eLEARN

ESP/ESC

191 - Giulietta

ESP - DESCRIPTION

The ABS electronic anti-lock braking system regulates the braking pressure transmitted to the wheels, preventing them from losing grip whatever the tyre and road conditions.

The system is designed to be incorporated with the braking system (using the same hydraulic fluid) without preventing the operation of the braking system itself if the ABS fails.

Four sensors, located on each of the four wheels, indicate the speed of each wheel to the electronic control unit, recording any situations involving locking, slipping or loss of grip.

In these situations, the control unit controls the solenoid valves which modulate the pressure in the hydraulic circuit, preventing the wheels from locking and restoring grip conditions for the vehicle. This ensures optimum handling of the vehicle and excellent stopping distances.

The sensors are active, supplied by the control unit; they consist of a magnetic resistive receiver with a magnetic codifier incorporated in the hub bearing so that the signal is less affected by electromagnetic interference and variations in temperature.

The ABS control unit also controls the distribution of the braking load between the front and rear axles, meaning that the mechanical load proportioning valve used previously can be dispensed with (EBD function: Electronic Brake Distribution).

The control unit is equipped with a self-diagnosis function: when an error in the ABS function is detected, the warning light switches on and the system is deactivated at the same time. In these conditions the vehicle brakes using the traditional system only.

When the control unit detects an error which also affects the EBD function, it turns on the ABS failure warning light and the low brake fluid and handbrake applied warning light.

In these conditions the rear braking distribution control is deactivated: the driver must therefore proceed very carefully to the first authorised service centre.

The ABS control unit calculates the speed of the vehicle starting from the figures that are supplied by the drive wheel sensors (with the ABS control unit calculating the average value) and from the circumference of the wheels themselves, supplied by the Body Computer: this speedometer signal is then sent, via the CAN, to the nodes that require this information.

The ABS comes with the ESP (Electronic Stability Program) or VDC (Vehicle Dynamic Control) system, which controls the stability of the vehicle, intervening on the drive torque and braking the wheels in a differentiated manner: in the event of a loss of grip, it contributes to returning the vehicle to the correct path.

In the more complete version, the ABS control unit also implements the ESP (Electronic Stability Program) and ASR (Anti-Slip Regulation) functions plus the Hill Holder, Brake Assist, MSR, CBC, "ELECTRONIC", DST and RAB functions.

The ESP system acts on the engine and brakes generating a stabilising torque when the ABS sensors detect conditions that could cause the vehicle to slip. The ESP system has a specific sensor in addition to the ABS sensors, a "yaw sensor" located in the control unit, that detects vehicle rotation on the vertical axis and lateral acceleration (centrifugal force). It also uses steering sensor signals from the steering control unit supplied through the CAN.

A longitudinal acceleration sensor is also provided with the Hill Holder function, incorporated into the same control unit.

In addition, the ESP system uses the information of the pressure sensor, which measures the pressure in the hydraulic circuit: this sensor is built into the hydraulic control unit.

The Hill Holder system is designed to assist the driver when setting off on an incline. In effect, the HH is capable of automatically providing sufficient braking torque to keep the vehicle stationary until the clutch is fully released and the engine torque is sufficient to start the vehicle comfortably.

The HH is automatically activated when the brake pedal is pressed in conjunction with the following conditions: vehicle speed equal to zero, gradient more than 2% and clutch pedal pressed; the moment the brake pedal is released, with all other conditions being equal, the Hill Holder keeps the braking system pressurised for 2 seconds to allow the driver to move their foot from the brake pedal to the accelerator pedal without the vehicle slipping backwards and without using the parking brake.

Once the accelerator is pressed, the Hill Holder continues to keep the vehicle still for a further 10 seconds or until the engine torque is sufficient to start the vehicle.The HH is not activated with reverse gear engaged.

This version sees the introduction of additional innovative features:

- MSR: it is an integral part of the ASR, that intervenes if there is a sudden change to a lower gear, restoring torque to the engine, thereby preventing excessive drive at the drive wheels which, especially in poor grip conditions, could lead to a loss in stability of the vehicle.

- DST (drive steering control): on surfaces with poor grip corrections are made automatically and oversteer is controlled thanks to dialogue with the steering control unit;

- CBC: this function improves the distribution of the braking pressure at the four wheels (to fully exploit the grip available on the ground) when braking round bends when the ABS intervenes. This improves stopping distances on bends and, above all, car stability;

- E-Q2 system: the Electronic Q2 system takes advantage of the braking system producing behaviour very similar to a limited slip differential. The front braking system, when accelerating around a corner, acts on the inside wheel to increase the drive of the outside wheel (increased load), dynamically and continuously distributing the torque between the front drive wheels according to driving and road conditions:

- RAB (available in "Dynamic" mode only): a function that allows a pre-positioning of the brake pads (front and rear) following a rapid release of the accelerator pedal to reduce braking times, reducing stopping distances.

For more details

See descriptions 3350 TRACTION CONTROL

The control unit supply lines are protected by two dedicated fuses in the engine compartment control unit.

ESP - FUNCTIONAL DESCRIPTION

The ABS electronic control unit M050 receives a power supply (at pins 1 and 32) directly from the battery through the line protected by fuses F4 and F23 of the engine compartment control unit B001.

The "ignition-operated" power supply (INT) reaches pin 8 through the line protected by fuse F42 of the Body Computer M001.

The control unit is earthed at pins 16 and 47.

The four sensors K070, K071, K075 and K076 send wheel speed signals to pins 46-45, 33-34, 37-36 and 42-43 of M050 respectively.

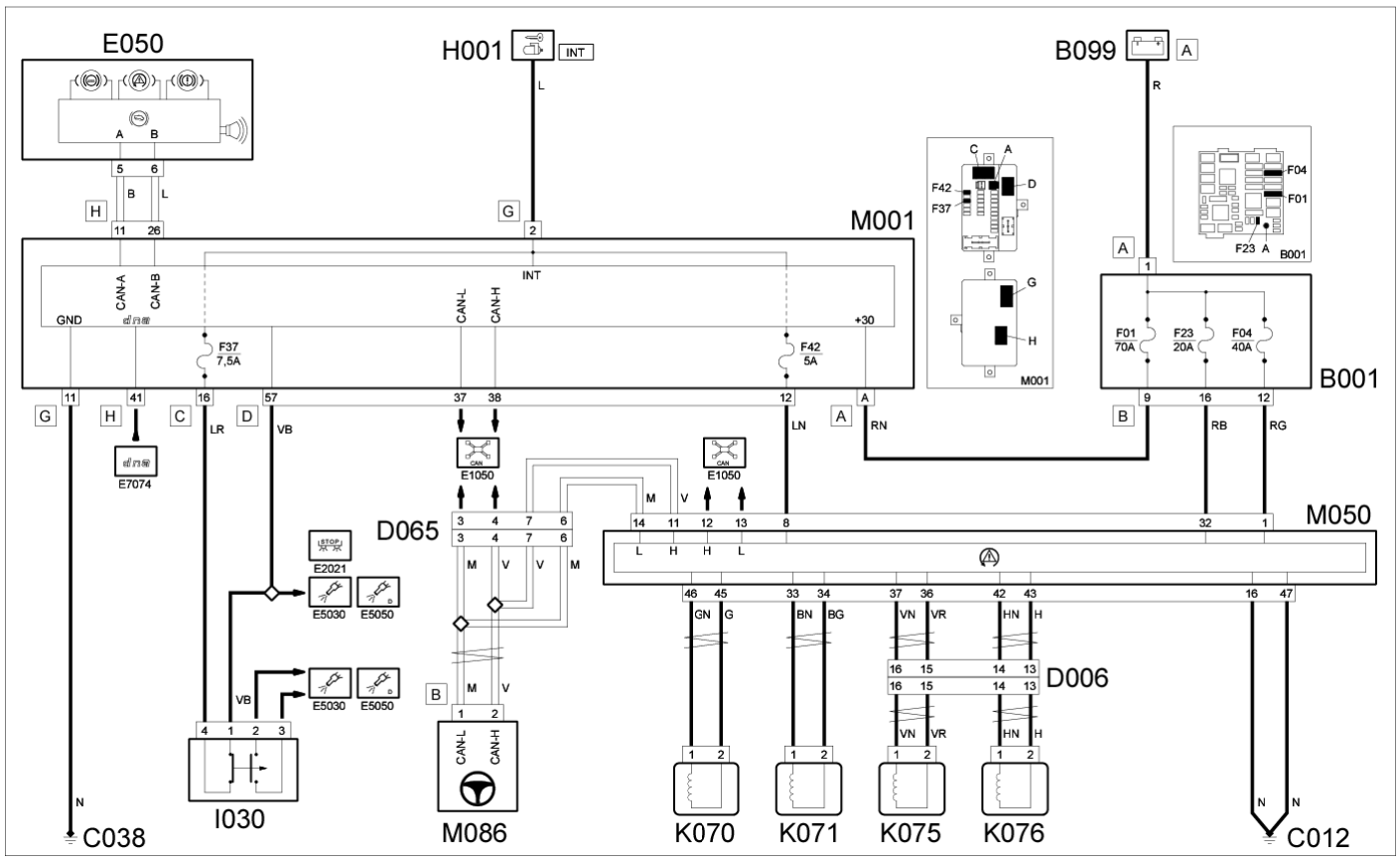
The switch for the brake pedal I030 sends an enablement signal to control unit M050 via the CAN through the Body Computer M001: all intervention of the ABS is excluded unless the brake pedal is pressed (signal from N.A. contact); switch I030 receives an ignition-operated power supply (INT) from fuse F37 of the Body Computer M001.

The ABS control unit M050 is connected, through the CAN line, from pins 12 and 13, to the engine management control unit M010 and, from pins 14 and 11, to the Body Computer M001 and to the instrument panel E050 to manage the "ABS failure" warning light and, if there are problems with the EBD function, the "insufficient brake fluid and handbrake engaged" warning light as well as the ESP/ASR warning light.

The speedometer signal for all the systems that require this information is sent via the CAN.

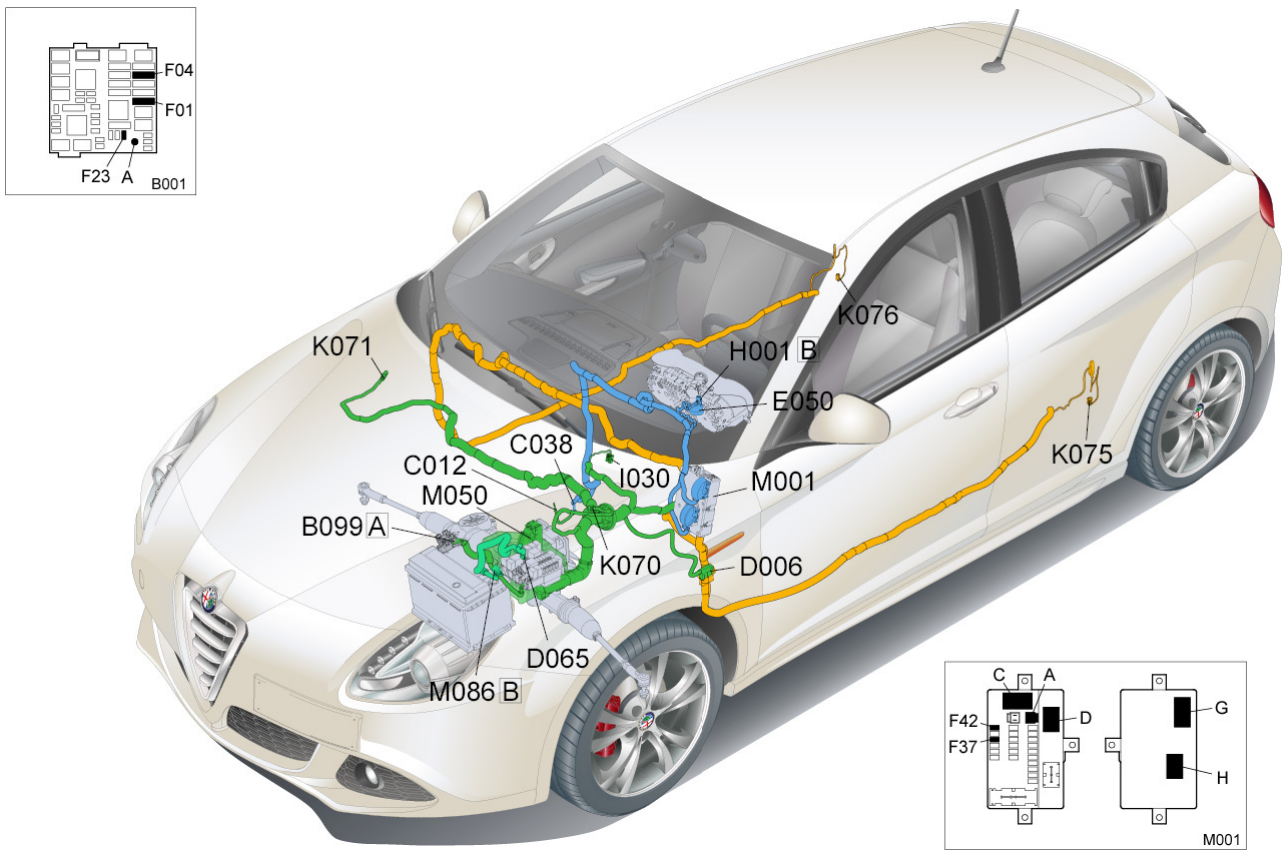

The yaw, lateral and longitudinal acceleration sensor is inside the ABS control unit M050.

ESP - WIRING DIAGRAM



Component Code	Name	Reference to the operation
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
C012	ABS FRONT EARTH	-
C038	EARTH ON CENTRE TUNNEL	-
D006	FRONT/REAR COUPLING	-
D065	ELECTRIC STEERING COUPLING	-
E050	INSTRUMENT PANEL	Op. 5560B10 CONTROL PANEL - R+R
H001	IGNITION SWITCH	Op. 5520A18 IGNITION SWITCH CONTACT CARRIER LOCK BARREL - R.R.
		Op. 5550D10 BRAKE LIGHT SWITCH - R+R
I030	BRAKE PEDAL SWITCH	
		Op. 1060G38 BRAKE PEDAL SWITCH - R.R
K070	LEFT FRONT WHEEL SENSOR FOR ABS	Op. 3340A30 RPM SENSOR (ONE) FOR ONE FRONT WHEEL, LEFT OR RIGHT - R.R.
K071	RIGHT FRONT WHEEL SENSOR FOR ABS	Op. 3340A30 RPM SENSOR (ONE) FOR ONE FRONT WHEEL, LEFT OR RIGHT - R.R.
K075	LEFT REAR WHEEL SENSOR FOR ABS	Op. 3340A34 LEFT OR RIGHT REAR WHEEL RPM SENSOR (ONE) - R.R.
K076	RIGHT REAR WHEEL SENSOR FOR ABS	Op. 3340A34 LEFT OR RIGHT REAR WHEEL RPM SENSOR (ONE) - R.R.
M001	BODY COMPUTER	Op. 5505A35 MAIN BODY COMPUTER/JUNCTION UNIT - R.R.
M050	ABS CONTROL UNIT	Op. 3340A20 ABS ELECTRONIC CONTROL UNIT - R+R
M086	ELECTRIC STEERING CONTROL UNIT	Op. 4110D50 WIRING HARNESS OF STEERING ELECTRIC CONTROL SYSTEM - R.R.

ESP - COMPONENT LOCATION



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