

# SERVICE MANUAL

**MODEL  
L14, L16 & L18 SERIES  
ENGINES**



**NISSAN MOTOR CO., LTD.**  
TOKYO, JAPAN

## SECTION CO

# COOLING SYSTEM

CO

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# COOLING SYSTEM

## COOLING SYSTEM

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### DESCRIPTION

The cooling system is of the conventional pressure type. A centrifugal pump built the front cover 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 rises 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 reached normal operating temperature, the coolant circulates through the radiator.

### CAUTION:

To avoid serious personal injury, never remove radiator cap quickly when the engine is hot. Sudden release of cooling system pressure is very dangerous.

If it is necessary to remove the radiator cap when the radiator is hot, turn the cap slowly counterclockwise to first stop. After all pressure in cooling system is released, then turn the cap past the stop and remove it.

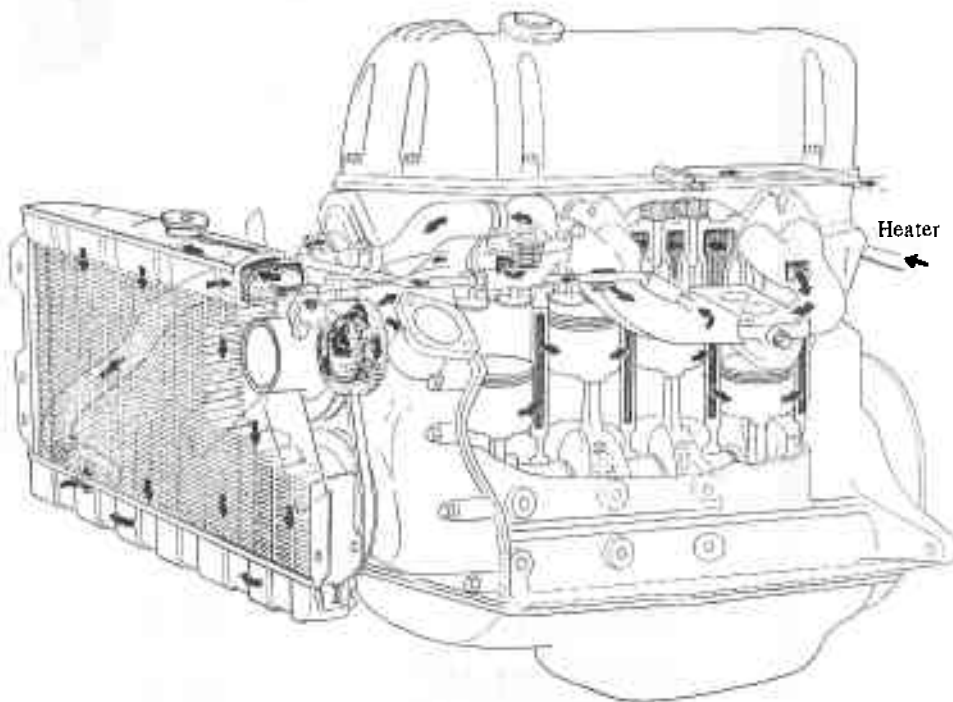


Fig. CO-1 Cooling system

### Coolant level

The radiator coolant level should be checked and maintained 30 mm (1.181 in) below the bottom of the

filler neck when the engine is cold. The expansion and contraction of the coolant will cause the level to drop by overflow.

### Draining and flushing the cooling system

To drain the cooling system remove the radiator cap, release the drain cock at the bottom of the radiator and a drain plug on the right side of the cylinder block. If the heater system is installed, set the heater temperature control valve at open position.

After the coolant is drained completely, close the drain cock and plug and refill the system with clean water.

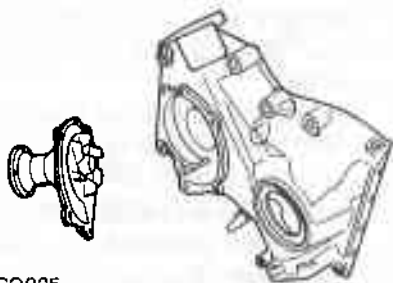
### WATER PUMP

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.

# COOLING SYSTEM

The pump shaft is supported by a double row ball bearing press fit in an aluminum die cast pump body. The bearings are permanently lubricated and sealed to prevent loss of lubricant 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 lower tank by a hose.

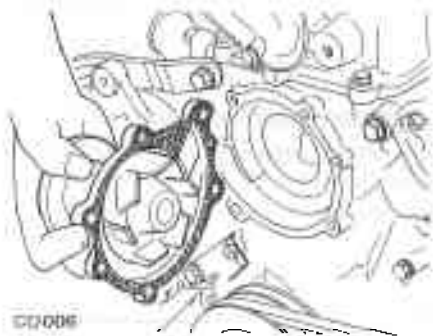


CO005

Fig. CO-2 Water pump and front cover

## Removal

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



CO006

Fig. CO-3 Removing water pump

## Disassembly

The water pump is made of aluminum, and its bearing outer race is press fit. For this reason, the body, shaft bearing should not be disassembled.

## Inspection

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

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

**Note:** Excessive bearing noise or squeak occurs when engine running, resulting from the above cause. In this case, use NPSL (Nissan water pump seal lubricant) to prevent squeak.

## Installation

1. Make sure to clean the gasket surfaces on pump and front cover. Always use new gasket when installing pump assembly. Be sure to tighten bolts uniformly.
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.

## Fan belt adjustment

The fan belt should be properly adjusted at all time. A tight belt serves wear of alternator and water pump bearings. A loose belt cause improper cooling fan, water pump and alternator operation.

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

Slackness of fan belt:

8 to 12 mm

(0.31 to 0.47 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.

## FLUID COUPLING

On the models with the air conditioner, the water pump equips with a fluid coupling which limits a

maximum fan speed of approximately 3,000 rpm. This mechanism uses the viscosity change of silicon oil enveloped in the coupling with engine. Consequently, the power loss and noise at high engine speeds can be eliminated.



CO007

Fig. CO-4 Fluid coupling

## Inspection

1. If a malfunction due to foreign matters, or sticking due to deteriorated oil is detected, disassemble coupling fan for interior cleaning.

**Note:** Wash coupling with clean solvent. In this case, take care to keep rubber seal away from solvent.

2. Check oil for gelatinized condition (a phenomenon of oil enriched by semi-solid form). Change such oil since enriched oil will make bearings and grooves sticky. At the same time, examine the condition of seal and bearing thoroughly. A blackened seal or bearings require the replacement of coupling assembly.
3. Check oil leaks because it will cause the overheat of engine by racing fan. In this case, replace water pump assembly with fluid coupling.

## Lubrication

The specified silicon oil should be used.

Viscosity number: 700 CTS

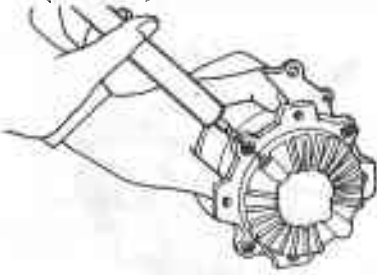
Part number: 21090 23000

If a malfunction is detected in fluid coupling, remove the cover of fluid coupling and clean its inner parts. After reassembling, it is necessary to refill with silicon oil of 11.5 cc (0.7 cu in) exactly, using a veterinary type injection syringe.

# COOLING SYSTEM

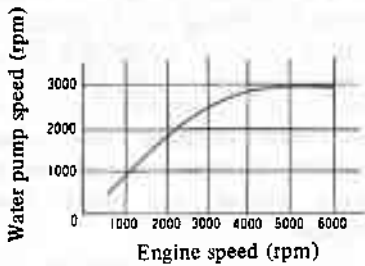
**Notes:**

- a. A suitable adhesive agent is to be used in assembling.
- b. Carry out oil injection slowly to help air escape.
- c. The quantity of silicon oil to be replenished must not exceed 5 cc (0.3 cu in).



CO008

Fig. CO-5 Lubricating fluid coupling



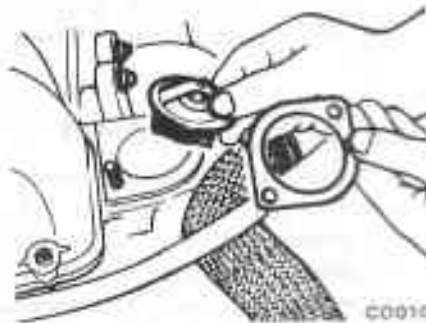
CO009

Fig. CO-6 Characteristic of fluid coupling

coolant temperature. The thermostats are designed to open and close at predetermined temperatures and if not operating properly should be removed and tested as listed 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 satisfactorily, reinstall, replacing with a new housing gasket.
5. Reinstall water outlet and tighten securing nuts.
6. Replenish coolant and check for leaks.

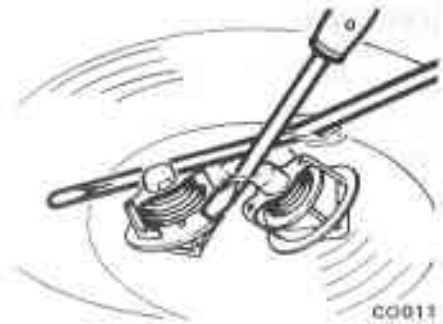


CO010

Fig. CO-7 Removing thermostat

the open position, the engine will warm up very slowly. If thermostat sticks in the closed position, overheating will result. Therefore, the thermostat should be inspected so as to make sure that it is in good condition.

1. Submerge thermostat in hot water 5°C (9°F) above the temperature specified in the following table.
2. Measure the lift height of valve by inserting a screwdriver marked at the point about 8 mm (0.315 in) from its tip.
3. Remove thermostat and place in water 5°C (9°F) below temperature stamped on the frame.
4. Under the above condition, valve should be closed completely. In this case, agitate water thoroughly.



CO011

Fig. CO-8 Inspecting thermostat

## THERMOSTAT

A wax pellet type thermostat is mounted in the thermostat housing at the cylinder head water outlet adjacent to the inlet manifold. The function of thermostat is to control the flow of coolant, facilitating fast engine warm up and regulating

## Inspection

A sticking thermostat will prevent the cooling system from functioning properly. If the thermostat sticks in

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

	Standard	For cold areas	For tropical areas
Valve opening temp.	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.

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## RADIATOR

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

The radiator filler cap is designed to maintain a pre-set pressure (0.9 kg/cm<sup>2</sup> 13 lb/in) above atmospheric pressure. The relief valve consisted of a blow-off valve and a vacuum valve, helps to prevent coolant loss from boiling for by raising the pressure on the coolant. On the contrary, as the pressure is reduced below atmospheric pressure the vacuum valve allows air to re-enter the radiator, preventing the formation of vacuum in the cooling system.

The bottom tank on cars equipped with the automatic transmission incorporates an oil cooler for the transmission fluid.

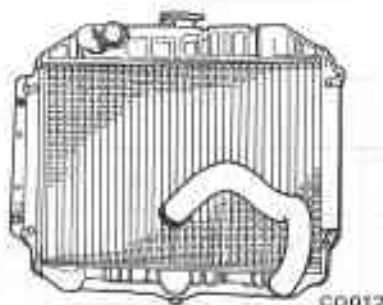


Fig. CO-9 Radiator for manual transmission

## Removal and installation

1. Drain coolant into a clean container.
2. Remove front grille.
3. Disconnect radiator upper and lower hoses. On a vehicle with automatic transmission, disconnect cooler inlet and outlet lines from radiator.

4. Remove bolts retaining radiator from radiator side supports and remove radiator upwards.

5. Install radiator in reverse sequence of removal.

## Inspection

Radiator cap should be checked for 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 pressure or will not release at the proper pressure, replace cap.

Also, inspect radiator for water leakage using the cap tester under applying a pressure of 1.2 kg/cm<sup>2</sup> (17 lb/sq in). If such the defect is detected, repair or replace radiator.

## SERVICE DATA AND SPECIFICATIONS

Fan belt slackness	mm (in)/kg (lb) ..... 8 to 12 (0.31 to 0.47)/10 (22)		
Fluid coupling			
Silicon oil:			
Viscosity number	..... 700 CTS		
Capacity	cc (cu in) ..... 11.5 (0.7)		
Thermostat			
	Standard	For cold areas	For tropical areas
Valve opening temp.	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)

## COOLING SYSTEM

	510			610	
	L14	L16		L16 and L18	
	Manual Transmission	Manual Transmission	Automatic Transmission	Manual Transmission	Automatic Transmission
Dimension of radiator cover					
height x width x thickness mm (in)	280 x 488 x 38 (11.0 x 19.2 x 1.496)	←	←	360 x 502 x 32 (14.2 x 19.8 x 1.260)	←
Type	Corrugated fin type	←	←	←	←
Radiator fin pitch mm (in)	2.3 (0.0906)	2.1 (0.0827)	←	2.9 (0.1142)	2.5 (0.0984)
Cap working pressure kg/cm <sup>2</sup> (lb/sq in)	0.9 (13)	←	←	←	←
Cooling system capacity					
Less heater	6.4 ℓ (1 3/4 U.S. gal.) (1 3/8 Imper. gal.)	←	←	6.0 ℓ (1 3/8 U.S. gal.) (1 3/8 Imper. gal.)	←
With heater	6.8 ℓ (1 3/4 U.S. gal.) (1 1/2 Imper. gal.)	←	←	6.5 ℓ (1 3/4 U.S. gal.) (1 3/8 Imper. gal.)	←

## TROUBLE DIAGNOSES AND CORRECTIONS

Condition	Probable cause	Corrective action
Loss water	Coolant filled up radiator. Damaged radiator seams. Excessive wear in water pump. Leakes at heater connections or plugs. Leak at water temperature gauge. Loose joints.	Do not fill up coolant to top of filler neck while cold. Repair. Replace. Repair. Tighten. Tighten.

## COOLING SYSTEM

Condition	Probable cause	Corrective action
	<p>Defective cylinder head gasket.</p> <p>Cracked cylinder block.</p> <p>Cracked cylinder head.</p> <p>Loose cylinder head bolts.</p>	<p>Replace.</p> <p>Check engine oil for contamination and refill as necessary.</p> <p>Replace.</p> <p>Pull engine oil level gauge to check for water in crankcase.</p> <p>Replace.</p> <p>Tighten.</p>
Poor circulation	<p>Restriction in system.</p> <p>Insufficient coolant.</p> <p>Inoperative water pump.</p> <p>Loose fan belt.</p> <p>Inoperative thermostat.</p>	<p>Check hoses for crimps, reverse flush radiator, and clear the system of rust and sludge.</p> <p>Replenish.</p> <p>Replace.</p> <p>Adjust.</p> <p>Replace.</p>
Corrosion	<p>Excessive impurity in water.</p> <p>Infrequent flushing and draining of system.</p>	<p>Use soft, clean water. (rain water is satisfactory).</p> <p>Cooling system should be drained and flushed thoroughly at least twice a year. [Nissan long life coolant (L.L.C.) can be used throughout the seasons of a year, and exchange every two years or total running mileage of 40,000 km (24,000 miles)].</p>
Over heating	<p>Defective thermostat.</p> <p>Radiator fins choked with mud, chaff, etc.</p> <p>Incorrect ignition and valve timing.</p> <p>Dirty oil and sludge in engine.</p> <p>Inoperative water pump.</p> <p>Loose fan belt.</p> <p>Restricted radiator.</p> <p>Inaccurate temperature gauge.</p> <p>Impurity in water.</p>	<p>Replace.</p> <p>Clean out air passage thoroughly by using air pressure from engine side of radiator.</p> <p>Adjust.</p> <p>Refill.</p> <p>Replace.</p> <p>Adjust.</p> <p>Flush radiator.</p> <p>Replace.</p> <p>Use soft, clean water.</p>
Over cooling	<p>Defective thermostat.</p> <p>Inaccurate temperature gauge.</p>	<p>Replace.</p> <p>Replace.</p>