Functional impairment of 48 V on-board electrical system

Topic number	LI54.10-P-069698
Version	9
Function group	54.10 Battery, power supply, voltage converter
Date	02-16-2021
Validity	Model series 257, 213, 238, 167, 290 with code B01
Reason for change	Updating remedy 1 to update software for all engines. Removing cause/remedy 5 for simplicity and due to infrequency.
Reason for block	

Complaint:

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 starts with fault B183349 and B183371 in 48V battery G1/3.

Cause 3: Hardware short circuit in 48V system causes fault B183319 in 48V battery

Cause 4: 48V battery detects abnormality and disconnects causing additional symptoms: Limp Home Mode, overheating, A/C not blowing cold, or loss of acceleration This cause will always have fault code in G1/3: B183371 but will Not have B183349.

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. Check software version in 48V battery via quick test. If 19/46 000 replace only 48V battery (regardless of other faults)

2. Update DC/DC converter N83/1 if newer software is available.

3. If software version is Not 19/46 000, open a PTSS case.

Remedy for 3:

1. Disconnect the 48V battery.

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

3. Check in Xentry: is error code still present?

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

If no, short must be outside the 48 V line battery. Possibly causes are the cables, screw connections, or 48V components.

--Disconnect all 48V components one at a time.

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

--If after disconnected the fault is gone, or the vehicle can be started, the disconnected component is defective and should be replaced.

PRELIMINARY MEASURES required for Remedy 4

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.
- Detach line between 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 <0.2 ohms).
- Remove and inspect all cables into/out of DC/DC converter.
- Note: ISA and ISG terms both refer to same component: Integrated Starter Alternator and Integrated Starter Generator. This is component A79 in the wiring diagrams. A79 is controlled by the power electronics N129 which is the ISA-control unit.

Remedy 4:

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

2. Review Fault Driving Cycle checking if Excess current is or is not highlighted in Red. Then we have two different options Excess Current or No Excess current.

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

A) Ask the customer about the driving situation: highway or in the city, during start/stop, acceleration, or constant speed, approximate speed, additional details?

B) Complete guided test(s) for every fault code--not just 48V

C) DC/DC control unit log

D) 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.

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

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 chassis:

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-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)

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 code	Fault text
N83/1 - DC/DC converter (DDW) (DCDC48_222)	B183301	The battery for the 48V on-board electrical system has a malfunction. There is a general electrical fault. (LIB48_222)
N83/1 - DC/DC converter (DDW) (DCDC48_222)	B183217	The 48V on-board electrical system has a malfunction. The limit value for electrical voltage has been exceeded.

N83/1 - DC/DC converter (DDW) (DCDC48_222)	B183216	The 48V on-board electrical system has a malfunction. The limit value for electrical voltage has not been attained.
N83/1 - DC/DC converter (DDW) (DCDC48_222)	B183301	The battery for the 48V on-board electrical system has a malfunction. There is a general electrical fault.
N83/1 - DC/DC converter (DDW) (DCDC48_222)	B183214	The 48V on-board electrical system has a malfunction. There is a short circuit to ground or an open circuit. (LIB48_222)
N83/1 - DC/DC converter (DDW) (DCDC48_222)	B183216	The 48V on-board electrical system has a malfunction. The limit value for electrical voltage has not been attained. (LIB48_222)
N83/1 - DC/DC converter (DDW) (DCDC48_222)	B183217	The 48V on-board electrical system has a malfunction. The limit value for electrical voltage has been exceeded. (LIB48_222)
N83/1 - DC/DC converter (DDW) (DCDC48_222)	B183371	The battery for the 48V on-board electrical system has a malfunction. The actuator is blocked. (LIB48_222)
N83/1 - DC/DC converter (DDW) (DCDC48_222)	B183319	The battery for the 48V on-board electrical system has a malfunction. The limit value for current has been exceeded. (LIB48_222)
N83/1 - DC/DC converter (DDW) (DCDC48_222)	B183214	The 48V on-board electrical system has a malfunction. There is a short circuit to ground or an open circuit.
N83/1 - DC/DC converter (DDW) (DCDC48_222)	B183319	The battery for the 48V on-board electrical system has a malfunction. The limit value for current has been exceeded.
N83/1 - DC/DC converter (DDW) (DCDC48_222)	B183371	The battery for the 48V on-board electrical system has a malfunction. The actuator is blocked.

Operation numbers/damage codes

Op. no.	Operation text	Time	Damage code	Note
			540HY 73	Battery 48 V on-board electrical system - electrical fault
			5416D 73	DC/DC converter 48 V on-board electrical system