

Revisions to this document are noted
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SIL 22-EP-16, Rev. B
September, 2018
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SUBJECT: Replacing Current Sensors Inside 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
- 6mm Hex Key
- 8mm Hex Socket
- 11mm Hex Socket
- Loctite® 242 thread locking compound
- Loctite® 425 thread locking compound

Parts Required

- Current Sensor and Harness Service Kit P/N 29561156 and/or P/N 29561157 (refer to following notes)

Introduction:

This Service Information Letter (SIL) announces the availability of the Current Sensor and Harness Service Kit electronic service kit P/N 29561156 and electronic service kit P/N 29561157 and includes the procedure to replace the Current Sensors located inside the DPIM2. The availability of these kits eliminates the need for a complete DPIM replacement under certain failure conditions.

Electronic Service Kits P/N 29561156 and P/N 29561157 replace Electronic Service Kit P/N 29556287. These two new kits (P/N 29561156 and P/N 29561157) allow for the current sensors to be mounted to the DPIM2 housing while the old kits (P/N 29556287) mounted the current sensors on the AC busbars. This Service Information Letter (SIL) 22-EP-16 is to be referenced when installing Electronic Service Kits P/N 29561156 and P/N 29561157 in a DPIM2.

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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.



NOTE: It is still acceptable to use Electronic Service Kit P/N 29556287 to repair a DPIM2 until stock of P/N 29556287 is depleted. Reference the latest version of Service Information Letter (SIL) 12-EP-14 when installing Electronic Service Kit P/N 29556287 in a DPIM2.



NOTE: P/N 29561156 is required for inverter A side repairs. P/N 29561157 is required for inverter B side repairs.



NOTE: P/N 29561156 replaces P/N 29557646. P/N 29561157 replaces P/N 29557647. The two (2) new kits are identical to the old kits but both new kits now contain one (1) tube of NyoGel® 760G lubricant preventing the need to separately order P/N 29559015.



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



NOTE: Using one kit (P/N 29561156) will provide the parts necessary to replace Current Sensors on Inverter A. Using one kit (P/N 29561157) will provide the parts necessary to replace Current Sensors on Inverter B side. When replacing a failed Current Sensor, these kits will include components to replace current sensors and harnesses on only ONE side of the DPIM (Inverter A or B).



NOTE: Two kits (P/N 29561156 and P/N 29561157) are required in order to replace all six (6) Current Sensors in the DPIM.

Refer to Table 1 and Table 2 for Current Sensor and Harness Service Kit contents.

Table 1. Current Sensor and Harness Service Kit - Inverter A

Part Name	Part Number	Quantity
Service Kit - A	29561156	1
Electronic Service Kit	29557646	1
Harness Assembly	29547593	3
Inverter A Current Sensor Assembly	29557481	3
Gasket, Cover	29540714	1
Screw, M4 x 16	29557587	6
Tool, Alignment	29558018	1
Zip Tie – 4"	*	10
Zip Tie – 8"	*	5
Tube, NyoGel® 760G lubricant	29559015	1
* Zip Tie material to be nylon 6/6 or approved equivalent.		

Table 2. Current Sensor and Harness Service Kit - Inverter B

Part Name	Part Number	Quantity
Service Kit - B	29561157	1
Electronic Service Kit	29557647	1
Harness Assembly	29547593	3
Inverter B Current Sensor Assembly	29557482	3
Gasket, Cover	29540714	1
Screw, M4 x 16	29557587	6
Tool, Alignment	29558018	1
Zip Tie – 4"	*	10
Zip Tie – 8"	*	5
Tube, NyoGel® 760G lubricant	29559015	1
* Zip Tie material to be nylon 6/6 or approved equivalent.		



NOTE: Perform the necessary diagnosis prior to ordering Current Sensor and Harness Service Kit, P/N 29561156 or P/N 29561157.



NOTE: The DC lug box cover, lug box cover screws, and lug bolts are available as service parts. Refer to the Parts Catalog PC3717EN for part number information.



NOTE: The DPIM Main Cover EMI Gasket (P/N 29540714 - Qty. 1, included in kit P/N 29561156 and P/N 29561157), 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.

Warranty Claim Information:

1. When a Current Sensor and Harness Service Kit, P/N 29561156 or P/N 29561157, is utilized to repair a failed DPIM under warranty, use Current Sensor and Harness Service Kit P/N 29561156 or P/N 29561157 as the PFP and claim the kit part number in the Service Parts subsection of the AWAARE claim.
2. The replacement of Current Sensors on a DPIM2 under Allison supplied warranty must be approved by Allison H 40/50 EP™ Service Engineering prior to removing DPIM Main Cover.

Diagnosis:

1. Check if ANY of the following Diagnostic Trouble Codes (DTCs) have been logged:
 - DTC 73-23
 - DTC 74-23
 - DTC 73-24
 - DTC 74-24
 - DTC 73-25

- DTC 74-25
- DTC 73-26
- DTC 74-26
- DTC 73-34
- DTC 74-34
- DTC 73-51
- DTC 74-51



NOTE: The DTCs listed above will identify which current sensor has failed.

2. Record any DTCs that are logged.
3. If any of the DTCs listed in Step 1 are logged, troubleshoot them per H 40/50 EP™ System Troubleshooting Manual TS5812EN. In addition to troubleshooting the aforementioned DTCs, a DPIM Check List should be completed. (Refer to the DPIM Check List appendix of the troubleshooting manual.) A failed Current Sensor will not cause any of the DPIM Check List measurements to be out of specification. If any one of these measurements are out of specification, additional DPIM components may need to be replaced.



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.



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: Allison Transmission, Inc. requires the removal of the DPIM from the vehicle prior to Current Sensor 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.



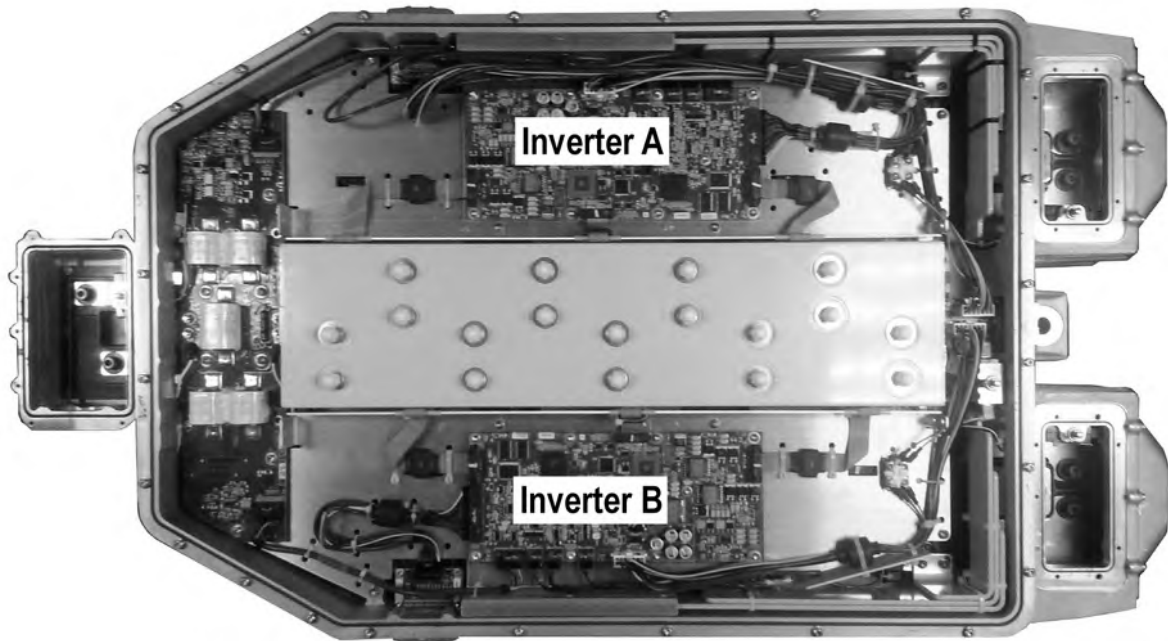
NOTE: The Current Sensor and Harness replacement should NOT be performed if smoke and/or water damage are present. Photograph the smoke and/or water damage and contact Allison TAC at (800) 252-5283.



NOTE: 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).



WARNING: Any conductive material (i.e. screws, bolts, nuts, etc.) can cause a short inside the DPIM that will result in permanent and irreversible DPIM damage. All hardware must be accounted for throughout the service procedure.



454519

Figure 1. DPIM2 (Main Cover and Lug Box Covers Removed)

The procedures contained in this SIL are organized into the following sections:

- Section 1: Removal of Main Cover and HVIL Circuit Card
- Section 2: Removal of BCA Card Mounting Shelf
- Section 3: Removal of the AC Busbar Assembly
- Section 4: Removal/Installation of Current Sensor (Inverter A Phase C and Inverter B Phase A)
- Section 5: Removal/Installation of Current Sensor (Inverter A Phases A and B, and Inverter B Phases B and C)
- Section 7: Installation of the AC Busbar Assembly
- Section 8: Installation of BCA Card Mounting Shelf
- Section 9: Installation of HVIL Circuit Card and Main Cover

Section 1: Removal of Main Cover and HVIL Circuit Card



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.



426411

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

1. 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.



421911

Figure 3. DPIM Main Cover

2. Exercising care, cut one (1) zip tie at location shown in Figure 4. Do NOT remove any zip ties that pass through the HVIL Circuit Card. Leaving the severed zip ties in place will provide a visual aid for zip tie locations during installation of the replacement circuit card.



422298

Figure 4. HVIL Circuit Card – Zip Tie Location

3. Cut the two (2) zip ties at locations shown in Figure 5 and remove them from the mounts. The zip tie mounts do NOT have to be removed from the DPIM Housing unless they interfere with the removal or installation of the HVIL circuit card.



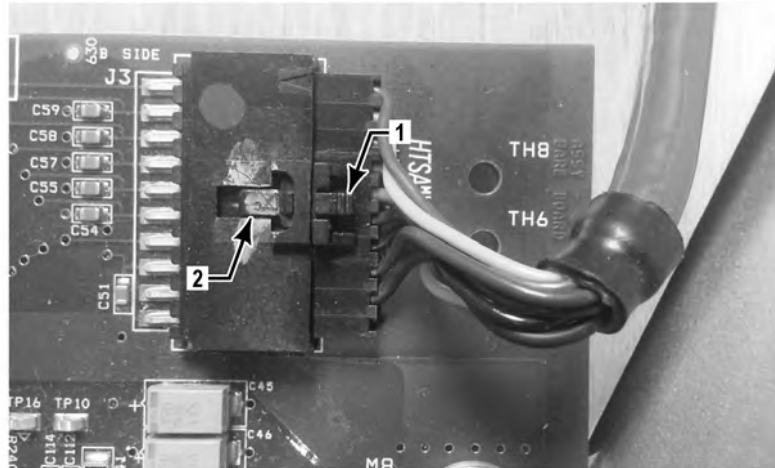
422327

Figure 5. HVIL Circuit Card – Two (2) Zip Tie Locations



CAUTION: Do NOT pull on the wires when removing connectors; doing so may pull the pins out of the connector.

4. When removing connectors, push down on the tab at Location 1 and push the harness out of the connector at Location 2 with a Pick or Small Flat Blade Screwdriver (refer to Figure 6).



454544

Figure 6. HVIL Circuit Card Connector Removal

5. Remove three (3) wire harness connectors from HVIL Circuit Card surface mount connectors by gently depressing the retaining tab with a pick or small flat blade screwdriver. Refer to Figure 7.



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



Figure 7. HVIL Circuit Card – Three (3) Harness Connector Locations



WARNING: Any conductive material (i.e. screws, bolts, nuts, etc.) can cause a short inside the DPIM that will result in permanent and irreversible DPIM damage. All hardware must be accounted for throughout the service procedure.

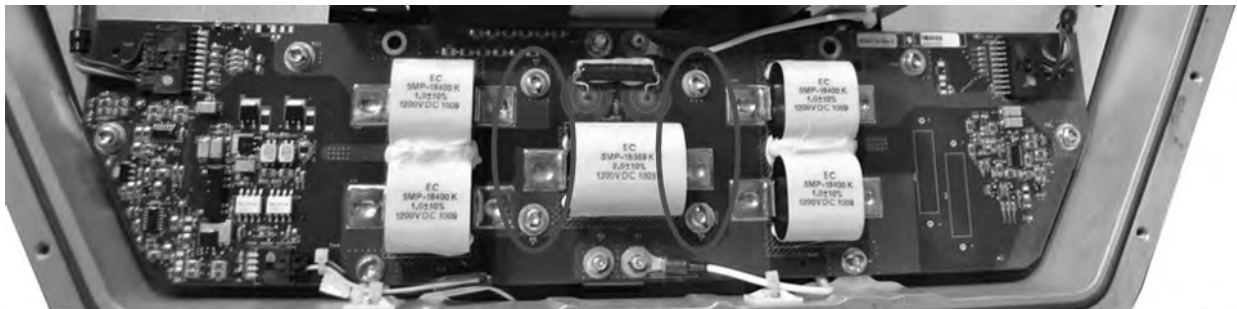
6. Using an 8mm socket, remove the four (4) M5 nut/washer assemblies as shown in Figure 8. Disconnect the two (2) wire ring terminals from the studs.



422390

Figure 8. HVIL Circuit Card – Four (4) Mounting Nut/Washer Locations (M5)

7. Using a Torx-Plus® T25 bit, remove the four (4) M5x30mm screws securing the HVIL Circuit Card as shown in Figure 9.



422540

Figure 9. HVIL Circuit Card – Four (4) Mounting Screw Locations (M5x30mm)

8. Using a Torx-Plus® T25 bit, remove the two (2) M5x14mm screws securing the HVIL Circuit Card as shown in Figure 10.



422564

Figure 10. HVIL Circuit Card – Two (2) Mounting Screw Locations (M5x14mm)

9. Using a Torx-Plus® T25 bit, remove the four (4) M5x22mm screws securing the HVIL Circuit Card as shown in Figure 11.



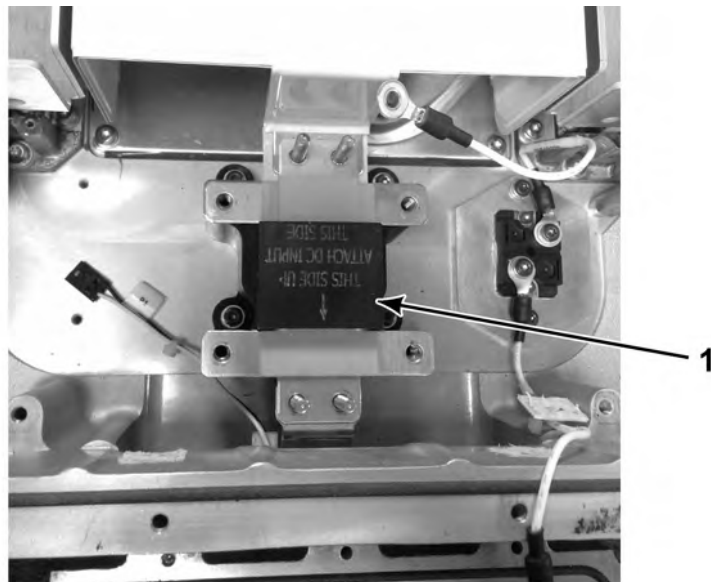
422586

Figure 11. HVIL Circuit Card – Four (4) Mounting Screw Locations (M5x22mm)

10. Lift the HVIL Circuit Card straight up and remove it from the DPIM Housing.
11. Verify that the choke is in place as shown in Figure 12.



NOTE: The choke may have adhered to the underside of the HVIL Circuit Card when it was removed. If this has occurred, reinstall choke to its proper location as shown in Figure 12. The choke must be installed with the arrow pointing toward the DC lug box.



437484

(1) – Choke

Figure 12. Verification of Choke Installation

Section 2: Removal of BCA Card Mounting Shelf

1. As required, carefully cut and remove the zip ties retaining the wire harnesses (refer to Figure 13).

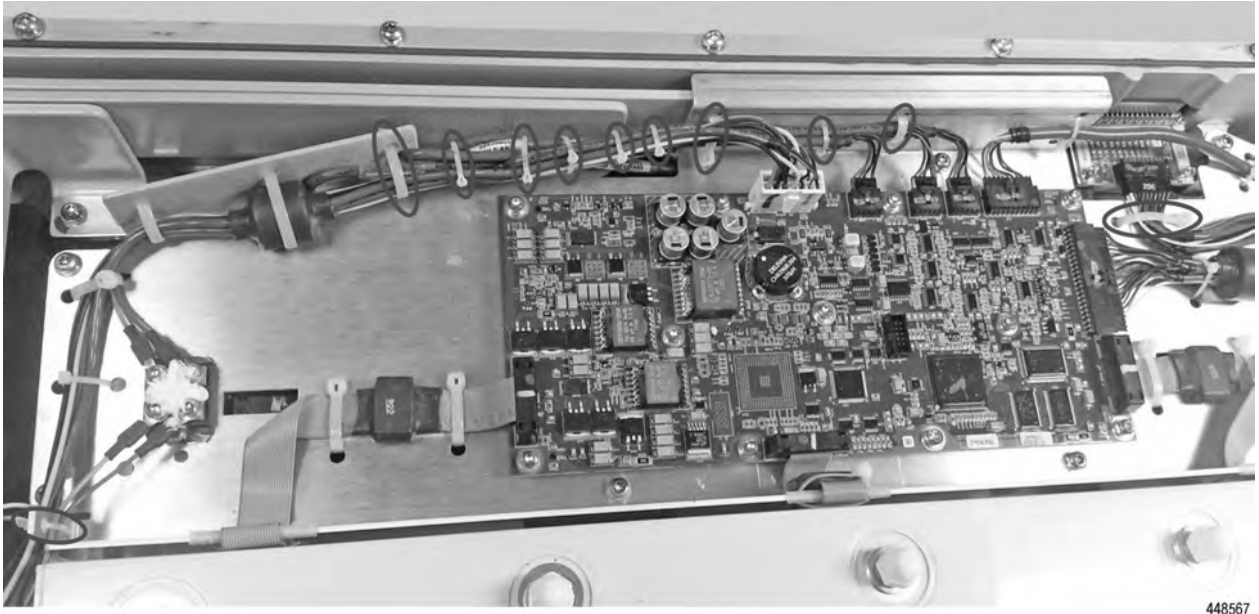


Figure 13. zip tie Locations

2. Remove five (5) wire harness connectors from circuit card surface mount connectors by gently depressing the retaining tab with a pick or small flat blade screwdriver (refer to Figure 14 and Figure 15).



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

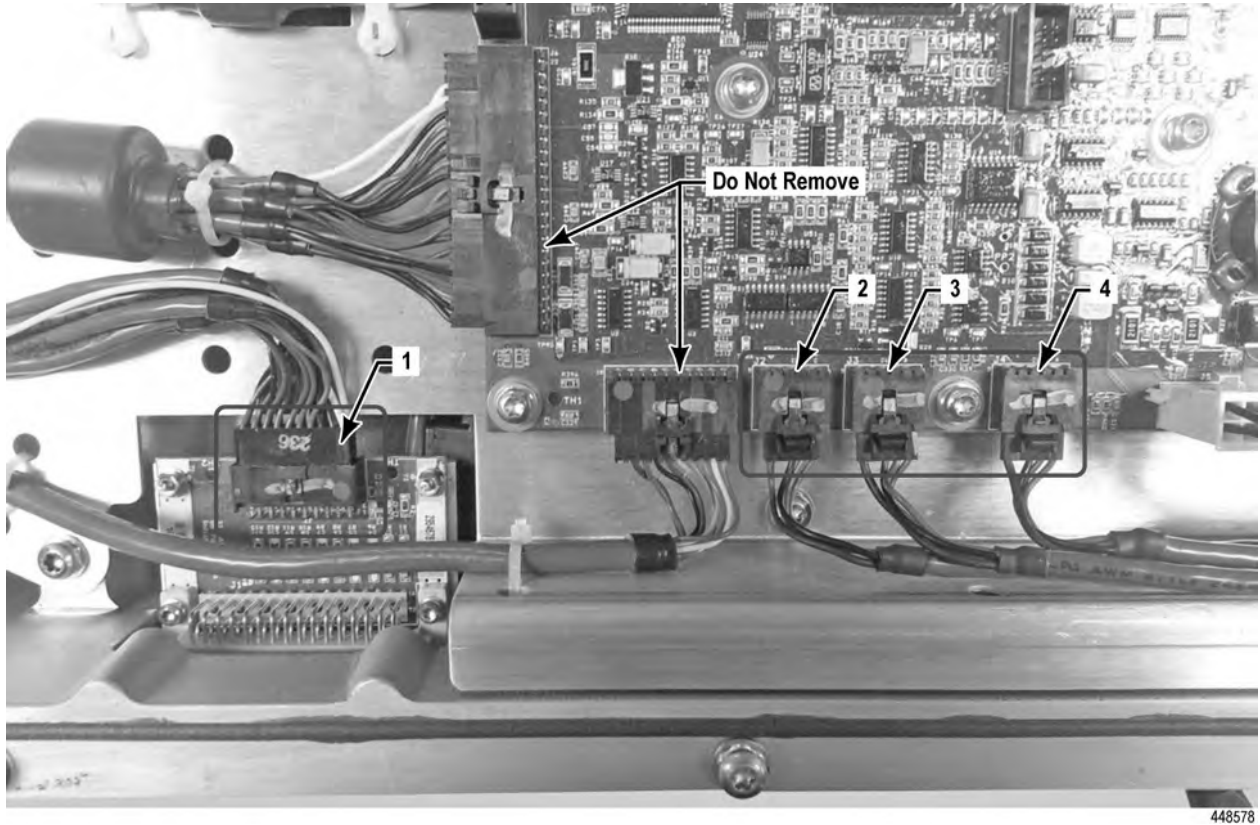


Figure 14. Wire Harness Connector Removal (4 Locations)

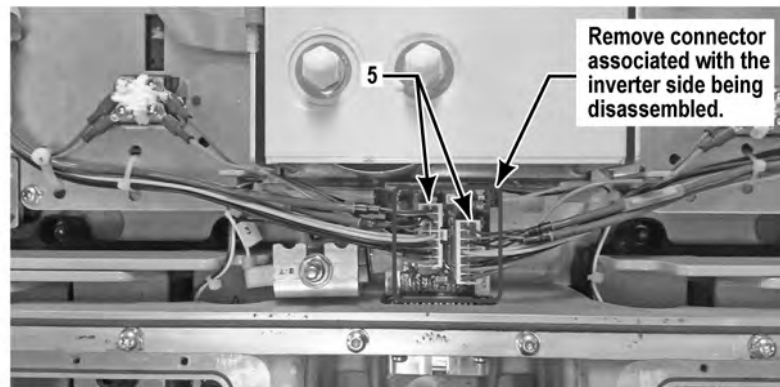


Figure 15. Wire Harness Connector Removal

3. Using a Torx-Plus® T25 bit, remove the seven (7) M5x14mm screws securing the BCA Mounting Shelf (refer to Figure 16).



NOTE: The BCA mounting shelf screws may twist off in the BCA standoffs during removal. Replacement screws (P/N 29540535) and BCA standoffs (P/N 29548554) may be needed.



NOTE: If BCA standoffs unthread from the chassis while removing screws, unthread each standoff/screw an equal amount to avoid stressing the BCA circuit card.

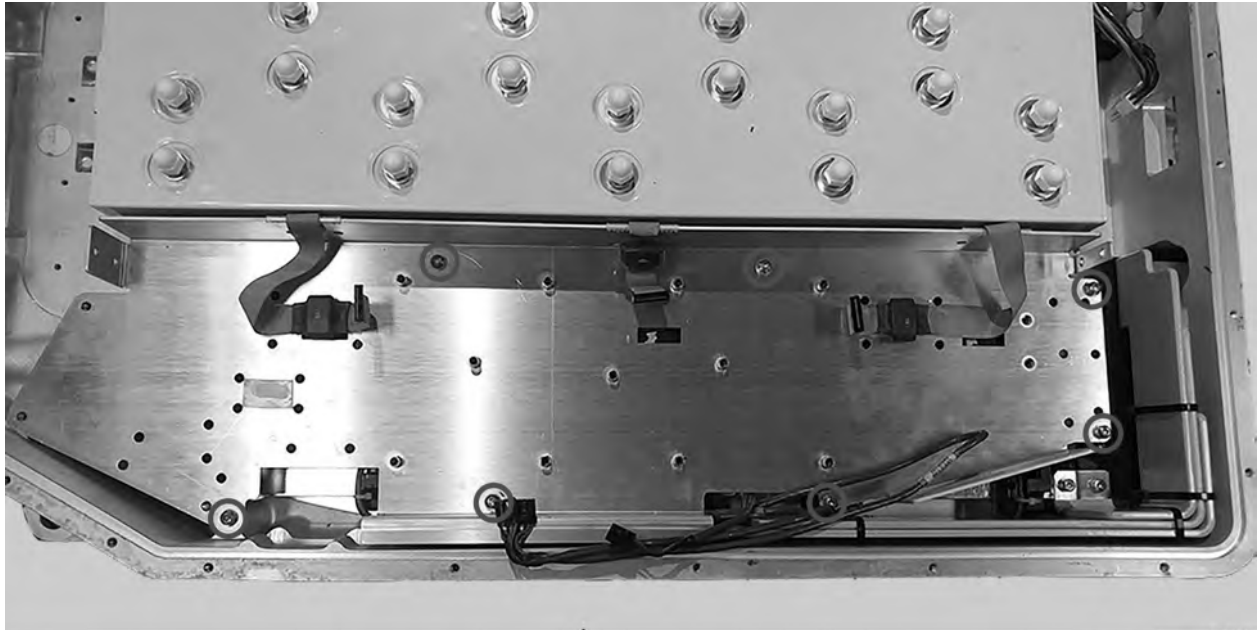


Figure 16. BCA Mounting Shelf Fastener Locations

4. Carefully lift the BCA Mounting Shelf and set in on the side of the chassis as shown in Figure 17.



NOTE: Three (3) harnesses are still connecting the BCA Card to the GATE Drive Cards. Do NOT relocate the BCA Mounting Shelf any farther than as shown in Figure 17.



NOTE: If any BCA standoffs are still attached to the shelf do not let the BCA standoffs touch the GATE drive circuit card.

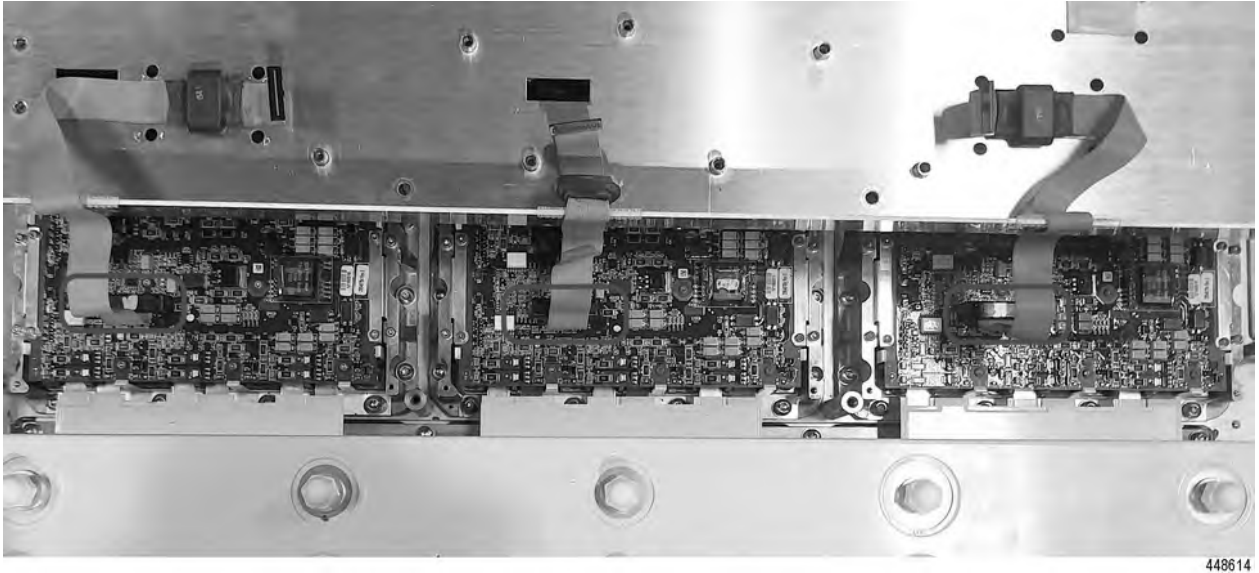


Figure 17. BCA Mounting Shelf (GATE Drive Card Cable Connectors Shown Circled)

5. Remove three (3) ribbon cable connectors from the GATE Drive Cards (refer to Figure 17) as follows:
 - a. Use the handle of Tab Bending Tool J-51586 to disengage and remove the cable strain relief cap (refer to Figure 18).

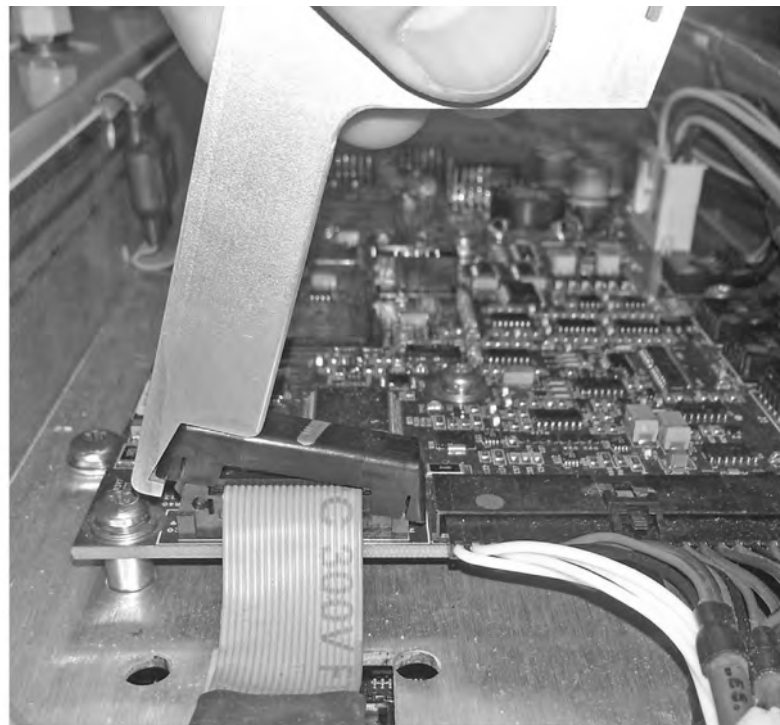
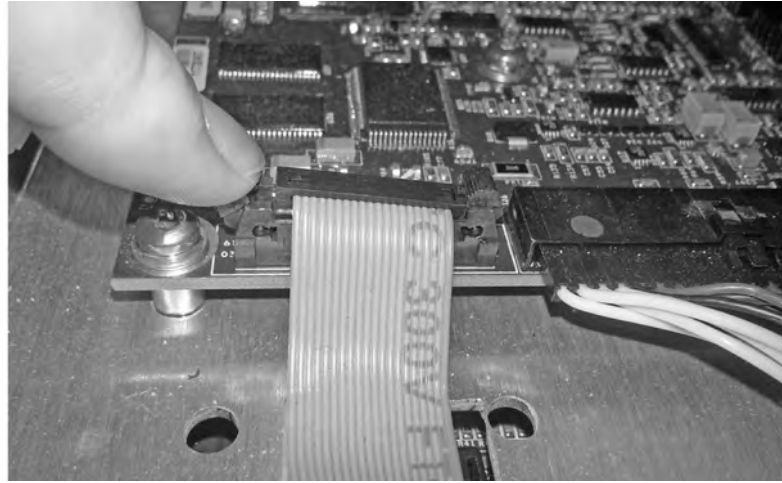


Figure 18. Cable Strain Relief Cap Removal (BCA Cable Card Connector Shown for Clarity)

- b. Press the tabs down on both sides of the GATE Drive Card Connector to release the ribbon cable connector (refer to Figure 19).



448879

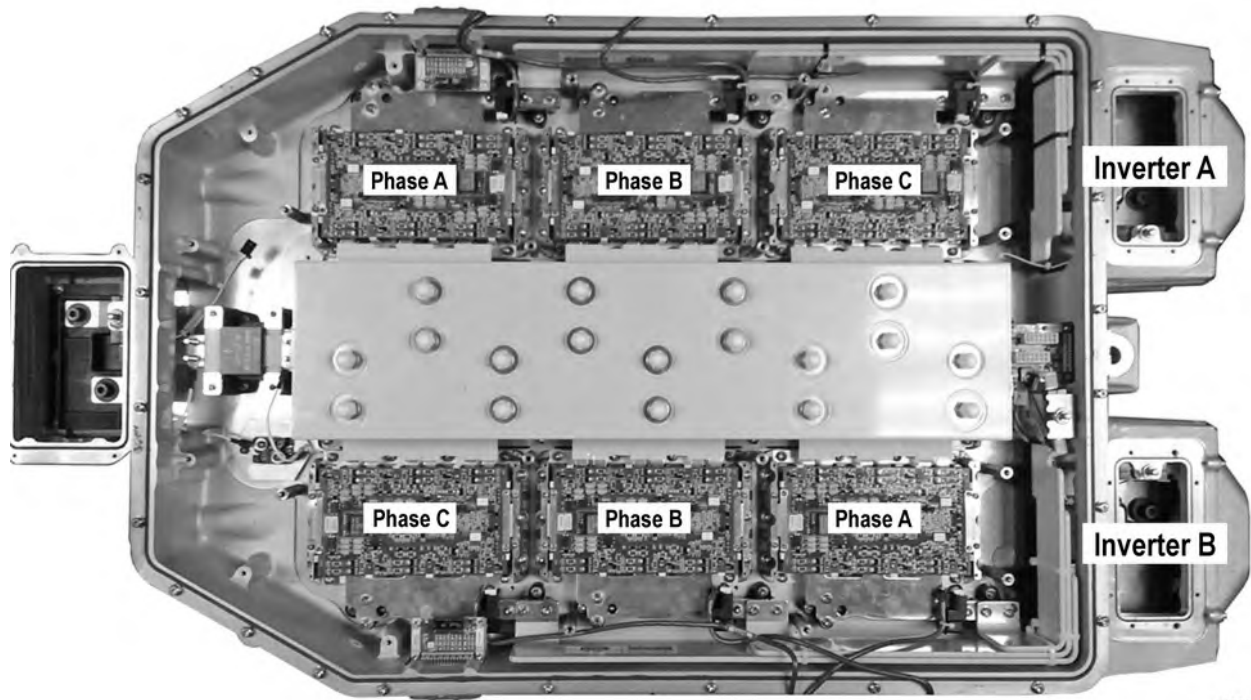
Figure 19. Releasing the GATE Drive Card Cable Connector (BCA Cable Card Connector Shown for Clarity)

6. Remove the BCA Mounting Shelf from the DPIM to gain access to the three (3) Current Sensors.

Section 3: Removal of the AC Busbar Assembly



NOTE: Refer to Figure 20 for DPIM2 Phase Locations.



448399

Figure 20. DPIM2 Phase Locations

1. Using a Torx-Plus® T25 bit, remove the six (6) M5x22mm screws (refer to Figure 21).

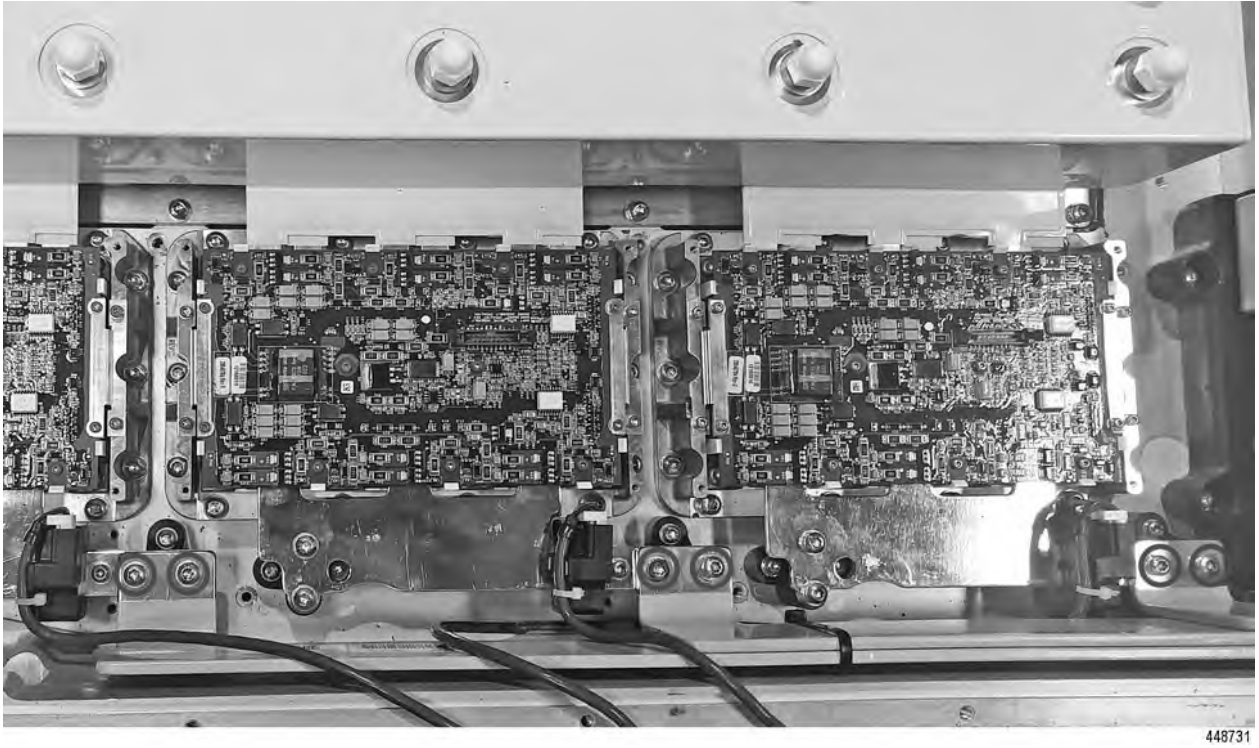


Figure 21. Mounting Screw Locations

2. Using a 6mm hex key, remove the three (3) M8 AC lug bolts (refer to Figure 22).

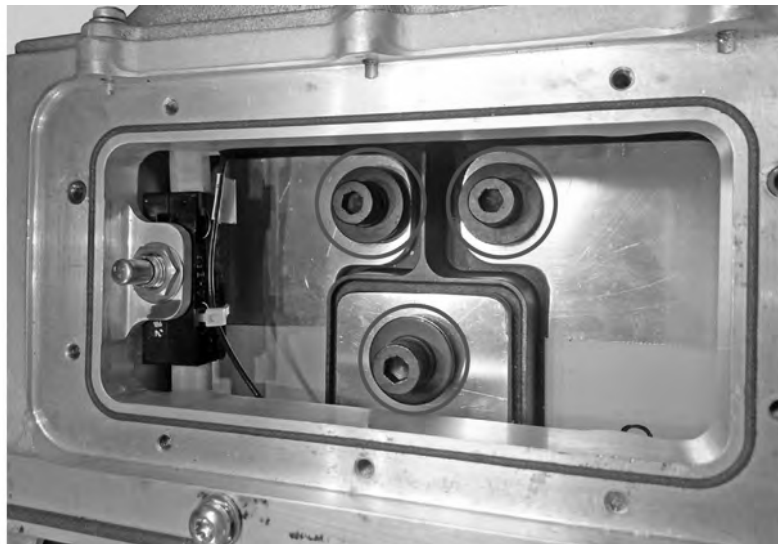


Figure 22. AC Lug Bolts

3. Remove the HVIL switch connector (refer to Figure 23).

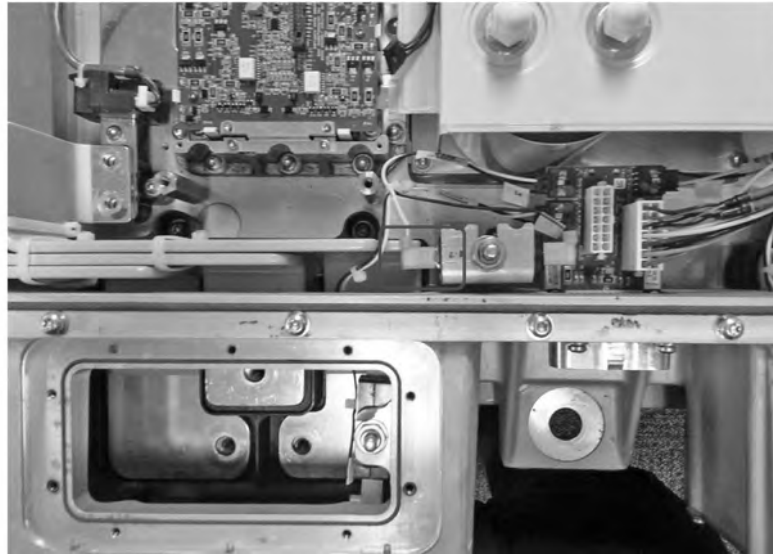


Figure 23. HVIL Switch Location

4. Carefully remove the AC Busbar Assembly by slightly lifting upward then outward from the AC Lug Box (refer to Figure 24).



CAUTION: Do not allow the AC Busbar Assembly to strike the HVIL Switch during the removal process.

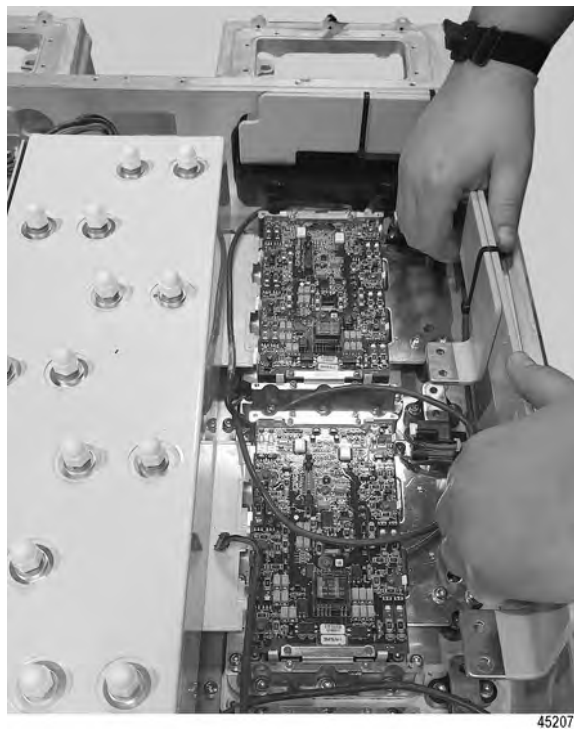


Figure 24. Removal of AC Busbar Assembly

Section 4: Removal/Installation of Current Sensor (Inverter A Phase C and Inverter B Phase A)

Current Sensor Removal

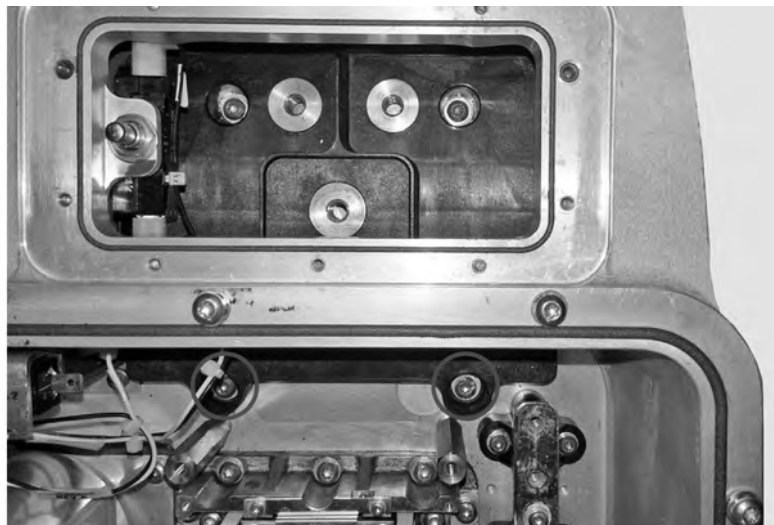
1. Using a Torx-Plus® T25 bit, remove the two (2) M5x22mm screws (refer to Figure 25).



452084

Figure 25. Location of Two (2) M5x22mm Screws

2. Using a Torx-Plus® T25 bit, remove the two (2) M5x18mm screws (refer to Figure 26).



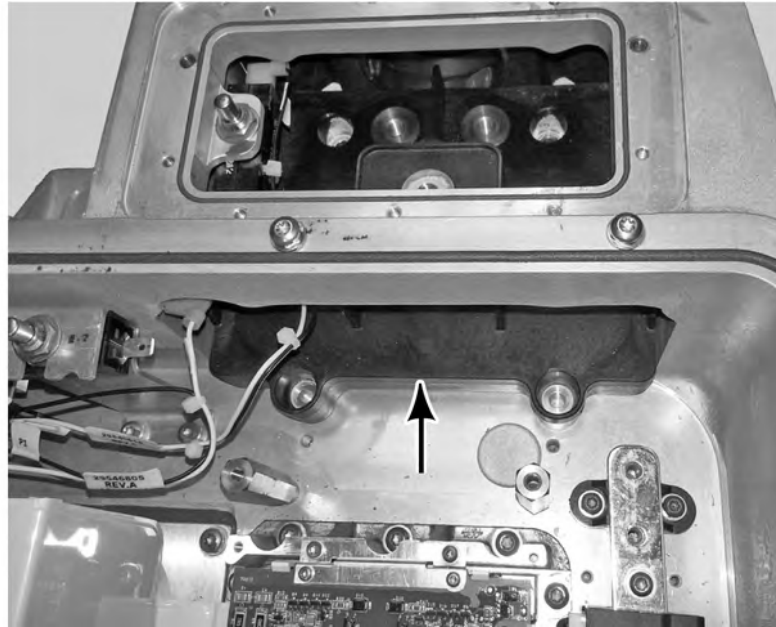
452093

Figure 26. Location of Two (2) M5x18mm Screws

3. Shift the AC terminal Block farther into the AC Lug Box (refer to Figure 27).



NOTE: Relocating the AC terminal Block will provide access for the removal of the AC Busbar Support.



452101

Figure 27. Relocating the AC Terminal Block

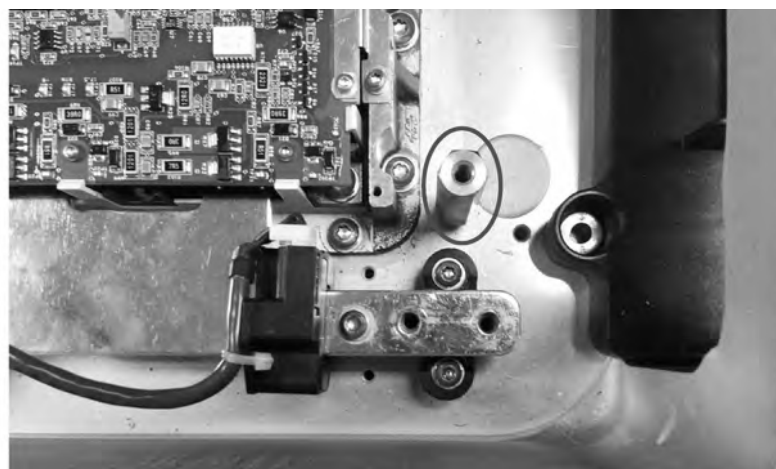
4. Using an 11mm hex socket, remove the one (1) M5 BCA Standoff (refer to Figure 28).



CAUTION: Do not break the threaded portion of the BCA standoff into the DPIM housing. The BCA standoffs are M5 thread and have Loctite® applied.



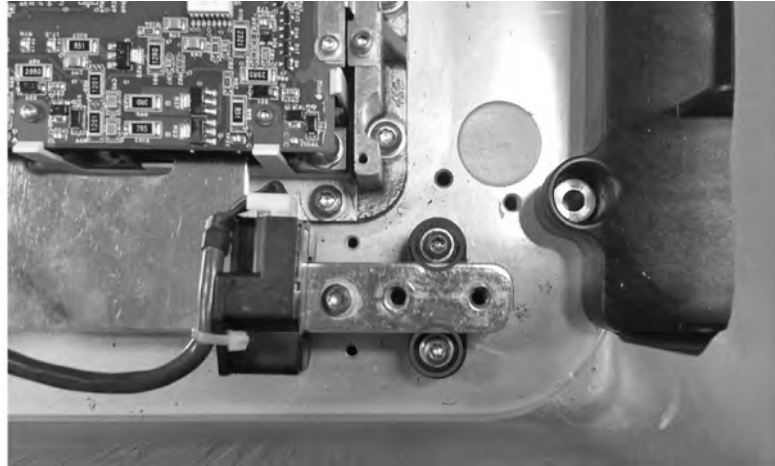
WARNING: There is no Allison approved repair for broken standoffs in the DPIM housing. Drilling the broken thread out presents a risk of drilling through the DPIM or into the coolant channel.



452110

Figure 28. Location of M5 BCA Standoff

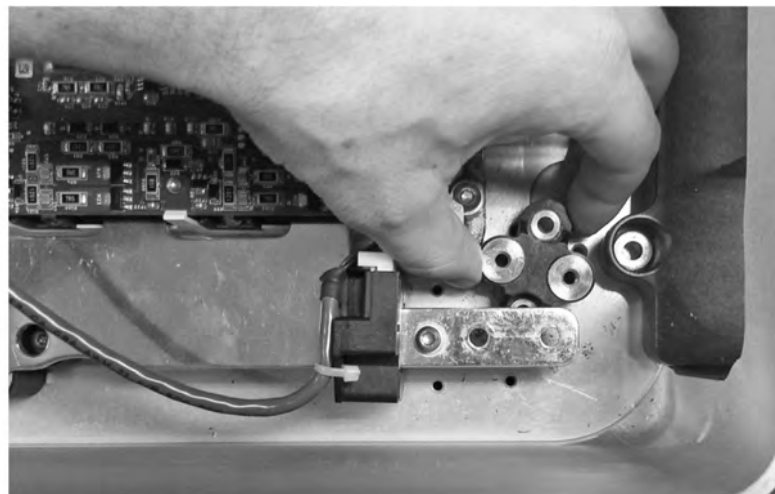
5. Using a Torx-Plus® T20 bit, remove the two (2) M4x22mm screws (refer to Figure 29).



452121

Figure 29. Location of Two (2) M4x22mm Screws

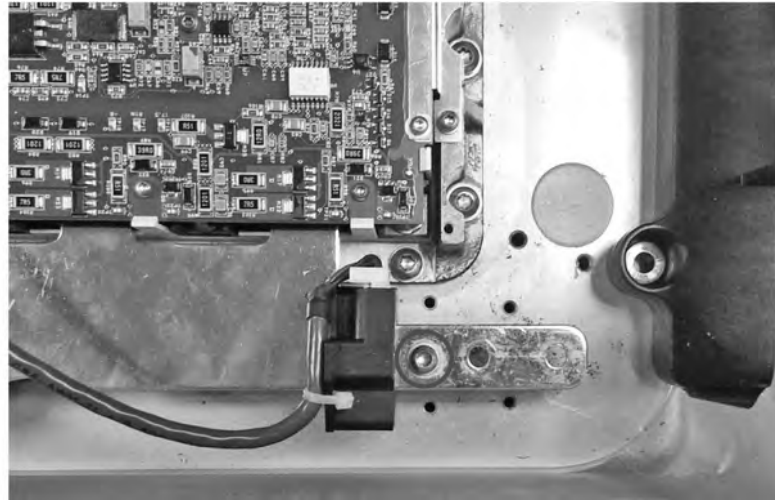
6. Remove the AC Busbar Support by sliding it out from under the AC Busbar (refer to Figure 30).



452131

Figure 30. Removal of AC Busbar Support

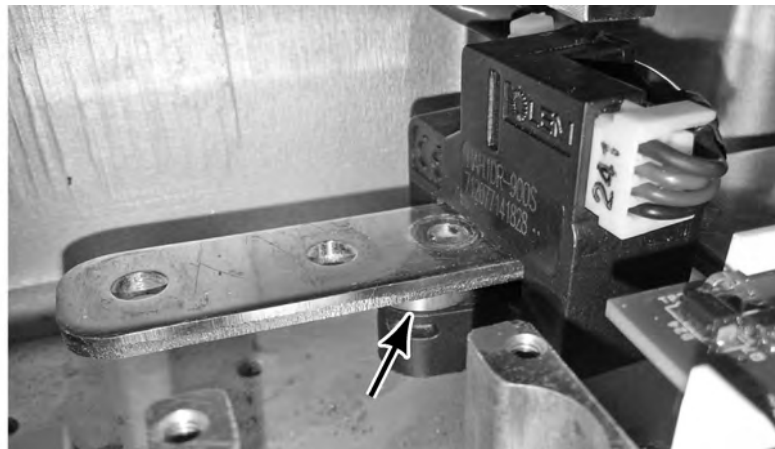
7. Using a Torx-Plus® T20 bit, remove the one (1) M4x19mm screw (refer to Figure 31).



452141

Figure 31. Location of One (1) M4x19mm Screw

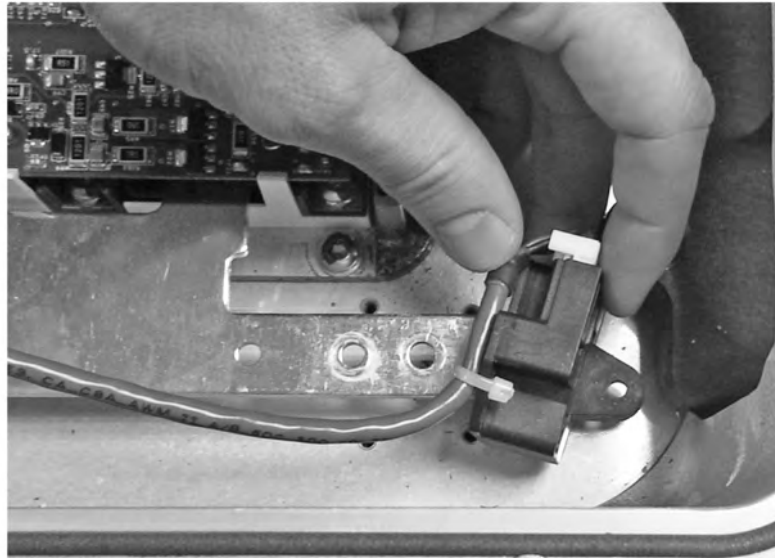
8. Remove the non-magnetic spacer located between the bottom of the Current Sensor and the underside of the AC Busbar (refer to Figure 32).



452150

Figure 32. Non-Magnetic Spacer Location

9. Remove the Current Sensor by sliding it off the end of the AC Busbar (refer to Figure 33).

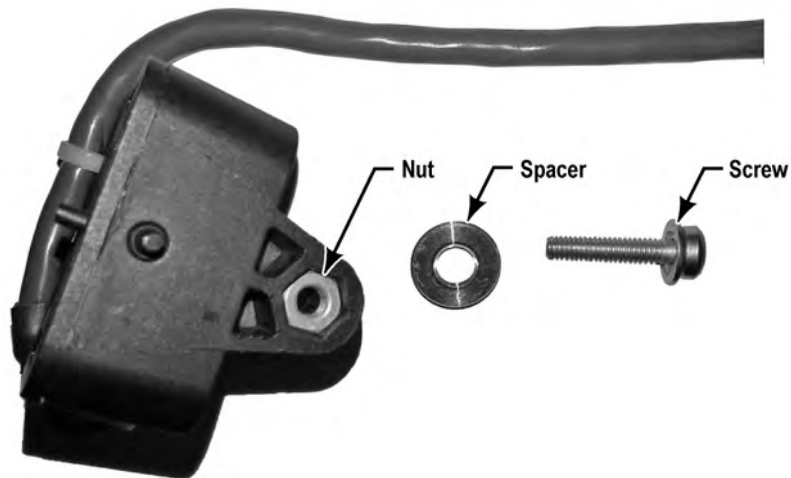


452161

Figure 33. Removal of Current Sensor



CAUTION: Ensure that the screw, spacer and nut have not been left in the DPIM after removing the Current Sensor (refer to Figure 34).



452219

Figure 34. Current Sensor Fasteners



WARNING: Inspect all reuse components for damage or corrosion, clean or replace any components as necessary. A vacuum may be used to clean any debris inside the DPIM chassis. Debris or excessive corrosion can cause isolation faults.



CAUTION: Ensure that the electrostatic discharge wrist strap is properly connected to the DPIM chassis while using the vacuum.

Current Sensor Installation

1. Apply one drop of NyoGel® 760G lubricant to each of the new Current Sensor pins (refer to Figure 35) and one drop to each of the mating harness terminals.



3174152

Figure 35. Applying NyoGel® 760G lubricant to Current Sensor Pins

2. Connect the new Harness Assembly to the new current sensor ensuring the latch is secure.



NOTE: The Wiring Harness **MUST** be replaced along with the Current Sensor.

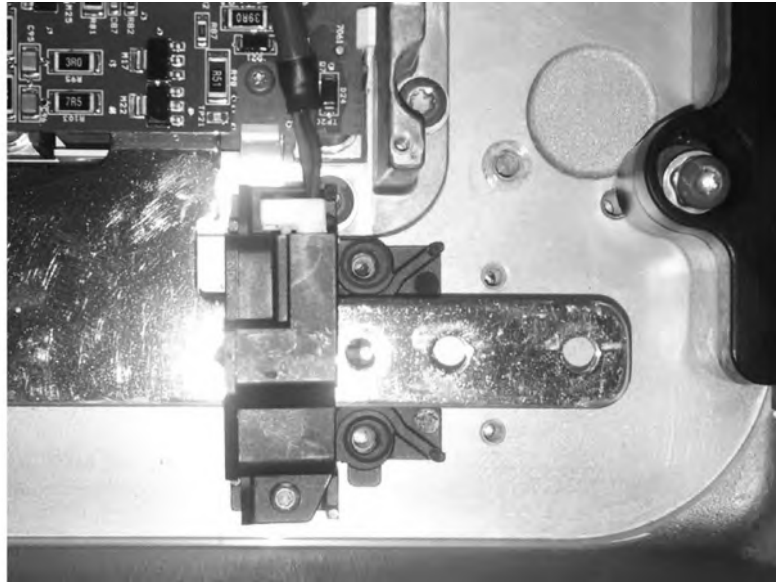
3. Lift the AC terminal block and install the current sensor by sliding it over the end of the AC Busbar (refer to Figure 36).



3174302

Figure 36. Installation of Current Sensor

4. Align the holes in the bracket to the mounting holes in the DPIM chassis and start two M4x16 screws included in the service kit. (refer to Figure 37).



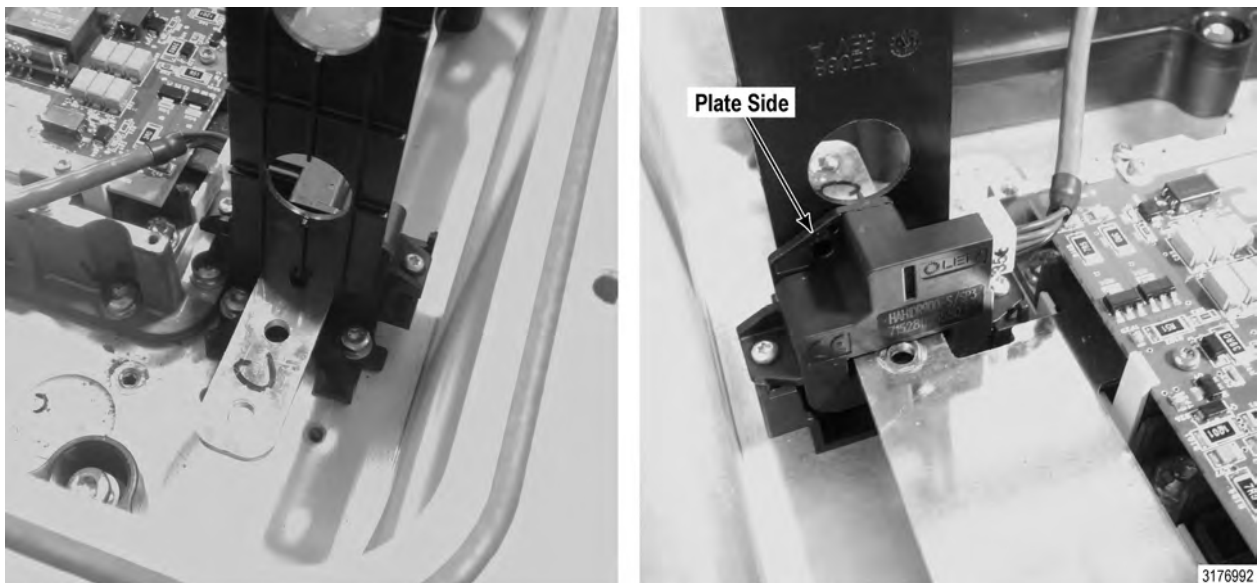
3174402

Figure 37. Location of Mounting Holes

5. Insert the alignment tool into the plate side of the current sensor so that the tool is against the sensor housing and sitting on top of the AC busbar (refer to Figure 38).



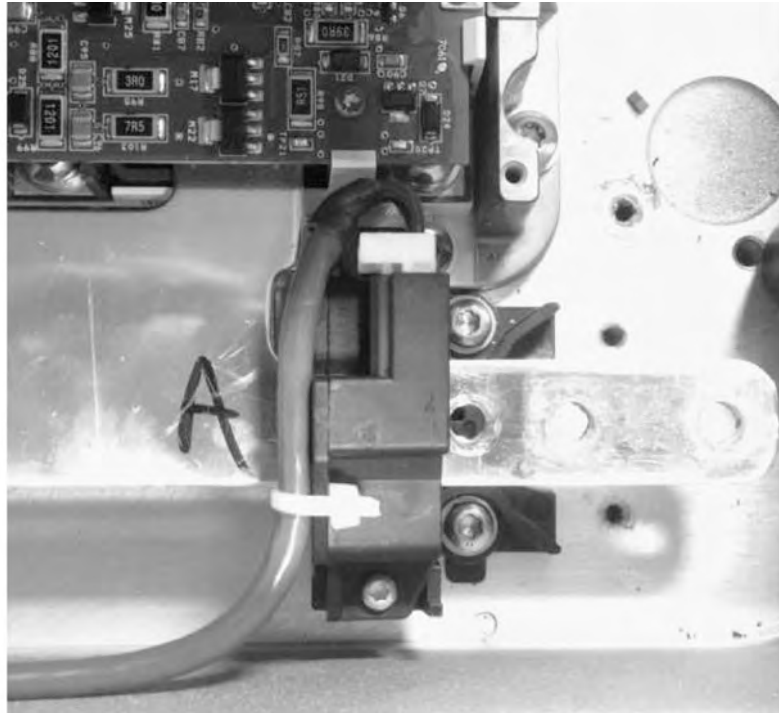
NOTE: The plate side of the sensor references the side of the sensor with a thin plate that completes the sensor housing.



3176992

Figure 38. Alignment Tool in Plate Side of Current Sensor

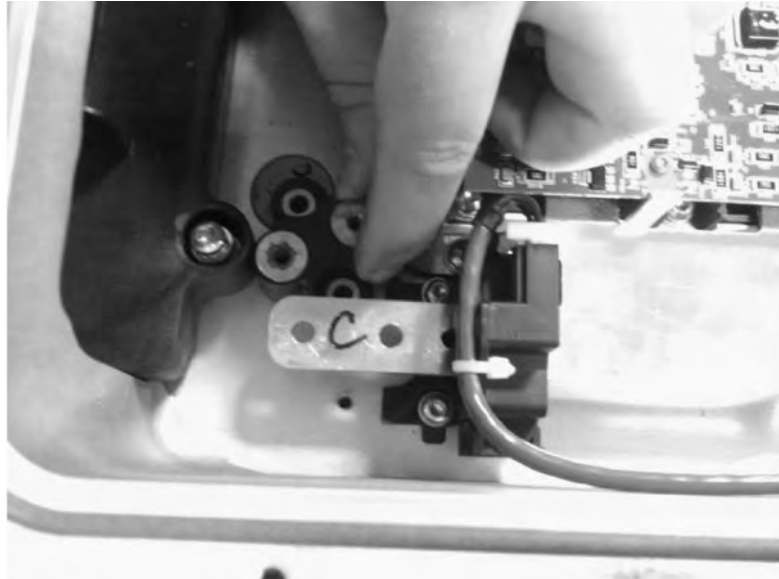
6. Using a Torx-Plus® T20 bit and with the alignment tool still installed, torque the two (2) M4x16 sensor mounting screws to 1.2-1.5 N·m (10.6-13.3 lb in.).
7. Remove the alignment tool and verify that the AC busbar is not touching the sensor housing.
8. Route the harness assembly ensuring adequate wire bend radius and secure it to the sensor with a new zip tie ensuring no relative movement of the harness to the sensor housing. Clip excess zip tie length as required (refer to Figure 39).



3178050

Figure 39. Harness Tied to Sensor Housing

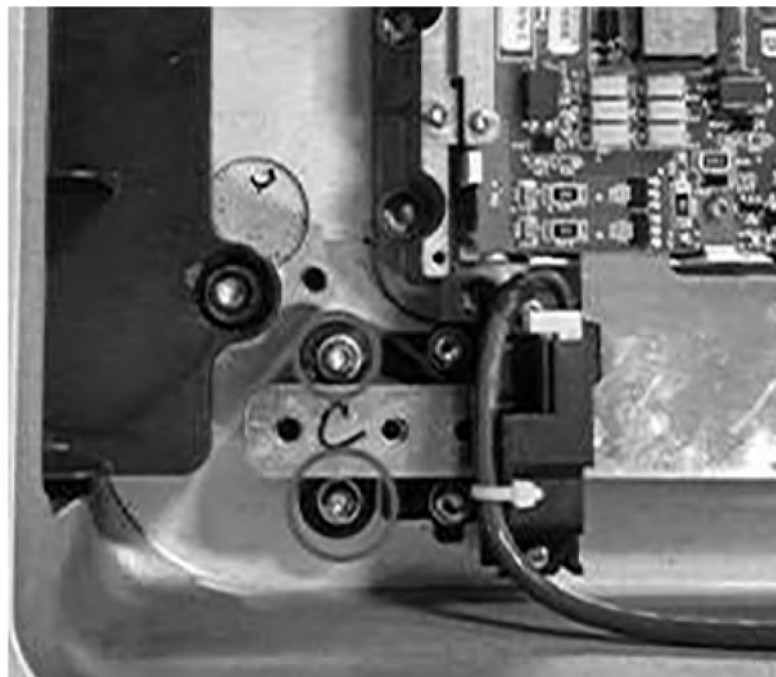
9. Label the harness with the appropriate phase ("A" or "C") on the BCA connector end of the harness to assist during reassembly.
10. Install the AC Busbar Support by sliding it under the AC Busbar (refer to Figure 40).



3178160

Figure 40. Installation of AC Busbar Support

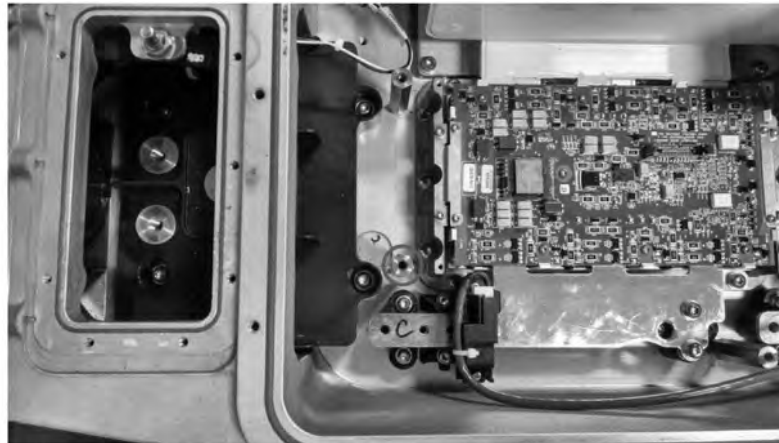
11. Using a Torx-Plus® T20 bit, apply a drop of Loctite® 242 thread locking compound and install the two (2) M4x22mm screws (refer to Figure 41). Torque the two (2) M4x22mm screws to 1.2-1.5 N·m (10.6-13.3 lb in.).



3178368

Figure 41. Location of Two (2) M4x22mm Screws

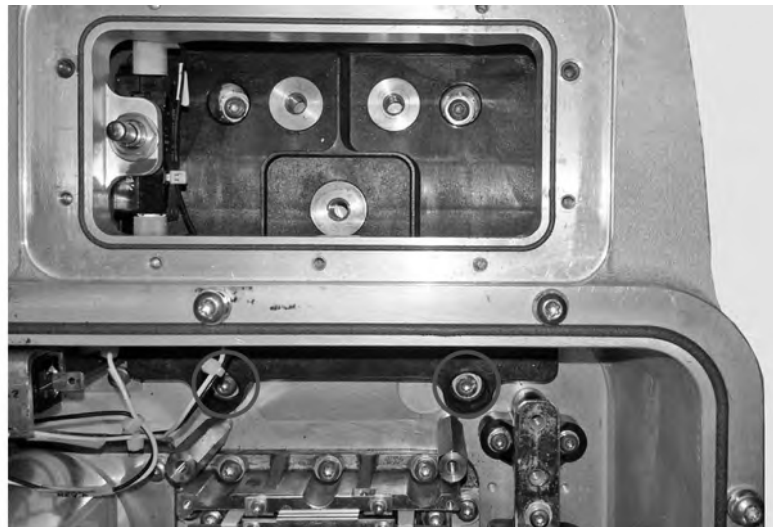
12. Apply one drop of Loctite® 242 thread locking compound to the end of the external threads of the M5 BCA Standoff. Using an 11mm hex socket, install the one (1) M5 BCA Standoff (refer to Figure 42). Torque the one (1) M5 BCA Standoff to 3.1-3.5 N·m (27.4-30.9 lb in.).



3178458

Figure 42. Location of M5 BCA Standoff

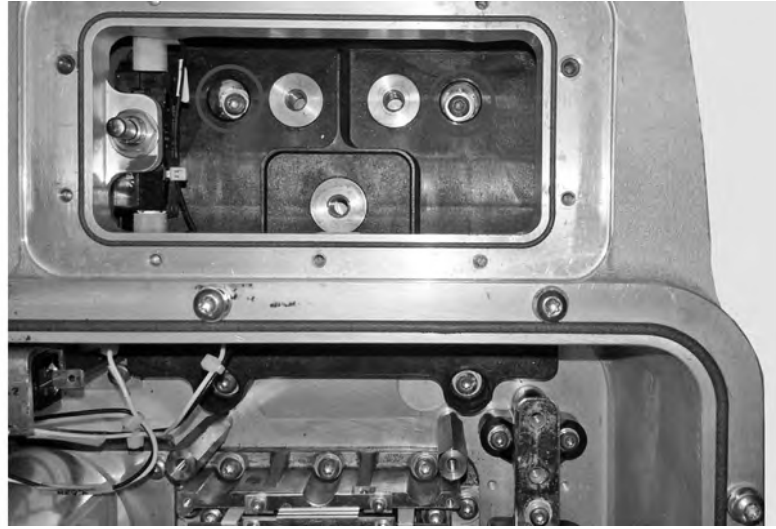
13. Slide the AC terminal Block back into its proper location. Apply one drop of Loctite® 425 or 242 thread locking compound to the ends of the external threads of the two (2) M5x18mm screws. Using a Torx-Plus® T25 bit, install the two (2) M5x18mm screws (refer to Figure 43). Torque the two (2) M5x18mm screws to 3.1-3.5 N·m (27.4-30.9 lb in.).



452093

Figure 43. Location of Two (2) M5x18mm Screws

14. Using a Torx-Plus® T25 bit, install the two (2) M5x22mm screws (refer to Figure 44). Torque the two (2) M5x22mm screws to 3.1-3.5 N·m (27.4-30.9 lb in.).



452084

Figure 44. Location of Two (2) M5x22mm Screws

Section 5: Removal/Installation of Current Sensor (Inverter A Phases A and B, and Inverter B Phases B and C)

Current Sensor Removal

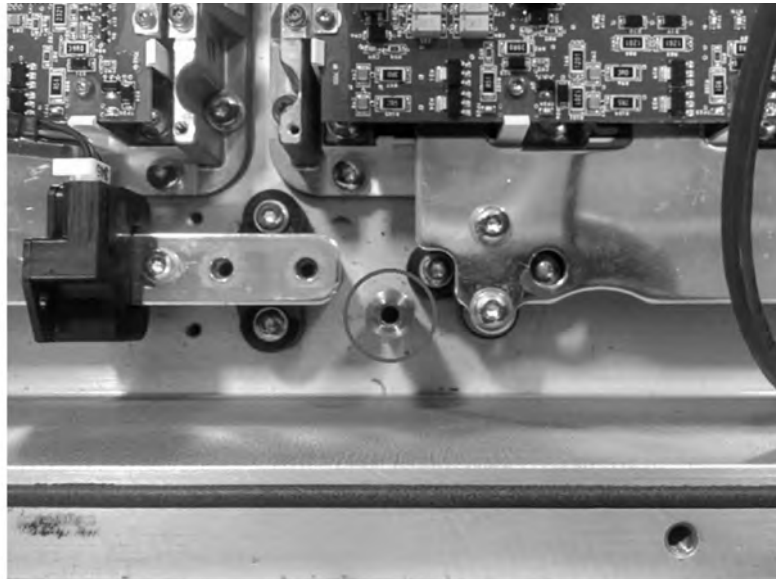
1. Using an 11mm hex socket, remove the one (1) M5 BCA Standoff (refer to Figure 45).



CAUTION: Do not break the threaded portion of the BCA standoff into the DPIM housing. The BCA standoffs are M5 thread and have Loctite® applied.



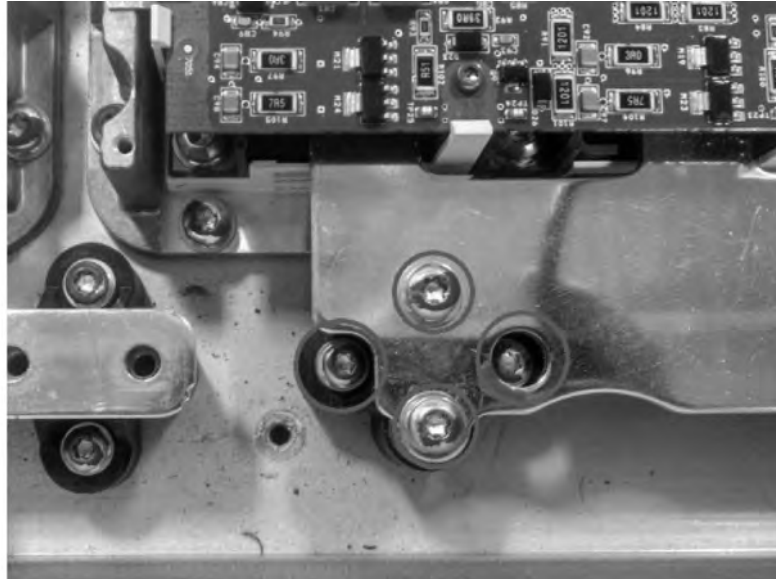
WARNING: There is no Allison approved repair for broken standoffs in the DPIM housing. Drilling the broken thread out presents a risk of drilling through the DPIM or into the coolant channel.



3178688

Figure 45. Location of M5 BCA Standoff

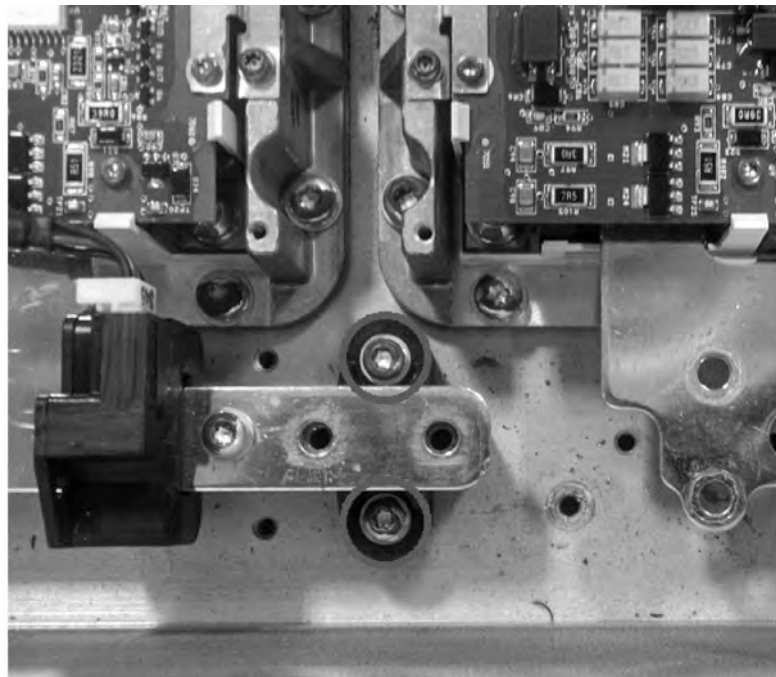
2. Using Torx-Plus® T20 and T25 bits, remove the two (2) M4x22mm screws and two (2) M5x18mm screws securing the AC busbar support for the phase nearest the current sensor being replaced (refer to Figure 46).



3178778

Figure 46. Location of M4 and M5 AC Busbar Support Screws

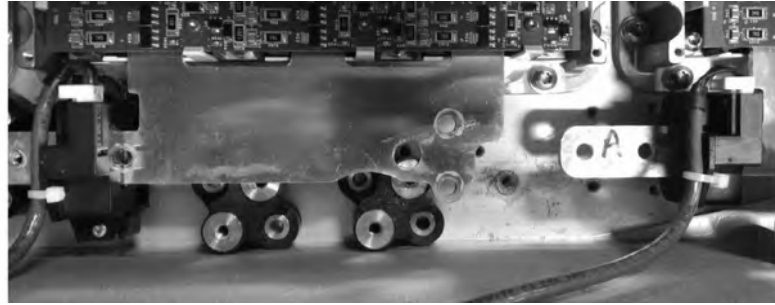
3. Using a Torx-Plus® T20 bit, remove the two (2) M4x22mm screws securing the AC busbar support for the phase which the current sensor is being replaced (refer to Figure 47).



3178878

Figure 47. Location of Two (2) M4x22mm Screws

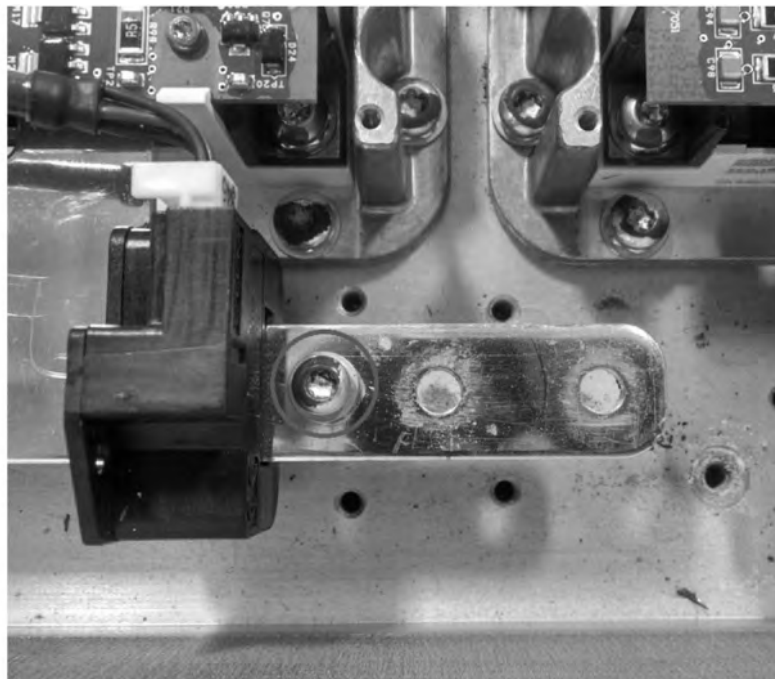
4. Slide the two (2) AC busbar supports under the AC busbar towards the AC lug box end of the chassis (refer to Figure 48).



3178968

Figure 48. Location of AC Busbar Supports

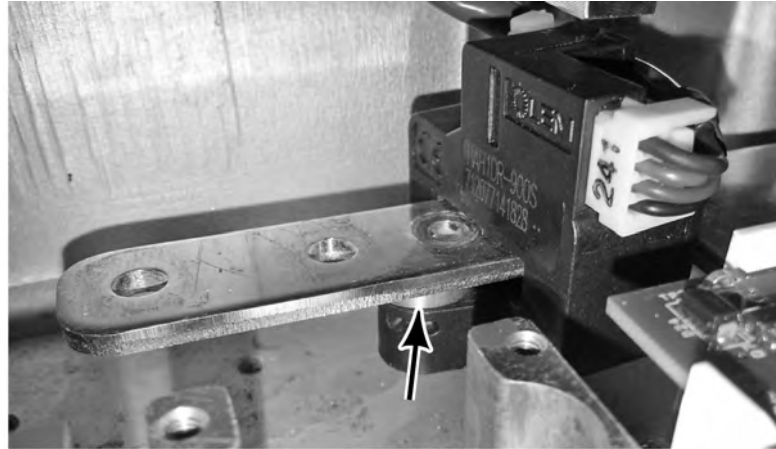
5. Using a Torx-Plus® T20 bit, remove the one (1) M4x19mm screw (refer to Figure 49).



3179058

Figure 49. Location of One (1) M4x19mm Screw

6. Remove the non-magnetic spacer located between the bottom of the Current Sensor and the underside of the AC Busbar (refer to Figure 50).



452956

Figure 50. Non-Magnetic Spacer Location

7. Remove the Current Sensor by sliding it off the end of the AC Busbar (refer to Figure 51).

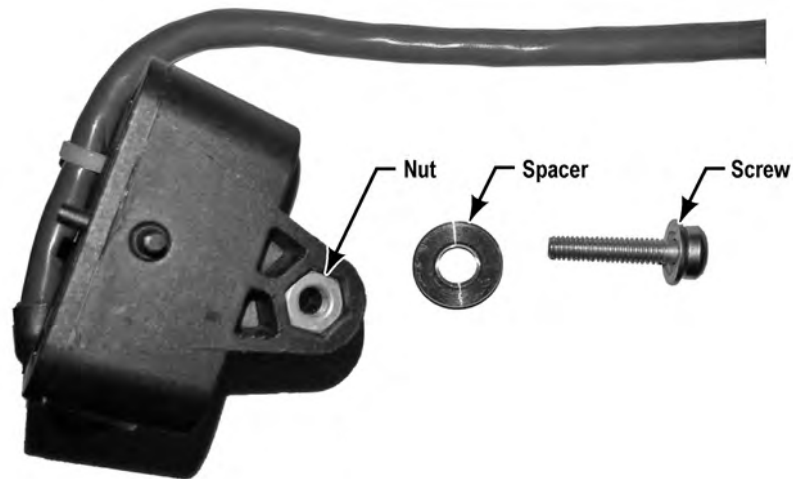


3179148

Figure 51. Removal of Current Sensor



CAUTION: Ensure that the screw, spacer and nut have not been left in the DPIM after removing the Current Sensor (refer to Figure 52).



452219

Figure 52. Current Sensor Fasteners



WARNING: Inspect all reuse components for damage or corrosion, clean or replace any components as necessary. A vacuum may be used to clean any debris inside the DPIM chassis. Debris or excessive corrosion can cause isolation faults.



CAUTION: Ensure that the electrostatic discharge wrist strap is properly connected to the DPIM chassis while using the vacuum.

Current Sensor Installation

1. Apply one drop of NyoGel® 760G lubricant to each of the new Current Sensor pins (refer to Figure 53) and one drop to each of the mating harness terminals.



3174152

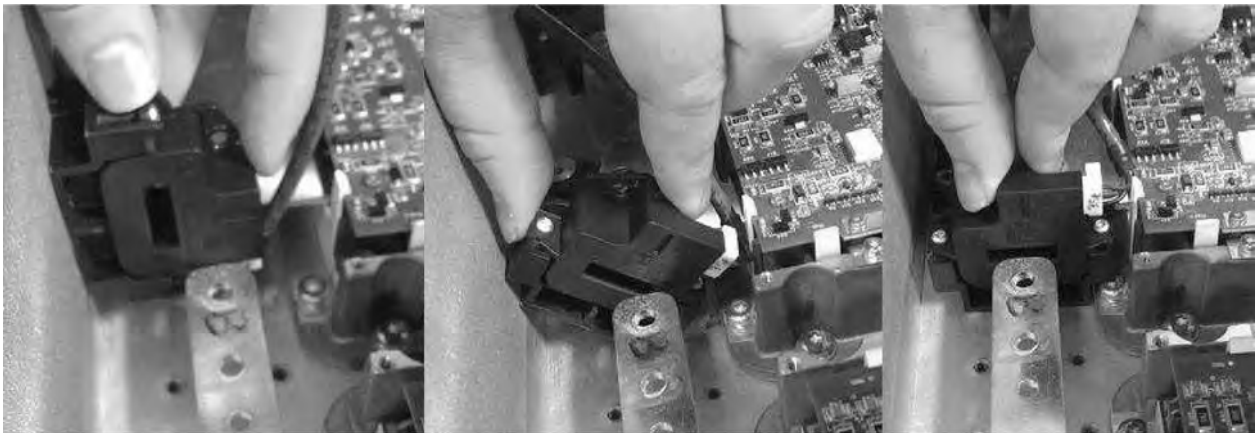
Figure 53. Applying NyoGel® 760G lubricant to Current Sensor Pins

2. Connect the new harness assembly to the new current sensor ensuring the latch is secure.



NOTE: The Wiring Harness **MUST** be replaced along with the Current Sensor.

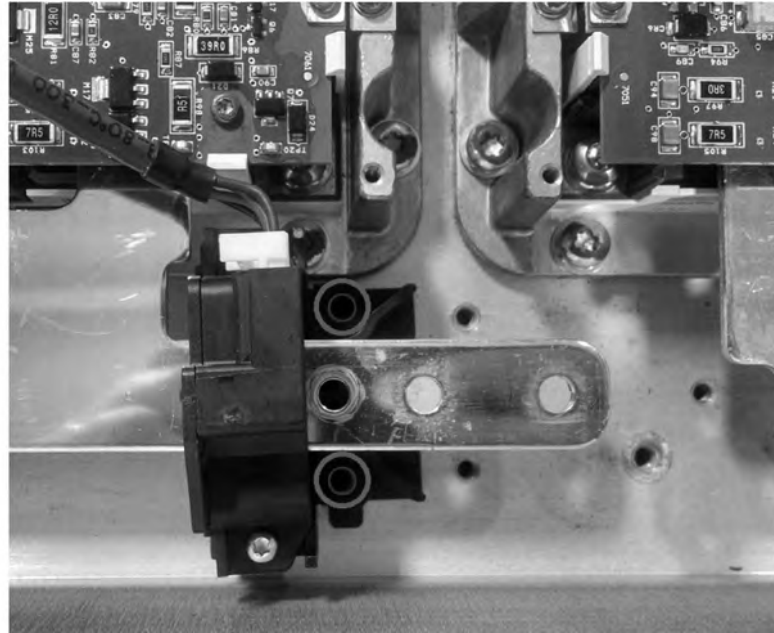
3. Install the new current sensor by rotating it down between the AC busbars and then sliding it over the end of the AC busbar (refer to Figure 54).



3179408

Figure 54. Installation of Current Sensor

4. Align the holes in the bracket to the mounting holes in the DPIM chassis and start two (2) M4x16 screws included in the service kit (refer to Figure 55).



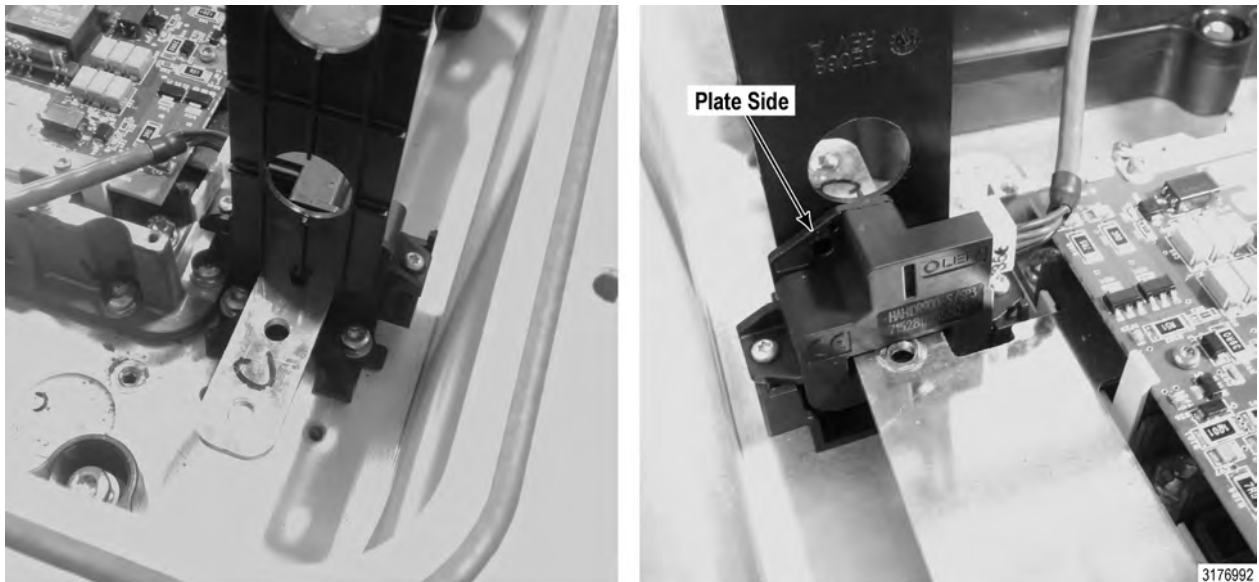
3179788

Figure 55. Location of Mounting Holes

5. Insert the alignment tool into the plate side of the current sensor so that the tool is against the sensor housing and sitting on top of the AC busbar (refer to Figure 56).



NOTE: The plate side of the sensor references the side of the sensor with a thin plate that completes the sensor housing.



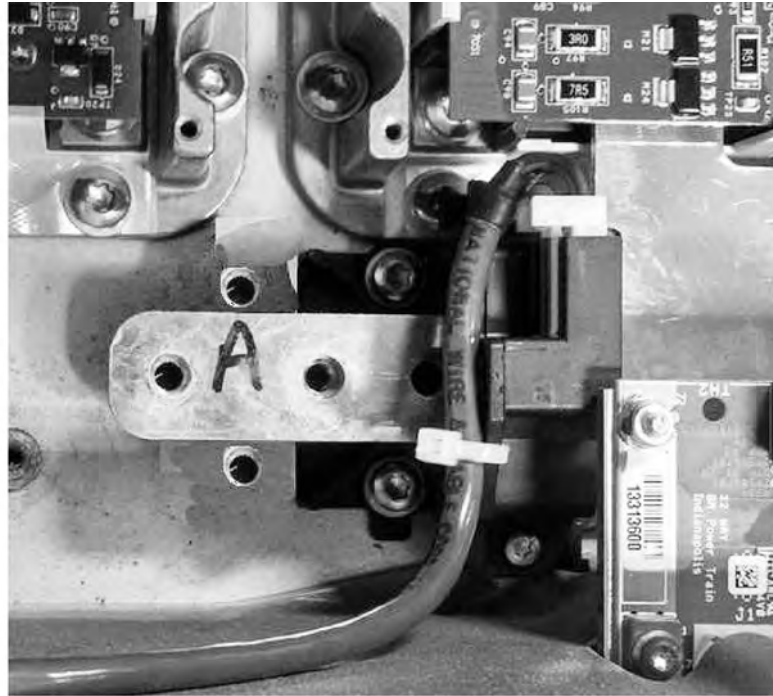
3176992

Figure 56. Alignment Tool in Plate Side of Current Sensor

6. Using a Torx-Plus® T20 bit and with the alignment tool still installed, torque the two (2) M4x16 sensor mounting screws to 1.2-1.5 N·m (10.6-13.3 lb in.)

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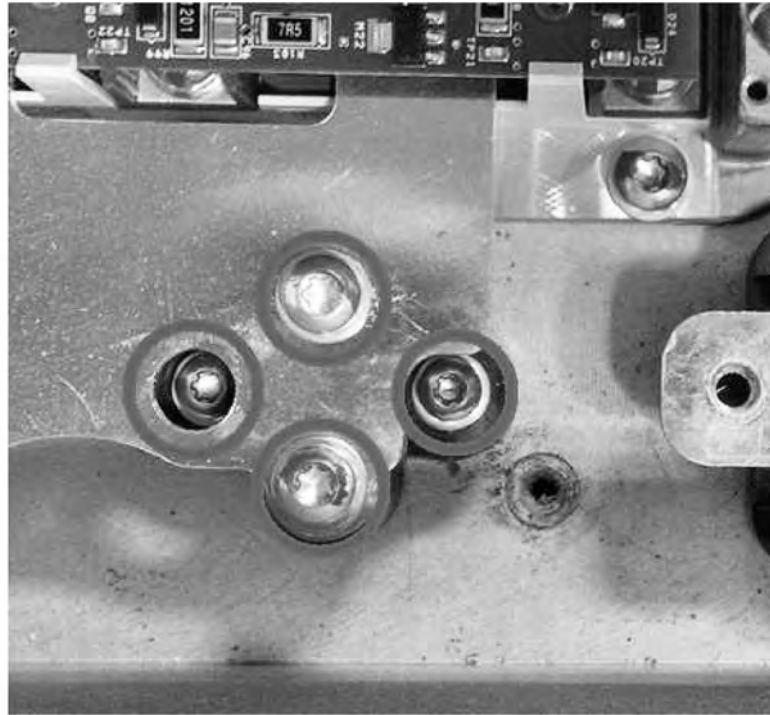
7. Remove the alignment tool and verify that the AC busbar is not touching the sensor housing.
8. Route the harness assembly ensuring adequate wire bend radius and secure it to the sensor with a new zip tie ensuring no relative movement of the harness to the sensor housing. Clip excess zip tie length as required. (refer to Figure 57).



3179948

Figure 57. Harness Tied to Sensor Housing

9. Label the harness with the appropriate phase ("A" or "B") on the BCA connector end of the harness to assist during reassembly.
10. Install both AC busbar supports by sliding them back in place under the AC busbars.
11. Using Torx-Plus® T20 and T25 bits and Loctite® 242 thread locking compound, install the two (2) M4x22mm screws and two (2) M5x18mm screws to secure the AC busbar support (refer to Figure 58). Torque the two (2) M4x22mm screws to 1.2-1.5 N·m (10.6-13.3 lb in.) and the two (2) M5x18mm screws to 3.1-3.5 N·m (27.4-30.9 lb in.).



3180038

Figure 58. Location of M4 and M5 AC Busbar Support Screws

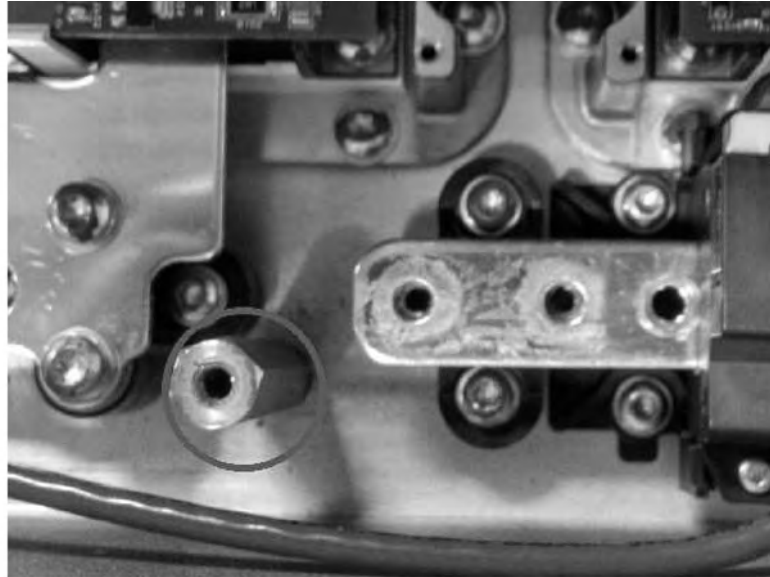
12. Using a Torx-Plus® T20 bit, install the two (2) M4x22mm screws (refer to Figure 59). Torque the two (2) M4x22mm screws to 1.2-1.5 N·m (10.6-13.3 lb in.).



3180128

Figure 59. Location of Two (2) M4x22mm Screws

13. Apply one drop of Loctite® 242 thread locking compound to the end of the external threads of the M5 BCA Standoff (refer to Figure 60). Using an 11mm hex socket, install the one (1) M5 BCA Standoff. Torque the one (1) M5 BCA Standoff to 3.1-3.5 N·m (27.4-30.9 lb in.).



3180218

Figure 60. Location of M5 BCA Standoff

Section 6: Removal/Installation of Inverter B Phase C Current Sensor

Current Sensor Removal

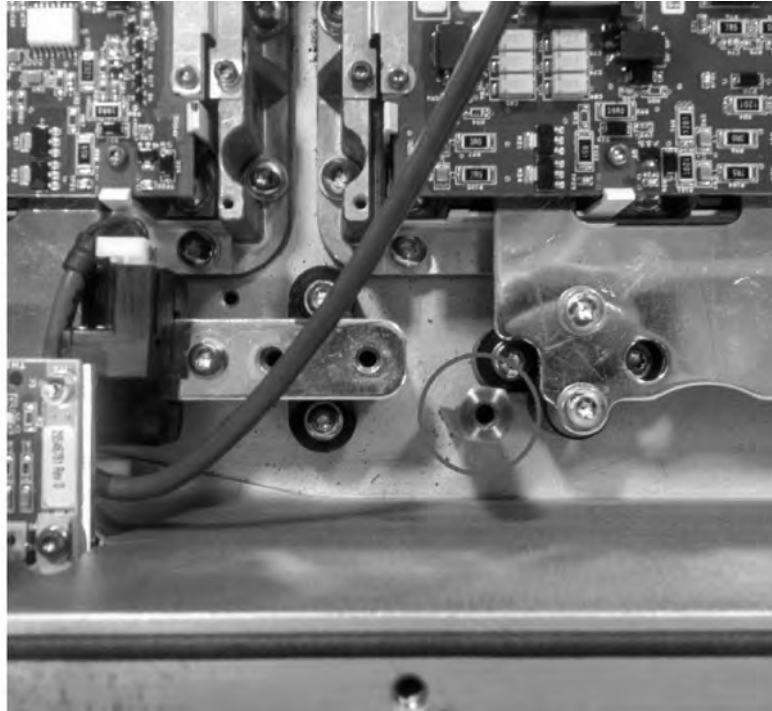
1. Using an 11mm hex socket, remove the one (1) M5 BCA standoff (refer to Figure 61).



CAUTION: Do not break the threaded portion of the BCA standoff into the DPIM housing. The BCA standoffs are M5 thread and have Loctite® applied.



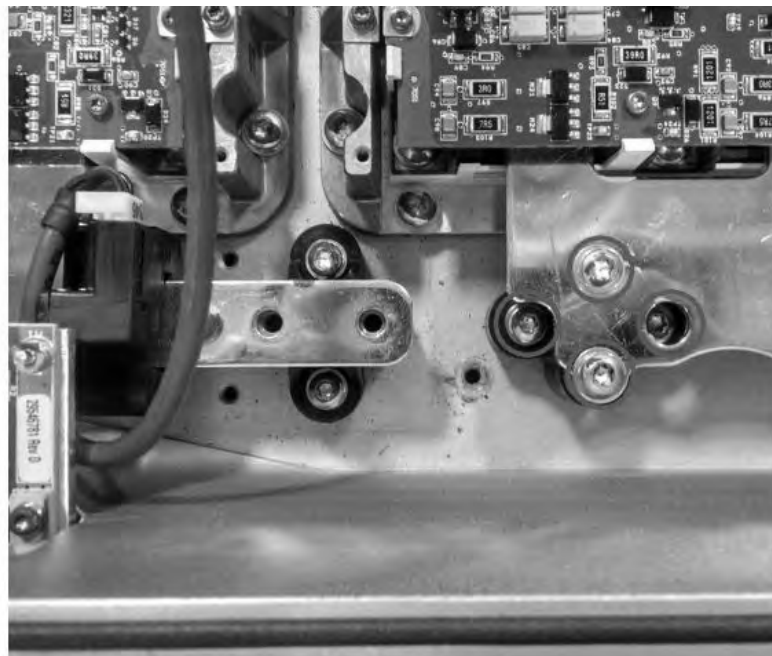
WARNING: There is no Allison approved repair for broken standoffs in the DPIM housing. Drilling the broken thread out presents a risk of drilling through the DPIM or into the coolant channel.



3180408

Figure 61. Location of M5 BCA Standoff

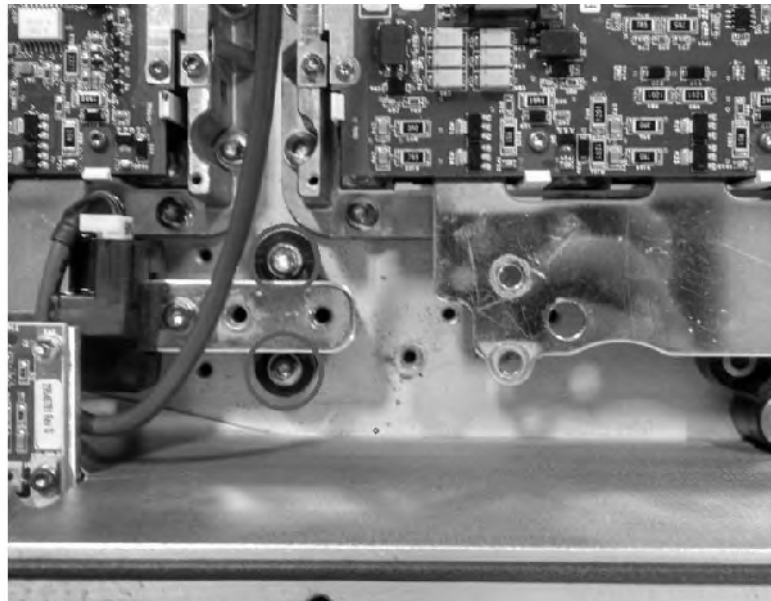
2. Using Torx-Plus® T20 and T25 bits, remove the two (2) M4x22mm screws and two (2) M5x18mm screws securing the AC busbar support for the phase nearest the current sensor being replaced (refer to Figure 62).



3180606

Figure 62. Location of M4 and M5 AC Busbar Support Screws

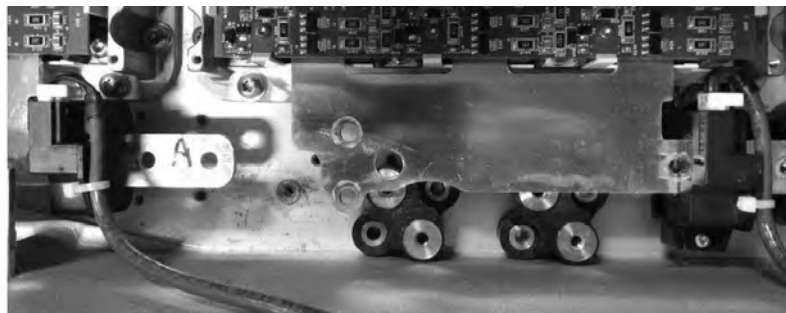
3. Using a Torx-Plus® T20 bit, remove the two (2) M4x22mm screws securing the AC busbar support for the phase which the current sensor is being replaced (refer to Figure 63).



318C796

Figure 63. Location of Two (2) M4x22mm Screws

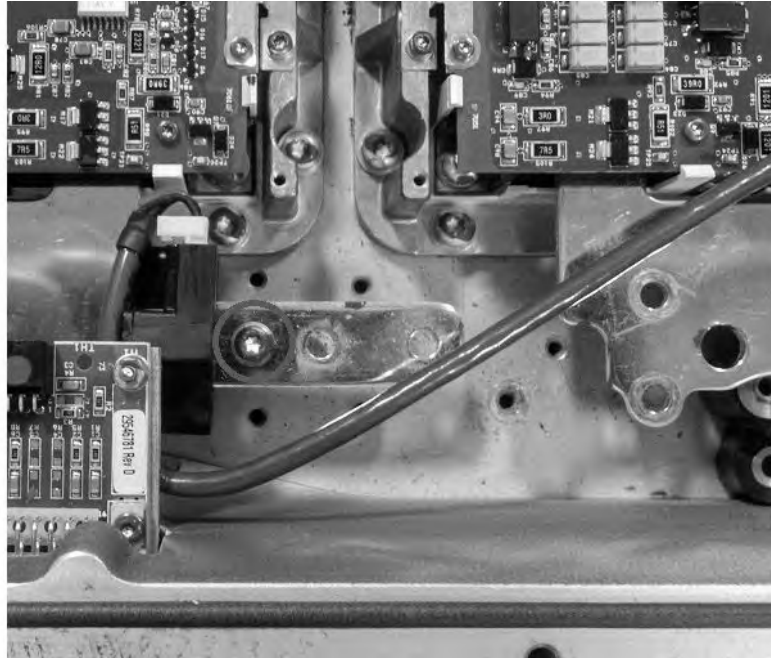
4. Slide the two (2) AC busbar supports under the AC busbar towards the AC lug box end of the chassis (refer to Figure 64).



3181006

Figure 64. Location of AC Busbar Supports

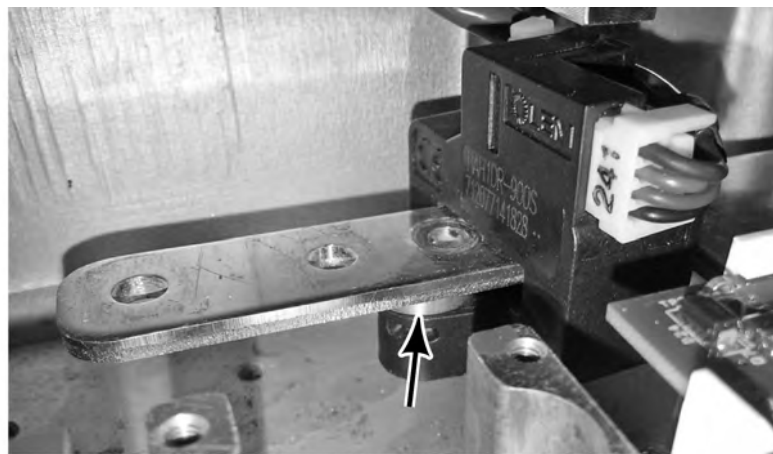
5. Using a Torx-Plus® T20 bit, remove the one (1) M4x19mm screw (refer to Figure 65).



3181216

Figure 65. Location of One (1) M4x19mm Screw

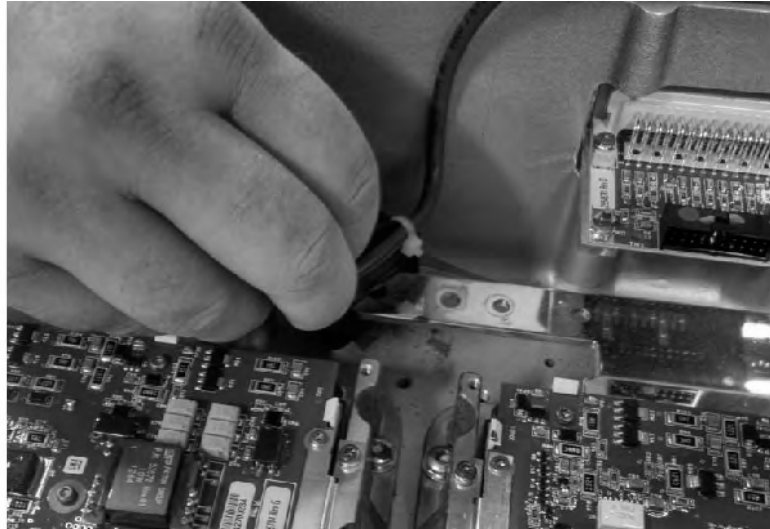
6. Remove the non-magnetic spacer located between the bottom of the current sensor and the underside of the AC busbar (refer to Figure 66).



452956

Figure 66. Non-Magnetic Spacer Location

7. Remove the current sensor by sliding it off the end of the AC busbar (refer to Figure 67).

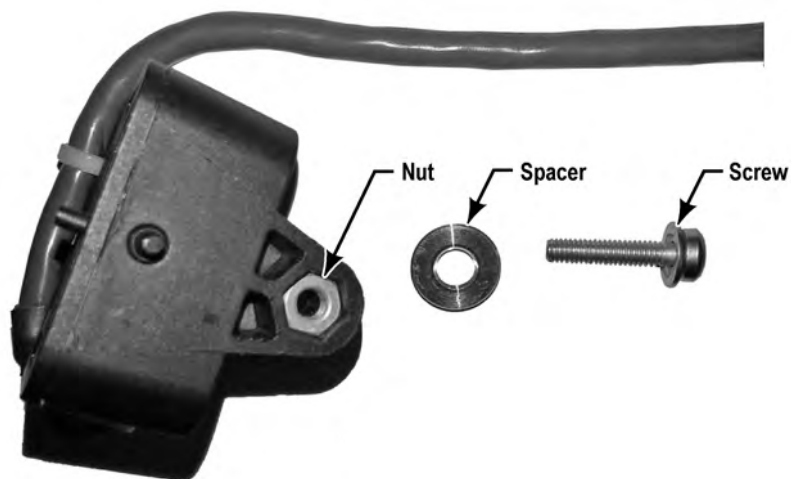


3151306

Figure 67. Removal of Current Sensor



CAUTION: Ensure that the screw, spacer and nut have not been left in the DPIM after removing the Current Sensor (refer to Figure 68).



452219

Figure 68. Current Sensor Fasteners



WARNING: Inspect all reuse components for damage or corrosion, clean or replace any components as necessary. A vacuum may be used to clean any debris inside the DPIM chassis. Debris or excessive corrosion can cause isolation faults.



CAUTION: Ensure that the electrostatic discharge wrist strap is properly connected to the DPIM chassis while using the vacuum.

Current Sensor Installation

1. Apply one drop of NyoGel® 760G lubricant to each of the new Current Sensor pins (refer to Figure 69) and one drop to each of the mating harness terminals.



3174152

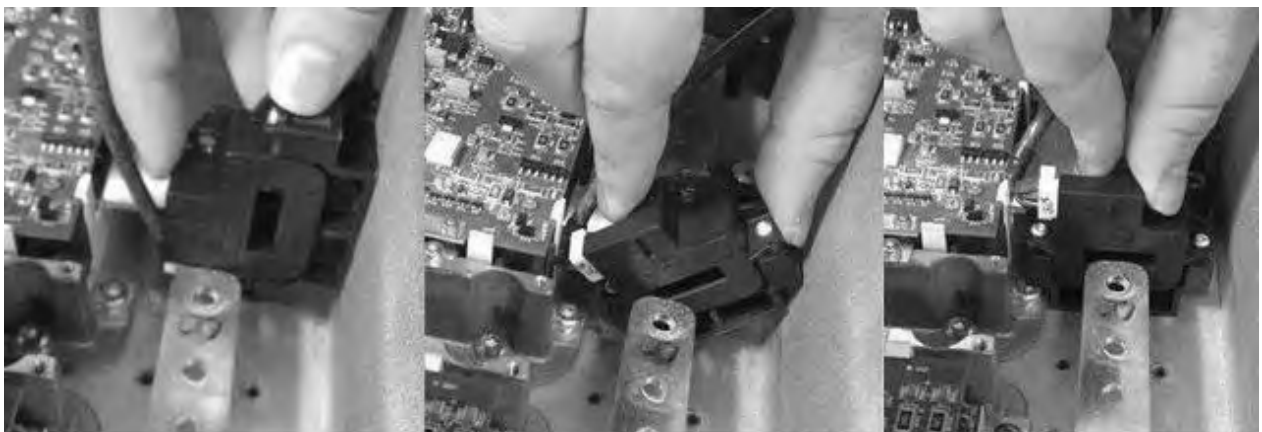
Figure 69. Applying NyoGel® 760G lubricant to Current Sensor Pins

2. Connect the new harness assembly to the new current sensor ensuring the latch is secure.



NOTE: The wiring harness **MUST** be replaced along with the current sensor.

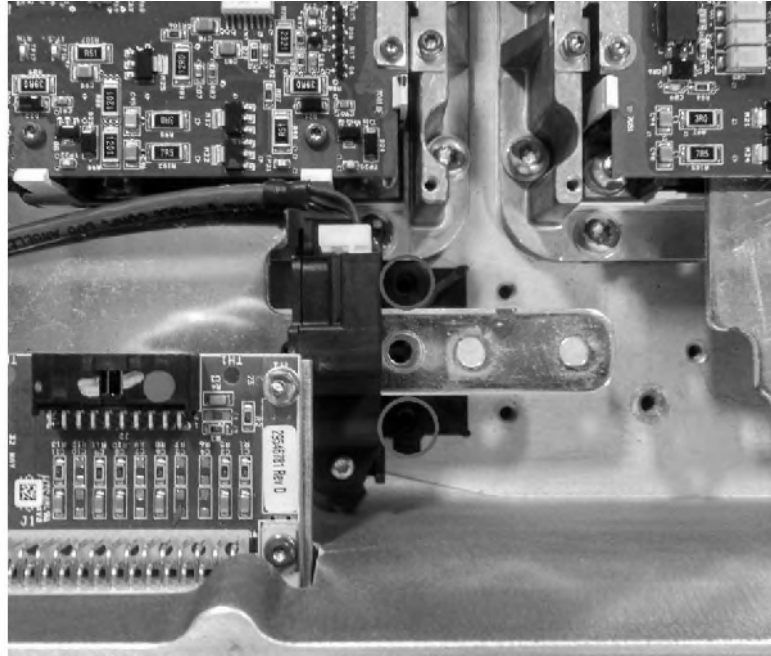
3. Install the new current sensor by rotating it down between the AC busbars and then sliding it over the end of the AC busbar (refer to Figure 70).



3181974

Figure 70. Installation of Current Sensor

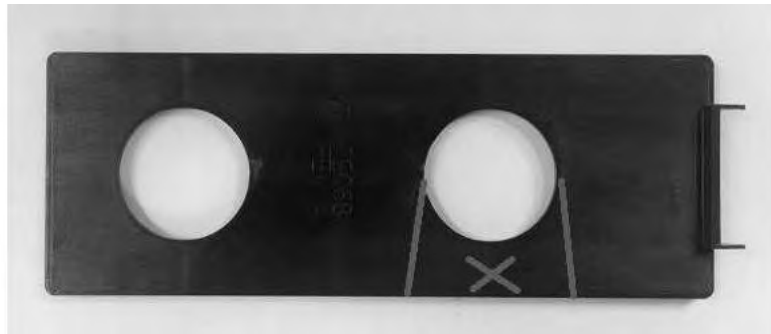
4. Align the holes in the bracket to the mounting holes in the DPIM chassis and start two (2) M4x16 screws included in the service kit (refer to Figure 71).



3102104

Figure 71. Non-Magnetic Spacer Location

5. Using a pair of snips, cut out the left side of the alignment tool across the top and bottom of the hole closest to the alignment tabs so the tool will fit around the inverter B encoder board (refer to Figure 72).



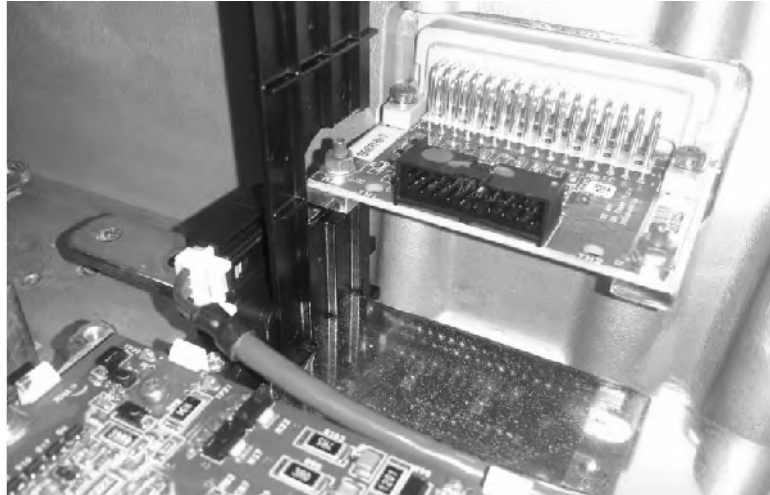
3183664

Figure 72. Alignment Tool Cut Location

6. Insert the alignment tool into the plate side of the current sensor so that the tool is against the sensor housing and sitting on top of the AC busbar (refer to Figure 73). The tool should clear the encoder board.



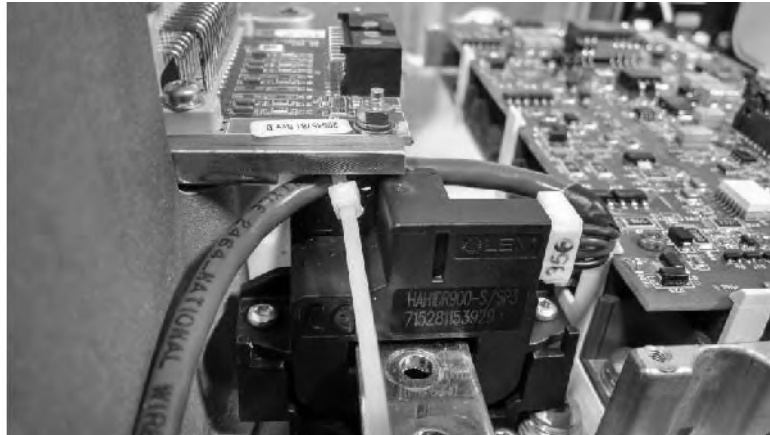
NOTE: The plate side of the sensor references the side of the sensor with a thin plate that completes the sensor housing.



3183061

Figure 73. Alignment Tool in Plate Side of Current Sensor

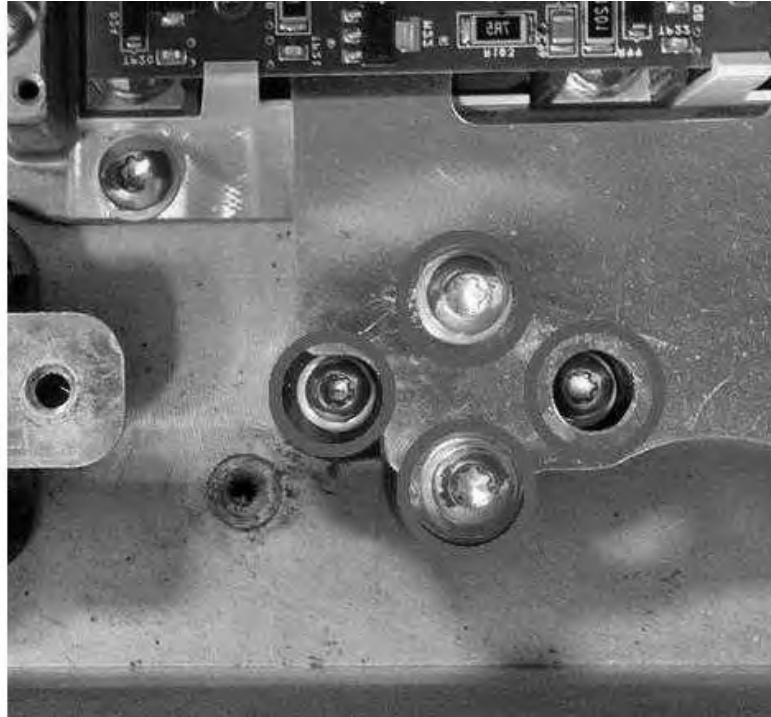
7. Using Torx-Plus® T20 and with the alignment tool still installed, torque the two (2) M4x16mm sensor mounting screws to 1.2-1.5 N·m (10.6-13.3 lb in.).
8. Remove the alignment tool and verify that the AC busbar is not touching the sensor housing.
9. Route the harness assembly ensuring adequate wire bend radius and secure it to the sensor with a new zip tie ensuring no relative movement of the harness to the sensor housing. Clip excess zip tie length as required. (refer to Figure 74).



3183894

Figure 74. Harness Routed and Tied to Sensor Housing

10. Label the harness with phase C on the BCA connector end of the harness to assist during reassembly.
11. Install both AC busbar supports by sliding them back in place under the AC busbars.
12. Using Torx-Plus® T20 and T25 bits and Loctite® 242 thread locking compound, install the two (2) M4x22mm screws and two (2) M5x18mm screws to secure the AC busbar support (refer to Figure 75). Torque the two (2) M4x22mm screws to 1.2-1.5 N·m (10.6-13.3 lb in.) and the two (2) M5x18mm screws to 3.1-3.5 N·m (27.4-30.9 lb in.).



3184254

Figure 75. Location of M4 and M5 AC Busbar Support Screws

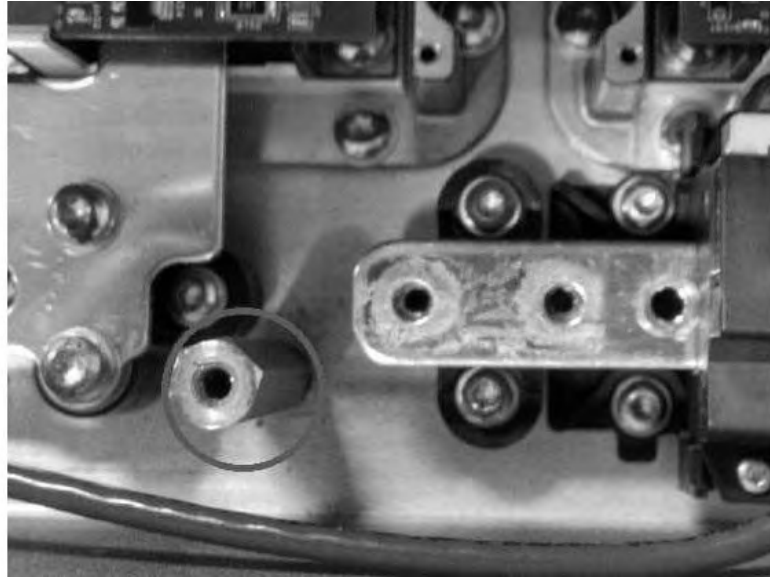
13. Using Torx-Plus® T20 and Loctite® 242 thread locking compound, install the two (2) M4x22mm screws to secure the AC busbar support (refer to Figure 76). Torque the two (2) M4x22mm screws to 1.2-1.5 N·m (10.6-13.3 lb in.).



3184374

Figure 76. Location of Two (2) M4x22mm Screws

14. Apply one drop of Loctite® 242 thread locking compound to the end of the external threads of the M5 BCA standoff. Using an 11mm hex socket, install the one (1) M5 BCA standoff (refer to Figure 77). Torque the one (1) M5 BCA standoff to 3.1-3.5 N·m (27.4-30.9 lb in.).



3184464

Figure 77. Location of M5 BCA Standoff

Section 7: Installation of the AC Busbar Assembly

1. Carefully install the AC Busbar Assembly into AC Lug Box (refer to Figure 78).



CAUTION: Do not allow the AC Busbar Assembly to strike the HVIL Switch during the installation process.

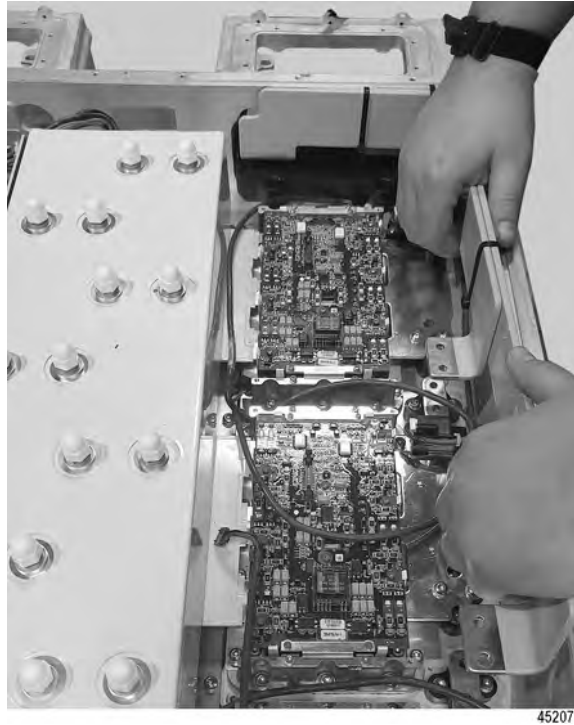


Figure 78. Installation of AC Busbar Assembly

2. Install the HVIL switch connector (refer to Figure 79).

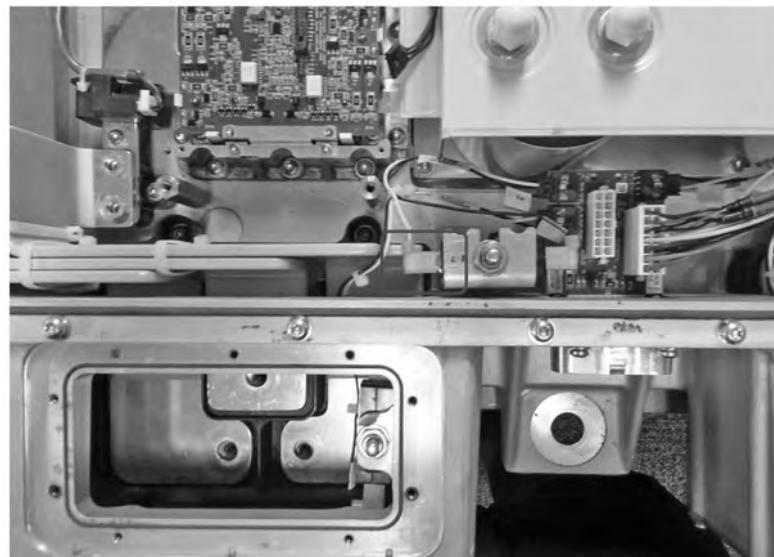
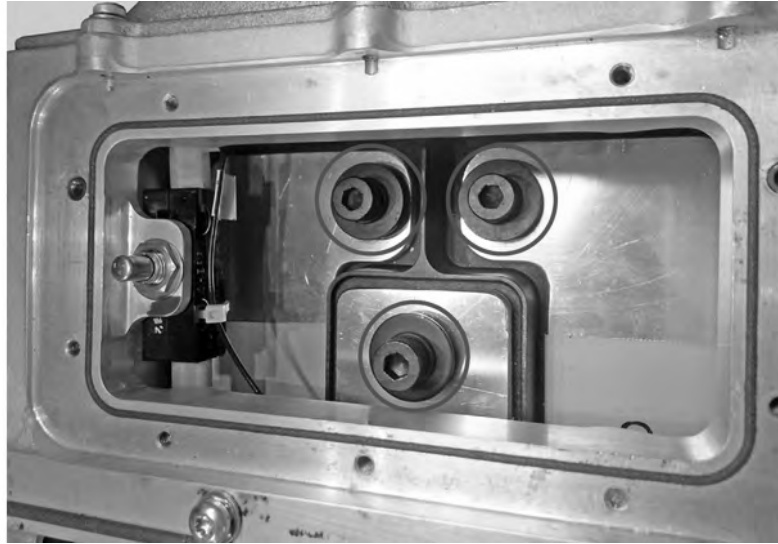


Figure 79. HVIL Switch Location

3. Install and finger tighten the three (3) M8 AC lug bolts (refer to Figure 80).



448740

Figure 80. AC Lug Bolts

4. Apply one drop of Loctite® 425 or 242 thread locking compound to the end of the external threads of the six (6) M5x22mm screws. Using a Torx-Plus® T25 bit, install the six (6) M5x22mm screws (refer to Figure 81). Torque the six (6) M5x22mm screws to 3.1-3.5 N·m (27.4-30.9 lb in.).



NOTE: Install all screws before torquing to ensure that the holes line up.



NOTE: Exercise special care to not pinch any wires when components are installed and screws are torqued.

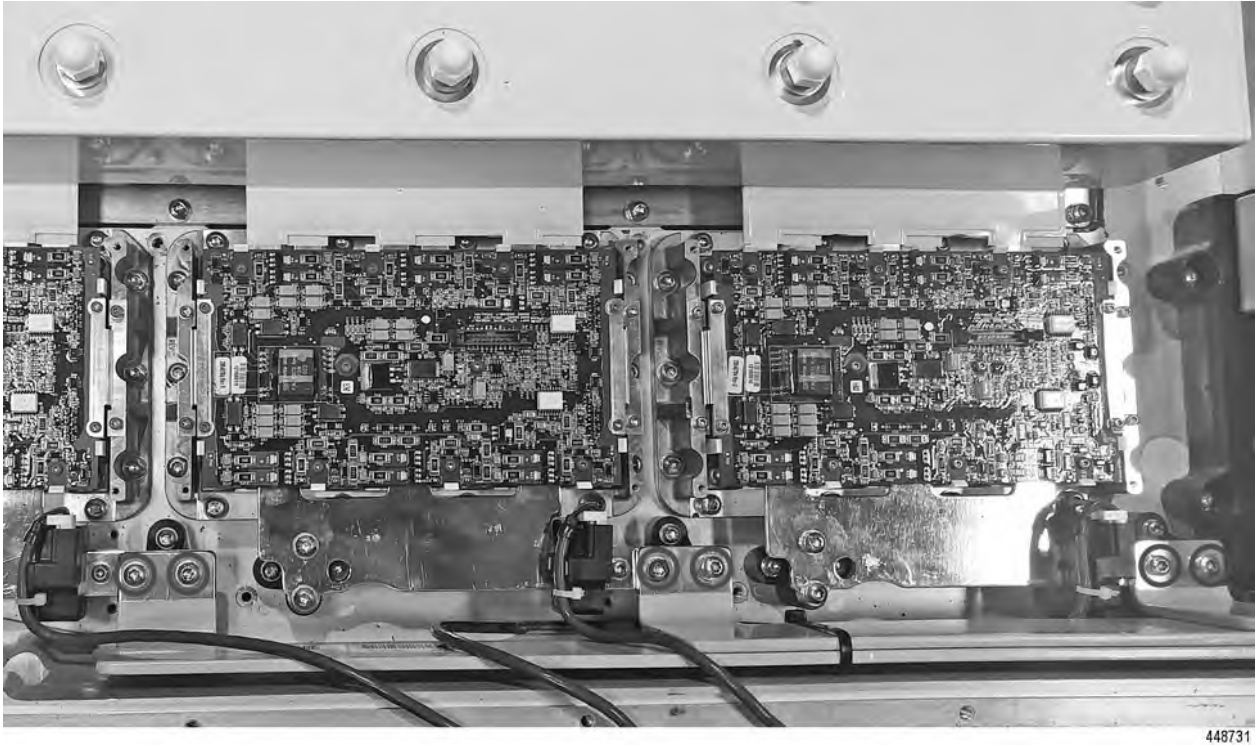


Figure 81. Mounting Screw Locations

Section 8: Installation of BCA Card Mounting Shelf

1. Feed all zip ties through the BCA Card Mounting Shelf (refer to Figure 82).

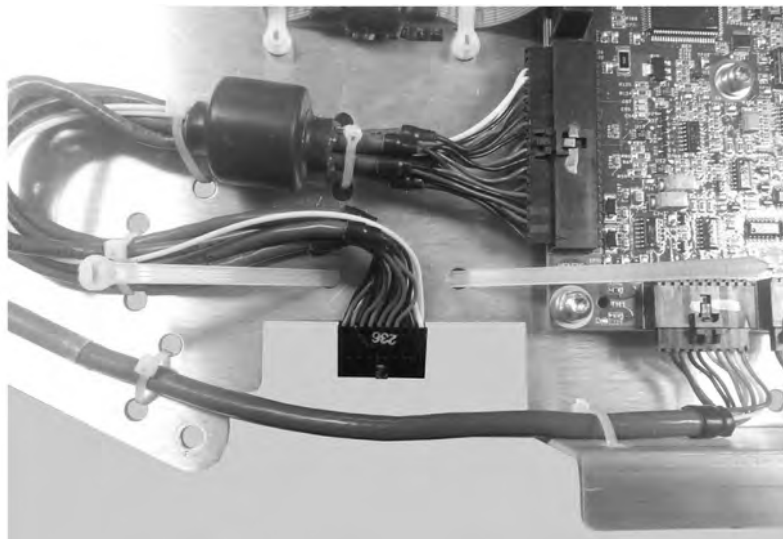


Figure 82. BCA Card Mounting Shelf Zip Tie Location

2. Place the BCA Mounting Shelf onto the side of DPIM chassis as shown in Figure 83.

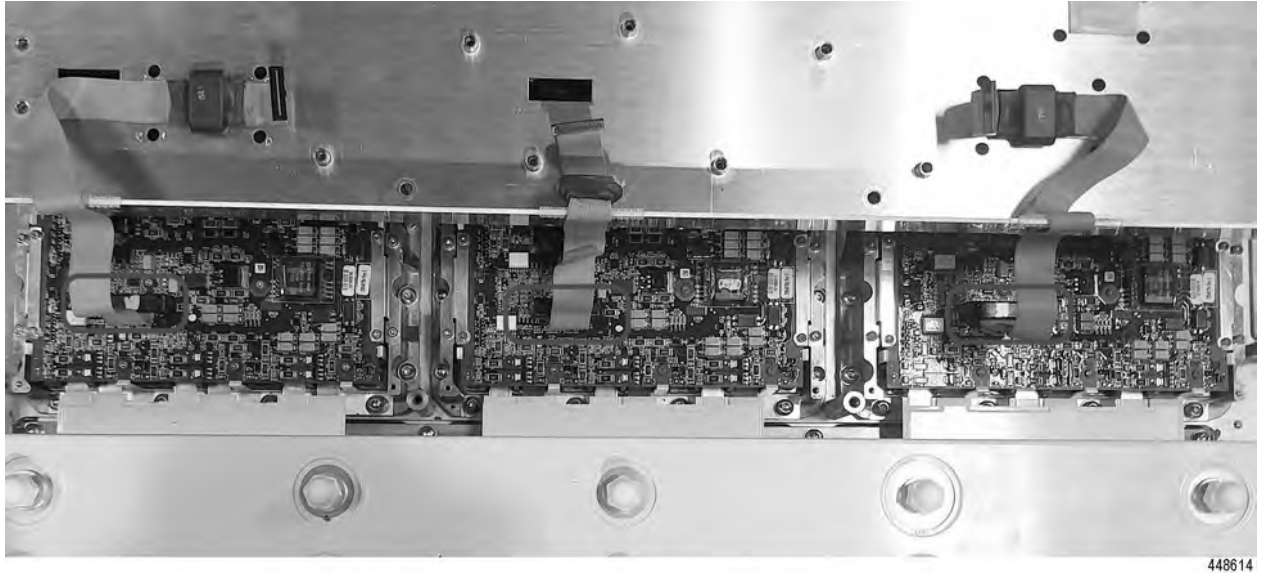


Figure 83. BCA Mounting Shelf (GATE Drive Card Cable Connectors Shown Circled)

3. Connect three (3) GATE Drive Card Connectors to three (3) GATE Drive Cards (refer to Figure 84) and install the cable strain relief caps.

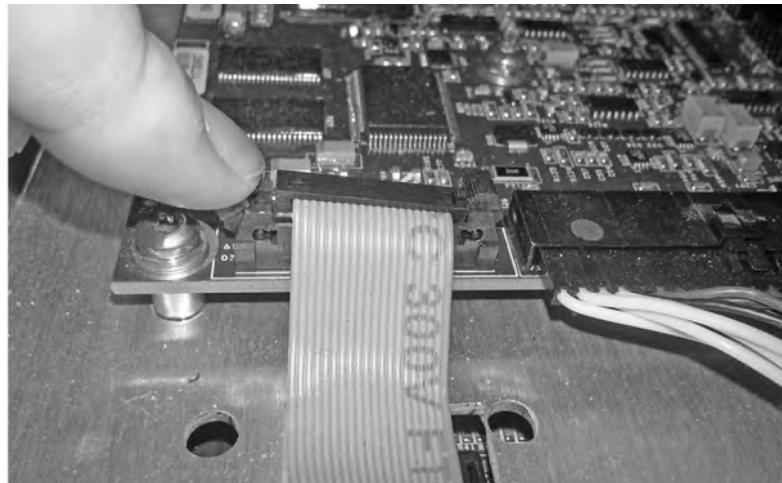
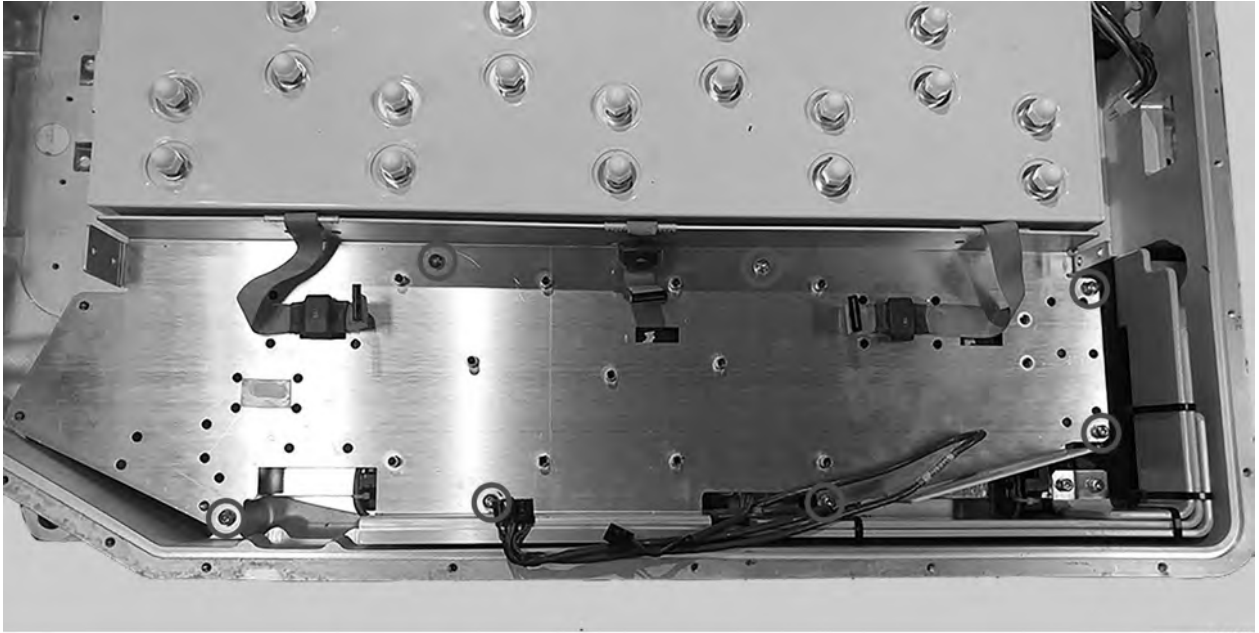


Figure 84. GATE Drive Card Cable Connector Installation (BCA Card Cable Connector Shown for Clarity)

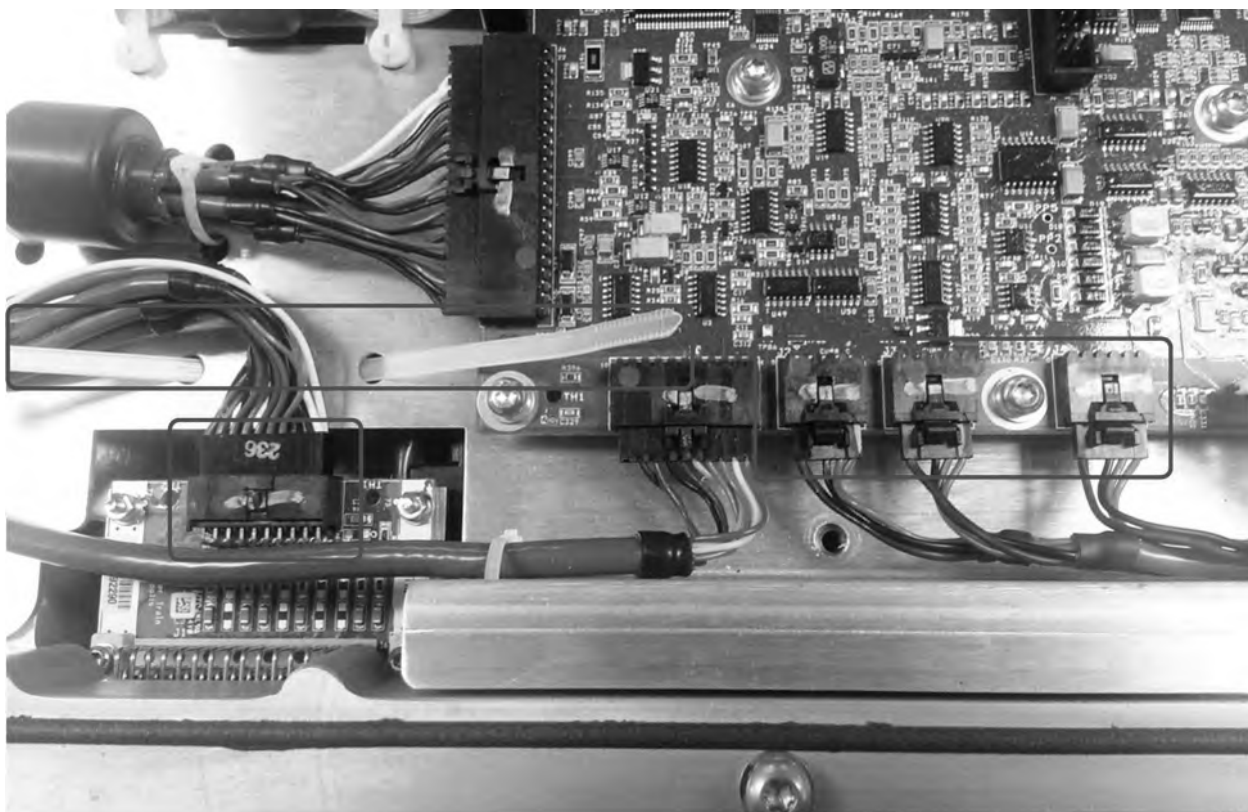
4. Move BCA Mounting Shelf to its final location. Using a Torx-Plus® T25 bit, install the seven (7) M5x14mm screws that secure the BCA Mounting Shelf (refer to Figure 85). Torque the seven (7) M5x14mm screws to 3.1-3.5 N·m (27.4-31.0 lb in.).



454652

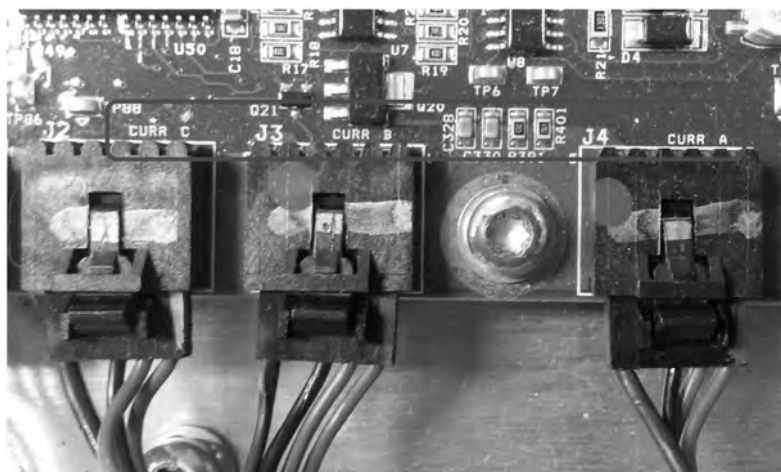
Figure 85. BCA Mounting Shelf Fastener Locations

5. Install five (5) wire harness connectors to circuit card surface mount connectors (refer to Figure 86, Figure 87, and Figure 88).



455457

Figure 86. Wire Harness Connector Installation (4 Locations)



453707

Figure 87. Current A, Current B, and Current C Locations



NOTE: Each current sensor phase (A, B, and C) MUST be plugged into the appropriate connector (CURR A, CURR B, CURR C).



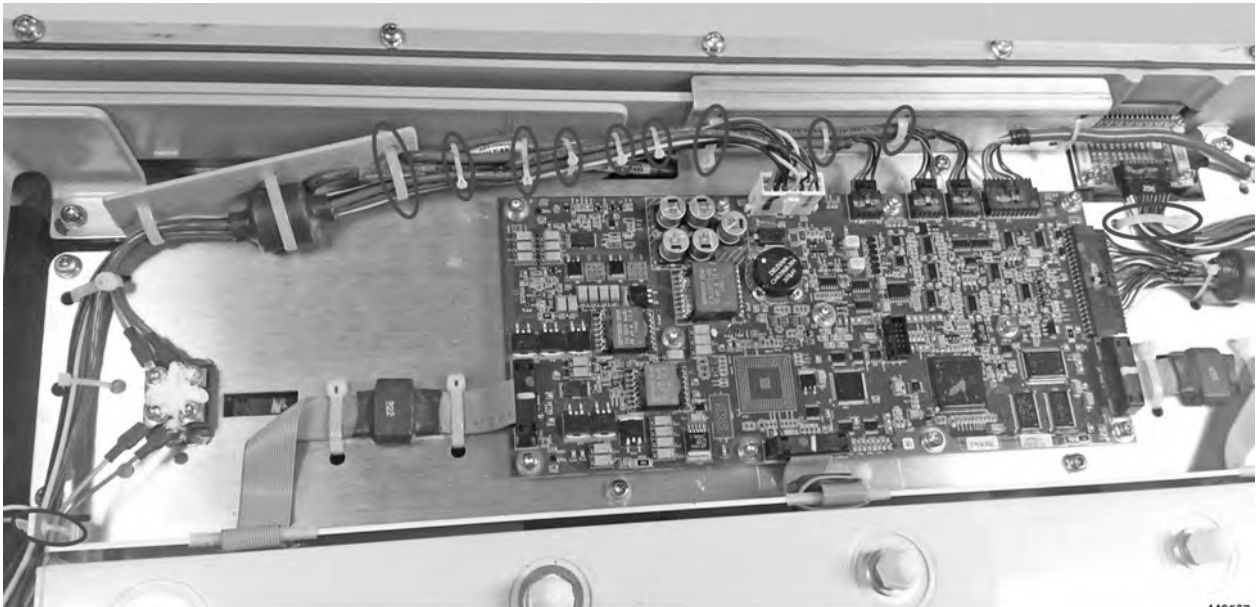
CAUTION: Permanent damage to the H 40/50 EP™ Drive Unit or DPIM can occur if the current sensor harnesses are plugged into the wrong connectors.



448591

Figure 88. Wire Harness Connector Installation

6. Install NEW zip ties as required to retain the wire harnesses (refer to Figure 89).



448567

Figure 89. Zip Tie Locations

Section 9: Installation of HVIL Circuit Card and Main Cover

1. Insert one (1) new zip tie into the new HVIL Circuit Card at the same location as shown in Figure 90.



NOTE: To ease assembly, the new zip tie must be inserted through the hole in the circuit card prior to installation in the DPIM Housing.



422298

Figure 90. HVIL Circuit Card – Zip Tie Location

2. Install HVIL Circuit Card into the DPIM Housing.



NOTE: Ensure that the wire harnesses and individual wires are NOT pinched under the circuit card during installation.

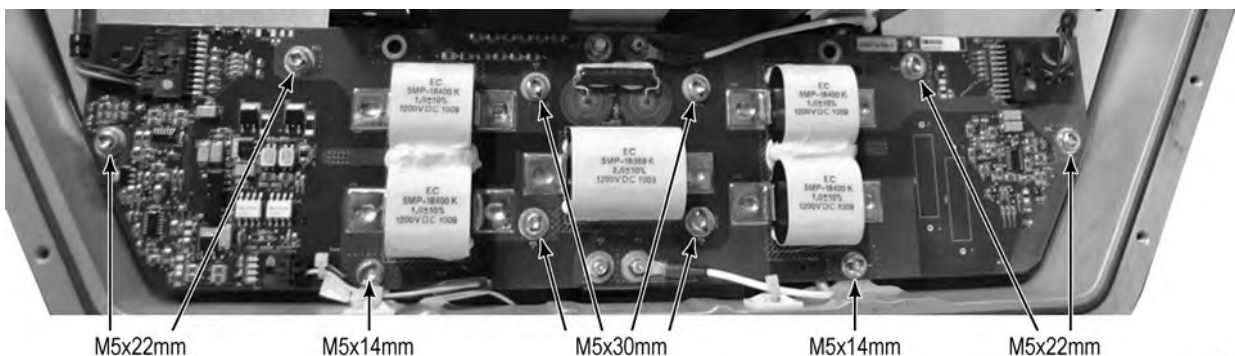
3. Connect the three (3) wiring harness connectors at locations shown in Figure 91.



422350

Figure 91. HVIL Circuit Card – Three (3) Harness Connector Locations

4. Using a Torx-Plus® T25 bit, install and finger tighten the ten (10) M5 screws that secure the HVIL Circuit Card to the DPIM Housing. Torque all M5 screws to 3.1-3.5 N·m (27-31 lb in). Refer to Figure 92 for fastener sizes and locations.



422663

Figure 92. HVIL Circuit Card – Fastener Sizes/Locations

5. Install the two (2) wire ring terminals onto the studs at locations shown in Figure 93. Using an 8mm socket, install four (4) M5 nut/washer assemblies onto the studs as shown in the same figure. Torque the nuts to 3.1-3.5 N·m (27-31 lb in).



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Figure 93. HVIL Circuit Card – Four (4) Mounting Nut/Washer Locations (M5)

6. Secure wiring with new zip ties and clip excess length as required. Refer to Figure 90 and Figure 94 for zip tie locations.



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Figure 94. HVIL Circuit Card – Two (2) Zip Tie Locations



NOTE: Verify that all eighteen (18) white protective caps are installed over the capacitor studs in the center of the DPIM. Reinstall or replace any missing caps as necessary.

7. Install new Cover Gasket P/N 29540714, included in Current Sensor and Harness Service Kit. 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 as shown in Figure 95. Torque the screws to 3.1-3.5 N·m (27-31 lb in).



421911

Figure 95. DPIM Main Cover



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



NOTE:

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