SUZUKI

Vitara 1.6 litre
From August 1991

The Suzuki 16 valve G16B four cylinder engine features multipoint fuel injection and ignition control.

Early models employ a mechanical type air flow meter using a moving inner core acting on a potentiometer. The air flow meter also houses the intake air temperature sensor. On late models, a hot wire air flow sensor measures the incoming air flow. On some models, a separate intake air temperature sensor is mounted to the top cover of the air cleaner housing. Exhaust gases are monitored by an oxygen sensor, which is heated on some models. Injectors are operated simultaneously on early models, and sequentially on late models.

Idle speed is controlled by an idle speed control valve. Idle speed is increased when the engine is cold by a thermowax device (fast idle control valve) allowing extra air to bypass the throttle plate.

The ECU is located behind the dashboard on the driver side of the vehicle. The diagnosis connector is located in the engine compartment, adjacent to the driver side suspension unit. A second diagnosis connector is located adjacent to the ECU and is used for manufacturers dedicated test equipment.

In the following text and illustrations, models with a mechanical air flow meter will be referred to as early models. Late models are fitted with a hot wire air flow sensor.

Some late model vehicles are fitted with a combined coil and distributor assembly. Due to the unavailability of Specifications from the manufacturer, these models are not covered.

SPECIFICATIONS

Firing order	1 – 3 – 4 – 2
Idle speed	800 ± 50 rpm with ISC duty cycle at 50%
Ignition timing	5° ± 1° BTDC
Spark plugs:	
Type	NGK BKR 6E or BK 6E
Gap	0.7 – 0.8 mm
Ignition coil resistance at 20°C:	
Early models —	
Primary	0.9 – 1.1 Ω
Secondary	10.2 – 13.8 Ω
Late models —	
Primary	1.08 – 1.32 Ω
Secondary	22.1 – 29.9 Ω
Distributor rotor air gap (early models)	0.2 – 0.3 mm
Pickup coil resistance (early models) at 20°C	140 – 180 Ω
High tension lead resistance	10 – 22 kΩ per meter
Fuel pressure:	
At idle	210 – 260 kPa
With vacuum hose disconnected from regulator	250 – 300 kPa
Idle speed control valve resistance at 20°C	11 – 14 Ω
VSV resistance	refer to text
Oxygen sensor heater element resistance at 20°C:	
Early models	11.7 – 15.5 Ω
Late models	11.7 – 14.3 Ω
Coolant temperature sensor resistances:	
0°	5.88 kΩ
20°	2.21 – 2.69 kΩ
40°	1.14 kΩ
60°	0.58 kΩ
80°	0.29 – 0.35 kΩ
Intake air temperature sensor resistances:	
Early models —	
0°	10.3 – 8.15 kΩ
20°	2.21 – 2.69 kΩ
60°	0.50 – 0.66 kΩ
Late models —	
0°	5.4 – 6.6 kΩ
20°	2.28 – 2.87 kΩ
40°	1.06 – 1.36 kΩ
60°	0.53 – 0.70 kΩ
80°	0.29 – 0.39 kΩ
100°	0.16 – 0.23 kΩ
Injector resistance	12 – 17 Ω

ECU VOLTAGES

Early Models

Terminal A1, ECU constant power supply	Battery V
Terminal A2, cranking signal input:	
Ignition On	Approx 0 V
Engine cranking	Battery V
Terminal A4, ignition trigger signal:	
Ignition On	0 – 1 V
Engine cranking	Fluctuates between 0 – 5 V
Terminal A5, fuel pump relay control:	
For two seconds after switching ignition On	0 – 1 V
After two seconds from switching ignition On	Battery V
Terminal A7, vehicle speed sensor:	
Ignition On, rotating rear propeller shaft slowly	Fluctuates between 0 – 5 V
Terminal A9, A/C control circuit, ignition On:	
A/C Off	Battery V
A/C compressor engaged	Approx 0 V
Terminal A10, ECU relay, ignition On	Approx 0 V
Terminal A11, electrical load signal, ignition On:	
Park lamp, ventilation fan or demister Off	Approx 0 V
Park lamps, ventilation fan or demister On	Battery V
Terminal A12, ECU power supply:	
Ignition Off	Approx 0 V
Ignition On	Battery V
Terminal A13, ECU power supply:	
Ignition Off	Approx 0 V
Ignition On	Battery V
Terminal A14, check engine lamp, ignition On:	
Lamp Off	Battery V
Lamp On	Approx 0 V
Terminal A16, coolant temperature output for A/T ECU, ignition On:	
Engine temperature below 55°C	Approx 0 V
Engine temperature above 60°C	Battery V
Terminal A18, TPS idle switch, ignition On:	
Throttle closed	Approx 0 V
Throttle open	3 – 5 V
Terminal A19, power steering pressure switch:	
Engine running, steering wheel stationary	Battery V
Engine running, steering wheel turning	Approx 0 V
Terminal A22, A/T inhibitor switch signal:	
Ignition On, Park or Neutral selected	0 V
Ignition On, any other position selected	Battery V
Terminal B1, ECU earth	0 V
Terminal B2, ECU earth	0 V
Terminal B5, ignition fail safe signal:	
Ignition On	0 – 2 V
Engine cranking	Fluctuates between 0 – 5 V
Terminal B6, sensor power supply:	
Ignition On	4.75 – 5.25 V
Terminal B7, throttle position sensor signal:	
Ignition On, throttle fully closed	0.1 – 1 V
Ignition On, throttle full open	3.3 – 4.5 V
Terminal B8, air flow meter:	
Ignition On, air flow meter at rest	3.7 – 4.3 V
Ignition On, air flow meter inner core fully depressed	0.2 – 0.4 V
Terminal B9, coolant temperature sensor, at 80°C:	
Ignition On or engine running	0.4 – 0.6 V
Terminal B11, injector control (No 1 and 4):	
Ignition On	Battery V
Terminal B13, EGR VSV, ignition On	Battery V
Terminal B14, ECU earth	Approx 0 V
Terminal B15, sensor earth	Approx 0 V
Terminal B16, crank angle sensor earth	Approx 0 V
Terminal B18, ECU earth (A/T only)	Approx 0 V
Terminal B20, oxygen sensor:	
Engine running above 2 000 rpm at operating temperature	Fluctuates above and below 0.45 V
Terminal B21, intake air temperature sensor at 20°C:	
Ignition On	2.2 – 2.6 V
Terminal B24, injector control (No 2 and 3):	
Ignition On	Battery V
Terminal B25, canister purge VSV, ignition On	Battery V

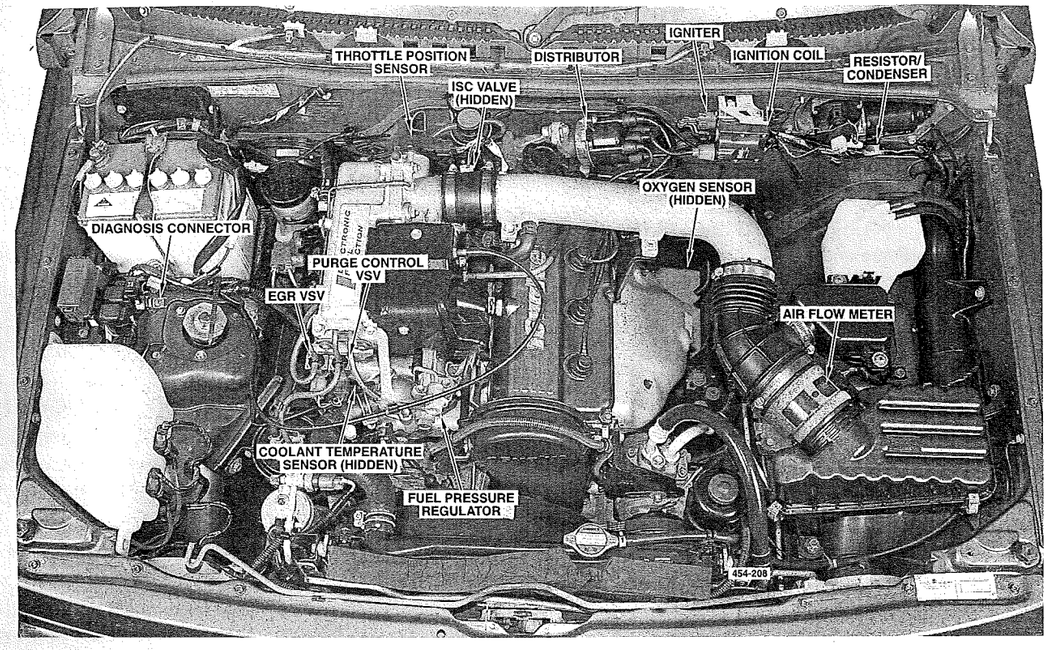
Terminal B26, oxygen sensor heater element earth:
Ignition On ..... Battery V

Late models

Terminal A1, ECU constant power supply ... Battery V
Terminal A2, cranking signal input:
Ignition On ..... Approx 0 V
Engine cranking ..... Battery V
Terminal A4, ignition trigger signal:
Ignition On ..... 0 – 1 V
Engine cranking ..... Fluctuates between 0 – 5 V
Terminal A5, fuel pump relay control:
For two seconds after switching ignition On ..... 0 – 1 V
After two seconds from switching ignition On ..... Battery V
Terminal A7, vehicle speed sensor:
Ignition On, rotating rear propeller shaft slowly ..... Fluctuates between 0 – 5 V
Terminal A8, ignition failsafe signal, ignition On ..... Battery V
Terminal A9, A/C control circuit, ignition On:
A/C Off ..... Battery V
A/C compressor engaged ..... Approx 0 V
Terminal A10, ECU relay, ignition On .... Approx 0 V
Terminal A12, ECU power supply:
Ignition Off ..... Approx 0 V
Ignition On ..... Battery V
Terminal A13, ECU power supply:
Ignition Off ..... Approx 0 V
Ignition On ..... Battery V
Terminal A14, check engine lamp, ignition On:
Lamp Off ..... Battery V
Lamp On ..... Approx 0 V
Terminal A15, EGR VSV, ignition On ..... Battery V
Terminal A16, coolant temperature output for A/T ECU, ignition On:
Engine temperature below 25°C ..... Approx 0 V
Engine temperature above 30°C ..... Battery V
Terminal A18, TPS idle switch, ignition On:
Throttle closed ..... Approx 0 V
Throttle open ..... 3 – 5 V
Terminal A19, power steering pressure switch:
Engine running, steering wheel stationary ..... Battery V
Engine running, steering wheel turning ..... Approx 0 V
Terminal A22, A/T inhibitor switch signal:
Ignition On, Park or Neutral selected ..... 0 V
Ignition On, any other position selected ..... Battery V
Terminal B1, ECU earth ..... 0 V
Terminal B2, ECU earth ..... 0 V
Terminal B3, ignition signal, engine cranking ..... Fluctuates between 0 – 5 V
Terminal B6, sensor power supply:
Ignition On ..... 4.75 – 5.25 V
Terminal B7, throttle position sensor signal:
Ignition On, throttle fully closed ..... 0.5 – 1.2 V
Ignition On, throttle fully open ..... 3.4 – 4.7 V
Terminal B8, air flow sensor:
Ignition On ..... 1.0 – 1.6 V
Engine idling ..... 1.7 – 2.0 V
Terminal B9, coolant temperature sensor at 80°C:
Ignition On or engine running ..... 0.5 – 0.9 V
Terminal B11, No 1 injector control:
Ignition On ..... Battery V
Terminal B12, IAC valve signal:
Ignition On ..... Battery V
Terminal B13, No 3 injector control:
Ignition On ..... Battery V
Terminal B14, ECU earth ..... Approx 0 V
Terminal B15, sensor earth ..... Approx 0 V
Terminal B20, oxygen sensor:
Engine running above 2 000 rpm at operating temperature ..... Fluctuates above and below 0.45 V
Terminal B21, intake air temperature sensor at 20°C:
Ignition On ..... 2.2 – 3.0 V
Terminal B23, oxygen sensor heater element earth:
Ignition On ..... Battery V
Terminal B24, No 2 injector control:
Ignition On ..... Battery V
Terminal B25, canister purge VSV, ignition On ..... Battery V
Terminal B26, No 4 injector control:
Ignition On ..... Battery V

SELF DIAGNOSIS

The self diagnosis codes (fault codes) are recorded in the ECU memory as they occur. If a fault is detected in a primary circuit, the ECU will revert to fail-safe mode and the Check Engine warning lamp will illuminate. If the fault is intermittent, the warning lamp will illuminate each time the fault is present. However, the fault code will be stored



Engine compartment showing various engine system components. Early model shown.

in memory (except for code 41) until the battery has been disconnected for more than 20 seconds.

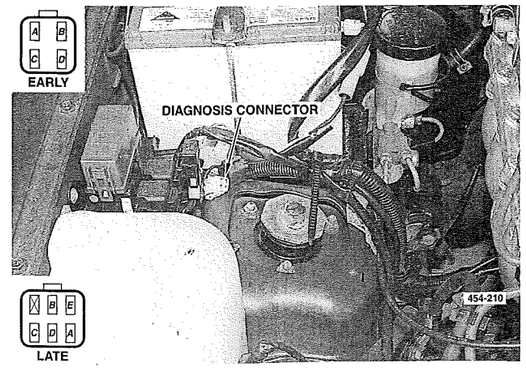
FAULT CODES

12	No faults in memory
13	Oxygen sensor
14	Coolant temperature sensor
15	Coolant temperature sensor
21	Throttle position sensor
22	Throttle position sensor
23	Intake air temperature sensor
24	Vehicle speed sensor
25	Intake air temperature sensor
33	Air flow sensor
34	Air flow meter
41	Ignition fail safe signal
42	Crank angle sensor
44	Throttle position sensor, idle switch
45	Throttle position sensor, idle switch

There are two diagnosis connectors, one in the engine compartment adjacent to the battery and the other in the passenger compartment, adjacent to the ECU. The diagnosis connector inside the vehicle is used for the manufacturer's dedicated test equipment.

1. Ensure that the engine is at operating temperature and all accessories are Off.

2. Ensure that the Check Engine lamp illuminates with the ignition switched On and then bridge terminals B and C on the engine compartment diagnosis connector. If the Check Engine lamp remains constantly illuminated,



Diagnosis connector, viewed with the cover removed. Inset shows terminal identification.

check the wiring between the check connector and the ECU. If no fault can be found, renew the ECU.

3. The codes will be set as a series of flashes of the Check Engine lamp.

4. The fault codes will be displayed by 0.3 second flashes to represent tens followed by a 1 second break and then 0.3 second flashes to represent units.

For example, 2 flashes followed 1 second later by 5 flashes would indicate code 25.

5. Each code will be displayed 3 times.

6. The sequence will be repeated as long as the diagnosis terminals are bridged.

7. Code 12 will be displayed continuously if no fault codes are stored in the ECU memory.

CLEARING CODES

The fault codes can be cleared by removing the tail lamp fuse for at least 20 seconds.

CONFIRMING CODES

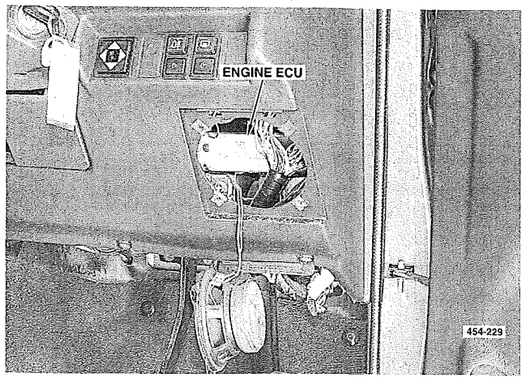
The code/s should be confirmed prior to further diagnosis.

1. Clear the codes.
2. Road test the vehicle and recheck the codes.
3. If the code is not set, an intermittent fault is indicated.

DIAGNOSTIC CIRCUIT CHECK

1. Switch the ignition On and confirm that the Check Engine warning lamp illuminates.

2. If the lamp does not illuminate, check for a blown ignition coil fuse or an open circuit between the ECU connector terminal A14, the warning lamp and the fuse box.



Location of the ECU. Note on some late models the ECU may be mounted vertically in a similar position.

3. Start the engine and check that the lamp goes off. If the lamp remains illuminated, check for fault codes. If there are no fault codes, check the circuit between the ECU and the warning lamp for a short to earth. If the wiring is not shorted, renew the ECU.

COMPONENT AND SYSTEM TESTS

TACHOMETER CONNECTION

1. Connect the positive lead of the tachometer to the negative terminal of the ignition coil.

2. Connect the negative lead to a good earth point.

BASE IDLE SPEED AND ISC VALVE DUTY CYCLE

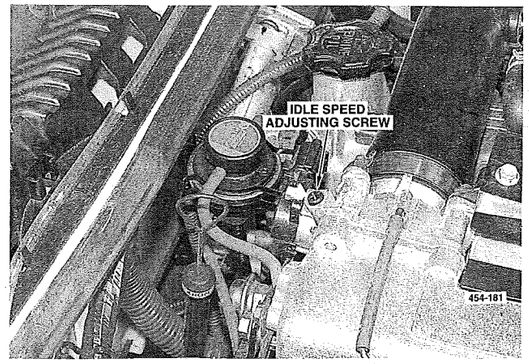
1. Ensure that the air cleaner element is clean and there is no air leaks or exhaust leaks. Also check that the spark plugs, distributor cap, rotor and high tension leads are in good condition.

2. Connect the tachometer and run the engine until it reaches operating temperature.

3. With the ignition On, bridge terminals B and C of the diagnosis connector and check that code 12 is displayed.

If codes other than 12 are displayed, trace and repair the fault before proceeding.

4. Connect the positive lead of a frequency meter to terminal A and the negative lead to terminal C of the diagnosis connector.



Location of the idle speed adjusting screw. On early models, a dust cap may be fitted above the screw.

5. Run the engine at idle and check that the idle speed is 800 ± 50 rpm and the frequency meter is showing the ISC valve duty cycle at 50%.

6. If necessary, remove the dust cap and adjust the idle speed adjusting screw to achieve the specified idle and duty cycle.

7. Remove the bridge wire from the diagnosis connector.

8. On early models with air conditioning, ensure that the idle increases to 900 ± 50 rpm for manual transmission models or 950 ± 50 rpm for automatic transmission models with the air conditioning switched On.

On air conditioned late model vehicles, the idle should increase to 1050 ± 50 rpm.

BASE IGNITION TIMING

1. Connect a tachometer and timing light and run the engine until it reaches operating temperature.

2. Ensure that all accessories are switched off and, on automatic transmission models, ensure that the transmission is in Park or Neutral.

3. Ensure that the engine idle is within Specifications.

4. Bridge terminals C and D on the diagnosis connector and check that the ignition timing is within Specifications.

5. If necessary, loosen the distributor bolts and adjust the ignition timing as required.

REDUCING FUEL SYSTEM PRESSURE

The pressure in the fuel system should be reduced before disconnecting any fuel lines or removing any components of the fuel supply system.

1. Start the engine.

2. While the engine is idling, disconnect the wiring connector from the fuel pump relay adjacent to the ECU.

3. When the engine stalls, operate the starter two or three times.

4. Switch the ignition Off and connect the relay connector.

FUEL PRESSURE

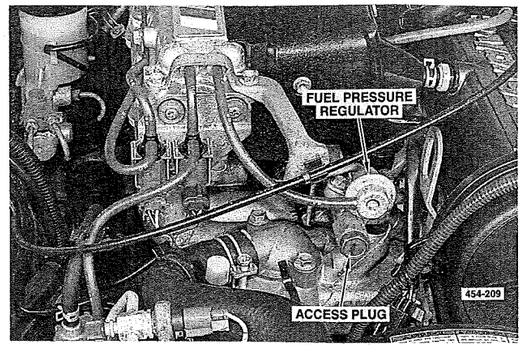
An access plug on the fuel rail, beneath the fuel pressure regulator can be used to connect the fuel pressure gauge.

1. Reduce the fuel pressure and install a pressure gauge into the access plug on the fuel rail.

2. Switch the ignition On and Off for five seconds several times to build up fuel pressure and check that there are no fuel leaks at the pressure gauge connections.

3. Start the engine and check that the fuel pressure at idle is the same as listed in Specifications.

If the pressure is high, check that the pressure regulator vacuum hose is connected and that the fuel return line is not restricted. If no fault can be found, renew the fuel pressure regulator.



Location of the fuel pressure regulator and access plug.

If the fuel pressure is low, check the fuel filter and supply lines for restriction or blockage. Also, check for a blocked fuel pump pickup strainer or a leaking pressure regulator. If no faults are found, renew the fuel pump.

4. Disconnect the vacuum hose from the pressure regulator and check that the fuel pressure increases to 250 – 300 kPa.

If the pressure is low or slow to increase when the vacuum hose is disconnected, check for a faulty pressure regulator or fuel pump.

5. Connect the vacuum hose to the pressure regulator and stop the engine. The fuel pressure should not decrease noticeably except for a small initial decrease.

6. If the fuel pressure continues to decrease, pinch the return line closed. If the pressure now remains steady, renew the pressure regulator. If the pressure continues to drop, check the fuel system for external leaks and leaking injectors. If no leaks are present, renew the fuel pump.

FUEL PUMP

1. Remove the fuel pump relay, bridge the relay connector terminals A (blue/black wire) and B (pink/black wire) and switch the ignition On.

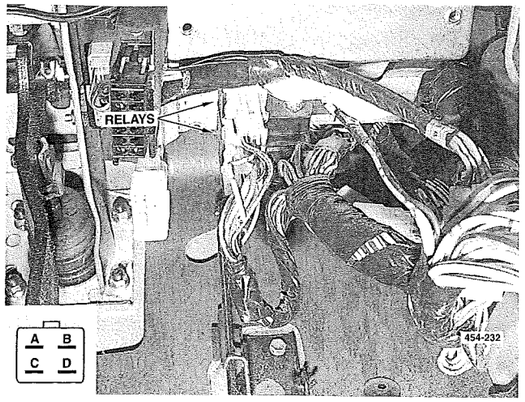
2. Squeeze the fuel return hose at the pressure regulator and check for fuel flow through the hose.

If the pump does not operate, disconnect the fuel pump wiring connector located beneath the vehicle and check that battery voltage is available between the harness connector terminals. Check the fuel pump earth circuit.

3. If battery voltage is present and the earth circuit is serviceable, renew the fuel pump.

4. Switch the ignition Off and install the fuel pump relay.

5. Switch the ignition On and check the fuel pump operation as previously described in step 2. The fuel pump should operate for approximately two seconds.



Location of the fuel pump and ECU power relays. Due to the variations of relay mounting positions, the relays should be identified by comparing the wire colours to the wiring diagrams. Inset shows terminal identification for both relays.

6. If the fuel pump does not operate, test the fuel pump relay, as described later.

7. If the relay is serviceable, check the associated wiring for continuity and shorts. Check the ECU power supply and earth circuits and if no fault can be found, renew the ECU.

FUEL INJECTORS

1. Disconnect the wiring from the injectors and measure the resistance of each injector.

2. Connect a test lamp between the terminals on an injector wiring connector and crank the engine. The test lamp should flicker. Repeat the procedure on the other connectors. If the test lamp remains constantly illuminated on one or more of the connectors, check the injector wiring for short circuits and if no faults can be found renew the ECU.

3. If the test lamp does not illuminate, check for battery voltage at the injector connector blue/black wire terminal. If battery voltage is not displayed, check the FI (15 amp) fuse and the ECU power relay.

4. Check the ECU power supply and earth circuits.

OXYGEN SENSOR (CODE 13)

1. On models with a heated oxygen sensor, proceed as follows:

a. Disconnect the oxygen sensor wiring and measure the resistance between the heater terminal (black wires).

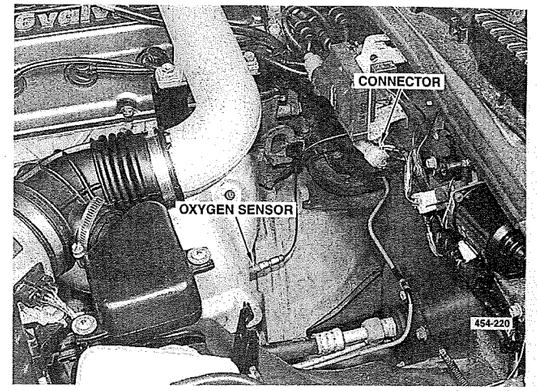
Renew the oxygen sensor if the resistance is not as listed in Specifications.

b. With the ignition On, ensure that battery voltage is available between the pink/black wire and black/white wire on the oxygen sensor wiring connector.

2. With the engine at operating temperature and running for at least two minutes at 2 000 rpm, backprobe terminal B20 at the ECU and check that the voltage fluctuates evenly above and below 0.45 volts.

If the voltage fluctuates evenly above and below 0.45 volts, clear the fault codes and road test the vehicle. If code 13 resets, renew the ECU.

If the voltage remains constantly above 0.45 volts, a rich mixture is indicated. Proceed to step 3.



Location of the oxygen sensor and connectors.

If the voltage remains constantly below 0.45 volts, race the engine for a further 60 seconds.

If the voltage does not climb above 0.45 volts, check the following possible causes:

- Vacuum leaks
- Low fuel pressure
- Coolant temperature sensor
- Air temperature sensor
- Air flow meter/sensor
- Blocked injectors
- Engine compression

A further check on models with a mechanical air flow meter can be done by disconnecting the air flow meter from the air cleaner housing and slightly depressing the inner core of the air flow meter, ensuring that the engine does not stall. If the voltage increases, a lean mixture is indicated.

If the voltage still remains below 0.45 volts, renew the oxygen sensor.

3. Check the following possible causes of a rich fuel mixture.

- Throttle position sensor
- Fuel pressure
- Air flow meter/sensor
- Coolant temperature sensor
- Air temperature sensor
- Leaking injectors
- ECU power supply and earth circuits

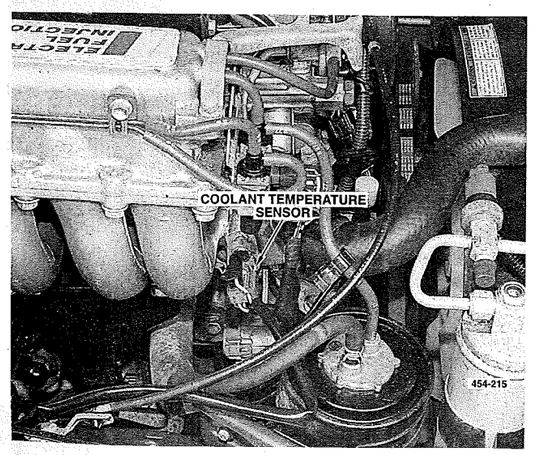
COOLANT TEMPERATURE SENSOR (CODES 14, 15)

1. Disconnect the wiring from the coolant temperature sensor.

2. With the ignition On, check that approximately 5 volts is available between the sensor harness connector terminals.

3. If the voltage is not correct, check the wiring for continuity and shorts between the ECU and the coolant temperature sensor. Also check the ECU power supply and earth circuits. If no fault can be found and the code resets, renew the ECU.

4. Remove the sensor and check that the resistance across the terminals is to Specifications.



Location of the coolant temperature sensor.

THROTTLE POSITION SENSOR (TPS) (CODES 21, 22, 44, 45)

1. Disconnect the wiring from the TPS and check that 5 volts is available between terminals 4 and 1 of the sensor connector.

If 5 volts is not available, check the wiring between the TPS, air flow meter/sensor, coolant temperature sensor and the ECU. Check the ECU power supply and earth circuits. Renew the ECU if no fault can be found.

2. Check that continuity exists between terminals 4 and 1 of the TPS. Renew the TPS if necessary.

3. Check that continuity exists between terminals 1 and 2 of the TPS with the throttle closed and changes to open circuit as the throttle is moved off the stop screw.

If necessary, adjust the TPS by inserting a 0.65 mm feeler gauge between the throttle stop screw and the lever. Loosen the TPS adjusting screws and rotate the TPS until the ohmmeter indicates the point where the idle switch opens and closes. Tighten the adjusting screws at this point, remove the feeler gauge and connect the wiring to the TPS.

4. With the ignition On and the wiring connected to the TPS, check the voltage at terminal 3 of the TPS by backprobing. The voltmeter should read between 0.1 – 1 volt with the throttle closed and should increase as the throttle is opened to approximately 4.5 volts.

Renew the TPS if necessary.

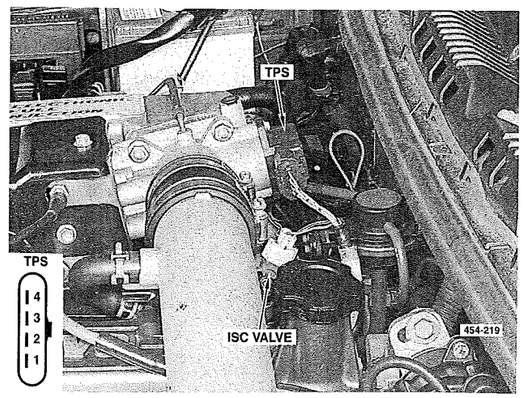
IDLE SPEED CONTROL (ISC) VALVE

1. Disconnect the wiring and remove the ISC valve from the throttle body and check that the valve is free from carbon and can be moved in and out.

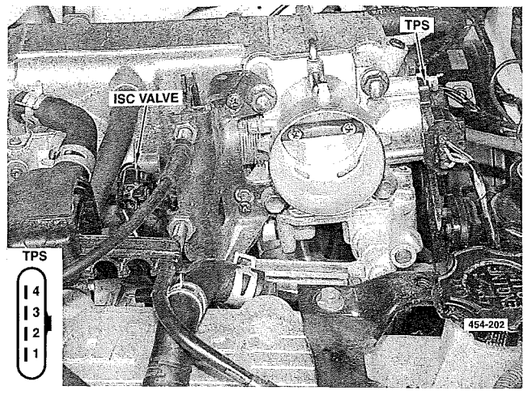
2. Ensure that the ISC ports in the throttle body are clean.

3. Check the resistance between the terminals of the ISC valve.

4. If the resistance is not 11 – 14 ohms at 20°C, renew the ISC valve.



Location of the throttle position sensor (TPS) and idle speed control (ISC) valve, early models. Inset shows the terminal identification for the TPS.



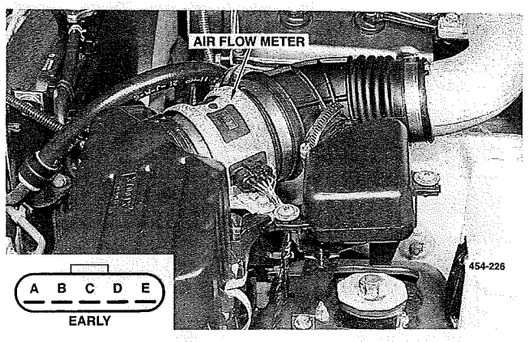
Location of the throttle position sensor (TPS) and idle speed control (ISC) valve, late models. Inset shows the terminal identification for the TPS.

INTAKE AIR TEMPERATURE (IAT) SENSOR (CODES 23, 25)

On early models, the IAT sensor is integral with the air flow meter and not serviced separately. On some late models, a separate IAT sensor is located on the top cover of the air cleaner housing.

1. Disconnect the wiring from the air flow meter or air temperature sensor and check for 5 volts between terminals A and B of the wiring connector with the ignition On.

2. If 5 volts is not available when checked at step 1, check the wiring between the ECU and air flow meter or IAT sensor. Also, check the wiring between the coolant temperature sensor, TPS and the ECU. Check the ECU power and earth circuits. If no fault can be found and code 23 or 25 resets, renew the ECU.



Mechanical air flow meter, early models. This air flow meter incorporates the air temperature sensor. On late models, the air temperature sensor is located in the air cleaner upper housing. Inset shows the terminal identification for the air temperature sensor.

3. On early models with a mechanical air flow meter, remove the air flow meter from the vehicle and maintain the temperature around the meter at 20°C for 30 minutes.

Measure the resistances between terminals A and B and compare to Specifications. Renew the air flow meter if necessary.

4. On late models with a hot wire air flow sensor, remove the IAT sensor and heat the sensor in water. Compare the resistances and temperatures with Specifications and renew the sensor if necessary.

VEHICLE SPEED SENSOR (CODE 24)

The vehicle speed sensor is located in the speedometer assembly. The speedometer is operated by a cable.

1. Ensure that the speedometer operates correctly. If necessary, check the operation of the speedometer cable and drive gear.

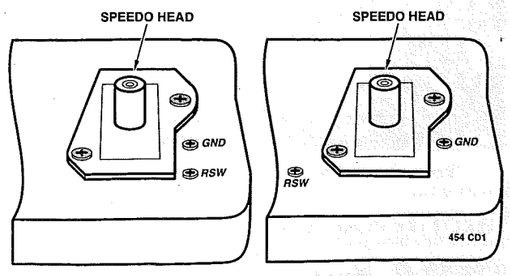
2. Raise the right rear wheel and support on chassis stands.

3. Disconnect the ECU wiring connector and connect an ohmmeter between terminal A7 and earth.

4. Check that the ohmmeter fluctuates between open and closed circuit as the rear wheel is being rotated slowly. If the ohmmeter does not fluctuate, proceed to step 6.

5. If the ohmmeter fluctuates when checked in step 4, check the ECU power and earth circuits. If no fault can be found and code 24 resets, renew the ECU.

6. Remove the instrument cluster from the vehicle and insert a screwdriver into the speedometer cable drive. Place the leads of an ohmmeter between the RSW and GND terminals on the rear of the speedometer. The ohmmeter should fluctuate 4 times per revolution between open and closed circuit, while rotating the screwdriver.



Illustrations showing the alternative locations of the RSW and GND terminals on the rear of the instrument cluster.

7. If the ohmmeter fluctuates between open and closed circuit 4 times per revolution, check for an open circuit in the wiring between the speedometer and ECU.

8. If the ohmmeter does not fluctuate when checked at step 6, renew the speedometer.

AIR FLOW METER\SENSOR (CODES 33, 34)

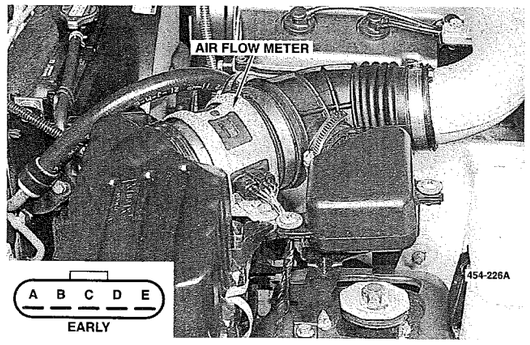
Mechanical Type

1. Disconnect the wiring from the air flow meter and check that there is 5 volts at terminal D.

If 5 volts is not available, check the wiring between the air flow meter, TPS and the ECU. Check the ECU power and earth circuits. If no fault can be found, renew the ECU.

2. Remove the air flow meter from the vehicle and check the resistance between terminals D and E.

Renew the air flow meter if the ohmmeter indicates an open circuit while depressing the inner core slowly between rest and fully depressed.



Mechanical air flow meter, early models. Inset shows the terminal identification.

Hot Wire Type

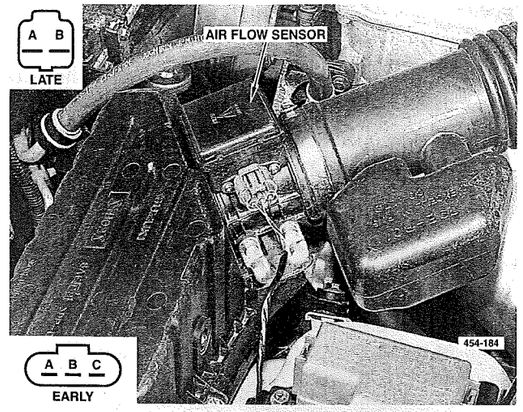
1. Check that there is battery voltage between terminals A and C of the air flow sensor with the ignition On.

If necessary, check the wiring between the ECU power relay and the air flow sensor earth circuit.

2. Check that there is between 1.0 – 1.6 volts at terminal B8 of the ECU with the ignition On.

3. With the engine running, check the voltage at terminal B8. The voltage should increase as the engine speed increases.

If the voltage does not increase, check the wiring and connections between the ECU and the air flow sensor. If no fault can be found, renew the air flow sensor.



Hot wire air flow sensor, late models. Inset shows the terminal identification.

IGNITION FAIL SAFE SIGNAL (CODE 41)

Code 41 will not remain stored in the ECU memory. It will only set in a no-start situation where the fault lies within the ignition system. To retrieve code 41, crank the engine for approximately 2 seconds. Leaving the ignition switched On, bridge the diagnosis connector terminals B and C. Code 41 will be read if there is a fault in the ignition system.

Early Models

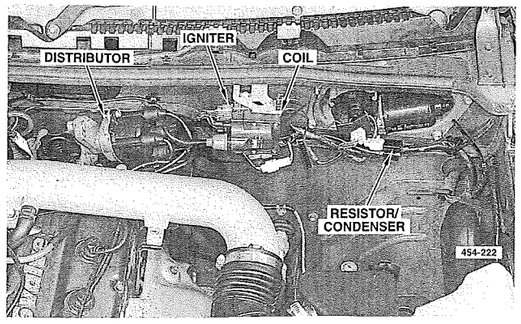
1. Check for spark at one of the spark plug leads.

If spark is present, proceed to step 4.

If no spark is present, check the coil, high tension leads, distributor cap and rotor. If this does not fix the problem proceed as follows:

2. Using an analogue voltmeter, check for a fluctuating 0 – 5 volt signal while cranking the engine at terminal A4 of the ECU.

If the fluctuating 0 – 5 volts is available, check the ignition coil, noise filter and associated wiring. If no fault can be found, renew the igniter.



Location of ignition system components, early models.

3. If the fluctuating 5 volt signal is not available, proceed as follows:

a. Check the wiring and connections between the ECU terminals A4 and B5 and the igniter.

b. Check the operation of the crank angle sensor as described under the Crank Angle Sensor heading.

c. Check the ECU power supply and earth circuits. If no fault can be found, renew the ECU.

4. If spark was present when checked at step 1, proceed as follows:

a. Check the voltage at terminal B5 of the ECU with the ignition On. The voltage should be 0 – 2 or 4 – 5 volts, depending on the position of the signal rotor in the distributor. Also check if the voltage fluctuates when the engine is cranked.

If the voltage fluctuates, check the ECU power supply and earth circuits. If no fault can be found, renew the ECU.

b. If the voltage does not fluctuate, disconnect the connector from the igniter and check for 5 volts at terminal B (blue/green wire) of the igniter with the ignition On.

If 5 volts is not available, check the wiring between the ECU and the igniter, and the ECU power supply and earth circuits. If no fault can be found, renew the ECU.

If 5 volts is available, check the wiring and connections between the ECU and the igniter. If no fault can be found, renew the igniter.

Late Models

1. Check for spark at one of the spark plug leads.

If no spark is present, check the coil, high tension leads, distributor cap and rotor.

2. Disconnect the wiring connectors from the ECU and check for battery voltage at terminal A8.

If battery voltage is available, check the ECU power supply and earth circuits. If no fault can be found, renew the ECU.

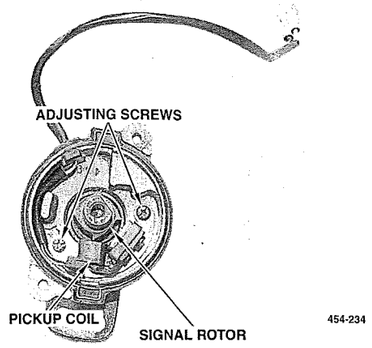
If battery voltage is not available, check for a faulty noise filter or an open circuit between the ECU and the ignition coil.

CRANK ANGLE SENSOR (CODE 42)

Early Models

1. Remove the distributor cap and rotor and check the rotor air gap.

If necessary, loosen the adjusting screws and move the pickup coil assembly until there is a 0.2 – 0.3 mm gap between the pickup coil assembly and rotor.



Distributor with rotor removed showing signal rotor, generator and adjusting screws.

2. Disconnect the pickup coil wiring connector from the distributor and measure the resistance between the pickup coil terminals.

If the resistance is not 140 – 180 ohms, renew the pickup coil assembly.

3. If the rotor air gap and pickup coil assembly resistance are within Specifications, check the wiring and connections between the distributor and the ECU.

If no fault can be found and code 42 resets, renew the ECU.

Late Models

1. Disconnect the wiring connector from the distributor and check for battery voltage at the blue/black wire with the ignition On.

2. Connect the wiring connector to the distributor, remove the distributor cap and check the voltage at the white wire while slowly rotating the engine.

The voltage should be 3 – 5 volts when the signal rotor is between the hall effect sensor and 0 – 1 volt when the signal rotor is not between the hall effect sensor.

3. If the voltages are not as specified in step 2, check the wiring between the distributor and ECU and that the distributor is earthing correctly. If no fault can be found and code 42 resets, renew the hall effect sensor.

4. If the voltages are as specified in step 2, check the wiring between the distributor and ECU. If no fault can be found and code 42 resets, renew the ECU.

POWER STEERING PRESSURE SWITCH

The power steering pressure switch is located on the side of the power steering pump.

1. Check for battery voltage at terminal A19 of the ECU with the engine idling.

If battery voltage is not available, check the ECU power and earth circuits. If no fault can be found, renew the ECU.

2. Check that the voltage drops to 0 volts when the steering wheel is turned.

3. If the voltage does not alter, check the wiring between the ECU and the power steering pressure switch.

If no fault can be found, renew the power steering pressure switch.

EGR AND PURGE CONTROL VACUUM SWITCHING VALVES (VSV)

The EGR VSV is brown and the purge control VSV is blue.

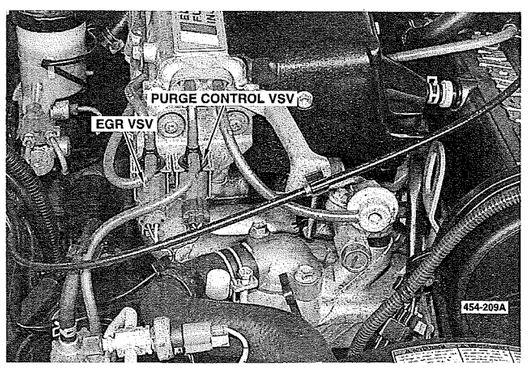
1. Disconnect the wiring from the VSV and check that the resistance between the terminals of the valve is 30 – 38 ohms, except for the purge control VSV on late models, which is 28 – 36 ohms.

Renew the VSV if necessary

2. Apply battery voltage to the terminals of the VSV and check that air can be blown from one port of the valve to the other.

3. Disconnect the battery power from the VSV and check that air cannot be blown through the purge control VSV, or that the air exhausts through the filter in the top of the EGR VSV.

Renew the VSV as necessary.



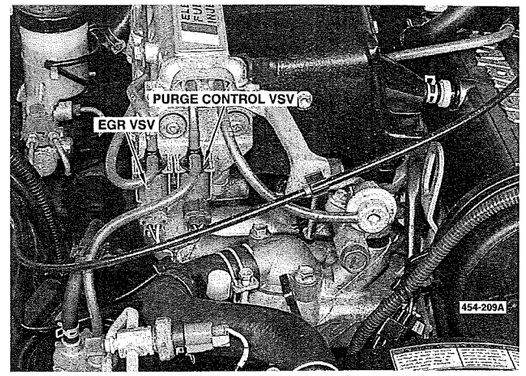
Location of the purge control VSV and EGR.

ECU POWER RELAY AND FUEL PUMP RELAY

1. Remove the relay from the vehicle and check that there is no continuity between terminals A and B and there is continuity between terminals C and D.

2. Apply battery voltage to terminals C and D and check that there is continuity between terminals A and B.

Renew the relay if necessary.



Location of the fuel pump and ECU power relays. Due to the variations of relay mounting positions, the relays should be identified by comparing the wire colours to the wiring diagrams. Inset shows terminal identification for both relays.

ECU POWER SUPPLY AND EARTH CIRCUITS

1. Check for constant battery voltage at terminal A1.

2. Check for battery voltage with the ignition On at terminals A12 and A13.

3. Check for continuity to earth at terminals B1, B2, B14. Also check for continuity to earth at B18 on early models.