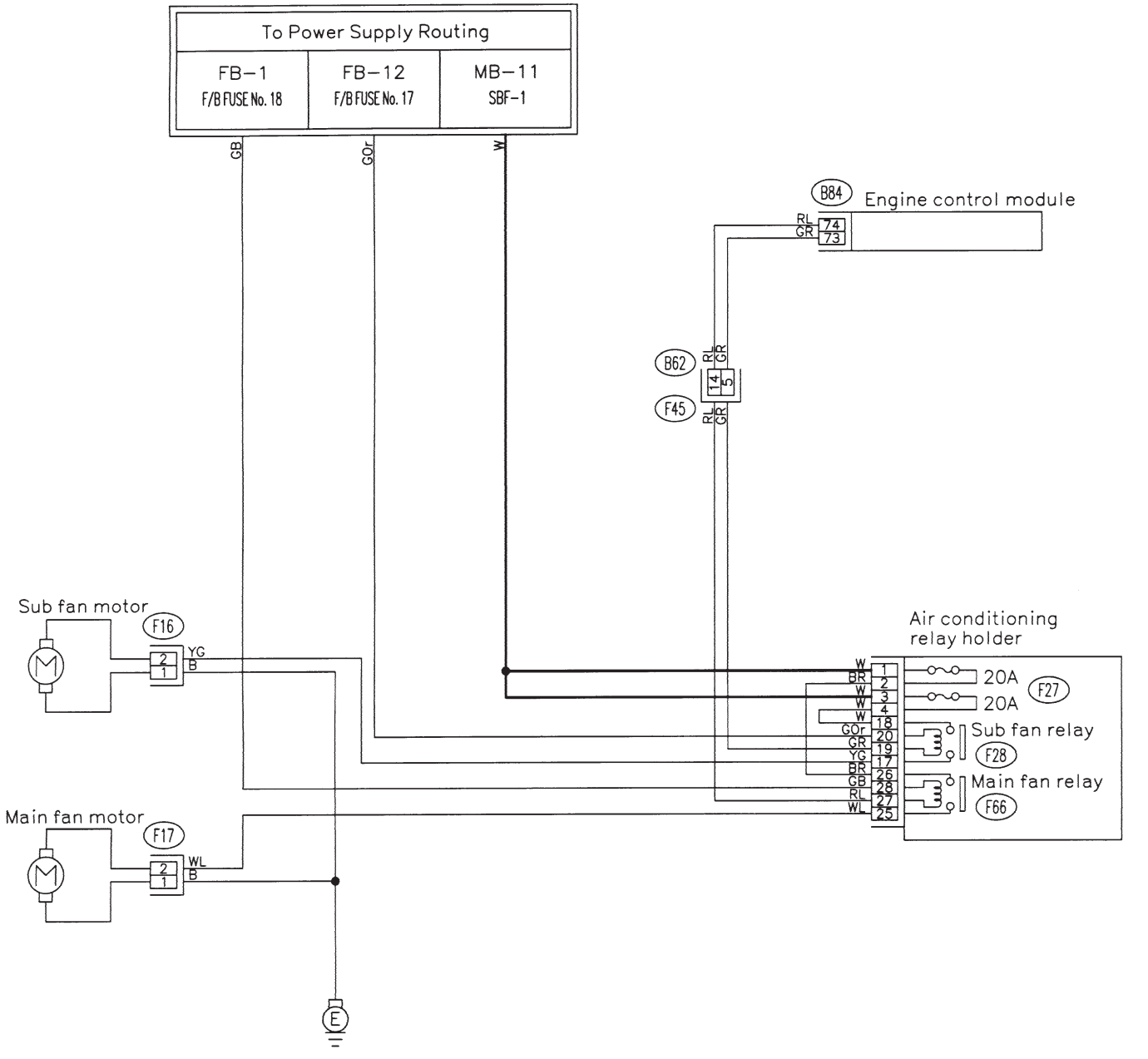
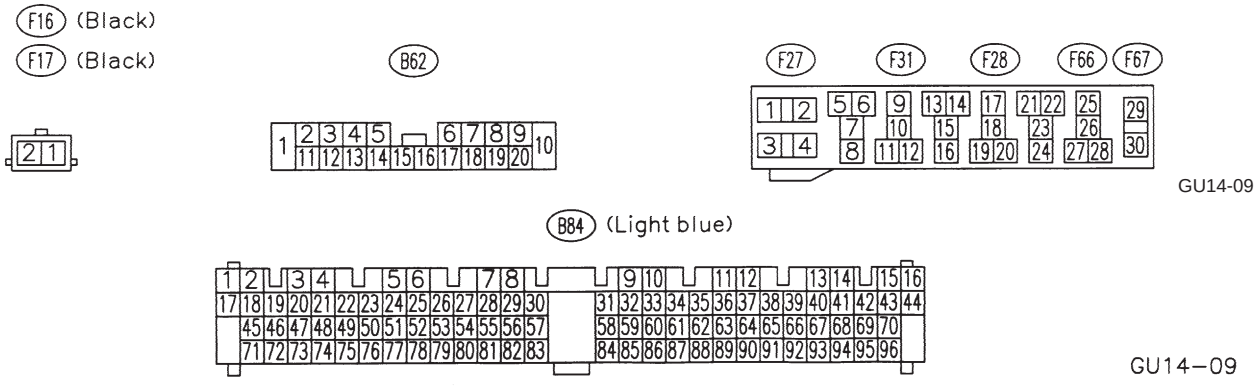
ENGINE COOLING SYSTEM 2-5

1. Wiring Diagram





2. Radiator Main Fan

A: OPERATION

DETECTING CONDITION:

Condition:
- Engine coolant temperature is above 95°C (203°F).
- Vehicle speed is below 19 km/h (12 MPH).

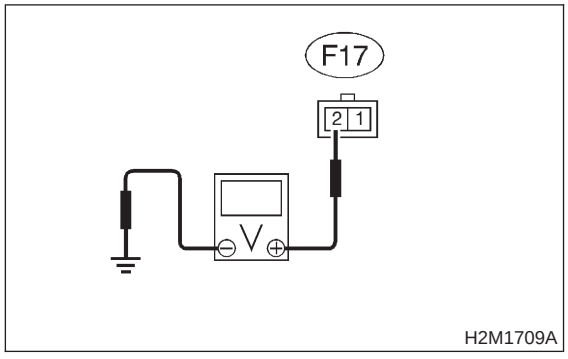
TROUBLE SYMPTOM:
- Radiator main fan does not rotate under the above conditions.

2A1 : 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 it up 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 (−):

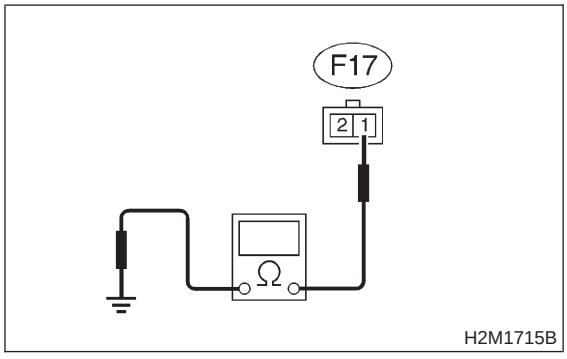


CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **2A2**.
NO : Go to step **2A5**.

2A2 : 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 the resistance less than 5 Ω?***
YES : Go to step **2A3**.
NO : Repair open circuit in harness between main fan motor connector and chassis ground.

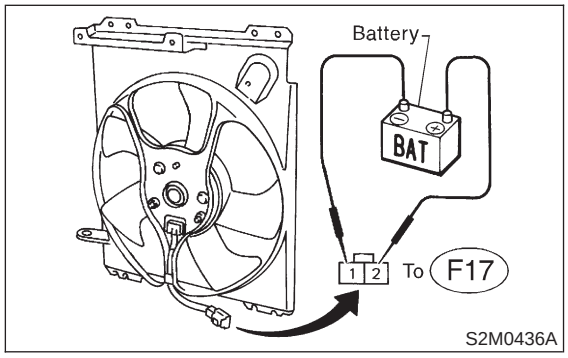
2A3 : CHECK POOR CONTACT.

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

CHECK : ***Is there poor contact in main fan motor connector?***
YES : Repair poor contact in main fan motor connector.
NO : Go to step **2A4**.

2A4 : CHECK MAIN FAN MOTOR.

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

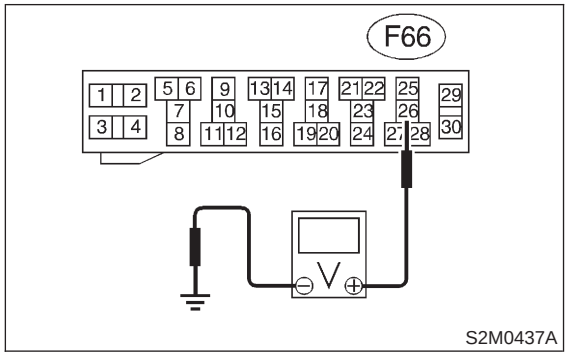


CHECK : ***Does the main fan rotate?***
YES : Repair poor contact in main fan motor connector.
NO : Replace main fan motor with a new one.

2A5 : CHECK POWER SUPPLY TO MAIN FAN RELAY.

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

Connector & terminal
(F66) No. 26 (+) — Chassis ground (−):

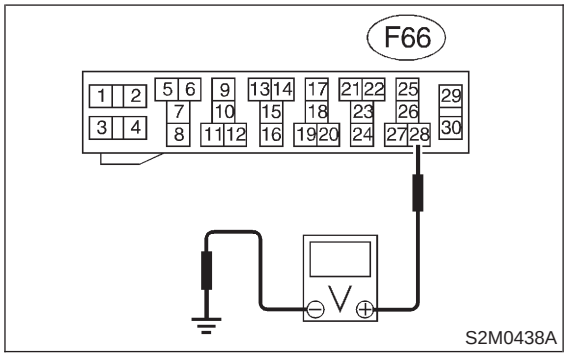


CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **2A6**.
NO : Go to step **2A7**.

2A6 : CHECK POWER SUPPLY TO MAIN FAN RELAY.

1) Turn ignition switch to ON.
2) Measure voltage between main fan relay terminal and chassis ground.

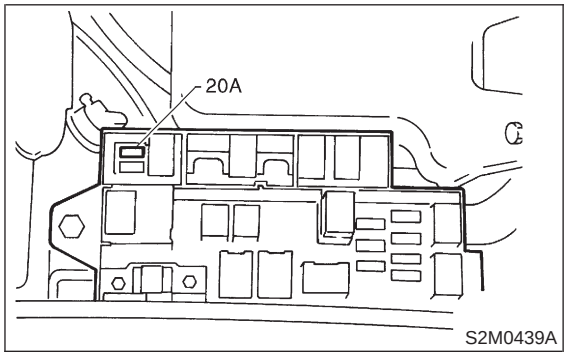
Connector & terminal
(F66) No. 28 (+) — Chassis ground (−):



CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **2A16**.
NO : Go to step **2A12**.

2A7 : CHECK 20 A FUSE.

1) Remove 20 A fuse from A/C relay holder.
2) Check condition of fuse.

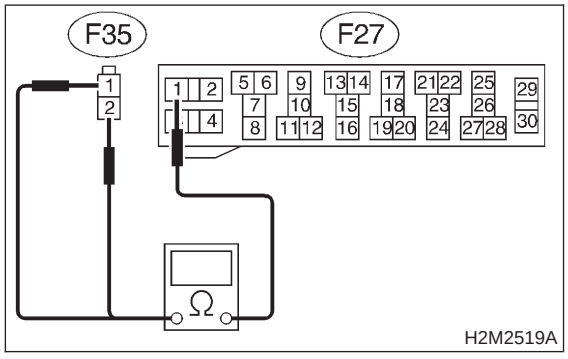


CHECK : ***Is the fuse blown-out?***
YES : Replace fuse.
NO : Go to step **2A8**.

2A8 : CHECK HARNESS CONNECTOR BETWEEN MAIN FUSE BOX AND A/C RELAY HOLDER 20 A FUSE.

1) Disconnect connector from main fuse box.
2) Disconnect connectors (F25) and (F26) from generator, and (F34) from SBF holder.
3) Measure resistance of harness connector between main fuse box connector and A/C relay holder 20 A fuse terminals.

Connector & terminal
(F35) No. 1 — (F27) No. 1:
(F35) No. 2 — (F27) No. 1:



CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **2A9**.
NO : Repair open circuit in harness between main fuse box connector and 20 A fuse terminal.

2A9 : 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 **2A10**.

2A10 : CHECK POOR CONTACT.

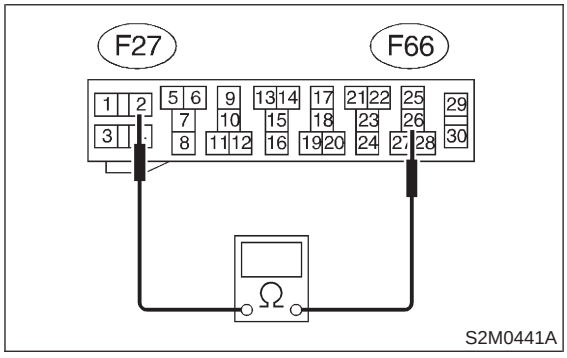
Check poor contact in A/C relay holder 20 A fuse connector. <Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in A/C relay holder 20 A fuse connector?***
YES : Repair poor contact in 20 A fuse
NO : Go to step **2A11**.

2A11 : CHECK HARNESS CONNECTOR BETWEEN 20 A FUSE AND MAIN FAN RELAY IN A/C RELAY HOLDER.

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

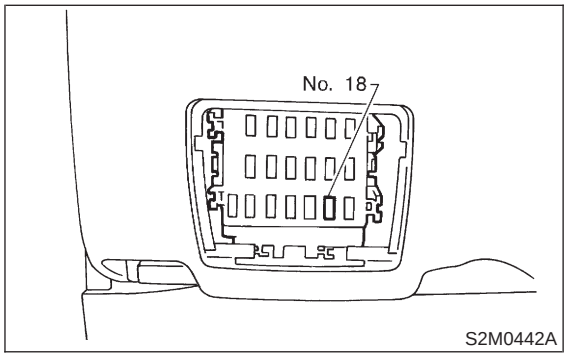
Connector & terminal
(F27) No. 2 — (F66) No. 26:



CHECK : ***Is the resistance less than 1 Ω?***
YES : Repair poor contact in main fan relay connector.
NO : Repair open circuit in harness between 20 A fuse and main fan relay connector.

2A12 : CHECK FUSE.

1) Turn ignition switch to OFF.
2) Remove fuse No. 18 from joint box.
3) Check condition of fuse.

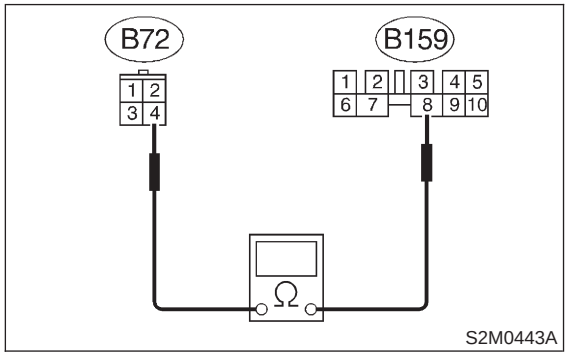


CHECK : ***Is the fuse blown-out?***
YES : Replace fuse.
NO : Go to step **2A13**.

2A13 : CHECK HARNESS CONNECTOR BETWEEN IGNITION SWITCH AND JOINT BOX.

1) Disconnect connector from ignition switch.
2) Separate connectors (F44) and (B61).
3) Disconnect connector (B159) from joint box.
4) Measure resistance of harness between ignition switch connector and joint box.

Connector & terminal
(B72) No. 4 — (B159) No. 8:



CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **2A14**.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
- Open circuit in harness between ignition switch connector and joint box.
- Poor contact in coupling connector (B61).

2A14 : 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.
NO : Go to step **2A15**.

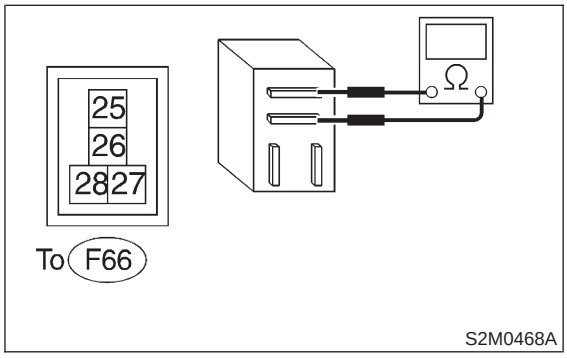
2A15 : CHECK POOR CONTACT.

Check poor contact in joint box 10 A fuse connector. <Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in joint box 10 A fuse connector?***
YES : Repair poor contact in joint box connector.
NO : Go to step **2A16**.

2A16 : CHECK MAIN FAN RELAY.

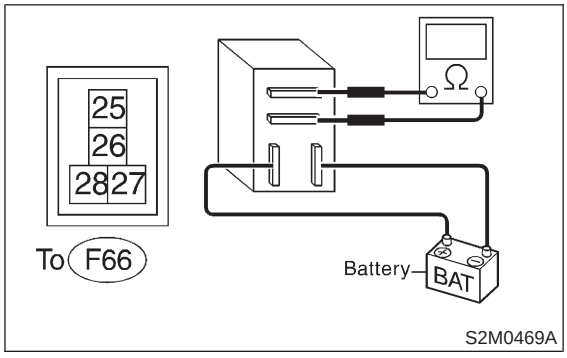
1) Turn ignition switch to OFF.
2) Check continuity between main fan relay terminals.



CHECK : ***Does no continuity exist between terminals No. 25 and No. 26?***
YES : Go to step **2A17**.
NO : Replace main fan relay.

2A17 : CHECK MAIN FAN RELAY.

1) Connect battery to terminals No. 27 and No. 28 of main fan relay.
2) Check continuity between main fan relay terminals.

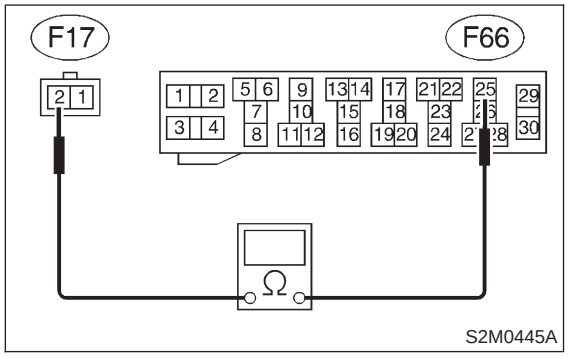


CHECK : ***Does continuity exist between terminals No. 25 and No. 26?***
YES : Go to step **2A18**.
NO : Replace main fan relay.

2A18 : CHECK HARNESS CONNECTOR BETWEEN MAIN FAN RELAY AND MAIN FAN MOTOR.

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

Connector & terminal
(F17) No. 2 — (F66) No. 25:



CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **2A19**.
NO : Repair open circuit in harness between main fan motor and main fan relay connector.

2A19 : CHECK POOR CONTACT.

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

CHECK : ***Is there poor contact in main fan relay connector?***
YES : Repair poor contact in main fan relay connector.
NO : Go to step **2A20**.

2A20 : CHECK POOR CONTACT.

Check poor contact in main fan relay 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 : Contact with SOA service.

NOTE:
Inspection by DTM is required, because probable cause is deterioration of multiple parts.

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

A: OPERATION

DETECTING CONDITION:

Condition (1):
- Engine coolant temperature is below 95°C (203°F).
- A/C switch is turned ON.
- Vehicle speed is below 19 km/h (12 MPH).

Condition (2):
- Engine coolant temperature is above 100°C (212°F).
- A/C switch is turned OFF.
- Vehicle speed is below 19 km/h (12 MPH).

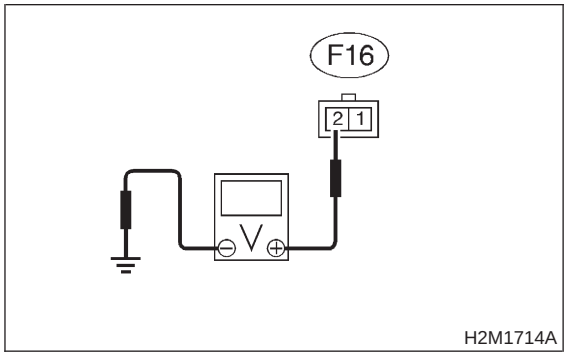
TROUBLE SYMPTOM:
- Radiator sub fan does not rotate under conditions (1) and (2) above.

3A1 : 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 it up until engine coolant temperature increases over 100°C (212°F).
4) Stop the engine and turn ignition switch to ON.
5) Measure voltage between sub fan motor connector and chassis ground.

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

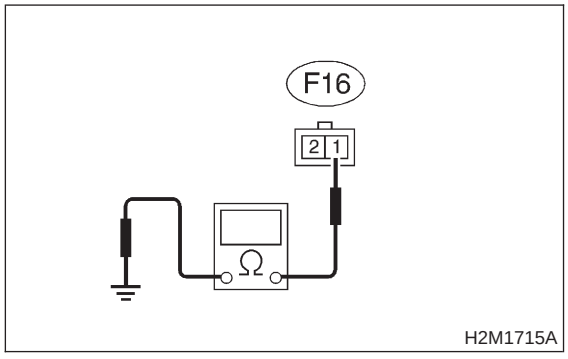


CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **3A2**.
NO : Go to step **3A5**.

3A2 : CHECK GROUND CIRCUIT OF SUB FAN MOTOR.

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

Connector & terminal
(F16) No. 1 — Chassis ground:



CHECK : ***Is the resistance less than 5 Ω?***
YES : Go to step **3A3**.
NO : Repair open circuit in harness between sub fan motor connector and chassis ground.

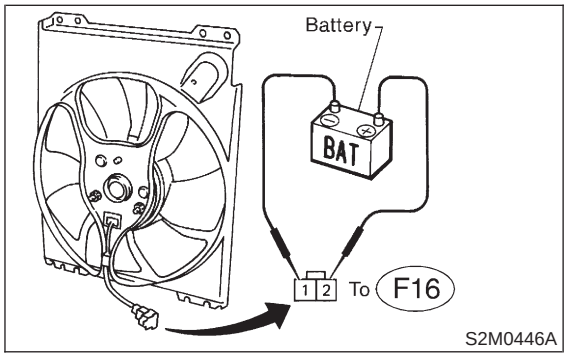
3A3 : CHECK POOR CONTACT.

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

CHECK : ***Is there poor contact in sub fan motor connector?***
YES : Repair poor contact in sub fan motor connector.
NO : Go to step **3A4**.

3A4 : CHECK SUB FAN MOTOR.

Connect battery positive (+) terminal to terminal No. 2, and negative (−) terminal to terminal No. 1 of sub fan motor connector.

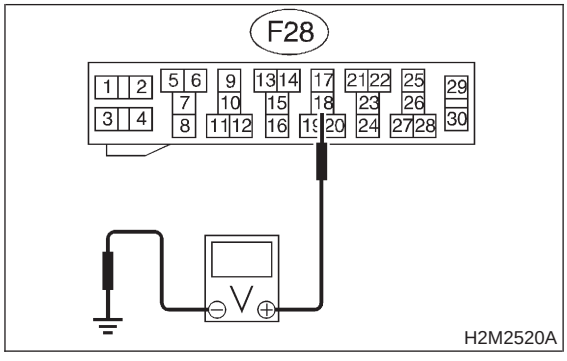


CHECK : ***Does the sub fan rotate?***
YES : Repair poor contact in sub fan motor connector.
NO : Replace sub fan motor with a new one.

3A5 : CHECK POWER SUPPLY TO SUB FAN RELAY.

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

Connector & terminal
(F28) No. 18 (+) — Chassis ground (−):

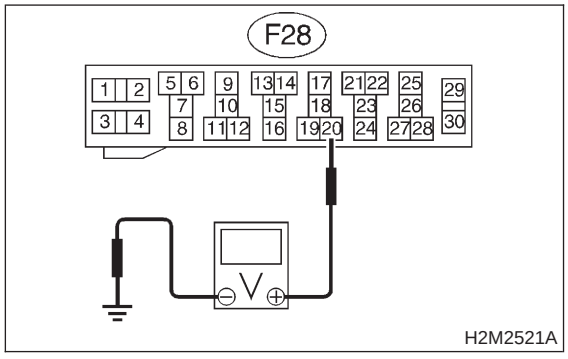


CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **3A6**.
NO : Go to step **3A7**.

3A6 : CHECK POWER SUPPLY TO SUB FAN RELAY.

1) Turn ignition switch to ON.
2) Measure voltage between sub fan relay terminal and chassis ground.

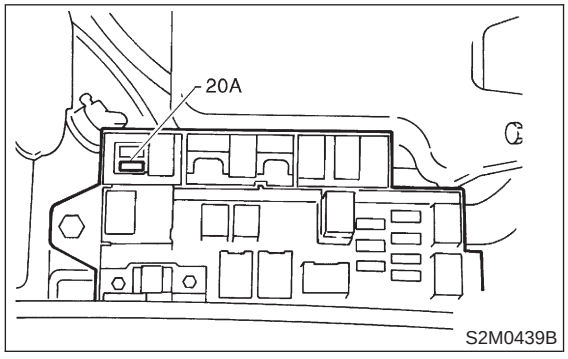
Connector & terminal
(F28) No. 20 (+) — Chassis ground (−):



CHECK : ***Is the voltage more than 10 V?***
YES : Go to step **3A16**.
NO : Go to step **3A12**.

3A7 : CHECK 20 A FUSE.

1) Remove 20 A fuse from A/C relay holder.
2) Check condition of fuse.

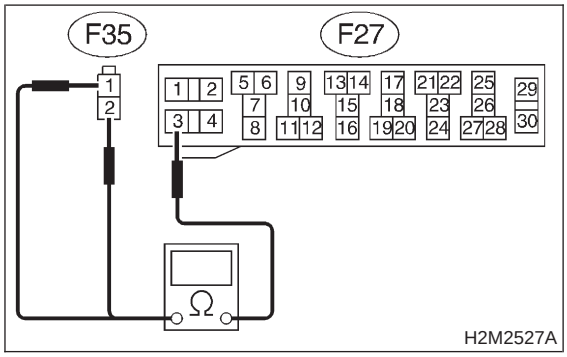


CHECK : ***Is the fuse blown-out?***
YES : Replace fuse.
NO : Go to step **3A8**.

3A8 : CHECK HARNESS CONNECTOR BETWEEN MAIN FUSE BOX AND A/C RELAY HOLDER 20 A FUSE.

1) Disconnect connector from main fuse box.
2) Disconnect connectors (F25) and (F26) from generator, and (F34) from SBF holder.
3) Measure resistance of harness connector between main fuse box connector and A/C relay holder 20 A fuse terminals.

Connector & terminal
(F35) No. 1 — (F27) No. 3:
(F35) No. 2 — (F27) No. 3:



CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **3A9**.
NO : Repair open circuit in harness between main fuse box connector and 20 A fuse terminal.

3A9 : 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 **3A10**.

3A10 : CHECK POOR CONTACT.

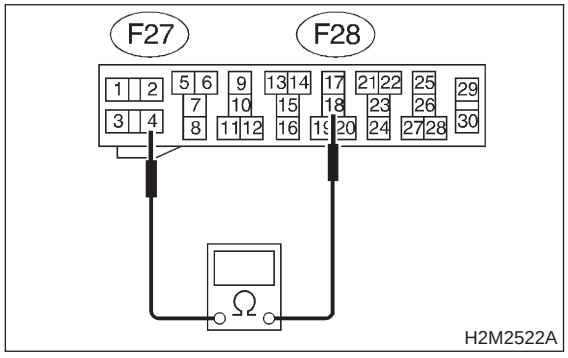
Check poor contact in A/C relay holder 20 A fuse connector. <Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in A/C relay holder 20 A fuse connector?***
YES : Repair poor contact in 20 A fuse
NO : Go to step **3A11**.

3A11 : CHECK HARNESS CONNECTOR BETWEEN 20 A FUSE AND SUB FAN RELAY IN A/C RELAY HOLDER.

Measure resistance of harness between 20 A fuse and sub fan relay terminal.

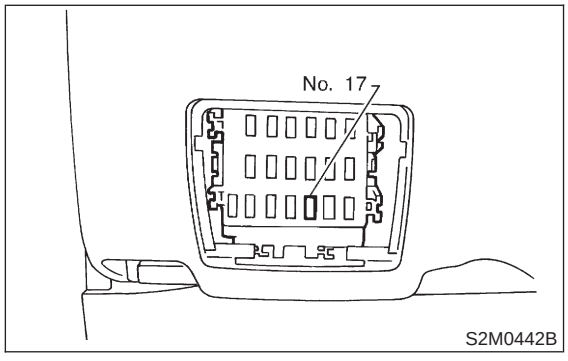
Connector & terminal
(F27) No. 4 — (F28) No. 18:



CHECK : ***Is the resistance less than 1 Ω?***
YES : Repair poor contact in sub fan relay connector.
NO : Repair open circuit in harness between 20 A fuse and sub fan relay connector.

3A12 : CHECK FUSE.

1) Turn ignition switch to OFF.
2) Remove fuse No. 17 from joint box.
3) Check condition of fuse.

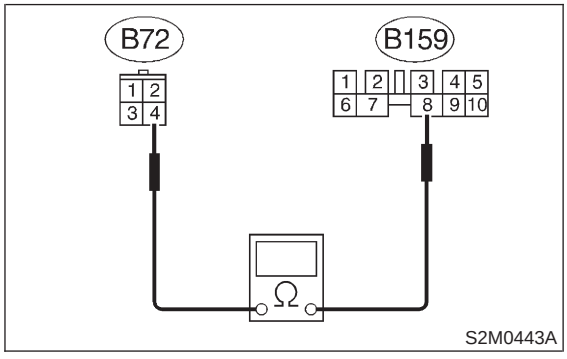


CHECK : ***Is the fuse blown-out?***
YES : Replace fuse.
NO : Go to step **3A13**.

3A13 : CHECK HARNESS CONNECTOR BETWEEN IGNITION SWITCH AND JOINT BOX.

1) Disconnect connector from ignition switch.
2) Separate connectors (F44) and (B61).
3) Disconnect connector (B159) from joint box.
4) Measure resistance of harness between ignition switch connector and joint box.

Connector & terminal
(B72) No. 4 — (B159) No. 8:



CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **3A14**.
NO : Repair harness and connector.

NOTE:
In this case, repair the following:
- Open circuit in harness between ignition switch connector and joint box.
- Poor contact in coupling connector (B61).

3A14 : 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.
NO : Go to step **3A15**.

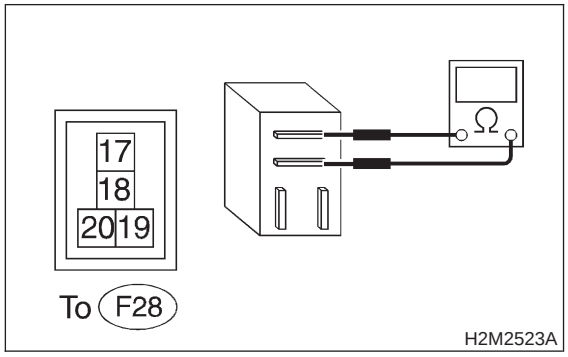
3A15 : CHECK POOR CONTACT.

Check poor contact in joint box 10 A fuse connector. <Ref. to FOREWORD [T3C1].>

CHECK : ***Is there poor contact in joint box 10 A fuse connector?***
YES : Repair poor contact in joint box connector.
NO : Go to step **3A16**.

3A16 : CHECK SUB FAN RELAY.

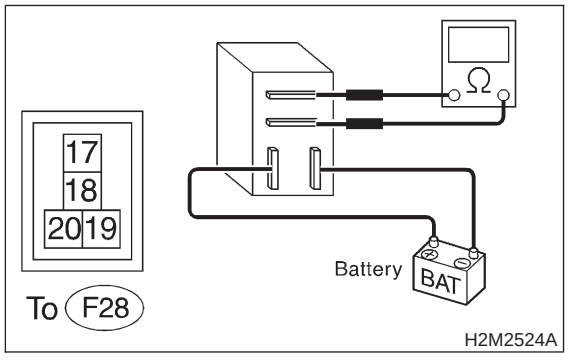
1) Turn ignition switch to OFF.
2) Check continuity between sub fan relay terminals.



CHECK : ***Does no continuity exist between terminals No. 17 and No. 18?***
YES : Go to step **3A17**.
NO : Replace sub fan relay.

3A17 : CHECK SUB FAN RELAY.

1) Connect battery to terminals No. 19 and No. 20 of sub fan relay.
2) Check continuity between sub fan relay terminals.

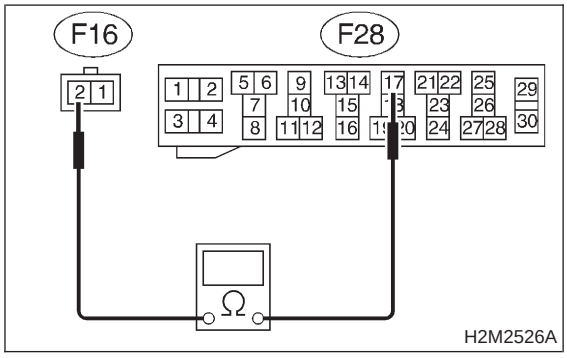


CHECK : ***Does continuity exist between terminals No. 17 and No. 18?***
YES : Go to step **3A18**.
NO : Replace sub fan relay.

3A18 : CHECK HARNESS CONNECTOR BETWEEN SUB FAN RELAY AND SUB FAN MOTOR.

Measure resistance of harness between sub fan motor connector and sub fan relay terminal.

Connector & terminal
(F16) No. 2 — (F28) No. 17:



CHECK : ***Is the resistance less than 1 Ω?***
YES : Go to step **3A19**.
NO : Repair open circuit in harness between sub fan motor and sub fan relay connector.

3A19 : CHECK POOR CONTACT.

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

CHECK : ***Is there poor contact in sub fan relay connector?***
YES : Repair poor contact in sub fan relay connector.
NO : Go to step **3A20**.

3A20 : CHECK POOR CONTACT.

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

CHECK : ***Is there poor contact in sub fan motor connector?***
YES : Repair poor contact in sub fan motor connector.
NO : Contact with SOA service.

NOTE:
Inspection by DTM is required, because probable cause is deterioration of multiple parts.

MEMO: