COOLING

CONTENTS

GENERAL SPECIFICATIONS

Cooling method	Water-cooling, forced circulation type
Radiator	
Type	Pressurized corrugated fin type
Performance kcal/h	43,600
Radiator cap	
High pressure valve opening pressure kPa (psi)	74-103 (11-15)
Vacuum valve opening pressure kPa (psi)	−5 or less (−0.7 or less)
Water pump	Centrifugal type impeller
Cooling fan	
Diameter mm (in.)	410 (16.1)
No. of blades	7
Fan clutch	
Type	Thermostatic controlled fluid coupling
Fan speed	2,750 ± 150 rpm at pulley speed of 4,000 rpm, 65°C (149°F) or higher 1,300 rpm at pulley speed of 4,000 rpm, 55°C (131°F) or lower
Thermostat	
Type	Wax pellet type with jiggle valve
Valve opening temperature	88°C (190°F)
Full-open temperature	100°C (212°F) at valve lift of 8 mm (.31 in.) or more
Identification mark	88 (stamped on flange)
Water temperature gauge unit	
Type	Thermistor type
Resistance	104 Ω at 70°C (158°F) 38 Ω at 100°C (212°F)
Drive belt	
Length mm (in.)	964 (37.95)
Automatic transmission oil cooler	
Performance kcal/h	1,200

SERVICE SPECIFICATION

	kPa (psi)
Service limit	
Opening pressure of radiator cap high pressure valve	65 (9.2)

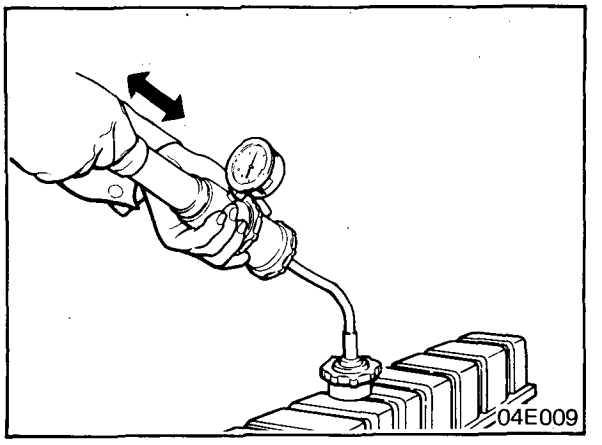
TORQUE SPECIFICATIONS	Nm (ft.lbs.)
Alternator to timing chain case	20-25 (14-18)
Brace to alternator	12-15 (8.5-11)
Water pump to timing chain case	12-14 (8.5-10.5)
Water temperature gauge unit	30-39 (22-28)
Radiator	
Radiator shroud to radiator (vehicles with a manual transmission)	3-7 (2-5)
Radiator shroud to radiator (vehicles with an automatic transmission)	8-11 (6-8)
Radiator to headlight support	8-11 (6-8)
Automatic transmission oil cooler	
Oil cooler tubes to transmission	20 (14)

LUBRICANT	lit. (U.S.qts., Imp. qts.)
Engine coolant	
Total quantity	8.0 (8.45, 7.04)
Quantity in reserve tank	0.65 (.69, .57)

Symptom	Probable cause	Remedy
Low coolant level	Leakage of coolant	
	Radiator	Repair or replace
	Heater or radiator hose	Tighten clamps or replace
	Thermostat housing gasket broken or bolts loose	Replace gasket or retighten
	Water pump gasket broken or bolts loose	Replace gasket or retighten
	Faulty radiator cap	Replace
Clogged radiator	Foreign material in coolant	Replace coolant
Abnormally high coolant temperature	Faulty thermostat	Replace
	Faulty radiator cap	Replace
	Restriction of flow in cooling system	Clear restriction
	Loose or slipping drive belt	Adjust tension or replace
	Faulty water pump	Replace
	Faulty temperature gauge or wiring	Repair or replace
Abnormally low coolant temperature	Faulty thermostat	Replace
	Faulty temperature gauge or wiring	Repair or replace

COOLANT LEAK CHECK

1. Loosen radiator cap.
2. Run the engine until coolant has warmed up enough so that the thermostat valve opens, and then stop the engine.
3. Confirm that the coolant level is up to the filler neck.
4. Install a radiator cap tester to the radiator filler neck and apply 160 kPa (23 psi) pressure, then check for leakage from the radiator, hoses or connections. (04E009)



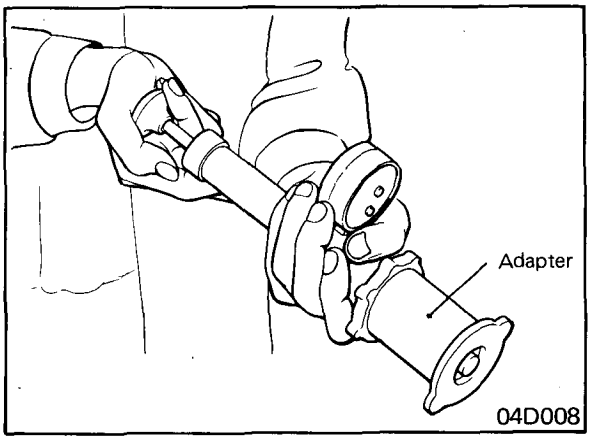
Caution
Be sure to completely clean away any moisture from the places checked.
When the tester is removed, be careful not to spill any coolant from it.
Be careful not to deform the radiator filler neck when installing and removing the tester and when testing.

5. If there is leakage, repair or replace the appropriate part.

RADIATOR CAP PRESSURE TEST

1. Use an adapter to attach the cap to the tester. (04D008)
2. Increase the pressure until the indicator of the gauge stops moving.
3. Check that the pressure level is maintained at or above the service limit for 5 to 6 seconds.
4. Replace the radiator cap if the reading does not remain at or above the service limit.

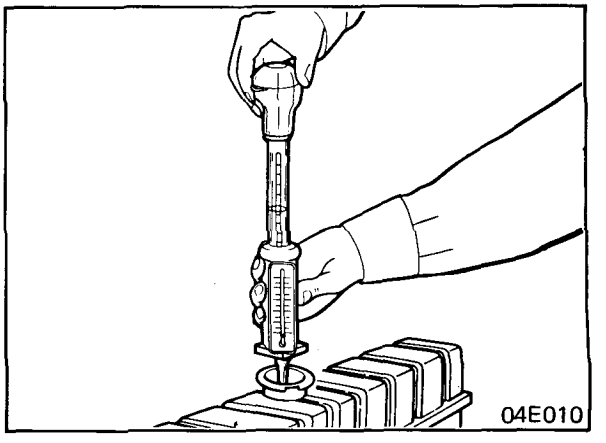
Opening pressure of radiator cap high pressure valve 65 kPa (9.2 psi)



NOTE
Be sure that the cap is clean before testing, since rust or other foreign material on the cap seal will cause an improper indication.

SPECIFIC GRAVITY TEST

1. Measure the specific gravity of the coolant with a hydrometer. (04E010)
2. Measure the coolant temperature and calculate the concentration from the relation between the specific gravity and temperature, using the following table for reference.



Relationship Between Antifreeze Concentration and Specific Gravity

The following table is applicable only to the specified antifreeze DIA-QUEEN LONG-LIFE COOLANT.

Coolant temperature °C (°F) and specific gravity					Freezing temperature °C (°F)	Safe operating temperature °C (°F)	Coolant concentration (Specific volume)
10 (50)	20 (68)	30 (86)	40 (104)	50 (122)			
1.037	1.034	1.031	1.027	1.023	–9 (15.8)	–4 (24.8)	20 %
1.045	1.042	1.038	1.034	1.029	–12 (10.4)	–7 (19.4)	25 %
1.054	1.050	1.046	1.042	1.036	–16 (3.2)	–11 (12.2)	30 %
1.063	1.058	1.054	1.049	1.044	–20 (–4)	–15 (5)	35 %
1.071	1.067	1.062	1.057	1.052	–25 (–13)	–20 (–4)	40 %
1.079	1.074	1.069	1.064	1.058	–30 (–22)	–25 (–13)	45 %
1.087	1.082	1.076	1.070	1.064	–36 (–32.8)	–31 (–23.8)	50 %
1.095	1.090	1.084	1.077	1.070	–42 (–44)	–37 (–35)	55 %
1.103	1.098	1.092	1.084	1.076	–50 (–58)	–45 (–49)	60 %

Example

The safe operating temperature is –15°C (5°F) when the measured specific gravity is 1.058 at the coolant temperature of 20°C (68°F).

Recommended Antifreeze

Antifreeze	Concentration
DIA-QUEEN LONG-LIFE COOLANT (Part No. 0103044) or HIGH QUALITY ETHYLENE GLYCOL ANTIFREEZE COOLANT	50%

Caution

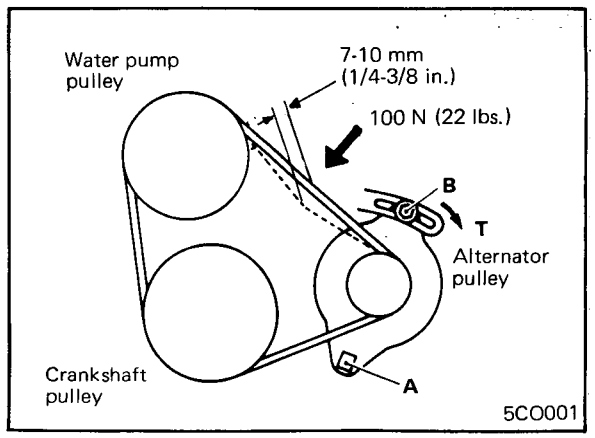
If the concentration of the antifreeze is below 20%, the anti-corrosion property will be adversely affected. In addition, if the concentration is above 60%, both the anti-freeze and engine cooling properties will decrease, affecting the engine adversely. For these reasons, be sure to maintain the concentration level within the specified range.

FAN BELT TENSION ADJUSTMENT

1. Loosen alternator support bolt "A" and brace bolt "B".
2. Move alternator in direction of arrow "T" to adjust belt tension to specifications.

Fan belt deflection	7-10 mm (.28-.39 in.)

3. Tighten bolt "B" and then tighten bolt "A".



Caution

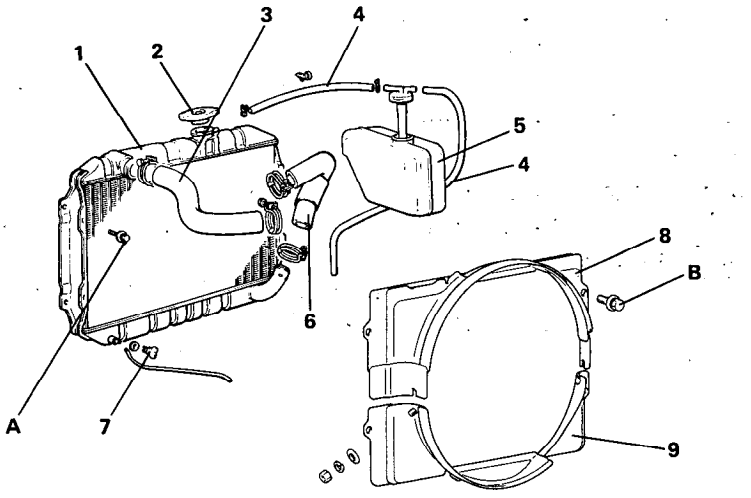
An over tensioned belt could cause not only premature wear of belt but also noise and damage to water pump bearing and alternator bearing.

A loose belt also could cause damage to the belt and failure of the alternator to generate enough power and consequently a rundown battery.

COMPONENTS

1. Radiator
2. Radiator cap
3. Radiator hose, upper
4. Overflow tube
5. Reserve tank
6. Radiator hose, lower
7. Drain plug
8. Upper shroud
9. Lower shroud

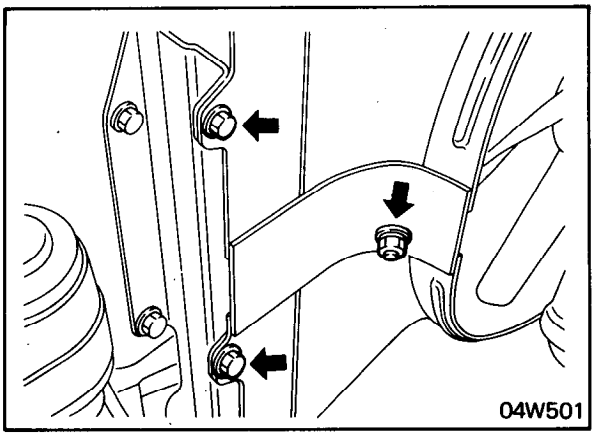
	Nm	ft.lbs.
A	8-11	6-8
B	3-7	2-5



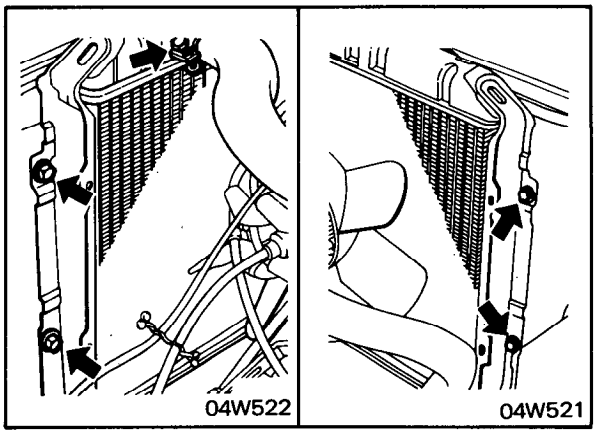
04W519

REMOVAL

1. Set the warm water flow control lever to the hot position.
2. Loosen the radiator drain plug to drain the coolant.
3. Disconnect the upper and lower hoses.
4. Remove the upper and lower shrouds. (04W501)



5. Remove the radiator mounting bolts. (04W522, 04W521)
6. Remove the radiator.



INSPECTION

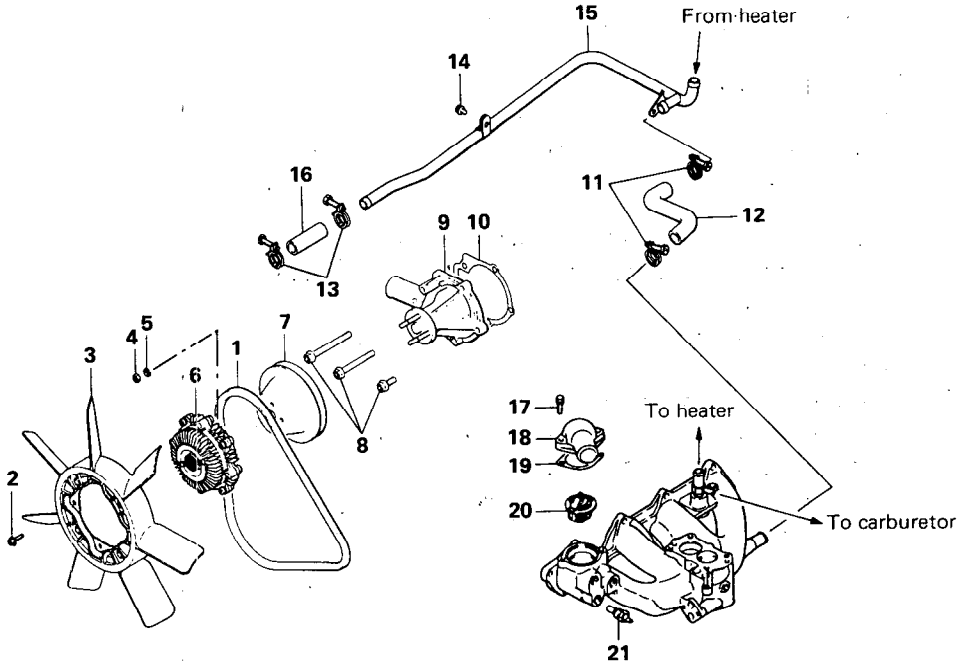
1. Check radiator fins for bent, broken or clogged.
2. Check the radiator for corrosion, damage, rust or scale.
3. Check the radiator hoses for cracks, damage or deterioration.
4. Check the reserve tank for damage.
5. Check the radiator cap spring for damage.
6. Check the radiator cap seal for cracks or damage.

INSTALLATION

1. Torque all parts to specifications during assembly.
2. Fill the radiator and reserve tank with clean coolant.
3. Run the engine until the coolant has warmed up enough so that the thermostat valve opens, and then stop the engine.
4. Remove the radiator cap, pour in the coolant until it is up to the filler neck of the radiator, and then fill the reserve tank to the upper level.
5. Check to be sure that there is no leakage from the radiator, hoses or connections. (Refer to p. 7-4.)

COMPONENTS

1. Belt
2. Flange bolt (4)
3. Cooling fan
4. Nut (4)
5. Spring washer (4)
6. Fan clutch
7. Pulley
8. Flange bolt (5)
9. Water pump assembly
10. Water pump gasket
11. Hose clamp (2)
12. Water hose
13. Hose clamp (2)
14. Bolt
15. Water pipe
16. Water hose
17. Bolt (2)
18. Water outlet fitting
19. Gasket
20. Thermostat
21. Water temperature gauge unit



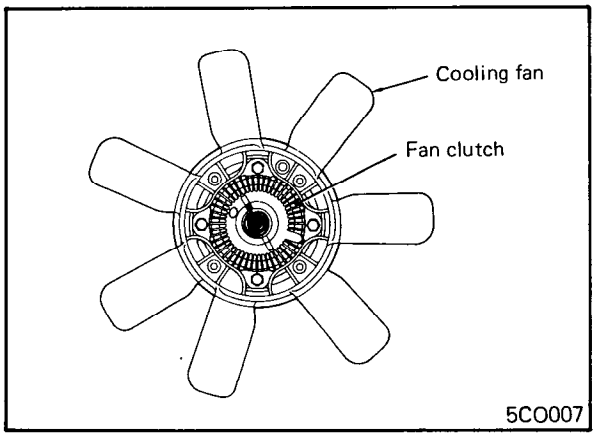
NOTE
Numbers show order of disassembly.
For reassembly, reverse the order of disassembly.

5CO011

INSPECTION

Cooling Fan

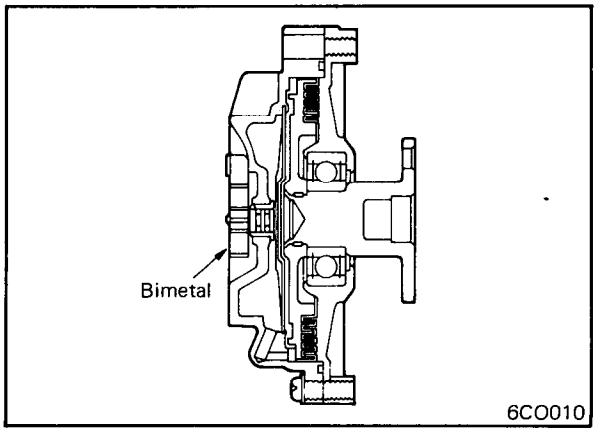
Check following items and replace if defective.
1. Check blades for damage or cracks.
2. Check around bolt holes in fan hub for cracks and damage.



5CO007

Fan Clutch

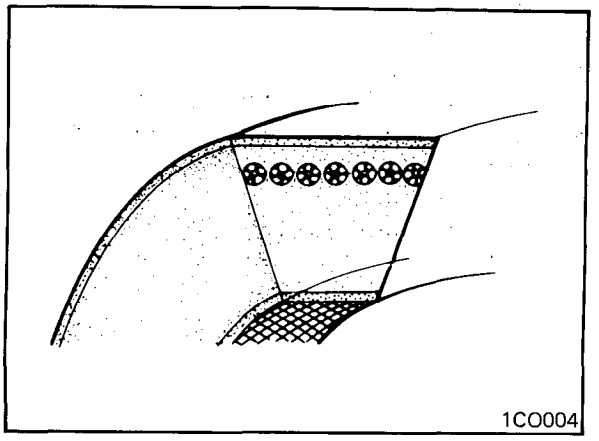
Check following items and replace if defective.
1. Check to ensure that fluid in the fan clutch is not leaking at case joint and seals. If fluid quantity decreases due to leakage, fan speed will decrease and engine overheating might result.
2. When a fan is attached to an engine and turned by hand, it should give a sense of some resistance. If fan turns lightly, it is defective.
3. Check the bimetal strip for damage.



6CO010

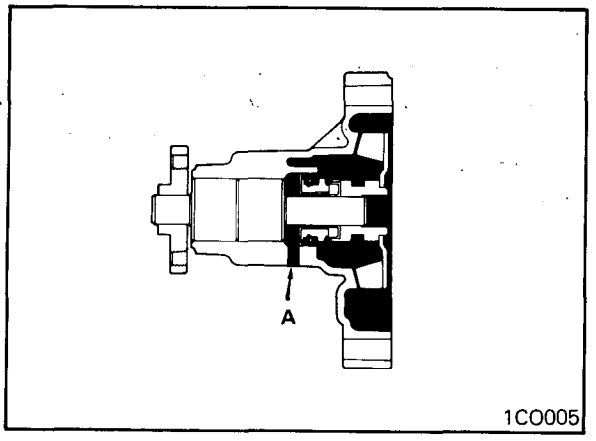
Belt

Check following items and replace if defective.
1. Check surface for damage, peeling or cracks.
2. Check for oil or grease on surface.
3. Check for worn or hardened rubber.



Water Pump

Check the following items and replace if defective.
1. Check for water leakage. If water leaks from hole "A", seal unit is defective. Replace as an assembly.
2. Check bearing for noise or roughness.



INSTALLATION

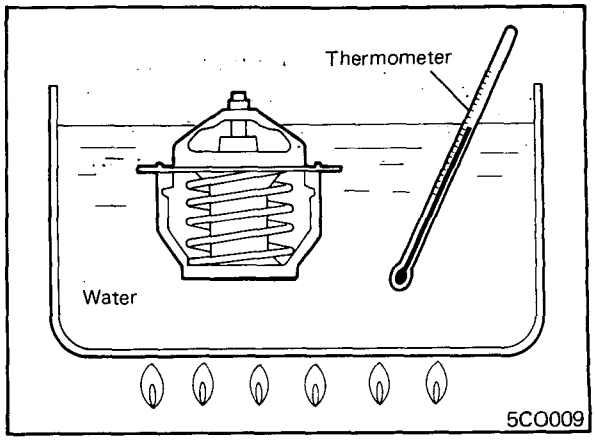
Water Pump

1. Install new water pump gasket and install water pump.
2. Install fan belt and adjust belt tension. (Reter to p. 7-7.)

INSPECTION

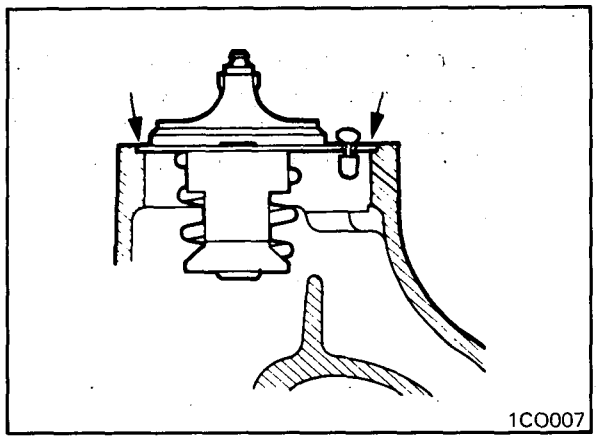
1. Heat thermostat as shown in illustration.
2. Check to see if valve operates properly.
3. Check to determine temperature at which valve begins to open.

Valve opening temperature	88°C (190°F)
Full opening temperature	100°C (212°F)
Valve lift (at full open)	8 mm (.31 in.) or more



INSTALLATION

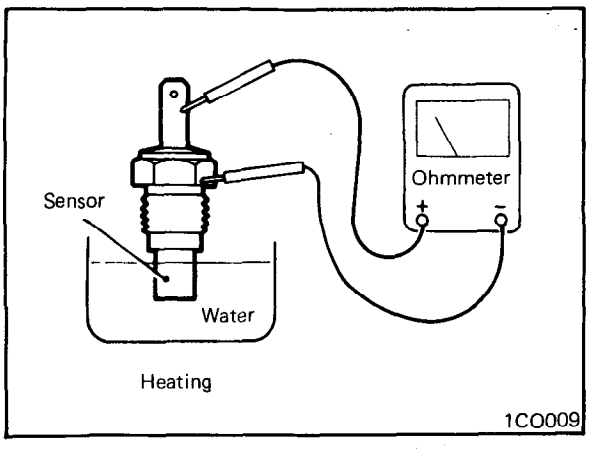
Check to ensure that flange of thermostat is correctly seated in socket of thermostat housing. If thermostat is installed in wrong direction, bottom of thermostat will touch rib inside inlet manifold, making it impossible to seat flange in position.



INSPECTION

1. Submerge the sensor element in water and then heat the water.
2. Connect an ohmmeter to the sensor terminal and ground it as illustrated (1CO009).
3. Observe the decrease in resistance as the temperature increases.

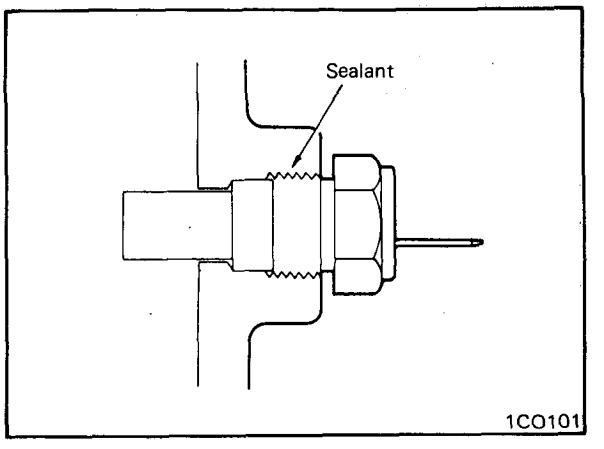
Indication point	Resistance value
70°C (158°F)	104 Ω
100°C (212°F)	38 Ω



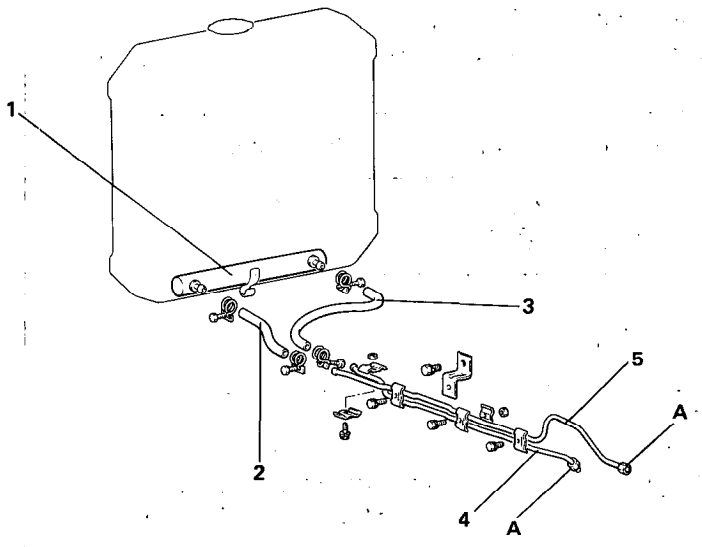
INSTALLATION

Apply sealant to the threaded portion and tighten to the specified torque.

Water temperature gauge unit tightening torque . . . . . 30-39 Nm (22-28 ft.lbs.)



COMPONENTS



1. Oil cooler
2. Return hose
3. Feed hose
4. Feed tube
5. Return tube

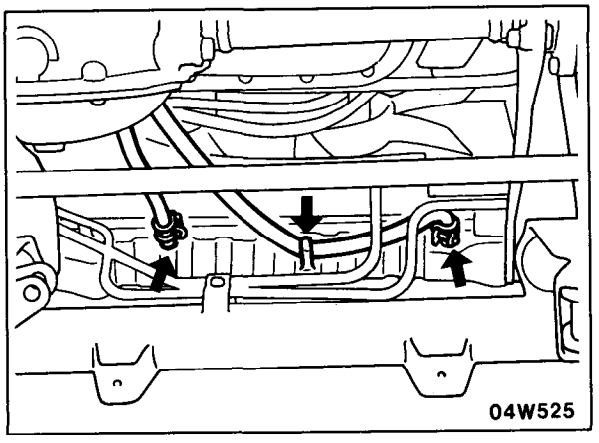
	Nm	ft.lbs.
A	20	14

04W524

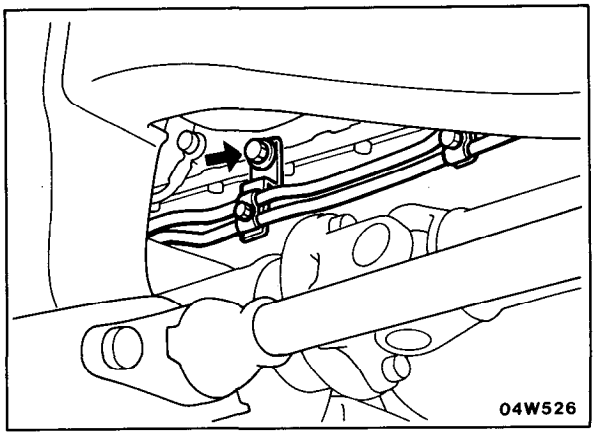
REMOVAL

1. Disconnect the oil cooler hoses from the radiator. (04W525)

NOTE
Be careful that the automatic transmission fluid does not spill out of the hoses.

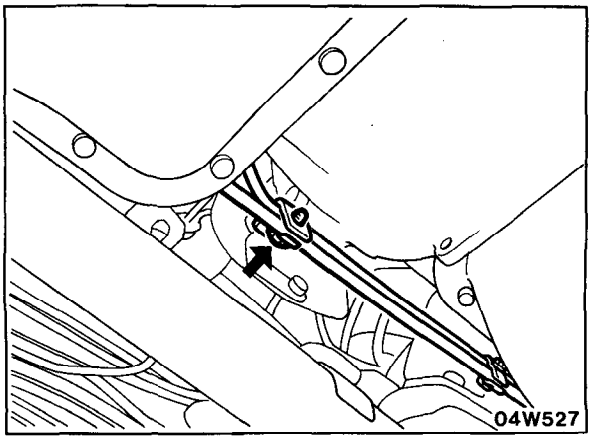


2. Detach the oil cooler tubes from where they are secured to the engine.



3. Detach the oil cooler tubes from where they are secured to the transmission. (04W527)
4. Disconnect the oil cooler tubes from the transmission, and remove the oil cooler hoses and tubes.

NOTE
Plug the transmission and oil cooler tube openings to prevent fluid from spilling out.



INSPECTION

1. Check oil cooler hoses for cracks, damage and deterioration.
2. Check oil cooler tubes for leakage and deformation .

INSTALLATION

1. Torque all parts to specifications during assembly.

NOTE
When connecting the oil cooler tubes to the transmission, first securely connect the oil cooler tubes to the transmission side flange bolts, and then tighten by the sleeve tube nuts. (04Y022)

2. After installation, add 120 cc of transmission fluid, and then, with the engine idling, check the fluid level and inspect for leakage.