

5-4 Generator Maintenance

5-4 PowerTech PTSMH17.5 Generator Maintenance/Service

5-4.1 Maintenance

!!CAUTION: To avoid personal injury:

- Be sure to conduct daily checks, periodic maintenance, refueling or cleaning on a level surface with the engine shut off and key removed.
- Before allowing other people to use the engine, explain how to operate, and have them read this manual before operation.
- When cleaning any parts, do not use gasoline but use regular cleanser.
- Always use proper tools, that are in good condition. Make sure you understand how to use them, before performing any service work.
- When installing, be sure to tighten all bolts to specified torque.
- Do not put any tools on the battery, or battery terminals may short out. Severe burns or fire could result. Detach the battery from the engine before maintenance.
- Do not touch muffler or exhaust pipes while they are hot; severe burns could result.

5-4.3 Service Intervals

Observe the following for service and maintenance.

The lubricating oil change intervals listed in the table below are for Classes CF, CE and CD lubricating oils of API classification with a low-sulfur fuel in use. If the CF-4 or CG-4 lubricating oil is used with a high-sulfur fuel, change the lubricating oil at shorter intervals than recommended in the table below depending on the operating condition.

No.	Check Point	Interval										
		First 50 Hours	Every 50 Hours	Every 100 Hours	Every 200 Hours	Every 400 Hours	Every 500 Hours	Every 800 Hours	Every 1500 Hours	Every 3000 Hours	Every 1 Year	Every 2 Years
1	Check of fuel pipes and clamp bands		○									
2	Change of engine oil	⊖			○							
3	Cleaning of air cleaner element			○								
4	Check of battery electrolyte level			○								
5	Check of fan belt tightness			○								
6	Check of radiator hoses and clamp bands				○							
7	Check of intake air line				○							
8	Replacement of oil filter cartridge	⊖				○						
9	Replacement of fuel filter cartridge					○						
10	Removal of sediment in fuel tank						○					
11	Cleaning of water jacket (radiator interior)						○					
12	Replacement of fan belt						○					
13	Check of valve clearance							○				
14	Replacement of air cleaner element										○	
15	Check of damage in electric wiring and loose connections										○	
16	Check of fuel injection nozzle injection pressure								○			
17	Check of turbo charger									○		
18	Check of injection pump									○		
19	Check of fuel injection timer									○		
20	Replacement of fuel pipes and clamp bands											○

Service Intervals - continued

No.	Check Point	Interval										
		First 50 Hours	Every 50 Hours	Every 100 Hours	Every 200 Hours	Every 400 Hours	Every 500 Hours	Every 800 Hours	Every 1500 Hours	Every 3000 Hours	Every 1 Year	Every 2 Years
21	Replacement of radiator hoses and clamp bands											○
22	Replacement of battery											○
23	Change of radiator coolant (L.L.C.)											○
24	Replacement of intake air line											○

IMPORTANT

- The jobs indicated by Θ must be done after the first 50 hours of operation.
- *1 Air cleaner should be cleaned more often in dusty conditions than in normal conditions.
- *2 After 6 times of cleaning.
- *3 Consult your local KUBOTA Dealer for this service.
- *4 Replace only if necessary.
- The items listed above (@ marked) are registered as emission related critical parts by KUBOTA in the U.S. EPA nonroad emission regulation. As the engine owner, you are responsible for the performance of the required maintenance on the engine according to the above instruction.

NOTE: Lubricating Oil - With the emission control now in effect, the CF-4 and CG-4 lubricating oils have been developed for use of a low-sulfur fuel on on-road vehicle engines. When an off-road vehicle engine runs on a high-sulfur fuel, it is advisable to employ the CF, CD or CE lubricating oil with a high total base number. If the CF-4 or CG-4 lubricating oil is used with a high-sulfur fuel, change the lubricating oil at shorter intervals.

Lubricating Oil Recommended when a low-sulfur or high-sulfur fuel is employed.

O: Recommended X: Not Recommended

Lubricating Oil Class	Fuel	Low-sulfur	High-sulfur	Remarks
CF		O	O	TBN \geq 10
CF-4		O	X	
CG-4		O	X	

5-4.4 Periodic Service**5-4.4.1 Fuel**

Fuel is flammable and can be dangerous. Be sure to handle with care.

!!CAUTION: To avoid personal injury:

- Do not mix gasoline or alcohol with diesel fuel. This mixture can cause an explosion.
- Be careful not to spill fuel during refueling. If fuel should spill, wipe it off at once, or it may cause a fire.
- Do not fail to stop the engine before refueling. Keep the engine away from the fire.
- Be sure to stop the engine while refueling or bleeding and when cleaning or changing fuel filter or fuel pipes. Do not smoke when working around the battery or when refueling.
- Check the above fuel systems in a well ventilated and wide open place.
- When fuel and lubricant are spilled, refuel after letting the engine cool off.
- Always keep spilled fuel and lubricant away from engine.

Fuel Level Check and Refueling

1. Check to see that the fuel level is above the lower limit of the fuel level gauge.
2. If the fuel is too low, add fuel to the upper limit. Do not overfill.

No. 2-D is a distillate fuel oil of lower volatility for engines in industrial and heavy mobile service. (SAE J313 JUN87)

Grade of Diesel Fuel Oil According to ASTM D975

Flash Point, °C (°F)		Water and Sediment, volume %		Carbon Residue on 10 percent Residuam, %		Ash, weight %	
Min		Max		Max		Max	
52 (125)		0.05		0.35		0.01	

Distillation Temperatures, °C (°F) 90% Point		Viscosity Kenematic cSt or mm ² /s at 40°C		Viscosity Saybolt, SUS at 100°F		Sulfur weight %	Copper strip Corrosion	Cetane Number
Min	Max	Min	Max	Min	Max	Max	Max	Min
282 (540)	338 (640)	1.9	4.1	32.8	40.1	0.5	No. 3	40

The cetane number is required not to be less than 45

!!IMPORTANT:

- Be sure to use a strainer when filling the fuel tank, or dirt or sand in the fuel may cause trouble in the fuel injection pump.
- For fuel, always use diesel fuel. Do not to use alternative fuel, its quality is unknown and it may be inferior in quality. Kerosene, which is very low in cetane rating, adversely affects the engine. Diesel fuel differs in grades depending on the temperature.
- Do not to let the fuel tank become empty, or air can enter the fuel system, necessitating bleeding before next engine start.

!!CAUTION: To avoid personal injury:
Do not bleed a hot engine, this could cause fuel to spill onto a hot exhaust manifold creating a danger of fire.

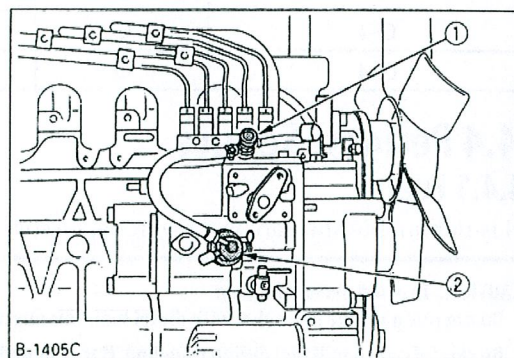
Air bleeding of the fuel system is required:

- After the fuel filter and pipes have been detached and refitted;
- After the fuel tank has become empty; or
- Before the engine is to be used after a long storage.

PROCEDURE:

1. Fill the fuel tank to the fullest extent. Open the fuel filter lever.
2. Open the air vent cock on top of the fuel injection pump.
3. Turn the engine, continue it for about 10 seconds, then stop it, or move the fuel feed pump lever by hand (optional).
4. Close the air vent cock on top of the fuel injection pump.

!!IMPORTANT: Always keep the air vent cock on the fuel injection pump closed except when air is vented, or it may cause the engine to stop.



(1) Air vent cock

(2) Fuel feed pump

Checking the Fuel Pipes

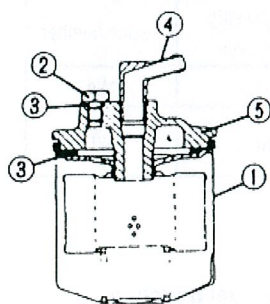
!!CAUTION: To avoid personal injury:
Check or replace the fuel pipes after stopping the engine. Broken fuel pipes can cause fires.

Check the fuel pipes every 50 hours of operation.

1. If the clamp band is loose, apply oil to the screw of the band, and tighten the band securely.
2. If the fuel pipes, made of rubber, become worn out, replace them and the clamp bands every two years.
3. If the fuel pipes and clamp bands are found worn or damaged before two years time, replace or repair them at once.
4. After replacement of the pipes and bands, air-bleed the fuel system.

!!IMPORTANT: When the fuel pipes are not installed, plug them at both ends with clean cloth or paper to prevent dirt from entering. Dirt in the pipes can cause fuel injection pump malfunction.

Fuel Filter Cartridge Replacement



- (1) Fuel Filter Cartridge
- (2) Air Vent Plug
- (3) O Ring
- (4) Pipe Joint
- (5) Cover

1. Replace the fuel filter cartridge with a new one every 400 operating hours.
2. Apply fuel oil thinly over the gasket and tighten the cartridge into position by hand-tightening only.
3. Finally, vent the air.

!!IMPORTANT: Replace the fuel filter cartridge periodically to prevent wear of the fuel injection pump plunger or the injection nozzle, due to dirt in the fuel.

5-4.5 Engine Oil

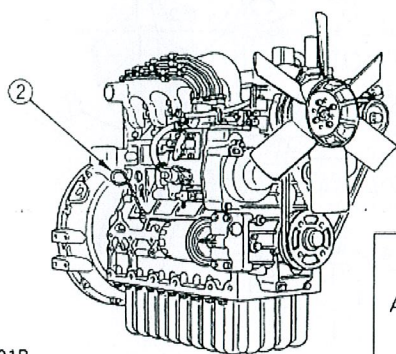
!!CAUTION: To avoid personal injury:

- Be sure to stop the engine before checking and changing the engine oil and the oil filter cartridge.
- Do not touch muffler or exhaust pipes while they are hot; Severe burns could result. Always stop the engine and allow it to cool before conducting inspections, maintenance, or for a cleaning procedure.
- Contact with engine oil can damage your skin. Put on gloves when using engine oil, if you come in contact with engine oil, wash it off immediately.

NOTE: Be sure to inspect the engine, locating it on a level place. If placed on gradients accurate oil quantity may not be measured.

5-4.5.1 Checking Oil Level and Adding Engine Oil

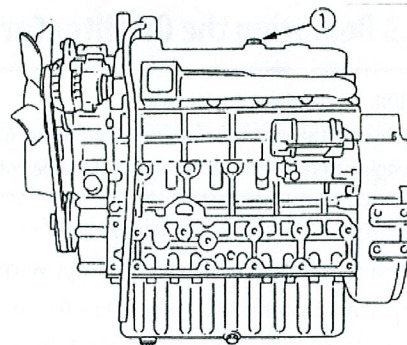
1. Check the engine oil level before starting or more than 5 minutes after stopping the engine.
2. Remove the oil level gauge, wipe it clean and reinstall it.
3. Take the oil level gauge out again, and check the oil level.



B-1401B

(1) Oil filler plug
(2) Oil level gauge

[Lower end of oil level gauge]
(A) Engine oil level within this range is proper.



B-1404A

4. If the oil level is too low, remove the oil filter plug, and add new oil to the prescribed level.
5. After adding oil, wait more than 5 minutes and check the oil level again. It takes some time for the oil to drain down to the oil pan.
6. If the engine is operated with the oil level nearing the lower limit, oil may deteriorate quickly; keeping the oil level near the upper limit is recommended.

Engine oil quantity

Models	Oil Pan Depth	
	124mm (4.88 in.)	≈90mm (3.54 in.)
D1403-BG D1703-BG	7.0L (1.85 U.S. gals.)	5.6L (4.48 U.S. gals.)
V1903-BG V2203-BG	9.5L (2.51 U.S. gals.)	7.6L (2.01 U.S. gals.)
F2803-BG	12.0L (3.17 U.S. gals.)	-

≈90mm (3.54 in.) oil pan depth is optional.
Oil quantities shown are for standard oil pans.

!!IMPORTANT: Engine oil should be MIL-L-2104C or have properties of API classification CD grades or higher. Change the type of engine oil according to the ambient temperature.

above 25°C (77°F)	SAE 30	or	SAE 10W-30 SAE 10W-40
0 to 25°C (32 to 77°F)	SAE 20	or	SAE 10W-30 SAE 10W-40
below 0°C (32°F)	SAE 10W	or	SAE 10W-30 SAE 10W-40

When using oil of different brands from the previous one, be sure to drain all the previous oil before adding the new engine oil.

5-4.5.2 Changing Engine Oil

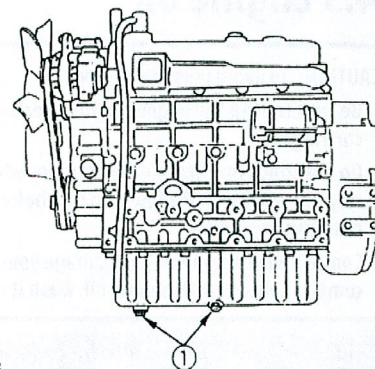
!!CAUTION: To avoid personal injury:

Be sure to stop the engine before draining engine oil.

When draining engine oil, place a container underneath the engine and dispose of it according to local regulations.

Do not drain oil after running the engine. Allow engine to cool down sufficiently.

1. Change oil after the initial 50 hours of operation and every 200 hours thereafter.
2. Remove the drain plug at the bottom of the engine, and drain all the old oil. Drain oil will drain easier when the oil is warm.
3. Add new engine oil up to the upper limit of the oil level gauge.



B-1404B
(1) Oil drain plug

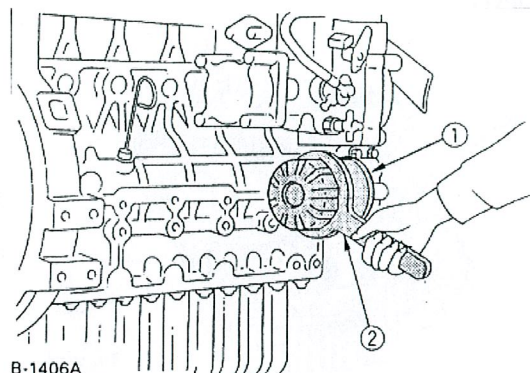
5-4.5.3 Replacing the Oil Filter Cartridge

!!CAUTION: To avoid personal injury:

Be sure to stop the engine before changing the oil filter cartridge.

Allow engine to cool down sufficiently. Oil can be hot and cause burns.

1. Replace the oil filter cartridge after every 400 hours of operation.
2. Remove the old oil filter cartridge with a filter wrench.
3. Apply a film of oil to the gasket for the new cartridge.
4. Screw in the cartridge by hand. When the gasket contacts the seal surface, tighten the cartridge by hand. Using a wrench will cause it to be tightened too much.
5. After the new cartridge has been replaced, the engine oil level normally decreases a little. Run the engine for a while and check for oil leaks through the seal before checking the engine oil level. Add oil if necessary.



B-1406A
(1) Oil filter cartridge
(2) Remove with a filter wrench
(Tighten with your hand)

NOTE: Wipe off any oil sticking to the machine completely.

5-4.6 Radiator

Coolant will last for one day's work if filled all the way up before operation. Be sure to check the coolant level before every operation.

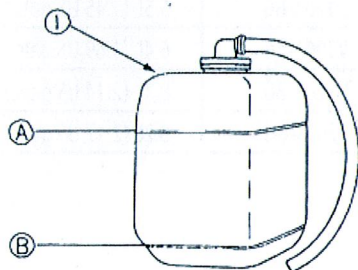
▲WARNING: To avoid personal injury:

- Do not stop the engine suddenly. Stop it after about 5 minutes of unloaded idling.
- Work only after letting the engine and radiator cool off completely (more than 30 minutes after it has been stopped).
- Do not remove the radiator cap while coolant is hot. When cool to the touch, rotate cap to the first stop to allow excess pressure to escape. Then remove cap completely.

If overheat should occur, steam may gush out from the radiator or reserve tank; Severe burns could result.

5-4.6.1 Checking Coolant Level, Adding Coolant

1. Remove the radiator cap after the engine has completely cooled, and check to see that coolant reaches the supply port.
2. If the radiator is provided with a reserve tank, check the coolant level of the reserve tank. When it is between the "FULL" and "LOW" marks, the coolant will last for one day's work.

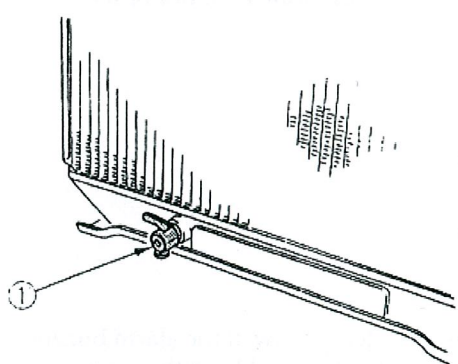


D-1772

(1) Reserve tank

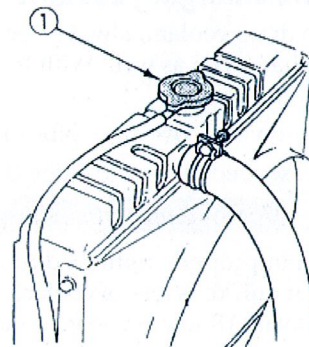
(A) "FULL"

(B) "LOW"



D-1773A

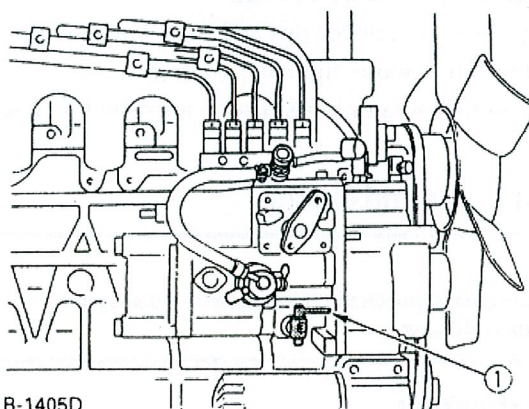
(1) Coolant drain cock



D-1771A

(1) Radiator pressure cap

3. When the coolant level drops due to evaporation, add water only up to the full level.
4. Check to see that two drain cocks; one is at the crankcase side and the other is at the lower part of the radiator as figures B-1405D and D-1773A show.



B-1405D

!!!IMPORTANT:

- If the radiator cap has to be removed, follow the caution and securely retighten the cap.
- If coolant should leak, consult your local KUBOTA dealer.
- Make sure that muddy or sea water does not enter the radiator.
- Use clean, fresh water and 50% anti-freeze to fill the recovery tank.
- Do not refill reserve tank with coolant over the "FULL" level mark.
- Be sure to close the radiator cap securely. If the cap is loose or improperly closed, coolant may leak out and decrease quickly.
- When coolant is added, coolant level drops the first time the engine is started. Stop the engine, and add more coolant.

5-2.6.2 Changing Coolant

1. To drain coolant, always open both drain cocks and simultaneously open the radiator cap as well. With the radiator cap kept closed, a complete drain of water is impossible.
2. Remove the overflow pipe of the radiator pressure cap to drain the reserve tank.
3. Prescribed coolant volume (U.S. gallons)

NOTE: Coolant quantities shown are for standard radiators.

4. An improperly tightened radiator cap or a gap between the cap and the seat quickens loss of coolant.
5. Coolant (Radiator cleaner and anti-freeze)

Models	Quantity
D1403-BG	4.2L (1.11 US gals.)
D1703-BG	5.5L (1.45 US gals.)
V1903-BG	6.4L (1.69 US gals.)
V2203-BG	8.1L (2.14 US gals.)
F2803-BG	8.2L (2.17 US gals.)

Season	Coolant
Summer	Pure water and radiator cleaner
Winter (When temperature drops below 0°C (32°F)) or all season	Pure water and anti-freeze (See "Anti-freeze" in RADIATOR section)

5-4.6.3 Remedies for Quick Decrease of Coolant

1. Check any dust and dirt between the radiator fins and tube. If any, remove them from the fins and the tube.
2. Check the tightness of the fan belt. If loose, tighten it securely.
3. Check the internal blockage in the radiator hose. If scale forms in the hose, clean with the scale inhibitor or its equivalent.

5-4.6.4 Checking Radiator Hoses and Clamp

!!CAUTION: To avoid personal injury:

Be sure to check radiator hoses and hose clamps periodically. If radiator hose is damaged or coolant leaks, overheats or severe burns could occur.

5-4.6.5 Precaution at Overheating

If the coolant temperature is "Overheating" which is near boiling or boiling, follow the steps below. If the alarm buzzer sounds or the alarm lamp lights up follow these steps. Stop the engine operation in a safe place and keep the engine unloaded idling.

1. Do not stop the engine suddenly. Stop it after about 5 minutes of unloaded idling.
2. If the engine stalls within 5 minutes of running under no load, immediately leave and keep yourself away from the machine. Do not open the hood and any other part.
3. Keep yourself and others well away from the engine for 10 minutes more or while the steam blows out.
4. Be sure to get rid of the causes of overheating according to the manual, see "Troubleshooting" section. Be sure there is no danger such as burns and start the engine again.

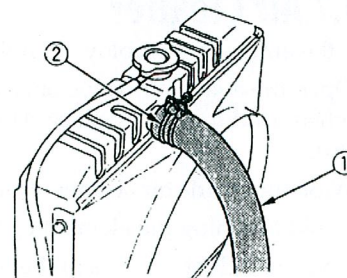
5-4.6.6 Cleaning Radiator Core (Outside)

If dust is between the fin and tube, wash it away with running water.

5-4.6.7 Cleaning the Radiator

Clean the cooling system every 500 hours. In addition, clean it before adding anti-freeze and before stopping use of anti-freeze.

!!IMPORTANT: Do not clean radiator with firm tools such as spatulas or screwdrivers. They may damage specified fin or tube, and can cause coolant leaks or decrease cooling performance.



D-17718

(1) Radiator hose

(2) Clamp band

5-4.6.8 Anti-freeze

!!CAUTION: To avoid personal injury:

- When using anti-freeze use protection such as rubber gloves.
- If you should drink anti-freeze, throw up at once and seek medical attention.
- When anti-freeze comes in contact with the skin or clothing, wash it off immediately.
- Do not mix different types of anti-freeze.
- Keep fire and children away from anti-freeze.
- Be mindful of the environment and ecology. Before draining any fluids, find out the correct way of disposing by checking with local codes.
- Also, observe the relevant environmental protection regulations when disposing of oil, fuel, coolant, brake fluid, filters and batteries.

If coolant freezes, it can damage the cylinders and radiator. It is necessary, if the ambient temperature falls below 0°C (32°F), to remove coolant after operating or to add anti-freeze to coolant.

1. There are two types of anti-freeze available; use the permanent type (PT) for this engine.
2. Before adding anti-freeze for the first time, clean the radiator and engine interior by pouring fresh water, and draining it a few times.
3. The procedure for the mixing of water and anti-freeze can vary according to the type of anti-freeze being used and the ambient temperature. Refer to SAE J1034 standard, more specifically also to SAE J814c.
4. Mix the anti-freeze with water, and then pour into the radiator.

!!IMPORTANT: When the anti-freeze is mixed with water, the antifreeze mixing ratio must be less than 50%.

Vol % Anti-freeze	Freezing Point		Boiling Point ^α	
	°C	°F	°C	°F
40	-24	-12	106	222
50	-37	-34	108	226

^αAt 1.013 x 105Pa (760mmHg) pressure (atmospheric). A higher boiling point is obtained by using a radiator pressure cap which permits the development of pressure within the cooling system.

NOTE:

- The above data represents industry standards that necessitate a minimum glycol content in the concentrated anti-freeze.
- When the coolant level drops due to evaporation, add water only to keep the anti-freeze mixing ratio less than 50%. In case of leakage, add anti-freeze and water in the specified mixing ratio before pouring into the radiator.
- Anti-freeze absorbs moisture. Keep unused anti-freeze in a tightly sealed container.
- Do not use radiator cleaning agents when anti-freeze has been added to the coolant. (Anti-freeze contains an anti-corrosive agent, which will react with the radiator cleaning agent forming sludge which will affect the engine parts.)

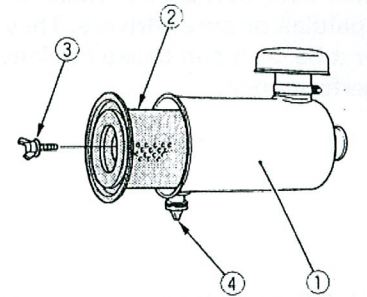
5-4.6.9 Radiator Cement

As the radiator is solidly constructed, there is little possibility of water leakage. Should this happen, however, radiator cement can easily fix it. If leakage is serious, contact your local KUBOTA dealer.

5-4.7 Air Cleaner

Since the air cleaner employed on this engine is a dry type, never apply oil to it.

1. Open the evacuator valve once a week under ordinary conditions - or daily when used in a dusty place. This will get rid of large particles of dust and dirt.
2. Wipe the inside air cleaner clean with cloth if it is dirty or wet.
3. Avoid touching the element except when cleaning.
4. When dry dust adheres to the element, blow with compressed air from the inside turning the element. Pressure of compressed air must be under 686kPa (7kgf/cm², 99psi).
5. When carbon or oil adheres to the element, soak the element in detergent for 15 minutes, then wash it several times in water, rinse with clean water and let dry.
6. After the element is fully dried, inspect the inside of the element with a light, and check if it is damaged or not, (referring to the instructions on the label attached to the element.)
7. Replace the element every year or every 6 cleanings.



D-1770A

- (1) Air cleaner body
- (2) Element
- (3) Wing bolt
- (4) Evacuator valve

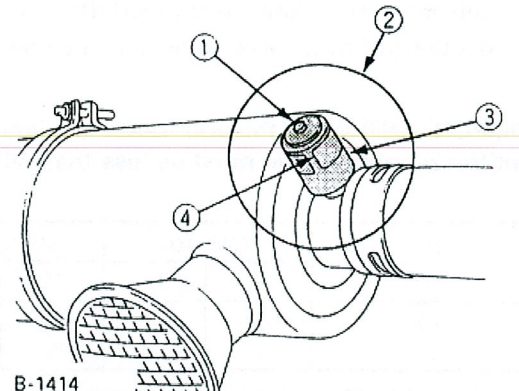
!!IMPORTANT:

- **Make sure the wing bolt for the element is tight enough. If it is loose, dust and dirt may be sucked in, wearing down the cylinder liner and piston ring earlier, and thereby resulting in poor power output.**
- **Do not over service the air cleaning element. Over servicing may cause dirt to enter the engine causing premature wear. Use the dust indicator as a guide for when to service.**

5-4.7.1 Dust Indicator (optional)

If the red signal on the dust indicator attached to the air cleaner is visible, the air cleaner has reached the service level.

Clean the element immediately, and reset the signal with the "RESET" button.



B-1414

- (1) "RESET" button
- (2) Dust indicator
- (3) Service level
- (4) Signal

5-4.8 Battery

Mishandling of the battery shortens the service life and adds to maintenance costs. To obtain the maximum performance and the longest life of the battery handle properly and with care.

!!CAUTION: To avoid personal injury:

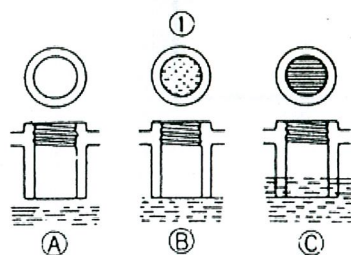
- Be careful not to let the battery electrolyte contact your body or clothing.
- Wear eye protection and rubber gloves, since the diluted sulfuric acid solution burns skin and eats holes in clothing. Should this occur, immediately wash it off with running water and seek medical attention.

Engine starting will be more difficult, if the battery charge is low. Be careful to recharge before it gets too low.

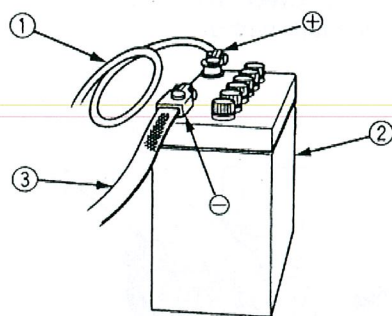
5-4.8.1 Battery Charging

!!CAUTION: To avoid personal injury:

- When the battery is being activated, hydrogen and oxygen gases in the battery are extremely explosive. Keep open sparks and flames away from the battery at all times, especially when charging the battery.
- When charging the battery, remove the battery vent plugs.
- When disconnecting the cable from the battery, start with the negative terminal, and when connecting them, start with the positive terminal first.
- DO NOT check the battery charge by placing a metal object across the terminals. Use a voltmeter or hydrometer.



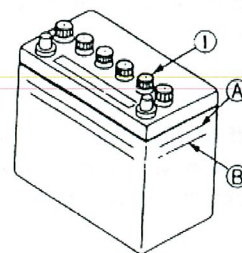
(1) Battery electrolyte level (A) "TOO LOW"
(B) "PROPER"
(C) "TOO HIGH"



D-1763

(1) Thick cable red (+) (2) Battery case
(3) Earth cable black (-)

1. Make sure each electrolyte level is at the bottom of vent wells, if necessary, add only distilled water in a well-ventilated place.
2. To slow charge the battery, connect the charger positive terminal to the battery positive terminal, and the negative to the negative, then recharge in the standard fashion.
3. Quick recharging charges the battery at a high rate in a short time. This is only for emergencies.
4. Recharge the battery as early as possible, or battery life will be extremely shortened.
5. When exchanging an old battery for a new one, use a battery of equal specifications.



F-5709

(1) Plug

(A) "HIGHEST LEVEL"
(B) "LOWEST LEVEL"

!!!IMPORTANT:

- Connect the charger positive terminal to the battery positive terminal, and negative to the negative.
- When disconnecting the cable from the battery, start with the negative terminal first. When connecting the cable to the battery, start with the positive terminal first. If reversed, the contact of tools on the battery may cause a short.

5-4.8.2 Directions for Long Term Storage

1. When storing the engine for long periods of time, remove the battery, adjust the electrolyte to the proper level, and store in a dry and dark place.
2. The battery naturally discharges while it is stored. Recharge it once a month in summer, and every 2 months in winter.

5-4.9 Electric Wiring

!!CAUTION: To avoid personal injury:

Shorting electric cable or wiring may cause a fire.

- Check to see if electric cables and wiring are swollen, hardened or cracked.
- Keep dust and water away from all power connections.
- Loose wiring terminal parts, make bad connections. Be sure to repair them before starting the engine.

Damaged wiring reduces the capacity of electrical parts. Change or repair damaged wiring immediately.

5-4.10 Fan Belt

5-4.10.1 Adjusting Fan Belt Tension

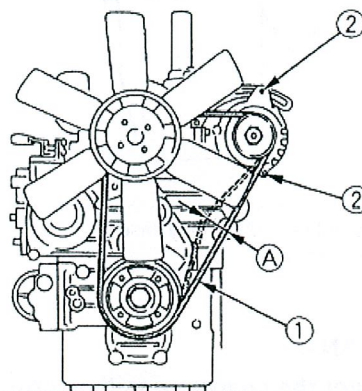
!!CAUTION: To avoid personal injury:

- Be sure to stop the engine and remove the key before checking the belt tension.
- Be sure to reinstall the detached safety shield after maintenance or checking.

Proper fan belt tension	A deflection of between 7 to 9 mm (0.28 to 0.35 in.) when the belt is pressed in the middle of the span.
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1. Stop the engine and remove the key.
2. Apply moderate thumb pressure to belt between pulleys.
3. If tension is incorrect, loosen the alternator mounting bolts and, using a lever placed between the alternator and the engine block, pull the alternator out until the deflection of the belt falls within acceptable limits.
4. Replace fan belt if it is damaged.

!!IMPORTANT: If belt is loose or damaged and the fan is damaged, it could result in overheating or insufficient charging. Correct or replace belt.



B-1403A

- (1) Fan belt
(2) Bolt and nut

(A) 7 to 9 mm (0.28 to 0.35 in.)
(under load of 10 kgf (22.1 lbs.))

5-4.11 Troubleshooting

If the engine does not function properly, use the following chart to identify and correct the cause.

5-4.11.1 When it is Difficult to Start the Engine

Cause	Countermeasures
Fuel is thick and doesn't flow.	<ul style="list-style-type: none"> Check the fuel tank and fuel filter. Remove water, dirt and other impurities. As all fuel will be filtered by the filter, if there is water or other foreign matters on the filter, clean the filter with kerosene.
Air or water mixed in fuel system	<ul style="list-style-type: none"> If air is in the fuel filter or injection lines, the fuel pump will not work properly. To attain proper fuel injection pressure, check carefully for loosened fuel line coupling, loose cap nut, etc. Loosen joint bolt atop fuel filter and air vent screws of fuel injection pump to eliminate all the air in the fuel system.
Thick carbon deposits on orifice of injection nozzle.	<ul style="list-style-type: none"> This is caused when water or dirt is mixed in the fuel. Clean the nozzle injection piece, being careful not to damage the orifice. Check to see if nozzle is working properly or not. If not, install a new nozzle.
Valve clearance is wrong.	<ul style="list-style-type: none"> Adjust valve clearance to 0.145 to 0.185 mm (0.0057 to 0.0072 in.) when the engine is cold.
Leaking valves	<ul style="list-style-type: none"> Grind valves
Fuel injection timing is wrong	<ul style="list-style-type: none"> Adjust injection timing The injection timing 16.5° before top dead center.
Engine oil becomes thick in cold weather and engine cranks slow.	<ul style="list-style-type: none"> Change grade of oil according to the weather (temperature.)
Low compression	<ul style="list-style-type: none"> Bad valve or excessive wear of rings, pistons and liners cause insufficient compression. Replace with new parts.
Battery is discharged and the engine will not crank	<ul style="list-style-type: none"> Charge battery. In winter, always remove battery from machine, charge fully and keep indoors. Install in machine at time of use.

NOTE: If the cause of trouble cannot be found, contact your KUBOTA Dealer.

5-4.11.2 When Output is Insufficient

Cause	Countermeasures
Carbon stuck around orifice of nozzle piece	<ul style="list-style-type: none"> • Clean orifice and needle valve, being very careful not to damage the nozzle orifice. • Check nozzle to see if good. If not, replace with new parts.
Compression is insufficient. Leaking valves	<ul style="list-style-type: none"> • Bad valve and excessive wear of rings, pistons and liners cause insufficient compression. Replace with new parts. • Grind valves.
Fuel is insufficient	<ul style="list-style-type: none"> • Check fuel system.
Overheating of moving parts	<ul style="list-style-type: none"> • Check lubricating oil system. • Check to see if lubricating oil filter is working properly. • Filter element deposited with impurities would cause poor lubrication. Change element. • Check the clearance of bearing are within factory specs. • Check injection timing.
Valve clearance is wrong.	<ul style="list-style-type: none"> • Adjust to proper valve clearance of 0.145 to 0.185 mm (0.0057 to 0.0072 in.) with engine cold.
Air cleaner is dirty	<ul style="list-style-type: none"> • Clean the element every 100 hours of operation.
Fuel injection pressure is wrong.	<ul style="list-style-type: none"> • Adjust to proper pressure. 13.7 Mpa (140kgf/cm², 1991psi)
Injection pump wear	<ul style="list-style-type: none"> • Do not use poor quality fuel as it will cause wear of the pump. Only use No. 2-D diesel fuel. • Check the fuel injection pump element and delivery valve assembly and replace as necessary.

5-4.11.3 When Engine Suddenly Stops

Cause	Countermeasures
Lack of fuel	<ul style="list-style-type: none"> • Check the fuel tank and refill the fuel, if necessary. • Also check the fuel system for air or leaks.
Bad nozzle	<ul style="list-style-type: none"> • If necessary, replace with a new nozzle.
Moving parts are overheated due to shortage of lubrication oil or improper lubrication	<ul style="list-style-type: none"> • Check amount of engine oil with oil level gauge. • Check lubricating oil system. • At every 2 times of oil change, oil filter cartridge should be replaced. • Check to see if the engine bearing clearances is within factory specs.

NOTE: When the engine has suddenly stopped, decompress the engine by the decomp and turn the engine lightly by pulling on the fan belt. If the engine turns easily without abnormalities, the cause of the trouble is usually lack of fuel or bad nozzle.

5-4.11.4 When Color of Exhaust is Especially Bad

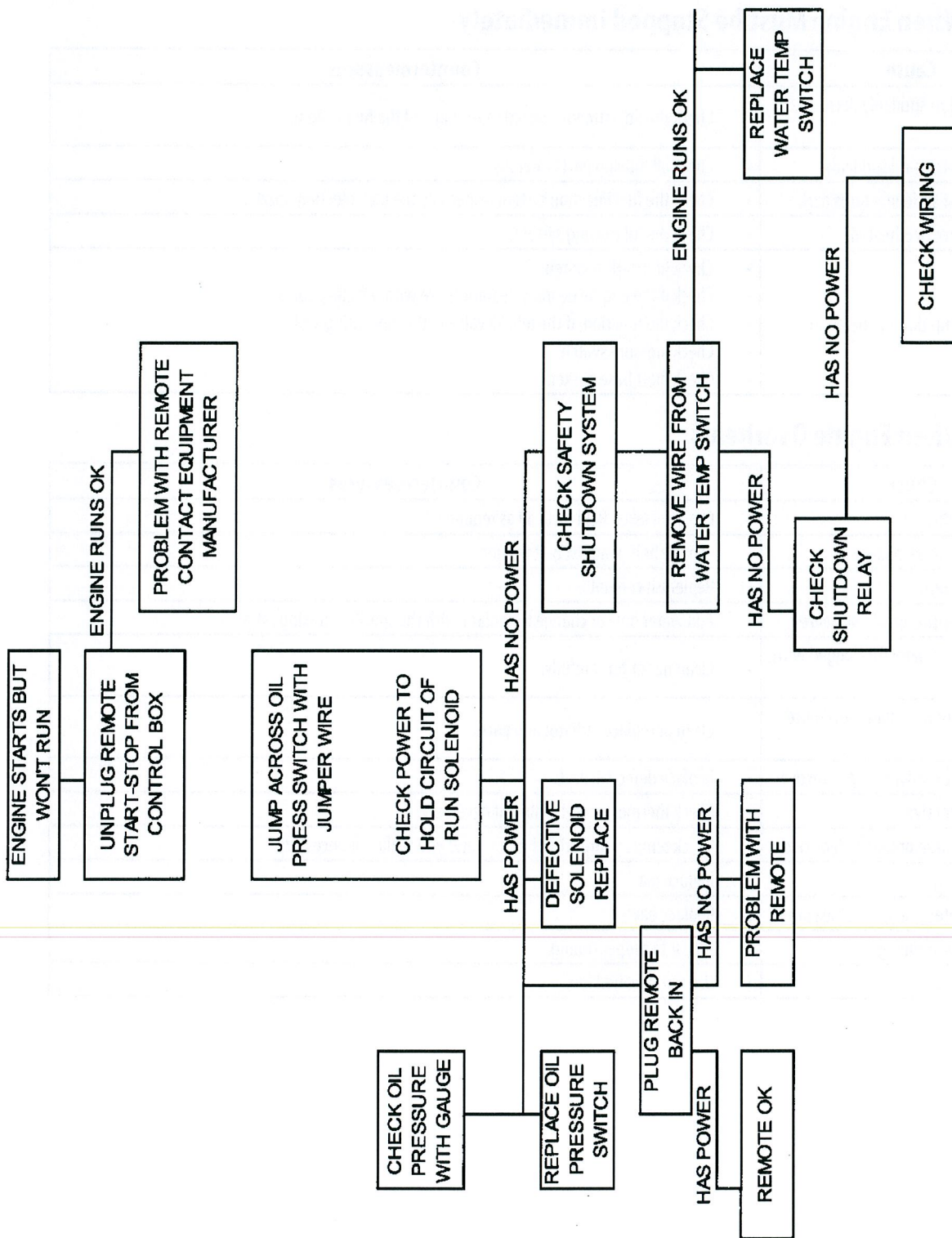
Cause	Countermeasures
Fuel governing device bad	<ul style="list-style-type: none"> • Contact dealer for repairs.
Fuel is of extremely poor quality.	<ul style="list-style-type: none"> • Select good quality fuel Use No. 2-D diesel fuel only.
Nozzle is bad	<ul style="list-style-type: none"> • If necessary, replace with new nozzle.
Combustion is incomplete	<ul style="list-style-type: none"> • Cause is poor atomization, improper injection timing, etc. Because of trouble in injection system or in poor valve adjustment, or compression leakage, poor compression, etc. Check for the cause.

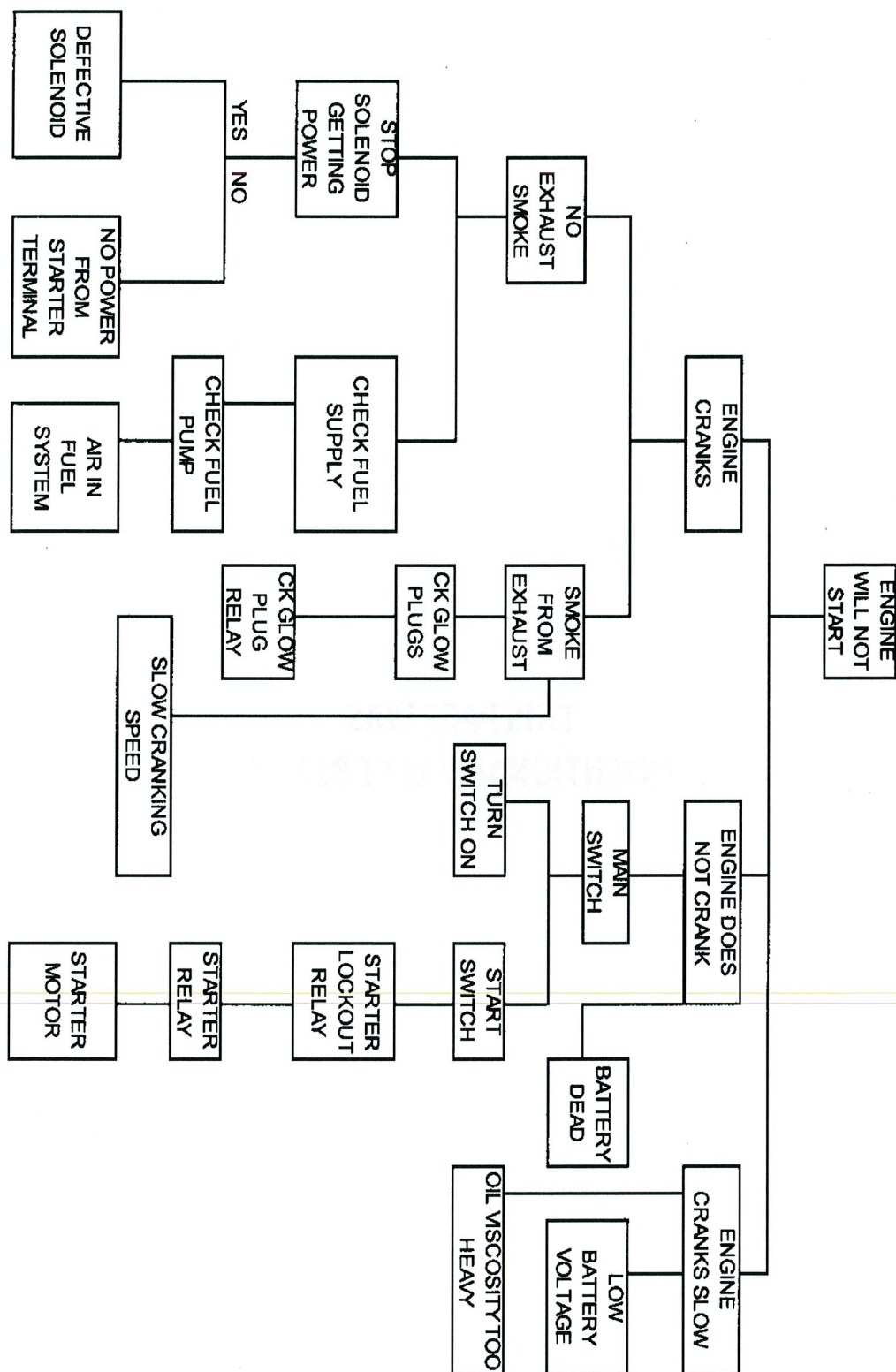
5-4.11.5 When Engine Must be Stopped Immediately

Cause	Countermeasures
Engine revolution suddenly decreases or increases.	<ul style="list-style-type: none"> • Check the adjustments, injection timing and the fuel system.
Unusual sound is heard suddenly	<ul style="list-style-type: none"> • Check all moving parts carefully.
Color of exhaust suddenly turns dark	<ul style="list-style-type: none"> • Check the fuel injection system, especially the fuel injection nozzle.
Bearing parts are overheated.	<ul style="list-style-type: none"> • Check the lubricating system.
Oil lamp lights up during operation	<ul style="list-style-type: none"> • Check lubricating system. • Check if the engine bearing clearances are within factory specs. • Check the function of the relieve valve in the lubricating system. • Check pressure switch. • Check filter base gasket.

5-4.11.6 When Engine Overheats

Cause	Countermeasures
Engine oil insufficient.	<ul style="list-style-type: none"> • Check oil level. Replenish oil as required.
Fan belt broken or elongated	<ul style="list-style-type: none"> • Change belt or adjust belt tension.
Coolant insufficient	<ul style="list-style-type: none"> • Replenish coolant.
Excessive concentration of antifreeze	<ul style="list-style-type: none"> • Add water only or change to coolant with the specified mixing ratio.
Radiator net or radiator fin clogged with dust	<ul style="list-style-type: none"> • Clean net or fin carefully.
Inside of radiator or coolant flow route corroded	<ul style="list-style-type: none"> • Clean or replace radiator and parts.
Fan or radiator or radiator cap defective	<ul style="list-style-type: none"> • Replace defective part.
Thermostat defective	<ul style="list-style-type: none"> • Check thermostat and replace if necessary.
Temperature gauge or sensor defective	<ul style="list-style-type: none"> • Check temperature with thermometer and replace if necessary.
Overload running	<ul style="list-style-type: none"> • Reduce load.
Head gasket defective or water leakage	<ul style="list-style-type: none"> • Replace parts.
Incorrect injection timing	<ul style="list-style-type: none"> • Adjust to proper timing.
Unsuitable fuel used	<ul style="list-style-type: none"> • Use the specified fuel.





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