CAT® Lift Trucks

Service Manual

S4S Diesel Engine

180396-up

DP20N	P4000
DP25N	P5000
DP30N	P6000
DP35N	P6500
	P7000

For use with DP20N, DP25N, DP30N, DP35N, P4000, P5000, P6000, P6500, P7000 Chassis Service Manual. 99729-87120

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Table 1-1 Main specifications (2 / 2)

Engine model			S4S
Lubrication system	Lubricating method		Forced circulation type (pressure feed by oil pump)
	Engine oil	Standard	Class CF-4 oil (API service classification)
		Engine oil capacity	Engine total: approx. 10 L [2.64 U.S.gal.] (approx. 9 L [2.38 U.S.gal.] in oil pan)
	Oil pump	Type	Trochoid
		Speed ratio to crankshaft	0.73
		Discharge capacity	28.6 L [7.56 U.S.gal.]/min or more (at pump rotation of 2230 min^{-1}, 0.3 MPa {3 kgf/cm^2} [42.67 psi])
	Relief valve	Type	Piston valve type
		Valve opening pressure	0.35 ± 0.05 MPa {3.5 ± 0.5 kgf/cm^2} [49.78 ± 7.11 psi]
	Oil filter	Type	Cartridge type paper element
Cooling system	Cooling method		Water-cooled, forced circulation
	Coolant capacity (engine)		5.5 L [1.453 U.S.gal.]
	Water pump	Type	Volute type centrifugal pump
		Speed ratio to crankshaft	1.1
		Discharge capacity	160 L [42.27 U.S.gal.]/min (at pump rotation of 3600 min^{-1}, 7.5×10^{-2} MPa {0.76 kgf/cm^2} [10.8 psi])
	Cooling fan	Type	Pressure type
		Diameter	ø 400 mm [15.75 in.]
	Thermostat	Type	Wax type
		Valve opening temperature	76.5 ± 2°C [169.7 ± 3.6°F] (90°C [194.0°F] when fully opened)
Electrical system	Voltage - polarity		12V - negative (-) ground
	Starter	Type	M008T75171
		Pinion meshing type	Solenoid shift
		Output	12 V - 2.2 kW
		Qty	1
		Ring gear and pinion ratio	10/122
	Alternator	Model number	3-phase alternating current, with rectifier
		Output	12 V - 50 A
		Speed in use	1000 to 18000 min^{-1}
		Regulator set voltage	14.7 ± 0.3 V
	Glow plug	Type	Electric
		Rated voltage - current	10.5 V - 9.7 A (30-second duration)
	Magnet valve (Stop solenoid)	Rated voltage	12 V
		Power consumption	20 W
		Starting voltage	6.3 V or below
		Return voltage	2.5 V or more
		Coil resistance	8 Ω

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2.3.13 Inspecting magnet switch

Inspect the magnetic switch for following items. Replace the magnetic switch if it is defective.

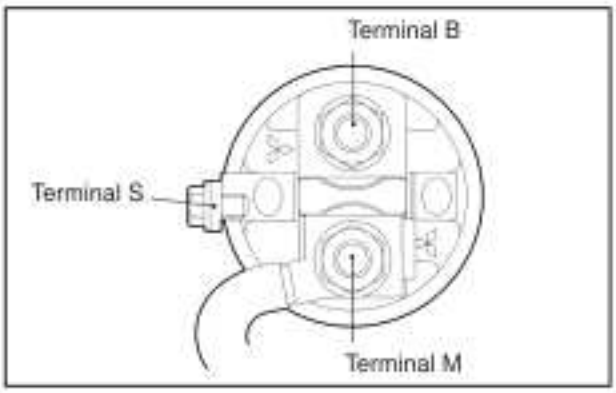
(1) Open circuit of coil

Check the continuity between terminal S and terminal M, AISO check the continuity between terminal S and ground, If continuity is not exist, the coil is open circuit.

(2) Adhesion of contactor

Check that there is no continuity between terminal B and terminal M.

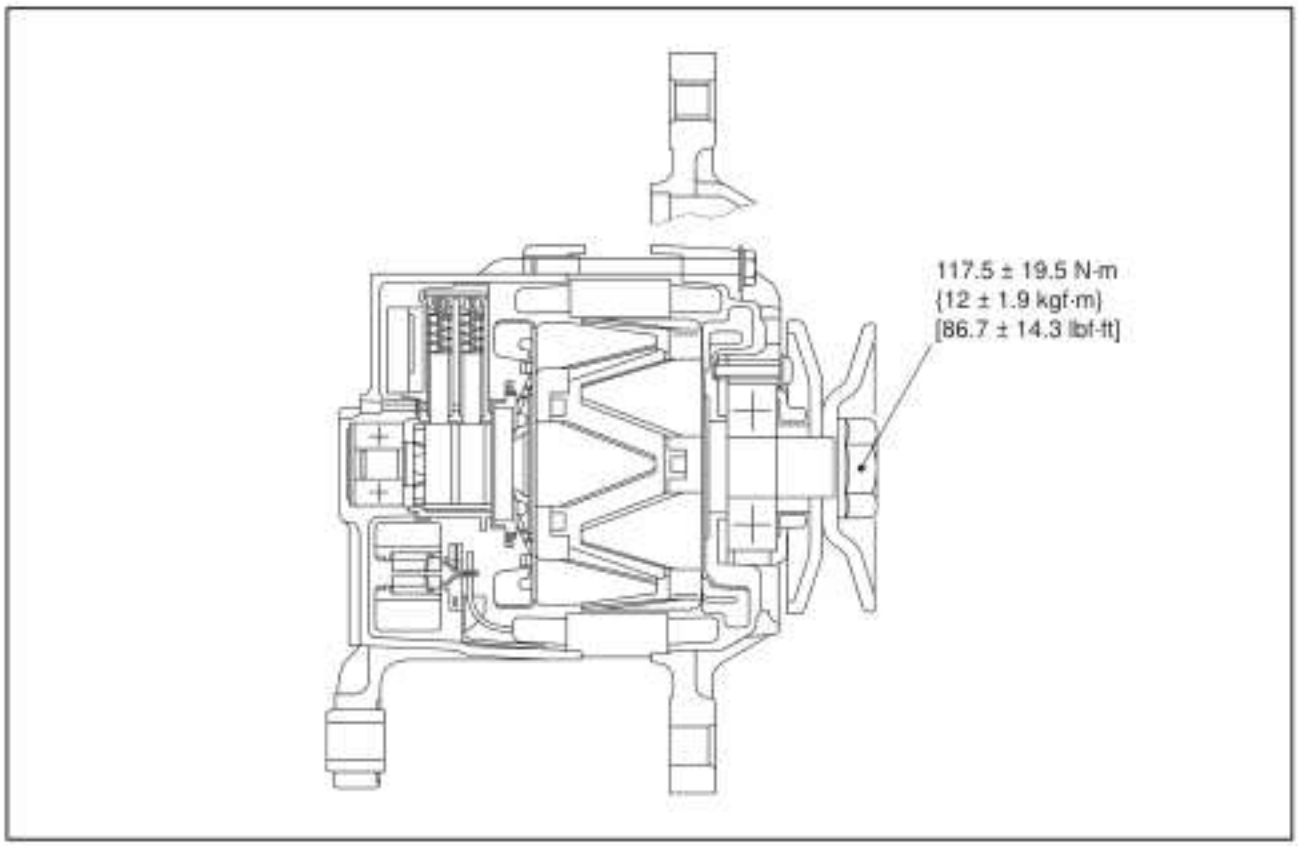
If continuity is exist, the contactor are welded closed.



Inspecting magnetic switch

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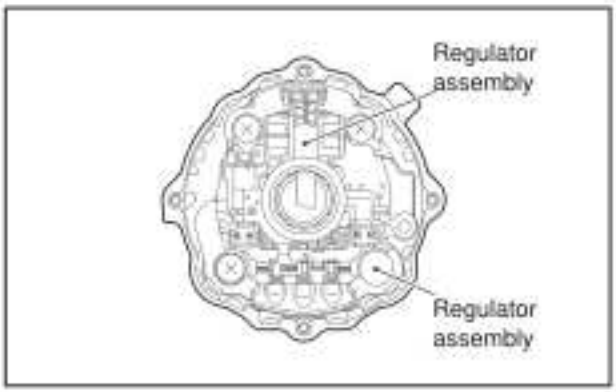
2.7 Reassembling alternator



Reassembling alternator

2.7.1 Installing rectifier assembly and regulator assembly

Install the rectifier assembly and regulator assembly on the rear bracket.



Installing rectifier assembly and regulator assembly

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

⚠ WARNING

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

CAUTION

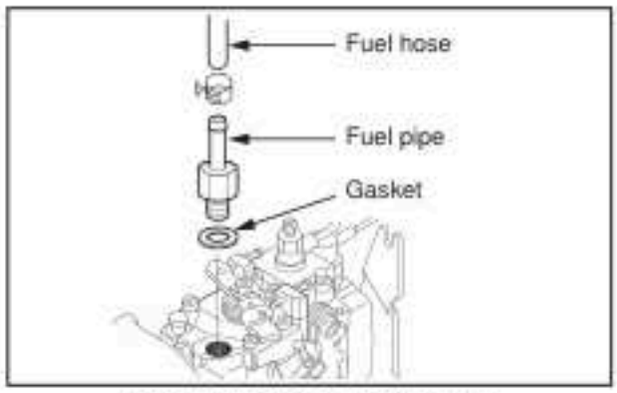
Cover the openings on the fuel injection pump to prevent dust from entering the fuel system.

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

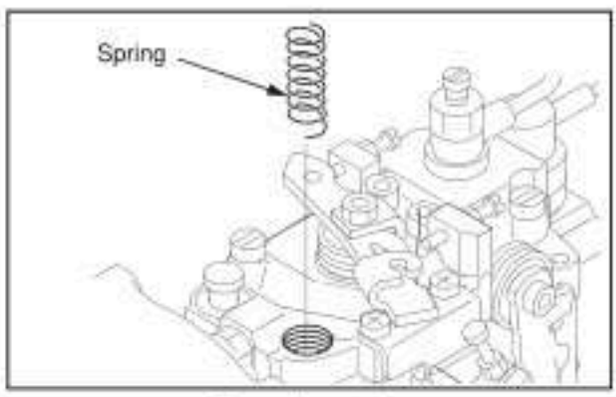
(1) Clean around the injection pump.
(2) Drain the fuel in the injection pump, and remove the fuel hose and fuel pipe.
(3) Remove the spring with a tweezer.
(4) Remove the gauze filter with a tweezer.

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

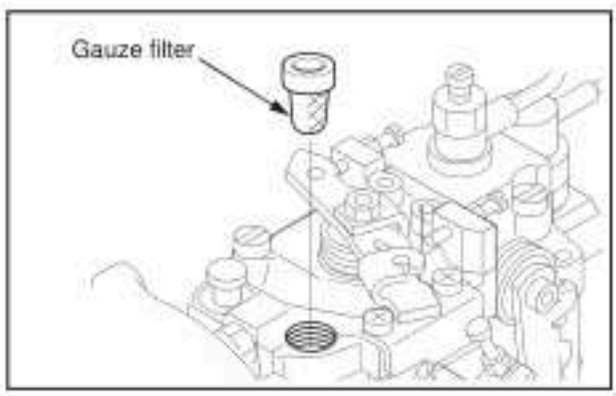
(5) Remove the dirt and dust from the gauze filter cleaning with compressed air or diesel fuel. When damage is found, or when the gauze filter is still dirty after cleaning, replace the gauze filter with a new one.
(6) Install the cleaned gauze filter and new gasket, and in reverse order of disassembly,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