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SIL 2-EP-16, Rev. A
April, 2016
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SUBJECT: Replacing BCA (Bias-Control Assembly) Cards Inside of the Dual Power Inverter Module 2 (DPIM2)

MODELS AFFECTED: H 40/50 EP™ System Equipped with DPIM2

Tools Required

- J-51586 Tab Bending Tool (available at Allison.service-solutions.com)
- J-46708 Multimeter (available at Allison.service-solutions.com) or equivalent
- Electrostatic Discharge Wrist Strap (Tool Number 7744 (available at Allison.service-solutions.com) or equivalent) (Refer to [Figure 2](#))
- Pick or Small Flat Blade Screwdriver
- Torx Plus™ T20 Bit
- Torx Plus™ T25 Bit
- 8mm Hex Socket

Parts Required

- Wire Ties (4 inch and 6 inch – Nylon 6/6 or approved equivalent)

Introduction:

This Service Information Letter (SIL) announces the availability of the BCA (Bias-Control Assembly) Card and related components and includes the procedure to replace the BCA Card located inside the DPIM2. The availability of this part eliminates the need for a complete DPIM2 replacement under certain failure conditions.



NOTE: Perform the necessary diagnosis prior to ordering parts related to a BCA Card failure. Contact Allison TAC at (800) 252-5283 to confirm the BCA Card failure. The parts necessary to perform a BCA Card replacement are NOT available as a kit. All necessary components MUST be ordered individually.

Refer to [Figure 1](#) for location of BCA Card and related components. Refer to [Table 1](#) for list of BCA Card Service Parts.

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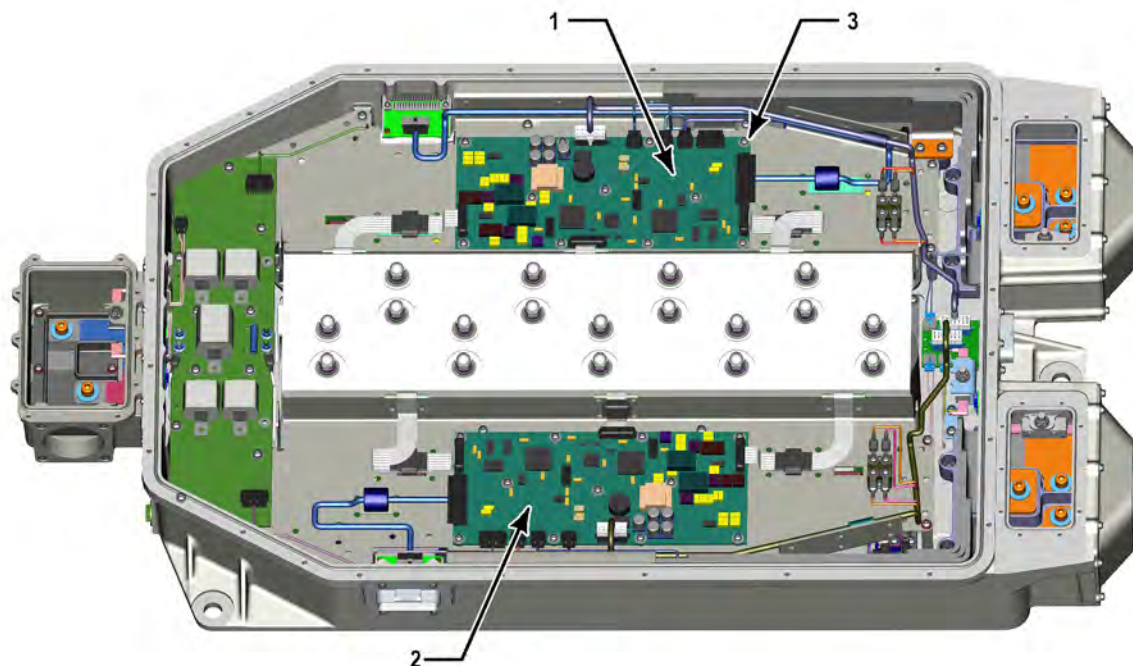
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Please Note: Allison Transmission Service Information Letters are intended for use by professional, trained technicians, not for the "do-it-yourselfer." They are written to inform those technicians of conditions that may occur on some transmission models (or serial numbers ranges) or to provide information that could assist in the proper servicing of a specific Allison transmission. Properly trained technicians have the equipment, tools, safety instructions, and know-how to do a job properly and safely. If a condition is described, do not assume that the Service Information Letter applies to your transmission, or that your transmission has the condition described. Product evolution and information updates are inevitable. Please see your authorized Allison Transmission service dealer or distributor to understand if your particular transmission may benefit from the information contained within the Service Information Letter.

Warranty Claim Information:



CAUTION: The Inverter A and Inverter B BCA cards are not interchangeable. Although the hardware is identical, the base programming loaded into each card is unique to Inverter A or Inverter B. The SID MUST be re-flashed when a BCA Card is replaced.



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Figure 1. BCA Card and Related Components

Table 1. BCA Card Service Parts

Item Number	Part Name	Part Number
1	BCA – Inverter A	29557268
2	BCA – Inverter B	29557269
3	Screw – M4X14mm	29540721

1. When a BCA Card, P/N 29557268 or P/N 29557269, is utilized to repair a failed DPIM under warranty, use P/N 29557268 or P/N 29557269 as the PFP and claim the same part number in the Service Parts subsection of the AWAARE claim.
2. The replacement of BCA cards on a DPIM2 under Allison supplied warranty must be approved by Allison H 40/50 EP™ Service Engineering prior to removing DPIM Main Cover.



NOTE: The DPIM Main Cover EMI Gasket (P/N 29540714 - Qty. 1, the DPIM DC Access Lug Box Cover EMI Gasket (P/N 29540614 - Qty. 1), and the DPIM AC Access Lug Box Cover EMI Gaskets (P/N 29540715 - Qty. 2 Required) should be discarded and replaced with new gaskets whenever the covers are removed.



NOTE: Allison Transmission, Inc. requires the removal of the DPIM from the vehicle prior to BCA Card replacement. Prior to removal of the DPIM, refer to the H 40/50 EP™ System Troubleshooting Manual (TS5812EN) and perform the Electrical Disconnect Verification Procedure.



NOTE: The BCA Card replacement should NOT be performed if smoke and/or water damage are present.



WARNING: Smoke inside the DPIM contains harmful Copper Oxide. Use proper protective equipment to protect your skin and eyes from contact. Avoid inhalation of smoke.



NOTE: Refer to the attachment at the end of this SIL for information regarding the name and location of components within the DPIM2.



WARNING: DO NOT rely on the High Voltage Interlock Loop (HVIL) or control systems to de-energize the system. Always perform the Electrical Disconnect Verification Procedure to be sure the system is discharged before servicing components.

DO NOT attempt to bypass any High Voltage Interlock for any reason. Tampering with the HVIL may result in injury. Failure to follow proper safety procedures may result in serious personal injury or death.

Removal of Main Cover



NOTE: The Main Cover MUST be removed prior to performing diagnosis of the DPIM.



NOTE: All circuit cards in the DPIM2 are sensitive to Electrostatic Discharge (ESD). ESD damage can be caused by voltage levels that cannot be felt by humans. When working on the DPIM2, ALWAYS wear an ESD wrist strap to ground any possible electrostatic charge. The strap should be worn around the wrist with the alligator clip securely attached to the DPIM chassis. Refer to [Figure 2](#).



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Figure 2. Electrostatic Discharge Wrist Strap (Tool Number 7744 Shown)

Using a Torx Plus™ T25 bit, remove twenty-six (26) M5x18mm machine screws that secure the Main Cover to the DPIM Housing (refer to [Figure 3](#)). Set the screws aside for reassembly. Remove the Main Cover. Discard the cover gasket.



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Figure 3. DPIM Main Cover

Diagnosis:



NOTE: Complete the DPIM Check Sheet prior to initiating DPIM repairs to help determine if additional components are damaged. All cables (AC and DC) must be removed from the DPIM prior to taking measurements shown on the DPIM Check List. For additional information, refer to H 40/50 EP™ System Troubleshooting Manual (TS5812EN).



NOTE: For assistance regarding the troubleshooting of BCA Cards, contact Allison TAC at (800) 252-5283.

Scenario 1:

Condition: CAN Issues

DTC 66-31 (CAN Link Lost with Inverter A Long Timeout)

DTC 66-32 (CAN Link Lost with Inverter B Long Timeout)

1. If CAN link lost codes are active for both inverter A and B, then the issue is likely external to the DPIM or the DPIM is not receiving the 12V wakeup.
2. If only one (1) inverter has CAN link codes, the BCA card on that inverter may need to be replaced.

Scenario 2:

Condition: Fuse (10-40A) for 12V DPIM power or fuse (10A) for 12V DPIM wakeup fails whenever the DPIM 24-way connector is plugged in.

1. Check for smoke damage.
2. Inspect the BCA cards for damaged components (refer to [Figure 4](#)). Replace BCA card if damage is discovered and verify the repair. If damage is NOT found, continue troubleshooting per the below steps until the failed component is identified.

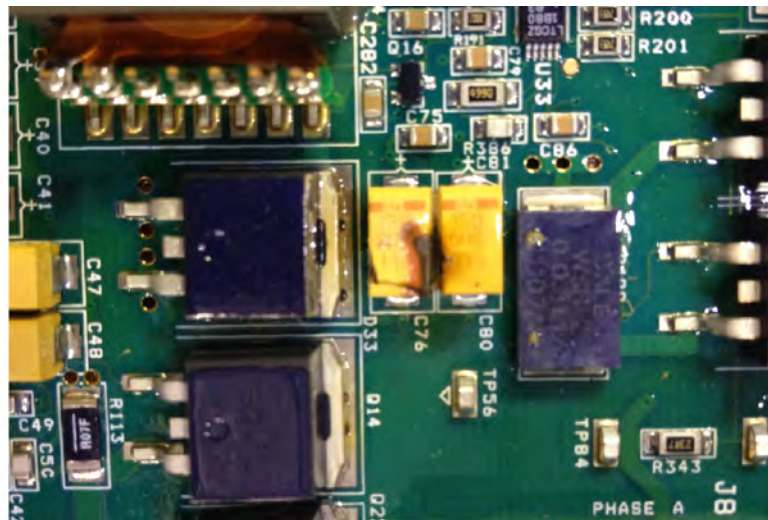
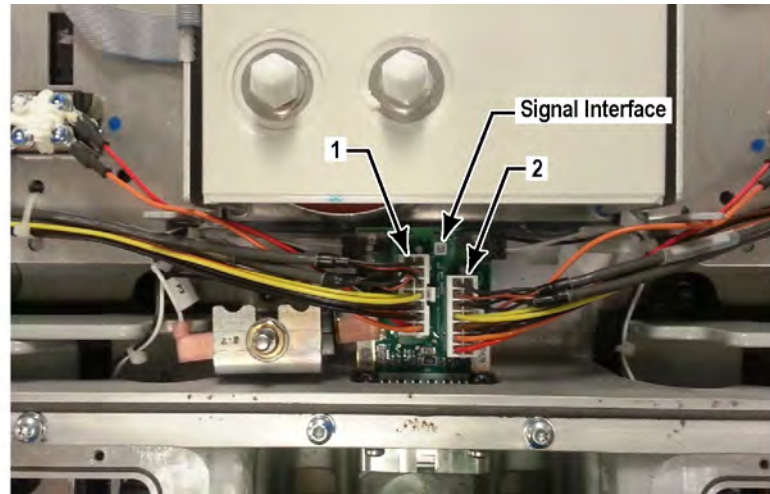


Figure 4. Damaged BCA Card

3. Isolate each of the low voltage circuits of each inverter by removing the two (2) white connectors from the signal interface. Refer to [Figure 5](#).



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Figure 5. Signal Interface Connectors

- a. Plug in the OEM 24-way connector with the two (2) internal harness connectors removed from the Signal Interface. If the 10A fuse fails again, the Signal Interface may need to be replaced.
- b. Plug the white A-Inverter connector into the Signal Interface and “Key On” the bus.
 - If the 10A fuse fails again, the issue is with the A-Inverter.
 - If the 10A fuse does NOT fail, connect the connector for the B-Inverter while leaving the white A-inverter connector mated and “Key On” the bus to determine if the B-Inverter is causing the 10A fuse failure.
4. After determining which inverter is causing the 10A fuse to fail, disconnect the three (3) ribbon cables going to the Gate Drives (refer to [Figure 6](#)).

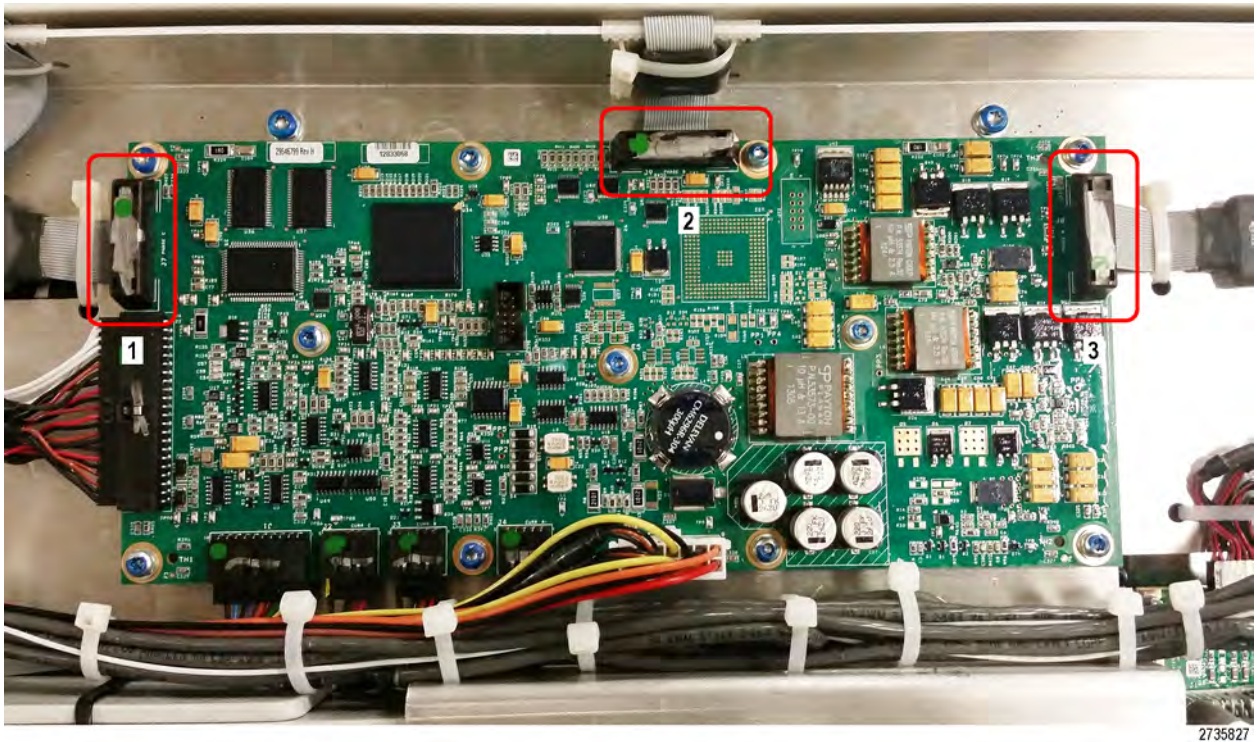


Figure 6. BCA Card Ribbon Cables

- a. Use the handle of Tab Bending Tool P/N J-51586 to disengage and remove the three (3) cable strain relief caps from the BCA card ribbon cable connectors (refer to [Figure 7](#)).



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Figure 7. Removing Cable Strain Relief Caps

- b. Press the tabs down on both sides of the BCA Card Connector to release the ribbon cable connector (refer to [Figure 8](#)).



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Figure 8. Releasing the BCA Card Ribbon Cable Connector



CAUTION: Do NOT pull on the wires when removing the ribbon cable connectors. Doing so may pull the pins out of the connector.

5. "Key On" the bus. If the 10A fuse fails, replace the BCA Card.
6. If the 10A fuse for 12V DPIM wakeup did NOT fail with the three (3) BCA ribbon cables disconnected, perform the following:
 - a. Reconnect only ONE ribbon cable connector and "Key On" the bus.
 - (1) If the 10A Fuse does NOT fail, "Key Off" the bus and go to Step 6b.
 - (2) If the 10A fuse fails, replace *that* phase SKiM Module and GATE Drive Card.
 - b. Repeat Step 6a for each of the remaining ribbon cable connectors.



NOTE: Refer to SIL 1-EP-15 (Replacing SKiM Module and GATE Drive Card Inside of the Dual Power Inverter Module 2 (DPIM2)).

BCA Card Removal

1. Remove three (3) ribbon cable retainers from the BCA Card as follows (refer to [Figure 9](#)):

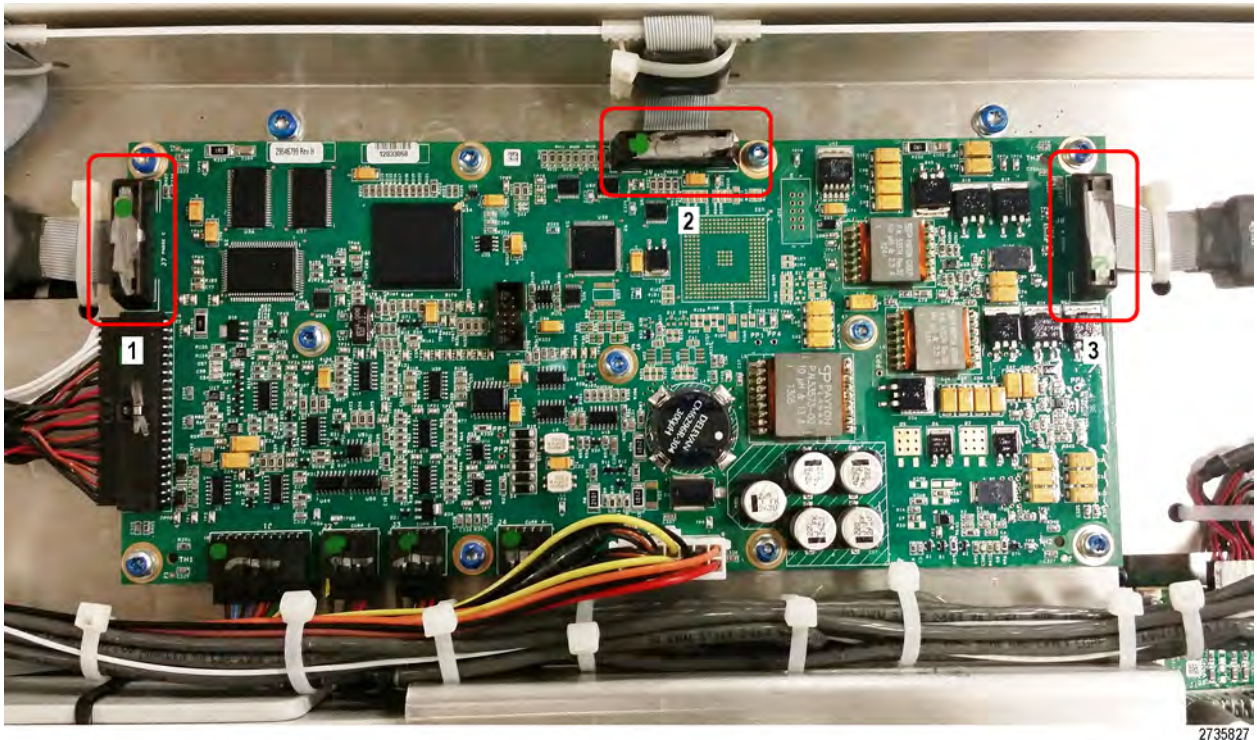
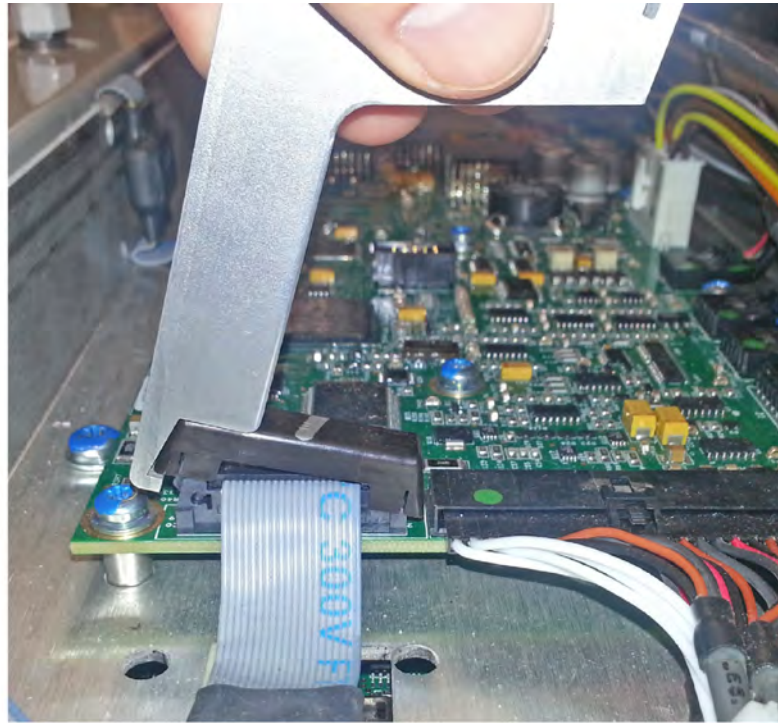


Figure 9. BCA Card Ribbon Cable Retainer Locations

- a. Use the handle of Tab Bending Tool J-51586 to disengage and remove the three (3) cable strain relief caps from the BCA Card ribbon cable connectors (refer to [Figure 10](#)).



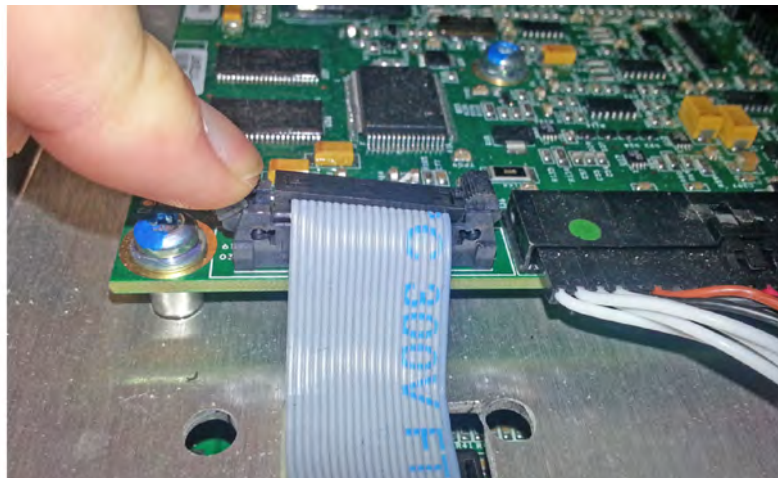
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Figure 10. Cable Strain Relief Cap Removal

- b. Press the tabs down on both sides of the BCA Card Connector to release the ribbon cable connector (refer to [Figure 11](#)).



CAUTION: Do NOT pull on the wires when removing the ribbon cable connectors. Doing so may pull the pins out of the connector.



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Figure 11. Releasing the BCA Card Cable Connector

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2. Label the three (3) current sensor harnesses to ensure they are connected to the correct location during reassembly (refer to [Figure 12](#)).

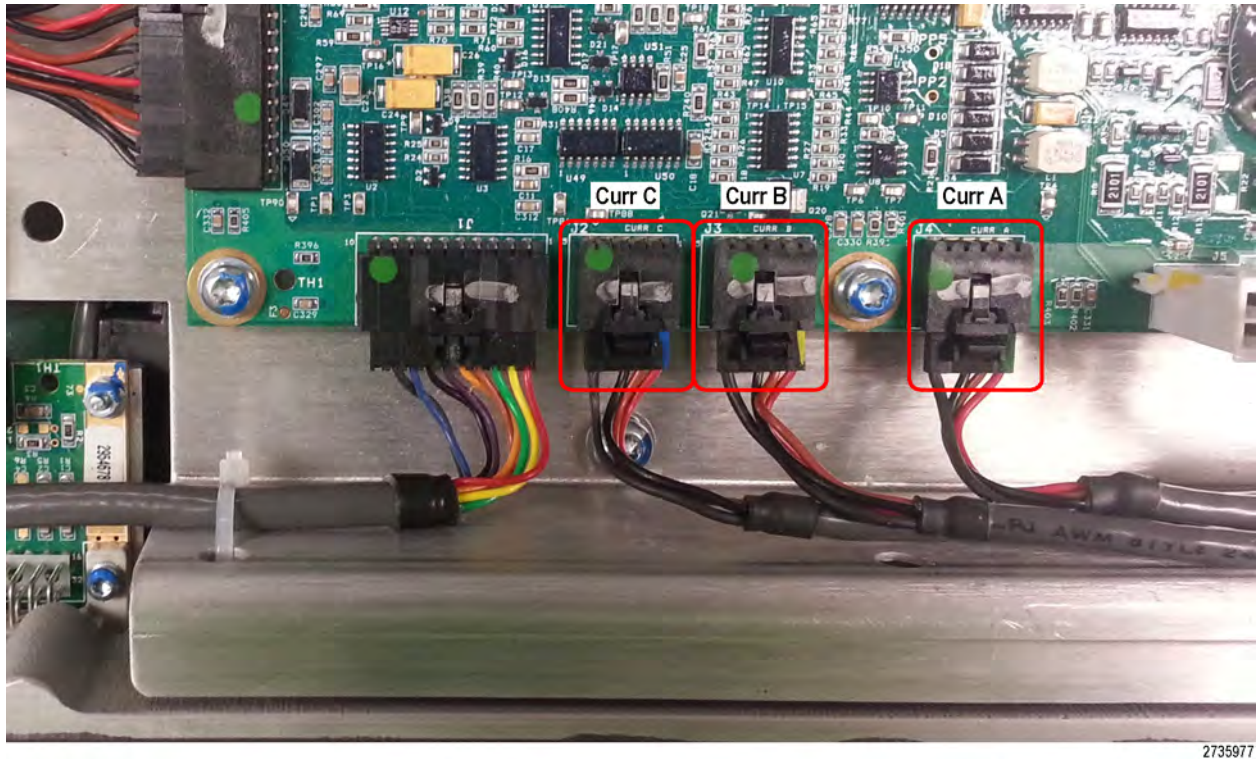


Figure 12. Labeling the Three (3) Current Sensor Harness Locations

3. Remove five (5) wire harness connectors from the circuit card surface mount connectors by gently depressing the retaining tab with a pick or small flat blade screw driver (refer to [Figure 13](#)).



NOTE: Use care to avoid bending or damaging the circuit card connectors.

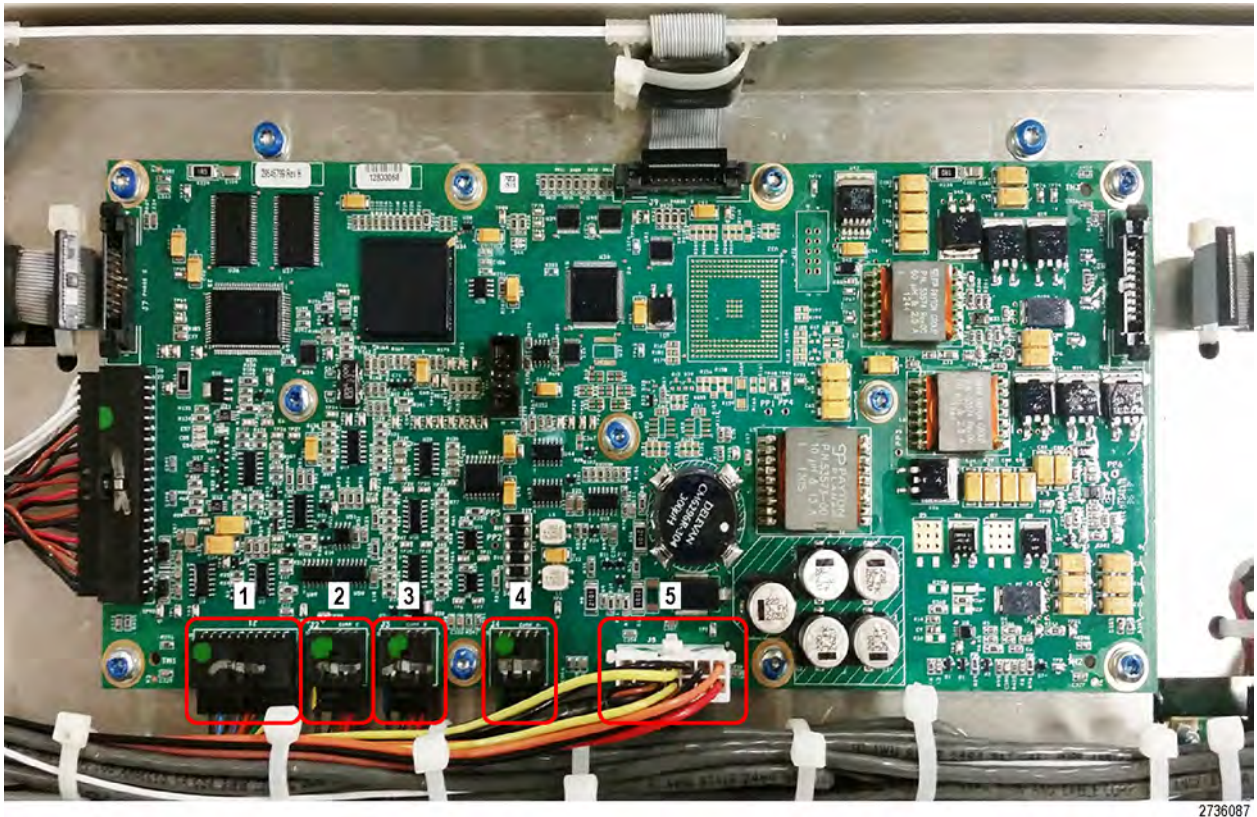
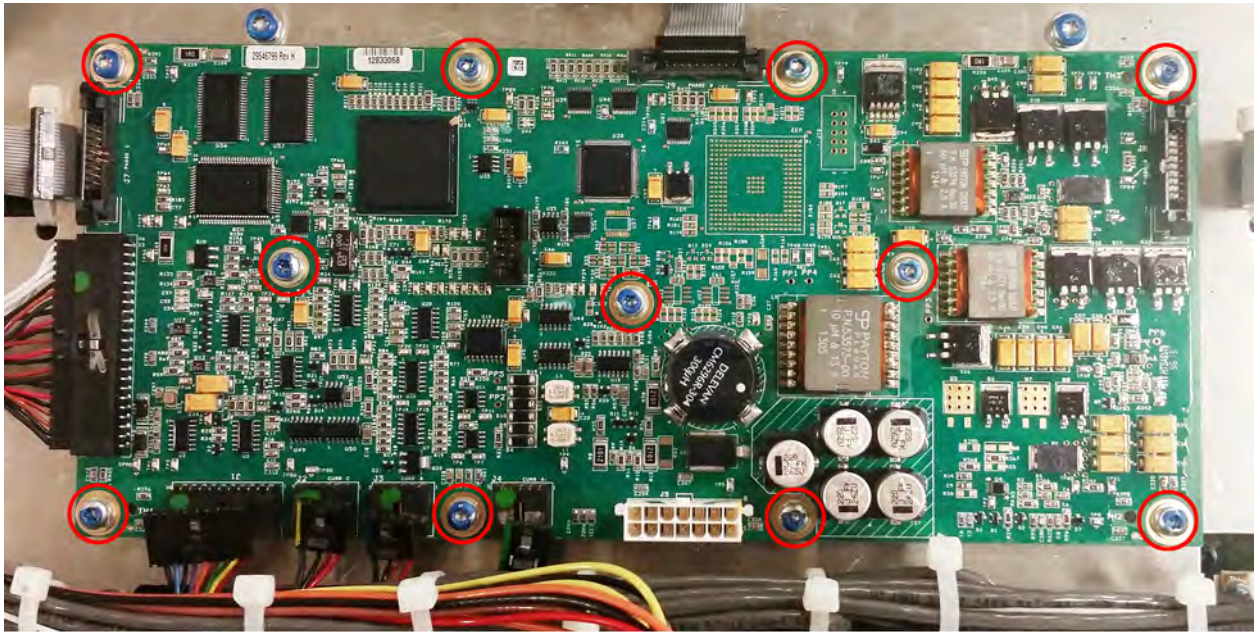


Figure 13. Five (5) Wire Harness Connector Locations

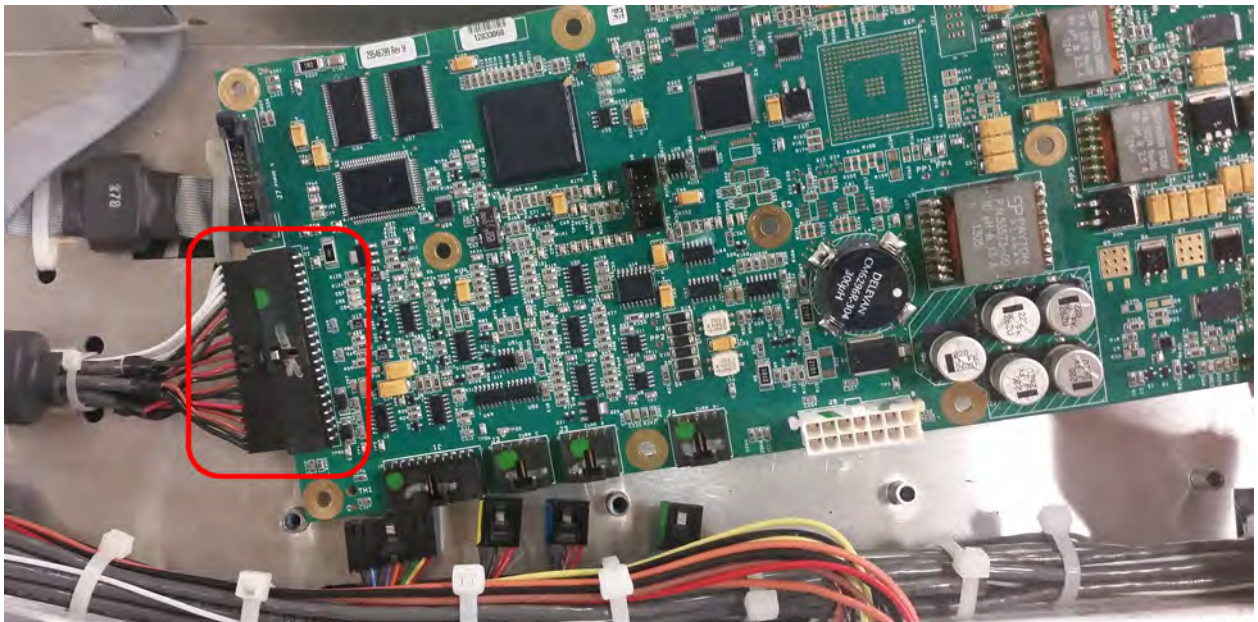
4. Using a Torx Plus™ T20 bit, remove the eleven (11) M4x14mm screws securing the BCA Card to the BCA Mounting Shelf (refer to [Figure 14](#)). The BCA Card should no longer be fastened to the BCA mounting shelf.



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Figure 14. BCA Card Mounting Screw Locations

5. Move the BCA Card to allow for easier removal of the one (1) remaining connector (refer to [Figure 15](#)). Remove the defective BCA Card from the DPIM.



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Figure 15. BCA Card Connector Location

Installation of New BCA Card and Main Cover



CAUTION: The Inverter A and Inverter B BCA cards are NOT interchangeable. Ensure that the correct part number is used for the BCA Card being replaced. Although the hardware is identical, the base programming previously loaded into each card is unique to Inverter A or Inverter B. The SID MUST be re-flashed when a BCA Card is replaced.



NOTE: To allow ease of installation, do NOT mount the BCA Card to the BCA Shelf until after the wiring harnesses are connected.

1. Connect the nine (9) wiring harnesses to the BCA Card (refer to [Figure 16](#)).

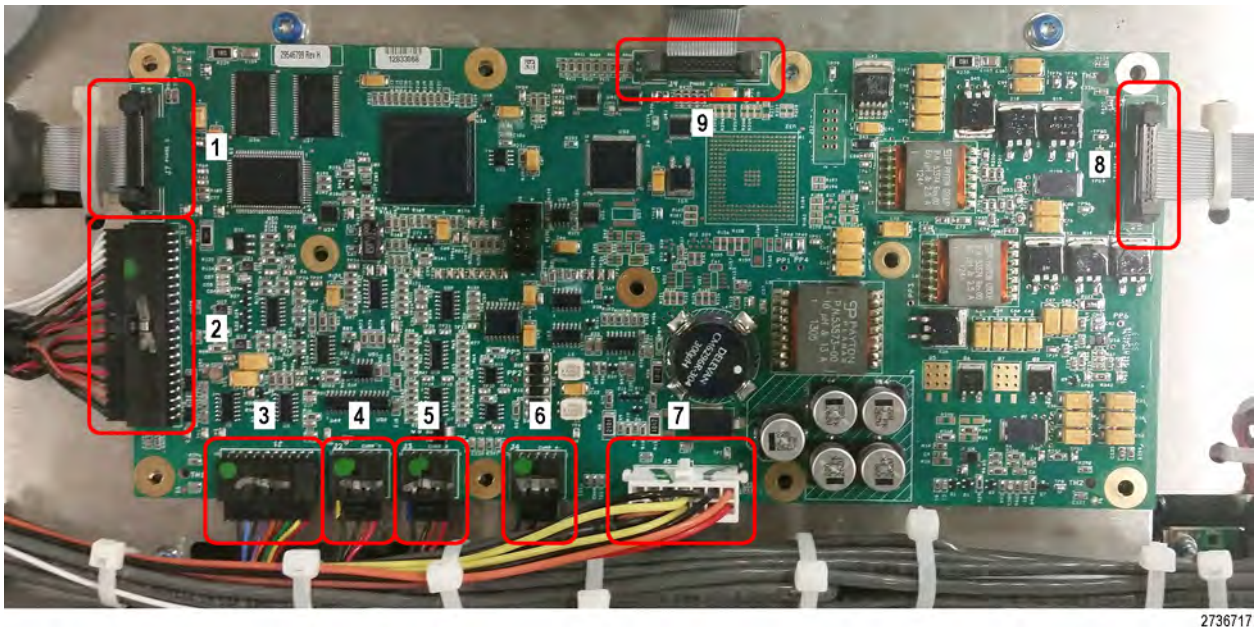


Figure 16. BCA Card Wiring Harness Locations

2. Install the three (3) ribbon cable retainers on the BCA card (refer to [Figure 17](#)).

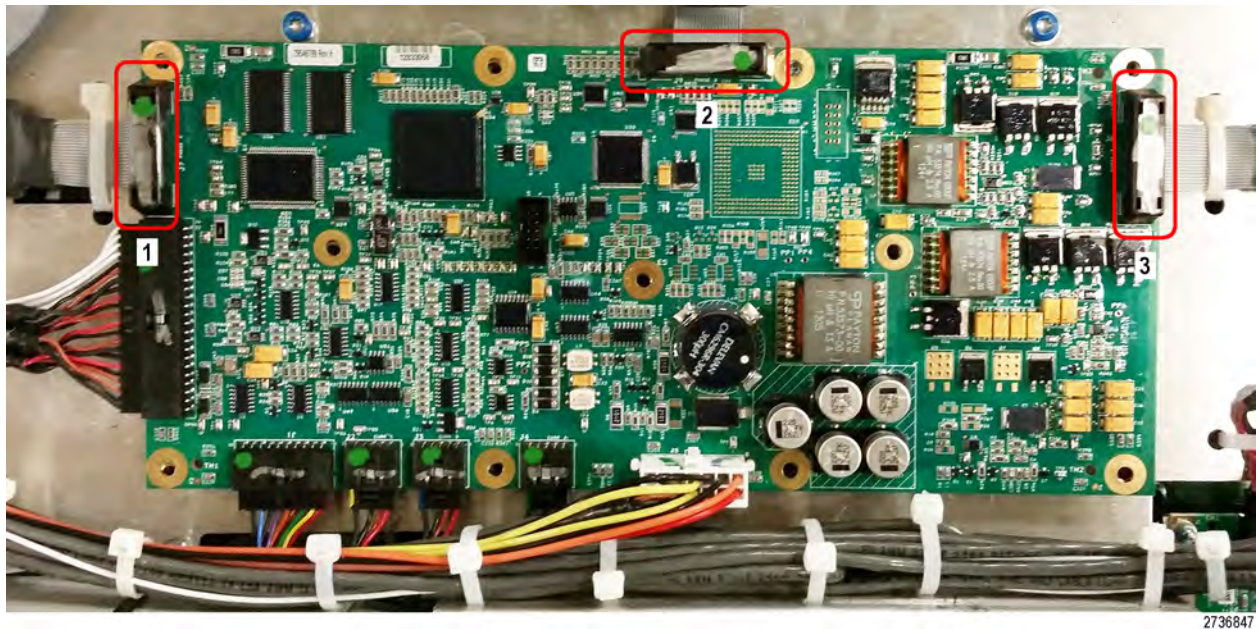


Figure 17. BCA Card Ribbon Cable Retainer Locations

3. Using a Torx Plus™ T20 bit, install the eleven (11) M4x14mm screws securing the BCA Card to the BCA Mounting Shelf (refer to [Figure 18](#)). Torque the eleven (11) M4x14mm screws to 1.2-1.5 N·m (11-13 lb in).

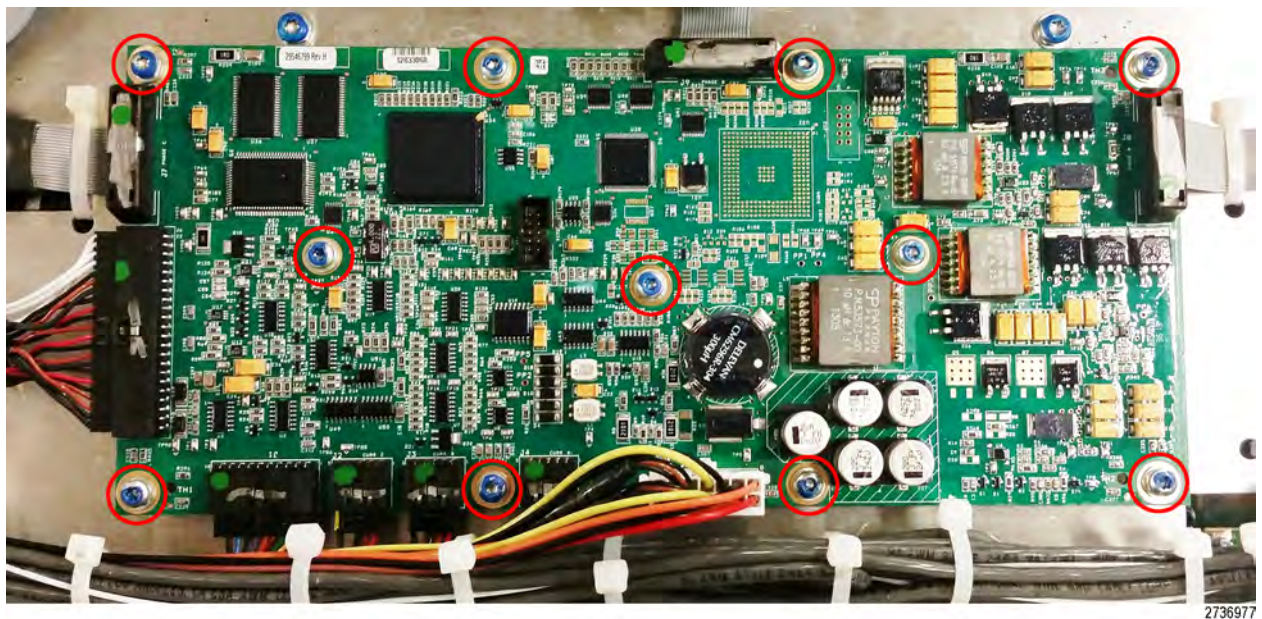


Figure 18. BCA Card Mounting Screw Locations

4. Install new Cover Gasket P/N 29540714. Using a Torx Plus™ T25 bit, install and finger tighten the twenty-six (26) M5x18mm machine screws that secure the Main Cover to the DPIM Housing (refer to [Figure 19](#)). Torque the screws to 3.1-3.5 N·m (27-31 lb in).



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Figure 19. DPIM Main Cover



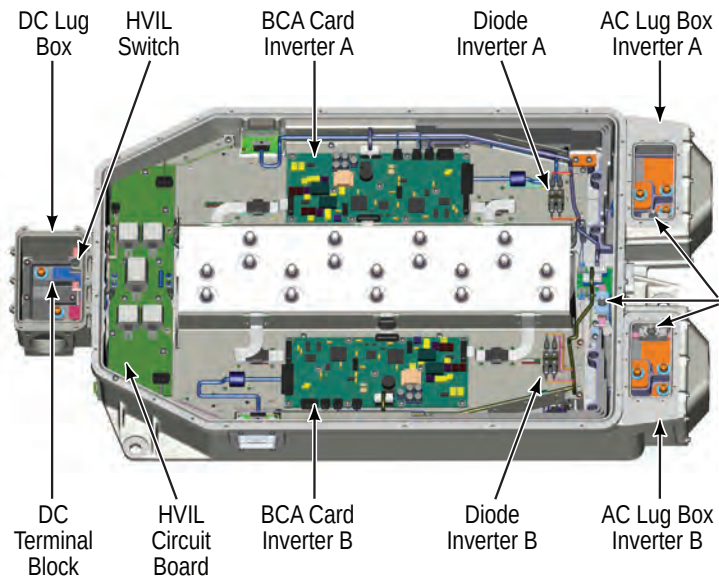
NOTE: For additional information refer to H 40/50 EP™ System Service Manual SM3602EN Appendix E.

5. Complete the DPIM check sheet again to verify the repair before installing the DPIM on the bus.
6. After installing the DPIM on the bus, re-flash the SID to calibrate the new BCA Card.

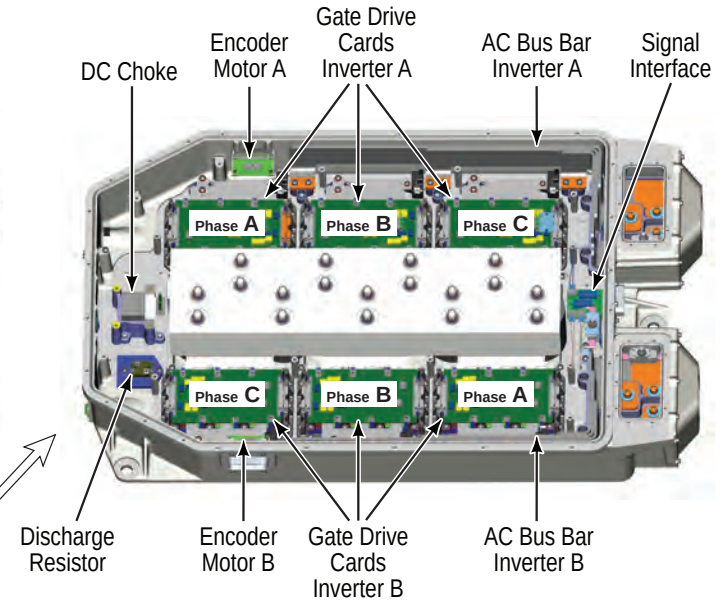
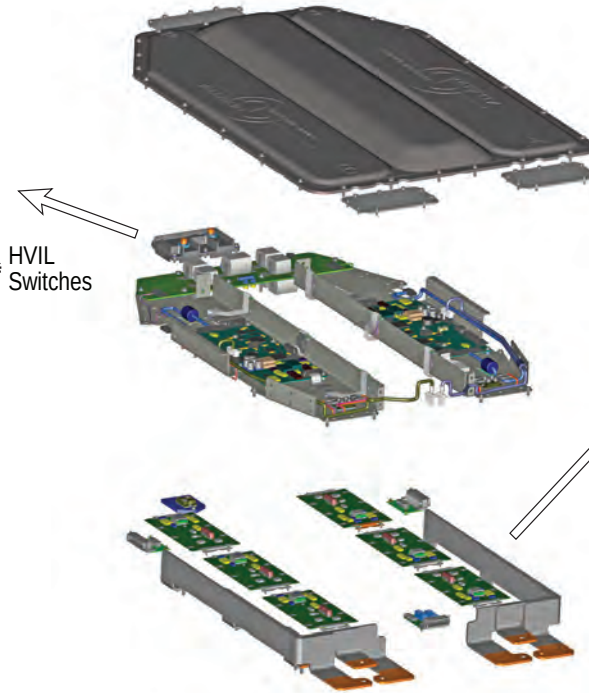
NOTE: This illustration is to be used for identifying the name and location of components within the Dual Power Inverter Module 2 (DPIM2). It is not intended to be used for disassembly and assembly procedures.

DPIM2

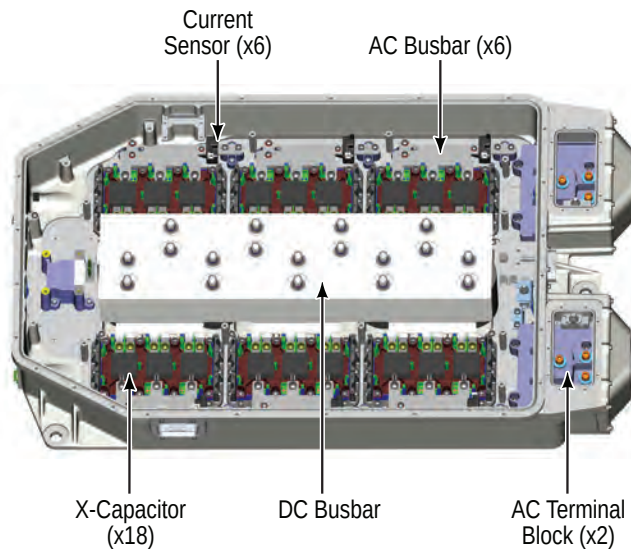
Levels of Assembly



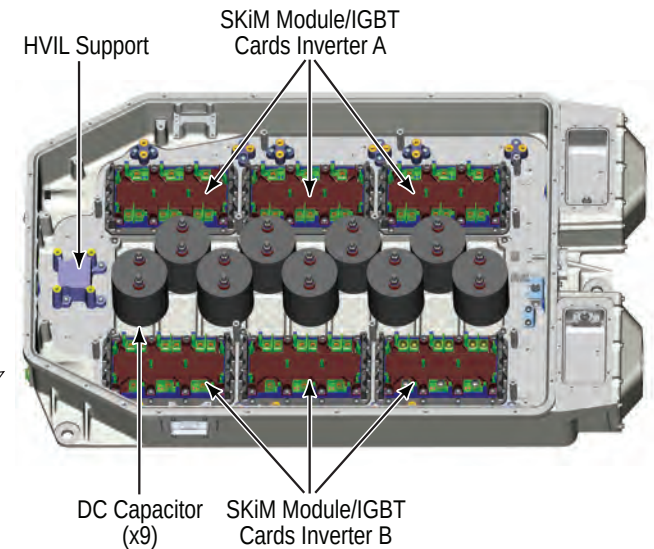
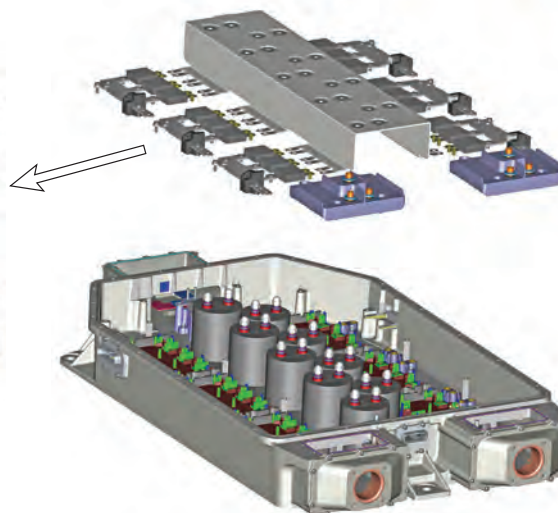
Level 1



Level 2



Level 3



Level 4