

### 2.1.2.2. Coolant temperature sensor

It is located in the intake manifold coolant jacket.

It provides to the ECU engine coolant temperature information.

From this input the ECU will :

- Enrich air/fuel mixture when the engine is cold,
- Control engine warm up idle speed,
- Increase the spark advance when the engine is cold,
- Inhibit the deceleration fuel cut off and canister purge when the engine is cold.

### 2.1.2.3. Magnetic sensor

It is located on the clutch housing.

### 2.1.2.4. Throttle position sensor

It is located on the throttle body.

It provides to the ECU informations on the throttle position for acceleration correction and full load correction.

### 2.1.2.5. Oxygen sensor

It is located on the exhaust pipe.

The voltage output of this sensor varies with the exhaust gas oxygen content.

The ECU utilizes this information to correct the air/fuel ratio.

### 2.1.2.6. Manifold absolute pressure sensor

It is located on the vehicle body and connected by an hose to the throttle body.

It reacts to the intake manifold absolute pressure.

The ECU uses this information for injection and ignition timing as well as for barometric information.

### 2.1.2.7. Closed throttle switch

It is included in the idle speed actuator (see § 2.1.3.1.)

It provides to the ECU information on the engine mode of operation (idle or not).

### 2.1.2.8. Battery voltage

The battery voltage input is used to compensate for the increase in injector opening delay when the battery voltage drops.

### 2.1.2.9. Ignition switch

Two informations are given by the switch to the ECU :

- Ignition switch on,
- Cranking in progress.

## 2.1.3. System actuators

### 2.1.3.1. Idle speed actuator

It is located on the throttle body.

The actuator, controlled by the ECU, changes the throttle stop angle by being a movable idle stop.

In that way, the ECU controls the engine idle speed and the throttle position during deceleration.

There is no idle speed adjustment.

### 2.1.3.2. Ignition power module

It is located on the right side of the engine compartment.

In order to provide the engine with the spark advance calculated from the inputs, the ECU triggers the ignition coil through the ignition power module.

### 2.1.3.3. Injector

It is part of the throttle body assembly.

It contains a solenoid with a plunger that is pulled upward when the injector is energized.

The ECU controls the injector pulse width according to the value calculated from the inputs.

### 2.1.3.4. Canister purge solenoid

The vacuum for the vapor canister purge function is controlled by this solenoid.

When the solenoid is energized by the ECU, it prevents vacuum action on the canister.

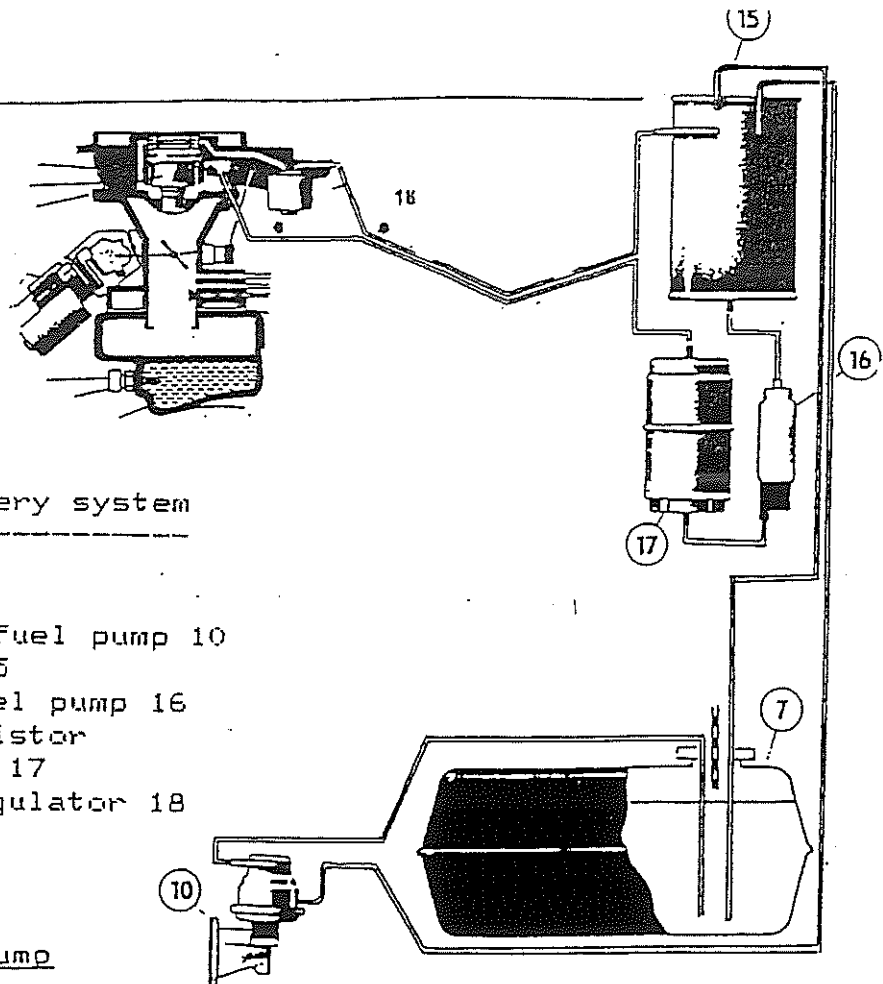
If the solenoid wire connector is disconnected, the canister purge function is operational at all times.

### 2.1.3.5. Power relay, fuel pump relay

These two relays are located on the right side of the engine compartment.

The power relay is energized during start up and remains energized 3 to 5 seconds after the engine is stopped, in order to enable the ECU to extend the idle speed actuator for the next start.

The fuel pump relay is energized by the ECU (battery voltage applied to the relay, ground provided by the ECU).



## 2.1.4 Fuel delivery system

Includes :

- Fuel tank 7
- Mechanical fuel pump 10
- Reservoir 15
- Electric fuel pump 16
- Ballast resistor
- Fuel filter 17
- Pressure regulator 18

### 2.1.4.1. Fuel pump

It is located on the right side of the engine compartment.

It is controlled by the ECU.

### 2.1.4.2. Ballast resistor

It is attached on a panel on the right side of the engine compartment.

Its purpose is to reduce the fuel pump speed after the engine is started up.

When the ignition switch is in the start position, the resistor is bypassed.

### 2.1.4.3. Fuel filter

It is attached on a panel on the right side of the engine compartment.

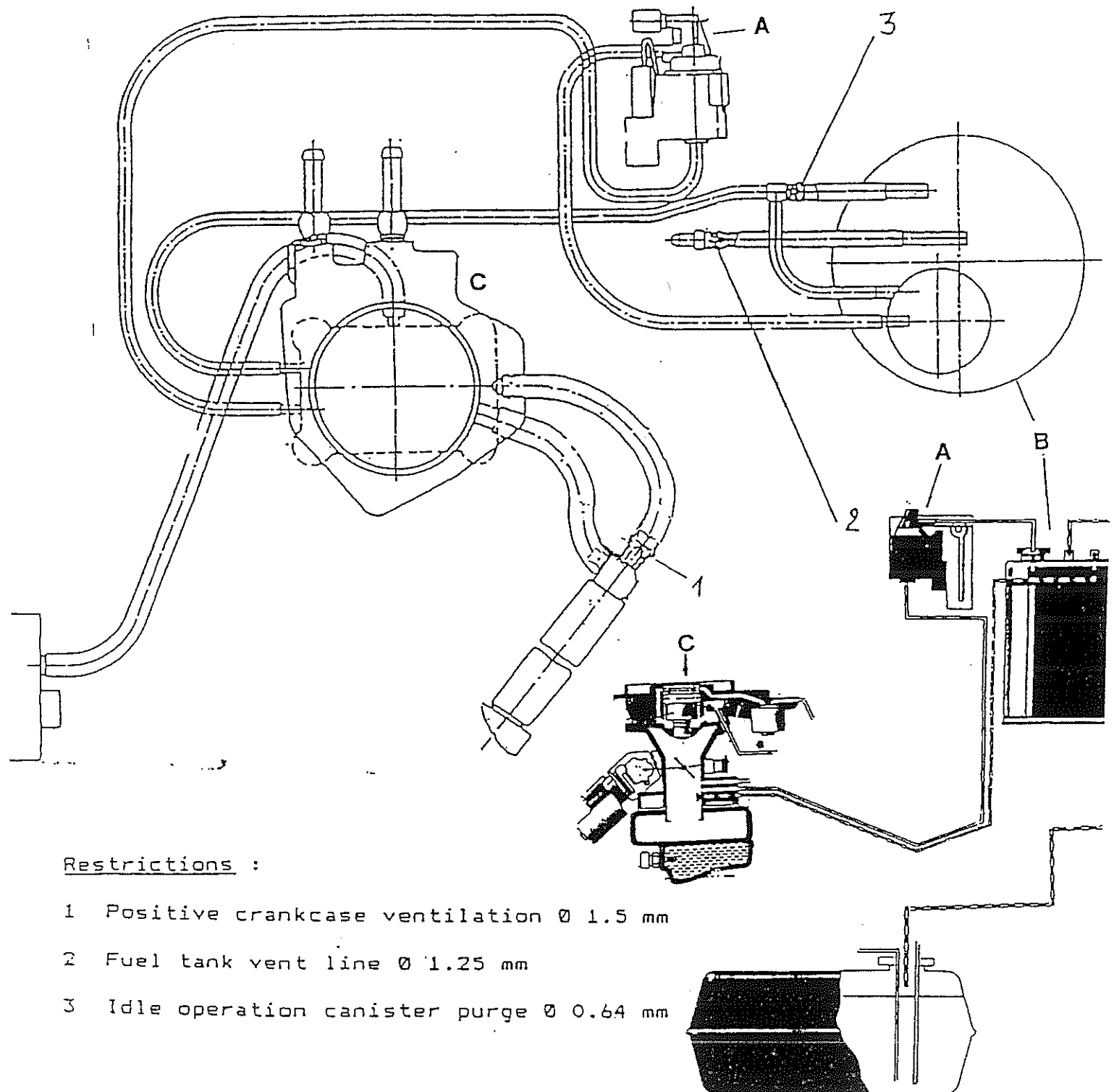
### 2.1.4.4. Fuel pressure regulator

The fuel pressure regulator is part of the throttle body assembly.

The fuel pump delivers fuel in excess of the maximum required by the engine. The excess fuel flows back to the fuel tank from the pressure regulator through the return hose.

## 2.1.5. Fuel evaporative control system and positive crankcase ventilation system

### EVAFORATIVE SYSTEM CONFIGURATION



#### Restrictions :

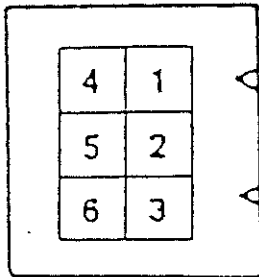
- 1 Positive crankcase ventilation  $\varnothing$  1.5 mm
- 2 Fuel tank vent line  $\varnothing$  1.25 mm
- 3 Idle operation canister purge  $\varnothing$  0.64 mm



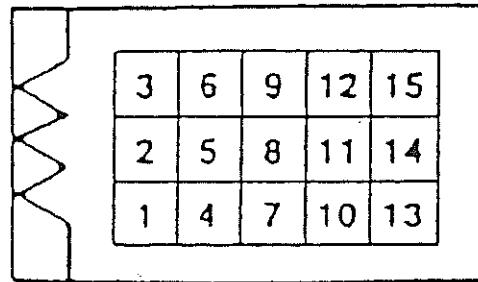
2.1.7 WIRING DIAGRAM CODES

- 100 Electronic Control Unit (ECU)
- 101 Coolant Temp Sensor
- 102 Injector
- 103 Air Temp Sensor
- 104 Oxygen Sensor (O2)
- 105 Idle Speed Actuator
- 106 Manifold Absolute Pressure Sensor
- 107 Throttle Position Sensor
- 108 Ballast Resistor
- 109 Fuel Pump Relay
- 110 Power Latch Relay
- 111 Fuel Pump
- 112 Solenoid Valve - Evaporative Control System
- 113 Fuse Box
- 114 Inputs to ignition module
- 115 Outputs from ignition module
- 116 Diagnostic Connector D2
- 117 Diagnostic Connector D1
- 118 Crankshaft Position Sensor (CPS)
- 119 Ground

Diagnostic connectors :



CONNECTOR  
D1



CONNECTOR  
D2

Connector D1 :

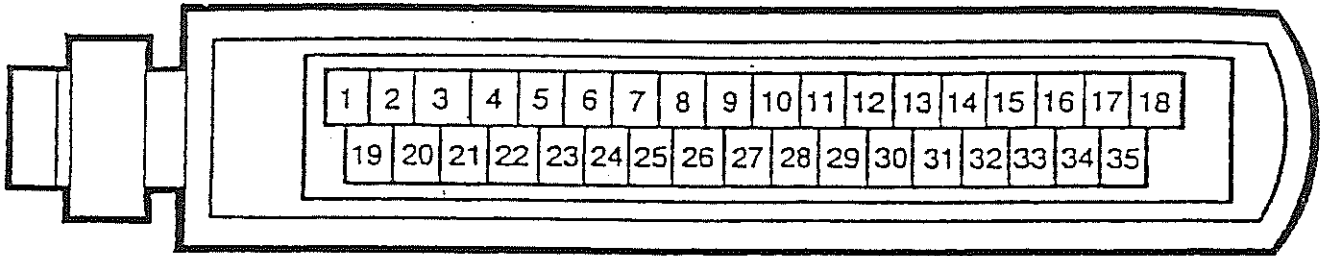
1. ECU Diagnostic (18)
2. Ignition key (3)
3. Ground
4. Start Solenoid
5. Battery
6. Fuel Pump

Connector D2 :

- 1.
- 2.
- 3.
4. Power Latch Relay (B+) (19)
- 5.
- 6.
7. Ground (temperature sensors)
8. Air/Fuel Temperature Sensor
- 9.
10. Canister Purge Solenoid
11. ISA Motor Forward
12. Coolant Temperature Sensor
13. Closed Throttle Switch
14. ISA Motor Reverse
- 15.



ECU CONNECTOR :



- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>1. Ground</li> <li>2. Ground</li> <li>3. Ignition Switch</li> <li>4. Battery.</li> <li>5. Canister Purge</li> <li>6. Fuel Pump Relay</li> <li>7. System Power Relay</li> <li>8. Not Used</li> <li>9. Not Used</li> <li>10. System Ground</li> <li>11. Speed Sensor</li> <li>12. Not Used</li> <li>13. Throttle Position Sensor</li> <li>14. Manifold Air/Fuel Temperature Sensor</li> <li>15. Coolant Temperature Sensor</li> <li>16. Manifold Absolute Pressure (Supply Voltage)</li> <li>17. Manifold Absolute Pressure (Ground)</li> <li>18. ECU Data (Output)</li> </ul> | <ul style="list-style-type: none"> <li>19. System Power (B+)</li> <li>20. Not Used</li> <li>21. Injector</li> <li>22. Not Used</li> <li>23. ISA Motor Retract (Reverse)</li> <li>24. ISA Motor Extend (Forward)</li> <li>25. Closed Throttle (Idle) Switch</li> <li>26. Not Used</li> <li>27. Ignition (Output)</li> <li>28. Speed Sensor</li> <li>29. Start</li> <li>30. Not Used</li> <li>31. Throttle Position Sensor</li> <li>32. Sensor Ground</li> <li>33. Manifold Absolute Pressure (Output Voltage)</li> <li>34. Not Used</li> <li>35. Oxygen Sensor</li> </ul> |
|---|--|

### 2.2. Test equipment and special tools

#### 2.2.1. Bendix XR25 diagnostic unit

The XR25 diagnostic unit is designed to check the Bendix electronic fuel injection system fitted on Skoda Vehicles.

It can also be used as test equipment for general repairs :

- Voltmeter,
- Continuity tester,
- Potentiometer tuning,
- Pulse generator,
- Pulse tester.

The unit has to be connected to the vehicle diagnostic connector and used following recommendations of the operating instructions manual ref. X201245.

#### 2.2.2. Hand vacuum pump and gauge

Used to check the manifold absolute pressure sensor.

#### 2.2.3. Multimeter

Used for voltage measurements and resistance measurements.

#### 2.2.4. Fuel pressure gauge

Used to check and adjust if necessary the fuel pressure regulator.

#### 2.2.5. Torx screwdriver or spanner set

Used for TBI removal and adjustment.

### 3. IGNITION SWITCH OFF TESTS

#### 3.1 Battery voltage, ignition switch, power latch relay

- STEP 1. Test for continuity between diagnostic connector terminal D1-3 and engine ground
- |            |             |                               |
|------------|-------------|-------------------------------|
| Continuity | Yes, good   | -----> STEP 2                 |
|            | No, failure | --> repair the wiring harness |
- STEP 2 Test for battery voltage between diagnostic connector terminals D1-5 and D1-3.
- |                 |             |                |
|-----------------|-------------|----------------|
| Battery voltage | Yes, good   | -----> STEP 3  |
|                 | No, failure | -----> STEP 47 |
- STEP 3 Test voltage between diagnostic connector terminals D1-2 and D1-3
- |     |             |            |
|-----|-------------|------------|
| OV. | Yes, good   | -> STEP 4  |
|     | No, failure | -> STEP 53 |

#### 3.2 Temperature sensors grounds

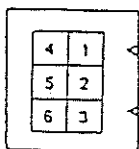
- STEP 4 Test for continuity between diagnostic connector terminals D2-7 and D1-3
- |            |             |            |
|------------|-------------|------------|
| Continuity | Yes, good   | -> STEP 5  |
|            | No, failure | -> STEP 86 |

#### 3.3. Coolant temperature sensor

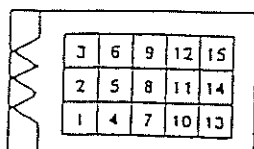
- STEP 5 Test the resistance between D2-12 and D2-7. Negative probe to D2-7
- |                            |                   |
|----------------------------|-------------------|
| Resistance = 1600 $\Omega$ | $\pm$ 50 $\Omega$ |
| at room temperature (20°C) |                   |
| Yes, good                  | -> STEP 6         |
| No, failure                | -> STEP 87        |

#### 3.4. Air temperature sensor

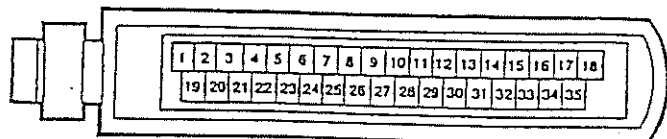
- STEP 6 Test the resistance between D2-8 and D2-7. Negative probe to D2-7
- |                            |                   |
|----------------------------|-------------------|
| Resistance = 1600 $\Omega$ | $\pm$ 50 $\Omega$ |
| at room temperature (20°C) |                   |
| Yes, good                  | -> STEP 7         |
| No, failure                | -> STEP 96        |



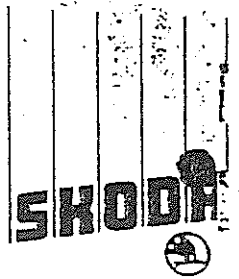
CONNECTOR  
D1



CONNECTOR  
D2



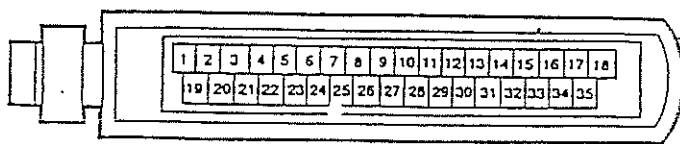
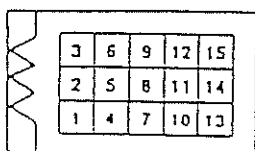
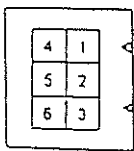
ECU CONNECTOR :



IGNITION SWITCH ON TESTS

Power latch relay

- |      |  |   |
|------|--|---|
| EP 7 | Test for battery voltage between diagnostic connector terminals D1-2 and D1-3.<br>D1-3 is ground.                            | Battery voltage<br>Yes, good -> STEP 8<br>No, failure -> STEP 54  |
| EP 8 | With the ignition switch off, connect voltmeter probes between powerlatch relay 85 and D1-3.<br>Turn the ignition switch on. | 1*) The voltage may be very high (spike) for a fraction of a second.<br>2*) The voltage decreases to 1V or less for 1 second.<br>3*) The voltage increases to battery voltage level (+/- 1 volt)<br><br>Yes, good -> STEP 9<br>No, failure -> STEP 58 |
| EP 9 | Test voltage between diagnostic connector terminals D2-4 and D1-3.<br>Terminal D1-3 is ground                                | Battery voltage<br>Yes, good -> STEP 10<br>No, failure -> STEP 65   |



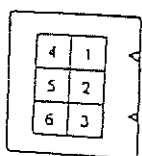
4.2. Fuel pump

STEP 10 With the ignition switch off, The fuel pump connect voltmeter probes operates for 1 second and during between D1-6 and D1-3. this time the Turn the ignition switch on. voltage between D1-6 and D1-3 is battery voltage.  
 Yes, good -> STEP 11  
 No, failure -> STEP 66

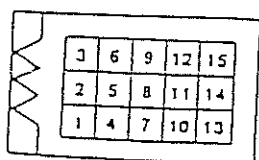
4.3. Programme and calibration codes

STEP 11. Use XR25 Diagnostic unit  
 Press keys D03  
 Press # 09  
 Programme code is 16  
 Calibration code is 3 --> STEP 12.  
 Press # 10  
 If not : ECU is not compatible with the vehicle.

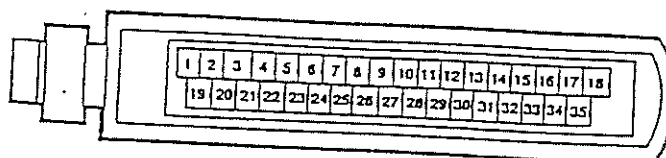
STEP 11 Correct ECU fitted part No  
 Bendix Fendix 1  
 S100 817 101A  
 If not replace  
 Yes --> Step 12



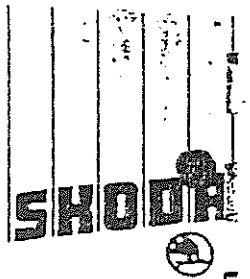
CONNECTOR 01



CONNECTOR 02



ECU CONNECTOR :

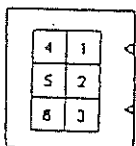


### 4. Coolant temperature sensor

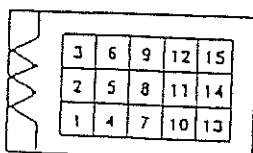
- STEP 12 This test should be by passed if the vehicle is not at room temperature (20°C). If the engine is either hot or cold, the test results will not be valid for fault diagnostic.
- Engine at room temperature  
Yes -> STEP 13  
No -> STEP 18
- STEP 13 Diagnostic unit  
Press # 02
- No XR25 -> STEP 14  
Display value :  
20°C.  
Yes, good -> STEP 15  
No, failure -> STEP 87
- STEP 14 Voltmeter  
Test the voltage between diagnostic connector terminals D2-12 and D2-7.  
Terminal D2-7 is ground
- Voltage value  
0.75V and 1.5V  
Yes, good -> STEP 15  
No, failure -> STEP 87

### 5. Air temperature sensor

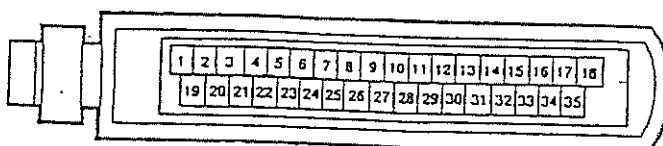
- STEP 15
- Engine at room temperature.  
Yes -> STEP 16  
No --> STEP 18
- STEP 16 XR25 Diagnostic unit  
Press # 03
- No XR25 --> STEP 17  
Display value : 20°C  
Yes, good -> STEP 18  
No, failure -> STEP 96
- STEP 17 Voltmeter  
Test the voltage between diagnostic connector terminals D2-8 and D2-7.  
Terminal D2-7 is ground
- Voltage value  
between 0.75V  
and 1.5V  
Yes, good -> STEP 18  
No, failure -> STEP 96



CONNECTOR  
D1



CONNECTOR  
D2



ECU CONNECTOR :

4.6.

Closed throttle switch

STEP 18 XR25 Diagnostic unit No XR25 --> STEP 20  
 Bargraph 10 left -----> lighted  
 Yes --> STEP 19  
 No ----> STEP 105

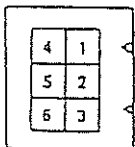
OR Pres # 40  
 Bit 3 -----> Zero Yes --> STEP 19  
 No --> STEP 105

STEP 19 Depress the throttle  
 Bargraph 10 left -----> off Yes --> STEP 22  
 No -----> STEP 106

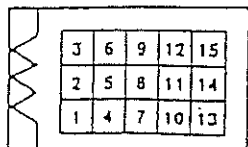
OR Press # 40  
 Bit 3 -----> One Yes --> STEP 22  
 No ----> STEP 106

STEP 20 Voltmeter  
 Test voltage between diagnostic terminals D2-13 and D1-3.  
 Terminal D1-3 is ground  
 Voltage less than 4 Volts  
 Yes -----> STEP 21  
 No -----> STEP 105

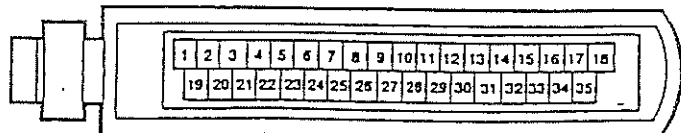
STEP 21 Depress the throttle  
 Test voltage between D2-13 and D1-3.  
 Voltage greater than 4V  
 Yes -----> STEP 22  
 No -----> STEP 106



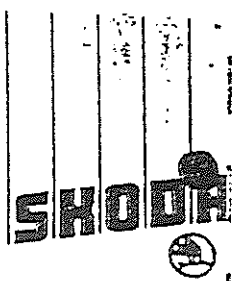
CONNECTOR D1



CONNECTOR D2



ECU CONNECTOR :

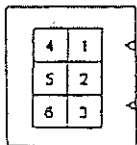


### 4. Coolant temperature sensor

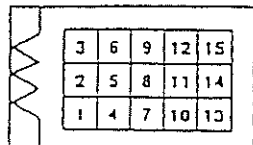
- STEP 12 This test should be by passed if the vehicle is not at room temperature (20°C). If the engine is either hot or cold, the test results will not be valid for fault diagnostic.  
 Engine at room temperature  
 Yes -> STEP 13  
 No -> STEP 18
- STEP 13 Diagnostic unit  
 Press # 02  
 No XR25 -> STEP 14  
 Display value :  
 20°C.  
 Yes, good -> STEP 15  
 No, failure -> STEP 87
- STEP 14 Voltmeter  
 Test the voltage between diagnostic connector terminals D2-12 and D2-7.  
 Terminal D2-7 is ground  
 Voltage value  
 0.75V and 1.5V  
 Yes, good -> STEP 15  
 No, failure -> STEP 87

### 5. Air temperature sensor

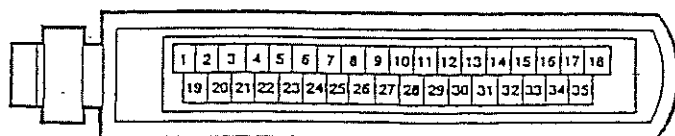
- STEP 15  
 Engine at room temperature.  
 Yes -> STEP 16  
 No --> STEP 18
- STEP 16 XR25 Diagnostic unit  
 Press # 03  
 No XR25 --> STEP 17  
 Display value : 20°C  
 Yes, good -> STEP 18  
 No, failure -> STEP 96
- STEP 17 Voltmeter  
 Test the voltage between diagnostic connector terminals D2-8 and D2-7.  
 Terminal D2-7 is ground  
 Voltage value  
 between 0.75V and 1.5V  
 Yes, good -> STEP 18  
 No, failure -> STEP 96



CONNECTOR  
D1



CONNECTOR  
D2



ECU CONNECTOR :

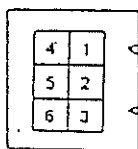


4.7. Throttle position sensor

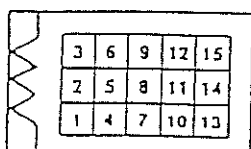
- STEP 22 XR25 Diagnostic unit  
Press # 17
- Display value 1V  
Yes -----> STEP 23  
No -----> STEP 113
- Voltmeter B and A Throttle position switch (B Ground).
- STEP 23 Depress. the throttle to reach full load
- Display value 4.5 V  
Yes -----> STEP 24  
No -----> STEP 113

4.8. Manifold absolute pressure sensor

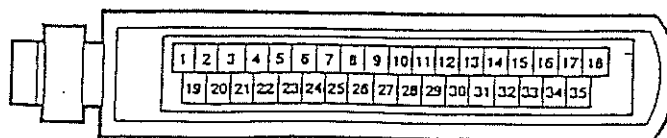
- STEP 24 XR25 Diagnostic unit  
Pres # 01 (inlet manifold pressure)
- Display value 1000 mbar +/- 50  
Yes ----> STEP 25  
No ----> STEP 122
- OR Press # 16 (barometric pressure)
- Display value 1000 mbar +/- 50  
Yes ----> STEP 25  
No ----> STEP 122
- STEP 25 Remove the hose and connect a vacuum pump with gauge to the map sensor. Apply a pressure  
Press # 01
- Display value consistent with gauge indication  
Yes -----> STEP 26  
No -----> STEP 122



CONNECTOR 01



CONNECTOR 02



ECU\_CONNECTOR



## 6. ENGINE RUNNING TESTS

Allow the engine to warm-up until the coolant temperature stabilizes.

### 6.1. Coolant temperature sensor

#### STEP 29 XR25 Diagnostic unit :

Press # 02

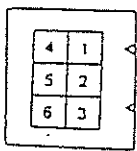
Display value is 90°C +/- 5° C ----> STEP 30  
if not : FAILURE go to STEP 87.

#### Voltmeter :

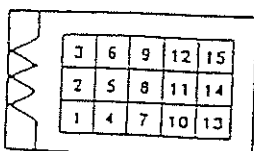
Test the voltage between diagnostic connector terminals D2-12 and D2-7. Terminal D2-7 is ground.

Voltage is between 150 mV and 350 mV ----> STEP 30

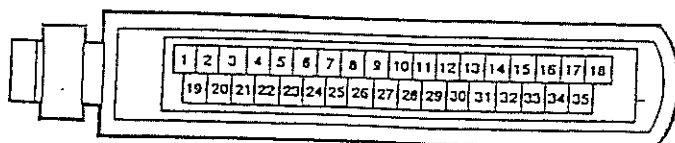
If not : FAILURE go to STEP 87.



CONNECTOR  
01



CONNECTOR  
02



ECU CONNECTOR

## 6.2. Air temperature sensor

STEP 30 XR25 Diagnostic unit :

Press # 03

Display value is between 80° C and 95° C --> STEP 31

If not : FAILURE go to STEP 96.

Voltmeter :

Test the voltage between diagnostic connector terminals D2-8 and D2-7.

Voltage is between 150 mV and 350 mV --> STEP 31

If not : FAILURE go to STEP 96.

## 6.3. Battery voltage

STEP 31 XR25 Diagnostic unit :

Press # 04

Display value is 13 V +/- 1 V ----> STEP 32

If not : FAILURE go to STEP 48

Voltmeter :

Test the voltage between D1-5 and D1-3 (ground). Should be 13 V +/- 1 V. If so ----> STEP 32.

If not : FAILURE go to STEP 48.

## 6.4. Pressure

STEP 32 XR25 Diagnostic unit :

Press # 01 for inlet manifold pressure.

Display value is 300 mbar ± 20 mbar.--> STEP 33

If not : FAILURE go to STEP 122.

STEP 33 Press # 16 for atmospheric pressure

Display is 950 mbar + 50 mbar --> STEP 34

If not : FAILURE go to STEP 122

