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Case Number: S1408000384 Rev.G

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Symptom/Vehicle Issue: Start Stop Charging Warning Lamp Illuminated On, Intelligent Battery Sensor (IBS) State of Charge (SOC) Inaccurate, Battery Charging Message, Presence of IBS related Diagnostic Trouble Codes (DTCs), or Battery Warning Lamp On

Discussion: The IBS measures voltage, current and temperature. From these core measurements, it estimates other characteristics of the battery such as SOC and battery internal resistance.

This document provides added information about the IBS to avoid incorrect and unnecessary IBS replacement. For most IBS returns, the IBS engineering team and supplier find no issue with the returned parts. Please ensure claim narratives list and reference any DTCs mentioned in this document and state the DTCs set at time of IBS replacement. A replacement IBS is not required on a vehicle without DTCs.

Note: In most cases, the IBS can self-recover from a functional software defect if the two-way connection gets cycled (i.e., resets/reboot the module). The IBS will then function normal again, however; it will need a quiescent (vehicle completely sleep) period of ~2 to 4 hours to calibrate SOC to the connected battery.

Battery Exchange

IBS DOES NOT NEED TO BE REPLACED WITH NEW OR RECHARGED BATTERIES. However, it might require SOC adaptation.

IBS SOC Adaptation (Learning)

Learning needs 1 crank followed by 2-4 hours of quiescent/sleep time. Quiescent/Sleep time is defined as Quiescent phase: [-500mA, 50mA] battery current.

If an external charger is used to charge the battery, the vehicle shall be started and kept on for at least one minute before the start of the quiescent sleep period, else the learning of the IBS data with a vehicle in the off position can be up to 3 days. IBS SOC IBS self-learning in-a BEV vehicles can take up to 3 days.

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If you are unsure of quiescent state current, disconnect the vehicle ground cable (example below: vVehicle battery ground/charge point) from the IBS to guarantee no current flows through the battery during this period. IBS 2-way connection and clamp connection to battery negative post should remain connected for the IBS to operate. After completion of quiescent state, re-connect the ground back to the IBS. In normal operation, all current flowing through the battery needs to pass through the IBS for proper reading.

IBS Functional Internal Monitoring

IBS software monitors itself for defective behavior which can trigger DTC B2193 on the Body Control Module (BCM) end. This defect occurs on rare occasions.

DTC U113E is a related DTC set by the BCM in the event of Local Interconnect Network (LIN) communication not responsive. Using, the IBS power reboot (reset) can sometimes help clear these faults.

IBS Related DTCs (set by BCM):

- **B2193:** Intelligent Battery Sensor Internal
- **U113E:** Lost communication with intelligent battery

DTC B2193

If you observe an active DTC B2193, reset the IBS by cycling the 2-way connection. Then start the vehicle and wait for about 30 seconds to determine if the DTC clears or it changes to a stored DTC. If you find it no longer exhibits an active fault, then it is appropriate to keep the same IBS. Else if an active DTC B2193 remains, replace the IBS.

DTC U113E and LIN Diagnostics

If you observe an active DTC U113E set by the BCM, it means a defect exists in the LIN bus. BCM monitors IBS data when IGN ON.

This defect can occur due to a wiring defect in the LIN bus created by short/open LIN bus circuit, or IBS fuse. Moreover, it can relate to an internal IBS or BCM defect in hardware or software under rare circumstances.

U113E DTC Root Cause Inspection:

1. Read vehicle DTCs while the IGN ON.
2. Wiggle the IBS 2-way harness takeout (LIN and IBS feed takeout) and monitor the state of **DTC U113E**.
 - If this step affects **U113E** behavior, the issue is likely related to a failure in the harness.

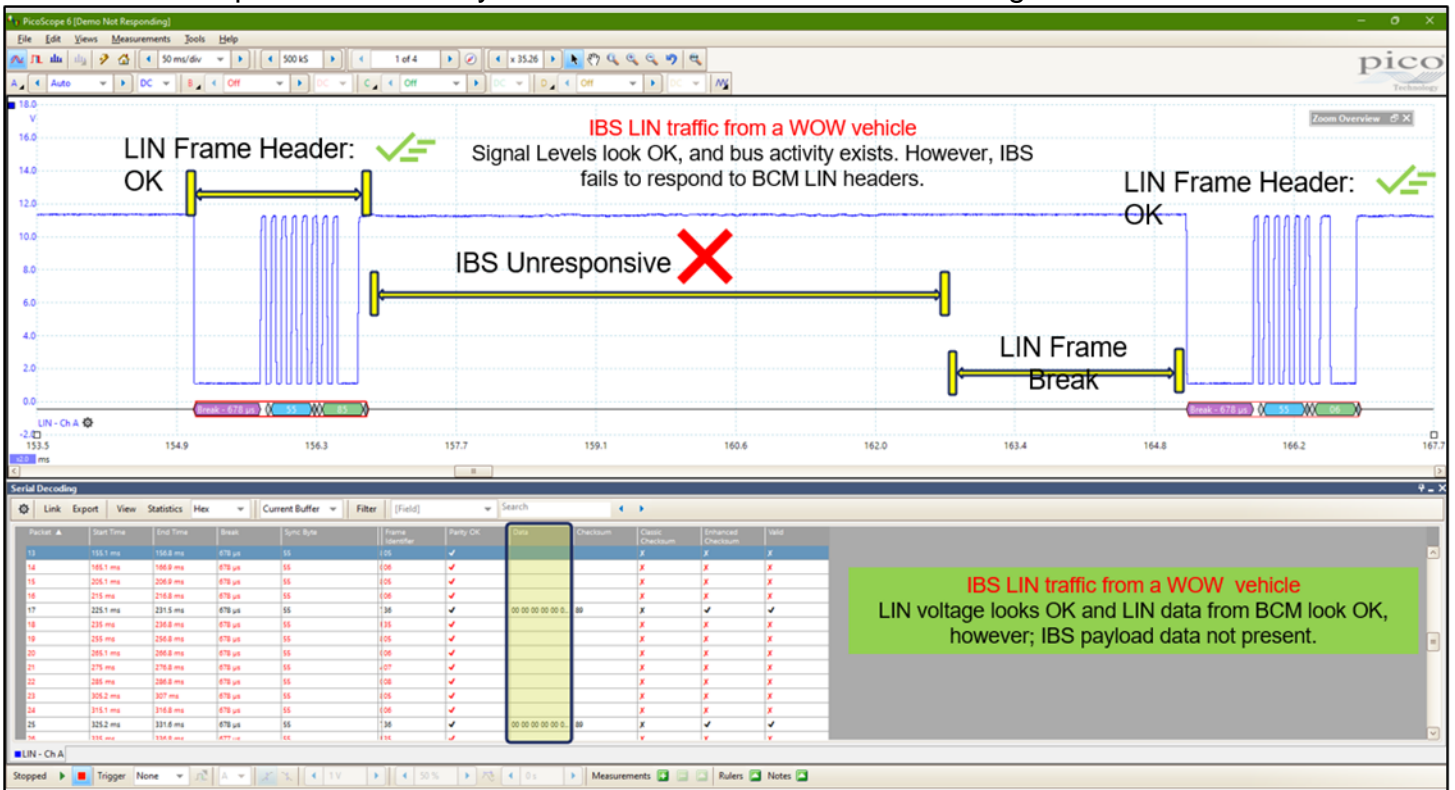
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3. Verify power to IBS by back probing the IBS 2-way connector (pin 2, "RD" wire).
 - o If voltage is lower than 11.8V, follow normal procedures for low batteries.
4. Verify IBS feed fuse state. Replace the fuse if needed.
5. Verify LIN bus activity with Mopar scope.
 - o Config scope to LIN monitor if feasible.
 - o Replace the IBS only based confirmation from the LIN diagnostic.



DTC P00FD

This DTC relates to ECM diagnostic of the Aux battery. If ECM detects a voltage delta above allowed limit between Aux and Main battery, this DTC get set. Please also note that ECM latches ON to this fault even after the delta voltage returns to an acceptable level unless cleared with a service tool.

P00FD is not related to the IBS. Never replace IBS for **P00FD**.

Proper Battery Charging

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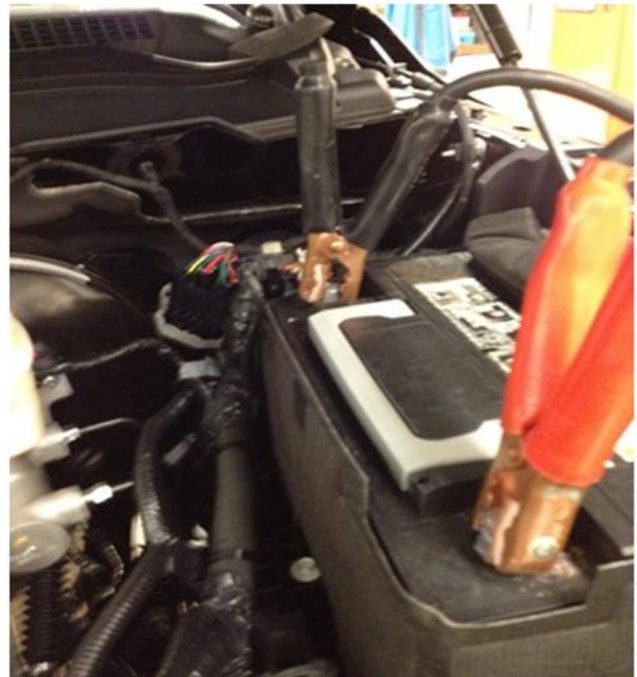
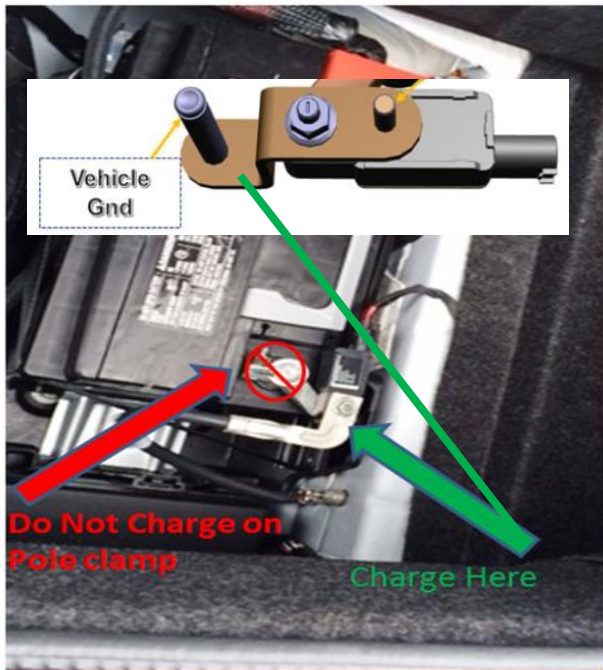


In-Vehicle systems is not an issue. Please note to charge through the IBS or tie negative clamp to Body/engine ground. Customers, Dealers, Mechanics, and Engineers usually want to place the negative clamp on the pole of the battery. This creates Blind charging. **“DO NOT BLIND CHARGE”** See below proper connections for charging.

Improper IBS Charging

Do not put Negative clamp on IBS Pole clamp

Do not remove IBS for charging



- IBS SOC adaptation is needed after charging the batteries.
- Note IBS will self-adapt in the next available quiescent state.
- A common misdiagnosis is Battery light illuminated. The IBS has NOTHING to do with this light. The battery Light is indicative of a “CHARGING SYSTEM and condition of the battery”

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START/STOP INOP

ESS INOP can occur due to many factors not related to the IBS functionality. Moreover, ESS can get inhibited if battery SOC (state of charge) falls below the allowed SOC level. The SOC level varies depending on temperature since temperature affects the battery performance. The SOC state is monitored by the PCM and BCM. Battery temperature and SOC (State of charge are critical) see chart for [start stop engine on conditions](#).

Example Display on a start stop vehicle.



- The IBS should only be replaced if a DTC for the IBS is active.

Stop-start Engine ON conditions:

1. Gear and brake switch conditions valid
2. Completed initial engine key start
3. Occupant sensed allowing engine start conditions
4. **OBD conditions** met allowing engine start conditions SOC (State of Charge) values found under OBDII monitors using wiTech 2 – example below.

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5. Vehicle hood is closed

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Engine OFF conditions:	Max	Min	True/False
1. Valid target gear and brake switch state combination	NA	NA	True
2. Threshold vehicle speed exceeded or timeout since last shift out of reverse	NA	NA	True
3. Transmission ready	NA	NA	True
4. Tow Haul mode not active	NA	NA	True
5. 4WD Low mode not active			True
6. Starter cool down condition met after reaching max allowable consecutive restarts			True
7. Ambient temperature within defined range	-10F	110F	
8. Engine coolant temperature within defined range	40C	110C	
9. Catalyst temperature within defined range	150F	950F	
10. Battery temperature within defined range	-256F	256F	
11. Barometric pressure greater than threshold		60KPa	
12. Brake booster delta pressure less than threshold		20kPa	
13. Steering wheel angle within defined range			
14. Steering wheel angle gradient within defined range			
15. Steering column torque within defined range			
16. Fuel level greater than threshold			
17. Vehicle hood closed			
18. No throttle request			
19. No engine stop disable request by HVAC			
20. Battery state of charge greater than threshold		65%	
21.			
22. Battery voltage state of function greater than threshold		8 volts	
23. Battery health state of function greater than threshold		40 <u>ah</u>	
24. Engine speed less than threshold	1000 rpm		
25. Vehicle speed less than threshold	0		
26. Threshold vehicle speed exceeded since last engine start	8 mph		
27. Occupant sensing allow engine stop condition met			True
28. OBD allow engine stop condition met			True
29. Engine runtime greater than threshold	3 seconds		
30. Stop-Start enable switch activated by driver			True
31. Flex fuel learn mode not active			True
32. ABS brake event not present			True

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IBS State of Charge (SOF) tool display.

Name	Value	Units
Intelligent Battery Sensor (IBS) State of Charge	43.0	%
Intelligent Batter Sensor (IBS) State of Charge Accuracy	2	Count
Transmission in Drive to Allow Start/Stop	False	
Tow/Haul Allow Start/Stop	True	
Battery (IBS) SOF Q Allow Start/Stop	True	
Battery (IBS) SOF V Allow Start/Stop	True	
Brake Pedal Pressed Allow Start/Stop	True	
HVAC/Cabin Heating/Cooling Allow Start/Stop	False	

New IBS Installation

1. If the Installation of a new IBS sensor is required it should be onto a fully charged battery.
2. Once installed allow the sensor to read the SOC for up to 4 hours without added system loads.
3. Performing from 3 to 5 drive cycles with an 8-hour key off period will improve calibration accuracy of the new sensor for proper operation.
4. Continue the drive cycles to allow proper adaption of the battery sensor State of Charge (SOC) and State of Function (SOF).

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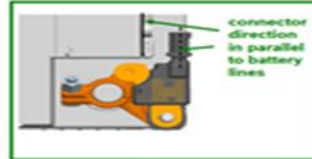
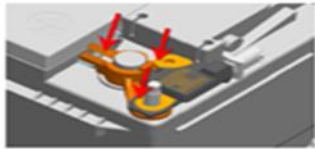


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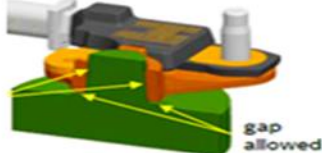
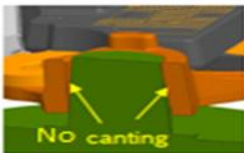


Proper IBS Installation

1. Place the IBS onto the negative battery post



2. Push the IBS down until properly seated on the cone of the post



Proper IBS Installation

3. Fasten Ground terminal to M8

7Nm +/- 2Nm

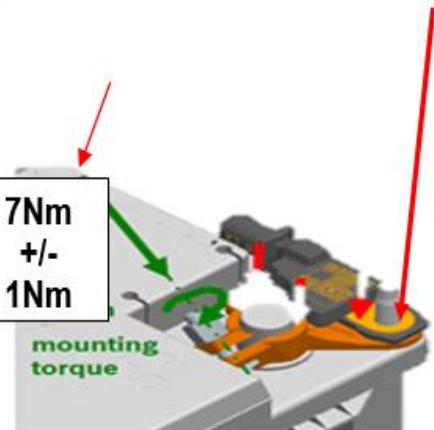
M8 7Nm
+/- 2Nm



7Nm
+/-
1Nm

mounting torque

4. Secure the M6 pole clamp



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