ENGINE COOLING SYSTEM

1. Radiator Main Fan

A: OPERATION (WITHOUT A/C MODEL)

DETECTING CONDITION:

Engine coolant temperature is above 95°C (203°F).

TROUBLE SYMPTOM:

 Radiator main fan does not operate under the above condition.

1A1: CHECK POWER SUPPLY TO MAIN FAN MOTOR.

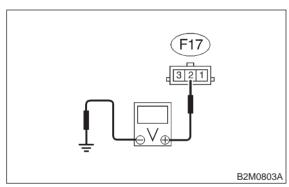
CAUTION:

Be careful not to overheat engine during repair.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from main fan motor.
- 3) Start the engine, and warm-up it until engine coolant temperature increases over 95°C (203°F).
- 4) Stop the engine and turn ignition switch to ON.
- 5) Measure voltage between main fan motor connector and chassis ground.

Connector & terminal

(F17) No. 2 (+) — Chassis ground (-):



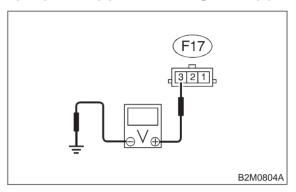
CHECK) : Is voltage more than 10 V?

(NO): Go to step 1A2.

1A2: CHECK POWER SUPPLY TO MAIN FAN MOTOR.

Measure voltage between main fan motor connector and chassis ground.

Connector & terminal (F17) No. 3 (+) — Chassis ground (-):



(CHECK): Is voltage more than 10 V?

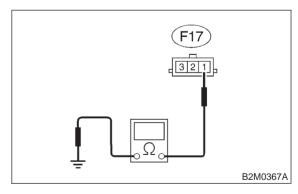
: Go to step 1A3.
: Go to step 1A6.

1A3: CHECK GROUND CIRCUIT OF MAIN FAN MOTOR.

1) Turn ignition switch to OFF.

2) Measure resistance between main fan motor connector and chassis ground.

Connector & terminal (F17) No. 1 — Chassis ground:



(CHECK): Is resistance less than 5 Ω ?

YES: Go to step 1A4.

(NO)

: Repair open circuit in harness between main fan motor connector and chassis ground.

CHECK POOR CONTACT. 1A4:

Check poor contact in main fan motor connector. <Ref. to FOREWORD [T3C1].>

(CHECK): Is there poor contact in main fan motor connector?

YES

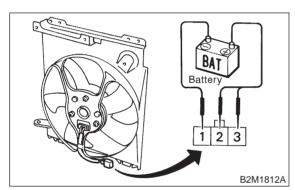
: Repair poor contact in main fan motor connector.

NO

: Go to step **1A5**.

1A5: CHECK MAIN FAN MOTOR.

Connect battery positive (+) terminal to terminals No. 2 and No. 3, and negative (-) terminal to terminal No. 1 of main fan motor connector.



: Does the main fan rotate? CHECK

YES

: Repair poor contact in main fan motor

connector.

(NO)

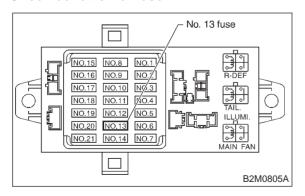
: Replace main fan motor with a new one.

CHECK FUSE. 1A6:

1) Turn ignition switch to OFF.

2) Remove fuse No. 13 from fuse and relay box.

3) Check condition of fuse.



: Is the fuse blown-out? CHECK

: Replace fuse. YES) : Go to step **1A7**. NO)

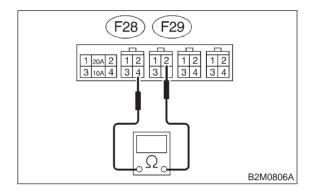
CHECK A/C RELAY HOLDER. 1A7:

1) Turn ignition switch to OFF.

2) Disconnect connectors from A/C relay holder.

3) Measure resistance between A/C relay holder connectors.

Connector & terminal (F28) No. 4 — (F29) No. 2:



: Is the resistance less than 1 Ω ?

YES

1A8:

: Go to step **1A8**.

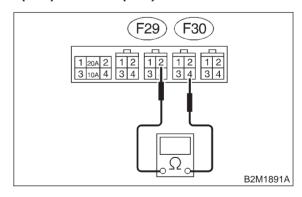
NO)

: Repair open circuit in A/C relay holder short harness.

Measure resistance between A/C relay holder connectors.

CHECK A/C RELAY HOLDER.

Connector & terminal (F30) No. 4 — (F29) No. 2:



(CHECK)

: Is the resistance less than 1 Ω ?

YES

: Go to step **1A9**.

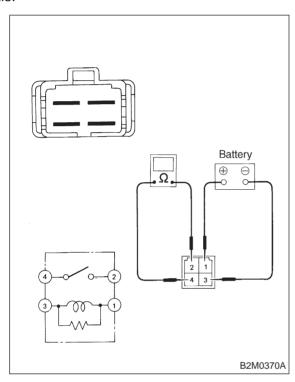
NO

: Repair open circuit in A/C relay holder

short harness.

1A9: CHECK MAIN FAN RELAY.

- 1) Turn ignition switch to OFF.
- 2) Remove main fan relay from fuse and relay box.
- 3) Check continuity between main fan relay terminals.



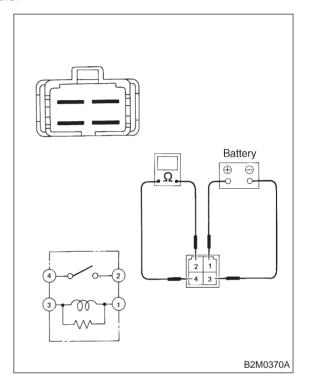
CHECK : Does no continuity exist between terminals No. 2 and No. 4?

YES : Go to step 1A10.

NO : Replace main fan relay.

1A10: CHECK MAIN FAN RELAY.

- 1) Connect battery positive (+) terminal to terminal No. 1 of main fan relay, and negative (–) terminal to terminal No. 3.
- 2) Check continuity between main fan relay terminals.



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

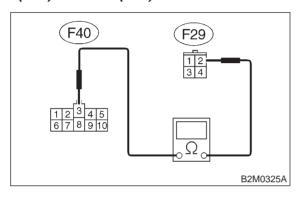
YES : Go to step 1A11.

No : Replace main fan relay.

1A11: CHECK HARNESS CONNECTOR
BETWEEN FUSE AND RELAY BOX
AND A/C RELAY HOLDER.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from fuse and relay box.
- 3) Measure resistance of harness connector between fuse and relay box and A/C relay holder.

Connector & terminal (F40) No. 3 — (F29) No. 2:



 $\widehat{\mathsf{CHECK}}$: Is resistance less than 1 Ω ?

YES : Go to step 1A12.

NO

: Repair open circuit in harness between fuse and relay box and A/C relay holder

connector.

1A12: CHECK POOR CONTACT.

Check poor contact in fuse and relay box connector. <Ref. to FOREWORD [T3C1].>

CHECK : Is there poor contact in fuse and relay box connector?

: Repair poor contact in fuse and relay box connector.

: Go to step **1A13**.

1A13: CHECK POOR CONTACT.

Check poor contact in A/C relay holder connector. <Ref. to FOREWORD [T3C1].>

CHECK : Is there poor contact in A/C relay holder connector?

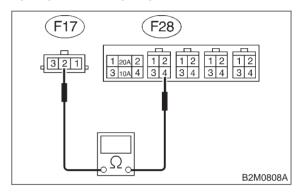
: Repair poor contact in A/C relay holder connector.

(NO) : Go to step 1A14.

1A14: CHECK HARNESS CONNECTOR BETWEEN A/C RELAY HOLDER AND MAIN FAN MOTOR.

Measure resistance of harness connector between A/C relay holder and main fan motor.

Connector & terminal (F28) No. 4 — (F17) No. 2:



(CHECK): Is resistance less than 1 Ω ?

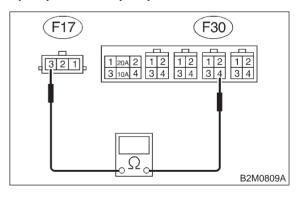
Go to step 1A15.

Repair open circuit in harness between A/C relay holder and main fan motor connector.

1A15: CHECK HARNESS CONNECTOR BETWEEN A/C RELAY HOLDER AND MAIN FAN MOTOR.

Measure resistance of harness connector between A/C relay holder and main fan motor.

Connector & terminal (F30) No. 4 — (F17) No. 3:



(CHECK): Is resistance less than 1 Ω ?

Go to step 1A16.

 Repair open circuit in harness between A/C relay holder and main fan motor connector.

ENGINE COOLING SYSTEM

1A16: CHECK POOR CONTACT.

Check poor contact in A/C relay holder connector. <Ref. to FOREWORD [T3C1].>

CHECK : Is there poor contact in A/C relay holder connector?

: Repair poor contact in A/C relay holder connector.

(NO) : Go to step 1A17.

1A17: CHECK POOR CONTACT.

Check poor contact in main fan motor connector. <Ref. to FOREWORD [T3C1].>

CHECK : Is there poor contact in main fan motor connector?

: Repair poor contact in main fan motor connector.

: Refer to 2-7 "On-Board Diagnostics II System" diagnostics procedure. <Ref. to 2-7 [T6A0].>

B: LO MODE OPERATION (WITH A/C MODEL)

DETECTING CONDITION:

Condition (1):

- Engine coolant temperature is below 89°C (192°F).
- A/C switch is turned ON.
- Vehicle speed is below 10 km/h (6 MPH).

Condition (2):

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

TROUBLE SYMPTOM:

• Radiator main fan does not rotate at LO speed under conditions (1) and (2) above.

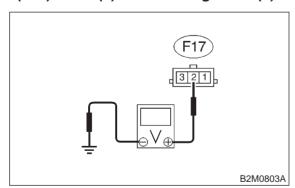
1B1: CHECK POWER SUPPLY TO MAIN FAN MOTOR.

CAUTION:

Be careful not to overheat engine during repair.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from main fan motor.
- 3) Start the engine, and warm-up it 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.

Connector & terminal (F17) No. 2 (+) — Chassis ground (-):



СНЕСК) : Is voltage more than 10 V?

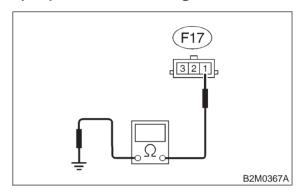
: Go to step **1B2**.

(ND): Go to step **1B5**.

1B2: CHECK GROUND CIRCUIT OF MAIN FAN MOTOR.

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

Connector & terminal (F17) No. 1 — Chassis ground:



(CHECK): Is resistance less than 5 Ω ?

YES: Go to step 1B3.

Repair open circuit in harness between main fan motor connector and chassis ground.

1B3: CHECK POOR CONTACT.

Check poor contact in main fan motor connector. <Ref. to FOREWORD [T3C1].>

CHECK : Is there poor contact in main fan motor connector?

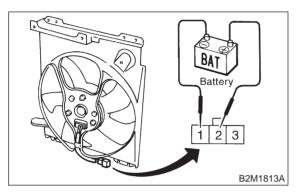
: Repair poor contact in main fan motor connector.

(NO) : Go to step **1B4**.

ENGINE COOLING SYSTEM

1B4: CHECK MAIN FAN MOTOR.

Connect battery positive (+) terminal to terminals No. 2 of main fan motor connector, and negative (-) terminal to terminal No. 1.



CHECK : Does the main fan rotate at LO speed?

Repair poor contact in main fan motor connector.

(NO) : Replace main fan motor with a new one.

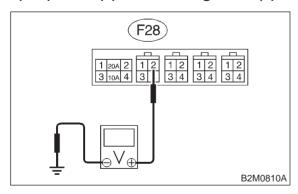
1B5: CHECK POWER SUPPLY TO MAIN FAN RELAY-1.

1) Turn ignition switch to OFF.

2) Remove main fan relay-1 from A/C relay holder.

3) Measure voltage between main fan relay-1 terminal and chassis ground.

Connector & terminal (F28) No. 2 (+) — Chassis ground (-):



CHECK): Is voltage more than 10 V?

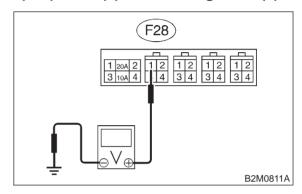
YES : Go to step 1B6.
NO : Go to step 1B7.

1B6: CHECK POWER SUPPLY TO MAIN FAN RELAY-1.

1) Turn ignition switch to ON.

2) Measure voltage between main fan relay-1 terminal and chassis ground.

Connector & terminal (F28) No. 1 (+) — Chassis ground (-):



(CHECK): Is voltage more than 10 V?

: Go to step **1B17**.

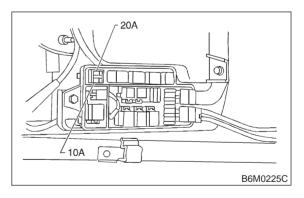
NO : Go to step **1B12**.

1B7: CHECK 20 A FUSE.

1) Turn ignition switch to OFF.

2) Remove 20 A fuse from A/C relay holder.

3) Check condition of fuse.



CHECK : Is the fuse blown-out?

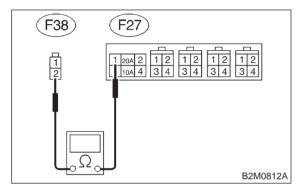
: Replace fuse.

No : Go to step 1B8.

1B8: CHECK HARNESS CONNECTOR
BETWEEN MAIN FUSE BOX AND A/C
RELAY HOLDER 20 A FUSE.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from main fuse box.
- 3) Disconnect connectors (F25) and (F26) from generator.
- 4) On LHD model, disconnect connector (F34) from SBF holder.
- 5) Measure resistance of harness between main fuse box connector and A/C relay holder 20 A fuse terminal.

Connector & terminal (F38) No. 2 — (F27) No. 1:



 $\widehat{\mathsf{CHECK}}$: Is resistance less than 1 Ω ?

YES : Go to step 1B9.

NO

: Repair open circuit in harness between main fuse box connector and 20 A fuse

terminal.

1B9: CHECK POOR CONTACT.

Check poor contact in main fuse box connector. <Ref. to FOREWORD [T3C1].>

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

(YES): Repair poor contact in main fuse box connector.

(NO) : Go to step **1B10**.

1B10: CHECK POOR CONTACT.

Check poor contact in A/C relay holder 20A fuse connector. <Ref. to FOREWORD [T3C1].>

CHECK : Is there poor contact in A/C relay holder 20 A fuse connector?

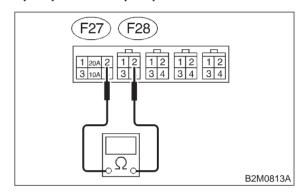
: Repair poor contact in 20 A fuse connector

No : Go to step 1B11.

1B11: CHECK HARNESS CONNECTOR BETWEEN 20 A FUSE AND MAIN FAN RELAY-1 IN A/C RELAY HOLDER.

Measure resistance of harness between 20 A fuse and main fan relay-1 terminal.

Connector & terminal (F27) No. 2 — (F28) No. 2:



 $\widehat{\text{CHECK}}$: Is resistance less than 1 Ω ?

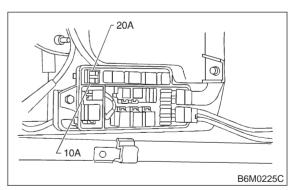
Repair poor contact in main fan relay-1 connector.

 Repair open circuit in harness between 20 A fuse and main fan relay-1 connector.

1B12: CHECK 10 A FUSE.

(NO)

- 1) Turn ignition switch to OFF.
- 2) Remove 10 A fuse from A/C relay holder.
- 3) Check condition of fuse.



CHECK): Is the fuse blown-out?

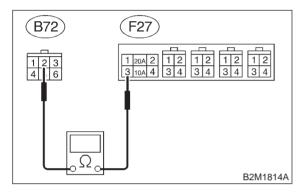
: Replace fuse.

NO : Go to step 1B13.

1B13: CHECK HARNESS CONNECTOR
BETWEEN IGNITION SWITCH AND
A/C RELAY HOLDER 10 A FUSE.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from ignition switch.
- 3) Disconnect connector (i5) from fuse and relay box.
- 4) Measure resistance of harness between ignition switch connector and A/C relay holder 10 A fuse terminal.

Connector & terminal (B72) No. 2 — (F27) No. 3:



 $\widehat{\text{CHECK}}$: Is resistance less than 1 Ω ?

(YES) : Go to step 1B14.

No : Repair harness and connector.

NOTE:

In this case, repair the following:

- Open circuit in harness between ignition switch connector and 10 A fuse terminal.
- Poor contact in coupling connector (B61).

1B14: CHECK POOR CONTACT.

Check poor contact in ignition switch connector. <Ref. to FOREWORD [T3C1].>

CHECK : Is there poor contact in ignition switch connector?

YES : Repair poor contact in ignition switch connector.

: Go to step **1B15**.

1B15: CHECK POOR CONTACT.

Check poor contact in A/C relay holder 10A fuse connector. <Ref. to FOREWORD [T3C1].>

CHECK : Is there poor contact in A/C relay holder 10 A fuse connector?

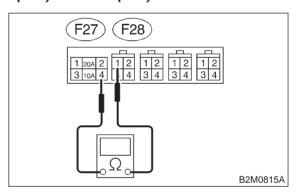
Repair poor contact in 10 A fuse connector.

: Go to step **1B16**.

1B16: CHECK HARNESS CONNECTOR
BETWEEN 10 A FUSE AND MAIN
FAN RELAY-1 IN A/C RELAY
HOLDER.

Measure resistance of harness between 10 A fuse and main fan relay-1 terminal.

Connector & terminal (F27) No. 4 — (F28) No. 1:



 $_{ extsf{CHECK}}$: Is resistance less than 1 Ω ?

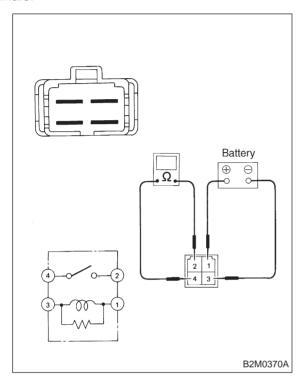
Repair poor contact in main fan relay-1 connector.

: Repair open circuit in harness between 10 A fuse and main fan relay-1 connector

(NO)

1B17: **CHECK MAIN FAN RELAY-1.**

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



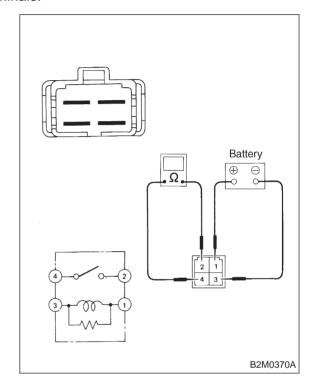
CHECK : Does continuity exist between terminals No. 2 and No. 4?

: Replace main fan relay-1. YES

: Go to step 1B18. (NO)

CHECK MAIN FAN RELAY-1. 1B18:

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



: Does continuity exist between termi-(CHECK) nals No. 2 and No. 4?

: Go to step 1B19. (YES)

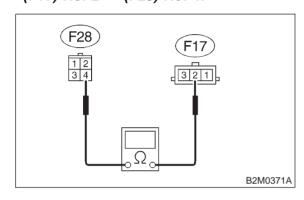
: Replace main fan relay-1. (NO)

1B19: CHECK HARNESS CONNECTOR
BETWEEN MAIN FAN RELAY-1 AND
MAIN FAN MOTOR.

Measure resistance of harness between main fan motor connector and main fan relay-1 terminal.

Connector & terminal

(F17) No. 2 — (F28) No. 4:



 $\widehat{\text{CHECK}}$: Is resistance less than 1 Ω ?

YES: Go to step **1B20**.

Repair open circuit in harness between main fan motor and main fan relay-1 connector.

1B20 : CHECK POOR CONTACT.

Check poor contact in main fan relay-1 connector. <Ref. to FOREWORD [T3C1].>

CHECK : Is there poor contact in main fan relav-1 connector?

Repair poor contact in main fan relay-1 connector.

No : Go to step 1B21.

1B21: CHECK POOR CONTACT.

Check poor contact in main fan motor connector. <Ref. to FOREWORD [T3C1].>

CHECK : Is there poor contact in main fan motor connector?

: Repair poor contact in main fan motor connector.

: Refer to 2-7 "On-Board Diagnostics II System" diagnostics procedure. <Ref. to 2-7 [T6A0].>

C: HI MODE OPERATION (WITH A/C MODEL)

DETECTING CONDITION:

Condition (1):

- Engine coolant temperature is below 89°C (192°F).
- A/C switch is turned ON.
- Vehicle speed is over 20 km/h (12 MPH).

Condition (2):

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

Condition (3):

- Engine coolant temperature is above 95°C (203°F).
- A/C switch is turned ON.

TROUBLE SYMPTOM:

• Radiator main fan does not rotate at HI speed under conditions (1), (2) and (3) above.

1C1: CHECK OPERATION OF MAIN FAN MOTOR LO MODE.

CAUTION:

Be careful not to overheat engine during repair.

- 1) Start the engine, and warm-up it 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 : Does the main fan operate at LO MODE?

YES : Go to step 1C2.

: Go to LO MODE OPERATION diagnostics chart. <Ref. to 2-5 [T1B0].>

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1C2: CHECK POWER SUPPLY TO MAIN FAN MOTOR.

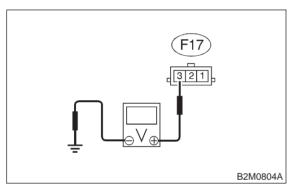
CAUTION:

Be careful not to overheat engine during repair.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from main fan motor.
- 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.

Connector & terminal

(F17) No. 3 (+) — Chassis ground (-):



CHECK) : Is voltage more than 10 V?

Go to step 1C3.

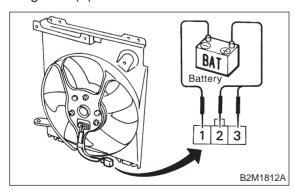
Go to step 1C4.

CHECK)

1C3: CHECK MAIN FAN MOTOR.

1) Turn ignition switch and A/C switch to OFF.

2) Connect battery positive (+) terminal to terminals No. 2 and No. 3 of main fan motor connector, and negative (-) terminal to terminal No. 1.



: Does the main fan rotate at HI speed?

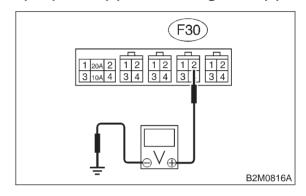
: Repair poor contact in main fan motor connector.

: Replace main fan motor with a new one.

1C4: CHECK POWER SUPPLY TO MAIN FAN RELAY-2.

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

Connector & terminal (F30) No. 2 (+) — Chassis ground (-):



(CHECK): Is voltage more than 10 V?

Go to step 1C5.

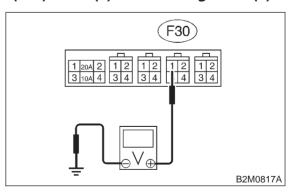
Go to step 1C6.

1C5: CHECK POWER SUPPLY TO MAIN FAN RELAY-2.

1) Turn ignition switch to ON.

2) Measure voltage between main fan relay-2 terminal and chassis ground.

Connector & terminal (F30) No. 1 (+) — Chassis ground (-):



CHECK): Is voltage more than 10 V?

Go to step 1C8.

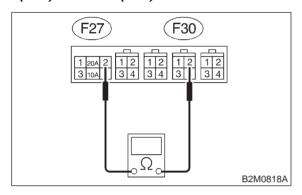
So to step 1C7.

2-5 [T1C6] 1. Radiator Main Fan

1C6: CHECK HARNESS CONNECTOR
BETWEEN 20 A FUSE AND MAIN
FAN RELAY-2 IN A/C RELAY
HOLDER.

- 1) Turn ignition switch to OFF.
- 2) Remove 20 A fuse from A/C relay holder.
- 3) Measure resistance of harness between 20 A fuse and main fan relay-2 terminal.

Connector & terminal (F27) No. 2 — (F30) No. 2:



 $\widehat{\text{CHECK}}$: Is resistance less than 1 Ω ?

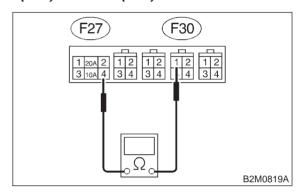
Repair poor contact in main fan relay-2 connector.

Repair open circuit in harness between 20 A fuse and main fan relay-2 connector.

1C7: CHECK HARNESS CONNECTOR
BETWEEN 10 A FUSE AND MAIN
FAN RELAY-2 IN A/C RELAY
HOLDER.

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

Connector & terminal (F27) No. 4 — (F30) No. 1:



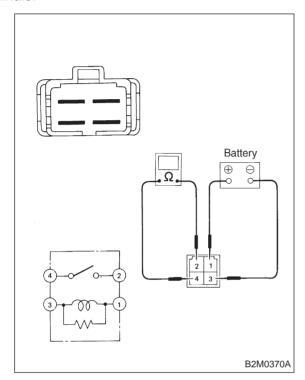
(CHECK): Is resistance less than 1 Ω ?

Repair poor contact in main fan relay-2 connector.

Repair open circuit in harness between 10 A fuse and main fan relay-2 connector.

1C8: CHECK MAIN FAN RELAY-2.

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



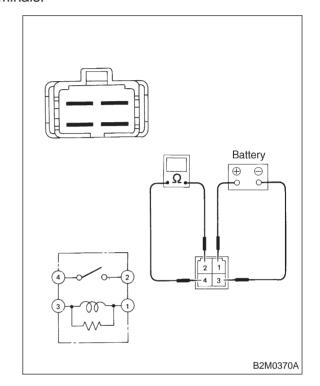
CHECK : Does continuity exist between terminals No. 2 and No. 4?

YES : Replace main fan relay-2.

: Go to step **1C9**.

1C9: CHECK MAIN FAN RELAY-2.

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



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

YES : Go to step 1C10.

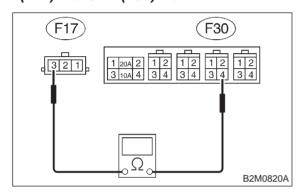
: Replace main fan relay-2.

2. Radiator Sub Fan (With A/C model only)

1C10: CHECK HARNESS CONNECTOR BETWEEN MAIN FAN RELAY-2 AND MAIN FAN MOTOR.

Measure resistance of harness between main fan motor connector and main fan relay-2 terminal.

Connector & terminal (F17) No. 3 — (F30) No. 4:



 $_{ extsf{CHECK}}$: Is resistance less than 1 Ω ?

YES: Go to step 1C11.

Repair open circuit in harness between main fan motor and main fan relay-2 connector.

1C11: CHECK POOR CONTACT.

Check poor contact in main fan relay-2 connector. <Ref. to FOREWORD [T3C1].>

CHECK : Is there poor contact in main fan relay-2 connector?

(YES): Repair poor contact in main fan relay-2 connector.

: Go to step **1C12**.

1C12: CHECK POOR CONTACT.

Check poor contact in main fan motor connector. <Ref. to FOREWORD [T3C1].>

CHECK : Is there poor contact in main fan motor connector?

Repair poor contact in main fan motor connector.

Refer to 2-7 "On-Board Diagnostics II System" diagnostics procedure. <Ref. to 2-7 [T6A0].>

2. Radiator Sub Fan (With A/C model only)

A: LO MODE OPERATION

DETECTING CONDITION:

Condition (1):

- Engine coolant temperature is below 89°C (192°F).
- A/C switch is turned ON.
- Vehicle speed is below 10 km/h (6 MPH).

Condition (2):

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

TROUBLE SYMPTOM:

• Radiator sub fan does not rotate at LO speed under conditions (1) and (2) above.

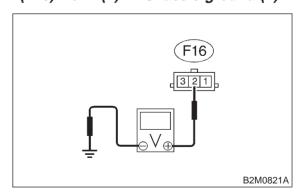
2A1: CHECK POWER SUPPLY TO SUB FAN MOTOR.

CAUTION:

Be careful not to overheat engine during repair.

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector from sub fan motor.
- 3) Start the engine, and warm-up it 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 sub fan motor connector and chassis ground.

Connector & terminal (F16) No. 2 (+) — Chassis ground (-):



(CHECK): Is voltage more than 10 V?

Go to step 2A2.

So to step 2A5.