

# SERVICE MANUAL

**MODEL**  
**A10 & A12**  
**ENGINE**



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

## SECTION CO

### COOLING SYSTEM

**CO**

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# COOLING SYSTEM

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## DESCRIPTION

The cooling system is of the conventional pressure type. A centrifugal pump installed on the timing chain 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.

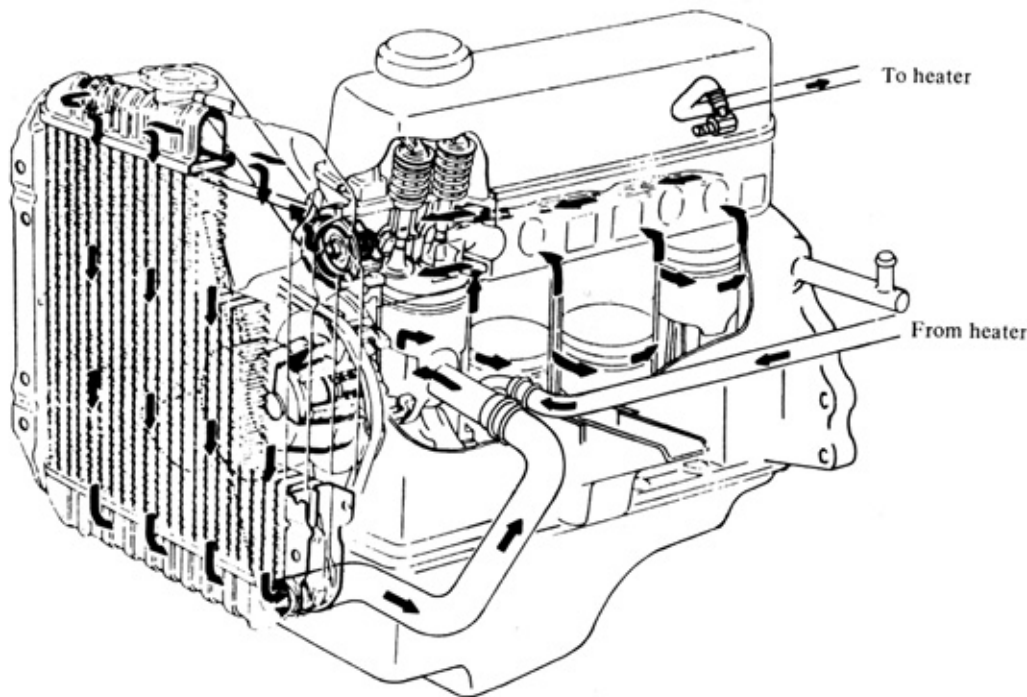
The higher pressure raises the boiling point of the coolant and increases the cooling efficiency of the radiator.

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

When the thermostat is closed, the

coolant remains in the cylinder head and block for swift warming up of the engine. After it reaches normal operating temperature, the coolant circulates through the radiator.

On the F10 models, the cooling fan drive is separated from the engine and is driven by an electric motor.



CO050

*Fig. CO-1 Cooling system*

## COOLANT LEVEL

The coolant should be checked and maintained at a level 50 mm (1.97 in) below the upper face of radiator filler neck, when the engine is cold.

**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 first step. After all pressure in cooling system is released, turn cap passing stop and remove it.

## DRAINING AND FLUSHING THE COOLING SYSTEM

To drain cooling system, remove radiator cap, release drain cock at bottom of radiator and drain plug on left side of cylinder block. If heater system is installed, set heater control valve to open position. After coolant is drained completely, close drain cock and plug and refill the system with a good anti-freeze solution such as Nissan Long Life Coolant (L.L.C.) or clean soft water.

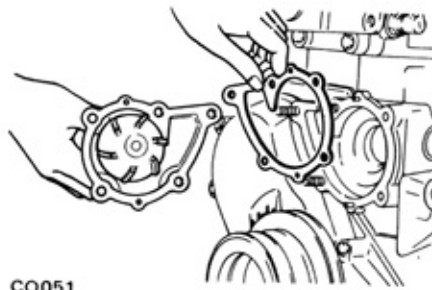
**Note:** If there is a trace of leakage in cooling system, pour N.C.S. (Nissan Cooling System) Sealer into radiator through filler opening.

## WATER PUMP

### REMOVAL AND INSTALLATION

#### Removal

1. Drain coolant into a clean container.
2. Remove radiator shroud if necessary.
3. Loosen belt, then remove fan blade (except F10), spacer and pulley from hub.
4. Remove pump assembly and gasket from front cover.



CO051

Fig. CO-2 Removing water pump

### Installation

1. Be sure to clean gasket surfaces in contact with pump and front cover. Always use new gaskets when installing pump assembly. Be sure to tighten bolts.

Tightening torque:  
0.9 to 1.4 kg-m  
(6.5 to 10 ft-lb)

2. Fill cooling system and check for leaks at pump.
3. Install fan pulley and fan blade if equipped, and tighten attaching bolts securely. Install belt and adjust to specified tension.
4. Operate engine at fast idle and re-check for leaks.
5. Install fan shroud if removed.

**Note:** Ensure that clearance between shroud and fan is even at any place.

### 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 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.

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

Fan belt slackness:

When alternator is on distributor side:

12 to 16 mm  
(0.47 to 0.63 in)

When alternator is on manifold side:

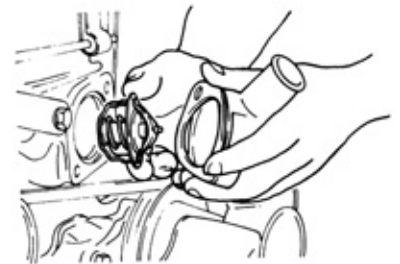
8 to 12 mm  
(0.31 to 0.47 in)

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

## THERMOSTAT

### REMOVAL AND INSTALLATION

1. Partially drain coolant.
2. Disconnect upper radiator hose at water outlet.
3. Remove bolts and remove water outlet, gasket, and thermostat from thermostat housing.



CO044

Fig. CO-3 Removing thermostat

4. After checking thermostat, re-install with a new gasket.
5. Reinstall water outlet.
6. Replenish coolant and check for leaks.

## INSPECTION

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

1. Measure coolant temperature when thermostat valve starts to open.
2. Measure maximum lift of thermostat valve.

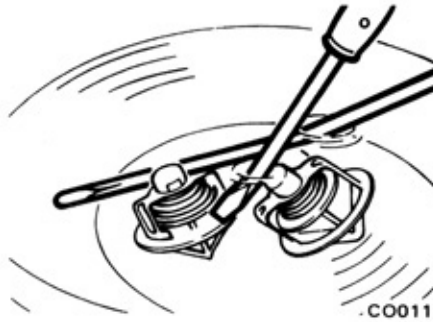


Fig. CO-4 Inspecting thermostat

	Standard	Cold areas	Tropical areas
Valve opening temperature °C (°F)	80.5 to 83.5 (177 to 183)	86.5 to 89.5 (187 to 193)	75 to 78 (167 to 172)
Maximum valve lift mm/°C (in/°F)	8/95 (0.31/203)	8/100 (0.31/212)	8/90 (0.31/194)

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

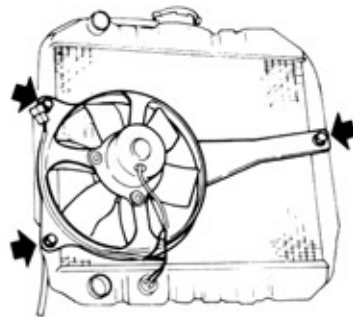


Fig. CO-5 Removing fan motor assembly (For F10 models)

## RADIATOR

### REMOVAL AND INSTALLATION

1. Drain coolant into a clean container.
2. Disconnect upper and lower radiator hoses.
3. Remove fan shroud retaining bolts and remove fan shroud, if equipped.

On F10 models, remove fan motor assembly retaining bolts and lift fan motor assembly out.

4. Remove radiator grille if necessary.
5. Remove radiator retaining bolts and then lift radiator out.
6. Install radiator in reverse sequence of removal.

#### Notes:

- a. Be careful not to damage radiator fins and core tube when installing.
- b. When installing hoses, insert them in their positions until they bottom.

## INSPECTION

### Radiator filler cap

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 specified pressure, replace cap.

Cap relief pressure:  
0.9 kg/cm<sup>2</sup> (13 psi)



Fig. CO-6 Testing radiator cap

### Cooling system pressure test

Inspect radiator for leakage using cap tester and applying a pressure of 1.6 kg/cm<sup>2</sup> (22.8 psi).

If a leakage is detected, repair or replace cooling system.

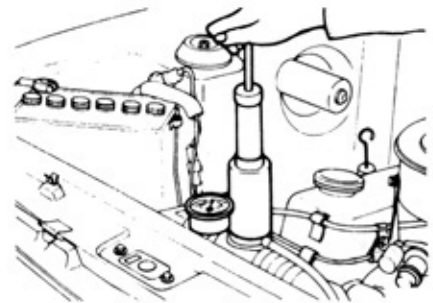


Fig. CO-7 Testing cooling system pressure

### Inspection of radiator core

Check radiator core for oil, dirt and other foreign matter. Clean as necessary to maintain cooling efficiency.

### Checking cooling system hoses and connections

Check hoses and fittings for loose connections or deterioration. Retighten or replace if necessary.

## SPECIFICATIONS

### Thermostat

		Standard	For cold areas	For tropical areas
Valve opening temperature	°C (°F) .....	80.5 to 83.5 (177 to 183)	86.5 to 89.5 (187 to 193)	75 to 78 (167 to 172)
Maximum valve lift	mm/°C (in/°F) .....	8/95 (0.31/203)	8/100 (0.31/212)	8/90 (0.31/194)

### Radiator

Type .....	Corrugated fin type
Cap relief pressure	kg/cm <sup>2</sup> (psi) .....

0.9 (13)

### Cooling system

Leakage testing pressure	kg/cm <sup>2</sup> (psi) .....	1.6 (22.8)	
Capacity	liters (U.S. qt, Imp. qt)	With heater	Without heater
F10	Standard .....	5.4 (5 3/4, 4 3/4)	4.8 (5 1/8, 4 1/4)
	Optional (For tropical) .....	5.8 (6 1/8, 5 1/8)	5.2 (5 1/2, 4 5/8)
B210	Standard .....	5.1 (5 3/8, 4 1/2)	4.4 (4 3/8, 3 3/8)
	Optional (For tropical) .....	5.5 (5 3/8, 4 3/8)	4.8 (5 1/8, 4 1/4)
B120	Standard .....	4.9 (5 3/16, 4 5/16)	4.3 (4 1/2, 3 3/4)
	Optional (For tropical) .....	5.4 (5 3/4, 4 3/4)	4.8 (5 1/8, 4 1/4)

### Fan

Number of blades		
x outer diameter	mm (in)	
F10 .....	6 x 220 (8.7)	
B210	Standard .....	4 x 310 (12.2)
	Optional (For tropical) .....	4 x 330 (13.0)
B120	Standard .....	4 x 310 (12.2)
	Optional (For tropical) .....	4 x 330 (13.0)

### Fan motor (F10 only)

Capacity .....	12V-85W
Number of revolutions	rpm .....

2,500

## TROUBLE DIAGNOSES AND CORRECTIONS

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