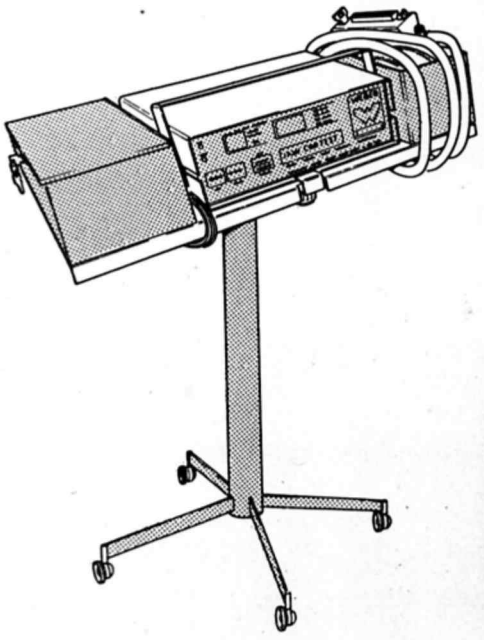
By Appointment to
His Royal Highness the Prince of Wales
Motor Car Manufacturer and Repairer
Aston Martin Lagonda Limited
Newport Pagnell

ASTON MARTIN LAGONDA LIMITED

ELECTRONIC FUEL INJECTION FAULT DIAGNOSIS MANUAL

for use with

E.F.I. VEHICLE TESTER 585 ENGINES



Part No. 694716

INSTRUCTIONS FOR USE

PREPARATION

1. Turn off the battery master switch.

2. Disconnect the ECU from the vehicle harness. Refer to SB12 Aug 86 for access information (Aston). Refer to SB506 April 88 for access information (Lagonda).

3. Connect the cable from the short interface lead to the 35-way male connector to the vehicle EFI harness. Connect the lead from the tester to the remaining female connector of the interface.

4. Connect the supply cables of the tester to a convenient battery feed on the vehicle.

Note: Do not use an independent battery or use the tester whilst charging the vehicles own battery. The operating range of the tester is 9 - 17 volts.

5. Turn the battery master switch on.

6. Switch on the ignition.

Note: To avoid unnecessary drain carrying out a diagnostic check, disconnect:-

a) A/C clutch feed cable from the pressure switch on Aston. Put slide control to OFF on Lagonda.
b) Interior light fuse.

7. Ensure that the test code 05 is entered into the tester, (located on the rear panel).

8. Switch the tester ON (switch located on the rear panel).

OPERATION

After switching the tester ON, check the following sequence on the front panel:
The voltage indicator light comes on and, for about 5 seconds, all the indicator lights and numerical indicators are activated apart from the 'fuse' light (the function of which is self-diagnosis of the tester).
If this sequence does not occur, refer to malfunction code E99. If only the 'fuse' indicator light comes on, refer to malfunction code E98.

The tester is automatically preset as follows:
Test sequence 00, 3-figure indicator showing the code entered by the operator on the rear panel preceded by C (e.g. C05 = preset for testing Aston Martin Cars).
At this point the tester is ready to start the cycle of testing.

'Up' Button

Each time the 'up' button is pressed, the tester performs the following operations:
It indicates on the two-figure display the test code following the one indicated.
It carries out the test and, at the same time, the yellow LED indicates 'Test in Progress'.

In cases where the operator has to take action before the test (e.g. checking that the fuel pump is working properly by connecting a pressure gauge to the petrol delivery circuit), the test code flashes on the display and the test is carried out by the operator pressing the 'Carry Out Test' button.

The outcome of test is displayed as follows:
Green LED 'Test OK' for test in which the tester is independently able to assess the outcome of the test.
(If the test is negative, the 3-figure indicator will show the code of the relevant malfunction).

Three figure indicator for tests in which the magnitude measured is shown. The value displayed must be assessed by the operator.

The test code can be rapidly advanced by keeping the 'up' button pressed.

'Carry Out/Repeat' Button

Each test can be carried out/repeated an indefinite number of times by pressing the 'run.rep' button.

'Down' Button

To repeat any preceding tests, simply press the 'down' button which operates in the same way as the 'up' button.

Test	Type of Test	Test Passed if:
00	Magnitude of voltage incorrect	Test carried out automatically when appliance switched on. 3-figure display indicating C05 = Aston Martin test code.
01	Injectors, pump relay control box relay ground return power supply, all properly connected	Press 'Carry out/Repeat button to carry out test. Green LED 'Test OK' lit and battery voltage appearing on 3-figure display
02	Cylinder 1-5 injectors in working order	Ticking of cylinder 1 or 5 Injector for 5 sec.(one at a time, disconnect the other) No error code displayed
03	Cylinder 4-2 Injectors in working order	Ticking of cylinder 2 or 4 Injector for 5 sec. No error code displayed.
04	Cylinder 3-6 Injectors in working order	Ticking of cylinder 3 or 6 Injectors for 5 sec. No error code displayed.
05	Cylinder 7-8 Injectors in working order	Ticking of cylinder 7 or 8 Injector for 5 sec. No error code displayed.
06	Resistance of R.P.M. and cam sensor.	Green LED 'Test OK' lit.
07	Air temperature sensor in working order	Temperature in °C of air temperature sensor displayed.
08	Water temperature sensor in working order	Temperature in °C of water Temperature sensor displayed
09	Dynamic operation of the absolute pressure sensor.	(Disconnect the throttle potentiometer during this test) Change the pressure in the sensor pipe and read the pressure value (range: 127 to 800mm Hg). Reconnect the throttle potentiometer.

Test	Type of Test	Test Passed if:
10	Throttle potentiometer in working order	(Disconnect the absolute pressure sensor plug during this test). Figure '0' indicated with the throttle at idle; '1' immediately out of idle; '0' with medium rotation; '2' fully open. If this is not occurring refer to Error Code E66. Reconnect the absolute pressure sensor plug.
11	Ignition modules test	Before carrying out this test, insert the spark plug gap units into the high-voltage cables of the coils. Press the 'Carry out/Repeat' button. Visually check a series of high rate sparks for about 10 seconds on each spark plug gap. If the fuse indicator light is activated during the test, refer to Error Code E69. in the absence of sparks, refer to Error Code E67.
12	Checking correct installation of ignition distributor.	Starter motor engaged for about 6 seconds. Green LED 'Test OK' lit. On completing the test, do not switch off the ignition.
13	Fuel pump in working order	Verify the pump rotation. Check the fuel pressure: 2.5+/- 0.2 bar. If the pump does not rotate, refer to Error Code E68. Refer to SB506 for pressure gauge fitting. **Note** Fuel pump will only rotate for 10 seconds in this test.
14	Intermittent malfunctions of RPM connection	Stress the connector of the RPM sensor and the relevant wiring. The resistance obtained must not vary appreciably

Test	Type of Test	Test Passed if:
15	Intermittent malfunctions of the cam connection	Stress the connector of the cam sensor and the relevant wiring,. The resistance obtained must not vary appreciably.
16	Intermittent malfunctions of air temperature sensor connection	Stress the connector of the air temperature sensor and relevant wiring. The temperature obtained must not vary appreciably.
17	Intermittent malfunctions of the water temperature sensor connection	Stress the connector of the water temperature sensor and the relevant wiring. The temperature obtained must not vary appreciably.
18	Pressure sensor at atmospheric in working order and checking intermittent malfunctions of the relevant wiring.	(Disconnect the throttle potentiometer during the test) Atmospheric pressure expressed in mm of Hg displayed. Stress the sensor and relevant wiring. Reconnect the throttle potentiometer.
19	EAV (Electromagnetic Air Valves) in working order	Ticking of each EAV for about 5 secs one at a time, (disconnect the other). The fuel pump is also operated at the same time.

Note:

After each cycle of tests always check that all the sensors are connected. Turn the ignition switch OFF. Turn the battery master switch OFF. Remove the tester connection. Reconnect the main harness to the ECU. Ensure the air conditioning system functions correctly. Ensure the interior light fuse is fitted.

Procedure for correcting faults and ascertaining whether the component is again in working order.

1. The action required regarding a fault takes the form of a series of phases to be carried out, one after the other.

2. As each phase of the action is completed, the equipment must be checked to ascertain whether it is again in working order by carrying out the same test which revealed the malfunction.

3. Having ascertained that the fault can be corrected, carry out the following standard test:-
   (a) Engine idle speed and CO%
   (b) Driveability test

Note: Refer to SB506 for specific tuning data.

Coding of faults and corrective action.

Operating faults are listed on the following pages,according to an ascending numerical code. Those codes which are missing are not relevant to Aston Martin and Lagonda vehicles.

Under the heading **'Diagnosis'** the possible causes of failure are listed.

Under the heading **'Action'** are listed the phases into which the corrective action is divided, in order of complexity.

Malfunction Code: E01

Diagnosis: Contact No. 20 of 35-pole connector oxidised or mechanically damaged.
Cable at contact No. 20 of connector at 35-pole connector interrupted.
Connections of Pin 87 of relay oxidised or damaged.

Action Verify contact No. 20 of central connector.

Malfunction Code: E03

Diagnosis Cylinder No. 1 or No. 5 injector coil open circuit.
Connector of injector not correctly installed.
Connector of injector oxidised or mechanically damaged.
Wiring of injector connector damaged.
Connector No. 35 of 35-pole connector oxidised or mechanically damaged.

Action: Check that the connector of the injector, its contacts, the wiring to the connector and contact No.35 of the 35-pole connector, are all in good condition.
Short-circuit the contacts of the detachable connector of cylinder No.1 or No.5 injector.
If the error disappears, replace the injector.
If the error persists,look for a break in the wiring.

Malfunction Code: E04

Diagnosis: Cylinder No.7 or No.8 injector coil open.
Connector of injector not correctly installed.
Connector of injector oxidised or mechanically damaged.
Wiring of injector connector damaged.
Contact No.32 of 35-pole connector oxidised or mechanically damaged.

Action: Check that the connector of the injector, its contacts, the wiring to the connector and contact No.32 of 35-pole connector are all in good condition.
Short-circuit the contacts of the detachable connector of cylinder No.7 or No.8 injector.
If the error disappears, replace the injector.
If the error persists,look for a break in the wiring.

Malfunction Code: E05

Diagnosis: Cylinder No.2 or No.4 injector coil open.
Connector of injector not correctly installed.
Connector of injector oxidised or mechanically damaged.
Wiring of injector connector damaged.
Contact No.33 of 35-pole connector oxidised or mechanically damaged.

Action: Check the connector of the injector, its contacts, the wiring to the connector and contact No.33 of 35-pole connector are all in good condition.
Short-circuit the contacts of the detachable connector of cylinder No.2 or No.4 injector.
If the error disappears, replace the injector.
If the error persists, look for a break in the wiring

Malfunction Code: E06

Diagnosis: Cylinder No.3 or No.6 injector coil open.
Connector of injector not correctly installed.
Connector of injector oxidised or mechanically damaged.
Wiring of connector damaged.
Contact No.18 of 35-pole connector oxidised or mechanically damaged.

Action: Check that the connector of the injector, its contacts, the wiring to the connector and contact No.18 of 35-pole connector are all in good condition.
Short-circuit the contacts of the detachable connector of cylinder No.3 or No.6 injector.
If the error disappears, replace the injector.
If the error persists,look for a break in the wiring.

Malfunction Code: E07

Diagnosis: Coil of relay controlling fuel pump broken.
Contacts of relay holder base, oxidised.
Wiring to relay holder base broken.
Contact No.28 of 35-pole connector oxidised or mechanically damaged.

Action: Check that the connections of the relay holder base and contact No.28 of 35-pole connector are in good condition.
Check the wiring of the relay holder base.
Short-circuit the connections to the operating coil relay holder base.
If error disappears, replace the relay.
If E07 persists, look for a break in the wiring.

Malfunction Code: E08

To test the injector operation, it is necessary to disconnect one of the pair. This code suggests both injectors are still connected.

Diagnosis: Resistance of cylinder No.1 or No.5 injector coil less than permitted value.
Wiring of injector No.1 or No.5 connector partly or totally short-circuited.

Action: Visually check the injector connector wiring.
Disconnect the injector and repeat test E09.
If the error disappears, replace the injector.
If E08 persists, look for a break in the wiring.

Malfunction Code: E09

Diagnosis: Resistance of cylinder No.1 or No.5 injector coil greater than permitted value.
Connector of cylinder No.1 or No.5 injector oxidised or mechanically damaged.
Wiring of cylinder No.1 or No.5 injector connector partly broken.
Contact No.35 of 35-pole connector oxidised or mechanically damaged.

Action: Check the wiring of the connector injector and the connector itself.
Check the condition of contact No.35 of the control box connector.
Short-circuit the two poles of the connector and repeat test E02.
If error E08 appears, replace the injector.
If E09 persists, look for a break in the wiring.

Malfunction Code: E10

To test the injector operation, it is necessary to disconnect one of the pair. This code suggests both are still connected.

Diagnosis: Resistance of cylinder No.7 or No.8 injector coil less than permitted value.
Wiring of injector No.7 or No.8 connector partly or totally short-circuited.

Action: Visually check the injector connector wiring.
Disconnect the injector and repeat test.
If error E11 appears, replace the injector.
If error E10 persists,look for a break in the wiring.

Malfunction Code: E11

Diagnosis: Resistance of cylinder No.7 or No.8 injector coil greater than permitted value.
Cylinder No.7 or No.8 injector connector oxidised or mechanically damaged.
Wiring of cylinder No.7 or No.8 injector partly broken.
Contact No.32 of 35-pole connector oxidised or mechanically damaged.

Action: Check the wiring of the injector connector and the connector itself.
Check the condition of contact No.32 of control box connector.
Short-circuit the two poles of the injector connector and repeat the test.
If error E10 appears, replace the injector.
If error E11 persists, look for a fault in the wiring.

Malfunction Code: E12

To test the injector operation it is necessary to disconnect one of the pair. This code suggests that both injectors are still connected.

Diagnosis: Resistance of cylinder No.4 or No.2 injector coil less than permitted value.
Wiring of injector No.4 or No.2 connector partly or totally short-circuited.

Action: Visually check the injector connector wiring.
Disconnect the injector and repeat the test.
If error E13 appears, replace the injector.
If error E12 persists,look for a break in the wiring.

Malfunction Code: E13

Diagnosis: Resistance of cylinder No.4 or No.2 injector coil greater than permitted value.
Cylinder No.4 or No.2 injector connector oxidised or mechanically damaged.
Wiring of cylinder No.4 or No.2 injector partly broken.
Contact No.33 of 35-pole connector oxidised or mechanically damaged.

Action: Check the wiring of the injector connector and the connector itself.
Check the condition of contact No.33 of control box connector.
Short-circuit the two poles of the injector connector and repeat the test.
If error E12 occurs, replace the injector.
If error E13 persists,look for a fault in the wiring.

Malfunction Code: E14

To test the injector operation it is necessary to disconnect one of the pair. This code suggests that both are still connected.

Diagnosis: Resistance of cylinder No.6 or No.3 injector coil less than permitted value.
Wiring of injector No.6 or No.3 connector partly or totally short-circuited.

Action: Visually check the injector connector wiring.
Disconnect the injector and repeat the test.
If error E15 appears, replace the injector.
If error E14 persists,look for a break in the wiring.

Malfunction Code: E15

Diagnosis: Resistance of cylinder No.6 or No.3 injector coil greater than permitted value.
Cylinder No.6 or no.3 injector connector oxidised or mechanically damaged.
Wiring of cylinder No.6 or No.3 injector connector partly broken.
Contact No.18 of 35-pole connector oxidised or mechanically damaged.

Action: Check the wiring of the injector and the connector itself.
Check the condition of contact No.18 of the ECU connector.
Short-circuit the two poles of the injector and repeat the test.
If error E14 occurs, replace the injector.
If error E15 persists,look for a break in the wiring.

Malfunction Code: E16

Diagnosis: Resistance of the revolution sensor coil (on front pulley) less than the permitted value.
Wiring of sensor connector partly or totally short-circuited.

Action: Check the wiring of the sensor connector and the cable of the sensor itself.
Disconnect the sensor and repeat the test.
If error E17 occurs, replace the sensor.
If error E16 persists,look for a fault in the wiring.

Malfunction Code: E17

Diagnosis: Resistance of the revolution sensor greater than the permitted value.
Sensor connector oxidised or mechanically damaged.
Wiring of sensor connector partly broken.
Contact No.3 and 4 of control box connector oxidised or mechanically damaged.

Action: Check the connector of the revolution sensor and the relevant wiring.
Check contacts No.3 and 4 of the ECU connector.
Disconnect the sensor and short-circuit the terminals of the two way connector of the wiring, repeat the test.
If error E16 occurs,replace the sensor.
If error E17 persists,look for a fault in the wiring.

Malfunction Code: E18

Diagnosis: Resistance of the phase sensor coil (located in the distributor) less than the permitted value.
Wiring of the two way connector partly or totally short-circuted.

Action: Check the wiring of the connector, the detachable connector, and the connector of the ignition distributor.
Disconnect the sensor and repeat the test.
If error E19 occurs, replace the sensor.
If error E18 persists,look for a fault in the wiring.

Malfunction Code: E19

Diagnosis: Resistance of the phase sensor coil (located in the distributor) greater than the permitted value.
Wiring and ignition distributor connectors oxidised or mechanically damaged.
Contacts No.6 and No.23 of the 35-pole connector oxidised or mechanically damaged.
Wiring to the engine compartment or to the 35-pole connector damaged.

Action: Check the distributor and wiring connectors.
Check contacts No.6 and No.23 of the 35-pole connector.
Disconnect the two-way connector of the distributor and short-circuit it's two terminals. Repeat the test.
If error E18 occurs, replace the sensor.
If error E19 persists,look for a fault in the wiring.

Malfunction Code: E21

If the red LED is off only in certain gears (excluding'P'&'N'), verify micro switch on automatic change is correctly adjusted.

Malfunction Code: E22

Diagnosis: Air temperature sensor electrically not continuous.
Sensor connector or wiring connector oxidised or mechanically damaged.
Contacts No.11 and No.31 of the 35-pole connector oxidised or mechanically damaged.
Engine compartment wiring or sensor cable damaged.

Action: Check sensor connector in the engine compartment.
Check sensor wiring and sensor cable.
Disconnect the sensor and short-circuit the contacts of the wiring connector. Repeat the test.
If error E23 occurs, replace the sensor.
If error E22 persists, look for a fault in the wiring of Pin No.11 in the following inter-connections:
Throttle potentiometer
Water temperature sensor
Pressure sensor.

Malfunction Code: E23

Diagnosis: Air temperature sensor short-circuited.
Sensor and wiring connector mechanically damaged.
Wiring and cable of sensor damaged.

Action: Visually check the connectors and wiring.
Disconnect the sensor and repeat the test.
if error E22 occurs, replace the sensor.
If error E23 persists,look for a fault in the wiring.

Malfunction Code: E24

Diagnosis: Water temperature sensor electrically not continuous.
Sensor connector or wiring connector oxidised or mechanically damaged.
Contacts No.11 and No.29 of 35-pole connector oxidised or mechanically damaged.
Engine compartment wiring or sensor cable damaged.

Action: Check sensor cable in the engine compartment.
Check sensor wiring and sensor cable.
Disconnect the senor and short-circuit the contacts of the wiring connector. Repeat the test.
If error E25 occurs, replace the sensor.
If error E24 persists, look for a break in the wiring of Pin No.11 in the following inter-connections:
Throttle potentiometer
Water temperature sensor
Pressure sensor.

Malfunction Code: E25

Diagnosis: Water temperature sensor short-circuited.
Sensor connector or wiring connector mechanically damaged.
Wiring and cable of sensor damaged.

Action: Visually check the connectors and wiring.
Disconnect the sensor and repeat the test.
If error E24 occurs, replace the sensor.
If error E25 persists,look for a fault in the wiring.

Malfunction Code: E26

Diagnosis: Absolute pressure sensor broken.
Sensor connector or wiring connector oxidised or mechanically damaged.
Engine compartment wiring broken.
Contacts No.11 and No.30 of the ECU connector oxidised or damaged.

Action: Check sensor connector and wiring.
Disconnect the connector from the sensor and connect the 3-way short-circuiting connector which is supplied. Repeat the test.
If error E27 occurs, replace the pressure sensor.
If error E26 persists, look for a break in the wiring or in the 35-pole connector contact No.11 and No.30, or in the following connectors:
Throttle potentiometer
Air temperature sensor
Water temperature sensor.

Malfunction Code: E27

The throttle potentiometer connector has not been disconnected. Disconnect it and repeat the test by pressing the 'Carry out/Repeat' button.

Diagnosis: Absolute pressure sensor short-circuited.
Sensor connector or wiring connector mechanically damaged.
Engine compartment wiring damaged.

Action: Visually check the sensor connectors and the engine compartment wiring.
Disconnect the connector from the sensor and repeat the test.
If error E26 occurs, replace the absolute pressure sensor.
If error E27 persists, look for a short-circuit in the wiring of the pressure sensor or in the wiring of the throttle potentiometer.

Malfunction Code: E28

Diagnosis: Pressure sensor damaged.
Sensor connector or wiring connector oxidised or mechanically damaged.
Engine compartment wiring damaged.
Contact No.15 of the 35-pole connector oxidised or damaged.

Action: Visually check the sensor connector and the wiring connector.
Visually check the wiring.
Visually check contact No.15 to the 35-pole connector.
Connect a sensor which is in working order.
If error E28 disappears, replace the absolute pressure sensor.
If error E28 persists, look for faults in the connections.

Malfunctions Code: E29

Diagnosis: Throttle potentiometer electrically not continuous.
Sensor connector or wiring connector oxidised or mechanically damaged.
Engine compartment wiring broken.
Contacts No.11 and No.30 of the ECU connector oxidised or damaged.

Action: Check sensor connector and wiring.
Disconnect the connector from the sensor and connect the 3-way short-circuiting connector which is supplied. Repeat the test.
if error E30 occurs, replace the sensor.
If error E29 persists, look for faults in the wiring, in the 35-pole connector contacts No.11 and No.30 or in the following connections:
Absolute pressure sensor
Air temperature sensor
Water temperature sensor.

(See Fig.2 Schematic Wiring Diagram)

Malfunction Code: E30

The pressure sensor connector has not been disconnected. Disconnect it and repeat the test by pressing the 'Carry out/Repeat' button.

Diagnosis: Throttle position sensor short-circuited.
Sensor connector or wiring connector mechanically damaged.
Engine compartment wiring damaged.

Action: Visually check the sensor connectors and the engine compartment wiring.
Disconnect the connector from the sensor and repeat the test.
If error E29 occurs, replace the throttle position sensor.
If error E30 persists, look for a short-circuit in the wiring of the throttle potentiometer or in the wiring of the pressure sensor.

Malfunction Code: E31

Diagnosis: Absence of revolution sensor signals. (RPM)
Position of distributor incorrect.

Action: Check that there are 4 teeth on the front pulley.
Check that the sensor adjacent to the pulley is not damaged.
Check that between each tooth and the sensor there is an air gap of more than .4mm (0.016") and less than 1.0mm (0.040").
If necessary, reset the gap.
Replace the sensor.
Check that the phase sensor inside the distributor is correctly installed and connected.
Correctly position the distributor.
Refer to SB506 for checking the air gap procedure.

Malfunction Code: E32

Diagnosis: Absence of phase sensor signals.
Position of distributor incorrect.
Reversed polarity of phase sensor.

Action: Correctly position the distributor.
Open the distributor and check that the sensor and the two-toothed cam are in good condition and that it is correctly installed.
Check that the gap between each tooth and the sensors is between 0.2mm (0.008") and 0.3mm (0.012"); if necessary reset the gap.
Replace the phase sensor.
Refer to SB506 for checking the air gap procedure.

Malfunction Code: E34

Diagnosis: Position of distributor incorrect.
Reversed polarity of revolution sensor.
Reversed polarity of phase sensor.

Action: Correctly position the component in relation the red mark on the body of same,, relating to the combustion TDC of cylinder No.1.
If the malfunction persists, replace the revolution sensor.
if the malfunction persists, replace the phase sensor.
Verify the condition of the phase sensor and the gap between the two teeth has the correct setting and that the connections are good.
Verify that the space between each tooth and the sensor is between 0.2mm and 0.3mm.
Substitute phase sensor; reset to the correct RPM clearance.
Substitute RPM sensor and reset to the correct clearance.

Malfunction Code: E35

Diagnosis: Position of distributor incorrect.
Reversed polarity of revolution sensor.
Reversed polarity of phase sensor.

Action: Correctly position the component in relation to the red mark on the body of same, relating to the combustion TDC of cylinder No.1.
If the malfunction persists, replace the revolution sensor.
If the malfunction persists, replace the phase sensor.

Malfunction Code: E36

Diagnosis: Coil of pump EAV control relay short-circuited.
Wiring of relay holder base damaged.

Action: Check the wiring to the relay holder base using the Schematic Wiring Diagram,(see Fig.2).
Remove the relay from its base and repeat the test.
If error E07 occurs, replace the relay.
If error E36 persists,look for a fault in the wiring.

Malfunction Code: E37

Diagnosis: Faulty contact in the connector of the revolution sensor on front pulley.
Wiring on sensor side and on vehicle side or revolution sensor partly broken.
Sensor damaged in the output zone of sensor body cable.

Action: Check condition of revolution sensor.
Check wiring on vehicle side.
Check sensor cable.
Replace revolution sensor.

Malfunction Code: E38

Diagnosis: Revolution sensor cable on front pulley partly short-circuited.
Wiring of connector in engine compartment partly short-circuited.
Sensor damaged in output zone of the cable from the sensor body.

Action: Visually check the sensor or relevant connector.
Visually check the sensor cable.
Visually check the engine compartment wiring in the connector zone.
Replace the revolution sensor.

Malfunction Code: E39

Diagnosis: Faulty contact between the connector of the high-voltage distributor and the phase sensor.
Wiring of 2-way connector partly broken.
Loose connections inside the distributor.

Action: Visually check the connectors.
Visually check the wiring on the vehicle.
Check the sensor and its connections inside the distributor.
Replace the high voltage distributor.

Malfunction Code E40***

Diagnosis: Two-way connector cable of the high-voltage distributor damaged (partly short-circuited).
Loose connection with the phase sensor inside the high-voltage distributor.

Actions: Visually check the condition of the two-way connector and the relevant wiring.
Check the sensor inside the distributor and its connections.
Replace the phase sensor.

*** Phase sensor inside the distributor damaged (partly short-circuited).

Malfunction Code: E43

Diagnosis: Faulty contact in the connector of the air temperature sensor.
Wiring of the detachable connector partly broken.
Air temperature is internally damaged.

Action: Visually check the connectors and attachments of the sensor.
Deoxidise with a spray-type product.
Replace the air temperature sensor.

Malfunction Code: E44

Diagnosis: Cable of the air temperature sensor connector damaged and/or relative attachments damaged(short-circuited).
Air temperature sensor internally damaged.

Action: Visually check the sensor wiring, the sensor itself and the connections.
Replace the sensor.

Malfunction Code: E45

Diagnosis: Faulty contact in the connector of the water temperature sensor.
Wiring of detachable connector partly broken.
Sensor internally damaged.

Action: Visually check the connectors and attachment of the sensor.
Deoxidise with a spray-type product.
Replace the water temperature sensor.

Malfunction Code: E46

Diagnosis: Cable of water temperature sensor connector damaged (partly short-circuited).
Water temperature sensor internally damaged.

Action: Visually check the engine side wiring of the water temperature sensor.
Replace the water temperature sensor.

Malfunction Code: E47

Diagnosis: Malfunction of ignition modules.
Wiring of ignition modules damaged with voltage from the battery terminals where battery is not permitted.

Action: Disconnect both two-way connectors from the ignition modules and repeat the test.
If error E47 persists,look for a fault in the wiring.
If the test is positive, reconnect one module at a time to find the broken one.
Replace the module and repeat the test with both modules connected.

Note: Always check the effectiveness of the power module earth connection to the bodywork.
Clean the connectors on the ignition modules.
Clean the contacts with a spray type product.
Verify correct connections of cable to ignition modules, and that no water/moisture is present in the connector or cap of the connector itself.
Disconnect the connector in one of the two ignition modules and repeat the test, holding the 'Carry out/Repeat' button. If it does not compare with E47, verify the cable and connector of the disconnected ignition module; if necessary substitute the module itself.
If error E47 persists, reconnect the connector of the other ignition module and repeat the test.

Malfunction Code: E48

Diagnosis: Resistance of the EAV coil less than permitted value.
EAV connector or wiring partly or totally short-circuited.

Action: Visually check the condition of the EAV and the relevant wiring.
Disconnect the EAV connector and repeat the test.
If error E49 appears, replace the EAV.
If error E48 persists,look for a fault in the wiring.

Note: Should the EAV be replaced, at the end of the test always check the engine idle speed and CO%.

Malfunction Code: E49

Diagnosis: Resistance of the EAV coil greater than permitted value.
EAV connector and relevant wiring oxidised or mechanically damaged.
Connections on pump/EAV relay holder base oxidised or mechanically damaged.
Contact No.34 of the 35-pole connector oxidised or mechanically damaged.

Action: Visually check the condition of the EAV connection and the relevant wiring.
Short-circuit the two poles of the EAV connector and repeat the test.
If error E48 appears, replace the EAV.
If error E49 persists, look for a fault in the wiring and connections (contact No.34 of the 35-pole connector, pump/EAV relay holder base.

Note: Should the EAV be replaced, at the end of the tests always check the engine idle speed and CO%.

Malfunction Code: E51

Note: Testing appliance is in danger of being damaged.
Switch it off and disconnect it.
Only reconnect it for the time strictly necessary for any repeat tests.

Diagnosis: Voltage from battery on positive cable of air temperature sensor.
injection wiring damaged in vicinity of connections or at on intermediate point.

Action: Visually check the wiring and connections relating to the sensor.
Disconnect the sensor; carry out a visual check of same and the connection.
Repeat the test with the sensor disconnected.
If the malfunction persists, replace the wiring.

Malfunction Code: E52

Note: Testing appliance is in danger of being damaged.
Switch it off and disconnect it.
Only reconnect it for the time strictly necessary for any repeat tests.

Diagnosis: Voltage from battery on positive cable of water temperature sensor.
Injection wiring damaged in vicinity of connections or at an intermediate point.

Action: Visually check the ignition wiring and connections relating to the sensor.
Disconnect the sensor; carry out a visual check of same and the connection.
Repeat the test with the sensor disconnected.
If the malfunction persists,replace the wiring.

Malfunction Code: E53

Note: Testing appliance is in danger of being damaged.
Switch it off and disconnect it.
Only reconnect it for the time strictly necessary for any repeat tests.

Diagnosis: Voltage from battery on positive cable of revolution sensor.
Injection wiring damaged in vicinity of connection or at an intermediate point.

Action: Visually check the injection wiring and connections relating to the sensor.
Disconnect the sensor in question; carry out a visual check of same and the connection. Repeat the test with the sensor disconnected.
If the malfunction persists, replace the wiring.

Malfunction Code: E54

Note: Testing appliance is in danger of being damaged.
Switch it off and disconnect it.
Only reconnect it for the time strictly necessary for any repeat tests.

Diagnosis: Voltage from battery on positive cable of phase sensor.
Injection wiring damaged in vicinity of connections or at an intermediate point.

Action: Visually check the injection wiring and connections relating to the sensor in question.
Disconnect the sensor in question; carry out a visual check of same and the connection.
Repeat the test with the sensor disconnected.
If the malfunction persists, replace the wiring.

Malfunction Code: E56

Note: Testing appliance in danger of being damaged.
Switch it off and disconnect it.
Only reconnect it for the time strictly necessary for any repeat tests.

Diagnosis: Voltage from battery on positive cable of the throttle potentiometer.
injection wiring damaged in vicinity of connections or at an intermediate point.

Action: Visually check the injection wiring and connections relating to the sensor in question.
Disconnect the sensor; carry out a visual check of same and connection.
Repeat the test with the sensor disconnected.
If the malfunction persists, replace the wiring.

Malfunction Code: E57

Note: Testing appliance is in danger of being damaged.
Switch it off and disconnect it.
Only reconnect it for the time strictly necessary for any repeat tests.

Diagnosis: Voltage from battery on positive cable of pressure sensor (contacts No.30 and No.15).
Injection wiring damaged in vicinity of connections or at an intermediate point.

Action: Visually check the injection wiring and connections of the sensor in question.
Check that the pressure sensor is in working order; if necessary, replace it.
Disconnect the sensor in question; carry out a visual check of same and the connection.
Repeat the test with the sensor disconnected.
If the malfunction persists, replace the wiring.

Malfunction Code: E58

Diagnosis: Ignition switch in 'OFF' position rather than 'ON'.
35-pole connector of the tester not correctly connected.
Supply relay of the control box/injectors damaged (operating coil broken).
Contacts of relay holder base oxidised or damaged.
If the malfunction persists, replace the wiring.

Action: Check the contacts of the relay holder base.
Check the wiring to the relay holder base.
Replace the relay with one of identical characteristics.
Verify also by substitution of ignition switch.

Malfunction Code: E59

Diagnosis: Supply relay of control box/injectors of operating coil short-circuited.
Wiring to relay holder base damaged.
Relay of different type from that originally fitted.

Action: Check the wiring to the relay holder base.
Replace the relay with one of identical characteristics.

Malfunction Code: E60

Diagnosis: Ground return between contact No.1 (in the 35-pole connector) and the engine connection not in good condition.

Action: Check earth connection on 35-pole connector and ensure that the engine has a good earth.
If the malfunction persists, look for a fault in the wiring.

Malfunction Code: E61

Diagnosis: Ground return between contact No.19 (in the 35-pole connector) and engine connection not in good condition.

Action: Check earth connections on 35-pole connector and ensure that the engine has good earth.
If the malfunction persists,look for a fault in the wiring.

Malfunction Code: E63

Diagnosis: ECU relay/injector fuse damaged.
Contacts of ECU relay/injectors oxidised or damaged.
Lack of voltage on connection 87 of the ECU relay/injectors caused by loose connections or oxidation.

Action: Check ECU/injector fuse and system relay; verify the presence of battery voltage with key on contact No.30 brings relay box/injectors on. If not, check all the connections in between and the continuity of wiring connections to base and the relevant wiring.
Replace the control box/injectors relay with an identical one in proper working order.

Note: Damaged IAW fuses must only be replaced with fuses of the same value.

Malfunction Code: E64

Diagnosis: Contact on relay box/injectors altered.
Contact No.20 of 35-pole connector oxidised or damaged.

Action: Verify all connections on relay box/injectors.
Visually check contact No.20 of 35-pole connector.

Malfunction Code: E65

Diagnosis: The four injectors are disconnected.
Contact on Pin 87 of the relay holder base of the control box/injector relay oxidised or damaged.

Action: Check the connection of the injectors to the respective connectors.
Check the connections of the base of the control box/injector relay holder (Pin 87) and the relevant wiring.
Check, and if necessary, replace the control box/injector relay.

Malfunction Code: E66

If the IAW tester indicates a delay in switching from position '0'(idle) to position '1', the potentiometer must be reset in accordance with the correct procedure (Refer to SB506). Then repeat the test.

If the IAW tester always indicates position '2' at any opening of the throttle, look for a fault in the potentiometer connection: if necessary, replace the component and repeat the test.

If the IAW tester always indicates position '0' or '1' at any opening of the throttle, replace the potentiometer and repeat the test.

If the IAW tester indicates position '1' with the throttle at idle, check that the component is mechanically sound and that the operating linkages of the throttle potentiometer are working properly. Also check that the throttle returns correctly)to idle position) onto the end-of-travel stop and that the linkage is in good condition.

Re-position the potentiometer or, if necessary, replace it.

Note: Always check that there is no excess movement or interface in the linkage between the throttle lever and the potentiometer.

The tests of the position of the potentiometer are always carried out many times. Try opening the throttle slowly through the pedal, verifying the sequence is correct even on the return (of maximum to minimum throttle opening). Always ascertain that clearance between the lever and throttle and the potentiometer is not excessive or that it overstresses the potentiometer.

Malfunction Code: E67

Lack of spark

Diagnosis: Ignition modules damaged.
Connections of ignition modules incorrect or damaged.
Power supply to high-voltage coil cut or not connected.

Spark irregular or
prolonged over 10 secs.

Action: Disconnect both the 7-pin connectors from the modules.
Check the condition of the contacts in both 7-pin connectors on the ignition modules and relevant wiring. Ensure that the high-voltage coil, with the ignition switched ON, is properly supplied with power and the right polarity (see Fig.2).
Also check the ground connections with the module.
Temporarily connect an ignition module which is working properly.
Repeat the test.

WARNING: Lack of an earth connection or imperfect contact of the latter with the bodywork can cause irreparable damage to the ignition module.

Malfunction Code: E68

Diagnosis: Pump fuse blown.
Pump/EAV relay has oxidised or damaged contacts.
Connection with relay holder base of pump/EAV relay oxidised or damaged.
Break in electrical connections (power supply and earth) with pump.
Pump damaged.

Action: Check that the pump fuse is serviceable as well as the relay, the relay holder base, the relevant connections, the wiring and the earth wire of the pump

Whilst the test is carried out, check that power is coming from the battery to the terminals of the pump. If there is power, and the pump does not work, or works with obvious difficulty, replace the pump.

Note: Damaged IAW fuses must only be replaced with fuses of the same value.

Malfunction Code: E97

Diagnosis: Ground connections between ignition modules and bodywork missing or imperfect.

Action: Replace the fuse of the IAW tester with an identical one.
Check the ground connections between the ignition modules and the bodywork.

WARNING: Lack of a ground connection or imperfect contact of the latter with the bodywork can cause irreparable damage to the ignition module.

Malfunction Code: E98

Diagnosis: Fuse of testing appliance blown or missing.
Power from battery on ground contacts of sensors.
Ground connection between the ignition modules and the bodywork missing or faulty.
Negative terminal of battery not connected to the bodywork.
Ground connection between engine and bodywork missing or faulty.

Action: Replace fuse.
Visually check the injection wiring and connections with sensor ground ignition module and ensure that the ground returns on the engine are serviceable.
Check the connection of negative terminal of battery to bodywork.
Disconnect all the sensors one by one, giving each one a visual check, together with its connection.
Repeat the test, each time with a different sensor disconnected. On completion, replace the fuse and deoxidise the relevant connections with a suitable spray.
If the malfunction persists, replace the wiring.

Malfunction Code: E99

Diagnosis: Testing appliance incorrectly connected.
Testing equipment not working properly.

Action: Check that the testing equipment is correctly connected to the power supply.
If malfunction remains, do not continue to use the appliance.

WARNING: DO NOT TEST CONNECTIONS WITH THE HARNESS PLUG CONNECTED TO THE ECU. CARE MUST BE TAKEN NOT TO SHORT TERMINALS WITH THE MULTI-METER PROBES.

Cable Colour	ECU Plug Pin No.	Function
Black	1	Power Ground
-	2	Not connected
Yellow/Purple	3	Speed Sensor
Yellow/Black	4	Speed Sensor input Signal
-	5	Not connected
Brown/Black	6	Phase Sensor (ground)
-	7	Not connected
-	8	Not connected
Yellow/Brown	9	Left Ignition Module Output(common)
Green/Pink	10	Injector and E.C.U. Relay
Black	11	Sensors Ground
-	12	Not connected
-	13	Not connected
-	14	Not connected
Blue/Brown	15	Manifold Air Pressure Signal Input
-	16	Not connected
Red/Green	17	Throttle Position Input
Blue	18	Injector Cyl. No.3 and No.6 Output
Black	19	Power Ground
White	20	Battery Voltage Supply
White/Black	21	Auto Relay
-	22	Not connected
Purple/Black	23	Phase Sensor Signal
Brown/Yellow	24	Right Ignition Module Output(common)
Blue/Yellow	25	Right Ignition Module Output Signal
Yellow/Blue	26	Left Ignition Module Output Signal
Grey	27	Unitest Driving Output(Serial line)
Purple/Black	28	Fuel Pump Relay
Yellow/Red	29	Water Temperature Sensor Input Signal
Red/Brown	30	Pressure and Throttle Sensors Supply
Green/Yellow	31	Air Temperature Sensor Input
Yellow	32	Injector Cyl. No.7 and No.8 Output
Brown	33	Injector Cyl. No.2 and No.4 Output
Red/Yellow	34	Electrical Air By-pass Output
Purple	35	Injector Cyl. No.1 and No.5 Output

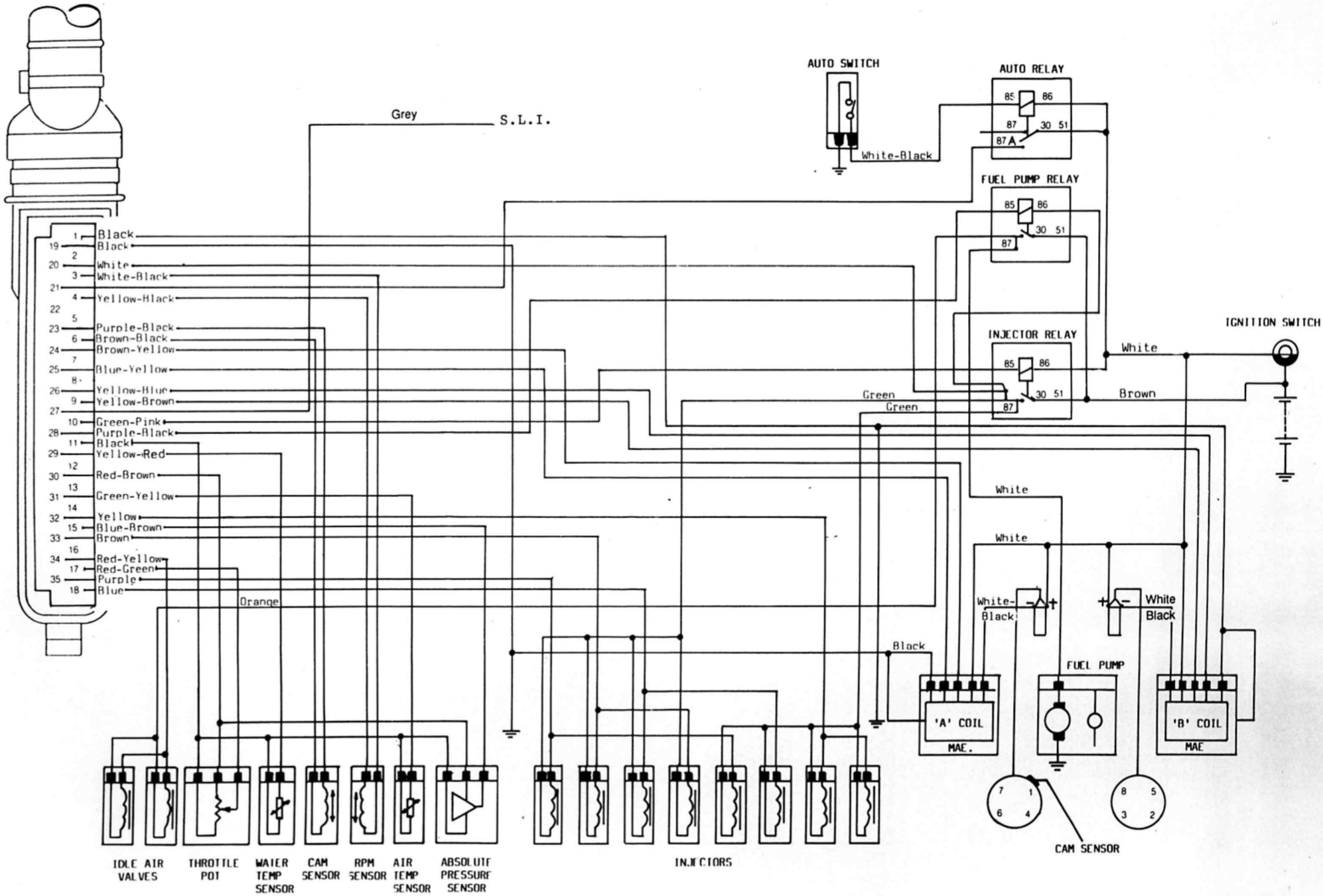


Fig.2 Schematic Wiring Diagram E.F.I.

All cars - with or without catalytic converters