CAT® Lift Trucks

Service Manual

S6S-T Diesel Engine

DP60
DP70
DP70E

For use with the DP60, DP70, DP70E
Chassis Service Manual.

99709-64100

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4. Main specifications

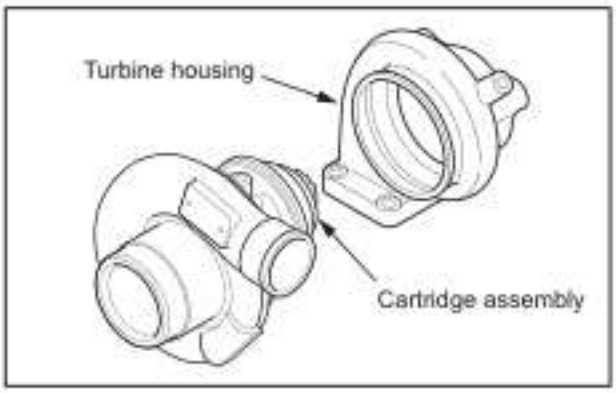
Table 1-1 Main specifications (1 / 3)

Engine model				S6S-Y3T51FL
Main specification	Type			Water cooled, 4 cycle diesel engine, turbocharged
	No. of cylinders - arrangement			6 cylinder in-line
	Combustion system			Swirl chamber type
	Valve mechanism			Overhead
	Cylinder bore × stroke			94 × 120 mm [3.70 × 4.72 in.]
	Displacement			4.996 L [305 cu. in.]
	Compression ratio			22.0 : 1
	Fuel			Diesel fuel, cetane number 45 or higher (JIS K2204) ASTM diesel fuel oil No. 2-D
	Firing order			1 - 5 - 3 - 6 - 2 - 4
	Direction of rotation			Counterclockwise when viewed from flywheel side
	Dimensions (varies depending on the specifications)	Length		1004 mm [39.53 in.]
		Width		622 mm [24.49 in.]
		Height		839 mm [33.03 in.]
	Dry weight			360 kg [793.7 lb]
Basic engine	Cylinder	Type		Dry (integral with cylinder block)
	Piston ring	Number of rings		Compression rings: 2
				Oil ring (w/expander): 1
	Valve timing (when warm)	Inlet valve	Open	BTDC 18°
			Close	ABDC 54°
		Exhaust valve	Open	BBDC 66°
			Close	ATDC 22°
	Starting system			Electric
	Starting aid system			Glow plug
Fuel system	Fuel injection pump	Type		Distribution (Bosch VE type)
		Plunger diameter		ø 11 mm [0.43 in.]
		Cam lift		1.741 mm [0.0685 in.]
		Governor		Bosch, all speed type
	Fuel injection nozzle	Nozzle type		Denso, throttle type
		Number of spray holes		1
		Spray hole diameter		ø 1.0 mm [0.039 in.]
		Spray angle		0°
		Valve opening pressure		11.77 MPa {120 kgf/cm²} [1706.80 psi]
	Fuel filter	Type		Cartridge type paper element

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2.3.3 Installing turbine housing

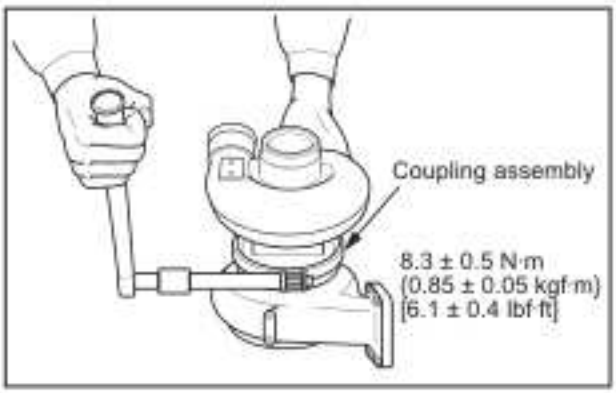
Install the turbine housing to the cartridge assembly by aligning the marks put during disassembly.



Installing turbine housing

2.3.4 Installing coupling assembly

Apply Molykote grease or equivalent to threads of the coupling assembly nut, and tighten the nut to the specified torque.



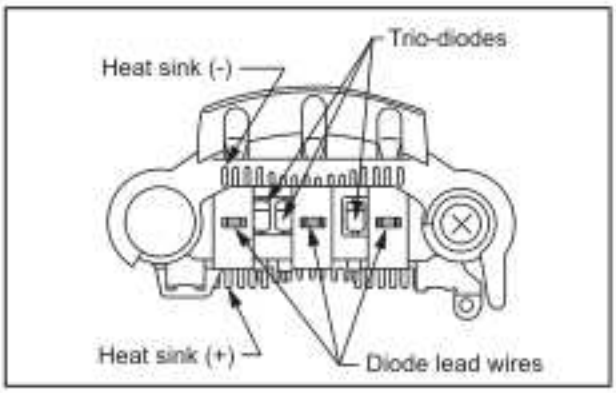
Installing coupling assembly

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2.5.1 Inspecting rectifier

Check that diodes in a rectifier function properly. To check, measure both negative (-) and positive (+) resistance alternately twice. If both infinite negative and infinite positive resistances are observed, the diode is open-circuited. If measured value is close to 0 Ohm, the diode is short-circuited. In either case, replace the rectifier with a new one.

Note: Use a wide measuring range as much as possible. The current flow during test is significantly lower than the current that normally flows in the rectifier, by which the accurate resistance may not be measured using a tester, and this tendency is noticeable if the measuring range is small.

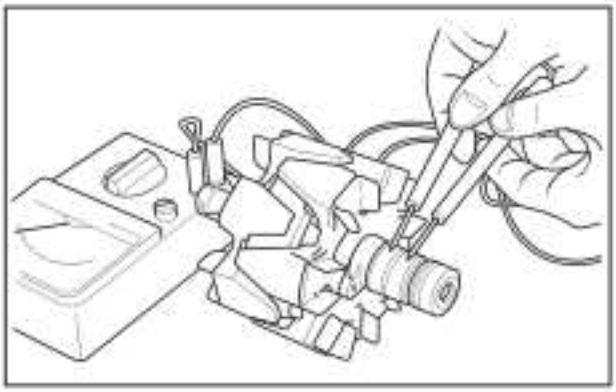


Inspecting rectifier

2.5.2 Inspecting rotor assembly

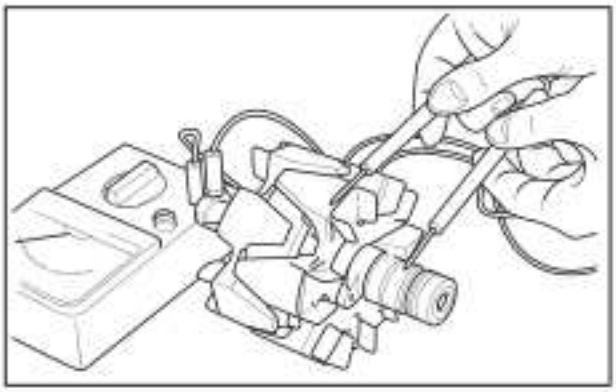
(1) Measure the resistance between the slip rings (rotor coil).
If measured value is out of standard, replace the rotor assembly with a new one.

Item	Standard
Resistance between slip rings	9 to 10.4 Ohm



Inspecting field coils for continuity

(2) Check continuity between the slip ring and the shaft (or core).
If continuity is found, replace the rotor assembly with a new one.



Inspecting field coils for grounding

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2.8 Inspecting and cleaning gauze filter of distribute type fuel injection pump (Bosch)

⚠ WARNING

Keep flames away when handling a diesel fuel. Wipe off any spilled fuel thoroughly.
Spilled fuel could cause a fire.

CAUTION

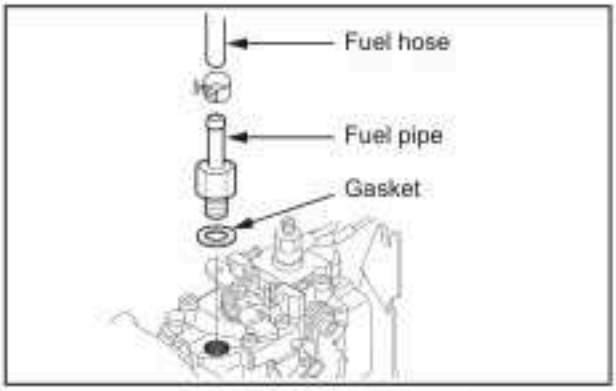
Cover the openings on the fuel injection pump to prevent dust from entering the fuel system.

When output shortage and/or hunting of the engine occurred, the gauze filter may be dirty. Clean the gauze filter accordingly.

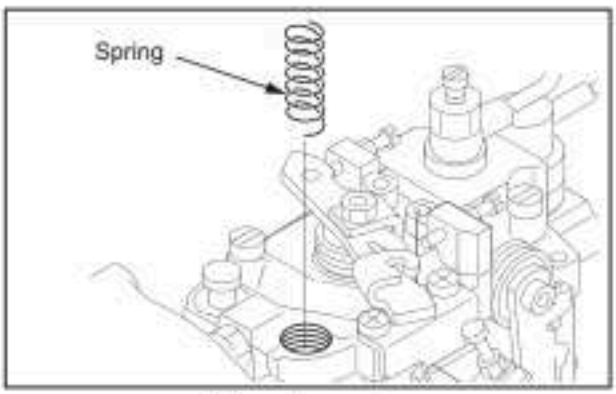
(1) Clean around the injection pump.
(2) Drain the fuel in the injection pump, and remove the fuel hose and fuel pipe.
(3) Remove the spring with a tweezer.
(4) Remove the gauze filter with a tweezer.

Note: When removing the gauze filter, be careful not to damage the metal mesh of the gauze filter.

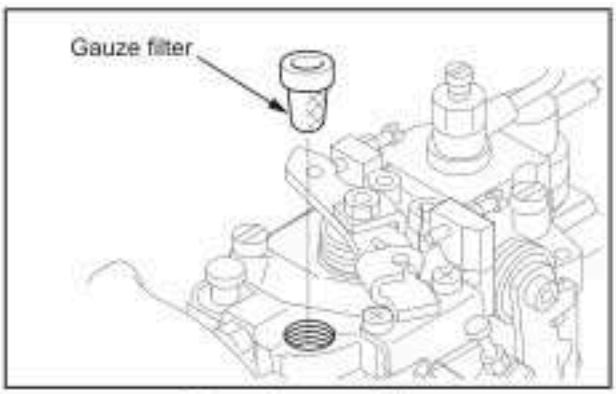
(5) Remove the dirt and dust from the gauze filter cleaning with compressed air or diesel fuel. When damage is found, or when the gauze filter is still dirty after cleaning, replace the gauze filter with a new one.
(6) Install the cleaned gauze filter and new gasket, and in reverse order of disassembly, install the fuel pipe and fuel hose.



Removing fuel hose and fuel pipe



Removing spring



Removing gauze filter

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⚠ WARNING

Be careful of burns

Do not touch the engine during or immediately after operation



Do not touch the engine during or immediately after operation to avoid risk of burns.

To conduct maintenance and inspection work, wait until the engine has cooled sufficiently, checking the temperature gauge.

Slowly and carefully open radiator cap

Never attempt to open the radiator cap while the engine is running or immediately after the engine stops. Give a sufficient cooling time to the engine coolant before opening the cap.

When opening the radiator cap, slowly turn the cap to release internal pressure. To prevent scalds with steam gushing out, wear thick rubber gloves or cover the cap with a cloth.

Close the radiator cap tightly without fail.

The coolant is very hot and under pressure during engine running or just after the engine stops. If the radiator cap is not closed tightly, steam and hot coolant may gush out and can cause scalds.

Add coolant only after the coolant temperature dropped

Do not add coolant immediately after the engine stops. Wait until the coolant temperature lowers sufficiently to avoid a risk of burns.

Never remove heat shields

The exhaust system, which becomes extremely hot while the engine is operating, is provided with various heat shields. Do not remove these heat shields. If any of these heat shields have been removed owing to unavoidable circumstances during the work, be sure to restore them after the work is completed.

⚠ WARNING

Be careful of exhaust fume poisoning

Operate engine in well-ventilated area



If the engine is installed in an enclosed area and the exhaust gas is ducted outside, ensure that there is no exhaust gas leak from duct joints.

Take care that the exhaust gas is not discharged toward plants or animals.

Exhaust gas from the engine contains carbon monoxide and other harmful substances. Operating the engine in an ill-ventilated area can produce gas poisoning.

⚠ WARNING

Protect ears from noises

Wear ear plugs



Always wear ear plugs when entering the machine room (engine room). Combustion sound and mechanical noise generated by the engine can cause hearing problems.

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