SERVICE MANUAL

MODEL

L20A, L24 & L26 SERIES

ENGINES

NISSAN

NISSAN MOTOR CO., LTD.

TOKYO, JAPAN

SECTION CO

COOLING SYSTEM

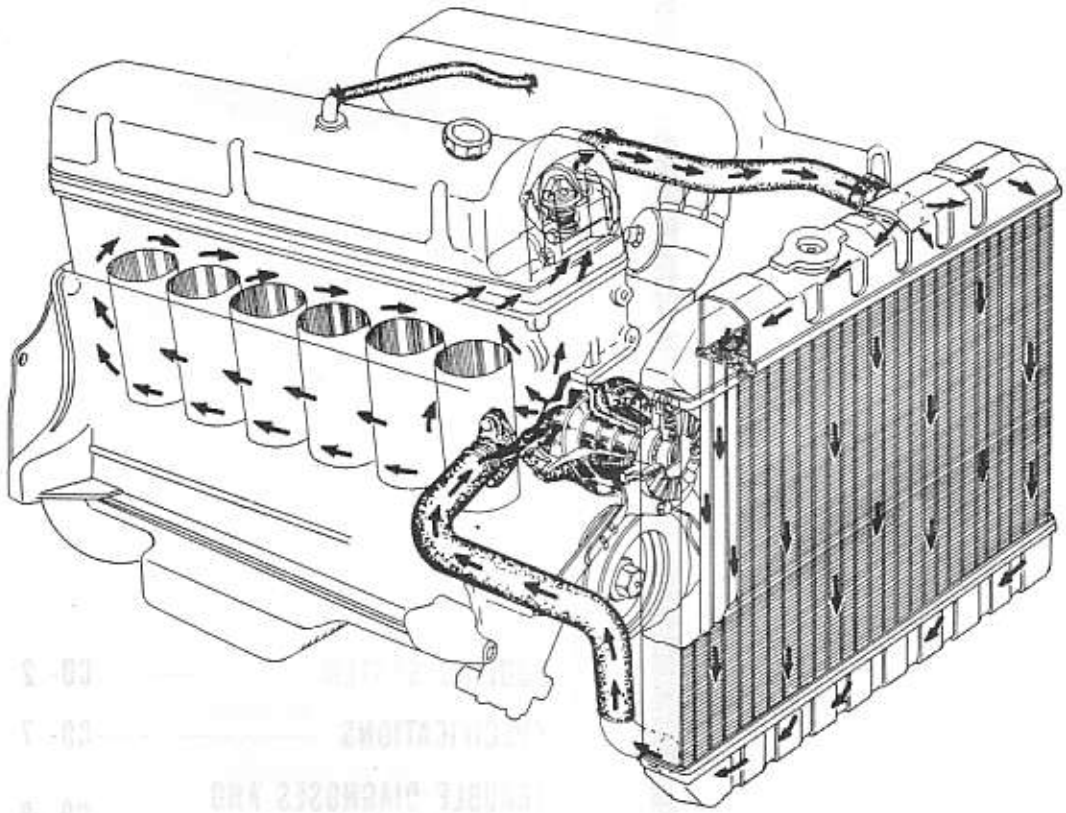
CO

COOLING SYSTEM

CONTENTS

DESCRIPTION

The cooling system is of the conventional pressure type. A centrifugal pump built in the front cover of the engine serves to circulate the coolant. The pressure type radiator filler cap installed on the radiator operates the cooling system at higher than atmospheric pressure. The higher pressure raises the boiling point of the coolant and increases the cooling efficiency of the radiator. When the thermostat is closed, the coolant remains in the cylinder head and block for swift warming up of the engine. After it reaches the normal operating temperature, the coolant circulates through the radiator.



CO027

Fig. CO-1 Cooling system

COOLANT LEVEL

The coolant level should be checked and maintained as follows:

1. 230: In the specified range indicated on reservoir tank after filling up radiator.
2. HGC110: Over the baffle plate of the radiator's upper tank.
3. S30: About 40 mm (1.575 in) below the bottom of filler neck.

CAUTION: To avoid serious personal injury, never remove radiator cap quickly when engine is hot. Sudden release of cooling system pressure is very dangerous.
If it is necessary to remove radiator cap when radiator is hot, turn cap slowly counterclockwise to the first stop. After all pressure in the cooling system is released, turn cap passing the stop and remove it.

DRAINING AND FLUSHING THE COOLING SYSTEM

To drain the cooling system remove radiator cap, release drain cock at the bottom of radiator and drain plug on the side of cylinder block. If heater system is installed, set heater temperature control valve to open position. After the coolant is drained completely, close drain cock and plug and refill the system with clean soft water.

WATER PUMP

The water pump is of a centrifugal type, which is mounted on the engine front cover. The fan and pulley are bolted at the pulley hub. The pump shaft is supported by a double row of ball bearings press fit in an aluminum die cast pump body. The bearings are permanently lubricated and sealed to prevent loss of lubricant and entry of dirt.

The pump contains an impeller that turns on a steel shaft which rotates in the ball bearings, and the volute chamber is built in the front cover assembly. The inlet of the pump is connected to the radiator's lower tank by a hose.

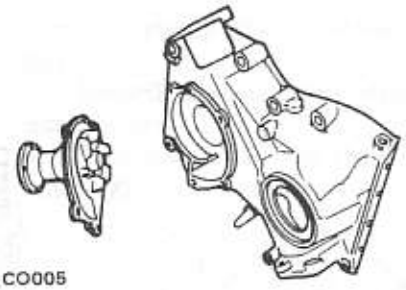


Fig. CO-2 Water pump and front cover

REMOVAL AND INSTALLATION

Removal

1. Drain coolant into a clean container.
2. Loosen bolts retaining fan shroud to radiator and remove shroud.
3. Loosen belt, then remove fan blade and pulley from hub.
4. Remove pump assembly and gasket from front cover.

Note: Prior to removing water pump, clean the cooling system with NISSAN CSC (Cooling System Cleaner).

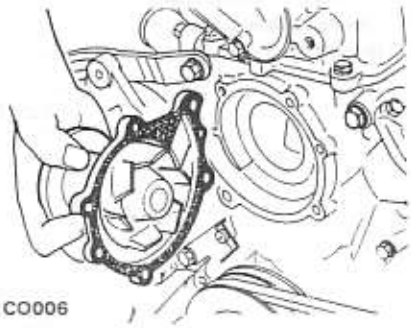


Fig. CO-3 Removing water pump

Installation

1. Be sure to clean the gasket surfaces in contact with pump and front cover. Always use new gaskets when installing pump assembly. Be sure to tighten bolts.
2. Fill cooling system and check for leaks at pump.
3. Install fan pulley and fan blade, and tighten fixing bolts securely. Install belt and adjust for proper tension.

DISASSEMBLY

Water pump is made of aluminum and its bearing outer race is of a press fit type. For this reason, water pump should not be disassembled.

INSPECTION AND ADJUSTMENT

Inspection

Inspect pump assembly for the following conditions and replace if necessary.

1. Badly rusted or corroded body assembly and vane.
2. Excessive end play or roughness of bearings in operation.

Note: If excessive mechanical seal squeak occurs when engine is running, use NPSL (Nissan water pump seal lubricant) to prevent squeak.

Adjustment

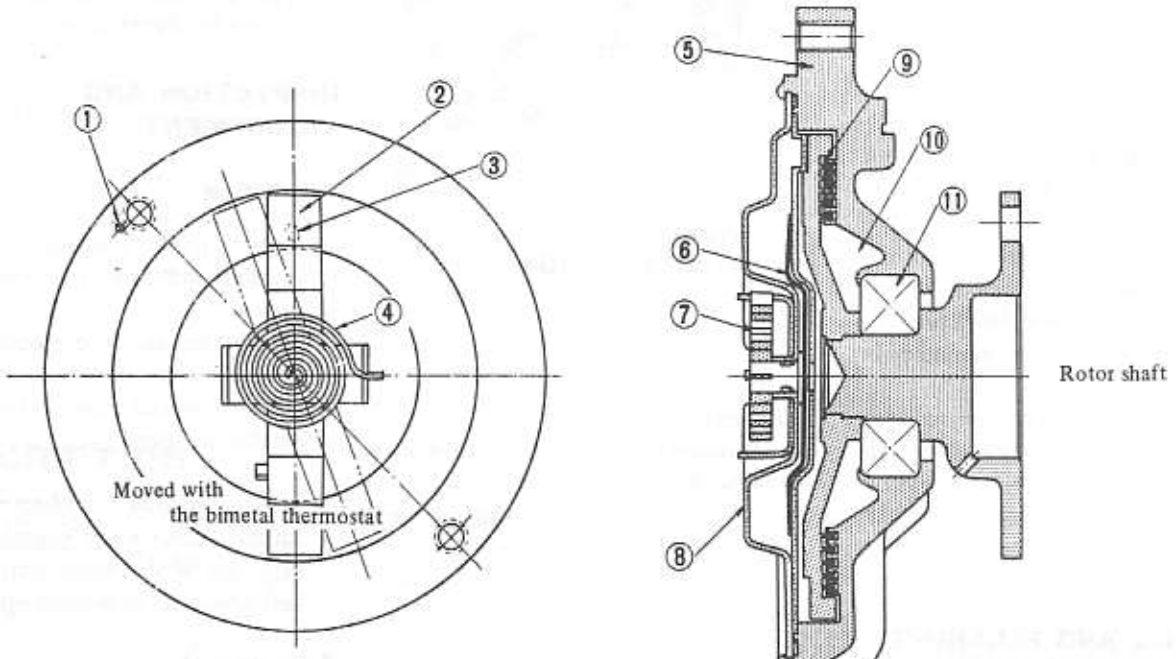
Fan belt should be properly adjusted at all times. A tight belt causes wear of alternator and water pump bearings. A loose belt brings about improper cooling fan, water pump, and alternator operation.

Check the belt slack between alternator and fan pulley by force of 10 kg (22 lb).

Slackness of fan belt:
8 to 12 mm
(0.315 to 0.472 in)

If adjustment is necessary, loosen bolt retaining alternator adjusting bar to alternator. Move alternator toward or away from engine until the correct tension is obtained.

TEM-COUPLING



1 Pump unit oil outlet
2 Slide valve
3 Oil inlet
4 Bimetal thermostat
5 Driven part
6 Slide valve
7 Bimetal thermostat
8 Reserve chamber for "OFF" condition
9 Coupling part (labyrinth)
10 Driving chamber
11 Bearing

CO028

Fig. CO-4 Cross-sectional view of Tem-coupling

Tem-coupling is a type of fan coupling which is provided with a temperature control system.

The conventional coupling always slips the fan at a high speed under a constant ratio regardless of the engine cooling requirement.

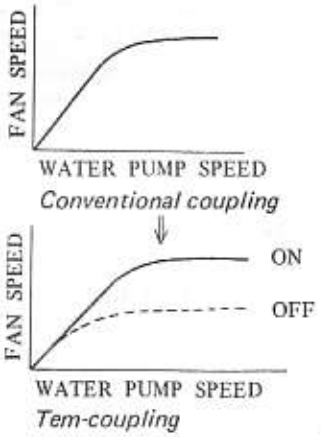
The slipping ratio of the Tem-coupling, however, is properly changed with the cooling requirement.

"ON" denotes that cooling is required and the fan operates up to about 2,500 rpm. When high cooling is not required (during cold season, with the engine warmed up, etc.), the operation is placed under "OFF" condition and the fan slips at about 1,600 rpm.

The coiled bimetal thermostat installed on the front center portion of the Tem-coupling detects temperature of air passing through the radiator (The air temperature is directly relative to the engine coolant temperature.) and the inside slide valve is opened or closed as required, and thus, the ON-OFF control is performed. When the air temperature rises, the bimetal is expanded, and the valve is opened, silicon oil is forwarded to the groove that transmits torque, and the system is placed under "ON" condition.

When the valve closes, silicon oil is not supplied to he groove, oil in the groove is accumulated on the Tem-coupling periphery due to the centrifugal force, and led into the reserve chamber. Now, oil is eliminated from the groove, and the system is placed under "OFF" condition.

With this system, when fan cooling is not required, the output loss is minimized and noise can be far reduced.



CO029

Fig. CO-5 Characteristic of Tem-coupling

INSPECTION

Check Tem-coupling for oil leakage or bend of bimetal.

If the above symptoms are found, replace it with a new one as an assembly.

THERMOSTAT

A wax pellet type thermostat is mounted in the thermostat housing at the cylinder head water outlet.

The founction of the thermostat is to control the flow of coolant, facilitating fast engine warm up and regulating coolant temperature. The thermostat is designed to open and close at predetermined temperatures and if not operating properly should be removed and tested as described below.

REMOVAL AND INSTALLATION

1. Drain coolant partially.
2. Disconnect upper radiator hose at water outlet.
3. Loosen two securing nuts and remove water outlet, gasket, and thermostat from thermostat housing.
4. After checking thermostat, reinstall, replacing with a new housing gasket.
5. Reinstall water outlet and tighten securing nuts.
6. Replenish coolant and check for leaks.

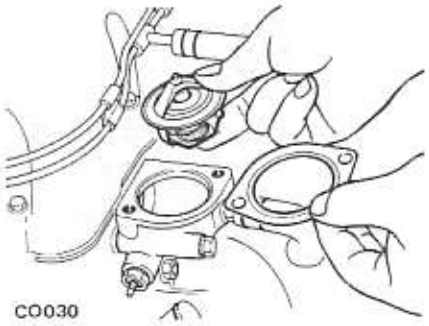


Fig. CO-6 Removing thermostat

INSPECTION

A sticking thermostat will prevent the cooling system from functioning properly. If the thermostat sticks in the open position, the engine warms up very slowly. If the thermostat sticks in the closed position, overheating will result. Therefore, the thermostat should be inspected to make sure that it is in good condition.

1. Submerge thermostat in hot water 5°C (31°F) above the temperature specified in the following table.
2. After preparing for the marked screwdriver at about 8 mm (0.315 in) from the tip, inspect the lift height of valve by inserting it.
3. Now, place thermostat in water 5°C (31°F) below the specified temperature.

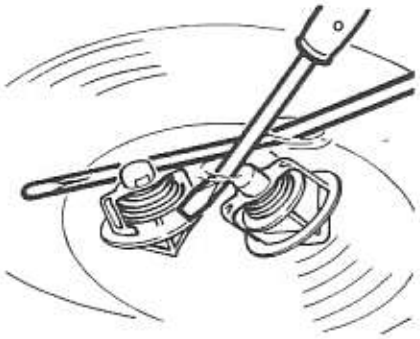


Fig. CO-7 Inspecting thermostat

If thermostat does not operate at the above specified temperature, it must be replaced because it cannot be repaired.

	Standard	For cold areas	For tropical areas
Valve opening temperature	82°C (180°F)	88°C (190°F)	76.5°C (170°F)
Max. valve lift	above 8 mm at 95°C (0.315 in at 203°F)	above 8 mm at 100°C (0.315 in at 212°F)	above 8 mm at 90°C (0.315 in at 194°F)

Note: It is necessary to check a new thermostat before installing it in the engine.

RADIATOR

The radiator is a conventional down flow type having top and bottom tanks to distribute the coolant flow uniformly through the vertical tube of radiator core.

The radiator filler cap is designed to maintain a pre-set pressure (0.9 kg/cm^2, 13 psi) above atmospheric pressure.

The relief valve consisting of a blow-off valve and a vacuum valve, helps to prevent the coolant from boiling by giving pressure to it. However, when the pressure is reduced below atmospheric pressure, the vacuum valve allows air to re-enter the radiator preventing the formation of a vacuum in the cooling system. The bottom tank on cars equipped with automatic transmission incorporates an oil cooler for the transmission fluid.

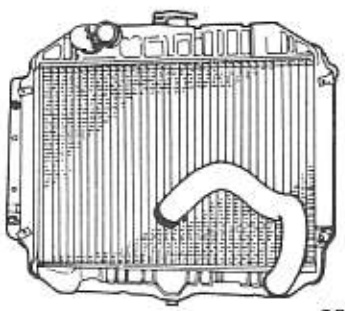


Fig. CO-8 Radiator for manual transmission

REMOVAL AND INSTALLATION

1. Drain coolant into a clean container.
2. Remove front grille. (except for the model S30 series)
3. Disconnect radiator's upper and lower hoses.
4. Remove hose connecting radiator to reservoir tank. (The reservoir tank is provided with only the model 230 series.)
5. On a vehicle with automatic transmission (except for the model HGC110 series), disconnect cooler inlet and outlet lines from radiator.
6. Remove radiator retaining bolts and then remove radiator upward.
7. Install radiator in the reverse sequence of removal.

INSPECTION

Radiator cap should be checked for working pressure at regular tune up intervals. First, check rubber seal on cap for tears, cracks or deterioration after cleaning it. Then, install radiator cap on a tester. If cap does not hold or will not release at the specified pressure, replace cap.

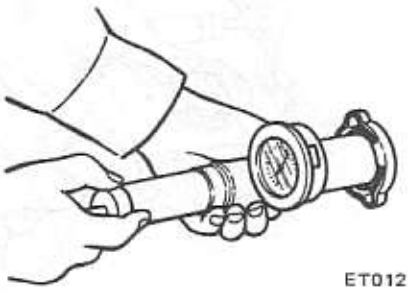


Fig. CO-9 Testing radiator cap

Also, inspect radiator for water leakage using cap tester and applying a pressure of 1.6 kg/cm^2 (22.8 psi).

If a defect is detected, repair or replace radiator.

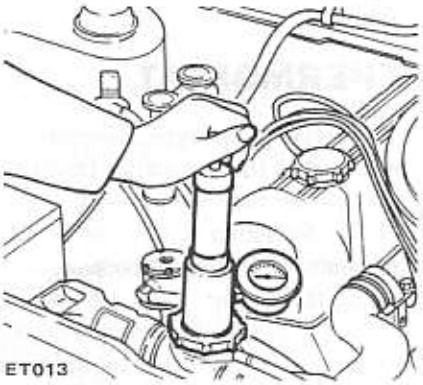
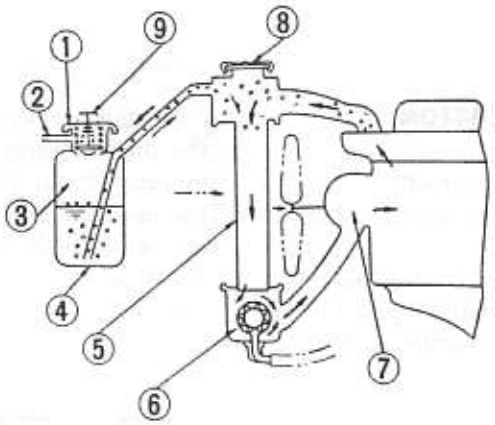


Fig. CO-10 Testing cooling system pressure



1 Pressure valve
2 Overflow pipe
3 Expanded part
4 Reservoir tank
5 Radiator
6 Oil cooler
7 Water pump
8 Cap for water supply
9 Push button

CO031

Fig. CO-11 Structural view of cooling system with reservoir tank

SPECIFICATIONS

	Model	230		HGC110	S30
	Engine	L20A	L26	L24	L26 (Twin carb.)
Radiator	Dimension of core (Height x Width x Thickness) mm (in)	395 x 558 x 32 (15.6 x 22.0 x 1.3)	410 x 614 x 32 (16.1 x 24.2 x 1.3)	376 x 474 x 38 (14.8 x 18.7 x 1.5)	350 x 600 x 49 (13.8 x 23.6 x 1.9)
	Type	Corrugated fin and tube			
	Fin pitch mm (in)	2.3 (0.09)		1.8 (0.07)	2.9 (0.114)
	Cap working pressure kg/cm^2 (psi)	0.9 (13)			
	Testing pressure kg/cm^2 (psi)	1.6 (23)			
	Water capacity (including engine) ℓ (U.S. qt., Imp. qt.)	9.0 (9½, 7⅞)		10.0 (10⅝, 8¾)	9.4 (10, 8 ¼)
	Reservoir tank	Installed		Not installed	
Fan	Tem-patrol	Not installed			Installed
	No. of blade x outer dia. mm (in)	4 x 350 (13.8)			8 x 450 (17.72)

TROUBLE DIAGNOSES AND CORRECTIONS

Condition	Probable cause	Corrective action
Loss of water	Damaged radiator seams.	Repair.
	Leaks at heater connections or plugs.	Repair.
	Leak at water temperature gauge.	Tighten.
	Loose joints.	Tighten.
	Defective cylinder head gasket.	Replace. Check engine oil for contamination and refill as necessary.
	Cracked cylinder block.	Replace. Check engine oil in crankcase for mixing with water by pulling oil level gauge.
	Cracked cylinder head.	Replace.
	Loose cylinder head bolts.	Tighten.
Poor circulation	Restriction in system.	Check hoses for crimps, and clear the system of rust and sludge by flushing radiator.
	Insufficient coolant.	Replenish.
	Inoperative water pump.	Replace.
	Loose fan belt.	Adjust.
	Inoperative thermostat.	Replace.
Corrosion	Excessive impurity in water.	Use soft, clean water. (rain water is satisfactory).
	Infrequent flushing and draining of system.	Cooling system should be drained and flushed thoroughly at least twice a year. Permanent antifreeze (Ethylene glycol base) can be used throughout the seasons of a year, and exchange every 40,000 km (24,000 miles).
Overheating	Faulty thermostat.	Replace.
	Radiator fin choked with mud, chaff, etc.	Clean out air passage thoroughly by using air pressure from engine side of radiator.
	Incorrect ignition and valve timing.	Adjust.
	Dirty oil and sludge in engine.	Refill.
	Inoperative water pump.	Replace.
	Loose fan belt.	Adjust.
	Restricted radiator.	Flush radiator.
	Inaccurate temperature gauge.	Replace.
	Impurity in water.	Use soft, clean water.
Overcooling	Faulty thermostat.	Replace.
	Inaccurate temperature gauge.	Replace.