BMW Diagnostics, Orange County

dealer level diagnostics and programming – (949) 306-5184
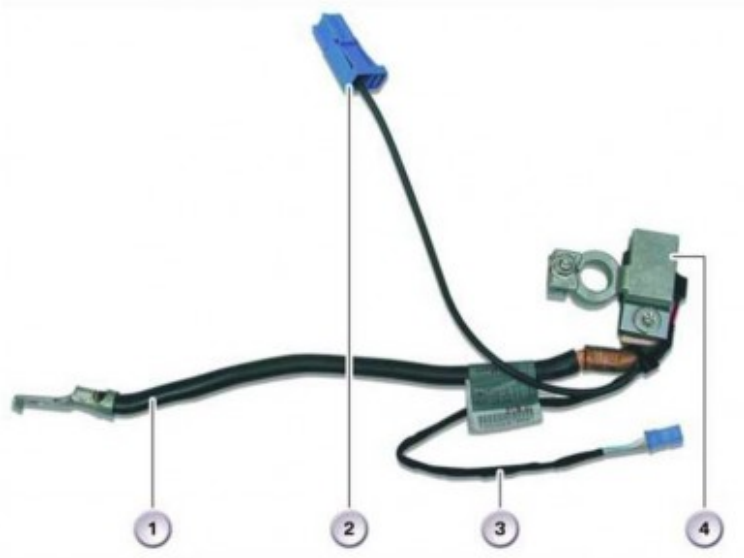
BMW Intelligent Battery Sensor (IBS)

The BMW Intelligent Battery Sensor (IBS) is a mechanical/electronic device which is connected directly to the negative battery terminal.
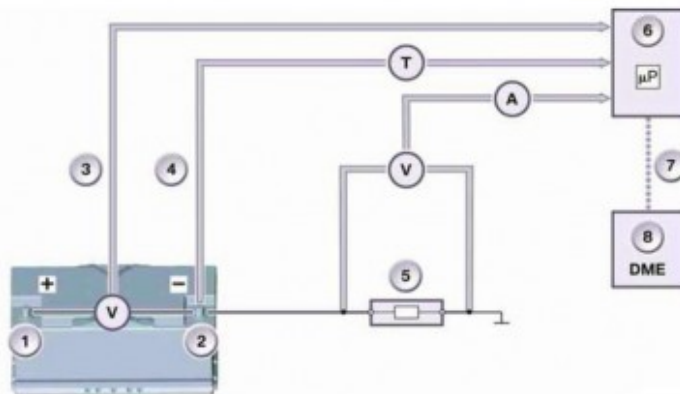
Index	Explanation
1	Battery Ground Lead
2	B+ Connection for IBS
3	Bit Serial Data Interface (BSD)
4	Intelligent Battery Sensor (IBS)

Intelligent Battery Sensor (IBS)

The IBS contains a micro-processor that is used to monitor/measure various battery conditions such as:

- Terminal voltage via measurement from B+ to Gnd
- Charge/discharge current via integrated shunt resistor
- Temperature of battery acid via integrated temp sensor

Index	Explanation
1	B+
2	B-
3	Battery Voltage Measurement
4	Battery Temp Measurement
5	Current Measurement
6	Microprocessor
7	BSD
8	DME/ECM

The IBS is able to withstand thermal loads up to 105°C, the chemical effects of the battery acid.

IBS MEASURING/EVALUATION FUNCTION

The measuring/evaluation function of the IBS electronics, continuously measures the following values under all vehicle operating conditions:

- Voltage (6V to 16.5V)
- Current (200A to +200A)
- Closed Circuit Current (0A to 10A)
- Starting Current (0A to 1000A)
- Temperature (-40C to 105C)

When the vehicle is stationary, the IBS is programmed to wake up every 14 sec. and makes the required measurements within approx. 50 ms in order to save power. The measured values from the IBS are provided to the DME by way of the Binary Serial Data Interface (BSD) to calculate the State of Charge and State of Health for the battery.

- State of Charge (SoC) is a calculated condition showing the current charge of the battery. SoC is used during key "OFF" periods to insure the battery maintains a sufficient charge to start the engine at least one more time.
- State of Health (SoH) tracks the history of the battery. Charge/dis-charge cycles and times are monitored. SoH helps the DME determine the proper charging rates and anticipated battery life. Internal resistance of the battery is calculated by the IBS from the current and voltage dip during engine start. The values are forwarded to the DME to calculate the SoH of the battery.

Software contained in the microprocessor of the IBS utilizes the measured values to calculate the State of Charge (SoC) of the battery during vehicle sleep mode and compares this information with that received from the DME/ECM pertaining to the battery SoC/SoH, during the period of time between engine "OFF" and deactivation of the DME main relay.

The current SoC/battery data is stored in the IBS every 2 hours over a 6 hour time frame, providing 3-2 hour snapshots of battery SoC information. The stored information/snap-shot data is overwritten every 6 hours. Whenever KL15 is activated the IBS updates the DME with the current closed circuit histogram/battery status information, by way of the BSD. Upon obtaining updated information the DME evaluates the new data and if a closed-circuit current draw is identified a fault will be stored in the fault memory of the DME.

SERVICING THE IBS

The IBS is very sensitive to mechanical stress and strain. It is serviced as a complete unit with the ground cable. The ground cable also serves as a heat dissipater for the IBS.

Particular attention should be paid to the following points in service:

- Do not make any addition connections at the negative terminal of the battery
- Do not modify the ground cable
- Do not make any connections between the IBS and the sensor screw
- Do not use force when disconnecting the ground terminal from the battery
- Do not pull at the ground cable
- Do not use the IBS as a pivot point to lever off the ground terminal
- Do not use the connections of the IBS as a lever

- Use only a torque wrench as described in the repair manual
- Do not release or tighten the sensor screw

IBS DIAGNOSIS

A fault code is stored in the DME when the IBS is defective. The DME adopts a substitute value and assumes IBS emergency mode. IBS emergency mode boosts the idle speed in order to sufficiently charge the battery. Direct diagnosis of the IBS is not possible, it can only be diagnosed through the DME. The self-diagnosis function checks the voltage, current, temperature, terminal 15 wake up signal as well as system errors in the IBS.

Fault memory list   15/10/2014 1/1

VIN: Vehicle: 3'/E90/SEDAN/330I/N52/MANUAL/USA/LL/2005/03

System version: 3.44.10.11900   Data version: R3.44.10.11900

Code	Description	Mileage	Class
002A99	DME: Crankshaft - exhaust camshaft, reference	279368	
002E8D	DME: Intelligent battery sensor, signal transmission	279464	
002E97	DME: Alternator	279464	
00FFF5	MOSTSYS: Fault: OPS/OPPS stored in setpoint configuration	279465	

ISTA/D IBS fault 2E8D

NOTE:

The software in the DME and that of the IBS must match. To ensure this requirement it may be necessary to replace the IBS in connection with a software update.

ENHANCED INTELLIGENT BATTERY SENSOR FXX

The enhanced intelligent battery sensor as of F10 enables better detection of the battery condition by:

- Detection of defective battery cells.

- Calculation of the remaining battery capacity.

⚠️ **Each total discharge results in a loss of battery capacity:**
The longer the battery remains completely discharged, the greater the loss of battery capacity.
The batteries installed at BMW can withstand several short total discharges or up to two long total discharges, however, when they are fully recharged with a constant charging voltage of 14.8 V after the total discharge.

⚠️ **For all models before F10, we should use the Midtronics tester, NOT a VAT40 or equivalent. For F10 and later vehicles, a battery test is built into the vehicle (through the IBS), and is accessed using ISTA.**

Note: A battery may only be replaced on F10 when identified as faulty using ISTA (the test plan returns a Diagnostic Code for the replacement)

Note: For further information regarding the IBS (intelligent battery sensor) refer to the Energy Management with Micro-power Module in the Power Management section of this training material.

INTELLIGENT BATTERY SENSOR DIAGNOSIS HINTS

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General Electrical Systems

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Technical Service

SUBJECT
Intelligent Battery Sensor Diagnosis Hints

MODEL
E60 (5 Series)

E61 (5 Series)

E63 (6 Series)

E64 (6 Series)

E70 (X5)

E71 (X6)

E82 (1 Series)

E88 (1 Series)

E84 (X1)

E89 (Z4)

E90 (3 Series Sedan)

E91 (3 Series Sports Wagon)

E92 (3 Series Coupe)

E93 (3 Series Convertible)

SITUATION
The vehicle enters the workshop with one or more of the following complaints:

- Check Control Message related to battery discharge

- No-start condition

- Consumer power reduction (reduced blower speed, heated seats operation, etc.)

- The following fault codes may be stored in the DME

    a. 2E8B – Intelligent battery sensor, signal

    b. 2E8C – Intelligent battery sensor, function

    c. 2E8D – Intelligent battery sensor, signal transmission

    d. 2E8E – Intelligent battery sensor, communication

CAUSE

A faulty battery or IBS sensor **(not both)**

The power management system and IBS in the vehicle cannot determine if the battery needs to be replaced. This is normal operation for all E-Series vehicles because they do not have the Advanced IBS sensor that the F-Series vehicles do.

An external battery tester (Midtronics EXP-1000) must be used to determine if the battery needs to be replaced. Energy Diagnosis will not prompt for a battery replacement unless the battery is "aged." When energy diagnosis identifies the battery as "aged," it means the amount of energy discharge over the course of the life of the battery has reached its maximum (worn out).

In most cases, energy diagnosis states that the battery is OK. This is typically an indication of the current State of Charge (SoC), not the State of Health (SoH).

The SoC is defined as the current amount of energy left in the battery (displayed as a percentage). The SoH is defined as an evaluation of the condition of the battery over a period of time (displayed as a percentage).

For more information about batteries, refer to Training Manual ST051, "07 Battery Basics."

PROCEDURE

1. Perform diagnosis using ISTA. Complete all test plans related to power management faults that are stored, including the energy diagnosis test plan.

2. If no power management faults are stored and only IBS faults are stored, complete the test plans linked to the faults mentioned in the situation above. **Only replace the IBS sensor when prompted by the test plan.** If no IBS faults are stored in the vehicle, proceed to the next step.

3. Test the battery using a Midtronics EXP-1000 battery tester. Follow the tester recommendation.

4. As a result of diagnosis, either the battery or the IBS must be replaced. Further analysis has shown that replaced IBS sensors are not defective if they were replaced without a fault code stored.

General diagnosis hints:

- View the State of Charge (SoC) and starting ability values to determine what shape the battery has been in currently and for the last five days. This can be accessed directly in the energy diagnosis test plan under general information.

- If the SoC values for the last five days consistently show between 30% to 40%, the battery is worn out. Proceed to the next point.

- The state of health of the battery can only be tested using the BMW battery tester (Midtronics EXP-1000 recommended, especially for AGM batteries).

- SoC values that show as "undetermined" in ISTA do not indicate an error with the IBS, but rather a worn-out battery or a vehicle issue that does not allow sufficient rest time for the vehicle (sleep inhibitor or frequent wakeups).