Functional impairment of 48 V on-board electrical system

Topic number	LI54.10-P-069698
Version	7
Function group	54.10 Battery, power supply, voltage converter
Date	11-05-2020
Validity	Model series 257, 213, 238, 167, 290 with code B01
Reason for change	updating remedies
Reason for block	

Complaint:

1. Instrument cluster message 48 V on-board electrical system battery (G1/3) in yellow or red

2. Vehicle does not start

3. Limp home mode due to high engine operating temperatures

Cause:

Cause 1: No start with B183387 in DC/DC converter N83/1

Cause 2: Battery Not found in Quick Test, OR Fault B183301 in DC/DC, and/or B183349 in 48V battery.

Cause 3: ALWAYS create PTSS case - Various symptoms: Limp Home Mode, overheating, A/C blowing hot, or loss of acceleration

This root cause will always have fault code in G1/3: B183371 The battery for 48V on-board electrical system has a malfunction. The actuator is blocked.

Note: this fault code may include additional 48V system consequential faults. B183371 is the primary root cause.

Note: Not every case will have Limp Home Mode.

Note: For any case with B183371 a PTSS case is required--except if B183349 is also in QT. Skip to Cause 5.

Note: Pull ISA performance data BEFORE clearing faults

Cause (4) 3: Red battery light or check engine light: With B183214, B183216, or B183217 but Without B183371

Cause 5: B183319 in 48V battery - hardware short circuit in 48V system

Remedy:

Remedy 1: Cause 1: No start with B183387 in DC/DC converter N83/1

a. If first visit pull Quick Test

   i. If fault code is B183387 in N83/1 (regardless of other faults) - replace only 48V battery

b. If second visit open PTSS case

Remedy 2: Battery Not found in Quick Test, OR Fault B183301 in DC/DC, and/or B183349 in 48V battery.

a. if 48V battery not found in quick test, OR if fault B183301 in DC/DC, OR if fault B183349 in 48V

i. Replace only 48V battery (regardless of other faults)

ii. Update DC/DC converter N83/1 if later software is available.

Preliminary measures are required for Remedy 3, 4, and 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.

• If Cause 2, pull ISA performance data BEFORE clearing faults

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

• Confirm all 48V components can be actuated via Xentry guided tests: A1 = M75 electrical coolant pump, A2 = M60 Electrical turbo, A3 = A9/5 electric refrigerant (A/C)

• Print out from 12V Test with Xentry Battery Tester in FSAM

• 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 nearly 0.2 ohms or less).

• 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

• Additional docs required for each Remedy

Remedy 3: Every vehicle with fault B183371 needs a PTSS case!!

Note: if B183349 is also in quick test skip to Remedy 2.

Note: Pull ISA performance data BEFORE clearing faults

Complaint: CEL, overheating, loss of power/acceleration, etc. - Create PTSS case with:

1. Review all 48V component wiring and connectors

2. Check grounds W106/x or W30/11. Upload picture to case.

3. Document resistance from circuit 40 from ISA (+) to F153/2 and F153/2 to G1/3 48V battery (+)

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

5. Ask the customer about the driving situation: was complaint on the highway or in the city, during start/stop, acceleration, or constant speed, approximate speed, additional details?

6. Upload DC/DC control unit log

8. Upload Recent 48V Conspicuous Data from FSAM

9. Before clearing any faults:

9a. Upload 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".

9b. Save file in a .CSV format --- file MUST be in .CSV format.

9c. To save in .CSV format click printer icon, name file, and then put .CSV at the end of file name

10. Clear all faults and test drive for 20 miles.

11. Open PTSS case with above information and preliminary information.

12. EVERY vehicle with fault B183371 needs a PTSS case is required...do not release without PTSS case.

Remedy for 4: Red battery light or check engine light: With B183214, B183216, or B183217 but Without B183371

a. Check ground point W106/x or W30/11 exactly (correct torque, damage, soiling)

b. Test drive.

i. If reproducible:

1. unplug all 48 V components individually (on F153/2 disconnect the individual components of circuits 40) and perform a test drive each time.

2. After each test drive, run a quick test to check if any of the 48 V components - except the unplugged ones - are detected as faulty.

a. Try to actuate all components that are still connected.

3. If unable to actuate or detected faulty = replace component.

4. Retest.

ii. If cannot reproduce = open PTSS case

Remedy for 5: fault B183319 in 48V battery - hardware short circuit in 48V system

1. Disconnect the 48V battery.

2. Remove terminal 40 (plus 48-V) to DC/DC converter N83/1.

3. Error code still present?

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

If no:

1. Short must be outside the 48 V line battery - possibly in the cables, screw connections, or components.

2. All 48V components in the series (depending on the equipment) must be disconnected one at a time.

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

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

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