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Troubleshooting

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When troubleshooting, go to the digital climate control quick-check first, section D8-70.

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Troubleshooting

Note

When troubleshooting, go to the digital climate control quick-check first, section D8-70 .

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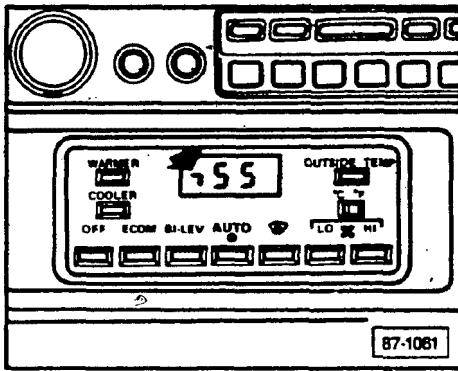
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A/C control head memory display, checking

Twenty-two diagnostic channels are available for information output on the A/C control head display.

- For diagnostic values greater than 199, the first digit 2 is represented as a horizontal and vertical line (arrow)

For example, 255 is shown on illustration.

Note

While information is being displayed on A/C control head, the A/C system will run in the last selected mode.

Starting display

- switch ignition **ON**
- push and hold down **OUTSIDE TEMP** button
- push and hold down **OFF** button
- release **OUTSIDE TEMP** button then release **OFF** button

Note

A vertical line in the first field (arrow) lights up to indicate the channel number.

To select a different channel

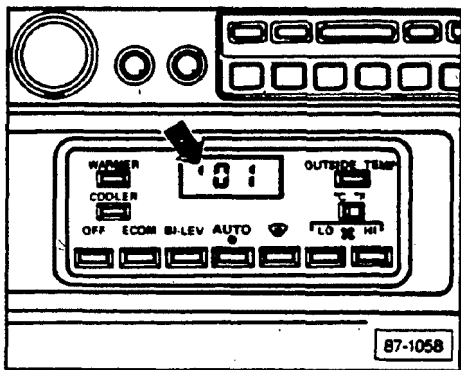
- press **WARMER** button to advance channel by one
- press **COOLER** button to decrease channel by one

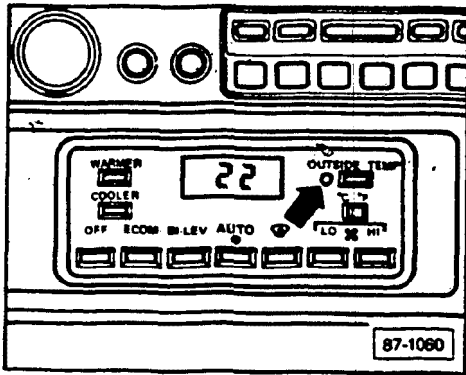
To call up information about a particular channel

- select desired channel
- press **OUTSIDE TEMP** button

To leave the memory display

- select any A/C operating mode, or switch ignition to **OFF**





Note

Some faults are displayed without having to start the memory fault sequence.

If a problem develops that affects temperature regulation, the ambient temperature light (**arrow**) will flash for about one minute each time the ignition is switched **ON** or when the fault first happens.

The following faults will cause the ambient temperature light to flash:

- one or both inside temperature sensors is transmitting incorrect values.
- both outside temperature sensors are transmitting incorrect values.
- the feedback potentiometer on the temperature regulating flap is supplying incorrect values or the adjustment motor is not properly adjusted.
- the A/C refrigerant high pressure switch **F118** (red housing) has switched the A/C compressor **OFF** eight times in the last driving period. (This fault can be erased by depressing the **OFF** button or by cycling ignition switch.

Memory display, channels 1-22

Diagnostic channel no.	Display	Specified display
1	System error	00 = no system error 09 = coolant temperature sensor — interruption Displayed system errors — see Section D8-30 Note Coolant temperature sensor will be phased in during production.
2	Measurement value of inside temperature sensor G86 on roof	Depends on temperature — see table, Section D8-310
3	Measurement value of inside temperature sensor G56 on instrument panel	
4	Measurement value of outside temperature sensor G57 (plenum)	Depends on temperature — see table, Section D8-240
5	Measurement value of outside temperature sensor G17 — cowl	
6	Measurement value of coolant temperature sensor G62 Note Will be phased in during production.	Depends on temperature — see table, Section D8-320 Note Display value for vehicles without coolant temperature sensor 255 = open circuit
7	Graphic display of output control information for A/C programmer	Depends on program — see Section D8-40

Diagnostic channel no.	Display	Specified display
8	Actual value of feedback potentiometer on temperature regulating flap servo motor, V68	Depends on program — A numerical value for the position of the servo motor is shown
9	Specified value of feedback potentiometer on temperature regulating flap servo motor, V68	Depends on program Only check when the value in channel 8 is between 30 and 200. Actual servo motor position (channel 8) and specified servo motor position (channel 9) must not differ by more than 3. If difference is greater than 3, ■ adjust feedback potentiometer, see Repair Group 87 ● specified value: 9-14
10	Specified voltage on fresh air blower V2 (coded)	Depends on program Note Specified voltage in volts. ■ see diagnostic channel no. 15
11	Vehicle electrical system voltage	Depends on instantaneous operating condition greater than 9.5 volts
12	Total of electrical system voltage interruptions — values between 5 and 9.5V Note Values less than 5 volts are recognized as an open low-pressure switch.	Depends on running performance since display was last erased Note Erase (for example, by disconnecting the battery).
13	Program number	No determination, is of no significance for troubleshooting
14	Switch position of high-pressure switch F118 (red housing)	0-5 (high-pressure switch closed)
15	Specified voltage on fresh air blower V2 in volts	Depends on program

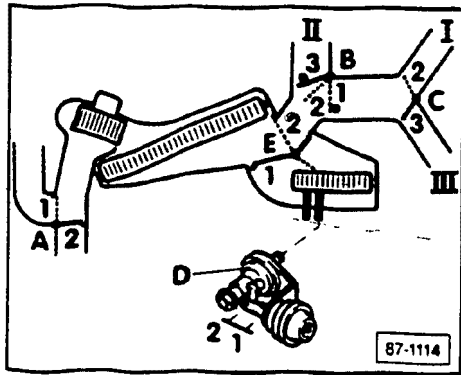
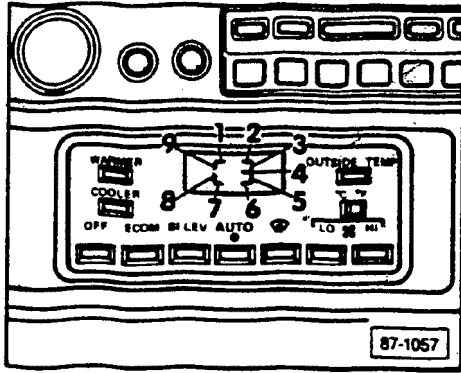
Diagnostic channel no.	Display	Specified display
16	Pulse counter	Of no significance for troubleshooting. (counts from 0-256)
17	Graphic display of compressor shut-off conditions	Depends on program — see Section D8-50
18	Graphic display of electrical outputs	Depends on program — see Section D8-60
19	Number of times compressor shut off via high-pressure switch F118 (red housing)	Depends on running performance since display was last reset Note Reset (for example, by disconnecting the battery).
20	Number of times compressor shut off via high-pressure switch F118 (red housing) since last ignition switch cycle or reset from OFF button	0 Note After 8th shut-off during a driving period, the compressor does not switch on again.
21	Program number	Of no significance for troubleshooting
22	Speed signal Note At high vehicle speeds fresh air blower speed is limited in "Fresh Air" mode.	00 when vehicle stopped 01 or greater dependent on vehicle speed

Errors displayed on memory channel 1

Error code	Error code	Correction of error
00	No error recognized	
01	Inside temperature sensor G56 (instrument panel), open circuit	■ check affected component and related wiring according to wiring diagram
02	Inside temperature sensor G56 (instrument panel), short-circuit	
03	Outside temperature sensor G57 (plenum), open circuit	
04	Outside temperature sensor G57 (plenum), short circuit	
05	Outside temperature sensor G17 (cowl), open circuit	
06	Outside temperature sensor G17 (cowl), short circuit	
07	Feedback potentiometer on adjustment motor for temperature regulating flap, V68 interruption/open	■ check temperature regulating flap servo motor V68 (with feedback potentiometer), Section D8-190
08	Feedback potentiometer on adjustment motor for temperature regulating flap, V68 short circuit	
09	Coolant temperature sensor G62 , open circuit	■ check coolant temperature sensor G62 and its wiring according to diagram
10	Coolant temperature sensor G62 , short circuit	
		Note Coolant temperature sensor will be phased in during production.

Error code number	Error code	Correction of error
11	Inside temperature sensor G68 (roof), open circuit	■ check inside temperature sensor (roof) and its wiring according to wiring diagram
12	Inside temperature sensor G68 (roof), short circuit	
13	Electrical system voltage is or was once less than 9.5 V but greater than 5 V during the current driving period Note Values less than 5 V are recognized as an open low-pressure switch.	■ check electrical system voltage display, Section D8-260
14	Compressor off; high-pressure switch F118 (red housing) cycled 8 times	■ check high-pressure switch F118 (red housing), Section D8-230
15	Adjustment motor for temperature regulating flap V68 (with feedback potentiometer) is set improperly	■ check temperature regulating flap servo motor V68 (with feedback potentiometer), Section D8-190
16	High-pressure switch F118 has open circuit or cycled at least 1 time during current driving period	■ check high-pressure switch F118 (red housing) and its wiring according to wiring diagram

Memory display channel 7, checking



This channel displays the control information to the A/C programmer.

Segment 1 lights or flashes

Temperature regulating flap E moves in direction 2 "heating," see Section D8-60

Segment 2 lights

Recirculation/fresh air flap A is in position 2 "recirculation mode."

Segments 3 and 5 light up

Regulating flap B (footwell/defrost outlet) is in position 1 "air from instrument panel outlets."

Segment 4 lights up

Heater valve D is in position 1 (closed).

Segment 5 lights up

(segment 3 does not light up)

Regulating flap B (outlets for footwell/defrost) is in position 2 "air from instrument panel outlets and to regulating flap (footwell/defrost)."

Segment 6 lights up

Regulating flap C (footwell/defrost) is in position 2 "air from footwell outlets."

Segment 7 lights up or flashes

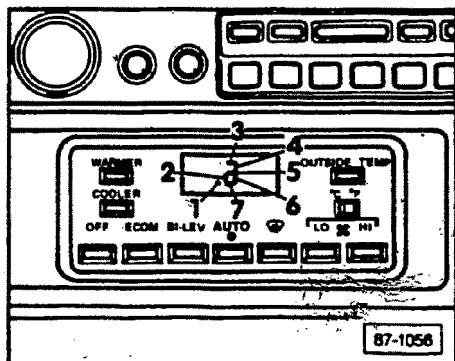
Temperature regulating flap E moves in direction 1 "cooling," see Section D8-60

Segment 8 lights up

Compressor on.

Segment 9 lights up

Radiator cooling fan runs on 1st speed.



Memory display channel 17, checking

Segment 1 lights up

Compressor on.

Segment 2 lights up

Compressor off. A/C refrigerant high-pressure switch F118 (red housing) open.

Segment 3 lights up

Compressor off. Outside temperature too low or operating mode set to **ECON** or **OFF**. Check outside temperature sensors, see Section D8-240

Segment 4 lights up

Compressor off. Electrical system voltage less than 9.5V. See Section D8-260.

Segment 5 lights up

Compressor off. A/C refrigerant low-pressure switch F73 open. See Section D8-270.

Segment 6 lights up

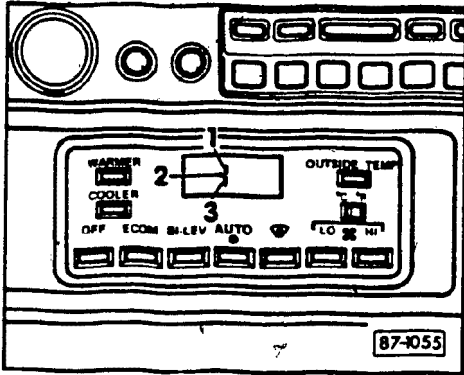
Compressor off. Kick-down switch F46 closed. See Section D8-280 (through 1990 m.y.) or Section D8-290 (from 1991 m.y.)

Note

A/C compressor switches back on after 12 seconds.

Segment 7 lights up

Compressor off. Electronic thermoswitch (multi-function temperature sensor), F76 closed. See Section D8-300.



Memory display channel 18, checking

Segment 1 lights
Compressor on.

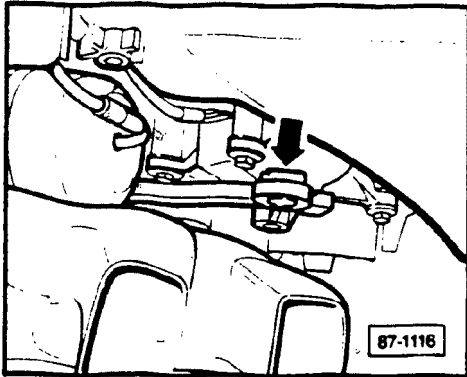
Segment 2 lights
Radiator cooling fan runs on 1st speed.

Segment 3 lights
Idle speed increases (A/C on).

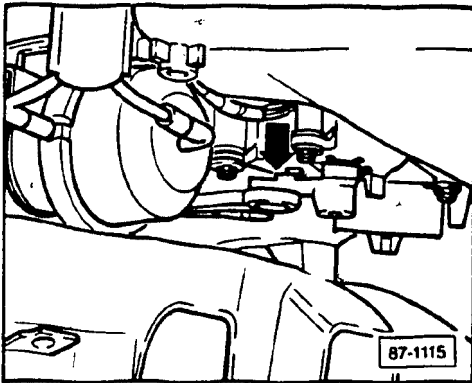
Note

Idle speed increase does not apply to all vehicles. See Section D8-330.

Temperature regulating flap, positions



► Fig. 1 Cooling position

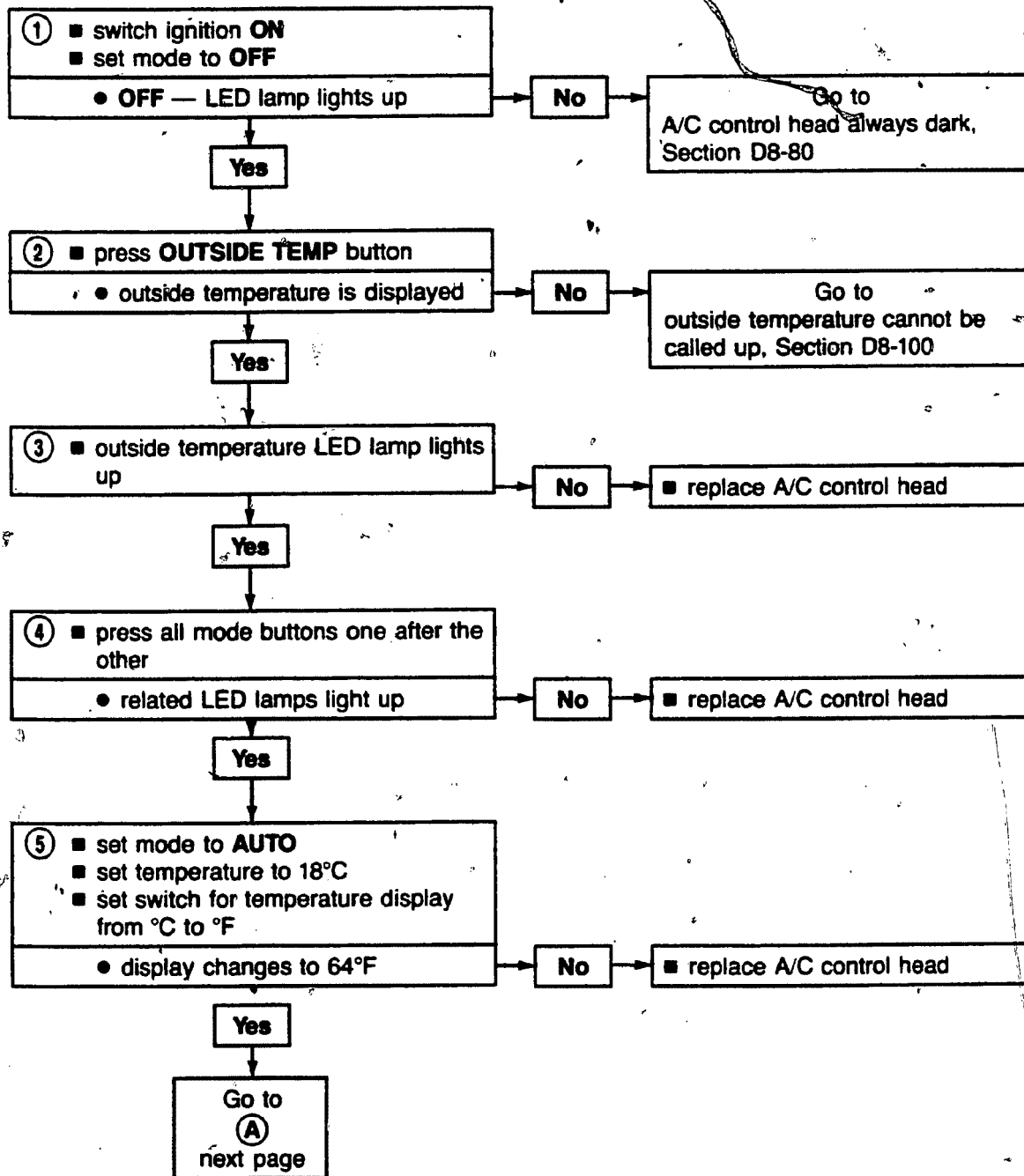


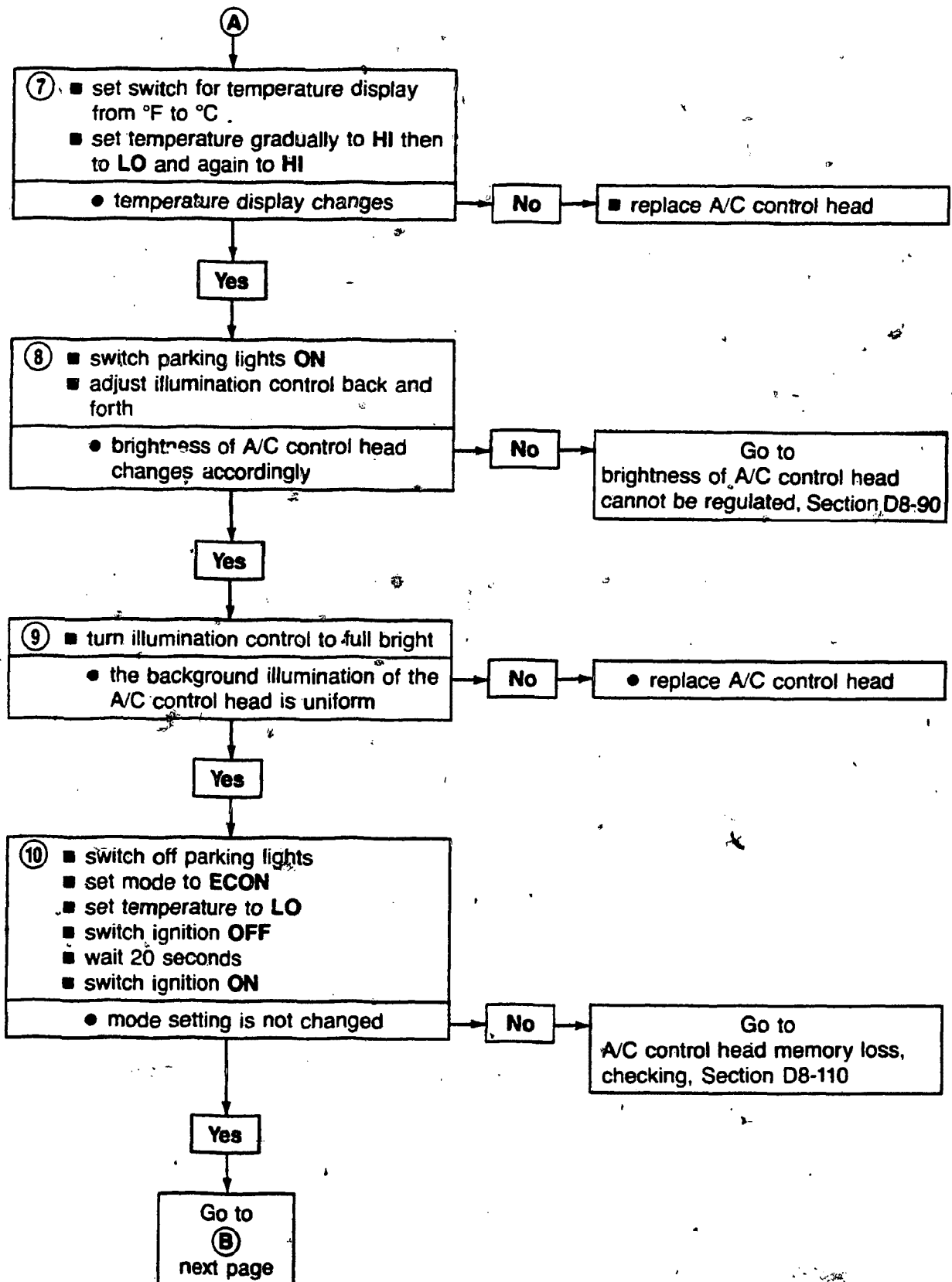
► Fig. 2 Heating position

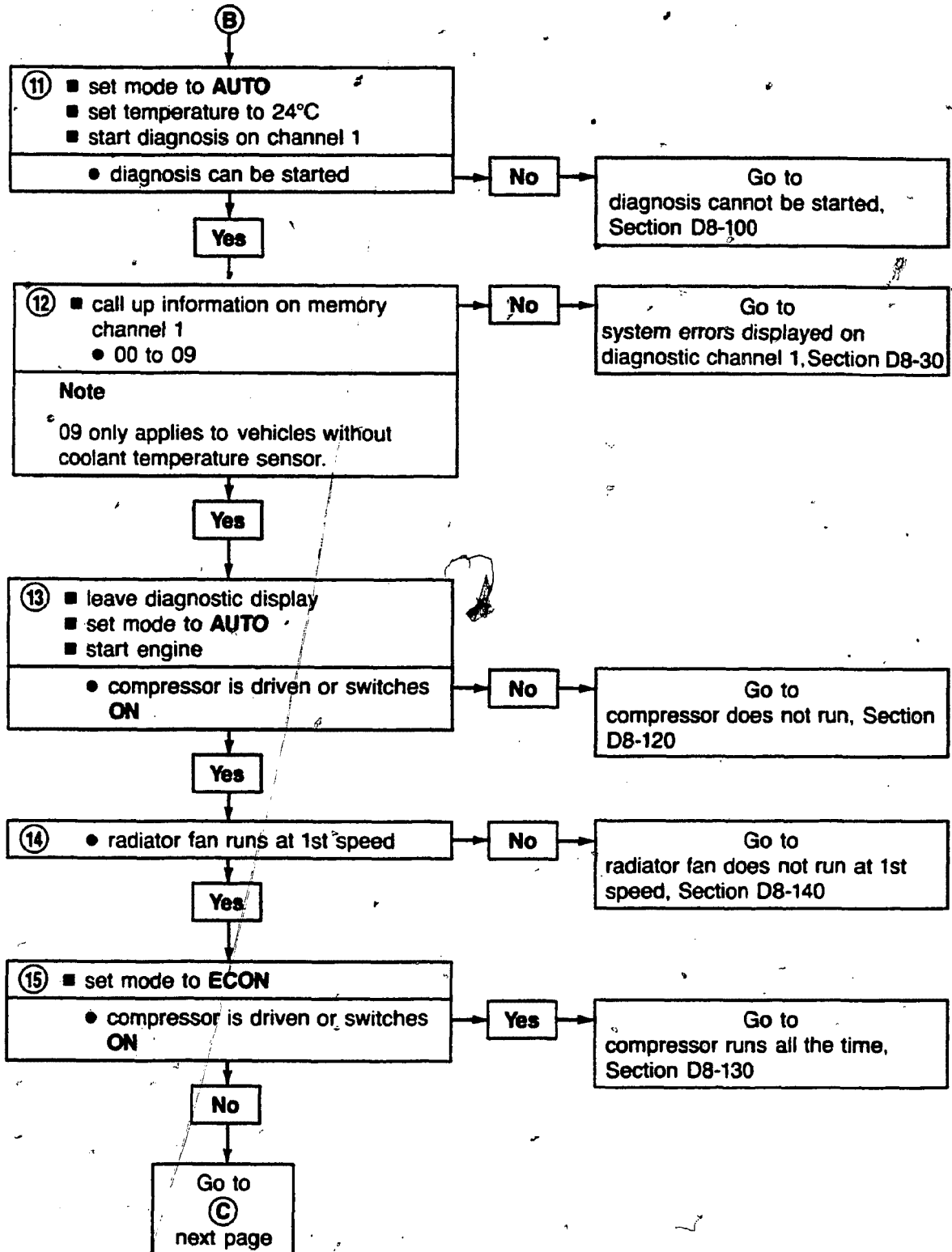
Digital climate control quick check

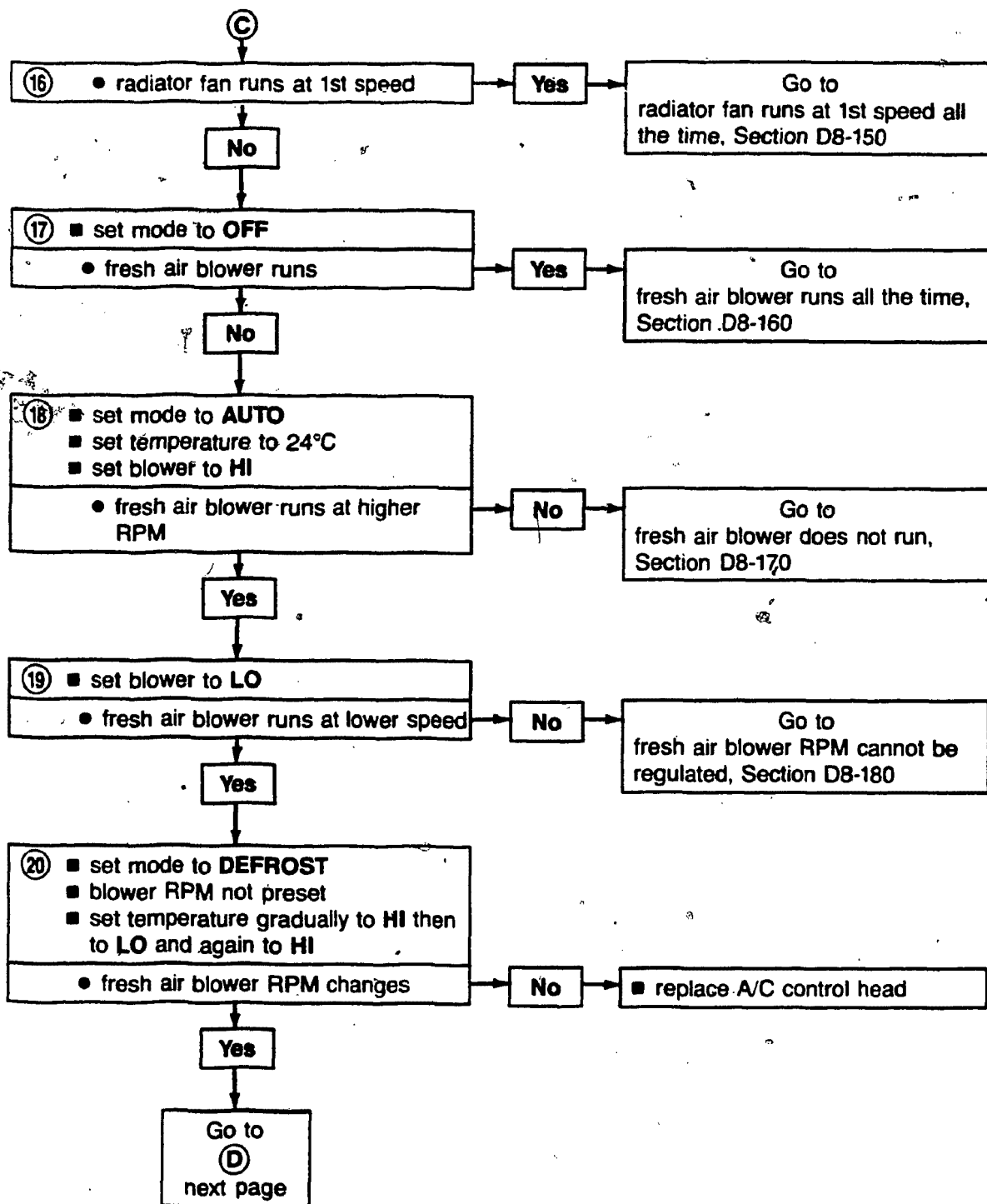
Note

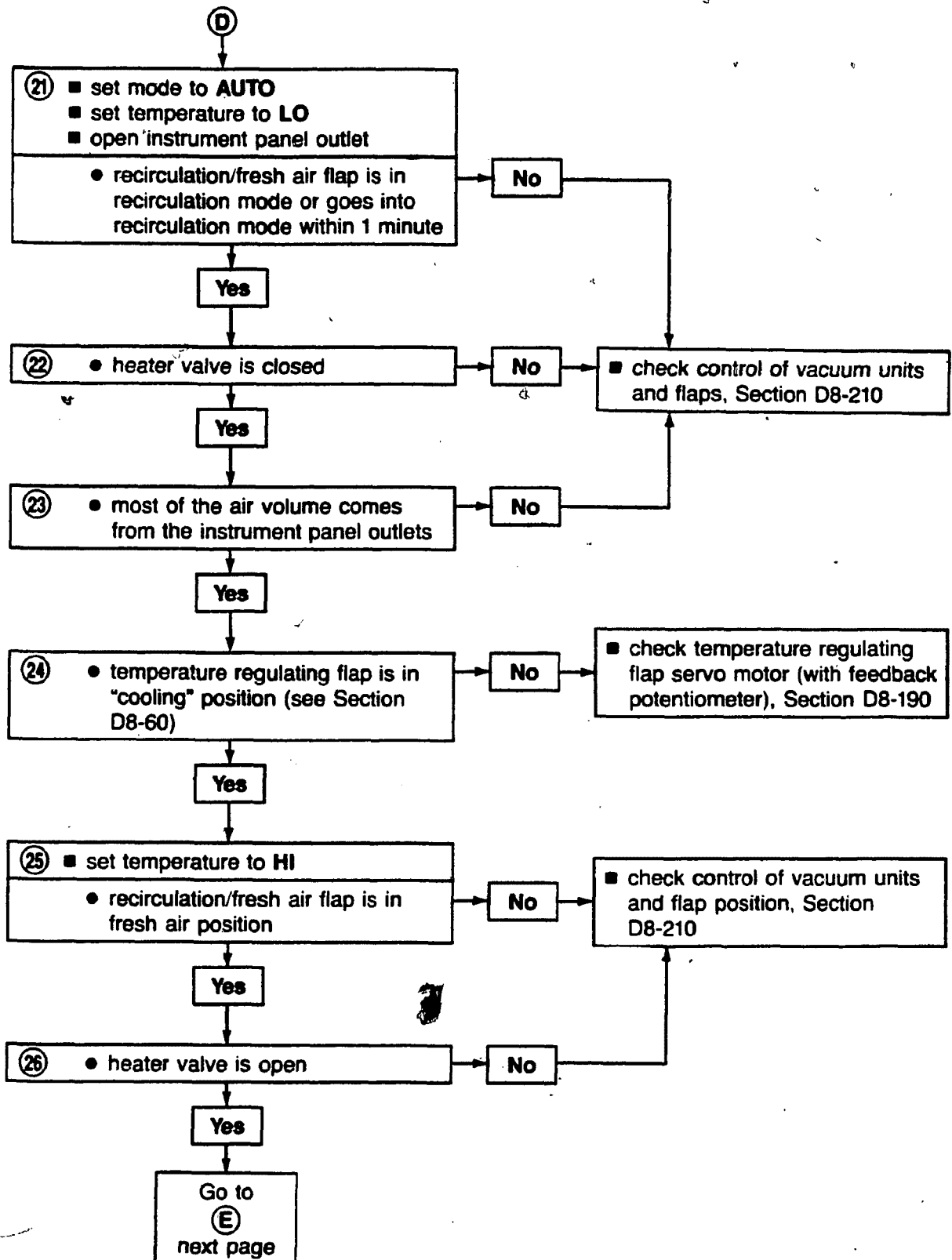
The test steps listed must be followed in their entirety and in sequence.

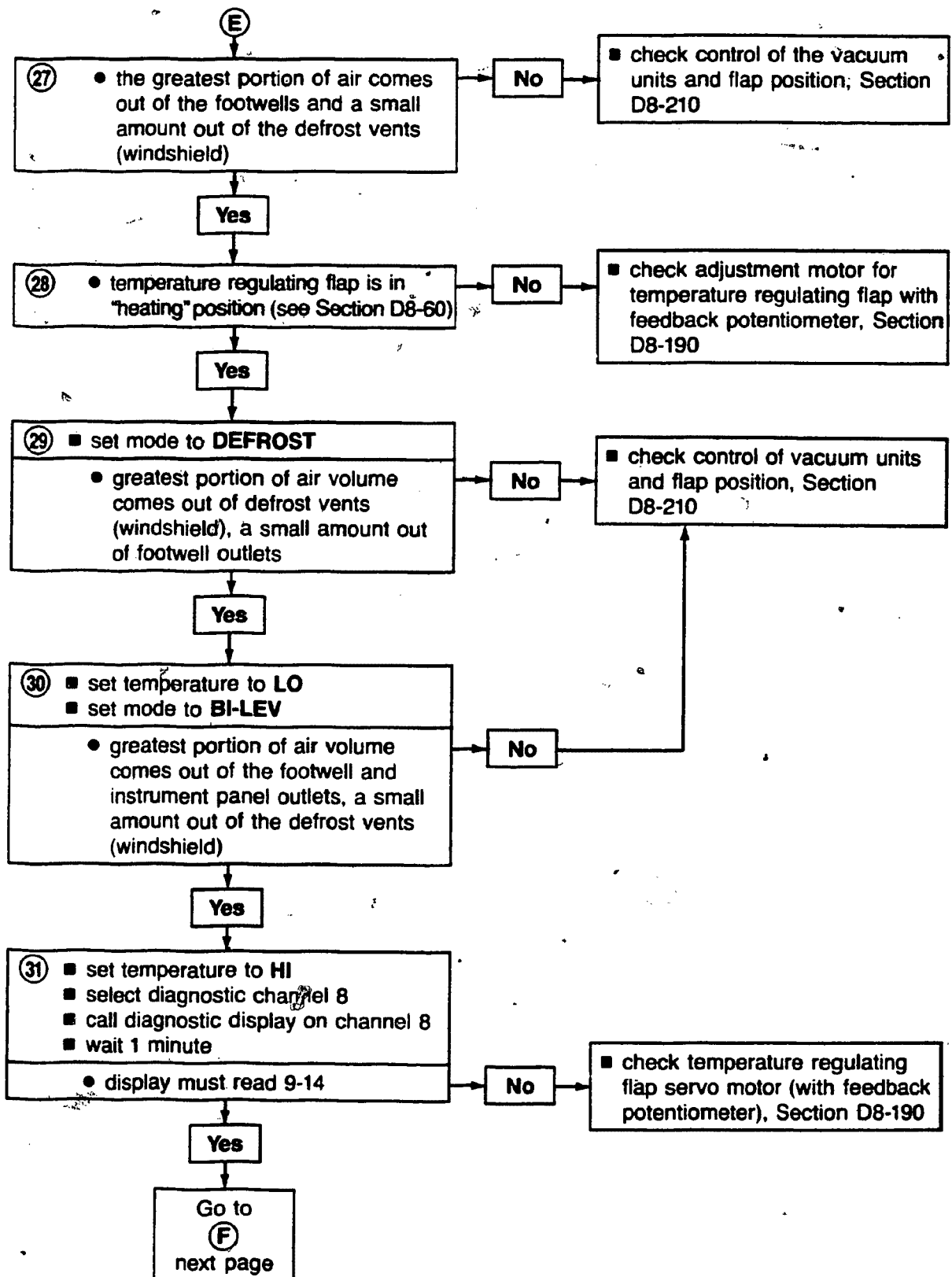


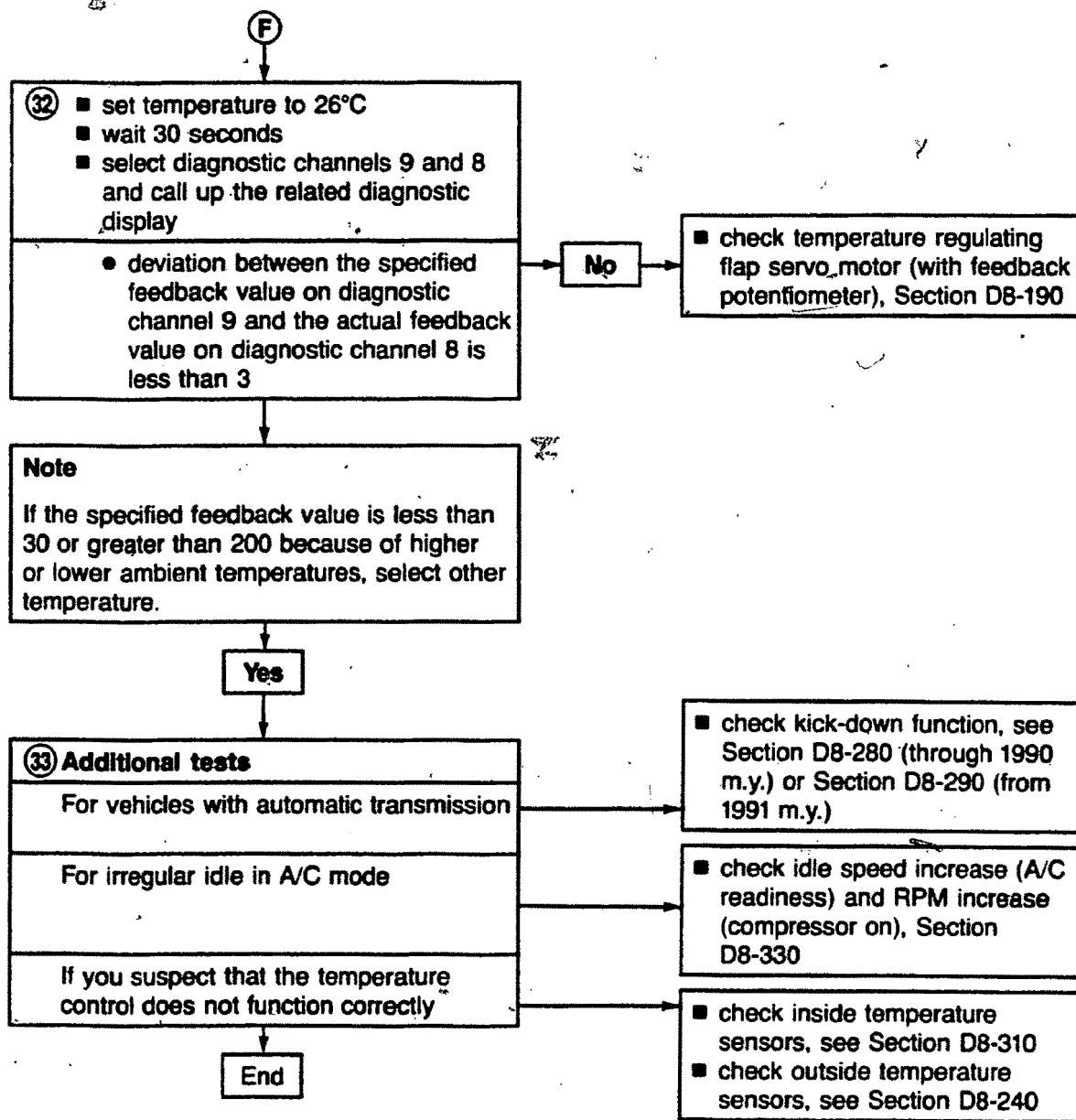


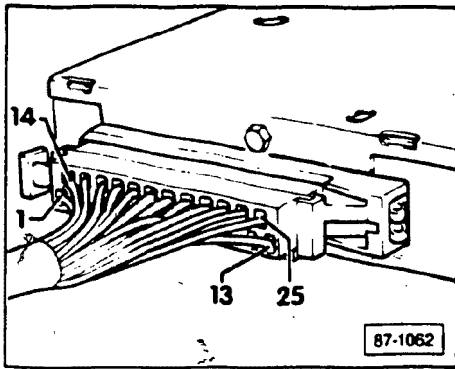












A/C control head, is always dark

- switch ignition **ON**
- switch parking lights **OFF**
- measure voltage between cavities 25 and 7 on A/C control head connector

• less than 8V

• greater than 8V

- repair voltage supply for cavity 25 or ground connection of cavity 7 to A/C control head according to wiring diagram

End

- measure voltage between cavities 13 and 7 on A/C control head connector

• greater than 8V

• less than 8V

- remove A/C control head connector
- measure voltage between cavities 13 and 7 on connector

• greater than 8V

• less than 8V

- replace A/C control head

End

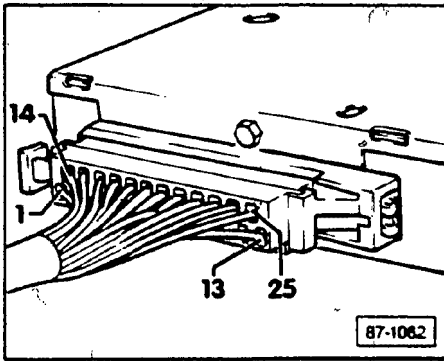
- replace A/C control head

End

- repair short circuit in wiring to cavity 13 according to wiring diagram

End

A/C control head illumination, cannot be regulated



- switch ignition **ON**
- set mode to **AUTO**
- set temperature to 24°C
- switch parking lights **ON**
- turn illumination control to full bright
- measure voltage between cavities 25 and 7 on A/C control head connector

• less than 8V

• greater than 8V

- repair voltage supply from cavities 25 or ground connection from cavity 7 according to wiring diagram

End

- measure voltage between cavities 24 and 7 on A/C control head connector

• less than 8V

• greater than 8V

- repair voltage supply to cavity 24 according to wiring diagram

End

- measure voltage between cavities 13 and 7 on A/C control head connector

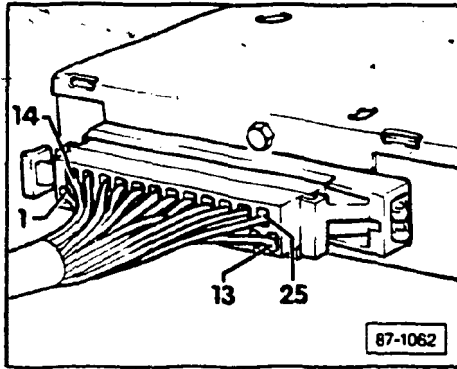
• less than 8V

• greater than 8V

- repair voltage supply to cavity 13 according to wiring diagram

End

Go to
Ⓐ
next page



A

- turn illumination control to full bright
- measure voltage between cavities 24 and 7 on A/C control head connector

● less than 6V

● greater than 6V

- replace A/C control head

End

- remove A/C control head connector
- measure voltage between cavities 24 and 7 on connector

● less than 6V

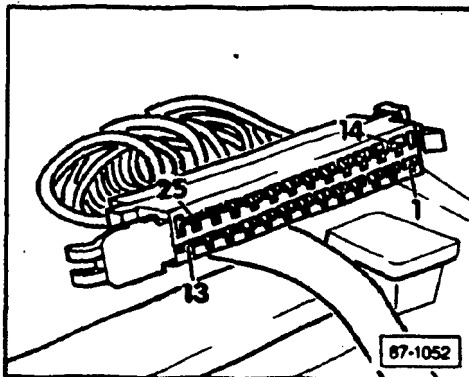
● greater than 6V

- replace A/C control head

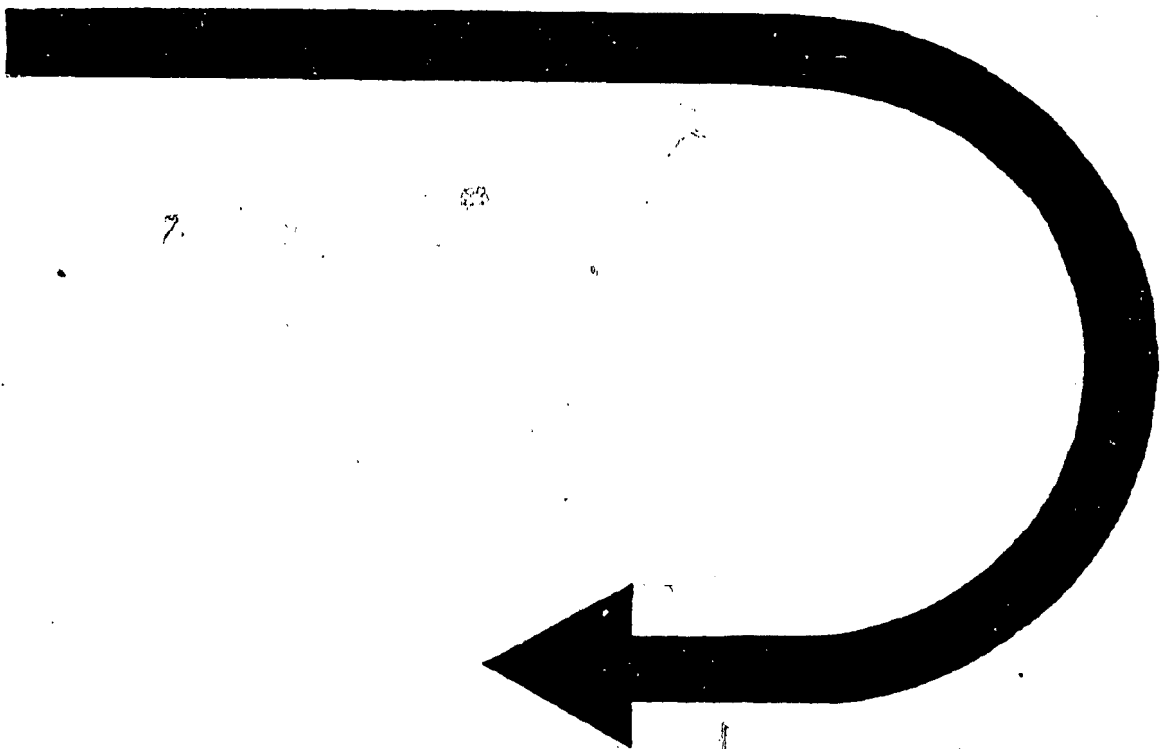
End

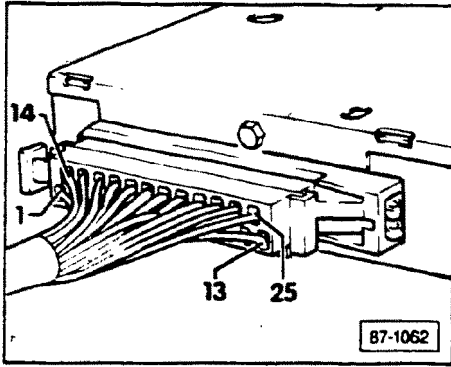
- eliminate short circuit in wiring to cavity 24 according to wiring diagram

End



CONTINUED IN THE
BEGINNING OF NEXT ROW





**Fault memory cannot be initiated/
outside temperature cannot be
displayed**

- switch ignition **ON**
- measure voltage between cavities 25 and 7 on A/C control head connector

● less than 8V

● greater than 8V

- repair voltage supply from cavities 25 or ground connection from cavity 7 according to wiring diagram

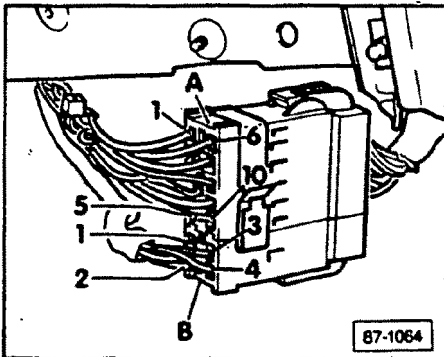
End

- measure voltage between cavities 11 and 7

● greater than 6V
less than 4.7V

● greater than 4.7V
less than 6V

Go to
section
D8-220



- remove connector to A/C programmer

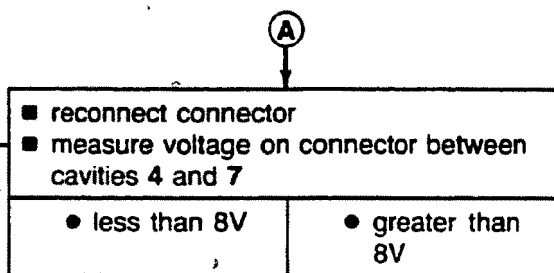
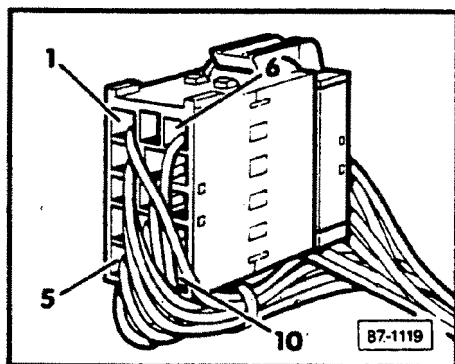
- troubleshooting can be initiated
- outside temperature can be called up

Yes

No

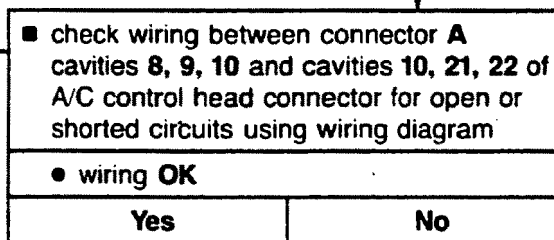
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Go to
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pages
following



■ repair voltage supply to cavity 4 or ground connection from cavity 7 connector A according to wiring diagram

End

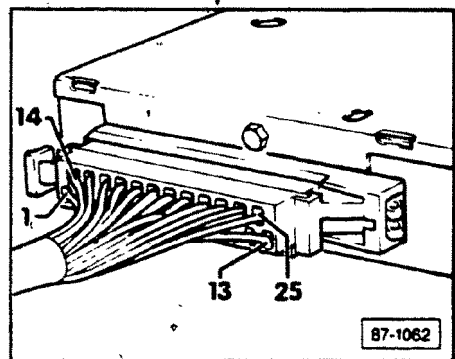


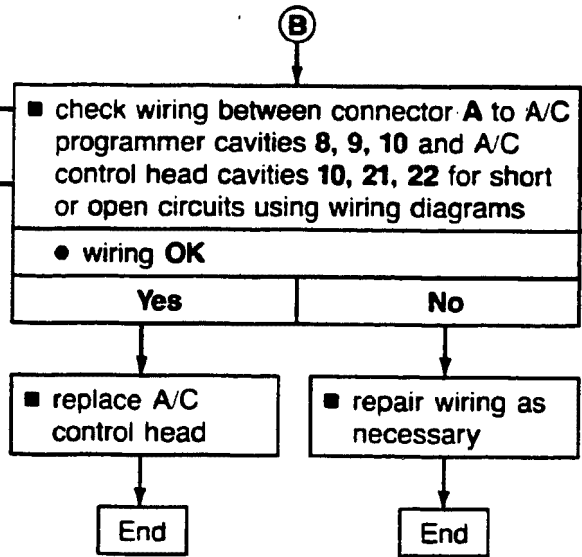
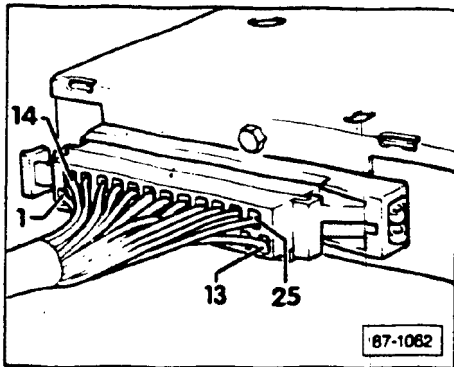
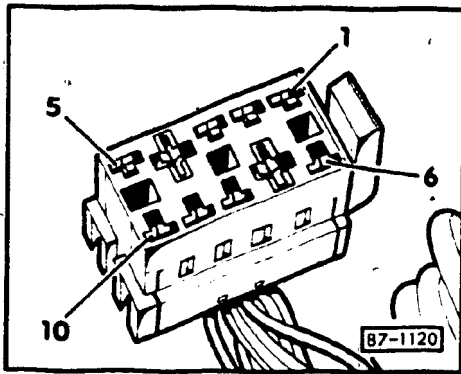
■ replace A/C programmer

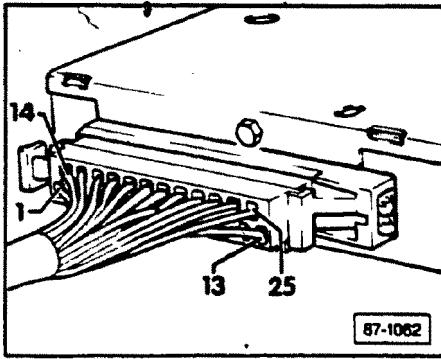
End

■ repair as necessary

End







A/C control head memory loss, checking

- switch ignition **OFF**
- measure voltage between cavities 12 and 7 on A/C control head connector

● less than 8V

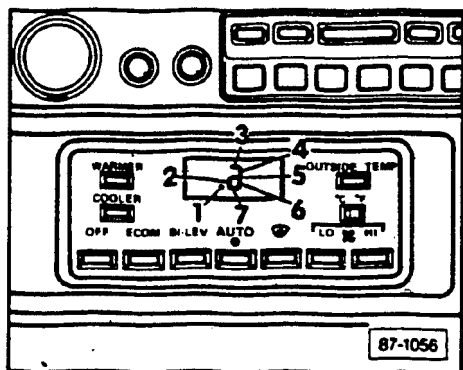
● greater than 8V

- repair voltage supply to cavity 12 or ground connection to cavity 7 according to wiring diagram

End

- replace A/C control head

End



Compressor does not run in AUTO, BI-LEV and DEF modes

- switch ignition **ON**
- set mode to **AUTO**
- set temperature to 24°C
- start diagnosis on channel 17

- segment 1 (compressor on) lights up

No

Yes

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next page

- segment 2 (high-pressure switch) lights up

Go to section D8-230

- segment 3 (low outside temperature or mode set to **ECON** or **OFF**)

Go to section D8-240

- segment 4 (electrical system voltage too low 5-9.5V) lights up

Go to section D8-260

- segment 5 (low-pressure switch) lights up

Go to section D8-270

- segment 6 (kick-down switch) lights up

Go to section D8-280
(through 1990 m.y.) or section
D8-290 (from 1991 m.y.)

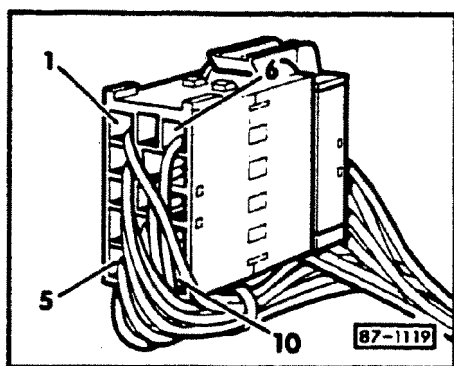
- segment 7 (hot light switch) lights up

Go to section D8-300

- none of the segments 1-7 lights up

- replace A/C control head

End



■ disconnect wire at terminal 4/87a of relay J 32
 ■ start engine
 ■ observe; compressor runs

Yes	No
-----	----

■ measure current draw between terminal connection at 4/87a of J 32

greater than 5 mA	less than 5 mA
-------------------	----------------

Fault not in A/C circuit. Check engine electronics.

Replace relay J 32

■ check following components and wiring per wiring diagram

- A/C relay, J 32
- A/C compressor clutch, N 25

(A)
 ■ measure voltage between cavities 5 and 7 at A/C programmer connector A

• less than 1.5V	• greater than 1.5V
------------------	---------------------

■ check wiring from A/C programmer connector cavity 5 to A/C relay for short circuit according to wiring diagram

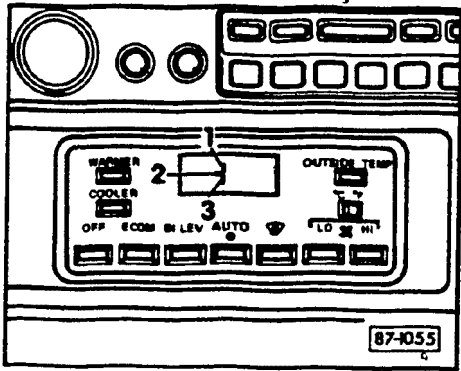
- wiring OK

Yes	No
-----	----

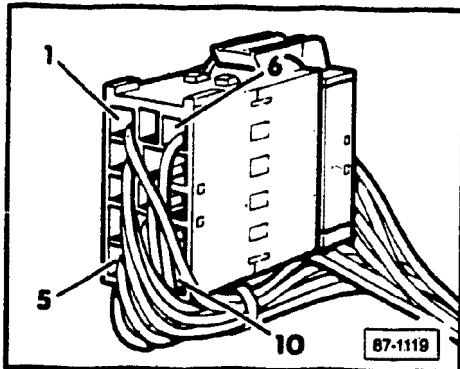
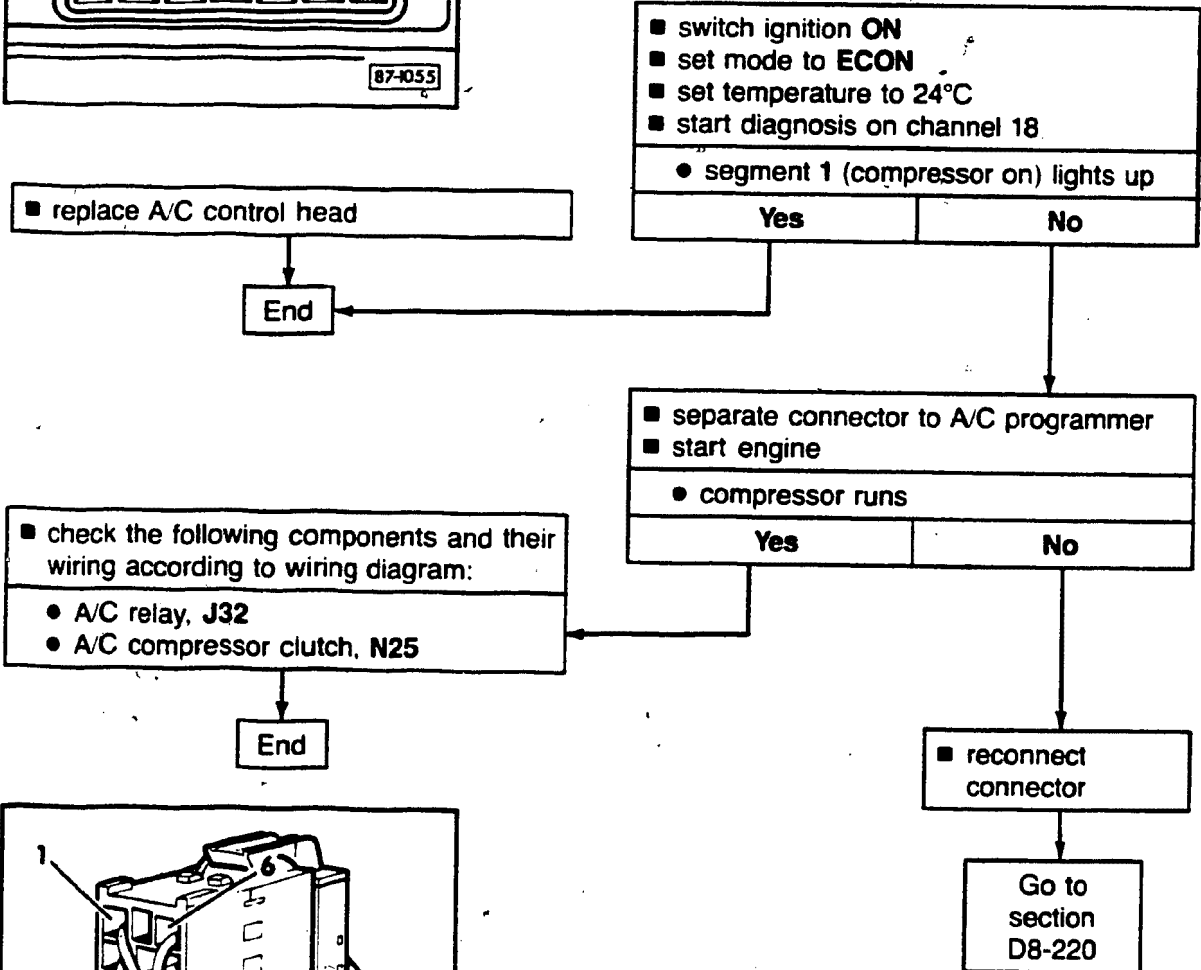
Go to section D8-220

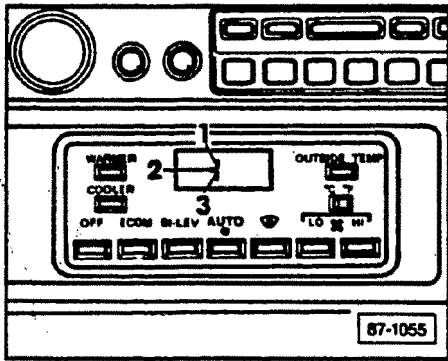
■ repair as necessary

End



Compressor runs in ECON and OFF modes





Radiator cooling fan, V7 does not run at 1st speed (in AUTO, BI-LEV, AND DEF modes)

■ replace A/C control head

End

■ switch ignition ON
 ■ set mode to AUTO
 ■ set temperature to 24°C
 ■ start diagnosis on channel 18

● segment 2 (radiator fan, 1st speed on) lights up

No	Yes
----	-----

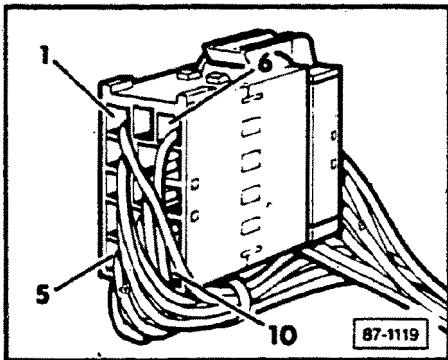
■ check the following components and their wiring according to wiring diagram:

- series resistor for radiator cooling fan, N39
- radiator cooling fan, V7
- radiator cooling fan after-run control unit, J138 or J26

End

■ measure voltage between cavities 3 and 7 on connector to A/C programmer

● less than 1.5V	● greater than 1.5V
------------------	---------------------



■ check wiring from A/C programmer connector A cavity 3 to radiator cooling fan after-run control unit J138 or J26 using wiring diagram

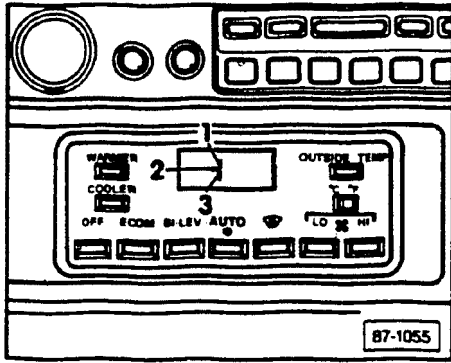
● wiring OK

Yes	No
-----	----

Go to section D8-220

■ repair as necessary

End



Radiator cooling fan, V7 always runs at 1st speed (in ECON and OFF modes)

- switch ignition **ON**
- set mode to **ECON**
- set temperature to **24°C**
- start diagnosis on channel **18**

● segment 2 (fan on 1st speed) lights up

Yes

No

■ replace A/C control head

End

■ separate connector to A/C control head

● fan continues to run at 1st speed

No

Yes

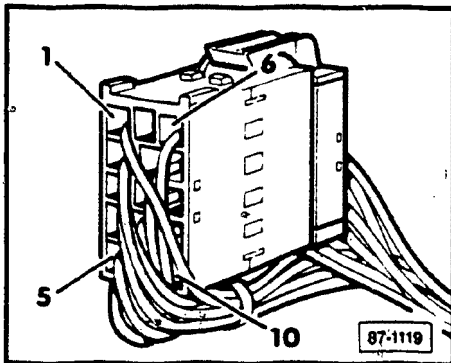
■ reconnect connector

Go to
section
D8-220

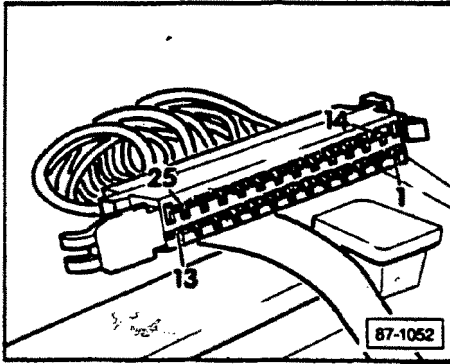
■ check the following components and their wiring according to wiring diagram

- radiator cooling fan series resistor, **N39**
- radiator cooling fan, **V7**
- radiator cooling fan after-run control unit **J138** or **J26** and thermoswitch **F95**

End



A/C fresh air blower always runs (In OFF mode)



■ measure voltage between cavities 25 and 7 on A/C control head connector

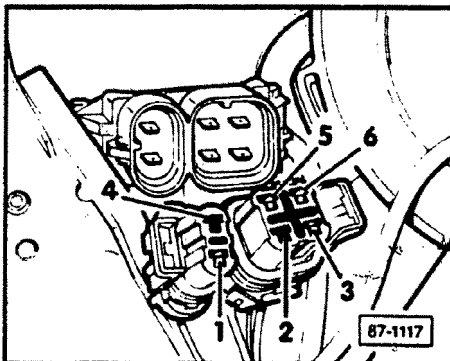
● greater than 8 V	● less than 8 V
--------------------	-----------------

■ replace A/C control head

End

■ repair voltage supply from cavity 25 or ground connection from cavity 7 according to wiring diagram

End



■ switch ignition ON
■ remove connector from A/C control head

● fresh air blower continues to run	
No	Yes

■ remove both connectors from A/C blower control unit, J126

● fresh air blower runs	
Yes	No

■ repair short circuit in wiring from A/C blower control unit to fresh air blower according to wiring diagram

End

● check wiring from A/C control head connector cavity 15 to blower control unit for short circuit according to wiring diagram

No	Yes
----	-----

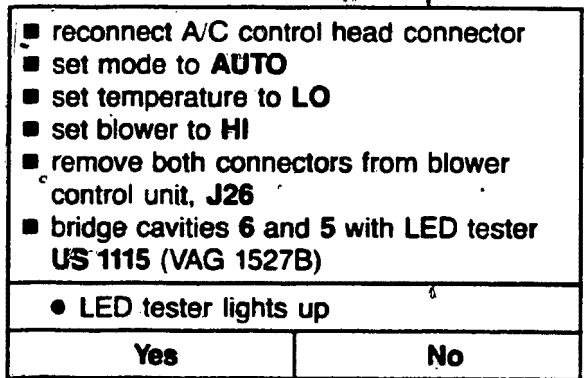
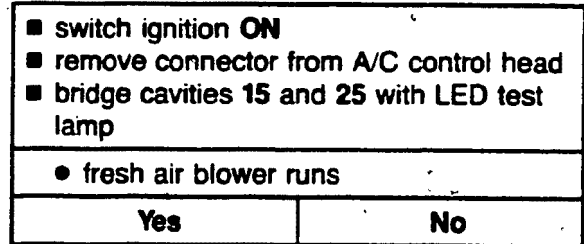
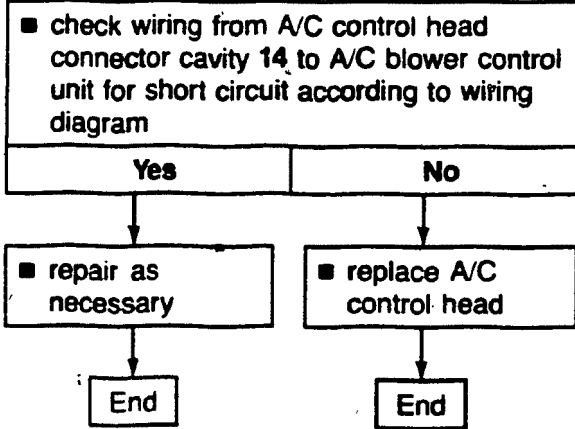
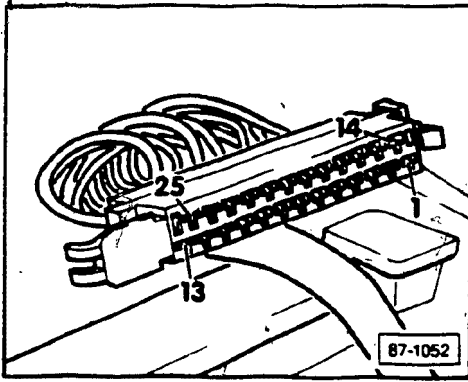
■ replace control unit for blower

End

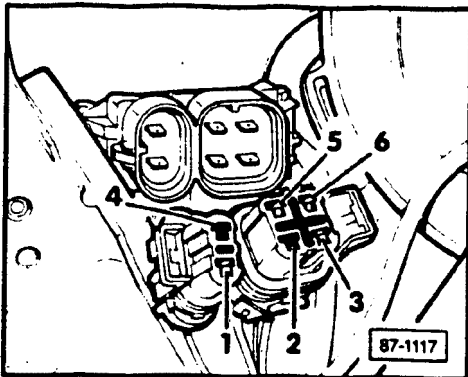
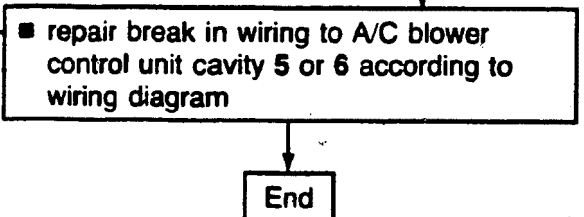
■ repair as necessary

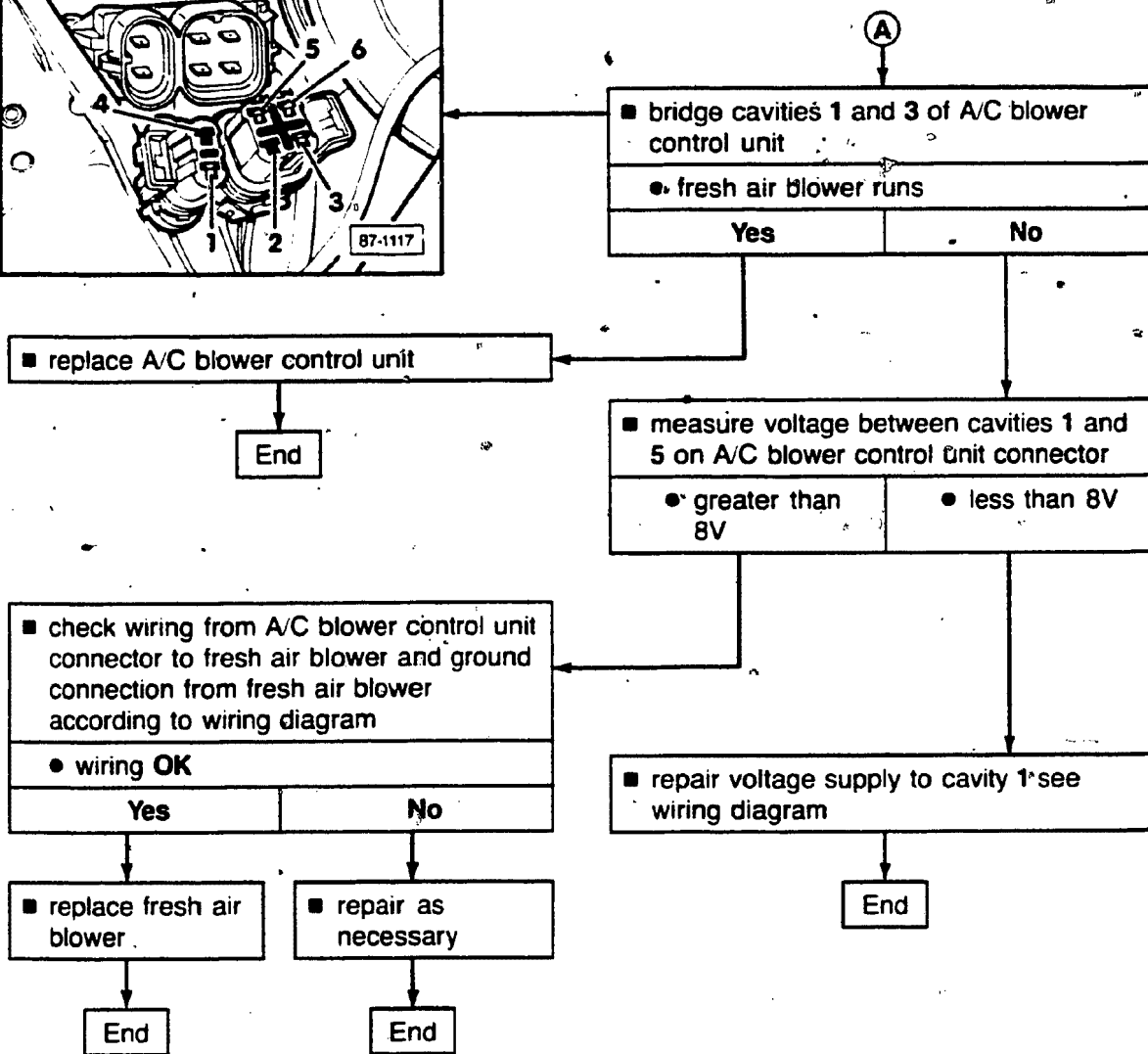
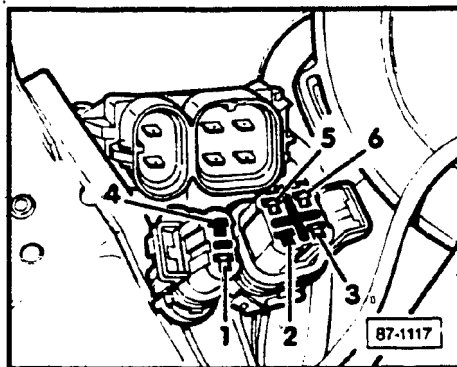
End

Fresh air blower does not run (in AUTO, BI-LEV, DEF or ECON modes)

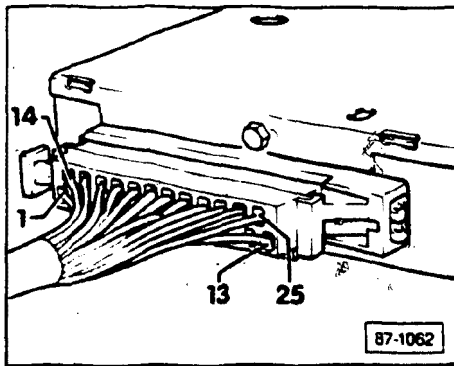


Go to
Ⓐ
next page





Fresh air blower speed cannot be regulated



■ repair voltage supply from cavities 25 or ground connection from cavity 7 according to wiring diagram

End

■ switch ignition ON
■ measure voltage between cavities 25 and 7 on A/C control head connector

● less than 8V	● greater than 8V
----------------	-------------------

■ check wiring from A/C control head connector cavities 14 and 15 to A/C blower control unit J126 for open or shorted circuits according to wiring diagram

● wiring OK

Yes

No

■ repair as necessary

End

■ check A/C blower control unit ground connection from cavity 5 for open circuit

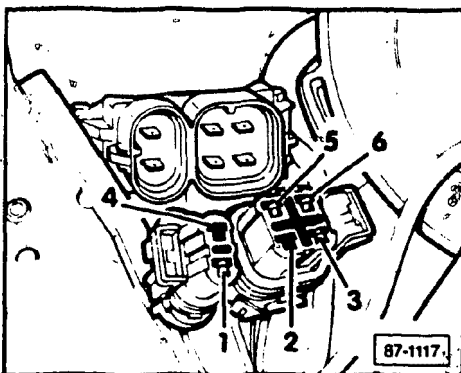
● ground connection OK

Yes

No

■ repair as necessary

End



■ replace A/C blower control unit
■ check function

● fresh air blower RPM cannot be regulated

Yes

No

End

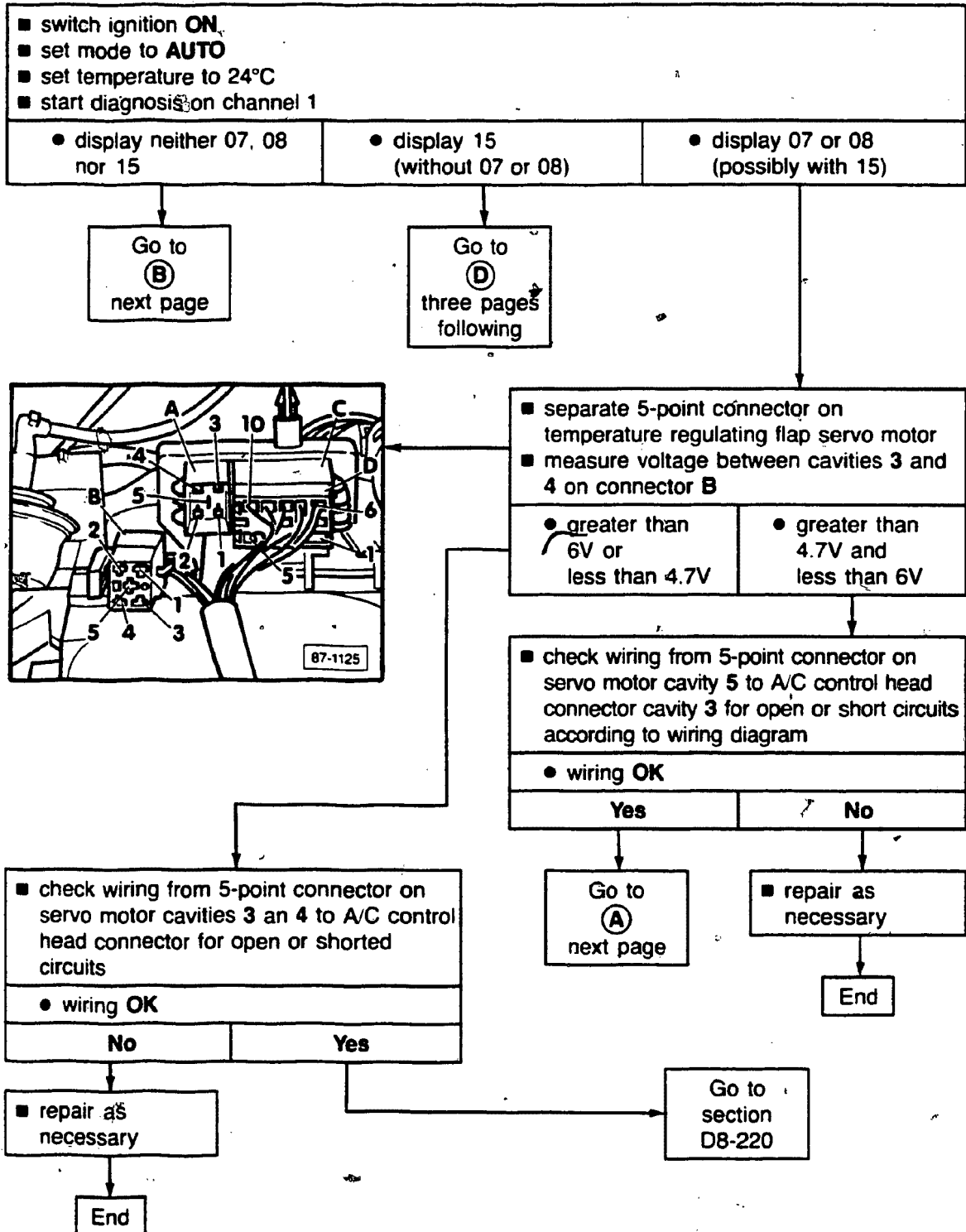
■ reinstall old A/C blower control unit
■ replace A/C control head

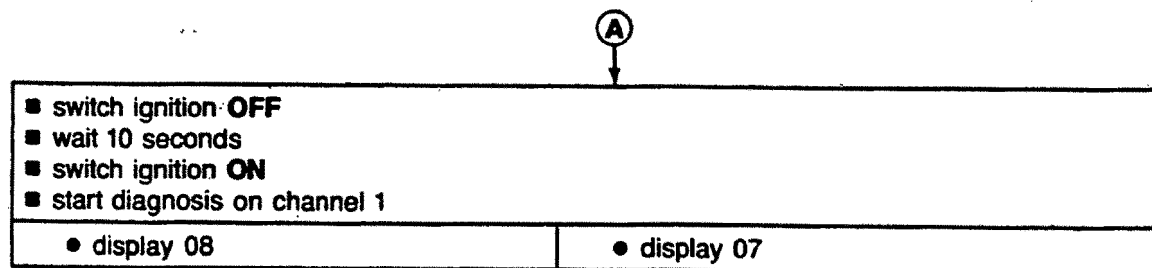
End

THIS FRAME INTENTIONALLY LEFT

BLANK

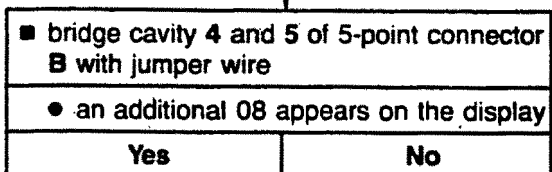
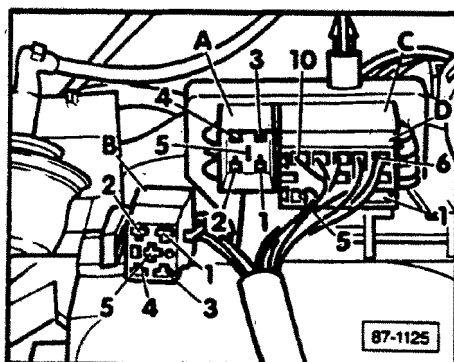
Temperature regulating flap servo motor, V68 (with feedback potentiometer), checking





■ replace A/C control head

End



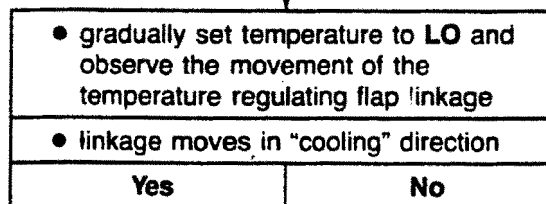
■ replace A/C control head

End

■ replace temperature regulating flap servo motor (with feedback potentiometer)

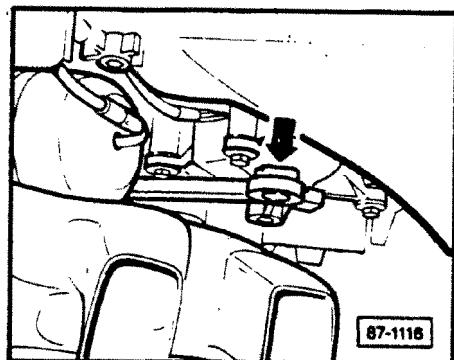
End

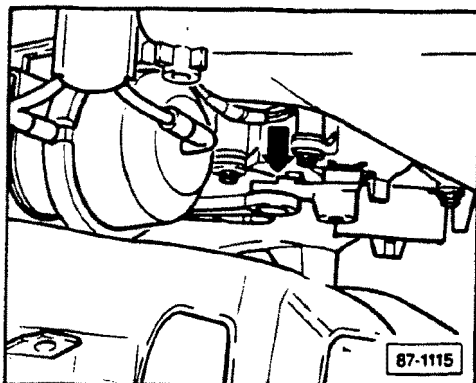
(B)



Go to
(C)
next page

Go to
(D)
two pages
following





Ⓒ

■ gradually set temperature to HI and observe movement of temperature regulating flap linkage

- linkage moves in "heating" direction

Yes

No

Go to
Ⓓ
next page

■ start diagnosis on channel 8

- display 9-14

- display greater than 14 / less than 9

■ adjust feedback potentiometer on adjustment motor to 12

Note

See repair manual, heater/air conditioner.

End

- set temperature to 26°C
- wait 30 seconds
- start diagnosis on channel 8 and 9

- deviation between the specified feedback value of channel 9 and the actual feedback value on diagnostic channel 8, less than 3

Note

If the specified feedback value on diagnostic channel 9 is less than 30 or greater than 200 because of higher or lower ambient temperatures, select different temperature

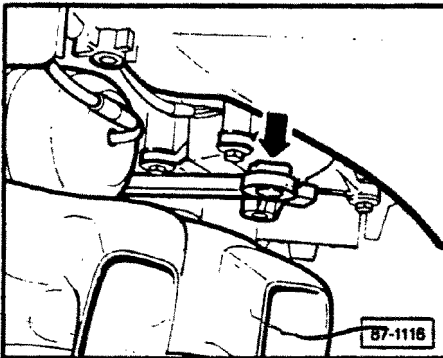
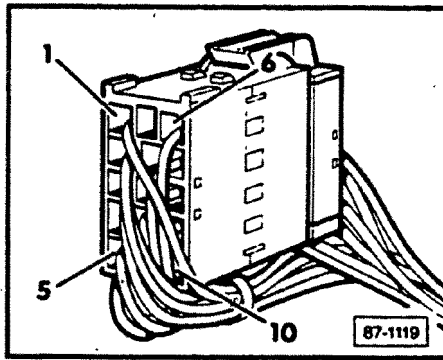
Yes

No

End

■ replace A/C control head

End



ⓓ

- bridge cavities 1 and 2 of connector to A/C programmer with LED tester US 1115 (VAG 1527B)
- set temperature to LO

• LED tester lights up or flashes

Yes	No
-----	----

Go to
ⓕ
two pages
following

• linkage of temperature regulating flap moves in "cooling" direction

No	Yes
----	-----

Go to
ⓔ
next page

- check wiring from cavities 1 and 2 of connector for A/C programmer to temperature regulating flap servo motor for open or short circuits according to wiring diagram

• wiring OK

Yes	No
-----	----

End

■ repair as necessary

- remove temperature regulating flap servo motor
- check temperature regulating flap for ease of operation

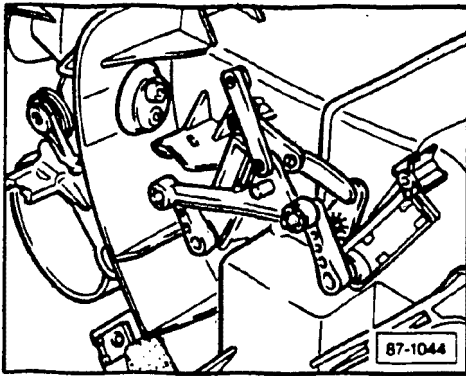
Yes	No
-----	----

■ replace temperature regulating flap

■ replace temperature regulating flap servo motor

End

End



- remove temperature regulating flap servo motor
- check temperature regulating flap for ease of operation
 - easy to operate

Yes

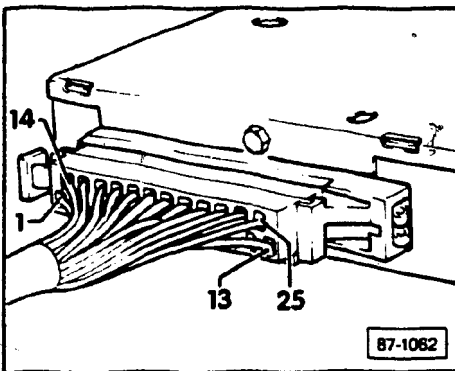
No

- replace temperature regulating flap servo motor

End

- repair temperature regulating flap

End



E

- set temperature to **HI**

- LED test lamp lights up or flashes

Yes

No

Go to
F
next page

- temperature regulating flap linkage moves in "heating" direction

No

Yes

- check wiring from A/C control head cavities 3, 6 and 11 to adjustment motor for temperature regulating flap for open or short circuits according to wiring diagram

- wiring OK

No

Yes

- repair as necessary

End

- replace temperature regulating flap servo motor

- set temperature to 24°C

- call up diagnosis on channel 1

- display 15

No

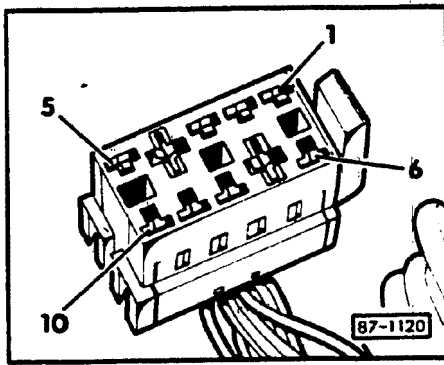
Yes

End

- exchange temperature regulating flap servo motor

- replace A/C control head

End



F

- separate connector to A/C programmer
- measure resistance between cavity 1 and 2 on connector

- greater than 30 ohms, less than 100 ohms

- less than 30 ohms, greater than 100 ohms

- check wiring to A/C programmer connector cavities 1 and 2 for short circuit according to wiring diagram

- wiring OK

Yes

No

Go to section D8-220

- repair as necessary

End

- check wiring from A/C programmer connector cavities 1 and 2 to temperature regulating flap servo motor for open or short circuits according to wiring diagram

- wiring OK

Yes

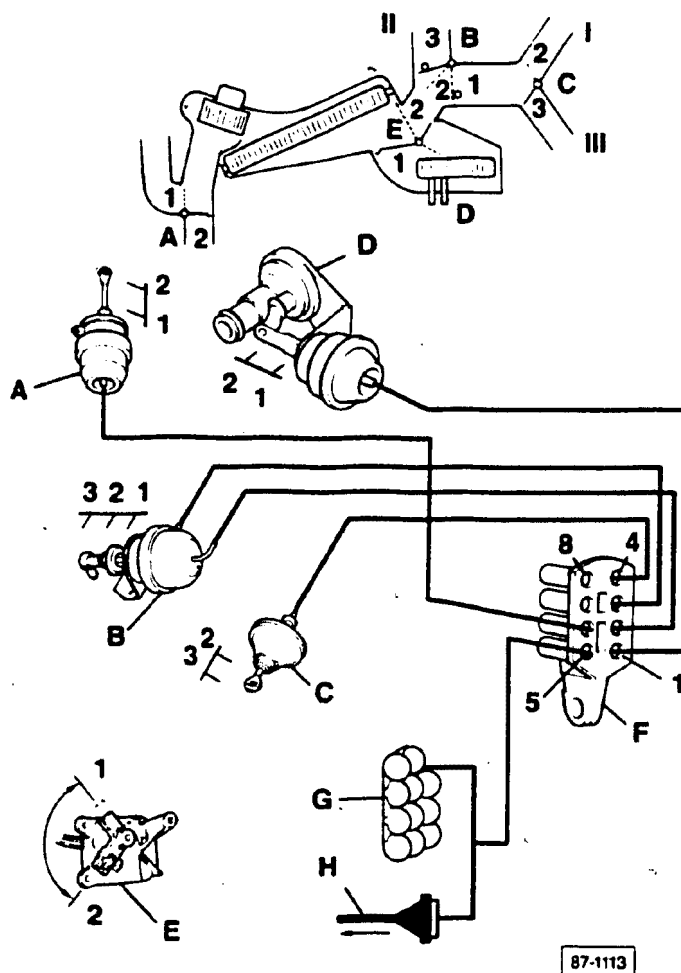
No

- replace temperature regulating flap servo motor

End

- repair as necessary

End



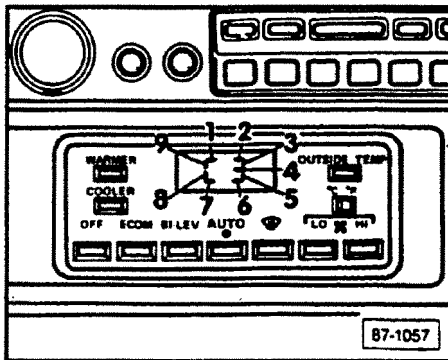
I — Defrost vent (windshield)
II — Instrument panel outlet
III — Footwell outlet
A — Vacuum unit for recirculation/fresh air flap
B — Vacuum unit for regulating flap (outlets, footwell/defrost)
C — Vacuum unit for regulating flap (footwell/defrost)
D — Vacuum unit for coolant check valve for heater
E — Adjustment motor for temperature regulating flap
F — Connector coupling for vacuum lines to A/C programmer
G — Vacuum reservoir
H — Check valve

Vacuum units and flap positions, checking

(air distribution is not correct or water valve is in wrong position)

Note

Do this section only if referred here by the Quick Check test.



- start engine
- open all instrument panel air outlets
- set mode to **AUTO**
- set temperature to **LO**
- wait 1 minute
- start diagnosis on channel 7

- segments 2, 3, 4, 5 and 6 light up

Yes

No
(one or more of the segments do not light up)

- replace A/C control head

- disconnect vacuum line connector from A/C programmer F
- check all vacuum servos and vacuum lines for leaks
- check all vacuum servos, flaps and the water valve for ease of operation

Note

The vacuum unit for regulating flap B goes only in position 1, if there is vacuum at both connections. Apply vacuum to cavity 3 only if there is vacuum at cavity 2 at the same time.

- check vacuum supply at cavity 5

- all vacuum units, vacuum lines, and vacuum supply are OK
- all flaps and the heater valve are operable

Yes

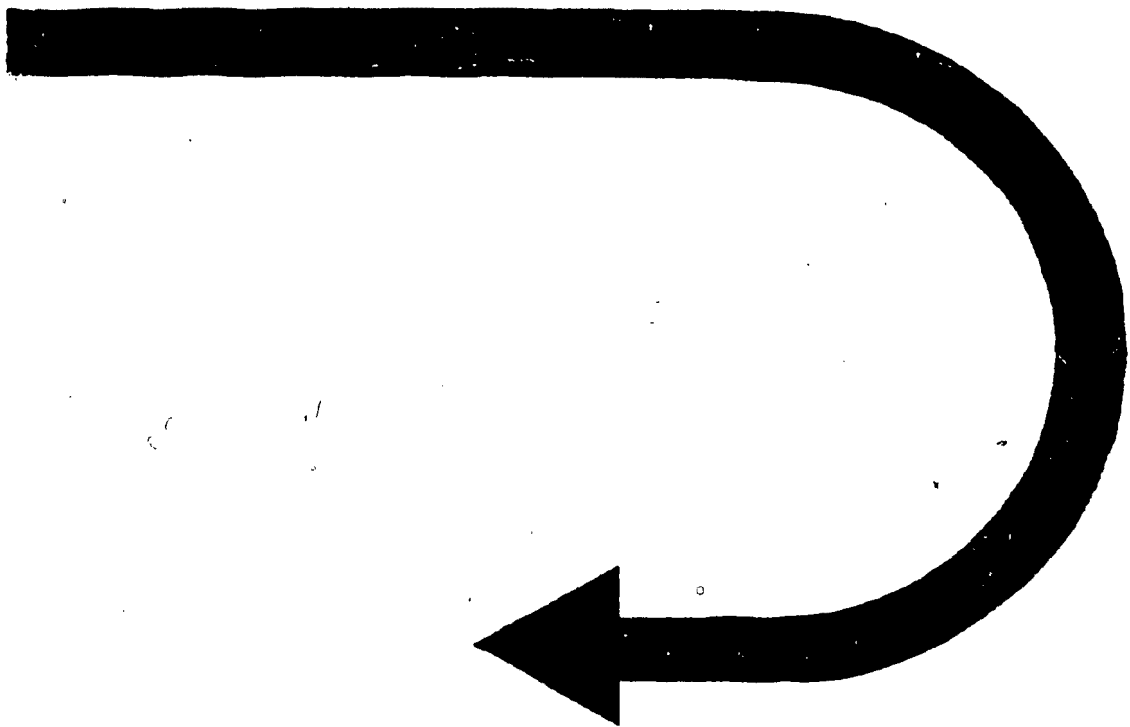
No

Go to
section
D8-220

- repair as necessary

End

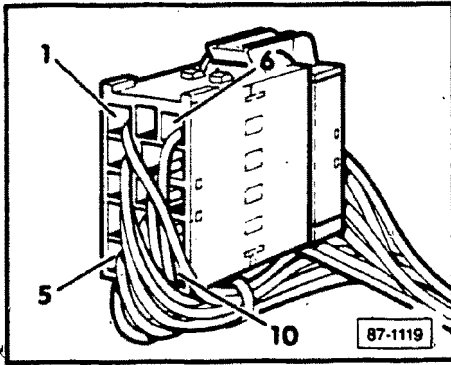
CONTINUED IN THE
BEGINNING OF NEXT ROW



Errors in the area of climate control regulation

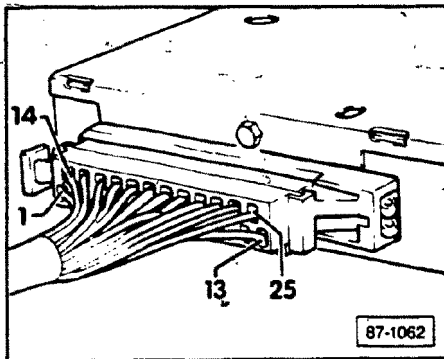
Note

Do this section only if referred here from other test sections.



- repair voltage supply from cavity 4 or ground connection from cavity 7 of connector according to wiring diagram

End



- switch ignition **ON**
- measure voltage between cavities 4 and 7 on connector to A/C programmer

• less than 8V

• greater than 8V

- measure voltage between cavities 6 and 7 at connector to A/C programmer

• greater than 4.7V and less than 6V

• less than 4.7V or greater than 6V

Go to
Ⓐ
next page

- check wiring from A/C programmer connector cavity 8, 9, and 10 to connector on A/C control head cavities 10, 21, and 22 according to wiring diagram

• wiring OK

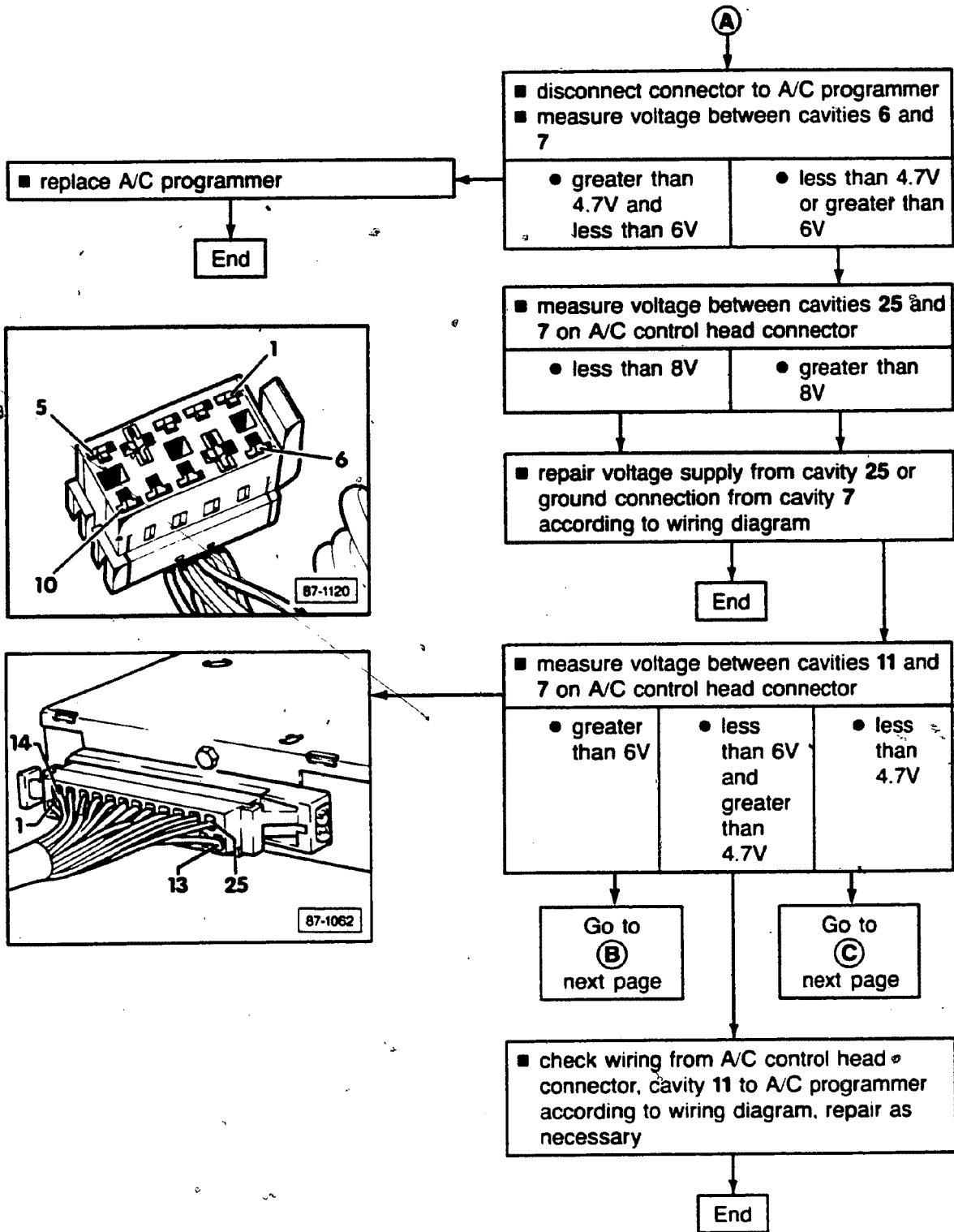
Yes

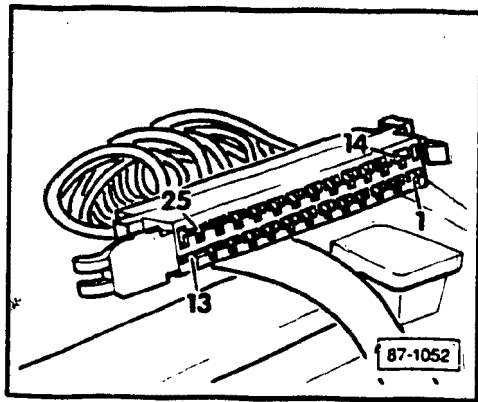
No

Go to
Ⓓ
three pages following

- repair as necessary

End





Ⓑ

■ remove connector from A/C control head and measure voltage on connector between cavity 11 and 7

• greater than 6V

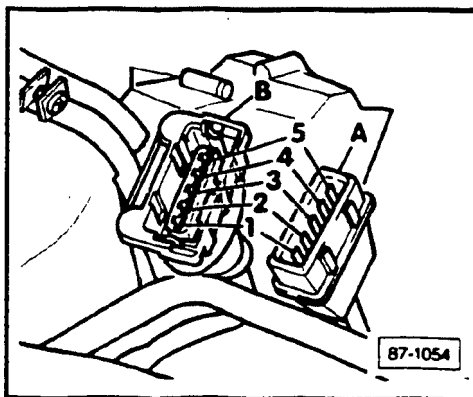
• less than 6V

■ replace A/C control head

End

■ eliminate short circuit in wiring to cavity 11 according to wiring diagram

End



Ⓒ

■ disconnect 5-point connector to temperature regulating flap servo motor
■ measure voltage to cavities 3 and 4 on connector B

• greater than 4.7V

• less than 4.7V

■ replace temperature regulating flap servo motor (with feedback potentiometer)

End

■ check wiring from connector for A/C control head cavity 11 to A/C programmer and to temperature regulating flap servo motor according to wiring diagram

• wiring OK

Yes

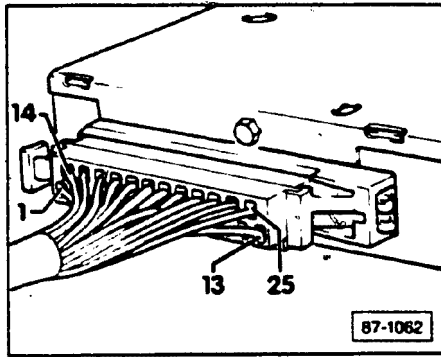
No

■ replace A/C control head

■ repair as necessary

End

End



■ replace A/C programmer ■ check affected function ● function OK	
Yes	No

End

■ reinstall old A/C programmer ■ replace A/C control head
--

End

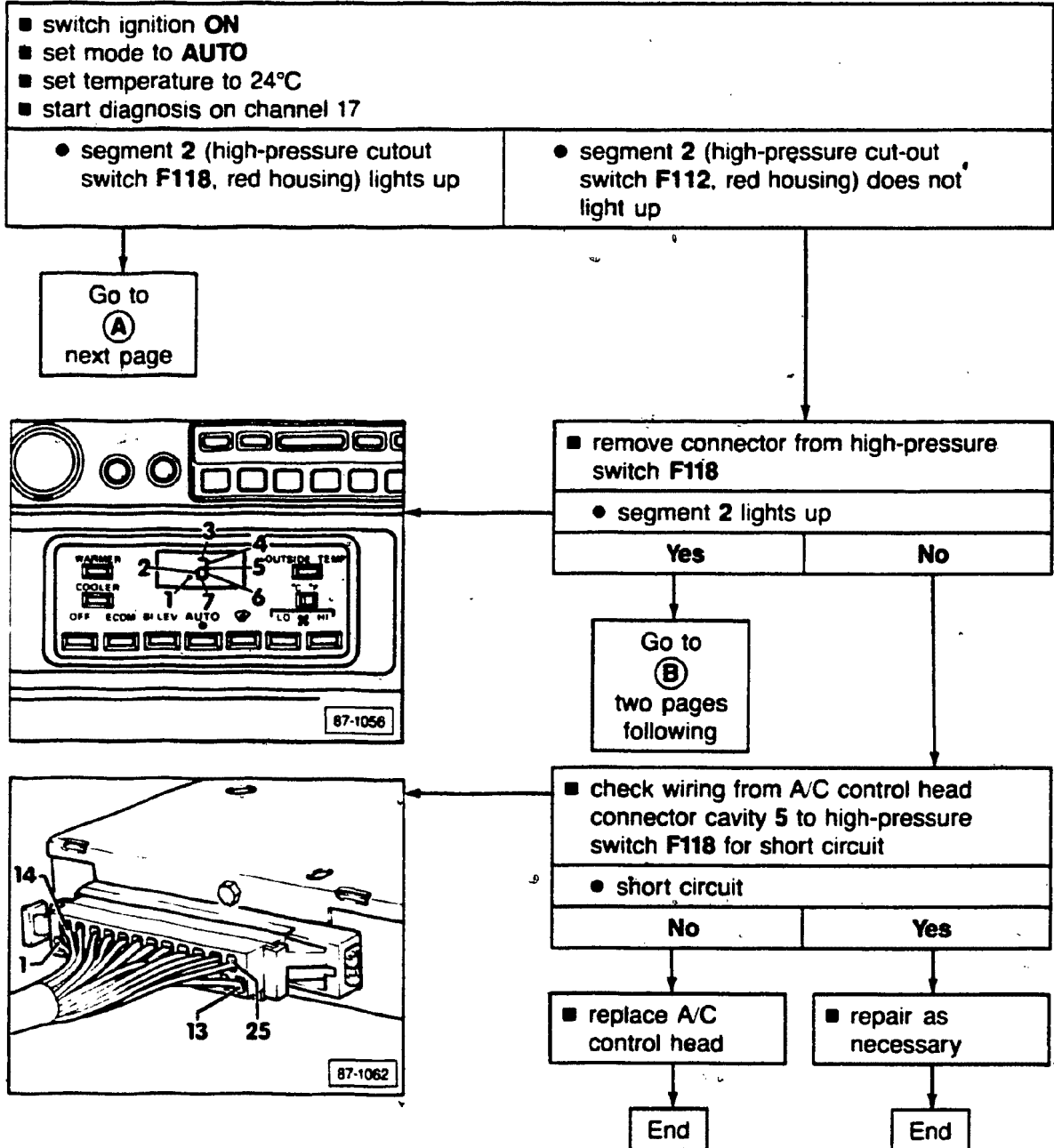
D

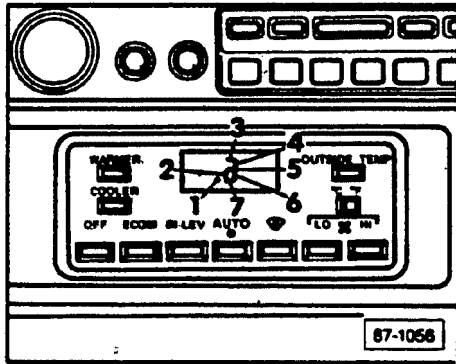
■ measure voltage between cavities 25 and 7 on the A/C control head	
● greater than 8V	● less than 8V

■ repair voltage supply from cavity 25 or ground connection from cavity 7

End

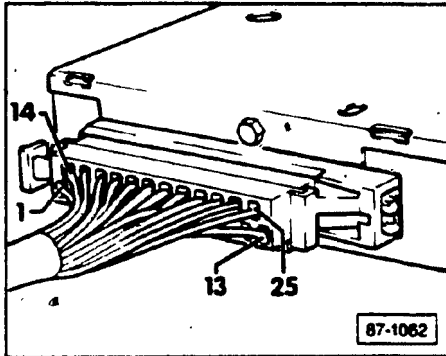
A/C high pressure switches (F118, F23), checking





■ replace A/C high-pressure switch F118

End



■ remove A/C high-pressure switch F118 connector and bridge with jumper wire
 ■ wait 10 seconds
 ● segment 1 (compressor on) lights up

Yes	No
-----	----

■ check wiring from A/C control head connector cavities 5 and 6 to A/C high pressure switch F118 for short or open circuits according to wiring diagram
 ● wiring OK

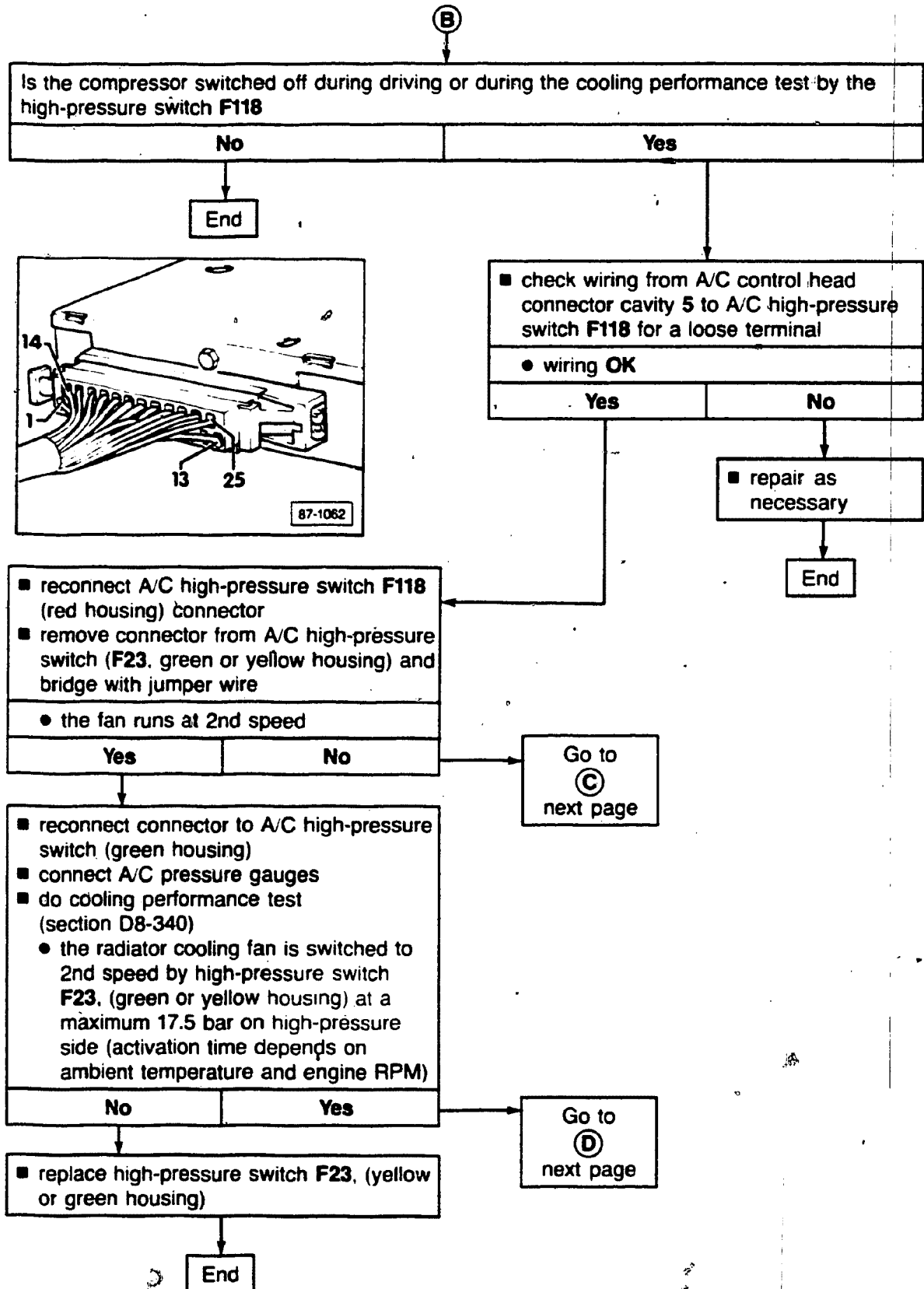
Yes	No
-----	----

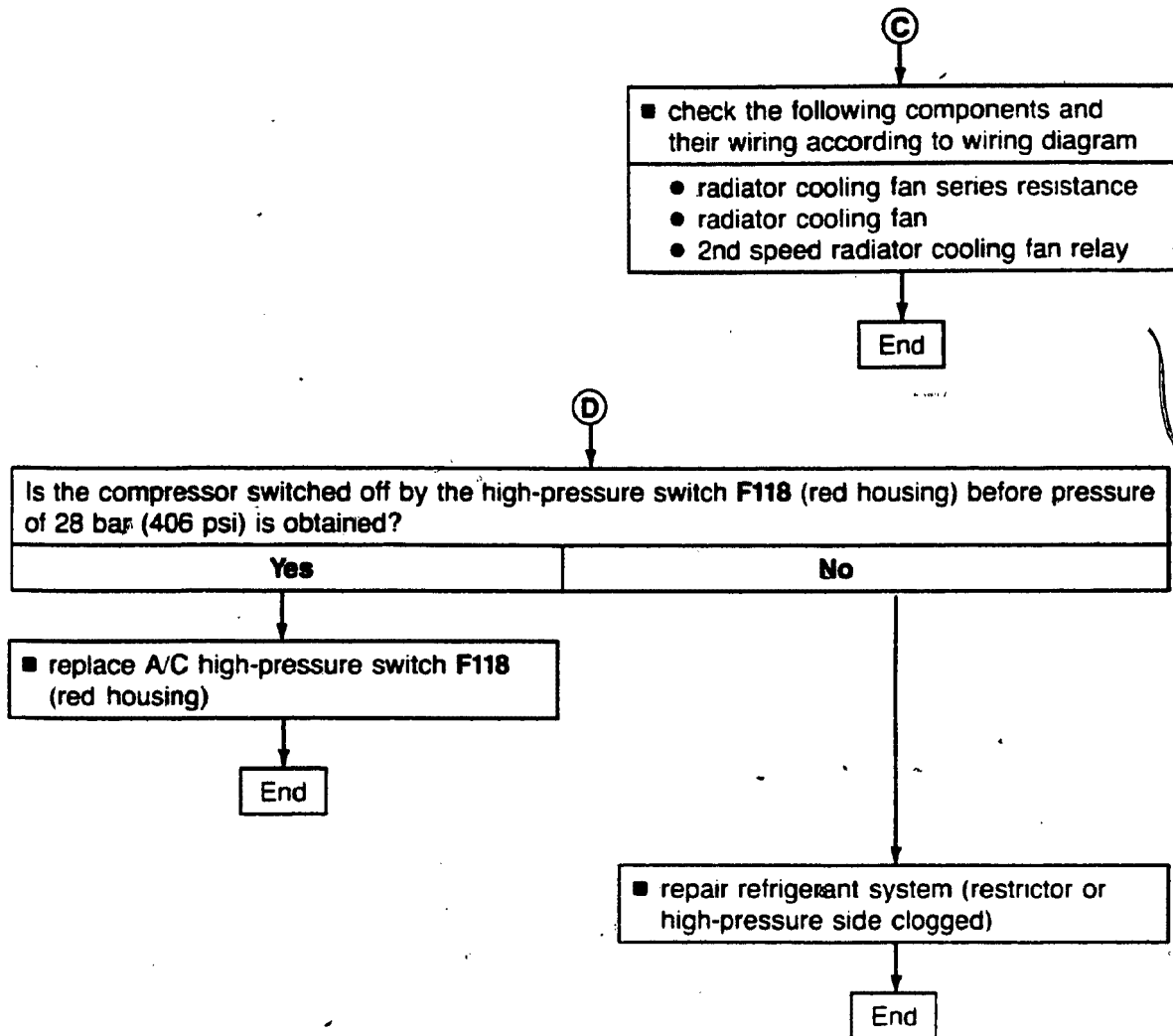
■ replace A/C control head

End

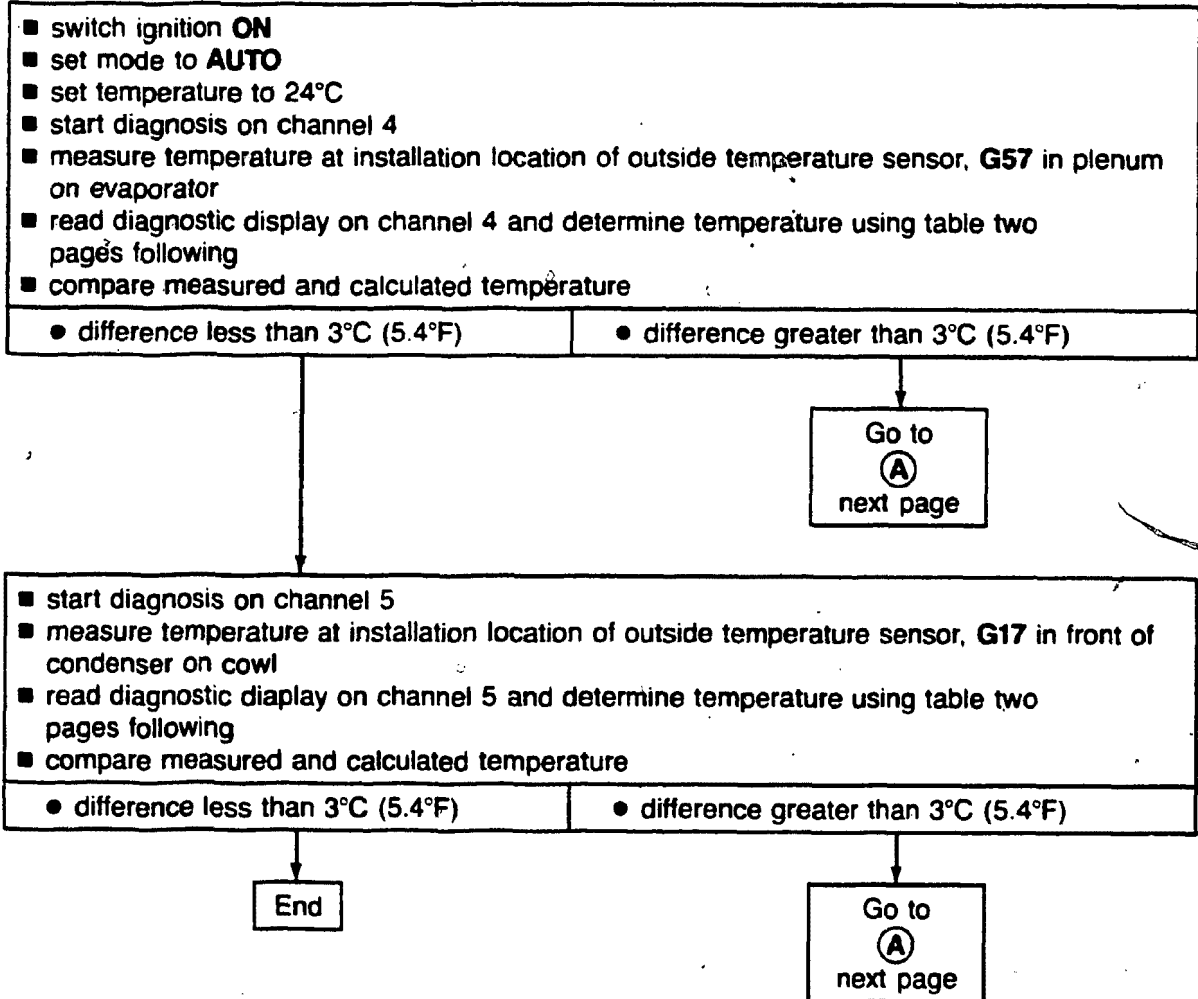
■ repair as necessary

End





Outside temperature sensors (G57, G17), checking

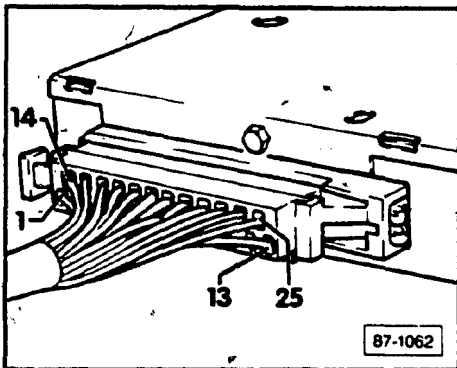


(A)

■ disconnect connector on affected outside temperature sensor, G17 or G57 ■ measure resistance of affected outside temperature sensor and calculate temperature using table on next page ■ measure temperature at installation location of affected outside temperature sensor ■ compare measured and calculated temperature	
● difference greater than 3°C (5.4°F)	● difference less than 3°C (5.4°F)

■ replace affected outside temperature sensor

End



■ check wiring from A/C control head connector cavities 6 and 1 or 16 and 1 for open or shorted circuits to sensors G57 or G17 respectively.

Note

Wire from cavity 6 goes to outside temperature sensor in plenum near evaporator.

Wire from cavity 16 goes to outside temperature sensor in cowl near condenser

● wiring OK

Yes

No

■ replace A/C control head

End

■ repair as necessary

End

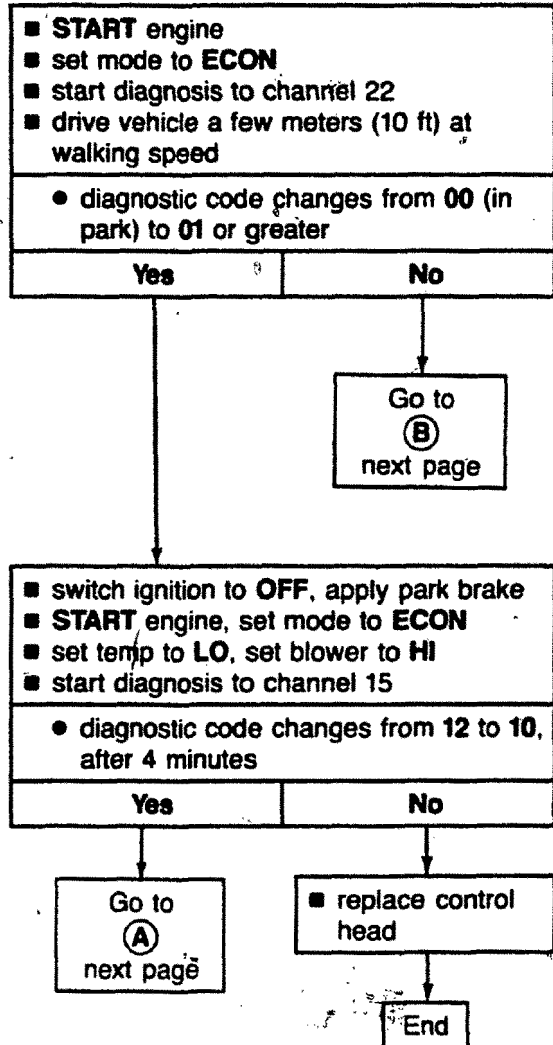
Resistance value of outside temperature sensors

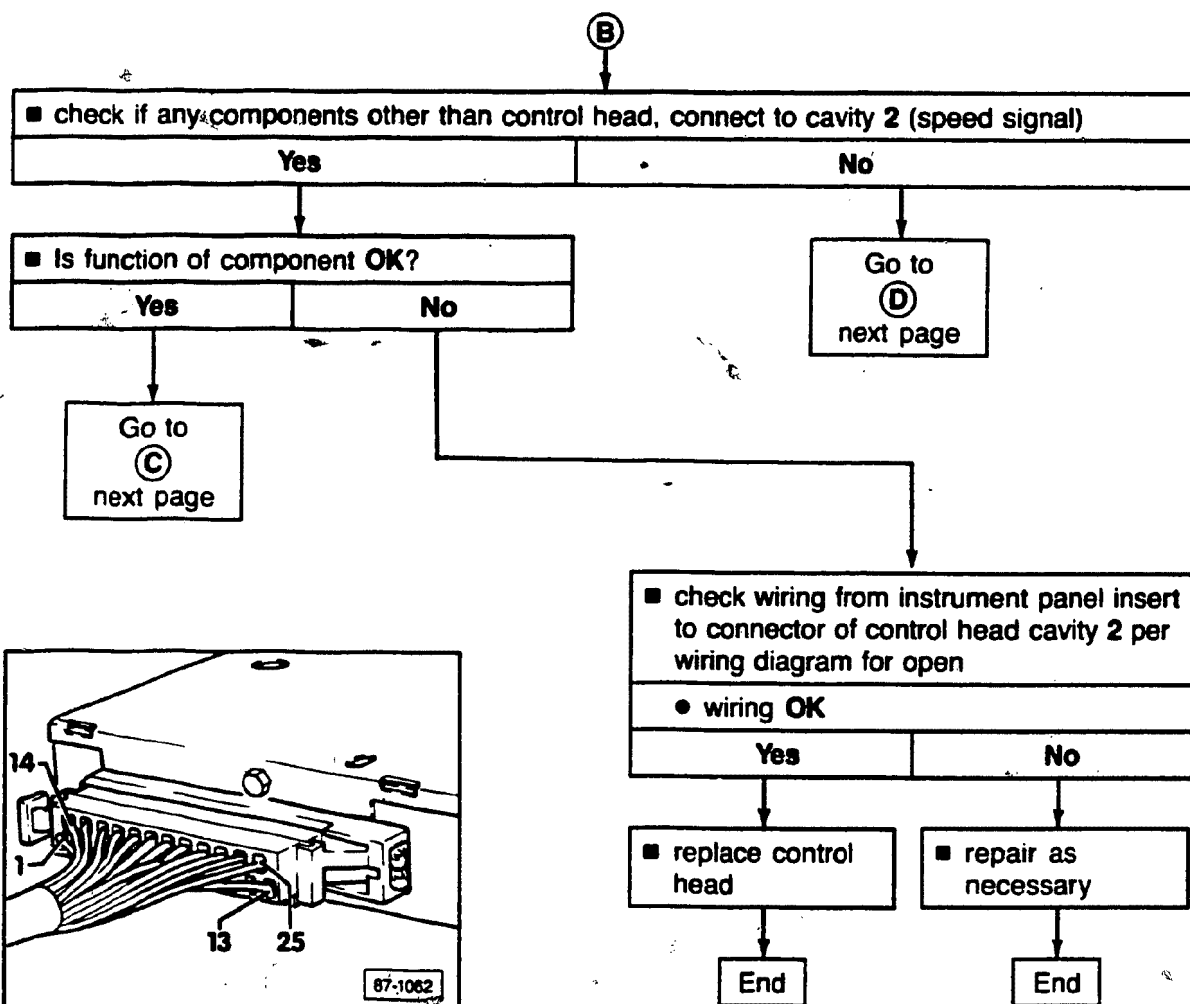
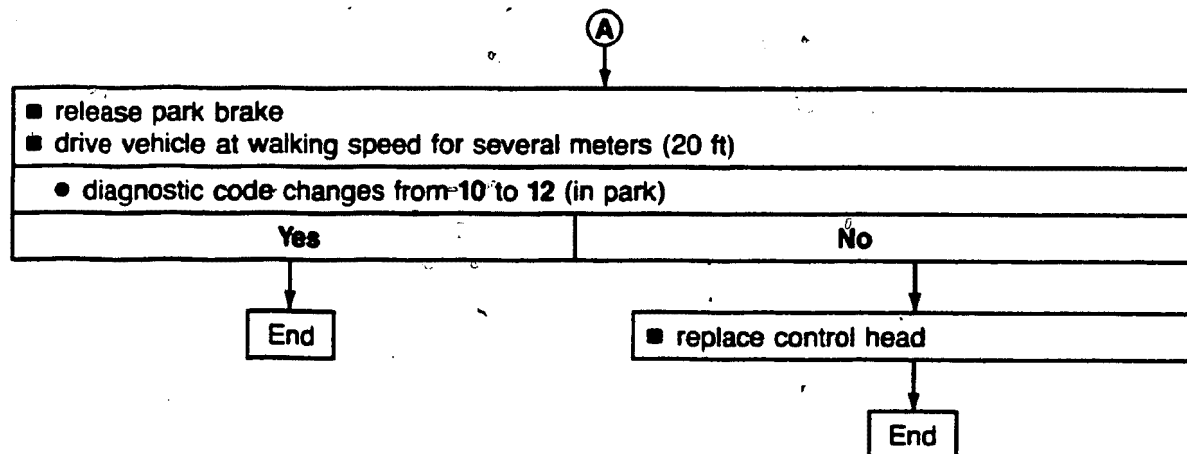
Outside temperature in °C (°F) at installation location	Diagnostic display Diagnostic channel 4 and 5	Resistance value of outside temperature sensor (ohms)
- 10 (14)	188	5636
- 8 (18)	183	5097
- 6 (21)	177	4558
- 4 (25)	171	4088
- 2 (28)	165	3688
0 (32)	159	3288
2 (36)	153	2992
4 (39)	146	2697
6 (43)	140	2439
8 (46)	134	2216
10 (50)	127	1995
12 (54)	122	1826
14 (57)	116	1657
16 (61)	110	1508
18 (64)	104	1379
20 (68)	98	1250
22 (72)	93	1150
24 (75)	88	1050
26 (79)	83	961
28 (82)	78	883
30 (86)	73	805
32 (90)	69	744
34 (93)	65	683
36 (97)	61	628
38 (100)	57	580
40 (104)	54	532
42 (108)	50	493
44 (111)	47	455
46 (115)	44	421
48 (118)	42	390
50 (122)	39	360
52 (126)	37	335
54 (129)	34	311
56 (133)	32	289
58 (136)	30	269
60 (140)	28	249

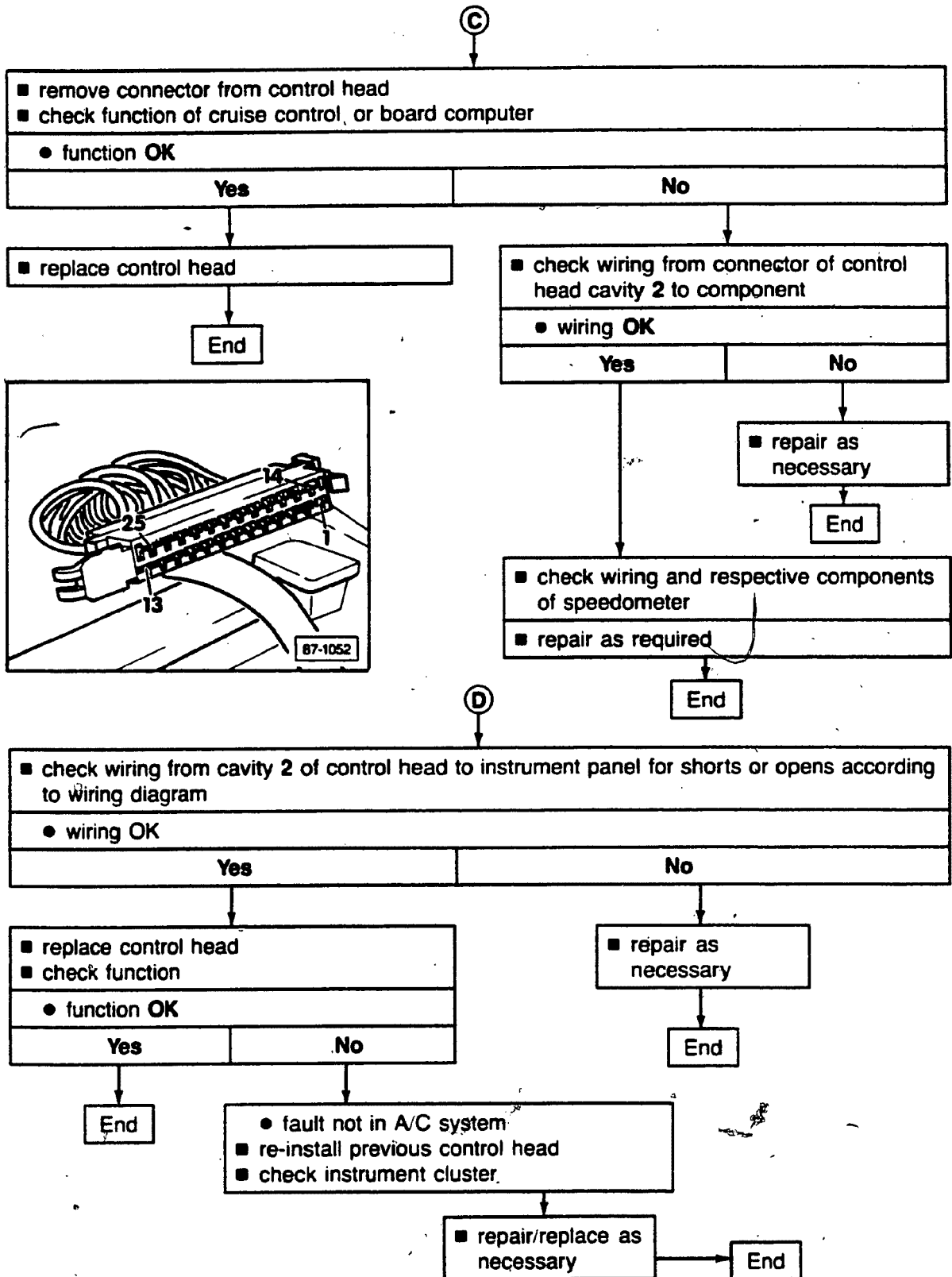
Speed dependent blower control, checking

Note

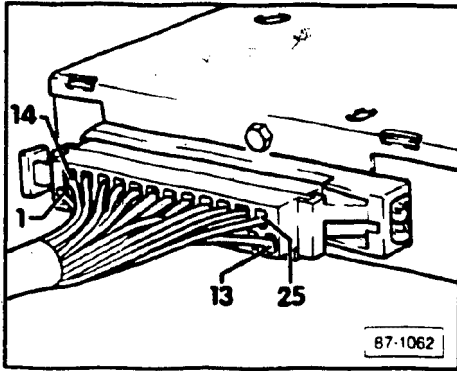
Control head limits maximum fresh air blower speed from speedometer signal, and/or lack of speedometer signal; approximately 4 minutes after ignition is switched ON.







Electrical system voltage display, checking



- switch ignition **ON**
 - set mode to **AUTO**
 - start diagnosis on channel 11
 - measure voltage between cavities 19 and 7 on A/C control head connector
- | | |
|-------------------|----------------|
| ● greater than 5V | ● less than 5V |
|-------------------|----------------|

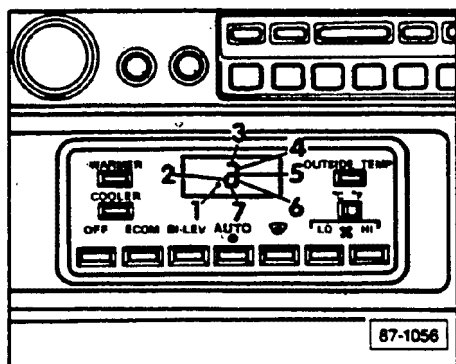
Go to section
D8-270 (check low-
pressure switch)

- | | |
|---|---------------------|
| ■ difference between displayed and measured voltage | |
| ● less than 1.5V | ● greater than 1.5V |

End

- replace A/C control head

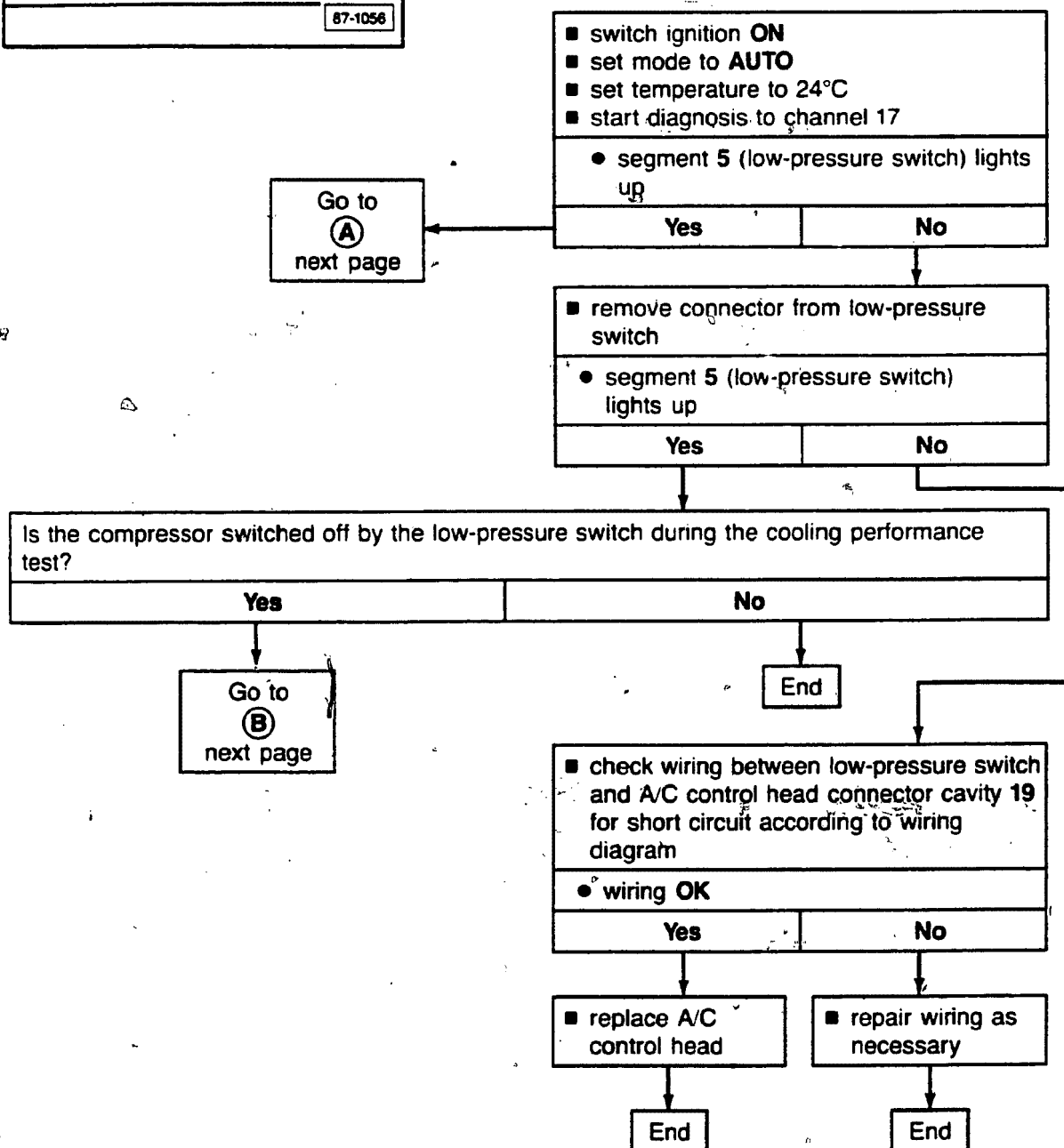
End

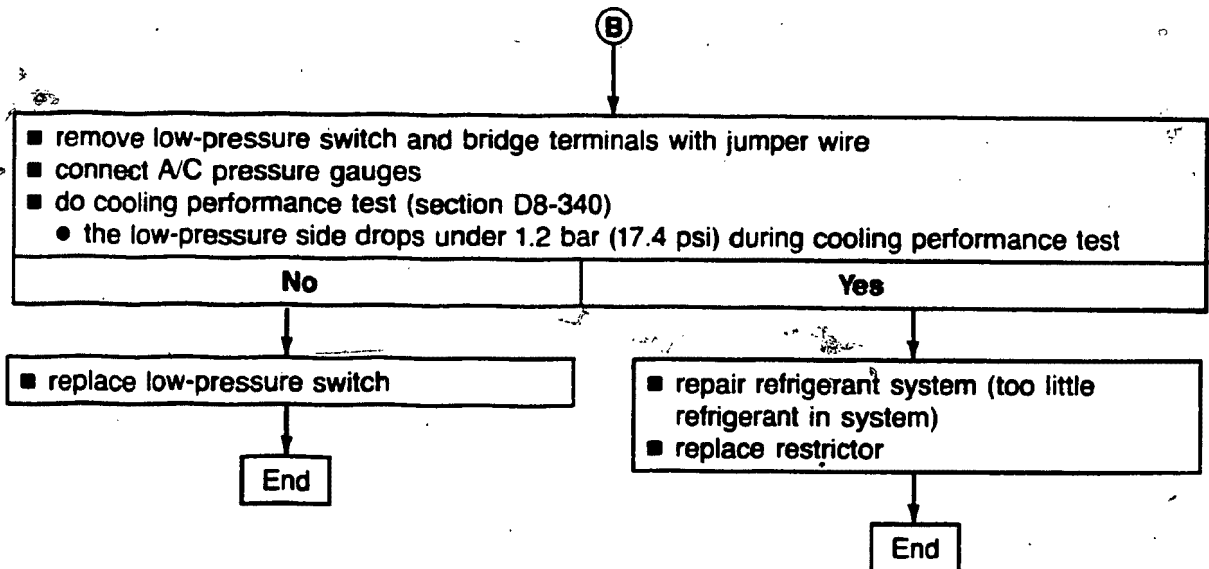
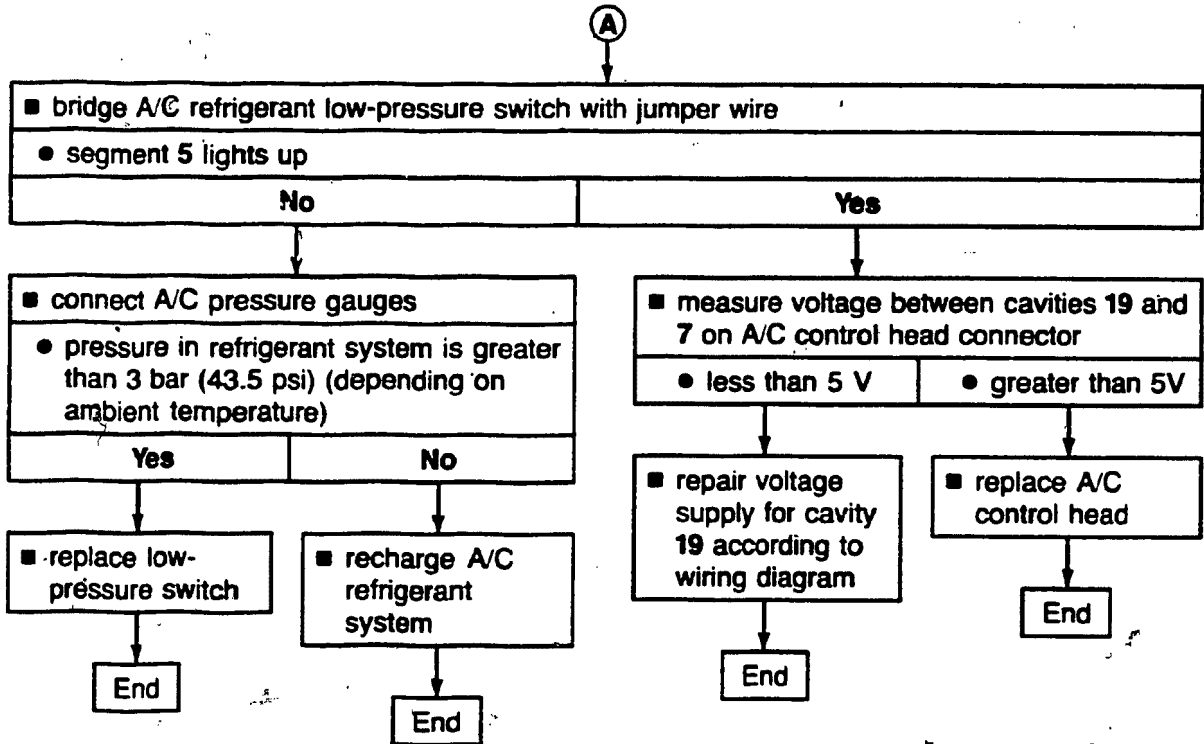


A/C refrigerant low-pressure switch (F73), checking

Note

The A/C refrigerant low-pressure switch shuts off the A/C compressor when refrigerant pressure is low.



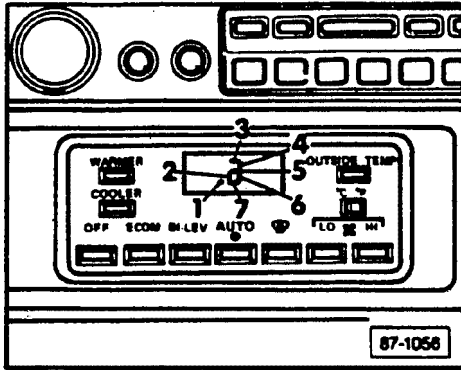


Kick-down switch F46, checking

Note

Kick-down switch **F46** is not installed in all vehicles with automatic transmission.

The A/C compressor is switched off for 12 seconds when kick-down switch **F46** is closed.



- switch ignition **ON**
- set mode to **AUTO**
- set temperature to 24°C
- start diagnosis to channel 17

- segment 6 (kick-down switch) lights up

No

Yes

Go to
(A)
next page

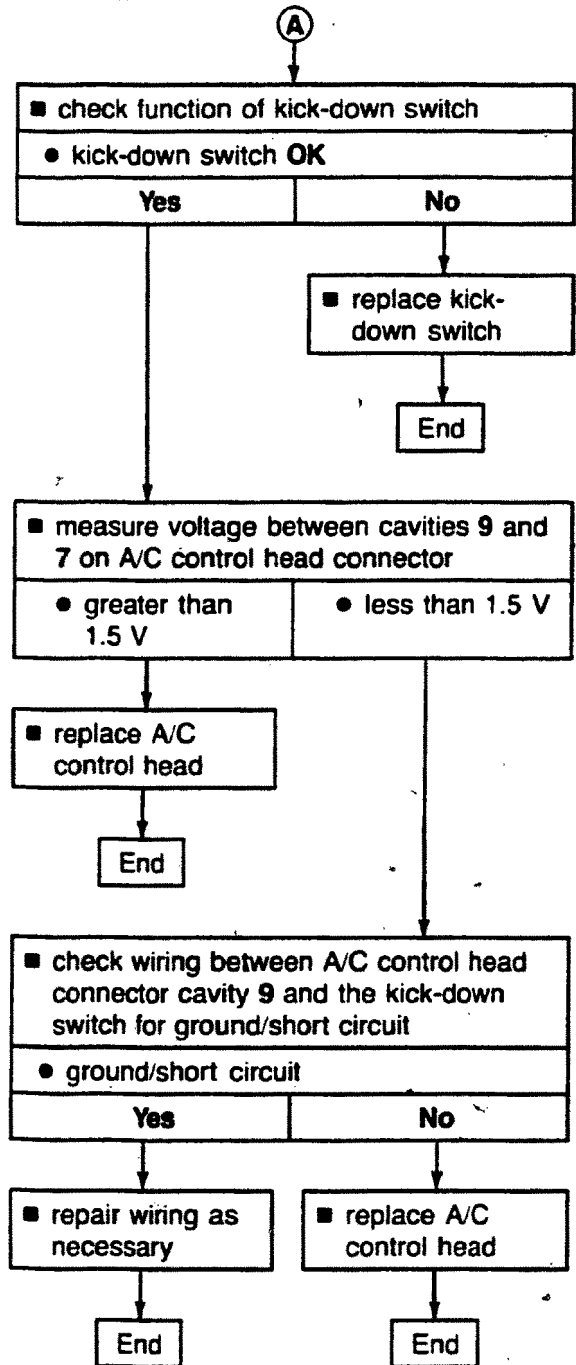
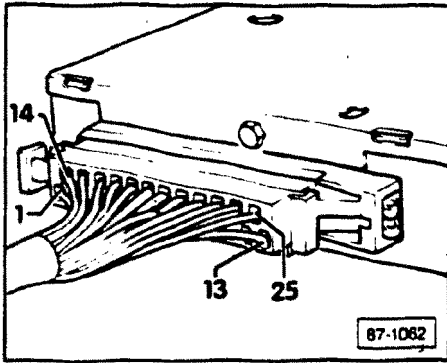
- depress accelerator pedal
- segment 6 (kick-down switch) lights up

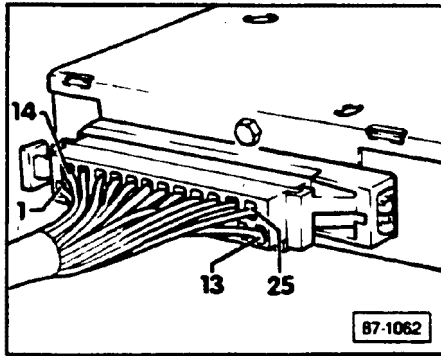
Yes

No

End

Go to
(B)
two pages
following





■ check function of kick-down switch ● kick-down switch OK	
Yes	No

■ replace kick-down switch

End

■ check wiring from A/C control head connector to kick-down switch for short circuit ● short circuit	
Yes	No

■ repair as necessary

End

■ replace A/C control head

End

■ release accelerator pedal (kick-down switch opens) ■ measure voltage between cavities 9 and 7 on A/C control head connector	
● less than 1.5 V	● greater than 1.5 V

■ depress accelerator pedal (kick-down switch closes) ■ measure voltage between cavities 9 and 7 on A/C control head connector	
● less than 1.5V	● greater than 1.5V

■ replace A/C control head

End

■ check kick-down switch function ● kick-down switch OK	
Yes	No

■ check wiring to kick-down switch for short circuit according to wiring diagram, repair as necessary

End

■ replace kick-down switch

End

Kick-down function, checking

The A/C compressor is switched off for 12 seconds when kick-down function is activated.

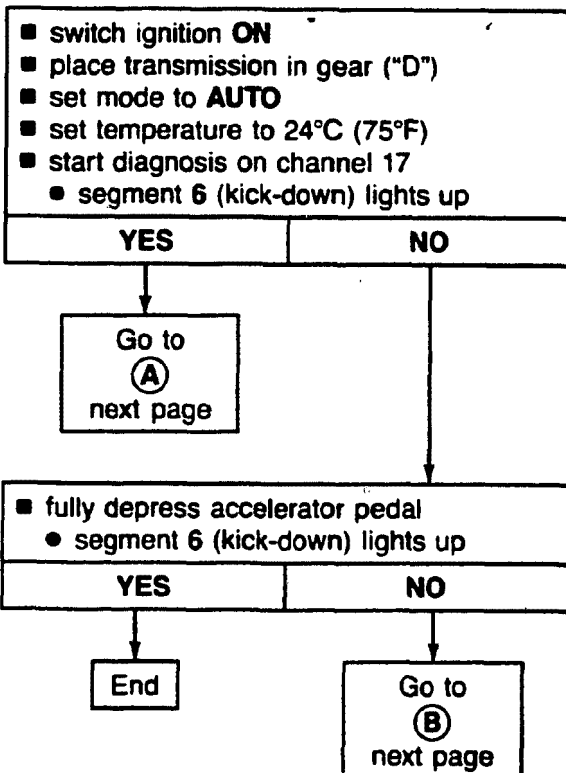
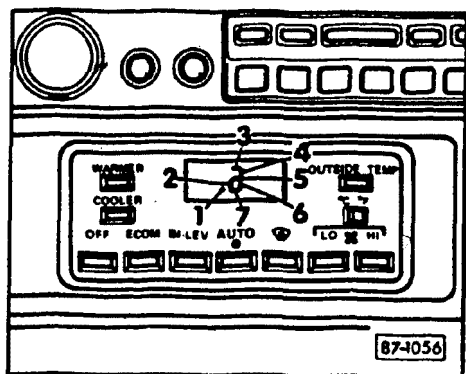
A/C kick-down is controlled by:

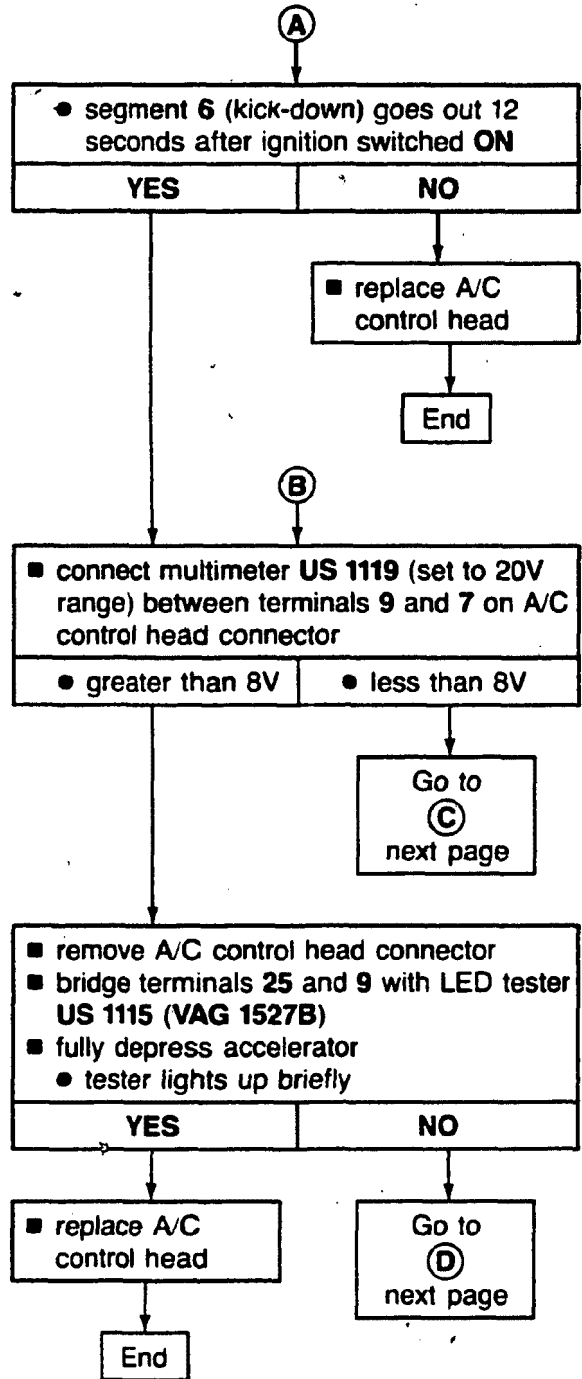
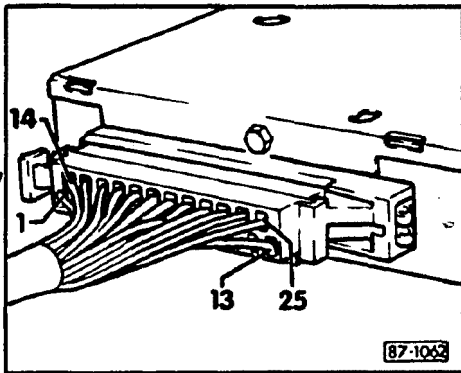
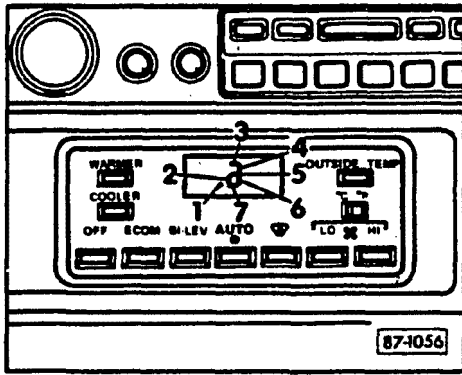
- A/C kick-down switch, **F46** on vehicles with 3-speed automatic transmission
- automatic transmission control unit, **J217** on vehicles with 4-speed automatic transmission

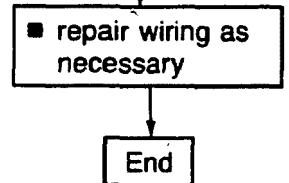
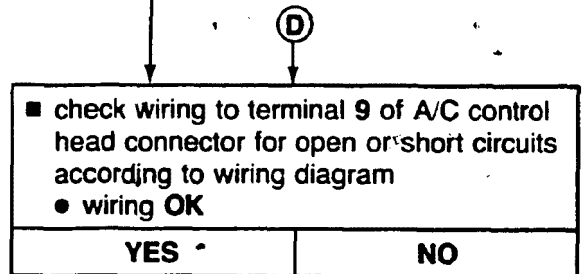
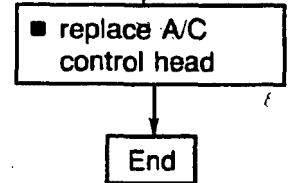
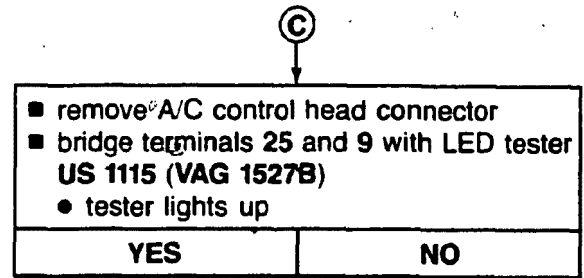
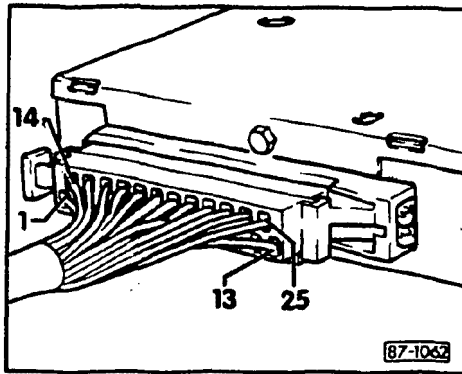
Note

Some vehicles with 3-speed automatic transmissions may not have the A/C kick-down switch installed, see wiring diagram.

On 90 Quattro 20V and Coupe Quattro 20V, the A/C compressor clutch can be switched off via the Multi-point injection control unit, **J192** and the A/C compressor clutch control unit, **J153**. A/C compressor clutch shut-off via these two components is not recognized by the A/C control head, **E87**.







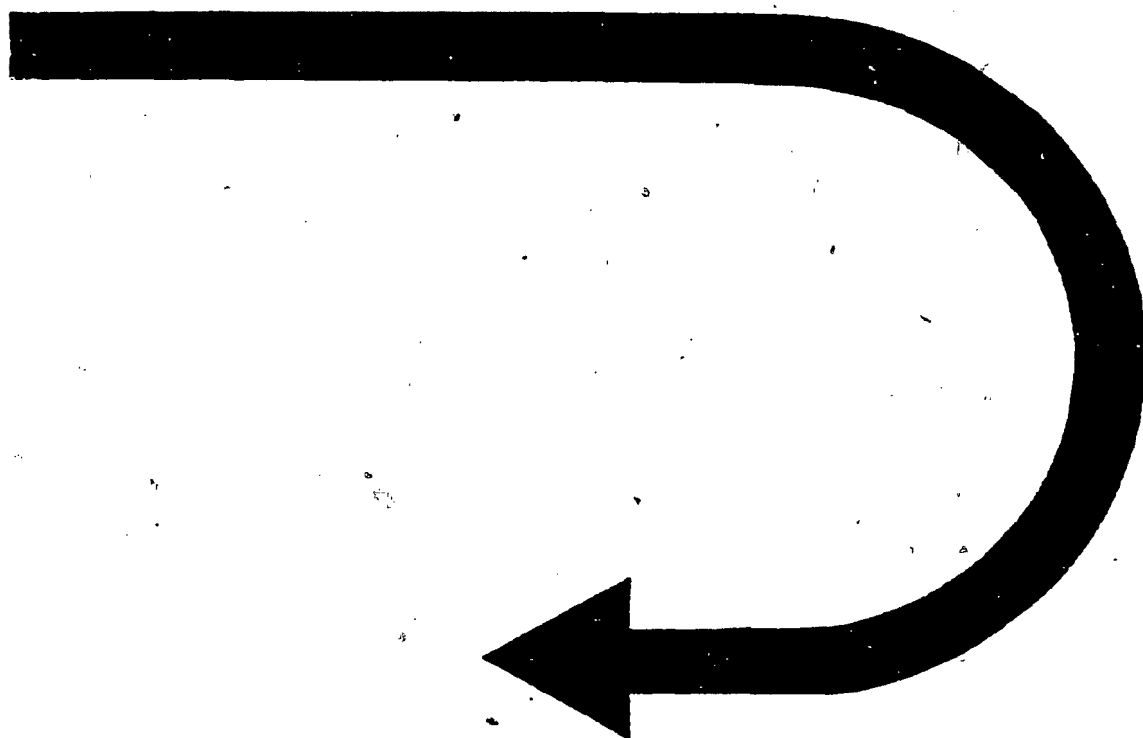
vehicles with 3-speed automatic transmission	vehicles with 4-speed automatic transmission
■ check kick-down switch, F46 and wiring to switch according to wiring diagram ■ repair as necessary	● fault not in area of climate control ■ check automatic transmission control unit, J217 — See Repair Group D3

End

End

C

CONTINUED IN THE
BEGINNING OF NEXT ROW

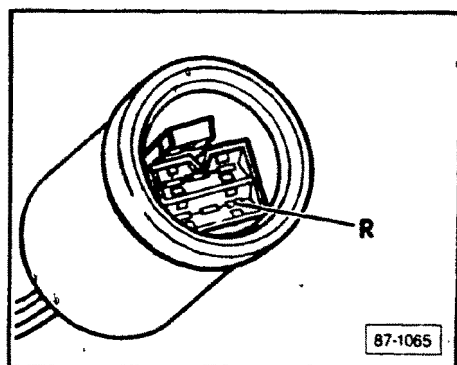
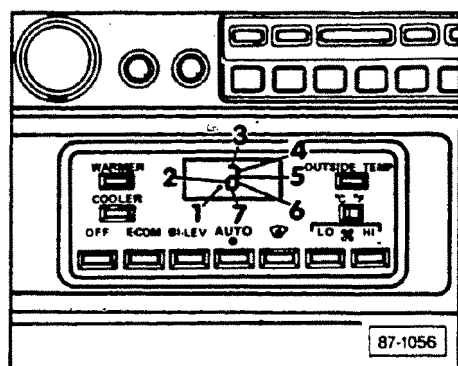


Electronic thermoswitch (multi-function temperature sensor) F76, checking

Do Not attempt to test switch by alternative method.

Note

Test does not apply to 4-cylinder engines with coolant temperature sensor **F14**.



- switch ignition ON - set mode to AUTO - set temperature to 24°C - start diagnosis on channel 17	
segment 7 (hot light switch) lights up	
Yes	No

Go to
(A)
next page

- remove connector from thermoswitch - connect terminal R to ground with jumper cable	
segment 7 lights up	
Yes	No

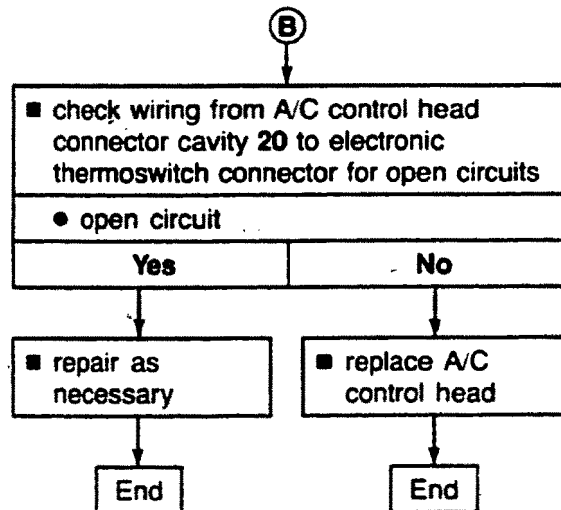
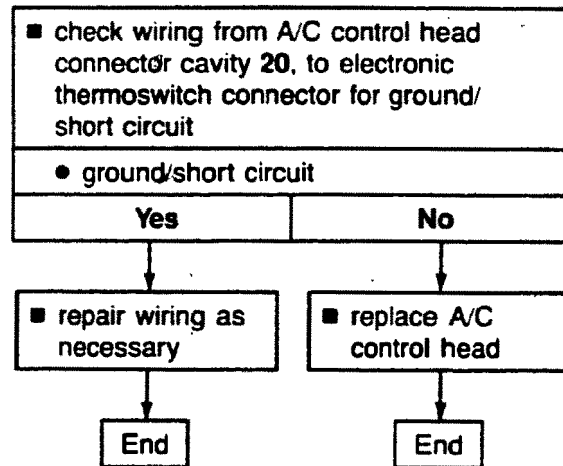
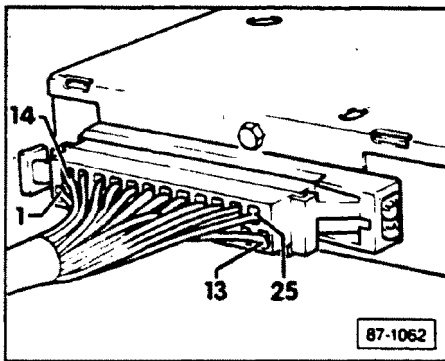
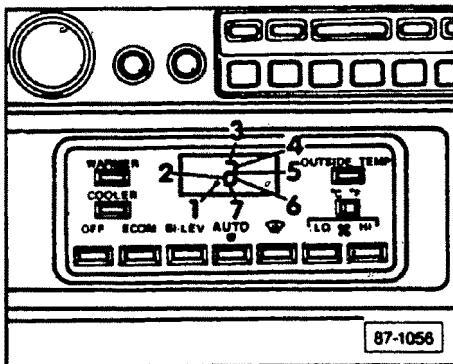
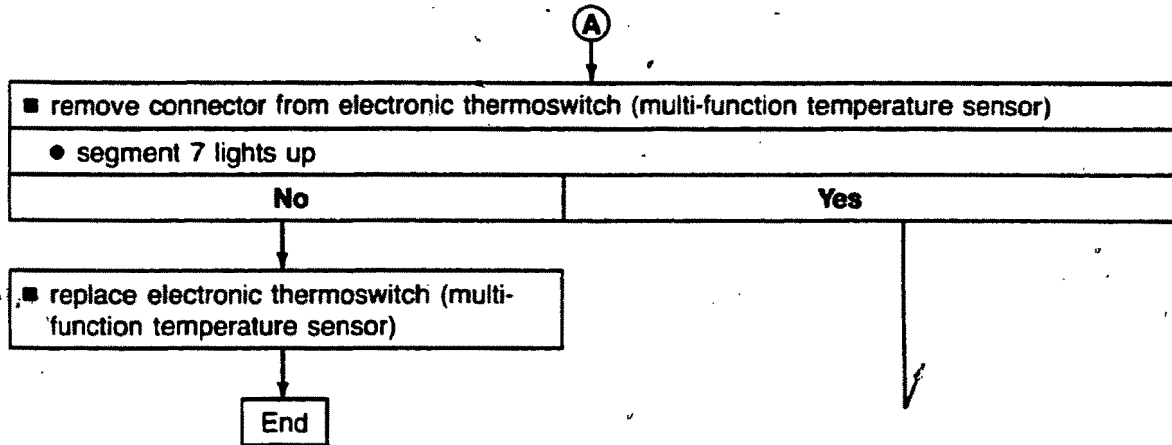
Go to
(B)
next page

- check engine cooling system and radiator cooling fan control
- replace electronic thermoswitch (multi-function temperature sensor) if necessary

End

Is the A/C compressor switched off by the electronic thermoswitch (multi-function temperature sensor) during driving or during the cooling performance test?	
Yes	No

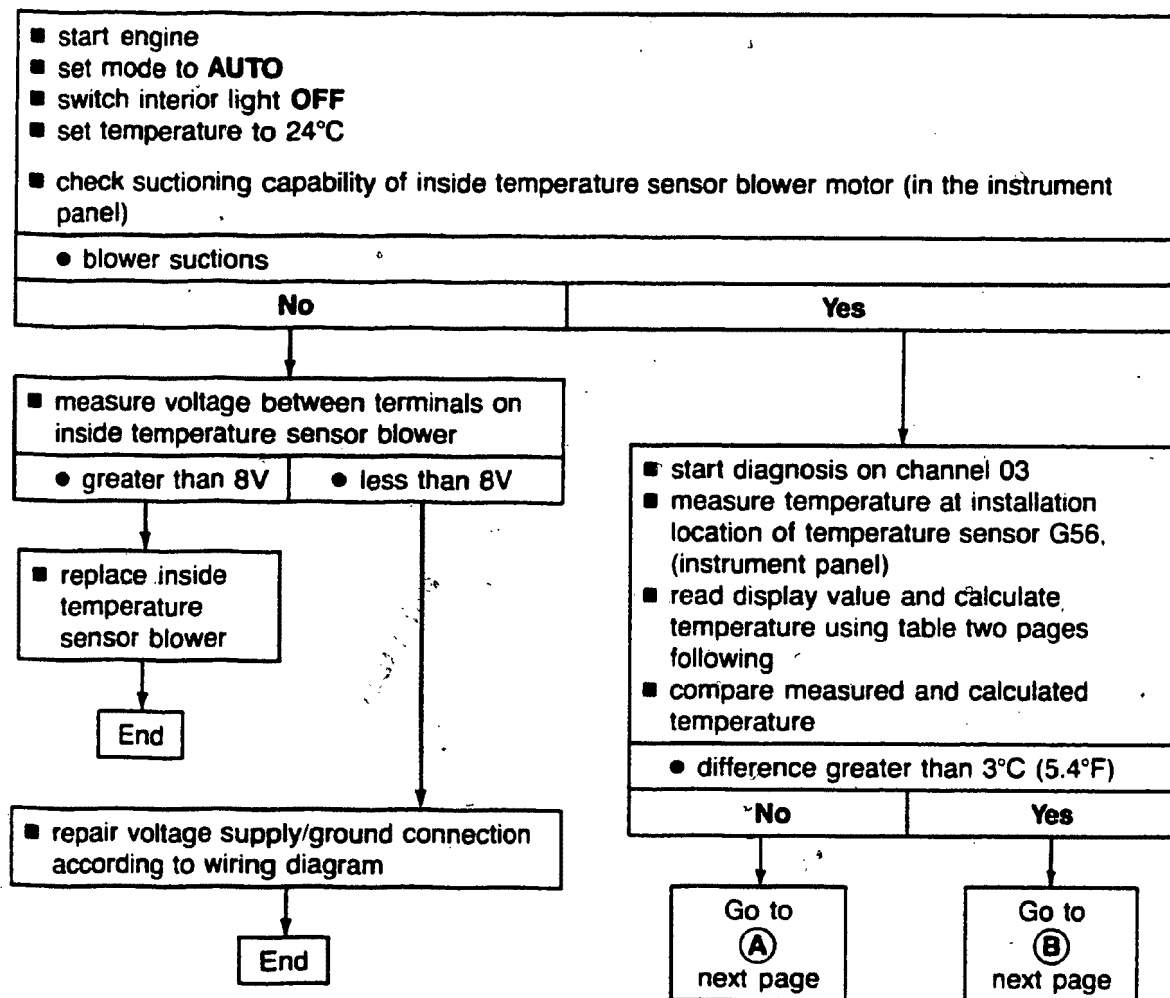
End

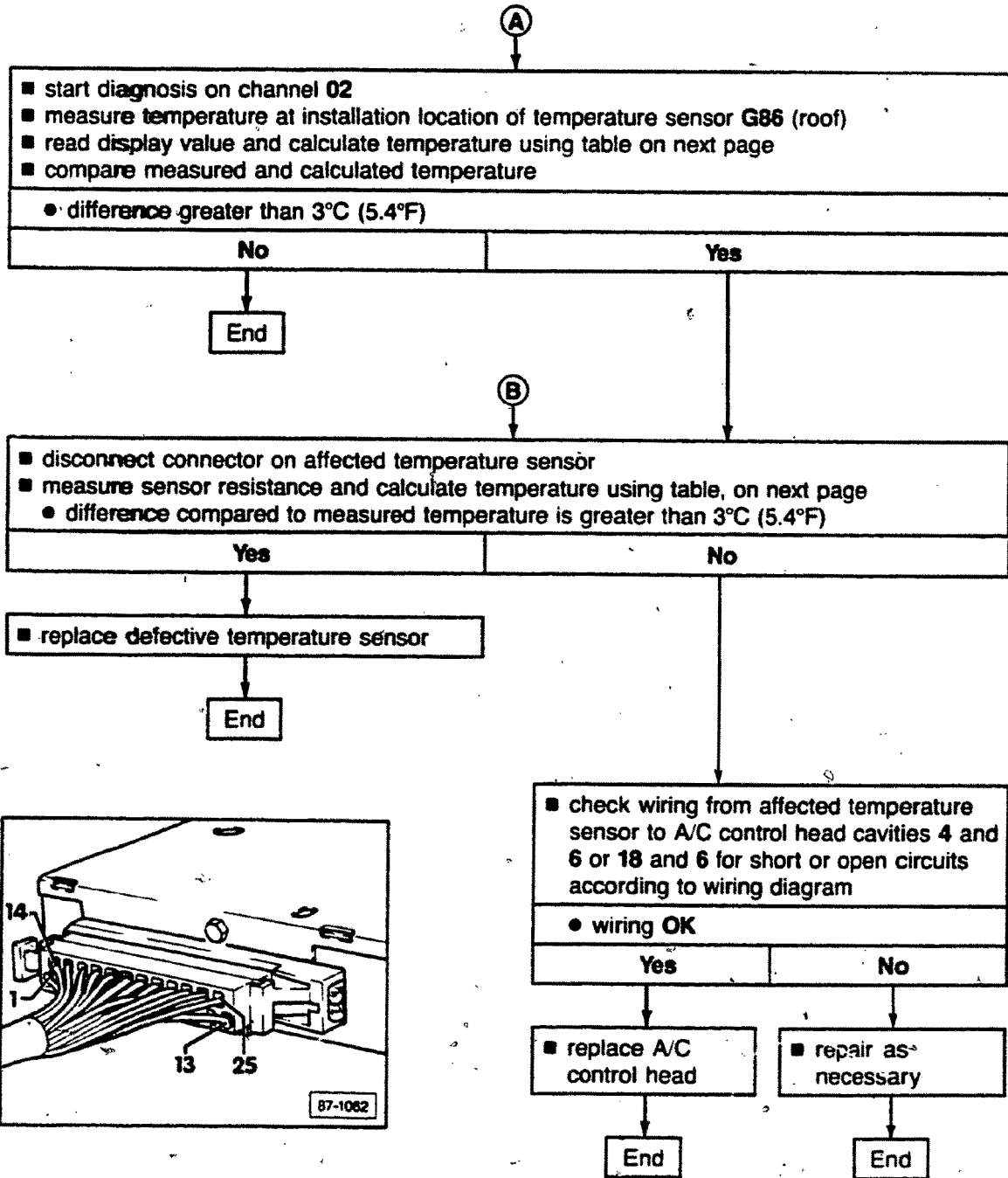


Inside temperature sensors (G56, G86), checking

Note

The measurement value of the temperature sensor can deviate significantly from the ambient temperature because of the temperature increase at the installation location. The comparable inside temperature is always to be measured at the installation location of the sensor.





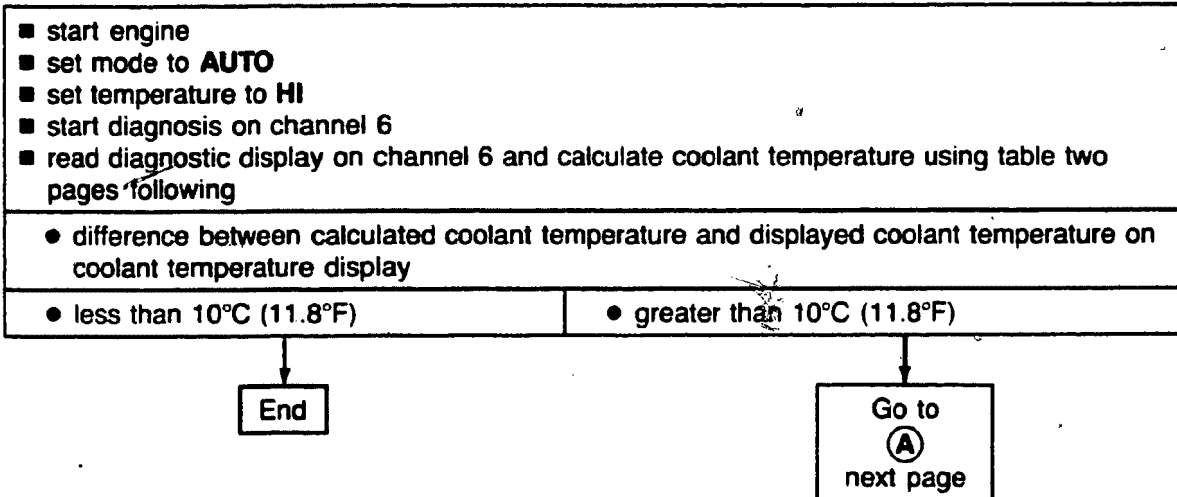
Resistance value of interior temperature sensors, G56 and G86

Inside temperature in °C (°F) at installation location	Diagnostic display Diagnostic channel 2 and 3	Resistance value of inside temperature sensor (ohms)
4 (39)	187	7699
6 (43)	182	6951
8 (46)	177	6308
10 (50)	171	5666
12 (54)	166	5178
14 (57)	160	4690
16 (61)	154	4259
18 (64)	148	3886
20 (68)	142	3513
22 (72)	137	3225
24 (75)	131	2938
26 (79)	125	2683
28 (82)	119	2460
30 (86)	113	2237
32 (90)	108	2062
34 (93)	103	1888
36 (97)	97	1732
38 (100)	92	1595
40 (104)	87	1459
42 (108)	83	1350
44 (111)	78	1242
46 (115)	74	1144
48 (118)	70	1058
50 (122)	65	972

Engine coolant temperature sensor G62, checking

Note

The engine coolant temperature sensor is not installed in all vehicles (to be phased in). For vehicles without coolant temperature sensor, diagnostic display on channel 6 255 = open circuit.



Ⓐ

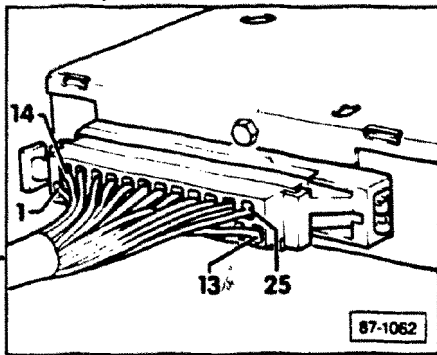
- remove connector on engine coolant temperature sensor, G62
- measure resistance of coolant temperature sensor and calculate coolant temperature using table on next page
- compare calculated coolant temperature with coolant temperature display (diagnosis channel 6)

● difference greater than 10°C (11.8°F)

● difference less than 10°C (11.8°F)

- replace engine coolant temperature sensor

End



- check wiring from A/C control head connector cavities 6 and 17 to coolant temperature sensor for excessive resistance and open or short circuits

● wiring OK

Yes

No

- replace A/C control head

End

- repair as necessary

End

Resistance value of coolant temperature sensor, G62

Coolant temperature in °C (°F) at installation location	Diagnostic display (Diagnostic channel 6)	Resistance value of coolant temperature sensor (ohms)
-20 (-4)	243	14700
-10 (14)	236	9200
0 (32)	225	5600
5 (41)	219	4635
10 (50)	212	3670
15 (59)	205	3060
20 (68)	195	2450
25 (77)	187	2060
30 (86)	176	1670
35 (95)	167	1415
40 (104)	155	1160
45 (113)	145	995
50 (122)	134	830
55 (131)	124	715
60 (140)	113	600
65 (149)	104	520
70 (158)	94	440
75 (167)	86	380
80 (176)	76	320
85 (185)	71	281
90 (194)	62	242
95 (203)	57	216
100 (212)	52	190
110 (230)	41	143
120 (248)	33	110
130 (266)	27	90

Idle speed increase (A/C ON), checking RPM increase (compressor ON), checking

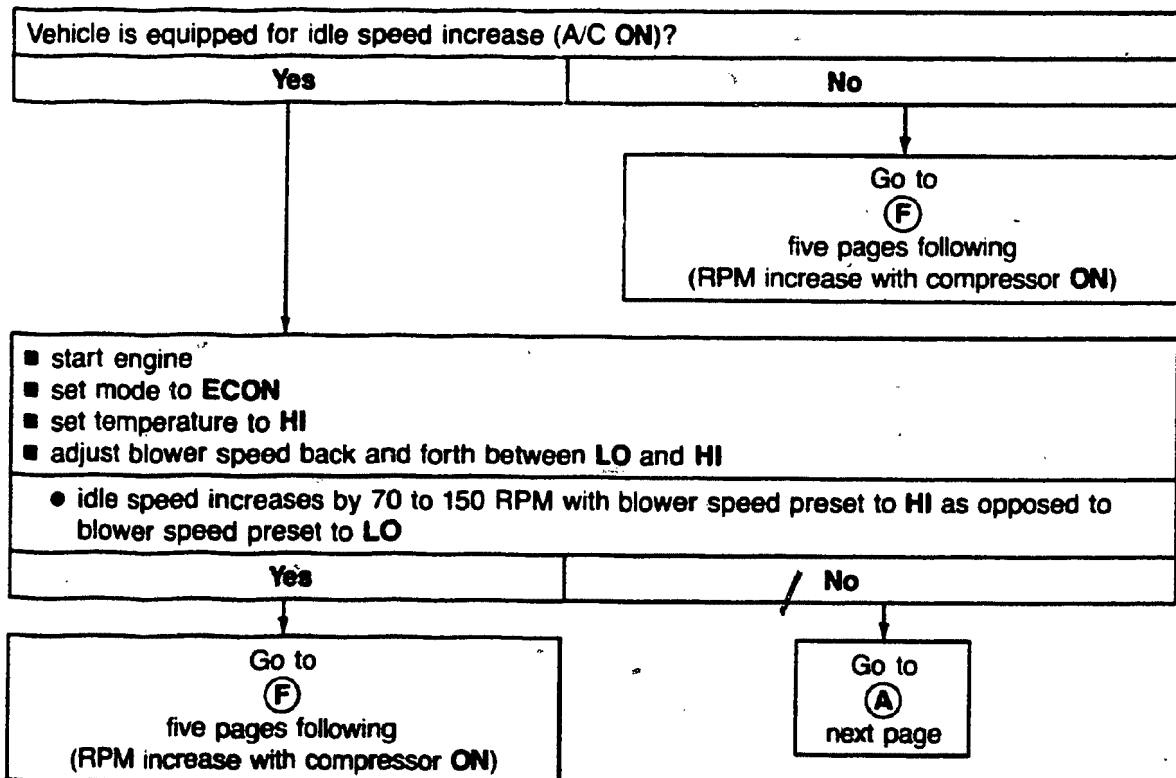
Note

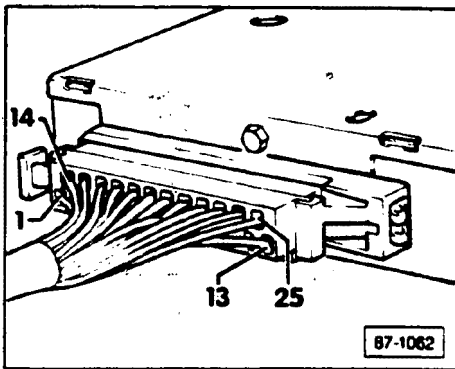
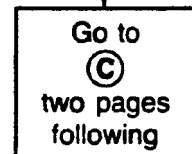
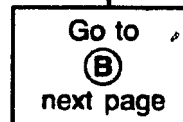
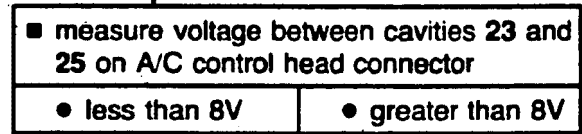
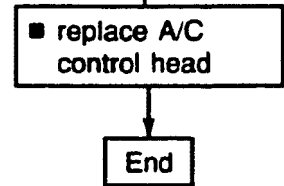
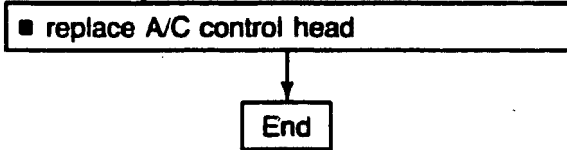
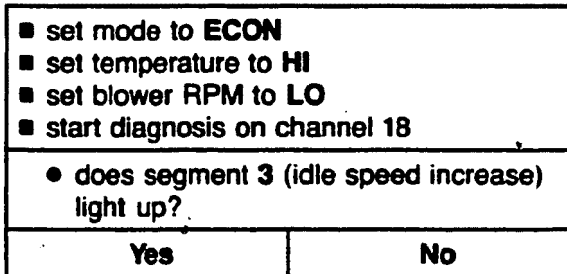
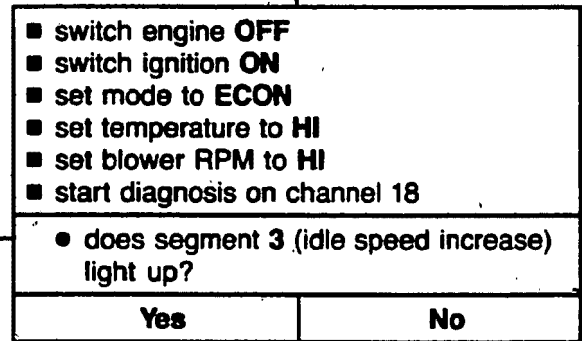
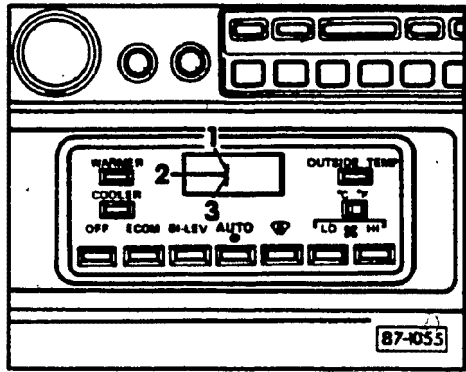
Idle speed increase (A/C ON)
(idle speed increases when A/C is switched ON)

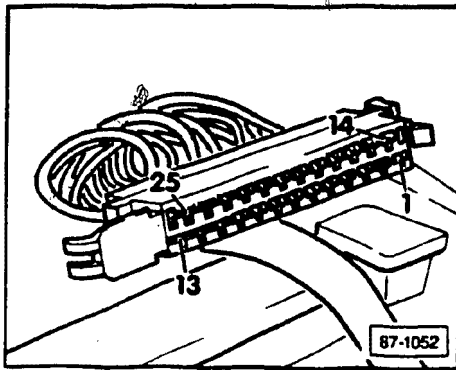
- not for vehicles with CIS-E III fuel injection
- for vehicles with CIS fuel injection (check according to wiring diagram whether vehicle is equipped for idle speed increase)
- idle speed increase occurs in all modes (except OFF), as soon as high heating performance is required and in the **AUTO**, **DEF**, and **BI-LEV** modes, as soon as high cooling performance is required
- idle speed increase does not occur with blower speed set to LO

RPM increase (compressor ON)

- for all vehicles







Ⓑ

- remove A/C control head connector
 - measure current between cavities 23 and 7 on connector
- | | |
|----------------------|-------------------|
| ● greater than 10 mA | ● less than 10 mA |
|----------------------|-------------------|

- check wiring from cavity 23 on A/C control head connector to cavity 6 of idle stabilizer control unit for open or short circuits according to wiring diagram
- | | |
|-------------|-----|
| ● wiring OK | |
| No | Yes |

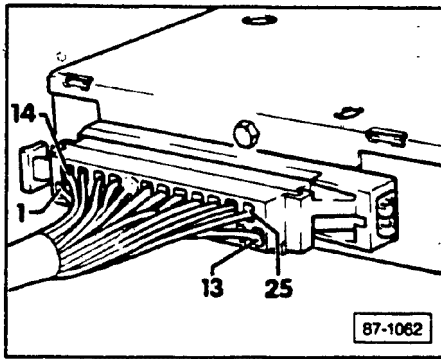
- replace A/C control head

End

Errors not in the area of climate control
(check engine electronics)

- repair as necessary

End



Ⓒ

- set mode to **ECON**
- set temperature to **HI**
- set blower speed to **HI**
- measure voltage between cavities 23 and 25 on A/C control head connector

• less than 3V

• greater than 3V

- check wiring from cavity 23 on A/C control head connector to idle stabilizer control unit cavity 6 for open circuit according to wiring diagram

• open circuit

Yes

No

- repair wiring as necessary

End

Errors not in the area of climate control
(check engine electronics)

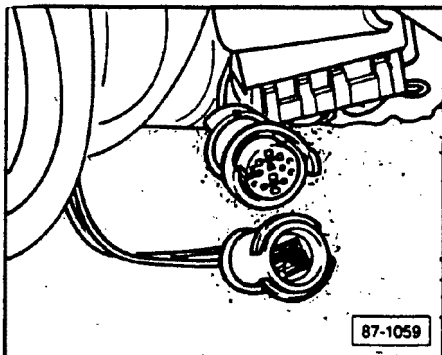
- separate 2-point connector between A/C control head cavity 23 and idle stabilizer control unit
- measure current between cavity 23 of A/C control head and the idle stabilizer control unit at the disconnected connector according to wiring diagram

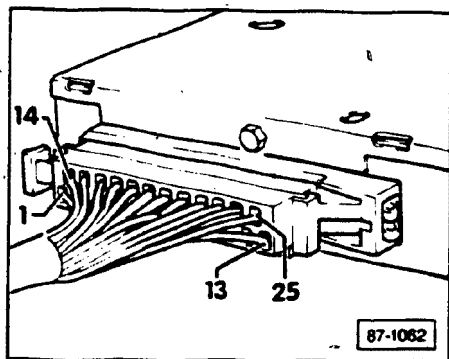
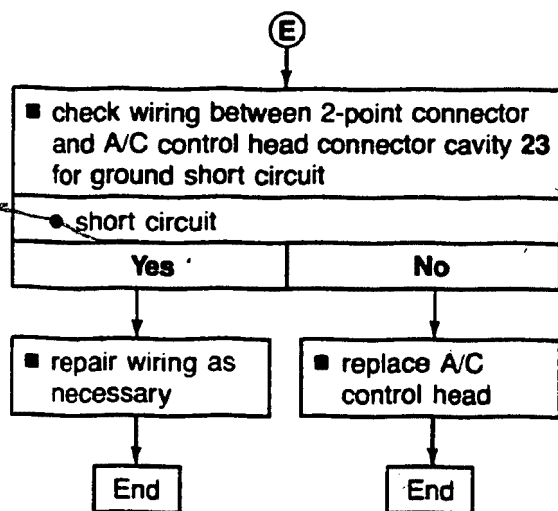
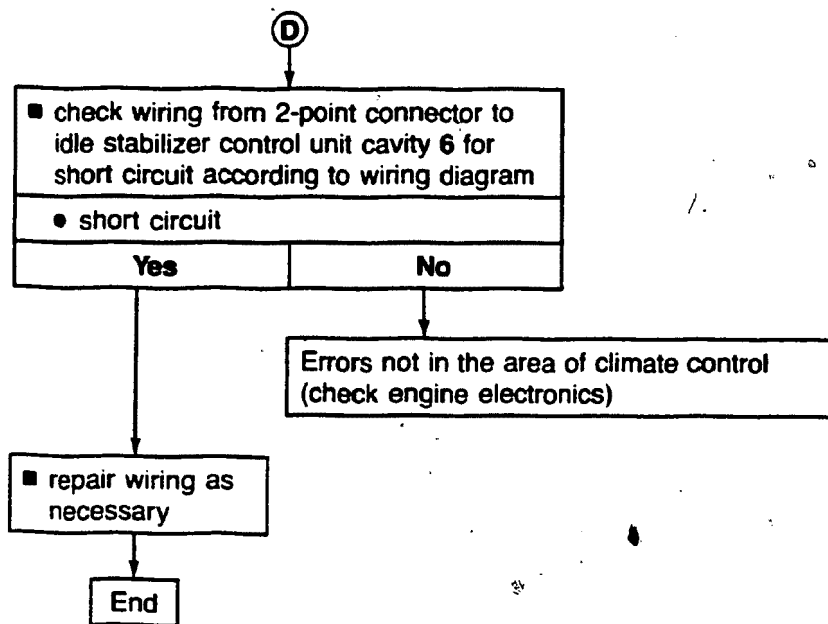
• greater than 3 mA

• less than 3 mA

Go to
Ⓓ
next page

Go to
Ⓔ
next page





(F)

■ switch ignition ON ■ adjust A/C control head back and forth between AUTO and ECON modes (wait 10 seconds between each change)	
● magnetic clutch clicks	
Yes	No

■ start engine ■ set mode to AUTO ■ set temperature to LO ■ set blower speed to LO	
● RPM increases and decreases as A/C thermostat switches the magnetic clutch ON and OFF	
Yes	No

End

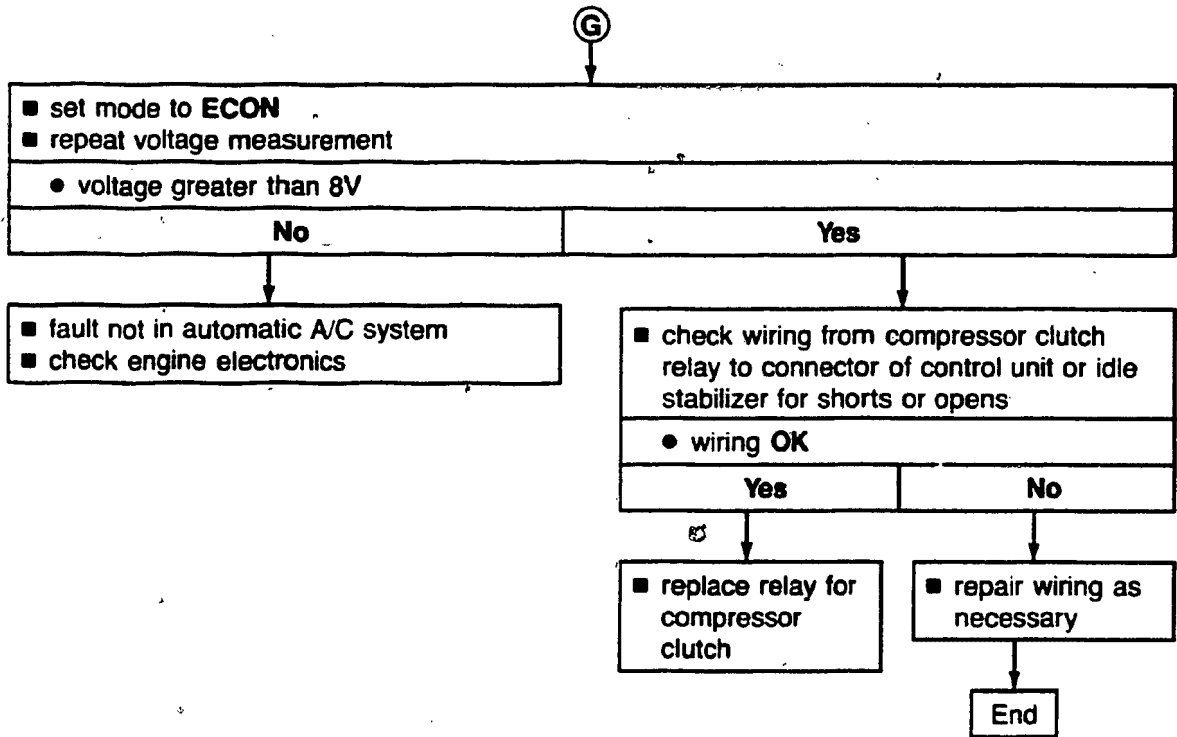
Go to section
D8-120
(compressor does
not run)

■ switch ignition OFF ■ remove connector from fuel injection control unit or idle stabilizer control unit (depending on vehicle) ■ switch ignition ON ■ set mode to AUTO	
On vehicles with CIS-E-III fuel injection ■ measure voltage at cavity 33 to ground	
or	
On vehicles with CIS fuel injection ■ measure voltage at cavity 2 to ground	
● greater than 8V	● less than 8V

Go to
(G)
next page

■ repair wiring as necessary

End



A/C cooling performance, checking

Note

Before each new test sequence

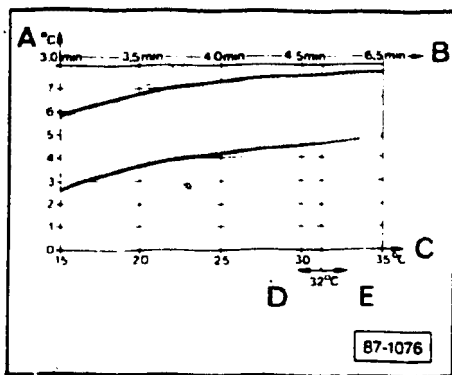
- switch ignition **OFF**
- start engine
- set mode to **ECON**
- set temperature to **LO**
- set blower to **HI**
- run in this condition approximately 5 minutes

Test conditions

- all fuses **OK**
- ambient temperature greater than 15°C (59°F)
- condenser and radiator are clean
- V-belts for compressor and alternator are tightened correctly
- all air ducts, covers and seals are **OK** and correctly installed
- vehicle is not exposed to direct sun
- engine warm

With engine running

- set mode to **AUTO**
- set temperature to **LO**
- set blower speed to **HI**
- open instrument panel outlets:
 - compressor is driven or switches **ON**
 - fresh air blower runs
 - radiator cooling fan runs
 - recirculation/fresh air flap goes into "recirculation" position after 1 minute
 - water valve for heating is closed
 - evaporator, heater, and connecting piece between heater and evaporator do not draw any secondary air
 - air comes out of the instrument panel outlets
 - temperature flap is in "cooling" position (see section D8-60)

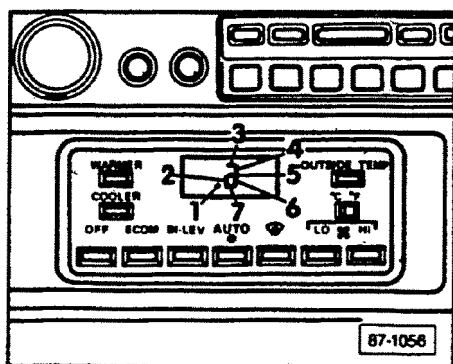
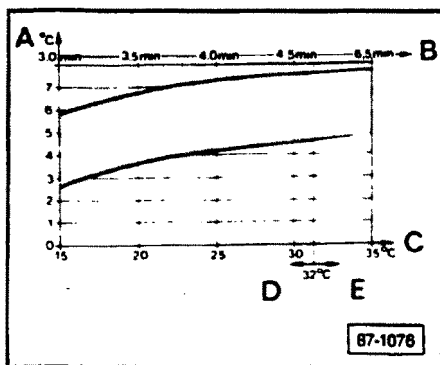


Testing

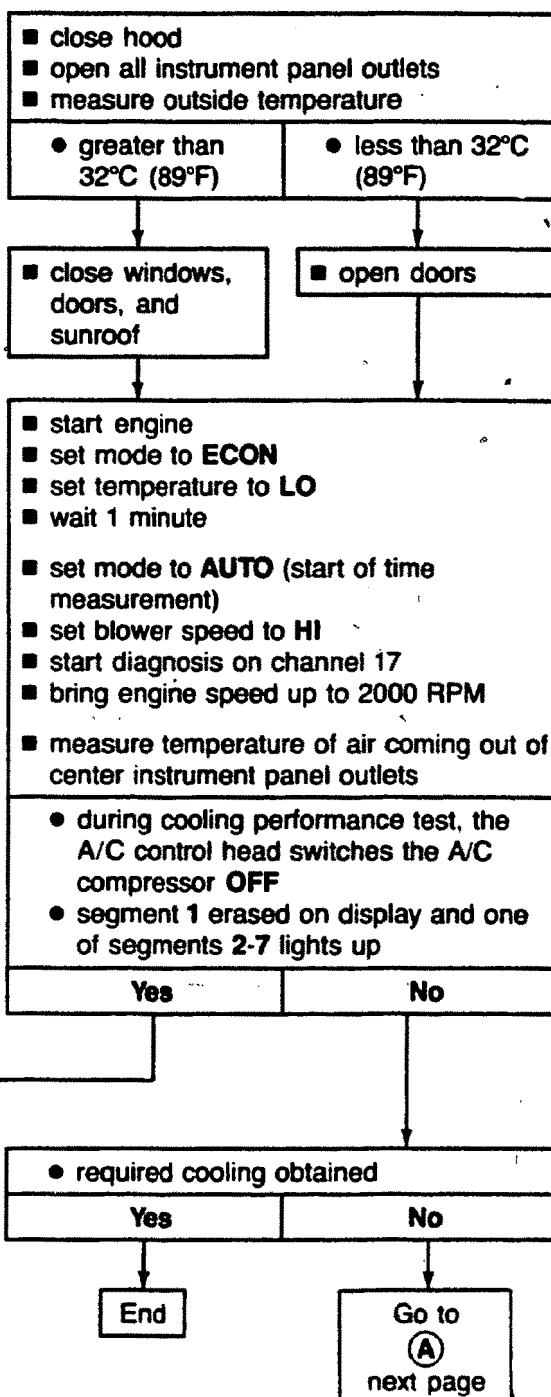
The temperature of the air coming out of the center instrument panel outlets must be within the tolerance and depends on the ambient temperature and cool-down period.

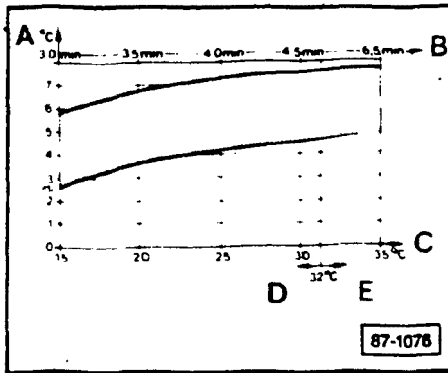
- A — Temperature of air from center instrument panel outlets
- B — Time
- C — Ambient temperature
- D — Doors opened
- E — Doors, windows, and sunroof closed

more



- segment 2 lights up
Go to section D8-230
- segment 3 lights up
Go to section D8-240
- segment 4 lights up
Check electrical system voltage
- segment 5 lights up
Go to section D8-270
- segment 6 lights up
Go to section D8-280 (through 1990 m.y.) or D8-290 (from 1991 m.y.)
- segment 7 lights up
Go to section D8-300





- remove A/C refrigerant high pressure switch (green housing) connector
 - bridge A/C thermostat terminals
 - connect A/C pressure gauges
 - repeat cooling performance test
- the radiator cooling fan is switched to 2nd speed by the high-pressure switch when pressure is maximum 17.5 bar (253.7 psi) (time of activation is a function of ambient temperature and engine speed)
- | | |
|----|-----|
| No | Yes |
|----|-----|

- replace A/C high-pressure switch (green housing)

End

- repair refrigerant system (too little refrigerant in system)
- replace restrictor

A

- switch engine OFF
 - switch ignition ON
 - bridge A/C high-pressure switch (green housing)
- radiator cooling fan runs at 2nd speed
- | | |
|-----|----|
| Yes | No |
|-----|----|

- check the following components and their wiring according to wiring diagram:
 - radiator cooling fan series resistance
 - radiator cooling fan
 - radiator cooling fan 2nd speed relay

- repair/replace as necessary

End

- required cooling performance is achieved
- | | |
|----|-----|
| No | Yes |
|----|-----|

- replace A/C thermostat

End