



GESTIONE ELETTRONICA ALIMENTAZIONE GPL

191 - Giulietta

cardiagn.com

DESCRIPTION OF LPG FUEL SYSTEM ELECTRONIC MANAGEMENT

The petrol supply system is managed by a control unit that also controls both ignition and injection.

The LPG supply system is managed by another control unit that controls LPG injection and the logic for the LPG/petrol fuel system switching which takes place through the special switching button in the central tunnel.

As regards the petrol fuel system,

See descriptions 1057 GPL INJECTION SYSTEM

The LPG system complements the basic system and does not affect its operation in any operating condition. The specific control unit manages the timed, sequential LPG injection and the activation of the LPG cut out solenoid valves as well as the LPG pump; in addition it controls the deactivation of the petrol pump. Injection takes place directly through the operation of the specific LPG system injectors.

The ignition advance is achieved by sending the basic electronic unit the advance variation to be added to the one for petrol operation.

For more details,

FUNCTIONAL DESCRIPTION OF LPG FUEL SYSTEM ELECTRONIC MANAGEMENT

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.

The main injection relay T09 of B1 controls the entire system: it is energised by a control signal (earth) from pin 72 of connector A of control unit M10 and then forwards power supply:

- to pins 5 and 3 of connector A of the control unit, via the line protected by fuse F17 of B1;
- to fuel vapour recovery solenoids L10, Waste Gate L37 and turbocharger by-pass L102, as well as 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.

The fuel pump relay T17 of B1 is energised by a control signal from pin 68 of connector A of control unit M10 and provides a power supply, through the line for fuse F21 of B1, for the 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 a power supply to sensor K43, which returns a signal proportional to intake air pressure to pin 25.

Turbocharging sensor K82 receives a reference earth from pin 44 of connector B and a power supply from pin 9 of connector B of M10 and returns a signal proportional to turbocharging pressure to pin 21.

Engine temperature sender unit K36 receives a reference earth from pin 29 of connector B of control unit M10 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 pre-converter K15 and the one on catalyzer K17 provide control unit M10 with information concerning the correct composition of the air-fuel mixture.

Sensor K15 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 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.

Sensor K17 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 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 27 and 29 of connector A of M10 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 M10 and sends a corresponding signal to pin 79 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 a signal from brake light switch I30 - N.O. contact - with an ignition-operated power supply from fuse F37 of Body Computer M1. Via the CAN, it receives a signal - N.C. contact - from brake light switch I30, with an ignition-operated supply from fuse F51 of Body Computer M1.

Pin 61 of connector A of M10 receives the signal from the clutch switch I31.

Pin 84 of connector A of M10 receives the signal from reversing switch I20.

The control unit M10 does not control the injector N70 opening directly but this control is delegated to the LPG control unit, M18, to which it sends signals from pin 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 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 N75.

The turbo pressure solenoid regulates the turbocharger Waste Gate mechanical valve; solenoid L37 is supplied by main relay T9 of B1 and is controlled by the control unit via a signal from pin 19 of connector A of M10.

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 main relay T9 of B1 and is controlled by the control unit via a signal from pin 5 of connector B of M10.

Control unit M010 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

- autodiagnosis 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 E50 that controls the warning light;

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

The LPG injection control unit M18 processes the information coming from the basic system sensors, and the information coming from the additional sensors for LPG operation in order to recognise the system operating conditions and produce suitable commands for the LPG injectors.

The control unit M18 is directly supplied by the battery - pins 15 and 43 - through the line protected by the loose fuse B34.

The control unit M18 receives an ignition-operated supply (15/54) - pin 5 - from the line protected by fuse F16 of B1.

Pins 22, 25 and 53 of control unit M18 are earthed.

The switching button H94 receives a 5 V supply from pin 49 of control unit M18, while pin 50 delivers the reference earth; pin 48 receives the switching signal while pin 47 manages the connection serial line where information about the LPG level displayed on the switch is also exchanged.

Pin 23 deactivates petrol operation: it sends a signal to the coil of relay switch J26 which, when energised, interrupts the supply to fuel pump N40.

Pin 24 activates LPG operation: it supplies the LPG cut out solenoid valve L63 and the LPG supply solenoid valve L95, which receive a reference earth from pin 52 of M18.

The LPG pressure/temperature sensor K215 receives a 5 V supply from pin 9 of control unit M18, while pin 37 delivers the reference earth; pin 8 of M18 receives the pressure signal and pin 6 the LPG temperature signal.

The LPG level sensor K33 is connected to pin 18 and 21 of control unit M18 (reference earth).

Control unit M18 receives some signals from the petrol system sensors:

- pin 33 receives the engine temperature signal;
- pin 42 receives the engine rpm signal;
- pin 36 receives the turbocharger air pressure signal;
- pin 20 is connected to the vehicle diagnosis connector R10 - pin 7 - through the special K diagnosis line.

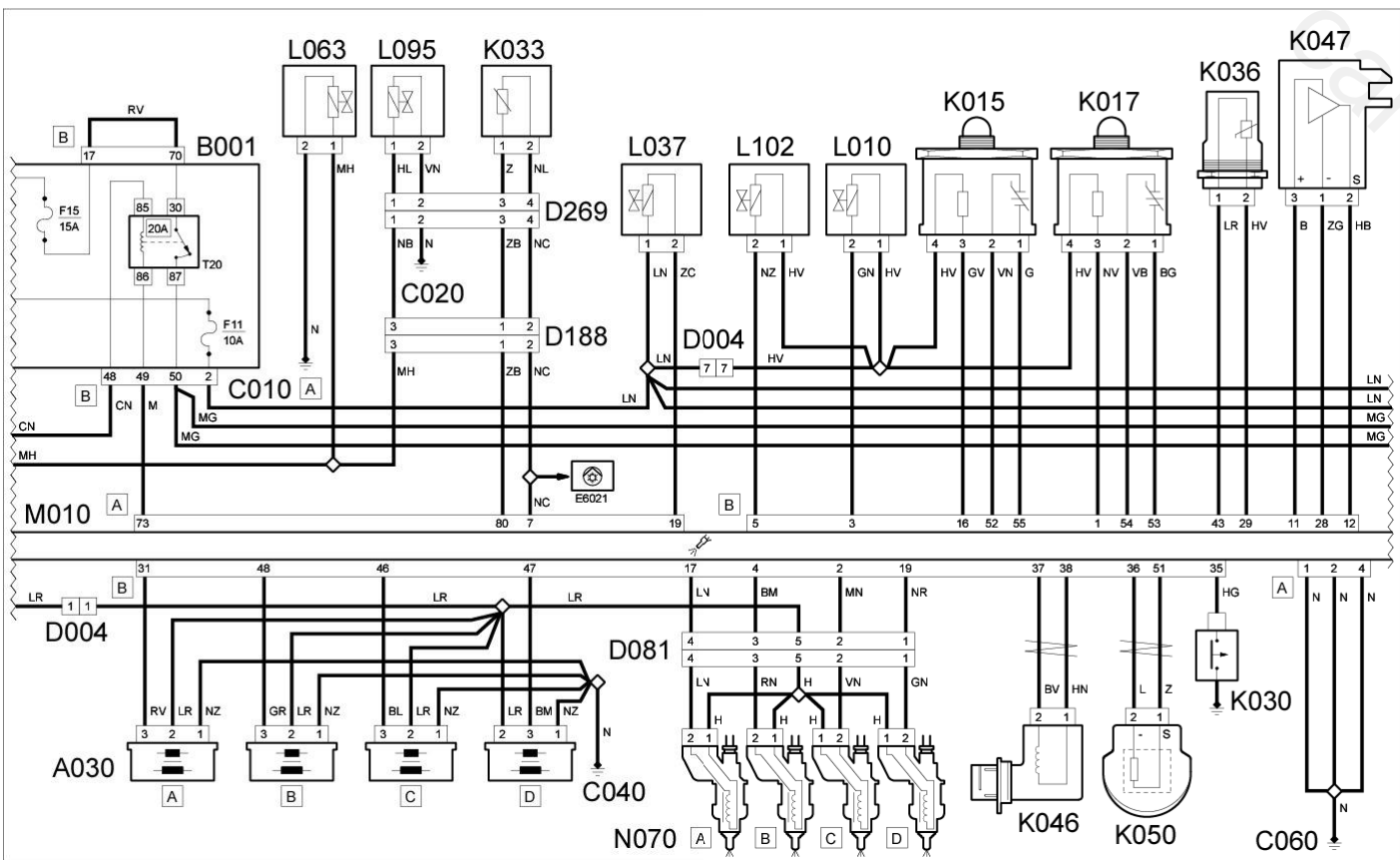
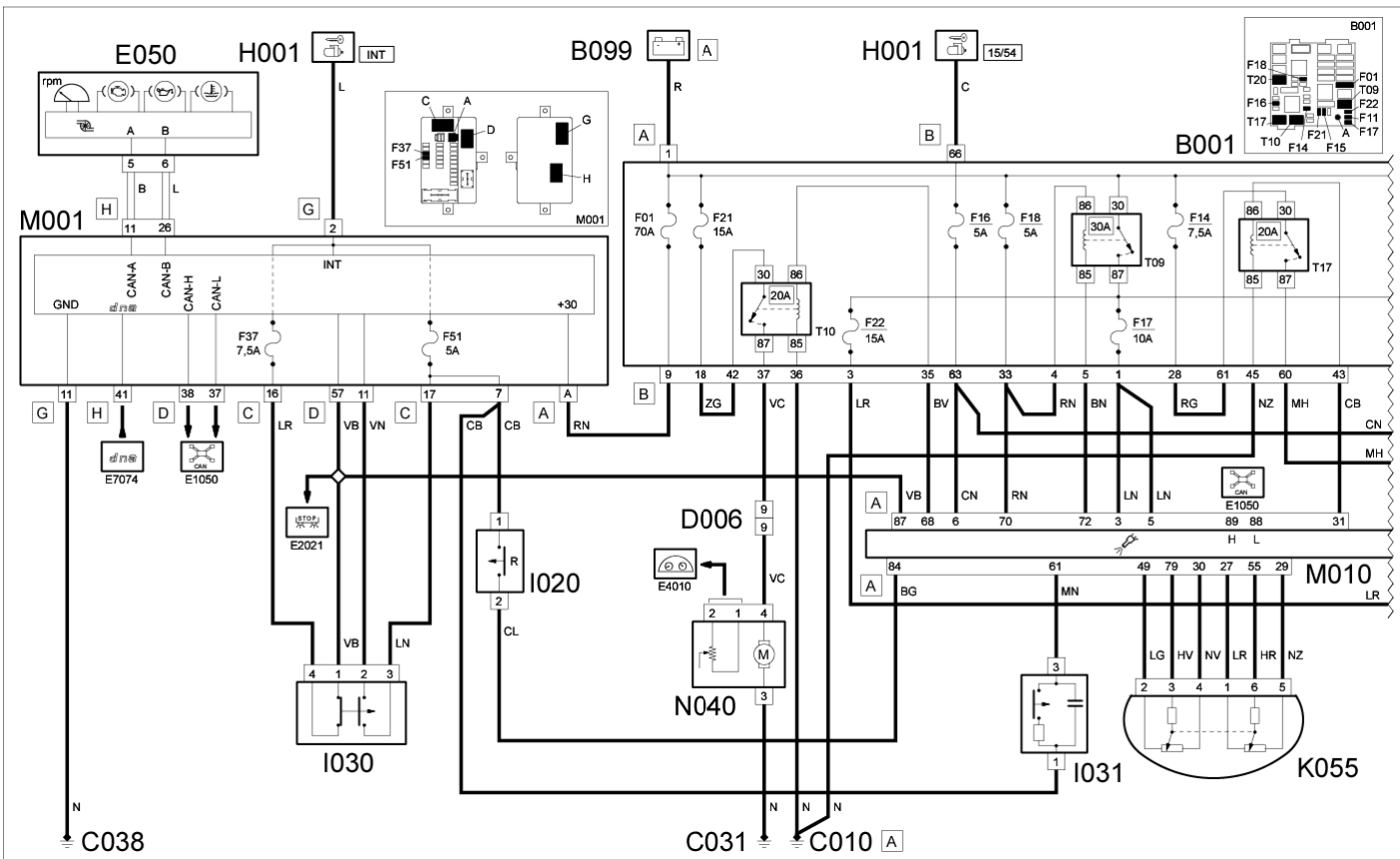
A special diagnosis connector R22 allows the self-diagnosis data from control unit M18 to be read, connected by pins 10, 11, 38 and 39.

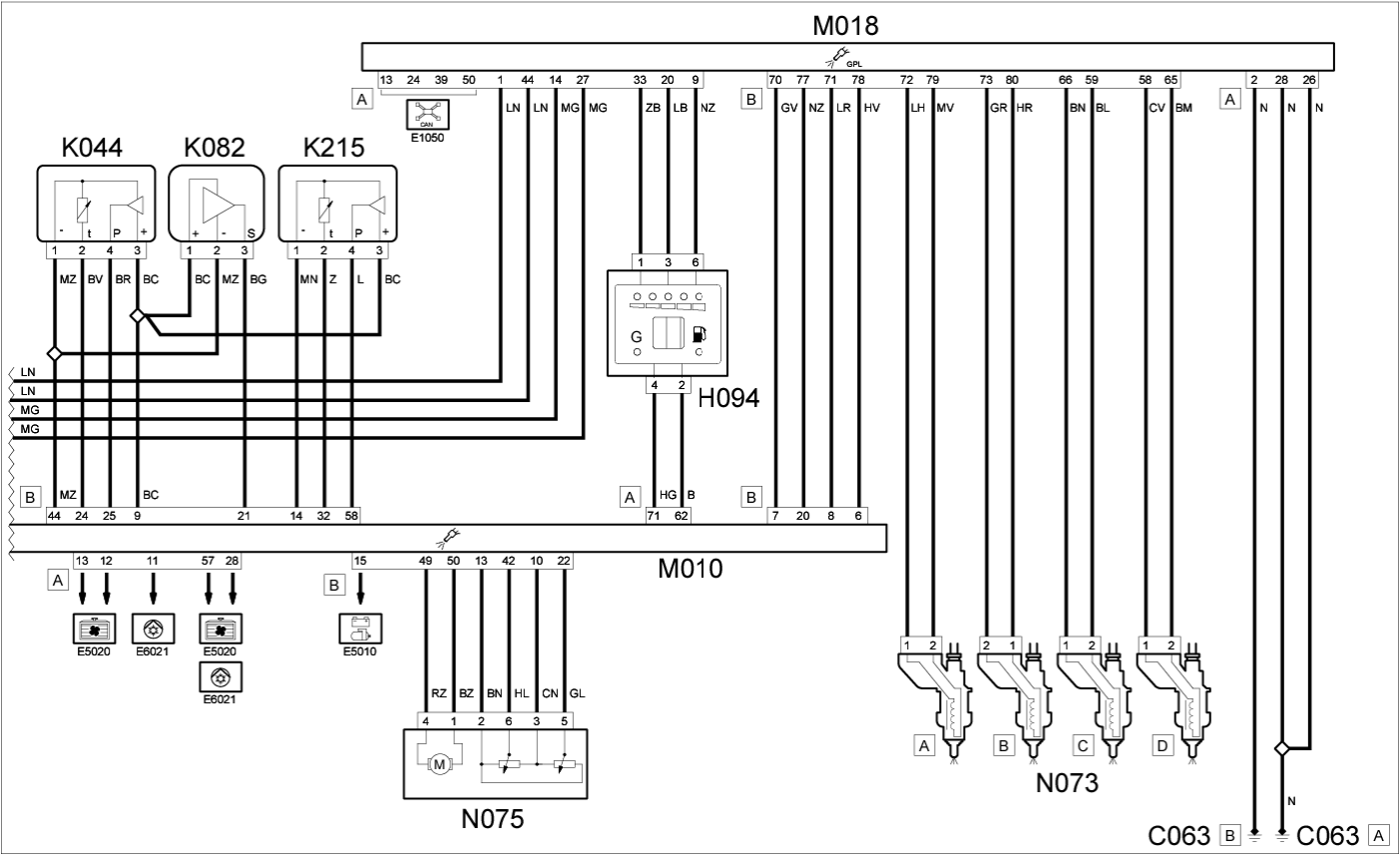
Control unit M18 controls - only in the event of petrol operation - the opening of the injectors N70 through special signals sent from pins 29, 30, 31 and 32.

The injector opening request comes from the engine management control unit M10, to pins 1, 2, 3 and 4 of M18.

Control unit M18 controls - in the event of LPG operation only - the opening of the injectors N73 through special signals sent from pins 26, 27, 28 and 54, 55, 56 of M18.

LPG FUEL SYSTEM ELECTRONIC MANAGEMENT WIRING DIAGRAM



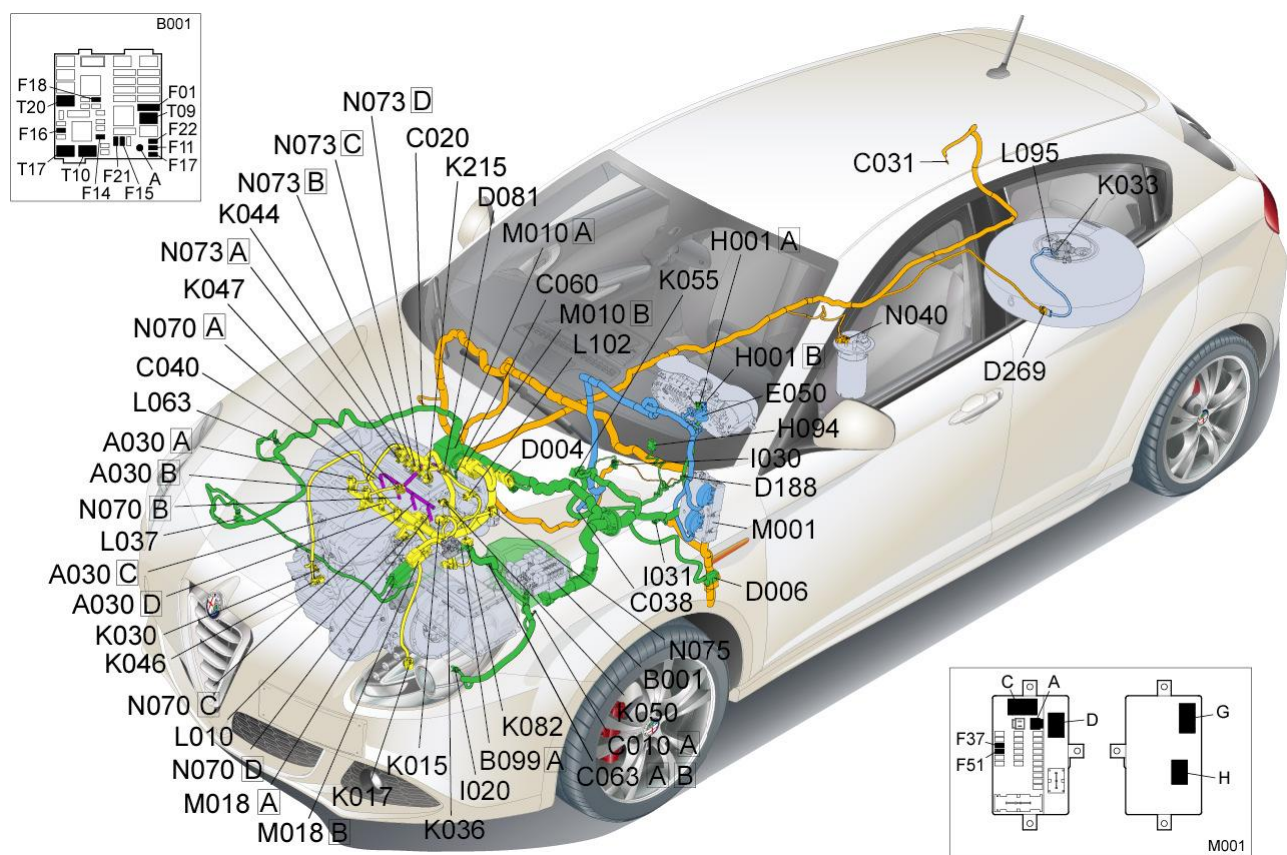


A030	IGNITION COIL	Op. 5510C14 IGNITION COIL/S - R.R.
A030	IGNITION COIL	Op. 5590B11 IGNITION COIL CONNECTOR - R.R.
B001	JUNCTION UNIT	Op. 5505A28 CONTAINER FOR ADDITIONAL JUNCTION UNIT IN ENGINE COMPARTMENT - R.R.
B099	MAXI FUSE BOX ON BATTERY	Op. 5530B40 SUPPLY BOX ON BATTERY (LINK BATTERY AND FUSE 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	
C063	LPG INJECTION UNIT MASS	
D004	FRONT/ENGINE COUPLING	
D006	FRONT/REAR COUPLING	
D081	INJECTOR JUNCTION	
D188	ENGINE/LPG JUNCTION	
D269	REAR JUNCTION / LPG MULTIVALVE BRIDGE	
E050	INSTRUMENT PANEL	Op. 5560B10 CONTROL PANEL - R+R
H001	IGNITION SWITCH	Op. 5520A18 IGNITION SWITCH CONTACT CARRIER LOCK BARREL - R.R.
H094	PETROL / GPL SWITCH	Op. 1057B20 LPG/G SWITCH
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.
K033	GPL LEVEL SENSOR	Op. 1043A10 LPG TANK - 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. 5590B12 SUPERCHARGING SENSOR CONNECTOR - R.R.
K215	LPG PRESSURE AND TEMPERATURE SENSOR	Op. 1057B70 PRESSURE AND TEMPERATURE SENSOR ON LPG INJECTOR ASSEMBLY - 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.
L063	GPL CUT OUT SOLENOID VALVE	Op. 1043B46 PRESSURE REGULATOR STOP SOLENOID COIL R R
L095	LPG DELIVERY SOLENOID VALVE	Op. 1043A16 LPG INTAKE 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
M018	LGP UNIT	Op. 1057B80 GPL INJECTION SYSTEM CONTROL UNIT 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

N073 LGP ELECTRIC INJECTOR
N075 INTEGRATED THROTTLE BODY ACTUATOR
N075 INTEGRATED THROTTLE BODY ACTUATOR

Op. 1057B66 GPL INJECTOR UNIT WITH CONNECTION PIPES TO PRESSURE REGULATOR R R
Op. 1056B14 THROTTLE BODY - R + R
Op. 5590B10 INTEGRATED THROTTLE BODY ACTUATOR CONNECTOR - R.R.

LPG FUEL SYSTEM ELECTRONIC MANAGEMENT - COMPONENT LOCATION



- A030 IGNITION COIL
A030 IGNITION COIL
B001 JUNCTION UNIT
B099 MAXI FUSE BOX ON BATTERY
C010 LEFT FRONT EARTH
C031 RIGHT REAR EARTH
C038 EARTH ON CENTRE TUNNEL
C040 EARTH ON ENGINE
C060 INJECTION CONTROL UNIT EARTH
C063 LPG INJECTION UNIT MASS
D004 FRONT/ENGINE COUPLING
D006 FRONT/REAR COUPLING
D081 INJECTOR JUNCTION
D188 ENGINE/LPG JUNCTION
D269 REAR JUNCTION / LPG MULTIVALVE BRIDGE
E050 INSTRUMENT PANEL
H001 IGNITION SWITCH
H094 PETROL / GPL SWITCH
I020 REVERSING LIGHTS SWITCH
I030 BRAKE PEDAL SWITCH
I031 CLUTCH PEDAL SWITCH
K015 LAMBDA SENSOR ON PRE-CATALYZER
K015 LAMBDA SENSOR ON PRE-CATALYZER
K017 LAMBDA SENSOR ON CATALYZER
K017 LAMBDA SENSOR ON CATALYZER
K030 ENGINE OIL PRESSURE SENSOR (SWITCH)
K030 ENGINE OIL PRESSURE SENSOR (SWITCH)
K033 GPL LEVEL SENSOR
K036 ENGINE COOLANT TEMPERATURE SENSOR/SENDER UNIT
K036 ENGINE COOLANT TEMPERATURE SENSOR/SENDER UNIT
K044 AIR TEMPERATURE/PRESSURE SENSOR
K044 AIR TEMPERATURE/PRESSURE SENSOR
K046 RPM SENSOR
K046 RPM SENSOR
K047 TIMING SENSOR
K047 TIMING SENSOR
K050 DETONATION SENSOR
K050 DETONATION SENSOR
K055 ACCELERATOR PEDAL POTENTIOMETER
K082 SUPERCHARGING SENSOR
K082 SUPERCHARGING SENSOR
K215 LPG PRESSURE AND TEMPERATURE SENSOR
L010 FUEL VAPOUR RECOVERY SOLENOID VALVE
L010 FUEL VAPOUR RECOVERY SOLENOID VALVE
L037 WASTE GATE SOLENOID VALVE
L063 GPL CUT OUT SOLENOID VALVE
L095 LPG DELIVERY SOLENOID VALVE
L102 TURBOCHARGER BY-PASS SOLENOID VALVE
L102 TURBOCHARGER BY-PASS SOLENOID VALVE
M001 BODY COMPUTER
M010 ENGINE MANAGEMENT CONTROL UNIT
Op. 5510C14 IGNITION COIL/S - R.R.
Op. 5590B11 IGNITION COIL CONNECTOR - R.R.
Op. 5505A28 CONTAINER FOR ADDITIONAL JUNCTION UNIT IN ENGINE COMPARTMENT - R.R.
Op. 5530B40 SUPPLY BOX ON BATTERY (LINK BATTERY AND FUSE BOX) - R R
Op. 5560B10 CONTROL PANEL - R+R
Op. 5520A18 IGNITION SWITCH CONTACT CARRIER LOCK BARREL - R.R.
Op. 1057B20 LPG/G SWITCH
Op. 5550D22 REVERSING LIGHT SWITCH - R+R
Op. 5550D10 BRAKE LIGHT SWITCH - R+R
Op. 1056B78 SWITCH ON CLUTCH PEDAL - R.R (PETROL ENGINES)
Op. 1080B94 FRONT LAMBDA SENSOR TO WITH CATALYTIC CONVERTER - R.R
Op. 5590B14 FRONT OXYGEN SENSOR CONNECTOR - R.R.
Op. 1080B95 REAR LAMBDA SENSOR TO CATALYTIC CONVERTER - R.R
Op. 5590B15 REAR OXYGEN SENSOR CONNECTOR - R.R.
Op. 1084A42 ENGINE OIL PRESSURE WARNING LIGHT SWITCH - R.R.
Op. 5590B01 OIL PRESSURE SENSOR CONNECTOR - R.R.
Op. 1043A10
Op. 1056B50 ENGINE COOLANT TEMPERATURE SENSOR - R + R
Op. 5590B02 ENGINE COOLANT TEMPERATURE SENSOR/SENDER UNIT CONNECTOR - R.R.
Op. 1056B54 INTAKE AIR PRESSURE/TEMPERATURE SENSOR - R.R.
Op. 5590B03 AIR TEMPERATURE/PRESSURE SENSOR CONNECTOR - R.R.
Op. 5510C26 ENGINE RPM SENSOR - R+R
Op. 5590B04 RPM SENSOR CONNECTOR - R.R.
Op. 1056B51 CAM ANGLE SENSOR - R.R.
Op. 5590B05 PHASE SENSOR CONNECTOR - R.R.
Op. 5510C42 DETONATION SENSOR (ONE) - R.R.
Op. 5590B18 KNOCK SENSOR CONNECTOR - R.R.
Op. 1068A20 ACCELERATOR PEDAL WITH BUILT-IN POTENTIOMETER - R.R
Op. 1056B44 AIR PRESSURE SENSOR - R + R
Op. 5590B12
Op. 1057B70 PRESSURE AND TEMPERATURE SENSOR ON LPG INJECTOR ASSEMBLY - R.R.
Op. 1080E28 PIPE FROM ACTIVE CHARCOAL FILTER TO SOLENOID - R.R.
Op. 5590B23 FUEL VAPOUR RECOVERY SOLENOID VALVE CONNECTOR - R.R.
Op. 1064B38 WASTE GATE SUPERCHARGING PRESSURE ADJUSTMENT SOLENOID VALVE - R.R.
Op. 1043B46
Op. 1043A16
Op. 1048B58 TURBOCHARGER AIR BY-PASS VALVE - R.R.
Op. 5590B26 TURBOCHARGER BY-PASS SOLENOID VALVE CONNECTOR - R.R.
Op. 5505A35 MAIN BODY COMPUTER/JUNCTION UNIT - R.R.
Op. 1056B82 INJECTION/IGNITION SYSTEM E.C.U. (ONE) - R + R

M018	LGP UNIT	Op. 1057B80 GPL INJECTION SYSTEM CONTROL UNIT 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
N073	LGP ELECTRIC INJECTOR	Op. 1057B66 GPL INJECTOR UNIT WITH CONNECTION PIPES TO PRESSURE REGULATOR 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.