

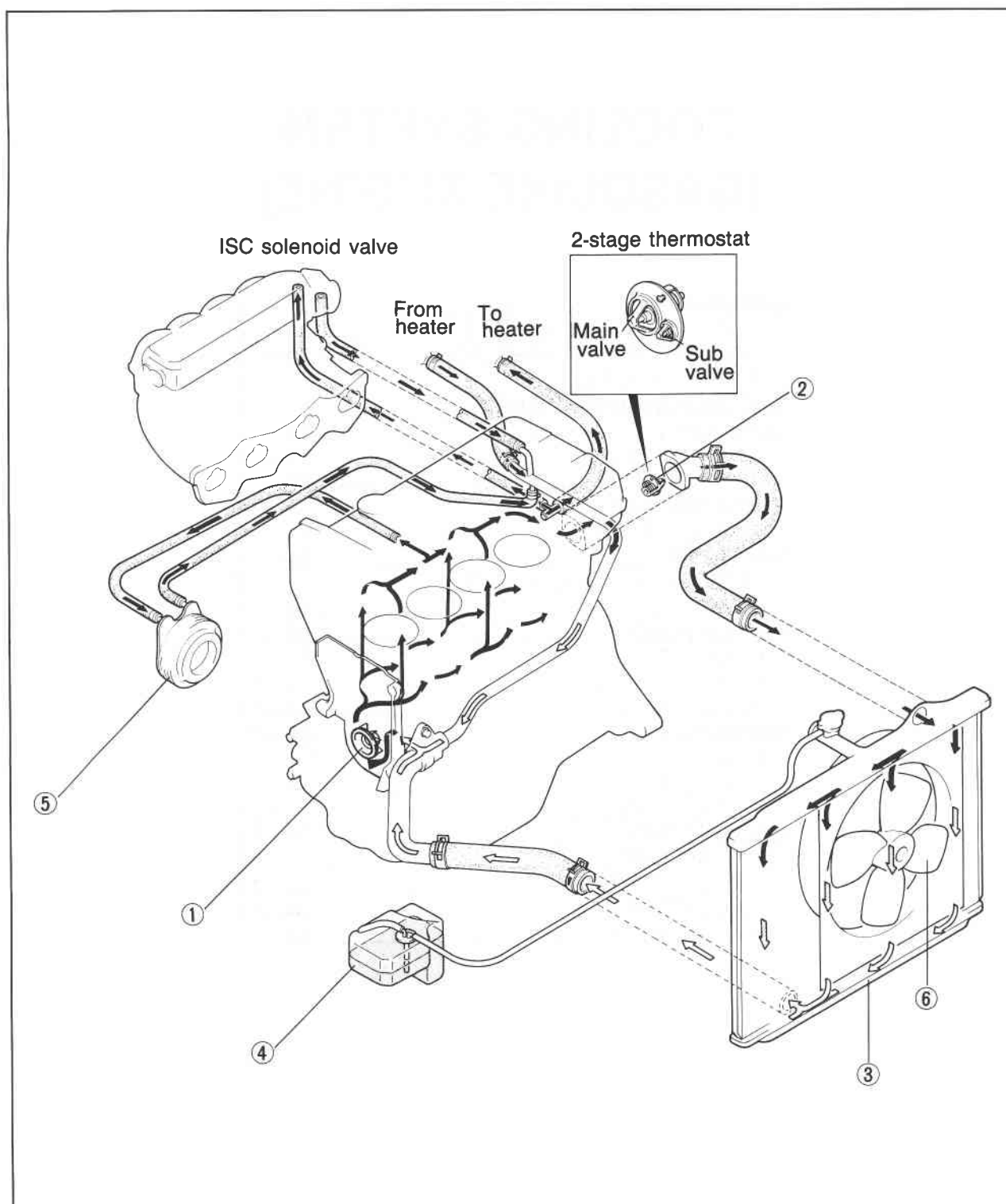
COOLING SYSTEM (GASOLINE ENGINE)

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3A OUTLINE

OUTLINE

COOLANT FLOW CHART (DOHC)

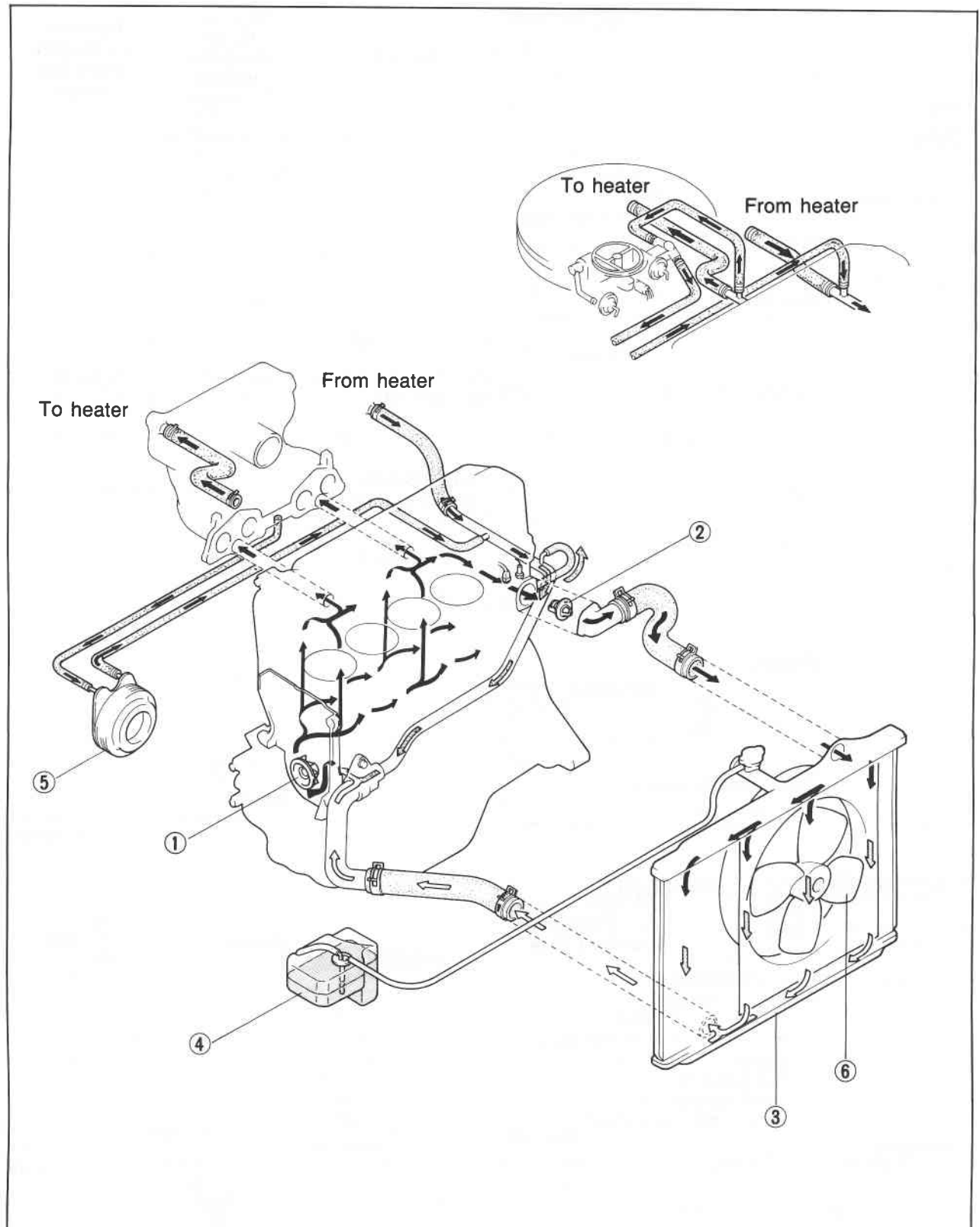


76G03A-002

- 1. Water pump
- 2. Thermostat
- 3. Radiator

- 4. Coolant reservoir
- 5. Oil cooler
- 6. Cooling fan

COOLANT FLOW CHART (SOHC)



76G03A-015

1. Water pump
2. Thermostat
3. Radiator

4. Coolant reservoir
5. Oil cooler (8-valve...only ECE, 12-valve)
6. Cooling fan

3A TROUBLESHOOTING GUIDE

SPECIFICATIONS

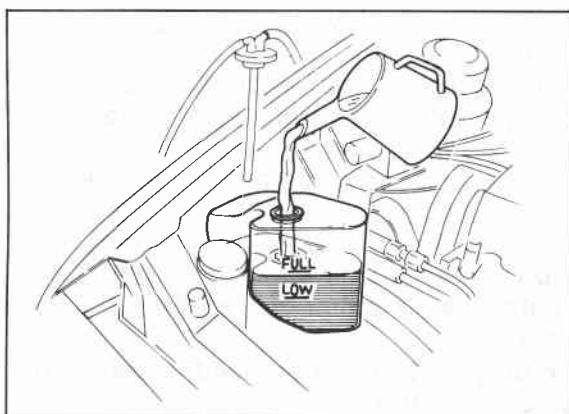
Engine model			FE·DOHC	FE 8-valve, F8, F6...except Middle East General FE 12-valve	FE 8-valve F8, F6...only Middle East General
Item					
Cooling system			Water cooled, forced circulation		
Coolant capacity	liters (US qt, Imp qt)	With heater	7.5 (7.9, 6.6)		
		Without heater	7.0 (7.4, 6.2)		
Water pump	Type		Centrifugal, timing belt driven		
	Water seal		Unified seal		
Thermostat	Type		Wax, 2-stage	Wax	
	Opening temperature	°C(°F)	Sub : 83.5—86.5 (182—188) Main: 86.5—89.5 (188—193)	86.5—89.5 (188—193)	80.5—83.5 (177—182)
	Full-open temperature	°C(°F)	100 (212)		95 (203)
	Full-open lift	mm (in)	Sub: 1.5 (0.06) min. Main: 8.0 (0.31) min.	8.5 (0.33) min.	
Radiator	Type		Corrugated		
	Cap valve opening pressure kPa (kg/cm ² , psi)		74—103 (0.75—1.05, 11—15)		
Cooling fan	Capacity	W	MTX	80	
			ATX	120	
	Number of blade		4		
	Outer diameter of blade	mm (in)	MTX	320 (12.6)	
		ATX	340 (13.4)		

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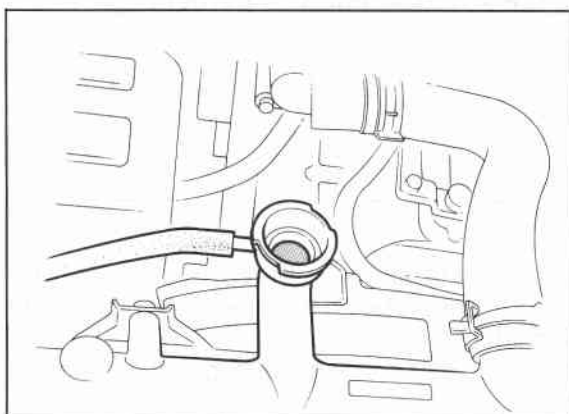
TROUBLESHOOTING GUIDE

Problem	Possible Cause	Remedy	Page
Overheating	Insufficient coolant	Add	3A— 5
	Coolant leakage	Repair	—
	Radiator fins clogged	Clean	3A— 7
	Radiator cap malfunction	Replace	3A— 6
	Cooling fan malfunction	Repair	3A—12
	Thermostat malfunction	Replace	3A—11
	Water passage clogged	Clean	3A— 5
	Water pump malfunction	Repair or replace	3A— 8
Corrosion	Impurities in coolant	Replace	3A— 5

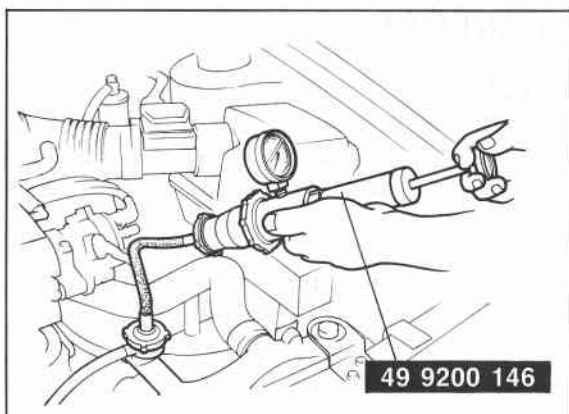
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86U03X-005



86U03X-006

COOLANT

INSPECTION

Coolant Level (Engine cold)

1. Check that the coolant level is near the radiator inlet port.
2. Check that the coolant level in the coolant reservoir is between the FULL and LOW marks. Add coolant if necessary.

Warning

- a) Never remove the radiator cap while the engine is hot.
- b) Wrap a thick cloth around the cap when removing it.

Coolant Quality

1. Check that there is no build-up of rust or scales around the radiator cap or radiator filler neck.
2. Check that coolant is free from oil.
3. Replace the coolant, if necessary.

Coolant Leakage

1. Connect a tester and SST to the radiator inlet port.
2. Apply **103 kPa (1.05 kg/cm², 15 psi)** pressure to the system.
3. Check that the pressure is held. If not, check for coolant leakage.

Warning

When removing either the radiator cap or the tester, loosen it slowly until the pressure in the radiator is released, and then remove it.

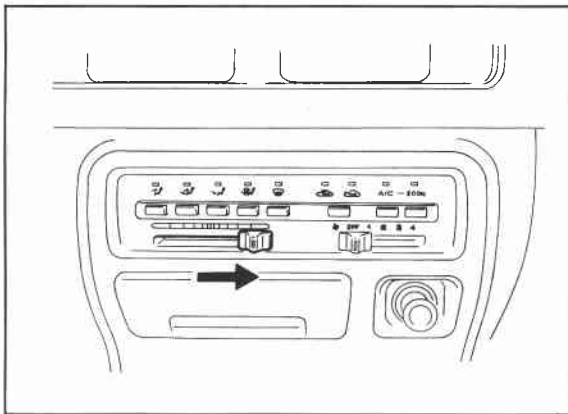
REPLACEMENT

1. Remove the radiator cap and loosen the drain plug.
2. Drain the coolant into a suitable container.

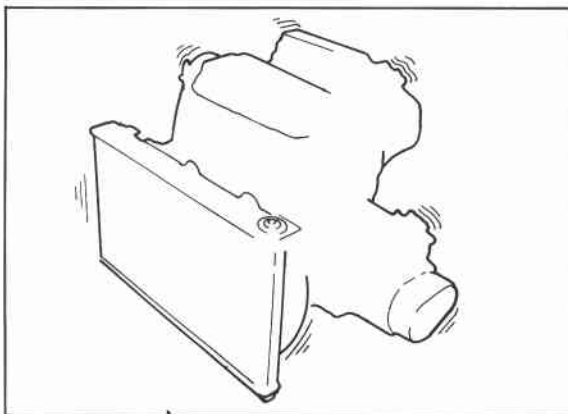
Warning

- a) Never open the radiator cap while the engine is hot.
- b) Wrap a thick cloth around the cap when loosening.
- c) Use caution when draining hot coolant.

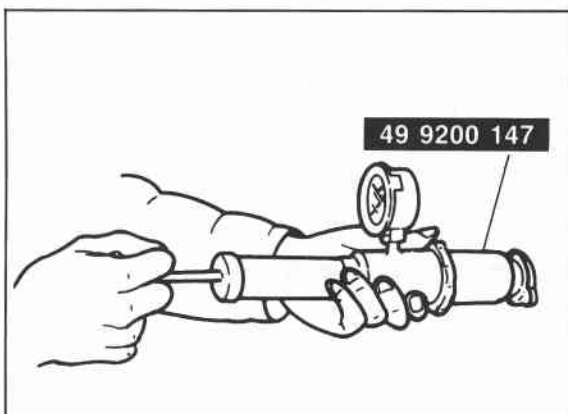
3A RADIATOR CAP



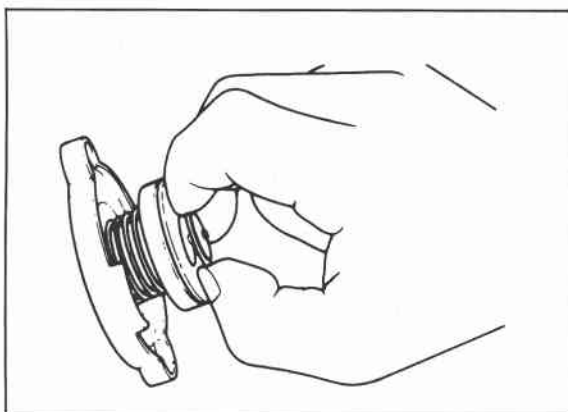
86U03X-028



86U03X-007



86U03X-008



86U03X-009

3. Set the heater control switch to the maximum heat position.
4. Flush the cooling system with water until all traces of color are gone, then let the system drain completely.
5. Fill with the proper mixture and amount of ethylene glycol-based coolant.

Caution

- a) Do not use alcohol- or methanol-based coolant.
- b) Use only soft (demineralized) water in the coolant mixture.

Anti-freeze solution mixture percentage

Protection	Volume percentage		Gravity at 20°C (68°F)
	Solution	Water	
Above -16°C (3°F)	35	65	1.054
Above -26°C (-15°F)	45	55	1.066
Above -40°C (-40°F)	55	45	1.078

6. Run the engine at idle with the radiator cap removed. Let any air bleed from the system, and add more coolant.
7. Install the radiator cap, and inspect all connections for leakage.

RADIATOR CAP

INSPECTION

Radiator Cap Valve

1. Remove foreign material (such as water residue) from between the radiator cap valve and the valve seat.
2. Attach the radiator cap to a tester with the SST. Apply pressure gradually to **74—103 kPa (0.75—1.05 kg/cm², 11—15 psi)**.
3. Wait about 10 seconds; then check that the pressure has not decreased.

Negative Pressure Valve

1. Pull the negative-pressure valve to open it. Check that it closes completely when released.
2. Check for damage on the contact surfaces, and for cracked or deformed seal packing.
3. Replace the radiator cap if necessary.

RADIATOR

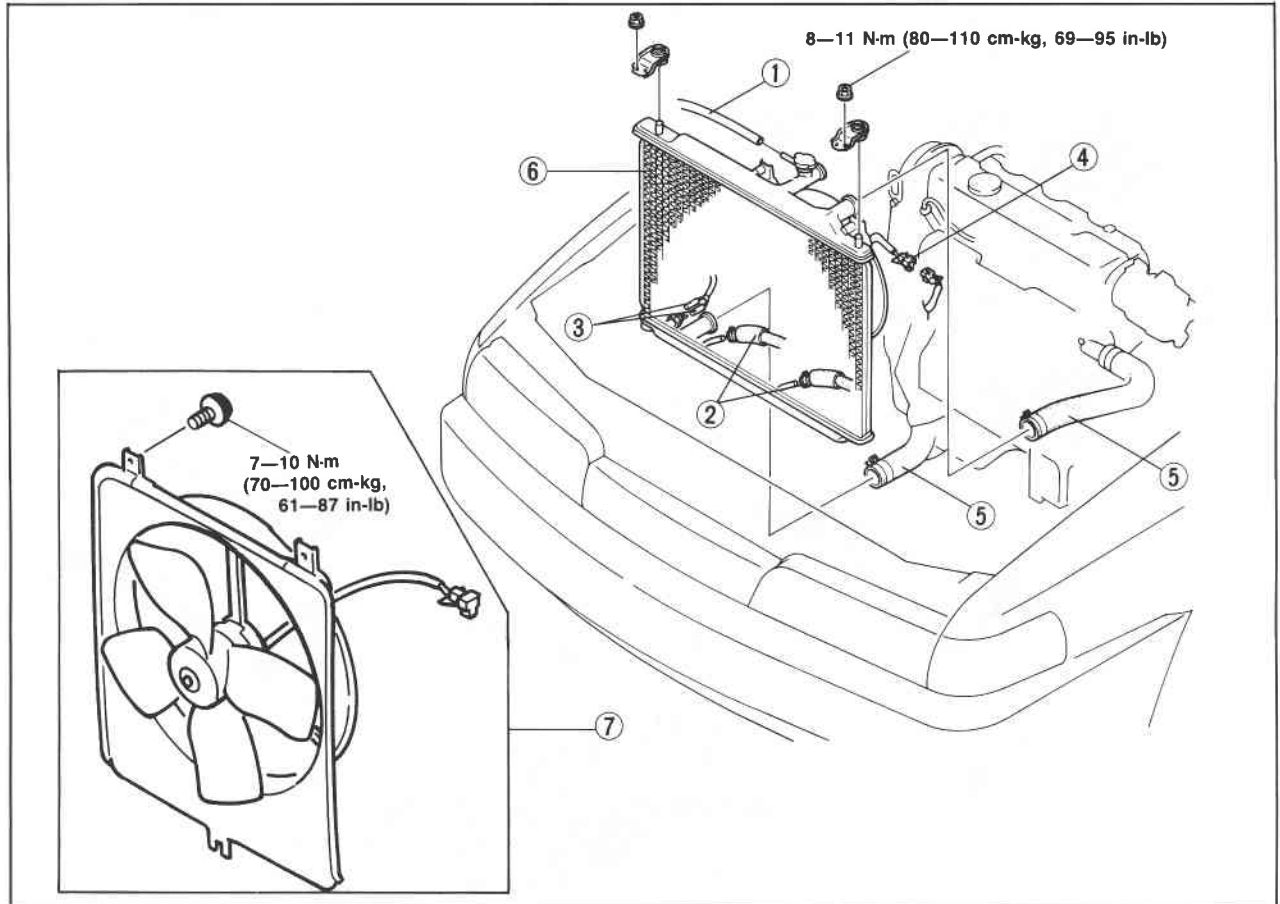
REMOVAL AND INSTALLATION

1. Drain the engine coolant.
2. Remove in the sequence shown in the figure.
3. Install in the reverse order of removal.

Note

- a) Position the hose clamp in the original location on the hose.
- b) Squeeze the clamp lightly with large pliers to ensure a good fit.

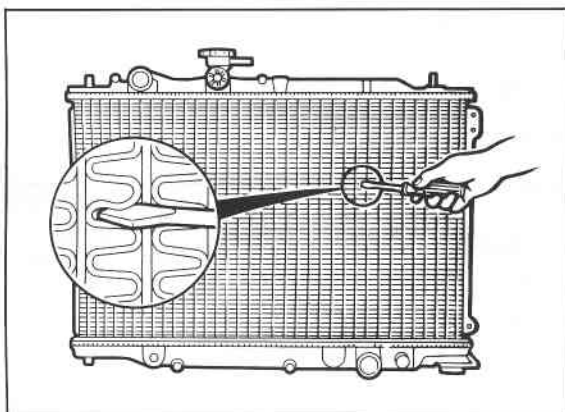
86U03X-010



76G03A-005

1. Coolant reservoir hose
2. ATF hose (ATX)
3. Water thermo switch connector
4. Cooling fan connector

5. Upper and lower radiator hose
6. Cooling fan and radiator assembly
7. Cooling fan



86U03X-012

INSPECTION

Check the following points. Repair or replace if necessary.

1. Cracks, damage, or water leakage
2. Bent fins (Repair with a screwdriver)
3. Distorted or bent radiator inlet.

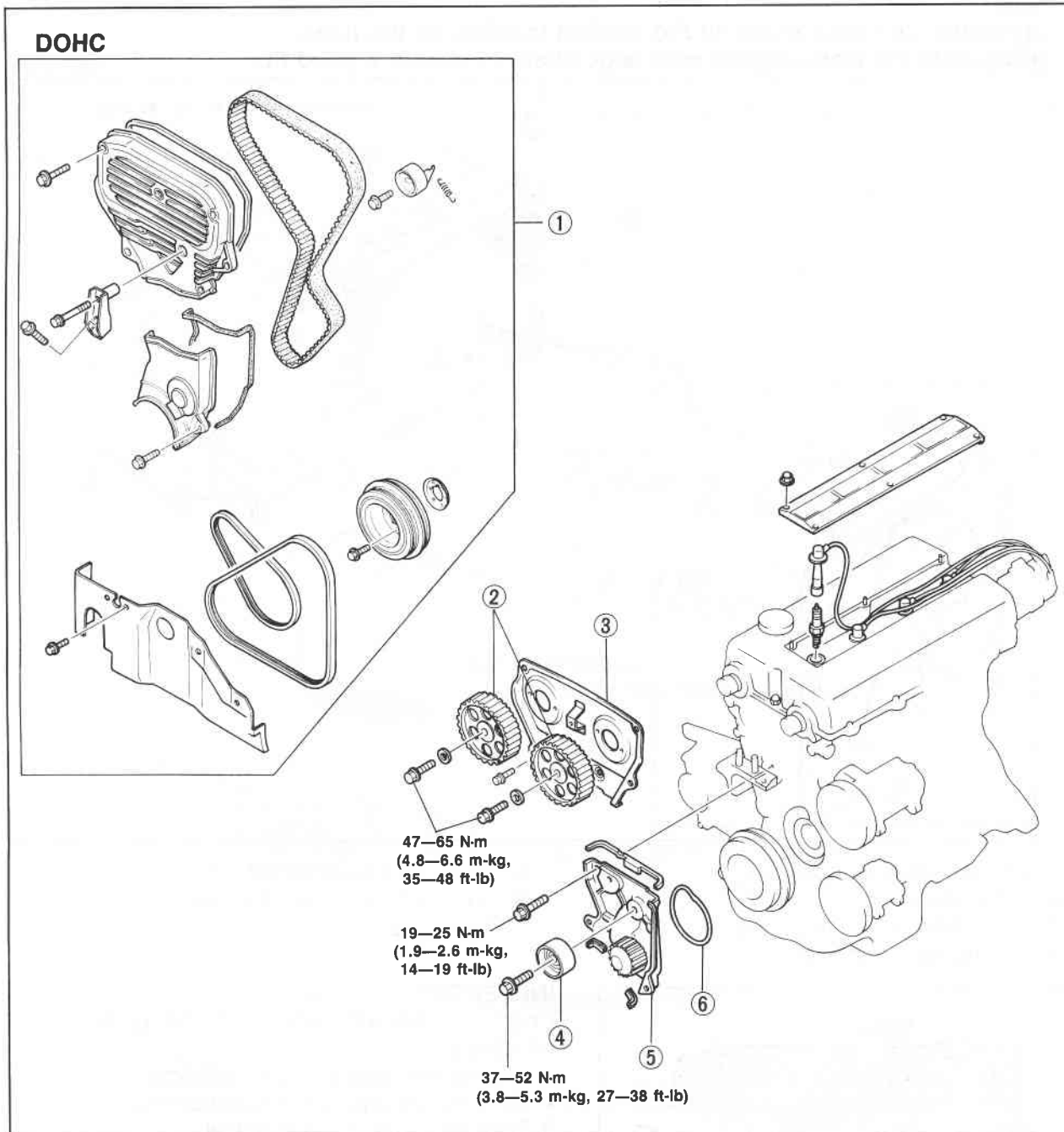
3A WATER PUMP

WATER PUMP

REMOVAL

1. Disconnect the negative battery cable.
2. Turn the crankshaft so that the No. 1 cylinder is at TDC of compression.
3. Drain the engine coolant.
4. Remove in the sequence shown in the figure.

69G03A-025

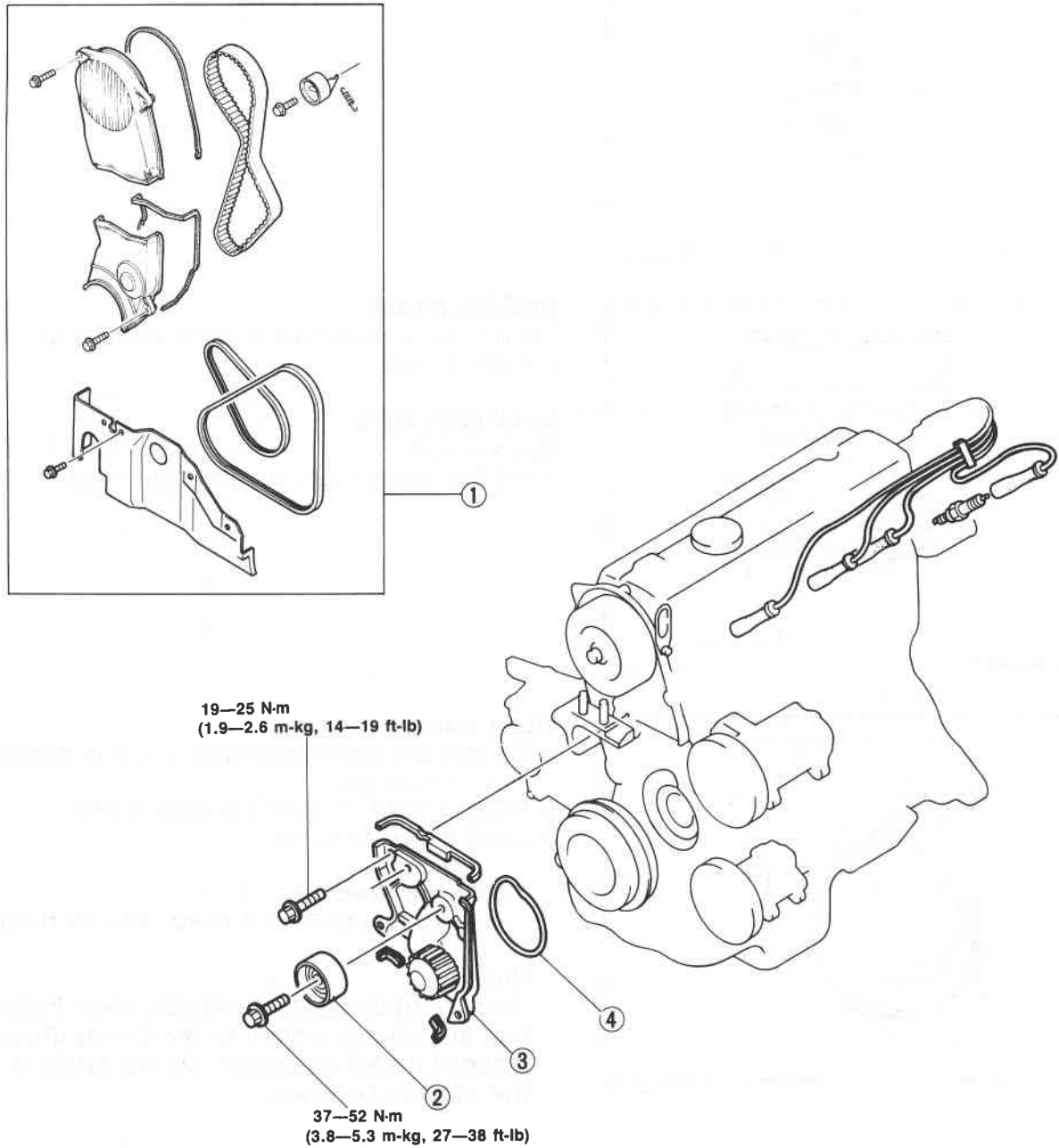


76G03A-006

1. Timing belt (Refer to Section 1B)
2. Camshaft pulley (Refer to Section 1B)
3. Seal plate

4. Idler pulley
5. Water pump
6. O-ring

SOHC

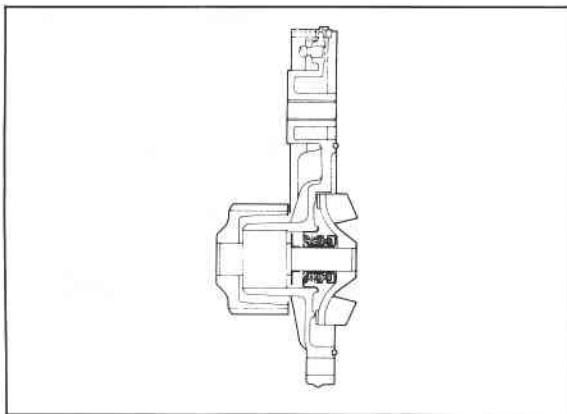


76G03A-007

1. Timing belt (Refer to Section 1A)
2. Idler pulley

3. Water pump
4. O-ring

3A WATER PUMP

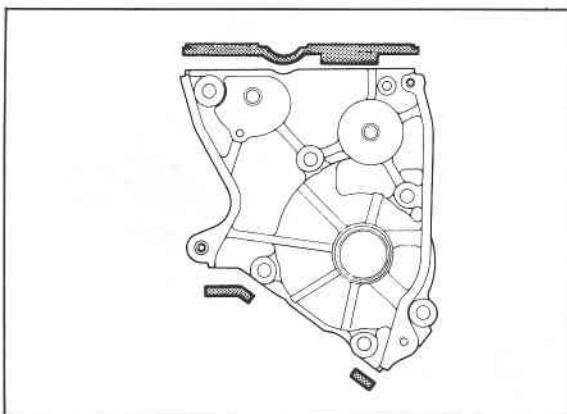


86U03X-014

INSPECTION

Check the following. Replace the pump if necessary.

1. Cracks or damage
2. Abnormal noise, bearing sticking or loose.



76G03A-017

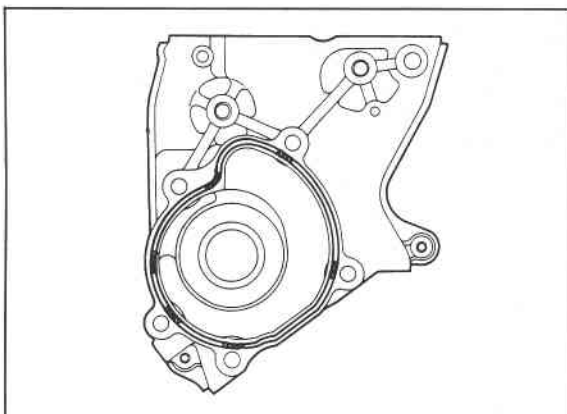
INSTALLATION

Install in the reverse order of removal referring to the installation note.

Installation Note

Rubber seal

Install the rubber seals on the water pump.



86U03X-016

Water pump

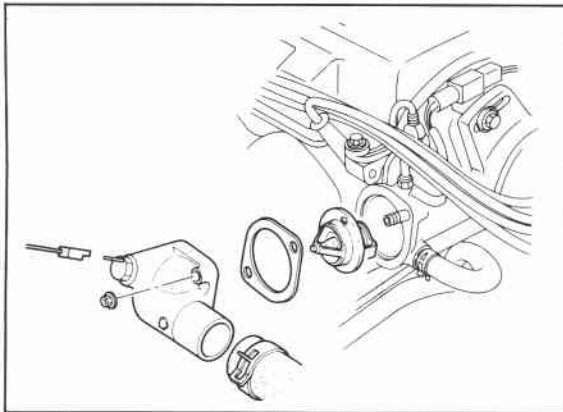
1. Remove any gasket fragments, dirt, or oil from the contact surfaces.
2. Install a new O-ring on the water pump.
3. Install the water pump.

Tightening torque:

19—25 N·m (1.9—2.6 m·kg, 14—19 ft·lb)

Note

To prevent dropping the O-ring when installing, put silicon sealant in the O-ring groove (shaded areas) as shown. Do not apply it to the contact surfaces.

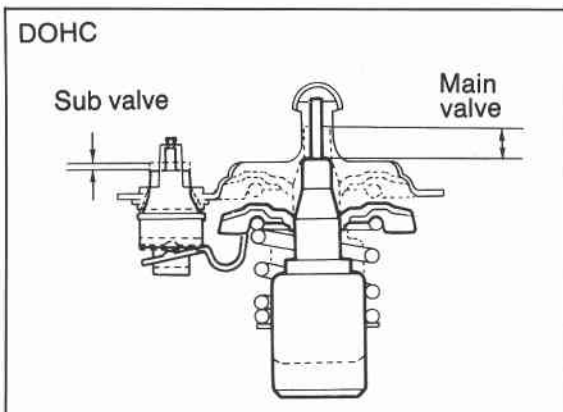


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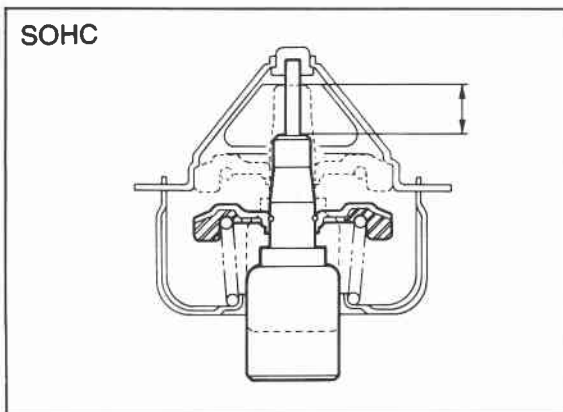
THERMOSTAT

REMOVAL

1. Drain the engine coolant.
2. Remove the thermostat cover.
3. Remove the thermostat.



76G03A-008



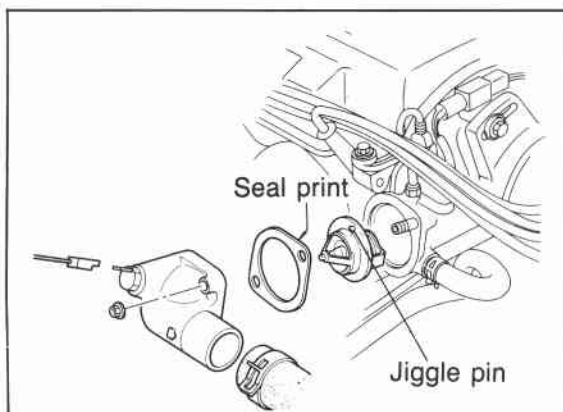
76G03A-009

INSPECTION

Check the thermostat. Replace if necessary.

1. Visually check that the valve is airtight.
2. Place the thermostat and a thermometer in water.
3. Gradually heat the water and check the following:

Model	FE-DOHC	FE 8-valve F8,F6...except Middle East General FE 12-valve	FE 8-valve, F8,F6...only Middle East General
Item			
Initial opening temperature	Sub valve 83.5—86.5°C (182—188°F) Main valve 86.5—89.5°C (188—193°F)	86.5—89.5°C (188—193°F)	80.5—83.5°C (177—182°F)
Full-open temperature	100°C (212°F)		95°C (203°F)
Full-open lift	Sub valve 1.5 mm (0.06 in) min. Main valve 8.0 mm (0.31 in) min.	8.5 mm (0.33 in)min.	



86U03X-018

INSTALLATION

1. Install the thermostat into the cylinder head with jiggle pin at the top.
2. Install a new gasket with the seal print side facing the cylinder head.
3. Install the thermostat cover.

Tightening torque:

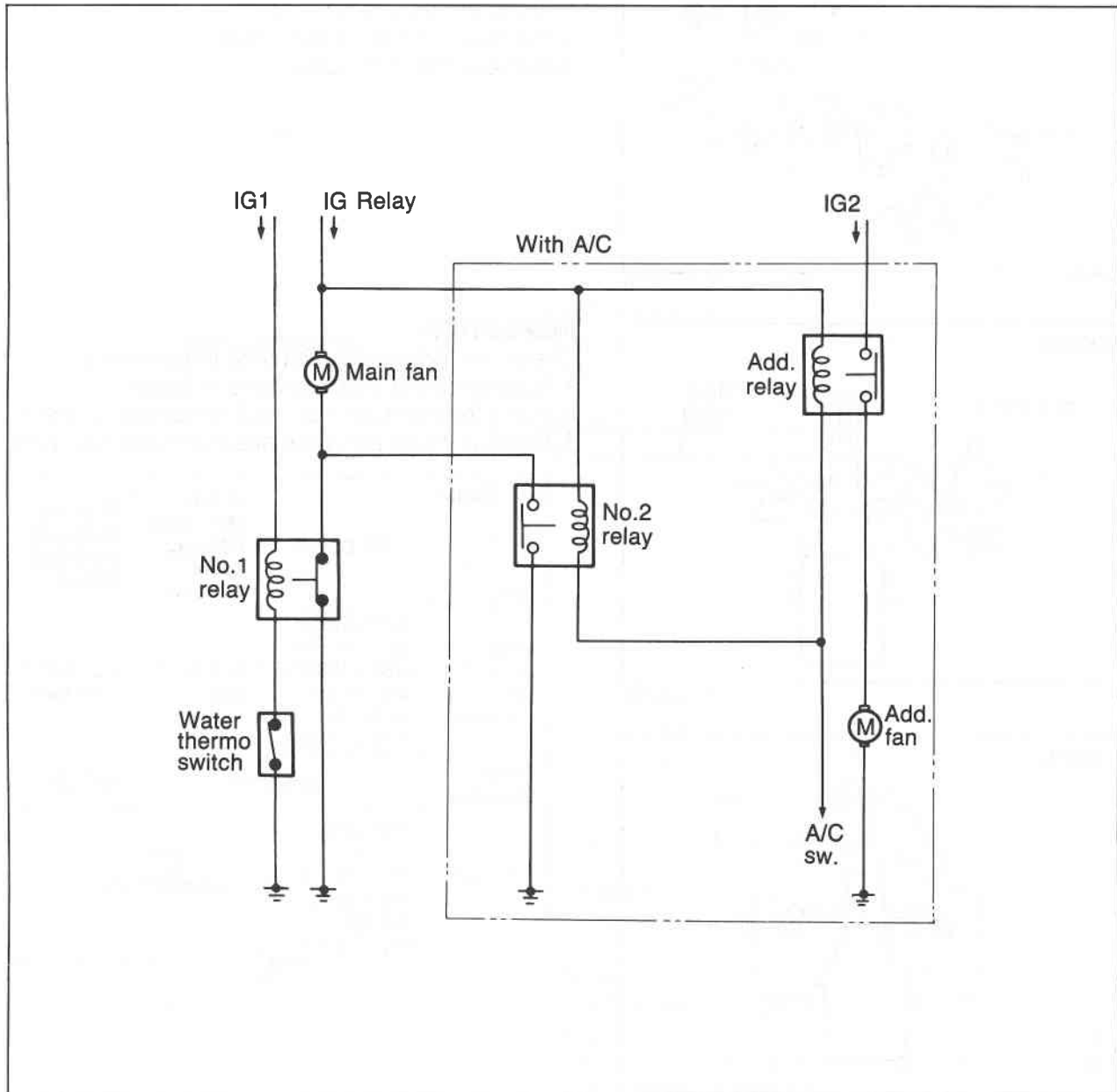
19—30 N·m (1.9—3.1 m·kg, 14—22 ft·lb)

4. Replenish the coolant.
5. Start the engine and check for leaks.

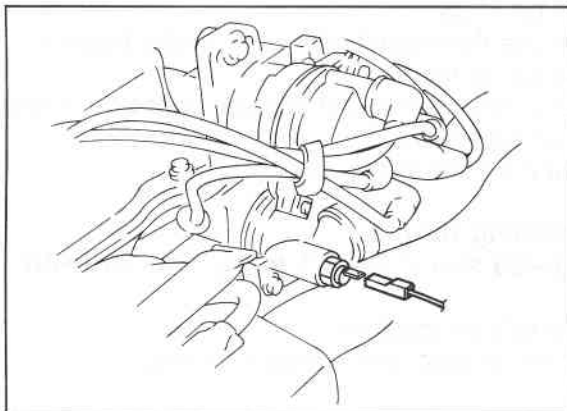
3A COOLING FAN

COOLING FAN

SYSTEM CIRCUIT



86U03X-019



76G03A-010

CIRCUIT INSPECTION

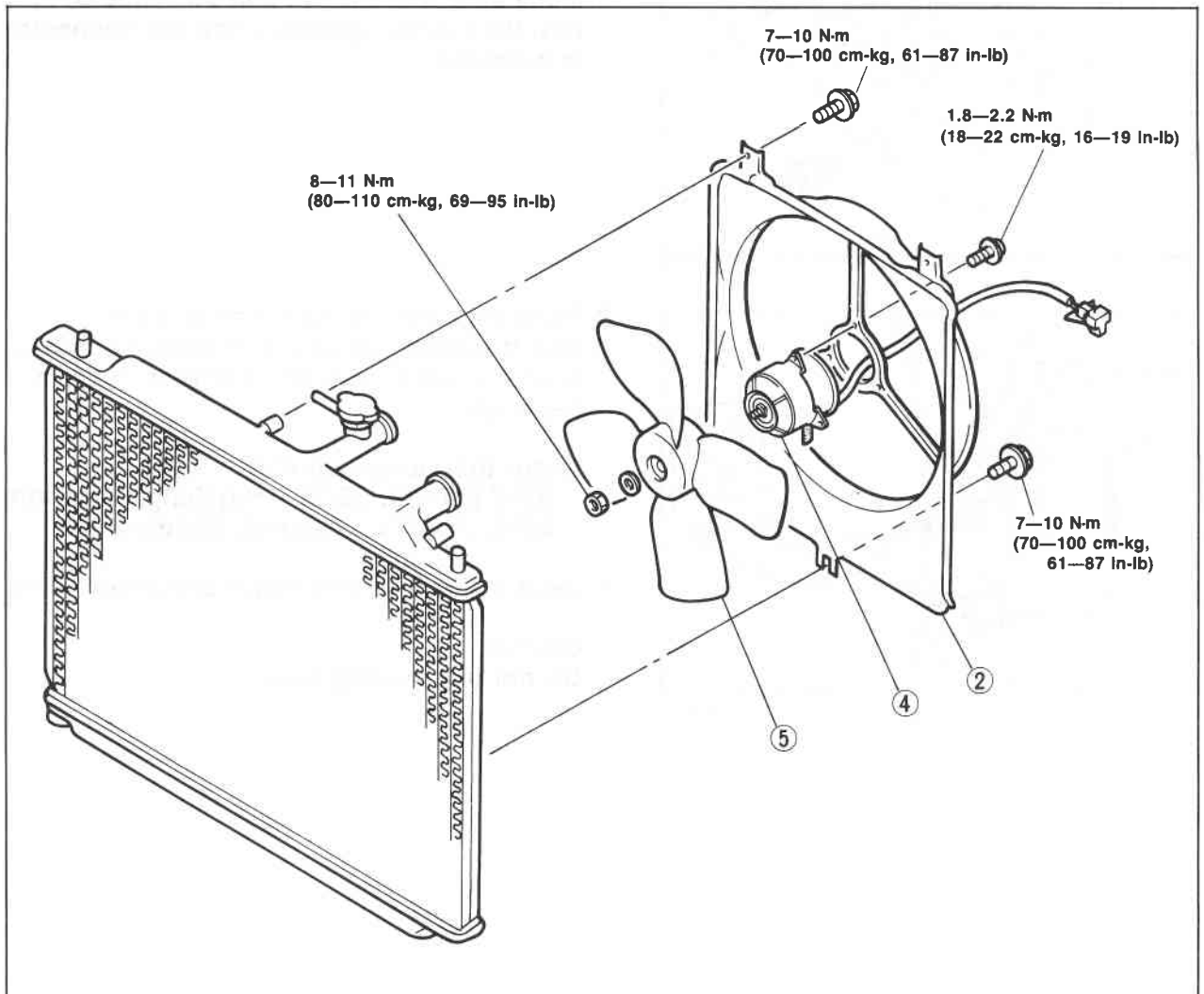
1. Turn the ignition switch ON.
2. Disconnect the water thermo switch connector, and check that the fan operates.
3. If the fan doesn't operate, check the fuse, fan relay, fan motor, thermo switch and wiring harness.

FAN MOTOR

Removal and Installation

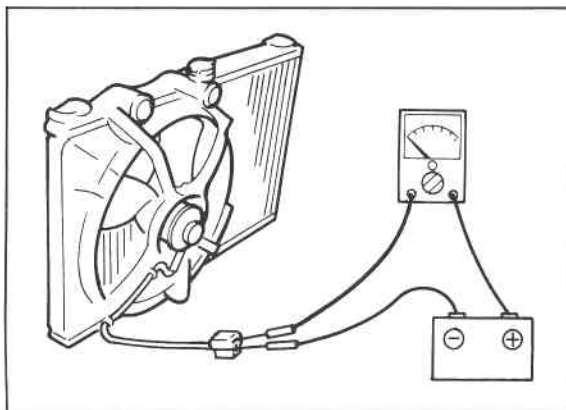
1. Remove in the sequence shown in the figure.
2. Install in the reverse order of removal.

86U03X-021



76G03A-011

1. Cooling fan assembly (Refer to page 3A-7)
2. Cowling
3. Fan
4. Fan motor



76G03A-012

Inspection

1. Connect an ammeter and battery to the fan motor connectors.
2. Check that the fan motor operates smoothly at the specified current or less.

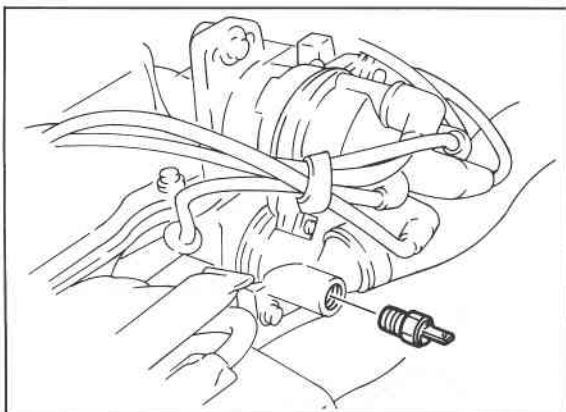
Current

MTX: 5.6—7.6 A

ATX: 8.0—11.0 A

3. Replace the fan motor if necessary.

3A COOLING FAN



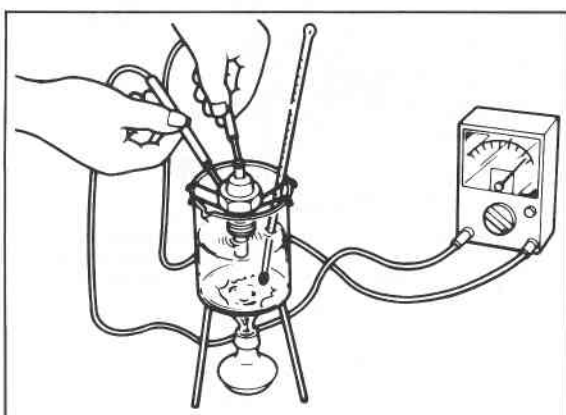
76G03A-013

WATER THERMO SWITCH

1. Remove the cooling fan water thermo switch.

Note

Make sure that the ignition switch is OFF. If not, the fan will operate when the connector is removed.



76G03A-014

2. Place the water thermo switch in water.
3. Heat the water gradually, and check for continuity of the switch with an ohmmeter. Replace if necessary.

Water thermo switch (ON → OFF):

97°C (207°F)....ECE, Hong Kong, Singapore

91°C (196°F)....General, Middle East

4. Install the water thermo switch and a new O-ring.

Caution

Do not use sealing tape.