Instructions for HV Battery Electrical Disconnection
Model S, Model X, Model 3, Model Y

CD-21-16-002

Last updated: 24 August 2021

Introduction

This document is developed to support third parties that handle Tesla End of Life vehicles in safely working with High Voltage components used in Tesla vehicles.

This document describes how to electrically disconnect the High Voltage battery on Tesla Model S, Model X, Model 3, and Model Y vehicles. It includes a procedure to carry out measurements to make sure that the High Voltage battery contactors are open and no High Voltage is present on the vehicle components. This is an extra step to make sure High Voltage is disconnected after cutting the First Responder Loop.

NOTE: Procedures for High Voltage Battery Electrical Disconnection are different between Model S/X and Model 3/Y. Make sure to select the correct procedure based on the type of vehicle you work on.

WARNING: Before the procedures described in this document are successfully completed, always treat the high voltage system as if it is live, because the High Voltage battery will still have energy stored in it and it is not known whether or not high voltage components including their safety systems have been damaged.

WARNING: Only personnel trained and certified for working on live high voltage systems under local jurisdiction are permitted to perform the procedures outlined in this document.

WARNING: Proper personal protective equipment (PPE) including insulating High Voltage gloves with a minimum rating of class 0 (1000 V) must be worn at any time when a High Voltage battery component is handled. Refer to document CD-21-92-001 “Personal Protective and Emergency Equipment - Guidance for Waste Treatment Partners” for additional information on PPE.

WARNING: Remove all jewelry (watches, bracelets, rings, necklaces, earrings, ID tags, piercings, etc.) from your body, and all objects (keys, coins, pens, pencils, tools, fasteners, etc.) from your pockets before performing any procedure that exposes you to high voltage.

NOTE: The procedures described in this document only apply when the High Voltage battery is mounted to the vehicle.

NOTE: Before disconnecting the 12V power supply, make sure that the driver’s door window is fully open. Failure to follow this instruction could result in vehicle lockout.

Tools Required

Tesla Part Number	Description
1076921-00-A	Fluke 1587 Insulation Multimeter (or equivalent)
1130480-00-A	Test Probes, Slim, Fluke TP38

Model S and Model X Electrical Disconnect Procedure

Disconnect 12 V and High Voltage Power

1. Open the hood (Figure 1).
2. Remove the rear underhood apron by pulling it upward to release the clips that attach the apron to the vehicle (Figure 2).

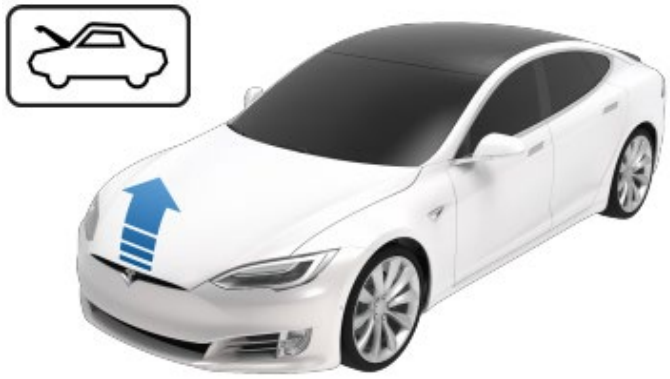

Figure 1

Figure 2

3. Double cut a section out of the First Responder Loop, located on the RH side of the vehicle, under the rear underhood apron (Figure 3).

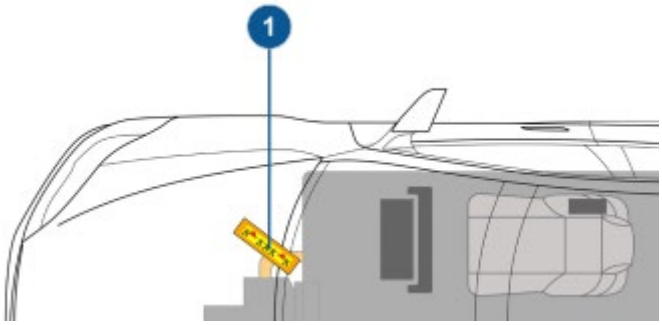

Figure 3

WARNING: Before continuing, wait for at least 2 minutes after the First Responder Loop has been cut to make sure that all electrical circuits have fully discharged.

NOTE: The First Responder Loop disables 12V power that energizes the airbag circuit and removes 12V power that energizes the high voltage contactors inside the High Voltage battery pack.
Removal or cutting the First Responder Loop does not disable the 12V battery system. The 12V battery must be disconnected in order to disable the 12V battery system.

4. Disconnect the 12V battery.

   NOTE: Depending on vehicle trim and production date, the location of the 12V battery under the hood can vary.

   NOTE: Always open doors, windows, the liftgate and the hood as required before disconnecting the 12V battery. Door, hood and liftgate latches cannot be unlocked when 12V power is disconnected.

5. Set up the multimeter to measure DC high voltage (500V) and measure the voltage across the terminals of a known good 12V auxiliary battery.

   CAUTION: If the voltage measured is less than 10 Volts or more than 14 Volts, the multimeter is not measuring reliably and must not be used.

   WARNING: Make sure that the multimeter and leads are capable of handling at least 500V.

6. Access and check for the presence of high voltage on the appropriate location. Based on the vehicle being worked on, choose one of the procedures listed:

   - Checking for High Voltage at the Drive Inverter
   - Checking for High Voltage at the High Voltage Junction Box (HVJB) (Model S)
   - Checking for High Voltage at the 3rd Generation Charger (Model S)
   - Checking for High Voltage at the 3rd Generation Charger (Model X)

   WARNING: Proper personal protective equipment (PPE) including insulating High Voltage gloves with a minimum rating of class 0 (1000V) must be worn while performing the remainder of this procedure.

Checking for High Voltage at the Drive Inverter

NOTE: This procedure can only be performed on Model S and Model X vehicles with the large rear drive unit.

- If the vehicle has the small rear drive unit, perform the Checking for High Voltage at the High Voltage Junction Box (HVJB) (Model S) section of this procedure instead.
- If the vehicle has a 3rd generation charger, perform the Checking for High Voltage at the 3rd Generation Charger (Model S) section of this procedure instead.

1. Raise and support the vehicle.
2. Remove the mid aero shield.
3. Disconnect the low voltage harness, release the bolt (Figure 1) and then remove the orange drive inverter cover (Figure 2).

Figure 1

Figure 2

4. Use the drive inverter case as a chassis ground. Measure the following voltages (Figure 3):
   - B+ to ground
   - B- to ground
   - B+ to B-

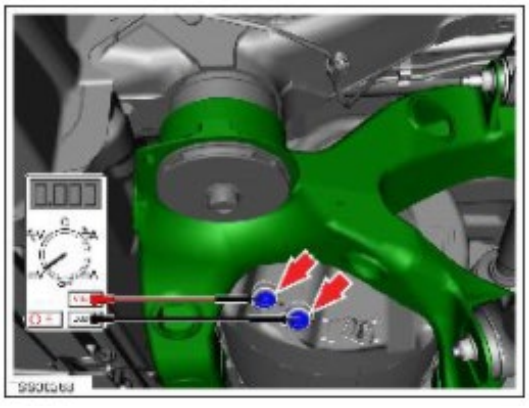

Figure 3

WARNING: All three measurements must read less than 10V. If any of the three measurements reads more than 10V, high voltage might be present on the terminals coming from the High Voltage battery.

Checking for High Voltage at the High Voltage Junction Box (Model S)

NOTE: This procedure can only be performed on Model S vehicles built before April 10, 2016.

NOTE: North American vehicles can either have a 1st or a 2nd generation High Voltage Junction Box (HVJB) installed, depending on the vehicle variant. The 2nd generation HVJB can be identified by its cast aluminum lid as shown in Figure 4 hereafter.

1. Open both rear doors.
2. Move the front seats fully forward.
3. Remove the 2nd row seat base cushion.
4. Remove the bolts (x8) that attach the seat frame to the body and all clips that attach secure cables to the 2nd row seat frame (Figure 1).

TIP: If the seat frame is being removed for access, it might not be necessary to remove it from the vehicle. Instead, lift up on the frame and temporarily secure it to the 2nd row seat backrest.

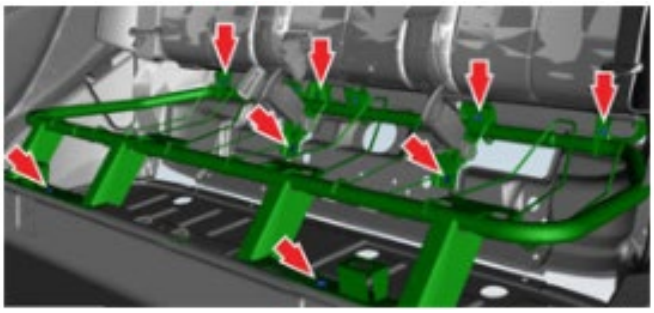

Figure 1

5. Remove the HVJB cover.

   1st Generation HVJB (North America only):

   a. Remove the bolts (x6) that attach the HVJB box cover (Figure 2).

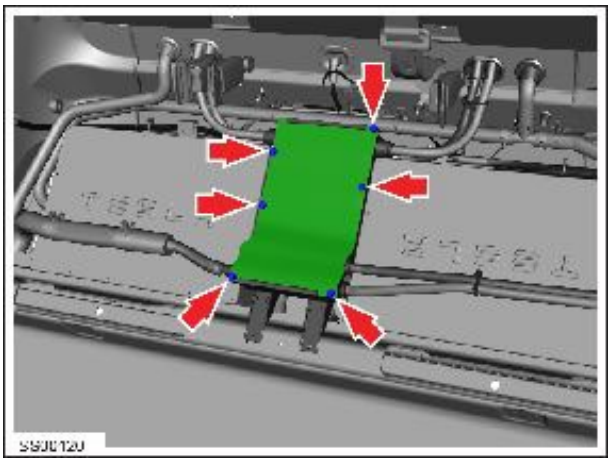

Figure 2

b. Use a multimeter to check voltages across the High Voltage cables and ground (Figure 3):

- B+ to ground
- B- to ground
- B+ to B-

1 = B+
2 = Ground
3 = B-

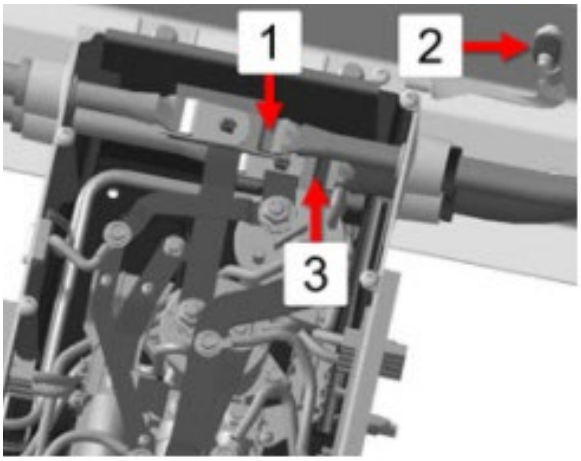

Figure 3

2nd Generation (All regions):

a. Remove the HVIL bolt from the HVJB cover (Figure 4).

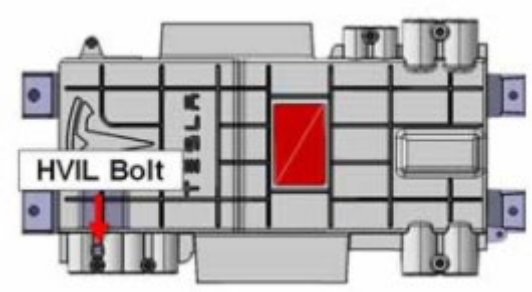

Figure 4

b. Remove the remaining fasteners (x6) that secure the HVJB cover (Figure 5).

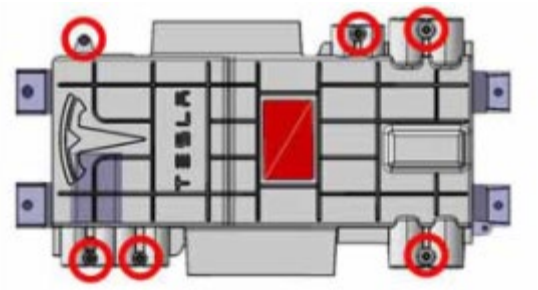

Figure 5

c. Use a multimeter to check voltages across the battery/rear drive unit High Voltage cable terminals and ground (Figure 6):

- B+ battery/rear drive unit to ground
- B- battery/rear drive unit to ground
- B+ battery/rear drive unit to B- battery/rear drive unit

WARNING: Never use a fastener or an e-coated surface as a path to ground. In this procedure, ensure that the ground strap from the HVJB is secure to the body and use the lug as a path to ground.

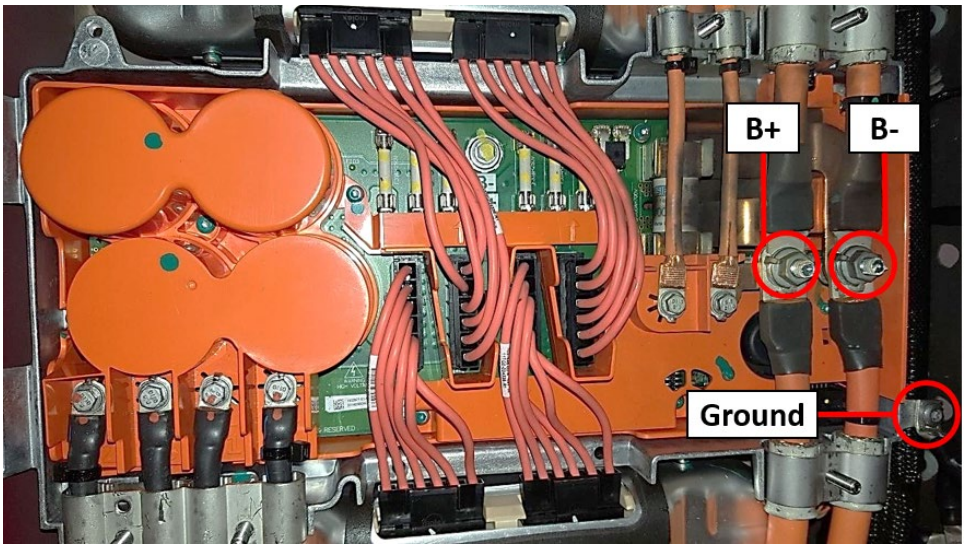

Figure 6

WARNING: All three measurements must read less than 10V. If any of the three measurements reads more than 10V, high voltage might be present on the terminals coming from the High Voltage battery.

Checking for High Voltage at the 3rd Generation Charger (Model S)

NOTE: This procedure can only be performed on Model S vehicles with a 3rd generation charger (vehicles built after April 10, 2016).

1. Open both rear doors.
2. Move the front seats fully forward.
3. Remove the 2nd row seat base cushion.
4. Remove the bolts (x8) that attach the seat frame to the body and all clips that attach cables to the 2nd row seat frame (Figure 1).

   TIP: If the seat frame is being removed for access, it might not be necessary to remove it from the vehicle. Instead, lift up on the frame and temporarily secure it to the 2nd row seat backrest.

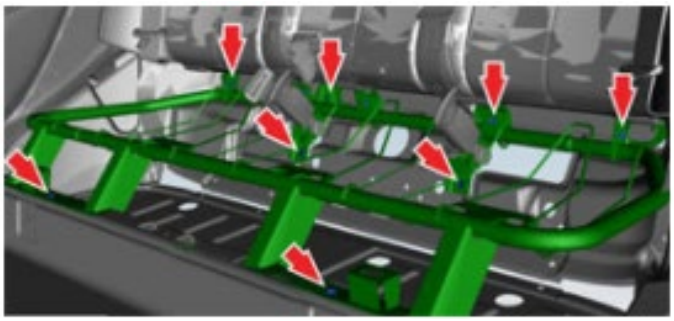

Figure 1

5. Remove and discard the warranty label from the charger access panel (Figure 2).

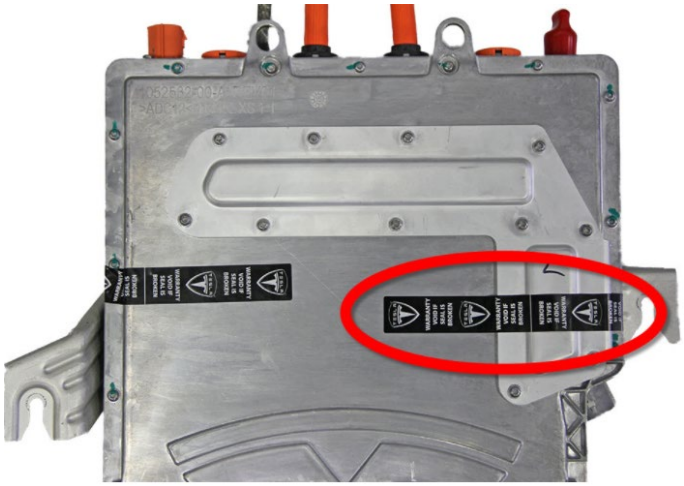

Figure 2

6. Remove the screws (x11) that attach the charger access panel (Figure 3).

Figure 3

7. Gently peel back the rubber cover to expose the High Voltage fasteners that secure the High Voltage cables to the High Voltage battery (Figure 4).

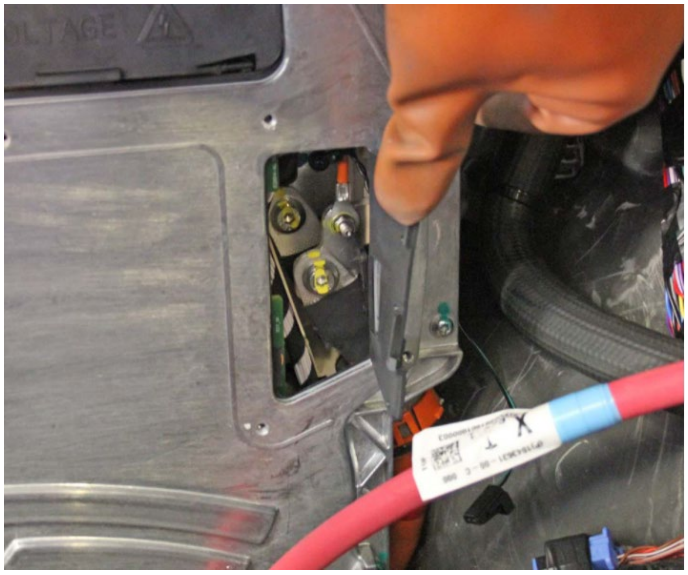

Figure 4

8. Use the charger casing as a chassis ground. Measure voltage across following locations (Figure 5):

WARNING: Do not use a probe with an exposed tip length that is greater than 3 mm.

- B+ to ground
- B- to ground
- B+ to B-

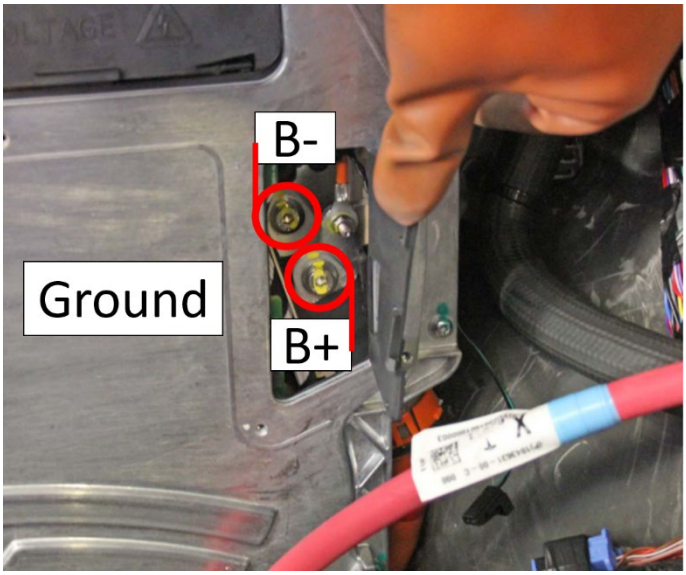

Figure 5

WARNING: All three measurements must read less than 10V. If any of the three measurements reads more than 10V, high voltage might be present on the terminals coming from the High Voltage battery.

Checking for High Voltage at the 3rd Generation Charger (Model X)

NOTE: This procedure can only be performed on Model X vehicles.

1. Remove the LH rear trunk side trim.
2. Remove the foam HVAC ducting (Figure 1).

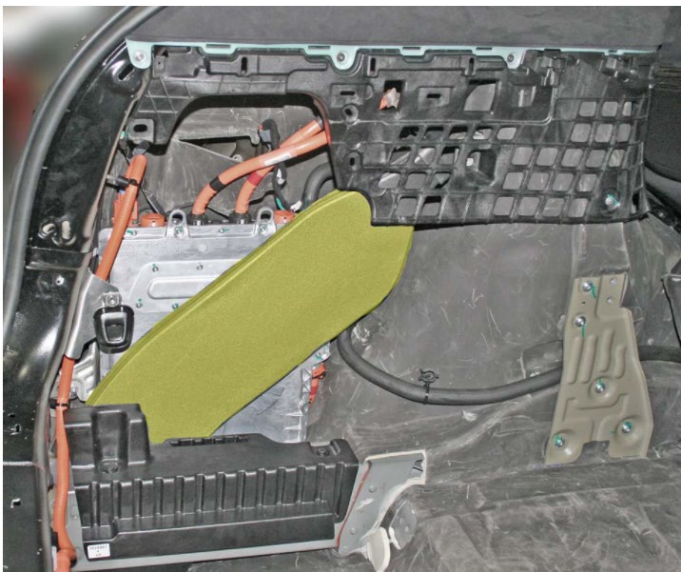

Figure 1

3. Remove and discard the warranty label from the charger access panel (Figure 2).

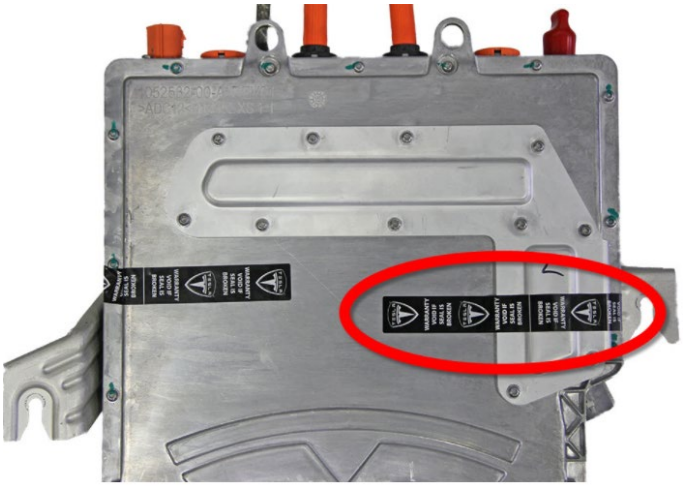

Figure 2

4. Remove the screws (x11) that attach the charger access panel (Figure 3).

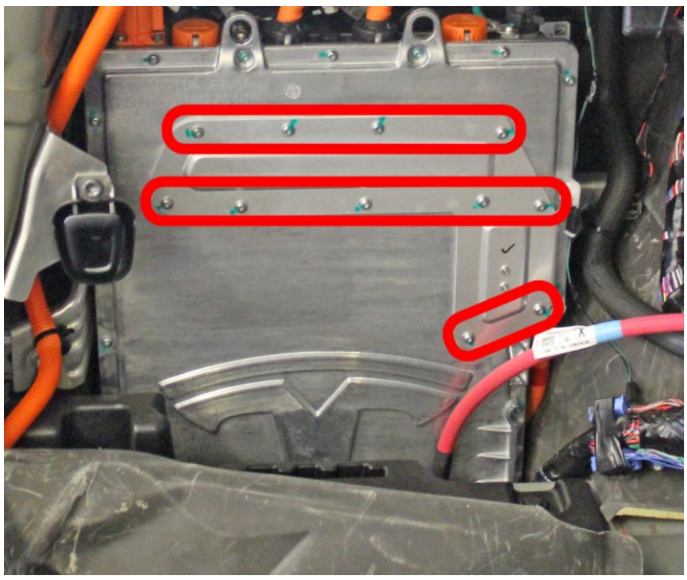

Figure 3

5. Gently peel back the rubber cover to expose the High Voltage fasteners that attach the High Voltage cables to the High Voltage battery (Figure 4).

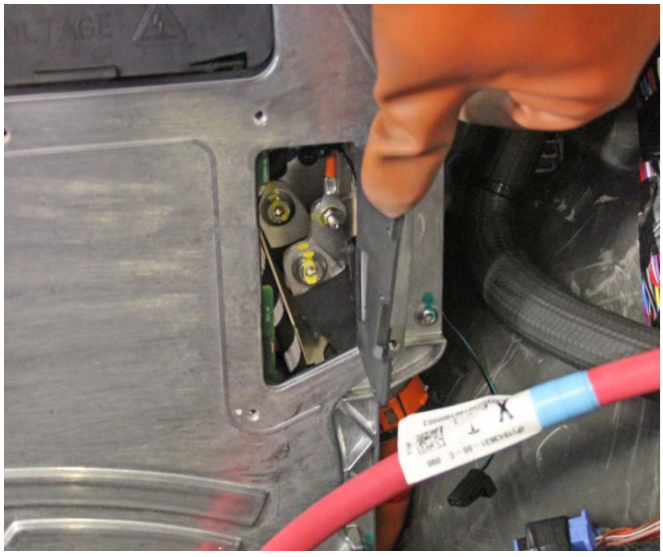

Figure 4

6. Use the charger casing as a chassis ground. Measure the voltage across following locations:

WARNING: Do not use a probe with an exposed tip length that is greater than 3 mm.

- B+ to ground
- B- to ground
- B+ to B-

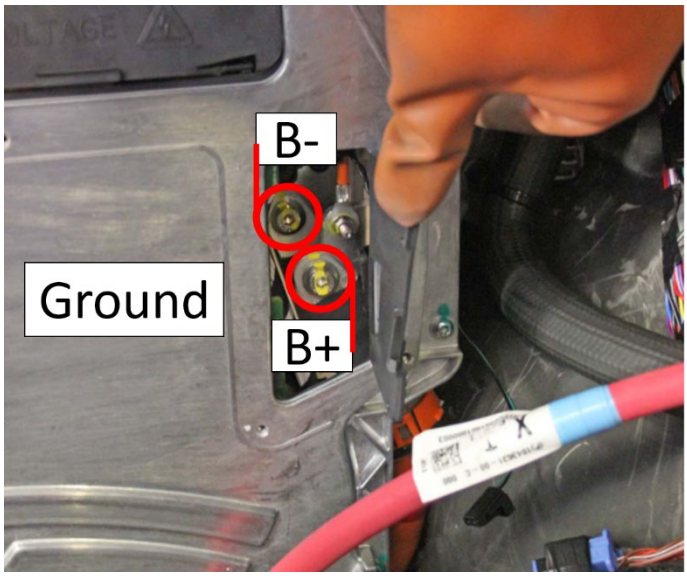

Figure 5

WARNING: All three measurements must read less than 10V. If any of the three measurements reads more than 10V, high voltage might be present on the terminals coming from the High Voltage battery.

Model 3 and Model Y Electrical Disconnect Procedure

Disconnect 12V and High Voltage power

1. Open the LH and RH rear doors and keep them open during the whole procedure.
2. Open the hood.
3. Remove the rear underhood apron by pulling it upward to release the clips that hold it in place (Figure 1).

Figure 1

4. Disconnect the 12V battery.
5. Remove the 2nd row lower seat cushion by pressing the LH and RH tabs towards the LH side of the vehicle, and then lift the front edge of the seat cushion (Figure 2).

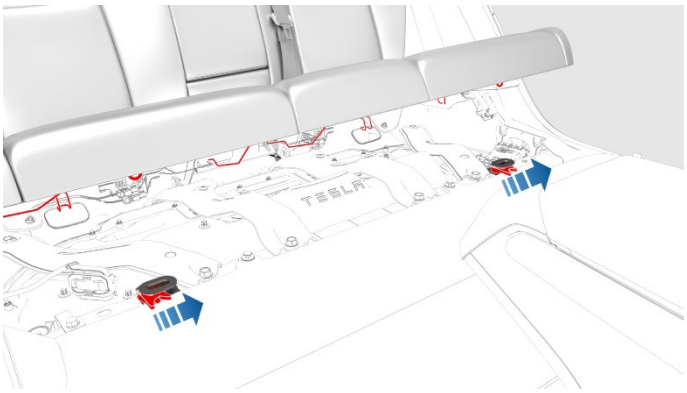

Figure 2

6. Remove the foam cover from the RH side of the penthouse (Figure 3).

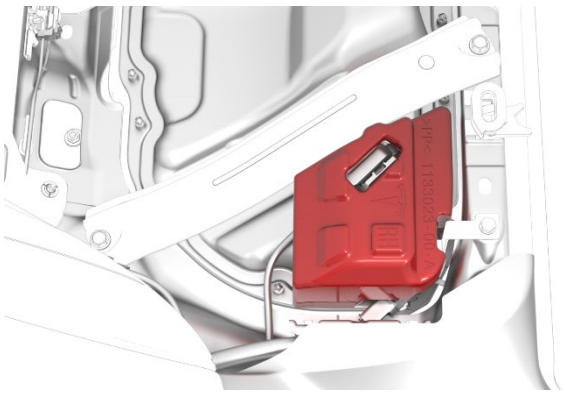

Figure 3

7. Disconnect the electrical harness from the high voltage controller connector (Figure 4).

NOTE: If not already open, the High Voltage battery positive contactor and negative contactor will open with a clunk sound.

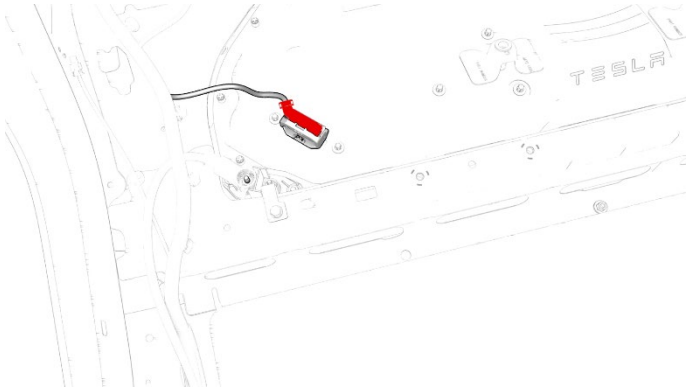

Figure 4

8. Before continuing, wait 2 minutes for the electrical system to fully discharge.

9. Set up the multimeter to measure DC high voltage (500V) and measure the voltage across the terminals of a known good 12V auxiliary battery.

CAUTION: If the voltage measured is less than 10 Volts or more than 14 Volts, the multimeter is not measuring reliably and must not be used.

WARNING: Make sure that the multimeter and leads are capable of handling at least 500V.

10. Remove the 5-lobe bolts (x2) that attach the High Voltage probe cover to the penthouse cover (Figure 5), and then remove the High Voltage probe cover from the penthouse cover.

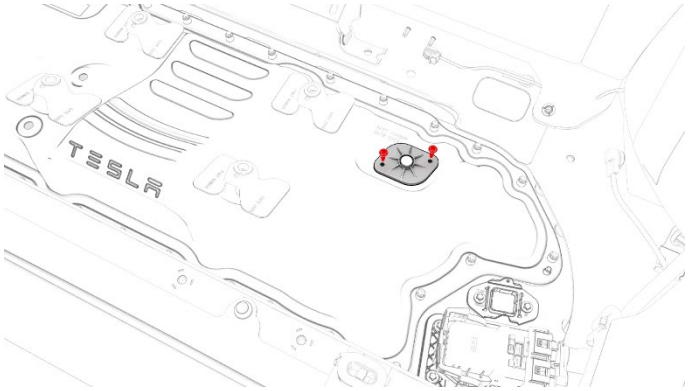

Figure 5

11. Use the penthouse casing as a chassis ground. Measure the voltage across the following locations (Figure 6):

    - B+ to ground
    - B- to ground
    - B+ to B-

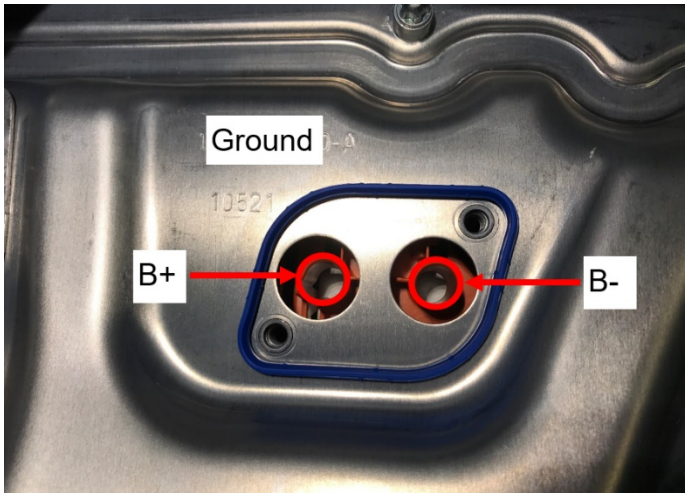

Figure 6

WARNING: All three measurements must read less than 10V. If any of the three measurements reads more than 10V, high voltage might be present on the terminals coming from the High Voltage battery.

12. Install the High Voltage probe cover.