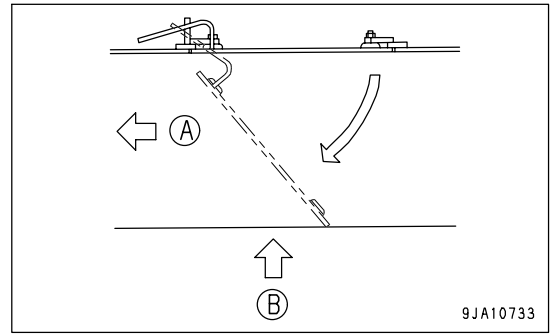


3. Remove the undercover from the rear bottom of the machine body as follows.

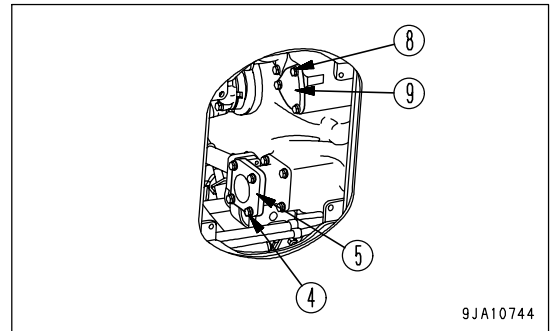
- 1) Remove two bolts (2) from the front side of the machine body.
- 2) Holding the cover, remove two bolts (3) from the rear side of the machine body.



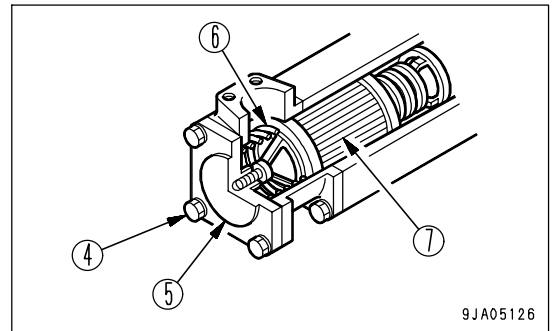
- 3) Lower and open the cover gradually.
 - (A) Front of machine
 - (B) Dangerous place



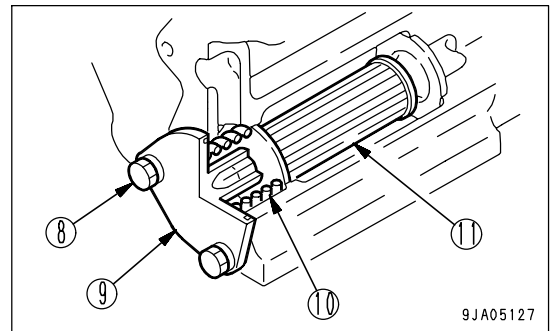
- 4. Loosen mounting bolt (4) of the power train strainer, then remove cover (5).



- 5. Take out spring (6), then take out strainer (7).
- 6. Remove all dirt from strainer (7), then wash in clean diesel oil or flushing oil. Clean the case interior and the removed parts.



- 7. Loosen mounting bolt (8) of the scavenging pump strainer, then remove cover (9).
- 8. Take out spring (10), then take out strainer (11).
- 9. Remove all dirt from strainer (11), then wash in clean diesel oil or flushing oil. Clean the case interior and the removed parts.

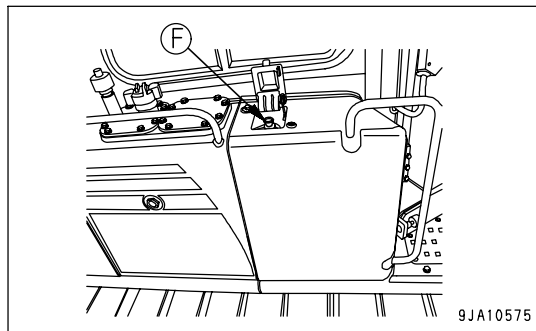


If the spring or strainer are damaged, replace them.

10. Install the strainers in their original position.

11. After installing, replace the element in the power train oil filter. For details, see "REPLACE POWER TRAIN OIL FILTER ELEMENT (PAGE 4-69)".

12. Open the inspection window of the cover on the right side of the machine.
13. Refill the specified quantity of oil through oil filler (F).
14. Check that the oil is at the specified level. For details, see "CHECK OIL LEVEL IN POWER TRAIN CASE, ADD OIL (PAGE 3-96)".
15. Close the inspection window of the cover on the right side of the machine.



9JA10575

REPLACE HYDRAULIC TANK BREATHER ELEMENT

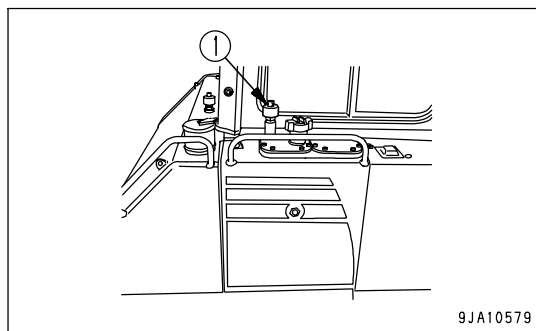
NOTICE

Note that the fuel tank breather and hydraulic tank breather have different part numbers.

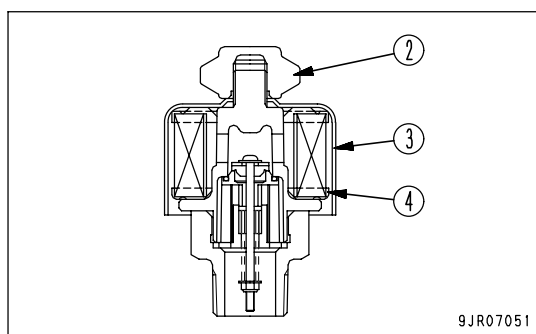
(The element is common to both. For details, see "WEAR PARTS LIST (PAGE 4-10)".)

Hydraulic tank breather part No.: 195-60-51550

1. Remove nut (2) of breather assembly (1) at the top of the hydraulic tank, then remove cover (3).
 2. Replace breather element (4) with a new part.
 3. Install cover (3) and nut (2).
- Tightening torque: 10 to 14 Nm (1.0 to 1.4 kgm , 7.2 to 10.1 lbft)



9JA10579

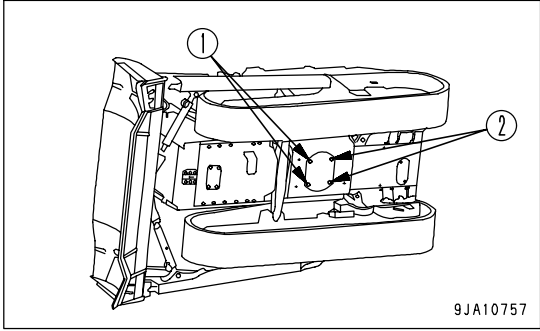


9JR07051

CHECK OIL LEVEL IN DAMPER CASE, ADD OIL

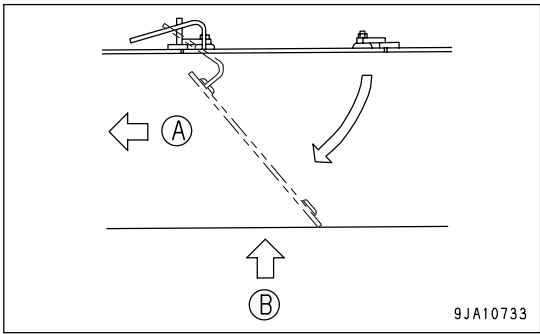
⚠ WARNING

- The oil is at high temperature immediately after the machine has been operated. Wait for the oil to cool down before starting the operation.
- The undercover is heavy. Never try to open or close the cover when directly beneath it. When removing bolts(2), carry out the work from the rear of the cover so that you can easily get out of the way.



If the quantity of the oil in the damper is insufficient, the damper may be seized. Accordingly, check, and add or replace the oil according to the following procedure.

1. Remove the undercover from the rear bottom of the machine body as follows.
 - 1) Remove two bolts (1) from the front side of the machine body.
 - 2) Holding the cover, remove two bolts (2) from the rear side of the machine body.
 - 3) Lower and open the cover gradually.
 - (A) Front of machine
 - (B) Dangerous place

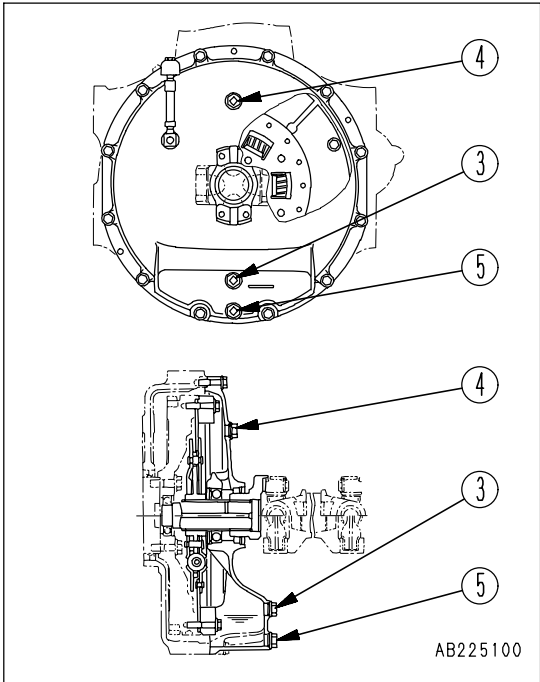


2. Remove oil level plug (3) and check the oil level. The proper oil level is the bottom edge of the plug hole. Tighten plug (3).

REMARK

- Check the oil level while the engine is stopped.
- If the machine is inclined, set it in a level position before checking the oil level.

3. If the oil level is below the bottom edge of the plug hole, remove oil filler plug (4) and add new oil. Add new oil until the oil level reaches the bottom edge of oil level plug (3).
4. After adding the oil, tighten plugs (3) and (4).

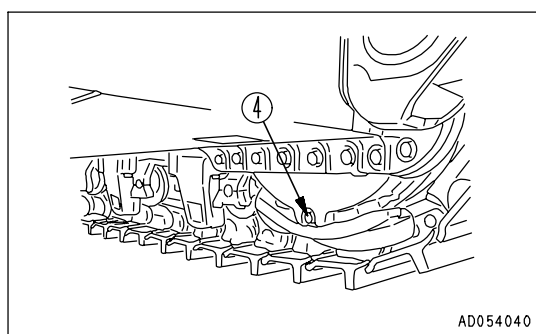
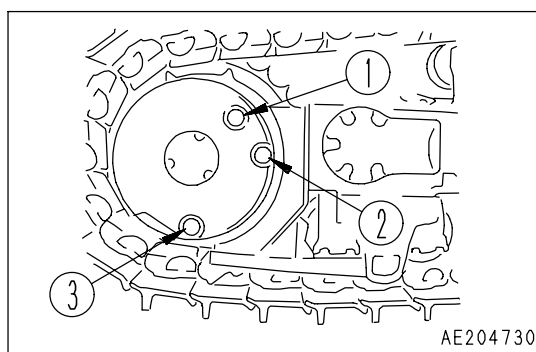


CHANGE OIL IN FINAL DRIVE CASE**WARNING**

- The oil is at high temperature immediately after the machine has been operated. Wait for the oil to cool down before starting the operation.
- If there is still pressure remaining inside the case, the oil or plug may fly out. Loosen the plug slowly to release the pressure.

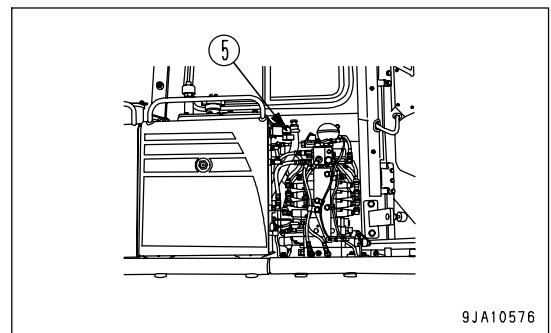
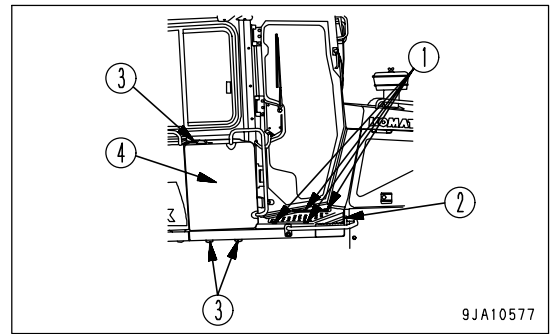
- Refill capacity:
D65EX : (each) 24 liters (6.34US gal)
D65PX,WX: (each) 27 liters (7.13US gal)

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.
3. After draining the oil, install drain plugs (3) and (4).
4. Add oil to the specified level through the hole in oil filler plug (1).
5. Check that the oil is at the specified level. For details, see "CHECK OIL LEVEL IN FINAL DRIVE CASE, ADD OIL (PAGE 4-58)".



CLEAN BREATHER

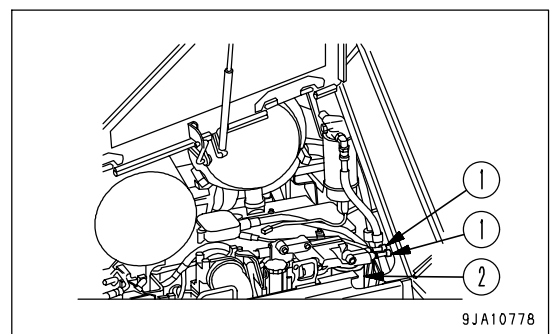
1. Remove bolts (1) of step (2) to remove step (2).
2. Remove bolts (3) to remove cover (4).
3. Remove breather (5), then use clean diesel fuel or flushing fluid to rinse the dirt out from the inside.



REPLACE CORROSION RESISTOR CARTRIDGE

Use Komatsu genuine cartridge.

1. Screw in 2 valves (1) at the top of the corrosion resistor.
2. Using a filter wrench, turn cartridge (2) to the left to remove it.
3. Apply engine oil to the sealing surface of a new cartridge, then install it to the filter holder.
4. When installing, screw in cartridge until seal comes in contact with sealing surface, then tighten approx. 2/3 turn.
5. Open valves (1) (2 places).



CHECK ALL TIGHTENING POINTS OF ENGINE EXHAUST PIPE CLAMPS

Please ask your Komatsu distributor to check the tightening of the clamps between the air cleaner - turbocharger - aftercooler - engine.

CHECK FOR LOOSE ROPS MOUNT BOLTS

Check that the bolts are not loose and that there is no damage.

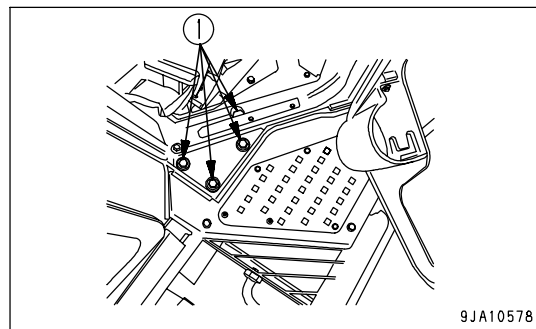
If any bolt is loose, tighten it to the following torque.

If there is any damage, replace the bolt with a genuine Komatsu part.

(Machine equipped with cab)

Bolt (1) (4 each on right and left sides)

Tightening torque: 245 to 309 Nm (25 to 31.5 kgm, 180.8 to 227.8
lbft)



INSPECTION OF AFTER-COOLER CIRCUIT FOR LOOSENED BOLTS AND NUTS

Check each clamp for loosening. If any clamp is found loosened, tighten it further.

EVERY 2000 HOURS SERVICE

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

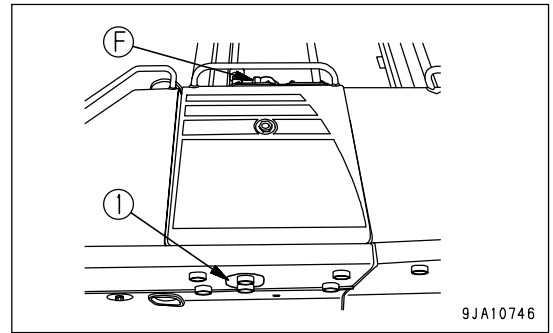
CHANGE OIL IN HYDRAULIC TANK, REPLACE HYDRAULIC OIL FILTER ELEMENT AND CLEAN HYDRAULIC TANK STRAINER

 **WARNING**

- Immediately after the engine is stopped, the parts and the oil are at a high temperature. Wait for the temperature to go down before starting the operation.
- When the cap of the oil filler port is removed, oil may spurt out, so turn the cap slowly to release the internal pressure, then remove it carefully.

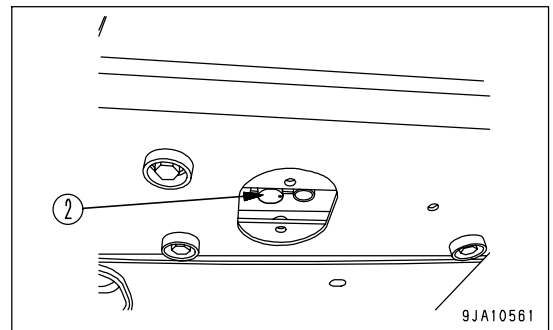
- Refill capacity: 55 liters (14.53 US gal)

1. Lower the work equipment to the ground, then stop the engine.
2. Turn the cap of oil filler port (F) at the top of the hydraulic tank slowly to release the internal pressure, then remove the cap.
3. Remove the cover (1) at the bottom of the hydraulic tank.



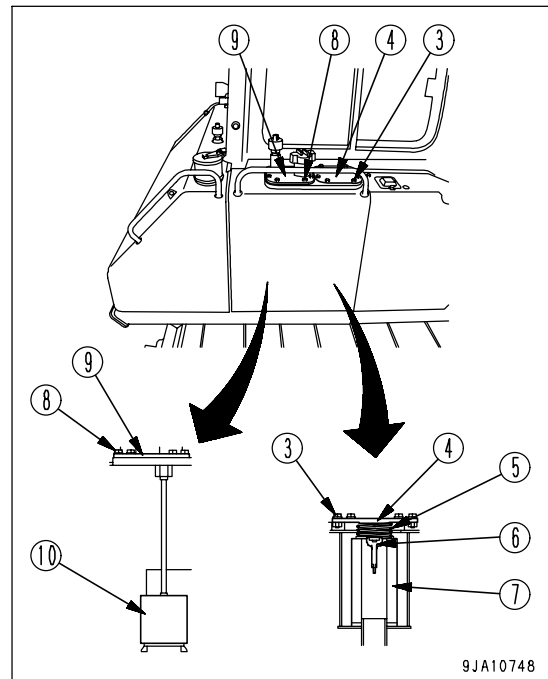
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4. Loosen drain valve (2), drain the oil, tighten drain valve (2) again, then install cover (1). When loosening drain valve (2), be careful not to get oil on yourself.



9JA10561

5. Remove bolt (3), then remove cover (4).
6. Take out spring (5), valve (6), and element (7).
7. Clean the inside of the case, then wash spring (5) and valve (6).
8. Install new element (7), valve (6), and spring (5).
9. Install cover (4) with bolt (3).
10. Remove bolts (8) and cover (9) and pull out strainer (10) from inside.
11. Wash the strainer (10) in clean diesel oil or flushing oil.
12. Install the strainer (10) to its original position.
13. Add the refill amount of engine oil through oil filler port (F), then install the cap.



14. Check that the oil is at the specified level. For details, see "CHECK OIL LEVEL IN HYDRAULIC TANK, ADD OIL (PAGE 4-59)".

CHECKING CHARGE PRESSURE OF NITROGEN GAS IN ACCUMULATOR (FOR CONTROL CIRCUIT)



WARNING

The accumulator is charged with high-pressure nitrogen gas, so mistaken operation may cause an explosion, which will lead to serious injury or damage. When handling the accumulator, always do as follows.

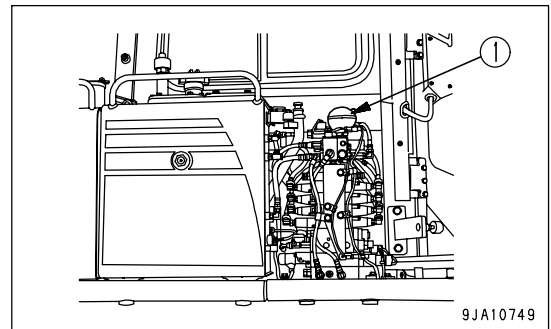
- The pressure in the hydraulic circuit cannot be completely removed. When removing the hydraulic equipment, do not stand in the direction that the oil spurts out when carrying out the operation. In addition, loosen the bolts slowly when carrying out the operation.
- Do not disassemble the accumulator.
- Do not bring it near flame or dispose of it in fire.
- Do not make holes in it or weld it.
- Do not hit it, roll it, or subject it to any impact.
- When disposing of the accumulator, the gas must be released. Please contact your Komatsu distributor to have this work carried out.

FUNCTION OF ACCUMULATOR

The accumulator (1) stores the pressure in the control circuit. Even after the engine is stopped, the control circuit can be operated, so the following actions are possible.

- If the control lever is operated in the direction to lower the work equipment, it is possible for the work equipment to go down under its own weight.
- The pressure in the hydraulic circuit can be released.

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

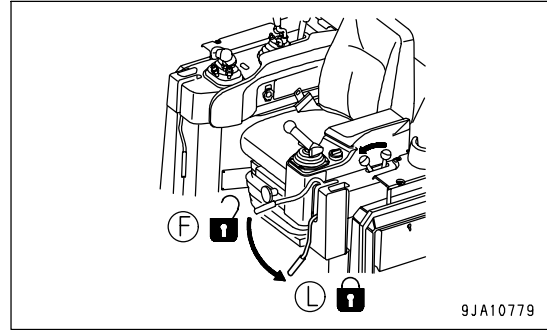


CHECKING FUNCTION OF ACCUMULATOR

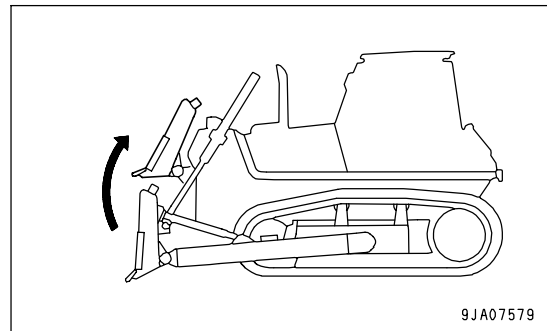
Replace the accumulator every 2 years or every 4000 hours, whichever comes sooner.

Check the nitrogen gas charge pressure as follows.

1. Stop the machine on firm, level ground.
2. Operate the parking brake lever to LOCK position (L).



3. Raise the work equipment (blade) to the maximum height.

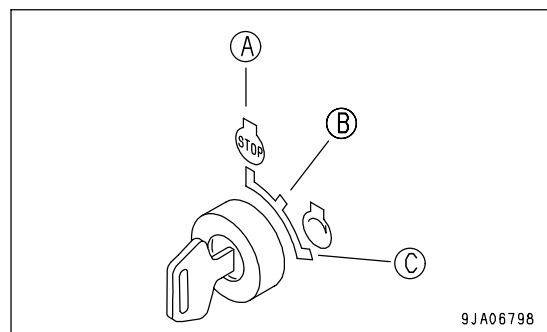


NOTICE

Carry out the following procedure for lowering the blade to the ground within 15 seconds after stopping the engine.

When the engine is stopped, the pressure inside the accumulator gradually goes down, so this inspection can be carried out only immediately after the engine is stopped.

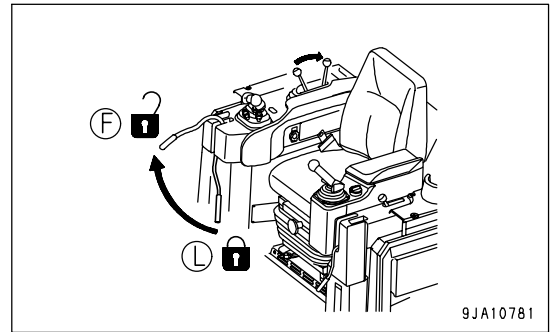
4. While holding the work equipment at the highest position, turn the engine starting switch key to OFF position (A).
5. Turn the engine starting switch key to ON position (B).



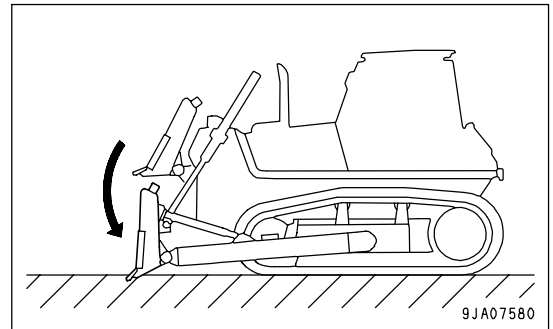
6. Turn the work equipment lock lever to FREE position (F).
7. Operate the blade control lever fully in the direction to lower the blade.

REMARK

Check that the area around the machine is safe, then operate the blade control lever to the LOWER position.



8. Check that the work equipment goes down to the ground under its own weight.
9. This completes the inspection.



NOTICE

If the nitrogen gas charge pressure in the accumulator is low and operations are continued, it will become impossible to release the remaining pressure inside the hydraulic circuit if a failure occurs on the machine.

In the following cases, the charge pressure of the accumulator has gone down. Please contact your Komatsu distributor.

- Work equipment does not go down
- Stops while going down

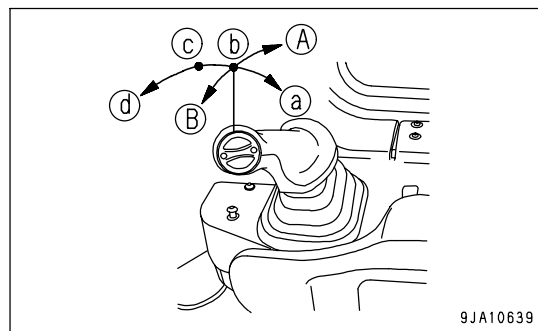
METHOD OF RELEASING PRESSURE IN HYDRAULIC CIRCUIT

NOTICE

Finish the steps of operating the blade control lever to the front and back, and to the right and left, to each stroke end within 15 seconds after the engine has stopped. After the engine stops, pressure inside the accumulator begins to gradually go down, so the pressure cannot be released except right after the engine stops.

1. Lower the work equipment and stop the engine.
2. Turn the starting switch to the ON position.
3. Set the work equipment lock lever to the FREE position.
4. Operate the blade control lever fully to the front, rear, left, and right to release the pressure from the hydraulic circuit.

In order to release pressure from the ripper hydraulic circuit, operate the ripper control lever to the right and left to each stroke end.



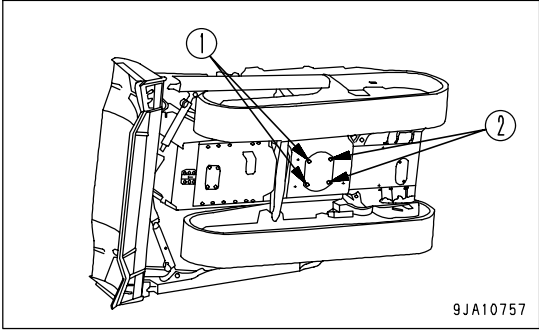
5. Set the work equipment lock lever to the LOCK position.

- (a) RAISE
- (b) HOLD
- (c) LOWER
- (d) FLOAT
- (A) RIGHT TILT
- (B) LEFT TILT

CHANGE OIL IN DAMPER CASE

WARNING

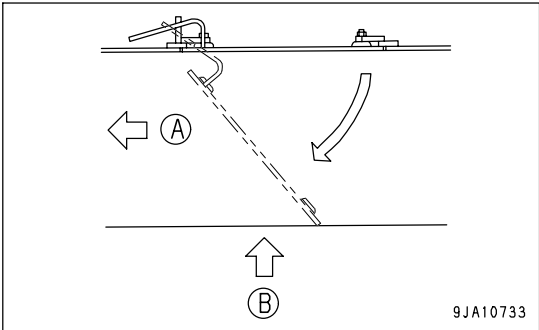
- The parts and oil is very hot just after the operation. Wait until the oil temperature drops, then start the work.
- The undercover is heavy (22 kg (49 lb)). Never try to open or close the cover when directly beneath it. When removing bolts (2), carry out the work from the rear of the cover so that you can easily get out of the way.
- When removing drain plug (5) of the damper case, take care not to get oil over yourself.



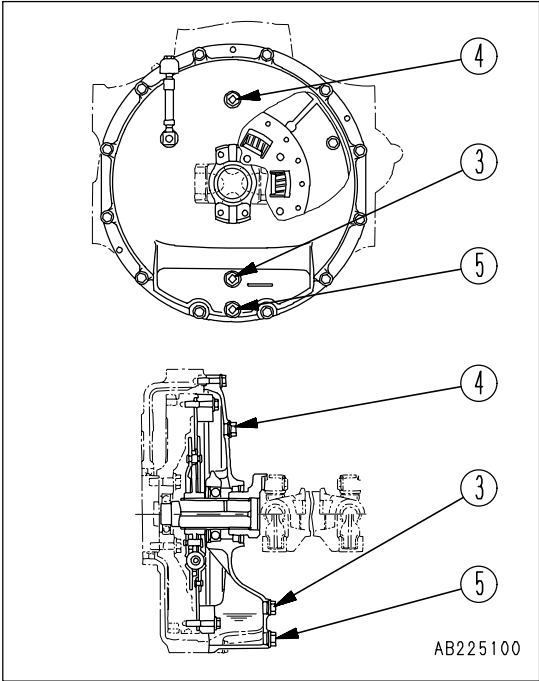
- Refill capacity: 1.7 liters (0.45 US gal)

1. Remove the undercover from the rear bottom of the machine body as follows.

- 1) Remove two bolts (1) from the front side of the machine body.
- 2) Holding the cover, remove two bolts (2) from the rear side of the machine body.
- 3) Lower and open the cover gradually.
 - (A) Front of machine
 - (B) Dangerous place



2. Remove oil level plug (3) and oil filler plug (4), then remove drain plug (5) to drain the oil. After the all oil is drained, tighten plug (5).
3. Add oil through the hole of oil filler plug (4) until the oil level reaches the bottom edge of the hole of oil level plug (3).
4. After refilling the oil, tighten plugs (3) and (4).

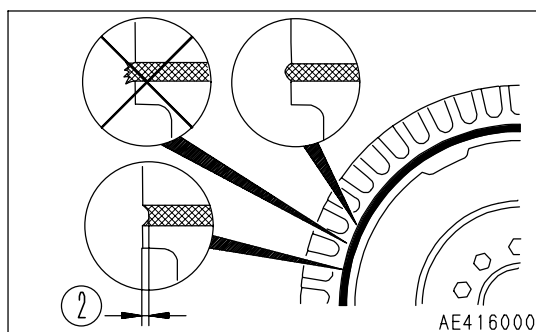
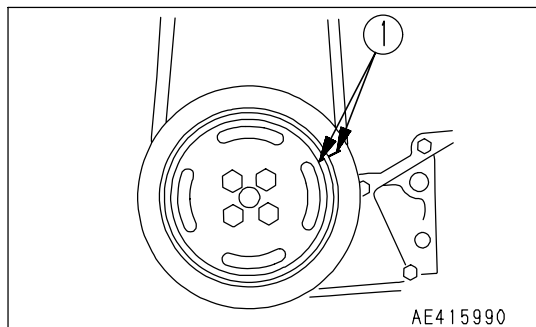


CHECK VIBRATION DAMPER

For the check and replacement of the vibration damper, special tools are required. Contact Komatsu Ltd. or its distributor in the territory for the replacement. It has to be replaced with a new one in the following cases.

Mating mark (1) is notched both on the damper hub and on the inertia member of the vibration damper to show any misalignment between the two.

If this misalignment exceeds 1.6 mm (0.063 in), or if there is any dent found on the damper metal surface deeper than 3.2 mm (0.1 in), then (2) the vibration damper must be replaced.



CHECK ALTERNATOR

Contact your Komatsu distributor to have the alternator checked.

If the engine is started frequently, have this inspection carried out every 1000 hours.

CHECK ENGINE VALVE CLEARANCE, ADJUST

Special tools are needed for inspection and maintenance, please contact your Komatsu distributor.

EVERY 4000 HOURS SERVICE

Maintenance for every 50, 250, 500, 1000 and 2000 hours service should be carried out at the same time.

REPLACE ACCUMULATOR (FOR CONTROL CIRCUIT)

Replace the accumulator every 2 years or every 4000 hours, whichever comes sooner.



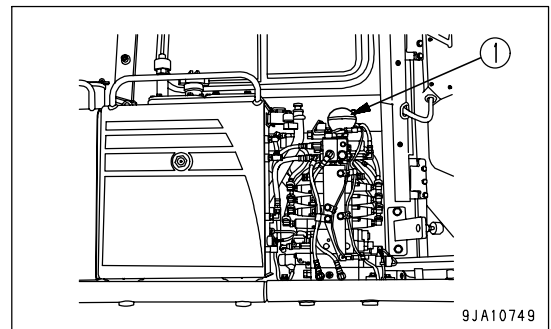
WARNING

The accumulator is charged with high-pressure nitrogen gas, so mistaken operation may cause an explosion, which will lead to serious injury or damage. When handling the accumulator, always do as follows.

- The pressure in the hydraulic circuit cannot be completely removed. When removing the hydraulic equipment, do not stand in the direction that the oil spurts out when carrying out the operation. In addition, loosen the bolts slowly when carrying out the operation.
- Do not disassemble the accumulator.
- Do not bring it near flame or dispose of it in fire.
- Do not make holes in it or weld it.
- Do not hit it, roll it, or subject it to any impact.
- When disposing of the accumulator, the gas must be released. Please contact your Komatsu distributor to have this work carried out.

If operations are continued when the function of accumulator (1) has dropped, it becomes impossible to release the remaining pressure in the hydraulic circuit when there is a failure in the machine.

If this happens, ask your Komatsu distributor to replace the accumulator.



CHECK WATER PUMP

Check the water pump and its relative parts for water leak, and if anything abnormal is found, call on your Komatsu distributor for repairs or replacement.

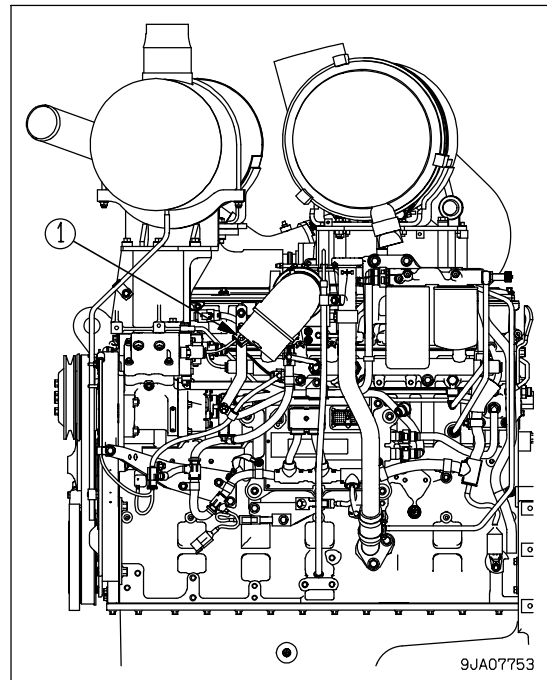
CHECK STARTING MOTOR

Contact your Komatsu distributor to have the starting motor checked.

If the engine is started frequently, have this inspection carried out every 1000 hours.

CHECKING FOR LOOSENESS OF HIGH-PRESSURE CLAMP, HARDENING OF RUBBER

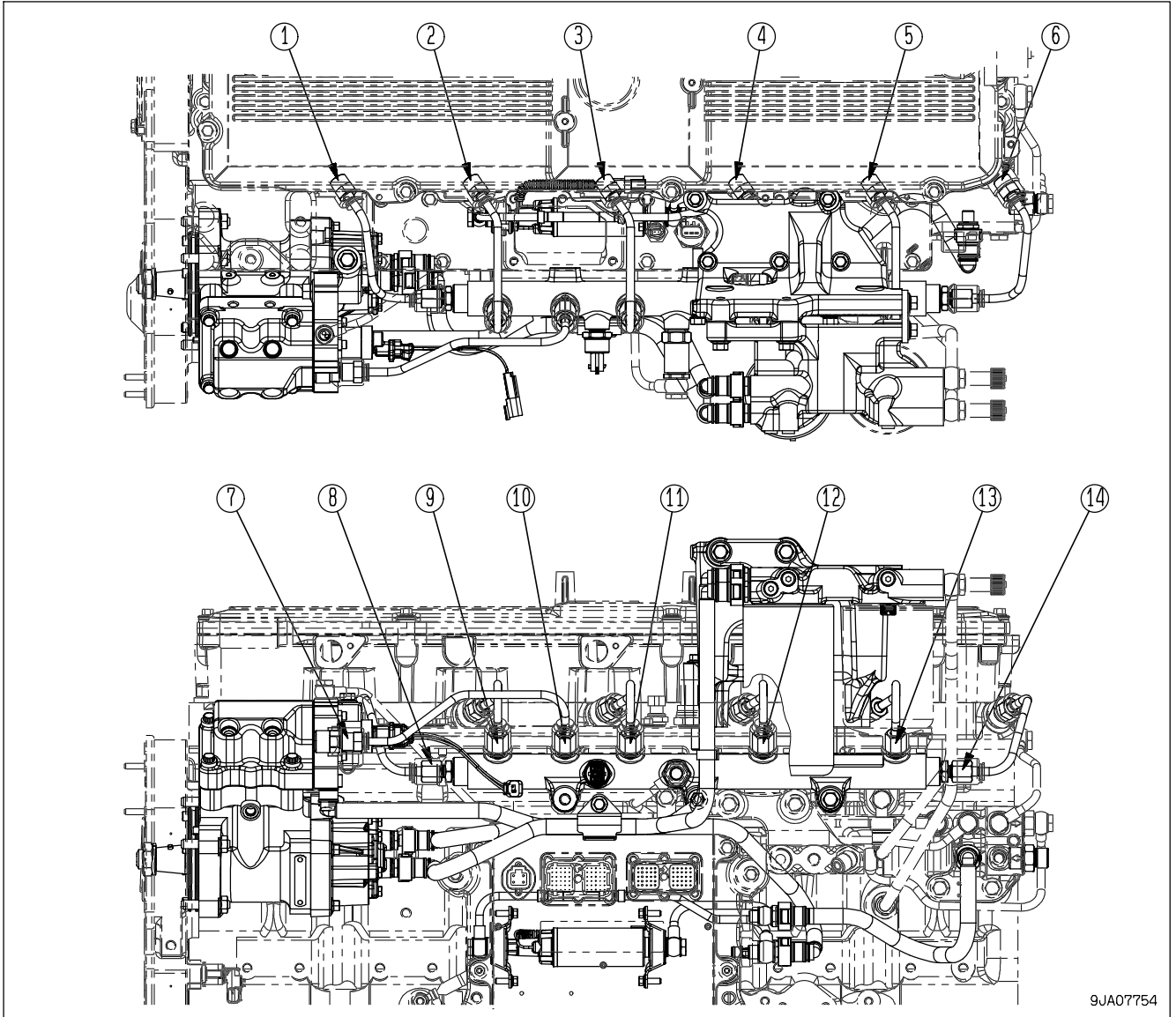
Check clamp (1) visually and touch by hand to check that there are no loose bolts or hardening of the rubber. If there are any loose bolts or hardened rubber, please contact your Komatsu distributor for replacement.

**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

Check fuel spray prevention caps (1) through (14) visually or with a finger to see if any of them has slipped off, or the rubber portion is hardened. If any such abnormality is found, call on your Komatsu distributor for repairs or replacement. Fuel spray prevention caps (1) through (14) are a protective part that serves to prevent leaked fuel from splashing over highly heated portions of the engine, causing fire as a result.



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EVERY 8000 HOURS SERVICE

Maintenance for every 50, 250, 500, 1000, 2000 and 4000 hours service should be carried out at the same time.

REPLACE HIGH-PRESSURE PIPING CLAMP

Contact your Komatsu distributor to have the engine high-pressure clamps replaced.

REPLACE FUEL SPLAY PREVENTION CAPS

Contact your Komatsu distributor to have the fuel spray prevention cap replaced.

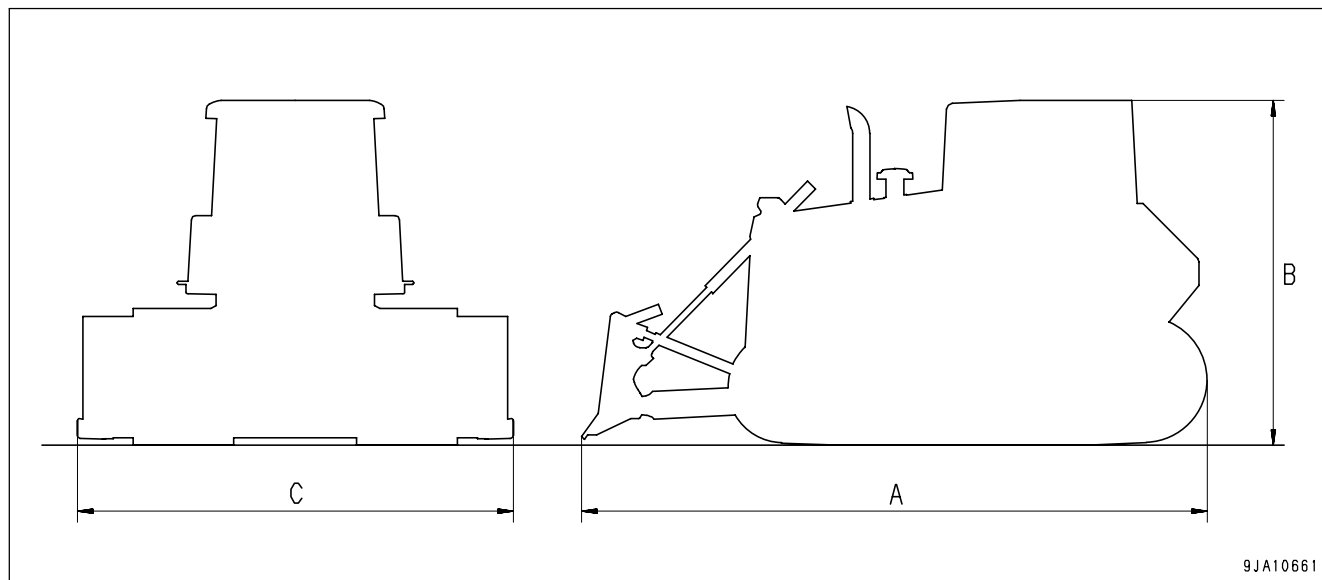
SPECIFICATIONS

SPECIFICATIONS

With ROPS cab, air conditioner

[]: Machines equipped with PLUS type track shoe

Item		Unit	D65EX-16 Sigma dozer	D65EX-16 Power angle power tilt dozer
Machine weight		kg (lb)	19,430 (42,843) [19,750 (43,549)]	20,910 (46,107) [21,230 (46,812)]
Name of engine		-	Komatsu SAA6D114E-3 diesel engine	
Engine horsepower (NET)		kW{HP}/rpm	153{205}/1,950	
Rear work equipment		-	Hitch	Counterweight
Type, width of shoe		mm (ft in)	Single, 510 (1' 8")	Single, 560 (1' 10")
A	Overall length	mm (ft in)	5,490 (18' 0")	5,790 (19' 0")
B	Overall height	mm (ft in)	3,155 (10' 4") [3,160 (10' 4")]	3,155 (10' 4") [3,160 (10' 4")]
C	Overall width	mm (ft in)	3,410 (11' 2")	3,870 (12' 8")
Travel speed (1st/2nd/3rd(Low)/3rd)		Forward	3.6/5.5/7.2/11.2 (2.2/3.4/4.5/7.0)	
		Backward	4.4/6.6/8.6/13.4 (2.7/4.1/5.3/8.3)	

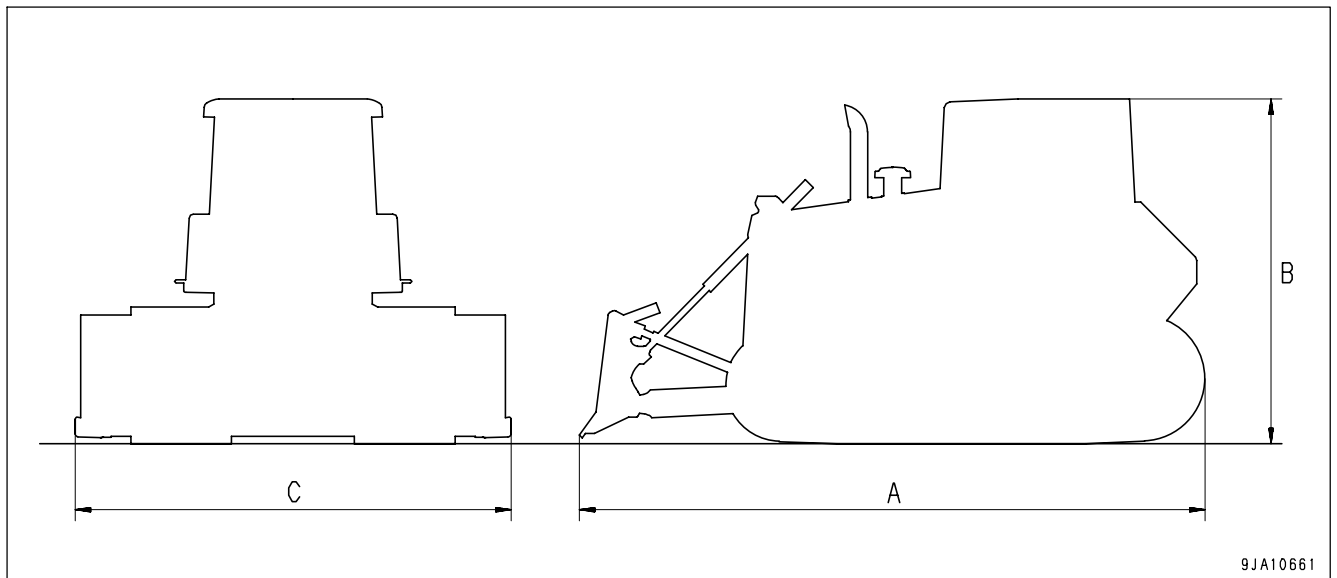


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With ROPS cab, air conditioner

[]: Machines equipped with PLUS type track shoe

Item		Unit	D65PX-16 Straight tilt dozer	D65PX-16 Power angle power tilt dozer
Machine weight		kg (lb)	20,910 (46,107) [21,230 (46,812)]	21,780 (48,025) [22,120 (48,775)]
Name of engine		-	Komatsu SAA6D114E-3 diesel engine	
Engine horsepower (NET)		kW{HP}/rpm	153{205}/1,950	
Rear work equipment		-	Hitch	Hitch
Type, width of shoe		mm (ft in)	Single, 915 (3' 0")	Single, 760 (2' 6")
A	Overall length	mm (ft in)	5,680 (18' 8")	5,790 (19' 0")
B	Overall height	mm (ft in)	3,155 (10' 4") [3,160 (10' 4")]	3,155 (10' 4") [3,160 (10' 4")]
C	Overall width	mm (ft in)	3,970 (13' 0")	4,010 (13' 2")
Travel speed (1st/2nd/3rd(Low)/3rd)		Forward	3.6/5.5/7.2/11.2 (2.2/3.4/4.5/7.0)	
		Backward	4.4/6.6/8.6/13.4 (2.7/4.1/5.3/8.3)	

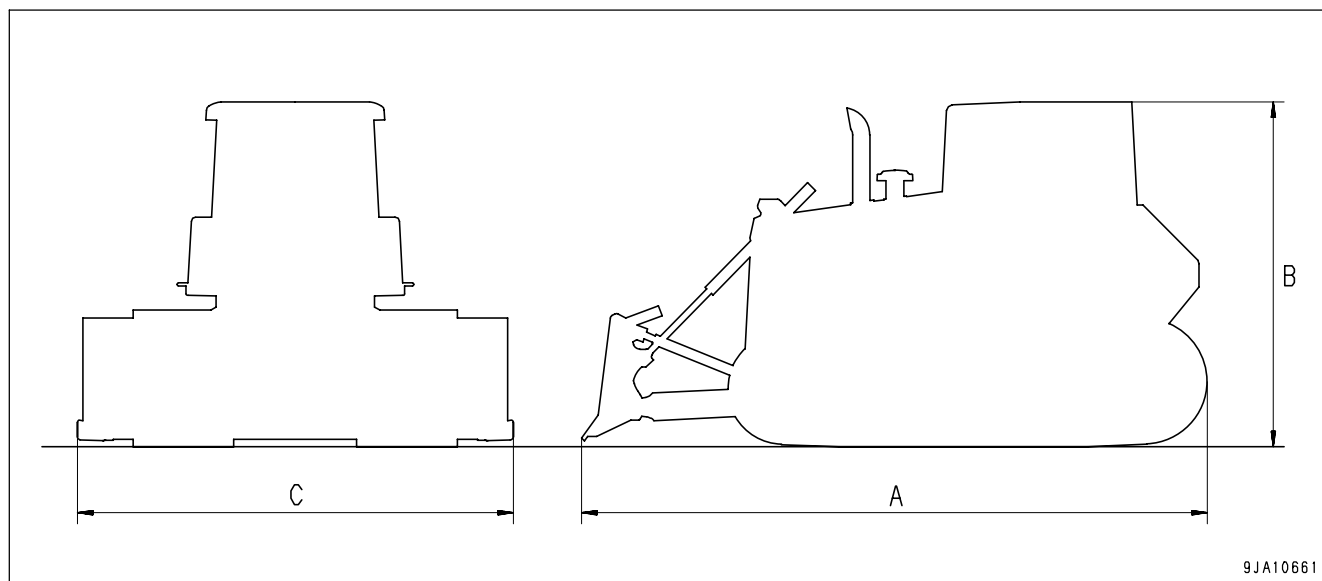


9JA10661

With ROPS cab, air conditioner

[]: Machines equipped with PLUS type track shoe

Item		Unit	D65WX-16 Sigma dozer	D65WX-16 Power angle power tilt dozer
Machine weight		kg (lb)	20,290 (44,739) [20,610 (45,445)]	21,810 (48,091) [22,130 (48,797)]
Name of engine		-	Komatsu SAA6D114E-3 diesel engine	
Engine horsepower (NET)		kW{HP}/rpm	153{205}/1,950	
Rear work equipment		-	Hitch	Counterweight
Type, width of shoe		mm (ft in)	Single, 760 (2' 6")	Single, 760 (2' 6")
A	Overall length	mm (ft in)	5,500 (18' 1")	5,790 (19' 0")
B	Overall height	mm (ft in)	3,155 (10' 4") [3,160 (10' 4")]	3,155 (10' 4") [3,160 (10' 4")]
C	Overall width	mm (ft in)	3,580 (11' 9")	4,010 (13' 2")
Travel speed (1st/2nd/3rd(Low)/3rd)		Forward	km/h (MPH) 3.6/5.5/7.2/11.2 (2.2/3.4/4.5/7.0)	
		Backward	km/h (MPH) 4.4/6.6/8.6/13.4 (2.7/4.1/5.3/8.3)	



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ATTACHMENTS, OPTIONS

 **WARNING**

Please read and make sure that you understand the SAFETY section 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 carefully, and do not use the machine before you understand the operation method completely.

If you lose the instruction manual, be sure to order another copy from your Komatsu distributor.

- To prevent serious personal injury caused by misoperation, place your foot on the pedal only when operating the pedal.

Precautions for removal and installation

When removing or installing an attachment, observe the following items and work safely.

- Select a firm, level surface when installing or removing an attachment.
- When working in cooperation with one or more other workers, decide signs and observe them when carrying out the operation.
- When carrying a heavy part (25 kg (55 lb) or more), use a crane.
- When removing a heavy part, always place a support in position before removing it.

When lifting a load with a crane, be particularly careful of the center of gravity.

- It is dangerous to carry out operations when the load has been raised by a crane. Always lower the load onto a stand and check that it is safe.
- When leaving an attachment removed or installing it, place it in a stable position to prevent it from falling over.
- Never go under a load raised by a crane.

Always stand in a place which is safe even if the load should fall.

NOTICE

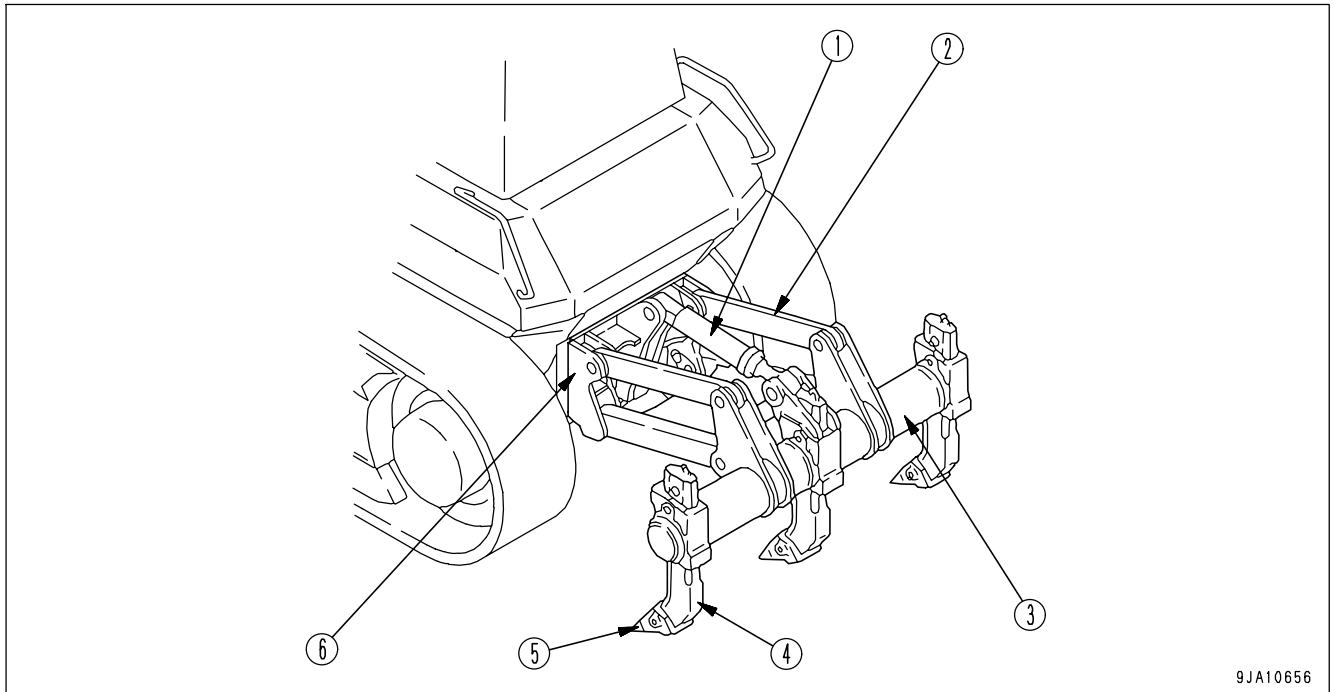
Qualifications are required to operate a crane. Never allow the crane to be operated by an unqualified person.

For details of removal and installation operations, contact your Komatsu distributor.

HANDLING HYDRAULIC RIPPER

- This hydraulic ripper is for D65EX and D65WX dozers.

GENERAL VIEW



- (1) Hydraulic cylinder
- (2) Link
- (3) Beam

- (4) Shank
- (5) Point
- (6) Support

EXPLANATION OF COMPONENTS

RIPPER CONTROL LEVER



WARNING

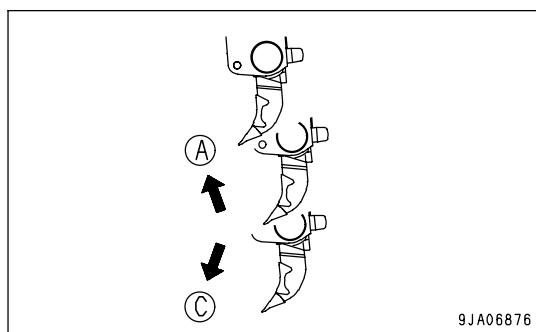
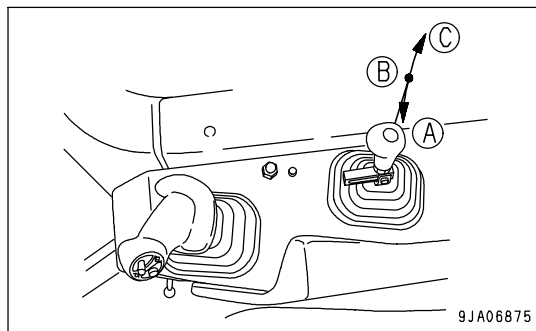
When carrying out inspection or maintenance of the machine, or when parking the machine, lower the ripper to the ground and set the work equipment lock lever to the LOCK position.

This lever is used to operate the ripper.

(A) RAISE: Ripper goes up

(B) HOLD: Ripper is stopped and held in the same position.

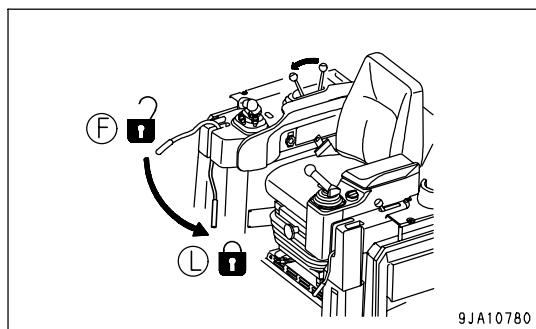
(C) LOWER: Ripper goes down



REMARK

If the work equipment lock lever is set to LOCK position (L), the operation of the ripper is locked.

For details of the operation of the work equipment lock lever, see "WORK EQUIPMENT LOCK LEVER (PAGE 3-58)".



OPERATION

CHECK BEFORE STARTING ENGINE, ADJUST

WALK-AROUND CHECK

1. Check for wear of the point at the tip of the shank, check the mounting condition, and check for damage to the rivets. If any problem is found, replace or repair.

PRECAUTIONS WHEN OPERATING

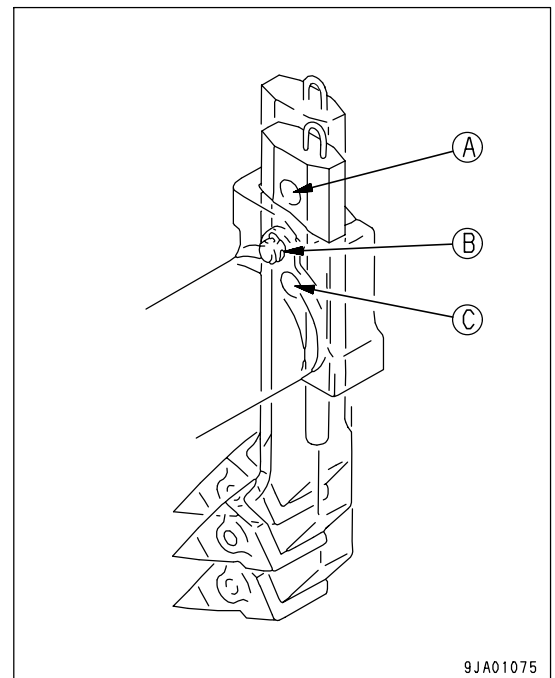
- Travel in low speed and lower the ripper gradually when starting to move the machine off. When the optimum digging depth is reached, move the control lever to the HOLD position.
Do not dig the shank in deep when starting digging operations.
- During ripping operations, never turn the machine suddenly or travel in reverse. When turning the machine suddenly or traveling in reverse, raise the shank from the ground surface.
- When carrying out digging operations with only one shank, always use the center shank. Remove both side shanks.
- When starting to travel up a steep slope or when reaching the bottom of the slope, the point may touch the ground. On hard ground, there is danger of the point breaking if it touches the ground, so raise the shank to the maximum height.

ADJUSTING POSTURE OF WORK EQUIPMENT

ADJUSTMENT OF DIGGING DEPTH

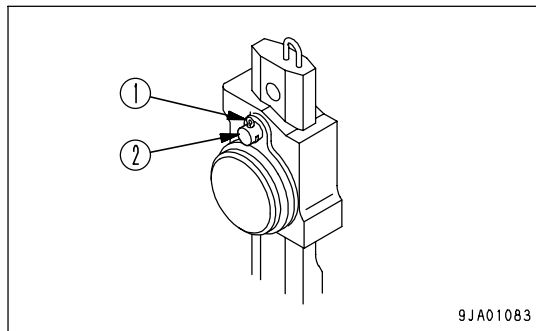
There are mounting holes for the pin in the shank. Select the mounting hole to match the digging depth.

Pin hole position	Use	Max. digging depth
(A)	When there is special need to dig deeply	585mm (23.0 in)
(B)	Normal	475mm (18.7 in)
(C)	When not using ripper	-



When changing the digging depth, do as follows.

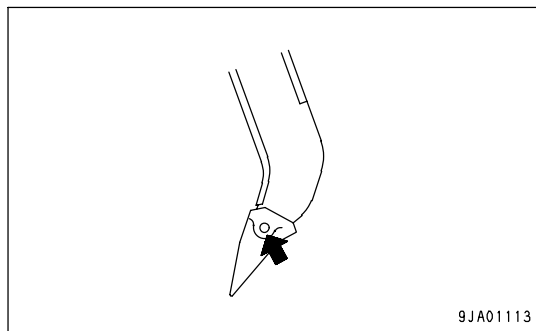
1. Remove cotter pin (1).
2. Remove pin (2), change the position of the shank hole, then insert pin (2).
3. Insert cotter pin (1).



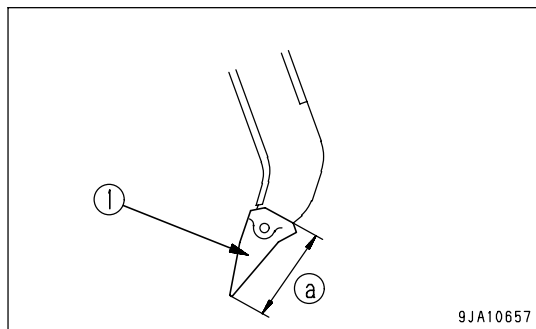
REPLACEMENT OF POINT

A point is installed to protect the shank. If the point is worn, replace it as follows.

1. Put a pin remover in contact with the pin marked by the arrow and tap with a hammer to remove.
2. Replace the point.
3. Insert the pin half way, then knock it in fully with a hammer.



NO.	Check Item	Criteria		Remedy
		Standard dimension	Repair limit	
(1)	Wear of point (a)	277 mm	170 mm	Replacement



TROUBLESHOOTING

OTHER TROUBLE

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

Problem	Main causes	Remedy
Slow ripper raising and function, lack of ripping force	<ul style="list-style-type: none"> • Improper hydraulic oil • Defective pump • Defective adjustment of relief valve • Defective control valve, safety valve <ul style="list-style-type: none"> • Defective valve spool • Defective piston ring, packing, valve • Clogging inside piping 	<ul style="list-style-type: none"> • Add oil to specified level, see EVERY 250 HOURS SERVICE (• Check, repair) (• Check, repair) (• Check, repair) (• Check, repair) (• Check, repair)
Cylinder lacks holding power	<ul style="list-style-type: none"> • Leakage of oil from piping, hose • Defective piston ring, packing • Defective piston valve • Defective valve spool • Defective safety valve, suction valve 	<ul style="list-style-type: none"> • Tighten (• Replace) (• Check, repair) (• Check, repair) (• Check, repair)
Oil pressure does not rise	<ul style="list-style-type: none"> • Clogging inside piping • Defective adjustment of relief valve 	<ul style="list-style-type: none"> (• Repair) (• Check, adjust)

HANDLING MACHINES EQUIPPED WITH KOMTRAX

- KOMTRAX is a machine management system that uses wireless communications.
- A contract with your Komatsu distributor is necessary before the KOMTRAX system can be used. Any customers desiring to use the KOMTRAX system should consult their Komatsu distributor.
- The KOMTRAX equipment is a wireless device using radio waves, so it is necessary to obtain authorization and conform to the laws of the country or territory where the machine equipped with KOMTRAX is being used. Always contact your Komatsu distributor before selling or exporting any machine equipped with KOMTRAX.
- When selling or exporting the machine or at other times when your Komatsu distributor considers it necessary, it may be necessary for your Komatsu distributor to remove the KOMTRAX equipment or to carry out action to stop communications.
- If you do not obey the above precautions, neither Komatsu nor your Komatsu distributor can take any responsibility for any problem that is caused or for any loss that results.

BASIC PRECAUTIONS



WARNING

- Never disassemble, repair, modify, or move the communications terminal, antenna, or cables. This may cause failure or fire on the KOMTRAX equipment or the machine itself. (Your Komatsu distributor will carry out removal and installation of KOMTRAX.)
- Do not allow cables or cords to become caught; do not damage or pull cables or cords by force. Short circuits or disconnected wires may cause failure or fire on the KOMTRAX equipment or the machine itself.
- For anyone wearing a pacemaker, make sure that the communications antenna is at least 22 cm (8.7 in) from the pacemaker. The radio waves may have an adverse effect on the operation of the pacemaker.

NOTICE

- Even when the key in the starting switch of the KOMTRAX system is at the OFF position, a small amount of electric power is consumed. When putting the machine into long-term storage, take the action given in "LONG-TERM STORAGE (PAGE 3-165)".
- Please contact your Komatsu distributor before installing a top guard or other attachment that covers the cab roof.
- Be careful not to get water on the communications terminal or wiring.

REMARK

- The KOMTRAX system uses wireless communications, so it cannot be used inside tunnels, underground, inside buildings, or in mountain areas where radio waves cannot be received. Even when the machine is outside, it cannot be used in areas where the radio signal is weak or in areas outside the wireless communication service area.
- There is absolutely no need to inspect or operate the KOMTRAX communications terminal, but if any abnormality is found, please consult your Komatsu distributor.

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D65EX-16, D65PX-16, D65WX-16 BULLDOZER

Form No. TEN00330-02

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Printed in Japan 12-09
