

Operation & Maintenance Manual

GALEO

PC228US-3

PC228USLC-3

HYDRAULIC EXCAVATOR

SERIAL NUMBERS	PC228US-3	30001 and up
	PC228USLC-3	30001 and up

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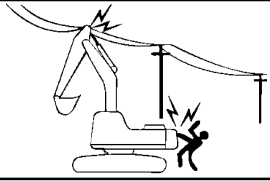
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(4) Warnings for high voltage (09801-03001)

⚠ DANGER



Hazardous voltage hazard.
Serious injury or death can occur
if machine or attachments are not
kept safe distance away from
electric lines.

VOLTAGE		SAFE DISTANCE
LOW VOLTAGE	100V 200V	2m
	6,600V	2m
	22,000V	3m
SPECIAL HIGH VOLTAGE	66,000V	4m
	154,000V	5m
	187,000V	6m
	275,000V	7m
	500,000V	11m

09801-03001

(5) Caution when opening or closing front window
(09839-03000)

⚠ WARNING

To open or close the front or ceiling window, never stand up from the operator's seat before throwing the lock lever to the LOCK position.

Inadvertently touching any of the working equipment control levers might cause the machine to start moving all of a sudden, probably resulting in a serious injury.

09839-03000

ATTACHMENT INSTALLATION

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

ATTACHMENT COMBINATIONS

Depending on the type or combination of work equipment, there is a hazard that the work equipment may hit the cab or other parts of the machine. Before using unfamiliar work equipment, check if there is any hazard of interference, and operate with caution.

CAB WINDOW GLASSES

- If the cab glass on the work equipment side is broken, there is a hazard that the work equipment may contact the operator's body directly. Stop operation immediately and replace the glass.
- The ceiling window is made of organic glass (polycarbonate), and as such it is apt to break easily when receiving damage on the surface, thereby deteriorating its protective characteristic. If there is a crack or damage caused by a fallen rock, or when any sign of them is noticed, replace it with a new window.

UNAUTHORIZED MODIFICATIONS

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

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

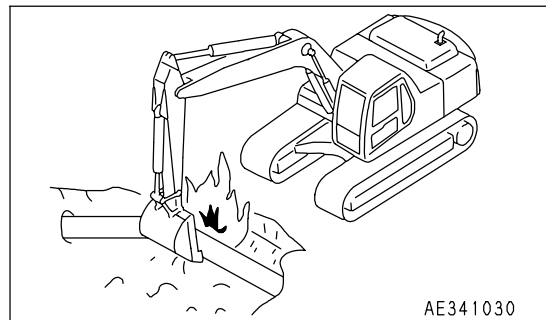
SAFETY AT JOBSITE

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

- When carrying out operations near combustible materials such as thatched roofs, dry leaves or dry grass, there is a hazard of fire, so be careful when operating.
- Check the terrain and condition of the ground at the worksite, and determine the safest method of operation. Do not carry out operations at places where there is a hazard of landslides or falling rocks.
- If water lines, gas lines, or high-voltage electrical lines may be buried under the worksite, contact each utility and identify their locations. Be careful not to sever or damage any of these lines.
- Take action to prevent unauthorized people from approaching the jobsite.

When working on public roads, position flagmen and erect barriers to ensure the safety of passing traffic and pedestrians.

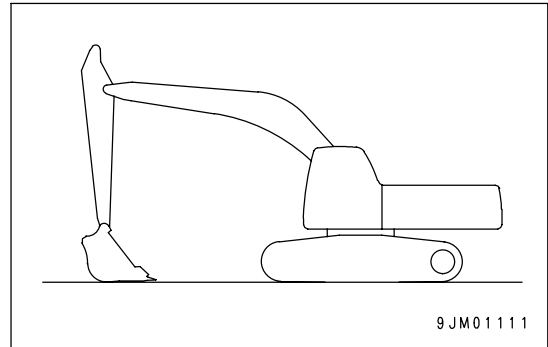
- When traveling or operating in shallow water or on soft ground, check the shape and condition of the bedrock, and the depth and speed of flow of the water before starting operations.

**WORKING ON LOOSE GROUND**

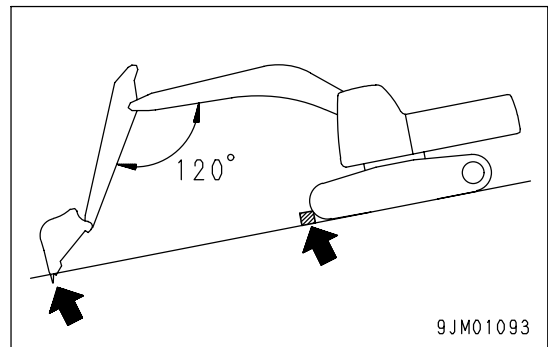
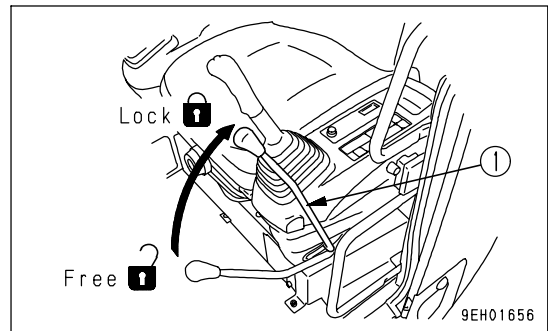
- Avoid traveling or operating your machine too close to the edge of cliffs, overhangs, and deep ditches. The ground may be weak in such areas. If the ground should collapse under the weight or vibration of the machine, there is a hazard that the machine may fall or tip over. Remember that the soil after heavy rain or blasting or after earthquakes is weak in these areas.

PARKING MACHINE

- Park the machine on firm, level ground.
- Select a place where there is no hazard of falling rocks or landslides, or of flooding if the land is low.
- Lower the work equipment completely to the ground.



- When leaving the machine, set lock lever (1) to the LOCK position, then 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 bucket on the downhill side, then dig it into the ground.
 - Put blocks under the tracks to prevent the machine from moving.



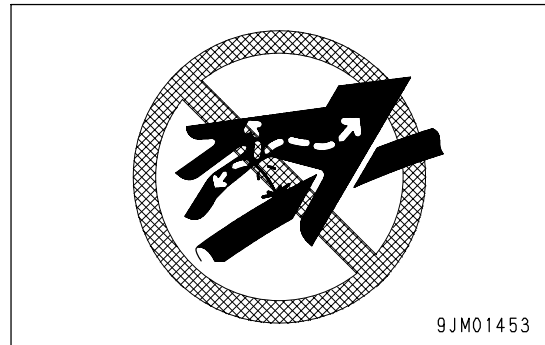
SAFETY RULES FOR HIGH-PRESSURE OIL

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

- For details of the method of releasing the pressure, see "METHOD FOR RELEASING INTERNAL PRESSURE IN HYDRAULIC CIRCUIT (PAGE 4-43)". If the circuit is still under pressure, do not carry out any inspection or replacement operation.
- If there is any leakage from the piping or hoses, the surrounding area will be wet, so check for cracks in the piping and hoses and for swelling in the hoses.

When carry out inspection, wear safety glasses and leather gloves.

- There is a hazard that high-pressure oil leaking from small holes may penetrate your skin or cause blindness if it contacts your eyes directly. If you are hit by a jet of high-pressure oil and suffer injury to your skin or eyes, wash the place with clean water, and consult a doctor immediately for medical attention.



SAFETY HANDLING HIGH-PRESSURE HOSES

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

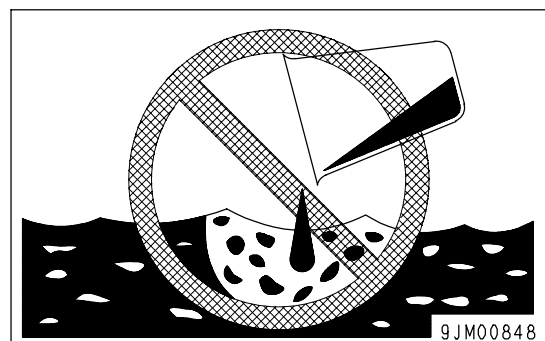
Replace the hose if any of the following problems are found.

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

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.



AIR CONDITIONER MAINTENANCE

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

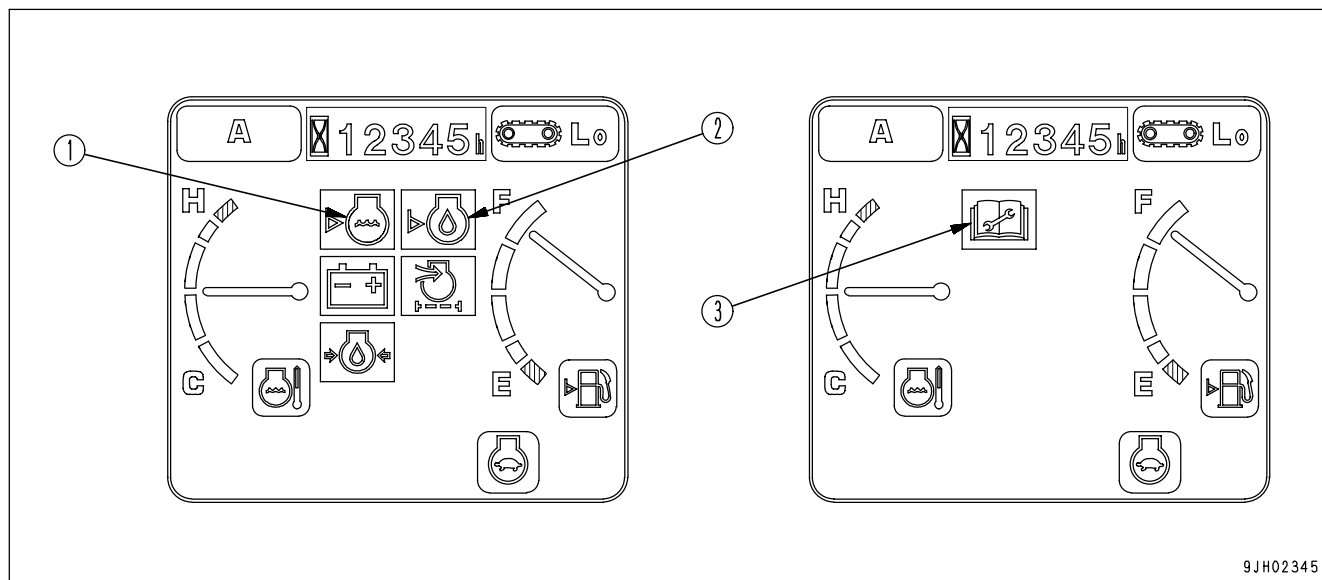
Basic Check Monitors



CAUTION

These monitors DO NOT ensure that the machine is in good condition. When performing checks before starting (daily checks), do not simply rely on the monitors. Always dismount 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.



9JH02345

A(1) Radiator coolant level monitor

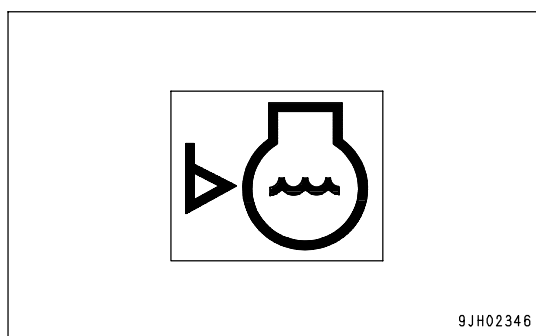
A(2) Engine oil level monitor

A(3) Maintenance interval monitor

Radiator Coolant Level Monitor

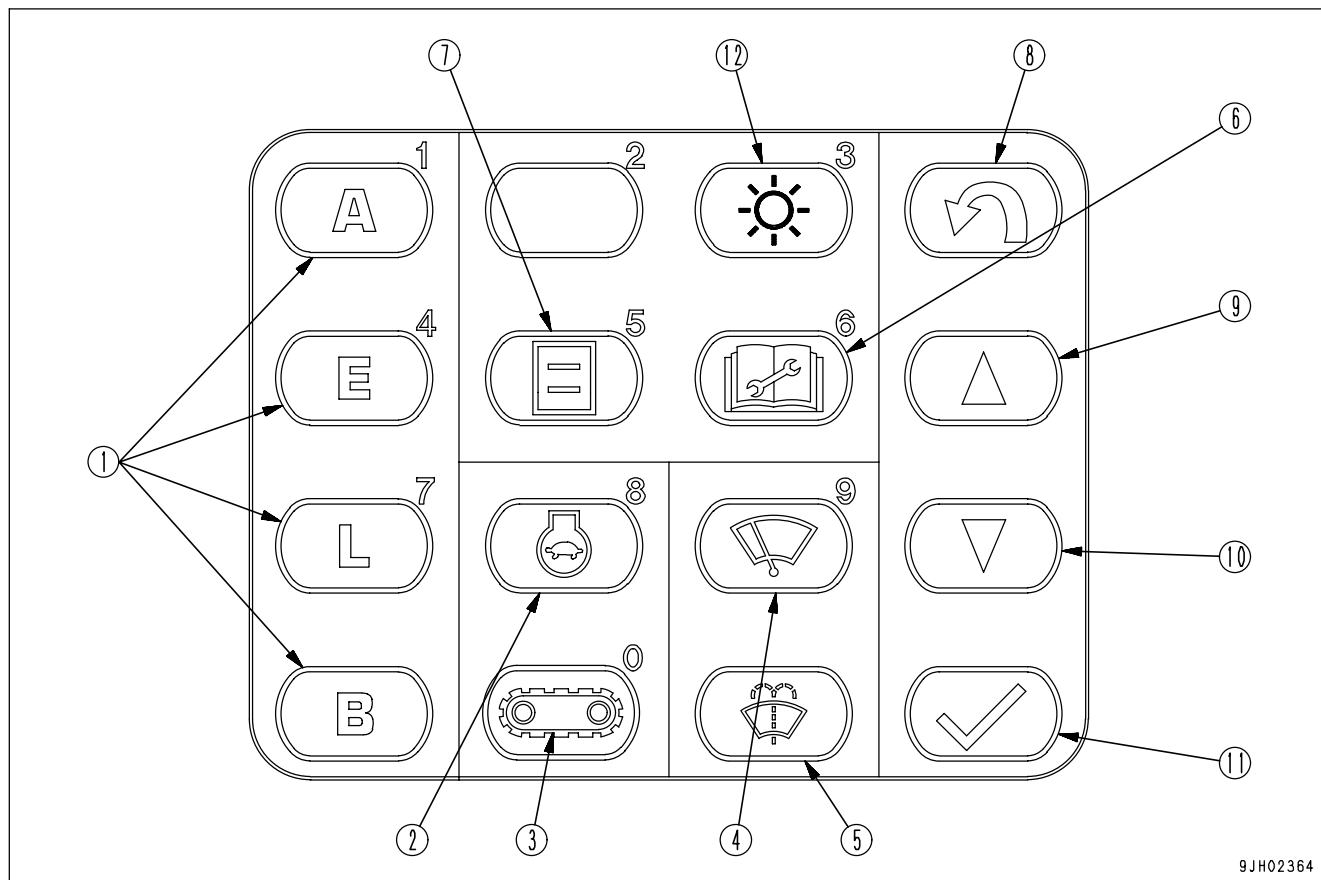
Monitor (1) warns the operator that there has been a drop in the radiator coolant level.

If the radiator coolant is low, the lamp lights up red, so check coolant level in the radiator and subtank, and add coolant.



9JH02346

Monitor Switches Portion



9JH02364

E(1) Working mode selector switch (basic switch)

E(2) Auto-deceleration switch (selection switch)

E(3) Travel speed selector switch

E(4) Wiper switch

E(5) Window washer switch

E(6) Maintenance switch

E(7) Select switch

E(8) Back switch

E(9) Up switch

E(10) Down switch

E(11) Input confirmation switch

E(12) Adjusting brightness and contrast

Working Mode Selector Switch (Basic Switch)

Switch (1) is used to set the power and movement of the work equipment.

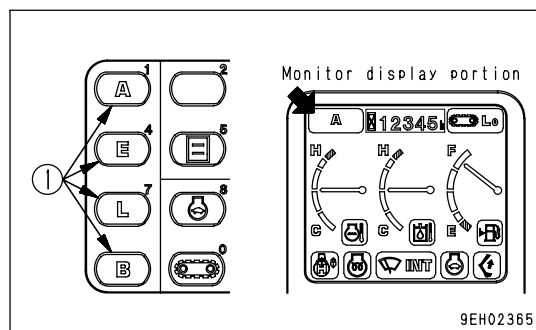
Operations can easily be performed by selecting the mode to match the type of operation.

A mode: For heavy-duty operations

E mode: For operations prioritizing fuel consumption

L mode: For fine-control operations

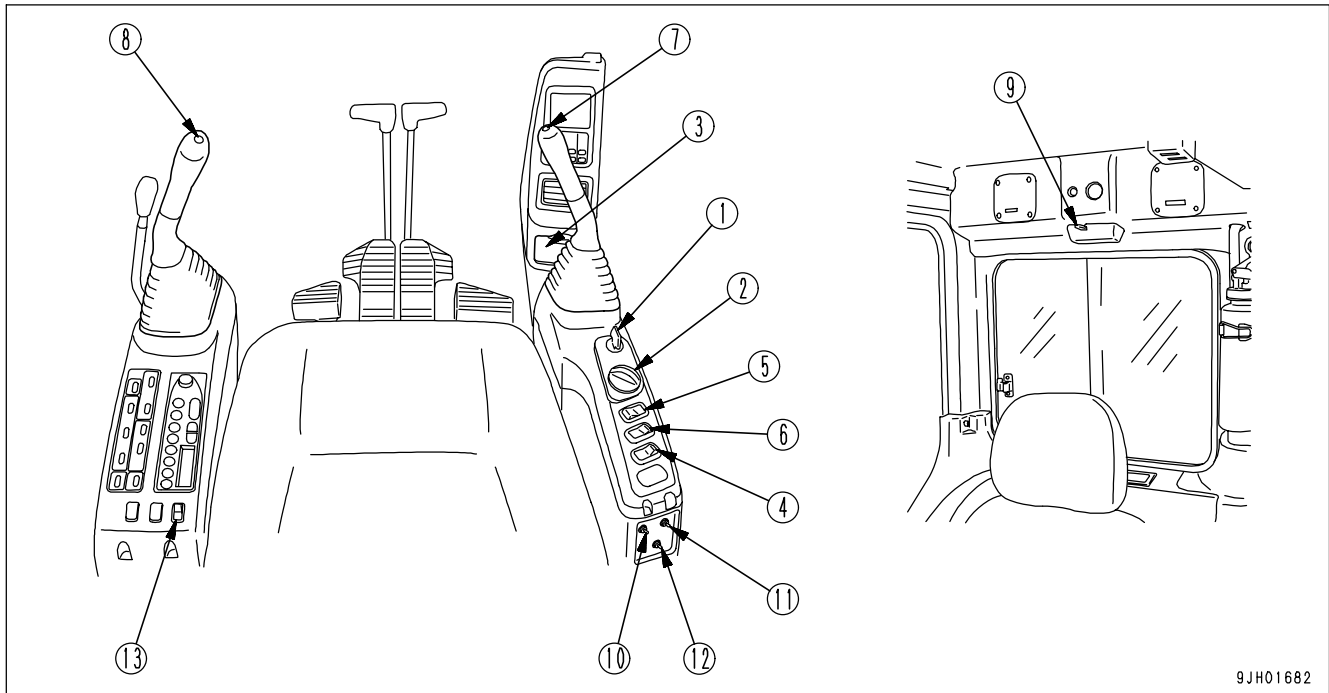
B mode: For breaker operations



9EH02365

- When the engine is started, the working mode is set automatically to A mode. When the switch is pressed, it is possible to select the other modes. The monitor display on the monitor display portion changes for each mode.
- If it is desired to have the working mode set to start automatically in E, L, or B mode (default options setting), please contact your Komatsu distributor to change the setting.

SWITCHES



9JH01682

- | | |
|------------------------------|--|
| (1) Starting switch | (8) Knob switch |
| (2) Fuel control dial | (9) Room lamp switch |
| (3) Cigarette lighter | (10) Pump drive emergency switch |
| (4) Swing lock Switch | (11) Swing holding brake release switch |
| (5) Lamp switch | (12) Emergency work equipment actuation switch |
| (6) Alarm buzzer stop switch | (13) Rotating lamp switch (if Equipped) |
| (7) Horn switch | |

Starting Switch

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

OFF position

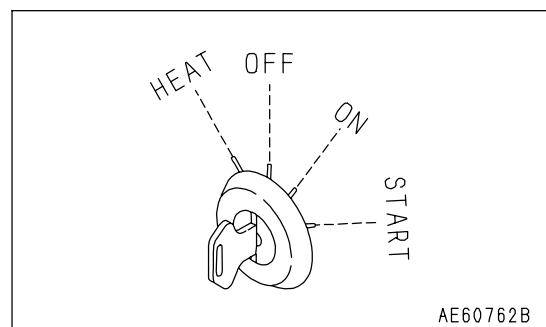
The key can be inserted or withdrawn. The switches for the electric system except the room lamp, are all turned off and the engine is stopped.

ON position

Electric current flows in the charging and lamp circuits. Keep the starting switch key at the ON position while the engine is running.

START position

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



AE60762B

SUN ROOF

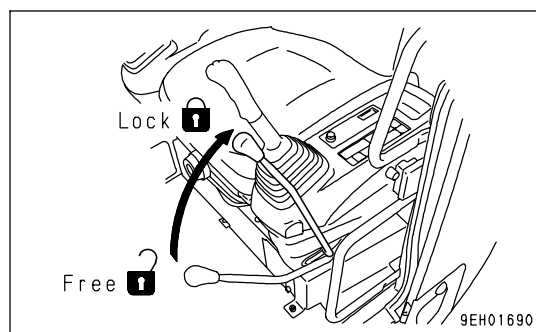


WARNING

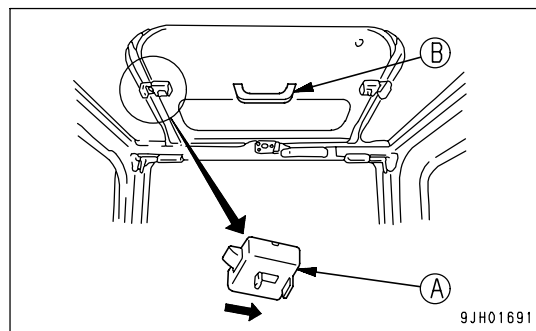
- When leaving the operator's compartment, set the lock lever securely to the LOCK position.
- If the control levers are not locked, and they are touched by mistake, this may lead to a serious accident.
- When opening or closing the roof hatch, carry out the operation on horizontal ground. If you open or close the hatch when the footing conditions are poor, there is danger that you may fall.

Opening

1. Set the lock lever securely to the LOCK position.



2. Release lock (A) provided on both side of the ceiling and check that it moves freely. Then push it up to open, holding handle (B).

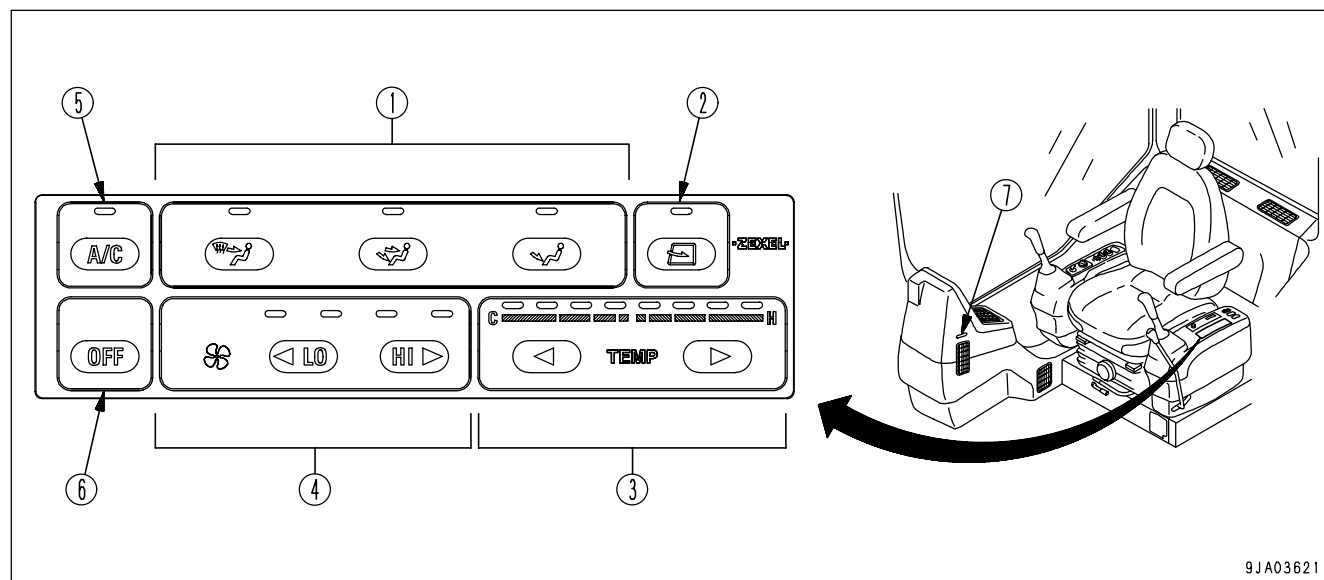


Closing

Pull the ceiling down, holding handle (B) and set locks (A). If the locks do not engage properly, open the ceiling once again and try to shut it.

AIR CONDITIONER CONTROLS

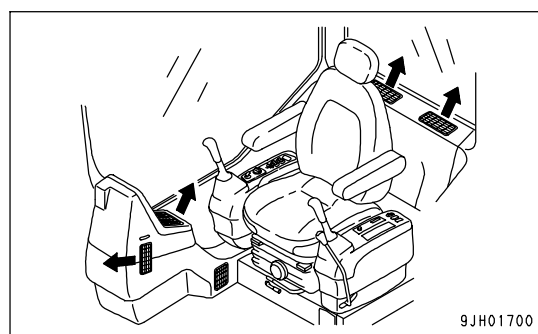
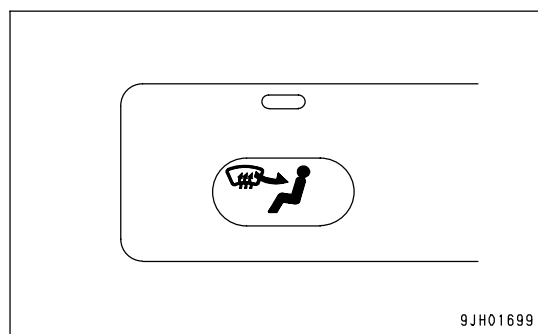
Air Conditioner Control Panel



- | | |
|---|------------------------------|
| (1) Vent selector switch | (5) Air conditioner switch |
| (2) Air circulation selector switch (external/internal) | (6) Off switch |
| (3) Temperature control switch | (7) Defroster selector lever |
| (4) Air flow selector switch | |

Vent Selector Switch (Air Flow to Upper Part of Body)

If this switch (1) is pressed, the air from the air conditioner is all directed to the face. This can be used to send a cool breeze to the face during hot weather.



Setting Correct Time

1. Press display selector button (4) to display the time.

After 5 seconds, the display will return to the frequency display and the time cannot be corrected. If this happens, press display selector button (4) again.

2. Press time adjustment button (8) to set to Hour or Minute.

H button: Adjusts the hour (each time the button is pressed, the time advances by one hour)

M button: Adjusts the minute (each time the button is pressed, the time advances by one minute)

If the H or M button is kept pressed, the time will advance continuously until the button is released.

ADJ button: When the ADJ button is pressed, the time is reset as follows.

When display is 00 - 05 minutes, time is returned to 00 min. 00 sec. (No change in hour)

When display is 55 - 59 minutes, time is advanced to 00 min. 00 sec. (Hour advances)

When display is 06 - 54 minutes, time cannot be reset. (Time stays same)

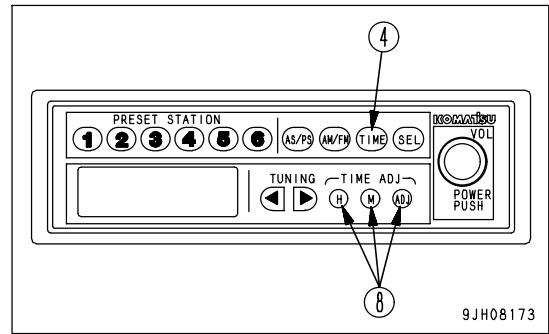
Example

10:05 → 10:00

10:59 → 11:00

10:26 → 10:26

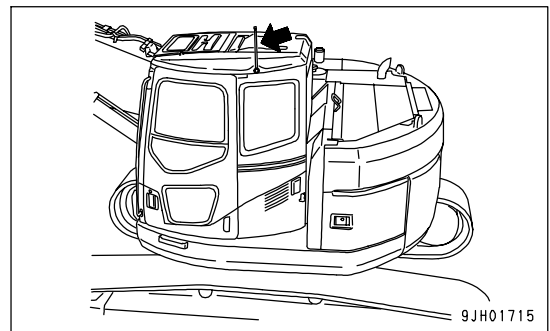
Use the H, M, and ADJ buttons to set to the correct time.



Antenna

NOTICE

Before transporting the machine or putting it inside a building, stored the antenna to prevent any interference.

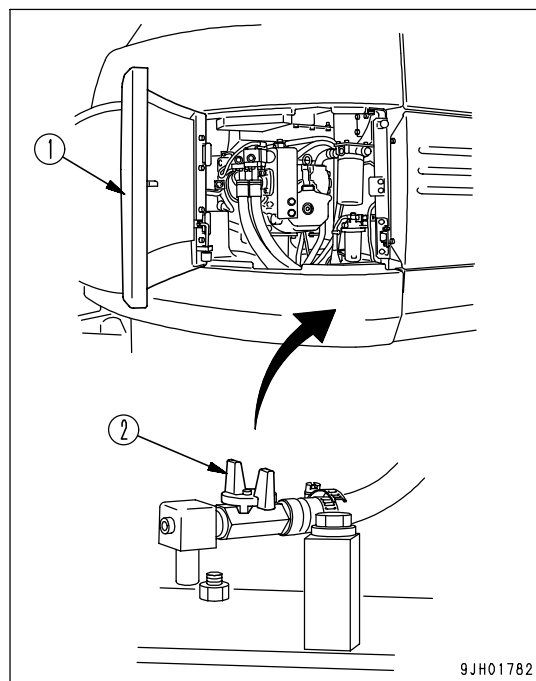


Use Radio with Care

- 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 benzene, thinner, or any other solvent. Wipe with a soft dry cloth. Use a cloth soaked in alcohol if the equipment is extremely dirty.
- When the battery is replaced, the settings for the preset buttons are all cleared, so set them again.

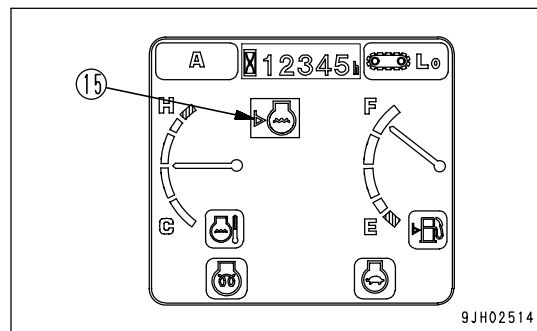
Drain Water And Sediment from Fuel Tank

1. Open the pump room door (1) at the rear right of the machine.
2. Put a container to catch the drained fuel under drain valve (2).
3. Open drain valve (2) at the rear of the fuel tank and drain the water and sediment accumulated at the bottom of the tank together with the fuel.
4. When only clean fuel comes out, close drain valve (2).
5. Close the pump room door (1) at the rear right of the machine.



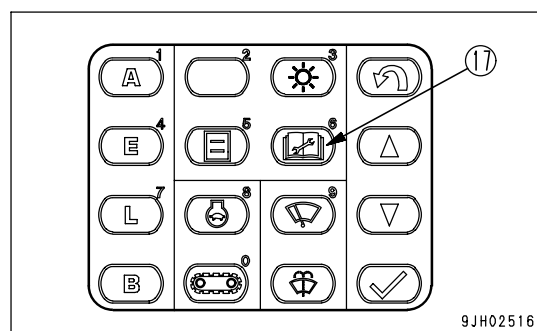
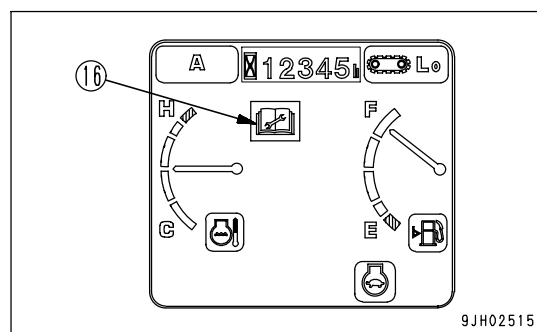
9JH01782

- 3) If the hydraulic oil temperature gauge goes out and caution lamp (15) stays lighted up red, perform inspection immediately for the item which is lighted up red.

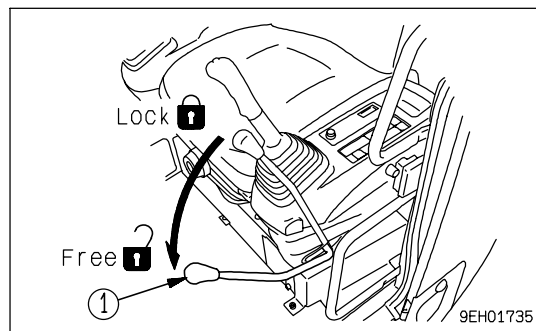


- 4) If there are any items where the maintenance time has passed, maintenance interval monitor (16) lights up for 30 seconds. Press maintenance switch (17), check the item, then perform maintenance immediately.

For details of the method of checking the maintenance interval, see "Maintenance Switch (PAGE 3-22)" in the Detailed controls and gauges.



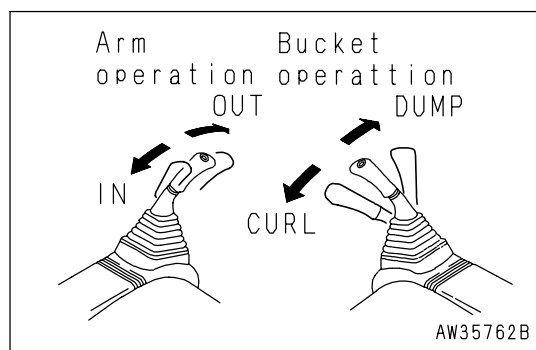
4. Set lock lever (1) to the FREE position and raise the bucket from the ground.



5. Operate bucket control lever (3) and arm control lever (4) slowly to move the bucket cylinder and arm cylinder to the end of the stroke.
6. Operate the bucket for 30 seconds and the arm for 30 seconds in turn fully for 5 minutes.

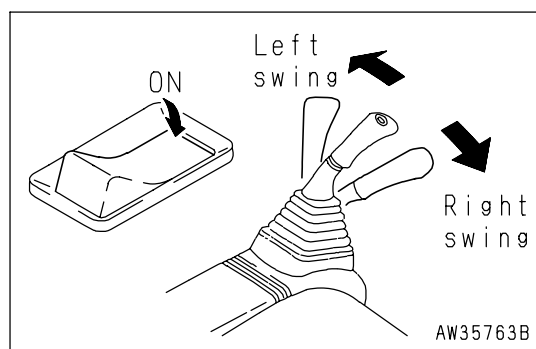
REMARK

If swing lock switch (5) is operated to the ON position, it is possible to raise the oil temperature faster.



NOTICE

When the work equipment is retracted, take care that it does not interfere with the machine body or ground.



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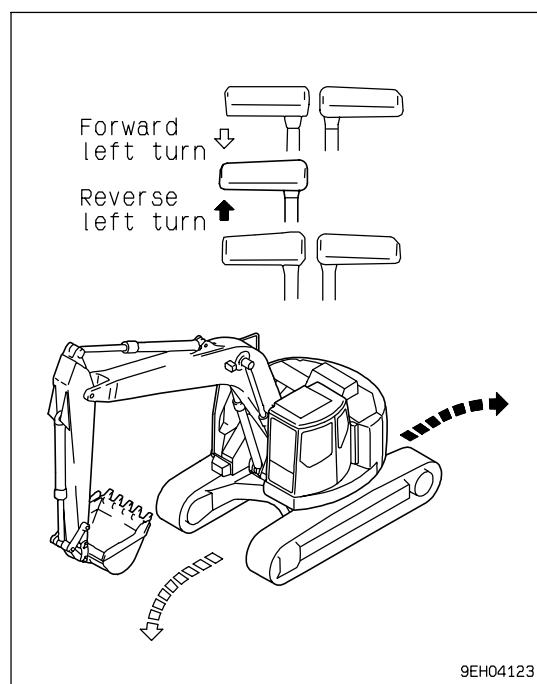
Changing Direction of the Machine

When turning to the left:

If the left travel lever is returned to the neutral position, the machine will turn to the left.

REMARK

When turning to the right, operate the right travel lever in the same way.

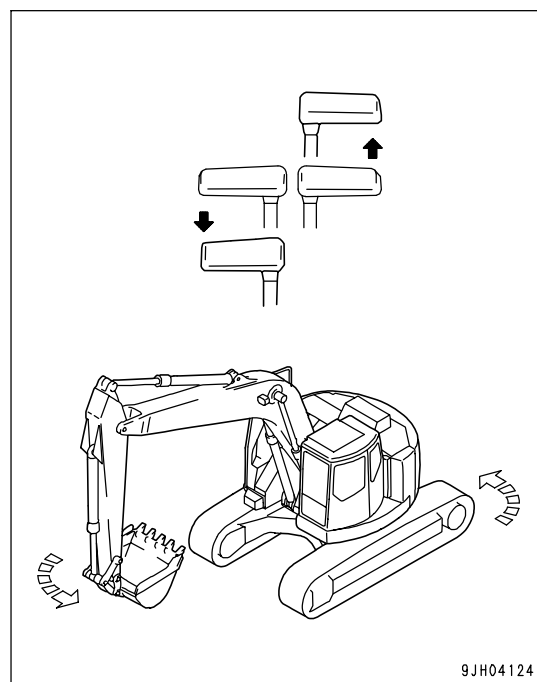


Counter-rotation Turn (Spin Turn)

When using counter-rotation (spin turn) to turn left, pull the left travel lever back and push the right travel lever forward.

REMARK

When using counter-rotation to turn right, pull the right travel lever back and push the left travel lever forward.



ESCAPE FROM MUD

Always operate carefully to avoid getting stuck in mud. If the machine does get stuck in mud, do as follows to get the machine out.

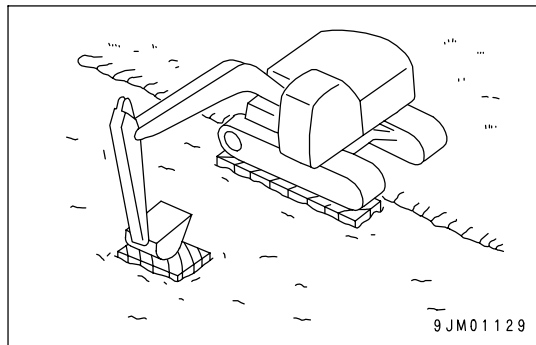
Track on One Side Stuck

NOTICE

When using the boom or arm to raise the machine, always have the bottom of the bucket in contact with the ground. The angle between the boom and arm should be 90° to 110° .

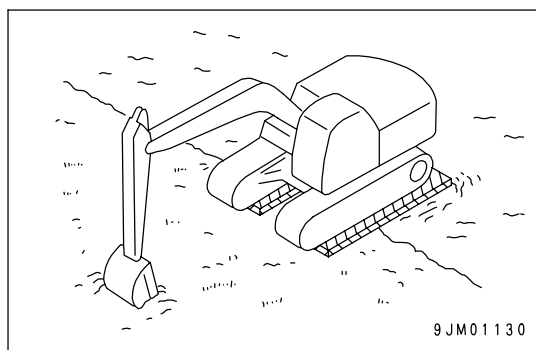
The same applies when using the bucket installed in the reverse direction.

When only one side is stuck in mud, use the bucket to raise the track, then lay boards or logs and drive the machine out.



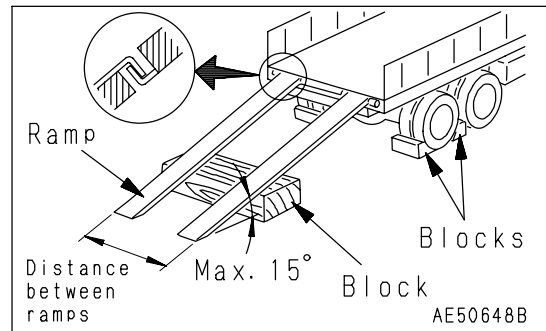
Tracks on Both Sides Stuck

When the tracks on both sides are stuck in mud and they slip, making it impossible for the machine to move, lay boards or logs as explained above, and dig the bucket into the ground in front. Then pull in the arm as in normal digging operations and put the travel levers in the FORWARD position to pull the machine out.

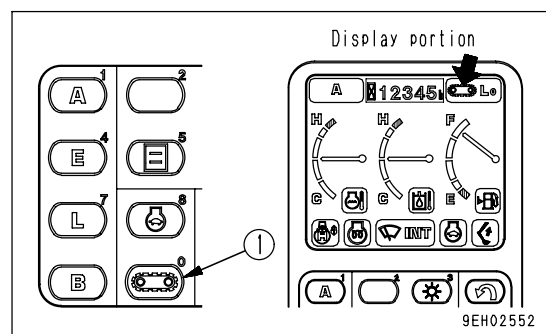


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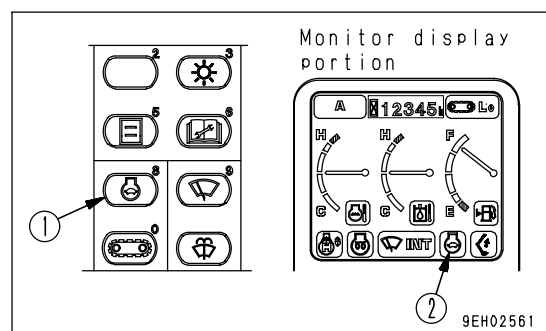
1. Load and unload on firm level ground only.
Maintain a safe distance from the edge of a road.
2. Properly apply the brakes on the trailer and put blocks under the tires to ensure that the trailer does not move.
Make the slope of the ramps a maximum of 15°.



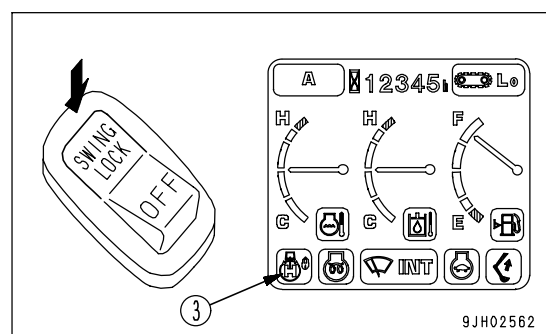
3. Set the travel speed selector switch to Lo (low speed travel).
 - To switch the travel speed, press travel speed selector switch (1). The travel speed is displayed as Lo, Mi, or Hi on the monitor display.



4. Turn auto-deceleration switch (1) OFF and operate the fuel control dial to set the engine speed to low idle.
 - Each time auto-deceleration switch (1) is pressed, it switches OFF → ON → OFF in turn.
 - When auto-deceleration switch (1) is turned OFF, display monitor (2) goes out.



5. Turn the swing lock switch ON to apply the swing lock.
 - When the swing lock switch is turned ON, display monitor (3) lights up.



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 (°C)	20	0	-10	-20
100	1.28	1.29	1.30	1.31
90	1.26	1.27	1.28	1.29
80	1.24	1.25	1.26	1.27
75	1.23	1.24	1.25	1.26

- As the battery capacity 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.

Starting the Engine



WARNING

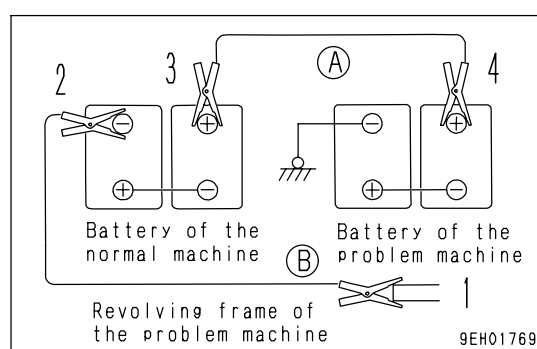
Always check that the lock lever is set to the LOCK position, regardless of whether the machine is working normally or has failed. Check also that all the control levers are in the neutral position.

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.

Booster Cable Disconnection

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

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



OUTLINE OF SERVICE

HANDLING OIL, FUEL, COOLANT, AND PERFORMING OIL CLINIC

Oil

- Even if oil is not dirty, always change the oil at the specified interval.
Oil is used in the engine and work equipment under extremely severe conditions (high temperature, high pressure), and it deteriorates with use.
- Always use oil that matches the grade and temperature for use given in the Operation and Maintenance Manual.
- Never mix oils of different grades or brands.
- Oil corresponds to blood in the human body, so always be careful when handling it to prevent any impurities (water, metal particles, dirt, etc.) from getting in.
Take particular care not to let any impurities get in when adding oil.
The majority of problems with machines are caused by the entry of such impurities.
- Always add the specified amount of oil.
Having too much oil or too little oil are both causes of problems.
- When changing the oil, always replace the related filters at the same time.
- 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.
- 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.

Fuel

- The fuel pump is a precision instrument, and if fuel containing water or dirt is used, it cannot work properly.
- Be extremely careful not to let impurities get in when storing or adding fuel.
- Always use the fuel specified in the Operation and Maintenance Manual.
Fuel may congeal, depending on the temperature, when it is used (particularly in low temperature below -15°C (5°F)). It is necessary to change to the fuel that is suitable for the temperature.
- To prevent the moisture in the air from condensing and forming water inside the fuel tank, always fill the fuel tank after completing the day's work.
- Before starting the engine, or when 10 minutes have passed after adding fuel, drain the sediment and water from the fuel tank.
- If the engine runs out of fuel, or if the filters have been replaced, it is necessary to bleed the air from the circuit.
- If there is any foreign material in the fuel tank, wash the tank and fuel system.

Cooling System Coolant

- If the coolant level is low, it will cause overheating, and will also cause problems with corrosion due to air entering the coolant.
- River water contains large amount of calcium and other impurities, so if it is used, scale will stick to the engine and radiator, and this will cause defective heat exchange and overheating.
- Do not use water that is not suitable for drinking.
- Antifreeze is also effective in preventing corrosion on the parts of the engine cooling system. It may be continuously used for two years or 4000 hours of operation, therefore it may be used throughout the year.
- When using anti-freeze, always observe the precautions given in the Operation and Maintenance Manual.
Anti-freeze is flammable, so be extremely careful not to expose it to flame or fire.
The proper mixing proportion of the antifreeze depends on the ambient temperature. For the mixing proportion, see "CLEAN INSIDE OF COOLING SYSTEM (PAGE 4-24)".

Grease

- Grease is used to prevent seizure and noises at the joints.

MAINTENANCE SCHEDULE

If the machine is equipped with a hydraulic breaker, the maintenance schedule for some parts will be different. For details, see "MAINTENANCE INTERVAL FOR HYDRAULIC BREAKER (PAGE 4-16)" to confirm the correct maintenance schedule when carrying out maintenance.

MAINTENANCE SCHEDULE CHART

INITIAL 250 HOURS MAINTENANCE (ONLY AFTER THE FIRST 250 HOURS)

REPLACE FUEL FILTER CARTRIDGE	4- 55
CHECK ENGINE VALVE CLEARANCE, ADJUST	4- 69

INITIAL 1000 HOURS MAINTENANCE (ONLY AFTER THE FIRST 1000 HOURS)

CHECK ENGINE VALVE CLEARANCE, ADJUST	4- 69
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WHEN REQUIRED

CHECK, CLEAN AND REPLACE AIR CREAMER ELEMENT	4- 18
CLEAN INSIDE OF COOLING SYSTEM	4- 24
CHECK AND TIGHTEN TRACK SHOE BOLTS	4- 26
CHECK AND ADJUST TRACK TENSION	4- 27
CHECK ELECTRICAL INTAKE AIR HEATER	4- 29
REPLACE BUCKET TEETH (VERTICAL PIN TYPE)	4- 30
REPLACE BUCKET TEETH (HORIZONTAL PIN TYPE)	4- 33
ADJUST BUCKET CLEARANCE	4- 34
CHECK WINDOW WASHER FLUID LEVEL, ADD FLUID	4- 35
CHECK AND ADJUST AIR CONDITIONER	4- 36
WASHING WASHABLE FLOOR	4- 38
BLEEDING AIR FROM HYDRAULIC SYSTEM	4- 41
METHOD FOR RELEASING INTERNAL PRESSURE IN HYDRAULIC CIRCUIT	4- 43
CHECK NITROGEN GAS CHARGE PRESSURE IN ACCUMULATOR (CONTROL CIRCUIT)	4- 44

CHECKS BEFORE STARTING

EVERY 100 HOURS MAINTENANCE

LUBRICATING	4- 46
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EVERY 250 HOURS MAINTENANCE

LUBRICATING	4- 48
LUBRICATE SWING CIRCLE (2 PLACES)	4- 49
CHECK OIL LEVEL IN SWING MACHINERY CASE, ADD OIL	4- 50
CHECK OIL LEVEL IN FINAL DRIVE CASE, ADD OIL	4- 51
CHECK LEVEL OF BATTERY ELECTROLYTE	4- 52
CHECK AIR CONDITIONER COMPRESSOR BELT TENSION, ADJUST	4- 54

EVERY 500 HOURS MAINTENANCE

REPLACE FUEL FILTER CARTRIDGE	4- 55
CHECK SWING PINION GREASE LEVEL, ADD GREASE	4- 56
CLEAN AND INSPECT RADIATOR FINS, OIL COOLER FINS, CONDENSER FINS AND AFTER COOLER FINS	4- 57
CLEAN FRESH/RECIRC AIR FILTER OF AIR CONDITIONER (IF EQUIPPED)	4- 58
REPLACE BREATHER ELEMENT IN HYDRAULIC TANK	4- 60

CLEAN INSIDE OF COOLING SYSTEM



WARNING

- Immediately after the engine is stopped, the coolant is at a high temperature and the radiator is under high internal pressure. If the cap is removed to drain the coolant in this condition, there is a hazard of burns. Wait for the temperature to go down, then turn the cap slowly to release the pressure before removing it.
- Cleaning is carried out with the engine running. When standing up or leaving the operator's seat, set the lock lever to the LOCK position.
- For details of starting the engine, see "BEFORE STARTING ENGINE (PAGE 3-63)" and "STARTING ENGINE (PAGE 3-79)" in the OPERATION section.
- There is danger of touching the fan if the undercover is left removed.
Never enter behind the machine when the engine is running.

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

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

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

Use a permanent type of antifreeze.

If, for some reason, it is impossible to use permanent type antifreeze, use an antifreeze containing ethylene glycol. Super Coolant (AF-ACL) has an anti-corrosion effect as well as an antifreeze effect.

The ratio of antifreeze to water depends on the ambient temperature, but to obtain the corrosion resistance effect, a minimum ratio of 30% by volume is necessary.

When deciding the ratio of antifreeze to water, check the lowest temperature in the past, and decide from the mixing rate table given below.

It is actually better to estimate a temperature about 10°C (18°F) lower when deciding the mixing rate.

Mixing rate of water and antifreeze

Min. atmospheric temperature	°C	Above -10	-15	-20	-25	-30
	°F	Above 14	5	-4	-13	-22
Amount of antifreeze	Liters	7.4	8.7	9.7	10.8	11.7
	US gal	1.96	2.30	2.56	2.85	3.09
Amount of water	Liters	15.0	13.7	12.7	11.6	10.7
	US gal	3.96	3.62	3.36	3.07	2.83
Volume ratio	%	30	36	41	46	50

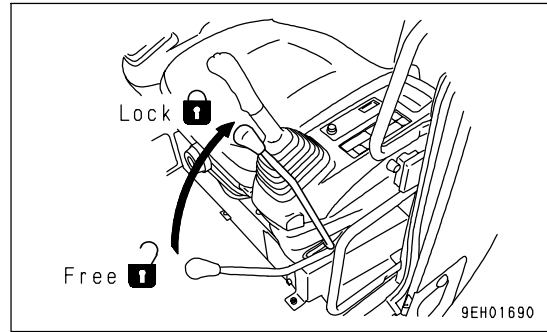
ADJUST BUCKET CLEARANCE



WARNING

It is dangerous if the work equipment moves by mistake while the bucket clearance is being adjusted.

Set the work equipment on the ground in a stable condition, then stop the engine and lock the lock lever without fail.



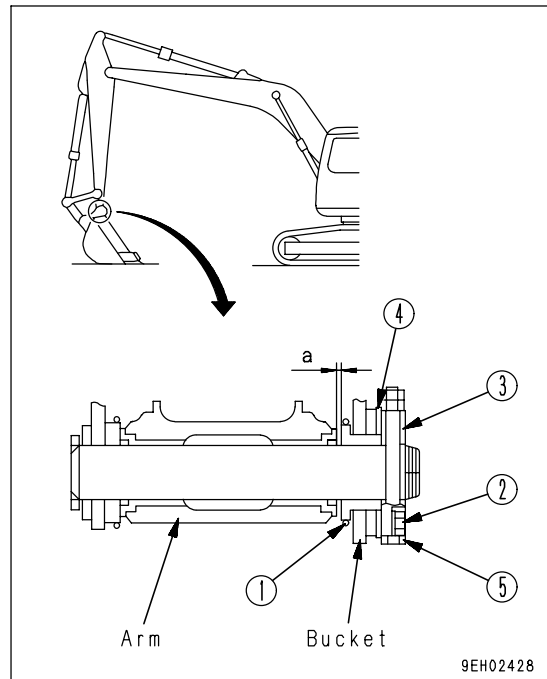
1. Set the work equipment to the position shown in the diagram on the right, then stop the engine and set the lock lever to the LOCK position.
2. Shift O-ring (1) and measure the amount of play "a".
Measurement is easier if you move the bucket to one side so that all the play can be measured at one place (the left side in the diagram).
Use a clearance gauge for easy and accurate measurement.
3. Loosen 4 plate mounting bolts (2), and loosen plate (3).
The shim is a split type, so the operation can be carried out without removing the bolts.
4. Remove shim (4) corresponding to the amount of play "a" measured above.

[Example]

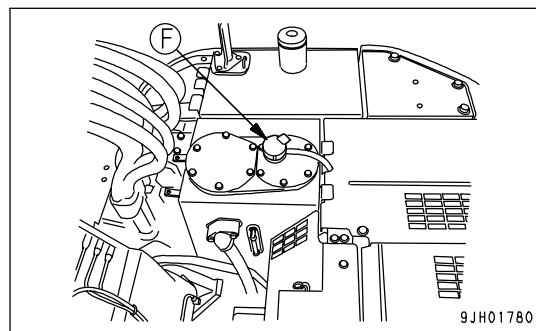
In the case of play of 3 mm (0.118 in), remove two 1.0 mm (0.039 in) shims and one 0.5 mm (0.020 in) shim. Play becomes 0.5 mm (0.020 in). For shim (4), two types of 1.0 mm (0.039 in) and 0.5 mm (0.020 in) are used.

When play "a" is smaller than one shim, do not carry out any maintenance.

5. Tighten the four bolts (2).
If the bolts (2) are too stiff to tighten, pull out pin stopper bolt (5) for easier tightening.



4. Loosen oil filler cap (F) at the top of the hydraulic tank slowly to release the internal pressure.



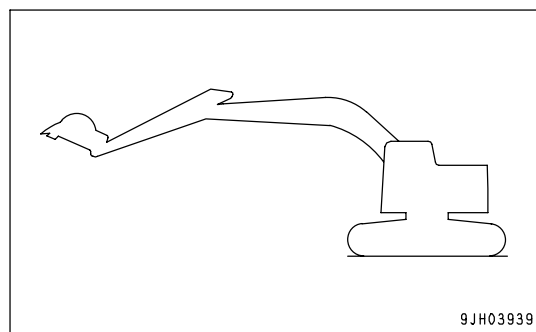
CHECK NITROGEN GAS CHARGE PRESSURE IN ACCUMULATOR (control circuit)

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.

Check the nitrogen gas charge pressure as follows.

1. Set the work equipment to maximum reach as shown in the diagram on the right.



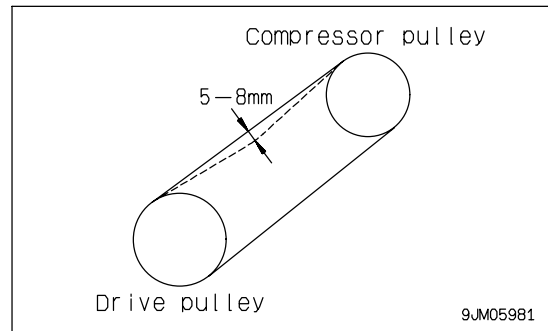
2. Stop the engine and carry out the LOWER operation for the boom.
3. Check that the tip of the bucket drops at least 1 m (3 ft).

If the tip of the bucket drops less than 1 m (3 ft), the charge pressure inside the accumulator is low, so contact your Komatsu distributor.

CHECK AIR CONDITIONER COMPRESSOR BELT TENSION, ADJUST

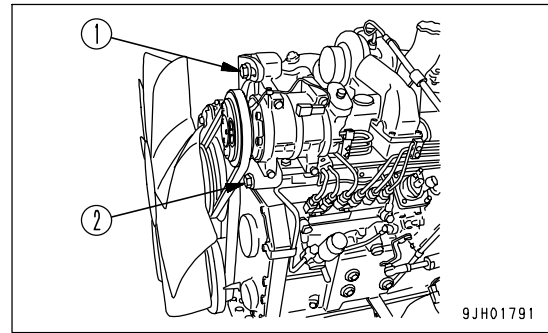
Checking

Press the belt at a point midway between the drive pulley and compressor pulley with a finger force of approx. 58.8 N (6 kgf) and check that the deflection is 5 to 8 mm (0.20 in to 0.31 in).

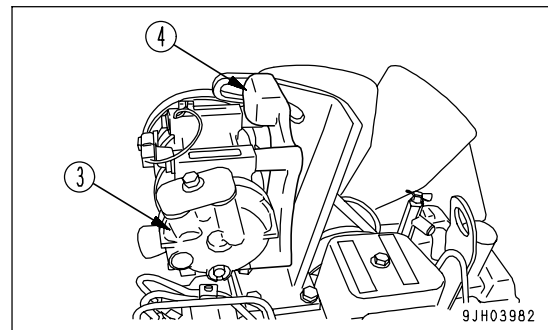


Adjustment

1. Loosen bolts (1) and (2).
 - Bracket (4) holds the compressor in place. When bolts (1) and (2) are loosened, bracket (4) moves with the securing position of bolt (2) as a fulcrum.



2. Loosen bolt (1) and bolts (2), then move compressor (3) to adjust.
3. When the position of the compressor is determined, tighten bolts (1) and (2) to hold it in position.



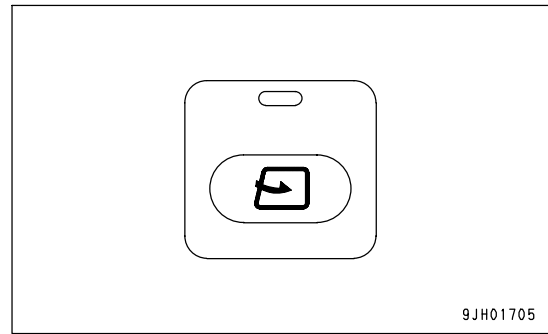
4. Check for damage to the pulleys, and wear of the V-groove and V-belt. Be particularly careful to check that the V-belt is not in contact with the bottom of the V-groove.
5. If the belt has elongated and there is no more allowance for adjustment, or if the belt is cut or cracked, replace the belt.
6. After replacing the V-belt, operate for one hour, then adjust again.

12. Check for oil leakage and wipe off any spilled oil.

Air Circulation Selector Switch (External Air Circulation)

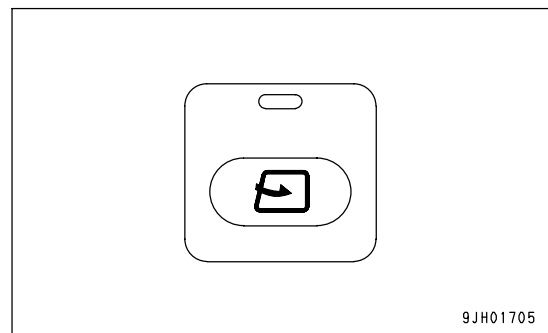
When switch (2) is pressed, fresh air is taken into the cab during heating or cooling.

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



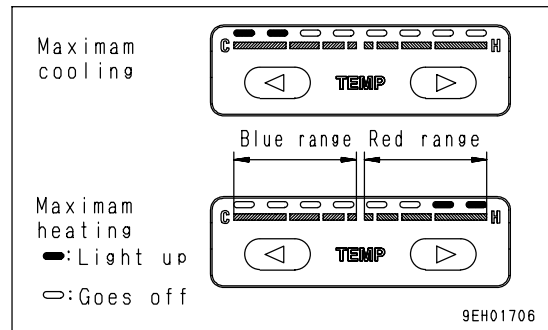
Air Circulation Selector Switch (Internal Air Circulation)

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



Temperature Control Switch (Cooling)

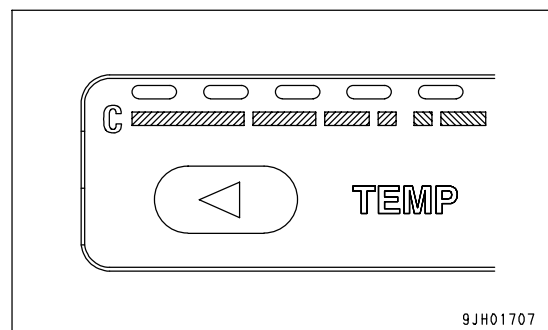
The closer to the "C" mark the lighting-up is in the range, the lower the room temperature is. Conversely the closer to the "H" mark the lighting-up is in the range, the higher the room temperature is. The indicator range is divided into 11 levels, but within each range the temperature changes steplessly.



Use switch (3) to reduce the temperature.

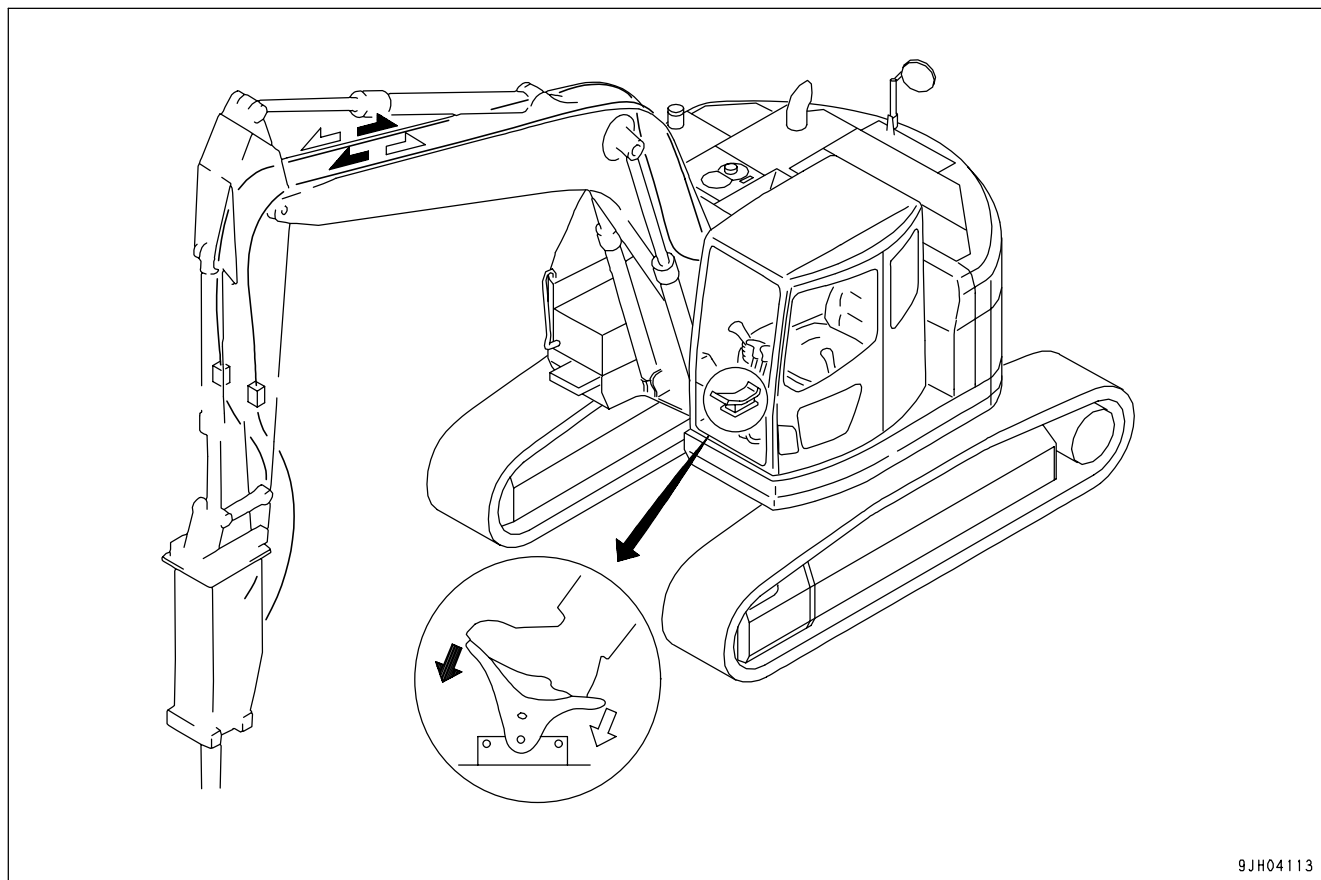
Press this switch to reduce the temperature of the air sent from the air conditioner.

The more times the switch is pressed, the lower the temperature becomes, as the indicator light moves to the "C".



Oil Flow Path

The direction of operation of the pedal and the path of the oil flow is as shown in the diagram below.



When the front of the pedal is depressed, oil flows to the piping on the left side of the work equipment; when the rear of the pedal is depressed, oil flows to the piping on the right side of the work equipment. (When a breaker is installed, only the front of the pedal can be used.)

HANDLING OF RUBBER PAD SHOE AND ROAD LINER

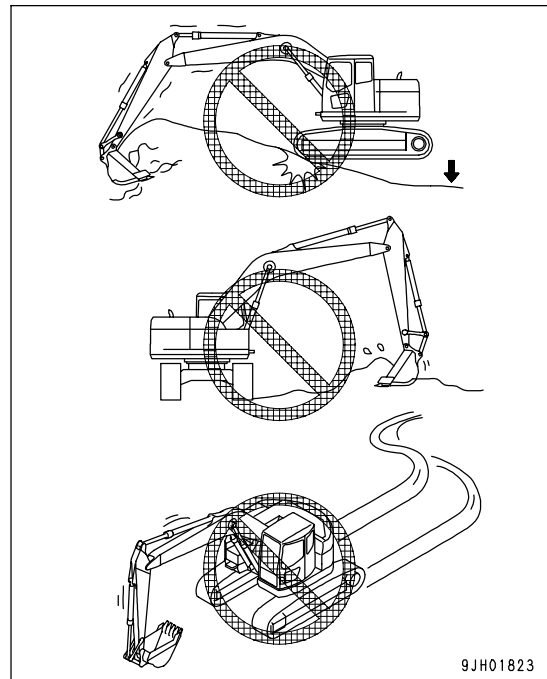
Be sure to observe the following instructions, when using a machine equipped with rubber pad shoes or Road Liner.

Working Environment

- Use a machine equipped with rubber pad shoes or Road Liner mainly for jobs on the paved roads. If used otherwise, breakage or chipping will occur on the rubber and the service life will be considerably reduced. Particularly the following jobsites must be avoided.
 - Jobsite strewn with crushed concrete or on sand
 - Jobsite with protruding edged objects like steel bar, glass and the like
 - Jobsite on rocky terrain or in a river with many rocks A ride over a concrete road shoulder or above all the tip of sheet piles driven into the ground must be avoided.
- Be careful of machine skidding on the road covered with water, ice, snow or gravel. Pay special attention when unloading a machine from a truck.
- Use a machine equipped with rubber pad shoes or Road Liner in the ambient temperature range of -25°C to 65 °C due to the properties of rubber.

Working Conditions

- A job using the undercarriage as a fulcrum, side digging job, digging job on a slope and a job requiring frequent steering, as shown in the picture, cause an excessive load on the rubber and there is danger that it may be damaged.
- Durability of rubber pad shoes may not be covered with warranty, if a special work equipment is mounted.



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