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Title: Electric Vehicle High Voltage Battery Diagnostics

Applies To: Electric CE Bus and eMV

CHANGE LOG

Please refer to the change log text box below for recent changes to this article:

04/21/2023 - Initial Article Release

DESCRIPTION

This document will guide the user through diagnosing a failed high-voltage battery when there is a suspected concern indicated by symptom or fault code.

SYMPTOMS

Diagnostic Trouble Codes & Dashboard Indicator Lights:

DTC/Light	Description
SPN 8100 FMI 2	HVESS State of Charge Status : Data Erratic, Intermittent Or Incorrect
SPN 5923 FMI 4	HVESS Lowest Cell Voltage : Voltage Below Normal, Or Shorted To Low Source
SPN 5923 FMI 17	HVESS Lowest Cell Voltage : Data Valid But Below Normal Operating Range – Least Severe Level
SPN 5924 FMI 2	HVESS Cell Voltage Differential Status : Data Erratic, Intermittent Or Incorrect

Customer Observations or Concerns:
Vehicle may derate or experience a shut down requiring a vehicle tow
Decreased driving range
Malfunction Indicator Lamp (MIL)
Power Limitation Indicator Lamp (PLIL - Turtle Light)
Red Stop Lamp (RSL)



SPECIAL TOOLS / SOFTWARE

Tool Description	Tool Number	Comments	Instructions
EZ-Tech® or EST	N/A	w/Service Diagnostics Solutions (SDS) Software	Version 1.6.18 or higher
NEXIQ USB Link 2 or 3	NQ124032 / 121052		
Electric Vehicle "Y" Adapter Cable	08-801-01	Works w/USB-LINK 2 or 3	
12v Battery Charger	PSC550CC	55 Amp	
Digital Multimeter	Fluke 1587	Category 3	

High Voltage PPE	N/A		
HV Battery Adapter Plate	08-529-04		
HV Battery Mount Adapter Bracket	08-529-03		
Lift Assembly	08-529-01		
HV Battery Cap Kit	08–529–05		

SERVICE PARTS INFORMATION

Kit Description	Part Number	Quantity Required	Notes
BATTERY, HIGH VOLT RENEWED	5013171R91	1	as diagnosed
BATTERY , HIGH VOLTAGE	4207165C91	1	as diagnosed

DIAGNOSTIC STEPS

WARNING! To prevent personal injury and / or death, or damage to property, park vehicle on hard flat surface, turn the engine off, set the parking brake, and install wheel chocks to prevent the vehicle from moving in both directions.

WARNING! To prevent personal injury and / or death, always wear safe eye protection when performing vehicle maintenance.

WARNING! To prevent personal injury and / or death, or damage to property, keep flames or sparks away from vehicle and do not smoke while servicing the vehicle's batteries. Batteries expel explosive gases.

WARNING! To prevent personal injury and / or death, NEVER service a high voltage vehicle without completing high-voltage safety training. Before working on vehicle, read and obey all High-Voltage Safety and Lock-Out Tag-Out procedures and information.

WARNING! To prevent personal injury and / or death, wear and use approved high-voltage Personal Protective Equipment (PPE) when near a high-voltage electric vehicle. Inspect PPE before use. Do not use gloves or other PPE with expired dates, holes, cracks, or damage. NEVER touch energized orange highvoltage cables or high-voltage components without wearing approved highvoltage PPE.

WARNING! To prevent personal injury and / or death, read all information in the Safety Information and High-Voltage Safety sections of the service manual.

WARNING! To prevent personal injury and / or death, or damage to property, remove the ground cable from the negative terminal of the battery box before disconnecting any electrical components. Always connect the ground cable last.

Step	Action	Decision
1	**DIAGNOSTIC:** Is there a suspected concern indicated by symptom or fault code for the high-voltage battery(s)?	**Yes**. Perform initial SDS CAN Trace. See SDS CAN Trace Instructions. Open technical service case file and attach SDS CAN Trace to case file. Proceed to step 2.
		No. Please refer to diagnostics of any non-related active faults, or end diagnostics if no symptom/faults present.

Step	Action	Possible Decisions
2	**DIAGNOSTIC:** Follow next steps provided within the technical service case file. Next steps may vary based on analysis of SDS CAN Trace.	**1**. Charge, discharge, and test drive of vehicle
		2. State of Charge (SOC) calibration
		3. High-voltage battery(s) replacement If the high-voltage battery(s) require replacement, record/document voltages and serial #s on the proper battery detail form 2-String Battery Detail Form 3-String Battery Detail Form
		4. Return vehicle back to service

SDS CAN Trace Instructions

1. Install the Electric Vehicle "Y" Adapter Cable to the diagnostic connector(s) on the vehicle.

Figure #1: Y Cable Installation Bus

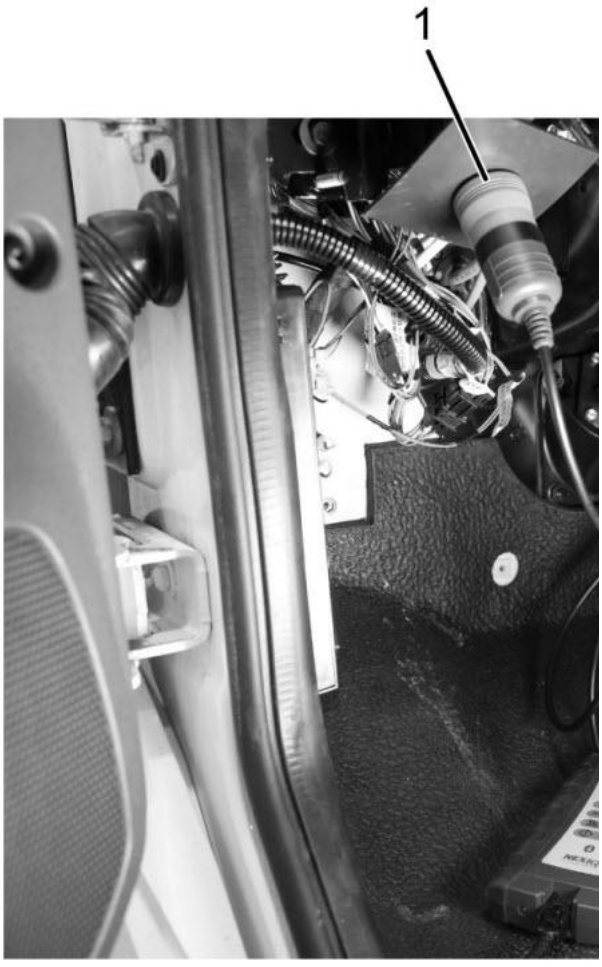

Figure #2: Y Cable Installation eMV

Item 1: 9-pin connector Item 2: 10-pin connector	Item 1: 9-pin connector Item 2: 10-pin connector

NOTE:

10-pin connector may be cable strapped to harness

2. Launch Navistar Service Diagnostics Solutions (SDS) Software using an Electronic Service Tool (EST).

3. Key ON, record for 3 mintues, end recording.

4. Key OFF.

5. Attach SDS CAN Trace to case file.

REPAIR STEPS

WARNING! To prevent personal injury and / or death, or damage to property, park vehicle on hard flat surface, turn the engine off, set the parking brake, and install wheel chocks to prevent the vehicle from moving in both directions.

WARNING! To prevent personal injury and / or death, always wear safe eye protection when performing vehicle maintenance.

WARNING! To prevent personal injury and / or death, or damage to property, keep flames or sparks away from vehicle and do not smoke while servicing the vehicle's batteries. Batteries expel explosive gases.

WARNING! To prevent personal injury and / or death, NEVER service a high voltage vehicle without completing high-voltage safety training. Before working on vehicle, read and obey all High-Voltage Safety and Lock-Out Tag-Out procedures and information.

WARNING! To prevent personal injury and / or death, wear and use approved high-voltage Personal Protective Equipment (PPE) when near a high-voltage electric vehicle. Inspect PPE before use. Do not use gloves or other PPE with expired dates, holes, cracks, or damage. NEVER touch energized orange highvoltage cables or high-voltage components without wearing approved highvoltage PPE.

WARNING! To prevent personal injury and / or death, read all information in the Safety Information and High-Voltage Safety sections of the service manual.

1. Obtain new high voltage battery(s).

NOTE:

Do not damage packaging of the new HV Battery. This packaging will be used to send back the failed HV Battery. Refer to G-Letters within other resources for HV battery returns

2. Perform voltage check on new high-voltage battery(s).

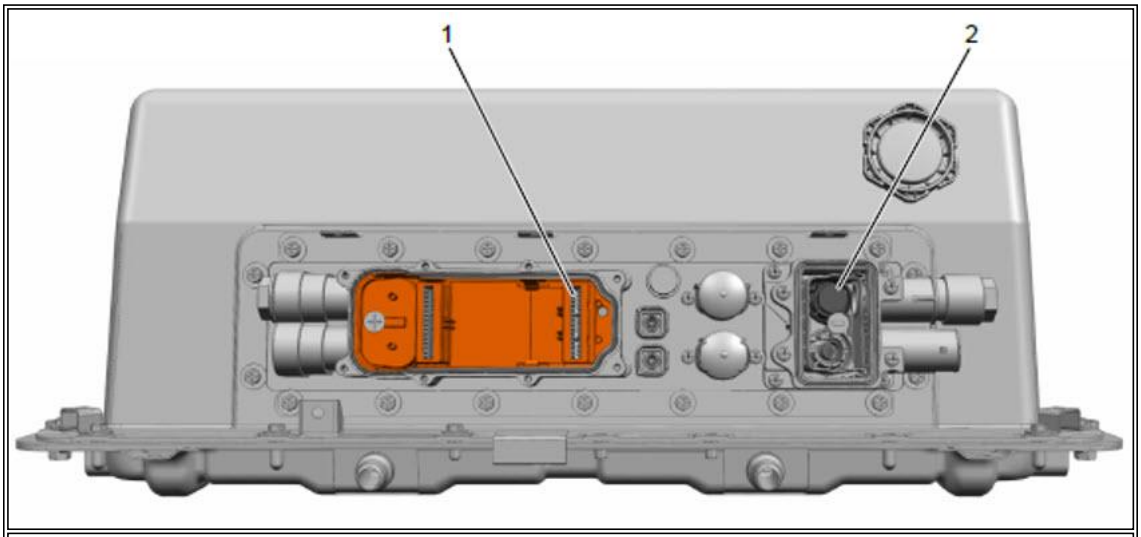

Figure 3: High-Voltage Battery Voltage Measurement Locations

Item 1: High-Voltage Positive Contact Slot
Item 2: High-Voltage Negative Contact Slot

3. Wearing and using approved high-voltage Personal Protective Equipment (PPE), use a category III digital multimeter to measure the voltage of the high-voltage battery. Place the positive multimeter probe on the high-voltage positive contact slot (1) and the negative meter probe on the high-voltage negative contact (2).

4. Record readings along with the serials #s of the high-voltage battery(s) on the proper battery detail form.

5. Submit the battery detail form on the case file and wait for next steps.

6. Once next steps have been defined and completed, proceed to step 7.

7. Disconnect high-voltage battery charger.

8. Bring vehicle to shop area and park vehicle on a dry level surface.

9. Turn ignition to key OFF position.

10. Turn 12V disconnect switch OFF.

11. Perform high-voltage isolation level 3; refer to the proper section within the service manual.

12. Perform the high-voltage battery replacement procedure for the identified failed battery(s); refer to the proper sections within the service manual.

13. Collect SDS CAN trace (refer to SDS CAN trace instructions) and attach to the case file.

14. If needed, charge vehicle up to 100% State of Charge (SOC).

15. Wait one hour after charging, then collect SDS CAN trace (refer to SDS CAN trace instructions) and attach to the case file.

16. Test drive vehicle until the SOC gauge on the cluster reads less than 40%.

17. Wait 30 minutesafter driving, then collect SDS CAN trace (refer to SDS CAN trace instructions) and attach to the case file.

18. Wait for next steps provided via case file.

19. Once next steps are completed, the vehicle can be release back to service.

WARRANTY INFORMATION

Warranty Claim Coding:
Refer to the Warranty Coding Manual for Group and Noun Codes.

Standard Repair Times:
Refer to the SRT Manual for Repair Times

OTHER RESOURCES

Master Service Information Site

Failed EV Battery Return Program - WIL2300001

- USA Letter G-99-101344-A
- Canada Letter GCE-99-101344-A

Hide Details

Feedback Information

Viewed: 141
Helpful: 3
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