Operation & Maintenance Manual

SEAM002410T

PC200,200LC-6
PC210,210LC-6 MIGHTY
PC220,220LC-6
PC230,230LC-6 MIGHTY
HYDRAULIC EXCAVATOR

SERIAL NUMBERS PC200,200LC-102229
PC210,210LC-31425
PC220,220LC-53562
PC230,230LC-10247
and up

⚠ WARNING

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

NOTICE

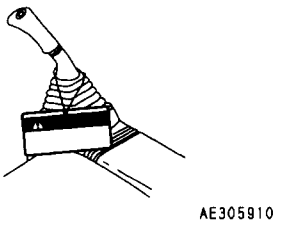
Komatsu has Operation & Maintenance Manuals written in some other languages. If a foreign language manual is necessary, contact your local distributor for availability.

KOMATSU

OPTIONS, ATTACHMENTS

WHEN STARTING ENGINE

- Walk around your machine again just before mounting it, and check for people and objects that might be in the way.
- Never start the engine if a warning tag has been attached to the work equipment control lever.
- When starting the engine, sound the horn as an alert.
- Start and operate the machine only while seated.
- An additional worker may ride in the machine only when sitting in the passenger seat. Do not allow anyone to ride on the machine body.
- Do not short circuit the starting motor circuit to start the engine. It is not only dangerous, but will also cause damage to the equipment.

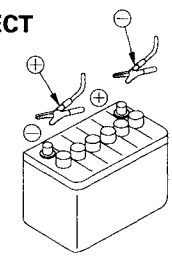


STARTING WITH BOOSTER CABLES

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

- Carry out the starting operation with two workers (with one worker sitting in the operator's seat).
- When starting from another machine, do not allow the two machines to touch.
- When connecting the booster cables, turn the starting switch OFF for both the normal machine and problem machine.
- Be sure to connect the positive ⊕ cable first when installing the booster cables. Disconnect the ground or negative ⊖ cable first when removing them.
- The final ground connection is the connection of the ground to the engine block of the problem machine. However, this will cause sparks, so be sure to connect it as far as possible from the battery.
  Starting procedure when using booster cables → See "16.5 IF BATTERY IS DISCHARGED".
- When removing the booster cables, be careful not to let the booster cable clips touch each other or to let the clips touch the machine.

INCORRECT



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CHARGING BATTERY

If the battery is handled incorrectly when it is being charged, there is danger that the battery may explode, so follow the instructions in HANDLING BATTERY and in the instruction manual for the charger, and always observe the following precautions.

- Carry out the charging in a well-ventilated place, and remove the battery caps. This disperses the hydrogen gas and prevents explosion.
- Set the voltage on the charger to match the voltage on the battery to be charged. If the voltage setting is wrong, it will cause the charger to overheat and catch fire, and this may lead to an explosion.
  Connect the positive ⊕ charging clip of the charger to the positive ⊕ terminal of the battery, then connect the negative ⊖ charging clip to the negative ⊖ terminal of the battery. Be sure to tighten both terminals securely.
- If the battery charge is less than 1/10 of the rated charge, and high speed charging is carried out, set to a value below the rated capacity of the battery.
  If there is an excessive flow of charging current, it may cause leakage or evaporation of the electrolyte, which may catch fire and explode.

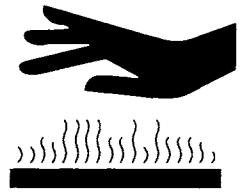
INCORRECT

A0055110

PRECAUTIONS WHEN CARRYING OUT MAINTENANCE AT HIGH TEMPERATURE

Immediately after stopping operations, the engine coolant, oil at all parts, the exhaust manifold, and the muffler are at high temperature.
In this condition, if the cap is removed, or the oil is drained, or the filters are replaced, this may result in burns or other injury. Wait for the temperature to go down, then carry out the inspection and maintenance in accordance with the procedures given in this manual.

Cleaning inside of cooling system → See "24.2 WHEN REQUIRED".
Checking coolant level, oil level in hydraulic tank → see "24.3 CHECK BEFORE STARTING".
Checking lubricating oil level, adding oil → see "24.3-7 PERIODIC MAINTENANCE".
Changing oil, replacing filters → see "24.5-10 PERIODIC MAINTENANCE".



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CHECKS AFTER INSPECTION AND MAINTENANCE

Failure to carry out inspection and maintenance fully, or failure to check the function of various maintenance locations may cause unexpected problems and may even lead to personal injury or damage, so always do as follows.

- Checks when engine is stopped
  - Have all the inspection and maintenance locations been checked?
  - Have all the inspection and maintenance items been carried out correctly?
  - Have any tools or parts dropped inside the machine? It is particularly dangerous if they get caught in the lever linkage.
  - Has water and oil leakage been repaired? Have bolts been tightened?

- Checks when engine is running
  For details of checks when the engine is running, **see "8.2 DURING MAINTENANCE, MAINTENANCE WITH ENGINE RUNNING"**, and be extremely careful to ensure safety.

- Do the inspection and maintenance locations work normally?

- Is there any oil leakage when the engine speed is raised and load is applied to the hydraulic system?

WASTE MATERIALS

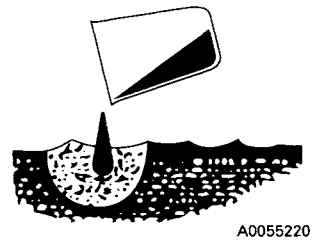
To prevent pollution, particularly in places where people or animals are living, always follow the procedures given below.

- Never dump waste oil in a sewer system, rivers, etc.

- Always put oil drained from your machine in containers. Never drain oil directly onto the ground.

- Obey appropriate laws and regulations when disposing of harmful objects such as oil, fuel, coolant, solvent, filters, and batteries.

INCORRECT



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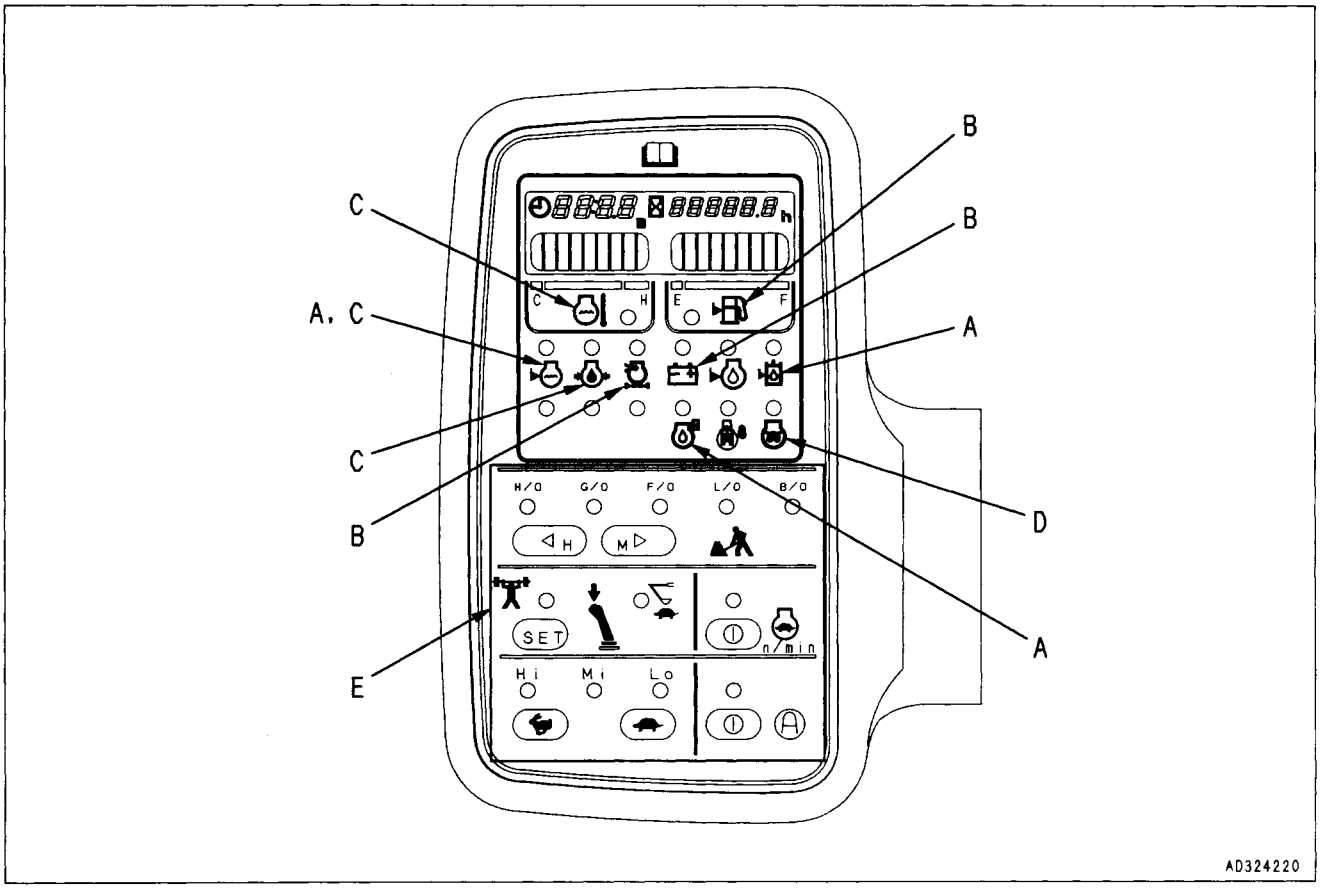
11. EXPLANATION OF COMPONENTS

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

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

11.1 MACHINE MONITOR



A. BASIC CHECK ITEMS (11.1.1)

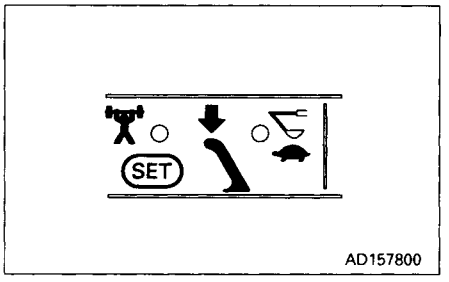
This displays the basic items that should be checked before starting the engine.

If there is any abnormality, the appropriate monitor lamp will flash.

NOTICE

When carrying out checks before starting, do not simply rely on the monitor. Always refer to the periodic maintenance items or "12. OPERATION" to carry out the checks.

4. POWER MAX./SWIFT SLOW-DOWN SWITCH



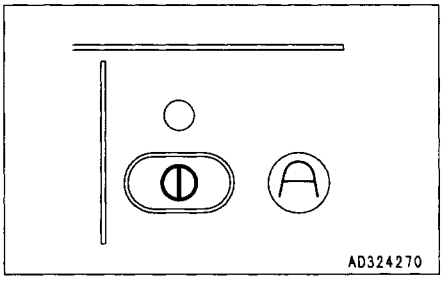
During operations, the digging power can be increased and the speed reduced by a one-touch operation of the knob button (single click while pushing).

Power max. (power up) lights up:
When the working mode is heavy-duty and general operation mode only, the power can be increased while the knob button is being pressed. Even if the knob button continues to be pressed, the increase in power finishes after approx. 8.5 sec.

Swift slow-down (speed down) lights up:
When the working mode is heavy-duty operation and general operation mode only, the speed can be reduced while the knob button is being pressed.

When the engine is started, the power max. lamp lights up. Each time the SET switch is pressed, the mode is switched.

5. ACTIVE MODE SWITCH (SELECTOR SWITCH)



The active mode is effective for quick leveling operations or deep digging and loading operations.

Lamp lights up: Active mode is actuated.
Lamp goes out: Active mode is cancelled.

The lamp is off when the engine is started.

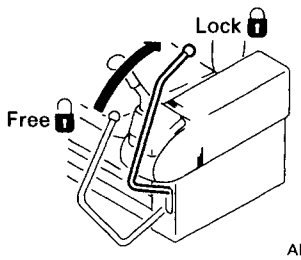
If it is turned lamp (lights up), it is possible to enter the active mode from any working mode.

Even when it is turned lamp (lights up), the working mode display does not change. When the lamp goes out, the system returns to the original working mode.

11.4 CEILING WINDOW

⚠ WARNING

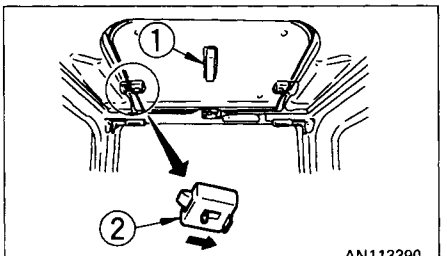
When leaving the operator's compartment, set the safety lock lever securely to the LOCK position.
If the control levers are not locked, and they are touched by mistake, this may lead to a serious accident.



AN112930

When opening

1. Lock the safety lock lever securely.
2. Check for any ceiling window movement by pulling lock ② located on both sides, then push up and open the ceiling window grasping grip ①.



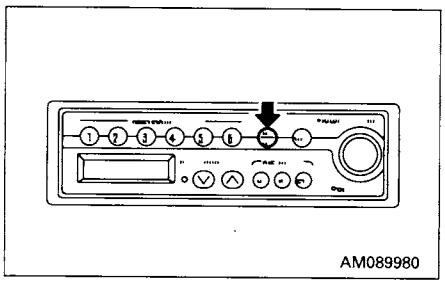
AN113390

When closing

Close the ceiling window grasping grip ① and lock it with lock ②. If the lock cannot be applied, open and close the ceiling window again.

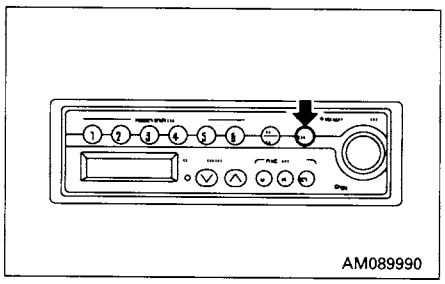
3. FM/AM SELECTOR BUTTON (AM/FM)

Press this button and select the desired band.
Each time the button is pressed, it switches AM → FM → AM ...


AM089980

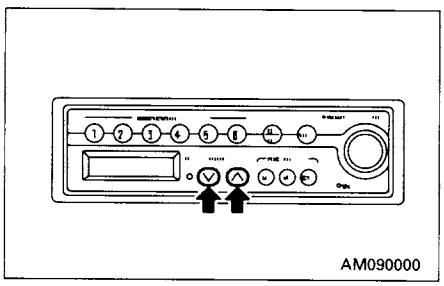
4. DISPLAY SELECTOR BUTTON (TIME)

This equipment gives priority to the frequency display. If the button is pressed when the frequency is displayed, display will give the present time for 5 seconds. After 5 seconds pass, the display will automatically return to the frequency display. If any button other than TIME SET (H, M, SET) is pressed within the 5 seconds, the display will return to the frequency display.


AM089990

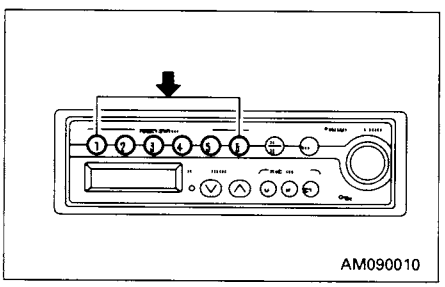
5. TUNING BUTTONS (TUNING) MANUAL TUNING (MANUAL)

Use the buttons to change the frequency.
Up button (∧): Each time the button is pressed, the frequency will go up in steps (FM: 0.1 MHz, AM: 9 kHz).
Down button (∨): Each time the button is pressed, the frequency will go down in steps (FM: 0.1 MHz, AM: 9 kHz).


AM090000

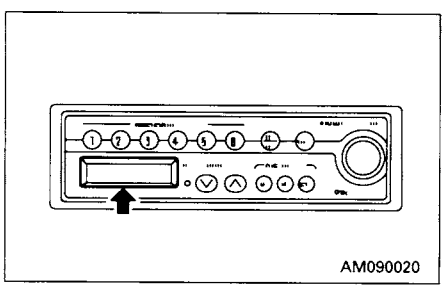
6. PRESET BUTTONS (1, 2, 3, 4, 5, 6) (PRESET STATION)

If these buttons are set to the frequency of the desired broadcasting station, the station can be selected at a touch.
For details of the method of presetting, see "11.12.2 METHOD OF OPERATION".


AM090010

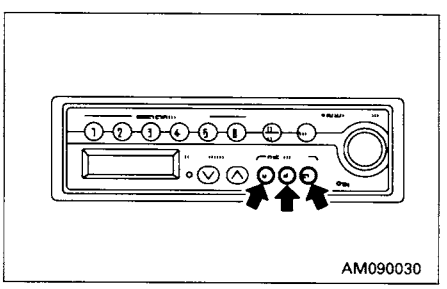
7. DISPLAY

The reception band, frequency, preset number, and time are displayed.


AM090020

8. TIME CORRECTION BUTTON

This is used to correct the time.
H : Hour
M : Minute
SET : Sets to start of hour (00 minutes)


AM090030

12.1.2 CHECK BEFORE STARTING

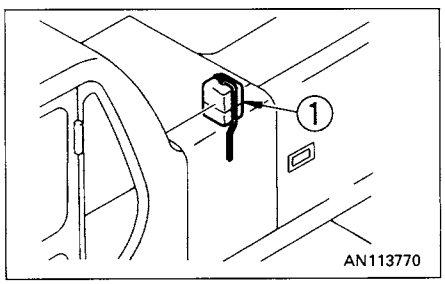
Always carry out the items in this section before starting the engine each day.

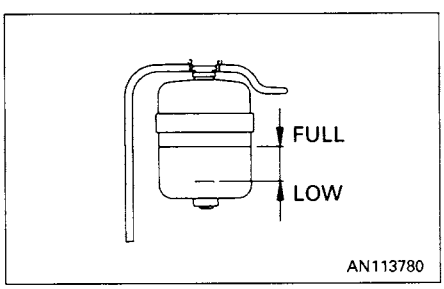
CHECK COOLANT LEVEL, ADD WATER

⚠ WARNING

Do not open the radiator cap unless necessary. When checking the coolant, always check the radiator reserve tank when the engine is cold.

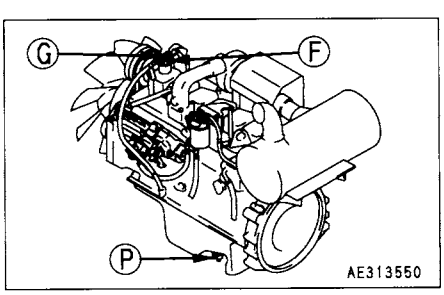
1. Open the rear door on the left side of the machine and check that the cooling water level is between the FULL and LOW marks on radiator reserve tank ① (shown in the diagram on the right). If the water level is low, add water through the water filler of reserve tank ① to the FULL level.
2. After adding water, tighten the cap securely.
3. If the reserve tank becomes empty, first inspect for water leaks and then fill the radiator and the reserve tank with water.



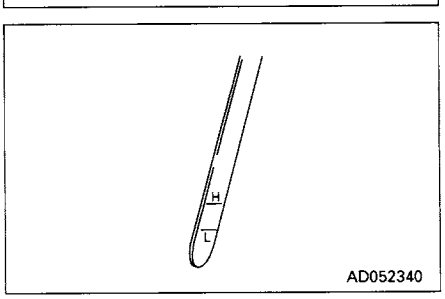


CHECK OIL LEVEL IN ENGINE OIL PAN, ADD OIL

1. Open the engine hood.
2. Remove dipstick Ⓖ and wipe the oil off with a cloth.
3. Insert dipstick Ⓖ 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 Ⓖ.
   If the oil level is below the L mark, add engine oil through oil filler Ⓕ.

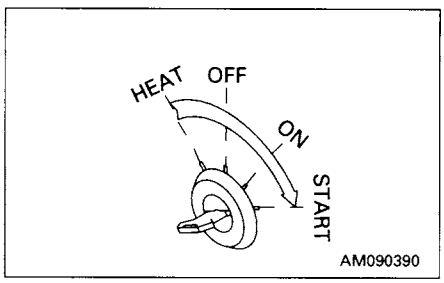


NOTICE

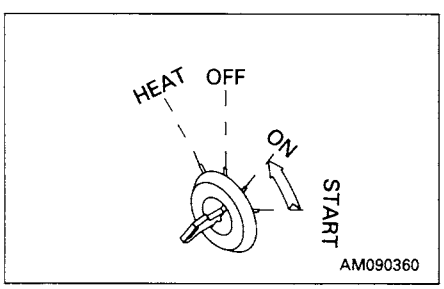
For details of the oil to use, see "20. USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE".

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

Ambient temperature	Preheating time
Above 0°C	–
0°C to –10°C	20 seconds
–10°C to –20°C	30 seconds



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



12.5 STEERING MACHINE

12.5.1 STEERING (CHANGING DIRECTION)

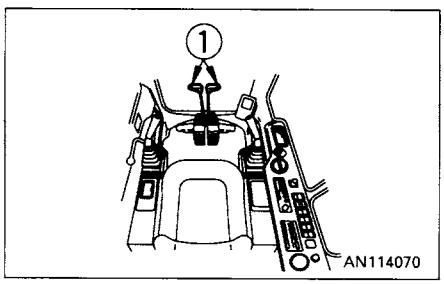
⚠ WARNING

Before operating the travel levers, check the position of the sprocket. If the sprocket is at the front, the operation of the travel levers is reversed.

Use the travel levers to change direction.

Avoid sudden changes of direction as far as possible. In particular, when carrying out counter-rotation (spin turn), stop the machine first before turning.

Operate two travel levers ① as follows.



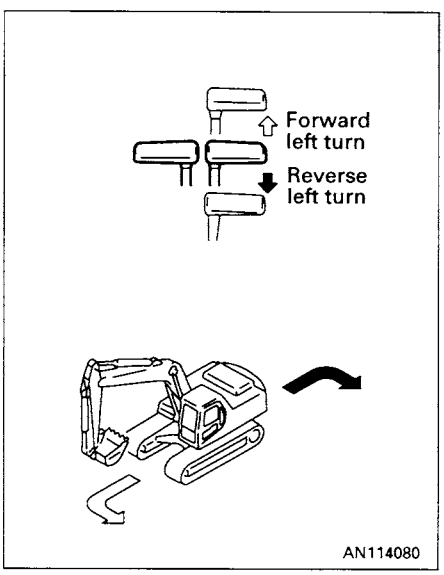
Changing direction of machine when stopped

When turning to the left:

Push the right travel lever forward to travel left when traveling forward; and pull it back to turn left when traveling in reverse.

REMARK

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



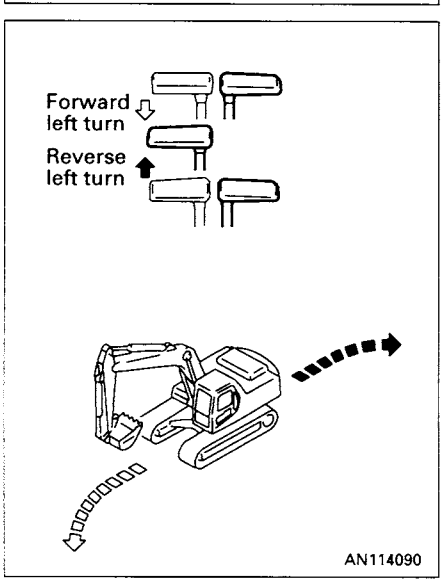
Steering when traveling (left and right travel levers both operated in same direction)

When turning to the left:

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

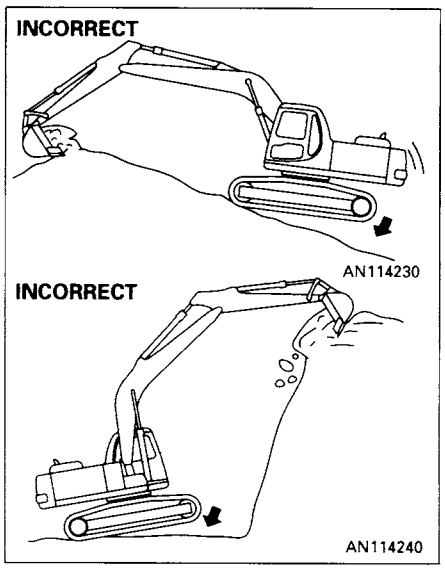
REMARK

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



Prohibited operations using dropping force of machine

Do not use the dropping force of the machine for digging.



Digging rocky ground

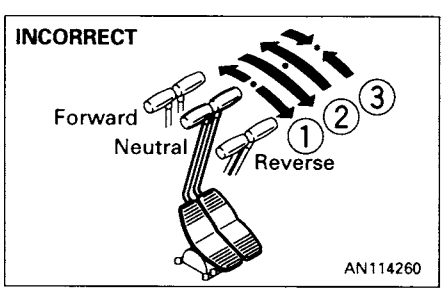
It is better to excavate hard rocky ground after breaking it up by some other means. This will not only reduce damage to the machine but make for better economy.

Sudden lever shifting during Hi-speed travel prohibited

① Never carry out sudden lever shifting as this may cause sudden starting.

② Avoid sudden lever shifting from forward to reverse (or vice versa).

③ Avoid sudden lever shifting change such as sudden stopping from near top speed (lever release operation).



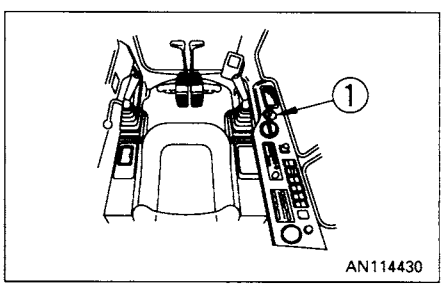
12.19 STOPPING ENGINE

NOTICE

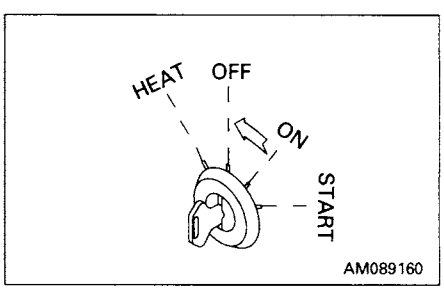
If the engine is abruptly stopped before it has cooled down, engine life may be greatly shortened. Consequently, do not abruptly stop the engine apart from an emergency.

In particular, if the engine has overheated, do not abruptly stop it but run it at medium speed to allow it to cool gradually, then stop it.

1. Run the engine at low idling speed for about 5 minutes to allow it go gradually cool down.



2. Turn the key in starting switch ① to the OFF position and stop the engine.
3. Remove the key from starting switch ①.



15.2 DURING STORAGE

⚠ WARNING

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

Operate the engine and move the machine for a short distance once a month so that a new film of oil will be coated over movable parts and component surfaces. At the same time, also charge the battery.
Also carry out cooler operation in the case of machines equipped with an air conditioner.

15.3 AFTER STORAGE

NOTICE

If the machine is stored without carrying out the monthly rust prevention operation, request your Komatsu distributor for service.

Carry out the following procedure when taking the machine out of long-term storage.

- Wipe off the grease from the hydraulic cylinder rods.
- Add oil and grease to all places.

15.4 STARTING MACHINE AFTER LONG-TERM STORAGE

When starting the machine after a long-term storage, first cancel the automatic warming-up function as follows.

1. Turn the starting switch key to the ON position.
2. Turn the fuel control dial from the low idling (MIN) position to the full (MAX) position, hold it there for 3 seconds, then return it to the low idling (MIN) position and start the engine.

16.6.4 ELECTRONIC CONTROL SYSTEM

If an error code appears on the machine monitor display (normally displays TIME), follow the countermeasure table as shown below in the self-diagnosis.

Machine monitor trouble display

Monitor display	Error mode	Countermeasure
E02	PC-EPC valve system error	If the pump override switch is set to the ON position, operation can be carried out. However, immediately have the TVC valve system inspected by your Komatsu distributor. (※)
E03	Swing brake system error	Turn the swing prolix switch ON to cancel the brake. When applying the swing brake, operate the swing lock switch manually. Depending on the cause of the failure, it may be impossible to release the brake. In any case, have the system inspected immediately by your Komatsu distributor. (※)
E05	Governor system error	Governor will not execute the control function. Manually operate the governor-lever. To fix the governor lever at the full stroke position, use the retaining bolt holes on bracket. In this case, immediately have the governor system inspected by your Komatsu distributor.
CALL	Error indicating that operation cannot be continued	Place the machine in a safe posture, then have it inspected immediately by your Komatsu distributor.
In the case where the monitor will not display error codes and work equipment operation and swing operation cannot be carried out.		Have the machine inspected immediately by your Komatsu distributor.

(※) For detail of operating the pump override switch and the swing override switch, refer to "11.2 SWITCHES".

19. WEAR PARTS LIST

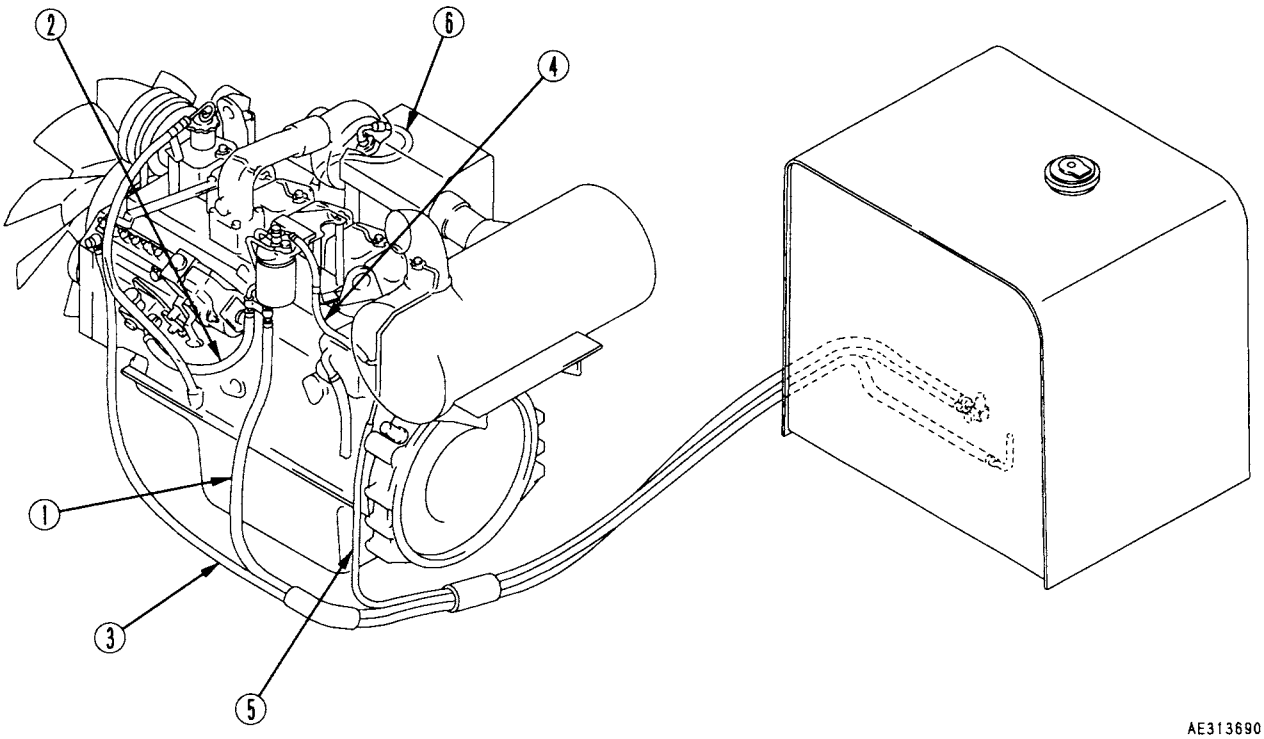
Wear parts such as the filter element, bucket tooth, etc. are to be replaced at the time of periodic maintenance or before their abrasion limits.
The wear parts should be changed correctly in order to use the machine economically.
For part change, Komatsu genuine parts of excellent quality should be used.
When ordering parts, please check the part number in the parts book.

The parts in parentheses are to be replaced at the same time.

Item	Part No.	Part Name	Q'ty	Replacement frequency
Engine oil filter	6735-51-5140	Cartridge	1	Every 250 hours service
Hydraulic oil filter	20Y-60-21510 (07000-05180)	Element (O-ring)	1 (1)	Every 500 hours service
Fuel filter	6732-71-6111	Cartridge	1	Every 500 hours service
Additional fuel filter (option)	600-311-9121	Cartridge	1	Every 500 hours service
Hydraulic tank breather	20Y-60-21410	Element	1	Every 500 hours service
Air cleaner	600-181-6740	Double element	1	—
Additional filter for breaker	20Y-970-1820 (07000-12115)	Element (O-ring)	1 (1)	—
Electrical intake air heater	6732-11-4810	Gasket	2	—
Corrosion resistor (option)	600-411-1151	Cartridge (400 g)	1	When change the coolant
Corrosion resistor (option)	600-411-1191	Cartridge (200 g)	1	Every 1000 hours service

If optional oil filter cartridge, replace the cartridge at every 500 hours service.

Item	Part No.	Part Name	Q'ty	Replacement frequency
Engine oil filter	6736-51-5141	Cartridge	1	Every 500 hours service



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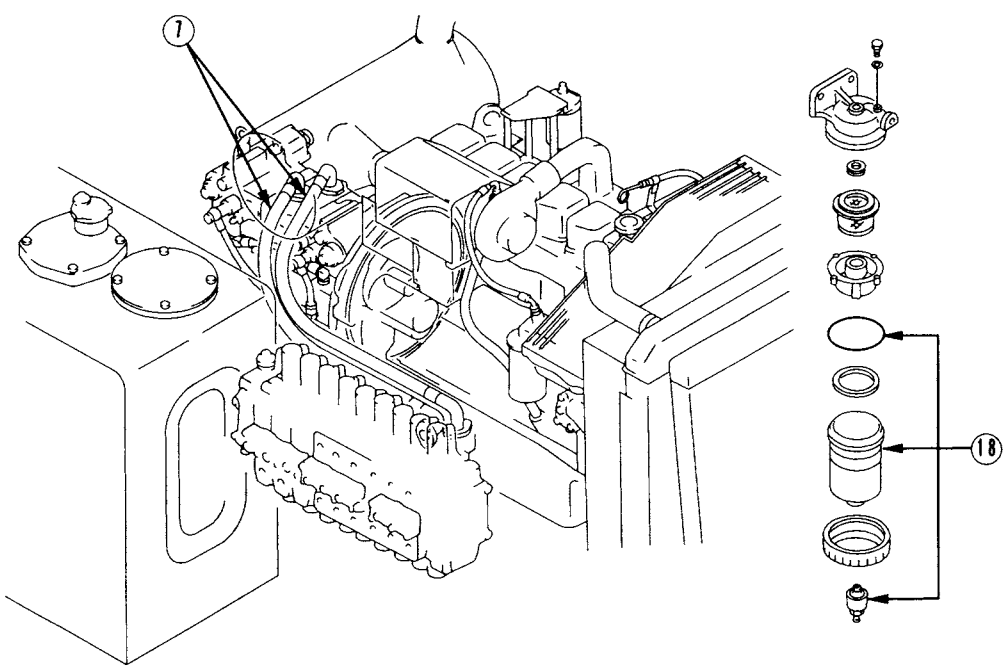
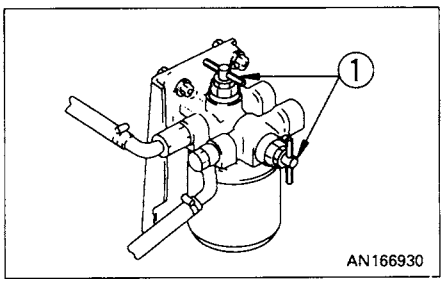
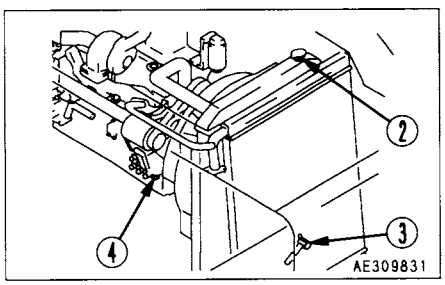


AW354640

- Prepare a container to catch drained coolant: Min 23.3 ℓ (6.16 US gal, 5.13 UK gal) capacity.

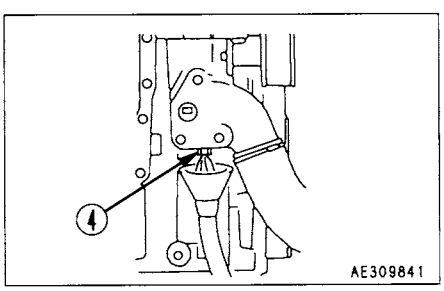


1. If a corrosion resistor cartridge is installed, close valves ①.
2. Turn radiator cap ② slowly to release the internal pressure.
3. Pushing radiator cap ②, turn it slowly to remove it.
4. Remove the undercover, then set a container to catch the coolant under drain valve ③ and drain plug ④. Open drain valve ③ at the bottom of the radiator to drain the water. Remove drain plug ④ in the cylinder block when draining the water.



5. After draining the water, close drain valve ③ and drain plug ④, and fill with city water.
6. Open drain valve ③ and drain plug ④, run the engine at low idling, and flush water through the system for 10 minutes.

   When doing this, adjust the speed of filling and draining the water so that the radiator is always full.
   While flushing water through the system, watch carefully that the water inlet hose does not come out of the radiator water filler.



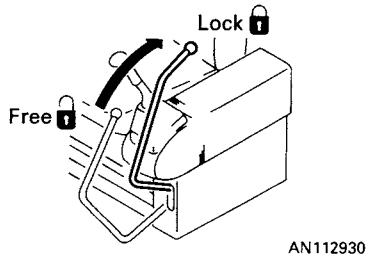
7. After flushing, stop the engine, open drain valve ③ and drain plug ④, then close it again after all the water has drained out.
8. After draining the water, clean with a flushing agent.
   We recommend use of a Komatsu genuine cleaning agent. For details of the cleaning method, see the instructions given with the cleaning agent.
9. After cleaning, open drain valve ③ and drain plug ④ to drain all the cooling water, then close them and fill slowly with clean water.
10. When the water comes up to near the water filler port, open drain valve ③ and drain plug ④, run the engine at low idling, and continue to run water through the system until clean colorless water comes out.

When doing this, adjust the speed of filling and draining the water so that the radiator is always full.

24.2.8 ADJUST BUCKET CLEARANCE

⚠WARNING

It is dangerous if the work equipment moves by mistake when the clearance is being adjusted.
Set the work equipment in a stable condition, then stop the engine and lock the lever securely.

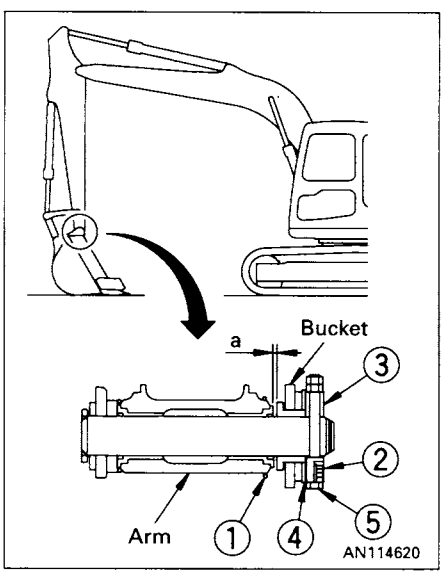


1. Set the work equipment to the position shown in the diagram at right, stop the engine and set the lock lever to the locked position.

2. Shift O-ring ① of the linkage and measure the amount of play (a).
   Measurement is easier of you move the bucket to one side or the other so all the play can be measured in one place.
   (In the diagram this is on the left-hand side)
   Use a gap (clearance) gauge for easy and accurate measurement.

3. Loosen the four plate fixing bolts of ② and loosen plate ③.
   Because it uses split shims, you can carry out the operation without removing the bolts entirely.

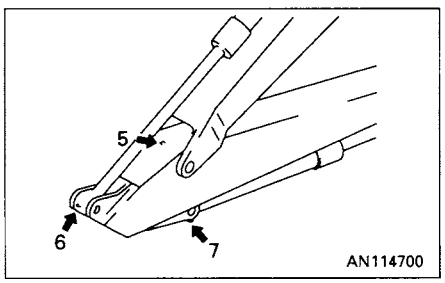
4. Remove shim ④ corresponding to the amount of play (a) measured above.



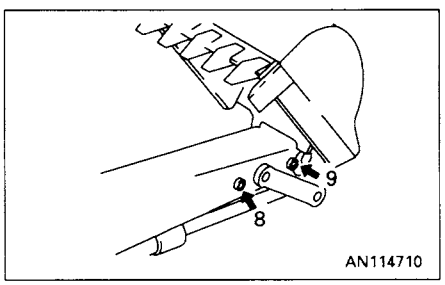
[Example]
In the case of play of 3 mm, remove two 1.0 mm shims and one 0.5 mm shim. Play becomes 0.5 mm. For shim (4), two types of 1.0 mm and 0.5 mm are used.
When play a is smaller than one shim, do not carry out any maintenance.

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

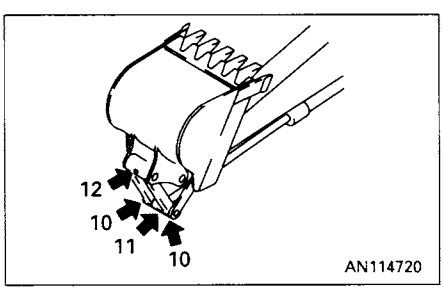
5. Boom-Arm coupling pin (1point)
6. Arm cylinder rod end (1 point)
7. Bucket cylinder foot pin (1 point)



8. Arm-Link coupling pin (1 point)
9. Arm-Bucket coupling pin (1 point)



10. Link coupling pin (2 points)
11. Bucket cylinder rod end (1 point)
12. Bucket-Link coupling pin (1 point)

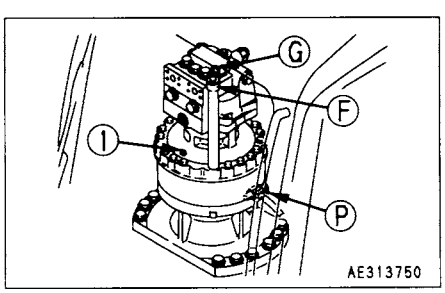


24.4.2 CHECK OIL LEVEL IN SWING MACHINERY CASE, ADD OIL

⚠WARNING

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

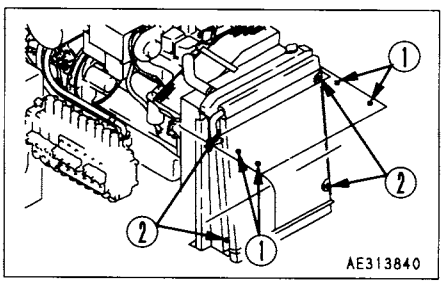
1. Remove dipstick Ⓖ and wipe the oil from the dipstick with a cloth.
2. Insert dipstick Ⓖ fully in the guide.
3. When dipstick Ⓖ is pulled out, if the oil level is between the H and L marks of the gauge, oil level is proper.



24.6.3 CLEAN AND INSPECT RADIATOR FINS, OIL COOLER FINS AND CONDENSER FINS (ONLY FOR MACHINES EQUIPPED WITH AIR CONDITIONER)

⚠WARNING

If compressed air, steam, or water hit your body directly, there is danger of injury. Always wear protective glasses, mask, and safety shoes.



1. Open the engine hood and rear door on the left side of the machine. Loosen 4 bolts ① and remove the radiator front cover.

2. When cleaning radiator fins, remove the four bolts ② fixing the oil cooler to the radiator. Tilt the oil cooler outward, then clean the radiator fins.

3. Blow off mud, dust or leaves clogging the radiator fins and oil cooler fins using compressed air.
   At the same time, clean the net in front of the oil cooler.
   Clean the condenser fins on machines equipped with the air conditioner.
   Steam or water may be used instead of compressed air.
   After cleaning, fix the oil cooler with bolts ② and install the cover with bolt ①.

4. Check the rubber hose. Replace with a new one if the hose is found to have cracks or to be hardened by ageing.
   Further, check hose clamps for looseness.

NOTICE

To prevent damage to the fins, apply compressed air from and appropriate distance. Damaged fins may cause water leakage or overheating. In a dusty site, check the fins daily, irrespective of the maintenance interval.

24.10 EVERY 5000 HOURS SERVICE

Maintenance for every 100, 250, 500 and 1000 hours should be carried out at the same time.

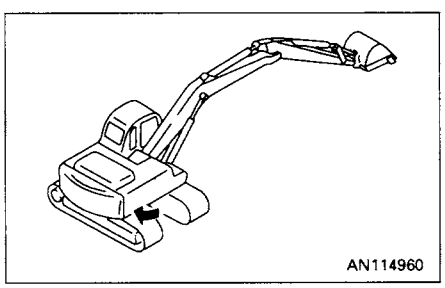
24.10.1 CHANGE OIL IN HYDRAULIC TANK

⚠WARNING

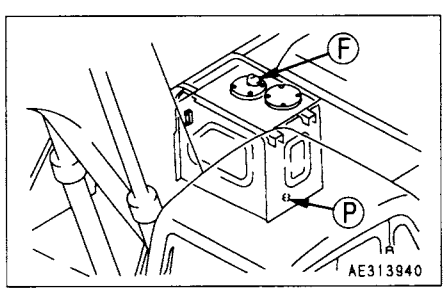
The oil is at high temperature immediately after the machine has been operated. Wait for the oil to cool down before changing the oil. When removing the oil filler cap, turn it slowly to release the internal pressure, then remove it carefully.

Prepare the following.
- Container to catch drained oil: min. 166 ℓ capacity
- Refill, capacity: 166 ℓ (43.8 US gal, 36.5 UK gal)
- Prepare a handle for the socket wrench set.

1. Swing the upper structure so that the drain plug under the hydraulic tank comes at the middle of the left or right track.


AN114960

2. Retract the arm and bucket cylinders to the stroke end, then lower the boom and put the bucket teeth in contact with the ground.
3. Lock the safety lock lever and stop the engine.
4. Remove the cap of oil filler Ⓕ over the hydraulic tank.



5. Set the oil container under the drain plug under the machine. Using the handle, remove drain plug Ⓟ and drain the oil. Check the O-ring installed to plug Ⓟ, and if it is damaged, replace the O-ring. After draining the oil, tighten drain plug Ⓟ. Tightening torque: 69 ± 10 Nm (7 ± 1 kgm, 51 ± 7 lbft).

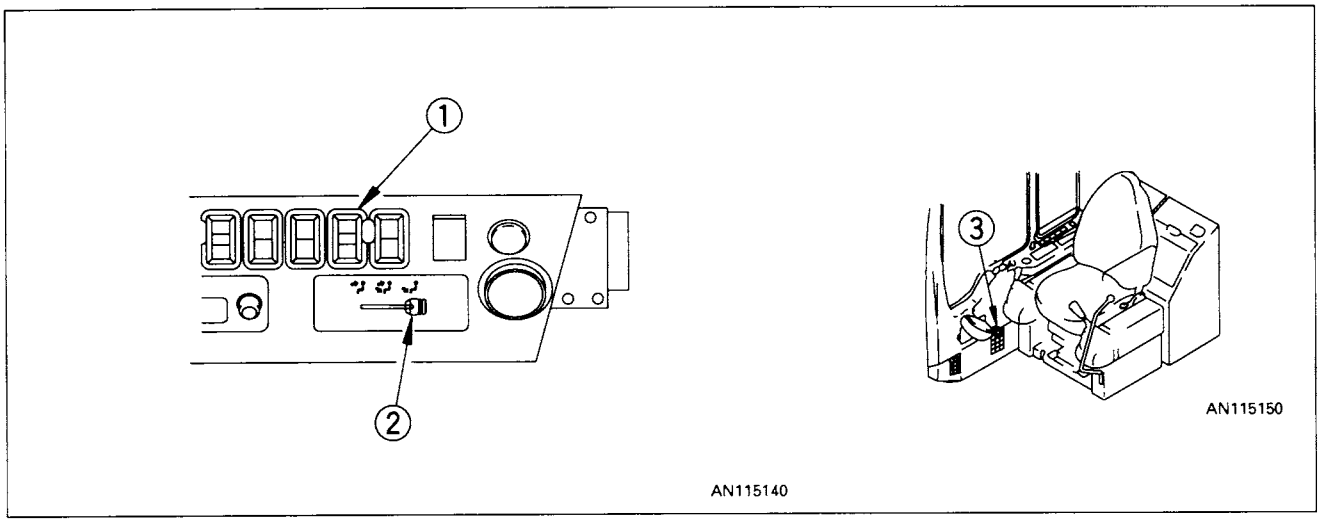
When removing drain plug Ⓟ, be careful not to get oil on yourself.

PC220, 220LC-6
PC230, 230LC-6 MIGHTY

		PC220-6	PC220LC-6	PC230-6 MIGHTY	PC230LC-6 MIGHTY
WEIGHT					
• Operating weight (without operator)		22100 kg (48730 lb)	23400 kg (51600 lb)	23300 kg (51380 lb)	24300 kg (53580 lb)
PERFORMANCE					
• Bucket capacity (standard bucket) SAE/CECE		1.0 m^3 (1.3 cu.yd)/0.9 m^3			
• Width of opening	(Standard bucket)	1155 mm (46 in)			
	(With side cutter)	1260 mm (50 in)			
• Travel speed	Low speed	3.0 km/h (1.8 MPH)			
	Middle speed	4.1 km/h (2.5 MPH)			
	High speeed	5.5 km/h (3.4 MPH)			
• Swing speed		12.4 rpm			
TRACK SHOE					
• Triple grouser shoe (standard)		600 mm (24 in) width	700 mm (28 in) width	600 mm (24 in) width	
ENGINE					
• Model		Komatsu SA6D102E-1-A diesel engine			
• Flywheel horsepower		117 kW (158 HP)/2000 rpm			
• Starting motor		24 V 4.5 kW			
• Alternator		24 V 35 A			
• Battery		12 V 110 Ah x 2 pieces			

29. HANDLING CAR HEATER

29.1 EXPLANATION OF COMPONENTS

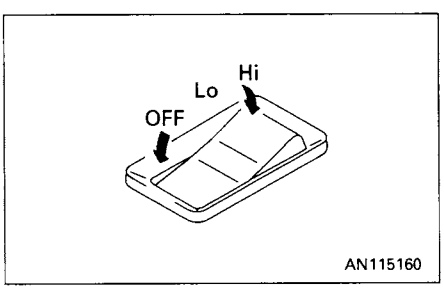


The car heater utilizes the water heated by the engine. Use the car heater when the engine coolant is warmed.

1. CAR HEATER FAN SWITCH

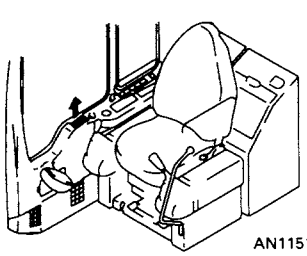
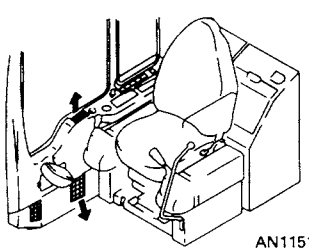
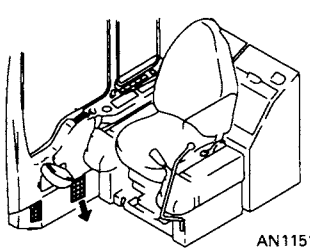
This adjusts air-flow in 2 steps.

Hi : Strong
Lo : Weak
OFF: Car heater turned off.



2. AIR OUTLET CHANGE-OVER LEVER

The air outlet is selectable according to the purpose.

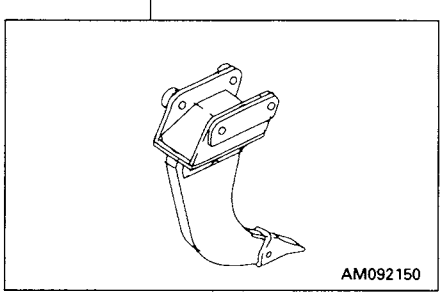
Purpose	To upper portion of operator	To upper and portions of operator	To foot portion of operator
Lever position			
Air outlet	 AN115170	 AN115180	 AN115190

31. INTRODUCTION OF ATTACHMENTS

31.1 SPECIFICATION, USE

• PC200, 200LC

Name	Specifications, use
Narrow bucket	Capacity SAE/CECE 0.5 m^3 (0.65 cu.yd)/0.45 m^3 Outside width 750 mm (30")
Narrow bucket	Capacity SAE/CECE 0.6 m^3 (0.78 cu.yd)/0.55 m^3 Outside width 970 mm (38")
Light duty bucket	Capacity SAE/CECE 0.9 m^3 (1.18 cu.yd)/0.8 m^3 Outside width 1200 mm (47")
Light duty bucket	Capacity SAE/CECE 1.0 m^3 (1.31 cu.yd)/0.9 m^3 Outside width 1330 mm (52")
Light duty bucket	Capacity SAE/CECE 1.17 m^3 (1.53 cu.yd)/1.0 m^3 Outside width 1450 mm (57")
Slope finishing bucket	Capacity SAE/CECE 0.40 m^3 (0.52 cu.yd)/0.35 m^3 Compacting width 2000 mm (79") Compacting area 2.00 m^2
Trapezoidal bucket	Capacity SAE/CECE 0.55 m^3 (0.72 cu.yd)/0.5 m^3 Outside width 3165 mm (10'5") (45°) 3280 mm (10'9") (45°) 3310 mm (10'10") (45°)
Ripper bucket	Capacity SAE/CECE 0.61 m^3 (0.8 cu.yd)/0.56 m^3 Outside width 950 mm (37")
Clamshell bucket (Loading)	Capacity SAE/CECE 0.66 m^3 (0.86 cu.yd)/0.6 m^3 Outside width 866 mm (34") Opening width 1782 mm (70")
Ditch cleaner bucket	Capacity SAE/CECE 0.80 m^3 (1.05 cu.yd)/0.7 m^3 Outside width 1800 mm (71")
One tooth ripper bucket	Shank width 106 mm (42") Crushing depth 800 mm (32")



Name	Specifications, use
Three teeth ripper bucket	Shank width 90 mm (3.5") Crushing depth 640 mm (25")
Track shoes (PC200)	Triple grouser shoe width 700 mm (28") Triple grouser shoe width 800 mm (31.4") Flate shoe width 610 mm (24") Swamp shoe width 860 mm (34") Rubber shoe width 600 mm (24")
Track shoes (PC200LC)	Triple grouser shoe width 600 mm (24") Triple grouser shoe width 800 mm (31.4") Triple grouser shoe width 900 mm (35.4") Swamp shoe width 860 mm (34") Flate shoe width 610 mm (24") Rubber shoe width 600 mm (24")
Short arm	Arm length 2400 mm (7'10") Max. digging depth 6095 mm (20')
Short arm	Arm length 1800 mm (5'11") Max. digging depth 5495 mm (18")
Extension arm	Arm length 1130 mm (3'8") Max. digging depth 7750 mm (25'5")
Head guard	In place where there is danger of falling rocks, always install the head guard to protect the operator.

• PC210, 210LC

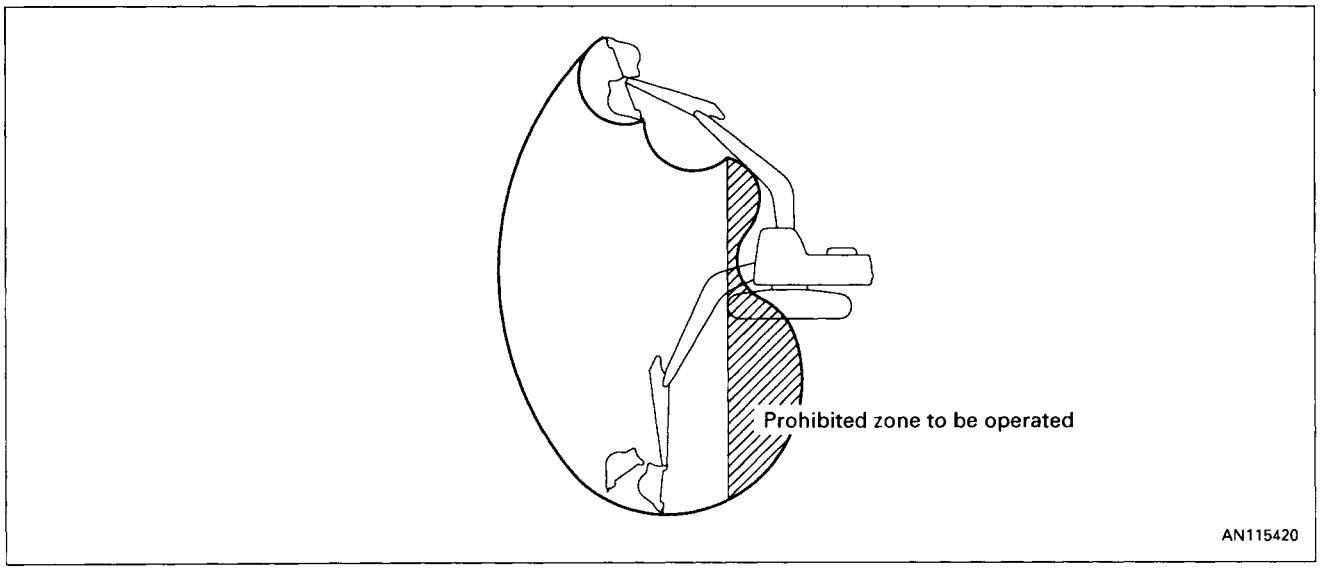
Name	Specifications, use
Ripper bucket	Capacity SAE/CECE 0.61 m^3 (0.8 cu.yd)/0.56 m^3 Outside width 950 mm (37")
One tooth ripper bucket	Shank width 106 mm (4.2") Crushing depth 800 mm (32")
Three teeth ripper bucket	Shank width 90 mm (3.5") Crushing depth 640 mm (25")
Track shoes	Flate shoe width 610 mm (24")

31.7 HANDLING EXTENSION ARM

When the extension arm is equipped, if the arm is retracted, the bucket interferes with the boom cylinder foot and the revolution frame. Be careful at operation and transportation.

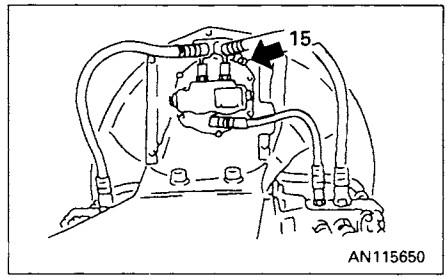
- When the extension arm is equipped, use the narrow bucket (bucket width: 750 mm (30") and 560 mm (22")) without the side cutter.
  Since the standard bucket causes body instability and the bucket interferes with the operator's cab when retracting the arm, do not mount the standard bucket.

- Work in hard soil or rocky terrain will shorten the life of the extension arm, the boom and the arm.
  It is better not to use the extension arm in such conditions.



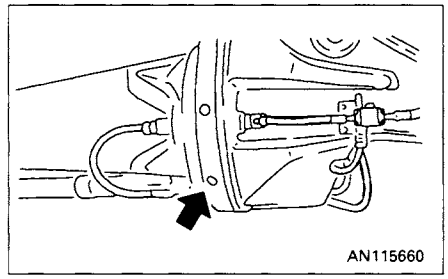
15. Check oil level in arm rotation machinery case, add oil
[When rotating arm is installed]
1. Set the arm horizontal.

2. Remove the plug, and check that the oil is near the bottom edge of the plug hole. If the oil level is low, add gear oil (GO90, regardless of ambient temperature) through the plug hole.



31.9.6 EVERY 250 HOURS SERVICE

GREASE ARM ROTATING CIRCLE (3 points)
(When rotating arm is installed)



31.9.7 EVERY 500 HOURS SERVICE

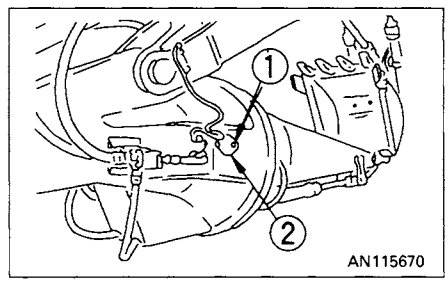
Carry out maintenance for every 100 hours and 250 hours at the same time.

CHECK LEVEL OF GREASE IN ARM ROTATING PINION, ADD GREASE
(When rotating arm is installed)

1. Remove 2 bolts ① from the top face of the arm rotating machinery case, then remove cover ②.

2. Rotate the arm slowly and add grease.

   Repeat Step 2 two or three times.



31.9.8 EVERY 1000 HOURS SERVICE

Carry out maintenance for every 100 hours, 250 hours, and 500 hours at the same time.

CHANGE OIL IN ARM ROTATING MACHINERY CASE
(When rotating arm is installed)

1. Remove plug ①, drain the oil, then tighten the plug again.

2. Add gear oil (GO90, regardless of ambient temperature) through the plug hole to the specified level.

3. After adding oil, check that the oil is at the specified level. For details, see EVERY 100 HOURS SERVICE.

Oil refill amount: 1.6 ℓ (0.4 US gal, 0.35 UK gal)