



## GESTIONE ELETTRONICA MOTORI BENZINA

198 - Bravo

## ELECTRONIC MANAGEMENT OF PETROL ENGINES - DESCRIPTION

An electronic control system supervises and manages all engine parameters to optimize performance and fuel consumption by means of a real-time response to different operating conditions.

The system is managed by a single control unit which controls both ignition and injection.

Depending on the signals received from numerous sensors, the control unit manages the injectors connected to it, handling the following systems:

- fuel supply;
- air supply;
- accelerator pedal;
- engine cooling;
- combustion control - Lambda sensors;
- control of exhaust with catalytic converter;
- fuel vapour recirculation.

The throttle body is also controlled electronically by the control unit: the throttle opening is calculated according to a specific logic inside the engine management control unit; the mechanical connection between the accelerator pedal and the throttle body is thereby eliminated.

Thanks to the electronic management described above, this engine conforms to the most recent emission control regulations (EURO 5).

For more details

See descriptions 1056 PETROL INJECTION SYSTEM

The system is also controlled by dedicated relays in the engine compartment junction unit. Lines supplying the control unit and various system components (sensors and actuators) are protected by dedicated fuses that are also located in the junction unit.

# ELECTRONIC MANAGEMENT OF PETROL ENGINES - OPERATIONAL DESCRIPTION

The M10 engine management control unit controls and regulates the entire ignition and electronic injection system.

Control unit M10 receives a direct supply from the battery at pin 70 of connector A via the line protected by fuse F18 of junction unit B1.

The ignition-operated power supply arrives via a line protected by fuse F16 of the engine compartment junction unit B1 at pin 6 of connector A of M10 .

Pins 1, 2 and 4 of connector A of M10 are earthed.

Main injection relay T9 of B1 controls the entire system: it is energized by an earth signal from pin 72 of connector A of control unit M10 and then forwards a power supply:

- to pins 3 and 5 of connector A of the control unit, through the line protected by fuse F17 of B1;
- to fuel vapour recovery solenoid L10 and to lambda sensors K15 and K17 (all these lines are protected by fuse F11 of B1);
- to coils A30 and injectors N70 via a line protected by fuse F22 of B1.

Fuel pump relay T10 of B1 is supplied by the line protected by fuse F21 of B1.

This is energized by a control signal from pin 68 of connector A of the control unit M10 and supplies power to fuel pump N40.

Engine control unit M10 receives signals from the various different sensors, in this way it keeps all the engine operating parameters under control.

The rpm sensor K46 provides information about the engine speed, via a frequency signal sent to pins 37 and 38 of connector B of the control unit M10.

Timing sensor K47 is supplied from pin 11 of connector B of control unit M10; it receives a reference earth from pin 28 of connector B and sends a frequency signal corresponding to the phase to pin 12 of connector B of the control unit.

Integrated air temperature sensor K43 receives a reference earth from pin 44 of connector B; it sends a signal corresponding to intake air temperature to pin 24 of the control unit. Pin 9 of connector B of M10 sends reference power supply to sensor K43, which returns a signal proportional to intake air pressure to pin 25.

The engine temperature sender unit K36 receives a reference earth from pin 43 of connector B of the control unit M10 and provides a signal proportional to the temperature of the engine coolant to pin 29 of connector B of the control unit.

The Lambda sensor on pre-converter K15 and the one on catalyzer K17 provide control unit M10 with information concerning the correct composition of the air-fuel mixture.

The sensor K15 sends a signal to pin 52 of connector B of the control unit, while pin 55 provides a reference earth: these two signals are very low intensity and are thus appropriately shielded. Sensor K15 is heated by a resistance to ensure correct operation even when cold; the resistance is supplied by the main relay T9; pin 16 of connector B of M10 provides the reference earth.

The sensor K17 sends a signal to pin 54 of connector B of the control unit, while pin 53 provides a reference earth: these two signals are very low intensity and are thus appropriately shielded. Sensor K17 is heated by a resistance to ensure correct operation even when cold; the resistance is supplied by the main relay T9; pin 1 of connector B of M10 provides the reference earth.

The detonation sensor K50 provides information, by means of frequency signals, concerning the onset of detonation in the combustion chamber: it sends two signals to pins 36 and 51 of connector B of M10; these signals are also appropriately shielded.

Accelerator pedal K55 has two built-in potentiometers (a main one and a safety one). The former receives power and earth signals from pins 49 and 30 respectively of connector A of M10 and sends a corresponding signal to pin 79 of the same connector. The latter receives power and earth signals from pins 27 and 29 respectively of connector A of M10 and sends a corresponding signal to pin 55 of the same connector.

Control unit M10 receives the minimum engine oil pressure sensor K30 signal at pin 35 of connector B.

Pin 87 of connector A of M10 receives the signal from the brake light switch I30 - N.O. contact - with an ignition-operated supply (INT) from fuse F37 of underdashboard control unit B2; it receives the signal - N.C. contact - from the brake lights switch I30 at pin 82 of connector A of M10 with an ignition-operated supply from fuse F35 of B2.

Pin 63 of connector A of M10 receives the signal from the clutch switch I31.

The control unit M10 controls the opening of injectors N70 by means of special signals sent from pins 17, 4, 2 and 19 of connector B of M10. The injectors N70 receive a power supply to enable the opening of the main relay T9 of B1 .

Control unit M10 also controls the coils A30 via control signals for the primary winding of the coil, while the secondary winding sends a pulse to the spark plugs: from pins 31, 48, 46 and 47 of connector B of M10. The primary windings of coils A30 receive a power supply to enable opening of main relay T9 of B1 .

Throttle body actuator N75 has two built-in potentiometers connected in parallel: this controls the throttle opening by means of a step motor.

The motor receives a power supply from pins 49 and 50 of connector B of M10. Pin 13 of connector B sends power to both potentiometers, while pin 10 sends an earth signal to the potentiometers; pins 42 and 22 of the same connector receive signals from the throttle body actuator N75.

Fuel vapour recovery solenoid L10 allows the flow of fuel vapours to the engine intake, where they are added to the mixture entering the combustion chamber. Valve L10 is supplied from main relay T9 of B1 ; it is opened by the control unit when the engine is loaded via a signal from pin 3 of connector B of M10 .

The control unit autodiagnostic data can be read by connecting to connector C of the Body Computer M1, pin 7: signals arrive from pin 91 of connector A from the control unit M10 via the special diagnostic line

On right hand drive versions there is also diagnostic connector R10 separate from the Body Computer.

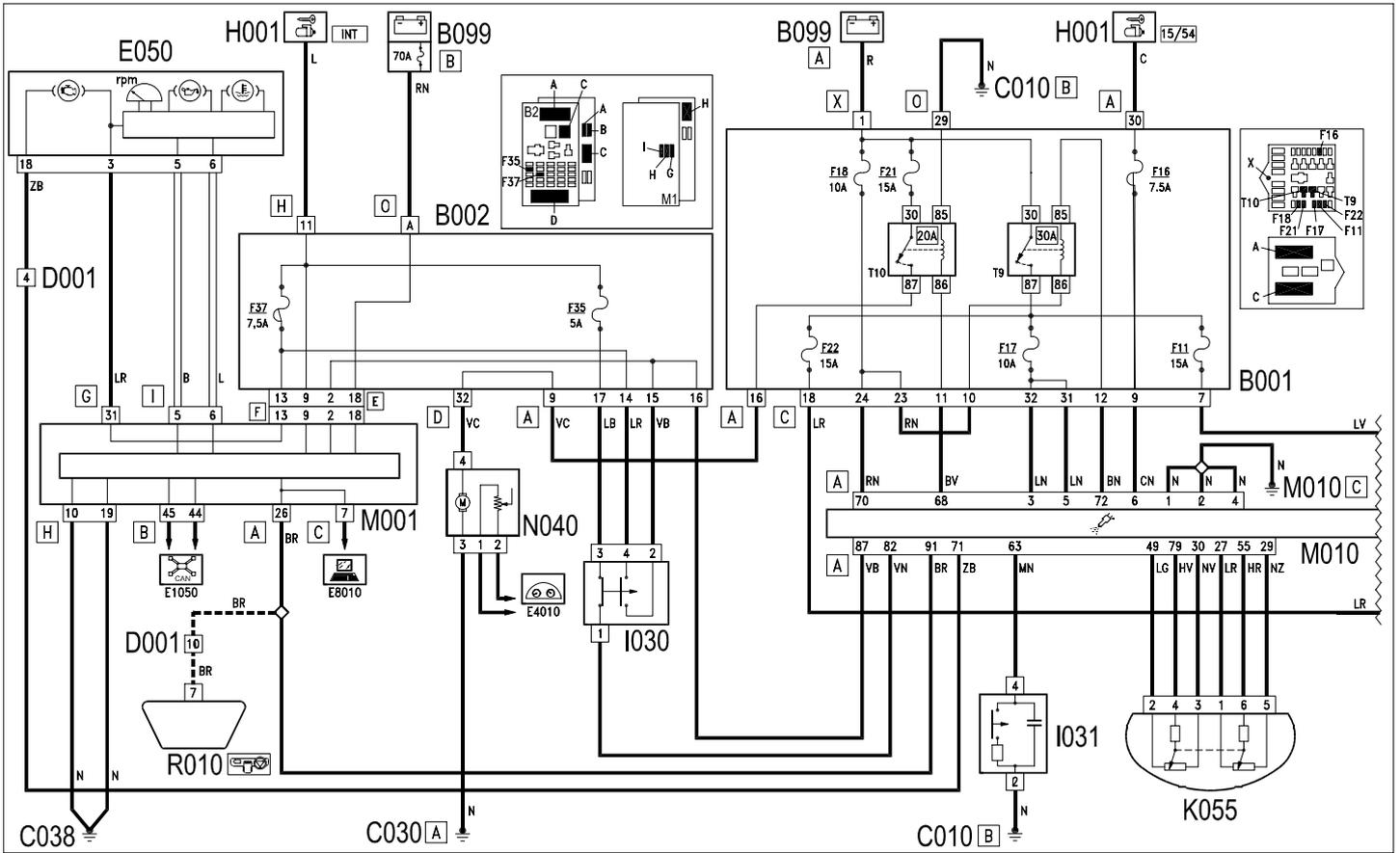
The autodiagnostic system for the control unit M10 also produces a signal - which leaves pin 71 of connector A - which is connected directly to the EOBD warning light in the instrument panel E50.

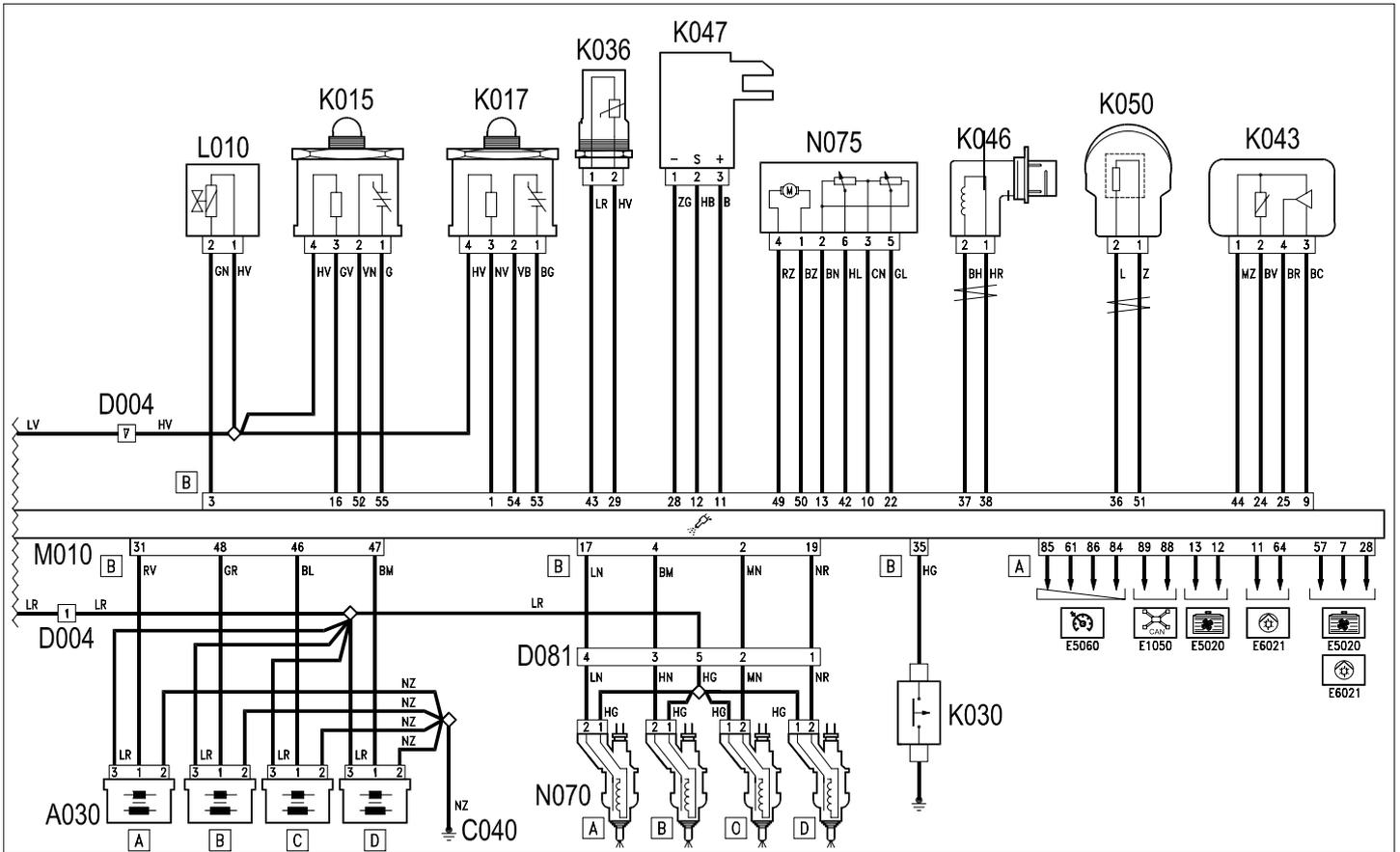
Control unit M10 is then connected via the CAN to Body Computer M1 and to the other network nodes: information on the following is sent through this connection

- engine coolant temperature, which is sent to the instrument panel E50 which manages the gauge and the warning light;
- engine rpm, which is sent to the instrument panel E50 rev counter;
- minimum engine oil pressure, which is sent to the instrument panel E50 which manages the warning light;

It receives the speedometer signal, via the CAN, produced by the ABS control unit M50.

# PETROL ENGINE ELECTRONIC MANAGEMENT - WIRING DIAGRAM

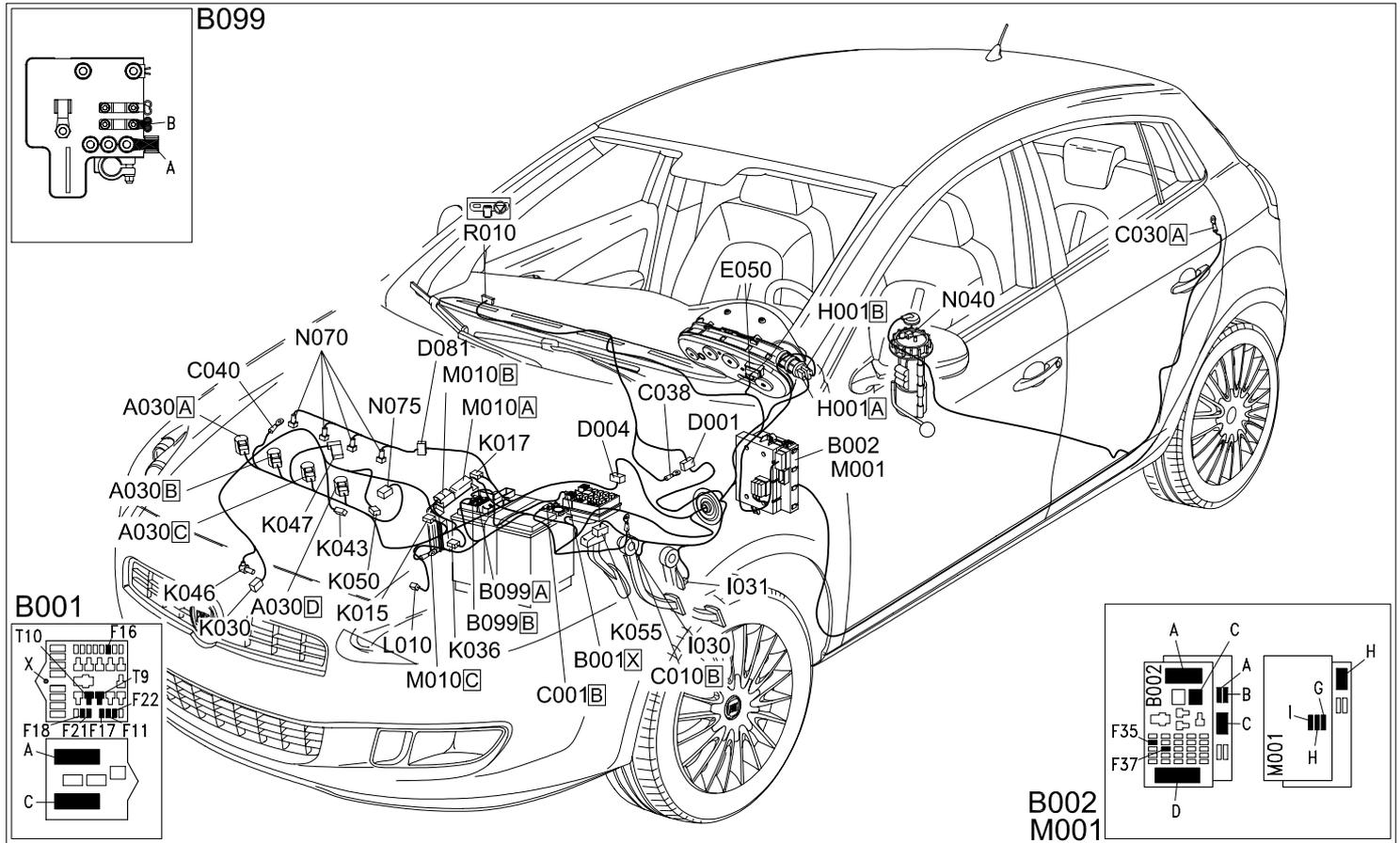




Component Code	Description	Reference to the operation
A030	IGNITION COIL	Op. 5510C14 IGNITION COIL/S - R.R.
A030	IGNITION COIL	Op. 5590B11 IGNITION COIL CONNECTOR - R.R.
B001	JUNCTION UNIT	Op. 5505A13 ADDITIONAL JUNCTION UNIT IN ENGINE COMPARTMENT - R.R.
B002	JUNCTION UNIT UNDER DASHBOARD	Op. 5505A35 MAIN BODY COMPUTER/JUNCTION UNIT - R.R.
B099	MAXI FUSE BOX ON BATTERY	-
C010	LEFT FRONT EARTH	-
C030	LEFT REAR EARTH	-
C038	EARTH ON CENTRE TUNNEL	-
C040	EARTH ON ENGINE	-
D001	FRONT/DASHBOARD COUPLING	-
D004	FRONT/ENGINE COUPLING	-
D081	INJECTOR JUNCTION	-
E050	INSTRUMENT PANEL	Op. 5560B10 CONTROL PANEL - R+R
H001	IGNITION SWITCH	Op. 5520A10 IGNITION SWITCH ASSEMBLY - R+R
I030	BRAKE PEDAL SWITCH	Op. 5550D10 BRAKE LIGHT SWITCH - R+R
I031	CLUTCH PEDAL SWITCH	Op. 1056B78 SWITCH ON CLUTCH PEDAL - R.R (PETROL ENGINES)
K015	LAMBDA SENSOR ON PRE-CATALYZER	Op. 1080B94 FRONT LAMBDA SENSOR TO WITH CATALYTIC CONVERTER - R.R
K015	LAMBDA SENSOR ON PRE-CATALYZER	Op. 5590B14 FRONT OXYGEN SENSOR CONNECTOR - R.R.
K017	LAMBDA SENSOR ON CATALYZER	Op. 1080B95 REAR LAMBDA SENSOR TO CATALYTIC CONVERTER - R.R
K017	LAMBDA SENSOR ON CATALYZER	Op. 5590B15 REAR OXYGEN SENSOR CONNECTOR - R.R.
K030	ENGINE OIL PRESSURE SENSOR (SWITCH)	Op. 1084A42 ENGINE OIL PRESSURE WARNING LIGHT SWITCH - R.R.
K030	ENGINE OIL PRESSURE SENSOR (SWITCH)	Op. 5590B01 OIL PRESSURE SENSOR CONNECTOR - R.R.
K036	ENGINE COOLANT TEMPERATURE SENSOR/SENDER UNIT	Op. 1056B50 ENGINE COOLANT TEMPERATURE SENSOR - R + R
K036	ENGINE COOLANT TEMPERATURE SENSOR/SENDER UNIT	Op. 5590B02 ENGINE COOLANT TEMPERATURE SENSOR/SENDER UNIT CONNECTOR - R.R.

K043	INTEGRATED AIR TEMPERATURE SENSOR	Op. 1056B54 INTAKE AIR PRESSURE/TEMPERATURE SENSOR - R.R.
K043	INTEGRATED AIR TEMPERATURE SENSOR	Op. 5590B03 AIR TEMPERATURE/PRESSURE SENSOR CONNECTOR - R.R.
K046	RPM SENSOR	Op. 5510C26 ENGINE RPM SENSOR - R+R
K046	RPM SENSOR	Op. 5590B04 RPM SENSOR CONNECTOR - R.R.
K047	TIMING SENSOR	Op. 1056B51 CAM ANGLE SENSOR - R.R.
K047	TIMING SENSOR	Op. 5590B05 PHASE SENSOR CONNECTOR - R.R.
K050	DETONATION SENSOR	Op. 5510C42 DETONATION SENSOR (ONE) - R.R.
K050	DETONATION SENSOR	Op. 5590B18 KNOCK SENSOR CONNECTOR - R.R.
K055	ACCELERATOR PEDAL POTENTIOMETER	Op. 1068A20 ACCELERATOR PEDAL WITH BUILT-IN POTENTIOMETER - R.R.
L010	FUEL VAPOUR RECOVERY SOLENOID VALVE	Op. 1080E20 ENABLEMENT SOLENOID FOR FLOW OF FUEL VAPOUR TO INLET - R+R
L010	FUEL VAPOUR RECOVERY SOLENOID VALVE	Op. 5590B23 FUEL VAPOUR RECOVERY SOLENOID VALVE CONNECTOR - R.R.
M001	BODY COMPUTER	Op. 5505A35 MAIN BODY COMPUTER/JUNCTION UNIT - R.R.
M010	ENGINE MANAGEMENT CONTROL UNIT	Op. 1056B82 INJECTION/IGNITION SYSTEM E.C.U. (ONE) - R + R
N040	FUEL PUMP AND LEVEL GAUGE	Op. 1040A70 SUBMERGED PUMP ASSEMBLY COMPLETE WITH LEVEL GAUGE CONTROL - R + R
N070	INJECTOR	Op. 1056B70 INJECTOR (ONE) - R + R WITH FUEL MANIFOLD PIPE REMOVED - INCLUDES SEAL REPLACEMENT
N075	INTEGRATED THROTTLE BODY ACTUATOR	Op. 1056B14 THROTTLE BODY - R + R
N075	INTEGRATED THROTTLE BODY ACTUATOR	Op. 5590B10 INTEGRATED THROTTLE BODY ACTUATOR CONNECTOR - R.R.
R010	MULTIPLE TESTER CONNECTION	-

# ELECTRONIC MANAGEMENT OF PETROL ENGINES - COMPONENT LOCATION



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