

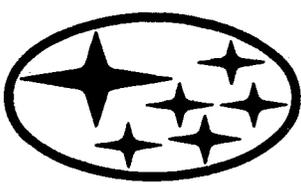
ENGINE COOLING SYSTEM

SUBARU

SVX

1992

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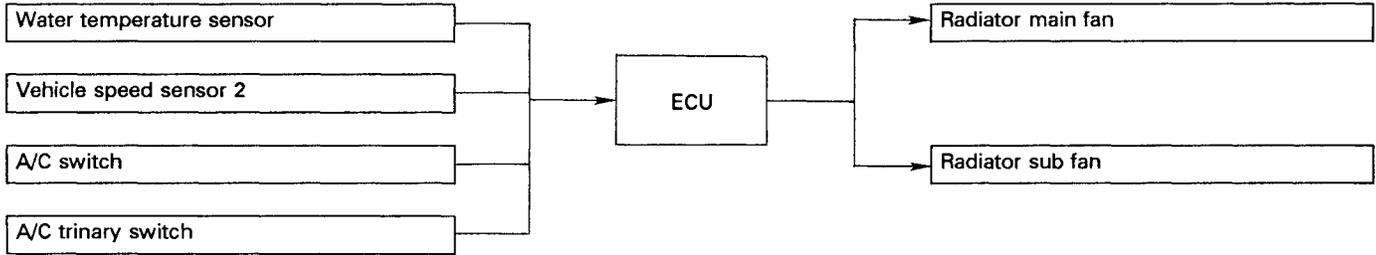


M MECHANISM AND FUNCTION

1. General

The engine cooling system consists of a down-flow radiator which features high heat-dissipation performance, an electric motor fan, a water pump, a thermostat, and a thermometer. The reserve tank is designed to eliminate the need for replenishing coolant.

ECU sends ON or OFF, and Lo (low) MID (medium) or Hi (high) switch signals to the radiator main fan and sub fan in response to signals from the water temperature sensor, vehicle speed sensor 2, A/C switch and A/C trinary switch.



2. Cooling Lines

This cooling system operates in three steps depending on the temperature of the coolant flowing through the cooling circuit.

1) 1st step ... With thermostat closed
 At coolant temperature of below 76°C (169°F), the thermostat remains closed and the coolant flows through the bypass and heater circuits.
 This permits the engine to warm up quickly.

2) 2nd step ... With thermostat opened
 When the coolant temperature is above 76 — 80°C (169 — 176°F), the thermostat opens and the coolant flows through the radiator where it is cooled.

3) 3rd step ... With electric cooling fan operating
 When the coolant temperature rises above 95°C (203°F), the water temperature sensor is turned on and radiator fan rotates.

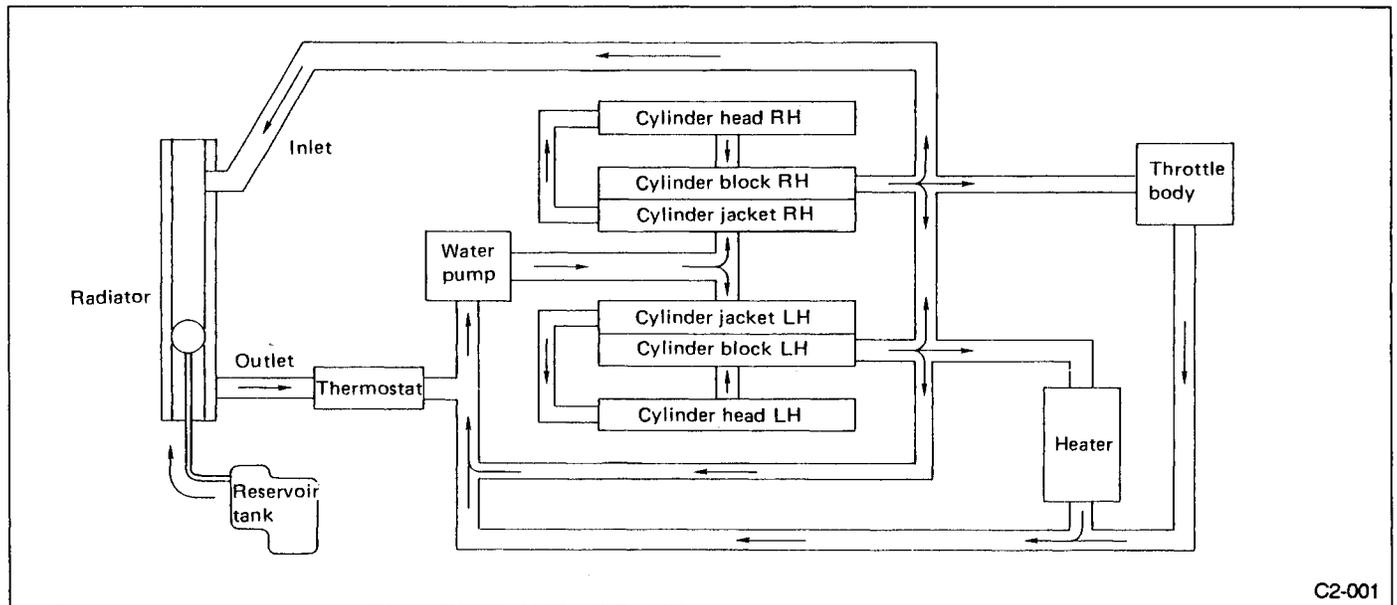


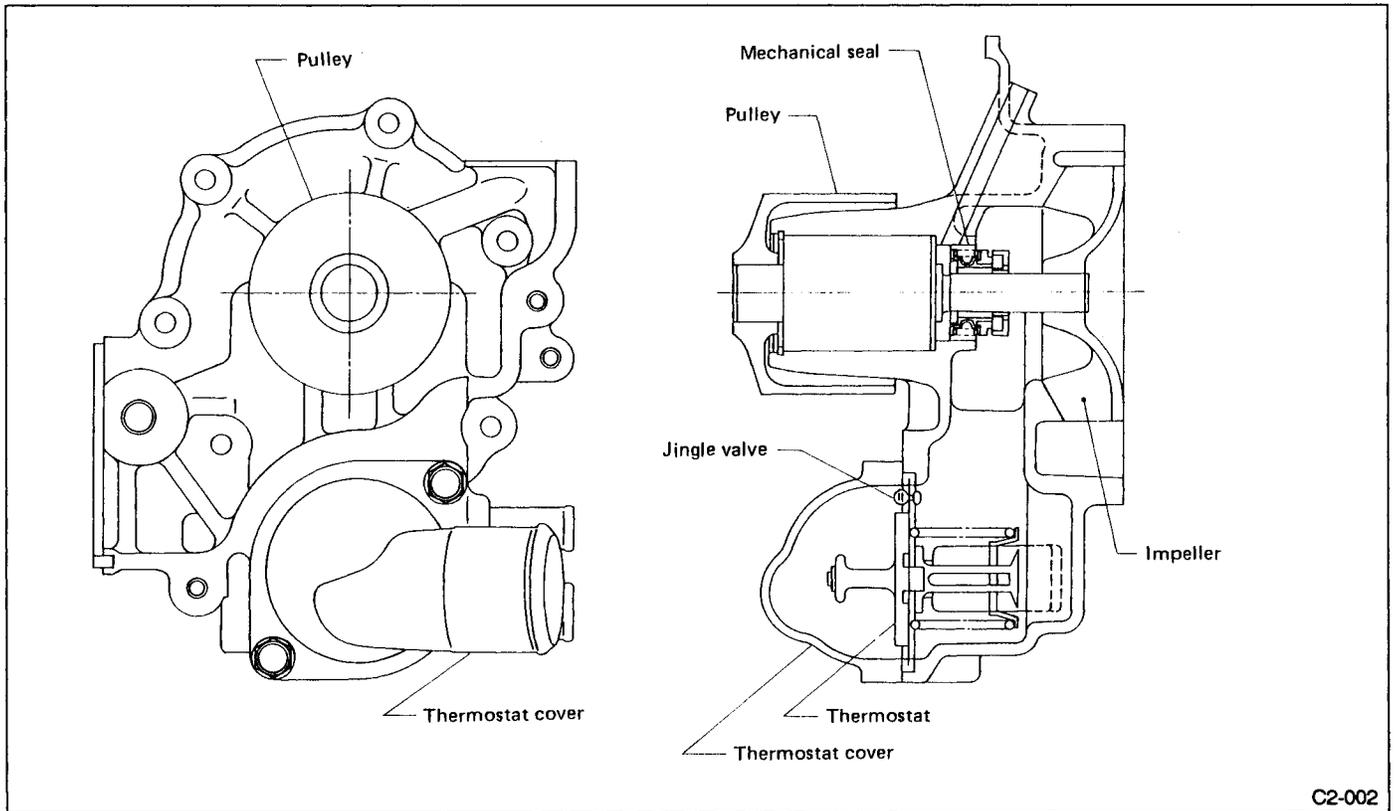
Fig. 1

C2-001

3. Water Pump

The water pump is located on the left front portion of the cylinder block and is driven by the back of the timing belt. The thermostat is built into the water inlet located on the lower side of the water pump. When the impeller

rotates, engine coolant is drawn into the water pump from the lower pipe (which is connected to the radiator hose) via the thermostat. It then flows along the perimeter of the impeller and is delivered to the engine's water passage.

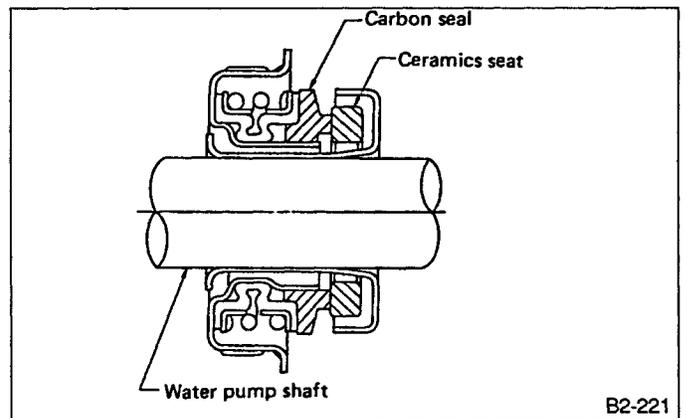


C2-002

Fig. 2

4. Mechanical Seal

The mechanical seal has its seat pressed into the water pump shaft to form the seal and water pump as a single unit. With this design, the water pump cannot be disassembled.



B2-221

Fig. 3

5. Thermostat

The thermostat is powered to open the valve by a totally-enclosed wax pellet which expands with in-

creased temperature. It provides the sure open-close operation of the valve and features high durability.

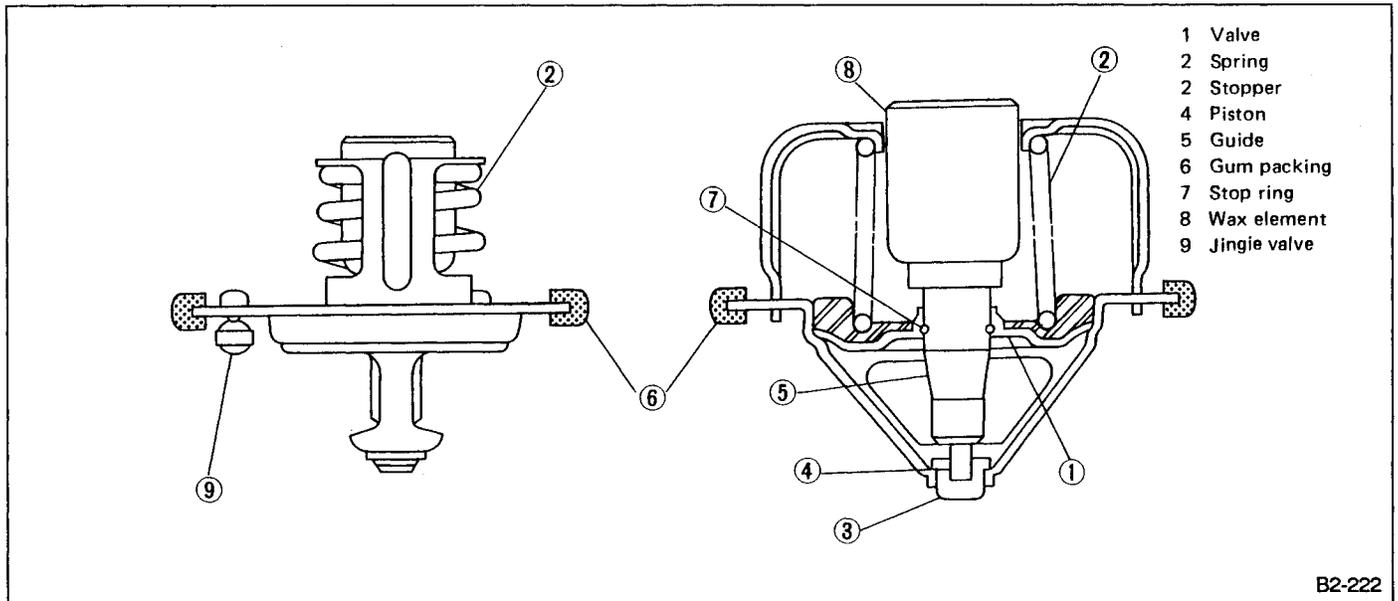


Fig. 4

B2-222

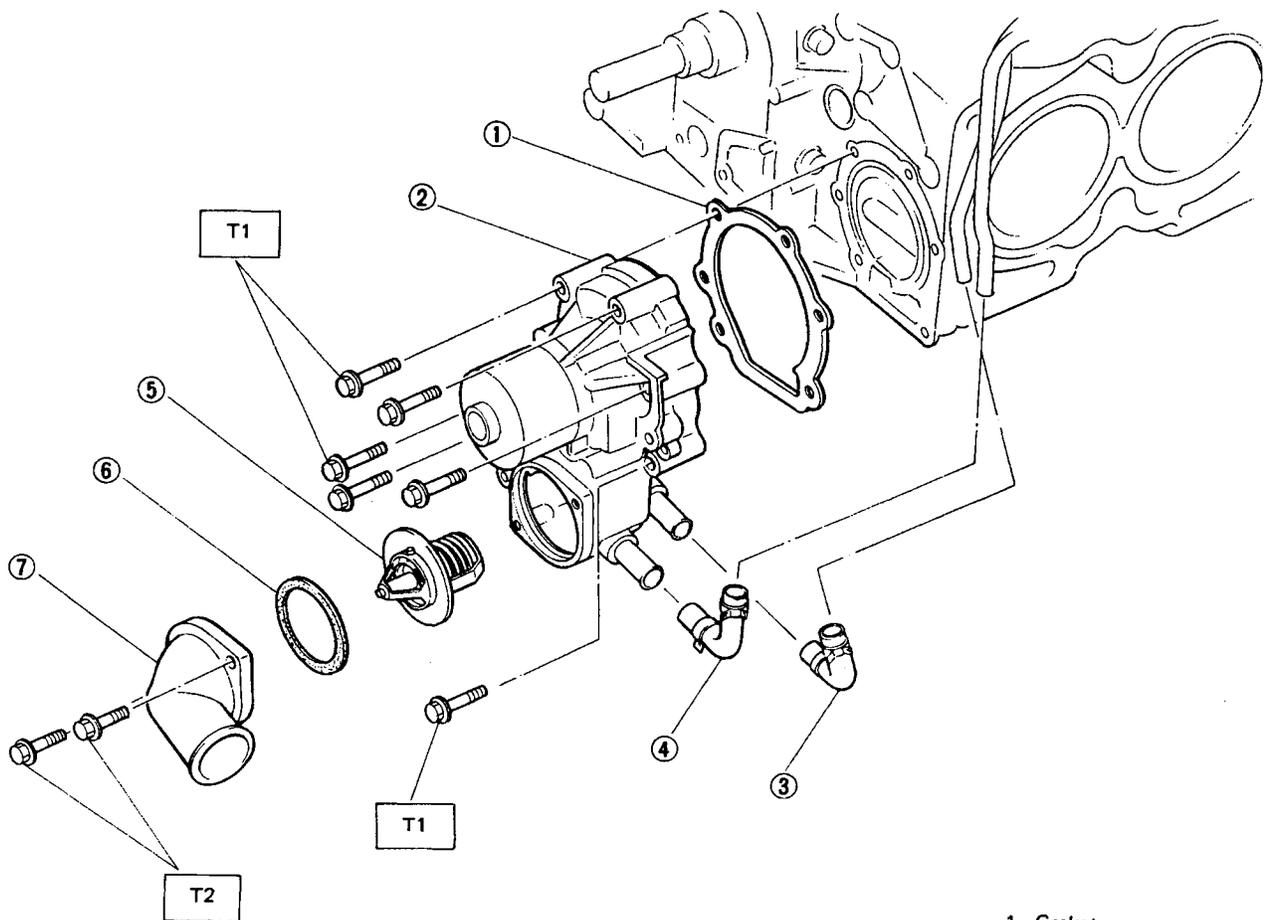
S SPECIFICATIONS AND SERVICE DATA

A: SPECIFICATIONS

Cooling system		Electric fan + Forced engine coolant circulation system	
Total coolant capacity		7.5 ℓ (7.9 US qt, 6.6 Imp qt)	
Engine coolant pump	Type	Centrifugal impeller type	
	Discharge performance I	Discharge	20 ℓ (5.3 US gal, 4.4 Imp gal)/min.
		Pump speed — total water head	760 rpm — 0.3 mAq (1.0 ft Aq)
		Engine coolant temperature	85°C (185°F)
	Discharge performance II	Discharge	100 ℓ (26.4 US gal, 22.0 Imp gal)/min.
		Pump speed — total water head	3,000 rpm — 5.0 mAq (16.4 ft Aq)
		Engine coolant temperature	85°C (185°F)
	Discharge performance III	Discharge	200 ℓ (52.8 US gal, 44.0 Imp gal)/min.
		Pump speed — total water head	6,000 rpm — 23.0 mAq (75.5 ft Aq)
		Engine coolant temperature	85°C (185°F)
Impeller diameter	76 mm (2.99 in)		
Number of impeller vanes	8		
Pump pulley diameter	60 mm (2.36 in)		
Thermostat	Type	Wax pellet type	
	Starts to open	76 — 80°C (169 — 176°F)	
	Fully opens	91°C (196°F)	
	Valve lift	9.0 mm (0.354 in) or more	
	Valve bore	35 mm (1.38 in)	
Fan control (main)	Motor	175 W	
	Fan dia. x blade	320 mm (12.60 in) x 4	
Fan control (sub)	Motor	175 W	
	Fan dia. x blade	320 mm (12.60 in) x 5	
Radiator	Type	Down-flow, pressure type	
	Core dimensions	691 x 345 x 25 mm (27.20 x 13.58 x 0.98 in)	
	Pressure range in which cap valve is open	Above 88 ± 10 kPa (0.9 ± 0.1 kg/cm ² , 13 ± 1.4 psi) Below -4.9 to -10 kPa (-0.05 to -0.1 kg/cm ² , -0.7 to -1.4 psi)	
	Fins	Corrugated fin type	
Reservoir tank	Capacity	0.55 ℓ (0.6 US qt, 0.5 Imp qt)	

C COMPONENT PARTS

1. Water Pump



- 1 Gasket
- 2 Water pump CP
- 3 Heater hose (Inlet)
- 4 Heater hose (Outlet)
- 5 Thermostat
- 6 Gasket
- 7 Thermostat cover

Tightening torque: N.m (kg-m, ft-lb)

T1: First 10 – 14 (1.0 – 1.4, 7 – 10)
Second 10 – 14 (1.0 – 1.4, 7 – 10)

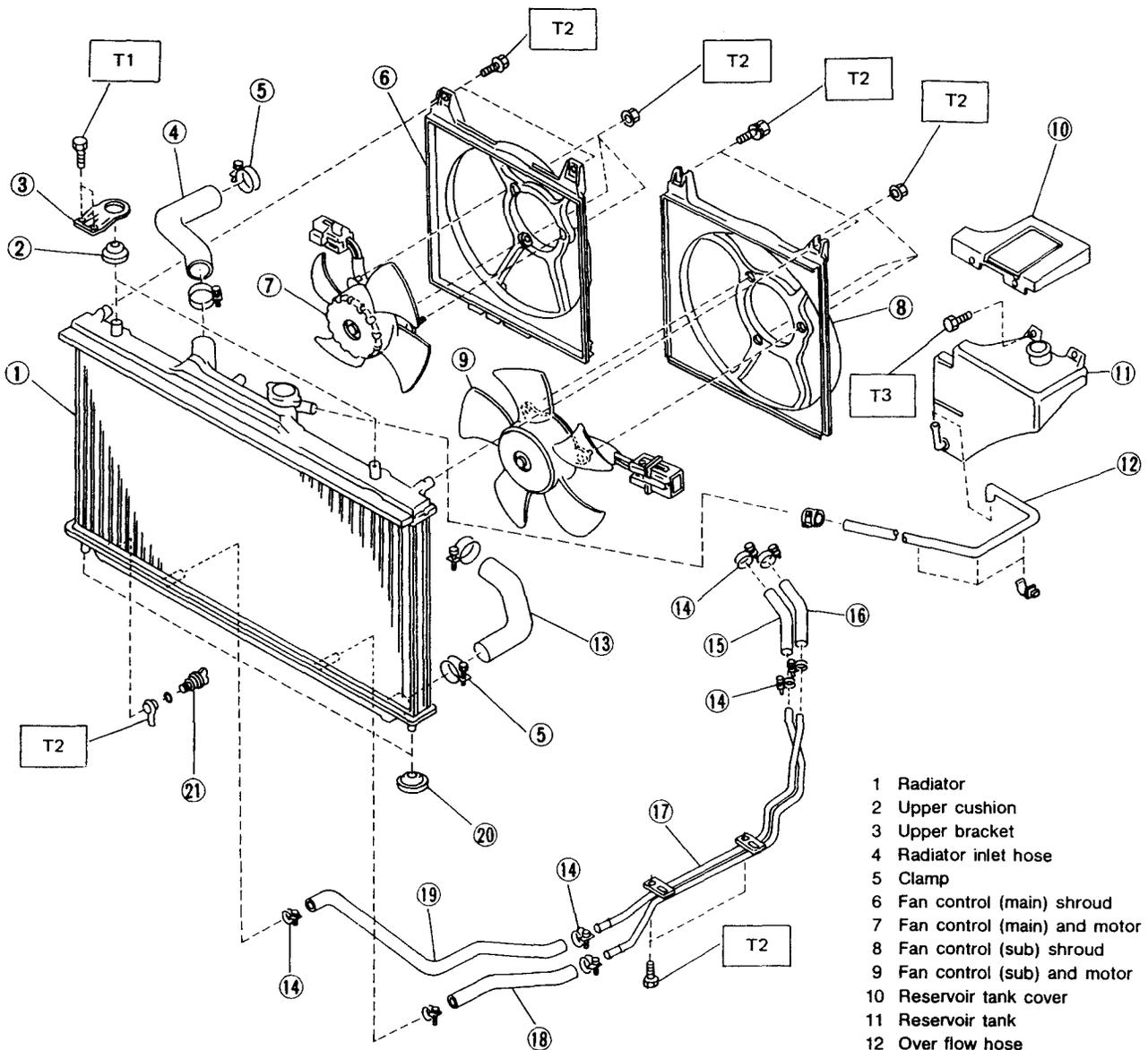
T2: 6 – 7 (0.6 – 0.7, 4.3 – 5.1)

Fig. 5

C2-003

C COMPONENT PARTS

2. Radiator and Fan Control



- 1 Radiator
- 2 Upper cushion
- 3 Upper bracket
- 4 Radiator inlet hose
- 5 Clamp
- 6 Fan control (main) shroud
- 7 Fan control (main) and motor
- 8 Fan control (sub) shroud
- 9 Fan control (sub) and motor
- 10 Reservoir tank cover
- 11 Reservoir tank
- 12 Over flow hose
- 13 Radiator outlet hose
- 14 Clamp
- 15 ATF cooler inlet hose A
- 16 ATF cooler outlet hose A
- 17 ATF cooler pipe
- 18 ATF cooler inlet hose B
- 19 ATF cooler outlet hose B
- 20 Lower cushion
- 21 Engine coolant drain cock
- 22 Drain pipe

Tightening torque: N·m (kg·m, ft·lb)

T1: 13 — 23 (1.3 — 2.3, 9 — 17)

T2: 5.5 — 9.5 (0.56 — 0.97, 4.06 — 7.01)

T3: 4.5 — 7.5 (0.46 — 0.77, 3.32 — 5.53)

Fig. 1

3. Water Pipe

- 1 Water pipe CP
- 2 Water temperature gauge
- 3 Water temperature sensor
- 4 O-ring
- 5 O-ring
- 6 Auxiliary air control valve

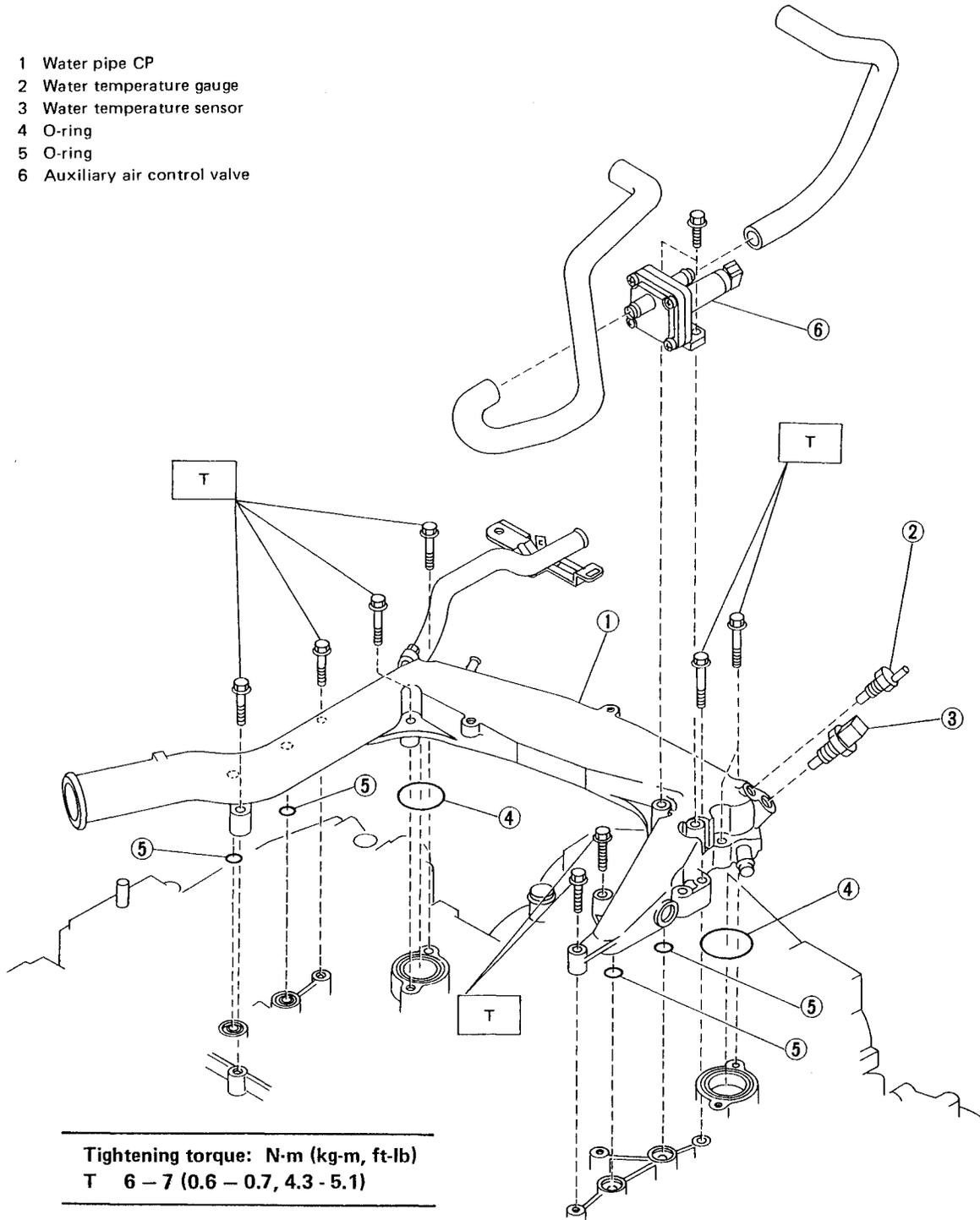


Fig. 7

W SERVICE PROCEDURE

1. Water Pump

A: REMOVAL

- 1) Open the front hood.
- 2) Disconnect the ground cable from the battery.
- 3) Drain the coolant completely.
- 4) Disconnect the radiator outlet hose.
- 5) Disconnect radiator fan motor connector.

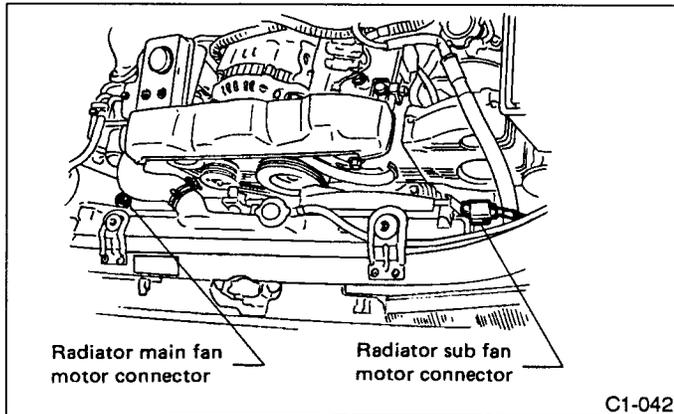


Fig. 8

- 6) Remove radiator bracket.
- 7) Remove radiator sub fan motor ASSY.

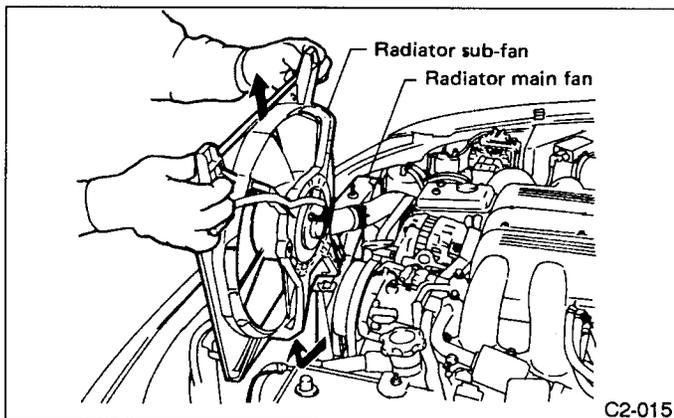


Fig. 9

- 8) Remove V-belt(s).
(Refer to "Chapter 1-5 section 1".)
- 9) Remove timing belt.
(Refer to "Chapter 1-5 section 2".)
- 10) Remove tensioner adjuster.
- 11) Remove cam angle sensor.

- 12) Remove left side camshaft pulley.

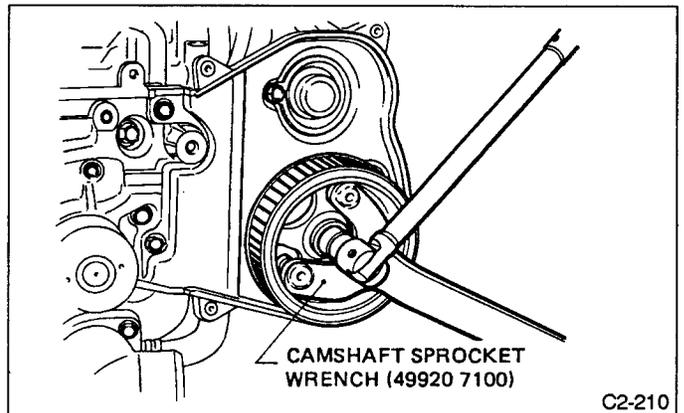


Fig. 10

- 13) Remove left side rear timing belt cover.

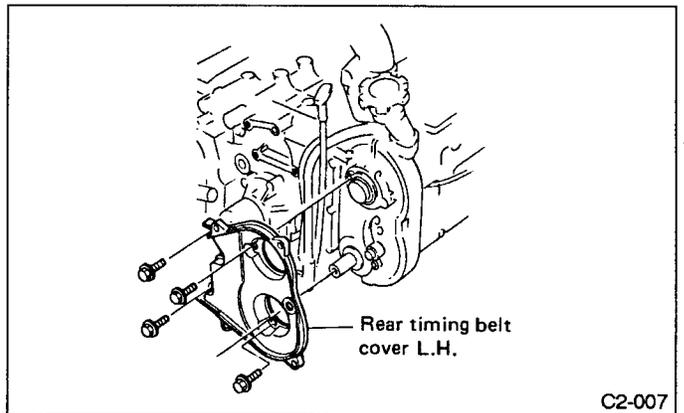


Fig. 11

- 14) Remove tensioner bracket.
- 15) Disconnect radiator hose and heater hose from water pump.
- 16) Remove water pump.

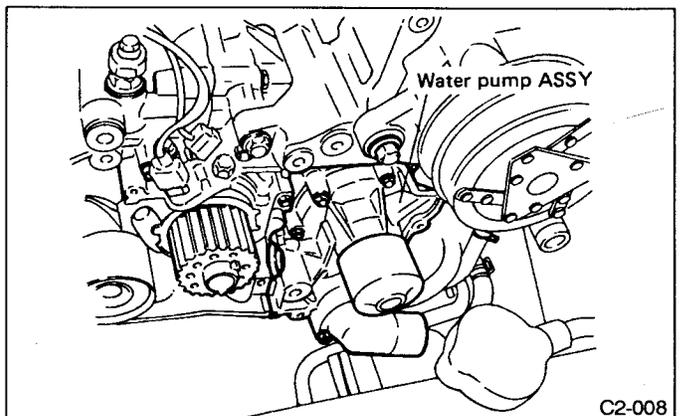


Fig. 12

B: INSPECTION

- 1) Check water pump bearing for smooth rotation.
- 2) Check water pump pulley for abnormalities.
- 3) Using a dial gauge, measure impeller runout in thrust direction while rotating the pulley.

"Thrust" runout limit:
0.5 mm (0.020 in)

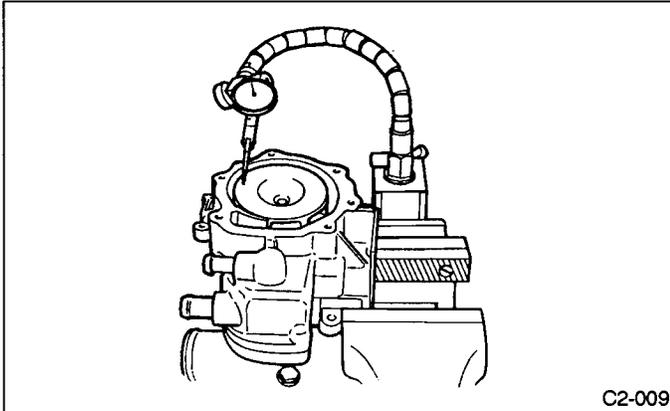


Fig. 13

- 4) Check clearance between impeller and pump case.

Clearance between impeller and pump case:**Standard**

0.5 — 0.7 mm (0.020 — 0.028 in)

Limit

1.0 mm (0.039 in)

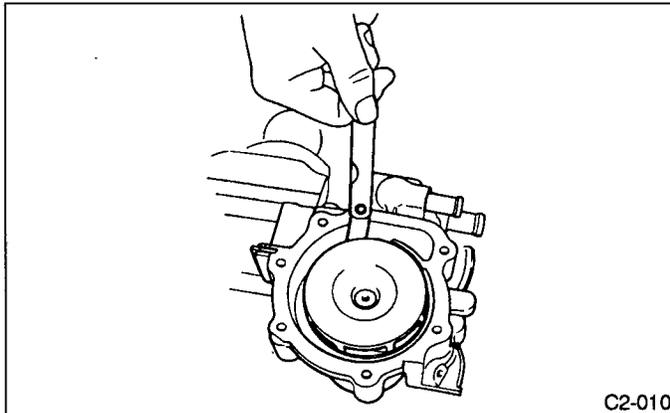


Fig. 14

- 5) After water pump installation, check pulley shaft for water leaks. If leaks are noted, replace water pump ASSY.

C: INSTALLATION

Installation is in the reverse order of removal.

a. Always use a new gasket.

b. When installing water pump, tighten all bolts in two steps in numerical sequence as shown in Figure.

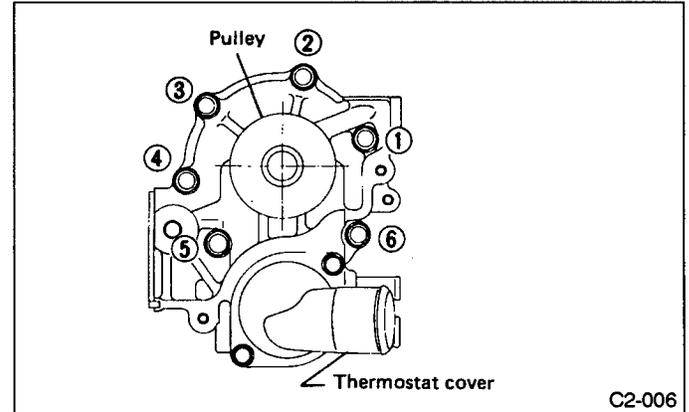


Fig. 15

Tightening torque: N·m (kg-m, ft-lb)

First: 10 — 14 (1.0 — 1.4, 7 — 10)

Second: 10 — 14 (1.0 — 1.4, 7 — 10)

c. After reinstalling the water pump, run the engine to make sure that neither water leakage nor abnormal noise exists.

2. Thermostat

A: REMOVAL AND INSTALLATION

- 1) Remove the thermostat case cover and gasket, and pull out the thermostat.
- 2) Install the thermostat in the intake manifold, and install the thermostat cover together with a gasket.
 - a. When reinstalling the thermostat, use a new gasket.
 - b. The thermostat must be installed with the jiggle pin upward.
 - c. In this time, set the jiggle pin of thermostat for front side.

B: INSPECTION

Replace the thermostat if the valve does not close completely at an ambient temperature or if the following test shows unsatisfactory results.

Immerse the thermostat and a thermometer in water. Raise water temperature gradually, and measure the temperature and valve lift when the valve begins to open and when the valve is fully opened. During the test, agitate the water for even temperature distribution. The measurement should be to the specification.

Starts to open:

76.0 — 80.0°C (169 — 176°F)

Fully opens:

91°C (196°F)

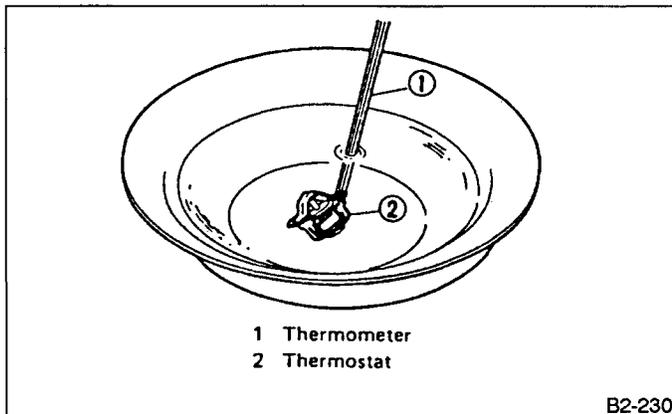


Fig. 16

3. Radiator

A: ON CAR SERVICE

- 1) Remove radiator cap, top off radiator, and attach tester to radiator in place of cap.
- 2) Apply a pressure of 157 kPa (1.6 kg/cm², 23 psi) to radiator to check if:
 - (1) Water leaks at/around radiator.
 - (2) Water leaks at/around hoses or connections.

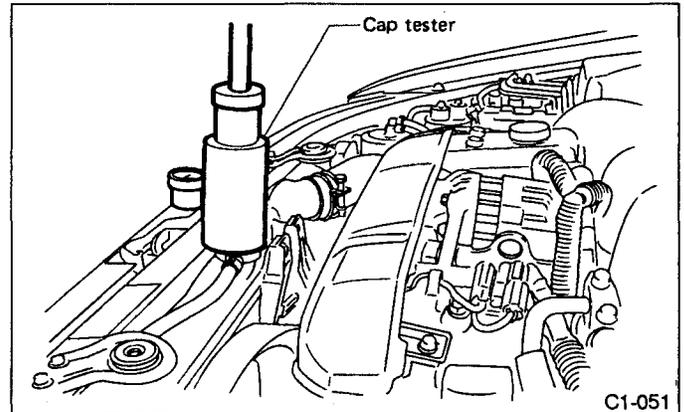


Fig. 17

- a. Engine should be off.
- b. Wipe water from check points in advance.
- c. Be careful to prevent cooling water from spurting out when removing tester.
- d. Be careful also not to deform filler neck of radiator when installing or removing tester.

B: REMOVAL

- 1) Disconnect battery cables and remove battery from body.
- 2) Lift up the vehicle, and remove lower cover.
- 3) Drain coolant from radiator.
 - (1) Fit end of vinyl tube into drain pipe.
 - (2) Loosen drain cock and drain coolant.

Refer to C.1-5.

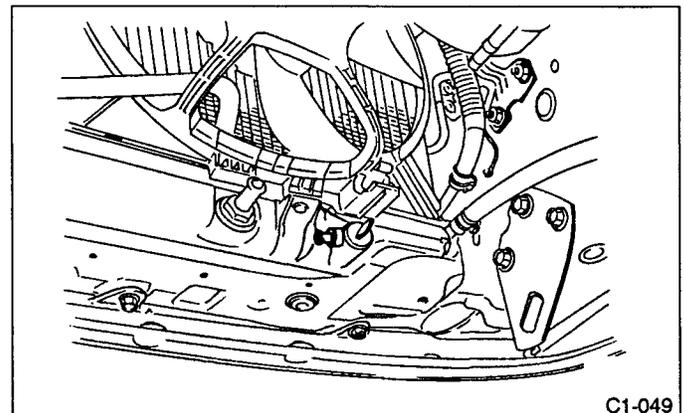


Fig. 18

- 4) Disconnect outlet hose from water pump.
Drain coolant into container.
- 5) Disconnect ATF cooler hose from pipe.
 - a. **Drain ATF into container.**
 - b. **Clog the pipe holes so as not to spill ATF.**

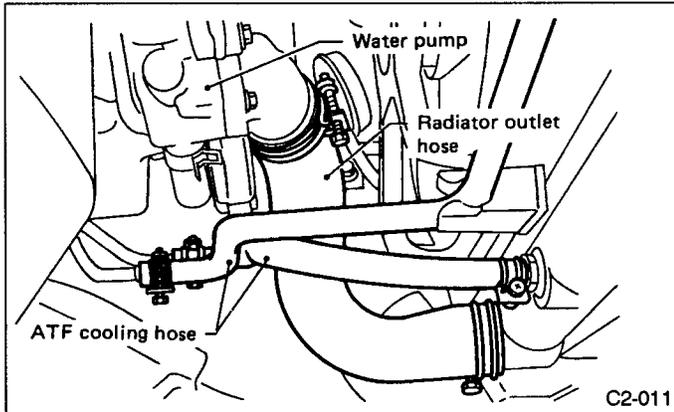


Fig. 19

- 6) Lower the vehicle.
- 7) Disconnect radiator fan motor connectors.

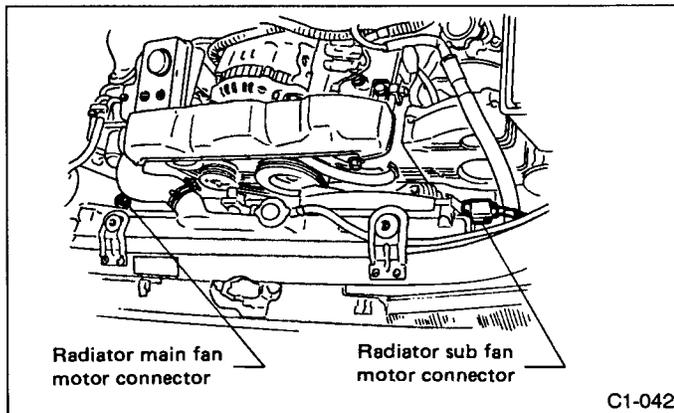


Fig. 20

- 8) Remove over-flow hose from radiator.
- 9) Remove V-belt cover.

- 10) Disconnect inlet hose from water pipe.

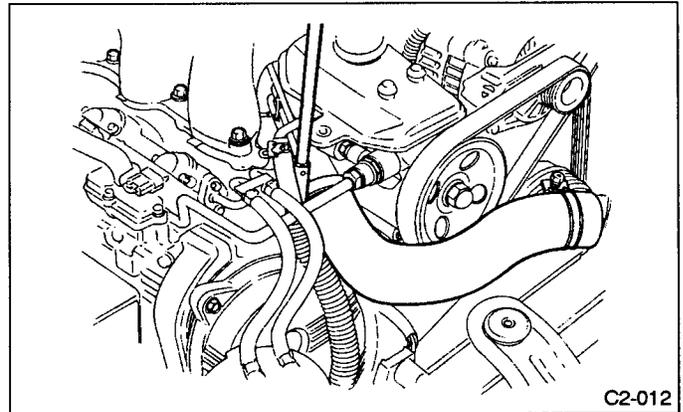


Fig. 21

- 11) Remove radiator upper bracket.

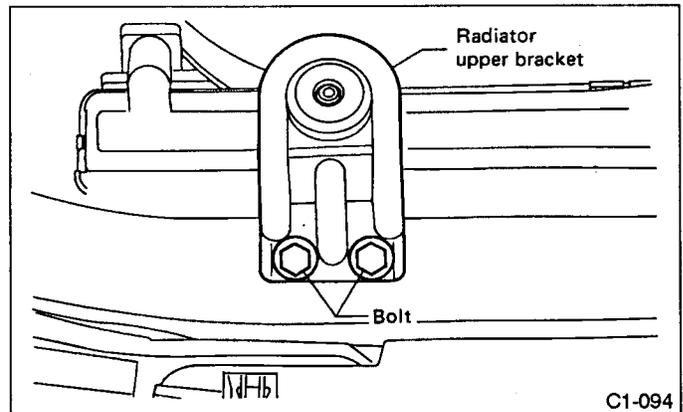


Fig. 22

- 12) Lift radiator up and away from vehicle.

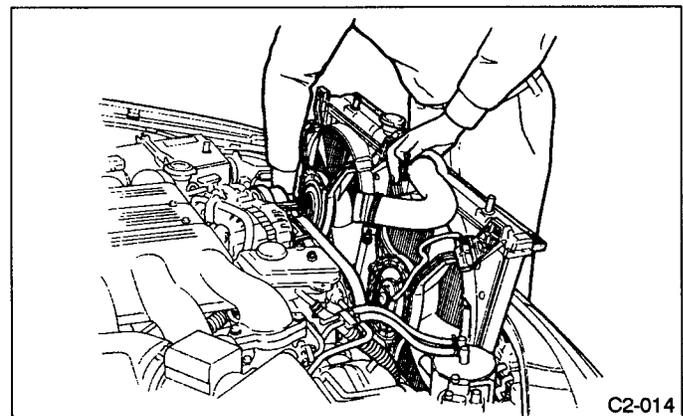


Fig. 23

C: INSTALLATION

- 1) Fit cushions on body and install radiator.

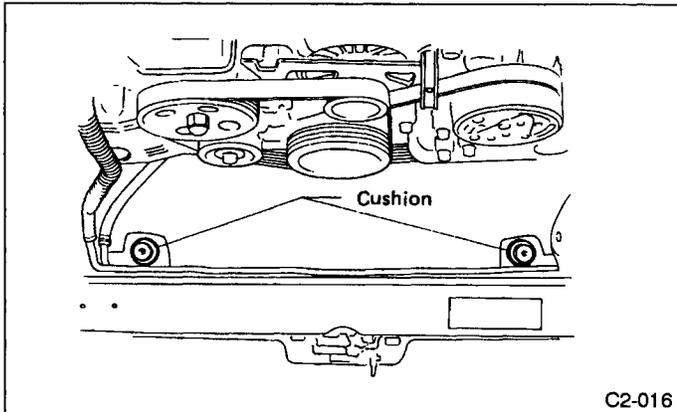


Fig. 24

- 2) Install radiator brackets and tighten bolts.
- 3) Connect radiator main fan and sub fan motor connectors.
- 4) Connect inlet hose and over-flow hose.
- 5) Install V-belt cover.
- 6) Lift up the vehicle, and connect outlet hose and ATF cooler hose.
- 7) Install lower cover.
- 8) Install battery and connect cables.
- 9) Pour coolant.
 - (1) Pour coolant into radiator up to filler neck position.
 - (2) Pour coolant into reservoir tank up to upper level.
 - (3) Attach radiator cap and reservoir tank cap properly.
 - (4) Warm up engine completely. (For more than 5 minutes at 2,000 to 3,000 rpm.)
 - (5) Stop engine and wait until temperature drops to a safe level.
 - (6) Remove radiator cap.
 - (7) If coolant level drops in radiator, add coolant to filler neck position.
 - (8) If coolant level drops from upper level of reservoir tank, add coolant to upper level.
 - (9) Attach radiator cap and reservoir tank cap properly.
- 10) Check ATF level.

4. Radiator Cap**A: INSPECTION**

- 1) Attach radiator cap to tester.
- 2) Increase pressure until tester gauge pointer stops. Radiator cap is functioning properly if it holds the service limit pressure for five to six seconds.

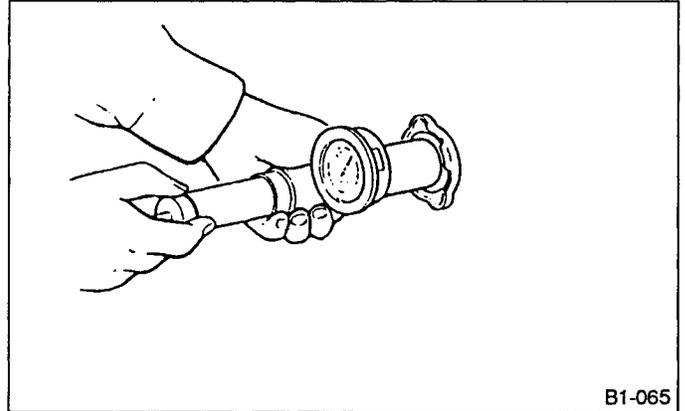


Fig. 25

Standard pressure:78 — 98 kPa (0.8 — 1.0 kg/cm², 11 — 14 psi)**Service limit pressure:**69 kPa (0.7 kg/cm², 10 psi)

Be sure to remove foreign matter and rust from the cap in advance; otherwise, results of pressure test will be incorrect.

5. Radiator Fan and Fan Motor

A: REMOVAL

- 1) Disconnect ground cable from battery terminal.
- 2) Disconnect connector from fan motor.
- 3) Remove radiator bracket.
- 4) Remove two bolts holding shroud to radiator upper side.
- 5) Remove radiator fan ASSY.

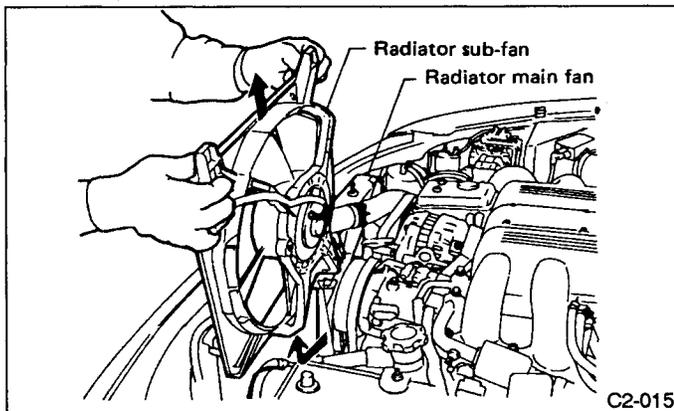


Fig. 26

- 6) Remove fan motor from shroud.

B: INSTALLATION

Installation is in the reverse order of removal procedures.

Observe the following:

- 1) Before installing radiator fan motor, apply a coat of sealant to threads and tighten nuts.

Tightening torque: N·m (kg-m, ft-lb)

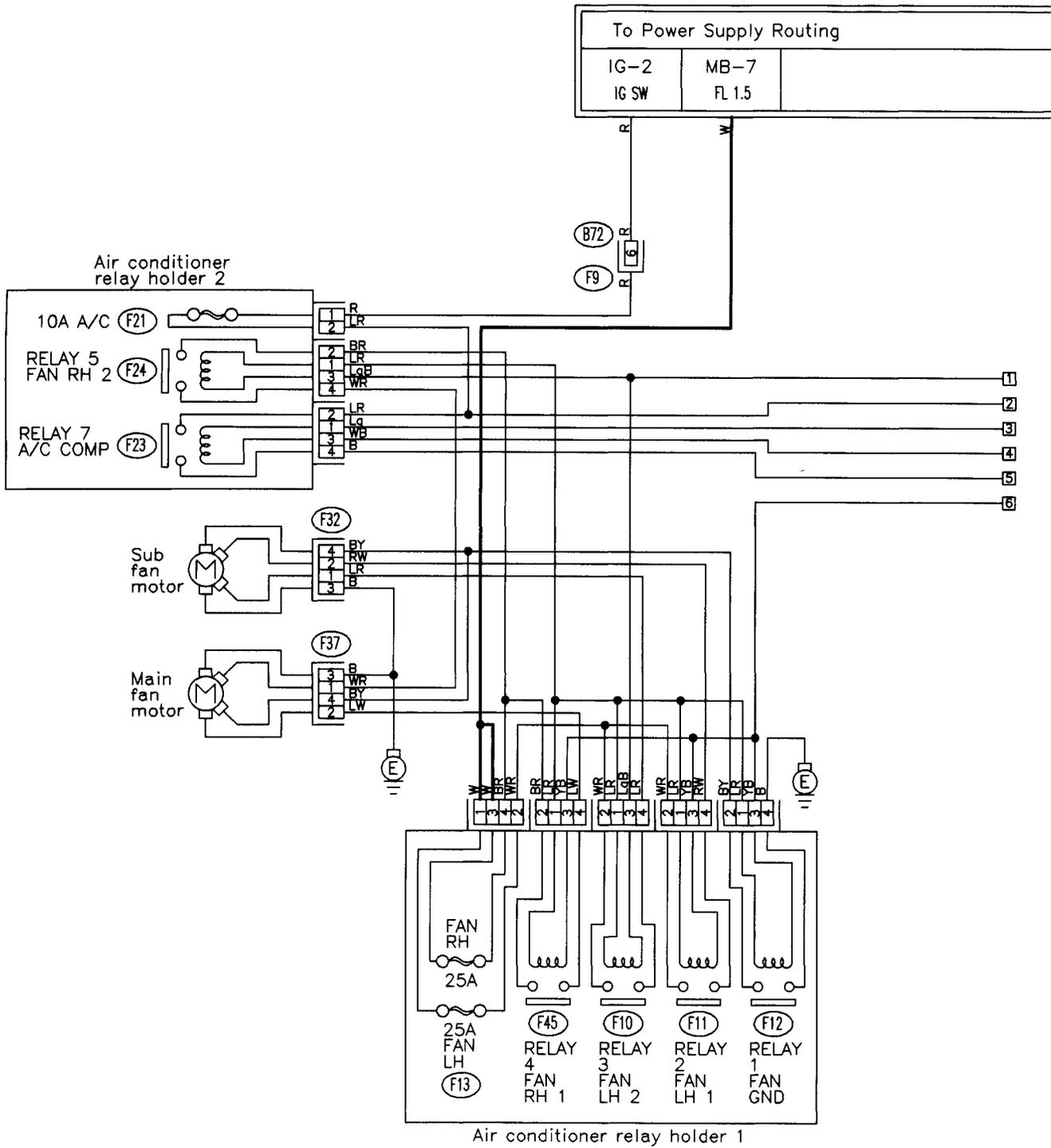
2 — 3 (0.2 — 0.3, 1.4 — 2.2)

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

1. Engine Cooling System

Trouble	Possible cause	Corrective action
Over-heating	a. Insufficient coolant.	Replenish coolant, inspect for leakage, and repair.
	b. Loose drive belt.	Adjust drive belt tension.
	c. Oil on drive belt.	Replace.
	d. Malfunction of thermostat.	Replace.
	e. Malfunction of water pump.	Replace.
	f. Clogged coolant passage.	Clean.
	g. Improper ignition timing.	Inspect and repair ignition control system. <Ref. to 2-7b On-Board Diagnostics II System.☆5>
	h. Clogged or leaking radiator.	Clean or repair, or replace.
	i. Improper engine oil.	Replace.
	j. Air-fuel mixture too thin.	Inspect and repair fuel injection system. <Ref. to 2-7b On-Board Diagnostics II System.☆5>
	k. Excessive back pressure in exhaust system.	Clean or replace.
	l. Insufficient clearance between piston and cylinder.	Adjust or replace.
	m. Slipping clutch.	Repair or replace.
	n. Dragging brake.	Adjust.
	o. Improper transmission oil.	Replace.
p. Defective thermostat.	Replace.	
q. Malfunction of radiator fan.	Inspect radiator fan relay, water temperature sensor or motor, and replace there.	
Over-cooling	a. Atmospheric temperature extremely low.	Partly cover radiator front area.
	b. Defective thermostat.	Replace.
Coolant leaks	a. Loosened or damaged connecting units on hoses.	Repair or replace.
	b. Leakage from water pump.	Replace.
	c. Leakage from intake manifold.	Repair or replace.
	d. Leakage around cylinder head gasket.	Retighten cylinder head nuts or replace gasket.
	e. Damaged or cracked cylinder head and crankcase.	Repair or replace.
	f. Damaged or cracked thermostat case.	Repair or replace.
	g. Leakage from radiator.	Repair or replace.
Noise	a. Defective drive belt.	Replace.
	b. Defective electric fan.	Replace.
	c. Defective water pump bearing.	Replace water pump.
	d. Defective water pump mechanical seal.	Replace water pump.

2. Radiator Fan



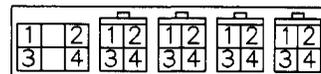
F32 (Gray)

F37 (Gray)

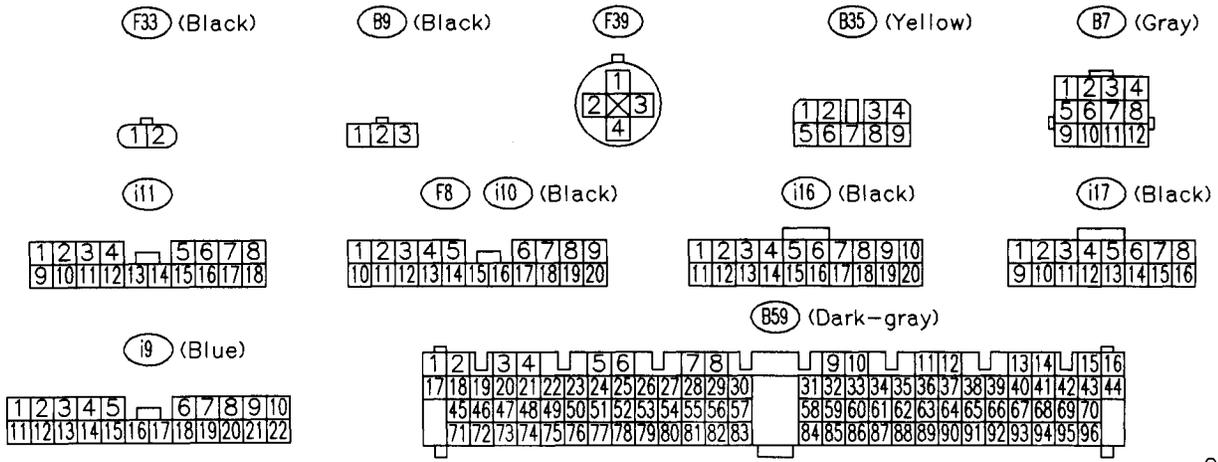
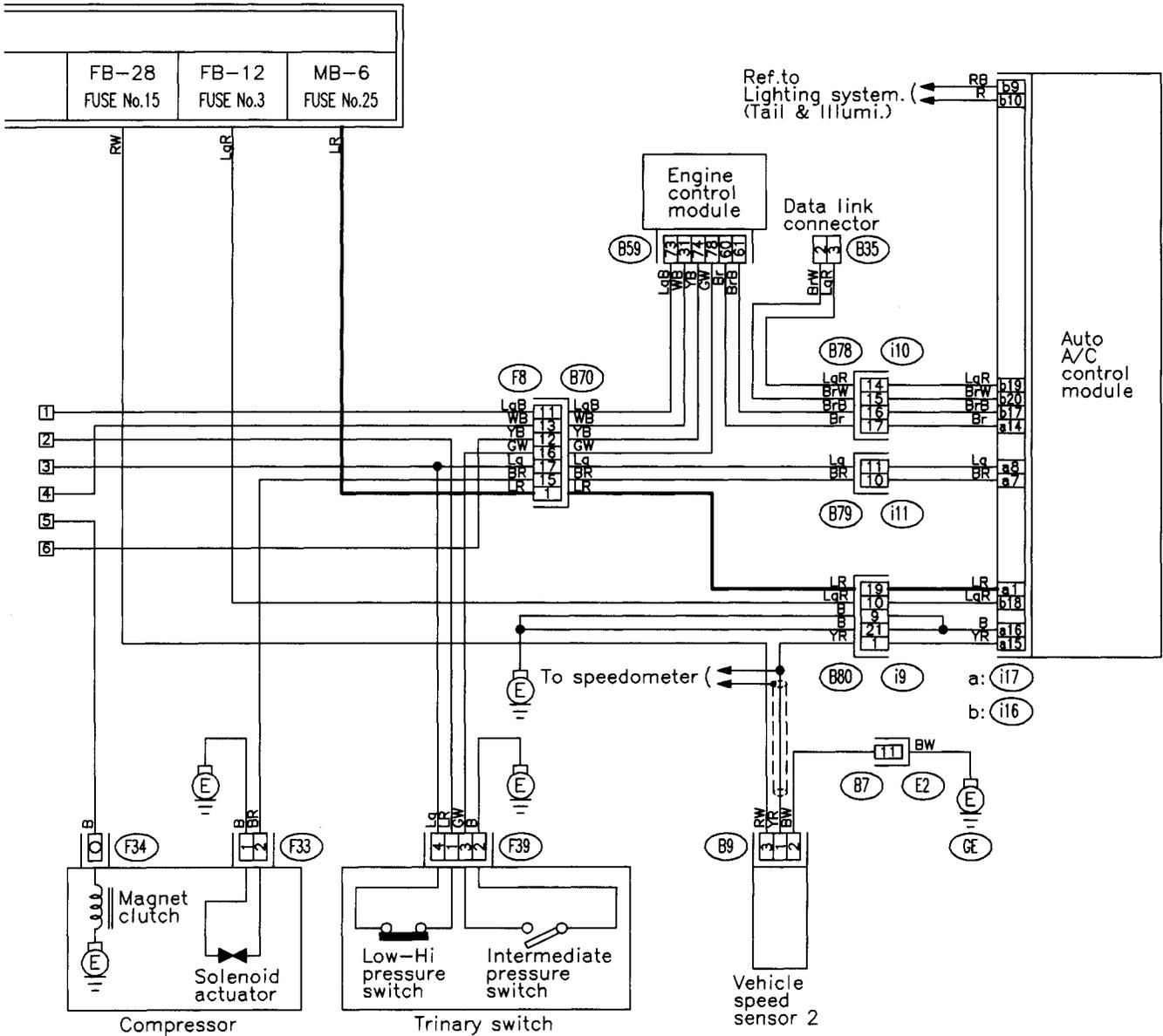
B72

F13 F45 F10 F11 F12

F21 F22 F23 F2 F24



(A/C relay holder 1 • 2)



A: LOW MODE OPERATION

DEFECTING CONDITION

Condition (1):

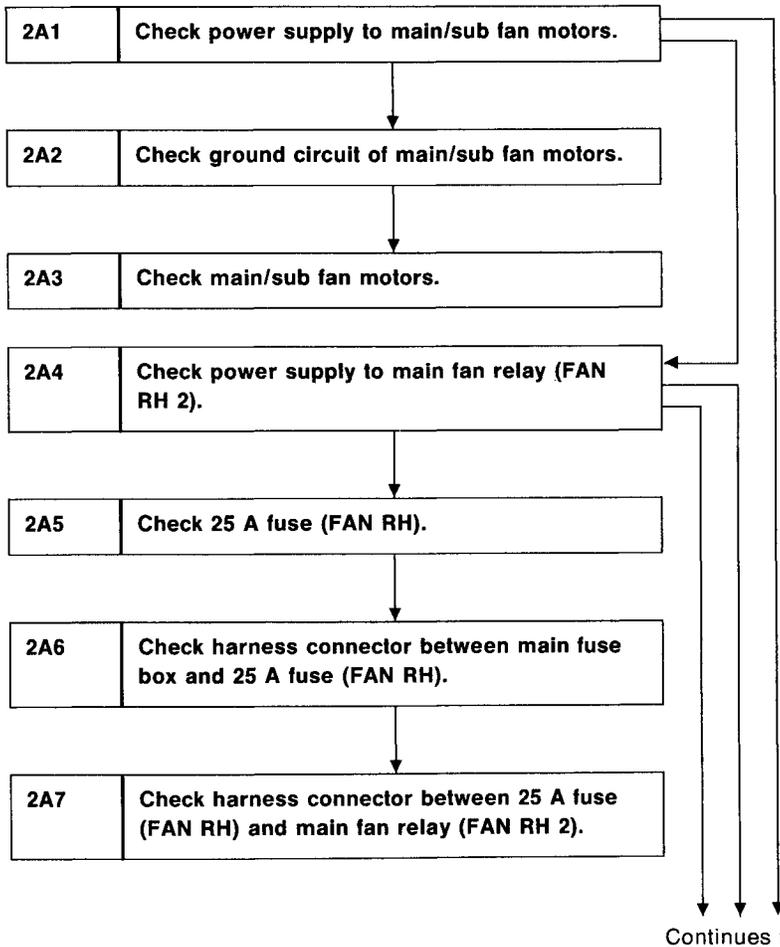
- Engine coolant temperature is below 89°C (192°F).
- A/C switch is turned ON.
- Vehicle speed is less than 10 km/h (6 MPH).
- A/C intermediate pressure switch is turned OFF. [less than 1,275 ± 147 kPa (13.0 ± 1.5 kg/cm², 185 ± 21 psi).]

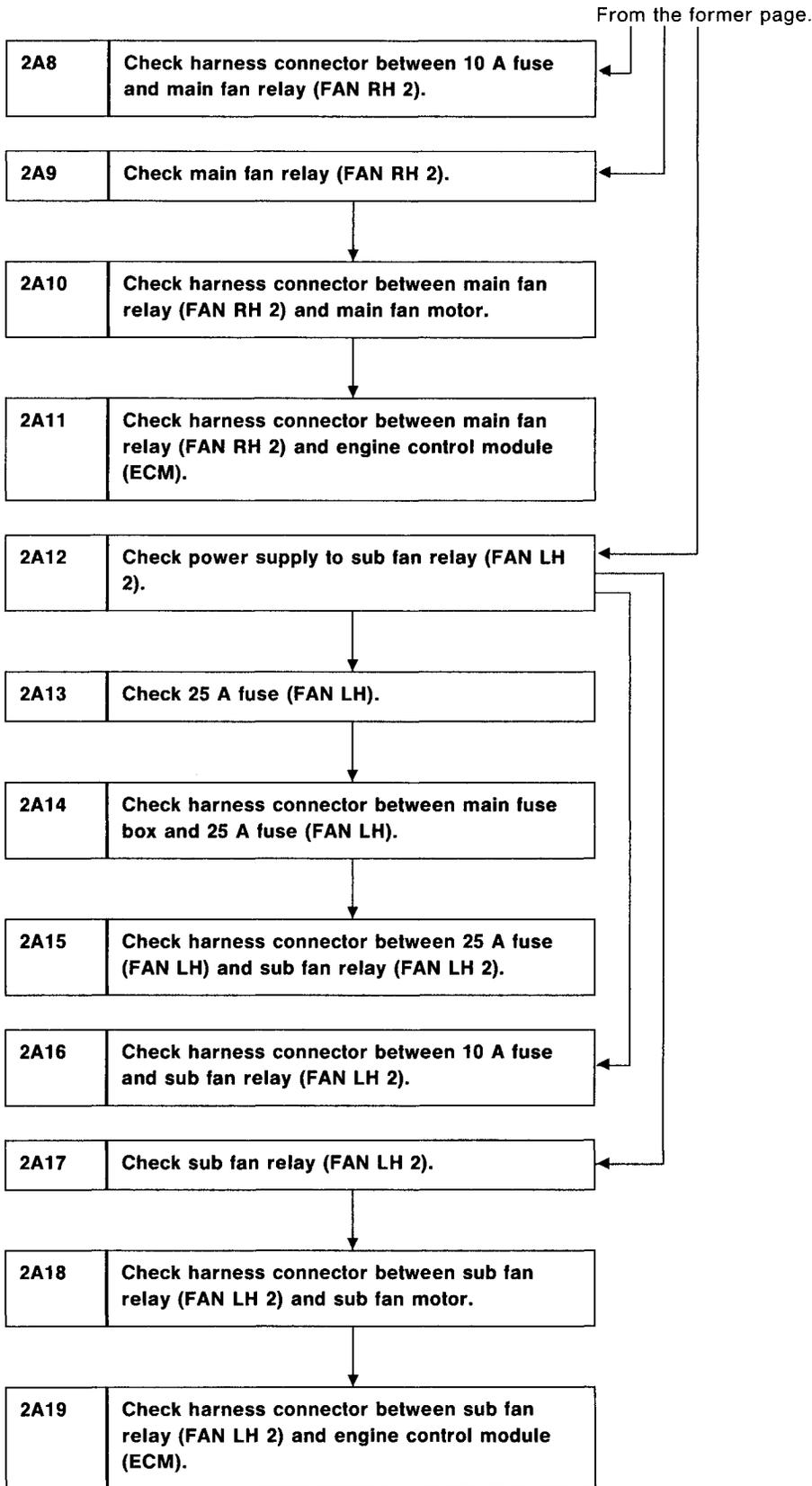
Condition (2):

- Engine coolant temperature is above 95°C (203°F).
- A/C switch is turned OFF.
- Vehicle speed is less than 10 km/h (6 MPH).

Condition (3):

- Engine coolant temperature is below 89°C (192°F).
- A/C switch is turned ON.
- Vehicle speed is more than 20 km/h (12 MPH).
- A/C intermediate pressure switch is turned OFF. [less than 1,275 ± 147 kPa (13.0 ± 1.5 kg/cm², 185 ± 21 psi).]





2A1	CHECK POWER SUPPLY TO MAIN/SUB FAN MOTORS.
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CAUTION:

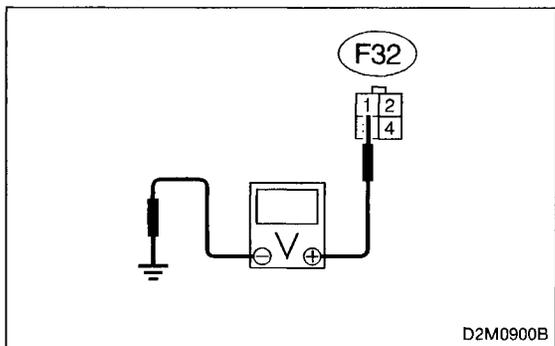
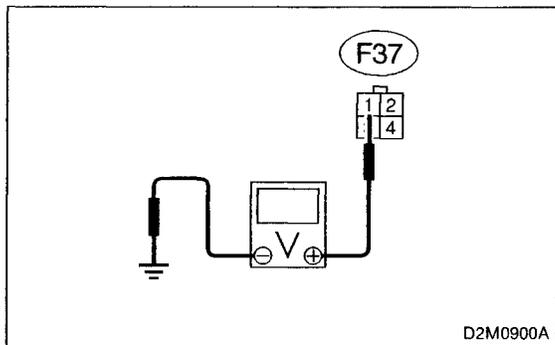
Be careful not to overheat engine during repair.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connectors from main and sub fan motors.
- 3) Warm-up the engine until engine coolant temperature increases over 95°C (203°F).
- 4) Stop the engine and turn ignition switch to ON.
- 5) Turn A/C switch to OFF.
- 6) Measure voltage between main fan motor connector and chassis ground.

CHECK : **Connector & terminal (F37) No. 1 (+) — Chassis ground (-): Is voltage more than 10 V?**

YES : Go to next step 7).

NO : Go to step **2A4**.

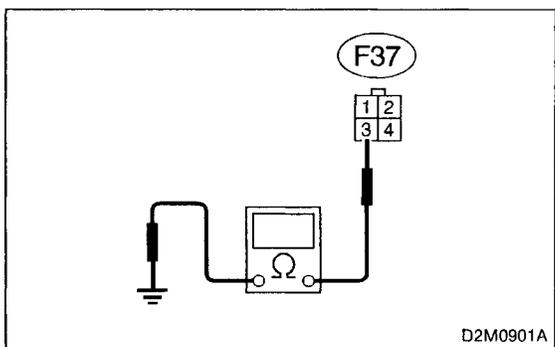


- 7) Measure voltage between sub fan motor connector and chassis ground.

CHECK : **Connector & terminal (F32) No. 1 (+) — Chassis ground (-): Is voltage more than 10 V?**

YES : Go to step **2A2**.

NO : Go to step **2A12**.



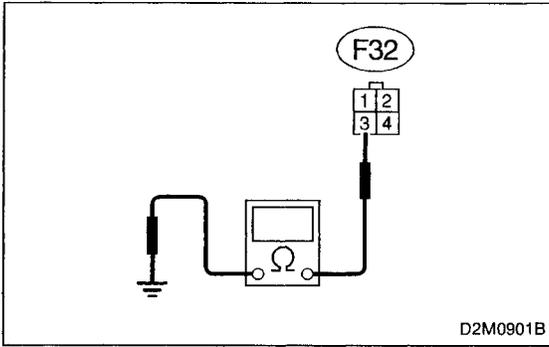
2A2	CHECK GROUND CIRCUIT OF MAIN/SUB FAN MOTORS.
------------	---

- 1) Turn ignition switch to OFF.
- 2) Measure resistance between main and sub fan motor connectors and chassis ground.

CHECK : **Connector & terminal (F37) No. 3 — Chassis ground: Is resistance less than 5 Ω?**

YES : Go to next **CHECK** .

NO : Repair open circuit in harness between main fan motor connector and chassis ground.



CHECK : **Connector & terminal (F32) No. 3 — Chassis ground: Is resistance less than 5 Ω?**

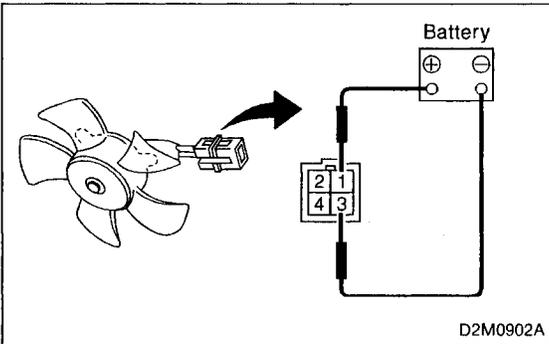
YES : Go to next **CHECK** .

NO : Repair open circuit in harness between sub fan motor connector and chassis ground.

CHECK : **Is there poor contact in main and sub fan motor connectors?**

YES : Repair poor contact in main and sub fan motor connectors.

NO : Go to step **2A3**.



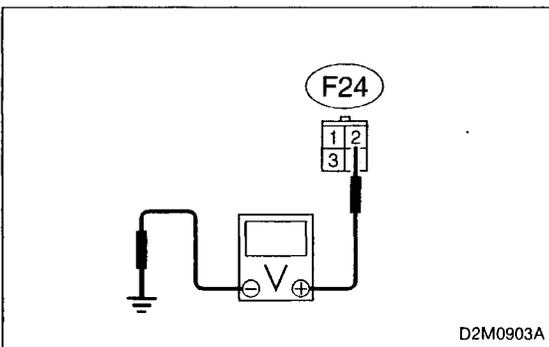
2A3 CHECK MAIN/SUB FAN MOTORS.

Connect battery positive (+) terminal to terminal No. 1 of both (main and sub) fan motor connectors, and negative (-) terminal to terminal No. 3.

CHECK : **Does the fan rotate at LOW speed?**

YES : Repair poor contact in fan motor connector.

NO : Replace fan motor with a new one.



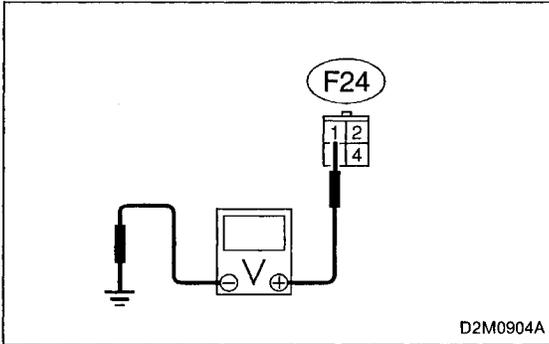
2A4 CHECK POWER SUPPLY TO MAIN FAN RELAY (FAN RH 2).

- 1) Turn ignition switch to OFF.
- 2) Remove main fan relay (FAN RH 2) from A/C relay holder 2.
- 3) Measure voltage between main fan relay (FAN RH 2) terminal and chassis ground.

CHECK : **Connector & terminal (F24) No. 2 (+) — Chassis ground (-): Is voltage more than 10 V?**

YES : Go to next step 4).

NO : Go to step **2A5**.



- 4) Turn ignition switch to ON.
- 5) Measure voltage between main fan relay (FAN RH 2) terminal and chassis ground.

CHECK : **Connector & terminal (F24) No. 1 (+) — Chassis ground (-): Is voltage more than 10 V?**

YES : Go to step **2A9**.

NO : Go to step **2A8**.

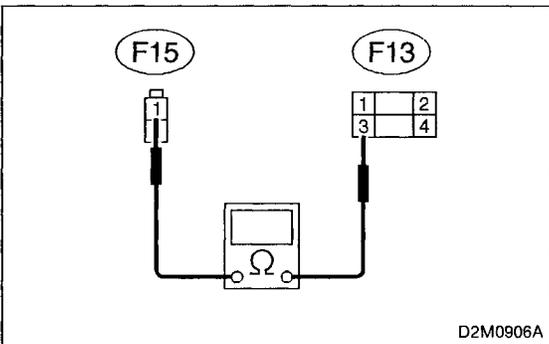
2A5	CHECK 25 A FUSE (FAN RH).
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- 1) Remove 25 A fuse (FAN RH) from A/C relay holder 1.
- 2) Check condition of fuse.

CHECK : **Is the fuse blown-out?**

YES : Replace fuse.

NO : Go to step **2A6**.



2A6	CHECK HARNESS CONNECTOR BETWEEN MAIN FUSE BOX AND 25 A FUSE (FAN RH).
------------	--

- 1) Disconnect connector from main fuse box.
- 2) Disconnect connector (F18) from SBF holder.
- 3) Measure resistance of harness between main fuse box connector and 25 A fuse (FAN RH) terminal.

CHECK : **Connector & terminal (F15) No. 1 — (F13) No. 3: Is resistance less than 1 Ω?**

YES : Go to next **CHECK** .

NO : Repair open circuit in harness between main fuse box and 25 A fuse (FAN RH) connector.

CHECK : **Is there poor contact in main fuse box connector?**

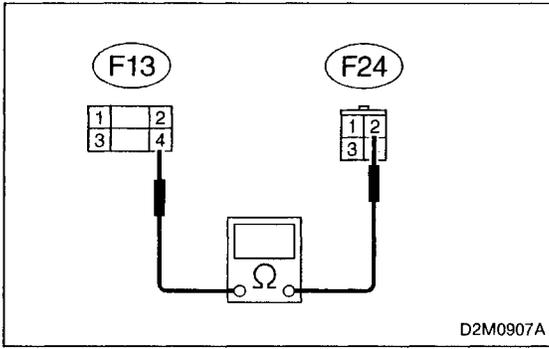
YES : Repair poor contact in main fuse box connector.

NO : Go to next **CHECK** .

CHECK : **Is there poor contact in 25 A fuse (FAN RH) connector?**

YES : Repair poor contact in 25 A fuse (FAN RH) connector.

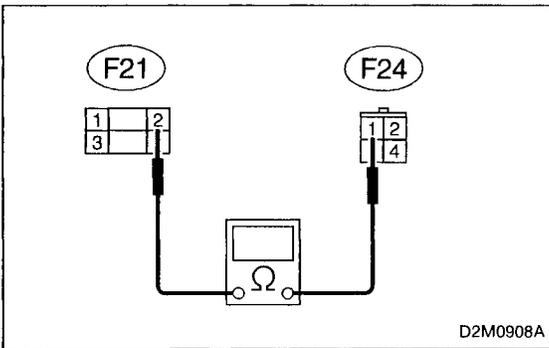
NO : Go to step **2A7**.



2A7 **CHECK HARNESS CONNECTOR BETWEEN 25 A FUSE (FAN RH) AND MAIN FAN RELAY (FAN RH 2).**

Measure resistance of harness between 25 A fuse (FAN RH) and main fan relay (FAN RH 2) terminal.

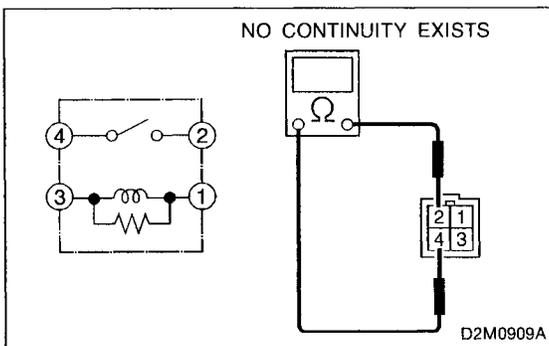
- CHECK** : **Connector & terminal (F13) No. 4 — (F24) No. 2:**
Is resistance less than 1 Ω?
- YES** : Repair poor contact in main fan relay (FAN RH 2) connector.
- NO** : Repair open circuit in harness between 25 A fuse (FAN RH) and main fan relay (FAN RH 2) connector.



2A8 **CHECK HARNESS CONNECTOR BETWEEN 10 A FUSE AND MAIN FAN RELAY (FAN RH 2).**

- 1) Turn ignition switch to OFF.
- 2) Remove 10 A fuse from A/C relay holder 2.
- 3) Measure resistance of harness between 10 A fuse and main fan relay (FAN RH 2) terminal.

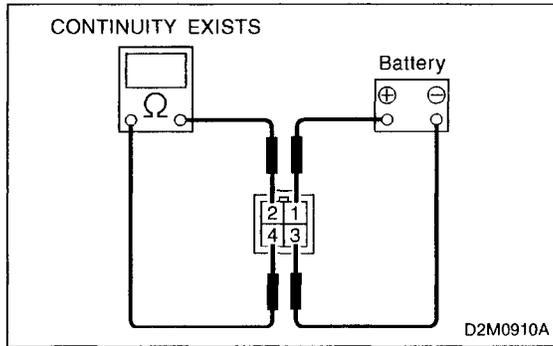
- CHECK** : **Connector & terminal (F21) No. 2 — (F24) No. 1:**
Is resistance less than 1 Ω?
- YES** : Repair poor contact in main fan relay (FAN RH 2) connector.
- NO** : Repair open circuit in harness between 10 A fuse and main fan relay (FAN RH 2) connector.



2A9 **CHECK MAIN FAN RELAY (FAN RH 2).**

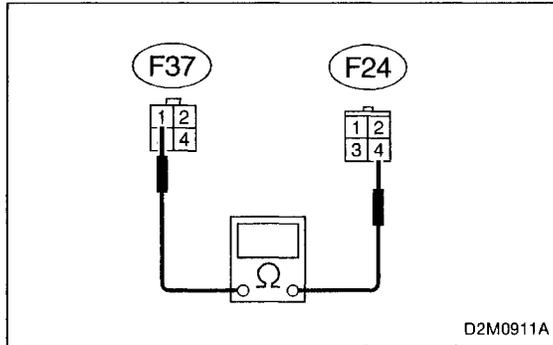
- 1) Turn ignition switch to OFF.
- 2) Check continuity between main fan relay (FAN RH 2) terminals.

- CHECK** : **Does any continuity exist between terminals No. 2 and No. 4?**
- YES** : Replace main fan relay (FAN RH 2).
- NO** : Go to next step 3).



- 3) Connect battery to terminals No. 1 and No. 3 of main fan relay (FAN RH 2).
- 4) Check continuity between main fan relay (FAN RH 2) terminals.

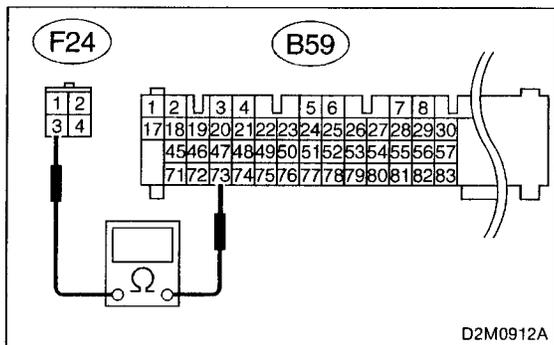
- CHECK** : Does continuity exist between terminals No. 2 and No. 4?
- YES** : Go to step **2A10**.
- NO** : Replace main fan relay (FAN RH 2).



2A10	CHECK HARNESS CONNECTOR BETWEEN MAIN FAN RELAY (FAN RH 2) AND MAIN FAN MOTOR.
-------------	--

Measure resistance of harness between main fan motor connector and main fan relay (FAN RH 2) terminal.

- CHECK** : Connector & terminal (F37) No. 1 — (F24) No. 4: Is resistance less than 1 Ω?
- YES** : Go to next **CHECK** .
- NO** : Repair open circuit in harness between main fan motor and main fan relay (FAN RH 2) connector.
- CHECK** : Is there poor contact in main fan relay (FAN RH 2) connector?
- YES** : Repair poor contact in main fan relay (FAN RH 2) connector.
- NO** : Go to next **CHECK** .
- CHECK** : Is there poor contact in main fan motor connector?
- YES** : Repair poor contact in main fan motor connector.
- NO** : Go to step **2A11**.



2A11 CHECK HARNESS CONNECTOR BETWEEN MAIN FAN RELAY (FAN RH 2) AND ENGINE CONTROL MODULE (ECM).

- 1) Disconnect connector from ECM.
- 2) Measure resistance of harness between main fan relay (FAN RH 2) terminal and ECM connector.

CHECK : *Connector & terminal (F24) No. 3 — (B59) No. 73: Is resistance less than 1 Ω?*

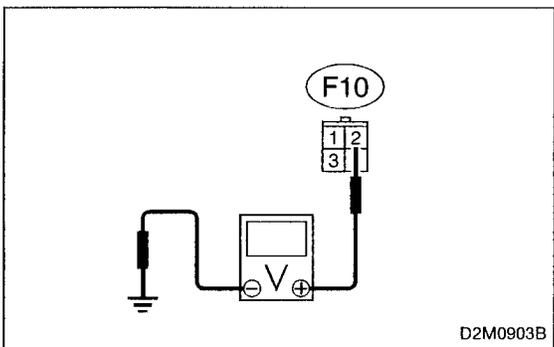
YES : Refer to 2-7b "On-Board Diagnostics II System" diagnostics procedure.

NO : Repair harness and connector.

NOTE:

In this case, repair the following:

- Open circuit in harness between main fan relay (FAN RH 2) and ECM connector.
- Poor contact in coupling connector (F8).



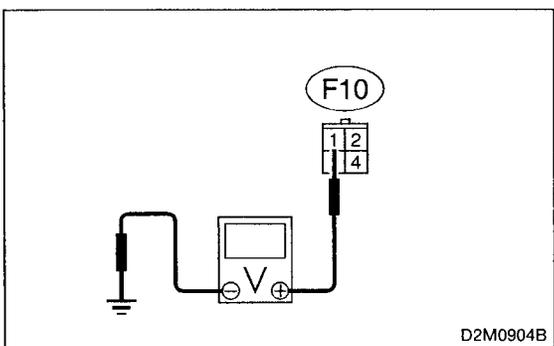
2A12 CHECK POWER SUPPLY TO SUB FAN RELAY (FAN LH 2).

- 1) Turn ignition switch to OFF.
- 2) Remove sub fan relay (FAN LH 2) from A/C relay holder 1.
- 3) Measure voltage between sub fan relay (FAN LH 2) terminal and chassis ground.

CHECK : *Connector & terminal (F10) No. 2 (+) — Chassis ground (-): Is voltage more than 10 V?*

YES : Go to next step 4).

NO : Go to step **2A13**.



- 4) Turn ignition switch to ON.
- 5) Measure voltage between sub fan relay (FAN LH 2) terminal and chassis ground.

CHECK : *Connector & terminal (F10) No. 1 (+) — Chassis ground (-): Is voltage more than 10 V?*

YES : Go to step **2A17**.

NO : Go to step **2A16**.

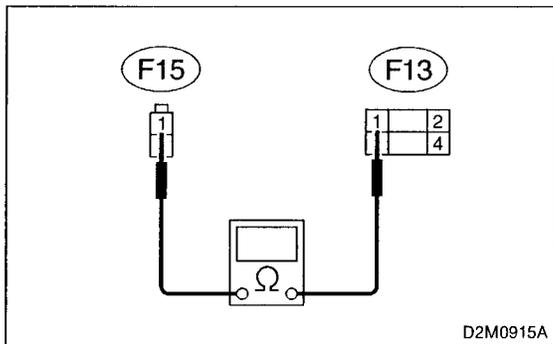
2A13 CHECK 25 A FUSE (FAN LH).

- 1) Remove 25 A fuse (FAN LH) from A/C relay holder 1.
- 2) Check condition of fuse.

CHECK : *Is the fuse blown-out?*

YES : Replace fuse.

NO : Go to step **2A14**.



2A14 CHECK HARNESS CONNECTOR BETWEEN MAIN FUSE BOX AND 25 A FUSE (FAN LH).

- 1) Disconnect connector from main fuse box.
- 2) Disconnect connector (F18) from SBF holder.
- 3) Measure resistance of harness between main fuse box connector and 25 A fuse (FAN LH) terminal.

CHECK : **Connector & terminal (F15) No. 1 — (F13) No. 1:**
Is resistance less than 1 Ω?

YES : Go to next **CHECK** .

NO : Repair open circuit in harness between main fuse box and 25 A fuse (FAN LH) connector.

CHECK : *Is there poor contact in main fuse box connector?*

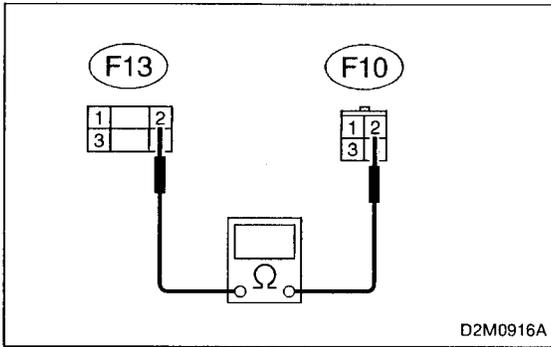
YES : Repair poor contact in main fuse box connector.

NO : Go to next **CHECK** .

CHECK : *Is there poor contact in 25 A fuse (FAN LH) connector?*

YES : Repair poor contact in 25 A fuse (FAN LH) connector.

NO : Go to step **2A15**.



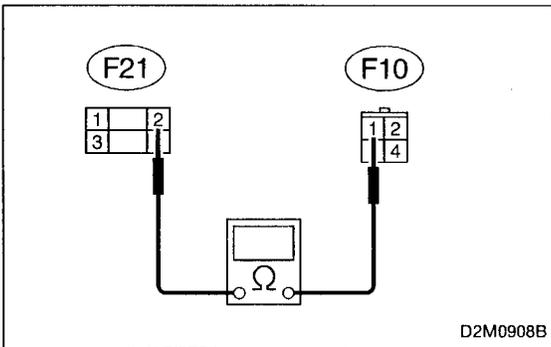
2A15 **CHECK HARNESS CONNECTOR BETWEEN 25 A FUSE (FAN LH) AND SUB FAN RELAY (FAN LH 2).**

Measure resistance of harness between 25 A fuse (FAN LH) and sub fan relay (FAN LH 2) terminal.

CHECK : **Connector & terminal (F13) No. 2 — (F10) No. 2: Is resistance less than 1 Ω?**

YES : Repair poor contact in sub fan relay (FAN LH 2) connector.

NO : Repair open circuit in harness between 25 A fuse (FAN LH) and sub fan relay (FAN LH 2) connector.



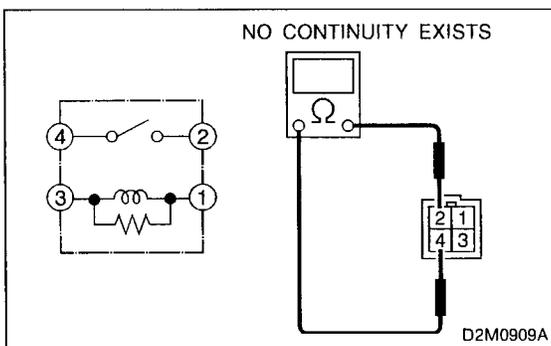
2A16 **CHECK HARNESS CONNECTOR BETWEEN 10 A FUSE AND SUB FAN RELAY (FAN LH 2).**

- 1) Turn ignition switch to OFF.
- 2) Remove 10 A fuse from A/C relay holder 2.
- 3) Measure resistance of harness between 10 A fuse and sub fan relay (FAN LH 2) terminal.

CHECK : **Connector & terminal (F21) No. 2 — (F10) No. 1: Is resistance less than 1 Ω?**

YES : Repair poor contact in sub fan relay (FAN LH 2) connector.

NO : Repair open circuit in harness between 10 A fuse and sub fan relay (FAN LH 2) connector.



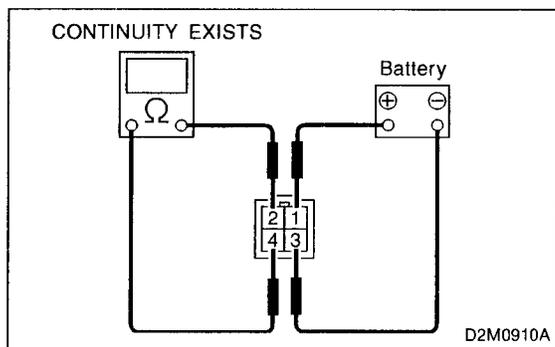
2A17 **CHECK SUB FAN RELAY (FAN LH 2).**

- 1) Turn ignition switch to OFF.
- 2) Check continuity between sub fan relay (FAN LH 2) terminals.

CHECK : **Does any continuity exist between terminals No. 2 and No. 4?**

YES : Replace sub fan relay (FAN LH 2).

NO : Go to next step 3).

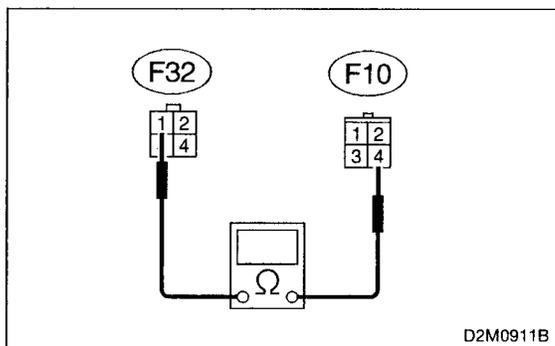


3) Connect battery to terminals No. 1 and No. 3 of sub fan relay (FAN LH 2).
4) Check continuity between sub fan relay (FAN LH 2) terminals.

CHECK : **Does continuity exist between terminals No. 2 and No. 4?**

YES : Go to step **2A18**.

NO : Replace sub fan relay (FAN LH 2).



2A18 **CHECK HARNESS CONNECTOR BETWEEN SUB FAN RELAY (FAN LH 2) AND SUB FAN MOTOR.**

Measure resistance of harness between sub fan motor connector and sub fan relay (FAN LH 2) terminal.

CHECK : **Connector & terminal (F32) No. 1 — (F10) No. 4: Is resistance less than 1 Ω?**

YES : Go to next **CHECK** .

NO : Repair open circuit in harness between sub fan motor and sub fan relay (FAN LH 2) connector.

CHECK : **Is there poor contact in sub fan relay (FAN LH 2) connector?**

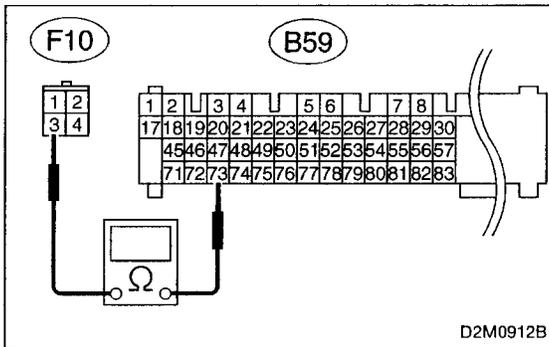
YES : Repair poor contact in sub fan relay (FAN LH 2) connector.

NO : Go to next **CHECK** .

CHECK : **Is there poor contact in sub fan motor connector?**

YES : Repair poor contact in sub fan motor connector.

NO : Go to step **2A19**.



2A19

**CHECK HARNESS CONNECTOR BETWEEN
SUB FAN RELAY (FAN LH 2) AND ENGINE
CONTROL MODULE (ECM).**

- 1) Disconnect connector from ECM.
- 2) Measure resistance of harness between sub fan relay (FAN LH 2) terminal and ECM connector.

CHECK : **Connector & terminal
(F10) No. 3 — (B59) No. 73:
Is resistance less than 1 Ω?**

YES : Refer to 2-7b "On-Board Diagnostics II System" diagnostics procedure.

NO : Repair harness and connector.

NOTE:

In this case, repair the following:

- Open circuit in harness between sub fan relay (FAN LH 2) and ECM connector.
- Poor contact in coupling connector (F8).

B: MEDIUM MODE OPERATION

DEFECTING CONDITION

Condition (1):

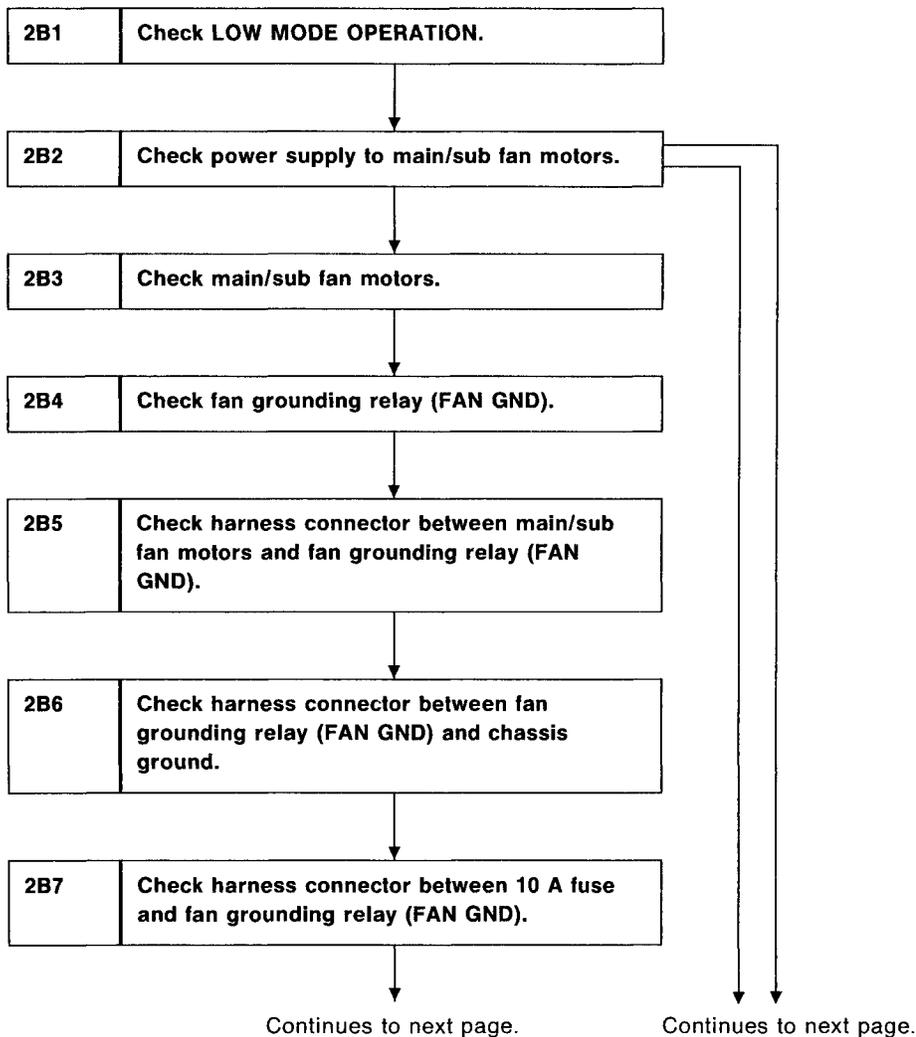
- Engine coolant temperature is below 89°C (192°F).
- A/C switch is turned ON.
- Vehicle speed is less than 10 km/h (6 MPH).
- A/C intermediate pressure switch is turned ON. [more than 1,569 ± 127 kPa (16.0 ± 1.3 kg/cm², 228 ± 18 psi).]

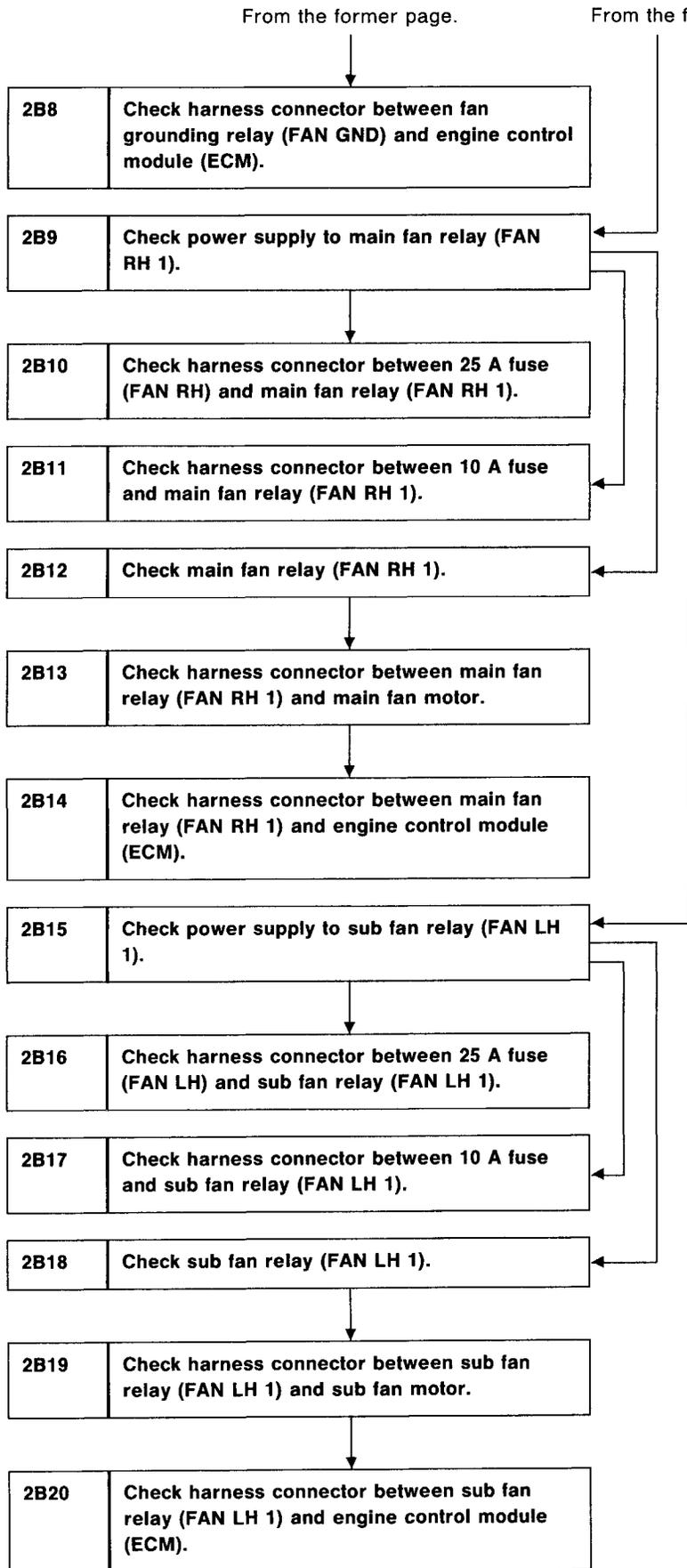
Condition (2):

- Engine coolant temperature is above 95°C (203°F).
- A/C switch is turned ON.
- Vehicle speed is less than 10 km/h (6 MPH).
- A/C intermediate pressure switch is turned OFF. [less than 1,275 ± 147 kPa (13.0 ± 1.5 kg/cm², 185 ± 21 psi).]

Condition (3):

- Engine coolant temperature is above 95°C (203°F).
- A/C switch is turned OFF.
- Vehicle speed is more than 20 km/h (12 MPH).





2B1	CHECK LOW MODE OPERATION.
------------	----------------------------------

CAUTION:

Be careful not to overheat engine during repair.

- 1) Warm-up the engine until engine coolant temperature increases over 95°C (203°F).
- 2) Stop the engine and turn ignition switch to ON.
- 3) Turn A/C switch to OFF.

CHECK : **Do the main fan and sub fan operate at LOW MODE?**

YES : Go to step **2B2**.

NO : Go to LOW MODE OPERATION diagnostics chart. <Ref. to 2-5 [T2A0].☆5>

2B2	CHECK POWER SUPPLY TO MAIN/SUB FAN MOTORS.
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CAUTION:

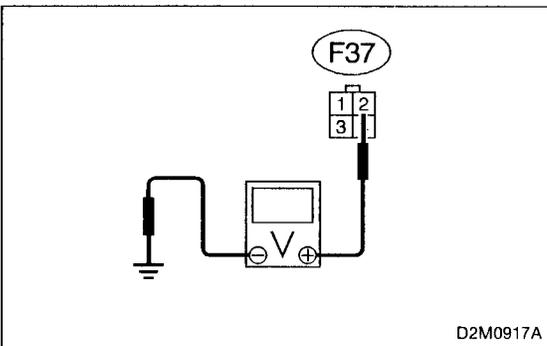
Be careful not to overheat engine during repair.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connectors from main and sub fan motors.
- 3) Warm-up the engine until engine coolant temperature increases over 95°C (203°F).
- 4) Stop the engine and turn ignition switch to ON.
- 5) Turn A/C switch to ON.
- 6) Measure voltage between main fan motor connector and chassis ground.

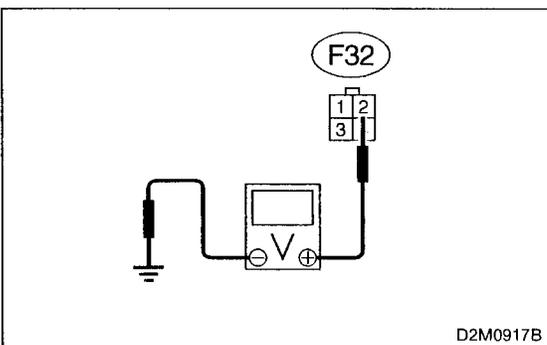
CHECK : **Connector & terminal (F37) No. 2 (+) — Chassis ground (-): Is voltage more than 10 V?**

YES : Go to next step 7).

NO : Go to step **2B9**.



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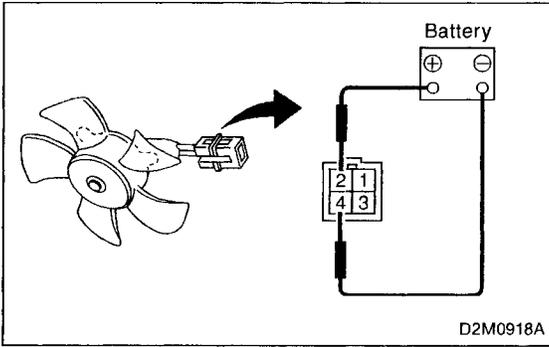
D2M0917B

- 7) Measure voltage between sub fan motor connector and chassis ground.

CHECK : **Connector & terminal (F32) No. 2 (+) — Chassis ground (-): Is voltage more than 10 V?**

YES : Go to step **2B3**.

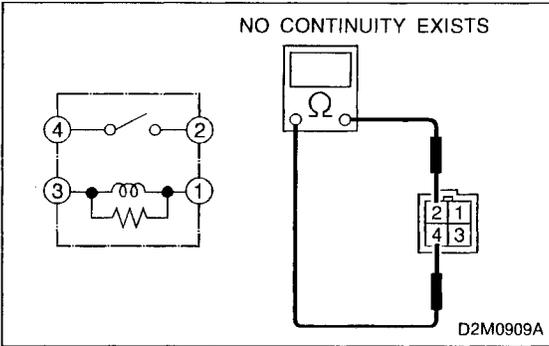
NO : Go to step **2B15**.



2B3 CHECK MAIN/SUB FAN MOTORS.

- 1) Turn ignition switch to OFF.
- 2) Connect battery positive (+) terminal to terminal No. 2 of both (main and sub) fan motor connectors, and negative (-) terminal to terminal No. 4.

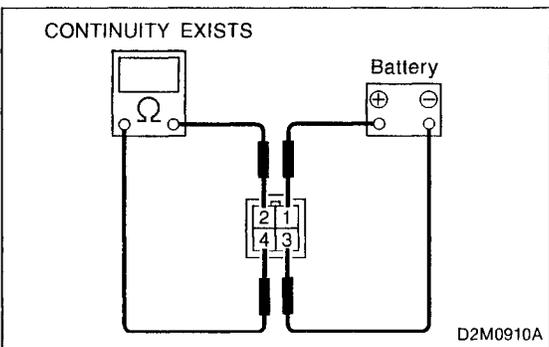
- CHECK** : Does the fan rotate at **MEDIUM** speed?
- YES** : Go to step **2B4**.
- NO** : Replace fan motor with a new one.



2B4 CHECK FAN GROUNDING RELAY (FAN GND).

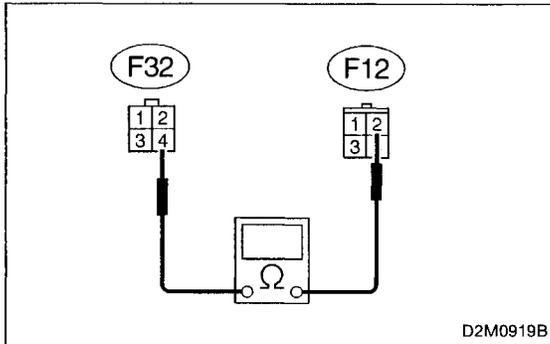
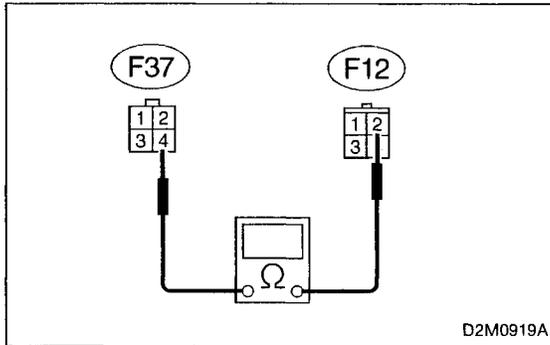
- 1) Remove fan grounding relay (FAN GND) from A/C relay holder 1.
- 2) Check continuity between fan grounding relay (FAN GND) terminals.

- CHECK** : Does any continuity exist between terminals **No. 2 and No. 4**?
- YES** : Replace fan grounding relay (FAN GND).
- NO** : Go to next step 3).



- 3) Connect battery to terminals No. 1 and No. 3 of fan grounding relay (FAN GND).
- 4) Check continuity between fan grounding relay (FAN GND) terminals.

- CHECK** : Does continuity exist between terminals **No. 2 and No. 4**?
- YES** : Go to step **2B5**.
- NO** : Replace fan grounding relay (FAN GND).



2B5

CHECK HARNESS CONNECTOR BETWEEN MAIN/SUB FAN MOTORS AND FAN GROUNDING RELAY (FAN GND).

Measure resistance of harness between main and sub fan motor connectors and fan grounding relay (FAN GND) terminal.

CHECK : **Connector & terminal (F37) No. 4 — (F12) No. 2:**
Is resistance less than 1 Ω?

YES : Go to next **CHECK** .

NO : Repair open circuit in harness between main fan motor and fan grounding relay (FAN GND) connector.

CHECK : **Connector & terminal (F32) No. 4 — (F12) No. 2:**
Is resistance less than 1 Ω?

YES : Go to next **CHECK** .

NO : Repair open circuit in harness between sub fan motor and fan grounding relay (FAN GND) connector.

CHECK : **Is there poor contact in main and sub fan motor connectors?**

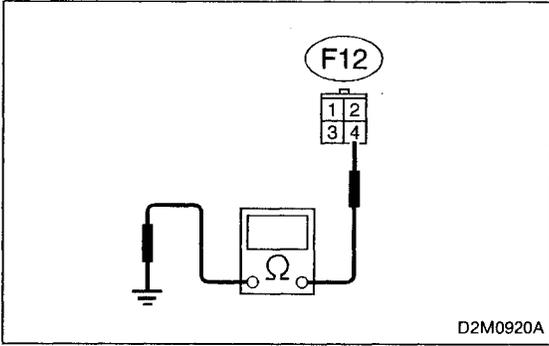
YES : Repair poor contact in main and/or sub fan motor connectors.

NO : Go to next **CHECK** .

CHECK : **Is there poor contact in fan grounding relay (FAN GND) connector?**

YES : Repair poor contact in fan grounding relay (FAN GND) connector.

NO : Go to step **2B6**.



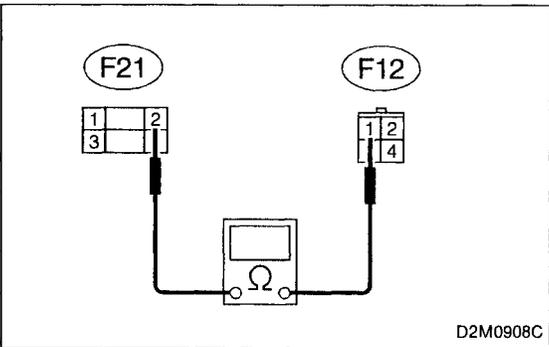
2B6 **CHECK HARNESS CONNECTOR BETWEEN FAN GROUNDING RELAY (FAN GND) AND CHASSIS GROUND.**

Measure resistance between fan grounding relay (FAN GND) terminal and chassis ground.

CHECK : **Connector & terminal (F12) No. 4 — Chassis ground: Is resistance less than 5 Ω?**

YES : Go to step **2B7**.

NO : Repair open circuit in harness between fan grounding relay (FAN GND) connector and chassis ground.



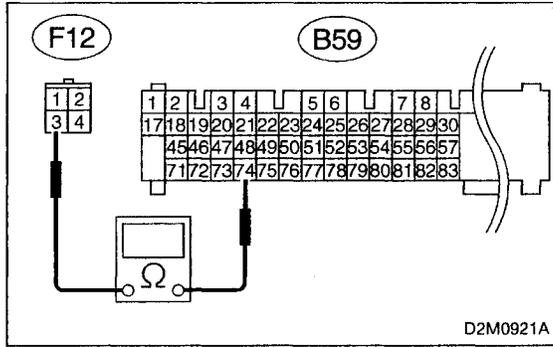
2B7 **CHECK HARNESS CONNECTOR BETWEEN 10 A FUSE AND FAN GROUNDING RELAY (FAN GND).**

- 1) Remove 10 A fuse from A/C relay holder 2.
- 2) Measure resistance of harness between 10 A fuse and fan grounding relay (FAN GND) terminal.

CHECK : **Connector & terminal (F21) No. 2 — (F12) No. 1: Is resistance less than 1 Ω?**

YES : Go to step **2B8**.

NO : Repair open circuit in harness between 10 A fuse and fan grounding relay (FAN GND) connector.



2B8 **CHECK HARNESS CONNECTOR BETWEEN FAN GROUNDING RELAY (FAN GND) AND ENGINE CONTROL MODULE (ECM).**

- 1) Disconnect connector from ECM.
- 2) Measure resistance of harness between fan grounding relay (FAN GND) terminal and ECM connector.

CHECK : **Connector & terminal (F12) No. 3 — (B59) No. 74: Is resistance less than 1 Ω?**

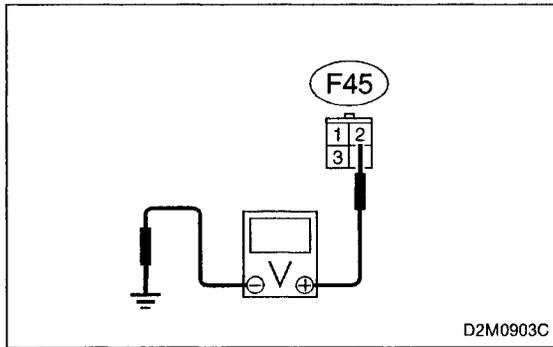
YES : Refer to 2-7b "On-Board Diagnostics II System" diagnostics procedure.

NO : Repair harness and connector.

NOTE:

In this case, repair the following:

- Open circuit in harness between fan grounding relay (FAN GND) and ECM connector.
- Poor contact in coupling connector (F8).



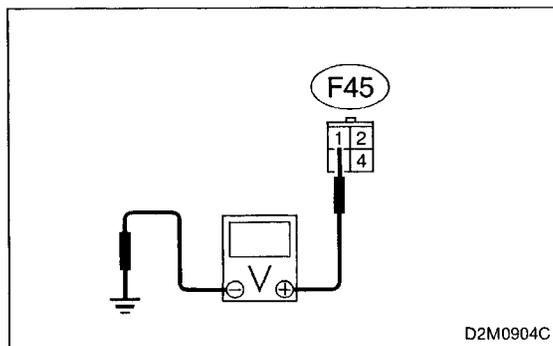
2B9 **CHECK POWER SUPPLY TO MAIN FAN RELAY (FAN RH 1).**

- 1) Turn ignition switch to OFF.
- 2) Remove main fan relay (FAN RH 1) from A/C relay holder 1.
- 3) Measure voltage between main fan relay (FAN RH 1) terminal and chassis ground.

CHECK : **Connector & terminal (F45) No. 2 (+) — Chassis ground (-): Is voltage more than 10 V?**

YES : Go to next step 4).

NO : Go to step **2B10**.

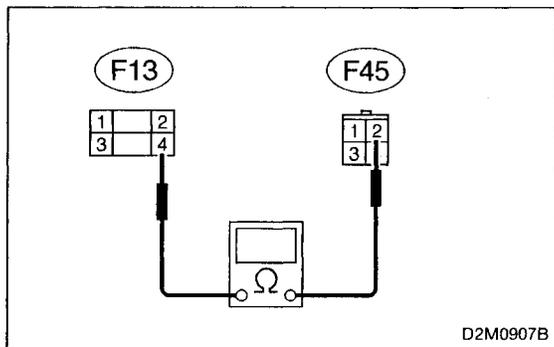


- 4) Turn ignition switch to ON.
- 5) Measure voltage between main fan relay (FAN RH 1) terminal and chassis ground.

CHECK : **Connector & terminal (F45) No. 1 (+) — Chassis ground (-): Is voltage more than 10 V?**

YES : Go to step **2B12**.

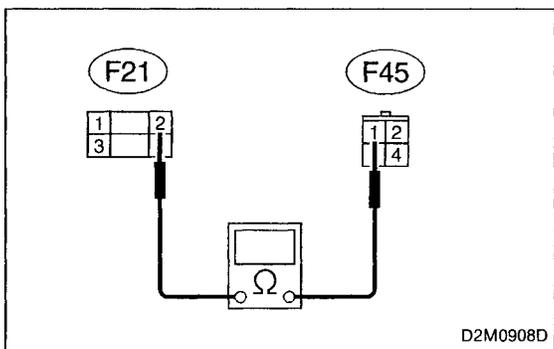
NO : Go to step **2B11**.



2B10 CHECK HARNESS CONNECTOR BETWEEN 25 A FUSE (FAN RH) AND MAIN FAN RELAY (FAN RH 1).

- 1) Remove 25 A fuse (FAN RH) from A/C relay holder 1.
- 2) Measure resistance of harness between 25 A fuse (FAN RH) and main fan relay (FAN RH 1) terminal.

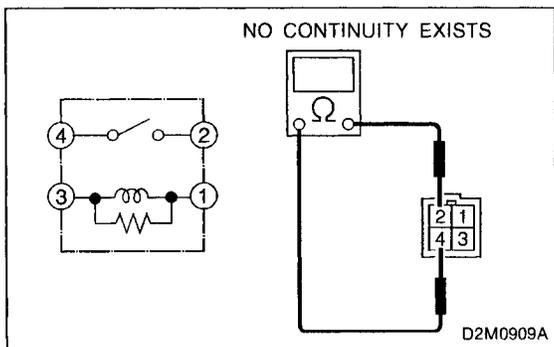
- CHECK** : **Connector & terminal (F13) No. 4 — (F45) No. 2: Is resistance less than 1 Ω?**
- YES** : Repair poor contact in main fan relay (FAN RH 1) connector.
- NO** : Repair open circuit in harness between 25 A fuse (FAN RH) and main fan relay (FAN RH 1) connector.



2B11 CHECK HARNESS CONNECTOR BETWEEN 10 A FUSE AND MAIN FAN RELAY (FAN RH 1).

- 1) Turn ignition switch to OFF.
- 2) Remove 10 A fuse from A/C relay holder 2.
- 3) Measure resistance of harness between 10 A fuse and main fan relay (FAN RH 1) terminal.

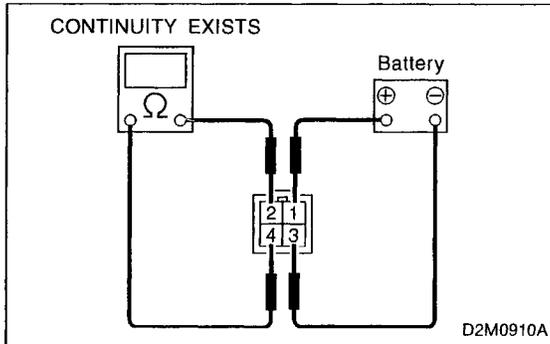
- CHECK** : **Connector & terminal (F21) No. 2 — (F45) No. 1: Is resistance less than 1 Ω?**
- YES** : Repair poor contact in main fan relay (FAN RH 1) connector.
- NO** : Repair open circuit in harness between 10 A fuse and main fan relay (FAN RH 1) connector.



2B12 CHECK MAIN FAN RELAY (FAN RH 1).

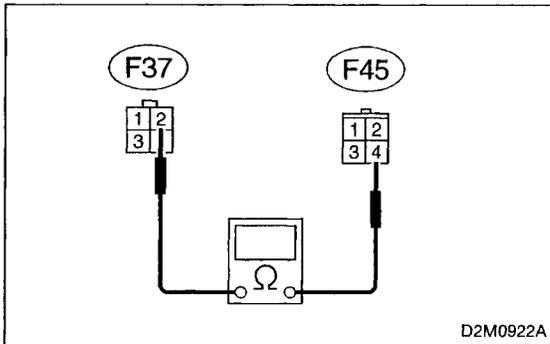
- 1) Turn ignition switch to OFF.
- 2) Check continuity between main fan relay (FAN RH 1) terminals.

- CHECK** : **Does any continuity exist between terminals No. 2 and No. 4?**
- YES** : Replace main fan relay (FAN RH 1).
- NO** : Go to next step 3).



- 3) Connect battery to terminals No. 1 and No. 3 of main fan relay (FAN RH 1).
- 4) Check continuity between main fan relay (FAN RH 1) terminals.

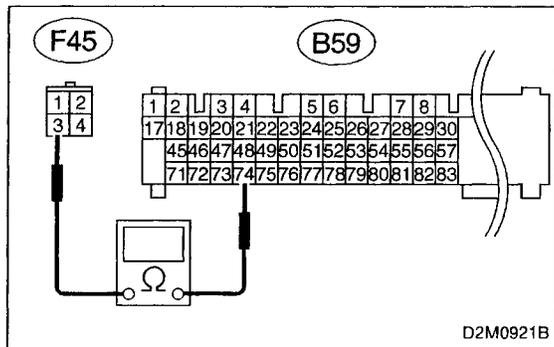
- CHECK** : Does continuity exist between terminals No. 2 and No. 4?
- YES** : Go to step **2B13**.
- NO** : Replace main fan relay (FAN RH 1).



2B13 CHECK HARNESS CONNECTOR BETWEEN MAIN FAN RELAY (FAN RH 1) AND MAIN FAN MOTOR.

Measure resistance of harness between main fan motor connector and main fan relay (FAN RH 1) terminal.

- CHECK** : Connector & terminal (F37) No. 2 — (F45) No. 4: Is resistance less than 1 Ω?
- YES** : Go to next **CHECK** .
- NO** : Repair open circuit in harness between main fan motor and main fan relay (FAN RH 1) connector.
- CHECK** : Is there poor contact in main fan relay (FAN RH 1) connector?
- YES** : Repair poor contact in main fan relay (FAN RH 1) connector.
- NO** : Go to next **CHECK** .
- CHECK** : Is there poor contact in main fan motor connector?
- YES** : Repair poor contact in main fan motor connector.
- NO** : Go to step **2B14**.



2B14 CHECK HARNESS CONNECTOR BETWEEN MAIN FAN RELAY (FAN RH 1) AND ENGINE CONTROL MODULE (ECM).

- 1) Disconnect connector from ECM.
- 2) Measure resistance of harness between main fan relay (FAN RH 1) and ECM connector.

CHECK : **Connector & terminal (F45) No. 3 — (B59) No. 74:**
Is resistance less than 1 Ω?

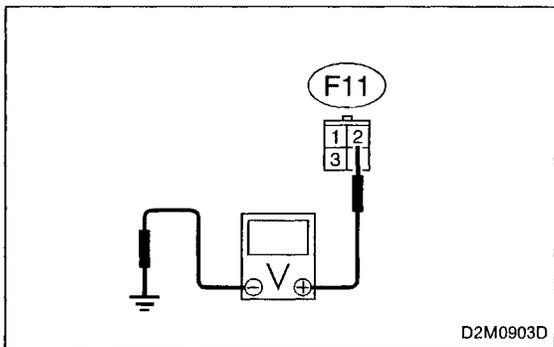
YES : Refer to 2-7b "On-Board Diagnostics II System" diagnostics procedure.

NO : Repair harness and connector.

NOTE:

In this case, repair the following:

- Open circuit in harness between main fan relay (FAN RH 1) and ECM connector.
- Poor contact in coupling connector (F8).



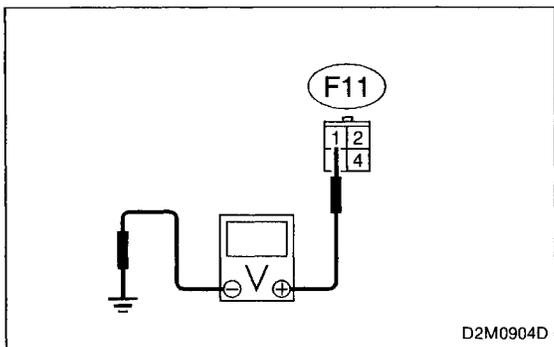
2B15 CHECK POWER SUPPLY TO SUB FAN RELAY (FAN LH 1).

- 1) Turn ignition switch to OFF.
- 2) Remove sub fan relay (FAN LH 1) from A/C relay holder 1.
- 3) Measure voltage between sub fan relay (FAN LH 1) terminal and chassis ground.

CHECK : **Connector & terminal (F11) No. 2 (+) — Chassis ground (-):**
Is voltage more than 10 V?

YES : Go to next step 4).

NO : Go to step 2B16.

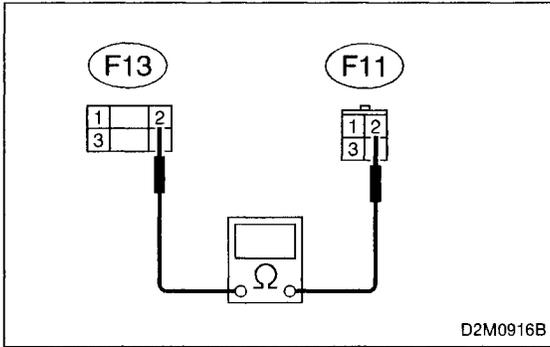


- 4) Turn ignition switch to ON.
- 5) Measure voltage between sub fan relay (FAN LH 1) terminal and chassis ground.

CHECK : **Connector & terminal (F11) No. 1 (+) — Chassis ground (-):**
Is voltage more than 10 V?

YES : Go to step 2B18.

NO : Go to step 2B17.



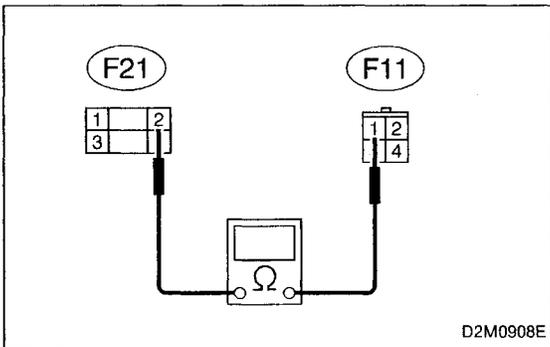
2B16 **CHECK HARNESS CONNECTOR BETWEEN 25 A FUSE (FAN LH) AND SUB FAN RELAY (FAN LH 1).**

- 1) Remove 25 A fuse (FAN LH) from A/C relay holder 1.
- 2) Measure resistance of harness between 25 A fuse (FAN LH) and sub fan relay (FAN LH 1) terminal.

CHECK : **Connector & terminal (F13) No. 2 — (F11) No. 2:**
Is resistance less than 1 Ω?

YES : Repair poor contact in sub fan relay (FAN LH 1) connector.

NO : Repair open circuit in harness between 25 A fuse (FAN LH) and sub fan relay (FAN LH 1) connector.



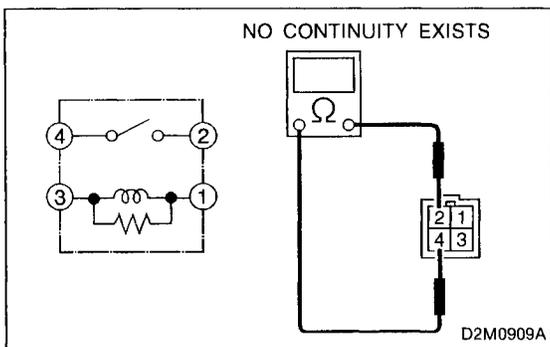
2B17 **CHECK HARNESS CONNECTOR BETWEEN 10 A FUSE AND SUB FAN RELAY (FAN LH 1).**

- 1) Turn ignition switch to OFF.
- 2) Remove 10 A fuse from A/C relay holder 2.
- 3) Measure resistance of harness between 10 A fuse and sub fan relay (FAN LH 1) terminal.

CHECK : **Connector & terminal (F21) No. 2 — (F11) No. 1:**
Is resistance less than 1 Ω?

YES : Repair poor contact in sub fan relay (FAN LH 1) connector.

NO : Repair open circuit in harness between 10 A fuse and sub fan relay (FAN LH 1) connector.



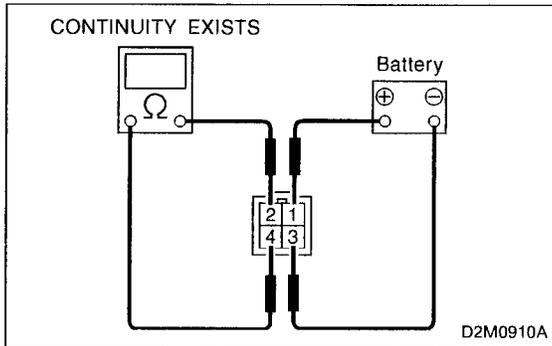
2B18 **CHECK SUB FAN RELAY (FAN LH 1).**

- 1) Turn ignition switch to OFF.
- 2) Check continuity between sub fan relay (FAN LH 1) terminals.

CHECK : **Does any continuity exist between terminals No. 2 and No. 4?**

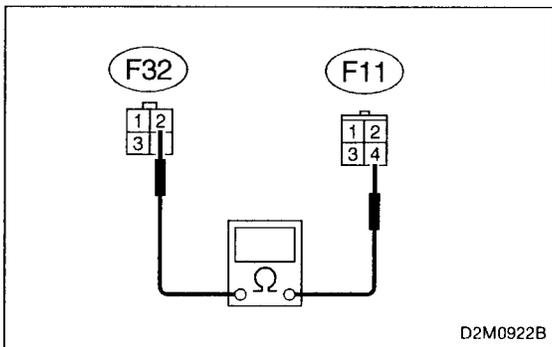
YES : Replace sub fan relay (FAN LH 1).

NO : Go to next step 3).



3) Connect battery to terminals No. 1 and No. 3 of sub fan relay (FAN LH 1).
4) Check continuity between sub fan relay (FAN LH 1) terminals.

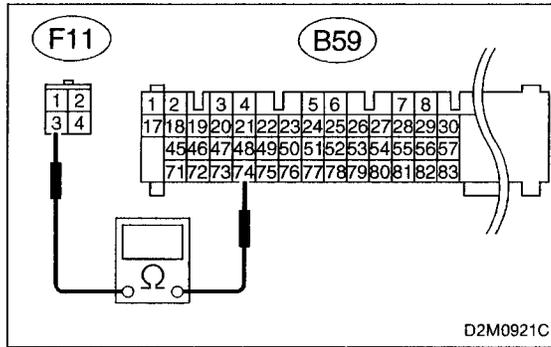
- CHECK** : Does continuity exist between terminals No. 2 and No. 4?
- YES** : Go to step **2B19**.
- NO** : Replace sub fan relay (FAN LH 1).



2B19 CHECK HARNESS CONNECTOR BETWEEN SUB FAN RELAY (FAN LH 1) AND SUB FAN MOTOR.

Measure resistance of harness between sub fan motor connector and sub fan relay (FAN LH 1) terminal.

- CHECK** : Connector & terminal (F32) No. 2 — (F11) No. 4: Is resistance less than 1 Ω?
- YES** : Go to next **CHECK** .
- NO** : Repair open circuit in harness between sub fan motor and sub fan relay (FAN LH 1) connector.
- CHECK** : Is there poor contact in sub fan relay (FAN LH 1) connector?
- YES** : Repair poor contact in sub fan relay (FAN LH 1) connector.
- NO** : Go to next **CHECK** .
- CHECK** : Is there poor contact in sub fan motor connector?
- YES** : Repair poor contact in sub fan motor connector.
- NO** : Go to step **2B20**.



2B20

CHECK HARNESS CONNECTOR BETWEEN SUB FAN RELAY (FAN LH 1) AND ENGINE CONTROL MODULE (ECM).

- 1) Disconnect connector from ECM.
- 2) Measure resistance of harness between sub fan relay (FAN LH 1) terminal and ECM connector.

CHECK : **Connector & terminal (F11) No. 3 — (B59) No. 74:**
Is resistance less than 1 Ω?

YES : Refer to 2-7b "On-Board Diagnostics II System" diagnostics procedure.

NO : Repair harness and connector.

NOTE:

In this case, repair the following:

- Open circuit in harness between sub fan relay (FAN LH 1) and ECM connector.
- Poor contact in coupling connector (F8).

C: HIGH MODE OPERATION

DEFECTING CONDITION

Condition (1):

- Engine coolant temperature is above 95°C (203°F).
- A/C switch is turned ON.
- Vehicle speed is less than 10 km/h (6 MPH).
- A/C intermediate pressure switch is turned ON. [more than 1,569 ± 127 kPa (16.0 ± 1.3 kg/cm², 228 ± 18 psi).]

Condition (2):

- Engine coolant temperature is below 89°C (192°F).
- A/C switch is turned ON.
- Vehicle speed is more than 20 km/h (12 MPH).
- A/C intermediate pressure switch is turned ON. [more than 1,569 ± 127 kPa (16.0 ± 1.3 kg/cm², 228 ± 18 psi).]

Condition (3):

- Engine coolant temperature is above 95°C (203°F).
- A/C switch is turned ON.
- Vehicle speed is more than 20 km/h (12 MPH).

2C1	Check LOW MODE/MEDIUM MODE OPERATIONS.
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2C1	CHECK LOW MODE/MEDIUM MODE OPERATIONS.
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CAUTION:

Be careful not to overheat engine during repair.

- 1) Warm-up the engine until engine coolant temperature increases over 95°C (203°F).
- 2) Stop the engine and turn ignition switch to ON.
- 3) Turn A/C switch to OFF.

CHECK : **Do the main fan and sub fan operate at LOW MODE?**

YES : Go to next step 4).

NO : Go to LOW MODE OPERATION diagnostics chart. <Ref. to 2-5 [T2A0].☆5>

- 4) Turn A/C switch to ON.

CHECK : **Do the main fan and sub fan operate at MEDIUM MODE?**

YES : Replace main or sub fan motor with a new one.

NO : Go to MEDIUM MODE OPERATION diagnostics chart. <Ref. to 2-5 [T2B0].☆5>