

SERVICE MANUAL

MODEL J13, J15 & J16 SERIES ENGINES

SECTION CO

COOLING SYSTEM

DESCRIPTION

The cooling system is of a conventional pressure type. A centrifugal pump, installed on the cylinder block, serves to circulate the coolant. The pressure type radiator filler cap is installed on the radiator and maintains

the cooling system at a constant atmospheric pressure. The higher pressure raises the boiling point of the coolant and increases the cooling efficiency of the radiator. When the thermostat closes, 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.

CO

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COOLING SYSTEM

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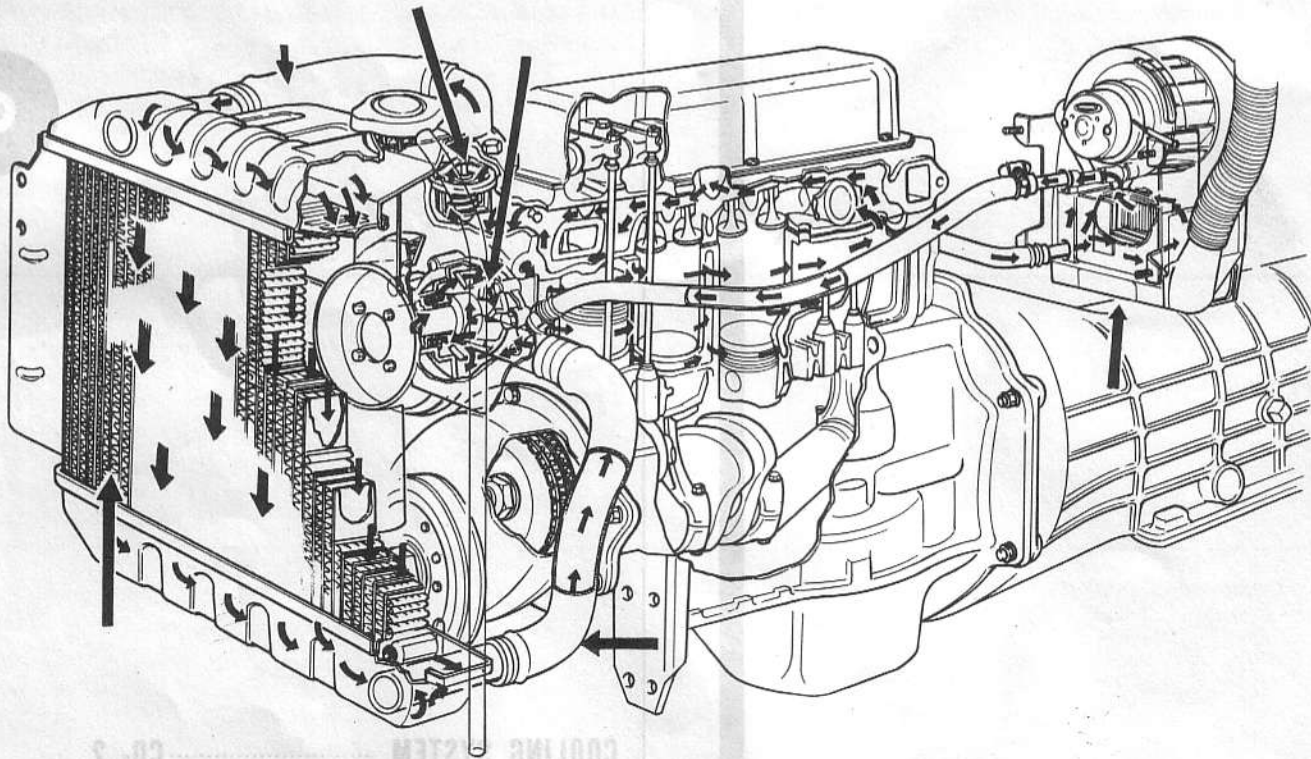
DESCRIPTION

The cooling system is of a conventional pressure type. A centrifugal pump, installed on the cylinder block, serves to circulate the coolant. The pressure type radiator filler cap is installed on the radiator and 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 normal operating temperature, the coolant circulates through the radiator.



CO032

Fig. CO-1 Cooling system

COOLANT LEVEL

The coolant level should be checked and maintained above the baffle plate of the radiator upper tank.

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 the cap slowly counterclockwise to the first stop. After all pressure in the cooling system is released, turn cap passing the stop and remove it.

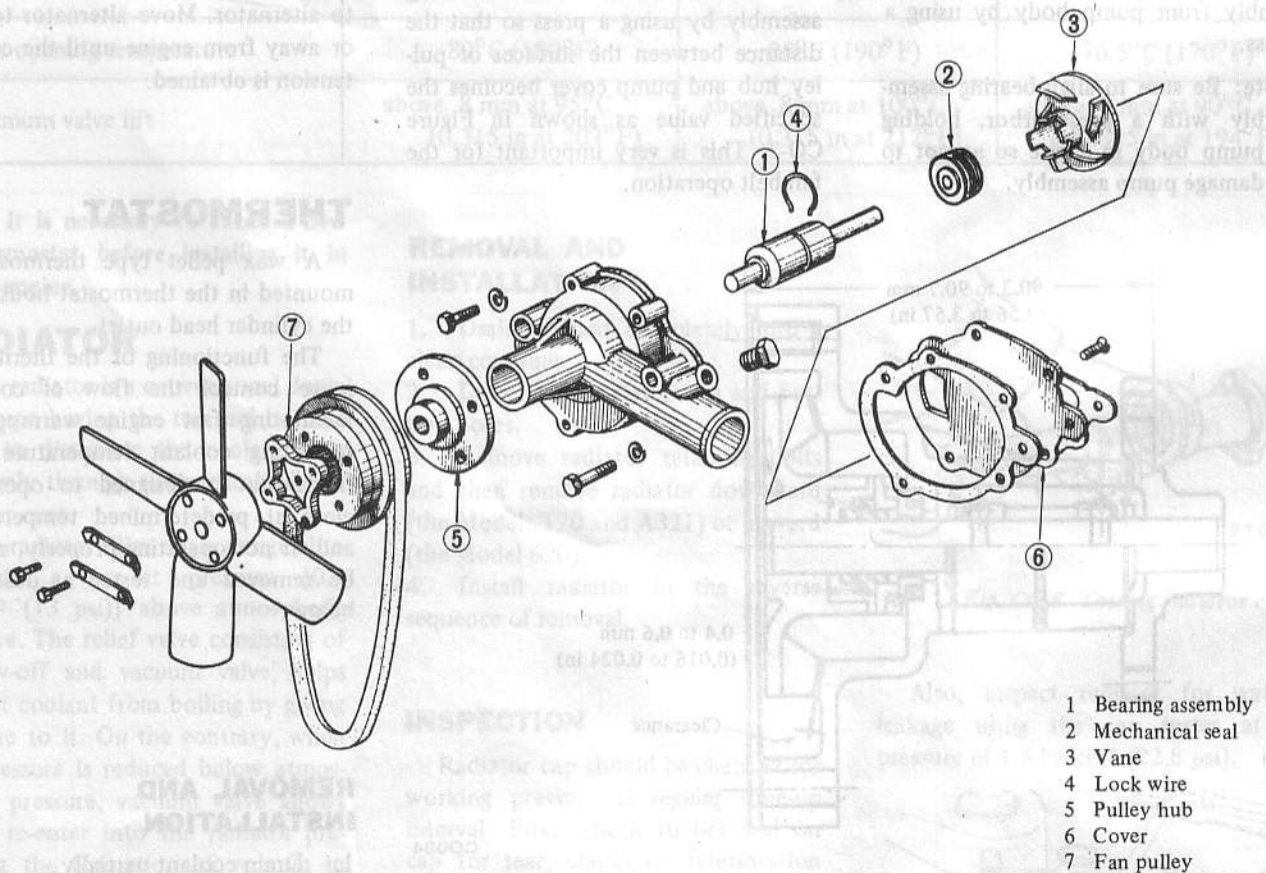
DRAINING AND FLUSHING THE COOLING SYSTEM

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 the 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 cylinder block. 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 the pump body. A mechanical seal is seated in the water pump body between the vane and bearing assembly.

The pump contains an impeller that turns on a steel shaft which rotates in the ball bearing. The inlet of the pump is connected to the radiator's lower tank by a hose.



CO033

Fig. CO-2 Exploded view of water pump

REMOVAL AND INSTALLATION

Removal

1. Drain coolant completely into a clean container.
2. Loosen belt, and then remove fan blade and pulley from hub.
3. Disconnect inlet hose from water

pump.
4. Remove pump assembly and gasket from cylinder block.

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

Installation

1. Be sure to clean the gasket surfaces in contact with pump and cylinder block. Always use new gasket when installing pump assembly.
2. After installing pump assembly, fill cooling system and check for leaks at pump.
3. Install fan pulley and fan blade,

Cooling System

and tighten fixing bolts securely.

4. Install fan belt and adjust for proper tension.

DISASSEMBLY AND ASSEMBLY

Disassembly

1. Remove cover and gaskets from pump body.
2. Remove hub by using a puller. In this case, be careful not to damage cast-iron hub.
3. Carefully remove cast-iron vane by using a puller.
4. Pull out lock wire with a screwdriver, and then take off bearing assembly from pump body by using a press.

Note: Be sure to align bearing assembly with a press arbor, holding pump body in a vise so as not to damage pump assembly.

5. Remove mechanical seal from pump body.

Assembly

1. Install bearing assembly into pump body by applying pressure to outer race, after fitting mechanical seal into pump body. Be sure to use new seal when assembling water pump.
2. Insert lock wire into the groove of bearing through the slit of pump body to fix bearing assembly.
3. Install vane on shaft of bearing assembly by using a press so that the correct clearance between the vane tip and pump body is obtained as shown in Figure CO-3.
4. Install hub on shaft of bearing assembly by using a press so that the distance between the surfaces of pulley hub and pump cover becomes the specified value as shown in Figure CO-3. This is very important for the fan belt operation.

4. Inspect mechanical seal for wear or damage.

Adjustment

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

Check the fan belt slack between alternator and fan pulley by 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.

THERMOSTAT

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

The functioning of the thermostat is to control the flow of coolant, facilitating fast engine warmup 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 top hose at water outlet.
3. Loosen two securing bolts and then remove water outlet, gasket and thermostat from thermostat housing.
4. After checking thermostat, re-install with a new housing gasket in place.
5. Reinstall thermostat, gasket and water outlet and then tighten securing bolts.
6. Replenish coolant and check for leaks.

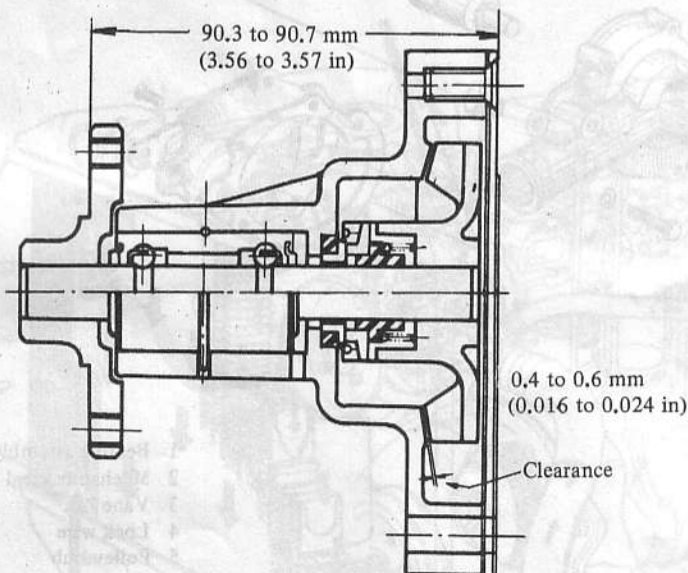


Fig. CO-3 Sectional view of water pump

INSPECTION AND ADJUSTMENT

Inspection

If any of the following conditions is found, replace defective parts with new ones.

1. Wash all parts except for bearing assembly and rubber sealing parts in cleaning solvent.

Note: Bearing assembly is of a permanent sealed and lubricated type and must not be washed in cleaning solvent.

2. Inspect respective component parts for cracks or excessive wear.
3. Inspect bearing assembly for roughness or excessive end play. Clean off rust or scale on the shaft or outer race of bearing assembly.

INSPECTION

A stuck 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 for condition.

1. Submerge thermostat in hot

water 5°C (9°F) above the temperature specified in the following table.

2. Put a mark on a screwdriver at about 8 mm (0.315 in) from the tip, and check the lift of valve by inserting this screwdriver.

3. Now, place thermostat in water 5°C (9°F) below the specified temperature. Under the above condition, valves should be closed completely.

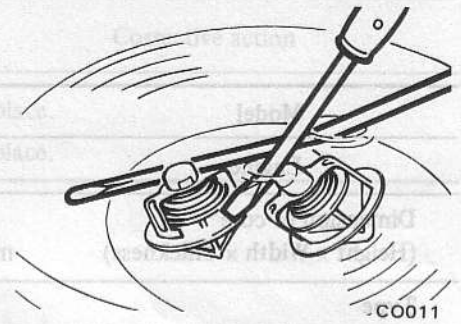


Fig. CO-4 Inspecting thermostat

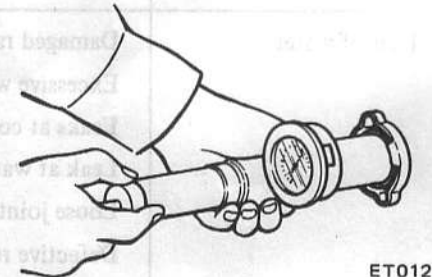
If thermostat does not operate at the above specified temperature, it must be replaced because it can not be repaired.

	Standard	For cold areas	For tropical areas
Valve opening temperature	82°C (180°F)	88°C (190°F)	76.5°C (170°F)
Maximum 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.

REMOVAL AND INSTALLATION

1. Drain coolant completely into a clean container.
2. Disconnect radiator top and bottom hoses.
3. Remove radiator retaining bolts and then remove radiator downward (the Models T20 and A321) or upward (the Model 620).
4. Install radiator in the reverse sequence of removal.



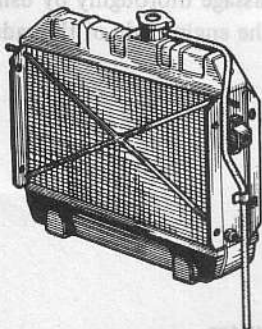
ET012

Fig. CO-6 Testing radiator cap

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 radiator core.

The radiator filler cap is designed to maintain a pre-set pressure [0.9 kg/cm² (13 psi)] above atmospheric pressure. The relief valve consisting of a blow-off and vacuum valve, helps prevent coolant from boiling by giving pressure to it. On the contrary, when the pressure is reduced below atmospheric pressure, vacuum valve allows air to re-enter into the radiator preventing the formation of vacuum in the cooling system.



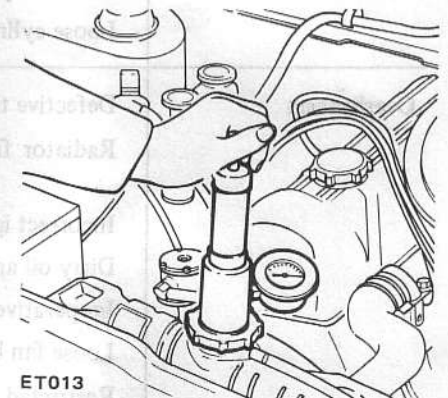
CO035

Fig. CO-5 Radiator

INSPECTION

Radiator cap should be checked for working pressure at regular tune-up interval. First, check rubber seal on cap for tear, 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.

Also, inspect radiator for water leakage using the cap tester at a pressure of 1.6 kg/cm² (22.8 psi).



ET013

Fig. CO-7

If the above defect is detected, repair or replace radiator.

Cooling System

SPECIFICATIONS

Model		T20	620	A321
Engine		J16	J13 & J15	J13 & J15
Dimension of core (Height x Width x Thickness)	mm (in)	330 x 446 x 49 (13.0 x 17.6 x 1.9)	330 x 446 x 32 (13.0 x 17.6 x 1.3)	300 x 488 x 49 (11.8 x 19.2 x 1.9)
Type		Corrugated fin and tube		
Fin pitch	mm (in)	2.1 (0.0827)	2.9 (0.1142)	2.5 (0.0984)
Cap working pressure	kg/cm ² (psi)	0.9 (13)		
Testing pressure	kg/cm ² (psi)	1.6 (23)		
Water capacity liters (U.S.gal., Imper. gal.)	without heater	5.5 (1 1/2, 1 1/4)	5.4 (1 3/8, 1 1/2)	6.3 (1 5/8, 1 3/4)
	with heater	6.5 (2 3/4, 1 3/8)	6.0 (1 5/8, 1 3/8)	7.2 (1 7/8, 1 5/8)
Fan outer dia. [mm (in)] x No. of blades		340 (13.4) x 4	310 (12.2) x 4	340 (13.4) x 4

TROUBLE DIAGNOSES AND CORRECTIONS

Condition	Probable cause	Corrective action
Loss of water	Damaged radiator seams.	Repair.
	Excessive wear in water pump.	Replace.
	Leaks at connections of heater hoses.	Repair.
	Leak at water temperature gauge.	Tighten.
	Loose joints.	Tighten.
	Defective rubber hoses.	Replace.
	Defective cylinder head gasket.	Replace. Check engine oil for contamination and refill as necessary.
	Cracked cylinder block.	Replace. Pull out and see engine oil level gauge to check for water in crankcase.
Overheating	Cracked cylinder head.	Replace.
	Loose cylinder head bolts.	Tighten.
	Defective thermostat.	Replace.
	Radiator fins choked with mud, chaff, etc.	Clean out air passage thoroughly by using air pressure from the engine side of the radiator.
	Incorrect ignition and valve timing.	Adjust.
	Dirty oil and sludge in engine.	Refill.
	Inoperative water pump.	Replace.
	Loose fan belt.	Adjust.
Overheating	Restricted radiator.	Flush radiator.
	Inaccurate temperature gauge.	Replace.
	Impurity in water.	Use soft clean water.

Cooling System

Condition	Probable cause	Corrective action
Overcooling	Defective thermostat. Inaccurate temperature gauge.	Replace. Replace.

MODEL

J13, J15 & J16 SERIES

ENGINES

ENGINE FUEL

AIR CLEANER	EF-2
FUEL STRAINER	EF-2
FUEL PUMP MECHANICAL	EF-2
FUEL PUMP ELECTRIC	EF-4
TWO-BARREL CARBURETOR	EF-7