



Technical Service Bulletin

GROUP HYBRID CONTROL	NUMBER 23-HC-001H
DATE JUNE 2023	MODEL(S) SONATA HYBRID (YF HEV)

SUBJECT: HYBRID POWER RELAY DTC P1B25, P1B76, P1B77, P0A0D

This TSB supersedes TSB# 14-HC-002-1 to revise the Service Procedure and applicable vehicles.

Description: On certain Sonata hybrid (YF HEV) vehicles, the HEV safety plug or power relay assembly (PRA) may cause the following symptoms and one or more current related DTCs. Follow the Service Procedure before diagnosing the hybrid battery. Please review the following instructions carefully to determine applicability depending on the model year of your vehicle.

Warning light:

- No “EV Ready” mode, or “Ready” light blinks on and off
- “Check Engine” warning light on
- Charging system warning light on
- “Wrench” symbol (service indicator) blinks on and off

Drivability symptoms:

- Vehicle will not move from a stop or gasoline engine will not turn on.
- Warning in the instrument cluster display: “Hybrid System Warning! Safely stop and Do Not Drive” and/or alarm sound.

DTC List:

DTC	Description	Inspect
P0A0D	High Voltage System Interlock Circuit High	HEV safety plug
P1B25	High Voltage Path Fault	HEV safety plug
P1B76	High Voltage Relay Fault	Power relay assembly
P1B77	High Voltage Precharging Fault	Power relay assembly

For 2013-2015MY Sonata Hybrid (YF HEV): Please refer to “TSB 23-01-XXXH Safety Plug and Fuse Inspection/Replacement (Service Campaign 994)” first if open on the vehicle before troubleshooting Power Relay Assembly (PRA). If no open campaigns are found, proceed with this TSB.

Applicable Vehicles: 2011-15MY Sonata Hybrid (YF HEV)

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Parts Information:

Model	Part Name	Section	PNC	Part Number
2011-15MY Sonata Hybrid (YF HEV)	Power Relay Assembly (PRA)	37-371	37514	37514-4R000
2011-15MY Sonata Hybrid (YF HEV)	EV Safety Plug		37586	37586-4R000AS 37586-4R002 *Refer to parts catalog for the applicable safety plug P/N

SST Information:

Tool Name	Figure	Tool #	Remarks
Electrical Insulating Safety Glove/Protector Set*		J-48755-10H (small) J-48755-11H (medium) J-48755-12H (large)	Order from Hyundai.service- solutions.com, "EV Tools"

*Use only rubber insulating gloves that meet or exceed ASTM D120 standards (1000 volts AC/1500 volts DC).

Warranty Information:

Model	Op. Code	Operation	Op. Time	Causal Part	Nature Code	Cause Code
All Sonata Hybrid (YF HEV)	37514R1H	Power Relay Assembly Replacement	1.0 M/H	37514-4R000	E23	ZZ6
2011-2012 Sonata Hybrid (YF HEV)	37586R1H	Safety Plug Inspection & Replacement	0.2 M/H	37586-4R001		
	37514RQ0	GDS operation	0.3 M/H	N/A		

NOTE 1: Normal warranty applies.

NOTE 2: Submit claim on Claim Entry Screen as "Warranty" type.

NOTE 3: All claims must follow the Digital Documentation Policy for VIN, Mileage and Part validation. **Claims submitted that have incomplete, illegible, or missing documentation are subject to debit.**

NOTE 4: The incident parts are subject to callback through the normal Warranty Technical Center (WTC) parts return process. **Claim is subject to debit if the parts requested are not returned.**

NOTE 5: If a part is found in need of replacement while performing this TSB and the affected part is still under warranty, submit a separate claim using the same repair order. If the affected part is out of warranty, submit a Prior Approval request for goodwill consideration prior to performing the work.

STUI

As outlined in the Digital Documentation Policy, all claims require VIN and Mileage validation through VCI connection or photo capture, AND photo capture of the repair Part according to the steps in the TSB. **All claims submitted that have incomplete, illegible, or missing documentation are subject to debit.**

Service Procedure:

1. If vehicle is 13-15MY, go directly to step 7 for Power Relay Assembly Replacement.
2. Depress the brake pedal and press the Start/Stop button once to activate “EV Ready” mode. Attach a GDS, and select **VIN, BMS** menu and **DTC**. Check for **DTC** in the **BMS** menu. **Record the DTC and description.** Delete the DTC.
Select **Current Data** and the following parameters. If the results are not as shown, the power relay assembly (PRA) may not be functioning correctly. Go to step 3.

Parameter	Result
BMS Main Relay ON Status	YES
Inverter Capacitor Voltage	200v~310v

3. Turn off the ignition, open the rear trunk and open the cover to the safety plug.

WARNING

Failure to wear protective gear and perform this procedure may result in accidental injury or death.

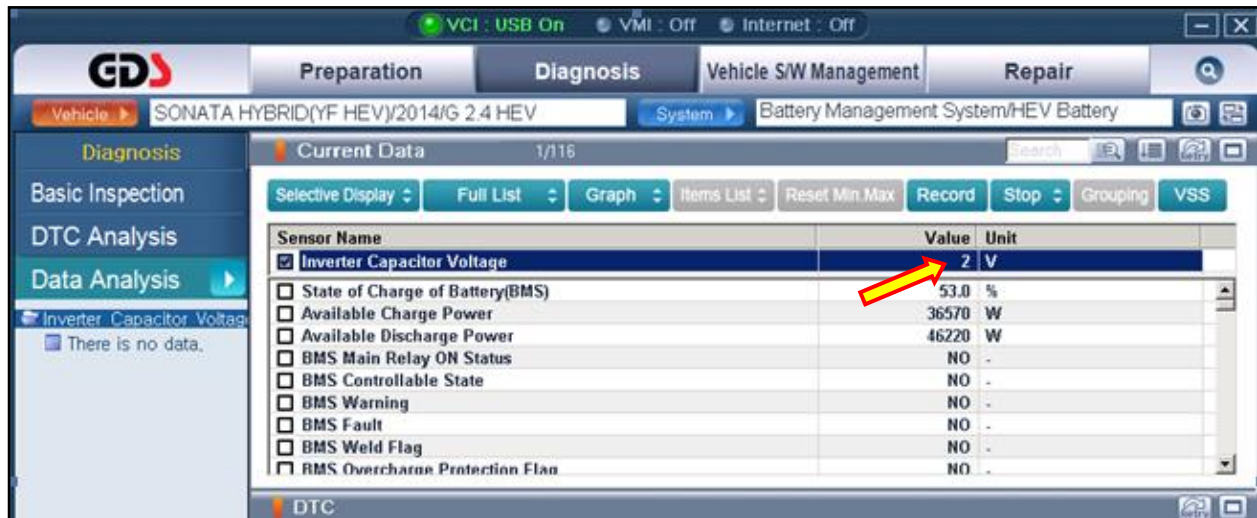
Follow all safety precautions in the shop manual:

- Hybrid Motor System > General Safety Information and Caution



Put on insulating gloves and pull up on the black tab and pull out the safety plug.

4. Without depressing the brake pedal, push the Engine Start-Stop button 2 times to power the cluster.
Attach a GDS and select **BMS** menu, **Current Data** and **Inverter Capacitor Voltage**. Confirm the **Inverter Capacitor Voltage** is less than 30V.
 - If less than 30V, the system voltage is safe for the technician. Turn OFF the ignition and disconnect the 12V negative (-) battery cable. Go to step 4.
 - If more than 30V, wait until the voltage is less than 30V before performing any repairs. Turn OFF the ignition and disconnect the 12V negative (-) battery cable. Go to step 5.



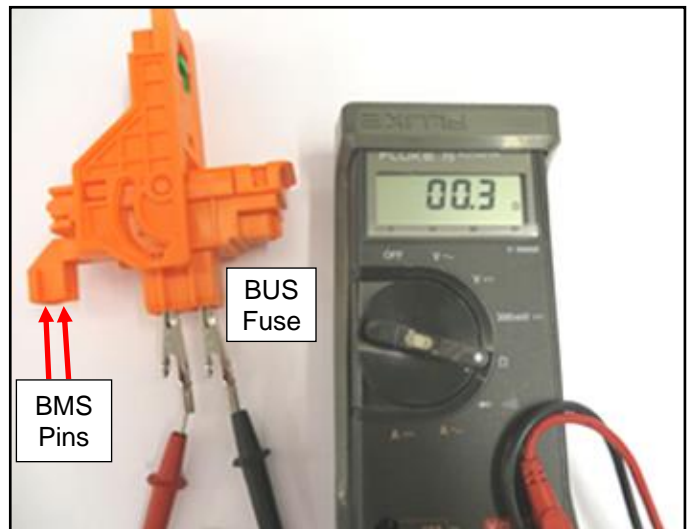
5. Use a DVOM to measure the resistance of the BUS fuse inside the safety switch.

Measure the resistance between the BMS pins.

Specification: 1Ω or less

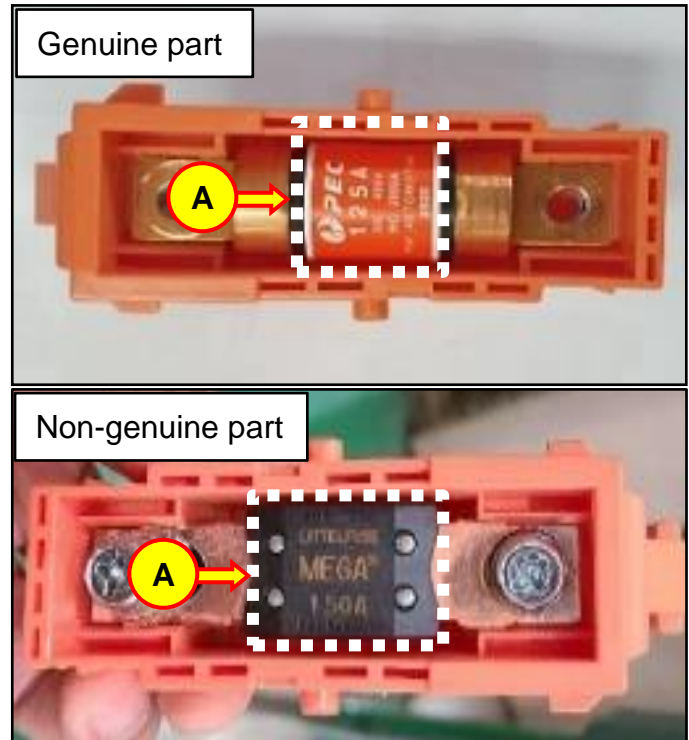
If the resistance is:

- Not within specification: Replace the safety plug and proceed to step 7.
- Within specification: Go to step 6.



6. Visually inspect the lower part (A) of the safety plug to see if the fuse is genuine or non-genuine as shown at right.

- Genuine part (“PEC” Branded): No need to replace. Reinstall all parts in reverse order of removal and proceed to step 8.
- Non-genuine part: Replace the safety plug, reinstall all parts in reverse order of removal.



7.

STUI



Using STUI, photograph the installed Safety Plug with the last 6 digits of the VIN and the date of the repair on a piece of paper.

Upload the photo to STUI and proceed to step 15.



8.

i Information

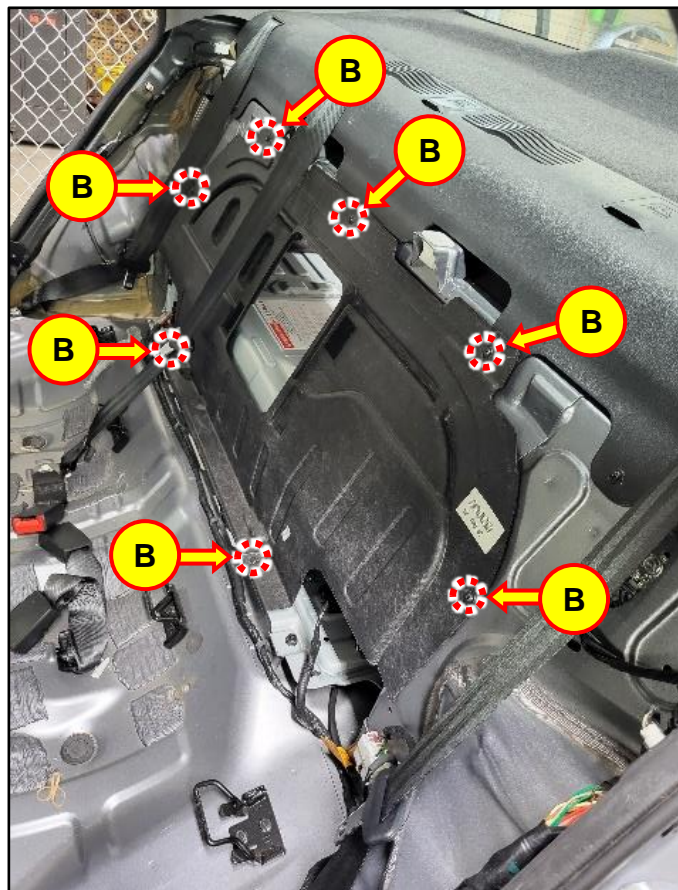
The following steps (8 – 14) only apply for PRA-related DTCs P1B76/P1B77.

Remove the rear seat.

Refer to the shop manual:

- **Body (Interior and Exterior) > Seat & Power Seat > Rear Seat > Repair procedures**

Remove the 7 screws (B) securing the rear seat access cover.



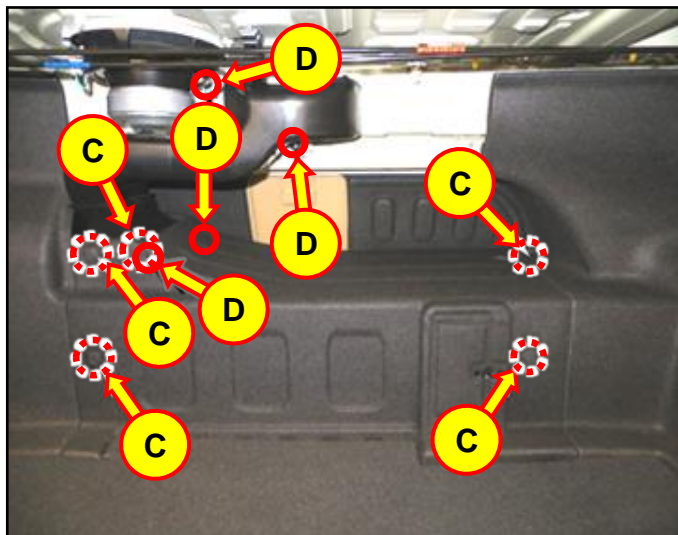
9.

Remove the 5 fasteners (C) and remove the carpet trim.

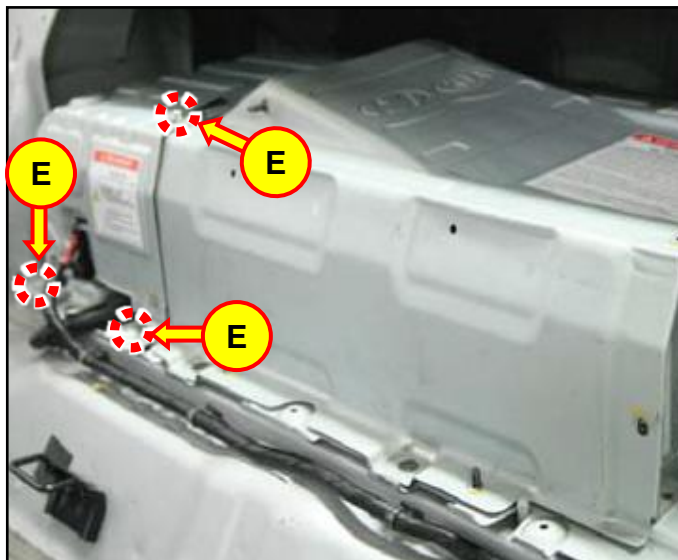
Refer to the shop manual:

- **Body (Interior and Exterior) > Interior > Trunk Trim > Repair procedures**

Remove the 4 nuts (D) securing the air duct and remove the air duct.



10. Remove the nuts and bolts (E) securing the steel cover and remove the cover for the power relay assembly (PRA).



- 11.

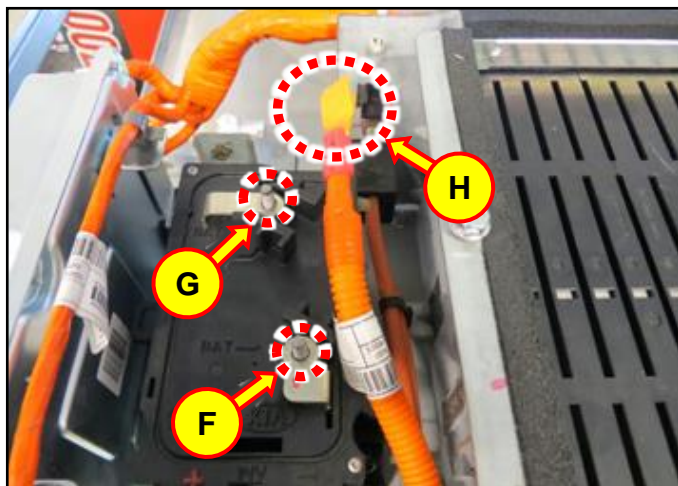
⚠ WARNING

The HEV battery may have a charge of 120~150v. Failure to wear insulating gloves may result in accidental injury or death.

Put on leather gloves on top of the insulating gloves. Wear safety glasses.

Remove the negative (-) cable (F) first and wrap the cable end with insulating tape.

Next remove the positive (+) cable (G) and wrap the end with insulating tape (H).



Tightening Torque:

lb-ft	7.3
lb-in	87
N.m	9.4

12.

i Information

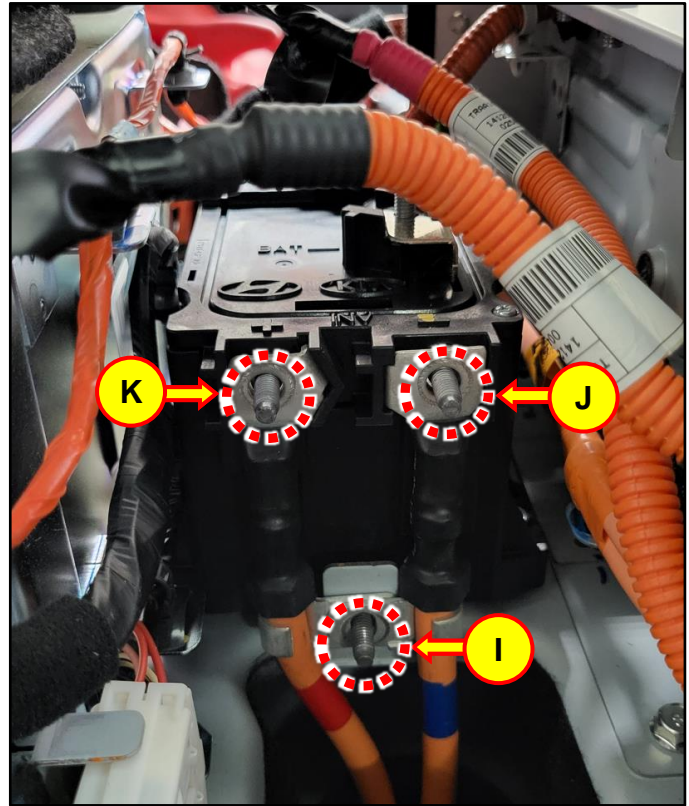
With the high voltage cables insulated, you may perform the steps below without PPE.

Remove the 10mm nut securing the inverter cables to the power relay assembly (PRA) (I).

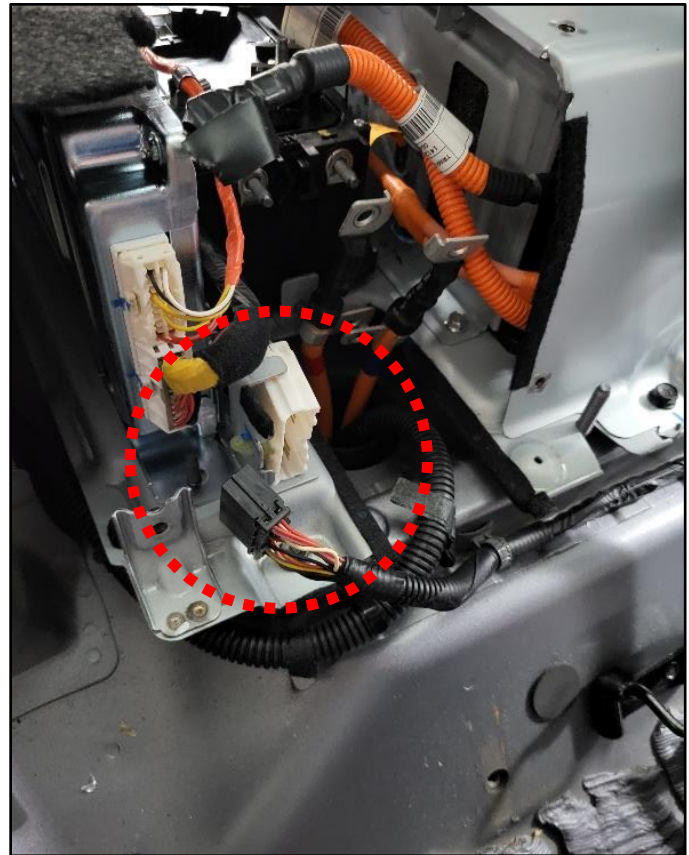
Remove the negative (-) inverter cable (J) first, then the positive (+) cable (K).

Tightening Torque:

lb-ft	7.3
lb-in	87
N.m	9.4



13. Remove the black connector here as well as the mating connector anchored to the steel tab to gain access to the nut securing the BMS ECU.

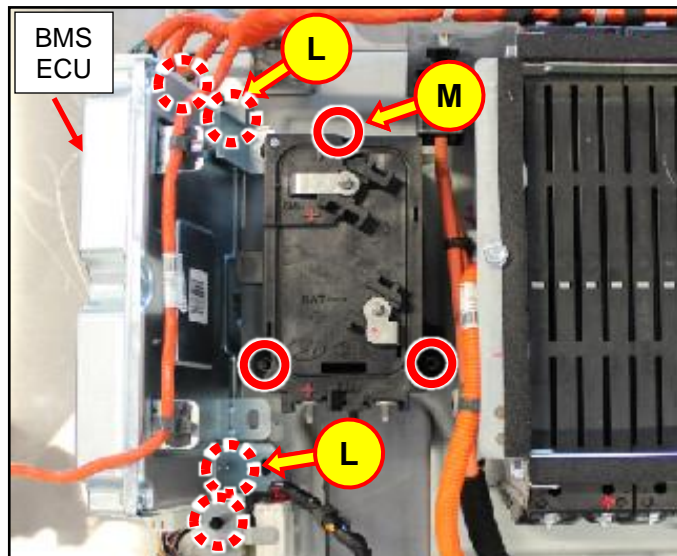


- Loosen the four nuts (L) and tilt the BMS ECU to the left to provide clearance between it and the power relay assembly (PRA).

Remove the three mounting nuts (M) and remove the power relay assembly (PRA). Install a new PRA following the reverse order of removal.

Tightening Torque:

lb-ft	7.3
lb-in	87
N.m	9.4



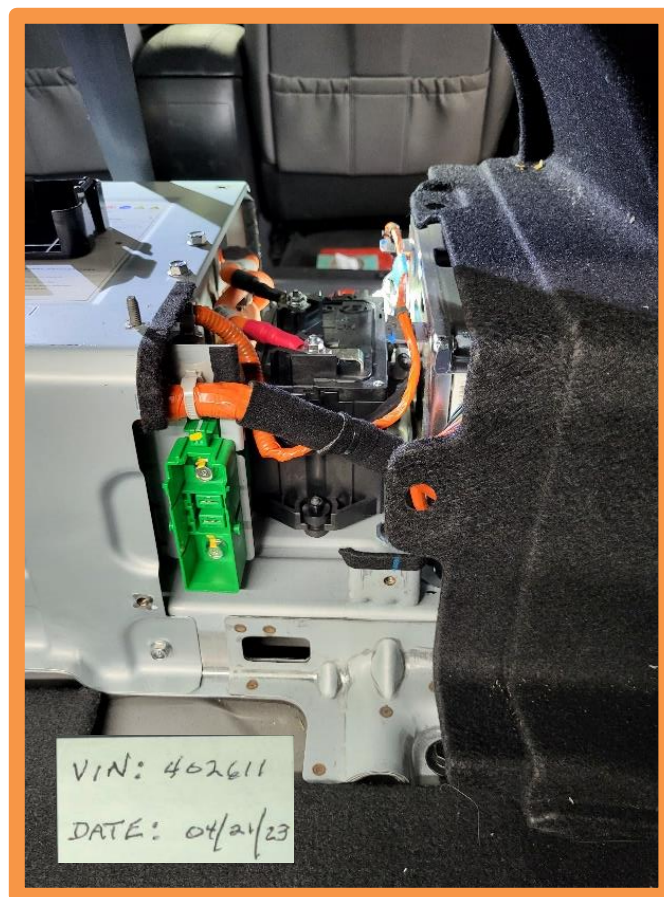
- STUI**

Using STUI, photograph the installed PRA with the last 6 digits of the VIN and the date of the repair on a piece of paper.

Upload the photo to STUI.

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- Reassemble all parts in the reverse order of disassembly.
- Attach a GDS and delete any DTC.

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18. Clear the DTC in the BlueLink system according to instructions in TSB 19-BE-010 (or latest version).
19. Drive the vehicle for two key-on/key-off drive cycles.
20. End of service procedure.