HEATER & AIR CONDITIONER

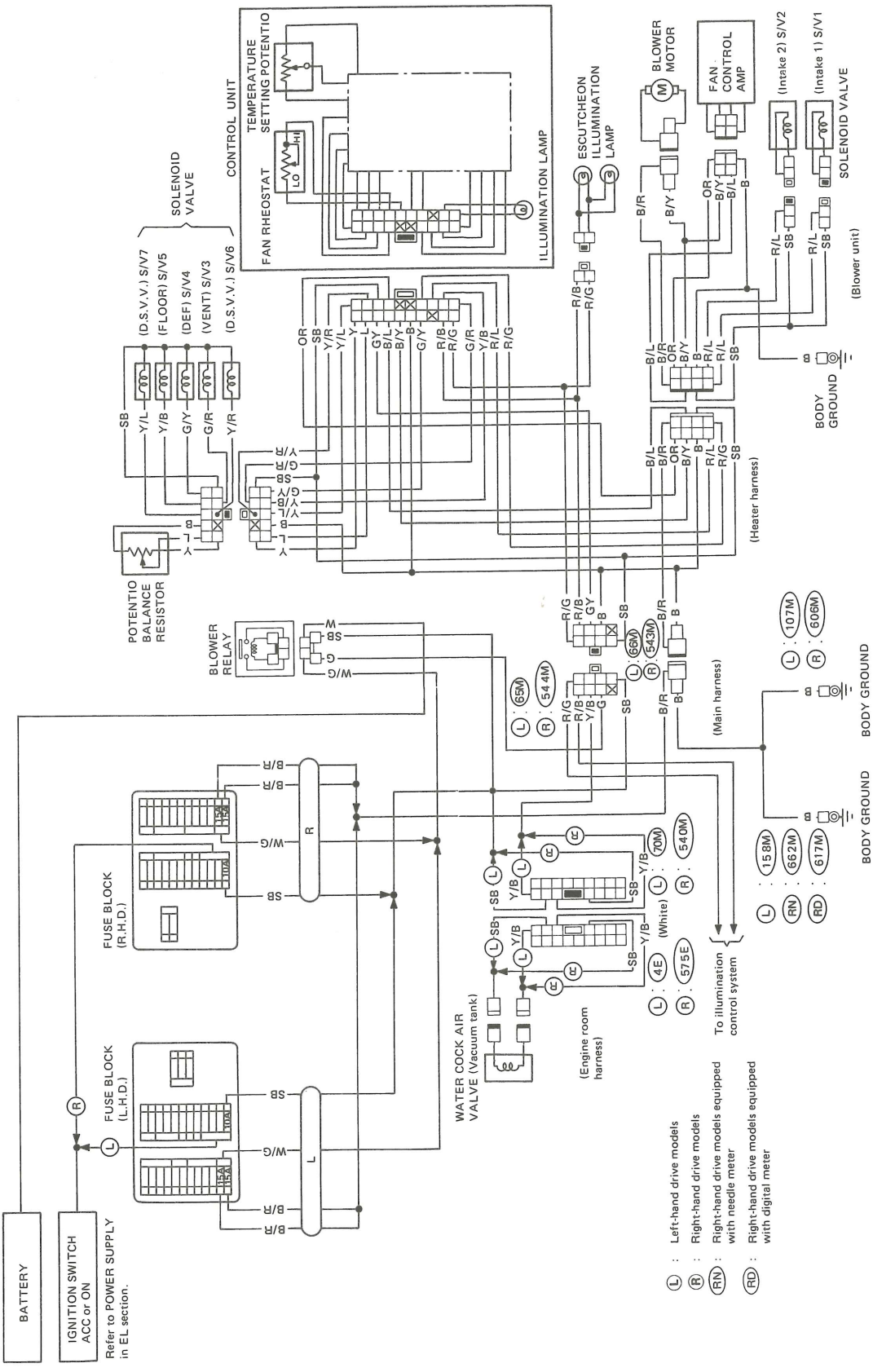
SECTION HA

CONTENTS

HEATER ELECTRICAL CIRCUIT ..... HA- 2
A/C ELECTRICAL CIRCUIT ..... HA- 3
TROUBLE DIAGNOSES (Manual) ..... HA- 6
SERVICE DATA AND SPECIFICATIONS HA-38

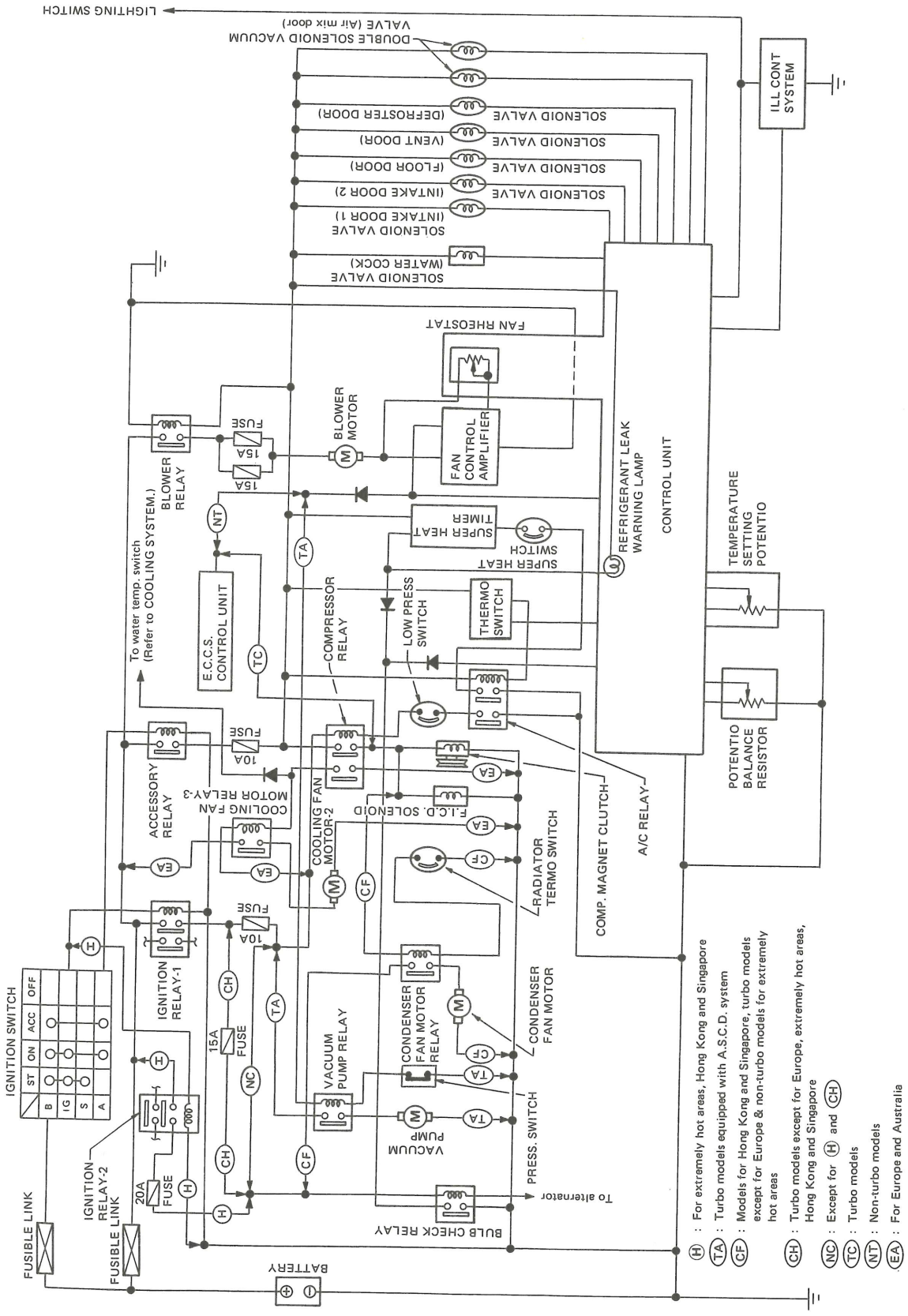
HEATER ELECTRICAL CIRCUIT

Wiring Diagram



A/C ELECTRICAL CIRCUIT

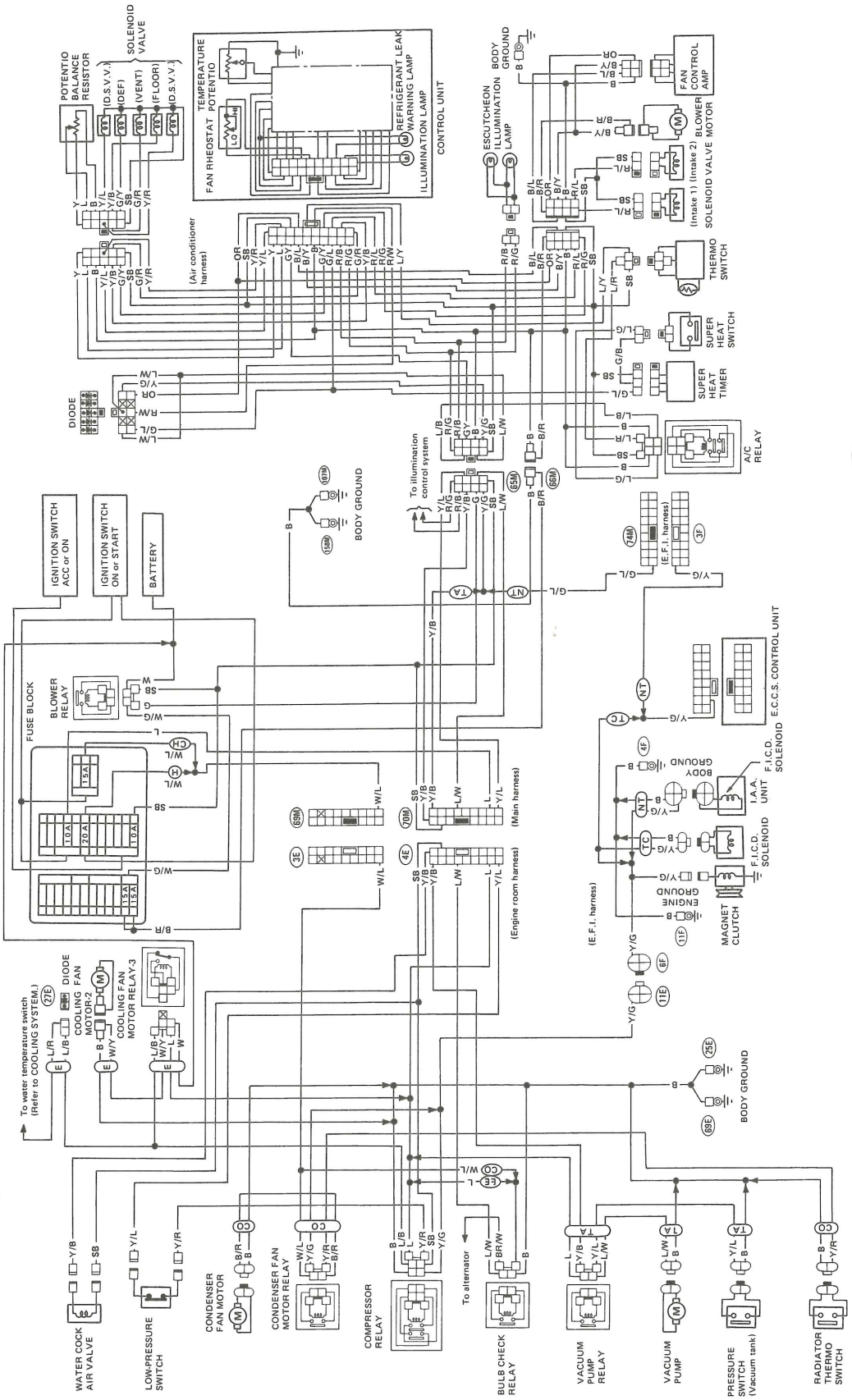
Schematic



SHA629B

A/C ELECTRICAL CIRCUIT

Wiring Diagram (L.H. drive model)



(CH) : Turbo models except for Europe and extremely hot areas

(TC) : Turbo models

(CO) : Turbo models except for Europe & Non-turbo models for extremely hot areas

(NT) : Non-turbo models

(EE) : For Europe & except for (CO)

(E) : For Europe

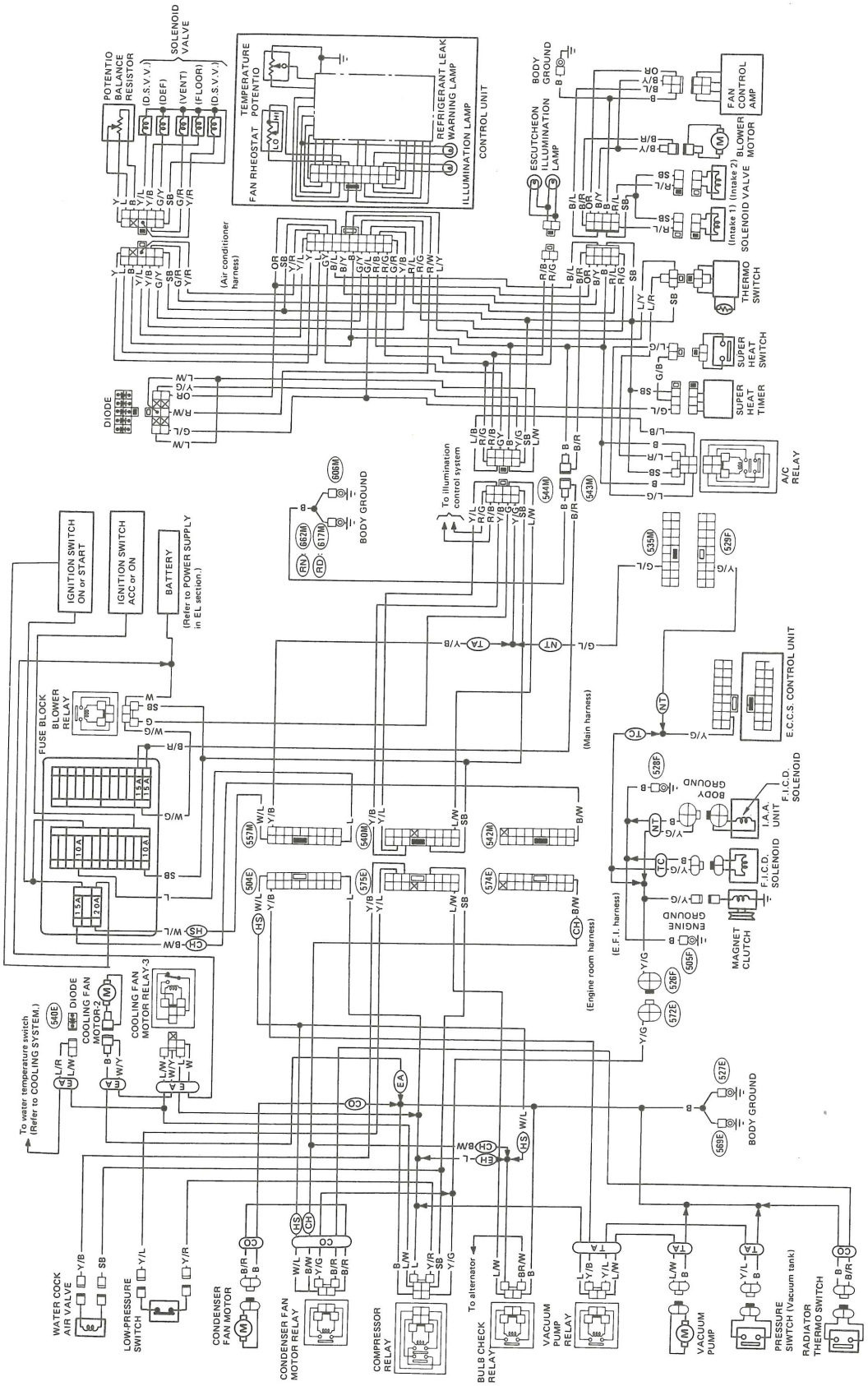
(TA) : Turbo models equipped with A.S.C.D. system

(H) : For extremely hot areas

SHA630B

A/C ELECTRICAL CIRCUIT

Wiring Diagram (R.H. drive model)



(EA) : For Europe and Australia
(TC) : Turbo models
(NT) : Non-turbo models
(HS) : For Hong Kong and Singapore
(EH) : For Europe and non-turbo models except for Hong Kong and Singapore

(TA) : Turbo models equipped with A.S.C.D. system
(RN) : Models equipped with needle meter
(RD) : Models equipped with digital meter
(CO) : Turbo models except for Europe & Non-turbo models for Hong Kong and Singapore
(CH) : Turbo models except for Europe, Hong Kong and Singapore

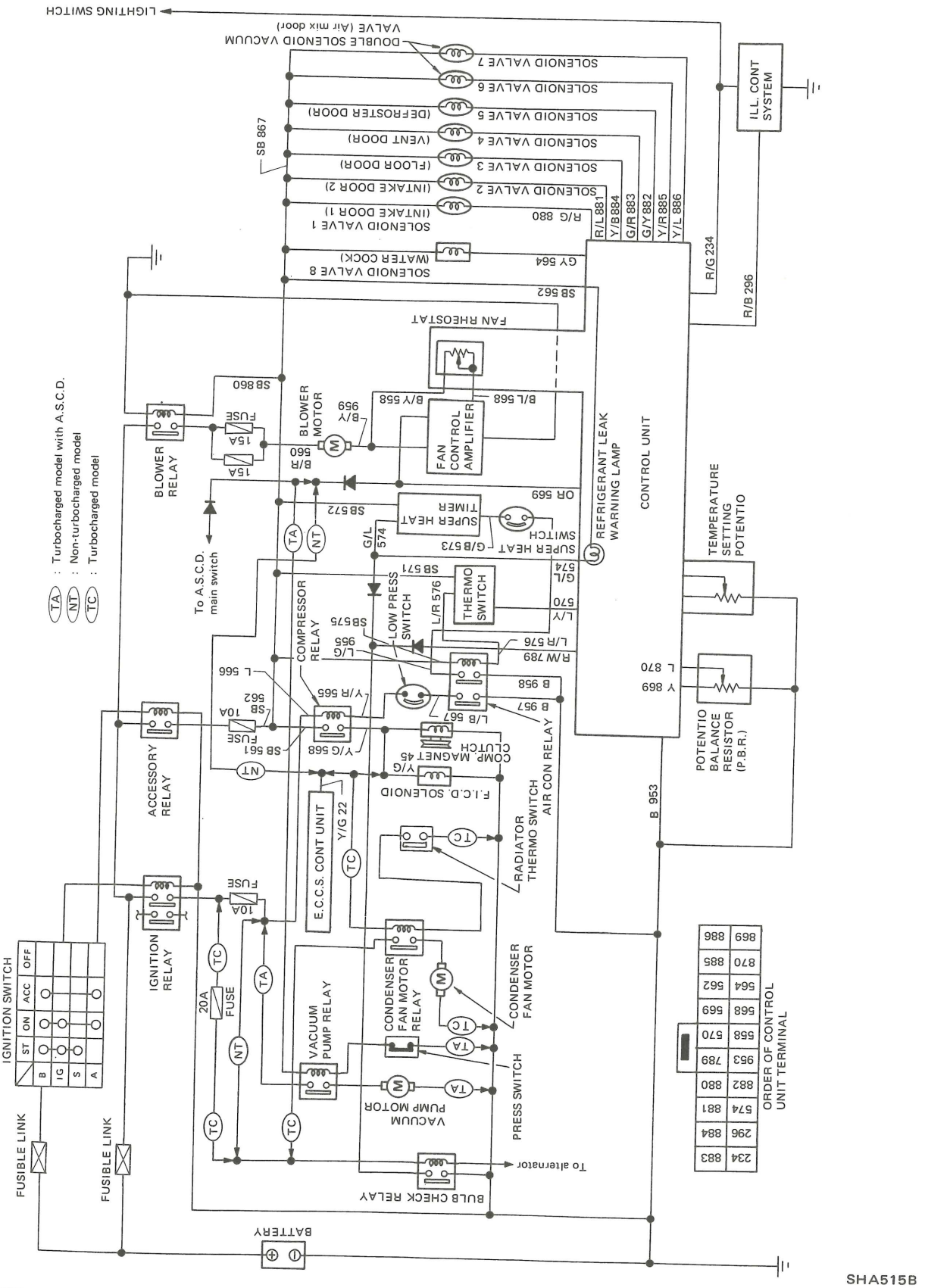
SHA631B

TROUBLE DIAGNOSES (Manual)

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Preliminary Check ..... HA- 8
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3) Insufficient air flow (Blower motor does not rotate.) HA-10
4) Abnormal sound HA-11
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(I) Outlet air will not become warm. HA-24
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(P) Outside air is not drawn into compartment when "REC" switch is turned off. HA-32
(Q) Compressor clutch is not engaged. HA-33
(R) Malfunction of F.I.C.D. HA-36
(S) Blower motor rotates intermittently. HA-37

Circuit for Trouble Diagnoses

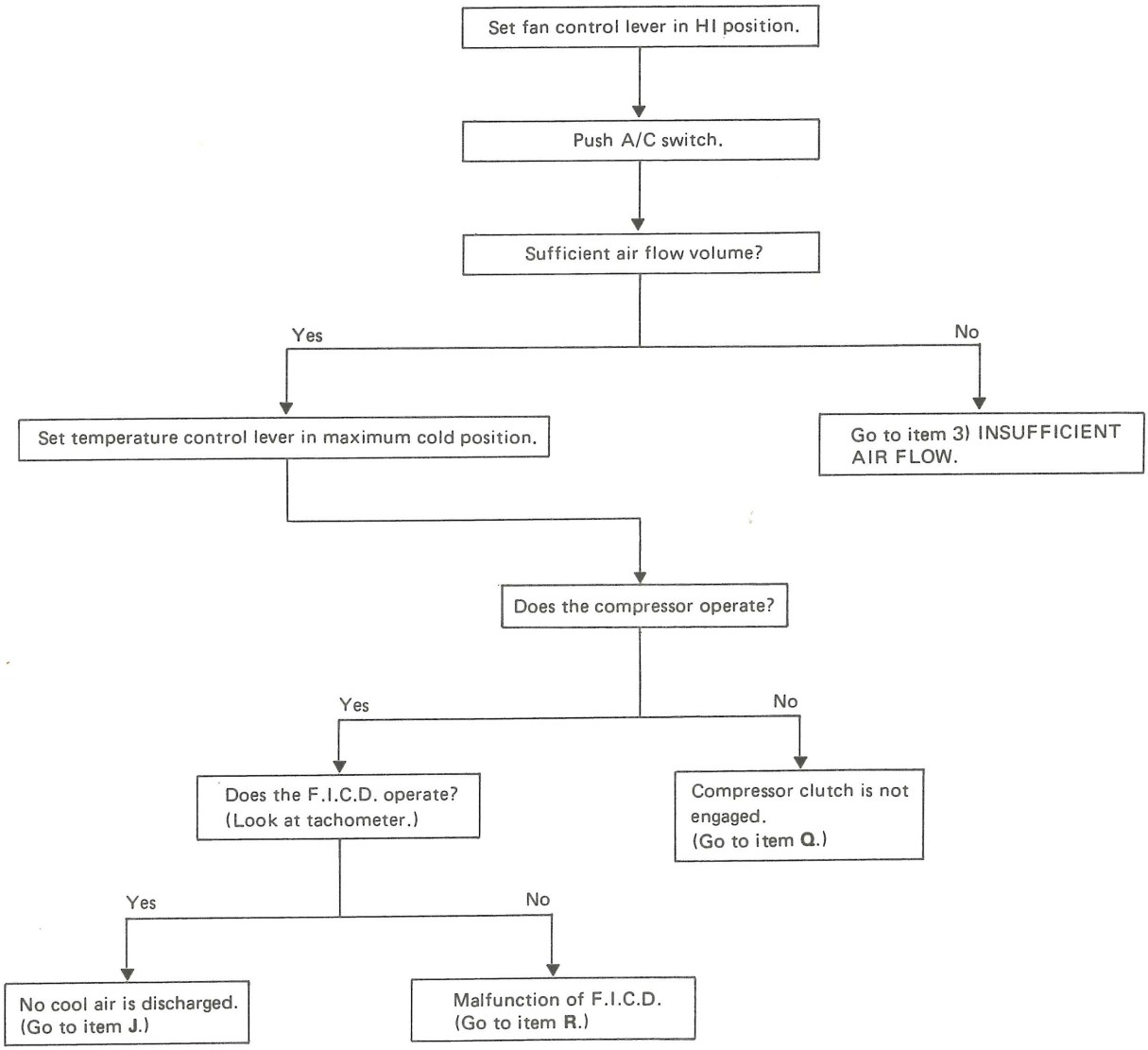


SHA515B

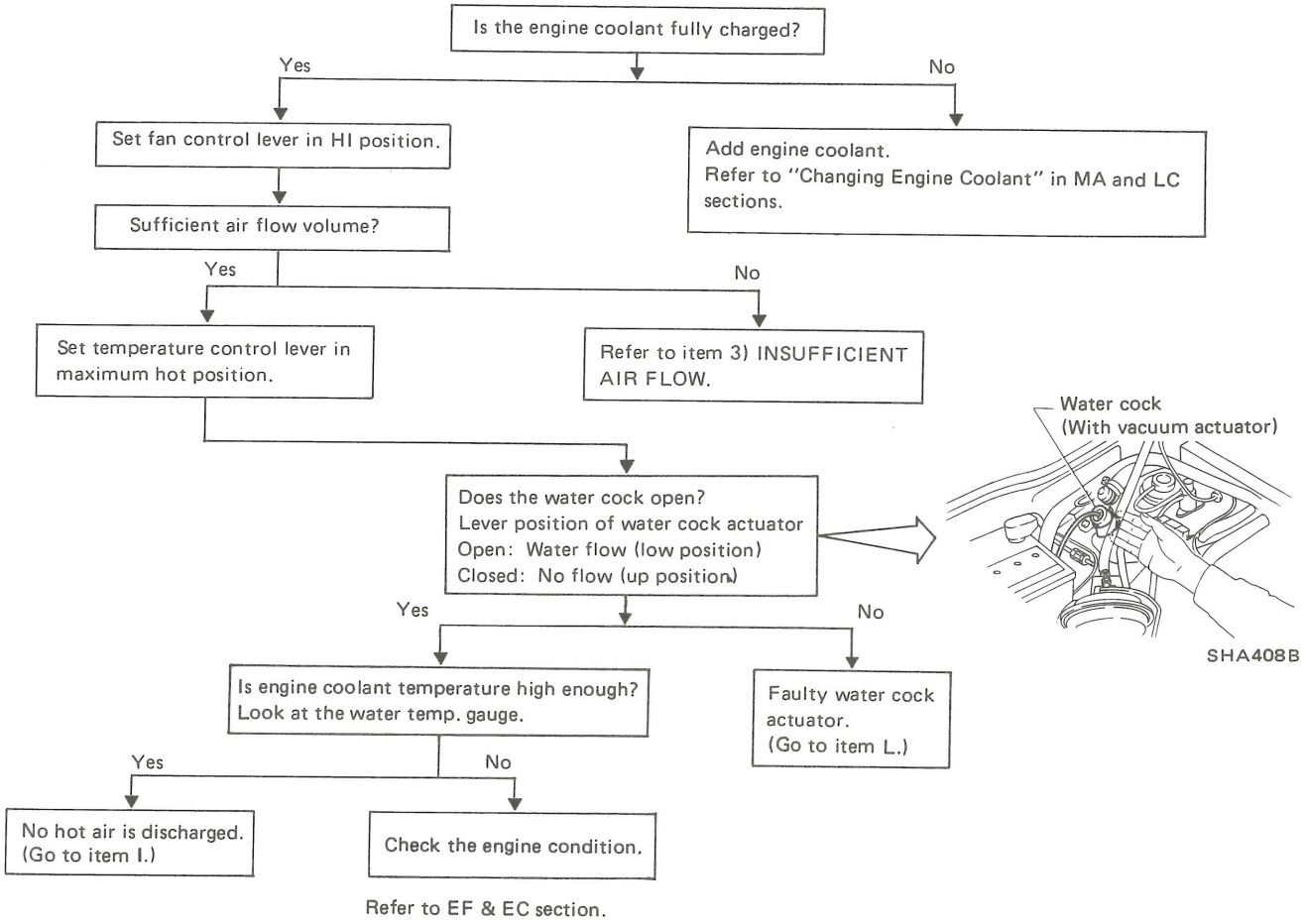
Preliminary Check

Before starting to diagnose the trouble, check the items below in order to completely understand the trouble symptom.

1) INSUFFICIENT COOLING (Mode switch position: "FACE")

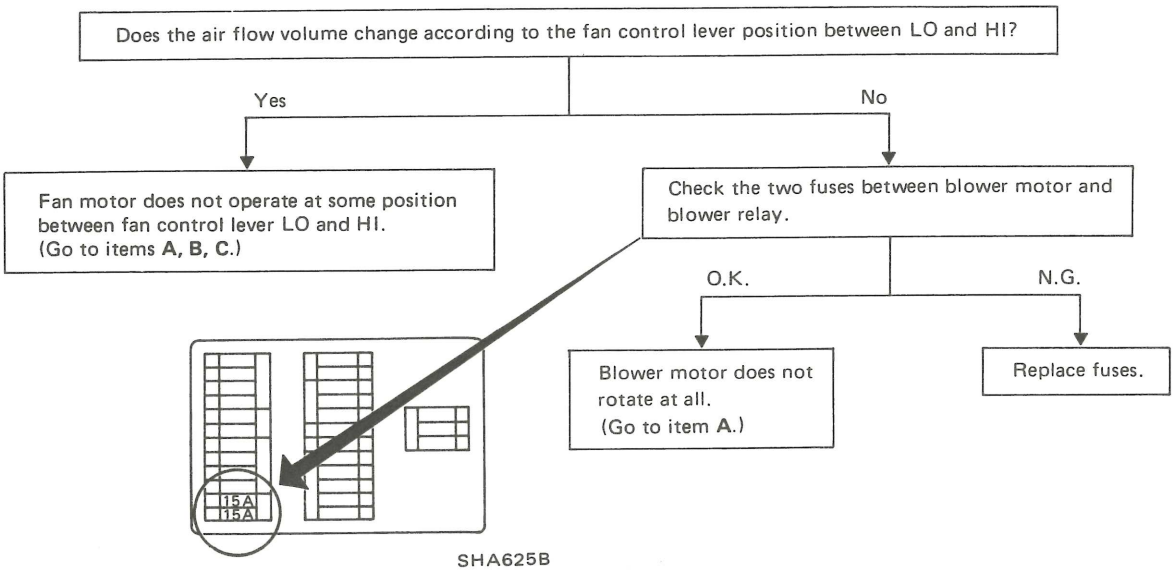


2) INSUFFICIENT HEATING



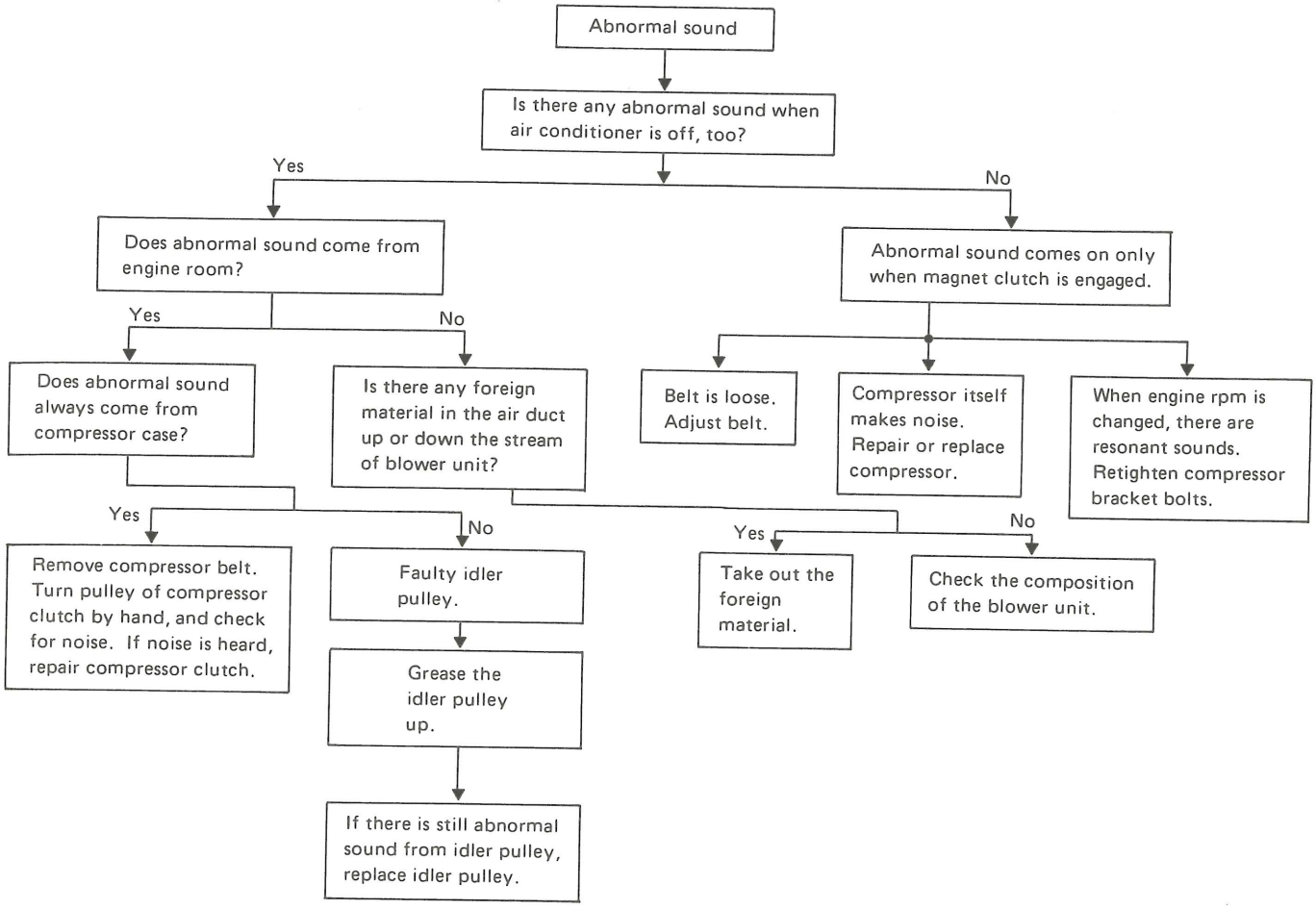
Preliminary Check (Cont'd)

3) INSUFFICIENT AIR FLOW (Blower motor does not rotate.)



Preliminary Check (Cont'd)

4) ABNORMAL SOUND



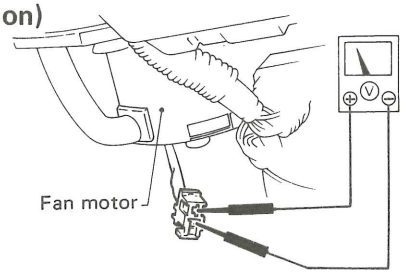
Trouble Diagnoses from Abnormal Conditions

(A) BLOWER MOTOR DOES NOT ROTATE. (Ignition switch on position)

Is motor's terminal voltage approx. 12 volts with FAN switch set to "HI"?
Remove 2-pin connector from motor and measure voltage.

Yes → Faulty motor.

No → Does approx. 1.5 volts exist between negative terminal of motor and body ground? (HI position)

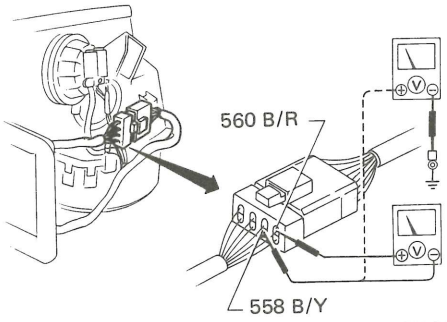


SHA450B

Applied voltage of motor check.

Yes → Go to item B.

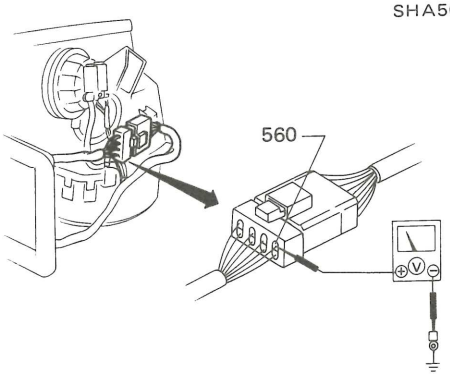
No → Does approx. 1.5 volts exist between negative terminal of motor and body ground? (Fan switch on high)



SHA506B

Yes → Open circuit in motor and negative side.

No → Is there an open circuit between blower harness and power line, when wires are traced back from blower harness via air conditioner harness?

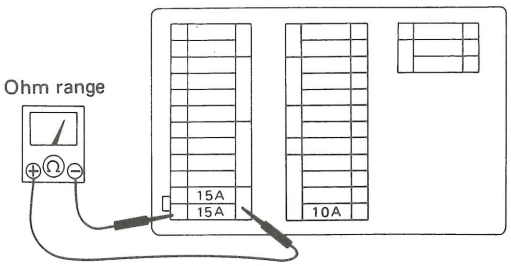


SHA507B

Yes → Repair.

No → Check fuses and blower relay for continuity.

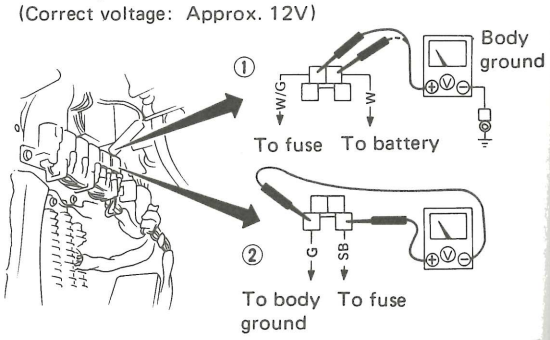
Fuse check
(Ignition switch: OFF position)



Blower relay check (Fan switch: ON position)

Remove relay bracket and check the relay operation from the back side of the electrical connector.

① Terminal voltage check (Correct voltage: Approx. 12V)
② If item ① is N.G., check applied voltage of relay coil. (Correct voltage: Approx. 12V)

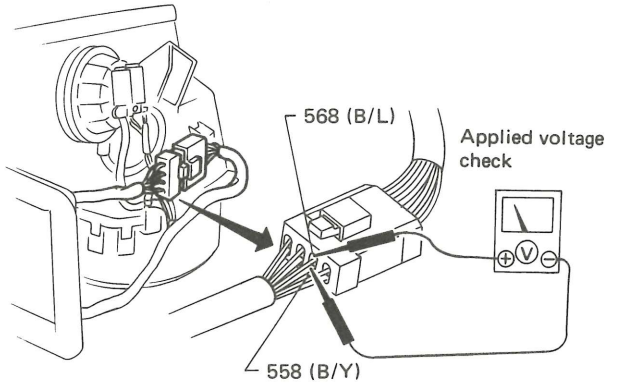


SHA396B

Trouble Diagnoses from Abnormal Conditions (Cont'd)

(B) AIR FLOW CANNOT BE CHANGED BETWEEN HI AND LO.

Check voltage between terminal 558 (B/Y) and 568 (B/L) by moving the fan control switch from high to low. Ignition switch must be on for this test.
Hi = approx. 8.0 volts
Lo = approx. 0.02 volts



SHA508B

O.K. → Faulty fan control amplifier.

N.G. → Remove control unit.

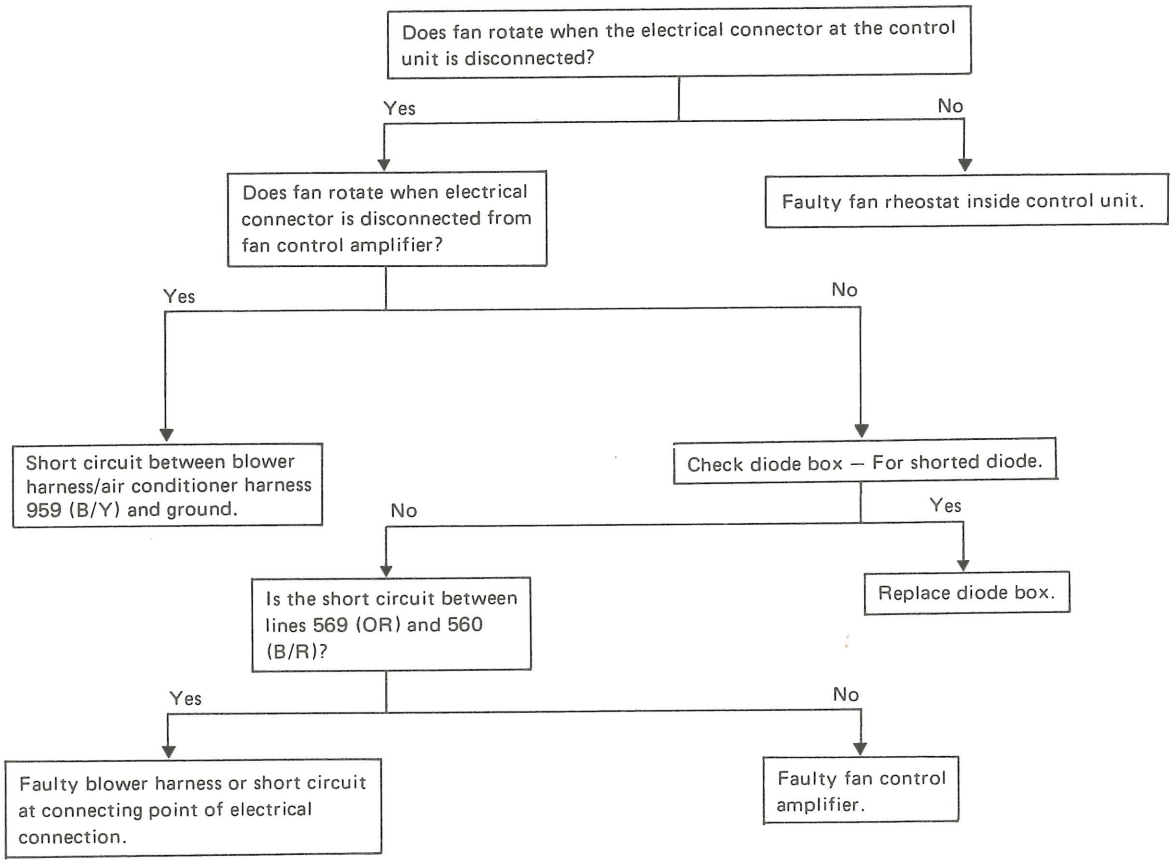
Check conditioning of blower harness and air conditioner harnesses running between fan control amplifier and control unit.

O.K. → Faulty fan rheostat.

N.G. → Faulty harnesses.

Trouble Diagnoses from Abnormal Conditions (Cont'd)

(C) BLOWER MOTOR CONTINUES TO ROTATE WHEN FAN SWITCH IS TURNED OFF.



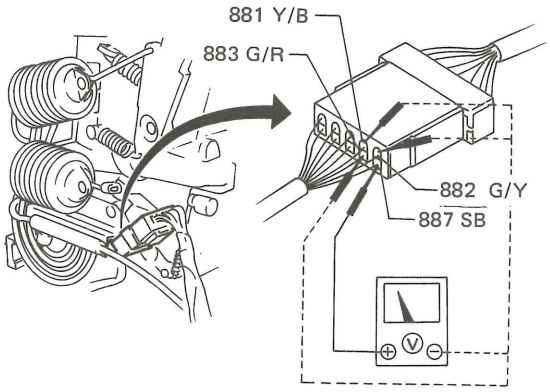
Trouble Diagnoses from Abnormal Conditions (Cont'd)

(D) "FACE" MODE CANNOT BE SET.

Depress FACE switch to "ON".

Remove under cover.

Check voltage at connector solenoid box.
Measure voltage with connector in place.
S/V4 and S/V5: Approx. 12 volts
S/V3: 0 volts

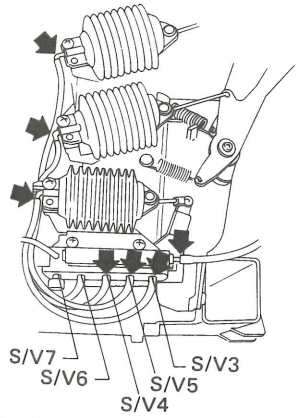


SHA626B

Yes

No

Verify if vacuum exists at solenoid box.



SHA400B

Yes

No

Check vacuum at outlet of S/V4 and S/V5 and also check S/V3 output port. This should be open to the atmosphere.

Malfunction of vacuum hose at the source side. Replace the hose.

Yes

No

Check vacuum hose between S/V3, 4 and 5.

Faulty solenoid valve.

O.K.

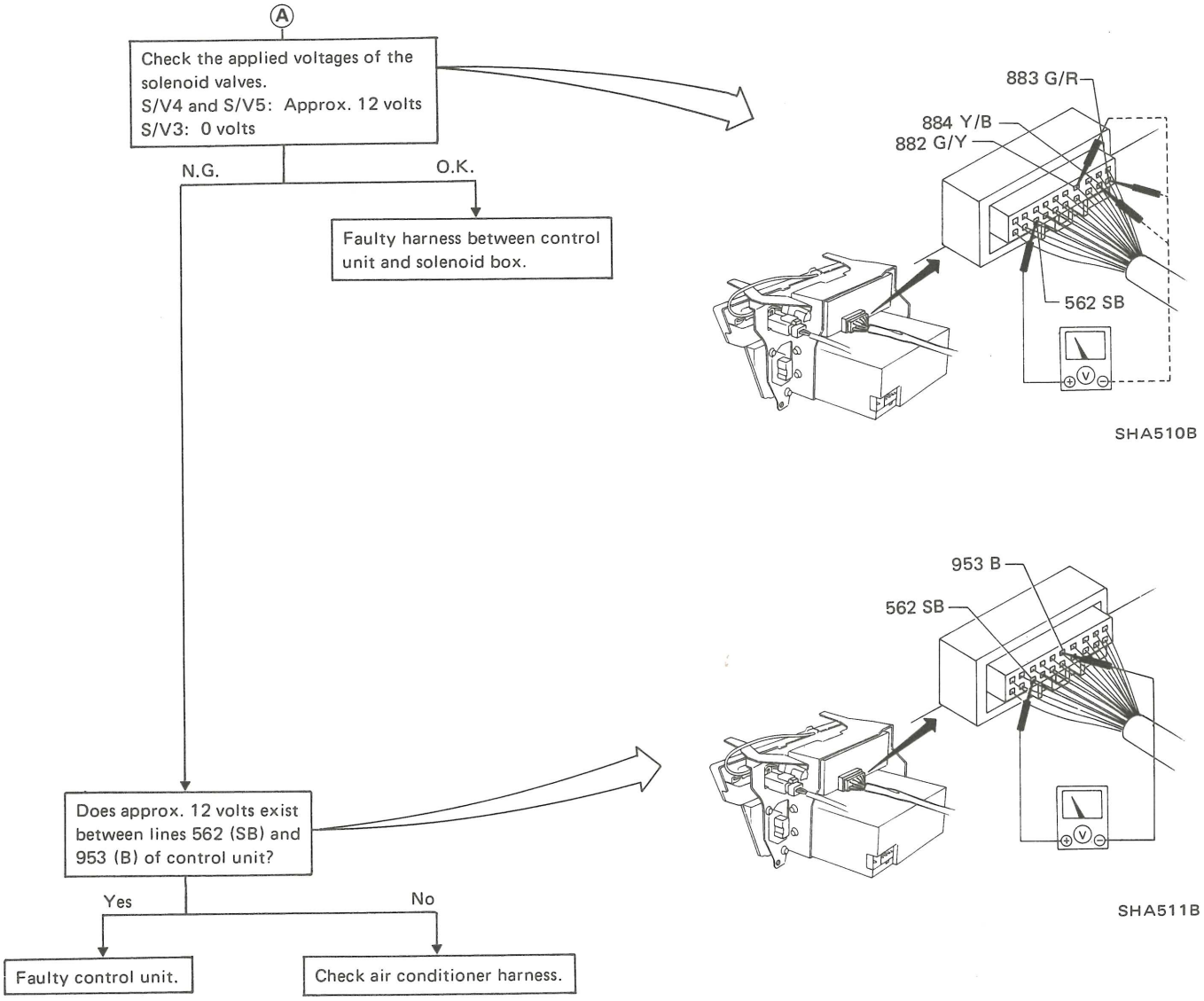
N.G.

Faulty vacuum actuator or linkage.

Replace vacuum hose.

Ⓐ

Trouble Diagnoses from Abnormal Conditions (Cont'd)



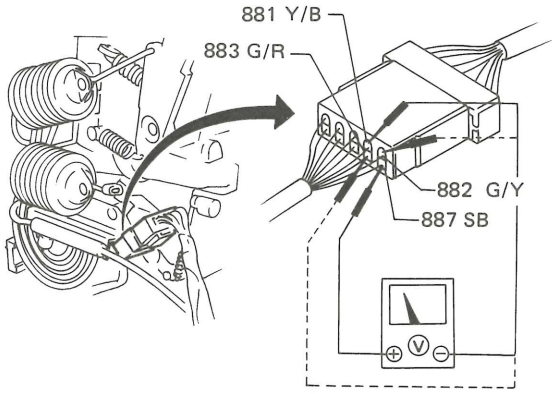
Trouble Diagnoses from Abnormal Conditions (Cont'd)

(E) "B/L" MODE CANNOT BE SET.

Depress B/L switch to "ON".

Remove under-cover.

Check voltage at connector solenoid box. Measure voltage with connectors in place.
All S/Vs: 12 volts

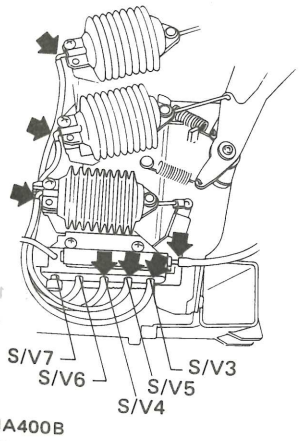


SHA509B

Yes

No

Verify that vacuum exists at solenoid box.



SHA400B

Yes

No

Check vacuum at outlet of S/V3, S/V4 and S/V5.

Malfunction of vacuum hose at source side.

Yes

No

Check vacuum hose between S/V3, 4 and 5.

Faulty solenoid valve.

O.K.

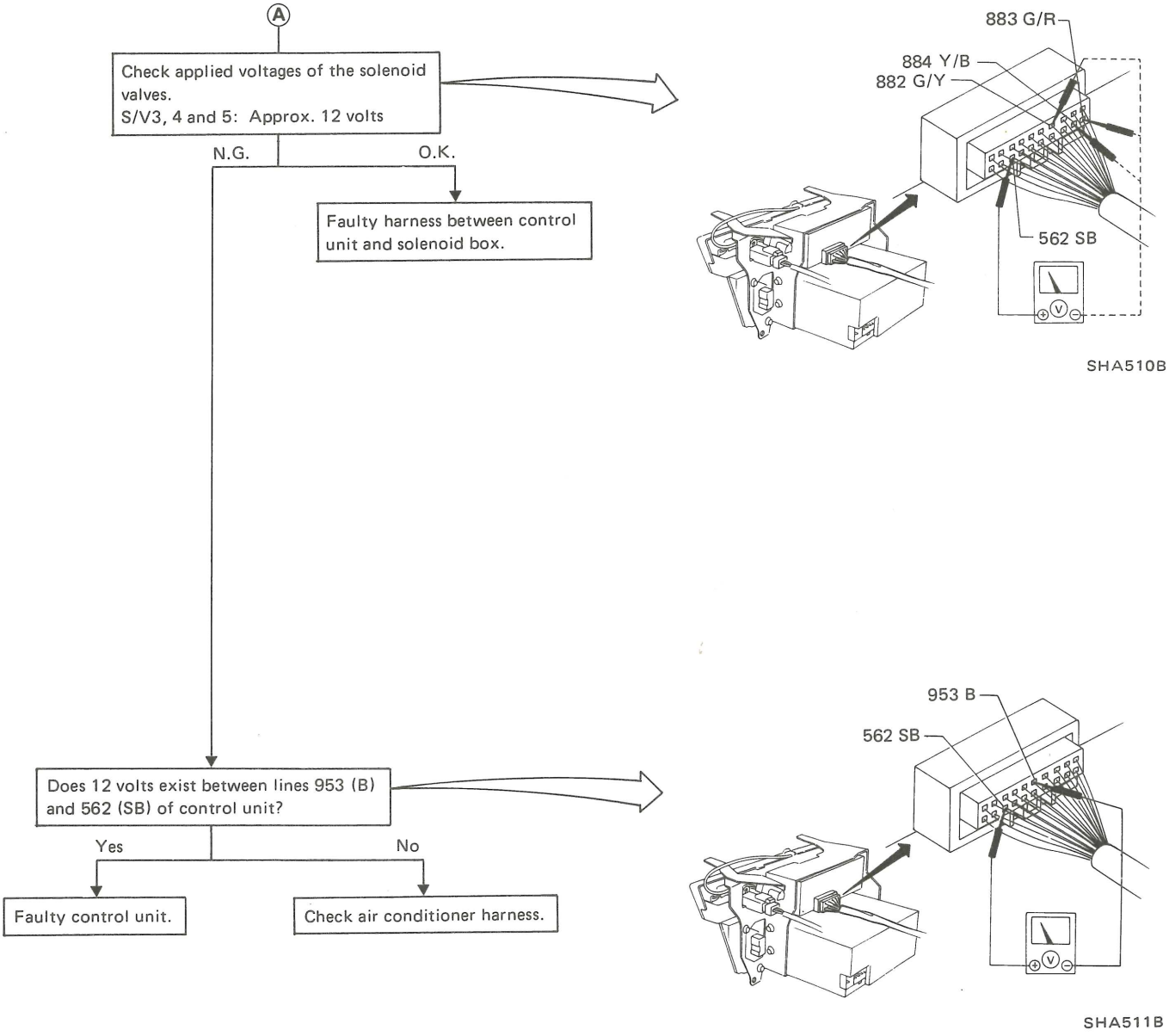
N.G.

Faulty vacuum actuator or linkage.

Replace vacuum hose.

Ⓐ

Trouble Diagnoses from Abnormal Conditions (Cont'd)



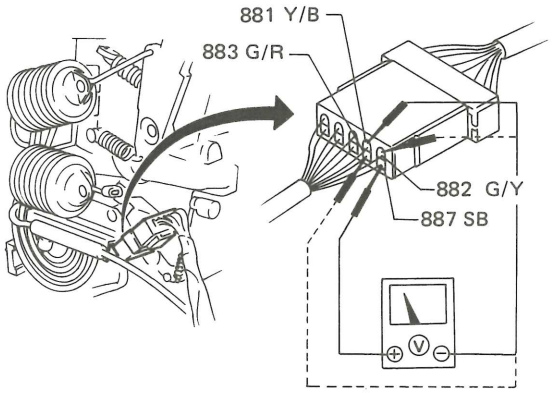
Trouble Diagnoses from Abnormal Conditions (Cont'd)

(F) "FOOT" MODE CANNOT BE SET.

Depress FOOT switch to "ON".

Remove under-cover.

Check voltage at connector solenoid box. Measure voltage with connector in place.
- S/V3 and S/V5: Approx. 12 volts
- S/V4: Approx. 0 volts

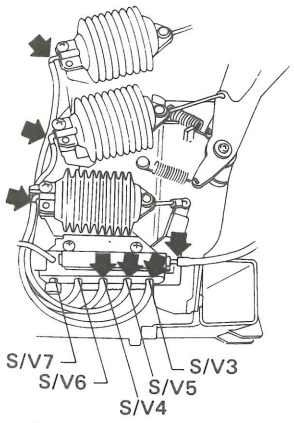


SHA509B

Yes

No

Check vacuum at the inlet of the solenoid box.



SHA400B

Yes

No

Check vacuum at the outlets of S/V3 and 5. Check S/V4—this should be opened to atmosphere.

Faulty vacuum hose at source side.

Yes

No

Check vacuum hose between solenoid valves and vacuum actuator.

Faulty solenoid valve.

O.K.

N.G.

Faulty vacuum actuator or linkage.

Replace vacuum hose.

Ⓐ

Trouble Diagnoses from Abnormal Conditions (Cont'd)

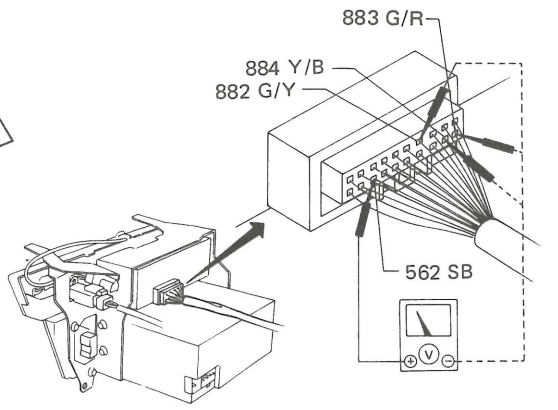
Ⓐ

Check applied voltages of the solenoid valves.
S/V3 and 5: Approx. 12 volts
S/V4: Approx. 0 volts

No

Yes

Faulty harness between control unit and solenoid box.



SHA510B

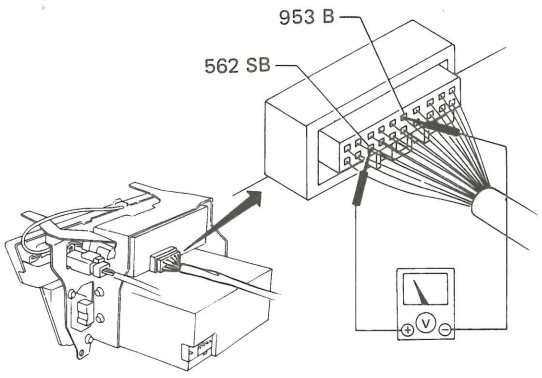
Does approx. 12 volts exist between lines 562 (SB) and 953 (B) of control unit?

Yes

No

Faulty control unit.

Check air conditioner harness.



SHA511B

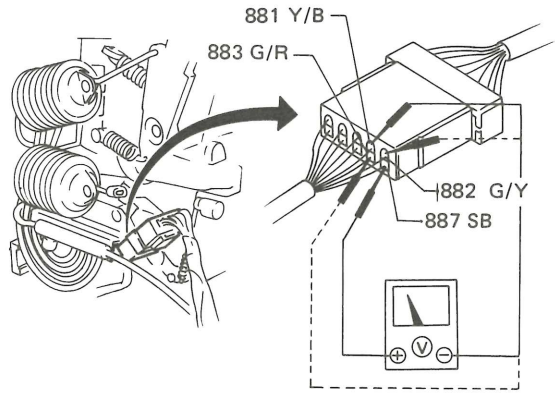
Trouble Diagnoses from Abnormal Conditions (Cont'd)

(G) "DEMIST" MODE CANNOT BE SET.

Depress DEMIST switch to "ON".

Remove under-cover from driver's side.

Check voltage at connector solenoid box.
Measure voltage with connector in place.
S/V4 and 5: Approx. 0 volts
S/V3: Approx. 12 volts

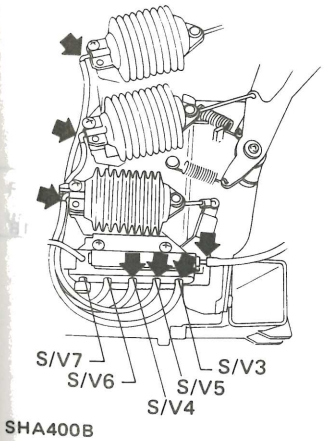


SHA509B

Yes

No

Check vacuum at the inlet of the solenoid box.



SHA400B

Yes

No

Check vacuum at outlets S/V3.
Check outlet at S/V4 and 5; this should be opened to the atmosphere.

Faulty vacuum hose at source side.

Yes

No

Check vacuum hose between solenoid valve and vacuum actuator.

Faulty solenoid valve.

O.K.

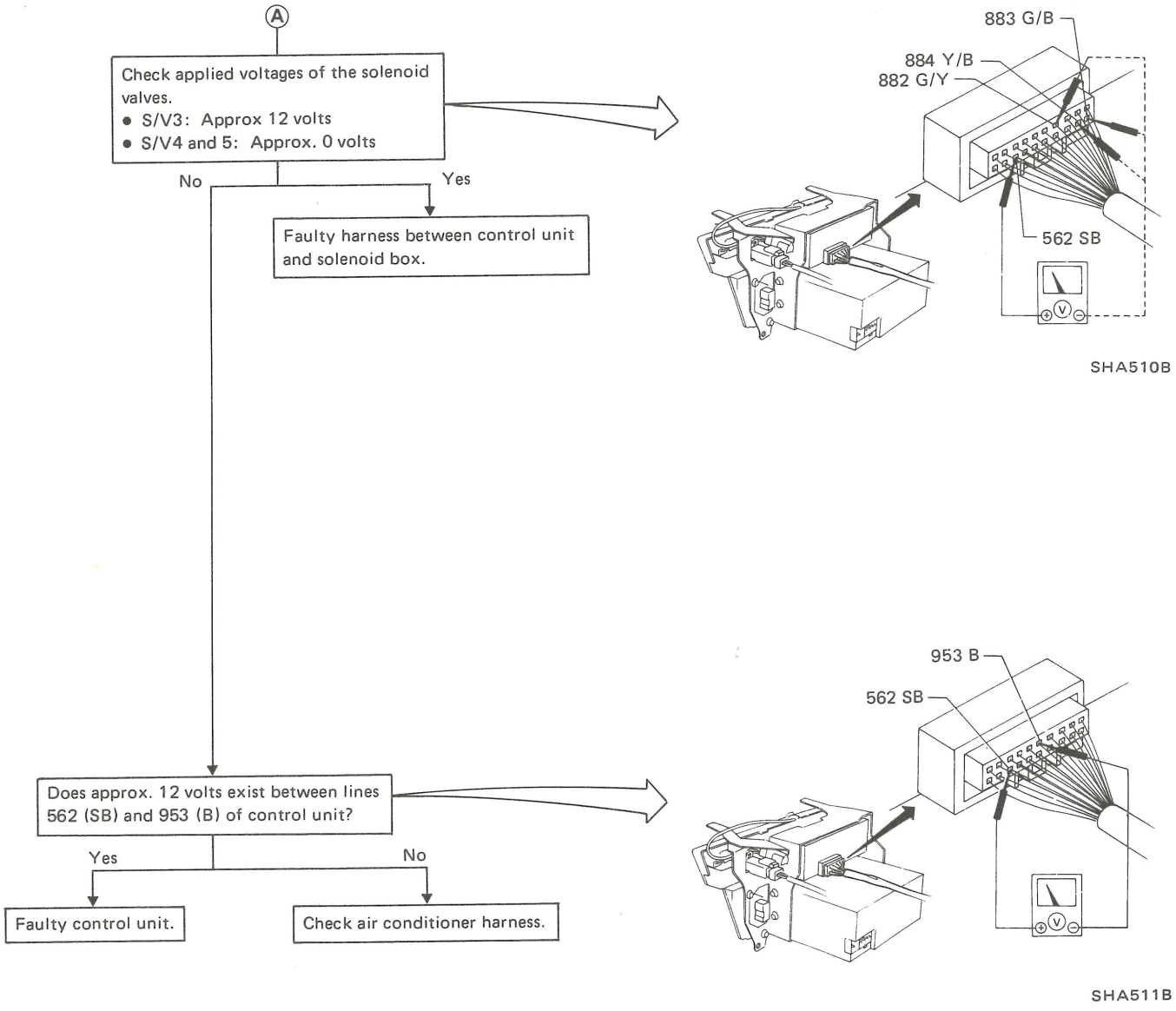
N.G.

Faulty vacuum actuator or linkage.

Replace vacuum hose.

Ⓐ

Trouble Diagnoses from Abnormal Conditions (Cont'd)

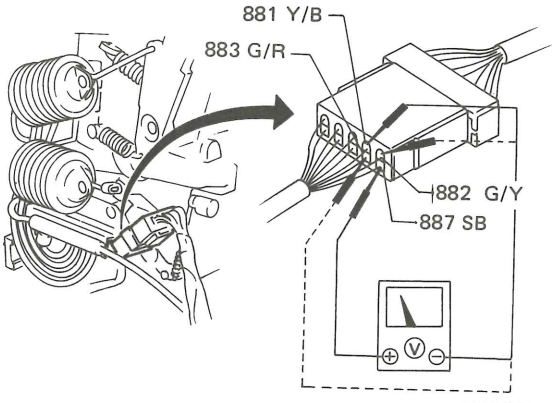


(H) "DEF" MODE CANNOT BE SET.

Turn DEF switch to "ON".

Remove under-cover from driver's side.

Check voltage at the connector solenoid box. Measure voltage with connector in place.
S/V3, 4 and 5: Approx. 0 volts



SHA509B

Yes

Solenoid valves S/V3, 4 and 5 should be open to the atmosphere.

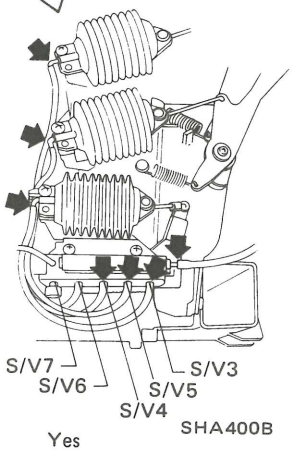
Yes

Faulty actuator or disconnected linkage.

No

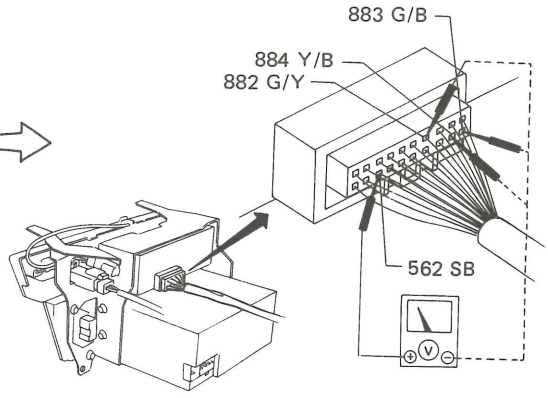
Faulty solenoid valve.

No



SHA400B

Check the applied voltages of solenoid valves.
S/V3, 4 and 5: 0 volts



SHA510B

Yes

Faulty harness between control unit and solenoid box.

No

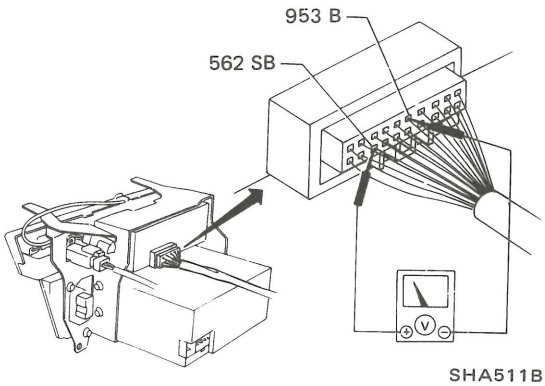
Does approx. 12 volts exist between lines 562 (SB) and 953 (B) of control unit?

Yes

Faulty control unit.

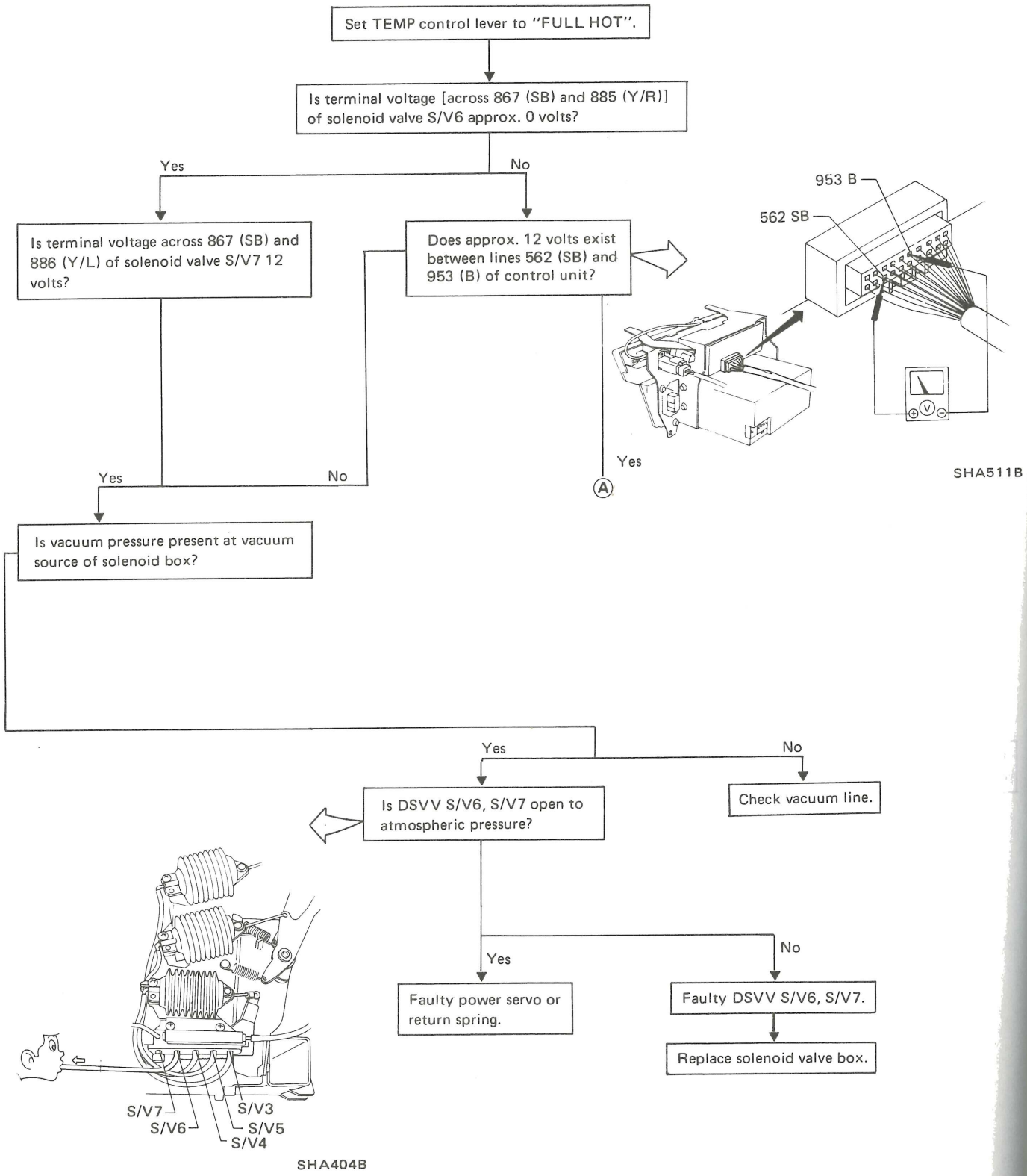
No

Check air conditioner harness.



SHA511B

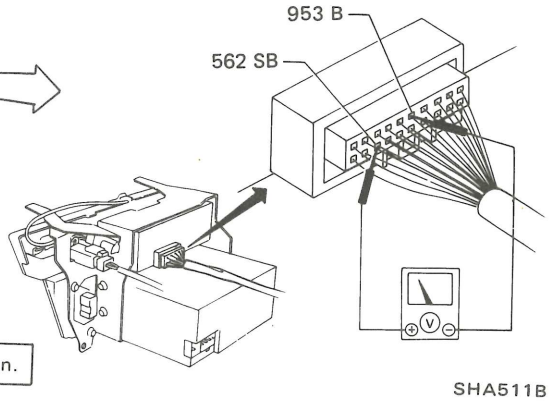
(I) OUTLET AIR WILL NOT BECOME WARM.



Trouble Diagnoses from Abnormal Conditions (Cont'd)

Ⓐ

Remove the connector from the control amplifier. Check to see if plug has electrical pins pushed back, or if the electrical pins in the control unit are bent.



SHA511B

Does approx. 12 volts exist between lines 562 (SB) and 953 (B), or the control unit (Ignition ON)?

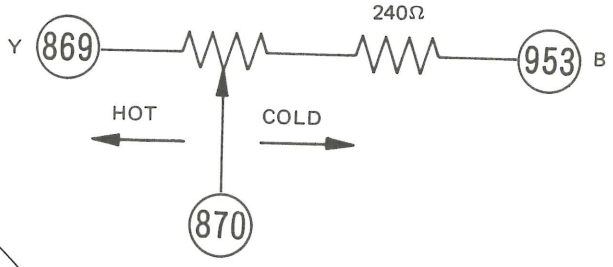
Yes

No

A/C harness malfunction.

Does the potential balance resistor work normally? Perform either the ohm or voltage output test with the electrical connector hooked up to the control amp.

Check resistance between terminals.
869 (Y) and 953 (B): 1.2 - 1.45 kΩ
870 (L) and 953 (B): 230 Ω - 1.45 kΩ
**DSVV with no vacuum applied 1.2 - 1.45 kΩ
DSVV with vacuum applied 230 - 250 Ω



SHA453B

Yes

No

Check wiring harness between control unit and PBR. Remove connectors at control unit and solenoid valve box. Check continuity between 869, 870 and 954.

P.B.R.: Potentio Balance Resistor

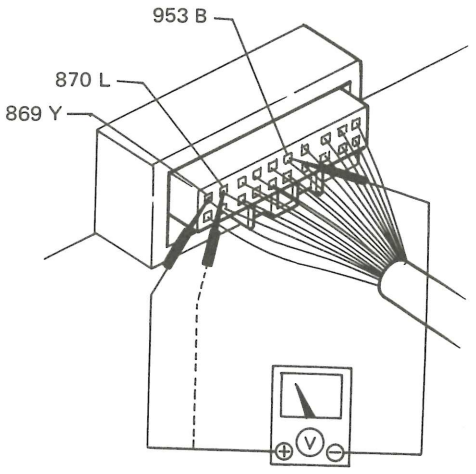
Faulty PBR.

O.K.

N.G.

Malfunction of control unit.

Malfunction of the A/C wiring harness.



SHA512B

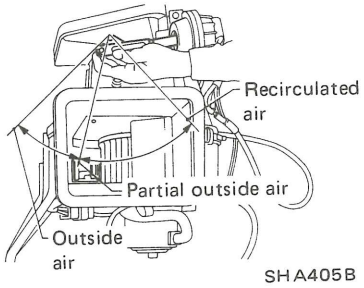
Trouble Diagnoses from Abnormal Conditions (Cont'd)

(J) OUTLET AIR WILL NOT BECOME COOL.

Set TEMP control lever to "FULL COOL" and press A/C switch and "Face" switch to "ON".

Make sure intake door is set to "partial outside air" position.*

* Intake door position is always in partial outside air position with A/C switch "ON".



SHA405B

Yes

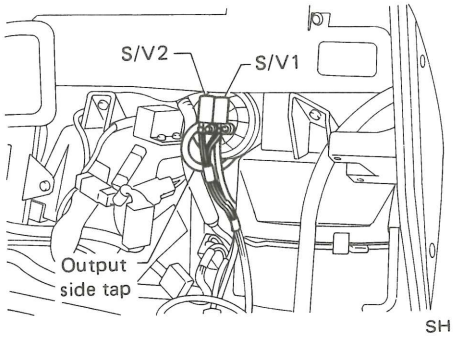
Does approx. 12 volts exist between lines 867 (SB) and 886 (Y/L) of solenoid valve S/V7?

No

Check the operation of the solenoid valve 1 by turning A/C switch to "ON" and "OFF". Is vacuum pressure present at outlet port or solenoid valve S/V2?

Yes

Check vacuum hoses between solenoid valve and actuator.

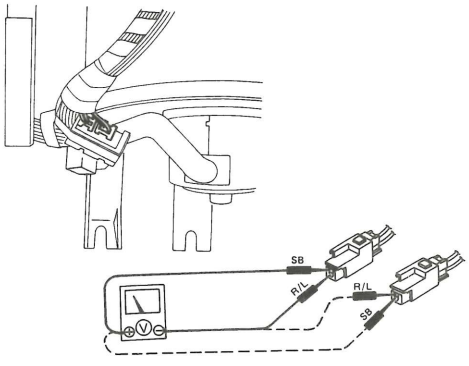


SHA406B

No

Check voltage at solenoid valves 1 and 2 when the recirculation switch is "OFF". The voltage should be at zero volts. When the recirculation switch is on, the voltage should be 12V at both solenoids.

Faulty linkage actuator or linkage.



SHA514B

Ⓐ

Trouble Diagnoses from Abnormal Conditions (Cont'd)

Ⓐ

Yes

Does approx. 12 volts exist between lines 867 (SB) and 885 (Y/R) of solenoid valve S/V6?

Yes

Is vacuum pressure present at vacuum source side of solenoid valve box?

Ⓑ

No

Does approx. 12 volts exist between lines 562 (SB) and 953 (B) of control unit?

No

Remove the connector from the control amplifier. Check to see if plug has electrical pins pushed back, or if the electrical pins in the control unit are bent.

Does approx. 12 volts exist between lines 562 (SB) and 953 (B) or the control unit (Ignition ON)?

Yes

Does the potential balance resistor work normally? Perform either the ohm or voltage output test with the electrical connector hooked up to the control amp.

Check resistance between terminals:
869 (Y) and 953 (B): Approx. 1.3 kΩ
870 (L) and 953 (B): Approx. 240Ω - 1.3 kΩ**
**DSVV with no vacuum applied 1.3 kΩ
DSVV with vacuum applied 240Ω

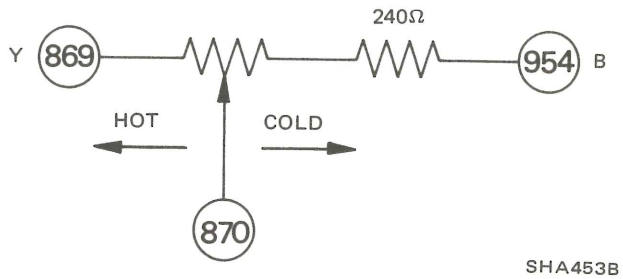
or

Voltage check, vehicle must be running.
Move temperature control lever to full hot, then to full cool, taking the following voltage measurements:
① 953 (B) Negative 869 (Y) Positive
Full hot = 5.14V Approx.
Full cold = 5.26V Approx.
② 953 (B) Negative 870 (L) Positive
Full hot = 4.86V Approx.
Full cold = 0.90V Approx.

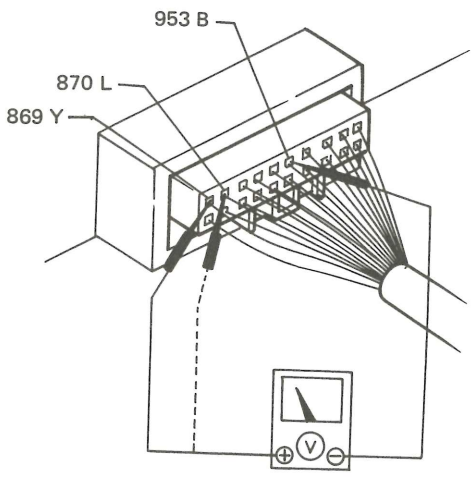
Ⓐ

No

A/C harness malfunction

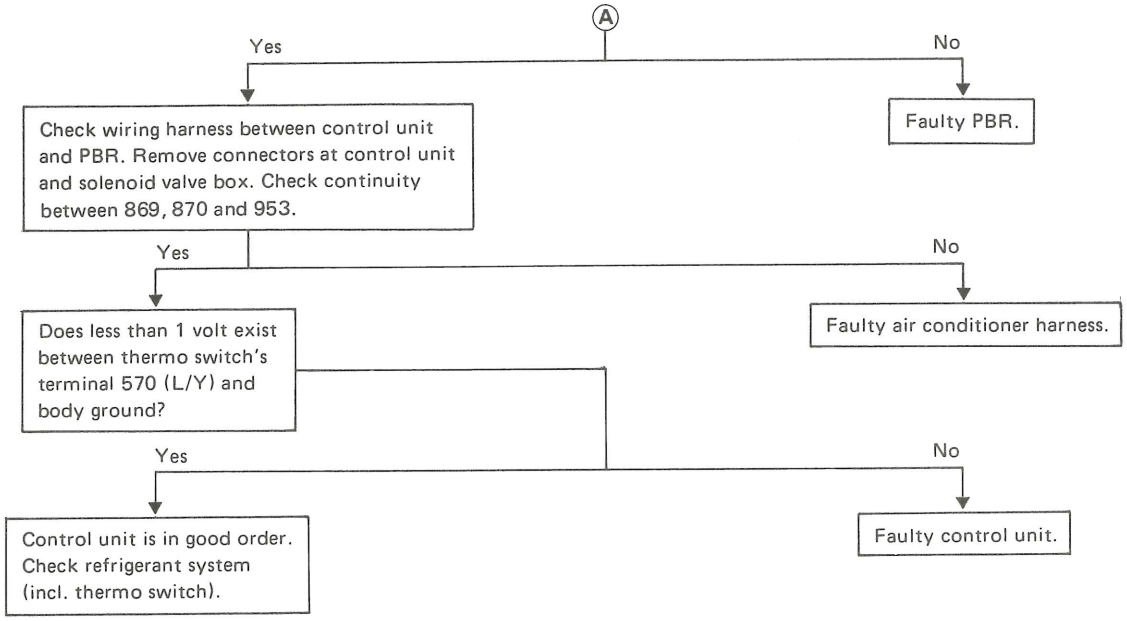


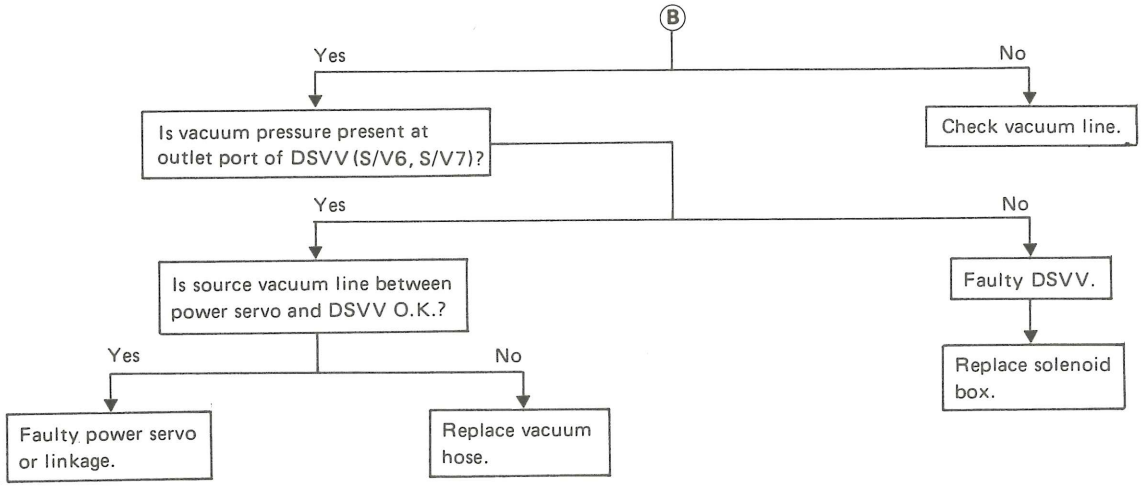
SHA453B



SHA512B

Trouble Diagnoses from Abnormal Conditions (Cont'd)





Trouble Diagnoses from Abnormal Conditions (Cont'd)

(K) OUTLET AIR TEMPERATURE CANNOT BE CHANGED WITH TEMP. CONTROL LEVER.

Refer to item (I) or (J) above to check and correct.

(L) MALFUNCTION OF WATER COCK OPERATION.

Set temp control lever to "Full Hot".

Remove the vacuum hose from water cock.

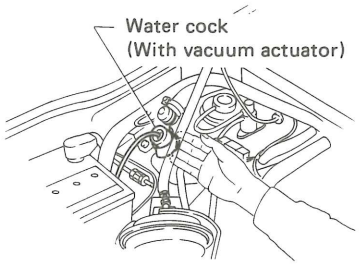
Check if water cock lever inside engine compartment is located at lower position.

Yes

Check for restriction of the vacuum hose between solenoid valve S/V8 on the vacuum tank and water cock.

No

Faulty water cock.



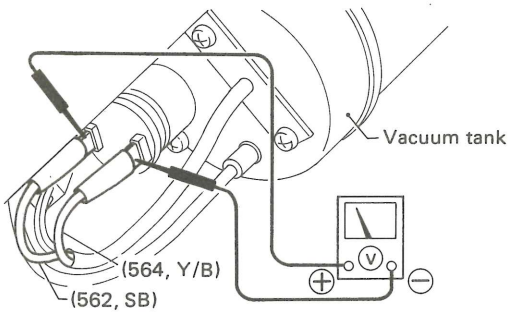
SHA408B

O.K.

Do 0 volts exist between lines 562 (SB) and 564 (GY) of solenoid valve S/V8?

N.G.

Replace vacuum hose.



SHA409B

Yes

Faulty S/V8.

No

Remove the electrical connection from the control unit.

Do 0 volts exist between lines 562 (SB) and 564 (GY) of solenoid valve S/V8?

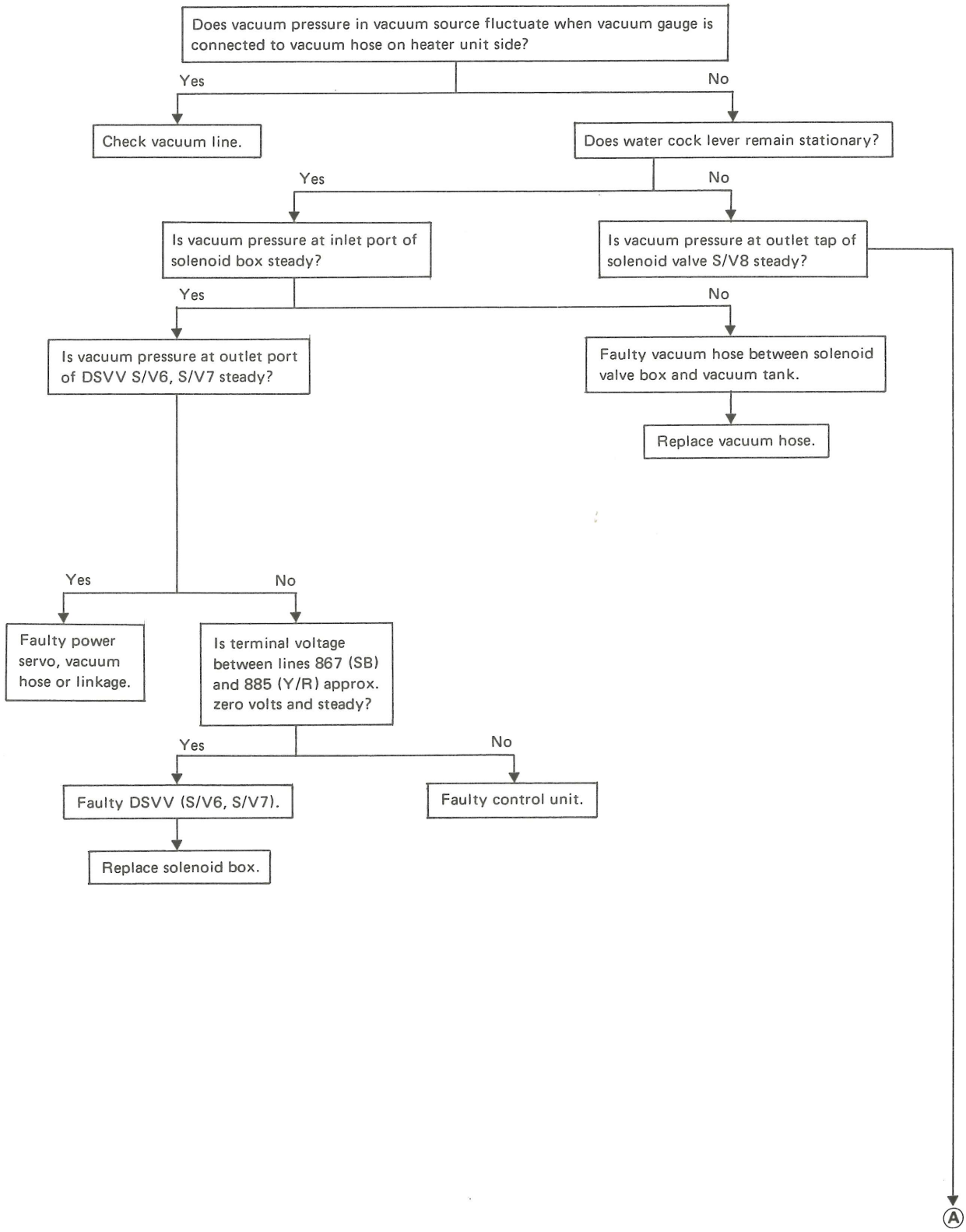
Yes

Faulty control unit.

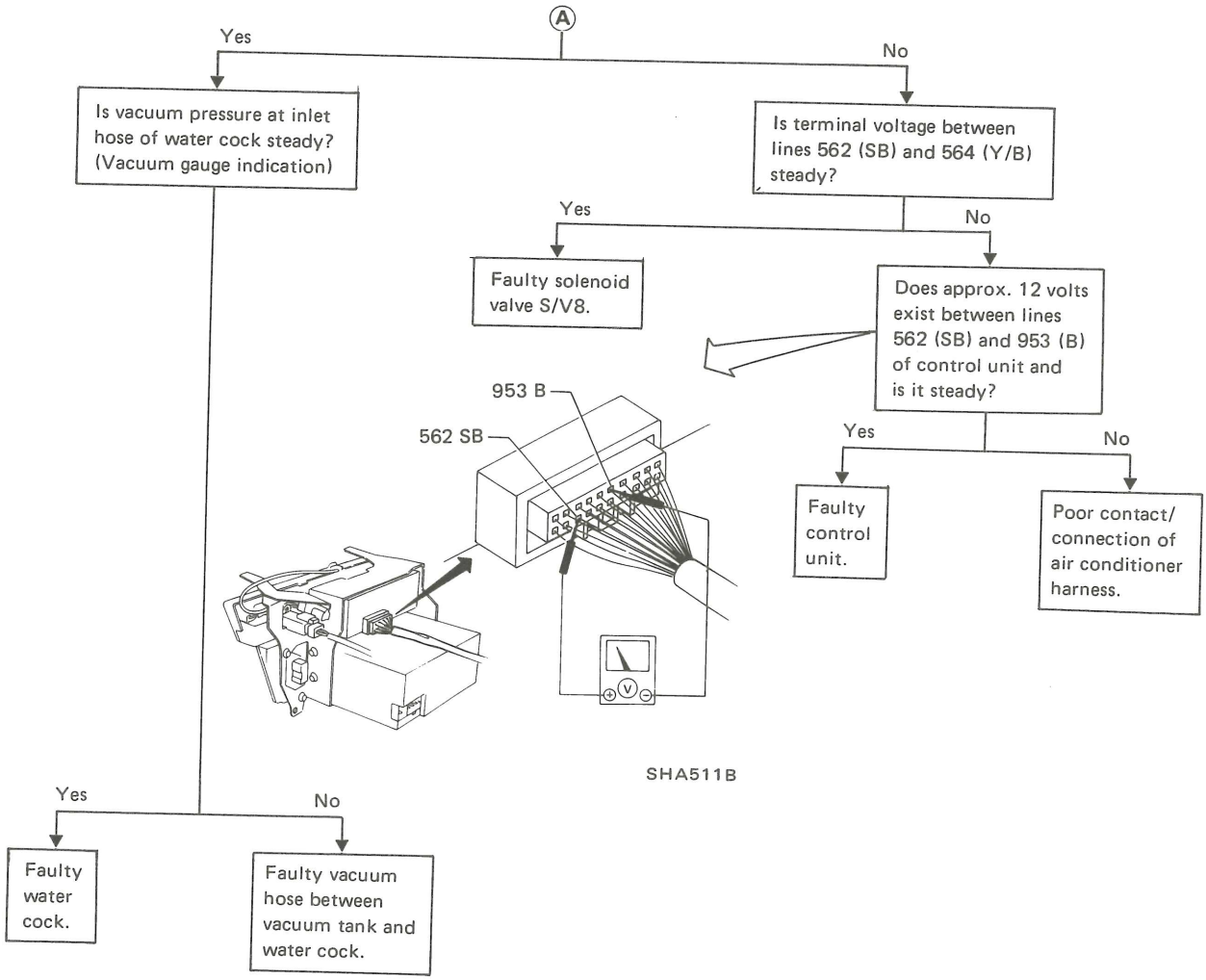
No

Faulty harness between control unit and S/V8.

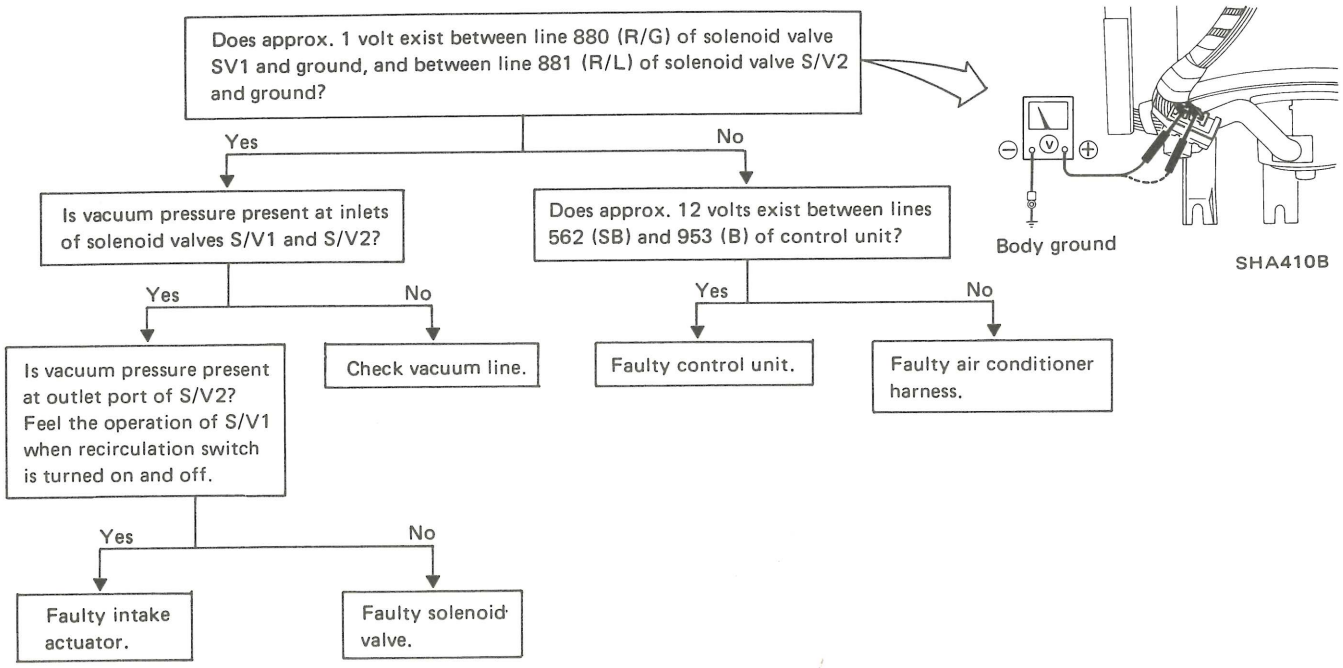
(M) OUTLET AIR TEMPERATURE FLUCTUATES.



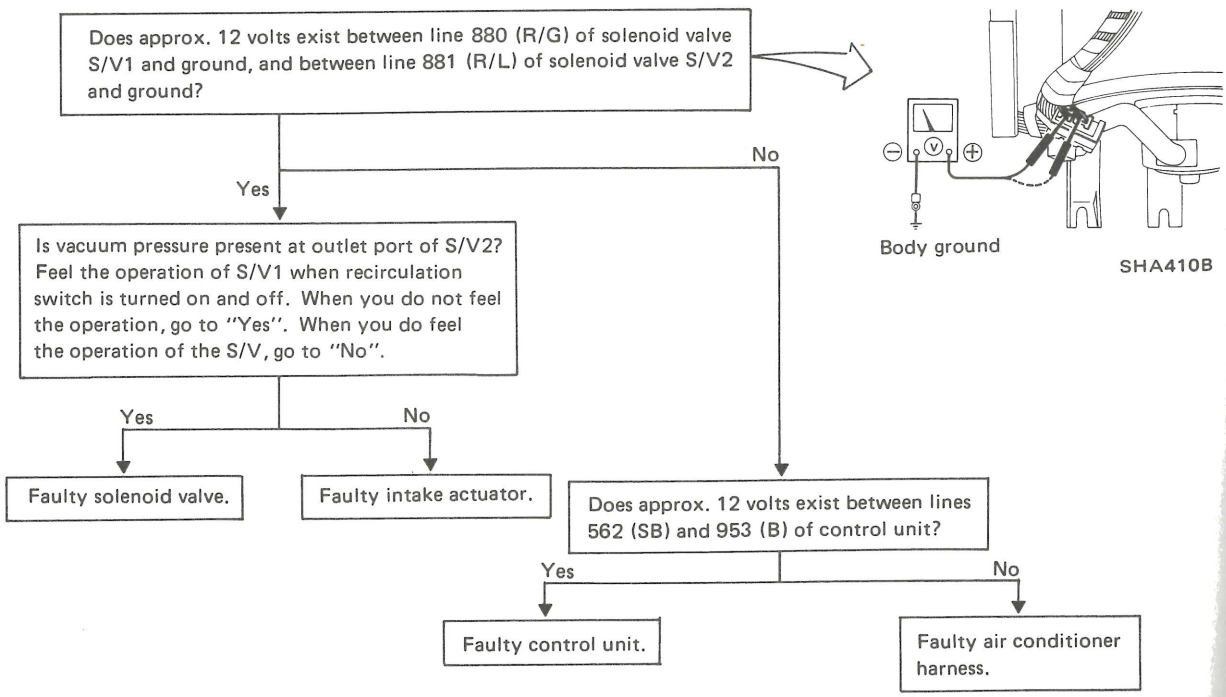
Trouble Diagnoses from Abnormal Conditions (Cont'd)



(N) RECIRCULATION MODE CANNOT BE SET WHEN "REC" SWITCH IS PRESSED.

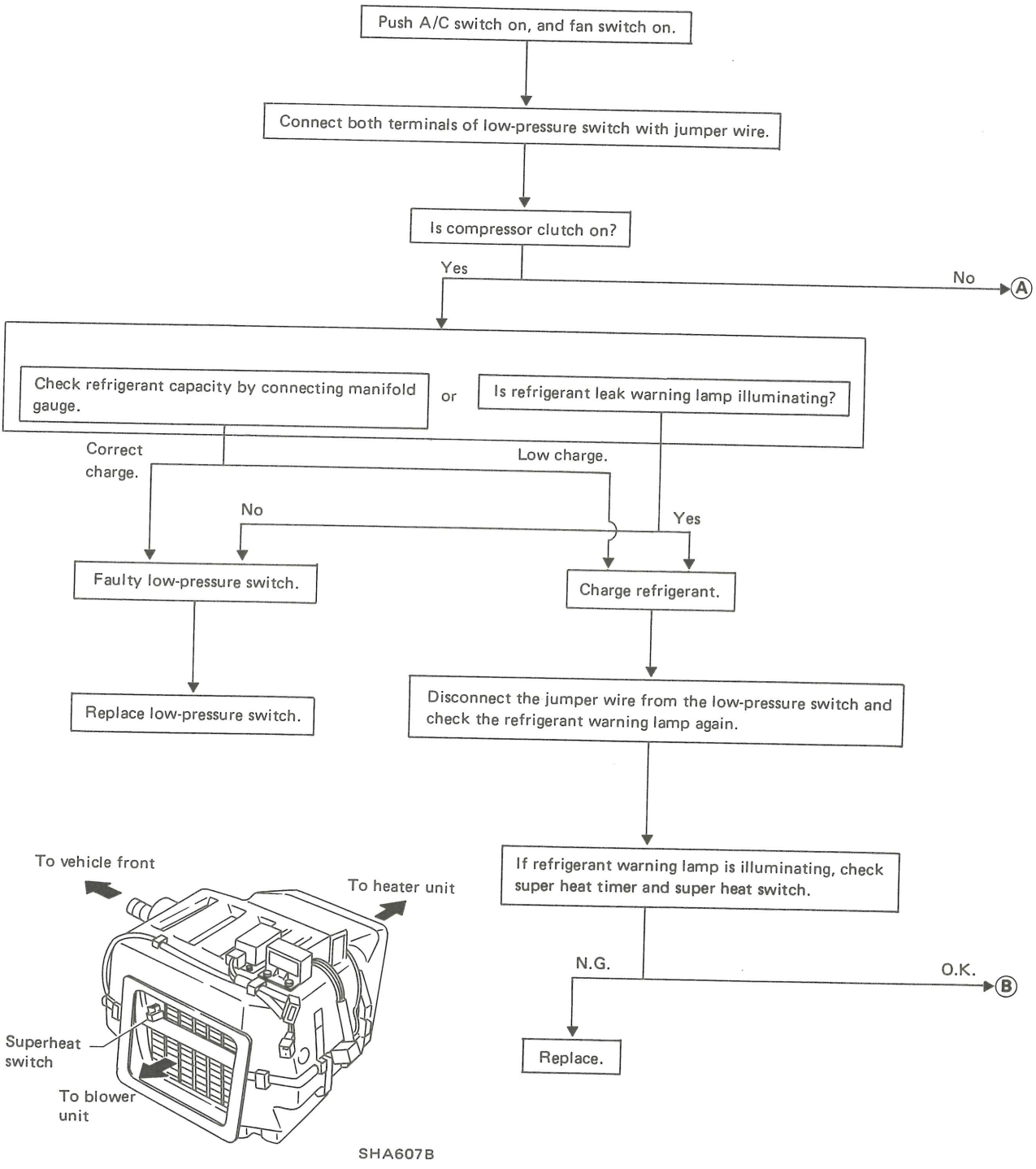


(P) OUTSIDE AIR IS NOT DRAWN INTO COMPARTMENT WHEN "REC" SWITCH IS TURNED OFF.



Trouble Diagnoses from Abnormal Conditions (Cont'd)

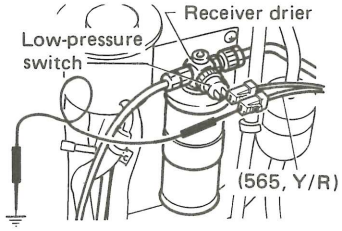
(Q) COMPRESSOR CLUTCH IS NOT ENGAGED.



Trouble Diagnoses from Abnormal Conditions (Cont'd)

Ⓐ

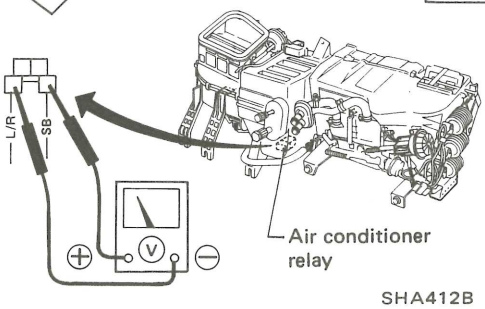
Make a short circuit with plus side terminal of low-pressure switch and body earth. Check the compressor clutch operation.



SHA411B

ON

Is correct voltage applied to air con. relay coil? (Correct voltage: 12 volts)



SHA412B

Yes

Faulty relay.

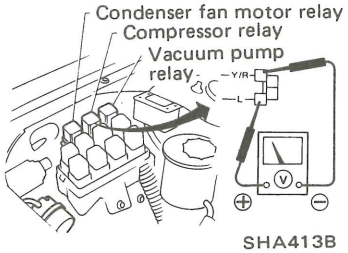
Replace.

No

OFF

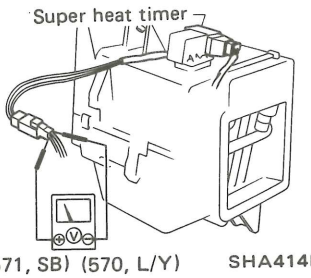
Remove compressor relay.
Is correct voltage applied to compressor relay? (Correct voltage: 12 volts)

Ⓑ



SHA413B

Is applied voltage between terminals 570 and 571 of thermo switch 12 volts?



SHA414B

Yes

Faulty thermo switch.

No

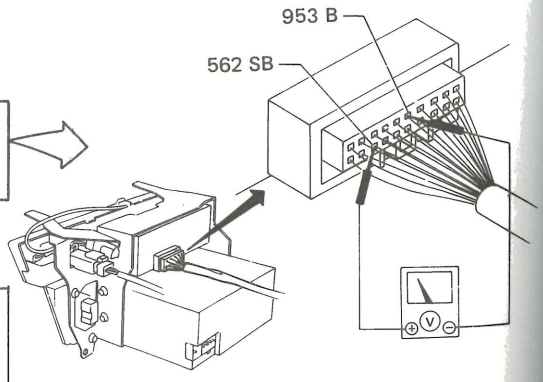
Is applied voltage between terminals 562 and 953 of control unit 12 volts?

Yes

Faulty control unit.

No

Faulty air conditioner harness.



SHA511B

Trouble Diagnoses from Abnormal Conditions (Cont'd)

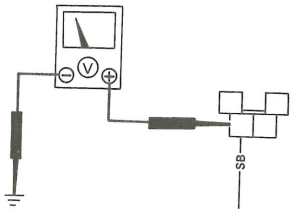
Ⓑ

Yes

No

Check voltage between the compressor relay (SB561) and ground. The voltage should be 12 volts.

Malfunction of wiring harness or burnt fuse between L566 of compressor relay and ignition relay.



SHA452B

Yes

No

Is the compressor relay terminals (SB561 and YG568 of compressor relay) shorted?

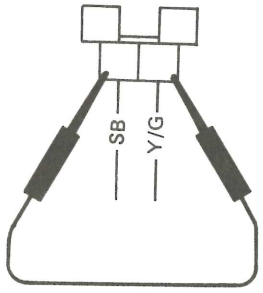
Malfunction of wiring harness (check between compressor relay SB561 and fuse 562).

Yes

No

Faulty compressor relay.

Reinsert compressor relay.



SHA454B

Check voltage between the compressor magnet clutch connector Y/G and ground. The voltage should be 12V.

Yes

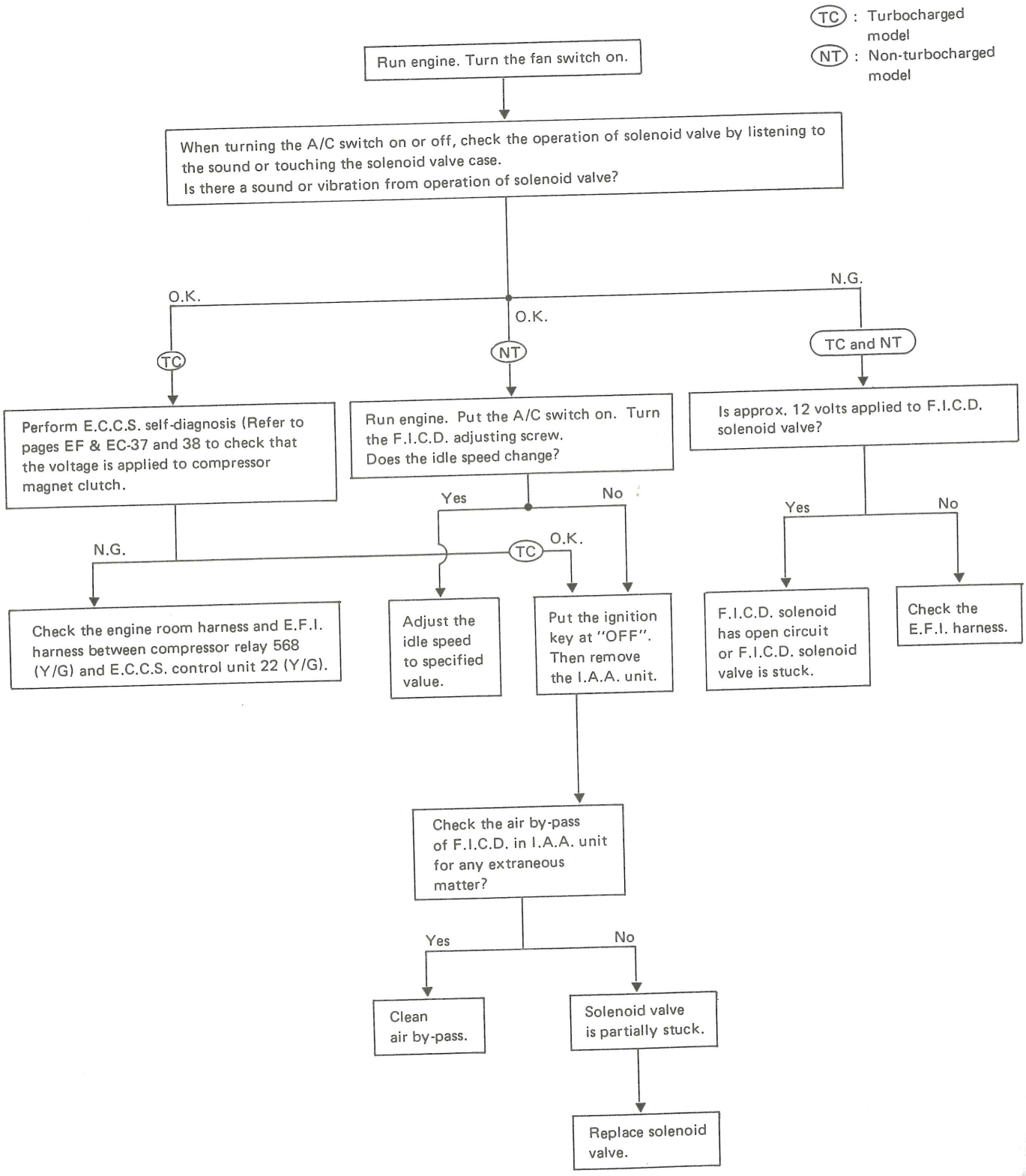
No

Faulty magnet clutch.

Malfunction of wiring harness. Check between EFI harness and compressor relay 568 Y/G of engine room harness.

Trouble Diagnoses from Abnormal Conditions (Cont'd)

(R) MALFUNCTION OF F.I.C.D.



(S) BLOWER MOTOR ROTATES INTERMITTENTLY.

Remove fan control amplifier from blower motor unit.

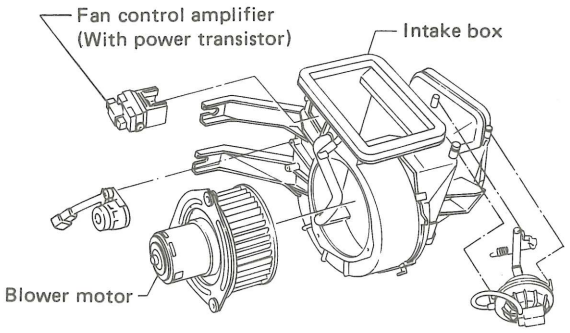
Does water stand on the fan control amplifier?

Yes

Remove the water and install the fan control amplifier again.

No

Go to item (A).



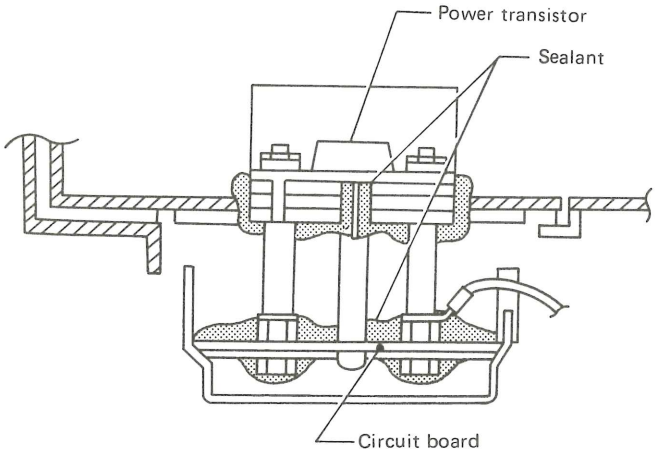
SHA318B

Normal operation

Modify the fan control amplifier as follows:
Apply sealant around the power transistor cover and the terminals of the power transistor.
Apply sealant to the surface of the circuit board.

N.G.

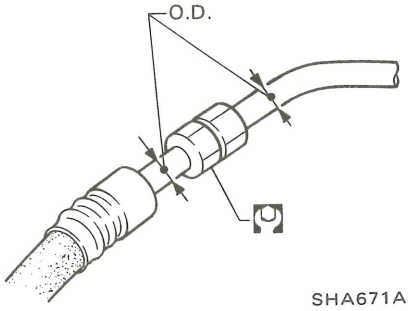
Replace fan control amplifier.



SHA521B

Tightening Torque

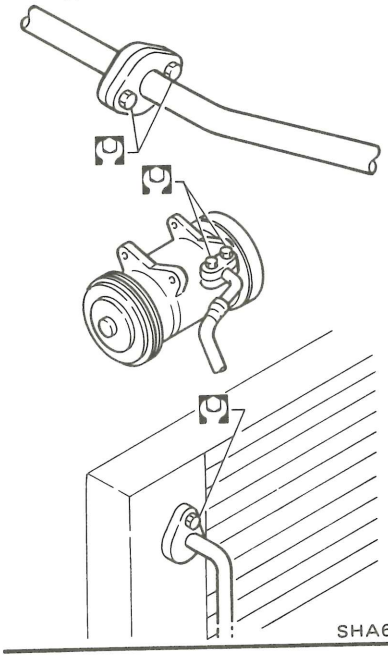
Union type (hose to pipe)



SHA671A

- Use tightening torque for flexible hose.

Plate type


SHA672A

Grade	Bolt type: Nominal size	Bolt type: Bolt diameter mm (in)	Bolt type: Pitch mm (in)	Tightening torque: N·m	Tightening torque: kg-m	Tightening torque: ft-lb
4T	M6	6.0 (0.236)	1.0 (0.039)	3 - 4	0.3 - 0.4	2.2 - 2.9
	M8	8.0 (0.315)	1.25 (0.0492)	8 - 11	0.8 - 1.1	5.8 - 8.0
	M10	10.0 (0.394)	1.5 (0.059)	16 - 22	1.6 - 2.2	12 - 16

In case of 7T Bolt has been installed in vehicle,
Tightening torque is as same as 4T bolt.