CAT® Lift Trucks

Service Manual

S4Q2 Diesel Engine

72645-up

DP15N
DP18N
DP20CN

For use with DP15N, DP18N, DP20CN Chassis Service Manual.

99719-8Q100

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Table 1-1 Main specifications(2 / 2)

Engine type				S4Q2-5EFL
Lubrication system	Lubricating method			Forced circulation type (pressure feed by oil pump)
	Engine oil	Standard		API service classification CD or above, SAE30 oil viscosity
		Engine oil capacity		Oil pan: approx. 7.5 L [1.98 U.S.gal.] in oil pan (Engine total: approx. 10 L [2.64 U.S.gal.])
	Oil pump	Type		Trochoid
		Discharge capacity		10.45 L [2.76 U.S.gal.]/min or more (at pump rotation of 1000 min^{-1})
	Relief valve	Valve opening pressure		0.30 to 0.40 MPa {3 to 4 kgf/cm^2} [42.67 to 56.89 psi]
	Oil filter	Type		Cartridge type paper element
Cooling system	Cooling method			Water-cooled, forced circulation
	Coolant capacity (engine)			4 L [1.06 U.S.gal.], approx.
	Water pump	Type		Volute type centrifugal pump
		Discharge capacity		70 L [18.49 U.S.gal]/min (Pump rotating speed 3000 min^{-1}, total pump head 2.5×10^{-2}MPa)
	Thermostat	Type		Wax type
		Valve opening temperature		76.5 ± 2 °C [170 ± 3.6°F]
Electrical system	Starter	Manufacturer		Mitsubishi Electronic Corporation
		Type		M008T70371
		Pinion meshing type		Pinion shift
		Output		12 V - 2.0 kW
		Qty		1
		Ring gear and pinion ratio		10/113
		No-load characteristics	Voltage	11 V
			Current	130 A or below
			Speed	3600 r/min or more
		Load characteristic	Voltage	7.7 V
			Current	400 A
			Torque	10.59 N·m {1.08 kgf·m} [7.8 lbf·ft] or more
			Speed	1280 r/min or more
		Load characteristics	Voltage	3 V
			Current	1000 A or below
			Torque	29.42 N·m {3.0 kgf·m} [21.7 lbf·ft] or more
	Alternator	Manufacturer		Mitsubishi Electronic Corporation
		Model number		A007T02077C
		Output		12 V - 50 A
		Regulated voltage		14.7 ± 0.3 V
	Glow plug	Type		Sheathe glow plug
		Rated voltage		DC10.5 V

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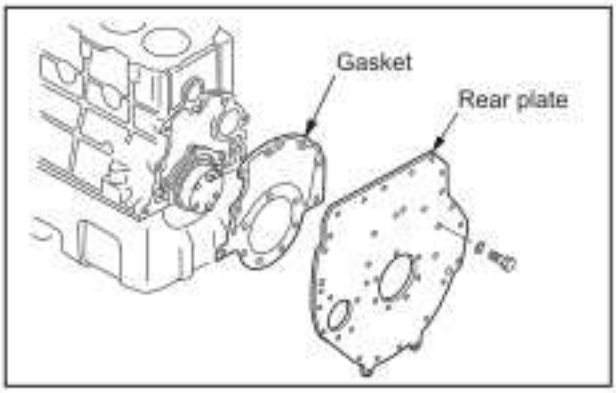
3. Reassembling flywheel

3.1 Installing rear plate

(1) Install a new rear plate gasket.

(2) Install the rear plate by aligning it with the dowel pins. Tighten the mounting bolt to the specified torque.

Note: Install the starter to the rear plate in advance to facilitate the subsequent reassembly.



Installing rear plate

3.2 Installing oil seal case

CAUTION

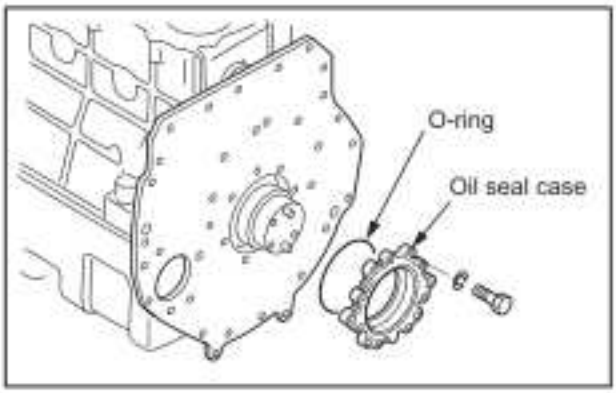
Be very careful not to damage the oil seal

(1) Apply engine oil to the entire circumference of the oil seal.

(2) Install the oil seal into the oil seal case.

(3) Apply engine oil to the entire circumference of the oil seal lip.

(4) Install the O ring into the oil seal case, and install the assembly onto the rear plate.



Installing oil seal case

3.3 Installing flywheel

⚠ CAUTION

The person who holds the pulley must be very careful to assure safety by communicating with the person who is installing the flywheel.

(1) One person must firmly hold the pulley with a wrench to prevent the crankshaft from turning.

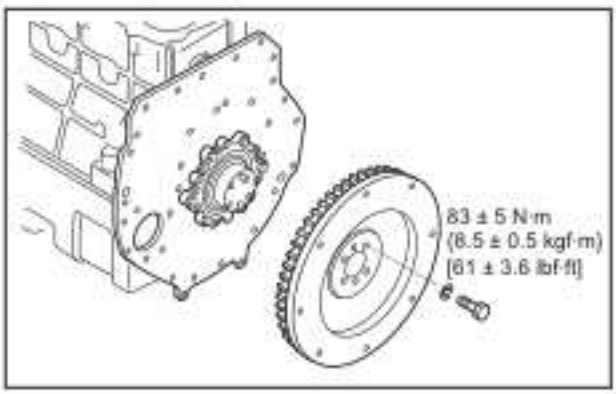
(2) Screw the guide bolt into the rear end of the crankshaft.

(3) Align the bolt hole of flywheel with the guide bolt and install the flywheel to the crankshaft.

(4) Temporarily tighten bolts.

(5) Remove the guide bolt and temporarily tighten the last bolt.

(6) Tighten the flywheel bolts to the specified torque.



Installing flywheel

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2.1.2 No load test

CAUTION

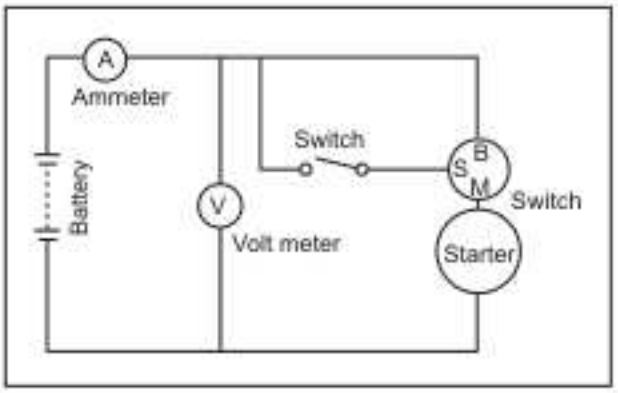
(a) Use as thick a wire as possible and firmly tighten each terminal.

(b) When detecting the rotation at the tip of the pinion, be careful, as the pinion pops out during operation.

(1) Connect the starter to the circuit as shown in the illustration.

(2) In normal condition, the pinion pops out when the switch is turned ON, and the starter rotates at more than the specified rotation speed.
If the terminal voltage, current or rotation speed does not meet the standard, disassemble, inspect and repair the starter.

Item		Standard
No-load characteristics	Terminal voltage	11 V
	Current	130 A or less
	Rotation speed	3600 min^{-1} or more



Test at no load

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2.1 Removing flywheel

⚠ CAUTION

(a) Be careful not to cut yourself with the ring gear when pulling out the flywheel.
Be careful not to drop or hit the flywheel when removing.

(b) The person who holds the pulley must be very careful to assure safety by communicating with the person who is removing the flywheel.

(1) One person must firmly hold the pulley with a wrench to prevent the flywheel from turning.

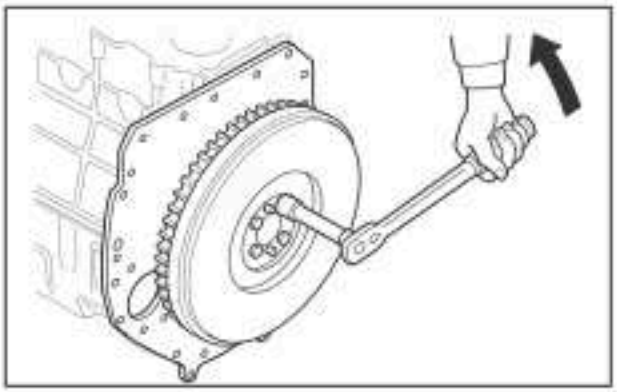
(2) Remove one bolt from the flywheel.

(3) Screw a guide bolt into the threaded hole of the bolt that has been removed.

(4) Remove remaining bolts from the flywheel.

(5) Hold the flywheel firmly with both hands while moving it back and forth, and then pull it out straight.

Note: The ring gear is shrink fitted to the flywheel. Do not remove the ring gear unless it is defective.



Removing flywheel

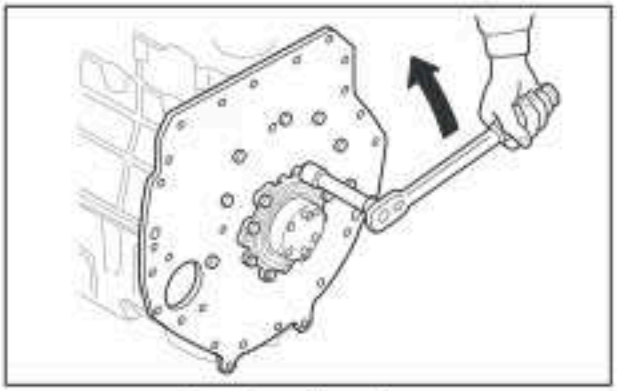
2.2 Removing oil seal case

CAUTION

Be very careful not to damage the oil seal.

(1) Remove bolts from the oil seal case.

(2) Pry out the oil seal case from the cylinder block using a screwdriver.



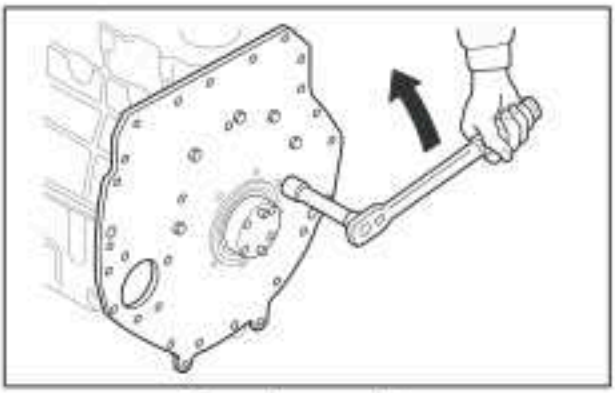
Removing oil seal case

2.3 Removing rear plate

CAUTION

Be very careful not to damage the oil seal.

Remove the rear plate mounting bolts, and remove the rear plate using a guide bolt.



Removing rear plate

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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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