TOWMOTOR®

Service Manual

S4S Diesel Engine (Tier 2)

For use with DP20HS-DP30HS
Chassis Service Manual.

99729-91100

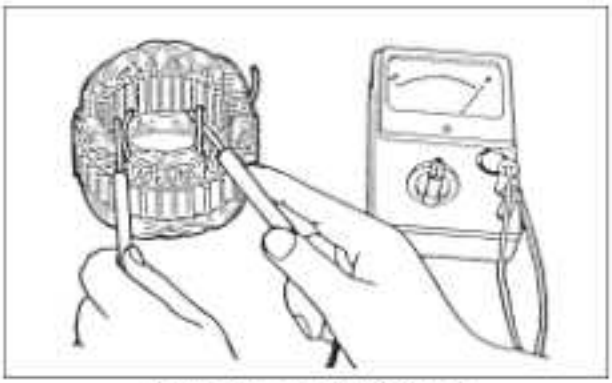
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Model designation			S4S
Lubrication system	Type		Force feed by oil pump
	Engine oil	Specification	Class CF oil (API Service Classification)
		Capacity (engine) liter (U.S. gal.)	Approx. 10 (2.6) [Oil pan: 9 (2.4), Filter: 1 (0.3)]
	Oil pump	Type	Trochoid
		Speed ratio to crankshaft	0.73
		Capacity liter (U.S. gal.)/min	28.6 (7.6) at 0.3 MPa (3 kgf/cm^2) [44 psi] discharge pressure of pump running at 2230 min^{-1}
	Relief valve	Type	Piston valve
		Opening pressure MPa (kgf/cm^2) [psi]	0.35±0.05 (3.6±0.5) [50±7]
	Oil filter	Type	Cartridge of paper element
Cooling system	Refill capacity (engine water jacket) liter (U.S. gal.)		5.5 (1.5)
	Water pump	Type	Centrifugal
		Speed ratio to crankshaft	1.1
		Capacity liter (U.S. gal.)/min	160 (42.3) at 0.075 MPa (0.75 kgf/cm^2) [109 psi] discharge pressure of pump running at 3600 min^{-1}
	V-belt	Type	Low-edge cogged A type V-belt × 1
	Thermostat	Type	Wax pellet
		Valve opening temperature °C (°F)	76.5±2 (170±3.6)
Electrical system	Voltage–polarity		12V–ground
	Starter	Model	M8T75171
		Type	Piston shift
		Output V–kW	12–2.2
		No. of pinion teeth/ flywheel ring gear teeth	10/122
	Alternator	Type	3–phase, with rectifier
		Output V–A	12–50
		Working speed min^{-1}	1000 to 18000
		Rated output generating speed min^{-1}	5000
		Maximum permissible speed min^{-1}	22000
		Speed ratio to crankshaft	2.1
	Glow plug	Type	Sheathed
		Rated voltage-current V–A	10.5–9.7 (30 sec. rating)
	Magnet valve (Stop Solenoid)	Rated voltage V	12
		Power consumption W	20
		Starting voltage V	6.3 or less
		Return voltage V	2.5 or less
		Coil resistance ohm	8

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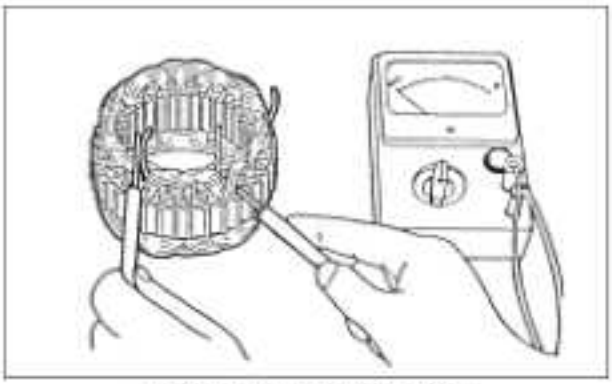
(3) Inspecting stator core

(a) Check the continuity between the stator core and each lead wire.
If there is no electric conduction, there is an open circuit: replace the stator core with new one.



Stator core continuity test

(b) Check to make sure that there is no continuity between the lead wires and core.
If there is continuity, the circuit is grounded: replace the stator with new one.



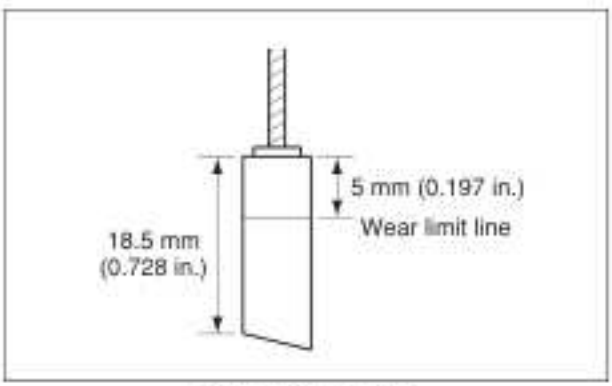
Stator core grounding test

(4) Inspecting brushes

(a) If the brushes are worn close to the wear limit line (service limit), replace the brushes.

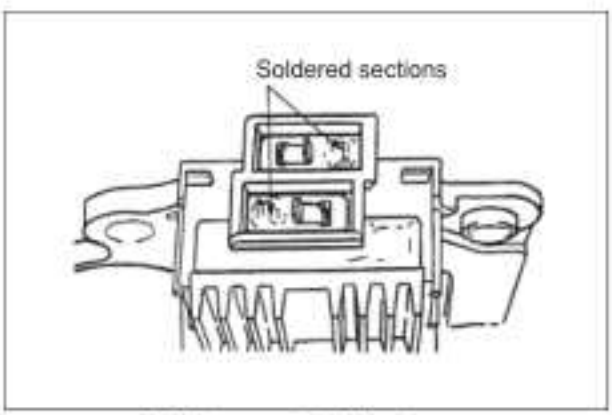
Unit: mm (in.)

Item	Assembly Standard	Service Limit
Brush length	18.5 (0.728)	5 (0.197)



Inspecting brush

(b) Disconnect the brush lead wires at the soldered sections to remove the brushes and springs.



Replacement of brushes

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(● Refer to the separate troubleshooting chart.)

Engine vibrates excessively	Engine stalls	Poor response for deceleration	Engine does not pick up speeds	Engine operates at high speeds and does not stop	Engine rotates in reverse direction	Fuel consumption is high	Oil consumption is high	Fuel mixes with oil	Water mixes with oil	Excessive blowby	Abnormality in lubrication system: Indicator does not light when engine is not operating	Abnormality in lubrication system: Indicator lights when engine operates at low speed	Abnormality in lubrication system: Indicator lights when engine operates at height speed	Abnormal coolant temperature: Overheating	Abnormal coolant temperature: Low	Alternator defective: Indicator does not light when engine is not operating	Alternator defective: Indicator lights when engine operates at high speed	Remedies
—	○	—	—	—	—	—	—	—	—	—	—	—	○	—	—	—	—	Heat oil pan at starting. After starting warm up engine thoroughly.
—	—	—	—	—	—	○	—	—	—	—	—	—	—	—	○	—	—	●
—	—	—	—	—	—	—	○	—	—	○	—	○	—	○	—	—	—	●
—	—	—	—	—	—	—	○	—	—	○	—	○	—	○	—	—	—	●
—	—	—	—	—	—	—	—	—	○	—	—	—	—	—	—	—	—	Tighten, replace gasket if necessary.
—	—	—	—	—	—	—	—	—	○	—	—	—	—	○	—	—	—	Disassemble and replace crankcase.
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Disassemble and repair. Replace part(s) if necessary.
—	—	—	—	—	○	—	—	—	—	—	—	—	—	—	—	—	—	Repair or replace.
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Repair or replace.
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Repair or replace starter if necessary.
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Repair or replace ring gear. Replace pinion gear.
—	—	—	—	—	○	—	—	—	—	—	○	—	—	—	—	○	—	Charge or replace battery. Heat it if necessary.
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Replace part(s).
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Replace copper packing(s). Replace glow plug(s), if necessary.
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	○	Replace alternator if necessary.
—	—	—	—	—	○	—	—	—	—	—	—	—	—	—	—	○	○	Adjust or replace.
—	—	—	—	—	—	—	—	—	—	—	○	—	—	—	—	○	—	Connect wires properly.
—	○	—	○	—	—	○	○	—	—	○	—	—	—	○	—	—	—	●
—	○	—	—	—	—	○	○	○	—	○	—	—	—	—	—	—	—	Repair or replace.
—	○	—	—	—	—	○	○	○	—	○	—	○	○	—	—	—	—	Repair or replace.
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Check and replace bearings with undersize ones if necessary.
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Tighten.
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Reinstall timing gears or adjust valve sinkage.
○	○	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Replace part(s).
○	○	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Adjust valve clearance to 0.25 mm (0.0098 in.)
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Repair.
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Replace gear(s) or idler gear bushing.

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