

# Operation & Maintenance Manual

# D85A, E, P-21

## BULLDOZER

	<b>D85A - 35001</b>	
SERIAL NUMBERS	<b>D85E - 35001</b>	and up
	<b>D85P - 3001</b>	

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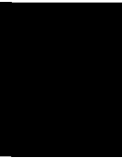
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# **SAFETY**



**⚠ WARNING**

**Read and follow all safety precautions. Failure to do so may result in serious injury or death.**

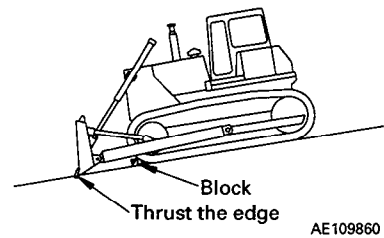
This safety section also contains precautions for optional equipment and attachments.

### WORKING ON LOOSE GROUND

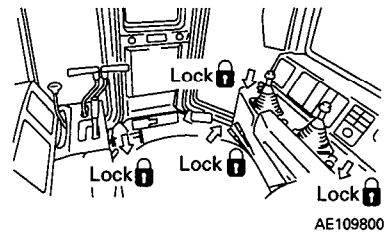
- Avoid operating your machine too close to the edge of cliffs, overhangs, and deep ditches. If these areas collapse, your machine could fall or tip over and result in serious injury or death. Remember that the soil after heavy rain or blasting is weakened in these areas.
- Earth laid on the ground and the soil near ditches are loose. They can collapse under the weight or vibration of your machine.
- Install the HEAD GUARD or FOPS if working in areas where there is danger of falling rocks and dirt.
- When working in places where there is danger of falling rocks or danger of the machine turning over, install ROPS and a seat belt.

### PARKING THE MACHINE

- Park on level ground whenever possible. If not possible, block the tracks, lower the blade to the ground and thrust the edge of the blade in the ground.



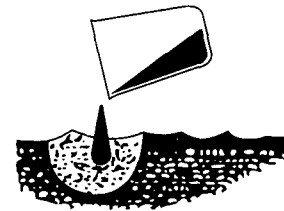
- When parking on public roads, provide fences and signs, such as flags or lights, on the machine to warn passersby to be careful. Be sure that the machine, flags or lights do not obstruct traffic. **Parking procedure → See "12.11 PARKING MACHINE".**
- Before leaving the machine, lower the work equipment to the ground, move the SAFETY LEVER to LOCK position, stop the engine, and lock all the doors, windows, and covers and remove the key(s). **Work equipment posture → See "12.11 PARKING MACHINE".**  
**Locks → See "12.15 LOCKING".**



**WASTE MATERIALS**

- Never dump waste oil in a sewer system, rivers, etc.
- Always put oil drained from your machine in containers. Never drain oil directly on the ground.
- Obey appropriate laws and regulations when disposing of harmful objects such as oil, fuel, coolant, solvent, filters, batteries, and others.

**INCORRECT**



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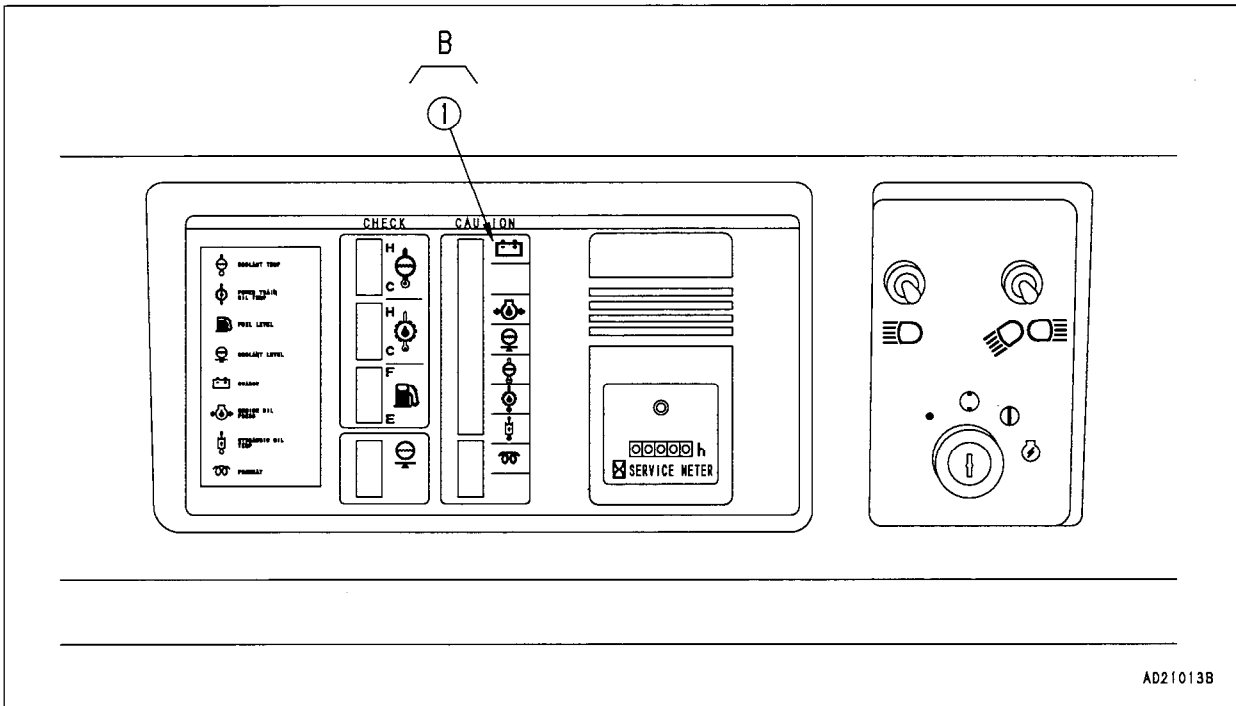
**11.1.2 B: CAUTION MONITOR GROUP  
(Caution items)**

**⚠ WARNING**

**If this monitor lamp flashes, repair it immediately.**

**NOTICE**

Park the machine on level ground and check the monitor lamps.  
 Confirm that these monitor lamps light for about 3 seconds after the starting switch is turned to ON. If any monitor lamp does not light, ask your Komatsu distributor to inspect it.



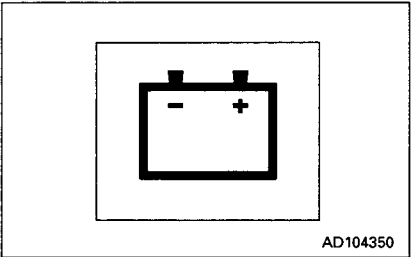
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**1. CHARGE MONITOR**

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

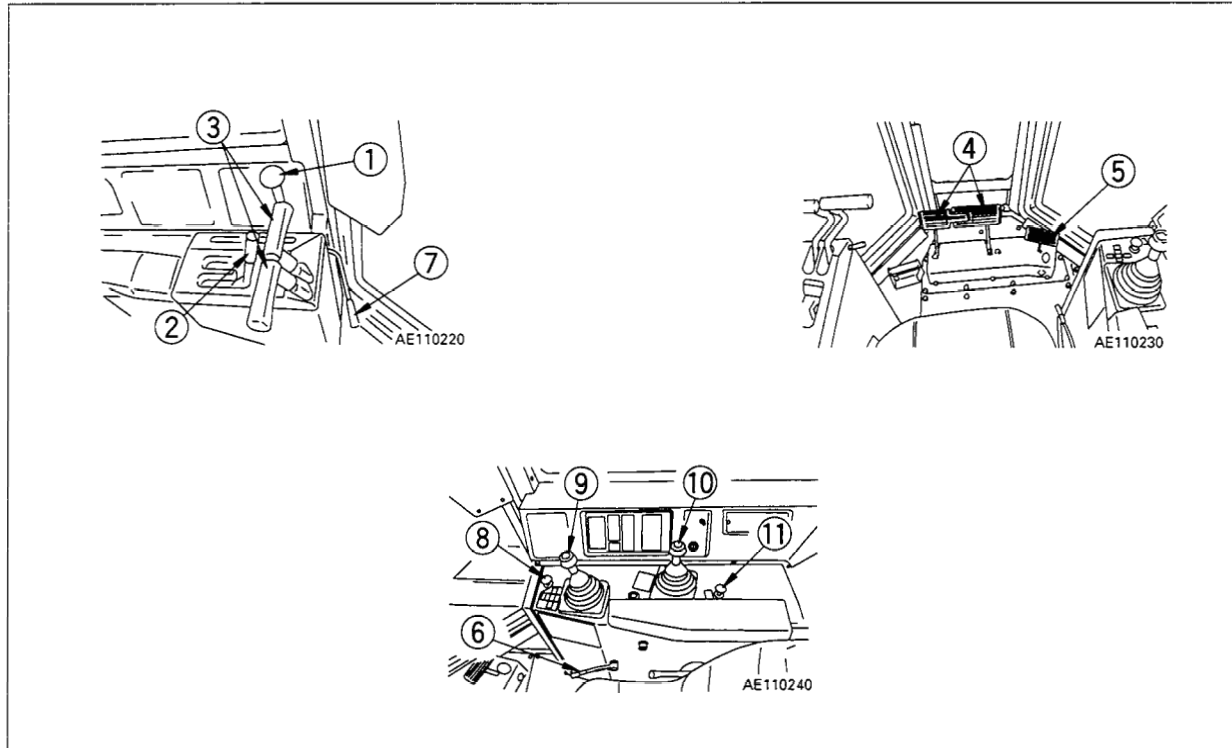
When the starting switch turned ON (Ⓢ), it will light up, but it should go out when the engine speed rises.

If the monitor lamp flashes, stop the engine and check the V-belt tension. If any abnormality is found, see "16. TROUBLESHOOTING."



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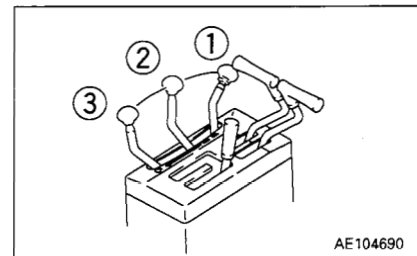
### 11.4 CONTROL LEVERS, PEDALS



#### 1. FUEL CONTROL LEVER

This lever is used to control the engine speed and output. It is also used to stop the engine.

- ① Engine stop position: Push the lever forward fully.
- ② Low idling position: Pull the lever from engine stop position ① until you feel the operating force falls off.
- ③ High idling position: Pull the lever fully from low idling position

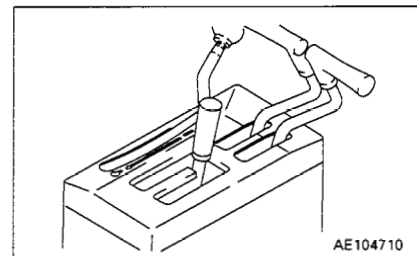


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#### 2. GEAR SHIFT LEVER

This lever changes the transmission gear range. Three-speed forward and three-speed reverse travel can easily be selected by simply shifting the gear shift lever to any desired speed position.

Place the gear shift lever in the neutral position before starting the engine.

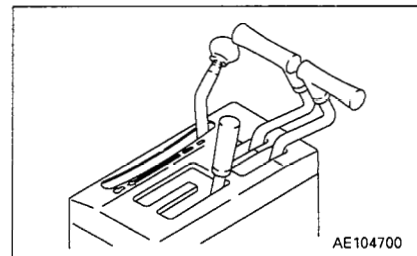


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#### 3. STEERING LEVER

This lever is used to steer the machine. If the lever is moved partially in the direction of turn, the machine, the steering clutch is disengaged and the machine turns gradually.

If the lever is moved more, the steering brake is applied and the machine will turn on the spot.



AE104700

**Presetting to selected stations**

When listening to a preset station, select either of the AM, FM1, FM2, FM3 bands using the FM/AM select switch, then simply press the number key corresponding to the preset selected station.

The system can memorize 6 stations in AM band and 18 stations in FM bands (FM1: 6 stations, FM2: 6 stations and FM3: 6 stations).

Presetting procedures:

1. If the system is playing a cassette tape, press the eject button to stop the tape.
2. Tune to the desired station for presetting:  
First, select either of the MW(AM), FM1, FM2 or FM3 bands before tuning to the frequency of the desired station using the TUNING buttons.
3. Press the MEMO switch.
4. While "MEMO" is flashing, press the preset key of the channel number into which you want to memorize the preset station. (The preset channel and frequency will be indicated. This concludes presetting.)
5. Repeat the above procedure Steps 2 to 4 to preset to other desired stations.

**REMARK**

- To change the station in a preset key number, repeat above procedure Steps 2 to 4, as well.
- If the main power supply is interrupted, such as when exchanging machine battery, all presettings will be erased. Repeat the presetting procedure in such case.

**Auto memory**

When the "A.MEMO" button is pressed, the system tunes itself to stations receivable in the area where the machine is currently located, one after another, and memorizes the frequencies in its preset-memory, all automatically.

**Memory backup battery**

When pressing a preset key fails to tune into the programmed station, repeat the presetting procedure after operating the vehicle for a day. If, however, the memory is still defective the next day, the service life of the backup battery is likely over, unless an imperfect contact or wire breakage is found. In this case, replace with a new backup battery.

- 1. Check for damage, wear, play in work equipment, cylinders, linkage, hoses**  
Check that there are no cracks, excessive wear, or play in the work equipment, cylinders, linkage, or hoses. If any abnormality is found, repair it.
- 2. Remove dirt and dust from around engine, battery radiator**  
Check if there is any dirt or dust accumulated around the engine or radiator. Check also if there is any flammable material (dead leaves, twigs, grass, etc.) accumulated around the battery or high temperature engine parts, such as the engine muffler or turbocharger. Remove all such dirt or flammable material.
- 3. Check for leakage of water or oil around engine**  
Check that there is no leakage of oil from the engine or leakage of water from the cooling system. If any abnormality is found, repair it.
- 4. Check for oil leakage of oil from transmission case, transfer case (incl. bevel gear case), steering clutch case, final drive case, hydraulic tank, hose, joints.**  
Check that there is no oil leakage. If any abnormality is found, repair the place where the oil is leaking.  
Check for leakage of oil from the undercover. Check the ground for traces of oil leakage.
- 5. Check the undercarriage (track, sprocket, idler, guard) for damage, wear, loose bolts, or leakage of oil from rollers**  
If any damage, wear, or oil leakage is found, repair the problem and tighten the bolts.
- 6. Check for damage to handrail, loose bolts**  
Repair any damage and tighten any loose.
- 7. Check for damage to gauges, lamps on instrument panel, loose bolts**  
Check that there is no damage to the panel, gauges and lamps. If any abnormality is found, replace the parts. Clean off any dirt on the surface.
- 8. Check for damage to seat belt and mounting clamps**  
Check that there is no abnormality in the seat belt or mounting clamps. If there is any damage, replace with new parts.

### 12.2.2 STARTING IN COLD WEATHER

When starting in low temperatures, do as follows.

**WARNING**

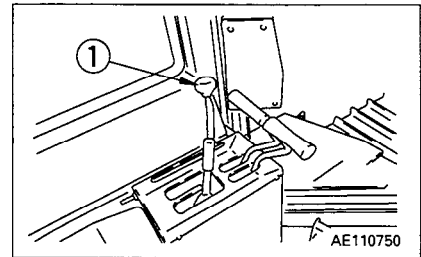
Never use starting aid fluids as they may cause explosions.

**NOTICE**

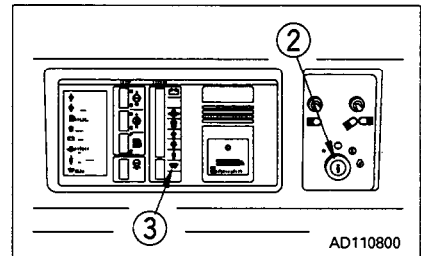
Do not keep the starting motor rotating continuously for more than 20 seconds.

If the engine fails to start, repeat steps 2 and 3 after waiting for about 2 minutes.

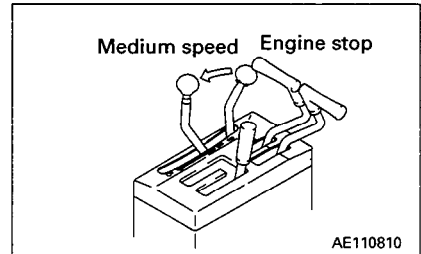
1. Pull fuel control lever ① to a position midway between the low idling and full speed positions.



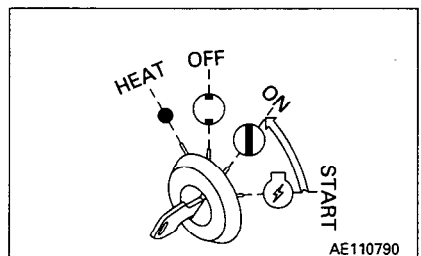
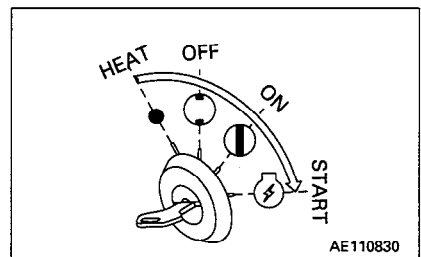
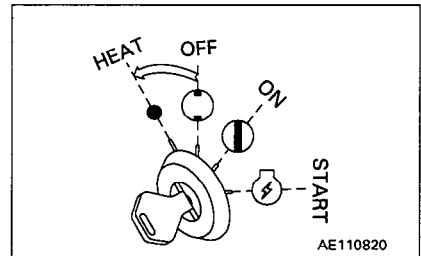
2. Turn the key in starting switch ② to the HEAT position, check that preheating monitor ③ lights up, and hold in this position. After approx. 36 seconds, preheating monitor ③ will flash to indicate that preheating is completed.



3. When preheating monitor ③ flashes, turn the key in starting switch ② to the START position to start the engine.



4. When the engine starts, release the key in starting switch ②. The key will return automatically to the ON position.



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### 12.9.5 PRECAUTIONS ON SLOPES

**Be careful of fuel level**

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

**Be careful of oil level**

When operating machine on sloped areas of more than 20°, fill every place with oil to H level.

**Precautions when engine stops on slopes**

If the engine stops when working on traveling on a slope, depress the brake pedal immediately, lower the work equipment, and stop the machine. Then pull the brake lock lever to lock the brake pedal.

Next, return the gear shift lever to neutral, lock it in position, then start the engine again.

**Precautions when stopping temporarily on slopes**

When stopping the machine temporarily on slope, depress the brake pedal, stop the machine, then lock the brake pedal securely with the brake lock lever.

Never operate the fuel control lever or decelerator pedal to stop the machine on slopes.

## 13. TRANSPORTATION

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

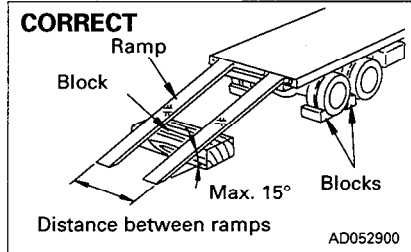
### 13.1 LOADING, UNLOADING WORK

**⚠ WARNING**

- Make sure the ramp has sufficient width, length and thickness to enable the machine to be safely loaded and unloaded. If the ramp sags appreciably, reinforce it with blocks, etc.
- When loading and unloading the machine, park the trailer on a flat firm roadbed. Keep a fairly long distance between the road shoulder and the machine.
- Remove the mud from the undercarriage to prevent the machine from slipping to the side on slopes. Be sure the ramp surface is clean and free of grease, oil, ice and loose materials.
- Never change the direction of travel when on the ramps. If it is necessary to change direction, drive off the ramps and correct the direction, then drive on to the ramps again.

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

1. Properly apply the brakes on the trailer and insert blocks beneath the tires to ensure that it does not move. Then fix the ramps in line with the centers of the trailer and the machine. Be sure that the two sides are at the same level as one another.
2. Determine the direction of the ramps, then slowly load or unload the machine by driving at 1st speed.
3. Load the machine correctly in the specified position on the trailer.



## 16. TROUBLESHOOTING

### 16.1 AFTER RUNNING OUT OF FUEL

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

For details of bleeding the air, see "24.5 EVERY 500 HOURS SERVICE".

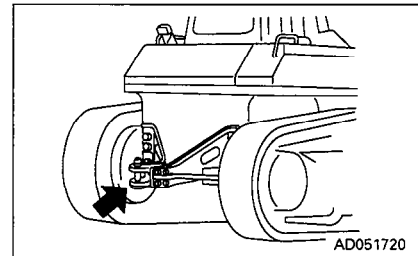
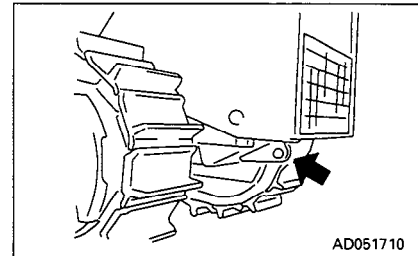
### 16.2 METHOD OF TOWING MACHINE

#### ⚠ WARNING

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

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

Permissible load for towing hook: 19500 kg (191230 N)

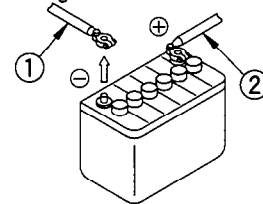


### 16.3 IF BATTERY IS DISCHARGED

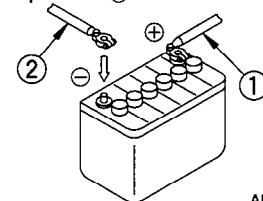
#### ⚠ WARNING

- When checking or handling the battery, stop the engine and turn the starting key to the OFF position before starting.
- The battery generates hydrogen gas, so there is danger of explosion. Do not bring lighted cigarettes near the battery, or do anything that will cause sparks.
- Battery electrolyte is dilute sulphuric acid, and it will attack your clothes and skin. If it gets on your clothes or on your skin, wash it immediately off with large amounts of water. If it gets in your eyes, wash it out with fresh water, and consult a doctor.
- When removing the battery, first disconnect the cable from the ground (normally, from the negative  $-$  terminal). When installing, install the positive  $+$  terminal first. If a tool touches the cable connecting the positive terminal and the chassis, there is danger that it will cause sparks.
- If the terminals are loose, there is danger that the defective contact may generate sparks that will cause an explosion. When installing the terminals, install them tightly.

When removing, disconnect the cable from the ground terminal first.



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



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### 18.1.2 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  $-15^{\circ}\text{C}$ ), so it is necessary to change to a fuel that matches the temperature.
- To prevent the moisture in the air from condensing and forming water inside the fuel tank, always fill the fuel tank after completing the day's work.
- Before starting the engine, or when 10 minutes have passed after adding fuel, drain the sediment and water from the fuel tank.
- If the engine runs out of fuel, or if the filters have been replaced, it is necessary to bleed the air from the circuit.

### 18.1.3 COOLANT

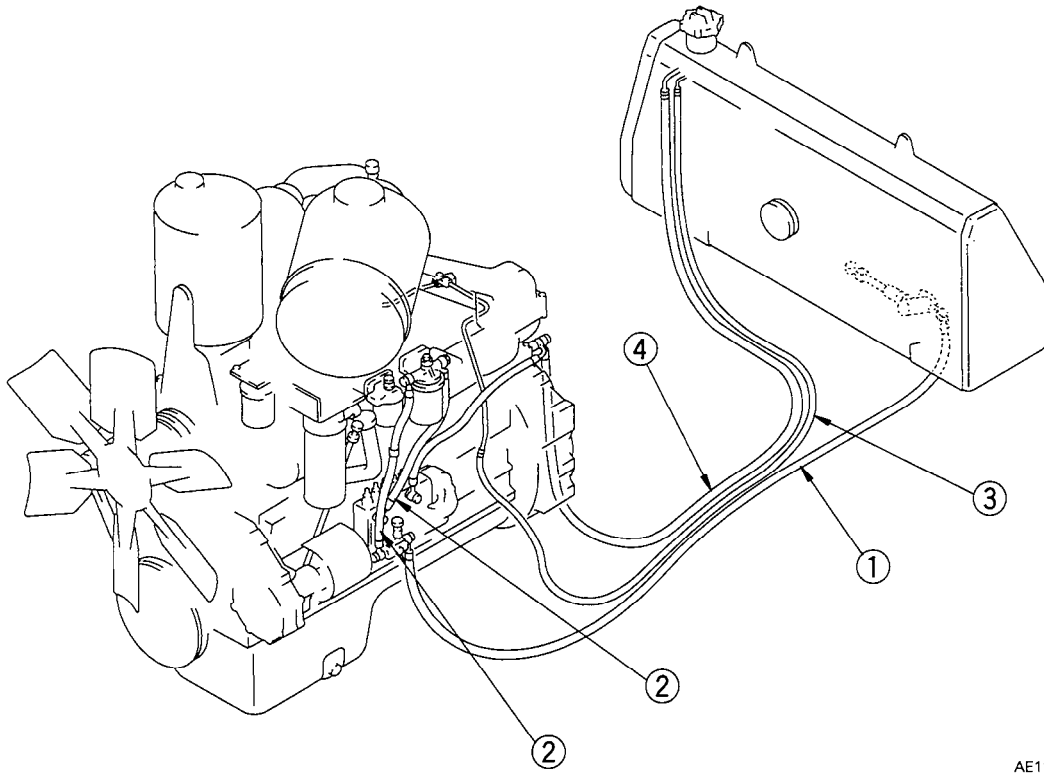
- River water contains large amounts of calcium and other impurities, so if it is used, scale will stick to the engine and radiator, and this will cause defective heat exchange and overheating.  
Do not use water that is not suitable for drinking.
- When using anti-freeze, always observe the precautions given in the Operation and Maintenance Manual.
- Komatsu machines are supplied with Komatsu original anti-freeze in the coolant when the machine is shipped.  
This anti-freeze is effective in preventing corrosion of the cooling system.  
The anti-freeze can be used continuously for two years or 4000 hours. Therefore, it can be used as it is even in hot areas.
- Anti-freeze is inflammable, so be extremely careful not to expose it to flame or fire.
- The proportion of anti-freeze to water differs according to the ambient temperature.  
For details of the mixing proportions, see "24.1.1 CLEAN INSIDE OF COOLING SYSTEM".
- If the engine overheats, wait for the engine to cool before adding coolant.
- If the coolant level is low, it will cause overheating and will also cause problems with corrosion from the air in the coolant.

### 18.1.4 GREASE

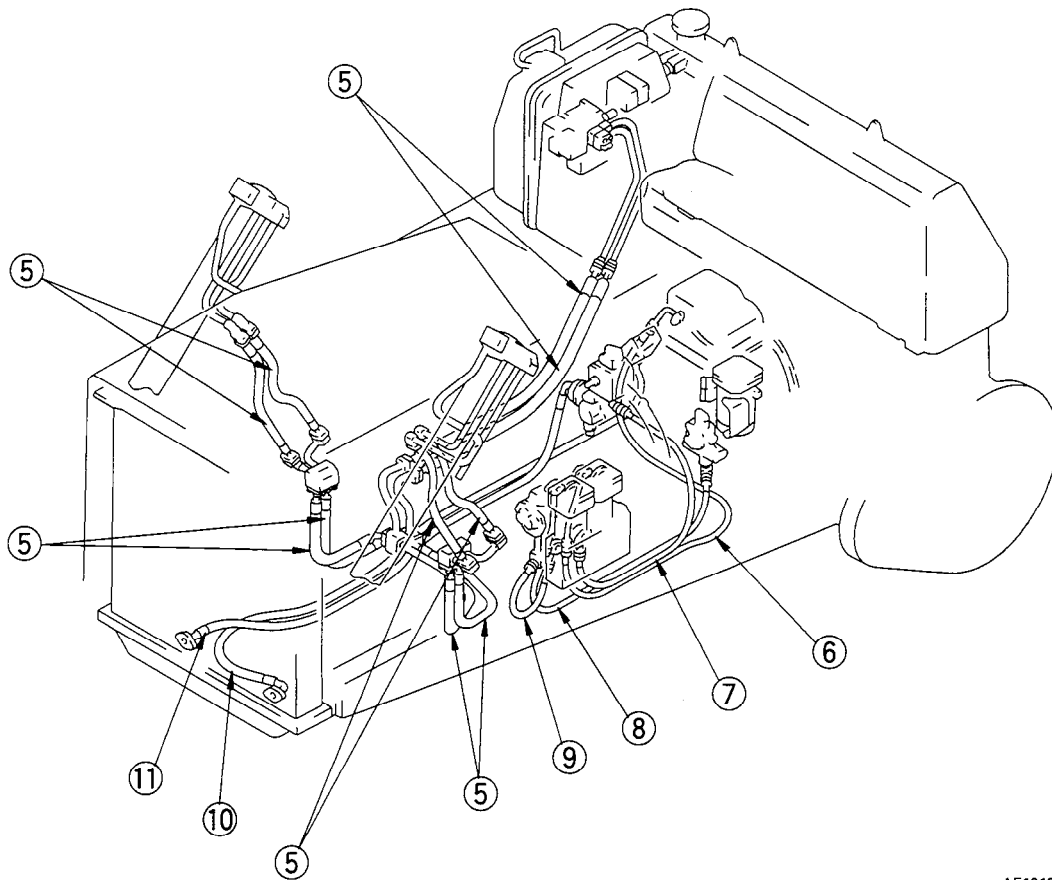
 **WARNING**

**Do not carry out greasing when the engine is running.**

- Grease is used to prevent twisting and noise at the joints.
- The nipples not included in the maintenance section are nipples for overhaul, so they do not need grease.  
If any part becomes stiff after being used for a 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.



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### 24.2.3 CHECK TRACK TENSION

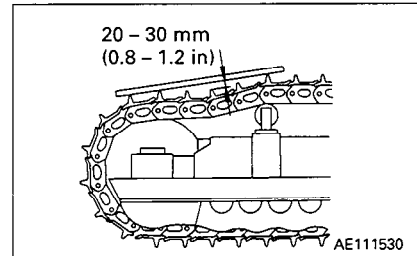
The wear of pins and bushings on the undercarriage will vary with the working conditions and soil properties. It is thus necessary to continually inspect the track tension so as to maintain the standard tension.

Carry out the check and adjustment under the same conditions as when operating (on jobsites where the track becomes clogged with mud, measure with the track clogged with mud).

#### INSPECTION

Stop the machine on level ground (stop with the transmission in FORWARD without applying the brake). Then place a straight bar on the track shoes between the carrier roller and the idler as shown in the figure, and measure the clearance between the bar and the grouser at the midpoint. If the clearance is 20 – 30 mm (0.79 – 1.18 in), the tension is standard.

If the track tension is not at the standard value, adjust it in the following manner.

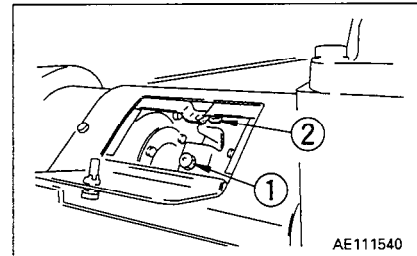


#### ADJUSTMENT

##### **⚠ WARNING**

**Grease inside the adjusting mechanism is under high pressure. Grease coming from lubricator ② under pressure can penetrate the body causing injury or death. For this reason, do not loosen lubricator ② more than one turn. Do not loosen any part other than lubricator ②. Furthermore, do not bring your face in front of grease fitting ①.**

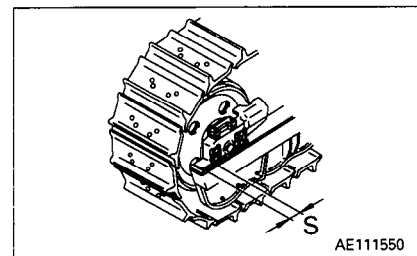
**If the track tension is not relieved by this procedure, please contact your Komatsu distributor.**



#### ● When increasing tension

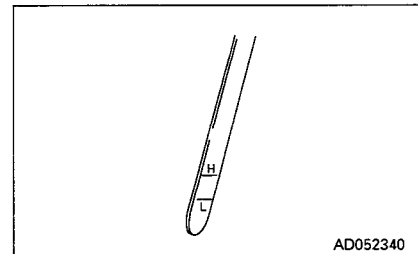
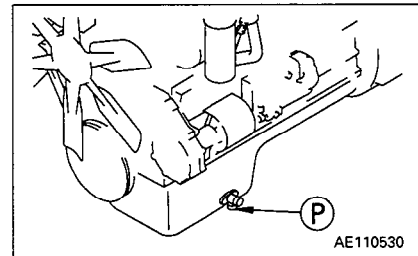
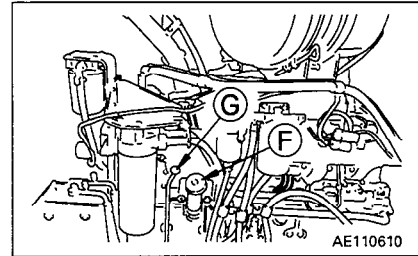
1. Pump in grease through grease fitting ① with a grease pump.
2. To check that the correct tension has been achieved, move the machine backwards and forwards.
3. Check the track tension again, and if the tension is not correct, adjust it again.
4. Continue to pump in grease until S becomes 0 mm. If the tension

is still loose, the pin and bushing are excessively worn, so they must be either turned or replaced. Please contact your Komatsu distributor.



**24.3.3 CHECK OIL LEVEL IN ENGINE OIL PAN, ADD OIL**

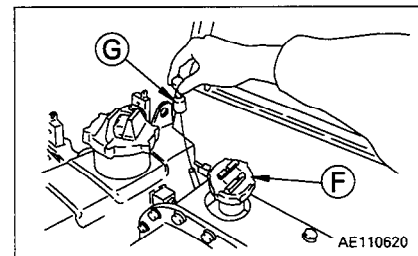
1. Open the engine side cover on the left side of the chassis.
2. Remove dipstick **G** and wipe the oil off with a cloth.
3. Insert dipstick **G** fully in the oil filler pipe, then take it out again.
4. The oil level should be between the H and L marks on dipstick **G**.  
If the oil level is below the L mark, add engine oil through oil filler **F**.  
For details of the oil to use, see "20. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".
5. If the oil is above the H mark, drain the excess engine oil from drain plug **P**, and check the oil level again.
6. If the oil level is correct, tighten the oil filler cap securely and close the engine side cover.

**REMARK**

- When stopping the engine, check the oil level.
- When checking the oil level after the engine has been operated, wait for at least 15 minutes after stopping the engine before checking.
- If the machine is at an angle, make it horizontal before checking.
- While adding oil, take out the oil level gauge through the gauge guide to bleed the air from the crankcase.

**24.3.4 CHECK OIL LEVEL IN STEERING CLUTCH CASE (INCL. TRANSMISSION CASE, TORQUE CONVERTER CASE), ADD OIL**

1. Remove dipstick **G** and wipe the oil off with a cloth.
2. Insert dipstick **G** fully in the oil filler pipe, then take it out again.
3. The oil level should be between the H and L marks on dipstick **G**.  
If the oil level is below the L mark, add engine oil through oil filler **F**.  
For details of the oil to use, see "20. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".
4. If the oil is above the H mark, drain the excess engine oil from the drain plug, and check the oil level again.
5. If the oil level is correct, tighten the oil filler cap securely and close the engine side cover.

**REMARK**

- When check the oil level after the engine has been operated, wait for at least 15 minutes after stopping the engine before checking.
- If the machine is at an angle, make it horizontal before checking.
- In case the work is carried out on sloped land of more than 20° declination, supply oil up to H level.

## 24.5 EVERY 500 HOURS SERVICE

Maintenance for every 250 hours service should be carried out at the same time.

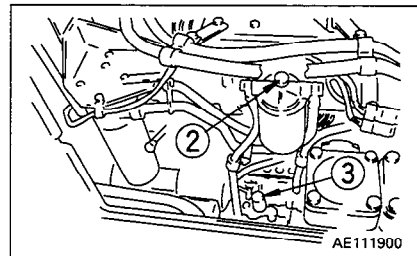
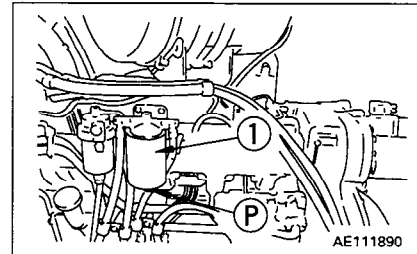
### 24.5.1 REPLACE FUEL FILTER CARTRIDGE

**⚠ 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.

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

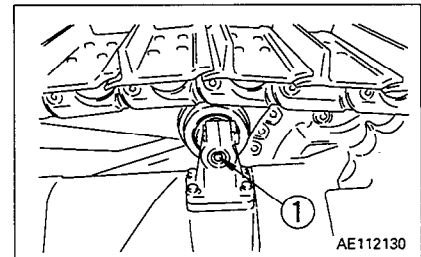
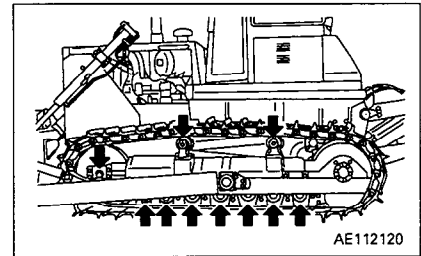
1. Set the container to catch the fuel under the filter cartridge.
2. Remove drain plug **P** at the bottom of the filter, and drain the oil.
3. Using a filter wrench, turn filter cartridge **①** counterclockwise to remove it.
4. Clean the filter holder, fill a new filter cartridge with clean fuel, coat the packing surface with engine oil, then install it to the filter holder.
5. When installing, tighten until the packing surface contacts the seal surface of the filter holder, then tighten it up 1/2 to 3/4 of a turn.  
If the filter cartridge is tightened too far, the packing will be damaged and this will lead to leakage of fuel. If the filter cartridge is too loose, fuel will also leak from the packing, so always tighten to the correct amount.
6. After replacing filter cartridge **①**, loosen air bleed plug **②**.
7. Loosen the knob of feed pump **③**, then operate it up and down until no more bubbles come out with the fuel from air bleed plug **②**.
8. Tighten air bleed plug **②**, then push in the knob of feed pump **③** and tighten it.
9. After replacing the filter cartridge, start the engine and check that there is no leakage of fuel from the filter seal surface. If there is any leakage of fuel, check the tightening of the filter cartridge. Whenever there is leakage of fuel, follow Steps 1 – 3 to remove the filter cartridge, then check the packing surface for damage or foreign material. If any damage or foreign material is found in the packing, replace the packing with a new part, then repeat Steps 4 – 9 to install the filter cartridge.



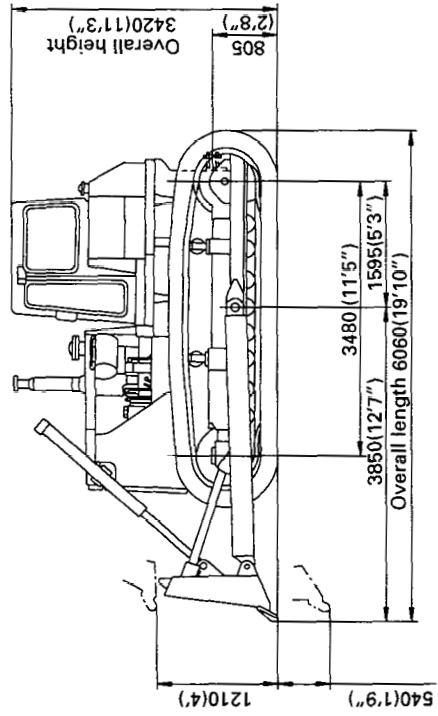
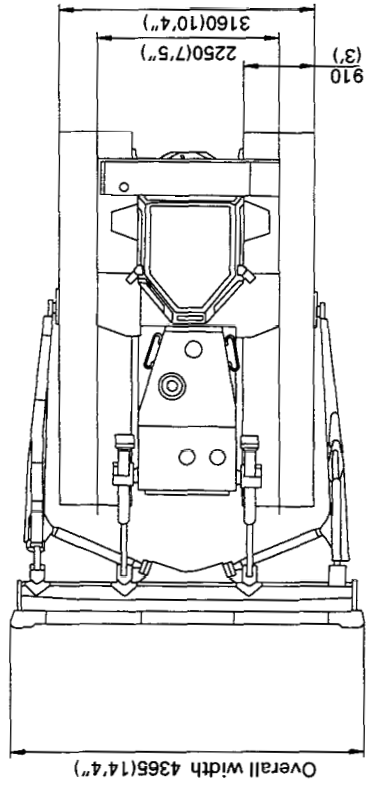
### 24.6.6 CHECK UNDERCARRIAGE OIL

Do as follows to check if the oil level in the track roller, carrier roller, and idler has gone down.

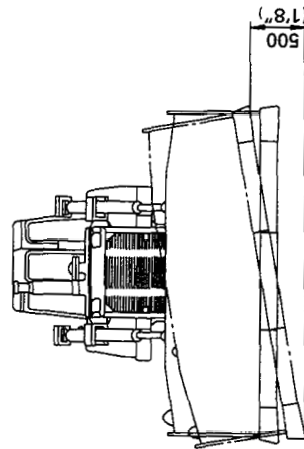
1. Stop the machine on level ground.
2. Loosen seal bolt ① slowly, and if oil oozes out from the thread, the oil level has not gone down, so tighten the bolt again immediately.
3. If no oil comes out even when seal bolt ① is removed, there is a lack of oil, so please contact your Komatsu distributor for repair.



D85P-21



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