Functional impairment of 48 V on-board electrical system

Topic number	LI54.10-P-069698
Version	13
Function group	54.10 - Battery, power supply, voltage converter
Date	12/15/21
Validity	Model series 257, 213, 238, 167, 290 with code B01
Reason for change	updating Cause/Remedy 2

Complaint

This does not apply to 223 or 206. Please follow the relevant guided tests for the 223 and 206.

Various causes are possible. The faults listed in the various causes do not all have to be present at all times. Some of these complaints may overlap. Rely on the faults listed in the Cause section for identifying the correct Remedy.

1. No start

2. Yellow or red instrument cluster message for 48 V on-board electrical system battery (G1/3)

3. Limp home mode, overheating, A/C not blowing cold, or loss of acceleration

Cause

Cause 1: Software causes Intermittent No Starts with fault B183387 in DC/DC converter N83/1

Cause 2: Software causes Permanent No Start with fault B183349 and B183371 in 48V battery G1/3

Cause 3: Hardware short circuit in 48V system causes fault B183319 in 48V battery. May also have fault B183371.

Cause 4: Internal 48V battery Peltier cooling element failure causes fault B183397

Cause 5: This will Always have fault code B183371 but different from cause 2 and 3 -- it will Not have B183349, B183319, or any other faults in the 48V battery. This will only have fault B183371 in 48V battery. Cause 5 is from the 48V battery detecting an abnormality which then causes the 48V battery to disconnect itself. The disconnected 48V battery then causes subsequent symptoms: Limp Home Mode, overheating, A/C not blowing cold, or loss of acceleration

Remedy

Note: each of these remedies correspond to a specific cause. Make sure to match correct Cause with Remedy.

Remedy 1:

Update software in G1/3 (48V battery) using newest Xentry software and AddOns

Remedy 2:

1. Xentry MUST be connected with VCI cable to correctly complete this remedy.
2. Update to AddOn 21538 (for Xentry Software 09/21) or AddOn 21539 (for Xentry Software 12/21).
3. Complete guided test for B183349.
4. If guided test completes, vehicle starts, and drive cycles show no further symptoms
5. release vehicle
6. If guided test does Not complete, vehicle does Not start, or symptoms remain
7. open a PTSS case
8. If guided test completes but a new fault code is present (such as B183319, B183371, etc.) follow the relevant Cause/Remedy for that fault in this LI
9. For any additional concerns open a PTSS case

Remedy for 3:

1. If fault is not Current (only Stored):

A) Perform Xentry actuations for all 48V components.

B) Create a PTSS case with ALL Preliminary measures required as noted below for Remedy 5

C) Include ISA performance data from the N129. See details on how to pull ISA data in Remedy 5 step 3) part D.

2. If fault is Current AND Stored:

A) Disconnect the 48V battery.

B) Remove terminal 40 on 48V battery to DC/DC converter N83/1.

C) Check Xentry: is error code Current, Stored, and not erasable?

--If yes, replace 48V on-board power battery G1/3 and set damage code 540HY73.

If no, short circuit must be somewhere other than the 48V battery. Possible causes: cables, screw connections, or 48V components.

To Troubleshoot:

--Disconnect each 48V components one at a time at 48V prefuse box.

--Check after disconnecting that component if the error code "B183319" is still in the 48V battery G1/3.

--If after disconnecting the fault goes from Current to Stored, or the vehicle can be started, then that current disconnected component is defective and should be replaced.

--If unable to reproduce or cannot clear faults open PTSS case.

Remedy 4:

1. Open PTSS case.

2. Order and replace 48V battery.

PRELIMINARY MEASURES required for Remedy 5

NOTE: It is imperative to document each one of these steps in detail. Some of the remedies will require opening a PTSS case. This information is vital in helping to expedite the diagnostic process.

• Make sure Add-ons are are up to date in Xentry Machine

• Before clearing faults or road test: pull initial Quick Test and DC/DC CUL.

• Road test to attempt to duplicate fault before proceeding below. Test drive with multiple ECO stop/starts and under as many various driving styles as possible: manual, automatic, slow, aggressive, Comfort, Sport+, etc. SAFETY is more important than testing. Please proceed with caution.

• Upload all below documentation and perform testing:

• Make sure to indicate in file names or descriptions the order the uploaded documents occurred.

• Quick Test and DC/DC Control Unit log (after test drive)

• Complete all guided test(s) and subsequent physical layer inspection.

• Remove and inspect all cables into/out of DC/DC converter N83/1 and 48 V on-board electrical system battery. Check for: damage, soiling, corrosion, and check resistance of all cable pins (should be close to 0.2 ohms)

• Note: ISA and ISG terms both refer to same component: Integrated Starter Alternator and Integrated Starter Generator. The ISA is component A79 in the wiring diagrams. A79 is controlled by the power electronics N129 which is the ISA control unit.

Remedy 5:

1. In Xentry go to N10/6 FSAM, on-board electrical data, conspicuous data. Locate date/time of complaint.

2. Review Fault Driving Cycle to check if Excess current is or is not highlighted in Red. Then we have two different options below: step 3 below Excess Current highlighted in Red...OR... step 4 below excess current is NOT highlighted in Red (or if 2nd visit for this complaint).

3. First option: excess current IS highlighted in Red (OR if 2nd visit for this complaint) create a PTSS case with the following:

A) DC/DC control unit log

B) ISA performance data from the N129 control unit under Special Procedures, then "Procedures for support queries to market support", "Collation of diagnosis performance data", and select "engine at idle".

--After next screen loads with data click continue. The next screen will show where the .CSV file is located in your Xentry. Navigate to this location and upload this CSV file to the case.

--Note it is important this is a .CSV file extension and Not a screenshot or print of the data values.

--See attached document for clarity.

4. Second option: excess current is NOT highlighted in Red (text is currently black):

Perform below physical layer inspections looking for corrosion, abnormalities, etc. If nothing is found release to the customer.

--Check the connection at W244/1 (Bus Bar)

--Check for 48V terminal 40/41 connections with following instructions

--Check each screw connection:

--Can the cable lug be moved? Is it wobbling? Are deformations on the cable lug? Are there discolorations or signs of overheating visible? Are paint residues or dirt visible on the bolt or cable lug?

--There are two types of ground bolts M6 and M8:

--For M6 bolts with paint-scraping nut, the thread cuts into the paint and the current flows through the nut and the thread into the bolts. No further contact surface on the bolt is required!

--If one of these is suspected of causing a contacting problem: create a PTSS case.

--For M8 ground points, the current flows through the contact surface between the bolt foot and the cable lug. For these, ensure this surface is clean and not painted. If painted remove paint.

Then review below for the relevant model:

Chassis: 167

-W106/1 (circuit 41 on battery)

-F153/2 (Pre-fuse box engine compartment to DC/DC converter terminal 40)

-F150/2 A2 (Pre-fuse box battery circuit 30)

Chassis: 213, 238, 257, 290

-F153/2 (Pre-fuse box engine compartment circuit 40)

-Powerpack 48V (circuit 30 and 31)

-W106/2 (battery grounds)

-W106/3

-N129 (ISA circuit 40 and 41)

-W30/11

Last inspect 48V cables and control unit connectors for the following

-Is the plug firmly locked?

-Are the contact pins in the plug locked?

-Are there signs of mechanical damage to the plug or pins (e.g. due to improper repair attempts, etc.)

-Are there traces of water, corrosion or traces of thermal overload?

-Check lines for damage such as abrasion, animal bites or other types of damage.

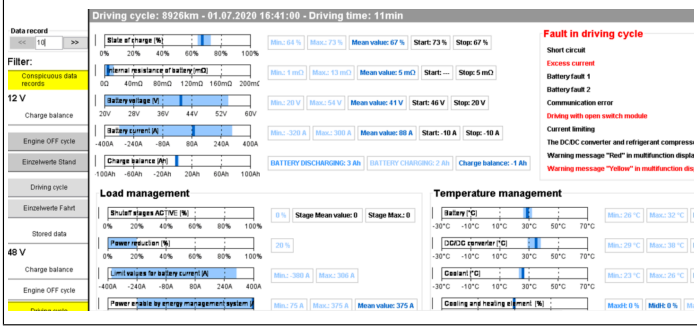
-Check all 48V screw and plug connections on each component present in the vehicle:

-Circuit 40/41 cables on components:

---Document release torque of circuit 40/41 M8 bolts and retorque to 16N-m

If after reviewing the above nothing is found the vehicle can be released to the customer.

If any abnormalities open a PTSS case with preliminary documentation requested.

Attachments	
File	Description
Excess Current.png 	Excess current in N10/6 conspicuous data

Symptoms
Overall vehicle > Power supply > Battery/On-board electrical system > Battery function > Battery discharges
Overall vehicle > Power supply > Battery/On-board electrical system > Battery/on-board electrical system display message > Battery/Alternator - Serviced Required

Control unit/fault code	
Control unit	Fault text
N83/1 - DC/DC converter (DDW)	B183301 - The battery for the 48V on-board electrical system has a malfunction. There is a general electrical fault. (LIB48_222) B183214 - The 48V on-board electrical system has a malfunction. There is a short circuit to ground or an open circuit. (LIB48_222) B183216 - The 48V on-board electrical system has a malfunction. The limit value for electrical voltage has not been attained. (LIB48_222) B183217 - The 48V on-board electrical system has a malfunction. The limit value for electrical voltage has been exceeded. (LIB48_222) B183371 - The battery for the 48V on-board electrical system has a malfunction. The actuator is blocked. (LIB48_222) B183319 - The battery for the 48V on-board electrical system has a malfunction. The limit value for current has been exceeded. (LIB48_222)
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Operation numbers/damage codes

Op. no.	Operation text	Time	Damage code	Note
			540HY73	Battery 48 V on-board electrical system - electrical fault

			5416D73	DC/DC converter 48 V on-board electrical system