

COOLING SYSTEM

Return To Main Table of Contents

GENERAL	2
COOLING SYSTEM.....	7
RADIATOR	8
RADIATOR FAN MOTOR ASSEMBLY.....	10
WATER PUMP	12
THERMOSTAT.....	14
WATER HOSE AND PIPE	15
WATER TEMPERATURE GAUGE UNIT AND SENSOR	16

GENERAL

SPECIFICATIONS

Cooling method	Water cooling, forced circulation with electric fan
Cooling system	
Quantity	8.6 lit (9.1 U.S.qts., 7.6 Imp.qts.)
Water pump	
Drive mechanism	Belt
Type	Centrifugal impeller
Thermostat	
Type	Wax pellet type with jiggle valve
Valve opening temperature	88°C (190°F)
Opening temperature range	86.5-89.5°C (187.7-193.1°F)
Full opening temperature	100°C (212°F)
Drive belt	
Type	V-type belt
Radiator	
Type	Pressurized corrugated fin type
Radiator cap	
Main valve opening pressure	74-103 kPa (0.75-1.05 kg/cm ² , 10.7-14.9 psi)
Vacuum valve opening pressure	-6.86 kPa (-0.07 kg/cm ² , -1.00 psi) or less
Water temperature gauge unit	
Type	Thermistor type
Resistance	90.5-117.55Ω at 70°C (158°F) 21.3-26.33Ω at 115°C (239°F)
Water temperature sensor	
Type	Thermistor type
Resistance	2.21-2.69 KΩ at 20°C (68°F) 264-328 Ω at 80°C (176°F)
Thermo sensor A (On radiator)	
Type	Wax pellet type
Operating temperature	
OFF - ON	87-93°C (189-199°F)
ON - OFF	83°C or more (181°F or more)
Thermo sensor B (On radiator)	
Operating temperature	
OFF - ON	108°C or more (226°F or more)
ON - OFF	112-118°C (234-244°F)
Coolant concentration	
Tropical area	40%
Other area	50%

GENERAL

LUBRICANT

Engine coolant

Ethylene glycol base for aluminum

SEALANT

Water temperature gauge unit

LOCTITE 962T or equivalent

Water temperature sensor

LOCTITE 962T or equivalent

TIGHTENING TORQUE

	Nm	Kg.cm	lb.ft
Alternator support bolt	20-25	200-250	14-18
Alternator brace bolt	15-22	150-220	10.8-15.9
Water pump installation flange bolt			
Head mark "7" bolt	20-26	200-270	14-20
Water temperature gauge unit	10-12	100-120	7.2-8.7
Water temperature sensor	20-39	200-400	14-29
Thermo sensor (On radiator)	20-25	200-250	14-18
Water outlet fitting attaching bolt	17-20	170-200	12-14

GENERAL

TROUBLESHOOTING

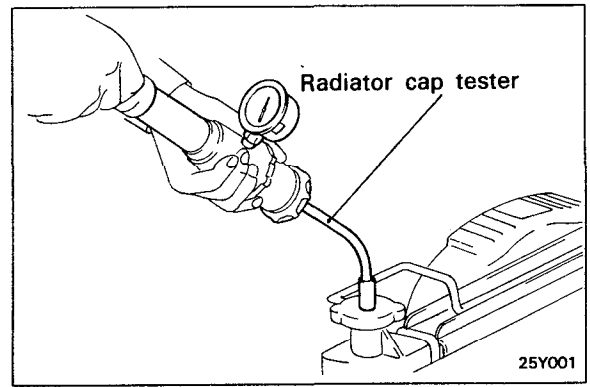
Symptom	Probable cause	Remedy
Low coolant level	Leakage of coolant Damaged radiator Corroded or cracked hoses (Radiator hose, heater hose, etc.) Faulty radiator cap valve or setting of spring Faulty thermostat Faulty water pump	Replace Replace Replace Replace Replace
Clogged radiator	Foreign material in coolant	Clean/Replace
Abnormally high coolant temperature	Faulty thermostat Faulty radiator cap Restriction of flow in cooling system Loose or missing drive belt Faulty water pump Faulty temperature gauge or wiring Faulty electric fan Faulty thermo-sensor on radiator Insufficient coolant	Replace Replace Replace Adjust or replace Replace Repair or replace Repair or replace Replace Refill coolant
Abnormally low coolant temperature	Faulty thermostat Faulty temperature gauge or wiring	Replace Repair or replace
Leakage from oil cooling system	Loose hose or pipe connection Cracked or collapsed hose or pipe	Retighten Replace
Inoperative electrical cooling fan	Faulty fan motor or wiring	Replace or repair

COOLANT LEAK CHECK

1. Loosen the radiator cap.
2. Check that the coolant level is up to the filler neck.
3. Install a cooling system pressure tester to the radiator filler neck and apply 150 kPa (21 psi, 1.53 kg/cm²) pressure. Hold for two minutes in that condition, and check for leakage from the radiator, hose or connections.

CAUTIONS

- 1) Radiator coolant may be extremely hot. Do not open the system while hot, or scalding water could spray out causing personal injury. Allow vehicle to cool before servicing this system.
 - 2) Be sure to clean away any moisture from the areas checked.
 - 3) When the tester is removed, be careful not to spill any coolant.
 - 4) Be careful not to distort the filler neck of the radiator when installing and removing the tester.
4. If there is leakage, repair or replace the appropriate part.



RADIATOR CAP PRESSURE TEST

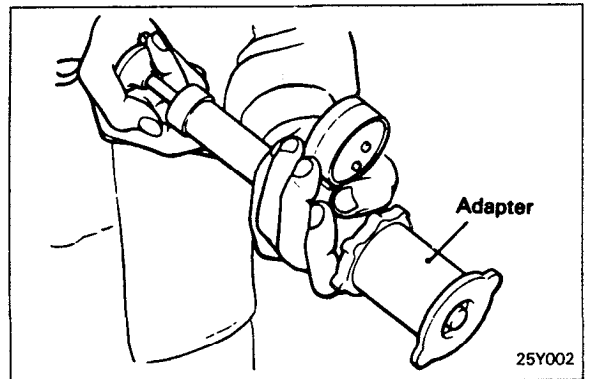
1. Use an adapter to attach the cap to the tester.
2. Increase the pressure until the needle on the gauge stops moving.

Main valve opening pressure
74-103 kPa (0.75-1.05 kg/m ² , 10.7-14.9 psi)
Limit: 65 kPa (0.66 kg/cm ² , 9.2 psi)

3. Check that the correct pressure level is maintained.
4. Replace the radiator cap if the reading does not remain at or above the limit.

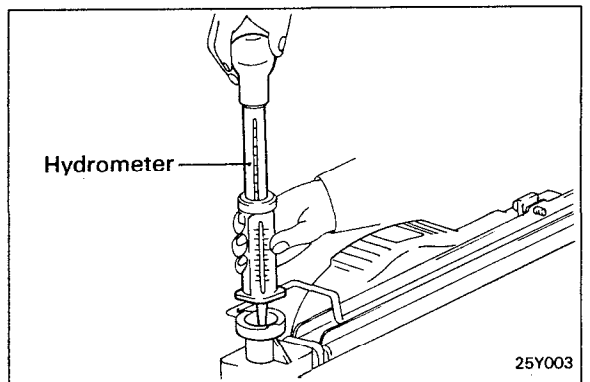
NOTE

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 coolant hydrometer.
2. Measure the coolant temperature, and calculate the concentration from the relation between the specific gravity and temperature, using the following table for reference.



GENERAL

RELATION BETWEEN COOLANT CONCENTRATION AND SPECIFIC GRAVITY

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)			
1.054	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 coolant temperature of 20°C (68°F).

CAUTION

If the concentration of the coolant is below 30%, 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. For these reasons, be sure to maintain the concentration level within the specified range.

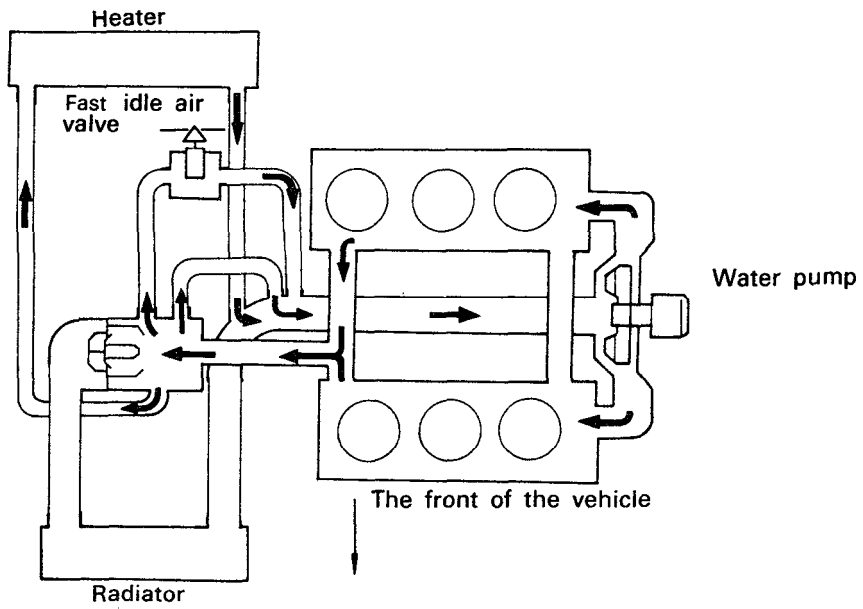
RECOMMENDED COOLANT

Antifreeze	Mixture ratio of anti-freeze in coolant
ETHYLENE GLYCOL BASE FOR ALUMINUM	Tropical area 40% Other area 50%

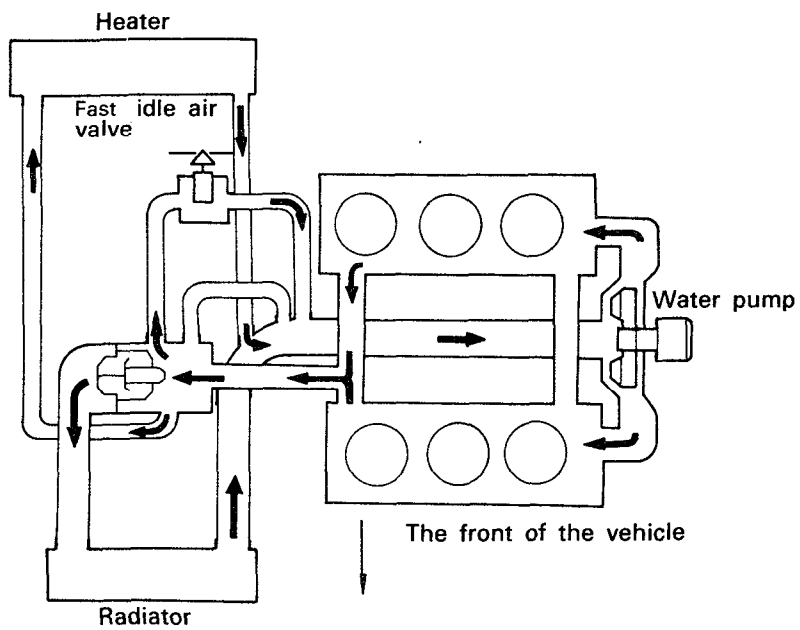
COOLING SYSTEM

COMPONENTS

Cold Engine



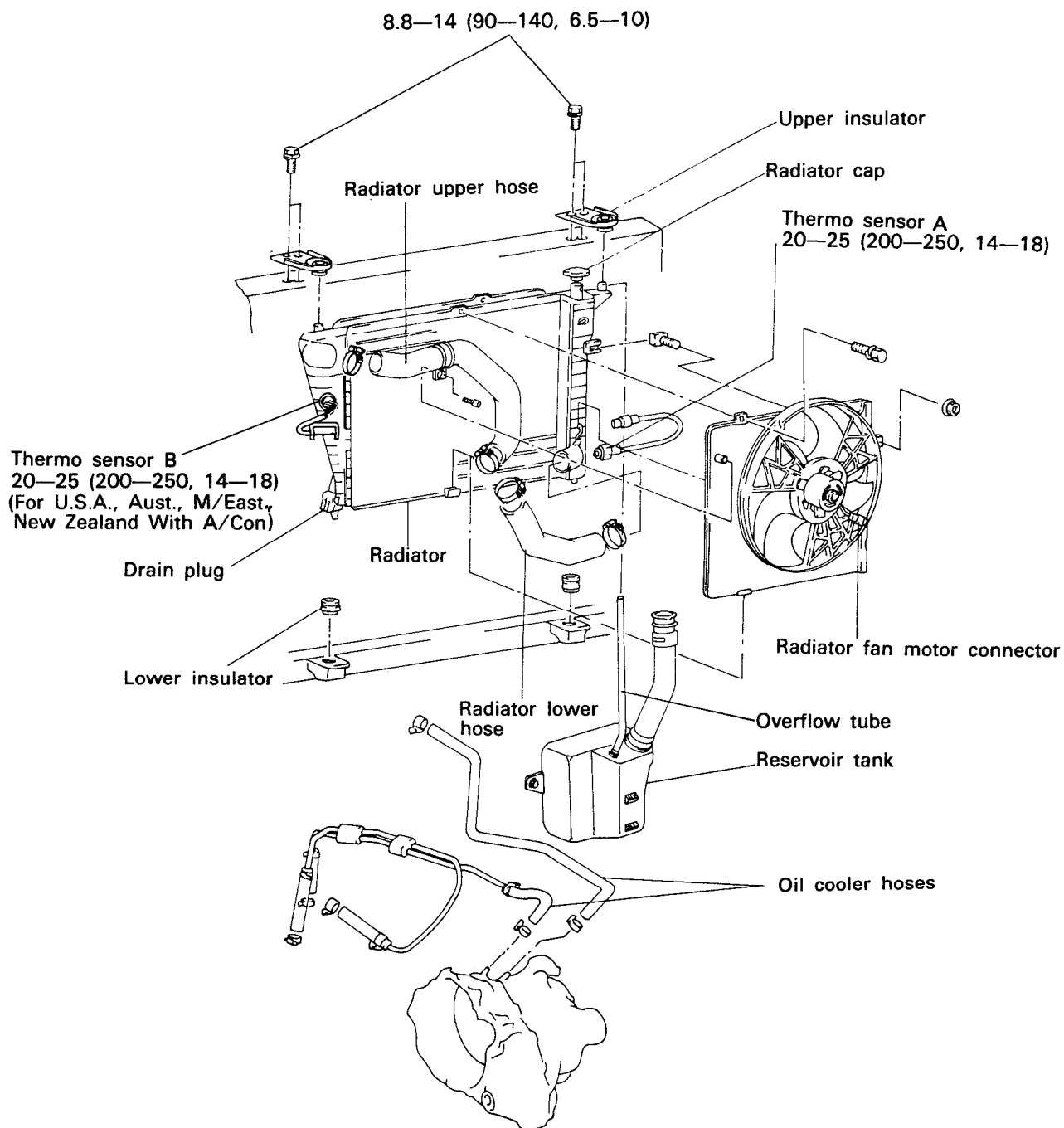
Hot Engine



RADIATOR

RADIATOR

COMPONENTS



Aust.: Australia

M/East: Middle East

TORQUE : Nm (kg.cm. lb.ft)

RADIATOR

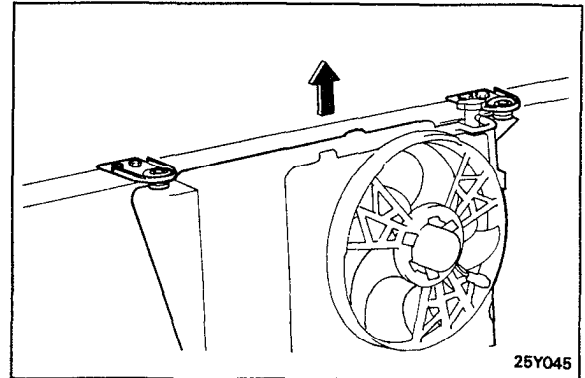
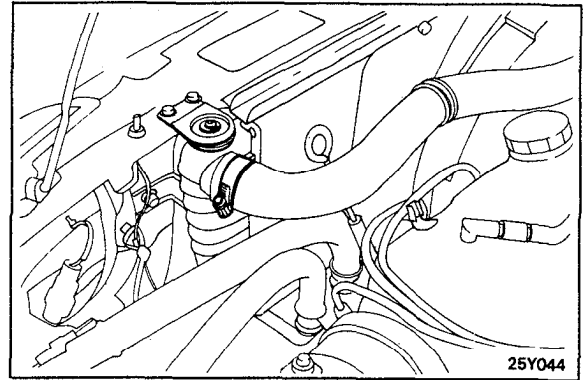
REMOVAL

1. Disconnect the fan motor connector.
2. Set the temperature control lever of the heater control to the hot position.
3. Loosen the radiator drain plug to drain the coolant.
4. Disconnect the upper and lower hoses and overflow tube after making marks on the radiator hose and the hose clamp.
5. Disconnect the oil cooler hoses from the automatic transaxle.

NOTE

Cover or plug the hose and nipple part of the radiator so that dust, foreign materials, etc. do not enter after the hose has been disconnected from the radiator.

6. Remove the radiator mounting bolts.
7. Remove the radiator together with the fan motor.
8. Remove the fan motor from the radiator.



INSPECTION

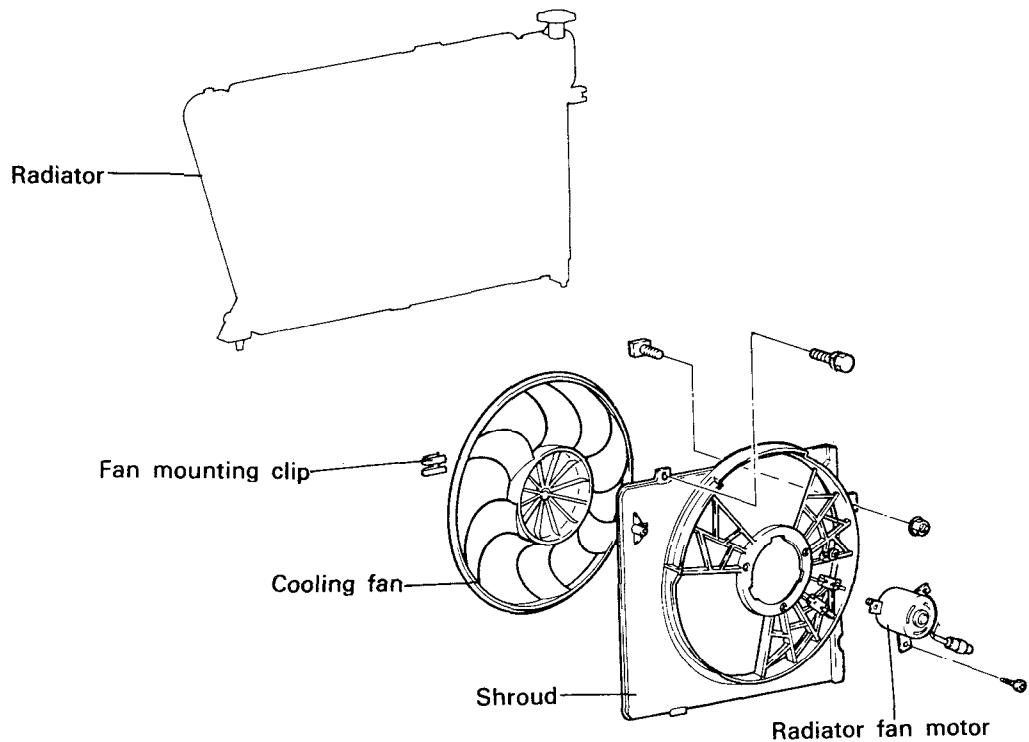
1. Check for foreign material between the radiator fins.
2. Check the radiator fins for damage, and straighten if necessary.
3. Check the radiator for corrosion, damage, rust or scale.
4. Check the radiator hoses for cracks, damage or deterioration.
5. Check the reservoir tank for damage.
6. Check the automatic transaxle oil cooler hoses for cracking, damage or deterioration.

INSTALLATION

1. Fill the radiator and reservoir tank with a clean coolant mixture.
2. Run the engine until the coolant has warmed up enough so that the thermostat opens, and then stop the engine.
3. Remove the radiator cap and pour in the coolant until it is up to the filler neck of the radiator. Fill the reservoir tank to the upper level.
4. Check that there is no leakage from the radiator, hoses or connections.

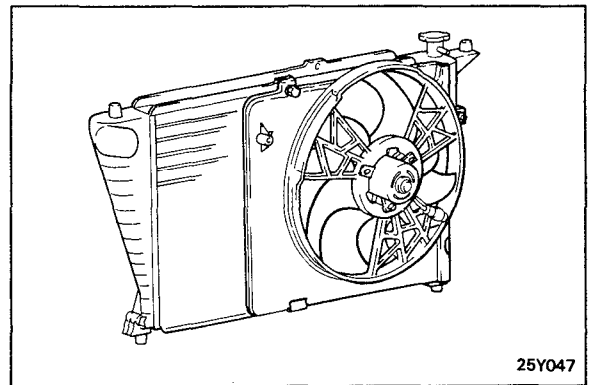
RADIATOR FAN MOTOR ASSY

COMPONENTS



REMOVAL

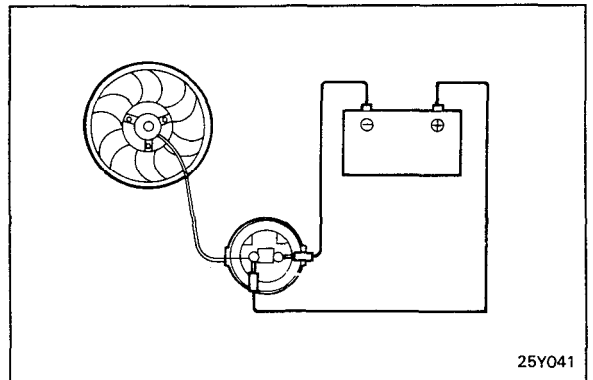
1. Disconnect the ground cable from the battery terminal.
2. Disconnect the connectors from the fan motor and remove the harness from the shroud.
3. Remove the two bolts and nut holding the shroud to the radiator and detach the shroud.
4. Remove the fan motor mounting bolts and detach the fan motor from the shroud.
5. Detach the cooling fan from the fan motor by removing the clip.



INSPECTION

Radiator Fan Motor

1. Check that the radiator fan rotates when battery voltage is applied between the terminals (as shown in the illustration).
2. Check that abnormal noises are not produced while the motor is turning.



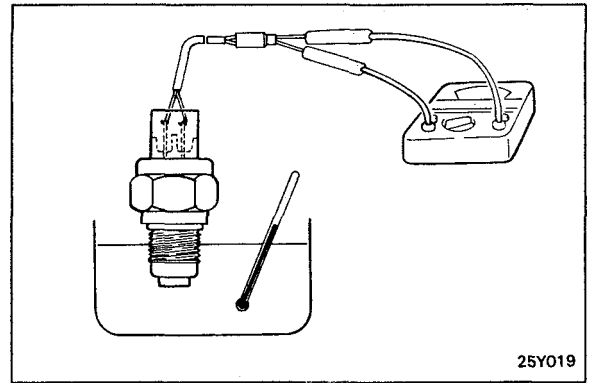
RADIATOR FAN MOTOR ASSEMBLY

Thermo Sensor A

Check for continuity with the thermo sensor in hot water.

NOTE:

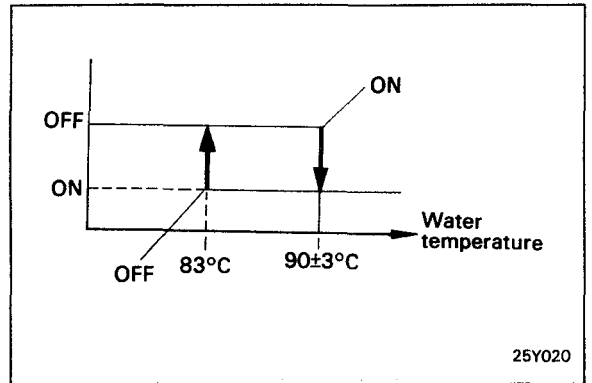
Immerse the thermo sensor in hot water up to the mounting threads to check for continuity.



Operating temperature

OFF - ON : 87-93°C (189-199°F)

ON - OFF : 83°C or more (181°F or more)

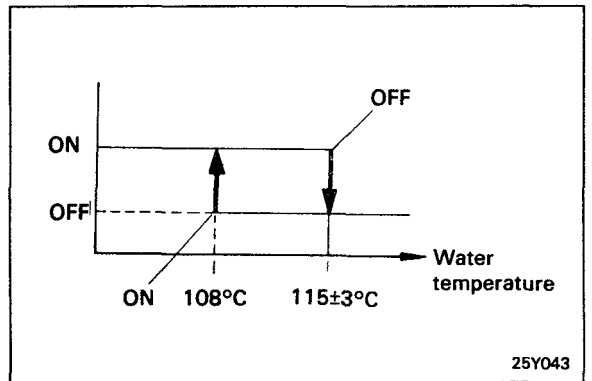


Thermo Sensor B

Operating temperature

OFF - ON : 108°C or more (226°F or more)

ON - OFF : 112-118°C (234-244°F)

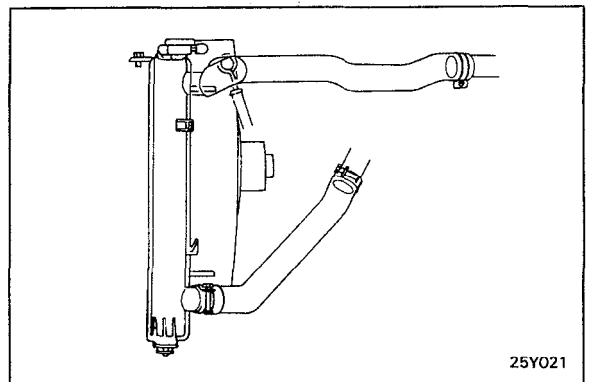


INSTALLATION

1. Installation is in the reverse order of removal procedures.

CAUTION:

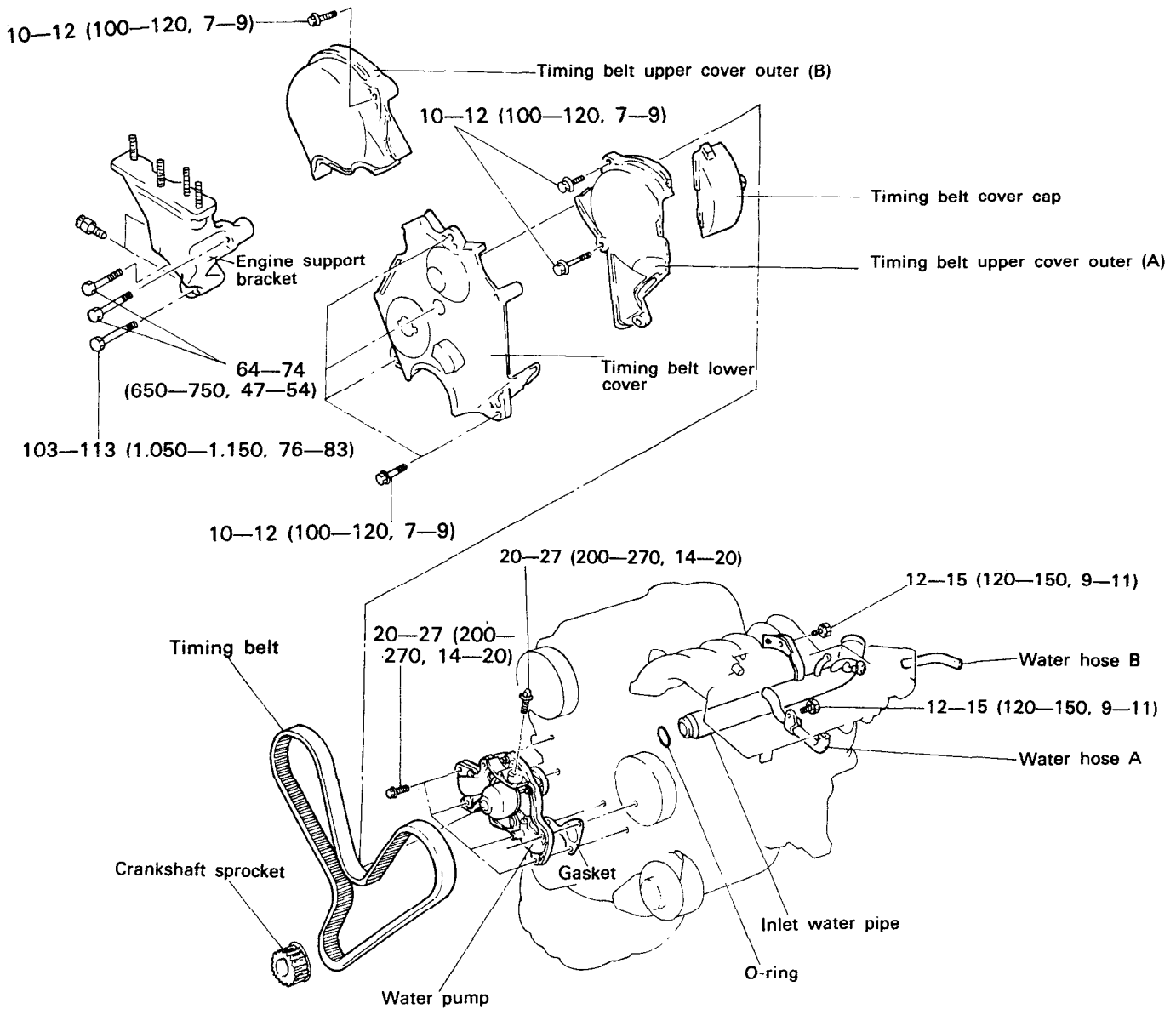
- 1) Make sure the cooling fan does not come into contact with the shroud when installed.
- 2) After installation, make sure there is no unusual noise or vibration when the fan is rotated.



WATER PUMP

WATER PUMP

COMPONENTS

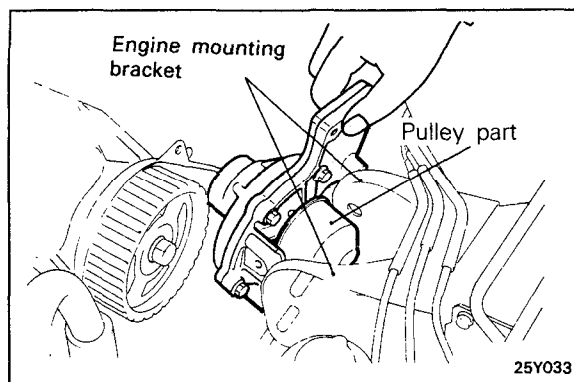


TORQUE : Nm (kg.cm, lb.ft)

WATER PUMP

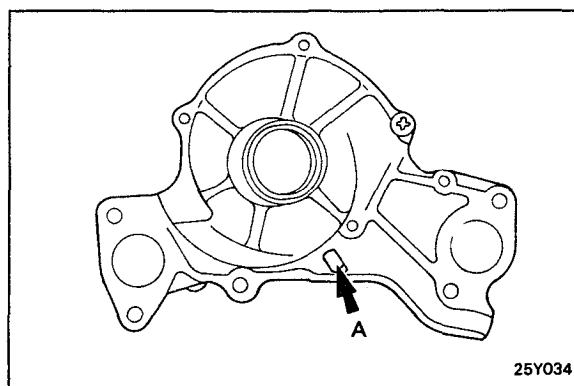
REMOVAL

1. Drain the coolant and disconnect the radiator outlet hose.
2. Remove the drive belt.
3. Remove the timing belt covers and the timing belt tensioner.
4. Remove the water pump assembly from the cylinder block.



INSPECTION

1. If there is any damage or cracks on the water pump body, replace the water pump assembly.
2. If water leakage is observed around hole A, replace the water pump assembly.



INSTALLATION

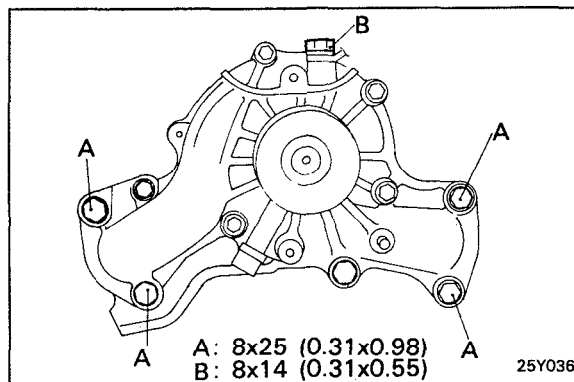
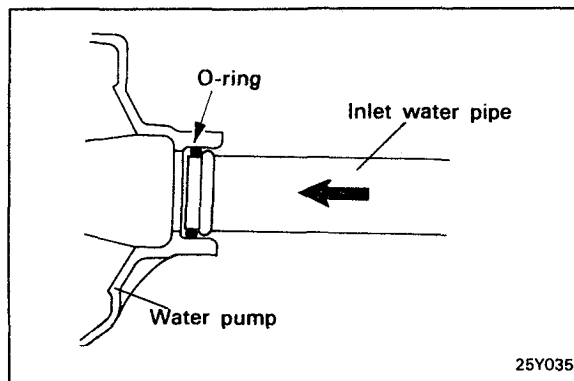
1. Clean the gasket surfaces of the water pump body and the cylinder block.
2. Install the new O-ring onto the groove on the front end of the water pipe, then wet the O-ring with water. Do not apply oil or grease.
3. Install a new water pump gasket and water pump assembly. Tighten the bolts to the specified torque.

Tightening torque

Water pump installation flange bolt

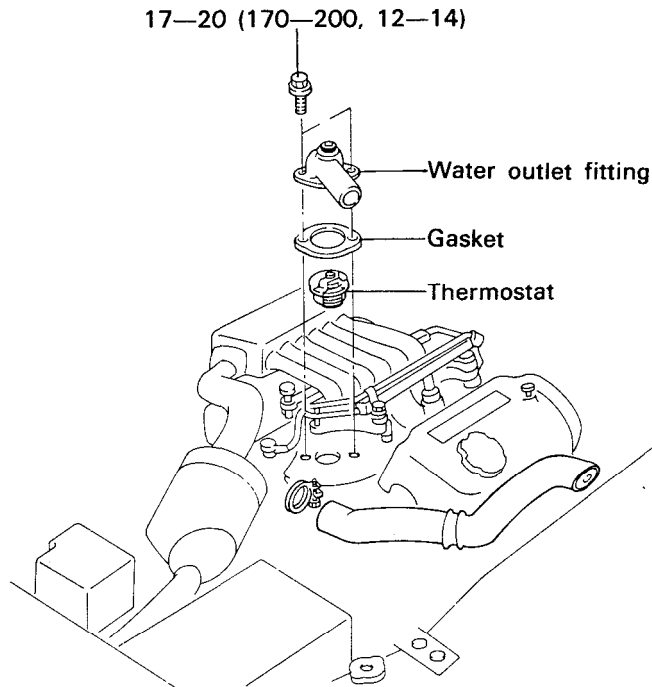
Head mark.....
20-26 Nm (200-270 kg.cm, 14-20 lb.ft)

4. Install the timing belt tensioner and timing belt. Adjust the timing belt tension, and then install the timing belt covers.
5. Install the drive belt, and then adjust the belt tension.
6. Refill the coolant.
7. Run the engine and check for leaks.



THERMOSTAT

COMPONENTS

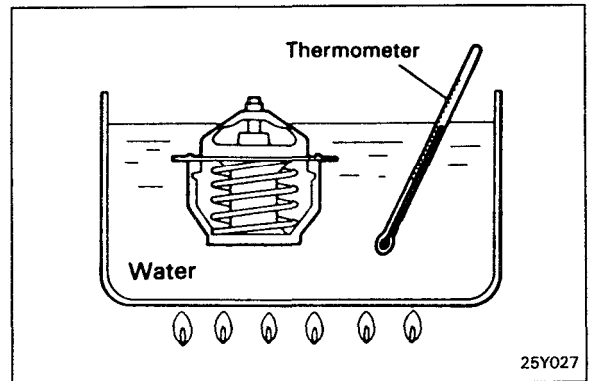


TORQUE : Nm (kg.cm, lb.ft)

REMOVAL AND INSPECTION

1. Drain the coolant down to the thermostat level or below.
2. Remove the water outlet fitting and gasket.
3. Remove the thermostat.
4. Heat the thermostat as shown in illustration.
5. Check that the valve operates properly.
6. Check the temperature at which the valve begins to open.

Valve opening temperature	88°C (190°F)
Full opening temperature	100°C (212°F)
Valve lift (at full open)	Min. 8 mm (0.31 in.)



25Y027

INSTALLATION

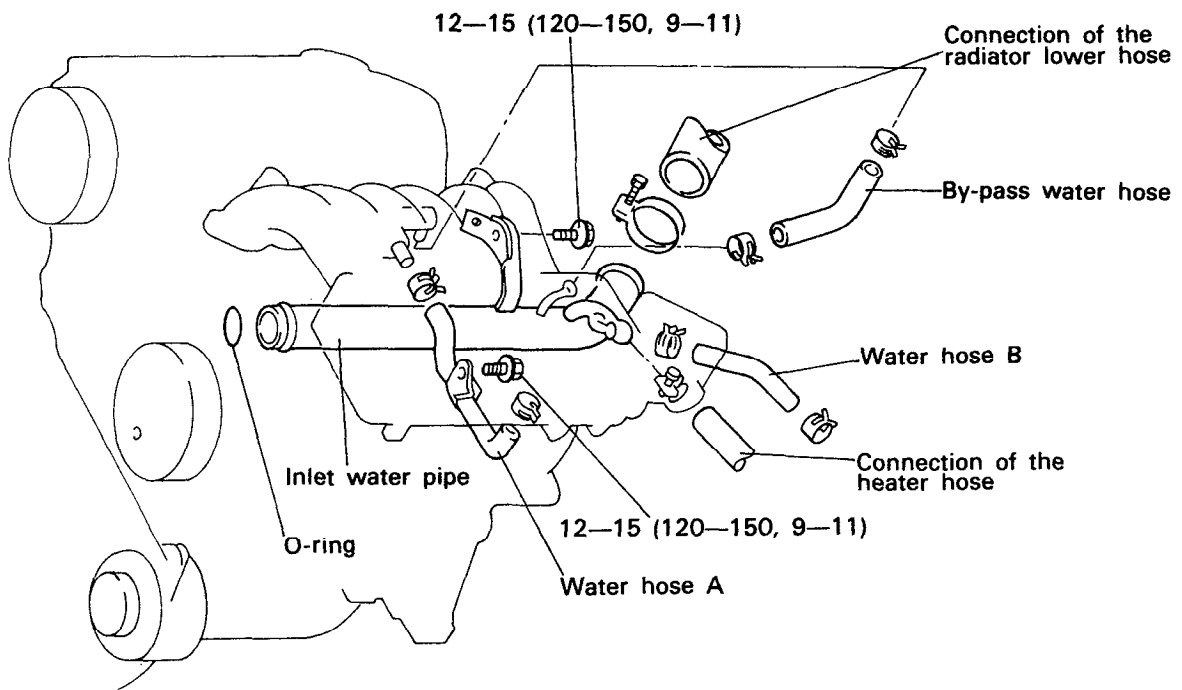
1. Check that the flange of the thermostat is correctly seated in the socket of the thermostat housing. If the thermostat is installed in the wrong direction, the bottom of the thermostat will touch the rib inside the intake manifold, making it impossible to seat the flange in position.
2. Install a new gasket and water outlet fitting.

Tightening torque	
Water outlet fitting bolt.....	
	17-20 Nm (170-200 kg.cm, 12-14 lb.ft)

3. Refill with coolant.

WATER HOSE AND PIPE

COMPONENTS



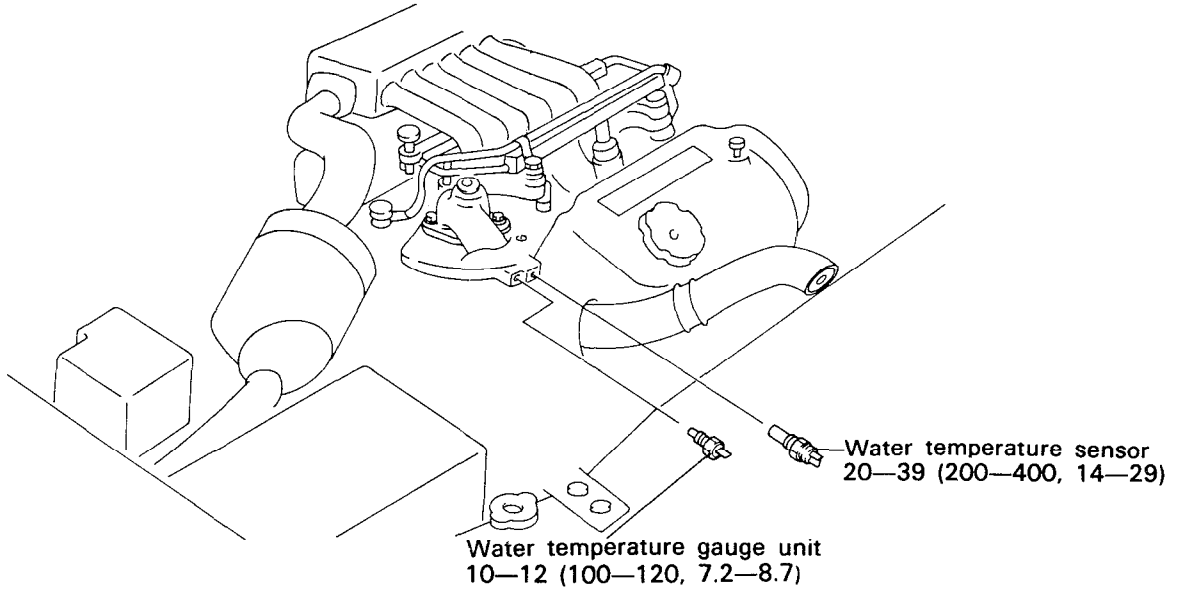
TORQUE : Nm (kg.cm, lb.ft)

INSPECTION

Check the water pipe and hose for cracks, damage, or restrictions. Replace if necessary.

WATER TEMPERATURE GAUGE UNIT AND SENSOR

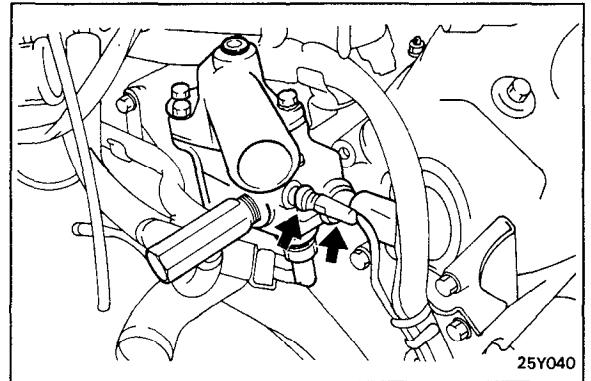
COMPONENTS



TORQUE : Nm (Kg.cm, lb.ft)

REMOVAL

1. Drain the coolant down to the gauge unit level or below.
2. Disconnect the battery ground cable.
3. Remove the coolant temperature gauge unit, sensor.

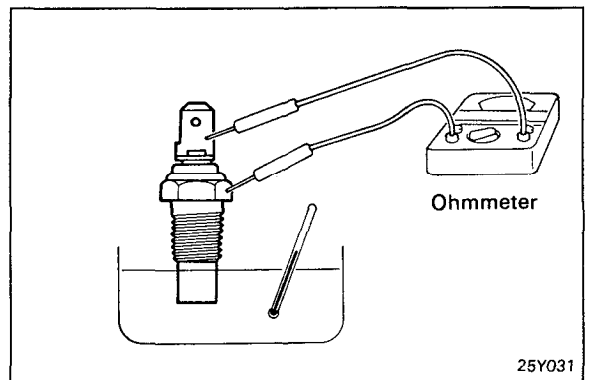


INSPECTION

Water Temperature Gauge Unit

1. Heat the coolant temperature gauge by submerging it in hot water.
2. Check that the resistance is within the specified range.

Resistance 90.5-117. 5Ω at 70°C (158°F)
21.3-26. 3Ω at 115°C (239°F)

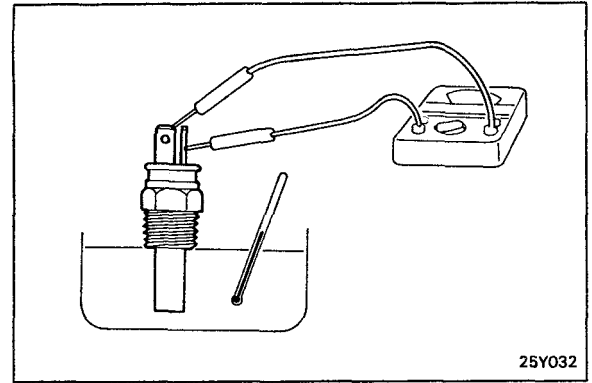


WATER TEMPERATURE GAUGE UNIT AND SENSOR

Water Temperature Sensor

1. Heat the sensor by submerging it in hot water.
2. Check that the resistance is within the specified range.

Resistance 2.21-2.69 k Ω at 20°C (68°F)
264-328 Ω at 80°C (176°F)



25Y032

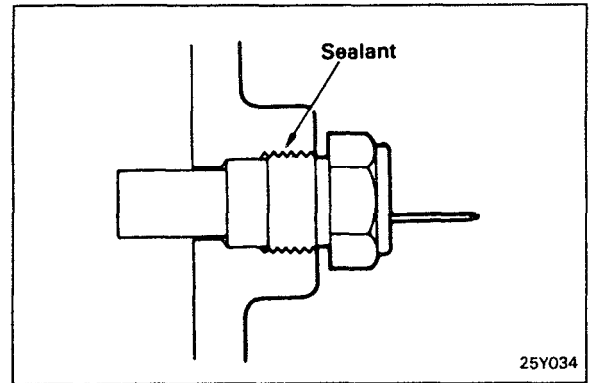
INSTALLATION

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

Water temperature gauge unit
LOCTITE 962T or equivalent
Water temperature sensor
LOCTITE 962T or equivalent

Tightening torque

Water temperature gauge.....
10-12 Nm (100-120 kg.cm, 7.2-8.7 lb.ft)
Water temperature sensor
20-39 Nm (200-400 kg.cm, 14-29 lb.ft)



25Y034

2. Connect the harness to the water temperature gauge unit, sensor.
3. Connect the battery ground cable.
4. Refill with coolant.