2012 Toyota Camry AVV50R – ‘Check Hybrid System’

Diagnosis and Report

Introduction:

2012 Toyota Camry ‘AVV50R’ with 106,807km on the odometer. Recently displaying ‘master warning light’ along with VSC, engine and warning lights and displays ‘CHECK HYBRID SYSTEM’. Vehicle will start and drive, albeit without utilizing the Electric Vehicle (EV) Hybrid system – only Internal Combustion Engine (ICE) is operational.

Figure 1 - Dashboard with warning lights

Diagnosis:

OBD reader returns code P0B56, ‘Hybrid Battery Voltage Sense ‘F’ Circuit Low. Code was cleared but returned upon cycling ignition power.

Figure 2 - OBD Reader codes returned

Subsequently, the HV battery pack service plug was removed and the sense voltage connector was accessed for further testing. Connector, module casing and surrounding shielding shows carbon deposits consistent with high heat, smoke, and/or fire. Several wires appear melted and are disconnected. The voltage sense plug is also corroded/melted and unable to be disconnected safely – will require removal and further disassembly of HV to assess comprehensively.

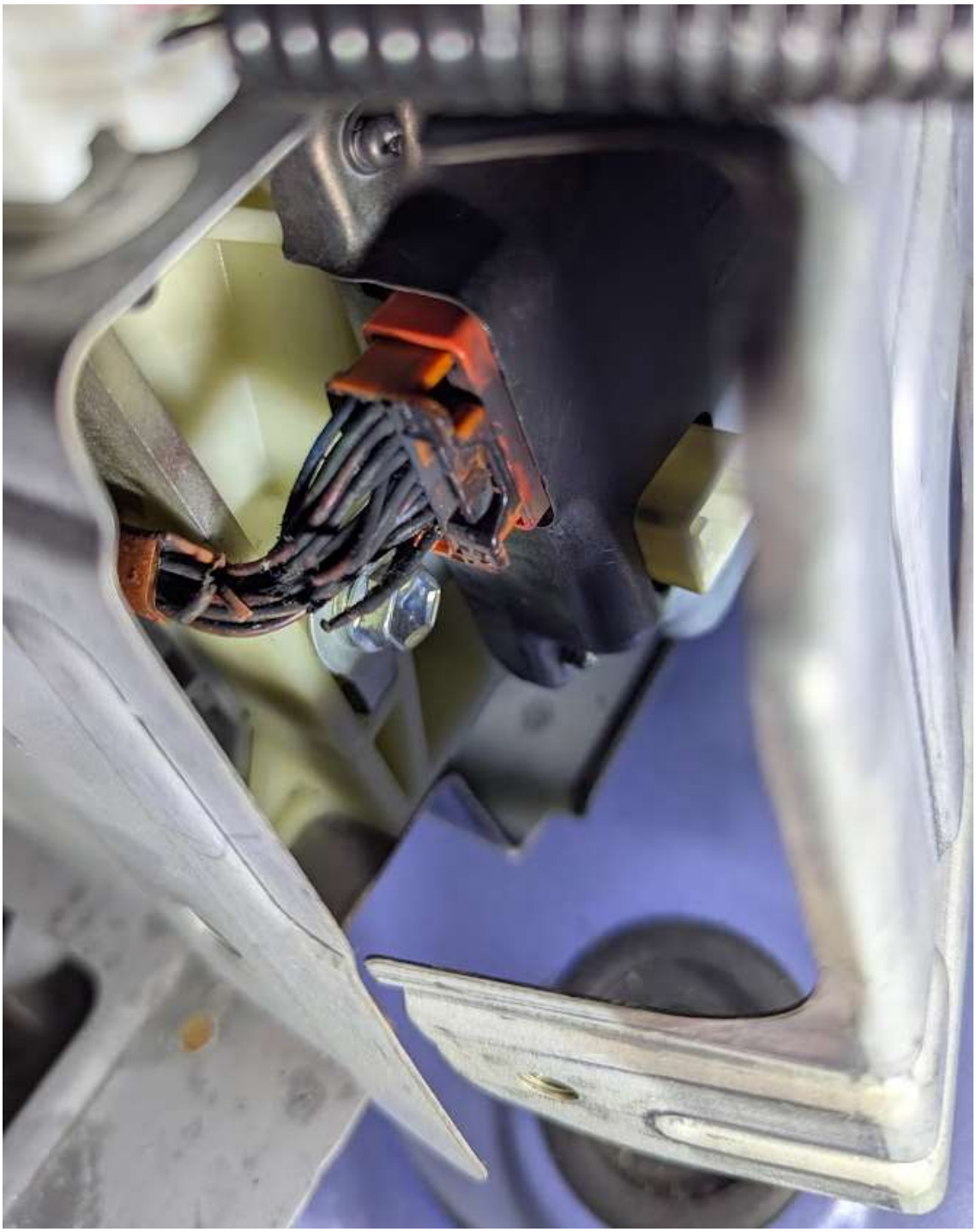

Figure 3 - Voltage sensor connector showing carbon deposits from smoke and/or fire

The HV Battery pack was removed from vehicle and assessed for further damage. No evidence of external causes were located.

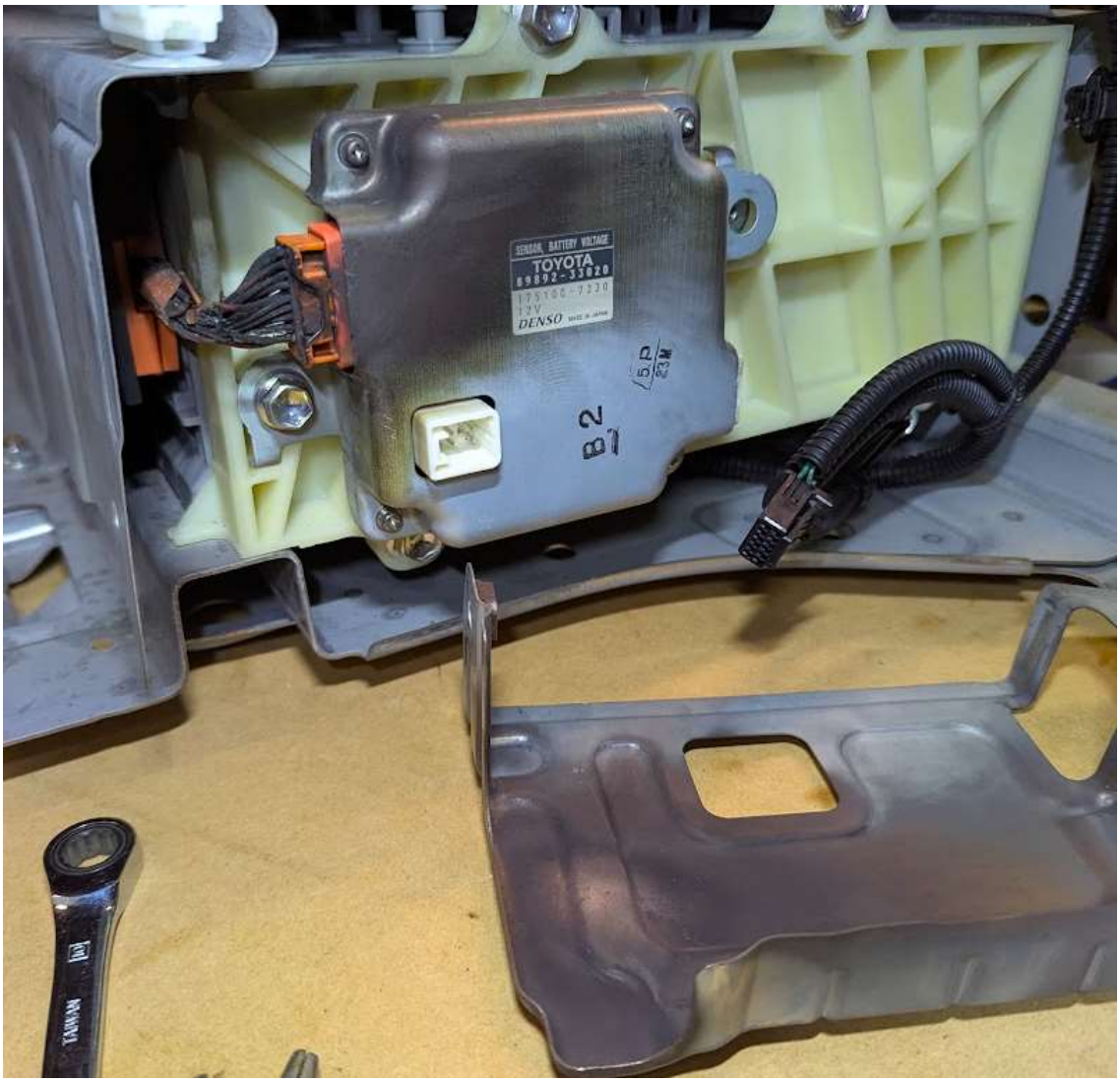

Figure 4 - Heat/carbon damage to module and cover plates

Superficial corrosion was observed on busbars and sense connectors.

Figure 5 - HV battery rear cell interface w. busbars

Figure 6 - HV battery front cell interface w. busbars

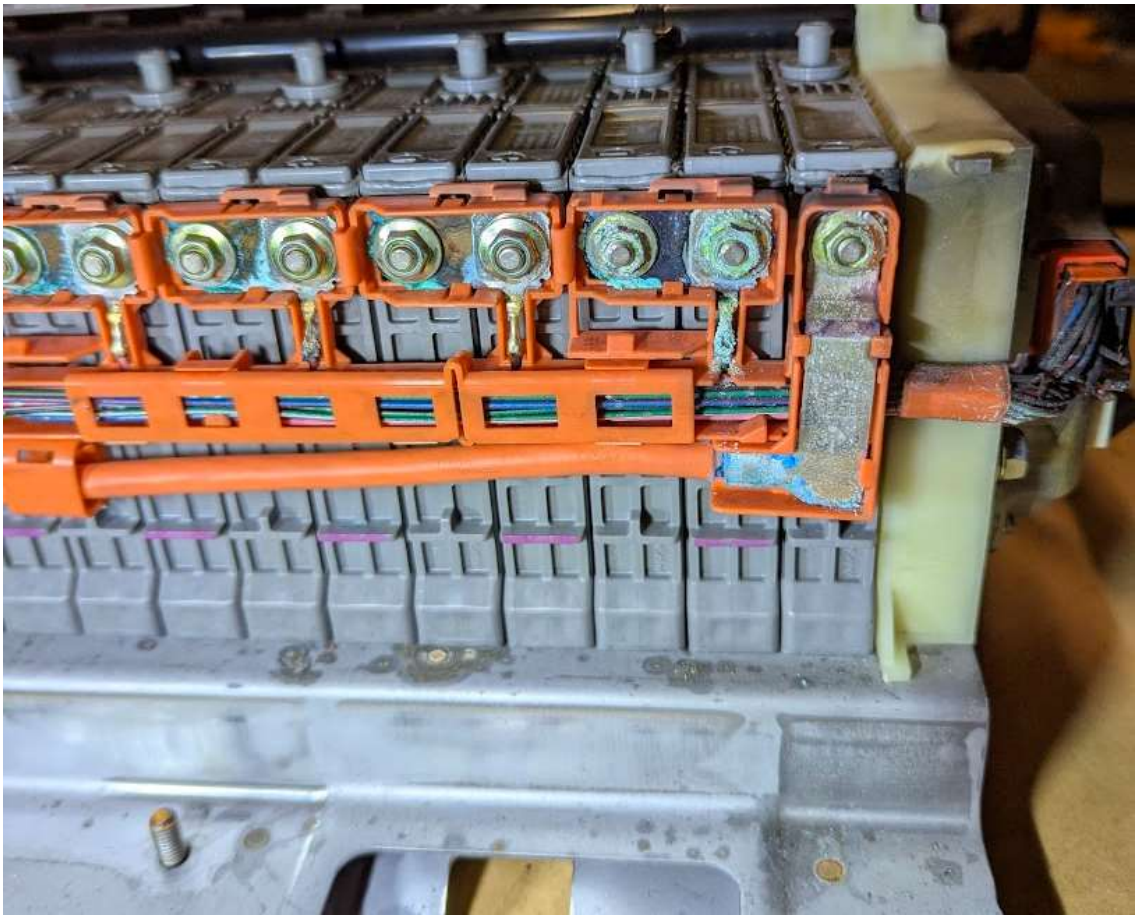

Figure 7 - Corrosion on HV battery connections – right rear of back with melted sense wires far right

Battery voltage sensor and harness was removed for further analysis

Figure 8 - 6 of 18 wires in sense harness have melted

Battery voltage sensor board internally appears ok, including soldered pins to board. Connector itself has sustained damage.

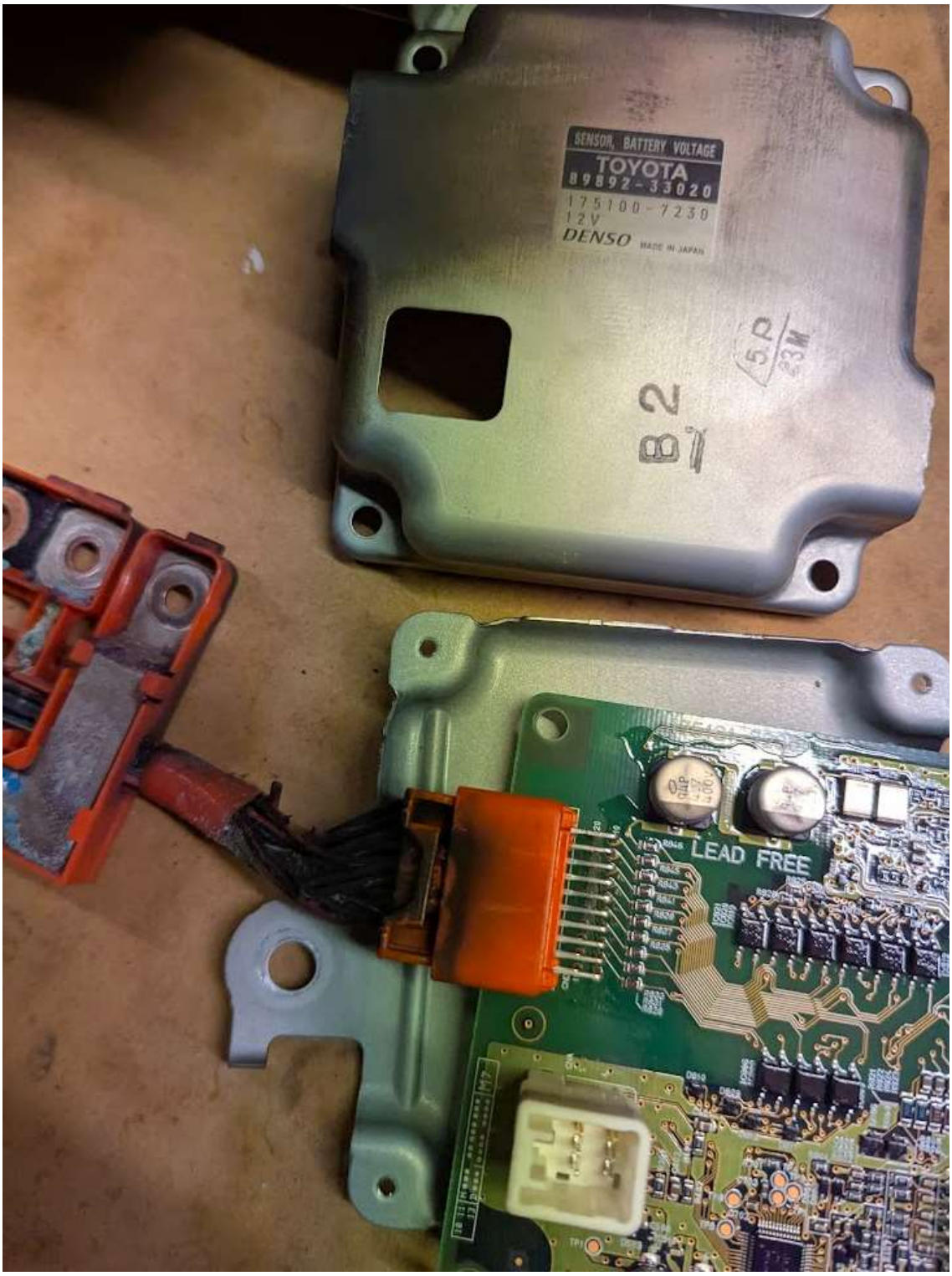

Figure 9 - Battery voltage sensor module board and connector

Plug is burnt/melted and required significant effort to remove, noting 2 of 18 connected male pins have the female terminal melted onto them.

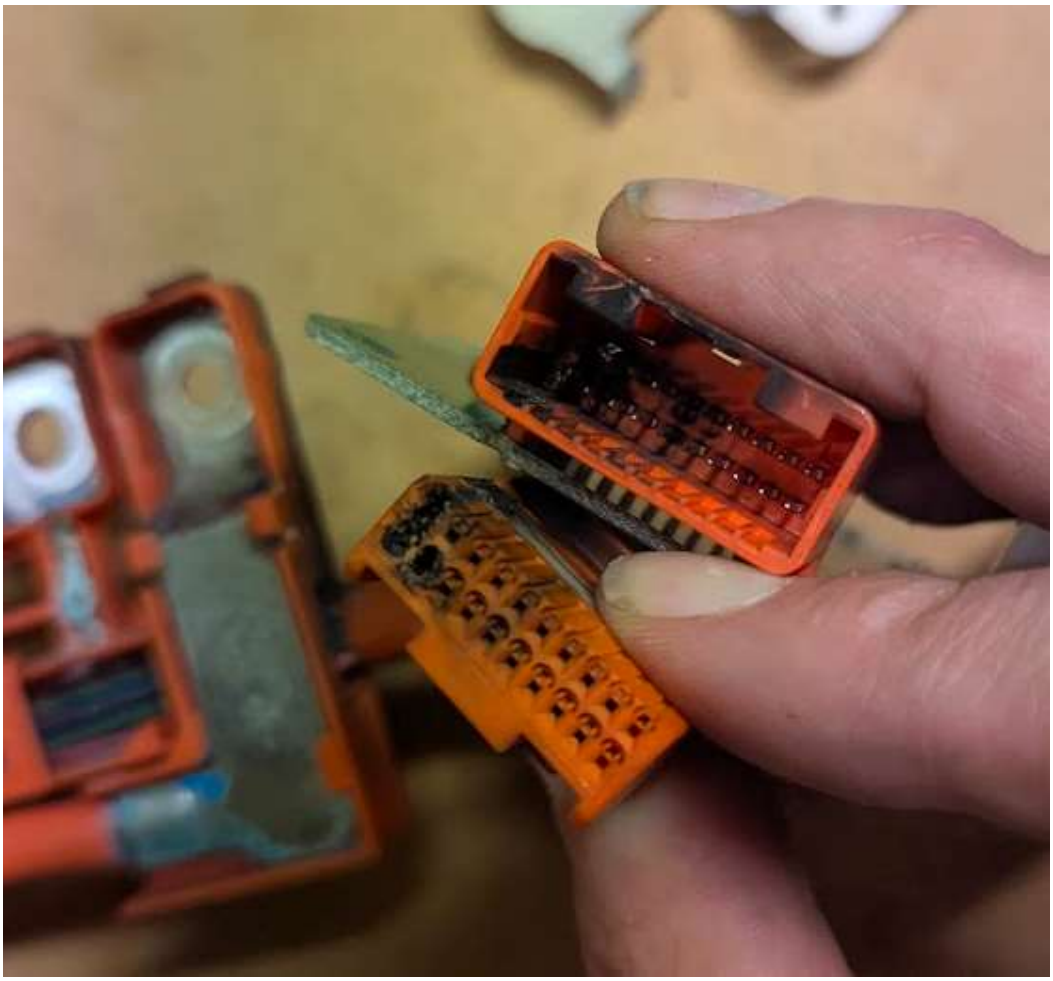

Figure 10 - Melted/burned connector.

Underside of voltage sensor board also shows no visible issue, including sense harness connector

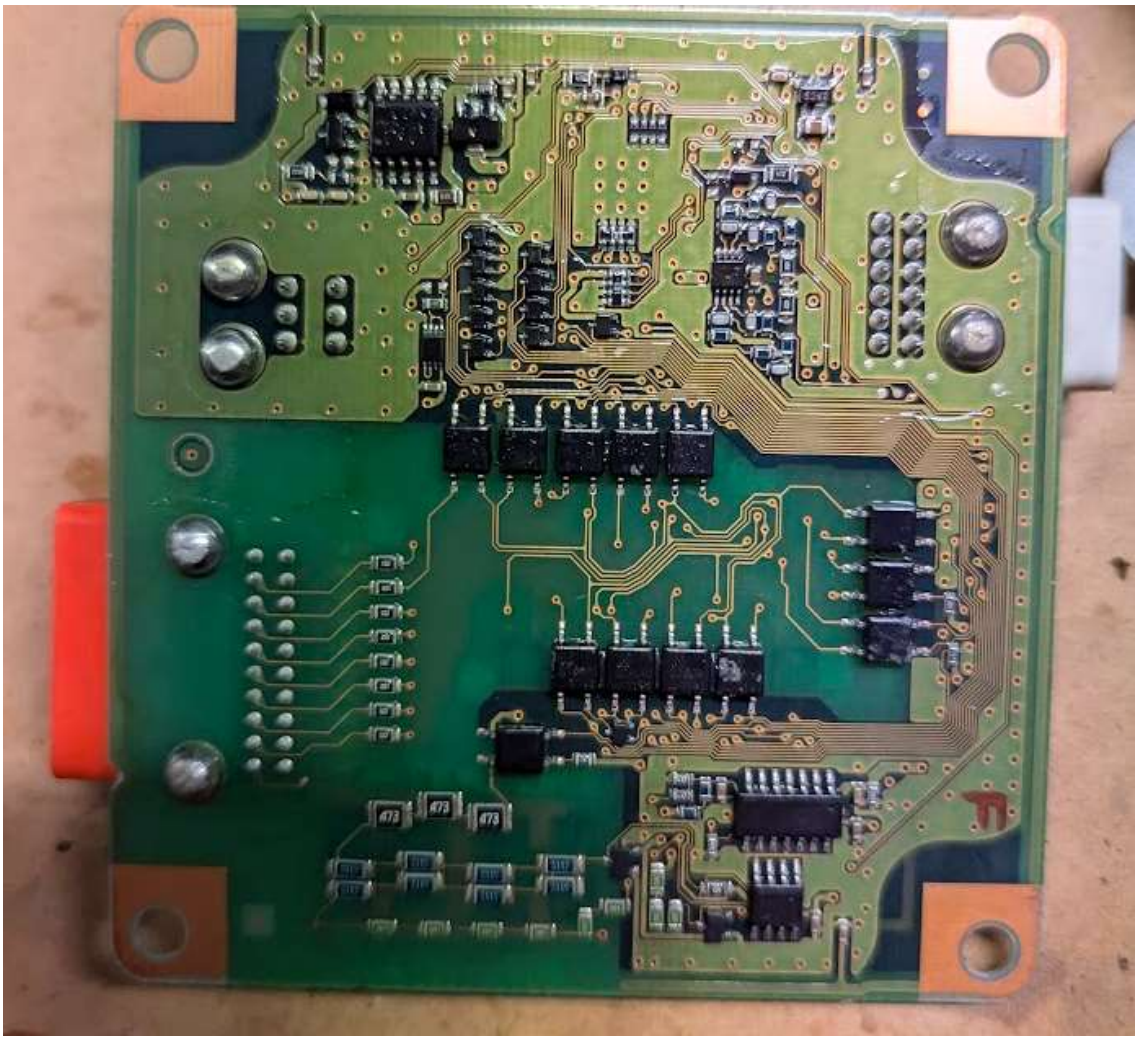

Figure 11 - Underside of battery voltage sensor board

The sense harness was disassembled, confirming that out of 18 wires, 6 had been completely melted and disconnected and a further 2 were partially damaged.

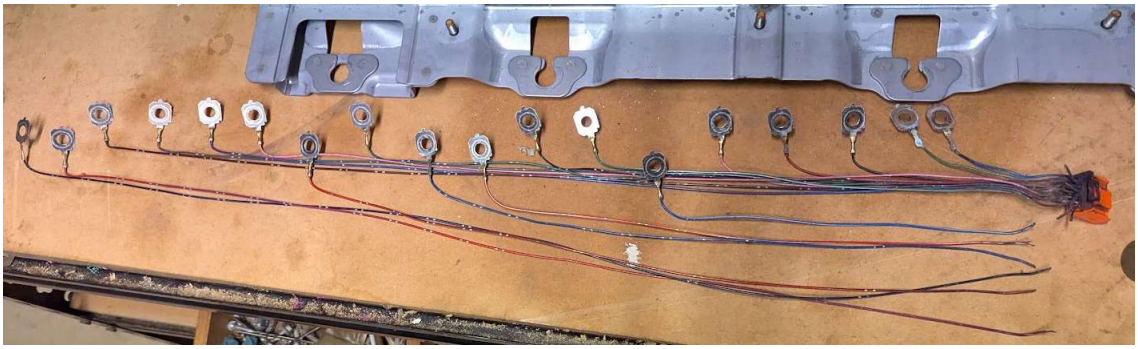

Figure 12 - battery voltage sensor harness

HV battery pack health was also assessed, with all 34 cell modules returning a voltage of 7.81v +/- 0.03v.

Conclusion:

It appears the interface between the battery voltage sensor module and wiring harness may have developed a high resistance join resulting in excessive heating, melting and smoke and/or fire.

There was no evidence of external influence exacerbating this, including no mechanical, liquid or rodent intrusion.

Items requiring replacement include the voltage sensor module and battery voltage sensor harness.