JdeMO Installation Procedures
Toyota RAV4 EV (model years 2012-2014)

DANGER:

WORKING WITH OR AROUND HIGH VOLTAGE ELECTRICITY CAN BE DEADLY

THESE PROCEDURES DO NOT GUARANTEE YOUR SAFETY

IF YOU ARE NOT CAPABLE OF SAFELY HANDLING DEADLY HIGH VOLTAGE ELECTRICITY, DO NO ATTEMPT THESE PROCEDURES

YOU ACKNOWLEDGE THE DIRE RISKS AND ACCEPT THEM AS YOUR OWN RISK

PROCEDE AT YOUR OWN RISK

Quick Charge Power LLC is not responsible for injury or death resulting from these procedures
or
with the use of JdeMO

1) Raise vehicle on lift or with ramps that are adequate to access the bottom of the vehicle while using tools. Because the vehicle will be disabled during work, it won't be possible to drive the vehicle onto ramps later. Ensure that ground is level for safety.

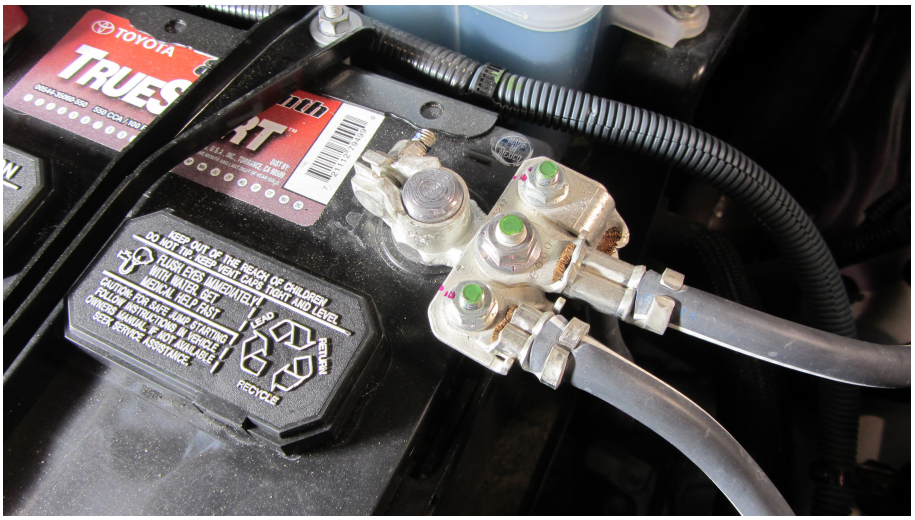
2) Set parking brake to maximum.

3) Prepare work area with a table, any lighting required, plus JdeMO parts and tools. Suggested tools are:

- ✓ Ramps, jacks, or lifts as necessary to raise vehicle
- ✓ Torque wrench in inch pounds / Nm
- ✓ Anti-seize compound (for ALL stainless steel threads… they will break and/or seize without this)
- ✓ Locktite thread locker – red “271”
- ✓ Powered drill to handle up to a 1/2” drill bit
- ✓ 1/4" / 6.35mm drill bit
- ✓ 3/8” / 9.53mm drill bit
- ✓ 1/2" / 12.7mm drill bit (“Forstner” style suggested for plastic cutting)
- ✓ Powered cutting tool for plastic panel
- ✓ Powered screw / bolt driver
- ✓ Allen hex wrench - 5mm (for M6 socket head bolts)
- ✓ Allen hex wrench - 4mm (for M5 socket head bolts)
- ✓ 1/4" drive ratchet driver
- ✓ 1/4" drive extension (recommended 6” long)
- ✓ 1/4" drive flexible “flex” drive (u-joint drive)
- ✓ 10mm hex socket (1/4” square drive)
- ✓ 12mm hex socket (1/4” square drive)
- ✓ 13mm hex socket (1/4” square drive)
- ✓ Adjustable jaw wrench that can open to 27mm
- ✓ 22mm wrench (optional)
- ✓ 24mm wrench (optional)
- ✓ 27mm socket (optional)
- ✓ Zip tie gun
- ✓ Razor blade knife
- ✓ Regular screw driver
- ✓ Needle nose pliers (to recover dropped parts and tools)
- ✓ Small vise grip pliers

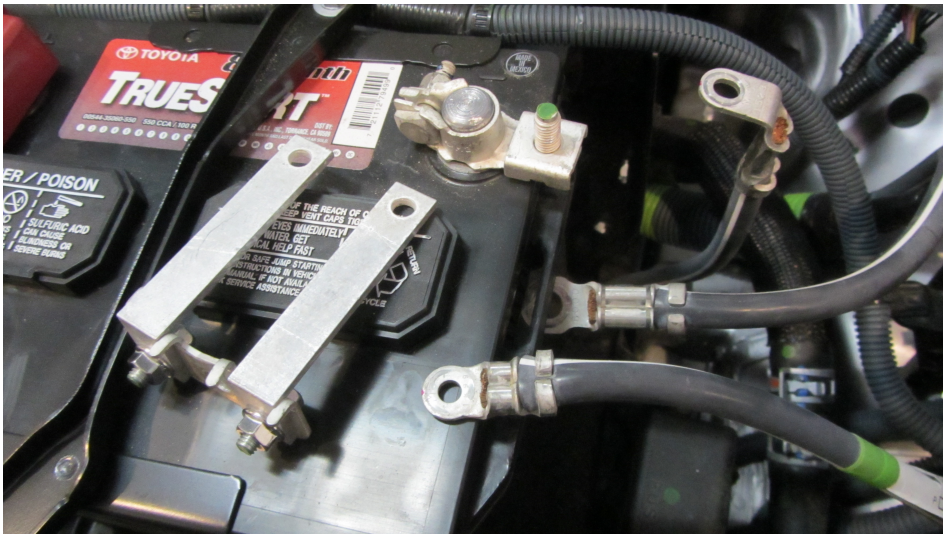
4) Disconnect all three 12 volt battery negative leads (12mm and 10mm socket).

- ✓ Replace M8 flange hex nut with M8 wing nut and M8 / 5/16” fender washer (supplied).



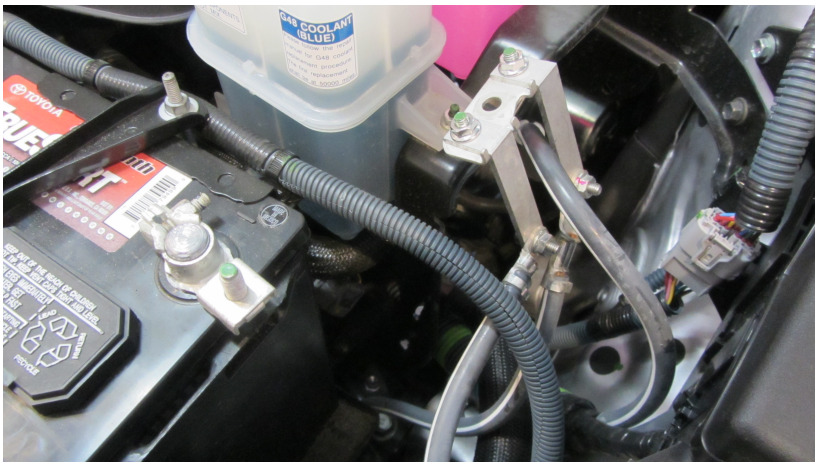
5) Install 12 volt negative extensions (supplied)

- ✓ Straighten the 90 degree lug first (use vise grip pliers)
- ✓ Use two additional M6 x 1.0 x 16mm socket head bolts and M6 serrated flange nuts (supplied).



6. Assemble the negative lug closest to the vehicle front perpendicular to the extension (as pictured)

- ✓ Install the remaining lug at 70 degrees
- ✓ Place the assembled cable and lug extensions under the 12 volt positive cable (pictured)
- ✓ Place the largest cable (with M8 lug) through the center
- ✓ This will prevent the cable from accidently touching the 12 volt negative post and also prevent forgetting the M8 lug later (easy to do!)



7) Drill1/2” diameter hole using “Forstner” bit into plastic panel to expose M6 (10mm socket) bolt as depicted

- ✓ The recommended center location is on the line directly below “VENTILATEURS”, aligned with the letter “R”, centered on the line below “R”

8) Remove the 12 volt battery and place in safe location

- ✓ Remove M8 nut from 12 volt positive lug
- ✓ Move the lower 12 volt positive cable to the upper right side of the motor bay, out of the way
- ✓ The upper (with attached red plastic cover) 12 volt positive cable remains, but is disconnected from the battery
- ✓ Clean any corrosion / battery acid from area using baking soda and water, or other appropriate method

9) Remove traction battery high voltage disconnect

- ✓ You must do this in the order of this procedure
- ✓ Always disconnect the 12 volt first
- ✓ Only then remove traction battery high voltage disconnect
- ✓ If the 12 volt battery is still connected when the high voltage battery is disconnected, you will fault the system and get a “CHECK EV SYSTEM” on the dash
- ✓ Move right passenger seat all the way forward, and move seat back all the way up / forward
- ✓ Open right rear door to access under passenger seat
- ✓ Pull back the carpet that is under the right passenger seat and place under the right rear floor mat
- ✓ Use 10mm socket to remove four bolts that secure the high voltage disconnect cover
- ✓ Pull up black lever on orange high voltage disconnect while pressing the orange disconnect tab. This will take considerable force to break a small black plastic tab. **IMPORTANT: to reinstall this, the disconnect tab must be pressed a second time, and the black lever must be FULLY vertical PRIOR to reinstalling later**
- ✓ Place the high voltage disconnect in a secure area. We recommend that you lock it in a box so that no person who may think that they are “helping you” will reinstall it without your knowledge. **This could result in injury or death.**

10) Drill / ream the high voltage disconnect cover bolt holes with a 1/4" drill bit for easier removal and installation of cover later.

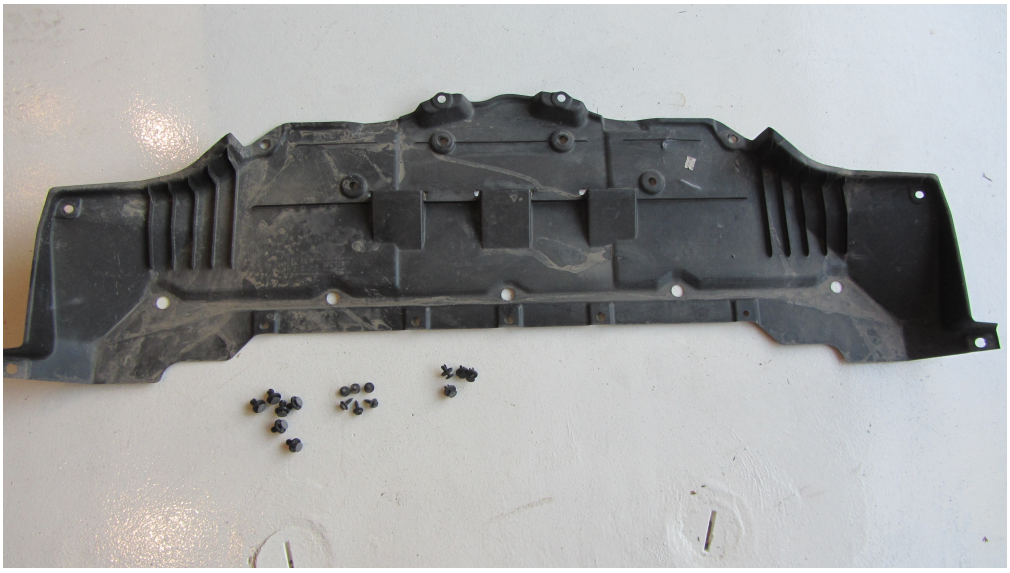
11) Discard the high voltage disconnect cover M6 hex head flange nuts

- ✓ Exchange for M6 wing nuts and M6 / 1/4" flat washers (included)
- ✓ Leave these with the high voltage disconnect cover for later installation

UNDERNEATH the RAV4 EV

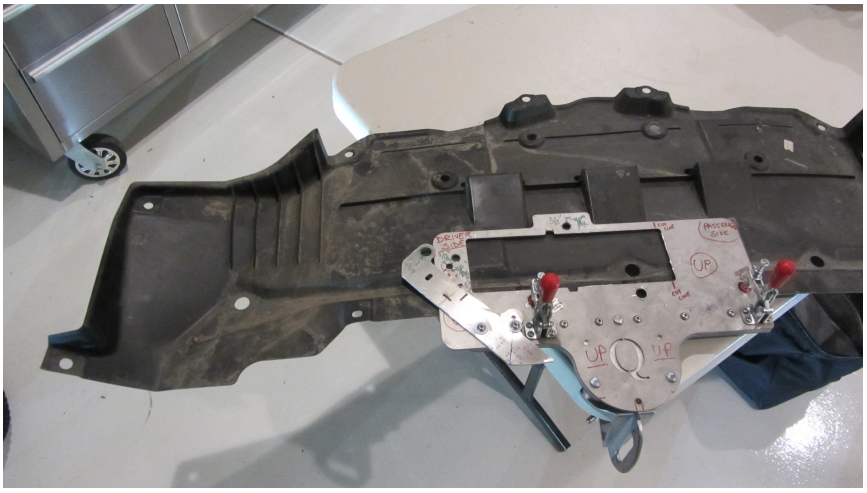
12) Remove bottom plastic cover (use 10mm socket and flat screwdriver) in front of the main traction high voltage battery:

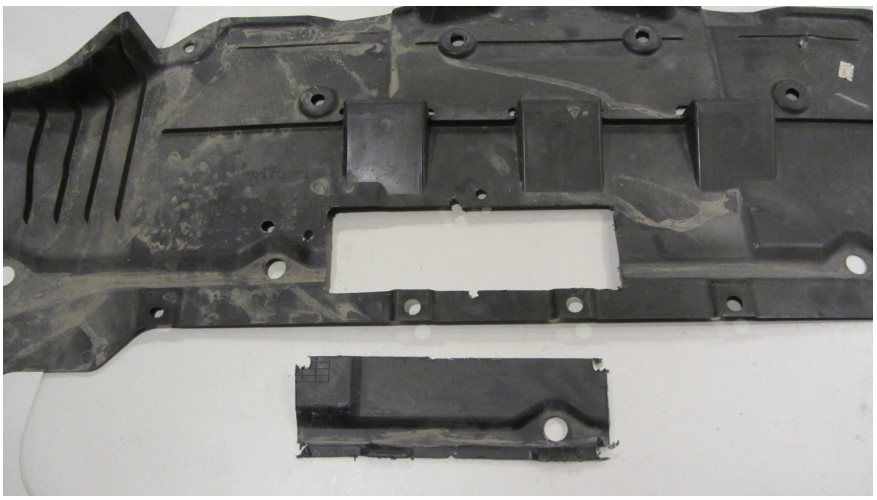
- ✓ You will remove:
- ✓ Six (6) screws
- ✓ Four (4) small plastic buttons
- ✓ Six (6) large plastic buttons
- ✓ If the vehicle has been operated in mud / dirt, it is likely that these will break when you attempt to remove them
- ✓ The two farthest to the left and right (directly behind the front wheels) will almost always break
- ✓ You will require two additional large plastic buttons when this is reassembled (optional, not included)



13) Cut a rectangular hole with jig or template in bottom cover

- ✓ Without a jig or template, you will have to “fit” this to the car after the new JdeMO battery mount “bathtub” and skid plate are installed

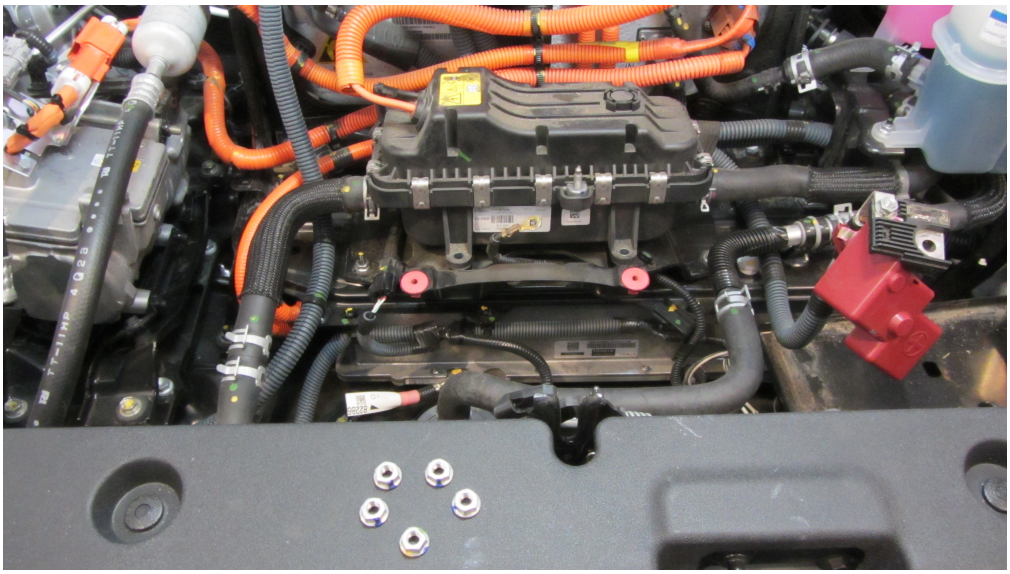




UNDER HOOD of RAV4 EV

14) Remove Toyota embossed plastic motor cover (use 10mm socket and long 1/4” square drive extension)

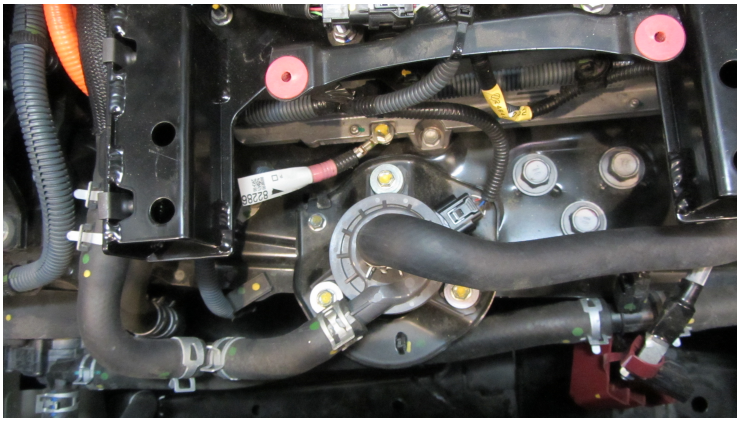
15) Remove four 10mm flange nuts from cabin heater mount and one 10mm flange nut from the cabin heater ground wire.

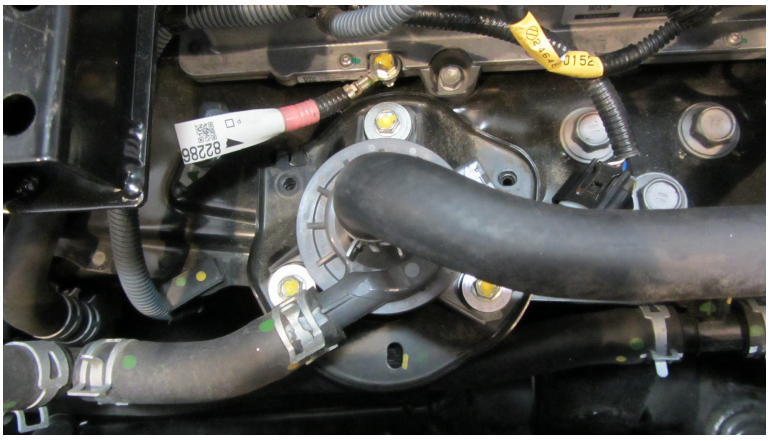


16) Cut the black plastic strap that secures the cabin heater wires / cable to its mount as depicted

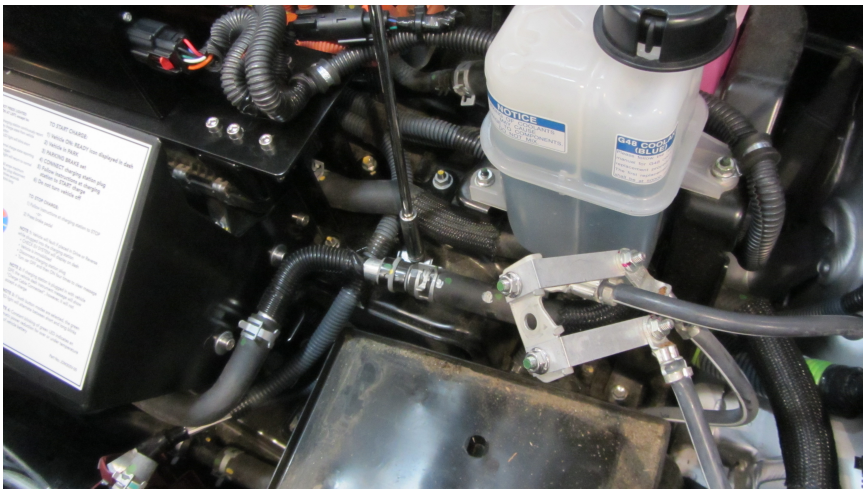
- ✓ Unplug the cabin heater connector from the vehicle harness
- ✓ You will need a flat screw driver to slide the connector off the mount

17) Remove two bolts (10mm socket and long 1/4” square drive extension) from cabin heater water pump, after removing wire / cable connector and removing cooling hose clip / attachment.



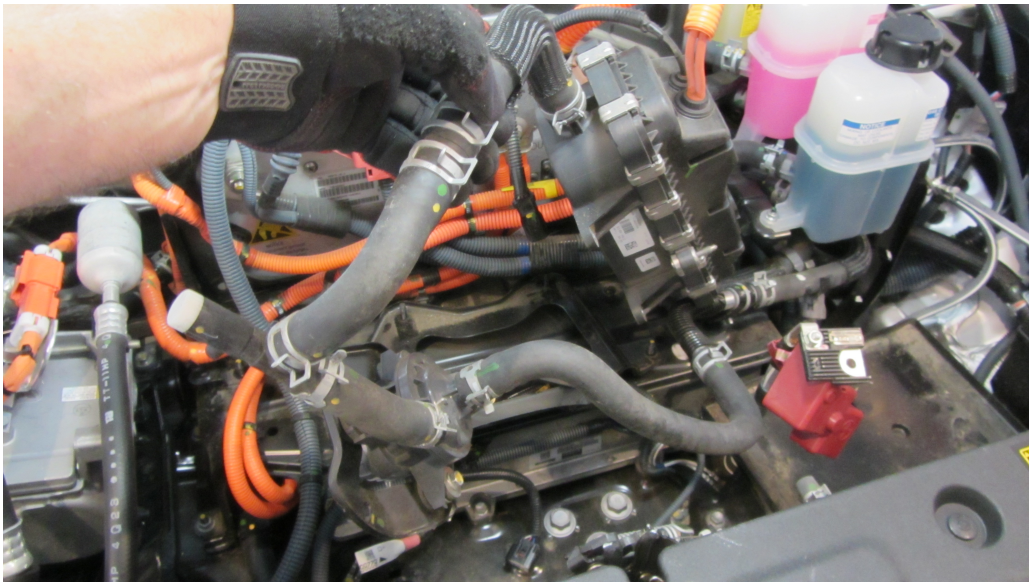


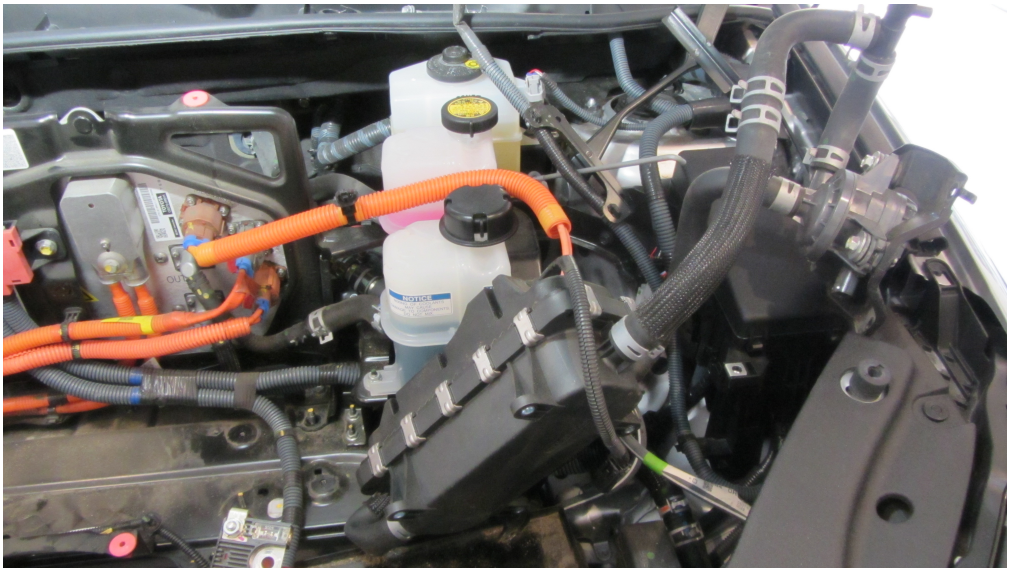
18) Remove bolt from cabin heater hose support as depicted (use 10mm socket with long 1/4” square drive extension)



19) Remove mounting clip from DC to DC mount for the cabin heater high voltage supply (orange)

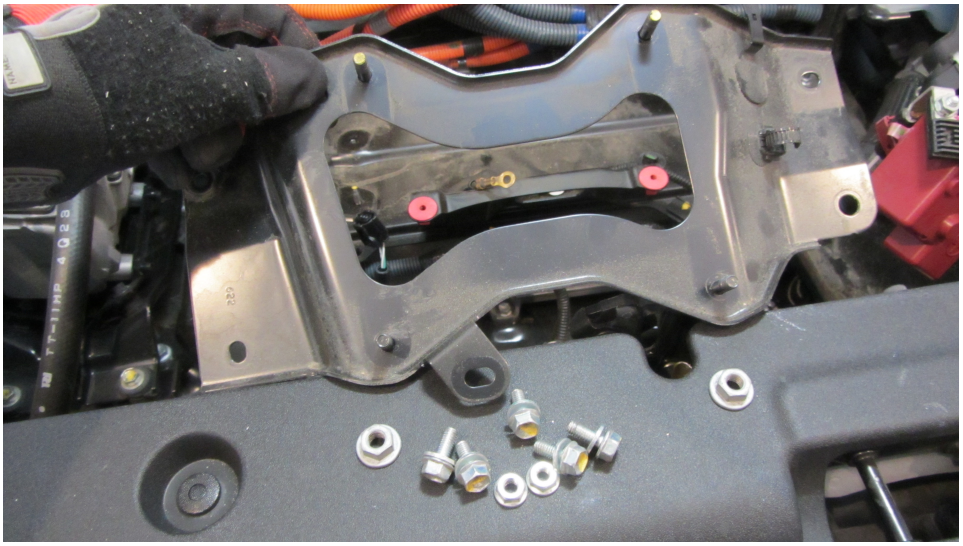
- ✓ Lift entire cabin heater / pump assembly
- ✓ Place to the upper right of motor bay





20) Remove M6 nuts and bolts from steel cabin heater mount (use 10mm socket with long 1/4” square drive extension)

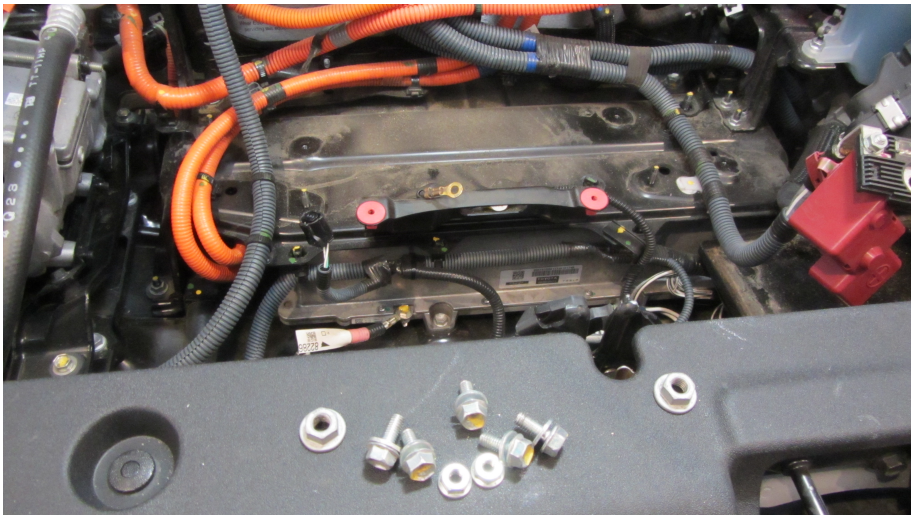
- ✓ Remove the steel cabin heater mount
- ✓ This mount will not be reused
- ✓ Remove two (2) M8 flange nuts of from the DC to DC base mount (use 12mm socket with long 1/4” square drive extension



21) Remove all plastic cable mounts with a flat screwdriver, from left to right:

- ✓ Remove the two orange high voltage cables from the onboard charger
- ✓ Remove the black plastic stud mount in the upper left for the onboard charger cables (you can pry this off the stud)
- ✓ Remove the black 12 volt cable

- ✓ Remove the remaining 12 volt cable to the right



AT THE WORK BENCH

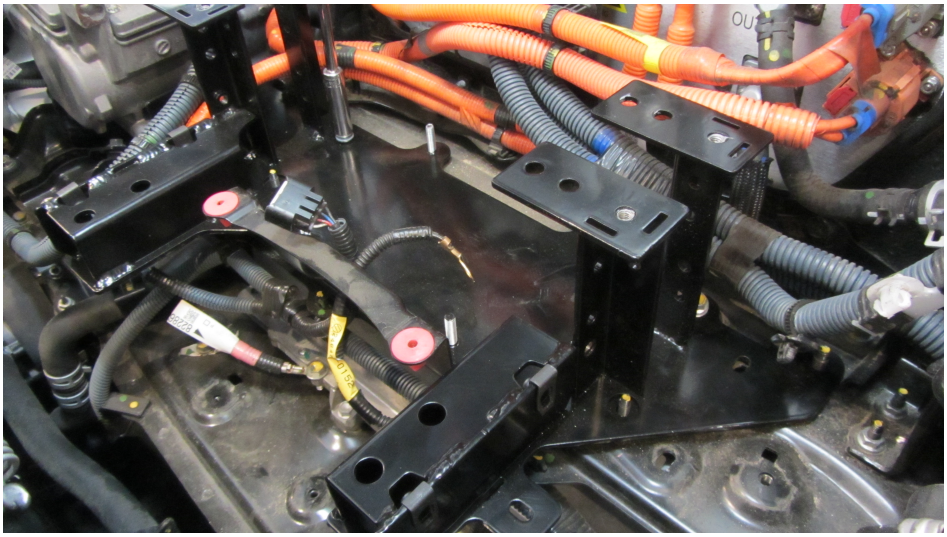
22) Disassemble the JdeMO assembly as depicted:

- ✓ Remove twelve (12) of the M6 socket head bolts from the top plate (5mm Allen socket with long 1/4" square drive extension)
- ✓ Remove six (6) of the M6 socket head bolts from the CHAdeMO inlet mount (5mm Allen socket with long 1/4" square drive extension)
- ✓ Remove eight (8) of the M6 socket head bolts from the angle support mounts (5mm Allen socket) from the CHAdeMO mount

UNDER THE HOOD

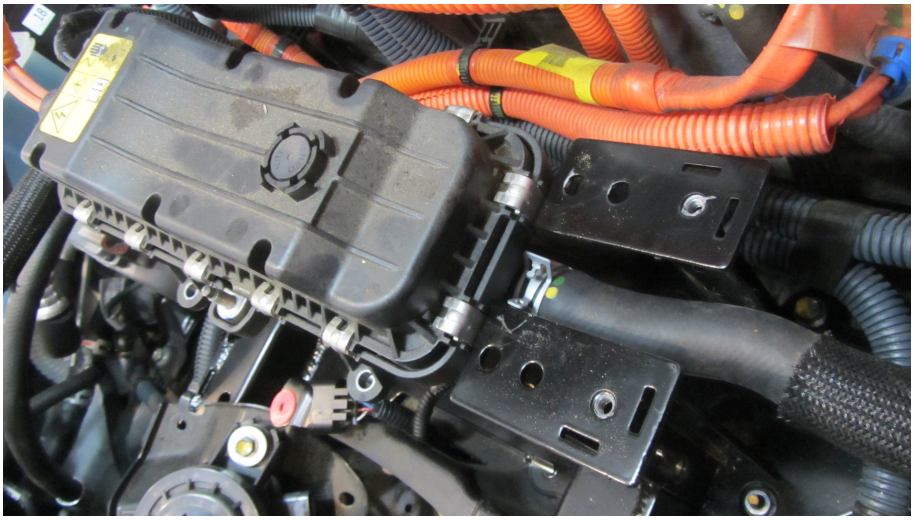
23) Place the JdeMO base plate assembly (with nothing attached) into the vehicle as depicted

- ✓ **CRITCAL: INSTALL THE TWO (2) M6 BOLTS FIRST TO ENSURE ALIGNMENT. DO NOT INSTALL ANY OF THE FOUR (4) M6 FLANGE NUTS YET**
- ✓ You may need to drill these out slightly to fit
- ✓ Install the two (2) M6 flange nuts (10mm socket with long 1/4" square drive extension) *only after installing the two (2) M6 bolts*
- ✓ Install the two (2) M8 flange nuts (12mm socket with long 1/4" square drive extension) *only after installing the two (2) M6 bolts*
- ✓ A total of six (6) bolts and nuts hold the JdeMO base plate in position



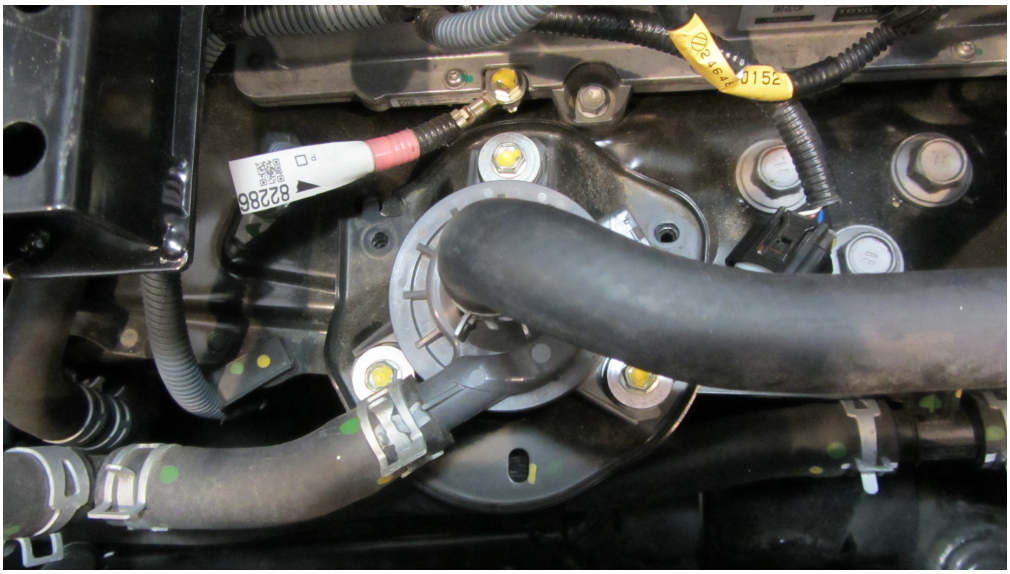
24) Install cabin heater and pump assembly

- ✓ Ensure that the metal spiral hose clamp on the right hand side of the cabin heater has the metal tabs pointed up (as depicted below)
- ✓ It may require slightly stretching the right cabin heater hose to fit over the JdeMO base plate legs
- ✓ Mount the cabin heater on the JdeMO base plate M6 studs
- ✓ Install four (4) M6 flange nuts on the M6 studs (use 10mm socket with long 1/4" square drive extension)
- ✓ Route the ground wire as depicted
- ✓ Install one (1) M6 nut on the ground wire (use 10mm socket with long 1/4" square drive extension)
- ✓ Plug the wire connector into the cabin heater wiring, after routing the wire as depicted
- ✓ Install zip tie as depicted to hold ground wire and wire connector
- ✓ Install cabin heater orange high voltage cable mount into DC to DC mount



25) Install cabin heater coolant pump:

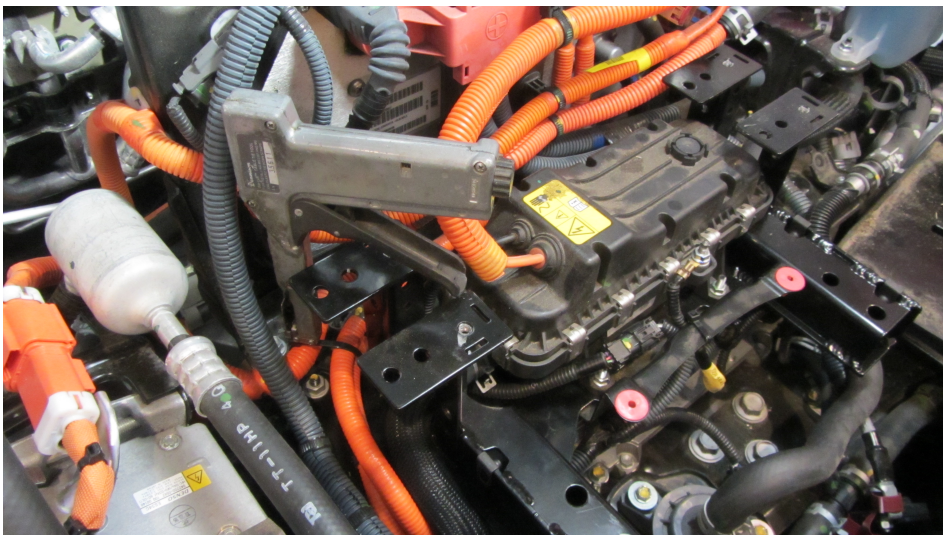
- ✓ Install two (2) M6 bolts (10mm socket with long 1/4” square drive extension)
- ✓ Install hose clamp mount
- ✓ Plug the wire connector into the cabin heater pump

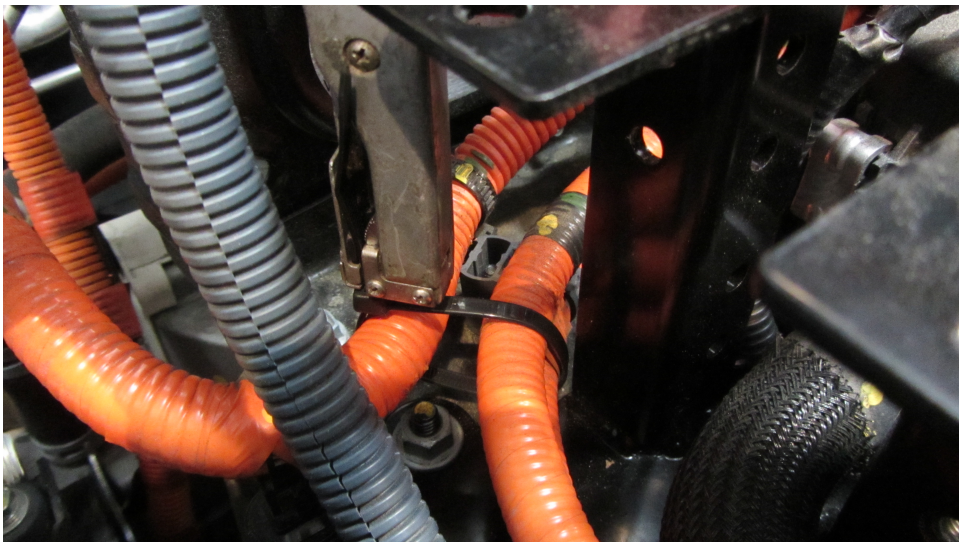


26) Install all four cables that cross over the JdeMO base plate:

- ✓ The black 12 volt cable farthest to the left has two plastic mounts into the JdeMO base plate
- ✓ The two high voltage orange cables for the onboard charger have one plastic clamp into the JdeMO base plate

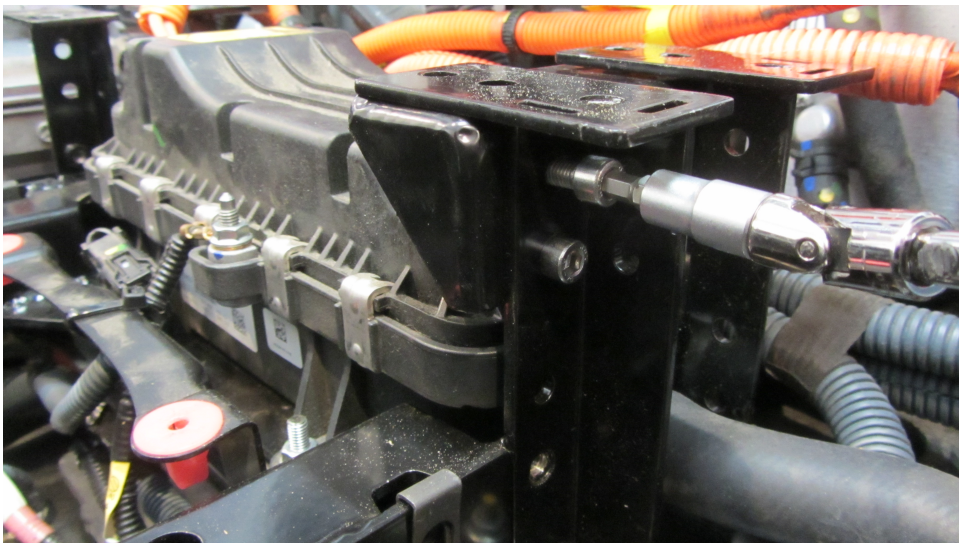
- ✓ Ensure that there are no sharp surfaces present on the JdeMO base plate
- ✓ Use zip ties to prevent cable contact with sharp surfaces as necessary
- ✓ **IMPORTANT: use zip ties on the two high voltage orange cables for the onboard charger to prevent touching the JdeMO base plate upright leg on the left hand side, as depicted. This may require more than one zip tie**
- ✓ The black 12 volt cable farthest to the right has two plastic mounts, only one of which goes directly into the JdeMO base plate



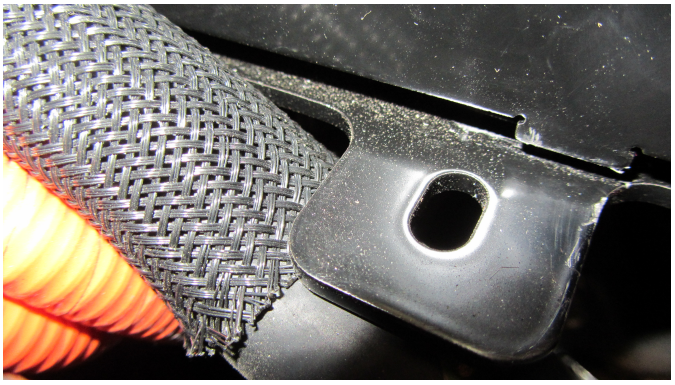


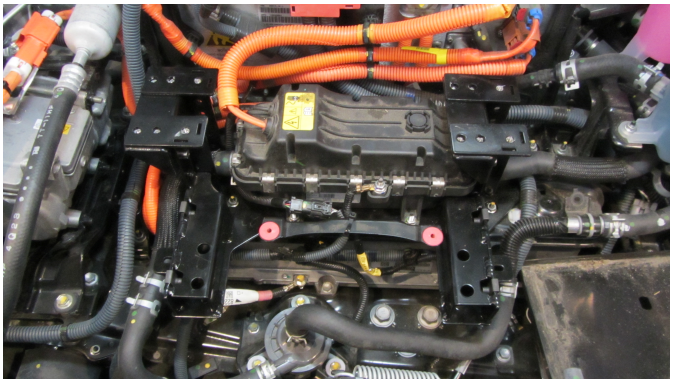
27) Install both JdeMO base plate angle support brackets:

- ✓ Use eight (8) M6x1.0x16mm socket head bolts (5mm Allen socket with long 1/4" square drive extension)
- ✓ Four (4) bolts per angle support
- ✓ **IMPORTANT: Use Locktite anti-seize on ALL stainless steel bolts**



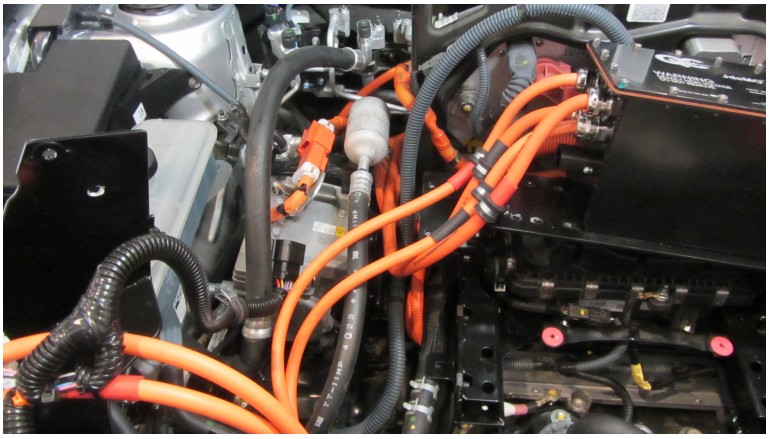
28) Move the cabin heater hoses on each side of the JdeMO base plate assembly to below the tabs, as depicted. This facilitates the installation of the CHAdeMO inlet mount later

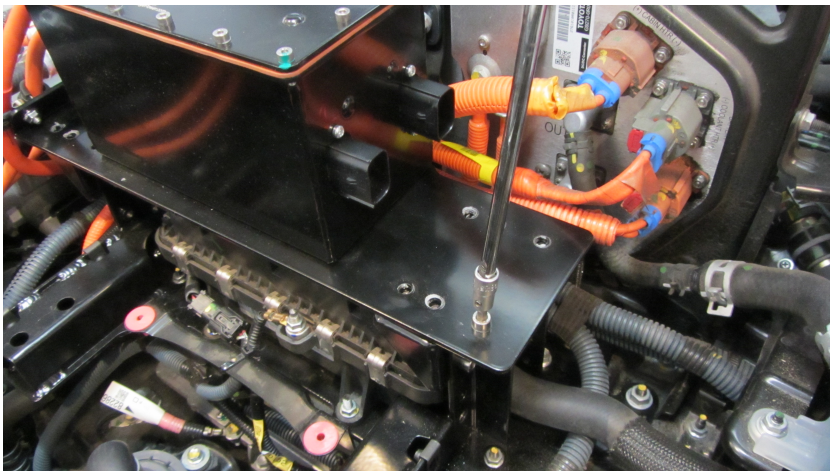




29) Install top plate and JdeMO box assembly (place the CHAdeMO mount aside):

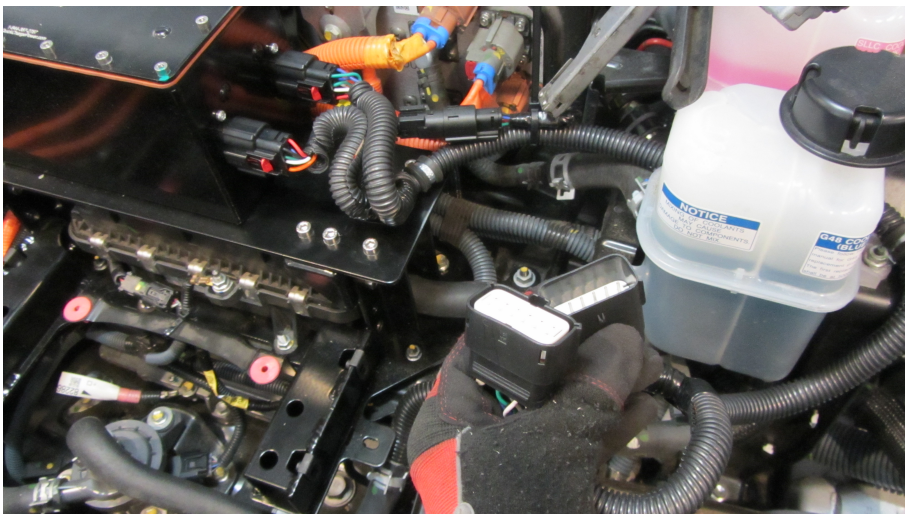
- ✓ Place the orange high voltage cables that go below the vehicle (to the traction battery) underneath the orange CHAdeMO inlet cables
- ✓ Place the "below the vehicle" cables over top of the orange high voltage cables that power the air conditioner compressor
- ✓ Install twelve (12) M6x1.0x16mm socket head bolts into the JdeMO top plate, six (6) on each side of the JdeMO box (5mm Allen socket with long 1/4" square drive extension, optional flex drive)
- ✓ Install one bolt on the right, centered, and tightened
- ✓ Then, with your fingers, slightly push or pull the JdeMO base plate upright legs on the left side until the holes are centered on the top plate. The legs will bend slightly
- ✓ Tighten the left side bolt when the hole is centered
- ✓ Then carefully install all the bolts. They will strip / damage the threads if you force them, so the holes must be centered
- ✓ It will be easier to install the two (2) bolts closest to the JdeMO box with a flex drive
- ✓ **IMPORTANT: Use Locktite anti-seize on ALL stainless steel bolts**
- ✓ Two (2) of these bolts will secure wire clamps. On the right side, it will be the farthest right bolt, closest to the driver's seat. On the left side, it will be the center bolt, closest to the front of the vehicle

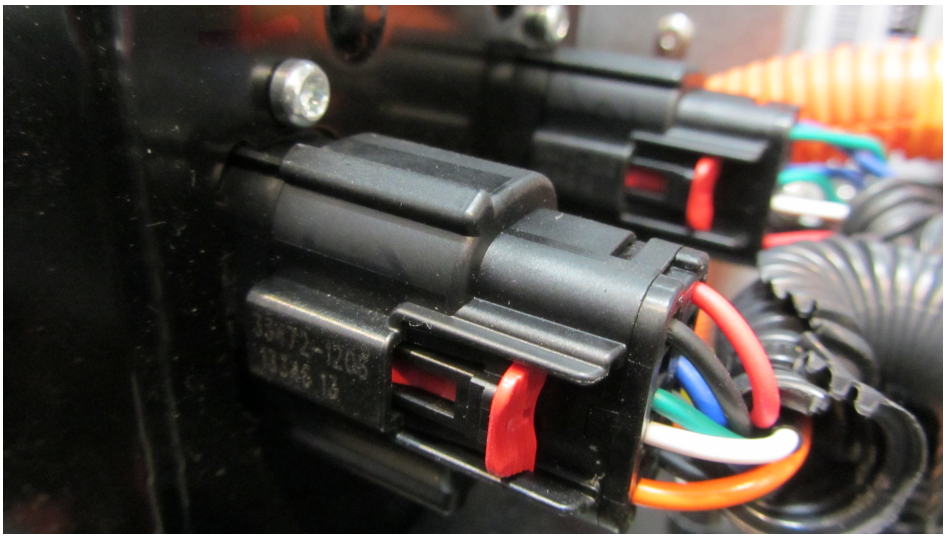




30) Install JdeMO box to vehicle external wiring harness

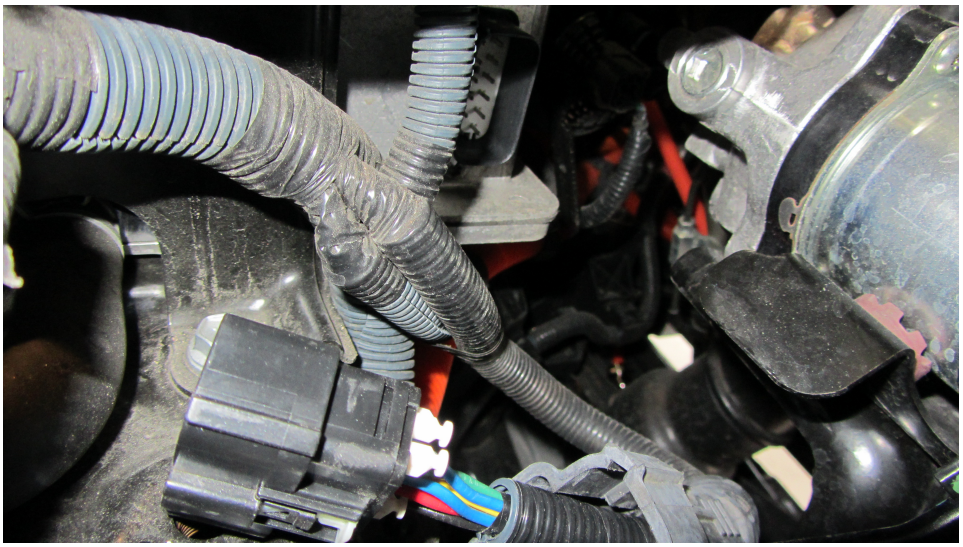
- ✓ **IMPORTANT: The plugs that go into the JdeMO box are numbered "1" and "3". It is critical to get these in the correct connection**
- ✓ Plug 1 is closest to the front of the vehicle
- ✓ Plug 3 is closest to the rear of the vehicle
- ✓ After installing Plug 1 and Plug 3, push the red locking tabs in to the lock position
- ✓ Install wire clamp with the JdeMO top plate bolt that is farthest to the right and closest to driver's seat (use 5mm Allen tool)
- ✓ Place a zip tie around the four (4) wire Molex connector pigtail as depicted
- ✓ Install wire clamp with M6 nut that is securing the dark green G48 coolant tank (10mm socket)
- ✓ **NOTE: the wiring harness must be loose between the two wire clamps to allow for motor movement in the chassis**



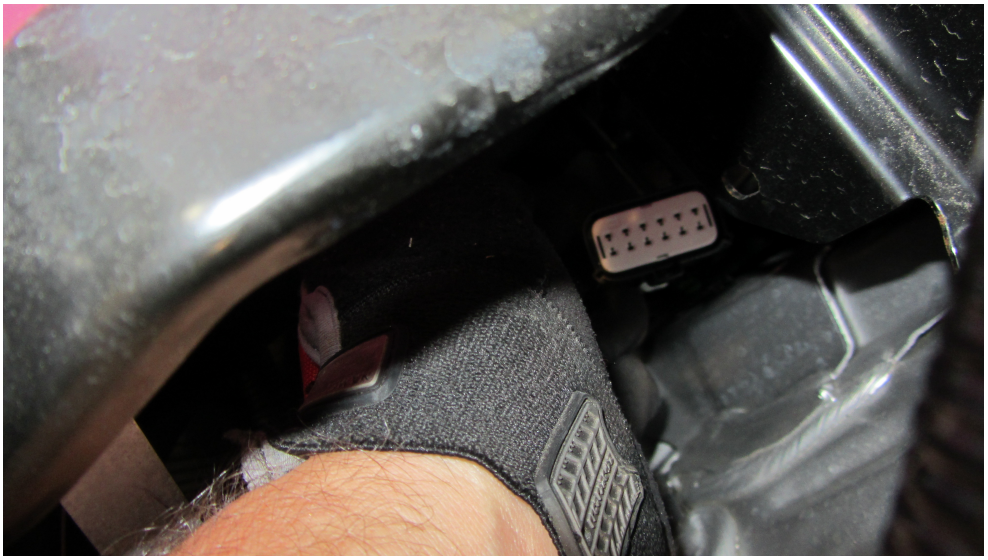


31) Remove the wiring connector from the onboard charger, on the driver's side, directly underneath the pink coolant container

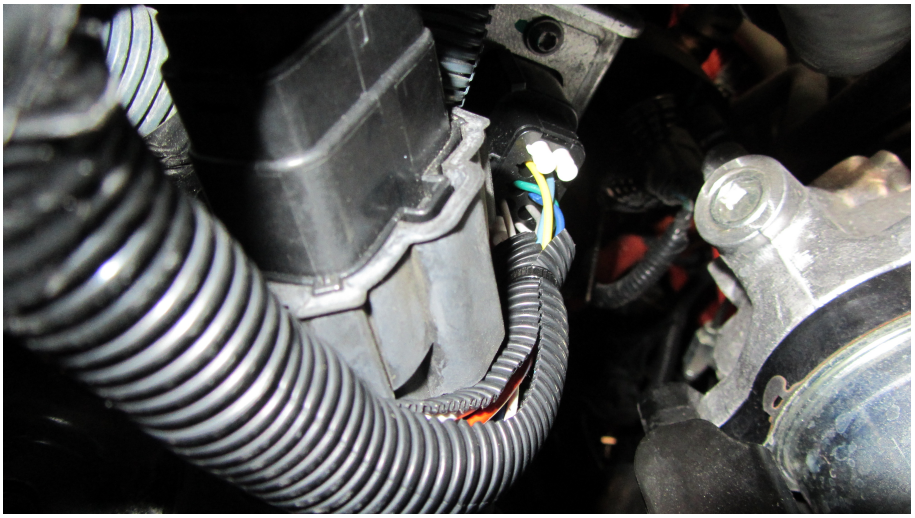
- ✓ It is very difficult, if not impossible to see this plug… good luck!
- ✓ You will have to pull back the rubber boot from around the plug first, prior to removing connector

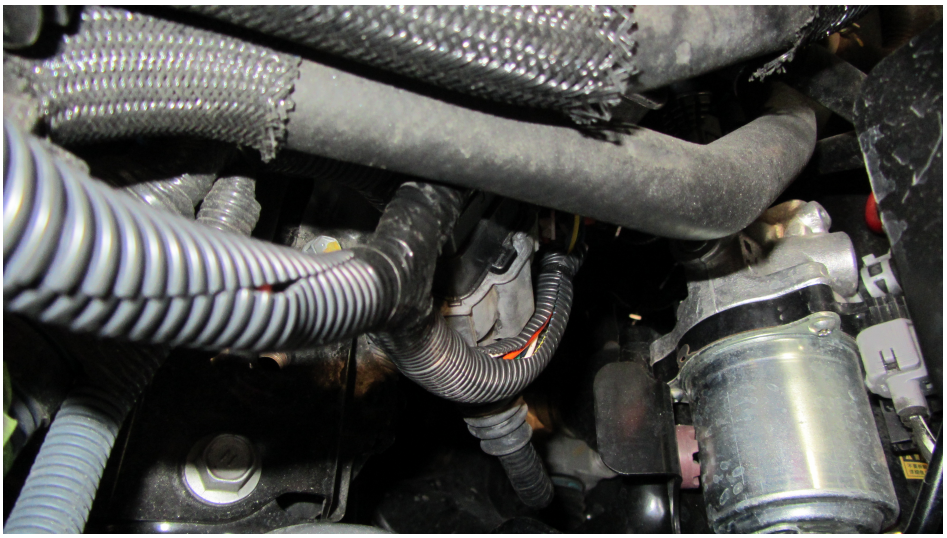


32) Place the appropriate JdeMO harness connector into the connector that was removed from the onboard charger. Install the rubber boot back onto the plug



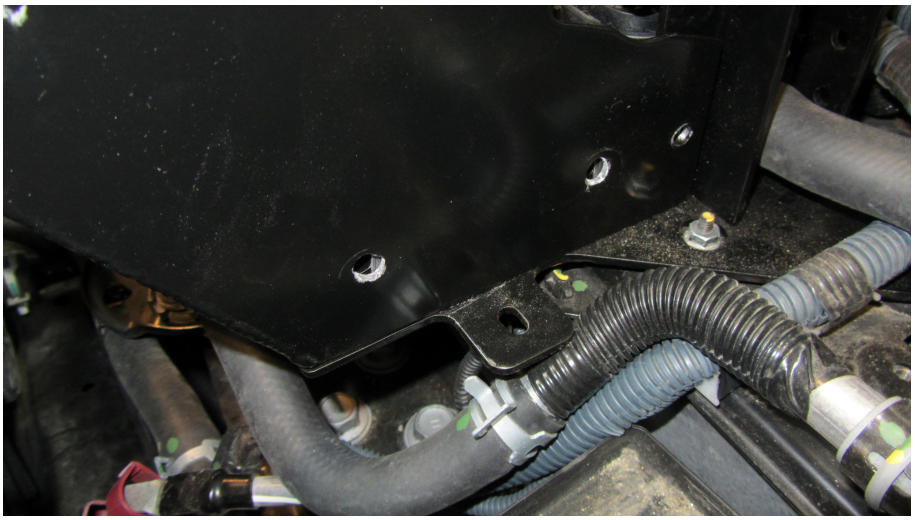
33) Plug correct wiring harness connector into onboard charger, routing the plug as depicted. If the cable isn't routed correctly, it may rattle against the vehicle chassis





34) Install CHAdeMO inlet mount

- ✓ Make sure that the CHAdeMO orange high voltage cables are not twisted
- ✓ Align the CHAdeMO mount tabs into the slots in the base plate
- ✓ It may require pushing in the side of the CHAdeMO inlet mount
- ✓ Install two (2) M6x1.0x16mm, one (1) on each side of the CHAdeMO inlet mount into the base plate upright legs on each side (use 5mm Allen socket with long 1/4" square drive extension, optional flex drive)
- ✓ Install four (4) M6x1.0x16mm or 20mm, two (2) on each side of the CHAdeMO mount (use 5mm Allen socket with long 1/4" square drive extension, optional flex drive)
- ✓ **IMPORTANT: Use Locktite anti-seize on ALL stainless steel bolts**
- ✓ **NOTE: Do not tighten any bolt until all six (6) are started into their thread**

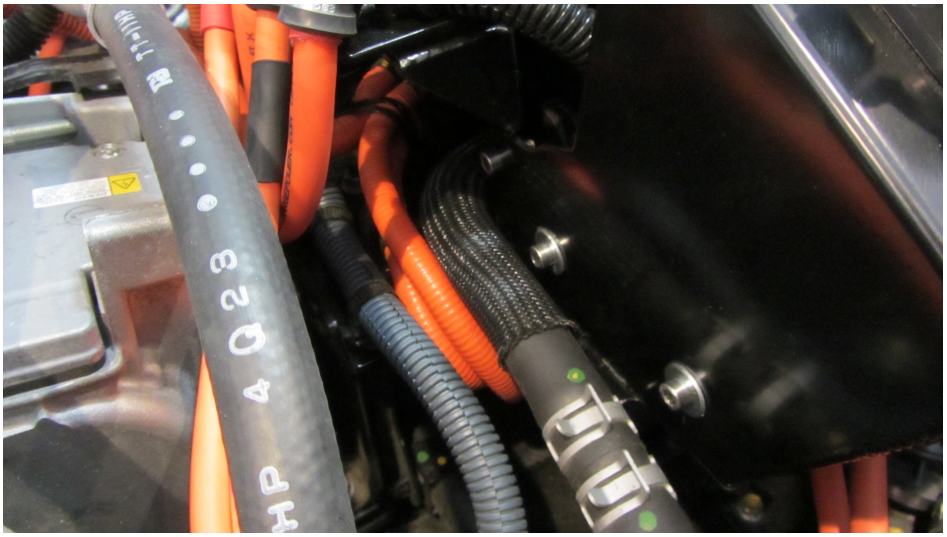


35) Install Plug 2 into left side of JdeMO box:

- ✓ Push in the red locking tab
- ✓ Install the wire clamp with center front top plate bolt (5mm Allen socket with long 1/4" square drive extension, optional flex drive).
- ✓ **IMPORTANT: Use Locktite anti-seize on ALL stainless steel bolts**
- ✓ Make sure that wire assembly is well clear of where the Toyota embossed plastic motor cover will mount

36) Place both cabin heater hoses above the base plate tabs on each side of the CHAdeMO inlet

- ✓ Slide the right hose tube in its mount approximately 1/2” to the right
- ✓ Install M6 bolt in mount as depicted (10mm socket with long 1/4” square drive extension).

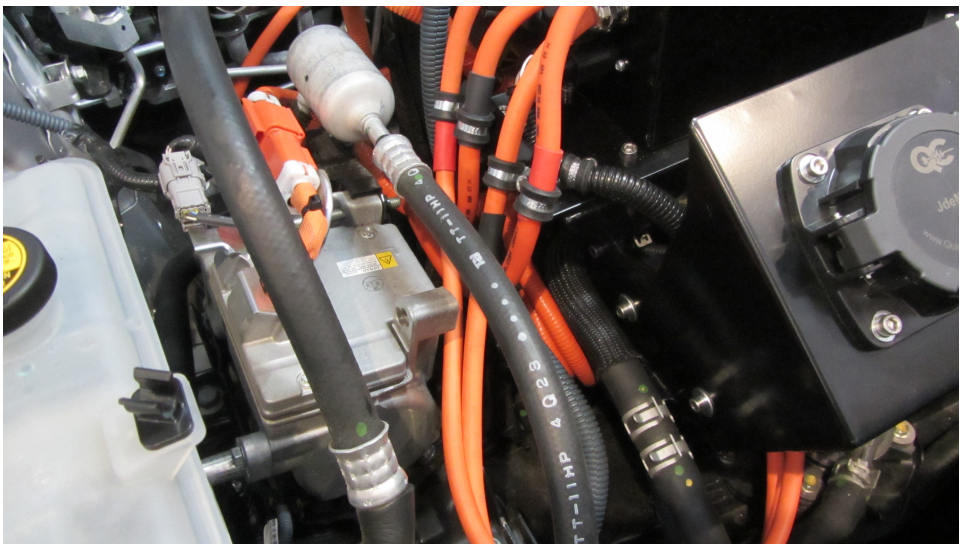


37) Install the 12 volt battery

- ✓ **IMPORTANT: DO NOT CONNECT THE NEGATIVE LEADS**

38) Organize the high voltage cables with zip ties to ensure that they do not come in contact with anything that can cause them to fail

- ✓ Special attention should be made where the high voltage cables pass between the air conditioner compressor and the DC to DC mounting hardware
- ✓ Use zip ties!

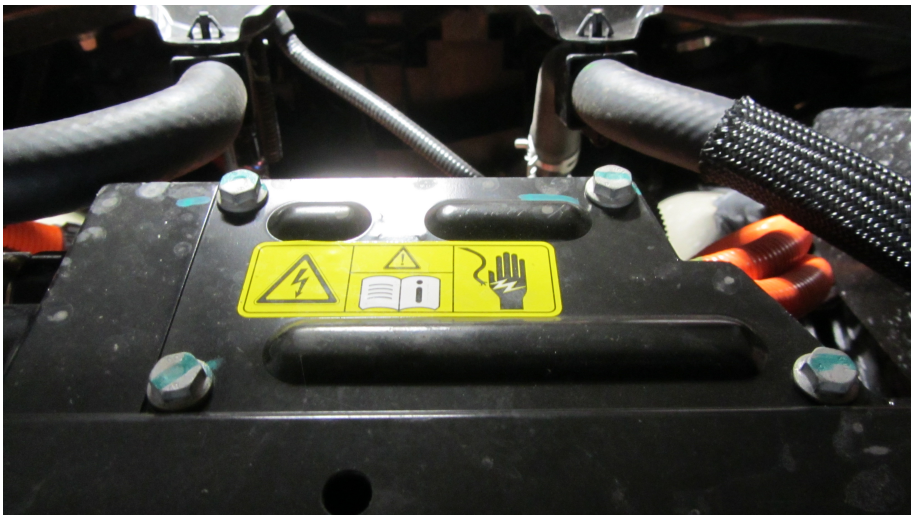


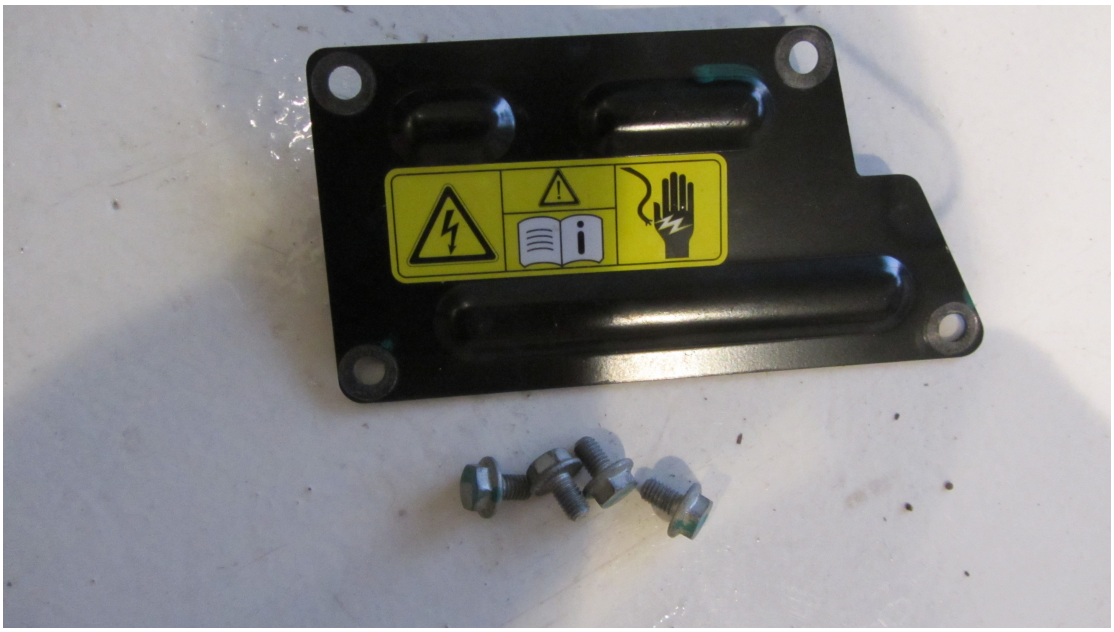
39) Install plastic motor cover (10mm socket and long 1/4” square drive extension) with five (5) screws. DO NOT OVER-TORQUE! These screws go into soft plastic

UNDER the RAV4 EV

40) Remove four (4) M6 bolts from traction battery access cover (use 10mm socket)

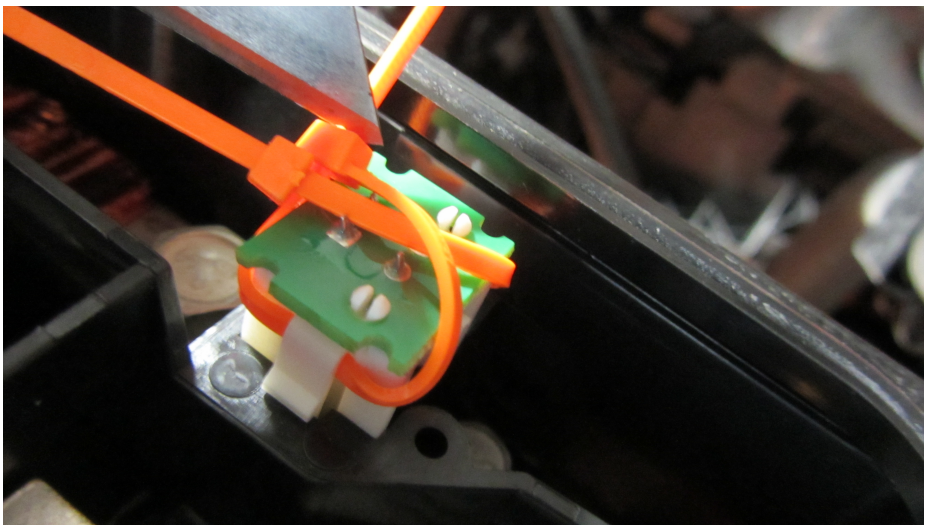
- ✓ The cover and 4 bolts are not reused. Discard them





41) Remove interlock circuit card from traction battery access cover, and reinstall with two small orange zip ties (supplied).

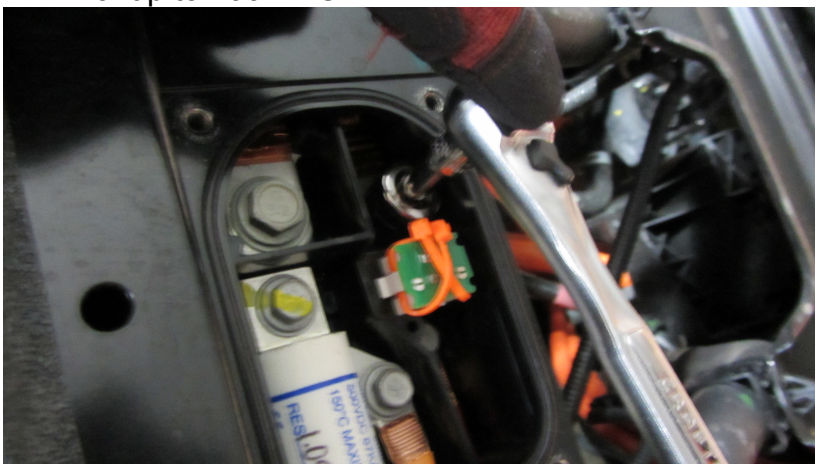
- ✓ Bend out the tabs on the metal cover that hold the interconnect circuit card
- ✓ The interconnect circuit card can only go into the socket only one way
- ✓ Carefully thread the orange zip ties (supplied) under the tabs as depicted and loop them together
- ✓ Duplicate this exactly as depicted
- ✓ **WARNING: DO NOT USE ZIP TIE GUN !!!**
- ✓ Use only finger tight on the zip ties, and trim carefully with razor blade knife
- ✓ If this fails at any time in the future, the vehicle will stop



42) Pull orange high voltage cables from JdeMO box through to the bottom of the vehicle on the driver's side, as shown

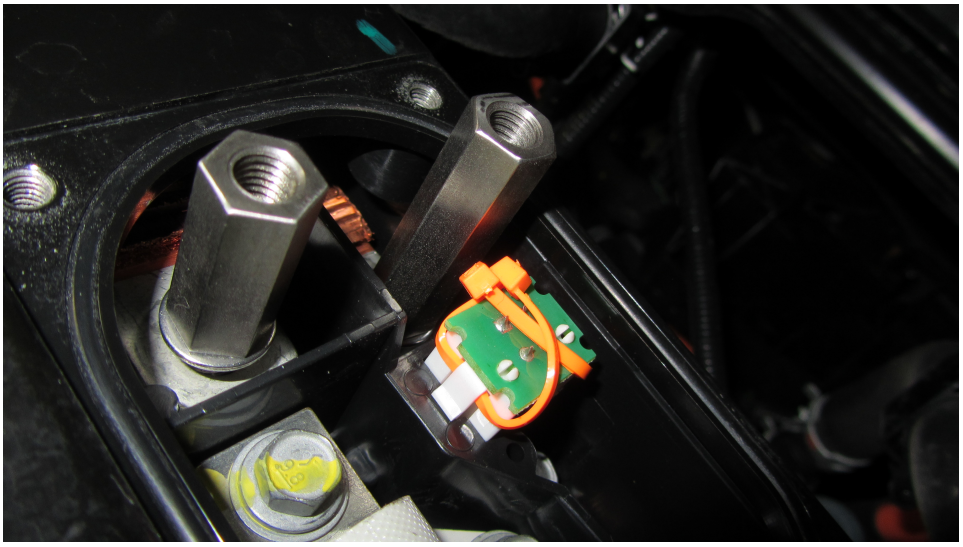
43) Remove bolts from Positive (RED) and Negative (Black) lugs as shown (13mm socket)

- ✓ First, check lugs for any voltage with appropriate volt meter on a scale of up to 400 VDC



44) Install traction battery lug extensions with 8mm flat washers (13mm wrench)

- ✓ Use M8 stainless steel washer
- ✓ The **short** extension is for **Negative**
- ✓ The **long** extension is for **Positive**
- ✓ Torque to 80 inch pounds / 9 Nm

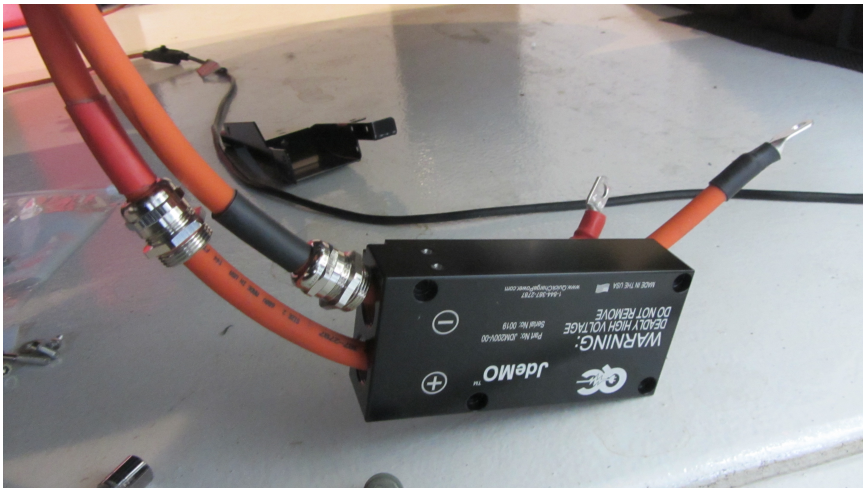


45) Install round orange rubber boots over extensions

- ✓ The shortest boot goes on the positive (longest) extension first
- ✓ Then, the longest one also goes on the positive extension next
- ✓ The medium length one goes on the negative extension alone
- ✓ DO NOT YET INSTALL THE CABLES UNTIL AFTER THE NEXT STEP

46) Insert cables into traction battery “bathtub”

- ✓ Ensure that the glands / strain relief do not have jam nuts on them
- ✓ Red MUST go into the threaded hole marked (+)
- ✓ Black MUST go into the threaded hole marked (–)
- ✓ There is no room for error; these must be correct

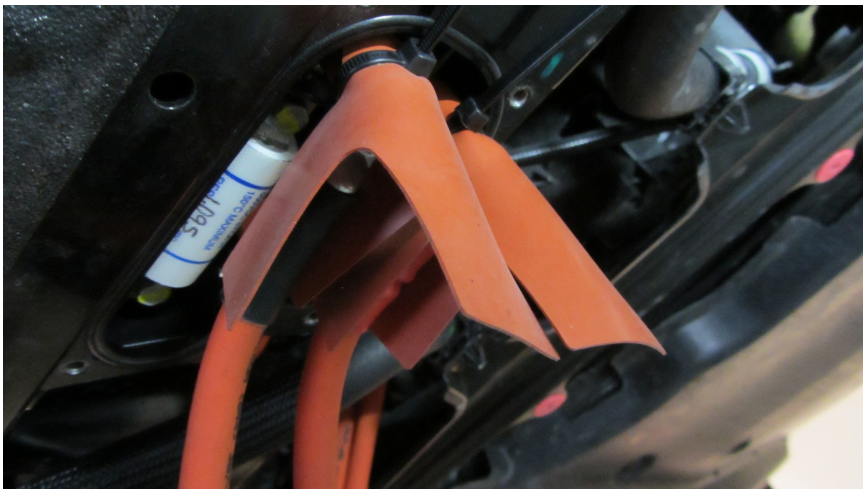


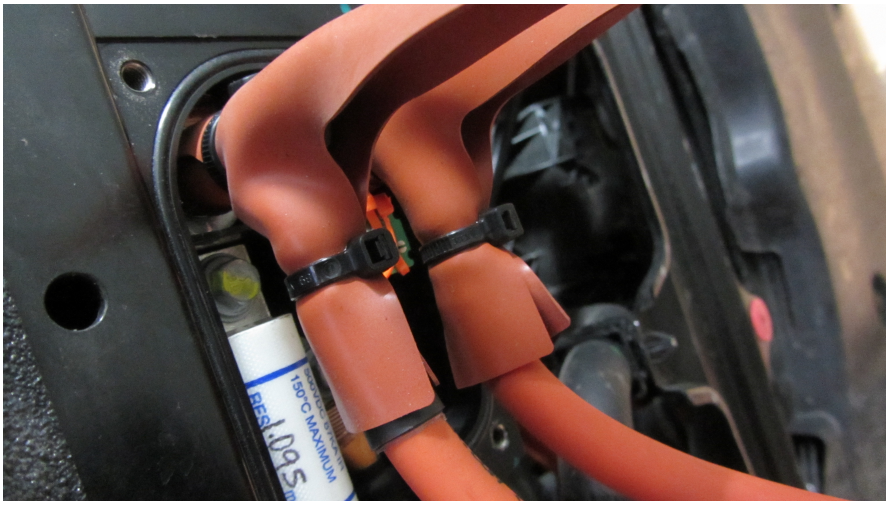
47) **CRITICAL STEP** - mount cables on respective positive and negative traction battery terminals (use 13mm socket)

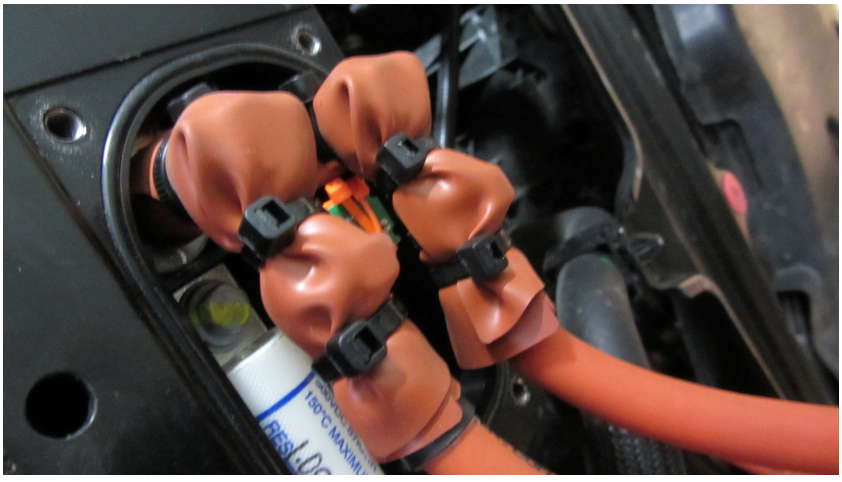
- ✓ These absolutely cannot be reversed
- ✓ Line up **red** with the **red** Tesla inverter cable (passenger side of car), then **red** on lug, then (+) on battery mount “bathtub”, then **red** on cable
- ✓ Line up **black** on the **black** Tesla inverter cable, then **black** on lug, then (-) on bathtub, then **black** on cable
- ✓ Both cables must be parallel, toward the driver’s side of the vehicle

50) Install flat orange silicone insulation material with zip-ties as depicted

- ✓ Ensure that the zip-ties do not interfere with battery sealing surface (black rubber round seal)





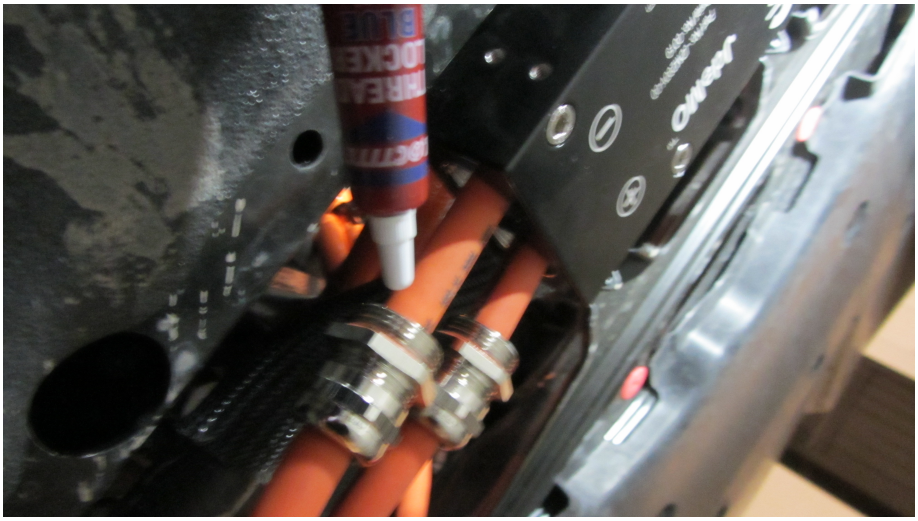


51) Install the battery mount “bathtub” with four (4) Allen head M6 x 1.0 x 40mm bolts (requires 5mm Allen tool)

- ✓ USE THREAD ANTI-SEIZE !!
- ✓ “FINGER TIGHT” ONLY !

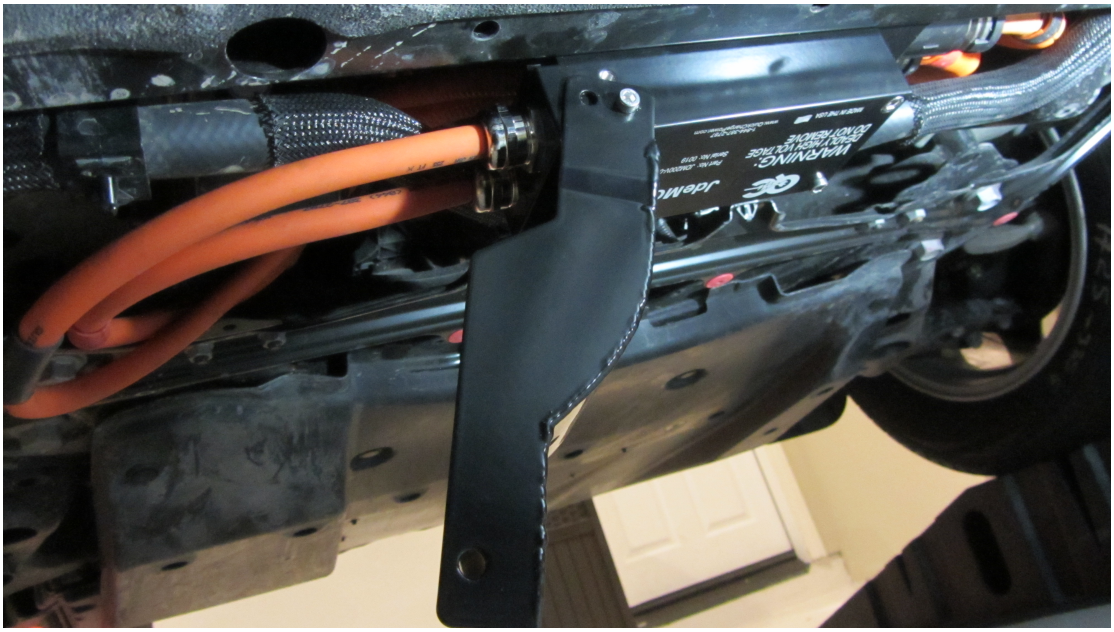
52) Install Amphenol cable glands / strain relief (requires 24mm and 27mm wrench / spanner)

- ✓ USE LOCTITE THREAD LOCKER, RED #271
- ✓ DO NOT OVERTIGHTEN !



53) Install skidplate to battery mount “bathtub” with one M5 bolt, “finger tight”

- ✓ It is recommended that the four (4) “bathtub” M6 bolts be loosened to the maximum possible, without falling out



54) Install Adel clamps as depicted

- ✓ Align the clamps so that the bolt holes will line up with the appropriate holes in the skidplate
- ✓ Install one (1) M6 x 1.0 x 16mm bolt through two (2) Adel clamps together
- ✓ Insert first M6 bolt into skidplate by pushing the skidplate up. This will required great patience
- ✓ Attach first M6 serrated flange nut and tighten
- ✓ Insert second M6 bolt into skidplate
- ✓ Attach second M6 serrated flange nut and tighten

55) Install battery hose clamp into skidplate as depicted

- ✓ First, push / pull the hose clamp to the driver's side about one (1) inch / 25mm
- ✓ Rotate the hose clamp to have the mounting tabs pointed down

56) Install and tighten all five (5) M5 bolt through the skidplate into the bathtub (use 4mm Allen tool)

- ✓ USE THREAD ANTI-SEIZE !!
- ✓ DO NOT OVERTIGHTEN !

57) Retighten the the battery mount "bathtub" with four (4) Allen head M6 x 1.0 x 40mm bolts (use 5mm Allen tool)

- ✓ USE THREAD ANTI-SEIZE !!
- ✓ DO NOT OVERTIGHTEN !

58) Route orange high voltage cables and zip-tie as depicted:

- ✓ Ensure cables are not loose at any point where they can rub against anything
- ✓ Use plenty of zip-ties to ensure the security of orange high voltage cables

59) Install plastic cover with cut rectangle hole (10mm wrench)

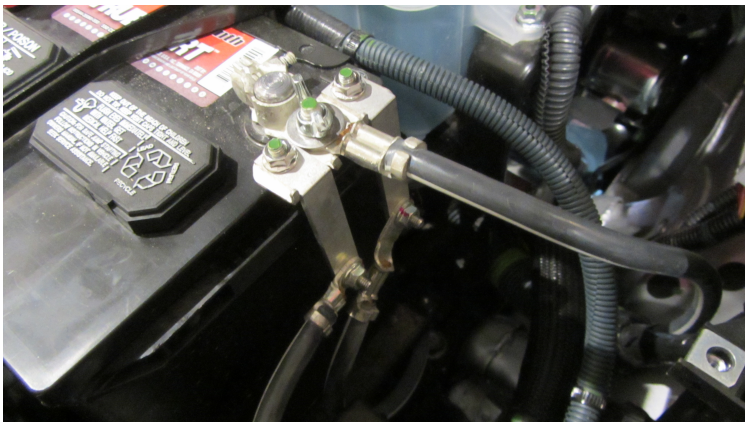
- ✓ Optional – drill out the existing 1/4” holes to 3/8” and install additional (not included) buttons

FINAL STEPS

60) Reinstall traction battery fused link

- ✓ The black release lever must be in its FULL vertical position prior to installation
- ✓ If the black release lever is not in its vertical position, it will not properly engage
- ✓ Install the cover with four (4) M6 wing nuts and flat washers (supplied)
- ✓ Return the front passenger seat to the normal position

61) Connect the negative lugs to the 12 volt battery with one (1) M8 wing nut and one (1) M8 / 5/16” fender washer



62) To start the RAV4 EV:

- ✓ Press foot on brake pedal and press the ON button (with key fob present)
- ✓ Fuel gauge should show “LO” with all 16 fuel segments illuminated
- ✓ **IMPORTANT: <u>Wait</u> for center navigation unit to spin up its hard drive**
- ✓ Once the center navigation screen display is normal, press the ON button again (with your foot still on brake)
- ✓ You should hear the main traction battery contactor close, and “READY” should be displayed on the driver’s dash panel
- ✓ No error messages should be displayed

These are the extra bits from the RAV4 EV:

- ✓ The hood rod is only removed if hood struts are added