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### Troubleshooting

#### Note

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

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- does not run at 1st speed in  
AUTO, BI-LEV and DEF modes D8-140
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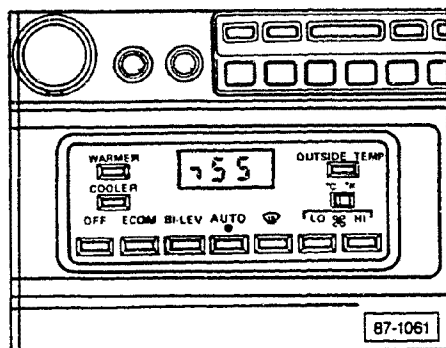
- checking D8-320

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## A/C control head memory display, checking

### Note

Up to August 1988, twenty-one diagnostic channels were available for information output on the A/C control head display. From August 1988, 22 channels are used.

For diagnostic values greater than 199, the first digit 2 is represented as a horizontal and vertical line.

For example, 255 is shown on illustration.

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

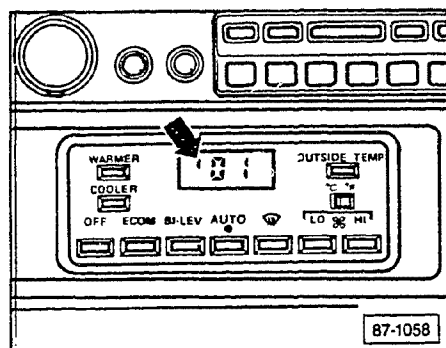
- press **WARMER** button to advance channel by one
- press **COOLER** button to decrease channel by one

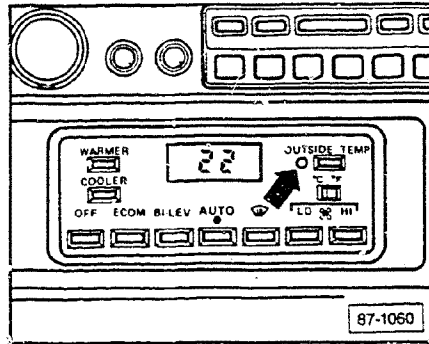
To call up information about a particular channel

- 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<br>09 = coolant temperature sensor — interruption<br>Displayed system errors — see section D8-30<br><br><b>Note</b><br>Coolant temperature sensor will be phased in during production. |
| 2                      | Measurement value of inside temperature sensor <b>G86</b> on roof                                                     | Depends on temperature — see table, section D8-300                                                                                                                                                          |
| 3                      | Measurement value of inside temperature sensor <b>G56</b> on instrument panel                                         |                                                                                                                                                                                                             |
| 4                      | Measurement value of outside temperature sensor <b>G57</b> (plenum)                                                   | Depends on temperature — see table, section D8-240                                                                                                                                                          |
| 5                      | Measurement value of outside temperature sensor <b>G17</b> — cowl                                                     |                                                                                                                                                                                                             |
| 6                      | Measurement value of coolant temperature sensor <b>G62</b><br><br><b>Note</b><br>Will be phased in during production. | Depends on temperature — see table, section D8-310<br><br><b>Note</b><br>Display value for vehicles without coolant temperature sensor<br>255 = open circuit                                                |
| 7                      | Graphic display of output control information for A/C programmer                                                      | Depends on program — see section D8-40                                                                                                                                                                      |

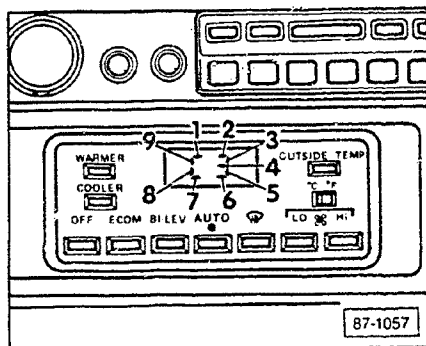
| Diagnostic channel no. | Display                                                                                                                                                                               | Specified display                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 8                      | Actual value of feedback potentiometer on temperature regulating flap servo motor, <b>V68</b>                                                                                         | 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, <b>V68</b>                                                                                      | <p>Depends on program</p> <p>Only check when the value in channel 8 is between 30 and 200.</p> <p>Actual servo motor position (channel 8) and specified servo motor position (channel 9) must not differ by more than 3</p> <p>If difference is greater than 3,</p> <ul style="list-style-type: none"> <li>■ adjust feedback potentiometer, see Repair Group 87 <ul style="list-style-type: none"> <li>● specified value 9-14 (up to <b>VIN: 44 LN 009586</b>)</li> <li>● specified value 9-25 (from <b>VIN: 44 LN 009586</b>)</li> </ul> </li> </ul> |
| 10                     | Specified voltage on fresh air blower <b>V2</b> (coded)                                                                                                                               | <p>Depends on program</p> <p><b>Note</b></p> <p>Specified voltage in volts.</p> <ul style="list-style-type: none"> <li>■ see diagnostic channel no. 15</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                     |
| 11                     | Vehicle electrical system voltage                                                                                                                                                     | Depends on instantaneous operating condition greater than 9.5 volts                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 12                     | <p>Total of electrical system voltage interruptions — values between 5 and 9.5V</p> <p><b>Note</b></p> <p>Values less than 5 volts are recognized as an open low-pressure switch.</p> | <p>Depends on running performance since display was last erased</p> <p><b>Note</b></p> <p>Erase (for example, by disconnecting the battery).</p>                                                                                                                                                                                                                                                                                                                                                                                                      |
| 13                     | Program number                                                                                                                                                                        | No determination, is of no significance for troubleshooting                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 14                     | Switch position of high-pressure switch <b>F118</b> (red housing)                                                                                                                     | 0-5 (high-pressure switch closed)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 15                     | Specified voltage on fresh air blower <b>V2</b> 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 <b>F118</b> (red housing)                                                                     | Depends on running performance since display was last reset<br><br><b>Note</b><br>Reset (for example, by disconnecting the battery). |
| 20                     | Number of times compressor shut off via high-pressure switch <b>F118</b> (red housing) since last ignition switch cycle or reset from <b>OFF</b> button    | 0<br><br><b>Note</b><br>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, new display from August, 1988 model year<br><br><b>Note</b><br>At high vehicle speeds fresh air blower speed is limited in "Fresh Air" mode. | 00 when vehicle stopped<br><br>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 <b>G56</b> (instrument panel), open circuit                                    | ■ check affected component and related wiring according to wiring diagram                                         |
| 02         | Inside temperature sensor <b>G56</b> (instrument panel), short-circuit                                   |                                                                                                                   |
| 03         | Outside temperature sensor <b>G57</b> (plenum), open circuit                                             |                                                                                                                   |
| 04         | Outside temperature sensor <b>G57</b> (plenum), short circuit                                            |                                                                                                                   |
| 05         | Outside temperature sensor <b>G17</b> (cowl), open circuit                                               |                                                                                                                   |
| 06         | Outside temperature sensor <b>G17</b> (cowl), short circuit                                              |                                                                                                                   |
| 07         | Feedback potentiometer on adjustment motor for temperature regulating flap, <b>V68</b> interruption/open | ■ check adjustment motor for temperature regulating flap <b>V68</b> (with feedback potentiometer), section D8-190 |
| 08         | Feedback potentiometer on adjustment motor for temperature regulating flap, <b>V68</b> short circuit     |                                                                                                                   |
| 09         | Coolant temperature sensor <b>G62</b> , open circuit                                                     | ■ check coolant temperature sensor <b>G62</b> and its wiring according to diagram                                 |
| 10         | Coolant temperature sensor <b>G62</b> , short circuit                                                    |                                                                                                                   |
|            |                                                                                                          | <b>Note</b><br>Coolant temperature sensor will be phased in during production.                                    |

| Error code number | Error code                                                                                                                                                                                                | Correction of error                                                                                               |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|
| 11                | Inside temperature sensor <b>G68</b> (roof), open circuit                                                                                                                                                 | ■ check inside temperature sensor (roof) and its wiring according to wiring diagram                               |
| 12                | Inside temperature sensor <b>G68</b> (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<br><br><b>Note</b><br>Values less than 5 V are recognized as an open low-pressure switch. | ■ check electrical system voltage display, section D8-250                                                         |
| 14                | Compressor off; high-pressure switch <b>F118</b> (red housing) cycled 8 times                                                                                                                             | ■ check high-pressure switch <b>F118</b> (red housing), section D8-230                                            |
| 15                | Adjustment motor for temperature regulating flap <b>V68</b> (with feedback potentiometer) is set improperly                                                                                               | ■ check adjustment motor for temperature regulating flap <b>V68</b> (with feedback potentiometer), section D8-190 |
| 16                | High-pressure switch <b>F118</b> has open circuit or cycled at least 1 time during current driving period                                                                                                 | ■ check high-pressure switch <b>F118</b> (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

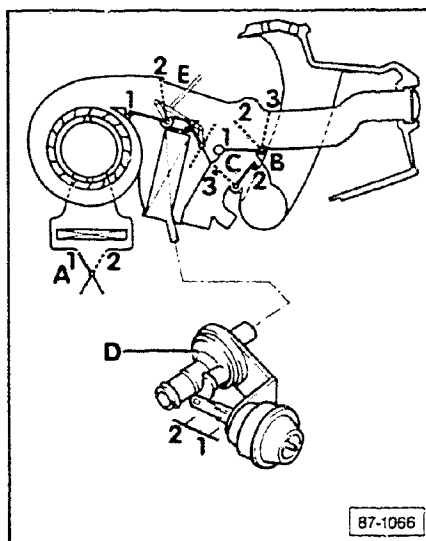
Temperature regulating flap E moves in direction 1 "cooling," see section D8-60

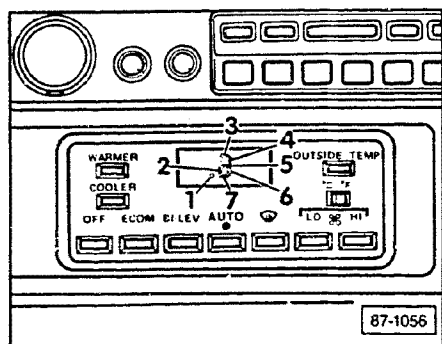
### Segment 8 lights up

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 D8-250.

### Segment 5 lights up

Compressor off. A/C refrigerant low-pressure switch **F73** open. See section D8-260.

### Segment 6 lights up

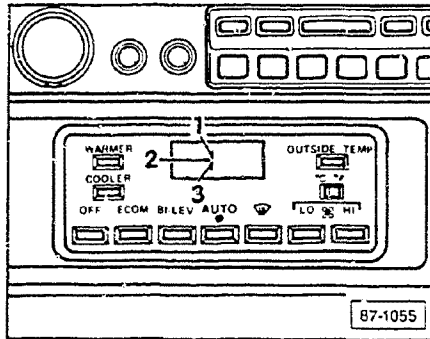
Compressor off. Kick-down function activated. See section D8-270 (through 1990 m.y.) or section D8-280 (from 1991 m.y.).

### Note

A/C compressor switches back on after 12 seconds.

### Segment 7 lights up

Compressor off. Coolant temperature warning switch, **F14** or electronic thermoswitch (multi-function temperature sensor), **F76** closed. See section D8-290.



## Memory display channel 18, checking

### Segment 1 lights

Compressor on.

### Segment 2 lights

Radiator cooling fan runs on 1st speed.

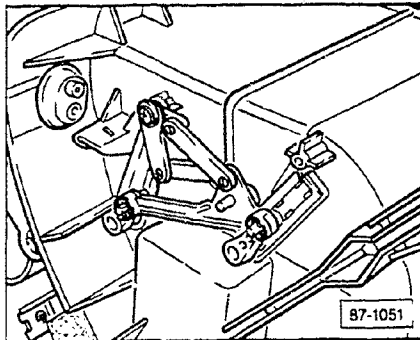
### Segment 3 lights

Idle speed increases (A/C on).

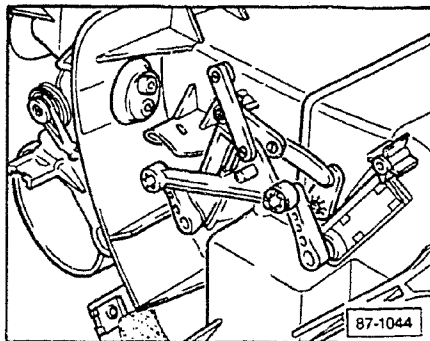
### Note

Idle speed increase does not apply to all vehicles. See section D8-320.

### Temperature regulating flap, positions



► Fig. 1 Cooling position

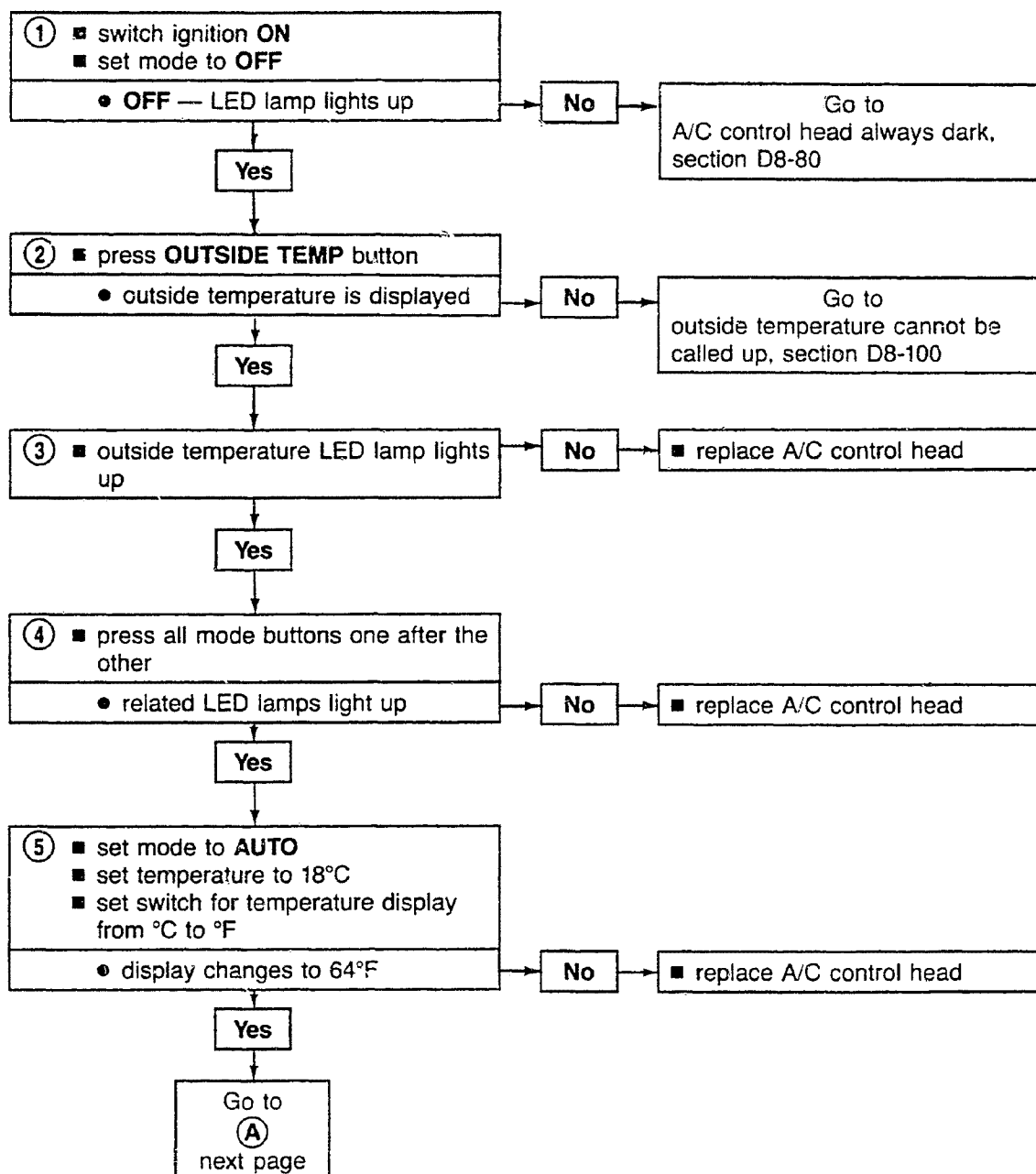


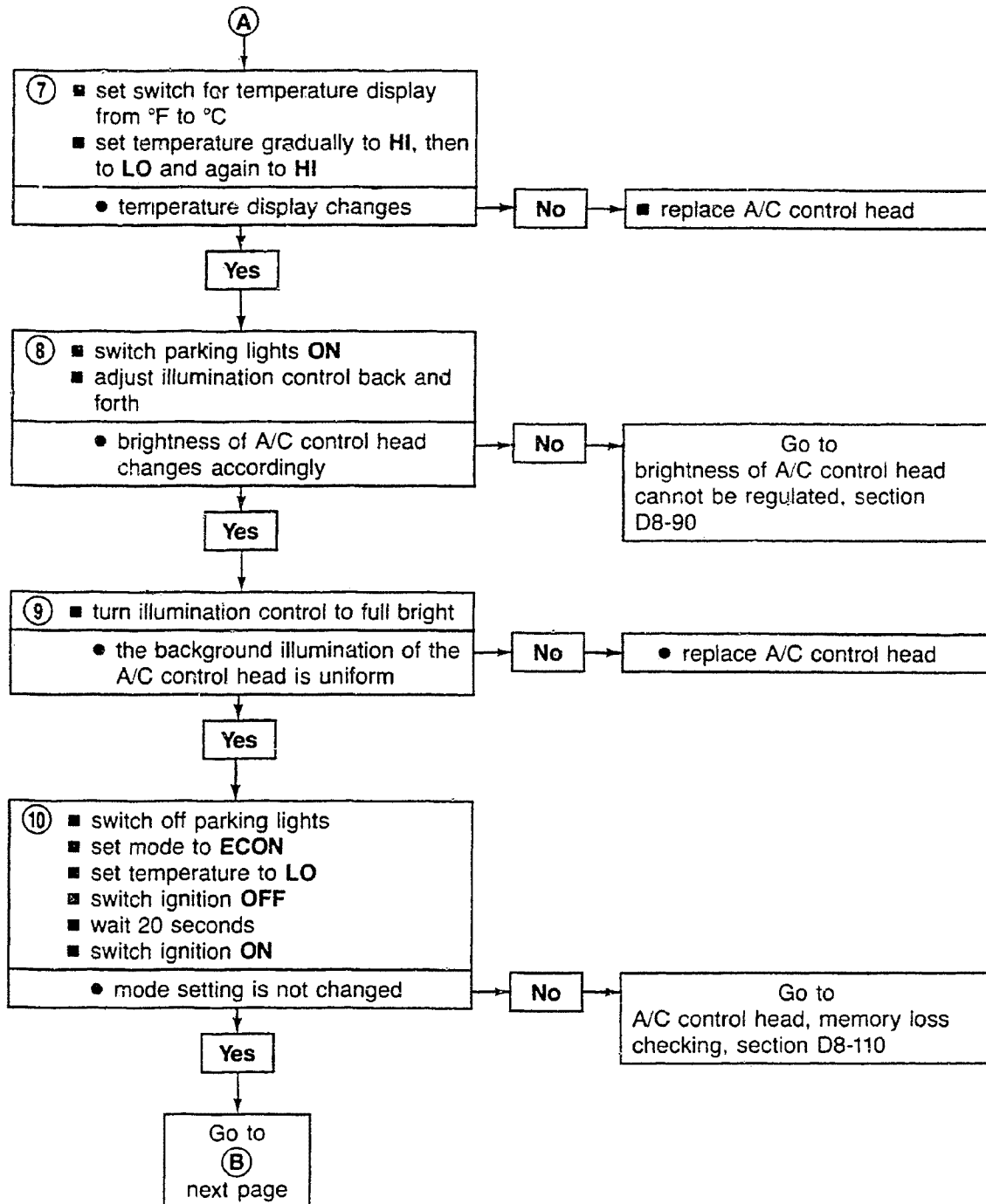
► Fig. 2 Heating position

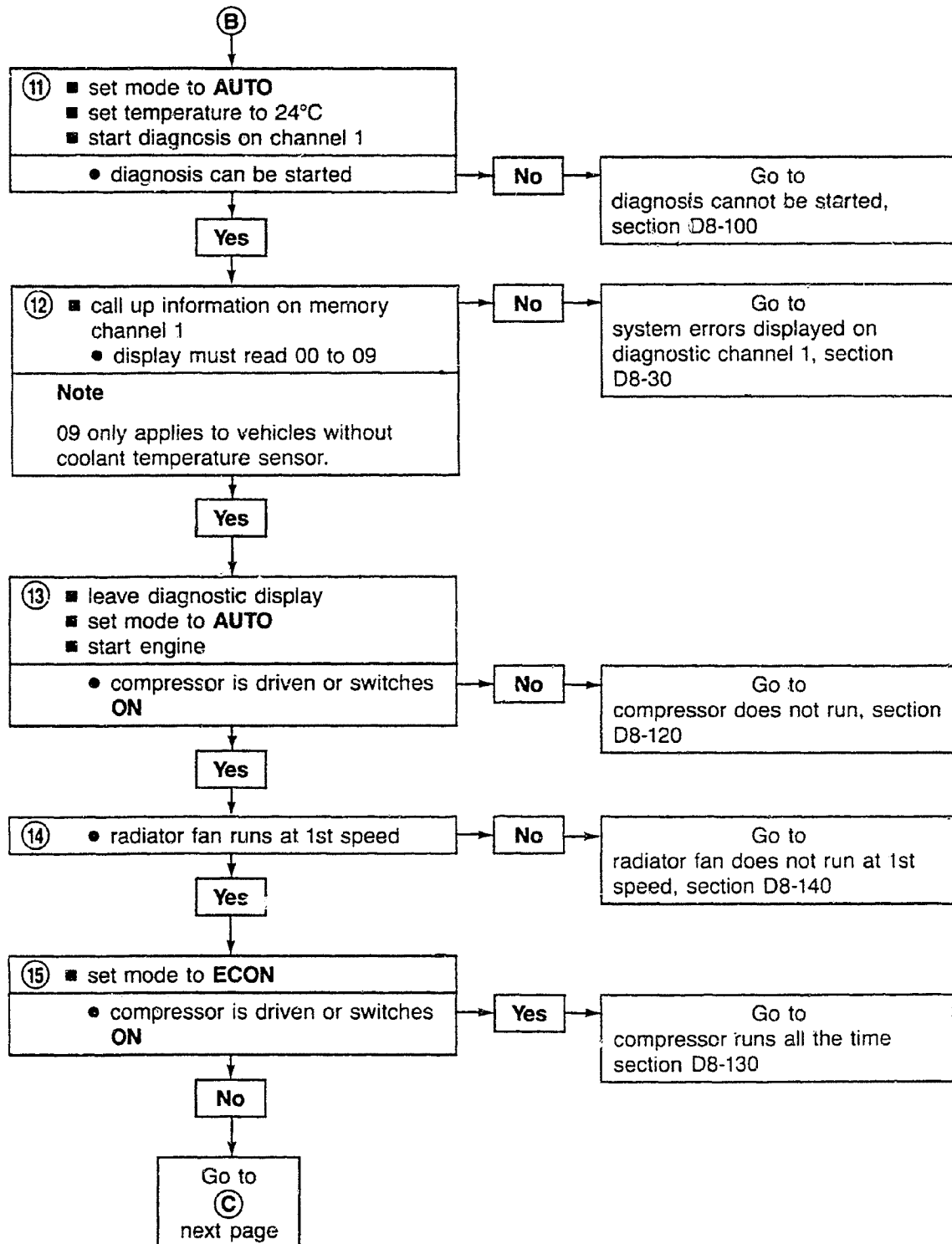
## Digital climate control, quick check

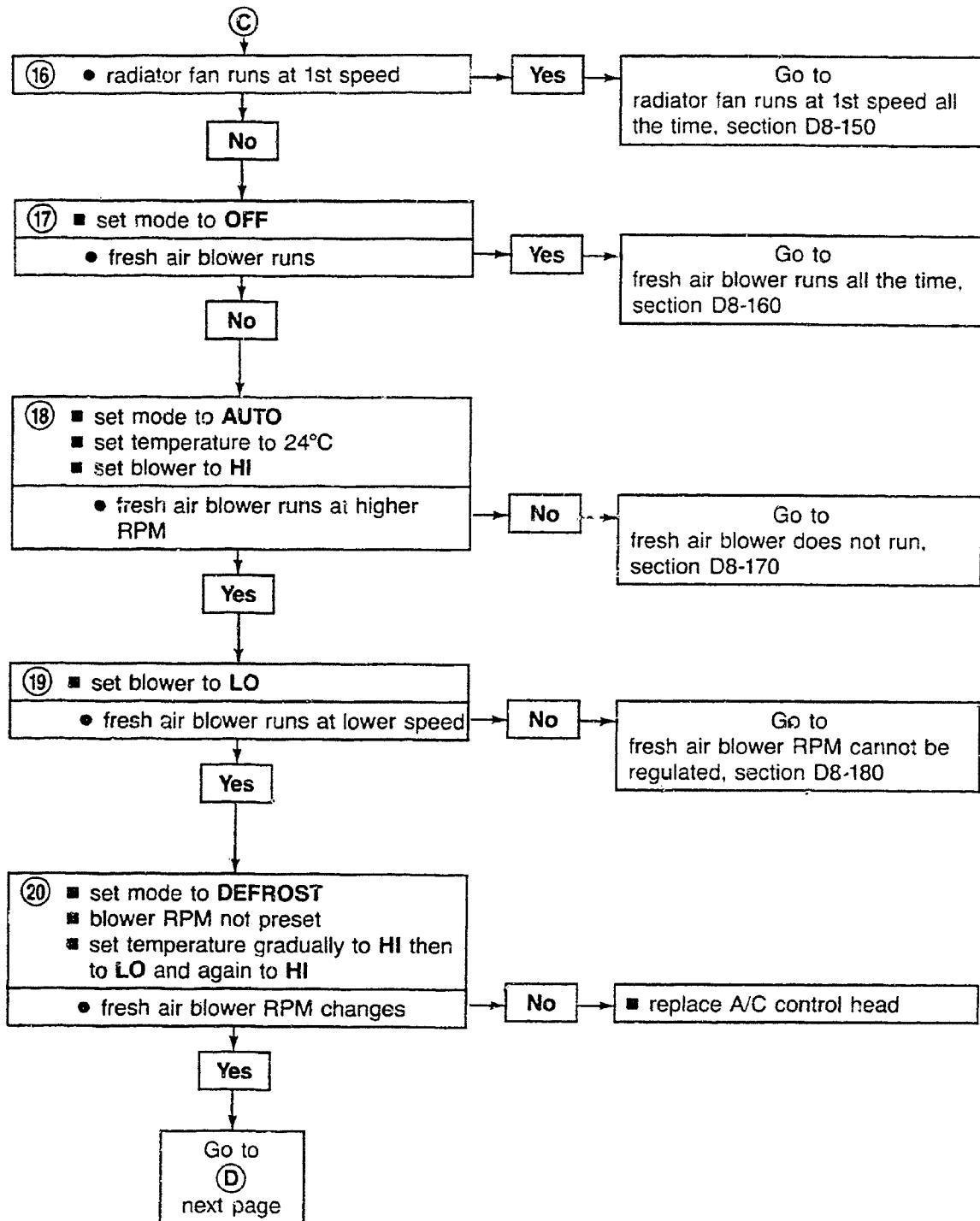
### Note

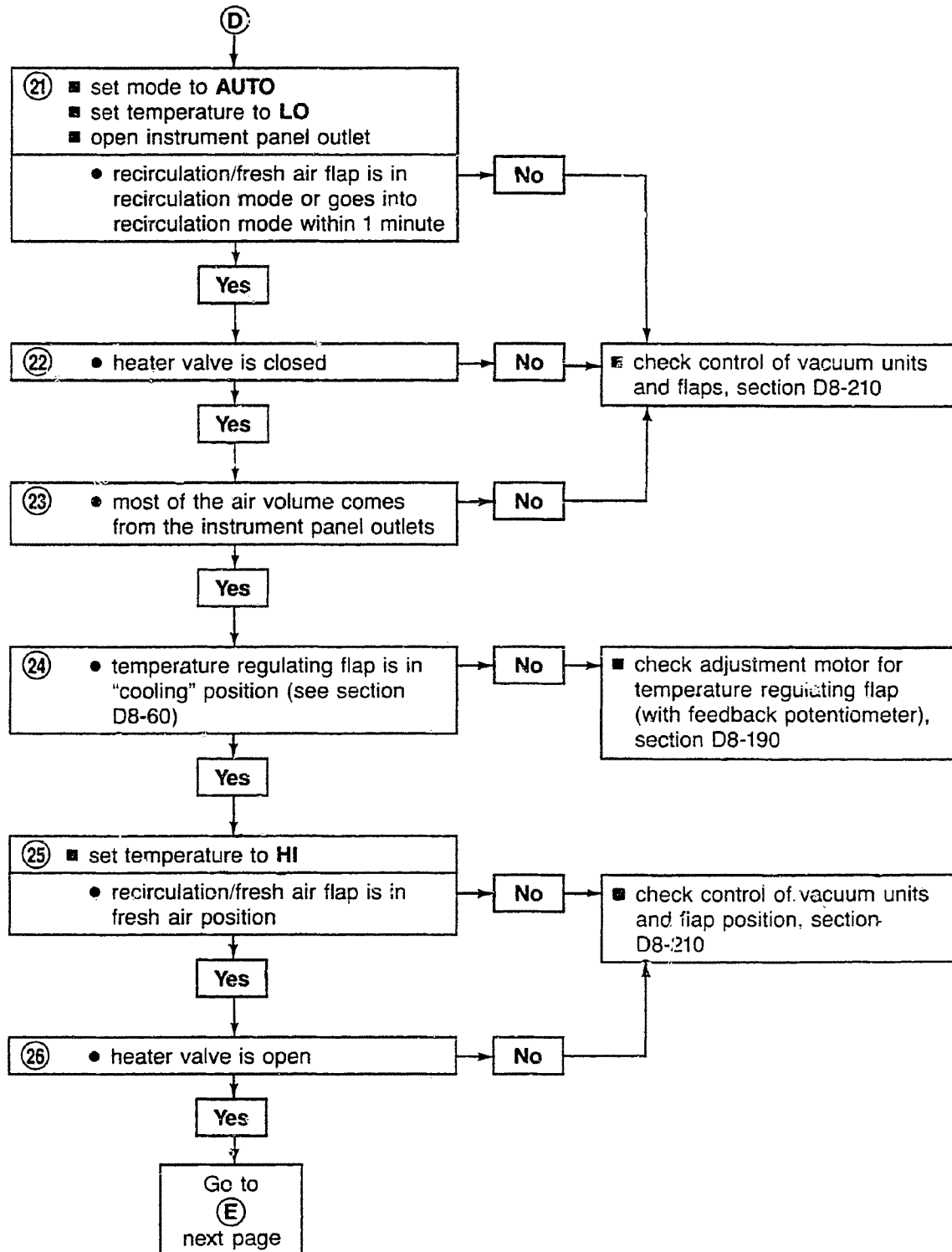
The test steps listed must be followed in their entirety and in sequence.

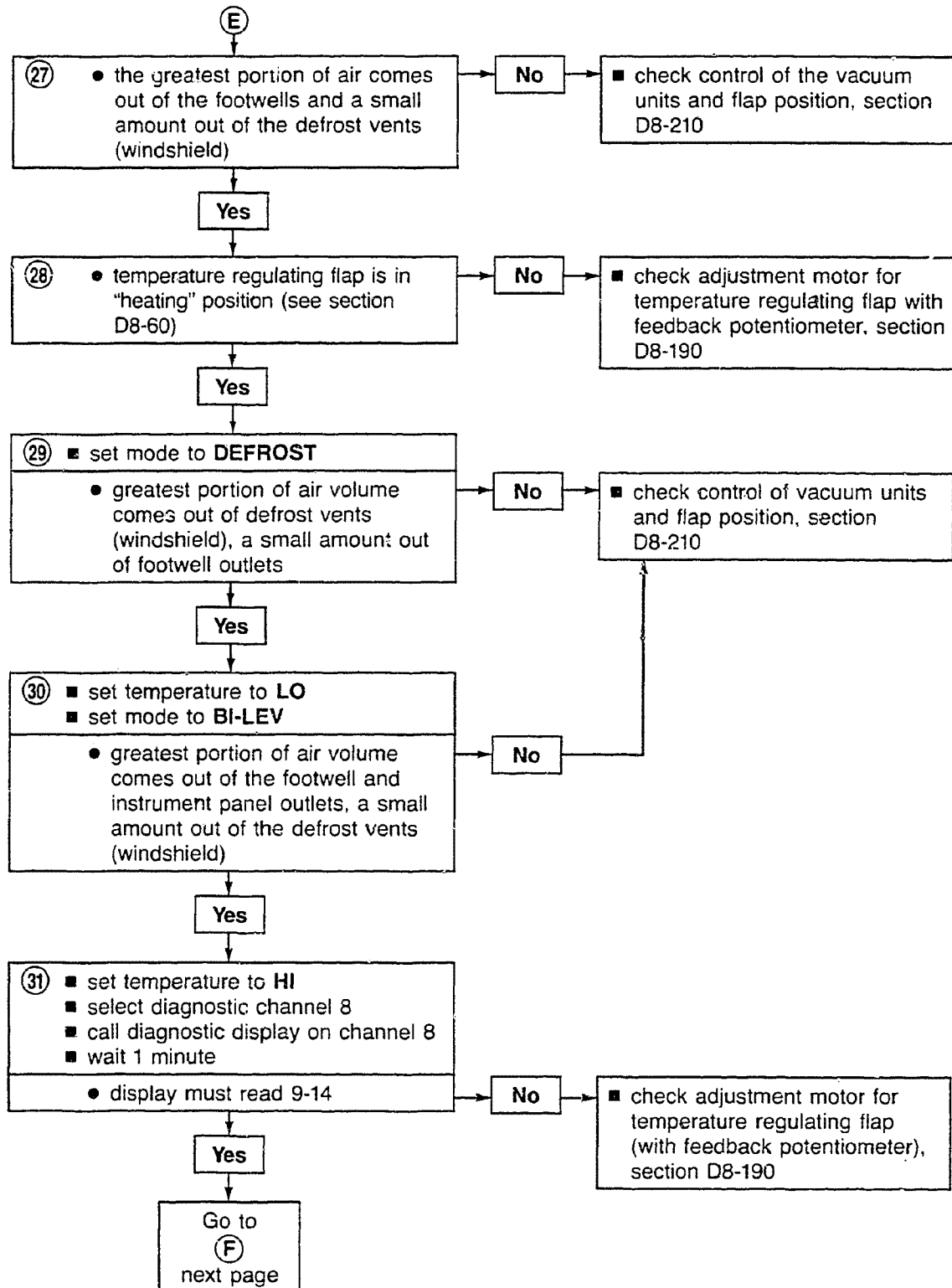


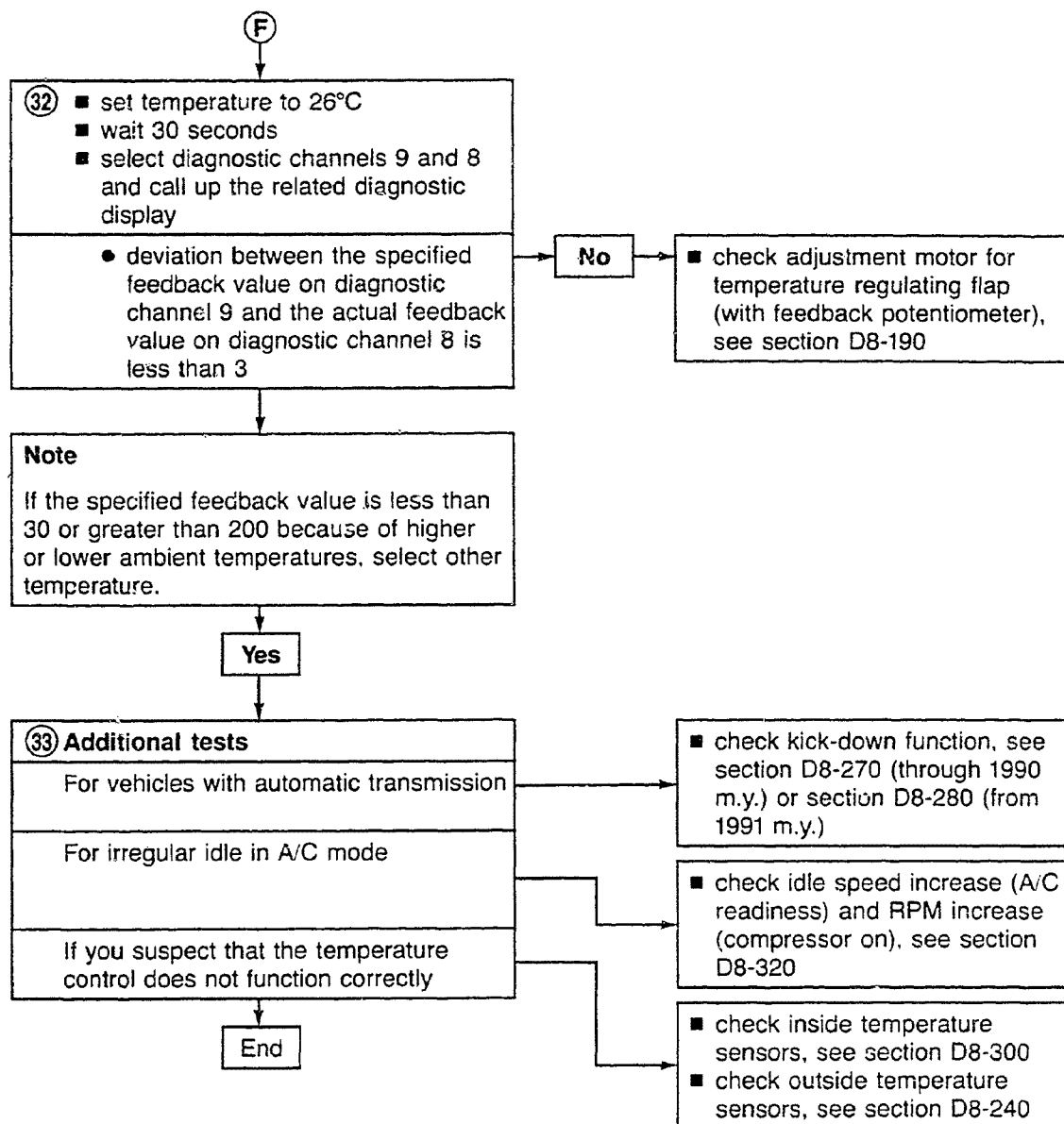


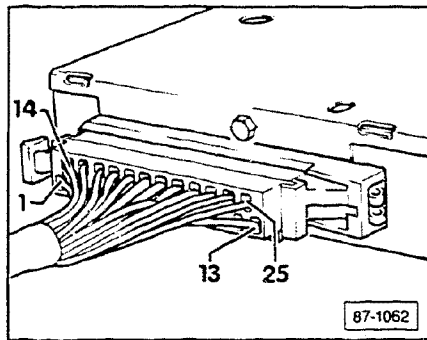




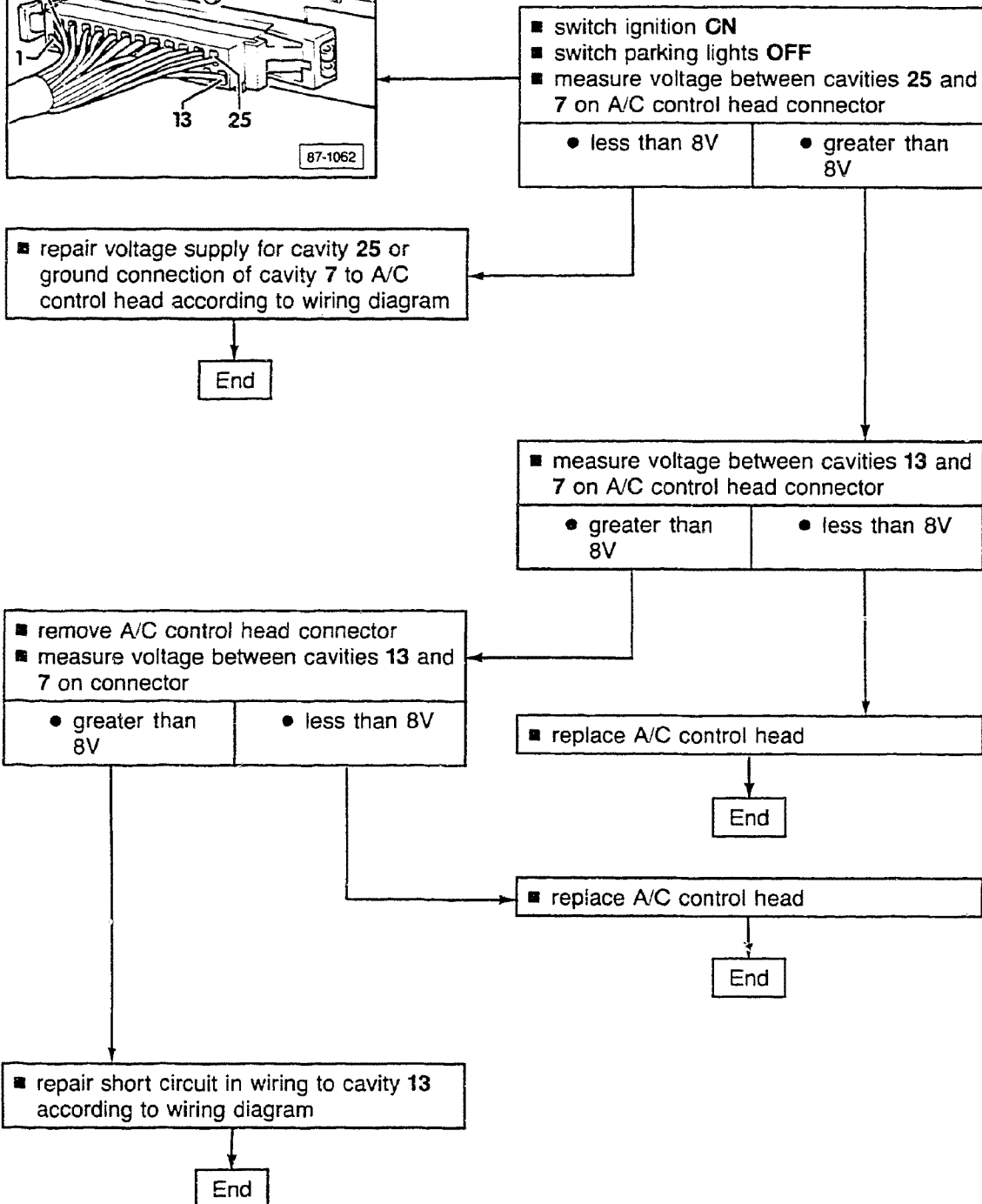


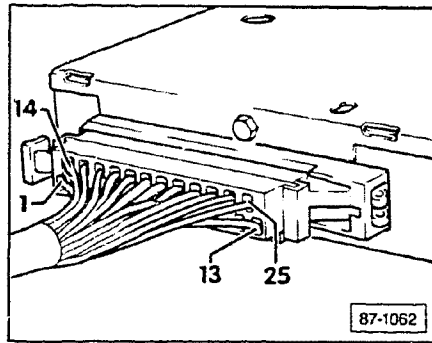






A/C control head, is always dark





**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

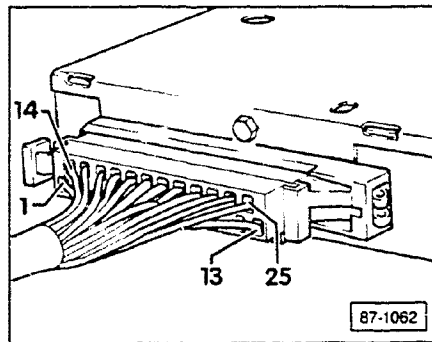
• less than 8V

• greater than 8V

- repair voltage supply to cavity 13 according to wiring diagram

End

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next page



■ replace A/C control head

End

**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 |
|----------------|-------------------|

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

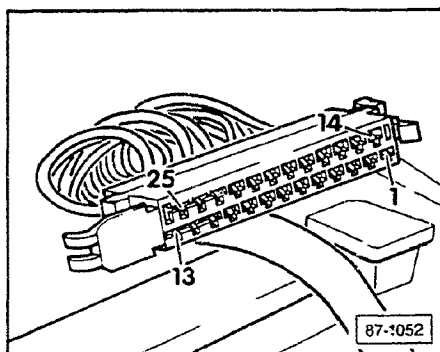
|                |                   |
|----------------|-------------------|
| • less than 6V | • greater than 6V |
|----------------|-------------------|

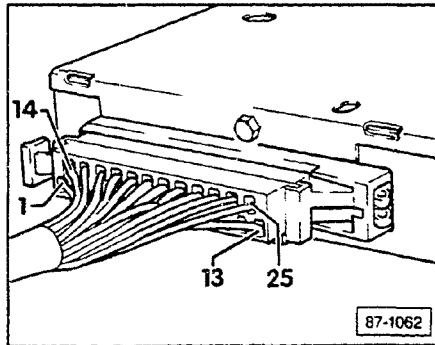
■ replace A/C control head

End

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

End





**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 |
|----------------|-------------------|

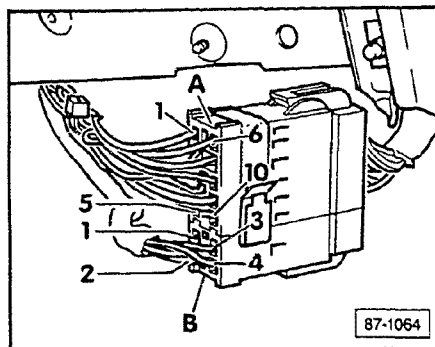
- repair voltage supply from cavities **25** or ground connection from cavity **7** according to wiring diagram

End

- measure voltage between cavities **11** and **7**

- |                                     |                                     |
|-------------------------------------|-------------------------------------|
| • greater than 6V<br>less than 4.7V | • greater than 4.7V<br>less than 6V |
|-------------------------------------|-------------------------------------|

Go to  
section  
D8-220



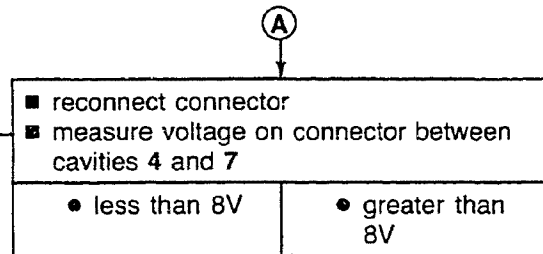
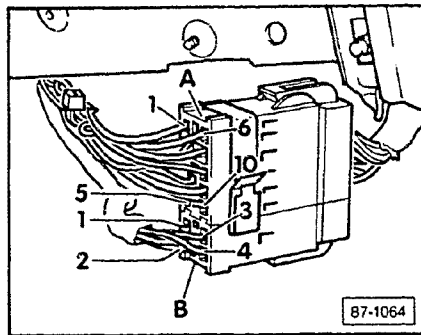
- remove connector to A/C programmer
- troubleshooting can be initiated
- outside temperature can be called up

**Yes**

**No**

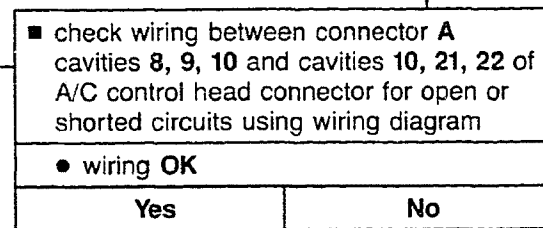
Go to  
**(A)**  
next page

Go to  
**(B)**  
two pages  
following



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

End

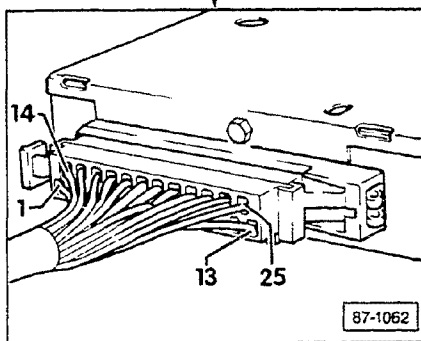


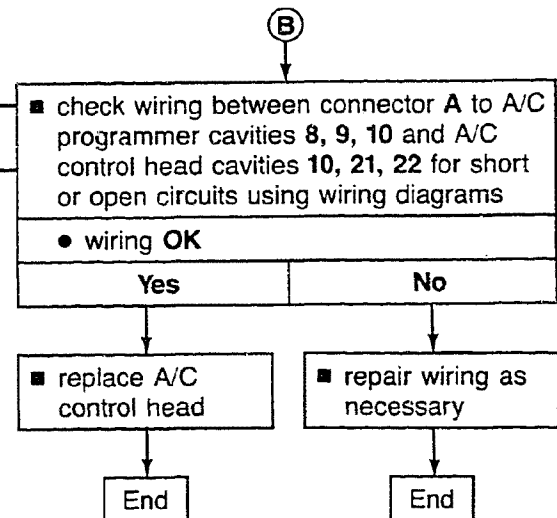
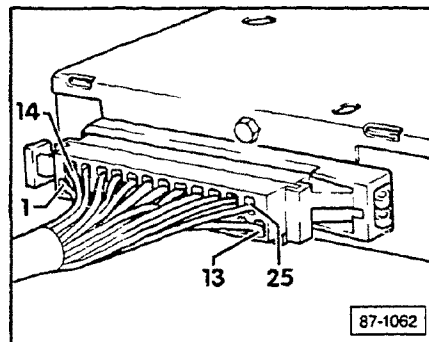
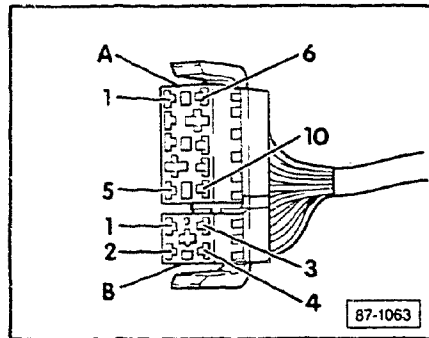
- replace A/C programmer

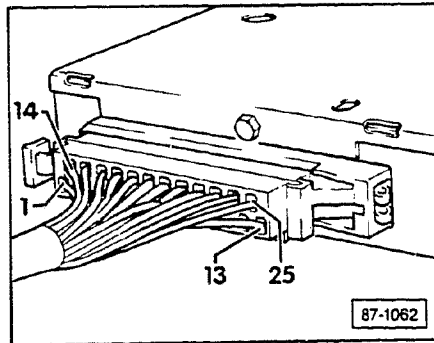
End

- repair as necessary

End







## A/C control head memory loss, checking

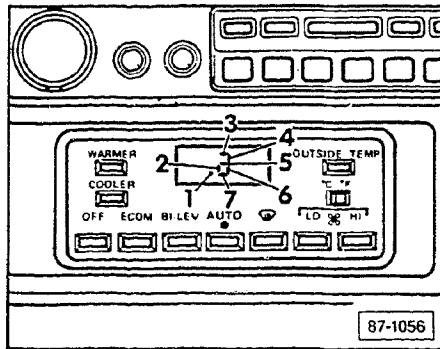
- switch ignition **OFF**
  - measure voltage between cavities 12 and 7 on A/C control head connector
- |                |                   |
|----------------|-------------------|
| ● less than 8V | ● greater than 8V |
|----------------|-------------------|

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

End

- replace A/C control head

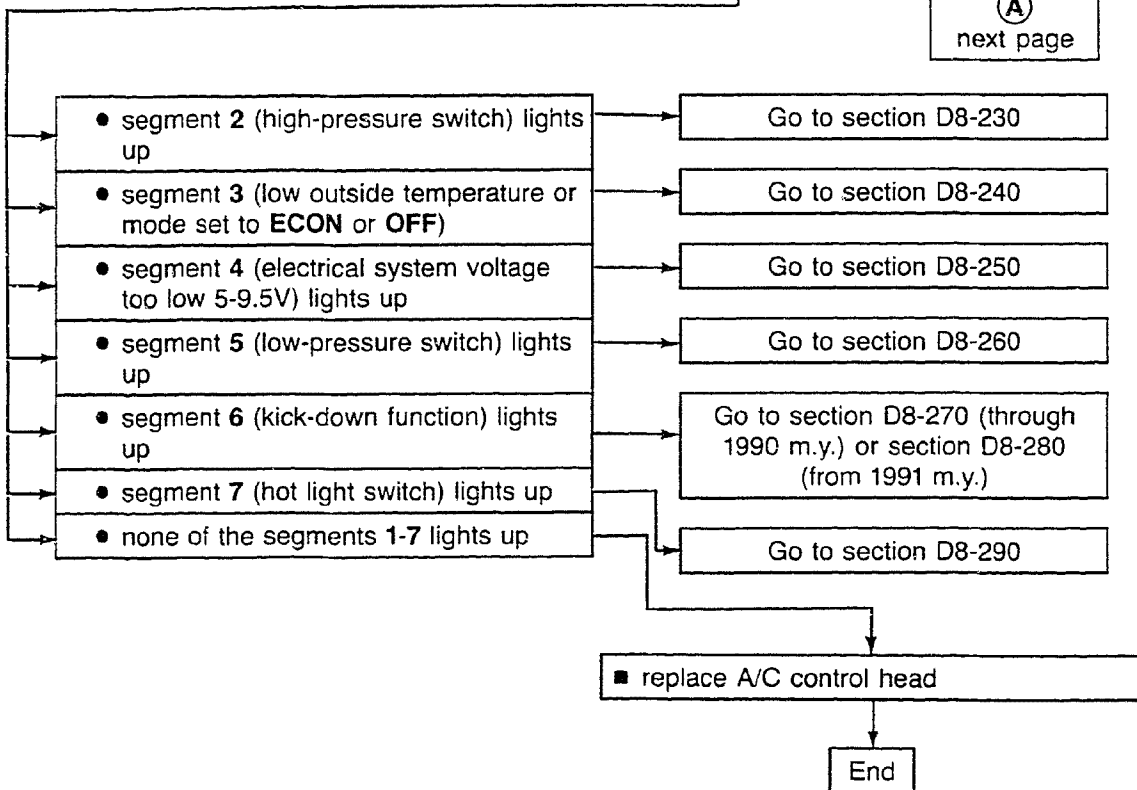
End

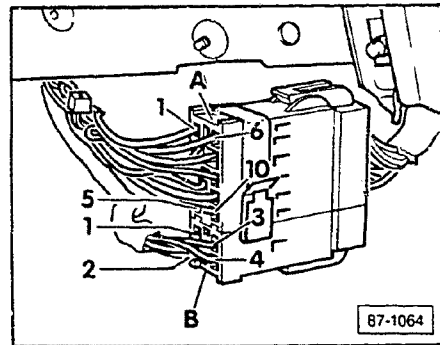


**Compressor does not run in AUTO, BI-LEV and DEF modes**

- switch ignition ON
  - set mode to **AUTO**
  - set temperature to 24°C
  - start diagnosis on channel 17
- |                                       |            |
|---------------------------------------|------------|
| ● segment 1 (compressor on) lights up |            |
| <b>No</b>                             | <b>Yes</b> |

Go to  
**(A)**  
next page





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

- A/C relay, **J32**
- A/C compressor clutch, **N25**

End

Ⓐ

■ 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

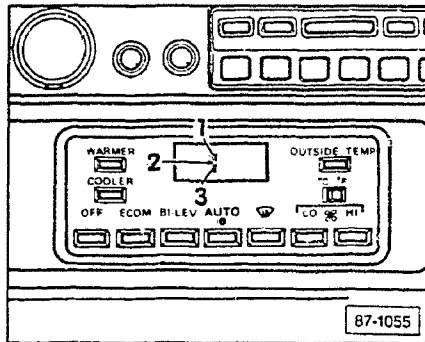
● wiring OK

|     |    |
|-----|----|
| Yes | No |
|-----|----|

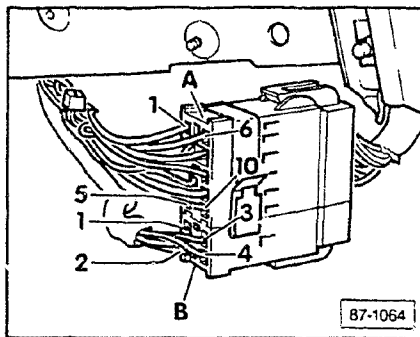
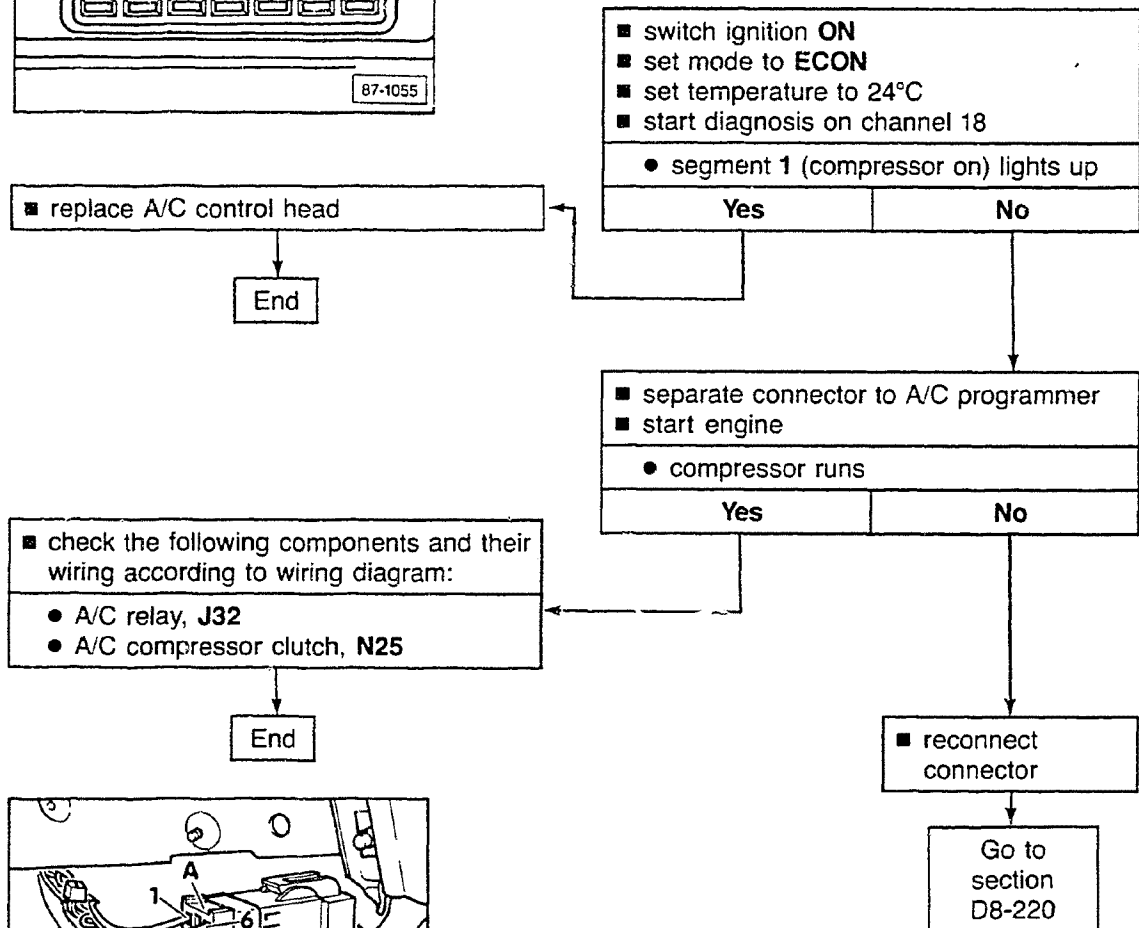
Go to section D8-220

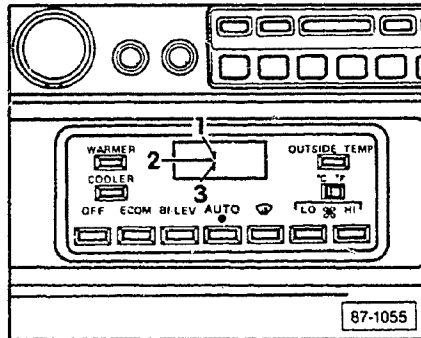
■ repair as necessary

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)**

- 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**

- replace A/C control head

**End**

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

- less than 1.5V

- greater than 1.5V

- 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**

- 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**

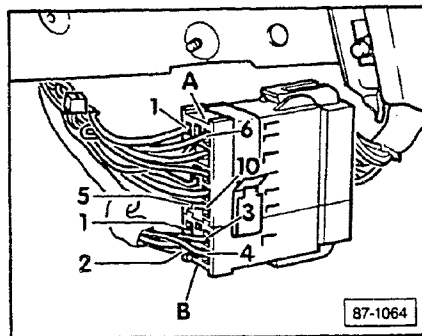
**Yes**

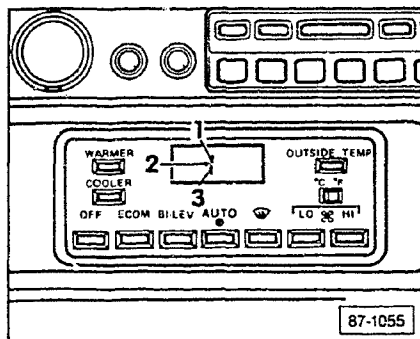
**No**

Go to  
section  
**D8-220**

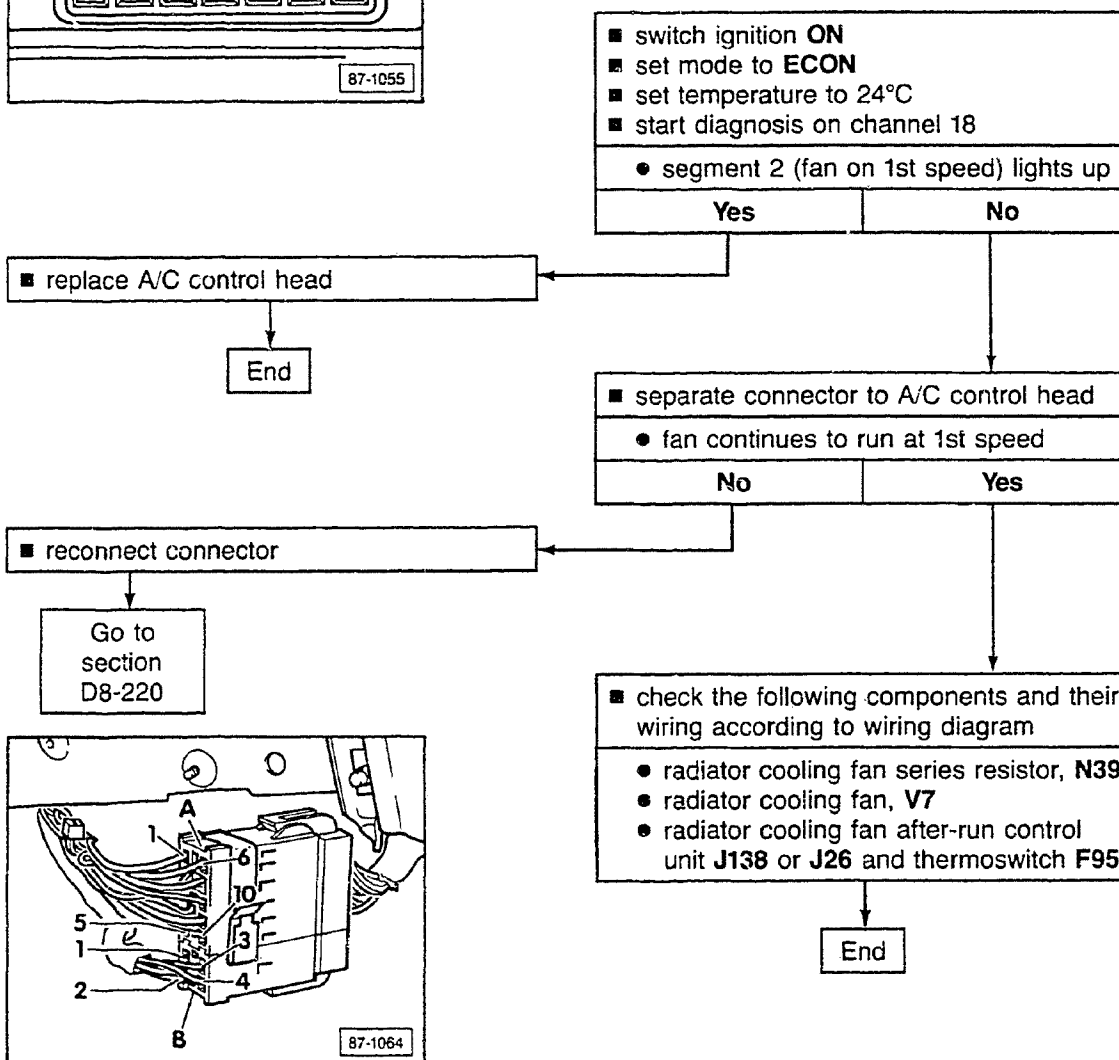
- repair as  
necessary

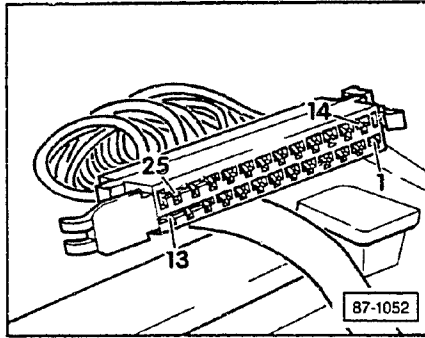
**End**





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





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

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

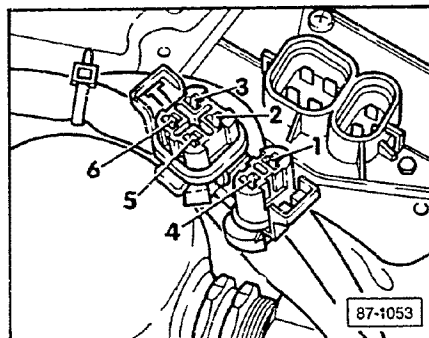
|                    |                 |
|--------------------|-----------------|
| • greater than 8 V | • less than 8 V |
|--------------------|-----------------|

■ 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 |
|----|-----|

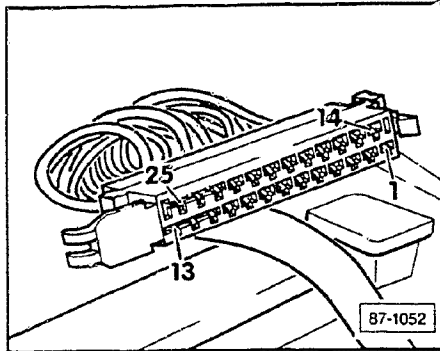
■ replace control unit for blower

End

■ repair as necessary

End

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



- check wiring from A/C control head connector cavity 14 to A/C blower control unit for short circuit according to wiring diagram

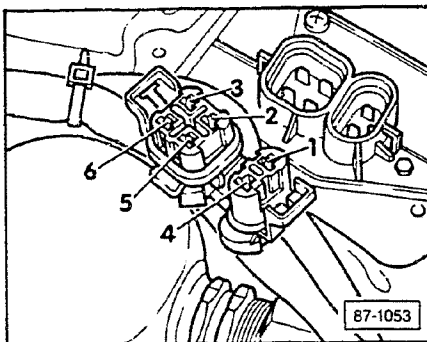
**Yes**

**No**

- repair as necessary

- replace A/C control head

**End**



- switch ignition **ON**
- remove connector from A/C control head
- bridge cavities 15 and 25 with LED test lamp

- fresh air blower runs

**Yes**

**No**

- reconnect A/C control head connector
- set mode to **AUTO**
- set temperature to **LO**
- set blower to **HI**
- remove both connectors from blower control unit, J 126
- bridge cavities 6 and 5 with LED test lamp

- LED test lamp lights up

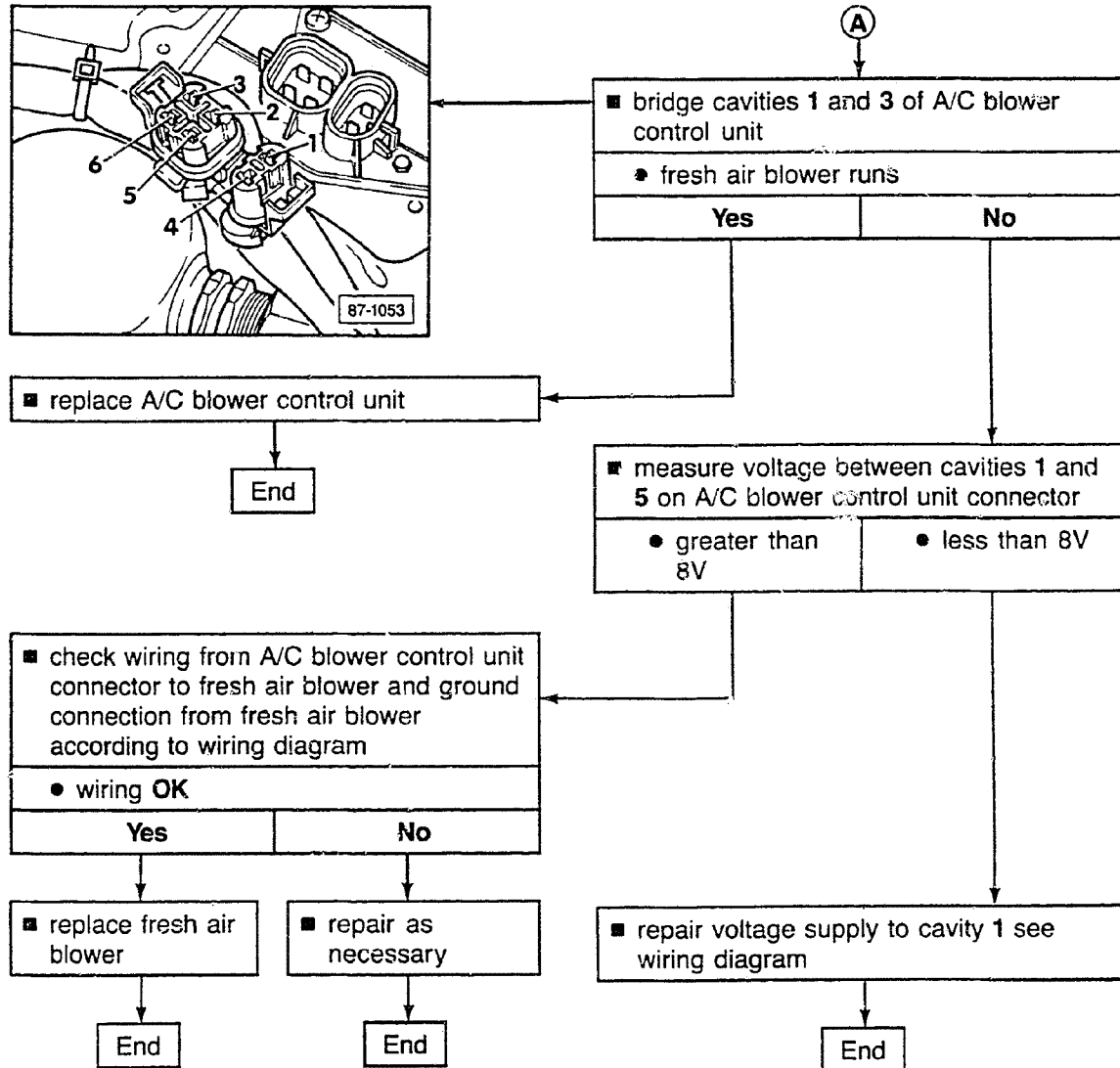
**Yes**

**No**

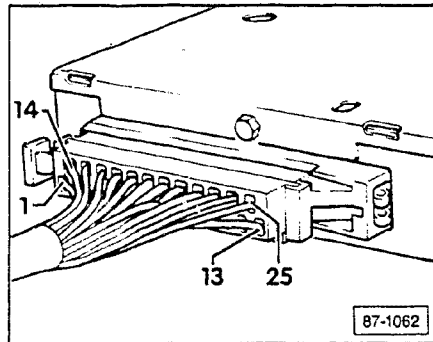
Go to  
**(A)**  
next page

- repair break in wiring to A/C blower control unit cavity 5 or 6 according to wiring diagram

**End**



## 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

- 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 can be regulated

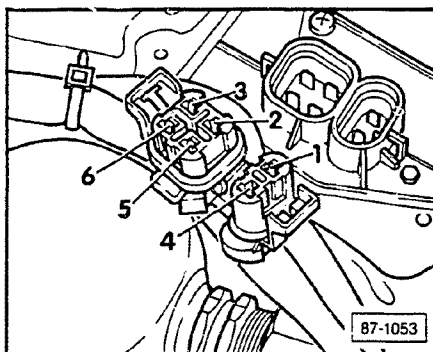
Yes

No

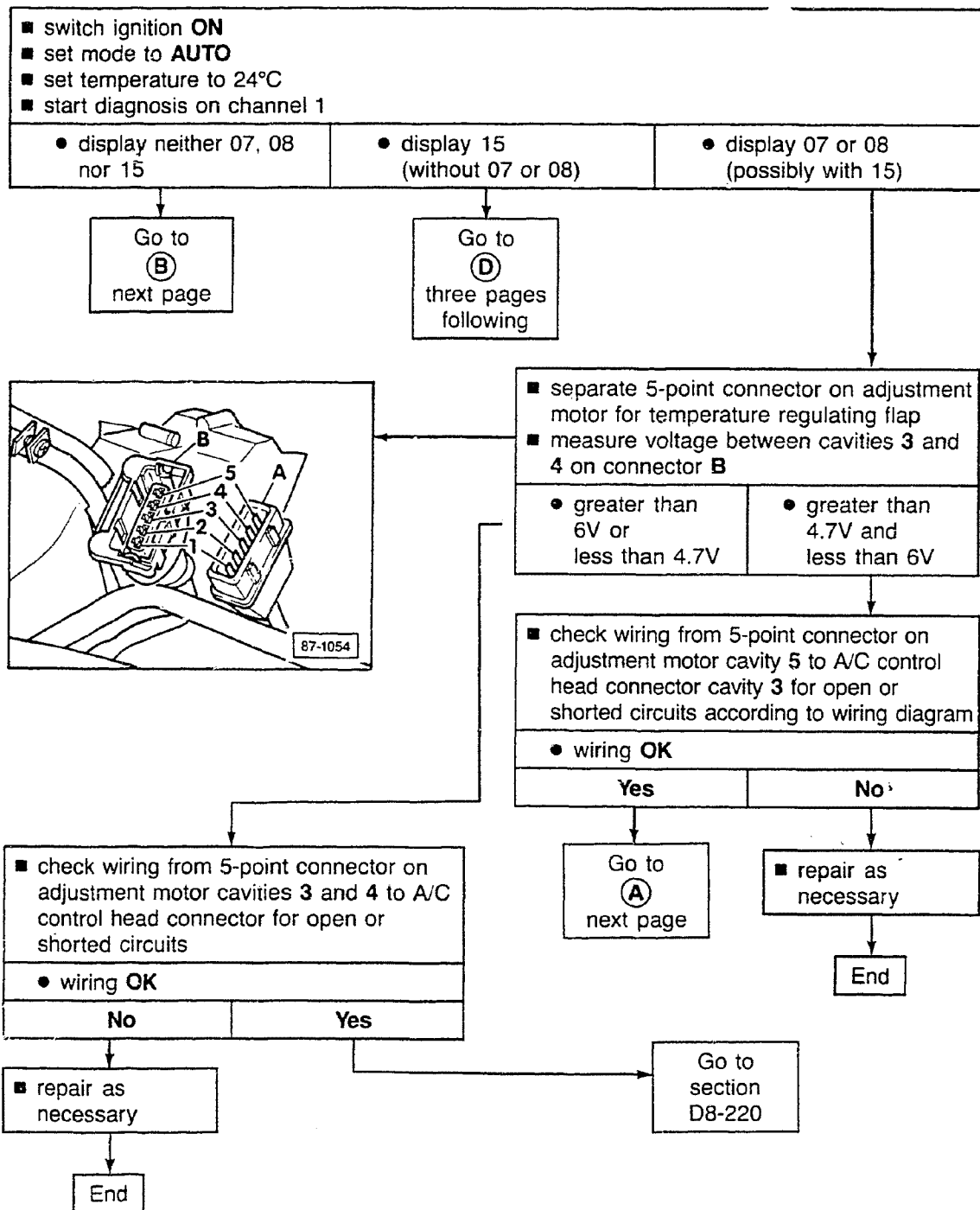
End

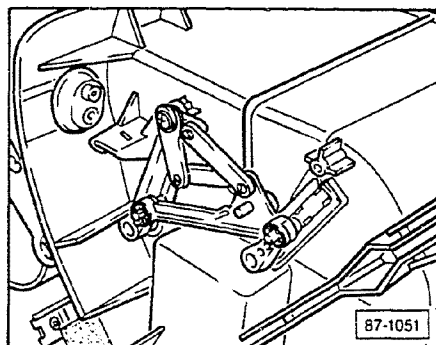
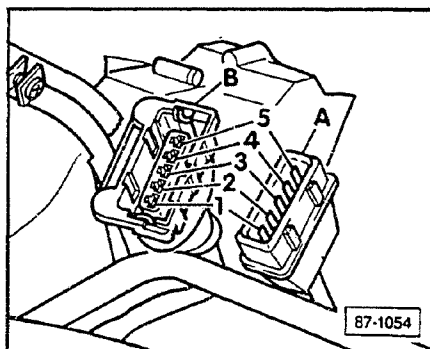
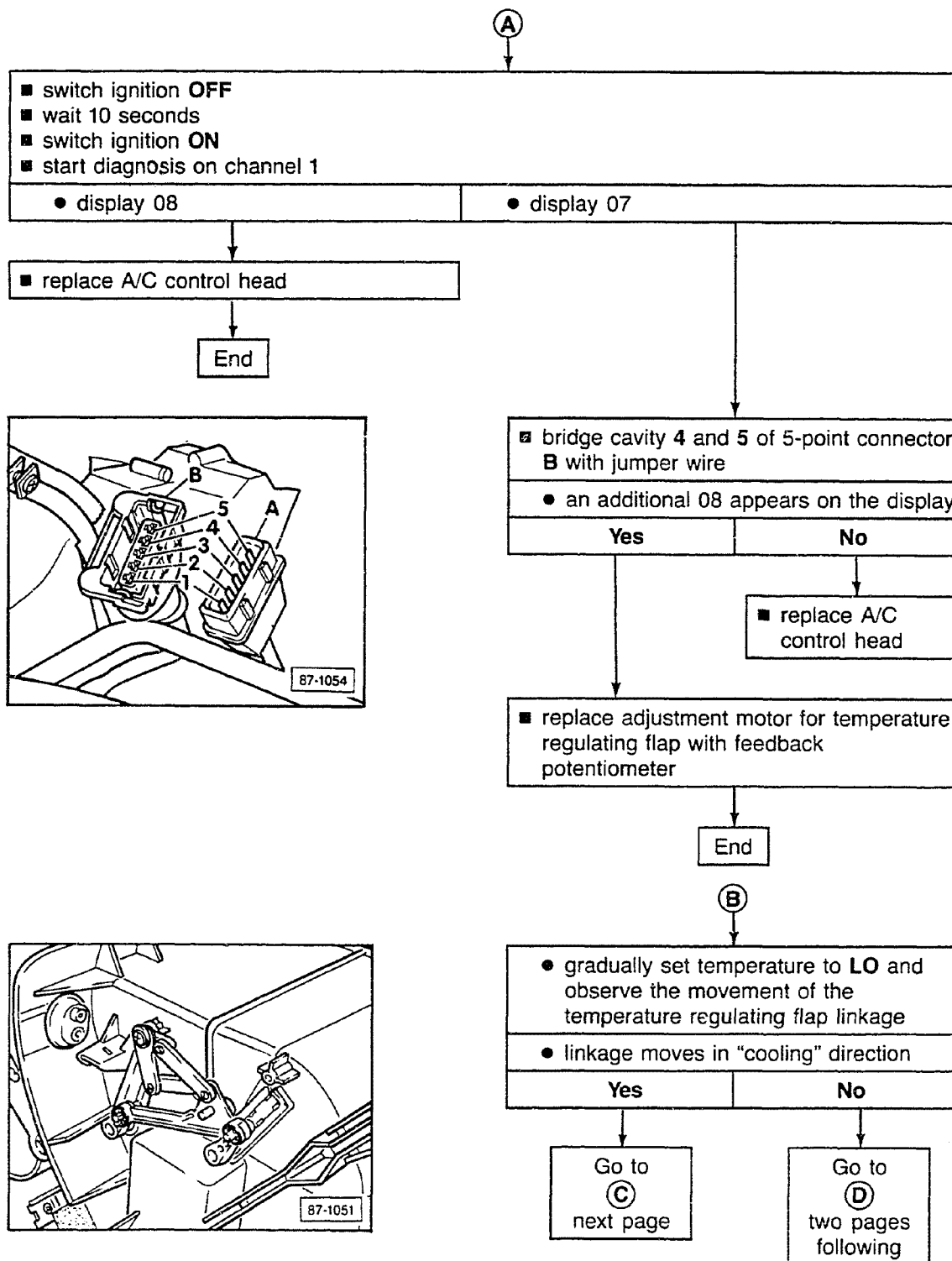
- reinstall old A/C blower control unit
- replace A/C control head

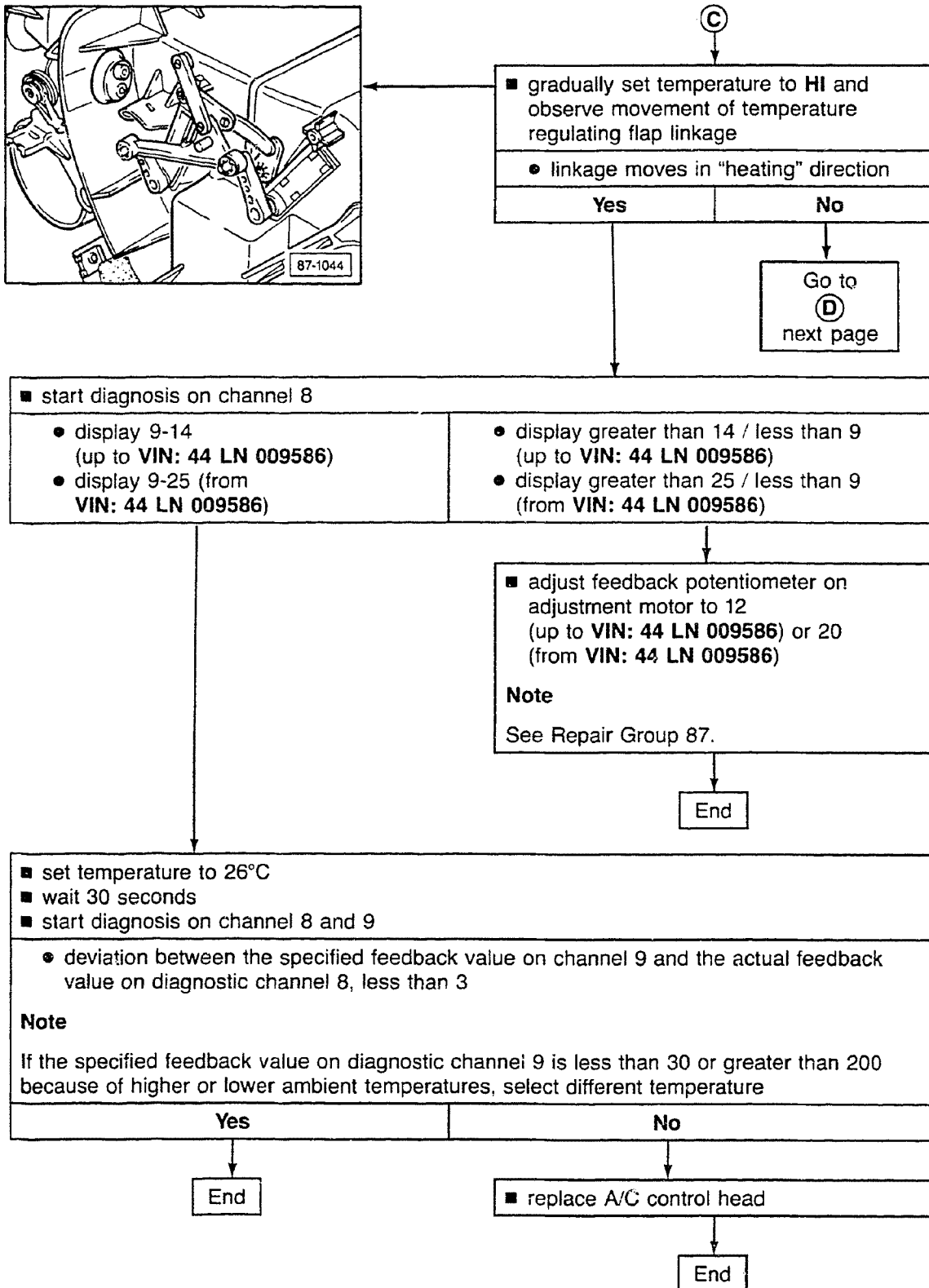
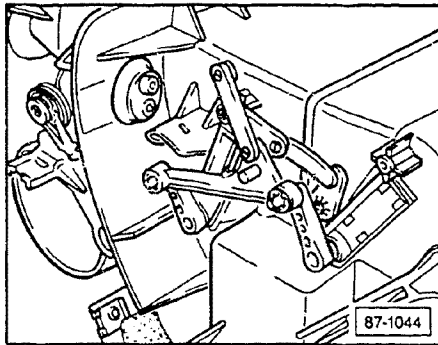
End

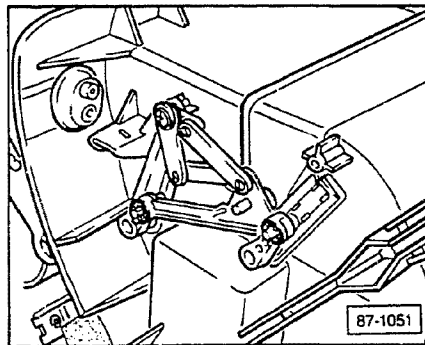
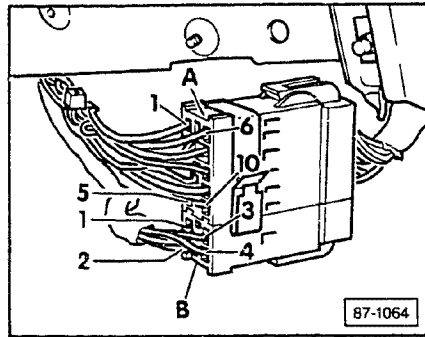


## Temperature regulating flap servo motor, V68 (with feedback potentiometer), checking









**■ bridge cavities 1 and 2 of connector A to A/C programmer with LED test light**  
**■ set temperature to LO**  
 • LED test lamp 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 A for A/C programmer to adjustment motor for temperature regulating flap for open or short circuit according to wiring diagram**  
 • wiring OK  

|     |    |
|-----|----|
| Yes | No |
|-----|----|

■ repair as necessary

End

**■ remove motor for temperature regulating flap**  
**■ check temperature regulating flap for ease of operation**  

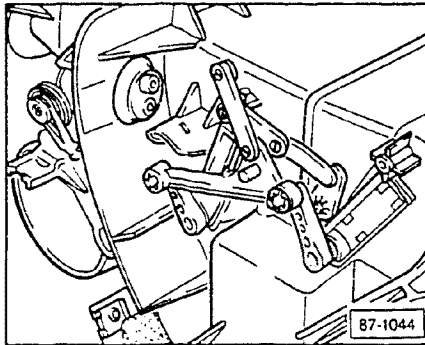
|     |    |
|-----|----|
| Yes | No |
|-----|----|

■ replace temperature regulating flap

End

■ replace adjustment motor for temperature regulating flap

End



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

|     |    |
|-----|----|
| Yes | No |
|-----|----|

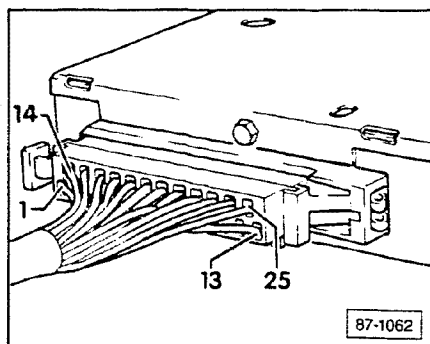
- replace adjustment motor for temperature regulating flap

- repair temperature regulating flap

End

- repair as necessary

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 |
|----|-----|

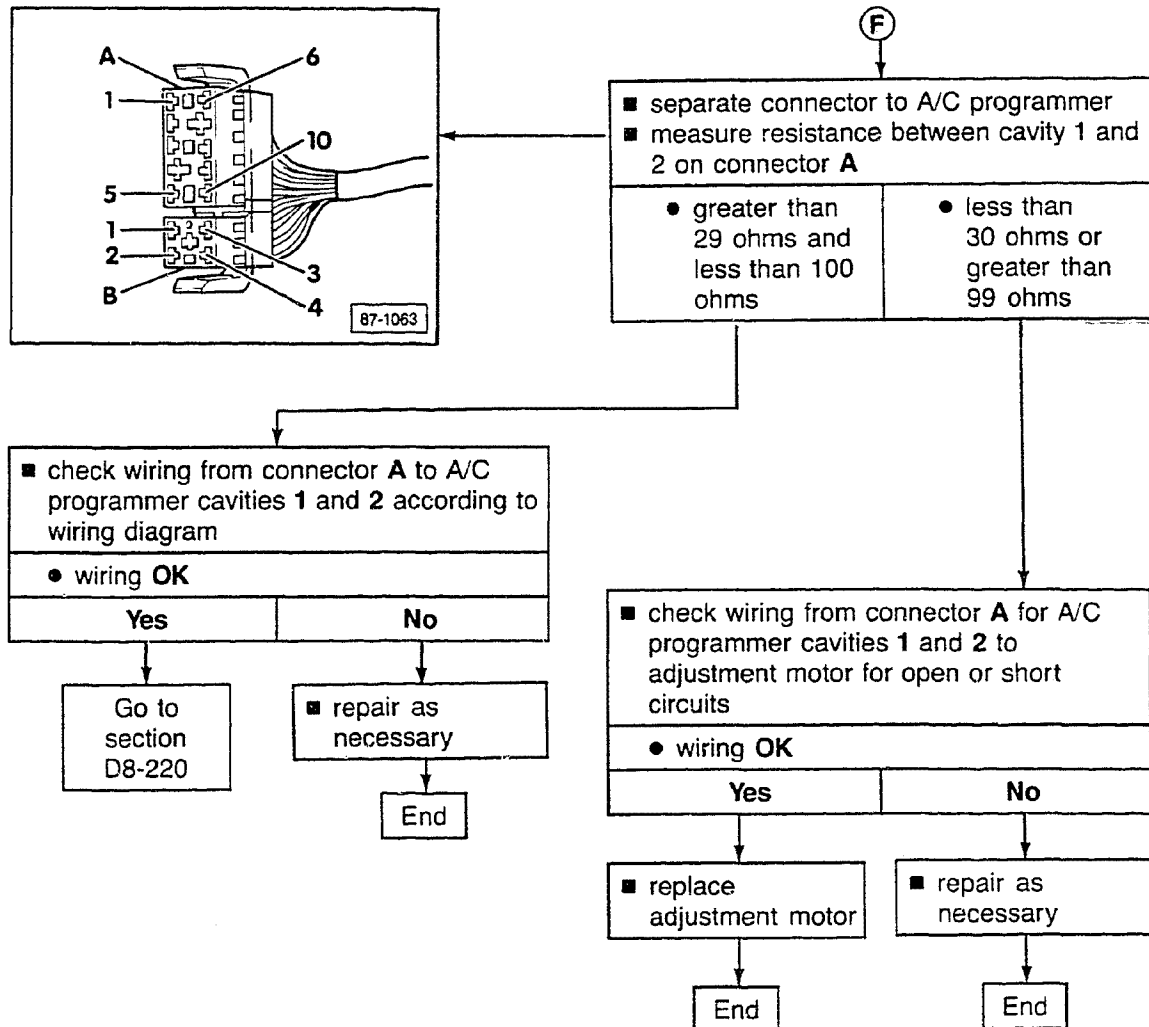
- replace adjustment motor for temperature regulating flap
- set temperature to 24°C
- call up diagnosis on channel 1
  - display 15

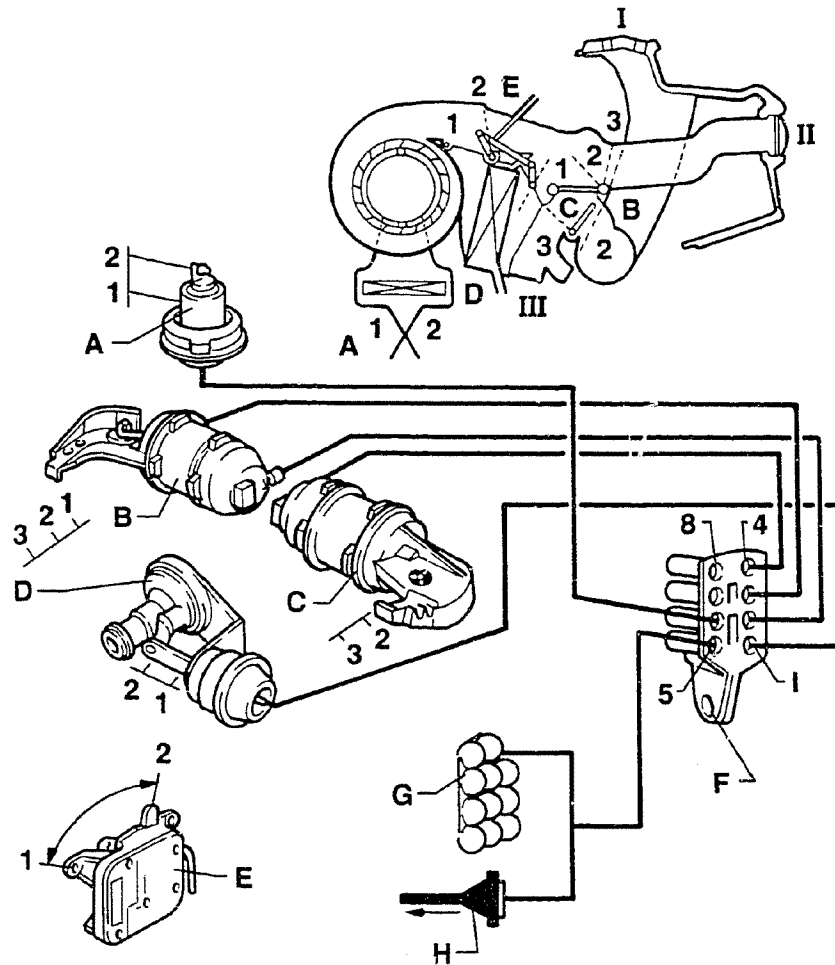
|    |     |
|----|-----|
| No | Yes |
|----|-----|

End

- exchange adjustment motor for temperature regulating flap
- replace A/C control head

End





87-1075

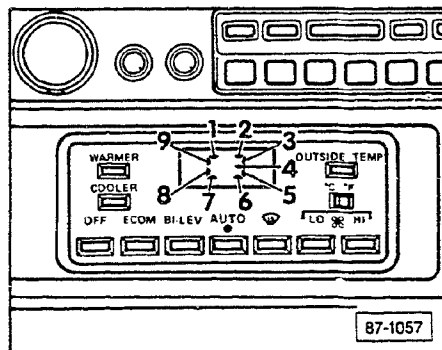
|                                                                 |
|-----------------------------------------------------------------|
| I — Defrost vent (windshield)                                   |
| II — Instrument panel outlet                                    |
| III — Footwell outlet                                           |
| 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

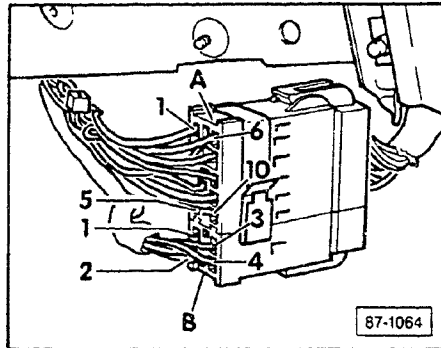
**Yes**

**No**

Go to  
section  
D8-220

- repair as necessary

End



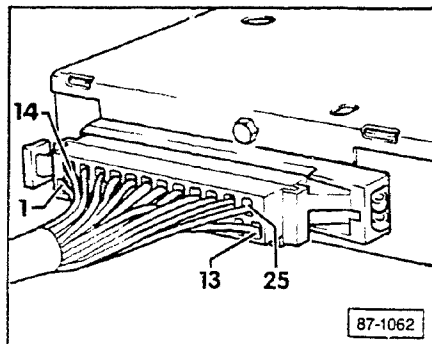
## Errors in the area of climate control regulation

### 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 A according to wiring diagram

End



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

- |                |                   |
|----------------|-------------------|
| • less than 8V | • greater than 8V |
|----------------|-------------------|

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

- |                                      |                                     |
|--------------------------------------|-------------------------------------|
| • greater than 4.7V and less than 6V | • less than 4.7V or greater than 6V |
|--------------------------------------|-------------------------------------|

Go to  
**(A)**  
next page

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

- wiring OK

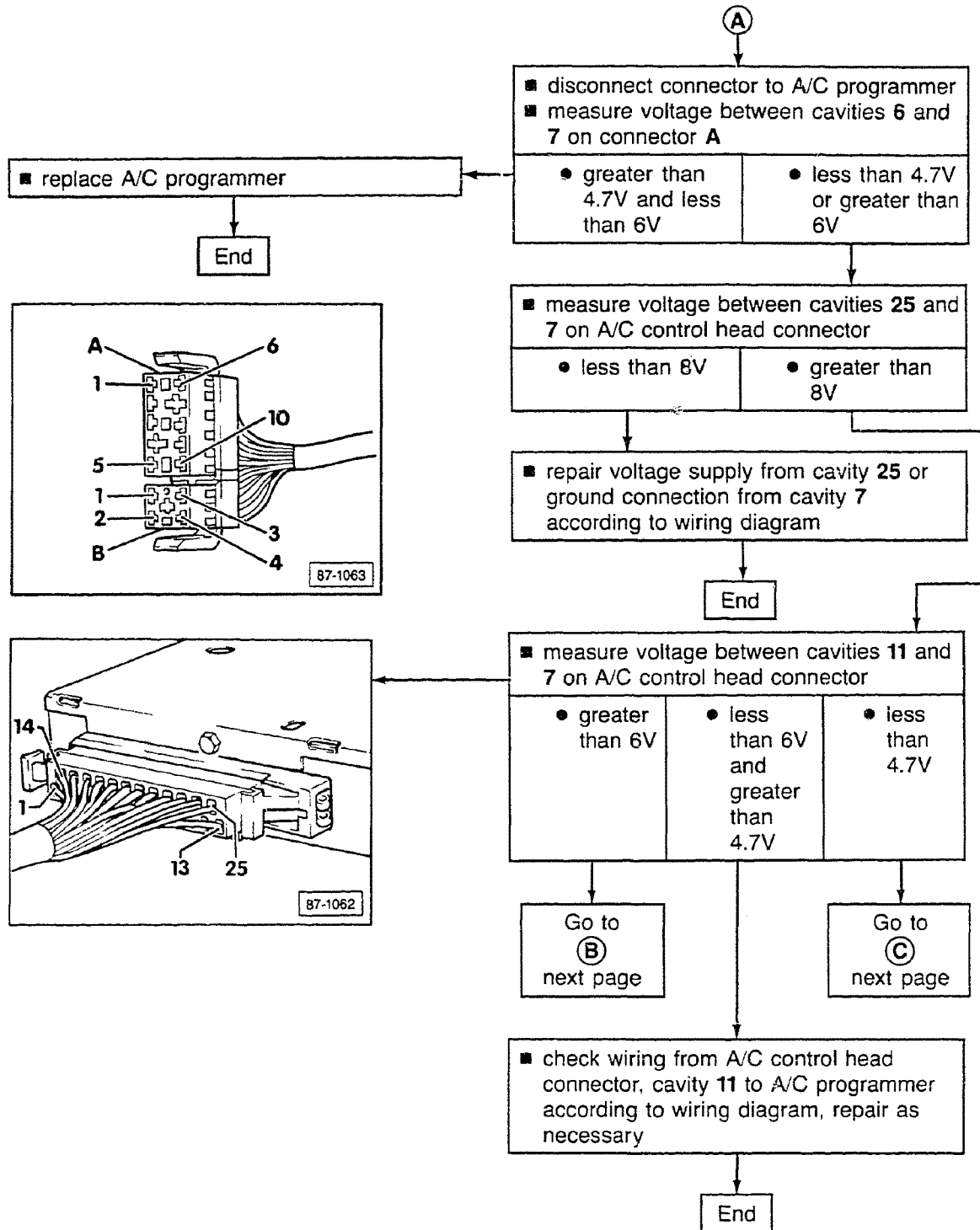
Yes

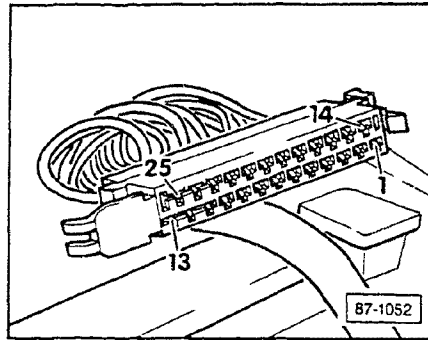
No

Go to  
**(D)**  
three pages following

■ repair as necessary

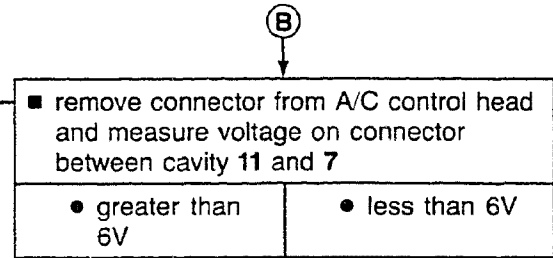
End





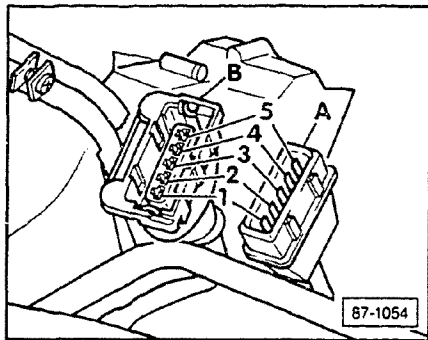
- eliminate short circuit in wiring to cavity 11 according to wiring diagram

End



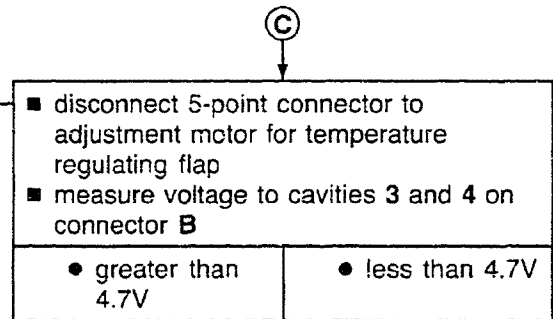
- replace A/C control head

End



- replace adjustment motor for temperature regulating flap (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

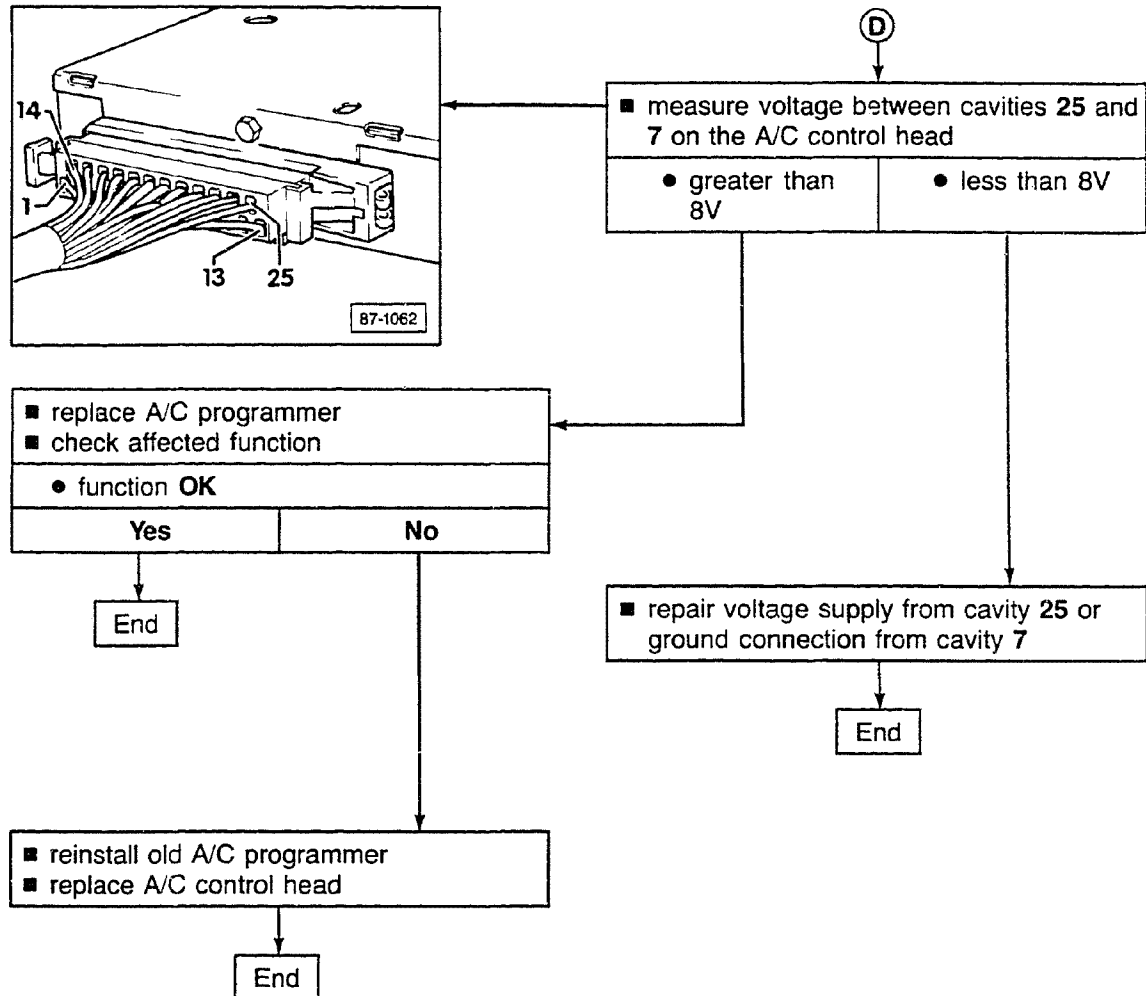
No

- replace A/C control head

End

- repair as necessary

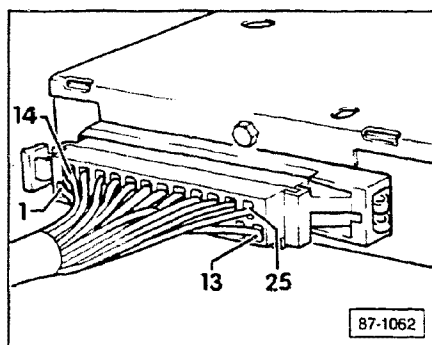
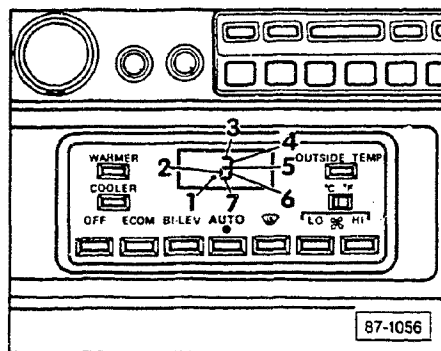
End



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

|                                                                                                                                                                                              |                                                                                                                                 |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>■ switch ignition <b>ON</b></li> <li>■ set mode to <b>AUTO</b></li> <li>■ set temperature to 24°C</li> <li>■ start diagnosis on channel 17</li> </ul> |                                                                                                                                 |
| <ul style="list-style-type: none"> <li>● segment 2 (high-pressure cutout switch F118, red housing) lights up</li> </ul>                                                                      | <ul style="list-style-type: none"> <li>● segment 2 (high-pressure cutout switch F118, red housing) does not light up</li> </ul> |

Go to  
**(A)**  
next page



|                                                                                                                                    |    |
|------------------------------------------------------------------------------------------------------------------------------------|----|
| <ul style="list-style-type: none"> <li>■ remove connector from high-pressure switch F118</li> <li>● segment 2 lights up</li> </ul> |    |
| Yes                                                                                                                                | No |

Go to  
**(B)**  
two pages following

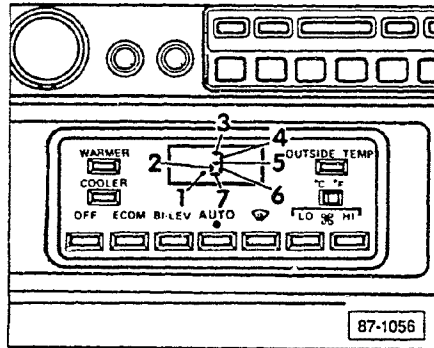
|                                                                                                                                                                                   |     |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| <ul style="list-style-type: none"> <li>■ check wiring from A/C control head connector cavity 5 to high-pressure switch F118 for short circuit</li> <li>● short circuit</li> </ul> |     |
| No                                                                                                                                                                                | Yes |

■ replace A/C control head

■ repair as necessary

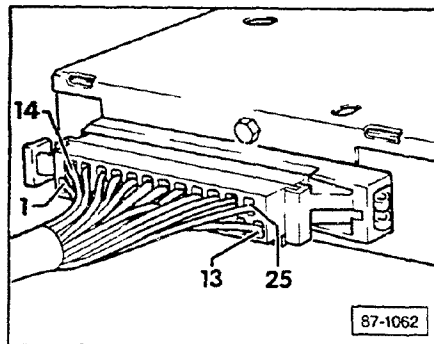
End

End



■ replace A/C high-pressure switch F118

End



**A**

- 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

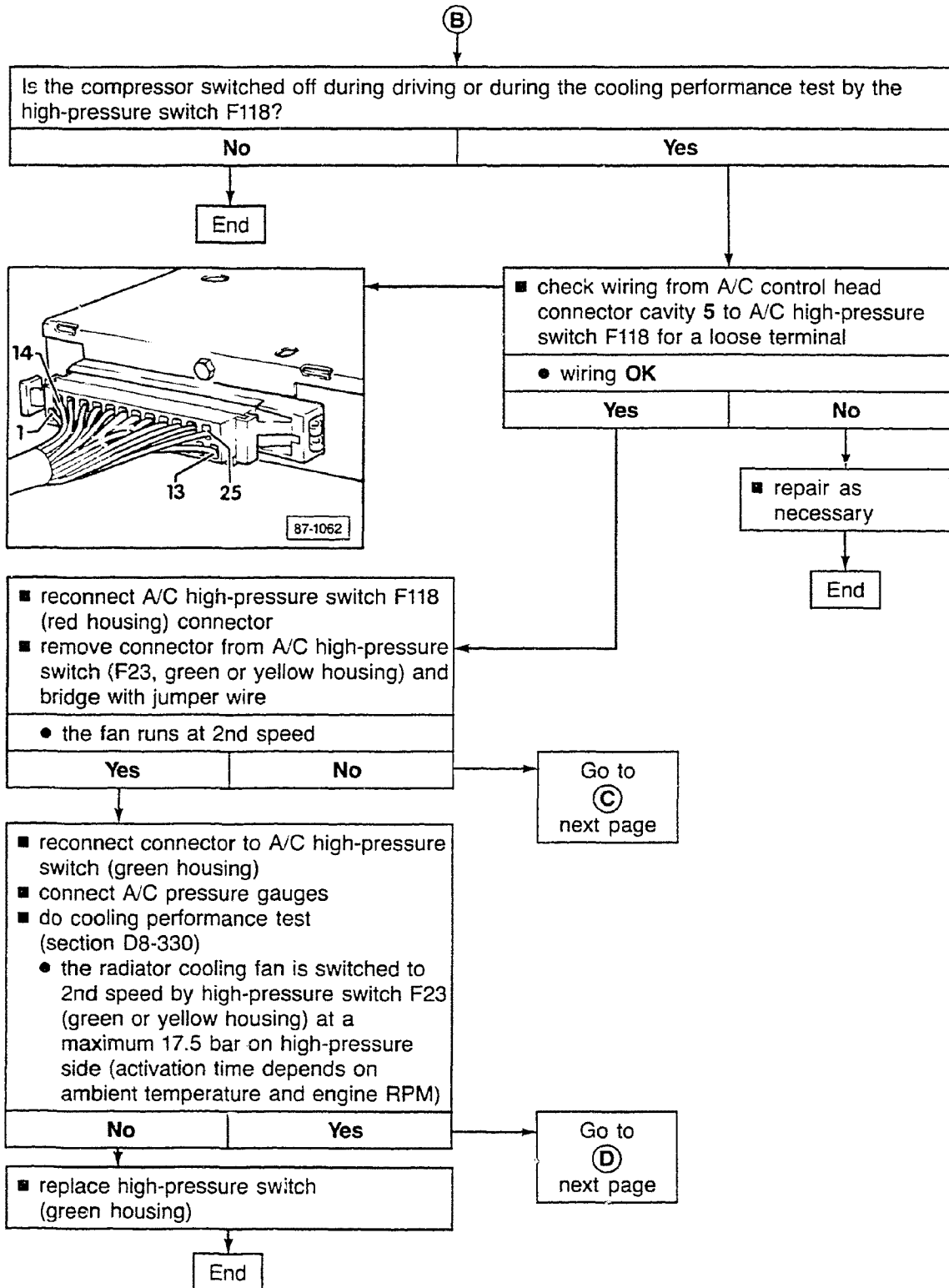
No

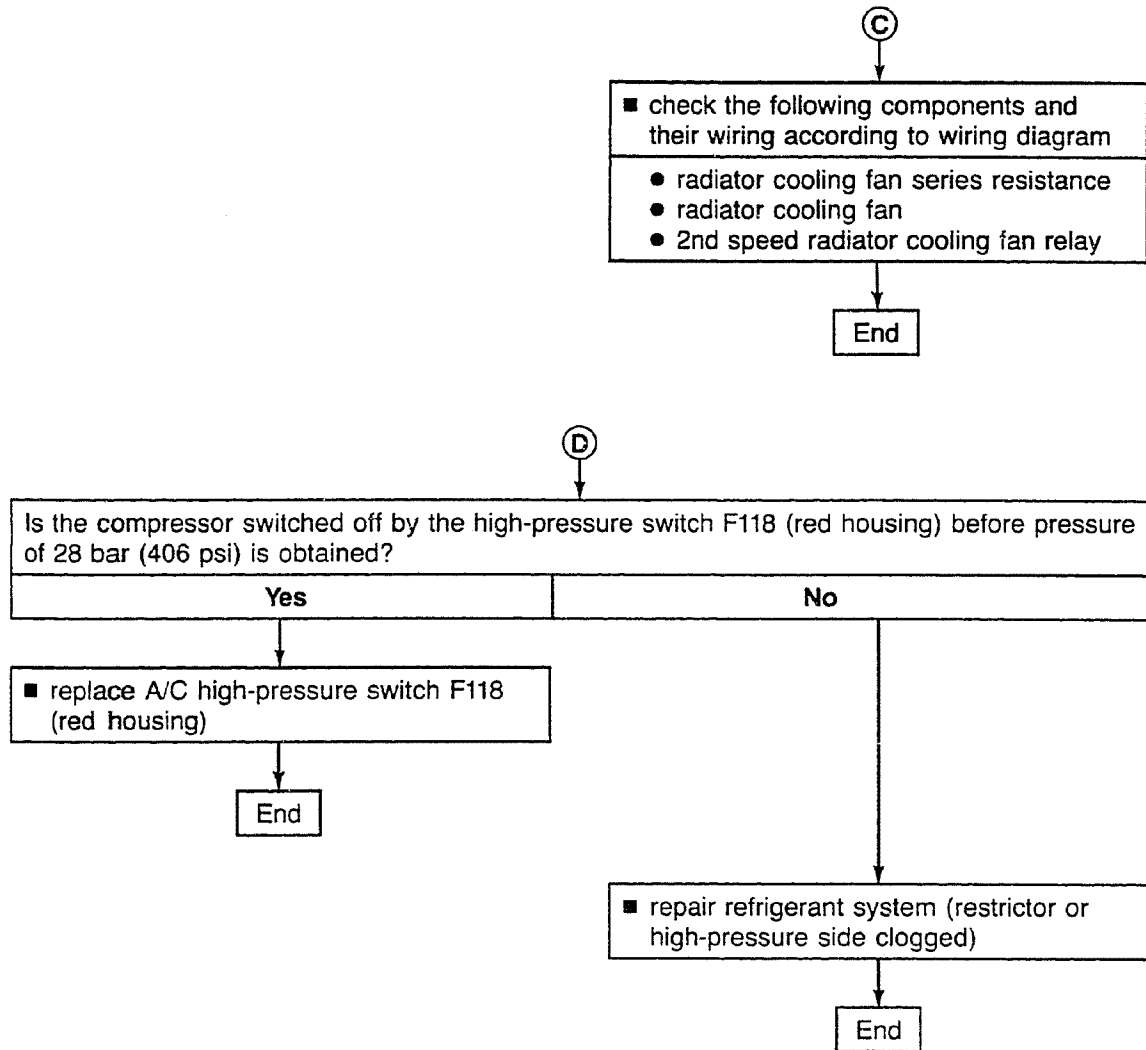
- replace A/C control head

End

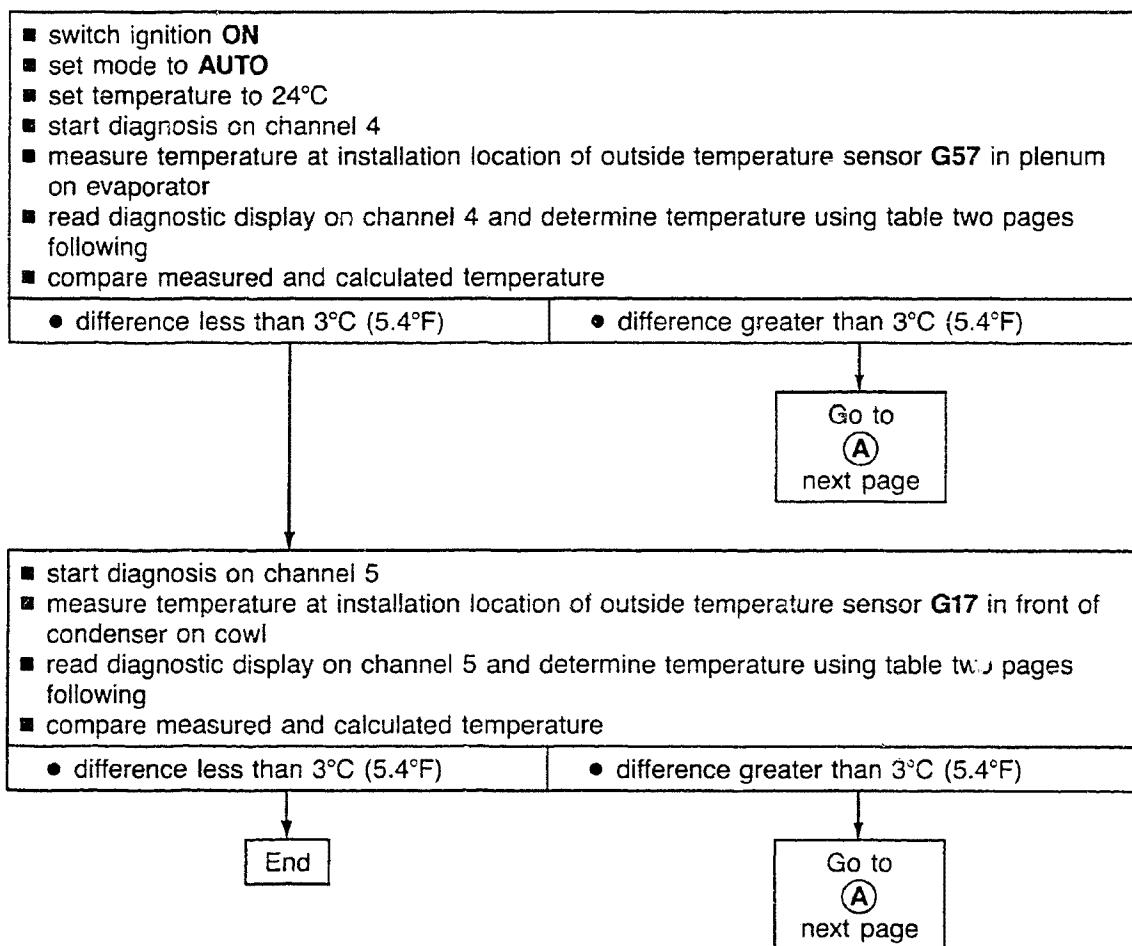
- repair as necessary

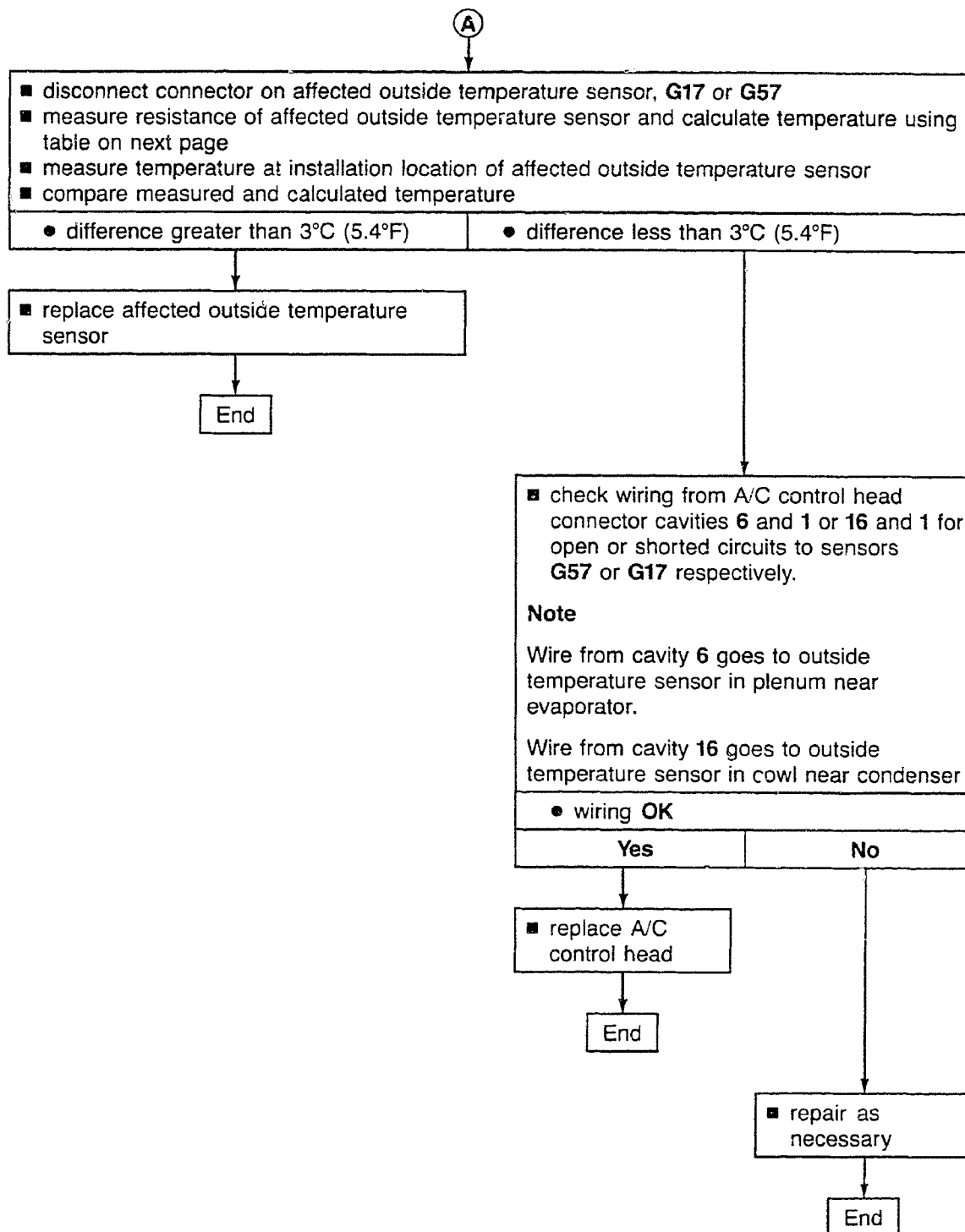
End





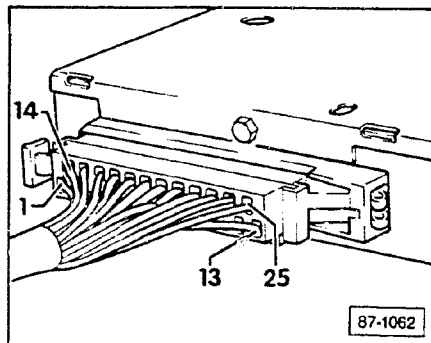
## Outside temperature sensors (G57, G17), checking





## Resistance value of outside temperature sensors

| Outside temperature<br>in °C (°F)<br>at installation location | Diagnostic display<br>Diagnostic channel<br>4 and 5 | Resistance value<br>of outside temperature<br>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                                                         |



## 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  
D8-260 (check low-  
pressure switch)

- difference between displayed and measured voltage

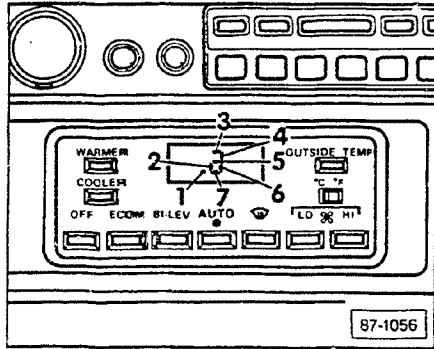
- less than 1.5V

- greater than 1.5V

End

- replace A/C control head

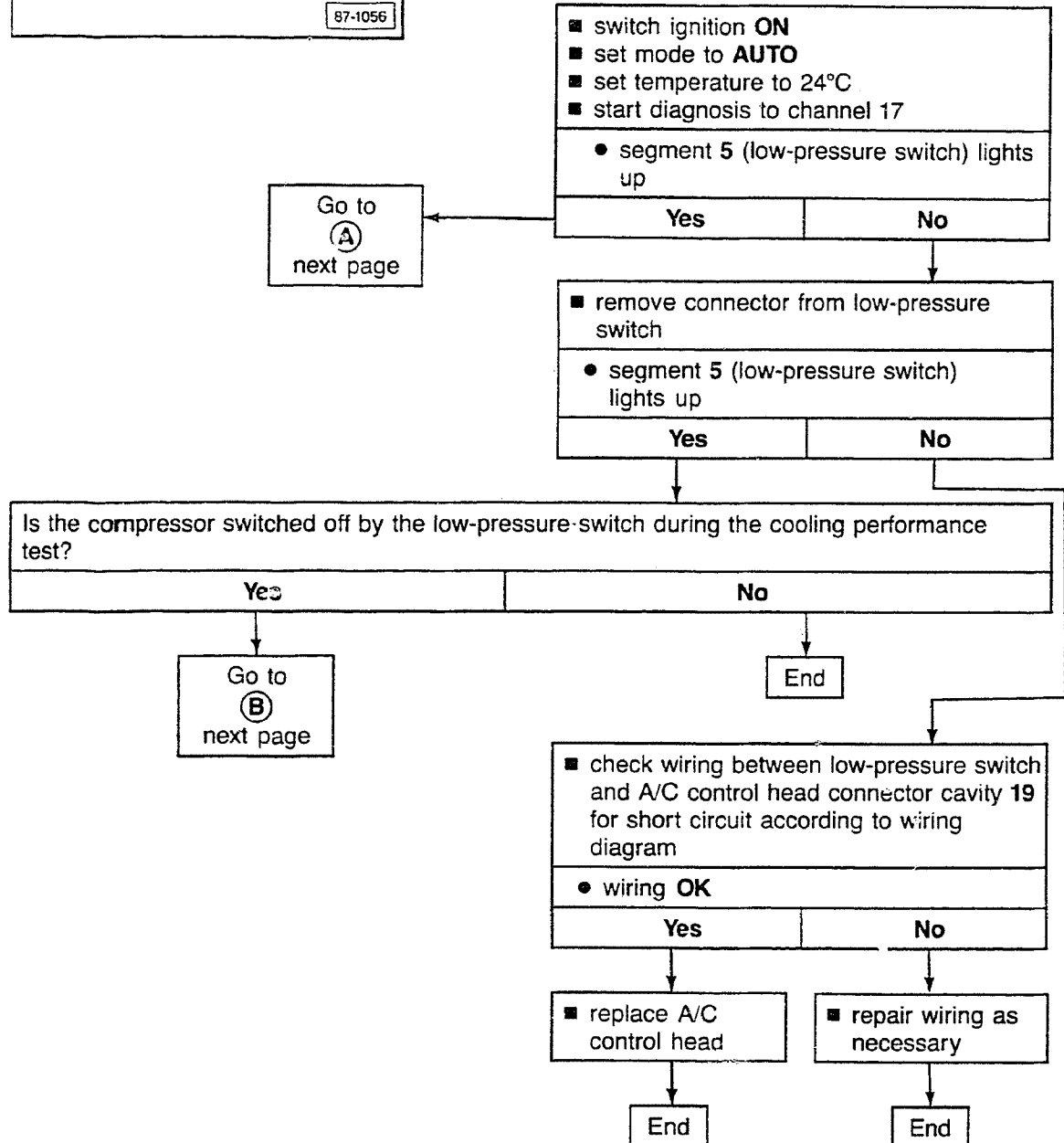
End

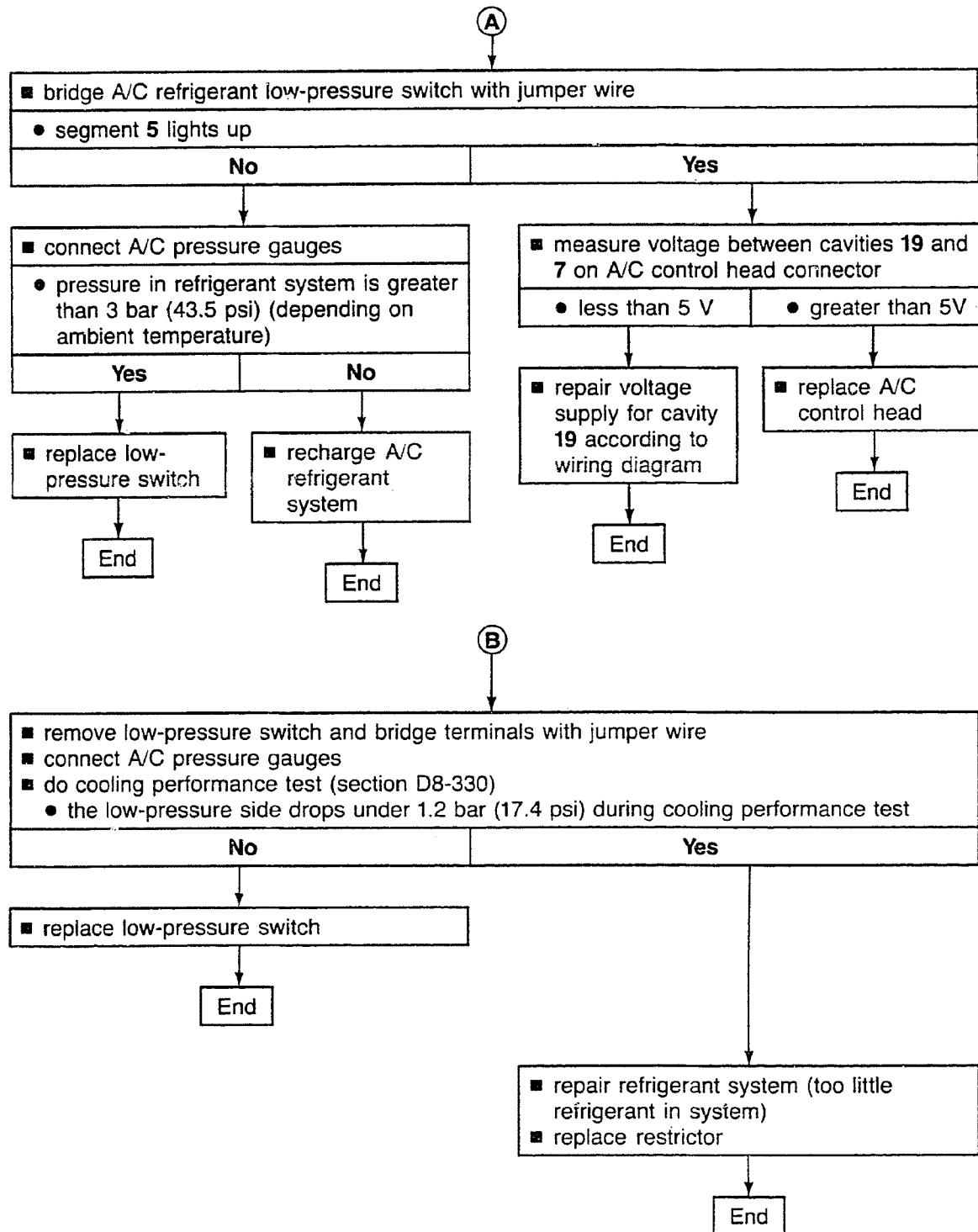


## A/C refrigerant low-pressure switch (F73), checking

### Note

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



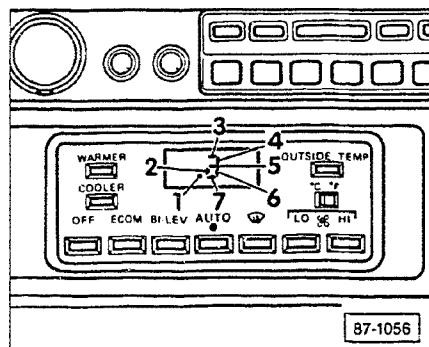


## Kick-down switch F46, checking

### 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  
Ⓐ  
next page

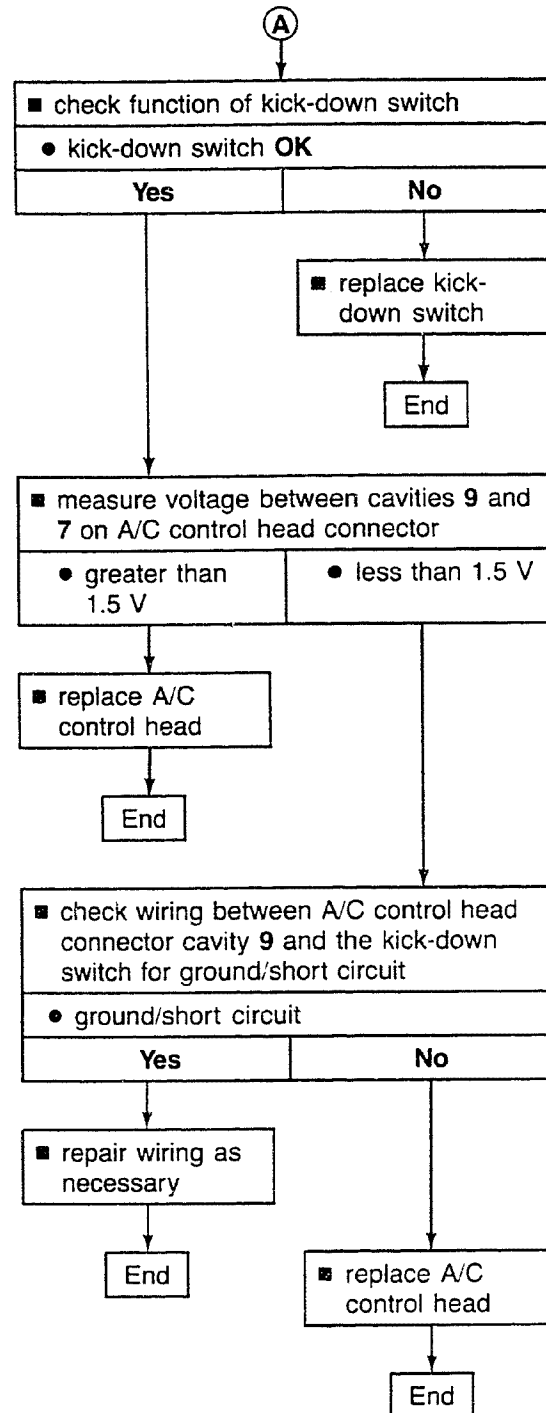
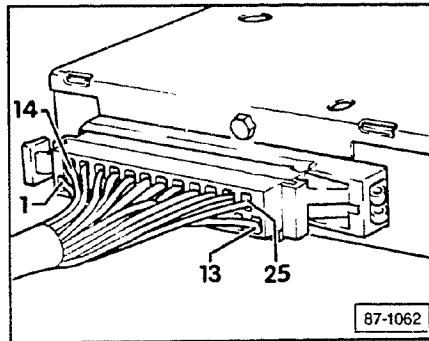
- depress accelerator pedal fully
- segment 6 (kick-down switch) lights up

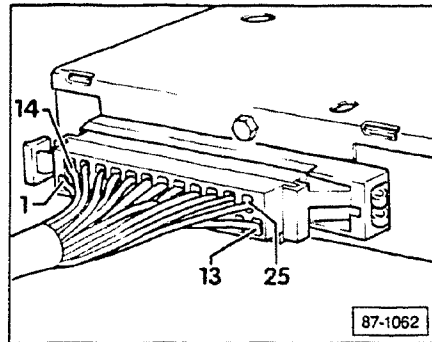
Yes

No

End

Go to  
Ⓑ  
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

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

|                                                                                                                                              |                     |
|----------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| <p>■ depress accelerator pedal (kick-down switch closes)</p> <p>■ measure voltage between cavities 9 and 7 on A/C control head connector</p> |                     |
| ● 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

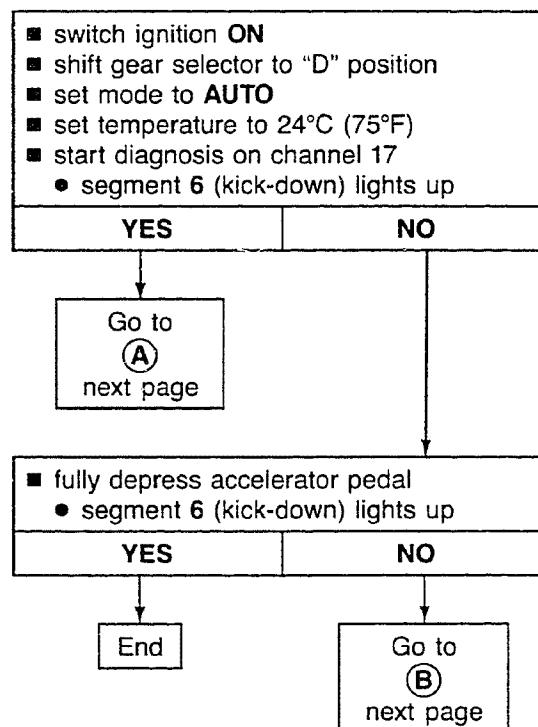
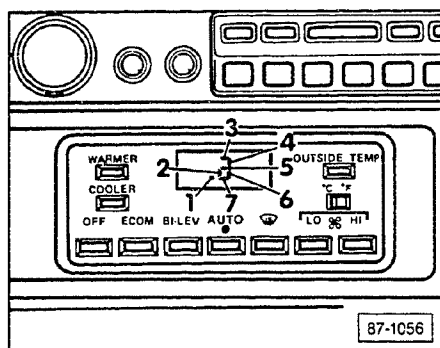
The A/C compressor is switched off for 12 seconds when kick-down function is activated.

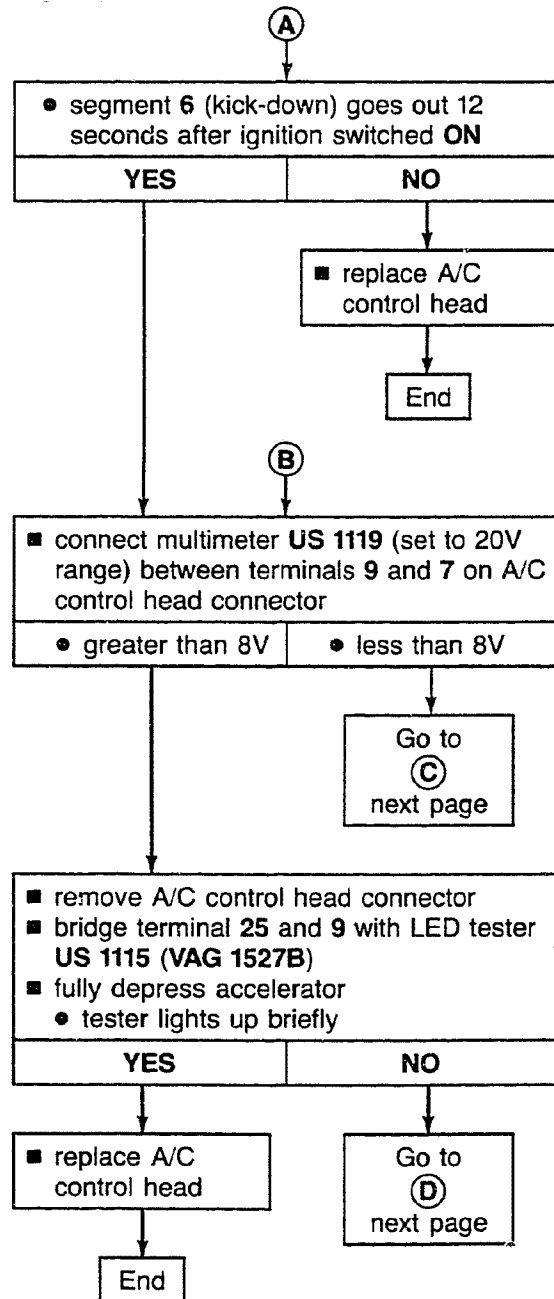
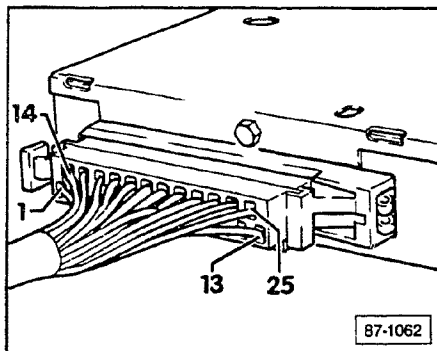
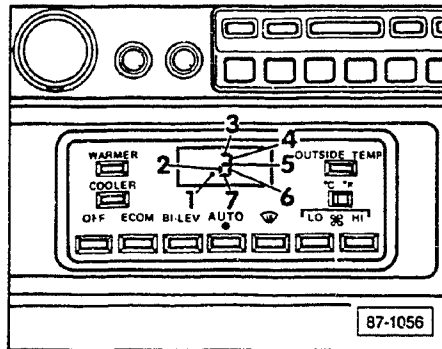
A/C kick-down is controlled by:

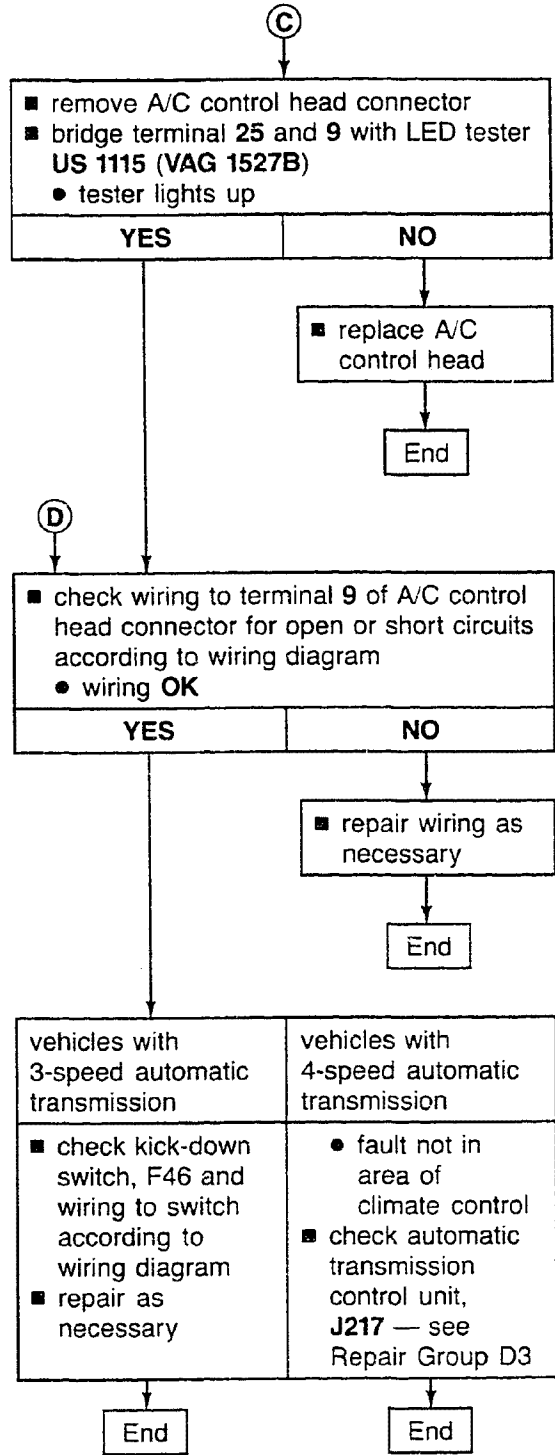
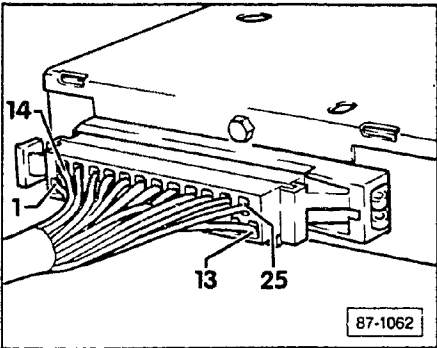
- A/C kick-down switch, **F46** on vehicles with 3-speed automatic transmission
- automatic transmission control unit, **J217** on vehicles with 4-speed automatic transmission

### Note

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

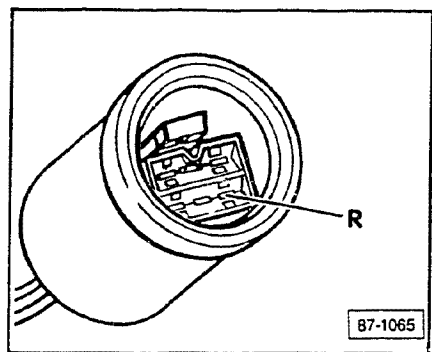
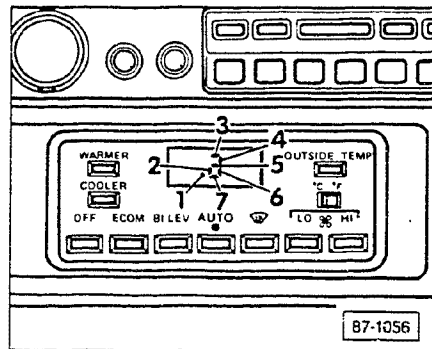






## Electronic thermoswitch (multi-function temperature sensor) F76, checking

**Do Not** attempt to test switch by alternative method.



|                                                                                                                                                                                              |           |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <ul style="list-style-type: none"> <li>■ switch ignition <b>ON</b></li> <li>■ set mode to <b>AUTO</b></li> <li>■ set temperature to 24°C</li> <li>■ start diagnosis on channel 17</li> </ul> |           |
| <ul style="list-style-type: none"> <li>• segment 7 (hot light switch) lights up</li> </ul>                                                                                                   |           |
| <b>Yes</b>                                                                                                                                                                                   | <b>No</b> |

Go to  
**(A)**  
next page

|                                                                                                                                                         |           |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <ul style="list-style-type: none"> <li>■ remove connector from thermoswitch</li> <li>■ connect terminal <b>R</b> to ground with jumper cable</li> </ul> |           |
| <ul style="list-style-type: none"> <li>• segment 7 lights up</li> </ul>                                                                                 |           |
| <b>Yes</b>                                                                                                                                              | <b>No</b> |

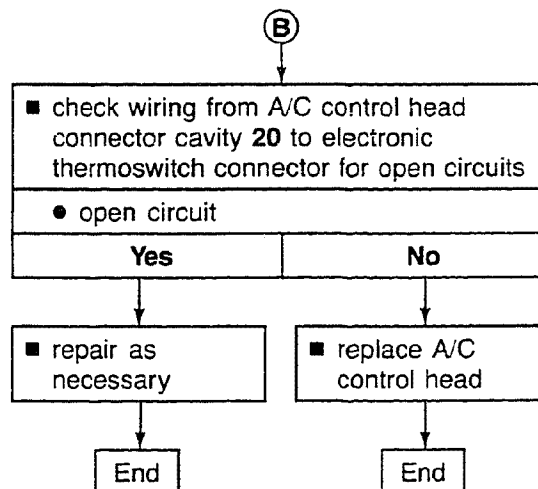
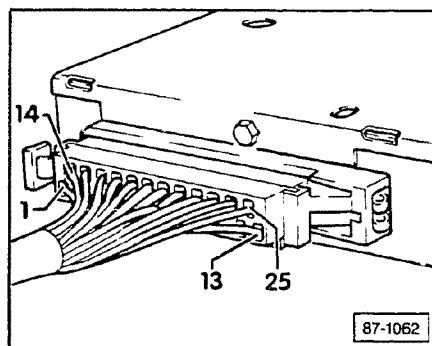
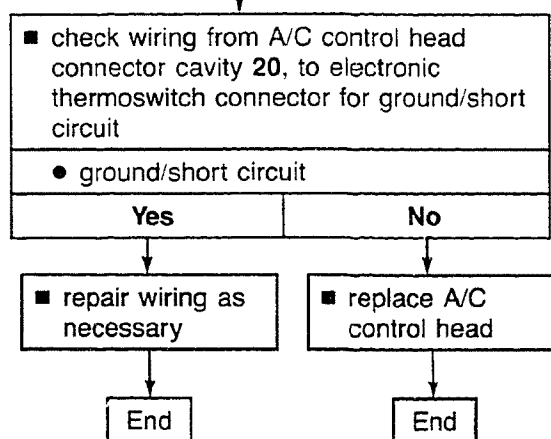
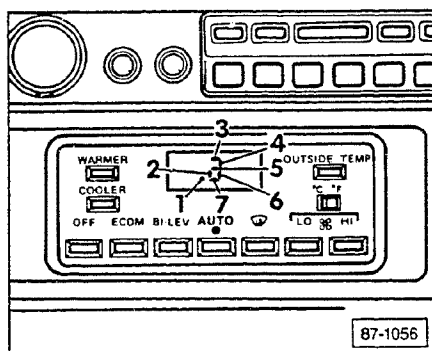
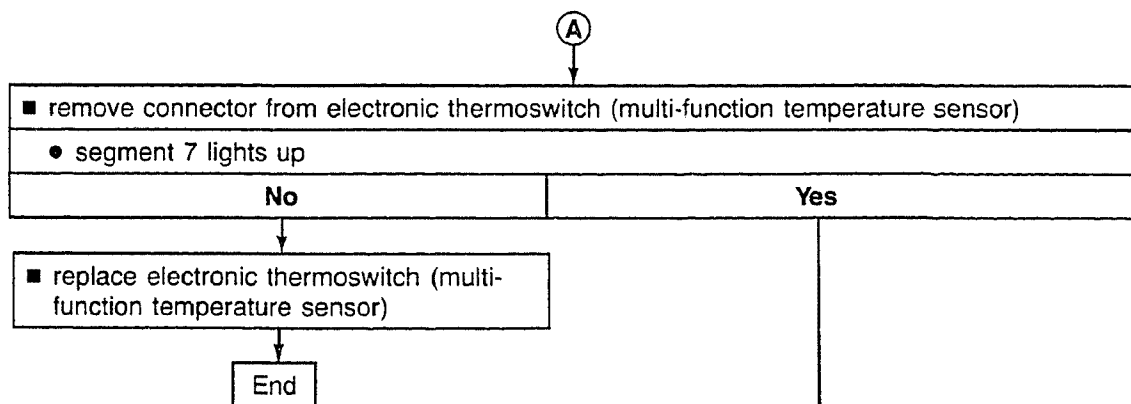
Go to  
**(B)**  
next page

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

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

End

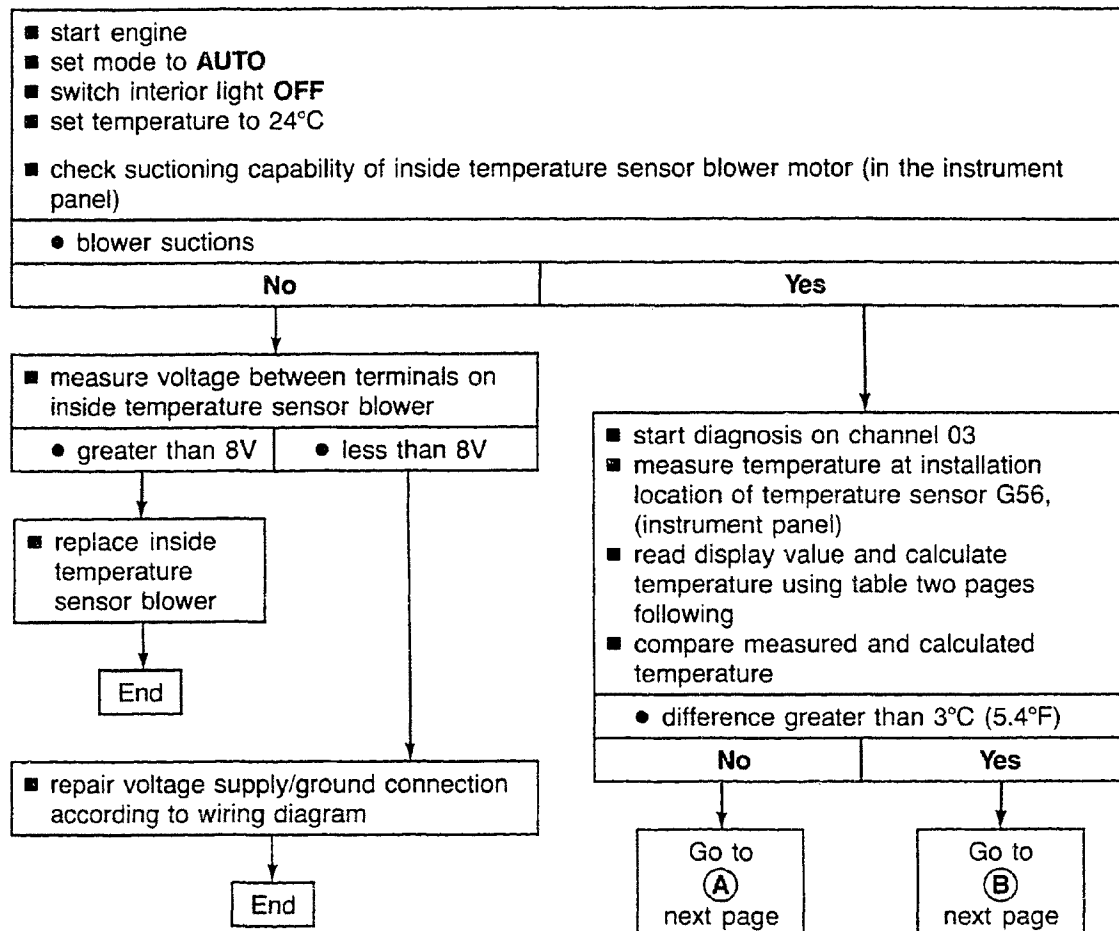
End

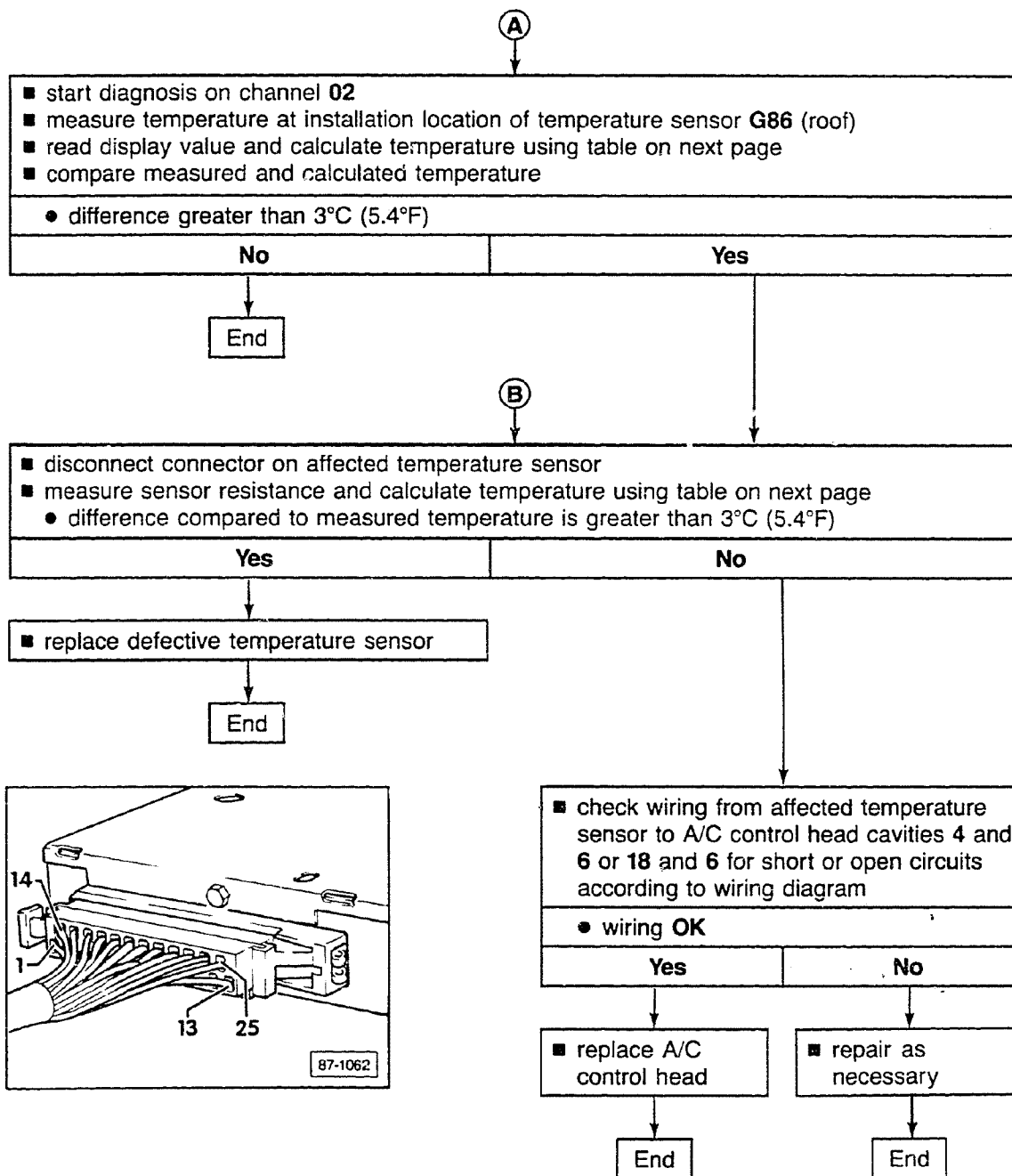


## Inside temperature sensors (G56, G86), checking

### 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.





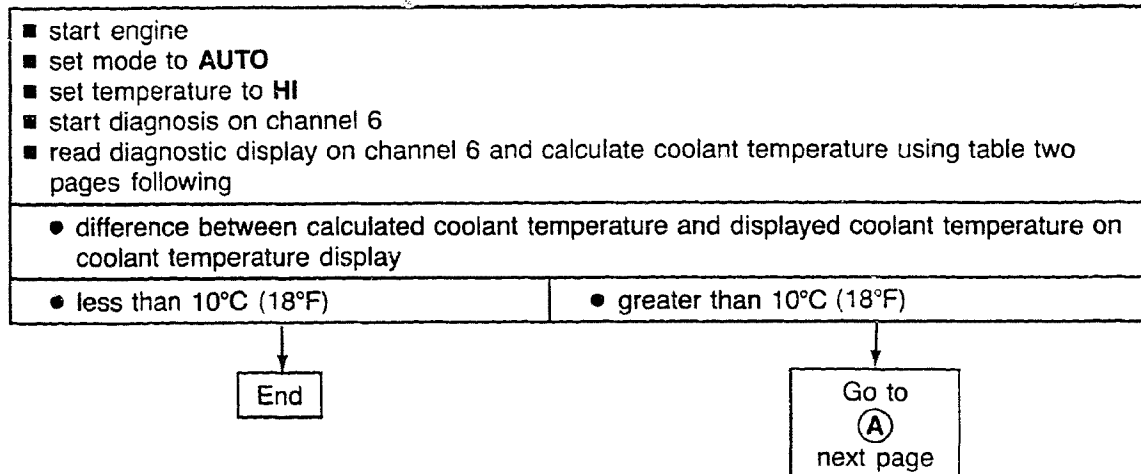
Resistance value of interior temperature sensors, G56 and G86

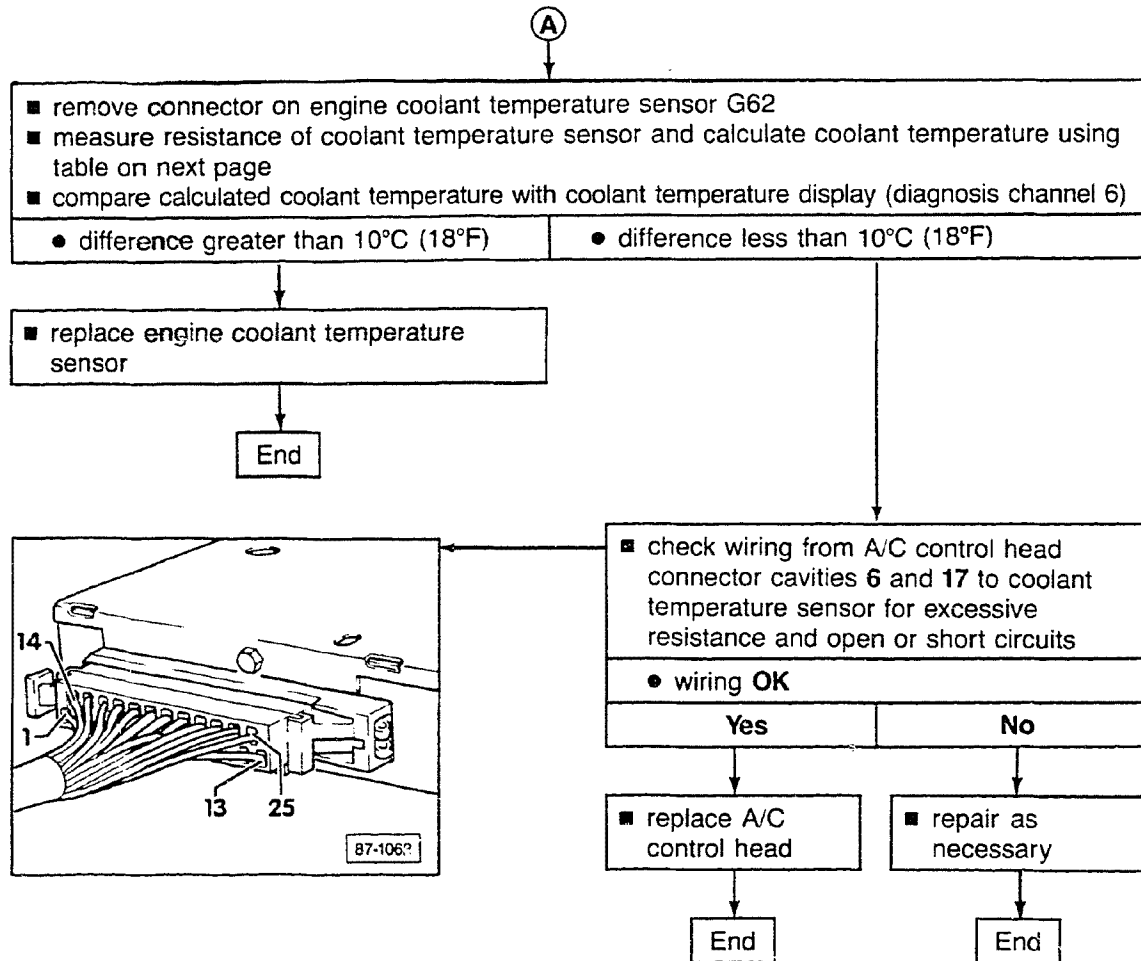
| Inside temperature<br>in °C (°F)<br>at installation location | Diagnostic display<br>Diagnostic channel<br>2 and 3 | Resistance value<br>of inside temperature<br>sensor (ohms) |
|--------------------------------------------------------------|-----------------------------------------------------|------------------------------------------------------------|
| 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.





Resistance value of coolant temperature sensor, G62

| Coolant temperature<br>in °C (°F)<br>at installation location | Diagnostic display<br>(Diagnostic channel 6) | Resistance value of<br>coolant temperature<br>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

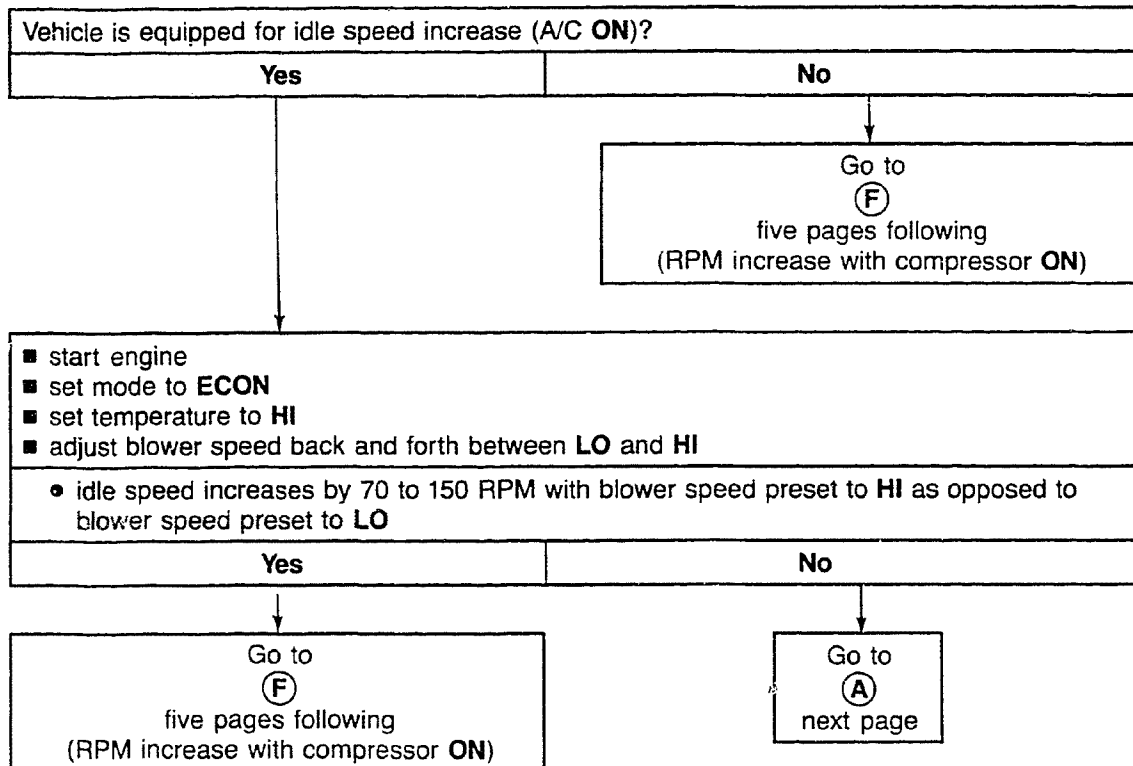
### Note

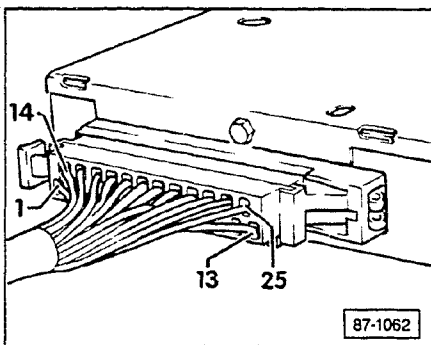
Idle speed increase (A/C **ON**)  
(idle speed increases when A/C is switched **ON**)

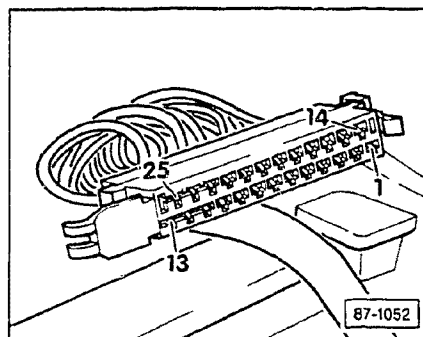
- not for vehicles with CIS-E III fuel injection
- for vehicles with CIS fuel injection (check according to wiring diagram whether vehicle is equipped for idle speed increase)
- idle speed increase occurs in all modes (except **OFF**), as soon as high heating performance is required and in the **AUTO**,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







■ check wiring from cavity **23** on A/C control head connector to cavity **6** of idle stabilizer control unit (for CIS Turbo) for open or shorted circuits according to wiring diagram

● wiring **OK**

|    |     |
|----|-----|
| No | Yes |
|----|-----|

■ repair as necessary

End

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

End

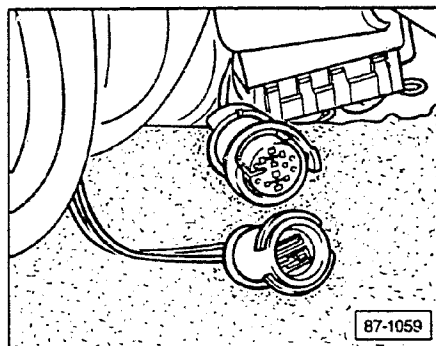
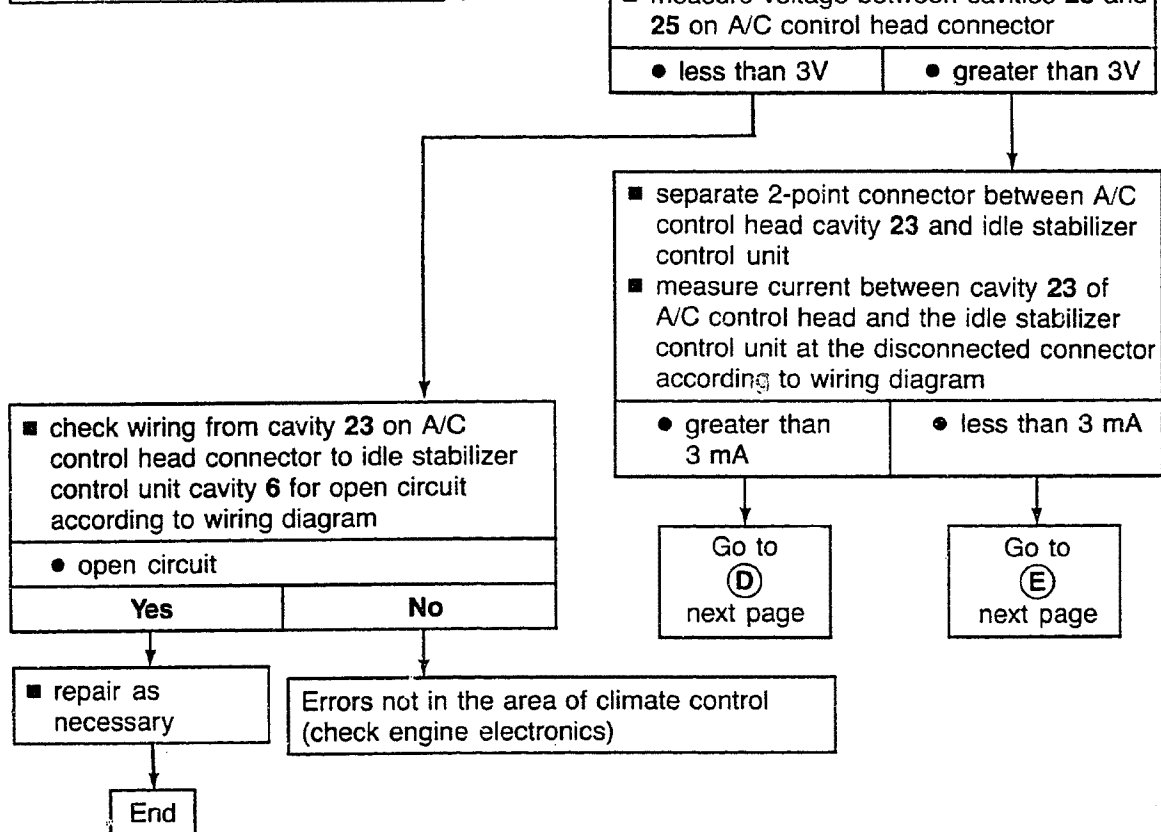
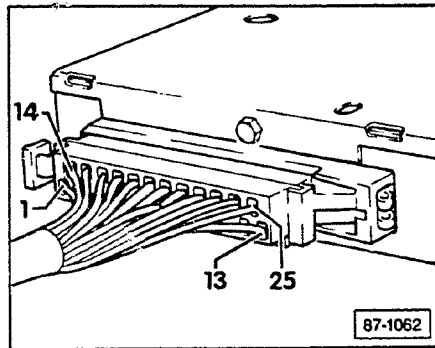
(B)

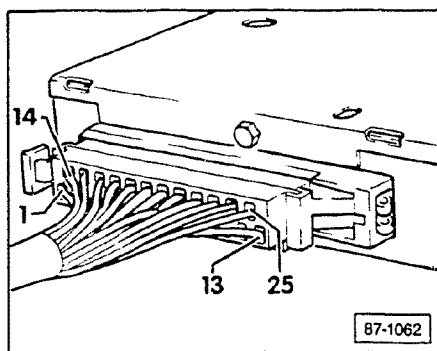
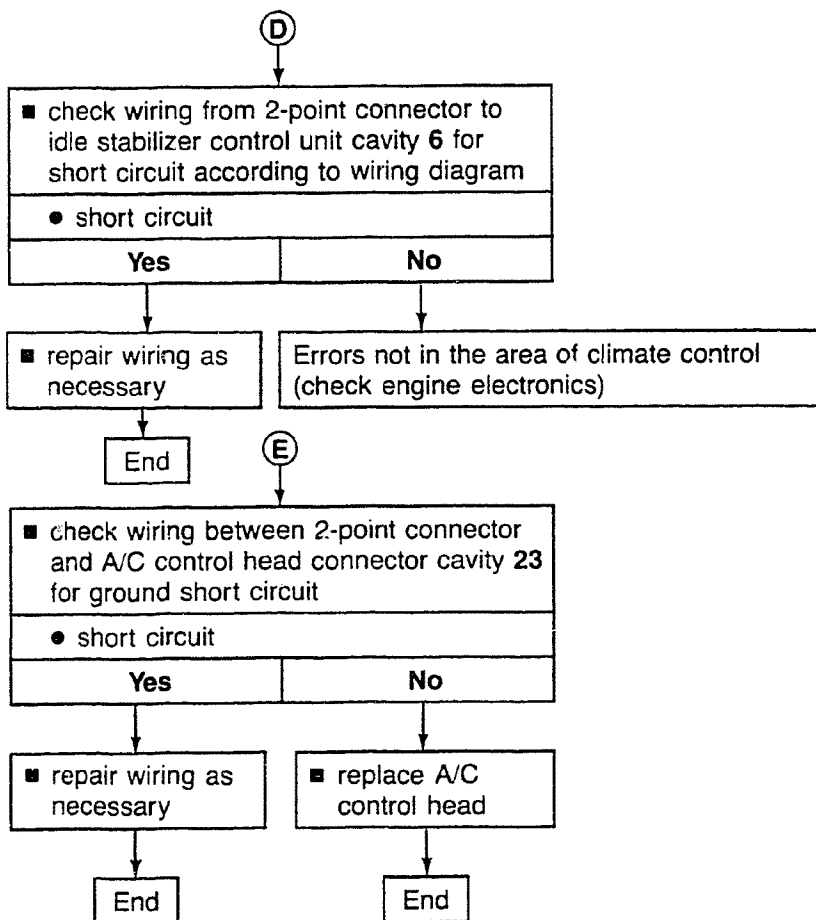
■ remove A/C control head connector  
■ measure current between cavities **23** and **7** on connector

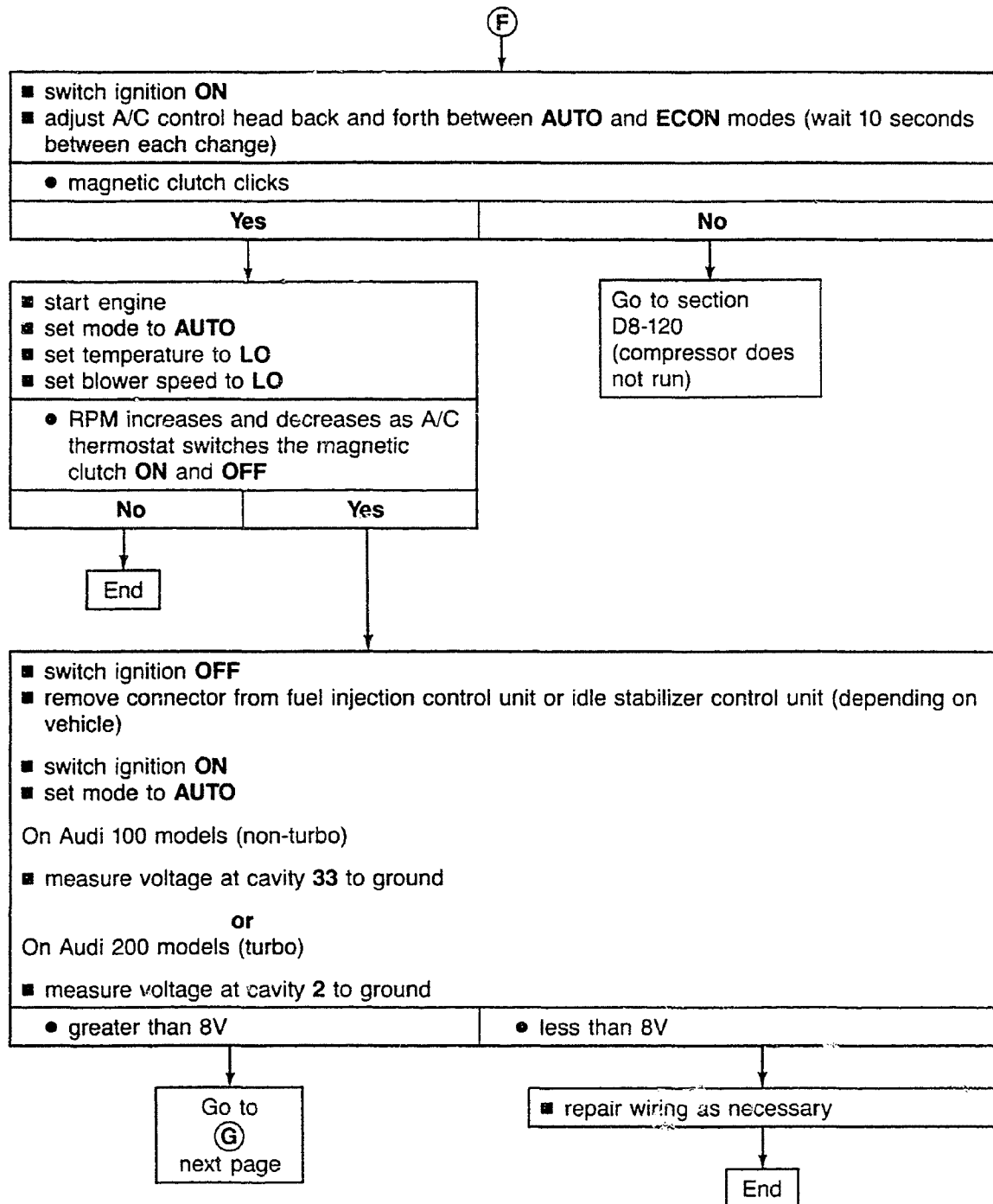
|                      |                   |
|----------------------|-------------------|
| ● greater than 10 mA | ● less than 10 mA |
|----------------------|-------------------|

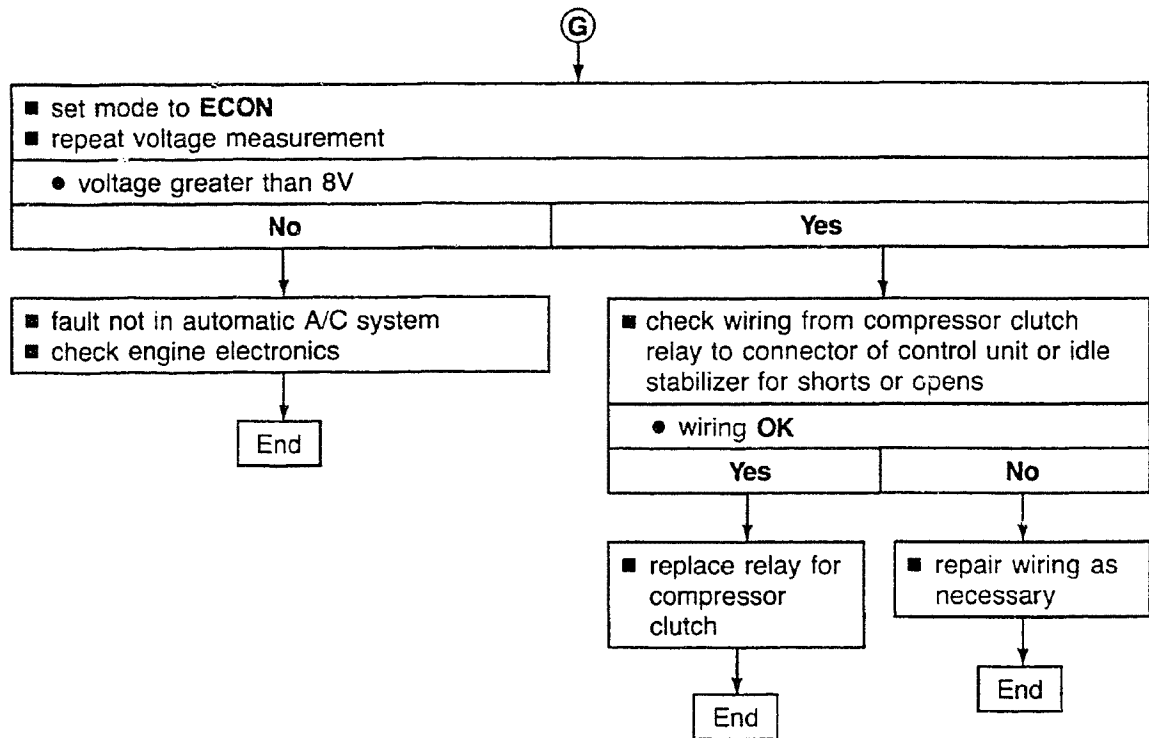
■ replace A/C control head

End









## A/C cooling performance, checking

### Note

Before each new test sequence

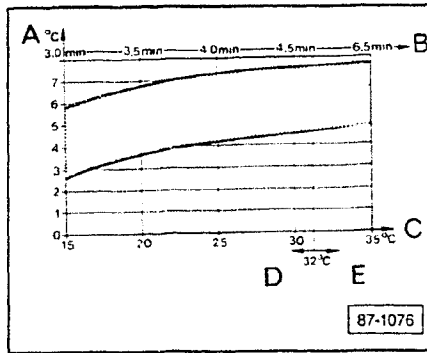
- switch ignition **OFF**
- start engine
- set mode to **ECON**
- set temperature to **LO**
- set blower to **HI**
- run in this condition approximately 5 minutes

### 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

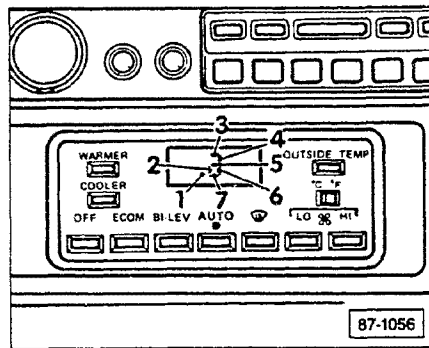
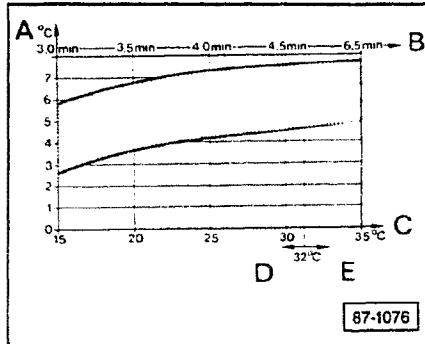
- set mode to **AUTO**
- set temperature to **LO**
- set blower speed to **HI**
- open instrument panel outlets:
  - compressor is driven or switches **ON**
  - fresh air blower runs
  - radiator cooling fan runs
  - recirculation/fresh air flap goes into "recirculation" position after 1 minute
  - water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



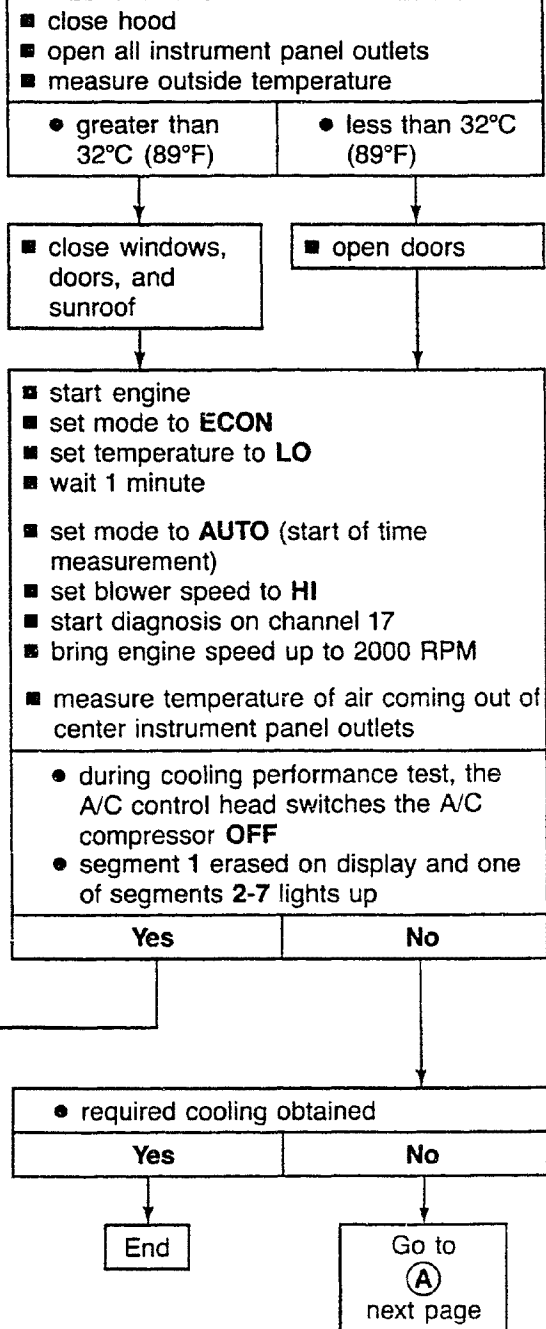
## Testing

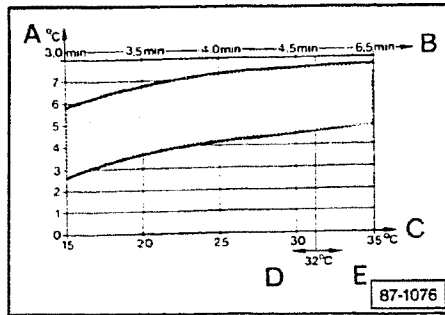
The temperature of the air coming out of the center instrument panel outlets must be within the tolerance and depends on the ambient temperature and cool-down period.

- 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 D8-260
- segment 6 lights up  
Go to section D8-270 (through 1990 m.y.) or D8-280 (from 1991 m.y.)
- segment 7 lights up  
Go to section D8-290





- 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