620 S. Magnolia Avenue
Suite B
Ontario, CA 91762
(909) 923-1973

INSTALLATION INSTRUCTION

Club Car Precedent Lithium Battery Pack Installation Notes Including Cars with Installed HPEVS Drive Systems

REVISION: D

Date: 11-20-23

Disclaimer: **HPEVS assumes that the installer possesses appropriate knowledge and skill to perform the installation of our drive system into any vehicle. If you feel that you DO NOT have the appropriate knowledge and skill to perform the installation, seek help from a professional installer.**

IMPORTANT DISCLAIMER: IF THE VEHICLE IS GOING TO BE STORED FOR A LONG PERIOD OF TIME, THE VEHICLE NEEDS TO BE PLUGGED IN TO CHARGING POWER AT ALL TIMES AND 12 VOLT DC-DC CONVERTOR SHOULD BE DISCONNECTED. FAILURE TO FOLLOW THIS PROCEDURE WILL DRAIN THE LITHIUM BATTERIES DOWN TO A POINT WHERE THE BATTERIES WILL BE DAMAGED. IF THE BATTERIES ARE DAMAGED FOR NOT FOLLOWING THIS PROCEDURE WILL VOID ANY IMPLIED WARRANTY.

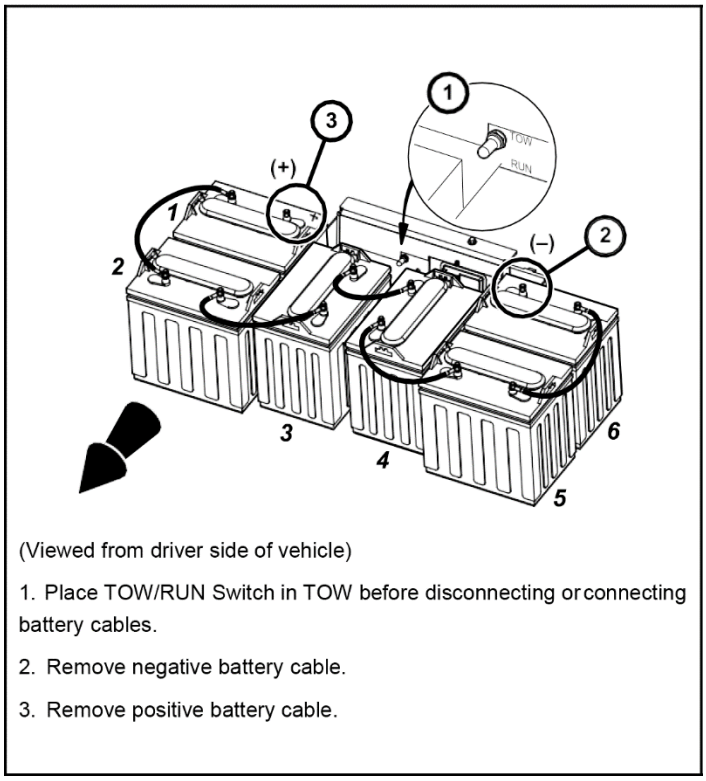
CAUTION: DO NOT HANDLE THE ELECTRICAL CONNECTORS WHEN THE SYSTEM IS ENERGIZED. DOUBLE CHECK THE VOLTAGE POTENTIAL WITH A VOLTAGE METER PRIOR TO HANDLING MAKING SURE VOLTAGE IS AT 0V. FAILURE TO DO SO WILL RESULT IN INJURY OR DEATH!

SCOPE: This instruction set is given as a detailed guide to install HPEVS complete lithium battery pack into a Club Car Precedent golf car with a HPEVS motor/controller drive system. Included in this lithium battery pack are 16 CALB 100Ahr batteries, one Orion Jr. BMS and one delta-Q battery charger. Included in this documentation are instructions on installing the wiring in a golf car that already has a HPEVS drive system installed.

HPEVS LITHIUM BATTERY PACK FOR CLUB CAR PRECEDENT

STOCK LEAD ACID BATTERY REMOVAL

1. Set the park brake.
2. Turn ON/OFF Switch to OFF position and remove key from key switch.
3. If equipped, place the Run/Tow switch into the Tow position.
4. Disconnect the stock lead acid battery cables based on (Fig. 1)



(Viewed from driver side of vehicle)

1. Place TOW/RUN Switch in TOW before disconnecting or connecting battery cables.
2. Remove negative battery cable.
3. Remove positive battery cable.

Fig. 1

5. Remove all battery cables from the stock batteries.
6. Remove all batteries from the stock battery tray/tub.

Stock Controller Removal:

1. To remove the stock controller plate, locate the black screw (Torx T-40) located at the top plate. NOTE: RETAIN THE BLACK TORX BIT SCREW. IT WILL BE USED IN THE INSTALLATION OF NEW CONTROLLER PLATE ANGLE BRACKET. (Fig. 2)

Fig. 2

2. Remove the controller plate from the cart. (Fig. 3)

Fig. 3

3. Once access is available to the backside of the controller plate, disconnect all the connectors. Do not cut any wires at this time. The original stock wire harness will be re-used. Remove and save the following items from the stock controller plate:

    a. Stock Contactor. Note: The contactor is removed by sliding it up out of the slot. Do not break the retainer legs. Discard the resistor across the main terminals.
    b. Controller plate black screw.

Battery Tray/Tub Modifications

Minor modifications need to be performed to the battery tray/tub so that the new lithium battery tray kit can be installed into this position.

There are three areas in the tray/tub that needs to be modified to allow for 1) the lithium battery pack to sit flush in the tray/tub; 2) allowing for the routing of the stock wiring harness through the tub/tray so that it reaches the back area of the vehicle where the controller is located.

1. For reference, here is a stock battery tray/tub that is out of a Club Car Precedent looking into the battery tray area. (Fig.4)

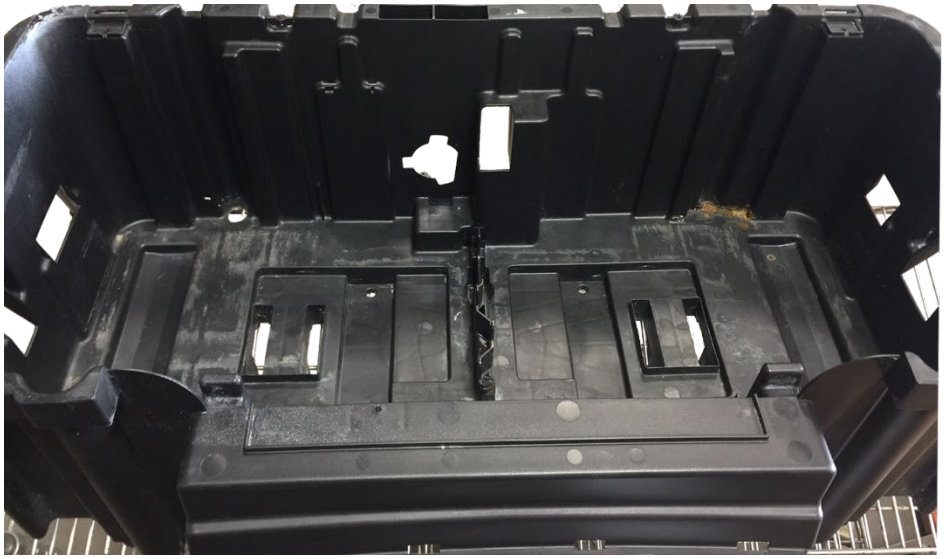


Fig. 4 Looking from the rear of cart forward

2. To ensure that the lithium battery tray sits flush within the battery tray/tub, there is a section of raised plastic that needs to be removed. (Fig. 5)

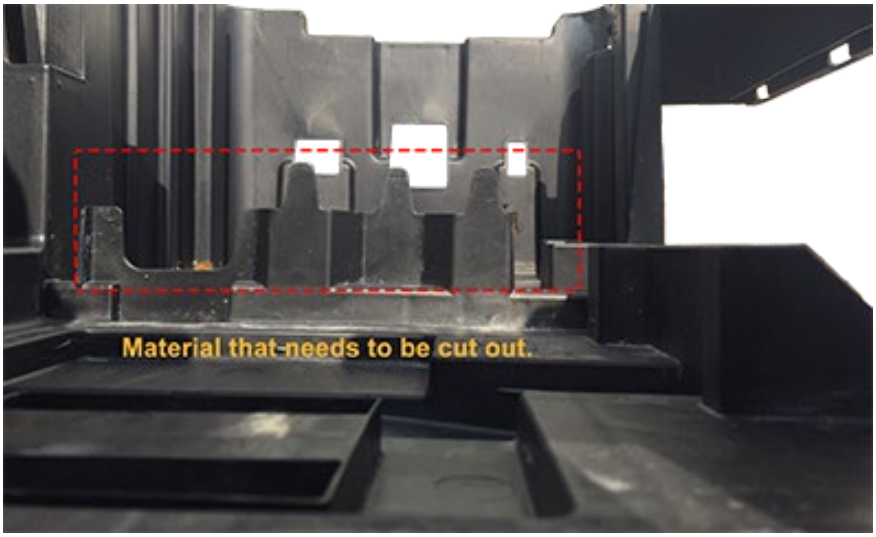


Fig. 5

3. Using a saw or cutoff wheel (pneumatic saw is highly recommended), cut the peak raised plastic material flush to the base from which this plastic material is located. (Fig. 6)

Fig. 6- Raised material removed.

Plastic material removed for wiring harness routing

Next, there is a small piece of plastic located on the bottom of the tray/tub that needs to me removed to allow for proper routing of the stock golf car wiring harness underneath the new lithium battery tray.

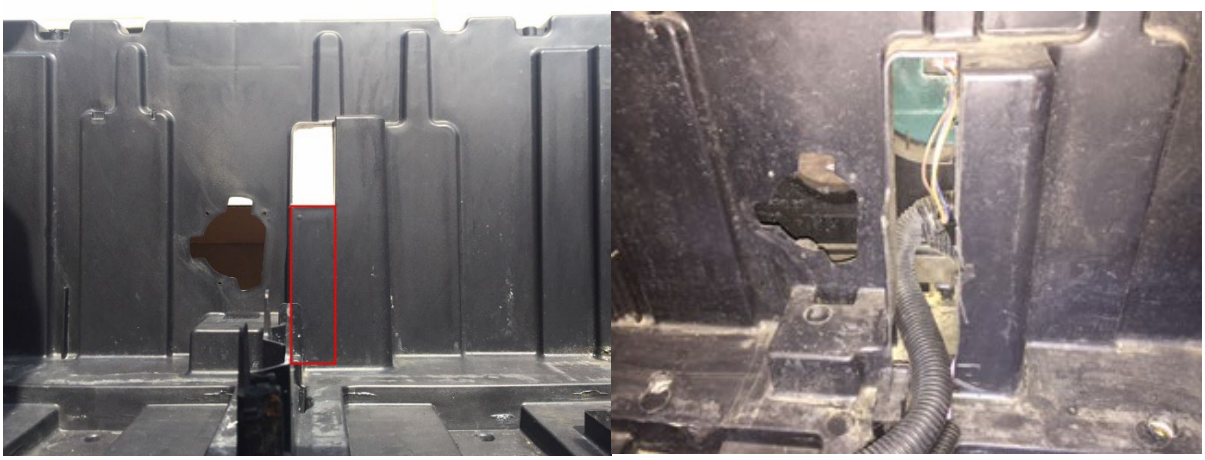
1. The piece is located towards the front of the tray/tub on the bottom along the lines of the previous cut. (Fig. 7)
2. The piece needs to be fully cutout and should end up being flush with the surrounding plastic material area.(Fig. 8)

Fig. 7

Fig. 8- Finished cut

3. Cut away plastic along the front side of the battery tub/tray to allow for a slot so that the stock wiring harness can be routed away from the existing access hole.

The harness will need to lay as flat as possible along the bottom surface of the battery tray/tub.



4. Next, a through hole needs to be drilled in the plastic to allow for the wiring harness to exit out of the battery tray/tub into the motor/controller area located in the back of the car. Using a 1 ¾" hole saw proceed to drill the hole on the rear driver side of the floor. Note that the hole has to be close as possible as the bottom surface of the battery tub/tray. (Fig. 9)

Fig. 9

5. Proceed to route the OEM harness through the battery tray/tub as shown then carefully feed the connector/harness though the hole. (Fig. 10)

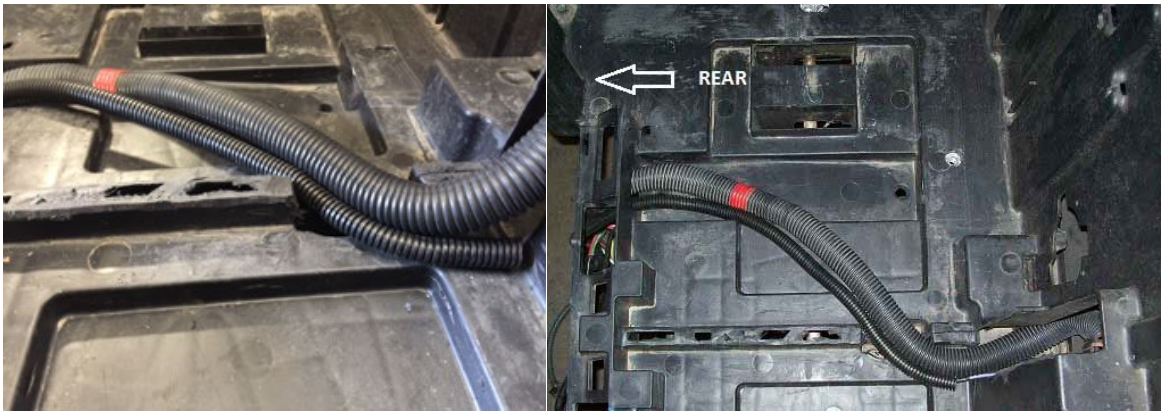


Fig. 10- OEM wiring harness routing

CONTROLLER PLATE INSTALLATION

Prior to installing the battery pack, the controller plate with the motor controller, BMS and contactor needs to be installed on the controller plate.

For reference of mounting of the controllers on the controller plate, please refer to the (Fig. 11).

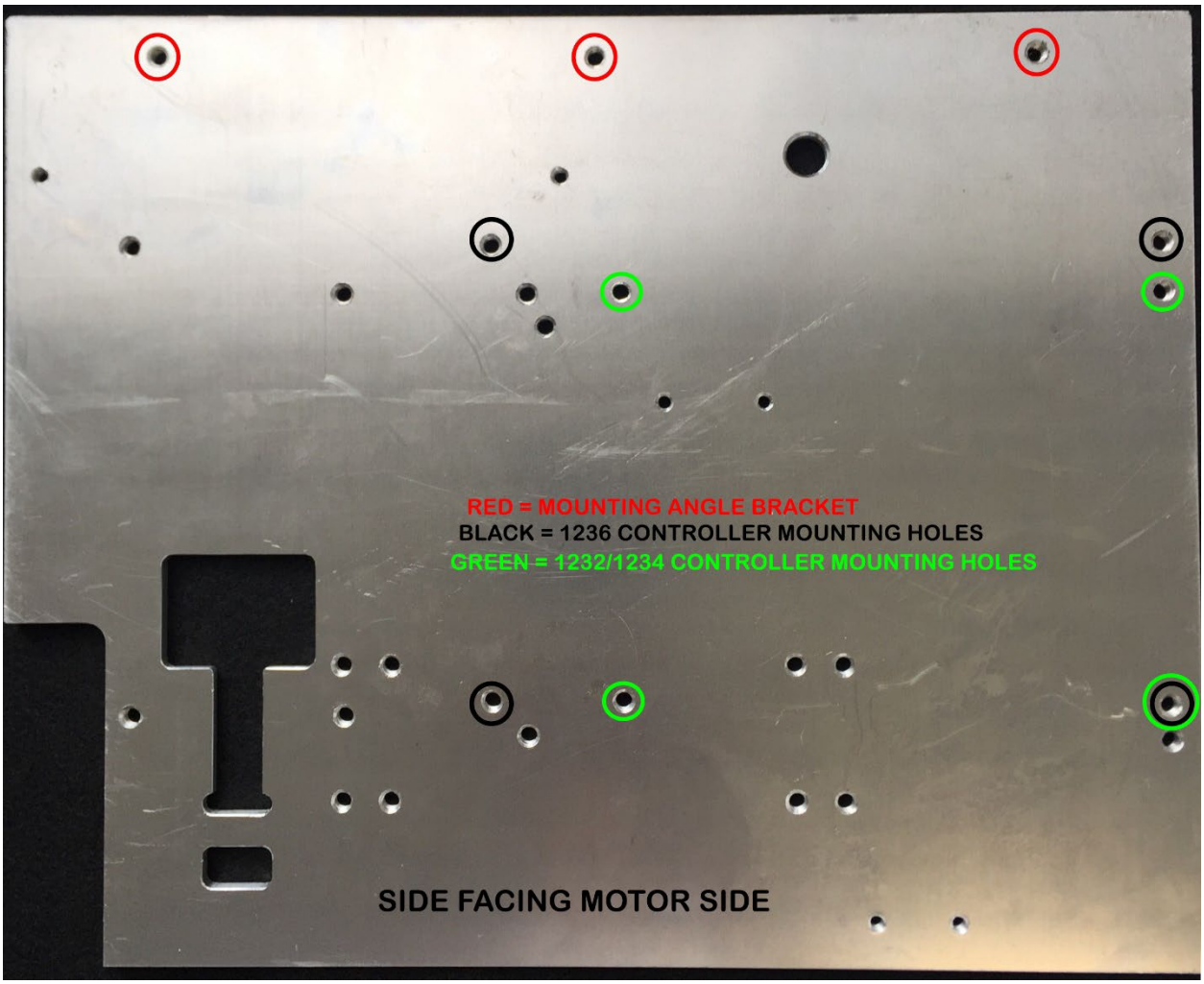


Fig. 11- Motor Controller Mounting Holes

For reference of installing the lower support brackets on the controller plate, please refer to Fig. 12.

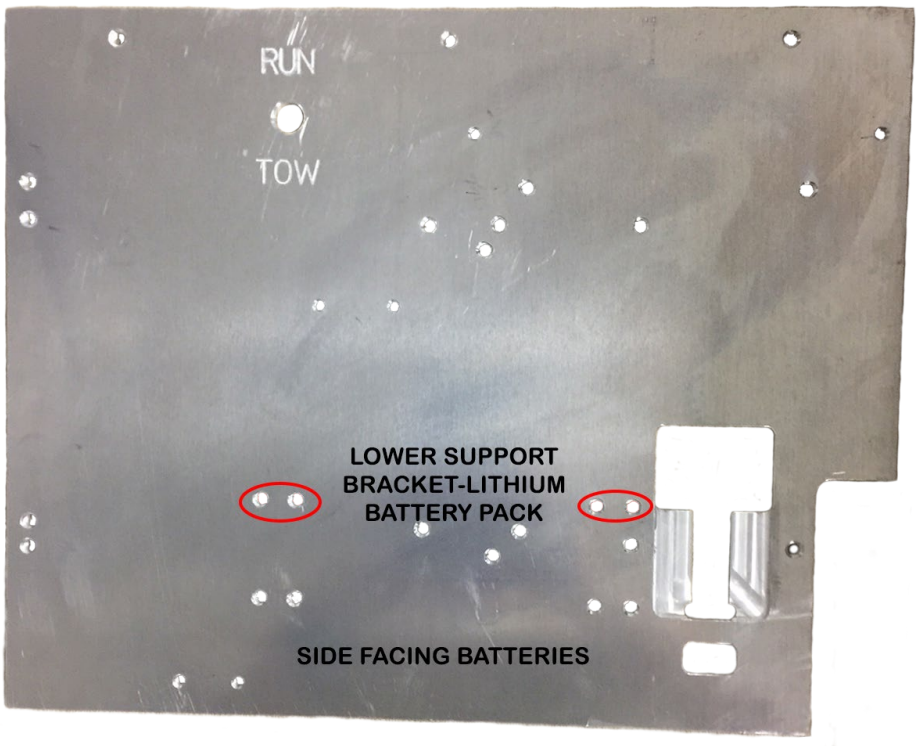


Fig. 12 – Lower Support Bracket Mounting

1. Mount the angle bracket onto the motor facing side of the controller plate. Use three ¼”-20 x ½” screws, ¼” flat and ¼” lock washers to install. Do not fully tighten the screws at this time. (Fig. 13)

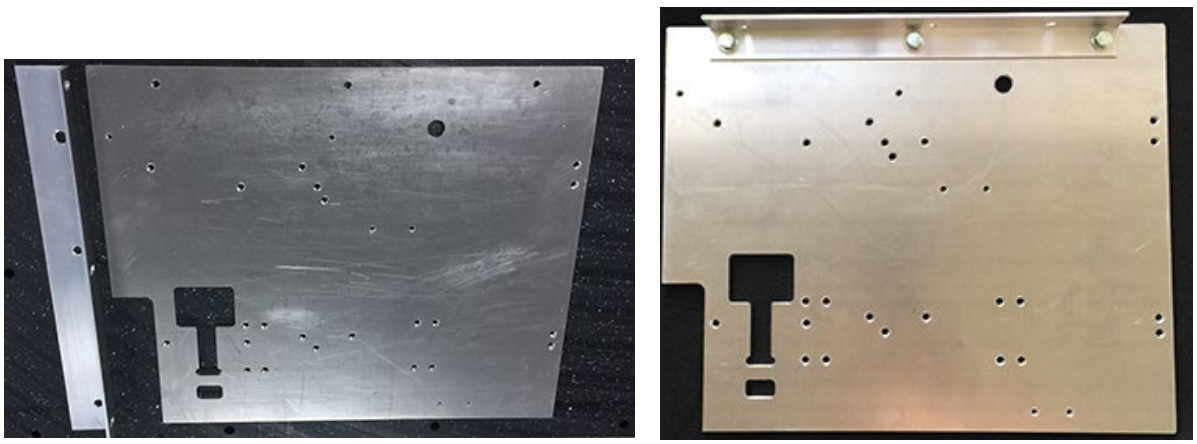


Fig. 13 – Controller plate mounting bracket

2. Flip the plate over to the battery facing side and install the lower support brackets. Use the four ¼”-20 x 1” screws with ¼” flat and ¼” lock washer to install. Make sure that the screws do not protrude out the other side of the mounting plate. Fully tighten the screws. (Fig. 14)

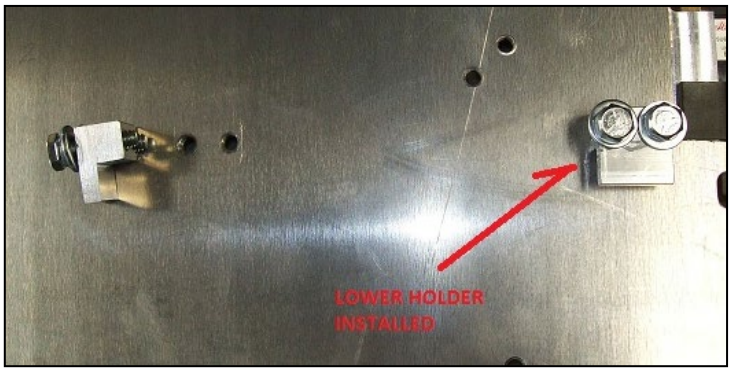
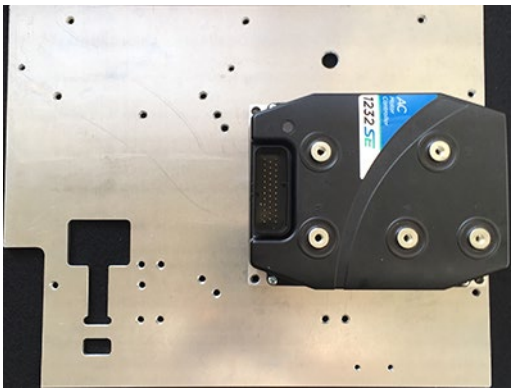


Fig. 14 – Lower Support Brackets

3. Turn the controller mounting plate over and install the controller. (Fig. 15)



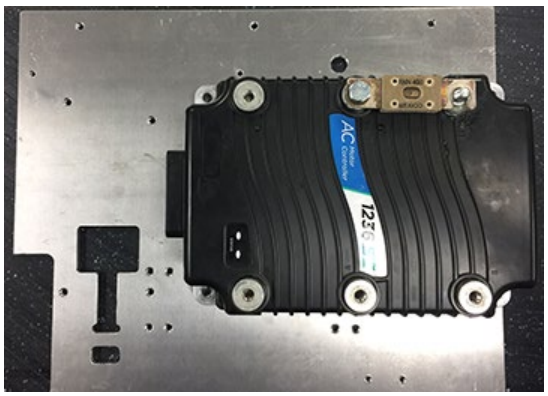


Fig. 15 – 1232 Curtis Controller or 1234/1236 Controller

4. Install the contactor by sliding it in the holder until the retainer bottoms out in the opening. The contactor body must be located on the motor side, similar to the stock location. (Fig. 16)

Fig. 16 – Contactor install

5. Install the controller plate into the cart using the original black screw and a self-tapping screw. Keep the screws loose so that the plate can be pushed outwardly towards the rear of the vehicle when needed. (Fig. 17)

Fig. 17 – Fully assembled controller plate installed

Installation of the HPEVS Lithium Battery Pack into the vehicle will require two people to set the pack into the battery tray/tub safely.

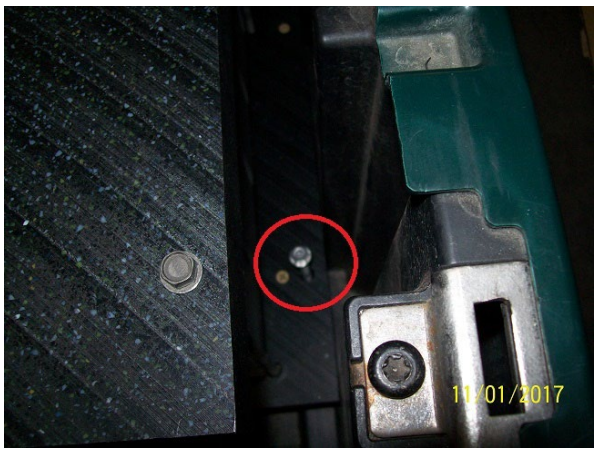
6. Install the lithium battery pack with the delta-Q charger located on the driver side of the vehicle. It is very important that the battery pack is located as far back as possible against the rear wall of the vehicle's battery tray/tub. (Fig. 18)

Fig. 18-Lithium battery pack installed into golf car

7. Using the supplied (4) ¼" x 4" stainless self-tapping; self-drilling screws (Fig. 19), secure the lithium battery pack to the vehicle's frame. There are four predrilled holes located in the bottom piece of the lithium battery pack tray. An impact driver is highly recommended in the process of drilling these screws into the frame.

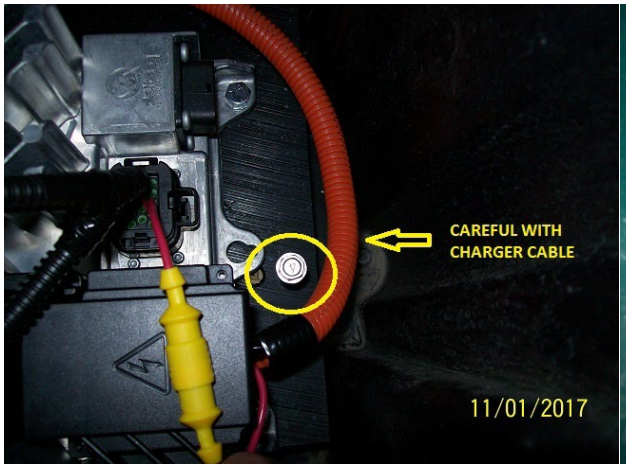
Fig. 19- Self-tapping screws

8. There are four locations that need to be secured.



Front passenger side

Front Driver side



Rear Driver side

Rear Passenger side

9. Make sure that all four mounting screws are tight and secure.
10. After securing the lithium battery pack into the vehicle, the wiring for the BMS needs to be plugged in. First plug in the smaller plug (power plug) (Fig. 20), then the larger plug that holds the wires from each battery (Fig. 21). Both plugs are plugged into the BMS with the plugs release tab oriented towards the battery pack.

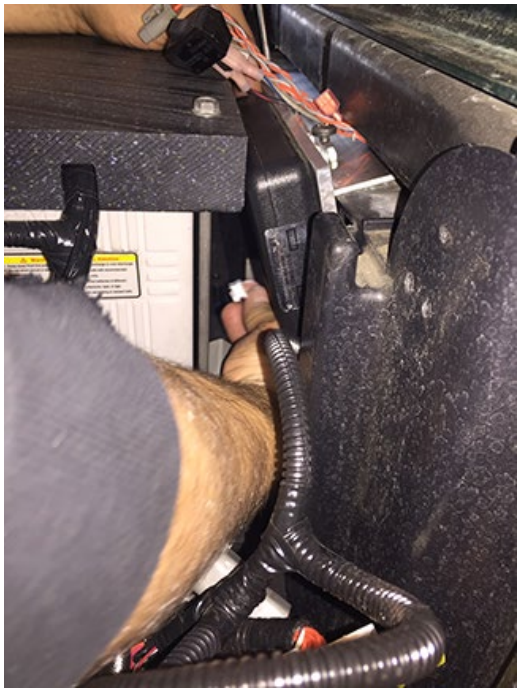
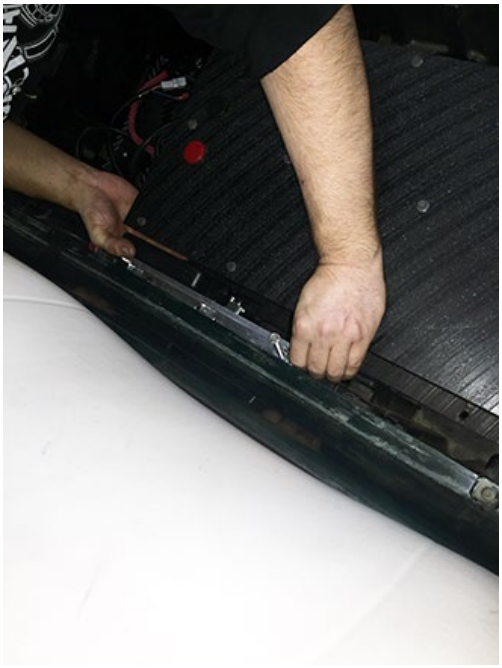
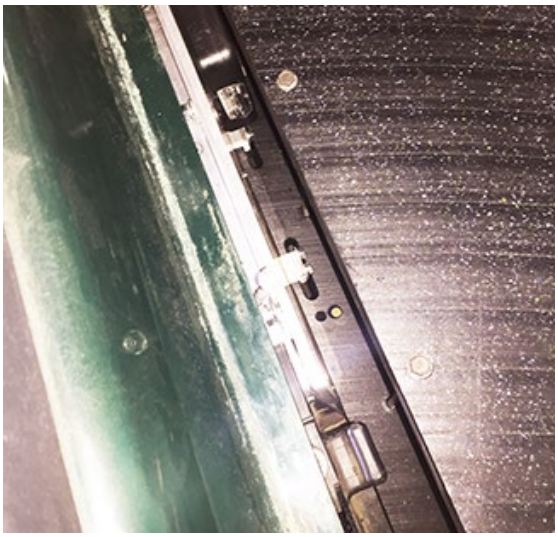


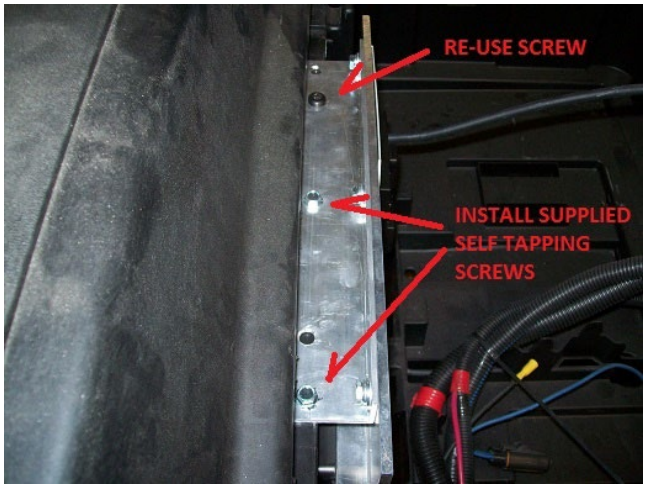
Fig. 20 - BMS power wires

Fig. 21 – Wires leading from batteries

11. Now the controller mounting plate will need to be secured into its final position. The lower support brackets will need to be placed into the slots located on the bottom piece of the battery pack. To do this procedure requires two people. While one person lifts up on the controller plate the second person will need to push on the controller plate from the backside of the vehicle through the access hole so that the lower support brackets align with the two slots on the bottom piece of the battery pack. Once aligned, lower the plate so that the lower support brackets are secure in the slots. Tighten the three screws mounting the controller plate to the angle bracket. Tighten the black screw plus the two other self-tapping screws to secure.







12. Install the pack negative cable from the lithium battery pack to the B- cable on the motor controller.

13. Carefully feed the power cable and pack negative (B- cable) beneath the controller plate and into the motor/controller area at the back of the vehicle. (Fig. 24)

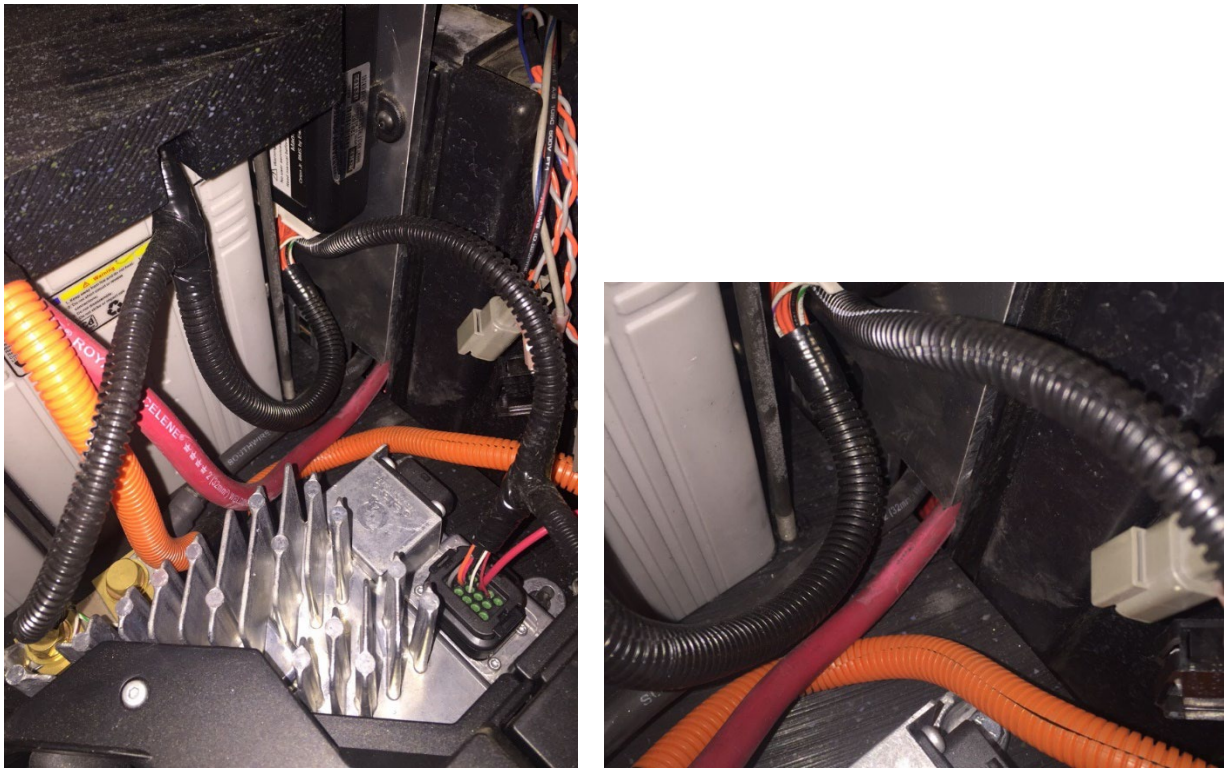


Fig. 24- Cable routing from battery pack

14. Carefully remove the electrical tape off of the pack positive cable lug install the lug onto the contactor. (Fig. 25)

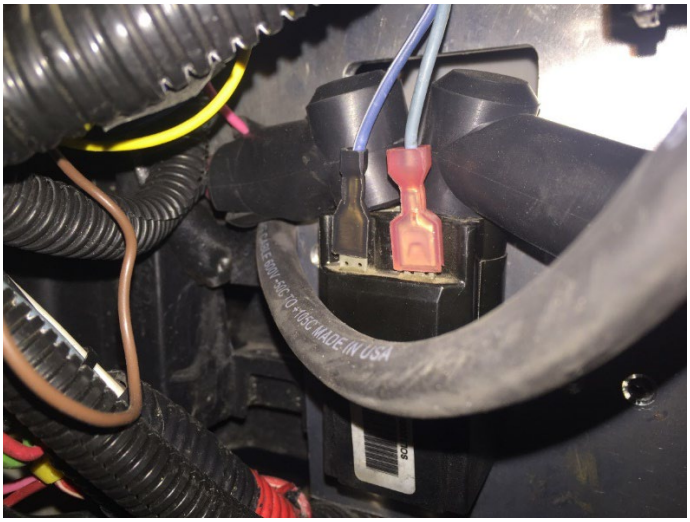


Fig. 25- Install pack positive cable onto contactor

15. Install the pack negative (B- cable) onto the B- terminal located on the controller. (Fig. 26)

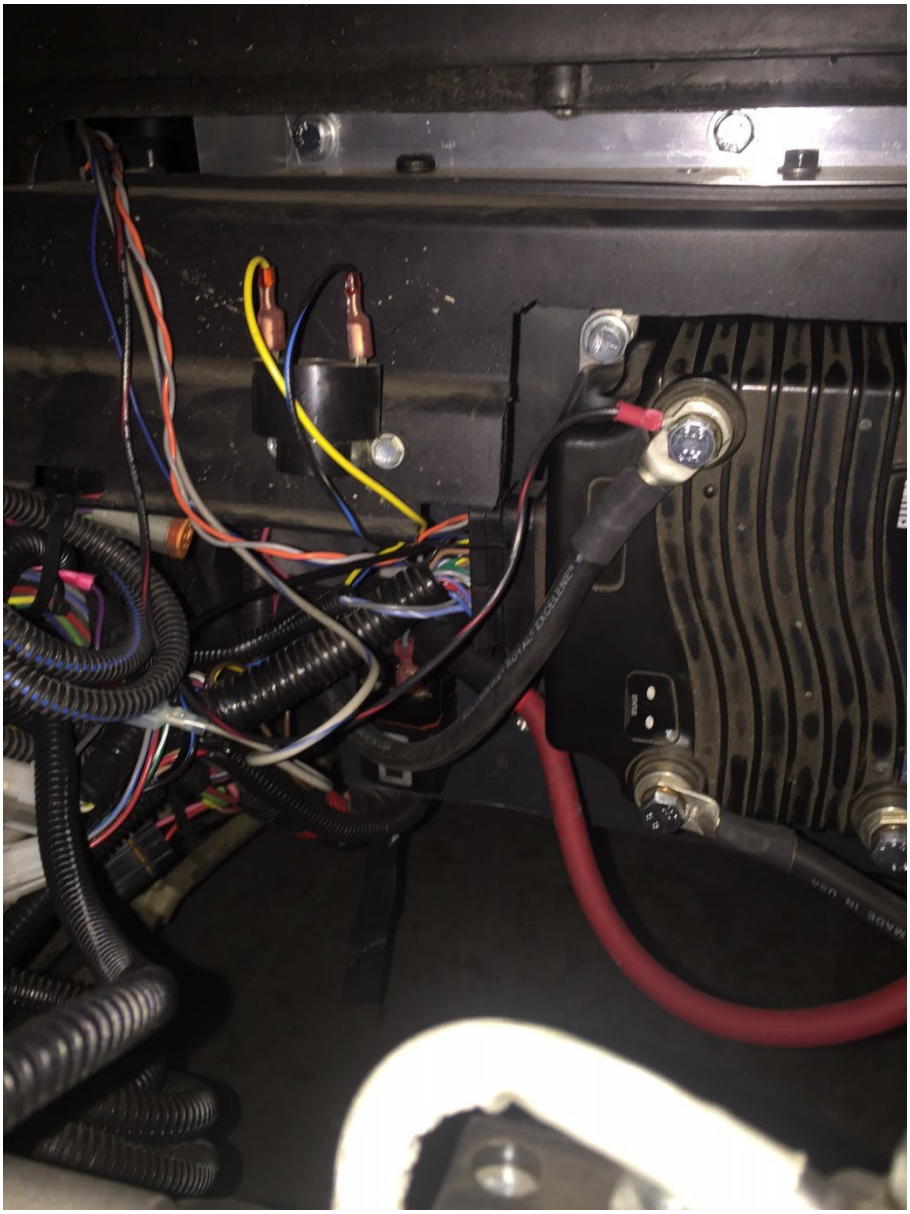


Fig. 26- Connect pack negative to B- on the controller

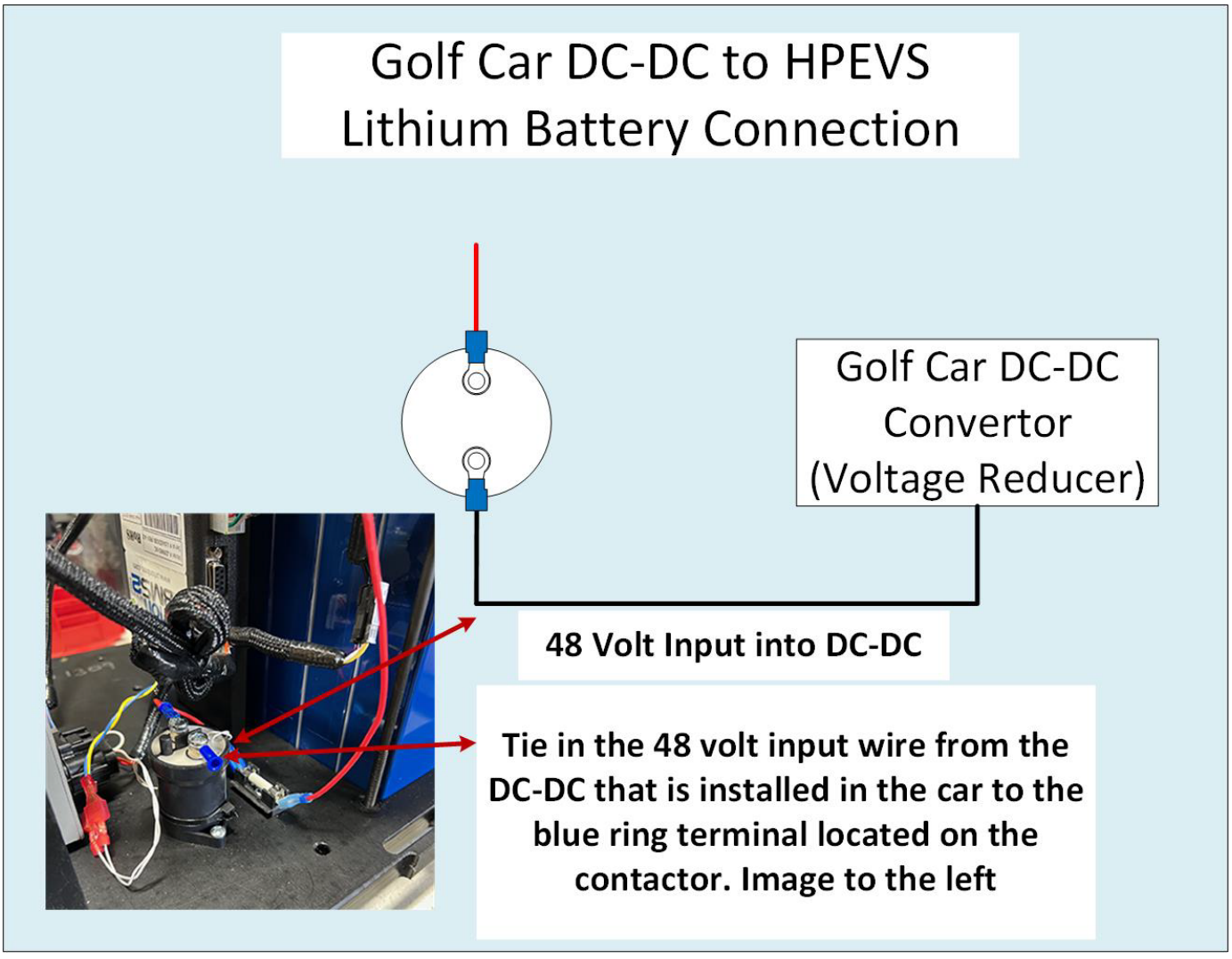
16. After the HPEVS drive system has been installed (SEE Precedent System Installation Instructions), proceed to connect the 2 pin Deutsch connector and the blue wire to the drive system harness. (Fig. 27)

Fig. 27- Electrical connections

DC-DC (Voltage Reducer) Connection

Located on the HPEVS lithium battery note that there is a contactor that is used to isolate the DC-DC (Voltage Reducer) 48 volt input from the battery. HPEVS highly recommends that this contactor be used so that the battery is protected from any peristatic current draw from the battery by the installed DC-DC (Voltage Reducer). If the HPEVS lithium battery has been drained of power and the DC-DC contactor was not used for isolation, the HPEVS lithium battery warranty could become void.

1. Located the 48-volt input wire leading into the DC-DC (voltage reducer). This wire color varies based on the manufacturer.
2. Locate/relocate this wire to the contactor located on the HPEVS lithium battery pack.



ELECTRICAL CONNECTIONS FOR GOLF CARS WITH PREVIOUSLY INSTALLED HPEVS DRIVE SYSTEMS

The added CANBUS wiring/connector and the power wire from the lithium battery pack kit needs to be adapted to the existing drive. Included in the kit are the connections/wires to perform this task.

1. To connect the HPEVS lithium battery pack to a Club Car Precedent with an existing HPEVS drive system, locate both the black wire and the CANBUS connector (orange/grey twisted wire). Both of these wires are for CANBUS communication (Fig. 28)

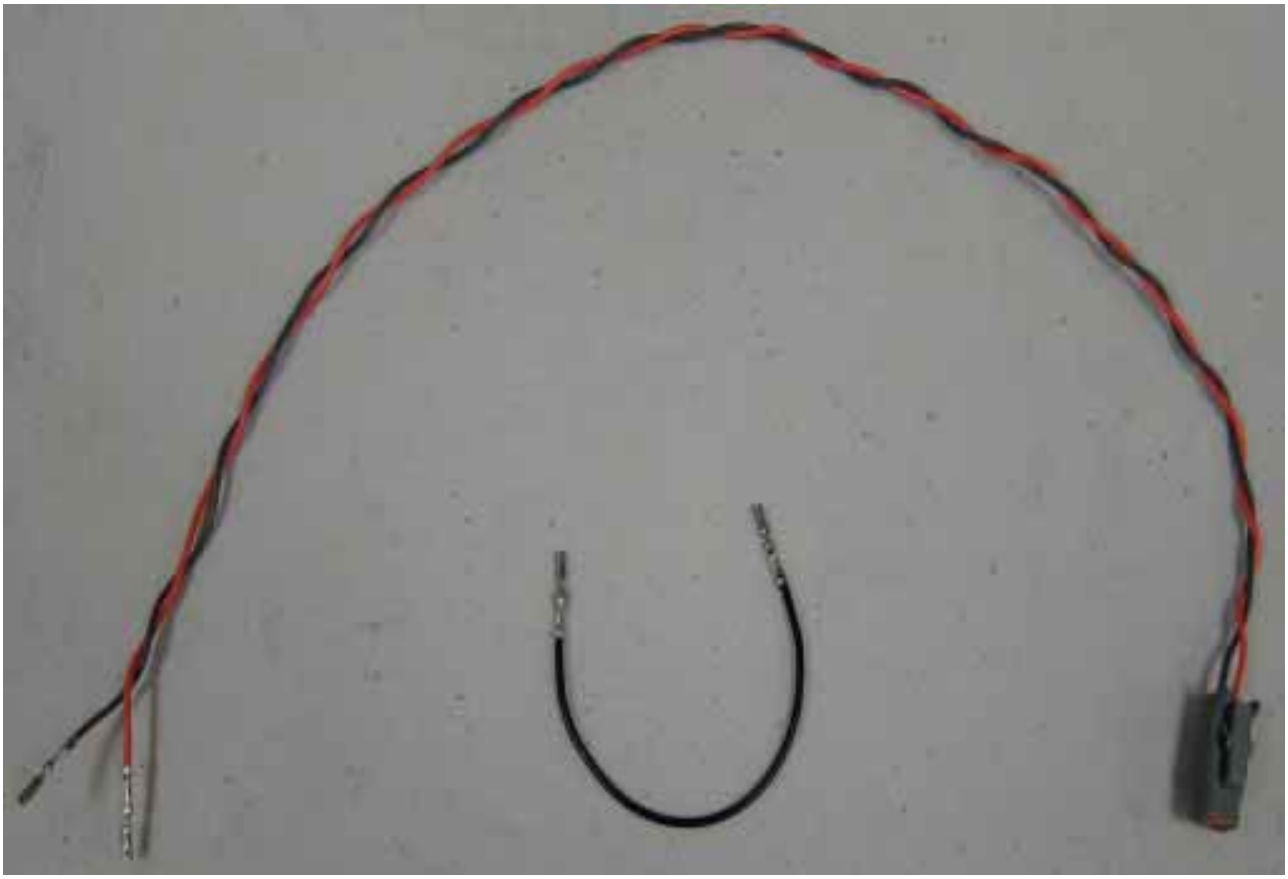


Fig. 28 – CANBUS wiring

2. The four pins need to be inserted into the 35-pin AMPSEAL connector that plugs into the controller. The black wire has two pins on each end. Those two pins are to be inserted into pin location 21 and 34. The CANBUS Deutsch connector has two wires that need to be inserted into the AMPSEAL connector. The orange wire will need to be inserted into pin #23. The grey wire on this connector will need to be inserted into pin #35. (Fig 29)

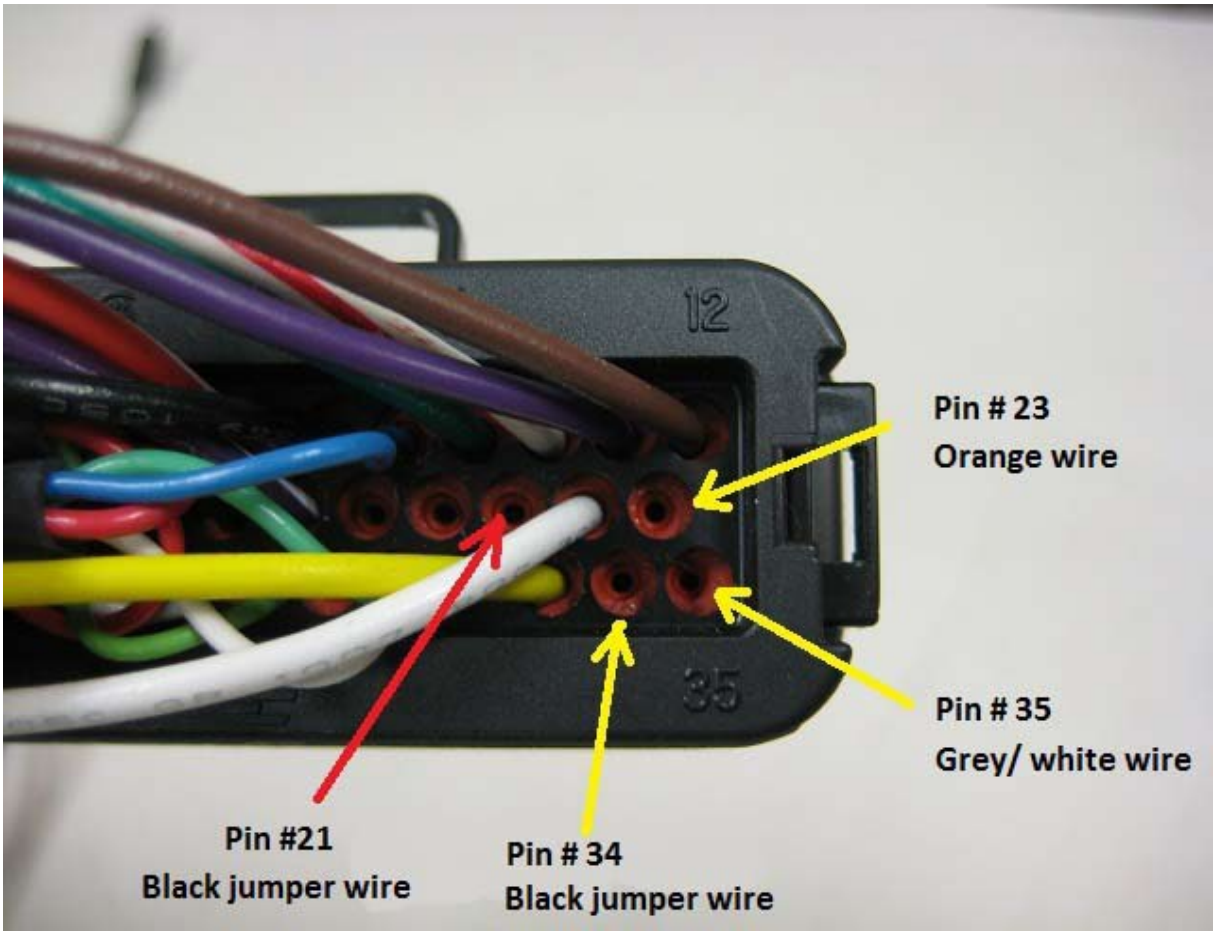


Fig. 29 – AMPSEAL connector CANBUS wire connections

3. Unplug the 35-pin Ampseal connector from the Curtis controller.
4. To get access to inserting the electrical pins into the connector, the red plastic pin capture piece of the connector that locks the connector terminals in place needs to be pried up **ONE CLICK, BUT NOT REMOVED**. **Warning: if the red connector holder piece is removed, all of the wires within the connector will become loose and will have to be re-installed.**
5. Using a small blade screwdriver, or a similar tool, place the blade of the tool between the black latch of the plug and the red colored body of the plug as shown in the pictures. (Fig. 30 and Fig. 31)

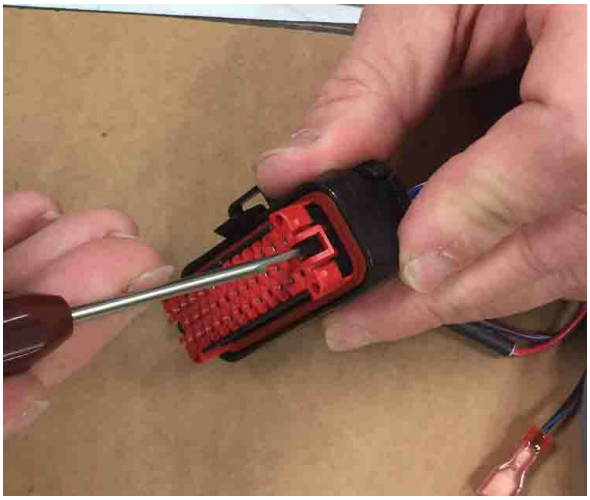


Fig. 30

Fig. 31

6. With the blade of the screwdriver in place at this point, slightly twist the screwdriver to pry the black colored tab on the body of the plug away from the red colored pin capture body of the plug.
7. While prying the black plastic tab away from red plastic pin capture portion of the plug, press the red piece up and away from the body of the plug. There will be a single click when the red plastic plug piece is lifted. This is an indication that the pin capture piece is in the correct orientation. (Fig. 32) Do this procedure for both sides of the plug.

   MAKE SURE THAT THE RED PLASTIC PIN CAPTURE PIECE ONLY CLICKS ONCE AND NO MORE!

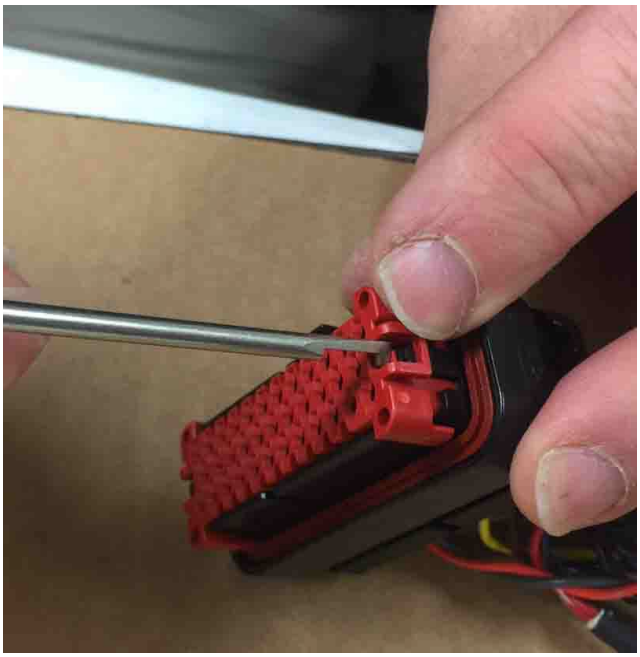


Fig. 32 – Capture release

8. Once completed the plug should look like the following. (Fig. 33) Note the red plastic pin capture piece is not attached to the black plastic tab.

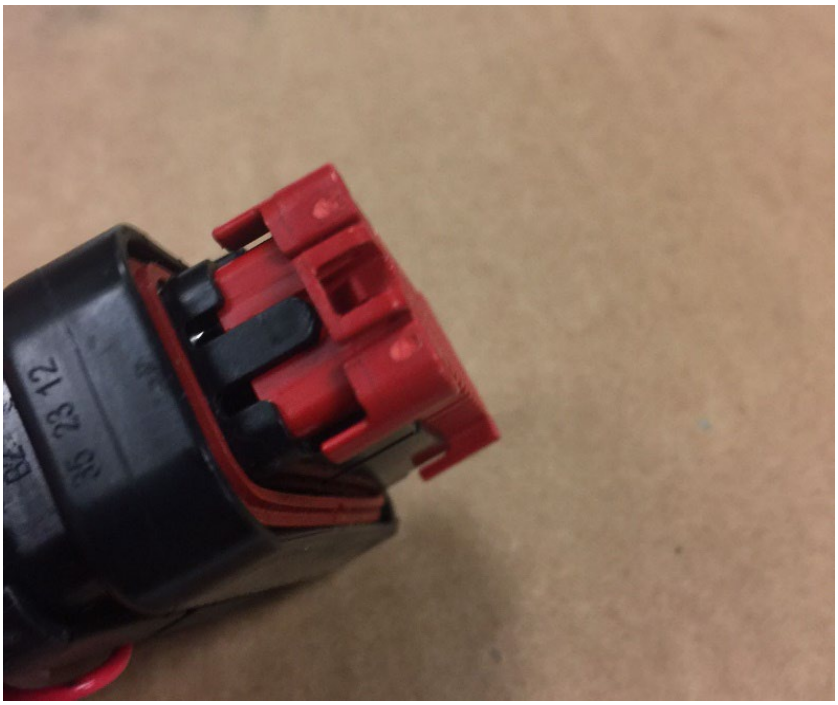


Fig. 33 – Capture Piece

9. Insert the wiring for the CANBUS connections (Orange wire into Pin #23, Grey wire into Pin #35, One end of the Black jumper wire into Pin #21 and the other end of the Black jumper wire into Pin #34). Make sure that the pins are fully seated. (Fig. 34)

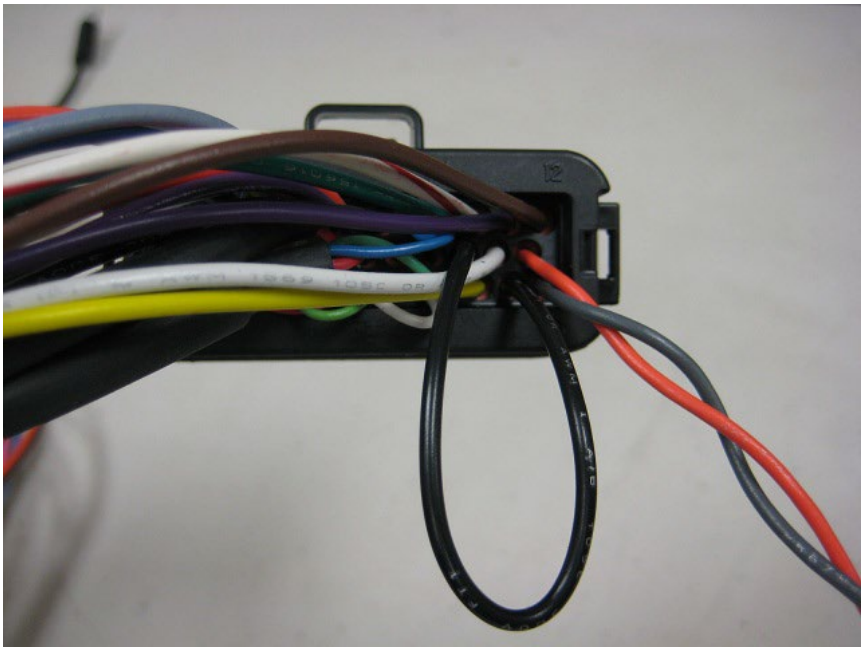


Fig. 34

10. Reset the red plastic pin capture by pressing this piece back in place. After resetting the red plastic pin capture back into place, look at the plug from the front side and make sure that all of the pins are visible and NOT recessed. If any pins look recessed,

perform the task of releasing the red capture piece as mentioned earlier in previous steps. (Fig. 35)

Fig. 35

11. Plug the 35-Pin AMPSEAL plug back into the controller.
12. Take the connector end of the CANBUS wiring that was installed into the 35-pin AMPSEAL plug and plug it into the CANBUS connector from the battery pack. Also, the blue wire from the battery pack needs to be spliced into the blue wire from Pin #1 coming from the controller. (Fig. 36)

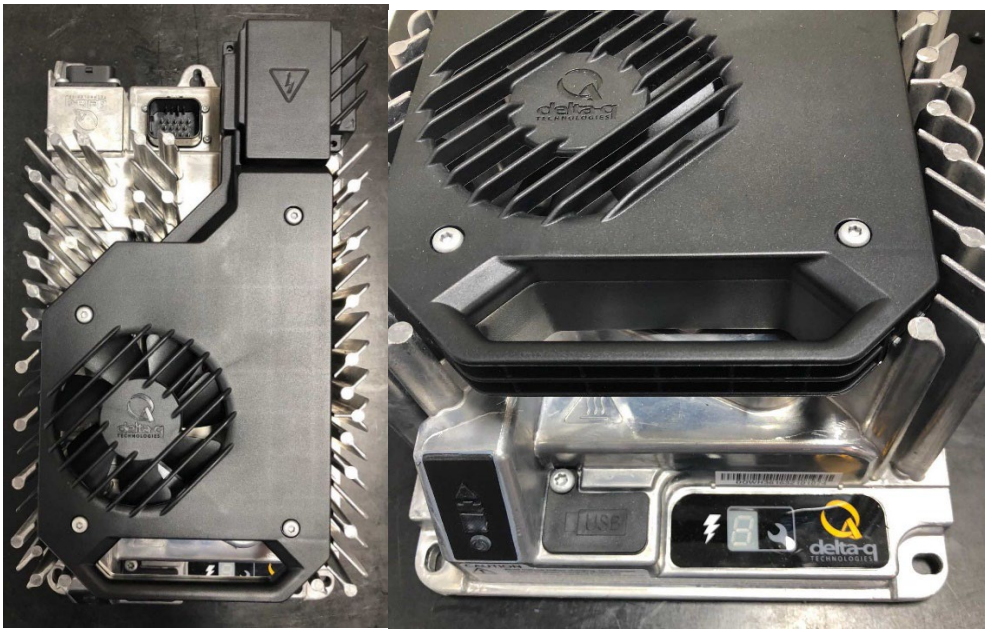
Fig. 36

NORMAL OPERATION WHILE CHARGING BATTERY PACK

The following information depicts what the user will see during operation of the Orion BMS and Delta-Q charger.

Items Of Interest

Charger



Orion BMS JR

1. With the power cord plugged in to the delta-q charger, the OrionJr. BMS will be powered as well. If the BMS is functional without any errors, the status indicator light will illuminate green. (Fig. 37)

Fig. 37

2. When the delta-q charger is powered and charging the lightning bolt that is located next to the LCD display on the charger will be illuminated. Note that the blue power indicator light is illuminated as well when the charger is plugged into source power When the batteries have been fully charged, the lightning bolt will no longer be illuminated. (Fig. 38)

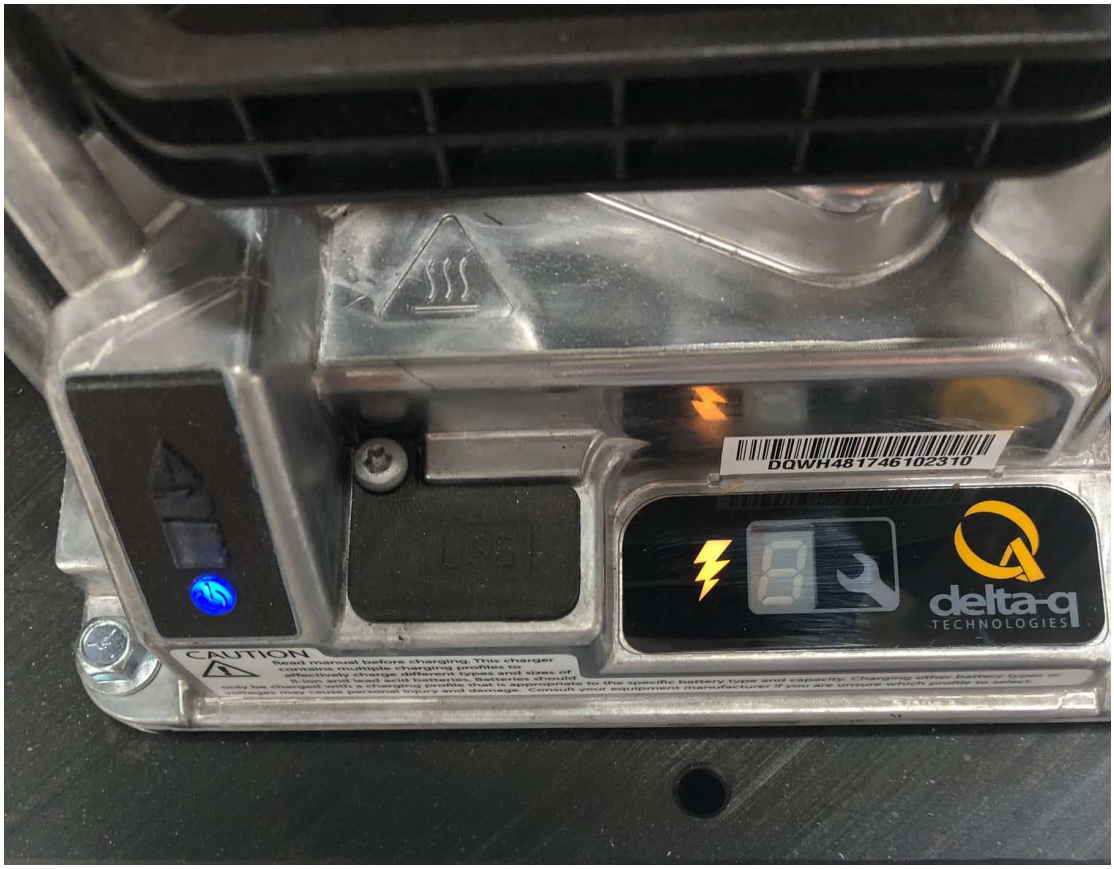
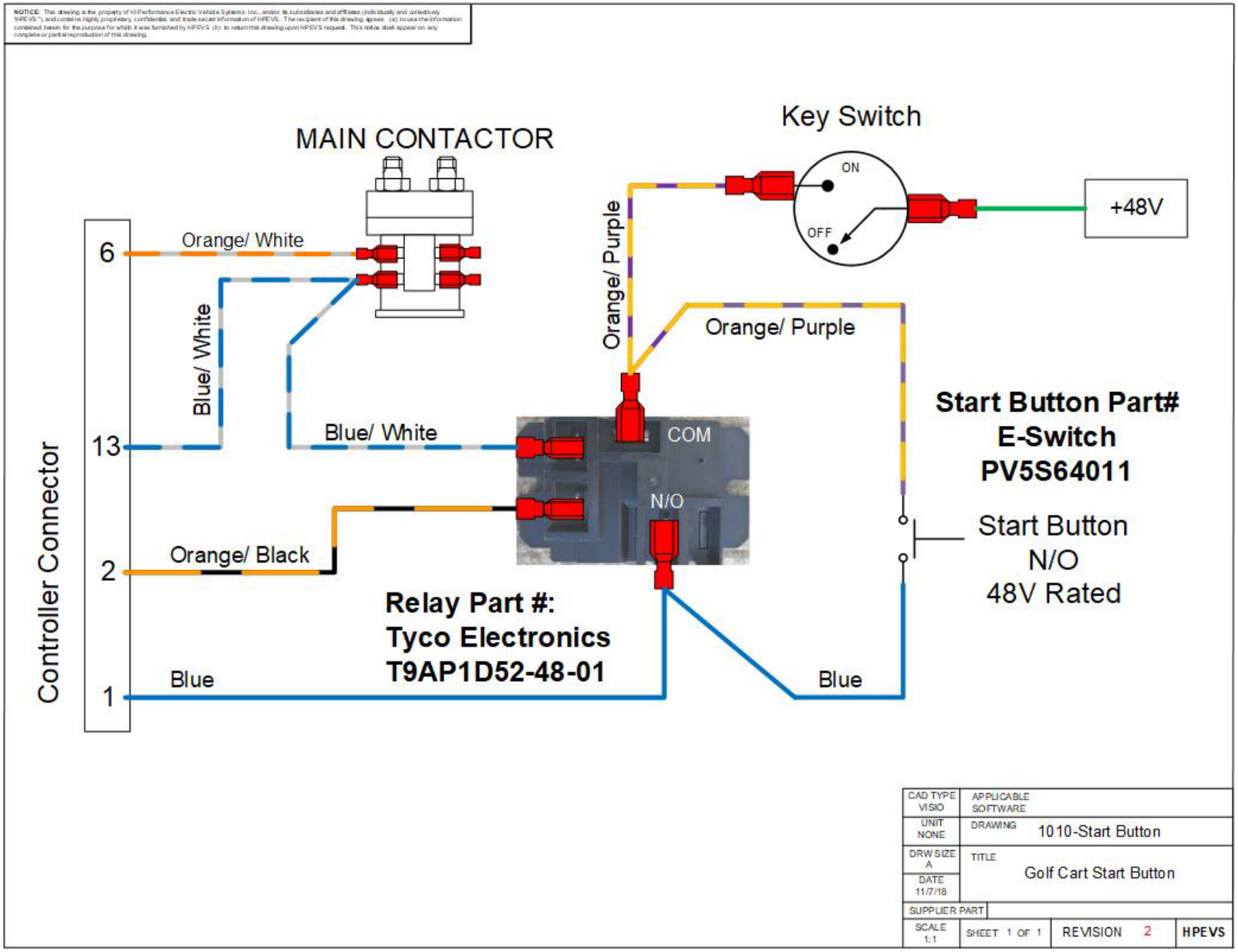


Fig. 38

3. When the plug that is used to charge the batteries has been disconnected from the vehicle, the LCD will flash the code “E030”. Note that this error code is normal in the operation of shutting down the charger. Also, the blue indicator power light will be turned off as well.

GOLF CAR START BUTTON

SCHEMATIC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MAIN CONTACTOR
Key Switch
ON
OFF
+48V
Orange/ Purple
Orange/ Purple
Orange/ White
Blue/ White
Blue/ White
Controller Connector
6
13
2
1
COM
N/O
Orange/ Black
Blue
Blue
Start Button Part#
E-Switch
PV5S64011
Start Button
N/O
48V Rated
Relay Part #:
Tyco Electronics
T9AP1D52-48-01
CAD TYPE VISIO
APPLICABLE SOFTWARE
UNIT NONE
DRAWING 1010-Start Button
DRW SIZE A
TITLE Golf Cart Start Button
DATE 11/7/18
SUPPLIER PART
SCALE 1:1
SHEET 1 OF 1
REVISION 2
HPEVS

THEORY OF OPERATION

Scope: The following steps gives the end user instruction on the process and functionality of how to start a golf car that is utilizing a start button system. A HPEVS drive system is needed for the functionality of this process.

Functionality: Utilizing the start button to start the golf car is designed to protect the batteries. Once the car is started and running, the vehicle will remain on. If the vehicle has not been driven for 30 minutes, the controller is programmed to shutdown the vehicle and all power so that battery power is not being used. To restart the vehicle, simply depress the start button again to restart the drive system.

(DISCLAIMER: ALTHOUGH THIS PROCESS IS DESIGNED TO SHUTDOWN THE DRIVE SYSTEM TO PROTECT THE BATTERIES FROM BEING FULLY DEPLETED, THE IGINITION KEY SHOULD ALWAYS BE USED TO SHUTDOWN THE DRIVE SYSTEM).

1. To start the golf car, first, turn on the ignition key.
2. Depress and hold the start button for two seconds.
3. The drive system will energize and the car will drive as normal.
4. If the car has not been driven for thirty (30) minutes, the controller will shut the drive system down.
5. If the drive system has shutdown and the ignition key has not been cycled off, simply depress the start button once more and the vehicle is ready to drive.