Foreword

The Multi-Tester plus/pro software cassette is the component that gives the diagnostic equipment its unique test characteristics: All data required to make the test system operate are stored on the software cassette.

The software cassette can be easily replaced enabling the Multi-Tester plus/pro to be rapidly adapted to the trouble-shooting job at hand.

These Trouble-Shooting Instructions describe how to use the equipment on Honda fuel injection systems type PGM-FI 53.

Multi-Tester plus/pro checks all input and output signals that have bearing on the control system and can also diagnose a faulty control unit.

Contents

System Description

General

The Honda PGM-FI 53 is a system which controls fuel injection and ignition. The system evaluates signals from various sensors and adjusts the amount of fuel and pre-ignition accordingly. The system is available in both multipoint form, with separate sequentially controlled injectors for each cylinder, and as a TBI system with one main injector and an auxiliary injector mounted in the throttle housing.

Summary – Car Models

The following car models are equipped with PGM-FI 53:

Manufacturer	Type	Engine
Honda	Accord 2.0	A20A4, B20AB, B20A3
Honda	Civic 1.5	D15B1, D15B2, D15B6, EW3
Honda	Civic 1.6	B16A6, D16A7, D16A8, D16A9, D16Z2
Honda	Concerto 1.5	D15B2
Honda	Concerto 1.6	D16A8, D16A9, D16Z2, D16Z4
Honda	CRX	D16Z5, EW3
Honda	Legend 2.7	C27A1, C27A2
Honda	Prelude 2.0	B20A5, B20A6, B20A7
Acura	Integra	B18A1, D16A1
Acura	Legend 2.7	C27A1
Rover	825	V6-24, P
Rover	827	V6 2.7, G, H, J, K
Rover	Sterling	V6-24, V6 2.7
Rover	Vitesse	V6 2.7
Rover	216/416	D16A6, D16A7, D16A8, D16A9, D16Z2, D16Z4

To check that a particular year's model is fitted with a fuel injection system described in this manual, we refer the reader to the particular car's instruction book or workshop manual.

Sensors, signals and switches

- Throttle potentiometer – measures the throttle's angle.
- Manifold air pressure sensor (MAP) – measures the pressure in the induction pipe.
- Atmospheric pressure sensor.
- Coolant temperature sensor.
- Air temperature sensor – measures the temperature of the air ingested.
- Lambda sensor – measures the oxygen content of the exhaust gases.
- Crankshaft sensor – measures the rotation speed and indicates the top dead center.
- TDC sensor.
- Cylinder sensor – provides information relating to TDC for cylinder 1.

Control functions

- Control of injection valves.
- Ignition advance control.
- Control of tank ventilation (only certain systems).
- Control of idle speed.

The V-TEC system

V-TEC is a system which controls the opening time and angle of inlet and exhaust valves during operation. The intention of the system is to combine high power at high engine speeds with high torque at low engine speeds.

To achieve this, an additional cam lobe and rocker arm for each pair of inlet and exhaust valves is fitted. At low engine speeds, the additional rocker arm is disconnected and has no effect on the valves. At high engine speeds though, the three rocker arms are locked together by a two-part piston. In this way, the two inlet or exhaust valves follow the third rocker arm's movements.

The control unit controls the two-part piston hydraulically via an electrically operated valve. The control unit verifies that the oil pressure is at the correct level with the aid of an oil pressure switch.

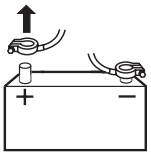
Users Guide

Connection of equipment

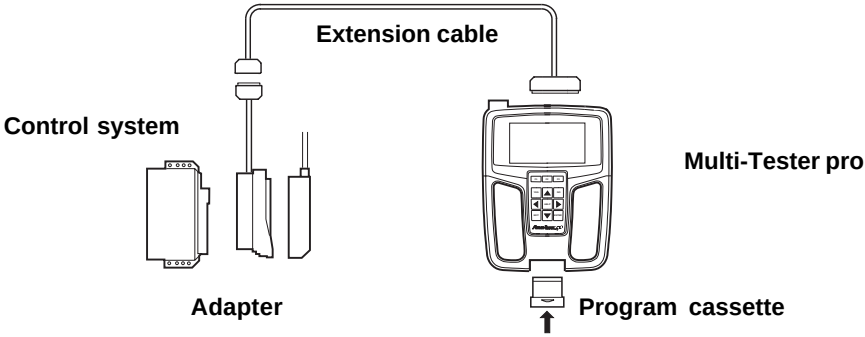
1. Preparations

Turn off ignition!

Disconnect positive battery terminal!



2. Connect adapter and program cassette



3. Connect power supply

Starting the program

General

The program is re-started each time the power supply is interrupted and re-connected. When the supply is interrupted any faults and pre-sets recorded in memory are deleted.

At any particular moment, those keys which are not required are disabled. If such a key is pressed, the unit emits a long beep signal.

The program starts automatically when the Multi-Tester plus/pro is connected to the power supply. The unit executes steps 1 to 3 and pauses at step 5.

Working procedure

MULTI-TESTER *plus*

1. All fields in the display are tested (i.e. are illuminated) *(Multi-Tester plus only).*
If no software cassette is installed or the cassette is incorrect, only the first and third row become illuminated.
At this point the display's contrast can be adjusted. Adjust the potentiometer to right of the switch inside the cassette opening (using a small screwdriver).

SELF-TEST OK

2. The Multi-Tester plus/pro performs a self-test....

MULTITESTER
HONDA PGM-FI 53

VER:XXXXXXXXXXXX

3. ...and identifies the current versions of the hardware and software.

4. Snapshots *(Multi-Tester pro only)*
If the instrument contains stored snapshots, a menu for managing these is displayed.

VIEW SNAPSHOTS
ERASE MAN.SNAPSHOTS
ERASE GRAPHS
↑/↓/ENTER

5. The adapter connected
The Multi-Tester plus/pro confirms which adapter is connected and displays this information.

Is the information on row 2 correct? Respond by pressing ENTER.

ADAPTER CONNECT.
XXXXXXXXXXXXXXX

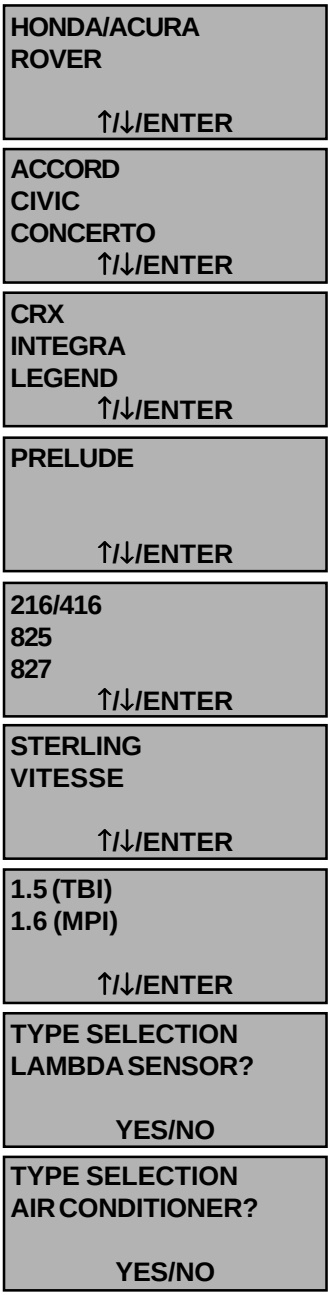
↑/↓/ENTER

This message is displayed if the adapter which is connected to the Multi-Tester plus/pro is of the incorrect type, i.e. not combined with the appropriate software cassette.

WRONG ADAPTER
CONNECTED

If the adapter is not connected to the unit, the message NO ADAPTER CONNECTED is displayed.

NO ADAPTER
CONNECTED



6. Questions during initialization

In order for the Multi-Tester plus/pro to perform the tests correctly it needs certain data on the system. The display shows either alternatives or questions.

Alternatives

Use the up or down arrow key to select the correct alternative and then press ENTER.

Questions

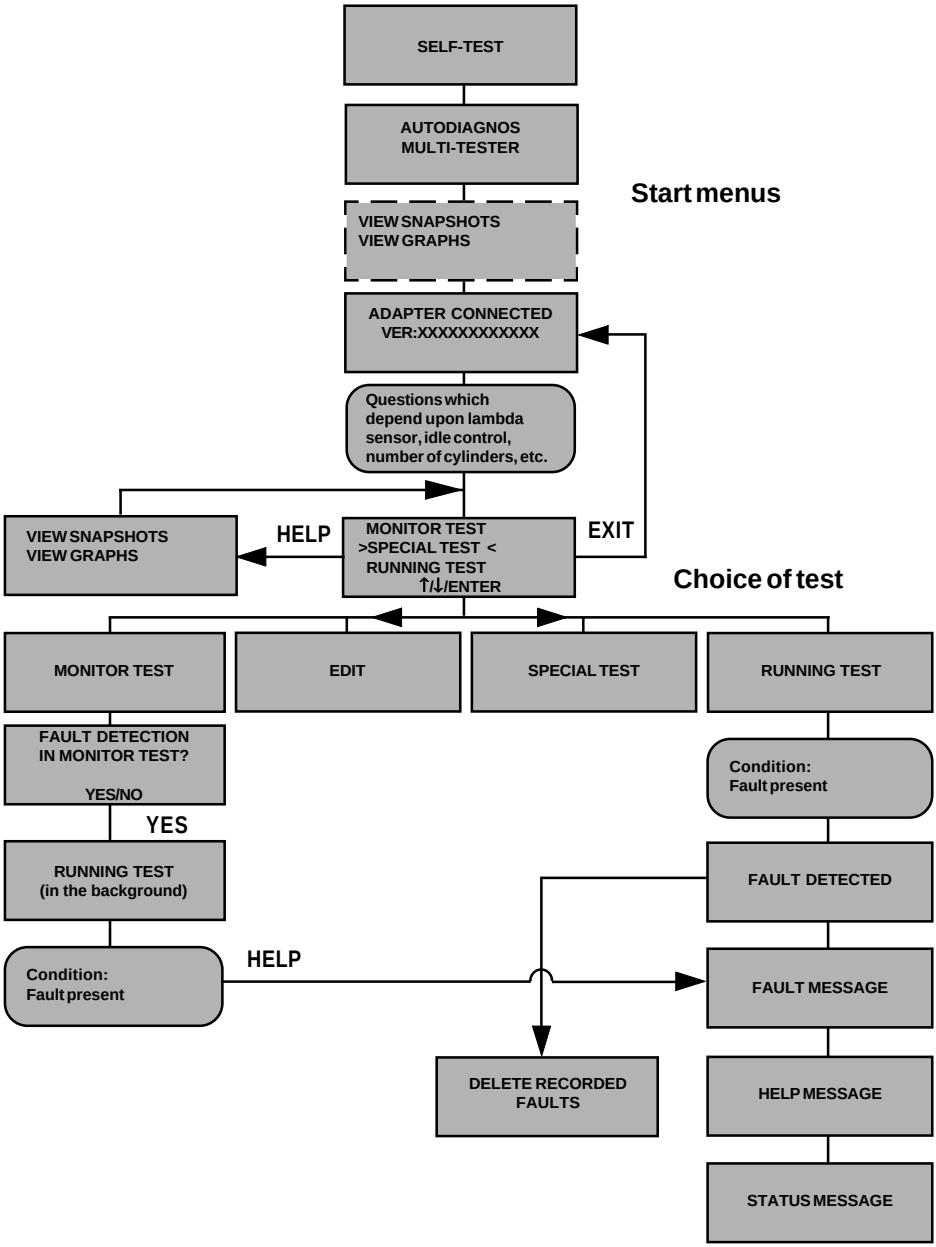
Answer the questions by pressing either the YES or NO key.

7. Cancel

To cancel work with the Multi-Tester plus/pro:

- Switch off engine.
- Disconnect the power cable from the unit.
- Disconnect the battery's positive terminal.
- Remove the adapter and re-connect the car's wiring harness to the control unit.
- Re-connect the battery's positive terminal.

Program structure



Programs and tests

The following types of test are available:

Monitor test Directs and displays the control system's signals without storing measured values.

Running test Records and stores faults which occur under both shorter and longer test periods.

Edit Can be used to disable fault detection on various signals.

Special tests A number of tests which are carried out in response to independent signals.

Monitor test

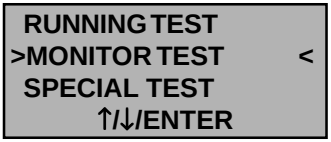
General
In Monitor test, values such as engine speed and coolant temperature are displayed.

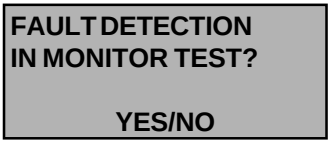
Monitor test – with fault detection
This test is used to detect incorrect input and output signals to/from the various control systems. An fault is recorded if a signal deviates from its pre-programmed standard value. The fault is recorded until it is deleted manually or the power supply is interrupted.

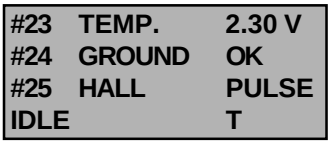
- Up to five faults can be recorded each time Running is executed.
- Each primary fault can lead to a number of secondary faults.
- The Multi-Tester plus/pro stores all faults (primary and secondary) temporarily and offers an assessment of which is the primary fault. This is important in order to carry out repair work. Fault information is saved and displayed.
- The same fault cannot be recorded twice in succession.
- Order of priority of fault registration:
  1. Power supply
  2. Frame connections to the control system
  3. Sensor signals which affect the basic functions of the engine
  4. Other signals

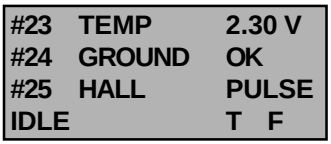
Warning! If the display is to be read whilst driving the test should be performed by two people.

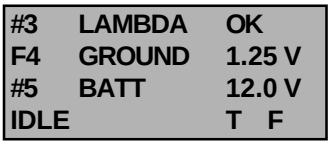
Monitor test

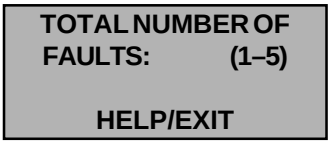












1. Monitor test
Select MONITOR TEST in the test choice menu.

2. Fault detection in Monitor test
Here you can select whether or not fault detection is run while in Monitor test. If you press YES, Running searches for faults while Monitor displays the values. If you press NO, START ENGINE shows. I you press ENTER, the list of signals is shown without the engine being started.

3. Test underway
A small **T** character flashes on the status row which indicates that the test is underway.

4. Fault detected
If an fault is detected, the unit emits a tone as well as a small **F** on the status row.

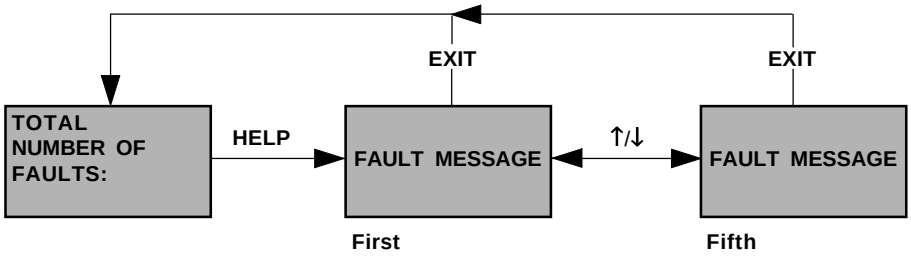
5. To inspect faults
If you press → the unit proceeds directly to the faulty signal. A small **F** character is displayed before the relevant pin number. If you select ← the unit proceeds to the beginning of the list of signals.

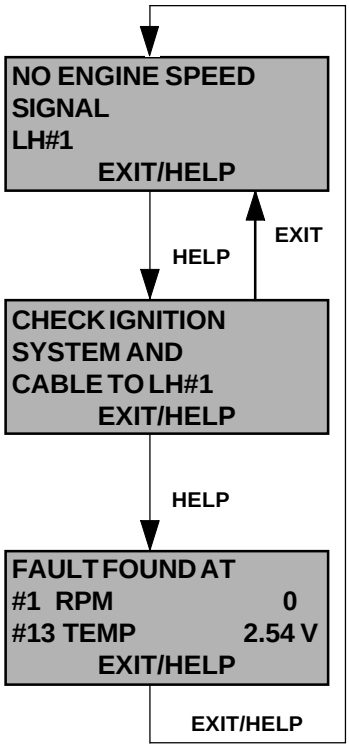
You can also press HELP to display which fault has been detected in simple text. If the engine is switched off, when Monitor is re-started, you must begin from stage 1 of this section.

Fault messages

Each fault has the following information associated with it:

- Fault message
- Help message
- Status message





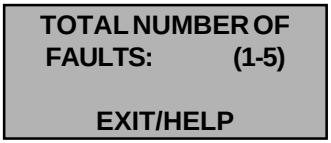
Example fault message for an LH control system.

Example help message.

Example status message.

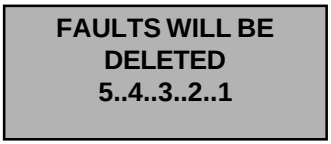
Display engine speed and voltage from coolant temperature sensor.

To delete recorded faults

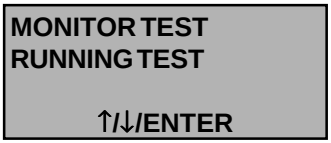


1. Start
To delete faults, start from this point.

2. To delete faults
Depress the EXIT key for at least 5 seconds. If EXIT is not pressed within 3 seconds the unit returns to the FAULT DETECTED message automatically.

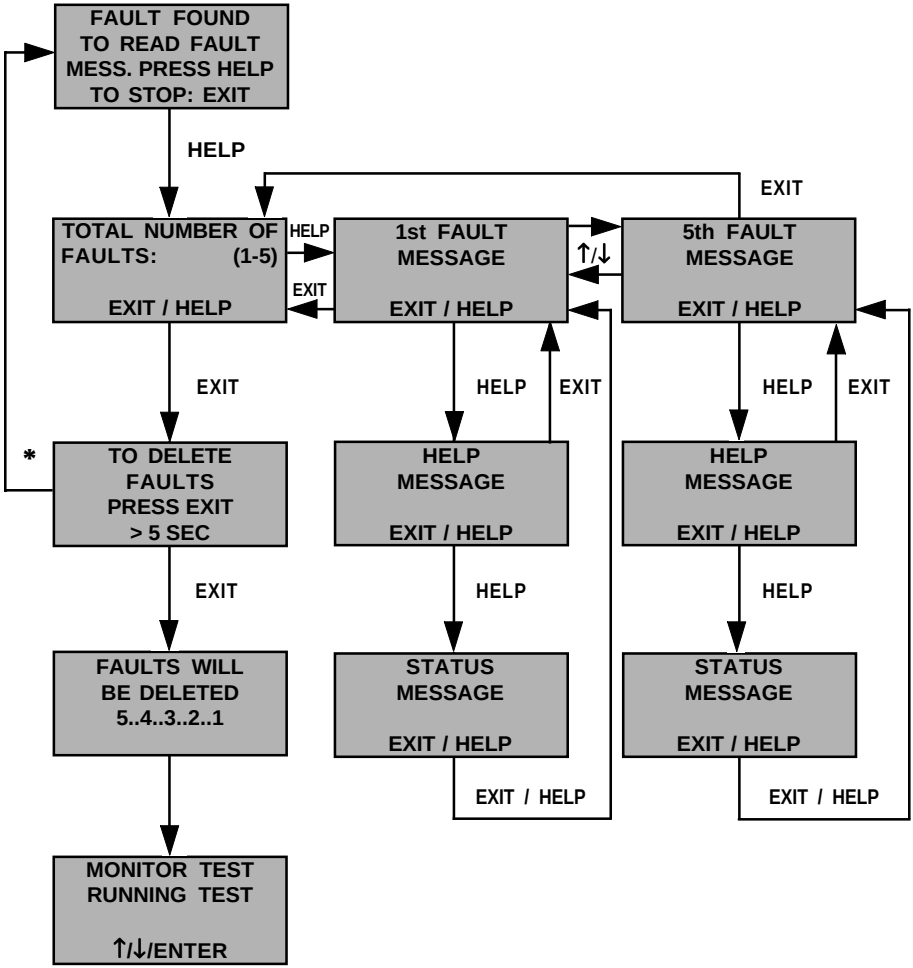


3. Delete faults.
All faults and all snapshots are deleted simultaneously.



4. Exit delete
When all faults have been deleted, the instrument returns to the “Choice of test” menu.

Fault detected



*** Occurs automatically after 3 seconds**

Snapshots (Multi-Tester pro only)

Automatic snapshots
When the Multi-Tester pro finds a fault, all the values in the monitor list are saved automatically as a snapshot. The Multi-Tester pro can store up to five snapshots. The number of snapshots stored is shown at the bottom of the display.

Certain parameters are displayed as mean values. Faults may be reported on the basis of instantaneous values, with the result that autosnap may not always display a faulty value even if the Multi-Tester pro indicates a fault on a particular signal.

Manual snapshots
Press ENTER to create a manual snapshot. Up to five manual snapshots can be stored. Here too, the number of snapshots stored is shown at the bottom of the display.

Viewing snapshots

To view snapshots, press EXIT, then HELP. Then move the cursor to VIEW SNAPSHOT with ↑/↓ and press ENTER. The manual snapshots appear first. The number of the current snapshot is shown at the bottom of the display. To view the next snapshot press →. Press EXIT to quit.

To delete manual snapshots, move the cursor to DELETE SNAPSHOT with ↓. Press ENTER, then YES.

Running test

General

This test is used to detect incorrect input and output signals to/from the various control systems. An fault is recorded if a signal deviates from its pre-programmed standard value. The fault is recorded until it is deleted manually or the power supply is interrupted.

- Up to five faults can be recorded each time Running is executed.
- Each primary fault can lead to a number of secondary faults.
- The Multi-Tester plus/pro stores all faults (primary and secondary) temporarily and offers an assessment of which is the primary fault. This is important in order to carry out repair work. Fault information is saved and displayed.
- The same fault cannot be recorded twice in succession.
- Automatic test restart when the engine is restarted (appropriate for long-term tests).
- Signal values cannot be studied.
- Order of priority of fault registration:
  1. Power supply
  2. Frame connections to the control system
  3. Sensor signals which affect the basic functions of the engine
  4. Other signals

Warning! If the display is to be read whilst driving the test should be performed by two people.

An fault can be recorded the moment Running starts. The Multi-Tester plus/pro emits a beep and the letter **F** is displayed when an fault is detected. Instructions for retrieving the fault from memory together with a description of fault, help and status messages are described in the “Fault messages” section.

Edit

Edit can be used to turn off the error diagnosis for signals which for some reason are not connected to the interface. This may accur if you are testing a different year model of the car than the one that was available when developing the program for the actual control system.

At the start all signals are switched on. When the operator answers the introductory questions, Multi-Tester plus/pro shuts out non-relevant signals.

Error diagnosis for other signals can be switched on and off. Press ENTER to change the signal's status. When you press HELP, more information on the actual signal is displayed.

All changes will be erased when the Multi-Tester plus/pro is disconnected from power.

Note
If error diagnosis is disconnected, this can lead to other errors being reported. For example, if error diagnosis for a main ground or power supply is disconnected, then signals that depend on them can be reported as faulty.

Special Tests

Special tests allows detailed study of certain signals.

The following functions are provided for Special Tests.

Graphical display (Multi-Tester pro only)

- All signals that are presented in the form of voltage (V) in Monitor mode are displayed graphically.
- Press ↑/↓ to reach the required signal and press ENTER.
- To see all functions press HELP. To return, press any key.

  The timebase of the X-axis is shown bottom right on the display. It is marked with a black square. To reduce/increase the timebase, press ←/→. The shortest timebase is 2 seconds and the longest is 1024 seconds.

  The amount above the Y-axis indicates the scaling. Pressing F3 toggles the highlight between the scale factor and the offset bottom left on the display. Depending on which is highlighted, the setting is changed by pressing ↑/↓. The minimum and maximum values for the scaling are 200 mV and 15 000 mV, and for the offset 0 V and 14 V.

  The offset moves the curve in the Y-direction.

- Min/max is displayed top right on the display and applies to the curve currently displayed. When a snapshot has been taken, min/max is replaced by new values.

Snapshot (Multi Tester pro only)

There are two ways of taking a snapshot in graphical mode:

- Press F1. Curve drawing stops. Press ENTER to take a snapshot. To return, press F1 or F2.
- Press F2. A new curve is drawn to the end of the X-axis, where it stops. Press ENTER to take a snapshot. To return, press F1 or F2.

To view snapshots, press EXIT twice, then press HELP. Move the cursor to VIEW GRAPHS with ↑/↓ and press ENTER. The current snapshot and the number of snapshots stored are shown at the top of the display. Press → to view the next snapshot. Press EXIT to quit.

To delete graphical snapshots, move the cursor to ERASE GRAPHS with ↓. Press ENTER, then YES.

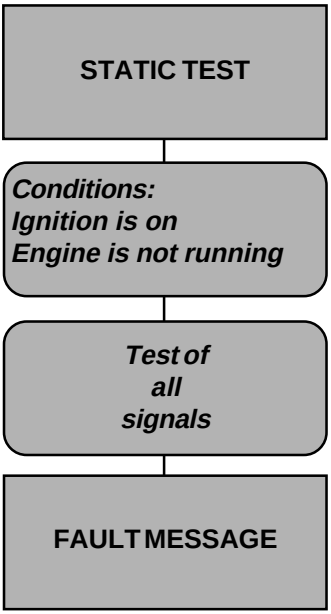
The program for the PGM-FI system includes the following special tests:

>STATIC TEST	**Static test** Checks the signals when the ignition is on but the engine is not running.
>CONT. STAT.TEST	**Continuous static test** Static test that is carried out continuously.
>BATTERY	**Battery** Displays the battery voltage and the minimum and maximum values.
>THROTTLE POT.	**Throttle potentiometer** Displays the signal voltage from the throttle potentiometer and the minimum and maximum values.
>THROTTLE TEST	**Throttle test** Tests the throttle potentiometer. Checks signal levels and continuity.
>MAP SENSOR	**Manifold air pressure** Displays the signal voltage from the manifold air pressure sensor and the minimum and maximum values.
>LAMBDA SENSOR	**Lambda sensor** Displays signal voltage from the lambda sensor and the minimum and maximum values.
>AIRTEMP.	**Air temperature** Displays the signal voltage from the air temperature sensor and the minimum and maximum values.

Coolant temperature
Displays the signal voltage from the coolant temperature sensor and the minimum and maximum values.

Idle valve
Display of the control current to the idle speed correction valve as well as minimum and maximum values.

V-TEC test
Check of the V-TEC system's signals.



Static test
Continuous static test

These tests detect incorrect input and output signals from the control unit when the ignition is on but the engine is not running.

A fault is registered if any signal differs from the pre-programmed standard value. The fault will be held in memory until it is erased manually or until the power is broken.

Starting conditions for the test:

- The ignition should be on.
- The engine should not be started.

  If the ignition is off, you will be asked to turn it on. If the engine is started the test will not be carried out and the program will return to the special tests menu.

After all the signals are controlled, the text NO FAULTS FOUND appears on the display or if any faults are located then FAULTS EXIST will appear.

If the continuous static test is selected, then all signals will be tested continuously until EXIT is pressed, the ignition is switched off or the engine is started.

If faults are found then this will appear on the display. To view these faults press HELP.

Throttle test

This test involves a comprehensive check of the signal levels of the throttle potentiometer and the condition of the potentiometer pathways. The test can for example detect signal interruptions that originate from a bad carbon path.

Starting conditions for the test:

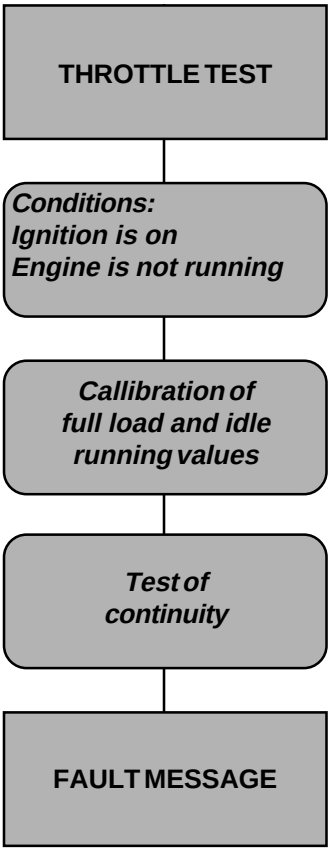
- The ignition has to be turned on.
- The engine should not be running.

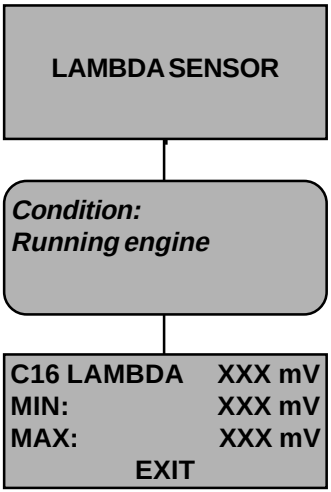
  If the ignition is off, you will be asked to turn it on. If the engine is started, the test will not be carried out and the program will return to the special tests menu.

Firstly, a calibration is carried out for the Multi-Tester plus/pro pre-programmed values for full load and idle running. This is to guarantee the Multi-Tester plus/pro function as its values can differ for different vehicles. You will be asked to give full throttle and then release the accelerator completely.

Then you will have to press down the accelerator slowly. A check is now being carried out to control that there is no break in signal from the throttle potentiometer. If the accelerator is depressed too quickly during this part of the test, you will be asked to release it and slowly depress the accelerator again.

If faults are found then this will appear on the display. To view these faults press HELP.





Lambda sensor

This test demonstrates the signal voltage of the lambda sensor.

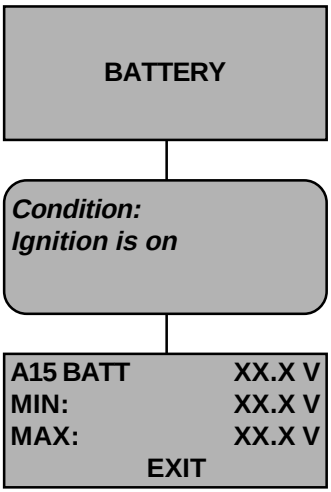
The test displays the actual value together with the minimum and maximum values recorded. This makes it possible to check that the sensor is working and swings between extreme positions 0 and 1 V approx.

Starting conditions for this test:

- The engine has to be running.

  If not, you will be asked to start it.

This test will continue until EXIT is pressed or until the engine is stopped.



Battery

This test demonstrates the voltage level of the car's battery.

The test displays the actual value together with the minimum and maximum values recorded. This enables the battery voltage during for example the starting phase to be measured.

Starting conditions for this test:

- The ignition has to be turned on.

  If not, you will be asked to turn it on.

This test will continue until EXIT is pressed or until the engine is stopped.

Throttle potentiometer

This test demonstrates the signal voltage of the throttle potentiometer.

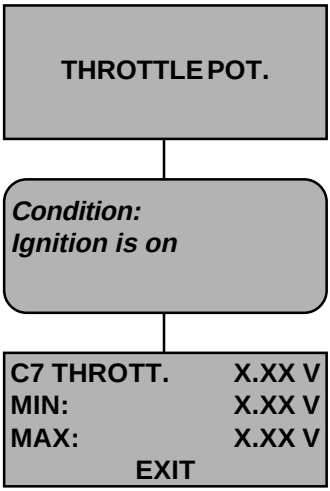
The test displays the actual value together with the minimum and maximum values recorded.

Starting conditions for this test:

- The ignition has to be turned on.

  If not, you will be asked to turn it on.

This test will continue until EXIT is pressed or until the engine is stopped.



Coolant temperature

This test demonstrates the signal voltage of the coolant temperature sensor.

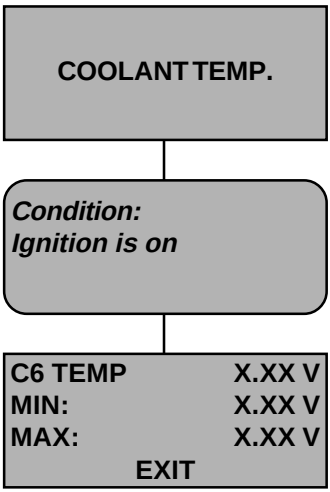
The test displays the actual value together with the minimum and maximum values recorded.

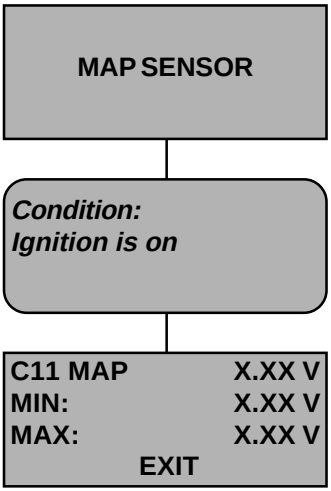
Starting conditions for this test:

- The ignition has to be turned on.

  If not, you will be asked to turn it on.

This test will continue until EXIT is pressed or until the engine is stopped.





Manifold air pressure (MAP)

This test demonstrates the signal voltage of the manifold air pressure sensor.

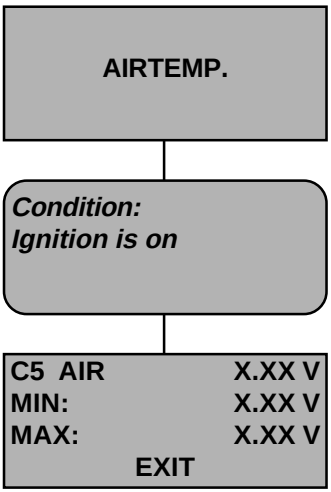
The test displays the actual value together with the minimum and maximum values recorded.

Starting conditions for this test:

- The ignition has to be turned on.

  If not, you will be asked to turn it on.

This test will continue until EXIT is pressed or until the engine is stopped.



Air temperature

This test demonstrates the signal voltage of the air temperature sensor.

The test displays the actual value together with the minimum and maximum values recorded.

Starting conditions for this test:

- The ignition has to be turned on.

  If not, you will be asked to turn it on.

This test will continue until EXIT is pressed or until the engine is stopped.

ISC valve

This test demonstrates the control current to the idle speed correction valve.

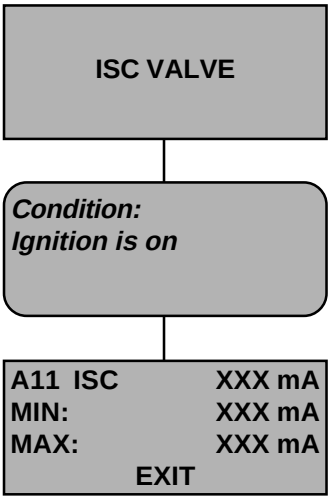
The test displays the actual value together with the minimum and maximum values recorded.

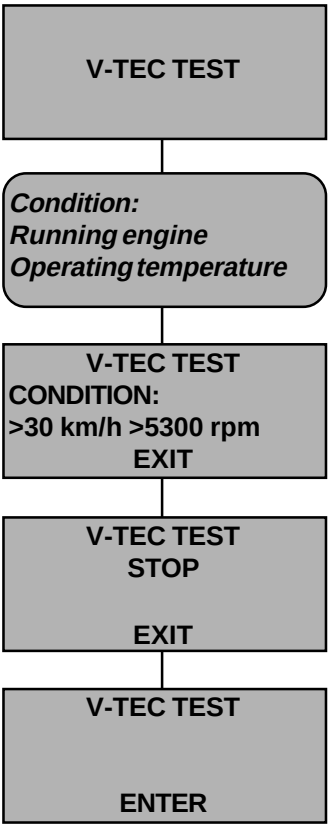
Starting conditions for this test:

- The ignition has to be turned on.

  If not, you will be asked to turn it on.

This test will continue until EXIT is pressed or until the engine is switched off.





V-TEC test

This test measures the engine speed when the V-TEC system's signals change. Initial conditions for the test:

- The engine has to be running. If not, you will be asked to start it.
- The engine is to have reached its normal operating temperature. If this does not apply, you will be asked to warm up the engine.

When these conditions have been fulfilled you will be asked to drive the vehicle at a speed of at least 30 km/h with a minimum engine speed of 5,300 rpm.

When the Multi-Tester plus/pro has registered a change in both the V-TEC system's signals, you are advised to stop the car.

Once the Multi-Tester plus/pro has registered a further change in the signals, you can study the results by pressing ENTER. The engine speed at individual signal changes can be studied by using the arrow keys.

Trouble-Shooting Procedure

General

Many faults can be detected by using the Multi-Tester plus/pro (with the appropriate software cassette) only. As an additional aid, each software cassette has a dedicated troubleshooting manual.

However, when troubleshooting, the following points should be observed:

- Faults of intermittent character, e.g. faulty switch contacts, are often difficult to observe in the workshop. In such cases, those components which are considered potential causes of the fault should be swapped out, each in turn, followed on each occasion with a test drive with the Multi-Tester plus/pro connected.
- **NB:** the fault rate for control units is relatively low. More likely causes of failure are harness connectors, cabling, sensors or switches.
- Whenever resistance or voltage supply measurements are being taken at the harness connector by the control unit, the Autodiagnos Break-out Box (A0201/A0202) and associated Break-out Box adapter should be used to avoid destroying the harness connector's sheathing. This is to ensure good electrical contact and to avoid damage to or a short circuit across the harness connector's sheathing.

The troubleshooting manuals include two chapters important to trouble-shooting.

The *Fault Tracing* chapter includes a brief signal description for each pin and three columns (the pin number means the number in the control unit's harness connector). The three columns enumerate the quantities to be checked by the various tests. In the rightmost column the corresponding section in the *Locating Faults* chapter is also included (see figure below).

Pin A1	**Control signal to injection valve 1**	
MONITOR	**SPECIAL**	**RUNNING**
"A1 INJ" (ms)	Static test: check of voltage level.	Continuous pulse check. See chapter Locating Faults ➧ 1

In the *Locating faults* chapter, the working procedure for locating faults is included.

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Fault Tracing

Pin A1 Control signal to injection valve 1

MONITOR	SPECIAL	RUNNING
"A1 INJ" (ms)	Static test: check of voltage level.	Continuous pulse check. See chapter Locating Faults ➧1

Pin A1/A3 Control signal to auxiliary injector valve (TBI)

MONITOR	SPECIAL	RUNNING
"A1/A3 INJ" (ms)	Not tested.	Continuous pulse check. See chapter Locating Faults ➧2

Pin A2 Ground

MONITOR	SPECIAL	RUNNING
"A2 GROUND" (OK/ERR)	Static test: check of ground level.	Continuous test of ground level. Desired value: 0 V See chapter Locating Faults ➧3

Pin A3 Control signal to injection valve 2

MONITOR	SPECIAL	RUNNING
"A3 INJ" (ms)	Static test: check of voltage level.	Continuous pulse check. See chapter Locating Faults ➧1

Pin A4 Ground

MONITOR	SPECIAL	RUNNING
"A4 GROUND" (OK/ERR)	Static test: check of ground level.	Continuous test of ground level. Desired value: 0 V See chapter Locating Faults ➧3

Pin A5 Control signal to injection valve 3

MONITOR	SPECIAL	RUNNING
"A5 INJ" (ms)	Static test: check of voltage level.	Continuous pulse check. See chapter Locating Faults ➧1

Pin A5/A7 Control signal to main injection valve (TBI only)

MONITOR	SPECIAL	RUNNING
"A5/A7 INJ" (PULSE/----)	Not tested.	Continuous pulse check. See chapter Locating Faults ➧4

Pin A6 Control signal to tank ventilation valve (certain systems)

MONITOR	SPECIAL	RUNNING
"A6 TANK" (ON/OFF)	Static test: check of voltage level.	Not tested. See chapter Locating Faults ➧5

Pin A6 Control signal to injection valve 6

MONITOR	SPECIAL	RUNNING
"A6 INJ" (ms)	Static test: check of voltage level.	Continuous pulse check. See chapter Locating Faults ➧1

Pin A7 Control signal to injection valve 4

MONITOR	SPECIAL	RUNNING
"A7 INJ" (ms)	Static test: check of voltage level.	Continuous pulse check. See chapter Locating Faults ➧1

Pin A8 Control signal to V-TEC valve (V-TEC only)

MONITOR	SPECIAL	RUNNING
"A8 V-TEC" (ON/OFF)	V-TEC test: check of voltage level.	Not tested. See chapter Locating Faults ➧6

Pin A8 Control signal to injection valve 5

MONITOR	SPECIAL	RUNNING
"A8 INJ" (ms)	Static test: check of voltage level.	Continuous pulse check. See chapter Locating Faults ➧ 1

Pin A8 Control signal to AT-lockup

MONITOR	SPECIAL	RUNNING
"A8 LOCK-UP" (ON/OFF)	Not tested.	Not tested.

Pin A10 Control signal to EGR sensor (certain systems)

MONITOR	SPECIAL	RUNNING
"A10 EGR" (PULSE/----)	Not tested.	Not tested. See chapter Locating Faults ➧ 7

Pin A11 Control signal to idle speed correction valve

MONITOR	SPECIAL	RUNNING
"A11 ISC" (mA)	Static test: check of current intensity. ISC valve: display of current fluctuations.	Continuous test of control signal level. See chapter Locating Faults ➧ 8

Pin A12 Control signal to fuel pump relay

MONITOR	SPECIAL	RUNNING
"A12 RELAY" (ON/OFF)	Static test: check of control signal level.	Continuous test of control signal level. See chapter Locating Faults ➧ 9

Pin A15 Power supply from main relay

MONITOR	SPECIAL	RUNNING
"A15 BATT" (V)	Static test: check of voltage level.	Continuous test of voltage level. Desired value: 12–14 V See chapter Locating Faults ➧ 10

Pin A16 Ground

MONITOR	SPECIAL	RUNNING
"A16 GROUND" (OK/ERR)	Static test: check of ground level.	Continuous test of ground level. Desired value: 0 V

See chapter Locating Faults ➧ 11

Pin A17 Constant power supply from battery (certain systems)

MONITOR	SPECIAL	RUNNING
"A17 BATT" (OK/ERR)	Static test: check of voltage level.	Continuous test of voltage level. Desired value: 12–14 V

See chapter Locating Faults ➧ 12

Pin A18 Ground

MONITOR	SPECIAL	RUNNING
"A18 GROUND" (OK/ERR)	Static test: check of ground level.	Continuous test of ground level. Desired value: 0 V

See chapter Locating Faults ➧ 11

Pin B1 Constant power supply from battery (certain systems)

MONITOR	SPECIAL	RUNNING
"B1 BATT" (OK/ERR)	Static test: check of voltage level.	Continuous test of voltage level. Desired value: 12–14 V

See chapter Locating Faults ➧ 13

Pin B2 Control signal to cold start valve (certain systems)

MONITOR	SPECIAL	RUNNING
"B2 COLDST" (ON/OFF)	Not tested.	Not tested.

See chapter Locating Faults ➧ 14

Pin B2 Control signal to tank ventilation valve (certain system)

MONITOR	SPECIAL	RUNNING
"B2 TANK" (ON/OFF)	Static test: check of voltage level.	Not tested. See chapter Locating Faults 15

Pin B5 Signal from oil pressure switch (V-TEC only)

MONITOR	SPECIAL	RUNNING
"B5 OIL PR" (ON/OFF)	V-TEC test: check of voltage level.	Not tested. See chapter Locating Faults 16

Pin B6 Control signal to engine control lamp

MONITOR	SPECIAL	RUNNING
"B6 LAMP" (ON/OFF)	Not tested.	Not tested. See chapter Locating Faults 17

Pin B10 Signal from crankshaft sensor (certain systems)

MONITOR	SPECIAL	RUNNING
"B10 CRANK" (PULSE/----)	Not tested.	Continuous pulse check. See chapter Locating Faults 18

Pin B11 Signal from lambda sensor (certain systems)

MONITOR	SPECIAL	RUNNING
"B11 LAMBDA" (mV)	Lambda sensor: display of voltage variation.	Check of power variation. Conditions: – engine at operating temperature – not idling or under full load – engine speed < 2.500 rpm See chapter Locating Faults 19

Pin B11 Signal from vehicle speed sensor (6-cylinder only)

MONITOR	SPECIAL	RUNNING
"B11 VSS" (PULSE/----)	Not tested.	Not tested.

See chapter Locating Faults 20

Pin B12 Ground to crankshaft sensor (certain systems)

MONITOR	SPECIAL	RUNNING
"B12 GROUND" (OK/ERR)	Static test: check of ground level.	Continuous test of ground level. Desired value: 0 V

See chapter Locating Faults 21

Pin B13 Control signal from ignition key to starter motor

MONITOR	SPECIAL	RUNNING
"B13 STARTER" (ON/OFF)	Static test: check of signal level.	Not tested.

See chapter Locating Faults 22

Pin B14 Load signal from alternator

MONITOR	SPECIAL	RUNNING
"B14 ALT" (PULSE/----)	Not tested.	Continuous pulse check.

See chapter Locating Faults 23

Pin B15 Control signal to ignition amplifier (certain systems)

MONITOR	SPECIAL	RUNNING
"B15 IGN" (PULSE/----)	Not tested.	Continuous pulse check.

See chapter Locating Faults 24

Pin B16 Signal from vehicle speed sensor (certain systems)

MONITOR	SPECIAL	RUNNING
"B16 VSS" (PULSE/----)	Not tested.	Not tested. See chapter Locating Faults 25

Pin B18 Signal from vehicle speed sensor (certain systems)

MONITOR	SPECIAL	RUNNING
"B18 VSS" (PULSE/----)	Not tested.	Not tested. See chapter Locating Faults 26

Pin B19 Signal from crankshaft sensor (6-cylinder only)

MONITOR	SPECIAL	RUNNING
"B19 CRANK" (PULSE/----)	Not tested.	Continuous pulse check. See chapter Locating Faults 27

Pin B20 Ground to crankshaft sensor (6-cylinder only)

MONITOR	SPECIAL	RUNNING
"B20 GROUND" (OK/ERR)	Static test: check of ground level.	Continuous test of ground level. Desired value: 0 V See chapter Locating Faults 28

Pin C1 Signal from cylinder sensor (certain systems)

MONITOR	SPECIAL	RUNNING
"C1 CYL" (PULSE/----)	Not tested.	Continuous pulse check. See chapter Locating Faults 29

Pin C1 Signal from crankshaft sensor (certain systems)

MONITOR	SPECIAL	RUNNING
"C1 CRANK" (PULSE/----)	Not tested.	Continuous pulse check. See chapter Locating Faults 30

Pin C2 Ground to cylinder/crankshaft sensor

MONITOR	SPECIAL	RUNNING
"C2 GROUND" (OK/ERR)	Static test: check of ground level.	Continuous test of ground level. Desired value: 0 V See chapter Locating Faults 31

Pin C3 Signal from TDC sensor

MONITOR	SPECIAL	RUNNING
"C3 TDC" (rpm)	Not tested.	Continuous pulse check. See chapter Locating Faults 32

Pin C4 Ground to TDC sensor

MONITOR	SPECIAL	RUNNING
"C4 GROUND" (OK/ERR)	Not tested.	Continuous test of ground level. See chapter Locating Faults 33

Pin C5 Signal from air temperature sensor

MONITOR	SPECIAL	RUNNING
"C5 I-AIR" (V)	Static test: check of signal level. Air temp: display of voltage variation.	Continuous test of signal level. Desired value at 20°C: 0.8-1.3 V See chapter Locating Faults 34

Pin C6 Signal from coolant temperature sensor

MONITOR	SPECIAL	RUNNING
"C6 TEMP" (V)	Static test: check of signal level. Coolant temp: display of voltage variation.	Continuous test of signal level. Desired value when engine at operating temperature: 0.6 V

See chapter Locating Faults 35

Pin C7 Signal from throttle potentiometer

MONITOR	SPECIAL	RUNNING
"C7 THROTT" (V)	Static test: check of signal level. Throttle test: check of signal level and continuity. Throttle: display of voltage variation.	Continuous test of signal level and continuity. Desired value at – idle: 0.5 V – full load: 4.0 V

See chapter Locating Faults 36

Pin C8 Signal from EGR sensor (certain systems)

MONITOR	SPECIAL	RUNNING
Not tested.	Not tested.	Not tested.

See chapter Locating Faults 37

Pin C9 Signal from atmospheric pressure sensor

MONITOR	SPECIAL	RUNNING
Not tested.	Not tested.	Not tested.

See chapter Locating Faults 38

Pin C10 Signal from lambda sensor (certain systems)

MONITOR	SPECIAL	RUNNING
"C10 LAMBDA" (mV)	Lambda sensor: display of voltage variation.	Check of power variation. Conditions: – engine at operating temperature – not idling or under full load – engine speed < 2.500 rpm. See chapter Locating Faults 39

Pin C11 Signal from MAP sensor

MONITOR	SPECIAL	RUNNING
"C11 MAP" (V)	Static test: check of signal level. MAP: display of voltage variation.	Continuous test of signal level. See chapter Locating Faults 40

Pin C12 Ground to sensors

MONITOR	SPECIAL	RUNNING
"C12 GROUND" (OK/ERR)	Static test: check of ground level.	Continuous test of ground level. Desired value: 0 V See chapter Locating Faults 41

Pin C12 Signal from lambda sensor (certain systems)

MONITOR	SPECIAL	RUNNING
"C12 LAMBDA" (mV)	Lambda sensor: display of voltage variation.	Check of power variation. Conditions: – engine at operating temperature – not idling or under full load – engine speed < 2.500 rpm.

See chapter Locating Faults ➧ 42

Pin C13 Power supply to sensors

MONITOR	SPECIAL	RUNNING
"C13 POWER" (OK/ERR)	Static test: check of voltage level.	Continuous test of voltage level. Desired value: 5 V

See chapter Locating Faults ➧ 43

Pin C14 Ground to sensor (MAP)

MONITOR	SPECIAL	RUNNING
"C14 GROUND" (OK/ERR)	Static test: check of ground level.	Continuous test of ground level. Desired value: 0 V

See chapter Locating Faults ➧ 44

Pin C15 Power supply to sensor (MAP)

MONITOR	SPECIAL	RUNNING
"C15 POWER" (OK/ERR)	Static test: check of voltage level.	Continuous test of voltage level. Desired value: 5 V

See chapter Locating Faults ➧ 45

Pin C16 Signal from lambda sensor (certain systems)

MONITOR	SPECIAL	RUNNING
"C16 LAMBDA" (mV)	Lambda sensor: display of voltage variation.	Check of power variation. Conditions: – engine at operating temperature – not idling or under full load – engine speed < 2,500 rpm

See chapter Locating Faults 46

Pin C16 Ground to sensor (certain systems)

MONITOR	SPECIAL	RUNNING
"16 GROUND" (OK/ERR)	Static test: check of ground level.	Continuous test of ground level. Desired value: 0 V

See chapter Locating Faults 47

Locating Faults

1

Check of control signal to the injection valve from PGM-FI, pin A1, A3, A5, A6, A7 and A8

This is an output signal from the control unit to the injection valve which controls fuel metering. Make the following measurements at the desired valve.

1. Turn on the ignition and measure the power supply to the injection valve. Desired value: 12–14 V

   Possible cause of fault: Wiring, connectors or the injection relay.

2. Check the opening pulse by measuring the voltage across the injection valves with a test lamp (measure from the rear of one of the connectors on any injector). At low rpm the lamp should flash; it should shine with even intensity at higher rpm. If incorrect:

   – Disconnect the 53-pin connector from the control unit. Connect the Break-out Box (A0201/A0202) and the 53-pin adapter (A020221) between the car's wiring harness and the control unit. Repeat corresponding measurement between the Break-out Box, pin A1, A3, A5, A6, A7 and A8, respectively and A2.

3. In the case of a suspected discontinuity between PGM-FI, pin A1, A3, A5, A6, A7 and A8, respectively and the injector, make the following measurement:

   – Turn off the ignition and disconnect the connector from the control unit. Measure the resistance between the Break-out Box, pin A1, A3, A5, A6, A7 and A8, respectively and the terminal on the injector's connector (see workshop manual). Desired value: 0 Ω

   Possible cause of fault: Wiring or connectors.

4. Measure the resistance across each individual injector with the injector connector terminal removed (i.e. directly on the injectors). Desired value: 1.5–2.5 Ω

   Possible cause of fault: Injector.

5. Release the connector to the injectors' pre resistor. Measure the reistance between the supply connector and other connectors. Desired value: 5–7 Ω

   Possible cause of fault: Injector resistor.

/ Continued

Note
The test is discontinued during fuel cut-off.

Injector failure can also have a mechanical cause (lining, etc.). Such faults are not registered by the Multi-Tester plus/pro. In such a case, a flow check must be carried out on each injector.

2

Check of control signal to the auxiliary injector valve from PGM-FI, pin A1 and A3

This is an output signal from the control unit to the auxiliary injector valve to control the amount of fuel.

1. Turn on the ignition and measure the supply voltage to the auxiliary injector valve during the two-second interval in which the pump relay is activated. Desired value: 12–14 V

   Possible cause of fault: Wiring, connectors or the injection relay.

2. Check the opening pulse by measuring the voltage across the help injection valves with a test lamp (measure from the rear of one of the connectors on any injector). At low rpm the lamp should flash; it should shine with even intensity at higher rpm.

   If incorrect:

   – Disconnect the 53-pin connector from the control unit. Connect the Break-out Box (A0201/A0202) and the 53-pin adapter (A020221) between the car's wiring harness and the control unit. Repeat corresponding measurement between the Break-out Box, pin A1 and A3, respectively and A2.

3. In the case of a suspected discontinuity between PGM-FI, pin A1 and A3, respectively and the injector, make the following measurement:

   – Turn off the ignition and disconnect the connector from the control unit. Measure the resistance between the Break-out Box, pin A1 and A3, respectively and the terminal on the injector's connector (see workshop manual). Desired value: 0 Ω

   Possible cause of fault: Wiring or connectors.

4. Measure the resistance across each individual injector with the injector connector terminal removed (i.e. directly on the injectors). Desired value: 6–10 Ω

   Possible cause of fault: Injector.

Note
The test is discontinued during fuel cut-off.

Injector failure can also have a mechanical cause (lining, etc.). Such faults are not registered by the Multi-Tester plus/pro. In such a case, a flow check must be carried out on each injector.

3

Check of ground connection to PGM-FI, pin A2 and A4

These contacts are the control unit's ground connection.

1. Disconnect the 53-pin connector from the control unit. Connect the Break-out Box (A0201/A0202) and the 53-pin adapter (A020221) to the car's wiring harness only. Do not reconnect the control unit.
2. Measure the resistance between the Break-out Box, pin A2 and A4 and ground. Desired value: 0 Ω

   Possible cause of fault: Wiring or connectors.

4

Check of control signal to the main injection valve from PGM-FI, pin A5 and A7

This is an output signal from the control unit to the main injector valve to control the amount of fuel.

1. Turn on the ignition and measure the supply voltage to the main injector valve during the two-second interval in which the pump relay is activated. Desired value: 12–14 V

   Possible cause of fault: Wiring, connectors or the injection relay.
2. Check the opening pulse by measuring the voltage across the main injection valves with a test lamp (measure from the rear of one of the connectors on any injector). The lamp should be off at idle speed. At low rpm the lamp shuld flash; it should shine with even intensity at higer rpm.

   If incorrect:

   – Disconnect the 53-pin connector from the control unit. Connect the Break-out Box (A0201/A0202) and the 53-pin adapter (A020221) between the car's wiring harness and the control unit. Repeat corresponding measurement between the Break-out Box, pin A5 and A7, respectively and A2.

/ Continued

3. In the case of a suspected discontinuity between PGM-FI, pin A5 and A7, respectively and the injector, make the following measurement:
   – Turn off the ignition and disconnect the connector from the control unit. Measure the resistance between the Break-out Box, pin A5 and A7, respectively and the terminal on the injector's connector (see workshop manual). Desired value: 0 Ω

   Possible cause of fault: Wiring or connectors.
4. Measure the resistance across each individual injector with the injector connector terminal removed (i.e. directly on the injectors). Desired value: 0.6–1.6 Ω

   Possible cause of fault: Injector.

Note
The test is discontinued during fuel cut-off.

Injector failure can also have a mechanical cause (lining, etc.). Such faults are not registered by the Multi-Tester plus/pro. In such a case, a flow check must be carried out on each injector.

5

Check of the control signal to tank ventilation valve from PGM-FI, pin A6

This is an output signal from the control unit. It regulates the valve which ventilates the fuel tank. The value should vary between 1 and 99 % when accelerating.

1. Disconnect the 53-pin connector from the control unit. Connect the Break-out Box (A0201/A0202) and the 53-pin adapter (A020221) to the car's wiring harness only. Do not reconnect the control unit.
2. Disconnect the cable from the tank ventilation valve. Measure the resistance of the cable between the Break-out Box, pin A6 and the contact (see workshop manual). Desired value: 0 Ω

   Possible cause of fault: Wiring or connectors.
3. Connect the Break-out Box and the 53-pin adapter between the car's wiring harness and the control unit.
4. Turn on the ignition and measure the voltage between the connector's other contact and ground. Desired value: 12 V

   Possible cause of fault: Wiring or connectors.

5. Reconnect the connector and measure the resistance between the Break-out Box, pin A6 and A18 (A15 on some models). Desired value: 12 Ω

   Possible cause of fault: Tank ventilation valve.

6

Check of the control signal to V-TEC control valve from PGM-FI, pin A8

1. Disconnect the 53-pin connector from the control unit. Connect the Break-out Box (A0201/A0202) and the 53-pin adapter (A020221) to the car's wiring harness only. Do not reconnect the control unit.
2. Disconnect the cable from the V-TEC control valve. Measure the resistance of the cable between the Break-out Box, pin A8 and the contact (see workshop manual). Desired value: 0 Ω

   Possible cause of fault: Wiring or connectors.
3. Measure the resistance of the cable between V-TEC control valve and ground. Desired value: 0 Ω

   Possible cause of fault: Wiring or connectors.
4. Measure the resistance between the valve's terminals. Desired value: 14–30 Ω

   Possible cause of fault: V-TEC control valve.

7

Check of the control signal to EGR valve from PGM-FI, pin A10

This is an output signal from the control unit to the EGR valve which controls the re-circulation of exhaust gases.

1. Disconnect the 53-pin connector from the control unit. Connect the Break-out Box (A0201/A0202) and the 53-pin adapter (A020221) to the car's wiring harness only. Do not reconnect the control unit.
2. Measure the resistance of the cable between the Break-out Box, pin A10 and EGR valve (see workshop manual). Desired value: 0 Ω

   Possible cause of fault: Wiring or connectors.
3. Connect the Break-out Box and the 53-pin adapter between the car's wiring harness and the control unit.

/ Continued

4. Turn on the ignition and measure the voltage between the Break-out Box pin A10 and ground. Desired value: 12 V

   Possible cause of fault: Wiring, connectors or EGR valve.

8

Check of control signal to idle speed correction valve from PGM-FI, pin A11

This is an output signal from the control unit to the idle speed correction valve (LFR or LLS). The signal controls a coil in the correction valve. The signal has a constant frequency and the pulse ratio varies between approx. 25 % and 75 %. When this value increases, so does engine speed, for example if the engine is cold or when an AC compressor is connected.

1. Disconnect the 53-pin connector from the control unit. Connect the Break-out Box (A0201/A0202) and the 53-pin adapter (A020221) to the car's wiring harness only. Do not reconnect the control unit.
2. Disconnect the connector from the ISC valve. Measure the resistance of the cable between the Break-out Box, pin A11 and the connector (see workshop manual). Desired value: 0 Ω

   Possible cause of fault: Wiring or connectors.
3. Measure the resistance of the cable between ISC valve and fuel pump relay. Desired value: 0 Ω

   Possible cause of fault: Wiring or connectors.
4. Measure the resistance between the valve's terminals. Desired value: 8–15 Ω
5. Connect the Break-out Box and the 53-pin adapter between the car's wiring harness and the control unit.
6. Connect the ISC valve again. Start the engine and check if pulses appear on the Break-out Box, pin A11 (use oscilloscope or similar).

   Possible cause of fault: ISC valve or control unit.

9

Check of control signal to fuel pump relay from PGM-FI, pin A12

This is a control signal from the control unit. The signal is grounded to activate the pump relay after the engine has been turned over by the starter motor. There are several possible causes for an absent signal including:

- Discontinuity in the wiring or connectors.
- A defective or absent main input signal to the system, such as:
  - ground connection
  - power supply
  - crankshaft sensor
  - cylinder sensor
  - TDC sensor
- Faulty control unit, although this is most unlikely as the failure rate for control units is very low.

1. Disconnect the 53-pin connector from the control unit. Connect the Break-out Box (A0201/A0202) and the 53-pin adapter (A020221) to the car's wiring harness only. Do not reconnect the control unit.
2. Measure the resistance of the cable between the Break-out Box, pin A12 and fuel pump relay, pin 8 (see workshop manual). Desired value: 0 Ω

   Possible cause of fault: Wiring or connectors.
3. Connect the Break-out Box and the 53-pin adapter between the car's wiring harness and the control unit.
4. Turn on the ignition and measure the voltage between fuel pump relay, pin 7 and ground. Desired value: 12 V

   Possible cause of fault: Wiring or connectors.

10

Check of power supply from main relay to PGM-FI, pin A15

1. Turn on the ignition and measure the voltage at the main relay's positive pole, pin 1 (see workshop manual). Desired value: 12–14 V

   Possible cause of fault: Wiring or connectors.
2. Measure the voltage on the main relay, pin 5 (terminal 15) and ground (see workshop manual). Desired value: 12–14 V

   Possible cause of fault: Wiring, connectors or ignition switch.
3. Turn off the ignition and disconnect the 53-pin connector from the control unit. Connect the Break-out Box (A0201/A0202) and the 53-pin adapter (A020221) to the car's wiring harness only. Do not reconnect the control unit.

/ Continued

4. Measure the resistance of the cable between the Break-out Box, pin A2 and main relay, pin 2. Desired value: 0 Ω

   Possible cause of fault: Wiring or connectors.

5. Measure the resistance of the cable between the Break-out Box, pin A15 and main relay, pin 3. Desired value: 0 Ω

   Possible cause of fault: Wiring or connectors.

6. Connect the Break-out Box and the 53-pin adapter between the car's wiring harness and the control unit.
7. Switch on the ignition and measure the voltage between the Break-out Box, pin A15 and ground. Desired value: 12–14 V

   Possible cause of fault: Main relay.

Note
The terminal 15 supply provides the stop signal for the Multi-Tester plus/pro test program. This means that an absent signal is interpreted as the engine being stopped. However, a faulty signal will be detected at the start of the test.

11

Check of ground connection to PGM-FI, pin A16 and A18

These contacts are the control unit's ground connection.

1. Disconnect the 53-pin connector from the control unit. Connect the Break-out Box (A0201/A0202) and the 53-pin adapter (A020221) to the car's wiring harness only. Do not reconnect the control unit.
2. Measure the resistance between the Break-out Box, pin A16 and A18 and ground. Desired value: 0 Ω

   Possible cause of fault: Wiring or connectors.

12

Check of constant power supply from battery to PGM-FI, pin A17

This connection provides the control unit with a constant power supply from the battery to maintain retention of those presets the control unit has "learnt".

1. Disconnect the 53-pin connector from the control unit. Connect the Break-out Box (A0201/A0202) and the 53-pin adapter (A020221) to the car's wiring harness only. Do not reconnect the control unit.

2. Measure the resistance between the Break-out Box, pin A17 and the battery's positive pole. Desired value: 0 Ω

   Possible cause of fault: Wiring, connectors or fuse.

3. Measure the voltage between the battery's positive pole and ground. Desired value: 12–14 V

   Possible cause of fault: Battery.

13

Check of constant power supply from battery to PGM-FI, pin B1

This connection provides the control unit with a constant power supply from the battery to maintain retention of those presets the control unit has "learnt".

1. Disconnect the 53-pin connector from the control unit. Connect the Break-out Box (A0201/A0202) and the 53-pin adapter (A020221) to the car's wiring harness only. Do not reconnect the control unit.
2. Measure the resistance between the Break-out Box, pin B1 and the battery's positive pole. Desired value: 0 Ω

   Possible cause of fault: Wiring, connectors or fuse.

3. Measure the voltage between the battery's positive pole and ground. Desired value: 12–14 V

   Possible cause of fault: Battery.

14

Check of control signal to cold start valve from PGM-FI, pin B2

This is an output signal from the control unit to the cold start valve which increases fuel metering when the engine is cold.

1. Disconnect the 53-pin connector from the control unit. Connect the Break-out Box (A0201/A0202) and the 53-pin adapter (A020221) to the car's wiring harness only. Do not reconnect the control unit.
2. Measure the resistance between the Break-out Box, pin B2 and cold start valve (see workshop manual). Desired value: 0 Ω

   Possible cause of fault: Wiring or connectors.

3. Connect the Break-out Box and the 53-pin adapter between the car's wiring harness and the control unit.

/ Continued

4. Turn on the ignition and measure the voltage between Break-out Box, pin B2 and ground. Desired value: 12 V

   Possible cause of fault: Wiring, connectors or cold start valve.

15

Check of the control signal to tank ventilation valve from PGM-FI, pin B2

This is an output signal from the control unit. It regulates the valve which ventilates the fuel tank. The value should vary between 1 and 99 % when accelerating.

1. Disconnect the 53-pin connector from the control unit. Connect the Break-out Box (A0201/A0202) and the 53-pin adapter (A020221) to the car's wiring harness only. Do not reconnect the control unit.
2. Disconnect the cable from the tank ventilation valve. Measure the resistance of the cable between the Break-out Box, pin B2 and the corresponding terminal on the contact (see workshop manual). Desired value: 0 Ω

   Possible cause of fault: Wiring or connectors.
3. Connect the Break-out Box and the 53-pin adapter between the car's wiring harness and the control unit.
4. Turn on the ignition and measure the voltage between the other terminal and ground. Desired value: 12 V

   Possible cause of fault: Wiring or connectors.
5. Reconnect the connector and measure the resistance between the Break-out Box, pin B2 and A18. Desired value: 12 Ω

   Possible cause of fault: Tank ventilation valve.

16

Check of control signal to oil pressure switch from PGM-FI, pin B5

1. Disconnect the 53-pin connector from the control unit. Connect the Break-out Box (A0201/A0202) and the 53-pin adapter (A020221) to the car's wiring harness only. Do not reconnect the control unit.
2. Measure the resistance between the Break-out Box, pin B5 and the oil pressure switch (see workshop manual). Desired value: 0 Ω

   Possible cause of fault: Wiring or connectors.

3. Measure the resistance between the oil pressure switch's other terminal and ground. Desired value: 0 Ω

   Possible cause of fault: Wiring or connectors.

4. Measure the resistance between the Break-out Box, pin B5 and ground. Desired value: 0 Ω

   Possible cause of fault: Oil pressure connector.

17

Check of the control signal to the engine control lamp from PGM-FI, pin B6

This is an output signal from the control unit to the engine control lamp. The lamp is lit when the control unit detects a fault in the engine or a faulty sensor signal.

1. Disconnect the 53-pin connector from the control unit. Connect the Break-out Box (A0201/A0202) and the 53-pin adapter (A020221) to the car's wiring harness only. Do not reconnect the control unit.
2. Measure the resistance of the cable between the Break-out Box, pin B6 and the corresponding terminal on the engine control lamp (see workshop manual). Desired value: 0 Ω

   Possible cause of fault: Wiring or connectors.

18

Check of signal from crankshaft sensor to PGM-FI, pin B10

This is an input signal to the control unit from the crankshaft sensor. The signal indicates engine speed and top dead centre.

1. Check the clearance between the sensor and the ring gear (see workshop manual) and that the cogs are clean.
2. Disconnect the 53-pin connector from the control unit. Connect the Break-out Box (A0201/A0202) and the 53-pin adapter (A020221) to the car's wiring harness only. Do not reconnect the control unit.
3. Measure the resistance of the cable between the Break-out Box, pin B10 and B12 and the crankshaft sensor. Desired value in both cases: 0 Ω

   Possible cause of fault: Wiring or connectors.

/ Continued

4. Measure the resistance between the Break-out Box, pin B10 and B12. Desired value: Prelude: 0.7–1.0 kΩ others: 350–700 Ω

   Possible cause of fault: Crankshaft sensor.

5. Connect the Break-out Box and the 53-pin adapter between the car's wiring harness and the control unit.
6. Start or crank the engine and check that pulses from crankshaft sensor are received at Break-out Box, pin B10 (use oscilloscope or similar). If the engine does not start, the signal level is lower but will be displayed on the oscilloscope.

   Possible cause of fault: Sensor, dirt between cogs or gap between crankshaft sensor and flywheel.

19

Check of signal from lambda sensor to PGM-FI, pin B11

This is an input signal to the control unit from the lambda sensor. It is only found on cars fitted with catalytic converters and is used for the fine adjustment of the ratio of fuel to air to approx. 1:14.6 (by weight). This ratio is called lambda = 1.

The following test conditions must be met as the Multi-Tester plus/pro checks that the lambda sensor signal level lies between 0 and 1 V:

- engine temperature must exceed +70°C
- the engine must not be idling – some sensors cool down after long periods of idling and oscillation ceases.
- the engine must not be at full throttle – the sensor signal then becomes constant at approx. 1V.
- Fuel cut-off should not be activated – the sensor signal then becomes constant at approx. 0 V
- Engine speed below 2.500 rpm.

1. Check the sensor's pre-heating (if fitted) by measuring the voltage at the sensor connector while the engine is running. Desired value: 12–14 V
2. Check the resistance in the heating coil by disassembling the connector for the pre-heater and measuring the resistance. Desired value: 2–20 Ω

   Posseible cause of fault: Lambda sensor.

3. Run the engine until it reaches operating temperature and maintain engine speed at approximately 2.500 rpm. Execute the LAMBDA SENSOR special test and confirm that the lambda sensor signals fluctuate between 0 and 1 V. The signal should oscillate about once a second. Oscillations of longer duration indicate that the sensor may be polluted and should be replaced.
4. Turn off the ignition and disconnect the 53-pin connector from the control unit. Connect the Break-out Box (A0201/A0202) and the 53-pin adapter (A020221) to the car's wiring harness only. Do not reconnect the control unit.
5. Measure the resistance between the Break-out Box, pin B11 and ground. If the reading is approximately 0 Ω the sensor has short-circuited and is no longer functioning. Repeat the measurement at the sensor connector to determine whether the short circuit is in the sensor or the cable between the sensor and the control unit.

20

Check of signal from vehicle speed sensor to PGM-FI, pin B11

1. Disconnect the 53-pin connector from the control unit. Connect the Break-out Box (A0201/A0202) and the 53-pin adapter (A020221) to the car's wiring harness only. Do not reconnect the control unit.
2. Measure the resistance of the cable between the Break-out Box, pin B11 and the corresponding terminal on the vehicle speed sensor (see workshop manual). Desired value: 0 Ω

   Possible cause of fault: Wiring or connectors.
3. Measure the resistance between the vehicle speed sensors other terminal and ground. Desired value: 0 Ω

   Possible cause of fault: MAP-sensor or ground wire.
4. Connect the Break-out Box and the 53-pin adapter between the car's wiring harness and the control unit. Disconnect conector B at the car's wiring harness from the Break-out Box.
5. Turn on the ignition and measure the voltage between The Break-out Box, pin B11 and A18. Desired value: 5 V

   Possible cause of fault: Control unit.

21

Check of ground connection to crankshaft sensor from PGM-FI, pin B12

1. Disconnect the 53-pin connector from the control unit. Connect the Break-out Box (A0201/A0202) and the 53-pin adapter (A020221) between the car's wiring harness and the control unit.
2. Start the engine and measure the voltage between the Break-out Box, pin B12 and ground. Desired value: 0 V

Possible cause of fault: Wiring, connectors or control unit.

22

Check of the control signal from the ignition key to the starter motor and PGM-FI, pin B13

This is an input signal to the control unit from the starter motor.
The signal indicates whether the starter motor is engaged.

1. Disconnect the 53-pin connector from the control unit. Connect the Break-out Box (A0201/A0202) and the 53-pin adapter (A020221) to the car's wiring harness only. Do not reconnect the control unit.
2. Measure the resistance of the cable between the Break-out Box, pin B13 and the corresponding terminal at the starter motor (see workshop manual). Desired value: 0 Ω

Possible cause of fault: Wiring or connectors.

23

Check of load signal from alternator to PGM-FI, pin B14

1. Disconnect the 53-pin connector from the control unit. Connect the Break-out Box (A0201/A0202) and the 53-pin adapter (A020221) to the car's wiring harness only. Do not reconnect the control unit.
2. Measure the resistance of the cable between the Break-out Box, pin B14 and the corresponding terminal on the alternator (se workshop manual). Desired value: 0 Ω

Possible cause of fault: Wiring or connectors.

24

Check of the control signal to the ignition amplifier from PGM-FI, pin B15

This is an output signal from the control unit to control ignition. The control unit emits ignition pulses which control the ignition amplifier. There are several possible causes of an absent signal:

- a discontinuity in the wiring or connectors.
- a defective or absent main input signal to the system such as:
  - crankshaft sensor
  - TDC sensor
  - cylinder sensor
- a faulty control unit, although this is most unlikely as the failure rate for control units is very low.

1. Release the 2-pole connector from the distributor, turn on the ignition and check for battery voltage on one of the terminals in the connector.

   Possible cause of fault: Ignition switch, fuse, cable between Ignition switch and distributor or connectors.

2. Turn off the ignition and disconnect the 53-pin connector from the control unit. Connect the Break-out Box (A0201/A0202) and the 53-pin adapter (A020221) to the car's wiring harness only. Do not reconnect the control unit.
3. Measure the resistance of the cable between Break-out Box, pin B15 and the 6/8 pole connector on the distributor. Desired value: 0 Ω

   Possible cause of fault: Wiring or connectors.

4. Connect the Break-out Box and the 53-pin adapter between the car's wiring harness and the control unit.
5. Connect the distributor's contacts and use a test lamp to check that pulses are received on one of the connections in the 2-pole connector on the distributor when the starter motor turns.

   Possible cause of fault: Ignition amplifier.

25

Check of control signal to vehicle speed sensor from PGM-FI, pin B16

1. Disconnect the 53-pin connector from the control unit. Connect the Break-out Box (A0201/A0202) and the 53-pin adapter (A020221) to the car's wiring harness only. Do not reconnect the control unit.
2. Measure the resistance of the cable between the Break-out Box, pin B16 and the corresponding terminal on the vehicle speed sensor (see workshop manual). Desired value: 0 Ω

   Possible cause of fault: Wiring or connectors.
3. Measure the resistance between the vehicle speed sensors other terminal and ground. Desired value: 0 Ω

   Possible cause of fault: MAP-sensor or ground wire.
4. Connect the Break-out Box and the 53-pin adapter between the car's wiring harness and the control unit. Disconnect conector B at the car's wiring harness from the Break-out Box.
5. Turn on the ignition and measure the voltage between the Break-out Box, pin B16 and A18. Desired value: 5 V

   Possible cause of fault: Control unit.

26

Check of control signal to distance frequency sensor from PGM-FI, pin B18

1. Disconnect the 53-pin connector from the control unit. Connect the Break-out Box (A0201/A0202) and the 53-pin adapter (A020221) to the car's wiring harness only. Do not reconnect the control unit.
2. Measure the resistance of the cable between the Break-out Box, pin B18 and the corresponding terminal on the distance frequency sensor (see workshop manual). Desired value: 0 Ω

   Possible cause of fault: Wiring or connectors.
3. Measure the resistance between the distance frequency sensors other terminal and ground. Desired value: 0 Ω

   Possible cause of fault: MAP-sensor or ground wire.

4. Connect the Break-out Box and the 53-pin adapter between the car's wiring harness and the control unit. Disconnect conector B at the car's wiring harness from the Break-out Box.
5. Turn on the ignition and measure the voltage between the Break-out Box, pin B18 and A18. Desired value: 5 V

   Possible cause of fault: Control unit.

27

Check of signal from crankshaft sensor to PGM-FI, pin B19

This is an input signal to the control unit from the crankshaft sensor. The signal indicates engine speed and top dead centre.

1. Check the clearance between the sensor and the ring gear (see workshop manual) and that the cogs are clean.
2. Disconnect the 53-pin connector from the control unit. Connect the Break-out Box (A0201/A0202) and the 53-pin adapter (A020221) to the car's wiring harness only. Do not reconnect the control unit.
3. Measure the resistance of the cable between the Break-out Box, pin B19 and B20 and the corresponding terminal on the crankshaft sensor (see workshop manual). Desired value in both cases: 0 Ω

   Possible cause of fault: Wiring or connectors.
4. Measure the resistance between the Break-out Box, pin B19 and B20. Desired value: 0,5-1,2 kΩ

   Possible cause of fault: Crankshaft sensor.
5. Connect the Break-out Box and the 53-pin adapter between the car's wiring harness and the control unit.
6. Start or crank the engine and check that pulses from crankshaft sensor are received at Break-out Box, pin B19 (use oscilloscope or similar). If the engine does not start, the signal level is lower but will be displayed on the oscilloscope.

   Possible cause of fault: Sensor, dirt between cogs or gap between crankshaft sensor and flywheel.

28

Check of ground connection to crankshaft sensor from PGM-FI, pin B20

1. Disconnect the 53-pin connector from the control unit. Connect the Break-out Box (A0201/A0202) and the 53-pin adapter (A020221) between the car's wiring harness and the control unit.
2. Start the engine and measure the voltage between the Break-out Box, pin B20 and ground. Desired value: 0 V

   Possible cause of fault: Wiring or connectors.

29

Check of signal from cylinder sensor to PGM-FI, pin C1

This is an input signal from the cylinder sensor which provides information relating to top dead centre for cylinder 1.

1. Check the clearance between the sensor and the ring gear (see workshop manual) and that the cogs are clean.
2. Disconnect the 53-pin connector from the control unit. Connect the Break-out Box (A0201/A0202) and the 53-pin adapter (A020221) to the car's wiring harness only. Do not reconnect the control unit.
3. Measure the resistance of the cable between the Break-out Box, pin C1 and C2 and the corresponding terminal on the cylinder sensor (see workshop manual). Desired value in both cases: 0 Ω

   Possible cause of fault: Wiring or connectors.
4. Measure the resistance between the Break-out Box, pin C1 and C2. Desired value: 350–1200 Ω

   Possible cause of fault: Sensor.
5. Connect the Break-out Box and the 53-pin adapter between the car's wiring harness and the control unit.
6. Start or crank the engine and check that pulses from cylinder sensor are received at Break-out Box, pin C1 (use oscilloscope or similar). If the engine does not start, the signal level is lower but will be displayed on the oscilloscope.

   Possible cause of fault: Sensor, dirt between cogs or gap between sensor and flywheel.

30

Check of signal from crankshaft sensor to PGM-FI, pin C1

This is an input signal to the control unit from the crankshaft sensor. The signal indicates engine speed and top dead centre.

1. Check the clearance between the sensor and the ring gear (see workshop manual) and that the cogs are clean.
2. Disconnect the 53-pin connector from the control unit. Connect the Break-out Box (A0201/A0202) and the 53-pin adapter (A020221) to the car's wiring harness only. Do not reconnect the control unit.
3. Measure the resistance of the cable between the Break-out Box, pin C1 and C2 and the corresponding terminal on the crankshaft sensor (see workshop manual). Desired value in both cases: 0 Ω

   Possible cause of fault: Wiring or connectors.
4. Measure the resistance between the Break-out Box, pin C1 and C2. Desired value: Accord: 650–850 Ω Civic/Concerto: 350–700 Ω

   Possible cause of fault: Crankshaft sensor.
5. Connect the Break-out Box and the 53-pin adapter between the car's wiring harness and the control unit.
6. Start or crank the engine and check that pulses from crankshaft sensor are received at Break-out Box, pin C1 (use oscilloscope or similar). If the engine does not start, the signal level is lower but will be displayed on the oscilloscope.

   Possible cause of fault: Sensor, dirt between cogs or gap between crankshaft sensor and flywheel.

31

Check of ground connection to cylinder/crankshaft sensor from PGM-FI, pin C2

1. Disconnect the 53-pin connector from the control unit. Connect the Break-out Box (A0201/A0202) and the 53-pin adapter (A020221) between the car's wiring harness and the control unit.
2. Start the engine and measure the voltage between the Break-out Box, pin C2 and ground. Desired value: 0 V

   Possible cause of fault: Wiring or connectors.

32

Check of signal from TDC sensor to PGM-FI, pin C3

This is an input signal to the control unit from the TDC sensor.
The signal indicates engine speed and top dead centre.

1. Check the clearance between the sensor and the ring gear (see workshop manual) and that the cogs are clean.
2. Disconnect the 53-pin connector from the control unit. Connect the Break-out Box (A0201/A0202) and the 53-pin adapter (A020221) to the car's wiring harness only. Do not reconnect the control unit.
3. Measure the resistance of the cable between the Break-out Box, pin C3 and C4 and the corresponding terminal on the TDC sensor (see workshop manual). Desired value in both cases: 0 Ω

   Possible cause of fault: Wiring or connectors.
4. Measure the resistance between the Break-out Box, pin C3 and C4. Desired value:

Accord: 650–850 Ω	Civic/Concerto/Integra: 350–700 Ω
Prelude: 700–1000 Ω	Rover 216: 350–500 Ω
Rover 416: 0.5–1.2 k Ω	6-cylinders: 500–1000 Ω

   Possible cause of fault: TDC sensor.
5. Connect the Break-out Box and the 53-pin adapter between the car's wiring harness and the control unit.
6. Start or crank the engine and check that pulses from TDC sensor are received at Break-out Box, pin C3 (use oscilloscope or similar). If the engine does not start, the signal level is lower but will be displayed on the oscilloscope.

   Possible cause of fault: Sensor, dirt between cogs or gap between crankshaft sensor and flywheel.

33

Check of ground connection to TDC sensor from PGM-FI, pin C4

1. Disconnect the 53-pin connector from the control unit. Connect the Break-out Box (A0201/A0202) and the 53-pin adapter (A020221) between the car's wiring harness and the control unit.

2. Start the engine and measure the voltage between the Break-out Box, pin C4 and ground. Desired value: 0 V

   Possible cause of fault: Wiring or connectors.

34

Check of signal from air temperature sensor to PGM-FI, pin C5

This is an input signal to the control unit from the air temperature sensor (type NTC with a negative temperature coefficient).

1. Disconnect the 53-pin connector from the control unit. Connect the Break-out Box (A0201/A0202) and the 53-pin adapter (A020221) to the car's wiring harness only. Do not reconnect the control unit.
2. Measure the resistance between the Break-out Box, pin C5 and the corresponding terminal on the air temperature sensor (see workshop manual). Desired value: 0 Ω

   Possible cause of fault: Wiring or connectors.
3. Measure the resistance between the Break-out Box, pin C12 and the corresponding terminal on the air temperature sensor (see workshop manual). Desired value: 0 Ω

   Possible cause of fault: Wiring or connectors.
4. Measure the resistance between the Break-out Box, pin C5 and C12. Desired values:

air temperature	**resistance (Ω)**
± 0°C	6 k
+ 20°C	2–4k
+ 40°C	980–1340
+ 80°C	220– 350

Possible cause of fault: Air temperature sensor.

35

Check of signal from coolant temperature sensor to PGM-FI, pin C6

This is an input signal to the control unit from the coolant temperature sensor (type NTC with a negative temperature coefficient).

1. Disconnect the 53-pin connector from the control unit. Connect the Break-out Box (A0201/A0202) and the 53-pin adapter (A020221) to the car's wiring harness only. Do not reconnect the control unit.

/ Continued

2. Measure the resistance between the Break-out Box, pin C6 and the corresponding terminal on the coolant temperature sensor (see workshop manual). Desired value: 0 Ω

   Possible cause of fault: Wiring or connectors.

3. Measure the resistance between the Break-out Box, pin C12 and the corresponding terminal on the coolant temperature sensor (se workshop manual). Desired value: 0 Ω

   Possible cause of fault: Wiring or connectors.

4. Measure the resistance between the Break-out Box, pin C6 and C12. Desired values:

engine temperature	**resistance (Ω)**
± 0°C	6 k
+ 20°C	2–4k
+ 40°C	980–1340
+ 80°C	220– 350

Possible cause of fault: Coolant temperature sensor.

36

Check of signal from throttle potentiometer to PGM-FI, pin C7

This is an input signal from the throttle potentiometer to the control unit. The output signal varies in response to the throttle position.
Two signal properties are tested; level and continuity.

Signal level fault

1. Disconnect the 53-pin connector from the control unit. Connect the Break-out Box (A0201/A0202) and the 53-pin adapter (A020221) to the car's wiring harness only. Do not reconnect the control unit.
2. Measure the resistance between the Break-out Box, pin C7 and the corresponding terminal on the throttle potentiometer (see workshop manual). Desired value: 0 Ω

   Possible cause of fault: Wiring or connectors.

3. Measure the resistance between the Break-out Box, pin C13 and the corresponding terminal on the throttle potentiometer (see workshop manual). Desired value: 0 Ω

   Possible cause of fault: Wiring or connectors.

4. Measure the resistance between the Break-out Box, pin C12 and the corresponding terminal on the throttle potentiometer (see workshop manual). Desired value: 0 Ω

   Possible cause of fault: Wiring or connectors.

5. Measure the resistance between the Break-out Box, pin C7 and pin C12. Desired value: 3–7 kΩ

   Possible cause of fault: Throttle potentiometer.

37

Check of signal from EGR sensor to PGM-FI, pin C8

1. Disconnect the 53-pin connector from the control unit. Connect the Break-out Box (A0201/A0202) and the 53-pin adapter (A020221) to the car's wiring harness only. Do not reconnect the control unit.
2. Measure the resistance between the Break-out Box, pin C8 and the corresponding terminal on the EGR sensor (see workshop manual). Desired value: 0 Ω

   Possible cause of fault: Wiring or connectors.

3. Measure the resistance between the Break-out Box, pin C13 and the corresponding terminal on the EGR sensor (see workshop manual). Desired value: 0 Ω

   Possible cause of fault: Wiring or connectors.

4. Measure the resistance between the Break-out Box, pin C12 (C16 when 6 cylinders) and the corresponding terminal on the EGR sensor (see workshop manual). Desired value: 0 Ω

   Possible cause of fault: Wiring or connectors.

5. Connect the Break-out Box and the 53-pin adapter between the car's wiring harness and the control unit.
6. Turn on the ignition and measure the voltage between the Break-out Box, pin C13 and C16. Desired value: 5 V

   Possible cause of fault: Control unit.

7. Turn on the ignition and measure the voltage between the Break-out Box, pin C8 and C12 (C16 when 6 cylinders). Desired value: 1 V

   Possible cause of fault: Control unit.

38

Check of signal from atmospheric pressure sensor to PGM-FI, pin C9

This is an input signal to the control unit from the sensor which gives information about air pressure.

1. Disconnect the 53-pin connector from the control unit. Connect the Break-out Box (A0201/A0202) and the 53-pin adapter (A020221) to the car's wiring harness only. Do not reconnect the control unit.
2. Measure the resistance between the Break-out Box, pin C9 and the corresponding terminal on the pressure sensor (see workshop manual). Desired value: 0 Ω

   Possible cause of fault: Wiring or connectors.
3. Measure the resistance between the Break-out Box, pin C13 and the corresponding terminal on the pressure sensor (see workshop manual). Desired value: 0 Ω

   Possible cause of fault: Wiring or connectors.
4. Measure the resistance between the Break-out Box, pin C12 (C16 when 6 cylinders) and the corresponding terminal on the pressure sensor (see workshop manual). Desired value: 0 Ω

   Possible cause of fault: Wiring or connectors.
5. Connect the Break-out Box and the 53-pin adapter between the car's wiring harness and the control unit.
6. Turn on the ignition and measure the voltage between the Break-out Box, pin C13 and ground. Desired value: 5 V

   Possible cause of fault: Sensor or Control unit.

39

Check of signal from lambda sensor to PGM-FI, pin C10

This is an input signal to the control unit from the lambda sensor.
It is only found on cars fitted with catalytic converters and is used for the fine adjustment of the ratio of fuel to air to approx. 1:14.6 (by weight). This ratio is called lambda = 1.

The following test conditions must be met as the Multi-Tester plus/pro checks that the lambda sensor signal level lies between 0 and 1 V:

- engine temperature must exceed +70°C
- the engine must not be idling – some sensors cool down after long periods of idling and oscillation ceases.
- the engine must not be at full throttle – the sensor signal then becomes constant at approx. 1V.
- Fuel cut-off should not be activated – the sensor signal then becomes constant at approx. 0 V
- Engine speed below 2.500 rpm.

1. Check the sensor's pre-heating (if fitted) by measuring the voltage at the sensor connector while the engine is running. Desired value: 12–14 V
2. Check the resistance in the heating coil by disassembling the connector for the pre-heater and measuring the resistance. Desired value: 2–20 Ω

   Possible cause of fault: Lambda sensor.
3. Run the engine until it reaches operating temperature and maintain engine speed at approximately 2.500 rpm. Execute the LAMBDA SENSOR special test and confirm that the lambda sensor signals fluctuate between 0 and 1 V. The signal should oscillate about once a second. Oscillations of longer duration indicate that the sensor may be polluted and should be replaced.
4. Turn off the ignition and disconnect the 53-pin connector from the control unit. Connect the Break-out Box (A0201/A0202) and the 53-pin adapter (A020221) to the car's wiring harness only. Do not reconnect the control unit.
5. Measure the resistance between the Break-out Box, pin C10 and ground. If the reading is approximately 0 Ω the sensor has short-circuited and is no longer functioning. Repeat the measurement at the sensor connector to determine whether the short circuit is in the sensor or the cable between the sensor and the control unit.

40

Check of signal from the MAP sensor to PGM-FI, pin C11

This is an input signal to the control unit from the manifold air pressure (MAP) sensor which indicates engine load.

1. Check that the vacuum hose is in good condition and is connected to the pressure sensor.

/ Continued

2. Disconnect the 53-pin connector from the control unit. Connect the Break-out Box (A0201/A0202) and the 53-pin adapter (A020221) to the car's wiring harness only. Do not reconnect the control unit.
3. Measure the resistance of the cable between the Break-out Box, pin C11 and the corresponding terminal on the MAP sensor (see workshop manual). Desired value: 0 Ω

   Possible cause of fault: Wiring or connectors.
4. Measure the resistance between the Break-out Box, pin C15 and the corresponding terminal on the MAP sensor (see workshop manual). Desired value: 0 Ω

   Possible cause of fault: Wiring or connectors.
5. Measure the resistance between the Break-out Box, pin C14 and the corresponding terminal on the MAP sensor (see workshop manual). Desired value: 0 Ω

   Possible cause of fault: Wiring or connectors.
6. Connect the Break-out Box and the 53-pin adapter between the car's wiring harness and the control unit.
7. Start the engine and measure the voltage between the Break-out Box, pin C15 and ground. Desired value: 5 V

   Possible cause of fault: Sensor or control unit.

41

Check of ground connection to sensors from PGM-FI, pin C12

1. Disconnect the 53-pin connector from the control unit. Connect the Break-out Box (A0201/A0202) and the 53-pin adapter (A020221) between the car's wiring harness and the control unit.
2. Start the engine and measure the voltage between the Break-out Box, pin C12 and ground. Desired value: 0 V

   Possible cause of fault: Wiring or connectors.

42

Check of signal from lambda sensor to PGM-FI, pin C12

This is an input signal to the control unit from the lambda sensor.
It is only found on cars fitted with catalytic converters and is used for the fine adjustment of the ratio of fuel to air to approx. 1:14.6 (by weight). This ratio is called lambda = 1.

The following test conditions must be met as the Multi-Tester plus/pro checks that the lambda sensor signal level lies between 0 and 1 V:

- engine temperature must exceed +70°C
- the engine must not be idling – some sensors cool down after long periods of idling and oscillation ceases.
- the engine must not be at full throttle – the sensor signal then becomes constant at approx. 1V.
- Fuel cut-off should not be activated – the sensor signal then becomes constant at approx. 0 V
- Engine speed below 2.500 rpm.

1. Check the sensor's pre-heating (if fitted) by measuring the voltage at the sensor connector while the engine is running. Desired value: 12–14 V
2. Check the resistance in the heating coil by disassembling the connector for the pre-heater and measuring the resistance. Desired value: 2–20 Ω

   Possible cause of fault: Lambda sensor.
3. Run the engine until it reaches operating temperature and maintain engine speed at approximately 2.500 rpm. Execute the LAMBDA SENSOR special test and confirm that the lambda sensor signals fluctuate between 0 and 1 V. The signal should oscillate about once a second. Oscillations of longer duration indicate that the sensor may be polluted and should be replaced.
4. Turn off the ignition and disconnect the 53-pin connector from the control unit. Connect the Break-out Box (A0201/A0202) and the 53-pin adapter (A020221) to the car's wiring harness only. Do not reconnect the control unit.
5. Measure the resistance between the Break-out Box, pin C12 and ground. If the reading is approximately 0 Ω the sensor has short-circuited and is no longer functioning. Repeat the measurement at the sensor connector to determine whether the short circuit is in the sensor or the cable between the sensor and the control unit.

43

Check of power supply to sensors from PGM-FI, pin C13

1. Disconnect the 53-pin connector from the control unit. Connect the Break-out Box (A0201/A0202) and the 53-pin adapter (A020221) between the car's wiring harness and the control unit.
2. Turn on the ignition and measure the voltage between the Break-out Box, pin C13 and C12. Desired value: 5 V

   Possible cause of fault: Wiring, connectors, sensor or control unit.

44

Check of ground connection to sensor from PGM-FI, pin C14

1. Disconnect the 53-pin connector from the control unit. Connect the Break-out Box (A0201/A0202) and the 53-pin adapter (A020221) between the car's wiring harness and the control unit.
2. Start the engine and measure the voltage between the Break-out Box, pin C14 and ground. Desired value: 0 V

   Possible cause of fault: Wiring or connectors.

45

Check of power supply to sensor from PGM-FI, pin C15

1. Disconnect the 53-pin connector from the control unit. Connect the Break-out Box (A0201/A0202) and the 53-pin adapter (A020221) between the car's wiring harness and the control unit.
2. Turn on the ignition and measure the voltage between the Break-out Box, pin C15 and C14. Desired value: 5 V

   Possible cause of fault: Wiring, connectors, sensor or control unit.

46

Check of signal from lambda sensor to PGM-FI, pin C16

This is an input signal to the control unit from the lambda sensor. It is only found on cars fitted with catalytic converters and is used for the fine adjustment of the ratio of fuel to air to approx. 1:14.6 (by weight). This ratio is called lambda = 1.

The following test conditions must be met as the Multi-Tester plus/pro checks that the lambda sensor signal level lies between 0 and 1 V:

- engine temperature must exceed +70°C
- the engine must not be idling – some sensors cool down after long periods of idling and oscillation ceases.
- the engine must not be at full throttle – the sensor signal then becomes constant at approx. 1V.
- Fuel cut-off should not be activated – the sensor signal then becomes constant at approx. 0 V
- Engine speed below 2.500 rpm.

1. Check the sensor's pre-heating (if fitted) by measuring the voltage at the sensor connector while the engine is running. Desired value: 12–14 V
2. Check the resistance in the heating coil by disassembling the connector for the pre-heater and measuring the resistance. Desired value: 2–20 Ω

   Possible cause of fault: Lambda sensor.
3. Run the engine until it reaches operating temperature and maintain engine speed at approximately 2.500 rpm. Execute the LAMBDA SENSOR special test and confirm that the lambda sensor signals fluctuate between 0 and 1 V. The signal should oscillate about once a second. Oscillations of longer duration indicate that the sensor may be polluted and should be replaced.
4. Turn off the ignition and disconnect the 53-pin connector from the control unit. Connect the Break-out Box (A0201/A0202) and the 53-pin adapter (A020221) to the car's wiring harness only. Do not reconnect the control unit.
5. Measure the resistance between the Break-out Box, pin C16 and ground. If the reading is approximately 0 Ω the sensor has short-circuited and is no longer functioning. Repeat the measurement at the sensor connector to determine whether the short circuit is in the sensor or the cable between the sensor and the control unit.

47

Check of ground connection to sensor from PGM-FI, pin C16

1. Disconnect the 53-pin connector from the control unit. Connect the Break-out Box (A0201/A0202) and the 53-pin adapter (A020221) between the car's wiring harness and the control unit.
2. Start the engine and measure the voltage between the Break-out Box, pin C16 and ground. Desired value: 0 V

   Possible cause of fault: Wiring or connectors.

Troubleshooting hint

If the engine runs badly even though the Multi-Tester plus/pro is not indicating any fault, following hints may be useful:

All cars:

If the engine runs badly the cause may be a faulty signal from the manifold air pressure (MAP) sensor. To confirm this, do the following:

1. Turn on the ignition and start the “MANIFOLD AIR PRESSURE” special test.
2. Check the voltage from the MAP sensor. Desired value: approx. 3 V
3. Start the engine and allow it to idle. Check the voltage from the MAP sensor. Desired value: approx. 1 V

   Possible cause of fault: Wiring, connectors or MAP sensor.

Also follow the procedure described in the Locating Faults section, point 40 “Check of signal from the MAP sensor to PGM-FI, pin C11”.

TBI only:

If the engine runs badly the cause may be a faulty signal to the auxiliary injector valve. To confirm this, do the following:

1. Start the engine and allow it to idle.
2. Start “MONITOR TEST”, answer NO to the question if fault should be detected in MONITOR TEST. Use the arrowkeys to show the injectiontime for “A1/A3 INSP”.
3. Check the injection time. Desired value: 2–5 ms

   Possible cause of fault: Wiring, connectors or injection valve.

Also follow the procedure described in the Locating Faults section, point 2 “Check of signal to the auxiliary injector valve from PGM-FI, pin A1/A3”.

Index

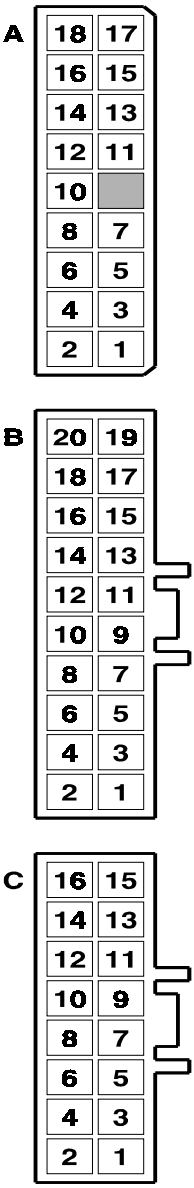
Interface - Signal Locations TBI

System Honda PGM-FI 53

A1. Control signal to auxiliary injection valve
A2. Ground
A3. Control signal to auxiliary injection valve
A4. Ground
A5. Control signal to main injection valve
A6. Control signal to tank ventilation valve*
A7. Control signal to main injection valve
A8. Control signal to AT lockup*
A9. Not connected
A10. Control signal to EGR valve*
A11. Control signal to idle speed correction valve
A12. Control signal to pump relay
A13. Not connected
A14. Not connected
A15. Power supply from main relay
A16. Ground
A17. Not connected
A18. Ground
B1. Constant power supply from battery
B2. Control signal to tandem valve
B3. Control signal to A/C clutch relay*
B4. Not connected
B5. Not connected
B6. Control signal to engine control lamp
B7. AT*
B8. AC*
B9. AT*
B10. Not connected
B11. AT*
B12. Not connected
B13. Control signal from ignition key to starter motor
B14. Signal from alternator
B15. Control signal to ignition amplifier
B16. Signal from vehicle speed sensor
B17. To B15
B18. Not connected
B19. Not connected
B20. Not connected
C1. Signal from crankshaft sensor
C2. Ground to crankshaft sensor
C3. Signal from TDC sensor
C4. Ground to TDC sensor
C5. Signal from air temperature sensor
C6. Signal from coolant temperature sensor
C7. Signal from throttle potentiometer
C8. Signal from EGR sensor*
C9. Signal from atmospheric pressure sensor
C10. Not connected
C11. Signal from MAP sensor
C12. Ground to sensor
C13. Power supply to sensor
C14. Ground to sensor
C15. Power supply to sensor
C16. Signal from lambda sensor*

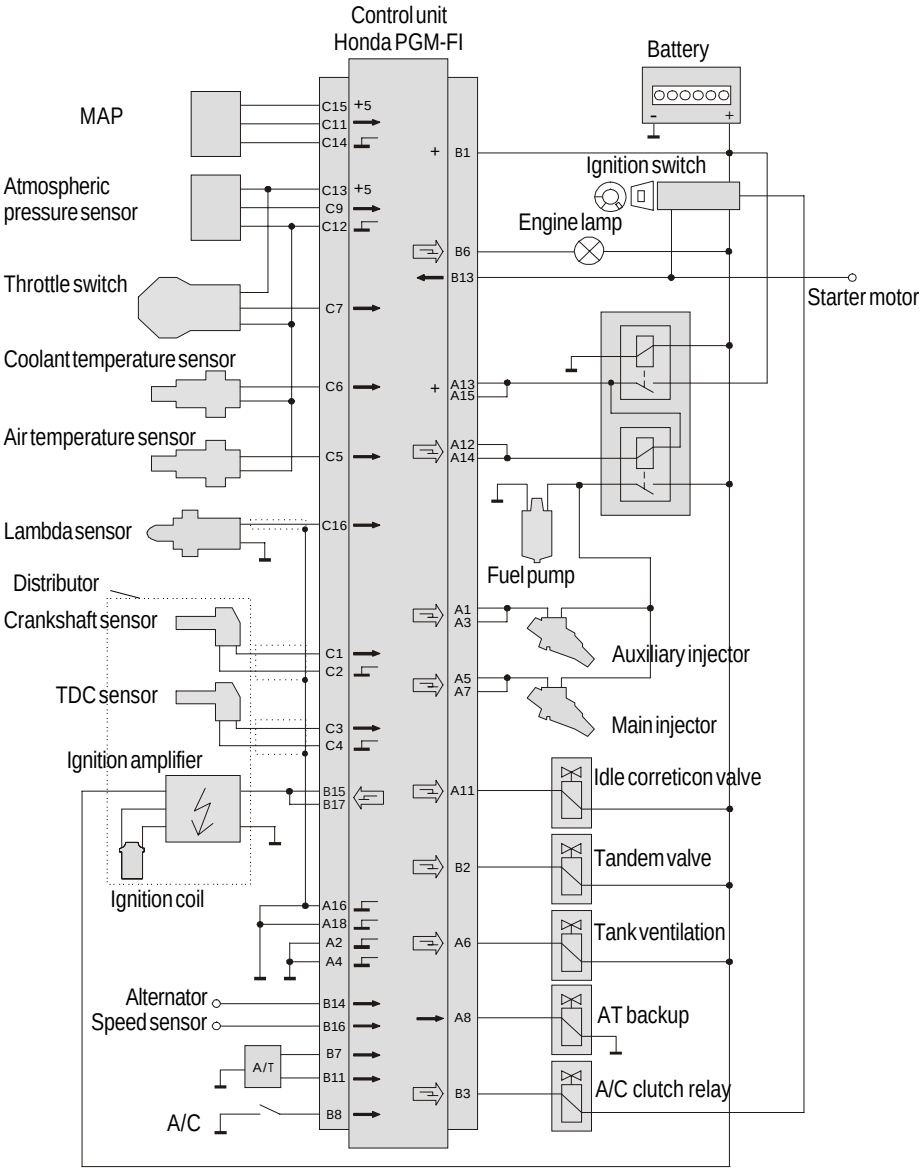
* only certain systems

Wiring harness



Wiring Diagram Honda PGM-FI TBI

This wiring diagram is an example. Check in the relevant workshop manual for the diagram of the car you are working with.



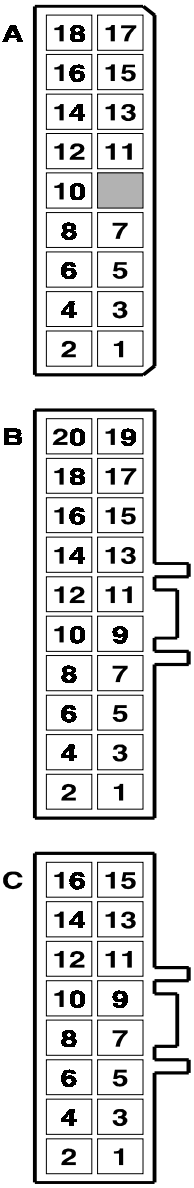
Interface - Signal Locations MPI

System Honda PGM-FI

A1. Control signal to injection valve 1
A2. Ground
A3. Control signal to injection valve 2
A4. Ground
A5. Control signal to injection valve 3
A6. Control signal to tank ventilation valve*
A7. Control signal to injection valve 4
A8. Control signal to V-TEC valve$^{V\text{-}TEC}$ / Control signal to AT lockup*
A9. Not connected
A10. Control signal to EGR valve*
A11. Control signal to idle speed correction valve
A12. Control signal to fuel pump relay
A13. Not connected
A14. Not connected
A15. Power supply from main relay
A16. Ground
A17. Constant power supply from battery*
A18. Ground
B1. Constant power supply from battery*
B2. Control signal to tank ventilation valve* / Control signal to cold start valve*
B3. Control signal to A/C clutch relay A/C*
B4. Not connected
B5. Signal from oil pressure switch^{-TEC}
B6. Control signal to engine control lamp
B7. AT*
B8. AC*
B9. AT*
B10. Signal from crankshaft sensor*
B11. Signal from lambda sensor*
B12. Ground to crankshaft sensor*
B13. Status signal from ignition key to starter motor
B14. Loadsignal from alternator
B15. Control signal to ignition amplifier*
B16. Signal from wehicle speed sensor*
B17. To B15*
B18. Signal from wehicle speed sensor*
B19. Not connected
B20. Not connected
C1. Signal to cylinder sensor / Signal from crankshaft sensor
C2. Ground to cylinder sensor / Ground to crankshaft sensor
C3. Signal from TDC sensor
C4. Ground to TDC sensor
C5. Signal from air temperature sensor
C6. Signal from coolant temperature sensor
C7. Signal from throttle potentiometer
C8. Signal from EGR sensor*
C9. Signal from atmospheric pressure sensor
C10. Not connected
C11. Signal from MAP sensor
C12. Ground to sensor
C13. Power supply to sensor
C14. Ground to sensor
C15. Power supply to sensor
C16. Signal from lambda sensor*

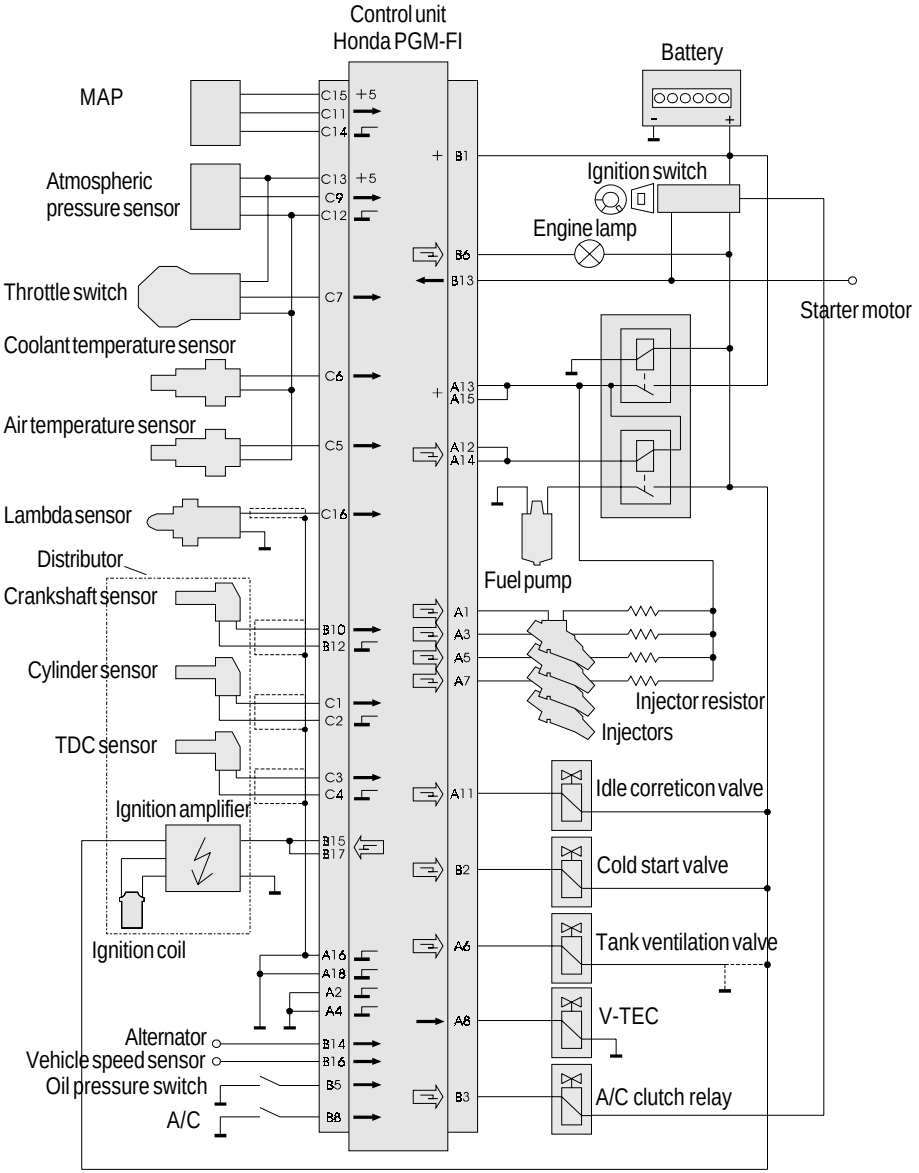
* only certain systems
V-TEC) only systems with V-TEC

Wiring harness



Wiring Diagram Honda PGM-FI MPI

This wiring diagram is an example. Check in the relevant workshop manual for the diagram of the car you are working with.



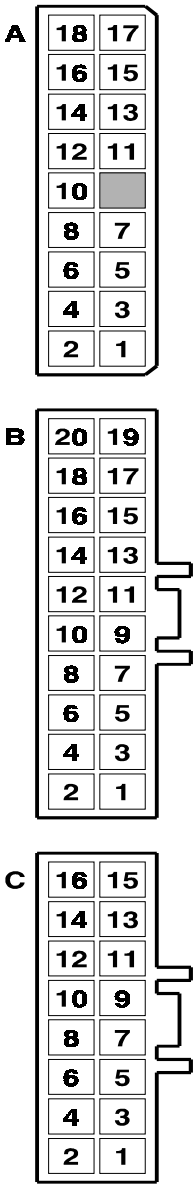
Interface - Signal Locations 6 cylinder

System Honda PGM-FI

A1. Control signal to injection valve 1
A2. Ground
A3. Control signal to injection valve 2
A4. Ground
A5. Control signal to injection valve 3
A6. Control signal to injection valve 6
A7. Control signal to injection valve 4
A8. Control signal to injection valve 5
A9. Not connected
A10. Control signal to EGR sensor*
A11. Control signal to idle speed correction valve
A12. Control signal to fuel pump relay
A13. Fuel pressure sensor
A14. Control signal to By-Pass A
A15. Power supply from main relay
A16. Ground
A17. Constant power supply from battery
A18. Ground
B1. Not connected
B2. A/C*
B3. Control signal to By-Pass B
B4. Not connected
B5. Not connected
B6. Controlsignal to engine control lamp
B7. AT*
B8. AC*
B9. Not connected
B10. Not connected
B11. Signal from vehicle speed sensor
B12. Not connected
B13. Status signal from ignition key to starter motor
B14. Loadsignal from alternator
B15. Control signal to ignition amplifier
B16. Not connected
B17. AT control unit*
B18. Not connected
B19. Signal from crankchaft sensor
B20. Ground to crankshaft sensor
C1. Signal from cylinder sensor
C2. Ground to cylinder sensor
C3. Signal from TDC sensor
C4. Ground to TDC sensor
C5. Signal from air temperature sensor
C6. Signal from coolant temperature sensor
C7. Signal from throttle potentiometer
C8. Signal from EGR sensor*
C9. Signal from atmospheric pressure sensor
C10. Signal from lambda sensor*
C11. Signal from MAP sensor
C12. Signal from lambda sensor*
C13. Power supply to sensor
C14. Ground to sensor
C15. Power supply to sensor
C16. Ground to sensor

* only certain systems

Wiring harness



Wiring Diagram Honda PGM-FI 6-cylinder

This wiring diagram is an example. Check in the relevant workshop manual for the diagram of the car you are working with.