

Operation & Maintenance Manual

D475A-3

BULLDOZER

With Palm Command Control System

SERIAL NUMBERS D475A -10695 and up

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March 2002

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TABLE OF ENTER SERIAL NO. AND DISTRIBUTORN

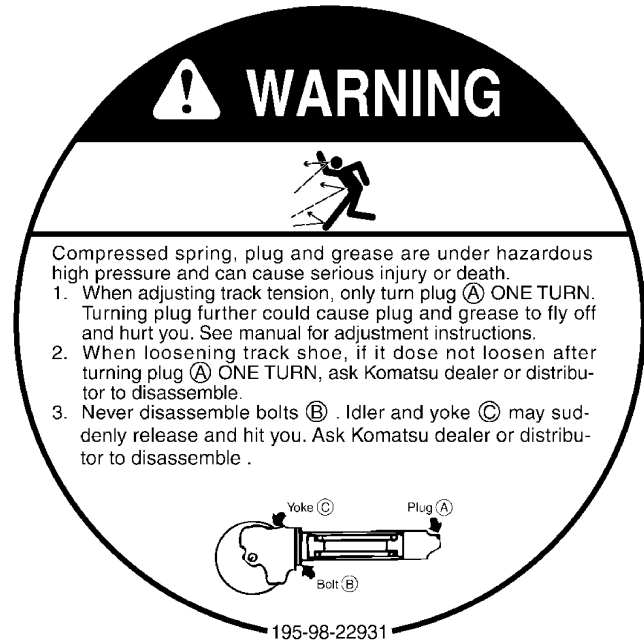
Machine serial No.	
Engine serial No.	
Distributor name	
Address	-----

Service Personnel	-----
Phone/Fax	-----

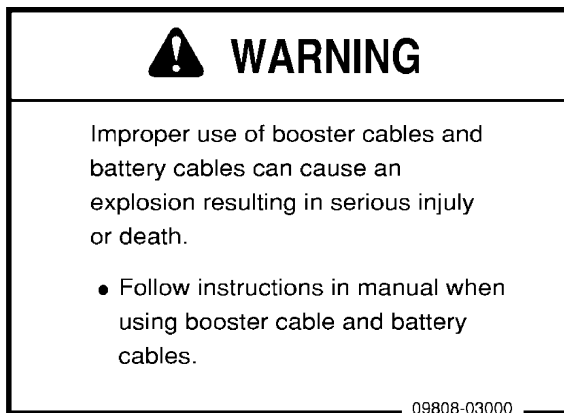
- (5) Precautions for high-temperature hydraulic oil
(09653-03001)



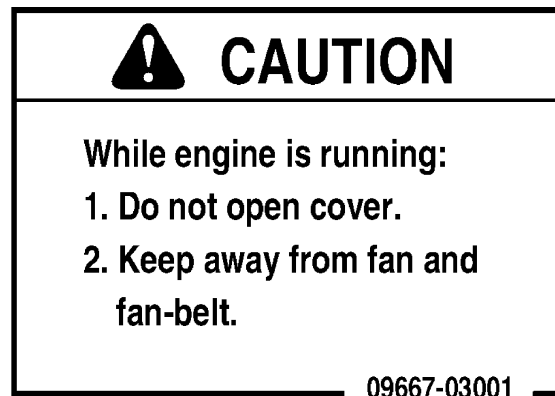
- (6) Precautions for check and adjust track tension
(195-98-22931)



- (7) Precautions for handling electric wires
(09808-03000)



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



CHECKING SIGNALMAN'S SIGNALS AND SIGNS

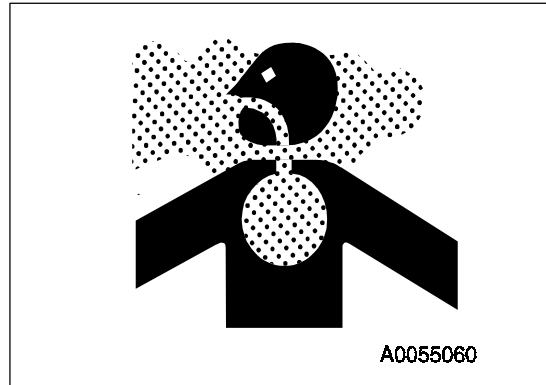
- Set up signs to inform of road shoulders and soft ground. If the visibility is not good, position a signalman if necessary. Operators should pay careful attention to the signs and follow the instructions from the signalman.
- Only one signalman should give signals.
- Make sure that all workers understand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

BE CAREFUL ABOUT ASBESTOS DUST

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

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

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



TOWING

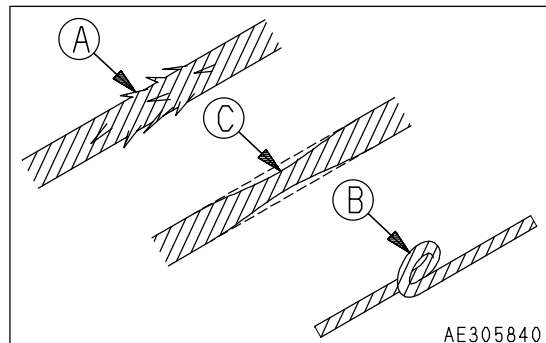
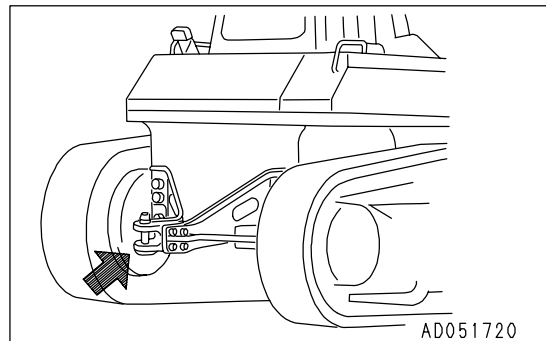
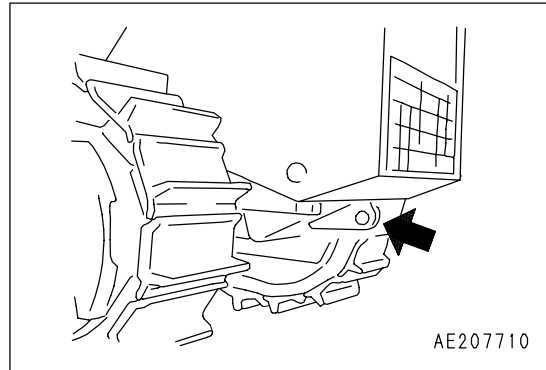
WHEN TOWING

Injury or death could result if a disabled machine is towed incorrectly. Always observe the following rules.

- Never use a towing method different from the one described in this manual.

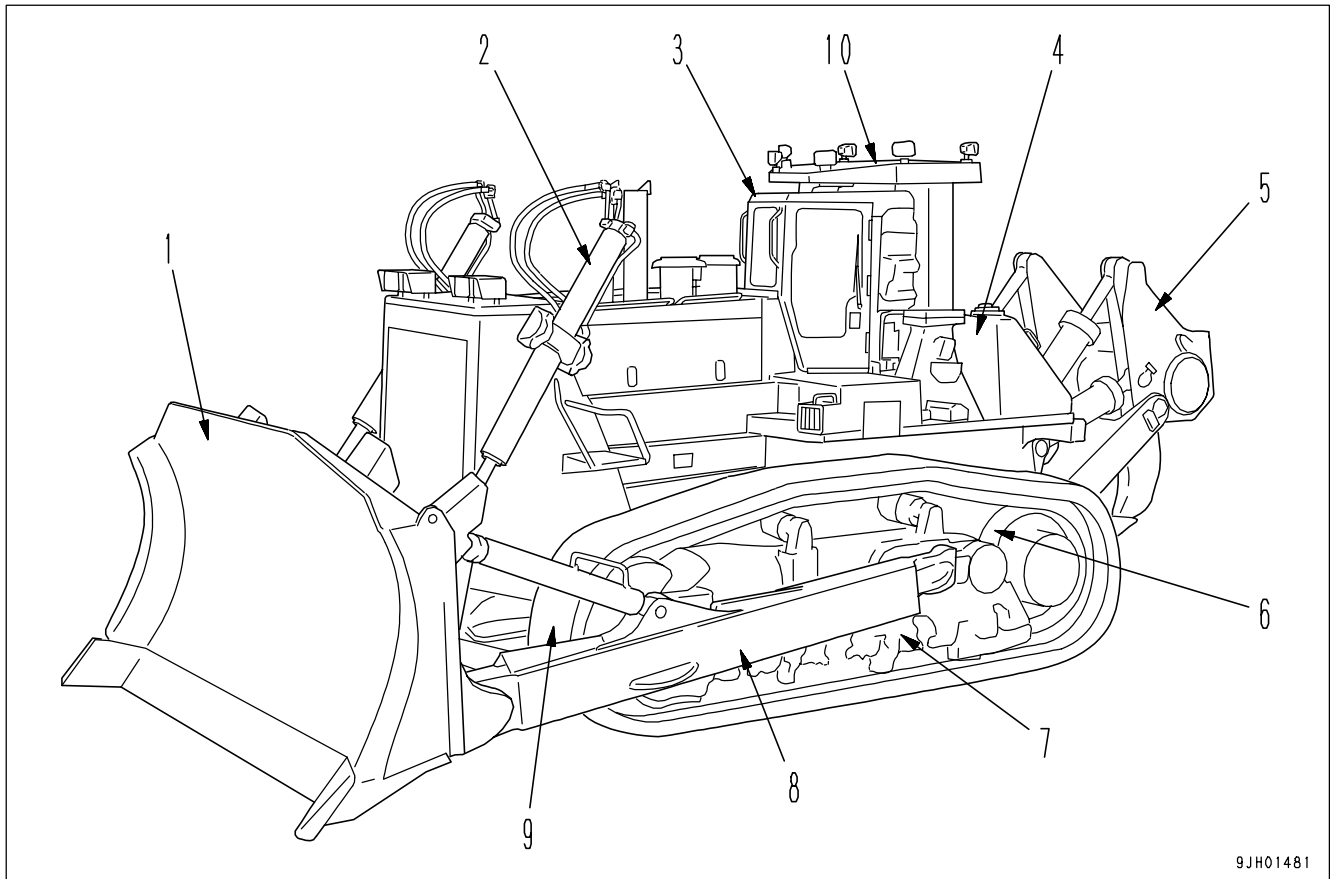
For the method of towing, see METHOD OF TOWING MACHINE (PAGE 3-139).

- When handling a wire rope, always wear leather gloves.
- When working with others to prepare for towing, signals should be agreed upon beforehand.
- If your machine is towed by another machine, stop the engine and release the brake. Please contact your Komatsu distributor to have the brake released.
- If this machine cannot travel under its own power, release the brakes, then tow the machine with another machine. Please contact your Komatsu distributor to have the brakes released.
- Towing on slopes is dangerous. When doing so, choose a gentle slope. If no gentle slope is available, make such a slope by earth-removal work.
- When connecting up a towing machine, do not let anyone enter the area between the towing machine and the equipment being towed.
- Do not straddle the towing cable or wire rope.
- When your machine is towed by another machine, ALWAYS use a wire rope with a sufficient towing capacity.
- Set the towing machine and the towing connection of the equipment being towed in a straight line when connecting it.
- Take up the slack in the wire rope and tow the machine.
- When lifting the machine up, use the towing hook.
- If the machine is stuck in sandy soil, dig out the soil around the towing hook, then use the towing hook to pull the machine out. Permissible load for towing hook: 71500 kg (701180 N)
- Do not use a broken (A), kinked (B) or frayed (C) wire rope.



GENERAL VIEW

GENERAL VIEW OF MACHINE



9JH01481

- (1) Blade
- (2) Blade lift cylinder
- (3) Cab
- (4) ROPS
- (5) Ripper

- (6) Sprocket
- (7) Track frame
- (8) Frame
- (9) Track shoe

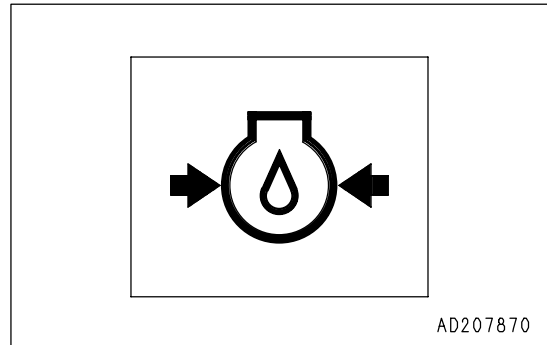
ENGINE OIL PRESSURE CAUTION LAMP

This lamp (1) indicates a low engine oil pressure.

If the monitor lamp flashes, stop the engine and check it immediately.

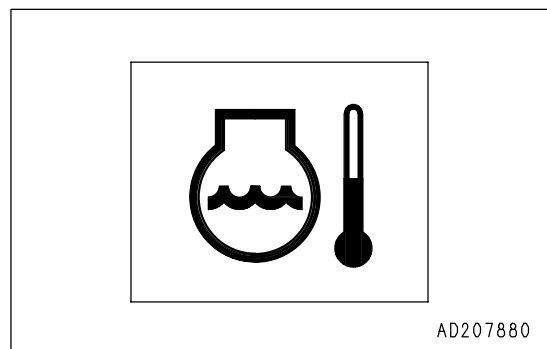
REMARK

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

**ENGINE COOLING WATER TEMPERATURE MONITOR**

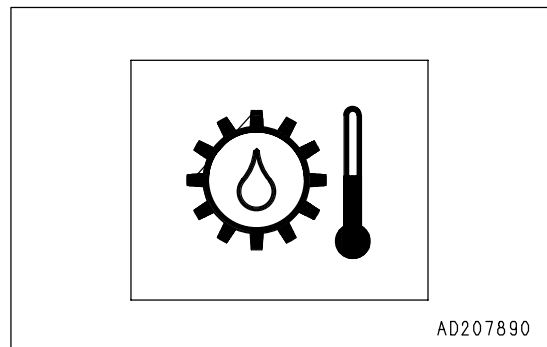
This lamp (2) indicates a rise in the cooling water temperature.

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

**POWER TRAIN OIL TEMPERATURE MONITOR**

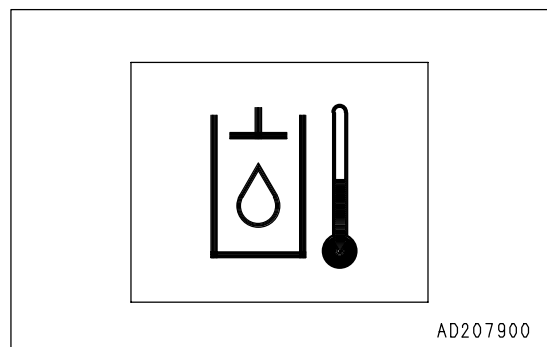
This lamp (3) indicates a rise in the oil temperature of the torque converter outlet.

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

**HYDRAULIC OIL TEMPERATURE MONITOR**

This lamp (4) indicates a rise in the hydraulic oil temperature.

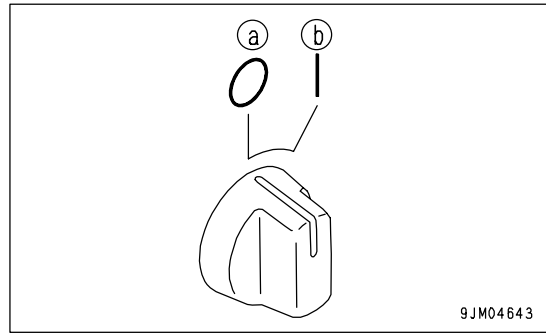
When the monitor lamp flashes, stop the machine and run the engine at the low idling speed until oil temperature falls.



FRONT LAMP, WORKING LAMP SWITCH

This switch (3) lights up when the front lamp, left and right working lamps on the front fender, and panel lamp light up.

- (a) OFF position: Goes out
- (b) ON position: Lights up

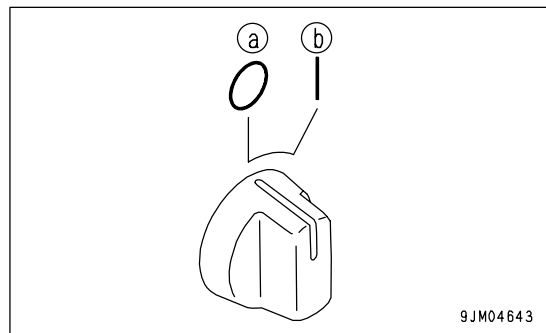


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REAR LAMP SWITCH

This switch (4) lights up the rear lamps.

- (a) OFF position: Lamps are out
- (b) ON position: Lamps light up



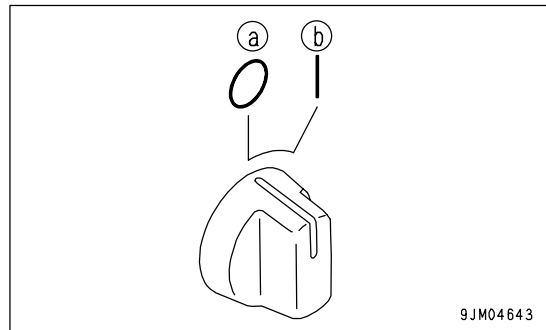
9JM04643

AUTO SHIFT DOWN SWITCH

When this switch (5) is operated to the right, if the travel speed drops because of the load conditions when traveling, the transmission automatically shifts to low speed.

- (a) OFF position: Automatic operation canceled
- (b) ON position: Automatically shifts down to low speed

For details, see "AUTO SHIFT DOWN OPERATION (PAGE 3-100)".



9JM04643

METHOD OF USING USER ADJUST MODE

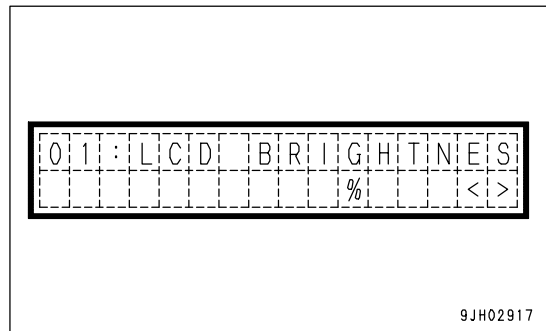
With the user adjust mode, the brightness of the panel screen backlighting and the contrast of the liquid crystal panel can be changed, or the cooling fan can be set to maximum speed to clean the radiator when it is clogged. These are displayed on display panel B.

REMARK

- To return to the function selection mode, operate the buzzer cancel switch to □.
- The brightness of the backlighting of the monitor panel differs according to whether the front lamp is lighted up or not. Entering this mode when the front lamps are lighted up makes it possible to adjust the brightness when the front lamps are lighted up. In the same way, entering this mode when the front lamps are not lighted up makes it possible to adjust the brightness when the front lamps are not lighted up.

1. Adjusting backlighting of liquid crystal display

The diagram on the right is the mode for adjusting the brightness of the backlighting of the liquid crystal panel. On this screen, operate the buzzer cancel switch to ◇ to switch to the screen to adjust the brightness.

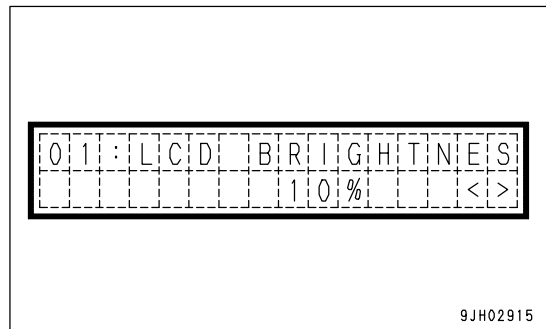


The brightness can be adjusted by operating the information switch.

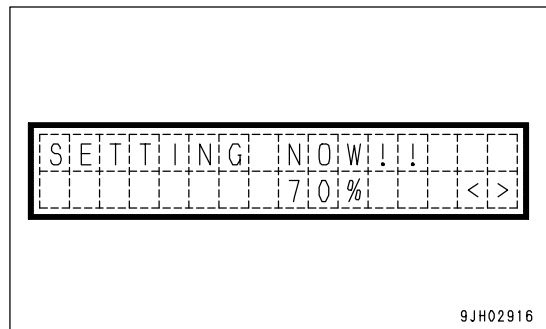
The higher the number, the brighter the screen becomes; the lower the number, the darker the screen becomes.

> position: Number increases

< position: Number decreases



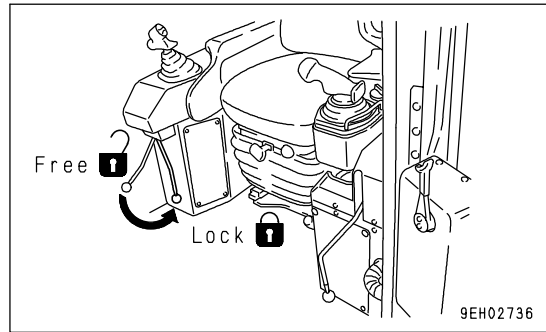
When the buzzer cancel switch is operated to ◇, the brightness of the liquid crystal display backlighting is set.



SAFETY LOCK LEVER

**WARNING**

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



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

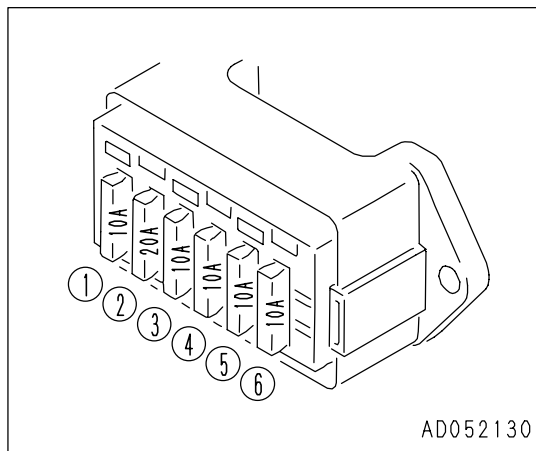
When it is set to the LOCK position, the TILT, RAISE, LOWER, and FLOAT operations are locked.

REMARK

When starting the engine, to ensure safety, always set the safety lever to the LOCK position.

FUSE BOX II

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

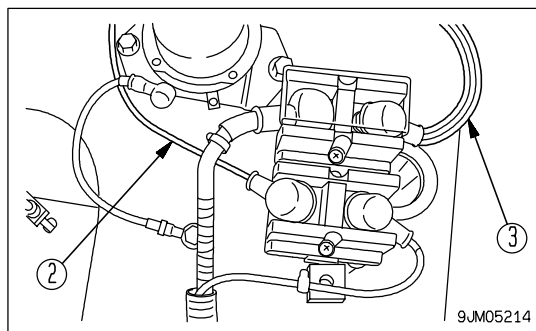
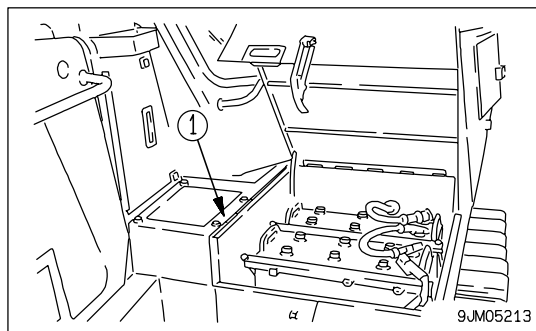


FUSIBLE LINK

If the starting motor does not work even when the starting switch is turned to the ON position, there may be a disconnection in fusible links (2) and (3) on top of the wiring, so remove the cover (1) at the side of the battery box cover on the left side of the machine and check or replace.

Capacity of (2): 32 A

Capacity of (3): 96 A



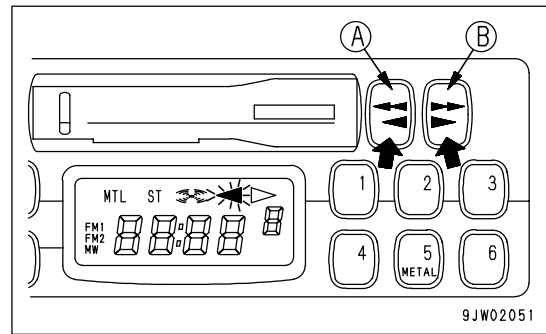
REMARK

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

REVERSING TAPE

When listening to the tape, press both FAST FORWARD, REWIND buttons (A) and (B) at the same time lightly.

When this is done, the tape direction display will be reversed.

**PRECAUTION WHEN USING**

! WARNING

- If a voltage greater than the specified voltage is input, it may cause fire, electrocution, or other failure. Never input any voltage other than the specified voltage.
- Places inside the radio are under high voltage. Do not remove the cover.
- Do not carry out any modification. This may cause fire, electrocution, or other failure.
- If the sound cannot be heard, no display is given, or any other abnormality occurs, turn off the power switch and ask your Komatsu distributor as soon as possible to carry repairs.

- Stow the antenna when traveling in places with low overhead clearance.
- To ensure safety during operations, keep the volume at a level where it is possible to hear other machines.
- If water gets inside the speaker case or car radio (auto tuning), it may cause a serious problem, take care not to let water get in these items.
- 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.

NOTICE**Handling cassette tape**

- Clean the tape head approx. once a month with a commercially available head. cleaning tape.
- Do not leave the tape in any place where it is exposed to direct sunlight, any place that is excessively dusty, or any place where there is a magnetic field.
- Do not use 120-minute tapes. The tape is thin and it is easily gets caught up inside the machine.
- If the tape is slack, it easily gets caught up inside the machine. Use a pencil to wind in the tape to remove any slack.
- Do not use any cassette tape if the label has started to come off. It may cause defective rotation, or it may be impossible to get the tape out of the machine.

CHECK COOLANT LEVEL, ADD WATER

! WARNING

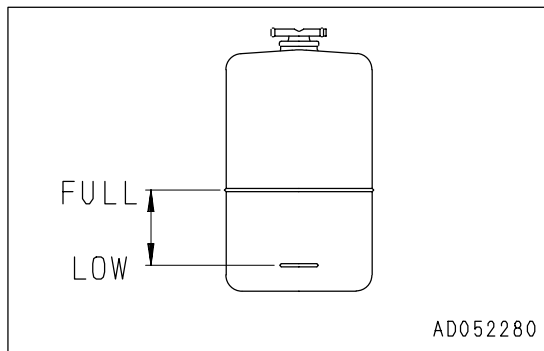
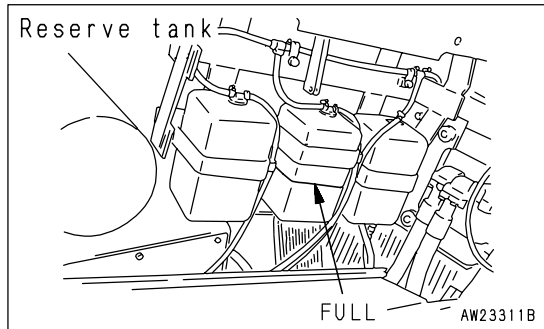
- Normally, do not open the radiator cap. When checking the cooling water level, check the sub-tank when the engine is cold.
- Do not remove the cap when the radiator water is hot. Boiling water may spurt out. After the water temperature goes down, turn the cap slowly to release the pressure, then remove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

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

REMARK

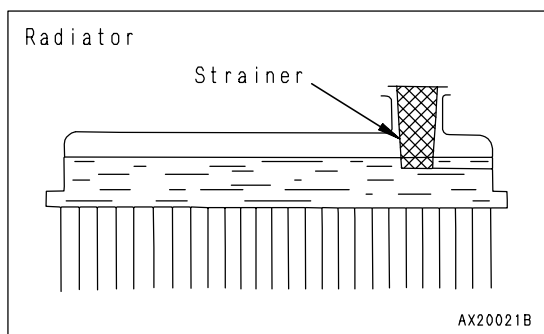
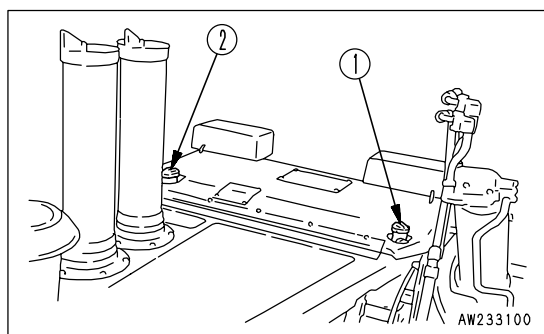
The coolant may overflow from the sub-tank drain hose. This is no problem. It occurs because too much coolant has been added.

2. After adding water, tighten the cap securely.



3. If the sub tank is empty, first check for leakage of water, then remove main radiator cap (2) and sub radiator cap (3), and check that the coolant water is above the bottom surface of the strainer as shown in the diagram on the right. Add water if the level is low.

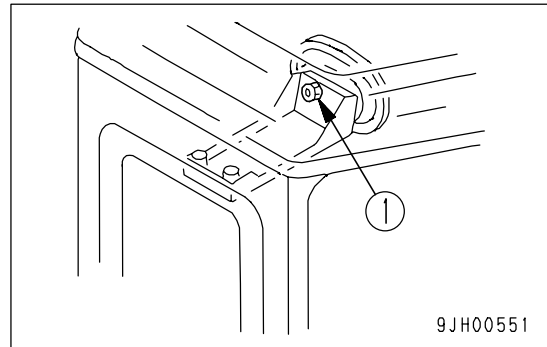
4. After adding water, close the engine side cover.



ADJUST MIRROR

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 JOYSTICK (PCCS LEVER)

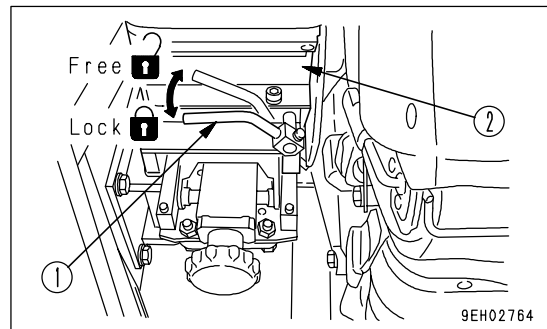


WARNING

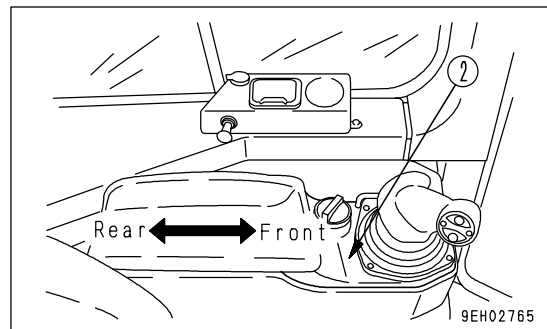
After moving case (2) in order to adjust the position of the steering, directional, and gearshift lever, check that lock lever (1) is fitted securely in the notch hole when securing it. Check that it is in the LOCK position. If the lock condition is not complete, the steering, directional, and gearshift lever may move at an unexpected time and cause serious injury or damage.

The steering, directional, and speed lever (wrist control type single lever: joystick) can be adjusted by 100 mm (3.9 in) in 5 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) at the rear of case (2) on the left side of the operator's compartment and make it free.



2. Keep lock lever (1) pulled up and use your other hand to grip the front of case (2), then move it to the front with your left and right hands. The joystick moves together with the case.
3. When moving, set to the desired position of the positions where a click can be heard. Then pull up lock lever (1) and release it. Lock lever (1) returns automatically to the LOCK position.



REMARK

PCCS: Palm command control system

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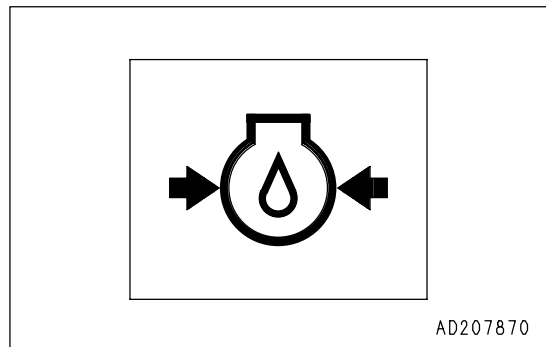
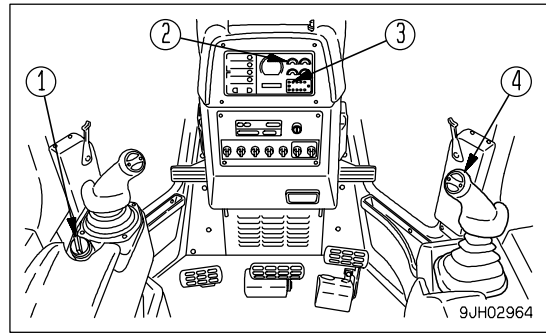
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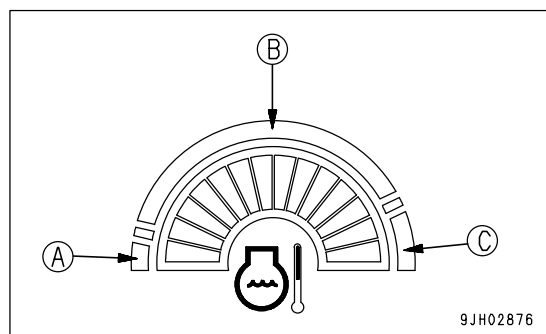
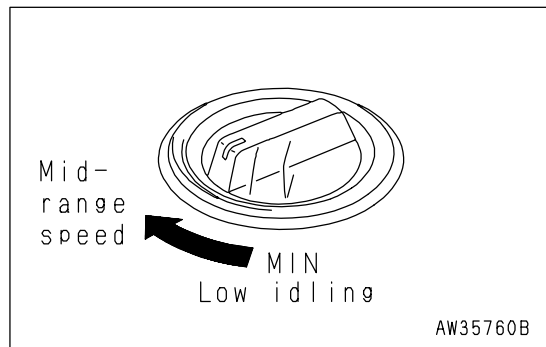
NORMAL OPERATION

NOTICE

- Do not carry out operations or operate the levers suddenly when the hydraulic oil is still at low temperature. Always carry out the warming-up operation until the hydraulic oil temperature monitor displays the green range. This will help to extend the machine life. Do not accelerate the engine suddenly before the warming-up operation is completed.
- Do not run the engine at low idling or high idling continuously for more than 20 minutes. This will cause leakage of oil from the turbocharger oil supply piping.
If it is necessary to run the engine at idling, apply a load from time to time or run the engine at a mid-range speed.
- If engine oil pressure caution lamp (3) flashes or the buzzer sounds intermittently, stop the engine and check for the cause.



1. Turn fuel control dial (1) to the center position between LOW IDLING (MIN) and HIGH IDLING (MAX) and run the engine at medium speed for about 5 minutes with no load.
2. After warm-up run is completed, check gauges and caution lamps for proper operation. If any abnormality is found, repair it.
Continue to run the engine at light load until engine water temperature gauge indicator (2) falls within the green range (B).
(A): White range
(B): Green range
(C): Red range

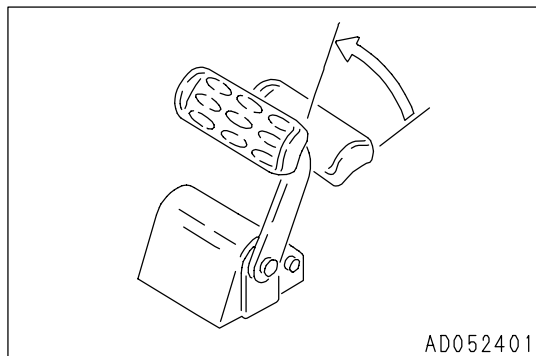


3. Check that there is no abnormal exhaust gas color, noise, or vibration. If any abnormality is found, contact your Komatsu distributor.

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

REMARK

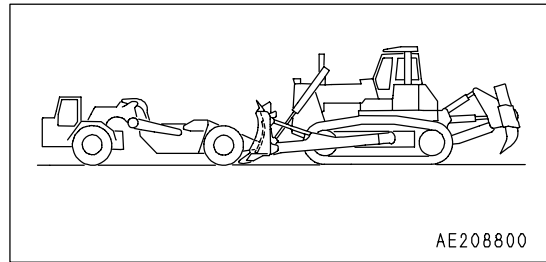
When the REVERSE switch is pressed, the backup alarm buzzer will sound.



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PUSHER OPERATIONS

- When carrying out pusher operations, always install a pusher plate.
- When approaching the other machine, depress the decelerator pedal to reduce the engine speed and approach slowly. After coming into contact, raise the travel speed slowly and push with full power.
- If the pivot turns switch is kept at the ON position, it is possible to carry out pivot turns, and this improves the ease of pusher operation.

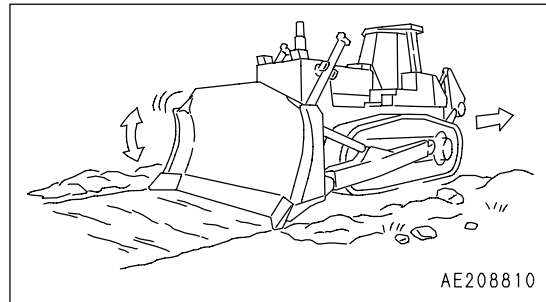


SMOOTHING

NOTICE

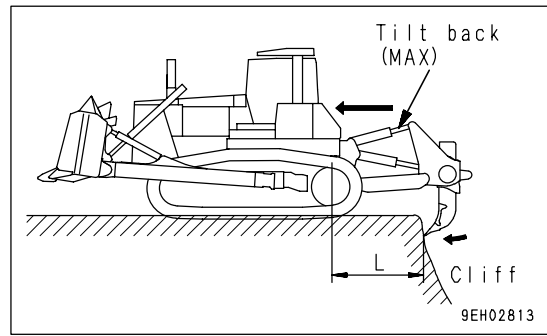
Avoid smoothing on rocky or stony ground. It can damage the blade.

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



RIPPING BY CLIFFS

- When carrying out ripping at the edge of a cliff, tilt the ripper back to make depth (L) longer.
- Depress the decelerator pedal, drive slowly forward, and when the ripper point contacts the cliff, tilt the ripper.



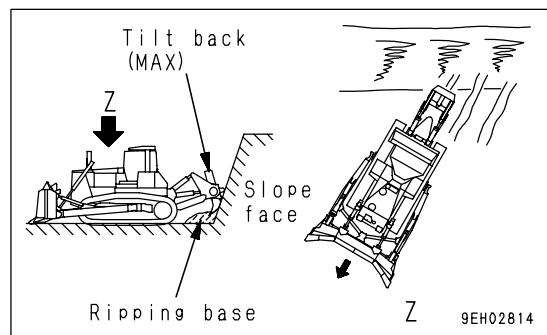
RIPPING BY SLOPE FACES

(Giant ripper)

- When carrying out ripping work at the edge of slope faces, make the ripper tilt back angle small, and if there is an area where the slope face has not been ripped, apply the ripper diagonally.

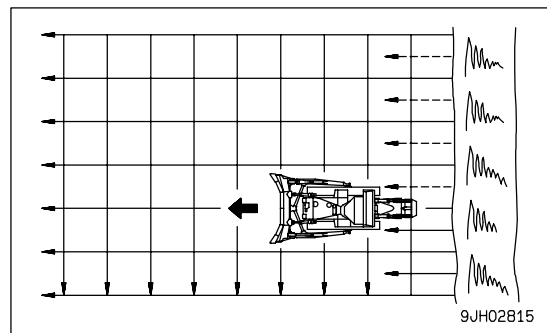
REMARK

In the case of the multi-shank ripper, carry out ripping at right angles to the slope face.

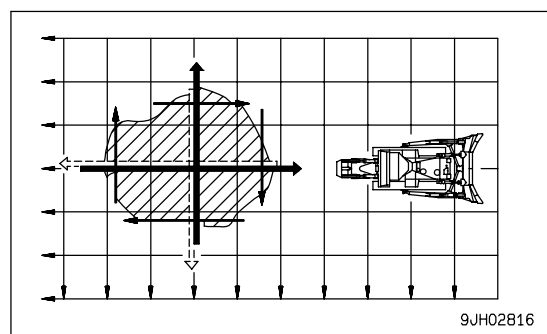


Cross ripping

- On jobsites with hard bedrock, for rocks and boulders which are impossible to break or dig up with one ripping pass, carry out the second ripping pass at right angles to the first ripping direction.
- At the edge of cliffs, where it is impossible to apply the ripper in a cross direction, make the space between the shanks smaller and carry out ripping.



- During the ripping operation, if there is any hard bedrock, carry out ripping in the opposite direction from the direction where the ripper was applied. If it is still impossible to break up the rock, break up the area around the bedrock a little at the time.
- When carrying out concentrated ripping of hard bedrock, the work efficiency is high if the ripper is applied to the whole of the digging face.



METHOD OF LIFTING MACHINE

WARNING

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

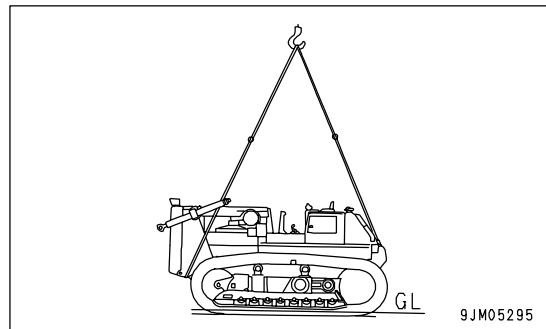
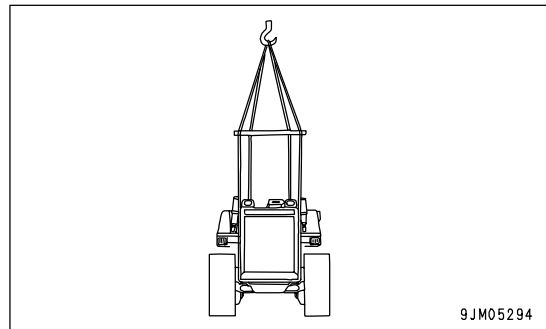
When lifting the machine, carry out the operation on flat ground as follows.

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

NOTICE

The lifting procedure applies to machines with standard specifications. The method of lifting differs according to the attachments and options actually installed. In such cases, please contact your Komatsu distributor for information.

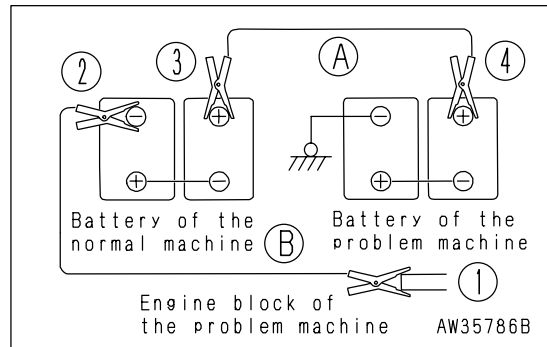
For details of the weight, see "SPECIFICATIONS (PAGE 5-2)".



DISCONNECTING THE BOOSTER CABLES

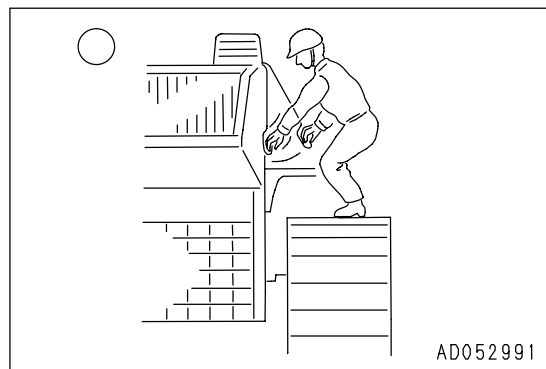
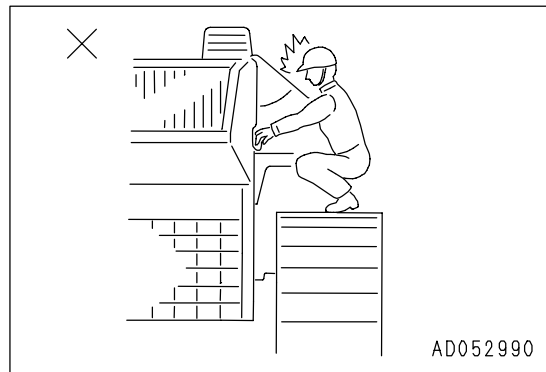
After the engine has started, disconnect the booster cables in the reverse of the order in which they were connected.

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



PRECAUTIONS WHEN OPENING AND CLOSING ENGINE SIDE COVER:

- When standing on track to open the engine side cover, adopt a standing position, hold the side cover with both thumbs, and open it slowly with your other fingers.
- When the side cover is open, do not open or close the cab. Before opening or closing the cab, always close the engine side cover first.



STANDARD TIGHTENING TORQUES FOR BOLTS AND NUTS

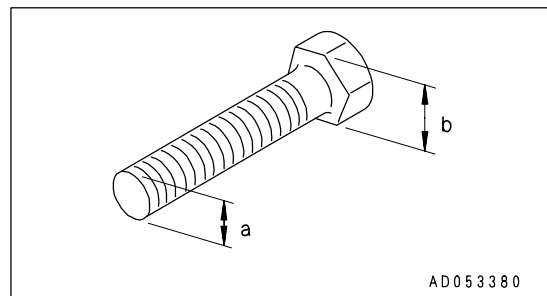
TORQUE LIST



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.

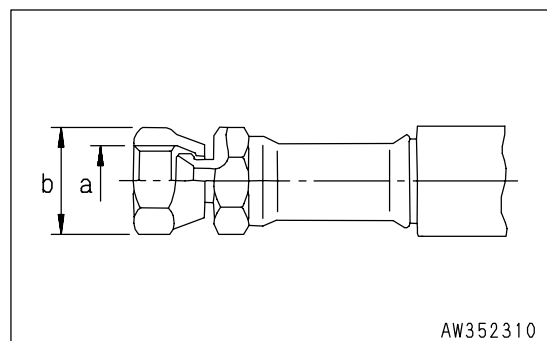
Unless otherwise specified, tighten the metric nuts and bolts to the torque shown in the table below. If it is necessary to replace any nut or bolt, always use a Komatsu genuine part of the same size as the part that was replaced.

Thread diameter of bolt (a)(mm)	Width across flats (b)(mm)	Tightening torque					
		Target value			Service limit		
		N·m	kgf·m	lbft	N·m	kgf·m	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	177	18	130.2	157-196	16.0-20.0	115.7-144.7
16	24	279	28.5	206.1	245-309	25.0-31.5	180.8-227.8
18	27	382	39	282.1	343-425	35.0-43.5	253.2-314.6
20	30	549	56	405.0	490-608	50.0-62.0	361.7-448.4
22	32	745	76	549.7	662-829	67.5-84.5	488.2-611.2
24	36	927	94.5	683.5	824-1030	84.0-105.0	607.6-759.5
27	41	1320	135.0	976.5	1180-1470	120.0-150.0	868.0-1085.0
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 (N·m (kgf·m, lbft))	
		Target valve	Permissible range
9/16 -18UNF	19	44 (4.5, 32.5)	35 - 63 (3.5 - 6.5, 25.3 - 47.0)
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)



CHECK, CLEAN AND REPLACE AIR CLEANER ELEMENT

WARNING

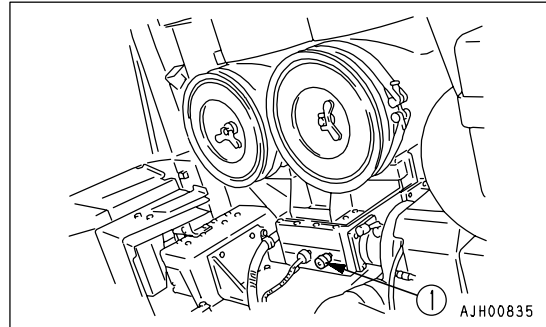
- Never clean or replace the air cleaner element with the engine running.
- When using compressed air to clean the element, wear safety glasses or goggles to protect the eyes.

CHECKING

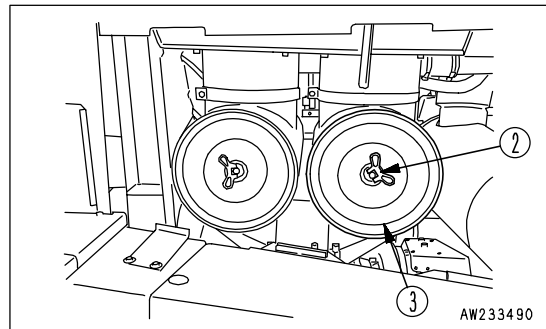
Whenever the red piston in dust indicator (1) appears, clean the air cleaner element.

NOTICE

Do not clean the air cleaner element before the dust indicator becomes red. If the element is cleaned frequently before the dust indicator becomes red, the performance of the air cleaner is not used perfectly and the cleaning effect is lowered. In addition, dust sticking to the element falls into the inner element each time the element is cleaned.

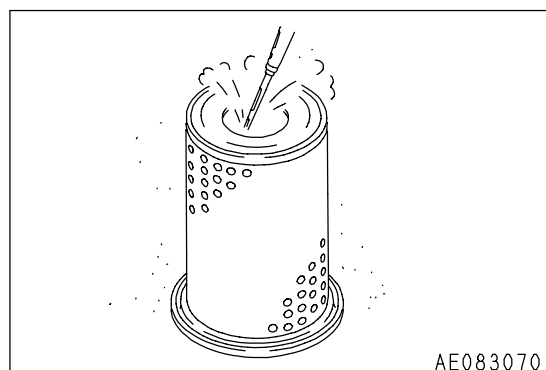
**CLEANING OR REPLACING OUTER ELEMENT**

1. Remove the wing nut (2), then remove the outer element (3).
2. Clean the air cleaner body interior and the cover.



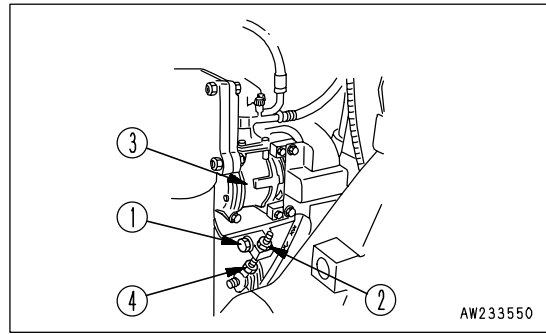
3. Direct dry compressed air (Max. 0.69 MPa (7 kgf/cm², 99.4 PSI)) from the inside of the outer element along its folds. Then blow with air along the folds from the outside, and finally blow again from the inside.

- 1) Remove one seal from the element whenever the element has been cleaned.
- 2) Replace the outer element if it has been cleaned 6 times repeatedly or used throughout a year. Replace the inner element at the same time.
- 3) Replace both inner and outer elements when the dust indicator red piston appears soon after installing the cleaned outer element even though it has not been cleaned 6 times.
- 4) Check inner element mounting nuts for looseness and, if necessary, retighten.



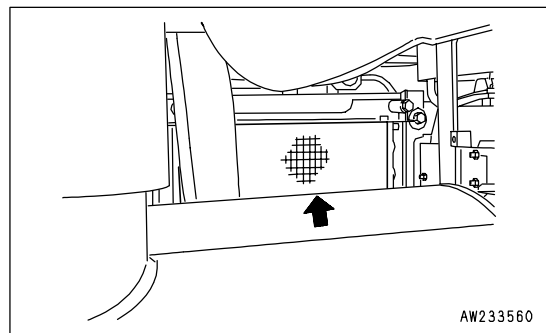
REPLACE AIE CONDITIONER BELT

1. Loosen 3 bolts (1) and lock nut (2), then move compressor (3) to the side.
2. Replace the V-belt.
 - When adjusting the V-belt, do not push the compressor directly with a bar. Use adjust nut (4).
 Tighten adjust nut (4) and bolts (1), and apply tension to the V-belt. The standard deflection for the V-belt is approx. 18 to 22 mm (0.71 to 0.88 in) when the belt is pushed by thumb (approx. 6 kg (13.2 lb)) at a point midway between the air compressor pulley and fan pulley.

**CLEAN, CHECK HYDRAULIC COOLER FINS**

If the hydraulic cooler fins are clogged or there is dirt caught in the fins, clean and check the fins.

1. Open the inspection cover on the right.
2. Use compressed air to remove the mud, dirt, and leaves clogging the hydraulic cooler fins. Steam or water may be used instead of compressed air.

**REMARK**

Check the rubber hose. If the hose is found to have cracks to be hardened by ageing, replace such hose with new one. Further, loosen hose clamp should also be checked.

CHECK BEFORE STARTING

For the following items, see "CHECK BEFORE STARTING (PAGE 3-71)".

- Checking with machine monitor
- Cooling System Coolant Level - Check/Add
- Fuel Level - Check/Add
- Engine Crankcase Oil Level - Check/Add
- Check oil level in power train case (incl. transmission, torque converter and bevel gear cases), add oil.
- Check damper case oil level, add oil
- Check brake pedal travel
- Check dust indicator
- Hydraulic Oil Level - Check/Add
- Electric Wiring - Inspect
- Check that lamps light up
- Check horn sound
- Check back-up alarm sound
- Check seat belt for wear or damage

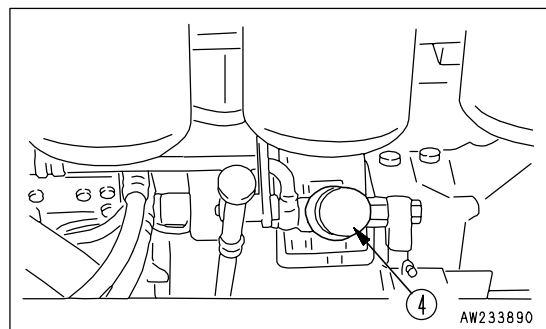
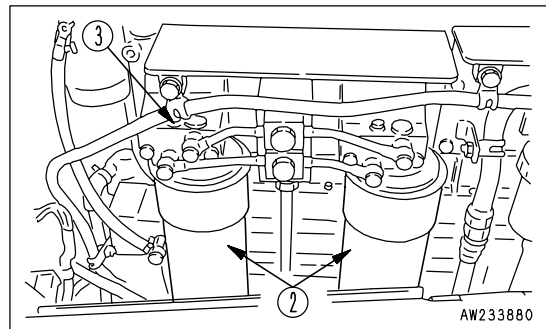
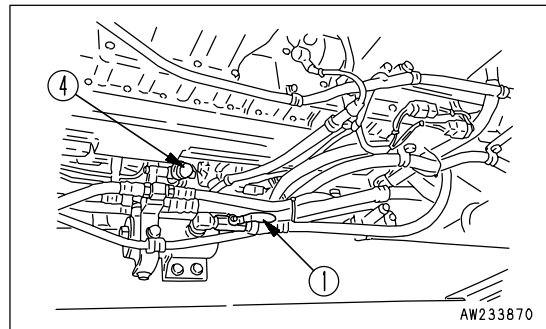
REPLACE FUEL FILTER CARTRIDGE

Prepare a filter wrench and a container to catch the fuel.

 **WARNING**

- Engine is at high temperature immediately after the machine has been operated. Wait for engine to cool down before replacing the filter.
- Do not bring fire or sparks near the fuel.
- When bleeding the air, be careful not to let the fuel overflow. It may cause a fire.

1. Set the container under the filter cartridge to catch the drained fuel.
2. Close valve (1) of fuel strainer part.
3. Remove the drain plug at the bottom of the filter to drain fuel.
After draining fuel, tighten the drain plug.
4. Using a filter wrench, turn filter cartridge (2) counterclockwise to remove it.
5. Clean the filter holder, fill a new filter cartridge with clean fuel, coat the packing surface with engine oil, then install it to the filter holder.
6. When installing, tighten until the packing surface contacts the seal surface of the filter holder, then tighten it up 3/4 to 1 of a turn.
If the filter cartridge is tightened too far, the packing will be damaged and this will lead to leakage of fuel. If the filter cartridge is too loose, fuel will also leak from the packing, so always tighten to the correct amount.
7. Open valve (1) of fuel strainer part and loosen air bleeding plugs (3).
8. Loosen the knob of feed pump (4) and move the pump up and down to draw off fuel until air ceases to come out of plugs (3).
9. Tighten air bleeding plugs (3), then push in the knob of feed pump (4), and tighten it.
10. After replacing the filter cartridge, start the engine and check for oil leakage from the filter seal surface.

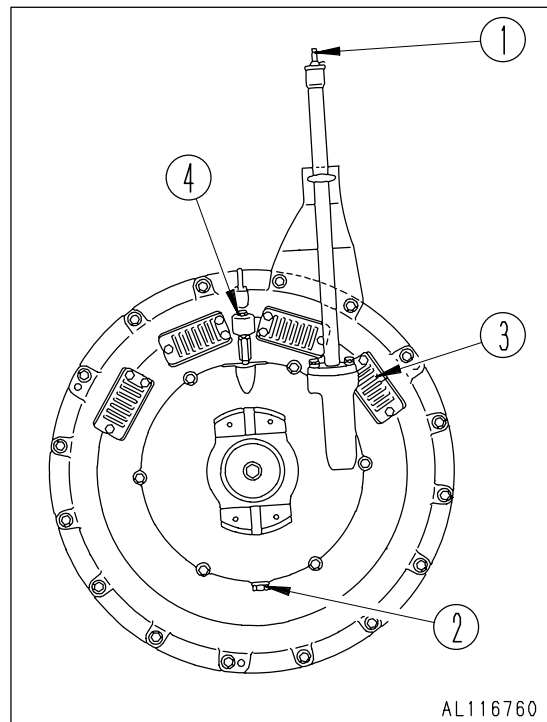
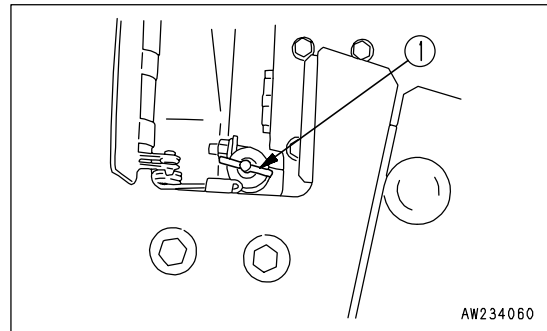
**REMARK**

When only the filter cartridge is replaced, it is sufficient that air bleeding is carried out for the filter head alone. But when the fuel piping is removed, air bleeding should also be carried out for the injection pump air-bleeding valve.

CHANGE OIL IN DAMPER CASE, CLEAN DANPER BREATHER**! WARNING**

The oil is at high temperature immediately after the machine has been operated. Wait for the oil to cool down before changing the oil.

- Refill capacity: 2.2 liters (0.58 US gal)
1. Remove breather (4) at the top of the damper.
 2. Wash out dust remaining inside of breather with diesel oil and flushing oil.
 3. Install breather (4) to the original position.
 4. Remove air hole plate (3) (4 places) from the top of the damper cover.
 5. remove any dirt or dust, then wash it in clean diesel oil or flushing oil.
 6. Open the inspection cover under the chassis.
 7. Remove drain plug (2) slowly to avoid getting oil on yourself, and drain the oil.
After draining the oil, tighten plug (2).
 8. Pull out dipstick (1), and add engine oil to the specified level through oil filler.
 9. Check that the oil level is between the H and L marks on dipstick (1). For details, see " (PAGE 888-888)".
 10. Close the inspection cover.



PROCEDURE FOR SELECTING RIPPER POINT

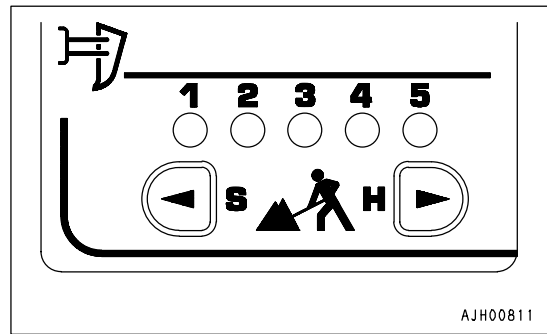
PROCEDURE FOR SELECTING RIPPER POINT

<p>Procedure①</p> <p>Procedure② Check wear</p> <p>Procedure③ Check for cracks or breakage</p>						
Typical rock	Hardness	Soft ↔ Hard	Soft ↔ Hard		Soft ↔ Hard	
	Type of rock	Shale, lime stone	General rock		Basalt, andesite, granite, chert	
	Features	<ul style="list-style-type: none"> • Little quartz, little wear • Deposited in layers, so ripping is easy 	—		<ul style="list-style-type: none"> • Fairly high proportion of quartz (40 - 70%) • Dose not form seams or layers, so there is excessive generation of heat from the point, the tip wears rapidly, and ripping is difficult 	
Suitable point	Features	<p>Ⓐ Point for lime stone</p> <ul style="list-style-type: none"> • Non-symmetrical shape • Yellow • Short 	<p>Ⓑ Standard point</p> <ul style="list-style-type: none"> • Non-symmetrical shape • Yellow • Short 	<p>Ⓒ</p> <ul style="list-style-type: none"> • Symmetrical shape • Yellow • Short 	<p>Ⓓ</p> <ul style="list-style-type: none"> • Non-symmetrical shape • Red • Short 	<p>Ⓔ</p> <ul style="list-style-type: none"> • Symmetrical shape • Red • Short
	Shape	AE107610	AE107610	AE107630	AE107610	AE107630
	Part No.	198-78-21420	198-78-21340	198-78-21370	198-78-21350	198-78-21380

ROCK SELECTION MODE SELECTOR SWITCH

Using this switch (2) during ripping operations, turn the shoe slip control ON and select mode [1] - [5] according to the shoe slip ratio.

The lamp for the selected mode lights up.



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