



GESTIONE ELETTRONICA MOTORI BENZINA

191 - Giulietta

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.

This version is equipped with a FIRE Turbo power unit, derived from the aspirated FIRE 1.4 16v engine. Turbocharging is provided by a fixed-geometry turbocharger and is managed by the engine management control unit via a turbo pressure solenoid valve that regulates the waste gate and shut-off solenoid valve.

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

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

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

Engine management control unit M010 controls and governs the entire electronic ignition and injection system.

The control unit M010 receives a direct supply from the battery at pin 70 of connector A via the line protected by fuse F18 of junction unit B001.

The ignition-operated power supply (15/54) arrives via a line protected by fuse F16 of the engine compartment junction unit B001 at pin 6 of connector A of M010 .

Pins 1, 2 and 4 of connector A of M010 are earthed.

The main injection relay T09 of B001 controls the entire system: it is energised by an earth signal from pin 72 of connector A of control unit M010 and then forwards a power supply:

- to pins 5 and 3 of connector A of the actual control unit, via the line protected by fuse F17 of B001;

- to the fuel vapour recovery solenoid valves L010, wastegate L037 and turbocharger by-pass L102, as well as oxygen sensors K015 and K017: all these lines are protected by fuse F11 of B001;

- to coils A030 and injectors N070 via a line protected by fuse F22 of B001.

The fuel pump relay T10 of B001 is supplied by the line for fuse F21 of B001.

This is energised by a control signal from pin 68 of connector A control unit M010 and supplies power to fuel pump N040.

The engine management control unit M010 receives signals from the various sensors, thereby keeping all the engine operating parameters under control.

The rpm K046 is supplied from pin 9 of connector B of the control unit M010; it receives a reference earth from pin 44 of connector B, and sends a frequency signal corresponding to the engine speed to pin 38 of connector B.

Timing sensor K047 is supplied from pin 11 of connector B of control unit M010; 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.

The air pressure/temperature sensor K044 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 M010 sends power supply to sensor K044, which returns a signal proportional to intake air pressure to pin 25.

Turbocharging sensor K082 receives a reference earth from pin 44 of connector B and a power supply from pin 9 of connector B of M010 and returns a signal proportional to turbocharging pressure to pin 21.

Engine temperature sender unit K036 receives a reference earth from pin 29 of connector B of control unit M010 and provides a signal proportional to the temperature of the engine coolant at pin 43 of connector B of the control unit.

The Lambda sensor on the pre-converter K015 and the one on converter K017 provide the control unit M010 with information concerning the correct composition of the air-fuel mixture

Sensor K015 sends a signal to pin 55 of connector B of the control unit, while pin 52 provides a reference earth: these two signals are very low intensity and are thus appropriately shielded. Sensor K015 is heated by a resistance to ensure correct operation even when cold; the resistance is supplied by the main relay T09; pin 16 of connector B of M010 provides the reference earth.

Sensor K017 sends a signal to pin 53 of connector B of the control unit, while pin 54 provides a reference earth: these two signals are very low intensity and are thus appropriately shielded. Sensor K017 is heated by a resistance to ensure correct operation even when cold; the resistance is supplied by the main relay T09; pin 1 of connector B of M010 provides the reference earth.

The detonation sensor K050 provides information, by means of frequency signals, concerning the onset of detonation in the combustion chamber: it sends two signals to pin 51 of connector B of M010; while it receives reference earth from pin 36; these signals are also appropriately shielded.

Accelerator pedal K055 contains two built-in potentiometers (a main one and a safety one). The former receives power and earth signals from pins 27 and 29 of connector A of M010 and sends a corresponding signal to pin 55 of the same connector. The latter receives power and earth signals from pins 49 and 30 of connector A of M010 and sends a corresponding signal to pin 79 of the same connector.

The control unit M010 receives - at pin 35 of connector B - a signal from the minimum engine oil pressure sensor K030.

Pin 87 of connector A of M010 receives a signal from brake light switch I030 - N.O. contact - provided with an "ignition-operated" power supply from fuse F37 of the Body Computer M001. Through the CAN, it receives a N.C. signal from the brake light switch I030, "ignition-operated" supplied from fuse F51 of the Body Computer M001.

Pins 62 and 63 of connector A of M010 receive the signals from the clutch switch I031, with an "ignition-operated" supply from the fuse F51 of the Body Computer M001.

The pin 84 of connector A of M010 receives the signal from the reverse switch I020, with "ignition-controlled" supply from the fuse F51 of the Body Computer M001.

Control unit M010 controls the opening of injectors N070 by means of special signals sent from pins 17, 14, 2 and 19 of connector B of M010. The injectors N070 receive a power supply to enable main relay switch T09 of B001 to open.

Control unit M010 also controls the coils A030 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 M010. The primary windings of coils A030 receive a power supply to enable opening of main relay T09 of B001 .

Throttle body actuator N075 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 M010. Pin 10 of connector B sends power to both potentiometers, while pin 13 sends an earth signal to the potentiometers; pins 42 and 22 of the same connector receive signals that reach throttle body actuator N075.

Fuel vapour recovery solenoid L010 allows fuel vapours to flow through toward the engine intake, where they join the mixture that is entering the combustion chamber. Valve L010, supplied by the main relay T09 of B001, is opened by the control unit when the engine is operating in load conditions by means of a signal from pin 3 of connector B of M010.

The turbo pressure solenoid regulates the turbocharger Waste Gate mechanical valve; solenoid L037 is supplied by main relay T09 of B001 and is controlled by the control unit via a signal from pin 19 of connector A of M010.

The turbocharger by-pass solenoid L102, connected to the intake pipe near the throttle body, allows the excess pressure to be discharged during the release stage in order to prevent excessive increases in pressure which could damage the inlet pipes and upset the operation of the turbine.

It is supplied by the main relay T09 of B001 and is controlled by the control unit via a signal from pin 5 of connector B of M010.

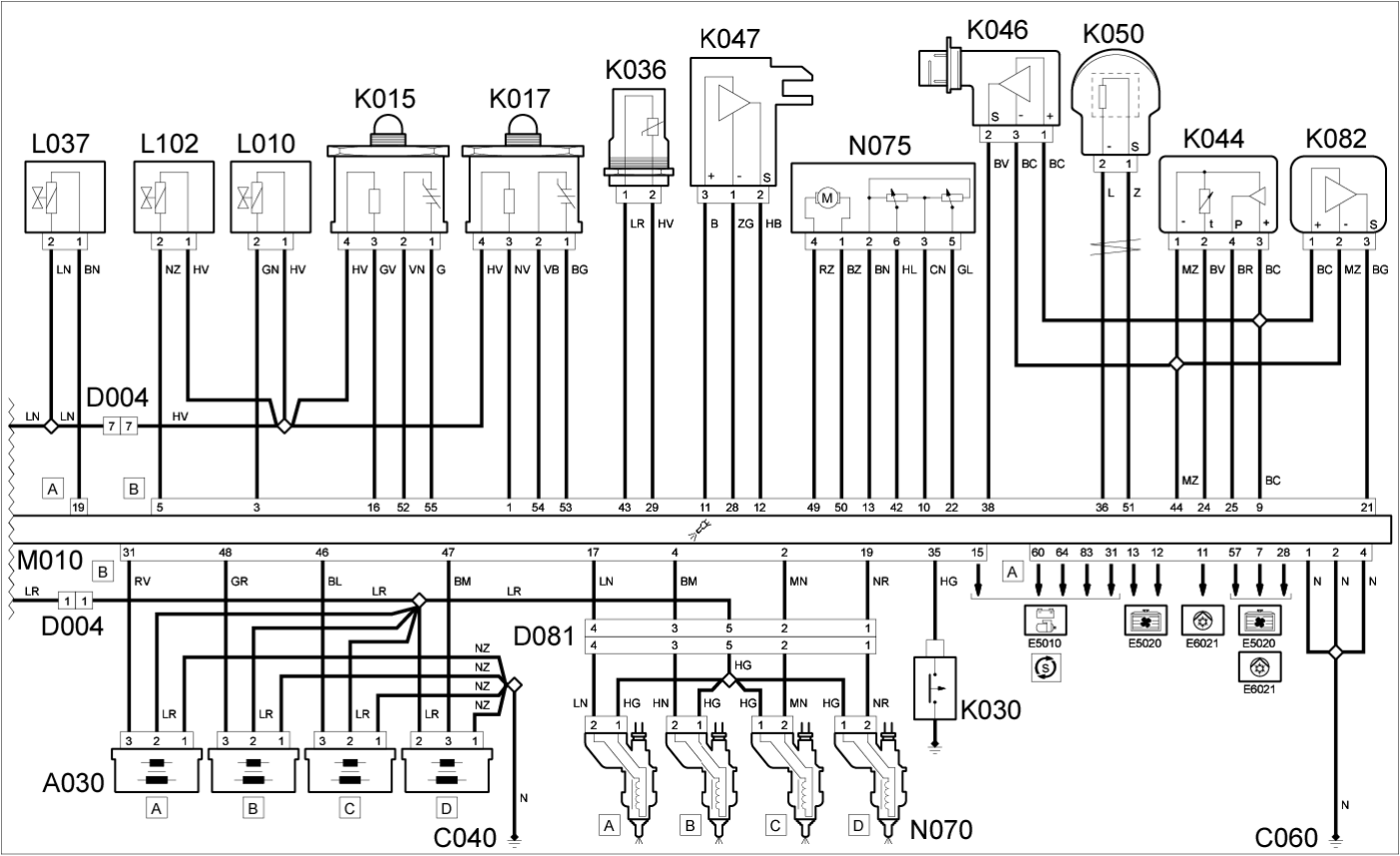
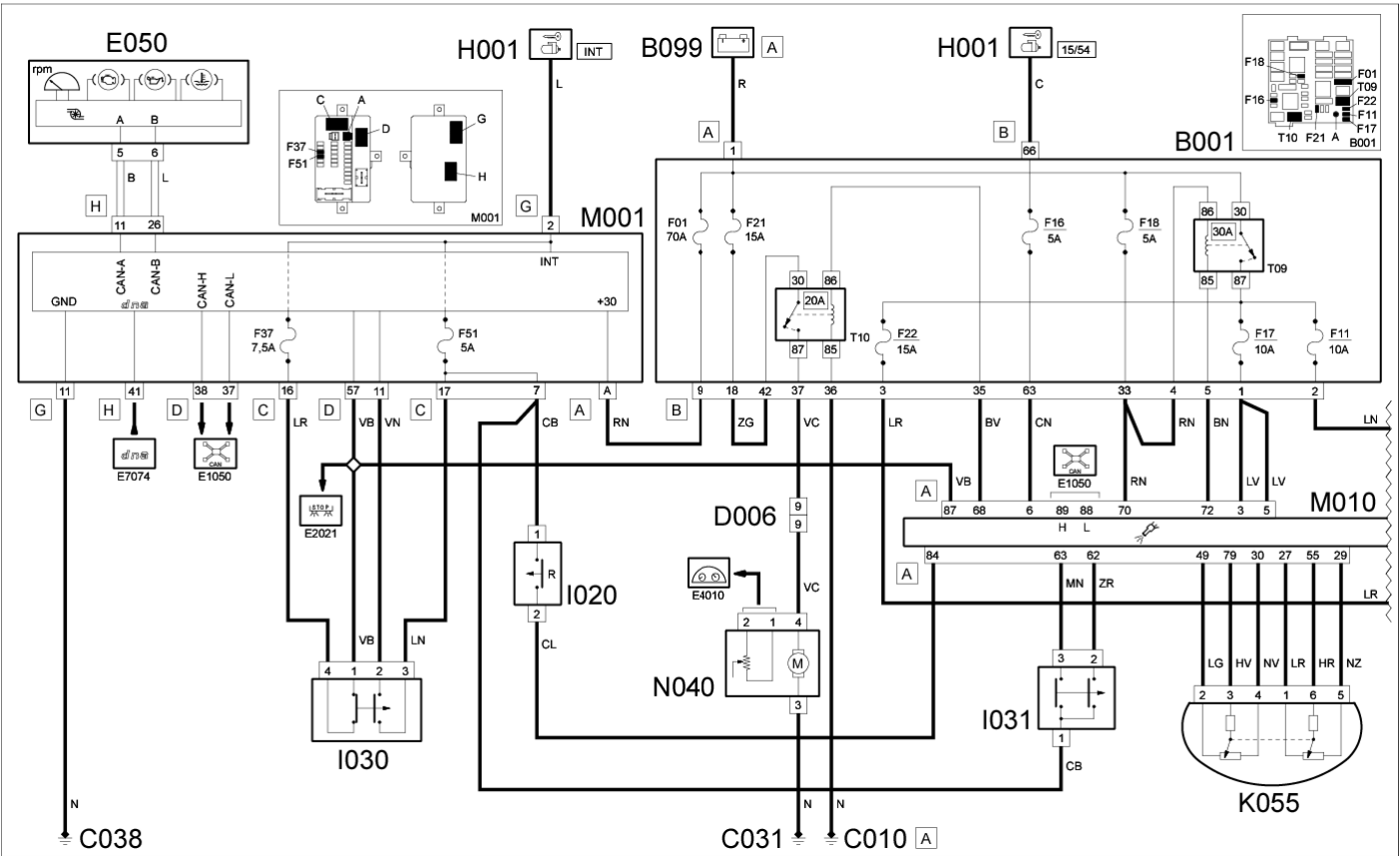
The control unit M010 is then connected through the CAN network to the Body Computer M001 and to the other network nodes: information on the following is sent through this

connection

- self-diagnosis of the system that also produces a signal for the "EOBD" warning light, located on the instrument panel E050 and that is connected to the connector R010;
- engine coolant temperature, which is sent to the instrument panel E050 which manages the gauge and the warning light;
- engine rpm, which is sent to the instrument panel E050 rev counter;
- minimum engine oil pressure, which is sent to the instrument panel E050 that controls the warning light;
- too high turbocharger pressure, sent to instrument panel E050, which controls the displaying.

It receives the speedometer signal, via the CAN, produced by the ABS control unit M050.

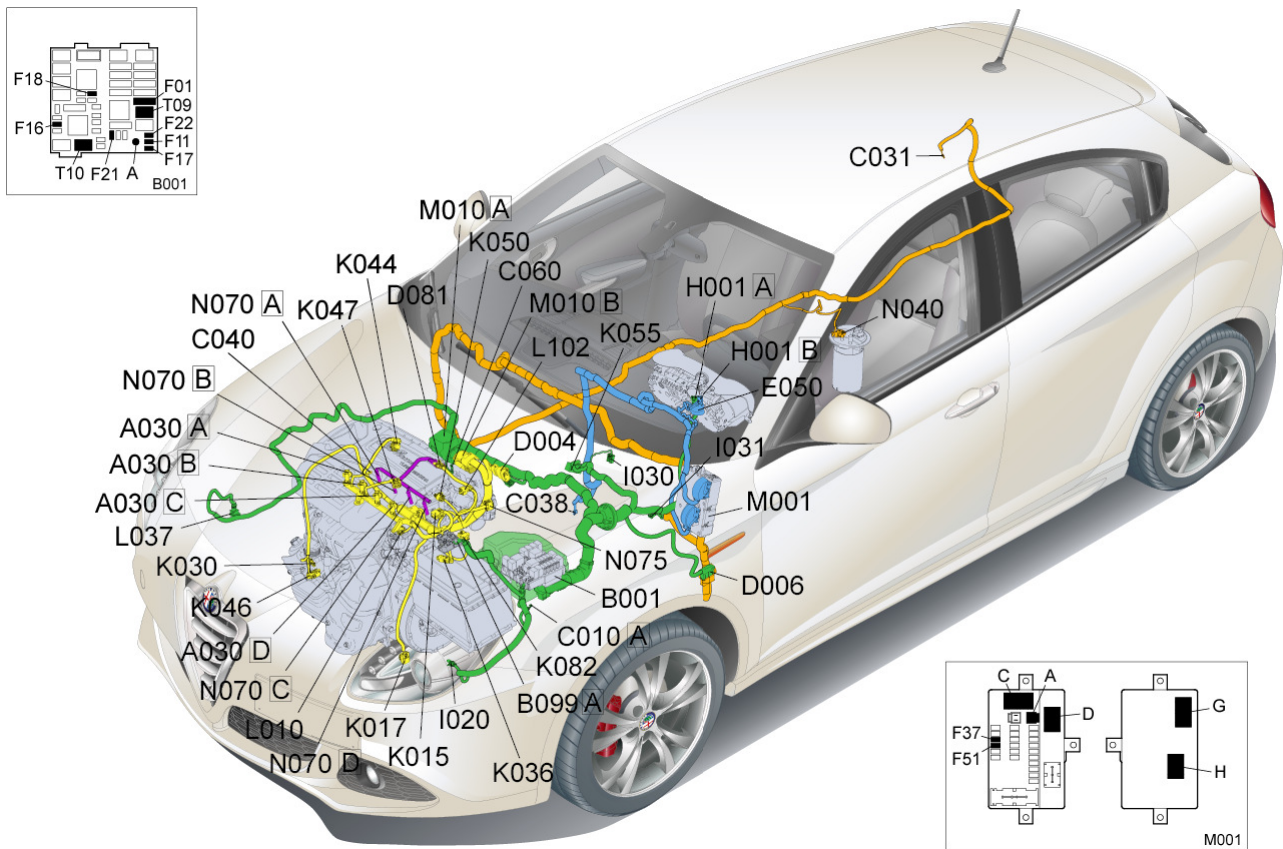
PETROL ENGINE ELECTRONIC MANAGEMENT - WIRING DIAGRAM



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. 5505A28 CONTAINER FOR ADDITIONAL JUNCTION UNIT IN ENGINE COMPARTMENT - R.R.
B099	MAXI FUSE BOX ON BATTERY	Op. 5530B40 SUPPLY BOX ON BATTERY (LINK BATTERY AND FUSE BOX) - R R
C010	LEFT FRONT EARTH	-
C031	RIGHT REAR EARTH	-
C038	EARTH ON CENTRE TUNNEL	-
C040	EARTH ON ENGINE	-
C060	INJECTION CONTROL UNIT EARTH	-
D004	FRONT/ENGINE COUPLING	-
D006	FRONT/REAR COUPLING	-
D081	INJECTOR JUNCTION	-
E050	INSTRUMENT PANEL	Op. 5560B10 CONTROL PANEL - R+R
H001	IGNITION SWITCH	Op. 5520A18 IGNITION SWITCH CONTACT CARRIER LOCK BARREL - R.R.
I020	REVERSING LIGHTS SWITCH	Op. 5550D22 REVERSING LIGHT SWITCH - 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.
K044	AIR TEMPERATURE/PRESSURE SENSOR	Op. 1056B54 INTAKE AIR PRESSURE/TEMPERATURE SENSOR - R.R.
K044	AIR TEMPERATURE/PRESSURE 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
K082	SUPERCHARGING SENSOR	Op. 1056B44 AIR PRESSURE SENSOR - R + R
K082	SUPERCHARGING SENSOR	Op. 5590B06 SUPERCHARGING SENSOR CONNECTOR - R.R.
L010	FUEL VAPOUR RECOVERY SOLENOID VALVE	Op. 1080E28 PIPE FROM ACTIVE CHARCOAL FILTER TO SOLENOID - R.R.
L010	FUEL VAPOUR RECOVERY SOLENOID VALVE	Op. 5590B23 FUEL VAPOUR RECOVERY SOLENOID VALVE CONNECTOR - R.R.
L037	WASTE GATE SOLENOID VALVE	Op. 1064B38 WASTE GATE SUPERCHARGING PRESSURE ADJUSTMENT SOLENOID VALVE - R.R.
L102	TURBOCHARGER BY-PASS SOLENOID VALVE	Op. 1048B58 TURBOCHARGER AIR BY-PASS VALVE - R.R.
L102	TURBOCHARGER BY-PASS SOLENOID VALVE	Op. 5590B26 TURBOCHARGER BY-PASS 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 REPLACEMNT
N070	INJECTOR	Op. 5590B09 INJECTOR CONNECTOR - R.R.
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.

ELECTRONIC MANAGEMENT OF PETROL ENGINES - COMPONENT LOCATION



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K015	LAMBDA SENSOR ON PRE-CATALYZER	Op. 5590B14 FRONT OXYGEN SENSOR CONNECTOR - R.R.
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N075	INTEGRATED THROTTLE BODY ACTUATOR	Op. 1056B14 THROTTLE BODY - R + R

