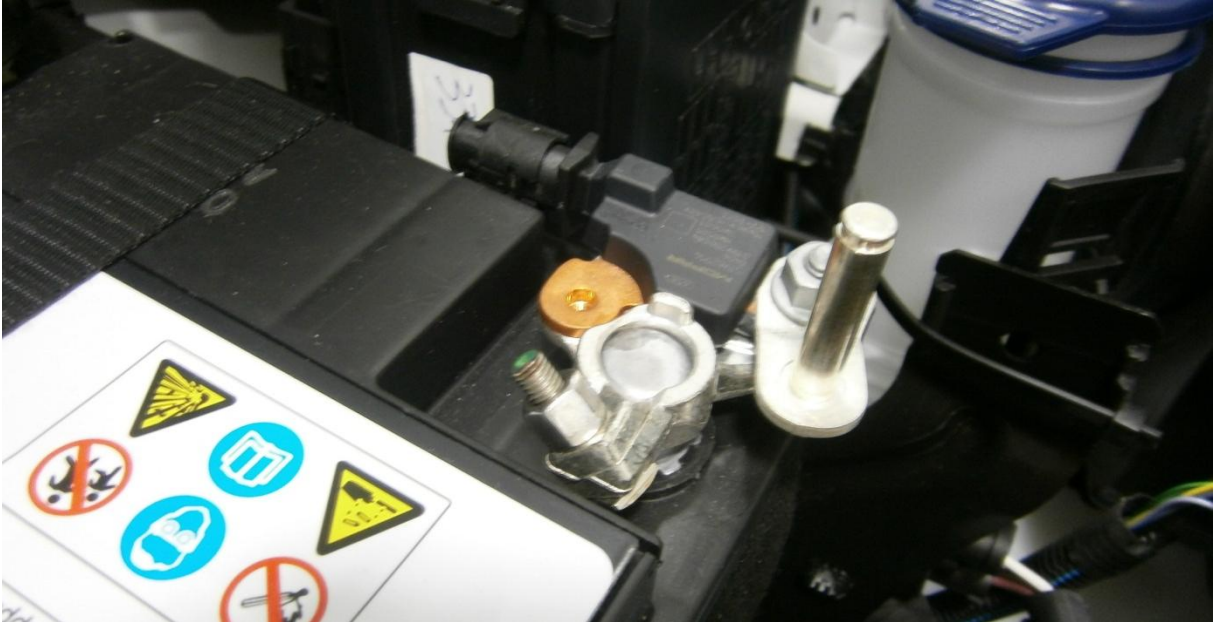


IBS (Intelligent Battery Sensor or Battery Monitor) and dummy negative pole

The IBS (Intelligent battery sensor) (A) is an electronic unit which informs the BCM of the battery operating conditions. This prevents an engine shutdown in the case the charge conditions or health of the battery are inadequate.



The information produced by the IBS and sent to the BCM through the LIN network is used for the management of the Stop/Start function to take the battery starting capacity into consideration. In particular, this information is used, in conjunction with other information coming from other vehicle devices/control units, to activate or deactivate the Stop/Start function.

The general concept is that, whilst the engine is on it should not be stopped automatically if the capacity of the battery is not sufficient to start it and, during an automatic stopping stage, the engine should be restarted if the battery start-up capacity becomes too low.

The Stop/Start function is also deactivated if a possible IBS fault does not allow the effective battery status to be determined: an internal error signal is generated in the BCM to this end.

The Stop/Start is primarily managed by the ECM which decides whether to activate/deactivate the Stop/Start taking a great deal of information into consideration, including data coming from the IBS (through the BCM).

NOTE.

The BCM and ECM can also deactivate the Stop/Start function as a result of vehicle conditions not connected to the IBS.

For more details on other conditions that can deactivate an automatic stop or cause automatic restarting of the engine, refer to the specific paragraph in this document.

IBS – Operation

The IBS performs the following measurements:

- Battery voltage (V)
- Battery current (A)
- Battery temperature (°C)



The control unit processes these values and calculates the following parameters expressing the battery status:

SOC: (State Of Charge) percentage of the battery residual charge as compared to its rated capacity. In other words it indicates the charge of the battery.

SOH: (State Of Health) "age" of the battery or, better, percentage of the battery real capacity as compared to the rated capacity.

This condition has to be considered because the battery undergoes an irreversible ageing process with time, reducing its ability to be fully recharged and therefore the possibility to supply all the energy it could store when new.

SOF: (State Of Function) minimum voltage peak that can be reached during the start-up stage, in volt.

These parameters identify the *starting capacity* of the battery.

In the case of insufficient **SOC** or **SOH**, the battery could not be able to restart the engine any more.

In the case of insufficient **SOF**, the battery voltage during starting may reach such low values that the standard operating conditions of the various electronic units of the car are no longer guaranteed.

Calibration of the IBS

When the IBS is connected to the power supply for the first time or is reconnected after a service operation, it enters the *recalibration*

During recalibration, the battery efficiency status (SOC,SOH and SOF) is calculated in a less accurate way and with broader tolerances for a certain period of time during which the IBS must recognise the type of battery it is connected to, its voltage and its efficiency status.

During this period, the S&S system may not stop/restart the engine to prevent the risk of an insufficient energy level remaining in the battery.

Whenever the IBS is removed from/refitted to the power supply or the battery is replaced, when the connections are restored a calibration processes is started to store the battery efficiency status again.

The following table illustrates the calibration process logic.

	Restoring supply	First start-up	First period of inactivity > 4 hours and engine start-up	5 time for 8 hours of inactivity, followed by car starting
SOC	Out of range	Out of range	Tolerance O.K.	Tolerance O.K.
SOF	Out of range	Tolerance O.K.	Tolerance O.K.	Tolerance O.K.
SOH	Out of range	Out of range	Out of range	Tolerance O.K.
	Calibration		Standard operation	